

10 27010664 Outdoor 2.4 GHz Dual-Polarized Directional Antenna (H60 V7 G18)

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10.1 27010664 Technical Specifications

Appearance and Structure

Figure 10-1 Appearance of the 27010664 Outdoor 2.4 GHz Dual-Polarized Directional Antenna (H60 V7 G18)



Technical Specifications

Table 10-1 Technical specifications of the 27010664 Outdoor 2.4 GHz Dual-Polarized Directional Antenna (H60 V7 G18)

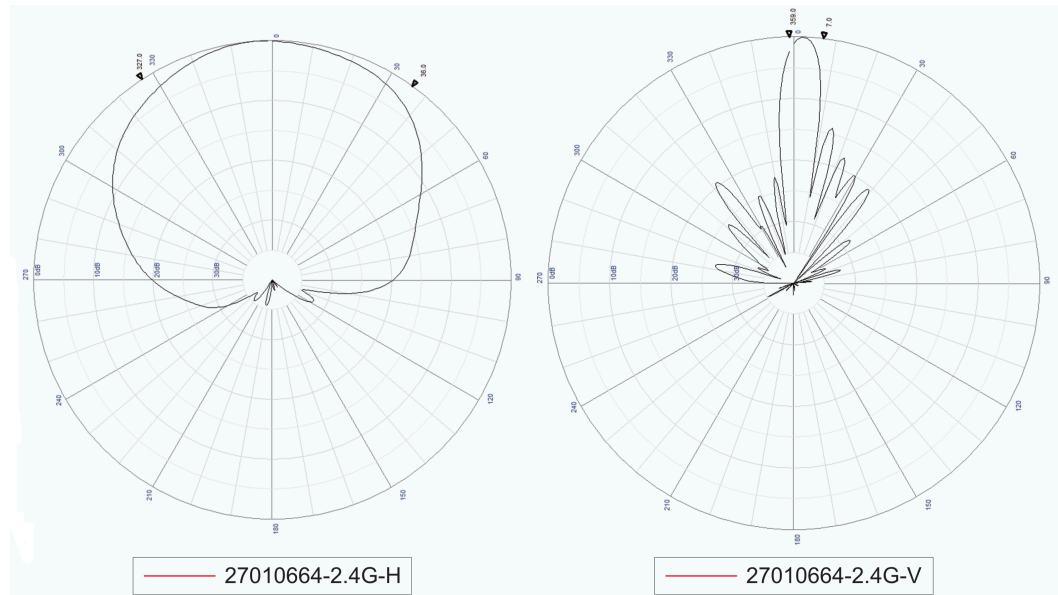
Item	Details
Part Number	27010664
Model	SL12432A
Description	Directional Antenna, 2300-2700/2300-2700MHz,18dBi/18dBi,60deg, +/-45,2deg/2deg,250W/250W,4*N Female,with bracket

Item	Details
Frequency [MHz]	2300 MHz to 2700 MHz
Antenna gain [dBi]	18 dBi
Coverage distance [m(ft.)]	The coverage distance is 500 m when the antenna is connected to an AirEngine 6760R-51E, the maximum input power of the AP is 30 dBm, and the RSSI is -70 dBm, regardless of the local EIRP limit. The downlink rate of a single STA is 10 Mbit/s. The coverage distance is 700 m when the antenna is connected to an AirEngine 8760R-X1E, two antennas are used for coverage to form 8x8 MIMO, the maximum input power of the AP is 33 dBm, the RSSI is -70 dBm, regardless of the local EIRP limit. The downlink rate of a single STA is 10 Mbit/s. The STA transmit power must be considered in the coverage distance to avoid insufficient uplink power.
Horizontal beamwidth [degrees]	60 degrees
Vertical beamwidth [degrees]	7 degrees
Standing wave ratio (SWR)	≤ 1.5
Polarization	Cross polarization
Antenna connector	N-female x 4
Antenna dimensions [mm(in.)]	86 mm x 1120 mm x 290 mm (3.39 in. x 44.09 in. x 11.42 in.)
Weight without packaging [kg(lb)]	Weight of antenna: 9.9 Weight of mounting bracket: 4.7
Installation type	Pole
Grounding requirements	Same as the AP
Pole diameter [mm(in.)]	φ50 to φ80

Item	Details
Antenna note	The gains and lobe widths in this document are typical values. The actual values are within a range. For specifications, see the corresponding data sheets. The coverage distance is a reference value in certain conditions. Plan an appropriate distance value according to planning experience, local standards, and onsite environments. There may be differences in the standards of different countries, so the mapping between antennas and APs shall comply with local standards. For details, refer to device access authentication information. The coverage distance is subject to the following constraints: - The default AP transmit power is 15 dBm. - The default STA type is mobile phone, and no obstacle exists. - 2.4 GHz: The uplink and downlink RSSIs are greater than or equal to -70 dBm. For any questions about the parameters above, contact Huawei technical support.

Antenna's Radiation Pattern

Figure 10-2 Antenna Pattern1 of the 27010664 Outdoor 2.4 GHz Dual-Polarized Directional Antenna (H60 V7 G18)

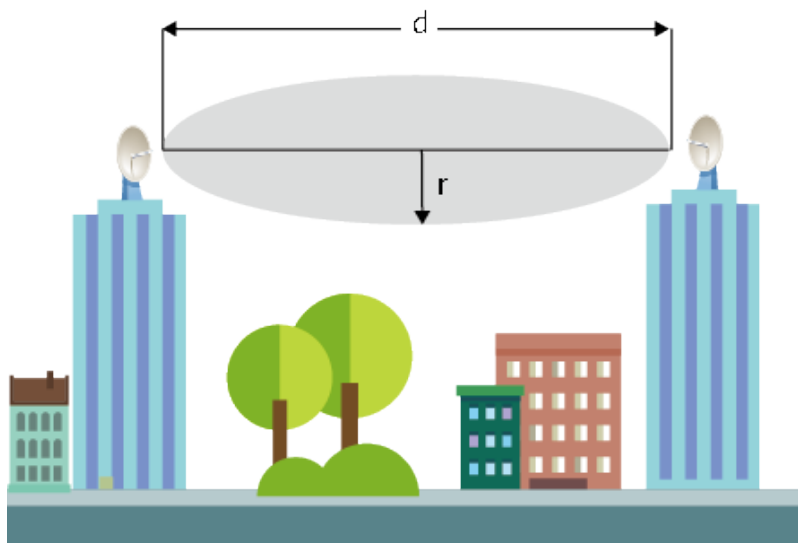


10.2 27010664 Installation Precautions

To ensure that the antenna works at the optimal performance level, take the following installation precautions:

- Install the antenna upright and place one side of the RF cable connector towards the ground.
- When installing single-polarized antennas, keep the distance between two antennas to within 30 cm to 50 cm.
- Install the antenna away from metal obstructions, such as air conditioners or heating pipes. Do not install the antenna on a wire mesh.
- Wall materials and thickness determine the number of walls that radio signals can pass through. Factor that into antenna selection.
- Install lightning rods for outdoor antennas to prevent lightning strikes. For details on how to install a lightning rod, see section "Antenna Installation."
- Ensure that no obstacle exists in the Fresnel zone in bridging scenarios. That is, the antenna height must be larger than the sum of the radius of the first Fresnel zone and obstacle height.

As shown in the figure, the Fresnel zone refers to the ellipsoid. Obstacles in the zone will adversely affect signal transmissions. If not blocked, radio signals can travel in an approximate free space.

Figure 10-3 Fresnel zone

Fresnel zones differ depending on the Fresnel zone radius. In a free space, radio signals are mainly transmitted between antennas in the first Fresnel zone. In normal cases, the Fresnel zone refers to the first Fresnel zone.

The radius of the first Fresnel zone is calculated and related parameters are described as follows:

$$r = 17.32\sqrt{d/4f}$$

- r : indicates the radius of the first Fresnel zone, in meters.
- d : indicates the distance between two antennas, in km.
- f : indicates the signal frequency, in GHz.

With 5 GHz signals as an example, [Table 10-2](#) lists the radius of the first Fresnel zone in different backhaul distances.

Table 10-2 Radius of the first Fresnel zone

Backhaul Distance (km)	Radius of the First Fresnel Zone (m)
1	3.87
2	5.48
3	6.71
5	8.66
10	12.25

10.3 27010664 Antenna Installation

The 27010664 antenna is an outdoor 2.4 GHz directional antenna. To obtain a better performance and wider coverage, the antenna should be installed at high

positions away from metal obstacles, for example, building tops, mountaintops, and tower tops. Its transmit end should not be blocked by obstacles.

10.3.1 Accessories and Tools

Tools:

- 13 mm open-end wrench: 1 PCS
- 16 mm or 18 mm open-end wrench: 1 PCS



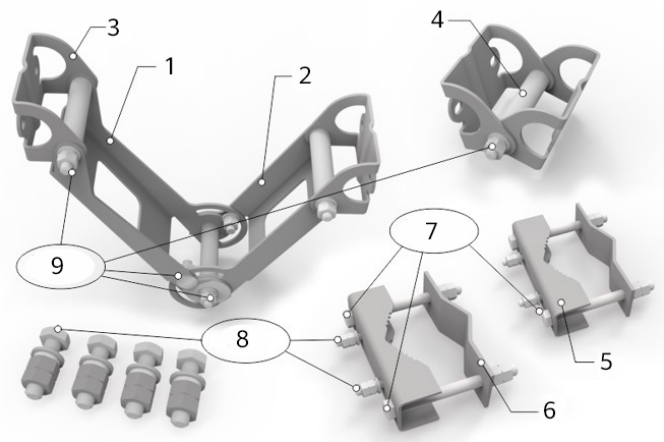
- Inclinator: 1 PCS



Pole:

- Pole with a diameter of $\phi 50$ mm to $\phi 80$ mm: 1 PCS

Accessories (for reference only, and the actual appearances shall prevail.):



NOTE

- The upper arm, lower arm, and holder are assembled into a support before delivery and do not need to be disassembled during installation.
- The C-type clamps and clamps are assembled before delivery and need to be disassembled during installation.

No.	Name	Quantity
1	Lower arm	1
2	Upper arm	1
3	Holder	4

No.	Name	Quantity
4	Toothed clamp	4
5	C-type clamp	2
6	Clamp	2
7	M12 assembly	• GB/T5783 M12x130 bolt: 4 • GB/T97.1 12 flat washer: 4 • GB/T93 12 spring washer: 4 • GB/T6170 M12 nut: 8
8	M8 assembly	• GB/T5783 M8x30 bolt: 8 • GB/T97.1 8 flat washer: 8 • GB/T93 8 flat washer: 8 • GB/T6170 M8 nut: 16
9	M10 assembly	• GB/T5782 M10x110 bolt: 4 • GB/T97.1 10 flat washer: 6 • GB/T93 10 flat washer: 6 • GB/T6170 M10 nut: 6

10.3.2 Pole Mounting

The 27010664 antenna is mounted on a pole with a diameter of $\phi 50$ mm to $\phi 80$ mm.



CAUTION

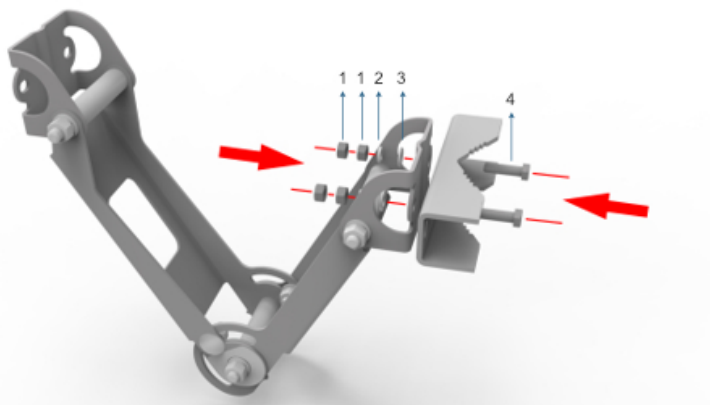
- The antenna must be installed in a place far away from high-voltage power supplies or radio signal interference sources (such as other APs or antennas).
- Do not install antennas in bad weather conditions, for example, during rain, snow, or strong winds.

Assembling Mounting Brackets

No.	Name
1	GB/T6170 M8 nut
2	GB/T93 8 flat washer: 8
3	GB/T97.1 8 flat washer: 8
4	GB/T5783 M8x30 bolt: 8

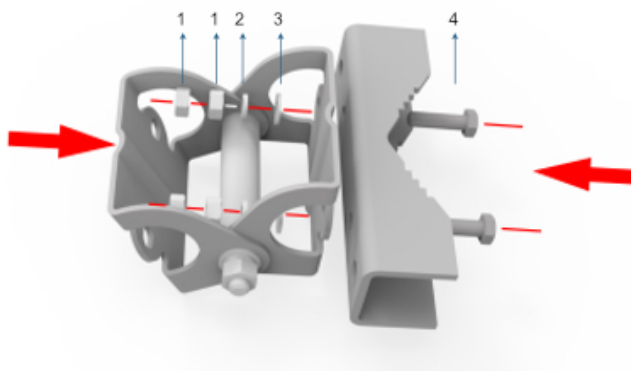
Assembling the Upper Mounting Bracket

1. Remove the bolts, nuts, spring washers, and flat washers from the clamp and C-type clamp.
2. Assemble the upper arm and the C-type clamp using the M8 assembly with a reference torque of 25 N·m.



Assembling the Lower Mounting Bracket

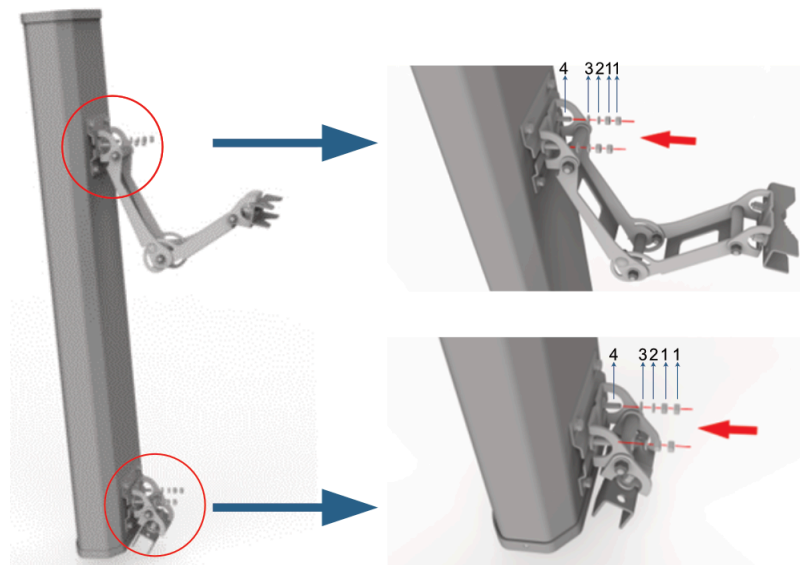
1. Remove the bolts, nuts, spring washers, and flat washers from the clamp and C-type clamp.
2. Assemble the toothed clamp and the C-type clamp using the M8 assembly with a reference torque of 25 N·m.



Securing the Upper and Lower Mounting Brackets to an Antenna

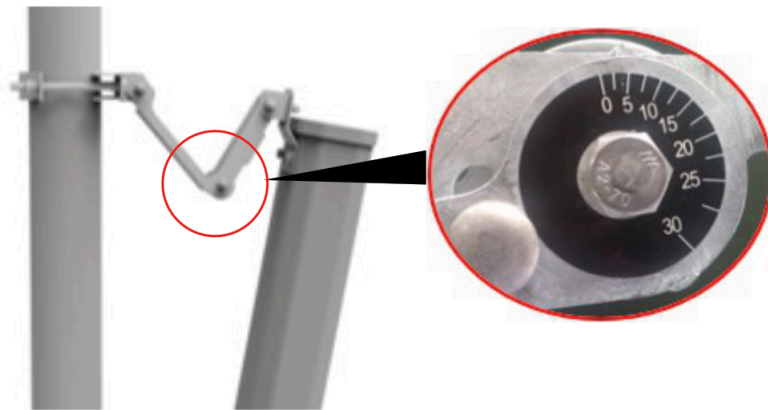
No.	Name
1	GB/T6170 M8 nut
2	GB/T93 8 flat washer: 8
3	GB/T97.1 8 flat washer: 8
4	GB/T5783 M8x30 bolt: 8

Secure the upper and lower mounting brackets to an antenna using the M8 assembly with a reference torque of 25 N·m, as shown in the following figure.



Fixing the Antenna to a Pole

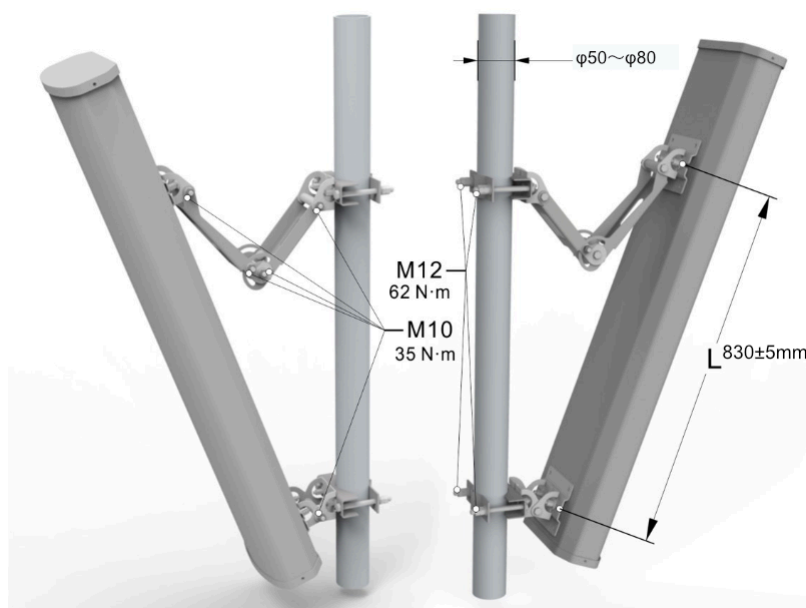
1. Loosen the nut between the upper and lower arms.
2. Secure the toothed clamps at the top mounting bracket to a pole.
 - a. Remove the bolts, nuts, spring washers, and flat washers from the toothed clamp.
 - b. Place the C-type clamp connected to the antenna against the pole, thread the bolts through the clamp, and put the other clamp on the bolts, and put back the flat washers, spring washers, and nuts.
 - c. Tighten the nuts to secure the toothed clamps (not tightly).
3. Repeat step 2 to secure the toothed clamps at the bottom mounting bracket to the pole.
4. Adjust the antenna until it is perfectly vertical (adjustable angle: 0 degrees), adjust the toothed clamps, and then secure all the toothed clamps to the pole using M12 screws with a reference torque of 62 N·m.
5. Adjust the antenna angle (adjustable angle range: 0 to 32 degrees).
 - a. Estimate the angle to be adjusted based on the angle between the upper and lower arms shown on the dial scale.



- b. Use an inclinometer to precisely measure the angle to be adjusted.



- c. After adjusting the antenna angle, tighten all the M10 nuts with a reference torque of 35 N·m.



6. Remove the protective cap from the antenna connector, connect the feeder cable to the connector, and tighten the connector. Thoroughly wrap the cable connector with waterproof tape. For details, see [Connecting RF Cables](#).

Installing the Pole and Lightning Rod

Carry out the following steps:

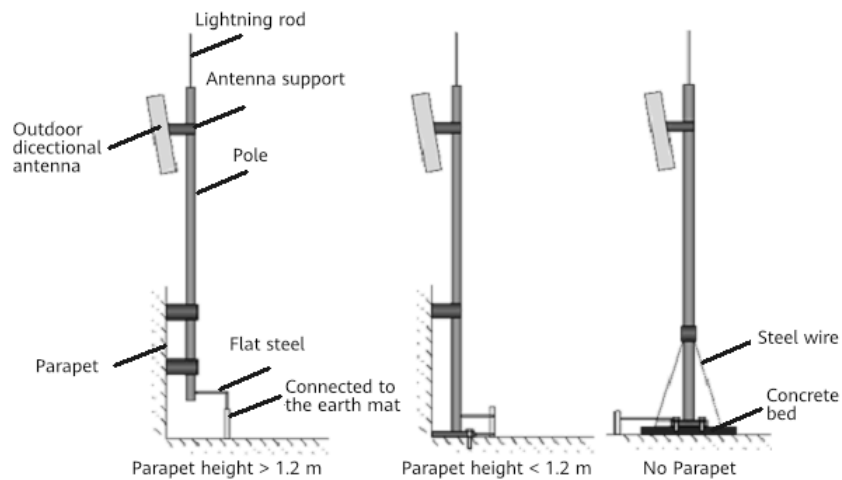
1. Weld the lightning rod to the top of the antenna pole.
2. Install the antenna pole on a parapet or concrete bed on the roof of the building.
3. Use a 40 mm x 4 mm flat piece of steel to connect the antenna pole to an earth mat.
4. Secure the outdoor directional antenna to the pole using an antenna support. Keep the pole vertical during the installation.

Take note of the following points when installing an outdoor directional antenna:

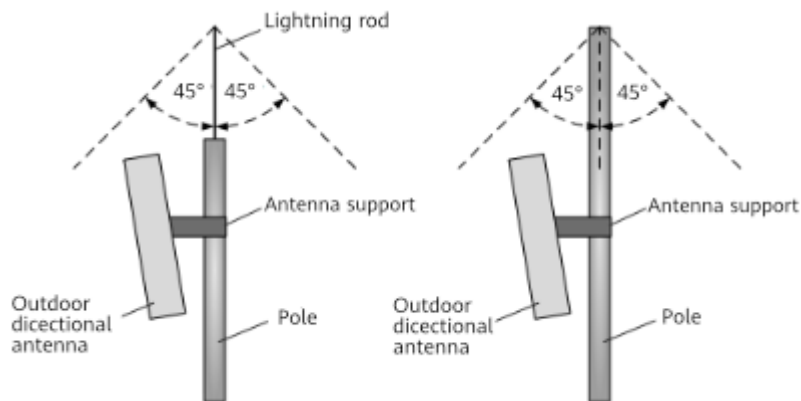
- If the roof of the building is surrounded by parapets of no less than 1.2 m high, fix the pole on a parapet with expansion screws, and then fix the outdoor directional antenna on the pole with an antenna support.
- If the roof of the building is surrounded by parapets of less than 1.2 m high, fix one of the installation points of the pole on a parapet and the other installation point to the roof with expansion screws, and then fix the outdoor directional antenna to the pole with an antenna support.
- If there are no parapets around the roof, fix the pole to the ground or a concrete bed with expansion screws and steel wires, and then fix the outdoor directional antenna on the pole with an antenna support.

Figure 10-4 illustrates how an outdoor directional antenna and a pole are installed.

Figure 10-4 Installing an outdoor directional antenna and a pole



The following figure shows the protection area of a lightning rod. The entire antenna must be within the 45-degree protection area of the lightning rod.



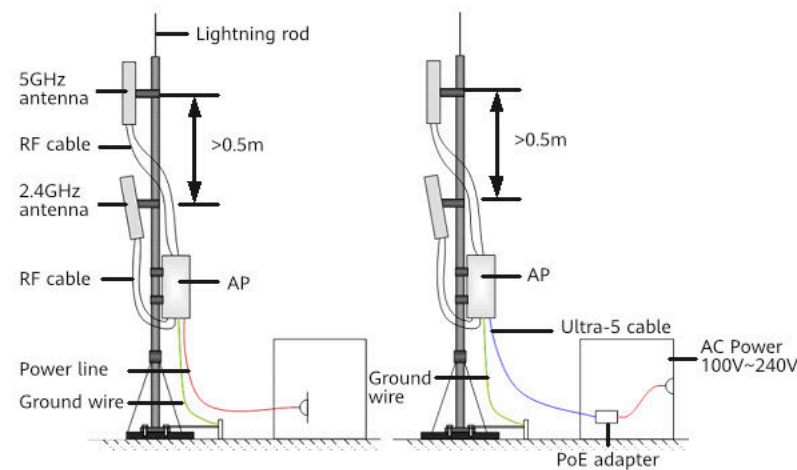
NOTE

If an antenna is installed on a metal pole such as a steel pole, you do not need to install a lightning rod, as shown on the right in the preceding figure.

Outdoor AP Installation Scenarios

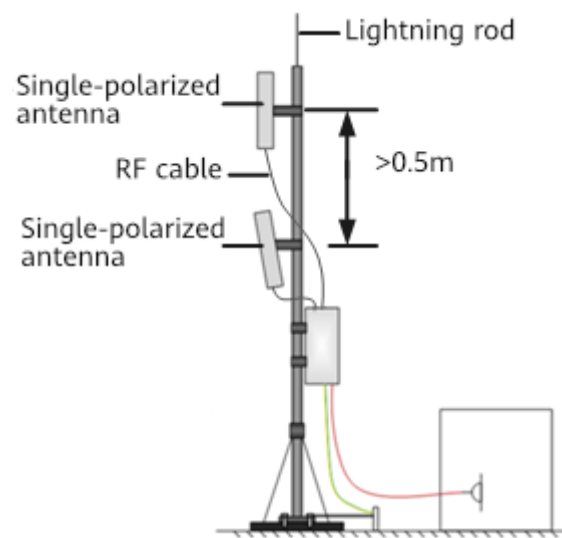
Figure 10-5 shows an outdoor AP installation scenario. The distance between a 2.4 GHz antenna and a 5 GHz antenna must be more than 0.5 m.

Figure 10-5 Outdoor AP installation scenarios



The distance between two single-polarized antennas of the same AP should be more than 0.5 m, and the two antennas should cover the same area, as shown in [Figure 10-6](#).

Figure 10-6 Installation of single-polarized antennas



10.3.3 Connecting RF Cables

RF Cable Connection Requirements

- The feeder cables on an antenna must be connected to the AP's RF ports on the corresponding bands. There is no mandatory requirement for the connection mapping between the two ends.
- For the AirEngine 8760R-X1E, the feeder cables on an antenna can be connected only to the RF ports on the same side of the AP but not to RF ports on both sides of the AP.

The following figure shows the cable connections.



RF Cable Deployment Requirements

- Use a short RF cable to connect the antenna to an AP.
- It is recommended that you connect a 50 ohm RF load to an idle RF port and wrap the RF load with both the insulation and waterproof tape.
- Wrap the RF cable in single-layer PVC insulation tape, triple-layer waterproof tape, and then triple-layer PVC insulation tape.
- Before wrapping the waterproof tape, stretch the tape evenly until it is 1/2 the width as before. With each layer of tape wrap the cable tightly and ensure that each layer covers more than 50% of the layer beneath it.
- Wrap the triple-layer tape from bottom to top, from top to bottom, and then from bottom to top again.
- Bend radius requirements: RG-8U RF cable: > 150 mm; 1/2" RF cable: > 50 mm; 7/8" RF cable: > 250 mm. One inch (1") equals 25.4 mm.
- The grounding requirements of antennas are the same as those of APs.

RF Cable Connections

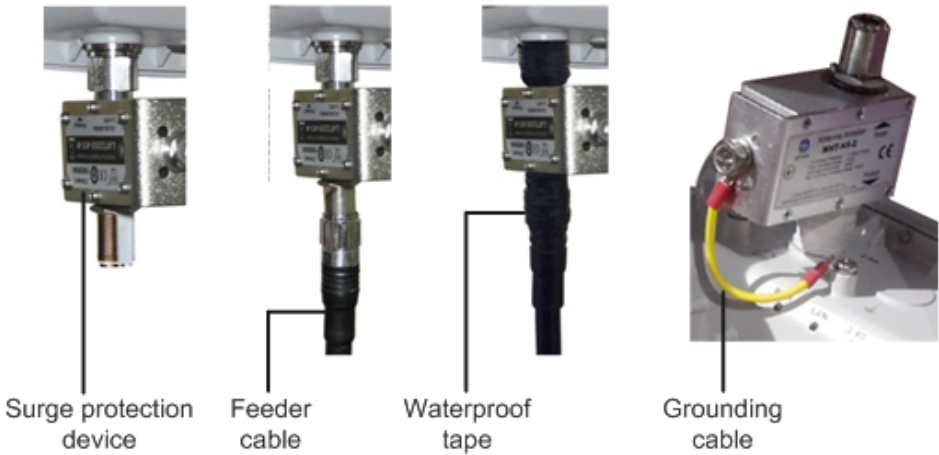
1. RF ports of Huawei outdoor APs provide a 5 kA surge protection capability. In general, no additional surge protective device needs to be installed, and the RF cables are directly connected to the RF ports with a tightening torque of 0.8 N·m.



 NOTE

Outdoor APs support built-in surge protection on all RF ports, but the surge protection works only when the outdoor APs are grounded.

2.
- If a higher surge protection capability is required, you need to purchase a surge protective device separately. When installing the surge protective device, ensure that it is connected to a ground cable.



Instructions on Making RF Cables

When making RF cables onsite, ensure that the coaxial cables and connectors in use comply with the mappings described in Table [Coaxial cables and connectors](#).

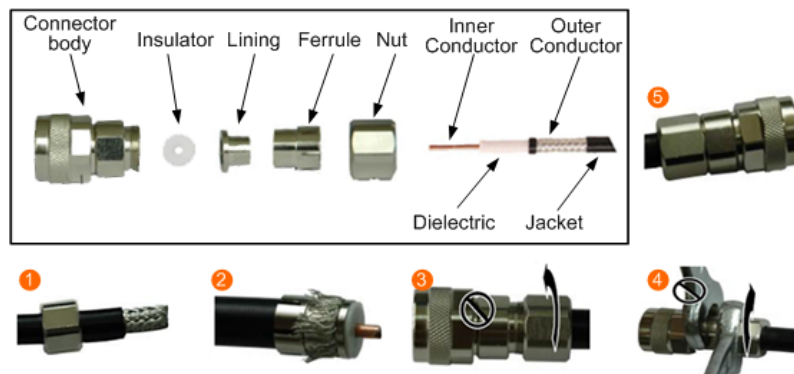
Table 10-3 Coaxial cables and connectors

Coaxial Cable	Coaxial Connector	Cable Loss	Appearance
RG-8U(25070009)	Type-N male connector (14040184)	2400MHz ~2483.5 MHz: 26.8dB/100m 4920Mhz ~5825Mhz: 41.8dB/100m	

Coaxial Cable	Coaxial Connector	Cable Loss	Appearance
1/2" (inch) super-flexible cable (25070076)	Type-N male connector (14040150)	2400MHz ~2483.5 MHz: 18.1dB/100m 4920Mhz ~5825Mhz: 30dB/100m	

Connecting the type-N male coaxial connector to the RG-8U feeder cable

1. Peel the cable.
2. Install accessories, such as the nut.
3. Install the connector body.
4. Tighten the connector on the cable.
5. After assembly is complete, verify that cable attenuation is within the proper range. Take waterproof measures during the operation.



Connecting the type-N male coaxial connector to the 1/2" feeder cable

1. Peel the cable.
2. Install the back nut.
3. Install the front nut.
4. Put the cable through the heat-shrink tubing.
5. After assembly is complete, verify that cable attenuation is within the proper range. Take waterproof measures during the operation.

