

# EM-1220 Series

**RISC-based ready-to-run embedded core module with 2 serial ports, dual LANs, SD,  $\mu$ Clinux**



- > 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  $\mu$ Clinux Kernel 2.6 platform
- > SD signals supported for external SD socket connection
- > Built-in RTC, buzzer
- > 8 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

The certification logos shown here apply to some or all of the products in this section. For details, see "Regulatory Approvals" under "Specifications" below.



## 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  $\mu$ Clinux 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

### Embedded Module—Top View

MOXA ART ARM9 32-bit  
Communication Processor



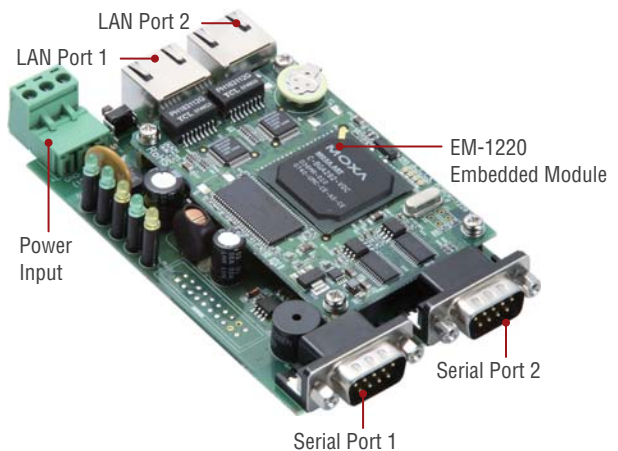
onboard 16 MB RAM

### Embedded Module—Bottom View



onboard Intel NOR  
Flash 8 MB

### Development Kit



## Hardware Specifications

### Computer

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

### 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

**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

### 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 2 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

#### Storage Temperature:

Standard Models: -20 to 80°C (-4 to 176°F)

Wide Temp. Models: -40 to 85°C (-40 to 185°F)

### 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)

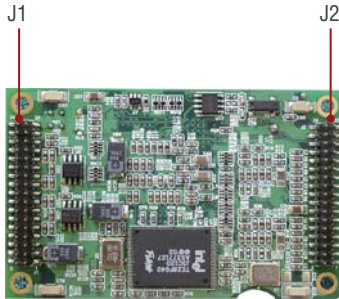
### Warranty

**Warranty Period:** 5 years

**Details:** See [www.moxa.com/warranty](http://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.

### Pin Assignment



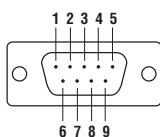
### Jumper 1 (J1)

Pin No.	Signals	Pin No.	Signals
1	VCC (3.3V)	2	VCC (3.3V)
3	VCC (3.3V)	4	VCC (3.3V)
5	GND	6	GND
7	GND	8	GND
9	TxD0 (RS-232)	10	RxD0(RS-232)
11	RTS0	12	CTS0
13	DTR0	14	DSR0
15	RxD1 (RS-232)	16	DCD0
17	CTS1	18	TxD1 (RS-232)
19	DSR1	20	RTS1
21	DCD1	22	DTR1
23	Data-(A)0/ RxD-(A)0	24	Data-(A)1/ RxD-(A)1
25	Data+(B)0/ RxD+(B)0	26	Data+(B)1/ RxD+(A)1
27	Serial LED_Tx0	28	Serial LED_Rx0
29	Serial LED_Tx1	30	Serial LED_Rx1
31	TxDA(-)0	32	TxDA(-)1
33	TxDB(+0)	34	TxDB(+1)

### Jumper 2 (J2)

Pin No.	Signals	Pin No.	Signals
1	Console_RxD	2	Console_TxD
3	Eth1_TxD_out+	4	GND
5	Eth1_TxD_out-	6	Eth1_RxD_in+
7	Eth1_LED_100M	8	Eth1_RxD_in-
9	Eth0_TxD_out+	10	Eth1_LED_10M
11	Eth0_TxD_out-	12	Eth0_RxD_in+
13	Eth0_LED_100M	14	Eth0_RxD_in-
15	GPIO0	16	Eth0_LED_10M
17	GPIO2	18	GPIO1
19	GPIO4	20	GPIO3
21	GPIO6	22	GPIO5
23	GPIO8	24	GPIO7
25	Buzzer	26	GPIO9
27	LED_Ready	28	SW_Reset
29	SDA	30	SCL
31	GND	32	GND
33	GND	34	GND

### DB9 male



PIN	RS-232	RS-422/485 -4W	RS-485-2W
1	DCD	TxD-(A)	-
2	RxD	TxD+(B)	-
3	TxD	RxD+(B)	Data+(B)
4	DTR	RxD-(A)	Data-(A)
5	GND	GND	GND
6	DSR	-	-
7	RTS	-	-
8	CTS	-	-

## 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, PPPoE

**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 PPPoE (Point-to-Point over Ethernet)

**snmpd:** SNMP V1 Agent daemon

**telnetd:** Telnet server daemon

**ineted:** TCP server manager program

**ftpd:** FTP server program

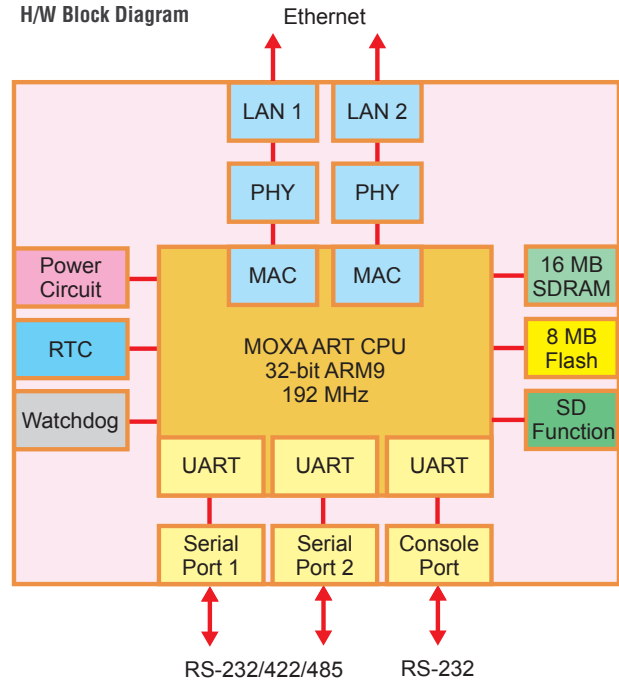
**boa:** Web server daemon

**ntpd:** Network Time Protocol client utility

**Tool Chain:**

- Arm-elf-gcc: C/C++ PC Cross Compiler
- µClibc: POSIX standard C library

H/W Block Diagram



## 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-150: 4-pin pin header to DB9 female console port cable, 150 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