MOXA Embedded Computers

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

Dimensions
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 (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
2.412-2.483 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)
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
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
- **File System:** JFFS2 (on-board flash)
- **System Utilities:** bash, busybox, tinylogin, telnet, ftp, scp
- **Supporting Services and Daemons:**
  - telnetd: Telnet 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

**H/W Block Diagram**

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

**Serial Console port**

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

**Available Models**

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

**Ordering Information**

- **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