Secured and Rugged LTE Router for Vehicle and Railway

WR322A M12 Series

Industrial Secure M12 Cellular IIoT Router

The ruggedized vibration-proof LTE WLAN router WR322A-M12 Series is designed for vehicle and railway with dual-radio high-speed LTE routing and WLAN networks. The RS232/422/485 serial port with Modbus support brings sensor and meter data to cloud wirelessly. The LTE to WLAN redundancy and LTE/WLAN auto offload design guarantees continuous connections. To safeguard cybersecurity, security features such as Firewall, OpenVPN, GRE tunnel are supported. The embedded MQTT and RESTful API enables instant public cloud integration such as AWS or Azure. The private cloud platform ThingsMaster and ThingsMaster OTA can also be set up for a instant and secured access to receive data or manage devices remotely.

Features & Benefits

High speed 4G LTE & Wi-Fi Network

- LTE Cat.4, 2x2 MIMO, 150M downlink and 50M uplink
- LTE Cat.6 with 2CA, 2T2R MIMO provides 300M downlink and 50M uplink
- 4G/3G/2G full cellular network compatibility
- Support GPS for location services
- IEEE 802.11ac compliant & backward compatible with 802.11a/b/g/n
- Selectable 5G/2.4G Wi-Fi for local coverage, up to 866Mbps bandwidth
- **Optional NBIoT + M1**
  LTE FDD: B1/B2/B3/B4/B5/B8/B12/B13/B18/B19/B20/B26/B28
  LTE TDD: B39 (For Cat M1 Only)

Serial Communication & High Throughput Data Switching

- 1 port RS232/422/485 full functions for serial over LTE/Wi-Fi/Ethernet data switching
- 2-port Gigabit Ethernet supports routing and bridging mode
- Close to wire-speed NAT routing performance
- Hardware NAT for CPU utilization saving

Dynamic Routing with Redundancy Protection

- RIPv1&v2, OSPFv1&v2 for intra-domain routing within an autonomous system
- Efficient unicast/multicast* static routing
- VRRP guarantees sustainable routing in a single point of failure

Rugged Design for Wayside Surveillance, ITS Application

- EN50121-4 railway trackside EMC certificate design for Industrial IoT, ITS applications
- Effective heat dissipation design for operating in -40~75°C environments
- CE Marking
- IEC61000-6-2/IEC61000-6-4 heavy industrial EMC compliance

Enhanced Cyber Security & Redundancy

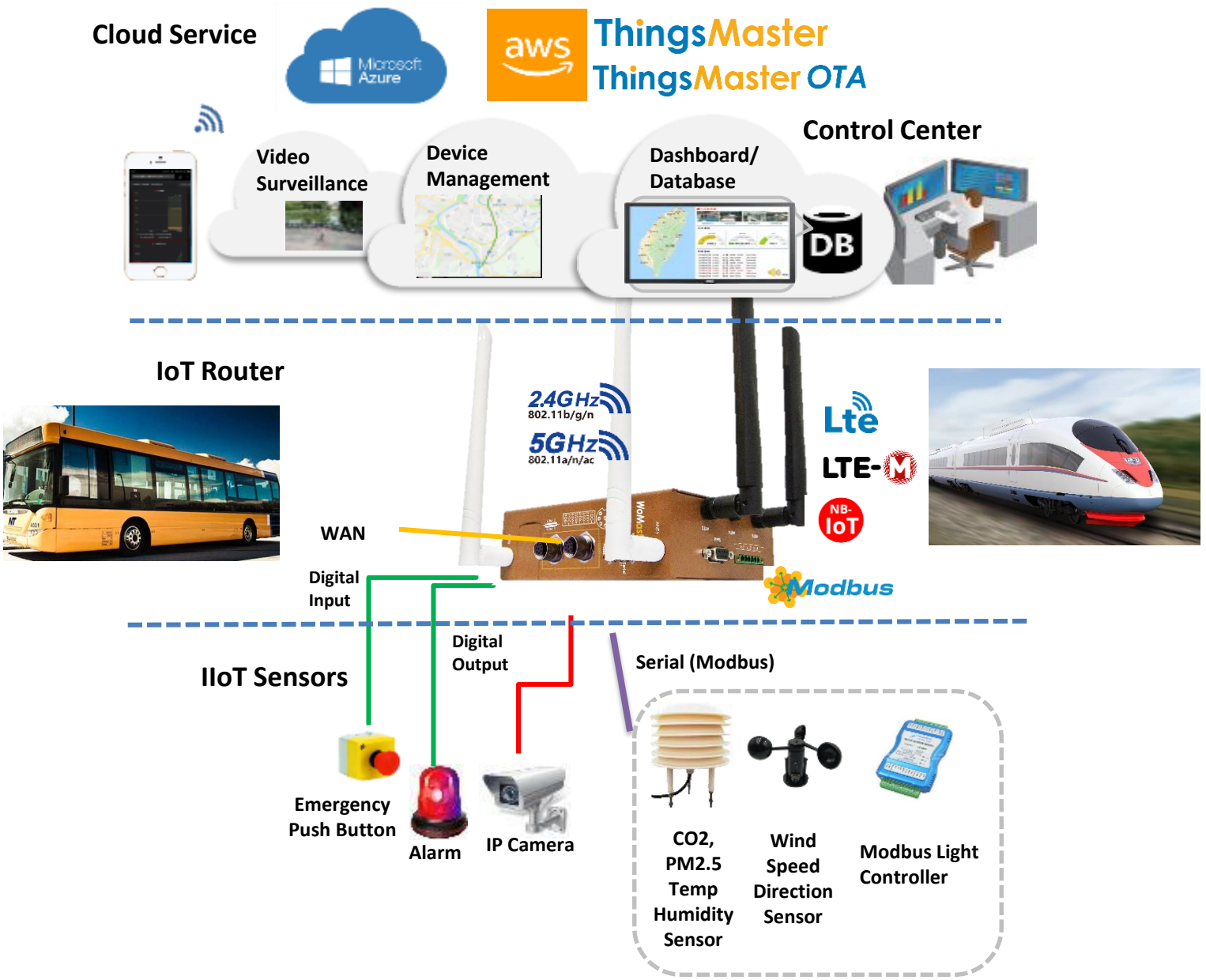
- Firewall for inbound/outbound traffic
- OpenVPN (server/client), IPsec for secure remote connection
- L2TP with PPP, PAP, CHAP(LCP, IPCP)
- GRE tunnel
- HTTPs/SSH secure login
- TACACS+ multi-user authentication for privileged user management
- Cellular to WAN redundancy, dual SIM backup
- Cellular to WLAN auto offload
- RSTP spanning tree protocol

Industrial IoT LAN & Cloud Management

- Embedded Amazon AWS & Microsoft Azure cloud service
- Various configuration paths, including CGI WebGUI, CLI, SNMP and RMON*
- 1:1 NAT, port forwarding and NAPT for local traffic protection
- ARP response over 802.2 LLC SNAP
- Support SNMPv3 and entity-MIB (RFC4133), MIB II (RFC1213)
- NTP v3 time management
- WoMaster Software Utilities
  -**NetMaster:** Network Management System with VLAN visualization* and ERPS* Ring
  -**ViewMaster:** Configuration Management
  -**ThingMaster**: Interactive monitoring dashboard to collect data from field devices
  -**ThingMaster OTA**: Realtime map showing the status, signal strength, location of the remote devices, over-the-air batch device registration, configuration and firmware upgrade*, alerts on critical events to prevent downtime
- Support MQTT protocol, ready to use AWS/Azure and Private Cloud Agent for cloud management
- LLDP* for topology control, auto-topology drawing
- USB for easy field configuration and firmware update
- Diagnostic tool includes Ping, TFTP, SNMP Trap, E-mail Alert and System Log

*by request

✓ Ready Total Solution for IoT

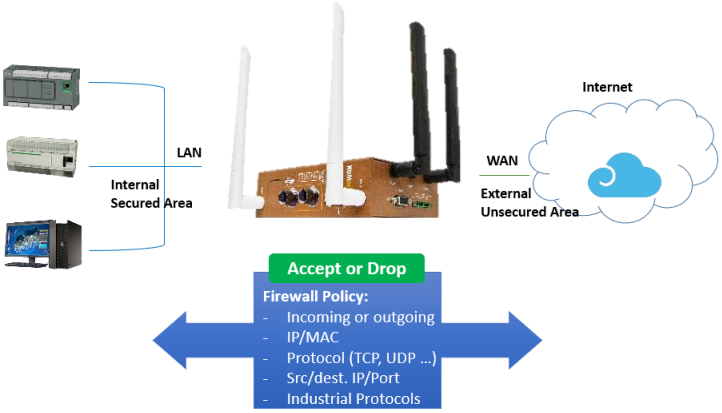


✓ Secured Remote Access by VPN

WR322A-M12 can act as a VPN server for data encryption and dynamic remote access. Multiple VPN protocols are supported such as OpenVPN, GRE, and L2TP. The channels between multiple networks, ex. private/public/hybrid networks are fully secured and with authentication features.

✓ Cyber Security Guard

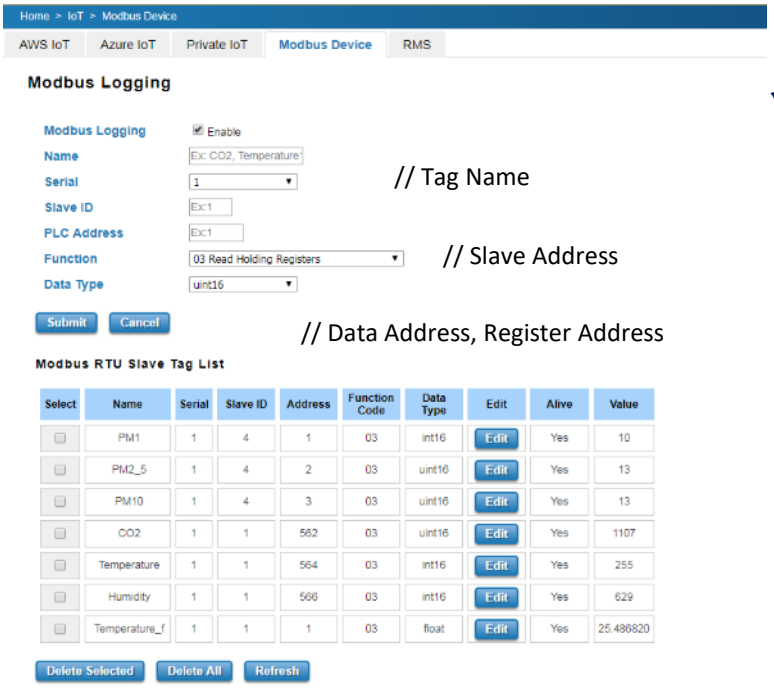
The stateful firewall can monitor the status of connection at all time. Multiple industrial fieldbus protocols, ex. Modbus TCP*, EtherNet/IP* are also supported for factory automation applications.



*by request

Secure IoT Modbus Tags

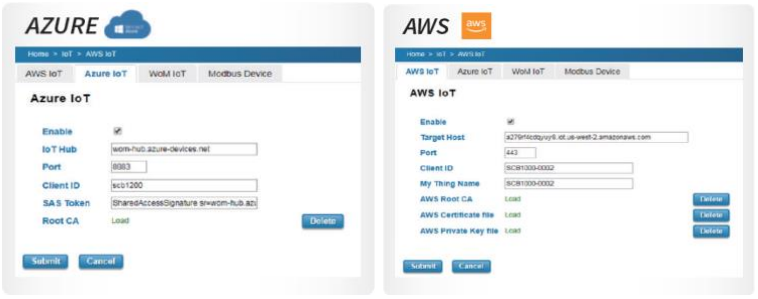
Tag-based data acquisition with MQTT support
MQTT client acting as publisher and subscriber
The latest TLS encryption and X.509 authentication
Selectable serial port and data type. Sensor alive check and display sensor value.



Secured Multi-sites Management

N to N VPN
Latest TLS encryption and X.509 authentication

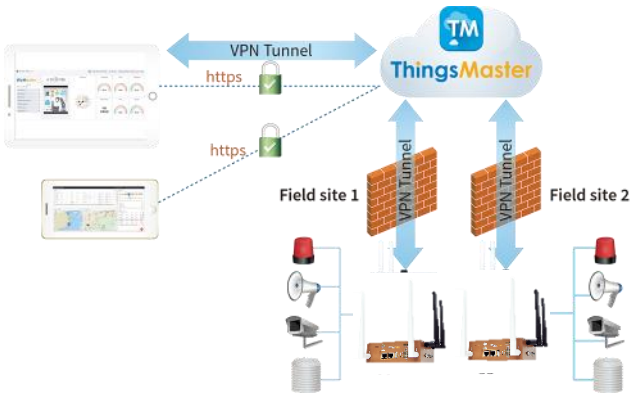
✓ Built-in Microsoft Azure and Amazon AWS agent



✓ Multi-Level User Passwords

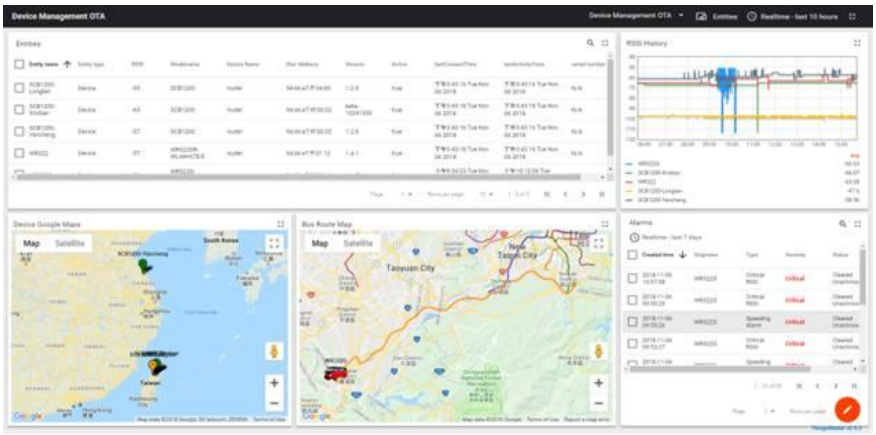
Different centralized authentication servers are supported such as RADIUS and TACACS+. Using a central authentication server simplifies account administration, when you have more than one switches in the network.

Authentication Chain is also supported. An authentication chain is an ordered list of authentication methods to handle more advanced authentication scenarios. For example, you can create an authentication chain which first contacts a RADIUS server, and then looks in a local database if the RADIUS server does not respond.



✓ ThingsMaster OTA (device management over the air)

The OTA agent embedded in WR322A-M12 upgrades device management over the air, anywhere you are and any time you want over your mobile devices. ThingsMaster OTA is a secured local OTA software that can be installed in a private or public server or even QNAP NAS (network attached storage). With OTA, all device information such as location, warning event can be shown in real time. The maintenance such as configuration reload, or device reboot can also be run by group.

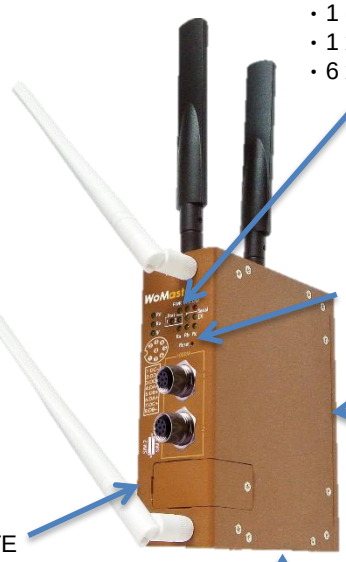


Interfaces

System LED
- 1 x Power
- 1 x System Status
- 1 x DO
- 2 x Ethernet Port
- 1 or 2 x Serial Port (By Model)
- 1 x DI (By Model)
- 6 x Radio LED (Ra~Rf)

	WR312A-M12-LTE	WR322A-M12
Ant 1	LTE-Main	Wi-Fi 1
Ant 2	LTE- Diversity/ GPS (by model)	Wi-Fi 2
Ant 3	-	LTE-Main
Ant 4	-	GPS (by model)
Ant 5	-	LTE-Diversity

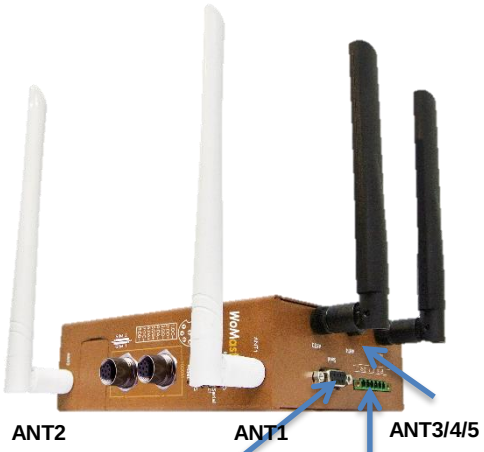
*Antenna: Wi-Fi in White; LTE in Black



Gigabit Ethernet
- 2-port 10/100/1000M M12 A/X-code
- WAN + LAN configurable

SIM Card
- WR312G-LTE
  1x SIM + 1x MicroSD
  or 2 x SIM
- WR322GR-WLAN+LTE
  2x SIM or
  2x SIM + 1x MicroSD

DIN Clip



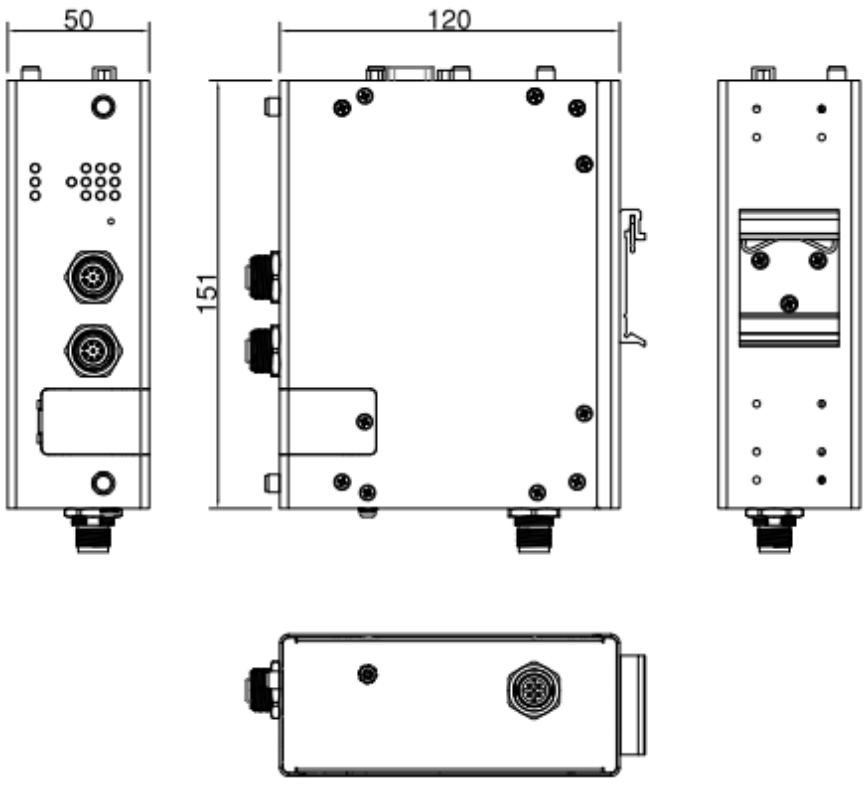
Integrated Power Connector
- M12 4 pin D-Code Male

Serial Communication
- RS232/422/485 Full functions
- DB9 female

Digital I/O
- 2DI+1DO

Dimensions

(mm)



Specifications

Technology

Standard	3GPP Release 11/12 Long Term Evolution (LTE), fallback 3GPP Release 7,8,9 for HSPA/UMTS
	IEEE 802.11ac wireless local area network (WLAN), Backward support 802.11n/g/a/b Wireless LAN
	IEEE 802.3 10Base-T Ethernet
	IEEE 802.3u 100Base-TX Fast Ethernet
	IEEE 802.3ab 1000Base-T Gigabit Ethernet Copper
	IEEE 802.1D-2004 Rapid Spanning Tree Protocol (RSTP)
	IEEE 802.1Q for VLAN

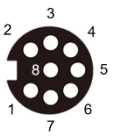
Interface

Ethernet Port

2 x 10/100/1000MBase-T M12 A-code, Auto-Negotiation, Auto-MDI/MDIX (X-code by request)

Pin Definition:

8 pin A-Code Female



Pin	Description	Pin	Description
1	DC -	5	DB +
2	DD +	6	DA +
3	DD -	7	DC +
4	DA -	8	DB -

Cable:

1000 Base-T: 4-pair Cat.5E/Cat.6 FTP/STP cable, EIA/TIA 568B 100Ohm, 100Meters

*Recommended uses FTP/STP cable for the railway on-board application

System LED

1 x PWR: Green On
1 x SYS: Ready: Green On, Firmware Updating: Green Blinking
1 x DO: Red On
2 x Ethernet Ports: Link: Green On, Activity: Green Blinking
1 x Serial Ports : Activity: Green Blinking
1 x DI: Green On
WR312A-M12-LTE:
3 x Radio (Ra, Rb, Rc): Radio status
Ra: SIM detected: Green On, SIM not inserted: Off
Rb: 2/3G connection: Green On, Not 2/3G connection: Off
Rc: 4G connection: Green On, Not 4G connection: Off
WR322A-M12-WLAN+LTE:
6 x Radio (Ra, Rb, Rc, Rd, Re, Rf): Radio status
Ra: AP mode: Green On, Station mode connected: Green Blinking, Station mode/radio disable: Off
Rb/Rc: Reserved
Rd: SIM detected: Green On, SIM not inserted: Off
Re: 4G connection: Green On, 2/3G connection: Green Blinking, disconnected: Off
Rf: Base station connected: Green On for 2 sec period, Base station disconnected: Green Off for 2 sec period

Reset

System Reset(2~6 Seconds) / Default Settings Reset(over 7 Seconds)

SMA Socket

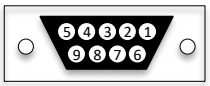
WR312A-M12-LTE:
2x SMA-Female: ANT1 for LTE Main, ANT2 for LTE Aux/GPS
WR312A-M12-WLAN:
2x RP-SMA: ANT1 for Wi-Fi1, ANT2 for Wi-Fi2
WR322A-M12-WLAN+LTE:
2x RP-SMA: ANT1 for Wi-Fi1, ANT2 for Wi-Fi2,
3x SMA-Female: ANT3 for LTE Main, ANT4 for GPS, ANT5 for LTE Aux

SIM Socket

2 x Nano SIM

Serial

1 x RS232/422/485, DB9 female



Pin	RS232	RS485-4w/422	RS485-2w
1	DCD	TX-	Data-
2	TXD	RX+	-
3	RXD	TX+	Data+
4	DSR	-	-
5	GND	GND	GND
6	DTR	RX-	-
7	CTS	-	-
8	RTS	-	-
9	RI	-	-

Digital Input/ Digital Output

6-Pin Removable Terminal Block Connector:
4 Pins for 2x DI with isolation
High: DC 2~30V
Low: DC 0~1V
2 Pins for 1x DO: 0.1A/24V with isolation

Power Input

M12 4 pin D-Code Male with polarity reverse protection

Pin Definition:

Pin	DESC
1	V1 +
2	V2 +
3	V2 -
4	V1 -

Cellular Properties	(LTE Cat. 6)
Standard	UMTS/HSPA 3GPP Release 8 LTE 3GPP Release 12 (LTE Cat.6)
Data Rate	TD-SCDMA: DL Max 4.2Mbps, UL: Max 2.2Mbps HSPA: DL: Max. 42 Mbps, UL: Max. 5.76 Mbps WCDMA: DL: Max 384Kbps, UL: Max 384Kbps LTE-FDD: DL: Max. 300 Mbps, UL: Max. 50 Mbps, 2x2 DL MIMO LTE-TDD: DL: Max. 226 Mbps, UL: Max. 28 Mbps, 2x2 DL MIMO
Band Information: LTE-E	LTE-FDD: B1/B3/B5/B7/B8/B20/B28/B32 (2100/1800/850/2600/900/800/700/1500MHz) LTE-TDD: B38/B40/B41 (2600/2300/2500MHz) WCDMA: B1/B3/B5/B8 (2100/1800/850/900MHz)
Band Information: LTE-U	LTE-FDD: B2/B4/B5/B7/B12/B13/B17/B25/B26/B29/B30/B66 (1900/1700/700/2600/700/700/700/1900/850/700/2300/1700MHz) LTE-TDD: B41 (2500MHz) WCDMA: B2/B4/B5 (1900/1700/850MHz)
Band Information: LTE-AP	LTE-FDD: B1/B3/B5/B7/B8/B18/B19/B21/B26 (2100/1800/850/2600/900/850/850/1500/850MHz) LTE-TDD: B38/B39/B40/B41 (2600/1900/2300/2500MHz) WCDMA: B1/B5/B6/B8/B9/B19 (2100/850/UMTS only/900/1800/850MHz) TD-SCDMA: B39 (1900MHz)
Cellular Properties	**(LTE Cat. 4)**
Standard	GSM/GPRS/EDGE 3GPP Release 6 UMTS/HSPA 3GPP Release 8 LTE 3GPP Release 11
Data Rate	GPRS: DL: max. 85.6 kbps, UL: max. 85.6 kbps EDGE: DL: max. 236.8 kbps, UL: max. 236.8 kbps HSPA: DL: max. 42 Mbps, UL: max. 5.76 Mbps LTE-FDD Cat.4: DL: max. 150 Mbps, UL: max. 50 Mbps, 2x2 DL MIMO LTE-TDD Cat.4: DL: max. 130 Mbps, UL: max. 35 Mbps, 2x2 DL MIMO
Band Information: LTE-E	LTE: FDD B1/B3/B5/B7/B8/B20 (2100/1800/850/2600/900/800MHz) LTE: TDD B38/B40/B41 (2600/2300/2500MHz) WCDMA: FDD B1/B5/B8 (2100/850/900MHz) GSM: B3/B8 (1800/900MHz)
Band Information: LTE-AU	LTE: FDD B1/B2/B3/B4/B5/B7/B8/B28 (2100/1900/1800/1700/850/2600/900/700MHz) LTE: TDD B40 (2300MHz) WCDMA: FDD B1/B2/B5/B8 (2100/1900/850/900MHz) GSM: B2/B3/B5/B8 (1900/1800/850/900MHz)
Band Information: LTE-U	LTE: FDD B2/B4/B12 (1900/1700/700MHz) WCDMA: B2/B4/B5 (1900/1700/850MHz)
Band Information: LTE-CN	LTE FDD: B1/B3/B5/B8 (2100/1800/850/900MHz) LTE TDD: B38/B39/B40/B41 (2600/1900/2300/2500MHz) TD-SCDMA: B34/B39 (2000/1900MHz) WCDMA: B1/B8 (2100/900MHz) CDMA: BC0 GSM: 900/1800MHz
GPS Properties	
GNSS	GPS/GLONASS/BeiDou/Galileo
Performance	Cold start: 18s, Warm start: 2.2s, Hot start: 1.8s
Sensitivity	Cold start: -146dBm, Reacquisition: -157dBm, Tracking: -157dBm
Accuracy	<1.5M
GNSS Frequency	GPS/Galileo: 1575.42±1.023 MHz GLONASS: 1597.5~1605.8 MHz BeiDou: 1561.098±2.046 MHz
Antenna (Optional Accessory- A-GPS-27-RSM-3M)	Frequency range: 1561~1615MHz Polarization: RHCP or linear VSWR: <2 (Typ.) Passive antenna gain: >0dBi
Wi-Fi Properties	
Standard	IEEE 802.11ac/a/b/g/n, 2T2R MIMO 802.11ac: OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)
Data Rate	802.11ac: MCS0 ~ 9, max. 866Mbps 802.11b: 11Mbps / 802.11a/g: 54Mbps / 802.11n: MCS0 ~ 15, max. 300Mbps Check detail TX/RX information in User Manual
Frequency	ISM Band, 2.412GHz ~ 2.472GHz, 5.180MHz ~ 5.825MHz(Band 1,4)
RSSI	≦20db, compliant with CE request

Antenna	
LTE Default Antenna	**Frequency:** 704~960/1710~2690 MHz
	Gain: 2 dBi
	Dimension: 161xΦ13 mm
Wi-Fi Default Antenna	**Frequency:** 2400~2500/ 4900~5900 MHz
	Gain: 2.4GHz: 2.5 dBi, 5GHz: 3dBi
	Direction: Omni-directional
	Dimension: 196xΦ13 mm
Power Requirement	
Input Voltage	24V (12~48VDC)
Reverse Polarity Protect	Yes
Input Current	**WR312A-M12-LTE:** 0.23A@24V **WR322A-M12-WLAN+LTE:** 0.26A@24V
Power Consumption	**WR312A-M12-LTE:** Max 5.52W@24VDC full traffic, suggest to reserve 15% tolerance **WR322A-M12-WLAN+LTE:** Max 6.24W@24VDC full traffic, suggest to reserve 15% tolerance
Software	
Management	CGI WebGUI, Command Line Interface (CLI), IPv4/IPv6*, Telnet, SNMP v1/v2c/v3, DDNS, DHCP server/client, DHCP Relay, TFTP, System Log, SMTP, ARP response over 802.2 LLC SNAP, Proxy ARP, DNS (client/proxy), PPPOE*
Traffic Management	Flow Control*, Traffic shaping
Filter	IEEE802.1Q VLAN
Security	IEEE 802.1X/RADIUS, TLS v1.2, HTTPs/SSH, First login password management WLAN AP Security: Share Key, WPA/WPA2-PSK(Pre-Shared Key), WPA/WPA2 Enterprise Encryption: 64/128-bit WEP(Wired Equivalent Privacy), TKIP(WPA-PSK), AES(WPA2-PSK), MAC Filter
Advanced Security	TACACS+, Mutli-user authentication
Time Management	NTP, SNTP, Cellular Time
Redundancy Protocol	WAN/LTE Redundancy, Rapid Spanning Tree Protocol (RSTP)
WAN / Routing / NAT/ Firewall / VPN	Routing: RIPv2, OSPFv2, VRRPv2 NAT: 1-1 NAT, NAPT(SNAT/DNAT), Port Forwarding, DMZ Firewall: Stateful Inspection firewall, IP/Port Filter VPN: IPSec, OpenVPN (Multipoint VPN), L2TP, GRE, PPTP, MGRE*
Watchdog	Hardware watchdog for system status monitoring Software cellular watchdog/ ping watchdog for connection monitoring
IIoT Industrial Protocol	Modbus RTU, MQTT, RESTful API
Private Cloud	ThingsMaster, ThingsMaster OTA
Public Cloud	AWS Agent, Azure Agent
Location	Google map, Baidu map
MIB	MIB-II, Entity MIB, WoMaster Private MIB
Utility	ViewMaster, NetMaster, Ping, Traceroute, IP SLA*
Serial communication	TCP Server/TCP Client/UDP mode, TCP Alive check, Force TX Delimiter/Timeout/interval/length, Long Distance Termination
Cellular Configuration	Radio on/off, 2G, 3G and 4G modes configurable, SIM Security, Connection Status, Cellular to Eth-WAN Redundancy, GPS positioning (by model), Backup SIM Retry (1-10 times)
Mechanical	
Installation	DIN Rail
Enclosure Material	Steel Metal with Aluminum
Dimension	50 x 151 x 120 mm(W x H x D) / without DIN Rail Clip
Ingress Protection	IP30
Weight	WR312A: ~600g without package WR322A: ~660g without package
Environmental	
Operating Temperature & Humidity	-40°C~75°C , 5%~95% Non- Condensing
Storage Temperature	-40°C~85°C
MTBF	>200,000 hours at 40º full cycle
Warranty	5 years

*by request

Approval	
FCC	CISPR 22, FCC part 15B Class A
Radio	RED Compliance Safety: EN 62368-1 EN 50385/EN62311 MPE assessment EN 301 489-1/17/19/52, EN 55032/55024 EN 300 328/EN 301 893 EN 301 908-1 FCC Part 15B
Railway	*EN50155

Ordering Information

Model Name	Description
WR302A-M12	Industrial Secure M12 IIoT Router, 2GbE+1COM, 2DI+1DO
WR312A-M12-WLAN	Industrial Secure M12 Wireless IIoT Router, 2GbE+1COM, 2DI+1DO, 802.11ac/n WLAN
WR312A-M12-LTE-E	Industrial Secure M12 Cellular IIoT Router, 2GbE+1COM, 2DI+1DO, LTE-E, 2SIM, FDD B1/3/5/7/8/20, TDD B38/40/41
WR312A-M12-LTE-CN	Industrial Secure M12 Cellular IIoT Router, 2GbE+1COM, 2DI+1DO, LTE-CN, 2SIM, FDD B1/B3/B5/B8, TDD B38/B39/B40/B41
WR312A-M12-LTE6-E	Industrial Secure M12 Cellular IIoT Router, 2GbE+1COM, 2DI+1DO, LTE-E Cat.6, 2SIM, FDD B1/3/5/7/8/20/28/32, TDD B38/40/41
WR322A-M12-WLAN+LTE-E	Industrial Secure M12 Cellular IIoT Router, 2GbE+1COM, 2DI+1DO, 802.11ac/n WLAN, LTE-E, GPS, 2SIM, FDD B1/3/5/7/8/20, TDD B38/40/41
WR322A-M12-WLAN+LTE-CN	Industrial Secure M12 Cellular IIoT Router, 2GbE+1COM, 2DI+1DO, 802.11ac/n WLAN, LTE-CN, GPS, 2SIM, FDD B1/B3/B5/B8, TDD B38/B39/B40/B41
WR322A-M12-WLAN+LTE6-E	Industrial Secure M12 Cellular IIoT Router, 2GbE+1COM, 2DI+1DO, 802.11ac/n WLAN, LTE-E Cat.6, GPS, 2SIM, FDD B1/3/5/7/8/20/28/32, TDD B38/40/41
	*Embedded SIM by request *LTE-AU/LTE-U Cat.4 by request *LTE-AP/LTE-U Cat.6 by request *Dual LTE concurrent by request *GPS support for WR312A-M12-LTE series by request
	Package List
	1 x Product Unit
	1 x 6-pin Removable Terminal Connector
	1 x Quick Installation Guide
	1 x Attached Din Clip
	Default Enclosed Antennas: **WR312A-M12-LTE**: 2 x LTE Antennas, Black **WR312A-M12-WLAN**: 2 x Wi-Fi Antennas, White **WR322A-M12-WLAN+LTE**: 2 x LTE Antennas, Black + 2 x Wi-Fi Antennas, White

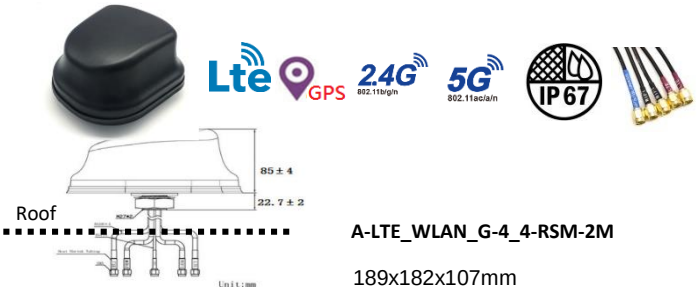
Ordering Information

A-LTE_WLAN_G-4_4-RSM-2M	Combo IP67 Antenna, LTE WW 4dBi, Wi-Fi 2.4/5GHz dual band Omni-directional 4/4dBi, GPS 1561-1670MHz 28dBi, SMA male (LTE/GPS), RP-SMA male (Wi-Fi), 2M
A-LTE_WLAN_G-3_2-RSM-2M	Combo IP67 Antenna, LTE WW 3dBi, Wi-Fi 2.4/5GHz dual band Omni-directional 2/2dBi, GPS 1575-1610MHz 28dBi, SMA male (LTE/GPS), RP-SMA male (Wi-Fi), 2M
A-LTE-3-NM	LTE Antenna, LTE WW 3dBi, N-type male
A-WLAN-6-NM	Wi-Fi Antenna, Wi-Fi 2.4/5GHz dual band Omni-directional 4/6dBi, N-type male
A-GPS-27-SM-3M	GPS Antenna, GPS 1575MHz 27dBi, SMA male, 3M
C-RF-RG58-RSF_RSM-1M	RF cable, RP-SMA female to RP-SMA male, RG-58, 1M
C-RF-RG58-SF_SM-1M	RF cable, SMA female to SMA male, RG-58, 1M
C-RF-CFD200-NF_RSM-2M	RF cable, N-type female to RP-SMA male, CFD200, 2M
C-RF-CFD200-NF_SM-2M	RF cable, N-type female to SMA male, CFD200, 2M

Outdoor Vehicle Combo Antenna

A-LTE_WLAN_G-4_4-RSM-2M

- 5 RF cables, LTE MIMO, Wi-Fi MIMO, GPS/GLONASS/GALILEO/BEIDOU
- 4dBi gain for LTE and 4dBi gain for 2.4G/5G Wi-Fi RF
- High WLAN gain is perfect for train to ground vehicle application
- 5 x 2-meter cables in RP SMA / SMA male connector
- Outdoor high gain, IP67 waterproof and -40°~85°C wide temperature design
- 189x182x107mm



A-LTE_WLAN_G-4_4-RSM-2M

189x182x107mm

A-LTE_WLAN_G-3_2-RSM-2M

- 5 RF cables, LTE MIMO, Wi-Fi MIMO, GPS&GLONASS
- 3dBi gain for LTE and 2dBi gain for 2.4G/5G Wi-Fi
- Suitable for in-vehicle, roadside box and short-range coverage WLAN to LTE communication environment
- 5 x 2-meter cables in RP SMA / SMA male connector
- Outdoor IP67 waterproof and -40°~85°C wide temperature
- 110x110x80mm slim size

110x110x80mm

A-LTE_WLAN_G-3_2-RSM-2M

Combo Antenna	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-LTE_WLAN_G-4_4-RSM-2M (optional)	Omni	LTE: 698~960/1710~2690/2900~3600 WLAN: 2400~2483.5/4900~5825 GNSS: 1561.1~1610 (GPS/GLONASS/GALILEO/BEIDOU)	4 4 28	3x SMA Male 2x RP SMA Male	189x182x107	2	-40°C~85°C	Outdoor
	A-LTE_WLAN_G-3_2-RSM-2M (optional)	Omni	LTE: 698~960/1710~2690 WLAN: 2400~2483.5/4900~5825 GNSS: 1575.42~1610 (GPS/GLONASS)	3 2 28	3x SMA Male 2x RP SMA Male	110x110x80	2	-40°C~85°C	Outdoor

LTE Antenna	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-LTE-2-SM (Default)	Omni	704~960/1710~2690	2	SMA Male	161xΦ13	-	-20°C~ 65°C	Indoor
	A-LTE-3-NM (optional) (require RF cable)	Omni	704~960 1710~2700	2 3	N-Type Male	187xΦ20	-	-20°C~ 65°C	Outdoor

Wi-Fi Antenna	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-WLAN-3-RSM (Default)	Omni	2400~2500 4900~5900	2.5 3	RP SMA Male	196xΦ13	-	-40°C~ 65°C	Indoor
	A-WLAN-6-NM (optional) (require RF cable)	Omni	2400~2500 5150~5850	4 6	N-Type Male	187xΦ20	-	-20°C~ 65°C	Outdoor

GPS Antenna	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-GPS-27-SM-3M	Omni	1575.42	27	SMA Male	36x36x13.9	3	-20°C~ 65°C	Indoor
	A-GPS-2-NM (optional) (require RF cable)	Omni	1575.42	2	N-Type Male	187xΦ20	-	-20°C~ 65°C	Outdoor