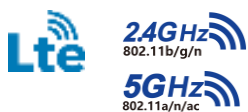


Easy Programmable Edge Computer for IIoT

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, or one WAN and one LAN with SFP, 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.



Features & Benefits

Programmable Edge Computer and Gateway

- QCA9558 MIPS-based processor 720MHz processor
- 2 auto-sensing 10/100/1000 Mbps Ethernet ports (one Giga SFP for F series)
- 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 (or one Giga WAN and one Giga SFP LAN port)
- 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
- Optional software kit for IEC 60870-5-101, IEC 60870-5-104

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



Scenario built with building blocks

Library With Building Blocks

CO2, Humidity, Temperature

Information Panel

Link Different Protocols and Platforms

Protocols

- input: inject, catch, status, link, mqtt, http, websocket, tcp, udp
- modbus: Modbus Response, Modbus Read, Modbus Getter, Modbus Flex Getter, Modbus Write, Modbus Flex Write, Modbus Server, Modbus Flex Server, Modbus Queue Info, Modbus Flex Connector, Modbus Response Filter

Function

- function, template, delay, trigger, comment, http request, tcp request, switch, csv, html, json, xml, yaml, rbe

Platforms

- output: debug, link, mqtt, http response, websocket, tcp, udp
- advanced: watch, feedparser, exec, sentiment
- social: email, twitter
- storage: tail, file, file



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)

USB Extension Port

- External Storage

Gigabit Ethernet

- 2-port 10/100/1000M RJ45
- WAN + LAN configurable

SIM Card

- WR312G-LTE-E-EC
1x SIM + 1x MicroSD
- WR322GR-WLAN+LTE-E-EC
2x SIM + 1x MicroSD

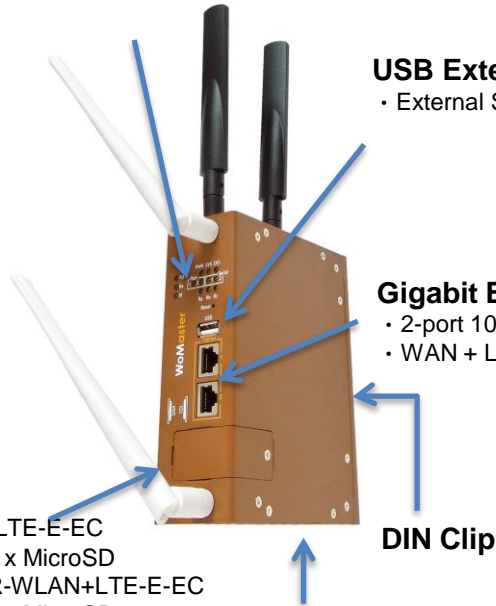
DIN Clip

Integrated Power Connector

- 1 x 6-pin terminal block
- 4 pin for redundant power
- 2 pin DO

	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



Giga SFP

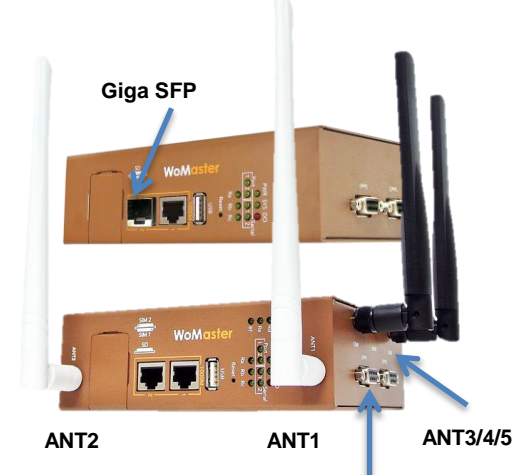
ANT2

ANT1

ANT3/4/5

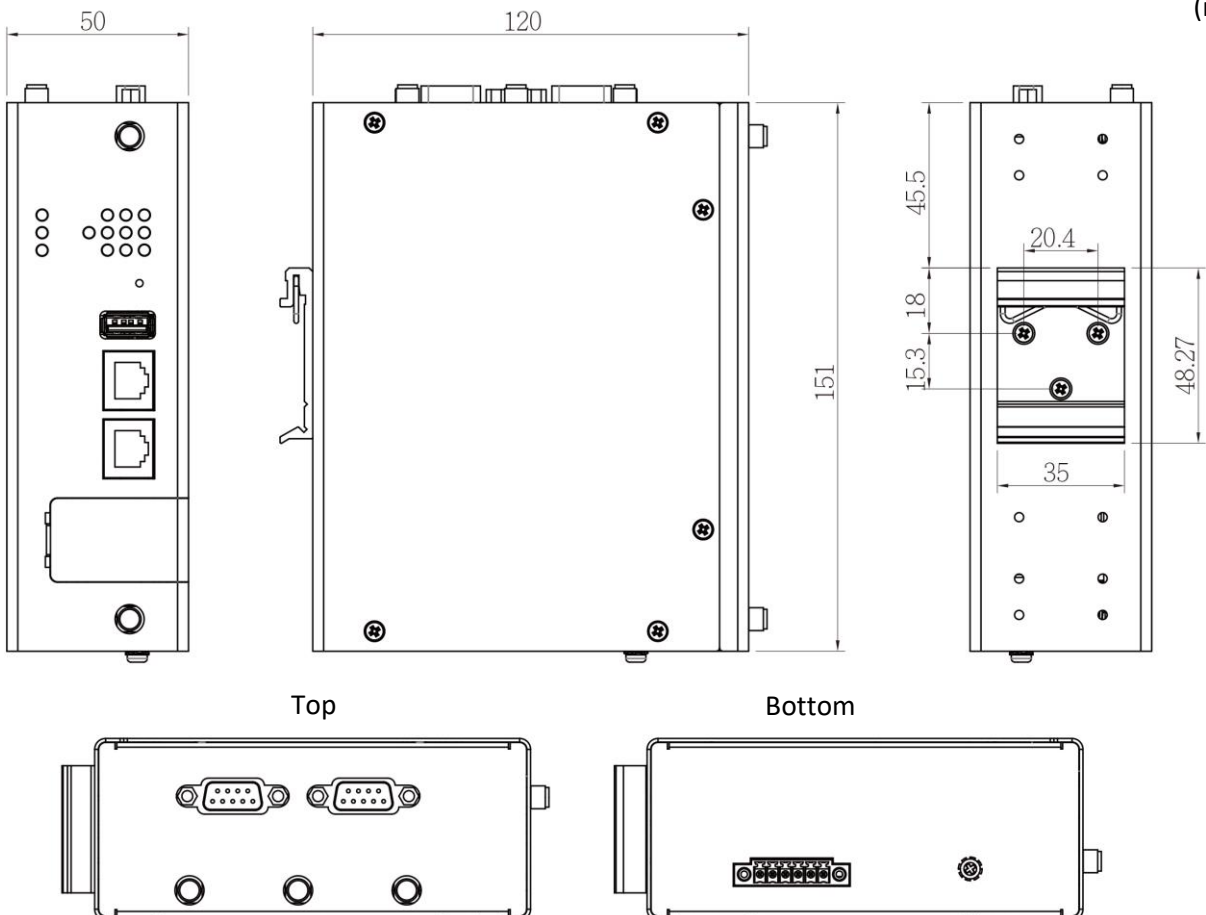
Serial Communication

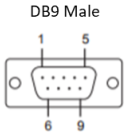
- RS232/422/485 Full functions
- DB9 female



Dimensions

(mm)



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  <table border="1" data-bbox="1013 1086 1348 1355"> <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>	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 LTE-TDD: B38/B40/B41 WCDMA: B1/B3/B5/B8
Band Information: LTE-U	LTE-FDD: B2/B4/B5/B7/B12/B13/B17/B25/B26/B30/B66 LTE-TDD: B41 WCDMA: B2/B4/B5

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-EUX	LTE: FDD B1/B3/B7/B8/B20/B28A LTE: TDD B38/B40/B41 WCDMA: FDD B1/B8, GSM: B3/B8
Band Information: LTE-ECGA	LTE: FDD B1/B3/B7/B8/B20/B28A WCDMA: FDD B1/B8, GSM: B3/B8
Band Information: LTE-AU	LTE: FDD B1/B2*/B3/B4/B5/B7/B8/B28 LTE: TDD B40 WCDMA: FDD B1/B2/B5/B8, GSM: B2/B3/B5/B8
Band Information: LTE-G (By MoQ Request)	LTE: FDD B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/B19/B20/B25/B26/B28 LTE: TDD B38/B39/B40/B41 WCDMA: FDD B1/B2/B4/B5/B6/B8/B19, GSM: B2/B3/B5/B8

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/≤23db, compliant with CE 2.4G/5G 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	36V (36~72VDC)
Reverse Polarity Protect	Yes
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	3 years
Approval	
Safety	EN 62368-1:2014/AC:2017
EMC	Railway Roadside EN 50121-1/4, EN61000-6-4 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 for power application
CE	CE RED Compliance Safety: EN 62368-1 EN 62311 MPE assessment EN 301 489-1/17/19/52, EN 55032/55024 EN 300 328/EN 301 893*, EN 301 908-1*
FCC	FCC part 15B Class A Compliance, FCC Approved LTE/WLAN Module
Environmental	Shock/Vibration: EN 50155:2017/EN 61373:2010 Railway Shock/Vibration Shock: IEC60068-2-27 Compliance Free fall: IEC60068-2-31 Compliance Vibration: IEC 60068-2-6 Compliance



Ordering Information

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
WR302G-F-EC	1 x GE	1 x GE Fiber SFP	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-(Region)-EC	Industrial Secure Cellular Edge Computer, 2GbE+2COM, USB, SD, LTE-E, 1SIM, LTE-EUX/ECGA/AU/G*(choose one by region)
WR322GR-WLAN+LTE-(Region)-EC	Industrial Secure Cellular Edge Computer, 2GbE+2COM, USB, SD, 802.11ac/n WLAN, GPS, 2SIM, LTE-EUX/ECGA/AU/G*(choose one by region)
	*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





Outdoor WLAN Directional Antennas

- 2.4Ghz / 5.8Ghz Wireless Access Point to Point
- High Gain, Long Distance Coverage
- Vertical Polarization, 50Ω **Input Impedance**
- IP65 Protection Enclosure and Prevention of Rust
- -40°C ~ +60°C operation temperature
- 190 * 190*30 mm (L x W x H)
- N Type Female Connector
- Two 1-meter RF Cables (C-RF-LMR200-NM_NM-1M)






Model	Frequency	Transmission	Gain	Max. Distance	Beam
A-D1T1R-2.4GHZ-14DB-6KM-NF	2.4 GHz	1T1R	14dBi	6KM	30° for Horizontal Plane and 28° Vertical
A-D1T1R-5GHZ-12DB-5KM-NF	5.8Ghz	1T1R	12dBi	5KM	40° for Horizontal Plane and 38° Vertical
A-D2T2R-5GHZ-15DB-6KM-NF	5.8Ghz	2T2R	15dBi	6KM	35° for Horizontal Plane and 16° Vertical
A-D2T2R-5GHZ-19DB-8KM-NF	5.8Ghz	2T2R	19dBi	8KM	90° for Horizontal Plane and 4° Vertical

Outdoor Omni Antennas

Model		Frequency	Gain	Enclosure	Dimension	RF Cable
A-2.4/5GHZ-2-RSM-2Mx2		2400-2500/5150~5850	2dBi	IP67	Φ80×15mm	Two 2-meter RG174 cables RP SMA male connector
A-LTE-2-SM-2M		700~960/1710~2690 /2900~3600	2dBi	IP67	Φ80×15mm	Two 2-meter RG174 cables SMA male connector
A-GPS-38-SM-3M		GPS 1575	38dBi	outdoor	50×38×17mm	3M RG174 cable SMA male
A-LORA433-7-SM-3M		433	7dBi	outdoor	Φ30×175mm	3M RG174 cable SMA male
A-LORA850-925-7-SM-3M		850~925	7dBi	outdoor	Φ30×290mm	3M RG174 cable SMA male

Outdoor Combo Antennas

Model		Frequency (MHz)	Gain (dBi)	Connector	Dimension (mm)	Cable (M)
A-LTE_WLAN_G-4_4-RSM-2M		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 (LTE/GPS) 2x RP-SMA Male (Wi-Fi)	189x182x107	2
A-LTE_WLAN_G-3_2-RSM-2M		LTE: 698~960/1710~2690 WLAN: 2400~2483.5/4900~5825 GNSS: 1575.42~1610 (GPS/GLONASS)	3 2 28	3x SMA Male (LTE/GPS) 2x RP-SMA Male (Wi-Fi)	110x110x80	2
A-LTE_WLAN_G-5_5-RSM-1M		LTE: 700~2700 WLAN: 2400~2500 GNSS: 1575.42	5 5 28	2x SMA Male (LTE/GPS) 1x RP-SMA Male (Wi-Fi)	70x70x15	1