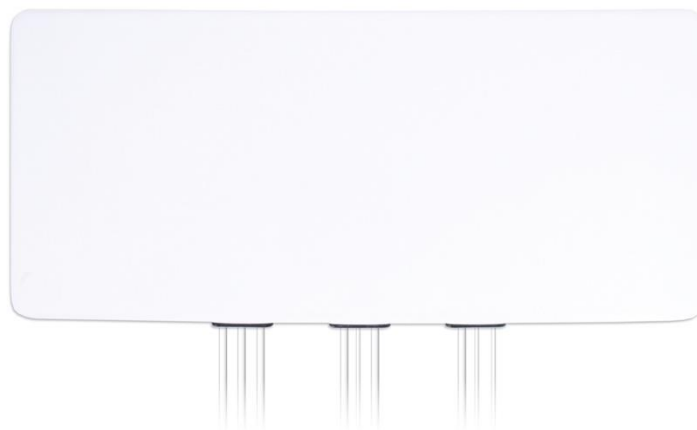


Specification

| | | |
|--------------|---|--|
| Part No. | : | MA9909.W.A.002 |
| Product Name | : | GuardianX 9-in-1 GNSS & 8*LTE MIMO Antenna 1*Active GNSS with RG-174 & SMA(M) 8*4G MIMO with TGC-200 & SMA(M) |
| Features | : | Low-profile Wall Mount Multi-antenna 1* GPS-GLONASS-Galileo Antenna 8* 4G 698 to 960MHz/1710 to 2170MHz/ 2490 to 2690MHz/ 3300 to 3600MHz Worldwide 4G Bands including 3G and 2G Cables: 3m Low Loss TGC-200 and RG174 Connectors: SMA(M) IP67 Rated Waterproof Enclosure Dimensions: 360 * 160 * 16.5mm RoHS & REACH Compliant |



1.Introduction

The Taoglas GuardianX MA9909.W.A.002 is a low profile heavy duty, fully IP67 waterproof external antenna. Combining 9 elements into one antenna, 1 GPS/GLONASS/Galileo, 8* 4G MIMO (698 to 960MHz/1710 to 2170MHz/ 2490 to 2690MHz/ 3300 to 3600MHz. This unique product delivers powerful worldwide 4G LTE MIMO antenna technology at 700MHz/800MHz/1700MHz/1800MHz/2600MHz.

Typical applications include:

- Passenger Bus / Rail / Air Applications.
- Automotive and Heavy Equipment Vehicle Tracking and Telematics
- Remote Asset and Pipeline Monitoring
- HD Video over LTE
- First Responder and Emergency Services
- M2M Applications/IoT

4G applications demand high speed data uplink and downlink. High efficiency and high gain MIMO antennas are necessary to achieve the required signal to noise ratio and throughput required to solve these challenges. Taoglas also takes care to have high isolation between the two MIMO antennas to prevent self-interference. Low loss cables are used to keep efficiency high over long cable lengths. In contrast, smaller MIMO antennas with poorer quality thinner cables will have much reduced efficiency and isolation, which would lead to a large drop in system throughput, increased number of drops, and may indeed not make a system connection at all.

Cable length and connector types are customizable. Contact your regional Taoglas customer support team for further information.

2. Specification

| 2G/3G/4G MIMO Antenna | | | | | | | | |
|-----------------------|------|---------|---------|---------|-----------|-----------|-----------|-----------|
| Frequency (MHz) | | LTE700 | GSM850 | GSM900 | DCS | PCS | UMTS1 | LTE2600 |
| | | 698~806 | 824~894 | 880~960 | 1710~1880 | 1850~1990 | 1920~2170 | 2490~2690 |
| Efficiency (%) | | | | | | | | |
| LTE1 | 0.3M | 40.43 | 46.11 | 55.89 | 48.39 | 52.24 | 59.34 | 48.34 |
| | 1M | 38.32 | 44.05 | 53.36 | 44.13 | 47.66 | 54.74 | 44.09 |
| | 2M | 35.76 | 40.36 | 48.67 | 39.33 | 42.11 | 47.96 | 38.32 |
| | 3M | 33.11 | 37.49 | 45.22 | 34.96 | 37.09 | 42.41 | 33.39 |
| | 5M | 30.67 | 34.83 | 42.02 | 31.08 | 32.68 | 37.51 | 29.10 |
| LTE2 | 0.3M | 29.45 | 29.73 | 31.73 | 17.97 | 54.87 | 67.07 | 68.57 |
| | 1M | 27.95 | 28.40 | 30.30 | 16.77 | 50.04 | 61.15 | 63.21 |
| | 2M | 26.09 | 26.03 | 27.64 | 14.95 | 44.60 | 54.04 | 55.36 |
| | 3M | 24.14 | 24.17 | 25.69 | 13.44 | 39.64 | 47.58 | 48.97 |
| | 5M | 22.34 | 22.45 | 23.88 | 12.09 | 35.23 | 41.90 | 43.31 |
| LTE3 | 0.3M | 42.76 | 53.50 | 53.81 | 56.38 | 63.42 | 65.38 | 46.32 |
| | 1M | 40.55 | 51.09 | 51.38 | 51.41 | 57.85 | 60.26 | 42.24 |
| | 2M | 37.84 | 46.81 | 46.86 | 45.82 | 51.13 | 52.79 | 36.70 |
| | 3M | 35.02 | 43.49 | 43.58 | 40.73 | 45.02 | 46.68 | 31.95 |
| | 5M | 32.42 | 40.40 | 40.53 | 36.20 | 39.64 | 41.28 | 27.82 |
| LTE4 | 0.3M | 34.69 | 38.21 | 33.37 | 44.24 | 40.48 | 39.12 | 54.81 |
| | 1M | 32.90 | 36.49 | 31.86 | 40.36 | 36.93 | 36.03 | 49.99 |
| | 2M | 30.70 | 33.44 | 29.06 | 35.97 | 32.67 | 31.60 | 43.44 |
| | 3M | 28.42 | 31.06 | 27.04 | 31.98 | 28.75 | 27.90 | 37.83 |
| | 5M | 26.31 | 28.85 | 25.15 | 28.43 | 25.30 | 24.64 | 32.95 |
| LTE5 | 0.3M | 33.63 | 37.30 | 33.06 | 44.90 | 39.93 | 38.90 | 54.66 |
| | 1M | 31.89 | 35.63 | 31.57 | 40.96 | 36.40 | 35.82 | 49.84 |
| | 2M | 29.76 | 32.65 | 28.80 | 36.51 | 32.21 | 31.43 | 43.30 |
| | 3M | 27.54 | 30.32 | 26.78 | 32.46 | 28.34 | 27.74 | 37.71 |
| | 5M | 25.49 | 28.16 | 24.91 | 28.86 | 24.94 | 24.49 | 32.84 |
| LTE6 | 0.3M | 43.09 | 51.93 | 52.88 | 55.26 | 64.68 | 66.42 | 45.37 |
| | 1M | 40.85 | 49.59 | 50.50 | 50.41 | 58.99 | 61.21 | 41.39 |
| | 2M | 38.13 | 45.43 | 46.06 | 44.93 | 52.14 | 53.63 | 35.95 |
| | 3M | 35.29 | 42.21 | 42.83 | 39.93 | 45.90 | 47.42 | 31.30 |
| | 5M | 32.67 | 39.21 | 39.83 | 35.49 | 40.42 | 41.94 | 27.26 |
| LTE7 | 0.3M | 29.19 | 30.19 | 32.01 | 49.76 | 66.45 | 65.00 | 36.72 |
| | 1M | 27.72 | 28.84 | 30.58 | 45.38 | 60.59 | 59.89 | 33.48 |
| | 2M | 25.87 | 26.43 | 27.89 | 40.44 | 53.56 | 52.47 | 29.09 |
| | 3M | 23.93 | 24.55 | 25.92 | 35.93 | 47.15 | 46.40 | 25.34 |
| | 5M | 22.14 | 22.80 | 24.09 | 31.92 | 41.51 | 41.04 | 22.07 |
| LTE8 | 0.3M | 38.75 | 50.32 | 54.81 | 45.83 | 52.11 | 59.53 | 46.12 |
| | 1M | 36.71 | 48.07 | 52.34 | 41.79 | 47.53 | 54.90 | 42.07 |
| | 2M | 34.26 | 44.05 | 47.74 | 37.25 | 41.99 | 48.09 | 36.57 |

| | | | | | | | | |
|--------------------------|------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | | | | |
| | 3M | 31.73 | 40.91 | 44.38 | 33.11 | 36.99 | 42.53 | 31.86 |
| | 5M | 29.39 | 38.01 | 41.26 | 29.43 | 32.59 | 37.62 | 27.77 |
| Average Gain (dB) | | | | | | | | |
| LTE1 | 0.3M | -3.93 | -3.36 | -2.53 | -3.15 | -2.82 | -2.27 | -3.16 |
| | 1M | -4.17 | -3.56 | -2.73 | -3.55 | -3.22 | -2.62 | -3.56 |
| | 2M | -4.47 | -3.94 | -3.13 | -4.05 | -3.76 | -3.19 | -4.17 |
| | 3M | -4.80 | -4.26 | -3.45 | -4.56 | -4.31 | -3.73 | -4.76 |
| | 5M | -5.13 | -4.58 | -3.77 | -5.08 | -4.86 | -4.26 | -5.36 |
| LTE2 | 0.3M | -5.31 | -5.27 | -4.99 | -7.46 | -2.61 | -1.73 | -1.64 |
| | 1M | -5.54 | -5.47 | -5.19 | -7.75 | -3.01 | -2.14 | -1.99 |
| | 2M | -5.84 | -5.85 | -5.59 | -8.25 | -3.51 | -2.67 | -2.57 |
| | 3M | -6.17 | -6.17 | -5.90 | -8.72 | -4.02 | -3.23 | -3.10 |
| | 5M | -6.51 | -6.49 | -6.22 | -9.18 | -4.53 | -3.78 | -3.63 |
| LTE3 | 0.3M | -3.69 | -2.72 | -2.69 | -2.49 | -1.98 | -1.85 | -3.34 |
| | 1M | -3.92 | -2.92 | -2.89 | -2.89 | -2.38 | -2.20 | -3.74 |
| | 2M | -4.22 | -3.30 | -3.29 | -3.39 | -2.91 | -2.77 | -4.35 |
| | 3M | -4.56 | -3.62 | -3.61 | -3.90 | -3.47 | -3.31 | -4.96 |
| | 5M | -4.89 | -3.94 | -3.92 | -4.41 | -4.02 | -3.84 | -5.56 |
| LTE4 | 0.3M | -4.60 | -4.18 | -4.77 | -3.54 | -3.93 | -4.08 | -2.61 |
| | 1M | -4.83 | -4.38 | -4.97 | -3.94 | -4.33 | -4.43 | -3.01 |
| | 2M | -5.13 | -4.76 | -5.37 | -4.44 | -4.86 | -5.00 | -3.62 |
| | 3M | -5.46 | -5.08 | -5.68 | -4.95 | -5.41 | -5.54 | -4.22 |
| | 5M | -5.80 | -5.40 | -5.99 | -5.46 | -5.97 | -6.08 | -4.82 |
| LTE5 | 0.3M | -4.73 | -4.28 | -4.81 | -3.48 | -3.99 | -4.10 | -2.62 |
| | 1M | -4.96 | -4.48 | -5.01 | -3.88 | -4.39 | -4.46 | -3.02 |
| | 2M | -5.26 | -4.86 | -5.41 | -4.38 | -4.92 | -5.03 | -3.63 |
| | 3M | -5.60 | -5.18 | -5.72 | -4.89 | -5.48 | -5.57 | -4.24 |
| | 5M | -5.94 | -5.50 | -6.04 | -5.40 | -6.03 | -6.11 | -4.84 |
| LTE6 | 0.3M | -3.66 | -2.85 | -2.77 | -2.58 | -1.89 | -1.78 | -3.43 |
| | 1M | -3.89 | -3.05 | -2.97 | -2.97 | -2.29 | -2.13 | -3.83 |
| | 2M | -4.19 | -3.43 | -3.37 | -3.47 | -2.83 | -2.71 | -4.44 |
| | 3M | -4.52 | -3.75 | -3.68 | -3.99 | -3.38 | -3.24 | -5.04 |
| | 5M | -4.86 | -4.07 | -4.00 | -4.50 | -3.93 | -3.77 | -5.65 |
| LTE7 | 0.3M | -5.35 | -5.20 | -4.95 | -3.03 | -1.77 | -1.87 | -4.35 |
| | 1M | -5.57 | -5.40 | -5.15 | -3.43 | -2.18 | -2.23 | -4.75 |
| | 2M | -5.87 | -5.78 | -5.55 | -3.93 | -2.71 | -2.80 | -5.36 |
| | 3M | -6.21 | -6.10 | -5.86 | -4.45 | -3.27 | -3.33 | -5.96 |
| | 5M | -6.55 | -6.42 | -6.18 | -4.96 | -3.82 | -3.87 | -6.56 |
| LTE8 | 0.3M | -4.12 | -2.98 | -2.61 | -3.39 | -2.83 | -2.25 | -3.36 |
| | 1M | -4.35 | -3.18 | -2.81 | -3.79 | -3.23 | -2.60 | -3.76 |
| | 2M | -4.65 | -3.56 | -3.21 | -4.29 | -3.77 | -3.18 | -4.37 |
| | 3M | -4.99 | -3.88 | -3.53 | -4.80 | -4.32 | -3.71 | -4.97 |
| | 5M | -5.32 | -4.20 | -3.85 | -5.31 | -4.87 | -4.25 | -5.56 |
| | | | | | | | | |

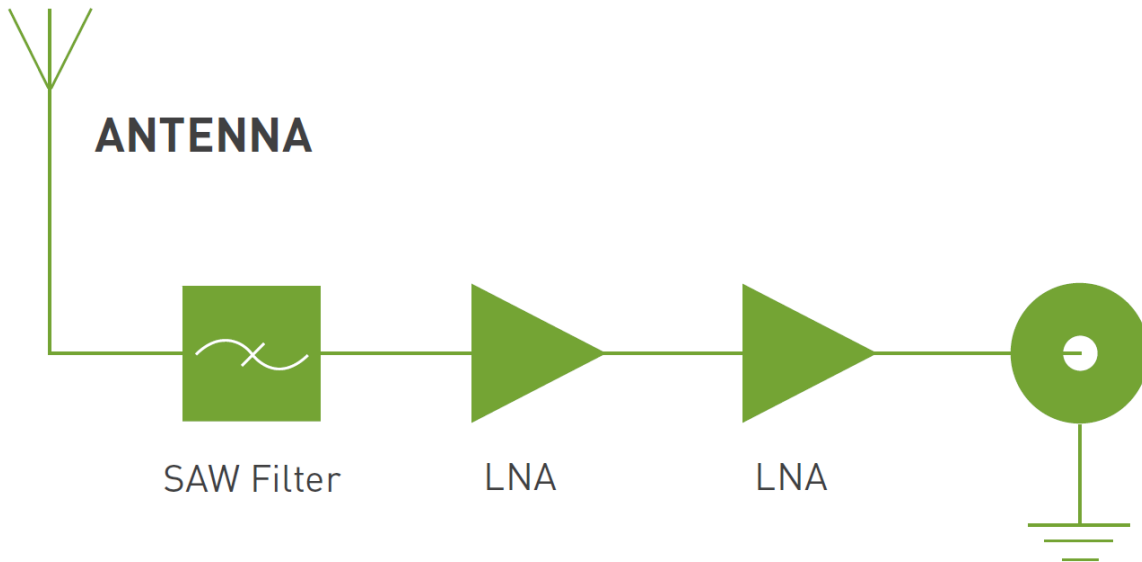
| Peak Gain (dBi) | | | | | | | | |
|-----------------|-------------|-------|-------|-------|-------|-------|------|-------|
| LTE1 | 0.3M | 1.5 | 1.6 | 1.92 | -4.21 | 3.2 | 3.15 | 3.27 |
| | 1M | 1.2 | 1.4 | 1.72 | -4.51 | 2.8 | 2.75 | 2.97 |
| | 2M | 0.9 | 1 | 1.32 | -5.01 | 2.3 | 2.15 | 2.37 |
| | 3M | 0.6 | 0.7 | 1.02 | -5.51 | 1.8 | 1.65 | 1.87 |
| | 5M | 0.3 | 0.4 | 0.72 | -6.01 | 1.3 | 1.15 | 1.37 |
| LTE2 | 0.3M | -1.01 | -1.44 | -0.5 | -0.96 | 1.38 | 3.07 | 3.42 |
| | 1M | -1.21 | -1.64 | -0.7 | -1.26 | 0.98 | 2.67 | 3.12 |
| | 2M | -1.51 | -2.04 | -1.1 | -1.76 | 0.48 | 2.07 | 2.52 |
| | 3M | -1.85 | -2.34 | -1.4 | -2.26 | -0.02 | 1.57 | 2.02 |
| | 5M | -2.15 | -2.64 | -1.7 | -2.76 | -0.52 | 1.07 | 1.52 |
| LTE3 | 0.3M | 0.5 | 1.65 | 1.77 | 3.23 | 3.93 | 4.12 | 2.35 |
| | 1M | 0.26 | 1.45 | 1.57 | 2.83 | 3.53 | 3.82 | 1.95 |
| | 2M | -0.04 | 1.05 | 1.17 | 2.33 | 2.93 | 3.22 | 1.25 |
| | 3M | -0.4 | 0.75 | 0.87 | 1.83 | 2.43 | 2.72 | 0.65 |
| | 5M | -0.7 | 0.45 | 0.57 | 1.33 | 1.93 | 2.22 | 0.05 |
| LTE4 | 0.3M | 1.48 | 1.25 | 0.66 | 2.18 | 2.18 | 2.08 | 3.75 |
| | 1M | 1.28 | 1.05 | 0.46 | 1.78 | 1.78 | 1.68 | 3.35 |
| | 2M | 0.98 | 0.65 | 0.06 | 1.28 | 1.28 | 1.18 | 2.75 |
| | 3M | 0.68 | 0.35 | -0.24 | 0.78 | 0.78 | 0.58 | 2.15 |
| | 5M | 0.38 | 0.05 | -0.54 | 0.28 | 0.28 | 0.05 | 1.55 |
| LTE5 | 0.3M | 2.02 | 1.11 | 0.45 | 2.16 | 3.03 | 3.03 | 4.11 |
| | 1M | 1.72 | 0.91 | 0.25 | 1.76 | 2.63 | 2.63 | 3.71 |
| | 2M | 1.42 | 0.51 | -0.15 | 1.26 | 2.03 | 2.03 | 3.11 |
| | 3M | 1.12 | 0.21 | -0.45 | 0.76 | 1.53 | 1.53 | 2.51 |
| | 5M | 0.82 | -0.09 | -0.75 | 0.26 | 1.03 | 1.03 | 1.91 |
| LTE6 | 0.3M | 0.83 | 1.5 | 1.65 | 2.69 | 3.73 | 3.73 | 2.67 |
| | 1M | 0.63 | 1.3 | 1.45 | 2.29 | 3.33 | 3.33 | 2.27 |
| | 2M | 0.33 | 0.9 | 1.05 | 1.79 | 2.73 | 2.73 | 1.57 |
| | 3M | -0.07 | 0.6 | 0.75 | 1.29 | 2.23 | 2.23 | 0.97 |
| | 5M | -0.41 | 0.3 | 0.45 | 0.79 | 1.73 | 1.73 | 0.37 |
| LTE7 | 0.3M | -0.98 | -1.6 | -0.76 | 1.77 | 2.66 | 3.15 | 0.99 |
| | 1M | -1.18 | -1.8 | -0.96 | 1.37 | 2.26 | 2.85 | 0.59 |
| | 2M | -1.48 | -2.2 | -1.36 | 0.87 | 1.66 | 2.25 | -0.01 |
| | 3M | -1.78 | -2.5 | -1.66 | 0.37 | 1.16 | 1.65 | -0.51 |
| | 5M | -2.08 | -2.8 | -1.96 | -0.13 | 0.66 | 1.05 | -1.01 |
| LTE8 | 0.3M | 2.32 | 1.55 | 2.78 | 3.07 | 2.73 | 2.35 | 2.46 |
| | 1M | 2.02 | 1.35 | 2.58 | 2.67 | 2.33 | 2.05 | 2.06 |
| | 2M | 1.72 | 0.95 | 2.18 | 2.17 | 1.83 | 1.45 | 1.36 |
| | 3M | 1.42 | 0.65 | 1.88 | 1.67 | 1.33 | 0.95 | 0.76 |
| | 5M | 1.12 | 0.35 | 1.58 | 1.17 | 0.83 | 0.45 | 0.16 |
| Impedance | 50 Ω | | | | | | | |
| Polarization | Vertical | | | | | | | |

| CERAMIC PATCH | | | |
|--|--|-----------|-----------|
| Frequency | 1574~1610MHz | | |
| Gain @ Zenith | 1575.42MHz 1.5 dBic Typ. @ Zenith 1602MHz +0 dBic Typ. @ Zenith | | |
| Gain at 90° with LNA | 1575.42MHz: 31 ± 3dBic 1602MHz: 30 ± 3dBic | | |
| Polarization | RHCP | | |
| Axial Ratio | 6.0dB max. @ 1575.42MHz Zenith 14.0dB max. @ 1602MHz Zenith | | |
| Patch Dimension | 25.1*25.1*4mm | | |
| LNA | | | |
| Frequency | 1574~1610MHz | | |
| Outer Band Attenuation | 1592±140MHz 15dB min. | | |
| Output Impedance | 50Ω | | |
| Output VSWR | 2.0 Max | | |
| Pout at 1dB Gain Compression point | Typ. -2dBm | | |
| | Min. -6dBm | | |
| Input Voltage | Min:1.8V Typ. 3.0V Max:5V | | |
| LNA Gain, Power Consumption and Noise Figure | | | |
| Input Voltage | Min:1.8V | Typ. 3.0V | Max: 5.5V |
| Total Gain @ Zenith | 25dBic | 31dBic | 34dBic |
| Current Consumption | 5mA | 10mA | 23mA |
| Noise Figure | 3dB | 3dB | 3.3dB |
| Cable | 3m RG174 standard, fully customizable | | |
| Connector | SMA(M) standard, standard, fully customizable | | |

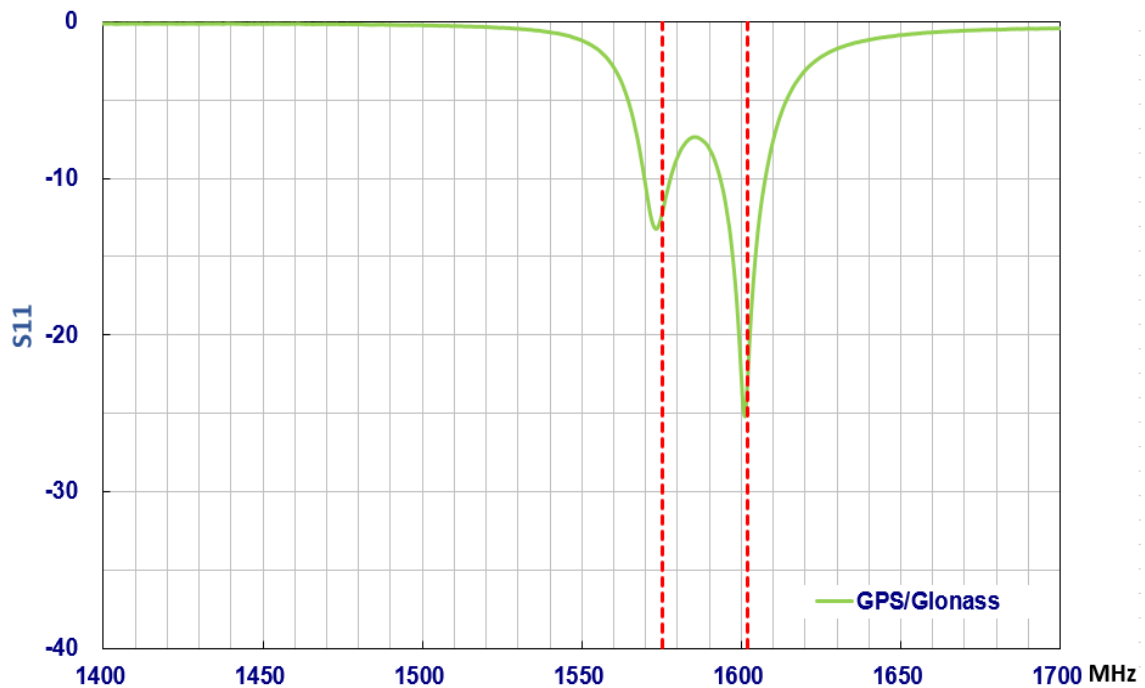
| MECHANICAL | |
|----------------------|--|
| Dimensions | 360mm * 160mm * 16.5mm |
| Cable | 1M TGC-200 for LTE Antenna – Fully Customizable 1M RF174 for GPS Antenna – Fully Customizable |
| Connector | SMA-Male – Fully Customizable |
| Casing | UV Resistant PC |
| Sealant | Rubber O-Ring |
| Weight | 1300g |
| ENVIRONMENTAL | |
| Protection | IP67 |
| Temperature Range | -40°C to +85°C |
| Thermal Shock | 100 cycles -40°C to +85°C |
| Humidity | Non-condensing 65°C 95% RH |

3. Antenna Characteristics

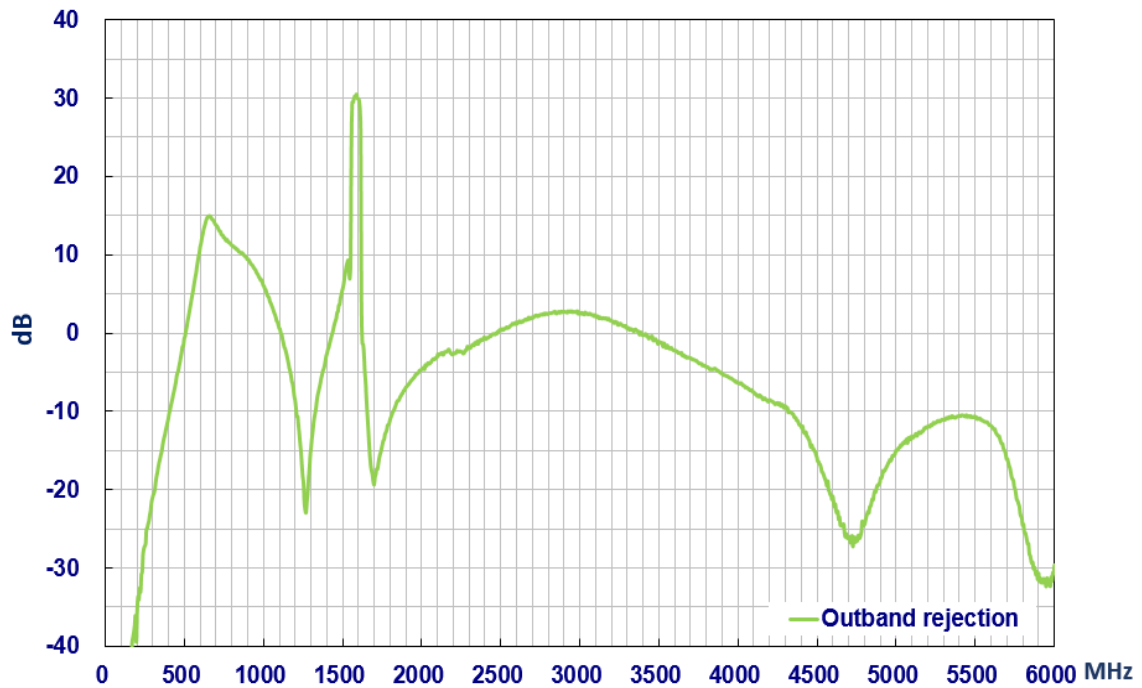
3.1 Block Diagram (Active antenna)



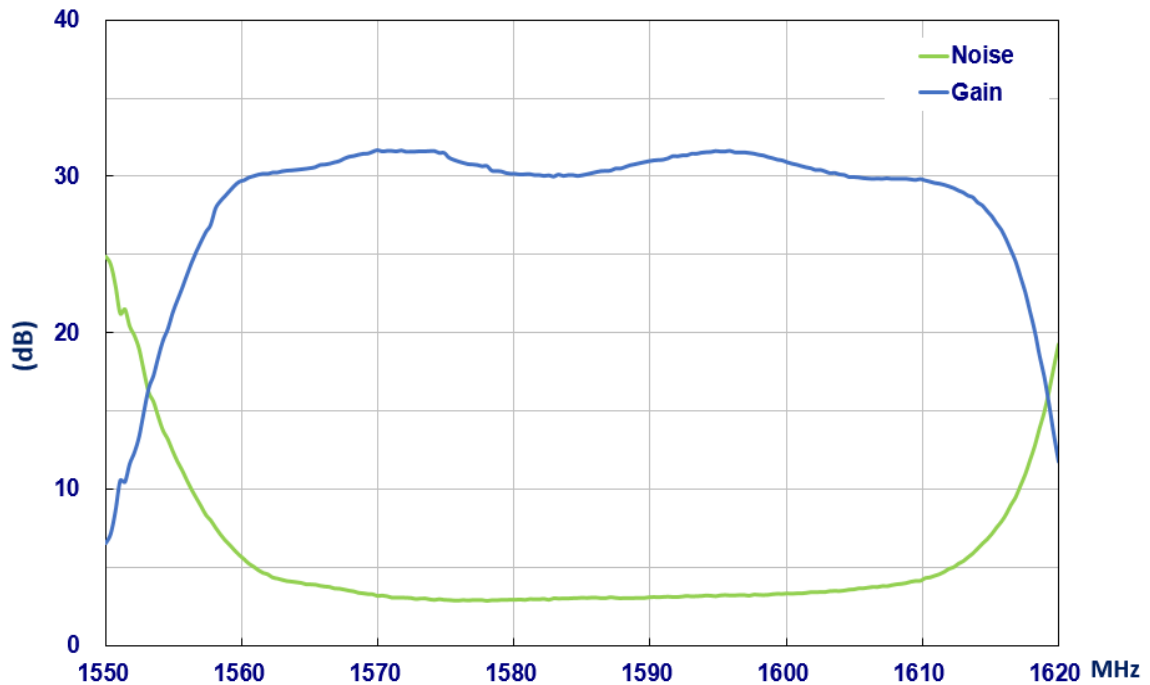
3.1.1 Return Loss



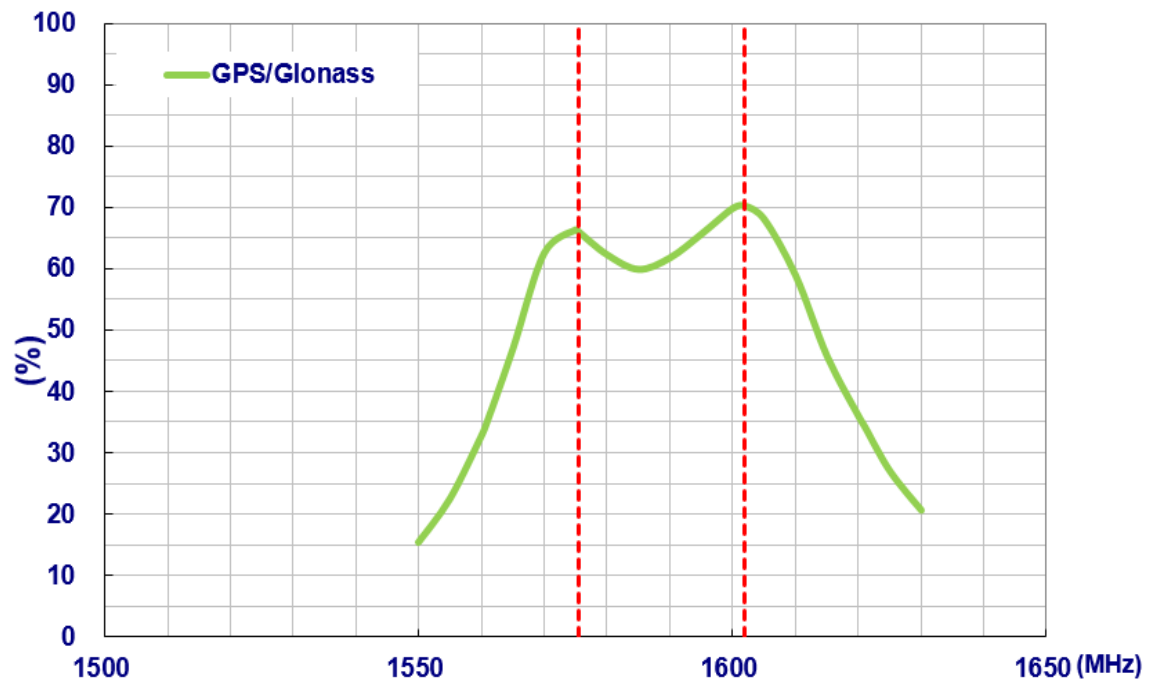
3.1.2 Out Band Rejection @3V



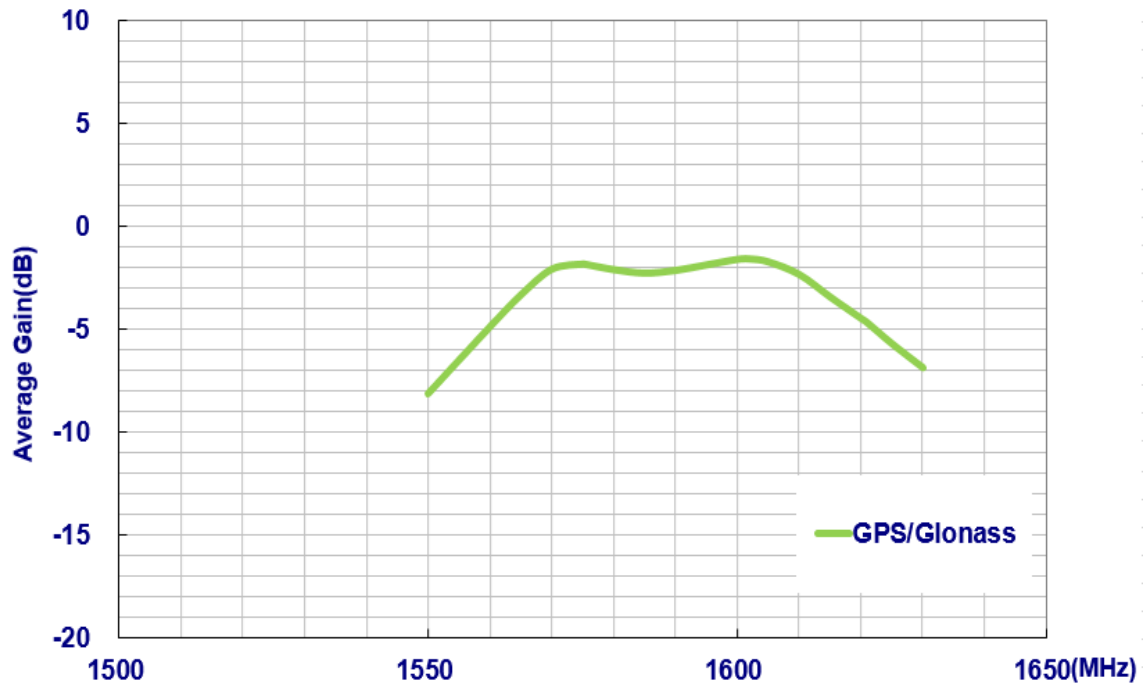
3.1.3 LNA Noise Figure and Gain @3V



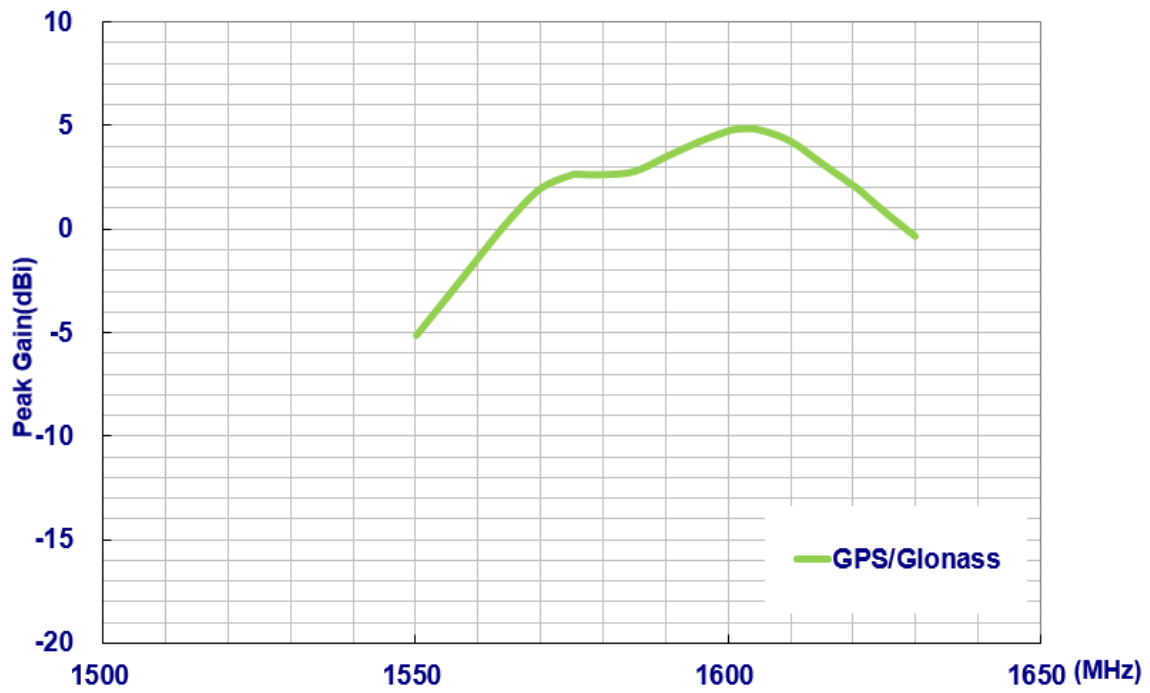
3.1.4 Efficiency



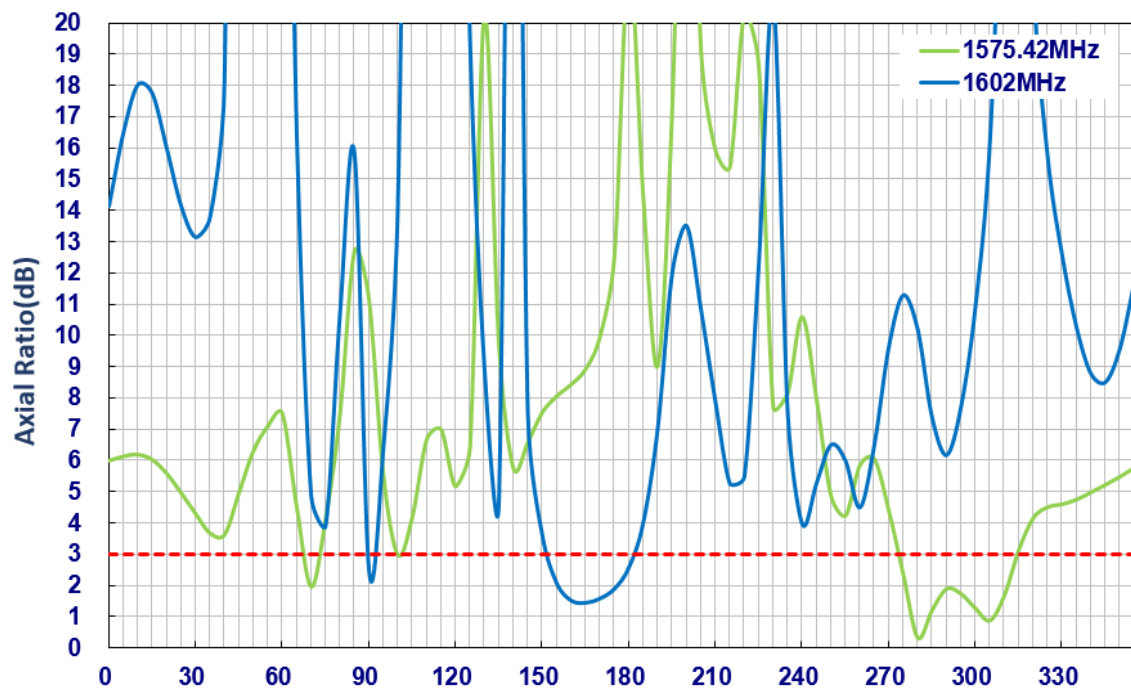
3.1.5 Average Gain



3.1.6 Peak Gain

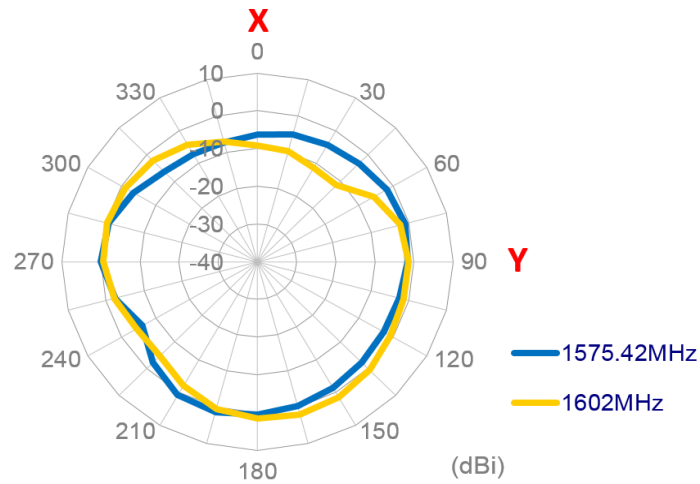


3.1.7 Axial Ratio

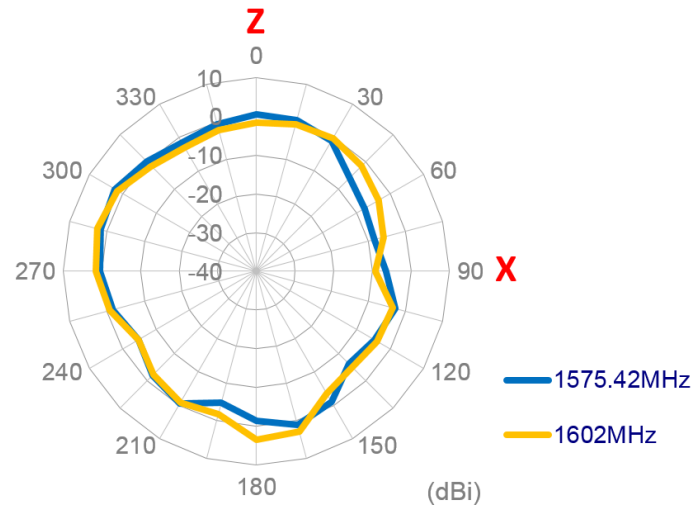


3.1.8 2D Radiation Patterns

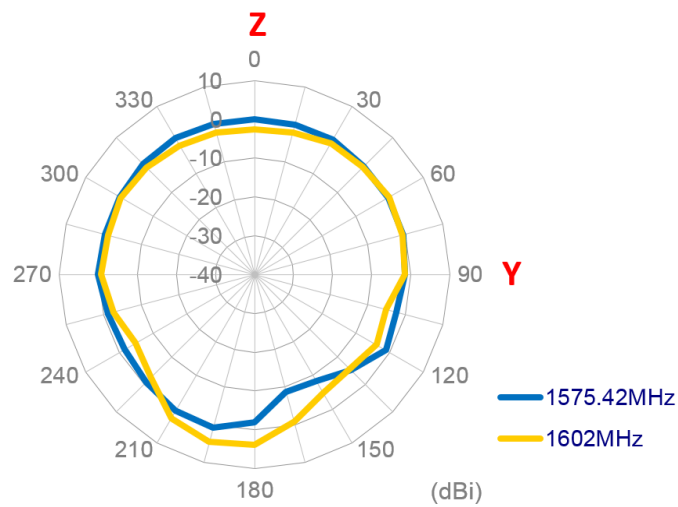
XY Plane



ZX Plane

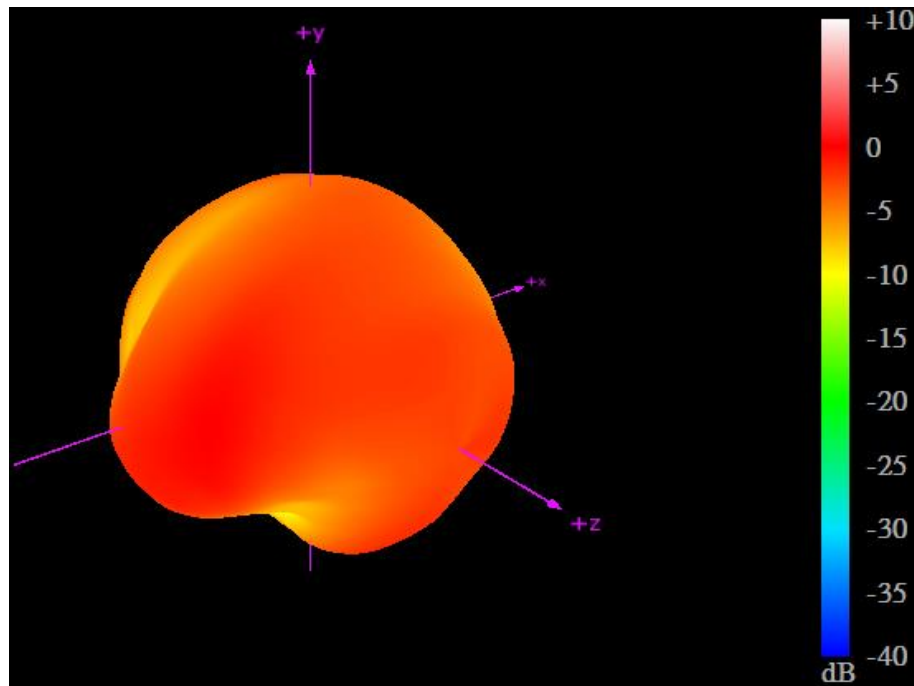


ZY Plane

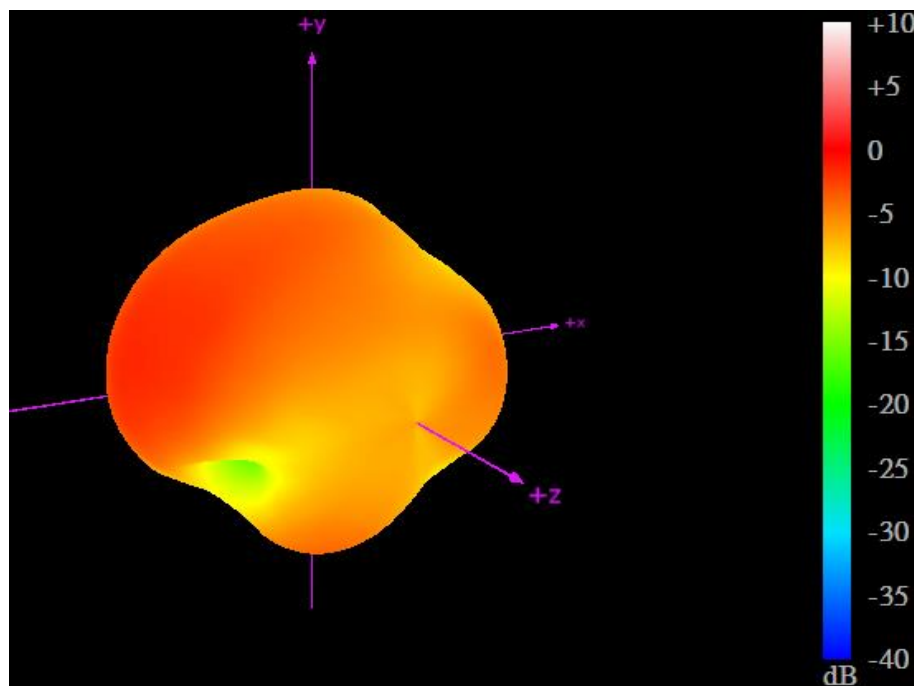


3.1.9 3D Radiation Patterns

1575.42MHz

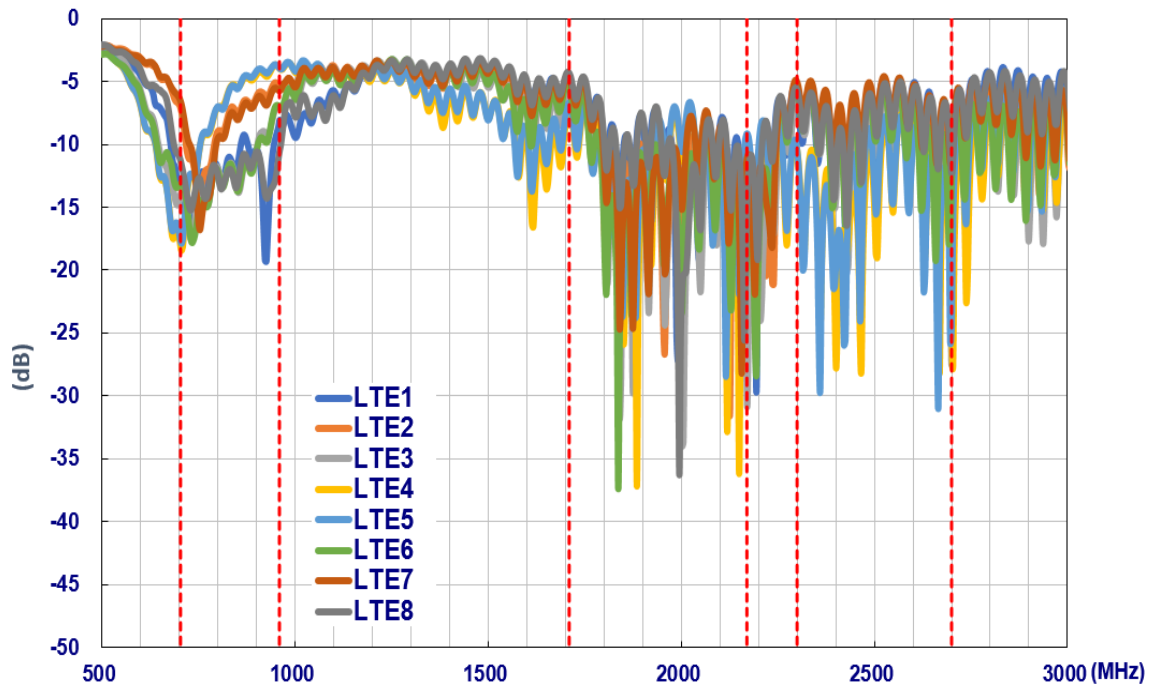


1602MHz

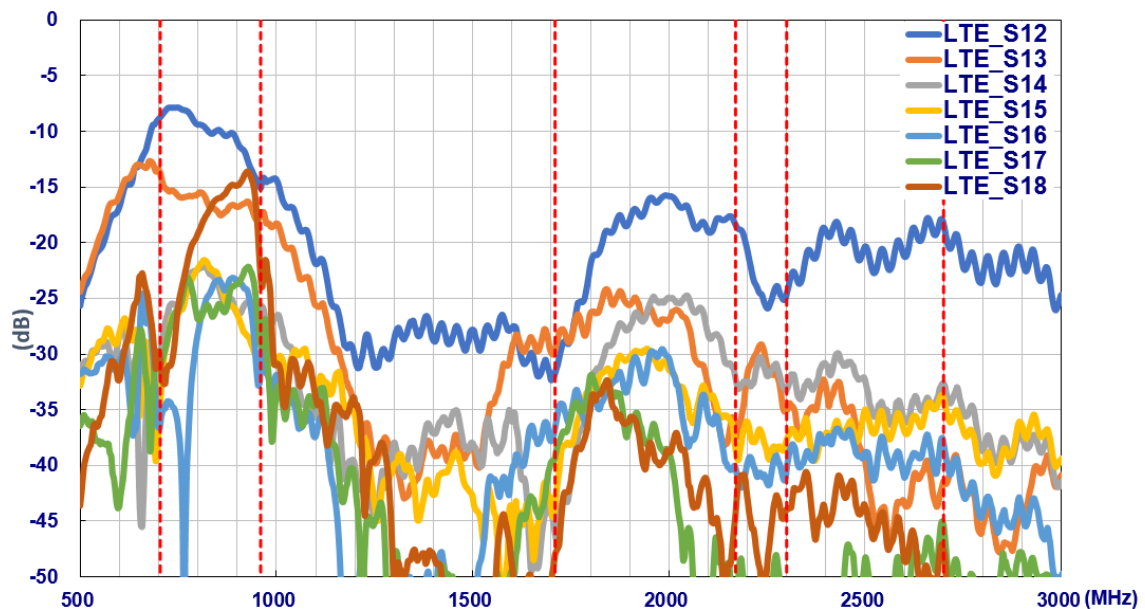


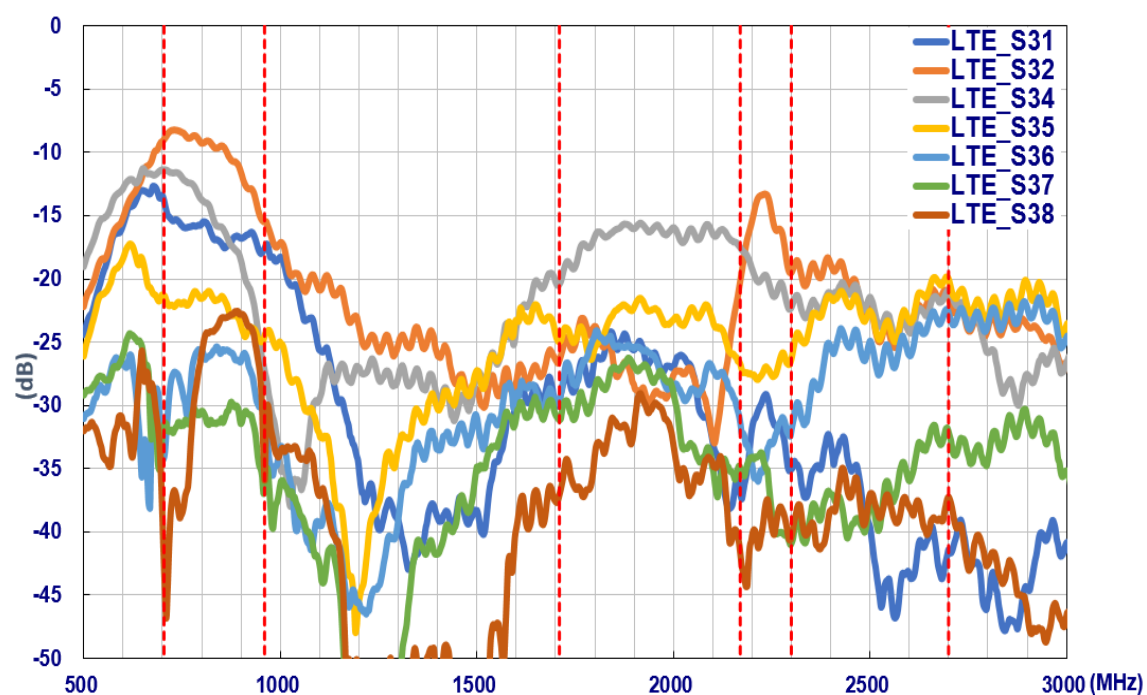
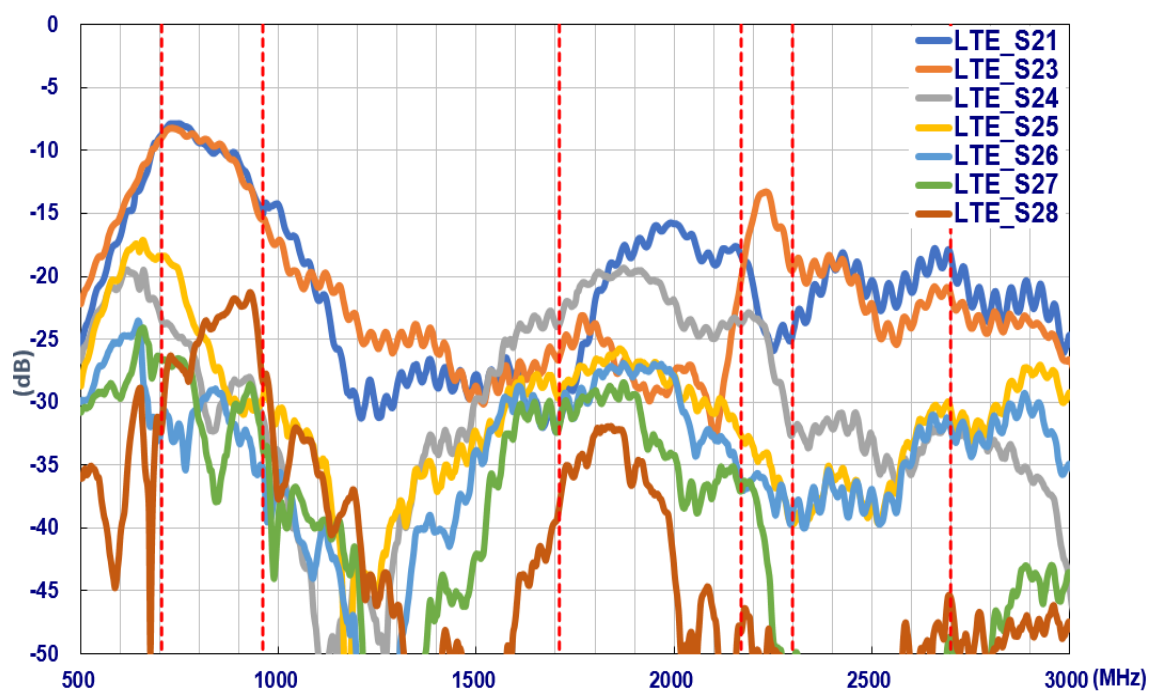
3.2 LTE Antenna

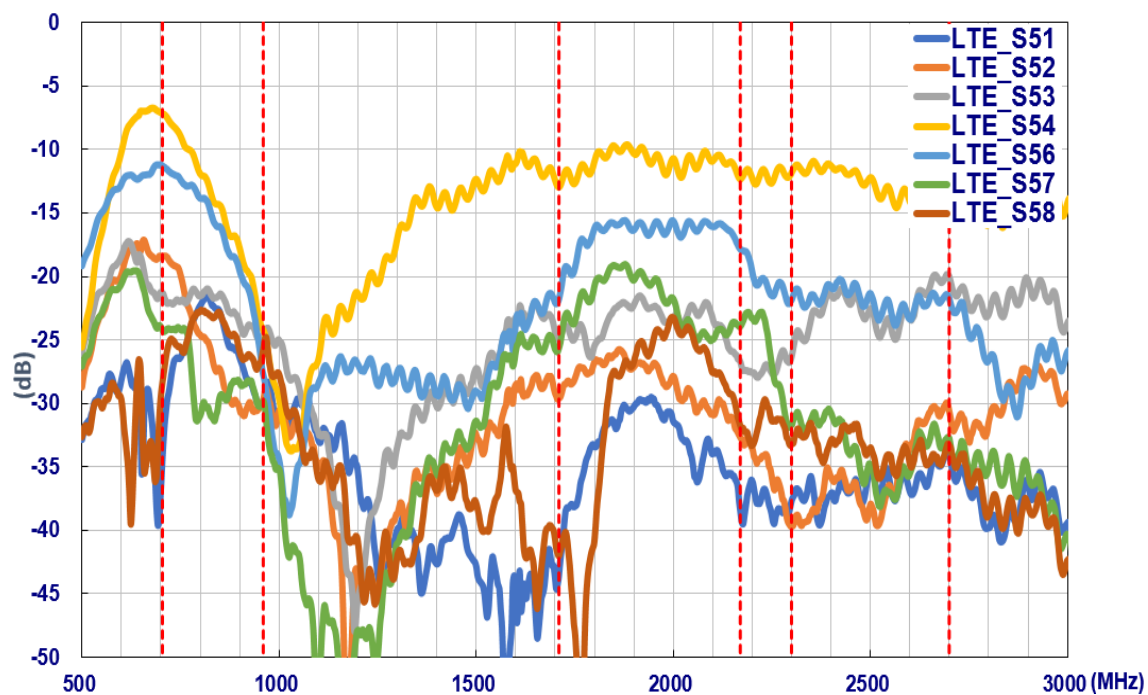
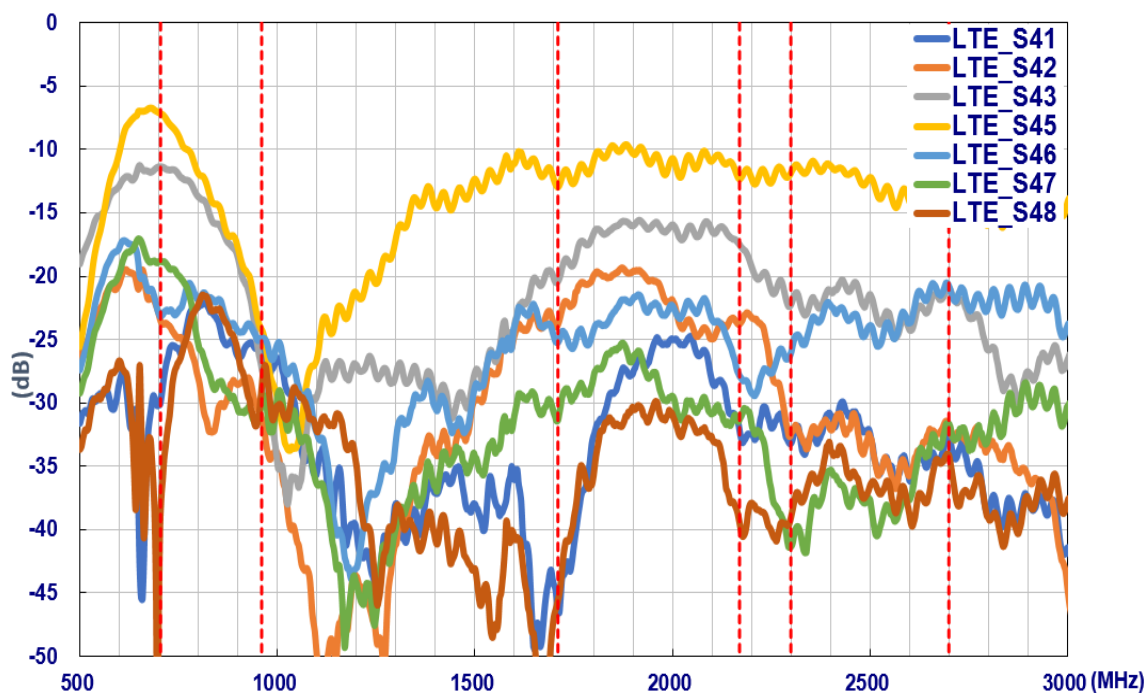
3.2.1 Return Loss

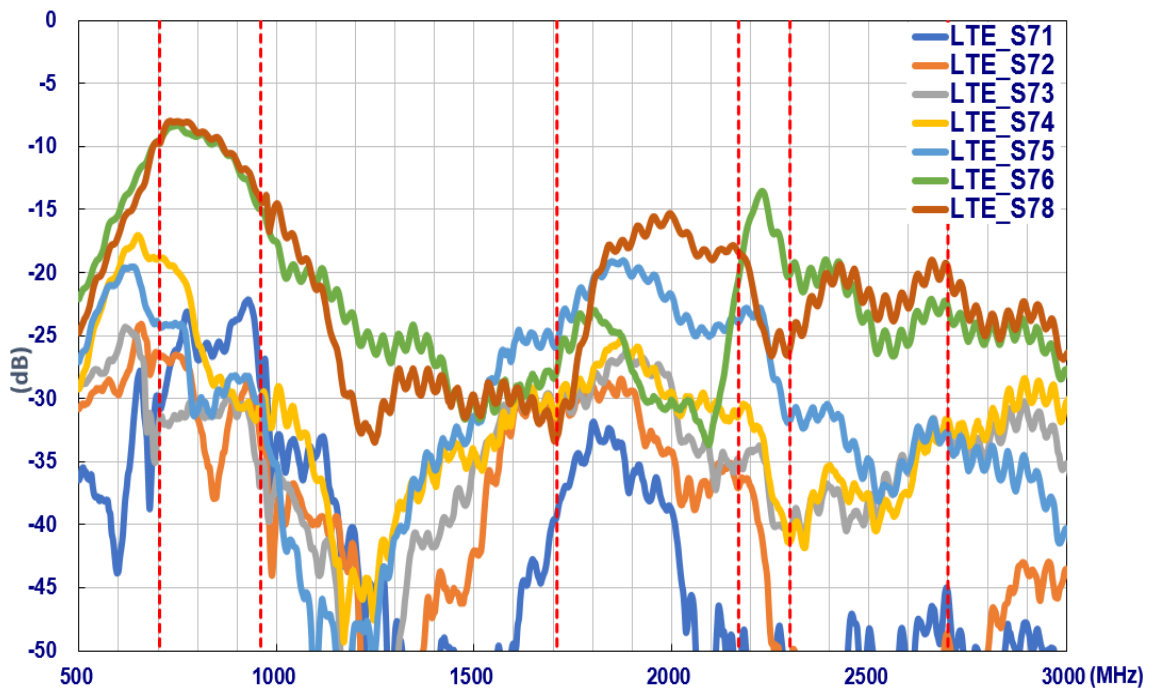
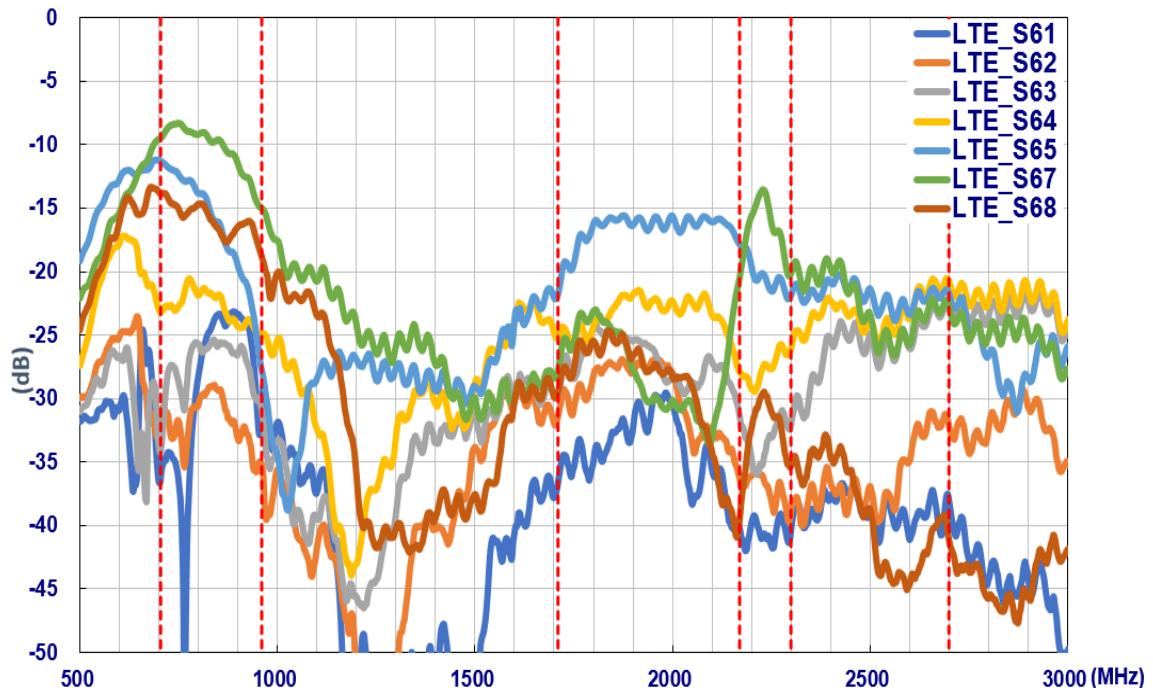


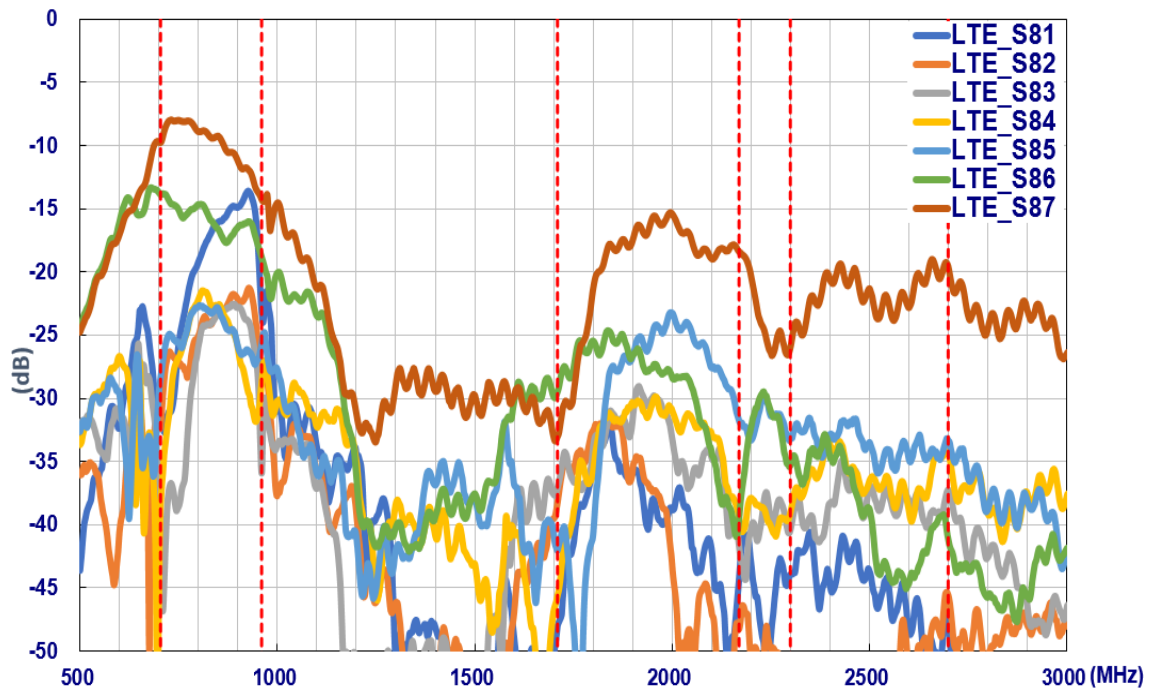
3.2.2 Isolation



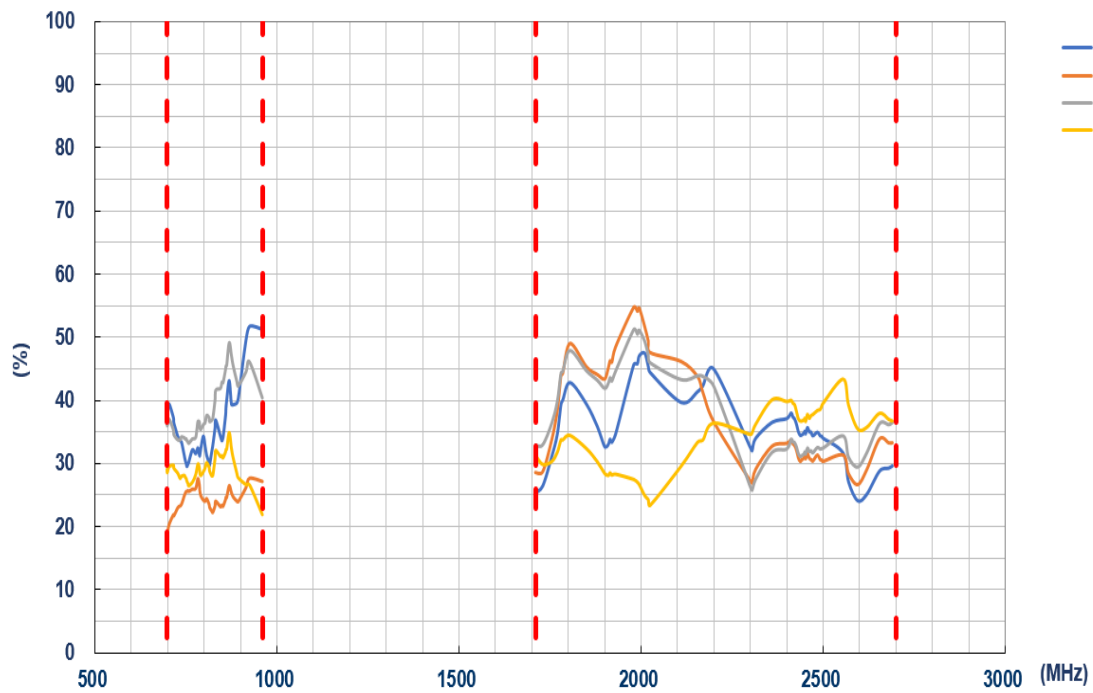


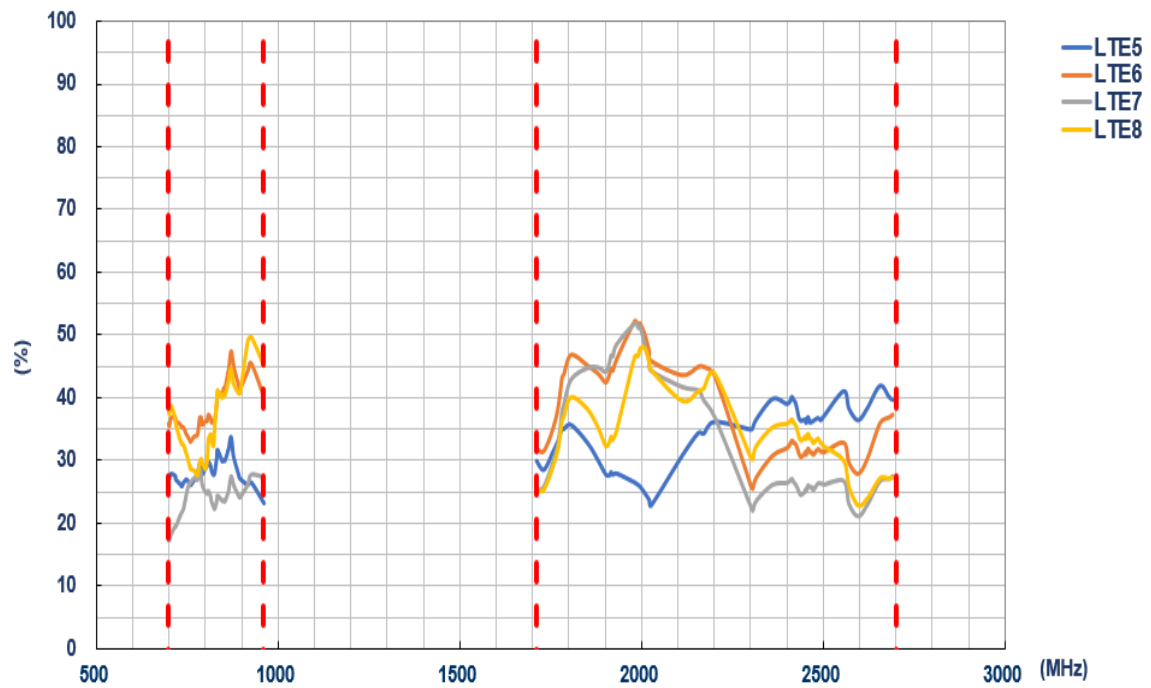




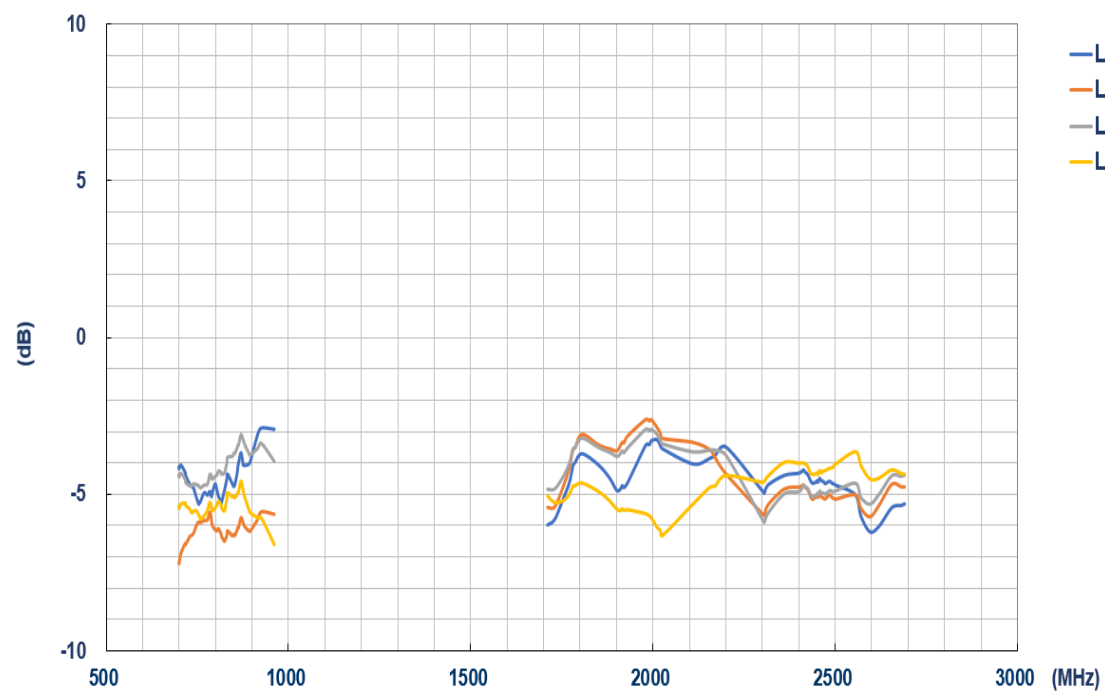


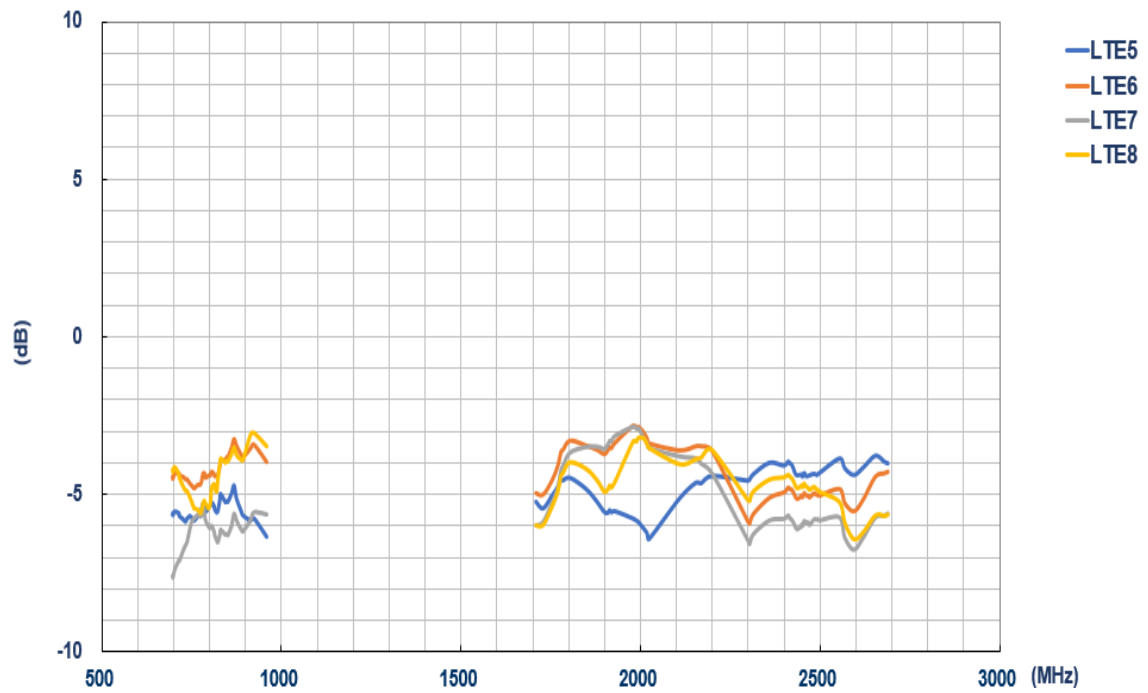
3.2.3 Efficiency



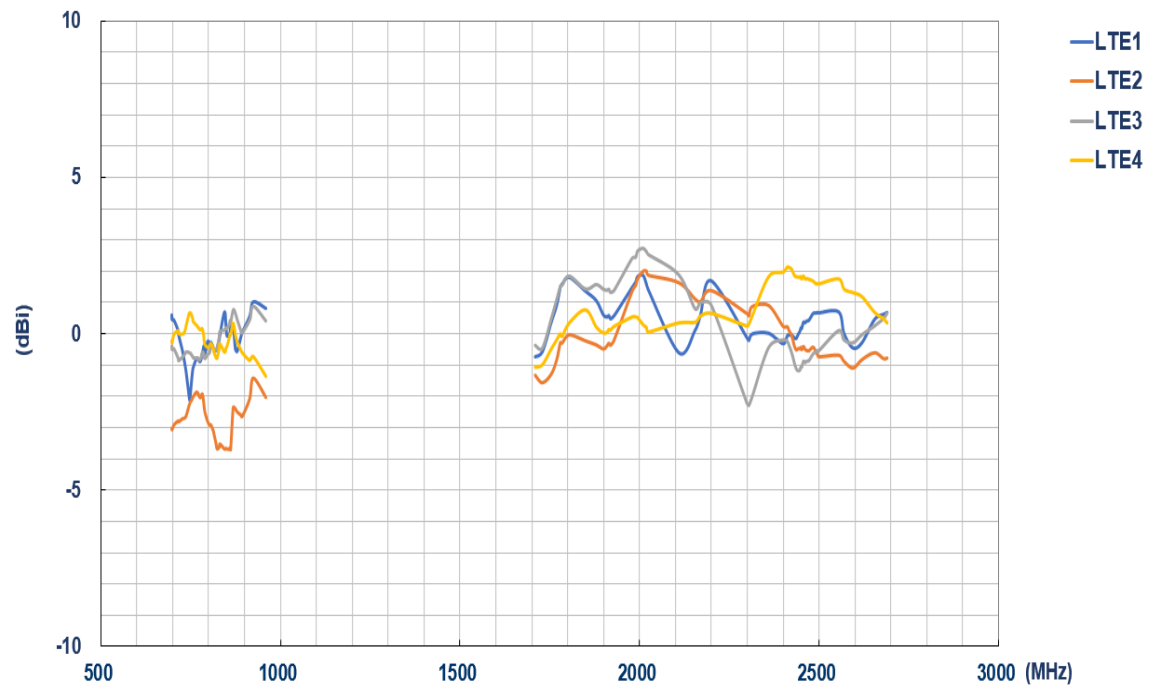


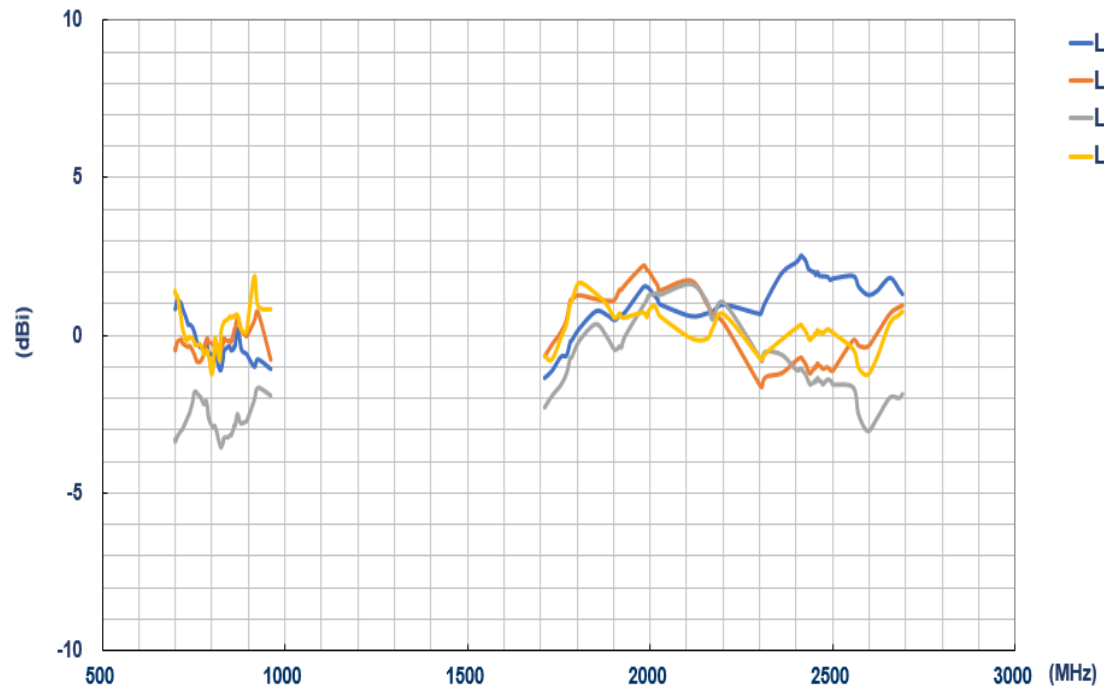
3.2.4 Average Gain





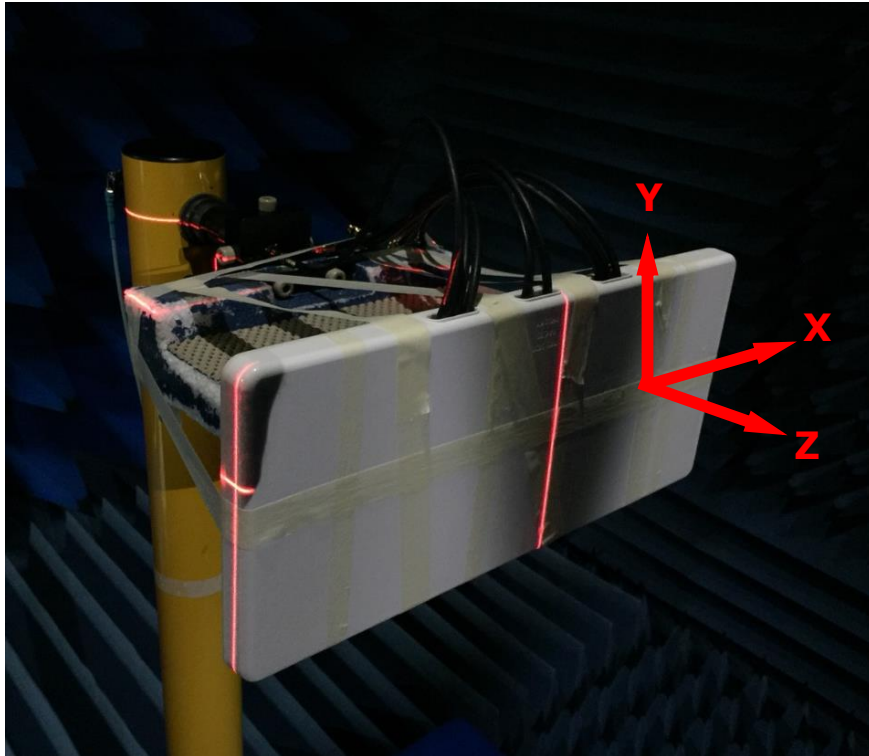
3.2.5 Peak Gain





4. Antenna Radiation Patterns

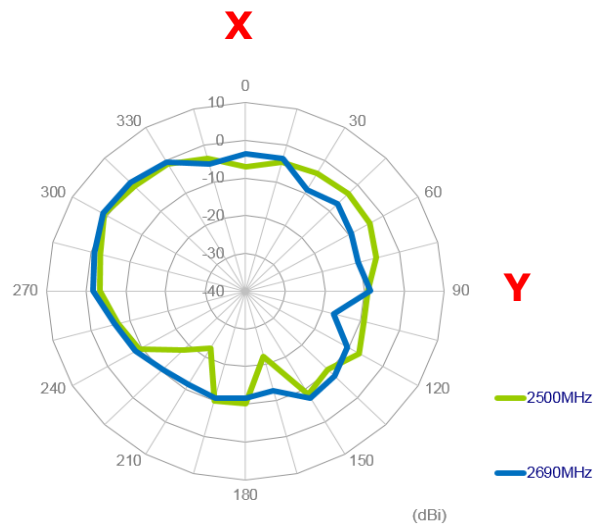
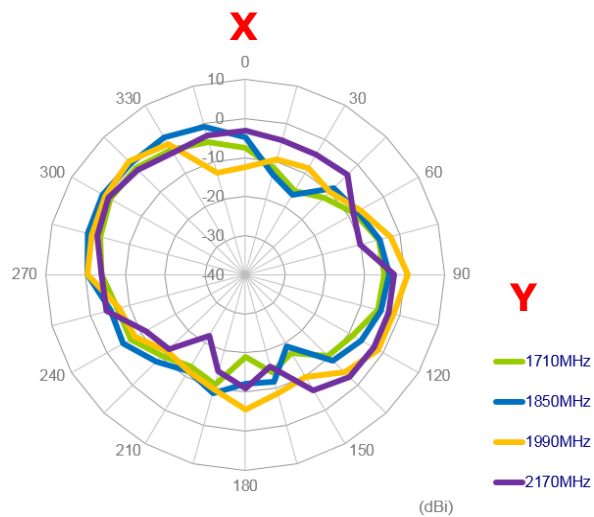
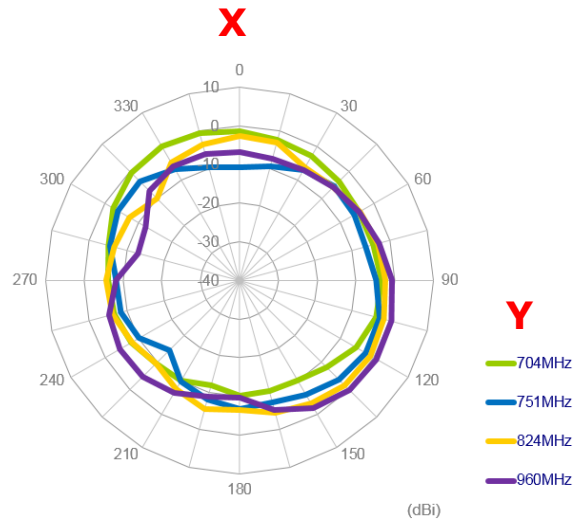
4.1 Antenna Setup (Antenna Test Setup in Anechoic Chamber)



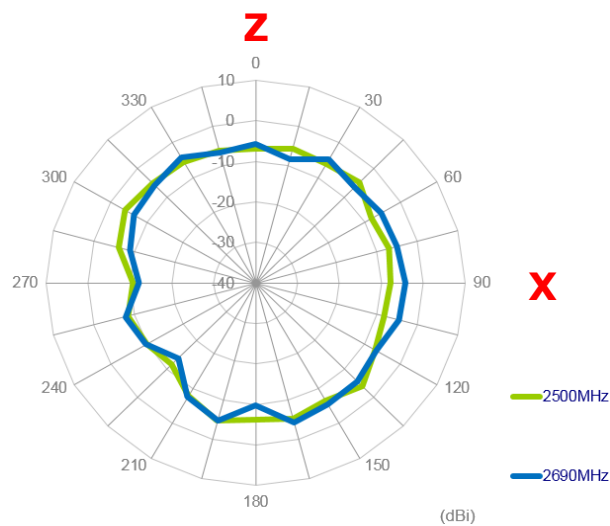
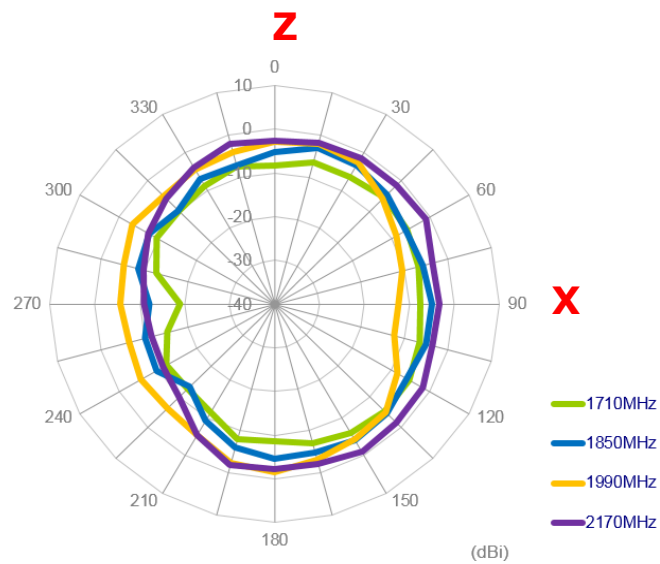
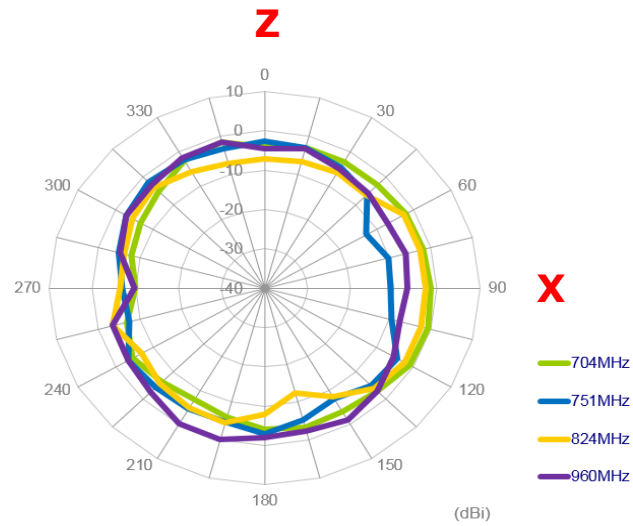
4.2 2D Radiation Patterns

4.2.1 LTE 1

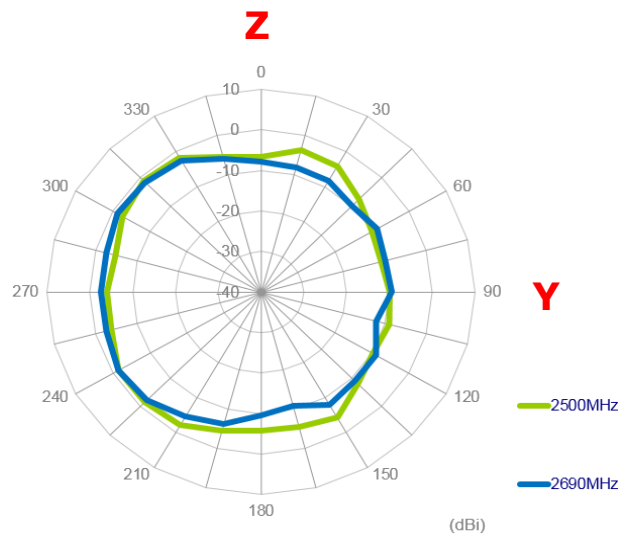
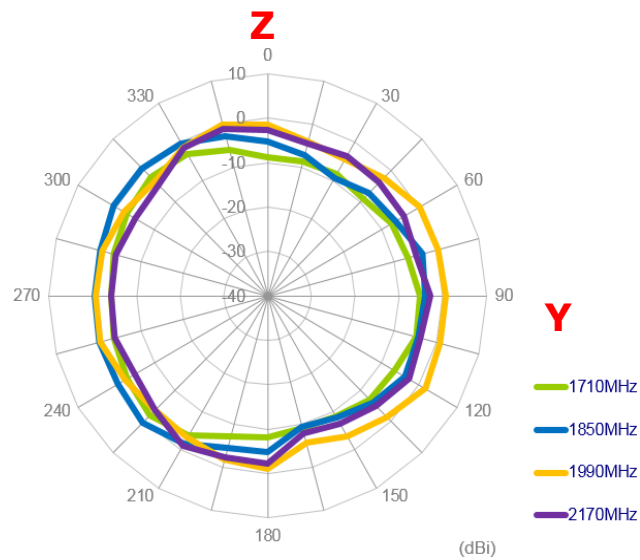
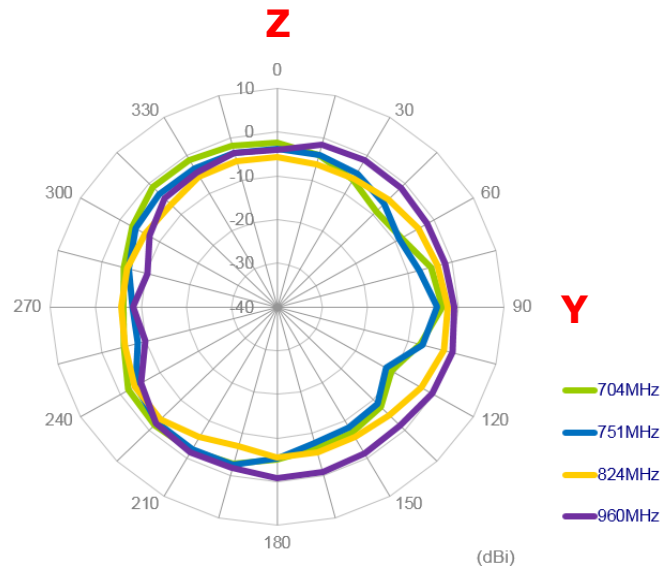
XY Plane



XZ Plane

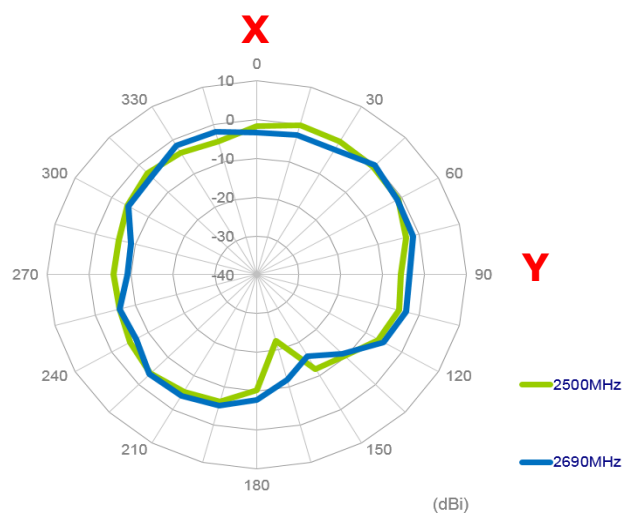
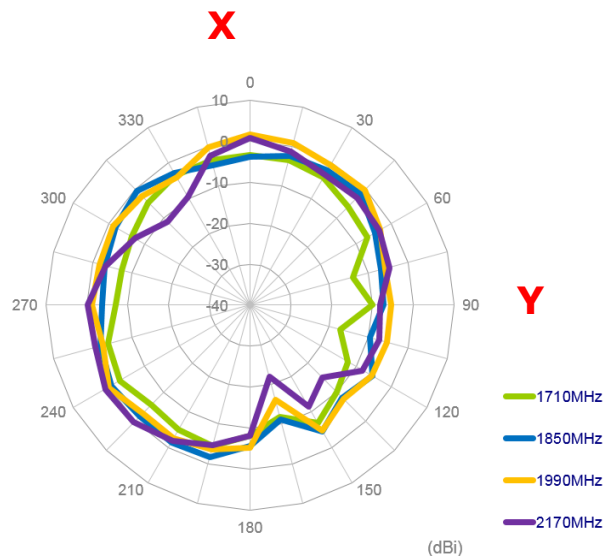
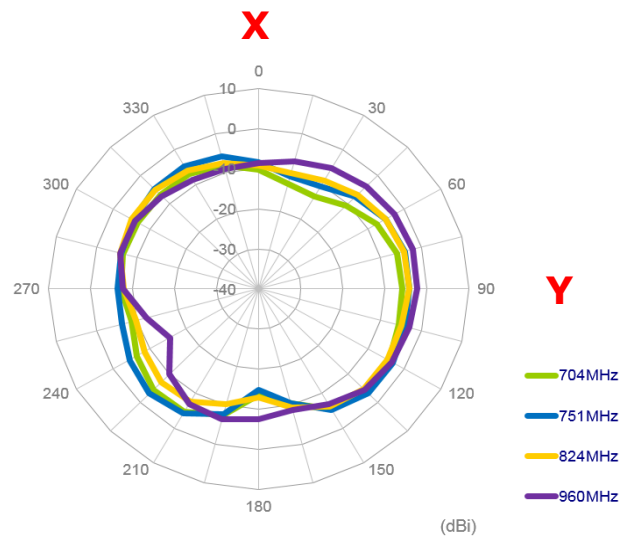


YZ Plane

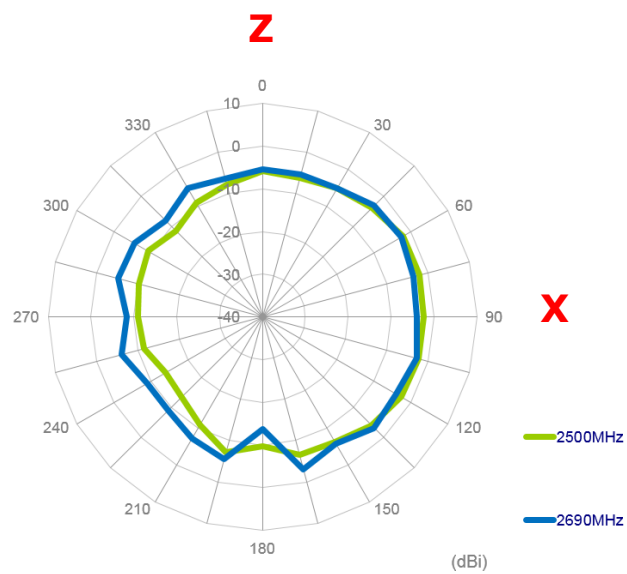
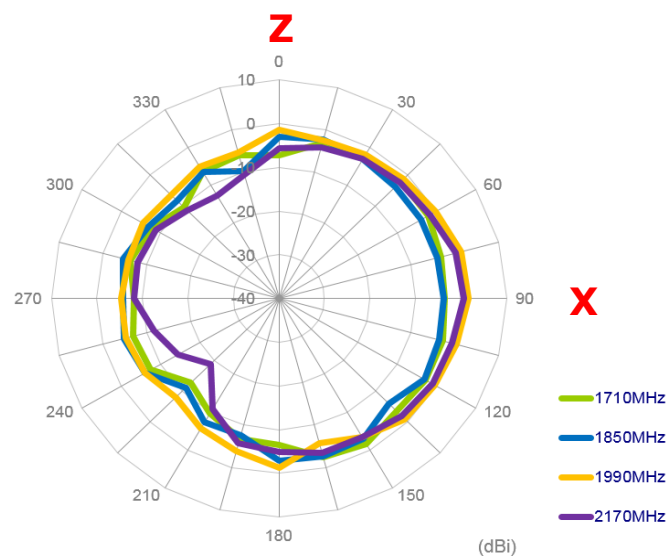
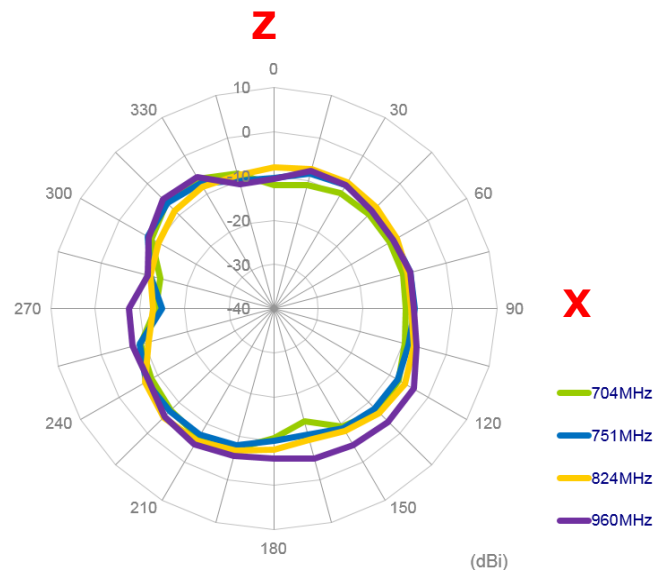


4.2.2 LTE 2

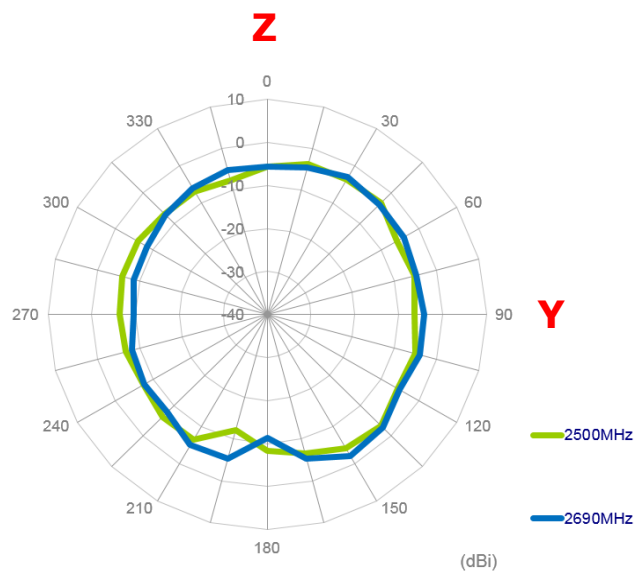
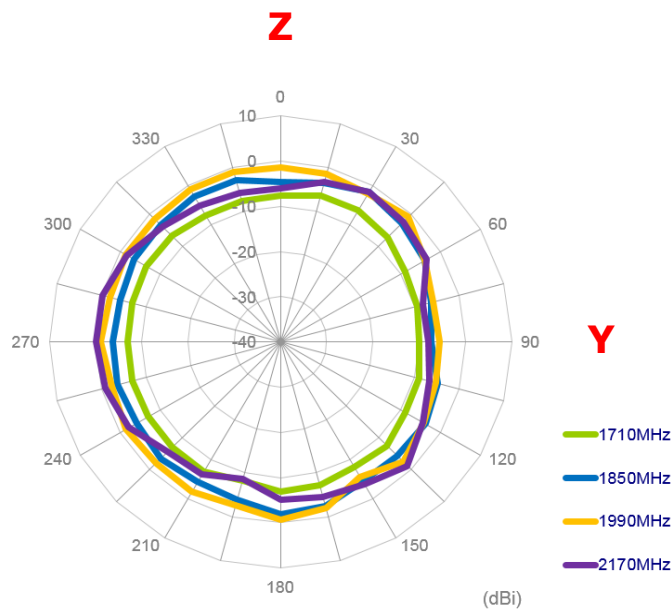
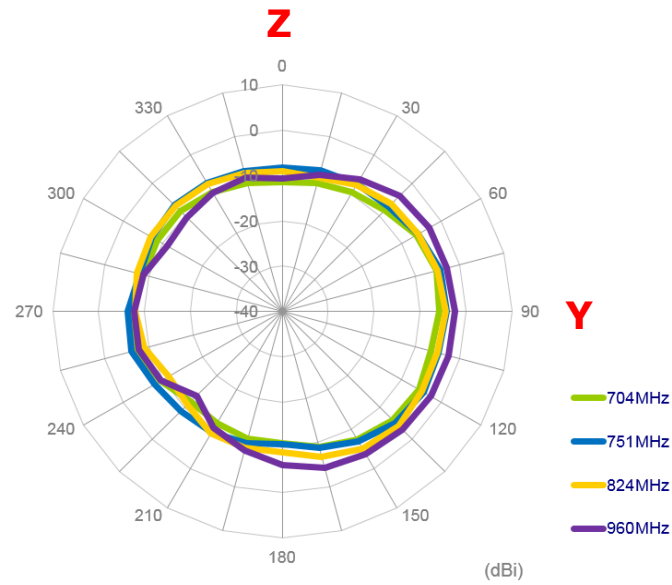
XY Plane



XZ Plane

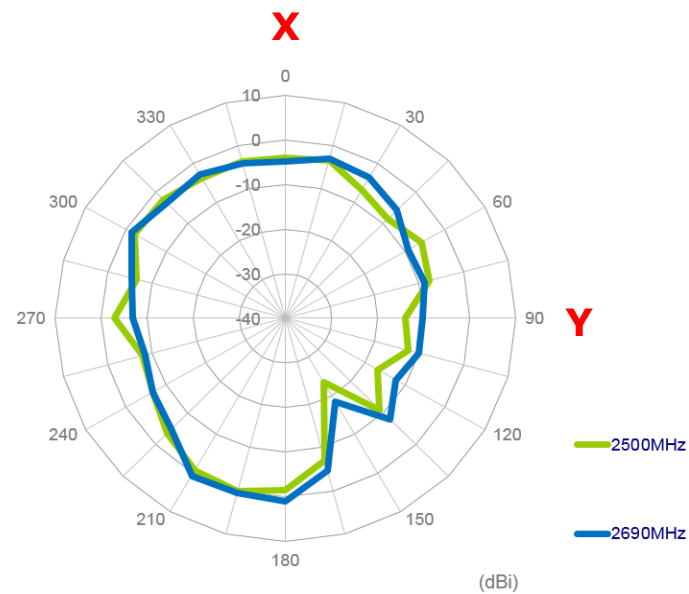
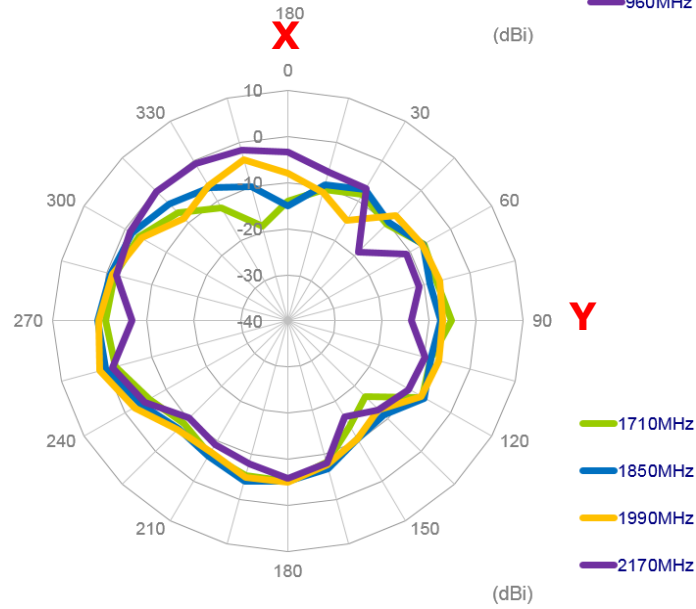
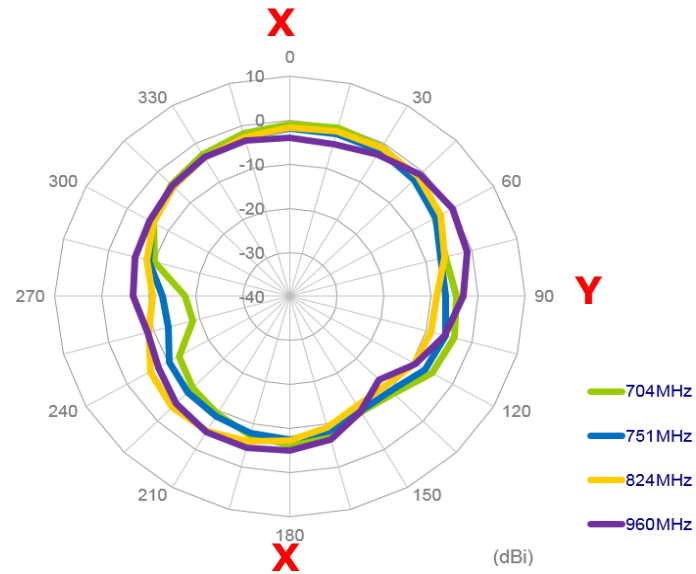


YZ Plane

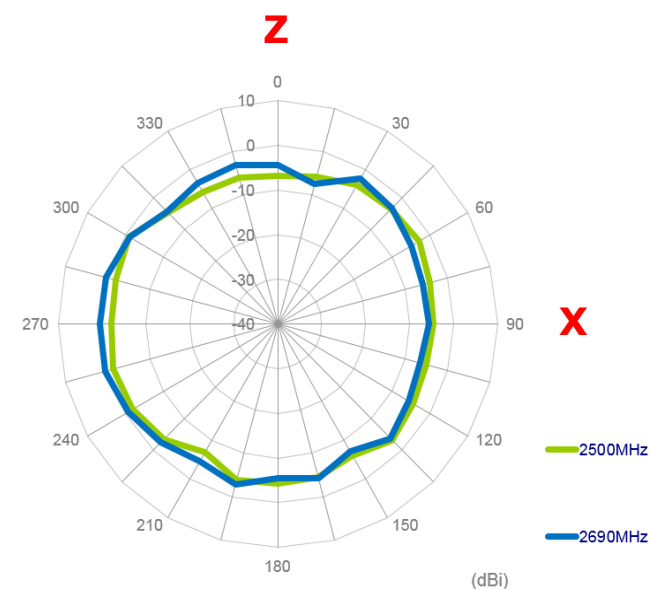
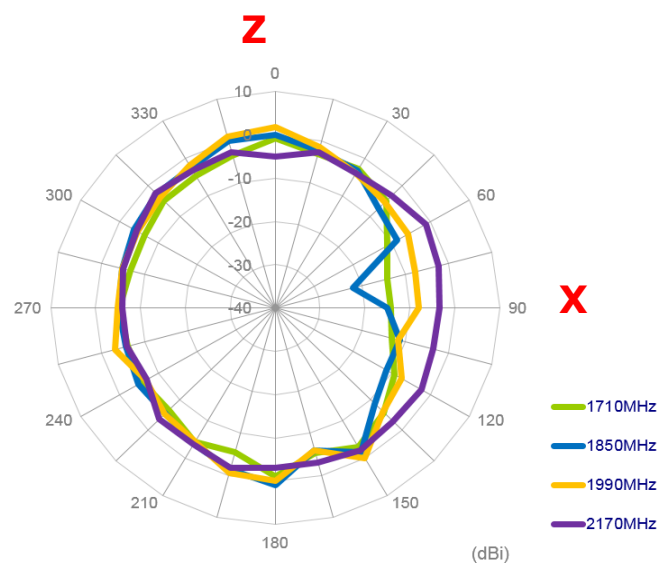
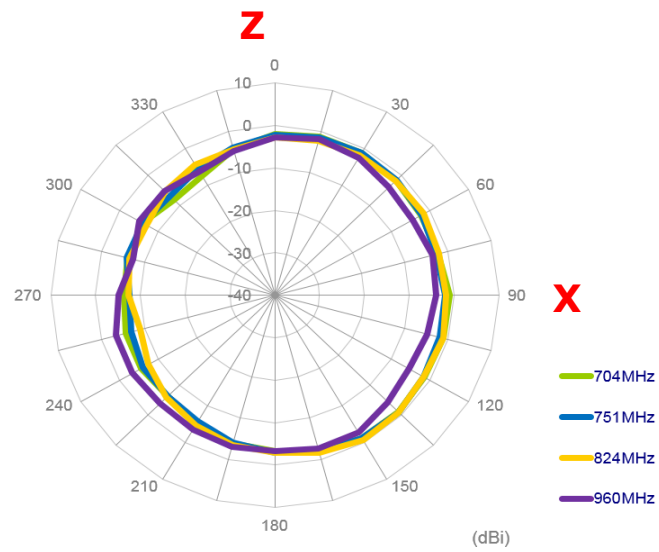


4.2.3 LTE 3

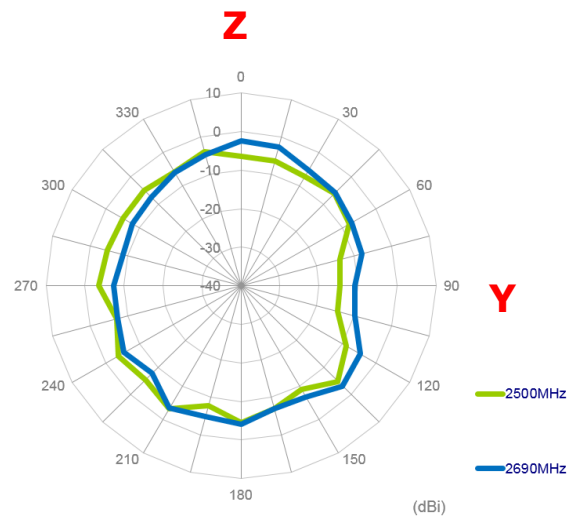
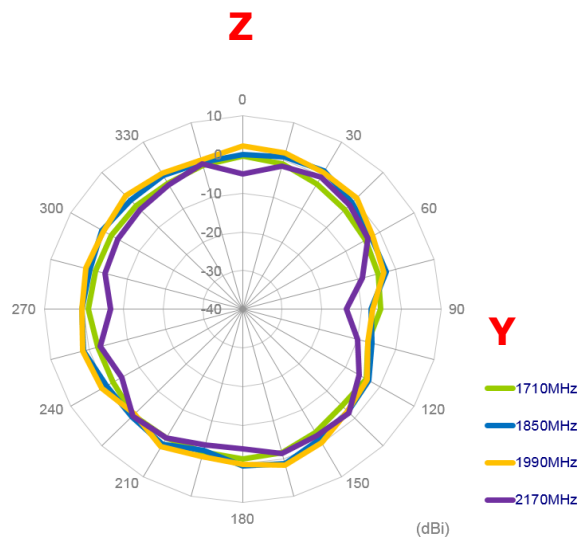
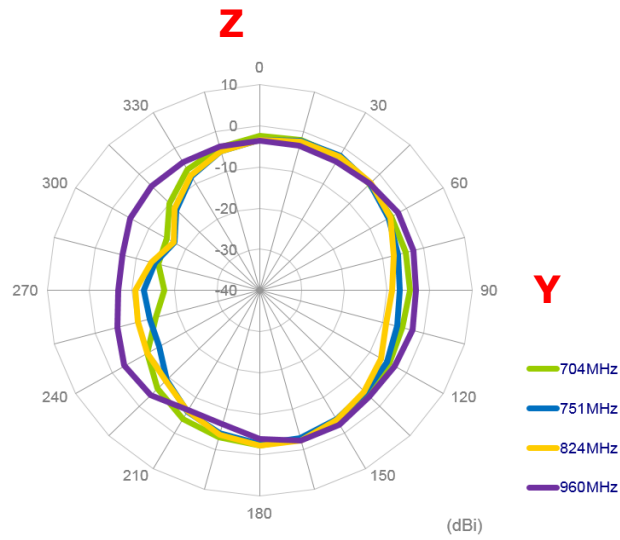
XY Plane



XZ Plane

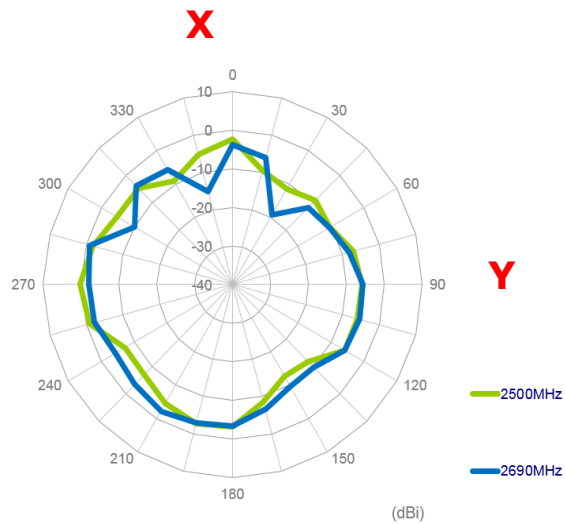
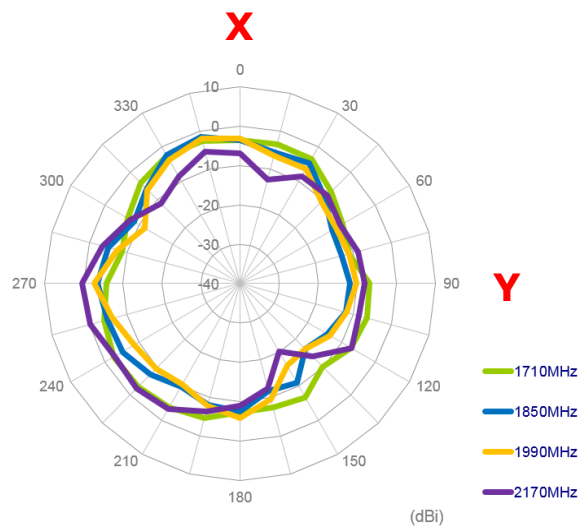
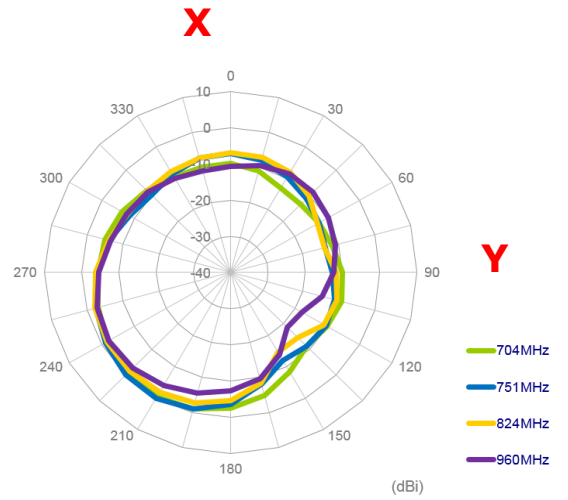


YZ Plane

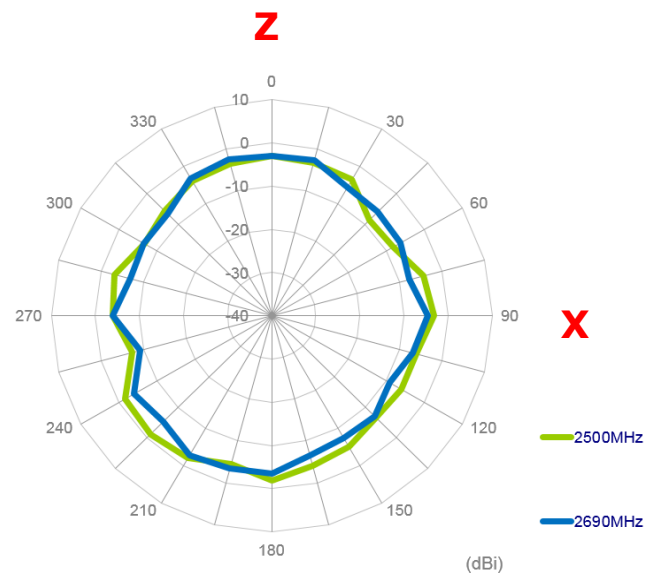
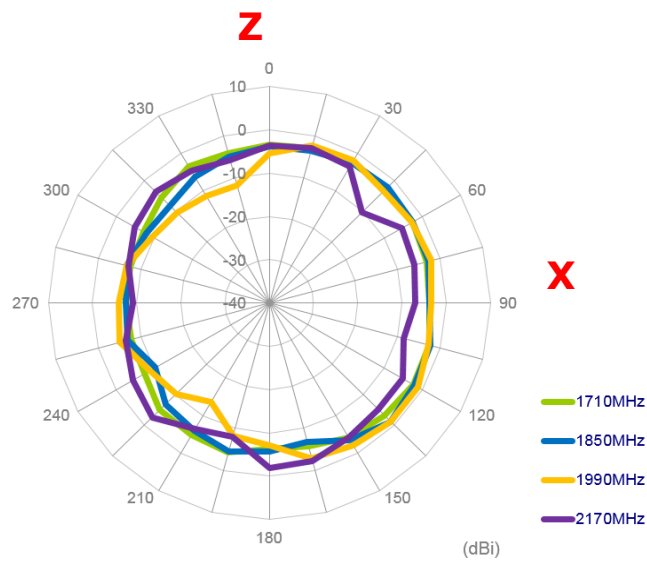
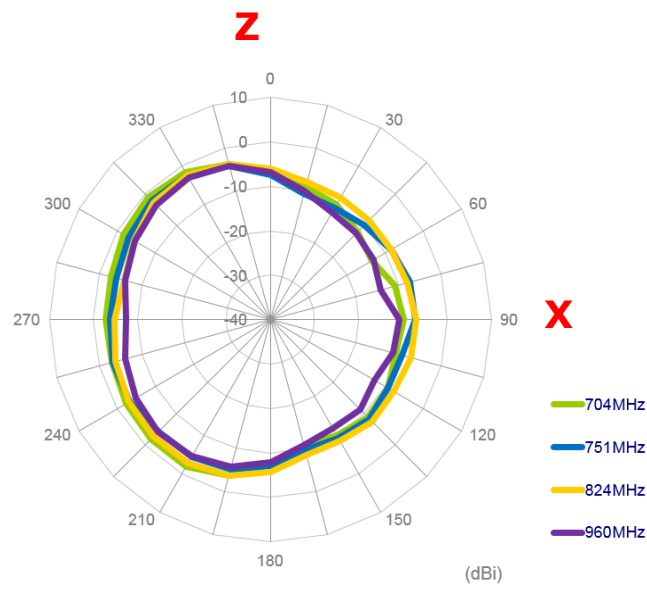


4.2.4 LTE 4

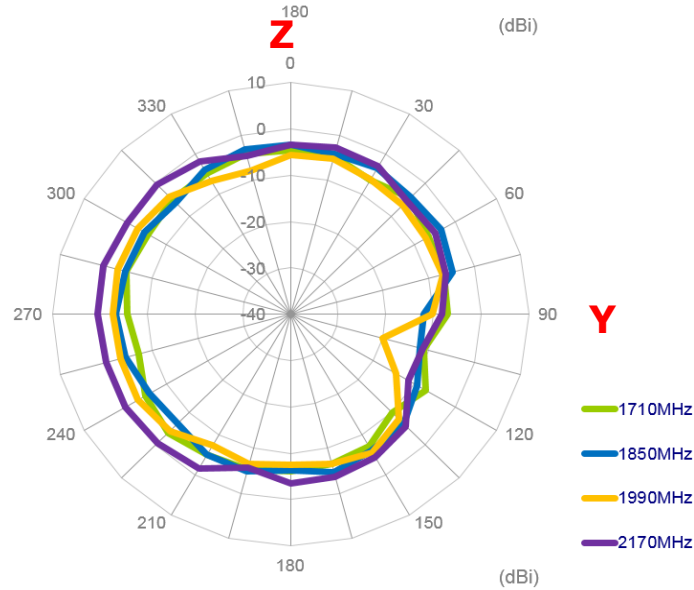
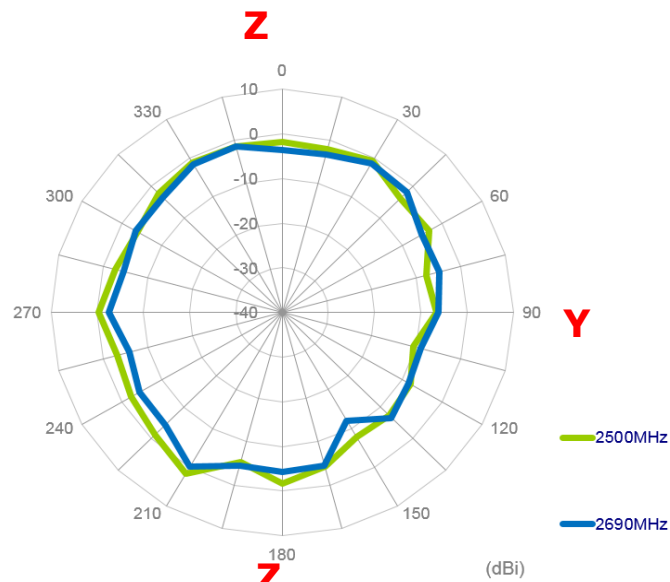
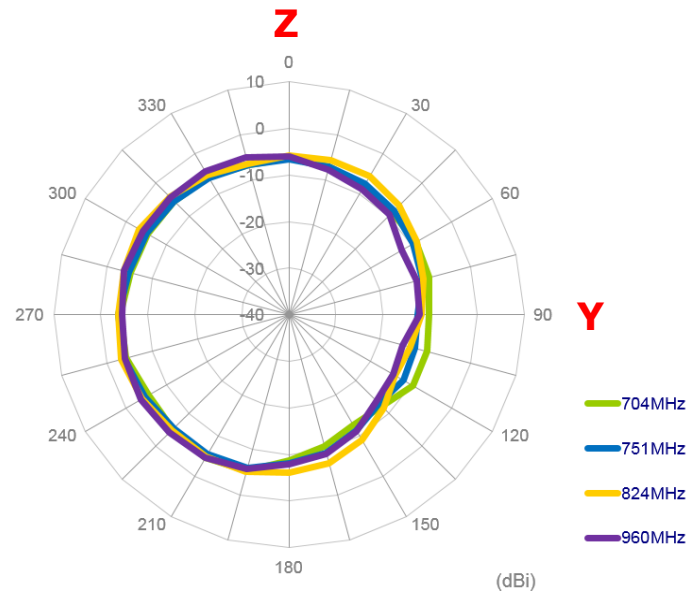
XY Plane



XZ Plane

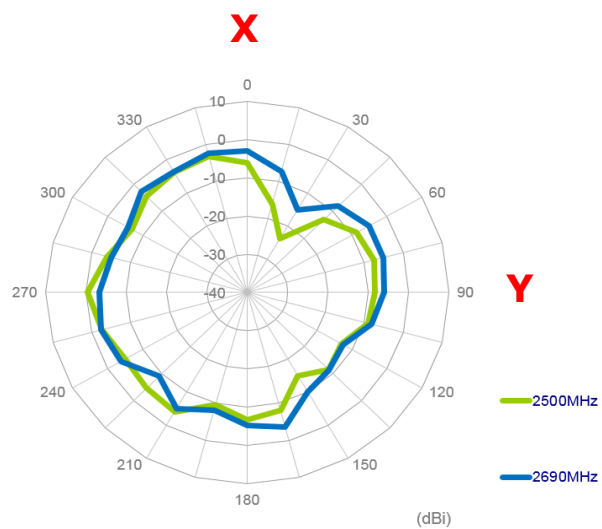
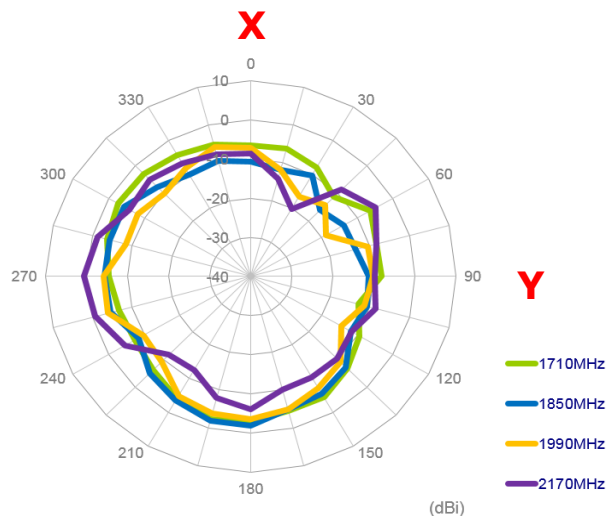
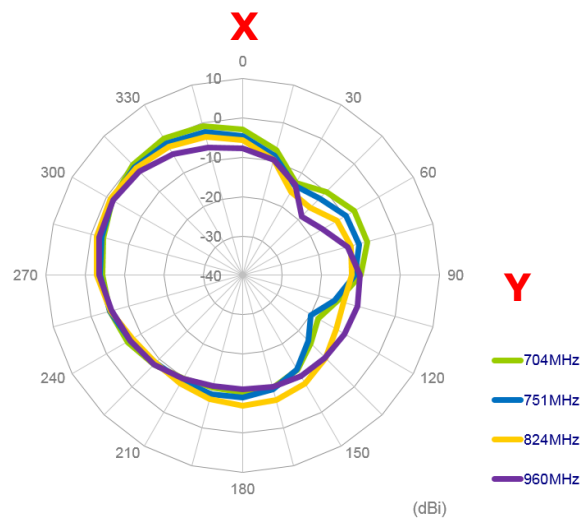


YZ Plane

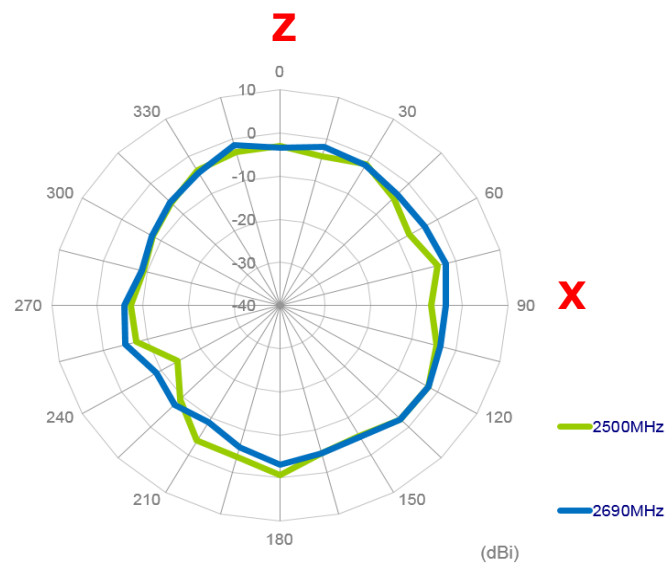
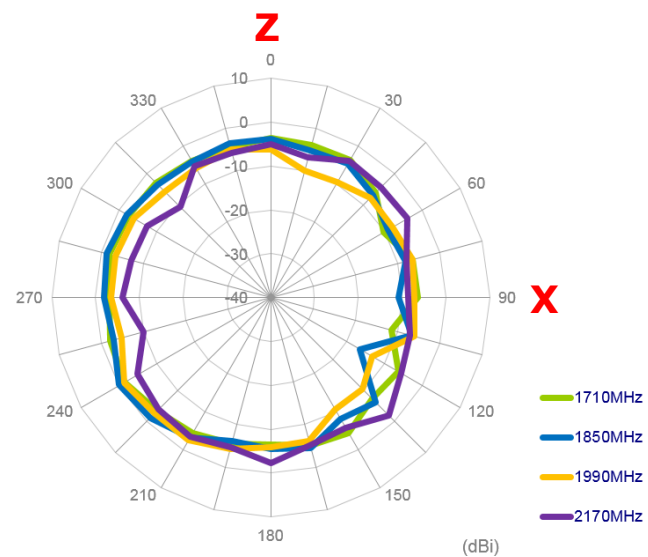
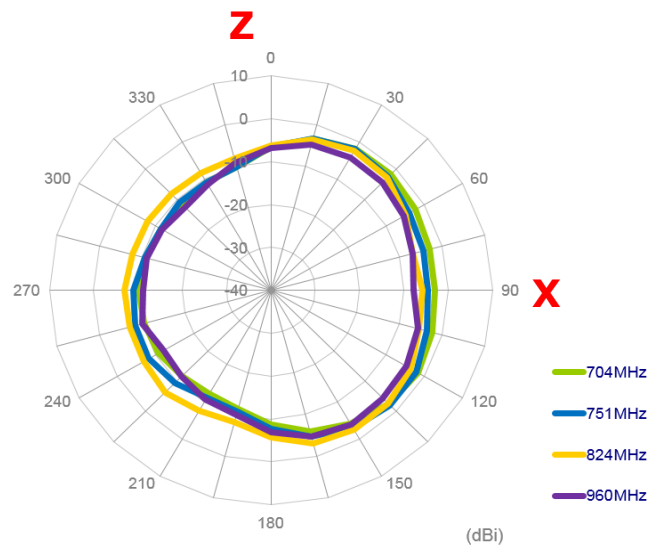


4.2.5 LTE 5

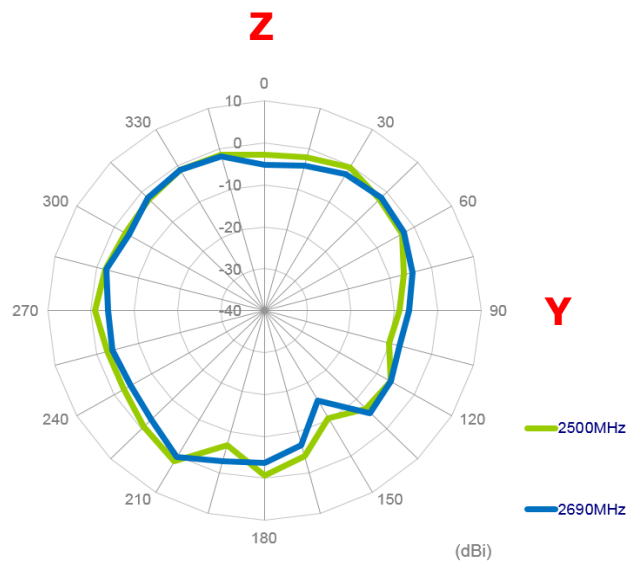
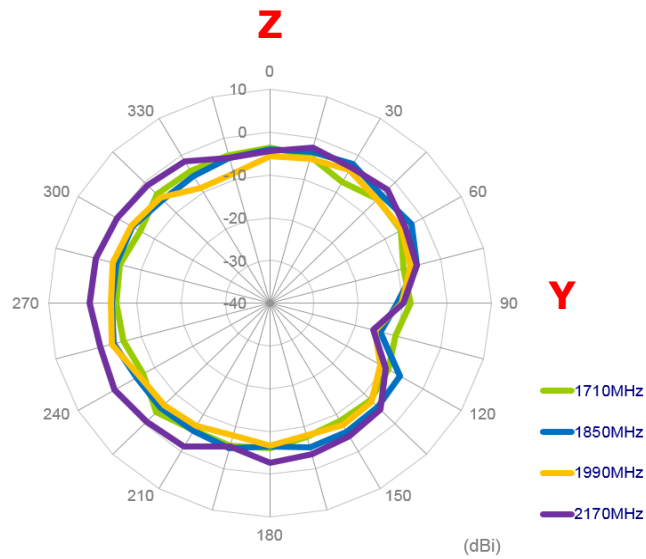
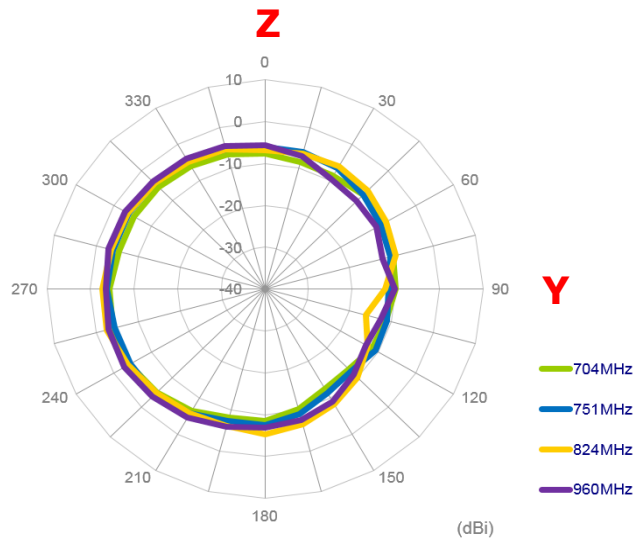
XY Plane



Z-X Plane

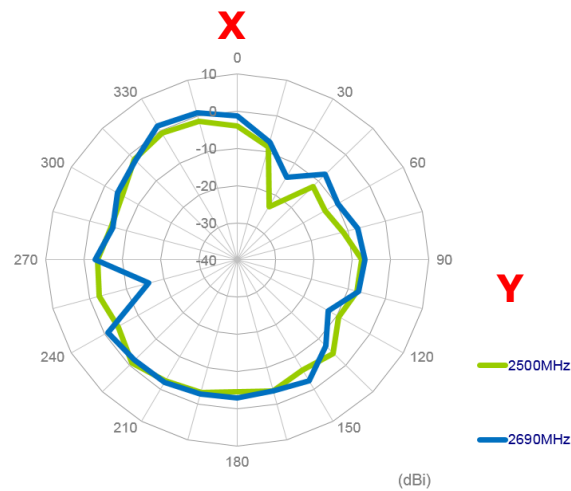
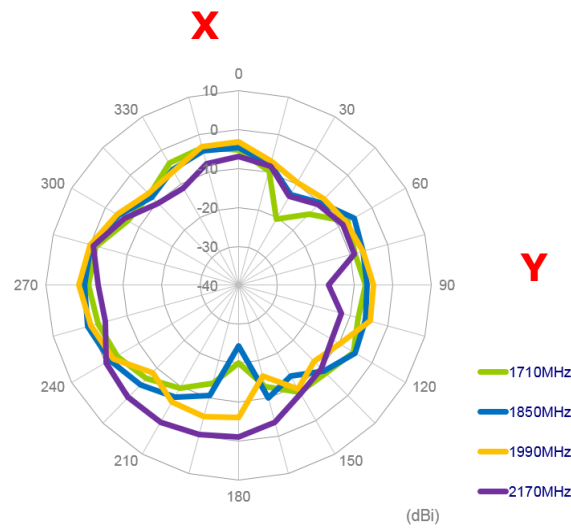
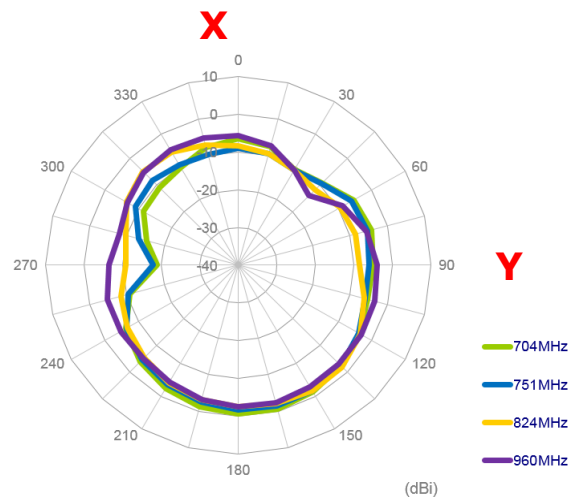


YZ Plane

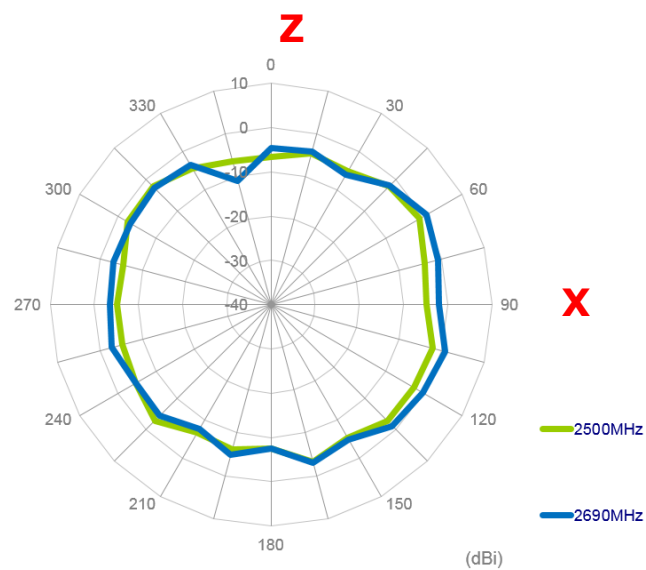
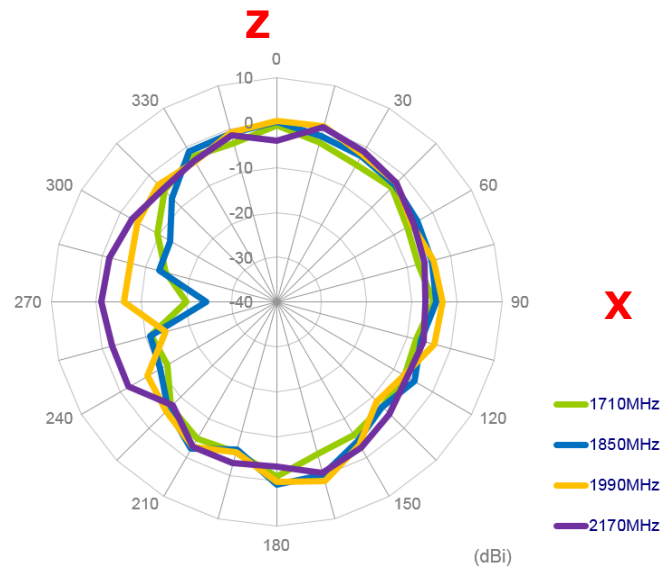
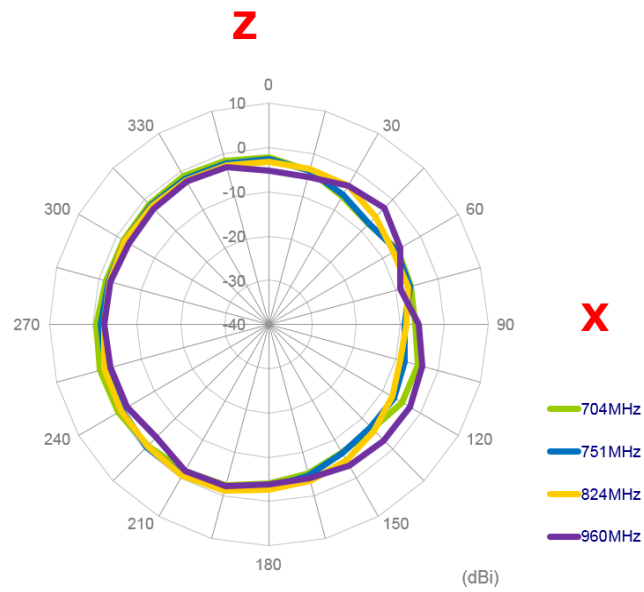


4.2.6 LTE 6

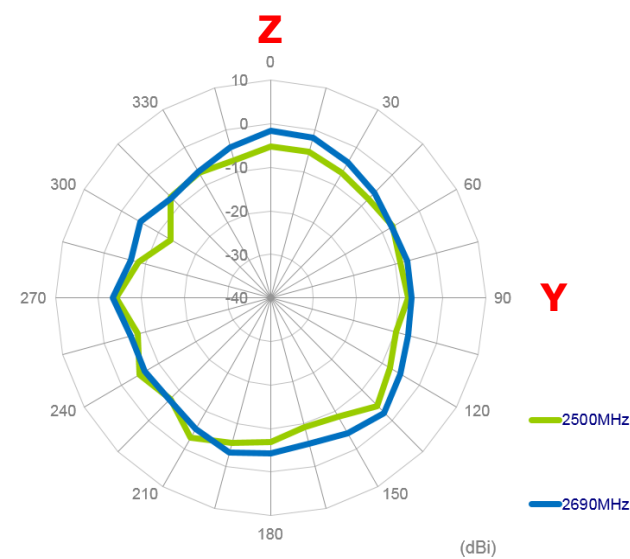
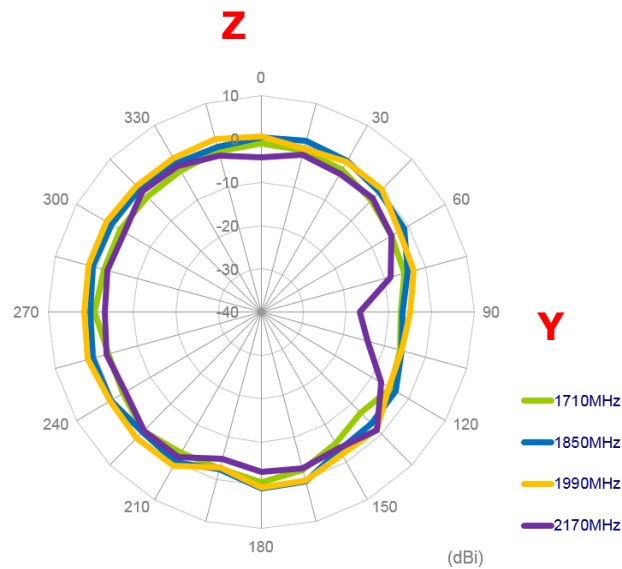
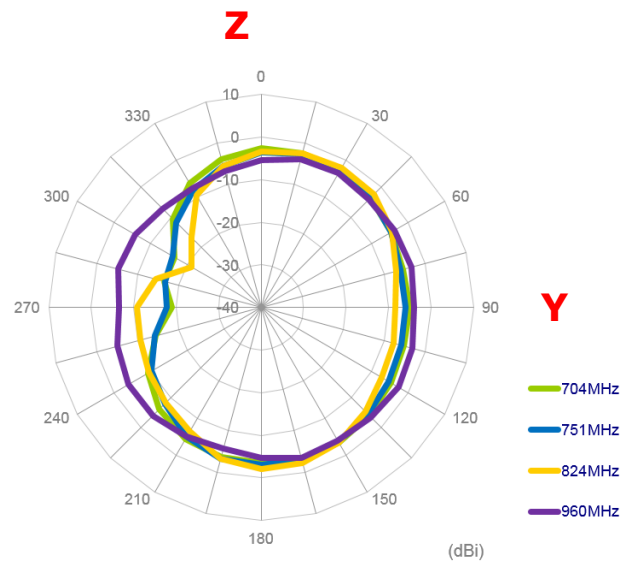
XY Plane



XZ Plane

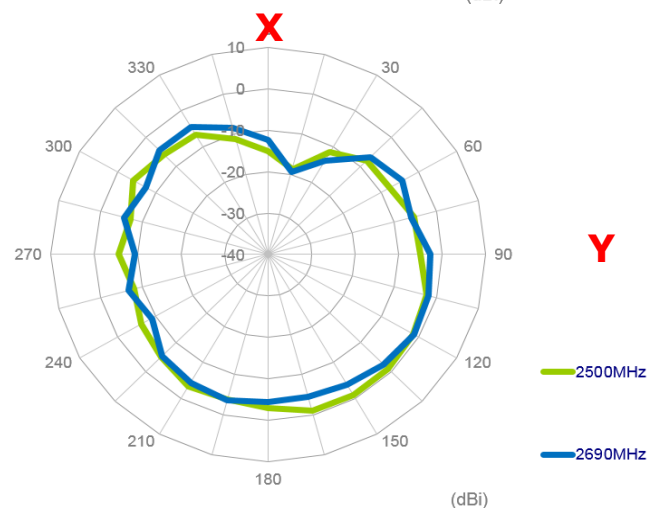
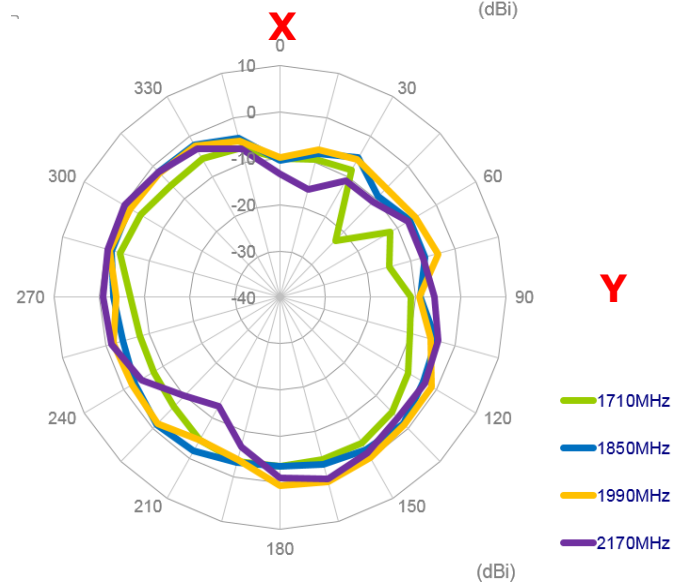
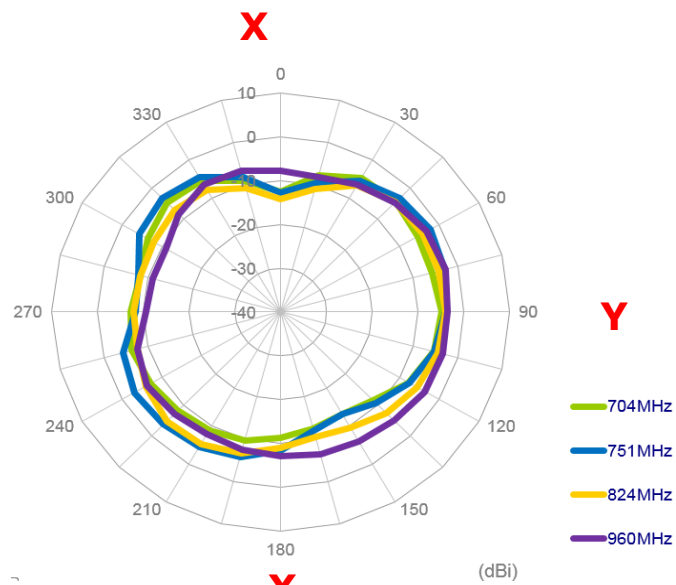


YZ Plane

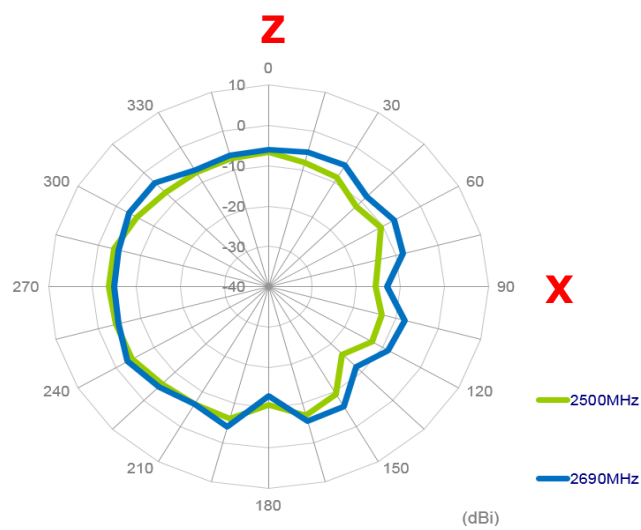
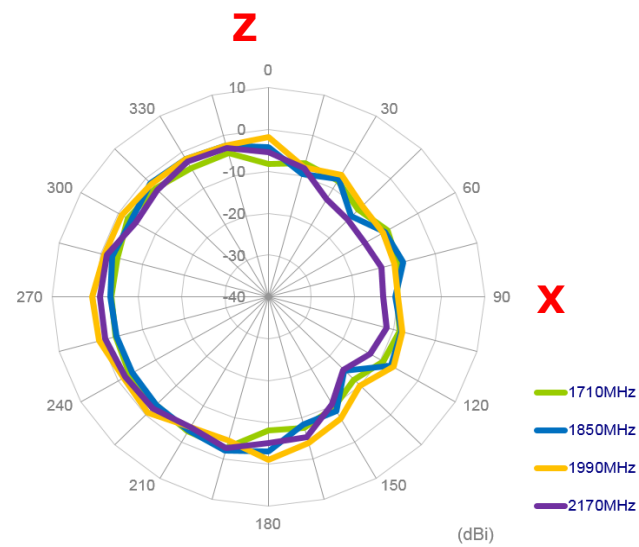
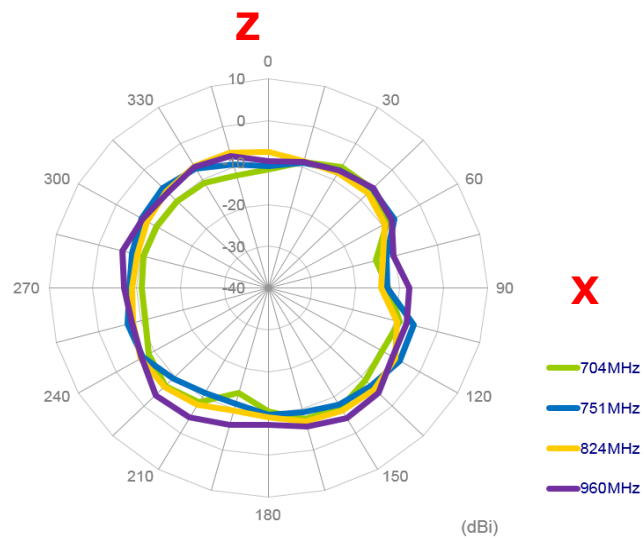


4.2.7 LTE 7

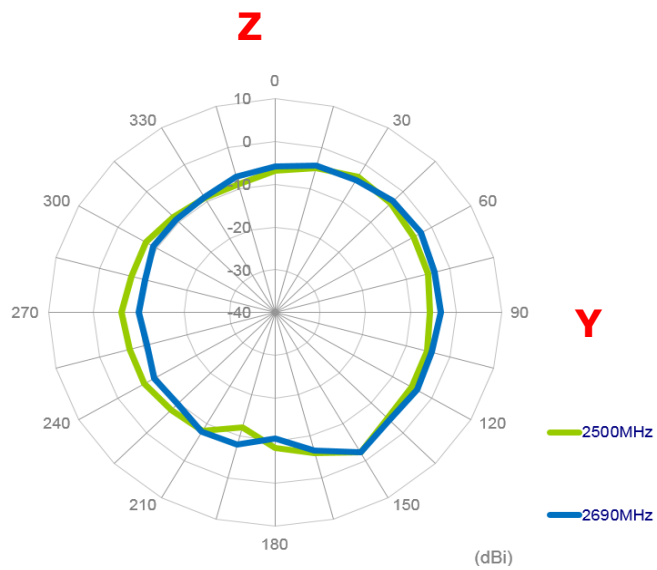
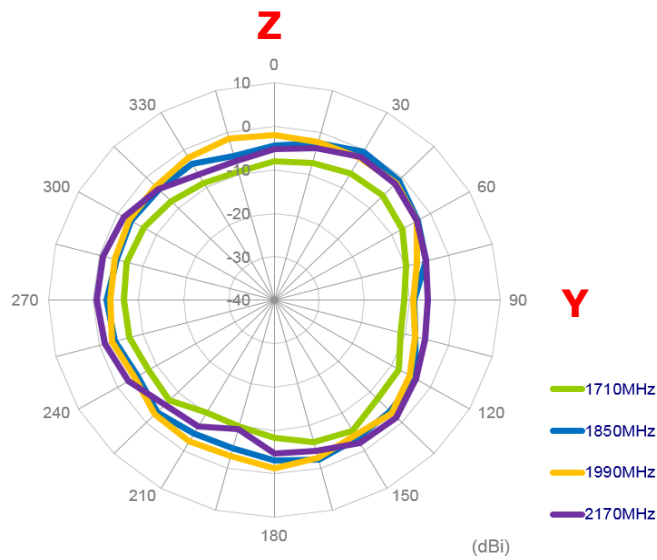
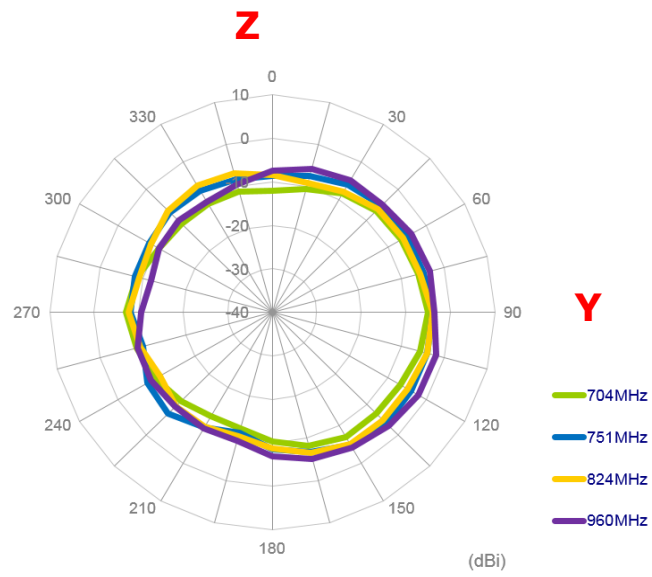
XY Plane



XZ Plane

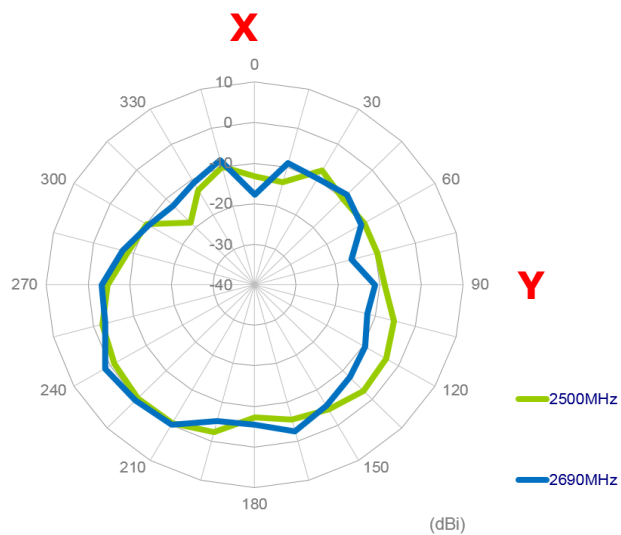
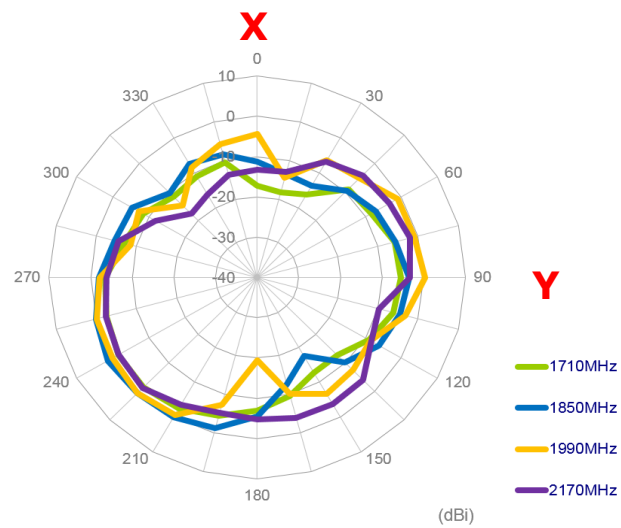
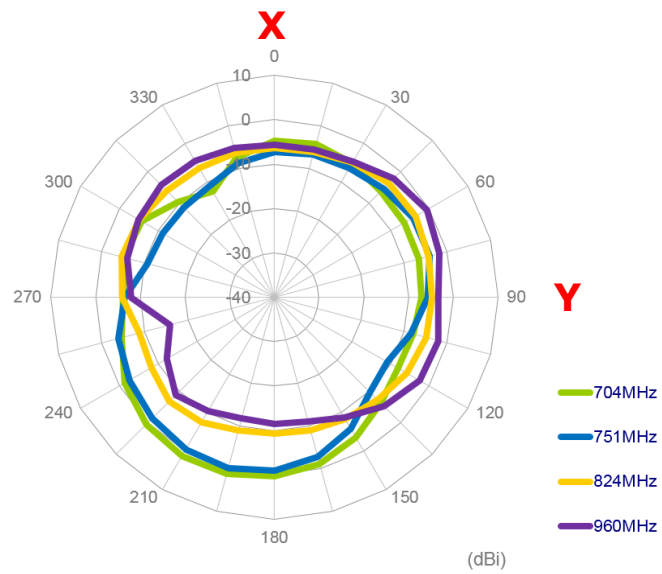


YZ Plane

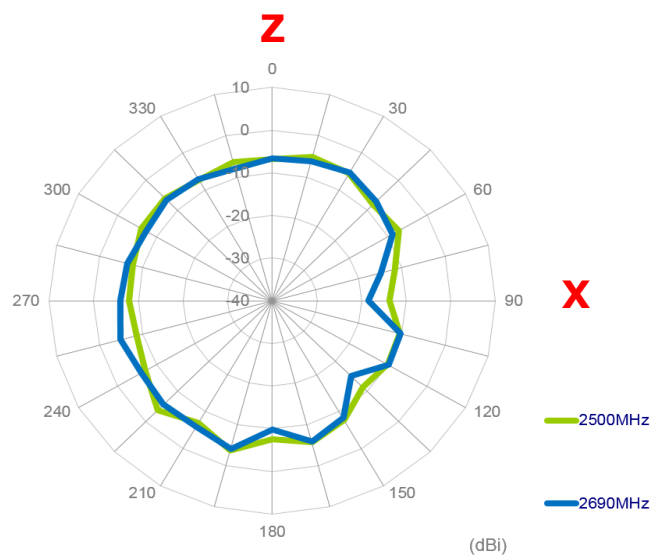
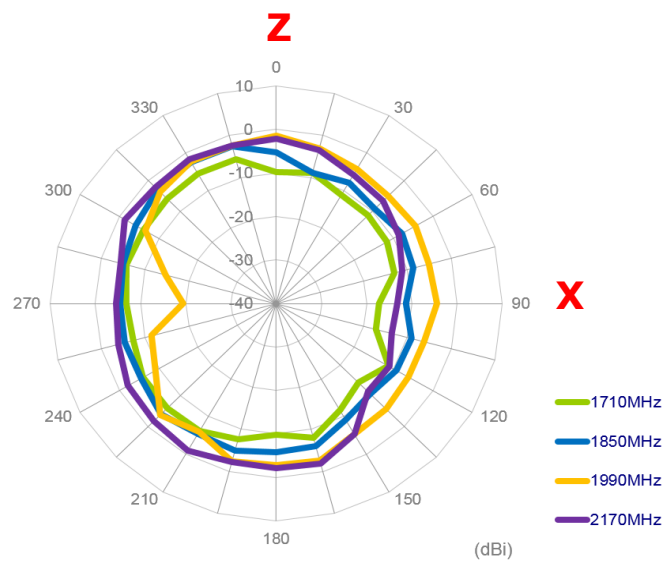
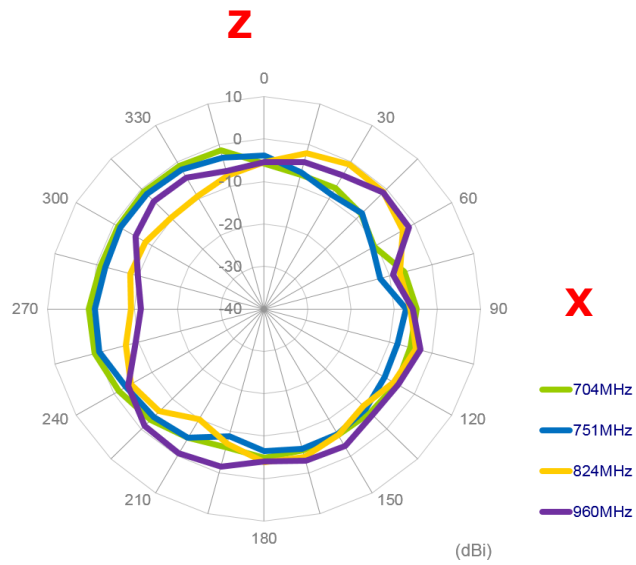


4.2.8 LTE 8

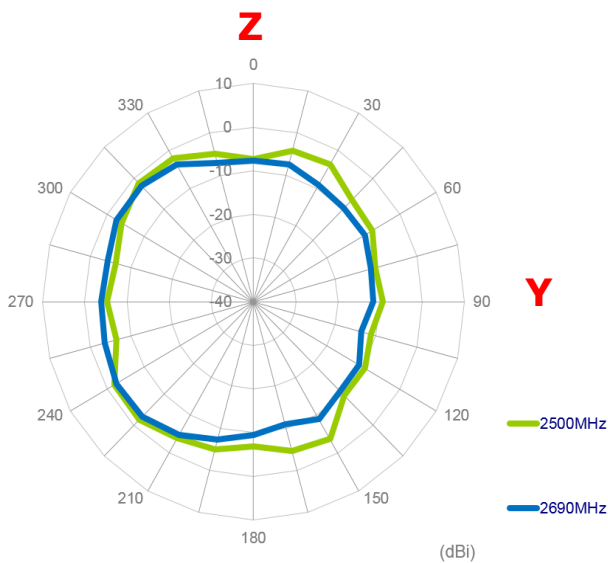
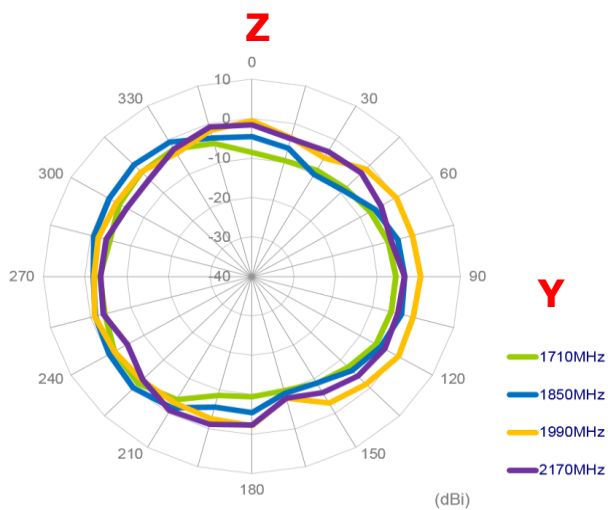
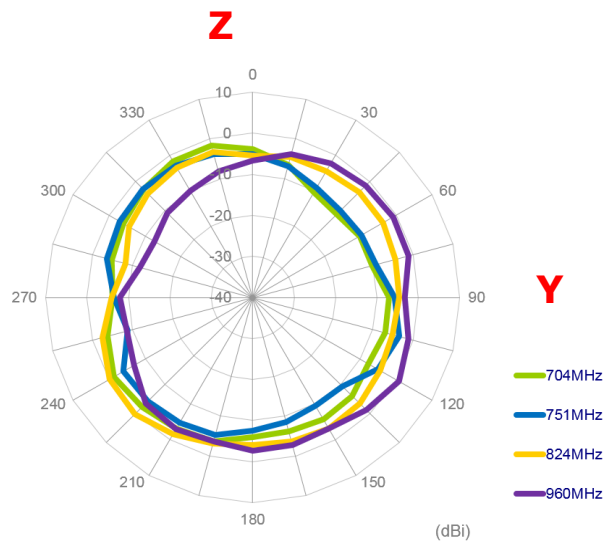
XY Plane



XZ Plane

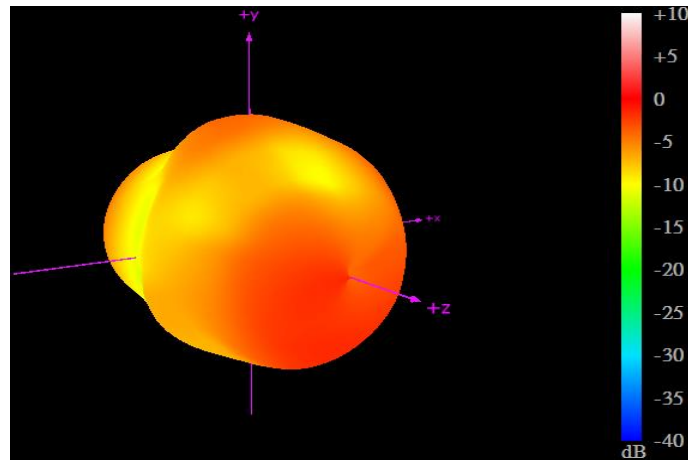


YZ Plane

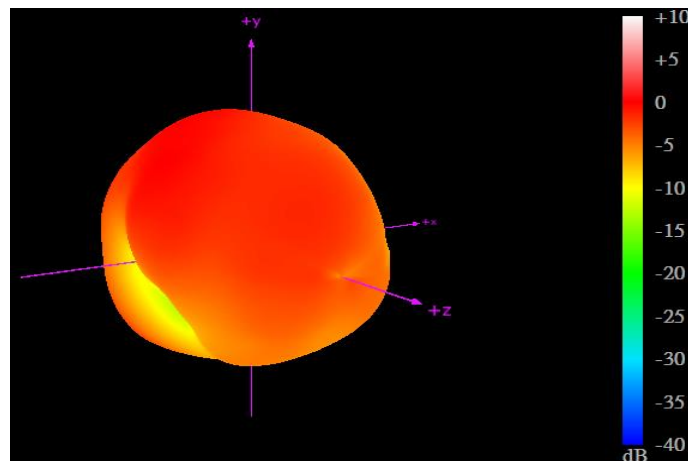


4.3 3D Radiation Patterns

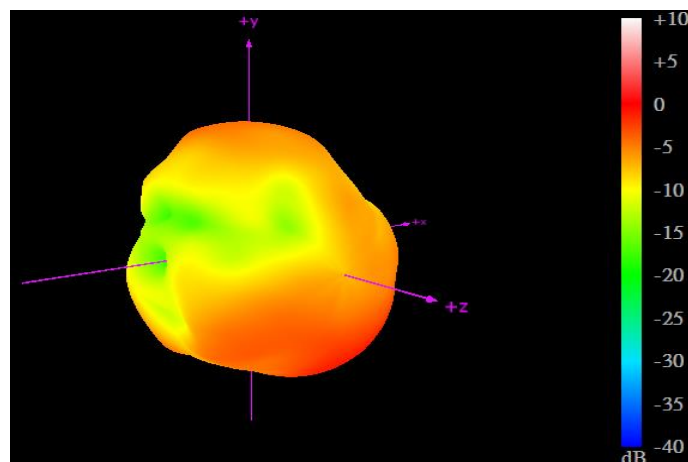
4.3.1 LTE 1



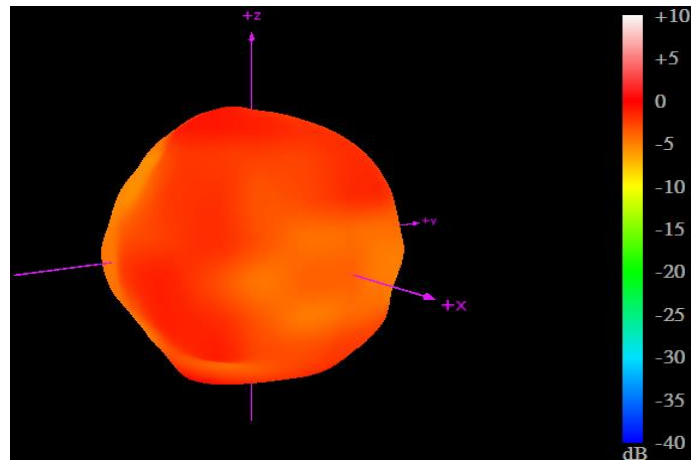
704MHz



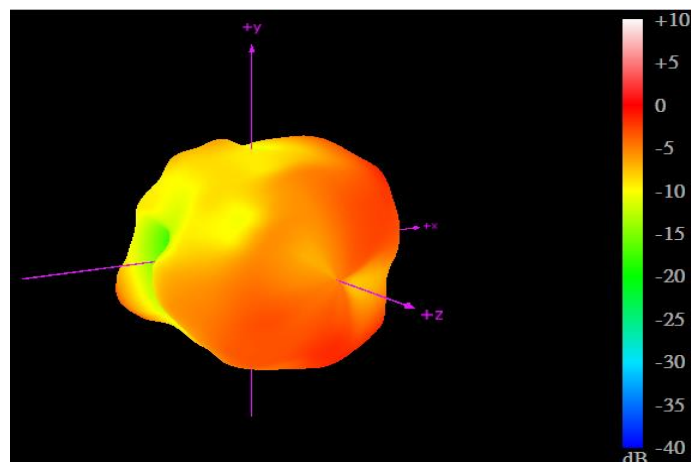
960MHz



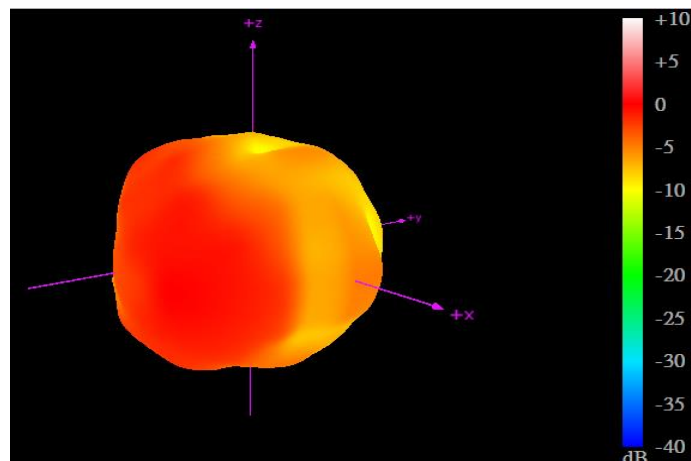
1710MHz



2170MHz

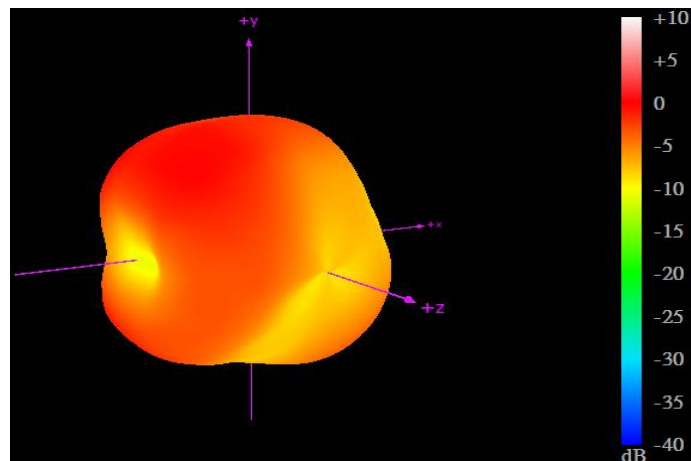


2300MHz

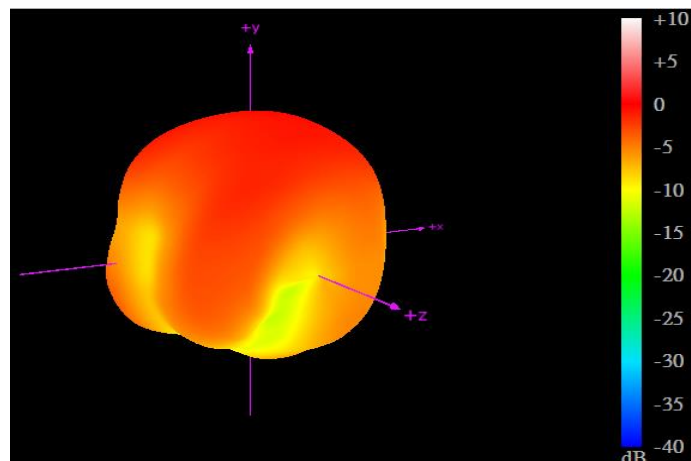


2690MHz

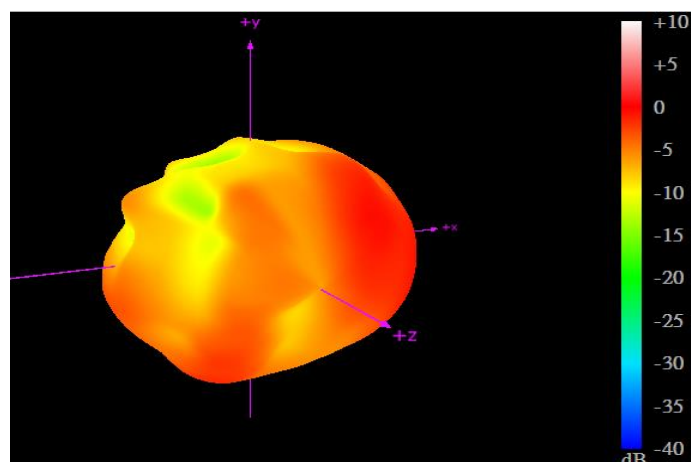
4.3.2 LTE 2



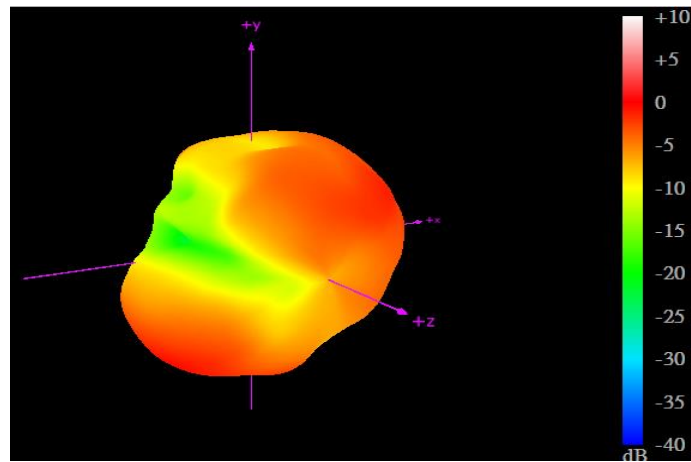
704MHz



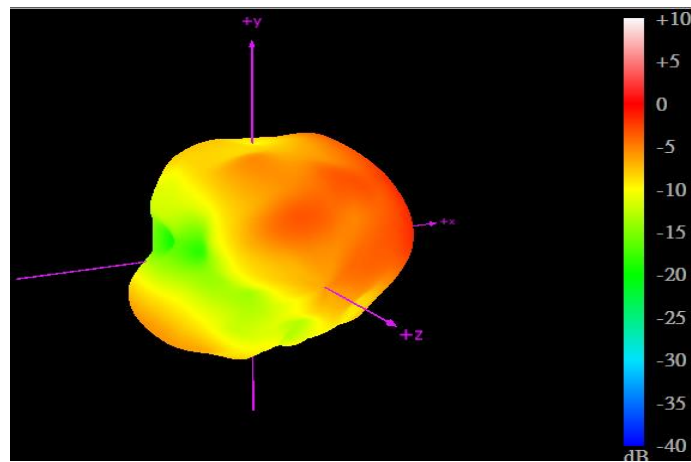
960MHz



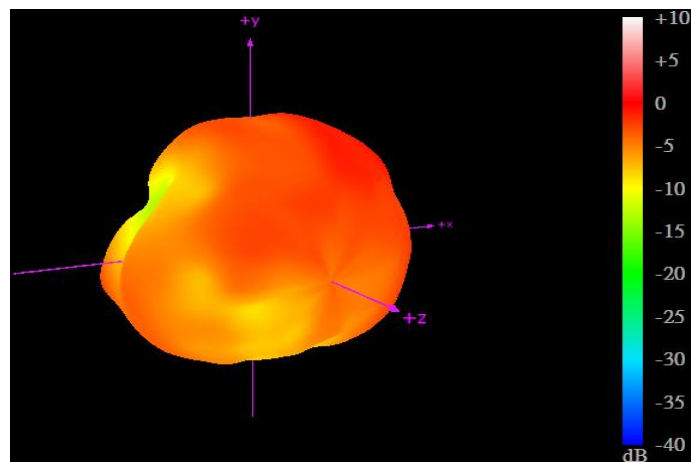
1710MHz



2170MHz

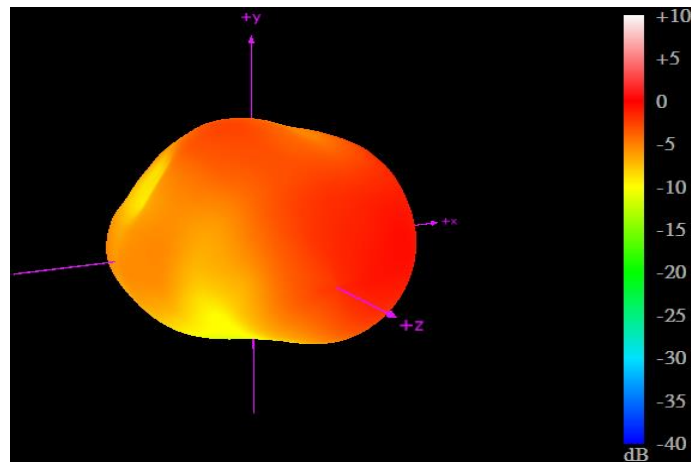


2300MHz

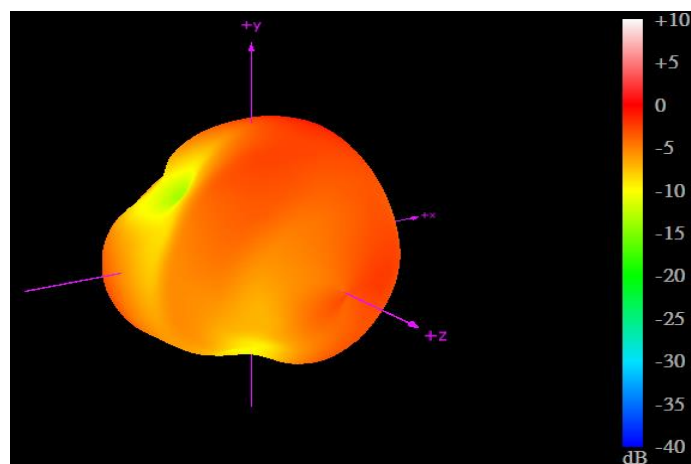


2690MHz

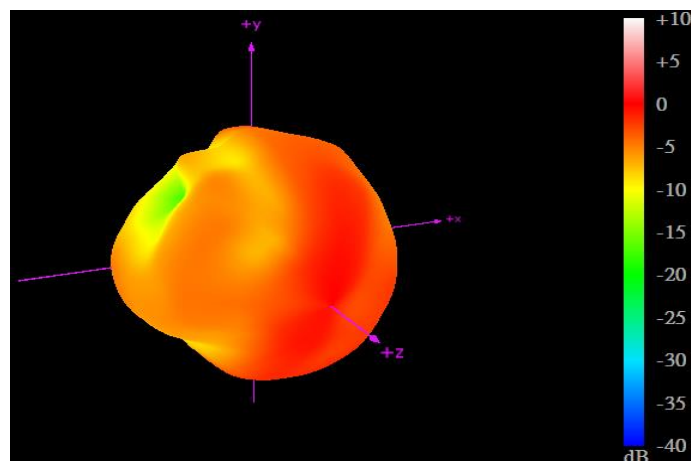
4.3.3 LTE 3



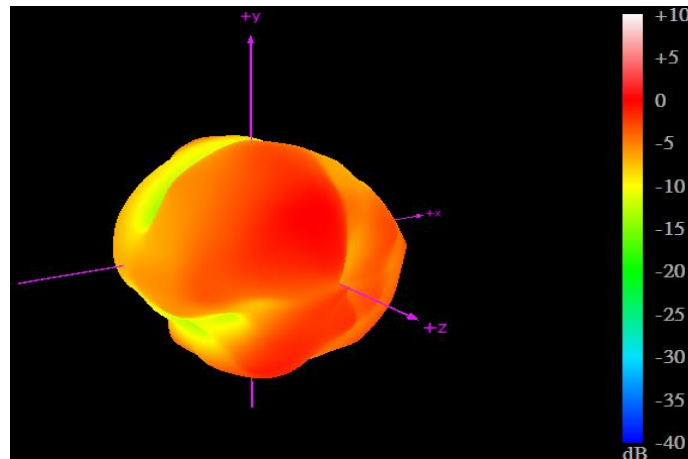
704MHz



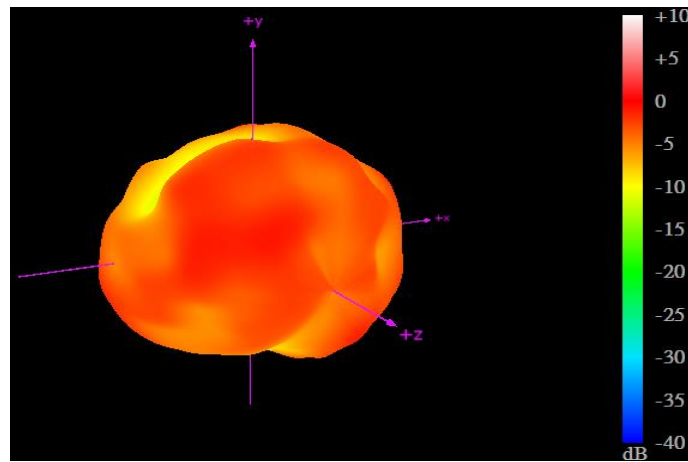
960MHz



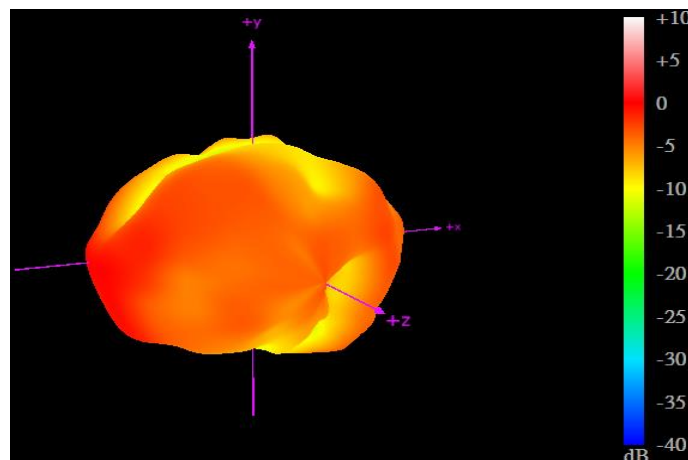
1710MHz



2170MHz

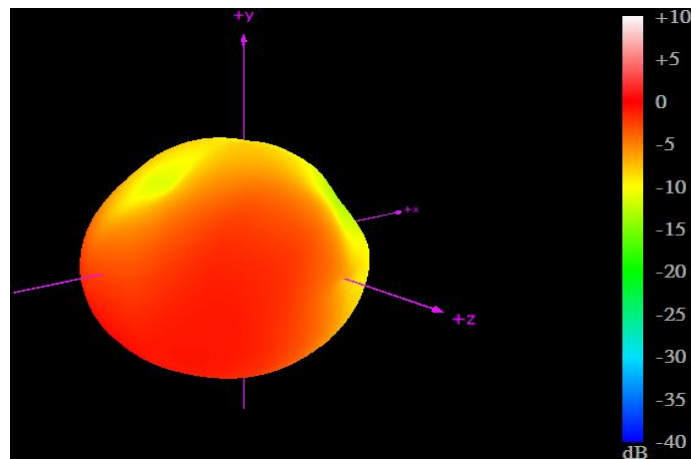


2300MHz

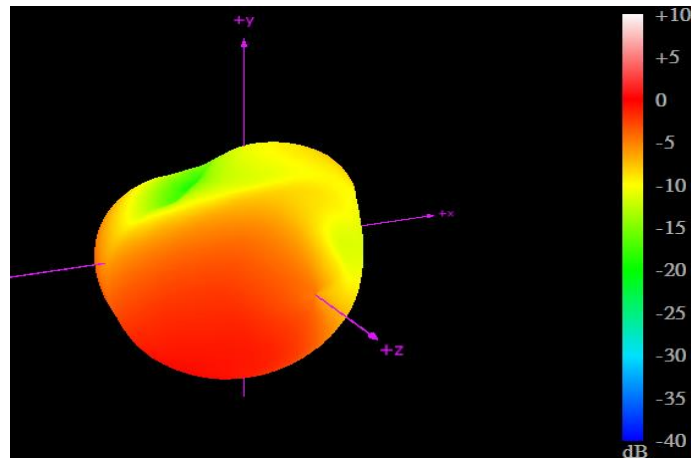


2690MHz

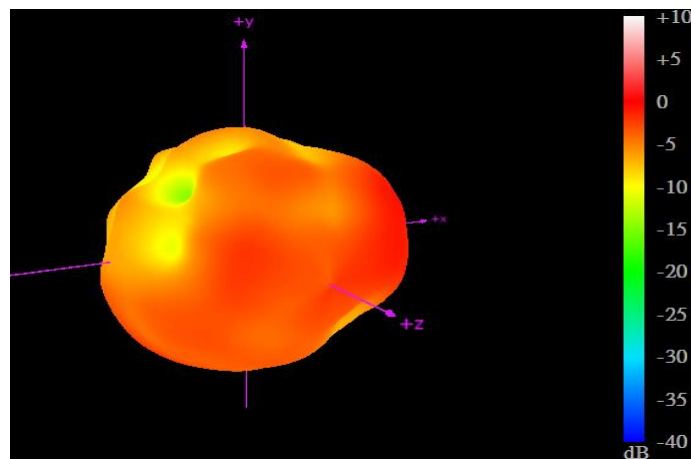
4.3.4 LTE 4



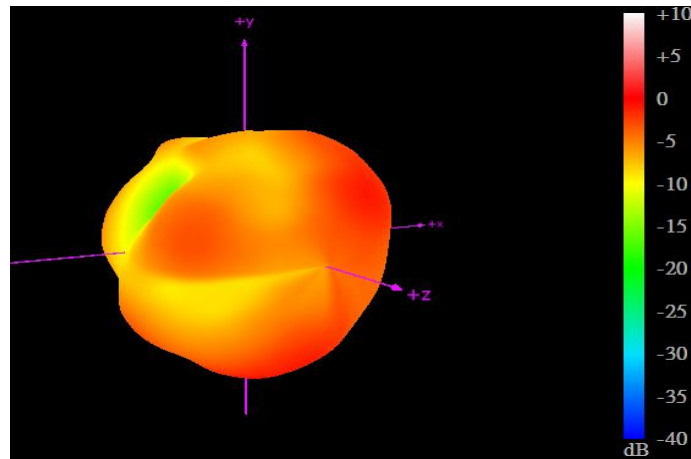
704MHz



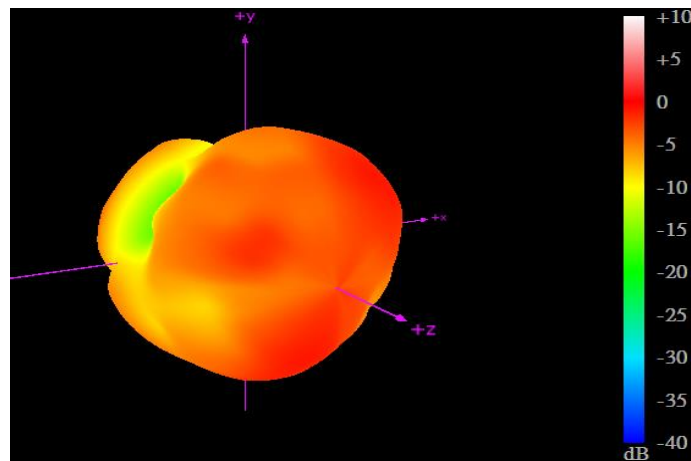
960MHz



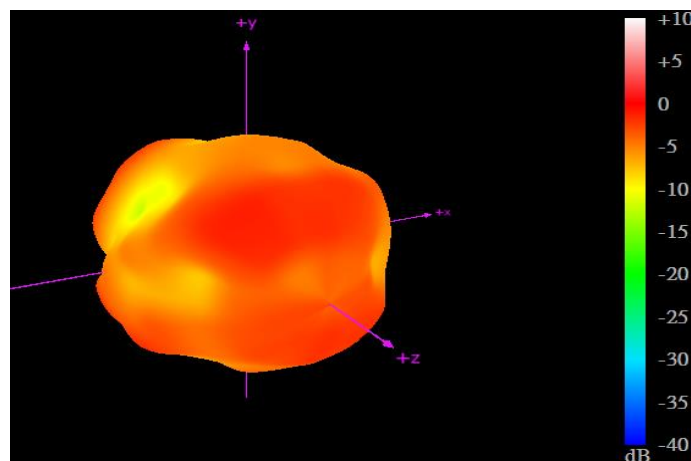
1710MHz



2170MHz

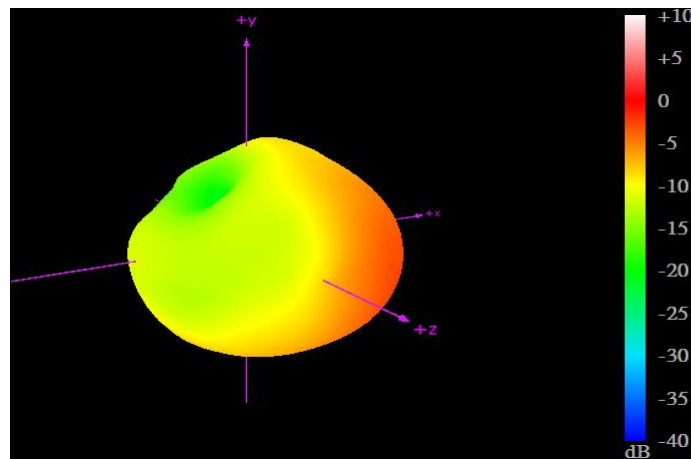


2300MHz

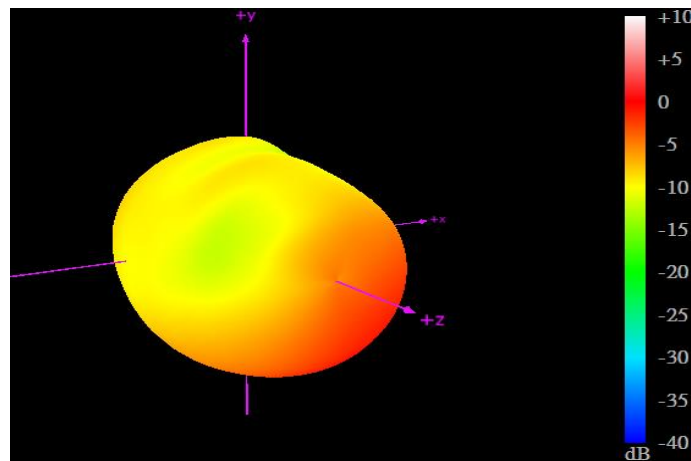


2690MHz

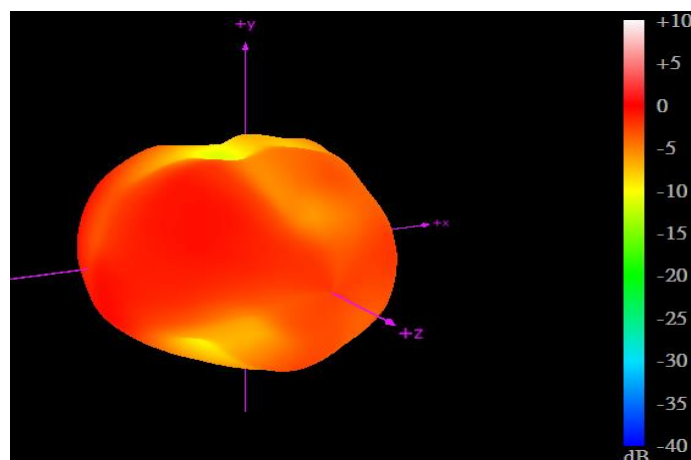
4.3.5 LTE5



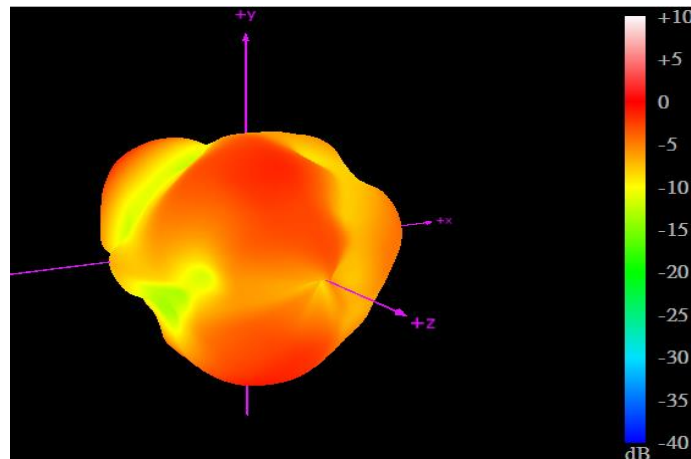
704MHz



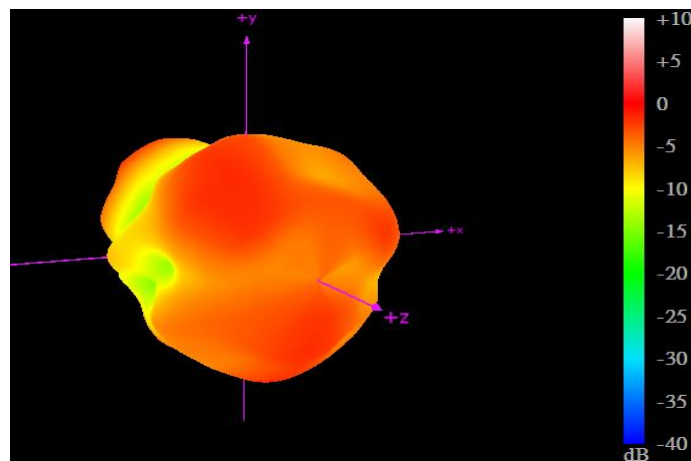
960MHz



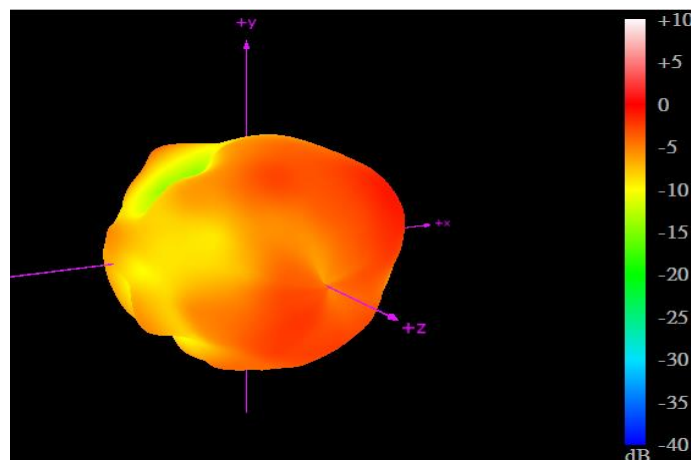
1710MHz



2170MHz

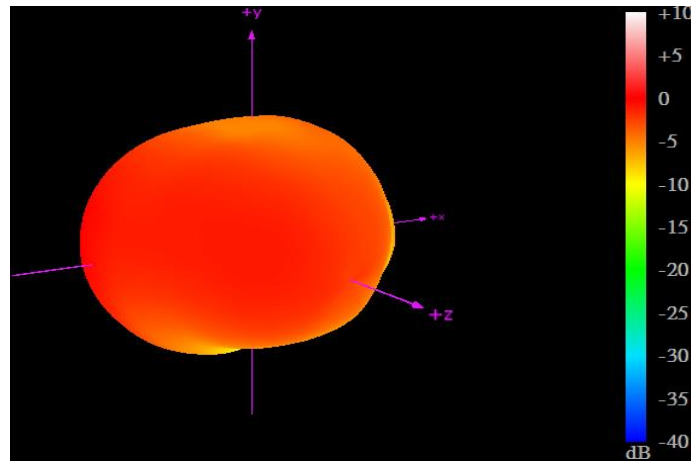


2300MHz

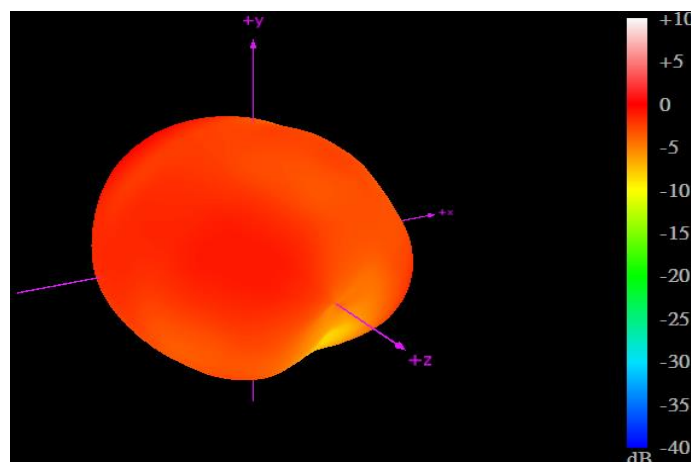


2690MHz

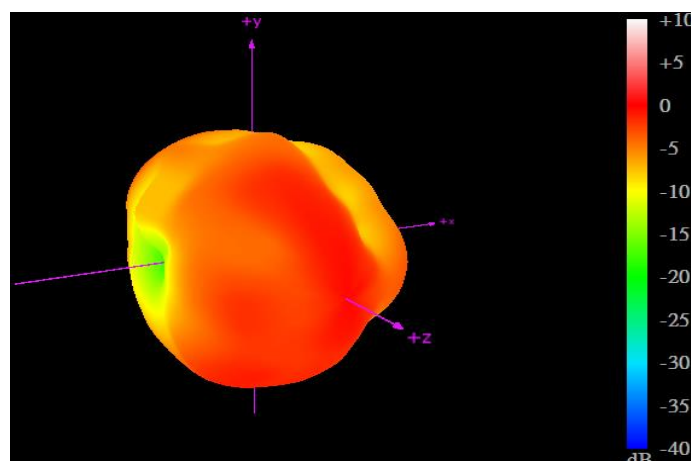
4.3.6 LTE 6



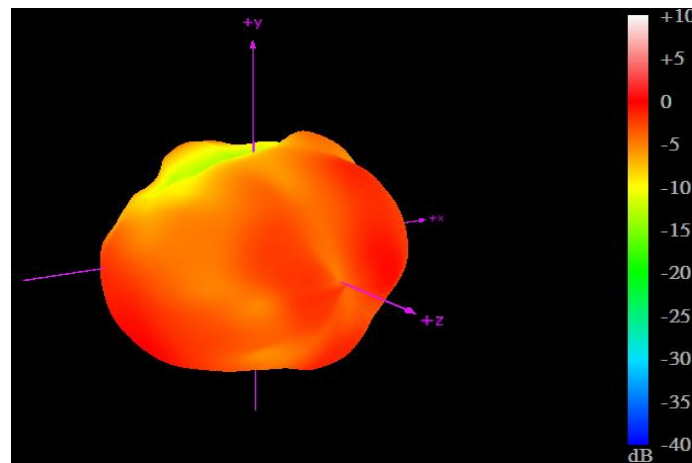
704MHz



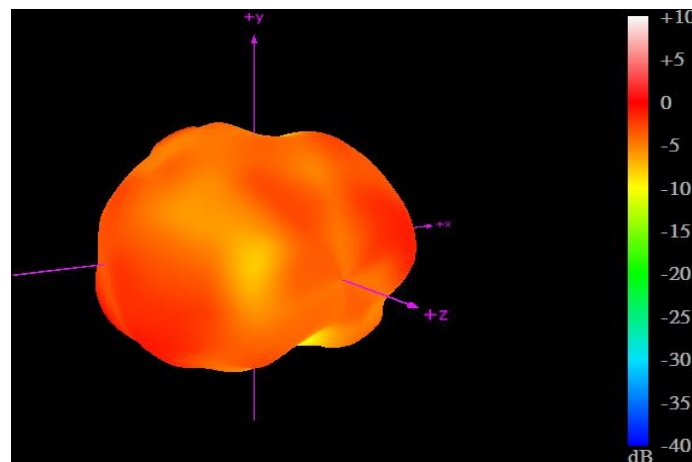
960MHz



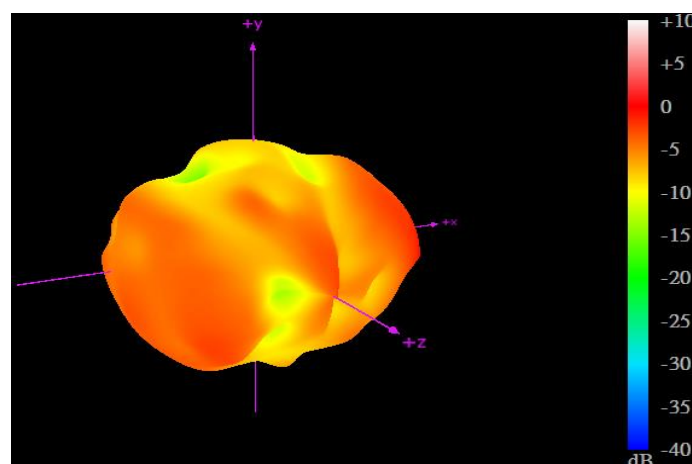
1710MHz



2170MHz

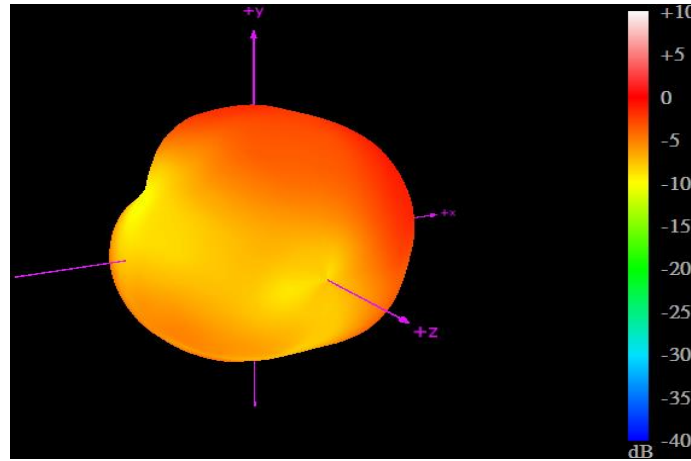


2300MHz

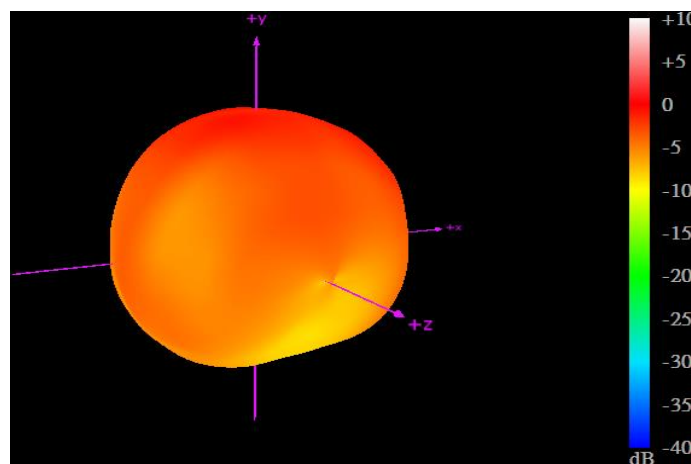


2690MHz

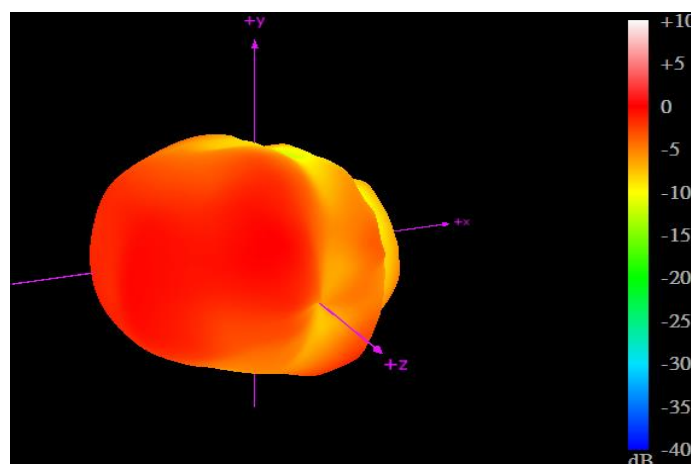
4.3.7 LTE 7



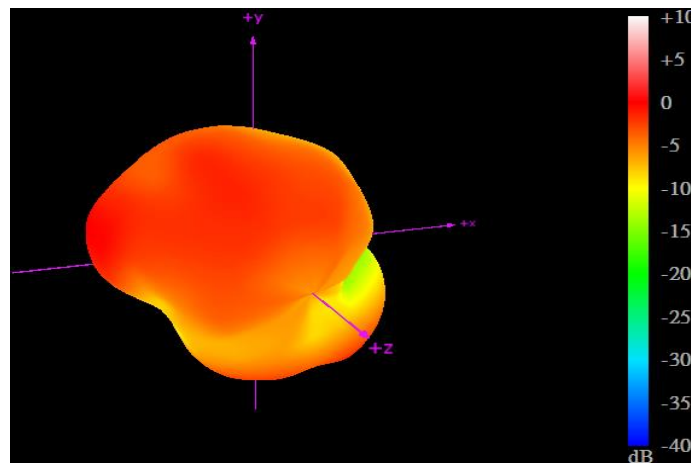
704MHz



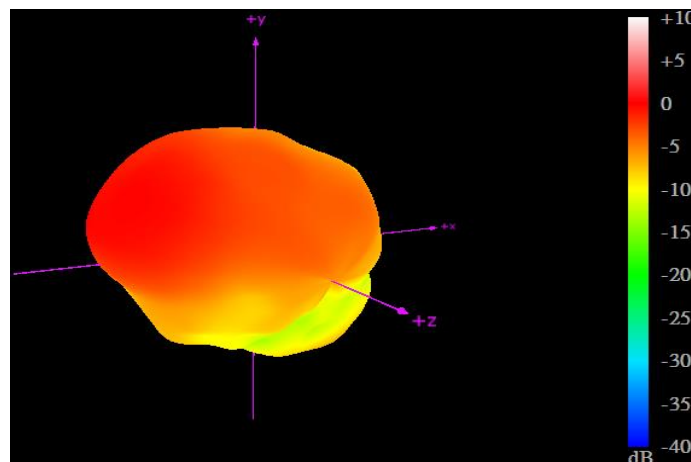
960MHz



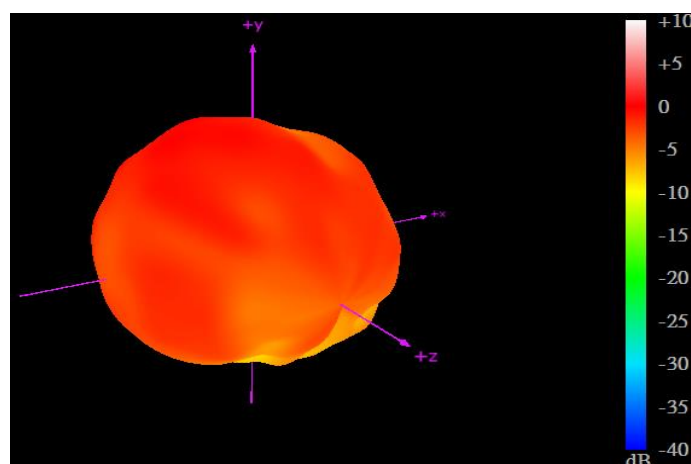
1710MHz



2170MHz

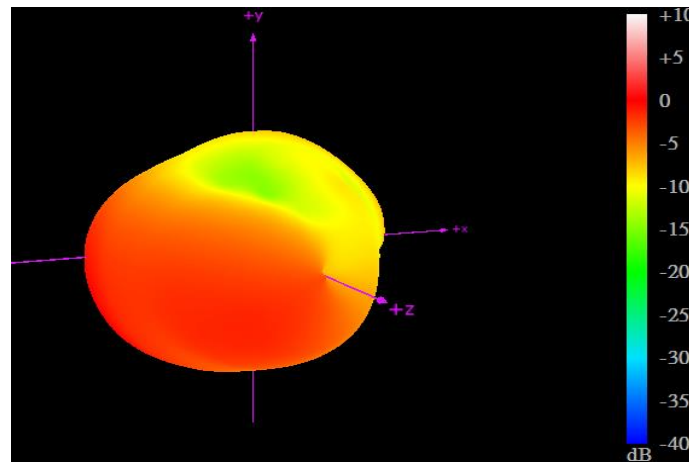


2300MHz

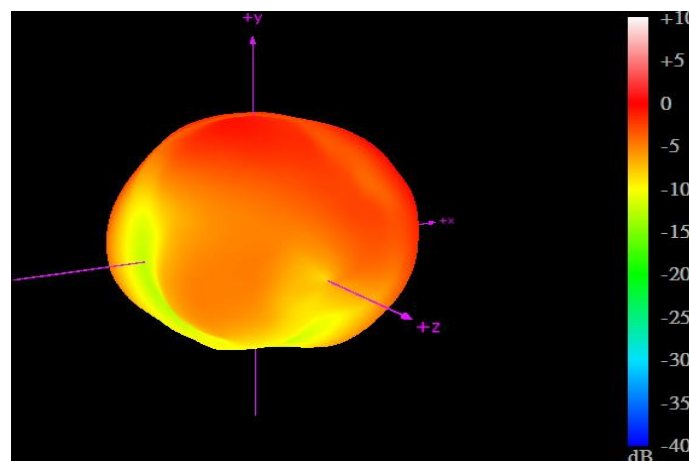


2690MHz

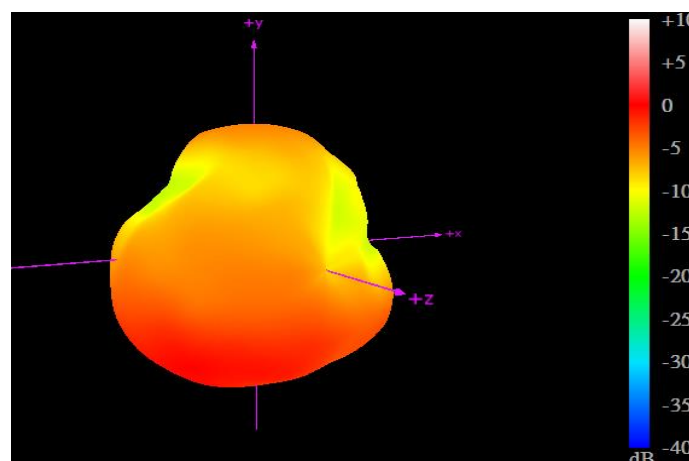
4.3.8 LTE 8



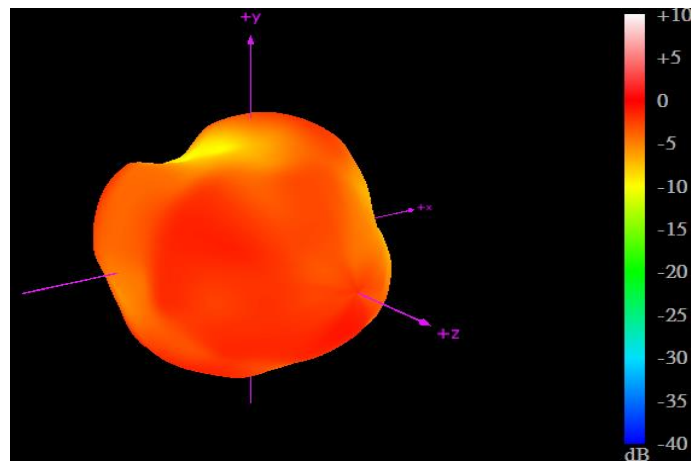
704MHz



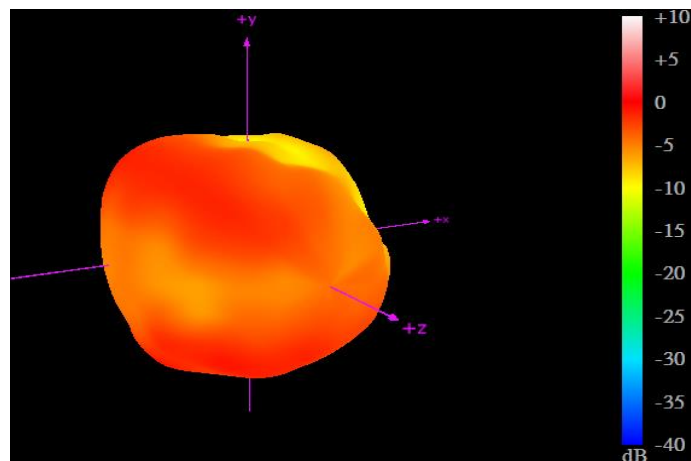
960MHz



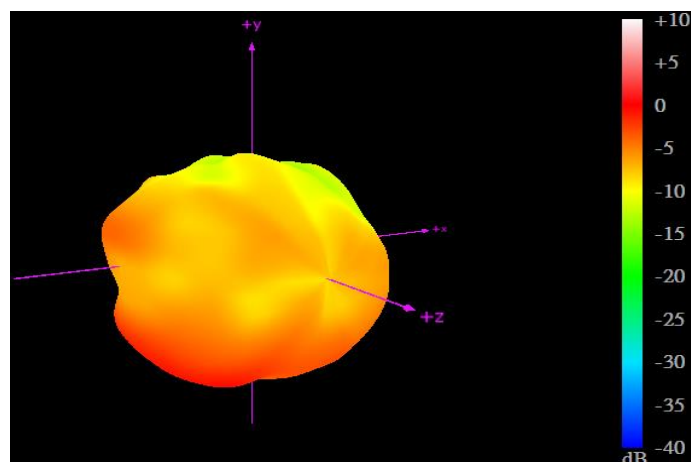
1710MHz



2170MHz

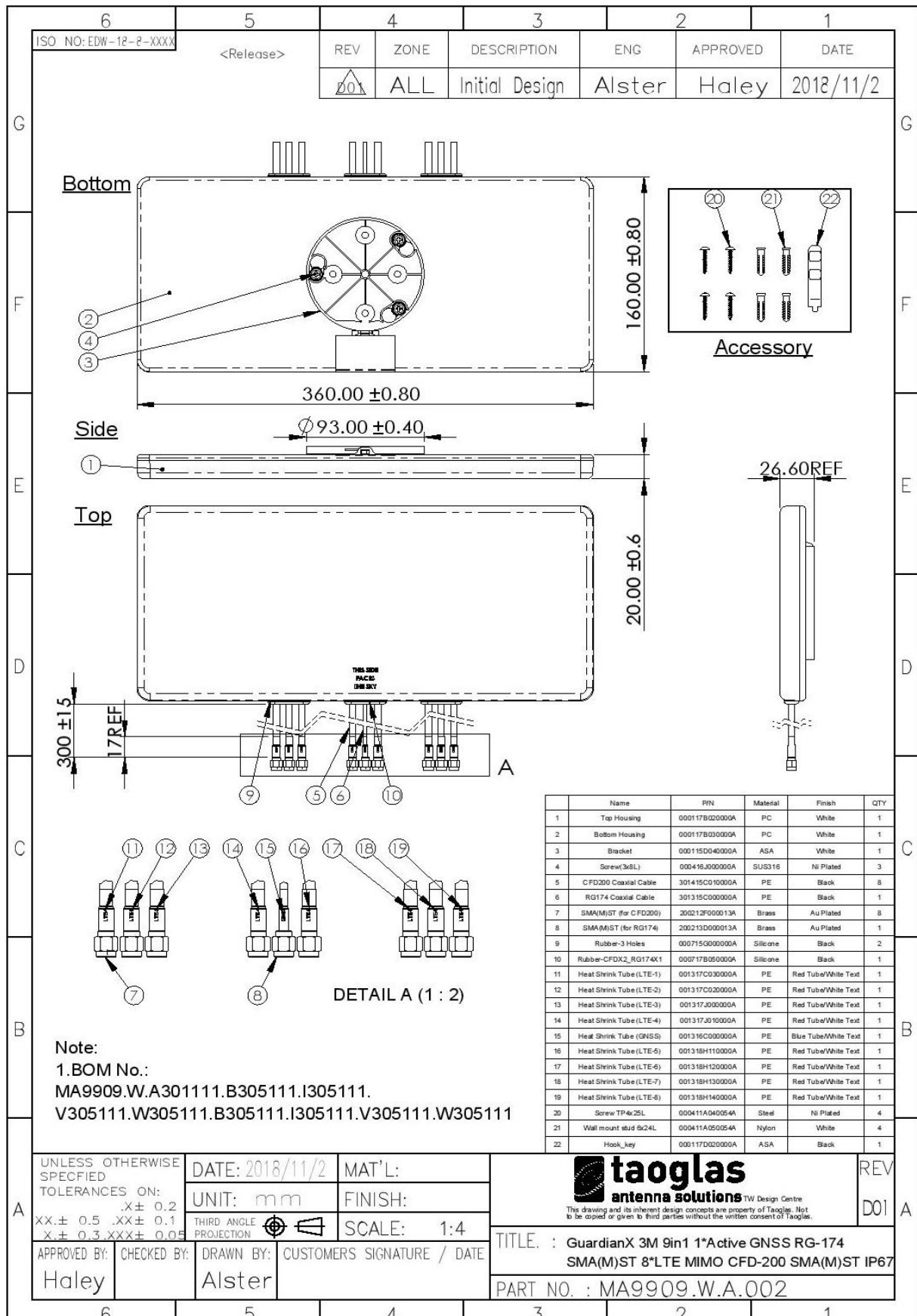


2300MHz



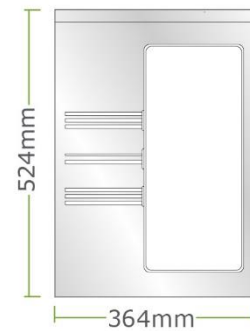
2690MHz

5. Mechanical Drawing (Unit: mm)

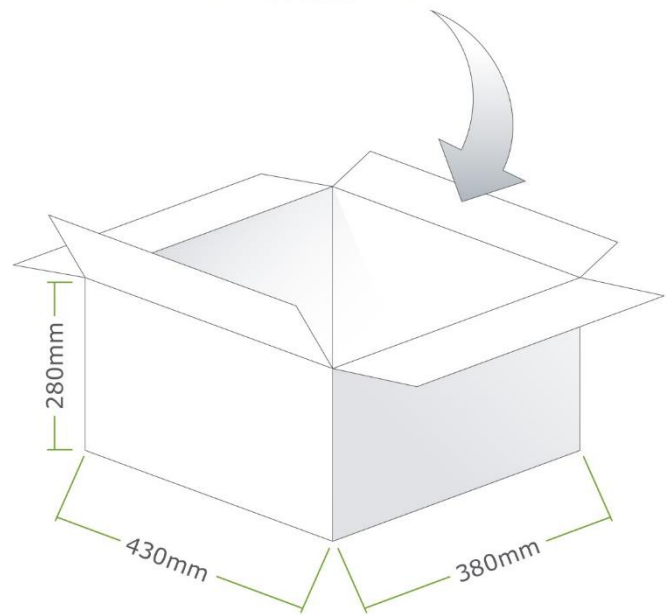


6. Packaging

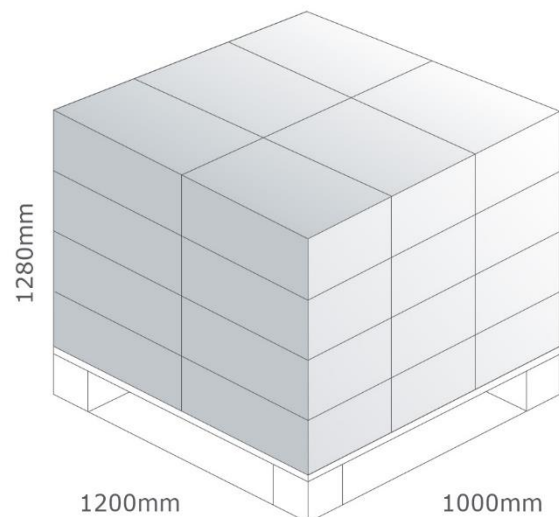
1pc MA9909.W.A.002 per PE Bag
 Bag Dimensions - 364*524mm
 Weight - 1.068Kg



10pcs MA9909.W.A.002 per Carton
 Carton Dimensions - 430*380*280mm
 Weight - 11.6Kg



Pallet Dimensions:
 1200mm*1000mm*1280mm
 24 Cartons per Pallet
 6 Cartons per Layer, 4 Layers

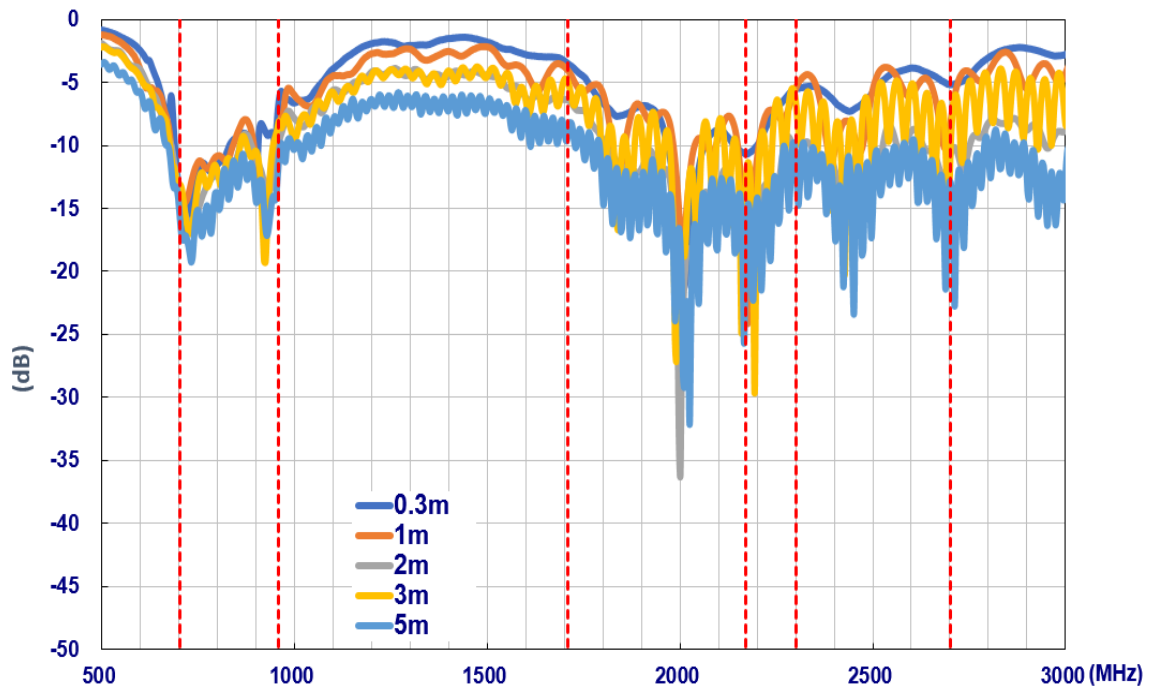


7. Application Note

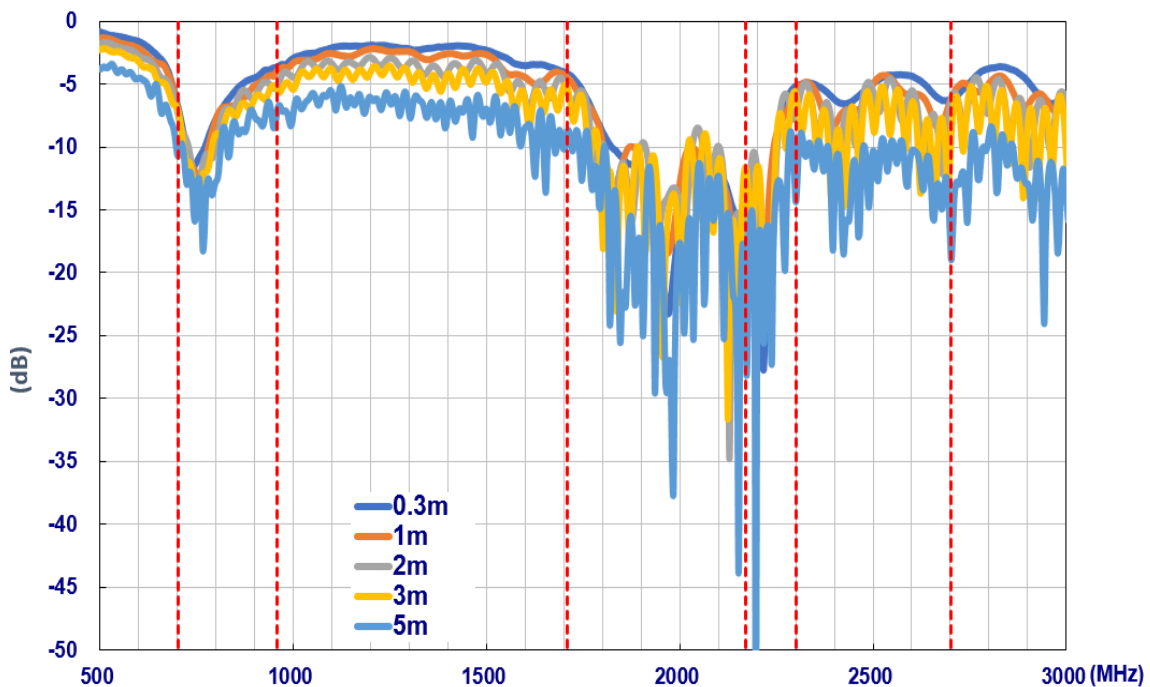
The MA9909 antenna performance with different cable lengths is shown below.

7.1. Return Loss

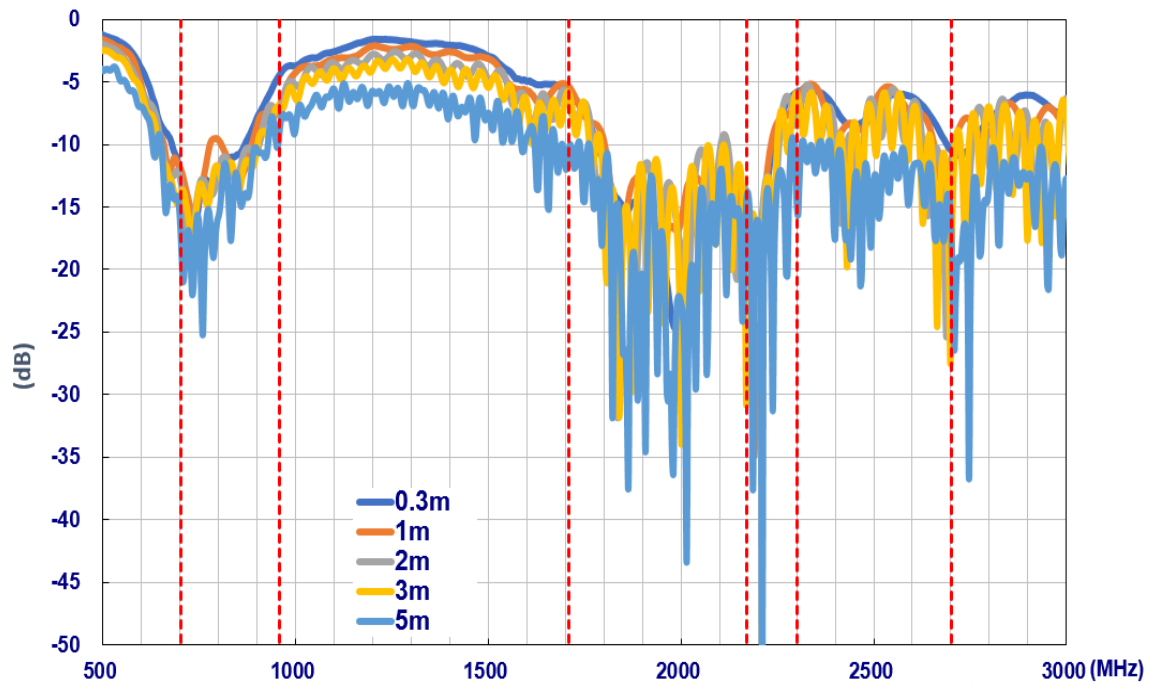
7.1.1 LTE 1



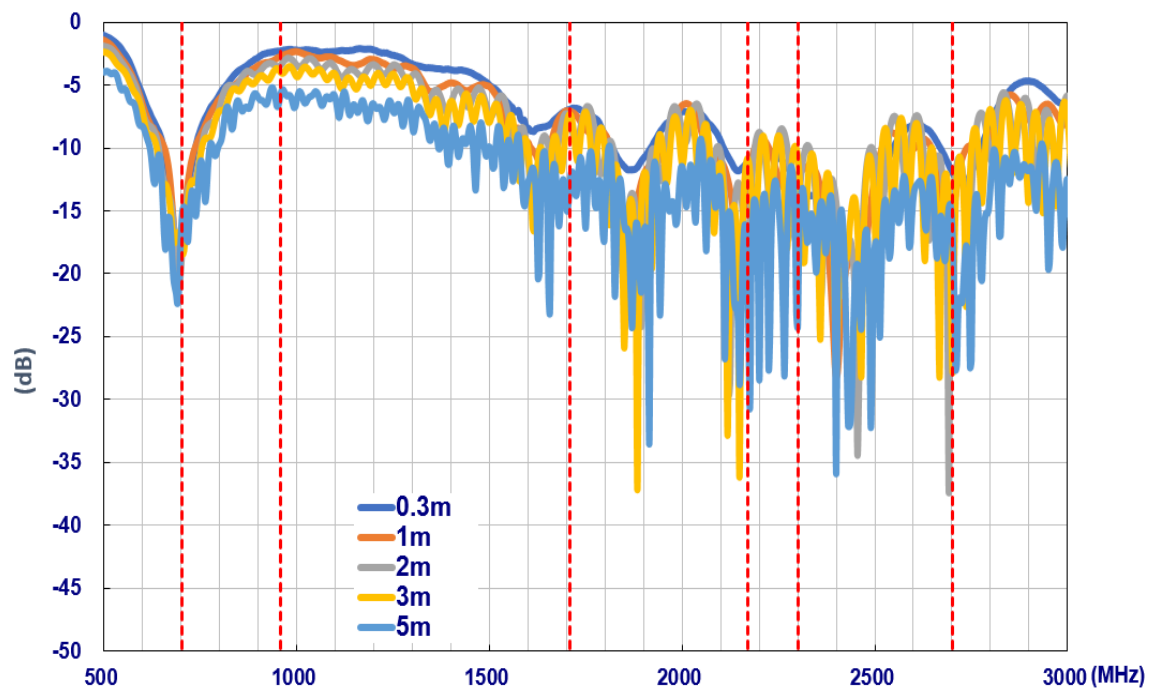
7.1.2 LTE 2



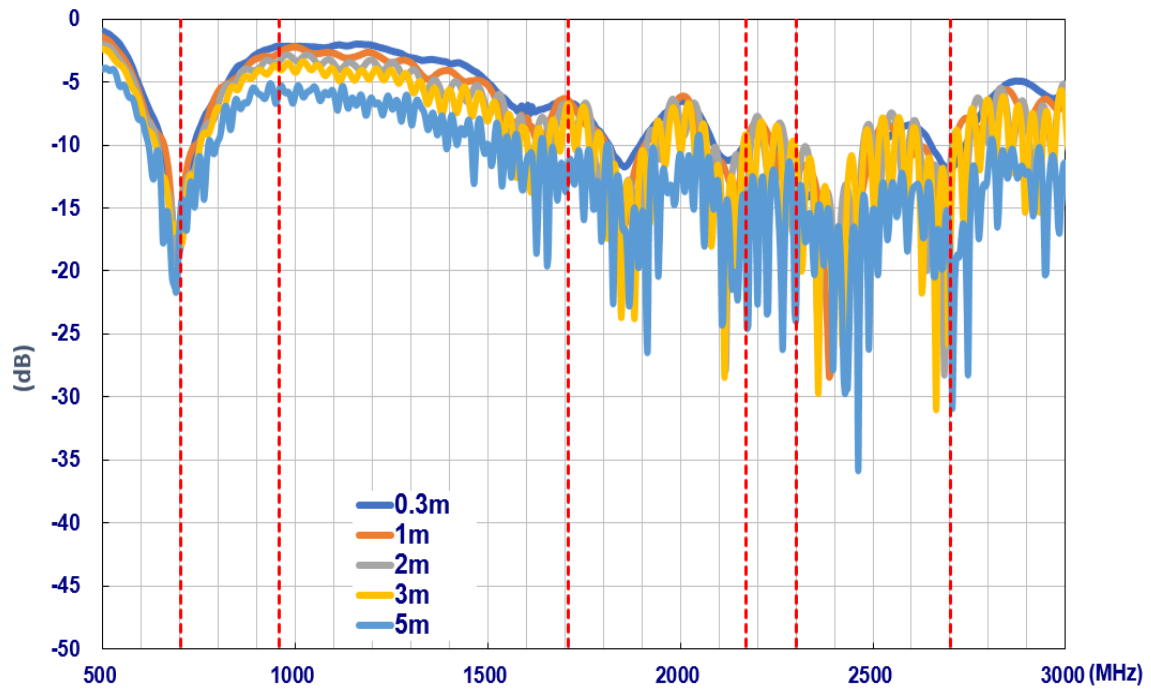
7.1.3 LTE 3



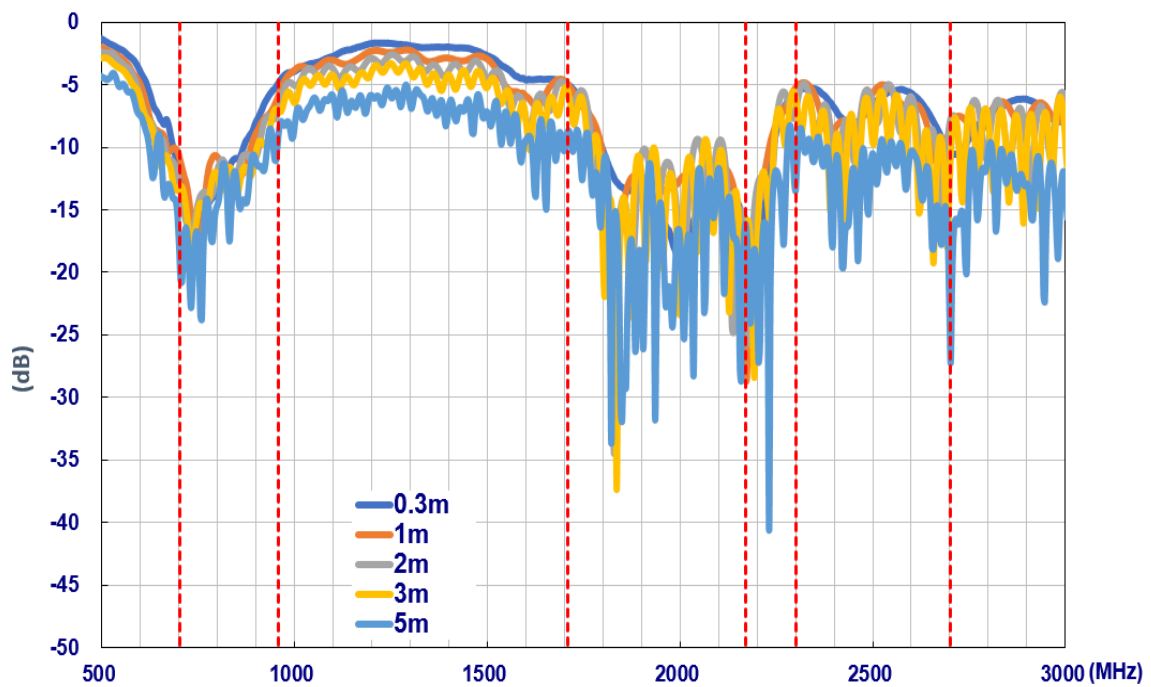
7.1.4 LTE 4



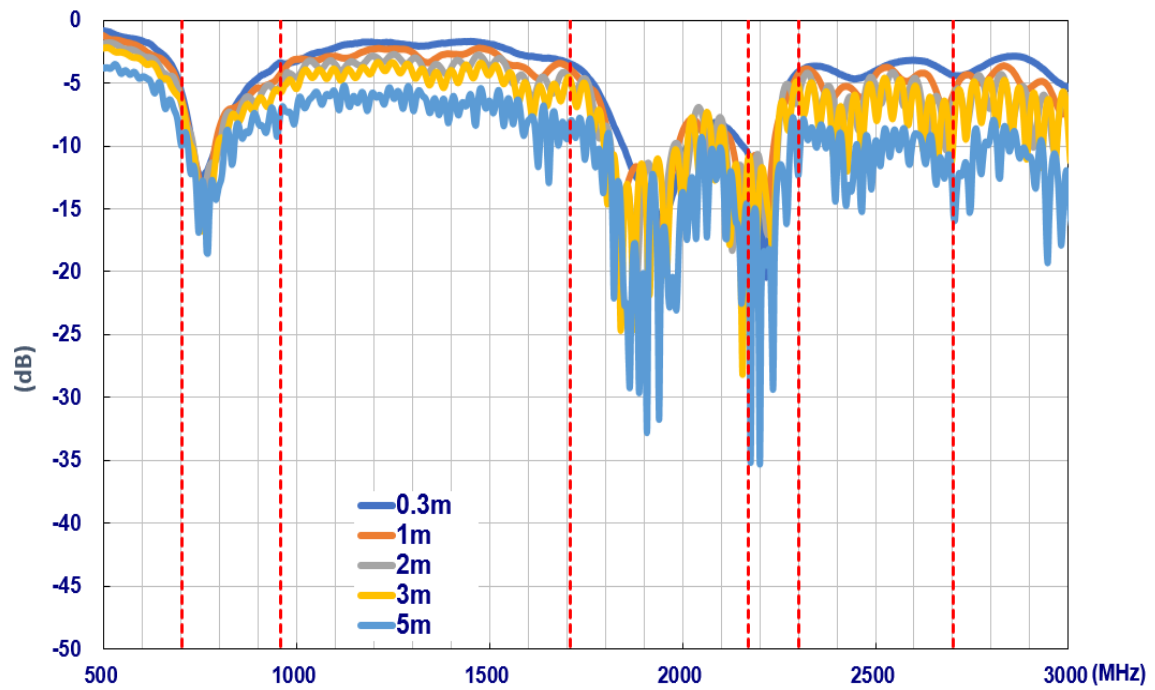
7.1.5 LTE 5



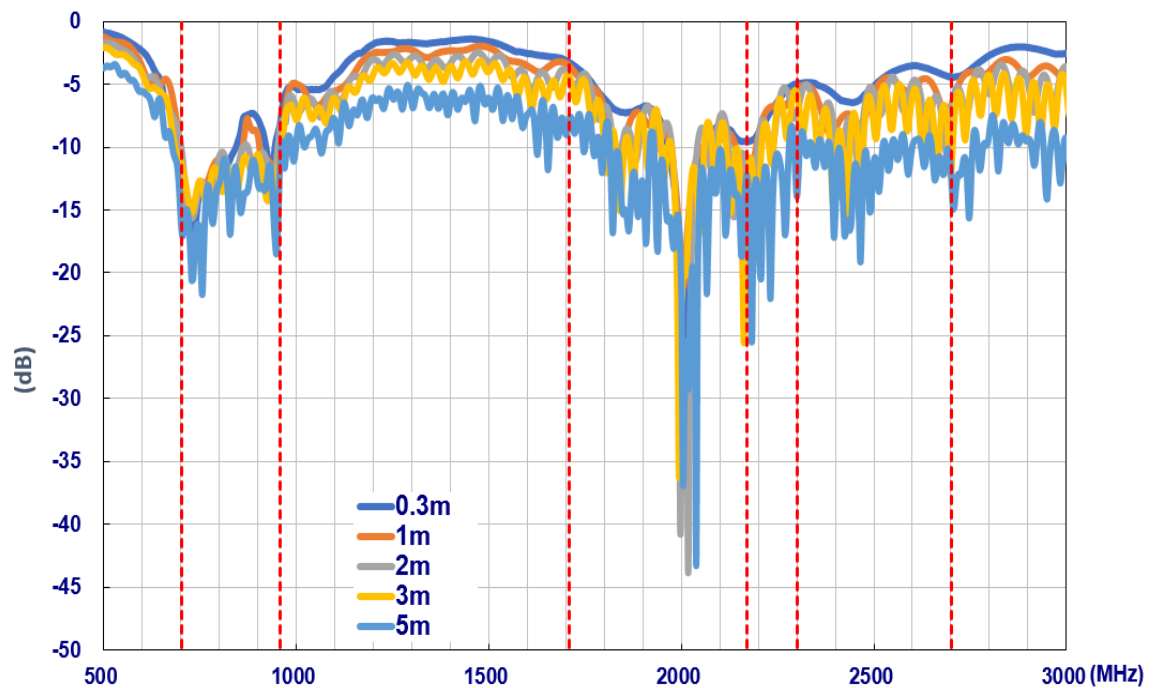
7.1.6 LTE 6



7.1.7 LTE 7

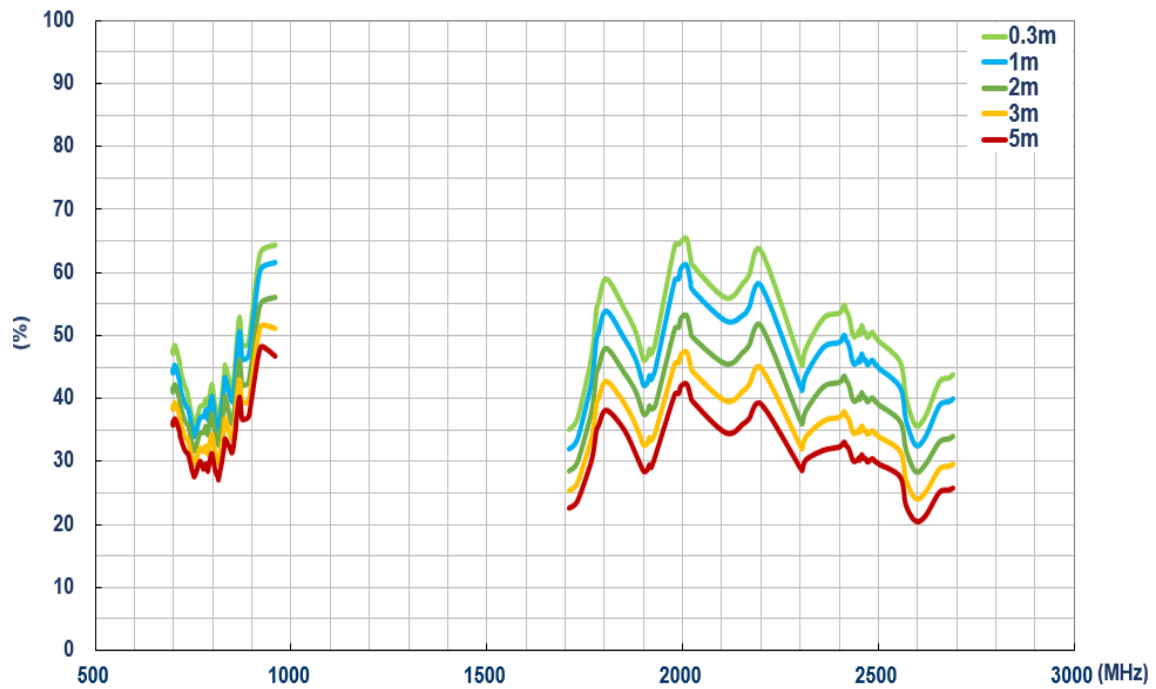


7.1.8 LTE 8

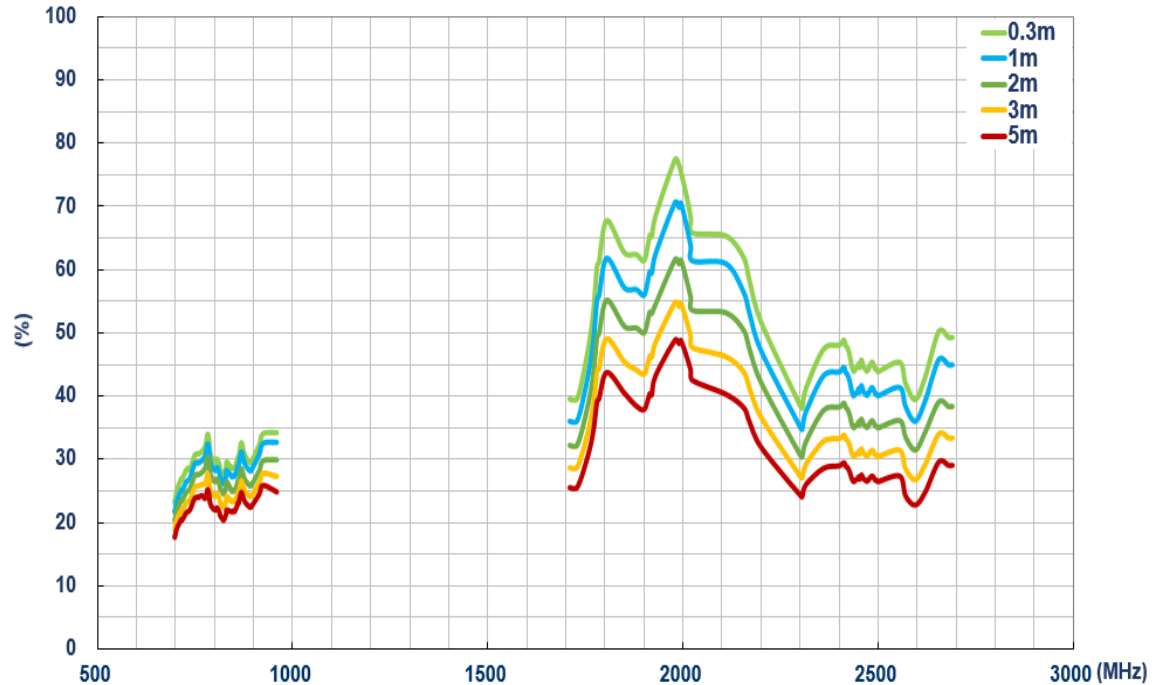


7.2. Efficiency

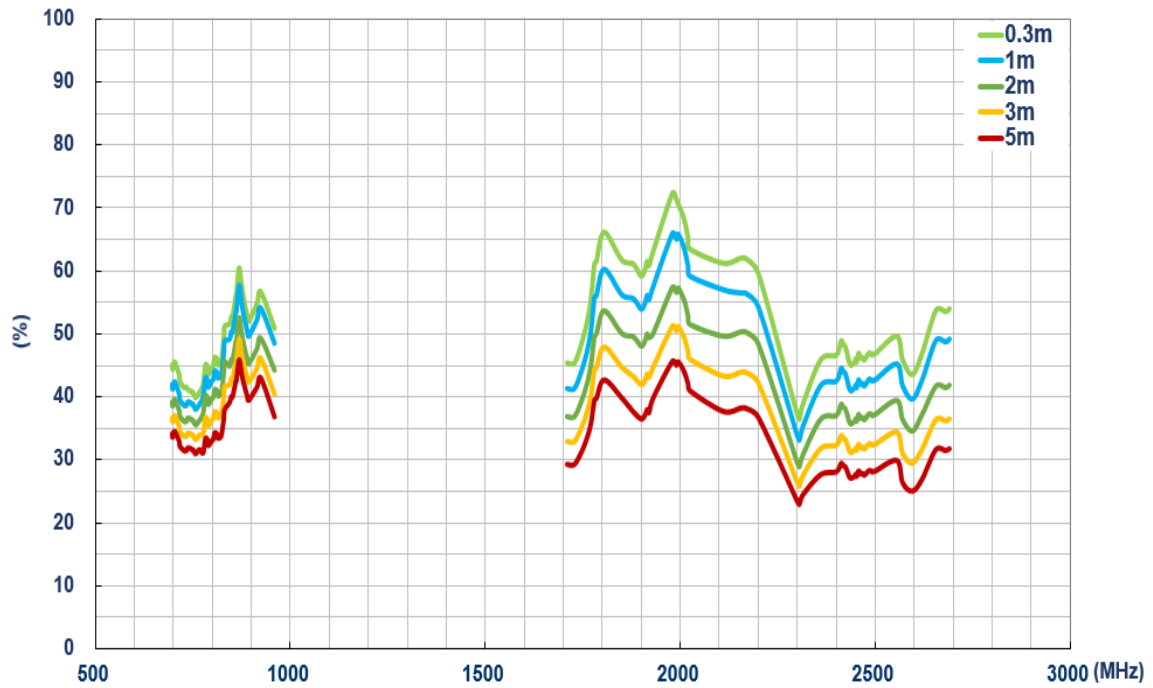
7.2.1 LTE 1



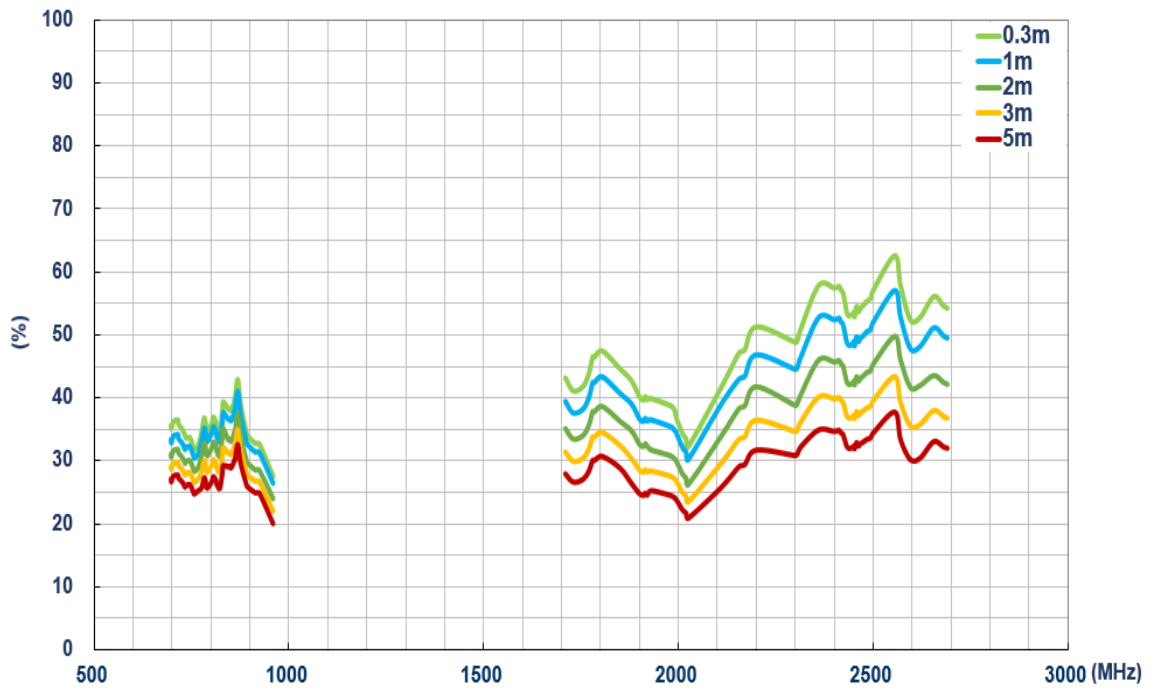
7.2.2 LTE 2



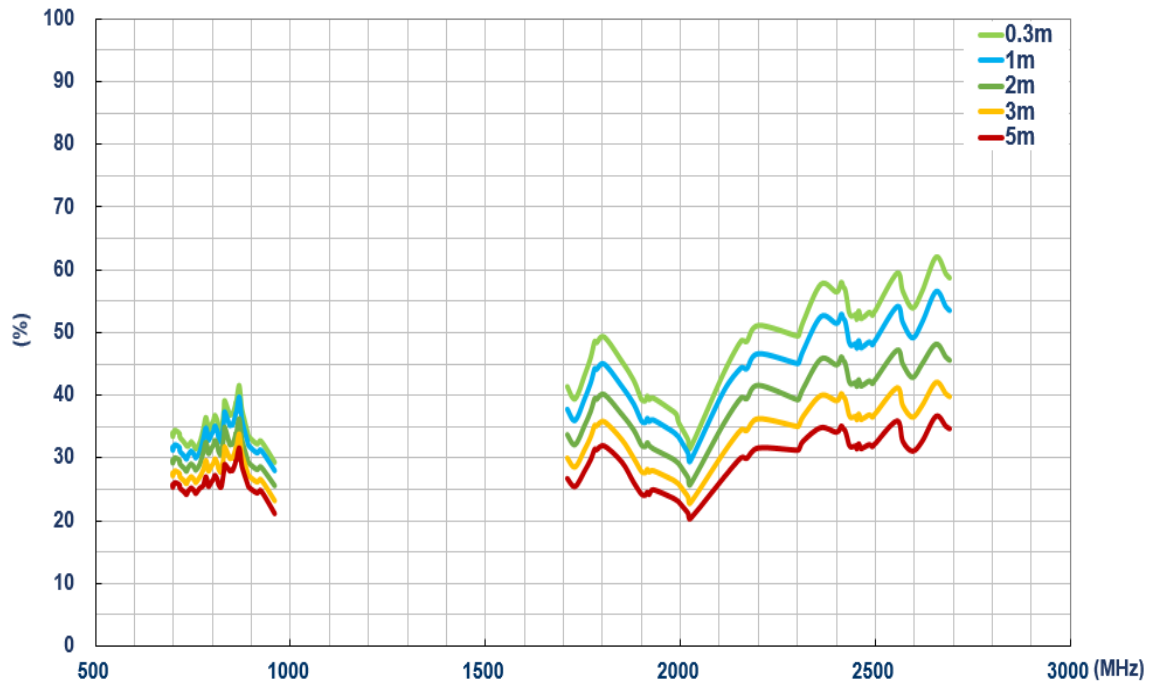
7.2.3 LTE 3



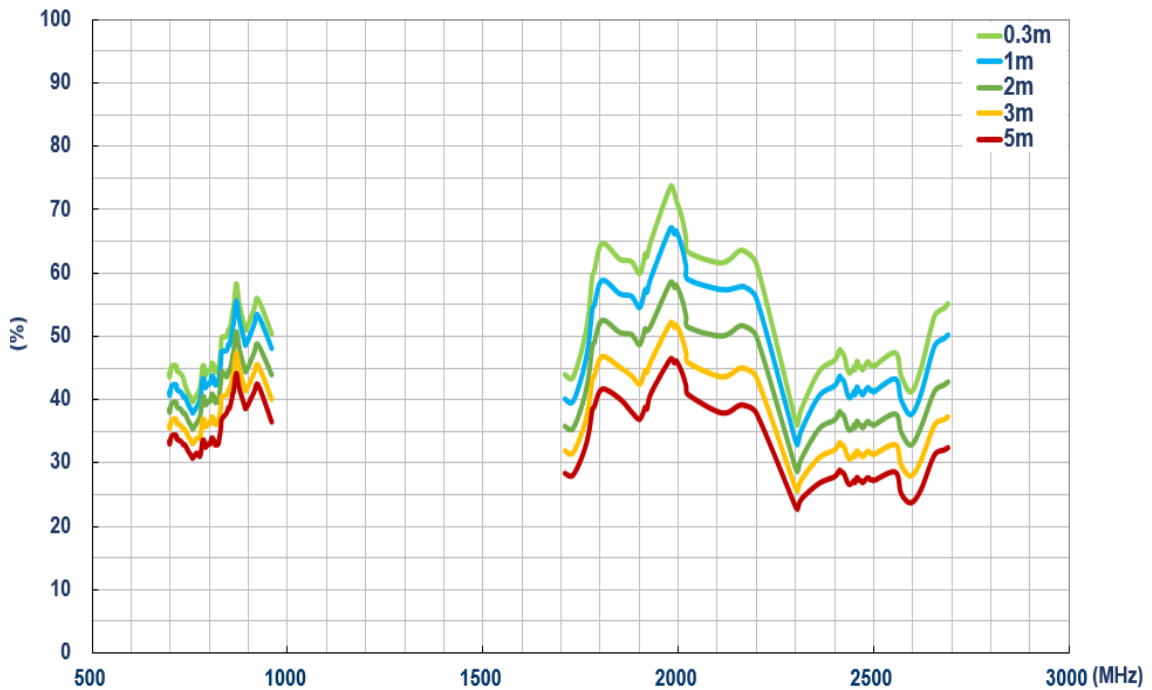
7.2.4 LTE 4



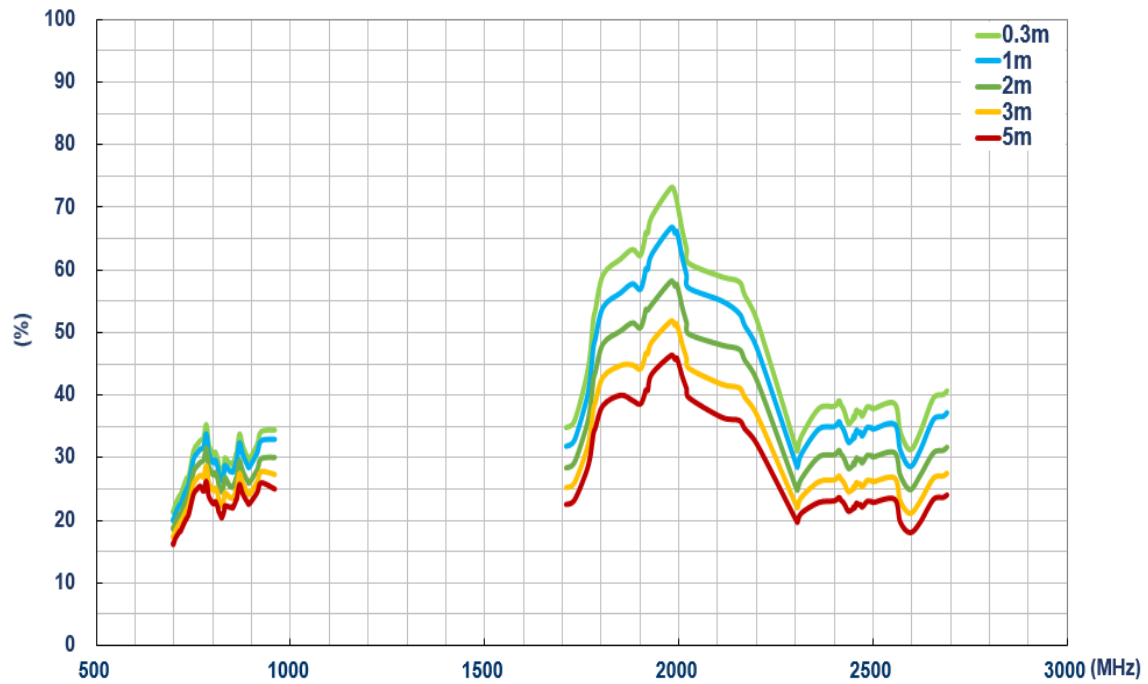
7.2.5 LTE 5



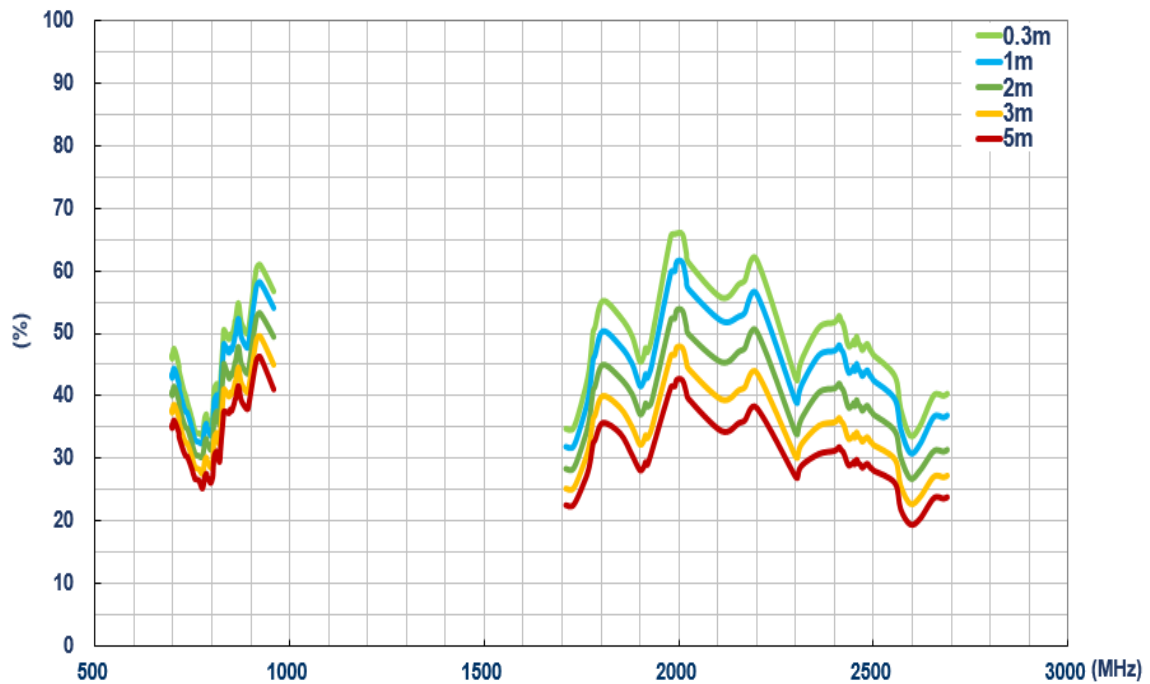
7.2.6 LTE 6



7.2.7 LTE 7

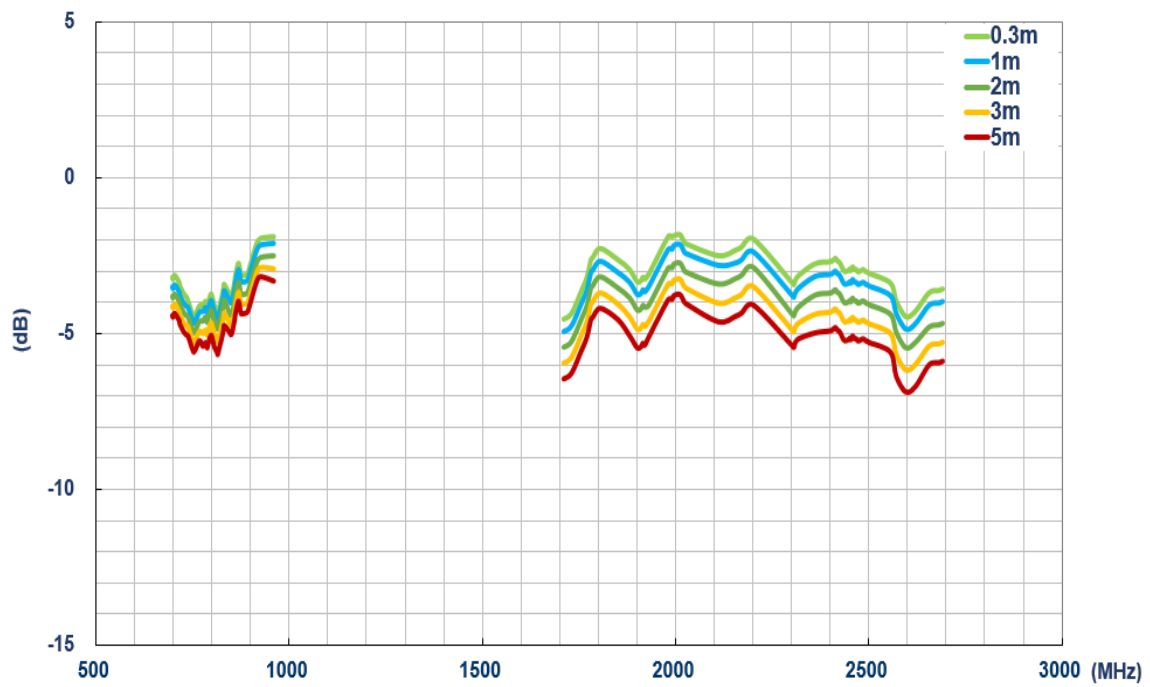


7.2.8 LTE 8

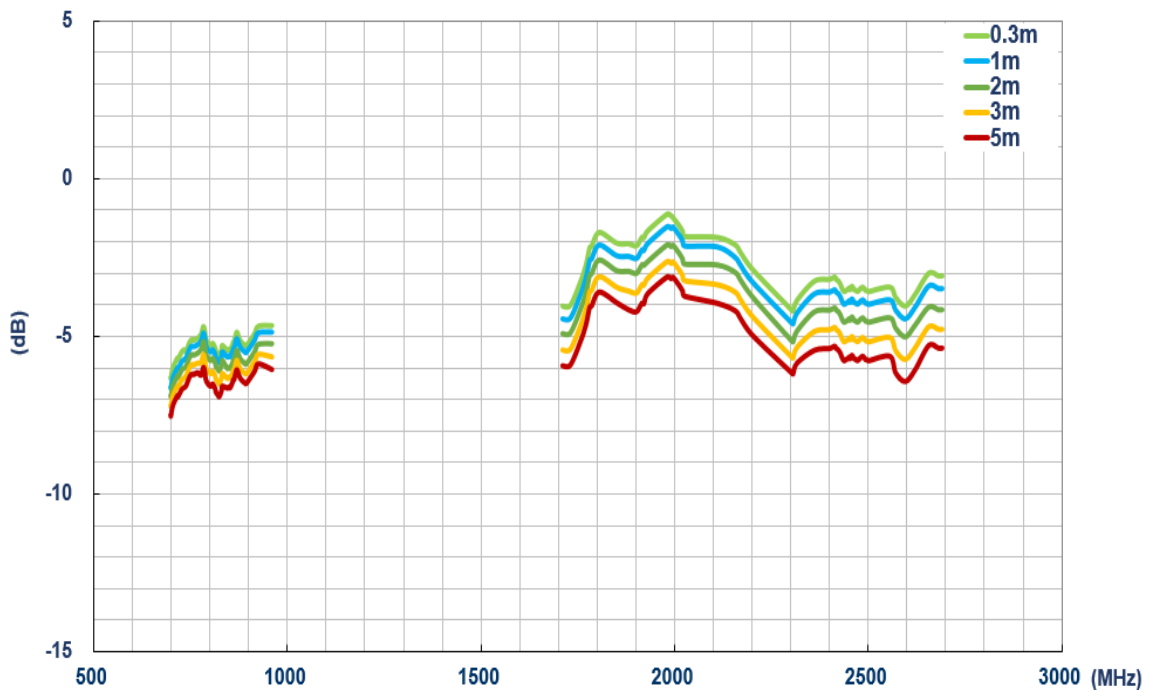


7.3. Average Gain

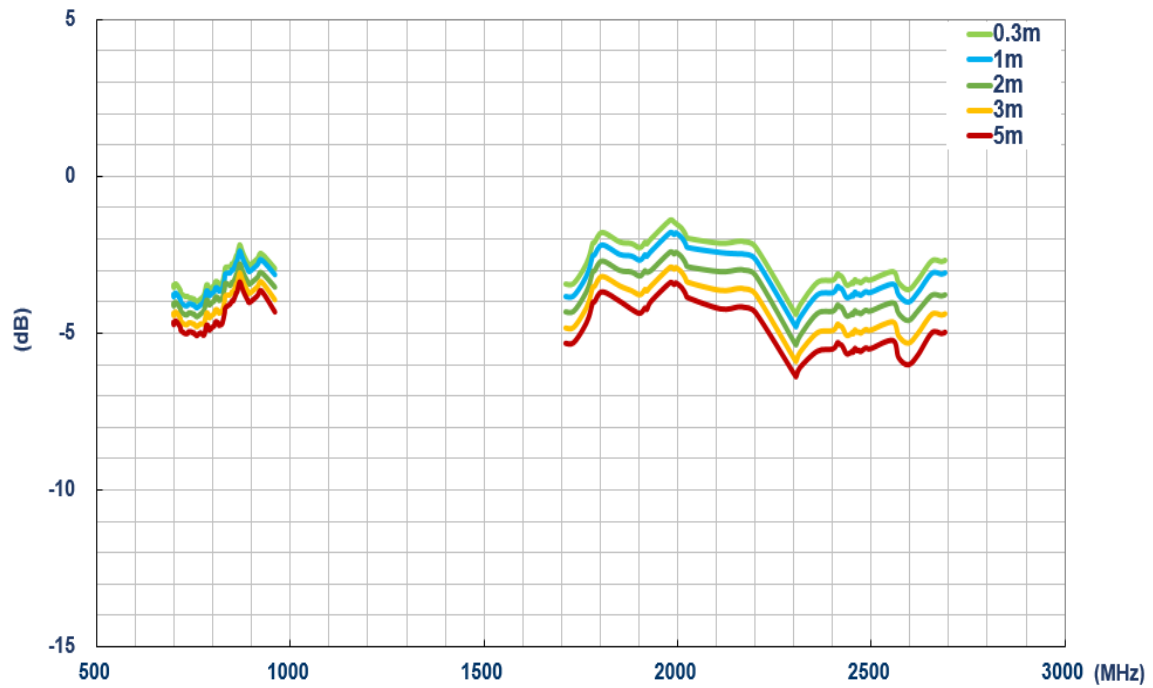
7.3.1 LTE 1



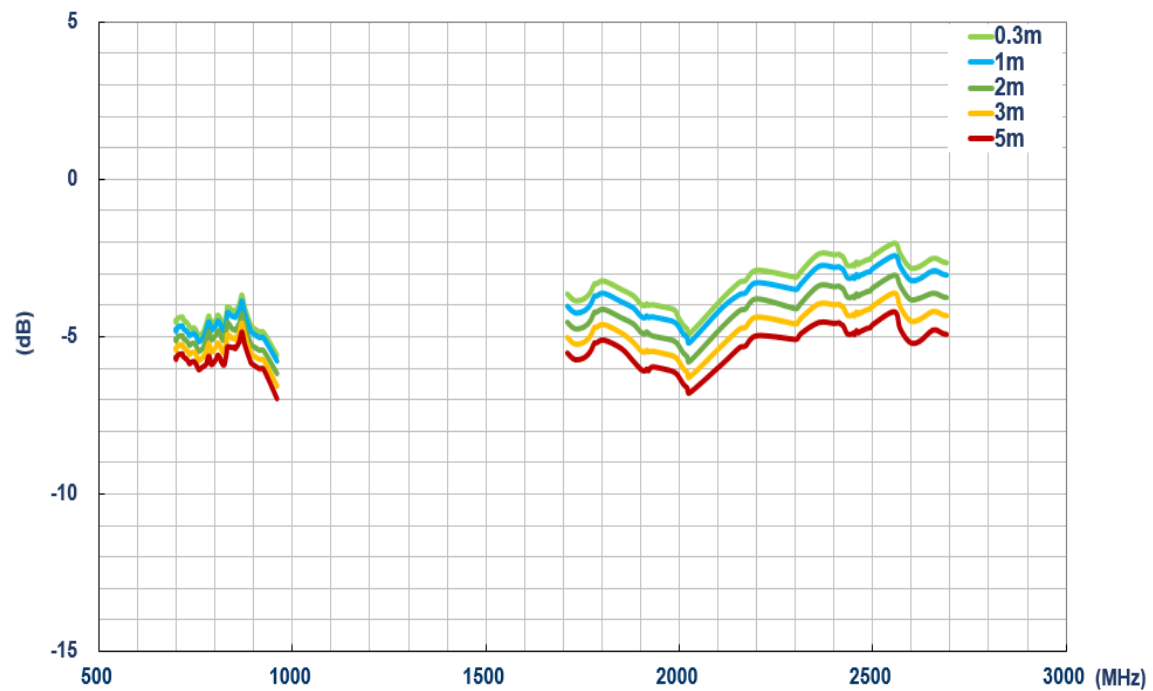
7.3.2 LTE 2



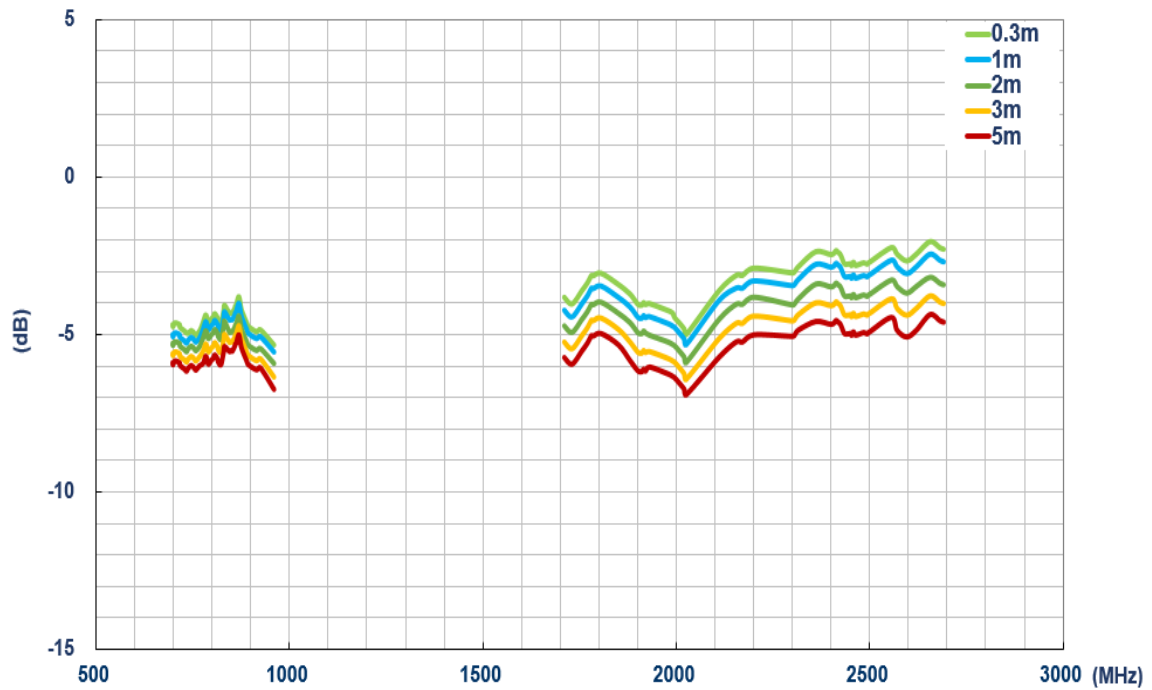
7.3.3 LTE 3



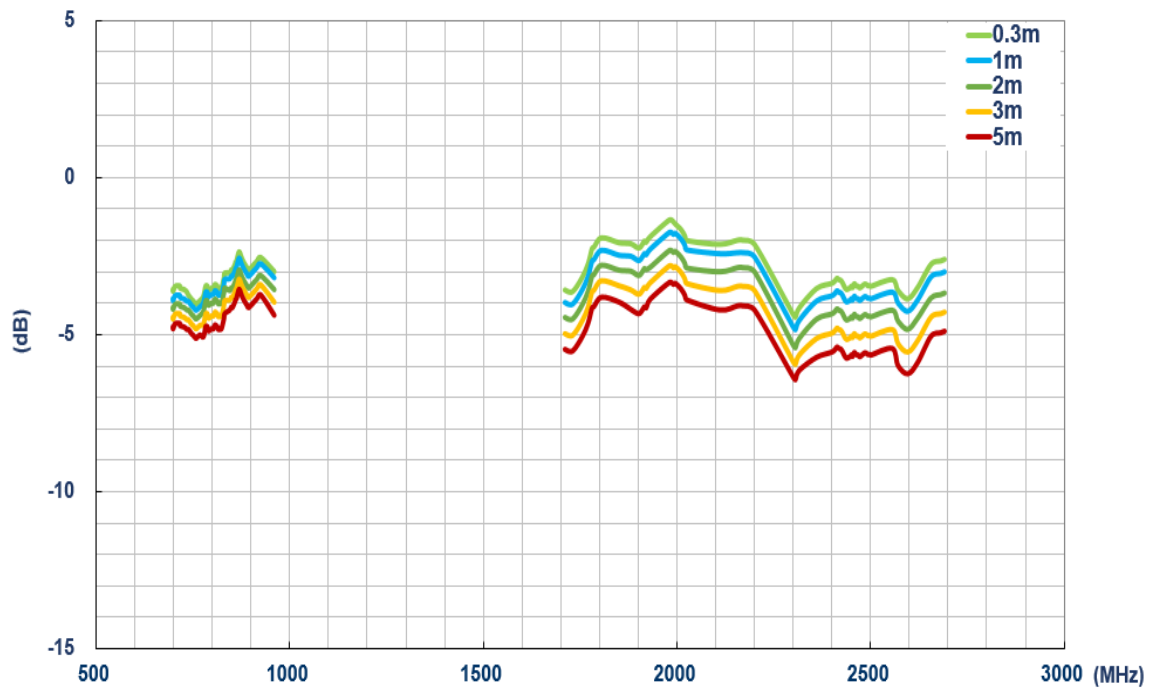
7.3.4 LTE 4



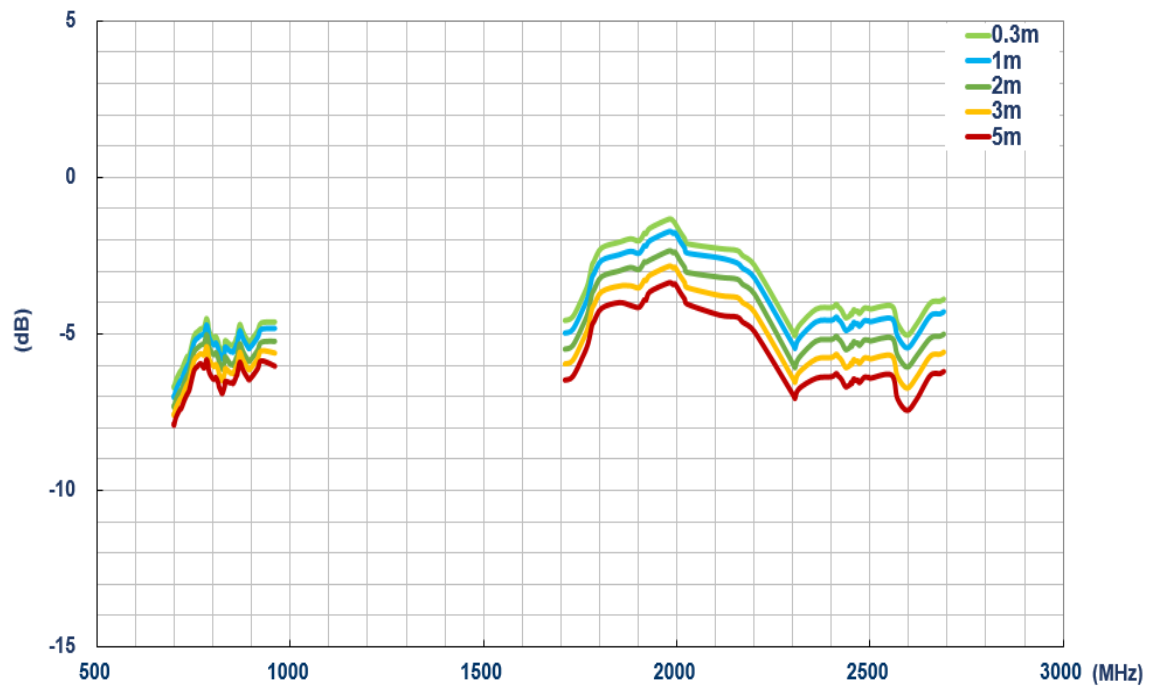
7.3.5 LTE 5



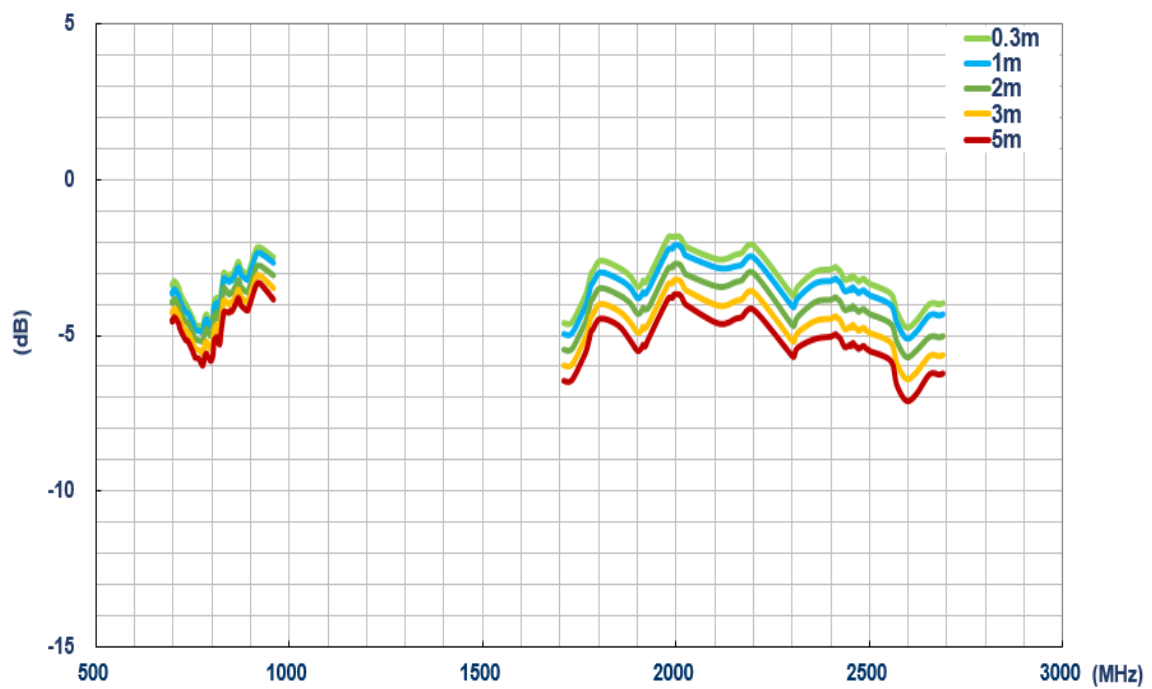
7.3.6 LTE 6



7.3.7 LTE 7

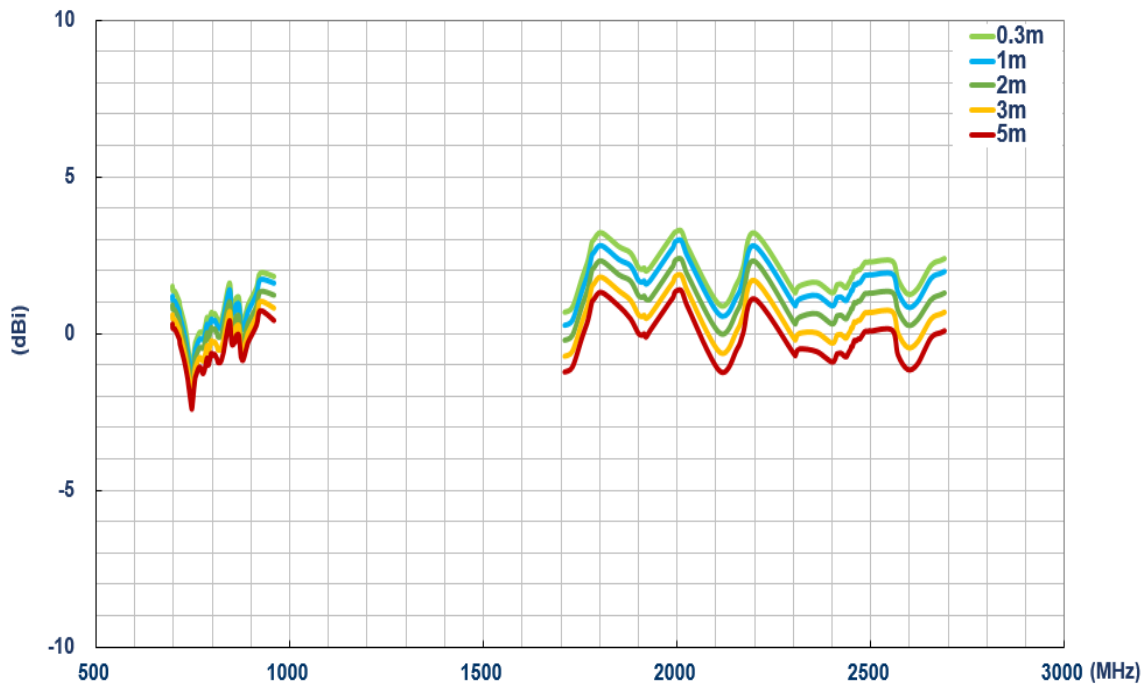


7.3.8 LTE 8

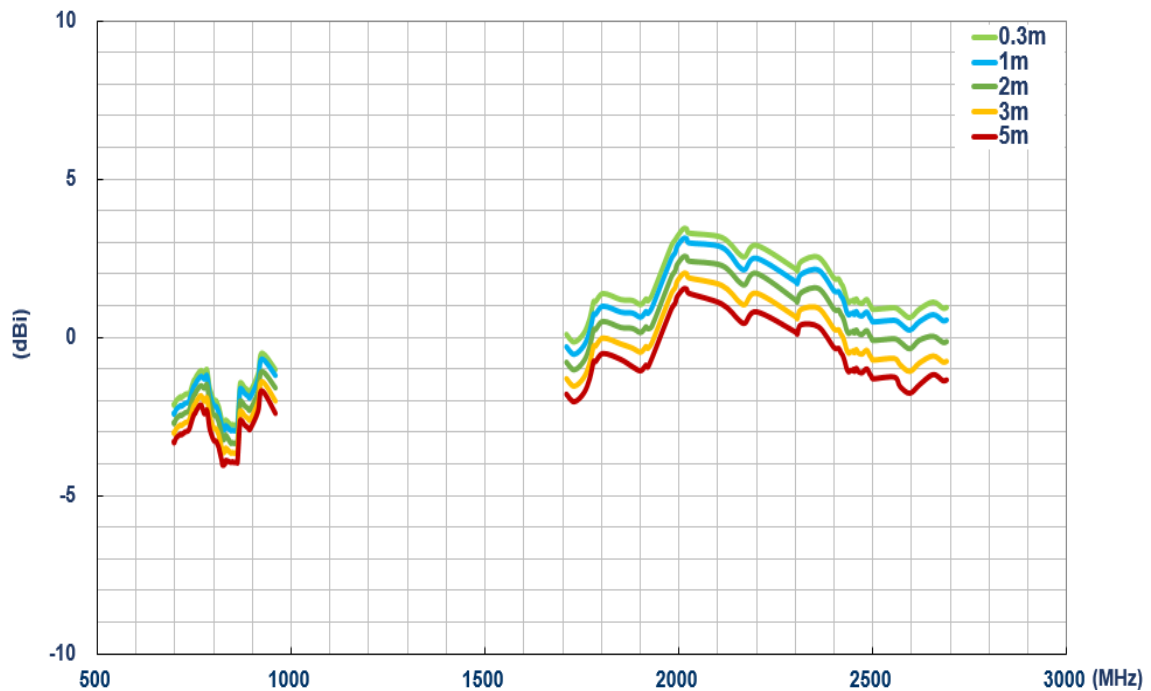


7.4. Peak Gain

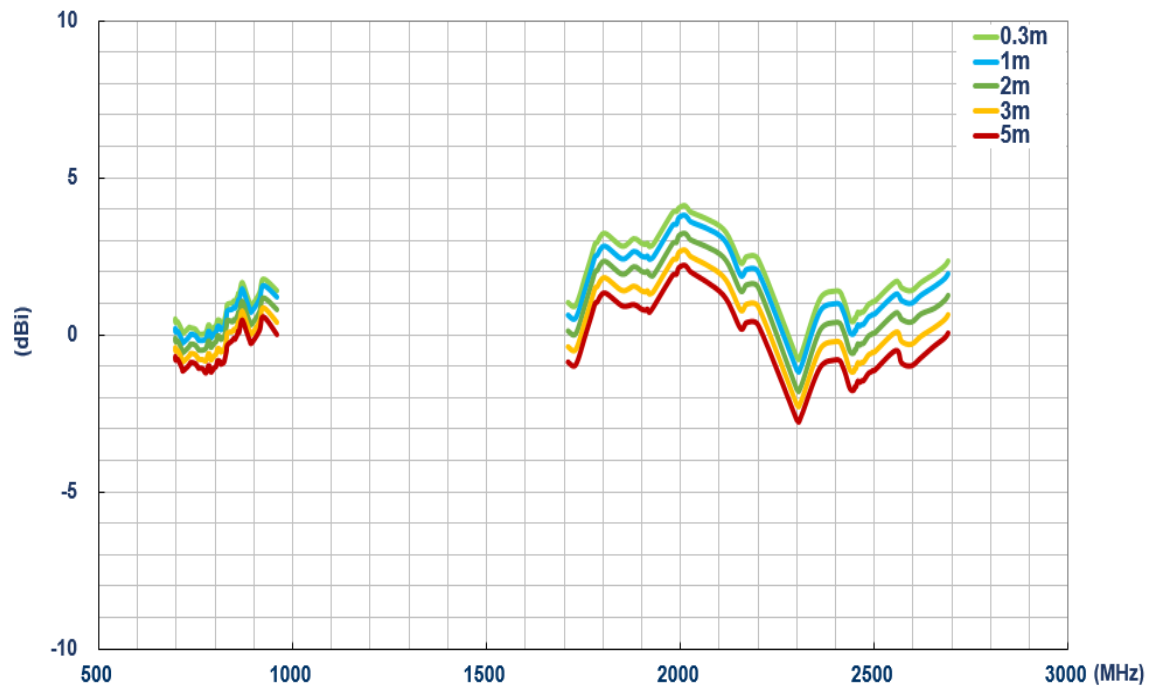
7.4.1 LTE 1



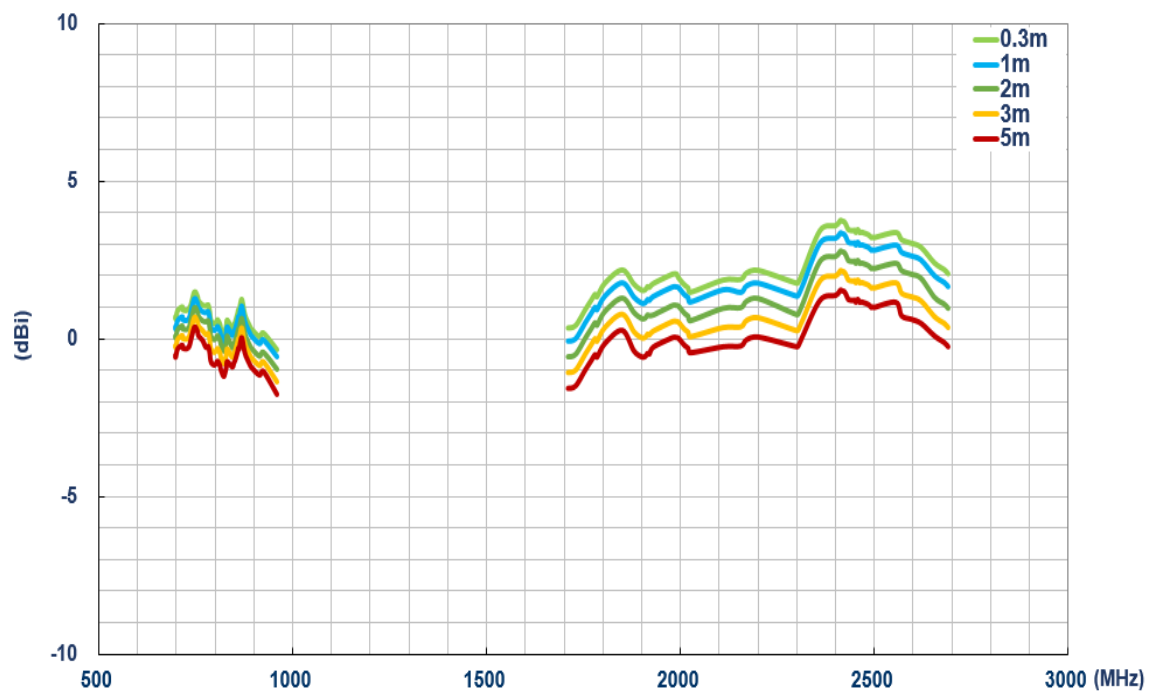
7.4.2 LTE 2



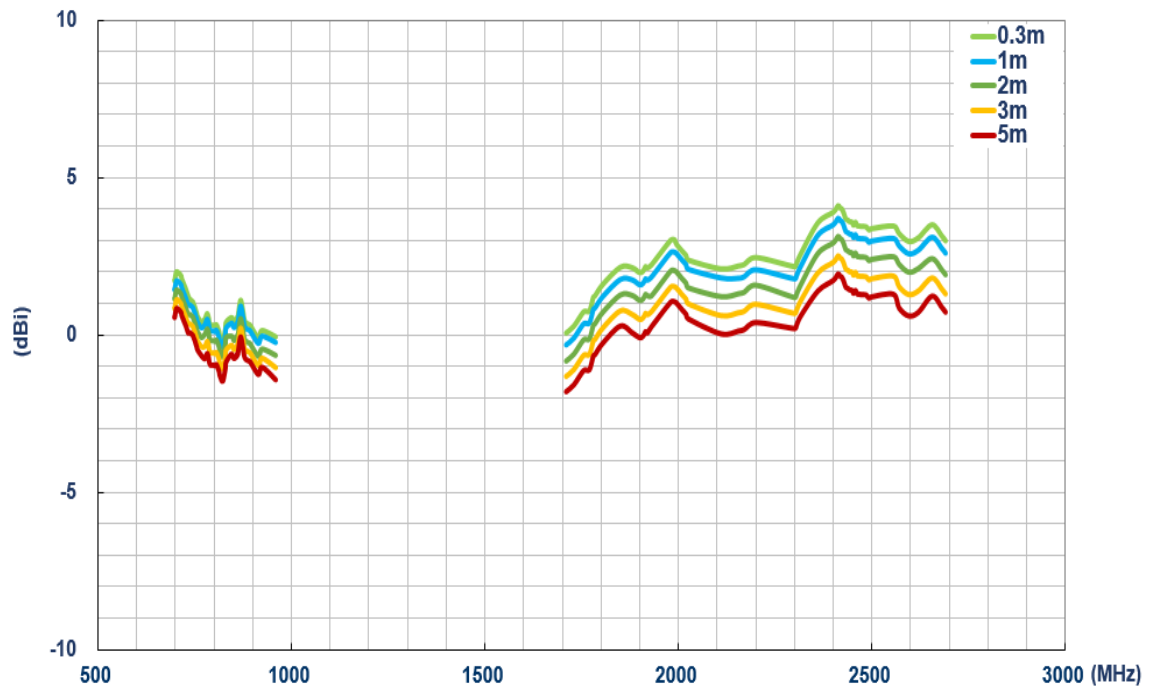
7.4.3 LTE 3



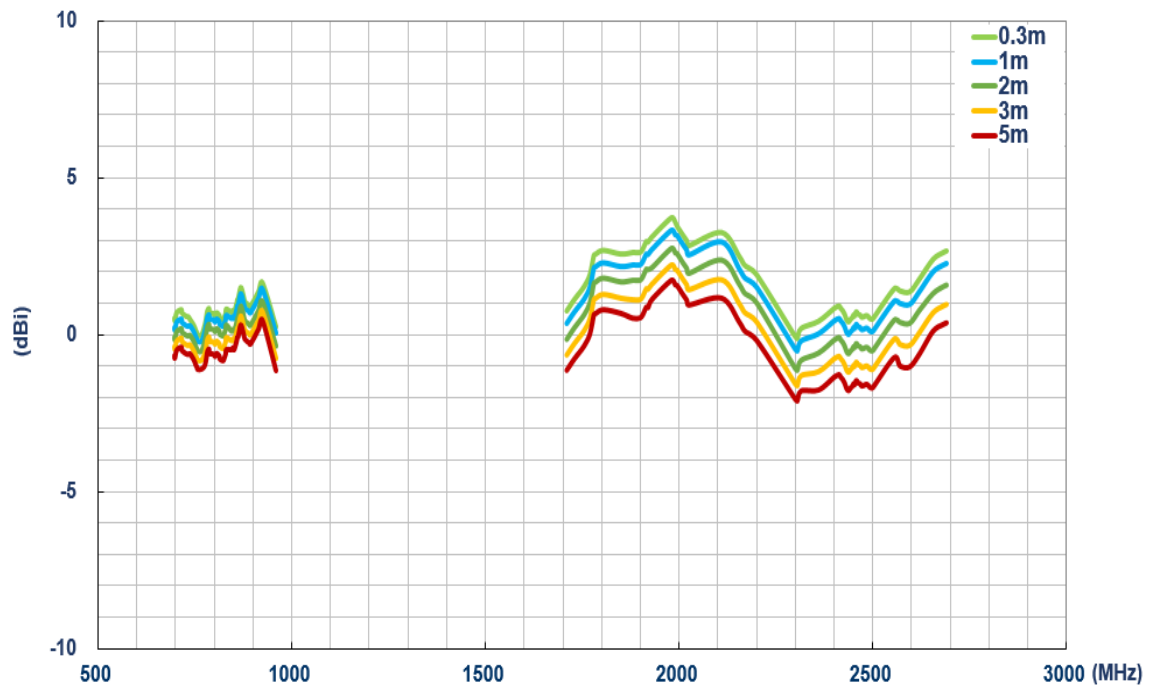
7.4.4 LTE 4



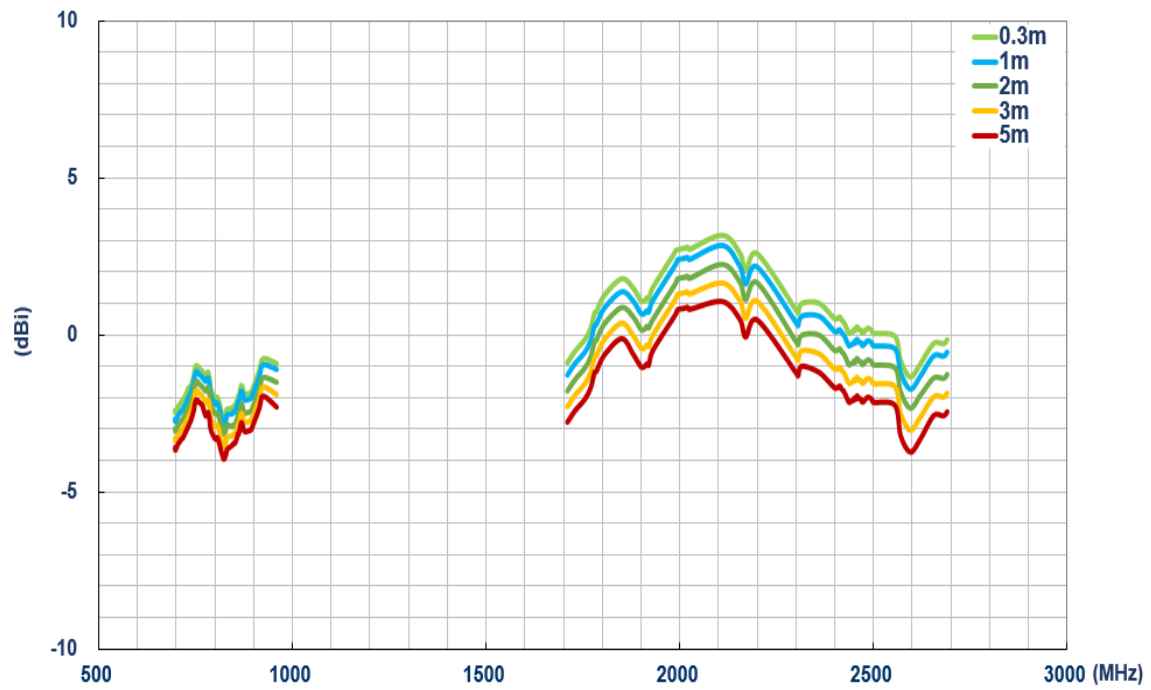
7.4.5 LTE 5



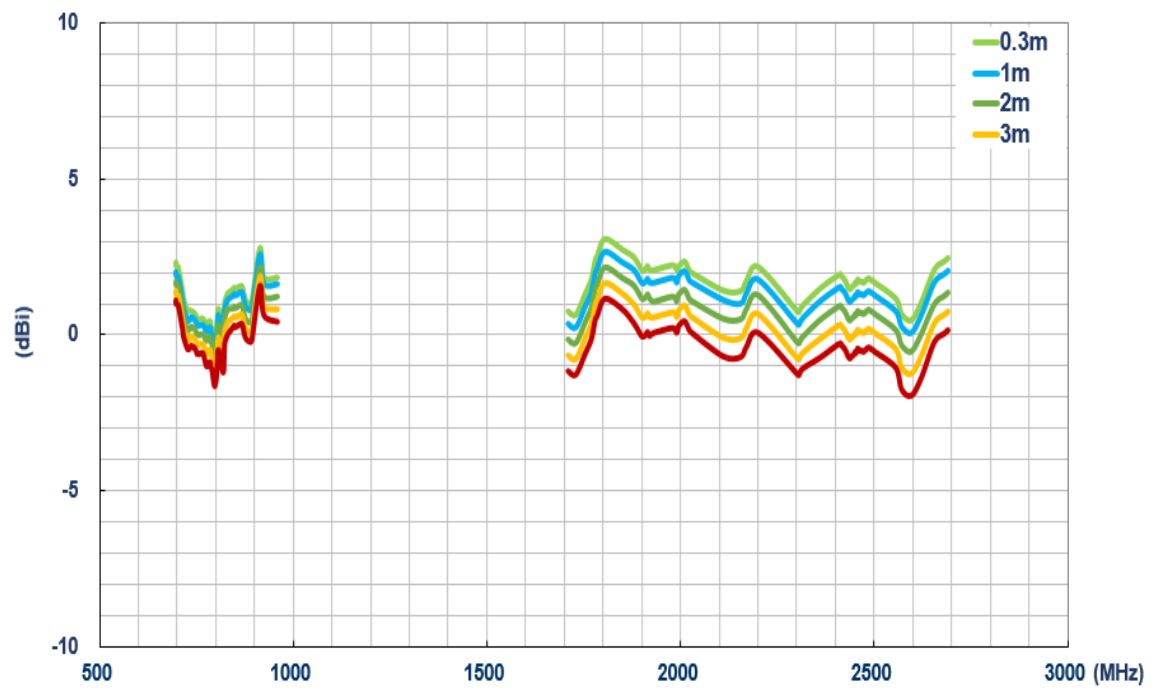
7.4.6 LTE 6



7.4.7 LTE 7



7.4.8 LTE 8



Taoglas makes no warranties based on the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and product descriptions at any time without notice. Taoglas reserves all rights to this document and the information contained herein.

Reproduction, use or disclosure to third parties without express permission is strictly prohibited.

Copyright © Taoglas Ltd.