W311/321/341

RISC-based embedded Linux computers with WLAN, LAN, and 1, 2, or 4 serial ports

- MOXA ART ARM9 32-bit 192 MHz processor running Linux 2.6
- 32 or 64 MB RAM, and 16 MB flash disk on board
- 802.11a/b/g WLAN with repeater function
- WEP, WPA, and WPA2 encryption
- 10/100 Mbps Ethernet for network redundancy
- Relay output for external alarm connection (W341 only)
- SD socket for storage expansion
- DIN-Rail or wall mount installation
- Designed to withstand continuous 5-g vibration and 50-g shocks
- Robust, fanless design

Overview

The W311/321/341 embedded Linux computers feature 1, 2, or 4 software selectable RS-232/422/485 ports, and support the IEEE 802.1a/b/g standards for WLAN connections. In addition, the computers have 1 Ethernet port, and some models come with USB 2.0 hosts and an SD socket for storage expansion. The W311/321/341 computers’ Linux OS runs on the MOXA ART 32-bit ARM9 processor that provides a powerful and reliable platform for harsh, industrial environments. You will find these computers ideal for a variety of machine-to-machine applications, including data acquisition, protocol conversion, and remote device control and monitoring.

Appearance

W311

- Ethernet (10/100BaseT)
- 12 to 48 VDC
- Wireless LAN Antenna
- Serial Port (RS-232/422/485)
- Internal SD Slot for Storage Expansion (remove cover to access)
- Serial Console Port

W321

- Ethernet (10/100BaseT)
- 12 to 48 VDC
- Wireless LAN Antenna
- Serial Console Port
- Serial Port 1 (RS-232/422/485)
- Serial Port 2 (RS-232/422/485)
- Internal SD Slot for Storage Expansion (remove cover to access)
**Computer**

CPU: Moxa ART ARM9 32-bit 192 MHz

OS (pre-installed): Embedded Linux with MMU support

DRAM: W311/321: 32 MB  
W341: 64 MB

Flash: 16 MB

USB: (W341 only) USB 2.0 compliant hosts x 2, type A connector

**Relay Output:** (W341 only)
- Form C, SPDT x 1
- Normal Switching Capacity: 2 A @ 30 VDC
- Switching Power: 60 W max.
- Switching Voltage: 220 VDC max.
- Switching Current: 2 A max.
- Operating Time: 4 ms @ 20°C
- Initial Contact Resistance: 100 milli-ohm max.

**Storage**

Storage Expansion: SD slot

**Ethernet Interface**

LAN: 1 auto-sensing 10/100 Mbps port (RJ45)

Magnetic Isolation Protection: 1.5 KV built-in

**WLAN Interface**

Standard Compliance: 802.11a/b/g

Radio Frequency Type: DSSS, CCK, OFDM

Media Access Protocol: CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance)

Tx Power (typical):
- 5.15-5.35 GHz: 14 dBm @ 6 Mbps, 14 dBm @ 54 Mbps
- 5.725-5.825 GHz: 14 dBm @ 6 Mbps, 13 dBm @ 54 Mbps
- 2.412-2.437 GHz (802.11g): 17 dBm @ 6 Mbps, 15 dBm @ 54 Mbps
- 2.412-2.427 GHz (802.11b): 18 dBm @ 1-11 Mbps

Rx Sensitivity (typical):
- 5.15-5.35 GHz: 6 Mbps @ -82 dBm, 54 Mbps @ -67 dBm
- 5.725-5.825 GHz: 6 Mbps @ -80 dBm, 54 Mbps @ -69 dBm
- 2.412-2.472 GHz (802.11g): 6 Mbps @ -84 dBm, 54 Mbps @ -69 dBm
- 2.412-2.472 GHz (802.11b): 11 Mbps @ -82 dBm, 1 Mbps @ -90 dBm

Transmission Rate: 54 Mbps (max.) with auto fallback (54, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1 Mbps)

- 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
- 802.11b: 1, 2, 5.5, 11 Mbps

Transmission Distance: Up to 100 meters (@ 11 Mbps in open areas)

Antenna Connector: Reverse SMA

Antenna: External 2 dbi dipole antenna

WLAN Modes: Ad-hoc (802.11b/g), Infrastructure

**Serial Interface**

Serial Standards: 1, 2, or 4 RS-232/422/485 ports, software-selectable (DB9 male)

ESD Protection: 15 KV ESD protection for all signals

Console Port: RS-232 interface (TxD, RxD, GND), with 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 (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
LEDs
System: Ready, SD
LAN: 10M/Link, 100M/Link (on connector)
WLAN: Enable, Signal Strength
Serial: TxD, RxD

Switches and Buttons
Reset Button: Supports “Reset to Factory Default”

Physical Characteristics
Housing: Aluminum (1 mm)
Weight:
W311: 170 g
W321: 185 g
W341: 390 g
Dimensions: (without ears or antenna)
W311/W321: 77 x 111 x 26 mm (3.03 x 4.37 x 1.02 in)
W341: 150 x 100 x 38 mm (5.91 x 3.94 x 1.50 in)
Mounting: DIN-rail (requires optional DK-35A DIN-rail kit), wall

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: 5 g’s @ IEC-68-2-6, sine wave, 5-500 Hz, 1 Oct./min, 1 hr/axis
Anti-shock: 50 g’s @ IEC-68-2-6, half-sine wave, 30 ms

Power Requirements
Input Voltage:
W311 and W321: 12 to 48 VDC
W341: 12 to 48 VDC
Power Consumption:
W311/321: 4.8 W
  • 200 mA @ 24 VDC
  • 400 mA @ 12 VDC
W341:
  With no load on USB ports: 7.2 W
  • 300 mA @ 24 VDC
  • 600 mA @ 12 VDC
With full load on USB ports: 14.4 W
  • 600 mA @ 24 VDC
  • 1200 mA @ 12 VDC

Standards and Certifications
Safety: UL 60950-1, EN 60950-1
EMC: EN 55022 Class A, EN 61000-3-2, EN 61000-3-3, EN 55024
Radio: EN 301 489-1/17, EN 301 893, EN 300 328, EN 50392, FCC Part 15, Subpart C/E
Wheel Vehicles: e-Mark (e13) (W311/321 only)
Green Product: RoHS, CRoHS, WEEE

Reliability
Alert Tools: Built-in buzzer and RTC (real-time clock) with battery backup
Automatic Reboot Trigger: Built-in WDT (watchdog timer) supporting 1-255 level time interval system reset, software programmable
MTBF (mean time between failures):
W311: 501,331 hrs
W321: 367,253 hrs
W341: 284,702 hrs

Warranty
Warranty Period: 5 years
Details: See www.moxa.com/warranty

Software Specifications
Linux
OS: Linux 2.6.9
File System: JFFS2 (for on-board flash)
Internet Protocol Suite: TCP, UDP, IPv4, SNMPv1, ICMP, ARP, HTTP, CHAP, PAP, SSH 1.0/2.0, SSL, DHCP, NTP, NIS, Telnet, FTP, TFTP, PPP, PPPoE
Internet Security: OpenVPN, iptables firewall
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.
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).
Watchdog: Features a software function to trigger system reset in a user specified time interval. (MOXA API provided)

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Serial Ports</th>
<th>LAN Port</th>
<th>WLAN</th>
<th>Cellular</th>
<th>Relay Output</th>
<th>Storage</th>
<th>OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>W311</td>
<td>RS-232/422/485</td>
<td>10/100 Mbps</td>
<td>802.11a/b/g</td>
<td>–</td>
<td>–</td>
<td>✓</td>
<td>–</td>
</tr>
<tr>
<td>W321</td>
<td>1</td>
<td>1</td>
<td>✓</td>
<td>GSM/GPRS Quad Band</td>
<td>–</td>
<td>✓</td>
<td>–</td>
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<tr>
<td>W341</td>
<td>4</td>
<td>1</td>
<td>✓</td>
<td>–</td>
<td>1</td>
<td>✓</td>
<td>2</td>
</tr>
</tbody>
</table>
**Dimensions**

**W311**

111 (4.37) mm

**W321**

111 (4.37) mm

**W341**

137 (5.40) mm

**Pin Assignment**

**Male DB9**

<table>
<thead>
<tr>
<th>PIN</th>
<th>RS-232</th>
<th>RS-422/485-4w</th>
<th>RS-485-2w</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DCD</td>
<td>TxD-(A)</td>
<td>–</td>
</tr>
<tr>
<td>2</td>
<td>RxD</td>
<td>TxD+(B)</td>
<td>–</td>
</tr>
<tr>
<td>3</td>
<td>TxD</td>
<td>RxD+(B)</td>
<td>Data+(B)</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
<td>RxD-(A)</td>
<td>Data-(A)</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
<td>–</td>
<td>–</td>
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</tbody>
</table>

**Serial Console port**

<table>
<thead>
<tr>
<th>PIN</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TxD</td>
</tr>
<tr>
<td>2</td>
<td>RxD</td>
</tr>
<tr>
<td>3</td>
<td>NC</td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
</tr>
</tbody>
</table>

**Ordering Information**

**Available Models**

- **W311-LX**: RISC-based wireless embedded computer with WLAN, 1 serial port, LAN, and SD
- **W321-LX**: RISC-based wireless embedded computer with WLAN, 2 serial ports, LAN, and SD
- **W341-LX**: RISC-based wireless embedded computer with WLAN, 4 serial ports, LAN, SD, USB, and relay output

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

- **DK-35A**: Mounting kit for 35-mm DIN-Rail

**Package Checklist**

- 1 W311 or W321 or W341 computer
- Wall mounting kit
- 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 adaptor (including terminal block to power jack converter)
- WLAN Antenna
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card