Installation Guide for the 9 dBi Omni-directional Antenna ANT2409

NETGEAR

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Trademarks

Statement of Conditions

In the interest of improving internal design, operational function, and/or reliability, NETGEAR reserves the right to make changes to the products described in this document without notice. NETGEAR does not assume any liability that may occur due to the use or application of the product(s) or circuit layout(s) described herein.

Federal Communications Commission (FCC) Compliance Notice: Radio Frequency Notice

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.
2. This device must accept any interference received, including interference that may cause undesired operation.

In the U.S., the ANT2409 antenna should only be used with devices that have been FCC approved for use with it. Please check the NETGEAR web site at http://www.NETGEAR.com/go/antannas_fcc for an updated list of FCC approved devices.

NOTE: 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 try to correct the interference by one or more of the following measures: (1) Reorient or relocate the receiving antenna, (2) Increase the separation between the equipment and receiver, (3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected, (4) Consult the dealer or an experienced radio/TV technician for help.

Federal Communications Commission (FCC) and European Radiation Exposure Statements

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antenna shall not be less than 30 cm (12 inches) during normal operation. This device should not be co-located with other transmitters.

European Emission Statement

For EU, use of any antenna requires careful planning and extra consideration to comply with EU emissions, health standards and regulations. It is recommended that a qualified professional installer service is consulted for site survey and proper installation. Antenna installation must comply with the maximum level authorized by each country. See http://www.NETGEAR.com/go/antannas_eu for product combinations that comply with EU regulations.

Safety

The NETGEAR wireless devices WG302, FWG114P, FVM318, ME103, and FM114P have been tested with the antenna ANT2409 and have successfully passed all relevant tests contained in the Standard for the Safety of Information Technology Equipment for Europe (EN 60950-2000) equivalent to North American Standards UL 60950, Third Edition, CAN/CSA-C22.2 No. 60950-00, Third Edition and Australian/New Zealand Standards ACA TS 001-1997, and AS/NZS 3260:1993 with A1 through A4.

Contents

Chapter 1
Getting Started with the ANT2409

Welcome

Thank you for purchasing the NETGEAR ANT2409 antenna. This Installation Guide provides installing instructions and guidelines for using the NETGEAR 9 dBi Omni-directional Antenna.

Package Contents

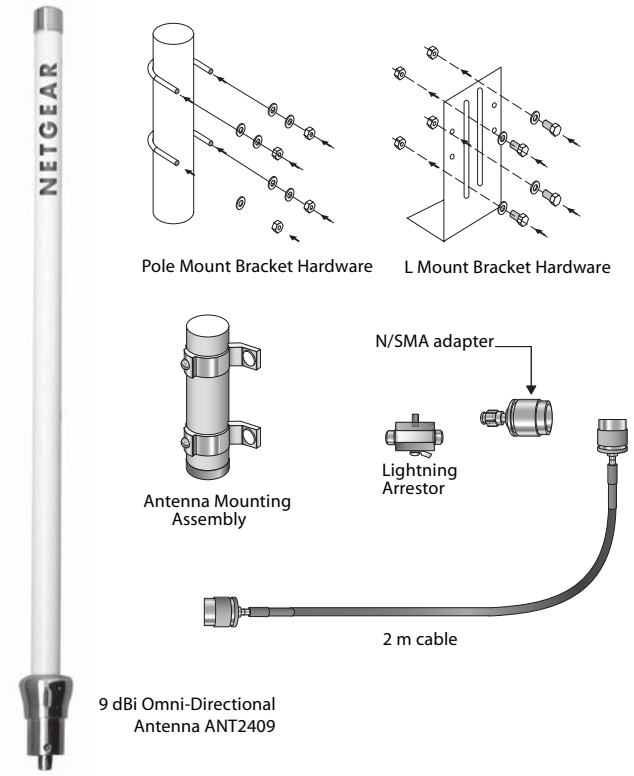


Figure 1-1: Package contents

The package should contain the following items:

- NETGEAR Indoor / Outdoor 9 dBi 2.4 – 2.5GHz Omni-Directional Antenna ANT2409
- 2-meter low loss antenna cable to connect the antenna to a lightning arrestor
- Lightning Arrestor
  NOTE: a ground cable is not included but required for outdoor installation. The grounding cable must be equivalent or better than: AWG 10, UL 1015, Stranded, 600 V, 105 °C, green or green/yellow insulation, 2 clip of 5.5 mm inner diameter cramped at both ends, cable no longer than 5 meters.
- Reverse N/SMA Adapter
- Antenna mounting assembly (tube, grommet, 2 brackets, screws, washers)
- L shape bracket for top & ceiling mounting
- Screws, bolts, washers, U-bolts and plastic anchors
- Installation Guide
- Warranty and Support Information card

If any of the parts are incorrect, missing, or damaged, contact your NETGEAR dealer. Keep the carton, including the original packing materials, in case you need to return the product for repair.

Antenna cable for connecting the wireless device is sold separately. Please use a NETGEAR model ACC-10314-01, 02, 03, 04, or 05 cable.

To obtain optimal results in extending wireless range with antenna installations, consult a qualified professional installer for site survey and installation assistance.

In the U.S., the ANT2409 antenna should only be used with devices that have been FCC approved for use with it. Please check the NETGEAR web site at http://www.NETGEAR.com/go/antennas_fcc for an updated list of FCC approved devices.

For Europe, use of any antenna requires careful planning and extra consideration to comply with EU emissions and health standards and regulations. Antenna installation must comply with the maximum level authorized by each country. Please check the NETGEAR web site at http://www.NETGEAR.com/go/antennas_eu for a list of restrictions and approved devices.

Pole Mount Configuration

This illustration shows the pole mount configuration option.

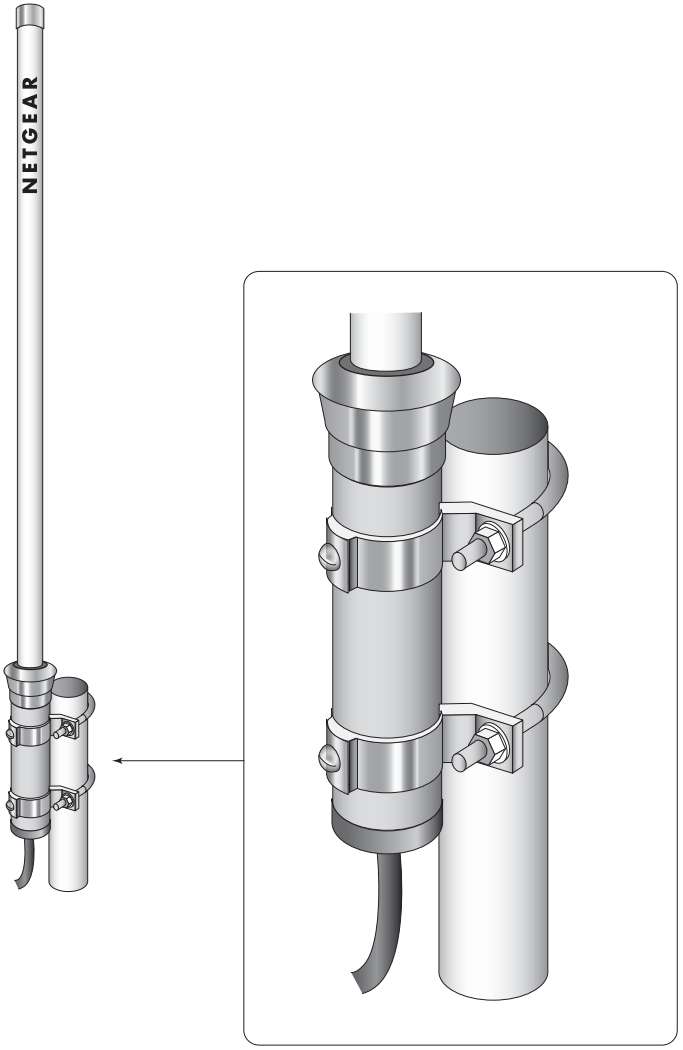


Figure 1-2: Antenna Assembled in Pole Mount Configuration

Flat Surface Mount Configuration

This illustration shows a flat surface mount configuration.

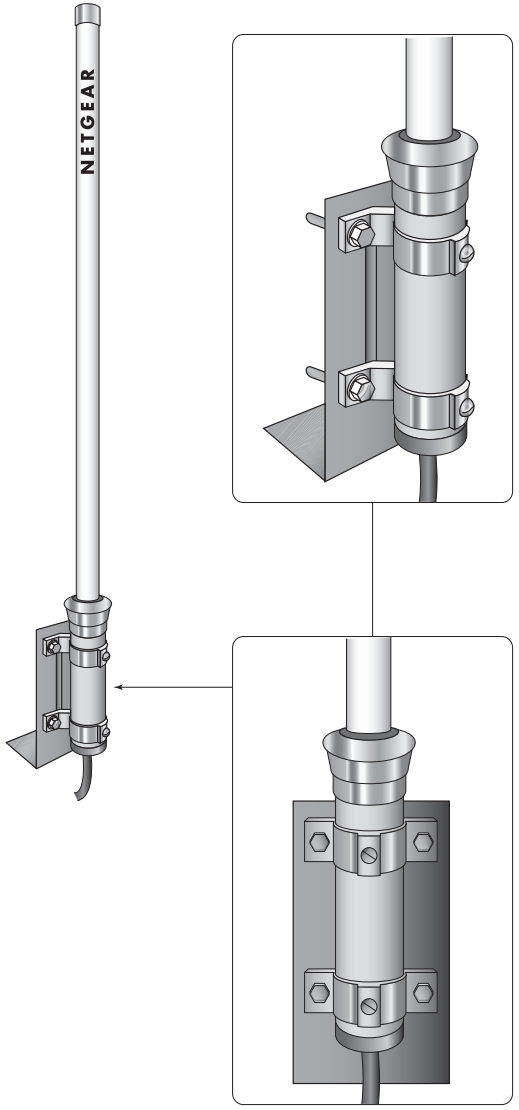


Figure 1-3: Antenna Assembled in the Flat Surface Mount Configuration

Note: For wall mount installation, the L-bracket is not used.

Placement and Other Important Considerations

Before installing your wireless antenna, observe the placement considerations. Antenna placement dramatically affects potential coverage. Follow these guidelines to maximize coverage:

- Place the ANT2409 in a vertical position. Either right side up or up-side-down is Ok.
- Place the antenna in the middle of the coverage zone and at 1.5m or higher above the floor.
- Minimize obstructions around the antenna. Ideally there shall be a visual line of sight between the ANT2409 and the client antenna(s).
- High Ceiling: place the ANT2409 in the center of the room installed up side down on a pole or on the ceiling with the L shape bracket.
- **Outdoors**: Place the ANT2409 on a roof fixed on a pole 2m above the roof level, or fixed directly on the roof near the edge, or against a wall, or on top of a telephone box. In most of the cases one ANT2409 is sufficient because the multipath fading is low or acceptable. However in cases where the building density is high, or narrow streets, or direct echo from another building, etc. two ANT2409 can improve the wireless performance (throughput and range). This latter is applicable only if the wireless device has two RF ports.

  NOTE: Ground cable is not provided but is required. Use AWG 10, UL 1015, Standard 600 V, 105°C, green or green/yellow insulation, 2 clips with a 5.5 mm inner diameter clamped at both ends, and cable no longer than 5 meters.
- **Indoors**: Place the ANT2409 above cubicle level, at the center of large room area preferred attached to the ceiling, a pole, or a column. Ideally, it should be located outside an IT data center or outside a room with multiple metal partitions. Use a NETGEAR antenna cable of up to 10 m length to connect the antenna to the wireless access point/router. In some situations one ANT2409 is sufficient because the multipath fading is low or acceptable and/or the client adapter wireless node provide spatial diversity. However in other cases where the multipath fading effect is medium to high two ANT2409 spaced by a few meters can improve the wireless performance (throughput and range). This latter is applicable only if the wireless device has two RF ports.

  Indoor wireless propagation loss increases as follows:

  - Wood building -- relatively little loss
  - Floors in concrete -- some loss
  - Reinforced concrete -- more loss
  - Metal floor or reinforced concrete with a lot of metal pipes, metal air conditioning channel, etc. -- most loss

- The best performance is achieved with a short cable between the antenna and the wireless device. The shortest approved cable to be used in conjunction with the ANT2409 in North America is the NETGEAR 1.5 m (ACC-10314-01) cable.
- The antenna should be installed so that it is a minimum of 30 cm (12 inches) away from people.

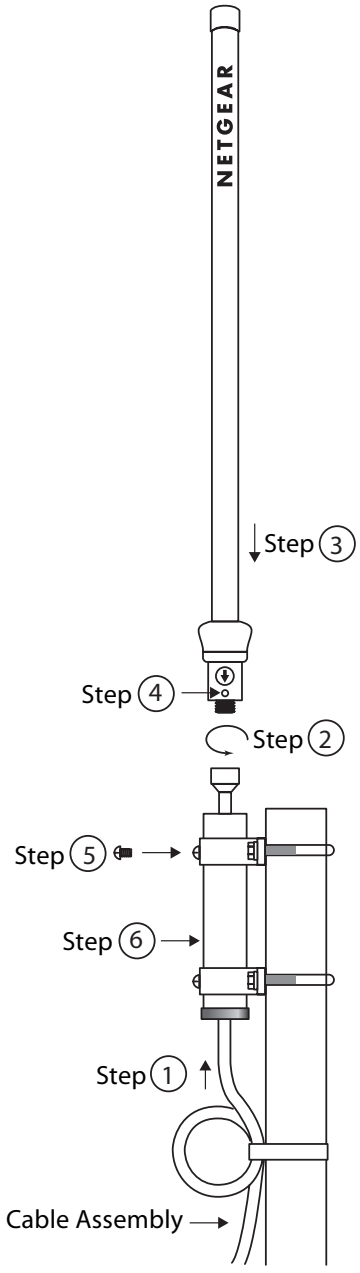
Chapter 2
Installing the 9 dBi Omni-directional Antenna

There are two parts to the wireless antenna installation process:

- Assemble the wireless antenna for pole mount installation or flat surface mount installation.
- Connect the appropriate electrical hardware depending on if the installation is indoors or outdoors.

Follow the instructions in this section of the manual to install your antenna.

First, Assemble and Mount the Antenna



Step	Procedure
Step 1	Feed the antenna cable through the antenna mounting assembly. **Note**: Use the correct cable. • **Outdoors**: use the provided 2m antenna cable. • **Indoors**: use the provided N/SMA adapter with a Netgear cable model ACC-10314-01, 02, 03, 04 or 05 (sold separately). For indoors, do not use the provided 2m cable.
Step 2	Securely attach the antenna cable by screwing it onto the antenna.
Step 3	Insert the antenna into the mounting assembly.
Step 4	Position the key slot on the antenna so that it is aligned with the mounting screw hole illustrated in step 5.
Step 5	Tighten the mounting screw so that it fits in the key slot on the antenna.
Step 6	Attach the assembled antenna to the mounting surface with the appropriate hardware (U-bolts for pole mount, L-bracket or no bracket for flat mount). **Note**: The antenna can be mounted vertically right-side-up or up-side-down.

Figure 2-1: Antenna Assembly and Mounting

Now, Connect the Antenna

The instructions below cover outdoor and indoor installations.

Connecting the Antenna for and Outdoor Installation

1. Turn off your wireless unit.
2. In the procedure "First, Assemble and Mount the Antenna" on page 2-2, the antenna should have been assembled for outdoor installation using the provided 2-meter cable. Connect the other side of the cable to the lighting arrestor as shown here. You can connect the cable to either of the two RF ports on the lightening arrestor.

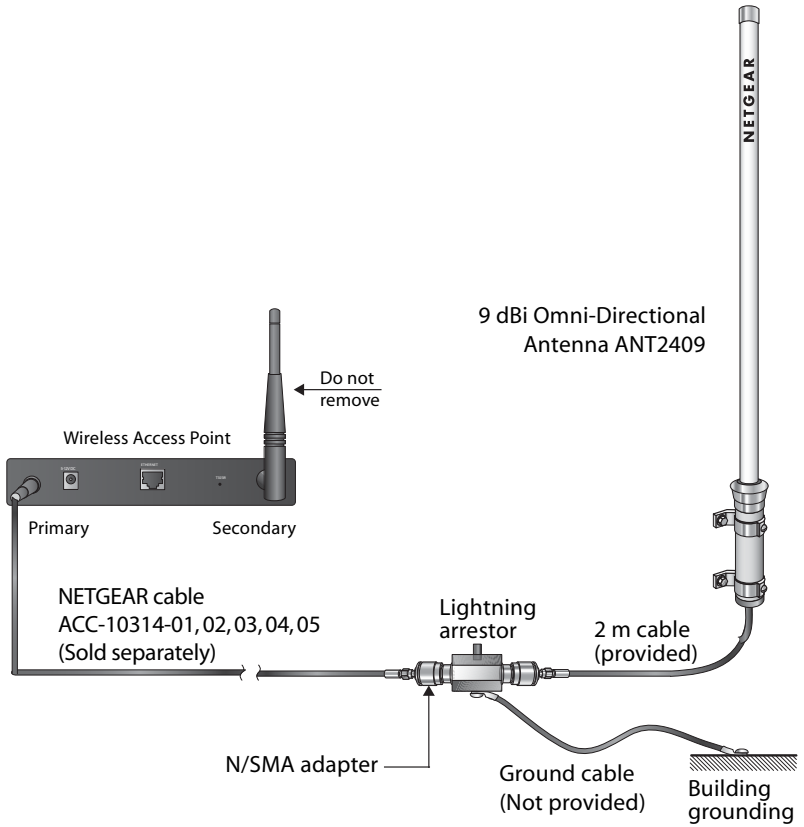


Figure 2-2: Antenna Assembly Installation Outdoors

3. Connect the grounding cable (not included) from the lightning arrestor to the ground of the building.

   Grounding cable: The grounding cable must be equivalent or better than: AWG 10, UL 1015, Stranded, 600 V, 105 °C, green or green/yellow insulation, 2 clip of 5.5 mm inner diameter cramped at both ends, cable no longer than 5 meters.

   WARNING: the lightning arrestor and appropriate ground cable must be used for outdoor installation. NETGEAR does not assume any responsibility in case of hazard resulting of non-compliance with these instructions.

4. Screw the N/SMA Reverse Adapter on the lightning arrestor (clockwise) on the second RF port. Connect a NETGEAR cable model ACC-10314-01, 02, 03, 04 or 05 (sold separately) to the adapter.

5. Locate the primary detachable antenna on the wireless access point. Remove the antenna and connect the other end of the NETGEAR cable ACC-10314-01, 02, 03, 04 or 05 to this port.

   NOTE: On access points with two antennas, if you are only replacing one antenna, be sure to replace the primary antenna and do not remove the secondary antenna.

6. After attaching your new 9 dBi antenna(s), reconnect your wireless device to the network and turn them on.

Connecting the Antenna for an Indoor Installation

1. Turn off your wireless unit.
2. In the procedure "First, Assemble and Mount the Antenna" on page 2-2, the antenna should have been assembled for indoor installation using a NETGEAR cable ACC-10314-01, 02, 03, 04 or 05 and the reverse N/SMA adaptor connected to the antenna. The provided 2m cable *should not* have been used.

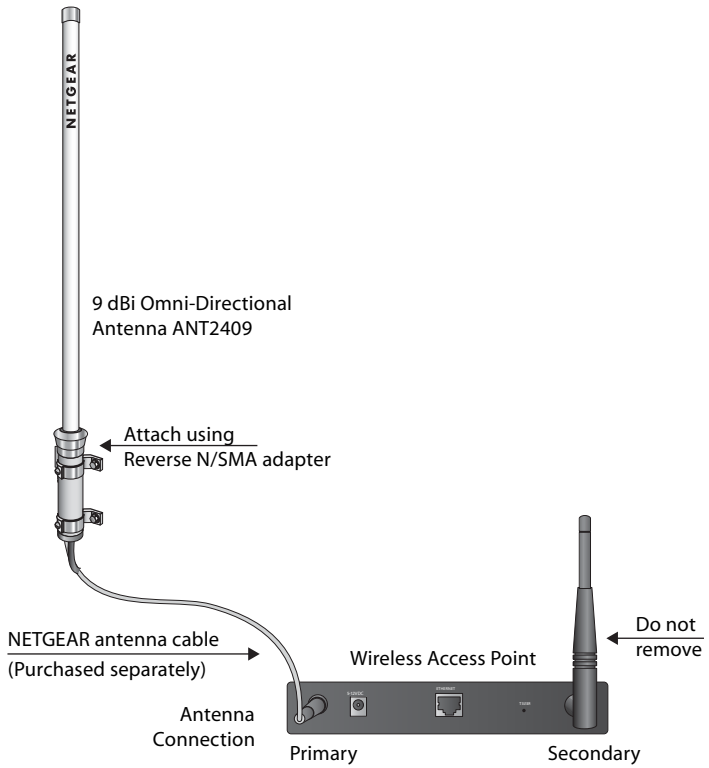


Figure 2-3: Antenna Assembly Installation Indoors

3. Locate the primary detachable antenna. Remove the antenna and connect the other end of the NETGEAR cable ACC-10314-01, 02, 03, 04 or 05 to this port.

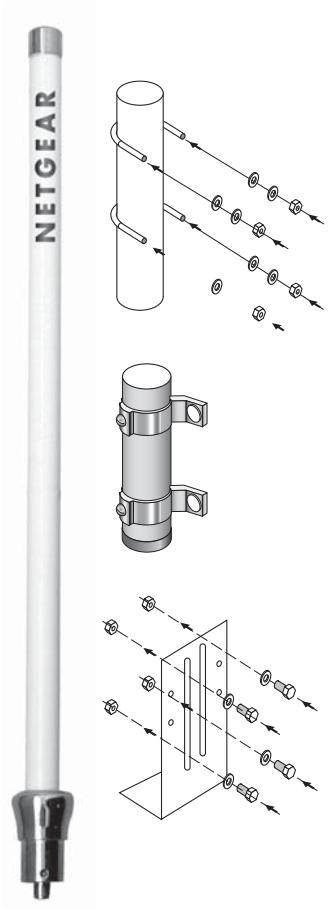
   NOTE: On access points with two antennas, if you are only replacing one antenna, be sure to replace the primary antenna and do not remove the secondary antenna.

4. After attaching your new 9dBi antenna, reconnect your wireless device to the network and turn it on.

Chapter 3
Specifications

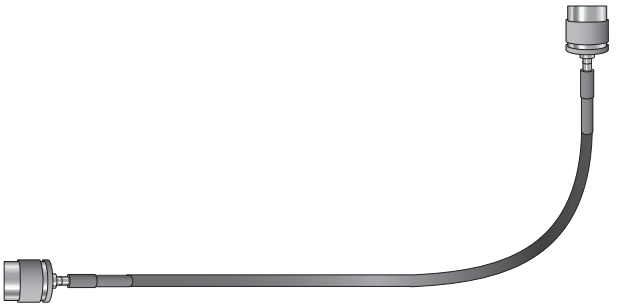
This chapter provides the 9 dBi Omni-directional Antenna specifications.

9 dBi Omni-directional Antenna and Mounting Assembly



Usage	OUTDOOR and INDOOR
Frequency Range	2400 - 2485 MHz
Type	Omnidirectional
Impedance	50 Ohms nominal
SWR	≤ 2.0
Return Loss	< -10 dB
Gain	8.5 dBi
Polarization	Vertical
Connector Type	Reverse N Female
Dimensions	22 mm (0.9 in) diameter, antenna element 610 mm (24 in) length
Maximum volume	Diameter: 44 mm (1.7 in) max. at antenna base Length: ~ 750 mm (30 in) max. for cabling with hardware
Hardware included	Guide pipe, grommet, 2 brackets, 2 U-bolts for pole fixation, L shape bracket, screws, washers, etc.
Antenna Color	White
Antenna Weight	0.9 kg (2 lbs)
Rust proof	Screws, washers, bracket, tube, antenna metal parts and connectors are rust proof.
Water	Water Resistant
UV	UV resistant
Temperature, Humidity	-30°C to +80 °C (-22 °F to 176 °F), 20 to 90% RH

2 Meter Antenna Cable



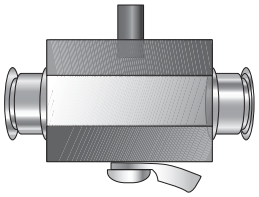
2 m cable

Frequency Range	0 - 3 GHz
VSWR	1.5 max.
Cable Type	HPF195 Harbour Industries
Transmission Loss	2.2 dB max. @ 2.4 - 2.5 GHz
Connector Type	2 N type Male reverse
Max. Working Voltage	250 Vrms min.
Minimum Bend Radius	25 mm (1 in)
Jacket	FRPBC Black, 0.195 in. diameter
Recommended coupling nut torque	229 mm.kg* to 559 mm.kg* (4.1 in lbs to 10.0 in lbs)
Coupling nut retention force	22 kg* (50 lbs) min.
Connector Body & Contact	Brass Per JIS H3250 C3604 BD, Plated
Insulation	PTFE Fluorocarbon Per ASTM D 1710
Storage, Transportation & Operating Temperature	- 40°C to + 75°C (-40 °F to 167 °F)
Storage, Transportation & Operating Humidity	20 to 95%RH
Waterproof	Water Resistant
UV	UV resistant

N/SMA Adaptor Accessory

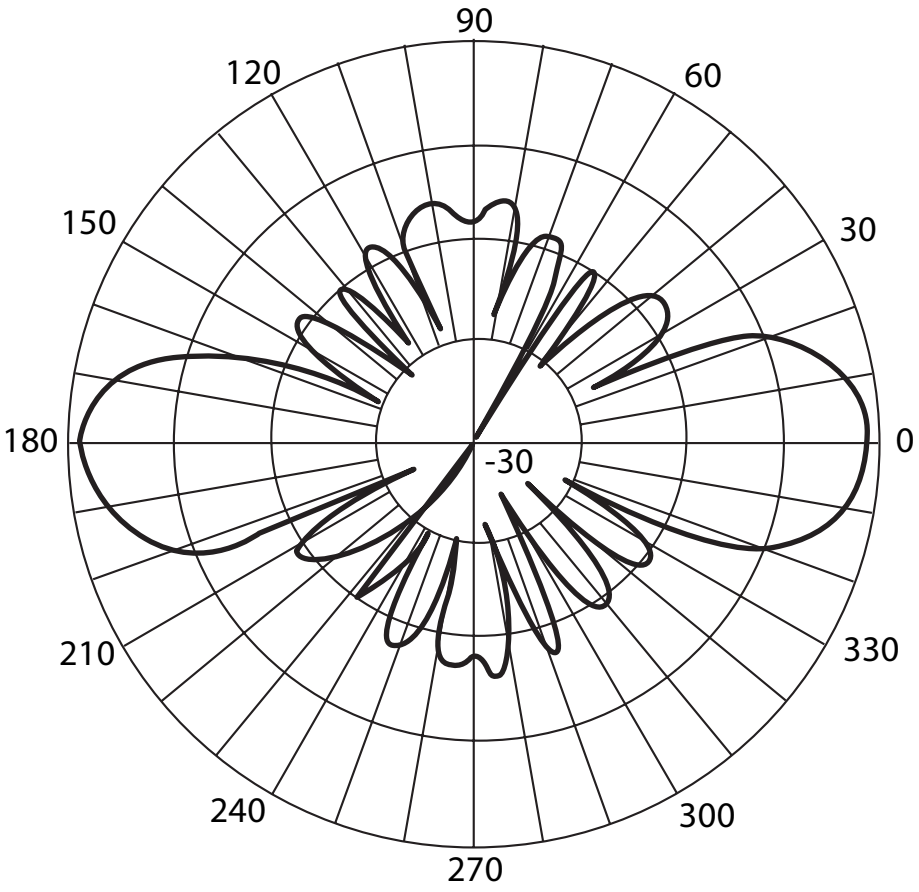
Frequency Range	0 - 3 GHz
VSWR	1.5 max.
Connector Type	N type Male reverse to SMA Female reverse
Insulation Resistance	1000 MOhms
Center Contact Resistance	6 mOhms
Outer Contact Resistance	2 mOhms
Working Voltage	500 V
Impedance	50 ± 5 Ohm
Body & Center Contacts	Brass
Insulation	PTFE
Gasket	Silicone Rubber
Storage & Operating Temperature	-30°C to +80°C (-22 °F to 176 °F)

Lightening Arrestor

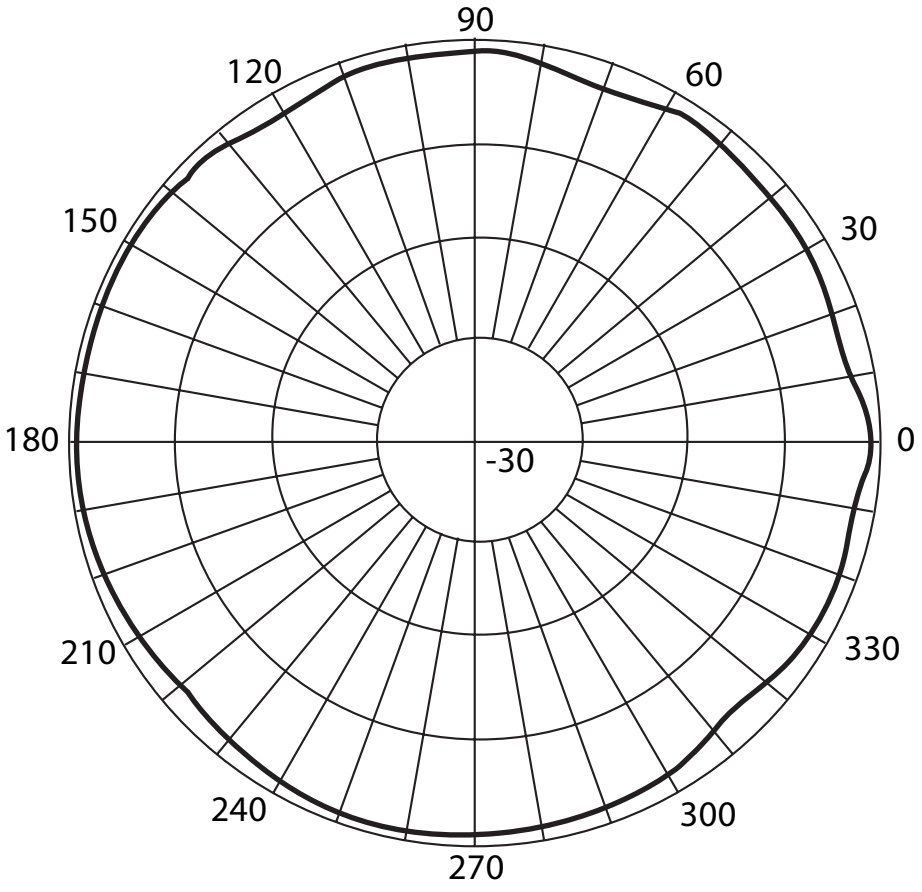


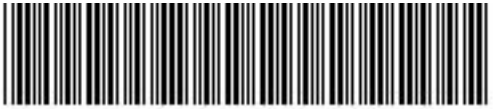
Frequency Range	0 to 3 GHz
VSWR	1.5 max.
Insertion Loss	1.2 dB max.
Impulse Breakdown Voltage	600 V min. (Voltage on upgrade ratio @100V/S)
Max. Power Rating	200 W
Impedance	50 ± 5 Ohm
Insulation Resistance	1000 MOhm
Max. Withstanding Current	5000 A, 8/20us
AC Current Range	20 A at voltage release=1S, testing period=5S, testing duration =3 min, per test
Pulse Current Range	200 A (at 10/1000us, wave =300, testing duration=3 min, per test)
Overvoltage Protection	150V min. (100mA, < 150ms)
Connectors	N type Female Reverse
Color	Black
Storage & Operating Temperature	-40 °C to +80°C (-40 °F to 176 °F)
Storage & Operating Humidity	20% to 95% RH
Waterproof	Water Resistant

Radiation Pattern: Elevation (Vertical plane)



Radiation Pattern: Azimuth (Horizontal plane)





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