



## Satellite IoT D2D Ready

# TN & NTN Dual-Mode Antenna Satellite IoT Direct to Device Ready

## Direct Mount Ground Plane Independent Antenna

Covering 4G/5G/Satellite Band 25, Wi-Fi & GNSS

The L001268 direct to device (D2D) antenna family has two variants offering two 4G/5G/Satellite Band 25 cellular ports with an optional GNSS port in a compact form factor.

The cellular bands operate in dual mode, being capable of communication with both satellites and terrestrial cellular base stations. As a ground plane independent antenna, this antenna can operate on both metallic and non-metallic surfaces. This feature combined with an IP67 rating makes this antenna an ideal solution for a broad range of IoT applications in both indoor and outdoor environments.

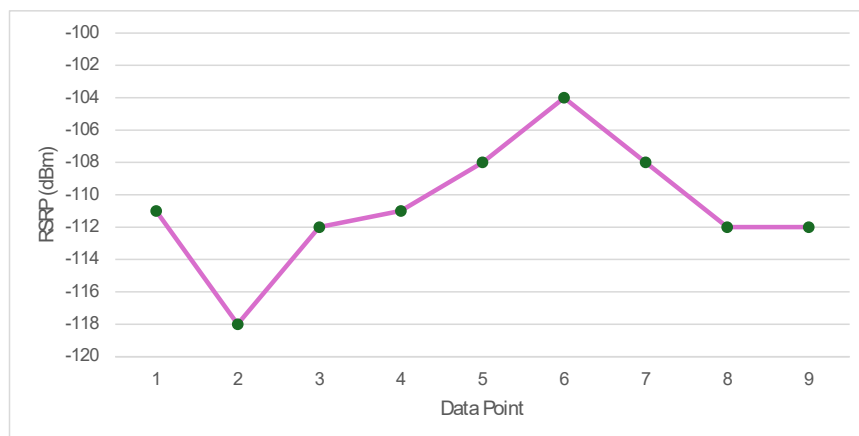
## SATELLITE IOT D2D COMMUNICATIONS

Low Earth Orbit (LEO) satellites, positioned a few hundred miles (km) above Earth, orbit rapidly and are ideal for IoT networks. A LEO satellite constellation can now support low data rate communications through specific LTE frequencies. Future upgrades are expected to support higher data rates and voice-grade services capable of calls or sending small files.

- Dual-mode capable - Supporting Terrestrial Networks (TN) and Non-Terrestrial Networks (NTN) from a single antenna
  - 698-3800 MHz terrestrial cellular coverage
  - Band 25 (1900 MHz) cellular satellite coverage
    - Testing available for other/future cellular satellite D2D frequency bands used by various network providers
- Enabling dual-mode communications via IoT devices
  - Prioritizing terrestrial networks but capable of automatically switching to satellite when the signal is weak or unavailable

## REFERENCE SIGNAL RECEIVED POWER (RSRP) VALUES

The L001268-02 antenna was live-tested for receive signal strength. Data encompasses multiple satellite pass-overs, showing signal strength variation; exceeding the -120 dBm minimum for IoT devices.



An RSRP value of -120 dBm is generally the recognized minimum requirement suitable for SMS connectivity.

RSRP can be susceptible to fluctuations for a variety of reasons. These can include: satellite elevation angle; antenna radiation patterns; solar flares; atmospheric conditions, and more.

## FEATURES AND BENEFITS

- Validated for use on satcom D2D networks
- Dual-Mode TN and NTN capable
- MIMO 4G/5G cellular with optional GNSS from a single antenna
- Supports CAT-M, CAT-1 to CAT-4, and NB-IoT
- Suitable for mounting on a variety of surfaces
- Radome is paintable using commonly available spray paints (must not contain metal)
- Ground plane independent, low profile, rugged and less prone to vandalizing

## APPLICATIONS

- Non-Terrestrial and Terrestrial Networks
- Satellite IoT D2D (Direct to Device) applications
- IoT endpoints
- Digital display and signage
- EV charging
- Smart lockers and storage
- Ticketing systems
- Smart terminals
- Data monitoring

| ELECTRICAL SPECIFICATION                 |                        |         |           |           |
|------------------------------------------|------------------------|---------|-----------|-----------|
|                                          | 4G/5G Cellular         |         |           |           |
| Operating Frequency (MHz)                | 698-760                | 760-960 | 1690-2690 | 3300-3800 |
| Free Space Performance                   |                        |         |           |           |
| VSWR - Typical                           | <2.0:1                 | <1.75:1 | <2.0:1    | <2.0:1    |
| Efficiency (%) Average                   | >40                    | >40     | >55       | >40       |
| Peak Gain (dBi)                          | 2.0                    | 2.8     | 3.0       | 3.0       |
| On Metallic Ground Plane Performance     |                        |         |           |           |
| VSWR - Typical                           | <3.5:1                 | <2.5:1  | <2.0:1    | <2.0:1    |
| Efficiency (%) Average                   | >40                    | >40     | >50       | >35       |
| Peak Gain (dBi)                          | 2.0                    | 2.9     | 4.8       | 6.0       |
| Isolation Between Cellular Elements (dB) | >-10                   |         |           |           |
| Input Max Power (W)                      | 20                     |         |           |           |
| Polarization                             | Linear                 |         |           |           |
| Azimuth Beamwidth                        | 360 °, Omnidirectional |         |           |           |

Measured with a 3.3 ft (1 m) cable, with and without a 2 ft (0.6m) diameter ground plane

| ELECTRICAL SPECIFICATION - GNSS                      |                                                                   |
|------------------------------------------------------|-------------------------------------------------------------------|
| Frequency (MHz)                                      | 1559-1606                                                         |
| Passive Antenna Gain (dBi)                           | 3.0                                                               |
| LNA Gain @ Room Temperature (dB)                     | 26 ± 3                                                            |
| Noise Figure @ Room Temperature (dB)                 | < 2.8                                                             |
| Max VSWR @ Room Temperature                          | < 2.0:1                                                           |
| Polarization                                         | RHCP                                                              |
| Nominal Impedance (ohm)                              | 50                                                                |
| Operating Supply Voltage (Vdc)                       | 2.5-7.0                                                           |
| Current Consumption, Max @ room temp. (mA)           | 11.5 @ 3.0V                                                       |
| Out-of-band Signal Rejection, Min @ room temp. (dBc) | 80 @ 1 – 1525 MHz<br>80 @ 1428 – 2700 MHz<br>70 @ 4900 – 5800 MHz |

## MECHANICAL SPECIFICATION

|                                   |                                            |
|-----------------------------------|--------------------------------------------|
| Dimensions - L x W x H - mm (in.) | 150 x 45 x 50 (5.90 x 1.77 x 1.97)         |
| Weight - g (oz.)                  | 2 Port - 173 (6.10)<br>3 Port - 199 (7.02) |
| Mounting                          | M16 Stud                                   |
| Radome                            | ASA (Black)                                |
| Cable                             | RG174 (3.3 feet / 1m)                      |
| Connector                         | Cellular - SMA, GNSS - SMA                 |

## ENVIRONMENTAL SPECIFICATION

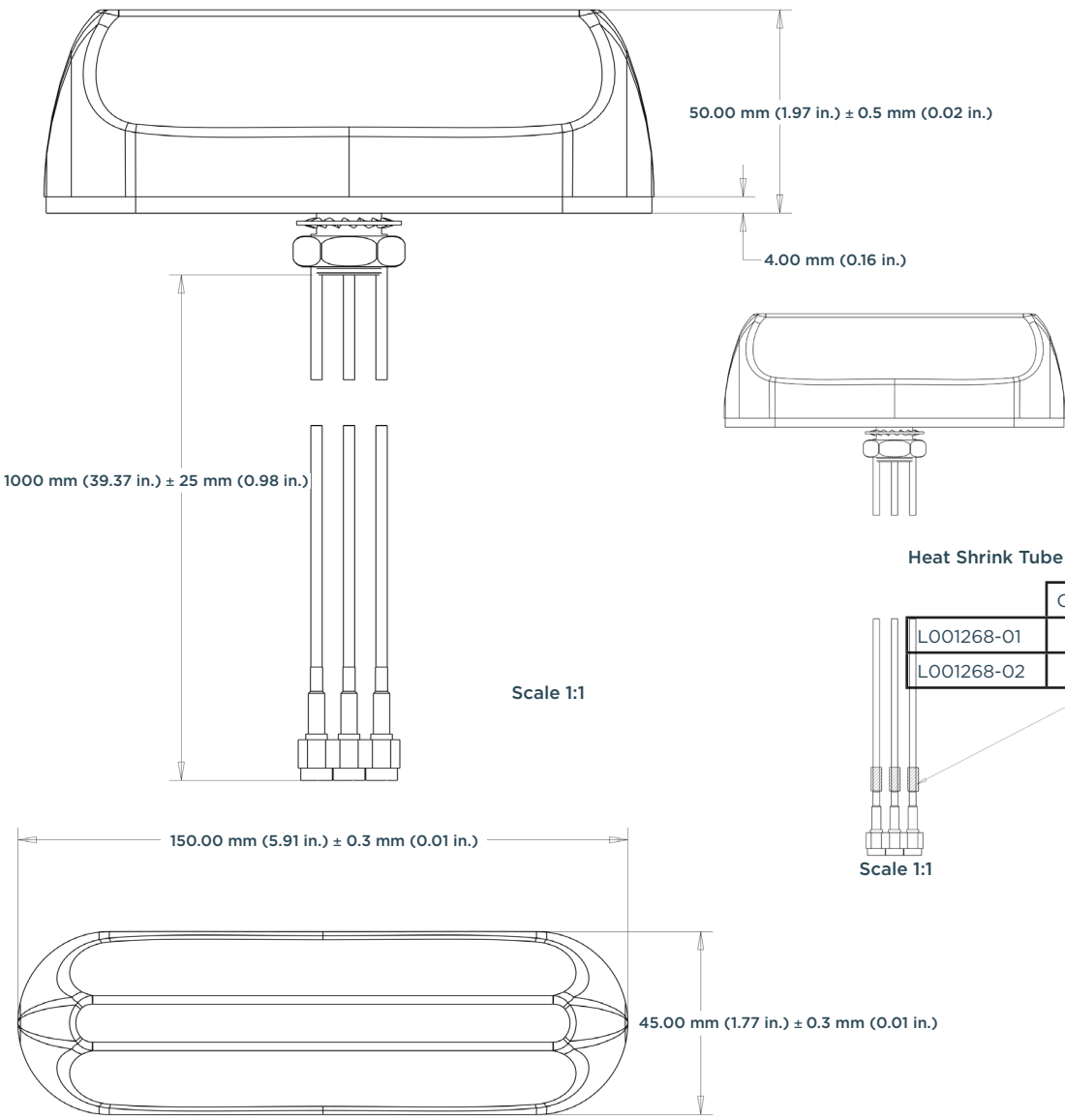
|                                 |                                       |
|---------------------------------|---------------------------------------|
| Operating Temperature - °C (°F) | -40 to +85°C (-40 to +185°F)          |
| Storage Temperature - °C (°F)   | -40 to +85°C (-40 to +185°F)          |
| Ingress Protection (IP Rating)  | IP67                                  |
| Material Substance Compliance   | RoHS Compliant<br>CE & UKCA Compliant |

| PART NUMBER | PORT COUNT | FREQUENCY COVERAGE                                              | CONNECTOR                        |
|-------------|------------|-----------------------------------------------------------------|----------------------------------|
| L001268-01  | 2          | 4G/5G Cellular x 2 - 698 - 3800 MHz                             | SMA Female x 2                   |
| L001268-02  | 3          | 4G/5G Cellular x 2 - 698 - 3800 MHz<br>GNSS x 1 - 1559-1606 MHz | SMA Female x 2<br>SMA Female x 1 |

## GLOBAL 4G/5G CELLULAR COVERAGE

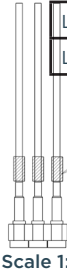
| RF BANDS                                                                                                             | FREQUENCY     |
|----------------------------------------------------------------------------------------------------------------------|---------------|
| 12, 13, 14, 17, 28, 29, 44, 67, 68, 85<br>N12, N14, N28, N29, N83                                                    | 698-806 MHz   |
| 5, 6, 8, 18, 19, 20, 26, 27<br>N5, N8, N18, N20, N81, N82, N89, N91, N92, N93, N94                                   | 807-960 MHz   |
| 1, 2, 3, 4, 9, 10, 15, 16, 23, 25, 33, 34, 35, 36, 37, 39, 65, 66, 70<br>N34, N39, N65, N66, N70, N80, N84, N86, N95 | 1690-2200 MHz |
| 7, 30, 38, 40, 41, 69 N30,<br>N38, N40, N41, N90                                                                     | 2200-2700 MHz |
| 22, 42, 43, 48<br>N48, N78                                                                                           | 3300-3800 MHz |

MECHANICAL DRAWINGS



Heat Shrink Tube Identification

|            | Cellular 1 | Cellular 2 | GNSS  |
|------------|------------|------------|-------|
| L001268-01 | Yellow     | Yellow     | -     |
| L001268-02 | Yellow     | Yellow     | White |



## RADIATION PATTERNS - 4G/5G CELLULAR

### Key

4G/5G Cellular Port 1 Measured in Free Space

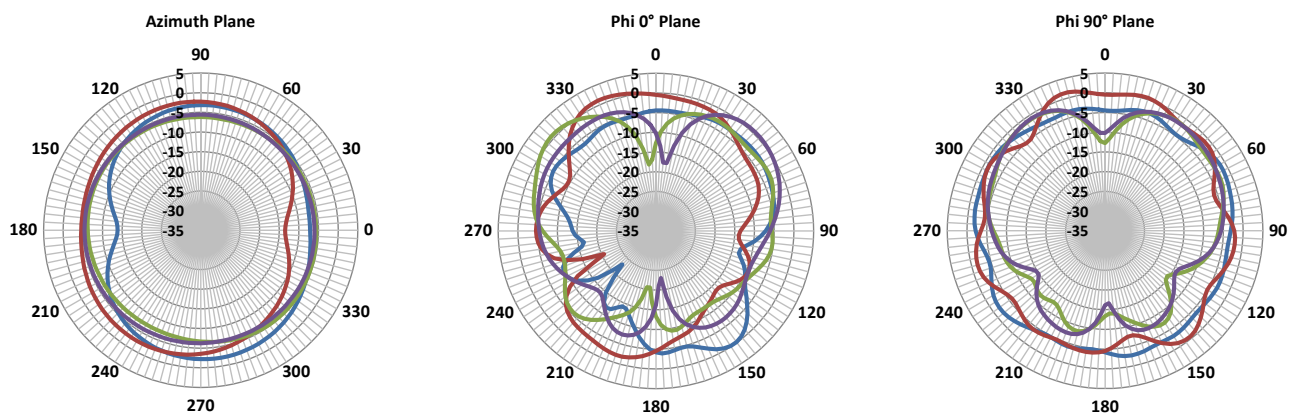
4G/5G Cellular Port 2 Measured in Free Space

4G/5G Cellular Port 1 Measured with Ground Plane

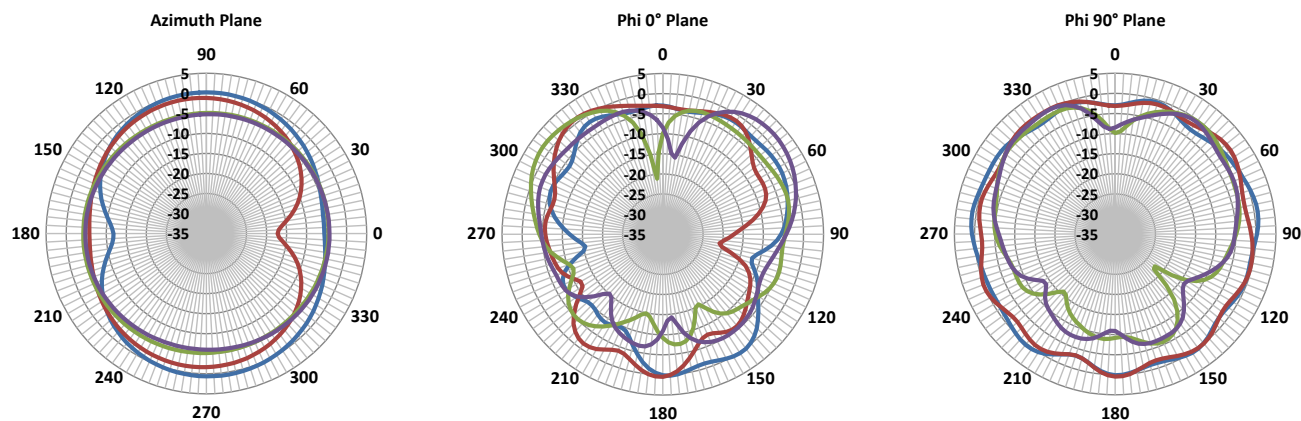
4G/5G Cellular Port 2 Measured with Ground Plane

**Note** - A label on the antenna base indicates the direction of 0° for ease of orientation and placement.

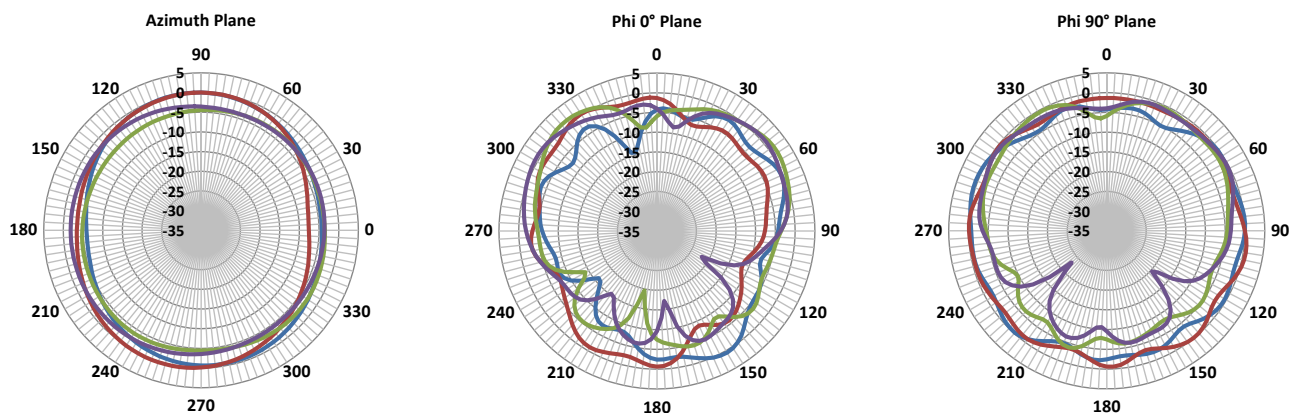
### Radiation Patterns at 698 MHz



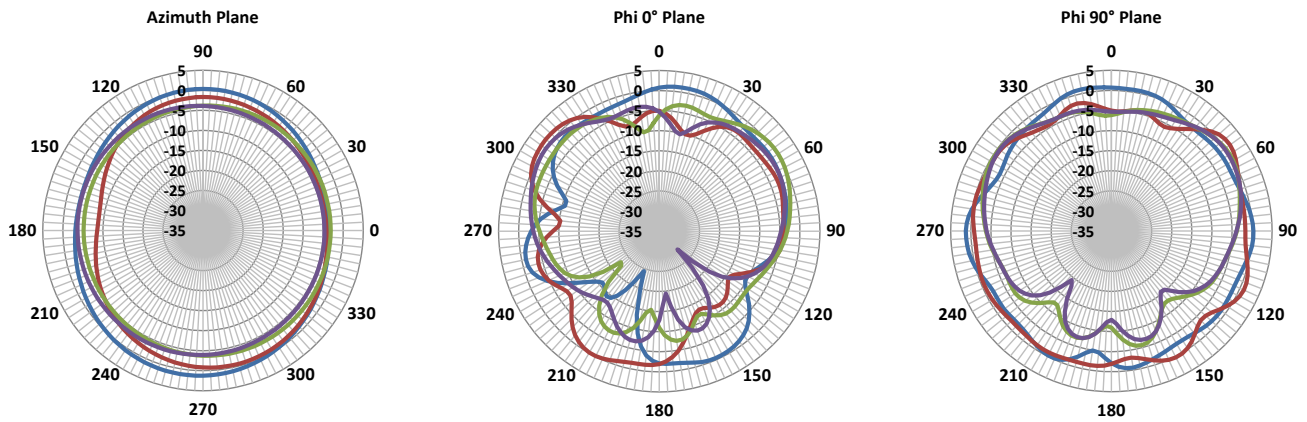
### Radiation Patterns at 750 MHz



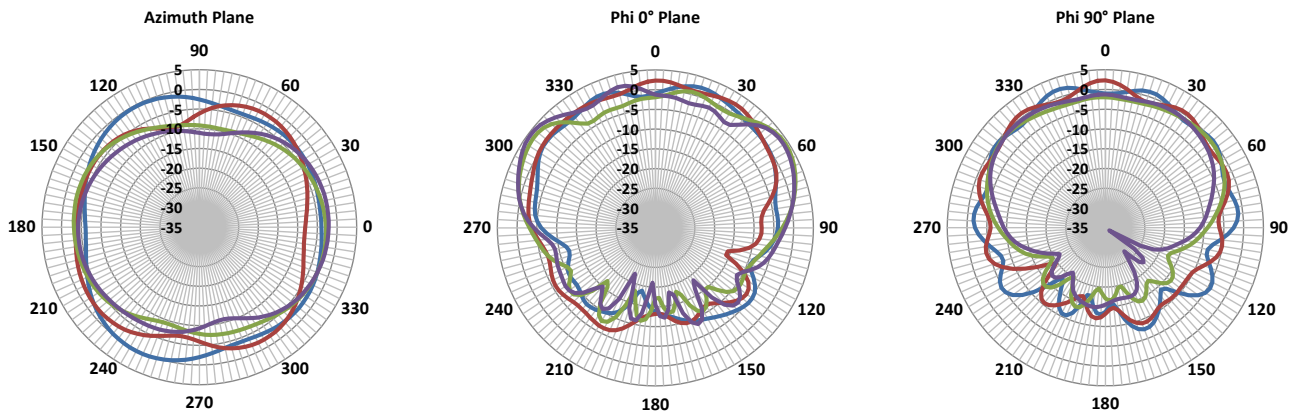
### Radiation Pattern at 850 MHz



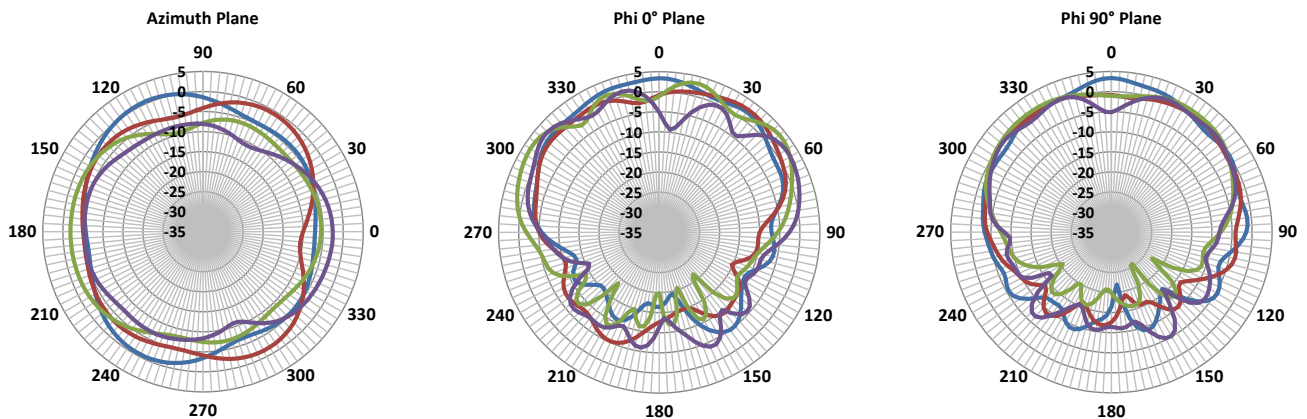
## Radiation Pattern at 960 MHz



## Radiation Pattern at 1690 MHz

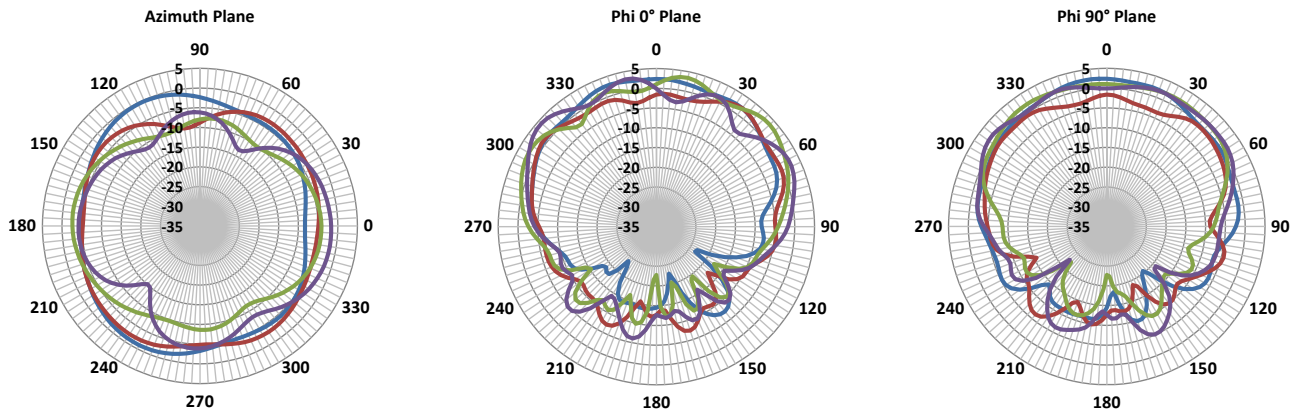


## Radiation Pattern at 1800 MHz

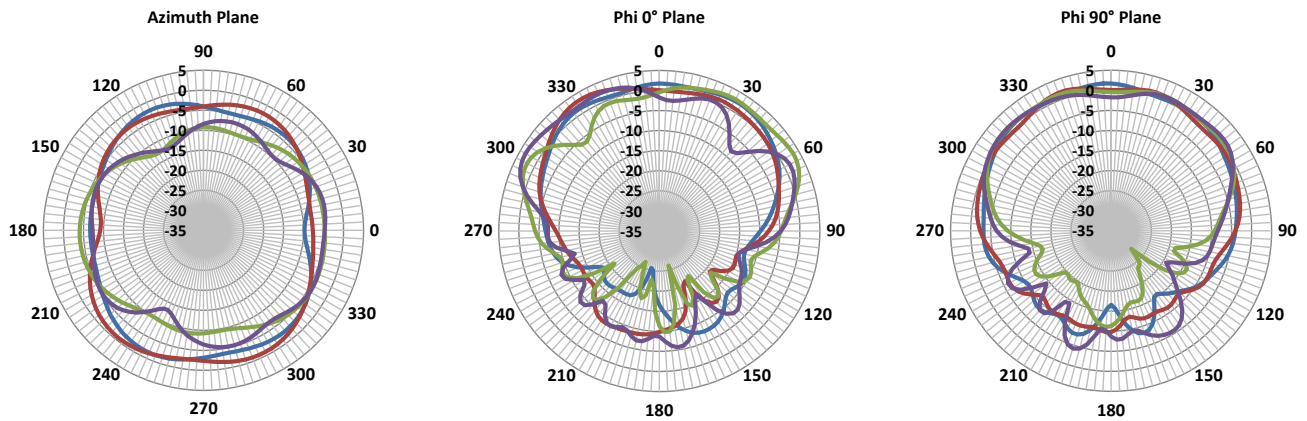




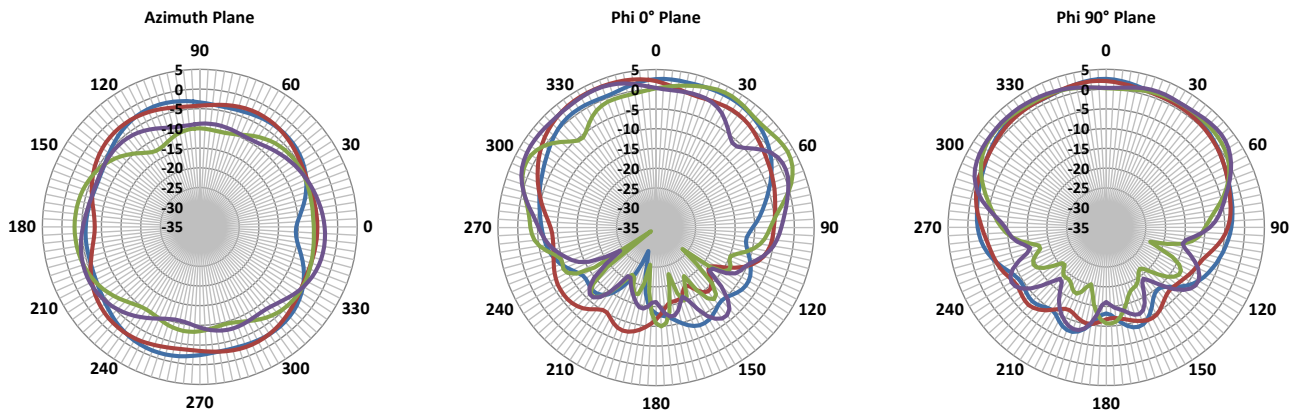
## Radiation Pattern at 1900 MHz



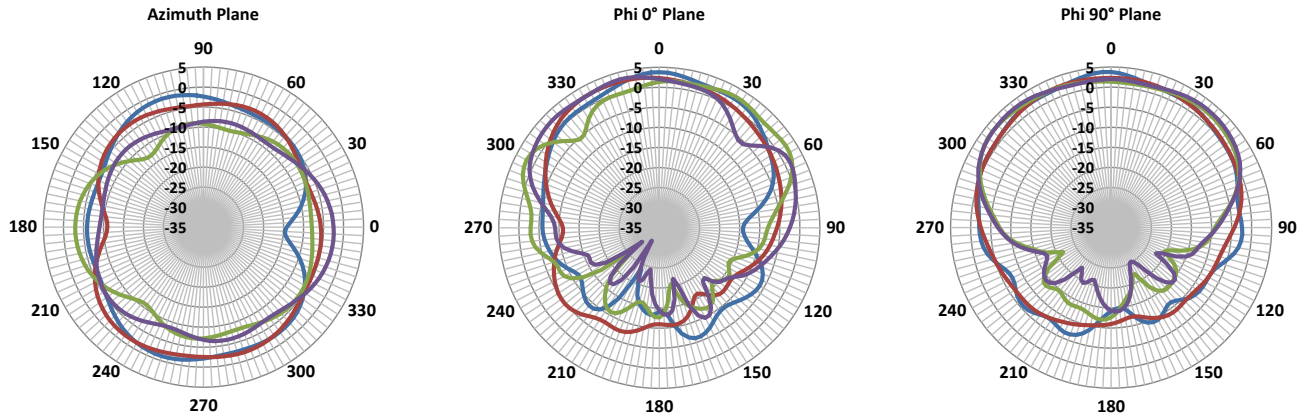
## Radiation Pattern at 2100 MHz



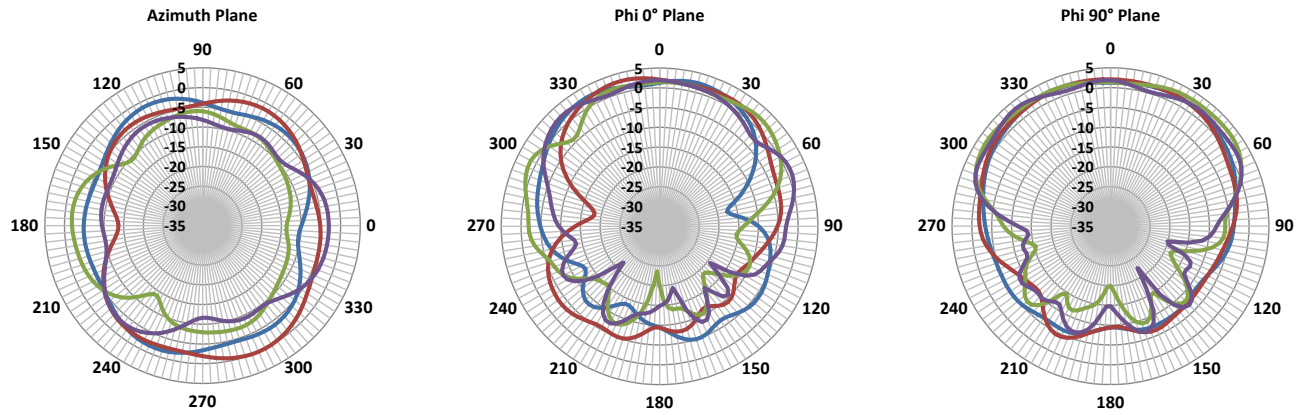
## Radiation Pattern at 2200 MHz



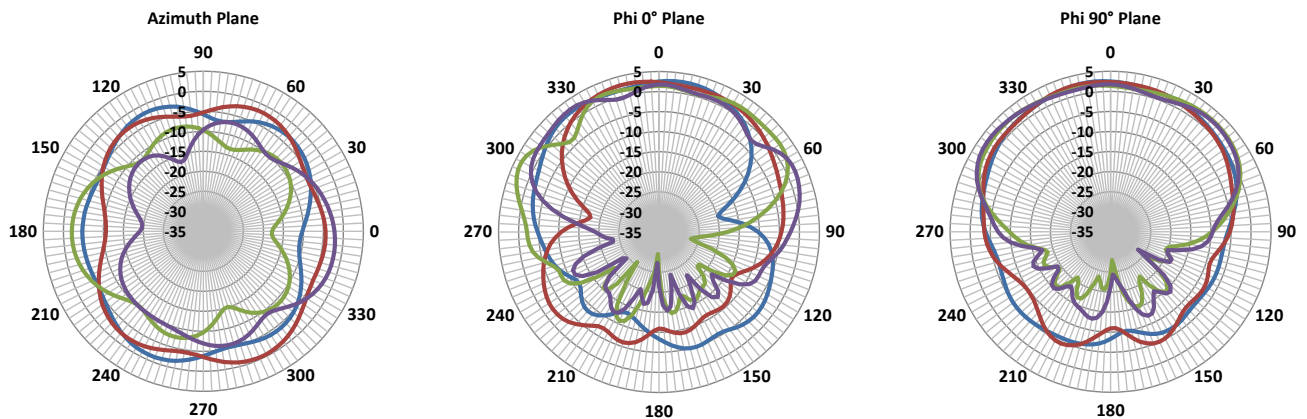
## Radiation Pattern at 2300 MHz



## Radiation Pattern at 2500 MHz

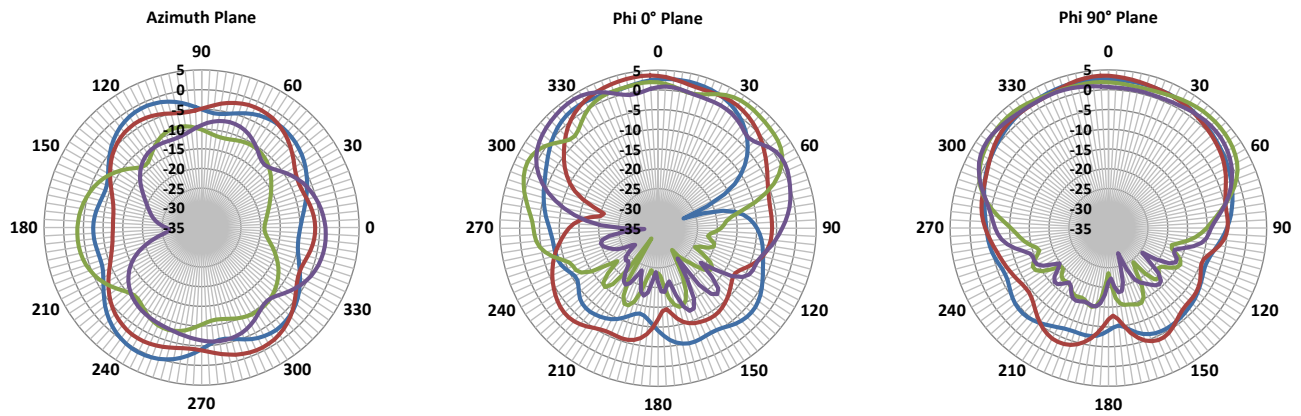


## Radiation Pattern at 2600 MHz

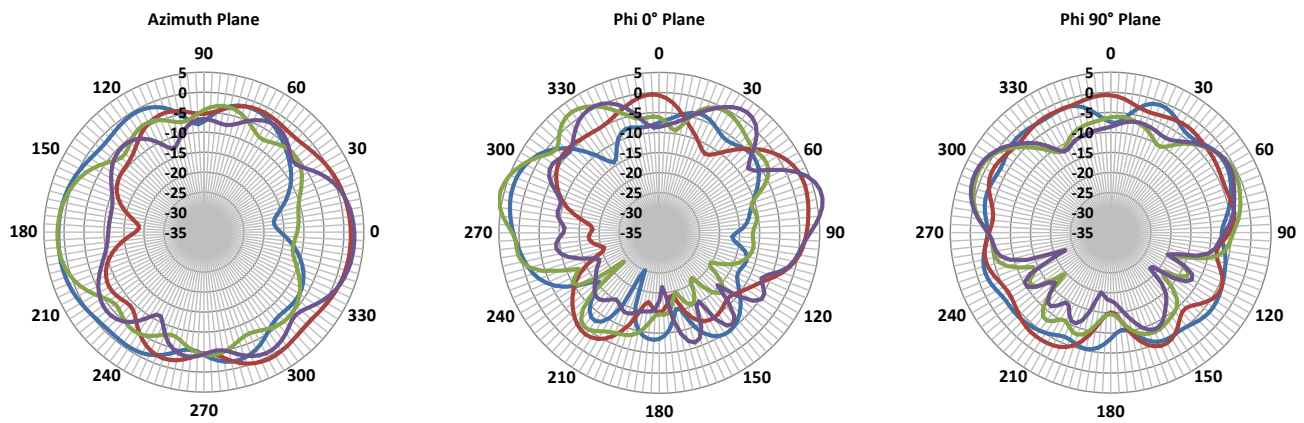




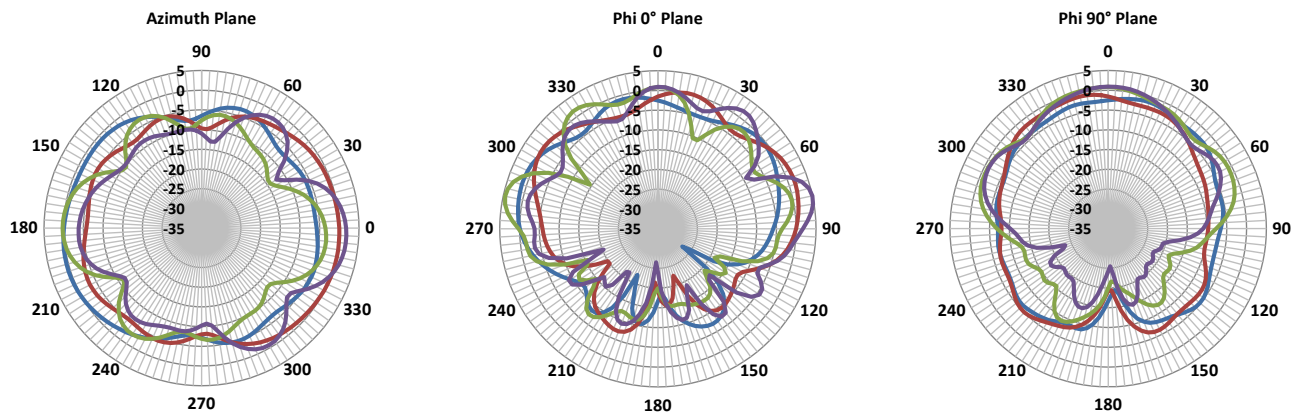
## Radiation Pattern at 2690 MHz



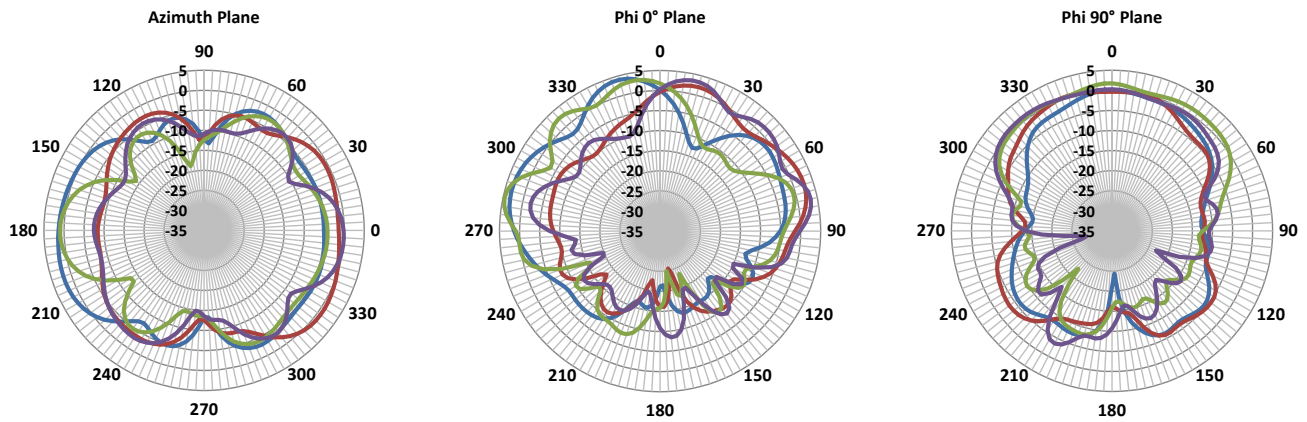
## Radiation Pattern at 3300 MHz



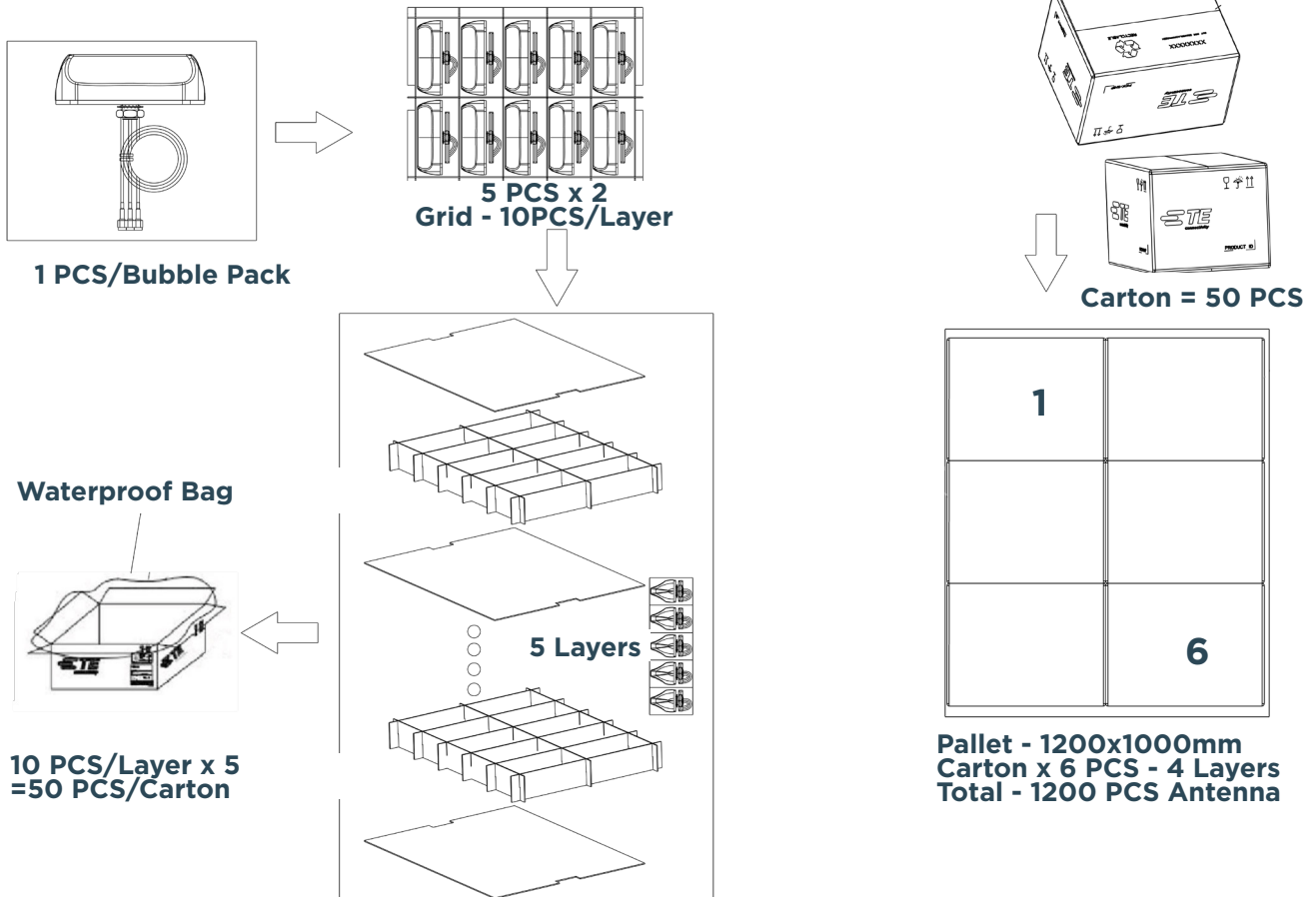
## Radiation Pattern at 3500 MHz



## Radiation Pattern at 3800 MHz



## PACKING INFORMATION



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