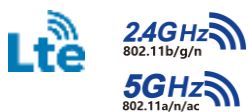


Easy Programmable Edge Computer for IIoT

WR322GR-EC Series

Industrial IoT Edge Computer Series

The WR302G-EC/WR312G-EC/WR322GR-EC edge computing platform is designed for embedded data acquisition applications. The computer comes with two software selectable RS-232/422/485 full-signal serial ports and two 10/100/1000 Mbps Ethernet ports, as well as optional one or two Wi-Fi/Cellular modules. These versatile communication capabilities let users efficiently customize for a variety of complex communication applications. The QCA9558 MIPS-based processor that is widely applicable to a variety of industrial solutions. The built in Node-RED flow-based programming in the tiny embedded computer provides reliable and secure gateway for data acquisition and processing at field sites as well as a user friendly communication platform for many other large-scale deployments.



ThingsMaster
NetMaster



Features & Benefits

Programmable Edge Computer and Gateway

- QCA9558 MIPS-based processor 720MHz processor
- 2 auto-sensing 10/100/1000 Mbps Ethernet ports
- SD socket for storage expansion
- Rich programmable LEDs and a programmable button for easy installation and maintenance
- Node-RED flow-based programming

Serial Communication & High Throughput Data Switching

- Dual serial ports with RS232/422/485 full functions for serial over LTE/Wi-Fi/Ethernet data switching
- 2-port Gigabit Ethernet supports routing and bridging mode
- Hardware NAT for CPU utilization saving*

Internet Security Suite and Cryptographic

- Netfilter suite for firewall
- Iptables suite for NAT/NAPT and port forwarding
- OpenVPN, IPsec for secure remote connection
- HTTPs/SSH for secure login
- AES, SHA, OpenSSL, random generator

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.*

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

Programming Environment

- GCC C/C++ cross development tool chain
- Ash, bash* System Shell
- vim, nano* text editor
- Lua, Perl*, Python* programming language

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

Intuitive Node-RED Programming



The screenshot shows a Node-RED flow with three parallel paths. Each path starts with a 'Modbus Read' node (CO2, Temperature, and Humidity), followed by a 'Modbus Response' node, then a 'Format to [Sensor Type]' function node, and finally an 'mqtt/demo2' output node. A red box highlights the flow, and another red box highlights the information panel on the right.

Scenario built with building blocks

Library With Building Blocks

CO2, Humidity, Temperature

Information Panel

Link Different Protocols and Platforms

The screenshot shows three categories of Node-RED nodes: 'Protocols' (input, modbus, function), 'Platforms' (output, advanced, social, storage), and 'Function' nodes. A red arrow points from the Protocols section towards the Platforms section.

Protocols

Platforms



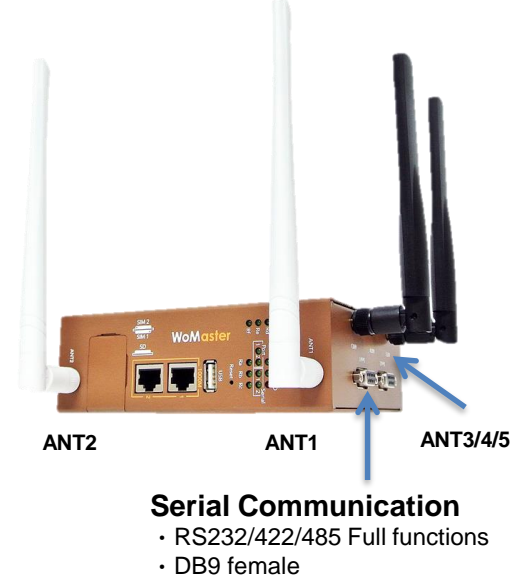
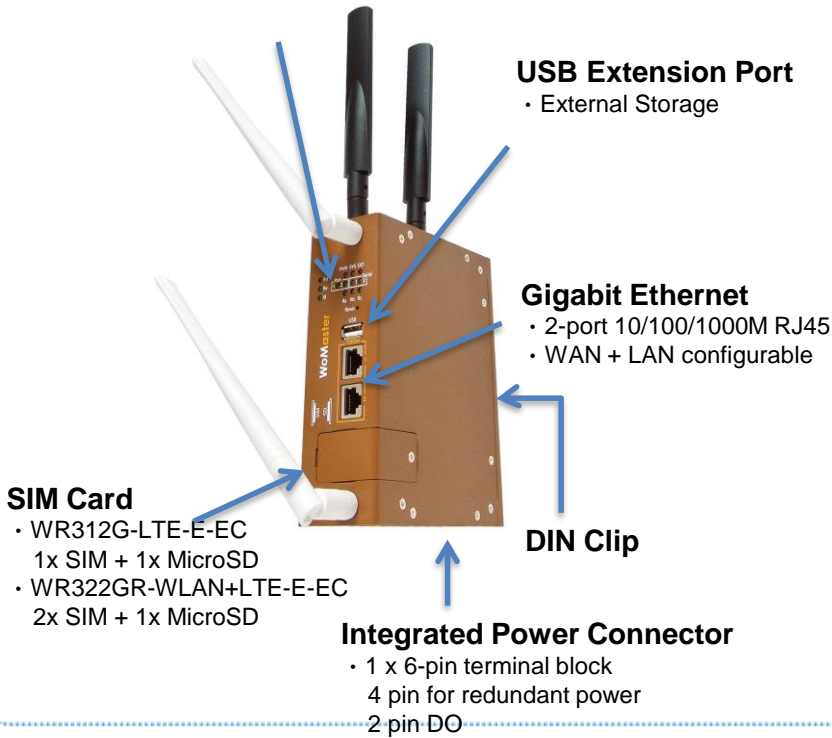
Interfaces

System LED

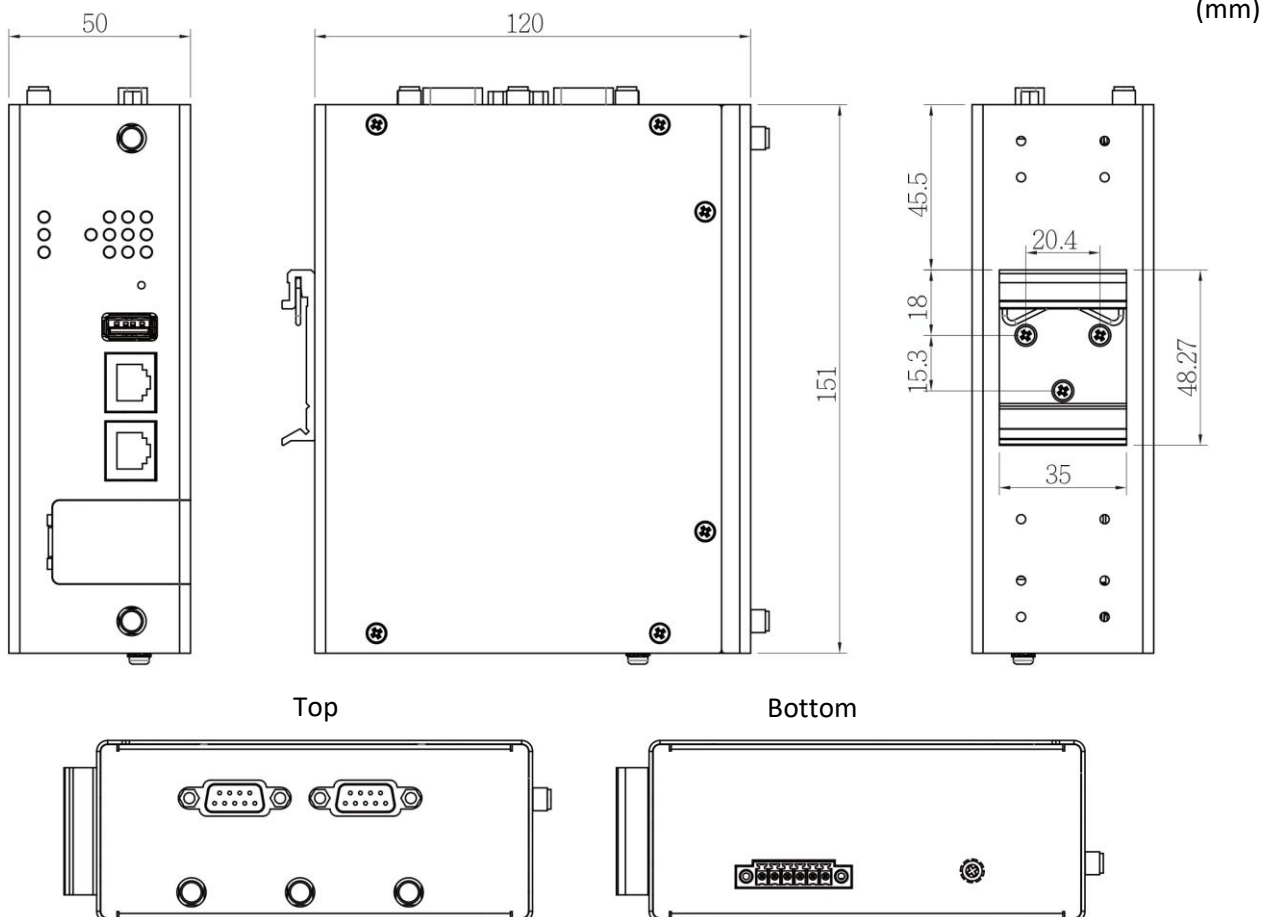
- 1 x Power
- 1 x System Status
- 1 x DO
- 2 x Ethernet Port
- 2 x Serial Port
- 6 x Radio LED (Ra~Rf)

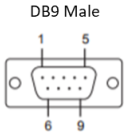
	WR312G-LTE-E-EC	WR322GR-WLAN+LTE-E-EC
Ant 1	LTE-Main	Wi-Fi 1
Ant 2	LTE- Diversity/ GPS (by model)	Wi-Fi 2
Ant 3	-	LTE-Main
Ant 4	-	GPS (by model)
Ant 5	-	LTE-Diversity

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



Dimensions



Interface																																									
CPU	QCA9558 MIPS-based processor 720MHz processor																																								
OS (preinstalled)	Linux (OpenWRT LEDE, Kernel 4.4)																																								
USB	USB 2.0 hosts x 1, Type A connector																																								
DRAM	DDR2 SDRAM 256MB																																								
Main Storage	8G Micro SD																																								
Storage Expansion	Micro SD expand to 16G/32G/64G																																								
Ethernet Port	2 x 10/100/1000MBase-T RJ45, Auto Negotiation, Auto-MDI/MDIX																																								
System LED	1 x PWR: Green On 2 x Ethernet Ports: Link: Green On, Activity: Green Blinking Programmable: 1x SYS, 2 x Serial Ports (s1, s2), 1 x DO: Red On WR312G-LTE-E-EC: Programmable: Ra, Rb, Rc WR322GR-WLAN+LTE-E-EC: Programmable: Ra, Rb, Rc, Rd, Re Rf: Base station connected: Green On for 2 sec period, Base station disconnected: Green Off for 2 sec period																																								
Reset	1 x Reset button (Programmable)																																								
SMA Socket	WR312G-LTE: Up 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 WR322GR-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 with redundancy																																								
Serial	Up to 2 x RS232/422/485, DB9 <div style="display: flex; align-items: center;">  <table border="1" style="border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Pin</th> <th>RS232</th> <th>RS485-4w/422</th> <th>RS485-2w</th> </tr> </thead> <tbody> <tr><td>1</td><td>DCD</td><td>TX-</td><td>Data-</td></tr> <tr><td>2</td><td>TXD</td><td>RX+</td><td>-</td></tr> <tr><td>3</td><td>RXD</td><td>TX+</td><td>Data+</td></tr> <tr><td>4</td><td>DSR</td><td>-</td><td>-</td></tr> <tr><td>5</td><td>GND</td><td>GND</td><td>-</td></tr> <tr><td>6</td><td>DTR</td><td>RX-</td><td>-</td></tr> <tr><td>7</td><td>CTS</td><td>-</td><td>-</td></tr> <tr><td>8</td><td>RTS</td><td>-</td><td>-</td></tr> <tr><td>9</td><td>RI</td><td>-</td><td>-</td></tr> </tbody> </table> </div>	Pin	RS232	RS485-4w/422	RS485-2w	1	DCD	TX-	Data-	2	TXD	RX+	-	3	RXD	TX+	Data+	4	DSR	-	-	5	GND	GND	-	6	DTR	RX-	-	7	CTS	-	-	8	RTS	-	-	9	RI	-	-
Pin	RS232	RS485-4w/422	RS485-2w																																						
1	DCD	TX-	Data-																																						
2	TXD	RX+	-																																						
3	RXD	TX+	Data+																																						
4	DSR	-	-																																						
5	GND	GND	-																																						
6	DTR	RX-	-																																						
7	CTS	-	-																																						
8	RTS	-	-																																						
9	RI	-	-																																						
Power Input, Digital Output	6-Pin Removable Terminal Block Connector 4 Pin for Redundant Power 2 Pin for DO (Relay Alarm) DO: Dry Relay Output with 1A/24V DC																																								

Software	
OS	Linux OpenWRT LEDE
Web Server	uHttpd, luCI Web Interface, Apache*
Terminal Server (SSH)	Secure encrypted communications between two untrusted hosts over an insecure network
Kernel	GNU/Linux kernel v4.4
System Shell	ASH (default), BASH*
Text Editor	vim, nano*
File System	JFFS2, NFS, Ext3, Ext4, VFAT, OverlayFS, NTFS
Internet Protocol Suite	TCP, UDP, IPv4, IPv6, SNMPv2, v3, ICMP, ARP, HTTP, CHAP,PAP,DHCP, NTP, NFS, SSH, PPP, SFTP, RSYNC, SSL, SCP
Programming Language Support	Lua, Perl*, Python*
Flow-based programming	Node-RED (Modbus TCP and Serial contribution package included)
Internet Security Suite	OpenVPN, IPSec, Netfilter/iptables
Cryptographic	AES, SHA, OpenSSL, random generator
Linux Board Support Packages (BSP)	GCC C/C++ cross development tool chain Kernel/ filesystem
Cellular Networking	QMI (Qualcomm MSM Interface): Glib-based library for talking to WWAN modems and devices that speak the Qualcomm MSM Interface (QMI) protocol

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	WR312G-LTE-E-EC: 0.23A @24V WR322GR-WLAN+LTE-E-EC: 0.26A @24V
Power Consumption	WR312G-LTE-E-EC: Max 5.52W @24VDC full traffic, suggest to reserve 15% tolerance WR322GR-WLAN+LTE-E-EC: Max 6.24W @24VDC full traffic, suggest to reserve 15% tolerance
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	WR312G: ~600g without package WR322GR: ~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 40° full cycle
Warranty	5 years
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
Environmental	EN 60870-2-2:1998 Compliance IEC 60068-2-21:2006 Compliance



Model	Eth-WAN	Eth-LAN	Serial	Radio 1	Radio 2	USB	SD	SIM	GPS	DI/DO
WR302G-EC	1 x GE	1 x GE	2 x RS232/422/485	-	-	1	1	-	-	0/1
WR312G-WLAN-EC	1 x GE	1 x GE	2 x RS232/422/485	Wi-Fi 2.4G 11n/5G 11ac	-	1	1	-	-	0/1
WR312G-LTE-E-EC	1 x GE	1 x GE	2 x RS232/422/485	LTE Cat.4	-	1	1	1	-	0/1
WR322GR-WLAN+LTE-E-EC	1 x GE	1 x GE	2 x RS232/422/485	Wi-Fi 2.4G 11n/5G 11ac	LTE Cat.4	1	1	2	Yes	0/1

Model Name	Description
WR302G-EC	Industrial Edge Computing Secure Serial Server, 2GbE+2COM, USB, SD
WR312G-WLAN-EC	Industrial Secure Wireless Edge Computer, 2GbE+2COM, USB, SD, 802.11ac/n WLAN
WR312G-LTE-E-EC	Industrial Secure Cellular Edge Computer, 2GbE+2COM, USB, SD, LTE-E, 1SIM, FDD B1/3/5/7/8/20, TDD B38/40/41
WR322GR-WLAN+LTE-E-EC	Industrial Secure Cellular Edge Computer, 2GbE+2COM, USB, SD, 802.11ac/n WLAN, LTE-E, GPS, 2SIM, FDD B1/3/5/7/8/20, 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 WR312G-LTE-E-EC 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: WR312G-LTE: 2 x LTE Antennas, Black WR312G-WLAN: 2 x Wi-Fi Antennas, White WR322GR-WLAN+LTE : 2 x LTE Antennas, Black + 2 x Wi-Fi Antennas, White



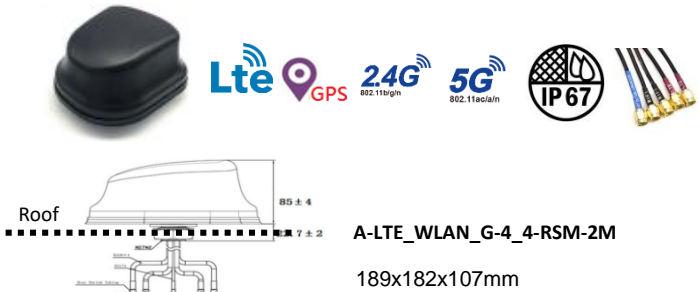
Ordering Information

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, 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-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



	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	5x 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	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 (Default)	Omni	704~960/1710~2690	2	RP 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 (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