

Meraki MG41 and MG41E Installation Guide

This document describes how to install and set up the MG41 LTE gateway. Additional reference documents are available online at: www.meraki.com/library/products.

MG41-HW Overview

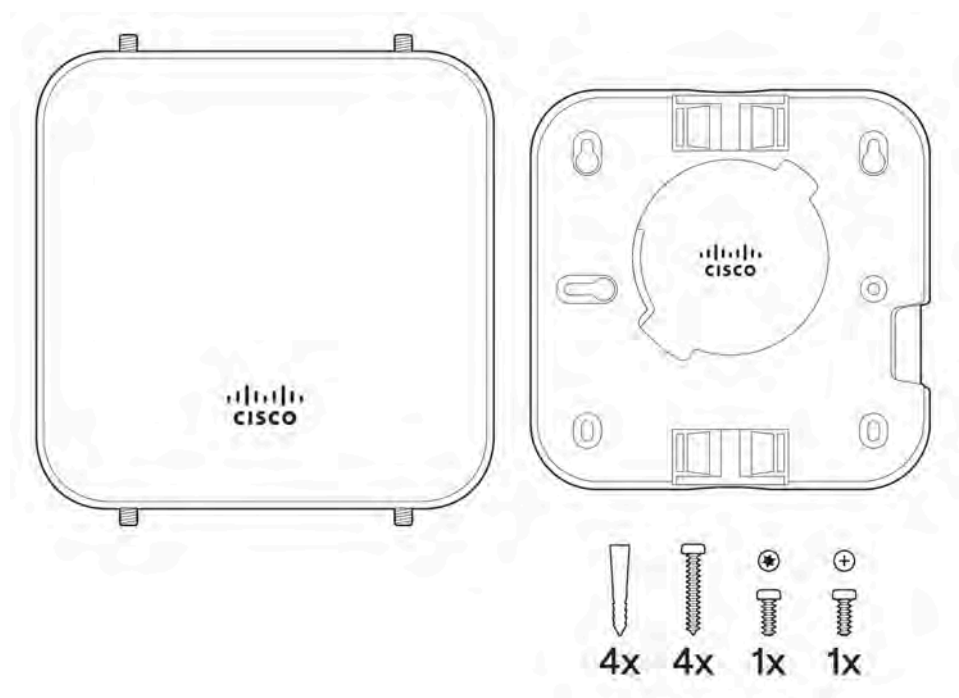
The Meraki MG41-HW (model: MG41-HW, MG41E-HW) is an enterprise LTE gateway designed for distributed deployments that require remote administration. It is ideal for network administrators who demand both ease of deployment and a state-of-the-art feature set. This appliance provides the following new features:

- Support for 2 LAN connections (1 for 802.3at support)
- Wall screws and anchors for mounting drywall surface, either vertically or horizontally

MG41-HW Operational Temperature: -40° F to 140° F (-40° C to 60° C)

Package Contents

In addition to the MG41-HW, the following are provided.



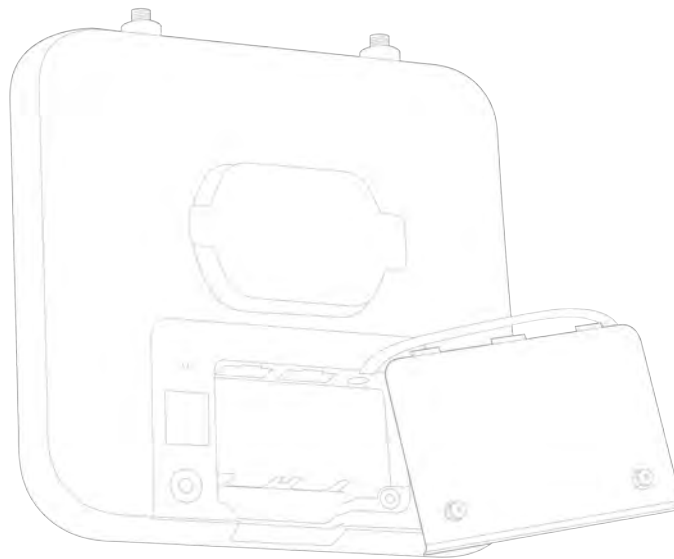
The MG41-HW front panel

Ports and Status Indicators

The MG41-HW uses a single LED to inform the user of the device's status.

Function	LED Status	Meaning
Power Up/Boot	Solid Orange	Power is applied
Connecting	Rainbow	Device in process of connecting to the Meraki Dashboard
Connected	Solid White	Fully operational
Upgrading	Flashing White	During boot or no WAN link
LTE Enabled	Purple	LTE is on and connected

The MG41-HW back panel

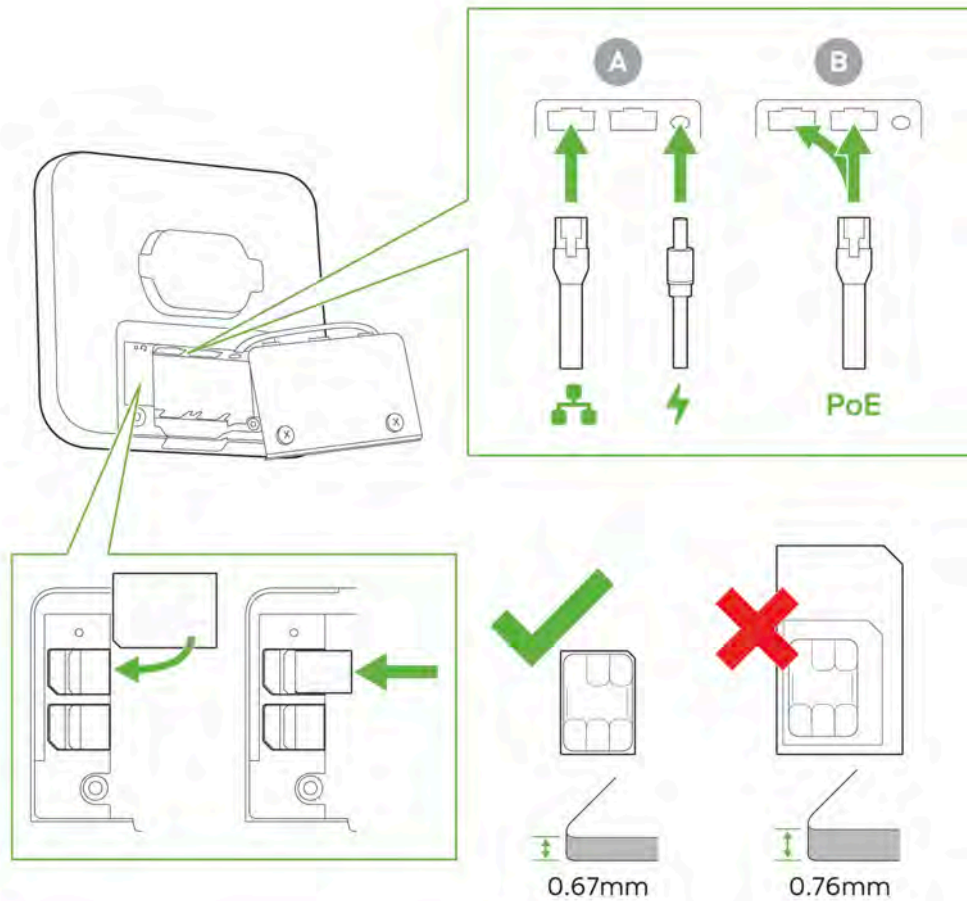


Additional functions on the back panel are described below, from left to right.

Internet ports	Two ports provide connectivity to the WAN.
Power input	Designed for use only with the unit's power supply.
Antenna ports	Four RP-SMA ports for dipole antennas (antennas included)

The MG41-HW input panel

Restore button	Insert a paper clip if a reset is required. A brief, momentary press: To delete a downloaded configuration and reboot. Press and hold for more than 10 sec: To force the unit into a full factory reset.
DC Power	Power the MG using the approved DC adapter (the DC power source must be used for indoor installations only)
POE Power	Power the MG using the approved POE adapter
WAN	
SIM Slot	Two SIM card slots supporting nano SIM format

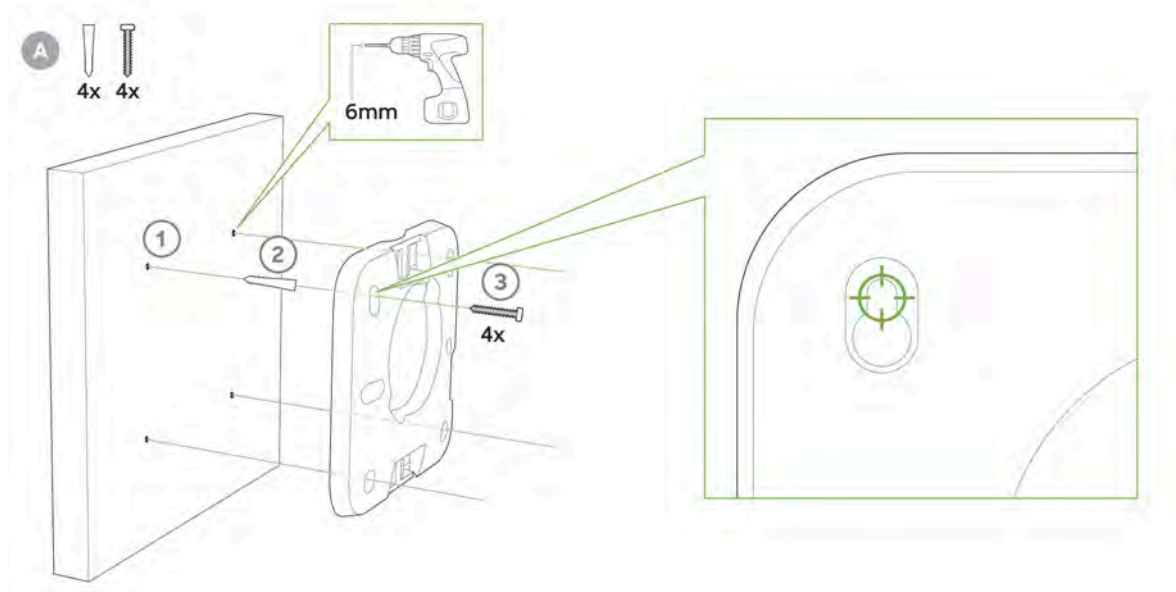


Mounting hardware

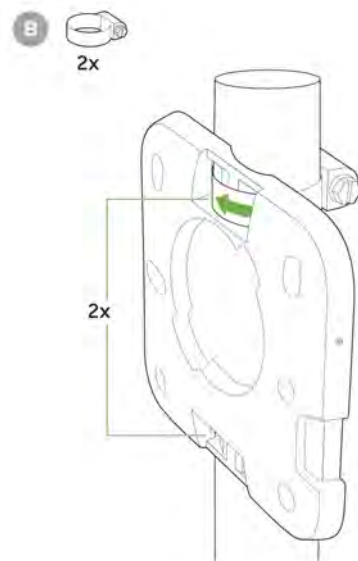
The supplied wall screws and anchors allow you to mount the appliance on a drywall surface, either vertically or horizontally. The distance between the holes you drill should be 93 mm.

- For mounting on drywall, use a ¼-in drill bit, then insert the plastic and screw assemblies.
- For mounting on wood or a similar surface, use only the screws.
- Allow the heads of the screws to stick out far enough to be inserted securely into the back of the appliance.

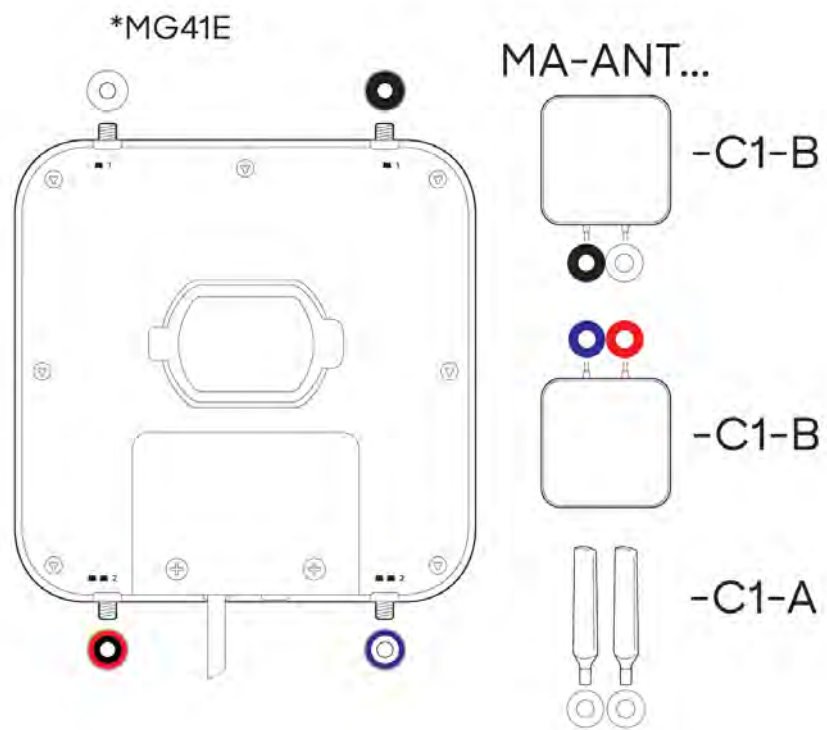
Mount Option A:



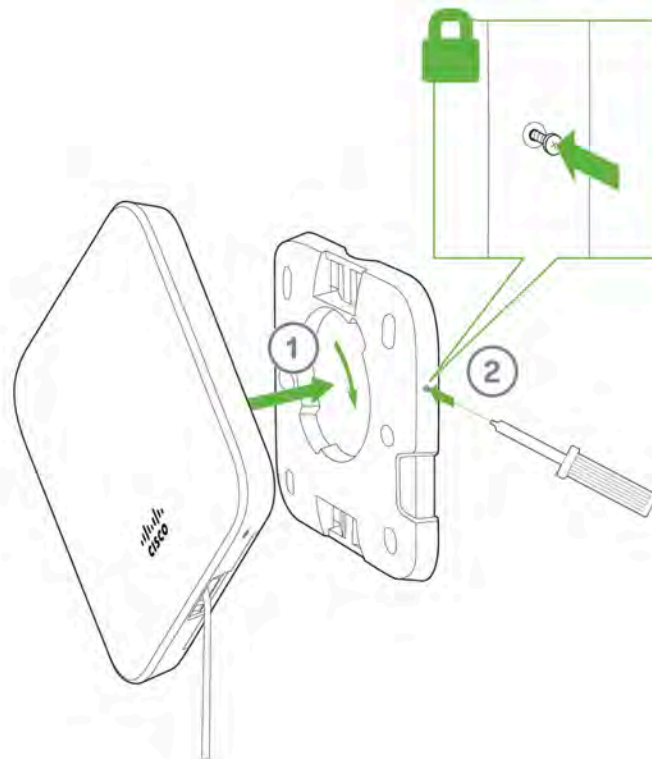
Mount Option: B



Attaching external antennas (MG41E only):



Mounting the device:



Outdoor Installation

Hardware

The installation for outdoor deployments of the MG41 and MG41E is the same procedure and uses the same mounting hardware as the indoor deployment.

Power

Powering the MG41 and MG41E in an outdoor deployment will require the use of the POE injector. For outdoor installation using the approved POE injector the installer must place the POE injector power source in an indoor location or in a location that can maintain a temperature range of -20-40 C

IP67 Rating

This device is IP67 rated.

Connecting to the WAN

All Meraki MG devices must have an IP address. This section describes how to configure your local area network before you deploy it. A local management web service, running on the appliance, is accessed through a browser running on a client PC. This web service is used for configuring and monitoring basic ISP/WAN connectivity.

Setting up a static IP address

To ensure that the client PC is redirected to the local web service in the following step, you must disable all other network services (e.g., Wi-Fi) on your client machine.

Do the following to configure basic connectivity and other networking parameters:

1. Using a client machine such as a laptop, connect to one of the **LAN** ports of the MG.
2. Using a browser on the client machine, access the appliance's built-in web service by browsing to <http://setup.meraki.com>. (You do not have to be connected to the Internet to reach this address)
3. Click **Uplink configuration** under the **Local status** tab.
4. Choose **Static** for the **IP Assignment option**.
5. Enter the IP address, subnet mask, default gateway IP and DNS server information.

Setting up a DHCP IP address

By default all MG devices are configured to DHCP from upstream WAN / ISP servers. Simply plug one of the MG's WAN / Internet ports into your upstream circuit and wait a few minutes for the unit to negotiate a DHCP address.

Icon

When the WAN connection is fully enabled, the Internet 1 or 2 LED 1 will turn green.

Additional settings

Please note that all these settings below are accessible only via the local management console.

Setting VLANs

If your WAN uplink is on a trunk port, choose **VLAN tagging > Use VLAN tagging** and enter the appropriate value for **VLAN ID** for your network.

Setting PPPoE

PPPoE authentication may be required if you are connecting the MG to a DSL circuit. You need to know your authentication option and credentials (supplied by your ISP) in order to complete these steps.

- Choose **Connection Type > PPPoE**.
- Select your **Authentication** option.
- If you select **Use authentication**, enter appropriate values for **Username** and **Password**.

Web proxy settings

These settings take effect if the MG device has to fall back to using HTTP to contact the Cloud Controller. By default, web proxy is disabled. To enable web proxy, do the following:

- Choose **Web proxy > Yes**.
- Enter values as appropriate for **Hostname or IP** and **Port**.
- If you require authentication, choose **Authentication > Use authentication**, and enter appropriate values for **Username** and **Password**.

To apply all configuration settings to the appliance, be sure to click **Save Settings** at the bottom of the page.

Configuring physical link settings

To configure physical link settings on the Ethernet ports, click **Local status > Ethernet configuration**. You can enable half duplex, full duplex, and auto-negotiation, as well as set 10- or 100-Mbps data rates.

Regulatory

FCC Compliance Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1)

This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Party issuing Supplier's Declaration of Conformity

Cisco Meraki
500 Terry A. Francois Blvd.
San Francisco, CA
94158
USA
compliance@meraki.com

FCC Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

FCC Caution

Any changes or modifications not expressly approved by Cisco could void the user's authority to operate this equipment. This Transmitter must not be co-located or operation in conjunction with any other antenna or transmitter.

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC Professional Installation Statement

This equipment requires professional installation.

Industry Canada Statement

The MG41-HW, MG41E-HW comply with license-exempt RSSs of the Industry Canada Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Ce dispositif est conforme à la norme RSS d'Industrie Canada applicable aux appareils radio exempts de licence. Son fonctionnement est sujet aux deux conditions suivantes: (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

This radio transmitter has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited

for use with this device.

Innovation, Sciences et Développement économique Canada a approuvé l'utilisation de ce transmetteur radio avec les types d'antenne énumérés ci-dessous, le gain maximal admissible étant indiqué. Les types d'antennes non inclus dans cette liste qui ont un gain supérieur au gain maximal indiqué pour tout type listé sont strictement interdits pour une utilisation avec cet appareil.

Industry Canada Radiation Exposure Statement

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

Déclaration d'exposition aux radiations

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

Antenna Information

	Ant.	Port		Brand	Model Name	Type	Connector	Antenna Gain (dBi)	Remark
1	1	1, Primary #0		CISCO	N/A	PIFA	I-PEX	Note 1	Internal
	2	2, Primary #1		CISCO	N/A	PIFA	I-PEX		
	3	3, Secondary #0		CISCO	N/A	PIFA	I-PEX		
	4	4, Secondary #1		CISCO	N/A	PIFA	I-PEX		
Set	Ant.	Port		Brand	Model Name	Type	Connector	Antenna Gain (dBi)	Remark
2	1	1, Primary #0	Up	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA	Note 1	External
	2	2, Secondary #1	Up	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
	3	3, Primary #1	Down	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
	4	4, Secondary #0	Down	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
3	1	1, Primary #0	Up	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		External
	2	2, Secondary #1	Up	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		
	3	3, Primary #1	Down	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		
	4	4, Secondary #0	Down	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		

Note1:

Set	Band	Port	Antenna Gain (dBi)	Remark
1	WCDMA Band 2	1, Primary #0 TX, RX	2.81	1TX/2RX
		3, Secondary #0 RX	2.03	
	WCDMA Band 4	1, Primary #0 TX, RX	2.48	1TX/2RX
		3, Secondary #0 RX	2.59	
	WCDMA Band 5	1, Primary #0 TX, RX	1.04	1TX/2RX
		3, Secondary #0 RX	0.98	
	LTE Band 2	1, Primary #0 TX, RX	2.81	1TX/2RX: Port 1 (TX) / Port 1, 3 (RX) 1TX/4RX: Port 1 (TX) / Port 1 ~ 4 (RX)
		2, Primary #1 RX	2.96	
		3, Secondary #0 RX	2.03	
		4, Secondary #1 RX	2.09	
	LTE Band 4	1, Primary #0 TX, RX	2.48	1TX/2RX: Port 1 (TX) / Port 1, 3 (RX) 1TX/4RX: Port 1 (TX) / Port 1 ~ 4 (RX)
		2, Primary #1 RX	1.50	
		3, Secondary #0 RX	2.59	
		4, Secondary #1 RX	2.09	
	LTE Band 5	1, Primary #0 TX, RX	1.04	1TX/2RX
		3, Secondary #0 RX	0.98	
	LTE Band 7	2, Primary #1 TX, RX	2.67	1TX/2RX
		4, Secondary #1 RX	1.82	
	LTE Band 12	1, Primary #0 TX, R X	1.91	1TX/2RX
		3, Secondary #0 RX	1.02	
	LTE Band 13	1, Primary #0 TX, RX	1.33	1TX/2RX
		3, Secondary #0 RX	1.02	
	LTE Band 17	1, Primary #0 TX, RX	1.91	1TX/2RX
		3, Secondary #0 RX	0.78	
	LTE Band 25	1, Primary #0 TX, RX	2.81	1TX/2RX: Port 1 (TX) / Port 1, 3 (RX) 1TX/4RX: Port 1 (TX) / Port 1 ~ 4 (RX)
		2, Primary #1 RX	2.96	
		3, Secondary #0 RX	2.03	
		4, Secondary #1 RX	2.09	
	LTE Band 26	1, Primary #0 TX,RX	1.14	1TX/2RX
		3, Secondary #0 RX	1.12	
	LTE Band 38	2, Primary #1 TX, RX	2.67	1TX/2RX
		4, Secondary #1 RX	1.77	
	LTE Band 41	1, Primary #0 RX	2.61	1TX/2RX: Port 2 (TX) / Port 2, 4 (RX) 1TX/4RX: Port 2 (TX) / Port 1 ~ 4 (RX)
		2, Primary #1 TX, RX	2.67	
		3, Secondary #0 RX	2.85	
		4, Secondary #1 RX	1.82	
Set	Band	Port	Antenna Gain (dBi)	Remark
1	LTE Band 66	1, Primary #0 TX, RX	2.48	1TX/2RX: Port 1 (TX) / Port 1, 3 (RX)

Set	Band	Port	Antenna Gain (dBi)	Remark
		2, Primary #1 RX	1.50	1TX/4RX: Port 1 (TX) / Port 1 ~ 4 (RX)
		3, Secondary #0 RX	2.86	
		4, Secondary #1 RX	2.09	

Set	Band	Port		Antenna Gain (dBi)	Cable Loss (dB)	True Gain (dBi)	Remark
2	WCDMA Band 2	1, Primary #0 TX, RX	Up	1.6	0.6	1.0	1TX/2RX
		4, Secondary #0 RX	Down	2.40	0.6	1.8	
	WCDMA Band 4	1, Primary #0 TX, RX	Up	2.10	0.6	1.5	1TX/2RX
		4, Secondary #0 RX	Down	2.00	0.6	1.4	
	WCDMA Band 5	1, Primary #0 TX, RX	Up	1.50	0.6	0.9	1TX/2RX
		4, Secondary #0 RX	Down	2.40	0.6	1.8	
	LTE Band 2	1, Primary #0 TX, RX	Up	1.6	0.6	1.0	1TX/2RX: Port 1 (TX) / Port 1, 4 (RX) 1TX/4RX: Port 1 (TX) / Port 1 ~ 4 (RX)
		2, Secondary #1 RX	Up	1.4	0.7	0.7	
		3, Primary #1 RX	Down	2.40	0.9	1.5	
		4, Secondary #0 RX	Down	2.40	0.6	1.8	
	LTE Band 4	1, Primary #0 TX, RX	Up	2.10	0.6	1.5	1TX/2RX: Port 1 (TX) / Port 1, 4 (RX) 1TX/4RX: Port 1 (TX) / Port 1 ~ 4 (RX)
		2, Secondary #1 RX	Up	1.8	0.7	1.1	
		3, Primary #1 RX	Down	1.0	0.9	0.1	
		4, Secondary #0 RX	Down	2.00	0.6	1.4	
	LTE Band 5	1, Primary #0 TX, RX	Up	1.50	0.6	0.9	1TX/2RX
		4, Secondary #0 RX	Down	2.40	0.6	1.8	
	LTE Band 7	2, Secondary #1 RX	Up	0.80	0.7	0.1	1TX/2RX
		3, Primary #1 TX, RX	Down	2.80	0.9	1.9	
	LTE Band 12	1, Primary #0 TX, RX	Up	1.20	0.6	0.6	1TX/2RX
		4, Secondary #0 RX	Down	1.80	0.6	1.2	
	LTE Band 13	1, Primary #0 TX, RX	Up	0.9	0.6	0.3	1TX/2RX
		4, Secondary #0 RX	Down	1.7	0.6	1.1	
	LTE Band 17	1, Primary #0 TX, RX	Up	1.20	0.6	0.6	1TX/2RX
		4, Secondary #0 RX	Down	1.80	0.6	1.2	
	LTE Band 25	1, Primary #0 TX, RX	Up	1.60	0.6	1.0	1TX/2RX: Port 1 (TX) / Port 1, 4 (RX) 1TX/4RX: Port 1 (TX) / Port 1 ~ 4 (RX)
		2, Secondary #1 RX	Up	1.40	0.7	0.7	
		3, Primary #1 RX	Down	2.40	0.9	1.5	
		4, Secondary #0 RX	Down	2.50	0.6	1.9	
	LTE Band 26	1, Primary #0 TX, RX	Up	1.50	0.6	0.9	1TX/2RX
		4, Secondary #0 RX	Down	2.40	0.6	1.8	
	LTE Band 38	2, Secondary #1 RX	Up	0.80	0.7	0.1	1TX/2RX
		3, Primary #1 TX, RX	Down	1.40	0.9	0.5	
	LTE Band 41	1, Primary #0 RX	Up	2.90	0.6	2.3	1TX/2RX: Port 3 (TX) / Port 2, 3 (RX) 1TX/4RX: Port 3 (TX) / Port 1 ~ 4 (RX)
		2, Secondary #1 RX	Up	0.80	0.7	0.1	
		3, Primary #1 TX, RX	Down	2.90	0.9	2	
		4, Secondary #0 RX	Down	2.90	0.6	2.3	

Set	Band	Port		Antenna Gain (dBi)	Cable Loss (dB)	True Gain (dBi)	Remark
2	LTE Band 66	1, Primary #0 TX, RX	Up	2.1	0.6	1.5	1TX/2RX: Port 1 (TX) / Port 1, 4 (RX) 1TX/4RX: Port 1 (TX) / Port 1 ~ 4 (RX)
		2, Secondary #1 RX	Up	1.80	0.7	1.1	
		3, Primary #1 RX	Down	1.50	0.9	0.6	
		4, Secondary #0 RX	Down	2.00	0.6	1.4	

Set	Band	Port		Antenna Gain (dBi)	Cable Loss (dB)	True Gain (dBi)	Remark
3	WCDMA Band 2	1, Primary #0 TX, RX	Up	9.0	0.6	8.4	1TX/2RX
		4, Secondary #0 RX	Down	8.6	0.6	8	
	WCDMA Band 4	1, Primary #0 TX, RX	Up	5.9	0.6	5.3	1TX/2RX
		4, Secondary #0 RX	Down	8.3	0.6	7.7	
	WCDMA Band 5	1, Primary #0 TX, RX	Up	4.6	0.6	4	1TX/2RX
		4, Secondary #0 RX	Down	4.9	0.6	4.3	
	LTE Band 2	1, Primary #0 TX, RX	Up	9.0	0.6	8.4	1TX/2RX: Port 1 (TX) / Port 1, 4 (RX) 1TX/4RX: Port 1 (TX) / Port 1 ~ 4 (RX)
		2, Secondary #1 RX	Up	8.6	0.7	7.9	
		3, Primary #1 RX	Down	9.0	0.9	8.1	
		4, Secondary #0 RX	Down	8.6	0.6	8	
	LTE Band 4	1, Primary #0 TX, RX	Up	5.9	0.6	5.3	1TX/2RX: Port 1 (TX) / Port 1, 4 (RX) 1TX/4RX: Port 1 (TX) / Port 1 ~ 4 (RX)
		2, Secondary #1 RX	Up	8.3	0.7	7.6	
		3, Primary #1 RX	Down	5.9	0.9	5	
		4, Secondary #0 RX	Down	8.3	0.6	7.7	
	LTE Band 5	1, Primary #0 TX, RX	Up	4.6	0.6	4	1TX/2RX
		4, Secondary #0 RX	Down	4.9	0.6	4.3	
	LTE Band 7	2, Secondary #1 RX	Up	8.2	0.7	7.5	1TX/2RX
		3, Primary #1 TX, RX	Down	7.8	0.9	6.9	
	LTE Band 12	1, Primary #0 TX, RX	Up	3.6	0.6	3	1TX/2RX
		4, Secondary #0 RX	Down	4.3	0.6	3.7	
	LTE Band 13	1, Primary #0 TX, RX	Up	6.1	0.6	5.5	1TX/2RX
		4, Secondary #0 RX	Down	6.5	0.6	5.9	
	LTE Band 17	1, Primary #0 TX, RX	Up	3.60	0.6	3	1TX/2RX
		4, Secondary #0 RX	Down	4.30	0.6	3.7	
	LTE Band 25	1, Primary #0 TX, RX	Up	9.0	0.6	8.4	1TX/2RX: Port 1 (TX) / Port 1, 4 (RX) 1TX/4RX: Port 1 (TX) / Port 1 ~ 4 (RX)
		2, Secondary #1 RX	Up	8.6	0.7	7.9	
		3, Primary #1 RX	Down	9.0	0.9	8.1	
		4, Secondary #0 RX	Down	8.6	0.6	8	
	LTE Band 26	1, Primary #0 TX, RX	Up	5.5	0.6	4.9	1TX/2RX
		4, Secondary #0 RX	Down	5.9	0.6	5.3	
	LTE Band 38	2, Secondary #1 RX	Up	8.2	0.7	7.5	1TX/2RX
		3, Primary #1 TX, RX	Down	7.8	0.9	6.9	
	LTE Band 41	1, Primary #0 RX	Up	7.8	0.6	7.2	1TX/2RX: Port 3 (TX) / Port 2, 3 (RX)

Set	Band	Port		Antenna Gain (dBi)	Cable Loss (dB)	True Gain (dBi)	Remark
		2, Secondary #1 RX	Up	8.2	0.7	7.5	1TX/4RX: Port 3 (TX) / Port 1 ~ 4 (RX)
		3, Primary #1 TX, RX	Down	7.8	0.9	6.9	
		4, Secondary #0 RX	Down	8.2	0.6	7.6	
Set	Band	Port		Antenna Gain (dBi)	Cable Loss (dB)	True Gain (dBi)	Remark
3	LTE Band 66	1, Primary #0 TX, RX	Up	7.2	0.6	6.6	1TX/2RX: Port 1 (TX) / Port 1, 4 (RX) 1TX/4RX: Port 1 (TX) / Port 1 ~ 4 (RX)
		2, Secondary #1 RX	Up	8.6	0.7	7.9	
		3, Primary #1 RX	Down	7.2	0.9	6.3	
		4, Secondary #0 RX	Down	8.6	0.6	8	

Note: The above information was declared by manufacturer.

For conducted test, only the highest antenna gain has been tested and recorded in the test report.

For radiated test, set 1 ~ set 3 antenna has been tested and recorded in the test report.

Set	Ant.	Port		Brand	Model Name	Type	Connector	Antenna Gain (dBi)	Remark
1	1	1, Primary #0		CISCO	N/A	PIFA	I-PEX	Note 1	Internal
	2	2, Primary #1		CISCO	N/A	PIFA	I-PEX		
	3	3, Secondary #0		CISCO	N/A	PIFA	I-PEX		
	4	4, Secondary #1		CISCO	N/A	PIFA	I-PEX		
Set	Ant.	Port		Brand	Model Name	Type	Connector	Antenna Gain (dBi)	Remark
2	1	1, Primary #0	Up	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA	Note 1	External
	2	2, Secondary #1	Up	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
	3	3, Primary #1	Down	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
	4	4, Secondary #0	Down	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
3	1	1, Primary #0	Up	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		External
	2	2, Secondary #1	Up	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		
	3	3, Primary #1	Down	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		
	4	4, Secondary #0	Down	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		

Note1:

Set	Band	Port	Antenna Gain (dBi)			Remark
1	LTE Band 14	1, Primary #0 TX, RX	1.45			1TX/2RX
		3, Secondary #0 RX	0.7			
Set	Band	Port	Antenna Gain (dBi)	Cable Loss (dB)	True Gain (dBi)	Remark

Set	Band	Port		Antenna Gain (dBi)			Remark
2	LTE Band 14	1, Primary #0 TX, RX	Up	1.1	0.6	0.5	1TX/2RX
		4, Secondary #0 RX	Down	2.00	0.6	1.4	
3	LTE Band 14	1, Primary #0 TX, RX	Up	6.10	0.6	5.5	1TX/2RX
		4, Secondary #0 RX	Down	6.50	0.6	5.9	

Note: The above information was declared by manufacturer.

For conducted test, only the highest antenna gain has been tested and recorded in the test report.
For radiated test, set 1 ~ set 3 antenna has been tested and recorded in the test report.

Set	Ant.	Port		Brand	Model Name	Type	Connector	Antenna Gain (dBi)	Remark
1	1	1, Primary #0		CISCO	N/A	PIFA	I-PEX	Note 1	Internal
	2	2, Primary #1		CISCO	N/A	PIFA	I-PEX		
	3	3, Secondary #0		CISCO	N/A	PIFA	I-PEX		
	4	4, Secondary #1		CISCO	N/A	PIFA	I-PEX		
Set	Ant.	Port		Brand	Model Name	Type	Connector	Antenna Gain (dBi)	Remark
2	1	1, Primary #0	Up	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA	Note 1	External
	2	2, Secondary #1	Up	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
	3	3, Primary #1	Down	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
	4	4, Secondary #0	Down	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
3	1	1, Primary #0	Up	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		External
	2	2, Secondary #1	Up	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		
	3	3, Primary #1	Down	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		
	4	4, Secondary #0	Down	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		

Note1:

Set	Band	Port		Antenna Gain (dBi)			Remark
1	LTE Band 30	2, Primary #1 TX, RX		2.48			1TX/2RX
		4, Secondary #1 RX		2.33			
Set	Band	Port		Antenna Gain (dBi)	Cable Loss (dB)	True Gain (dBi)	Remark
2	LTE Band 30	2, Secondary #1 RX	Up	4.60	0.7	3.9	1TX/2RX
		3, Primary #1 TX, RX	Down	3.9	0.9	3.0	
3	LTE Band 30	2, Secondary #1 RX	Up	8.1	0.7	7.4	1TX/2RX
		3, Primary #1 TX, RX	Down	8.8	0.9	7.9	

Note: The above information was declared by manufacturer.

For conducted test, only the highest antenna gain has been tested and recorded in the test report.
For radiated test, set 1 ~ set 3 antenna has been tested and recorded in the test report.

Set	Ant.	Port		Brand	Model Name	Type	Connector	Antenna Gain (dBi)	Remark
1	1	1, Primary #0		CISCO	N/A	PIFA	I-PEX	Note 1	Internal
	2	2, Primary #1		CISCO	N/A	PIFA	I-PEX		
	3	3, Secondary #0		CISCO	N/A	PIFA	I-PEX		
	4	4, Secondary #1		CISCO	N/A	PIFA	I-PEX		
Set	Ant.	Port		Brand	Model Name	Type	Connector	Antenna Gain (dBi)	Remark
2	1	1, Primary #0	Up	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA	These antennas don't support band 42.	External
	2	2, Secondary #1	Up	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
	3	3, Primary #1	Down	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
	4	4, Secondary #0	Down	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
3	1	1, Primary #0	Up	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		External
	2	2, Secondary #1	Up	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		
	3	3, Primary #1	Down	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		
	4	4, Secondary #0	Down	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		

Note1:

Set	Band	Port	Antenna Gain (dBi)	Remark
1	LTE Band 42	2, Primary #1 TX, RX	2.76	1TX/2RX
		4, Secondary #1 RX	2.72	

Note: The above information was declared by manufacturer.

Only the highest antenna gain has been tested and recorded in the test report.

Set	Ant.	Port		Brand	Model Name	Type	Connector	Antenna Gain (dBi)	Remark
1	1	1, Primary #0		CISCO	N/A	PIFA	I-PEX	Note 1	Internal
	2	2, Primary #1		CISCO	N/A	PIFA	I-PEX		
	3	3, Secondary #0		CISCO	N/A	PIFA	I-PEX		
	4	4, Secondary #1		CISCO	N/A	PIFA	I-PEX		
Set	Ant.	Port		Brand	Model Name	Type	Connector	Antenna Gain (dBi)	Remark
2	1	1, Primary #0	Up	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA	These antennas don't support band 43.	External
	2	2, Secondary #1	Up	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
	3	3, Primary #1	Down	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
	4	4, Secondary #0	Down	CISCO	MA-ANT-C1-A	Dipole	Reversed-SMA		
3	1	1, Primary #0	Up	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA	These antennas don't support band 43.	External
	2	2, Secondary #1	Up	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		
	3	3, Primary #1	Down	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		
	4	4, Secondary #0	Down	CISCO	MA-ANT-C1-B	Panel	Reversed-SMA		

Note1:

Set	Band	Port	Antenna Gain (dBi)	Remark
1	LTE Band 43	2, Primary #1 TX, RX	2.92	1TX/2RX
		4, Secondary #1 RX	2.44	

Note: The above information was declared by manufacturer.

Only the highest antenna gain has been tested and recorded in the test report.