EM-1220 Series

RISC-based ready-to-run embedded core module with 2 serial ports, dual LANs, SD, μClinux

- MOXA ART ARM9 32-bit 192 MHz processor
- 16 MB RAM, 8 MB flash disk on-board
- 2 software-selectable RS-232/422/485 serial ports
- Dual 10/100 Mbps Ethernet for network redundancy
- Ready-to-run μClinux Kernel 2.6 platform
- SD signals supported for external SD socket connection
- Built-in RTC, buzzer
- 10 GPIOs reserved for system integration
- Credit card size design for easy integration at any field site
- Full-function development kit for quick evaluation and application development
- -40 to 75°C wide temperature model 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, the “wide temperature” EM-1220-T model is also available to provide a reliable solution for any harsh environment.

Appearance

Development Kit

- Embedded Module—Top View
  - MOXA ART ARM9 32-bit Communication Processor
  - onboard 16 MB RAM

- Embedded Module—Bottom View
  - J1
  - J2
  - onboard Intel NOR Flash 8 MB

- Development Kit
  - LAN Port 1
  - LAN Port 2
  - Power Input
  - EM-1220 Embedded Module
  - Serial Port 1
  - Serial Port 2
**Hardware Specifications**

**Computer**
- **CPU:** MOXA ART ARM9 32-bit 192 MHz processor
- **OS (pre-installed):** Embedded μClinux (kernel 2.6.19)
- **DRAM:** 16 MB onboard
- **Flash:** 8 MB onboard

**Storage**
- **Storage Expansion:** SD signals for external Secure Digital (SD) socket connection

**Ethernet Interface**
- **LAN:** 2 auto-sensing 10/100 Mbps ports (RJ45)
- **Magnetic Isolation Protection:** 1.5 KV built-in

**Serial Interface**
- **Serial Standards:** 2 RS-232/422/485 ports, software-selectable
- **ESD Protection:** 15 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
- **ESD Protection:** 15 KV for all signals
- **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:** Ready
- **LAN:** 10M/Link x 2, 100M/Link x 2
- **Serial:** TxD x 2, RxD x 2

**Jumper 1 (J1)**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signals</th>
<th>Pin No.</th>
<th>Signals</th>
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<tbody>
<tr>
<td>1</td>
<td>VCC (3.3V)</td>
<td>2</td>
<td>VCC (3.3V)</td>
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<tr>
<td>3</td>
<td>VCC (3.3V)</td>
<td>4</td>
<td>VCC (3.3V)</td>
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<tr>
<td>5</td>
<td>GND</td>
<td>6</td>
<td>GND</td>
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<td>7</td>
<td>GND</td>
<td>8</td>
<td>GND</td>
</tr>
<tr>
<td>9</td>
<td>TxD0 (RS-232)</td>
<td>10</td>
<td>RxD0 (RS-232)</td>
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<tr>
<td>11</td>
<td>RTS0</td>
<td>12</td>
<td>CTS0</td>
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<tr>
<td>13</td>
<td>DTR0</td>
<td>14</td>
<td>DSR0</td>
</tr>
<tr>
<td>15</td>
<td>RxD1 (RS-232)</td>
<td>16</td>
<td>DCD0</td>
</tr>
<tr>
<td>17</td>
<td>CTS1</td>
<td>18</td>
<td>TxD1 (RS-232)</td>
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<tr>
<td>19</td>
<td>DSR1</td>
<td>20</td>
<td>RTS1</td>
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<tr>
<td>21</td>
<td>DCD1</td>
<td>22</td>
<td>DTR1</td>
</tr>
<tr>
<td>23</td>
<td>Data+(A)/RxD+(A)</td>
<td>24</td>
<td>Data-(A)/RxD-(A)</td>
</tr>
<tr>
<td>25</td>
<td>Data+(B)/RxD+(B)</td>
<td>26</td>
<td>Data-(B)/RxD-(B)</td>
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<td>27</td>
<td>Serial LED_Tx0</td>
<td>28</td>
<td>Serial LED_Rx0</td>
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<td>29</td>
<td>Serial LED_Tx1</td>
<td>30</td>
<td>Serial LED_Rx1</td>
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<td>31</td>
<td>TxD((-)0)</td>
<td>32</td>
<td>TxD(A)(+)1</td>
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<td>33</td>
<td>TxD(B)(+)0</td>
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<td>TxD(B)(+)1</td>
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**Jumper 2 (J2)**

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<td>Console_TxD</td>
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<td>3</td>
<td>Eth0_TxD_out</td>
<td>4</td>
<td>GND</td>
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<tr>
<td>5</td>
<td>Eth0_TxD_out</td>
<td>6</td>
<td>Eth0_RxD_in+</td>
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<tr>
<td>7</td>
<td>Eth0_LED_100M</td>
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<td>Eth0_RxD_in-</td>
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<td>9</td>
<td>Eth1_TxD_out</td>
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<td>Eth1_LED_10M</td>
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<td>Eth1_TxD_out</td>
<td>12</td>
<td>Eth1_RxD_in+</td>
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<tr>
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<td>Eth1_LED_100M</td>
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<td>Eth1_RxD_in-</td>
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<td>GPIO0</td>
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<td>Eth1_LED_10M</td>
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<td>GPIO4</td>
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<td>23</td>
<td>GPIO8</td>
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<td>25</td>
<td>Buzzer</td>
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<td>GND</td>
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<td>27</td>
<td>LED_Ready</td>
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<td>SW Reset</td>
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<td>29</td>
<td>SD卡</td>
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<td>SCL</td>
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<td>GND</td>
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</tr>
<tr>
<td>33</td>
<td>GND</td>
<td>34</td>
<td>GND</td>
</tr>
</tbody>
</table>

**Physical Characteristics**
- **Weight:**
  - EM-1220 Module: 40 g
  - EM-1220 Development Kit: 120 g
- **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 x 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)
- **Operating Humidity:** 5 to 95% RH

**Power Requirements**
- **Input Voltage:** 3.3 VDC
- **Power Consumption:** 2.1 W (625 mA @ 3.3 VDC)

**Regulatory Approvals**
- **EMC:** CE (EN55022 Class A, EN61000-3-2 Class A, EN61000-3-3, EN55024), FCC (Part 15 Subpart B, CISPR 22 Class A)

**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 adaptor and cables.
Software Specifications

μClinux
Kernel Version: 2.6.19
Protocol Stack: ARP, ICMP, IPv4, TCP, UDP, FTP, Telnet, SNMP V1, HTTP, CHAP, PAP, DHCP, NTP, NFS V2, SMTP, Telnet, PPP, PPoE
File System: JFFS2, root file system (read only), and user directory (read/write)
System Utilities: msh, busybox, tinylogin, telnet, ftp
pppd: Dial in/out over serial port daemon, including PPoE (Point-to-Point over Ethernet)
snmpd: SNMP V1 Agent daemon
 telnetd: Telnet server daemon
inetd: TCP server manager program
ftp: FTP server program
boa: Web server daemon
ntpd: Network Time Protocol client utility
Tool Chain:
• Arm-elf-gcc: C/C++ PC Cross Compiler
• μClibc: POSIX standard C library

Ordering Information

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 (must 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 (module)
• EM-1220-LX or EM-1220-T-LX embedded module

Package Checklist (Development Kit)
• EM-1220 embedded 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 adaptor (including terminal block to power jack converter)
• Ethernet cable: RJ45 to RJ45 cross-over cable, 100 cm
• Document and Software CD
• Quick Installation Guide (printed)
• Warranty Card