Rugged IIoT LTE Router for Railway

WR322A M12 Series

Industrial Secure M12 Cellular IIoT Router

Innovative industrial secure LTE router WR322A-M12 Series is designed for IIoT applications on railway by dual radio high-speed LTE routing and Wi-Fi networks. LTE Cat.4/6 technology provides up to 300Mbps data rate, while IEEE 802.11ac Wi-Fi delivers up to 866Mbps high throughput. RS232/422/485 and DIO devices are able to connect the cloud over cellular and Ethernet network. Cyber redundancy includes wireless auto-offload, LTE/WAN backup, redundant SIM ensure the best connectivity. The embedded MQTT and RESTful API enables public cloud integration such as AWS or Azure. The private cloud platform ThingsMaster can also be setup for instant and secured access to track location and monitor data over cloud.

EN50121-4 IEC61000-6-2 IEC61000-6-4 MQTT ThingsMaster NetMaster

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

Management Features

- Various configuration paths, including Web GUI, Telnet, LAN Utility (ViewMaster), and NMS (NetMaster)
- Supports cellular to WAN redundancy, dual SIM backup
- Supports Cellular to WLAN auto offload
- Supports RSTP spanning tree protocol
- 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

Serial Communication & High Throughput Data Switching

- 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

Cloud Management Service

- Support Amazon AWS & Microsoft Azure cloud service
- Support proprietary ThingsMaster cloud service
- Interactive monitoring dashboard and map shows the status, signal strength, location etc.

Enhanced Cyber Security & Redundancy

- Support Firewall for inbound/outbound traffic
- OpenVPN (server/client), IPsec for secure remote connection
- Support L2TP with PPP, PAP, CHAP(LCP, IPCP)
- Support GRE tunnel
- HTTPs/SSH secure login
- Support TACACS+ multi-user authentication for privileged user management

Rugged Design for Wayside Surveillance, ITS Application

- EN50155 railway onboarding compliance design for Industrial IoT, ITS applications
- 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

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)

	WR312G-LTE	WR322GR-WLAN+LTE
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

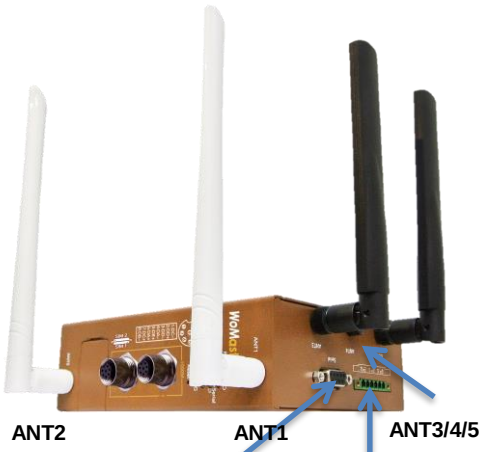
SIM Card

- 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

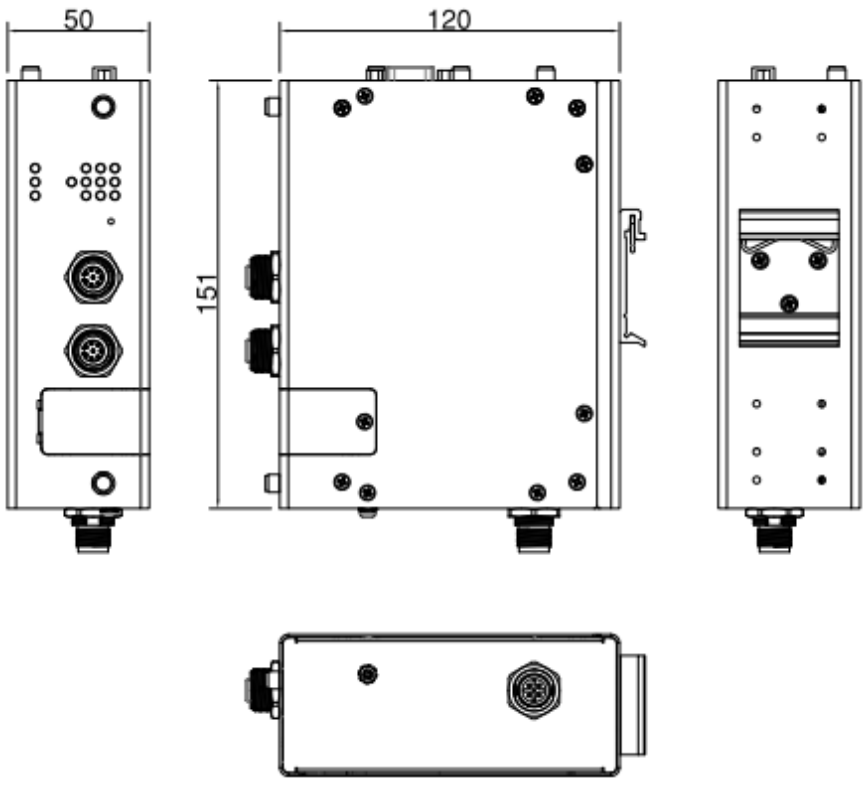
- RS232/422/485 Full functions
- DB9 female

Digital I/O

- 2DI+1DO

Dimensions

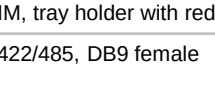
(mm)



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:#1 (D3-), #2 (D4+), #3 (D4-), #4 (D1-), #5 (D2+), #6 (D1+), #7 (D3+), #8 (D2-) **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: U**p to 2 x RP-SMA Female LTE 2T2R: ANT1 for LTE Main, ANT2 for LTE Aux OR LTE + GPS: ANT1 for LTE Main, ANT2 for GPS **WR322A-M12-WLAN+LTE:** Up to 5 x RP-SMA Female Wi-Fi 2T2R: ANT1 for Wi-Fi1, ANT2 for Wi-Fi2, LTE 2T2R: ANT3 for LTE Main, ANT 5 for LTE Aux GPS: ANT4
SIM Socket	2 x Nano SIM, tray holder with redundancy
Serial	1 x RS232/422/485, DB9 female DB9 Female  5 4 3 2 1 9 8 7 6

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: #1 (V+), #2 (V+), #3 (V-), #4 (V-)

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	
Network Protocols	TCP/IP, UDP, DHCP, Telnet, DNS, SNMP, HTTP, HTTPS, SMTP, NTP, ARP, ICMP
Management Interface	CGI WebGUI, Command Line Interface (CLI), Telnet, SNMP
User Management	Radius client, TACACS+, local database
Serial communication	TCP Server/TCP Client/UDP mode, MODBUS RTU mode, TCP Alive check, Force TX Delimiter/Timeout/interval/length, Long Distance Termination
Time Management	NTPv3, SNTP, Cellular Time
IoT	AWS Agent, Azure Agent, ThingsMaster Agent
Network Management	IPv4, SNMP v1/v2c/v3/Trap, MIB II, Entity MIB, DHCP server/client, DHCP relay, TFTP, ARP response over 802.2 LLC SNAP, Proxy ARP, DNS (client/proxy)
Traffic Management	Traffic Control, 1:1 NAT, NAPT(SNAT/DNAT), Port Forwarding
Routing	RIPv2, Static Route, OSPF
Security	Firewall, DMZ, HTTPs, SSH, IEEE 802.1X/RADIUS
Redundancy Protocol	Rapid Spanning Tree Protocol (RSTP)
VPN	IPsec, OpenVPN server (Max. 6 clients) and client, L2TP, GRE
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)
WLAN Configuration	WLAN Basic Settings: Radio on/off, AP/client mode, 2.4G 11n/5G 11ac Band and Frequency selection, SSID/Multi-SSID configuration, SSID broadcast, VLAN ID, WLAN to LAN Link fault pass-through, Cellular to WLAN Auto Offload and advanced WLAN settings, 802.1X
Utility	ViewMaster, NetMaster, Ping, Traceroute
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	
Safety	EN 60950-1 Compliance EN 62368-1:2014/AC:2017 Compliance IEC 60255-27:2013 Compliance
EMC	EN61000-6-2/EN61000-6-4 Compliance
EMI	CISPR 22, FCC part 15B Class A Compliance
EMS	EN61000-4-2 ESD, EN61000-4-3 RS, EN61000-4-4 EFT, EN61000-4-5, EN61000-4-6 CS, EN61000-4-8 Magnetic Field EN61000-4-12/16/17/18/29
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	EN50121-4 *EN50155 compliance
Environmental	EN 60870-2-2:1998 Compliance IEC 60068-2-21:2006 Compliance

Ordering Information

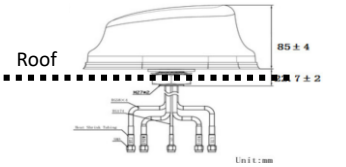
Model Name	Description
WR302A-M12	Industrial Secure M12 IIoT Router, 2GbE+1COM, 2DI+1DO
WR312A-M12-WLAN	Industrial Secure M12 Wireless IIoT Router, 2GbE+1COM, 2DI+1DO, 802.11ac/n WLAN
WR312A-M12-LTE-E	Industrial Secure M12 Cellular IIoT Router, 2GbE+1COM, 2DI+1DO, LTE-E, 2SIM, FDD B1/3/5/7/8/20, TDD 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
	NOTE: Antennas are not included in the package. **Please order the antennas from the optional accessories.**

Optional Accessory

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, RP-SMA male, 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, RP-SMA male, 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-RSM-3M	GPS Antenna, GPS 1575MHz 27dBi, RP-SMA male, 3M
C-RF-R-RSF_RSM-1M	RF cable, RP-SMA female to RP-SMA male, 1M
C-RF-C2-NF_RSM-2M	RF cable, N-type female to RP-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 WIFI RF
- High WLAN gain is perfect for train to ground vehicle application
- 5 x 2 meter cables in RP 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 WIFI
- Suitable for in-vehicle, roadside box and short range coverage WLAN to LTE communication environment
- 5 x 2 meter cables in RP SMA male connector
- Outdoor IP67 waterproof and -40˚~85˚C wide temperature
- 110x110x80mm slim size

110x110x80mm

A-LTE_WLAN_G-3_2-RSM-2M

	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-LTE_WLAN_G-4_4-RSM-2M	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	5x RP SMA Male	189x182x107	2	-40˚C~85˚C	Outdoor
	A-LTE_WLAN_G-3_2-RSM-2M	Omni	LTE: 698~960/1710~2690 WLAN: 2400~2483.5/4900~5825 GNSS: 1575.42~1610 (GPS/GLONASS)	3 2 28	5x 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-RSM	Omni	704~960/1710~2690	2	RP SMA Male	161xΦ13	-	-20˚C~ 65˚C	Indoor
	A-LTE-3-NM (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	Omni	2400~2500 4900~5900	2.5 3	RP SMA Male	196xΦ13	-	-40˚C~ 65˚C	Indoor
	A-WLAN-6-NM (require RF cable)	Omni	2400~2500 5150~5850	4 6	N-Type Male	187xΦ20	-	-20˚C~ 65˚C	Outdoor

GPS Antenna (optional)

	Model	Type	Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)	Operating Temp.	Application
	A-GPS-27-RSM-3M	Omni	1575.42	27	RP SMA Male	36x36x13.9	3	-20˚C~ 65˚C	Indoor