Votre interlocuteur

AIRICOM — Ile de France, Paris et Nord
65 rue de la Libération - 60710 Chevrières
tél 03.44.91.04.14 - fax 03.44.91.04.15
www.airicom.com - info@airicom.com

AURECOM — Bretagne et Grand Ouest
La Ville Cognac - 56430 Mauron
tél 02.97.22.79.72 - fax 02.97.22.90.51
www.aurecom.fr - info@aurecom.fr

RG2i — Rhône Alpes, Est et Sud-est
26 rue Bergson - 42000 Saint Etienne
tél 04.77.92.03.56 - fax 04.77.92.03.57
www.rg2i.com - info@rg2i.fr

Groupe 2AR

WLAN & Cellular Solutions

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WLAN & Cellular Solutions

Groupe 2AR Votre contact

AURECOM — Bretagne et Grand Ouest
La Ville Cognac - 56430 Mauron
tél 02.97.22.79.72 - fax 02.97.22.90.51
www.aurecom.fr - info@aurecom.fr

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www.rg2i.com - info@rg2i.fr

Access Point/Bridge/AP Client Selection Guide




	AWK-1100	AWK-1200-AP	AWK-1200-AC	AWK-3121
WLAN				
IEEE 802.11g/b (wireless LAN)	√	√	√	√
IEEE 802.3u (10/100M Ethernet LAN)	√	√	√	√
IEEE 802.3af (power-over-Ethernet)	√	√	√	√
IEEE 802.1d (Spanning Tree Protocol)	---	---	---	√
Frequency	2.4 GHz			2.4and 5 GHz
Modulation	11b: DBPSK, DQPSK, CCK 11g: OFDM			11b: DBPSK, DQPSK, CCK 11g: OFDM with BPSK, QPSK, 16QAM, 64QAM 11a: OFDM with BPSK, QPSK, 16QAM, 64QAM
Channels	US: 11 channels EU: 12 channels JP: 14 channels			11b/g: US: 11 channels EU: 12 channels JP: 14 channels 11a: US: 12 channels EU: 19 channels JP: 19 channels
Security	64-bit and 128-bit WEP encryption, WPA (IEEE 802.1X/ RADIUS and TKIP), Hide SSID	WEP, WPA, WPA2, IEEE 802.1X, MAC address filtering, Hide SSID	64-bit and 128-bit WEP encryption, WPA	64-bit and 128-bit WEP encryption, WPA / WPA2 (IEEE 802.1X/RADIUS and TKIP), Hide SSID
802.11b Data Rates (Mbps)	1, 2, 5.5, 11			
802.11g Data Rates (Mbps)	6, 9, 12,18, 24, 36, 48, 54			
802.11a Data Rates (Mbps)	---	---	---	6, 9, 12,18, 24, 36, 48, 54
Configuration	Web-based management			Web-based management Console management
Interface				
Antenna	2 dBi omni-directional antenna with an RP-SMA connector	5 dBi External / N-type connector	9 dBi Internal	2 dBi dual-band omni-directional antenna with an RP-SMA connector
RJ45 Port	10/100BaseT(X) auto negotiation			
Alarm Contact	---	---	---	√
Digital Inputs	---	---	---	2
Console	---	---	---	RS-232 (RJ45)
Power Requirements				
Power Input	12-45 VDC or 48 VDC (PoE)	48 VDC (PoE)	48 VDC (PoE)	±12-48 VDC or 48 VDC (PoE)
Number of Power Inputs	3	1	1	3
Overload Current Protection	√	---	---	√
Reverse Polarity Protection	√	---	---	√
Physical Characteristics				
Housing	metal, IP30 protection	IP68 protection	IP67 protection	metal, IP30 protection
Dimensions	53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in.)	284.4 x 254.3 x 77.5 mm (11.20 x 10.01 x 3.05 in)	165.8 x 195.8 x 60.3 mm (6.53 x 7.71 x 2.37 in)	53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in)
Installation Options	DIN-Rail mounting, wall mounting	Wall or Mast Mounting	Wall or Mast Mounting	DIN-Rail mounting, wall mounting
Environmental Limits				
Operating Temperature	0 to 60°C (32 to 140°F)	-20 to 70°C (-4 to 158°F)		Standard models: 0 to 60°C (32 to 140°F) Wide Temp. Models: -40 to 75°C (-40 to 167°F)
Storage Temperature	-20 to 70°C (-4 to 158°F)	-40 to 80°C (-40 to 176°F)		-40 to 85°C (-40 to 185°F)
Ambient Relative Humidity	5% to 95% (non-condensing)			
Regulatory Approvals				
CE	√	√	√	√
FCC	√	√	√	√
Safety	EN60950-1: 2001, UL60950-1	---	---	EN60950-1: 2001, UL60950-1, UL508, UL2043 (pending)
Hazardous location	UL/cUL Class I, Division 2, Groups A, B, C and D ATEX Class I, Zone 2, EEx nC IIC (pending)	---	---	UL/cUL Class I, Division 2, Groups A, B, C, and D (pending) ATEX Class I, Zone 2, EEx nC IIC (pending)
Radio	EN300 328-1/-2			
EMC	EN301 489-1/-17			
EMI	FCC Part 15.247			
Reliability				
Warranty	5 years (see www.moxa.com/warranty)			

Wireless Device Server Selection Guide

	NPort® W2004	NPort® W2150 Plus	NPort® W2250 Plus
LAN Interface			
Ethernet	10/100 Mbps (RJ45)		
1.5 KV Magnetic Isolation Protection	√	√	√
WLAN Interface			
Standard Compliance	802.11b/g	802.11a/b/g	
Radio Frequency Type	DSSS/OFDM		
Rx Sensitivity	-80 dBm	-80 dBm	-80 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: 54 Mbps 802.11b: 11 Mbps 802.11g: 54 Mbps (max.) with auto fallback (54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1 Mbps)	
Transmission Distance	Up to 300 meters (at 12 Mbps in open areas)	Up to 100 meters (in open areas)	
Network Modes	Infrastructure, Ad-Hoc		
Wireless Security	64-bit/128-bit data encryption with WEP	WEP: 64-bit/128-bit data encryption WPA, WPA2, 802.11i: Enterprise mode and Pre-Share Key (PSK) mode Encryption: 128-bit TKIP/AES-CCMP EAP-TLS, PEAP/GTC, PEAP/MD5, PEAP/MSCHAPV2, EAP-TTLS/PAP, EAP-TTLS/CHAP, EAP-TTLS/MSCHAP, EAP-TTLS/MSCHAPV2, EAP-TTLS/EAP-MSCHAPV2, EAP-TTLS/EAP-GTC, EAP-TTLS/EAP-MD5, LEAP	
Serial Interface			
Serial Standards	RS-232/422/485		
Number of Ports	4	1	2
Connectors	RJ45	DB9 male	
Console Port	√	---	---
64 KB Serial Data Log	---	√	√
Off-line Port Buffering	---	20 MB	10 MB
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	RTS/CTS, XON/XOFF, DTR/DSR	
Baudrate	50 bps to 460.8 Kbps	50 bps to 921.6 Kbps	
Software			
Network Protocols	ICMP, IP, TCP, UDP, DHCP, Telnet, DNS, SNMP, HTTP, SMTP, SNTP, SSH, HTTPS	ICMP, IP, TCP, UDP, DHCP, Telnet, DNS, SNMP, HTTP, SMTP, SNTP, SSH, HTTPS	
Configuration Options	Web Console, Serial Console, Telnet Console		
Utilities	NPort® Search Utility and NPort® Windows Driver Manager		
Driver Support	Windows Real COM driver (for Windows 95, 98, ME, NT, 2000, XP, 2003, Vista, XP x64, 2003 x64, Vista x64), Linux Real TTY driver, Fixed TTY driver (for SCO Unix, SCO OpenServer, UnixWare 7, UnixWare 2.1, SVR 4.2, QNX 4.25, QNX 6, Solaris 10, FreeBSD, AIX 5.x, HP-UX 11i)		
Physical Characteristics			
Housing	SECC sheet metal (1 mm)	Aluminum sheet metal (1 mm)	
Dimensions	45.8 x 135 x 105 mm (1.80 x 5.31 x 4.13 in)	77 x 111 x 26 mm (3.03 x 4.37 x 1.02 in)	
Environmental Limits			
Operating Temperature	0 to 55°C (32 to 131°F)		
Operating Humidity	5 to 95% RH		
Storage Temperature	-20 to 85°C (-4 to 185°F)		
Regulatory Approvals			
EMC	CE (EN55022 and EN55024 Class A, ETSI EN 301 489-17, ETSI EN 301 489-1), FCC (Part 15 Subpart C, Part 17 Subpart B Class A)	CE (EN55022 and EN55024 Class A, ETSI EN 301 489-17, ETSI EN 301 489-1), FCC Part 15 and 17 Subpart B Class A	
Safety	UL (UL60950-1), TÜV (EN60950-1)		
DSPR	---	ARIB-STD 33, ARIB-STD 66	
Reliability			
Warranty	5 years (see www.moxa.com/warranty)		

RISC-based WLAN Computer Selection Guide



	W311-LX	W321-LX	W341-LX
Computer			
CPU	MOXA ART ARM9 32-bit 192 MHz		
OS (pre-installed)	Embedded Linux with MMU support		
DRAM	32MB		64 MB
Flash	16 MB		
Reset Button	√	√	√
Storage			
SD socket	---	√	√
Other Peripherals			
USB	---	---	√
Relay Output	---	---	√
LAN Interface			
Ethernet	10/100 Mbps (RJ45)		
1.5 KV Magnetic Isolation Protection	√	√	√
WLAN Interface			
Standard Compliance	802.11a/b/g		
Radio Frequency Type	DSSS, CCK, OFDM		
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)		
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		
Number of Ports	1	2	4
Connector	DB9 male		
ESD Protection	15 KV		
RS-232 Console Port	√	√	√
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™		
Baudrate	50 bps to 921.6 Kbps		
LEDs			
System	Ready	Ready, SD	
LAN	10M/Link, 100M/Link (on connector)		
WLAN	Enable, Signal Strength		
Serial	TxD, RxD		
Physical Characteristics			
Housing: Aluminum (1 mm)	Aluminum (1 mm)		
Weight	150 g	185 g	390 g
Dimensions	67 x 100.4 x 22 mm (2.64 x 3.95 x 0.87 in)	77 x 111 x 26 mm (3.03 x 4.37 x 1.02 in)	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)		
Operating Humidity	5 to 95% RH		
Storage Temperature	-20 to 80°C (-4 to 176°F)		
5-g Anti-Vibration	√	√	√
50-g Anti-Shock	√	√	√
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), T V (EN60950-1)		
Directives	RoHS, CRoHS, WEEE		
Reliability			
Buzzer, RTC, WDT	√	√	√
Warranty	5 years (see www.moxa.com/warranty)		

Industrial Cellular Selection Guide




	OnCell G3110	OnCell G3150	OnCell G2110/G2110-T	OnCell G2150I
Hardware				
CPU	MOXA ART CPU, 192 MHz		---	---
RAM	8 MB		---	---
Flash ROM	4 MB		---	---
LAN Interface				
Ethernet	10/100 Mbps (RJ45)		---	---
1.5 KV Magnetic Isolation Protection	√	√	---	---
Cellular Interface				
Standards	GSM/GPRS/EDGE		GSM/GPRS	
Band Options	Quad-band 850/900 and 1800/1900 MHz			
GPRS Multi-slot Class	Class 12		Class 10	
GPRS Terminal Device Class	Class B			
GPRS Coding Schemes	CS1 to CS4			
SMS	Point-to-point Text/PDU, Mobile Originated (MO) and Mobile Terminated (MT Cell Broadcast in accordance with GSM 07.05)			
Serial Interface				
Serial Standards	RS-232	RS-232/422/485	RS-232	RS-232/422/485
Number of Ports: 1	1	1	1	1
2.5 KV Serial Line Isolation	DB9 male	RS-232: DB9 male RS-422/485: 5-pin terminal block	DB9 female	RS-232: DB9 female RS-422/485: 5-pin terminal block
2 KV Power EFT/Surge Protection	---	---	---	√
ESD Protection: 15 KV	√	√	√	√
Serial Communication Parameters				
Communication Parameters	Data Bits: 5, 6, 7, 8; Stop Bits: 1, 1.5, 2; Parity: None, Even, Odd, Space, Mark		Data Bits: 7, 8; Stop Bits: 1, 2; Parity: None, Even, Odd, Space, Mark	
Flow Control	RTS/CTS, XON/XOFF		RTC/CTS	
Baudrate	50 bps to 921.6 Kbps		300 bps to 115.2 Kbps	
Physical Characteristics				
Housing	Aluminum, IP30 protected		ABS + PC, IP30 protected	
Environmental Limits				
Operating Temperature	0 to 55°C (32 to 131°F)			
Operating Humidity	5 to 95% RH			
Storage Temperature	-40 to 75°C (-40 to 167°F)			
Regulatory Approvals				
Safety	UL UL EN60950-1, TÜV EN60950-1		---	---
EMC	FCC part 15 subpart B, Class A, CE EN55022 Class A, CE EN55024			
EN61000-4-2 (ESD)	√	√	√	√
EN61000-4-3 (RS)	√	√	√	√
EN61000-4-4 (EFT)	√	√	√	√
EN61000-4-5 (Surge)	√	√	√	√
EN61000-4-8	√	√	√	√
EN61000-4-12	√	√	---	---
RF	FCC Part22H			
	FCC PART24E			
	EN301 489-1			
	EN301 489-7			
	EN301 511			
Reliability				
Warranty	5 years (see www.moxa.com/warranty)			

Cellular Computer Selection Guide

	W315-LX	W325-LX	W345-LX
Computer			
CPU	MOXA ART ARM9 32-bit RISC CPU, 192 MHz		
OS (pre-installed)	Embedded Linux with MMU support		
DRAM	32 MB		64 MB
Flash	16 MB		
Reset Button	√	√	√
Storage			
SD Socket	---	√	√
Other Peripherals			
USB	---	---	√
Relay Output	---	---	√
LAN Interface			
Ethernet	10/100 Mbps (RJ45)		
1.5 KV Magnetic Isolation Protection	√	√	√
Cellular Interface			
Cellular Modes	GSM, GPRS		
Radio Frequency Bands	850/900/1800/1900 MHz		
GPRS Class	10		
Coding Schemes	CS1 to CS4	CS1 to CS4	CS1 to CS4
Serial Interface			
Serial Standards	RS-232/422/485		
Number of Ports	1	2	4
Connector	DB9 male		
15 KV ESD protection	√	√	√
RS-232 Console Port	√	√	√
Serial Communication Parameters			
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®		
Baudrate	50 bps to 921.6 Kbps (non-standard baudrates supported; see user's manual for details)		
LEDs			
System		Ready, SD	
LAN	10M/Link, 100M/Link (on connector)		
Cellular	GPRS Enabled, GSM Signal Strength		
Serial	TxD, RxD		
Physical Characteristics			
Housing	Aluminum (1 mm)		
Weight	195 g		400 g
Dimensions	77 x 111 x 26 mm (3.03 x 4.37 x 1.02 in)		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)		
Operating Humidity	5 to 95% RH		
Storage Temperature	-20 to 80°C (-4 to 176°F)		
5-g Anti-Vibration	√	√	√
50-g Anti-Shock	√	√	√
Regulatory Approvals			
EMC	CE (Class A), FCC		
Safety	UL/cUL, T V		
Directives	RoHS, CRoHS, WEEE		
Reliability			
Buzzer, RTC, WTC	√	√	√
Warranty	5 years (see www.moxa.com/warranty)		

Introduction to Industrial Wireless

An easier way to connect your remote devices

Using wireless LANs in offices and homes is now commonplace, and it was only a matter of time before wireless technology found its way into factories and other industrial settings. Wireless technology offers several benefits, including mobility, greater versatility in device placement, wider coverage, and cost savings.

In a factory setting, for example, the benefits of using wireless technology include the reduction in cost and time required to install and maintain cabling. This is especially true for harsh environments where cables are easily damaged by chemicals, or the cables can shake loose because of excessive vibration or equipment motion. Wireless solutions provide enhanced flexibility with device connections, and can help establish connections to stationary or mobile devices that would otherwise be impossible. In addition, with wireless, plant machinery is much easier to access when running diagnostics or updating programs.

Five Reasons to Use Wireless

1. Mobility leads to increased efficiency
2. Greater versatility for expansion or migration
3. Wider network coverage
4. Easier device installation and maintenance
5. Reduced cabling and installation costs

Mobility leads to increased efficiency

Adding mobility to your operation can lead to increased efficiency, and improve your ability to meet the needs of your customers. For example, employees can easily check the location and number of items in stock with a handheld computer, even while driving a forklift through a large warehouse.

Greater versatility for expansion or migration

Setting up a wireless LAN in a factory setting allows stationary systems to be connected to mobile subsystems or robots to achieve a connectivity that would otherwise be impossible. In addition, wireless technology can make it much simpler to gain temporary access to plant machinery to run diagnostic tests or update device programs.

Wider network coverage

Wireless technology allows you to connect to devices and other computers more conveniently, and from a wider range of locations. You can send and receive information at any time, and without being limited by the need to run wiring from your computer or device to the network.

Easier device installation and maintenance

Setting up the hardware and software for a wireless network is relatively straightforward. Most industrial networks use access points placed at strategic locations to maximize coverage, and use wireless device servers to connect serial devices to the network.

Reduced cabling and installation costs

Setting up a wireless network can be cheaper and easier than implementing a wired network. If your application is right for wireless, then you can save both time and money by doing away with the need to use wire to connect your computers and devices to the network.

WLAN vs. Cellular

WLAN

WLAN technology is based on the open IEEE 802.11 standards, which include the well-known standard known as Wi-Fi. Since the 802.11 standards are open, any compliant device can connect to any other compliant device, and you can set up your wireless network by installing access points. WLAN is ideal for applications that already have a network infrastructure in place, and is typically used when wireless Ethernet and Internet access is required at high data transission speeds.

Cellular

With cellular technology, devices communicate over cellular networks that are managed by licensed cellular providers. There are several cellular standards worldwide, with GSM/SMS (2G) firmly established, and GPRS/CDMA (3G) quickly emerging as its natural successor. However, the bandwidth for even GPRS/CDMA is still far below WLAN, and maxes out at 120 Kbps. Network availability and reliability is also dependent on the specific cellular provider. On the other hand, while cellular bandwidth may be lower, the communication range is far greater than for WLAN.

Since cellular providers use heavily restricted and well-defined bands for their networks, cellular signals are considered very secure and not vulnerable to eavesdropping in the way that WLAN signals are.

Selecting a Suitable Wireless Solution

Both WLAN and cellular technologies have enjoyed widespread adoption and long-term support. Determining which technology is suitable for your application depends to a large extent on the type of speed, bandwidth, and security that you need.

WLAN

Choose WLAN when you need:

- Higher bandwidth
- To connect to an existing wired network
- A high degree of control and customization

Cellular

Choose cellular when you need:

- A much wider transmission range
- Better security
- To manage devices by cell phone

Higher bandwidth with WLAN

	Application	Equivalent Wired Product
Wireless access point	establish/extend network	Ethernet switch or router
Wireless serial device server	connect serial device to Wi-Fi network	serial device server
Wireless embedded computer	advanced remote management and data processing over Wi-Fi	embedded computer

Better mobility with cellular

	Application	Equivalent Wired Product
Industrial cellular router	establish wide area network	broadband router
Industrial cellular modem	connect serial device to network	land line or broadband modem-
Cellular-enabled embedded computer	advanced remote management and data processing	embedded computer

Case Study: Intelligent Transportation System

Monitoring and controlling traffic, parking facilities, and more

ThinkCore W300 wireless embedded computers can play a critical role in the design of intelligent transportation systems. A prime example is the ThinkCore W315, which can be used to manage and control message display panels by transmitting data through the computer's GSM/GPRS module.

In addition, the ThinkCore W341 wireless embedded computer can connect to various devices, such as IP cameras and vehicle detectors, to monitor vehicle density and traffic violations, and it can even be used to control traffic lights and report vehicle conditions. When used at parking facilities, the W341 is often connected to sensors that detect parking lot conditions. The information is collected by the ThinkCore W341 and then transmitted back to the control center using the 802.11a/b/g module.

Application Requirements

- Live images of traffic conditions that are accessible anytime, and from any location
- Network and/or device redundancy to guarantee nonstop operation
- Industrial-grade design that is rugged enough for outdoor environments
- Optical fiber for large bandwidth and immunity from electromagnetic interference
- Easy integration with other network equipment to provide centralized control over one network

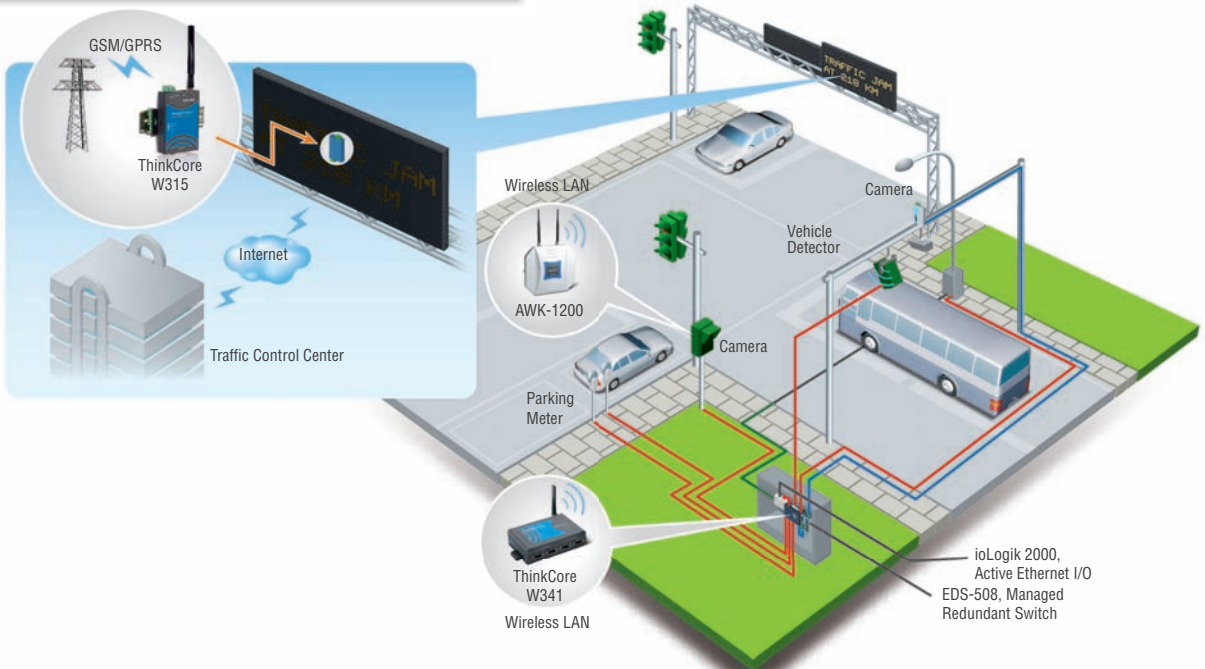
Why Moxa?

- Built-in Ethernet and power redundancy for robust, reliable operation in harsh environments
- Integrate video, voice, and data over one network
- Easy connection of CCTVs to Ethernet with Moxa's video servers
- Wireless architecture and scalable, modular design for easier upgrades and expansion
- Use any combination of optical fiber, twisted pair copper wire, serial devices, and wireless connections

Key Products

ThinkCore W341 Wireless embedded computer
ThinkCore W315 GSM/GPRS embedded computer
AWK-1200 Wireless AP/bridge or AP client for outdoor

Application Diagram



Case Study: Automated Meter Reading

Cost-effective connections to power meters

Traditionally, power meters were read manually by technicians on-site, but recent improvements in technology have led to a dramatic growth in the implementation of AMR systems, which can be retrofitted onto existing meters. However, it may not be practical to install additional wiring for AMR systems in urban settings that have high meter densities in locations that are difficult to reach. A simple, cost-effective solution is needed to connect power meters to a central network, but with minimal additional cabling.

There are several technologies available for implementing wireless AMR, such as Global System for Mobile communication (GSM), GIobal Packet Radio Service (GPRS), Wi-Fi, Bluetooth, and more. Although cellular solutions can be used in any location with access to the cellular network, Wi-Fi solutions may be better suited for metropolitan areas that have a well-developed wireless infrastructure. Utility companies can enjoy the benefits of automated, centralized meter reading and the associated cost savings.

Application Requirements

- Instant access to remote meters from a centralized location
- Cost-effective installation
- Seamless operation with meters from different manufacturers

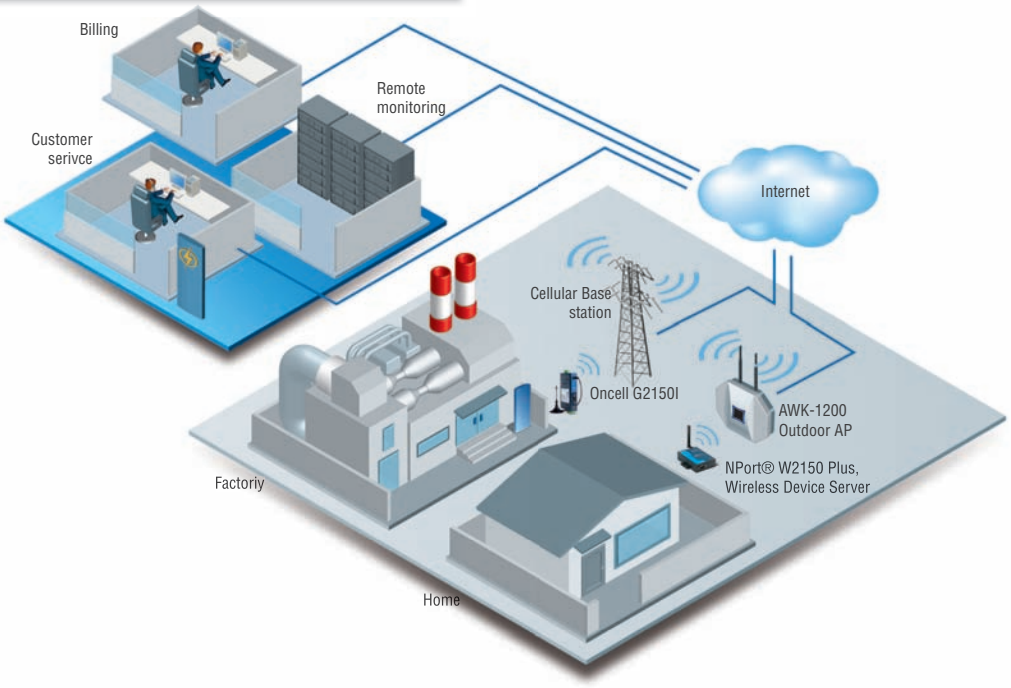
Why Moxa?

- We provide both cellular and Wi-Fi solutions for wireless access to power meter data
- Our products have built-in RS-232, RS-422/485 interfaces that support legacy serial devices
- DIN-rail and wall mounting form factors

Key Products

OnCell G2150 Industrial GPRS/GSM modem
AWK-1200 Wireless AP/bridge or AP client for outdoors
NPort® W2150 Plus Wireless 1-port serial device server

Application Diagram



Case Study: WLAN for Water and Wastewater Plants

Easy, timely access to monitoring data

Water and wastewater treatment plants face a number of challenges, including stricter regulation, an aging infrastructure, and the need for increased operational efficiency. Traditional methods of operation are no longer sufficient, and utilities must become more aggressive in applying new technologies. This trend is driving the need for integrated information systems that can help managers make better operational decisions, and better manage plant assets.

Modern plants are typically spread out over a large area, with much of the facility located outdoors. The use of automated systems has been a key solution for improving operational efficiency. Implementation involves using Ethernet-based SCADA systems for computer-controlled devices and remote monitoring over a fast and reliable network. Since many devices face harsh environmental conditions, it is essential that they have a rugged design and features that ensure reliable operation.

Application Requirements

- Reliable and durable industrial-grade design that can withstand harsh outdoor environments
- Timely access to relevant monitoring data for quick and accurate decision making
- Cost-effective network access over large, spread-out areas, including locations that are not easily wired
- Ability to integrate both new and legacy control devices into one communication network

Why Moxa?

- Complete selection of industrial Ethernet solutions that fulfill all network demands
- Easy Ethernet connections for both new and legacy devices
- Reduced cabling costs and greater flexibility with wireless Ethernet
- Rugged hardware design for harsh industrial environments, both indoors and outdoors

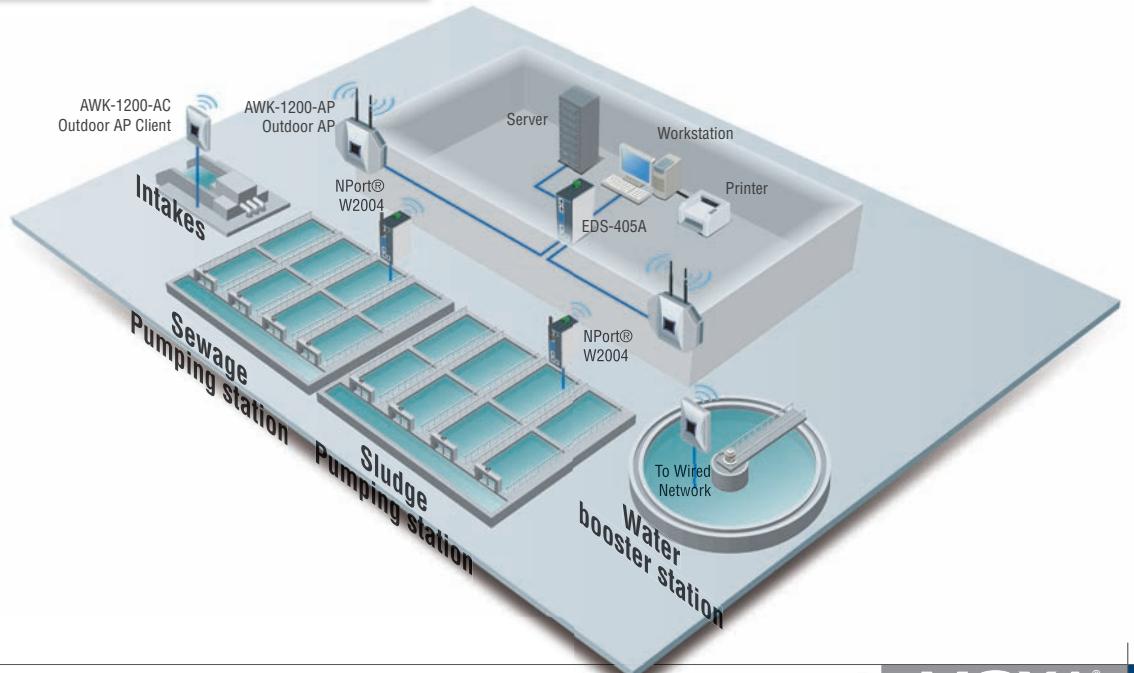
Key Products

AWK-1200 Wireless AP/bridge or AP client for outdoors

EDS-405A/408A 5/8-port managed Ethernet switches

NPort® W2004 Wireless 4-port serial device server

Application Diagram



Introduction to IEEE 802.11

Introduction

Are you ready for the convenience that comes from sending your Ethernet packets over the air instead of through a wire? Wireless is not for everyone, but if your application uses mobile equipment that is controlled over a TCP/IP network, or the cost of installing wire conduits at your work site is prohibitive, then consider setting up a wireless local area network (WLAN). The IEEE 802.11 standard established a way to use radio frequency (RF) technology to send Ethernet packets over the air. Applications that include TCP/IP will run on 802.11-compliant WLANs the same as they do over Ethernet. By common agreement between regulatory agencies around the world (FCC, ETSI, etc.), a WLAN transmits over unlicensed spectrums, with only minor variations from country to country.

	802.11b	802.11g	802.11a
Approval Date	September 1999	June 2003	September 1999
Compatibility	IEEE 802.11b compliant	IEEE 802.11b/g compliant	IEEE 802.11a compliant
Number of Channels	3 non-overlapping	3 non-overlapping	8 non-overlapping (4 in some countries)
Data Rates	11, 5.5, 2, 1 Mbps	54, 48, 36, 24, 18, 12, 9, 6 Mbps	54, 48, 36, 24, 18, 12, 9, 6 Mbps
Wireless Medium	Direct Sequence Spread Spectrum (DSSS), 2.4 GHz	Orthogonal Frequency Division Multiplexing (OFDM), 2.4 GHz	Orthogonal Frequency Division Multiplexing (OFDM), 5 GHz

Benefits of Using Wireless Technology

What makes wireless networking a natural choice for many networking requirements?
Flexibility: Wireless networks work anywhere, anytime.
Easy Deployment: Wireless networks are ideal for those hard to wire areas.
High Performance: Wireless networks have the bandwidth and safeguards needed to keep essential applications running continuously.
Cost Effective: Wireless networks can be installed quickly, and help reduce the cost of cabling and maintenance.

Moxa's Wireless Solutions for Industrial Markets

One of the biggest concerns raised by potential users of WLAN technology is safety. Since data is transmitted by radio waves, how can users guarantee the confidentiality of their information? To provide secure transmission over wireless networks, Moxa provides WPA (Wi-Fi Protected Access) and WPA2 and WPA2 security specifications to overcome weaknesses in Wired Equivalent Privacy (WEP). In addition, Moxa's wireless products incorporate several important features to meet the stringent demands of industrial applications, including redundant power inputs, operating temperature ranges of either 0 to 60°C or -40 to 75 °C (for wide temperature models), and DIN-Rail mounting capability. The enhanced reliability of these products makes them a great choice for your wireless industrial applications.

WPA (Wi-Fi Protected Access)

Moxa's wireless products support the WPA/WPA2 standards proposed by the Wi-Fi Alliance (http://www.wi-fi.org). Both WPA-PSK (Pre-Shared Key) mode and full WPA mode are supported. WPA includes TKIP (Temporal Key Integrity Protocol) and IEEE 802.1X, and replaces WEP by providing better WLAN security.

WLAN Security

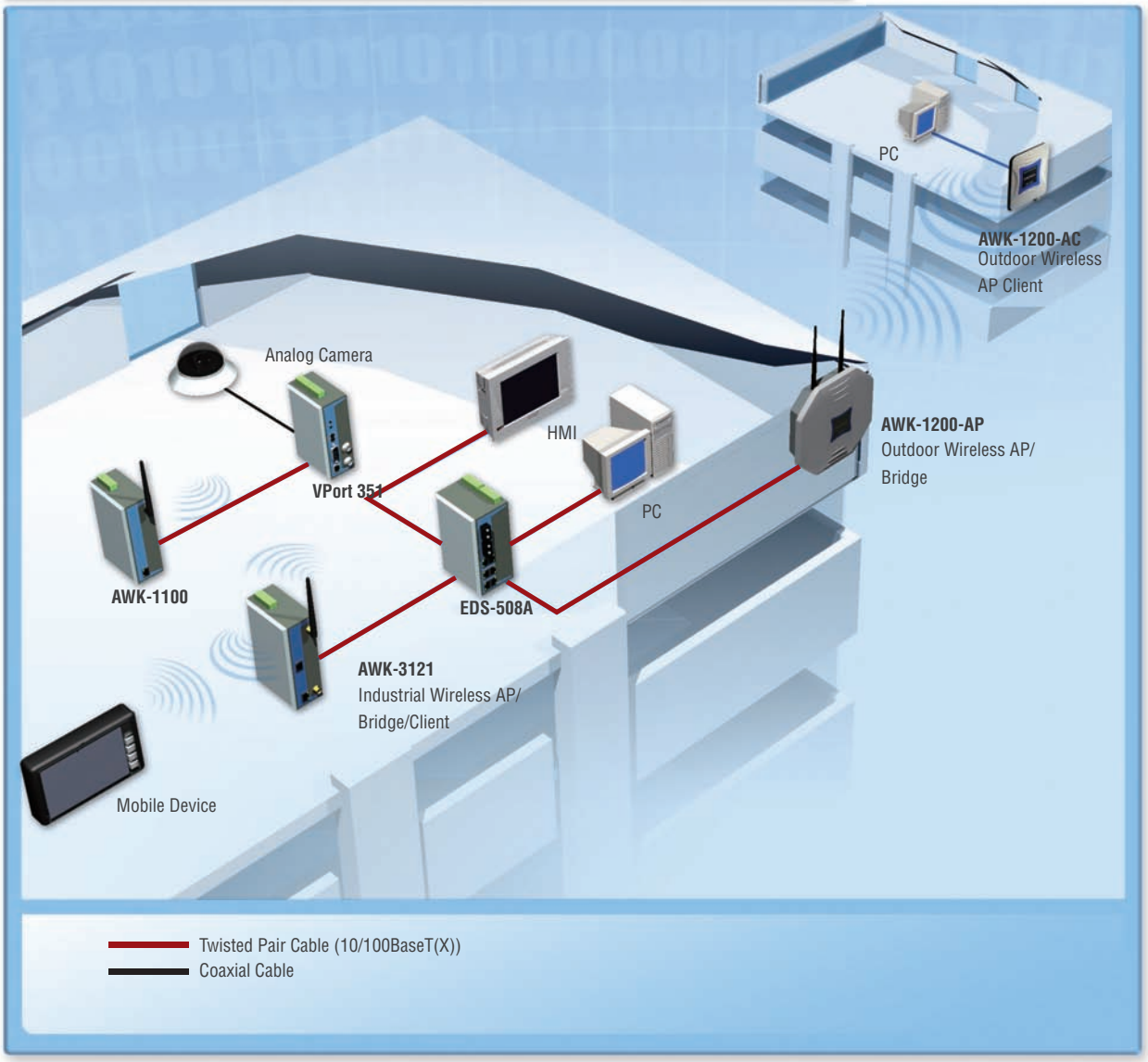
Moxa's wireless products support WPA-PSK (Pre-Shared Key) mode and full WPA mode proposed by the Wi-Fi Alliance (http://www.wi-fi.org). WPA includes TKIP (Temporal Key Integrity Protocol) and IEEE 802.1X, and replaces WEP by providing better WLAN security.

Security Protocols	Features	Status
WEP (Wired Equivalent Privacy)	• Data encryption with RC4 • User-name/password authentication not provided	Standard
TKIP (Temporary Key Integration Protocol)	• Enhanced WEP with extended WEP IV length • Packet Integration Check	Available
802.1X	• Uses EAP (Extensible Authentication Protocol) for port-based authentication • Supports RADIUS, Kerberos, and other authentication services	Available
WPA (Wi-Fi Protected Access)	• TKIP, 802.1X, MIC (Message Integration Check) • Supports RADIUS for authentication • Backward upgradeable to all systems	Available
802.11i (WPA2)	• WPA+AES cipher	Available in AWK-3121, AWK-1200-AP

IEEE 802.X/RADIUS

When configured for AP/Bridge mode, Moxa's wireless products use EAP-MD5, EAP-TLS, EAPTTLS, and PEAP to authenticate wireless users and distribute encryption keys dynamically with IEEE 802.1X Port-Based Network Access Control and RADIUS (Remote Authentication Dial-In User Service).

Typical Industrial Application of Wireless Ethernet



AWK-1100 Series

Industrial IEEE 802.11g/b wireless Access Point/Bridge/AP Client

- IEEE 802.11g/b compliant
- Power input by redundant 24 VDC power inputs or Power-over-Ethernet
- Powerful security with WPA/802.1X/MAC address filtering
- DIN-Rail or panel mounting ability
- IP30 protected high-strength metal housing

The certification logos shown here apply to some or all of the products in this section. Please see the **Specifications** section or Moxa's website for details.

Introduction

Are your industrial applications hard to wire, or are your wiring costs out of control? Are you already using mobile equipment that connects over a TCP/IP network? If so, then the AWK-1100 Access Point/Bridge/AP Client could be what you're looking for. The AWK-1100 is rated to operate at temperatures ranging from 0 to 60°C and is rugged enough for any harsh industrial environment. Installation is easy, with either DIN-Rail mounting or distribution boxes. The DIN-Rail mounting ability, wide operating temperature range, and IP30 housing with LED indicators make the AWK-1100 a convenient yet reliable solution for any industrial wireless application.

Advanced Security Capability

- 64-bit and 128-bit WEP (Wired Equivalent Privacy)
- Enable/disable SSID broadcasts
- MAC-address-based access control
- IEEE 802.1X/RADIUS
- WPA (Wi-Fi Protected Access)

Useful Utilities and Remote Configuration

- Firmware upgrade from TFTP or HTTP
- Web-based Management
- Supports SNMP and UPnP
- Configuration backup and reset

Specifications

WLAN

Standards:
IEEE 802.11g/b for Wireless LAN
IEEE 802.3u 10/100BaseT(X) for Ethernet LAN
IEEE 802.3af for Power-over-Ethernet

Frequency Range:
2.4-2.4835 GHz, Direct Sequence Spread Spectrum (DSSS)

Data Rate & Modulation:
OFDM @ 54 Mbps, CCK @ 11/5.5 Mbps, DQPSK @ 2 Mbps, and DBSK @ 1 Mbps

Operating Channels:
USA: 1-11 (US)
Europe: 1-13 (EU)
Japan: 1-14 (JP)

Security:
64-bit and 128-bit WEP encryption, WPA (IEEE 802.1X/RADIUS and TKIP)

Data Rates:
1 Mpbs, 2 Mbps, 5.5 Mbps, 6 Mbps, 9 Mbps, 11 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps, 54 Mbps

Transmit Power:
Typ. +18 dBm (+/- 1.5 dBm) @ 11 Mbps, +14 dBm (+/- 1.5 dBm) @ 54 Mbps

RX Sensitivity:
802.11b:
-81 dBm @ 11 Mbps, -85 dBm @ 5.5 Mbps, -86 dBm @ 2 Mbps, -87 dBm @ 1 Mbps
802.11g:
-68 dBm @ 54 Mbps, -70 dBm @ 48 Mbps, -74 dBm @ 36 Mbps, -78 dBm @ 24 Mbps, -81 dBm @ 18 Mbps, -84 dBm @ 12 Mbps, -85 dBm @ 9 Mbps, -86 dBm @ 6 Mbps

Software

Protocols: HTTP, DHCP, TCP/IP, RADIUS

Configuration: Web-based management

Client OS Support: Windows (95, 98, 2000, ME, NT, XP), Unix, Macintosh

Interface

Antenna: 2 dBi omni-directional antenna with an RP-SMA connector

RJ45 Port: 10/100BaseT(X) auto negotiation speed

LED Indicators: PWR1, PWR2, WLAN, LAN (Link/ACT)

Power Requirements

Input Voltage: 12 to 45 VDC, redundant dual DC power inputs or 48 VDC Power-over-Ethernet (IEEE802.3af)

Power Consumption: 0.3 A @ 24 V

Overload Current Protection: 1.6 A

Connection: Removable terminal block

Reverse Polarity Protection: Present

Physical Characteristics

Housing: metal, providing IP30 protection

Dimensions: 53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in.)

Weight: 800 g

Installation: DIN-Rail mounting, wall mounting (optional kit)

Environmental Limits

Operating Temperature: 0 to 60°C (32 to 140°F)

Storage Temperature: -20 to 70°C (-4 to 158°F)

Ambient Relative Humidity: 5% to 95% (non-condensing)

Regulatory Approvals

Safety: EN60950-1, UL60950-1

Hazardous location: UL/cUL Class I, Division 2, Groups A, B, C, and D; ATEX Class I, Zone 2, EEx nC IIC (Pending)

Radio: EN300 328

EMC: EN301 489-1/-17

EMI: FCC Part 15C

*Please check Moxa's website for the most up-to-date certification status.

Reliability

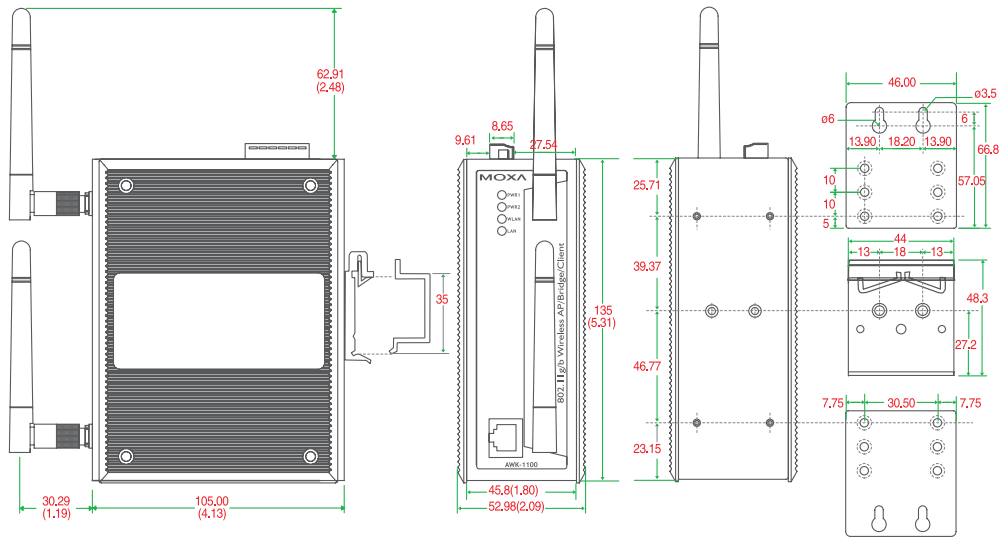
MTBF:
200,000 hrs
database: MIL-HDBK-217F, GB 25°C

Warranty

Warranty Period: 5 years

Details: See www.moxa.com/warranty

Dimensions



Ordering Information

Available Models

AWK-1100-US: IEEE 802.11g/b wireless AP/Bridge/AP Client, US band, 0 to 60°C

AWK-1100-EU: IEEE 802.11g/b wireless AP/Bridge/AP Client, Euro band, 0 to 60°C

AWK-1100-JP: IEEE 802.11g/b wireless AP/Bridge/AP Client, Japan band, 0 to 60°C

Optional Accessories (can be purchased separately)

DR-4524: 45W/2A DIN-Rail 24 VDC power supply with universal 85 to 264 VAC input

DR-75-24: 75W/3.2A DIN-Rail 24 VDC power supply with universal 85 to 264 VAC input

DR-120-24: 120W/5A DIN-Rail 24 VDC power supply with 88 to 132 VAC/176 to 264 VAC input by switch

WK-46: Wall mounting kit

RK-4U: 4U-high 19" rack mounting kit

AWK-1200 Series

IEEE 802.11g/b wireless Access Point/Bridge or AP Client for outdoors

AWK-1200-AP

AWK-1200-AC

- IP68-rated wireless Access Point/Bridge and IP67-rated wireless AP Client
- Point-to-point, point-to-multipoint wireless connectivity
- WEP/WPA/WPA2/IEEE 802.1X authenticator supported
- -20 to 70°C operating temperature range

The certification logos shown here apply to some or all of the products in this section. Please see the **Specifications** section or Moxa's website for details.

Introduction

The AWK-1200 Access Point/Bridge or AP Client is ideal for applications that are hard to wire, too expensive to wire, or use mobile equipment that connects to a TCP/IP network. The AWK-1200 series is rated to operate at temperatures ranging from -20 to 70°C, and its weatherproof design allows you to set up a WLAN, or extend existing wired networks to outdoor locations. In addition, the AWK-1200 has a detachable antenna design, which gives you the flexibility of choosing your own special-purpose antennas instead of using the standard models. You also don't need to worry about finding a power supply in outdoor environments, since the AWK-1200's PoE (Power over Ethernet) design makes it easy to deploy.

Advanced Security Capability

- 64-bit and 128-bit WEP (Wired Equivalent Privacy)
- Enable/disable SSID broadcasts
- MAC-address-based access control
- IEEE 802.1X/RADIUS
- WPA/WPA2

Useful Utilities and Remote Configuration

- Firmware upgrade from HTTP
- Web-based Management
- Supports SNMP
- Configuration backup and reset to factory default

Specifications

WLAN

Standards:
IEEE 802.11g/b for Wireless LAN
IEEE 802.3u for 10/100BaseT(X)

Frequency Range:
2.4-2.4835 GHz, Direct Sequence Spread Spectrum (DSSS)

Data Rate & Modulation:
OFDM @ 54 Mbps, CCK @ 11/5.5 Mbps, DQPSK @ 2 Mbps, and DBSK @ 1 Mbps

Operating Channels:
USA: 1-11 (US)
Europe: 1-13 (EU)
Japan: 1-14 (JP)

Security:
For AWK-1200-AP:
WEP, WPA, WPA2, IEEE 802.1X, MAC address filtering, Hide SSID, Layer 2 Isolation
For AWK-1200-AC:
64-bit and 128-bit WEP encryption, WPA

Data Rates:
1 Mpbs, 2 Mbps, 5.5 Mbps, 6 Mbps, 9 Mbps, 11 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps, 54 Mbps

Transmit Power:
Typ. 17 dBm @ 1, 2, 5.5 and 11 Mbps, 17 dBm @ 6 Mbps, 14 dBm @ 54 Mbps

RX Sensitivity:
802.11b:
-81 dBm @ 11 Mbps
802.11g:
-65 dBm @ 54 Mbps, -66 dBm @ 48 Mbps,
-70 dBm @ 36 Mbps, -74 dBm @ 24 Mbps,
-77 dBm @ 18 Mbps, -79 dBm @ 12 Mbps,
-81 dBm @ 9 Mbps, -82 dBm @ 6 Mbps

Software

Protocols: HTTP, DHCP, TCP/IP, RADIUS, DNS, NetBIOS, AppleTalk, and IPX/SPX

Configuration: Web-based management

Client OS Support: Windows (95, 98, 2000, ME, NT, XP), Unix, Macintosh

Interface

Antenna:
AWK-1200-AP: 5 dBi External / N-type female connector
AWK-1200-AC: 9 dBi Internal

RJ45 Port: 10/100BaseT(X) auto negotiation speed

Power Requirements

Input Voltage: Active Ethernet, 48 VDC

Input Current (@ 48 VDC, PoE):
AWK-1200-AP: 0.38A
AWK-1200-AC: 0.375A

Physical Characteristics

Housing:
AWK-1200-AP: provides IP68 protection
AWK-1200-AC: provides IP67 protection

Dimensions:
AWK-1200-AP: 284.4 x 254.3 x 77.5 mm (11.20 x 10.01 x 3.05 in)
AWK-1200-AC: 165.8 x 195.8 x 60.3 mm (6.53 x 7.71 x 2.37 in)

Weight:
AWK-1200-AP: 3100 g
AWK-1200-AC: 600 g

Installation: Wall or Mast Mounting

Environmental Limits

Operating Temperature: -20 to 70°C (-4 to 158°F)

Storage Temperature: -40 to 80°C (-40 to 176°F)

Ambient Relative Humidity: 5% to 95% (non-condensing)

Regulatory Approvals

Safety: EN60950-1: 2001, UL60950-1

Radio: EN300 328

EMC: EN301 489-1/-17

EMI: FCC Part 15C

*Please check Moxa's website for the most up-to-date certification status.

Reliability

MTBF:
More than 200,000 hrs
Database: GB, GC (Ground Benign, Controlled) 25°C

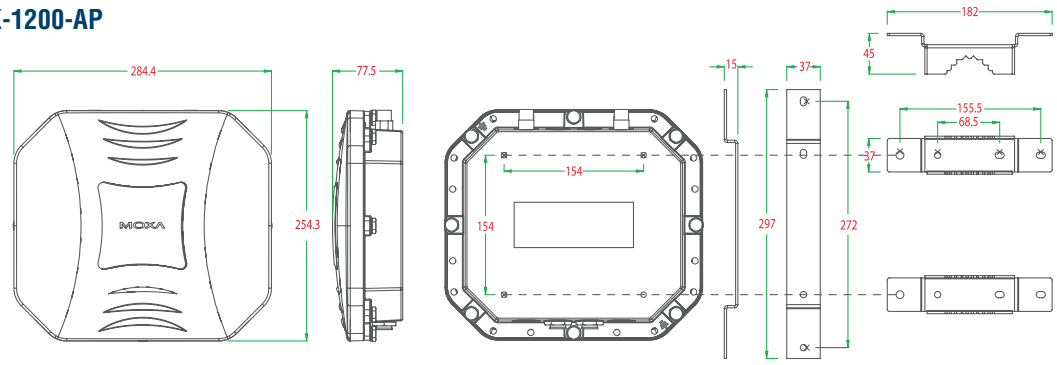
Warranty

Warranty Period: 5 years

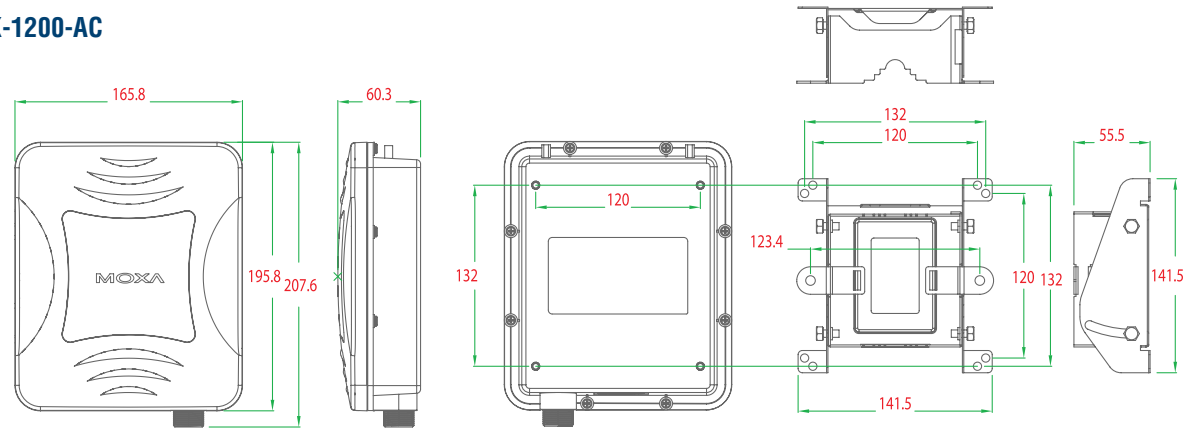
Details: See www.moxa.com/warranty

Dimensions

AWK-1200-AP



AWK-1200-AC



Ordering Information

Available Models

AWK-1200-AP-US: IEEE 802.11g/b IP68 wireless AP/Bridge, US band, -20 to 70°C
AWK-1200-AP-EU: IEEE 802.11g/b IP68 wireless AP/Bridge, Euro band, -20 to 70°C
AWK-1200-AP-JP: IEEE 802.11 g/b IP68 wireless AP/Bridge, Japan band, -20 to 70°C
AWK-1200-AC-US: IEEE 802.11g/b IP67 wireless AP Client, US band, -20 to 70°C
AWK-1200-AC-EU: IEEE 802.11g/b IP67 wireless AP Client, Euro band, -20 to 70°C
AWK-1200-AC-JP: IEEE 802.11 g/b IP67 wireless AP Client, Japan band, -20 to 70°C

AWK-3121 Series

Industrial IEEE 802.11a/b/g wireless Access Point/Bridge/Client

- IEEE 802.11a/b/g compliant
- Power input by redundant 24 VDC power inputs or Power-over-Ethernet
- Powerful security with WPA/WPA2/802.1X/MAC address filtering
- DIN-Rail or wall mounting ability
- IP30 protected high-strength metal housing

The certification logos shown here apply to some or all of the products in this section. Please see the **Specifications** section or Moxa's website for details.

Introduction

Are your applications hard to wire, or are your wiring costs out of control? Are you already using mobile equipment that connects over a TCP/IP network? If so, then what you need is the AWK-3121 Access Point/Bridge/AP Client. The AWK-3121 is rated to operate at temperatures ranging from 0 to 60°C for standard models and -40 to 75°C for extended temperature models, and is rugged enough for any harsh industrial environment. Installation is easy, with either DIN-Rail mounting or distribution boxes. The DIN-rail mounting ability, wide operating temperature range, and IP30 housing with LED indicators make the AWK-3121 a convenient yet reliable solution for any industrial wireless application.

Advanced Security

- 64-bit and 128-bit WEP (Wired Equivalent Privacy)
- Enabling/disabling SSID broadcasts
- MAC-address-based access control
- IEEE 802.1X/RADIUS
- WPA (Wi-Fi Protected Access)/WPA2

Useful Utilities and Remote Configuration

- Firmware upgrade from TFTP or HTTP
- Console/Web-based Management
- Supports SNMP and UPnP
- Configuration backup and reset

Specifications

WLAN

Standards:
IEEE 802.11a/g/b for Wireless LAN
IEEE 802.3u 10/100BaseT(X) for Ethernet LAN
IEEE 802.3af for Power-over-Ethernet
IEEE 802.1D/w STP/RSTP

Modulation:
802.11b: DBPSK, DQPSK, CCK
802.11g: OFDM with BPSK, QPSK, 16QAM, 64QAM
802.11a: OFDM with BPSK, QPSK, 16QAM, 64QAM

Data Rate and Modulation:
OFDM @ 54 Mbps, CCK @ 11/5.5 Mbps, DQPSK @ 2 Mbps, DBSK @ 1 Mbps

Operating Channels:
US:
2.412 to 2.462 GHz (11 channels)
5.15 to 5.35, 5.725 to 5.825 GHz (12 channels)
EU:
2.412 to 2.472 GHz (13 channels)
5.15 to 5.35 GHz (8 channels)
5.47 to 5.725 GHz (11 channels)
JP:
2.412 to 2.472 GHz (13 channels, OFDM)
2.412 to 2.484 GHz (14 channels, CCK)
5.15 to 5.35 GHz (8 channels for W52, W53)
5.47 to 5.725 GHz (11 channels for W56)

Security:
64-bit and 128-bit WEP encryption, WPA /WPA2 (IEEE 802.1X/RADIUS and TKIP)

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

Transmit Power:
802.11b:
1 to 11 Mbps: Typ. 18±1.5 dBm
802.11g:
6 to 24 Mbps: Typ. 18±1.5 dBm
36 to 48 Mbps: Typ. 16±1.5 dBm
54 Mbps: Typ. 15±1.5 dBm
802.11a:
6 to 24 Mbps: Typ. 16±1.5 dBm
36 to 48 Mbps: Typ. 14±1.5 dBm
54 Mbps: Typ. 13±1.5 dBm

RX Sensitivity:
802.11b:
-92 dBm @ 1 Mbps, -90 dBm @ 2 Mbps, -88 dBm @ 5.5 Mbps, -84 dBm @ 11 Mbps
802.11g:
-87 dBm @ 6 Mbps, -86 dBm @ 9 Mbps, -85 dBm @ 12 Mbps, -82 dBm @ 18 Mbps, -80 dBm @ 24 Mbps, -76 dBm @ 36 Mbps, -72 dBm @ 48 Mbps, -70 dBm @ 54 Mbps
802.11a:
-87 dBm @ 6 Mbps, -86 dBm @ 9 Mbps, -85 dBm @ 12 Mbps, -82 dBm @ 18 Mbps, -80 dBm @ 24 Mbps, -76 dBm @ 36 Mbps, -72 dBm @ 48 Mbps, -70 dBm @ 54 Mbps

Interface

Antenna: 2 dBi dual-band omni-directional antenna with an RP-SMA female connector

RJ45 Port: 10/100BaseT(X) auto negotiation speed

LED Indicators: PWR1, PWR2, PoE, FAULT, STATE, CLIENT MODE, BRIDGE MODE, WLAN

Alarm Contact: 1 relay output with current carrying capacity of 1A @ 24 VDC

Digital Input: 2 inputs with the same ground, but electrically isolated from the electronics

- +13 to +30V for state "1"
- -30 to -3V for state "0"
- Max. input current: 8 mA

Console: RS-232 (RJ45)

Power Requirements

Input Voltage: ±12 to 48 VDC, redundant dual DC power inputs or 48 VDC Power-over-Ethernet (IEEE 802.3af)

Connection: Removable terminal block

Reverse Polarity Protection: Present

Physical Characteristics

Housing: metal, providing IP30 protection

Dimensions: 53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in)

Installation: DIN-Rail mounting, wall mounting (optional kit)

Environmental Limits

Operating Temperature:
Standard models: 0 to 60°C (32 to 140°F)
Wide Temp. Models: -40 to 75°C (-40 to 167°F)

Storage Temperature: -40 to 85°C (-40 to 185°F)

Ambient Relative Humidity: 5% to 95% (non-condensing)

Regulatory Approvals

Safety: EN60950-1, UL60950-1, UL508, UL2043 (pending)

Hazardous location:
UL/cUL Class I, Division 2, Groups A, B, C, and D (pending)
ATEX Class I, Zone 2, EEx nC IIC (pending)

Radio: EN300 328, ARIB STD-33/66 (Japan)

EMC: EN301 489-1/-17

EMI: FCC Part 15

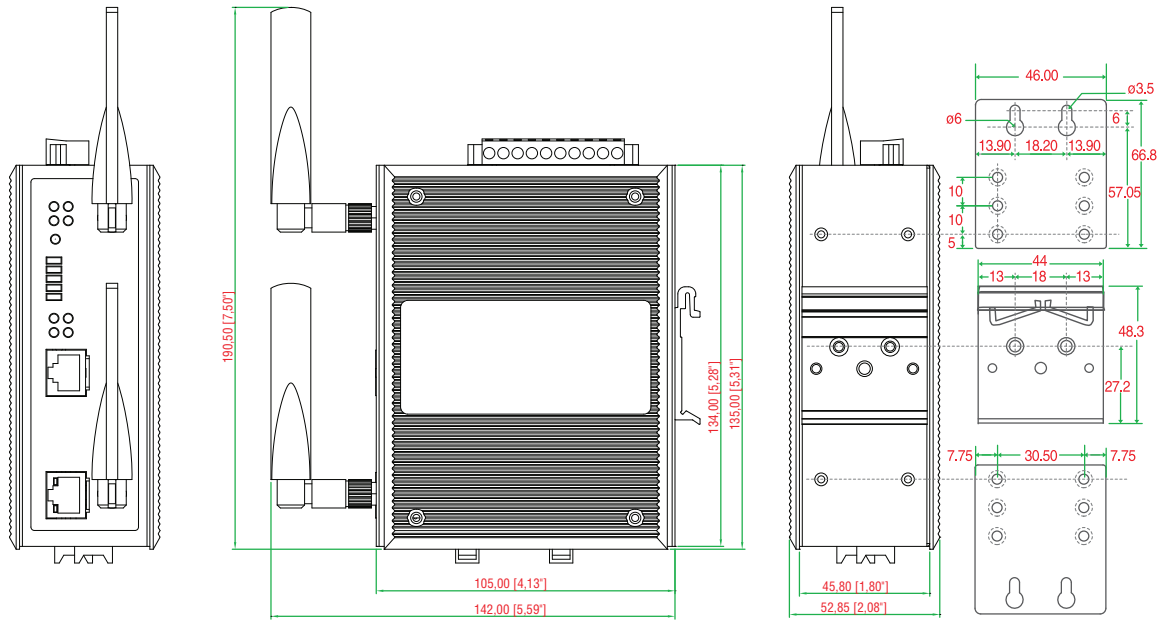
*Please check Moxa's website for the most up-to-date certification status.

Warranty

Warranty Period: 5 years

Details: See www.moxa.com/warranty

Dimensions



Ordering Information

Available Models

AWK-3121-US: IEEE 802.11a/b/g wireless AP/Bridge/Client, US band, 0 to 60˚C

AWK-3121-EU: IEEE 802.11a/b/g wireless AP/Bridge/Client, EU band, 0 to 60˚C

AWK-3121-JP: IEEE 802.11a/b/g wireless AP/Bridge/Client, JP band, 0 to 60˚C

AWK-3121-US-T: IEEE 802.11a/b/g wireless AP/Bridge/Client, US band, -40 to 75˚C

AWK-3121-EU-T: IEEE 802.11a/b/g wireless AP/Bridge/Client, EU band, -40 to 75˚C

AWK-3121-JP-T: IEEE 802.11a/b/g wireless AP/Bridge/Client, JP band, -40 to 75˚C

Optional Accessories (can be purchased separately)

DR-4524: 45W/2A DIN-Rail 24 VDC power supply with universal 85 to 264 VAC input

DR-75-24: 75W/3.2A DIN-Rail 24 VDC power supply with universal 85 to 264 VAC input

DR-120-24: 120W/5A DIN-Rail 24 VDC power supply with 88 to 132 VAC/176 to 264 VAC input by switch

WK-46: Wall mounting kit

RK-4U: 4U-high 19" rack mounting kit

NPort® W2004

4-port RS-232/422/485 IEEE 802.11b/g wireless device server

- Link any serial device to an IEEE 802.11b/g network
- 460.8 Kbps baudrate for RS-232/422/485 transmissions
- Web-based configuration using built-in Ethernet or WLAN
- Windows real COM and Linux real TTY drivers provided
- Real COM, TCP Server, TCP Client, and UDP modes
- Enhanced remote configuration with HTTPS, SSH

The certification logos shown here apply to some or all of the products in this section. Please see the **Specifications** section or Moxa's website for details.

802.11b/g Wireless Connectivity to Serial Devices

The NPort® W2004 wireless device server provides a convenient means of reducing the number of cables for hard-to-wire applications. Both Infrastructure and Ad-Hoc modes are supported, and the NPort® W2004 can connect to access points or another NPort® W2004 located up to 300 meters away.

Works with Existing Software, Saving Time and Money

Field-proven Windows real COM and Linux real TTY drivers are provided for the NPort® W2004, ensuring that existing PC software will work with your wireless LAN infrastructure. In addition, the NPort® W2004 supports TCP Server, TCP Client, and UDP operation modes that allow IP-based software to use the IP address and TCP port number to access devices directly.

Secure Remote Management and Configuration with SSH/SSL

The NPort® W2004 supports several functions to help prevent unauthorized access to your wireless LAN. In addition to WEP protection, IP filtering, and password protection, the NPort® W2004 also supports SSH and SSL to thwart hacker attacks. Using web browsers that support https (Internet Explorer, for example) provides secure access by browser to your wireless LAN. In addition, using terminal emulators that support SSH (PuTTY, for example) provides secure Telnet access.

Specifications

LAN Interface

Ethernet: 10/100 Mbps, RJ45 connector, Auto MDI/MDIX

Magnetic Isolation Protection: 1.5 KV built-in

WLAN Interface

Standard Compliance: 802.11b/g

Radio Frequency Type: DSSS/OFDM

Tx Power:
802.11b: 20 dBm maximum
802.11g: 18 dBm maximum

Rx Sensitivity: -80 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 300 meters (at 12 Mbps in open areas)

Antenna Connector: Reverse SMA

Network Modes: Infrastructure, Ad-Hoc

Wireless Security: 64-bit/128-bit data encryption with WEP

Serial Interface

Serial Standards: RS-232/422/485

Number of Ports: 4

Connectors: RJ45

Console Port: RS-232 console port on front panel

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

Baudrate: 50 bps to 460.8 Kbps

Serial Signals

RS-232: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND

RS-422: TxD+, TxD-, RxD+, RxD-, GND

RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND

RS-485-2w: Data+, Data-, GND

Software

Network Protocols: ICMP, IP, TCP, UDP, DHCP, Telnet, DNS, SNMP, HTTP, SMTP, SNTP, SSH, HTTPS

Configuration Options: Web Console, Serial Console, Telnet Console

Utilities: NPort® Search Utility and NPort® Windows Driver manager

Driver Support: Windows Real COM driver (for Windows 95, 98, ME, NT, 2000, XP, 2003, Vista, XP x64, 2003 x64, Vista x64), Linux Real TTY driver, Fixed TTY driver (for SCO Unix, SCO OpenServer, UnixWare 7, UnixWare 2.1, SVR 4.2, QNX 4.25, QNX 6, Solaris 10, FreeBSD, AIX 5.x, HP-UX 11i)

Physical Characteristics

Housing: SECC sheet metal (1 mm), providing IP30 protection

Weight: 873 g

Dimensions:
Without antenna: 45.8 x 135 x 105 mm (1.80 x 5.31 x 4.13 in)
With antenna: 45.8 x 204 x 142 mm (3.94 x 8.03 x 5.59 in)

Environmental Limits

Operating Temperature: 0 to 60°C (32 to 140°F)

Operating Humidity: 5 to 95% RH

Storage Temperature: -20 to 85°C (-4 to 185°F)

Power Requirements

Input Voltage: 12 to 48 VDC

Power Consumption: 685 mA @ 12 V, 340 mA @ 20 V, 184 mA @ 48 V

Regulatory Approvals

EMC: CE (EN55022 and EN55024 Class A, ETSI EN 301 489-17, ETSI EN 301 489-1), FCC (Part 15 Subpart C, Part 17 Subpart B Class A)

Safety: UL (UL60950-1), TÜV (EN60950-1)

Reliability

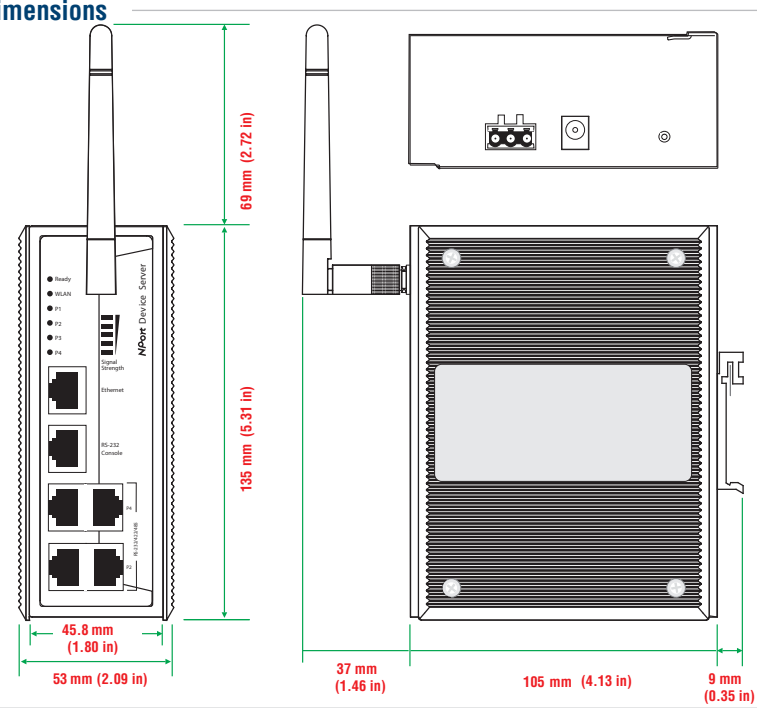
MTBF (mean time between failures): 81501 hrs

Warranty

Warranty Period: 5 years

Details: See www.moxa.com/warranty

Dimensions



RJ45 RS-232/422/485 port

PIN	RS-232	RS-422/485-4w	RS-485-2w
1	DSR	–	–
2	RTS	TxD+	–
3	GND	GND	GND
4	TxD	TxD-	–
5	RxD	RxD+	Data+
6	DCD	RxD-	Data-
7	CTS	–	–
8	DTR	–	–

Ordering Information

Available Models

NPort® W2004-US: 4-port RS-232/422/485 wireless device server with 802.11b/g WLAN, antenna, US band, US plug

NPort® W2004-EU: 4-port RS-232/422/485 wireless device server with 802.11b/g WLAN, antenna, Euro band, Euro plug

NPort® W2004-CN: 4-port RS-232/422/485 wireless device server with 802.11b/g WLAN, antenna, Euro band, US plug, CCC

NPort® W2004-UK: 4-port RS-232/422/485 wireless device server with 802.11b/g WLAN, antenna, Euro band, UK plug

NPort® W2004-SAA: 4-port RS-232/422/485 wireless device server with 802.11b/g WLAN, antenna, Euro band, Australia plug

Optional Accessories (can be purchased separately)

Serial cables and adaptors (see page A-10)

Package Checklist

- NPort® W2004 wireless device server
- Ethernet cable: RJ45 to RJ45 cross-over cable, 100 cm
- CBL-RJ45M9-150: RJ45 (8 pins) to DB9 male serial port cable, 150 cm
- Power adaptor
- Antenna
- Document and Software CD
- Quick Installation Guide (printed)
- Warranty Card

NPort® W2150/2250 Plus

1 and 2-port RS-232/422/485 IEEE 802.11a/b/g wireless device servers

- Link any serial device to an IEEE 802.11a/b/g network
- 921.6 Kbps baudrate for RS-232/422/485 transmissions
- Web-based configuration using built-in Ethernet or WLAN
- Enhanced remote configuration with HTTPS, SSH
- Secure data access with WEP, WPA, WPA2
- Built-in WLAN site survey tool
- Wireless roaming with user-defined signal strength threshold
- Off-line port buffering and serial data log
- Dual power inputs (1 power jack, 1 terminal block)

The certification logos shown here apply to some or all of the products in this section. Please see the **Specifications** section or Moxa's website for details.

Overview

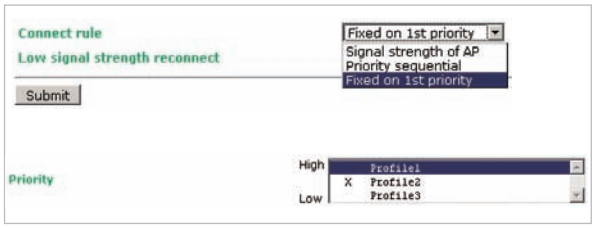
The NPort® W2150 Plus and W2250 Plus are the ideal choice for connecting your serial devices, such as PLCs, meters, and sensors, to a wireless LAN. Your communications software will be able to access the serial devices from anywhere over a wireless LAN. Moreover, the Wireless device servers require fewer cables and are ideal forapplications that involve difficult wiring situations. In Infrastructure Mode or Ad-Hoc Mode, the NPort® W2250 Plus and W2150 Plus can Wi-Fi networks at offices and factories allow users to move, or "roam," between several APs (Access Points). The NPort® W2150 Plus and WLAN environment offers an excellent solution for devices that are frequently moved from place to place.

802.11a/b/g Wireless Connectivity to Serial Devices

Wireless device servers require fewer cables and are ideal for applications that involve difficult wiring situations. In Infrastructure Mode or Ad-Hoc Mode, the NPort® 2150 Plus and NPort® 2250 Plus can communicate with any host computer through an access point, or with another NPort® W2150 Plus or NPort® W2250 Plus located up to 100 meters away.

Wireless Roaming Function

Wi-Fi networks at offices and factories allow users to move, or "roam," between several APs (Access Points). The NPort® W2150 Plus and W2250 Plus include a "Connect Rule" setting to allow wireless roaming.



The "Connect rule" field is only available in Infrastructure Mode and is used to specify the NPort®'s roaming behavior. When "Signal strength of AP" is selected, if more than one AP is detected, the NPort® will connect to the AP that has the highest signal strength, regardless of priority as set in the Priority field. When "Priority sequential" is selected, the NPort® will always try to connect to APs in order of priority, as set in the Priority field, regardless of signal strength. When "Fixed on 1st priority" is selected, the NPort® is only allowed to connect to the first priority AP, as set in the "Priority" field.

This "Priority" field is only available in Infrastructure Mode, and is used to set the priorities of the three available profiles.

Off-line Port Buffering and Serial Data Log for Each Port

For mission-critical applications, data from the serial device must not be lost if the wireless connection goes down. The NPort® W2150 Plus and W2250 Plus are designed to continue operating if the wireless connection is disconnected temporarily. When the wireless connection is retraining, or if the connection fails, the serial data from the serial device will be queued in the 10 MB port buffer built into the device server. As soon as the wireless connection returns to normal, the data stored in the buffer will be sent to its destination. In addition, a serial data log can be enabled to make troubleshooting easier.

The off-line port buffer for both the NPort® W2150 Plus and NPort® W2250 Plus is 64 KB per port.

Built-in WLAN Site Survey Tool

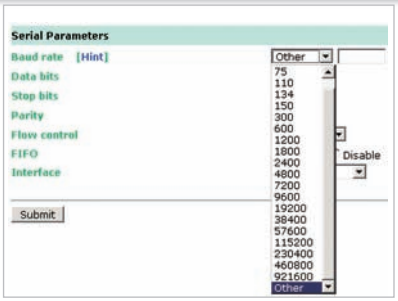
The NPort® W2150 Plus and W2250 Plus both have a built-in WLAN site survey tool. Additional software is NOT required to complete the site survey.

The purpose of conducting a WLAN site survey is to determine how many access points are required, and where the access points should be placed. For most implementations, the number and placement of access points is designed to guarantee a minimum data rate. With wireless systems, it is often necessary to perform a WLAN site survey before installing the access points, in order to understand how radio waves behave within the facility.

Secure Remote Management and Configuration with SSH/SSL

Unauthorized access is one of the biggest headaches for system managers. In addition to IP filtering and password protection, the NPort® W2150 Plus and W2250 Plus also support SSH and SSL to protect the NPort® W2150 Plus and W2250 Plus from hackers. To transmit control messages securely, open the web console using a web browser (Internet Explorer, for example) that supports https. You may also open the serial or Telnet console, such as PuTTY, using a terminal emulator that supports SSH.

Select "Any Baudrate" between 50 bps and 921.6 Kbps



Most device servers only support a fixed number of serial baudrates. However, some applications require special baudrates, such as 250 Kbps or 500 Kbps. With the NPort® W2150 Plus and W2250 Plus, you can enter any baudrate between 50 and 921.6 Kbps.

If your device's baudrate is not a standard baudrate, select "other" from the drop-down list and then enter the baudrate.

Specifications

LAN Interface

Ethernet: 10/100 Mbps, RJ45 connector, Auto MDI/MDIX

Magnetic Isolation Protection: 1.5 KV built-in

WLAN Interface

Standard Compliance: 802.11a/b/g

Radio Frequency Type: DSSS/OFDM

Tx Power:
802.11a: 14 dBm (typical)
802.11b: 17 dBm (typical)
802.11g: 15 dBm (typical)

Rx Sensitivity: -80 dBm

Transmission Rate:
802.11a: 54 Mbps
802.11b: 11 Mbps
802.11g: 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 (in open areas)

Antenna Connector: Reverse SMA

Network Modes: Infrastructure, Ad-Hoc

Wireless Security:
WEP: 64-bit/128-bit data encryption
WPA, WPA2, 802.11i: Enterprise mode and Pre-Share Key (PSK) mode
Encryption: 128-bit TKIP/AES-CCMP EAP-TLS, PEAP/GTC, PEAP/MD5, PEAP/MSCHAPV2, EAP-TTLS/PAP, EAP-TTLS/CHAP, EAP-TTLS/MSCHAP, EAP-TTLS/MSCHAPV2, EAP-TTLS/EAP-MSCHAPV2, EAP-TTLS/EAP-GTC, EAP-TTLS/EAP-MD5, LEAP

Serial Interface

Serial Standards: RS-232/422/485

Number of Ports:
NPort® W2150 Plus: 1
NPort® W2250 Plus: 2

Connectors: DB9 male

Serial Data Log: 64 KB

Off-line Port Buffering:
NPort® W2150 Plus: 20 MB
NPort® W2250 Plus: 10 MB

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, DTR/DSR

Baudrate: 50 bps to 921.6 Kbps

Serial Signals

RS-232: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND

RS-422: TxD+, TxD-, RxD+, RxD-, GND

RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND

RS-485-2w: Data+, Data-, GND

Software

Network Protocols: ICMP, IP, TCP, UDP, DHCP, Telnet, DNS, SNMP, HTTP, SMTP, SNTP, SSH, HTTPS

Configuration Options: Web Console, Serial Console, Telnet Console, Windows Utility

Driver Support: Windows Real COM driver (for Windows 95, 98, ME, NT, 2000, XP, 2003, Vista, XP x64, 2003 x64, Vista x64), Linux Real TTY driver, Fixed TTY driver (for SCO Unix, SCO OpenServer, UnixWare 7, UnixWare 2.1, SVR 4.2, QNX 4.25, QNX 6, Solaris 10, FreeBSD, AIX 5.x, HP-UX 11i)

Management: SNMP MIB-II

Physical Characteristics

Housing: Aluminum sheet metal (1 mm)

Dimensions:
Without ears or antenna: 77 x 111 x 26 mm (3.03 x 4.37 x 1.02 in)
With ears, without antenna: 100 x 111 x 26 mm (3.94 x 4.37 x 1.02 in)
Antenna Length: 109 mm (4.29 in)

Environmental Limits

Operating Temperature: 0 to 55°C (32 to 131°F)

Operating Humidity: 5 to 95% RH

Storage Temperature: -20 to 85°C (-4 to 185°F)

Power Requirements

Input Voltage: 12 to 48 VDC

Power Consumption: 560 mA @ 12 V

Regulatory Approvals

EMC: CE (EN55022 and EN55024 Class A, ETSI EN 301 489-17, ETSI EN 301 489-1), FCC Part 15 and 17 Subpart B Class A

Safety: UL (UL60950-1), TÜV (EN60950-1)

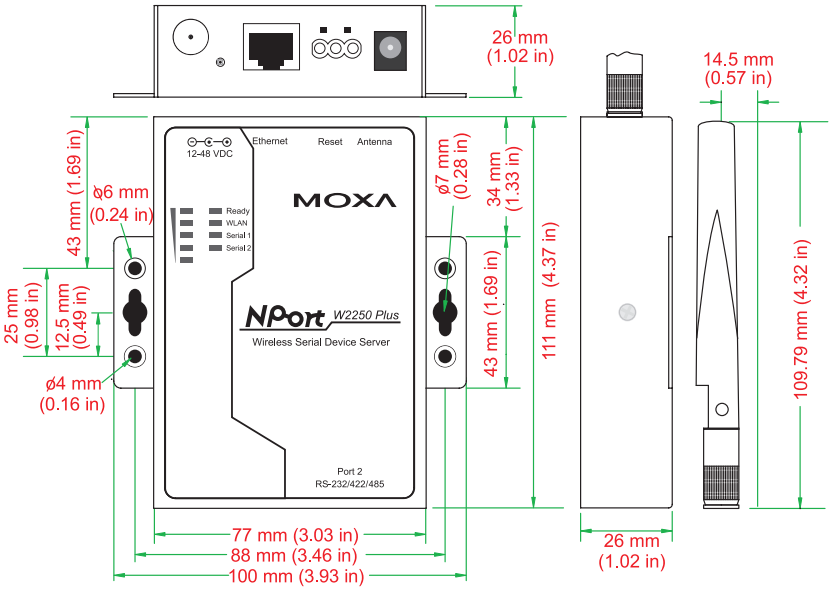
DSPR: ARIB-STD 33, ARIB-STD 66

Warranty

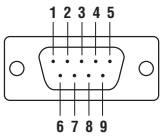
Warranty Period: 5 years

Details: See www.moxa.com/warranty

Dimensions



Pin Assignment, 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	–	–
9	–	–	–

Ordering Information

Available Models

NPort® W2150 Plus-US: 1-port RS-232/422/485 wireless device server with 802.11a/b/g WLAN, antenna, US band, US plug
NPort® W2150 Plus-EU: 1-port RS-232/422/485 wireless device server with 802.11a/b/g WLAN, antenna, Euro band, Euro plug
NPort® W2150 Plus-CN: 1-port RS-232/422/485 wireless device server with 802.11a/b/g WLAN, antenna, Euro band, US plug, CCC
NPort® W2150 Plus-UK: 1-port RS-232/422/485 wireless device server with 802.11a/b/g WLAN, antenna, Euro band, UK plug
NPort® W2150 Plus-SAA: 1-port RS-232/422/485 wireless device server with 802.11a/b/g WLAN, antenna, Euro band, Australia plug
NPort® W2150 Plus-JP: 1-port RS-232/422/485 wireless device server with 802.11a/b/g WLAN, antenna, Japan band, Japan plug
NPort® W2250 Plus-US: 2-port RS-232/422/485 wireless device server with 802.11a/b/g WLAN, antenna, US band, US plug
NPort® W2250 Plus-EU: 2-port RS-232/422/485 wireless device server with 802.11a/b/g WLAN, antenna, Euro band, Euro plug
NPort W2250 Plus-CN: 2-port RS-232/422/485 wireless device server with 802.11a/b/g WLAN, antenna, Euro band, US plug, CCC
NPort® W2250 Plus-UK: 2-port RS-232/422/485 wireless device server with 802.11a/b/g WLAN, antenna, Euro band, UK plug
NPort® W2250 Plus-SAA: 2-port RS-232/422/485 wireless device server with 802.11a/b/g WLAN, antenna, Euro band, Australian plug
NPort® W2250 Plus-JP: 2-port RS-232/422/485 wireless device server with 802.11a/b/g WLAN, antenna, Japan band, Japan plug

Optional Accessories (can be purchased separately)

Serial cables and adaptors: See Appendix A

DK-35A: 35 mm DIN-Rail Mounting Kit

Package Checklist

- NPort® W2150 Plus or NPort® W2250 Plus wireless device server
- Power adaptor
- Antenna
- Document and Software CD
- Quick Installation Guide (printed)
- Warranty Card

W311/321/341

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

W311 W321 W341

- 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 (W321 and W341 only)
- DIN-rail or wall-mount installation
- Designed to withstand 5 g's of continuous vibration and 50-g shocks
- Robust, fan-less design

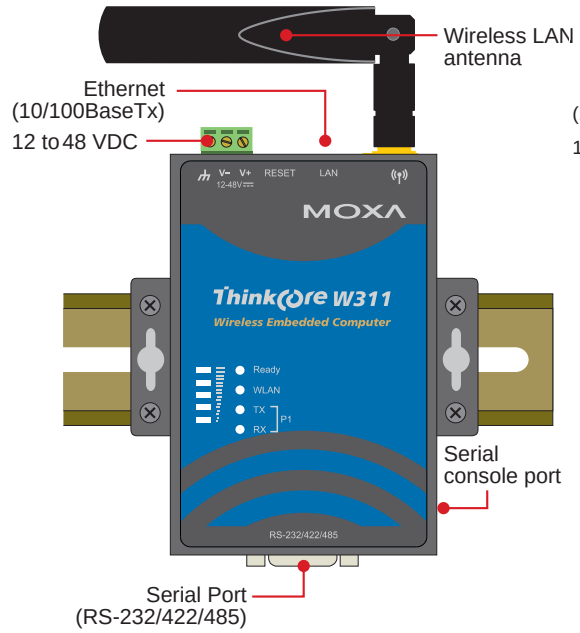
The certification logos shown here apply to some or all of the products in this section. Please see the **Specifications** section or Moxa's website for details.

Overview

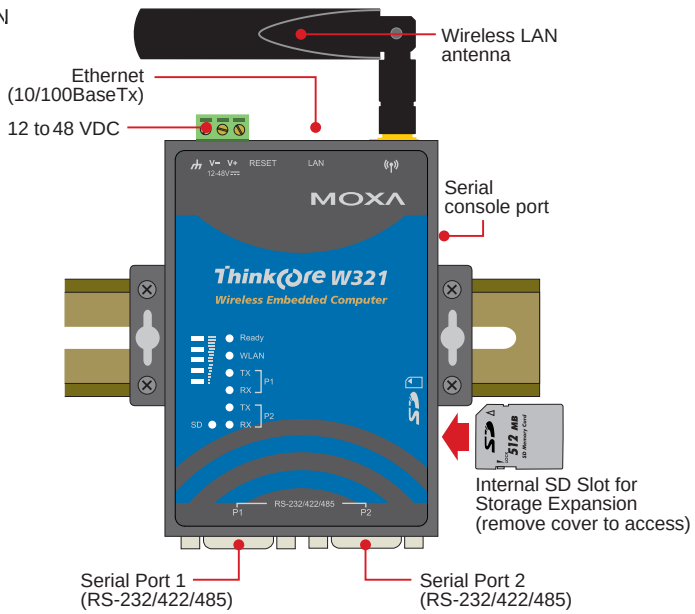
The W311/321/341 are embedded Linux computers that feature 1, 2, or 4 software selectable RS-232/422/485 ports, and support the IEEE 802.1a/b/g standards for WLAN connections. In addition, the computers have 1 Ethernet port, and some models come with USB 2.0 hosts and an SD socket for storage expansion. The W311/321/341'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

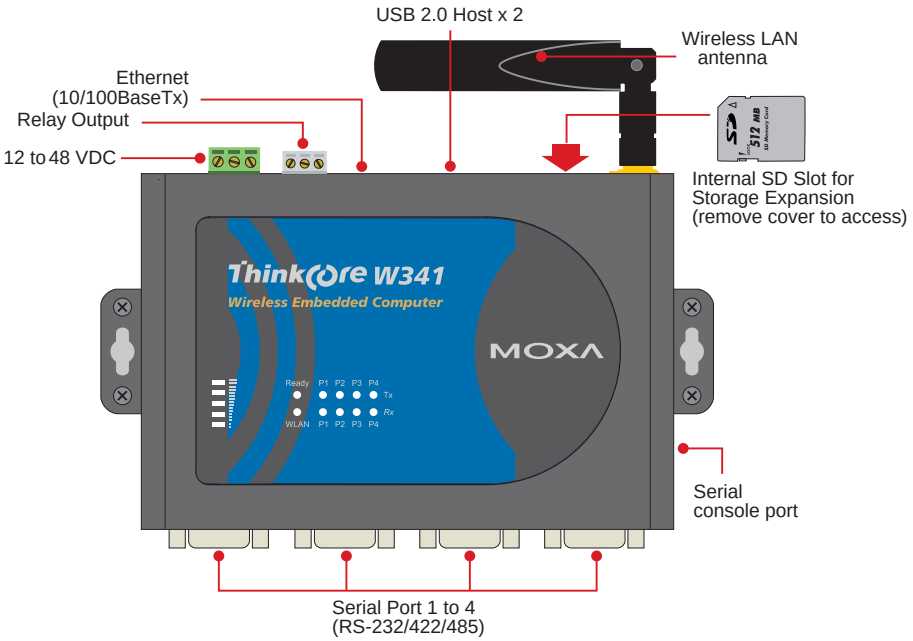
W311



W321



W341



Hardware Specifications

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

Storage

Expansion: SD socket (W321/341 only)

Other Peripherals

USB (W341 only): USB 2.0 compliant hosts x 2, type A connector, supports system boot up

Relay Output (W341 only):
Form C, SPDT x 1
Normal Switching Capacity: 2A @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.

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:
W311: 1
W321: 2
W341: 4

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 (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:
W311: Power
W321: Ready
W341: Ready, SD

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:
W311: 150 g
W321: 185 g
W341: 390 g

Dimensions (without ears or antenna):
W311: 67 x 100.4 x 22 mm (2.64 x 3.95 x 0.87 in)
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)

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:
W311/321: 400 mA @ 12 VDC, 4.8 watts
W341: 600 mA @ 12 VDC (no USB load), 1200 mA @ 12 VDC (with load on 2 USB ports)

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), T V (EN60950-1)

Directives: 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

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

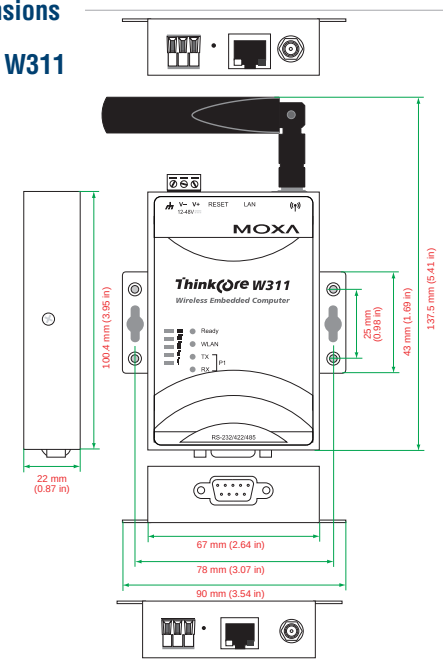
Supporting Services and Daemons:
telnetd: Telnet Server daemon
ftpd: FTP server daemon
sshd: Secure shell server
Apache: Web server daemon, supporting PHP and XML
OpenVPN: Virtual private network service manager
iptables: Firewall service manager
pppd: dial in/out over serial port daemon & PPPoE
snmpd: 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)

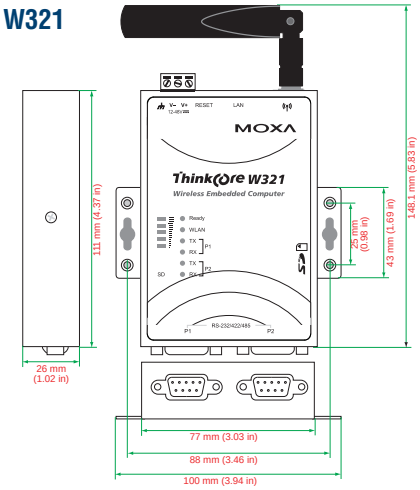
Device Drivers:
W311: UART, RTC, Buzzer
W321: UART, RTC, Buzzer, SD Card
W341: UART, RTC, Buzzer, SD Card, USB (supports USB flash disk), Watchdog Timer, DO

Dimensions

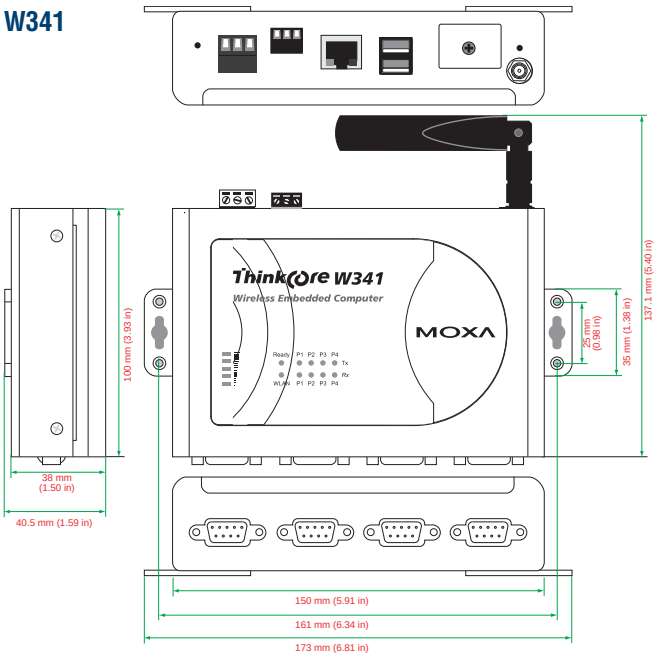
W311



W321

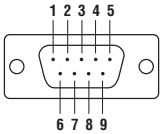


W341



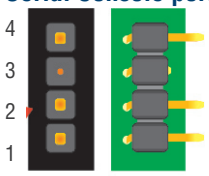
Pin Assignment

Male DB9



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	–	–

Serial Console port



PIN	
1	TxD
2	RxD
3	NC
4	GND

Ordering Information

Available Models

W311-LX: Mini RISC-based wireless Linux computer with WLAN, 1 serial port, and LAN

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

W341-LX: RISC-based wireless Linux computer with WLAN, 4 serial ports, LAN, SD, USB, and relay output

Package Checklist

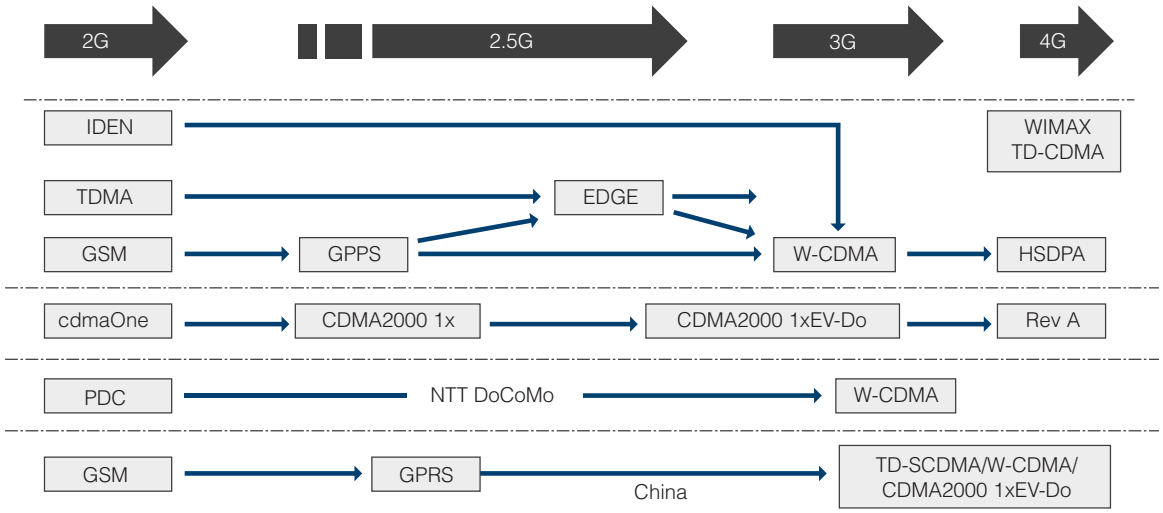
- W311 or W321 or W341 computer
- Wall mounting kit
- Ethernet cable: RJ45 to RJ45 cross-over cable, 100 cm
- CBL-4PINDB9F-100: 4-pin pin header to DB9 female console port cable, 100 cm
- Universal power adaptor (including terminal block to power jack converter)
- WLAN Antenna
- Document and Software CD
- Quick Installation Guide (printed)
- Warranty Card

Introduction to Industrial Cellular

A cellular network is a radio network made up of a number of radio cells—the so-called "cell sites" or "base stations"—that are each served by a fixed transmitter. The cellular network allows cell phone subscribers to move anywhere within the coverage area while remaining connected to the Public Switched Telephone Network (PSTN). The term "cellular" typically refers to the wireless technology used for mobile phone networks, such as GSM, GPRS, CDMA, UMTS, PDC, and others.

Cellular Terminology

- Carrier—Telecommunications company that sells cellular transmission services.
- Cell Phone—Also called a mobile phone, this is the device used by consumers to connect to a carrier's base stations.
- Base Station—A fixed station in a cellular wireless network used for communicating with mobile terminals, such as cell phones. Base stations link cell phones to a carrier's wireless network.
- Subscriber—Someone who purchases cell phone service from a carrier, often in the form of a monthly service plan.



The evolution of cellular technology

A common way of describing cellular technology is by "generation," such as 1G, which refers to first generation analog cellular technology. The primary difference between the different generations of cellular technologies is the speed at which data is transmitted through the network.

1G refers to analog cellular technology that was designed for basic voice calls. With 1G, the only kind of data transfer supported is the exchange of analog signals between phones. 1G was widely considered to wast a lot of bandwidth, and had extremely limited capabilities for data transmission, security, and location tracking. In most regions worldwide, analog cellular technology has been phased out of commercial use.

2G is used by the majority of today's cell phones, and is the real starting point for comparing cellular technologies used for data communication. 2G refers to digital cellular technology, in which voice calls are converted into binary form, and then transmitted through the network as a collection of ones and zeros. By making smart use of sophisticated data compression and manipulation techniques, several calls can be forced to share the same bandwidth of a single analog call. 2G is designed for voice calls and for sending simple SMS (Short Message System) text messages between phones. GSM

(Global System for Mobile) communication is the most popular 2G cellular standard worldwide. GSM operates in the 850 MHz and 1900 MHz bands in the USA, and in the 900 MHz and 1800 MHz bands everywhere else. Data transfer speeds are typically low, at around 9.6 Kbps.

2.5G could actually be referred to as 2G+. Because of the limited data transfer speeds available with 2G technologies, many carriers found ways to enhance data transfer speeds enough to support other services, such as browsing the Internet and sharing multimedia files. The enhancements that were made work over existing cellular networks are often lumped together under the one 2.5G label. On GSM networks, for example, carriers can provide GPRS (General Packet Radio Service) for 115 Kbps data transfer speeds.

3G cellular technology provides broadband speeds for high-speed web navigation, videoconferencing, TV streaming, and similar applications. 3G technology is designed for "always on" Internet (TCP/IP) access, and can achieve speeds between 100 and 300 Kbps.

Cellular Standards

The acronyms CDMA, GSM, and GPRS refer to cellular communication standards that have been adopted by different carriers around the world. Although there are many proprietary and regional differences, two competing sets of standards dominate the worldwide market: GSM/GPRS and CDMA.

GSM/GPRS

The most widely used 2G cellular technology worldwide is based on the GSM (Global System for Mobile Communication) standard. GSM works by storing subscriber and carrier information on interchangeable SIM (Subscriber Identification Module) cards, which allow subscribers to change phones or providers by simply swapping out the cell phone's SIM card. For this and other reasons, GSM is extremely popular and well-supported worldwide, making it particularly well-suited for international roaming. One drawback, however, is that the 850 MHz and 1900 MHz bands are used in North America, whereas the 900 MHz and 1800 MHz bands are used everywhere else.

GPRS (General Packet Radio Service) is the 2.5G extension for GSM networks. GPRS was further developed for even better performance with enhanced data rates for GSM Evolution (EDGE), also known as Enhanced GPRS (EGPRS) protocol.

Generation	2G	2.5G	3G
GSM Standard	GSM	GRPS GPRS/EDGE	UMTS (3GSM)

3G service is implemented using a standard called UMTS (Universal Mobile Telecommunications System), which is also known as 3GSM. Although this technology is not directly compatible with GSM, the standard is implemented so that devices support both standards, switching seamlessly between them as needed. As with GSM, the United States implements UMTS on different frequencies from the rest of the world, making transparent global roaming difficult. One potentially confusing aspect of UMTS is that it is based on an underlying standard called W-CDMA, which is not related to the CDMA set of standards.

Moxa's Cellular Solutions

Moxa's cellular products provide today's machine-to-machine applications with quick, easy, and seamless connectivity to cellular networks. The industrial cellular modems offered by Moxa allow customers to add a unique type of connectivity to even the most advanced machine-to-machine applications. Moxa's industrial cellular IP modems are some of the most affordable, secure, and versatile products of this type available. The modems provide remote access, support TCP/IP, and can be configured over the network.

Although Moxa's cellular family of products can perform most of the same functions supported by cellular modems, they can actually do much more.

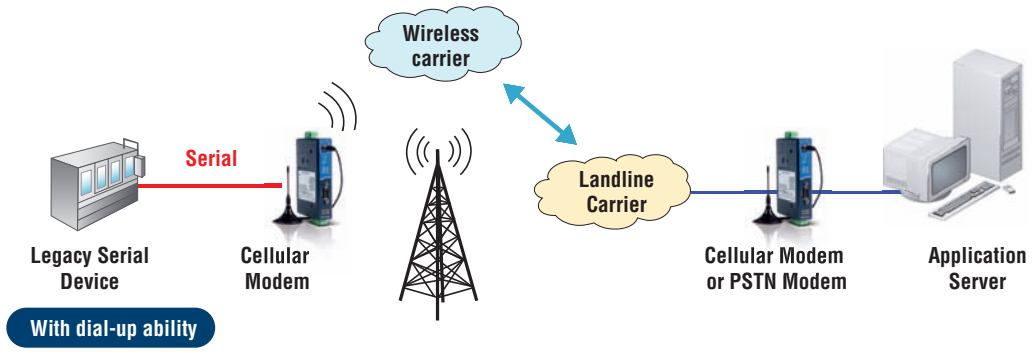
- Support for both standard and specialized AT commands simplifies connecting to the network and configuring equipment
- Modem intelligence with a full TCP/IP stack to connect seamlessly to the cellular provider's IP network.
- Applications can connect to remote devices using TCP/IP, without the need for a standard modem at both ends

Cellular Modems vs. Cellular IP Modems

When using an industrial cellular modem to connect a serial device to the cellular network, an application server must connect to a PSTN modem to be able to connect to the serial device. When using a cellular IP modem to connect a serial device to the cellular network, the application server can connect directly to the serial device through the Internet.

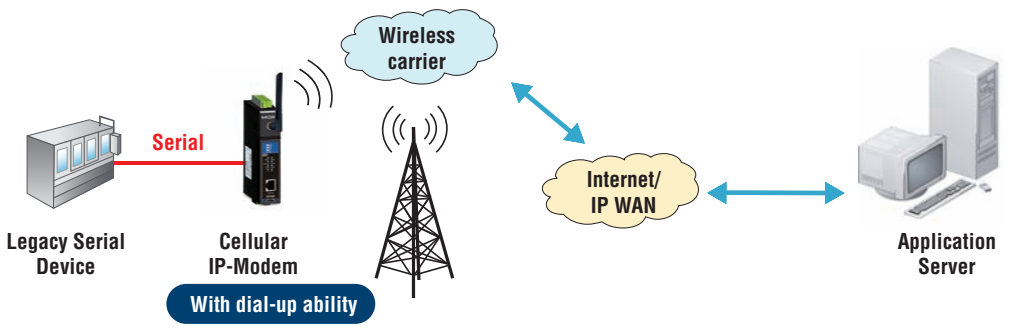
Feature	Cellular Modem	Cellular IP-Modem
Wireless interface	GSM/GPRS/CSD/SMS	GSM/GPRS/EDGE/SMS
Dialing capability	No	Yes
TCP/IP stack	No	Yes
Local memory	No	8 MB RAM, 4 MB Flash
PSTN modem or cellular modem at both ends	Required (except GPRS)	Not required

Cellular Modem



An extra modem is required to connect from the application computer to the serial device.

Cellular IP Modem



An extra modem is NOT required to connect the application server.

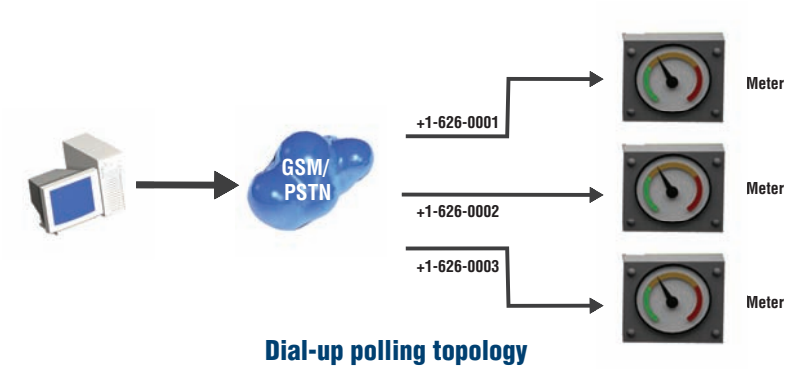
Cellular Modems

AT Commands

The OnCell G2100 supports the standard and extended Hayes* AT command set, in which AT is short for “attention code.” These commands form an industry standard language used to communicate with the modem. The modem can switch between one of two modes. When in “data mode,” the modem treats everything it receives from the intelligent device as data, and then sends it across the cellular network. When in “command mode,” data is interpreted as commands to the local modem.

CSD Data Connection

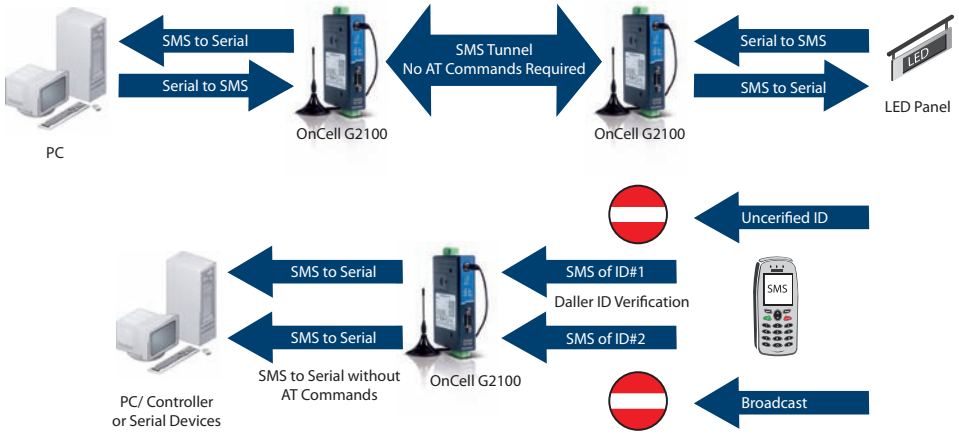
CSD (Circuit Switched Data) is the original form of data transmission developed for GSM systems. CSD uses a single radio time slot that transmits data at 9.6 to 14.4 Kbps to both GSM networks and PSTN switching subsystems by calling direct. Most of the time, transmission is initiated by standard AT commands. Since CSD provides direct modem access to remote devices, system extensions can be used without requiring the installation of cables and data lines. CSD overcomes the limitations of hard wiring and inaccessible terrain for easier, more flexible data collection and monitoring.



Dial-up polling topology

SMS Tunnel Mode

A major benefit of GSM technology is its support of short messages (SMS) for easy communication over the mobile network. With Moxa’s SMS Tunnel Mode, the OnCell G2100 modems allow users to expand applications at little or no extra cost. For example, SMS Tunnel Mode can be used to update the message on a highway display panel, place refill orders for vending machines, handle maintenance for remote rental equipment, or even help create an SMS alarm by directly transforming the text, binary, or unicode data from a legacy device to short message format, without using AT Commands. SMS Tunnel Mode is particularly suitable for devices that communicate infrequently or do not have access to the local network. Although SMS Tunnel Mode converts both ASCII and binary data to short messages transparently, a caller ID (phone number identification) design has been implemented to block messages sent from uncertified users, system broadcasts, and commercial SMS advertisements.



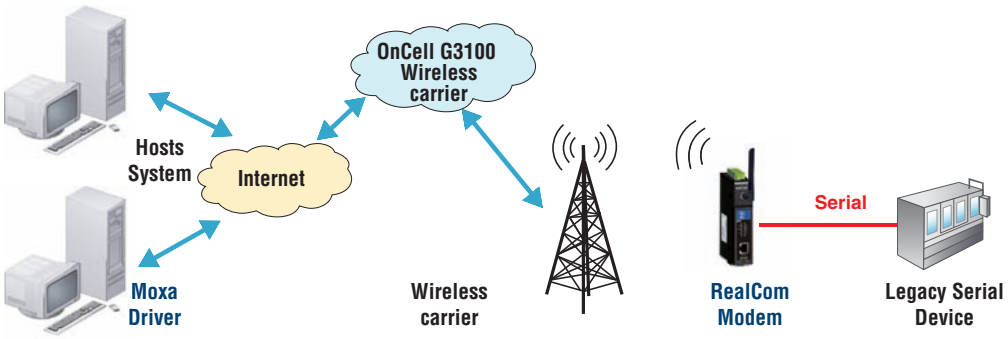
Cellular IP Modems

Choice of Connection Mode

The OnCell G3100 supports three types of connection mode for GSM/GPRS/EDGE communication: (1) Always ON, (2) Inactivity Timeout, and (3) Remote Host Recovered. These connection modes provide users with more connection options for GSM/GPRS/EDGE, and have the potential to reduce the total cost of applications. The GPRS "Always ON" mode maintains connectivity between the OnCell G3100 and the remote device. That is, it enables a fail-safe mechanism that re-establishes the connection when the remote device is down. Moreover, if the "Inactivity Timeout" mode is enabled, the connection will disconnect if data has not been transmitted between the serial device and cellular network during a user-specified time period, or the remote Ethernet host crashes. The OnCell 3100 will keep pinging the remote host over the Ethernet every 3 seconds after powering on. After failing to connect 5 times in a row, the data from the serial device will be sent through the GSM connection.

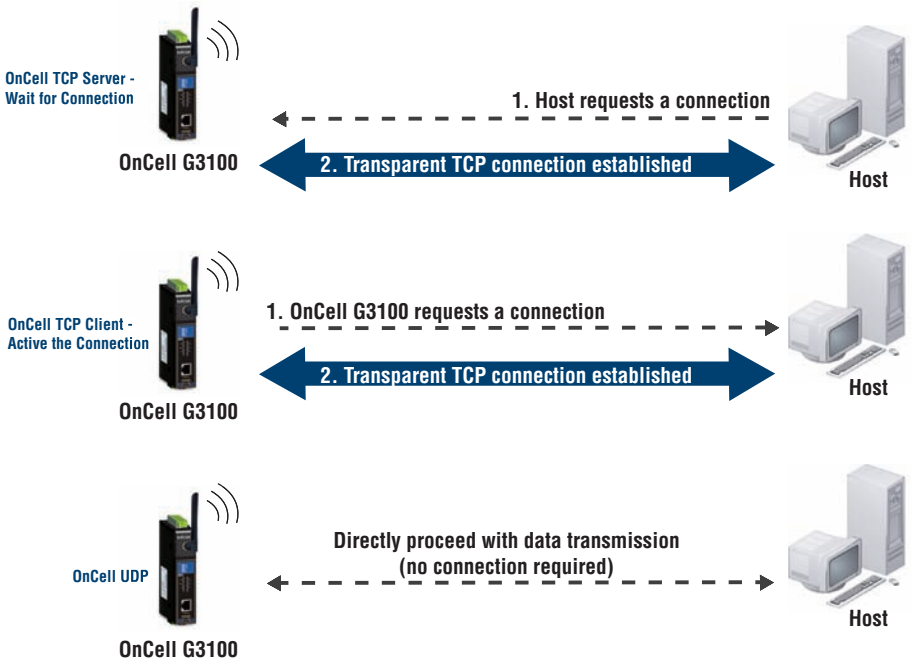
RealCOM Connection

The OnCell G3100 comes bundled with Real COM drivers for Windows 98, ME, NT, 2000, XP, 2003, and Vista systems. In Real COM mode, the bundled drivers are able to establish a transparent connection between a host and a serial device by mapping the serial port on the OnCell G3100 to a local COM port on the host computer. One of the major conveniences of using Real COM mode is that it allows you to use software that was written for pure serial communication applications. The Real COM driver intercepts data sent to the host's COM port, packs it into a TCP/IP packet, and then redirects it through the host's cellular system. At the other end of the connection, the OnCell G3100 accepts the cellular frame, unpacks the TCP/IP packet, and then transparently sends the data through the serial port to the attached serial device.



Choice of TCP/IP Connection

The OnCell G3100 supports three different socket modes: (1) TCP Server, (2) TCP Client, and (3) UDP. The main difference between the two TCP protocols and the UDP protocol is that TCP guarantees delivery of data by requiring the recipient to send an acknowledgement to the sender. UDP does not require this type of verification, making it possible to offer speedier delivery. In TCP Server mode, the OnCell G3100 is configured with a unique IP:Port address for the TCP/IP network, and it waits passively to be contacted by the host computer or a remote TCP client device. Once the connection is established, the two sides of the connection can both send and receive data. In TCP Client mode, the OnCell G3100 can actively establish a TCP connection with a network device that has a pre-defined IP:port combination. In TCP Client Mode, multiple destination IPs can be defined. Multiple destination IP addresses can also be defined In UDP mode.



Redundant Power Inputs

The OnCell G3100 modems have two inputs that can be connected simultaneously to live DC power sources. If one power source fails, the other source takes over automatically. Redundant power inputs help assure non-stop operation of your OnCell G3100 series.

Warning by relay output and e-mail

The built-in relay output function can be used to inform you of the status of the Ethernet link and power inputs. If you determine that one of the power inputs has failed, you can use the web console to determine which power or Ethernet link has failed. The OnCell G3100 can also send out a warning when an exception is detected. The relay output and e-mail warning function gives maintenance engineers a valuable tool for reacting promptly to emergency situations.

Secure remote management and configuration with SSH and SSL

Preventing unauthorized access is a major concern for system managers. The OnCell G3100 helps you control access by supporting IP filtering and password protection. Extra protection from hackers is also provided by SSH and SSL. Secure configuration of the OnCell G3100 is provided by opening the web console with a web browser that supports https (e.g., Internet Explorer), or by opening the SSH console using a terminal emulator that supports SSH (e.g, PuTTY)

Port buffering preserves data if the Ethernet fails

For mission-critical applications, data collected from a serial device must be safeguarded if the network connection is severed. The OnCell G3100 provides exceptionally reliable data transmission by saving serial data to an internal 256 KB port buffer if the network connection fails. When the network is reconnected, data in the buffer is automatically released and sent to the appropriate destination.

OnCell G3100 Series

Industrial quad-band GSM/GPRS/EDGE IP modem

- Universal quad-band GSM/GPRS/EDGE 850/900/1800/1900 MHz
- Choice of operation modes, including TCP Server, TCP Client, UDP, Real COM driver, and RFC2217
- Secure modes for TCP Server, TCP Client, and Real COM
- Versatile GSM/GPRS/EDGE connection modes
- Redundant DC power input
- LED indicators for status and signal level
- 2 digital inputs and 1 relay output
- Choice of configuration methods, including web console , serial console, and Telnet
- DIN-Rail

The certification logos shown here apply to some or all of the products in this section. Please see the **Specifications** section or Moxa's website for details.

Overview

The OnCell G3100 industrial RS-232 or RS-232/422/485 GSM/GPRS/EDGE IP modems are designed to transmit data and short messages (SMS) over GSM/GPRS/EDGE cellular networks. The Real COM operation mode automatically generates a virtual COM port to match serial ports supported by the OnCell G3100, allowing you to communicate with remote serial devices. The OnCell G3100's CPU comes pre-installed with the TCP/IP protocol suite to transmit data back and forth between the serial device and cellular TCP/IP network. It also comes with a built-in relay output that can be configured to indicate the priority of events when notifying or warning engineers in the field, and the two digital inputs allow you to connect basic I/O devices, such as sensors, to the cellular network. The G3100 can be mounted on a DIN-rail, and the 12 to 48 VDC power input has 2 KV EFT/Surge protection to allow the use of different types of field power source. The serial ports are also protected by 15 KV ESD line protection to keep your system safe from unexpected electrical discharges.

Specifications

Hardware

CPU: MOXA ART CPU, 192 MHz
RAM: 8 MB
Flash ROM: 4 MB

LAN Interface

Ethernet: 10/100 Mbps, RJ45 connector, Auto MDI/MDIX
Magnetic Isolation Protection: 1.5 KV built-in

Cellular Interface

Standards: GSM/GPRS/EDGE
Band Options: Quad-band 850/900 and 1800/1900 MHz
GPRS Multi-slot Class: Class 12
GPRS Terminal Device Class: Class B
GPRS Coding Schemes: CS1 to CS4
Tx Power: 1 watt GSM 1800/1900, 2 watts EGSM 850/900
SIM Control: 3 V

Serial Interface

Serial Standards:
G3110: RS-232 (DB9 male connector)
G3150: RS-232 (DB9 male connector), RS-422/485 (5-pin terminal block connector)
Number of Ports: 1
ESD Protection: 15 KV
Power EFT/Surge Protection: 2 KV

Serial Communication Parameters

Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2 (when parity = None)
Parity: None, Even, Odd, Space, Mark
Flow Control: RTS/CTS, XON/XOFF
Baudrate: 50 bps to 921.6 Kbps

Serial Signals

RS-232: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND
RS-422: Tx+, Tx-, Rx+, Rx-, GND
RS-485-4w: Tx+, Tx-, Rx+, Rx-, GND
RS-485-2w: Data+, Data-, GND

I/O Interface

Alarm Contact: 1 relay output with current carrying capacity of 1A @ 24 VDC
Digital Input: 2 inputs electrically isolated from the electronics

Software

Network Protocols: ICMP, TCP/IP, UDP, DHCP, Telnet, DNS, SNMP, HTTP, HTTPS, SMTP, SNTP, ARP
Operation Modes: RealCOM, Secure RealCOM, TCP Server, Secure TCP Server, TCP Client, Secure TCP Client, UDP, RFC2217, Ethernet Modem, SMS Tunnel
Configuration and Management Options: SNMP MIB-II, v3, DDNS, IP Report, Web/Telnet/Serial Console, Serial Logging

Authentication: Local user-name and password

Security: Accessible IP list

Utilities: Provided for Windows 98, ME, NT, 2000, XP, 2003, XP x64, 2003 x64, Vista x64

Windows Drivers: Windows 98, ME, NT, 2000, XP, 2003, XP x64, 2003 x64, Vista x64

Fixed TTY Drivers: SCO Unix, SCO OpenServer 5, SCO OpenServer 6, UnixWare 7, SVR4.2, QNX 4.25, QNX 6, Solaris 10, FreeBSD 5, FreeBSD 6

Real TTY Drivers: Linux kernels 2.2.x, 2.4.x, 2.6.x

Physical Characteristics

Housing: Aluminum, providing IP30 protection

Environmental Limits

Operating Temperature: 0 to 55°C (32 to 131°F)

Operating Humidity: 5 to 95% RH

Storage Temperature: -40 to 75°C (-40 to 167°F)

Power Requirements

Input Voltage: 12 to 48 VDC

Data Link: 585 to 1185 mA (peak) @ 12 V

Regulatory Approvals

Safety:
UL: UL60950
TÜV: EN60950

EMC:
CE: EN55022 Class A / EN55024
FCC: FCC part 15 subpart B, Class A
EN61000-4-2 (ESD) Level 4
EN61000-4-3 (RS) Level 3
EN61000-4-4 (EFT) Level 4
EN61000-4-5 (Surge) Level 3
EN61000-4-8 Level 3
EN61000-4-12 Level 3

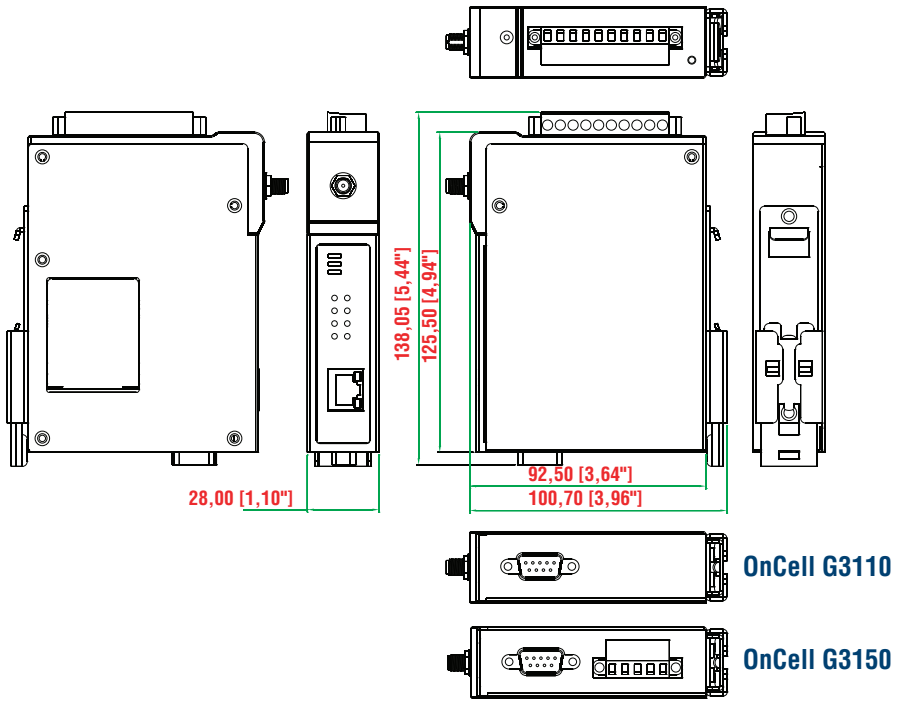
RF:
FCC Part22H
FCC PART24E
EN301 489-1
EN301 489-7
EN301 511

Warranty

Warranty Period: 5 years

Details: See www.moxa.com/warranty

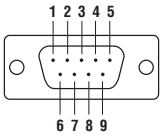
Dimensions (unit: mm) & Pin Assignment



OnCell G3110

OnCell G3150

DB9 male connector



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	–	–
9	–	–	–

Ordering Information

Available Models

OnCell G3110: 1-port RS-232 to GSM/GPRS/EDGE IP modem
OnCell G3150: 1-port RS-232/422/485 to GSM/GPRS/EDGE IP modem

Optional Accessories (can be purchased separately)

Power Adaptor: 1.2 A (or above) @ 12 V
DC Power Supply: See Appendix A
Power Jack to Terminal Block Cable: See Appendix A

Quad-band Antennas (impedance = 50 ohms):
ANT-CQB-O-0-3m: Omni 0dBi/10cm, magnetic SMA antenna, 3 m
ANT-CQB-O-3-3m: Omni 3dBi/25cm, magnetic SMA antenna, 3 m
ANT-CQB-O-5-3m: Omni 5dBi/37cm, magnetic SMA antenna, 3 m

Package Checklist

- OnCell G3100 modem
- Rubber SMA antenna
- DIN-Rail Kit
- 5-Pin Terminal Block (screw type)
- 10-Pin Terminal Block (screw type)
- Document and Software CD
- Quick Installation Guide (printed)
- Warranty Card

OnCell G2100 Series

Industrial quad-band GSM/GPRS modem

- Quad-band GSM/GPRS 850/900/1800/1900 MHz
- Separate RS-232 and RS-422/485 serial interfaces (G2150I only)
- 2.5 KV RMS isolation for 1 minute for all serial signals (G2150I only)
- Extended operating temperature from -30 to 75°C (G2110-T only)
- Vertical IP30 housing with SIM card protection
- LED indicators for GSM/GPRS, data transmission, and signal level
- DIN-Rail and wall mounting
- SMS Tunnel Mode provided

The certification logos shown here apply to some or all of the products in this section. Please see the **Specifications** section or Moxa's website for details.

Overview

The OnCell G2100 Series of industrial quad-band GSM/GPRS modems are designed to transmit data and short messages (SMS) over GSM/GPRS mobile networks. The modems can be used to increase the efficiency of maintenance and communication, but do not require detailed training. In addition, the modems can be mounted on a DIN-rail or wall. The OnCell G2100 modems accept a 12 to 48 VDC power input, making them suitable for use with a variety of field power sources. The serial ports feature 15 KV ESD line protection to protect the product from harmful electrical discharge, and separate RS-232 and RS-422/485 interfaces are built into the OnCell G2150I, each with 2.5 KV RMS isolation protection for one minute. The two serial interfaces on the OnCell G2150I make it ideal for attaching all kinds of devices, such as stand-alone controllers, PC COM ports, and multi-dropped electric meters. In addition, the OnCell G2110-T has an extended operating temperature (-40 to 75°C) design that makes it suitable for heavy industrial use.

Specifications

Cellular Interface

Standards: GSM and GPRS
Band Options: Quad-band 850/900/1800/1900 MHz
GPRS Multi-slot Class: Class 10
GPRS Terminal Device Class: Class B
GPRS Coding Schemes: CS1 to CS4
CSD Data Transmission Rate: Up to 14,400 bps
SMS: Point-to-point Text/PDU, Mobile Originated (MO) and Mobile Terminated (MT Cell Broadcast in accordance with GSM 07.05)
Tx Power: 1 watt GSM1800/1900, 2 watts EGSM 900/GSM 850
SIM Control: 3 V

Serial Interface

Serial Standards:
G2110: RS-232 (DB9 female connector)
G2150I: RS-232 (DB9 female connector), RS-422/485 (5-pin terminal block connector)
Number of Ports: 1
ESD Protection: 15 KV (G2110 only)
Optical Isolation: 2.5 KV (G2150I only)

Serial Communication Parameters

Data Bits: 7, 8
Stop Bits: 1, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: RTS/CTS
Baudrate: 300 bps to 115.2 Kbps

Serial Signals

RS-232: TxD, RxD, RTS, CTS, DTR, DSR, DCD, RI, GND
RS-422: Tx+, Tx-, Rx+, Rx-, GND
RS-485-4w: Tx+, Tx-, Rx+, Rx-, GND
RS-485-2w: Data+, Data-, GND

Physical Characteristics

Housing: ABS + PC, IP30 protected
Weight: 150 ± 5 g
Dimensions: 27 x 123 x 79 mm (1.06 x 4.84 x 3.11 in)

Environmental Limits

Operating Temperature:
G2110/2150I: 0 to 55°C (32 to 131°F)
G2110-T: -30 to 75°C (-22 to 167°F)
Operating Humidity: 5 to 95% RH
Storage Temperature: -40 to 75°C (-40 to 167°F)

Power Requirements

Input Voltage: 12 to 48 VDC
Power Consumption:
Idle: 50 mA @ 12 V
Data Link: 300 to 900 mA (peak) @ 12 V

Regulatory Approvals

EMC: CE (EN55022 Class A, EN55024), FCC Part 15 Subpart B Class A
RF: FCC Part 22H, FCC Part 24E, EN301 489-1, EN301 489-7, EN301 511

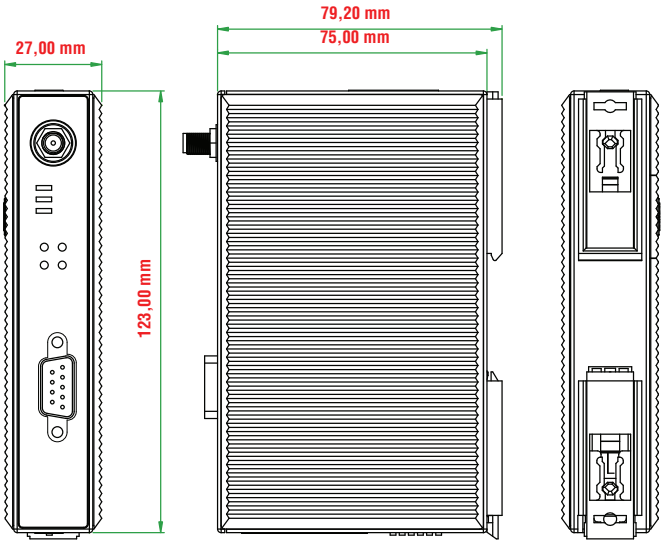
Reliability

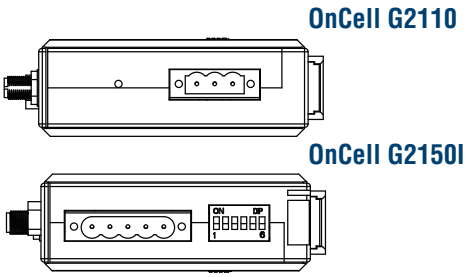
MTBF:
G2110/G2110-T: 925627 hours
G2150I: 864965 hours

Warranty

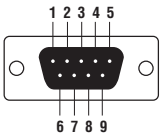
Warranty Period: 5 years
Details: See www.moxa.com/warranty

Dimensions





DB9 female RS-232 port



PIN	RS-232
1	DCD
2	TxD
3	RxD
4	DSR
5	GND
6	DTR
7	CTS
8	RTS

Ordering Information

Available Models

OnCell G2110: 1-port RS-232 to GSM/GPRS modem
OnCell G2110-T: 1-port RS-232 to GSM/GPRS modem, wide temperature (-30 to 75°C)
OnCell G2150I: 1-port RS-232/422/485 to GSM/GPRS moden, with 2.5 KV optical isolation

Optional Accessories (can be purchased separately)

Power Adaptor: 1.2 A (or above) @ 12 V
DC Power Supply: See Appendix A

Quad-band Antennas (impedance = 50 ohms):
ANT-CQB-O-0-3m: Omni 0dBi/10cm, magnetic SMA antenna, 3 m
ANT-CQB-O-3-3m: Omni 3dBi/25cm, magnetic SMA antenna, 3 m
ANT-CQB-O-5-3m: Omni 5dBi/37cm, magnetic SMA antenna, 3 m
ANT-CQB-O-1: Omni 1dBi rubber SMA antenna

Package Checklist

- OnCell G2100 modem
- ANT-CQB-O-0-3m: Omni 0dBi/10cm, magnetic SMA antenna, 3 m
- Power jack to terminal block cable
- 3-Pin Terminal Block (screw type)
- Document and Software CD
- Quick Installation Guide (printed)
- Warranty Card

NPort® 6450 with NM-GPRS/GSM Modules

4-port cellular device server

- Quad-band 900/1800, 850/1900 MHz GSM/GPRS
- Cellular Status/Signal LED indicator
- GPRS Class 10
- CSD data connection
- Up to 14,400 bps in Circuit Switched Data mode
- Short message alerts
- Real COM mode supported

The certification logos shown here apply to some or all of the products in this section. Please see the **Specifications** section or Moxa's website for details.

NPort® 6450 + NM-GPRS/GSM

The NM-GPRS/GSM module is all that's needed to convert the NPort® 6450 into a handy cellular-to-serial device server. The NPort® 6450 has 4 handy RS-232/422/485 ports for connecting to a wide variety of serial devices.

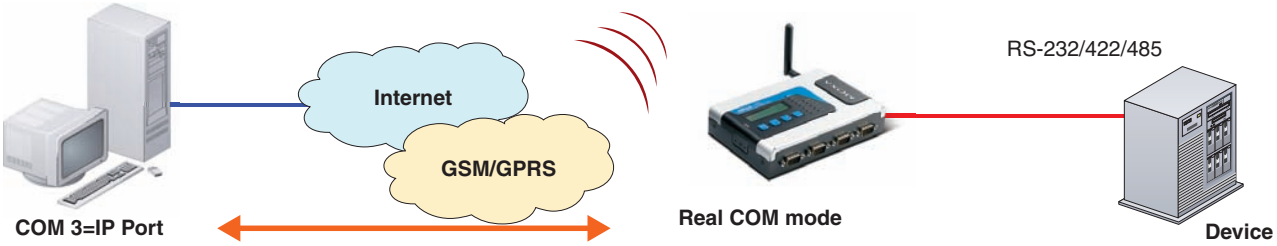
Quad-band GSM/GPRS Communication

Most countries in the world use the GSM-900 and GSM-1800 cellular frequencies. However, in the United States, Canada, and other parts of the Americas, GSM-850 and GSM-1900 are used. With the NM-GPRS/GSM quad-band cellular module, you don't need to worry about selecting different products for different parts of the world. The NM-GPRS/GSM module's GSM/GPRS band is configured at 900/1800 MHz by default, but can be easily reconfigured to 850/1900 MHz.

Real COM Mode

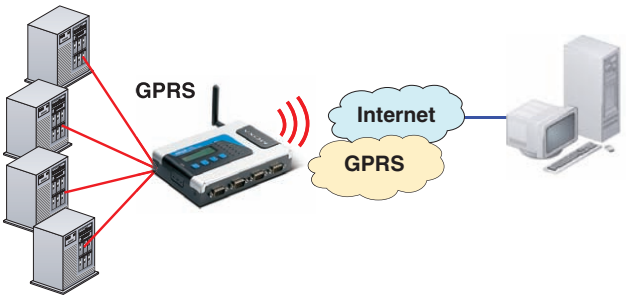
The NPort® 6450 comes with Real COM drivers for Windows 95, 98, ME, NT, 2000, XP, XP x64, 2003, 2003 x64, Vista, and Vista x64 operating systems, and Real TTY drivers for Linux systems used in a GSM/GPRS network environment.

In Real COM mode, the bundled drivers are able to establish a transparent connection between a host and a serial device by mapping the serial port on the NPort® 6000 to a local COM/TTY port on the host computer. One of the major conveniences of using Real COM mode is that it allows you to use software that was written for pure serial communication applications.



GSM CSD data connection

CSD (Circuit Switched Data) provides direct modem access to remote devices, and system extensions can be used without installing cables and data lines. CSD transmits data at 9.6 to 14.4 Kbps to both GSM networks and the PSTN switching subsystem by calling direct. CSD overcomes the limitations of hard wiring and inaccessible terrain for easier, more flexible data collection and monitoring of applications that use NPort® 6450 device servers.



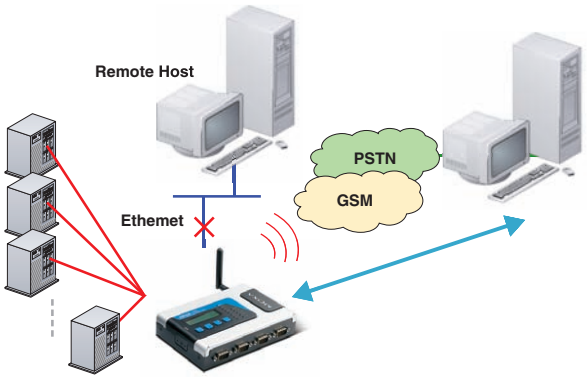
GPRS IP connectivity

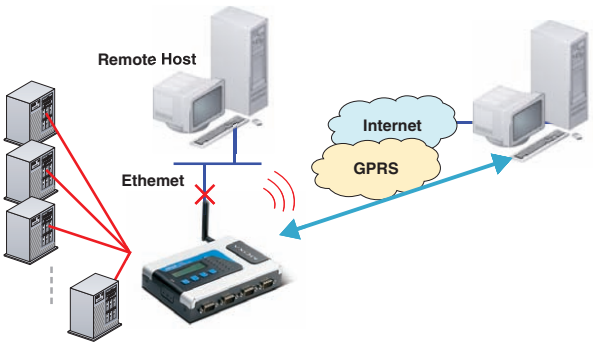
A GPRS packet-switched system can be viewed as a special IP network that offers IP connectivity to IP terminals. Devices without PPP or TCP/IP capability can be easily connected to the IP network and the Internet through GPRS by using the NPort® 6450 GSM/GPRS module.

GPRS backup application

The NM-GPRS/GSM module can be used to provide the NPort® 6450 with automatic backup capability. When the backup function is enabled, the NPort® 6450 will check the remote host's connection on the Ethernet side after power-on. If a connection failure occurs, data from the serial device will be sent out through the GSM/GPRS network.

When the remote host on the Ethernet side returns to normal status, data will again be sent through the Ethernet connection. The NPort® 6450 backup function makes your data transmission safer and more reliable.

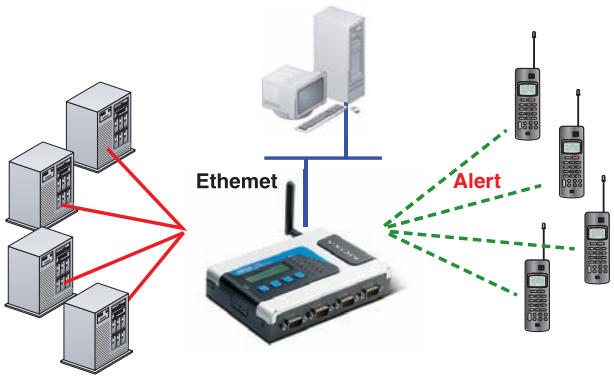




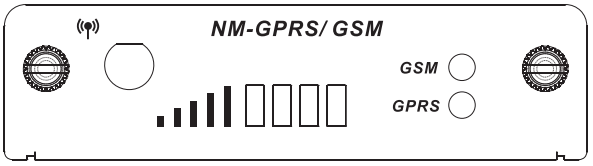
SMS alerts by event

The NM-GPRS/GSM module provides the NPort® 6450 device server with an SMS alert function that support up to 4 phone numbers. As shown in the table, there are four event categories (System, Network, Configure, Serial Port), and a total of eight different options that can be configured.

System Events	Network Events	Configure Events	Serial Port Events
Cold start	Ethernet link down	Console login authentication failure	DCD changed
Warm start	---	Ethernet IP changed	DSR changed
---	---	Password changed	---



Appearance



Cellular Status and Signal Strength LEDs	
GSM	Lights up when the GSM is connected
GPRS	Lights up when the GPRS is connected
Signal Strength	Number of lit LEDs indicates the signal strength

Specifications

LAN Interface

Ethernet: 10/100 Mbps, RJ45 connector

Magnetic Isolation Protection: 1.5 KV built-in

Cellular Interface

Standards: GSM and GPRS

Band Options: 850/900 MHz and 1800/1900 MHz quad-band

GPRS Multi-slot Class: Class 10

GPRS Terminal Device Class: Class B

GPRS Coding Schemes: CS1 to CS4

CSD Data Transmission Rate: Up to 14,400 bps

SIM Control: Point-to-point Text/PDU, Mobile Originated (MO) and Mobile Terminated (MT Cell Broadcast is in accordance with GSM 07.05)

Antenna: SMA female type connecter, 50W impedance and 1 dBm peak gain

Serial Interface

Number of Ports: 4

Serial Standards: RS-232/422/485

Connector: DB9 male

Serial Line Protection: 15 KV ESD protection for all signals

RS-485 Data Direction Control: ADDC™ (automatic data direction control)

Console Port: Serial port 1 doubles as RS-232 console port

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, DTR/DSR, XON/XOFF

Baudrate: 50 bps to 921.6 Kbps

Memory Expansion Slot

Slot Type: SD slot

Software

Network Protocols: ICMP, IP, TCP, UDP, DHCP, BOOTP, Telnet, DNS, SNMP, HTTP, SMTP, ARP, PPPoE, DDNS, RIP

Security Protocols: DES, 3DES, AES, SSH, SSL, HTTPS, RADIUS, PAP, CHAP, TACACS+

Configuration Options: Web Console, Serial Console, Telnet Console, Windows Search Utility

Driver Support: Windows Real COM driver (for Windows 95, 98, ME, NT, 2000, XP, 2003, Vista, XP x64, 2003 x64, Vista x64), Linux Real TTY driver, Fixed TTY driver (for SCO Unix, SCO OpenServer, UnixWare 7, UnixWare 2.1, SVR 4.2, QNX 4.25, QNX 6, Solaris 10, FreeBSD, AIX 5.x, HP-UX 11i)

Management: SNMP MIB-II

Physical Characteristics

Housing: SECC sheet metal (0.8 mm), providing IP30 protection

Weight: 1020 g

Dimensions:
Without ears: 158 x 103 x 35 mm (6.22 x 4.06 x 1.38 in)
With ears: 181 x 103 x 35 mm (7.13 x 4.06 x 1.38 in)

Environmental Limits

Operating Temperature: 0 to 55°C (32 to 131°F)

Operating Humidity: 5 to 95% RH

Storage Temperature: -20 to 70°C (-4 to 158°F)

Power Requirements

Input Voltage: 12 to 48 VDC

Power Consumption: 730 mA @ 12 V (max.)

Power Line Protection: 1 KV burst (EN61000-4-4: EFT/B), 0.5 KV surge (EN61000-4-5)

Regulatory Approvals

EMC: CE (EN55022 Class A, EN55024), FCC Part 15 Subpart B Class A

Safety: UL (UL60950-1), TÜV (EN60950-1)

EN61000-4-2 (ESD): 4 KV contact

EN61000-4-4 (EFT): 1 KV power

EN61000-4-5 (Surge): 2 KV power

Reliability

Alert Tools: Built-in buzzer and RTC (real-time clock)

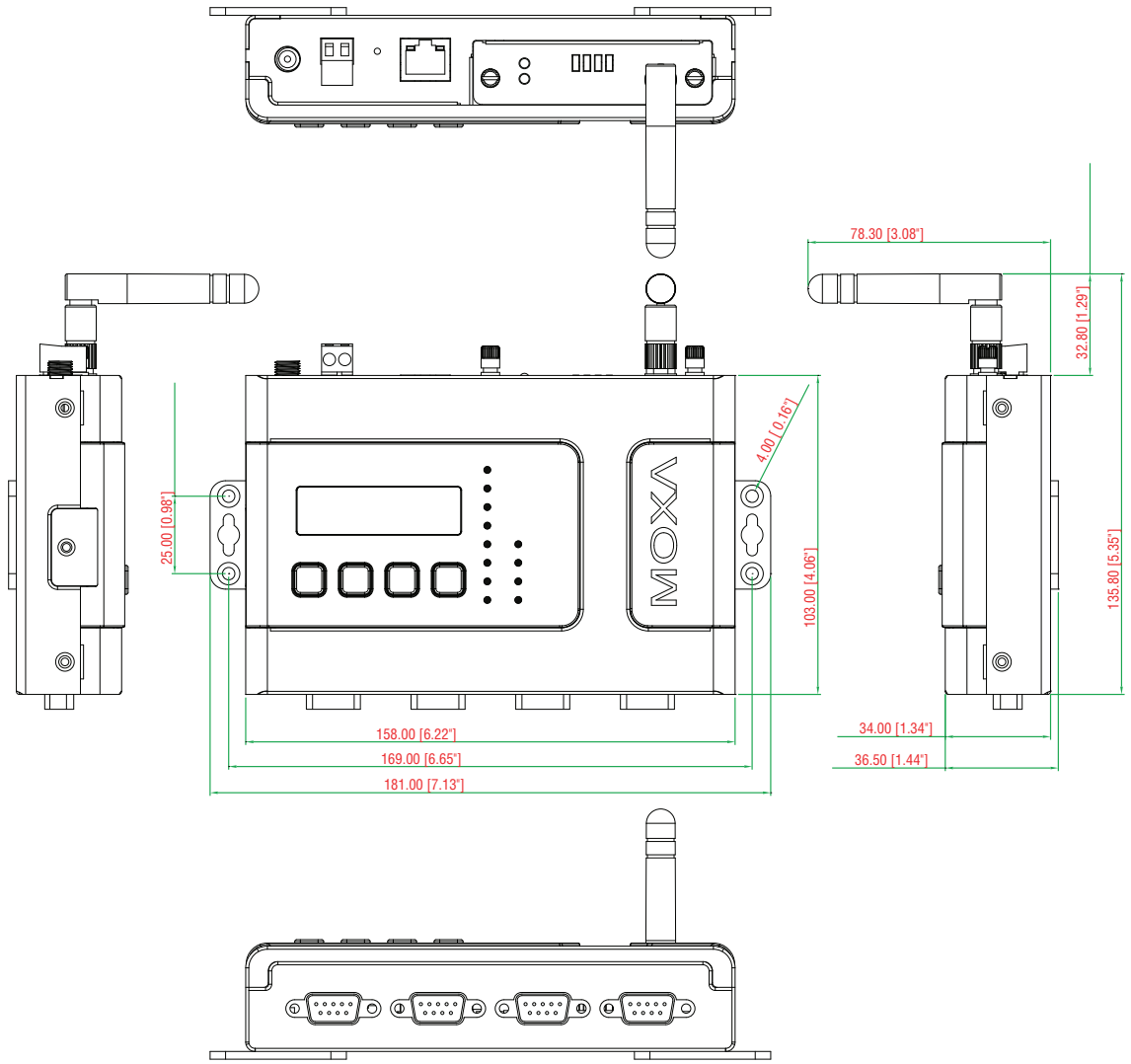
Automatic Reboot Trigger: Built-in WDT (watchdog timer)

Warranty

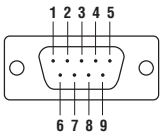
Warranty Period: 5 years

Details: See www.moxa.com/warranty

Dimensions



Pin Assignment



NPort® 6450 (RS-232/422/485)

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	–	–

Ordering Information

Available Models

NPort® 6450: 4-port RS-232/422/485 to Ethernet Secure Terminal Server

NM-GPRS/GSM: GSM/GPRS network module (standard accessory)

Optional Accessories (can be purchased separately)

DK-35A: Mounting Kit for 35-mm DIN-Rail

Package Checklist

- NPort® 6450 device server with NM-GPRS/GSM module
- Power Adaptor (see page A-10)
- Document and Software CD
- Quick Installation Guide (printed)
- Warranty Card

W315/325/345

RISC-based embedded computers with GSM/GPRS, LAN, and 1, 2, or 4 serial ports

The certification logos shown here apply to some or all of the products in this section. Please see the **Specifications** section or Moxa's website for details.

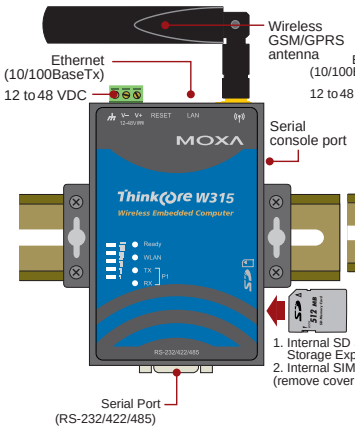
- MOXA ART ARM9 32-bit 192 MHz processor
- 32 or 64 MB RAM, and 16 MB flash disk onboard
- Built-in quad band GSM/GPRS 850/900/1800/1900 MHz
- GPRS Class 10, coding scheme from CS1 to CS4 supported
- 1, 2, or 4 software-selectable RS-232/422/485 serial ports
- 10/100 Mbps Ethernet for network redundancy
- Designed to withstand 5 g's of continuous vibration and 50-g shocks
- Relay Output for external alarm connection (W345 only)
- SD slot for storage expansion (W325/345 only)
- Ready-to-run Linux Kernel 2.6 platform
- DIN-rail or wall-mount installation
- Robust, fanless design

Overview

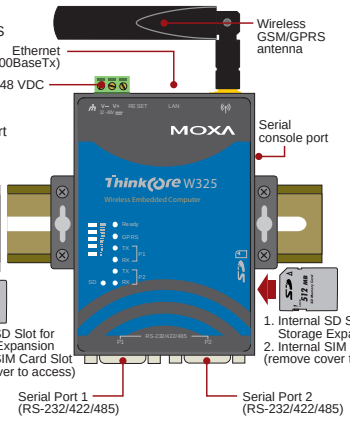
The W315/325/345 are embedded Linux computers that feature 1, 2, or 4 software selectable RS-232/422/485 ports, 1 Ethernet port, and quad-band GSM/GPRS 900/1800/850/1900 MHz for cellular communication. In addition, the W345 has 2 USB 2.0 hosts, and 1 relay output, and the W325 and W345 come with an SD socket for external storage expansion. The W315/325/345's Linux OS runs on the MOXA ART 32-bit ARM9 processor, which 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

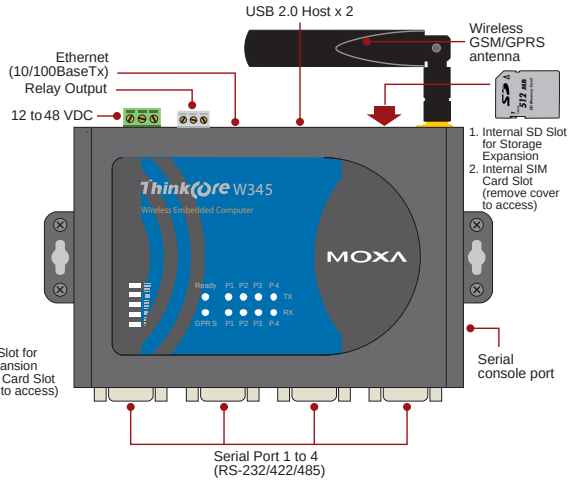
W315



W325



W345



Hardware Specifications

Computer

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

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

DRAM:
W315/325: 32 MB
W345: 64 MB

Flash: 16 MB

Storage

Expansion: SD socket

Other Peripherals

USB (W345 only): USB 2.0 compliant hosts x 2, type A connector, supports system boot up

Relay Output (W345 only):
Form C, SPDT x 1
Normal Switching Capacity: 2A @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.

LAN Interface

Ethernet: Auto-sensing 10/100 Mbps, RJ45 connector

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: RS-232/422/485 (software-selectable)

Number of Ports:
W315: 1
W325: 2
W345: 4

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 (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:
W315: Ready
W325: Ready, SD
W345: Ready, SD

LAN: 10M/Link, 100M/Link (on connector)

Cellular: GPRS Enabled, GSM Signal Strength

Serial: TxD, RxD

Switches and Buttons

Buttons: Reset button for resetting to factory defaults

Physical Characteristics

Housing: Aluminum (1 mm)

Weight:
W315/325: 195 g
W345: 400 g

Dimensions (without ears or antenna):
W315: 77 x 111 x 26 mm (3.03 x 4.37 x 1.02 in)
W325: 77 x 111 x 26 mm (3.03 x 4.37 x 1.02 in)
W345: 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

Antenna Length: 110 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'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

Regulatory Approvals

EMC: CE (Class A), FCC

Safety: UL/cUL, TÜV

Directives: 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

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

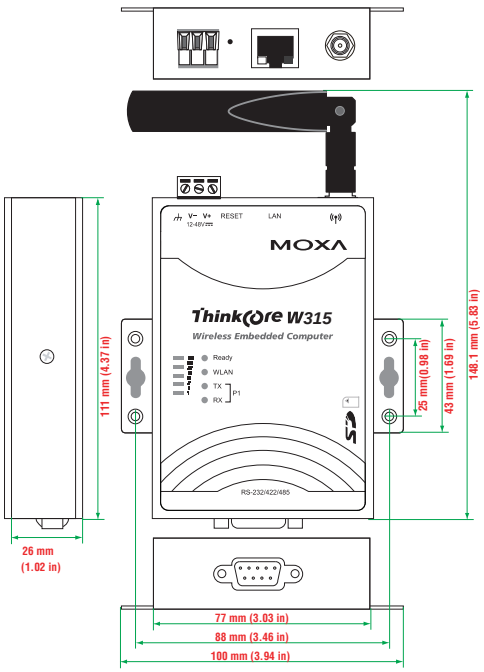
Supporting Services and Daemons:
telnetd: Telnet Server daemon
ftpd: FTP server daemon
sshd: Secure shell server
Apache: Web server daemon, supporting PHP and XML
OpenVPN: Virtual private network service manager
iptables: Firewall service manager
pppd: dial in/out over serial port daemon & PPPoE
snmpd: 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)

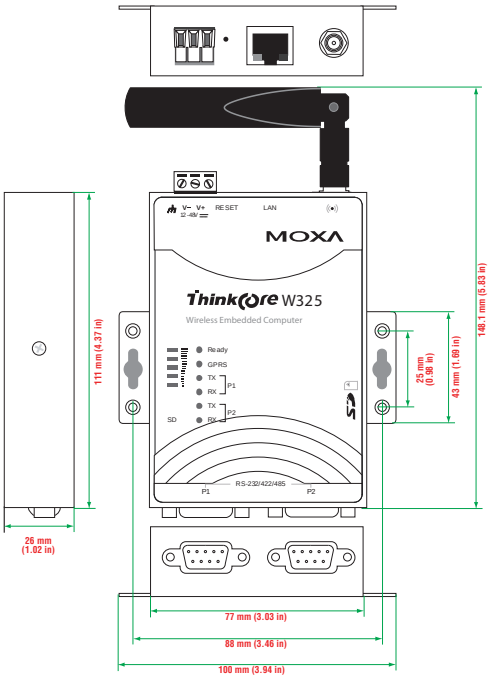
Device Drivers:
W315: UART, RTC, Buzzer, SD Card
W325: UART, RTC, Buzzer, SD Card
W345: UART, RTC, Buzzer, SD Card, USB (supports USB flash disk), DO

Dimensions

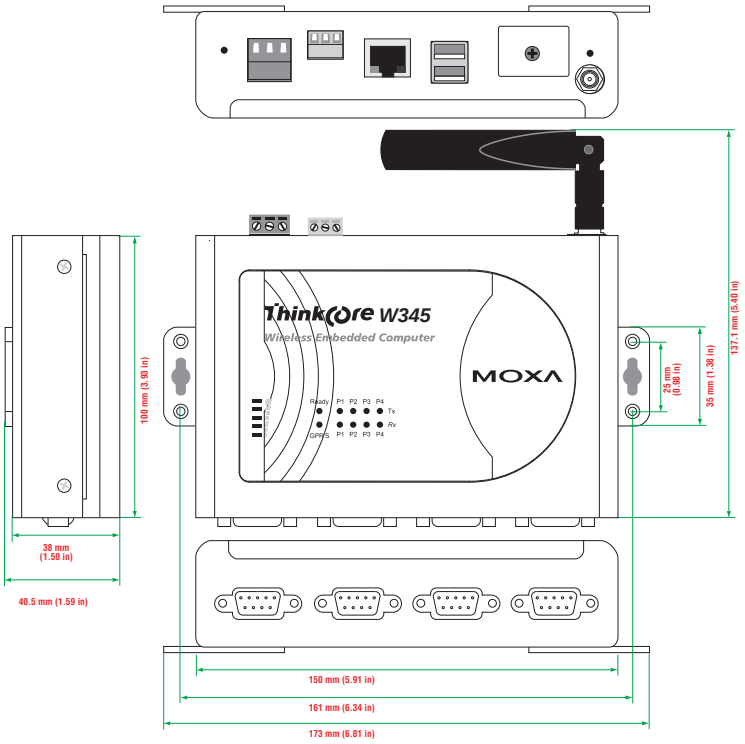
W315



W325



W345



Ordering Information

Available Models

W315-LX: Mini RISC-based wireless Linux computer with GSM/GPRS, 1 serial port, and LAN

W325-LX: Mini RISC-based wireless Linux computer with GSM/GPRS, 2 serial ports, LAN, and SD

W345-LX: RISC-based wireless Linux computer with GSM/GPRS, 4 serial ports, LAN, SD, USB, and relay output

Package Checklist

- W315 or W325 or W345 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
- GSM/GPRS Antenna
- Document and Software CD
- Quick Installation Guide (printed)
- Warranty Card

Antennas and Terminal Blocks

IEEE 802.11g/b 2.4 GHz Antennas

ANT-WSB-O-02

Frequency Range: 2.4-2.5 GHz
Antenna Type: 1/4λ Dipole Sleeve
Antenna Gain: 2 dBi (typical)
Impedance: 50 ohms nominal
Polarization: Linear
Type of Radiation: Toroidal

V.S.W.R: < 2
Connector: RP-SMA (male)
Antenna Profile: 108 mm length

ANT-WSB-O-5-150

Frequency Range: 2.4-2.5 GHz
Antenna Type: 1/4λ Dipole Sleeve
Antenna Gain: 5 dBi (typical)
Impedance: 50 ohms nominal
Polarization: Vertical

V.S.W.R: < 2
Connector: RP-SMA (male)
Cable Length: 150 cm

ANT-1-O-09

Frequency Range: 2.4-2.5 GHz
Antenna Type: Omni-directional
Antenna Gain: 9 dBi
Impedance: 50 ohms
Polarization: Linear
HPBW/Horizontal: 360°
HPBW/Vertical: 10°

V.S.W.R.: < 1.3
Power Handling: 15W Max.
Connector: N-type (female)
Antenna Profile: 420 mm length
Weight: 430g

ANT-1-D-12

Frequency Range: 2.4-2.5 GHz
Antenna Type: Directional, Flat Panel
Antenna Gain: 12 dBi
Impedance: 50 ohms
Polarization: Linear
HPBW/Horizontal: 50°
HPBW/Vertical: 30°

V.S.W.R.: < 1.5
Power Handling: 10W Max.
Connector: N-type (female)
Dimensions: 90 x 215 x 30 mm (W x H x D)
Weight: 520 g
Installation: wall mounting or swivel mounting kit (optional)

IEEE 802.11a/b/g 2.4 & 5 GHz Dual-band Antenna

ANT-WDB-O-2

Frequency Range: 2.4-2.5 GHz & 4.9-5.8 GHz
Antenna Peak Gain: 2 dBi (typical)
Antenna Average Gain: 1 dBi (typical)
Impedance: 50 ohms
HPBW/Horizontal: 360°
HPBW/Vertical: 80°
Polarization: Linear, Vertical

V.S.W.R: < 2
Power Handling: 2W (cw)
Connector: RP-SMA (male)

Cellular Antennas

ANT-CQB-O-1

Operating Frequency: 850/900/1800/1900 MHz
Polarization Type: Linear
Type of Radiation: Toroidal
Peak Gain: 1.0 dBi Max

Impedance: 50 ohms nominal
Connector: SMA (male)
Antenna Profile: 3.3 mm length

ANT-CQB-O-0-3m

Operating Frequency: 850/900/1800/1900 MHz
Cable Type: RG174/U
Antenna Gain: 0 dBi
Impedance: 50 ohms
V.S.W.R: < 2

Connector: SMA (male)
Antenna Profile: 100 mm length
Cable Length: 3 m

ANT-CQB-O-3-3m

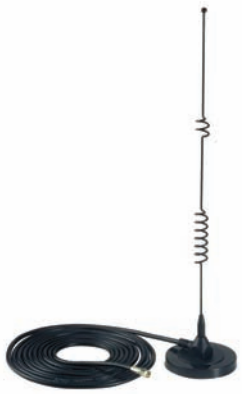
Operating Frequency: 850/900/1800/1900 MHz
Cable Type: RG174/U
Antenna Gain: 3 dBi
Impedance: 50 ohms
V.S.W.R: < 2

Connector: SMA (male)
Antenna Profile: 250 mm length
Cable Length: 3 m

ANT-CQB-O-5-3m

Operating Frequency: 850/900/1800/1900 MHz
Cable Type: RG174/U
Antenna Gain: 5 dBi
Impedance: 50 ohms
V.S.W.R: < 2

Connector: SMA (male)
Antenna Profile: 370 mm length
Cable Length: 3 m



Terminal Block Accessories

3-pin Terminal Block (screw type)

(P/N: 1111000005200)

5-pin Terminal Block (screw type)

(P/N: 1111000005400)

10-pin Terminal Block (screw type)

(P/N: 1111211021212)

Power Jack to Terminal Block Power Cable

(P/N: 1701040110010)

Cable Length: 100±20 mm

Open Wire: 7.5±1 mm

Optional Accessories (can be purchased separately)

CRF- N0117SA-3M: CFD200 cable, N-Male to RP SMA Male connector, 3 meters (for AWK-1100/3121 only)

*This cable is required for connecting to an optional antenna for devices that have an RP-SMA connector.

CRF-N0429N-3M: CFD400 cable, N-Male to N-Male connector, 3 meters (for AWK-1200 only)

*This cable is required for connecting to an optional antenna for devices that have an N-type connector.

HA-1002SU: Swivel Mounting Kit, swivel angle 90° horizontal, 40° vertical

*Supports ANT-1-D-12 by adjusting the angle for use with different wireless applications.