Enabling Connectivity for the Industrial Internet of Things

• Edge Connectivity  • Industrial Computing  • Network Infrastructure
Moxa: Your Trusted Partner in Automation

As the Industrial Internet of Things (IoT) interconnects our world faster than ever, we rely more than ever on network infrastructures. Since its establishment in 1987, Moxa has had a proven track record of providing customers with the most reliable networks for a variety of industrial applications.

With over 25 years of industry experience, Moxa has connected more than 40 million devices worldwide. These devices have delivered highly reliable communications between people, systems, and processes to achieve all forms of automation and collaboration.

Promise for the Future

**Reliable Networks, Sincere Service** continues to be Moxa’s promise to enable connectivity for the Industrial IoT. Moxa stays ahead of the curve with innovative Ethernet-core technology and solutions to help customers tap into the potential of the Industrial IoT market.

**Reliable Networks**

Network reliability is the cornerstone of Moxa’s commitment to deliver the best value to our customers and partners. Moxa’s many solutions share a common set of robust features designed to provide maximum network uptime, especially in harsh environments.

Our cutting-edge product portfolio comprises quality and innovative technology to ensure nonstop productivity, operational efficiency, and robust security for complex industrial communications and automation applications.

**Sincere Service**

At Moxa, we listen carefully to learn more about our customers’ expectations and needs before we develop a solution. With extensive experience and innovative technology, we provide premium customization, expert network consulting, and a broad range of technical support services. Through close collaboration with our worldwide partners, we help customers optimize their applications’ performance, adapt to fast-changing technologies, and seize opportunities to achieve the best time-to-market results.
Product Offerings

Edge Connectivity
Moxa’s edge connectivity products bridge various industrial devices to streamline the acquisition and transmission of data, voice, and video to backbone networks. Customers can enjoy seamless network integration for various cross-system collaborations.

- Serial connectivity
- Industrial Ethernet gateways
- RTU controllers and smart I/O devices
- Industrial IP cameras and video management software

Industrial Computing
Moxa provides RISC- and x86-based industrial computers to work in the most demanding conditions. The world’s first wide-temperature-range 4G LTE computer is a perfect example of a device that delivers reliable 4G performance without requiring a fan or a heater.

- Mission-critical computers
- Displays and panel computers
- Compact and wireless computers
- Embedded CPU modules

Network Infrastructure
Moxa’s network infrastructure solutions provide comprehensive building blocks to develop robust wired and wireless backbones for mission-critical applications with regard to device reliability, connection availability, cybersecurity, and easy management.

- Industrial Ethernet switches
- Industrial wireless AP/bridge/client and cellular routers
- Industrial secure routers
- Ethernet media converters
- Network management software
Get Connected to Success and Opportunity

Worldwide, Moxa’s expert sales team is ready to provide the best quality, support, and services to assist you in all aspects of your projects—from concept to completion—to empower your network operations and applications.

Global Service Coverage

Customer-Oriented Service
Moxa has established a global service network to be closer to our customers to better understand their needs and respond faster to their requirements. Leveraging Moxa’s industrial experiences and technological intelligence, our service team provides professional solutions and consulting services, backed by our extensive global resources and solution capabilities.

Extended Teamwork
Through our annual MTSC (Moxa Technical Support Certification) training, Moxa provides the most up-to-date solutions and technologies to our global partners to ensure the best service to customers. Integrating the strengths of our worldwide industry and technology partners, we deliver sincere service and an extended range of innovative solutions to customers.

Total Quality Management
Our commitment to quality is at the heart of Moxa’s promise of Reliable Networks, Sincere Service. Moxa employs a corporate-wide Total Quality Management System (TQMS) to achieve customer satisfaction and unbeatable results in the following categories:

- Robust Technology
  At Moxa, quality starts with concepts that benefit our partners and customers. Moxa attracts a broad spectrum of talent and encourages new ideas to nurture innovation at every level. Following the well-defined New Product Development Process (NPDP), all of Moxa’s products must undergo strict tests, verifications, and validations to achieve tangible quality-related benchmarks for various industrial applications.

- Project Life-Cycle Management
  Moxa is IRIS-certified and implements a rigorous management process to ensure quality and optimal results for long-term projects. Specific RAMS and LCC management guidelines guarantee reliability, longevity, low life-cycle costs, and easy maintenance throughout a project’s lifetime.

- Continuous Improvement
  Moxa motivates each employee to work smarter and find ways for continuous improvement. Our Quality Improvement Team (QIT) and Eight Disciplines Problem-Solving (8D) methodology for solving problems and preventing crises promote continuous progress in the quality of our products, service, and technology, to ensure customer satisfaction.
Technological Innovation

Moxa cultivates continuous technological innovation to meet the constantly changing requirements of industrial environments. To enable the most capable and reliable connectivity required for the Industrial IoT, Moxa strives to achieve application-driven innovations in the following aspects.

- **Performance**
  High-speed wired/wireless connectivity for future-proof networks

- **Reliability**
  Proven reliability for continuous productivity

- **Availability**
  Millisecond-level redundancy for nonstop operations

- **Security**
  Industrial cybersecurity for critical device protection and secure remote access

- **Manageability**
  Easy operations in deployment, monitoring, and diagnostics maintenance

- **Interoperability**
  Leading legacy and versatile fieldbus technologies for seamless automation communication
# Product Portfolio

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Enabling Connectivity for the Industrial Internet of Things

Moxa’s industrial network and automation solutions are ready to take connectivity to new frontiers. With a forecast of more than 50 billion devices connected worldwide by 2020, Moxa focuses on connectivity enablement to expand communication and collaboration between various devices, technologies, and people.

**Powering Productivity**
Our cutting-edge product portfolio delivers superior performance thanks to high bandwidth, reliability, availability, and interoperability in mixed-protocol and legacy environments.
- High-speed transmission
- Maximum uptime and availability
- Video always-on networking
- Reliable mobile communications
- Industry-proven reliability
- Legacy compatibility
- Protocol interoperability

**Optimizing Operational Efficiency**
Moxa’s extensive software solutions are the key to operational efficiency, including intuitive management software for operations that are faster and less error-prone, as well as an API platform for faster development and ease-of-use.
- Faster deployment
- Visualized management
- Easier troubleshooting
- Preventive maintenance
- APIs for easy application deployment
- Seamless integration with SCADA systems

**Strengthening Security**
A convergence of cybersecurity and physical security systems forge a reinforced network to ensure the full protection of control systems and staff safety in industrial applications.
- Device security with authentication, integrity, and firewall protection
- Secure remote access with IPSec, L2TP, or OpenVPN encryption
- IEC 62443 standard compliance (Available in Q4, 2016)
- Industrial-grade IP surveillance systems

**Factory Automation**
Moxa’s factory automation solutions are designed to drive productivity and cost reduction through network convergence from the edge to the core. The solutions deliver optimized process integration and automation-friendly management to improve throughput and performance.
Moxa’s ITS solutions combine high-bandwidth networks and HD IP video solutions to ensure fast information convergence and nonstop operational continuity, allowing traffic control managers to make decisions quickly in the event of road traffic emergencies.

Moxa’s oil and gas automation solutions comply with UL Class 1 Division 2, ATEX Zone 2, and IECEx standards, allowing customers to achieve maximum uptime and improved productivity with our oil and gas networking, monitoring, and computing solution portfolio.

Moxa’s marine solutions, compliant with all major maritime certifications, offer a wide range of marine-grade industrial Ethernet and computer products that ensure long-lasting and reliable operations in the challenging environments experienced by ship, offshore oil and gas, and windmill applications.

Moxa’s railway solutions come with the top-notch service, quality, and commitment that industrial customers demand. Moxa’s railway solutions deliver EN 50155-compliant control and communications between train, ground, and trackside to ensure safety and uninterrupted passenger services.

Embedded computers enable seamless data aggregation, analytics, and reporting from the extreme edge to the cloud/core.

Industrial Ethernet and WLAN solutions offer leading performance, availability, and reliability to achieve maximum uptime and efficiency for wired and wireless connectivity.

Industrial secure and cellular routers enable asset protection and secure access across public networks.

IA-friendly device management and network management address easy deployment, supervision, troubleshooting, and seamless collaboration with SCADA and third-party platforms.
Enhanced Efficiency, Productivity, and Competitiveness
Integrated IP Solutions for Smarter Railways

IRIS-Certified Rail Solutions
Verified for Maximum Quality

Moxa is an IRIS-certified global leader in a wide range of IP-based communications solutions. Now, Moxa is contributing its networking expertise to the railway industry through membership in IEC railway committees. Railway operators world-wide have discovered new operational efficiencies by deploying Moxa’s unique time and cost-saving railway technologies. By designing for a long MTBF, owning all the core component IPs, and building long-term partnerships, Moxa helps railway integrators create sustainable solutions with low life-cycle costs for passenger comfort and railway operation networks.

Application Focus
• Passenger-oriented service (e.g., onboard Wi-Fi, passenger information systems)
• Railway CCTV
• CBTC (Communication-Based Train Control)
• Wayside data communications systems

Leading Technologies
• Turbo Ring and Turbo Chain: Advanced Ethernet redundancy solutions
• Turbo Roaming: Fast and secure train-to-ground wireless communications
• ACC: Intelligent wireless inter-carriage links
• FLI: Flexible, location-based, intelligent industrial-grade auto-configuration technology

Visit www.moxa.com/rail
Many Successful Deployments in Power Projects Worldwide

Create rock-solid and future-proof power networks by partnering with Moxa. Moxa is a Collective Member of CIGRE and has delivered solutions in over 500 successful substation transmission and distribution networking and computing applications around the world. Moxa is now the leading solar energy monitoring supplier in North America with many diverse projects in advanced metering infrastructures worldwide. You can rely on our expertise of more than 25 years in proven solutions in the following industry applications.

Application Focus
- Solar power
- Wind power
- IEC 61850 transmission and distribution substation
- Advanced metering infrastructure

Leading Technologies
- Industry's first IEC 61850 switch with MMS data modeling: SNMP/MMS management with integrated network monitoring solutions for power substation SCADA
- Industry's first integrated PRP/HSR redundancy box for zero recovery time
- Turbo Chain: Different redundant networks can be extended without any ring coupling effort
- Patented computing platform for heat dissipation with wide temperature tolerance
- ThingsPro: Asset management for solar energy monitoring

Visit www.moxa.com/SmartGrid
Proven Solutions for the Harshest Oil & Gas Environments
Integrated Networking, Monitoring, and Computing Systems

Your Trusted Partner in Oil & Gas Automation

Moxa is a leading provider of industrial automation solutions and has proven experience in providing networking equipment and service suitable for the harshest oil & gas environments. Moxa’s industrial-grade products and well respected technology enable efficient remote monitoring and easy asset management, delivering business value to customers all over the world. To assure the highest level of safety, the computing, networking, and automation products Moxa develops especially for use in oil & gas facilities meet important global certifications, including ATEX Zone 2, Class 1 Division 2, and IECEX.

Application Focus
- Offshore oil drilling control systems
- Onshore drilling / wellhead monitoring
- Pump stations and pipeline monitoring
- Oil refining and gas station operations

Leading Technologies
- Turbo Ring and Turbo Chain: Unrivaled network redundancy solutions with 20 ms recovery
- Dual-Radio and Turbo Roaming: Zero packet loss and millisecond-level wireless roaming
- ISA99/IEC 62443 compliant for industrial security: Layered cybersecurity solution with innovative PacketGuard™ for Modbus TCP deep packet inspection
- World-leading panel computer design: 1000-nit LCD, glove-friendly multi-touch, system bootup within 3 minutes, -40 to 70°C operating temperature without heater
- MXview, MXview ToGo, QuickLink, MX-AOPC UA Server: Efficient network management by smart visualization, automated configuration, and seamless integration with SCADA systems

Visit www.moxa.com/Solutions/Oil_and_gas
Successful Deployment of Integrated Marine Bridge Solutions Worldwide

Moxa provides maritime professionals with industrial-grade marine computers, panel PCs, displays, and Ethernet switches that use leading technologies and reliable designs perfect for applications on docks, marine bridges, open decks, and in control rooms.

Moxa's marine solutions pass strict tests and follow critical industrial standards to ensure compliance with international marine standards, including DNV, ABS, GL, LR, IEC 60945, IEC 61174, IEC 61162, and IACS E10, making Moxa's marine solutions the best option for marine applications.

Application Focus

- Electronic Chart Display and Information System (ECDIS)
- Radar System
- Integrated Navigation System (INS)
- Integrated Platform Management System (IPMS)

Leading Technologies

- Advanced ECDIS color calibration technology: more consistent color rendering for a longer period of use
- Customer initiated smart OSD design: Off-Screen-Display control allows users to easily control the monitor in low light environments
- High performance computing power in a fanless design enhances computers’ reliability and reduces customers’ maintenance costs

Visit www.moxa.com/marine
Maximize Your Factory Potential
With Reliability, Ease of Integration, and Global Support

Your Trusted Partner for Factory Automation
To help manufacturers maximize the benefits of integrating network and automation technology, Moxa has focused on the factory automation market for over 26 years. Moxa provides leading solutions for industrial communications, including wired and wireless infrastructures, industrial computing, remote monitoring, and video surveillance.

Application Focus
- SCADA
- Control system networks
- Wireless infrastructures and machine-to-machine communication
- Packaging equipment
- Cybersecurity
- Industrial video surveillance
- Material handling

Main Benefits
Reliability
- Industry leading communication redundancy for < 20 ms recovery time
- Unique thermal design that supports fanless wide temperature operation (-40 to 75°C)
- High level EMI/EMC shielding
- Redundant power supply with isolation protection
- Continual improvement of total quality management
- ISO 9001 quality management standard recognized

Ease of Integration
- User-friendly network and device management software
- Serial, Ethernet, I/O, and wireless solutions integrated into a single network
- Quick mass configuration tool for 90% time savings (with up to 100 switches)
- OPC server for cost-effective SCADA integration

Global Support
- Access to products and support in over 70 countries
- Customization service

Vertical Market Solutions

- VPort Series
  Industrial IP Cameras
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- EDS Series
  Industrial Ethernet Switches
  ➤ Page 1-27
- MGATE Series
  Industrial Ethernet Gateways
  ➤ Page 4-1
- NPort Series
  Serial-to-Ethernet Device Servers
  ➤ Page 10-1
- ioLogik 2500-WL1 Series
  Smart Wireless I/O
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- EDR-810 Series
  Industrial 8+2G Multiport Secure Routers
  ➤ Page 5-7
- AWK-A Series
  Industrial Wireless AP/Bridge/Client
  ➤ Page 6-6
Real-Time Convergence for Non-Stop Safety

Today more than ever before, roadway safety and efficiency depend on real-time information and communication. To increase traffic flow, reduce congestion, and improve incident response times, Moxa's industrial Ethernet solutions facilitate real-time convergence of various sensor data, voice, and video by providing high-speed throughputs and a wide range of network devices. All of these devices emphasize extreme reliability, smart redundancy, easy manageability, and a lower total cost of ownership.

Application Focus
• Advanced Transportation Management Systems
• Tunnels
• Intelligent E-Bus
• Electronic Toll Collection (ETC)

Leading Technologies
High Bandwidth
• 1GbE/10GbE switching and routing
• Up to 500 Mbps router throughput
• Up to 300 Mbps wireless transmission
• Up to 150 Mbps VPN traffic

Extreme Reliability
• Turbo Ring and Turbo Chain self-recovery (< 20 ms @ 250 switches)
• V-ON network redundancy under 50 ms for mission-critical IP surveillance
• Turbo Roaming with millisecond-level handoff times for seamless mobility

Efficient Management
• MXstudio network management suite for installation, operation, maintenance, and diagnostics
• OnCell Central Manager for remote cellular device management
• IP surveillance software solutions for easy SCADA surveillance

Visit www.moxa.com/ITS
Ready-to-Run Rcore Software Platform

Empower Your Competitiveness with Faster Time-to-Market

Take advantage of Moxa's Rcore platform to increase your competitiveness and ensure a faster time-to-market. The Rcore platform provides the following hard-to-beat benefits:

- Easy-to-use application libraries
- Proven and bug-free sample code
- Consulting-level advice for application development
- Fast concept validation and development cycle

: BIOS and Boot Loader

Moxa provides full-featured BIOS and boot loader solutions for both x86-based and RISC-based systems. The wide range of options and extensions provide an answer to any potential need. Key features include:

**BIOS**
- Power failure recovery
- LVDS innovation: various resolutions supported (up to 64 options)
- Dynamic throttling technology
- Remote system wake-up
- Remote LAN boot
- Wide compatibility with peripheral devices
- Secure software protocols
- Fast boot
- BIOS code customization and consulting
- Secure pen drive boot

**Boot Loader**
- External disk boot option
- MDM remote management tool to remotely update firmware or for system recovery
- Fast boot
- Boot loader customization and consulting

: Operating Systems

Moxa’s x86 and RISC-based embedded computers offer a powerful computing environment and stable system for a variety of industrial applications. These computers use either a Linux or Windows embedded operating system to provide programmers around the world with a user-friendly environment for application development, and help reduce the effort required for system integration. Moxa is continually on the lookout for real-time operating systems that are suitable for mission-critical applications.
Middleware

Moxa offers a variety of middleware to help you easily integrate these application modules into your system. This is essential for leveraging the key features of these modules and reducing the effort required for application development.

VPN

The VPN (OpenVPN, L2TP, and IPSec) middleware makes it easy for user applications to create secure tunnels between communication parties.

Firewall

The firewall (iptables) middleware protects enterprise information from unfriendly access.

Database

The database system (MySQL and MSSQL) middleware can be used to manage field-data acquisition, with web services (Web, PHP, ASP) included to give programmers an integration framework for building Internet accessible field applications, such as WebSCADA.

Sample Code

To reduce customers’ development cost, Moxa provides sample code for a wide range of embedded applications, including serial-to-Ethernet (S2E), serial-to-serial (S2S), and Modbus TCP and RTU. The high-level sample code and application libraries hide the details of implementing complex data communication by presenting relatively simple function prototypes for user applications. In addition, low-level libraries that manage direct access to peripheral I/O devices, such as LCM, keypad, digital I/O signals, and watchdog functions, are also included. With ready access to such a rich assortment of embedded applications, programmers obtain much greater flexibility than would otherwise be possible. These libraries help programmers quickly grasp the full functionality of their applications, and in this way gain the confidence needed to complete their project, speeding up product development and ensuring that code is efficient and bug-free.

To download Sample Code, visit the following link:

http://rcorecommunity.moxa.com/samplecodedownload
ThingsPro Suite, which is built on an open Debian Linux platform, enables the integration of fieldbus communications, computing, data acquisition, and wireless networking in a few simple steps. Featuring a Data Logger and Wireless Manager tools, ThingsPro Suite empowers users to focus primarily on their applications instead of the complex integration between things in the field and services in a central computing facility.

Data Acquisition Flow from Edge to Core

Features and Benefits

- Ready-to-run Modbus RTU and Modbus/TCP polling engine; Modbus knowledge not required.
- Modbus tag API to interface with user applications if data computing is required, providing greater programming flexibility.
- Ready-to-run data-logging software supported to interface with a remote database, making data acquisition easier.

ThingsPro Data Logger

A programmable Modbus data logger to enable your industrial IoT applications:

Features and Benefits

- Ready-to-run Modbus RTU and Modbus/TCP polling engine; Modbus knowledge not required.
- Modbus tag API to interface with user applications if data computing is required, providing greater programming flexibility.
- Ready-to-run data-logging software supported to interface with a remote database, making data acquisition easier.

ThingsPro Wireless Manager

A communication-ready programmable platform to enable your industrial IoT applications:

Features and Benefits

- Modbus-protocol-ready for easy interfacing with Modbus devices
- 4G-communication-ready to ensure that your 4G connection is always active
- Network-system-log-ready for easy 4G and network troubleshooting
- VPN-ready for easy setup of remote VPN tunnels from a central server
- Ethernet/serial-to-cellular routing to connect all peripherals to the 4G network
### Power Computers

#### Product Selection Guide

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<td>DA-683 Series: x86 ready-to-run embedded computers with Intel Atom DS10, DVI-I, 6 LANs, 2 serial ports, 4 DIs, 4 DOs, 4 USB 2.0 ports, CompactFlash, 2 peripheral expansion slots</td>
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Power Computers

Power Computers > Product Selection Guide

Power Computers

Operating Temperature
- DA-820-C8: -40 to 60°C (-40 to 140°F)
- DA-820-C7: -40 to 75°C (-40 to 167°F)
- DA-681A Series: -40 to 85°C (-40 to 185°F)
- DA-682A Series: -20 to 80°C (-4 to 176°F)
- DA-683 Series: -20 to 80°C (-4 to 176°F)

Dimensions
- DA-820 Series: 361 x 440 x 133 mm (14.23 x 17.32 x 5.24 in)
- DA-821 Series: 361 x 440 x 133 mm (14.23 x 17.32 x 5.24 in)
- DA-681A Series: 315 x 440 x 90 mm (12.40 x 17.32 x 3.54 in)
- DA-682A Series: 315 x 440 x 90 mm (12.40 x 17.32 x 3.54 in)
- DA-683 Series: 315 x 440 x 90 mm (12.40 x 17.32 x 3.54 in)

Storage Expansion
- DA-820 Series: 4 SATA 2.0 interfaces, supporting RAID 0, 1, 5, 10, hot-swappable
- DA-821 Series: 2 x SATA-300 connector
- DA-681A Series: SATA 3.0 interface
- DA-682A Series: SATA 3.0 interface
- DA-683 Series: SATA 3.0 interface

Display
- Graphics Controller
  - DA-820 Series: Intel® HD Graphics 4000
  - DA-682A Series: Intel® GMA3150 graphics controller in Intel D510 card

- Resolution
  - DA-820 Series: CRT display mode with pixel resolution up to 2548 x 1536 at 75 Hz
  - DA-682A Series: CRT display mode with pixel resolution up to 2048 x 1536 @ 75 Hz

Ethernet Interface
- LAN: 10/100/1000 Mbps ports x 4

Serial Interface
- Serial Standards: 2 RS-232/422/485 ports (DB9 male)

Digital Input/Output
- Input/Output Channels: 4, sink-type

Power Consumption
- 60 W

Multiple Power Supplies
- Single / Dual power supplies

Power Supplies
- 80 W

Input Voltage
- 30 W (full loading)

Safety
- LVD, UL, cUL
- UL 60950-1, CSA C22.2 No. 60950-1-03, EN 60950-1, CCC (GB4824), GB16954, GB81262.1
- UL 60950-1, IEC 60950-1, EN 60950-1
- UL/cUL (UL 60950-1, CSA C22.2 No. 60950-1-03), LVD (EN 60950-1), CCC (GB4824), IEC 61850-3, IEEE 1613
- IEC 61850-3, IEEE 1613
- IEC 61850-3, IEEE 1613
- IEC 61850-3, IEEE 1613
- RoHS, CHoHS, WEEE

Warranty
- 3 years

Details
- See www.moxa.com/warranty

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www.moxa.com
### Power Computers

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<tr>
<td>System Memory</td>
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<td>2 GB capacity, 1 GB pre-installed; 1 slot of DDR2-533/667/200-pin SO-DIMM SDRAM</td>
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<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Storage</td>
<td>2 GB (LX and XPE) / 8 GB (W7E) industrial DOM onboard to store OS</td>
<td>2 GB industrial DOM onboard to store OS</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Storage Expansion</td>
<td>CompactFlash socket</td>
<td>CompactFlash socket</td>
<td>–</td>
<td>1 GB SD or 2 GB MicroSD card pre-installed</td>
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<td>Other Peripherals</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>KB/MS</td>
<td>1 PS/2 interface, supports standard PS/2 keyboard and mouse through Y-type cable</td>
<td>1 PS/2 interface, supports standard PS/2 keyboard and PS/2 mouse</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Graphics Controller</td>
<td>nVIA nVIA100 integrated graphics media accelerator (nVIA X100)</td>
<td>nVIA nVIA100 integrated graphics media accelerator (nVIA X100)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Intel Clear Video Technology</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td>Display Interface</td>
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<td>1 VGA output (DB15 female connector)</td>
<td>–</td>
<td>1 VGA output (DB15 female connector)</td>
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<td>Auto-sensing 10/100/1000 Mbps ports x 4</td>
<td>Auto-sensing 10/100 Mbps ports (RU35) x 2</td>
<td>Auto-sensing 10/100 Mbps ports (RU35) x 2</td>
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<td>Magnetic Isolation Protection</td>
<td>1.5 kV built-in</td>
<td>1.5 kV built-in</td>
<td>1.5 kV built-in</td>
<td>1.5 kV built-in</td>
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<tr>
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<td>2 RS-232 ports (DB9 male)</td>
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<td>RS-232/485 ports, software-selectable (5-pin terminal block connector) x 1 or 2</td>
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<td>8 kV contact, 15 kV Air ESD protection for all signals</td>
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<td>–</td>
<td>–</td>
<td>–</td>
<td>RS-232 (all signals), RJ45 connector</td>
</tr>
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<td>RS-232</td>
<td>TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND</td>
<td>TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND</td>
<td>TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND</td>
<td>TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND</td>
</tr>
<tr>
<td>RS-422</td>
<td>TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND</td>
<td>TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND</td>
<td>TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND</td>
<td>TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND</td>
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<tr>
<td>RS-485-4W</td>
<td>TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND</td>
<td>TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND</td>
<td>TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND</td>
<td>TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND</td>
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<td>RS-485-2W</td>
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<td>Data+, Data-, GND</td>
<td>Data+, Data-, GND</td>
<td>Data+, Data-, GND</td>
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<td>4, sink-type</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<td>Input Voltage/Output Current</td>
<td>0 to 30 VDC max. 200 mA per channel</td>
<td>–</td>
<td>–</td>
<td>–</td>
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<tr>
<td>Physical Characteristics</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Housing</td>
<td>SECC sheet metal (1 mm)</td>
<td>SECC sheet metal (1 mm)</td>
<td>SECC sheet metal (1 mm)</td>
<td>Polycarbonate plastic</td>
</tr>
<tr>
<td>Weight</td>
<td>4 kg (8.8 lb)</td>
<td>14 kg (31.1 lb)</td>
<td>4.3 kg (9.5 lb)</td>
<td>22 g (0.50 lb)</td>
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<tr>
<td>Dimensions</td>
<td>315 x 440 x 90 mm (12.40 x 17.32 x 3.54 in) (without rackmount ears)</td>
<td>315 x 440 x 90 mm (12.40 x 17.32 x 3.54 in) (without rackmount ears)</td>
<td>315 x 440 x 90 mm (12.40 x 17.32 x 3.54 in) (without rackmount ears)</td>
<td>315 x 440 x 90 mm (12.40 x 17.32 x 3.54 in) (without rackmount ears)</td>
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<tr>
<td>Operating Temperature</td>
<td>-10 to 55°C (14 to 121°F)</td>
<td>-10 to 55°C (14 to 121°F)</td>
<td>-10 to 60°C (14 to 140°F)</td>
<td>-10 to 60°C (14 to 140°F)</td>
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<tr>
<td>Storage Temperature</td>
<td>-20 to 80°C (-4 to 176°F)</td>
<td>-20 to 80°C (-4 to 176°F)</td>
<td>-20 to 80°C (-4 to 176°F)</td>
<td>-20 to 80°C (-4 to 176°F)</td>
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<tr>
<td>Ambient Relative Humidity</td>
<td>5 to 95% (non-condensing)</td>
<td>5 to 95% (non-condensing)</td>
<td>5 to 95% (non-condensing)</td>
<td>5 to 95% (non-condensing)</td>
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<tr>
<td>Power Requirements</td>
<td>Input Voltage: 100 to 240 VAC, 50/60 Hz, 0.9-0.4 A</td>
<td>Single or dual inputs, 100 to 240 VAC VDC auto-ranging, 47 to 63 Hz, terminal block</td>
<td>100 to 240 VAC auto-ranging, 47 to 63 Hz for AC input</td>
<td>12 to 24 VDC (3-pin terminal block, V+, V-, SG)</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>40 W</td>
<td>60 W</td>
<td>20 W</td>
<td>5.4 W</td>
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#### Standards and Certifications

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<td>UL 60950-1, UL 60950-1, UL 60950-1, UL 60950-1</td>
<td>UL 60950-1, UL 60950-1, UL 60950-1, UL 60950-1</td>
<td>UL 60950-1, UL 60950-1, UL 60950-1, UL 60950-1</td>
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<tr>
<td>EMS</td>
<td>IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11</td>
<td>–</td>
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<tr>
<td>Details</td>
<td>View Moxa’s warranty policy</td>
<td>View Moxa’s warranty policy</td>
<td>View Moxa’s warranty policy</td>
<td>View Moxa’s warranty policy</td>
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<tr>
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The DA-820’s main operating system is based on the Intel quad-core i7-3612QE CPU and QM77 chipset, which supports standard x86, 2 VGA ports, 6 USB port, 4 gigabit LAN ports, and 2 3-in-1 RS-232/422/485 serial ports. The DA-820 is equipped with a 4 SATA disk interface and supports RAID 0/1/5/10 functionality. The DA-820 is specifically designed for substation applications that require precise time synchronization and adherence to the IEC 61850-3 standards. The flexible design makes the DA-820 suitable for local SCADA, environmental monitoring, video surveillance, protocol conversion, and PRP/HSR redundancy applications. In addition, the cybersecurity function makes the DA-820 an ideal solution for secure network communication applications.

The DA-820 complies with the IEC 60255 standards to enable the protection of electrical relays in a smart substation. IEC 60255 is one of the most widely used standards for testing relays and protection equipment, and compliance ensures that the DA-820 will work reliably and seamlessly with IEDs (intelligent electronic devices) as a part of the robust substation automation system.

The housing is a standard 3U, 19-inch wide, rack-mounted rugged enclosure. This robust, rack-mountable design provides the hardened protection needed for industrial environment applications.
### Hardware Specifications

#### Computer

**CPU:**
- DA-820-C7: Intel dual-core i7-3555LE 2.5 GHz processor
- DA-820-C8: Intel quad-core i7-3612QE 2.1 GHz processor

**OS (Optional):**
- 64-bit Debian 7
- 64-bit Windows Embedded Standard 7
- 64-bit Windows 7 Professional for embedded systems

*Note: The OS is optional; you may purchase Windows 7 Embedded Standard 7 or Windows 7 Professional for embedded systems via CTOS, or download Debian 7 from our website.*

**System Chipset:** QM77

**BIOS:** SPI Flash 64 Mbit BIOS, PCI Plug & Play, ACPI function support

**System Memory:** Max. 16 GB capacity (204-pin SO-DIMM x 2, each supporting un-buffered ECC DDR3 memory at 1333 and 1600 MT/s, 8 GB Max.)

**USB:**
- Rear panel: USB 2.0 hosts x 4, Type A connector
- Front panel: USB 2.0 hosts x 2, Type A connector

**Storage**

**Built-in:** CFast socket: Optional Cfast card to store OS

**Storage Expansion:** 4 SATA 2.0 interfaces, supporting RAID 0, 1, 5, 10, hot-swappable

#### Display

**Graphics Controller:** Intel® HD Graphics 4000

**Display Interface:** 2 VGA outputs (DB15 female connector)

**Resolution:** CRT display mode with pixel resolution up to 2048 x 1536 at 75 Hz

#### Ethernet Interface

**LAN:** Auto-sensing 10/100/1000 Mbps ports x 4
- Ethernet 1 to 3: Intel 82574 gigabit Ethernet controller
- Ethernet 4: Intel 82579 gigabit Ethernet controller supporting Intel AMT technology

**Magnetic Isolation Protection:** 1.5 kV built-in

#### Serial Interface

**Serial Standards:** 2 RS-232/422/485 ports (DB9 male)

**Serial Signals**
- RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
- RS-422: TxD+, TxD-, RxD+, RxD-, GND
- RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
- RS-485-2w: Data+, Data-, GND

**LEDs**

**System:** Power, Storage

**Gigabit LAN:** 100M x 4, 1000M x 4

**Serial:** TX/RX

**Programmable:** LED x 8

#### Switches and Buttons

**Power Switch:** on/off (on rear panel)

#### Physical Characteristics

**Housing:** SECC sheet metal (1 mm)

**Weight:** 14 kg (31.11 lb)

**Dimensions:** 361 x 440 x 133 mm (14.23 x 17.32 x 5.24 in) (without rackmount ears)

**Mounting:** Standard 19-inch rackmount

#### Environmental Limits

**Operating Temperature:**
- DA-820-C8: -40 to 60°C (-40 to 140°F)
- DA-820-C7: -40 to 75 °C (-40 to 167°F)

**Storage Temperature:** -40 to 85°C (-40 to 185°F)

**Ambient Relative Humidity:** 5 to 95% (non-condensing)

**Anti-Vibration:** 2 Grms @ IEC-68-2-34, random wave, 5-500 Hz, 1 hr per axis

**Anti-Shock:** 20 g @ IEC-68-2-27, half sine wave, 11 ms

#### Power Requirements

**Input Voltage:**
- High Voltage: 100 to 240 VAC/VDC, 50/60 Hz, 1 A
- Low Voltage: 24 to 110 VDC, 4.7 A

**Multiple Power Supplies:**
- SP: Single power supply
- DP: Dual power supplies

**Power Consumption:** 60 W

#### Standards and Certifications

**Safety:** LVD, UL, cUL

**Electrical Substation:** IEC 61850-3, IEC 60255, IEEE 1613

**Protection Relay:** IEC 60255

**EMC:**
- EN 50082-1/6-4
- CISPR 22, FCC Part 15B Class A

**EMS:**
- IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV
- IEC 61000-4-3 RS: 80 MHz to 1 GHz: 10 V/m
- IEC 61000-4-4 EFT: Power: 4 kV; Signal: 4 kV
- IEC 61000-4-5 Surge: Power 4 kV; Signal 4 kV
- IEC 61000-4-6 CS: Signal: 10 V
- IEC 61000-4-8: 20 A/m
- IEC 61000-4-9: 300 A/m
- IEC 61000-4-11: (AC models only)

**Green Product:** RoHS, CRoHS, WEEE

#### Reliability

**Alert Tools:** Built-in buzzer and RTC (real-time clock) with lithium backup battery

**Automatic Reboot Trigger:** Built-in WDT (watchdog timer) supporting 1-255 level time interval system reset, software programmable
Software Specifications

Linux
OS: 64-bit Linux Debian 7
Web Server (Apache): Allows you to create and manage web sites; supports PHP and XML
File System: EXT 4
Internet Protocol Suite: TCP, UDP, IPv4, SNMPv1/v2c/v3, ICMP, ARP, HTTP, SSH 1.2/0, SSL, DHCP, FTP, TFTP, PPP, PPPoE
Internet Security: OpenVPN, Netfilter/iptables
Secure Shell for Remote Access: SSH allows remote logins to a secure encrypted console from any connected network
Dial-up Networking: PPP Daemon for Linux that allows Unix machines to connect to the Internet through dialup lines, using the PPP protocol, as a PPP server or client. Works with 'chat', 'dip', and 'dial', among (many) others. Supports IP, TCP, UDP, and (for Linux) IPX (Novell).
File Server: Enables remote clients to access files and other resources over the network
Watchdog: A watchdog timer that triggers a system reset upon software freezes, for both specific applications and system-wide failures.
Application Development Software:
• Moxa API Library (Watchdog timer, Moxa serial I/O control)
• GNU C/C++ cross-compiler
• GNU C library
• Perl
Software Package:
• SNMP
• SafeGuard technology

Windows Embedded Standard 7
Core OS:
• 64-bit support
• Remote Client
• Remote Procedure Call
Applications and Services Development:
• .Net Framework 3.5
• Remote Desktop Protocol 7.1
• COM OLE Application Support
• COM+ Application Support
• MSMQ
Internet Services:
• Internet Explorer 8.0
• IIS 7.0
File Systems and Data Storage:
• Windows Data Access Components
• Windows Backup and Restore
Diagnostics:
• Common Diagnostic Tools
• Problem Reports and Solutions
Fonts: Chinese (Trad. and Simp.), Japanese, Korean, Western, Middle Eastern, South East Asian, and South Asian Fonts

MTBF (mean time between failures)
Time:
DA-820-C7-DP-HV-T: 138,503 hrs
DA-820-C7-SP-HV-T: 191,570 hrs
DA-820-C8-DP-HV: 128,077 hrs
DA-820-C8-SP-HV: 172,182 hrs
DA-820-C7-DP-LV-T: 240,015 hrs
DA-820-C7-SP-LV-T: 221,019 hrs
DA-820-C8-DP-LV: 240,015 hrs
DA-820-C8-SP-LV: 221,019 hrs
Standard: Telcordia (Bellcore) Standard TR/SR

Warranty
Warranty Period: 3 years
Details: See www.moxa.com/warranty

Graphics and Multimedia:
• MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
• MPEG Layer-3 Audio Codecs (MP3)
• MPEG4 Decoders
• Windows Media Video VC-1 (WMV) Codecs
• DirectX and Windows Device Experience
• Windows Media Player 12
• Create and Play DVDs
• Photo Viewer
• Remote media streaming
• Windows Media Center
International:
• IME Simplified Chinese Support
• IME Traditional Chinese Support
• IME Japanese Support
• IME Korean Support
Management:
• Group Policy Management
• Windows Management Instrument (WMI)
• Windows Update
Networking:
• Extensible Authentication Protocol (EAP)
• Internet Authentication Service
• Telnet Server
• Bluetooth
• Domain Services
• Network Access Protection
• Network and Sharing Center
• Quality of Service
• Remote Access Service (RAS)
• Telephony API Client
• Windows Firewall
• Wireless Networking
Security:
• Credential Roaming Service
• Credentials and Certificate Management
• Windows Authorization Manager (AZMAN)
• Windows Security Center
• Active Directory Rights Management
• Security Base
• Encrypted File System (EFS)
• MS AntiMalware
• Windows Defender
• Bitlocker Secure Startup
• Applocker
Enterprise Features:
• Enterprise Search Scopes
• BranchCache
• DirectAccess
• Windows XP Mode
Embedded Features:
- Enhanced Write Filter (EWF)
- File-Based Write Filter (FBWF)
- Message Box Default Reply
- Registry Filter
- WSDAPI for .NET

Embedded Self-Health Diagnostics: SNMP-based remote scripting layer for monitoring, reporting, and control

Windows 7 Professional for Embedded Systems

Core OS:
- 64-bit support
- Remote Client
- Remote Procedure Call

Applications and Services Development:
- .Net Framework 3.5
- Remote Desktop Protocol 7.1
- COM OLE Application Support
- COM+ Application Support
- MSMQ

Internet Services:
- Internet Explorer 8.0
- IIS 7.0

File Systems and Data Storage:
- Windows Data Access Components
- Windows Backup and Restore

Diagnostics:
- Common Diagnostic Tools
- Problem Reports and Solutions

Graphics and Multimedia:
- MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
- MPEG Layer-3 Audio Codec (MP3)
- MPEG4 Decoders
- Windows Media Video VC-1 (WMV) Codec
- DirectX and Windows Device Experience

To order a DA-820 system with a pre-installed OS, please contact a Moxa sales representative.

Recommended Configuration

<table>
<thead>
<tr>
<th>Operating System</th>
<th>System Memory</th>
<th>CFast Card</th>
</tr>
</thead>
<tbody>
<tr>
<td>64-bit Linux Debian 7</td>
<td>≥ 2 GB</td>
<td>≥ 2 GB</td>
</tr>
<tr>
<td>Windows Embedded Standard 7</td>
<td>≥ 4 GB</td>
<td>≥ 16 GB</td>
</tr>
</tbody>
</table>

Optional DA-820 Expansion Modules

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA-IRIG-B-S-02-T</td>
<td>IRIG-B expansion module, PCI interface, 1 fiber IRIG-B in, 1 DB9M in/out, 1 DB9M out</td>
</tr>
<tr>
<td>DA-IRIG-B-S-04-T</td>
<td>IRIG-B expansion module, PCI interface, 1 fiber IRIG-B in, 1 DB9M in/out, 3 DB9M out</td>
</tr>
<tr>
<td>DA-PRP-HSR</td>
<td>PRP, HSR expansion module, PCIe interface</td>
</tr>
<tr>
<td>DE-GX02-SFP-T</td>
<td>2-port 1000 Mbps fiber card, SFP slot x 2, PCIe interface (SFP module excluded)</td>
</tr>
<tr>
<td>DE-FX02-SFP-T</td>
<td>2-port 100 Mbps fiber card, SFP slot x 2, PCIe interface (SFP module excluded)</td>
</tr>
</tbody>
</table>

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<td>IRIG-B expansion module, PCI interface, 1 fiber IRIG-B in, 1 DB9M in/out, 3 DB9M out</td>
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</tbody>
</table>
### Optional Accessories

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini DB9F-to-TB</td>
<td>DB9 female to terminal block adapter</td>
<td>For IRIG-B card</td>
</tr>
<tr>
<td>DDR3-THERMAL-KIT-82001</td>
<td>DDR3 SDRAM Thermal Kit</td>
<td>For non-DDR3L SDRAM</td>
</tr>
<tr>
<td>FAN-KIT-82001</td>
<td>Fan kit without lock</td>
<td>Fan Kit for when using a 3rd party high performance graphics accelerator card in the PCIe x 16 slot.</td>
</tr>
<tr>
<td>FAN-KIT-82002</td>
<td>Fan kit with lock</td>
<td>Fan Kit for when using a 3rd party high performance graphics accelerator card in the PCIe x 16 slot.</td>
</tr>
<tr>
<td>HDD-DOOR-LOCK-82001</td>
<td>HDD kit with thermal hole</td>
<td>For heat dissipation</td>
</tr>
</tbody>
</table>

### Expansion Cards

<table>
<thead>
<tr>
<th>Slot</th>
<th>No.</th>
<th>Expansion Card</th>
<th>Application</th>
<th>Moxa Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCIe x 16</td>
<td>1</td>
<td>Video Card</td>
<td>Video surveillance</td>
<td>(purchase from another vendor)</td>
</tr>
<tr>
<td>PCIe x 1</td>
<td>3</td>
<td>PRP/HSR Card</td>
<td>Communication redundancy</td>
<td>DA-PRP-HSR</td>
</tr>
</tbody>
</table>
| PCIe x 1 | 3   | LAN Card/Fiber Card | Data transmission | DE-GX02-SFP-T  
|        |     | RS-232         |                              |              |
|        |     | RS-422         |                              |              |
|        |     | RS-485         |                              |              |
|        |     | CAN            |                              |              |
| PCI    | 2   | IRIG-B         | Time synchronization         | DA-IRIG-B-S-02-T  
|        |     | RS-232         |                              |              |
|        |     | RS-422         |                              |              |
|        |     | RS-485         |                              |              |
|        |     | CAN            |                              |              |
|        |     | HDD-DOOR-LOCK-82001 | HDD kit with thermal hole |              |
DA-682A Series

x86 2U 19-inch rackmount computer with Intel® i7 CPU, 6 gigabit Ethernet ports, 2 PCI expansion slots, fanless design

- 2nd generation Intel core processors (Sandy Bridge)
- Built-in DDR3 SDRAM and industrial DOM
- 6 Gigabit Ethernet ports for network redundancy
- 2 PCI expansion slots for expansion modules
- 1 CompactFlash socket for storage expansion
- 4 high speed, system-bootable USB 2.0 ports
- 19 inch 2U rack-mountable case
- 100/240 VAC power inputs
- Ready-to-Run Linux or Windows Embedded Standard 7 platform
- Fanless design

Overview

The DA-682A series of computers are x86 platforms with VGA, 6 gigabit Ethernet ports, CompactFlash, USB, and two PCI ports for DA Series expansion modules. The DA-682A comes in a standard 19-inch 2U rack-mountable case.

With their robust design, DA-682A computers are specialized for industrial automation applications: power substations, transportation and shipping, and oil and gas production and supply.

The DA-682A runs either Linux or Windows Embedded Standard 7, providing a friendly environment for developing sophisticated application software. Moxa’s ready-to-run software and readily available after-service support makes the programmer’s job easier, helping programmers develop bug-free code quickly and at a lower cost. In addition, the DA-682A also comes with three different CPU options, and basic models that allow system designers to install the DOM, RAM, and operating system according to their specific requirements. This is particularly flexible for building custom industrial solutions.

The DA-682A comes with 2 PCI ports that accept DA series expansion modules. Moxa provides a variety of communication modules for the DA series, including an 8-port RS-232/422/485 module, a 4-port 10/100 Mbps LAN module, and a universal PCI expansion module. This friendly design gives users the advantage of being able to swap out modules quickly and easily, making the DA-682A an ideal solution for a wide array of industrial automation applications.

Appearance

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## Hardware Specifications

**Computer**
- CPU: 2nd generation Intel core processors (Sandy Bridge)
  - Intel Celeron 870E, 1.4 GHz single-core processor
  - Intel Celeron 847E, 1.1 GHz dual-core processor
  - Intel Core i7-2610UE, 1.5 GHz dual-core processor
- OS: Linux or Windows Embedded Standard 7 (pre-installed)
  - Note: The OS is pre-installed.
- System Chipset: Intel HM65
- BIOS: 64 Mbit Flash BIOS, PCI Plug & Play, ACPI
- System Memory: 8 GB capacity, 1 GB (LX) / 2 GB (W7E, 32-bit)
  - pre-installed: 1 slot of 4 GB DDR3-1066/1333 SO-DIMM SDRAM
  - USB: USB 2.0 hosts x 2, system bootable, Type A connector

**Storage**
- Built-in: 2 GB (LX) / 8 GB (W7E, 32-bit) industrial DOM for read-only OS
- Storage Expansion:
  - 1 x CompactFlash socket
  - 2 x SATA-300 connector

**Display**
- Display Memory: Dynamic video memory (shared up to 32 MB of system memory)
- Display Interface: 1 VGA output (DB15 female connector)
- Resolution: CRT display mode with pixel resolution up to 2548 x 1536 at 75 Hz

**Ethernet Interface**
- LAN: Auto-sensing 10/100/1000 Mbps ports x 6

**Magnetic Isolation Protection:** 1.5 kV built-in

**LEDs**
- System: Power, Storage
- LAN: 100/1000M mode
- Programmable: 8 LEDs

**Communication**
- Module A x 16, Module B x 16

**Switches and Buttons**
- Power Button: On/Off (on rear panel)
- Reset Button: Soft reboot (on front panel)

**Physical Characteristics**
- Housing: SECC sheet metal (1 mm)
- Weight: 7 kg (15.56 lb)

**Power Computers**
- **Dimensions:** 440 x 315 x 90 mm (17.32 x 12.40 x 3.54 in) (without rackmount ears)
- **Mounting:** Standard 19-inch rack

### Environmental Limits
- **Operating Temperature:** -10 to 60°C (14 to 140°F)
- **Storage Temperature:** -20 to 80°C (-4 to 176°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-Vibration:** 2 Grms @ IEC-68-2-34, random wave, 5-500 Hz, 1 hr per axis
- **Anti-Shock:** 20 g @ IEC-68-2-27, half sine wave, 11 ms

### Power Requirements
- **Input Voltage:** 100 to 240 VAC auto-ranging (47 to 63 Hz for AC input)
- **Power Consumption:** 30 W (full loading)

### Standards and Certifications
- **Safety:** UL 60950-1, CSA C22.2 No. 60950-1-03, EN 60950-1, CCC (GB4943, GB9934, GB17625.1)
- **EMC:** EN 61000-6-2/6-4
- **EMI:** CISPR 22, FCC Part 15B Class A

### Reliability
- **Alert Tools:** Built-in buzzer and RTC (real-time clock) with battery lithium backup
- **Automatic Reboot Trigger:** Built-in watchdog timer, configurable for restarts at 1 to 255 second intervals
- **MTBF:** (mean time between failures)
- **Time:** 527,124 hrs
- **Standard:** Telcordia (Bellcore) Standard TR/SR

### Warranty
- **Warranty Period:** 3 years
- **Details:** See www.moxa.com/warranty

## Software Specifications

### Linux
- **OS:** Linux Debian 7
- **Web Server (Apache):** Allows you to create and manage web sites; supports PHP and XML
  - File System: EXT2, JFFS2
  - Internet Protocol Suite: TCP, UDP, IPv4, SMNPv1/v2c/v3, ICMP, ARP, HTTP, CHAP, PAP, SSH 1.0/2.0, SSL, DHCP, NTP, NFS, Telnet, FTP, TFTP, PPP, PPTP

**Internet Security:** OpenVPN, iptables firewall

**Secure Shell for Remote Access:** SSH allows remote logins to a secure encrypted console from any connected network

**Dial-up Networking:** PPP Daemon for Linux that allows Unix machines to connect to the Internet through dialup lines, using the Point-to-Point Protocol (PPP). Works with ‘chat’, ‘dip’, and ‘diad’, among (many) others. Supports IP, TCP, UDP, and for Linux) IPX (Novell).

**File Server:** Enables remote clients to access files and other resources over the network

**Watchdog:** A watchdog timer that triggers a system reset upon software freezes, for both specific applications and system-wide failures.

**Application Development Software:**
- Moxa API Library (Watchdog timer, Moxa serial I/O control)
- GNU C/C++ cross-compiler
- GNU C library
- Perl

### Windows Embedded Standard 7
- **Core OS:**
  - Windows 7 Embedded, 32 bit
  - Sensor and Location Platform
  - Remote Procedure Call

**Applications and Services Development:**
- .NET Framework 3.5
- Remote Desktop Protocol 7.1
- COM OLE Application Support
- COM+ Application Support
- MSMQ

**Internet Services:**
- Internet Explorer 8.0
- IIS 7.0

**File Systems and Data Storage:**
- Windows Data Access Components
- Windows Backup and Restore

**Diagnostics:**
- Common Diagnostic Tools
- Problem Reports and Solutions

**Fonts:**
- Chinese (Trad. and Simp.), Middle East, South East Asian, and South Asian Fonts
- True Type Fonts
Graphics and Multimedia:
• MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
• MPEG Layer-3 Audio Codecs (MP3)
• MPEG4 Decoders
• Windows Media Video VC-1 (WMV) Codecs
• DirectX and Windows Device Experience
• Windows Media Player 12

International:
• IME Simplified Chinese Support
• IME Traditional Chinese Support

Management:
• Group Policy Management
• Windows Management Instrument (WMI)
• Windows Update

Networking:
• Extensible Authentication Protocol (EAP)
• Internet Authentication Service
• Telnet Server
• Bluetooth
• Domain Services
• Network Access Protection
• Network and Sharing Center
• Quality of Service
• Remote Access Service (RAS)
• Telephony API Client
• Windows Firewall
• Wireless Networking

Security:
• Credential Roaming Service
• Credentials and Certificate Management
• Windows Authorization Manager (AZMAN)
• Windows Security Center
• Active Directory Rights Management

Embedded Features:
• Security Base
• Encrypted File System (EFS)

Embedded Self-Health Diagnostics: SNMP-based remote scripting layer for monitoring, reporting, and control

Available Models
DA-682A-C0: Rackmount computer with Celeron 827E, 1.4 GHz, single-core CPU, without DOM/RAM/OS, VGA, 6 gigabit LANs, USB x 4, CompactFlash socket
DA-682A-C0-LX: Rackmount computer with Celeron 827E, 1.4 GHz, single-core CPU, VGA, 6 gigabit LANs, USB x 4, CompactFlash socket, 1 GB system memory, 2 GB Linux Debian 7 pre-installed DOM
DA-682A-C0-W7E: Rackmount computer with Celeron 827E, 1.4 GHz, single-core CPU, VGA, 6 gigabit LANs, USB x 4, CompactFlash socket, 2 GB system memory, 8 GB Windows Embedded Standard 7 pre-installed DOM
DA-682A-C1: Rackmount computer with Celeron 847E, 1.1 GHz, dual-core CPU, without DOM/RAM/OS, VGA, 6 gigabit LANs, USB x 4, CompactFlash socket
DA-682A-C1-LX: Rackmount computer with Celeron 847E, 1.1 GHz, dual-core CPU, VGA, 6 gigabit LANs, USB x 4, CompactFlash socket, 1 GB system memory, 2 GB Linux Debian 7 pre-installed DOM
DA-682A-C1-W7E: Rackmount computer with Celeron 847E, 1.1 GHz, dual-core CPU, VGA, 6 gigabit LANs, USB x 4, CompactFlash socket, 2 GB system memory, 8 GB Windows Embedded Standard 7 pre-installed DOM
DA-682A-C7: Rackmount computer with Core i7-2610UE 1.5 GHz, dual-core CPU, without DOM/RAM/OS, VGA, 6 gigabit LANs, USB x 4, CompactFlash socket
DA-682A-C7-LX: Rackmount computer with Core i7-2610UE 1.5 GHz, dual-core CPU, VGA, 6 gigabit LANs, USB x 4, CompactFlash socket, 1 GB system memory, 2 GB Linux Debian 7 pre-installed DOM
DA-682A-C7-W7E: Rackmount computer with Core i7-2610UE 1.5 GHz, dual-core CPU, VGA, 6 gigabit LANs, USB x 4, CompactFlash socket, 2 GB system memory, 8 GB Windows Embedded Standard 7 pre-installed DOM

Expansion Modules (can be purchased separately)
DA-SP08-I-EMC4-DB: 8-port RS-232/422/485 serial module with DB9 connector and isolation; suitable for EMC Level 4 environments
DA-SP08-I-EMC4-TB: 8-port RS-232/422/485 serial module with terminal block connector and isolation; suitable for EMC Level 4 environments
DA-SP08-I-DB: 8-port RS-232/422/485 serial module with a digitally isolated DB9 connector
DA-SP08-DB: 8-port RS-232/422/485 serial module with DB9 connector
DA-SP38-I-TB: 8-port RS-422/485 serial module with digitally isolated terminal block
DA-SP38-DB: 8-port RS-422/485 serial module with DB9 connector

Optional Accessories
DA-682A HDD Kit: Hard disk installation package

Dimensions
Unit: mm (inch)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>136 (5.36)</td>
</tr>
<tr>
<td>Width</td>
<td>440 (17.32)</td>
</tr>
<tr>
<td>Depth</td>
<td>315 (12.40)</td>
</tr>
</tbody>
</table>
DA-681A Series

x86 1U 19-inch rackmount computers with 3rd Gen Intel® Core™ Celeron 1047UE 1.4GHz CPU, 2 isolated RS-232/422/485 and 10 isolated RS-485 ports, 6 LANs, VGA, mSATA, USB

- IEC 61850-3, IEEE 1613, and IEC 60255 compliant for power substation automation systems (DPP and DPP-T models only)
- 3rd Gen Intel® Core™ Celeron 1047UE 1.4 GHz CPU
- 1 built-in DDR3 memory socket
- 1 mSATA for OS and 1 SATA III for storage expansion
- 6 gigabit Ethernet ports for network redundancy
- 4 USB 2.0 ports for high speed peripherals
- 2 isolated RS-232/422/485 and 10 isolated RS-485 ports
- Embedded Debian 8 Linux (W7E by CTOS)
- Supports both 100 to 240 VAC and VDC power inputs (single power and dual power models available)
- Optional IRIG-B expansion module available on DPP and DPP-T models

Overview

The Moxa DA-681A Series x86-based rackmount embedded computers are designed for control, monitoring, data acquisition, and protocol conversion applications. With its robust design, the DA-681A is suitable for industrial automation applications, such as power automation, transportation, and oil and gas.

The DA-681A’s main operating system is based on the 3rd Gen Intel® Core™ Celeron 1047UE 1.4 GHz CPU and HM65 chipset, which supports standard x86, 1 x VGA, 4 x USB, 6 gigabit LAN ports, 2 RS/232/422/485 3-in-1 serial ports, and 10 RS-485 (RS-422 by CV) ports. The DA-681A has a mini PCIe socket for mSATA and comes with Linux pre-installed; Windows 7 Embedded is also supported by the CTOS (Configuration To Order Service) process.

Another plus is that the serial ports come with 2 kV digital galvanic isolation protection to guarantee communication reliability in harsh industrial environments. In addition, the state-of-art IEC 61850-3, IEEE 1613, and IEC 60255 compliance all-in-one design provides rich interfaces especially well suited for power substation automation applications.

Smart Recovery Function

The DA-681A’s Smart Recovery function makes it easy to troubleshoot system software errors on computers to minimize downtime. Engineers who are experts in a particular vertical market may not have enough computer domain knowledge to know how to fix the operating system problems. Moxa Smart Recovery™ is an automated BIOS-level software recovery system that allows engineers to automatically trigger OS recovery to minimize downtime.

Proactive Monitoring Function

The DA-681A’s Proactive Monitoring function monitors the computer’s health by keeping an eye on CPU usage, memory usage, storage partition usage, the operating temperature of the CPU and motherboard, and the redundant power monitor, and can trigger a relay to provide either visual or audio alarms.
### Hardware Specifications

#### Computer
- **CPU:** 3rd Gen Intel® Core™ Celeron 1047UE 1.4 GHz
- **OS:** Linux Debian 8 (pre-installed)
  - Note: W7E available by CTOS
- **System Chipset:** Intel HM65
- **BIOS:** 64 Mbit Flash BIOS, PCI Plug & Play, ACPI
- **System Memory:** 8 GB capacity, 2 GB for Linux pre-installed; 1 slot of DDR3-1066/1333 SO-DIMM SDRAM
- **Expansion Bus:** PCI/104 onboard (DPP models only)
- **USB:** USB 2.0 hosts x 4, Type A connector, supports system boot up
- **Storage**
  - Built-in: 8 GB for Linux (pre-installed in mSATA)
  - Expansion: SATA 3.0 interface

#### Display
- **Graphics Controller:** Intel® HD Graphics (Integrated)
- **Display Memory:** Dynamic video memory (shares up to 32 MB of system memory)
- **Display Interface:** 1 VGA output (DB15 female connector)
- **Resolution:** CRT display mode with pixel resolution up to 2048 x 1536 at 75 Hz

#### Ethernet Interface
- **LAN:** Auto-sensing 10/100/1000 Mbps ports x 6
- **Magnetic Isolation Protection:** 1.5 kV built-in

#### Serial Interface
- **Serial Standards:**
  - 2 RS-232/422/485 ports (DB9 male)
  - 10 RS-485 ports (terminal block)
- **ESD Protection:** 15 kV for all signals
- **Surge Protection:** 4 kV (DA-681A-I-DPP-T only)
- **Isolation:** 2 kV digital galvanic isolation

#### Serial Communication Parameters
- **Data Bits:** 5, 6, 7, 8
- **Stop Bits:** 1, 1.5, 2
- **Parity:** None, Even, Odd, Space, Mark
- **Flow Control:** RTS/CTS, XON/XOFF
- **Baudrate:** 50 bps to 115.2 kbps

#### Serial Signals
- **RS-232:** Tx0, Rx0, DTR, DSR, RTS, CTS, DCD, GND
- **RS-422:** TxO+, RxO+, RxO-, GND
- **RS-485-4w:** TxO+, RxO+, RxO-, GND
- **RS-485-2w:** Data+, Data-, GND

#### LEDs
- **System:** Power, Storage
- **LAN:** 100M x 6, 1000M x 6
- **Serial:**
  - RS-232/422/485: 2 x Tx, 2 x Rx
  - RS-485: 10 x Tx, 10 x Rx
- **Programmable:** 6 LEDs

#### Physical Characteristics
- **Housing:** SECC sheet metal (1 mm)
- **Weight:** 4.5 kg (10 lb)
- **Dimensions:** 440 x 315 x 45 mm (17.32 x 12.40 x 1.77 in), 19-inch 1U height
- **Mounting:** Standard 19-inch rackmount
Software Specifications

**Linux**

- **OS:** Linux Debian 8, 64-bit
- **Terminal Server (SSH):** Provides secure encrypted communications between two un-trusted hosts over an insecure network
- **Kernel Version:** GNU/Linux 3.16
- **System Shell:** DASH (default), BASH
- **File System:** EXT2, EXT3, EXT4
- **Internet Protocol Suite:** TCP, UDP, IPv4, IPv6, SNMPv2, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SSH, PPP, SFTP, RSYNC, SSL
- **Programming Language Support:** PHP, Perl, Python
- **Internet Security Suite:** OpenVPN, iptables

**Secure Shell for Remote Access:** SSH allows remote logins to a secure encrypted console from any connected network

**Watchdog:** Features a hardware function to trigger system reset in a user specified time interval (Linux standard API)

**Windows Embedded Standard 7** (by CTOS)

- **Core OS:**
  - Windows 7 Embedded, 32-bit/64-bit
  - Sensor and Location Platform
  - Remote Procedure Call

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**Dimension**

Unit: mm (inch)

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**Environmental Limits**

- **Operating Temperature:**
  - SP Models: -25 to 55°C (-13 to 131°F)
  - DPP Models: -25 to 55°C (-13 to 131°F)
  - DPP-T Models: -40 to 70°C (-40 to 158°F)
- **Storage Temperature:** -40 to 85°C (-40 to 185°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-Vibration:** 7 mm (2-9 Hz), 20 m/s² (9-200 Hz), 15 m/s² (200-500 Hz) @ IEC-61850-3, IEC 60870-2-2/Cm/(3M6)/(4M6), sine wave, 2-500 Hz, 1 Oct/min, 10 cycles, 2 hrs 40 mins per axis
- **Anti-Shock:** 300 m/s² @ IEC-61850-3, IEC 60870-2-2/Cm/(3M6)/(4M6), half sine wave, 11 ms

**Power Requirements**

- **Input Voltage:** 100 to 240 VAC; 100 to 240 VDC
- **Input Current:** 0.80 A @ 100 VAC; 0.41 A @ 100 VDC
- **Power Consumption:** 25 W

**Standards and Certifications**

- **Safety:** UL 60950-1, IEC 60950-1, EN 60950-1
- **Electrical Substation:** IEC 61850-3, IEEE 1613, IEC 60255
- **Protection Relay:** IEC 60255
- **EMC:** EN 61000-6-2/6-4
- **EMS:**
  - IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV
  - IEC 61000-4-3 RS: 80 MHz to 1 GHz: 10 V/m
  - IEC 61000-4-4 EFT: Power: 4 kV; Signal: 4 kV
  - IEC 61000-4-5 Surge: Power: 4 kV; Signal: 4 kV
  - IEC 61000-4-6 CS: 10 V
- **IEC 61000-4-11**
  - For DPP models only:
  - IEC 61000-4-16: 30 V / 300 V
  - IEC 61000-4-17: 10% nominal DC voltage
  - IEC 61000-4-18:
    - 100 kHz: 25k VCM; 1 kV DIM
    - 1 MHz: 2.5 kV CM; 1 kV DM
  - IEC 61000-4-29: 30% reduction, 0.1 sec.

**Green Product:** RoHS, CRoHS, WEEE

**Reliability**

- **Alert Tools:**
  - Built-in buzzer and RTC (real-time clock) with battery lithium backup
  - Built-in 1 relay for visual/audio alarm
- **Automatic Reboot Trigger:** Built-in watchdog timer, configurable for restarts at 1 to 255 second intervals

**MTBF** (mean time between failures)

- **Time:**
  - DA-681A-I-SP: 240,784 hrs
  - DA-681A-I-DPP: 215,436 hrs
  - DA-681A-I-DPP-T: 215,436 hrs

**Warranty**

- **Warranty Period:** 3 years
- **Details:** See www.moxa.com/warranty
Applications and Services Development:
- .Net Framework 3.5
- Remote Desktop Protocol 7.1
- COM OLE Application Support
- COM+ Application Support
- MSMQ

Internet Services:
- Internet Explorer 8.0
- IIS 7.0

File Systems and Data Storage:
- Windows Data Access Components
- Windows Backup and Restore

Diagnostics:
- Common Diagnostic Tools
- Problem Reports and Solutions

Fonts:
- Chinese (Trad. and Simp.), Middle East, South East Asian, South Asian Fonts
- True Type Fonts

Graphics and Multimedia:
- MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
- MPEG Layer-3 Audio Codecs (MP3)
- MPEG4 Decoders
- Windows Media Video VC-1 (WMV) Codecs
- DirectX and Windows Device Experience

Management:
- Group Policy Management
- Windows Management Instrument (WMI)
- Windows Update

Networking:
- Extensible Authentication Protocol (EAP)
- Internet Authentication Service
- Telnet Server
- Bluetooth
- Domain Services
- Network Access Protection
- Network and Sharing Center
- Quality of Service
- Remote Access Service (RAS)
- Telephone API Client
- Windows Firewall
- Wireless Networking

Security:
- Credential Roaming Service
- Credentials and Certificate Management
- Windows Authorization Manager (AZMAN)
- Windows Security Center
- Active Directory Rights Management
- Security Base
- Encrypted File System (EFS)

Embedded Features:
- Enhanced Write Filter (EWF)
- File-Based Write Filter (FBWF)
- Message Box Default Reply
- Registry Filter
- WSDAPI for .NET

Embedded Self-Health Diagnostics: SNMP-based remote scripting
layer for monitoring, reporting, and control

Available Models
DA-681A-I-SP: 6 Ethernet ports, VGA, 2 RS-232/422/485 ports, 10 RS-485 ports, mSATA, SATA, USB, single power (RAM, mSATA, OS not included), -25 to 55°C operating temperature
DA-681A-I-SP-LX: 6 Ethernet ports, VGA, 2 RS-232/422/485 ports, 10 RS-485 ports, mSATA, SATA, USB, single power, Linux Debian 8, -25 to 55°C operating temperature
DA-681A-I-DPP: IEC 61850-3 computer with VGA, 6 LAN ports, 2 RS-232/422/485 ports, 10 RS-485 ports, mSATA, SATA, USB, dual power (RAM, mSATA, OS not included), -25 to 55°C operating temperature
DA-681A-I-DPP-LX: IEC 61850-3 computer with VGA, 6 LAN ports, 2 RS-232/422/485 ports, 10 RS-485 ports, mSATA, SATA, USB, dual power, Linux Debian 8, -25 to 55°C operating temperature
DA-681A-I-DPP-T: IEC 61850-3 computer with VGA, 6 LAN ports, 2 RS-232/422/485 ports, 10 RS-485 ports, mSATA, SATA, USB, dual power (RAM, mSATA, OS not included), -40 to 70°C operating temperature
DA-681A-I-DPP-T-LX: IEC 61850-3 computer with VGA, 6 LAN ports, 2 RS-232/422/485 ports, 10 RS-485 ports, mSATA, SATA, USB, dual power, Linux Debian 8, -40 to 70°C operating temperature

Note: To order a DA-681A system with a pre-installed W7E OS, please contact a Moxa sales representative.

Recommended Configurations

<table>
<thead>
<tr>
<th>Operating System</th>
<th>System Memory</th>
<th>mSATA for OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows Embedded Standard 7 32 bit</td>
<td>≥ 4 GB</td>
<td>≥ 8 GB</td>
</tr>
<tr>
<td>Windows Embedded Standard 7 64 bit</td>
<td>≥ 4 GB</td>
<td>≥ 16 GB</td>
</tr>
<tr>
<td>Linux Debian 8</td>
<td>≥ 2 GB</td>
<td>≥ 4 GB</td>
</tr>
</tbody>
</table>

Package Checklist
- DA-681A rackmount computer
- 19-inch rackmount kit
- Documentation CD or DVD
- Quick installation guide (printed)
- Warranty card

Ordering Information
Applications and Services Development:
- .Net Framework 3.5
- Remote Desktop Protocol 7.1
- COM OLE Application Support
- COM+ Application Support
- MSMQ

Internet Services:
- Internet Explorer 8.0
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File Systems and Data Storage:
- Windows Data Access Components
- Windows Backup and Restore

Diagnostics:
- Common Diagnostic Tools
- Problem Reports and Solutions

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- MPEG4 Decoders
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- DirectX and Windows Device Experience

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- Group Policy Management
- Windows Management Instrument (WMI)
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- Internet Authentication Service
- Telnet Server
- Bluetooth
- Domain Services
- Network Access Protection
- Network and Sharing Center
- Quality of Service
- Remote Access Service (RAS)
- Telephone API Client
- Windows Firewall
- Wireless Networking

Security:
- Credential Roaming Service
- Credentials and Certificate Management
- Windows Authorization Manager (AZMAN)
- Windows Security Center
- Active Directory Rights Management
- Security Base
- Encrypted File System (EFS)

Embedded Features:
- Enhanced Write Filter (EWF)
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Embedded Self-Health Diagnostics: SNMP-based remote scripting
layer for monitoring, reporting, and control
### Comparison of DA-Series Models

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Serial Ports</th>
<th>Giga LAN Port</th>
<th>Storage</th>
<th>Expansion</th>
<th>System</th>
<th>Power</th>
<th>Relay</th>
<th>IEC 61850-3 IEC 60255</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3-in-1 RS-485</td>
<td>SATa mSATA USB</td>
<td>PCI-104 (for IRIG-B)</td>
<td>OS RAM mSATA</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DA-681A-I-SP</td>
<td>2</td>
<td>10</td>
<td>6</td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>DA-681A-I-SP-LX</td>
<td>2</td>
<td>10</td>
<td>6</td>
<td>1</td>
<td>4</td>
<td>–</td>
<td>Linux</td>
<td>2G 8G 1</td>
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<td>DA-681A-I-DPP-T</td>
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<td>Linux</td>
<td>2G 8G 2 1</td>
</tr>
</tbody>
</table>

### Optional Accessories

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Expansion Module</th>
<th>Accessory</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DA-IRIGB-4DIO-PCI104-EMC4</td>
<td>USB Dongle</td>
<td>DA-681A HDD Kit</td>
<td></td>
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<tr>
<td>DA-681A-I-SP</td>
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<td>✓</td>
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<tr>
<td>DA-681A-I-SP-LX</td>
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</tbody>
</table>

**Expansion Modules** (can be purchased separately)

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA-IRIGB-4DIO-PCI104-EMC4</td>
<td>Time-synchronization expansion module, 1 IRIG-B signal input port, 3 digital inputs, 4 digital outputs (DA-681A-I-DPP series only)</td>
</tr>
</tbody>
</table>

**Optional Accessories** (can be purchased separately)

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>DA-681A HDD Kit</td>
<td>HDD/SSD installation package, supports single HDD/SSD.</td>
</tr>
<tr>
<td>USB Dongle Kit</td>
<td>USB dongle kit installation package. This kit can be installed inside the DA-681A and is suited for security applications. For example, the license activate USB dongle for SCADA or the backup image storage for Smart Recovery.</td>
</tr>
</tbody>
</table>
DA-683 Series

x86 ready-to-run embedded computers with Intel Atom D510, DVI-I, 6 LANs, 2 serial ports, 4 DIs, 4 DOs, 4 USB 2.0 ports, CompactFlash, 2 peripheral expansion slots

DA-683 industrial computers excel in a wide array of power automation applications. The DA-683 series is based on the Intel x86 processor and supports DVI-I, 6 gigabit Ethernet ports, 2 RS-232 serial ports, CompactFlash, and USB. They come standard in a 19-inch, 2U high form factor. The Intel Atom D510 processor gives the DA-683 enough punch to perform demanding industrial tasks without consuming a lot of power, for a highly cost-effective overall system. DA-683 computers are IEEE 1588 compliant and support precision time protocol and clock synchronization to provide the time accuracy required for event logging in power substation systems.

IEC-61850-3 compliance confirms that the DA-683 can deliver stable and reliable system operations in power applications. Additional value and convenience is provided through a modular design with two independent slots for flexible system integration and expansion. Users have the option to add a variety of different communications modules, including an 8-port RS-232/422/485 module, 8-port RS-422/485 module, 4-port 10/100 Mbps LAN module, 8-port 10/100 Mbps switch module, and a universal PCI expansion module.

The DA-683 series includes wide temperature models that operate reliably in a -40 to 70°C operating temperature range for the same great performance in applications in extremely harsh environments.

DA-683 computers run Linux, Windows Embedded Standard 2009, or Windows Embedded Standard 7 (pre-installed), providing a familiar environment for developing sophisticated application software. Moxa provides comprehensive software support to help programmers develop bug-free code quickly and at a lower cost.

Overview

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Appearance

Front View

- Intel Atom D510 1.66 GHz processor
- 1 DDR2 SO-DIMM socket, supporting DDR2 667 up to 2 GB (max.)
- 6 10/100/1000 Mbps Ethernet ports
- 2 RS-232 serial ports
- 4 USB 2.0 ports for high speed peripherals
- 4 DIs, 4 DOs
- CompactFlash socket for storage expansion
- 2 SATA interfaces for hard disk drive expansion
- 2 PCI expansion slots for inserting expansion modules
- IEC 61850-3 compliant (DPP-T models only)
- IEEE 1588 compliance for Precision Time Protocol (Linux models only)
- Dual power input models available
- Ready-to-run Embedded Linux, Windows Embedded Standard 2009, or Windows Embedded Standard 7 platform
- -40° to 70°C wide temperature models available
Hardware Specifications

Computer
CPU: Intel Atom D510 1.66 GHz processor
Note: The OS is pre-installed.
System Chipset: Intel Pineview-D + ICH8M
BIOS: 16 Mbit Flash BIOS, PCI Plug & Play, ACPI function support
FSB: 667 MHz
System Memory: 2 GB capacity, 1 GB (LX and XPE)/ 2 GB (W7E) pre-installed: 1 or 2 slots of 2 GB 200-pin DDR2-667 SO-DIMM
Expansion Bus: PCI/104 interface reserved
USB: USB 2.0 hosts x 4, Type A connector, supports system boot up
Storage
Built-in: 2 GB (LX and XPE) / 8 GB (W7E) industrial DOM onboard to store OS
Built-in Storage Expansion: CompactFlash socket for CF card expansion, supporting CF Type-I/II
HDD Support: 2 SATA connectors for drive expansion (with optional HDD kit)

Other Peripherals
KB/MS: 1 PS/2 interface, supports standard PS/2 keyboard and mouse through Y-type cable
Display
Graphics Controller: Intel® GMA3150 graphics controller in Intel D510 card
DVI Interface:
• Analog RGB display: output resolution up to 2048 x 1536 @ 60 Hz
• Digital DVI display: output resolution up to 1024 x 768 @ 60 Hz
Ethernet Interface
LAN: Auto-sensing 10/100/1000 Mbps ports x 6
Magnetic Isolation Protection: 1.5 KV built-in
Serial Interface
Serial Standards: 2 RS-232 ports (DB9 male)
Serial Signals
RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND, RI
Input Channels: 4, source type
Input Voltage: 0 to 30 VDC
Digital Input Levels for Dry Contacts:
• Logic level 0: Close to GND
• Logic level 1: Open
Digital Input Levels for Wet Contacts:
• Logic level 0: +10 V to +30 V (source to DI)
Connectors Type: 10-pin screw terminal block (4 DI points, 4 DO points, DI source, GND)
Isolation: 3 kV optical isolation
Digital Output
Output Channels: 4, sink type
Output Current: Max. 200 mA per channel
On-State Voltage: 24 VDC nominal, open collector to 30 V
Connectors Type: 10-pin screw terminal block (4 DI points, 4 DO points, DI source, GND)
Isolation: 3 kV optical isolation

LEDs
System: Power, Storage
Gigabit LAN: 100M x 6, 1000M x 6
Serial: TX/RX
Programmable: LED x 8
Communication: Module A x 16, Module B x16

Switches and Buttons
Power Switch: on/off (on rear panel)
Reset Button: To reset system hardware (on front panel)

Physical Characteristics
Housing: SECC sheet metal (1 mm)
Weight: 4 kg (8.89 lb)
Dimensions: 315 x 440 x 90 mm (12.40 x 17.32 x 3.54 in) (without rackmount ears)
Mounting: Standard 19-inch rackmount

Environmental Limits
Operating Temperature:
Standard models: -10 to 60°C (14 to 140°F)
DPP-T models: +40 to 70°C (-40 to 158°F)
Storage Temperature:
Standard models: -20 to 80°C (-4 to 176°F)
DPP-T models: -40 to 85°C (-40 to 185°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)
Anti-Vibration: 7 mm (2-9 Hz), 20 m/s/s (9-200 Hz), 15 m/s/s (200-500 Hz) @ IEC-61850-3, IEC 60870-2-2/Cm/(3M6)/(4M6), sine wave, 2-500 Hz, 1 Oct/min, 10 cycles, 2 hrs 40 mins per axis
Anti-Shock: 300 m/s2 @ IEC-61850-3, IEC 60870-2-2/Cm/(3M6)/(4M6), half sine wave, 11 ms

Power Requirements
Input Voltage: 100 to 240 VAC, 50/60 Hz, 0.9-0.4 A
Power Consumption: 40 W

Standards and Certifications
Safety: UL/cUL (UL 60950-1, CSA C22.2 No. 60950-1-03), LVD (EN 60950-1), CCC (GB4943)
EMC:
EMC EN 61000-6-2/6-4
EMI: CISPR 22, FCC Part 15B Class A
EMS:
IEC 61000-4-2 ESD: Contact: 8 kV, Air: 15 kV
IEC 61000-4-3 RS: 80 MHz to 1 GHz: 10 V/m
IEC 61000-4-4 EFT: Power: 4 kV, Signal: 4 kV
IEC 61000-4-5 Surge: Power: 4 kV, Signal: 4 kV
IEC 61000-4-6 CS: Signal: 10 V
IEC 61000-4-8: 20 A/m
IEC 61000-4-9: 300 A/m
IEC 61000-4-11: (AC models only)
For DPP-T models only:
IEC 61000-4-16: 30 V / 300 V
IEC 61000-4-17: 10% nominal DC voltage
IEC 61000-4-18:
100 kHz: 25k VCM; 1 kV DM
1 Mhz: 2.5 kV CM; 1 kV DM
IEC 61000-4-29: 30% reduction, 0.1 sec.

Green Product: RoHS, CRoHS, WEEE
Reliability
Alert Tools: Built-in buzzer and RTC (real-time clock) with lithium backup battery
Automatic Reboot Trigger: Built-in WDT (watchdog timer) supporting 1-255 level time interval system reset, software programmable

MTBF (mean time between failures)
Time: 135,852 hrs
Standard: Telcordia (Bellcore) Standard TR/SR
Warranty
Warranty Period: 3 years
Details: See www.moxa.com/warranty

Software Specifications

Linux
OS: Linux 2.6.18, Debian Etch 5
Web Server (Apache): Allows you to create and manage web sites; supports PHP and XML
Terminal Server (SSH): Provides secure encrypted communications between two un-trusted hosts over an insecure network
File System: EXT2, JFFS2
Internet Protocol Suite: TCP, UDP, IPv4, SNMPv1/v2c/v3, ICMP, ARP, HTTP, CHAP, PAP, SSH 1.0/2.0, SSL, DHCP, NTP, NFS, Telnet, FTP, TFTP, PPP, PPPoE, PTP
Internet Security: OpenVPN, iptables firewall

Dial-up Networking: PPP Daemon for Linux that allows Unix machines to connect to the Internet through dialup lines, using the PPP protocol, as a PPP server or client. Works with 'chat', 'dip', and 'diald', among (many) others. Supports IP, TCP, UDP, and (for Linux) IPX (Novell).

File Server: Enables remote clients to access files and other resources over the network

Watchdog: Features a hardware function to trigger system reset in a user specified time interval (Moxa API provided)

Application Development Software:
• Moxa API Library (Watchdog timer, Moxa serial I/O control)
• GNU C/C++ cross-compiler
• GNU C library
• Perl

Windows Embedded Standard 7
Core OS:
• 32-bit support
• Remote Client
• Remote Procedure Call

Applications and Services Development:
• .Net Framework 3.5
• Remote Desktop Protocol 7.1
• COM OLE Application Support
• COM+ Application Support
• MSMQ

Internet Services:
• Internet Explorer 8.0
• IIS 7.0

File Systems and Data Storage:
• Windows Data Access Components
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• Common Diagnostic Tools
• Problem Reports and Solutions

Fonts: Chinese (Trad. and Simp.), Japanese, Korean, Western, Middle Eastern, South East Asian, and South Asian Fonts

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• MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
• MPEG Layer-3 Audio Codescs (MP3)
• MPEG4 Decoders
• Windows Media Video VC-1 (WMV) Codsces
• DirectX and Windows Device Experience
• Windows Media Player 12

International:
• IME Simplified Chinese Support
• IME Traditional Chinese Support
• IME Japanese Support
• IME Korean Support

Management:
• Group Policy Management
• Windows Management Instrument (WMI)
• Windows Update

Networking:
• Extensible Authentication Protocol (EAP)
• Internet Authentication Service
• Telnet Server
• Bluetooth
• Domain Services
• Network Access Protection
• Network and Sharing Center
• Quality of Service
• Remote Access Service (RAS)
• Telephony API Client
• Windows Firewall
• Wireless Networking

Security:
• Credential Roaming Service
• Credentials and Certificate Management
• Windows Authorization Manager (AZMAN)
• Windows Security Center
• Active Directory Rights Management
• Security Base
• Encrypted File System (EFS)

Embedded Features:
• Enhanced Write Filter (EWF)
• File-Based Write Filter (FBWF)
• Message Box Default Reply
• Registry Filter
• WSDAPI for .NET

Embedded Self-Health Diagnostics: SNMP-based remote scripting layer for monitoring, reporting, and control

Windows XP Embedded
OS: Windows Embedded Standard 2009
File System: NTFS
Internet Protocol Suite: DHCP, DNS, FTP, HTTP, SNTP, NTP, Telnet, SMTP, SNMPv2, TCP, UDP, IPv4, ICMP, IGMP, IPsec, TAPI, ICS, PPP, CHAP, EAP, PPPoE, PPTP, NetBIOS, PTP
Web Server (IIS): Allows users to create and manage websites
Remote Registry Service: Enables remote users to modify registry settings on this computer

Watchdog: Features a hardware function to trigger system reset in a user specified time interval (Moxa API provided)

Enhanced Write Filter: Redirect disk write operations to volatile (RAM) or non-volatile (disk) storage

File-based Write Filter: Redirects all write requests directed at protected volumes to the overlay cache, which records and displays the changes while preserving the protected status of the target volume.

Application Development Software:
• Moxa API Library
• Microsoft .Net Framework 3.5 with SP1
• Active Directory Service Interface (ADSI) Core
• Active Template Library (ATL)
• Common Control Libraries
• Enhanced Windows Security Center
• Windows API, Script Engines, and WMI
• Microsoft Visual C++ Run Time Libraries
Available Models
DA-683-SP-XPE: x86 ready-to-run rackmount computer with 1.66 GHz CPU, DVI-I, 6 Giga LANs, 2 RS-232 serial ports, 4 DIs, 4 DOs, 2 peripheral expansion slots, CompactFlash, 4 USB ports, single power, Windows Embedded Standard 2009, -10 to 60°C operating temperature
DA-683-SP-LX: x86 ready-to-run rackmount computer with 1.66 GHz CPU, DVI-I, 6 Giga LANs, 2 RS-232 serial ports, 4 DIs, 4 DOs, 2 peripheral expansion slots, CompactFlash, 4 USB ports, single power, Linux, -10 to 60°C operating temperature
DA-683-SP-W7E: x86 ready-to-run rackmount computer with 1.66 GHz CPU, DVI-I, 6 Giga LANs, 2 RS-232 serial ports, 4 DIs, 4 DOs, 2 peripheral expansion slots, CompactFlash, 4 USB ports, single power, Windows Embedded Standard 7, -10 to 60°C operating temperature
DA-683-DPP-T-XPE: IEC 61850-3 x86 ready-to-run rackmount computer with 1.66 GHz CPU, DVI-I, 6 Giga LANs, 2 RS-232 serial ports, 4 DIs, 4 DOs, 2 peripheral expansion slots, CompactFlash, 4 USB ports, dual power, Windows Embedded Standard 2009, -40 to 70°C operating temperature
DA-683-DPP-T-LX: IEC 61850-3 x86 ready-to-run rackmount computer with 1.66 GHz CPU, VGA, 6 gigabit Ethernet Ports, 2 RS-232 serial ports, 4 DIs, 4 DOs, 2 peripheral expansion slots, CompactFlash, 4 USB ports, dual power, Linux, -40 to 70°C operating temperature
DA-683-DPP-T-W7E: IEC 61850-3 x86 ready-to-run rackmount computer with 1.66 GHz CPU, DVI-I, 6 Giga LANs, 2 RS-232 serial ports, 4 DIs, 4 DOs, 2 peripheral expansion slots, CompactFlash, 4 USB ports, dual power, Windows Embedded Standard 7, -40 to 70°C operating temperature

Expansion Modules (can be purchased separately)
DA-SP08-I-DB: 8-port RS-232/422/485 serial module with DB9 connector and digital isolation
DA-SP08-DB: 8-port RS-232/422/485 serial module with DB9 connector
DA-SP08-I-TB: 8-port RS-232/422/485 serial module with terminal block connector and digital isolation
DA-SP38-I-TB: 8-port RS-422/485 serial module with terminal block connector and digital isolation
DA-SW08-RJ: 8-port 10/100 Mbps unmanaged switch module
DA-LN04-RJ: 4-port 10/100 Mbps LAN module
DA-UPCI-DK: Universal PCI development kit
DA-FX04-MM-ST-T: 4-port (100BaseFX) fiber LAN module with multi-mode, ST connector, supports IP Teaming

Optional Accessories (can be purchased separately)
FK-78127-01: Hard disk installation package
DA-685 Series

*x86 rackmount substation computers with VGA, 2 RS-232/422/485 and 6 RS-485 serial ports, 6 LAN Ports, CompactFlash, USB*

- Intel Atom D510 1.66 GHz processor
- 1 DDR2 SO-DIMM sockets supporting DDR2 667 up to 2 GB (max.)
- 6 10/100/1000 Mbps Ethernet ports
- 2 RS-232/422/485 serial ports (DB9 male)
- 6 RS-485 serial ports (terminal block)
- 2 USB 2.0 ports for high speed peripherals
- CompactFlash socket for storage expansion
- 1 SATA interface for hard disk drive expansion
- EMC Level 4 certified

Overview

DA-685 industrial computers excel in a wide array of power automation applications. The DA-685 series is based on the Intel x86 processor and supports VGA, 6 gigabit Ethernet ports, 2 RS-232/422/485 and 6 RS-485 serial ports, CompactFlash, and USB. The computers come standard in a 19-inch, 2U high form factor, and the Intel Atom processor gives them enough punch to perform demanding industrial tasks without consuming a lot of power.

Appearance

The DA-685 computer are pre-installed with Linux, Windows Embedded Standard 2009, or Windows Embedded Standard 7 operating systems, providing a familiar environment for developing sophisticated application software.
### Hardware Specifications

#### Computer
- **CPU:** Intel Atom D510 1.66 GHz processor
- **OS:** Linux, Windows Embedded Standard 2009, or Windows Embedded Standard 7
- **System Chipset:** Intel Pineview-D + ICH8M
- **BIOS:** 16 Mbit Flash BIOS, PCI Plug & Play, ACPI function support
- **FSB:** 667 MHz
- **System Memory:** 2 GB capacity, 1 GB (LX and XPE) / 2 GB (W7E) pre-installed: 1 or 2 slots of 2 GB 200-pin DDR2-667 SO-DIMM
- **Expansion Bus:** PCI/104 interface reserved
- **USB:** USB 2.0 hosts x 2, Type A connector, supports system boot up

#### Storage
- **Built-in:** 2 GB (LX and XPE) / 8 GB (W7E) industrial DOM onboard to store OS
- **Storage Expansion:** CompactFlash socket for CF card expansion, supporting CF Type-I/II
- **HDD Support:** 1 SATA connector for drive expansion

#### Other Peripherals
- **KB/MS:** 1 PS/2 interface, supports standard PS/2 keyboard and mouse through Y-type cable

#### Display
- **Graphics Controller:** Intel® GMA3150 graphics controller on Intel D510 card
- **Display Interface:** VGA output (DB15 female connector)
- **Resolution:** CRT display mode with pixel resolution up to 2048 x 1536 at 75 Hz

#### Ethernet Interface
- **LAN:** Auto-sensing 10/100/1000 Mbps ports x 6

#### Serial Interface
- **Serial Standards:**
  - 2 RS-232/422/485 ports (DB9 male)
  - 6 RS-485-2W ports (terminal block)

#### Serial Signals
- **RS-232:** TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
- **RS-422:** TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-4w:** TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-2w:** Data+, Data-, GND

#### LEDs
- **System:** Power, Storage
- **Gigabit LAN:** 100M x 6, 1000M x 6
- **Serial:** TX/RX
- **Programmable:** LED x 8

#### Switches and Buttons
- **Power Switch:** on/off (on rear panel)

#### Physical Characteristics
- **Housing:** SECC sheet metal (1 mm)
- **Weight:** 4 kg (8.89 lb)
- **Dimensions:** 315 x 440 x 90 mm (12.40 x 17.32 x 3.54 in) (without rackmount ears)
- **Mounting:** Standard 19-inch rackmount

#### Environmental Limits
- **Operating Temperature:** -10 to 55°C (14 to 131°F)
- **Storage Temperature:** -20 to 80°C (-4 to 176°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-Vibration:** 2 G rms @ IEC-68-2-34, random wave, 5-500 Hz, 1 hr per axis
- **Anti-Shock:** 20 g @ IEC-68-2-27, half sine wave, 11 ms

#### Power Requirements
- **Input Voltage:** 100 to 240 VAC, 50/60 Hz, 0.9-0.4 A
- **Power Consumption:** 40 W
### Software Specifications

#### Linux
- **OS:** Debian 5 Linux, Lenny; kernel 2.6.26
- **Web Server (Apache):** Allows you to create and manage web sites; supports PHP and XML
- **Terminal Server (SSH):** Provides secure encrypted communications between two un-trusted hosts over an insecure network
- **File System:** EXT2, JFFS2
- **Internet Protocol Suite:** TCP, UDP, IPv4, SNMPv1/v2c/v3, ICMP, ARP, HTTP, CHAP, PAP, SSH 1.0/2.0, SSL, DHCP, Telnet, FTP, TFTP, PPP, PPPoE, PTP
- **Internet Security:** OpenVPN, iptables firewall
- **Dial-up Networking:** PPP Daemon for Linux that allows Unix machines to connect to the Internet through dialup lines, using the PPP protocol, as a PPP server or client. Works with ‘chat’, ‘dip’, and ‘diald’, among (many) others. Supports IP, TCP, UDP, and (for Linux) IPX (Novell)
- **File Server:** Enables remote clients to access files and other resources over the network
- **Watchdog:** Features a hardware function to trigger system reset in a user specified time interval (Moxa API provided)
- **Application Development Software:**
  - Moxa API Library (Watchdog timer, Moxa serial I/O control)
  - GNU C/C++ cross-compiler
  - GNU C library
  - Perl

#### Windows Embedded Standard 7
- **Core OS:**
  - 32-bit support
  - Remote Client
  - Remote Procedure Call
- **Applications and Services Development:**
  - .Net Framework 3.5
  - Remote Desktop Protocol 7.1
  - COM OLE Application Support
  - COM+ Application Support
  - MSMQ
- **Internet Services:**
  - Internet Explorer 8.0
  - IIS 7.0
- **File Systems and Data Storage:**
  - Windows Data Access Components
  - Windows Backup and Restore
- **Diagnostics:**
  - Common Diagnostic Tools
  - Problem Reports and Solutions
- **Fonts:** Chinese (Trad. and Simp.), Japanese, Korean, Western, Middle Eastern, South East Asian, and South Asian Fonts

#### Graphics and Multimedia:
- MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
- MPEG Layer-3 Audio Decoders (MP3)
- MPEG4 Decoders
- Windows Media Video VC-1 (WMV) Decoders
- DirectX and Windows Device Experience
- Windows Media Player 12

#### International:
- IME Simplified Chinese Support
- IME Traditional Chinese Support
- IME Japanese Support
- IME Korean Support

#### Management:
- Group Policy Management
- Windows Management Instrument (WMI)
- Windows Update

#### Networking:
- Extensible Authentication Protocol (EAP)
- Internet Authentication Service
- Telnet Server
- Bluetooth
- Domain Services
- Network Access Protection
- Network and Sharing Center
- Quality of Service
- Remote Access Service (RAS)
- Telephony API Client
- Windows Firewall
- Wireless Networking

#### Security:
- Credential Roaming Service
- Credentials and Certificate Management
- Windows Authorization Manager (AZMAN)
- Windows Security Center
- Active Directory Rights Management
- Security Base
- Encrypted File System (EFS)

#### Embedded Features:
- Enhanced Write Filter (EWF)
- File-Based Write Filter (FBWF)
- Message Box Default Reply
- Registry Filter
- WSDAPI for .NET

#### Embedded Self-Health Diagnostics:
- SNMP-based remote scripting layer for monitoring, reporting, and control
Power Computers

Windows XP Embedded
OS: Windows Embedded Standard 2009
File System: NTFS
Internet Protocol Suite: HCP, DNS, FTP, HTTP, SNTP, NTP, Telnet, SMTP, SNIPv2, TCP, UDP, IPv4, ICMP, IGMP, IPsec, TAPI, ICS, PPP, CHAP, EAP, PPPoE, PPTP, NetBIOS, PTP
Web Server (IIS): Allows users to create and manage websites
Remote Registry Service: Enables remote users to modify registry settings on this computer
Watchdog: Features a hardware function to trigger system reset in a user-specified time interval (Moxa API provided)
Enhanced Write Filter: Redirect disk write operations to volatile (RAM) or non-volatile (disk) storage
File-based Write Filter: Redirects all write requests directed at protected volumes to the overlay cache, which records and displays the changes while preserving the protected status of the target volume.

Application Development Software:
• Moxa API Library
• Microsoft .Net Framework 3.5 with SP1
• Active Directory Service Interface (ADSI) Core
• Active Template Library (ATL)
• Common Control Libraries
• Common File Dialogs
• Direct3D, DirectPlay, DirectShow, and Direct show filters
• Mapi32 Libraries
• Message Queuing (MSMQ) Core
• Microsoft Visual C++ Run Time Libraries
• Power Management dynamic-link library
• RPC
• Windows API, Script Engines, and WMI

Ordering Information
Available Models
DA-685-XPE: x86 rackmount computer with 1.66 GHz CPU, VGA, 6 gigabit Ethernet ports, 2 RS-232/422/485 and 6 2-wire RS-485 ports, CompactFlash, 2 USB ports, single power input, Windows Embedded Standard 2009
DA-685-LX: x86 rackmount computer with 1.66 GHz CPU, VGA, 6 gigabit Ethernet ports, 2 RS-232/422/485 and 6 2-wire RS-485 ports, CompactFlash, 2 USB ports, single power input, Linux
DA-685-W7E: x86 rackmount computer with 1.66 GHz CPU, VGA, 6 gigabit Ethernet ports, 2 RS-232/422/485 and 6 2-wire RS-485 ports, CompactFlash, 2 USB ports, single power input, Windows Embedded Standard 7
Optional Accessories (can be purchased separately)
FK-12072-01: Hard disk installation package (8 screws, 4 brass standoffs, 1 SATA cable, 1 hard disk mounting bracket)

Package Checklist
• DA-685 embedded computer
• 19-inch rackmount kit
• Ethernet cable: RJ45-to-RJ45 cross-over cable, 100 cm
• Documentation CD or DVD
• Quick installation guide (printed)
• Warranty card
DA-662A Series

RISC 19-inch rackmount data acquisition computers with 8 to 16 serial ports, 4 Ethernet ports, USB

- MoxMacro 500 MHz processor
- 128 MB RAM onboard, 32 MB flash
- 8 to 16 software-selectable RS-232/422/485 serial ports
- 8 to 16 jumper-configurable 1/150 kΩ pull low/high and 120 ohm termination resistors
- 15 kV ESD protection for all serial signals
- Quad 10/100 Mbps Ethernet ports
- USB and CF slots for storage expansion supported
- Standard 19-inch rackmount installation, 1U height
- Wide range of power input voltages from 100 to 240 VAC
- LCM display and keypad for HMI
- Ready-to-Run Linux OS platform
- Robust, fanless design
- Isolated serial port protection models available

Overview

The DA-662A RISC-based, ready-to-run embedded computers are designed for industrial data acquisition applications. The computers have 8 to 16 RS-232/422/485 serial ports, 4 Ethernet ports, and 2 USB 2.0 ports, all based on the MoxaMacro communication processor. In addition, the DA-662A-I-8/16-LX’s serial ports come with high level interference protection. The housing is a standard 1U, 19-inch wide rack-mounted rugged enclosure. The robust, rack-mountable mechanism design provides the hardened protection needed for industrial environment applications, and makes it easy for users to install the DA-662A computers on a standard 19-inch rackmount. The DA-662A computers are ideal for applications that require a distributed embedded technology, such as SCADA systems, plant floor automation, and power electricity monitoring applications.

Appearance

Front View (DA-662A-8)

Front View (DA-662A-16)
## Rear View (DA-662A-8)

RS-232/422/485 Serial Ports x 8
RS-232 Console Port
Power Input, 100 to 240 VAC
10/100 Mbps Ethernet, RJ45 x 2
ON/OFF Switch

## Rear View (DA-662A-16)

RS-232/422/485 Serial Ports x 16
RS-232 Console Port
Power Input, 100 to 240 VAC
10/100 Mbps Ethernet, RJ45 x 4
ON/OFF Switch

# Hardware Specifications

## Computer
- **CPU:** MoxaMacro 500 MHz
- **OS:** Embedded Linux (pre-installed)
- **DRAM:** 128 MB onboard
- **Flash:** 32 MB onboard

## Ethernet Interface
- **LAN:** Auto-sensing 10/100 Mbps ports (RJ45) x 4
- **Magnetic Isolation Protection:** 1.5 kV built-in

## Serial Interface
- **Serial Standards:** 8 to 16 RS-232/422/485 ports, software selectable (8-pin RJ45)
- **ESD Protection:** 8 kV contact, 15 kV Air ESD protection for all signals
- **Surge Protection:** 2 kV line-to-line and 4 kV line-to-ground surge protection, 8/20 μs waveform (DA-662A-I-8/16-LX only)
- **Insulation:** 500 V (DA-662A-I-8/16-LX only)
- **Isolation:** 2 kV digital isolation (DA-662A-I-8/16-LX only)
- **Termination Resistor:** 120 ohm, jumper selectable
- **Console Port:** RS-232 (all signals), RJ45 connector

## Serial Communication Parameters
- **Data Bits:** 5, 6, 7, 8
- **Stop Bits:** 1, 1.5, 2
- **Parity:** None, Even, Odd, Space, Mark
- **Flow Control:** RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
- **Baudrate:** 50 bps to 921.6 Kbps (supports non-standard baudrates; see user’s manual for details)

## Serial Signals
- **RS-232:** TxD, RXD, DTR, DSR, RTS, CTS, DCD, GND
- **RS-422:** TxD+, TxD-, RXD+, RXD-, GND
- **RS-485-4w:** TxD+, TxD-, RXD+, RXD-, GND
- **RS-485-2w:** Data+, Data-, GND

## LEDs
- **System:** OS Ready
- **LAN:** 10/100M x 4
- **Serial:** TxD, RXD (16 of each)

## Mini Screen with Push Buttons
- **LCD Panel:** Liquid Crystal Display on the case, 2 x 16 text mode
- **Push Buttons:** Four membrane buttons for convenient on-site configuration

## Physical Characteristics
- **Housing:** SECC sheet metal (1 mm)
- **Weight:** 4.3 kg (9.56 lb)

## Environmental Limits
- **Operating Temperature:** -10 to 60°C (14 to 140°F)
- **Storage Temperature:** -20 to 80°C (-4 to 176°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-Vibration:** 1 g @ IEC-68-2-6, sine wave (resonance search), 5-500 Hz, 1 Oct/min, 1 Cycle, 13 mins 17 sec per axis

## Power Requirements
- **Input Voltage:** 100 to 240 VAC auto ranging (47 to 63 Hz for AC input)
- **Power Consumption:** 20 W

## Standards and Certifications
- **Safety:** UL 60950-1
- **EMC:** EN 61000-6-2/6-4
- **EMI:** CISPR 22, FCC Part 15B Class A
- **EMS:**
  - IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV
  - IEC 61000-4-3 RS: 80 MHz to 1 GHz: 3 V/m
  - IEC 61000-4-4 EFT: Power: 1 kV; Signal: 0.5 kV
  - IEC 61000-4-5 Surge: Power: 2 kV; Signal: 4 kV
  - IEC 61000-4-6 CS: Signal: 3 V/m
  - IEC 61000-4-8 1 A/m
  - IEC 61000-4-11
- **Green Product:** RoHS, CrRoHS, WEEE

## Reliability
- **Alert Tools:** Built-in buzzer and RTC (real-time clock)
- **Automatic Reboot Trigger:** Built-in WDT (watchdog timer)
- **MTBF** (mean time between failures)
- **Time:**
  - DA-662A-8-LX: 272,913 hrs
  - DA-662A-16-LX: 177,580 hrs
  - DA-662A-16-DP-LX: 177,260 hrs
  - DA-662A-I-8-LX: 268,332 hrs
  - DA-662A-I-16-LX: 189,455 hrs
- **Standard:** Telcordia (Bellcore) Standard TR/SR

## Warranty
- **Warranty Period:** 5 years
- **Details:** See www.moxa.com/warranty
**Software Specifications**

**Linux**
- OS: Linux 2.6.38.8
- Web Server (Apache): Allows you to create and manage web sites; supports PHP and XML
- Terminal Server (SSH): Provides secure encrypted communications between two un-trusted hosts over an insecure network
- File System: JFFS2 (on-board flash)
- Internet Protocol Suite: TCP, UDP, IPv4, SNMPv1, ICMP, ARP, HTTP, CHAP, PAP, SSH 1.0/2.0, SSL, DHCP, NTP, NFS, Telnet, FTP, TFTP, PPP, PPTP, SNMIPv1/v2, SSL, OpenVPN
- Internet Security: iptables firewall
- Dial-up Networking: PPP Daemon for Linux that allows Unix machines to connect to the Internet through dialup lines, using the PPP protocol, as a PPP server or client. Works with 'chat', 'dip', and 'diald', among (many) others. Supports IP, TCP, UDP, and (for Linux) IPX (Novell).

**File Server:** Enables remote clients to access files and other resources over the network

**Watchdog:** Features a hardware function to trigger system reset in a user specified time interval (Moxa API provided)

**Application Development Software:**
- Moxa API Library (Watchdog timer, LCM, keypad, Moxa serial I/O control)
- GNU C/C++ cross-compiler
- GNU C library

**Ordering Information**

**Available Models**
- **DA-662A-8-LX:** RISC-based 19-inch rackmount data acquisition computer with 8 serial ports, quad LANs, USB, Linux OS
- **DA-662A-16-LX:** RISC-based 19-inch rackmount data acquisition computer with 16 serial ports, quad LANs, USB, Linux OS
- **DA-662A-16-DP-LX:** RISC-based 19-inch rackmount data acquisition computer with 16 serial ports, quad LANs, USB, Linux OS, dual power inputs
- **DA-662A-I-8-LX:** RISC-based 19-inch rackmount data acquisition computer with 8 serial ports (isolation protection), quad LANs, USB, Linux OS
- **DA-662A-I-16-LX:** RISC-based 19-inch rackmount data acquisition computer with 16 serial ports (isolation protection), quad LANs, USB, Linux OS

**Package Checklist**
- DA-662A embedded computer
- 19-inch rackmount kit
- Ethernet cable: RJ45-to-RJ45 cross-over cable, 100 cm
- CBL-RJ45F9-150: 8-pin RJ45 to DB9 female console port cable, 150 cm
- CBL-RJ45M9-150: 8-pin RJ45 to DB9 male serial port cable, 150 cm
- 6 jumper caps
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card
### Power Computers

#### DA-662A Series

<table>
<thead>
<tr>
<th>Model Name</th>
<th>RS-232/422/485 Serial Port</th>
<th>RS-485 2-wire Serial Port only</th>
<th>10/100 Mbps LAN Port</th>
<th>Storage Expansion</th>
<th>Serial port protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA-662A-8-LX</td>
<td>8</td>
<td>–</td>
<td>4</td>
<td>2 USB ports, CF slot</td>
<td>15 kV Air ESD protection</td>
</tr>
<tr>
<td>DA-662A-16-LX</td>
<td>16</td>
<td>–</td>
<td>4</td>
<td>2 USB ports, CF slot</td>
<td>15 kV Air ESD protection</td>
</tr>
<tr>
<td>DA-662A-16-DP-LX</td>
<td>16</td>
<td>–</td>
<td>4</td>
<td>2 USB ports, CF slot</td>
<td>15 kV Air ESD protection</td>
</tr>
<tr>
<td>DA-662A-1-8-LX</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2 USB ports, CF slot</td>
<td>Isolation: 2 kV digital isolation ESD Protection: 8 kV contact, 15 kV Air ESD protection Surge Protection: 2 kV line-to-line and 4 kV line-to-ground surge protection, 8/20 μs</td>
</tr>
<tr>
<td>DA-662A-1-16-LX</td>
<td>4</td>
<td>12</td>
<td>4</td>
<td>2 USB ports, CF slot</td>
<td>Isolation: 2 kV digital isolation ESD Protection: 8 kV contact, 15 kV Air ESD protection Surge Protection: 2 kV line-to-line and 4 kV line-to-ground surge protection, 8/20 μs</td>
</tr>
</tbody>
</table>

### Accessories (can be purchased separately)

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWC-C13US-3B-183 10A/125V</td>
<td>US-type power supply cord</td>
</tr>
<tr>
<td>PWC-C13EU-3B-183 10A/250V</td>
<td>EU-type power supply cord</td>
</tr>
<tr>
<td>PWC-C13CN-3B-183 10A/250V</td>
<td>CN-type power supply cord</td>
</tr>
<tr>
<td>PWC-C13UK-3B-183 10A/250V</td>
<td>UK-type power supply cord</td>
</tr>
<tr>
<td>PWC-C13AU-3B-183 10A/250V</td>
<td>AU-type power supply cord</td>
</tr>
</tbody>
</table>
DA-710 Series

x86 embedded computers with 2 serial ports, quad LANs, VGA, 4 DIs, 4 DOs, USB, and 4 peripheral expansion slots

- Intel Core 2 Duo T7500 2.2 GHz processor
- 1 socket of 2GB DDR2-533/667 SODIMM SDRAM
- 4 PCI slots for expansion modules
- Quad 10/100/1000 Mbps Ethernet for network redundancy
- 1 CompactFlash socket, 1 IDE, and 2 serial ATA-150 connectors for storage expansion
- 4 USB 2.0 ports for high speed peripherals
- 4 DIs, 4 DOs
- Ready-to-Run Linux or Windows Embedded Standard 2009 platform
- 19-inch rackmount model, 4U high
- Fanless design
- Dual 100/240 VAC/VDC power input

: Overview

The DA-710 computer is based on the Intel x86 processor, supports VGA, and comes with 4 Ethernet ports, 2 RS-232 serial ports, CompactFlash, and USB. The DA-710 comes in a standard 19-inch, 4U high form factor, making it an ideal platform for industrial applications.

The DA-710 comes with 4 PCI slots for inserting expansion modules. Moxa provides a variety of communication modules, including an 8-port RS-232/422/485 module, a 4-port 10/100 Mbps LAN module, an 8-port RS-422/485 module, an 8-port switch module, and a universal PCI expansion module. The friendly modular design gives users the advantage of being able to swap out modules quickly and easily.

The DA-710 runs Linux, or Windows Embedded Standard 2009 (pre-installed), providing a friendly environment for developing sophisticated application software. The great software support that Moxa provides makes the programmer’s job easier, and helps programmers develop bug-free code quickly and at a lower cost.

: Appearance

Front View

Rear View

- Programmable LED x 4
- Power/Storage LED Indicators
- Ethernet LED x 4
- Module A LED x 16
- Module B LED x 16
- Module C LED x 16
- Module D LED x 16
- Rackmount Ear

- Module Slot A
- Module Slot B
- Module Slot C
- Module Slot D
- VGA PS/2
- USB 2.0 Host x 4
- RS-232 Serial Port x 2
- DIs x 4
- DOs x 4
- Reset Button
- 10/100/1000 Ethernet Port x 4
- Power Switch
- Power Input 1
- Power Input 2
Power Computers

DA-710 Series

Dimensions

Unit: mm (inch)

:: Hardware Specifications

Computer
CPU: Intel Core 2 Duo T7500 2.2 GHz processor
OS: Windows Embedded Standard 2009, Linux 2.6

Note: The OS is pre-installed.

System Chipset: Intel GME965 + ICH8M
BIOS: 8 Mbit SPI Serial Flash, PCI Plug & Play, ACPI function support
FSB: 800 MHz

System Memory: 2 GB capacity, 1 GB pre-installed: 1 slot of DDR2-533/667 200-pin SO-DIMM SDRAM

USB: USB 2.0 hosts x 4, Type A connector, supports system boot up

Storage
Built-in: 2 GB industrial DOM onboard to store OS
Storage Expansion: CompactFlash socket
HDD Support: 2 x SATA connector, 1 x IDE connector

Other Peripherals
KB/MS: 1 PS/2 interface, supports standard PS/2 keyboard and PS/2 mouse

Display
Graphics Controller: Integrated Intel graphics media accelerator (GMA X3100)
Display Memory: Dynamic video memory technology

Intel Clear Video Technology: MPEG-2 hardware accelerator, Microsoft DirectX 9
Display Interface: CRT interface for VGA output (DB15 female connector)
Resolution: QXGA maximum with resolution up to 2048 x 1536 at 60 Hz

Ethernet Interface
LAN: Auto-sensing 10/100/1000 Mbps ports (RJ45) x 4

Magnetic Isolation Protection: 1.5 kV built-in

Serial Interface
Serial Standards: 2 RS-232 ports (DB9 male)
ESD Protection: 4 kV for all signals

Serial Communication Parameters
Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2

Parity: None, Even, Odd, Space, Mark
Flow Control: XON/XOFF

Baudrate: 50 bps to 115.2 kbps

Serial Signals
RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND

Digital Input
Input Channels: 4, source type
Input Voltage: 0 to 30 VDC

Digital Input Levels for Dry Contacts:
• Logic level 0: Close to GND
• Logic level 1: Open

Digital Input Levels for Wet Contacts:
• Logic level 0: +3 V max.
• Logic level 1: +10 to +30 V (DI Source to DI)

Connector Type: 6-pin screw terminal block (4 points, DI Source, GND)

Isolation: 4 kV optical isolation

Digital Output
Output Channels: 4, sink type
Output Current: Max. 200 mA per channel
On-State Voltage: 24 VDC nominal, open collector to 30 V

Connector Type: 5-pin screw terminal block (4 points, GND)

Isolation: 4 kV optical isolation

LEDs
System: Power x 1, Storage x 1
LAN: 100M x 4, 1000M x 4
Programmable: LED x 4
Power Failure: LED x 2

Module: Module A x 16, Module B x 16, Module C x 16, Module D x 16

Physical Characteristics
Housing: SECC sheet metal (1 mm)

Weight: 14 kg (31.11 lb)

Dimensions:
• Without ears: 400 x 420 x 180 mm (15.75 x 16.54 x 7.09 in)
• With ears: 400 x 480 x 180 mm (15.75 x 18.90 x 7.09 in)

Mounting: Standard 19-inch rackmount
Environmental Limits
Operating Temperature: -10 to 50°C (14 to 122°F)
Storage Temperature: -20 to 80°C (4 to 176°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)

Power Requirements
Input Voltage: Single or dual inputs, 100 to 240 VAC/VDC auto-ranging, 47 to 63 Hz, terminal block
Power Consumption: 50 W

Standards and Certifications
Safety: UL 60950-1, CSA C22.2 No. 60950-1-07, CCC (GB4943, GB9254, GB17625.1)
EMC: EN 61000-6-2/6-4
EMI: CISPR 22, FCC Part 15B Class A
EMS: IEC 61000-4-2 ESD: Contact: 8 kV; Air: 15 kV
IEC 61000-4-3 RS: 80 MHz to 1 GHz: 10 V/m
IEC 61000-4-4 EFT: Power: 4 kV; Signal: 4 kV
IEC 61000-4-5 Surge: Power: 4 kV; Signal: 4 kV
IEC 61000-4-6 CS: Signal: 10 V
IEC 61000-4-8: 20 A/m
IEC 61000-4-9: 300 A/m
IEC 61000-4-11: (AC models only)

Green Product: RoHS, CrRoHS, WEEE

Reliability
Alert Tools: Built-in buzzer and RTC (real-time clock) with backup lithium battery
Automatic Reboot Trigger: Built-in WDT (watchdog timer) supporting 1-255 time interval levels for system reset, software programmable
MTBF (mean time between failures): 118,815 hrs

Warranty
Warranty Period: 3 years
Details: See www.moxa.com/warranty

Software Specifications
Linux
OS: Linux 2.6.26, Debian 5 (Lenny)
Web Server (Apache): Allows you to create and manage Web sites, supporting PHP and XML
Terminal Server (SSH): Provides secure encrypted communications between two un-trusted hosts over an insecure network.
File System: EXT2
Internet Protocol Suite: TCP, UDP, IPv4, SNMP v1/v2c/v3, ICMP, ARP, HTTP, CHAP, PAP, SSH 1.0/2.0, SSL, DHCIP, NTP, NFS, Telnet, FTP, TFTP, PPP, PPPoE
Internet Security: iptables firewall, OpenVPN
Dial-up Networking: PPP Daemon for Linux allows Unix machines to connect to the Internet through dialup lines, using the PPP protocol, as a PPP server or client. Works with ‘chat’, ‘dip’, and ‘diald’, among (many) others. Supports IP, TCP, UDP and (for Linux) IPX (Novell).
File Server: Enables remote clients to access files and other resources over the network
Watchdog: Features a software function to trigger system reset in a user specified time interval (Moxa API provided)

Application Development Software:
• Moxa API Library
• GNU C library

Windows XP Embedded
OS: Windows Embedded Standard 2009
File System: NTFS
Internet Protocol Suite: DHCP, DNS, FTP, HTTP, SMTP, NTP, Telnet, SMTP, SNMPv2, TCP, UDP, IPv4, ICMP, IPX, IP, Telnet, FTP, TFTP, PPP, PPPoE
Internet Security: iptables firewall, OpenVPN
Dial-up Networking: PPP Daemon for Linux allows Unix machines to connect to the Internet through dialup lines, using the PPP protocol, as a PPP server or client. Works with ‘chat’, ‘dip’, and ‘diald’, among (many) others. Supports IP, TCP, UDP and (for Linux) IPX (Novell).
File Server: Enables remote clients to access files and other resources over the network
Watchdog: Features a software function to trigger system reset in a user specified time interval (Moxa API provided)

Application Development Software:
• Moxa API Library
• GNU C/C++ compiler
• GNU C library

Ordering Information
Available Models
DA-710-XPE: x86-based rackmount embedded computer with 2 RS-232 ports, 4 LANs, 4 peripheral expansion slots, 4 DIs, 4 DOs, VGA, CompactFlash, USB, Windows Embedded Standard 2009
DA-710-LX: x86-based rackmount embedded computer with 2 RS-232 ports, 4 LANs, 4 peripheral expansion slots, 4 DIs, 4 DOs, VGA, CompactFlash, USB, Linux 2.6

Expansion Modules (can be purchased separately)
DA-SP08-I-DB: 8-port RS-232/422/485 serial module with DB9 connector and digital isolation
DA-SP08-DB: 8-port RS-232/422/485 serial module with DB9 connector
DA-SP08-I-TB: 8-port RS-232/422/485 serial module with terminal block connector and digital isolation
DA-SP38-I-TB: 8-port RS-422/485 serial module with terminal block connector and digital isolation
DA-SW08-RJ: 8-port 10/100 Mbps unmanaged switch module
DA-LN04-RJ: 4-port 10/100 Mbps LAN module
DA-UPCI-DK: Universal PCI development kit
DA-FX04-MM-ST-T: 4-port (100BaseFX) fiber LAN module with multi-mode, ST connector, supports IP Teamming

Optional Accessories (can be purchased separately)
FK-12072-01: Hard disk installation package (8 screws, 4 brass standoffs, 1 SATA cable, 1 hard disk mounting bracket)

Package Checklist
• DA-710 embedded computer
• 19-inch rackmount kit
• Ethernet cable: RJ45-to-RJ45 cross-over cable, 100 cm
• Documentation and software CD or DVD
• Quick installation guide (printed)
• Warranty card
DA Series Expansion Modules

Expansion modules with time-synchronization ports, RS-232/422/485 and RS-232/485 serial ports, 10/100 Mbps LAN and unmanaged switch ports, 100 Mbps fiber LAN ports, and PCI development kit

> IRIG-B time-synchronization module
> Universal PCI expansion module
> 4-port 10/100 Mbps LAN module
> 4-port 100 Mbps Fiber LAN module
> 8-port 10/100 Mbps unmanaged switch module
> 8-port RS-422/485 serial module with terminal block connectors
> 8-port RS-232/422/485 software-selectable serial modules with isolation protection
> Fully compatible with Moxa embedded computers that have peripheral expansion slots

Overview

Moxa’s peripheral expansion modules, which come with serial ports, LAN ports, switch ports, fiber ports, time-synchronization IRIG-B ports, and PCI slots, give end-users the greatest flexibility for setting up industrial applications and are fully compatible with Moxa’s embedded computers that have peripheral expansion slots.

The serial port modules include an 8-port RS-232/422/485 module with either DB9 or terminal block connectors, and an 8-port RS-422/485 module with terminal block connectors. Some modules are even designed with 2 kV digital isolation, making them fully suitable for the great demands of industrial applications that use serial communication.

In addition, a 4-port LAN module, 8-port switch module, and 4-port fiber LAN module are available for setting up industrial communication applications with Ethernet-based devices. A universal PCI development kit is also available for PCI-based devices for expanding industrial applications at a reasonable cost.

The time-synchronization module features 3 digital inputs and 4 digital outputs and provides precision timing information using IRIG-B input signals. The module is designed for embedded computers that support the PCI/104 interface.

All modules are designed to offer the greatest flexibility for setting up applications and performing industrial tasks. In particular, users can swap out modules quickly and easily.

Appearance

DA-SP08-I-TB/DA-SP08-I-EMC4-TB

DA-SP08-DB/DA-SP08-I-DB/DA-SP08-I-EMC4-DB

DA-SP38-I-TB

DA-LN04-RJ
**DA-IRIGB-4DIO-PCI104-EMC4 Hardware Specifications**

**Hardware**
- **Communication Controller:** FPGA Cyclone V
- **Form Factor:** PCI/104

**Time Code Input**
- **IRIG-B:** Based on the IRIG STANDARD 200-04 and IEEE 1344

**Precision and Accuracy**
- **Accuracy (Time Synchronization):** ±1 μs
- **Accuracy (Free Running):** ±500 ms @ 24 hr

**Input Signals**
- **Single Level:**
  - Open: High
  - Short to GND: > Low
  - Level Input: 5 to 12 V
- **Differential Level:**
  - D+ - D- > 0.2 V, RXD is High
  - D+ - D- < -0.2 V, RXD is Low
  - Level Input: 5 V

**Interface**
- **IRIG-B:** 2-pin wafer to DB9
- **DI/DO:** 10-pin wafer to DB9

**Protection**
- **ESD Protection:** 8 kV contact, 15 kV Air ESD protection
- **Surge Protection:** 2 kV line-to-line and 4 kV line-to-ground surge protection, 8/20 μs waveform
- **Insulation:** 500 V

**Digital Input**
- **Input Channels:** 3, source type
- **Input Voltage:** 0 to 30 VDC

**Digital Input Levels for Dry Contacts:**
- Logic level 0: Close to GND
- Logic level 1: Open

**Digital Input Levels for Wet Contacts:**
- Logic level 0: +3 V max.
- Logic level 1: +10 V to +30 V (source to DI)
- **Isolation:** 3 kV optical isolation
- **Connector Type:** DB9 male

**Digital Output**
- **Output Channels:** 4, sink type
- **Output Current:** Max. 200 mA per channel
- **On-state Voltage:** 24 VDC nominal, open collector to 30 V
- **Isolation:** 3 kV optical isolation
- **Connector Type:** Male

**Operating Systems**
- **Windows:** Windows 7E
- **Linux:** Debian 7

**Physical Characteristics**
- **Dimensions:** 90 x 96 mm (3.54 x 3.78 in)

**Environmental Limits**
- **Operating Temperature:** -10 to 60°C (14 to 140°F)
- **Storage Temperature:** -40 to 85°C (-40 to 185°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Altitude:** Up to 2000 m

**Standards and Certifications**
- **EMC:** CE, FCC
- **EMI:** EN 55022, EN 61000-3-2, EN 61000-3-3, FCC Part 15 Subpart B Class A
- **EMS:**
  - IEC 61000-4-2 ESD: Contact 8 kV; Air 15 kV
  - IEC 61000-4-3 RS: 10 V/m (80 MHz to 1 GHz)
  - IEC 61000-4-4 EFT: Signal 4 kV
  - IEC 61000-4-5 Surge: Signal 4 kV
  - IEC 61000-4-6 CS: 10 V
  - IEC 61000-4-8
- **Green Product:** RoHS, CRoHS, WEEE
**DA-SP08-DB, DA-SP08-I-DB, DA-SP08-I-TB Hardware Specifications**

**Serial Interface**

Serial Standards: 8 RS-232/422/485 ports, software selectable (DB9 male or terminal block connector)

- **ESD Protection**: 15 kV for all signals
- **Isolation**: 2 kV digital isolation (DA-SP08-I-DB and DA-SP08-I-TB only)

**Serial Communication Parameters**

- **Data Bits**: 5, 6, 7, 8
- **Stop Bits**: 1, 1.5, 2
- **Parity**: None, Even, Odd, Space, Mark
- **Flow Control**: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485

- **Baudrate**: 50 bps to 921.6 kbps (supports non-standard baudrates; see user’s manual for details)

**Serial Signals**

- **RS-232**: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
- **RS-422**: TxD+, TxD-, RxD+., RxD-, GND
- **RS-485-4w**: TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-2w**: Data+, Data-, GND

**Physical Characteristics**

- **Weight**: 290 g (0.64 lb)
- **Dimensions**: 130 x 150 x 42 mm (5.12 x 5.91 x 1.65 in)
- **MTBF (mean time between failures)**: 1,753,143 hrs

---

**DA-SP08-I-EMC4-DB/TB Hardware Specifications**

**Serial Interface**

Serial Standards: 8 RS-232/422/485 ports, software selectable (DB9 male or terminal block connector)

- **ESD Protection**: 8 kV contact, 15 kV air
- **Surge Protection**: 2 kV line-to-line and 4 kV line-to-ground surge protection, 8/20 μs waveform
- **Insulation**: 500 V
- **Isolation**: 2 kV digital isolation
- **Pull low/high**: 1k/150k, jumper selectable
- **Termination Resistor**: 120 ohms, jumper selectable

**Serial Communication Parameters**

- **Data Bits**: 5, 6, 7, 8
- **Stop Bits**: 1, 1.5, 2
- **Parity**: None, Even, Odd, Space, Mark
- **Flow Control**: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485

**Serial Signals**

- **RS-232**: TxD, RxD, RTS, CTS, DCD, GND
- **RS-422**: TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-4w**: TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-2w**: Data+, Data-, GND

**Physical Characteristics**

- **Weight**: 500 g (1.11 lb)
- **Dimensions**: 130 x 150 x 42 mm (5.12 x 5.91 x 1.65 in)
- **MTBF (mean time between failures)**: 1,753,143 hrs

---

**DA-SP08-I-TB Hardware Specifications**

**Serial Interface**

Serial Standards: 8 RS-232/422/485 ports, software selectable (DB9 male or terminal block connector)

- **ESD Protection**: 8 kV contact, 15 kV air
- **Isolation**: 2 kV digital isolation

**Serial Communication Parameters**

- **Data Bits**: 5, 6, 7, 8
- **Stop Bits**: 1, 1.5, 2
- **Parity**: None, Even, Odd, Space, Mark
- **Flow Control**: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485

**Serial Signals**

- **RS-232**: TxD, RxD, RTS, CTS, DCD, GND
- **RS-422**: TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-4w**: TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-2w**: Data+, Data-, GND

**Baudrate**: 50 bps to 921.6 kbps (supports non-standard baudrates; see user’s manual for details)

**Physical Characteristics**

- **Weight**: 245 g (0.54 lb)
- **Dimensions**: 130 x 150 x 42 mm (5.12 x 5.91 x 1.65 in)
- **MTBF (mean time between failures)**: 1,753,143 hrs

---

**DA-LN04-RJ Hardware Specifications**

**Ethernet Interface**

- **LAN**: 4 auto-sensing 10/100 Mbps ports (RJ45)
- **Magnetic Isolation Protection**: 1.5 kV built-in

**Physical Characteristics**

- **Weight**: 198 g (0.44 lb)
- **Dimensions**: 132 x 150 x 42 mm (5.20 x 5.91 x 1.65 in)

---

**DA-SW08-RJ Hardware Specifications**

**Ethernet Interface**

- **LAN**: 8 auto-sensing 10/100 Mbps unmanaged Ethernet switch ports (RJ45)
- **Magnetic Isolation Protection**: 1.5 kV built-in

**Physical Characteristics**

- **Weight**: 200 g (0.44 lb)
- **Dimensions**: 132 x 150 x 42 mm (5.20 x 5.91 x 1.65 in)

---

**DA-UPCI-DK Hardware Specifications**

**Universal PCI Expansion Adapter**

- **PCI Slots**: 1
- **Interface Bus**: 32-bit Universal PCI (3.3 V and 5 V)

**Physical Characteristics**

- **Weight**: 195 g (0.43)
- **Dimensions**: 132 x 150 x 42 mm (5.20 x 5.91 x 1.65 in)
- **MTBF (mean time between failures)**: 11,053,266 hrs
Fiber Interface
Number of Ports: 4 (100BaseFX)  
Fiber Mode: Multi-mode  
Connector Type: ST  
Optical Wavelength: 0 to 2 km, 1310 nm (62.5/125 μm, 500 MHz·km)  
Min-TX Output: -20 dBm  
Max-TX Output: -14 dBm  
RX Sensitivity: -34 dBm

Physical Characteristics
Weight: 495 g (1.10 lb)  
Dimensions: 132 x 150 x 42 mm (5.20 x 5.91 x 1.65 in)

Environmental Limits
Operating Temperature: -40 to 70°C (-40 to 158°F)

Standards and Certifications
EMC: EMC Level 4, ESD Level 4, criteria A

Software Functions
IEEE 1588 or IP Teaming Selectable (Default = IP Teaming): Supports 4 modes  
AFT: Adapter Failover Teaming  
SFT: Switch Fault Tolerance  
ALB: Adapter Failover and Load Balancing  
Link Aggregation: supported

Compatibility Chart for Peripheral Expansion Modules and Embedded Computers

All expansion modules can be used on any of Moxa’s embedded computers that come with the peripheral expansion slots. Refer to the following chart.

<table>
<thead>
<tr>
<th>Module Models</th>
<th>DA-682A</th>
<th>DA-710</th>
<th>DA-683</th>
<th>DA-681A</th>
</tr>
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<tbody>
<tr>
<td>DA-SP08-DB 8-port Serial Module (RS-232/224/485)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>–</td>
</tr>
<tr>
<td>DA-SP08-I-DB 8-port Serial Module (RS-232/224/485)</td>
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<td>✓</td>
<td>✓</td>
<td>–</td>
</tr>
<tr>
<td>DA-SP08-I-TB 8-port Serial Module (RS-232/224/485)</td>
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<tr>
<td>DA-LN04-RJ 4-port LAN Module (10/100 Mbps)</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>DA-SW08-RJ 8-port Switch Module (10/100 Mbps)</td>
<td>✓</td>
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</tr>
<tr>
<td>DA-UPCI-DK PCI Module</td>
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<tr>
<td>DA-FX04-MM-ST-T 4-port Fiber LAN Module (100 Mbps)</td>
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<tr>
<td>DA-SP08-I-EMC4-DB 8-port Serial Module with DB9 connector and digital isolation</td>
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<td>✓</td>
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</tr>
<tr>
<td>DA-SP08-I-EMC4-TB 8-port Serial Module with terminal block connector and digital isolation</td>
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<td>✓</td>
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<tr>
<td>DA-IRIGB-4DIO-PCI104-EMC4 Time Synchronization Module</td>
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</tr>
</tbody>
</table>

Ordering Information

Available Models
- DA-IRIGB-4DIO-PCI104-EMC4: 1 IRIG-B signal input port, 3 digital inputs, 4 digital outputs  
- DA-SP08-I-DB: 8-port RS-232/424/485 serial module with DB9 connector and digital isolation  
- DA-SP08-DB: 8-port RS-232/424/485 serial module with DB9 connector  
- DA-SP08-I-TB: 8-port RS-232/424/485 serial module with terminal block connector and digital isolation  
- DA-SP08-DB: 8-port RS-232/424/485 serial module with digital isolation  
- DA-SW08-RJ: 8-port 10/100 Mbps unmanaged switch module  
- DA-LN04-RJ: 4-port 10/100 Mbps LAN module  
- DA-UPC1-DK: Universal PCI development kit  
- DA-FX04-MM-ST-T: 4-port (100BaseFX) fiber LAN module with multi-mode, ST connector, supports IP Teaming  
- DA-SP08-I-EMC4-DB: 8-port RS-232/224/485 serial module with DB9 connector, digital isolation, and capable of withstanding EMS Level 4 environments  
- DA-SP08-I-EMC4-TB: 8-port RS-232/224/485 serial module with terminal block connector, digital isolation, and capable of withstanding EMS Level 4 environments

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Serial Ports</th>
<th>Isolation</th>
<th>Switch</th>
<th>LAN</th>
<th>Connector Type</th>
<th>PCI</th>
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<tr>
<td></td>
<td>2V</td>
<td>RS-232/224/485</td>
<td>RS-232/224/485</td>
<td>Fiber 100 Mbps (RJ45)</td>
<td>RJ45</td>
<td>Terminal Block</td>
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<tr>
<td>DA-UPC1-DK</td>
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<td>–</td>
</tr>
<tr>
<td>DA-FX04-MM-ST-T</td>
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<td>✓</td>
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<tr>
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<tr>
<td>DA-SP08-I-EMC4-TB</td>
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<td>✓</td>
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</tr>
</tbody>
</table>
UC-8100 Series

Communication-centric RISC computing platform

> ARMv7 Cortex-A8 300/600/1000 MHz processor
> Dual auto-sensing 10/100 Mbps Ethernet ports
> SD socket for storage expansion and OS installation
> Rich programmable LEDs and a programmable button for easy installation and maintenance
> Mini PCIe socket for cellular module
> Debian ARM 7 open platform
> Cybersecurity

Overview

The UC-8100 computing platform is designed for embedded data acquisition applications. The computer comes with one or two RS-232/422/485 serial ports and dual 10/100 Mbps Ethernet LAN ports, as well as a Mini PCIe socket to support cellular modules. These versatile communication capabilities let users efficiently adapt the UC-8100 to a variety of complex communications solutions.

The UC-8100 is built around a Cortex-A8 RISC processor that has been optimized for use in energy monitoring systems, but is widely applicable to a variety of industrial solutions. With flexible interfacing options, this tiny embedded computer is a reliable and secure gateway for data acquisition and processing at field sites as well as a useful communication platform for many other large-scale deployments. Wide temperature (T) models* are also available for extended temperature applications. All units are thoroughly tested in a testing chamber, guaranteeing that the computing platforms are suitable for wide temperature applications.

Appearance

Front View

- USB/Power LED x 2
- Diagnosis/Programmable LED x 3
- 10/100 Mbps Ethernet Port x 2
- SD/SIM Card Holder
- Wireless Antenna x 2 (only available in cellular module accessories)
- USB 2.0 Port
- SD LED
- Signal Strength LED x 3

Top View

- Programmable Button
- Power Input
- Console Port
- Serial Port 1 (RS-232/422/485)

Bottom View

- Serial Port 2 (RS-232/422/485)
Hardware Specifications

Computer
- CPU: ARMv7 Cortex-A8 300/600/1000 MHz
- USB: USB 2.0 hosts x 1, Type A connector
- DRAM: DDR3 SDRAM:
  - UC-8112-LX: 512 MB
  - UC-8162-LX: 512 MB
  - UC-8132-LX: 256 MB
  - UC-8131-LX: 256 MB
- OS (pre-installed): Debian ARM 7 (Kernel 3.2)

Storage
- Storage Expansion:
  - SDHC/SDXC socket for storing OS and storage expansion
  - 1 GB SD card with OS pre-installed
  - MicroSD socket for storage expansion (UC-8112-LX only)
  - 2 GB MicroSD cards with OS pre-installed (UC-8112-LX only)

Ethernet Interface
- LAN: Auto-sensing 10/100 Mbps ports (RJ45) x 2
- Magnetic Isolation Protection: 1.5 kV built-in

Serial Interface
- Serial Standards: RS-232/422/485 ports, software-selectable (5-pin terminal block connector) x 1 or 2
- Console Port: RS-232 (TxD, RxD, GND), 4-pin pin header output (115200, n, 8, 1)

Serial Communication Parameters
- Data Bits: 5, 6, 7, 8
- Stop Bits: 1, 1.5, 2
- Parity: None, Even, Odd, Space, Mark
- Flow Control: XON/XOFF, ADDC® (automatic data direction control) for RS-485
- Baudrate: Max. 921600 bps

Serial Signals
- RS-232: TxD, RxD, RTS, CTS, GND
- RS-422: TxD+, TxD-, RxD+, RxD-, GND
- RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
- RS-485-2w: Data+, Data-, GND

LEDs
- System: Power x 1, USB x 1, SD x 1, signal strength x 3 (UC-8112/8162/8132 with cellular module)
- LAN: 10M/100M on connector
- Programmable: Diagnosis x 3

Switches and Buttons
- Push Button: Initially configured to return a diagnostic report, and to reset the device to factory defaults

Physical Characteristics
- Housing: Polycarbonate plastic
- Weight: 224 g (0.50 lb)
- Dimensions: 101 x 27 x 128 mm (3.98 x 1.06 x 5.04 in)
- Mounting: DIN-rail, wall (with optional kit)

Environmental Limits
- Operating Temperature:
  - Standard Models: -10 to 60°C (14 to 140°F)
  - Wide Temp. Models: -40 to 75°C (-40 to 167°F)
- Storage Temperature: -40 to 80°C (-40 to 176°F)
- Ambient Relative Humidity: 5 to 95% (non-condensing)
- Anti-Vibration: 2 Grms @ IEC 60068-2-64, random wave, 5-500 Hz, 1 hr per axis (without any USB devices attached)
- Anti-Shock: 20 g @ IEC 60068-2-27, half sine wave, 30 ms

Power Requirements
- Input Voltage: 12 to 24 VDC (3-pin terminal block, V+, V-, SG)
- Input Current:
  - 450 mA @ 12 VDC
  - 225 mA @ 24 VDC
- Power Consumption: 5.4 W (without cellular module and external USB device attached)

Standards and Certifications
- Safety: UL 60950-1, EN 60950-1
- EMC: EN 61000-6-2/6-4
- EMI: CISPR 22, FCC Part 15B Class A
Software Specifications

Linux
OS: Debian ARM 7
Web Server (Apache): Allows you to create and manage web sites; supports PHP and XML
Terminal Server (SSH): Provides secure encrypted communications between two un-trusted hosts over an insecure network
Kernel: GNU/Linux 3.2
System Shell: DASH (default), BASH
Text Editor: vim, nano
Internet Protocol Suite: TCP, UDP, IPv4, IPv6, SNMPv2, ICMP, ARP, HTTP, CHAP, PAP, HDCP, NTP, NFS, SSH, PPP, SFTP, RSYSYN, SSL
Programming Language Support: PHP, Perl, Python
Internet Security Suite: OpenVPN, iptables
Cryptographic Hardware Accelerators: AES, SHA, OpenSSL
Self Diagnosis: Check status of system and hardware component via software method

Cellular Networking: (UC-8132-LX, UC-8162-LX, UC-8112-LX only)
• WVDIAL: Point-to-Point Protocol dialer that dials a modem and starts pppd to connect to the Internet.
• QMI (Qualcomm MSM Interface): Glib-based library for talking to WWAN modems and devices that speak the Qualcomm MSM Interface (QMI) protocol.

• MODBUS: Software library to send/receive data according to the Modbus protocol. This library is written in C and supports RTU (serial) and TCP (Ethernet) communications.
• Watchdog: Features a hardware function to trigger system reset in a user specified time interval (Linux standard API).

Cybersecurity:
• Secure Boot: A novel authentication algorithm proposed to secure platform integration. Only trusted Linux kernel and bootloader should be executed (Patent Pending).
• SUDO Mechanism: Sudo (sometimes considered short for Super-user Do) is a program designed to let system administrators allow some users to execute some commands as root (or another user). The basic philosophy is to give as few privileges as possible but still allow people to get their work done, and the Root account is disabled by default.
• Security Update of existing software packages: All packages in the UC-8100 could be updated for security purposes via Debian or Moxa’s Advanced Packaging Tool (APT) server.
• USB Protection: Provides a mechanism for disabling USB function to avoid USB stick malware attacks.
• SD Write Protection: Provides a mechanism for disabling SD write permission both in the filesystem SD and extended storage SD. (Note: Extended storage SD is only supported by the UC-8112-LX).

Reliability
Alert Tools: Built-in RTC (real-time clock)
Automatic Reboot Trigger: Built-in WDT (watchdog timer)

Ordering Information

<table>
<thead>
<tr>
<th>Model</th>
<th>CPU</th>
<th>RAM</th>
<th>Serial</th>
<th>Ethernet</th>
<th>Mini PCIe Socket for Wireless Module</th>
<th>Micro SD Socket</th>
<th>SD Socket</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC-8112-LX</td>
<td>1 Ghz</td>
<td>512 MB</td>
<td>2</td>
<td>2</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(2 GB MicroSD card with OS pre-installed)</td>
<td>(SD card not attached)</td>
<td></td>
</tr>
<tr>
<td>UC-8162-LX</td>
<td>600 Mhz</td>
<td>512 MB</td>
<td>2</td>
<td>2</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(1 GB SD card with OS pre-installed)</td>
<td>(1 GB SD card with OS pre-installed)</td>
<td></td>
</tr>
<tr>
<td>UC-8132-LX</td>
<td>300 Mhz</td>
<td>256 MB</td>
<td>2</td>
<td>2</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(1 GB SD card with OS pre-installed)</td>
<td>(1 GB SD card with OS pre-installed)</td>
<td></td>
</tr>
<tr>
<td>UC-8131-LX</td>
<td>300 Mhz</td>
<td>256 MB</td>
<td>1</td>
<td>2</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Package Checklist (computer)
• UC-8100 embedded computer
• Power jack
• 3-pin terminal block for power
• 5-pin terminal block for UART x 2
## Optional Accessories

### Power Adapters & Cords, Console Cable

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapter</td>
<td>PWR-24250-DT-S1</td>
<td>Power adapter with input: 100-240 VAC, 50-60 Hz, 1.5 A Output: 24 VDC, 2.5 A, 60 W for test and system development in the office under ambient temperature</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7US-2B-183</td>
<td>Power cord with 2-pin connector, USA plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7EU-2B-183</td>
<td>Power cord with 2-pin connector, Euro plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7UK-2B-183</td>
<td>Power cord with 2-pin connector, British plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7AU-2B-183</td>
<td>Power cord with 2-pin connector, Australia plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7CN-2B-183</td>
<td>Power cord with 2-pin connector, China plug</td>
</tr>
<tr>
<td>Console Cable</td>
<td>CBL-F9DPF1x4-BK-100</td>
<td>Console cable with 4-pin connector</td>
</tr>
</tbody>
</table>

### Wireless Package

<table>
<thead>
<tr>
<th>Package</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cellular Package</td>
<td>CELLULAR-LTE-US</td>
<td>LTE module mounting package:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cellular module x 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• i-PEX MHF to SMA adapter with cable x 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mini PCI/e mounting screw sets x 2</td>
</tr>
<tr>
<td>Cellular Package</td>
<td>CELLULAR-LTE-EU</td>
<td>LTE module mounting package:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cellular module x 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• i-PEX MHF to SMA adapter with cable x 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mini PCI/e mounting screw sets x 2</td>
</tr>
<tr>
<td>Cellular Package</td>
<td>CELLULAR-3G-EVDO-HSPA+</td>
<td>3G module mounting package:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Cellular module x 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• i-PEX MHF to SMA adapter with cable x 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mini PCI/e mounting screw sets x 2</td>
</tr>
<tr>
<td>WiFi Package</td>
<td>WiFi-BGN</td>
<td>WiFi module mounting package:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• WiFi module x 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• i-PEX MHF to RP-SMA adapter with cable x 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mini PCI/e mounting screw sets x 2</td>
</tr>
</tbody>
</table>

### Antennas and Internal Antenna Cables

<table>
<thead>
<tr>
<th>Antenna</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS Antenna</td>
<td>ANT-GPS-OSM-05-3M</td>
<td>Active GPS antenna, 26 dBi, 1572 MHz, L1 band antenna for GPS</td>
</tr>
<tr>
<td>3G Antenna</td>
<td>ANT-3G-SMA</td>
<td>SMA male antenna for cellular, support bands: 850/900/1800/1900/2100 MHz</td>
</tr>
<tr>
<td>WiFi Antenna</td>
<td>ANT-WDB-ARM-02</td>
<td>RP-SMA male antenna for WiFi, support bands: 2.4 Ghz</td>
</tr>
<tr>
<td>Cellular antenna cable</td>
<td>A-CRF-MHFSF</td>
<td>i-PEX MHF (male, on cellular module) to SMA (female, on top cover) adapter with cable. For when you need to install a GPS antenna or second cellular antenna.</td>
</tr>
<tr>
<td>WiFi antenna cable</td>
<td>CRF-MHF/SMA(M)-14.2</td>
<td>i-PEX MHF (male, on cellular module) to RP-SMA (female, on top cover) adapter with cable. For when you need to install a second WiFi antenna.</td>
</tr>
</tbody>
</table>

### Mounting Kits

<table>
<thead>
<tr>
<th>Kit</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall-mounting Kit</td>
<td>WALL_MOUNT-8100-01</td>
<td>Wall-mounting kit with screws</td>
</tr>
</tbody>
</table>
Railway Computers

Product Selection Guide

Railway Computers .................................................. 22-2

Onboard Computers

TC-6110 Series: EN 50155-compliant x86 train computer with dual LAN ports, dual power inputs, USB, VGA, serial port, CompactFlash, and 4 expansion slots .................................................. 22-4

TC-6000 Series Expansion Modules: Peripheral modules for the TC-6000 series ........................................ 22-8

V2616A Series: x86 embedded computer with Intel Core i5/i7 processor, dual M12 Ethernet ports, serial interfaces, 6 DIs, 2 DOs, VGA and DVI-D, 3 USB ports, 3 SATA interfaces, 2 removable drive trays, CFast card .............. 22-11

V2406A Series: x86 embedded computer with Intel Celeron/Core i7 CPU, VGA, DVI, dual M12 Ethernet ports, 4 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, dual CFast slots .................................................. 22-15

V2416A Series: x86 embedded computer with Intel Celeron/Core i7 CPU, VGA, DVI, dual M12 Ethernet ports, 4 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, dual CFast slots, 2 hot-swappable storage trays .................. 22-20

V2426A Series: x86 embedded computer with Intel Celeron/Core i7 CPU, VGA, DVI, dual M12 Ethernet ports, 4 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, dual CFast slots, 2 peripheral expansion slots, 12 to 48 VDC power 22-25

V2400 Series Expansion Modules: Expansion peripheral modules (EPM) for the V2400A series .................. 22-31

(Mobile) Multiple WAN Computers

UC-8481 Series: Industrial RISC-based mobile Linux computers with cellular, Wi-Fi, and GPS modules, 2 Ethernet, 2 serial, 2 USB 2.0 ports, and 2 mini PCIe sockets .................................................. 22-35

Mobile Networking Appliances

RNAS-1200 Series: Network-attached storage with 2 M12 gigabit PoE/PoE+ LAN ports and -40 to 70°C temperature tolerance .................................................. 22-40
### Railway Computers

#### V2416A Series
- **CPU**: Intel Atom D2600 (dual-core, 1.8 GHz)
- **Memory**: 2GB pre-installed
- **Storage**: 2.5-inch SSD or HDD storage drive
- **Expansion**: 1 full-size/half-size mini PCI socket with 1 SIM card socket, Mini PCI socket supports power-on/off control
- **Display**: LVDS (up to 1920 x 1200 resolution @ 60 Hz)
- **Internal**: 1 internal SATA-II bus for 2.5-inch SSD or HHD
- **Ethernet**: LAN (Auto-sensing 10/100/1000 Mbps ports)
- **USB**: 2 software-selectable RS-232/422/485 ports
- **RS-232**: 1 RS-232 port (DB9 male)
- **RS-422/485**: 4 RS-232/422/485 ports, software selectable
- **I/O**: 32 I/O pins
- **Power**: 24 VDC nominal, open collector to 30 VDC
- **Ambient Temperature**: -25 to 60°C (-13 to 140°F)
- **Humidity**: 5 to 95% (non-condensing)
- **Warranty**: 3 years

#### V2406A Series
- **CPU**: Intel Core i7-3612QE (2.1 GHz)
- **Memory**: 4GB pre-installed
- **Storage**: 2.5-inch SSD or HDD storage drive
- **Expansion**: 1 full-size/half-size mini PCI socket with 1 SIM card socket, Mini PCI socket supports power-on/off control
- **Display**: LVDS (up to 1920 x 1080 resolution @ 60 Hz)
- **Internal**: 1 internal SATA-II bus for 2.5-inch SSD or HHD
- **Ethernet**: LAN (Auto-sensing 10/100/1000 Mbps ports)
- **USB**: 2 software-selectable RS-232/422/485 ports
- **I/O**: 32 I/O pins
- **Power**: 24 VDC nominal, open collector to 30 VDC
- **Ambient Temperature**: -25 to 60°C (-13 to 140°F)
- **Humidity**: 5 to 95% (non-condensing)
- **Warranty**: 3 years

#### V22-20
- **CPU**: Intel Atom D2600 (dual-core, 1.8 GHz)
- **Memory**: 2GB pre-installed
- **Storage**: 2.5-inch SSD or HDD storage drive
- **Expansion**: 1 full-size/half-size mini PCI socket with 1 SIM card socket, Mini PCI socket supports power-on/off control
- **Display**: LVDS (up to 1920 x 1200 resolution @ 60 Hz)
- **Internal**: 1 internal SATA-II bus for 2.5-inch SSD or HHD
- **Ethernet**: LAN (Auto-sensing 10/100/1000 Mbps ports)
- **USB**: 2 software-selectable RS-232/422/485 ports
- **I/O**: 32 I/O pins
- **Power**: 24 VDC nominal, open collector to 30 VDC
- **Ambient Temperature**: -25 to 60°C (-13 to 140°F)
- **Humidity**: 5 to 95% (non-condensing)
- **Warranty**: 3 years

#### V22-21
- **CPU**: Intel Core i7-3612QE (2.1 GHz)
- **Memory**: 4GB pre-installed
- **Storage**: 2.5-inch SSD or HDD storage drive
- **Expansion**: 1 full-size/half-size mini PCI socket with 1 SIM card socket, Mini PCI socket supports power-on/off control
- **Display**: LVDS (up to 1920 x 1080 resolution @ 60 Hz)
- **Internal**: 1 internal SATA-II bus for 2.5-inch SSD or HHD
- **Ethernet**: LAN (Auto-sensing 10/100/1000 Mbps ports)
- **USB**: 2 software-selectable RS-232/422/485 ports
- **I/O**: 32 I/O pins
- **Power**: 24 VDC nominal, open collector to 30 VDC
- **Ambient Temperature**: -25 to 60°C (-13 to 140°F)
- **Humidity**: 5 to 95% (non-condensing)
- **Warranty**: 3 years
## Railway Computers

<table>
<thead>
<tr>
<th>Details</th>
<th>V2426A Series</th>
<th>UC-8481 Series</th>
<th>RNAS-1200 Series</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Warranty Period</strong></td>
<td>–</td>
<td>5 years</td>
<td>5 years (storage drive not included)</td>
</tr>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>-25 to 75°C (-13 to 131°F)</td>
<td>-25 to 75°C (-13 to 131°F) or -25 to 70°C (-13 to 176°F)</td>
<td>-25 to 75°C (-13 to 131°F) or -25 to 70°C (-13 to 176°F)</td>
</tr>
<tr>
<td><strong>Ambient Relative Humidity</strong></td>
<td>5 to 95% (non-condensing)</td>
<td>5 to 95% (non-condensing)</td>
<td>5 to 95% (non-condensing)</td>
</tr>
<tr>
<td><strong>Anti-Shock</strong></td>
<td>EN 5155 standard</td>
<td>EN 5155 standard</td>
<td>EN 5155 standard</td>
</tr>
<tr>
<td><strong>Anti-Vibration</strong></td>
<td>IEC 61373 standard</td>
<td>IEC 61373 standard</td>
<td>IEC 61373 standard</td>
</tr>
<tr>
<td><strong>Conformal Coating</strong></td>
<td>Available on request</td>
<td>–</td>
<td>Available on request</td>
</tr>
<tr>
<td><strong>Power Requirements</strong></td>
<td>–</td>
<td>–</td>
<td>Available on request</td>
</tr>
<tr>
<td><strong>Input Voltage</strong></td>
<td>12 to 48 VDC (M12 A-coded)</td>
<td>24 VDC (9 to 48 V), M12 connector</td>
<td>PoE (IEEE 802.3at), or PoE+ (IEEE 802.3at)</td>
</tr>
<tr>
<td><strong>Power Consumption</strong></td>
<td>47 W</td>
<td>20 W</td>
<td>25.5 W</td>
</tr>
<tr>
<td><strong>Standards and Certifications</strong></td>
<td>UL 60950-1, EN 60950-1</td>
<td>UL 60950-1, EN 60950-1</td>
<td>UL 60950-1</td>
</tr>
<tr>
<td><strong>Computer</strong></td>
<td>Intel Celeron 1047UE (1.4 GHz), Intel Core i7-3517UE (1.7 GHz)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>CPU</strong></td>
<td>Intel i7-3517UE (1.7 GHz)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>OS</strong></td>
<td>Windows Embedded Standard 7 or Linux Debian 7</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>System Chipset</strong></td>
<td>Mobile InteI® HM65 Express</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>System Memory</strong></td>
<td>1 DDR3-1600 SO-DIMM SDRAM slot, 8 GB max., 4 GB pre-installed</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>USB</strong></td>
<td>USB 2.0 hosts x 3 (Type A connectors x 2, M12 D-coded x 1)</td>
<td>USB 2.0 hosts x 2</td>
<td>USB 2.0 hosts x 2</td>
</tr>
<tr>
<td><strong>DRAM</strong></td>
<td>–</td>
<td>512 MB DDR2 SDRAM onboard, 32 MB NAND Flash, 512 MB NAND Flash</td>
<td>512 MB DDR3</td>
</tr>
<tr>
<td><strong>Flash Memory</strong></td>
<td>–</td>
<td>Onboard 2 GB USB DOM to store OS</td>
<td>–</td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>HDD/SSD Support</strong></td>
<td>1 internal SATA-II bus for 2.5-inch HDD/SSD storage expansion*</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Drives</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Graphics Controller</strong></td>
<td>Intel® HD Graphics 4000 (integrated)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Connectors</strong></td>
<td>2 DVI-I connectors</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Display Interface</strong></td>
<td>DVI up to 1024x1200 resolution @ 60 Hz, VGA up to 1280x1024 resolution @ 75 Hz</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Ethernet Interface</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>LAN</strong></td>
<td>Auto-sensing 10/100/1000 Mbps ports (M12 X-coded) x 2</td>
<td>Auto-sensing 10/100 Mbps ports (M12) x 2</td>
<td>Auto-sensing 10/100/1000 Mbps ports (M12) x 2</td>
</tr>
<tr>
<td><strong>Magnetic Isolation Protection</strong></td>
<td>–</td>
<td>1.5 kV built in</td>
<td>–</td>
</tr>
<tr>
<td><strong>Physical Characteristics</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Housing</strong></td>
<td>Aluminum</td>
<td>SECC sheet metal (1 mm)</td>
<td>Aluminum</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>3 kg (6.67 lb)</td>
<td>1 kg (2.2 lbs)</td>
<td>1.88 kg (4.2 lbs) (RNAS-1201-T)/2 kg (4.4 lbs) (RNAS-1211-T)</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>354 x 228 x 76 mm (9.92 x 9.05 x 3.0 in)</td>
<td>200 x 57 x 120 mm (7.87 x 2.24 x 4.72 in)</td>
<td>210 x 122 x 43 mm (8.3 x 4.8 x 1.7 in)</td>
</tr>
<tr>
<td><strong>Environmental Limits</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Power Inputs</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Input Voltage</strong></td>
<td>24 VDC (9 to 48 V), M12 connector</td>
<td>24 VDC nominal, open collector to 30 VDC</td>
<td>24 VDC nominal, open collector to 30 VDC</td>
</tr>
<tr>
<td><strong>Input Current</strong></td>
<td>Max. 200 mA per channel</td>
<td>Max. 200 mA per channel</td>
<td>–</td>
</tr>
<tr>
<td><strong>Connector</strong></td>
<td>10-pin screw-fastened Euroblock terminal (6 inputs, 2 outputs, D-coded x 1)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Digital IO</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Input Channels</strong></td>
<td>6</td>
<td>4</td>
<td>–</td>
</tr>
<tr>
<td><strong>Input Voltage</strong></td>
<td>0 to 30 VDC at 5 Hz</td>
<td>0 to 30 VDC</td>
<td>0 to 30 VDC</td>
</tr>
<tr>
<td><strong>Digital Inputs for Digital Outputs</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Dry Contacts</strong></td>
<td>Logic level 0: Close to GND</td>
<td>Logic level 0: Close to GND</td>
<td>Logic level 0: Close to GND</td>
</tr>
<tr>
<td><strong>Digital Outputs</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Output Channels</strong></td>
<td>2, sink type</td>
<td>4, sink type</td>
<td>–</td>
</tr>
<tr>
<td><strong>Output Current</strong></td>
<td>Max. 200 mA per channel</td>
<td>Max. 200 mA per channel</td>
<td>–</td>
</tr>
<tr>
<td><strong>Anti-Shock</strong></td>
<td>EN 5155 standard</td>
<td>EN 5155 standard</td>
<td>EN 5155 standard</td>
</tr>
<tr>
<td><strong>Anti-Vibration</strong></td>
<td>IEC 61373 standard</td>
<td>IEC 61373 standard</td>
<td>IEC 61373 standard</td>
</tr>
<tr>
<td><strong>Conformal Coating</strong></td>
<td>Available on request</td>
<td>–</td>
<td>Available on request</td>
</tr>
<tr>
<td><strong>Power Requirements</strong></td>
<td>–</td>
<td>–</td>
<td>Available on request</td>
</tr>
<tr>
<td><strong>Input Voltage</strong></td>
<td>12 to 48 VDC (M12 A-coded)</td>
<td>24 VDC (9 to 48 V), M12 connector</td>
<td>PoE (IEEE 802.3at), or PoE+ (IEEE 802.3at)</td>
</tr>
<tr>
<td><strong>Power Consumption</strong></td>
<td>47 W</td>
<td>20 W</td>
<td>25.5 W</td>
</tr>
<tr>
<td><strong>Standards and Certifications</strong></td>
<td>UL 60950-1, EN 60950-1</td>
<td>UL 60950-1, EN 60950-1</td>
<td>UL 60950-1</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>EMC</strong></td>
<td>EN 55022/24</td>
<td>EN 55022 Class B, EN 55024-4-2, EN 55024-4-3, EN 55024-4-4, FCC Part 15 Subpart B Class B</td>
<td>EN 55022 Class A, EN 61000-3-2, EN 61000-3-3, EN 55024</td>
</tr>
<tr>
<td><strong>EMI</strong></td>
<td>EN 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11</td>
<td>–</td>
<td>FCC Part 15 Subpart B Class A, CISPR 22/2008</td>
</tr>
<tr>
<td><strong>Antenna</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Rail Traffic</strong></td>
<td>EN 50155*, EN 50121-3-2, EN 50121-4, IEC 60571</td>
<td>EN 50155*, EN 50121-2-3, EN 50121-4, IEC 61373</td>
<td>EN 50155 (essential compliance*), EN 50121-3-2, IEC 61373</td>
</tr>
<tr>
<td><strong>Warranty</strong></td>
<td>3 years</td>
<td>5 years (does not apply to cellular module)</td>
<td>5 years (storage drive not included)</td>
</tr>
<tr>
<td><strong>Details</strong></td>
<td>See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a></td>
<td>See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a></td>
<td>See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a></td>
</tr>
<tr>
<td><strong>Product Selection Guide</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>
TC-6110 Series

EN 50155-compliant x86 train computer with dual LAN ports, dual power inputs, USB, VGA, serial port, CompactFlash, and 4 expansion slots

- Durable, fanless design for rolling stock applications
- Modular design for easy storage and peripheral expansion
- Comes with Moxa SafeGuard™, for HDD in wide temperature and high vibration environments
- Compact rackmount 3U housing, wide 24 to 110 VDC isolated power supply
- Supports SNMP-based system configuration, control, and monitoring
- Essential compliance with EN 50155*
- Conformal coating models available

* Moxa defines “essential compliance” to include those EN 50155 requirements that make products more suitable for rolling stock railway applications.

Introduction

TC-6110 train computers are designed specifically for car-borne train automation like network video recorders, passenger information systems, condition monitoring, and train-to-ground communications. The computers come with two gigabit LAN ports, one RS-232 serial port, three USB 2.0 ports, and two TC-SATA-T storage modules, giving customers a versatile solution for on-board train computing.

Designed for high reliability in the demanding conditions experienced in on-board train environments, TC-6110 computers come with M12 connectors on both the gigabit LAN ports and dual power inputs, and an additional M12 USB port. The TC-6000 Series expansion modules further allow for highly flexible, convenient integration into a variety of systems. Users can easily add storage modules for additional capacity, gigabit switch modules to expand network connectivity and/or bandwidth, serial and CAN bus modules for additional serial/CAN device connectivity, or mini PCIe modules for additional peripheral communications.

For the strongest component protection in harsh environments, TC-6110 Series computers are available with conformal coating.

Appearance

![Diagram of TC-6110 Series train computer with various ports and LEDs]
Hardware Specifications

**Computer**
- **CPU**: Intel Atom D525, dual-core 64-bit threaded 1.8 GHz, 1 MB for L2 cache
- **OS**: Windows Embedded Standard 7 or Linux
  - Note: The OS is pre-installed.
- **System Chipset**: ICH8-M
- **System Memory**: 4 GB capacity, 2 GB pre-installed; 2 slots of 2 GB DDR3-1066 204 pin SO-DIMM SDRAM
- **USB**: USB 2.0 hosts x 3 (Type A connectors x 2, supporting system boot up, M12 connectors x 1)

**Storage**
- **Built-in**: 8 GB onboard industrial CompactFlash card for operating system storage
- **HDD Support**: 2 removable TC-SATA-T storage trays, for 2.5-inch SSD or HDD storage drive (with Intelligent Heating Solution)

**Other Peripherals**
- **Audio**: 1 line in / line out interface with M12 connector
- **Independent Sensors**: Accelerometer (G-sensor), thermometer (T-sensor)
- **Display**
  - **Graphics Controller**: Integrated Intel GMA 3150 (Pineview) Graphics Engine
  - **VGA Interface**: Up to 2048 x 1536 resolution at 75 Hz, DB9 female connector

**Ethernet Interface**
- **LAN**: Auto-sensing 10/100/1000 Mbps ports (M12) x 2

**GPS Module**
- **Receiver Types**: 50 channels, GPS L1 C/A code, SBAS (WAAS), EGNOS, MSAS, GAGAN
- **Acquisition**:
  - Cold start: 29 s
  - Warm start: 29 s
  - Aided start: 1 s
  - Hot start: 1 s
- **Sensitivity**:
  - Tracking & Navigation: -160 dBm
  - Reacquisition: -160 dBm
  - Cold start: -147 dBm
- **Accuracy**:
  - Autonomous: 2.5 m
  - SBAS: 2.0 m
- **Protocols**: NMEA, UBX binary, max. update rate: 5 Hz (ROM version)
- **Time Pulse**: 0.25 Hz to 1 kHz
- **Velocity Accuracy**: 0.1 m/s
- **Heading Accuracy**: 0.5°
- **A-GPS**: AssistNow Online/Offline, SUPL (Open Mobile Alliance) compliant

**Operational Limits**
- **Dynamics**: ≤ 4 g
- **Altitude**: 50,000 m
- **Velocity**: 500 m/s

**Connector Type**: QMA

**WLAN Module** (Available on request)
- **Standards**: IEEE 802.11 a/b/g/n for wireless LAN
- **Security**: WEP, TKIP, and AES hardware encryption
- **Antenna Type**: 2 QMA connectors (female type)
- **Mode**: Client (default), Access Point (available on request)

**Serial Interface**
- **Serial Standards**: 1 RS-232 port (DB9 male)
- **Data Bits**: 5, 6, 7, 8
- **Stop Bits**: 1, 1.5, 2
- **Parity**: None, Even, Odd, Space, Mark
- **Flow Control**: RTS/CTS
- **Baudrate**: Up to 115.2 kbps

**Serial Signals**
- **RS-232**: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND

**LEDs**
- **System**: Independent “Power” and “System Ready” signals
- **LAN**: 1000M/Link x 2, 1000M/Link x 2
- **Serial**: TX x 1, RX x 1
- **Other**: Programmable x 4

**Physical Characteristics**
- **Housing**: Aluminum and SECC sheet metal (1 mm)
- **Weight**: 5 kg (11.11 lb)
- **Dimensions**:
  - Without ears: 210 x 222 x 133 mm (8.27 x 8.74 x 5.24 in)
  - With ears: 210 x 269 x 133 mm (8.27 x 10.60 x 5.24 in)
- **Mounting**: Rack

**Environmental Limits**
- **Operating Temperature**:
  - Standard models: -25 to 55°C (-13 to 140°F), (EN 50155 Class T1)
  - Wide temp. models: -40 to 70°C (-40 to 158°F), (EN 50155 Class Tx)
- **Storage Temperature**: -40 to 85°C (-40 to 185°F)
- **Ambient Relative Humidity**: 5 to 95% (non-condensing)
- **Anti-Vibration**: Meets EN 50155 standard
- **Anti-Shock**: Meets EN 50155 standard

**Power**
- **Reset Button**: For warm reboot (front panel)
- **Input Voltage**: 24 to 110 VDC, M12 connector
- **Power Consumption**: 32 W (without heater), 62 W (with heater), no SSD/HDD attached

**Standards and Certifications**
- **Safety**: UL 60950-1, CSA C22.2 No. 60950-1-07, EN 60950-1
- **Reliability**
  - **Automatic Reboot Trigger**: Built-in WDT (watchdog timer) supporting system reset with software programmable time intervals of 1-255
  - **MTBF**: (mean time between failures)
  - **Time**: 360,616 hrs
  - **Standard**: Telcordia (Bellcore) Standard TR/SR

**Warranty**
- **Warranty Period**: 3 years
- **Details**: See www.moxa.com/warranty

*Note: These hardware specifications describe the embedded computer unit itself, but not its official accessories. In particular, the wide temperature specification does not apply to accessories such as power adapters and cables.*
**Software Specifications**

**Linux**
- **OS:** Linux Debian 7
- **Web Server (Apache):** Allows you to create and manage websites; supports PHP and XML
- **File System:** EXT 4
- **Internet Protocol Suite:** TCP, UDP, IPv4, SNMPv1/v2c/v3, ICMP, ARP, HTTP, SSH 1.0/2.0, SSL, DHCP, NTP, NFS, Telent FTP, TFTP, PPP, PPoE
- **Internet Security:** OpenVPN, iptables firewall
- **Secure Shell for Remote Access:** SSH allows remote logins to a secure encrypted console from any connected network Dial-up Networking: PPP Daemon for Linux that allows Unix machines to connect to the Internet through dialup lines, using the Point-to-Point Protocol (PPP). Works with ‘chat’, ‘dip’, and ‘dialup’ dip’, and ‘diald’, among (many) others. Supports IP, TCP, UDP, and (for Linux) IPX (Novell).
- **File Server:** Enables remote clients to access files and other resources over the network
- **Watchdog:** A watchdog timer that triggers a system reset upon software freezes, for both specific applications and system-wide failures.
- **Application Development Software:**
  - Moxa API Library
  - GNU C/C++ cross-compiler
  - GNU C library
  - Perl
- **Software Package:**
  - SNMP
  - SafeGaurd technology

**Windows Embedded Standard 7**
- **Core OS:**
  - Windows 7 Embedded, 32 bit
  - Sensor and Location Platform
  - Remote Procedure Call
- **Applications and Services Development:**
  - .Net Framework 4.0
  - Remote Desktop Protocol 7.1
  - COM OLE Application Support
  - COM+ Application Support
  - MSMQ

**Internet Services:**
- **Internet Explorer 8.0**
- **IIS 7.0**

**Diagnostics:**
- Common Diagnostic Tools
- Problem Reports and Solutions

**Fonts:**
- Chinese (Trad. and Simp.), Middle East, South East Asian, and South Asian Fonts
- True Type Fonts

**Graphics and Multimedia:**
- MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
- MPEG Layer-3 Audio Codecs(MP3)
- MPEG4 Decoders
- Windows Media Video VC-1 (WMV) Codecs
- DirectX and Windows Device Experience
- Windows Media Player 12

**Management:**
- Group Policy Management
- Windows Management Instrument (WMI)
- Windows Update

**Networking:**
- Extensible Authentication Protocol (EAP)
- Internet Authentication Service
- Telnet Server
- Bluetooth
- Domain Services
- Network Access Protection
- Network and Sharing Center
- Quality of Service
- Remote Access Service (RAS)
- Telephony API Client
- Windows Firewall
- Wireless Networking

**Security:**
- Credential Roaming Service
- Credentials and Certificate Management
- Windows Authorization Manager (AZMAN)
- Windows Security Center
- Active Directory Rights Management
- Security Base
- Encrypted File System (EFS)
Embedded Features:
- Enhanced Write Filter (EWF)
- File-Based Write Filter (FBWF)
- Message Box Default Reply
- Registry Filter
- WSDAPI for .NET

File Systems and Data Storage:
- Windows Data Access Components
- Windows Backup and Restore

Embedded Self-Health Diagnostics: SNMP-based remote scripting layer for monitoring, reporting, and control

Available Models
TC-6110-W7E: Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, WLAN module (available on request), Win7 Embedded (32-bit), -25 to 55°C operating temperature range, compliant with EN 50155 Class T1
TC-6110-T-W7E: Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, WLAN module (available on request), Win7 Embedded (32-bit), -40 to 70°C operating temperature range, compliant with EN 50155 Class TX
TC-6110-CT-W7E: Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, conformal coating, WLAN module (available on request), Win7 Embedded (32-bit), -25 to 55°C operating temperature range, compliant with EN 50155 Class T1
TC-6110-CT-T-W7E: Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, conformal coating, WLAN module (available on request), Win7 Embedded (32-bit), -40 to 70°C operating temperature range, compliant with EN 50155 Class TX
TC-6110-LX: Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, WLAN module (available on request), Linux Debian 7, -25 to 55°C operating temperature range, compliant with EN 50155 Class T1
TC-6110-T-LX: Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, WLAN module (available on request), Linux Debian 7, -40 to 70°C operating temperature range, compliant with EN 50155 Class TX
TC-6110-CT-LX: Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, conformal coating, WLAN module (available on request), Linux Debian 7, -25 to 55°C operating temperature range, compliant with EN 50155 Class T1
TC-6110-CT-T-LX: Modular 3U/42HP train computer, Intel Atom D525 1.8 GHz CPU, 4 expansion slots, 24 to 110 VDC isolated power, conformal coating, WLAN module (available on request), Linux Debian 7, -40 to 70°C operating temperature range, compliant with EN 50155 Class TX

Package Checklist
- TC-6110 train computer
- Rackmount kit
- Power switch with cable extender
- M12 connector (M12A-5P-IP68)
- Power cable (CBL-Power Jack to M12)
- Quick installation guide (printed)
- Documentation and software CD or DVD
- Warranty card
TC-6000 Series Expansion Modules

Peripheral modules for the TC-6000 series

Introduction

TC-6000 series expansion modules provide peripheral interfaces for the TC-6000 series line of railway computers. These modules include a 4-port (without PoE) gigabit or megabit Ethernet switch module with M12 connectors, a mini PCIe card carrier module with four sockets, a serial module supporting four software-selectable RS-232/422/485 interfaces over a single DB44-F connector (cable adapter), and an optically isolated CAN module with two ports.

The modules let system integrators and administrators easily add additional Ethernet ports and/or bandwidth, as well as serial, PCIe, and CAN interfaces to the TC-6000 series of train computers.

All of the TC-6000 modules are compliant with the essential sections of the EN 50155 Class TX standard, maintaining the TC-6000 series goal of offering a highly dependable computing platform suitable for a wide variety of on-board railway applications.

Appearance

TC-6110 Expansion Slot Location

> TC-SP04-DB44-T: 4-port software-selectable RS-232/422/485 over DB44-F serial module
> TC-CP02-DB-T: 2-port optically isolated CAN module
> TC-DK10-T/TC-DK20-T: 4-socket mini PCIe card carrier module
> TC-SW04-M12-4P-T: 4-port megabit Ethernet switch port module with M12 connector
> TC-SW04-M12-8P-T: 4-port gigabit Ethernet switch port module with M12 connector
**TC-SP04-DB44-T Serial Module**

**Serial Port Interface**
- **Serial Standards:** RS-232/422/485, software-selectable
- **Connector Type:** 1 DB44 connector serving all 4 interfaces; special cable required

**Serial Communication Parameters**
- **Data Bits:** 5, 6, 7, 8
- **Stop Bits:** 1, 1.5, 2
- **Parity:** None, Even, Odd, Space, Mark
- **Flow Control:** RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485

**Baudrate:** 50 bps to 921.6 Kbps (non-standard baudrates supported; see user’s manual for details)

**Physical Characteristics**
- **Dimensions:** 186 x 118 x 20 mm (7.32 x 4.65 x 0.79 in)
- **Weight:** 227 g (0.50 lb)

**Environmental Limits**
- **Operating Temperature:** -40 to 70°C (-40 to 158°F) (EN 50155 Class TX)
- **Storage Temperature:** -40 to 85°C (-40 to 185°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)

**TC-CP02-DB-T CAN Module**

**CAN Interface**
- **Interface:** 2 optically isolated CAN 2.0 A/B ports
- **Signal:** CAN_H, CAN_L
- **Isolation:** 2 kV
- **Speed:** 1 Mbps
- **Connector Type:** DB9 male

**Physical Characteristics**
- **Dimensions:** 186 x 118 x 20 mm (7.32 x 4.65 x 0.79 in)
- **Weight:** 227 g (0.50 lb)

**Environmental Limits**
- **Operating Temperature:** -40 to 70°C (-40 to 158°F) (EN 50155 Class TX)
- **Storage Temperature:** -40 to 85°C (-40 to 185°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)

**TC-DK10-T/TC-DK20-T mini PCIe Carrier Module**

**Mini PCIe Card**
- **Interface:** 4 sockets, total
  - Socket 1 on both TC-DK10-T and TC-DK20-T: USB 2.0 / PCIe V1.0
  - Sockets 2, 3, and 4 on the TC-DK10-T: USB 2.0
  - Sockets 2, 3, and 4 on the TC-DK20-T: USB 2.0 / PCIe V1.0
- **SIM Card Socket:** 4 sockets reserved for cellular applications
- **Wireless Antenna Hole:** 5 reserved for QMA antenna connectors

**Physical Characteristics**
- **Dimensions:** 186 x 118 x 20 mm (7.32 x 4.65 x 0.79 in)
- **Weight:** 220 g (0.49 lb)

**Environmental Limits**
- **Operating Temperature:** -40 to 70°C (-40 to 158°F) (EN 50155 Class TX)
- **Storage Temperature:** -40 to 85°C (-40 to 185°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
TC-SW04-M12-4P-T/TC-SW04-M12-8P-T Switch Module

**Ethernet Interface**
- Standard: 4 Ethernet M12 switch ports: auto-sensing 10/100 Mbps (TC-SW04-M12-4P-T) or 10/100/1000 Mbps (TC-SW04-M12-8P-T)
- Protection: 1.5 kV magnetic isolation protection
- Connector Type: 4-pin M12 D-coded/8-pin M12 A-coded

**Physical Characteristics**
- Dimensions: 186 x 118 x 20 mm (7.32 x 4.65 x 0.79 in)
- Weight: 278 g (0.62 lb)

**Environmental Limits**
- Operating Temperature: -40 to 70°C (-40 to 158°F) (EN 50155 Class TX)
- Storage Temperature: -40 to 85°C (-40 to 185°F)
- Ambient Relative Humidity: 5 to 95% (non-condensing)

**Available Models**
- **TC-SP04-DB44-T**: 4 RS-232/422/485 serial interfaces over a single DB44 connector; cable sold separately, -40 to 70°C operating temperature (EN 50155 Class TX)
- **TC-CP02-DB-T**: 2 optically isolated CAN interfaces with DB9 connectors, -40 to 70°C operating temperature (EN 50155 Class TX)
- **TC-DK10-T**: 4 PCIe mini card slots with PCIe and USB interfaces on Slot 1 and USB interfaces on Slot 2, 3, and 4, 4 SIM card sockets, -40 to 70°C operating temperature (EN 50155 Class TX)
- **TC-DK20-T**: 4 PCIe mini card slots with PCIe and USB interfaces, 4 SIM card sockets, -40 to 70°C operating temperature (EN 50155 Class TX)
- **TC-SW04-M12-4P-T**: 4-port megabit Ethernet switch with M12 D-coded connectors, -40 to 70°C operating temperature (EN 50155 Class TX)
- **TC-SW04-M12-8P-T**: 4-port gigabit Ethernet switch with M12 A-coded connectors, -40 to 70°C operating temperature (EN 50155 Class TX)

**Package Checklist**
- TC-6000 series expansion module
**V2616A Series**

*High performance network video recorder computer*

- Compliant with EN 50121-4
- Essential compliance with EN 50155*
- IEC 61373 certified for shock and vibration resistance
- Two hot-swappable storage trays for 2.5-inch SSDs or HDDs
- SynMap for system health monitoring
- 24 to 110 VDC wide range isolated power input
- Easy coin battery replacement
- Smart Recovery for manual or automatic system recovery

*Moxa defines “essential compliance” to include those EN 50155 requirements that make products more suitable for rolling stock railway applications.

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**Introduction**

The V2616A series of embedded computers are based on the Intel Core i5/i7 processor, and feature 2 RS-232/422/485 serial ports, dual gigabit LAN ports, 3 USB 2.0 ports, and dual VGA/DVI-D video outputs. The V2616A computers are compliant with essential sections of EN 50155, covering operating temperature, power input voltage, surge, ESD, and vibration, as well as conformal coating and power insulation, making them suitable for a variety of industrial applications.

The V2616A computers come with a CFast socket that provides ample and secure data buffering or additional storage expansion, as well as 2 hot-swappable storage trays that accept 2.5-inch solid state or hard disk storage drives, and may be arranged in RAID 1 arrays to give full data redundancy.

The V2616A series comes with pre-installed Windows Embedded Standard 7 or Debian 7 environments, allowing programmers and system integrators to choose their preferred computing and development platform.

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**Appearance**

**Front View**
- Protection Lock
- Hot-Swappable Trays for HDD/SSD x 2
- Hot-Swappable Button
- Hot-Swappable LED

**Rear View**
- Power Button
- CFast Socket
- Serial/LAN LEDs (Storage, Power, DVI-D Output)
- USB Port (M12)
- Reserved for RF SMA type antennas
- 10/100/1000 Mbps LAN Ports x 2 (M12)
- USB Port x 2 (RS-233/422/485)
- Power Input
- Audio Input Output
- DI x 6
- DO x 2
- Battery Socket
- Reserved for RF SMA type antennas

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**EN 50155**

- Compliant with EN 50121-4
- Essential compliance with EN 50155*
- IEC 61373 certified for shock and vibration resistance
- Two hot-swappable storage trays for 2.5-inch SSDs or HDDs
- SynMap for system health monitoring
- 24 to 110 VDC wide range isolated power input
- Easy coin battery replacement
- Smart Recovery for manual or automatic system recovery

*Moxa defines “essential compliance” to include those EN 50155 requirements that make products more suitable for rolling stock railway applications.
**Hardware Specifications**

**Computer**
- CPU: • Intel® Core™ i5-3610ME dual-core processor (3M Cache, 2.7 GHz) for V2616A-C5 series
  • Intel® Core™ i7-3517UE dual-core processor (4M Cache, 1.7 GHz) for V2616A-C7-T series
  • Intel® Core™ i7-3612QE quad-core processor (6M Cache, 2.1 GHz) for V2616A-C8 series
- OS: Linux or Windows Embedded Standard 7
  Note: The OS is pre-installed.
- System Chipset: Mobile Intel HM65 Express Chipset

**Display**
- Graphics Controller: Intel® HD Graphics 4000 (integrated)
- DVI Interface: DVI-D connector (Chrontel CH7307 SDVO to DVI transmitter), max. resolution 1920 x 1200
- VGA Interface: DB15 female connector, max. resolution 2048 x 1536

**Ethernet Interface**
- LAN: Auto-sensing 10/100/1000 Mbps ports (M12 X-coded) x 2

**Serial Interface**
- Serial Standards: 2 software-selectable RS-232/422/485 ports (DB9 male)
- ESD Protection: 4 kV for all signals
- Isolation Protection: 1.5 kV

**Serial Communication Parameters**
- Data Bits: 5, 6, 7, 8
- Stop Bits: 1, 1.5, 2
- Parity: None, Even, Odd, Space, Mark
- Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
- Baudrate: 50 bps to 921.6 Kbps (non-standard baudrates supported; see user’s manual for details)

**Serial Signals**
- RS-232: Tx0, Rx0, DTR, DSR, RTS, CTS, DCD, GND
- RS-422: TxD(0), TxD(1), RxD(0), RxD(1), GND
- RS-485: TxD(-), TxD(+), RxD(-), RxD(+), GND
- Digital Input: 6 Input Channels
- Input Voltage: 0 to 30 VDC at 25 Hz

**Digital Output**
- Output Channels: 2, sink type
- Output Current: Max. 200 mA per channel
- On-State Voltage: 24 VDC nominal, open collector to 30 VDC
- Connector Type: 10-pin screw terminal block (6 DI points, 2 DO points, DI Source, GND)
- Isolation: 3 kV optical isolation

**LEDs**
- System: 1 Power, 1 Storage
- LAN: 2 100M/Link, 2 1000M/Link
- Serial: 2 TX, 2 RX

**Physical Characteristics**
- Housing: Aluminum
- Weight: 5 kg (11.11 lb)
- Dimensions: 287 x 290 x 101 mm (11.29 x 11.41 x 3.97 in)
- Mounting: Wall (mounting kit must be purchased separately)

**Environmental Limits**
- Operating Temperature: (without HDD installed)
  - Standard models: -25 to 55°C (-13 to 131°F)
  - Wide temp. models: -40 to 70°C (-40 to 158°F)
- Storage Temperature: (with SSD installed) -40 to 85°C (-40 to 185°F)
- Ambient Relative Humidity: 5 to 95% (non-condensing)
- Anti-Shock: EN 50155 standard
- Anti-Vibration: EN 50155 standard

**Power Requirements**
- Input Voltage: 24 to 110 VDC, M12 connector
  Note: 24 and 110 VDC are EN 50155 compliant
- Input Current: 2.5 A @ 24 VDC to 0.55 A @ 110 VDC (SSD/HDD not attached)
- Power Consumption: 60 W (no SSD/HDD attached)
- Power Button: On/off (rear panel)

**Standards and Certifications**
- Safety: UL 60950-1, CSA C22.2 No. 60950-1-07, EN 60950-1
- EMC: EN 55022/24
- CEM: CISPR 22, FCC Part 15B Class A
- MOC: IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV
- VIA: IEC 61000-4-3 RS: 80 MHz to 1 GHz: 20 V/m
- IEC 61000-4-4 EFT: Power: 2 kV; Signal: 2 kV
- IEC 61000-4-5 Surge: Power: 2 kV, Signal: 2 kV
- IEC 61000-4-6 CS: 10 V
- IEC 61000-4-8
- EMI: RoHS, CbRoHS, WEEE
- Rail Traffic: EN 50155 (essential compliance*), EN 50121-3-2, EN 50121-4, IEC 61373
  *Moxa defines “essential compliance” to include those EN 50155 requirements that make products more suitable for rolling stock railway applications.

**Reliability**
- Automatic Reboot Trigger: Built-in WDT (watchdog timer) supporting 1-255 second system reset, software programmable
- MTBF (mean time between failures)
  - Time: V2616A-C5 Series: 280,726 hrs
  - V2616A-C7/C8 Series: 261,297 hrs
- Standard: Telcordia (Bellcore) Standard TR/SR

**Warranty**
- Warranty Period: 3 years
- Details: See www.moxa.com/warranty
  Note: These hardware specifications describe the embedded computer unit itself, but not its official accessories. In particular, the wide temperature specification does not apply to accessories such as power adapters and cables.
Software Specifications

**Linux**
- OS: Linux Debian 7
- Web Server (Apache): Allows you to create and manage web sites; supports PHP and XML
- Terminal Server (SSH): Provides secure encrypted communications between two un-trusted hosts over an insecure network
- File System: EXT 4
- Internet Protocol Suite: TCP, UDP, IPv4, SNMPv1/v2c/v3, ICMP, ARP, HTTP, SSH 1.0/2.0, SSL, DHCP, NTP, NFS, Telnet, FTP, TFTP, PPP, PPPoE
- Internet Security: OpenVPN, Netfilter/iptables
- Secure Shell for Remote Access: SSH allows remote logins to a secure encrypted console from any connected network
- ntpdate: Sets the date and time via NTP
- Ethernet bonding: The Ethernet bonding for combination of network interfaces on one host for redundancy and/or increased throughput
- Dial-up Networking: PPP Daemon for Linux that allows Unix machines to connect to the Internet through dialup lines, using the Point-to-Point Protocol (PPP). Works with ‘chat’, ‘dip’, and ‘dialup’, ‘dip’, and ‘diald’, among (many) others. Supports IP, TCP, UDP, and (for Linux) IPX (Novell).
- mdadm: A Linux utility used to manage software RAID devices
- Dmraid: Discovers software RAID devices and activates RAID sets
- File Server: Enables remote clients to access files and other resources over the network
-alsa-utils: Contains various utilities for controlling audio cards
- Watchdog: A watchdog timer that triggers a system reset upon software freezes, for both specific applications and system-wide failures.
- Moxa mini-PCIe Reset Utility: Resets the mini-PCIE module on the mini-PCIE slot
- Moxa Hotplug Daemon: Monitors and manages the hard disk status

**Application Development Software:**
- Moxa API library
- GNU C/C++ cross compiler
- GNU C library
- Perl

**Software Package:**
- SNMP
- mx-e1000e
- mx-iptpd2

**Windows Embedded Standard 7**

**Core OS:**
- Windows 7 Embedded, 32 bit
- Remote Client
- Remote Procedure Call

**Applications and Services Development:**
- .Net Framework 3.5
- Remote Desktop Protocol 7.1
- COM OLE Application Support
- COM+ Application Support
- MSMQ

**Internet Services:**
- Internet Explorer 8.0
- IIS 7.0

**File Systems and Data Storage:**
- Windows Data Access Components
- Windows Backup and Restore

**Diagnostics:**
- Common Diagnostic Tools
- Problem Reports and Solutions

**Fonts:**
- Chinese (Trad. and Simp.), Japanese, Korean, Western, Middle East, South East Asian, and South Asian Fonts
### Available Models

**V2616A-C5**: (Barebone) x86 embedded computer with Intel Core i5-3610ME, VGA, DVI, 2 LANs, 2 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, 24 to 110 VDC power, -25 to 55°C operating temperature (EN 50155 Class T1)

**V2616A-C5-W7E**: x86 embedded computer with Intel Core i5-3610ME, VGA, DVI, 2 LANs, 2 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 Ports, 24 to 110 VDC Power, Win7 Embedded, -25 to 55°C operating temperature (EN 50155 Class T1)

**V2616A-C5-T-W7E**: x86 embedded computer with Intel Core i5-3610ME, VGA, DVI, 2 LANs, 2 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, 24 to 110 VDC power, Windows Embedded Standard 7, -25 to 55°C operating temperature (EN 50155 Class T1), conformal coating

**V2616A-C5-LX**: x86 embedded computer with Intel Core i5-3610ME, VGA, DVI, 2 LANs, 2 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, 24 to 110 VDC power, Linux, -25 to 55°C operating temperature (EN 50155 Class T1)

**V2616A-C5-T-LX**: x86 embedded computer with Intel Core i5-3610ME, VGA, DVI, 2 LANs, 2 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, 24 to 110 VDC power, Linux, -25 to 55°C operating temperature (EN 50155 Class T1), conformal coating

**V2616A-C7-T**: (Barebone) x86 embedded computer with Intel Core i7-3517UE, VGA, DVI, 2 LANs, 2 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, 24 to 110 VDC power, Linux, -25 to 55°C operating temperature (EN 50155 Class T1)

**V2616A-C7-T-W7E**: x86 embedded computer with Intel Core i7-3517UE, VGA, DVI, 2 LANs, 2 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, 24 to 110 VDC Power, Windows Embedded Standard 7, -40 to 70°C operating temperature (EN 50155 Class TX)

**V2616A-C7-T-LX**: x86 embedded computer with Intel Core i7-3517UE, VGA, DVI, 2 LANs, 2 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, 24 to 110 VDC power, Linux, -40 to 70°C operating temperature (EN 50155 Class TX), conformal coating

**V2616A-C7-C8**: (Barebone) x86 embedded computer with Intel Core i7-3612OE, VGA, DVI, 2 LANs, 2 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, 24 to 110 VDC power, Linux, -25 to 55°C operating temperature (EN 50155 Class T1)

**V2616A-C8-W7E**: x86 embedded computer with Intel Core i7-3612OE, VGA, DVI, 2 LANs, 2 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, 24 to 110 VDC power, Windows Embedded Standard 7, -25 to 55°C operating temperature (EN 50155 Class T1)

**V2616A-C8-T-W7E**: x86 embedded computer with Intel Core i7-3612OE, VGA, DVI, 2 LANs, 2 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, 24 to 110 VDC power, Windows Embedded Standard 7, -25 to 55°C operating temperature (EN 50155 Class T1), conformal coating

**V2616A-C8-LX**: x86 embedded computer with Intel Core i7-3612OE, VGA, DVI, 2 LANs, 2 serial ports, 6 DIs, 2 DOs, 3 USB 2.0 ports, 24 to 110 VDC power, Linux, -25 to 55°C operating temperature (EN 50155 Class T1), conformal coating

### Package Checklist

- V2616A embedded computer
- 2 storage tray keys
- Power cable (CBL-M12FF5PPJ21-BK-15-IP68)
- 2 5-pin terminal blocks
- Documentation and software CD or DVD
- Quick installation guide (printed)
- Warranty card
V2406A Series

Compact, fanless, anti-vibration railway computers

The V2406A Series embedded computers are based on the Intel 3rd generation processor, and feature 4 RS-232/422/485 serial ports, dual LAN ports, audio in/out, 3 USB 2.0 hosts, 2 CFast sockets, and 1 SATA storage socket. The V2406A computers provide dual DVI-I outputs, and in addition are compliant with a portion of EN 50155 specifications, covering operating temperature, power input voltage, surge, ESD, and vibration, making the computers suitable for a variety of industrial applications.

The dual megabit/gigabit Ethernet ports with M12 X-coded connectors offer a reliable solution for network redundancy, promising continuous operation for data communication and management. As an added convenience, the V2406A computers have 6 DIs and 2 DOs for connecting digital input/output devices, and the CFast feature provides the reliability needed for industrial applications that require data buffering and storage expansion.

Pre-installed with Linux Debian 7 or Windows Embedded Standard 7, the V2406A Series provides programmers with a friendly environment for developing sophisticated, bug-free application software at a low cost. Wide temperature models of the V2406A Series that operate reliably in a -40 to 70°C operating temperature range are also available, offering an optimal solution for applications subjected to harsh environments.

Front View

<table>
<thead>
<tr>
<th>LED (Power, Storage)</th>
<th>OS CFast Socket</th>
<th>10/100/1000 Mbps LAN Ports x 2 (M12 X-coded)</th>
<th>USB Hosts x 1 (M12 D-coded)</th>
<th>DVI-I Outputs x 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio Output/Input (M12 A-coded)</td>
<td>LAN LEDs (10/100/1000 Mbps)</td>
<td>RTC Battery Holder</td>
<td>Power Switch</td>
<td></td>
</tr>
</tbody>
</table>
**Computer**

**CPU:**
- Intel Celeron 1047UE processor (2M cache, 1.40 GHz) for the V2406A-C2 series
- Intel Core i7-3517UE processor (6M cache, 1.7 GHz) for the V2406A-C7 series

**OS:** Windows Embedded Standard 7 or Linux Debian 7

**System Chipset:** Mobile Intel® HM65 Express

**System Memory:** 1 DDR3-1600 SO-DIMM SDRAM slot, 8 GB max., 4 GB pre-installed

**USB:** USB 2.0 hosts x 3 (Type A connectors x 2, supporting system boot up, M12 connectors x 1)

**Hardware Specifications**

**Storage**

**HDD/SSD Support:** 1 internal SATA-II bus for 2.5-inch HDD/SSD*
  *Storage drive not included. To be purchased separately.

**CFast Support:** 1 slot for OS*, 1 slot for backup storage
  *32-bit W7E requires at least an 8 GB CFast card
  *64-bit W7E requires at least a 16 GB CFast card (optional)
  *Linux Debian 7 requires at least an 8 GB CFast card (to be purchased separately)

**Other Peripherals**

**Audio:** Line-in, line-out interface (M12 A-coded)

**Display**

**Graphics Controller:** Intel® HD Graphics 4000 (integrated)

**Connector Type:** 2 DVI-I connectors

**Display Interface:**
- DVI up to 1920x1200 resolution @ 60 Hz
- VGA up to 1920x1200 resolution @ 60 Hz
- VGA up to 2048x1536 resolution @ 75 Hz

**Ethernet Interface**

**LAN:** Auto-sensing 10/100/1000 Mbps ports (M12 X-coded) x 2

**Isolation Protection:** 1.5 kV

**Serial Interface**

**Serial Standards:** 4 RS-232/422/485 ports, software selectable (DB9 male)

**ESD Protection:** 4 kV for all signals

**Isolation Protection:** 1.5 kV

**Serial Communication Parameters**

**Data Bits:** 5, 6, 7, 8
**Stop Bits:** 1, 1.5, 2
**Parity:** None, Even, Odd, Space, Mark
**Flow Control:** RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
**Baudrate:** 50 bps to 921.6 kbps (non-standard baudrates supported; see user’s manual for details)

**Serial Signals**

**RS-232:** TxD+, TxD-, RxD+, RxD-, GND
**RS-422:** TxD+, TxD-, RxD+, RxD-, GND
**RS-485-4w:** 4 wire mode (TxD+, TxD-, RxD+, RxD-)
**RS-485-2w:** 2 wire mode (Data+, Data-, GND)

**Digital Input**

**Input Channels:** 6
**Input Voltage:** 0 to 30 VDC at 25 Hz
**Digital Input Levels for Dry Contacts:**
- Logic level 0: Close to GND
- Logic level 1: Open
**Digital Input Levels for Wet Contacts:**
- Logic level 0: +3 V max.
- Logic level 1: +10 V to +30 V (Source to DI)
**Isolation:** 3 kV optical isolation

**Digital Output**

**Output Channels:** 2, sink type
**Output Current:** Max. 200 mA per channel
**On-State Voltage:** 24 VDC nominal, open collector to 30 VDC

**Connector Type:** 2 multi-pin screw-fastened Euroblock terminal (4 outputs, 2 inputs, DI Source, GND)

**Isolation:** 3 kV optical isolation

**LEDs**

**System:** Power, Storage
**LAN:** 2 per port (10/100/1000 Mbps)
**Serial:** 2 per port (Tx and Rx)

**Switches and Buttons**

**Power Switch:** on/off (front panel)
**Reset Button:** For warm reboot (front panel)

**Physical Characteristics**

**Housing:** Aluminum
**Weight:** 2 kg (4.44 lb)

**Dimensions:**
- Without ears: 250 x 57 x 154 mm (9.84 x 2.23 x 6.06 in)
- With ears: 275 x 63 x 154 mm (10.83 x 2.47 x 6.06 in)

**Mounting:** Wall, DIN rail (optional), VESA (optional)

**Environmental Limits**

**Operating Temperature:**
- Standard models: -25 to 55°C (-13 to 131°F)
- Wide temp. models: -40 to 70°C (-40 to 158°F)

**Storage Temperature:** -40 to 85°C (-40 to 185°F)
*without HDD installed

**Ambient Relative Humidity:** 5 to 95% (non-condensing)

**Anti-Vibration:** EN 50155 standard
**Anti-Shock:** EN 50155 standard

**Conformal Coating:** Available on request

**Power Requirements**

**Input Voltage:** 12 to 48 VDC (M12 A-coded)
**Note:** Compliant with EN 50155 at 24 VDC

**Input Current:**
- 3.3 A @ 12 VDC
- 0.82 A @ 48 VDC

**Power Consumption:** 40 W
**Software Specifications**

**Linux**
- **OS**: Linux Debian 7
- **Web Server (Apache)**: Allows you to create and manage web sites; supports PHP and XML
- **Terminal Server (SSH)**: Provides secure encrypted communications between two un-trusted hosts over an insecure network
- **File System**: EXT 4
- **Internet Protocol Suite**: TCP, UDP, IPv4, SNMPv1/v2c/v3, ICMP, ARP, HTTP, SSH 1.0/2.0, SSL, NTP, NFS, Telnet, FTP, TFTP, PPP, PPPoE
- **Internet Security**: OpenVPN, iptables firewall
- **Secure Shell for Remote Access**: SSH allows remote logins to a secure encrypted console from any connected network
- **Dial-up Networking**: PAM Daemon for Linux that allows Unix machines to connect to the Internet through dialup lines, using the Point-to-Point Protocol (PPP). Works with ‘chat’, ‘dip’, and ‘dialup dip’, and ‘diald’, among many others. Supports IP, TCP, UDP, and (for Linux) IPX (Novell).
- **File Server**: Enables remote clients to access files and other resources over the network
- **Watchdog**: A watchdog timer that triggers a system reset upon software freezes, for both specific applications and system-wide failures.

**Application Development Software**:
- Moxa API Library
- GNU C library
- Perl

**Windows Embedded Standard 7**
- **Core OS**: 32/64-bit support
- Remote Client
- Remote Procedure Call

**Applications and Services Development**:
- .Net Framework 4.5
- Remote Desktop Protocol 7.1
- COM OLE Application Support
- COM+ Application Support
- MSMQ

**Internet Services**:
- Internet Explorer 8.0
- IIS 7.0

**Diagnostics**:
- Common Diagnostic Tools
- Problem Reports and Solutions

**Fonts**: Chinese (Trad. and Simp.), Japanese, Korean, Western, Middle Eastern, South East Asian, and South Asian Fonts

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**Dimensions**

Unit: mm (inch)

**Reliability**

**Automatic Reboot Trigger**: Software-programmable watchdog timer configurable from 1 to 255 seconds

**MTBF** (mean time between failures)

- V2406A-C2 Series: 373,248 hrs
- V2406A-C7 Series: 332,173 hrs

**Warranty**

- **Warranty Period**: 3 years
- **Details**: See www.moxa.com/warranty

*Note: These hardware specifications describe the embedded computer unit itself, but not its official accessories. In particular, the wide temperature specification does not apply to accessories such as power adapters and cables.*
Graphics and Multimedia:
• MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
• MPEG Layer-3 Audio Decoders (MP3)
• MPEG4 Decoders
• Windows Media Video VC-1 (WMV) CODECS
• Directx and Windows Device Experience
• Windows Media Player 12

Management:
• Group Policy Management
• Windows Management Instrument (WMI)
• Windows Update

Networking:
• Extensible Authentication Protocol (EAP)
• Internet Authentication Service
• Telnet Server
• Bluetooth
• Domain Services
• Network Access Protection
• Network and Sharing Center
• Quality of Service
• Remote Access Service (RAS)
• Telephony API Client
• Windows Firewall
• Wireless Networking

Security:
• Credential Roaming Service
• Credentials and Certificate Management
• Windows Authorization Manager (AZMAN)
• Windows Security Center
• Active Directory Rights Management
• Security Base
• Encrypted File System (EFS)

Embedded Features:
• Enhanced Write Filter (EWF)
• File-Based Write Filter (FBWF)
• Message Box Default Reply
• Registry Filter
• WSDAPI for .NET

File Systems and Data Store:
• Windows Data Access Components
• Windows Backup and Restore

Embedded Self-Health Diagnostic Software: SNMP-based remote scripting layer for monitoring, reporting, and control

SmartRecovery: BIOS level system recovery tool

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</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Intel Celeron 1047UE 1.4 GHz</td>
<td>Intel Core i7-3517UE 1.7 GHz</td>
<td>Intel Celeron 1047UE 1.4 GHz</td>
<td>Intel Core i7-3517UE 1.7 GHz</td>
<td>Windows Embedded Standard 7 (32-bit)</td>
<td>4 GB pre-installed</td>
<td>8 GB pre-installed</td>
<td></td>
</tr>
<tr>
<td>Operating System (CTO*)</td>
<td>Optional</td>
<td>Note: Windows Embedded Standard 7 (32-bit/64-bit) or Linux Debian 7 (64-bit)</td>
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</tr>
<tr>
<td>Memory (CTO*)</td>
<td>4 GB pre-installed, can be upgradabled to 8 GB</td>
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</tr>
<tr>
<td>USB</td>
<td>USB 2.0 (Type A) x 2</td>
<td>USB 2.0 (M12 D-coded) x 1</td>
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<tr>
<td>Power Input Voltage</td>
<td>12 to 48 VDC (M12 A-coded)</td>
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</tbody>
</table>

Storage

| OS CFast Storage (CTO*) | Optional | Note: 32-bit W7E requires at least an 8 GB CFast card, 64-bit W7E requires at least a 16 GB CFast card, and 64-bit Debian7 requires at least an 8 GB CFast card | | | | |
| Backup CFast Storage (CTO*) | Optional | | | | | |
| SSD / HDD Storage (CTO*) | Optional | Note: Anti-vibration storage kit (FK-75125-02) must be purchased separately to install an SSD/HDD | | | | |

Interface

| Display Interface | DVI-I x 2 | | | | | |
| Audio Interface | Line in/out (M12 A-coded) x 1 | | | | | |
| Ethernet Interface | 10/100/1000 Mbps (M12 X-coded) x 2 | | | | | |
| RS-232/422/485 (DB9) x 4 | | | | | |
| Digital Input Channels | 6 | | | | | |
| Digital Output Channels | 2 | | | | | |

Environmental Limits

| Operating Temperature | T1: -25 to 55°C | T1: -25 to 55°C | T1: -25 to 55°C | TX: -40 to 70°C | TX: -40 to 70°C | TX: -40 to 70°C |
| Conformal Coating | – | Yes | – | Yes | – | – |

*CTO = Configure To Order

Note:
Please refer to the Component Compatibility Guide (CCG) for the list of components that Moxa has validated to be compatible with this product. You can download the CCG from the Moxa product website.

For components with a Moxa P/N, you can order the components together with your product from Moxa and we will install the selected components in your product. Moxa guarantees the compatibility of the components installed in your CTO product.

Package Checklist
• V2406A embedded computer
• Wall-mounting kit
• Documentation and software CD or DVD
• Quick installation guide (printed)
• Warranty card
### Optional Accessories (can be purchased separately)

<table>
<thead>
<tr>
<th>Type</th>
<th>Model Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable &amp; Connector</td>
<td>CBL-M12XMM8PRJ45-BK-100-IP67</td>
<td>8-pin male X-coded M12-to-RJ45 Cat-5E UTP gigabit Ethernet cable, 1 meter, IP67-rated</td>
</tr>
<tr>
<td>Connector</td>
<td>M12X-8PM-IP67</td>
<td>8-pin male X-coded circular threaded gigabit Ethernet connector, IP67-rated (for field installation)</td>
</tr>
<tr>
<td>Mounting Kits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolated Wall-mounting Kit</td>
<td>V2400 Isolated Wall-mounting Kit</td>
<td>Wall-mounting kit with isolation protection, including two wall-mounting brackets and four screws</td>
</tr>
<tr>
<td>DIN-Rail Mounting Kit</td>
<td>DK-DC50131-01</td>
<td>DIN-rail mounting kit, including two DIN-rail brackets and eight screws</td>
</tr>
<tr>
<td>Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable</td>
<td>CBL-M12(FF5P)/Open-100 IP67</td>
<td>5-pin female A-coded M12 power cable, 1 meter, IP67-rated</td>
</tr>
<tr>
<td>Connector</td>
<td>M12A-5P-IP68</td>
<td>5-pin male circular threaded A-coded M12 power connector, IP68-rated (for field installation)</td>
</tr>
<tr>
<td>Adapter</td>
<td>PWR-24250-DT-S1</td>
<td>Power adapter for testing and system development in the office under ambient temperature conditions: Input: 100 to 240 VAC, 50 to 60 Hz, 1.5 A Output: 24 VDC, 2.5 A, 60 W</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7US-2B-183</td>
<td>Power cord with 2-pin connector, USA plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7EU-2B-183</td>
<td>Power cord with 2-pin connector, Euro plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7UK-2B-183</td>
<td>Power cord with 2-pin connector, British plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7AU-2B-183</td>
<td>Power cord with 2-pin connector, Australia plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7CN-2B-183</td>
<td>Power cord with 2-pin connector, China plug</td>
</tr>
<tr>
<td>Audio</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>M12A-8PMM-IP67</td>
<td>8-pin male circular threaded A-coded M12 connector, IP67-rated (for field-installation)</td>
</tr>
<tr>
<td>USB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>M12A-5PMM-IP68</td>
<td>5-pin male circular threaded D-coded M12 USB connector, IP68-rated</td>
</tr>
<tr>
<td>Storage Kit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Storage Kit</td>
<td>FK-7512S-02</td>
<td>Hard disk installation package (for HDD, SSD, EN 50155) (only available for the V2406A and V2426A series)</td>
</tr>
<tr>
<td>Battery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery Kit</td>
<td>RTC Battery Kit</td>
<td>Lithium battery with built-in connector for easy replacement</td>
</tr>
</tbody>
</table>
V2416A Series

Compact, fanless, anti-vibration railway computers

- Intel Celeron/Core i7 high performance network video recorder for rolling stock applications
- Two hot-swappable trays for 2.5-inch HDD/SSD storage expansion
- API Library for easy development and storage volume notification
- Dual independent DVI-I displays
- 2 gigabit Ethernet ports with M12 X-coded connectors
- 2 CFast sockets for OS backup
- M12 A-coded power connector
- Compliant with EN 50121-4
- Complies with a portion of EN 50155 specifications
- IEC 61373 certified for shock and vibration resistance
- -40 to 70°C wide temperature models available
- Supports SNMP-based system configuration, control, and monitoring (Windows Embedded Standard 7 only)

Introduction

The V2416A Series embedded computers are based on the Intel 3rd generation processor and feature 4 RS-232/422/485 serial ports, dual LAN ports, and 3 USB 2.0 hosts. In addition, the V2416A computers provide dual DVI-I outputs and comply with a portion of EN 50155 specifications, covering operating temperature, power input voltage, surge, ESD, and vibration, making them suitable for a variety of industrial applications.

The CFast socket, SATA connectors, and USB sockets provide the V2416A computers with the reliability needed for industrial applications that require data buffering and storage expansion. Most importantly, the V2416A computers come with 2 hot-swappable storage trays for inserting additional storage media, such as hard disk or solid-state drives, and support hot swapping for convenient, fast, and easy storage replacement. Each storage tray has its own LED to indicate whether or not a storage module is plugged in. The V2416A series computers come pre-installed with a choice of Linux Debian 7 or Windows Embedded Standard 7 to provide programmers with a familiar environment in which to develop sophisticated, bug-free application software at a low cost.

Appearance

Front View
Hardware Specifications

Computer
CPU:
• Intel Celeron 1047UE processor (2M cache, 1.40 GHz) for the V2416A-C2 series
• Intel Core i7-3517UE processor (6M cache, 1.7 GHz) for the V2416A-C7 series
OS: Windows Embedded Standard 7 or Linux Debian 7
System Chipset: Mobile Intel® HM65 Express
System Memory: 1 DDR3-1600 SO-DIMM SDRAM slot, 8 GB max., 4 GB pre-installed
USB: USB 2.0 hosts x 3 (Type A connectors x 2, supporting system boot up, M12 connectors x 1)

Storage
HDD/SSD Support: 2 hot-swappable trays for 2.5-inch HDD/SSD storage expansion*
*Storage drive not included. Must be purchased separately.
CFast Support: 1 slot for OS*, 1 slot for backup storage
*32-bit W7E requires at least an 8 GB CFast card
*64-bit W7E requires at least a 16 GB CFast card (optional)
*Linux Debian 7 requires at least an 8 GB CFast card (must be purchased separately)

Other Peripherals
Audio: Line-in, line-out interface (M12 A-coded)
Display
Graphics Controller: Intel® HD Graphics 4000 (integrated)
Connector Type: 2 DVI-I connectors
Display Interface:
DVI up to 1920x1200 resolution @ 60 Hz
VGA up to 1920x1200 resolution @ 60 Hz
VGA up to 2048x1536 resolution @ 75 Hz

Ethernet Interface
LAN: Auto-sensing 10/100/1000 Mbps ports (M12 X-coded) x 2
Isolation Protection: 1.5 kV

Serial Interface
Serial Standards: 4 software-selectable RS-232/422/485 ports (DB9 male)
ESD Protection: 4 kV for all signals
Isolation Protection: 1.5 kV

Serial Communication Parameters
Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
Baudrate: 50 bps to 921.6 kbps (non-standard baudrates supported; see user’s manual for details)

Serial Signals
RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
RS-422: Tx+, Tx-, Rx+, Rx-, GND
RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
RS-485-2w: Data+, Data-, GND

Digital Input
Input Channels: 6
Input Voltage: 0 to 30 VDC at 25 Hz
Digital Input Levels for Dry Contacts:
• Logic level 0: Close to GND
• Logic level 1: 0 V max.
Digital Input Levels for Wet Contacts:
• Logic level 0: +10 V to +30 V (Source to DI)
Isolation: 3 kV optical isolation

Digital Output
Output Channels: 2, sink type
Output Current: Max. 200 mA per channel
On-State Voltage: 24 VDC nominal, open collector to 30 VDC
Connector Type: 10-pin screw-fastened Euroblock terminal (6 inputs, 2 outputs, DI Source, GND)
Isolation: 3 kV optical isolation

LEDs
System: Power x 1, Storage x 1, hot-swappable trays x 2
LAN: 2 per port (10/100/1000 Mbps)
Serial: 2 per port (Tx and Rx)

Switches and Buttons
Power Switch: on/off (front panel)
Reset Button: For warm reboot (front panel)
Hot-swappable: trigger (on each removable tray)

Physical Characteristics
Housing: Aluminum
Weight: 4 kg (8.89 lb)
Dimensions:
Without ears: 250 x 86 x 154 mm (9.84 x 3.38 x 6.06 in)
With ears: 275 x 92 x 154 mm (10.83 x 3.62 x 6.06 in)
Mounting: Wall, DIN rail (optional), VESA (optional)

Environmental Limits
Operating Temperature*: Standard models: -25 to 55°C (-13 to 131°F)
Wide temp. models: -40 to 70°C (-40 to 158°F)
Storage Temperature*: -40 to 85°C (-40 to 185°F)
*without HDD installed

Ambient Relative Humidity: 5 to 95% (non-condensing)

Power Requirements
Input Voltage: 12 to 48 VDC (M12 A-coded)
Note: Compliant with EN 50155 at 24 VDC
Input Current:
• 3.3 A @ 12 VDC
• 0.82 A @ 48 VDC
Power Consumption: 40 W
Standards and Certifications

Safety: UL 60950-1, EN 60950-1
EMC: EN 55022/24
EMI: CISPR 22, FCC Part 15B Class A
EMS:
  IEC 61000-4-2 ESD: Contact 6: kV, Air: 8 kV
  IEC 61000-4-3 RS: 80 MHz to 1 GHz: 20 V/m
  IEC 61000-4-4 EFT: Power: 2 kV; Signal: 2 kV
  IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV
  IEC 61000-4-6 CS: 10 V
  IEC 61000-4-8

Green Product: RoHS, CRoHS, WEEE

Rail Traffic: EN 50155*, EN 50121-3-2, EN 50121-4, IEC 60571
  *Complies with a portion of EN 50155 specifications. Please contact Moxa or a Moxa distributor for details.

Reliability

Automatic Reboot Trigger: Software-programmable watchdog timer configurable from 1 to 255 seconds

MTBF (mean time between failures)
  Time: 332.173 hrs

Standard: Telcordia (Belcore) Standard TR/SR

Warranty

Warranty Period: 3 years
Details: See www.moxa.com/warranty

Note: These hardware specifications describe the embedded computer unit itself, but not its official accessories. In particular, the wide temperature specification does not apply to accessories such as power adapters and cables.

Dimensions

Unit: mm (inch)

Software Specifications

Linux

OS: Linux Debian 7
Web Server (Apache): Allows you to create and manage web sites; supports PHP and XML
Terminal Server (SSH): Provides secure encrypted communications between two un-trusted hosts over an insecure network
File System: EXT 4
Internet Protocol Suite: TCP, UDP, IPv4, SNMPv1/v2c/v3, ICMP, ARP, HTTP, SSH 1.0/2.0, SSL, DHCP, NTP, NFS, Telnet, FTP, TFTP, PPP, PPPoE
Internet Security: OpenVPN, Netfilter/iptables
Secure Shell for Remote Access: SSH allows remote logins to a secure encrypted console from any connected network dial-up
Dial-up Networking: PPP Daemon for Linux that allows Unix machines to connect to the Internet through dialup lines, using the Point-to-Point Protocol (PPP). Works with ‘chat’, ‘dip’, and ‘dialup’, ‘dip’, and ‘diald’, among (many) others. Supports IP, TCP, UDP, and (for Linux) IPX (Novell)
File Server: Enables remote clients to access files and other resources over the network
Watchdog: A watchdog timer that triggers a system reset upon software freezes, for both specific applications and system-wide failures.

Application Development Software:
  * Moxa API Library (Watchdog timer, Moxa serial I/O control, Moxa DI/DO API)
  * GNU C library
  * Perl

Windows Embedded Standard 7

Core OS:
  * 32-bit or 64-bit supported
  * Remote Client
  * Remote Procedure Call

Applications and Services Development:
  * .Net Framework 4.5
  * Remote Desktop Protocol 7.1
  * COM OLE Application Support
  * COM+ Application Support
  * MSMQ

Internet Services:
  * Internet Explorer 11
  * IIS 7.0

File Systems and Data Storage:
  * Windows Data Access Components
  * Windows Backup and Restore
Diagnostics:
• Common Diagnostic Tools
• Problem Reports and Solutions
Fonts:
• Chinese (Trad. and Simp.), Japanese, Korean, Western, Middle Eastern, South East Asian, and South Asian Fonts
Graphics and Multimedia:
• MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
• MPEG Layer-3 Audio Decoders (MP3)
• MPEG4 Decoders
• Windows Media Video VC-1 (WMV) Decoders
• DirectX and Windows Device Experience
• Windows Media Player 12
Management:
• Group Policy Management
• Windows Management Instrument (WMI)
• Windows Update
Networking:
• Extensible Authentication Protocol (EAP)
• Internet Authentication Service
• Telnet Server
• Bluetooth
• Domain Services
• Network Access Protection
• Network and Sharing Center
• Quality of Service
• Remote Access Service (RAS)
• Telephony API Client
• Windows Firewall
• Wireless Networking
Security:
• Credential Roaming Service
• Credentials and Certificate Management
• Windows Authorization Manager (AZMAN)
• Windows Security Center
• Active Directory Rights Management
• Security Base
• Encrypted File System (EFS)
Embedded Features:
• Enhanced Write Filter (EWF)
• File-Based Write Filter (FBWF)
• Message Box Default Reply
• Registry Filter
• WSDAPI for .NET
Embedded Self-Health Diagnostic Software: SNMP-based remote scripting layer for monitoring, reporting, and control
SmartRecovery: BIOS level system recovery tool

Ordering Information

| Package Checklist |
|-------------------|-------------------|-------------------|
| V2416A series embedded computer |
| Wall-mounting kit |
| 8 screws for hot-swappable HDD trays |
| 8 HDD soft washers |
| 2 keys for hot-swappable HDD trays |
| Documentation and software CD or DVD |
| Quick installation guide (printed) |
| Warranty card |

<table>
<thead>
<tr>
<th>Type</th>
<th>CTO Models</th>
<th>Pre-Configured Models</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>V2416A-C2</td>
<td>V2416A-C2-T</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU</td>
<td>Intel Celeron 1047UE 1.4 GHz</td>
<td>Intel Core i7-3517UE 1.7 GHz</td>
</tr>
<tr>
<td>Operating System (CTO*)</td>
<td>Optional</td>
<td>Windows Embedded Standard 7 (32-bit/64-bit) or Linux Debian 7 (64-bit)</td>
</tr>
<tr>
<td>Memory (CTO*)</td>
<td>4 GB pre-installed</td>
<td>can be upgraded to 8 GB</td>
</tr>
<tr>
<td>USB</td>
<td>USB 2.0 (Type A) x 2</td>
<td>USB 2.0 (M12 D-coded) x 1</td>
</tr>
<tr>
<td>Power Input Voltage</td>
<td>12 to 48 VDC (M12 A-coded)</td>
<td></td>
</tr>
<tr>
<td>Storage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CFast Storage (CTO*)</td>
<td>Optional</td>
<td>8 GB CFast card pre-installed</td>
</tr>
<tr>
<td>Backup CFast Storage (CTO*)</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>SSD / HDD Storage (CTO*)</td>
<td>Optional</td>
<td></td>
</tr>
<tr>
<td>Display Interface</td>
<td>DVI-I x 2</td>
<td></td>
</tr>
<tr>
<td>Audio Interface</td>
<td>Line in/out (M12 A-coded) x 1</td>
<td></td>
</tr>
<tr>
<td>Ethernet Interface</td>
<td>10/100/1000 Mbps (M12 X-coded) x 2</td>
<td></td>
</tr>
<tr>
<td>Serial Ports</td>
<td>RS-232/422/485 (DB9) x 4</td>
<td></td>
</tr>
<tr>
<td>Digital Input Channels</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Digital Output Channels</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>T1: -25 to 55°C</td>
<td>TX: -40 to 70°C</td>
</tr>
<tr>
<td>Conformal Coating</td>
<td>–</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*CTO = Configure To Order
Note:
Please refer to the Component Compatibility Guide (CCG) for the list of components that Moxa has validated to be compatible with this product. You can download the CCG from the Moxa product website.
For components with a Moxa P/N, you can order the components together with your product from Moxa and we will install the selected components in your product. Moxa guarantees the compatibility of the components installed in your CTO product.
### Optional Accessories (can be purchased separately)

<table>
<thead>
<tr>
<th>Type</th>
<th>Model Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethernet</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable &amp; Connector</td>
<td>CBL-M12XMM8PRJ45-BK-100-IP67</td>
<td>8-pin male X-coded M12-to-RJ45 Cat-5E UTP gigabit Ethernet cable, 1 meter, IP67-rated</td>
</tr>
<tr>
<td>Connector</td>
<td>M12X-8PMM-IP67</td>
<td>8-pin male X-coded circular threaded gigabit Ethernet connector, IP67-rated (for field installation)</td>
</tr>
<tr>
<td><strong>Mounting Kits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolated Wall-mounting Kit</td>
<td>V2400 Isolated Wall-mounting Kit</td>
<td>Wall-mounting kit with isolation protection, including two wall-mounting brackets and four screws</td>
</tr>
<tr>
<td>DIN-Rail Mounting Kit</td>
<td>DK-DC50131-01</td>
<td>DIN-rail mounting kit, including two DIN-rail brackets and eight screws</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable</td>
<td>CBL-M12(FF5P)/Open-100 IP67</td>
<td>5-pin female A-coded M12 power cable, 1 meter, IP67-rated</td>
</tr>
<tr>
<td>Connector</td>
<td>M12A-5P-IP68</td>
<td>5-pin male circular threaded A-coded M12 power connector, IP68-rated (for field installation)</td>
</tr>
<tr>
<td>Adapter</td>
<td>PWR-24250-DT-S1</td>
<td>Power adapter for testing and system development in the office under ambient temperature conditions: Input: 100 to 240 VAC, 50 to 60 Hz, 1.5 A Output: 24 VDC, 2.5 A, 60 W</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7US-2B-183</td>
<td>Power cord with 2-pin connector, USA plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7EU-2B-183</td>
<td>Power cord with 2-pin connector, Euro plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7UK-2B-183</td>
<td>Power cord with 2-pin connector, British plug</td>
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<td>Connector</td>
<td>M12A-8PMM-IP67</td>
<td>8-pin male circular threaded A-coded M12 connector, IP67-rated (for field-installation)</td>
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<td></td>
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<tr>
<td>Connector</td>
<td>M12A-5PMM-IP68</td>
<td>5-pin male circular threaded D-coded M12 USB connector, IP68-rated</td>
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<td>Battery Kit</td>
<td>RTC Battery Kit</td>
<td>Lithium battery with built-in connector for easy replacement</td>
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The V2426A Series embedded computers are based on the Intel 3rd generation processor, and feature 4 RS-232/422/485 serial ports, dual LAN ports, 3 USB 2.0 hosts, and dual DVI-I outputs. In addition, the V2426A Series computers comply with a portion of EN 50155 specifications, covering operating temperature, power input voltage, surge, ESD, and vibration, making them suitable for a variety of industrial applications.

The dual megabit/gigabit Ethernet ports with M12 X-coded connectors offer a reliable solution for network redundancy, promising continuous operation for data communication and management. As an added convenience, the V2426A computers have 6 DIs and 2 DOs for connecting digital input/output devices. In addition, the CFast socket, SATA connector, and USB sockets provide the V2426A computers with the reliability needed for industrial applications that require data buffering and storage expansion. Moreover, the V2426A computers come with 2 peripheral expansion slots for inserting different communication modules (2-port CAN module, or HSDPA, GPS, or WLAN module), an 8+8-port digital input/output module, and a 2-port serial module, giving greater flexibility for setting up different industrial applications at field sites.

Pre-installed with Linux Debian 7 or Windows Embedded Standard 7, the V2426A Series provides programmers with a friendly environment for developing sophisticated, bug-free application software at a low cost. Wide temperature models of the V2426A Series that operate reliably in a -40 to 70°C operating temperature range are also available, offering an optimal solution for applications subjected to harsh environments.
**Computer**

**CPU:**
- Intel Celeron 1047UE processor (2M cache, 1.40 GHz) for the V2406A-C2 series
- Intel Core i7-3517UE processor (6M cache, 1.7 GHz) for the V2406A-C7 series

**OS:** Windows Embedded Standard 7 or Linux Debian 7

**System Chipset:** Mobile Intel® HM65 Express

**System Memory:** 1 DDR3-1600 SO-DIMM SDRAM slot, 8 GB max., 4 GB pre-installed

**USB:** USB 2.0 hosts x 3 (Type A connectors x 2, M12 D-coded x 1)

**Storage**

- HDD/SSD Support: 1 internal SATA-II bus for 2.5-inch HDD/SSD storage expansion*
  *Storage drive not included. Must be purchased separately.
- CFast Support: 1 slot for OS*, 1 slot for backup storage
  *32-bit W7E requires at least an 8 GB CFast card
  *64-bit W7E requires at least a 16 GB CFast card (optional)
- *Linux Debian 7 requires at least an 8 GB CFast card (to be purchased separately)

**Other Peripherals**

**Audio:** Line-in, line-out interface (M12 A-coded)

**Expansion Slot:** 2 peripheral expansion slots

**Display**

- Graphics Controller: Intel® HD Graphics 4000 (integrated)
- Connector Type: 2 DVI-I connectors

**Ethernet Interface**

- LAN: Auto-sensing 10/100/1000 Mbps ports (M12 A-coded) x 2
- Isolation Protection: 1.5 kV

**Serial Interface**

- Serial Standards: 4 RS-232/422/485 ports, software selectable (DB9 male)
- ESD Protection: 4 kV for all signals
- Isolation Protection: 1.5 kV

**Serial Communication Parameters**

- Data Bits: 5, 6, 7, 8
- Stop Bits: 1, 1.5, 2
- Parity: None, Even, Odd, Space, Mark
- Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
- Baudrate: 50 bps to 921.6 kbps (non-standard baudrates supported; see user’s manual for details)

**Serial Signals**

- RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
- RS-422: TxD+, TxD-, RxD+, RxD-, GND
- RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
- RS-485-2w: Data+, Data-, GND
- RS-485-4w: Data+, Data-, GND
- RS-485-2w: Data+, Data-, GND

**Digital Input**

- Input Channels: 6
- Input Voltage: 0 to 30 VDC at 25 Hz
- Digital Input Levels for Dry Contacts:
  - Logic level 0: Close to GND
  - Logic level 1: Open
- Digital Input Levels for Wet Contacts:
  - Logic level 0: +3 V max.
  - Logic level 1: +10 V to +30 V (Source to DI)
- Isolation: 3 kV optical isolation

**Digital Output**

- Output Channels: 2, sink type
- Output Current: Max. 200 mA per channel
- On-State Voltage: 24 VDC nominal, open collector to 30 VDC
- Connector Type: 10-pin screw-fastened Euroblock terminal (6 inputs, 2 outputs, DI Source, GND)
- Isolation: 3 kV optical isolation

**LEDs**

- System: Power, Storage
- LAN: 2 per port (10/100/1000 Mbps)
- Serial: 2 per port (Tx and Rx)

**Switches and Buttons**

- Power Switch: on/off (front panel)
- Reset Button: For warm reboot (rear panel)

**Physical Characteristics**

- Housing: Aluminum
- Weight: 3 kg (6.67 lb)
- Dimensions: Without ears: 250 x 86 x 154 mm (9.84 x 3.38 x 6.06 in)
  With ears: 275 x 92 x 154 mm (10.83 x 3.62 x 6.06 in)
- Mounting: Wall, DIN rail (optional), VESA (optional)

**Environmental Limits**

- Operating Temperature*: Standard models: -25 to 55°C (-13 to 131°F)
  Wide temp. models: -40 to 70°C (-40 to 158°F)
- Storage Temperature*: -40 to 85°C (-40 to 185°F)
  *without HDD installed
- Ambient Relative Humidity: 5 to 95% (non-condensing)
- Anti-Vibration: EN 50155 standard
- Anti-Shock: EN 50155 standard
- Conformal Coating: Available on request

**Power Requirements**

- Input Voltage: 12 to 48 VDC (M12 A-coded)
- Note: Compliant with EN 50155 at 24 VDC
- Input Current:
  - 3.78 A @ 12 VDC
  - 0.96 A @ 48 VDC
- Power Consumption: 47 W
**Standards and Certifications**
- **Safety:** UL 60950-1, EN 60950-1
- **EMC:** EN 55022/24
- **EMI:** CISPR 22, FCC Part 15B Class A
- **EMS:**
  - IEC 61000-4-2 ESD: Contact 6: kV; Air: 8 kV
  - IEC 61000-4-3 RS: 80 MHz to 1 GHz: 20 V/m
  - IEC 61000-4-4 EFT: Power: 2 kV; Signal: 2 kV
  - IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV
  - IEC 61000-4-6 CS: 10 V
  - IEC 61000-4-8
- **Green Product:** RoHS, CROHS, WEEE
- **Rail Traffic:** EN 50155*, EN 50121-3-2, EN 50121-4, IEC 60571
  - *Complies with a portion of EN 50155 specifications. Please contact Moxa or a Moxa distributor for details.

**Reliability**

**Automatic Reboot Trigger:** Software-programmable watchdog timer configurable from 1 to 255 seconds

**MTBF** (mean time between failures)
- **Time:** 304,998 hrs
- **Standard:** Telcordia (Bellcore) Standard TR/SR

**Warranty**
- **Warranty Period:** 3 years
- **Details:** See www.moxa.com/warranty

*Note: These hardware specifications describe the embedded computer unit itself, but not its official accessories. In particular, the wide temperature specification does not apply to accessories such as power adapters and cables.*

**Dimensions**

**Dimensions**

**Unit:** mm (inch)

**Software Specifications**

### Linux
- **OS:** Linux Debian 7
- **Web Server (Apache):** Allows you to create and manage web sites; supports PHP and XML
- **Terminal Server (SSH):** Provides secure encrypted communications between two un-trusted hosts over an insecure network
- **File System:** EXT 4
- **Internet Protocol Suite:** TCP, UDP, IPv4, SNMPv1/v2c/v3, ICMP, ARP, HTTP, SSH 1.0/2.0, SSL, DHCP, NTP, NFS, Telnet, FTP, TFTP, PPP, PPPoE
- **Internet Security:** OpenVPN, Netfilter/iptables
- **Secure Shell for Remote Access:** SSH allows remote logins to a secure encrypted console from any connected network dial-up
- **Dial-up Networking:** PPP Daemon for Linux that allows Unix machines to connect to the Internet through dialup lines, using the PPP protocol, as a PPP server or client. Works with ‘chat’, ‘dip’, and ‘diald’, among (many) others. Supports IP, TCP, UDP, and (for Linux) IPX (Novell).
- **File Server:** Enables remote clients to access files and other resources over the network
- **Watchdog:** A watchdog timer that triggers a system reset upon software freezes, for both specific applications and system-wide failures.

**Application Development Software:**
- Moxa API Library (Watchdog timer, Moxa serial I/O control)
- GNU C library
- Perl

**Windows Embedded Standard 7**

**Core OS:**
- 32-bit or 64-bit supported
- Remote Client
- Remote Procedure Call

**Applications and Services Development:**
- .Net Framework 4.5
- Remote Desktop Protocol 7.1
- COM OLE Application Support
- COM+ Application Support
- MSMQ

**Internet Services:**
- Internet Explorer 11
- IIS 7.0

**File Systems and Data Storage:**
- Windows Data Access Components
- Windows Backup and Restore
**Diagnostics:**
- Common Diagnostic Tools
- Problem Reports and Solutions

**Fonts:**
- Chinese (Trad. and Simp.), Japanese, Korean, Western, Middle Eastern, South East Asian, and South Asian Fonts

**Graphics and Multimedia:**
- MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
- MPEG Layer-3 Audio Codecs (MP3)
- MPEG4 Decoders
- Windows Media Video VC-1 (WMV) Codecs
- DirectX and Windows Device Experience
- Windows Media Player 12

**Management:**
- Group Policy Management
- Windows Management Instrument (WMI)
- Windows Update

**Networking:**
- Extensible Authentication Protocol (EAP)
- Internet Authentication Service
- Telnet Server
- Bluetooth
- Domain Services
- Network Access Protection
- Network and Sharing Center
- Quality of Service
- Remote Access Service (RAS)
- Telephony API Client
- Windows Firewall
- Wireless Networking

**Security:**
- Credential Roaming Service
- Credentials and Certificate Management
- Windows Authorization Manager (AZMAN)
- Windows Security Center
- Active Directory Rights Management
- Security Base
- Encrypted File System (EFS)

**Embedded Features:**
- Enhanced Write Filter (EWF)
- File-Based Write Filter (FBWF)
- Message Box Default Reply
- Registry Filter
- WSDAPI for .NET

**Embedded Self-Health Diagnostic Software:**
SNMP-based remote scripting layer for monitoring, reporting, and control

**SmartRecovery:**
BIOS level system recovery tool

---

### Ordering Information

<table>
<thead>
<tr>
<th>Type</th>
<th>CTO Models</th>
<th>Pre-Configured Models</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Computer</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPU</td>
<td>Intel Celeron 1047UE 1.4 GHz</td>
<td>Intel Core i7-3517UE 1.7 GHz</td>
</tr>
<tr>
<td>Operating System</td>
<td>Optional</td>
<td>Note: Windows Embedded Standard 7 (32-bit/64-bit) or Linux Debian 7 (64-bit)</td>
</tr>
<tr>
<td>Memory (CTO*)</td>
<td>4 GB pre-installed, can be upgraded to 8 GB</td>
<td></td>
</tr>
<tr>
<td>USB</td>
<td>USB 2.0 (Type A) x 2</td>
<td>USB 2.0 (M12 D-coded) x 1</td>
</tr>
<tr>
<td>Power Input Voltage</td>
<td>12 to 48 VDC (M12 A-coded)</td>
<td></td>
</tr>
<tr>
<td><strong>Storage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OS CFast Storage (CTO*)</td>
<td>Optional</td>
<td>Note: 32-bit W7E requires at least an 8 GB CFast card, 64-bit W7E requires at least a 16 GB CFast card, and 64-bit Debian7 requires at least an 8 GB CFast card</td>
</tr>
<tr>
<td>Backup CFast Storage (CTO*)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSD / HDD Storage (CTO*)</td>
<td>Optional</td>
<td>SSD / HDD to be purchased separately</td>
</tr>
<tr>
<td>Note: Anti-vibration storage kit (FK-75125-02) must be purchased separately to install an SSD / HDD</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display Interface</td>
<td>DVI-I x 2</td>
<td></td>
</tr>
<tr>
<td>Audio Interface</td>
<td>Line in/out (M12 A-coded) x 1</td>
<td></td>
</tr>
<tr>
<td>Ethernet Interface</td>
<td>10/100/1000 Mbps (M12 X-coded) x 2</td>
<td></td>
</tr>
<tr>
<td>Serial Ports</td>
<td>RS-232/422/485 (DB9) x 4</td>
<td></td>
</tr>
<tr>
<td>Digital Input Channels</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Digital Output Channels</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Environmental Limits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>T1: -25 to 55°C</td>
<td>TX: -40 to 70°C</td>
</tr>
<tr>
<td>Conformal Coating</td>
<td>–</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Other Peripherals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peripheral Expansion Card</td>
<td>Peripheral expansion slots x 2</td>
<td>Note: Peripheral expansion cards must be purchased separately. Please refer to the “Peripheral Expansion Modules” table below.</td>
</tr>
</tbody>
</table>

*CTO = Configure To Order

Note:
Please refer to the Component Compatibility Guide (CCG) for the list of components that Moxa has validated to be compatible with this product. You can download the CCG from the Moxa product website. For components with a Moxa P/N, you can order the components together with your product from Moxa and we will install the selected components in your product. Moxa guarantees the compatibility of the components installed in your product though CTO.

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**Package Checklist**
- V2426A embedded computer
- Wall-mounting kit
- Documentation and software CD or DVD
- Quick installation guide (printed)
- Warranty card
## Optional Accessories (can be purchased separately)

<table>
<thead>
<tr>
<th>Type</th>
<th>Model Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ethernet</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable &amp; Connector</td>
<td>CBL-M12XMM8PRJ45-BK-100-IP67</td>
<td>8-pin male X-coded M12-to-RJ45 Cat-5E UTP gigabit Ethernet cable, 1 meter, IP67-rated</td>
</tr>
<tr>
<td>Connector</td>
<td>M12X-8PMM-IP67</td>
<td>8-pin male X-coded circular threaded gigabit Ethernet connector, IP67-rated (for field installation)</td>
</tr>
<tr>
<td><strong>Mounting Kits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolated Wall</td>
<td>V2400 Isolated Wall-mounting Kit</td>
<td>Wall-mounting kit with isolation protection, including two wall-mounting brackets and four screws</td>
</tr>
<tr>
<td>DIN-Rail Mounting</td>
<td>DK-DC50131-01</td>
<td>DIN-rail mounting kit, including two DIN-rail brackets and eight screws</td>
</tr>
<tr>
<td><strong>Power</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable</td>
<td>CBL-M12(FF5P)/Open-100 IP67</td>
<td>5-pin female A-coded M12 power cable, 1 meter, IP67-rated</td>
</tr>
<tr>
<td>Connector</td>
<td>M12A-5P-IP68</td>
<td>5-pin male circular threaded A-coded M12 power connector, IP68-rated (for field installation)</td>
</tr>
<tr>
<td>Adapter</td>
<td>PWR-24250-DT-S1</td>
<td>Power adapter for testing and system development in the office under ambient temperature conditions: Input: 100 to 240 VAC, 50 to 60 Hz, 1.5 A Output: 24 VDC, 2.5 A, 60 W</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7US-2B-183</td>
<td>Power cord with 2-pin connector, USA plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7EU-2B-183</td>
<td>Power cord with 2-pin connector, Euro plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7UK-2B-183</td>
<td>Power cord with 2-pin connector, British plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7AU-2B-183</td>
<td>Power cord with 2-pin connector, Australia plug</td>
</tr>
<tr>
<td>Power Cord</td>
<td>PWC-C7CN-2B-183</td>
<td>Power cord with 2-pin connector, China plug</td>
</tr>
<tr>
<td><strong>Audio</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>M12A-8PMM-IP67</td>
<td>8-pin male circular threaded A-coded M12 connector, IP67-rated (for field-installation)</td>
</tr>
<tr>
<td><strong>USB</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector</td>
<td>M12A-5PMM-IP68</td>
<td>5-pin male circular threaded D-coded M12 USB connector, IP68-rated</td>
</tr>
<tr>
<td><strong>Storage Kit</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal Storage</td>
<td>FK-75125-02</td>
<td>Hard disk installation package (for HDD, SSD, EN 50155) (only available for the V2406A and V2426A series)</td>
</tr>
<tr>
<td><strong>Battery</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Battery Kit</td>
<td>RTC Battery Kit</td>
<td>Lithium battery with built-in connector for easy replacement</td>
</tr>
</tbody>
</table>
## Peripheral Expansion Modules

<table>
<thead>
<tr>
<th>Model name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPM-DK02</td>
<td>2 mini PCIe slots, -25 to 55°C operating temperature when used with a Moxa recommended wireless module. &lt;br&gt;Note: See the “Wireless Accessory Packages” table below to select a wireless accessory package.</td>
</tr>
<tr>
<td>EPM-DK03</td>
<td>GPS receiver with 2 mini PCIe slots, -25 to 55°C operating temperature when used with a Moxa recommended wireless module (3G x 1 + WiFi x 1). &lt;br&gt;Note: See the “Wireless Accessory Packages” table below to select a wireless accessory package.</td>
</tr>
<tr>
<td>EPM-3032</td>
<td>2 isolated RS-232/422/485 ports with DB9 connectors, -40 to 70°C operating temperature</td>
</tr>
<tr>
<td>EPM-3112</td>
<td>2 isolated CAN ports with DB9 connectors, -25 to 55°C operating temperature</td>
</tr>
<tr>
<td>EPM-3438</td>
<td>8 DI s and 8 DO s, with 3 kV digital isolation protection, 2 kHz counter, -40 to 70°C operating temperature</td>
</tr>
</tbody>
</table>

## Wireless Accessory Packages

Note: These packages are for the EPM-DK02 and EPM-DK03 only

<table>
<thead>
<tr>
<th>Type</th>
<th>Model Name</th>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPM-DK Wi-Fi Package</td>
<td>Mini-PCIe Card</td>
<td>SprakLAN WPEA-121N Wi-Fi mini card x 1, bracket x 1, silver screws x 2, black screws x 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Digital Interface</td>
<td>Mini card internal antenna with QMA connectors x 2, locking washers x 2, O-rings x 2, nuts x 2</td>
<td></td>
</tr>
<tr>
<td>EPM-DK 3G Package</td>
<td>Mini-PCIe Card</td>
<td>Gemalto PHS8-P 3G mini card x 1, black screws x 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thermal Pad</td>
<td>Cellular mini card thermal pad x 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Digital Interface</td>
<td>Mini card internal antenna with QMA connector x 1, locking washer x 1, O-ring x 1, nut x 1</td>
<td></td>
</tr>
<tr>
<td>EPM-DK LTE-US Package</td>
<td>Mini-PCIe Card</td>
<td>Gemalto PLS8-US LTE mini card x 1, black screws x 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thermal Pad</td>
<td>Cellular mini card thermal pad x 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Digital Interface</td>
<td>Mini card internal antenna with QMA connector x 1, locking washer x 1, O-ring x 1, nut x 1</td>
<td></td>
</tr>
<tr>
<td>EPM-DK LTE-EU Package</td>
<td>Mini-PCIe Card</td>
<td>Gemalto PLS8-E LTE mini card x 1, black screws x 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thermal Pad</td>
<td>Cellular mini card thermal pad x 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Digital Interface</td>
<td>Mini card internal antenna with QMA connector x 1, locking washer x 1, O-ring x 1, nut x 1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS Extension Cable</td>
<td>TNC to SMA (female) adapter with 50 cm cable x 1</td>
</tr>
<tr>
<td>GPS External Antenna</td>
<td>26 dBi, 1572 MHz, L1 band SMA antenna x 1</td>
</tr>
<tr>
<td>Digital Interface</td>
<td>Mini card internal antenna with QMA connector x 1, locking washer x 1, O-ring x 1, nut x 1</td>
</tr>
<tr>
<td>Wi-Fi External Antenna</td>
<td>Wi-Fi external antenna with SMA connector x 1</td>
</tr>
<tr>
<td>3G External Antenna</td>
<td>3G external antenna with SMA connector x 1</td>
</tr>
<tr>
<td>LTE-US External Antenna</td>
<td>LTE-US external antenna with SMA connector x 1</td>
</tr>
<tr>
<td>LTE-EU External Antenna</td>
<td>LTE-EU external antenna with SMA connector x 1</td>
</tr>
<tr>
<td>Wi-Fi Extension Cable</td>
<td>QMA (male) to SMA (male) adapter with 50 cm cable x 1</td>
</tr>
<tr>
<td>Cellular Extension Cable</td>
<td>QMA (male) to SMA (female) adapter with 50 cm cable x 1</td>
</tr>
</tbody>
</table>
V2400 Series Expansion Modules

Introduction

Moxa's V2400 series expansion modules, which come with serial ports, CAN ports, wireless and GPS cards, digital input/output channel cards, mini PCI and PCIe modules, a 2-slot mini-PCIe module, and VGA or DVI-I display connectors, can be used with Moxa's V2426 embedded computers, and give end-users the best flexibility for setting up and expanding a variety of industrial applications.

Appearance

<table>
<thead>
<tr>
<th>EPM-3032</th>
<th>EPM-3112</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial Ports x 2 (RS-232/422/485, DB9)</td>
<td>CAN Ports x 2 (DB9)</td>
</tr>
<tr>
<td>Serial Port LED Indicators (TX x 2, RX x 2)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EPM-3438</th>
</tr>
</thead>
<tbody>
<tr>
<td>DI Channels x 8</td>
</tr>
</tbody>
</table>

- EPM-3032: 2 isolated RS-232/422/485 ports with DB9 connectors
- EPM-3112: 2 isolated CAN ports with DB9 connectors
- EPM-3438: 8+8 DI/DO with 3 kV digital isolation protection, 2 kHz counter
- EPM-DK02*: 2 mini PCIe slots
- EPM-DK03*: GPS receiver, 2 mini PCIe slots

*Operating Temperature:
- w/o wireless module: EN 50155 Class TX
- w/ wireless module: EN 50155 Class T1
EPM-DK02

Serial Interface

Serial Standards: 2 RS-232/422/485 ports, software-selectable (DB9 male)

Isolation: 2 kV digital isolation

Serial Communication Parameters

Data Bits: 5, 6, 7, 8

Stop Bits: 1, 1.5, 2

Parity: None, Even, Odd, Space, Mark

Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485

Baudrate: 50 bps to 921.6 kbps (non-standard baudrates supported; see user’s manual for details)

EPM-DK03

Serial Signals

RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND

RS-422: TxD+, TxD-, RxD+, RxD-, GND

RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND

RS-485-2w: Data+, Data-, GND

Physical Characteristics

Weight: 137 g (0.30 lb)

Dimensions: 104 x 121 x 34 mm (4.09 x 4.76 x 1.34 in)

Environmental Limits

Operating Temperature: -40 to 70°C (-40 to 158°F), EN 50155 Class TX
### EPM-3112 Specifications

**CANbus Communication**
- **Interface:** 2 optically isolated CAN2.0A/2.0B compliant ports
- **CAN Controller:** Phillips SJA1000T
- **Signals:** CAN_H, CAN_L
- **Isolation:** 2 kV digital isolation
- **Speed:** 1 Mbps
- **Connector Type:** DB9 male

**Physical Characteristics**
- **Weight:** 127 g (0.28 lb)
- **Dimensions:** 104 x 121 x 34 mm (4.09 x 4.76 x 1.34 in)

**Environmental Limits**
- **Operating Temperature:** -25 to 55°C (-13 to 131°F), EN 50155 Class T1

### EPM-3438 Specifications

**Digital Input**
- **Input Channels:** 8
- **Input Voltage:** 0 to 30 VDC at 25 Hz

**Digital Input Levels for Dry Contacts:**
- Logic level 0: Close to GND
- Logic level 1: Open

**Digital Input Levels for Wet Contacts:**
- Logic level 0: +3 V max.
- Logic level 1: +10 V to +30 V (Source to DI)

**Counter Frequency:** 2 kHz (DI0 only)
- **Connector Type:** 10-pin screw terminal block (8 DI points, DI Source, GND)
- **Isolation:** 3 kV optical isolation

**Physical Characteristics**
- **Weight:** 120 g (0.27 lb)
- **Dimensions:** 104 x 121 x 34 mm (4.09 x 4.76 x 1.34 in)

**Environmental Limits**
- **Operating Temperature:** -40 to 70°C (-40 to 158°F), EN 50155 Class TX

### EPM-DK02 Specifications

**PCI Express Mini Slot**
- **Interface:**
  - Slot 1: PCI-Express V1.0 (one lane) / USB 2.0
  - Slot 2: USB 2.0

**USB 2.0 Bus SIM Card Holder:** Reserved for cellular applications

**Physical Characteristics**
- **Weight:** 125 g (0.28 g)
- **Environmental Limits**
- **Operating Temperature:** -40 to 70°C (-40 to 158°F), EN 50155 Class TX

### EPM-DK03 Specifications

**PCI Express Mini Slot**
- **Interface:**
  - Slot 1: PCI-Express V1.0 (one lane) / USB 2.0
  - Slot 2: USB 2.0

**USB 2.0 Bus SIM Card Holder:** Reserved for cellular applications

**Physical Characteristics**
- **Weight:** 220 g (0.49 lb)
- **Dimensions:** 104 x 121 x 34 mm (4.09 x 4.76 x 1.34 in)

**Environmental Limits**
- **Operating Temperature:**
  - w/o wireless module: -40 to 70°C (-40 to 158°F), EN 50155 Class TX
  - w/ wireless module: -25 to 55°C (-13 to 131°F), EN 50155 Class T1

**GPS Interface**
- **Receiver Types:**
  - 50-channel u-blox 6 LEA-6 receiver
  - GPS L1 C/A code
  - GALILEO L1 open service (with upgrade)
  - SBAS: WAAS, EGNOS, MSAS, GAGAN

**Acquisition:**
- Cold starts: 28 s
- Warm starts: 28 s
- Aided starts: 1 s
- Hot starts: 1 s

**Sensitivity:**
- Tracking: -160 dBm
- Reacquisition: -160 dBm
- Cold starts: -147 dBm

**Timing accuracy:**
- RMS: 30 ns
- 99%: <60 ns
- Granularity: 21 ns

**Accuracy:**
- Position: 2.5 m CEP
- SBAS: 2.0 m CEP

**Protocols:**
- NMEA, UBX binary, max. update rate: 5 Hz (ROM version)

**Time Pulse:**
- 0.25 Hz to 1 kHz

**Velocity Accuracy:**
- 0.1 m/s

**Heading Accuracy:**
- 0.5 degrees

**A-GPS:**
- Supports AssistNow Online and AssistNow Offline, OMA SUPL compliant

**Operational Limits:**
- Velocity: 500 m/s (972 knots)
### Dimensions

Unit: mm (inch)

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 (1.93)</td>
<td></td>
</tr>
<tr>
<td>80 (3.15)</td>
<td></td>
</tr>
<tr>
<td>94 (3.70)</td>
<td></td>
</tr>
<tr>
<td>104 (4.09)</td>
<td></td>
</tr>
<tr>
<td>26 (1.02)</td>
<td></td>
</tr>
<tr>
<td>34 (1.34)</td>
<td></td>
</tr>
<tr>
<td>49 (1.93)</td>
<td></td>
</tr>
<tr>
<td>56 (2.20)</td>
<td></td>
</tr>
<tr>
<td>121 (4.76)</td>
<td></td>
</tr>
</tbody>
</table>

### Ordering Information

**Available Models**

- **EPM-DK02**: 2 mini PCIe slots, -25 to 55°C operating temperature
- **EPM-DK03**: GPS receiver, 2 mini PCIe slots, -25 to 55°C operating temperature
- **EPM-3032**: 2 isolated RS-232/422/485 ports with DB9 connectors, -40 to 70°C operating temperature
- **EPM-3112**: 2 isolated CAN ports with DB9 connectors, -25 to 55°C operating temperature
- **EPM-3438**: 8+8 DI/DO with 3 kV digital isolation protection, 2 kHz counter, -40 to 70°C operating temperature
UC-8481 Series

Industrial RISC-based mobile Linux computers with cellular, Wi-Fi, and GPS modules, 2 Ethernet, 2 serial, 2 USB 2.0 ports, and 2 mini PCIe sockets

Overview

The UC-8481 embedded computer comes with 2 RS-232/422/485 serial ports, 2 Ethernet ports, 4 digital input channels, 4 digital output channels, a CompactFlash socket, and 2 USB 2.0 ports.

The computer uses the Intel XScale IXP435 533 MHz RISC CPU. This powerful computing engine supports several useful communication functions, but will not generate too much heat. The built-in 32 MB NOR Flash ROM and 512 MB SDRAM give you enough memory to run your application software directly on the UC-8481, and the 512 MB NAND Flash can be used to provide additional data storage.

Mostly importantly, the UC-8481 series comes with seven connectors that allow users to connect various wireless and GPS modules, making it particularly well-suited for rolling stock and moving vehicles. The UC-8481 is a convenient cornerstone for customizing intelligent, cost-effective wireless communication platforms.

With an embedded Linux operating system pre-installed, the UC-8481 series provides an open software platform perfect for custom-authored software. Software written on desktop PCs can be easily ported to the UC-8481 via a common compiler, without any modification of code. This makes the UC-8481 an optimal solution for industrial applications, allowing ample customization with minimal cost and effort.

The UC-8481 also comes in a wide-temperature model designed to operate reliably in extreme temperatures ranging from -25 to 70°C.

Appearance

Front View

- 512 MB NAND Flash for data storage
- Fanless and rugged design for rolling stock applications
- Complies with a portion of EN 50155 specifications
- Extra Wi-Fi and cellular slots for cross-operator expansions
- Wi-Fi, cellular, and GPS modules for full communications mobility
- Independent, software-based power control of cellular modules
- Ready-to-run embedded Linux operating system
- -25 to 70°C wide temperature models available
Railway Computers

**Rear View**

- Wireless Antenna Connectors x 7 (Wi-Fi, 3G, GPS)
- USB 2.0 Ports x 2
- Configuration Switch
- Serial Ports x 2, DB9 (RS-232/422/485)
- LED Indicators x 4 (Tx, Rx)
- Reset Button

**Dimensions**

Unit: mm (inch)

- **Height**: 100 (4.72)
- **Width**: 200 (7.87)
- **Depth**: 57 (2.24)
### Hardware Specifications

#### Computer
- **CPU:** Intel XScale IXP435, 533 MHz
- **OS:** Linux (pre-installed)
- **USB:** USB 2.0 hosts x 2
- **DRAM:** 512 MB DDR2 SDRAM onboard
- **Flash:**
  - NOR Flash, 32 MB (max. 32 MB) onboard to store OS
  - NAND Flash, 512 MB (max. 1 GB) for OS file system, caching storage, and data logger

#### Storage
- **Storage Expansion:** CompactFlash socket

#### Ethernet Interface
- **LAN:** Auto-sensing 10/100 Mbps ports (M12) x 2
- **Magnetic Isolation Protection:** 1.5 kV built in

#### GPS Module (U-Blox LEA-6S)
- **Receiver Types:**
  - 50-channel U-blox 6 engine
  - GPS L1 C/A code
  - SBAS: WAAS, EGNOS, MSAS, GAGAN
- **Acquisition:**
  - Cold starts: 28 s
  - Warm starts: 28 s
  - Aided starts: 1 s
  - Hot starts: 1 s
- **Sensitivity:**
  - Tracking: -160 dBm
  - Reacquisition: -160 dBm
  - Cold starts: -147 dBm
- **Timing Accuracy:**
  - RMS: 30 ns
  - 99%: <60 ns
  - Granularity: 21 ns
- **Accuracy:**
  - Position: 2.5 m CEP
  - SBAS: 2.0 m CEP
- **Protocols:** NMEA, UBX binary, max. update rate: 5 Hz (ROM version)
- **Time Pulse:** 0.25 Hz to 1 kHz
- **Velocity Accuracy:** 0.1 m/s
- **Heading Accuracy:** 0.5 degrees
- **A-GPS:** Supports AssistNow Online and AssistNow Offline, OMA SUPL compliant

#### WLAN Module (Atheros AR9220)
- **WAPN001:** IEEE 802.11a/b/g/n wireless LAN module with U.FL antenna connector
- **Standards:** IEEE 802.11a/b/g/n for wireless LAN
- **Connector Type:** QMA connector (female type) x 2
- **Mode:** Client

#### Cellular Module (Cinterion PH8)
- **Frequency Bands:** GSM/GPRS/EDGE/UMTS/HSPA+
- **Band Options:**
  - Five band UMTS(WCDMA/FDD)
  - 800/850/1900 MHz
  - Quad-band GSM: 850/900/1800/1900 MHz
- **HSDPA/HSUPA Data Rates:**
  - DL: 3.6/7.2/14.4 Mbps
  - UL: 2.0/5.76 Mbps
- **UMTS Data Rates:**
  - DL: max 384 kbps
  - UL: max 384 kbps
- **EDGE Class 12:**
  - DL: max 237 kbps
  - UL: max 237 kbps
- **GPRS Class 12:**
  - DL: max 85.6 kbps
  - UL: max 85.6 kbps
- **Connector Type:** QMA connector (female type) x 1

#### Serial Interface
- **Serial Standards:** 2 RS-232/422/485 ports, software-selectable (DB9)
- **Console Port:** RS-232 (Tx/D, Rx/D, GND), 4-pin pin header output (115200, n, 8, 1)

#### Serial Communication Parameters
- **Data Bits:** 5, 6, 7, 8
- **Stop Bits:** 1, 1.5, 2
- **Parity:** None, Even, Odd, Space, Mark
- **Flow Control:** RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
- **Baudrate:** 50 bps to 921.6 kbps (supports non-standard baudrates; see user’s manual for details)

#### Digital Input
- **Input Channels:** 4
- **Input Voltage:** 0 to 30 VDC
- **Digital Input Levels for Dry Contacts:**
  - Logic level 0: Close to GND
  - Logic level 1: Open
- **Digital Input Levels for Wet Contacts:**
  - Logic level 0: +3 V max.
  - Logic level 1: +10 V to +30 V (COM to DI)
- **Connector Type:** 10-pin screw terminal block (4 points, COM, GND)

#### Digital Output
- **Output Channels:** 4, sink type
- **Output Current:** Max. 200 mA per channel
- **On-State Voltage:** 24 VDC nominal, open collector to 30 V
- **Connector Type:** 10-pin screw terminal block (4 points, GND)

#### Physical Characteristics
- **Housing:** SECC sheet metal (1 mm)
- **Weight:** 1 kg (2.22 lb)
- **Dimensions:** 200 x 57 x 120 mm (7.87 x 2.24 x 4.72 in)
- **Mounting:** Wall, DIN rail

#### Environmental Limits
- **Operating Temperature:**
  - Standard Models: -25 to 55°C (-13 to 131°F)
  - Wide Temp. Models: -25 to 70°C (-13 to 158°F)
- **Storage Temperature:**
  - Standard Models: -25 to 75°C (-13 to 167°F)
  - Wide Temp. Models: -40 to 80°C (-40 to 176°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-Vibration:** IEC 61373 standard
- **Anti-Shock:** IEC 61373 standard

#### Power Requirements
- **Input Voltage:** 24 VDC (9 to 48 V), M12 connector
- **Input Current:** 833 mA @ 24 VDC
- **Power Consumption:** 20 W

#### Standards and Certifications
- **Safety:** UL 60950-1, EN 60950-1
- **EMC:** EN 55022/24
- **EMI:** CISPR 22, FCC Part 15B Class A

---

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**LEDs**
- **System:** Power, Ready, Storage, Programmable
- **LAN:** 10M/Link x 2, 100M/Link x 2 (on connector)
- **Serial:** Tx/D x 2, Rx/D x 2
- **Reset Button:** Supports “Reset to Factory Default”

**Physical Characteristics**
- **Housing:** SECC sheet metal (1 mm)
- **Weight:** 1 kg (2.22 lb)
- **Dimensions:** 200 x 57 x 120 mm (7.87 x 2.24 x 4.72 in)
- **Mounting:** Wall, DIN rail

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**Standards and Certifications**
- **Safety:** UL 60950-1, EN 60950-1
- **EMC:** EN 55022/24
- **EMI:** CISPR 22, FCC Part 15B Class A
Software Specifications

Linux
OS: Linux 2.6.38
Web Server (Apache): Allows you to create and manage web sites; supports PHP and XML
Terminal Server (SSH): Provides secure encrypted communications between two un-trusted hosts over an insecure network
File System: JFFS2, NFS, Ext2, Ext3, YAFFS2
Internet Protocol Suite: TCP, UDP, IPv4, IPv6, SNMPv1, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SMTP, Telnet, FTP, TFTP, PPP, PPTP, OpenVPN, iptables firewall, OpenSSL
Software Specifications
• GNU C/C++ cross-compiler, supports EABI
• Moxa API Library (Watchdog timer, Moxa serial I/O control, Moxa DI/DO API)
• Moxa API Library (Watchdog timer, Moxa serial I/O control, Moxa DI/DO API)
Application Development Software:
• Executable encryption (based on patented Moxa technology)

Available Models
UC-8481-LX: RISC-based industrial wireless mobile computer with 2 LANs, 2 serial ports, 4 DIs, 4 DOs, 2 USB 2.0 hosts, CF, 1 cellular module, 1 Wi-Fi module, 1 GPS module, 2 mini PCIe sockets (USB interface), Linux OS, -25 to 55°C operating temperature (EN 50155 Class T1)
UC-8481-T-LX: RISC-based industrial wireless mobile computer with 2 LANs, 2 serial ports, 4 DIs, 4 DOs, 2 USB 2.0 hosts, CF, 1 cellular module, 1 Wi-Fi module, 1 GPS module, 2 mini PCIe sockets (USB interface), Linux OS, -25 to 70°C operating temperature (EN 50155 Class T3)

Optional Accessories (can be purchased separately)
PWR-24250-DT-S1: Power adapter
PWC-C7US-2B-183: Power cord with 2-pin connector, USA plug
PWC-C7EU-2B-183: Power cord with 2-pin connector, Euro plug
PWC-C7UK-2B-183: Power cord with 2-pin connector, British plug
PWC-C7AU-2B-183: Power cord with 2-pin connector, Australia plug
PWC-C7CN-2B-183: Power cord with 2-pin connector, China plug

M12 Connectors (can be purchased separately)
M12A-5P-IP68: 5-pin female circular threaded A-coded M12 power connector, IP68-rated (for field installation)
M12D-4P-IP68: 4-pin male circular threaded D-coded M12 Ethernet connector, IP68-rated (for field installation)
M12 Cables (can be purchased separately)
CBL-M12(FF5P)/Open-100 IP67: 1-meter A-coded M12-to-5-pin power cable, 5-pin female M12 connector, IP67-rated
CBL-M12D(MM4P)/RJ45-100 IP67: 1-meter D-coded M12-to-RJ45 Cat-5C UTP Ethernet cable, 4-pin male M12 connector, IP67-rated

UC-8481 Wi-Fi Accessory Package
WAPN001: Wireless LAN module, supporting IEEE 802.11 a/b/g/n
Wireless Antenna Connector and Cable: OMA (female) antenna connector with 140 mm cable to Wi-Fi module
Installation Kit: Bronze screws x 3, M2.5 screws x 3, thermal pad x 1

UC-8481 PH8 Cellular Accessory Package
EPN-PH8: Cellular Module
Wireless Antenna Connector and Cable: OMA (female) antenna connector with 140 mm cable to cellular module
Installation Kit: Bronze screw x 1, M2.5 screw x 1, thermal pad x 1

WLAN Cable and Antenna
Cable: OMA (male) to SMA (male) adapter with 50 cm cable
Antenna: 2 dual-band omni-directional antenna (2 dBi, RP-SMA, 2.4/5 GHz)

Cellular Cable and Antenna
Cable: OMA (male) to SMA (female) adapter with 50 cm cable
Antenna: Omni 1 dBi rubber SMA antenna

GPS Cable and Antenna
Cable: TNC to SMA (female) adapter with 50 cm cable
Antenna: 26 dBi, 1572 MHz, L1 band antenna

Package Checklist
• UC-8481 embedded computer
• Wall-mounting kit
• DIN-rail mounting kit
• CBL-4PINDB9F-100: 100 cm console port cable; 4 pin header connector to DB9 female connector
• Documentation and software CD or DVD
• Quick installation guide (printed)
## Optional Accessories

<table>
<thead>
<tr>
<th>Ethernet</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cable</td>
<td>1-meter D-coded M12-to-RJ45 Cat-5E UTP Ethernet cable, 4-pin male M12 connector, IP67-rated</td>
</tr>
<tr>
<td>2</td>
<td>Connector</td>
<td>Field-installation D-coded screw-in Ethernet connector, 4-pin male M12 connector, IP68-rated</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cable</td>
<td>1-meter A-coded M12-to-5-pin power cable, 5-pin female M12 connector, IP67-rated</td>
</tr>
<tr>
<td>2</td>
<td>Power adapter kit</td>
<td>Power adapter, power jack, M12 connector, power cord</td>
</tr>
<tr>
<td>3</td>
<td>Power adapter kit</td>
<td>Power adapter, power jack, M12 connector, power cord</td>
</tr>
<tr>
<td>4</td>
<td>Power adapter kit</td>
<td>Power adapter, power jack, M12 connector, power cord</td>
</tr>
<tr>
<td>5</td>
<td>Power adapter kit</td>
<td>Power adapter, power jack, M12 connector, power cord</td>
</tr>
<tr>
<td>6</td>
<td>Power adapter kit</td>
<td>Power adapter, power jack, M12 connector, power cord</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wi-Fi</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cable</td>
<td>QMA (male) to SMA (male) adapter with 50 cm cable</td>
</tr>
<tr>
<td>2</td>
<td>Antenna</td>
<td>Omni 1 dBi rubber SMA antenna</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cellular</th>
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<td>2</td>
<td>Antenna</td>
<td>Omni 1 dBi rubber SMA antenna</td>
</tr>
<tr>
<td>3</td>
<td>Module</td>
<td>PH8, cellular module</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GPS</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cable</td>
<td>TNC to SMA (female) adapter with 50 cm cable</td>
</tr>
<tr>
<td>2</td>
<td>Antenna</td>
<td>26 dBi, 1572 MHz, L1 band SMA antenna</td>
</tr>
</tbody>
</table>
Moxa’s RNAS-1200 network-attached storage (NAS) units provide high performance, high reliability, and high capacity data storage in harsh industrial environments. All RNAS-1200 devices are housed in a fanless, thermally efficient, dust and water-protected IP54-rated chassis. This sealed enclosure eliminates internal fans as a point of critical system failure, and protects the internal components from dust and water splashes. RNAS-1200 devices are compliant with essential sections of EN 50155, covering operating temperature, power input voltage, surge, ESD, and vibration, as well as conformal coating and power insulation, making them suitable for a variety of industrial applications.

RNAS-1200 devices also come with Moxa’s Intelligent Heating Solution™ (IHS) and Data XPro™ technologies. IHS automatically heats the system to ensure reliable operation even in extremely low temperatures, while the Data XPro™ utility provides intelligent data and drive protections against extreme heat and vibration. In addition, the series’ remarkably fast array synchronizations make the full data and hardware redundancies of RAID 1 a feasible alternative for industrial applications, while the two gigabit PoE+ network interfaces provide not only network redundancy, but also a highly efficient, fully redundant power supply over the same set of wires.

The RNAS-1200 Series combines simple configuration and multiple data and hardware redundancies in a compact, durable, fanless chassis ideal for industrial environments where extreme temperatures and vibration are a concern. The RNAS-1200 NAS devices are your best choice for industrial-strength data storage for rolling stock video surveillance or remote site data storage applications.
Hardware Specifications

Computer
CPU: Onboard Marvell 1.0 GHz 88F6281
DRAM: 512 MB DDRII
Flash Memory: Onboard 2 GB USB DOM to store OS

Storage
RNAS-1201-T: 2.5-inch HDD bay x 2, reserved for storage expansion
RNAS-1211-T: 100 GB HDD x 2 pre-installed

Ethernet Interface
LAN: Auto-sensing 10/100/1000 Mbps ports (M12) x 2

IHS Control
IHS Function Control: Temperature reading, power output control for heating function

LEDs
System: RAID, Ready, HDD1, HDD2
LAN: 100M/Link x 2, 1000M/Link x 2

Physical Characteristics
Housing: Aluminum
Weight:
RNAS-1201-T: 1.98 kg (4.4 lb)
RNAS-1211-T: 2 kg (4.44 lb)
Dimensions: 252 x 130 x 57 mm (9.92 x 5.12 x 2.24 in)
Mounting: Wall
IP Rating: IP 54

Environmental Limits
Operating Temperature: -40 to 70°C (-40 to 158°F)
Storage Temperature: -40 to 85°C (-40 to 176°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)

Anti-Vibration: EN 50155 standard
Anti-Shock: EN 50155 standard
Conformal Coating: Available on request

Power Requirements
Input: PoE (IEEE 802.3af), or PoE+ (IEEE 802.3at)
Note: If the RNAS-1200 is connected to a PoE switch and T1 mode has been configured, the RNAS-1200 should only be booted up when the ambient temperature is above 0°C.

Standards and Certifications
Safety: UL 60950-1
EMC: EN 55022/24
EMI: CISPR 22, FCC Part 15B Class A
EMS:
IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV
IEC 61000-4-3 RS: (80 MHz to 1 GHz: 20 V/m
IEC 61000-4-4 EFT: Power: 2 kV; Signal: 2 kV
IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV
IEC 61000-4-6 CS: 10 V
IEC 61000-4-8
Green Product: RoHS, CRoHS, WEEE
Rail Traffic: EN 50155 (essential compliance*), EN 50121-3-2, IEC 61373

* Moxa defines “essential compliance” to include those EN 50155 requirements that make products more suitable for rolling stock railway applications.
MTBF (mean time between failures)
Time:
- RNAS-1211: 486,185 hrs
- RNAS-1201: 503,159 hrs
Standard: Telcordia (Bellcore) Standard TR/SR

Warranty
Warranty Period: 5 years (storage drive not included)
Details: See www.moxa.com/warranty
Note: These hardware specifications describe the NAS unit itself, but not its recommended accessories. In particular, the wide temperature specification does not apply to accessories such as power adapters and cables.

Software Specifications

Operating System
System Platform: Linux 2.6 pre-installed

Network
IP Settings: Fixed IP, DHCP
Redundancy: Port trunking / NIC teaming

System Management
Firmware Upgrade: Can be run via web interface
System Bootup: Can be observed by LED indicators for system status
HDD Failure Status: Can be observed by LED indicators

Disk Management
JBOD: Two hard disks can work independently
Spanning Big: Two hard disks can be merged as spanning big mode
RAID 0: Two hard disks can be merged and work in RAID 0 mode
RAID 1: Two hard disks can be merged and work in RAID 1 mode
HDD Recovery: Support automatic or manual data recovery when new hard disk has been inserted

Data Protection
Vibration Protection: Storage buffer available for strong vibration status
Temperature Protection: Storage buffer available for low/high temperature environment
Fast Sync.: Fast synchronization in RAID 1 mode
SNMP Management
System: Standard MIB-II (RFC 1213), plus additional Moxa features that include: NTP, time zone, and time display management; channel bonding and IP configuration; management of SSH, FTP, and DNS; and configuration of SNMP agents and traps.

Ordering Information
Available Models
- RNAS-1201-T: Network-attached storage with 2 M12 PoE+ gigabit LAN ports and -40 to 70°C temperature tolerance (operating)
- RNAS-1211-T: Network-attached storage with 2 M12 PoE+ gigabit LAN ports, 2 pre-installed 100 GB hard disks, and -40 to 70°C temperature tolerance (operating)
- RNAS-1201-CT-T: Network-attached storage with 2 M12 PoE+ gigabit LAN ports and -40 to 70°C temperature tolerance (operating), conformal coating
- RNAS-1211-CT-T: Network-attached storage with 2 M12 PoE+ gigabit LAN ports, 2 pre-installed 100 GB hard disks, and -40 to 70°C temperature tolerance (operating), conformal coating

Optional Accessories

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<th>Model Name</th>
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<tbody>
<tr>
<td>1 Cable</td>
<td>CBL-M12MM8PRJ45-BK-100-IP67</td>
<td>1-meter A-coded M12-to-RJ45 Cat-5E UTP gigabit Ethernet cable, 8-pin male M12 connector, rated IP67</td>
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<td>2 Connectors</td>
<td>M12A-8PMM-IP67</td>
<td>Field-installation A-coded screw-in gigabit Ethernet connector, 8-pin male M12 connector, rated IP67</td>
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<tr>
<td>1 Mounting Kit</td>
<td>RNAS Wall-Mounting Assembly with a Lock</td>
<td>Mounting frame with a lock, screws, 2 faceplate brackets, 2 rails</td>
<td></td>
</tr>
<tr>
<td>2 Rail</td>
<td>RNAS Slide Rail</td>
<td>2 extra rails for the RNAS-1200</td>
<td></td>
</tr>
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Package Checklist
- 1 RNAS-1200 storage appliance
- Wall-mounting kit
- Documentation and software CD or DVD
- Quick installation guide (printed)
- Warranty card

MTBF (mean time between failures)
Time:
- RNAS-1211: 486,185 hrs
- RNAS-1201: 503,159 hrs

Standard: Telcordia (Bellcore) Standard TR/SR

Operating System
System Platform: Linux 2.6 pre-installed

Network
IP Settings: Fixed IP, DHCP
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Ordering Information
Available Models
- RNAS-1201-T: Network-attached storage with 2 M12 PoE+ gigabit LAN ports and -40 to 70°C temperature tolerance (operating)
- RNAS-1211-T: Network-attached storage with 2 M12 PoE+ gigabit LAN ports, 2 pre-installed 100 GB hard disks, and -40 to 70°C temperature tolerance (operating)
- RNAS-1201-CT-T: Network-attached storage with 2 M12 PoE+ gigabit LAN ports and -40 to 70°C temperature tolerance (operating), conformal coating
- RNAS-1211-CT-T: Network-attached storage with 2 M12 PoE+ gigabit LAN ports, 2 pre-installed 100 GB hard disks, and -40 to 70°C temperature tolerance (operating), conformal coating

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<td>Mounting frame with a lock, screws, 2 faceplate brackets, 2 rails</td>
<td></td>
</tr>
<tr>
<td>2 Rail</td>
<td>RNAS Slide Rail</td>
<td>2 extra rails for the RNAS-1200</td>
<td></td>
</tr>
</tbody>
</table>

Package Checklist
- 1 RNAS-1200 storage appliance
- Wall-mounting kit
- Documentation and software CD or DVD
- Quick installation guide (printed)
- Warranty card

Warranty
Warranty Period: 5 years (storage drive not included)
Details: See www.moxa.com/warranty
Note: These hardware specifications describe the NAS unit itself, but not its recommended accessories. In particular, the wide temperature specification does not apply to accessories such as power adapters and cables.
## Mission-Critical Computers

### Product Selection Guide

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<td>23-2</td>
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### Mission-Critical Computers

- **MC-7200 Series:** x86 fanless, wide temperature industrial computer with 3rd Generation Intel® Core™ processor
  - 23-3
- **MC-7130-MP:** Optimized, highly secure marine platform with diverse interface connectivity
  - 23-6
- **MC-5000 Series:** Fanless ECDIS bridge computers
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- **MC-1100 Series:** Quad-core fanless DIN-rail automation computer
  - 23-13
## Mission-Critical Computers

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<tbody>
<tr>
<td><strong>CPU</strong></td>
<td>Intel® Core™ i7-3550U 2.8 GHz, Intel® Core™ i3-3120ME 2.4 GHz, Intel® Core™ i5-3447s 2.7 GHz</td>
<td>Intel® Core™ i7-3550U 2.8 GHz, Intel® Core™ i3-3120ME 2.4 GHz, Intel® Core™ i5-3447s 2.7 GHz</td>
<td>Intel® Core™ i7-3550U 2.8 GHz, Intel® Core™ i3-3120ME 2.4 GHz, Intel® Core™ i5-3447s 2.7 GHz</td>
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<td>Intel® Core™ i7-3550U 2.8 GHz, Intel® Core™ i3-3120ME 2.4 GHz, Intel® Core™ i5-3447s 2.7 GHz</td>
<td>Intel® Core™ i3-3120ME 2.4 GHz, Intel® Core™ i5-3447s 2.7 GHz</td>
</tr>
<tr>
<td><strong>Supported OSs</strong></td>
<td>W7E, Windows 8, Linux, and Ubuntu</td>
<td>W7E, Windows 8, Linux, and Ubuntu</td>
<td>W7E, Windows 8, Linux, and Ubuntu</td>
<td>W7E, Windows 8, Linux, and Ubuntu</td>
<td>W7E, Windows 8, Linux, and Ubuntu</td>
<td>W7E, Windows 8, Linux, and Ubuntu</td>
</tr>
<tr>
<td><strong>USB</strong></td>
<td>2.0 x 2, Type A</td>
<td>2.0 x 2, Type A</td>
<td>2.0 x 2, Type A</td>
<td>2.0 x 2, Type A</td>
<td>2.0 x 2, Type A</td>
<td>2.0 x 2, Type A</td>
</tr>
<tr>
<td><strong>Audio</strong></td>
<td>Line in x 2, Line out x 1, Mic input x 1</td>
<td>Line in x 2, Line out x 1, Mic input x 1</td>
<td>Line in x 2, Line out x 1, Mic input x 1</td>
<td>Line in x 2, Line out x 1, Mic input x 1</td>
<td>Line in x 2, Line out x 1, Mic input x 1</td>
<td>Line in x 2, Line out x 1, Mic input x 1</td>
</tr>
<tr>
<td><strong>LAN Ports</strong></td>
<td>10/100/1000 Mbps (RJ45) x 4</td>
<td>10/100/1000 Mbps (RJ45) x 4</td>
<td>10/100/1000 Mbps (RJ45) x 4</td>
<td>10/100/1000 Mbps (RJ45) x 4</td>
<td>10/100/1000 Mbps (RJ45) x 4</td>
<td>10/100/1000 Mbps (RJ45) x 4</td>
</tr>
<tr>
<td><strong>Display Interface</strong></td>
<td>1 VGA output, DB15 female</td>
<td>1 VGA output, DB15 female</td>
<td>1 VGA output, DB15 female</td>
<td>1 VGA output, DB15 female</td>
<td>1 VGA output, DB15 female</td>
<td>1 VGA output, DB15 female</td>
</tr>
<tr>
<td><strong>Physical Characteristics</strong></td>
<td>Aluminum sheet metal</td>
<td>Aluminum sheet metal</td>
<td>Aluminum sheet metal</td>
<td>Aluminum sheet metal</td>
<td>Aluminum sheet metal</td>
<td>Aluminum sheet metal</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>8 kg (17.7 lb)</td>
<td>8 kg (17.7 lb)</td>
<td>8 kg (17.7 lb)</td>
<td>8 kg (17.7 lb)</td>
<td>8 kg (17.7 lb)</td>
<td>8 kg (17.7 lb)</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>120 x 120 x 31 mm (4.7 x 4.7 x 1.2 in)</td>
<td>120 x 120 x 31 mm (4.7 x 4.7 x 1.2 in)</td>
<td>120 x 120 x 31 mm (4.7 x 4.7 x 1.2 in)</td>
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<td>120 x 120 x 31 mm (4.7 x 4.7 x 1.2 in)</td>
</tr>
<tr>
<td><strong>Mounting</strong></td>
<td>Wall</td>
<td>Wall</td>
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<tr>
<td><strong>Environmental Limits</strong></td>
<td>Operating Temperature: -40 to 70°C (-40 to 131°F)</td>
<td>Operating Temperature: -40 to 70°C (-40 to 131°F)</td>
<td>Operating Temperature: -40 to 70°C (-40 to 131°F)</td>
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<td>Operating Temperature: -40 to 70°C (-40 to 131°F)</td>
</tr>
<tr>
<td><strong>Power Requirements</strong></td>
<td>Input Voltage: 24 VDC (18 to 30 VDC), 100 to 240 VAC</td>
<td>Input Voltage: 24 VDC (18 to 30 VDC), 100 to 240 VAC</td>
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<td>Input Voltage: 24 VDC (18 to 30 VDC), 100 to 240 VAC</td>
</tr>
</tbody>
</table>

### Additional Specifications

- **Supported Memory Slots**: 2 SO-DIMM slots, 16 GB capacity
- **Power Consumption**: Less than 30 W
- **Environmental Limits**: Humidity: 5 to 95% (non-condensing)
- **Mounting**: Wall, DIN rail
- **Warranty**: 3 years

For more details, visit [www.moxa.com/warranty](http://www.moxa.com/warranty).
MC-7200 Series

x86 fanless, wide temperature industrial computer with 3rd Generation Intel® Core™ processor

- High performance platform with 3rd gen. Intel® Core™ i7 3555LE processor
- Rugged, fanless design optimized for harsh environments
- Scalable, modularized interfaces for marine solutions
- Four Ethernet LAN ports + SNMP delivers strong network availability and manageability
- High graphics performance supported across up to 3 independent displays

Overview

The MC-7200 marine computers are powered by the latest 3rd generation Intel® Core™ i7 3555LE processor and provide high-performance graphics alongside a full range of I/O connectivity that includes eight NMEA 0183 terminals, four serial ports, four gigabit Ethernet ports, six USB 2.0 ports, and two SuperSpeed USB 3.0 ports. The MC-7200 series is designed to deliver unrivalled PC performance for a new generation of automated marine solutions.

Designed for reliability, durability, and extensive computational and graphics performance, the marine-grade MC-7200 computers feature a rugged shell and vibration tolerance up to 1G. This computer's compact size and low power consumption return a low-heat profile that simplifies bridge and cabinet installations. To facilitate customization and expansion, MC-7200 series computers come with a single PCIe (x16) slot and two universal PCI slots, allowing users to easily install a wide variety of peripherals like radar, graphics, and PROFINET cards.

The MC-7200 series is optimized for use with the Windows XP Embedded, XP Professional, or Windows 7 operating systems, allowing users to choose the development environment most suitable for their application.

Appearance

Front View

MC-7200-DC-CP
- LPT Port (Dongle)
- USB 2.0 x 2 (type A)
- CD/DVD-ROM
- Removable Storage Tray
- Power Button
- System LEDs (Power, Storage)
- Reset Button
- USB 2.0 x 2 (type A)

MC-7200-DC-CP
- PS/2 for Keyboard/Mouse
- USB 2.0 x 2 (type A)
- Power ON/OFF Switch
- Removable Storage Slot
- System LEDs (Power, Storage)
- Power Button
- LPT Port (Dongle)

Rear View

MC-7200-DC-CP
- Power Input (DC 24V)
- Power Input (100-240 VAC)
- Grounding Screw
- PCI x 1 (x16)
- PCI Slot x 2
- Serial Port x 4 (DB9)
- DI x 8, DO x 8
- LPT Port (Dongle)
- USB 2.0 Ports x 4 (type A)
- Gigabit LANs x 4 (RJ45)
- USB 3.0 x 2
- NMEA 0183 x 8

MC-7200-DC-CP
- Power Input (DC 24V)
- DVI-D x 2
- Gigabit LANs x 4 (RJ45)
- VGA Output
- USB 2.0 Ports x 4 (type A)
- Audio Input/Output
- Grounding Connector
- Gigabit LANs x 4 (RJ45)
- VGA Output
- USB 2.0 Ports x 4 (type A)
### Specifications

**Computer**
- CPU: Intel® Core™ i7-3555LE (BGA CPU package), quad-core, 8-threaded, 2.1 GHz processor
- OS: Windows 7, Windows XP SP3, Windows XP Embedded (must be installed by the user)
- System Chipset: Intel® QM77 Express Chipset
- System Memory: 16 GB capacity, 4 GB pre-installed: 1 slot for 4 GB DDR3 204-pin SO-DIMM SDRAM
- USB:
  - MP model: 6 USB 2.0 hosts x 6, Type A
  - DC-CP model: 6 USB 2.0 hosts x 6, Type A
- Storage:
  - 2 SATA 6 Gbps ports for SSD/HDD
  - 2 SATA 3 Gbps ports for SSD/HDD (MC-7270-MP only)

**Other Peripherals**
- Audio: Line in, line out, microphone; 3.5 mm mini-jack
- KB/MS: 2 PS/2 interfaces supporting standard PS/2 keyboard and mouse
- PCI Slots: 2 (MP model)
- LPT Ports: 1
- PCIe x16 Slots: 1 (MP model)

**Display**
- Display Interface:
  - 1 VGA output: 15-pin D-Sub connector (female), max. resolution 2048 x 1536, 32-bit color at 75 Hz
  - 2 DVI-D outputs: 29-pin DVI-D connectors (female), max. resolution 1920 x 1200, 32-bit color at 60 Hz
- Graphics Controller: Onboard Intel® HD 4000 graphics

**Ethernet Interface**
- LAN: Auto-sensing 10/100/1000 Mbps ports (RJ45) x 4
- Magnetic Isolation Protection: 1.5 kV built in

**Serial Interface**
- Serial Standards:
  - 2 software-selectable RS-232/422/485 ports (DB9 male)
  - 2 RS-232 ports (DB9 male)
  - 8 NMEA 0183 v2 terminals (3.81 mm Euroblock connector) (NMEA 2000 available on request)

**Serial Communication Parameters**
- Data Bits: 5, 6, 7, 8
- Stop Bits: 1, 1.5, 2
- Parity: None, Even, Odd, Space, Mark
- Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
- Baudrate: 50 bps to 230.4 kbps

**Serial Signals**
- RS-232: TxD+, RxD+, DTR, DSR, RTS, CTS, DCD, GND
- RS-422: TxD+, TxD-, RxD+, RxD-, GND
- RS-485: TxD+, TxD-, RxD+, RxD-, GND
- RS-485-2w: Data+, Data-, GND

**NMEA Interface**
- Note: The NMEA interface specs only apply to the MC-7270-MP.
- Interfaces:
  - 8 NMEA 0183 v2 terminals (NMEA 2000 available on request)
- Base Serial Standard:
  - NMEA 0183: RS-422
  - NMEA 2000: CAN bus (available on request)
- Optical Isolation Protection: 3 kV
- Voltage Differential: -15 V to +15 V
Baudrate: 4800 bps  
Data Bits: 8  
Stop Bits: 1, 1.5, 2  
Parity: None  
Handshake: None

**Digital Input**  
Input Channels: 8 dry channels, with 4 grounds  
Digital Input Levels for Dry Contacts:  
• Logic level 0: Close to GND  
• Logic level 1: Open  
Connector Type: 2 screw-fastened 6-pin 3.81 mm Euroblock terminals  
Isolation: ESD protection to DIN specifications  
Relay Output  
Note: The relay output specs only apply to the MC-7270-MP.  
Type: Form A (N.O.) power relay  
Output Channels: 8  
Contact Rating: 2 A, 30 VDC / 0.5 A, 125 VAC under resistor load  
Initial Insulation Resistance: 1000 mega-ohms (min.) @ 500 VDC  
Mechanical Endurance: 100,000 operations @ 2 A, 30 VDC resistive load  
Electrical Endurance: 100,000,000 operations  
Contact Resistance: 50 milli-ohms (max.) @ 6 V, 0.1 A  
Connector Type: 2 screw-fastened 8-pin 3.81 mm Euroblock terminals  
Isolation: Relay isolation; ESD protection to DNV specifications

**LEDs**  
System: Storage, Power  
LAN: 100M/Link x 4, 1000M/Link x 4 (on connector)

**Physical Characteristics**  
Housing: Aluminum, sheet metal  
Weight:  
• DC-CP Model: 3.75 kg (8.33 lb)  
• MP Model: 8 kg (17.78 lb)  
Dimensions:  
• DC-CP Model: 150 x 160 x 80 mm (5.91 x 6.30 x 3.15 in)  
• MP Model: 287 x 250 x 70 mm (11.30 x 9.84 x 2.76 in)  
Mounting: Wall (mounting kit must be purchased separately)

**Environmental Limits**  
Operating Temperature: -40 to 70°C (-40 to 131°F)  
Storage Temperature: -50 to 80°C (-40 to 176°F)  
Ambient Relative Humidity: 5 to 95% (non-condensing)  
Anti-vibration:  
• 0.7 g @ DNV 2.4 (Class A), sine wave, 2-100 Hz, 1 Oct./min., 1.5 hr per axis  
• 1 Grms @ DNV 2.4, random wave, 3-100 Hz, 2.5 hr per axis  
• 2.1 g @ DNV 2.4 (Class C), sine wave, 2-50 Hz, 1 Oct./min., 1.5 hr per axis

**Power Requirements**  
Input Voltage:  
• DC: 24 VDC (with tolerance from 18 to 30 VDC, 2-pin terminal block)  
• AC: 100 to 240 VAC (MC-7270-MP only)  
Power Consumption: Less than 100 W, 2.5 A @ 24 VDC

**Standards and Certifications**  
Safety: UL 60950-1, DNV 2.4, IEC 60945 (4th), IACS-E10, CCC (GB4943, GB9254, GB17625.1)  
EMC: EN 55022 Class B, FCC Part 15 Subpart B Class B  
Marine: IEC 60945 4th (Pending), IACS-E10 (Pending)  
Green Product: RoHS, cRoHS, WEEE

**MTBF** (mean time between failures)  
Time:  
• MC-7230-DC-CP-T/MC-7270-DC-CP-T: 619,557 hrs  
• MC-7230-MP-T: 219,195 hrs  
• MC-7270-MP-T: 219,214 hrs  
Standard: Telcordia (Bellcore) Standard TR/SR

**Warranty**  
Warranty Period: 3 years  
Details: See www.moxa.com/warranty

### Available Models

**MC-7270-MP-T**  
- x86-based industrial computer with 3rd gen. Intel® Core™ i7 3555LE processor, 4 serial ports, 8 NMEA 0183 ports, 4 gigabit Ethernet ports, 8 DIs, 8 DOs, 6 USB 2.0 ports, 2 USB 3.0 ports, 2 PCI slots, 1 PCIe x16 slot, VGA/DVI, and AC/DC power inputs

**MC-7230-MP-T**  
- x86-based industrial computer with 3rd gen. Intel® Core™ i3 3120ME processor, 4 serial ports, 8 NMEA 0183 ports, 4 gigabit Ethernet ports, 8 DIs, 8 DOs, 6 USB 2.0 ports, 2 USB 3.0 ports, 2 PCI slots, 1 PCIe x16 slot, VGA/DVI, and AC/DC power inputs

**MC-7210-MP-T**  
- x86-based industrial computer with Intel® Celeron 1047 processor, 4 serial ports, 8 NMEA 0183 ports, 4 gigabit Ethernet ports, 8 DIs, 8 DOs, 6 USB 2.0 ports, 2 USB 3.0 ports, 2 PCI slots, 1 PCIe x16 slot, VGA/DVI, and AC/DC power inputs

**MC-7270-DC-CP-T**  
- x86-based industrial computer with Intel® Core™ i7 3555LE processor, fanless, wide temperature, 4 serial ports, 4 gigabit Ethernet ports, 6 USB hosts, VGA/DVI, and DC power input

**MC-7230-DC-CP-T**  
- x86-based industrial computer with Intel® Core™ i3 3120ME processor, fanless, wide temperature, 4 serial ports, 4 gigabit Ethernet ports, 6 USB hosts, VGA/DVI, and DC power input

**MC-7210-DC-CP-T**  
- x86-based industrial computer with Intel® Celeron 1047UE processor, fanless, wide temperature, 4 serial ports, 4 gigabit Ethernet ports, 6 USB hosts, VGA/DVI, and DC power input

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**Package Checklist (MC-7200-MP-T Series)**  
- 1 MC-7200-MP-T marine computer  
- 2 removable storage protection keys  
- Wall mounting kit, with 8 screws  
- 1 2-pin terminal block for DC power input  
- 1 2-pin terminal block for power ON/OFF switch  
- 2 6-pin digital input terminal blocks  
- 2 8-pin digital output terminal blocks  
- 8 5-pin terminal blocks for NMEA 0183 ports  
- Documentation and driver CD  
- Quick installation guide  
- Warranty card

**Package Checklist (MC-7200-DC-CP-T Series)**  
- 1 MC-7200-DC-CP-T computer  
- 1 2-pin terminal block for DC power input  
- 1 2-pin terminal block for power ON/OFF switch  
- Hard disk installation kit  
- Documentation and driver CD  
- Quick installation guide (printed)  
- Warranty card
**MC-7130-MP**

*Optimized, highly secure marine platform with diverse interface connectivity*

- High-performance computing platform with 3rd gen Intel® Core™ i3 3120ME processor
- Optimized solution with modularized NMEA interfaces
- DNV- and ABS-certified
- Trusted Platform Module provides data and hardware security integrated at the hardware level
- High graphics performance supported across up to 3 independent displays

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**Overview**

The MC-7130-MP marine computer is powered by the latest 3rd generation Intel® Core™ i3 3120ME processor. Optimized for ECDIS, these computers can serve in nearly any bridge role thanks to their comprehensive range of I/O and communications interfaces: eight NMEA 0183 terminals, four serial ports, four gigabit Ethernet ports, six USB 2.0 and three SuperSpeed USB 3.0 ports. The MC-7130-MP is designed to give unrivalled PC performance for a new level of flexibility and control for marine applications.

Designed with the highest quality and durability in mind, the marine-grade MC-7130-MP computer features a rugged chassis and vibration tolerance up to 1G, together providing a highly reliable platform that can easily tolerate the harsh environmental challenges of marine environments. Additionally, the MC-7130-MP’s compact size and low power consumption return a low heat profile that increases MTBF while simplifying integration into existing bridge systems or newly designed marine solutions.

Finally, the MC-7130-MP also offers convenient connectivity expansions via a single PCIe (x16) slot and two universal PCI slots, allowing users to install a variety of peripheral extensions for radar, PROFIBUS, VGA graphics, and more, allowing for direct consolidation of all input sources at a single hub.

The MC-7130-MP platform is optimized for use with the Windows XP Embedded, XP Professional, or Windows 7 operating systems, allowing users to choose the development environment most suitable for the application’s needs.

**Appearance**

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**Front View**

![Front View Diagram](diagram_url)

- Removable Storage Slot
- Protection Lock
- Power Button
- System LEDs (Power, Storage)
- 2. x USB 2.0 (type A)
- LPT Port (Dongle)
- Reset Button
**Specifications**

**Computer**
- **CPU:** Intel® Core™ i3-3120ME (BGA CPU package), dual-core threaded 64-bit 2.4-GHz processor
- **OS:** Windows 7, Windows XP SP3, Windows XP Embedded (must be installed by the user)
- **System Chipset:** Intel® QM77 Express Chipset
- **System Memory:** 16 GB capacity, 4 GB pre-installed: 2 slots of 8 GB DDR3-1066 204 pin SO-DIMM SDRAM
- **USB:**
  - USB 2.0 hosts x 6, Type A
  - USB 3.0 hosts x 2, Type A
- **Storage:**
  - 2 SATA 6 Gbps ports for SSD/HDD
  - 2 SATA 3 Gbps ports for SSD/HDD

**Other Peripherals**
- **Audio:** Line in x 1, Line out x 1, Mic in x 1
- **KB/MS:** 2 PS/2 interfaces supporting standard PS/2 keyboard and mouse
- **PCI Slots:** 2
- **LPT Ports:** 1
- **PCIe x16 Slots:** 1

**Display**
- **Display Interface:**
  - VGA Interface x 1: 15-pin D-Sub connector (female), with resolution up to 1920 x 1080
  - DVI-D Interface x 2: 29-pin DVI-D connectors (female), with resolution up to 1920 x 1080, 60 Hz (with reduced blanking)
- **Graphics Controller:** Onboard Intel® HD 4000 graphics
**Ethernet Interface**
LAN: Auto-sensing 10/100/1000 Mbps ports (RJ45) x 4

**Magnetic Isolation Protection:** 1.5 kV built in

**Serial Interface**
Serial Standards:
- 2 RS-232/422/485 ports, software-selectable (DB9 male)
- 2 RS-232 ports (DB9)
- 8 NMEA 0183 terminals (NMEA 2000 available on request)

**Serial Communication Parameters**
Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
Baudrate: 50 bps to 230.4 kbps

**Serial Signals**
RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
RS-422: TxD+, TxD-, RxD+, RxD-, GND
RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
RS-485-2w: Data+, Data-, GND

**NMEA Interface**
Serial Standards: NMEA 0183v2 (NMEA 2000 available on request)
Base Serial Standard:
- NMEA 0183: RS-422
- NMEA 2000: CAN bus (available on request)

**Optical Isolation Protection:** 3 kV

**Voltage Differential:** -15 V to +15 V

Baudrate: 4800 bps

Data Bits: 8
Stop Bits: 1, 1.5, 2
Parity: None
Handshake: None

**Digital Input**
Input Channels: 8 dry channels, with 4 grounds

Digital Input Levels for Dry Contacts:
- Logic level 0: Close to GND
- Logic level 1: Open

**Connector Type:** 6-pin Phoenix-compatible 3.81-mm screw terminal blocks x 2

**Isolation:** ESD protection to DNV specifications

**Relay Output**
Type: Form A (N.O.) power relay
Output Channels: 8
Contact Rating:
- 2 A, 30 VDC / 0.5 A, 125 VAC under resistor load

**Initial Insulation Resistance:** 1000 mega-ohms (min.) @ 500 VDC

**Mechanical Endurance:** 100,000 operations @ 2 A, 30 VDC resistive load

**Electrical Endurance:** 100,000,000 operations

**Contact Resistance:** Max. 50 mega-ohms @ 6 V, 0.1 A

**Connector Type:** 2 Euroblock 6-pin 3.81 mm screw terminals

**Isolation:** Relay isolation; ESD protection to DNV specifications

**LEDs**
System: Storage, Power
LAN: 2 LEDs on each port: 100 Mbps (left) / 1000 Mbps (right)

**Physical Characteristics**
Housing: Aluminum, sheet metal
Weight: 8 kg (17.8 lb)
Dimensions: 322 x 300 x 150 mm (12.68 x 11.81 x 5.91 in)
Mounting: Wall
System Cooling: Moxa intelligent fan

**Environmental Limits**
Operating Temperature: -15 to 55°C (5 to 131°F)
Storage Temperature: -20 to 60°C (-4 to 131°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)

**Anti-vibration:**
- 0.7 g @ DNV 2.4 (Class A), sine wave, 2-100 Hz, 1 Oct./min., 1.5 hr per axis
- 1 Grms @ DNV 2.4, random wave, 3-100 Hz, 2.5 hr per axis
- 2.1 g @ DNV 2.4 (Class C), sine wave, 2-50 Hz, 1 Oct./min., 1.5 hr per axis

**Power Requirements**
Input Voltage:
- DC: 24 VDC (with tolerance from 18 to 30 VDC, 2-pin terminal block)
- AC: 100 to 240 VAC

Power Consumption: Less than 100 W, 2.5 A @ 24 VDC

**Standards and Certifications**
Safety: UL 60950-1, DNV 2.4, IEC 60945 (4th), IACS E10
EMC: EN 55022 Class B, EN 55024-4-2, EN 55024-4-3, EN 55024-4-4, FCC Part 15 Subpart B Class B
Marine: IEC 60945 4th, IACS E10

**Green Product:** RoHS, eRoHS, WEEE

**MTBF** (mean time between failures)
Time: 114,305 hrs
Standard: MIL-HDBK-217 FN2

**Warranty**
Warranty Period: 3 years
Details: See www.moxa.com/warranty

**Available Models**
MC-7130-MP: x86-based ECDIS computer with 3rd gen. Intel® Core™ i3 CPU processor, 4 serial ports, 8 NMEA 0183 ports, 4 gigabit Ethernet ports, 8 Dis, 8 DOs, 6 USB 2.0 ports, 2 USB 3.0 ports, 2 PCI slots, 1 PCIe x16 slot, VGA/DVI, TPM, and AC/DC power inputs

**Optional Accessories** (for AC models only, can be purchased separately)
PWC-C13US-3B-183: 10A/125V North American (US) power cord, 183 cm
PWC-C13EU-3B-183: 10A/250V Continental European (EU) power cord, 183 cm
PWC-C13UK-3B-183: 10A/250V United Kingdom (UK) power cord, 183 cm
PWC-C13AU-3B-183: 2.5A/250V Australian (AU) power cord, 183 cm
PWC-C13CN-3B-183: 10A/250V China (CN) power cord, 183 cm

**Package Checklist**
- MC-7130-MP computer
- 2 removable storage protection keys
- 8 screws for internal and removable drive trays
- Wall-mounting kit
- 6 screws for wall mounting
- 1 terminal block for power input
- 4 terminal blocks for DI/DO channels
- 8 terminal blocks for NMEA 0183 ports
- Documentation and driver CD
- Quick installation guide (printed)
- Warranty card
MC-5000 Series

Fanless ECDIS bridge computers with built-in NMEA interfaces and Intel® dual core i5-520E CPU

- High performance Intel® Core™ i5 520E processor, 3 MB L2 cache
- 2 GB of DDR3 memory built in; supports up to 8 GB
- Dual independent displays (DVI-I + VGA)
- 2 gigabit Ethernet ports for network redundancy
- 2 RS-232/422/485 serial ports
- 2 RS-232 ports
- 8 NMEA terminals
- 2 universal PCI slots
- 6 USB 2.0 ports
- 1 internal SATA storage drive slot
- 1 removable SATA storage drive tray
- 1G anti-vibration design for system reliability
- Compact, fanless design
- 24 VDC or 100 to 240 VAC power input models available
- Supports Windows XP Embedded, XP Professional, Windows 7

: Overview

The MC-5000 Series computers feature the Intel® Core™ i5 520E processor and come with four serial ports, two gigabit Ethernet ports, six USB hosts, and eight NMEA terminals. The computers offer high performance and versatile peripherals for marine applications.

Designed with the highest quality and durability in mind, the marine-grade MC-5000 Series computers feature a rugged chassis and are proven against constant vibrations up to 1G, making these computers a most reliable platform even in harsh maritime environments and conditions. In addition, the MC-5150 series’ compact size, fanless design, and low power consumption return a low thermal profile that translates into easier installations for any marine solution. 2 universal PCI slots allow users to expand the system using standard peripheral cards for radar, PROFIBUS, or marine-specific interfaces like NMEA.

The MC-5000 series is optimized for use with the Windows XP Embedded, XP Professional, or Windows 7 operating systems, allowing users to choose the development environment most suitable for the application’s needs.

: Appearance

MC-5150-DC-CP Front View

MC-5150-DC-CP Rear View
Specifications

Computer

CPU: Intel® Core™ i5-520E (BGA CPU package), dual core threaded 64 bit 2.4 Ghz processor
OS: Windows 7, Windows XP SP3, Windows XP Embedded (must be installed by the user)
System Chipset: Intel® QM57 Express Chipset
FSB: 1066

System Memory:

• MC-5150-DC-CP: 2 GB capacity, 2 GB pre-installed: 2 slots of 2 GB DDR3 204 pin SO-DIMM SDRAM
• MC-5150-AC/DC: 8 GB capacity, 2 GB pre-installed: 2 slots of 4 GB DDR3 204 pin SO-DIMM SDRAM
• MC-5157-AC/DC: 8 GB capacity, 2 GB pre-installed: 2 slots of 4 GB DDR3 204 pin SO-DIMM SDRAM

USB:

• USB 2.0 ports x 6, type A

Storage:

• MC-5150-DC-CP: 1 internal SATA storage tray, 1 removable SATA storage tray with 64 GB SSD
• MC-5150-AC/DC: 1 internal SATA storage tray, 1 removable SATA storage drive tray
• MC-5157-AC/DC: 1 internal SATA storage tray, 1 removable SATA storage drive tray

Other Peripherals

Audio: line in / line out, 3.5 mm mini-jack
KB/MS: 2 PS/2 interfaces supporting standard PS/2 keyboard and mouse
PCI Slots: 2 (MC-5157 only)

Display

Display Interface:

• VGA Interface: 15-pin D-Sub connector (female)
• DVI-I Interface: 29-pin DVI-I connector (female)

Graphics Controller: Onboard Intel® HD graphics, 1920 x 1080 max. resolution

Ethernet Interface

LAN: Auto-sensing 10/100/1000 Mbps ports (RJ45) x 2

Serial Interface

Serial Standards:

• 2 software-selectable RS-232/422/485 ports, male DB9
• 2 RS-232 ports (DB9)
• 8 NMEA 0183 v2 terminals (3.81 mm Euroblock connector)
(MC-5150-AC/DC, MC-5157-AC/DC only)

Serial Communication Parameters

Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
Baudrate: 50 bps to 230.4 kbps

Serial Signals

RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
RS-422: Tx+, Rx+, Rs+, Rs-, GND
RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
RS-485-2w: Data+, Data-, GND

LEDs

System: Storage, Power
LAN: 100M/Link x 2, 1000M/Link x 2 (on connector)

Physical Characteristics

Housing: Aluminum, sheet metal
Weight:

• MC-5150-DC-CP: 3.85 kg (8.56 lb)
• MC-5150-AC/DC: 6.85 kg (15.22 lb)
• MC-5157-AC/DC: 8 kg (17.78 lb)

Dimensions:

• MC-5150-DC-CP: 287 x 250 x 70 mm (11.30 x 9.84 x 2.76 in) without ears
• MC-5150-AC/DC: 287 x 250 x 135 mm (11.30 x 9.84 x 5.31 in) without ears
• MC-5157-AC/DC: 320 x 300 x 171 mm (12.60 x 11.81 x 6.73 in) without ears

Mounting: Wall

Environmental Limits

Operating Temperature: -15 to 55°C (5 to 131°F)
Storage Temperature: -20 to 60°C (-4 to 131°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)
Anti-vibration:

• 0.7 g @ DNV 2.4 (Class A), sine wave, 2-100 Hz, 1 Oct./min., 1.5 hr per axis
• 1 Grms @ DNV 2.4, random wave, 3-100 Hz, 2.5 hr per axis
• 2.1 g @ DNV 2.4 (Class C), sine wave, 2-50 Hz, 1 Oct./min., 1.5 hr per axis

Power Requirements

Input Voltage:

MC-5150-DC-CP: 24 VDC (with tolerance from 18 to 30 VDC, 2-pin terminal block)
MC-5150-AC/DC:
• DC: 24 VDC (with tolerance from 18 to 30 VDC, 2-pin terminal block)
• AC: 100 to 240 VAC
MC-5157-AC/DC:
• DC: 24 VDC (with tolerance from 18 to 30 VDC, 2-pin terminal block)
• AC: 100 to 240 VAC

Power Consumption: Less than 100 W, 2.5 A @ 24 VDC

Standards and Certifications

Safety: UL 60950-1, DNV 2.4, IEC 60945 (4th), IACS-E10, CCC (GB8943, GB9254, GB17625.1)
EMC: EN 55022 Class B, EN 55024-4-2, EN 55024-4-3, EN 55024-4-4, FCC Part 15 Subpart B Class B
Marine: IEC 60945 4th, IACS-E10
Green Product: RoHS, eRoHS, WEEE

MTBF (mean time between failures)

Time:

• MC-5150 Series: 220,490 hrs
• MC-5157 Series: 152,997 hrs

Standard: Telcordia (Bellcore) Standard TR/SR

Warranty

Warranty Period: 3 years
Details: See www.moxa.com/warranty
## Dimensions

### MC-5150-DC-CP

- Width: 274 mm (10.81 inch)
- Height: 250 mm (9.84 inch)
- Depth: 302 mm (11.90 inch)

### MC-5150-AC/DC

- Width: 340 mm (13.39 inch)
- Height: 250 mm (9.84 inch)
- Depth: 360 mm (14.17 inch)

### MC-5157-AC/DC

- Width: 320 mm (12.60 inch)
- Height: 290 mm (11.42 inch)
- Depth: 360 mm (14.17 inch)

Unit: mm (inch)

## Ordering Information

### Available Models

**MC-5150-DC-CP**: Industrial computer with Intel® Core™ i5 CPU processor, 4 serial ports, 2 gigabit Ethernet ports, 6 USB ports, storage, VGA/DVI, and DC power input

**MC-5150-AC**: ECDIS computer with Intel® Core™ i5 CPU processor, 4 serial ports, 8 NMEA terminals, 2 gigabit Ethernet ports, 6 USB ports, storage, VGA/DVI, and AC power input

**MC-5150-DC**: ECDIS computer with Intel® Core™ i5 CPU processor, 4 serial ports, 8 NMEA terminals, 2 gigabit Ethernet ports, 6 USB ports, storage, VGA/DVI, and DC power input

**MC-5157-AC**: Ship’s bridge computer with Intel® Core™ i5 CPU processor, 4 serial ports, 8 NMEA terminals, 2 gigabit Ethernet ports, 6 USB ports, 2 universal PCI slots, storage, VGA/DVI, and AC power input

**MC-5157-DC**: Ship’s bridge computer with Intel® Core™ i5 CPU processor, 4 serial ports, 8 NMEA terminals, 2 gigabit Ethernet ports, 6 USB ports, 2 universal PCI slots, storage, VGA/DVI, and DC power input

### Optional Accessories (for AC models only, can be purchased separately)

- PWC-C13US-3B-183: 10A/125V North American (US) power cord, 183 cm
- PWC-C13EU-3B-183: 10A/250V Continental European (EU) power cord, 183 cm
- PWC-C13UK-3B-183: 10A/250V United Kingdom (UK) power cord, 183 cm
- PWC-C13AU-3B-183: 2.5A/250V Australian (AU) power cord, 183 cm
- PWC-C13CN-3B-183: 10A/250V China (CN) power cord, 183 cm

### Package Checklist (MC-5150-DC-CP)

- MC-5150-DC-CP computer
- 2 keys for the locking removable storage trays
- 4 screws for internal drive tray
- Terminal block for power input
- Hard disk installation kit
- Documentation and driver CD
- Quick installation guide (printed)
- Warranty card

### Package Checklist (MC-5150-AC/DC)

- MC-5150-AC/DC computer
- 2 keys for the locking removable storage trays
- 4 screws for internal drive tray
- Terminal block for power input
- Hard disk installation kit
- Documentation and driver CD
- Quick installation guide (printed)
- Warranty card

### Package Checklist (MC-5157-AC/DC)

- MC-5157-AC/DC computer
- 2 keys for the locking removable storage trays
- 8 screws for internal and removable drive trays
- Terminal block for power input (DC model only)
- 8 terminal blocks for NMEA interfaces
- Documentation and driver CD
- Quick installation guide (printed)
MC-1100 Series Quad-core fanless DIN-rail automation computer

The Moxa MC-1100 series DIN-rail, fanless, x86 embedded computers are based on the Intel® Atom™ E3800 series processor, feature the most reliable I/O design to maximize connectivity, and support wireless modules (WiFi/3G/LTE), making them suitable for a diverse range of communication applications.

Powered by a wide operating temperature range (-40 to 70°C) and Safety/EMI/EMS compliances, the MC-1100 series is ideal for intelligent computing and communication solutions in critical environments, including marine communication, oil & gas field site monitoring, and transportation.

The MC-1100 series supports “Moxa Hardware Monitoring” for device I/O status monitoring and alerts, system temperature monitoring and alerts, and system power management. Monitoring system status closely makes it easier to recover from errors and provides the most reliable platform for your applications.

Overview

The Moxa MC-1100 series DIN-rail, fanless, x86 embedded computers are based on the Intel® Atom™ E3800 series processor, feature the most reliable I/O design to maximize connectivity, and support wireless modules (WiFi/3G/LTE), making them suitable for a diverse range of communication applications.

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Appearance

MC-1111

- Intel Atom E3800 series processor
- Dual-storage (SD and CFast slots)
- Dual-independent displays (VGA + display port)
- Variety of interfaces: 2 serial ports, 4 Giga LAN, 4 DIs, 4 DOs, 2 USB2.0
- Mini-PCIe sockets for WiFi, 3G, LTE, GPS
- 9 to 36 VDC, wide range isolated power
- -40 to 70°C system operating temperature range
- Moxa SmartRecovery utility to recover system from boot failure (W7E only)
- Marine-grade and Zone 2 compliance
**Dimensions**

**MC-1111**

- **Dimensions**: 122 (4.80) mm, 68 (2.66) mm

**MC-1121**

- **Dimensions**: 122 (4.80) mm, 87 (3.43) mm
Specifications

Computer
CPU:
• Intel® Atom™ processor E3845 (quad-core, 1M cache, 1.91 GHz)
• Intel® Atom™ processor E3826 (dual-core, 1M cache, 1.46 GHz)

System Memory: System Memory: 1 DDR3L SO-DIMM slot, 2 GB pre-installed, 8 GB max.
• E3826: supports DDR3L-1066
• E3845: supports DDR3L-1333

USB: USB 2.0 hosts x 2, Type A connectors

Other Peripherals
Expansion Slots: 1, Mini-PCIe socket
USIM Slots: 1

Display
Display Interface:
• VGA interface x 1: 15-pin D-Sub connector (female), with resolution up to 1920 x 1200 pixels at 75 Hz
• Display port interface x 1: Display port connector, with resolution up to 2560 x 1600 pixels at 60 Hz

Graphics Controller: Intel® HD Graphics 4000

Ethernet Interface
LAN: 4 auto-sensing 10/100/1000 Mbps ports (RJ45)

Magnetic Isolation Protection: 1.5 kV built in

Serial Interface
Serial Standards: 2 RS-232/422/485 ports, software-selectable (DB9 male)

Serial Communication Parameters
Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
Baudrate: 50 bps to 115.2 kbps

Serial Signals
RS-232: TxD+, TxD-, DTR, DSR, RTS, CTS, DCD, GND
RS-422: TxD+, TxD-, RxD+, RxD-, GND
RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
RS-485-2w: Data+, Data-, GND

Digital Input
Input Channels: Dis x 4, source-type
Input Voltage: 0 to 30 VDC at 25 Hz

Digital Input Levels for Dry Contacts:
• Logic level 0: Close to GND
• Logic level 1: Open

Digital Input Levels for Wet Contacts:
• Logic level 1: +3 V max
• Logic level 0: -10 V to +30 V (Source to DI)

Connector Type: 10-pin screw-fastened Euroblock terminal

Isolation: 3 kV optical isolation

Digital Output
Output Channels: DOs x 4, sink-type
Output Current: 200 mA (max.) per channel

On-State Voltage: 24 VDC nominal, open collector to 30 VDC

Connector Type: 10-pin screw-fastened Euroblock terminal

Isolation: 3 kV optical isolation

LEDs
System: Power
Storage: CFast, SD
LAN: 2 LEDs per port (100/1000 Mbps)
Serial: 2 LEDs per port (Tx and Rx)

Physical Characteristics
Housing: Aluminum, sheet metal
Weight:
• MC-1111: 1.21 kg (2.69 lb)
• MC-1121: 0.97 kg (2.16 lb)

Dimensions:
• MC-1111: 132 x 122 x 68 mm (5.20 x 4.81 x 2.68 in)
• MC-1121: 132 x 122 x 87 mm (5.20 x 4.81 x 3.43 in)

Mounting: DIN rail, wall (optional)

Environmental Limits
Operating Temperature: -40 to 70°C (-40 to 158°F)
Storage Temperature: -40 to 75°C (-40 to 158°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)

Anti-vibration: 0.7 g @ DNV 2.4 (Class A), sine wave, 2-100 Hz, 1 Oct./min., 1.5 hr per axis

Power Requirements
Input Voltage: 9 to 36 VDC, isolated
Power Consumption: Less than 30 W

Standards and Certifications
Safety: UL 60950-1, CCC
EMC: EN 55022 Class B, EN 55024-4-2, EN 55024-4-3, EN 55024-4-4, FCC Part 15 Subpart B Class A
Marine Standards: IEC 60945 4th
Marine Type Approval: DNV 2.4
Green Product: RoHS, cRoHS, WEEE

Reliability
Automatic Reboot Trigger: Built-in watchdog timer (WDT), configurable for resets following 1-255 second hang intervals; software programmable

Warranty
Warranty Period: 3 years
Details: See www.moxa.com/warranty

Ordering Information
Available Models
MC-1111-E2-T: x86 embedded computer with Intel Atom dual-core E3826 processor, 2 GB RAM, VGA, 2 USBs, 2 GigaLANs, 1 CFast socket, 1 SD slot, display port, 9 to 36 VDC power
MC-1111-E4-T: x86 embedded computer with Intel Atom dual-core E3845 processor, 2 GB RAM, VGA, 2 USBs, 2 GigaLANs, 1 CFast socket, 1 SD slot, display port, 9 to 36 VDC power
MC-1121-E2-T: x86 embedded computer with Intel Atom dual-core E3826 processor, 2 GB RAM, VGA, 2 USBs, 4 GigaLANs, 2 serial ports, 4 Dis, 4 DOs, 1 CFast socket, 1 SD slot, display port, 9 to 36 VDC power
MC-1121-E4-T: x86 embedded computer with Intel Atom dual-core E3845 processor, 2 GB RAM, VGA, 2 USBs, 4 GigaLANs, 2 serial ports, 4 Dis, 4 DOs, 1 CFast socket, 1 SD slot, display port, 9 to 36 VDC power

Package Checklist
• MC-1100 embedded computer
• Terminal block to power jack converter
• Din-rail mounting kit
• Documentation and software CD or DVD
• Quick installation guide (printed)
• Warranty card
## Optional Accessories

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<th>Model Name</th>
<th>Description</th>
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<td><strong>Power Adapters</strong></td>
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<tr>
<td>Adapter</td>
<td>PWR-24250-DT-S1</td>
<td>Power adapter, input voltage 90 to 264 VAC, output voltage 24 V with 2.5 A DC load</td>
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<td>Power Cord</td>
<td>PWC-C7US-2B-183</td>
<td>Power cord with 2-pin connector, USA plug</td>
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<tr>
<td>Power Cord</td>
<td>PWC-C7EU-2B-183</td>
<td>Power cord with 2-pin connector, Europe plug</td>
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<td>Power Cord</td>
<td>PWC-C7UK-2B-183</td>
<td>Power cord with 2-pin connector, British plug</td>
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<td>Power Cord</td>
<td>PWC-C7AU-2B-183</td>
<td>Power cord with 2-pin connector, Australia plug</td>
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<td>Power Cord</td>
<td>PWC-C7CN-2B-183</td>
<td>Power cord with 2-pin connector, China plug</td>
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<td><strong>Wi-Fi</strong></td>
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<tr>
<td>Mini-PCIe Card</td>
<td>SprakLAN WPEA-251NI Wi-Fi mini card, black screws x 4</td>
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<tr>
<td><strong>LTE/3G</strong></td>
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<tr>
<td>Mini-PCIe Card</td>
<td>Telit LE910 mini card, LTE for North America and Europe, black screws x 4</td>
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</table>
Marine Displays and Panel Computers

Product Selection Guide
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# Marine Displays and Panel Computers

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<tr>
<td>CPU</td>
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<td>–</td>
<td>Intel® Core™ i7-3517UE 1.7 GHz, or Intel® Celeron® 1047U 1.4 GHz</td>
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<tr>
<td>Supported OS</td>
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<tr>
<td>System Chassis</td>
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<td>Intel® NM8 Express Chipset</td>
<td>Intel® NM8 Express Chipset</td>
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<td>Memory Slot</td>
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<td>4 GB pre-installed (SRAM)</td>
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<td>Storage Pre-installed</td>
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<td>RS-232/422/485 port</td>
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<td>2 RS-232/422/485 ports, software-selectable (DB9 male)</td>
<td>2 RS-232/422/485 ports, software-selectable (DB9 male)</td>
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<tr>
<td>Serial Ports</td>
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<td>2 RS-232/422/485 ports, software-selectable (DB9 male)</td>
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<td><strong>Warranty</strong></td>
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**NOTE:** For complete specifications, please refer to the Moxa website or consult the product selection guide.
Introduction

The MD-215/219/224/226 series of marine displays comes with full range dimming, wide viewing angles and optional optical bonding. These displays are built with a small-profile modular design that allows easier integration into industrial marine systems, reducing deployment costs and overall time-to-market.

The innovative and user-friendly SavvyTouch display controls offer several unique features not found on any other marine display console: a proximity sensor for convenient adjustments in dark conditions, an info button for immediate updates on power status, and a quick-switch to adjust between day, dusk, and night-time ECDIS modes (for color-calibrated ECDIS models only).

The MD-215/219/224/226 series displays are compliant with IEC 60945, DNV, and IACS-E10, verifying their resilience and durability in maritime conditions. Their IP54 rated enclosure provides additional protection against dust and moisture above and beyond the limits established by these international standards bodies.

ECDIS-approved models are also available, offering an excellent HMI solution for ECDIS charting and navigation stations.

Appearance

MD-215

- 15-inch Panel
- High quality LCD with LED backlight
- Color calibrated for ECDIS compliance
- Full range dimming, 0 to 100%
- SavvyTouch™ display controls
- Dual power supplies (AC & DC)
- Optically bonded and touch panel models available on request

MD-219

- 19-inch Panel
- High quality LCD with LED backlight
- Color calibrated for ECDIS compliance
- Full range dimming, 0 to 100%
- SavvyTouch™ display controls
- Dual power supplies (AC & DC)
- Optically bonded and touch panel models available on request

MD-224

- 24-inch Panel
- High quality LCD with LED backlight
- Color calibrated for ECDIS compliance
- Full range dimming, 0 to 100%
- SavvyTouch™ display controls
- Dual power supplies (AC & DC)
- Optically bonded and touch panel models available on request

MD-226

- 26-inch Panel
- High quality LCD with LED backlight
- Color calibrated for ECDIS compliance
- Full range dimming, 0 to 100%
- SavvyTouch™ display controls
- Dual power supplies (AC & DC)
- Optically bonded and touch panel models available on request
### Specifications

**Display**
- **Panel Size:** 15/19/24/26-inch viewable image size
- **Panel Type:** MVA
  - **Aspect Ratio:**
    - MD-215: 5:4
    - MD-219: 5:4
    - MD-224: 16:9
    - MD-226: 16:10
- **Pixels:**
  - MD-215: 1024 x 768
  - MD-219: 1280 x 1024 (SXGA)
  - MD-224: 1920 x 1080 (WSXGA+)
  - MD-226: 1920 x 1200 (WUXGA)
- **Pixel Pitch (RGB):**
  - MD-215: 0.297 (H) x 0.297 (V) mm
  - MD-219: 0.294 (H) x 0.294 (V) mm
  - MD-224: 0.282 (H) x 0.282 (V) mm
  - MD-226: 0.2865 (H) x 0.2865 (V) mm
- **Response Time:**
  - MD-215: 20 ms (gray to gray)
  - MD-219: 20 ms (gray to gray)
  - MD-224: 25 ms (gray to gray)
  - MD-226: 15 ms (gray to gray)
- **Contrast Ratio:**
  - MD-215: 700:1
  - MD-219: 2000:1

**Light Intensity:** 300 cd/m²

**Viewing Angles:**
- MD-215: 160°/140°
- MD-219/224: 178°/178°
- MD-226: 176°/176°

**Active Display Area:**
- MD-215: 304.128 (H) x 228.096 (V) mm
- MD-219: 376.320 (H) x 301.060 (V) mm
- MD-224: 531.360 (H) x 298.890 (V) mm
- MD-226: 550.080 (H) x 343.800 (V) mm

**Max. No. of Colors:**
- 16.7M / 8-bit color

**Display Interface:**
- 1 VGA input
  - 1 DVI-D input

**Resolution:**
- VGA: 640 x 480
- SVGA: 800 x 600
- XGA: 1024 x 768
- SXGA: 1280 x 1024 (MD-219/224/226 only)
- WSXGA+: 1920 x 1080 (MD-224/226 only)
- WUXGA: 1920 x 1200 (MD-226 only)

**Serial Interface**
- **Serial Standards:**
  - 1 RS-232 port (male DB9), 1 RS-422/485 port (Euroblock)
- **Optical Isolation Protection:** 3 kV
We recommend taking the following precautions to minimize heat build-up within the display:

- Position the display within ±40° of the vertical.
- Install an external fan to increase airflow upwards through the display if (a) the display is not positioned within ±40° of the vertical, (b) the ambient temperature exceeds 25°C, or (c) the display is used in a location with minimal ventilation.

Important Safety Precaution:
Even though the display is rated to operate within the IEC 60945 standard of -15 to 55°C, it is best to ensure that the ambient temperature does not exceed 25°C. Doing so will increase the life of your display and minimize service costs.

Serial Signals
RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
RS-422: Tx+, Rx+, DTR+, DSR+, RTS+, CTS+, DCD+, GND
RS-485-2w: Data+, Data-, GND

Front Panel
LEDs: MENU, Brightness, INFO, ECDIS, Day/Dusk/Night
Smart OSD: Yes

Physical Characteristics
Housing: Aluminum sheet metal

Weight:
- MD-215: 6.1 kg (13.56 lb)
- MD-219: 7.8 kg (17.33 lb)
- MD-224: 12 kg (26.67 lb)
- MD-226: 15.2 kg (33.78 lb)

Dimensions:
- MD-215: 356 x 315 x 77.2 mm (14.02 x 12.40 x 3.04 in)
- MD-219: 429 x 387 x 75 mm (16.89 x 15.24 x 2.95 in)
- MD-224: 595 x 393 x 75 mm (23.43 x 15.47 x 2.95 in)
- MD-226: 621 x 440 x 90 mm (24.45 x 17.48 x 3.57 in)

Mounting: VESA (optional), panel (optional), desktop (optional)

Environmental Limits
Operating Temperature: -15 to 55°C (5 to 131°F)
Storage Temperature: -20 to 60°C (-4 to 140°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)

Available Models
MD-224X: 24-inch tape bonded marine display with 16:9 aspect ratio, full HD (1920 x 1080), LED backlighting, dual-power supply (AC/DC)
MD-224Z: 24-inch tape bonded marine display with 16:9 aspect ratio, full HD (1920 x 1080), projected-capacitive touch panel, LED backlighting, dual-power supply (AC/DC)
MD-215X-T: 15-inch display, DVI-D/VGA video output, AC/DC dual power, tape bonding
MD-215Z-T: 15-inch display, DVI-D/VGA video output, AC/DC dual power, multitouch w/ glove friendly, tape bonding
MD-219X: 19-inch, 5:4 aspect ratio display (1280 x 1024), LED backlight, DVI-D/VGA, RS-232 and RS-422/485 serial ports, AC/DC dual power, tape bonding
MD-219Z: 19-inch, 5:4 aspect ratio display (1280 x 1024), projected capacitive multitouch, LED backlight, DVI-D/VGA, RS-232 and RS-422/485 serial ports, AC/DC dual power, tape bonding
MD-226X: 26-inch, 16:10 aspect ratio display (1920 x 1200), LED backlighting, RS-232/422/485 serial ports, dual-power supply (AC/DC)

Optional Accessories (can be purchased separately, for AC power input)
PWC-C13US-3B-183: 10A/250V North American (US) power cord, 183 cm
PWC-C13EU-3B-183: 10A/250V Continental European (EU) power cord, 183 cm
PWC-C13UK-3B-183: 10A/250V United Kingdom (UK) power cord, 183 cm
PWC-C13AU-3B-183: 10A/250V Australian (AU) power cord, 183 cm
PWC-C13CN-3B-183: 10A/250V China (CN) power cord, 183 cm

Optional Mounting/Bracket Kits (can be purchased separately)
MPC-MD-2-24-PMTK: Panel-mounting kit
MPC-MD-2-24-VESAMTK: VESA-mounting kit
MPC-MD-2-24-26-DMTK w/o hinge: Desktop-mounting kit without hinge
MPC-MD-2-24-26-DMTK w/ hinge: Desktop-mounting kit with hinge
MPC-MD-2-19-PMTK: Panel-mounting kit
MPC-MD-2-19-VESAMTK: VESA-mounting kit
MPC-MD-2-19-DMTK w/o hinge: Desktop-mounting kit without hinge
MPC-MD-2-19-DMTK w/ hinge: Desktop-mounting kit with angle adjustment hinge
MPC-MD-2-15-PMTK: Panel-mounting kit with 8 screws
MPC-MD-2-15-VESAMTK: VESA-mounting bracket, 100 x 100 mm and 75 x 75 mm

IP Rating:
- Front: IP54
- Rear: IP22

Anti-vibration: 0.7 g @ DNV 2.4 (Class A), sine wave, 2-100 Hz, 1 Oct./min., 1.5 hr per axis

Power Requirements
Input Voltage:
- DC: 24 VDC (with tolerance from 18 to 30 VDC, 2-pin terminal block)
- AC: 100 to 240 VAC

Power Consumption: 40 W max.

Standards and Certifications
Safety: UL 60950-1, EN 60950-1, IEC 60950-1
EMC: EN 55022/24
EMI: CISPR 22, FCC Part 15 Class A

EMS:
IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV
IEC 61000-4-3 RS: 80 MHz to 1 GHz: 3 V/m
IEC 61000-4-4 EFT: Power: 1 kV; Signal: 0.5 kV
IEC 61000-4-5 Surge: Power: 2 kV; Signal: 1 kV
IEC 61000-4-6 CS: Signal: 1 kV

Marine: IEC 60945 4th, IEC 61174, DNV2.4, IACS E10

Green Product: RoHS, cRoHS, WEEE

Warranty
Warranty Period: 1 year
Details: See www.moxa.com/warranty
MD-119/124 Series

19 inch and 24 inch type-approved ECDIS displays

Overview

MD-119 and MD-124 marine displays are designed to meet the demanding performance and durability requirements of industrial-grade maritime service. The MD-119 has a 19 inch screen in a 5:4 aspect ratio, with 1280 x 1024 pixel resolution, PIP (Picture-in-a-Picture) and PBP (Picture-by-a-Picture). The MD-124 has a 24 inch screen in a 16:9 aspect ratio, a maximum resolution of 1920 x 1080, and also supports PIP and PBP. With full range dimming, wide viewing angles, both AC and DC power inputs, and optional touch screens or optical bonding, MD-119 / MD-124 marine displays are ideal not only for use in ECDIS stations, but for a variety of other applications, as well, whether outdoors or on the bridge.

MD-124/MD-119 displays are compliant with a variety of industrial marine standards, including IEC 60945, IEC 61174, DNV, and IACS-E10, amply demonstrating their suitability for on-board marine uses.

Appearance

MD-124

- 19/24-inch marine display
- LED backlighting
- Full range dimming
- Dual power supplies (AC and DC)
- Picture-in-Picture (PIP) and Picture-by-Picture (PBP)
- ECDIS color calibration (by request)
- IP66 (front) and IP22 (rear) ratings

MD-119
**Dimensions**

**MD-124**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Unit: mm (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>593 (23.35)</td>
</tr>
<tr>
<td>Height</td>
<td>384 (15.12)</td>
</tr>
<tr>
<td>Depth</td>
<td>124 (4.88)</td>
</tr>
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</table>

**MD-119**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Unit: mm (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>483 (19.02)</td>
</tr>
<tr>
<td>Height</td>
<td>85 (3.35)</td>
</tr>
<tr>
<td>Depth</td>
<td>118 (4.65)</td>
</tr>
</tbody>
</table>

**: Specifications**

**Display**

- **Panel Size:**
  - MD-124: 24-inch viewable image size
  - MD-119: 19-inch viewable image size
- **Panel Type:** MVA
- **Aspect Ratio:**
  - MD-124: 16:9
  - MD-119: 5:4
- **Pixels:**
  - MD-124: 1920 x 1080
  - MD-119: 1280 x 1024 (WSXGA+)
- **Pixel Pitch (RGB):**
  - MD-124: 0.282 (H) x 0.282 (V) mm
  - MD-119: 0.294 (H) x 0.294 (V) mm
- **Response Time:**
  - MD-124: 8 ms (gray to gray)
  - MD-119: 5 ms (gray to gray)
- **Contrast Ratio:**
  - MD-124: 5000:1
  - MD-119: 1000:1
- **Light Intensity:**
  - MD-124: 300 cd/m²
  - MD-119: 350 cd/m²
- **Viewing Angles:**
  - MD-124: 178° x 178° (right-left/up-down)
  - MD-119: 178° x 178° (right-left/up-down)
- **Active Display Area:**
  - MD-124: 531.36 (H) x 298.89 (V) mm
  - MD-119: 376.32 (H) x 301.06 (V) mm / 14.81 (H) x 11.85 (V) in
- **Max. No. of Colors:** 16.7M (8-bit)
- **Display Interface:**
  - VGA x 1, DVI-I x 2, BNC composite x 3
- **Resolution:**
  - VGA: 640 x 480
  - SVGA: 800 x 600
  - XGA: 1024 x 768
  - SXGA: 1280 x 1024
  - WSXGA+: 1920 x 1080 (optimal setting) (MD-124 only)

**Serial Interface**

- **Serial Standards:** 1 software-selectable RS-232/422/485 port, male DB9
- **Serial Signals:**
  - RS-232: TxD, RxD, DTR, DSR, CTS, DCD, GND (RTS for MD-124)
  - RS-422: TxD+, TxD-, RxD+, RxD-, GND
  - RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
  - RS-485-2w: Data+, Data-, GND

**Front Panel**

- **Panel Control Buttons:** Power x 1, OSD controls x 4
- **LEDs:** Status, Power

**Physical Characteristics**

- **Housing:** Aluminum sheet metal
- **Weight:**
  - MD-124: 12 kg (26.67 lb)
  - MD-119: 9.7 kg (21.56 lb)
- **Dimensions:**
  - MD-124: 85 x 593 x 384 mm (3.35 x 23.45 x 15.12 in)
  - MD-119: 82 x 483 x 444 mm (3.23 x 19.02 x 17.48 in)
- **Mounting:** Console mounting

**Environmental Limits**

- **Operating Temperature:** -15 to 55°C (5 to 131°F)
- **Storage Temperature:** -20 to 60°C (-4 to 140°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-vibration:**
  - 0.7 g @ DNV 2.4 (Class A), sine wave, 2-100 Hz, 1 Oct./min., 1.5 hr per axis
  - 1 g @ DNV 2.4, random wave, 3-100 Hz, 2.5 hr per axis
  - 2.1 g @ DNV 2.4 (Class C), sine wave, 2-50 Hz, 1 Oct./min., 1.5 hr

**Power Requirements**

- **Input Voltage:**
  - 24 VDC (with tolerance from 18 to 36 VDC, 2-pin terminal block)
  - 110 to 230 VAC, 50/60 Hz
- **Power Consumption:**
  - MD-119: 60 W max.
  - MD-124: 90 W max.
We recommend taking the following precautions to minimize heat build-up within the display:

- Position the display within ±40° of the vertical.
- Install an external fan to increase airflow upwards through the display if (a) the display is not positioned within ±40° of the vertical, (b) the ambient temperature exceeds 25°C, or (c) the display is used in a location with minimal ventilation.

**Important Safety Precaution:**
Even though the display is rated to operate within the IEC 60945 standard of -15 to 55°C, it is best to ensure that the ambient temperature does not exceed 25°C. Doing so will increase the life of your display and minimize service costs.

### Available Models

**MD-124X:** 24-inch tape bonded marine display with 16:9 aspect ratio, full HD (1920 x 1080), LED backlighting, multipower supply (AC/DC)

**MD-124Y:** 24-inch optically bonded marine display with 16:9 aspect ratio, full HD (1920 x 1080), LED backlighting, multipower supply (AC/DC)

**MD-124Z:** 24-inch marine touch-screen display with 16:9 aspect ratio, full HD (1920 x 1080), LED backlighting, multipower supply (AC/DC)

**MD-119-X1:** 19-inch type approved ECDIS marine display with 5:4 aspect ratio, 1280 x 1024 resolution, LED backlighting, tape bonding, and dual AC/DC power supplies

### Package Checklist

- MD-119/MD-124 panel
- Rubber waterproofing gasket
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card

### Warranty

**Warranty Period:** 1 year

**Details:** See [www.moxa.com/warranty](http://www.moxa.com/warranty)
MPC-2150/2190/2240/2260 Series

15/19/24/26-inch Fanless panel computers

> 15/19/24/26-inch panel computer
> Color calibrated for ECDIS compliance
> 3rd Generation Intel® processor (Intel® Core i7 3517UE 1.7 GHz or Celeron® 1047UE, 1.40 GHz)
> SavvyTouch™ display controls
> Fanless system design
> Built-in NMEA 0183 and 3-in-1 software selectable RS-232/422/485 interfaces
> Multipower supplies (AC & DC)

### Introduction

The MPC-2150/2190/2240/2260 series panel computers feature an Intel 3rd generation processor and 4 GB of system memory to deliver a reliable, high performance platform of wide versatility for use in industrial marine environments. With their RS-232/422/485 serial, NMEA 0183, and gigabit Ethernet LAN ports, the MPC-2260 series panel computers support a wide variety of serial and marine-specific interfaces as well as high speed IT communications, all with native network redundancy.

### Appearance

The MPC-2150/2190/2240/2260 series comes with a range of standard display enhancements useful in industrial environments (including 0 to 100% full range dimming, 178°/178° wide viewing angles, and optional optical bonding), as well as Moxa’s innovative SavvyTouch display controls.

The MPC-2150/2190/2240/2260 panel computers are compliant with several industrial marine standards, including IEC 60945 4th, IEC 61174, DNV2.4, and IACS E10, verifying their resilient durability in marine operations. The MPC-2150/2190/2240/2260 are rugged, type approved, high performance, user-friendly panel computers perfect for ECDIS navigation systems and other marine IBS applications.
### Specifications

#### Computer
- **CPU:** Intel® Core™ i7-3517UE 1.7 GHz, or Intel® Celeron® 1047UE 1.4 GHz
- **Supported OS:** Windows Embedded Standard 7 32/64-bit, Windows 7 Professional 32/64-bit (the OS is not pre-installed)
- **System Chipset:** Intel HM65
- **System Memory:** 8 GB capacity, 4 GB pre-installed; 1 slot for a 4 GB DDR3-1600 204 pin SO-DIMM SDRAM
- **USB:** 4 USB 2.0 hosts x 4, type A connectors, supporting system boot up
- **BIOS:** 64 Mbit Flash BIOS with SPI, ACPI
- **Graphics Controller:** Intel HM65 Express chipset built in

#### Display
- **Panel Size:** 15/19/24/26-inch viewable image size
- **Panel Type:** MVA
- **Aspect Ratio:**
  - MPC-2150/2190: 5:4
  - MPC-2240: 16:9
  - MPC-2260: 16:10
- **Pixels:**
  - MPC-2150: 1024 x 768 (XGA)
  - MPC-2190: 1280 x 1024 (SXGA)
  - MPC-2240: 1920 x 1080 (WSXGA+)
  - MPC-2260: 1920 x 1200 (WUXGA)
- **Pixel Pitch (RGB):**
  - MPC-2150/2190: 0.297 (H) x 0.297 (V) mm
  - MPC-2190: 0.294 (H) x 0.294 (V) mm
  - MPC-2240: 0.276 (H) x 0.276 (V) mm
  - MPC-2260: 0.2685 (H) x 0.2685 (V) mm
- **Response Time:**
  - MPC-2150/2190: 20 ms (gray to gray)
  - MPC-2240: 25 ms (gray to gray)
  - MPC-2260: 15 ms (gray to gray)
- **Contrast Ratio:**
  - MPC-2150: 700:1
  - MPC-2190: 2000:1
  - MPC-2240: 5000:1
  - MPC-2260: 1500:1
- **Light Intensity:** 300 cd/m²
- **Viewing Angles:**
  - MPC-2150: 160°/140°
  - MPC-2190/2240: 178°/178°
  - MPC-2260: 176°/176°
- **Active Display Area:**
  - MPC-2150: 304.128 (H) x 228.096 (V) mm
  - MPC-2190: 376.32 (H) x 301.06 (V) mm
  - MPC-2240: 531.36 (H) x 298.89 (V) mm
  - MPC-2260: 550.08 (H) x 343.8 (V) mm
- **Max. No. of Colors:** 16.7M (8 bit color)

#### Resolution:
- VGA: 640 x 480
- SVGA: 800 x 600
- XGA: 1024 x 768
- SXGA: 1280 x 1024 (MPC-2190/2240/2260 only)
- WSXGA+: 1920 x 1080 (MPC-2240/2260 only)
- WUXGA: 1920 x 1200 (MPC-2260 only)

#### Ethernet Interface
- **LAN:** Auto-sensing 10/100/1000 Mbps ports (RJ45) x 2
- **Magnetic Isolation Protection:** 1.5 kV built in

#### Serial Interface
- **Serial Standards:** 2 RS-232/422/485 ports, software-selectable (DB9 male)

#### Serial Communication Parameters
- **Data Bits:** 5, 6, 7, 8
- **Stop Bits:** 1, 1.5, 2
- **Parity:** None, Even, Odd, Space, Mark
- **Flow Control:** RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
- **Baudrate:** 50 bps to 115.2 kbps (supports non-standard baudrates; see user’s manual for details)

#### Serial Signals
- **RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND**
- **RS-422: TxD+, TxD-, RxD+, RxD-, GND**
- **RS-485-4w: Data+, Data-, GND**
- **RS-485-2w: Data+, Data-, GND**

#### NMEA Interface
- **Serial Standards:**
  - MPC-2190: 4 NMEA 0183 ports
  - MPC-2240/2260: 8 NMEA 0183 ports
- **Base Serial Standard:** RS-422
- **Optical Isolation Protection:** ±6 kV contact discharge, ±8 kV air discharge
- **Voltage Differential:** -15 to +15 V
- **Baudrate:** 4800 bps
- **Data Bits:** 8
- **Stop Bits:** 1, 1.5, 2
- **Parity:** None
- **Handshake:** None

#### LEDs
- **System:** Storage, Power
- **LAN:** 100M/Link x 2, 1000M/Link x 2 (on connector)
- **Front Panel:**
  - **LEDs:** MENU, Brightness, INFO, ECDIS, Day/Dusk/Night, Storage

#### Physical Characteristics
- **Housing:** Aluminum sheet metal
- **Weight:**
  - MPC-2150: 6.5 kg (14.44 lb)
  - MPC-2190: 7.8 kg (17.33 lb)
  - MPC-2240: 12.4 kg (27.56 lb)
  - MPC-2260: 16.6 kg (36.89 lb)
- **Dimensions:**
  - MPC-2190: 356 x 315 x 77.2 mm (14.02 x 12.40 x 3.04 in)
  - MPC-2190: 429 x 387 x 74.5 mm (16.89 x 15.24 x 2.93 in)
  - MPC-2240: 595 x 393 x 75 mm (23.44 x 15.48 x 2.95 in)
  - MPC-2260: 621 x 444 x 90 mm (24.45 x 17.48 x 3.57 in)
- **Mounting:** VESA (optional), panel (optional), desktop (optional)
- **System Cooling:** Fanless thermal design

#### Environmental Limits
- **Operating Temperature:**
  - MPC-2150: -40 to 70°C (-40 to 158°F)
  - MPC-2190/2240/2260: -15 to 55°C (5 to 131°F)
- **Storage Temperature:**
  - MPC-2190/2240/2260: -20 to 60°C (-4 to 140°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)

Note: For MPC-2260 models, if you expect the storage temperature to exceed 40°C, please ensure that the ambient relative humidity remains below 95%.
We recommend taking the following precautions to minimize heat build-up within the display:

- Position the display within ±40° of the vertical.
- Install an external fan to increase airflow upwards through the display if (a) the display is not positioned within ±40° of the vertical, (b) the ambient temperature exceeds 25°C, or (c) the display is used in a location with minimal ventilation.

**Important Safety Precaution:**
Even though the display is rated to operate within the IEC 60945 standard of -15 to 55°C for bridge applications, it is best to ensure that the ambient temperature does not exceed 25°C. Doing so will increase the life of your display and minimize service costs.

**Power Requirements**
- Input Voltage:
  - 24 VDC, 6 A or (18 to 34 VDC, 8 A max.), screw-type terminal block
  - 100 to 240 VAC, 50 to 60 Hz, 2 A, AC power inlet

**Standards and Certifications**
- Safety: UL 60950-1, EN 60950-1, IEC 60950-1
- EMC: EN 55022/24
- EMI: CISPR 22, FCC Part 15B Class A
- EMS:
  - IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV
  - IEC 61000-4-3 RS: 80 MHz to 1 GHz; 3 V/m
  - IEC 61000-4-4 EFT: Power: 2 kV, Signal: 1 kV
  - IEC 61000-4-6 CS: Signal: 1 kV
- Marine: IEC 60945 4th, IEC 61174, IEC 61162, DNV2.4, IACS E10
- Green Product: RoHS, eRoHS, WEEE

**Reliability**
- Automatic Reboot Trigger: Built-in WDT (watchdog timer) supporting 1-255 levels for time interval system reset, software programmable

**Warranty**
- Warranty Period:
  - Computer systems: 3 years
  - LCD panels: 1 year
- Details: See www.moxa.com/warranty

**Dimensions**

**MPC-2150**

- 315 (12.4)
- 226 (8.9)
- 90.8 (3.57)
- 444.03 (17.48)

**MPC-2190**

- 315 (12.4)
- 407.93 (16.06)
- 9.5 (0.37)
- 387.03 (15.24)

**MPC-2240**

- 305 (12.01)
- 595.31 (23.44)
- 11.19 (0.44)
- 407.93 (16.06)

**MPC-2260**

- 293.37 (11.55)
- 621.03 (24.45)
- 75 (2.95)
- 296.53 (11.67)

**Unit:** mm (inch)
Available Models

MPC-2240X: 24-inch fanless panel computer with Intel® Celeron® 1047UE 1.4 GHz processor, NMEA 0183, RS-232/422/485 serial ports, gigabit LAN ports, USB 2.0 ports, SSD trays, dual AC/DC power inputs, tape bonding

MPC-2240Z: 24-inch fanless panel computer with Intel® Celeron® 1047UE 1.4 GHz processor, NMEA 0183, RS-232/422/485 serial ports, gigabit LAN ports, USB 2.0 ports, SSD trays, dual AC/DC power inputs, tape bonding

MPC-2247X: 26-inch fanless panel computer with Intel® Core™ i7 3517UE 1.7 GHz processor, NMEA 0183, RS-232/422/485 serial ports, gigabit LAN ports, USB 2.0 ports, SSD trays, dual AC/DC power inputs, tape bonding

MPC-2247Z: 26-inch fanless panel computer with Intel® Core™ i7 3517UE 1.7 GHz processor, NMEA 0183, RS-232/422/485 serial ports, gigabit LAN ports, USB 2.0 ports, SSD trays, dual AC/DC power inputs, tape bonding

Optional Mounting Kits

(MPC-2150)

• Panel-mounting kit

(MPC-2190)

• Panel-mounting kit

(MPC-2240)

• Desktop-mounting kit with hinge

(MPC-2260)

• Desktop-mounting kit with hinge

Optional Accessories

PWC-C13US-3B-183: 10A/125V North American (US) power cord, 183 cm

PWC-C13EU-3B-183: 10A/250V Continental European (EU) power cord, 183 cm

PWC-C13UK-3B-183: 10A/250V United Kingdom (UK) power cord, 183 cm

PWC-C13AU-3B-183: 10A/250V Australian (AU) power cord, 183 cm

PWC-C13CN-3B-183: 10A/250V China (CN) power cord, 183 cm

Optional Mounting Kits (can be purchased separately)

MPC-MD-2-15-PMTK: 8 screws for panel mount

MPC-MD-2-15-VESAMTK: VESA-mounting bracket, 100 x 100 mm and 75 x 75 mm

Optional Mounting/Bracket Kits (can be purchased separately)

MPC-MD-2-15-VESAMTK: VESA-mounting bracket, 100 x 100 mm and 75 x 75 mm

MPC-MD-2-15-PMTK: Panel-mounting kit

MPC-MD-2-19-PMTK: Panel-mounting kit

MPC-MD-2-19-VESAMTK: VESA-mounting kit

MPC-MD-2-19-DMTK w/o hinge: Desktop-mounting kit without hinge

MPC-MD-2-19-DMTK w/ hinge: Desktop-mounting kit with hinge

MPC-MD-2-15-PMTK: Panel-mounting kit with 8 screws

MPC-MD-2-15-VESAMTK: VESA-mounting bracket, 100 x 100 mm and 75 x 75 mm
## Oil & Gas Displays and Panel Computers

### Product Selection Guide

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# Oil & Gas Displays & Panel Computers

## MD-219Z-HB/224Z-HB Series
- **Operating Temperature**: -40 to 60°C (-40 to 140°F)
- **Humidity**: 5 to 95% (non-condensing)
- **Weight**: 356 x 315 x 72.2 mm (14.02 x 12.60 x 2.86 in)
- **Mounting**: VESA, desktop, panel
- **Storage**: CFast x 1
- **Power Requirements**: 12 VDC (2-pin terminal block)
- **Standards and Certifications**: IECEx
- **Warranty Period**: 3 years

## MPC-2150 Series
- **Operating Temperature**: -40 to 60°C (-40 to 140°F)
- **Humidity**: 5 to 95% (non-condensing)
- **Weight**: 483 x 408 x 99 mm (19.02 x 16.06 x 3.90 in)
- **Mounting**: VESA, desktop, panel
- **Storage**: CFast x 1
- **Power Requirements**: 12 VDC (2-pin terminal block)
- **Standards and Certifications**: IECEx
- **Warranty Period**: 3 years

## MD-219 Series
- **Operating Temperature**: -20 to 60°C (-4 to 140°F)
- **Humidity**: 5 to 95% (non-condensing)
- **Weight**: 356 x 315 x 72.2 mm (14.02 x 12.60 x 2.86 in)
- **Mounting**: VESA, desktop, panel
- **Storage**: CFast x 1
- **Power Requirements**: 12 VDC (2-pin terminal block)
- **Standards and Certifications**: IECEx
- **Warranty Period**: 3 years

## EXP-1519 Series
- **Operating Temperature**: -20 to 60°C (-4 to 140°F)
- **Humidity**: 5 to 95% (non-condensing)
- **Weight**: 483 x 408 x 99 mm (19.02 x 16.06 x 3.90 in)
- **Mounting**: VESA, desktop, panel
- **Storage**: CFast x 1
- **Power Requirements**: 12 VDC (2-pin terminal block)
- **Standards and Certifications**: IECEx
- **Warranty Period**: 3 years

## EXP-1319 Series
- **Operating Temperature**: -20 to 60°C (-4 to 140°F)
- **Humidity**: 5 to 95% (non-condensing)
- **Weight**: 483 x 408 x 99 mm (19.02 x 16.06 x 3.90 in)
- **Mounting**: VESA, desktop, panel
- **Storage**: CFast x 1
- **Power Requirements**: 12 VDC (2-pin terminal block)
- **Standards and Certifications**: IECEx
- **Warranty Period**: 3 years

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## Environmental Limits
- **Operating Temperature**: -20 to 60°C (-4 to 140°F)
- **Storage Temperature**: -20 to 70°C (-4 to 158°F)
- **Relative Humidity**: 5 to 95% (non-condensing)
- **Power Requirements**: 12 VDC (2-pin terminal block)

## Standards and Certifications
- **UL 60950-1, CCC**
- **IECEx**
- **RoHS, eRoHS, WEEE**
- **Warranty Period**: 3 years
- **Details**: See www.moxa.com/warranty

---

## Display Specifications
- **Size**: 19/24 inches
- **Viewing Angles**: 170°/160°
- **Light Intensity**: 1000 cd/m²
- **Pixel**: 1024 x 768
- **Aspect Ratio**: 5:4
- **Touch**: Projected capacitive touch, glove friendly

## Network Interface
- **Ethernet**: 2 10/100/1000 Mbps ports
- **Fiber**: 2 multimode 100M fiber ports
- **Protocol**: TCP/IP

## Physical Characteristics
- **Housing**: Aluminum sheet metal
- **Weight**: 6.5 kg (14.33 lb)
- **Dimensions**: 1920 x 1080 (SXGA)

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## Conclusion
Moxa offers a range of Oil & Gas Displays & Panel Computers designed for harsh environments, ensuring reliability and durability in challenging conditions. Whether it's for oil and gas, marine, hazardous areas, or marine applications, Moxa has the solution for you.
**MD-219Z-HB/224Z-HB Series**  

**19/24-inch sunlight-readable display**

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<td>Full-range dimming, wide viewing angles, and optional optical bonding features.</td>
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**Introduction**

The MD-219Z/224Z-HB displays come with full-range dimming, wide viewing angles, and optional optical bonding features. These displays have a small-profile modular design that allows easier integration into industrial systems, reducing deployment costs and overall time-to-market. The innovative and user-friendly SavvyTouch display controls offer several unique features not found on any other marine display console: a proximity sensor for convenient adjustments in the dark, an info button for immediate updates on power status, and a quick-switch to adjust three different brightness modes. The MD-219Z/224Z-HB series displays are compliant with UL Class 1 Division 2, IEC 60945, DNV, and IACS-E10, verifying their resilience and durability in hazardous conditions. The displays' IP66-rated enclosure provides additional protection against dust and moisture above and beyond the limits established by these international standards.

**Appearance**

**MD-219Z-HB**

- 19-inch Panel
- SavvyTouch Display Control Buttons
- VGA/DVI-D Input
- RS-422/485
- 24 VDC Power Input
- RS-232
- Buzzer
- 100 to 240 VAC Power Input

**MD-224Z-HB**

- 24-inch Panel
- SavvyTouch Display Control Buttons
- VGA/DVI-D Input
- RS-422/485
- 100 to 240 VAC Power Input
- Buzzer
- RS-232
- 24 VDC Power Input
Oil & Gas Displays and Panel Computers

### Specifications

**Display**
- Panel Size: 19/24-inch viewable image size
- Panel Type: MVA
- Aspect Ratio:
  - MD-219Z-HB: 5:4
  - MD-224Z-HB: 16:9
- Pixels:
  - MD-219Z-HB: 1280 x 1024 (SXGA)
  - MD-224Z-HB: 1920 x 1080 (WSXGA+)
- Pixel Pitch (RGB):
  - MD-219Z-HB: 0.294 (H) x 0.294 (V) mm
  - MD-224Z-HB: 0.282 (H) x 0.282 (V) mm
- Response Time:
  - MD-219Z-HB: 20 ms (gray to gray)
  - MD-224Z-HB: 25 ms (gray to gray)
- Contrast Ratio:
  - MD-219Z-HB: 2000:1
  - MD-224Z-HB: 5000:1
- Light Intensity: 1000 cd/m/m
- Viewing Angles: 178°/178°
- Active Display Area: 531.36 (H) x 298.89 (V) mm
- Max. No. of Colors: 16.7M (8-bit color)
- Display Interface:
  - 1 VGA input
  - 1 DVI-D input
- Resolution:
  - VGA: 640 x 480
  - SVGA: 800 x 600
  - XGA: 1024 x 768
  - SXGA: 1280 x 1024
  - WSXGA+: 1920 x 1080 (optimal setting, MD-224Z-HB only)

**Serial Interface**
- Serial Standards: RS-232 ports (DB9) x 1, RS-422/485 ports (terminal block) x 1
- Optical Isolation Protection: 4 kV

**Serial Signals**
- RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
- RS-422: TxD+, TxD-, RxD+, RxD-, GND
- RS-485-2W: Data+, Data-, GND

**Front Panel**
- LEDs: MENU, Brightness, INFO, ECDIS, Day/Dusk/Night
- Smart OSD: Yes

**Physical Characteristics**
- Housing: Aluminum sheet metal
- Weight:
  - MD-219Z-HB: 7.8 kg (17.33 lb)
  - MD-224Z-HB: 12 kg (26.67 lb)
- Dimensions:
  - MD-219Z-HB: 429 x 387 x 75 mm (16.89 x 15.24 x 2.95 in)
  - MD-224Z-HB: 595 x 393 x 75 mm (23.43 x 15.47 x 2.95 in)
- Mounting: VESA (optional), panel (optional), desktop (optional)

**Environmental Limits**
- Operating Temperature: -20 to 60°C (-4 to 140°F)
- Storage Temperature: -20 to 60°C (-4 to 140°F)
- Ambient Relative Humidity: 5 to 95% (non-condensing)
- IP Rating:
  - Front: IP66
  - Rear: IP22
- Anti-vibration: 0.7 Grms @ DNV 2.4 (Class A), sine wave, 2-100 Hz, 1 Oct./min., 1.5 hr per axis

**Power Requirements**
- Input Voltage:
  - DC: 24 VDC (with tolerance from 18 to 30 VDC, 2-pin terminal block)
  - AC: 100 to 240 VAC
- Power Consumption: 60 W (Max.)

**Standards and Certifications**
- Safety: UL 60950-1, CCC
- Hazardous Environments: UL Class 1 Division 2
- EMC: EN 55022/24, CISPR 22, FCC Part 15B Class A
- Marine: IEC 60945 4th, DNV, IACS E10, IEC 61174
- Green Product: RoHS, cRoHS, WEEE

**Warranty**
- Warranty Period: 3 years for system, 1 year for LCD panel
- Details: See www.moxa.com/warranty
We recommend taking the following precautions to minimize heat build-up within the display:

- Position the display within ±40° of the vertical.
- Install an external fan to increase airflow upwards through the display if (a) the display is not positioned within ±40° of the vertical, (b) the ambient temperature exceeds 25°C, or (c) the display is used in a location with minimal ventilation.

**Important Safety Precaution:**
Even though the display is rated to operate within the IEC 60945 standard of -15 to 55°C, it is best to ensure that the ambient temperature does not exceed 25°C. Doing so will increase the life of your display and minimize service costs.

### Available Models

**MD-224X:** 24-inch tape bonded marine display with 16:9 aspect ratio, full HD (1920x1080), LED backlighting, dual-power supply (AC/DC)

**MD-224Z:** 24-inch tape bonded marine display with 16:9 aspect ratio, full HD (1920x1080), projected-capacitive touch panel, LED backlighting, dual-power supply (AC/DC)

**MD-224Z-HB:** 24-inch tape bonded marine display, 16:9 aspect ratio, full HD (1920x1080), 1000-nit sunlight readable, glove-friendly multi-touch, LED backlighting, dual-power supply (AC/DC)

**MD-219X:** 19-inch, 5:4 aspect ratio display (1280x1024), LED backlighting, DVI-D/VGA, RS-232 and RS-422/485 serial ports, AC/DC dual power, tape bonding

**MD-219Z:** 19-inch, 5:4 aspect ratio display (1280x1024), projected capacitive multi-touch, LED backlight, DVI-D/VGA, RS-232 and RS-422/485 serial ports, AC/DC dual power, tape bonding

**MD-219Z-HB:** 19-inch sunlight readable display, 5:4 aspect ratio (1280x1024), glove-friendly multi-touch, LED backlight, DVI-D/VGA, RS-232 and RS-422/485 serial ports, AC/DC dual power, tape bonding

### Optional Accessories (can be purchased separately, for AC power input)

- **PWC-C13US-3B-183:** 10A/125V North American (US) power cord, 183 cm
- **PWC-C13EU-3B-183:** 10A/250V Continental European (EU) power cord, 183 cm
- **PWC-C13UK-3B-183:** 10A/250V United Kingdom (UK) power cord, 183 cm
- **PWC-C13AU-3B-183:** 10A/250V Australian (AU) power cord, 183 cm
- **PWC-C13CN-3B-183:** 10A/250V China (CN) power cord, 183 cm

### Optional Mounting/Bracket Kits (can be purchased separately)

- **MPC-MD-2-24-PMTK:** Panel-mounting kit
- **MPC-MD-2-24-VESAMTK:** VESA-mounting kit
- **MPC-MD-2-24-26-DMTK w/o hinge:** Desktop-mounting kit without hinge
- **MPC-MD-2-24-26-DMTK w/ hinge:** Desktop-mounting kit with hinge
- **MPC-MD-2-19-PMTK:** Panel-mounting kit
- **MPC-MD-2-19-VESAMTK:** VESA-mounting kit
- **MPC-MD-2-19-DMTK w/o hinge:** Desktop-mounting kit without hinge
- **MPC-MD-2-19-DMTK w/ hinge:** Desktop-mounting kit with hinge

### Package Checklist

- MD-219/224 display
- VGA cable
- DVI-D cable
- 2-pin terminal block x 1
- 5-pin terminal block x 2
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card
**MD-215 Series**

*Preliminary*

### 15-inch rugged industrial display

- 15-inch industrial-grade display
- -40 to 70°C wide-temperature design
- 1000-nit sunlight-readable LCD
- Glove-friendly multi-touch (touch model only)
- Fanless system design
- Multiple power supplies (AC & DC)

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### Introduction

The MD-215 15-inch display has a rugged design for industrial environments. The display uses VGA and DVI-D video signals to support a 1024 x 768 resolution, and comes with RS-232/422/485 ports for connecting serial devices.

The MD-215 series panel computers are designed with a wide, -40 to 70°C temperature range and come with a patented, fanless, streamlined enclosure designed for highly efficient heat dissipation, making this one of the most reliable industrial platforms available for harsh, hot, outdoor environments, such as oil and gas fields and drilling platforms.

The MD-215 series also features a 1000-nit LCD panel offering a sunlight-readable, projected-capacitive, glove-friendly, multi-touch screen, providing an excellent touch panel for outdoor applications.

The MD-215 series supports both VESA- and panel-mounting, which can be implemented with accessories that can be purchased separately from Moxa.

### Appearance

- 15-inch industrial-grade display
- -40 to 70°C wide-temperature design
- 1000-nit sunlight-readable LCD
- Glove-friendly multi-touch (touch model only)
- Fanless system design
- Multiple power supplies (AC & DC)

---

**Appearance**

- 15-inch Panel
- Buzzer
- SavvyTouch Display Control Buttons

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- **Power Input**: 100 to 240 VAC, 24 VDC
- **VGA**: RS-232/422/485
- **DVI-D**: BUZZER
- **Power Input**: 100 to 240 VAC, 24 VDC
### Specifications

**Display**
- **Panel Size:** 15-inch readable image size
- **Panel Type:** TN
- **Touch:** Capacitive multi-touch with glove-friendly support (touch models only)
- **Aspect Ratio:** 5:4
- **Pixels:** 1024 x 768
- **Pixel Pitch (RGB):** 0.297 (H) x 0.297 (V) mm
- **Response Time:** 20 ms (gray to gray)
- **Contrast Ratio:** 700:1
- **Light Intensity:** 1000 cd/m²
- **Viewing Angles:** 160°/140°
- **Active Display Area:** 304.128 (H) x 228.096 (V) mm
- **Display Interface:** VGA input x 1, DVI-D input x 1

**Serial Interface**
- **Serial Standards:** 1 RS-232 port (DB9), 1 RS-422/485 port (terminal block)
- **Optical Isolation Protection:** 4 kV

**Serial Signals**
- **RS-232:** TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
- **RS-422:** TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-2w:** Data+, Data-, GND

**Front Panel**
- **LEDs:** MENU, brightness, INFO, Brightness mode, Day/Dusk/Night
- **Smart OSD:** Yes

**Physical Characteristics**
- **Housing:** Aluminum sheet metal
- **Weight:** 6.1 kg (13.56 lb)
- **Dimensions:** 356 x 315 x 77.2 mm (14.02 x 12.40 x 3.04 in)
- **Mounting:** Panel (standard), VESA (mounting kit is optional)
- **System Cooling:** Fanless thermal design

**Environmental Limits**
- **Operating Temperature:** -40 to 70°C (-40 to 158°F)
- **Storage Temperature:** -40 to 70°C (-40 to 158°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-vibration:** 2 Grms, 5-500 Hz frequency, compliant with IEC 60068-2-6 standard
- **Anti-shock:** 20 Grms, half sine wave under system operating, 11 ms duration, compliant with IEC 60068-2-27 standard

**Power Requirements**
- **Input Voltage:**
  - DC: 12/24 VDC (Range 9 to 36 VDC)
  - AC: 100 to 240 VAC
- **Power Consumption:** 60 W (max.)

**Standards and Certifications**
- **Safety:** UL 60950-1, IEC 60950-1
- **EMC:** EN 55022/24
- **EMI:** CISPR 22, FCC Part 15B Class A
- **EMS:** IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV
  - IEC 61000-4-3 RS: 80 MHz to 1 GHz: 10 V/m
  - IEC 61000-4-4 EFT: Power: 2 kV; Signal: 1 kV
  - IEC 61000-4-5 Surge: Power: 2 kV; Signal: 1 kV
  - IEC 61000-4-6 CS: 10 V
  - IEC 61000-4-8
  - IEC 61000-4-11
- **Ingress Protection Rating:** IP66 (front) / IP22 (rear)
- **Green Product:** RoHS, cRoHS, WEEE

**Warranty**
- **Warranty Period:** 3 years for system, 1 year for LCD panel
- **Details:** See www.moxa.com/warranty
## Ordering Information

### Available Models
- **MD-215X-T**: 15-inch display, DVI-D/VGA video output, AC/DC dual power, tape bonding
- **MD-215Z-T**: 15-inch display, DVI-D/VGA video output, AC/DC dual power, multi-touch w/ glove friendly, tape bonding

### Optional Mounting/Bracket Kits (can be purchased separately)
- **MPC-MD-2-15-PMTK**: 8 screws for panel mount
- **MPC-MD-2-15-VESAMTK**: VESA-mounting bracket, 100 x 100 mm and 75 x 75 mm

### Package Checklist
- MD-215 display
- VGA cable
- DVI-D cable
- 2-pin terminal block x 1
- 5-pin terminal block x 2
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card
MPC-2150 Series

15-inch industrial fanless panel computers

> 15-inch panel computer
> 3rd Generation Intel® processor (Intel® Core i7 3517UE 1.7 GHz or Celeron® 1047UE, 1.40 GHz)
> -40 to 70°C wide-temperature design
> 1000-nit sunlight-readable LCD
> Glove-friendly and multi-touch screen
> Fanless system design
> Class 1 Division 2, ATEX Zone 2*, and IECEx* certified
> Multiple power supplies (AC & DC)

*Certification is underway. Please check Moxa’s website for the most up-to-date certification status.

Introduction

The MPC-2150 15-inch panel computers with 3rd Generation Intel® Core™ processor deliver a reliable, durable, high-performance platform of wide versatility for use in industrial environments. With its two software selectable RS-232/422/485 serial ports and two gigabit Ethernet LAN ports, the MPC-2150 panel computer supports a wide variety of serial interfaces as well as high-speed IT communications, all with native network redundancy. The MPC-2150 also comes with DVI-D and VGA video outputs, allowing you to extend the screen size and reduce the total cost of system development.

Appearance

The MPC-2150 series panel computers are designed with a wide, -40 to 70°C temperature range, and come with a patented, fanless, streamlined enclosure designed for highly efficient heat dissipation, making this one of the most reliable industrial platforms available for harsh, hot, outdoor environments like oil and gas fields, or drilling platforms.

The MPC-2150 also features a 1000-nit LCD panel offering a sunlight-readable, projected-capacitive, glove-friendly, multi-touch screen, providing for an excellent user experience for applications outdoors.
Specifications

**Computer**
- **CPU:** Intel® Core™ i7-3517UE 1.7 GHz, or Intel® Celeron® 1047UE 1.4 GHz
- **Supported OS:** Windows Embedded Standard 7 32/64-bit, Windows 7 Professional 32/64-bit (the OS is not pre-installed)
- **System Chipset:** Intel® HM65 Express Chipset
- **System Memory:** 4 GB pre-installed (SDRAM)
- **USB:** USB 2.0 hosts x 4, type-A connectors, supporting system boot up
- **Storage:** 1 2.5-inch HDD/SSD slot + 1 CFast slot (storage is not pre-installed)
- **BIOS:** 64 Mbit Flash BIOS SPI type, ACPI function supported
- **Video Output:** DVI-D x 1, VGA x 1 (female)
- **Buzzer:** 75 to 85 db (IEC 60945 compliant)

**Other Peripherals**
- **Audio:** Line-in and line-out interface, with 3.5 mm mini jack
- **KB/MS:** 2 PS/2 interfaces supporting standard PS/2 keyboard and mouse

**Display**
- **Panel Size:** 15-inch viewable image size
- **Panel Type:** TN
- **Touch:** Capacitive multi-touch with glove-friendly support (touch models only)
- **Aspect Ratio:** 5:4
- **Pixels:** 1024 x 768
- **Pixel Pitch (RGB):** 0.297 (H) x 0.297 (V) mm
- **Response Time:** 20 ms (gray to gray)
- **Contrast Ratio:** 700:1
- **Light Intensity:** 1000 cd/m²/m
- **Viewing Angles:** 178°/178°
- **Max. No. of Colors:** 16.7M (8 bit color)
- **Resolution:**
  - VGA: 640 x 480
  - SVGA: 800 x 600
  - XGA: 1024 x 768

**Ethernet Interface**
- **LAN:** Auto-sensing 10/100/1000 Mbps ports (RJ45 port) x 2

**Serial Interface**
- **Serial Standards:** 2 RS-232/422/485 ports, software-selectable (DB9 male)

**Serial Communication Parameters**
- **Data Bits:** 5, 6, 7, 8
- **Stop Bits:** 1, 1.5, 2
- **Parity:** None, Even, Odd, Space, Mark
- **Flow Control:** RTS/CTS, XON/XOFF
- **Baudrate:** 50 bps to 115.2 Kbps (supports non-standard baudrates; see user’s manual for details)

**LEDs**
- **System:** Storage, Power
- **LAN:** 100M/Link x 2, 1000M/Link x 2 (on connector)

**Front Panel**
- **LEDs:** MENU, Brightness, INFO, Brightness Mode, Day/Dusk/Night, Storage
- **Smart OSD:** Yes

**Physical Characteristics**
- **Housing:** Aluminum sheet metal
- **Weight:** 6.5 kg (14.44 lb)
- **Dimensions:** 356 x 315 x 77.2 mm (14.02 x 12.40 x 3.04 in)
- **Mounting:** Panel (standard), VESA (mounting kit is optional)
- **System Cooling:** Fanless thermal design

**Environmental Limits**
- **Operating Temperature:** -40 to 70°C (-40 to 158°F)
- **Storage Temperature:** -40 to 70°C (-40 to 158°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-vibration:** 2 Grms, 5-500 Hz frequency, compliant with IEC 60068-2-6 standard
- **Anti-shock:** 20 Grms, half sine wave under system operating, 11 ms duration, compliant with IEC 60068-2-27 standard

**Power Requirements**
- **Input Voltage:**
  - DC: 12/24 VDC (Range 9 to 36 VDC)
  - AC: 100 to 240 VAC
- **Power Consumption:** Less than 120 W, 2.5 A @ 24 VDC

**Standards and Certifications**
- **Safety:** UL 60950-1, IEC 60950-1
- **EMC:** EN 55022/24
- **EMI:** CISPR 22, FCC Part 15B Class A
- **EMS:**
  - IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV
  - IEC 61000-4-3 RS: 80 MHz to 1 GHz: 10 V/m
  - IEC 61000-4-4 EFT: Power: 2 kV; Signal: 1 kV
  - IEC 61000-4-5 Surge: Power: 2 kV; Signal: 1 kV
  - IEC 61000-4-6 CS: 10 V
  - IEC 61000-4-8, IEC 61000-4-11
  - Ingress Protection Rating: IP66 (front) / IP22 (rear) / NEMA 4X

**Green Product:** RoHS, cRoHS, WEEE

**Warranty**
- **Warranty Period:**
  - Computer system: 3 years
  - LCD panel: 1 year
- **Details:** See www.moxa.com/warranty
### Ordering Information

**Available Models**

- **MPC-2150X-T**: 15-inch fanless panel computer with Intel® Celeron® 1047UE 1.4 GHz processor, RS-232/422/485 serial ports, gigabit LAN ports, USB 2.0 ports, -40 to 70°C operating temperature, 2.5-inch SSD tray and CFast slot, dual AC/DC power inputs, tape bonding
- **MPC-2150Z-T**: 15-inch fanless panel computer with Intel® Celeron® 1047UE 1.4 GHz processor, RS-232/422/485 serial ports, gigabit LAN ports, USB 2.0 ports, -40 to 70°C operating temperature, 2.5-inch SSD tray and CFast slot, dual AC/DC power inputs, tape bonding, projected-capacitive touch screen
- **MPC-2157X-T**: 15-inch fanless panel computer with Intel® Core™ i7 3517UE 1.7 GHz processor, RS-232/422/485 serial ports, gigabit LAN ports, USB 2.0 ports, -40 to 70°C operating temperature, 2.5-inch SSD tray and CFast slot, dual AC/DC power inputs, tape bonding
- **MPC-2157Z-T**: 15-inch fanless panel computer with Intel® Core™ i7 3517UE 1.7 GHz processor, RS-232/422/485 serial ports, gigabit LAN ports, USB 2.0 ports, -40 to 70°C operating temperature, 2.5-inch SSD tray and CFast slot, dual AC/DC power inputs, tape bonding, projected-capacitive touch screen

**Optional Mounting Kits** (can be purchased separately)
- **MPC-MD-2-15-PMTK**: 8 screws for panel mount
- **MPC-MD-2-15-VESAMTK**: VESA-mounting bracket, 100 x 100 mm and 75 x 75 mm

**Package Checklist**

- 1 MPC-2150 panel computer
- 1 2-pin terminal block for DC power input
- 2.5-inch SATA SSD/HDD installation kit
- Documentation and driver DVD
- Quick installation guide (printed)
- Warranty card

### Dimensions (Unit: mm (inch))

- **MPC-2150X-T**: 356 (14.02) x 267 (10.51) x 95 (3.74)
- **MPC-2150Z-T**: 356 (14.02) x 267 (10.51) x 95 (3.74)
- **MPC-2157X-T**: 356 (14.02) x 267 (10.51) x 95 (3.74)
- **MPC-2157Z-T**: 356 (14.02) x 267 (10.51) x 95 (3.74)

### Panel Cutout Dimension

- **MPC-2150X-T**: 339 (13.35) x 241 (9.53)
- **MPC-2150Z-T**: 339 (13.35) x 241 (9.53)
- **MPC-2157X-T**: 339 (13.35) x 241 (9.53)
- **MPC-2157Z-T**: 339 (13.35) x 241 (9.53)
EXPC-1519 Series

Zone 2 19-inch panel computers with multiple connectivity options

The EXPC-1519 series features Intel® 3rd generation Core™ i7-3555LE 2.5 GHz or Celeron 1047UE 1.4 GHz processor, with up to 16 GB of memory to deliver high performance processing.

The EXPC-1519 series offers flexible interface connectivity options to meet your application needs: standard connectors with cable glands, terminal block with cable glands, and standard connectors on the bottom panel.

The EXPC-1519 computers are designed with wide temperature range (-40 to 70°C) and come with a patented, fanless, streamlined enclosure designed for highly efficient heat dissipation, making this one of the most reliable industrial platforms available for harsh, hot outdoor environments like oil and gas fields, or drilling platforms.

In addition, the EXPC-1519 computers feature touchscreen controls with anti-reflection treatment and 1000-nit LED backlight, making them easy to read even during the peak daylight hours.

Introduction

The EXPC-1519 panel computers are designed for Zone 2 applications in hazardous environments, both indoors and outdoors. The EXPC-1519 series features Intel® 3rd generation Core™ i7-3555LE 2.5 GHz or Celeron 1047UE 1.4 GHz processor, with up to 16 GB of memory to deliver high performance processing.

The EXPC-1519 series offers flexible interface connectivity options to meet your application needs: standard connectors with cable glands, terminal block with cable glands, and standard connectors on the bottom panel.

Specifications

Computer

CPU: Intel® Core™ i7-3555LE 2.5 GHz or Intel® Celeron® 1047UE 1.4 GHz processor
OS: Windows Embedded Standard 7 32/64-bit, Windows 7 Professional 32/64-bit
System Chipset: Intel® QM77 Express Chipset (Intel® BD82QM77 PCH)
System Memory: 2 SO-DIMM slot, DDR3/DDR3L support, 4 GB pre-installed, maximum 16 GB capacity
Expansion Bus: 1 mini PCIe socket
BIOS: 64 Mbit SPI Flash
Graphics Controller: Intel® HD Graphics 4000
Touchscreen: Projected capacitive touch, 7H surface hardness, anti-reflection treatment, glove-friendly

Storage

HDD Support: 2.5-inch SATA, 7 or 9.5 mm in height, access externally
CFast: Push-push type, access externally

Display

Panel Size: 19-inch SXGA, 1000-nit LED backlit LCD
Aspect Ratio: 5:4
Response Time: 5 ms
Contrast Ratio: 1000:1
Viewing Angles:
- Horizontal: 170° (left to right)
- Vertical: 160° (up to down)
Resolution:
- VGA: 640 x 480
- SVGA: 800 x 600
- XGA: 1024 x 768
- SXGA: 1280 x 1024
Serial Communication Parameters
Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: RTS/CTS, XON/XOFF
Baudrate: 50 bps to 115.2 Kbps
Serial Signals
RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
RS-422: TxD+, TxD-, RxD+, RxD-, GND
RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
RS-485-2w: Data+, Data-, GND

Interface (EXPC-1519-C1-S1/EXPC-1519-C7-S1)
Connector type: On motherboard via cable glands
USB: USB 2.0 hosts x 3, type-A connectors
VGA: 15-pin D-Sub connector (DB15 female), with resolution up to 2048 x 1536 pixels with 32-bit color at 75 Hz
Serial Port: Auto-sensing 10/100/1000 Mbps ports (DB9 male) x 2, software-selectable
Ethernet: Auto-sensing 10/100/1000 Mbps ports (RJ45) x 2
Optical Fiber: Multimode 100M fiber optic ports x 2
AC: 100 to 240 VAC (3-pin terminal block)
DC: 24 VDC (2-pin terminal block)

Interface (EXPC-1519-C1-S2/EXPC-1519-C7-S2)
Connector type: On terminal block via cable glands
USB: USB 2.0 hosts x 4, terminal block
Serial Port: RS-232/422/485 ports (terminal block) x 2, software-selectable
Ethernet: Auto-sensing 10/100/1000 Mbps ports (terminal block) x 2
Optical Fiber: Multimode 100M fiber optic ports x 2
AC: 100 to 240 VAC (3-pin terminal block)
DC: 24 VDC (2-pin terminal block)

Interface (EXPC-1519-C1-S3/EXPC-1519-C7-S3)
Connector type: On bottom panel
USB: USB 2.0 hosts x 1, type-A connector
Ethernet: Auto-sensing 10/100/1000 Mbps port (RJ45) x 1
AC: 100 to 240 VAC (3-pin terminal block)
DC: 24 VDC (2-pin terminal block)

LEDs and Buttons
System LEDs: Power, Fiber1, Fiber2, LAN1, LAN2, Touch, Info, DAY, Dusk, Night
LAN LEDs: 100M/Link, 1000M/Link (on each RJ45 connector)
Buttons: Power, Brightness +/-, Fn, Touch, Info, Brightness mode

Physical Characteristics
Housing: Aluminum
Weight: 10.7 kg (23.78 lb)
Dimensions: 483 x 408 x 99.5 mm (19.02 x 16.06 x 3.92 in)
Mounting: VESA (100 x 100 mm), desktop, yoke, wall

Environmental Limits
Operating Temperature: -40 to 70°C (-40 to 158°F)
Storage Temperature: -40 to 70°C (-40 to 158°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)
Anti-vibration: 2 Grms, 5-500 Hz frequency, compliant with IEC 60068-2-6 standard
Anti-shock: 20 Grms, half sine wave under system operating, 11 ms duration, compliant with IEC 60068-2-27 standard

Power Requirements
Input Voltage: 100 to 240 VAC or 24 VDC (18 to 32 VDC, 2-pin terminal block)
Power Consumption: 100 to 240 VAC, 47 to 63 Hz, 1 A (less than 100 W) or 24 VDC, 6 A (less than 150 W)

Standards and Certifications
Safety: UL 60950-1, IEC 60950-1
Hazardous Environments: Class 1 Division 2
EMC: EN 55022/24
EMI: CISPR 22, FCC Part 15B Class A
EMS: IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV
IEC 61000-4-3 RS: 80 MHz to 1 GHz: 3 V/m
IEC 61000-4-4 EFT: Power: 1 kV; Signal: 0.5 kV
IEC 61000-4-5 Surge: AC Power: 2 kV; Signal: 1 kV;
DC Power: 1 kV; Signal: 1 kV
IEC 61000-4-6 CS: 3 V
IEC 61000-4-8, IEC 61000-4-11
Ingress Protection Rating: IP66 / NEMA 4X
Green Product: RoHS, cRoHS, WEEE

Warranty
Warranty Period: 3 years for computer system, 1 year for LCD panel
Details: See www.moxa.com/warranty

Dimensions
Unit: mm (inch)
483 (19.02)
99.5 (3.92)
### Appearance

**Front View**

[Image of the front view of the EXPC-1519 series with control buttons and LED indicators labeled.]

- Control Button x 7
- LED Indicator x 10

**Bottom View** (EXPC-1519-C1-S1-T, EXPC-1519-C7-S1-T, EXPC-1519-C1-S2-T, EXPC-1519-C7-S2-T)

- 2.5-inch SATA/CFast Slot
- Reserved for M20 Cable Gland X 8

**Bottom View** (EXPC-1519-C1-S3-T, EXPC-1519-C7-S3-T)

- Out-of-the-box view; connectors must be installed by the user
- Reserved for USB 2.0 Port
- 2.5-inch SATA/CFast Slot
- USB 3.0 Port
- AC Power Input
- DC Power Input
- Reserved for Ethernet Port
- Ethernet Port

**Rear View** (EXPC-1519-C1-S1-T, EXPC-1519-C7-S1-T)

- Optional Antenna Port (N type)
- Connector Panel
- AC Input
- Serial Port x 2
- Fiber Port x2
- Ethernet Port x 2
- Reserved for M20 Cable Glands

*Viewed at a 5-degree angle*
Ordering Information

Available Models

- **EXPC-1519-C1-S1-T**: Fanless, Zone 2 19-inch 1000-nit LCD panel computer, Intel® Celeron® Processor 1047UE 1.4 GHz, cable gland with standard I/O design, projected capacitive touch screen, IP66, -40 to 70°C operating temperature, 2.5-inch SSD tray and CFast slot

- **EXPC-1519-C1-S2-T**: Fanless, Zone 2 19-inch 1000-nit LCD panel computer, Intel® Celeron® Processor 1047UE 1.4 GHz, cable gland with terminal block I/O design, projected capacitive touch screen, IP66, -40 to 70°C operating temperature, 2.5-inch SSD tray and CFast slot

- **EXPC-1519-C1-S3-T**: Fanless, Zone 2 19-inch 1000-nit LCD panel computer, Intel® Celeron® Processor 1047UE 1.4 GHz, harsh environment I/O connector, projected capacitive touch screen, IP66, -40 to 70°C operating temperature, 2.5-inch SSD tray and CFast slot

- **EXPC-1519-C7-S1-T**: Fanless, Zone 2 19-inch 1000-nit LCD panel computer, Intel® Core™ i7-3555LE Processor 2.5 GHz, cable gland with standard I/O design, projected capacitive touch screen, IP66, -40 to 70°C operating temperature, 2.5-inch SSD tray and CFast slot

- **EXPC-1519-C7-S2-T**: Fanless, Zone 2 19-inch 1000-nit LCD panel computer, Intel® Core™ i7-3555LE Processor 2.5 GHz, cable gland with terminal block I/O design, projected capacitive touch screen, IP66, -40 to 70°C operating temperature, 2.5-inch SSD tray and CFast slot

- **EXPC-1519-C7-S3-T**: Fanless, Zone 2 19-inch 1000-nit LCD panel computer, Intel® Core™ i7-3555LE Processor 2.5 GHz, harsh environment I/O connector, projected capacitive touch screen, IP66, -40 to 70°C operating temperature, 2.5-inch SSD tray and CFast slot

**Package Checklist (EXPC-1519-C1-S1-T, EXPC-1519-C1-S2-T, EXPC-1519-C7-S1-T, EXPC-1519-C7-S2-T)**

- 1 EXPC-1519 panel computer
- HDD/SSD installation kit
- USB female connector installation kit
- RJ45 female connector installation kit
- DC power installation kit
- AC power installation kit
- Quick installation guide
- Documentation and software DVD
- Warranty card

**Package Checklist (EXPC-1519-C1-S3-T, EXPC-1519-C7-S3-T)**

- 1 EXPC-1519 panel computer
- SSD/HDD installation kit
- 1 2-pin terminal block for DC power input
- 1 3-pin terminal block for AC power input
- Quick installation guide
- Documentation and software DVD
- Warranty card
EXPC-1319 Series

Fanless rugged Zone 2 19-inch 1000-nit LCD panel computers with touch screen

Introduction

The EXPC-1319 panel computers are fanless, durable devices made for both indoor and outdoor hazardous environments. The EXPC-1319 series features the Intel Atom dual core D525 1.8 GHz processor, with up to 4 GB of memory available to deliver high performance processing. The EXPC-1319 is Zone 2 certified, and comes with two electrically isolated, software-selectable RS-232/422/485 serial ports alongside two gigabit LAN ports, providing reliable serial and high speed Ethernet LAN transmissions with full network redundancy.

Appearance

Front and Side Views

Rear and Bottom Views

- Zone 2 certified for hazardous area applications
- High performance / low power Intel dual core Atom D525 1.8 GHz CPU
- Anti-scratch 19-inch sunlight-viewable 1000-nit LCD panel
- Self-health diagnostics software package for remote predictive maintenance
- -40 to 60°C extended operation temperature (with built-in Intelligent Heater)
- Completely sealed IP66 / NEMA 4X panel computer
- Fanless, streamlined enclosure for highly-efficient heat dissipation
- Touch screen control button to enable/disable touch screen interface
- Optional WLAN, 100M Fiber optic connection

Award-winning Product

TAIWAN EXCELLENCE 2014

Oil & Gas Displays and Panel Computers

EXPC-1319 Series

Control Button x 5
LED Indicator x 6
SSD/CF Socket Cover
Power Input
(M12, 24 VDC)

Serial Port x 2
(D9 Male)

USB x 2
(Type A)

Fiber Port x 2
(Multimode 100M, FX models only)
LAN Port x 2
(Gigabit, RJ45)

VGA Output
Hardware Specifications

Computer
CPU: Intel Atom D525 dual core 1.8 GHz processor  
OS: Windows Embedded Standard 7  
System Chipset: Intel Pineview-D+ ICH8M  
BIOS: 16 Mbit Flash BIOS, SPI type with ACPI  
FSB: Intel GMA3150 integrated graphics controller  
Video Output: VGA output, waterproof DB-15 (female) connector  
System Memory: 4 GB capacity, 2 GB pre-installed: 2 slots of 2 GB DDR3-800  
Automatic Reboot Trigger: Built-in software-programmable watchdog timer for system resets, configurable from 1 to 255 second timeout intervals  
Expansion Bus: 1 PCI-104 slot, 1 mini PCIe socket  
USB: 2 USB 2.0 hosts, waterproof circular type-A connector  
KB/MS: PS/2 interface supports both keyboard and mouse via Y type cable, waterproof connector (optional)

Storage
Storage Expansion:  
- Onboard CompactFlash socket x 1  
- One extra onboard SATA interface, supporting configurable RAID 0/1  
Storage Support: Removable 32 GB industrial grade SSD (operating temperature: -40 to 85°C) to store OS; supports up to 256 GB

Display
Panel Size: 19-inch SXGA, 1000-nit LED backlit LCD  
Aspect Ratio: 5:4  
Response Time: 5 ms  
Contrast Ratio: 1000:1  
Viewing Angles:  
- Horizontal: 170° (left to right)  
- Vertical: 160° (up to down)  
Max Colors: 16.7 M colors  
Graphics Controller: Integrated Intel GMA3150 graphics controller  
Video Output: VGA output, waterproof DB15 (female) connector

Resolution:  
- VGA: 640 x 480  
- SVGA: 800 x 600  
- XGA: 1024 x 768  
- SXGA: 1280 x 1024

Touchscreen
EXPC-1319-STS: Resistive single point glass-film-glass  
Note: All EXPC-1319 touchscreens are scratch resistant and anti-glare, suitable for use outdoors around heavy equipment.

Ethernet Interface
Hardware Interface: Waterproof RJ45 connector  
LAN: 2 auto-sensing 10/100/1000 Mbps ports  
Optical Fiber Interface: 2 multimode 100M fiber-optic ports with waterproof Q-ODC connector (FX models only)  
WLAN: 1 802.11b/g/n interface (available on request)  
Magnetic Isolation Protection: 1.5 kV, built-in

Serial Interface
Serial Standards: 2 RS-232/422/485 ports, software-selectable  
Connector Type: Waterproof DB9 (male)  
Baudrate: Up to 38,400 bps  
Isolation Protection: 2 kV

Serial Communication Parameters
Data Bits: 5, 6, 7, 8  
Stop Bits: 1, 1.5, 2  
Parity: None, Even, Odd, Space, Mark  
Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485  
Baudrate: Up to 38,400 bps

Serial Signals
RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND  
RS-422: TxD+, TxD-, RxD+, RxD-, GND  
RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND  
RS-485-2w: Data+, Data-, GND

LEDs and Buttons
LEDs: Power on/off, heater on/off, storage, LAN port communication x 2, fiber communication  
Control Buttons: System on/off, brightness adjustment x 2, touchscreen on/off, programmable “Fn” button

Physical Characteristics
Housing: Aluminum  
Weight:  
- 10.7 kg (23.78 lb) (without Intelligent Heating Solution)  
- 11.9 kg (26.44 lb) (with Intelligent Heating Solution)  
Dimensions: 483 x 408 x 99 mm (19.02 x 16.06 x 3.90 in)  
Mounting: Yoke, panel, mounting holes for VESA 75/100-mounting
Environmental Limits

Operating Temperature:
- Without Intelligent Heating Solution: -20 to 60°C (-4 to 140°F)
- With Intelligent Heating Solution: -40 to 60°C (-40 to 140°F)

Storage Temperature: -40 to 80°C (-40 to 176°F)

Ambient Relative Humidity: 5 to 95% (non-condensing)

Anti-Vibration: 2 Grms, 5-500 Hz frequency, compliant with IEC 60068-2-6 standard

Anti-Shock: 20 g, half sine wave under system operating, 11 ms duration, compliant with IEC 60068-2-27 standard

Power Requirements

Input Voltage:
- Typical 24 VDC
- External 100 to 240 VAC isolated power supply unit (available on request)

Software Specifications

Windows Embedded Standard 7

Core OS:
- 32-bit support
- Remote Client
- Remote Procedure Call

Applications and Services Development:
- .Net Framework 3.5
- Remote Desktop Protocol 7.1
- COM OLE Application Support
- COM+ Application Support
- MSMQ

Internet Services:
- Internet Explorer 8.0
- IIS 7.0

Diagnostics:
- Common Diagnostic Tools
- Problem Reports and Solutions

Fonts: Chinese (Trad. and Simp.), Japanese, Korean, Western, Middle Eastern, South East Asian, and South Asian Fonts

Graphics and Multimedia:
- MPEG DTV-DVD Audio Decoder (MPEG-2, AAC)
- MPEG Layer-3 Audio Codecs (MP3)
- MPEG4 Decoders
- Windows Media Video VC-1 (WMV) Codecs
- DirectX and Windows Device Experience
- Windows Media Player 12

International:
- IME Simplified Chinese Support
- IME Traditional Chinese Support

Management:
- Group Policy Management
- Windows Management Instrument (WMI)
- Windows Update

Available Models

EXPC-1319-STS-W7E: Fanless rugged Zone 2 19-inch 1000-nit LCD panel computer, single point touchscreen, IP66, Atom D525 dual core 1.8 GHz CPU, -20 to 60°C operating temperature

EXPC-1319-STS-IHS-W7E: Fanless rugged Zone 2 19-inch 1000-nit LCD panel computer, single point touchscreen, IP66, Atom D525 dual core 1.8 GHz CPU, -40 to 60°C operating temperature, with Intelligent Heating Solution (IHS)

EXPC-1319-STS-FX-W7E: Fanless rugged Zone 2 19-inch 1000-nit LCD panel computer, single point touchscreen, IP66, optical fiber ports, Atom D525 dual core 1.8 GHz CPU, -20 to 60°C operating temperature

EXPC-1319-STS-IHS-FX-W7E: Fanless rugged Zone 2 19-inch 1000-nit LCD panel computer, single point touchscreen, IP66, optical fiber ports, Atom D525 dual core 1.8 GHz CPU, -40 to 60°C operating temperature, with Intelligent Heating Solution (IHS)

Networking:
- Extensible Authentication Protocol (EAP)
- Internet Authentication Service
- Telnet Server
- Bluetooth
- Domain Services
- Network Access Protection
- Network and Sharing Center
- Quality of Service
- Remote Access Service (RAS)
- Telephony API Client
- Windows Firewall
- Wireless Networking

Security:
- Credential Roaming Service
- Credentials and Certificate Management
- Windows Authorization Manager (AZMAN)
- Windows Security Center
- Active Directory Rights Management
- Security Base
- Encrypted File System (EFS)

Embedded Features:
- Enhanced Write Filter (EWF)
- File-Based Write Filter (FBWF)
- Message Box Default Reply
- Registry Filter
- WSDAPI for .NET

File Systems and Data Store:
- Windows Data Access Components
- Windows Backup and Restore

Embedded Self-Health Diagnostic Software:
- SNMP-based remote scripting layer for monitoring, reporting, and control

Ordering Information

Package Checklist
- 1 EXPC-1319 panel computer
- Ethernet cable: RJ45 to RJ45 cross-over cable, 100 cm
- Waterproof USB connector pack x 2
- Waterproof DB9 connector pack x 2
- Waterproof LAN connector pack x 2
- Water-resistant power connector pack x 1
- Wall-mounting kit
- Quick installation guide
- Documentation and software DVD
- Warranty card
## Product Selection Guide

### x86 Computers

<table>
<thead>
<tr>
<th>Series</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2403 Series</td>
<td>x86 embedded computer with Intel 3rd Gen Core-i CPU, HDMI, DVI, 2 LANs, 4 serial ports, 4 DI, 4 DO, 4 USB 2.0 ports, dual CFast slots, wireless enabled</td>
</tr>
<tr>
<td>V2201 Series</td>
<td>x86 embedded computer with Intel Atom E3800 CPU, HDMI, 2 LANs, 2 serial ports, 4 DI, 4 DO, 2 USB 2.0 and 1 USB 3.0 ports, mSATA, SD, wireless enabled</td>
</tr>
</tbody>
</table>

### RISC Computers

<table>
<thead>
<tr>
<th>Series</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC-8416/8418 Series</td>
<td>RISC ready-to-run embedded computers with 8 serial ports, 3 LANs, DIOs, 8 switch ports, 2 CAN ports, USB, CompactFlash</td>
</tr>
<tr>
<td>UC-7101/7110/7112 Series</td>
<td>RISC ready-to-run embedded computers with 1 or 2 serial ports, dual LANs, SD</td>
</tr>
<tr>
<td>UC-7122/7124 Series</td>
<td>RISC ready-to-run embedded computers with dual LANs, 2 or 4 serial ports, SD, USB</td>
</tr>
<tr>
<td>IA260 Series</td>
<td>RISC-embedded computers with 4 serial ports, dual LANs, VGA, DIOs, CompactFlash, USB</td>
</tr>
<tr>
<td>IA240 Series</td>
<td>RISC-embedded computers with 4 serial ports, 4 DI and 4 DO channels, dual LANs, PCMCIA, SD</td>
</tr>
</tbody>
</table>
## x86 Computers

### CPU

<table>
<thead>
<tr>
<th>CPU Model</th>
<th>Processor Type</th>
<th>Cache</th>
<th>Clock Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2403-C2 Series</td>
<td>Intel® Celeron 1047UE</td>
<td>2M</td>
<td>1.40 GHz</td>
</tr>
<tr>
<td>V2403-C3 Series</td>
<td>Intel® Core i3-3217UE</td>
<td>2M</td>
<td>1.60 GHz</td>
</tr>
<tr>
<td>V2403-C7 Series</td>
<td>Intel® Core i7-3517UE</td>
<td>4M</td>
<td>1.70 GHz</td>
</tr>
<tr>
<td>V2201-E1 Series</td>
<td>Intel® Atom™ Processor E3815</td>
<td>512K</td>
<td>1.46 GHz</td>
</tr>
<tr>
<td>V2201-E2 Series</td>
<td>Intel® Atom™ Processor E3826</td>
<td>1M</td>
<td>1.60 GHz</td>
</tr>
</tbody>
</table>

### OS

- Windows Embedded Standard 7 64-bit or Linux Debian 8 64-bit

### System Memory

- 1 DDR3-1600 SDRAM slot, 4 GB pre-installed, 8 GB max.
- 1 DDR3 SO-DIMM slot (2 GB pre-installed for Linux models, 4 GB pre-installed for Windows models, 8 GB max.)
- E3815 and E3826 support DDR3L-1066
- E3845 supports DDR3L-1333

### USB

- USB 2.0 hosts x 4, type A connectors
- USB 3.0 hosts x 1, USB 2.0 hosts x 2, type A connectors

### Storage

- 1 removable CFast socket for OS storage, 1 internal CFast socket for OS backup
- 1 internal mini-Pcie socket for storage expansion
- 1 internal SATA-II connector for 2.5" SSD/HDD

### Audio

- Line-in interface (audio jack)
- Line-out interface (together with HDMI)

### Expansion Slot

- 2 Mini-Pcie sockets
- 1 USB signal, for Sierra Wireless 3G/LTE module
- 1 USIM slot

### Display

- HDMI supports HDMI 1.4b, 1920 x 1200 resolution @ 60 Hz
- VGA up to 1920x1200 resolution @ 60 Hz
- VGA up to 2048x1536 resolution @ 75 Hz

### Ethernet Interface

- Auto-sensing 10/100/1000 Mbps ports (RJ45) x 2
- Auto-sensing 10/100/1000 Mbps ports (RJ45) x 2

### Isolation Protection

- 1.5 kV

### Power Requirements

- Input Voltage: 9 to 36 VDC (3-pin terminal block for V+, V-, 5G)
- Input Current: 1.39 A @ 24 VDC
- 31.59 W

### Warranty

- 3 years

### Standards and Certifications

- UL 60950-1, CSA C22.2 No. 60950-1-03 (60950-1-07), EN 60950-1-03
- EMF: CISPR 22, FCC Part 15B Class A
- EMI: IEC 61000-4-2: 5 Gms, 5 Hz to 500 Hz, 1 hr/axis w/ mSATA, CFast, SSD
- Ant-Shock: IEC 60668-2-27: 100 g/11ms x, y, z, 3 shocks each axis w/ mSATA, SD

### Other Peripherals

- Serial Interface
  - RS-232/422/485 x 2 (DB9 male)
  - 10-pin screw-fastened Euroblock terminal

### Physical Characteristics

- Weight: 2.247 kg (4.99 lb) or 2.168 kg (4.82 lb)
- Dimensions: 275 x 63 x 154 mm (10.83 x 2.47 x 6.06 in)
- Mounting: DIN-rail, wall

### Environmental Limits

- Operating Temperature: -40 to 70°C (-40 to 158°F)
- Storage Temperature: -40 to 85°C (-40 to 185°F)
- Ambient Relative Humidity: 5 to 95% (non-condensing)
- Anti-Vibration: IEC 60668-2-64: 5 Gms, 5 Hz to 500 Hz, 1 hr/axis w/ mSATA, CFast, SSD
- Anti-Shock: IEC 60688-2-27: 100 g/11ms x, y, z, 3 shocks each axis w/ mSATA, SD

### Product Information

- See www.moxa.com/warranty
## RISC Computers

<table>
<thead>
<tr>
<th>Series</th>
<th>UC-8416/8418 Series</th>
<th>UC-7101/7110/7112 Series</th>
<th>UC-7123/7124 Series</th>
<th>IA260 Series</th>
<th>IA240 Series</th>
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<tbody>
<tr>
<td><strong>Computer</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>CPU Speed</td>
<td>533 MHz</td>
<td>192 MHz</td>
<td>260 MHz</td>
<td>200 MHz</td>
<td>192 MHz</td>
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<tr>
<td>OS</td>
<td>Linux or Windows CE 6.0</td>
<td>Windows CE 6.0</td>
<td>Linux or Windows CE 6.0</td>
<td>Linux</td>
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<tr>
<td>Expansion Bus</td>
<td>PCI/104 onboard</td>
<td>PCI-104 (VGA or PS/2)</td>
<td>PCI-104 (VGA or PS/2)</td>
<td>PCI-104 (VGA</td>
<td>PCI-104 (VGA</td>
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<tr>
<td>USB</td>
<td>USB 2.0 ports x 2</td>
<td>USB 2.0 ports x 2</td>
<td>USB 2.0 ports x 2</td>
<td>USB 2.0 ports x 2</td>
<td>USB 2.0 ports x 2</td>
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<tr>
<td>DRAM</td>
<td>DDR2 SDRAM, 128 MB</td>
<td>DDR2 SDRAM, 32 MB</td>
<td>DDR2 SDRAM, 128 MB</td>
<td>DDR2 SDRAM, 64 MB</td>
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<tr>
<td>Flash</td>
<td>NOR Flash, 16 MB</td>
<td>NAND Flash, 32 MB</td>
<td>NOR Flash, 16 MB</td>
<td>NOR Flash, 16 MB</td>
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<td>SRAM</td>
<td>256 MB, battery backup</td>
<td>256 MB, battery backup</td>
<td>256 MB, battery backup</td>
<td>256 MB, battery backup</td>
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<tr>
<td><strong>Storage</strong></td>
<td>Storage Expansion</td>
<td>CompactFlash socket</td>
<td>SD slot</td>
<td>CompactFlash socket</td>
<td>SD slot</td>
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<tr>
<td><strong>Display</strong></td>
<td>Display Interface</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>Ethernet</strong></td>
<td>Ethernet Interface</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td><strong>LAN</strong></td>
<td>10/100 Mbps ports x 2 (RJ45)</td>
<td>10/100 Mbps ports x 2 (RJ45)</td>
<td>10/100 Mbps ports x 2 (RJ45)</td>
<td>10/100 Mbps ports x 2 (RJ45)</td>
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<tr>
<td><strong>Serial Interface</strong></td>
<td>Serial Standards</td>
<td>RS-232/422/485 x 8 (RS-422)</td>
<td>RS-232/422/485 x 2 (DB9 male)</td>
<td>RS-232/422/485 x 4 (DB9 male)</td>
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<tr>
<td><strong>Console Port</strong></td>
<td>RS-232 (TxD, RxD, GND), 4-pin header output (115200, 8, 1)</td>
<td>RS-232 (TxD, RxD, GND), 4-pin header output</td>
<td>RS-232 (TxD, RxD, GND), 4-pin header output</td>
<td>RS-232 (TxD, RxD, GND), 4-pin header output</td>
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<tr>
<td><strong>Digital Input</strong></td>
<td>Input Channels</td>
<td>UC-8416: DI x 4</td>
<td>DI x 8</td>
<td>DO x 4</td>
<td>DO x 4</td>
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<tr>
<td><strong>Connector Type</strong></td>
<td>10-pin screw-fastened terminal block (4 points, COM, GND)</td>
<td>10-pin screw-fastened terminal block (6 points, COM, DIO, GND)</td>
<td>9-pin screw-fastened terminal block (4 points, COM, GND)</td>
<td>9-pin screw-fastened terminal block (8 points, COM, DIO, GND)</td>
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<tr>
<td><strong>Physical Characteristics</strong></td>
<td>Weight</td>
<td>1 kg (2.2 lb)</td>
<td>1 kg (2.2 lb)</td>
<td>1 kg (2.2 lb)</td>
<td>430 g (0.96 lb)</td>
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<tr>
<td><strong>Dimensions</strong></td>
<td>Dimensions</td>
<td>200 x 170 x 78 mm (7.88 x 6.66 x 3.07 in)</td>
<td>77 x 21 x 200 mm (3.03 x 0.83 x 7.87 in)</td>
<td>52 x 112 x 162 mm (2.05 x 4.33 x 6.38 in)</td>
<td>60 x 137 x 100 mm (2.36 x 5.39 x 3.94 in)</td>
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<tr>
<td><strong>Environmental Limits</strong></td>
<td>Operating Temperature</td>
<td>-10°C to 55°C (-14°F to 131°F)</td>
<td>-10°C to 55°C (-14°F to 131°F)</td>
<td>-10°C to 55°C (-14°F to 131°F)</td>
<td>-10°C to 55°C (-14°F to 131°F)</td>
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<td><strong>Storage Temperature</strong></td>
<td>-20°C to 75°C (-4°F to 167°F)</td>
<td>-20°C to 75°C (-4°F to 167°F)</td>
<td>-20°C to 75°C (-4°F to 167°F)</td>
<td>-20°C to 75°C (-4°F to 167°F)</td>
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<tr>
<td><strong>Ambient Relative Humidity</strong></td>
<td>5 to 95% (non-condensing)</td>
<td>5 to 95% (non-condensing)</td>
<td>5 to 95% (non-condensing)</td>
<td>5 to 95% (non-condensing)</td>
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<tr>
<td><strong>Anti-Vibration</strong></td>
<td>2 g rms @ IEC-68-2-34, random wave, 5-500 Hz, 1 hr per axis</td>
<td>2 g rms @ IEC-68-2-34, random wave, 5-500 Hz, 1 hr per axis</td>
<td>2 g rms @ IEC-68-2-34, random wave, 5-500 Hz, 1 hr per axis</td>
<td>2 g rms @ IEC-68-2-34, random wave, 5-500 Hz, 1 hr per axis</td>
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</tr>
<tr>
<td><strong>Anti-Shock</strong></td>
<td>20 g @ IEC-68-2-27, half sine wave, 11 ms</td>
<td>20 g @ IEC-68-2-27, half sine wave, 11 ms</td>
<td>20 g @ IEC-68-2-27, half sine wave, 11 ms</td>
<td>20 g @ IEC-68-2-27, half sine wave, 11 ms</td>
<td></td>
</tr>
<tr>
<td><strong>Input Voltage</strong></td>
<td>12 to 48 VDC (3-pin terminal block)</td>
<td>12 to 48 VDC</td>
<td>12 to 48 VDC (3-pin terminal block)</td>
<td>12 to 48 VDC (3-pin terminal block)</td>
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<tr>
<td><strong>Input Current</strong></td>
<td>130 mA @ 48 VDC</td>
<td>130 mA @ 48 VDC</td>
<td>130 mA @ 48 VDC</td>
<td>130 mA @ 48 VDC</td>
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<tr>
<td><strong>Power Consumption</strong></td>
<td>15 W</td>
<td>4.5 W</td>
<td>15 W</td>
<td>4.5 W</td>
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<td><strong>Safety</strong></td>
<td>UL 60950-1, EN 60950-1, CCC (GB9254, GB17825.1)</td>
<td>UL 60950-1, EN 60950-1, CCC (GB9254, GB17825.1)</td>
<td>UL 60950-1, EN 60950-1, CCC (GB9254, GB17825.1)</td>
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<td><strong>EMC</strong></td>
<td>FCC Part 15 Subpart B Class A</td>
<td>FCC Part 15 Subpart B Class A</td>
<td>FCC Part 15 Subpart B Class A</td>
<td>FCC Part 15 Subpart B Class A</td>
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<td>5 years</td>
<td>5 years</td>
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<td><strong>Details</strong></td>
<td>See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a></td>
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</table>
V2403 Series

**Fanless, rugged, ready-to-go x86 Industrial IoT embedded computer**

- Intel Core-i series processor with three performance options
- -40 to 70°C (system+LTE) operating temperature
- Dual CFast sockets for storing OS and OS backup
- Triple mini-PCIe sockets for storage and wireless modules; supports mSATA, Wi-Fi, 3G, LTE, GPS, and Bluetooth
- Variety of interfaces: 4 serial ports, 2 Ethernet LAN ports, 4 DIs, 4 DOs, USB, HDMI, wireless
- EN 61000-6-2 and EN 61000-6-4 certification; meets EMC standard for heavy industry
- Up to 5 Grms anti-vibration and 100-g anti-shock
- Ready-to-run Debian 8 and Windows Embedded Standard 7 platforms
- Moxa Proactive Monitoring utility for system hardware health monitoring
- Moxa Smart Recovery utility to recover system from boot failure (W7E only)

### Applications:
- Remote Terminal Unit (RTU)
- Data acquisition
- M2M communication (smart gateway)
- Digital signage
- Factory automation
- In-vehicle monitor/data logger (transportation)
- Programmable router
- Energy usage optimization
- Predictive maintenance
- Asset management

### Overview

The Moxa V2403 series fanless x86 embedded computer is based on the Intel® 3rd gen Core-i™ series processor, features the most reliable I/O design to maximize connectivity, and supports dual wireless modules, making it suitable for a diverse range of communication applications. The computer’s thermal design ensures reliable system operation in temperatures ranging from -40 to 70°C (with a special purpose Moxa wireless module installed). The V2403 series supports “Moxa Proactive Monitoring” for device I/O status monitoring and alerts, system temperature monitoring and alerts, and system power management. Monitoring system status closely makes it easier to recover from errors and provides the most reliable platform for your applications.

### Appearance

**Front View**

- OS CFast Socket
- 1G/10/100/1000 Mbps Ethernet x 2 (RJ45)
- HDMI Output (Type A)
- Power Switch
- RS-232/422/485 Serial Port x 4 (DB9)
- Audio Line-in, Line-out (audio jack)
- GPS Antenna Connector (SMA)
- 3G/LTE Antenna Connector (SMA)
- RTC Battery Holder

**Rear View**

- Serial LEDs (Tx, Rx)
- Power Input (3-pin terminal block)
- DO x 4
- RS-232/422/485 Serial Port x 4 (DB9)
- USB 2.0 x 2 (Type A)
- LED (Power, Storage)
- 10/100/1000 Mbps Ethernet x 2 (RJ45)
- DVI-I Output
- HDMI Output (Type A)
- GPS Antenna Connector (SMA)
- Wi-Fi Antenna Connector (SMA)
- DO x 4
- Reset
**Compact/Fanless Computers**

**V2403 Series**

**Industrial Computing**

---

### Hardware Specifications

#### Computer

**CPU:**
- V2403-C2 Series: Intel® Celeron 1047UE (Dual Core, 2M Cache, 1.40 GHz)
- V2403-C3 Series: Intel® Core i3-3217UE (Dual Core, 3M Cache, 1.60 GHz)
- V2403-C7 Series: Intel® Core i7-3517UE (Dual Core, 4M Cache, 1.70 GHz)

**OS:** Windows Embedded Standard 7 64-bit or Linux Debian 8 64-bit

**System Memory:**
1 DDR3-1600 SDRAM slot, 8 GB max.

**USB:**
- USB 2.0 hosts x 4, type A connectors, supporting system boot up

**Storage**
- CFast: 1 removable CFast socket for OS storage, 1 internal CFast socket for OS backup
- mSATA: 1 internal mini-PCIe socket for storage expansion
- SSD/HDD: 1 internal SATA-II connector for 2.5" SSD/HDD

**Audio**
- Input: Line-in interface (audio jack)
- Output: Line-out interface (audio jack)

**Wireless Peripherals**
- Expansion Slot: 2 Mini-PCIe sockets
  - 1 USB signal, for Sierra Wireless 3G/LTE module
  - 1 USB + PCIe signal

**USIM**:
- 2 USIM slots

**Display**
- **Graphics Controller:** Intel® HD (integrated)
- **Connector Type:** 1 HDMI connector (type A), 1 DVI-I connector, 1 VGA connector (CV required)

**Display Interface:**
- HDMI supports HDMI 1.4b, 1920 x 1200 resolution @ 60 Hz
- DVI up to 1920x1200 resolution @ 60 Hz
- VGA up to 1920x1200 resolution @ 60 Hz
- VGA up to 2048x1536 resolution @ 75 Hz

**Ethernet Interface**
- LAN: Auto-sensing 10/100/1000 Mbps ports (RJ45) x 2

**Isolation Protection:**
- 1.5 kV

**Wireless SMA Interface**
- **WiFi:** 2 SMA connectors
- **3G/LTE:** 2 SMA connectors
- **GPS:** 1 SMA connector

**Serial Interface**
- **Serial Standards:** RS-232/422/485 software selectable ports (DB9 male) x 4

**Serial Communication Parameters**
- **Data Bits:** 5, 6, 7, 8
- **Stop Bits:** 1, 1.5, 2
- **Parity:** None, Even, Odd, Space, Mark
- **Flow Control:** RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485

**Baudrate:** 50 bps to 921.6 kbps

**RS-232:**
- TxD+, RxD+, DTR, DSR, RTS, CTS, DCD, GND
- **RS-422:**
- TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-4w:**
- TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-2w:**
- Data+, Data-, GND

**Digital Input**
- **Input Channels:** DI x 4
- **Input Voltage:** 0 to 30 VDC at 25 Hz
- **Digital Input Levels for Dry Contacts:**
  - Logic level 0: Close to GND
  - Logic level 1: Open

**Digital Input Levels for Wet Contacts:**
- Logic level 1: +3 V max
- Logic level 0: +10 V to +30 V (Source to DI)

**Connector Type:** 10-pin screw-fastened Euroblock terminal

**Isolation:** 3 kV optical isolation

**Digital Output**
- **Output Channels:** DO x 4, sink type
- **Output Current:** Max. 200 mA per channel

**On-State Voltage:** 24 VDC nominal, open collector to 30 VDC

**Connector Type:** 10-pin screw-fastened Euroblock terminal

**Isolation:** 3 kV optical isolation

**LEDs**
- **System:** Power
- **Storage:** CFast/SSD/HDD/mSATA
- **LAN:** 2 LEDs per port (10/100/1000 Mbps)
- **Serial:** 2 LEDs per port (Tx and Rx)

**Switches and Buttons**
- **Power Switch:** on/off
- **Reset Button:** System reset

**Physical Characteristics**
- **Housing:** Aluminum
- **Weight:**
  - “W” Models: 2.247 kg (4.99 lb)
  - non “W” Models: 2.168 kg (4.82 lb)
- **Dimensions:**
  - Without ears: 250 x 57 x 154 mm (9.84 x 2.23 x 6.06 in)
  - With ears: 275 x 63 x 154 mm (10.83 x 2.47 x 6.06 in)
- **Mounting:** DIN rail, wall

**Environmental Limits**
- **Operating Temperature:** Standard models: -40 to 70°C (-40 to 158°F), with Moxa recommended wireless modules (3G/LTE + Wi-Fi) installed
- **Storage Temperature:** -40 to 85°C (-40 to 185°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-Vibration:** IEC 61000-4-2: 5 Grms, 5 Hz to 500 Hz, 1 hr/axis w/ mSATA, CFast, SSD
- **Anti-Shock:** IEC 61000-4-3: 50 g/11ms ±X, ±Y, ±Z, 3 shocks each axis w/ mSATA, CFast, SSD

**Power Requirements**
- **Input Voltage:** 9 to 36 VDC (3-pin terminal block for V+, V-, SG)
- **Input Current:**
  - 3.51 A @ 9 VDC
  - 1.39 A @ 24 VDC
  - 0.93 A @ 36 VDC
- **Power Consumption:** 34 W

**Standards and Certifications**
- **Safety:** UL 60950-1, CSA C22.2 No. 60950-1-03 (60950-1-07), EN 60950-1, UL 508
- **EMC:** EN 55022/24, EN 61000-6-2/6-4
- **EMI:** CISPR 22, FCC Part 15B Class A
- **EMS:**
  - IEC 61000-4-2 ESD: Contact: 4 kV, Air: 8 kV
  - IEC 61000-4-3 RS: 80 MHz to 1 GHz: 10 V/m
  - IEC 61000-4-4 EFT: Power: 2 kV, Signal: 1 kV
  - IEC 61000-4-5 Surge: Power: 2 kV, Signal: 1 kV
  - IEC 61000-4-6 CS: Signal: 1 kV
  - IEC 61000-4-8
- **Green Product:** RoHS, CrRoHS, WEEE

**Reliability**
- **Automatic Reboot Trigger:** Software-programmable watchdog timer configurable from 1 to 255 seconds
MTBF (mean time between failures)
Time:
V2403-C2-W-T/V2403-C3-W-T/V2403-C7-W-T: 335,810 hrs
V2403-C2-T/V2403-C3-T/V2403-C7-T: 358,958 hrs
V2403-C2-T-W7E/V2403-C2-T-LX: 329,398 hrs
Standard: Telcordia (Bellcore) Standard TR/SR

Warranty
Warranty Period: 3 years
Details: See www.moxa.com/warranty
Note: These hardware specifications describe the embedded computer unit itself, but not its official accessories. In particular, the wide temperature specification does not apply to accessories such as power adapters and cables.

Windows Embedded Standard 7
Core OS:
• 64-bit support
• Remote Client
• Remote Procedure Call
Applications and Services Development:
• Remote Desktop Protocol 7.1
• COM OLE Application Support
• COM + Application Support
• MSMQ
Internet Services:
• Internet Explorer 8.0
• IIS 7.0
Diagnostics:
• Common Diagnostic Tools
• Problem Reports and Solutions
Fonts:
Western, Middle Eastern, South East Asian, and South Asian
Graphics and Multimedia:
• MPEG Layer-3 Audio Codes (MP3)
• MPEG4 Decoders
• DirectX and Windows Device Experience
Management:
• Group Policy Management
• Windows Management Instrument (WMI)
• Windows Update
Networking:
• Extensible Authentication Protocol (EAP)
• Internet Authentication Service
• Telnet Server
• Bluetooth
• Domain Services
• Network Access Protection
• Network and Sharing Center
• Quality of Service
• Remote Access Service (RAS)
• Telephony API Client
• Windows Firewall
• Wireless Networking
Security:
• Credential Roaming Service
• Credentials and Certificate Management
• Windows Authorization Manager (AZMAN)
• Windows Security Center
• Active Directory Rights Management
• Security Base
• Encrypted File System (EFS)
Embedded Features:
• Enhanced Write Filter (EWF)
• File-Based Write Filter (FBWF)
• Registry Filter
• WSDAPI for .NET
File Systems and Data Store:
• Windows Data Access Components
• Windows Backup and Restore
Maintenance: Moxa Proactive Monitoring and Moxa Smart Recovery

Software Specifications
Linux
OS: Linux Debian 8 64-bit
Web Server (Apache): Allows you to create and manage web sites; supports PHP and XML
Terminal Server (SSH): Provides secure encrypted communications between two unsecure hosts over an unsecure network
Kernel Version: GNU/Linux 3.16
System Shell: DASH (default), BASH
Text Editor: vim
File System: ext4
Internet Protocol Suite: TCP, UDP, IPv4, SNMPv2, ICMP, ARP, HTTP, ICMP, ARP, DHCP, NTP, NFS, SSH, SFTP, RSYNC, SSL
Internet Security Suite: OpenVPN, IPTables Firewall
Cellular Networking: QMI (Qualcomm MSM Interface): Glib-based library for talking to WWAN modems and devices that speak the Qualcomm MSM Interface (QMI) protocol.
Watchdog: A watchdog timer that triggers a system reset upon software freezes, for both specific applications and system-wide failures.
Application Development Software:
• Moxa API Library
• GNU C library
• Perl
Embedded Self-Health Maintenance Software: Moxa Proactive Monitoring
Security Update of Existing Software Packages: All software packages installed on the V2403 can be automatically updated using Debian Linux’s Advanced Packaging Tool (APT) server or Moxa’s server.
### Dimensions

Unit: mm (inch)

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<tr>
<th>Field</th>
<th>Value</th>
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<tbody>
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<td>Width</td>
<td>250 (9.84)</td>
</tr>
<tr>
<td>Height</td>
<td>104.7 (4.11)</td>
</tr>
<tr>
<td>Depth</td>
<td>76.9 (3.03)</td>
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#### Ordering Information

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<tbody>
<tr>
<td>V2403-C2-T-LX</td>
<td>1047UE</td>
<td>1047UE</td>
<td>8 GB</td>
<td>Debian 8</td>
<td>–</td>
<td>–</td>
<td>1 1 2 4</td>
<td>–</td>
<td>–</td>
<td>-40 to 70°C</td>
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<tr>
<td>V2403-C2-T-W7E</td>
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<td>1047UE</td>
<td>4 GB</td>
<td>W7E</td>
<td>–</td>
<td>–</td>
<td>1 1 2 4</td>
<td>–</td>
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#### Pre-Configured Models

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<td>1 1 2 4</td>
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<td>-40 to 70°C</td>
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<tr>
<td>V2403-C2-T-W7E</td>
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<td>1047UE</td>
<td>4 GB</td>
<td>W7E</td>
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<td>1 1 2 4</td>
<td>–</td>
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<td>-40 to 70°C</td>
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#### CTO Models, Default (optional)

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<td>Debian 8</td>
<td>–</td>
<td>–</td>
<td>1 1 2 4</td>
<td>–</td>
<td>–</td>
<td>-40 to 70°C</td>
</tr>
<tr>
<td>V2403-C2-T-W7E</td>
<td>1047UE</td>
<td>1047UE</td>
<td>8 GB</td>
<td>W7E</td>
<td>–</td>
<td>–</td>
<td>1 1 2 4</td>
<td>–</td>
<td>–</td>
<td>-40 to 70°C</td>
</tr>
</tbody>
</table>

---

**Note:** Refer to the Component Compatibility Guide (CCG) for the list of components that Moxa has validated to be compatible with this product. You can download the CCG from the Moxa product website. For components with a Moxa P/N, you can order the components together with your product from Moxa and we will install the selected components in your product. Moxa guarantees the compatibility of the components installed in CTO products.

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**CTO = Configured To Order**

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**Package Checklist**

- V2403 embedded computer
- Terminal block to power jack converter
- Wall-mounting kit
- Documentation and software CD or DVD
- Quick installation guide (printed)
- Warranty card
# V2201 Series

**Fanless, ultra-compact, rugged x86 IIoT embedded computer**

- Intel Atom E3800 series processor with three performance options
- -40 to 85°C system operating temperature (-40 to 70°C with LTE module installed)
- Dual mini-PCIe sockets for wireless modules, supports Wi-Fi, 3G, LTE, GPS, and Bluetooth
- Variety of interfaces: 2 serial ports, 2 Ethernet LAN port, 4 DI, 4 DO, SD, USB, HDMI, wireless
- EN 61000-6-2 and EN 61000-6-4 certification*; meets EMC standard for heavy industry
- Up to 5 Grms anti-vibration and 100-g anti-shock
- Ready-to-run Debian 8 and Windows Embedded Standard 7 platforms
- Moxa Proactive Monitoring utility for system hardware health monitoring
- Moxa Smart Recovery utility to recover system from boot failure (W7E only)

*Passed with AC/DC adapter.

## Overview

The Moxa V2201 series ultra-compact x86 embedded computer is based on the Intel® Atom™ E3800 series processor, features the most reliable I/O design to maximize connectivity, and supports dual wireless modules, making it suitable for a diverse range of communication applications. The computer’s thermal design ensures reliable system operation in temperatures ranging from -40 to 85°C (-40 to 70°C with a special purpose Moxa wireless module installed). The V2201 series supports “Moxa Hardware Monitoring” for device I/O status monitoring and alerts, system temperature monitoring and alerts, and system power management. Monitoring system status closely makes it easier to recover from errors and provides the most reliable platform for your applications.

## Applications:
- Remote Terminal Unit (RTU)
- Data acquisition
- M2M communication (smart gateway)
- Digital signage
- Factory automation
- In-vehicle monitor/data logger (transportation)
- Programmable router
- Energy usage optimization
- Predictive maintenance
- Asset management

## Appearance

<table>
<thead>
<tr>
<th>Front View</th>
<th>Left Side View</th>
<th>Right Side View</th>
</tr>
</thead>
<tbody>
<tr>
<td>3G/LTE Antenna Connector (SMA)</td>
<td>Power Input (3-pin terminal block)</td>
<td>Up: SDHC/SDXC Slot</td>
</tr>
<tr>
<td>Wi-Fi Antenna Connector (SMA)</td>
<td>Power Button</td>
<td>Down: USIM Card Slot</td>
</tr>
<tr>
<td>HDMI (Type A)</td>
<td>DI x 4</td>
<td>USB 3.0 Hosts x 1</td>
</tr>
<tr>
<td>LED Indicators x 10</td>
<td>Grounding Screw (M4)</td>
<td>Up: SDHC/SDXC Slot</td>
</tr>
<tr>
<td>USB Hosts x 2 (Type A)</td>
<td>Power Button</td>
<td>Down: USIM Card Slot</td>
</tr>
<tr>
<td>10/100/1000 Mbps LAN Ports x 2 (RJ45)</td>
<td>Power Button</td>
<td>(Type A)</td>
</tr>
<tr>
<td>Serial Ports x 2 (DB9)</td>
<td>Power Button</td>
<td>USB 3.0 Hosts x 1</td>
</tr>
<tr>
<td>3G/LTE Antenna Connector (SMA)</td>
<td>Grounding Screw (M4)</td>
<td>Down: USIM Card Slot</td>
</tr>
</tbody>
</table>
### Hardware Specifications

#### Computer
- **CPU:**
  - V2201-E1 Series: Intel® Atom™ Processor E3815 (Single Core, 512K Cache, 1.46 GHz)
  - V2201-E2 Series: Intel® Atom™ Processor E3826 (Dual Core, 1M Cache, 1.46 GHz)
  - V2201-E4 Series: Intel® Atom™ Processor E3845 (Quad Core, 1M Cache, 1.91 GHz)
- **OS:** Windows Embedded Standard 7 64-bit or Linux Debian 8 64-bit
- **System Memory:**
  - E3815 and E3826 support DDR3L-1066
  - E3845 supports DDR3L-1333
- **USB:** 1 bootable USB 3.0 port, 2 bootable USB 2.0 ports (type A)
- **Storage**
  - mSATA: 1 internal mini-PCIe socket for OS storage
  - SD: 1 SD 3.0 (SDHC/SDXC) socket for storage expansion*

*W7E only supports SD 2.0

#### Audio
- **Output:** Line-out interface (together with HDMI)

#### Other Peripherals
- **Expansion Slot:** 2 Mini-PCIe sockets
  - 1 USB signal, for Sierra Wireless 3G/LTE module
  - 1 USB + PCIe signal
- **USIM:** 1 USIM slot

#### Display
- **Graphics Controller:** Intel® HD (integrated)
- **Connector Type:** 1 HDMI connector (type A)
- **Display Interface:** Supports HDMI 1.4a, 1920 x 1080 pixels @ 60/24 Hz

#### Ethernet Interface
- **LAN:** Auto-sensing 10/100/1000 Mbps ports (RJ45) x 2
- **Isolation Protection:** 1.5 kV

#### Wireless SMA Interface
- **Wi-Fi:** 2 SMA connectors
- **3G/LTE:** 2 SMA connectors
- **GPS:** 1 SMA connector

#### Serial Interface
- **Serial Standards:** RS-232/422/485 software selectable ports (DB9 male) x 2

#### Serial Communication Parameters
- **Data Bits:** 5, 6, 7, 8
- **Stop Bits:** 1, 1.5, 2
- **Parity:** None, Even, Odd, Space, Mark
- **Flow Control:** RTS/CTS, XON/XOFF
- **Baudrate:** 50 bps to 115.2 kbps

#### Serial Signals
- **RS-232:** TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
- **RS-422:** TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-2w:** TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-4w:** TxD+, TxD-, RxD+, RxD-, GND

#### Digital Input
- **Input Channels:** DI x 4
- **Input Voltage:** 0 to 30 VDC at 25 Hz
- **Digital Input Levels for Dry Contacts:**
  - Logic level 0: Close to GND
  - Logic level 1: Open
- **Digital Input Levels for Wet Contacts:**
  - Logic level 1: 3 V max.
  - Logic level 0: +10 V to +30 V (Source to DI)
- **Connector Type:** 10-pin screw-fastened Euroblock terminal
- **Isolation:** 3 kV optical isolation

#### Digital Output
- **Output Channels:** DO x 4, sink type
- **Output Current:** Max. 200 mA per channel
- **On-State Voltage:** 24 VDC nominal, open collector to 30 VDC
- **Connector Type:** 10-pin screw-fastened Euroblock terminal
- **Isolation:** 3 kV optical isolation

#### LEDs
- **System:** Power, user-defined
- **Storage:** mSATA, SD
- **LAN:** 2 LEDs per port (100/1000 Mbps)
- **Serial:** 2 LEDs per port (Tx and Rx)
- **Wireless:** Mini-PCIe 1, Mini-PCIe 2

#### Switches and Buttons
- **Power Switch:** on/off (left-side panel)
- **Reset Button:** For warm reboot (left-side panel)

#### Physical Characteristics
- **Housing:** Aluminum
- **Weight:** 940 g (2.09 lb)
- **Dimensions:**
  - Without ears: 150 x 52.5 x 120.2 mm (5.91 x 2.07 x 4.73 in)
  - With ears: 178 x 52.5 x 120.2 mm (7.01 x 2.07 x 4.73 in)
- **Mounting:** DIN rail, wall

#### Environmental Limits
- **Operating Temperature:**
  - E1/E2 models: -40 to 85°C (-40 to 185°F)
  - E4 models: -40 to 70°C (-40 to 158°F)
  - E1-W/E2-W/E4-W models with Moxa recommended wireless modules (3G/LTE + Wi-Fi) installed: -40 to 70°C (-40 to 158°F)
  - Storage Temperature: -40 to 85°C (-40 to 158°F)
  - **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-Vibration:** IEC 60068-2-64: 5 Grms, 5 Hz to 500 Hz, 1 hr/axis w/ mSATA, SD
- **Anti-Shock:** IEC 60068-2-27: 100 g/11 ms ±X, ±Y, ±Z, 3 shocks each axis w/ mSATA, SD
- **Power Consumption:** 18 W

#### Power Requirements
- **Input Voltage:** 9 to 36 VDC (3-pin terminal block for V+, V-, SG)
- **Input Current:** 2 A @ 9 VDC

#### Standards and Certifications
- **Safety:**
  - UL 60950-1, CSA C22.2 No. 60950-1-03 (60950-1-07), EN 60950-1-1, UL 508
  - EMC: EN 55022/24, EN 61000-6-2/6-4*
  - *Passed with AC/DC adapter.
  - EMI: CISPR 22, FCC Part 15B Class A
- **Environmental:**
  - IEC 61800-4-2: Contact: 6 kV; Air: 8 kV
  - IEC 61800-4-3: RS: 80 MHz to 1 GHz: 20 V/m
  - IEC 61800-4-4: EFT: Power: 2 kV; Signal: 2 kV
  - IEC 61800-4-5: Surge: Power: 2 kV; Signal: 1 kV
  - IEC 61000-4-6: CS: 10 V
  - IEC 61000-4-8

#### Green Product
- RoHS, CRoHS, WEEE

#### Reliability
- **Automatic Reboot Trigger:** Software-programmable watchdog timer configurable from 1 to 255 seconds
- **MTBF** (mean time between failures): 408,275 hrs
- **Standard:** Telcordia (Bellcore) Standard TR/SR

#### Warranty
- **Warranty Period:** 3 years
- **Details:** See www.moxa.com/warranty

*Note: These hardware specifications describe the embedded computer unit itself, but not its official accessories. In particular, the wide temperature specification does not apply to accessories such as power adapters and cables.*
**Software Specifications**

**Linux**
- **OS:** Linux Debian 8 64-bit
- **Terminal Server (SSH):** Provides secure encrypted communications between two untrusted hosts over an unsecure network
- **File System:** EXT2, EXT3, EXT4
- **Internet Protocol Suite:** TCP, UDP, IPv4, IPv6, SNMPv2, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SSH, PPP, SFTP, RSYNC, SSL
- **Internet Security:** OpenVPN, IPTables
- **Secure Shell for Remote Access:** SSH allows remote logins to a secure encrypted console from any connected network
- **Watchdog:** Features a hardware function to trigger system reset in a user specified time interval (Linux standard API)
- **Embedded Self-Health Maintenance Software:** Moxa Proactive Monitoring

**Windows Embedded Standard 7**
- **Core OS:**
  - 64-bit support
  - Remote Client
  - Remote Procedure Call
- **Applications and Services Development:**
  - Remote Desktop Protocol 7.1
  - COM OLE Application Support
  - COM+ Application Support
  - MSMQ
- **Internet Services:**
  - Internet Explorer 8.0
  - IIS 7.0
- **Diagnostics:**
  - Common Diagnostic Tools
  - Problem Reports and Solutions
- **Fonts:** Western, Middle Eastern, South East Asian, and South Asian
- **Graphics and Multimedia:**
  - MPEG Layer-3 Audio Codecs (MP3)
  - MPEG4 Decoders
  - DirectX and Windows Device Experience
- **Management:**
  - Group Policy Management
  - Windows Management Instrument (WMI)
  - Windows Update
- **Networking:**
  - Extensible Authentication Protocol (EAP)
  - Internet Authentication Service
  - Telnet Server
  - Bluetooth
  - Domain Services
  - Network Access Protection
  - Network and Sharing Center
  - Quality of Service
  - Remote Access Service (RAS)
  - Telephony API Client
  - Windows Firewall
  - Wireless Networking
- **Security:**
  - Credential Roaming Service
  - Credentials and Certificate Management
  - Windows Authorization Manager (AZMAN)
  - Windows Security Center
  - Active Directory Rights Management
  - Security Base
  - Encrypted File System (EFS)
- **Embedded Features:**
  - Enhanced Write Filter (EWF)
  - File-Based Write Filter (FBWF)
  - Registry Filter
  - WSDAPI for .NET
- **File Systems and Data Store:**
  - Windows Data Access Components
  - Windows Backup and Restore
- **Maintenance:** Moxa Proactive Monitoring and Moxa Smart Recovery
## Dimensions

<table>
<thead>
<tr>
<th>Unit: mm (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H: 150 (5.91)</td>
</tr>
<tr>
<td>W: 9.1 (0.36)</td>
</tr>
<tr>
<td>D: 178 (7.01)</td>
</tr>
</tbody>
</table>

### Ordering Information

#### Pre-Configured Models

<table>
<thead>
<tr>
<th>Model Name</th>
<th>CPU</th>
<th>RAM</th>
<th>mSATA</th>
<th>OS</th>
<th>SD</th>
<th>HDMI</th>
<th>LAN</th>
<th>Serial</th>
<th>USB 3.0/2.0</th>
<th>USIM Slot</th>
<th>LTE Expansion Socket</th>
<th>Wireless Connector</th>
<th>LTE Operating Temp.</th>
<th>Operating Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2201-E1-T-LX</td>
<td>E3815</td>
<td>2 GB</td>
<td>8 GB</td>
<td>Debian 8</td>
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<td>1/2</td>
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<td>2</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>V2201-E1-T-W7E</td>
<td>E3815</td>
<td>4 GB</td>
<td>8 GB</td>
<td>W7E</td>
<td>–</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>4/4</td>
<td>1/2</td>
<td>1</td>
<td>2</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

#### CTO Models

<table>
<thead>
<tr>
<th>Model Name</th>
<th>CPU</th>
<th>RAM</th>
<th>mSATA</th>
<th>OS</th>
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<th>HDMI</th>
<th>LAN</th>
<th>Serial</th>
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<th>USIM Slot</th>
<th>LTE Expansion Socket</th>
<th>Wireless Connector</th>
<th>LTE Operating Temp.</th>
<th>Operating Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td>V2201-E1-T</td>
<td>E3815</td>
<td>Default 4 GB (2 or 8 GB optional)</td>
<td>Default 8 GB (16 or 32 GB optional)</td>
<td>N/A (Debian 8 or W7E optional)</td>
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<td>2</td>
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<td>4/4</td>
<td>1/2</td>
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<td>2</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>V2201-E2-T</td>
<td>E3826</td>
<td>Default 8 GB (16 or 32 GB optional)</td>
<td>N/A</td>
<td>N/A (Debian 8 or W7E optional)</td>
<td>Default</td>
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<td>2</td>
<td>2</td>
<td>4/4</td>
<td>1/2</td>
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<td>2</td>
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</tr>
<tr>
<td>V2201-E4-T</td>
<td>E3845</td>
<td>Default 16 GB (32 GB optional)</td>
<td>N/A</td>
<td>N/A (Debian 8 or W7E optional)</td>
<td>Default</td>
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<td>2</td>
<td>2</td>
<td>4/4</td>
<td>1/2</td>
<td>1</td>
<td>2</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>V2201-E1-W-T</td>
<td>E3815</td>
<td>Default 4 GB (2 or 8 GB optional)</td>
<td>Default 8 GB (16 or 32 GB optional)</td>
<td>N/A (Debian 8 or W7E optional)</td>
<td>Default</td>
<td>1</td>
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<td>4/4</td>
<td>1/2</td>
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<td>2</td>
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<td>V2201-E2-W-T</td>
<td>E3826</td>
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<td>N/A (Debian 8 or W7E optional)</td>
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<td>1/2</td>
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<tr>
<td>V2201-E4-W-T</td>
<td>E3845</td>
<td>Default 16 GB (32 GB optional)</td>
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<td>N/A (Debian 8 or W7E optional)</td>
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<td>1</td>
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<td>4/4</td>
<td>1/2</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

*CTO = Configured To Order

Note:

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### Package Checklist

- V2201 embedded computer
- Terminal block to power jack converter
- Wall-mounting kit
- Documentation and software CD or DVD
- Quick installation guide (printed)
- Warranty card
**UC-8416/8418 Series**

**RISC ready-to-run embedded computers with 8 serial ports, 3 LANs, DIOs, 8 switch ports, 2 CAN ports, USB, CompactFlash**

- Intel XScale IXP435 533 MHz processor
- 8 RS-232/422/485 serial ports
- 2 CAN-bus ports (UC-8418)
- 8 unmanaged-switch ports (UC-8416)
- 12 digital input and 12 digital output channels (UC-8418)
- 3 10/100 Mbps Ethernet ports
- 2 USB 2.0 hosts for mass storage devices
- Supports IPv6 function (Linux model only)
- DIN-rail or wall-mounting installation
- Robust, fanless design
- -40 to 75°C wide temperature model available
- Ready-to-run Embedded Linux or Windows CE 6.0

---

**Overview**

The UC-8416/8418 series embedded computers come with 8 RS-232/422/485 serial ports, 3 Ethernet ports, 2 CAN ports, 8 Ethernet ports, 12 digital input channels, 12 digital output channels, a CompactFlash socket, and 2 USB 2.0 hosts.

The computers use the Intel XScale IXP435 533 MHz RISC CPU. This powerful computing engine supports several useful communication functions, but will not generate too much heat. The built-in 16 MB NOR Flash ROM and 256 MB SDRAM give you enough memory to run your application software directly on the UC-8418, and the 32 MB NAND Flash can be used to provide additional data storage. Moreover, the 256 KB SRAM offers a better data retention mechanism for avoiding data loss. These computers come with various communication interfaces, such as serial ports, Ethernet ports, CAN ports, and digital input/output channels, making them ideal as a communication platform for industrial applications that require network and device communications.

The UC-8416/8418 Series comes with the Linux 2.6 or Windows CE 6.0 platform pre-installed to provide an open software operating system for software program development. Software written for a desktop PC can be easily ported to the UC-8416/8418 Series platform by using a common compiler, without needing to modify the code. making these computers an optimal solution for use with industrial applications, but with minimal cost and effort.

In addition to the standard model, a -40 to 75°C wide temperature model is also available for harsh industrial environments.

---

**Appearance**

**Front View**

- Reset Button
- USB 2.0 Host x 2
- Serial Port x 8, RJ45 (RS-232/422/485)
- 10/100 Mbps Ethernet Switch Port x 8
- 10/100 Mbps Ethernet Port x 8
- DI Channel x 4
- Power Input 12 to 48 VDC

**Rear View**

- 10/100 Mbps Ethernet Port x 3
- DO Channel x 4
- Power Input 12 to 48 VDC
- LED Indicators (Power, SRAM Battery, Ready, Storage)
**Hardware Specifications**

### Computer
- **CPU:** Intel XScale IXP435, 533 MHz
- **Expansion Bus:** PCI/104 onboard
- **USB:** USB 2.0 hosts x 2, type A connectors
- **DRAM:** DDR2 SDRAM, 256 MB (512 MB max.)
- **Flash:**
  - NOR Flash, 16 MB to store OS (32 MB max. on CV request)
  - NAND Flash, 32 MB to store data
- **OS (pre-installed):** Linux
- **SRAM:** 256 KB, battery backup

### Ethernet Interface
- **LAN:** Auto-sensing 10/100 Mbps ports (RJ45) x 3
  - Switch Port: 10/100 Mbps unmanaged-switch ports (RJ45) x 8 (UC-8416)
- **Magnetic Isolation Protection:** 1.5 kV, built-in

### Serial Interface
- **Serial Standards:** RS-232/422/485 software-selectable ports (8-pin RJ45) x 8
- **Console Port:** RS-232 (TxD, RxD, GND), 4-pin header output (115200, n, 8, 1)

### Serial Communication Parameters
- **Data Bits:** 5, 6, 7, 8
- **Stop Bits:** 1, 1.5, 2
- **Parity:** None, Even, Odd, Space, Mark
- **Flow Control:** RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
- **Baudrate:** 50 bps to 921.6 kbps (supports nonstandard baudrates; see user’s manual for details)

### Serial Signals
- **RS-232:** TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
- **RS-422:** TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-4w:** TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-2w:** Data+, Data-, GND

### Digital Input
- **Input Channels:**
  - UC-8416: DI x 4
  - UC-8418: DI x 12
- **Input Voltage:** 0 to 30 VDC
- **Input Levels for Dry Contacts:**
  - Logic level 0: Close to GND
  - Logic level 1: Open
- **Input Levels for Wet Contacts:**
  - Logic level 0: -3 V max.
  - Logic level 1: -10 V to +30 V (COM to DI)
- **Connector Type:** 10-pin screw-fastened terminal block (4 points, COM, GND)
- **Isolation:** 3 kV optical isolation

### Digital Output
- **Output Channels:** UC-8416: DO x 4, sink type
  - UC-8418: DO x 12, sink type
- **Output Current:** Max. 200 mA per channel
- **On-State Voltage:** 24 VDC nominal, open collector to 30 V
- **Connector Type:** 10-pin screw-fastened terminal block (4 points, GND)
- **Isolation:** 3 kV optical isolation

### CANbus Communication (UC-8418 only)
- **Interface:** Dual optically-isolated CAN2.0A/2.0B compliant ports
- **CAN Controller:** Phillips SJA1000T
- **Signals:** \( \text{CAN}_H, \text{CAN}_L \)
- **Isolation:** 2 kV digital isolation
- **Speed:** 10 kbps to 1 Mbps

### LEDs
- **System:** Power, Ready, Storage, Battery for SRAM
- **LAN:** 10M/Link x 2, 100M/Link x 2 (on connector)
- **Serial:** TxD x 8, RxD x 8
- **Reset Button:** Supports “Reset to Factory Default”

### Physical Characteristics
- **Housing:** SECC sheet metal (1 mm)
- **Weight:** 1 kg (2.22 lb)
- **Dimensions:** 200 x 57 x 120 mm (7.87 x 2.24 x 4.72 in)
- **Mounting:** DIN rail, wall

### Environmental Limits
- **Operating Temperature:**
  - Standard Models: -10 to 60°C (14 to 140°F)
  - Wide Temp. Models: -40 to 75°C (-40 to 167°F)
- **Storage Temperature:**
  - Standard Models: -20 to 75°C (-4 to 167°F)
  - Wide Temp. Models: -40 to 85°C (-40 to 185°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-Vibration:** 2 G rms @ IEC-68-2-34, random wave, 5-500 Hz, 1 hr per axis
- **Anti-Shock:** 20 g @ IEC-68-2-27, half sine wave, 11 ms

### Power Requirements
- **Input Voltage:** 12 to 48 VDC (3-pin terminal block)
- **Input Current:**
  - 310 mA @ 48 VDC
  - 625 mA @ 24 VDC
  - 1350 mA @ 12 VDC
- **Power Consumption:** 15 W

### Standards and Certifications
- **Safety:** UL 60950-1, EN 60950-1, CCC (GB9254, GB17625.1)
- **EMC:** EN 55022 Class B, EN 55024-4-2, EN 55024-4-3, EN 55024-4-4, FCC Part 15 Subpart B Class B
### Reliability

**Alert Tools:** Built-in buzzer and RTC (real-time clock)

**Automatic Reboot Trigger:** Built-in WDT (watchdog timer)

**MTBF** (mean time between failures)

**Time:**
- UC-8416: 156,942 hrs
- UC-8418: 149,140 hrs

**Standard:** Telcordia (Bellcore) Standard

### Warranty

**Warranty Period:** 5 years

**Details:** See www.moxa.com/warranty

Note: The Hardware Specifications apply to the embedded computer unit itself, but not to accessories. In particular, the wide temperature specification does not apply to accessories such as the power adapter and cables.

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### Software Specifications

#### Linux

- **OS:** Linux 3.8.13
- **Web Server (Apache):** Allows you to create and manage web sites; supports PHP and XML
- **Terminal Server (SSH):** Provides secure encrypted communications between two untrusted hosts over an unsecure network
- **File System:** JFFS2, NFS, Ext2, Ext3
- **Internet Protocol Suite:** TCP, UDP, IPv4, IPv6, SNMPv1, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SMTP, Telnet, FTP, TFTP, PPP, PPoE
- **Internet Security:** OpenVPN, IPTables Firewall
- **Dial-up Networking:** PPP Daemon (pppd) for Linux that uses the PPP protocol and allows Unix machines to connect to the Internet as PPP servers or clients, through dialup. The PPP Daemon Works with chat, dip, and diald programs among others, and supports the IP, TCP, UDP, and IPX for Linux (Novell) protocols.
- **Software Protection:** Encryption tool for user executable files (based on patented Moxa technology)

#### Windows Embedded CE 6.0

- **OS:** Windows Embedded CE 6.0
- **File System:** FAT
- **Internet Protocol Suite:** TCP, UDP, IPv4, IPv6, SNMPv2, ICMP, ARP, HTTP, CHAP, PAP, SSL, DHCP, SMTP, Telnet, FTP, PPP
- **Web Server (WinCE IIS):** Supports ASP, ISAPI Secure Socket Layer (SSL 2/3) and Transport Layer Security (TLS/SSL 3.1) public key-based protocols, and Web Administration ISAPI Extensions
- **Dial-up Networking:** Supports RAS client API and PPP, Extensible Authentication Protocol (EAP), and RAS scripting
- **Watchdog:** Features a hardware function to trigger system reset in a user-specified time interval (Moxa API provided)

#### Application Development Software:

- Moxa WinCE 6.0 SDK
- Moxa API Library
- C runtime libraries
- Component Services (COM and DCOM)
- Microsoft® .NET Compact Framework 3.5
- XML, including DOM, XQL, XPATH, XSLT, SAX, SAX2
- SOAP Toolkit Client
- Winsock 2.2

---

### Dimensions

<table>
<thead>
<tr>
<th>UC-8416</th>
<th>UC-8418</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>120.20 (4.73)</td>
</tr>
<tr>
<td>Depth</td>
<td>214 (8.43)</td>
</tr>
<tr>
<td>Height</td>
<td>65.00 (2.56)</td>
</tr>
</tbody>
</table>

Unit: mm (inch)
## Ordering Information

### Available Models

**UC-8416-LX:** RISC-based industrial embedded computer with 8 serial ports, 4 DIs, 4 DOs, 3 LANs, 8 switch ports, CompactFlash, USB, Linux OS, -10 to 60°C operating temperature

**UC-8416-CE:** RISC-based industrial embedded computer with 8 serial ports, 4 DIs, 4 DOs, 3 LANs, 8 switch ports, CompactFlash, USB, Windows CE 6.0 OS, -10 to 60°C operating temperature

**UC-8416-T-LX:** RISC-based industrial embedded computer with 8 serial ports, 4 DIs, 4 DOs, 3 LANs, 8 switch ports, CompactFlash, USB, Linux OS, -40 to 75°C operating temperature

**UC-8416-T-CE:** RISC-based industrial embedded computer with 8 serial ports, 4 DIs, 4 DOs, 3 LANs, 8 switch ports, CompactFlash, USB, Windows CE 6.0 OS, -40 to 75°C operating temperature

**UC-8418-LX:** RISC-based industrial embedded computer with 8 serial ports, 12 DIs, 12 DOs, 3 LANs, 2 CAN ports, CompactFlash, USB, Linux OS, -10 to 60°C operating temperature

**UC-8418-CE:** RISC-based industrial embedded computer with 8 serial ports, 12 DIs, 12 DOs, 3 LANs, 2 CAN ports, CompactFlash, USB, Windows CE 6.0 OS, -10 to 60°C operating temperature

**UC-8418-T-LX:** RISC-based industrial embedded computer with 8 serial ports, 12 DIs, 12 DOs, 3 LANs, 2 CAN ports, CompactFlash, USB, Linux OS, -40 to 75°C operating temperature

**UC-8418-T-CE:** RISC-based industrial embedded computer with 8 serial ports, 12 DIs, 12 DOs, 3 LANs, 2 CAN ports, CompactFlash, USB, Windows CE 6.0 OS, -40 to 75°C operating temperature

### Package Checklist

- UC-8416/8418 embedded computer
- Wall-mounting kit
- DIN-rail mounting kit
- Ethernet cable: RJ45-to-RJ45 cross-over cable, 100 cm
- CBL-4PIND89F-100: 4-pin pin header to DB9 female console port cable, 100 cm
- Universal power adapter (including power jack converter)
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card
UC-7101/7110/7112 Series

RISC ready-to-run embedded computers with 1 or 2 serial ports, dual LANs, SD

- MOXA ART ARM9 32-bit 192 MHz processor
- 16 or 32 MB RAM
- 8 or 16 MB Flash ROM
- Dual or single 10/100 Mbps Ethernet for network redundancy
- 1 or 2 software-selectable RS-232/422/485 ports
- 50 bps to 921.6 kbps baudrate (nonstandard baudrates supported)
- SD socket for storage expansion
- Built-in real-time clock (RTC) and buzzer
- Pre-installed Linux Kernel 2.6 platform
- -40 to 75°C wide-temperature models available

Overview

The UC-7101/UC-7110/UC-7112 mini RISC-based communication platforms are ideal for embedded applications. The computers come with 1 or 2 RS-232/422/485 serial ports and single or dual 10/100 Mbps Ethernet LAN ports to provide users with a versatile communication platform.

The UC-7101/UC-7110/UC-7112 platforms use the ARM9 RISC CPU. The architecture and modern semiconductor technology used in the ARM9 RISC CPU are designed to provide the CPU with a powerful computing engine and many useful communication functions, but without generating too much heat. The built-in 8 or 16 MB NOR Flash ROM and 16 or 32 MB SDRAM provide plenty of storage, and the SD socket (UC-7101 and UC-7112 only) provide users with flexible storage expansion to run applications that generate a lot of data.

The dual or single LAN ports built into the ARM9 make the UC-7101/7110/UC-7112 computers ideal communication platforms for data acquisition and protocol conversion applications, and the 1 or 2 RS-232/422/485 serial ports allow you to connect a variety of serial devices.

The pre-installed µClinux or Linux operating system provides an open platform for software development. This means that software written for desktop PCs can be easily ported to a UC-7101, UC-7110, or UC-7112 embedded computer with a GNU cross compiler, eliminating the need to spend time modifying existing code. The operating system, device drivers, and your own software can all be stored in the UC-7101/UC-7110/UC-7112’s flash memory.

Appearance

UC-7110/UC-7112

The diagram shows the appearance of the UC-7110 and UC-7112 with the following components:

- Ethernet x 2 (10/100BaseTx)
- RS-232 Console Terminal
- Internal SD Slot for Storage Expansion (remove cover to access)
- Serial Port 1 (RS-232/422/485)
- Serial Port 2 (RS-232/422/485)
- 12 to 48 VDC

Other features include:

- RESET
- 12-48 VDC
- Ethernet x 2 (10/100BaseTx)
- RS-232 Console Terminal
- Internal SD Slot for Storage Expansion (remove cover to access)
- Serial Port 1 (RS-232/422/485)
- Serial Port 2 (RS-232/422/485)
UC-7101

Hardware Specifications

**Computer**
- **CPU**: MOXA ART ARM 32-bit RISC CPU, 192 MHz
- **DRAM**:
  - UC-7101/7110/7112: 16 MB
  - UC-7112 Plus: 32 MB
- **Flash**:
  - UC-7101/7110/7112: 8 MB
  - UC-7112 Plus: 16 MB
- **OS (pre-installed)**: μClinux or Linux

**Storage**
- **Storage Expansion**: SD slot (UC-7101, UC-7112, and UC-7112 Plus only)

**Ethernet Interface**
- **LAN**: Auto-sensing 10/100 Mbps (RJ45)
  - UC-7101: 1 port
  - UC-7110/7112/7112 Plus: 2 ports
- **Magnetic Isolation Protection**: 1.5 kV built-in

**Serial Interface**
- **Serial Standards**: RS-232/422/485 software-selectable (DB9 male)
  - UC-7101: 1 port
  - UC-7110/7112: 2 ports
- **ESD Protection**: 4 kV ESD for all signals
- **Console Port**: RS-232 (TxD, RxD, GND)
  - UC-7101: 4-pin pin header output
  - UC-7110/7112: 3-wire pin-header

**Serial Communication Parameters**
- **Data Bits**: 5, 6, 7, 8
- **Stop Bits**: 1, 1.5, 2
- **Parity**: None, Even, Odd, Space, Mark
- **Flow Control**: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
- **Baudrate**: 50 bps to 921.6 kbps (supports nonstandard baudrates; see user’s manual for details)

**Serial Signals**
- **RS-232**: TxD+, DTR, RTS, CTS, DCD, GND
- **RS-422**: TxD+, RxD+, RxD-, GND
- **RS-485-4w**: TxD+, RxD+, RxD-, GND
- **RS-485-2w**: Data+, Data-, GND

**LEDs**
- **System**: Ready
- **LAN**: LED located on the RJ45 connector
  - UC-7101: 10M/Link x 1, 100M/Link x 1
  - UC-7110/7112: 10M/Link x 2, 100M/Link x 2
- **Serial**:
  - UC-7101: TxD x 1, RxD x 1
  - UC-7110/7112: TxD x 2, RxD x 2

**Physical Characteristics**
- **Housing**: Aluminum (1 mm)
- **Weight**:
  - UC-7101: 130 g (0.29 lb)
  - UC-7110/7112: 190 g (0.42 lb)
- **Dimensions**: (UC-7101/7110/7112 Plus)
  - UC-7101: 67 x 22 x 100.4 mm (2.64 x 0.87 x 3.95 in)
  - UC-7110/7112: 77 x 111 x 26 mm (3.03 x 4.37 x 1.02 in)
- **Mounting**: DIN rail, wall

**Environmental Limits**
- **Operating Temperature**:
  - Standard Models: -10 to 60°C (14 to 140°F)
  - Wide Temp. Models: -40 to 75°C (-40 to 167°F)
- **Storage Temperature**:
  - Standard Models: -20 to 80°C (-4 to 176°F)
  - Wide Temp. Models: -40 to 85°C (-40 to 185°F)
- **Ambient Relative Humidity**: 5 to 95% (non-condensing)
- **Anti-Vibration**: 1 Grms @ IEC-68-2-6, sine wave (resonance search), 5-500 Hz, 1 Oct/min, 1 cycle, 13 min 17 sec per axis (UC-7101/7110 only)

**Power Requirements**
- **Input Voltage**: 12 to 48 VDC
- **Input Current**:
  - 170 mA @ 24 VDC
  - 340 mA @ 12 VDC
- **Power Consumption**: 4.5 W

**Standards and Certifications**
- **Safety**:
  - UC-7101: UL 60950, CSA-C22.2 No. 60950-1, EN 60950-1
  - UC-7110/7112: UL 60950-1, CSA C22.2 No. 60950-1-03, EN 60950-1
  - EMC: EN 55022 Class A, EN 61000-3-2 Class A, EN 61000-3-3, EN 55024, FCC Part 15 Subpart B Class A, DNV
- **Green Product**: RoHS, CRoHS, WEEE

**Reliability**
- **Alert Tools**: Built-in buzzer and RTC (real-time clock)
- **Automatic Reboot Trigger**: Built-in WDT (watchdog timer)
MTBF (mean time between failures)

Time:
- UC-7101: 514,973 hrs
- UC-7110: 149,414 hrs
- UC-7112 Plus: 148,980 hrs
- UC-7112: 148,980 hrs

Standard:
- UC-7101: Telcordia (Bellcore) Standard
- UC-7110: MIL-HDBK-217F
- UC-7112 Plus: Bellcore-SR332
- UC-7112: MIL-HDBK-217F

Warranty

Warranty Period: 5 years
Details: See www.moxa.com/warranty
Note: These hardware specifications describe the embedded computer unit itself, but not its official accessories. In particular, the wide temperature specification does not apply to accessories such as power adapters and cables.

Software Specifications

Linux (UC-7112-LX Plus only)
- OS: Linux 2.6.38
- File System: JFFS2, NFS, Ext2, Ext3, Ext4, VFAT/FAT
- Internet Protocol Suite: TCP, UDP, IPv4, IP6, SNMP v1/v2c, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SMTP, Telnet, FTP, TFTP, PPP, PPPoE, SSH, SSL
- Internet Security: OpenVPN, IPTables Firewall, OpenSSL
- Terminal Server (SSH): Provides secure encrypted communications between two untrusted hosts over an unsecure network
- Dial-up Networking: PPP Daemon (pppd) for Linux that uses the PPP protocol and allows Unix machines to connect to the Internet as PPP servers or clients, through dialup. The PPP Daemon Works with chat, dip, and dial programs among others, and supports the IP, TCP, UDP, and IPX for Linux (Novell) protocols.
- Watchdog: Features a hardware function to trigger system reset in a user-specified time interval (Moxa API provided)
- Moxa Package Management System (MPKG): Provides package management system which you can install/uninstall software utilities or libraries.
- IP Bonding: Linux standard bonding driver provides a method for aggregating multiple network interfaces into a single logical “bonded” interface.
- Net-SNMP: Support v1 and v2c.
- Cryptographic Hardware Accelerator: Supports DES-ECB, DES-CBC, DES-IDE3, AES-ECB, and AES-CBC algorithms
- Debian: Debian 5 lenny port provided

Application Development Software:
- Moxa API Library (Watchdog timer, Moxa serial I/O control)
- arm-elf-gcc: C/C++ cross-compiler
- μClibc: POSIX standard C library

μClinux
- OS: μClinux 2.6.19
- File System: JFFS2
- Internet Protocol Suite: TCP, UDP, IPv4, SNMPv1, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SMTP, Telnet, FTP, TFTP, PPP, PPPoE
- Web Server (Boa): Allows you to create and manage web sites
- Terminal Server (Telnet): Provides telnet communications between two hosts over the network
- Dial-up Networking: PPP Daemon (pppd) for Linux that uses the PPP protocol and allows Unix machines to connect to the Internet as PPP servers or clients, through dialup. The PPP Daemon Works with chat, dip, and dial programs among others, and supports the IP, TCP, UDP, and IPX for Linux (Novell) protocols.

Application Development Software:
- Moxa API Library (Watchdog timer, Moxa serial I/O control)
- arm-elf-gcc: C/C++ cross-compiler
- μClibc: POSIX standard C library
Available Models

**UC-7101-LX**: Mini RISC-based embedded computer with 1 serial port, LAN, μClinux OS, -10 to 60°C operating temperature

**UC-7110-LX**: Mini RISC-based embedded computer with 2 serial ports, dual LANs, μClinux OS, -10 to 60°C operating temperature

**UC-7112-LX**: Mini RISC-based embedded computer with 2 serial ports, dual LANs, SD, μClinux 2.6 OS, -10 to 60°C operating temperature

**UC-7112-LX Plus**: Mini RISC-based embedded computer with 2 serial ports, dual LANs, SD, Linux 2.6 OS, -10 to 60°C operating temperature

**UC-7101-T-LX**: Mini RISC-based embedded computer with 1 serial port, LAN, μClinux OS, -40 to 75°C operating temperature

**UC-7110-T-LX**: Mini RISC-based embedded computer with 2 serial ports, dual LANs, μClinux OS, -40 to 75°C operating temperature

### Package Checklist

- UC-7101 or UC-7110 or UC-7112 embedded computer
- Ethernet cable: RJ45-to-RJ45 cross-over cable, 100 cm
- CBL-4PINDB9F-100: 4-pin pin header to DB9 female console port cable, 100 cm
- Universal power adapter (including terminal block to power jack converter)
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card

### Ordering Information

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Serial Ports</th>
<th>LAN Ports</th>
<th>Storage</th>
<th>OS</th>
<th>Wide Temp.</th>
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</thead>
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<td>–</td>
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<td>UC-7112</td>
<td>2</td>
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<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Model Name**

**Serial Ports**: RS-232/422/485

**LAN Ports**: 10/100 Mbps

**Storage**: SD

**OS**: μClinux, Linux

**Wide Temp.**: ✓
UC-7122/7124 Series

RISC ready-to-run embedded computers with dual LANs, 2 or 4 serial ports, SD, USB

- Cirrus Logic EP9302 ARM9 32-bit 200 MHz processor
- On-board 32 MB RAM, 16 MB flash disk
- 2 or 4 software-selectable RS-232/422/485 serial ports
- 50 bps to 921.6 kbps baudrate (nonstandard baudrates supported)
- Dual 10/100 Mbps Ethernet for network redundancy
- SD socket for storage expansion supported
- Built-in real-time clock (RTC), buzzer, watchdog timer (WDT)
- Ready-to-run WinCE 5.0 platform
- -40 to 75°C wide temperature models available

Overview

The UC-7122/7124 embedded computers come with 2 or 4 RS-232/422/485 serial ports and dual 10/100 Mbps Ethernet LAN ports to provide users with a versatile communication platform, making these RISC-based embedded computers ideal for your embedded applications.

The UC-7122/7124 embedded computers use the Cirrus Logic EP9302 ARM9 200 MHz RISC CPU. Unlike the x86 CPU, which uses a CISC design, the ARM9's RISC design architecture and modern semiconductor technology provide the UC-7122/7124 with a powerful computing engine and communication functions, but without generating too much heat. Moreover, the built-in 16 MB NOR Flash ROM and 32 MB SDRAM give you enough storage capacity to run applications on the UC-7122/7124 computers. The additional SD socket provides the flexibility of adding storage expansion disks, and the dual LAN ports built into the ARM9 make the UC-7122/7124 ideal communication platforms for simple data acquisition and protocol conversion applications. The RS-232/422/485 serial ports on these computers allow you to connect a variety of serial devices. These features ensure that the UC-7122/7124 embedded computers are convenient and powerful central control units for industrial applications, such as data acquisition, remote device control and monitoring, and protocol conversion.

The pre-installed WinCE 5.0 operating system provides a common Windows-based software operating system for software program development. This means that software written in Visual C/C++ for desktop PCs can easily be ported to the UC-7122/7124 computers with a general programming tool such as Microsoft Embedded Visual C++ or Microsoft Visual Studio 2005. You will not need to spend time modifying existing software code, the operating system, device or the drivers. You can store the software that you created on the computer’s flash memory without any modification.

Appearance

UC-7122

- USB 2.0 Host x 1
- 12 to 48 VDC
- Ethernet x 2 (10/100 Mbps)
- RS-232 Console Terminal
- Internal SD Slot for Storage Expansion (remove cover to access)
- Serial Port 1 (RS-232/422/485, DB9 Male)

UC-7124

- USB 2.0 Host x 1
- 12 to 48 VDC
- Ethernet x 2 (10/100 Mbps)
- RS-232 Console Terminal
- Internal SD Slot for Storage Expansion (remove cover to access)
- Serial Port 1 to 4 (RS-232/422/485, RJ45)
Hardware Specifications

**Computer**
- **CPU**: Cirrus EP9302 ARM9 CPU, 200 MHz
- **USB**: USB 2.0 hosts x 1, type A connector
- **DRAM**: DDR2 SDRAM, 32 MB
- **Flash**: NOR Flash, 16 MB
- **OS (pre-installed)**: Windows CE 5.0

**Storage**
- **Storage Expansion**: SD slot

**Ethernet Interface**
- **LAN**: Auto-sensing 10/100 Mbps ports (RJ45) x 2

**Serial Interface**
- **Serial Standards**:
  - UC-7122: RS-232/422/485 ports, software-selectable (DB9 male) x 2
  - UC-7124: RS-232/422/485 ports, software-selectable (RJ45) x 4
- **ESD Protection**: 4 kV for all signals
- **Console Port**: RS-232 (TxD, RxD, GND), 4-pin pin header output

**Serial Communication Parameters**
- **Data Bits**: 5, 6, 7, 8
- **Stop Bits**: 1, 1.5, 2
- **Parity**: None, Even, Odd, Space, Mark
- **Flow Control**: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
- **Baudrate**: 50 bps to 921,600 bps (supports nonstandard baudrates; see user’s manual for details)

**Serial Signals**
- **RS-232**: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
- **RS-422**: TxD+, TxD-, RxD+, RxD-, DCD, GND
- **RS-485-4w**: TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-2w**: Data+, Data-, GND

**LEDs**
- **System**: Ready, SD
- **LAN**: 10M/Link x 2, 100M/Link x 2 (on connector)
- **Serial**: TxD, RxD (2 or 4 of each)

**Physical Characteristics**
- **Housing**: Aluminum (1 mm)
- **Weight**:
  - UC-7122: 190 g (0.42 lb)
  - UC-7124: 200 g (0.44 lb)
- **Dimensions**: 77 x 111 x 26 mm (3.03 x 4.37 x 1.02 in)
- **Mounting**: DIN rail, wall

**Environmental Limits**
- **Operating Temperature**: Standard Models: -10 to 60°C (14 to 140°F)
  Wide Temp. Models: -40 to 75°C (-40 to 167°F)
- **Storage Temperature**: Standard Models: -20 to 80°C (-4 to 176°F)
  Wide Temp. Models: -40 to 85°C (-40 to 185°F)
- **Ambient Relative Humidity**: 5 to 95% (non-condensing)
- **Anti-Vibration**: 1 Grms @ IEC-68-2-6, sine wave (resonance search), 50-500 Hz, 1 Oct/min, 1 cycle, 13 min 17 sec per axis

**Power Requirements**
- **Input Voltage**: 12 to 48 VDC
- **Input Current**:
  - UC-7122: • 170 mA @ 24 VDC
  - • 340 mA @ 12 VDC
- **UC-7124**: • 180 mA @ 24 VDC
  • 360 mA @ 12 VDC
- **Power Consumption**:
  - • UC-7122: 4.1 W
  - • UC-7124: 4.3 W

**Standards and Certifications**
- **Safety**: UL 60950-1, CSA C22.2 No. 60950-1-03, EN 60950-1
- **EMC**: EN 55022 Class A, EN 61000-3-2 Class A, EN 61000-3-3, EN 55024, FCC Part 15 Subpart B Class A
- **Green Product**: RoHS, CrRoHS, WEEE
Compact/Fanless Computers

Reliability
Alert Tools: Built-in buzzer and RTC (real-time clock)
Automatic Reboot Trigger: Built-in WDT (watchdog timer)
MTBF (mean time between failures)
- UC-7122: 234,746 hrs
- UC-7124: 210,233 hrs
Standard: Telcordia (Bellcore) Standard

Pin Assignment
UC-7122 (DB9 male connector)

<table>
<thead>
<tr>
<th>PIN</th>
<th>RS-232</th>
<th>RS-422/485-4w</th>
<th>RS-485-2w</th>
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</thead>
<tbody>
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<td>DCD</td>
<td>TxD-(A)</td>
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<td>RTS</td>
<td>TxD+(B)</td>
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<td>6</td>
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<td>–</td>
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<tr>
<td>7</td>
<td>CTS</td>
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</table>

UC-7124 (8-pin RJ45 connector)

<table>
<thead>
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</tr>
<tr>
<td>7</td>
<td>CTS</td>
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<td>–</td>
</tr>
</tbody>
</table>

Windows Embedded Specifications
OS: Windows Embedded CE 5.0
File System: FAT (for onboard flash memory)
Internet Protocol Suite: TCP, UDP, IPv4, SNMPv2, ICMP, IGMP, ARP, HTTP, CHAP, PAP, SSL, DHCP, SMTP, Telnet, FTP, PPP
Web Server (WinCE IIS): Supports ASP, ISAPI Secure Socket Layer (SSL 2/3) and Transport Layer Security (TLS/SSL 3.1) public key-based protocols, and Web Administration ISAPI Extensions
Dial-up Networking: Supports RAS client API and PPP, Extensible Authentication Protocol (EAP), and RAS scripting
Watchdog: Features a hardware function to trigger system reset based on a user-specified time interval. (Moxa API provided)

Available Models
UC-7122-CE: Mini RISC-based embedded computer with 2 serial ports, dual LANs, SD, USB, WinCE 5.0, -10 to 60°C operating temperature
UC-7124-CE: Mini RISC-based embedded computer with 4 serial ports, dual LANs, SD, USB, WinCE 5.0, -10 to 60°C operating temperature
UC-7122-T-CE: Mini RISC-based embedded computer with 2 serial ports, dual LANs, SD, USB, WinCE 5.0, -40 to 75°C operating temperature
UC-7124-T-CE: Mini RISC-based embedded computer with 4 serial ports, dual LANs, SD, USB, WinCE 5.0, -40 to 75°C operating temperature

Optional Accessories (can be purchased separately)
DK35A: DIN-rail mounting clips, 35 mm, 2 DIN-rail plates with 4 screws

Ordering Information
Package Checklist
- UC-7122 or UC-7124 embedded computer
- Ethernet cable: RJ45-to-RJ45 cross-over cable, 100 cm
- CBL-4PINDB9F-100: 4-pin pin header to DB9 female console port cable, 100 cm
- CBL-RJ45M9-150: 8-pin RJ45-to-DB9 male serial port cable, 150 cm
- Universal power adapter (including terminal block to power jack converter)
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Serial Ports</th>
<th>LAN Ports</th>
<th>Storage</th>
<th>OS</th>
<th>Wide Temp.</th>
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**IA260 Series**

**RISC-embedded computers with 4 serial ports, dual LANs, VGA, DIOs, CompactFlash, USB**

- Cirrus Logic EP9315 ARM9 CPU, 200 MHz
- 128 MB RAM on-board, 32 MB flash disk
- 4 software-selectable RS-232/422/485 serial ports
- VGA interface for field site monitoring
- Dual 10/100 Mbps Ethernet for network redundancy
- 8+8 DI/DO channels, up to 30 VDC
- 12 to 48 VDC power input design
- Supports CompactFlash and USB 2.0 hosts
- Ready-to-run Linux or WinCE 6.0 platform
- H-type heat dissipation design for system reliability
- -40 to 75°C wide operating temperature model available

**Overview**

The IA260 embedded computers come with 4 RS-232/422/485 serial ports, dual Ethernet ports, 8 digital input channels, 8 digital output channels, a VGA output, 2 USB hosts, and a CompactFlash socket. The computers are housed in a compact, IP40 protected, industrial-strength aluminum case.

The IA260 computers use the Cirrus Logic EP9315 ARM9, 32-bit, 200 MHz RISC CPU. This powerful computing engine supports several useful communication functions, but will not generate too much heat. The built-in 32 MB NOR Flash ROM and 128 MB SDRAM give you enough memory to run your application software directly on the IA260.

The patented “H-Type” heat dissipation design can directly transmit heat from inside the housing to the outside, which makes the IA260 an ideal computing unit for applications that involve extremely high temperatures. With its built-in VGA output interface, the IA260 computers are suitable for use with SCADA systems in industrial applications, such as factory automation, production line process monitoring, and mining automation, that require VGA and HMI features.

The IA260 computers support RS-232/422/485, digital I/O, and have dual LAN ports, making them ideal for communication platforms in industrial applications that require network redundancy. In addition to the standard model, a wide-temperature (-40 to 75°C) model is available for use in harsh industrial-automation environments.

**Appearance**

**Front View**

**Top View**

- 10/100 Mbps Ethernet x 2
- CompactFlash Socket
- VGA Output
- USB 2.0 Host x 2
- LED Indicators (Power, Ready, Storage)
- RS-232/422/485 Serial Port x 4
- DI x 8 DO x 8
- Power Input
- Reset
## Hardware Specifications

### Computer
- **CPU:** Cirrus EP9315 ARM9 CPU, 200 MHz
- **USB:** USB 2.0 hosts x 2, type A connector
- **DRAM:** DDR2 SDRAM, 128 MB
- **Flash:** NOR Flash, 32 MB
- **OS (pre-installed):** Linux or Windows CE 6.0

### Display
- **Graphics Controller:** EP9315 internal graphics accelerator engine with TTL graphical signal support
- **Display Memory:** Dynamic video memory (shares system memory)
- **Display Interface:** CRT interface for VGA output, DB15 female connector
- **Resolution:** 1024 x 768, 8 bits

### Ethernet Interface
- **LAN:** Auto-sensing 10/100 Mbps ports (RJ45) x 2

### Serial Interface
- **Serial Standards:** RS-232/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
- **ESD Protection:** 4 kV for all signals
- **Console Port:** RS-232 (TxD, RxD, GND), 4-pin header output (115200, n, 8, 1)

### Serial Communication Parameters
- **Data Bits:** 5, 6, 7, 8
- **Stop Bits:** 1, 1.5, 2
- **Parity:** None, Even, Odd, Space, Mark
- **Flow Control:** RTS/CTS, XON/XOFF, ADDC®
- **Baudrate:** 50 bps to 921.6 kbps (supports nonstandard baudrates; see user’s manual for details)

### Digital Input
- **Input Channels:** DI x 8
- **Input Voltage:** 0 to 30 VDC
- **Input Levels for Dry Contacts:**
  - Logic level 0: Close to GND
  - Logic level 1: Open
- **Input Levels for Wet Contacts:**
  - Logic level 0: -3 V max.
  - Logic level 1: +10 V to +30 V (COM to DI)
- **Connector Type:** 10-pin screw-fastened terminal block (8 points, COM, GND)
- **Isolation:** 3 kV optical isolation

### Digital Output
- **Output Channels:** DO x 8, sink type
- **Output Current:** Max. 200 mA per channel
- **On-State Voltage:** 24 VDC nominal, open collector to 30 V
- **Connector Type:** 9-pin screw-fastened terminal block
- **Isolation:** 3 kV optical isolation

### LEDs
- **System:** Power, Ready, Storage
- **LAN:** 10M/Link x 2, 100M/Link x 2 (on connector)
- **Serial:** TxD x 4, RxD x 4

### Switches and Buttons
- **Reset Button:** Supports “Reset to Factory Default”

### Physical Characteristics
- **Housing:** Aluminum, industrial vertical form factor
- **Weight:** 1 kg (2.22 lb)
- **Dimensions:** 52 x 112.6 x 162 mm (2.05 x 4.43 x 6.38 in)
- **Mounting:** DIN-rail, wall

### Environmental Limits
- **Operating Temperature:**
  - Standard Models: -10 to 60°C (14 to 140°F)
  - Wide Temp. Models: -40 to 75°C (-40 to 167°F)
- **Storage Temperature:**
  - Standard Models: -20 to 80°C (-4 to 176°F)
  - Wide Temp. Models: -40 to 85°C (-40 to 185°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-Vibration:** 2 Grms @ IEC-68-2-34, random wave, 5-500 Hz, 1 hr per axis
- **Anti-Shock:** 20 g @ IEC-68-2-27, half sine wave, 11 ms

### Power Requirements
- **Input Voltage:** 12 to 48 VDC (3-pin terminal block)
- **Input Current:**
  - With no load on USB ports:
    - 240 mA @ 24 VDC
    - 480 mA @ 12 VDC
  - With full load on USB ports:
    - 450 mA @ 24 VDC
    - 900 mA @ 12 VDC
- **Power Consumption:**
  - With no load on USB ports: 5.8 W
  - With full load on USB ports: 11 W

### Standards and Certifications
- **Safety:** UL 60950-1, CSA C22.2 No. 60950-1-03, EN 60950-1, CCC (GB4943, GB9254, GB17625.1)
- **EMC:** EN 55022 Class A, EN 61000-3-2 Class A, EN 61000-3-3, EN 55024, FCC Part 15 Subpart B Class A
- **EMS:**
  - IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV
  - IEC 61000-4-3 RS: 80 MHz to 1 GHz: 3 V/m
  - IEC 61000-4-4 EFT: Power: 1 kV; Signal: 0.5 kV
  - IEC 61000-4-5 Surge: Power: 1 kV; Signal: 1 kV
  - IEC 61000-4-6 CS: Signal: 3 V/m
  - IEC 61000-4-8 1 A/m
  - IEC 61000-4-11
- **Green Product:** RoHS, CRoHS, WEEE

### Reliability
- **Automatic Reboot Trigger:** Built-in WDT (watchdog timer)
- **MTBF** (mean time between failures): 145,328 hrs
- **Warranty Period:** 5 years
- **Warranty:** See www.moxa.com/warranty
- **Note:** The Hardware Specifications apply to the embedded computer unit itself, but not to accessories. In particular, the wide temperature specification does not apply to accessories such as the power adapter and cables.
### Software Specifications

**Linux**
- **OS:** Linux 2.6.23
- **Web Server (Apache):** Allows you to create and manage web sites
- **Terminal Server (SSH):** Provides secure encrypted communications between two untrusted hosts over an unsecure network
- **File System:** JFFS2, NFS, Ext2, Ext3
- **Internet Protocol Suite:** TCP, UDP, IPv4, SNMPv1, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SMTP, Telnet, FTP, TFTP, PPP, PPoE
- **Internet Security:** OpenVPN, IPTables Firewall
- **Dial-up Networking:** PPP Daemon (pppd) for Linux that uses the PPP protocol and allows Unix machines to connect to the Internet as PPP servers or clients, through dialup. The PPP Daemon Works with chat, dial, and dialup programs among others, and supports the IP, TCP, UDP, and IPX for Linux (Novell) protocols.
- **Watchdog:** Features a hardware function to trigger system reset in a user-specified time interval (Moxa API provided)

**Application Development Software:**
- Moxa API Library (Watchdog timer, Moxa serial I/O control, Moxa DI/DO API)
- GNU C/C++ cross-compiler
- GNU C library
- GDB source-level debugging server

**Software Protection:** Encryption tool for user executable files (based on patented Moxa technology)

**Windows Embedded CE 6.0**
- **OS:** Windows Embedded CE 6.0
- **File System:** FAT (for onboard flash memory)
- **Internet Protocol Suite:** TCP, UDP, IPv4, SNMPv2, ICMP, IGMP, ARP, HTTP, CHAP, PAP, SSL, DHCP, SMTP, Telnet, FTP, PPP
- **Web Server (WinCE IIS):** Supports ASP, ISAPI Secure Socket Layer (SSL 2/3) and Transport Layer Security (TLS/SSL 3.1) public key-based protocols, and Web Administration ISAPI Extensions
- **Dial-up Networking:** Supports RAS client API and PPP, Extensible Authentication Protocol (EAP), and RAS scripting
- **File Server:** Enables remote clients to access files and other resources over the network
- **Watchdog:** Features a hardware function to trigger system reset in a user-specified time interval. (Moxa API provided)

**Application Development Software:**
- Moxa WinCE 6.0 SDK
- Moxa API Library
- C Libraries and Run-times
- Component Services (COM and DCOM)
- Microsoft® .NET Compact Framework 2.0
- XML, including DOM, XQL, XPATH, XSLT, SAX, SAX2
- SOAP Toolkit Client
- Winsock 2.2

### Ordering Information

**Available Models**
- **IA260-CE:** RISC-based embedded computer with 4 serial ports, 8 DIs, 8 DOs, dual LANs, VGA, CompactFlash, USB, Win CE 6.0 OS, -10 to 60°C operating temperature
- **IA260-LX:** RISC-based industrial embedded computer with 4 serial ports, 8 DIs, 8 DOs, dual LANs, VGA, CompactFlash, USB, Linux OS, -10 to 60°C operating temperature
- **IA260-T-CE:** RISC-based embedded computer with 4 serial ports, 8 DIs, 8 DOs, dual LANs, VGA, CompactFlash, USB, Win CE 6.0 OS, -40 to 75°C operating temperature
- **IA260-T-LX:** RISC-based industrial embedded computer with 4 serial ports, 8 DIs, 8 DOs, dual LANs, VGA, CompactFlash, USB, Linux OS, -40 to 75°C operating temperature

**Package Checklist**
- IA260 or IA260-T embedded computer
- Wall-mounting kit
- DIN-rail mounting kit
- Ethernet cable: RJ45-to-RJ45 cross-over cable, 100 cm
- CBL-RJ45F9-150: 8-pin RJ45-to-DB9 female console port cable, 150 cm
- CBL-RJ45M9-150: 8-pin RJ45-to-DB9 male serial port cable, 150 cm
- Universal power adapter
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card
The IA240 embedded computers are designed for industrial automation applications. The computers feature 4 RS-232/422/485 serial ports, dual LANs, 4 digital input channels, 4 digital output channels, and a PCMCIA cardbus and SD socket in a compact, IP30-protected, industrial-strength rugged housing.

The IA240’s vertical DIN-rail form factor makes it easy to install the computers in a small cabinet. This space-saving solution also facilitates easy wiring, making the IA240 a great choice as front-end embedded controllers for industrial applications.

Wide-temperature models of the IA240 are also available. The IA240-T can operate reliably in a temperature range from -40 to 75°C, making them appropriate for harsh industrial automation environments.

The industrial design of the IA240 provides a robust, reliable computing platform. Due to their RISC-based architecture, the IA240 computers will not generate a lot of heat, making them ideal for industrial automation environments.
Hardware Specifications

Computer
CPU: MOXA ART ARM9 32-bit RISC CPU, 192 MHz
USB: USB 2.0 hosts x 1, type A connector
DRAM: DDR2 SDRAM, 64 MB
Flash: NOR Flash, 16 MB
OS (pre-installed): Embedded Linux

Storage
Storage Expansion: SD slot

Ethernet Interface
LAN: Auto-sensing 10/100 Mbps ports (RJ45) x 2
Magnetic Isolation Protection: 1.5 kV, built-in

Serial Interface
Serial Standards: RS-232/422/485 ports, software-selectable (8-pin RJ45) x 4
ESD Protection: 4 kV for all signals
Console Port: RS-232, RJ45 connector, supports PPP

Serial Communication Parameters
Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
Baudrate: 50 bps to 921.6 kbps (supports nonstandard baudrates; see user’s manual for details)

Serial Signals
RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
RS-422: TxD+, TxD-, RxD+, RxD-, GND
RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
RS-485-2w: Data+, Data-, GND

Digital Input
Input Channels: DI x 4
Input Voltage:
Logic 0: 0-0.8 V
Logic 1: 2.0-5.5 V
Over-current Limit: -24 mA

Digital Output
Output Channels: DO x 4
Output Current: 24 mA
Output Voltage:
Logic 0: 0-0.55 V
Logic 1: 2.5-3.3 V

LEDs
System: Power, Ready, Storage
LAN: 10M/Link x 2, 100M/Link x 2 (on connector)
Serial: TxD x 4, RxD x 4 (on connector)

Switches and Buttons
Reset Button: Supports “Reset to Factory Default”

Physical Characteristics
Housing: SECC sheet metal (1 mm)
Weight: 430 g (0.96 lb)
Dimensions: 60 x 137 x 100 mm (2.36 x 5.39 x 3.94 in)
Mounting: DIN rail, wall

Environmental Limits
Operating Temperature:
Standard Models: -10 to 60°C (14 to 140°F)
Wide Temp. Models: -40 to 75°C (-40 to 167°F)
Storage Temperature:
Standard Models: -20 to 80°C (-4 to 176°F)
Wide Temp. Models: -40 to 85°C (-40 to 185°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)
Anti-Vibration: 1 Grms @ IEC-68-2-6, sine wave (resonance search), 5-500 Hz, 1 Oct/min, 1 cycle, 13 min 17 sec per axis

Power Requirements
Input Voltage: 12 to 48 VDC
Input Current:
• 300 mA @ 24 VDC
• 600 mA @ 12 VDC
Power Consumption: 7 W

Standards and Certifications
Safety: UL 60950-1, CSA C22.2 No. 60950-1-03, EN 60950-1
EMC: EN 55022 Class A, EN 61000-3-2 Class A, EN 61000-3-3, EN 55024, FCC Part 15 Subpart B Class A
EMS:
IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV
IEC 61000-4-3 RS: 80 MHz to 1 GHz: 3 V/m
IEC 61000-4-4 EFT: Power: 1 kV; Signal: 0.5 kV
IEC 61000-4-5 Surge: Power: 1 kV
IEC 61000-4-6 CS: Signal: 10 V/m
IEC 61000-4-8 1 A/m
IEC 61000-4-11
Green Product: RoHS, CRoHS, WEEE

Reliability
Alert Tools: Built-in buzzer and RTC (real-time clock)
Automatic Reboot Trigger: Built-in WDT (watchdog timer)
MTBF (mean time between failures)
Time: 425,321 hrs
Standard: Telcordia (Bellcore) Standard

Warranty
Warranty Period: 5 years
Details: See www.moxa.com/warranty

Note: The Hardware Specifications apply to the embedded computer unit itself, but not to accessories. In particular, the wide temperature specification does not apply to accessories such as the power adapter and cables.
### Dimensions

![Dimensions Diagram](image)

**Unit:** mm (inch)

### Software Specifications

**Linux**
- OS: Linux 2.6.9
- Web Server (Apache): Allows you to create and manage web sites
- Terminal Server (SSH): Provides secure encrypted communications between two untrusted hosts over an unsecure network
- File System: JFFS2
- Internet Protocol Suite: TCP, UDP, IPv4, SNMPv1, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SMTP, Telnet, FTP, TFTP, PPP, PPPoE
- Internet Security: OpenVPN, IPTables Firewall
- Dial-up Networking: PPP Daemon (pppd) for Linux that uses the PPP protocol and allows Unix machines to connect to the Internet as PPP servers or clients, through dialup. The PPP Daemon works with chat, dip, and diald programs among others, and supports the IP, TCP, UDP,
- and IPX for Linux (Novell) protocols.
- Watchdog: Features a hardware function to trigger system reset in a user-specified time interval (Moxa API provided)

**Application Development Software:**
- Moxa API Library (Watchdog timer, Moxa serial I/O control, Moxa DI/DO API)
- GNU C/C++ cross-compiler
- GNU C library
- GDB source-level debugging server
- Software Protection: Encryption tool for user executable files (based on patented Moxa technology)

### Ordering Information

**Available Models**
- **IA240-LX:** RISC-based industrial computer with 4 serial ports, 4 DIs and 4 DO channels, dual LANs, SD, Linux OS, -10 to 60°C operating temperature
- **IA240-T-LX:** RISC-based industrial computer with 4 serial ports, 4 DIs and 4 DO channels, dual LANs, SD, Linux OS, -40 to 75°C operating temperature

### Package Checklist

- IA240 embedded computer
- Wall-mounting kit
- Ethernet cable: RJ45-to-RJ45 cross-over cable, 100 cm
- CBL-RJ45F9-150: 8-pin RJ45-to-DB9 female console port cable, 150 cm
- CBL-RJ45M9-150: 8-pin RJ45-to-DB9 male serial port cable, 150 cm
- Universal power adapter (including terminal block to power jack converter)
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card
## Wireless Computers

### Product Selection Guide

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### Cellular Computers

| W6000 Series: Compact, rugged, wireless computer with 3G/LTE, LAN, and 2 serial ports | 27-7 |

### WLAN Computers

| UC-8100-ME-T Series: Communication-centric RISC computing platform | 27-10 |
| UC-8410A Series: Highly efficient, security-enabled, wireless platform that supports a rich set of interfaces | 27-14 |
# Wireless Embedded Computers

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<td>1.5 kV</td>
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<td><strong>Housing</strong></td>
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MAR-2000 Series

*Industrial multi-radio mobile access and applications router*

- Dynamic routing across multiple WANs
- Policy-based routing management
- Simple Web management user interface
- IEEE 802.11a/b/g/n wireless AP/bridge/client
- Five-band UMTS/HSPA+ and quad-band GSM/GPRS/EDGE industrial IP-modems
- Complies with a portion of EN 50155 specifications
- Built-in 50-channel GPS for location-based applications
- -25 to 70°C wide temperature range (EN 50155 Class T3)

**Overview**

The MAR-2000 is a compact, simple, and programmable RISC-based wireless mobile router with strong wireless routing capabilities. With a built-in GPS module, HSPA+ cellular and 802.11a/b/g/n wireless capabilities, independent power switches on its cellular module connectors, and high thermal tolerance, the MAR-2000 is compliant with a portion of EN 50155 specifications. The built-in 32 MB NOR Flash ROM and 512 MB SDRAM give you enough memory for installing your own application software, the 512 MB NAND Flash can be used to provide additional data storage, and the CompactFlash socket is available for adding more memory when needed. The built-in GPS module supports geo-fencing functionality, making it ideal for managing wireless connections in cross-WAN environments often associated with rolling stock and other vehicular applications.

When a train travels to a different region, it often encounters switches that support different wireless interfaces, such as Wi-Fi, UMTS, and HSPA+. The MAR-2000 uses multiple-WAN support and backup functionality to ensure that your wireless connections are always available, stable, and reliable.

As an added bonus, the MAR-2000 series includes wide temperature models designed to operate reliably in extreme environments with temperatures ranging from -25 to 70°C.

**Appearance**

**Front View**

**Rear View**
**Dimensions**

![Dimensions Diagram]

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**Hardware Specifications**

**Computer**
- **CPU:** Intel XScale IXP435, 533 MHz
- **USB:** USB 2.0 hosts x 2, type A connector
- **DRAM:** DDR2 SDRAM, 512 MB
- **Flash:**
  - NOR Flash, 32 MB onboard to store OS
  - NAND Flash, 512 MB (1 GB max.) for OS file system, caching storage, and data logger
- **OS (pre-installed):** Linux 3.8.13

**Storage**
- **Storage Expansion:** CompactFlash (Type I/II) sockets x 1, up to 8 GB

**Ethernet Interface**
- **LAN:** Auto-sensing 10/100 Mbps ports (M12) x 2
- **Magnetic Isolation Protection:** 1.5 kV, built in

**GPS Module** (U-Blox LEA-6S)
- **Receiver Types:**
  - 50-channel U-blox 6 engine
  - GPS L1 C/A code
  - SBAS: WAAS, EGNOS, MSAS, GAGAN
- **Acquisition:**
  - Cold starts: 28 s
  - Warm starts: 28 s
  - Aided starts: 1 s
  - Hot starts: 1 s
- **Sensitivity:**
  - Tracking: -160 dBm
  - Reacquisition: -160 dBm
  - Cold starts: -147 dBm
- **Timing Accuracy:**
  - RMS: 30 ns
  - 99%: < 60 ns
  - Granularity: 21 ns
- **Accuracy:**
  - Position: 2.5 m CEP
  - SBAS: 2.0 m CEP
- **Protocols:** NMEA, UBX binary, 5 Hz max. update rate (ROM version)
- **Time Pulse:** 0.25 Hz to 1 kHz
- **Velocity Accuracy:** 0.1 m/s
- **Heading Accuracy:** 0.5 degrees
- **A-GPS:** Supports AssistNow Online and AssistNow Offline, OMA SUPL compliant

**Operational Limits:**
- **Velocity:** 500 m/s (972 knots)
- **Connector Type:** TNC

**WLAN Module** (Atheros AR9220)
- **WAPN001:** IEEE 802.11a/b/g/n wireless LAN module with TNC antenna connector
- **Standards:** IEEE 802.11a/b/g/n for wireless LAN
- **Connector Type:** QMA connectors (female type) x 2
- **Mode:** Client/AP

**Cellular Module** (Cinterion PH8)
- **Frequency Bands:** GSM/GPRS/EDGE/UMTS/HSPA+
- **Band Options:**
  - Five-band UMTS (WCDMA/FDD)
  - 800/850/1900 AWS and 2100 MHz
  - Quad-band GSM: 850/900/1800/1900 MHz
- **HSDPA/HSUPA Data Rates:**
  - DL: 3.6/7.2/14.4 Mbps; UL: 2.0/5.76 Mbps
- **UMTS Data Rates:**
  - DL: 384 kbps (max.); UL: 384 kbps (max.)
- **EDGE Class 12:**
  - DL: 237 kbps (max.); UL: 237 kbps (max.)
- **GPRS Class 12:**
  - DL: 85.6 kbps (max.); UL: 85.6 kbps (max.)
- **Connector Type:** QMA connector (female type)

**Serial Interface**
- **Serial Standards:** RS-232/422/485 software-selectable ports (DB9) x 2
- **Console Port:** RS-232 (TxD, RxD, GND), 4-pin pin header output (115200, n, 8, 1)

**Serial Communication Parameters**
- **Data Bits:** 5, 6, 7, 8
- **Stop Bits:** 1, 1.5, 2
- **Parity:** None, Even, Odd, Space, Mark
- **Flow Control:** RTS/CTS, XON/XOFF, ADDC® (Automatic Data Direction Control) for RS-485
- **Baudrate:** 50 bps to 921.6 kbps (supports nonstandard baudrates; see user’s manual for details)

**Serial Signals**
- **RS-232:** TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
- **RS-422:** TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-4w:** TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-2w:** Data+, Data-, GND
**Digital Input**
- **Input Channels:** DI x 4
- **Input Voltage:** 0 to 30 VDC
- **Digital Input Levels for Dry Contacts:**
  - Logic level 0: Close to GND
  - Logic level 1: Open
- **Digital Input Levels for Wet Contacts:**
  - Logic level 0: +3 V max.
  - Logic level 1: +10 V to +30 V (COM to DI)
- **Connector Type:** 10-pin screw-fastened terminal block (4 points, COM, GND)
- **Isolation:** 2 kV optical isolation

**Digital Output**
- **Output Channels:** DO x 4, sink type
- **Output Current:** 200 mA (max.) per channel
- **On-State Voltage:** 24 VDC nominal, open collector to 30 V
- **Connector Type:** 10-pin screw-fastened terminal block (4 points, GND)

**LEDs**
- **System:** Power, Ready, Storage, Programmable
- **LAN:** 10M x 2, 100M x 2 (on connector)
- **Serial:** TxD x 2, RxD x 2
- **Reset Button:** Supports “Reset to Factory Default”

**Physical Characteristics**
- **Housing:** SECC sheet metal (1 mm)
- **Weight:** 1.2 kg (2.67 lb)
- **Dimensions:** 200 x 57 x 120 mm (7.87 x 2.24 x 4.72 in)
- **Mounting:** DIN rail, wall

**Environmental Limits**
- **Operating Temperature:** -25 to 70°C (-13 to 158°F)
- **Storage Temperature:** -40 to 80°C (-40 to 176°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-Vibration:** IEC 61373 standard
- **Anti-Shock:** IEC 61373 standard

**Power Requirements**
- **Input Voltage:** 24 VDC (9 to 48 V), M12 connector
- **Input Current:** 833 mA @ 24 VDC
- **Power Consumption:** 20 W

**Standards and Certifications**
- **Safety:** UL 60950-1
- **EMC:** EN 55022 Class A, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, FCC Part 15 Subpart B Class A
- **Rail Traffic:** EN 50155*, EN 50121-3-2, EN 50121-4, IEC 61373
- ***Complies with a portion of EN 50155 specifications.**

**Reliability**
- **Alert Tools:** Built-in buzzer and RTC (real-time clock)
- **Automatic Reboot Trigger:** Built-in WDT (watchdog timer)
- **MTBF** (mean time between failures)
  - Time:
    - MAR-2002-T: 280,129 hrs
    - MAR-2001-T: 350,609 hrs
- **Standard:** Telcordia (Bellcore) Standard TR/SR

**Warranty**
- **Warranty Period:** 5 years (does not apply to cellular module)
- **Details:** See www.moxa.com/warranty

**Linux**
- **OS:** Linux 3.8.13
- **Terminal Server (SSH):** Provides secure encrypted communications between two untrusted hosts over an unsecure network
- **File System:** JFFS2, NFS, Ext2, Ext3, Ext4, UBIFS
- **Internet Protocol Suite:** TCP, UDP, IPv4, SNMPv2, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, PPP
- **Internet Security:** OpenVPN, IPTables Firewall, OpenSSL
- **Network Service:** Moxa’s Dynamic Routing and network management Web UI
- **GPS:** Uses gpsd, which is a daemon that receives data from a GPS receiver, and provides the data back to multiple applications such as Kismet or GPS navigation software
- **Application Development Software:**
  - Moxa API Library (Moxa serial I/O control, Moxa DI/DO API)
  - GNU C/C++ cross-compiler, supports EABI
  - GNU C library
  - GDB source-level debugging server
- **Software Protection:** Encryption tool for user executable files (based on patented Moxa technology)
## Ordering Information

<table>
<thead>
<tr>
<th>Type</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Name</td>
<td>MAR-2001-T</td>
</tr>
<tr>
<td>MAR-2000 Web Management Utility</td>
<td>Available</td>
</tr>
<tr>
<td>MAR-2000 Dynamic Routing</td>
<td>Available</td>
</tr>
<tr>
<td>CF Sockets</td>
<td>1</td>
</tr>
<tr>
<td>Cellular 3G (WCDMA)</td>
<td>2 quad-band GSM/GPRS, EDGE, five-band UMTS/HSPA+ industrial IP-modems</td>
</tr>
<tr>
<td>Wi-Fi</td>
<td>2 IEEE 802.11a/b/g/n dual-RF wireless AP/bridge/client</td>
</tr>
<tr>
<td>GPS</td>
<td>50-channel GPS module</td>
</tr>
<tr>
<td>Ethernet Ports</td>
<td>2</td>
</tr>
<tr>
<td>Serial Ports</td>
<td>2</td>
</tr>
<tr>
<td>DI/DO</td>
<td>4 Dis, 4 DOs</td>
</tr>
<tr>
<td>USB</td>
<td>2.0 host</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-25 to 70°C (-13 to 158°F), (EN 50155 Class T3)</td>
</tr>
<tr>
<td>Conformal Coating</td>
<td>Available by Request</td>
</tr>
</tbody>
</table>

### M12 Connectors (can be purchased separately)
- **M12A-5P-IP68**: Field-installable A-coded screw-fastened power connector, 5-pin female M12 connector, IP68-rated
- **M12D-4P-IP68**: Field-installable D-coded screw-fastened Ethernet connector, 4-pin male M12 connector, IP68-rated

### M12 Cables (can be purchased separately)
- **CBL-M12(FF5P)/Open-100 IP67**: 1-meter A-coded M12-to-5-pin power cable, 5-pin female M12 connector, IP67-rated
- **CBL-M12D(OM4P)/RJ45-100 IP67**: 1-meter D-coded M12-to-RJ45 Cat-5C UTP Ethernet cable, 4-pin male M12 connector, IP67-rated

### WLAN Cable and Antenna
- **Cable**: QMA (male) to SMA (male) adapter with 50 cm cable
- **Antenna**: 2 dual-band omnidirectional antennas (2 dBi, RP-SMA, 2.4/5 GHz)

### Cellular Cable and Antenna
- **Cable**: QMA (male) to SMA (female) adapter with 50 cm cable
- **Antenna**: Omni 1 dBi rubber SMA antenna

### GPS Cable and Antenna
- **Cable**: TNC to SMA (female) adapter with 50 cm cable
- **Antenna**: 26 dBi, 1572 MHz, L1 band antenna

### Package Checklist
- MAR-2000 programmable router
- Wall-mounting kit
- DIN-rail mounting kit
- CBL-4PIND9F-100: 100 cm console port cable
- 4 pin header connector to female DB9 connector
- Documentation and software CD or DVD
- Quick installation guide (printed)
W6000 Series

Compact, rugged, wireless computer with 3G/LTE, LAN, and 2 serial ports

> ARMv7 Cortex-A8 processor with 512 MB RAM
> Built-in high speed HSPA+, LTE, and GPS support
> -40 to 70°C LTE operating temperature for harsh environments
> Compact size: 100 x 60 x 22 mm
> Auto-sensing 10/100 Mbps Ethernet port
> Dual software-selectable RS-232/422/485 serial ports
> MicroSD socket for storage expansion
> Debian ARM 8 open platform
> Keep alive session persistence
> Wireless, secure-router computer

: Overview

The W6000 series computers are embedded Linux computers featuring 2 software selectable RS-232/422/485 ports, 1 Ethernet port, and LTE/US, HSPA, GPRS/GSM, and GPS for complex communication solutions. All W6000 computers come with a microSD socket for external storage expansion. The W6000 computers' Linux OS runs on the 32-bit ARM Cortex-A8 processor, which provides a powerful and reliable platform for harsh, industrial environments.

The W6000 is built around a low-power Cortex-A8 RISC processor and Debian ARM Linux OS that has been optimized for use in energy monitoring systems, but is widely applicable to a variety of industrial solutions. With powerful computing and multiple communication options, this tiny embedded computer is a reliable and secure gateway for data acquisition and processing at field sites as well as a useful communication platform to replace individual computers and routers for many other large-scale deployments.

: Appearance

Power Input (12-40 VDC)

10/100 Mbps Ethernet Port

Antennas (cellular/GPS/cellular)

LED Indicators

Signal Strength Indicators

DI x 4
DO x 4

SIM/Micro SD Card Cover

Console Port

Serial Ports x 2
(RS-232/422/485, terminal block)
# Hardware Specifications

## Computer
- **CPU:** ARMv7 Cortex-A8 300 MHz (600 MHz, 1 GHz by project)
- **USB:** USB 2.0 hosts x 1, type A connector
- **DRAM:** DDR3 SDRAM: 512 MB
- **OS (pre-installed):** Debian ARM 8 (Kernel 4.0)

## Storage
- **Storage Expansion:** MicroSD socket for storage expansion

## Ethernet Interface
- **LAN:** Auto-sensing 10/100 Mbps ports (RJ45) x 1
- **Magnetic Isolation Protection:** 1.5 kV, built-in

## Serial Interface
- **Serial Standards:** RS-232/422/485 ports, software-selectable (5-pin terminal block connector) x 1 or 2
- **Console Port:** RS-232 (TxD, RxD, GND), 4-pin pin header output (115200, n, 8, 1)

## Serial Communication Parameters
- **Data Bits:** 5, 6, 7, 8
- **Stop Bits:** 1, 1.5, 2
- **Parity:** None, Even, Odd, Space, Mark
- **Flow Control:** XON/XOFF, ADDC® (Automatic Data Direction Control) for RS-485
- **Baudrate:** 921600 bps (max.)

## Serial Signals
- **RS-232:** TxD, RxD, RTS, CTS, GND
- **RS-422:** TxD+, TxD-, RxO+, RxO-, GND
- **RS-485-4w:** TxD+, TxD-, RxO+, RxO-, GND
- **RS-485-2w:** Data+, Data-, GND

## Digital I/O
- **Digital Input:** 3.3V/TTL digital inputs x 4
- **Digital Output:** 3.3V/TTL digital outputs x 4

## LEDs
- **System:** Power x 1, cellular x 1, serial TX/RX x 2, signal strength x 5, user-defined x 1
- **LAN:** 10M/100M on connector

## Physical Characteristics
- **Housing:** Aluminum (1 mm)
- **Weight:** 875 g (1.94 lb)
- **Dimensions:** 111 x 25 x 77 mm (4.37 x 0.98 x 3.03 in)
- **Mounting:** Wall, DIN rail (with optional kit)

## Environmental Limits
- **Operating Temperature:** -40 to 70°C (-40 to 158°F)
- **Storage Temperature:** -40 to 85°C (-40 to 185°F)
- **Ambient Relative Humidity:** 5 to 95% (non-condensing)
- **Anti-Vibration:** 2 Grms @ IEC 60068-2-64, random wave, 5-500 Hz, 1 hr per axis
- **Anti-Shock:** 20 g @ IEC 60068-2-27, half sine wave, 30 ms

## Power Requirements
- **Input Voltage:** 9 to 40 VDC (3-pin terminal block, V+, V-, SG)
- **Input Current:**
  - 450 mA @ 12 VDC
  - 225 mA @ 24 VDC
- **Power Consumption:** 5.4 W

## Standards and Certifications
- **Safety:** UL 60950-1, EN 60950-1
- **EMC:** EN 55022 Class B, EN 55024-4-2, EN 55024-4-3, EN 55024-4-4, FCC Part 15 Subpart B Class A
- **Green Product:** RoHS, CRoHS, WEEE

## Reliability
- **Alert Tools:** Built-in RTC (real-time clock)
- **Automatic Reboot Trigger:** Built-in WDT (watchdog timer)

## Warranty
- **Warranty Period:** 5 years
- **Details:** See www.moxa.com/warranty
Software Specifications

Linux
OS: Debian ARM 8 (Kernel 4.0)
Web Server (Apache): Allows you to create and manage web sites; supports PHP and XML
Terminal Server (SSH): Provides secure encrypted communications between two untrusted hosts over an unsecure network
Kernel: GNU/Linux 4.0
System Shell: DASH (default), BASH
Text Editor: vim, nano
Internet Protocol Suite: TCP, UDP, IPv4, IPv6, SNMPv2, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SSH, PPP, SFTP, RSYNC, SSL
Programming Language Support: PHP, Perl, Python
Internet Security Suite: OpenVPN, IPTables
Cryptographic Hardware Accelerators: AES, SHA, OpenSSL
Linux Board Support Packages (BSP):
• GCC C/C++ cross development tool chain
• Bootloader/Kernel
Cellular Networking:
• WVDIAL: Point-to-Point Protocol dialer that dials a modem and uses the PPP protocol to connect to the Internet.
• QMI (Qualcomm MSM Interface): Glib-based library for talking to WWAN modems and devices that speak the Qualcomm MSM Interface (QMI) protocol.
• MODBUS: Software library to send/receive data according to the Modbus protocol. This library is written in C and supports RTU (serial) and TCP (Ethernet) communications.

Ordering Information

<table>
<thead>
<tr>
<th>Model</th>
<th>Antennas</th>
<th>Primary Network</th>
<th>Auxiliary Network</th>
<th>Serial Ports</th>
<th>LAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>W6393-T-LX-US</td>
<td>3</td>
<td>LTE-US</td>
<td>GPS</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>W6393-T-LX-EU</td>
<td>3</td>
<td>LTE-EU</td>
<td>GPS</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>W6273-T-LX</td>
<td>2</td>
<td>HSPA+</td>
<td>GPS</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Optional Accessories

Antennas and Internal Antenna Cables

<table>
<thead>
<tr>
<th>Antennas</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS</td>
<td>Active GPS antenna, 26 dBi, 1572 MHz, L1 band antenna for GPS</td>
</tr>
<tr>
<td>LTE</td>
<td>Multi-band antenna that covers 700-2700 MHz frequencies, specially designed for 2G, 3G, and 4G applications. Magnetic mounting is available.</td>
</tr>
<tr>
<td>LTE</td>
<td>LTE Stick antenna that covers 704-960/1710-2620 MHz, providing omnidirectional radiation with a gain of 4.5 dBi.</td>
</tr>
<tr>
<td>LTE</td>
<td>LTE stick antenna that covers 704-960/1710-2620 MHz with a gain of 5 dBi.</td>
</tr>
<tr>
<td>LTE</td>
<td>Multi-band antenna that covers 700-2700/2400-2500/5150-5850 MHz frequencies. Screw-fastened mounting and full IP67 waterproofing are available.</td>
</tr>
</tbody>
</table>

Package Checklist

• W6000 embedded computer
The UC-8100-ME-T computing platform is designed for embedded data acquisition applications. The computer comes with one or two RS-232/422/485 serial ports and dual 10/100 Mbps Ethernet LAN ports, as well as a Mini PCIe socket to support cellular modules. These versatile communication capabilities let users efficiently adapt the UC-8100-ME-T to a variety of complex communications solutions.

The UC-8100-ME-T is built around a Cortex-A8 RISC processor that has been optimized for use in energy monitoring systems, but is widely applicable to a variety of industrial solutions. With flexible interfacing options, this tiny embedded computer is a reliable and secure gateway for data acquisition and processing at field sites as well as a useful communication platform for many other large-scale deployments.

Wide temperature LTE-enabled models are available for extended temperature applications. All units are thoroughly tested in a testing chamber, guaranteeing that the LTE-enabled computing platforms are suitable for wide temperature applications.
## Dimensions

<table>
<thead>
<tr>
<th>Unit: mm (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.2 (0.36)</td>
</tr>
<tr>
<td>141 (5.55)</td>
</tr>
<tr>
<td>45.8 (1.80)</td>
</tr>
<tr>
<td>125.6 (4.94)</td>
</tr>
</tbody>
</table>

: **Hardware Specifications**

<table>
<thead>
<tr>
<th>Computer</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU: ARMv7 Cortex-A8 1000 MHz</td>
</tr>
<tr>
<td>USB: USB 2.0 host x 1 (type A connector)</td>
</tr>
<tr>
<td>DRAM:</td>
</tr>
<tr>
<td>UC-8112-ME-T-LX: 512 MB DDR3 SDRAM</td>
</tr>
<tr>
<td>UC-8112-ME-T-LX-US: 512 MB DDR3 SDRAM</td>
</tr>
<tr>
<td>OS (pre-installed): Debian ARM 7 (Kernel 3.2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Expansion:</td>
</tr>
<tr>
<td>• SDHC/SDXC socket for storage expansion</td>
</tr>
<tr>
<td>• 4 GB eMMC flash with OS pre-installed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ethernet Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAN: 2 auto-sensing 10/100 Mbps ports (RJ45)</td>
</tr>
<tr>
<td>Magnetic Isolation Protection: 1.5 kV built-in</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Serial Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial Standards: 1 or 2 RS-232/422/485 ports, software-selectable (5-pin terminal block connector)</td>
</tr>
<tr>
<td>Console Port: RS-232 (TxD, RxD, GND), 4-pin pin header output</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Serial Communication Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Bits: 5, 6, 7, 8</td>
</tr>
<tr>
<td>Stop Bits: 1, 1.5, 2</td>
</tr>
<tr>
<td>Parity: None, Even, Odd, Space, Mark</td>
</tr>
<tr>
<td>Flow Control: XON/XOFF, ADDC® (automatic data direction control)</td>
</tr>
<tr>
<td>Baudrate: 921600 bps (max.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing: SECC + Al 5052</td>
</tr>
<tr>
<td>Weight: 550 g (1.22 lb)</td>
</tr>
<tr>
<td>Dimensions: 141 x 119.9 x 36 mm (5.56 x 4.72 x 1.42 in)</td>
</tr>
<tr>
<td>Mounting: DIN rail, wall (with optional kit)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature:</td>
</tr>
<tr>
<td>Wide Temp. Models: -40 to 85°C (-40 to 185°F)</td>
</tr>
<tr>
<td>Wide Temp. models (with LTE accessory): -40 to 70°C (-40 to 158°F)</td>
</tr>
<tr>
<td>Storage Temperature: -40 to 85°C (-40 to 185°F)</td>
</tr>
<tr>
<td>Ambient Relative Humidity: 5 to 95% (non-condensing)</td>
</tr>
<tr>
<td>Anti-Vibration: 2 Grms @ IEC 60068-2-64, random wave, 5-500 Hz, 1 hr per axis (without any USB devices attached)</td>
</tr>
<tr>
<td>Anti-Shock: 20 g @ IEC 60068-2-27, half sine wave, 30 ms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Voltage: 12 to 24 VDC (3-pin terminal block, V+, V-, SG)</td>
</tr>
<tr>
<td>Input Current:</td>
</tr>
<tr>
<td>• 260 mA @ 12 VDC</td>
</tr>
<tr>
<td>• 135 mA @ 24 VDC</td>
</tr>
<tr>
<td>Power Consumption: 3.24 W (without cellular module and external USB device attached)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standards and Certifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety: UL 60950-1, EN 60950-1</td>
</tr>
<tr>
<td>EMC: EN 55022 Class B, EN 55024-4-2, EN 55024-4-3, EN 55024-4-4, FCC Part 15 Subpart B Class A</td>
</tr>
<tr>
<td>Green Product: RoHS, CRoHS, WEEE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alert Tools: External RTC (real-time clock)</td>
</tr>
<tr>
<td>Automatic Reboot Trigger: External WDT (watchdog timer)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Warranty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warranty Period: 5 years</td>
</tr>
<tr>
<td>Details: See <a href="http://www.moxa.com/warranty">www.moxa.com/warranty</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switches and Buttons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Push Button: Initially configured to return a diagnostic report, and to reset the device to factory defaults</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>System: Power x 1, USB x 1, SD x 1, signal strength x 3</td>
</tr>
<tr>
<td>LAN: 10M/100M on connector</td>
</tr>
<tr>
<td>Programmable: Diagnosis x 3</td>
</tr>
</tbody>
</table>
Software Specifications

Linux
OS: Debian ARM 8
Web Server (Apache): Allows you to create and manage web sites; supports PHP and XML
Terminal Server (SSH): Provides secure encrypted communications between two untrusted hosts over an unsecure network
Kernel: GNU/Linux 4.0
System Shell: DASH (default), BASH
Text Editor: vim, nano
Internet Protocol Suite: TCP, UDP, IPv4, IPv6, SNMPv2, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SSH, PPP, SFTP, RSYNC, SSL
Programming Language Support: PHP, Perl, Python
Internet Security Suite: OpenVPN, IPTables
Cryptographic Hardware Accelerators: AES, SHA, OpenSSL
Self Diagnosis: Check status of system and hardware component via software method
Linux Board Support Packages (BSP):
• GCC C/C++ cross development tool chain
• Bootloader/ Kernel/ filesystem
Cellular Networking:
• WVDIAL: Point-to-Point Protocol dialer that dials a modem and starts pppd to connect to the Internet.
• QMI (Qualcomm MSM Interface): Glib-based library for talking to WWAN modems and devices that speak the Qualcomm MSM Interface (QMI) protocol.

Ordering Information

<table>
<thead>
<tr>
<th>Model</th>
<th>CPU</th>
<th>RAM</th>
<th>Serial</th>
<th>Ethernet</th>
<th>SD Card Slot</th>
<th>USB</th>
<th>Operating Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC-8112-ME-T-LX</td>
<td>1 Ghz</td>
<td>512 MB</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>-40 to 85°C</td>
</tr>
<tr>
<td>UC-8112-ME-T-LX-LTE-US</td>
<td>1 Ghz</td>
<td>512 MB</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>-40 to 70°C</td>
</tr>
</tbody>
</table>

Package Checklist
• UC-8100-ME-T embedded computer
• Power jack
• 3-pin terminal block for power
• 5-pin terminal block for UART x 2
• Quick installation guide (printed)
• Warranty card
## Optional Accessories (can be purchased separately)

### Power Adapters, Power Cords, Console Cables

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Package Contents</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PWR-24250-DT-S1</td>
<td>• Power Adapter x 1</td>
<td>Power adapter for testing and system development indoors under ambient temperature conditions (input: 100 to 240 VAC, 50 to 60 Hz, 1.5 A; output: 24 VDC, 2.5 A, 60 W)</td>
</tr>
<tr>
<td>PWC-C7US-2B-183</td>
<td>• Power Cord x 1</td>
<td>10A/125V North American (US) power cord, 183 cm</td>
</tr>
<tr>
<td>PWC-C7EU-2B-183</td>
<td>• Power Cord x 1</td>
<td>10A/250V Continental European (EU) power cord, 183 cm</td>
</tr>
<tr>
<td>PWC-C7UK-2B-183</td>
<td>• Power Cord x 1</td>
<td>10A/250V United Kingdom (UK) power cord, 183 cm</td>
</tr>
<tr>
<td>PWC-C7AU-2B-183</td>
<td>• Power Cord x 1</td>
<td>2.5A/250V Australian (AU) power cord, 183 cm</td>
</tr>
<tr>
<td>PWC-C7CN-2B-183</td>
<td>• Power Cord x 1</td>
<td>10A/250V China (CN) power cord, 183 cm</td>
</tr>
<tr>
<td>CBL-F9DPF1x4-BK-100</td>
<td>• Console Cable x 1</td>
<td>Console cable with 4-pin connector</td>
</tr>
</tbody>
</table>

### Wireless Packages

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Package Contents</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME-CELLULAR-LTE-EU</td>
<td>• Cellular module x 1</td>
<td>LTE regions: Asia, Europe, Australia, New Zealand (compatible with LTE/EU, HSPA+, GPRS/GSM, and GPS)</td>
</tr>
<tr>
<td></td>
<td>• i-PEX MHF to SMA adapter with cable x 3</td>
<td>LTE: B1, B3, B7, B8, B20, UMTS/HSPA+: B1, B2, B3, B6, B8</td>
</tr>
<tr>
<td></td>
<td>• Mini PCI/e mount screw sets x 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Heat sink x 1</td>
<td></td>
</tr>
<tr>
<td>ME-CELLULAR-LTE-US</td>
<td>• Cellular module x 1</td>
<td>LTE regions: North America (compatible with LTE/US, HSPA, GPRS/GSM, and GPS)</td>
</tr>
<tr>
<td></td>
<td>• i-PEX MHF to SMA adapter with cable x 3</td>
<td>LTE: B2, B4, B5, B13, B17, B25, UMTS/HSPA+: B1, B2, B4, B5, B8</td>
</tr>
<tr>
<td></td>
<td>• Mini PCI/e mount screw sets x 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Heat sink x 1</td>
<td></td>
</tr>
<tr>
<td>ME-WiFi-BGN</td>
<td>• Wi-Fi module x 1</td>
<td>(compatible with IEEE 802.11b/g/n) 2.4 Ghz only</td>
</tr>
<tr>
<td></td>
<td>• i-PEX MHF to RP-SMA adapter with cable x 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Mini PCI/e mount screw sets x 2</td>
<td></td>
</tr>
</tbody>
</table>

### Antennas and Internal Antenna Cables

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Package Contents</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANT-GPS-OSM-05-3M</td>
<td>• GPS Antenna x 1</td>
<td>Active GPS antenna, 26 dBi, 1572 MHz, L1 band antenna for GPS</td>
</tr>
<tr>
<td>ANT-LTE-OSM-03-3m BK</td>
<td>• LTE Antenna x 1</td>
<td>Multi-band antenna that covers 700-2700 MHz. Specially designed for 2G, 3G, and 4G applications. Magnetic mounting is available.</td>
</tr>
<tr>
<td>ANT-LTE-ASM-04 BK</td>
<td>• LTE Antenna x 1</td>
<td>LTE Stick antenna that covers 704-960/1710-2620 MHz providing omni-directional radiation with a gain of 4.5 dBi.</td>
</tr>
<tr>
<td>ANT-LTE-ASM-05 BK</td>
<td>• LTE Antenna x 1</td>
<td>LTE stick antenna that covers 704-960/1710-2620 MHz with a gain of 5 dBi.</td>
</tr>
<tr>
<td>ANT-LTE-OSM-06-3m BK MIMO</td>
<td>• LTE Antenna x 1</td>
<td>Multi-band antenna that covers 700-2700/2400-2500/5150-5850 MHz frequencies. Screw-fastened mounting and full waterproofing are available.</td>
</tr>
<tr>
<td>CRF-MHF/SMa(M)-14.2</td>
<td>• Wi-Fi Antenna x 1</td>
<td>RP-SMA male antenna for Wi-Fi; supports 2.4 GHz band.</td>
</tr>
<tr>
<td>A-CRF-MHFSF</td>
<td>• Cellular antenna cable x 1</td>
<td>i-PEX MHF (male, on cellular module) to SMA (female, on top cover) adapter with cable. Used to install a GPS antenna or second cellular antenna.</td>
</tr>
<tr>
<td>CRF-MHF/SMa(M)-14.2</td>
<td>• Wi-Fi antenna cable x 1</td>
<td>i-PEX MHF (male, on cellular module) to RP-SMA (female, on top cover) adapter with cable. Used to install a second Wi-Fi antenna.</td>
</tr>
</tbody>
</table>

### Mounting Kits

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Package Contents</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>• Wall-mounting kit x 1</td>
<td>Wall-mounting kit with screws</td>
</tr>
</tbody>
</table>
**UC-8410A Series**

Highly efficient, security-enabled, wireless platform that supports a rich set of interfaces

- Freescale LS1021A Coretex-A7 1 GHz dual-core processor
- 512 MB DDR3 SDRAM
- 8 RS-232/422/485 serial ports
- 3 10/100/1000 Mbps Ethernet ports
- Wireless-enabled with PCIe mini slot
- 2 USB 2.0 hosts for mass storage devices
- DIN-rail or wall-mounting installation
- Robust, fanless design
- -40 to 75°C wide temperature model available
- Ready-to-run Debian ARM 8

---

**Overview**

The UC-8410A Series embedded computers support a rich collection of communication interfaces, including 8 RS-232/422/485 serial ports, 3 Ethernet ports, 1 PCIe mini slot for a wireless module, 4 digital input channels, 4 digital output channels, 1 mSATA slot, and 2 USB 2.0 hosts.

The UC-8410A computer uses the Freescale Cortex-A7 dual-core 1 GHz RISC CPU. This powerful computing engine supports several useful communications functions, without generating too much heat. The built-in 1 GB SD card and 512 MB DDR3 SDRAM give you enough memory to run your application software, and the mSATA slot provides the flexibility of adding additional data storage. The UC-8410A comes with a variety of communication interfaces, including serial ports, Ethernet ports, wireless communication slot, and digital input/output channels, making them ideal as communication platforms for industrial applications that require network and device communications.

The UC-8410A Series comes with Linux Debian 8 pre-installed to provide an open software operating system for software program development. This makes the UC-8410A computer an optimal solution for use with industrial applications, but at minimal cost and effort. In addition to the standard model, a -40 to 75°C wide temperature model is also available for harsh industrial environments.

---

**Appearance**

Front View

Rear View
Hardware Specifications

Computer
CPU: ARMv7 Cortex-A7 dual-core 1 GHz
USB: USB 2.0 hosts x 2, Type A connector
DRAM: 512 MB DDR3 SDRAM onboard (up to 1 GB, by CV request)
OS (pre-installed): Debian ARM 8

Storage
Main Storage: 1 GB SD card for OS
Storage Expansion: mSATA slot

Ethernet Interface
LAN: Auto-sensing 10/100/1000 Mbps ports (RJ45) x 3
Magnetic Isolation Protection: 1.5 kV built-in

Serial Interface
Serial Standards: RS-232/422/485 software-selectable ports (8-pin RJ45) x 8
Console Port: RS-232 (TxD, RxD, GND), 4-pin header output (115200, n, 8, 1)

Serial Communication Parameters
Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
Baudrate: 50 bps to 115.2 kbps (supports nonstandard baudrates; see user’s manual for details)

Serial Signals
RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
RS-422: TxD+, TxD-, RxD+, RxD-, GND
RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
RS-485-2w: Data+, Data-, GND

Digital Input
Input Channels: DI x 4
Input Voltage: 0 to 30 VDC
Digital Input Levels for Dry Contacts:
  • Logic level 0: Close to GND
  • Logic level 1: Open
Digital Input Levels for Wet Contacts:
  • Logic level 0: +10 to +30 V (COM to DI)
  • Logic level 1: +3 V max.
Connector Type: 10-pin screw terminal block (4 points, COM, GND)
Isolation: 3 kV optical isolation

Digital Output
Output Channels: 4, sink type
Output Current: Max. 200 mA per channel
On-State Voltage: 24 VDC nominal, open-drain to 30 V
Connector Type: 10-pin screw terminal block (4 points, GND)
Isolation: 3 kV optical isolation

LEDs
System: Power, Ready, Storage, Diagnostic, Wireless signal strength
LAN: 100M/Link/Act x 3, 1000M/Link/Act x 3 (on connector)
Serial: TxD x 8, RxD x 8 (on connector)
Reset Button: Supports “Reset to Factory Default and System diagnostics”

Physical Characteristics
Housing: SECC sheet metal (1 mm)
Weight: 1 kg (2.21 lb)
Dimensions: 200 x 120 x 48.6 mm (7.87 x 4.72 x 1.91 in)
Mounting: DIN-rail, wall

Environmental Limits
Operating Temperature:
Standard Models: -10 to 60°C (14 to 140°F)
Wide Temp. Models: -40 to 75°C (-40 to 167°F)
Storage Temperature:
Standard Models: -20 to 75°C (-4 to 167°F)
Wide Temp. Models: -40 to 85°C (-40 to 185°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)
Anti-Vibration: 2 Grms @ IEC-68-2-34, random wave, 5-500 Hz, 1 hr per axis
Anti-Shock: 20 g @ IEC-68-2-27, half sine wave, 11 ms

Power Requirements
Input Voltage: 12 to 48 VDC (3-pin terminal block)
Input Current:
  • 1570 mA @ 12 VDC
  • 420 mA @ 24 VDC
Power Consumption: 18 W

Standards and Certifications
Safety: UL 60950-1, CCC (GB9254, GB17625.1)
EMC: EN 55022 Class A, EN 55024-4-2, EN 55024-4-3, EN 55024-4-4, FCC Part 15 Subpart B Class B

Reliability
Alert Tools: Built-in buzzer and RTC (real-time clock)
Automatic Reboot Trigger: Built-in WDT (watchdog timer)

Warranty
Warranty Period: 5 years
Details: See www.moxa.com/warranty

Note: The Hardware Specifications apply to the embedded computer unit itself, but not to accessories. In particular, the wide temperature specification does not apply to accessories such as the power adapter and cables.
Software Specifications

**Linux**
- OS: Debian ARM 8
- **Web Server (Apache):** Allows you to create and manage web sites; supports PHP and XML
- **Terminal Server (SSH):** SSH allows remote logins to a secure encrypted console from any connected network
- **Kernel:**
  - GNU/Linux 3.12
  - System Shell: DASH, BASH
  - Text Editor: vim, nano
- **File System:** Ext2, Ext3, Ext4
- **Internet Protocol Suite:** TCP, UDP, IPv4, IPv6, SNMPv2, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SSH, PPP, SFTP, RSYNC, SSL
- **Programming Language Support:** PHP, Perl, Python
- **Internet Security:** OpenVPN, iptables
- **Cryptographic Hardware Accelerators:** AES, SHA, OpenSSL
- **Self Diagnosis:** Check status of system and hardware component via software method

**Linux Board Support Packages (BSP):** GCC C/C++ cross development tool chain
- **Bootloader/Kernel/filesystem**
- **Cellular Networking:** Allows Unix machines to connect to the Internpppd to connect to the Internet.
- **Watchdog:** Features a hardware function to trigger system reset in a user specified time interval (Linux standard provided)

**Application Development Software:**
- Moxa API Library (Watchdog timer, Moxa serial I/O control, Moxa DI/DO API)
- GNU C/C++ cross-compiler
- GNU C library
- GDB source-level debugging server
- **Software Protection:** Encryption tool for user executable files (based on patented Moxa technology)

**Dimensions**

```
+-------------------+-------------------+-------------------+
| 70 (2.8)          | 70 (2.8)          | 70 (2.8)          |
| 45.54 (1.8)       | 45.54 (1.8)       | 45.54 (1.8)       |
| 120.2 (4.7)       | 120.2 (4.7)       | 120.2 (4.7)       |
| 12 (0.5)          | 12 (0.5)          | 12 (0.5)          |
| 4 (0.2)           | 4 (0.2)           | 4 (0.2)           |
| 228 (9)           | 228 (9)           | 228 (9)           |
| 214 (8.4)         | 214 (8.4)         | 214 (8.4)         |
| 200 (7.9)         | 200 (7.9)         | 200 (7.9)         |
+-------------------+-------------------+-------------------+
| 20 (0.8)          | 20 (0.8)          | 20 (0.8)          |
+-------------------+-------------------+-------------------+
| 4 (0.2)           | 4 (0.2)           | 4 (0.2)           |
+-------------------+-------------------+-------------------+
| 20 (0.8)          | 20 (0.8)          | 20 (0.8)          |
| 20 (0.8)          | 20 (0.8)          | 20 (0.8)          |
| 20 (0.8)          | 20 (0.8)          | 20 (0.8)          |
| 20 (0.8)          | 20 (0.8)          | 20 (0.8)          |
| 20 (0.8)          | 20 (0.8)          | 20 (0.8)          |
+-------------------+-------------------+-------------------+
| 200 (7.9)         | 200 (7.9)         | 200 (7.9)         |
+-------------------+-------------------+-------------------+
| 70 (2.8)          | 70 (2.8)          | 70 (2.8)          |
| 45.54 (1.8)       | 45.54 (1.8)       | 45.54 (1.8)       |
+-------------------+-------------------+-------------------+
| 4 (0.2)           | 4 (0.2)           | 4 (0.2)           |
+-------------------+-------------------+-------------------+

**Ordering Information**

**Available Models**
- **UC-8410A-LX:** Cortext-A7 1 GHz dual-core RISC-based computer, 1 GB SD card, 512 MB DDR3L, serial ports x 8, DIs x 4, DOs x 4, LANs x 3, wireless enabled, mSATA slots x 1, USB, Debian ARM8, -10 to 60°C operating temperature
- **UC-8410A-T-LX:** Cortext-A7 1 GHz dual-core RISC-based computer, 1 GB SD card, 512 MB DDR3L, serial ports x 8, DIs x 4, DOs x 4, LANs x 3, wireless enabled, mSATA slots x 1, USB, Debian ARM8, -40 to 75°C operating temperature

**Package Checklist**
- UC-8410A embedded computer
- Wall-mounting kit
- DIN-rail mounting kit
- Power jack
- 3-pin terminal block for power
- CBL-4PINDB9F-100: 4-pin pin header to DB9 female console port cable, 100 cm
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card
## Embedded CPU Modules

<table>
<thead>
<tr>
<th>Product Selection Guide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Embedded CPU Modules.</td>
</tr>
<tr>
<td>28-2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Embedded CPU Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EM-2260 Series</strong>: RISC embedded core modules with 4 serial port DI/DO, dual LANs, VGA, CompactFlash, USB</td>
</tr>
<tr>
<td><strong>EM-1220 Series</strong>: RISC ready-to-run embedded core modules with 2 serial ports, dual LANs, SD</td>
</tr>
<tr>
<td><strong>EM-1240 Series</strong>: RISC ready-to-run embedded core modules with 4 serial ports, dual LANs, SD</td>
</tr>
</tbody>
</table>
# Embedded CPU Modules

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Speed</td>
<td>200 MHz</td>
<td>200 MHz</td>
<td>192 MHz</td>
<td>192 MHz</td>
<td>192 MHz</td>
<td>192 MHz</td>
</tr>
<tr>
<td>OS (pre-installed)</td>
<td>WinCE 6.0</td>
<td>Linux</td>
<td>Embedded μClinux</td>
<td>Embedded μClinux</td>
<td>Embedded μClinux</td>
<td>Embedded μClinux</td>
</tr>
<tr>
<td>DRAM</td>
<td>128 MB</td>
<td>128 MB</td>
<td>16 MB</td>
<td>16 MB</td>
<td>16 MB</td>
<td>16 MB</td>
</tr>
<tr>
<td>Flash</td>
<td>32 MB</td>
<td>32 MB</td>
<td>8 MB</td>
<td>8 MB</td>
<td>8 MB</td>
<td>8 MB</td>
</tr>
<tr>
<td>Digital I/O</td>
<td>8 DI, 8 DOs</td>
<td>8 DI, 8 DOs</td>
<td>10 GPIOs</td>
<td>10 GPIOs</td>
<td>10 GPIOs</td>
<td>10 GPIOs</td>
</tr>
</tbody>
</table>

## Storage
- SD Slot: – | – | – | – | – | – | – |
- SDI Interface: ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## Display
- Graphics Controller: ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
- LAN Interface: 10/100 Mbps Ethernet Ports: 2 | 2 | 2 | 2 | 2 | 2 | 2 |
- Magnetic Isolation Protection: 1.5 kV | 1.5 kV | 1.5 kV | 1.5 kV | 1.5 kV | 1.5 kV | 1.5 kV |

## Serial Interface
- RS-232/422/485 Ports: 4 | 4 | 2 | 2 | 4 | 4 | 4 |
- ESD Protection: 15 kV | 15 kV | 15 kV | 15 kV | 15 kV | 15 kV | 15 kV |
- Console Port: ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## Serial Communication Parameters
- Data Bits: 5, 6, 7, 8; Stop Bits: 1, 1.5, 2; Parity: None, Even, Odd, Space, Mark

## Flow Control
- RTS/CTS, XON/XOFF, AODC

## Baudrate
- 50 bps to 921.6 Kbps (nonstandard baudrates supported; see user’s manual for details)

## Physical Characteristics
| Weight | 70 g (0.16 lb) | 40 g (0.09 lb) | 50 g (0.11 lb) |
| Dimensions | 106 x 87 mm (4.17 x 3.43 in) | 80 x 50 mm (3.15 x 1.97 in) | 90 x 80 mm (3.54 x 3.15 in) |
| Module Interface | – | – | Two 2 x 28 pin-headers (1.27 x 1.27 mm pitch) |

## Environmental Limits

### Operating Temperature
- -10 to 60°C (-14 to 140°F) | -10 to 60°C (-14 to 140°F) | -10 to 60°C (-14 to 140°F) | -40 to 75°C (-40 to 167°F) | -10 to 60°C (-14 to 140°F) | -40 to 75°C (-40 to 167°F) |

### Storage Temperature
- -20 to 80°C (-4 to 176°F) | -20 to 80°C (-4 to 176°F) | -20 to 80°C (-4 to 176°F) | -40 to 85°C (-40 to 185°F) | -20 to 80°C (-4 to 176°F) | -40 to 85°C (-40 to 185°F) |

### Ambient Relative Humidity
- 5 to 95% RH | 5 to 95% RH | 5 to 95% RH | 5 to 95% RH | 5 to 95% RH | 5 to 95% RH |

## Regulatory Approvals

### EMC
- EN 55022 Class A, EN 61000-3-2 Class A, EN 61000-3-3, EN 55024, FCC Part 15 Subpart B Class A
- CE (EN55022 Class A, EN61000-3-2 Class A, EN61000-3-3, EN65024), FCC (Part 15 Subpart B, CISPR 22 Class A)

## Green Product
- RoHS, CrRoHS, WEEE

## Reliability
- Buzzer, RTC, WDT: ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

## Warranty
- 5 years (see www.moxa.com/warranty)
EM-2260 Series

RISC embedded core modules with 4 serial ports, 8 DIs, 8 DOs, dual LANs, VGA, CompactFlash, USB

> Cirrus Logic EP9315 ARM9 CPU, 200 MHz
> 128 MB RAM onboard, 32 MB flash disk
> Graphical interface for external VGA output connection
> 2 kV optically isolated RS-232/422/485 serial ports
> Dual 10/100 Mbps Ethernet ports for network redundancy
> 8 DI and 8 DO channels
> Supports CompactFlash and USB 2.0 hosts
> Ready-to-run WinCE 6.0 platform
> Full-function development kit for quick evaluation and application development

: Overview

The EM-2260 embedded module features 4 RS-232/422/485 serial ports, dual Ethernet ports, and an EIDE interface for designing an external storage connection, such as a CompactFlash socket or USB port signals. The module has a compact design that is easily integrated with a variety of industrial applications, including gas stations, vending machines, and ticketing machines, and offers a powerful serial communication capability for better system integration. Programmers will find the pre-installed, ready-to-run Windows CE 6.0 platform and full-function development kit a great benefit when developing software and building reliable communication bases for industrial automation applications.

The EM-2260 embedded module uses the Cirrus Logic EP9315 ARM9, 32-bit, 200 MHz RISC CPU. This powerful computing engine supports several useful communication functions, but will not generate a lot of heat. The built-in 32 MB NOR Flash ROM and 128 MB SDRAM give you enough memory to run your application software directly on the EM-2260. With its built-in VGA output interface, the EM-2260 is suitable for use with SCADA systems in industrial applications, such as manufacturing automation, production line process monitoring, and mining automation, that require VGA and HMI features.

The EM-2260 Development Kit provides users with a handy tool for first time evaluation to test the functionality of the embedded core module. It has several peripherals built-in, including RS-232/422/485 ports and digital input and output, making it suitable for developing a variety of industrial applications.

: Appearance

EM-2260 Embedded Module
Development Kit

Hardware Specifications

**Computer**
- **CPU**: Cirrus Logic EP9315 ARM9 CPU, 200 MHz
- **DRAM**: SDRAM, 128 MB
- **Flash**: NOR Flash, 32 MB
- **OS (pre-installed)**: Linux or Windows CE 6.0

**Storage**
- **Storage Expansion**: EIDE interface for connecting up to 2 external devices

**Display**
- **Graphics Controller**: EP9315 internal graphics accelerator engine with TTL graphical signal support
- **Display Memory**: Dynamic video memory (shares system memory)
- **Resolution**: 1024 x 768, 8 bits

**Ethernet Interface**
- **LAN**: Auto-sensing 10/100 Mbps ports (RJ45) x 2
- **Magnetic Isolation Protection**: 1.5 kV built-in

**Serial Interface**
- **Serial Standards**: RS-232/422/485 ports x 4, software-selectable
- **Console Port**: RS-232 (TxD, RxD, GND), 4-pin pin header output

**Serial Communication Parameters**
- **Data Bits**: 5, 6, 7, 8
- **Stop Bits**: 1, 1.5, 2
- **Parity**: None, Even, Odd, Space, Mark
- **Flow Control**: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
- **Baudrate**: 50 bps to 921,600 bps (supports nonstandard baudrates; see user’s manual for details)

**Serial Signals**
- **TTL**: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
- **RS-232**: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
- **RS-422**: TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-4w**: TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-2w**: Data+, Data-, GND

**Digital Input**
- **Input Channels**: DI x 8
- **Input Voltage**: 3.3 V, CMOS level

**Digital Output**
- **Output Channels**: DO x 8
- **Digital Output Levels**: 3.3 V, CMOS level

**Switches and Buttons**
- **Reset Button**: Supports “Reset to Factory Default”

**Physical Characteristics**
- **Weight**: 70 g (0.16 lb)
- **Dimensions**: 106 x 87 mm (4.17 x 3.43 in)

**Environmental Limits**
- **Operating Temperature**: -10 to 60°C (-14 to 140°F)
- **Storage Temperature**: -20 to 80°C (-4 to 176°F)
- **Ambient Relative Humidity**: 5 to 95% (non-condensing)

**Power Requirements**
- **Input Voltage**: 12 VDC
- **Input Current**: 480 mA @ 12 VDC
- **Power Consumption**: 5.8 W

**Standards and Certifications**
- **EMC**: EN 55022 Class A, EN 61000-3-2 Class A, EN 61000-3-3, EN 55024, FCC Part 15 Subpart B Class A
- **Green Product**: RoHS, CRoHS, WEEE

**Reliability**
- **Alert Tools**: Built-in buzzer and RTC (real-time clock)
- **Automatic Reboot Trigger**: Built-in WDT (watchdog timer)

**MTBF** (mean time between failures)
- **Time**: 131,832 hrs

**Warranty**
- **Warranty Period**: 5 years
- **Details**: See www.moxa.com/warranty
Software Specifications

**Linux**

OS: Linux 2.6.23

Web Server (Apache): Allows you to create and manage web sites

Terminal Server (SSH): Provides secure encrypted communications between two untrusted hosts over an unsecured network

File System: JFFS2, NFS, Ext2, Ext3

Internet Protocol Suite: TCP, UDP, IPv4, SNMPv1/v2c/v3, IGMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, Telnet, FTP, TFTP, PPP, PPPoE

Internet Security: OpenVPN, iptables Firewall

Dial-up Networking: PPP Daemon (pppd) for Linux that uses the PPP protocol and allows Unix machines to connect to the Internet as PPP servers or clients, through dialup. The PPP Daemon works with chat, dip, and dialup programs among others, and supports the IP, TCP, UDP, and IPX for Linux (Novell) protocols.

Watchdog: Features a hardware function to trigger system reset based on a user-specified time interval (Moxa API provided)

Application Development Software: Moxa API Library (Watchdog timer, Moxa serial I/O control, Moxa DI/DO API)

GNU C/C++ cross-compiler

GNU C library

GDB source-level debugging server

Software Protection: Encryption tool for user executable files (based on patented Moxa technology)

**Windows Embedded CE 6.0**

OS: Windows Embedded CE 6.0

File System: FAT (for onboard flash)

Internet Protocol Suite: TCP, UDP, IPv4, SNMPv2, ICMP, IGMP, ARP, HTTP, CHAP, PAP, SSL, DHCP, SNTP, SMTP, Telnet, FTP, TFTP, PPP

Web Server (WinCE IIS): Supports ASP, ISAPI Secure Socket Layer (SSL 2/3) and Transport Layer Security (TLS/SSL 3.1) public key-based protocols, and Web Administration ISAPI Extensions

Dial-up Networking: Supports RAS client API and PPP, Extensible Authentication Protocol (EAP), and RAS scripting

File Server: Enables remote clients to access files and other resources over the network

Watchdog: Features a hardware function to trigger system reset based on a user-specified time interval. (Moxa API provided)

Application Development Software: Moxa WinCE 6.0 SDK

Moxa API Library

C Libraries and Run-times

Component Services (COM and DCOM)

Microsoft® .NET Compact Framework 2.0

XML, including DOM, XQL, XPATH, XSLT, SAX, SAX2

SOAP Toolkit Client

Winsock 2.2

Dimensions

Unit: mm (inch)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>146 (5.75)</td>
<td>106 (4.17)</td>
</tr>
<tr>
<td>110 (4.33)</td>
<td>87 (3.43)</td>
</tr>
</tbody>
</table>

Ordering Information

Available Models

EM-2260-CE: RISC-based embedded core module with 4 serial ports, 8 DI and 8 DO channels, dual LANs, VGA, CompactFlash, USB, WinCE 6.0 OS

EM-2260-LX: RISC-based embedded core module with 4 serial ports, 8 DI and 8 DO channels, dual LANs, VGA, CompactFlash, USB, Linux OS

Development Kits (can be purchased separately)

EM-2260-CE Development Kit: Includes the EM-2260-CE module and EM-2260-DK carrier board for testing and application development

EM-2260-LX Development Kit: Includes the EM-2260-LX module and EM-2260-DK carrier board for testing and application development

Package Checklist (modules)

- EM-2260-CE or EM-2260-LX module

Package Checklist (development kits)

- EM-2260 module
- EM-2260-DK, the carrier board for the EM-2260 module
- Universal power adapter set
- Ethernet cable: RJ45-to-RJ45 cross-over cable, 100 cm
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card
EM-1220 Series

RISC ready-to-run embedded core modules with 2 serial ports, dual LANs, SD

- MOXA ART ARM9 32-bit 192 MHz processor
- 16 MB RAM, 8 MB flash disk onboard
- 2 software-selectable RS-232/422/485 serial ports
- Dual 10/100 Mbps Ethernet ports for network redundancy
- SD signals supported for external SD socket connection
- Built-in RTC, buzzer
- 10 GPIOs reserved for system integration
- Ready-to-run μClinux Kernel 2.6 platform
- Full-function development kit for quick evaluation and application development
- -40 to 75°C wide temperature models available

Overview

The EM-1220 embedded module features 2 RS-232/422/485 serial ports, dual Ethernet ports, and an SD socket for external storage expansion. The module has a compact design that can be easily integrated with industrial applications such as gas stations, vending machines, and ticketing machines, and offers a powerful serial communication capability for better system integration. Programmers will find that the pre-installed, ready-to-run μClinux platform and the full-function development kit make it easy to develop software and build a reliable communication base for industrial automation applications. In addition, a wide temperature model is also available to provide a reliable solution for harsh environments.

Appearance

EM-1220 Embedded Module

Top View

- MOXA ART ARM9 32-bit Communication Processor
- Onboard 16 MB RAM

Bottom View

- Onboard Intel NOR Flash 8 MB

Development Kit

- LAN Port 1
- LAN Port 2
- Power Input
- Serial Port 1
- Serial Port 2
- EM-1220 Embedded Module
Hardware Specifications

Computer
CPU: MOXA ART ARM9 32-bit, 192 MHz
DRAM: SDRAM, 16 MB
Flash: NOR Flash, 8 MB
OS (pre-installed): Linux

Storage
Storage Expansion: SD sockets x 1

Ethernet Interface
LAN: Auto-sensing 10/100 Mbps ports (RJ45) x 2

Serial Interface
Serial Standards: RS-232/422/485 x 2, software-selectable
ESD Protection: 15 kV for all signals
Console Port: TTL signal, 4-pin pin header output

Serial Communication Parameters
Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
Baudrate: 50 bps to 921.6 kbps (supports nonstandard baudrates; see user’s manual for details)

Serial Signals
RS-232: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
RS-422: TxD+, TxD-, RxD+, RxD-, GND
RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
RS-485-2w: Data+, Data-, GND

LEDs
System: Ready
LAN: 10M/Link x 2, 100M/Link x 2
Serial: TxD x 2, RxD x 2

Software Specifications
μClinux
OS: μClinux 2.6.19
File System: JFFS2
Internet Protocol Suite: TCP, UDP, IPv4, SNMPv1, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SMTP, Telnet, FTP, TFTP, PPP, PPPoE
Web Server (Boa): Allows you to create and manage web sites
Terminal Server (Telnet): Provides telnet communications between two hosts over the network

Dimensions

EM-1220

Unit: mm (inch)

EM-1220-DK

Unit: mm (inch)

Physical Characteristics
Weight:
- EM-1220 Module: 40 g (0.09 lb)
- EM-1220 Development Kit: 120 g (0.27 lb)

Dimensions:
- EM-1220 Module: 80 x 50 mm (3.15 x 1.97 in)
- EM-1220 Development Kit: 117 x 70 mm (4.61 x 2.76 in)

Module Interface: Two 2-by-17 pin-headers (2.5 x 2.5 mm pitch)

Environmental Limits
Operating Temperature:
- Standard Models: -10 to 60°C (14 to 140°F)
- Wide Temp° Models: -40 to 75°C (-40 to 167°F)

Storage Temperature:
- Standard Models: -20 to 80°C (-4 to 176°F)
- Wide Temp° Models: -40 to 85°C (-40 to 185°F)

Ambient Relative Humidity:
5 to 95% (non-condensing)

Power Requirements
Input Voltage: 3.3 VDC
Input Current: 625 mA @ 3.3 VDC
Power Consumption: 2.1 W

Standards and Certifications
EMC:
- EN 55022 Class A, EN 61000-3-2 Class A, EN 55024, FCC Part 15 Subpart B Class A

Green Product:
- RoHS, CRoHS, WEEE

Reliability
Alert Tools: Built-in buzzer and RTC (real-time clock)
Automatic Reboot Trigger: Built-in WDT (watchdog timer)
MTBF (mean time between failures):
- Time: 405,735 hrs
- Standard: Telcordia (Bellcore) Standard

Warranty
Warranty Period: 5 years
Details: See www.moxa.com/warranty

Note: The Hardware Specifications apply to the embedded computer unit itself, but not to accessories. In particular, the wide temperature specification does not apply to accessories such as the power adapter and cables.

Dial-up Networking: PPP Daemon (pppd) for Linux that uses the PPP protocol and allows Unix machines to connect to the Internet as PPP servers or clients, through dialup. The PPP Daemon works with chat, dip, and dial programs among others, and supports the IP, TCP, UDP, and IPX for Linux (Novell) protocols.

Application Development Software:
- Moxa API Library (Watchdog timer, Moxa serial I/O control)
- arm-elf-gcc: C/C++ cross-compiler
- μClibc: POSIX standard C library
Available Modules

EM-1220-LX: RISC-based embedded core module with 2 serial ports, dual LANs, SD, μClinux, -10 to 60°C operating temperature
EM-1220-T-LX: RISC-based embedded core module with 2 serial ports, dual LANs, SD, μClinux, -40 to 75°C operating temperature

Development Kits (can be purchased separately)
EM-1220 Development Kit: Includes the EM-1220-DK snap-on testing board with built-in RJ45 LAN ports and DB9 male serial ports

Package Checklist (modules)
- EM-1220 module

Package Checklist (development kits)
- EM-1220 module
- EM-1220-DK, the carrier board for the EM-1220 module
- CBL-4PINDB9F-100: 4-pin pin header to DB9 female console port cable, 100 cm
- Universal power adapter (including terminal block to power jack converter)
- Ethernet cable: RJ45-to-RJ45 cross-over cable, 100 cm
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card
EM-1240 Series

**RISC ready-to-run embedded core modules with 4 serial ports, dual LANs, SD**

- MOXA ART ARM9 32-bit 192 MHz processor
- 16 MB RAM, 8 MB flash disk onboard
- 4 software-selectable RS-232/422/485 serial ports
- Dual 10/100 Mbps Ethernet ports for network redundancy
- SD signals supported for external SD socket connection
- Built-in RTC, buzzer
- 10 GPIOs reserved for system integration
- Ready-to-run μClinux Kernel 2.6 platform
- Full-function development kit for quick evaluation and application development
- -40 to 75°C wide temperature models available

**Overview**

The EM-1240 embedded module features 4 RS-232/422/485 serial ports, dual Ethernet ports, and an SD socket for external storage expansion. The modules have a compact design that can be easily integrated with industrial applications such as gas stations, vending machines, and ticketing machines, and offer a powerful serial communication capability for better system integration. Programmers will find that the pre-installed, ready-to-run μClinux platform and the full-function development kit make it easy to develop software and build a reliable communication base for industrial automation applications. In addition, a wide temperature model is also available to provide a reliable solution for harsh environments.

**Appearance**

EM-1240 Embedded Module

Top View

- MOXA ART ARM9 32-bit Communication Processor
- Onboard Intel NOR Flash 8 MB

Bottom View

- Onboard Flash 16 MB

Development Kit
## Hardware Specifications

### Computer
- **CPU**: MOXA ART ARM9 32-bit, 192 MHz
- **DRAM**: SDRAM, 16 MB
- **Flash**: NOR Flash, 8 MB
- **OS (pre-installed)**: Linux

### Storage
- **Storage Expansion**: SD sockets x 1

### Ethernet Interface
- **LAN**: Auto-sensing 10/100 Mbps ports (RJ45) x 2
- **Magnetic Isolation Protection**: 1.5 kV, built-in

### Serial Interface
- **Serial Standards**: RS-232/422/485 x 4, software-selectable
- **ESD Protection**: 15 kV for all signals
- **Console Port**: RS-232 (all signals), RJ45 connector

### Serial Communication Parameters
- **Data Bits**: 5, 6, 7, 8
- **Stop Bits**: 1, 1.5, 2
- **Parity**: None, Even, Odd, Space, Mark
- **Flow Control**: RTS/CTS, XON/XOFF, ADDC® (automatic data direction control) for RS-485
- **Baudrate**: 50 bps to 921,600 bps (supports nonstandard baudrates; see user’s manual for details)

### Serial Signals
- **RS-232**: TxD, RxD, DTR, DSR, RTS, CTS, DCD, GND
- **RS-422**: TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-4w**: TxD+, TxD-, RxD+, RxD-, GND
- **RS-485-2w**: Data+, Data-, GND

### LEDs
- **System**: Ready
- **LAN**: 10M/Link x 2, 100M/Link x 2
- **Serial**: TxD x 2, RxD x 2

### Physical Characteristics
- **Weight**:
  - EM-1240 Module: 50 g (0.11 lb)
  - EM-1240 Development Kit: 200 g (0.44 lb)
- **Dimensions**:
  - EM-1240 Module: 90 x 80 mm (3.54 x 3.15 in)
  - EM-1240 Development Kit: 177 x 115 mm (6.97 x 4.53 in)

### Environmental Limits
- **Operating Temperature**:
  - Standard Models: -10 to 60°C (14 to 140°F)
  - Wide Temp Models: -40 to 75°C (-40 to 167°F)

- **Storage Temperature**:
  - Standard Models: -20 to 80°C (-4 to 176°F)
  - Wide Temp Models: -40 to 85°C (-40 to 185°F)

- **Ambient Relative Humidity**: 5 to 95% (non-condensing)

### Power Requirements
- **Input Voltage**: 5 VDC
- **Input Current**: 500 mA @ 5 VDC
- **Power Consumption**: 2.5 W

### Standards and Certifications
- **EMC**: EN 55022 Class A, EN 61000-3-2 Class A, EN 61000-3-3, EN 55024, FCC Part 15 Subpart B Class A

### Reliability
- **Alert Tools**: Built-in buzzer and RTC (real-time clock)
- **Automatic Reboot Trigger**: Built-in WDT (watchdog timer)
- **MTBF (mean time between failures)**: 385,419 hrs

### Warranty
- **Warranty Period**: 5 years
- **Details**: See www.moxa.com/warranty

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## Software Specifications

### μClinux
- **OS**: μClinux 2.6.19
- **File System**: JFFS2

### Internet Protocol Suite
- **ARP, ICMP, IPv4, TCP, UDP, FTP, Telnet, SNMP V1, HTTP, CHAP, PAP, DHCP, NTP, NFS V2, SMTP, Telnet, PPP, PPPoE**

### Web Server (Boa)
- **Allows you to create and manage web sites**

### Terminal Server (Telnet)
- **Provides telnet communications between two hosts over the network**

### Dimensions

#### EM-1240
- **Dimensions**: 90 (3.54) x 70 (2.76) mm

#### EM-1240-DK
- **Dimensions**: 177 (6.97) x 115 (4.53) mm

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**Note**: The Hardware Specifications apply to the embedded computer unit itself, but not to accessories. In particular, the wide temperature specification does not apply to accessories such as the power adapter and cables.
Ordering Information

Available Modules
EM-1240-LX: RISC-based embedded core module with 4 serial ports, dual LANs, SD, μClinux OS, -10 to 60°C operating temperature
EM-1240-T-LX: RISC-based embedded core module with 4 serial ports, dual LANs, SD, μClinux, -40 to 75°C operating temperature

Development Kits (can be purchased separately)
EM-1240 Development Kit: Includes the EM-1240-DK snap-on testing board with built-in RJ45 LAN ports and DB9 male serial ports

Package Checklist (modules)
- EM-1240 module

Package Checklist (development kits)
- EM-1240 module
- EM-1240-DK, the carrier board for the EM-1240 module
- CBL-4PINDB9F-100: 4-pin pin header to DB9 female console port cable, 100 cm
- Universal power adapter (including terminal block to power jack converter)
- Ethernet cable: RJ45-to-RJ45 cross-over cable, 100 cm
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card
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