W321

RISC-based embedded Linux computers with WLAN, LAN, 2 serial ports, and SD

- MOXA ART ARM9 32-bit 192 MHz processor running Linux 2.6
- 32 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
- SD socket for storage expansion
- DIN-rail or wall-mount installation
- Designed to withstand 5 g’s of continuous vibration and 50-g shocks
- Robust, fan-less design

Overview

The W321 is an embedded Linux computer that features 2 software selectable RS-232/422/485 ports, and support the IEEE 802.1a/b/g standards for WLAN connections. In addition, the computer has 1 Ethernet port, and comes with an SD socket for storage expansion. The W321’s Linux OS runs on the MOXA ART 32-bit ARM9 processor, and 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

- Ethernet (10/100BaseTx)
- 12 to 48 VDC
- Wireless LAN antenna
- Serial console port
- Internal SD Slot for Storage Expansion (remove cover to access)
- Serial Port 1 (RS-232/422/485)
- Serial Port 2 (RS-232/422/485)

Dimensions

- 111 mm (4.37 in) x 77 mm (3.03 in) x 88 mm (3.46 in)
- 43 mm (1.69 in) x 26 mm (1.02 in) x 25 mm (0.98 in)
- 148.1 mm (5.83 in) x 43 mm (1.69 in) x 25 mm (0.98 in)
- 100 mm (3.94 in)
# Hardware Specifications

## Computer
- **CPU**: MOXA ART ARM9 32-bit 192 MHz
- **OS (pre-installed)**: Embedded Linux with MMU support
- **DRAM**: 32 MB
- **Flash**: 16 MB

## Storage
- **Expansion**: SD socket

## LAN Interface
- **Ethernet**: Auto-sensing 10/100 Mbps, RJ45 connector
- **Magnetic Isolation Protection**: 1.5 KV built-in

## WLAN Interface
- **Standard Compliance**: 802.11a/b/g
- **Radio Frequency Type**: DSSS, CCK, OFDM
- **Radio Frequency Band**:
  - 802.11a: 5.15-5.25 GHz, 5.25-5.35 GHz, 5.725-5.825 GHz
  - 802.11b/g: U.S., Europe, Japan products, covering 2.4-2.484 GHz
- **Media Access Protocol**: CSMA/CA
- **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
  - 2.412-2.483 GHz (802.11g): 17 dBm @ 6 Mbps, 15 dBm @ 54 Mbps
  - 2.412-2.472 GHz (802.11b): 18 dBm @ 1-11 Mbps
- **Rx Sensitivity (typical)**:
  - 5.15-5.35 GHz: 6 Mbps @ -82 dBm, 54 Mbps @ -67 dBm
  - 5.47-5.725 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, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1 Mbps)
- **Transmission Distance**: Up to 100 meters (@ 11 Mbps in open areas)
- **Antenna Connector**: Reverse SMA
- **Antenna**: External 2 dbi dipole antenna
- **Wireless Security**: WEP: 64-bit/128-bit, WPA, WPA2 data encryption
- **WLAN Modes**: Ad-hoc (802.11b/g), Infrastructure

## Serial Interface
- **Serial Standards**: RS-232/422/485 (software-selectable)
- **Number of Ports**: 2
- **Connector**: DB9 male
- **Serial Line 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 (RS-232/422/485 ports can select non-standard baudrates in this range)

## 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, SD card detection
- **LAN**: 10M/Link, 100M/Link (on connector)
- **WLAN**: Enable, Signal Strength
- **Serial**: TxD, RxD

## Switches and Buttons
- **Buttons**: Reset button for resetting to factory defaults

## Physical Characteristics
- **Housing**: Aluminum (1 mm)
- **Weight**: 185 g
- **Dimensions (without ears or antenna)**: 77 x 111 x 26 mm (3.03 x 4.37 x 1.02 in)
- **Mounting**: DIN-rail (requires optional DK-35A DIN-rail kit), wall

## Environmental Limits
- **Operating Temperature**: -10 to 60°C (14 to 140°F)
- **Operating Humidity**: 5 to 95% RH
- **Storage Temperature**: -20 to 80°C (-4 to 176°F)
- **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**: 12 to 48 VDC
- **Power Consumption**: 400 mA @ 12 VDC, 4.8 watts

## Regulatory Approvals
- **EMC**: CE (ETSI EN 301 489-1/-17, ETSI EN 301 893, ETSI EN 300 328, EN50392), FCC Part 15C & Part 15E
- **Safety**: UL/cUL (UL60950-1), TÜV (EN60950-1)
- **Directives**: RoHS, CRoHS, WEEE
- **MTBF**: 367,253 hrs

## 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

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

**Linux**
- **Kernel Version:** 2.6.9
- **Boot Loader:** Redboot
- **Protocol Stack:** TCP, UDP, IPv4, SNMP V1, ICMP, IGMP, ARP, HTTP, CHAP, PAP, SSH 1.0/2.0, SSL, DHCP, NTP, NFS, SMTP, Telnet, FTP, PPP, PPPoE
- **File System:** JFFS2 (on-board flash)
- **System Utilities:** bash, busybox, tinylogin, telnet, ftp, scp
- **Supporting Services and Daemons:**
  - telnetd: Telnet Server daemon
  - ftpd: FTP server daemon
  - sshd: Secure shell server
  - Apache: Web server daemon, supporting PHP and XML
  - OpenVPN: Virtual private network service manager
  - iptables: Firewall service manager
  - pppd: dial in/out over serial port daemon & PPPoE
  - snmpd: snmpd agent daemon
  - inetd: TCP server manager program
- **Application Development Environment:**
  - MOXA Linux API Library
  - Linux Tool Chain: Gcc, Glibc, GDB
  - BINEncryptor: Encryption tool for binary files; based on Moxa Intellectual Protection Technology (Patented)

**Device Drivers:** UART, RTC, Buzzer, SD Card

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**H/W Block Diagram**

- **MOXA ART CPU**
- **32-bit ARM9**
- **192 MHz**

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**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>
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<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>
</tr>
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</table>

**Serial Console port**

<table>
<thead>
<tr>
<th>PIN</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>TxD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>RXD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>NC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>GND</td>
<td></td>
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</tbody>
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**Ordering Information**

**Available Models**

**W321-LX:** Mini RISC-based wireless Linux computer with WLAN, 2 serial ports, LAN, and SD

**Package Checklist**

- W321 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
- Document and Software CD
- Quick Installation Guide (printed)
- Warranty Card