

SPECIFICATION

| | |
|--------------|--|
| Part No. | MA230.LBC.002 |
| Product Name | MA230 Stream 3-in-1 Adhesive Mount Combination Antenna with GNSS, LTE & Wi-Fi. |
| Description | GPS / GLONASS / Galileo - 3m RG-174 & SMA(M) 4G with 3G/2G Fallback- 3m Low Loss CFD200 & SMA(M) Dual Band Wi-Fi - 3m Low Loss CFD200 & RP-SMA(M) IP67 Rated UV Resistant ABS Enclosure Dimensions: 200*66*9mm Reach & RoHS Compliant |



1. Introduction

The Taoglas Stream MA230, is a 3in1 adhesive mount combination with GNSS, LTE and Wi-Fi. GPS/GLONASS/GALILEO and Dual-Band Wi-Fi are covered and as well as LTE, the MA230 offers fallback to 3G/2G bands. It is a low profile, heavy-duty, fully IP67 waterproof external M2M antenna for use by RF professionals in telematics, transportation and remote monitoring applications.

The Stream 3in1 is unique in the market as it combines the highest possible efficiency and peak gain for GNSS, 2.4/5GHz Wi-Fi and all cellular bands in a low profile compact format for mounting via high quality first tier automotive approved 3M adhesive foam. Its comes with 3m of low loss CFD200 cable for LTE and Wi-Fi, RG-174 for GNSS and SMA(M) and RP(SMA) as standard. Cables and connectors are customizable.

Many module manufacturers specify peak gain limits for any antennas that are to be connected to that module. Those peak gain limits are based on free-space conditions. In practice, the peak gain of an antenna tested in free-space can degrade by at least 1 or 2dBi when put inside a device. So ideally you should go for a slightly higher peak gain antenna than mentioned on the module specification to compensate for this effect, giving you better performance.

Upon testing of any of our antennas with your device and a selection of appropriate layout, integration technique, or cable, Taoglas can make sure any of our antennas' peak gain will be below the peak gain limits. Taoglas can then issue a specification and/or report for the selected antenna in your device that will clearly show it complying with the peak gain limits, so you can be assured you are meeting regulatory requirements for that module.

For example, a module manufacturer may state that the antenna must have less than 2dBi peak gain, but you don't need to select an embedded antenna that has a peak gain of less than 2dBi in free-space. This will give you a less optimized solution. It is better to go for a slightly higher free-space peak gain of 3dBi or more if available. Once that antenna gets integrated into your device, performance will degrade below this 2dBi peak gain due to the effects of GND plane, surrounding components, and device housing. If you want to be absolutely sure, contact Taoglas and we will test. Choosing a Taoglas antenna with a higher peak gain than what is specified by the module manufacturer and enlisting our help will ensure you are getting the best performance possible without exceeding the peak gain limits.

For further information, contact your regional Taoglas Customer Support team.

2. Antenna Specification

| Performance Specifications | | | |
|----------------------------|---|----------------------------------|--|
| Items | GPS-GLONASS-GALILEO Antenna | Cellular Antenna | Wi-Fi Antenna |
| Features | High performance GPS/Glonass 35*35*4mm ceramic patch antenna | LTE – 700MHz | High performance dual-band Wi-Fi 2.4/5 GHz |
| | | LTE – 800MHz | |
| | | CDMA: 824-896 MHz | |
| | | GSM: 880-960 MHz | |
| | | DCS: 1710-1880 MHz | |
| | | PCS: 1850-1990 MHz | |
| | | 3G: 1920-2170MHz | |
| | | LTE – 2300 | |
| | | LTE - 3500 | |
| Gain | 1575.42MHz 1.92dBi typ @ Zenith 1602MHz 3.19dBi typ @ Zenith | Average: -3.03dBi at 700– 960MHz | 1.5dBi typ.@2450MHz 2.0dBi typ.@5000MHz |
| | | -4.34dBi at 1710 – 2170MHz | |
| | | Peak: 2.16dBi at 700 – 960MHz | |
| | | 0.42dBi at 1710 – 2170MHz | |
| VSWR | 1.21 Max at 1575MHz 1.55Max at 1602MHz | 3.3 Max. at 700- 960MHz | 2.30 Max at 2400MHz 1.08Max at 5000MHz |
| | | 3.6 Max. at 1710- 1850MHz | |
| | | 2.2 Max. at 1880-2170MHz | |
| Impedance | 50Ω | 50Ω | 50Ω |
| Efficiency | | ≥ 68% @ 700MHz, | ≥ 40% @ 2450MHz ≥ 30% @ 5000MHz |
| | | ≥ 72% @ 750MHz, | |
| | | ≥ 66% @ 824MHz, | |
| | | ≥ 56% @ 890MHz, | |
| | | ≥ 61% @ 880MHz, | |
| | | ≥ 53% @ 960MHz, | |
| | | ≥ 37% @1710MHz, | |
| | | ≥ 51% @1880MHz, | |
| | | ≥ 55% @1990MHz, | |
| | | ≥ 54% @2110MHz, | |
| | | ≥ 45% @2170MHz, | |
| | | @2300MHz, | |
| | | @3500MHz | |

MECHANICAL

| Items | GPS-GLONASS-GALILEE Antenna | Cellular Antenna | Wi-Fi Antenna |
|-------------------|---|--|---|
| Cable / Connector | 3M RG-174 with SMA(M) Fully Customisable | 3M CFD-200 with SMA(M) Fully customisable | 3M CFD-200 with RP-SMA(M) Fully customisable |
| Housing | UV resistant ABS | | |
| Adhesive Mount | 3M 1600TB(196.57*62.57*1.25mm) | | |
| Protection Class | IP-67 | | |

ENVIRONMENTAL

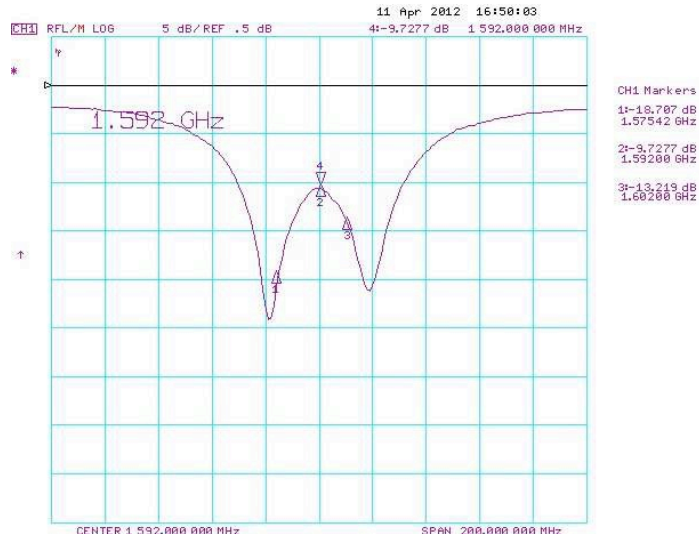
| | |
|-----------------------|----------------|
| Operation Temperature | -40°C to +85°C |
| Storage Temperature | -40°C to +85°C |
| Relative Humidity | 20% to 95% |
| Weight per unit | 0.18kg |

| LTE BANDS | | | |
|-------------|--|-------------------------------|---------|
| Band Number | LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA | | |
| | Uplink | Downlink | Covered |
| 1 | UL: 1920 to 1980 | DL: 2110 to 2170 | ✓ |
| 2 | UL: 1850 to 1910 | DL: 1930 to 1990 | ✓ |
| 3 | UL: 1710 to 1785 | DL: 1805 to 1880 | ✓ |
| 4 | UL: 1710 to 1755 | DL: 2110 to 2155 | ✓ |
| 5 | UL: 824 to 849 | DL: 869 to 894 | ✓ |
| 7 | UL: 2500 to 2570 | DL: 2620 to 2690 | ✗ |
| 8 | UL: 880 to 915 | DL: 925 to 960 | ✓ |
| 9 | UL: 1749.9 to 1784.9 | DL: 1844.9 to 1879.9 | ✓ |
| 11 | UL: 1427.9 to 1447.9 | DL: 1475.9 to 1495.9 | ✗ |
| 12 | UL: 699 to 716 | DL: 729 to 746 | ✓ |
| 13 | UL: 777 to 787 | DL: 746 to 756 | ✓ |
| 14 | UL: 788 to 798 | DL: 758 to 768 | ✓ |
| 17 | UL: 704 to 716 | DL: 734 to 746 (LTE only) | ✓ |
| 18 | UL: 815 to 830 | DL: 860 to 875 (LTE only) | ✓ |
| 19 | UL: 830 to 845 | DL: 875 to 890 | ✓ |
| 20 | UL: 832 to 862 | DL: 791 to 821 | ✓ |
| 21 | UL: 1447.9 to 1462.9 | DL: 1495.9 to 1510.9 | ✗ |
| 22 | UL: 3410 to 3490 | DL: 3510 to 3590 | ✗ |
| 23 | UL: 2000 to 2020 | DL: 2180 to 2200 (LTE only) | ✓ |
| 24 | UL: 1625.5 to 1660.5 | DL: 1525 to 1559 (LTE only) | ✗ |
| 25 | UL: 1850 to 1915 | DL: 1930 to 1995 | ✓ |
| 26 | UL: 814 to 849 | DL: 859 to 894 | ✓ |
| 27 | UL: 807 to 824 | DL: 852 to 869 (LTE only) | ✓ |
| 28 | UL: 703 to 748 | DL: 758 to 803 (LTE only) | ✓ |
| 29 | UL: - | DL: 717 to 728 (LTE only) | ✓ |
| 30 | UL: 2305 to 2315 | DL: 2350 to 2360 (LTE only) | ✗ |
| 31 | UL: 452.5 to 457.5 | DL: 462.5 to 467.5 (LTE only) | ✗ |
| 32 | UL: - | DL: 1452 - 1496 | ✗ |
| 35 | | 1850 to 1910 | ✓ |
| 38 | | 2570 to 2620 | ✗ |
| 39 | | 1880 to 1920 | ✓ |
| 40 | | 2300 to 2400 | ✗ |
| 41 | | 2496 to 2690 | ✗ |
| 42 | | 3400 to 3600 | ✗ |
| 43 | | 3600 to 3800 | ✗ |

*Covered bands represent an efficiency greater than 20%

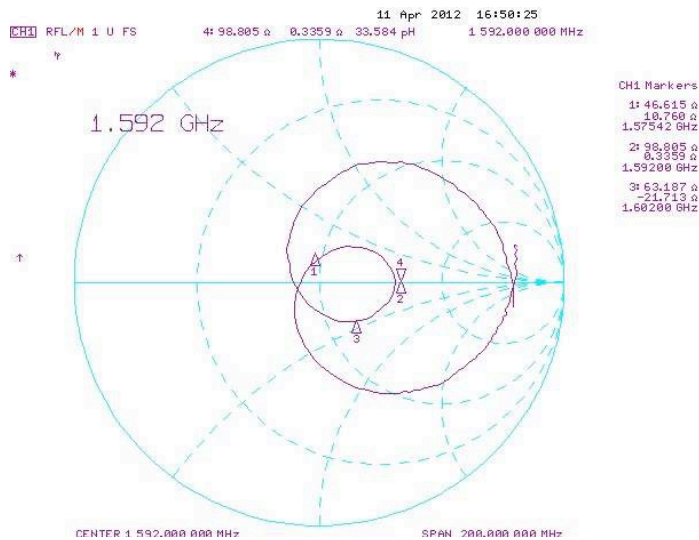
3. GPS-GLONASS-GALILEO Antenna

3.1. Return Loss



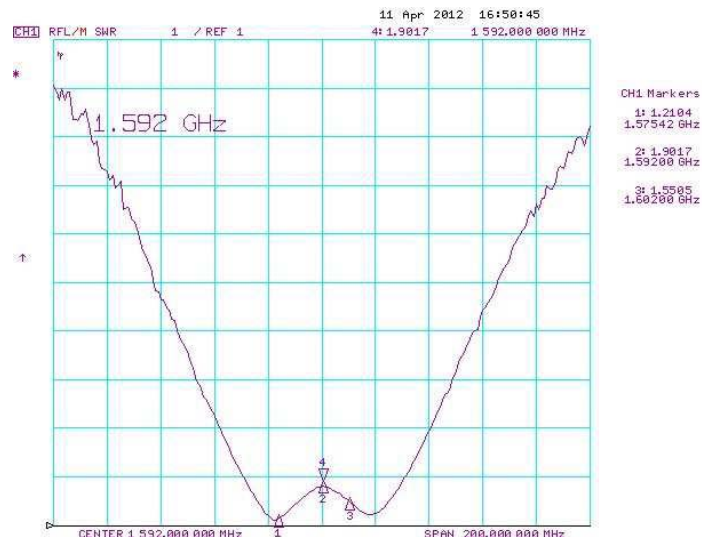
Return Loss : -18.70 dB @ 1575MHz, -13.21 dB @ 1602MHz

3.2. Smith Chart



Impedance : 46.61 +j10.76 Ohm@ 1575MHz, 63.18 -j21.73 Ohm@ 1602MHz

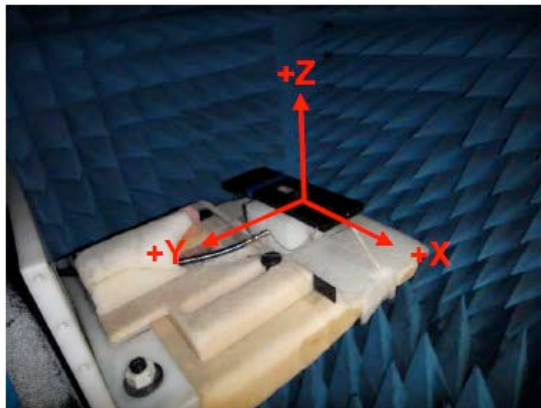
3.3. VSWR



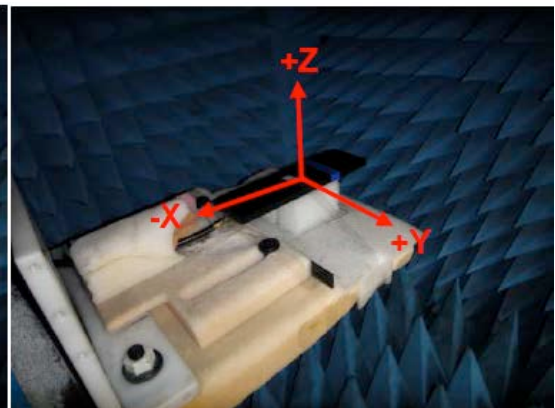
VSWR : 1.21 @ 1575MHz, 1.55 @ 1602MHz

3.4. Radiation patterns

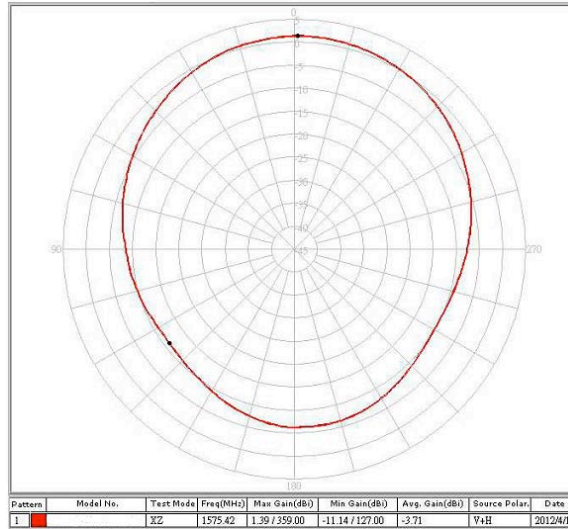
XZ Plane



YZ Plane



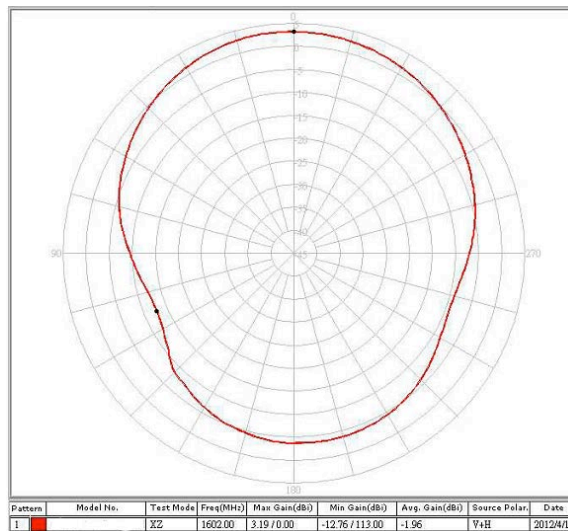
XZ Plane 1575.42MHz Horizontal & Vertical



| 1575 MHz | Peak Gain | Zenith Gain |
|----------|-----------|-------------|
| V+H | 1.39 | 1.35 |

(dBi)

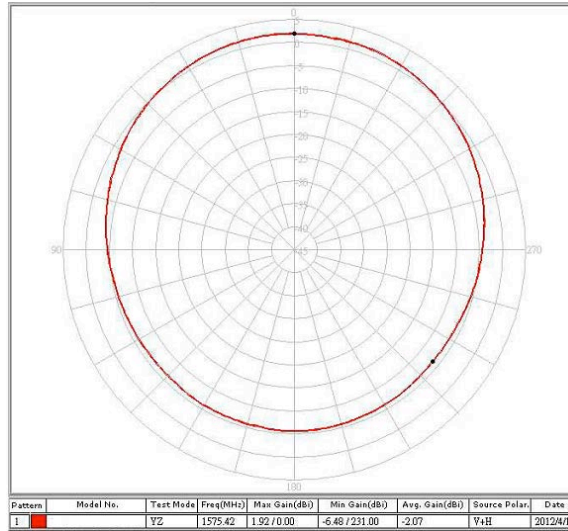
XZ Plane 1602MHz Horizontal & Vertical



| 1602 MHz | Peak Gain | Zenith Gain |
|----------|-----------|-------------|
| V+H | 3.19 | 3.19 |

(dBi)

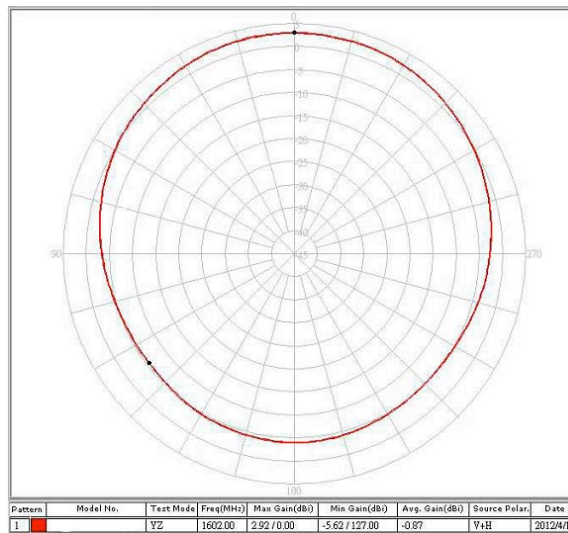
YZ Plane 1575.42MHz Horizontal & Vertical



| 1575 MHz | Peak Gain | Zenith Gain |
|----------|-----------|-------------|
| V+H | 1.92 | 1.92 |

(dBi)

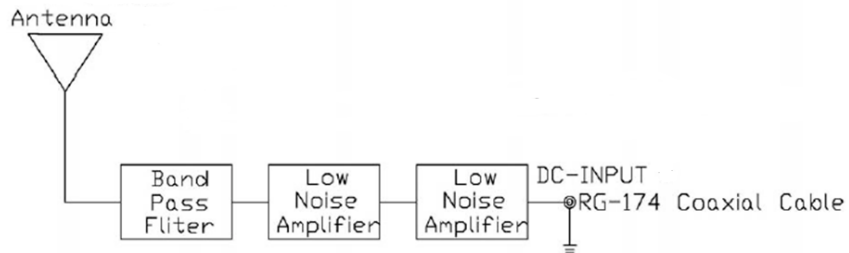
YZ Plane 1602MHz Horizontal & Vertical



| 1602 MHz | Peak Gain | Zenith Gain |
|----------|-----------|-------------|
| V+H | 2.92 | 2.92 |

(dBi)

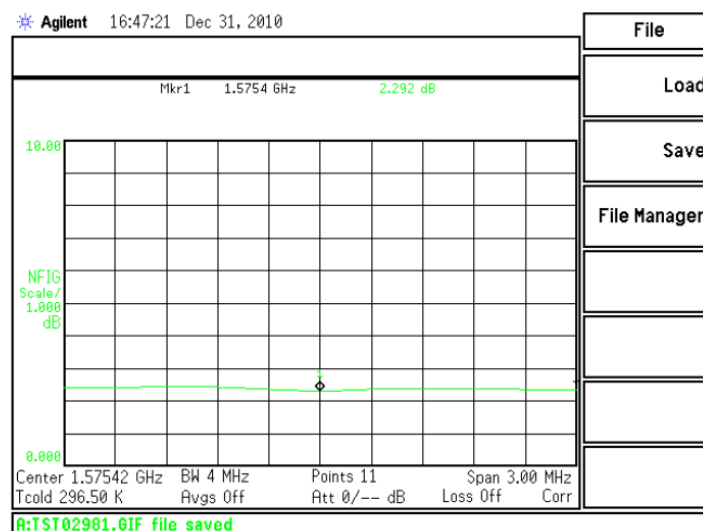
3.5. LNA characteristics



| | |
|---------------------------------------|-------------|
| Output Impedance | 50 Ohm |
| Output Power at 1dB Compression Point | -35dBm typ. |
| Output VSWR | 2.0 Max. |

| Supply Voltage | Gain(Typ) | Noise Figure(Typ) | Power Consumption (Typ.) |
|----------------|-----------|-------------------|--------------------------|
| 1.8V | 27.0dB | 2.2dB | 5.5mA |
| 3.0V | 32.9dB | 2.3dB | 12.5mA |
| 5.5V | 33.8dB | 2.5dB | 15.0mA |

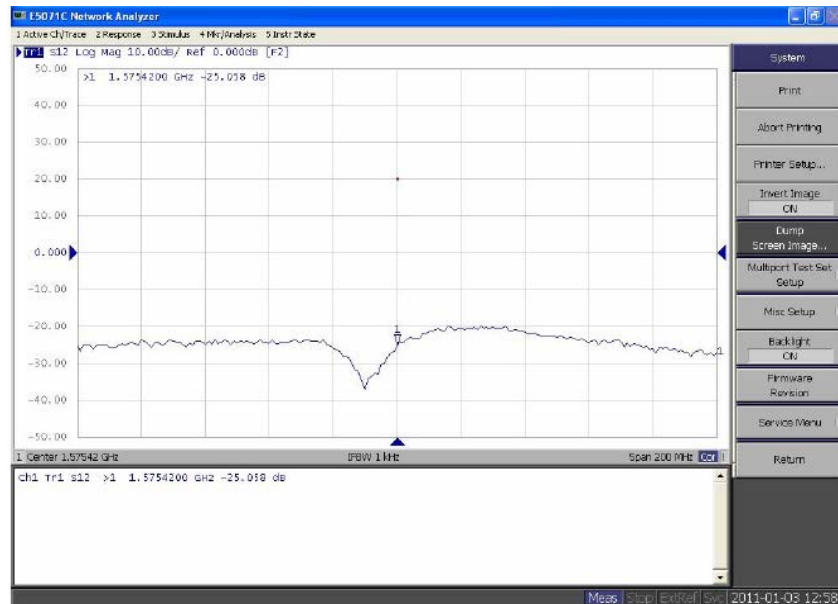
3.6. LNA Noise Figure at 3.0V



LNA Gain and Output of VSWR at 3.0V

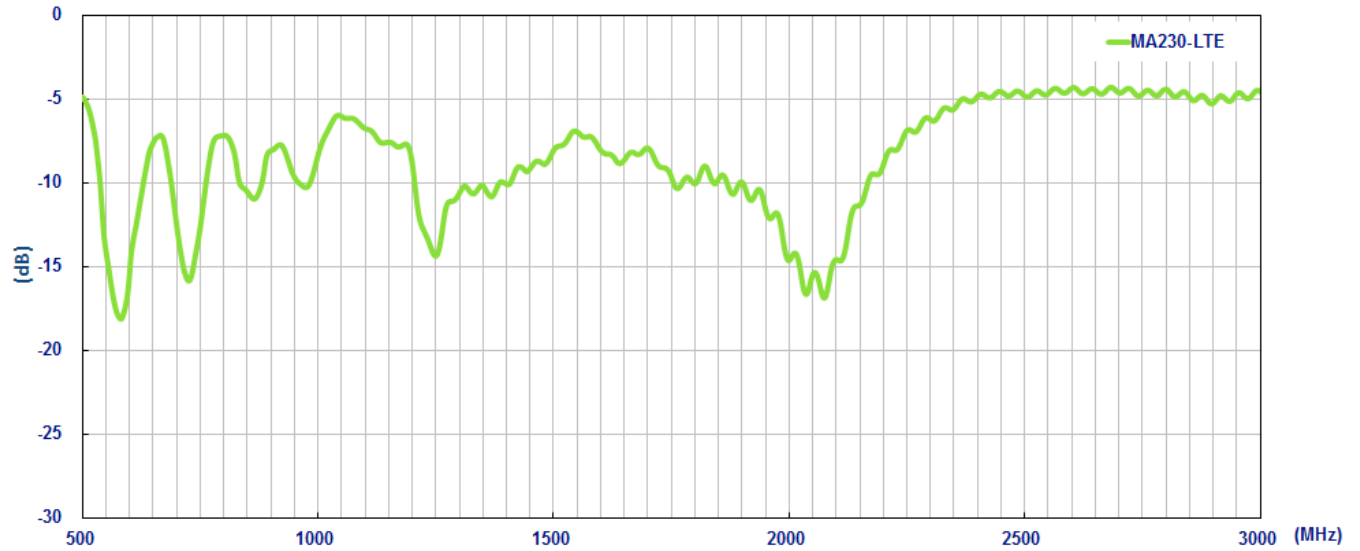


20dBmin isolation to LNA input and LTE/ GSM/ CDMA/UMTS /HSPA antenna

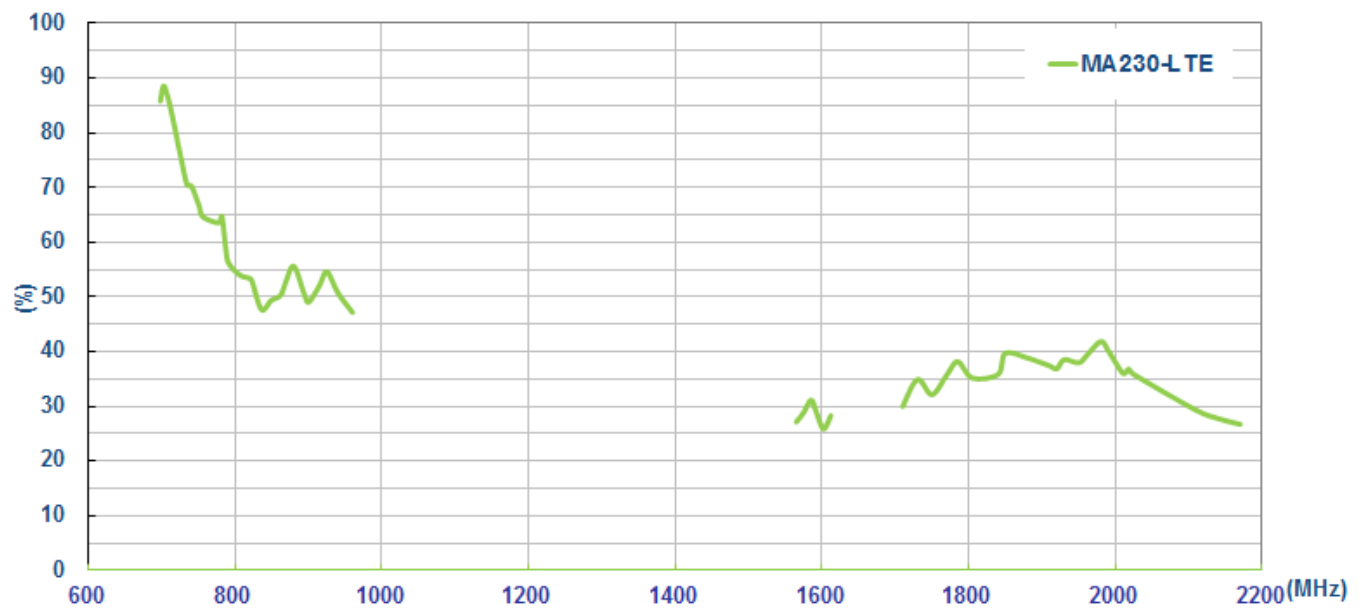


4. Cellular 4G/3G/2G Antenna

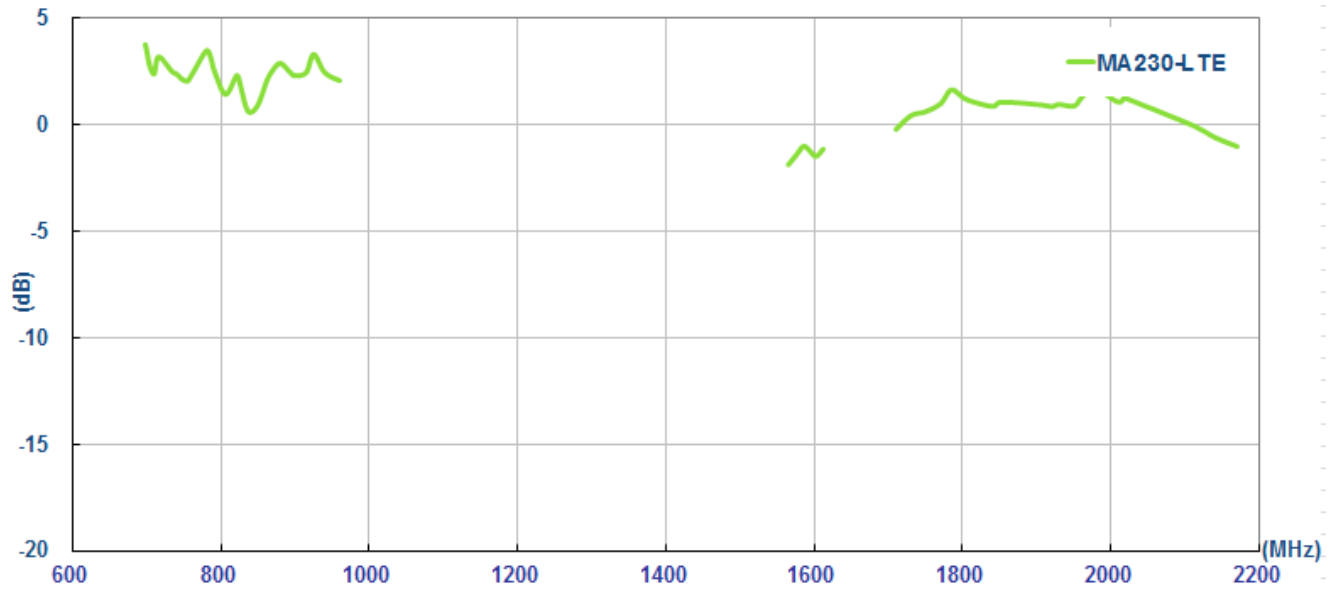
4.1. Return Loss



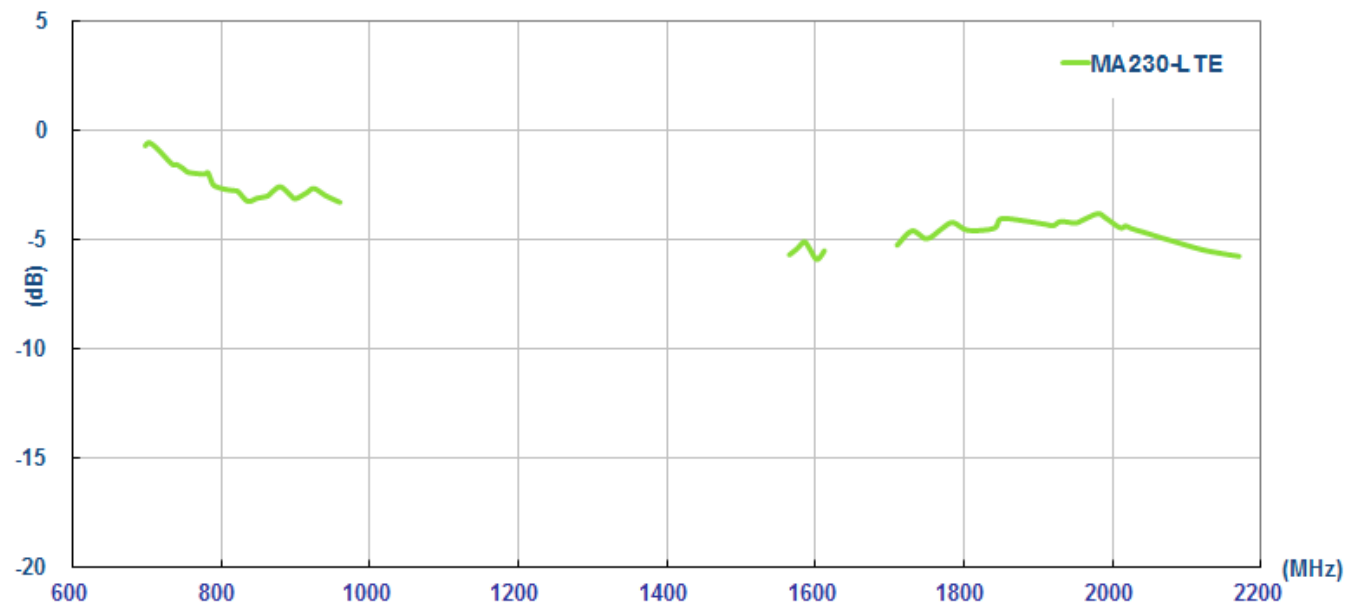
4.2. Efficiency



4.3. Peak Gain

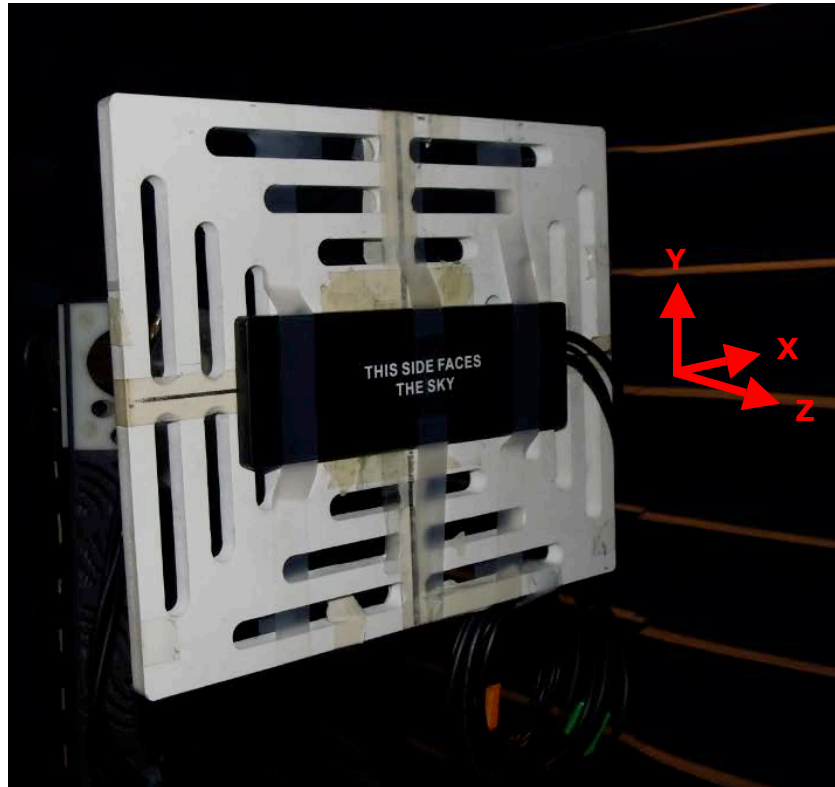


4.4. Average Gain

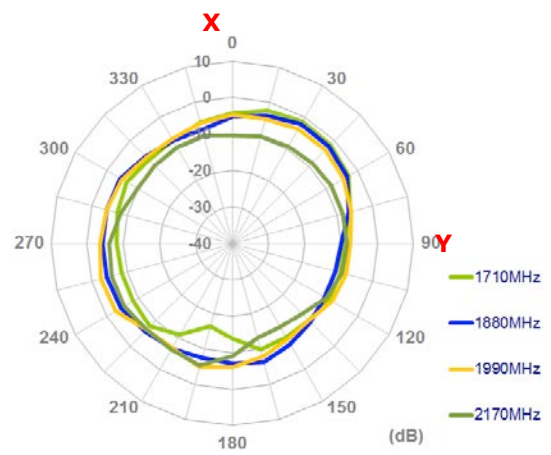
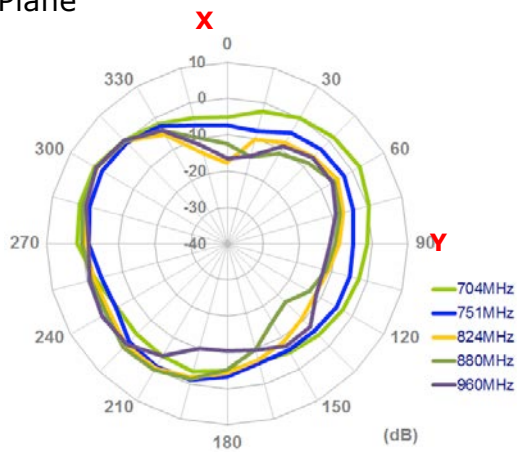


4.5. Radiation patterns

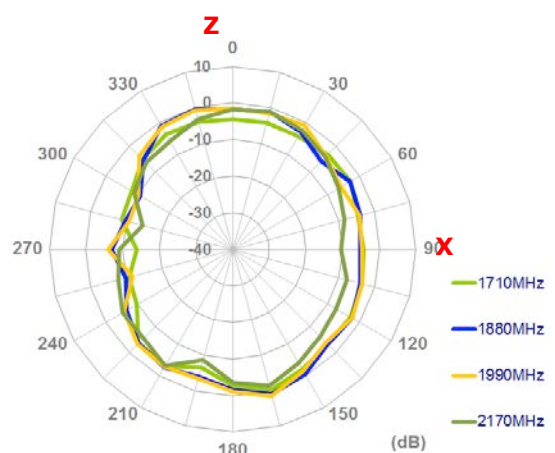
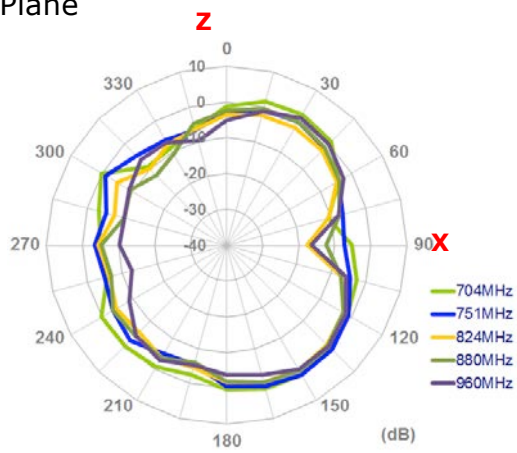
Measurement setup



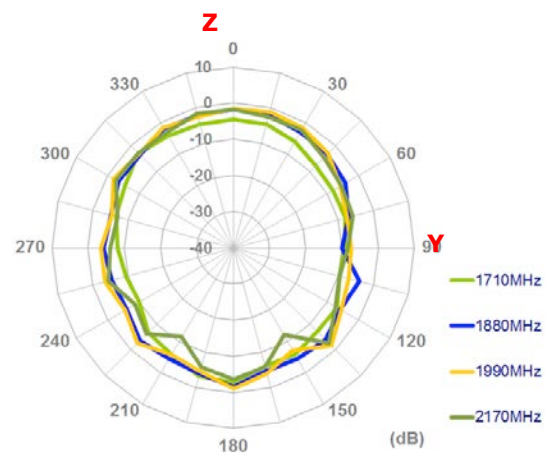
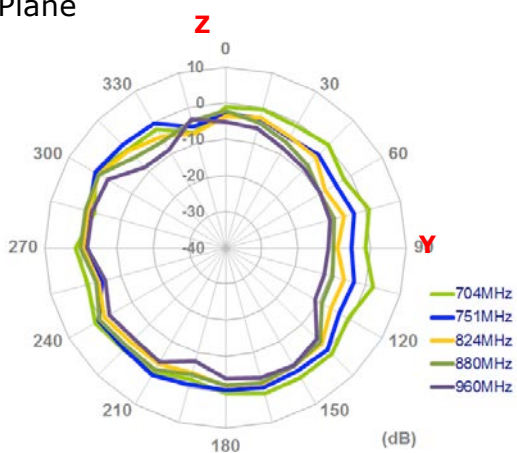
XY Plane



XZ Plane

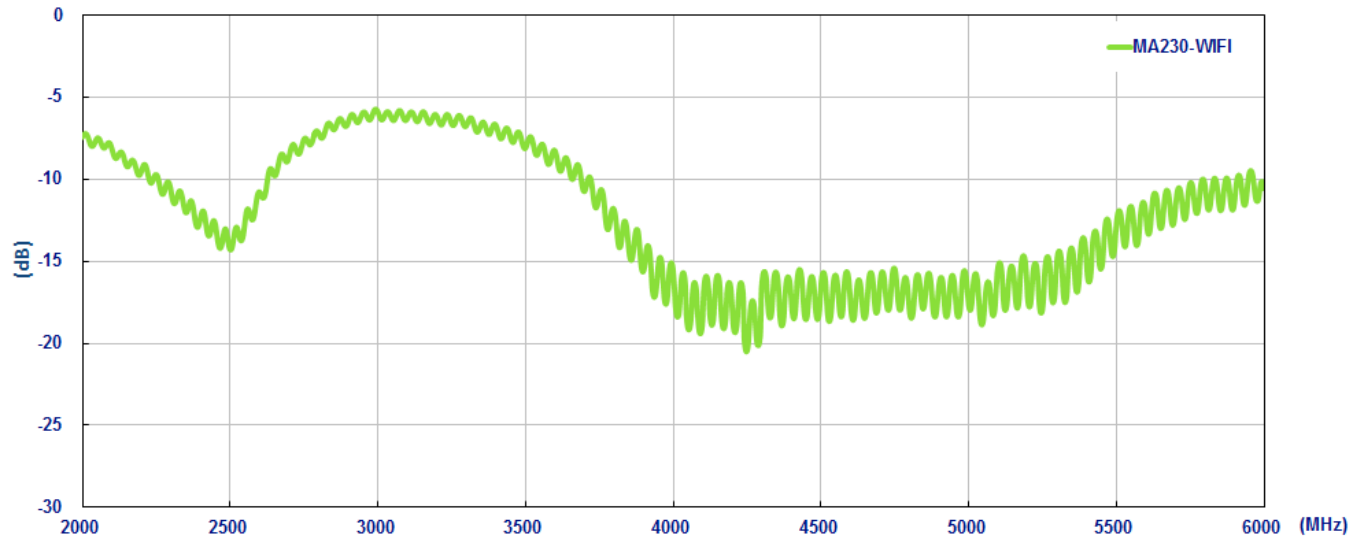


YZ Plane

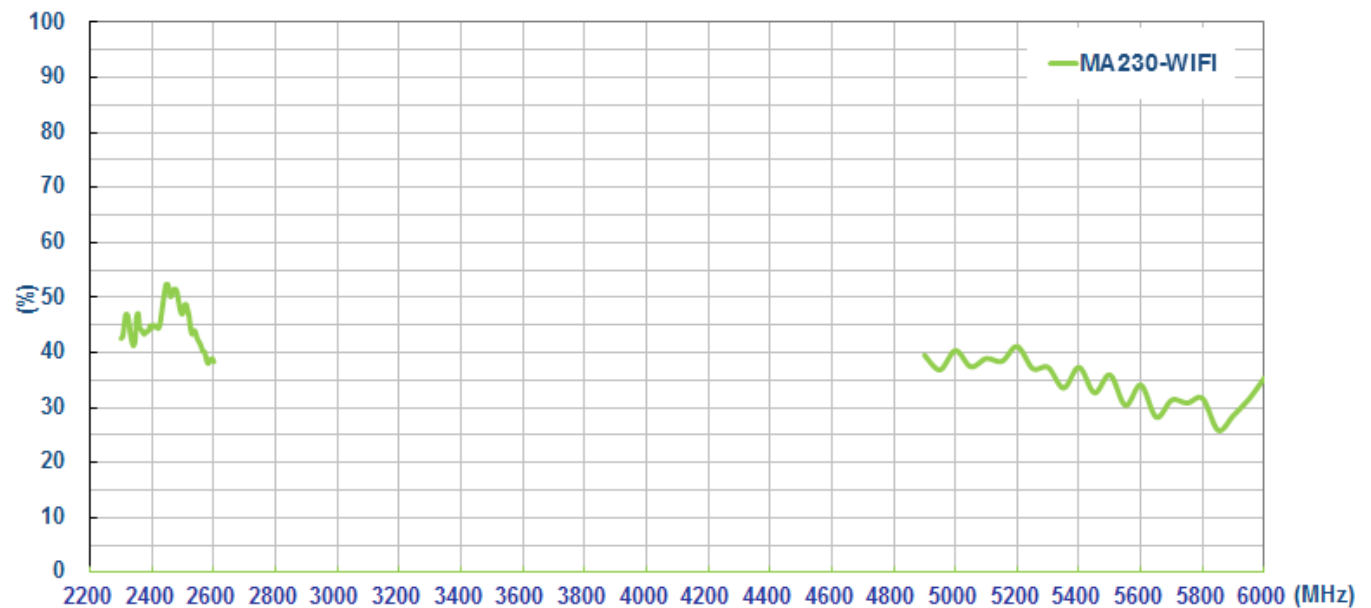


5. Wi-Fi 2.4/5.0 GHz antenna

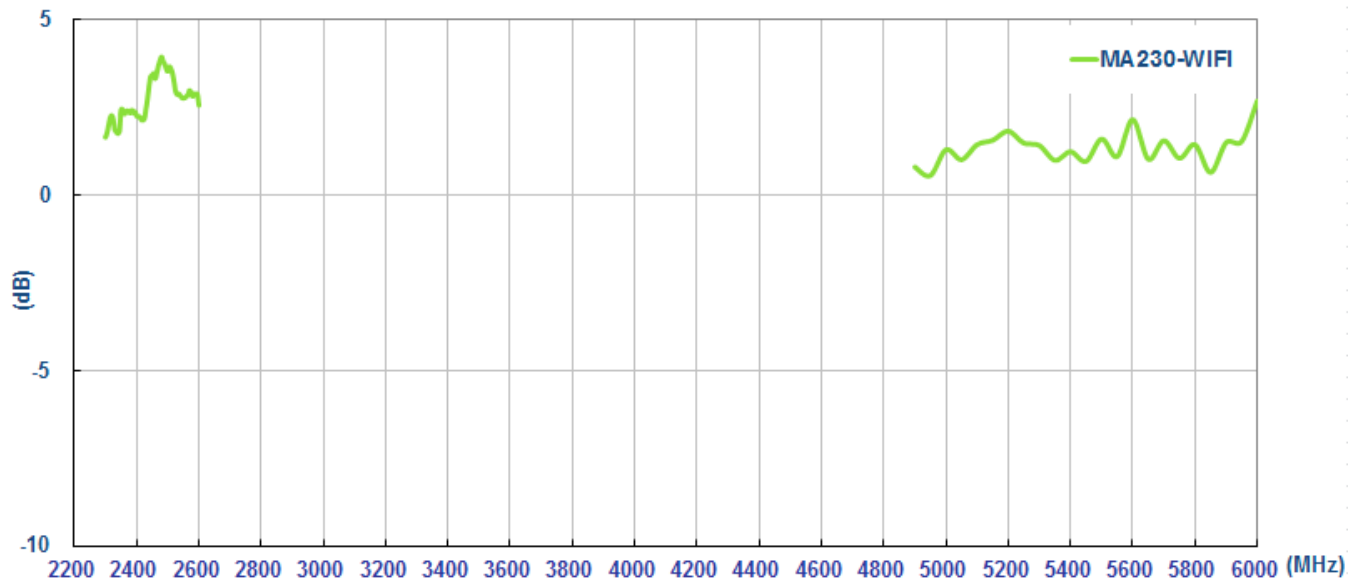
5.1. Return Loss



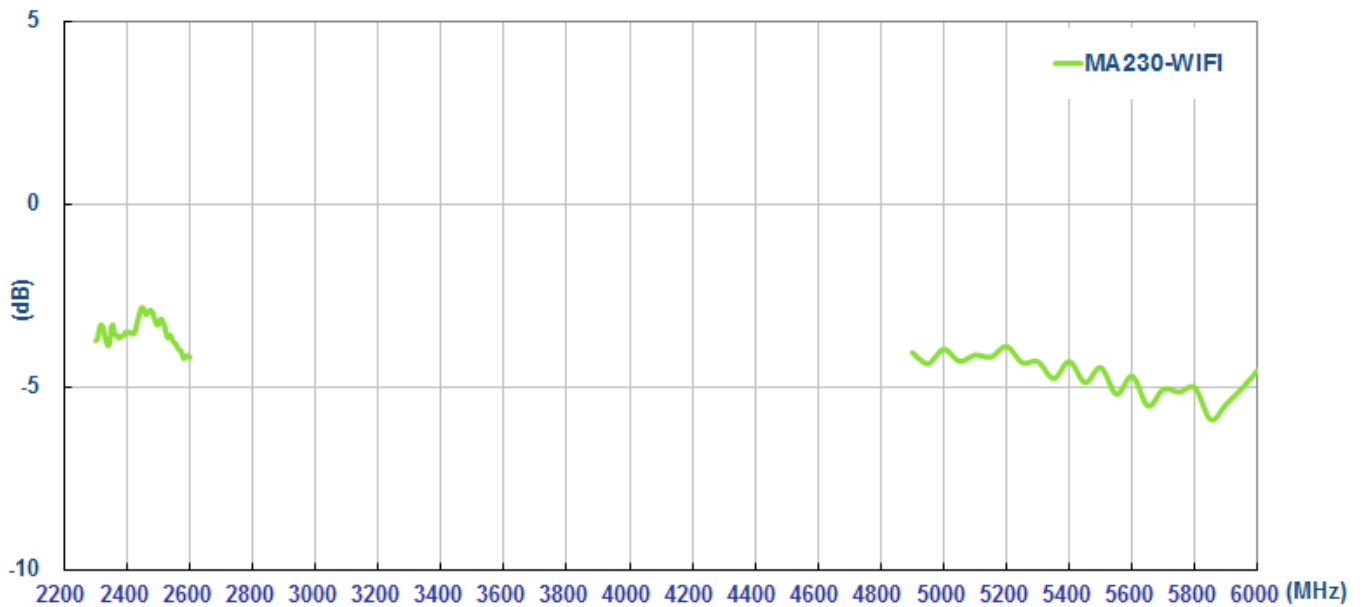
5.2. Efficiency



5.3. Peak Gain

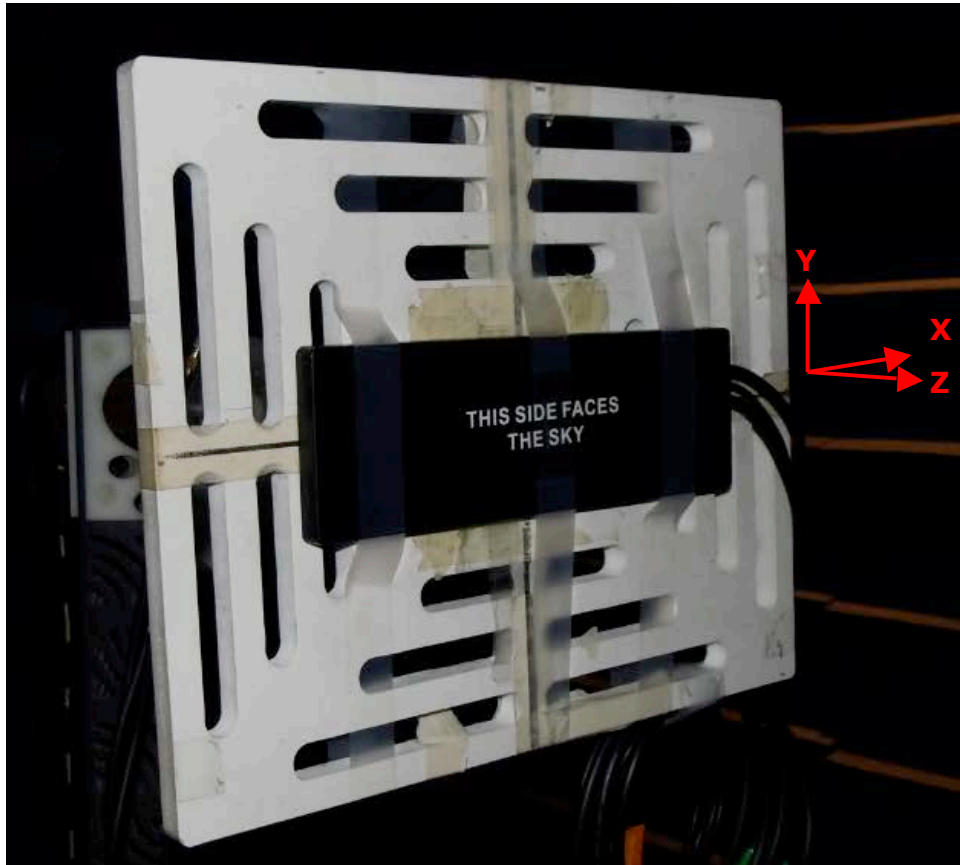


5.4. Average Gain

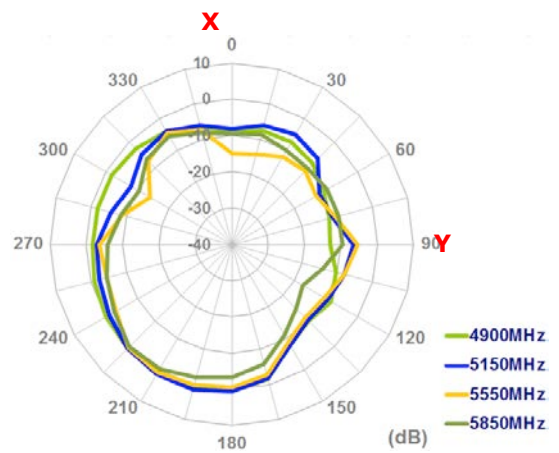
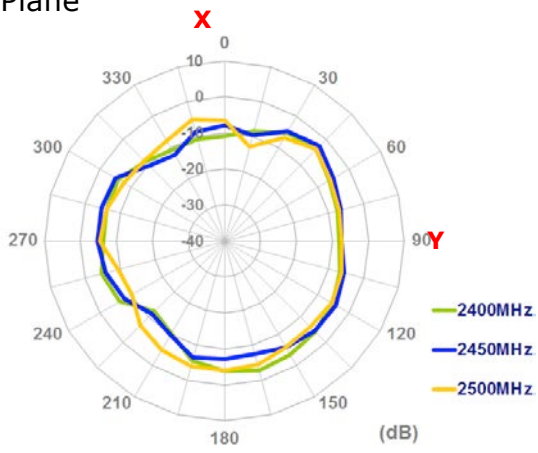


5.5. Radiation patterns

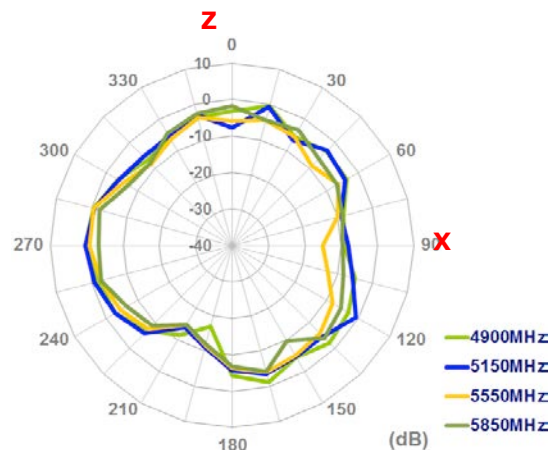
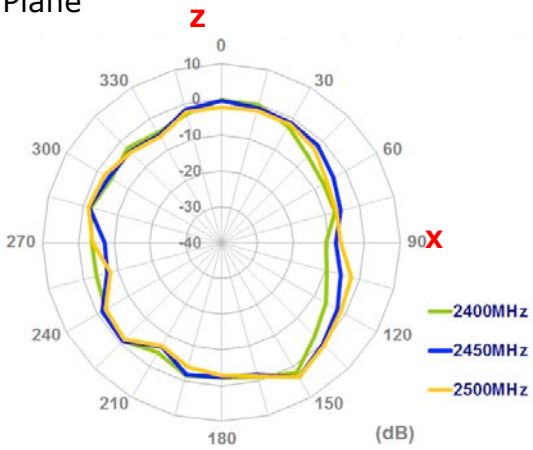
Measurement setup



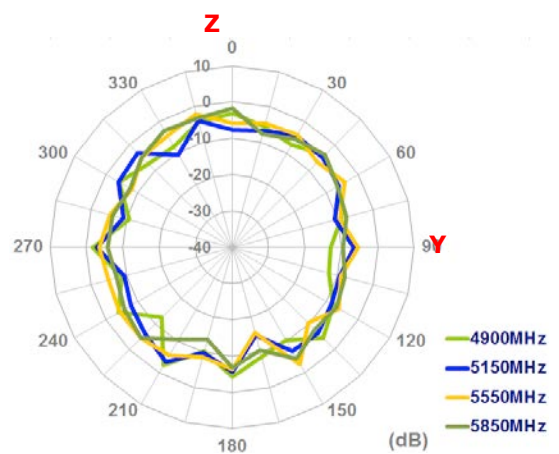
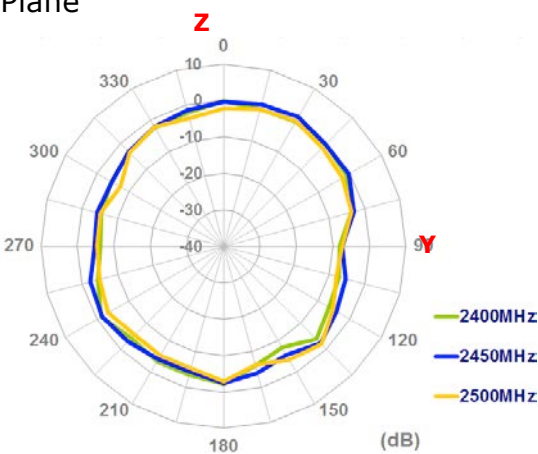
XY Plane



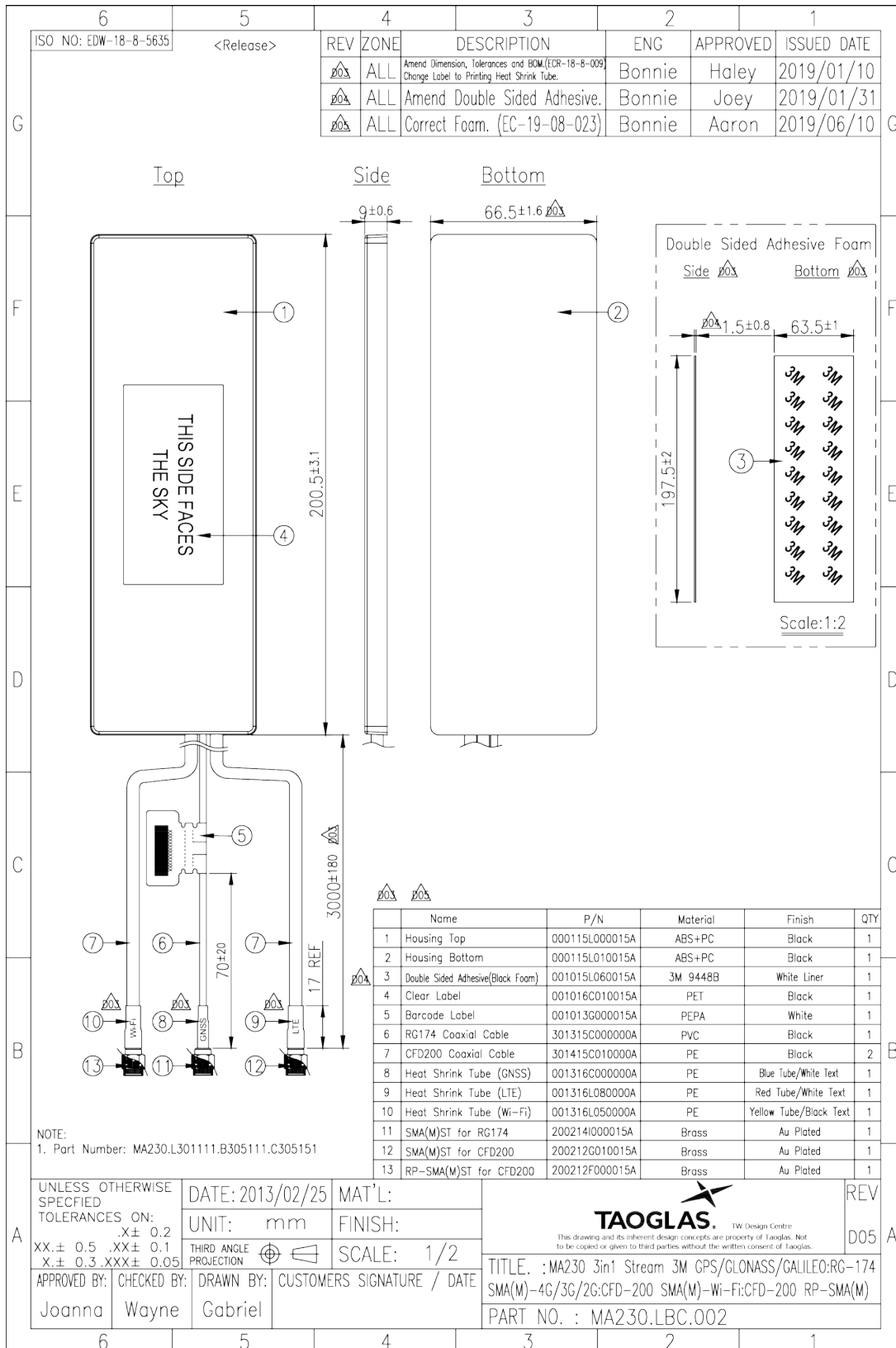
XZ Plane



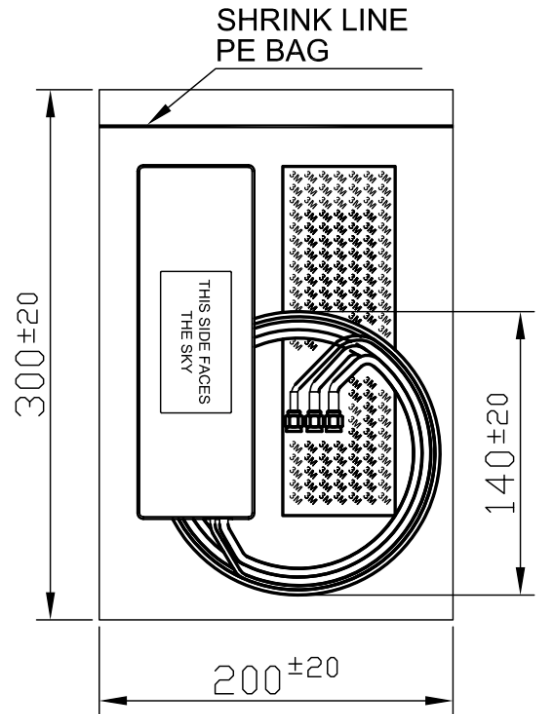
YZ Plane



8. Drawing



9. Packaging



PACKING: 1PCS/BAG

