

W315A/325A User's Manual

Second Edition, March 2011

www.moxa.com/product

MOXA[®]

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W315A/325A User's Manual

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Technical Support Contact Information

www.moxa.com/support

Moxa Americas

Toll-free: 1-888-669-2872
Tel: +1-714-528-6777
Fax: +1-714-528-6778

Moxa Europe

Tel: +49-89-3 70 03 99-0
Fax: +49-89-3 70 03 99-99

Moxa China (Shanghai office)

Toll-free: 800-820-5036
Tel: +86-21-5258-9955
Fax: +86-10-6872-3958

Moxa Asia-Pacific

Tel: +886-2-8919-1230
Fax: +886-2-8919-1231

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Introduction

The W315A/325A wireless RISC-based embedded computers feature a GSM/GPRS module, RS-232/422/485 serial ports, and an Ethernet port in a small, rugged chassis. In addition, the W315A and W325A come with an SD socket, making them the ideal solution when the applications require external storage expansion.

The W315A/325A embedded computers are ideal for diverse, machine-to-machine embedded applications. The computers enable the wireless operation of traditionally wired network and serial devices, and can handle transparent data transfer, numerical computing, protocol conversion, data processing, and even data encryption. You will find it easier to build embedded systems for distributed peer-to-peer communication, turn wired devices into wireless devices, and introduce higher mobility and more intelligence to your system. In this chapter, we cover the various capabilities of the W315A/325A series embedded computers.

The following topics are covered in this chapter:

- **Overview**
- **Package Checklist**
- **Product Features**
- **Hardware Block Diagrams**
 - W315A
 - W325A

Overview

The W315A/325A wireless embedded computers are designed around the MOXA ART ARM9 32-bit RISC processor. Unlike the X86 CPU, which uses a CISC design, the MOXA ART ARM9 uses RISC architecture and modern semiconductor technology to provide a powerful computing engine without generating a significant amount of heat. The processor also integrates UART and LAN functions to provide exceptional communication performance, but without the bus bandwidth limitations associated with general ARM-based communication products.

An onboard NOR Flash ROM and SDRAM provide ample storage capacity, and the SD slot gives applications extra room to expand. The built-in GSM/GPRS function supports the 850/900/1800/1900 MHz frequency bands, providing a coding scheme from CS-1 to CS-4. The backup LAN port not only provides an alternative solution for networking, but also supports Ethernet clients, allowing any network device to plug in and connect to the GPRS network. The built-in RS-232/422/485 serial ports support a wide range of serial devices, making this platform suitable for data acquisition and protocol conversion applications.

The Linux-based operating system comes pre-installed and ready to run, providing an open platform for software development. Software written for desktop PCs can be ported easily to W315A/325A series embedded computers by using a common compiler, so you do not need to spend a lot of time modifying existing software code. In addition, the operating system, device drivers, and user-developed software can all be stored in the built-in flash memory.

Package Checklist

The W315A/325A Series includes the following models:

W315A-LX

Mini RISC-based, ready-to-run, wireless embedded computer with GSM/GPRS, one serial port, LAN, SD, and Linux OS

W325A-LX

Mini RISC-based, ready-to-run, wireless embedded computer with GSM/GPRS, two serial ports, LAN, SD, and Linux OS

Each model is shipped with the following items:

- W315A or W325A embedded 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
- GSM/GPRS antenna
- Documentation and software CD
- Quick installation guide (printed)
- Warranty card

Optional Accessories

- 35 mm DIN-rail mounting kit (DK-35A)

NOTE: Please notify your sales representative if any of the above items are missing or damaged.

Product Features

W315A/325A series embedded computers have the following features:

- MOXA ART 32-bit ARM9 RISC industrial communication processor
- 16 MB built-in flash memory
- RS-232/422/485 serial ports with software selectable interface
- Baudrate between 50 and 921.6Kbps; supports non-standard baudrates
- 10/100M Ethernet for backup networking
- Built-in quad band 850/900/1800/1900 MHz GSM/GPRS module
- GPRS class 10
- Coding scheme from CS1 to CS4
- SD card slot for storage expansion
- Designed to withstand continuous 5G vibration and a 50G shock
- LED indicators for status, serial transmission, and wireless signal strength
- Ready-to-run Linux platform
- Can be installed on a DIN-Rail or wall mounted
- Fanless design for increased ruggedness

Hardware Specifications

Computer

CPU: MOXA ART ARM9 32-bit RISC CPU, 192 MHz

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

DRAM: 32 MB

Flash: 16 MB

Storage

Storage Expansion: SD slot

Ethernet Interface

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

Magnetic Isolation Protection: 1.5 KV built-in

Cellular Interface

Cellular Modes: GSM, GPRS

Radio Frequency Bands: 850/900/1800/1900 MHz

GPRS Class: 10

Coding Schemes: CS1 to CS4

Serial Interface

Serial Standards: 1 or 2 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)

Cellular: GPRS Enabled, GSM Signal Strength

Serial: TxD, RxD

Switches and Buttons

Reset Button: Supports "Reset to Factory Default"

Physical Characteristics

Housing: Aluminum (1 mm)

Weight: 195 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

Antenna Length: 84 mm

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 @ IEC-68-2-6, sine wave, 5-500 Hz, 1 Oct./min, 1 hr/axis

Anti-shock: 50 g @ IEC-68-2-6, half-sine wave, 30 ms

Power Requirements

Input Voltage: 12 to 48 VDC

Power Consumption:

Without GPRS loading: 4.8 W

- 100 mA @ 48 VDC
- 200 mA @ 24 VDC
- 400 mA @ 12 VDC

With GPRS loading: 12 W

- 330 mA @ 48 VDC
- 540 mA @ 24 VDC
- 1000 mA @ 12 VDC
- 200 mA @ 24 VDC
- 400 mA @ 12 VDC

Regulatory Approvals

EMC: CE (EN55022 Class A, EN61000-3-2, EN61000-3-3, EN55024), FCC (Part 15 Subpart B, CISPR 22 Class A, ANSI C63.4)

Safety: UL/cUL (UL60950-1), LVD (EN 60950-1)

R&TTE: EN301 489-1, EN301 489-7, EN301 511

Safety: LVD: EN60950-1

UL/cUL: UL60950-1, CSA C22.2 No. 60950-1-03

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)

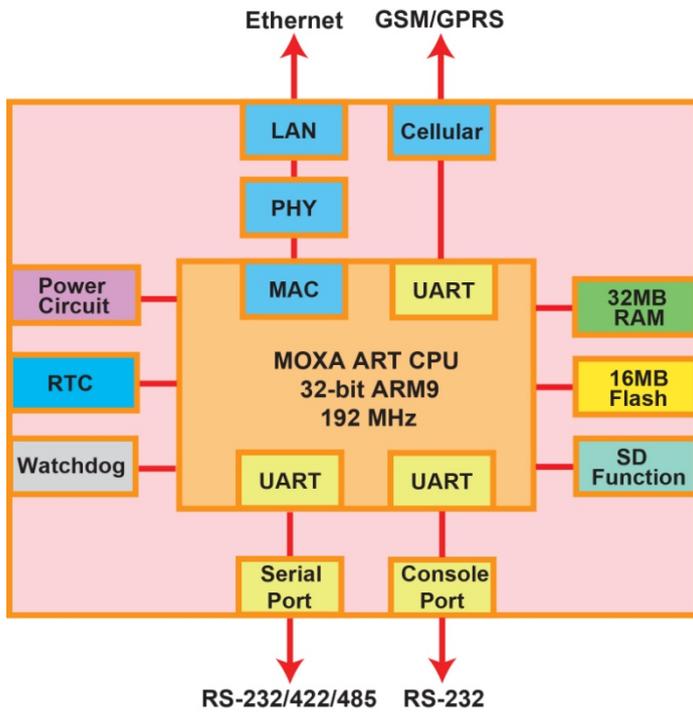
Warranty

Warranty Period: 5 years

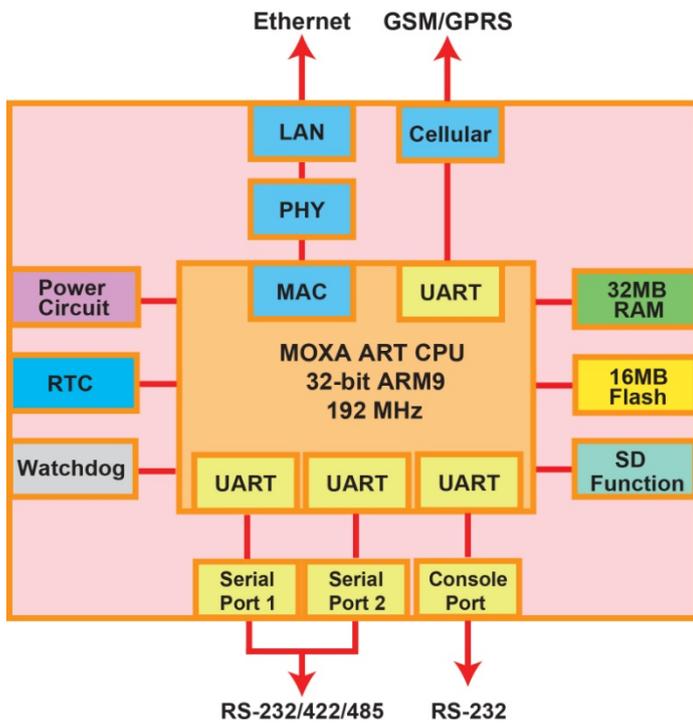
Details: See www.moxa.com/warranty

Hardware Block Diagrams

W315A



W325A



Hardware Introduction

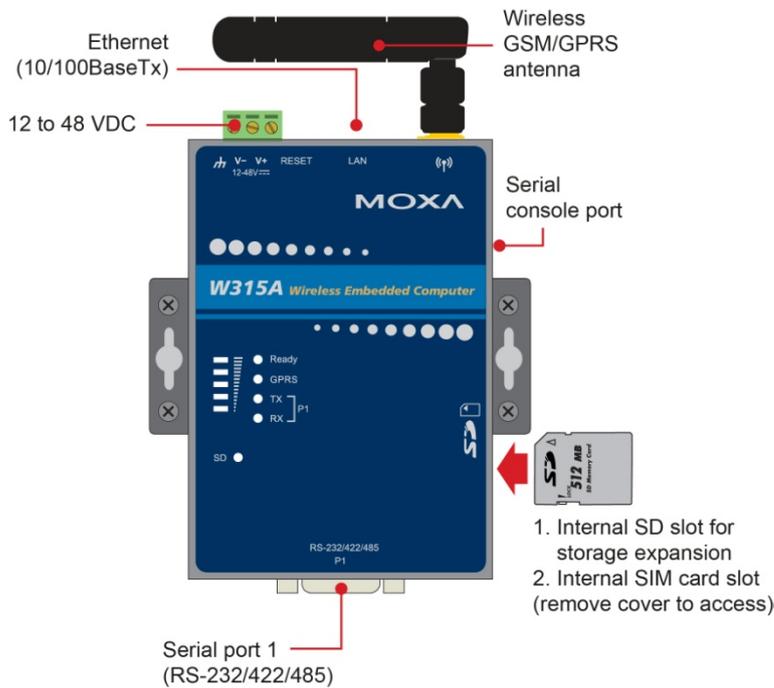
The W315A/325A series embedded computers are compact, well-designed, and built rugged enough for industrial applications. LED indicators help you monitor performance and identify trouble spots, multiple serial ports allow you to connect different devices for wireless operation, and the reliable and stable hardware platform lets you devote your attention to developing your applications.

The following topics are covered in this chapter:

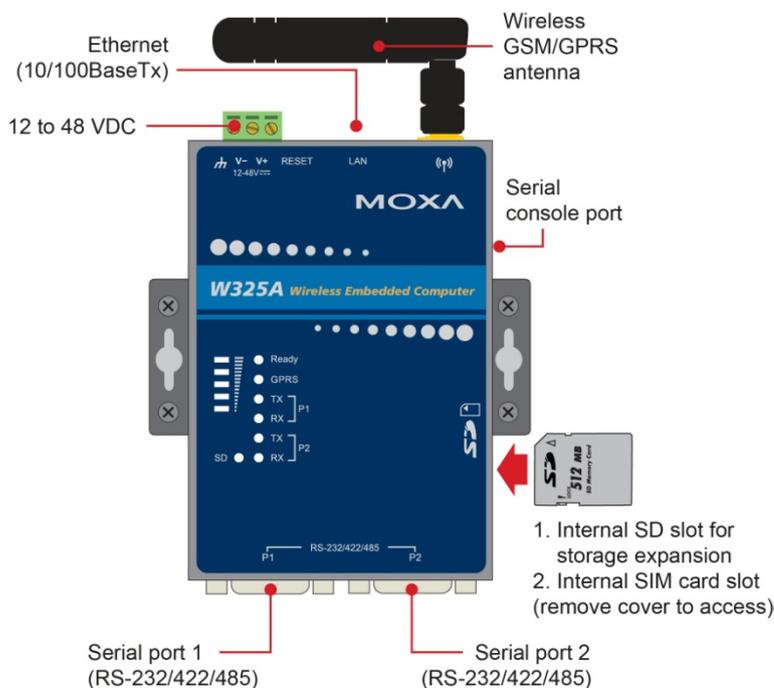
- ❑ **Appearance**
 - W315A
 - W325A
- ❑ **Dimensions**
- ❑ **LED Indicators**
- ❑ **Reset Button**
- ❑ **Real Time Clock**

Appearance

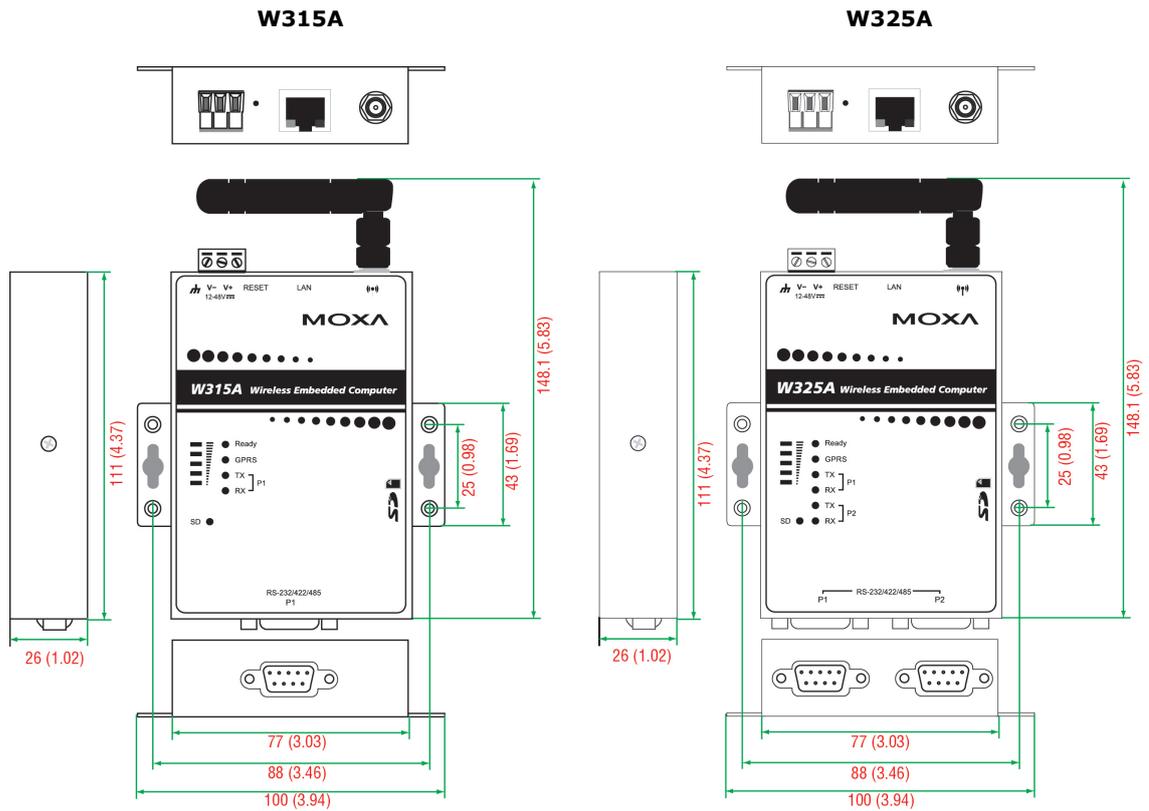
W315A



W325A



Dimensions



LED Indicators

LED Name	LED Color	LED Function
Ready	Green	Power is on and functioning normally
	Off	Power is off or a power error exists
SD	Green	SD card is detected
	Off	SD card is not detected
GPRS	Green	ON: GPRS is ready Blinking: Conflict with GPRS IP or no response from DHCP server
	Off	GPRS is not ready or function error exists
Signal Strength	Green	Number of glowing LEDs indicates signal strength 5: Excellent 4: Very good 3: Good 2: Fair 1: Bad
	Off	No signal or GPRS connection failed
LAN	Orange	10 Mbps Ethernet link
	Green	100 Mbps Ethernet link
	Off	Disconnected or short circuit
TxD P1-P2	Green	Serial ports P1-P2 transmitting data
	Off	Serial ports P1-P2 not transmitting data
RxD P1-P2	Orange	Serial ports P1-P2 receiving data
	Off	Serial ports P1-P2 not receiving data

Reset Button

Hold in the reset button for 5 seconds to load the factory default configuration. After loading the factory defaults, the system will reboot automatically. We recommend that you use this function only if the software is not working properly. To reset the Linux system software, always use the software reboot command ("reboot") to protect the integrity of your data.

The reset button is NOT designed to hard reboot the embedded computer.



ATTENTION

Restoring default settings preserves your data

Resetting the embedded computer to factory defaults will format the user directory and erase the contents in **/etc** and **/home**. The reset button only loads a configuration file. All files in the **/etc** directory will revert to their factory defaults.

Note that if there is a problem with the **/etc** directory, the embedded computer may be unable to restore the factory default settings.

Real Time Clock

The embedded computer's real-time clock is powered by a lithium battery. We strongly recommend that you do NOT replace the lithium battery on your own. If the battery needs to be changed, contact the Moxa RMA service team.



WARNING

There is a risk of explosion if the wrong type of battery is used. To avoid this potential danger, always use the correct type of battery. Contact the Moxa RMA service team if you need to replace your battery. Dispose of used batteries according to the instructions on the battery.

Hardware Connection Description

The W315A/325A wireless embedded computers support multiple connection types. GSM/GPRS, Ethernet, and one or more serial ports are built into every model. In addition, the computers come with a serial console port for monitoring bootup messages. All models include an SD storage socket for additional device and storage options. With the open-source Linux kernel, you are free to develop custom applications for remote, wireless operation of your device. In this chapter, learn how to connect the embedded computer to the network and to various devices.

The following topics are covered in this chapter:

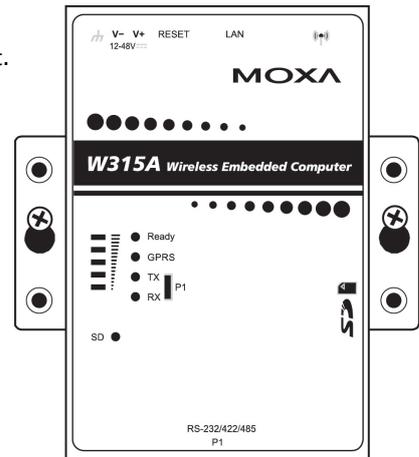
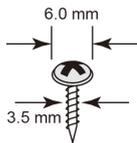
- ❑ **Installing the W315A/325A**
- ❑ **Wiring Requirements**
 - Connecting the Power
 - Grounding the Unit
- ❑ **Connecting Data Transmission Cables**
 - Connecting to the Network
 - Connecting to a Serial Device
 - Connecting to the Serial Console Port
 - Connecting an Antenna
- ❑ **Installing a SIM Card**
- ❑ **Installing an SD Card for Storage Expansion**

Installing the W315A/325A

Wall or Cabinet Mounting

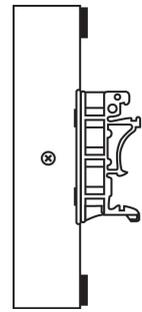
The W315A/325A embedded computers have built-in “ears” for attaching the embedded computers to a wall or the inside of a cabinet. We suggest using two screws per ear to attach the W315A/325A to a wall or cabinet.

The heads of the screws should be less than 6.0 mm in diameter, and the shafts should be less than 3.5 mm in diameter.



DIN-Rail Mounting

DIN-rail attachments can be purchased separately to attach the product to a DIN-rail. When snapping the attachments to the DIN-rail, make sure that the stiff metal springs are at the top.



Wiring Requirements

In this section, we describe how to connect serial devices to the embedded computer. Read and follow these common safety precautions before proceeding with the installation:

- Use separate paths to route wiring for power and devices. If power wiring and device wiring paths must cross, the wires should be perpendicular at the intersection point.
NOTE: Do not run signal or communication wiring together with power wiring in the same wire conduit. To avoid interference, wires with different signal characteristics should be routed separately.
- Use the type of signal transmitted through a wire to determine which wires should be kept separate. The rule of thumb is that wiring that shares similar electrical characteristics can be bundled together.
- Keep input wiring and output wiring separate.
- It is a good idea to label the wiring to all devices in the system.



ATTENTION

Safety First!

Be sure to disconnect the power cord before installing and/or wiring your W315A/325A.

Wiring Caution!

Calculate the maximum possible current in each power wire and common wire. Observe all electrical codes dictating the maximum current allowable for each wire size. If the current goes above the maximum ratings, the wiring could overheat and cause serious damage to your equipment.

Temperature Caution!

Be careful when handling the unit. When the unit is plugged in, the internal components generate heat, and consequently the outer casing may feel hot to the touch.

Connecting the Power

The PC's power source should be provided by a UL listed class 2 or "Limited Power Source" (LPS), with external adaptor output rated at 12 to 48 VDC, with minimum amperage of 1.2 A. If the power is supplied properly, the "Ready" LED will glow a solid green after a 25 to 30 second delay.

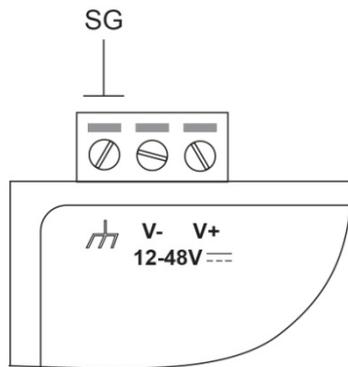
Grounding the Unit

Grounding and wire routing help limit the effects of noise due to electromagnetic interference (EMI). Before connecting devices, run a ground wire from the ground screw to the grounding surface.



ATTENTION

This product should be mounted to a well-grounded mounting surface such as a metal panel.



SG: The **Shielded Ground** (sometimes called Protected Ground) contact is the left most contact of the 3-pin power terminal block connector when viewed from the angle shown here. Connect the SG wire to an appropriate grounded metal surface.

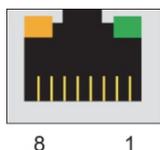
Connecting Data Transmission Cables

In this section, we describe how to connect the W315A/325A embedded computers to the network, serial devices, and a serial COM terminal.

Connecting to the Network

Plug your network cable into the embedded computer's Ethernet port. The other end of the cable should be plugged into your Ethernet network. When the cable is properly connected, the LEDs on the embedded computer's Ethernet port will glow to indicate a valid connection.

The 10/100 Mbps Ethernet LAN port accepts 8-pin RJ45 connectors. The following diagram shows the pinouts for these ports.



The LED indicator on the right glows a solid green color when the cable is properly connected to a 100 Mbps Ethernet network. The LED will flash on and off when Ethernet packets are being transmitted or received.

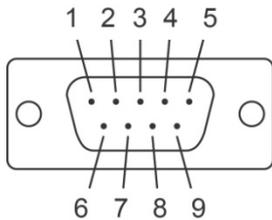
The LED indicator on the left glows a solid orange color when the cable is properly connected to a 10 Mbps Ethernet network. The LED will flash on and off when Ethernet packets are being transmitted or received.

Pin	Signal
1	ETx+
2	ETx-
3	ERx+
4	-
5	-
6	ERx-
7	-
8	-

Connecting to a Serial Device

Use a serial cable to plug your serial device into the embedded computer's serial port. Serial ports P1 to P2 have male DB9 connectors and can be configured for RS-232, RS-422, or RS-485 communication by software. The pin assignments are shown in the following table:

DB9 Male Port



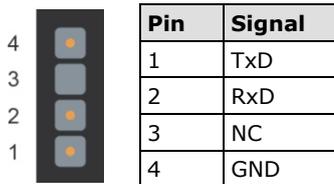
RS-232/422/485 Pinouts

Pin	RS-232	RS-422	RS-485 (4-wire)	RS-485 (2-wire)
1	DCD	TxDA(-)	TxDA(-)	-
2	RxD	TxDB(+)	TxDB(+)	-
3	TxD	RxDB(+)	RxDB(+)	DataB(+)
4	DTR	RxDA(-)	RxDA(-)	DataA(-)
5	GND	GND	GND	GND
6	DSR	-	-	-
7	RTS	-	-	-
8	CTS	-	-	-

Connecting to the Serial Console Port

The serial console port is a 4-pin pin-header RS-232 port. It is designed for serial console terminals, which are useful for viewing boot up messages.

Serial Console Port & Pinouts



Serial Console Cable



Connecting an Antenna

The W315A/325A embedded computers come with a 1 dBi antenna for GPRS communication. Connect the antenna to the SMA connector located on the front panel of the embedded computer. Connect the antenna to the computer by rotating it in a clockwise direction.



Installing a SIM Card

The W315A/325A embedded computers have a built-in GSM/GPRS cellular module to provide long-range communication. SIM (Subscriber Identity Module) cards are used to authenticate and identify subscribers when connecting to a network.

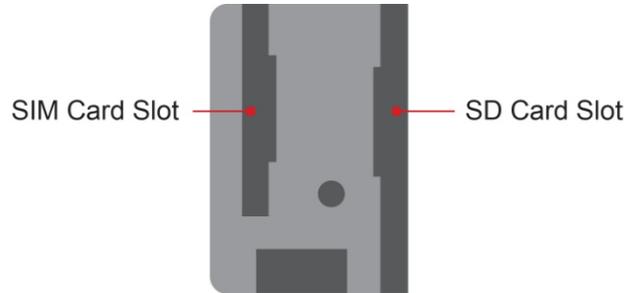
Follow these steps to install a SIM card:

Step1: Before you install a SIM card, make sure the embedded computer is powered off.

Step2: Use a screwdriver to remove the protective cover to access the slot. Note that the SD slot and SIM card slot for the W315A/325A share the same protective cover.



Step3: When inserting the SIM card, make sure the chip is facing upwards. Plug the SIM card directly into the slot.



Step 4: Power on the embedded computer and start the operating system.

Step 5: To operate GPRS connection, refer to the operating system user’s manual for details.

NOTE To remove the SIM card from the slot, press the SIM card in slightly with your finger, and then remove your finger to allow the card to spring out partially. You may now grasp the top of the card with two fingers and pull it out.

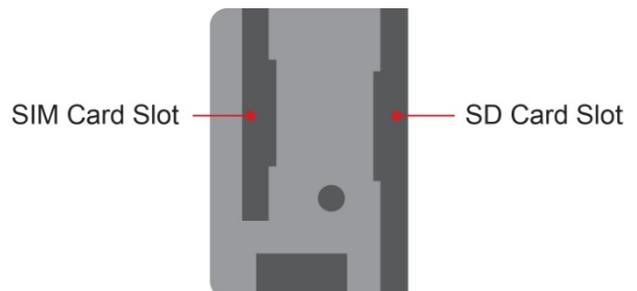
Installing an SD Card for Storage Expansion

The W315A/325A embedded computers have an SD slot for storage expansion. The SD slot allows users to plug in a Secure Digital (SD) memory card compliant with the SD 1.0 standard for up to 1 GB of additional memory space, or a Secure Digital High Capacity (SDHC) memory card compliant with the SD 2.0 standard for up to 16 GB of additional memory space. The following steps show you how to install an SD card.

The SD slot is located on the right side of the W315/W325 casing. To install an SD card, first remove the protective cover to access the slot, and then plug the SD card directly into the slot.

Step 1: Use a screwdriver to remove the screws holding the SD/SIM card slot’s outer cover.

Step 2: After removing the cover, insert the SD memory card into the slot.



Regulatory Approval Statement



This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Class A: FCC Warning! This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



European Community

Warning:

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult with the dealer or an experienced radio/TV technician.

CAUTION:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Prohibition of co-location:

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

Safety Information:

To maintain compliance with the FCC's RF exposure guidelines, when installing and/or operating this equipment, you should maintain a minimum distance of 20 cm between the transmitter and your body. Use only the supplied antenna. Unauthorized antennae, modifications, or attachments could damage the transmitter and may violate FCC regulations. The device includes a GPRS module. This module has been approved by FCC. The FCC ID is 09EQ24PL001.