

Unlicensed Transmitters: Approved Antennas List

<i>Manufacturer</i>	<i>Antenna</i>	<i>Description</i>	<i>Type</i>	<i>Peak Gain (dBi)</i>	<i>Min Cable loss (dB)</i>	<i>Ω</i>	<i>Connector Type</i>	<i>Notes</i>
Molex	1461750001	Linear polarized	Chip antenna	2.4	0	50	Integral	
2J Antennas	2J7086BGFa	Linear polarized	Monopole	5.5	0	50	RP-SMA	

Notes:

- 1) Antenna is approved by similarity with equivalent or lesser gain.
- 2) Antenna gain declared in linear terms converted from dBiC



Part Number : 1461750001

Series Number : 146175

Product Category : Antennas

Product Description : 2.4GHz / 5GHz SMT MID
Chip Antenna, 5.00mm by 3.00mm

Status : Active

Documents & Resources

Drawings
Drawing 1461750001_sd.pdf

3D Models and Design Files
3D Model 1461750001_stp.zip
HFSS Model 1461750001_HFSS.zip

Specifications
Application Specification AS-146175-001-001.pdf
Packaging Specification PK-146175-001-001.pdf
Product Specification PS-146175-001-001.pdf

Product Environment Compliance

Compliance

GADSL/IMDS	Not Relevant
China RoHS	
EU ELV	Not Relevant
Low-Halogen Status	Low-Halogen per IEC 61249-2-21
REACH SVHC	Not Contained per D(2023)8585-DC (23 Jan 2024)
EU RoHS	Compliant per EU 2015/863

Multiple Part Product Compliance Statements

- Eu RoHS
- REACH SVHC
- Low-Halogen

Multiple Part Industry Compliance Documents

- IPC 1752A Class C
- IPC 1752A Class D
- Molex Product Compliance Declaration

- IEC-62474
- chemSHERPA (xml)

EU RoHS Certificate of Compliance

Part Details

General

Status	Active
Category	Antennas
Series	146175
Description	2.4GHz / 5GHz SMT MID Chip Antenna, 5.00mm by 3.00mm
Component Type	Surface Mount Device Antenna
Function	Signal
Product Family	Internet of Things (IoT) Antennas: Wi-Fi, Bluetooth, Zigbee
Product Name	2.4/5GHz SMT OnGround MID Chip
Protocol	BLE, BT, Thread, Wi-Fi, Wireless Hart, Zigbee
Type	Internal, Wi-Fi Antenna
UPC	889056512084

Electrical

Band#1 F_End (MHz)	2483.5
Band#1 F_Start (MHz)	2400
Band#2 F_End (MHz)	5850
Band#2 F_Start (MHz)	5150
Electrical Connectivity	SMD
Peak Gain (dBi)	3.0 @ 2.4 GHz, 4.2 @ 5 GHz
Return Loss - S11 (dB)	< -6
Total Efficiency	>70%

Physical

Cable Length	N/A
Length	5.00mm
Mounting Style	Surface Mount
Net Weight	0.058/g

Packaging Type	Embossed Tape on Reel
Polarization	Linear
Radiation Pattern	Omnidirectional
Thickness	4.00mm
Width	3.00mm

2J7086BGFa

2× 5GNR MIMO, 2.4/5.0/6.0 GHz ISM MIMO and GNSS Screw Mount

Key Features

Cable 1-2: 5GNR

- 617-960 MHz
- 1427-2690 MHz
- 3300-5000 MHz
- 5150-5925 Mhz

Cable 3-4: 2.4/5.0/6.0 GHz ISM

- 2410-2490 MHz
- 4920-5925 MHz
- 5915-7125 MHz

Cable 5: GPS/GLONASS/QZSS/Galileo

- 1561-1606 MHz

Screw Mount

Heavy Duty antenna

High Performance

Ground Plane Independent

Anti-Rotation Mounting

Customizable Cable and Connector

Dimensions: Ø 96 x H 90 mm

Certificates: IP67, IP69, IK09



1. Antenna and electrical specifications

Cable 1

Parameters	5G NR Antenna			
Technologies	5G, 4G, 3G and 2G			
Standards	5G NR/4G LTE/FirstNet/CBRS/LPWA/CAT-X/CAT-Mx/CAT-NBx/NB-IoT/3G/2G			
Frequency (MHz)	617-960	1427-2690	3300-5000	5150-5925
Band (MHz)	600, 700, 850, 900	1500, 1600, 1700, 1800, 1900, 2000, 2100, 2300, 2500, 2600	3300, 3500, 3600, 3700, 4500	5200, 5500, 5800
5G NR Bands	n5, n8, 12, n20, n28, n71, n81, n82, n83,	n1, n2, n3, n7, n25, n34, n38, n39, n40, n41, n50, n51, n66, n70, n74, n75, n76, n80, n84, n86	n77, n78, n79	
4G LTE Bands	B5, B6, B8, B12, B13, B14, B17, B18, B19, B20, B26, B27, B28, B29, B44, B67, B68, B71, B85	B1, B2, B3, B4, B7, B9, B10, B11, B21, B23, B24, B25, B30, B32, B33, B34, B35, B36, B37, B38, B39, B40, B41, B45, B50, B51, B65, B66, B69, B70, B74, B75, B76	B22, B42, B43, B48, B49, B52	B46, B47, B252, B255
3G CELL Bands	B5, B6, B8, B12, B13, B14, B19, B20, B26	B1, B2, B3, B4, B7, B9, B10, B11, B21, B25, B32, B33, B34, B35, B36, B37, B38, B39, B40	B22	
2G CELL Bands	710, 750, 810T, 850, 900P, 900E, 900R	1800DCS, 1900PCS		
CDMA CELL Bands	BC0, BC2, BC3, BC7, BC9, BC10, BC12, BC18, BC19	BC1, BC4, BC6, BC8, BC13, BC14, BC15, BC16, BC20, BC21		
Return Loss (dB)	~-5.2	~-15.7	~-10.8	~-14.4
VSWR	~3.9:1	~1.5:1	~2.0:1	~1.7:1
Efficiency (%)	~38.0	~51.6	~40.5	~35.3
Peak Gain (dBi)	~0.4	~3.5	~3.1	~2.5
Average Gain (dB)	~-4.3	~-2.9	~-4.0	~-4.5
Impedance (Ohm)	50			
Polarisation	Linear			
Radiation Pattern	Omni-Directional			
Max. Input Power (W)	35			
Connector Type	SMA-Male Standard (Other Connectors Available)			
Cable Length	300 cm Standard (Any Cable Length Available)			
Cable Type	LL195 Standard (Other Cables Available)			

Cable 2

Parameters	5GNR Antenna			
Technologies	5G, 4G, 3G and 2G			
Standards	5GNR/4GLTE/FirstNet/CBRS/LPWA/CAT-X/CAT-Mx/CAT-NBx/NB-IoT/3G/2G			
Frequency (MHz)	617-960	1427-2690	3300-5000	5150-5925
Band (MHz)	600, 700, 850, 900	1500, 1600, 1700, 1800, 1900, 2000, 2100, 2300, 2500, 2600	3300, 3500, 3600, 3700, 4500	5200, 5500, 5800
5GNR Bands	n5, n8 ,12, n20, n28, n71, n81, n82, n83,	n1, n2, n3, n7, n25, n34, n38, n39, n40, n41, n50, n51, n66, n70, n74, n75, n76, n80, n84, n86	n77, n78, n79	
4GLTE Bands	B5, B6, B8, B12, B13, B14, B17, B18, B19, B20, B26, B27, B28, B29, B44, B67, B68, B71, B85	B1, B2, B3, B4, B7, B9, B10, B11, B21, B23, B24, B25, B30, B32, B33, B34, B35, B36, B37, B38, B39, B40, B41, B45, B50, B51, B65, B66, B69, B70, B74, B75, B76	B22, B42, B43, B48, B49, B52	B46, B47, B252, B255
3GCELL Bands	B5, B6, B8, B12, B13, B14, B19, B20, B26	B1, B2, B3, B4, B7, B9, B10, B11, B21, B25, B32, B33, B34, B35, B36, B37, B38, B39, B40	B22	
2GCELL Bands	710, 750, 810T, 850, 900P, 900E, 900R	1800DCS, 1900PCS		
CDMACELL Bands	BC0, BC2, BC3, BC7, BC9, BC10, BC12, BC18, BC19	BC1, BC4, BC6, BC8, BC13, BC14, BC15, BC16, BC20, BC21		
Return Loss (dB)	~-5.2	~-16.0	~-10.2	~-11.5
VSWR	~3.8:1	~1.5:1	~2.1:1	~1.9:1
Efficiency (%)	~37.8	~52.0	~42.4	~35.0
Peak Gain (dBi)	~0.5	~3.5	~3.2	~2.6
Average Gain (dB)	~-4.3	~-2.9	~-3.8	~-4.6
Impedance (Ohm)	50			
Polarisation	Linear			
Radiation Pattern	Omni-Directional			
Max. Input Power (W)	35			
Connector Type	SMA-Male Standard (Other Connectors Available)			
Cable Length	300 cm Standard (Any Cable Length Available)			
Cable Type	LL195 Standard (Other Cables Available)			

Cable 3

Parameters	2.4/5.0/6.0 GHz ISM Antenna		
Standards	WiFi, BT, ZigBee, ISM		
Band (MHz)	2.4 GHz	5.0 GHz	6.0 GHz
Frequency (MHz)	2410-2490	4920-5925	5925-7125
Return Loss (dB)	~-12.5	~-11.2	~-11.2
VSWR	~1.6:1	~2.0:1	~2.0:1
Efficiency (%)	~51.6	~32.7	~26.7
Peak Gain (dBi)	~5.3	~1.8	~-0.2
Average Gain (dB)	~-2.9	~-5.0	~-5.7
Impedance (Ohm)	50		
Polarisation	Linear		
Radiation Pattern	Omni-Directional		
Max. Input Power (W)	25		
Connector Type	SMA-Male-RP Standard (Other Connectors Available)		
Cable Length	300 cm Standard (Any Cable Length Available)		
Cable Type	LL195 Standard (Other Cables Available)		

Cable 4

Parameters	2.4/5.0/6.0 GHz ISM Antenna		
Standards	WiFi, BT, ZigBee, ISM		
Band (MHz)	2.4 GHz	5.0 GHz	6.0 GHz
Frequency (MHz)	2410-2490	4920-5925	5925-7125
Return Loss (dB)	~-11.7	~-11.3	~-11.1
VSWR	~1.7:1	~2.1:1	~2.0:1
Efficiency (%)	~50.9	~35.8	~26.6
Peak Gain (dBi)	~5.5	~3.6	~-0.3
Average Gain (dB)	~-2.9	~-4.6	~-5.7
Impedance (Ohm)	50		
Polarisation	Linear		
Radiation Pattern	Omni-Directional		
Max. Input Power (W)	25		
Connector Type	SMA-Male-RP Standard (Other Connectors Available)		
Cable Length	300 cm Standard (Any Cable Length Available)		
Cable Type	LL195 Standard (Other Cables Available)		

Antenna Measurement Conditions:

Mounted on Metal Plate of 30 x 30 cm
 100 cm of LL195 Cable
 Measured in Certified CTIA 3D Anechoic Chamber

Cable 5

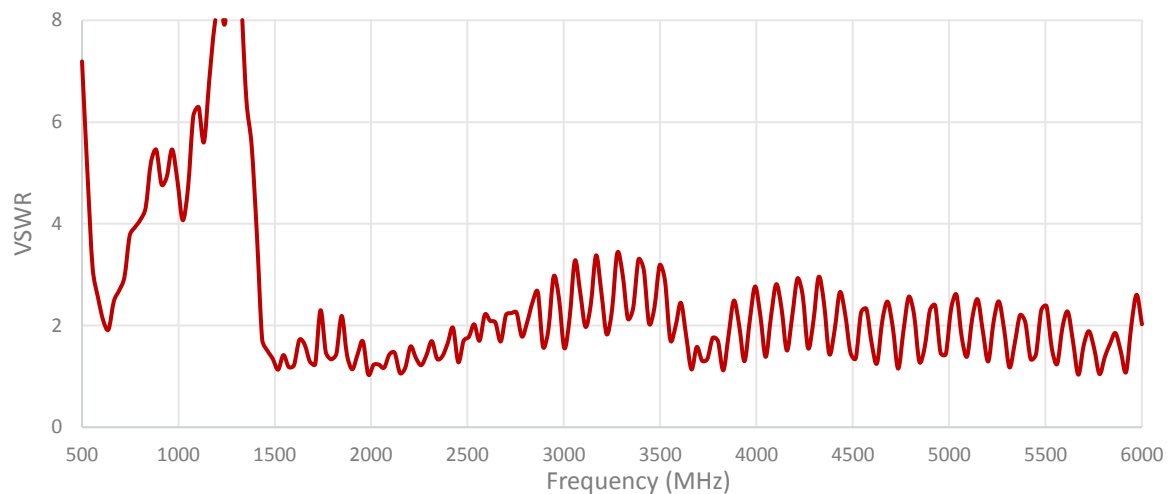
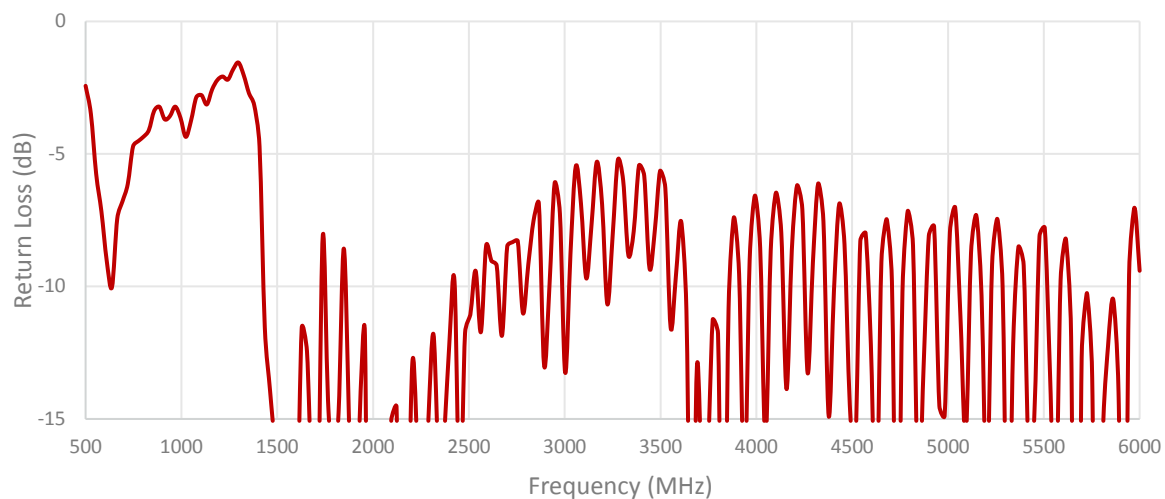
Parameters	GPS/GLONASS Antenna	
Standard	GPS/QZSS/Galileo	GLONASS
Band (MHz)	1575	1602
Frequency(MHz)	1575.42	1598-1610
Return Loss (dB)	<=-14	
VSWR	<=1.5:1	
Impedance	50	
Radiation Pattern	Hemispherical	
Polarization	RHCP	
Saw Filter	Post-Filter	
Active Gain (dB)	23 @ 3 V, 24 @ 5 V	
Noise Figure (dB)	1.2	
Voltage (V)	2.7 - 5.5	
Current Consumption (mA)	15 - 25	
Power Consumption (mW)	40.5 - 137.5	
Out of Band Rejection (dBc)	~32	
Connector Type	SMA-Male Standard (Other Connectors Available)	
Cable Length	300 cm Standard (Any Cable Length Available)	
Cable Type	LL100 Standard (Other Cables Available)	

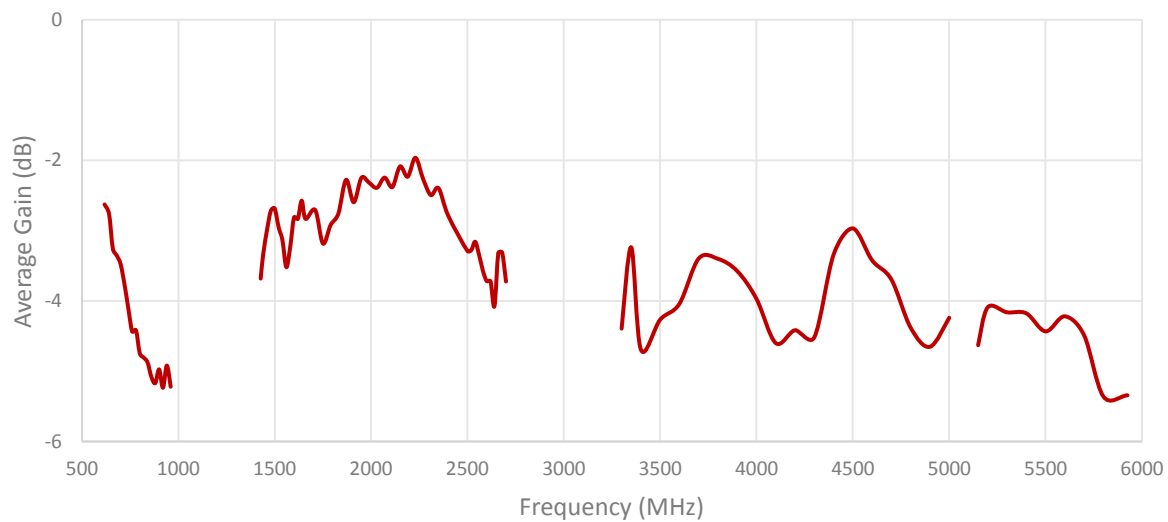
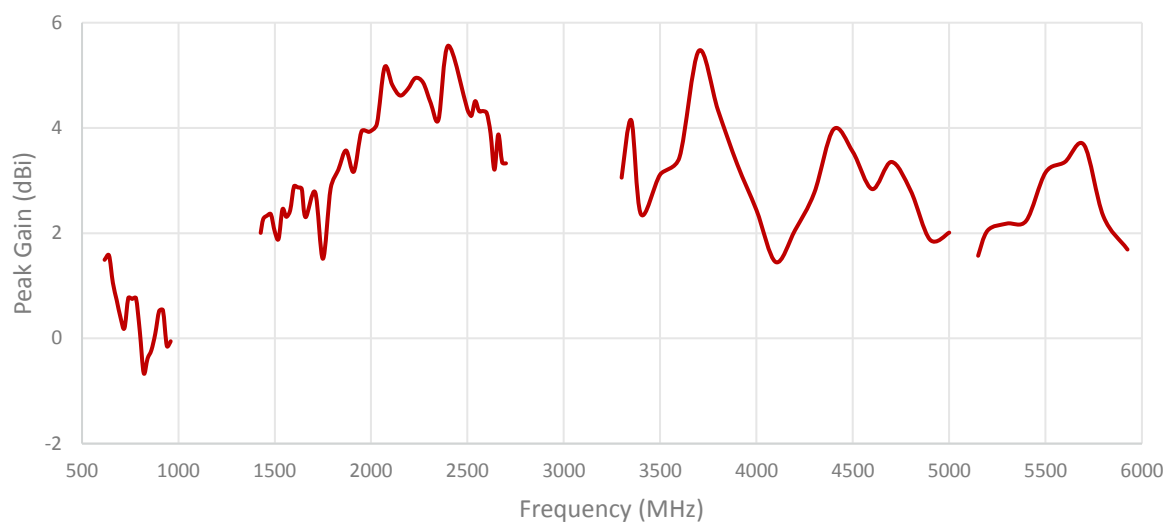
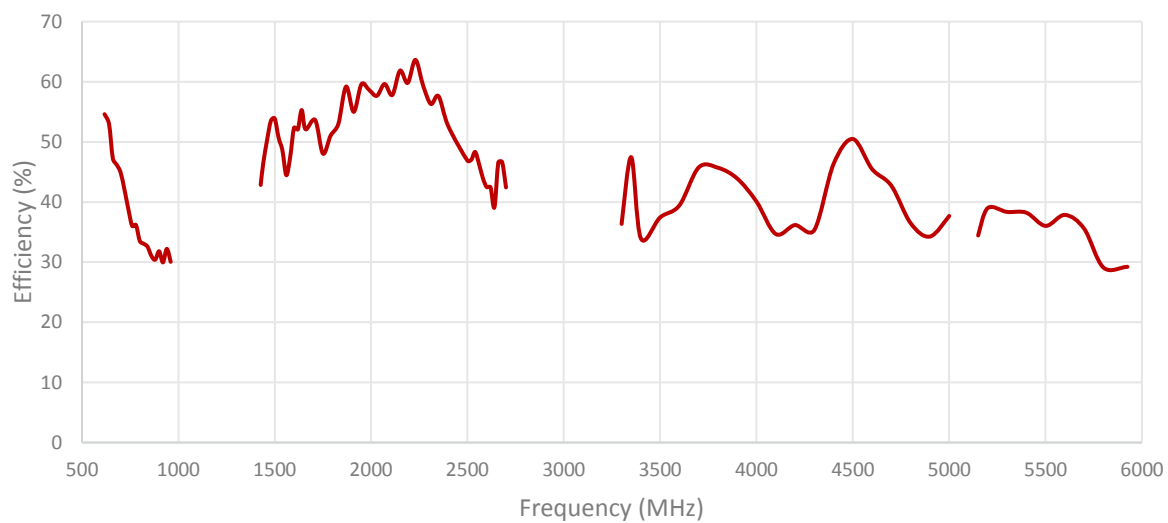
2. Mechanical and environmental specifications

Specifications	2J7086BGFa
Mounting Type	Screw Mount
Dimensions (mm)	Ø 96 x H 90
Max. Tighten Torque (Nm)	15 Nm
Radome	ASA
Radome color	White, Black
Antenna Base	Aluminium alloy
Operating Temperature (C)	-40 to +85
Storage Temperature (C)	-40 to +85
Substance Compliance	RoHS
Certificates	IP67, IP69, IK09

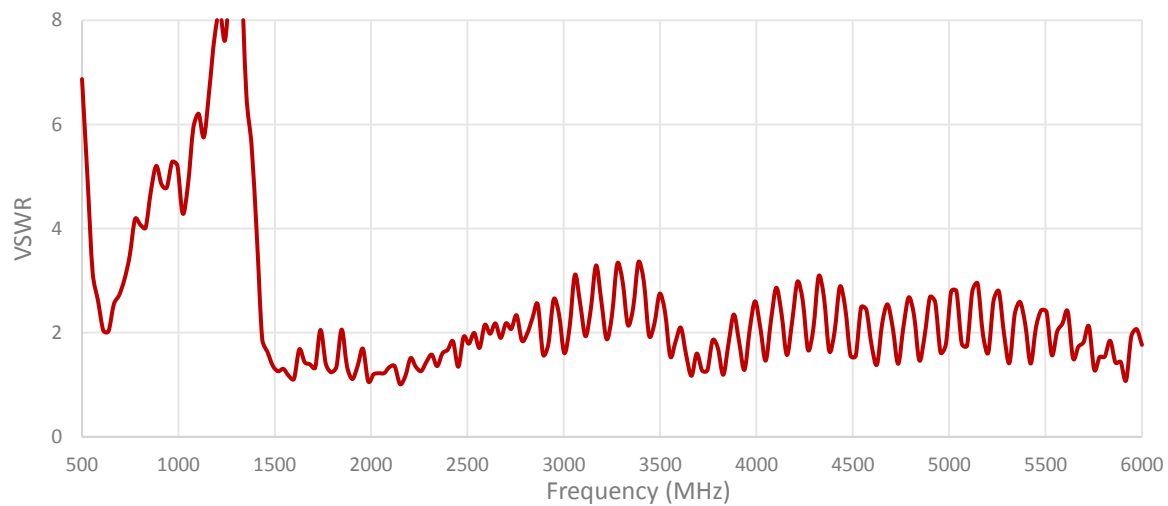
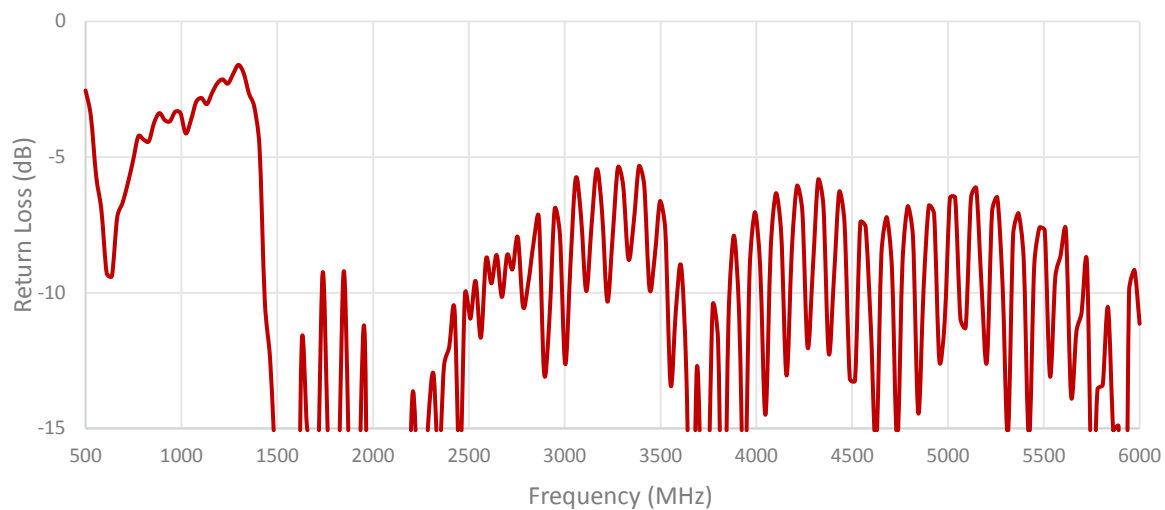
3. Antenna parameters

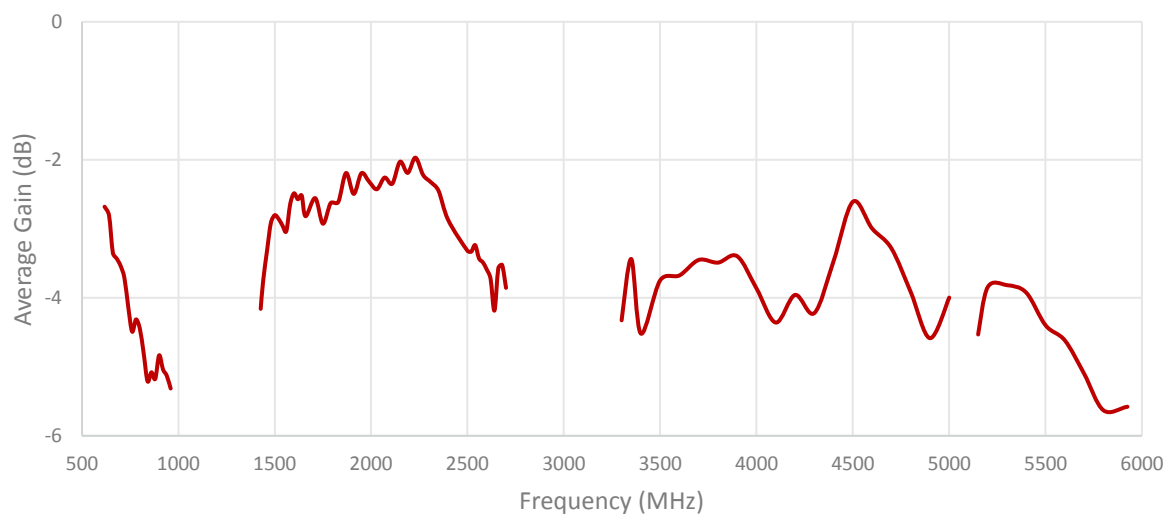
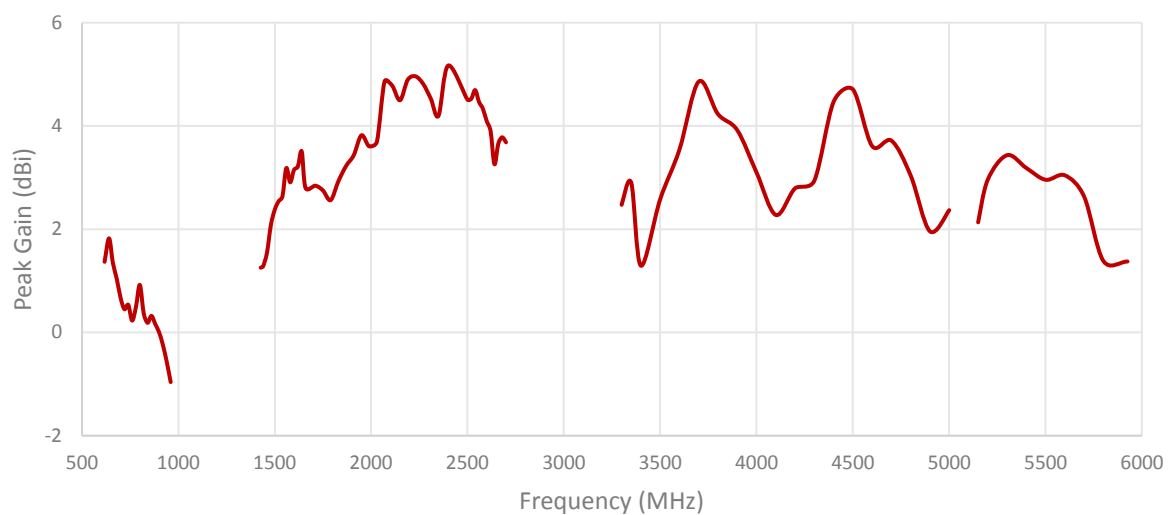
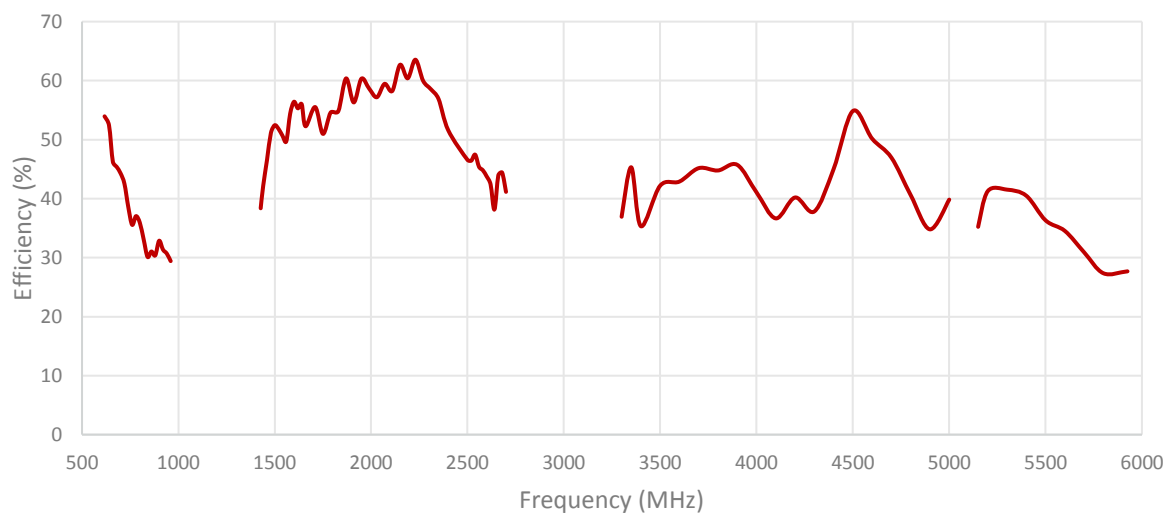
Cable 1: 5GNR



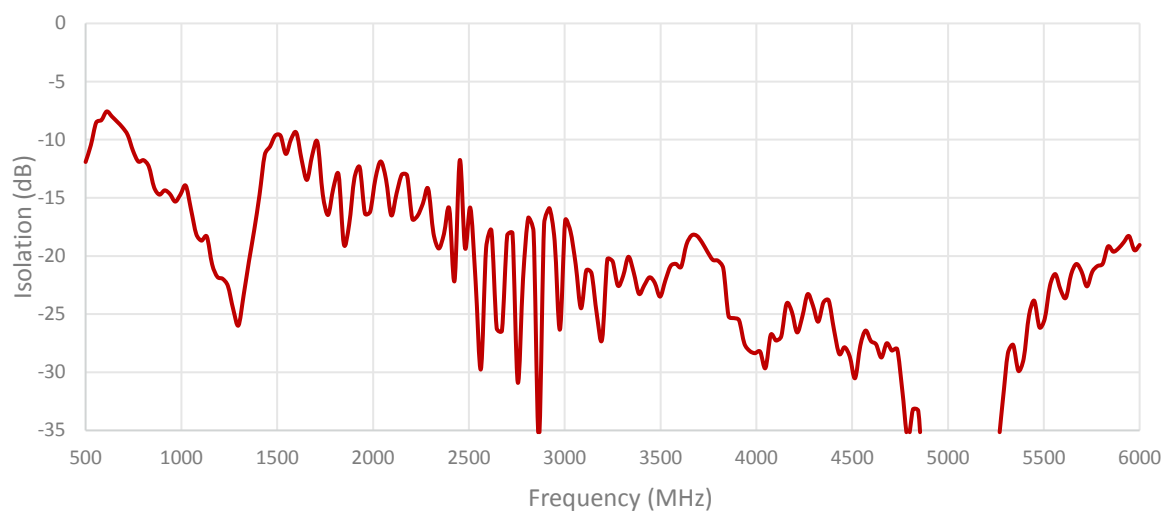


Cable 2: 5GNR

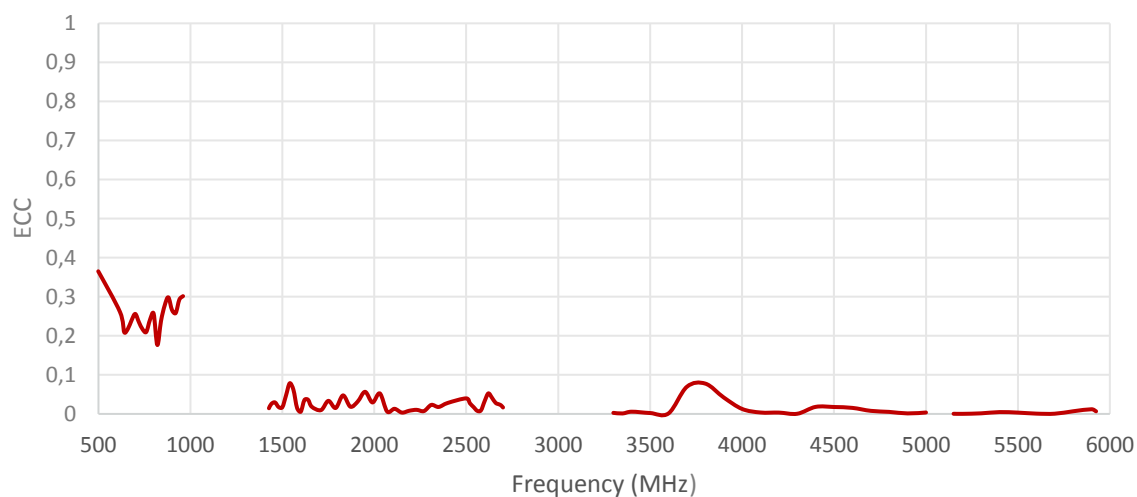




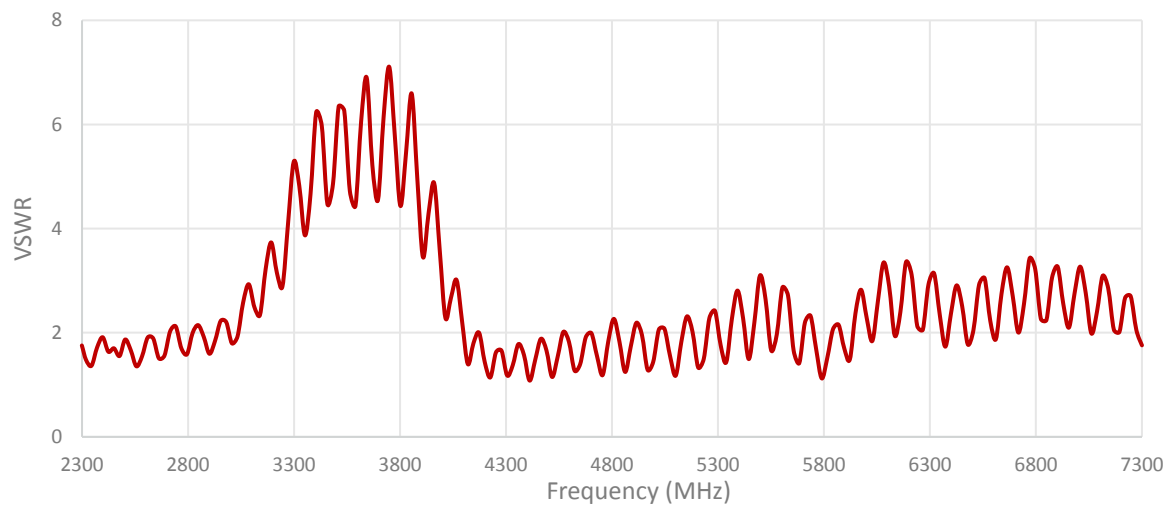
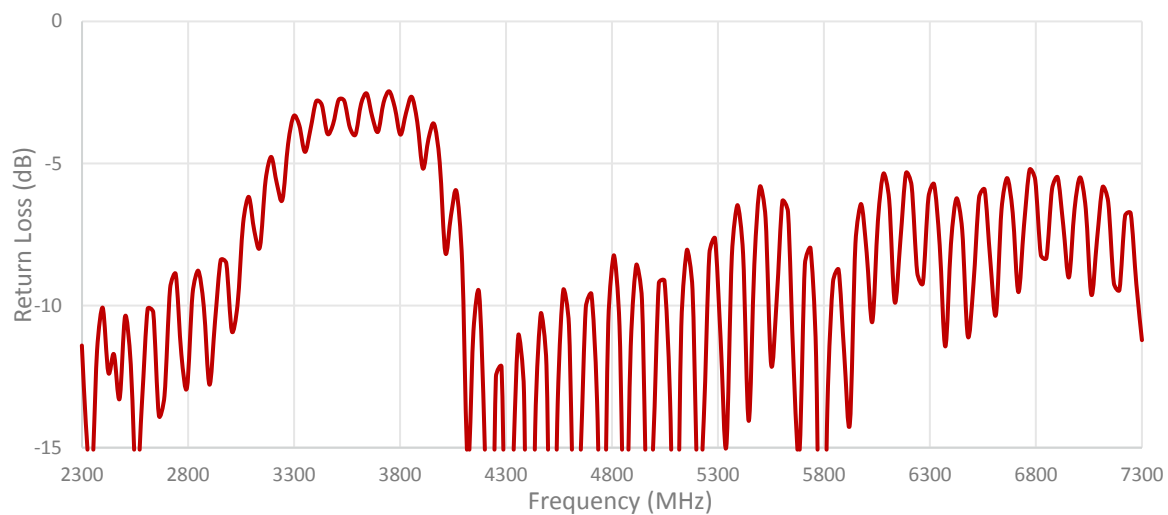
ISOLATION FOR CABLES 1 AND 2

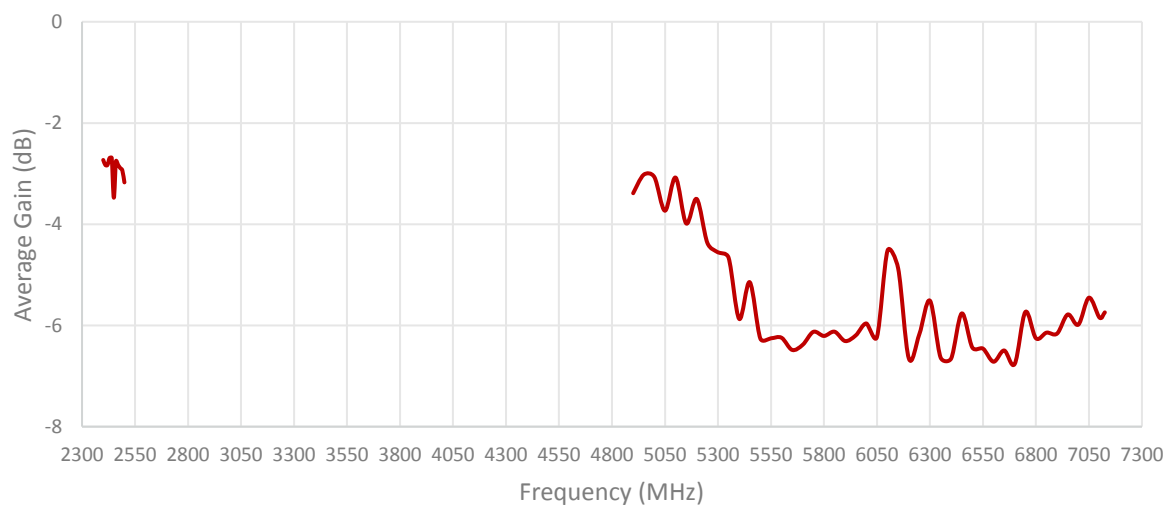
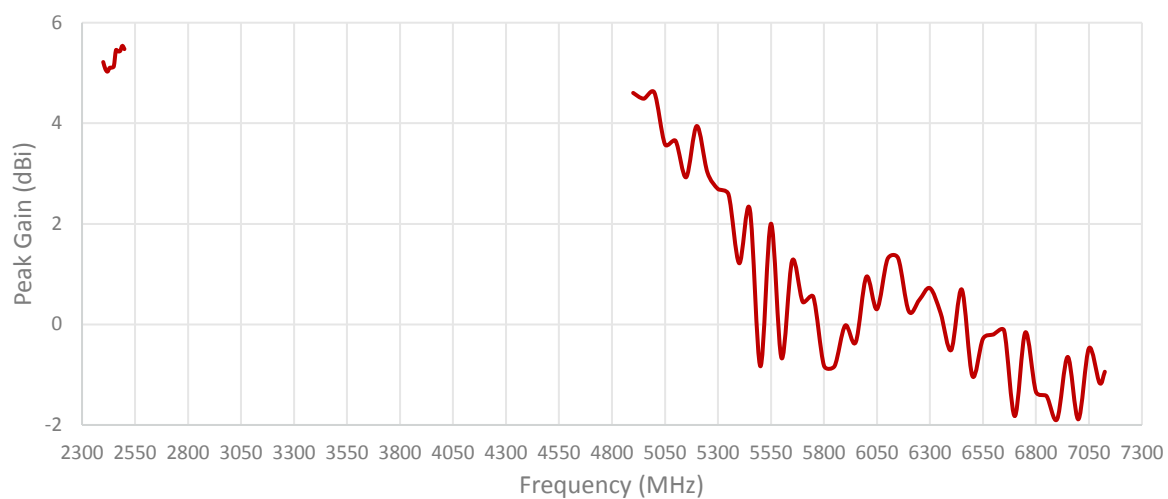
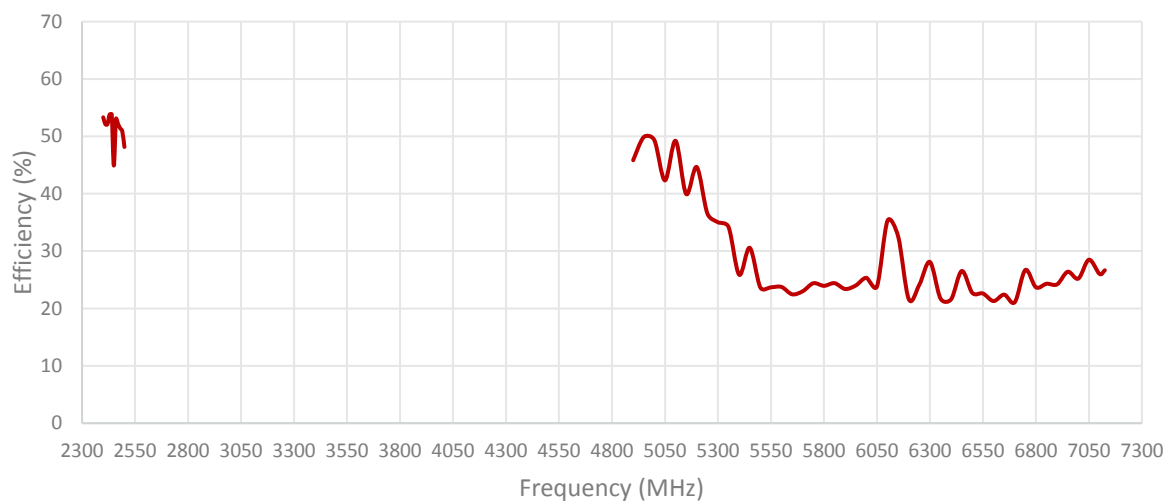


ENVELOPE CORRELATION COEFFICIENT FOR CABLES 1 AND 2

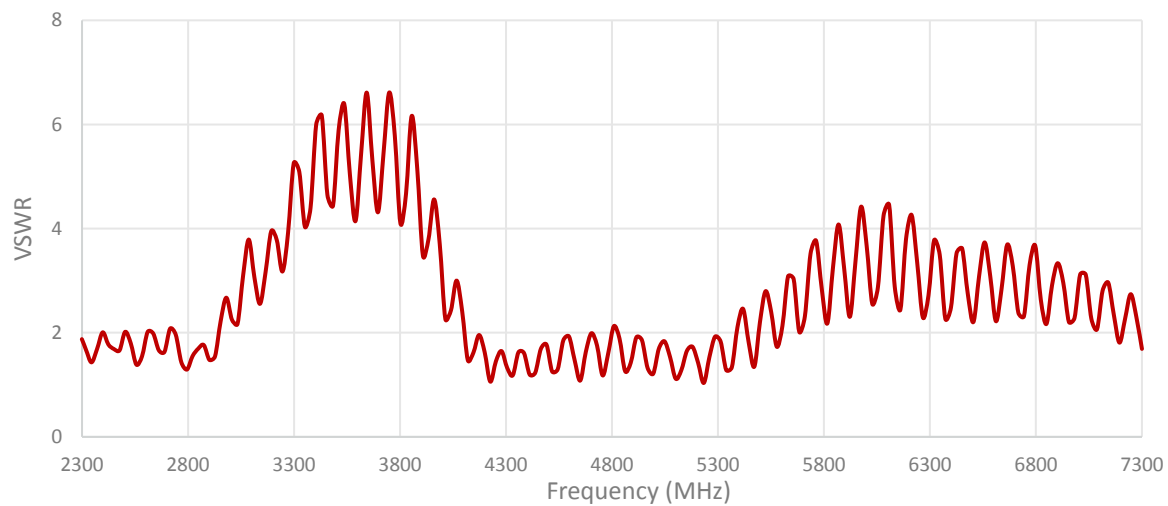
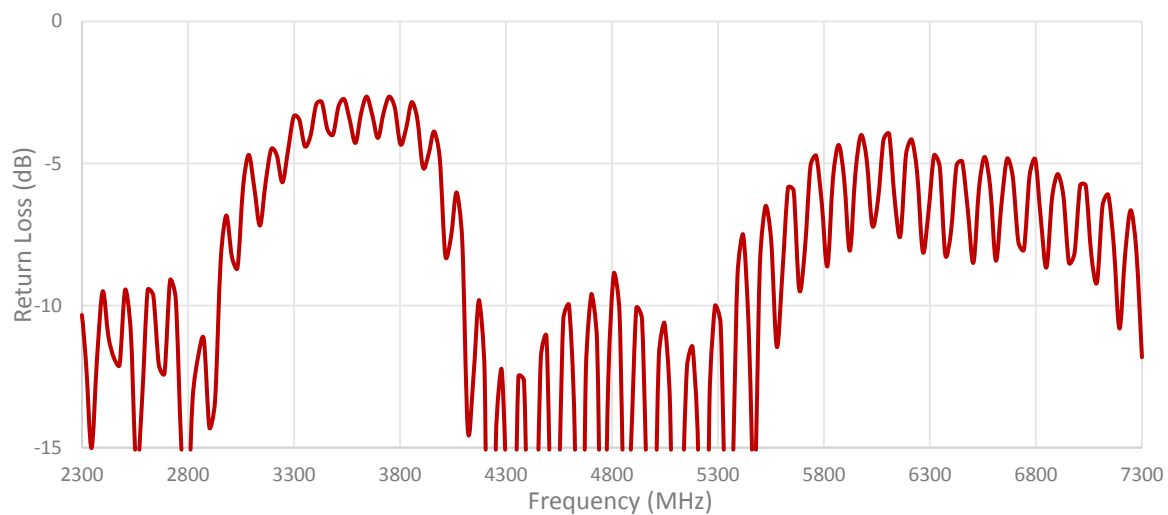


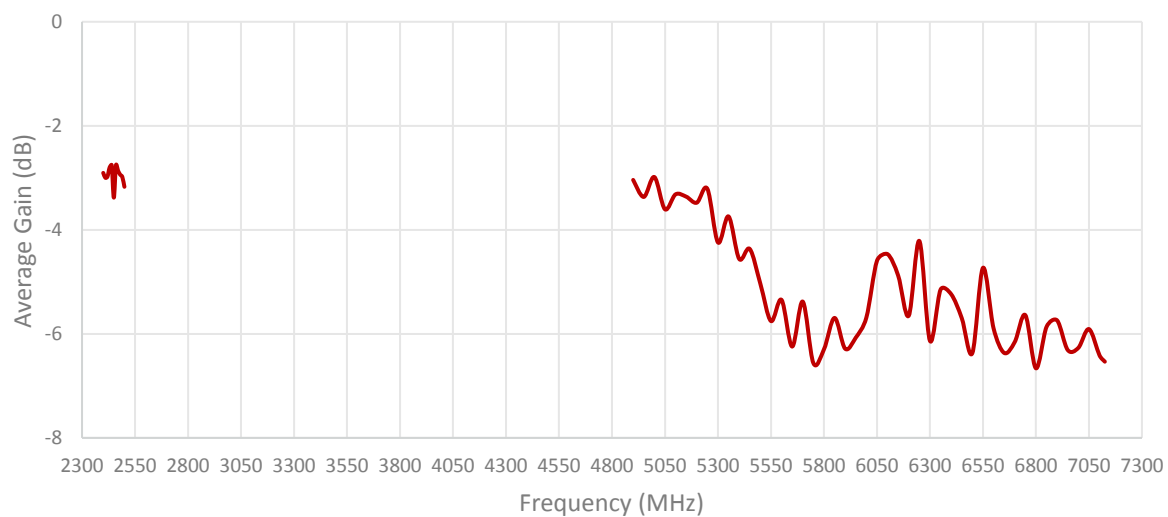
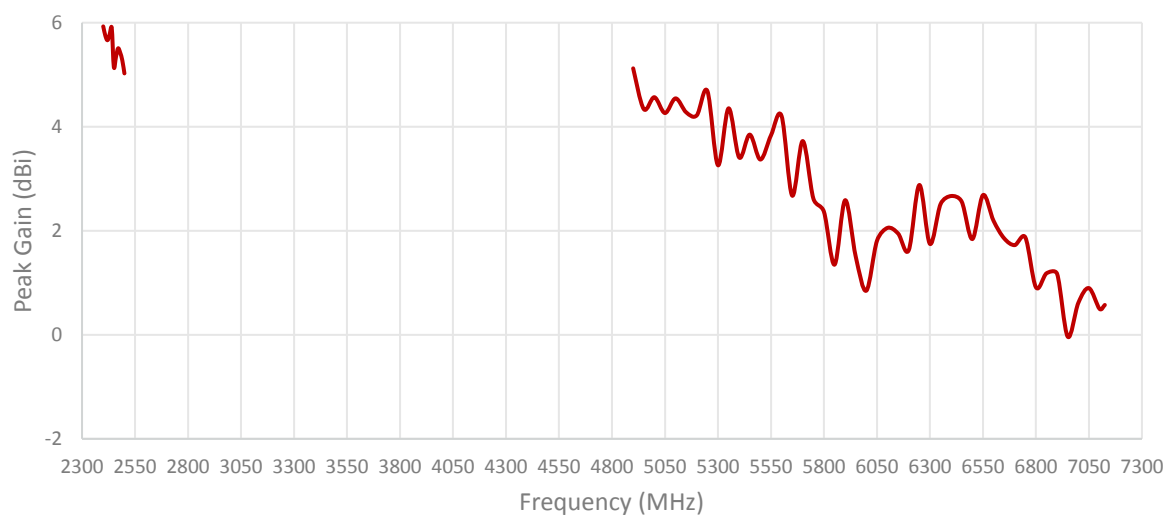
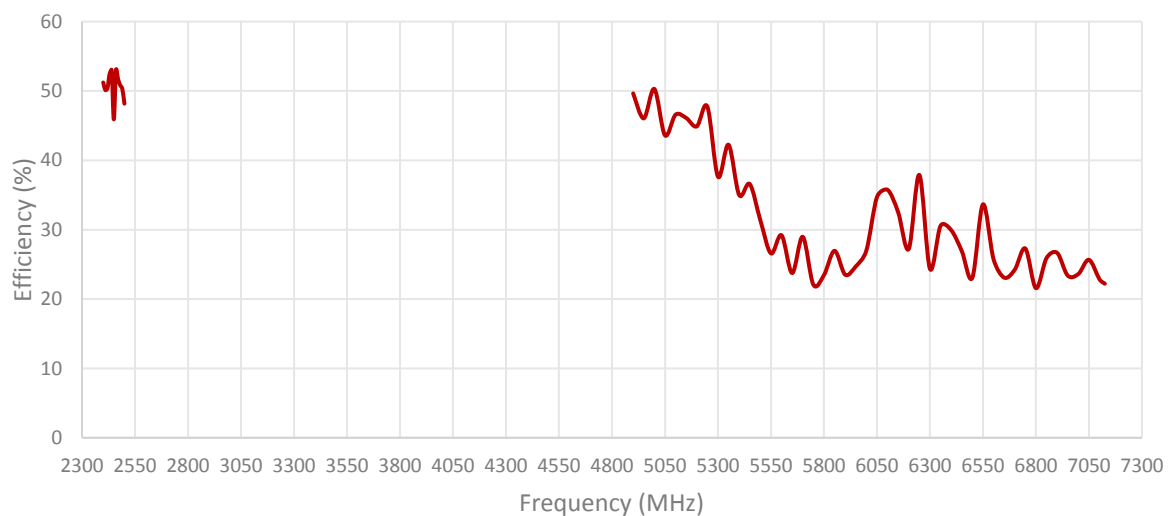
Cable 3: 2.4/5.0/6.0 GHz ISM



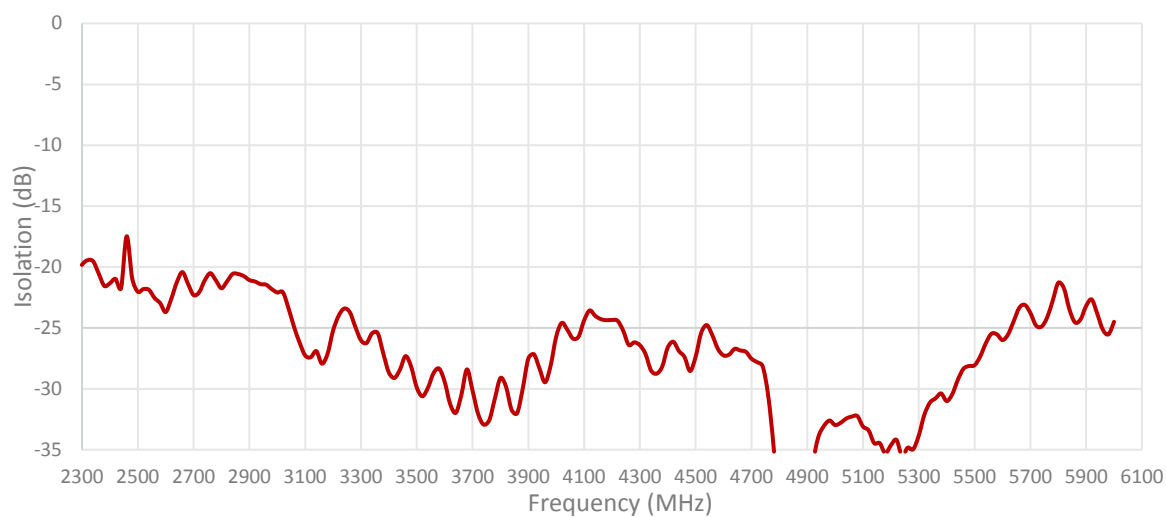


Cable 4: 2.4/5.0/6.0 GHz ISM

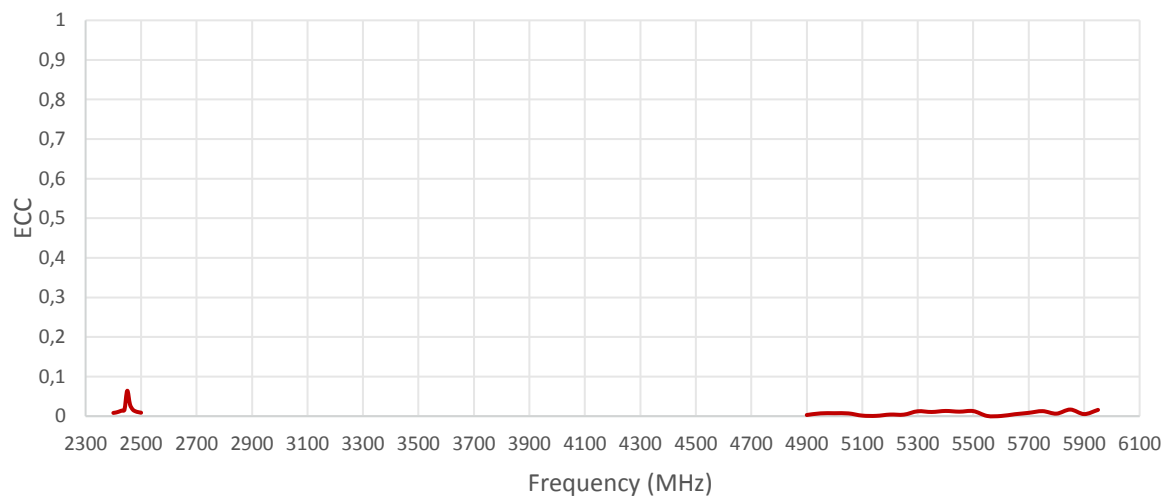


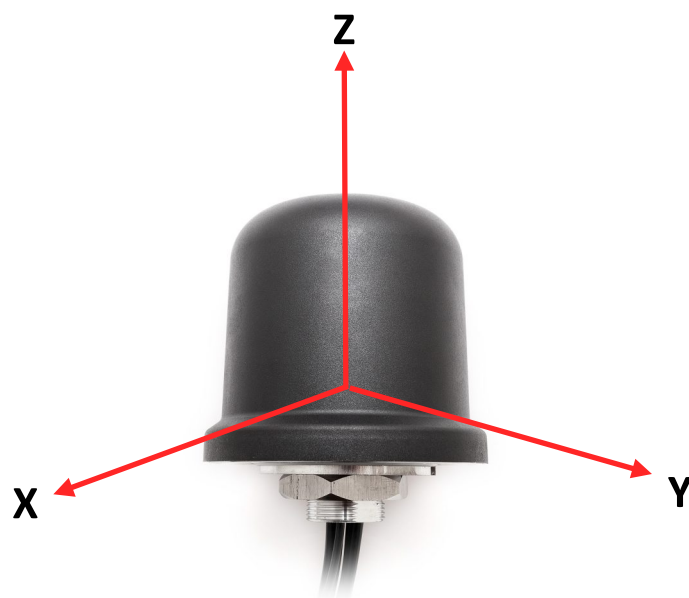


ISOLATION FOR CABLES 3 AND 4



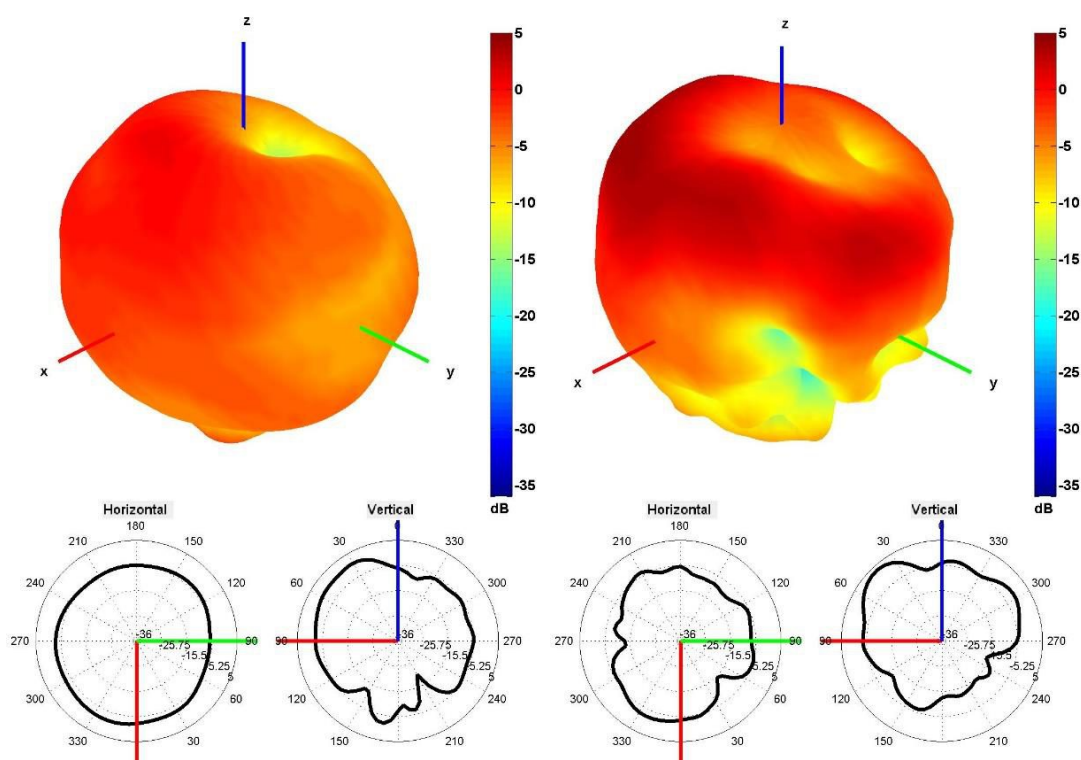
ENVELOPE CORRELATION COEFFICIENT FOR CABLES 3 AND 4



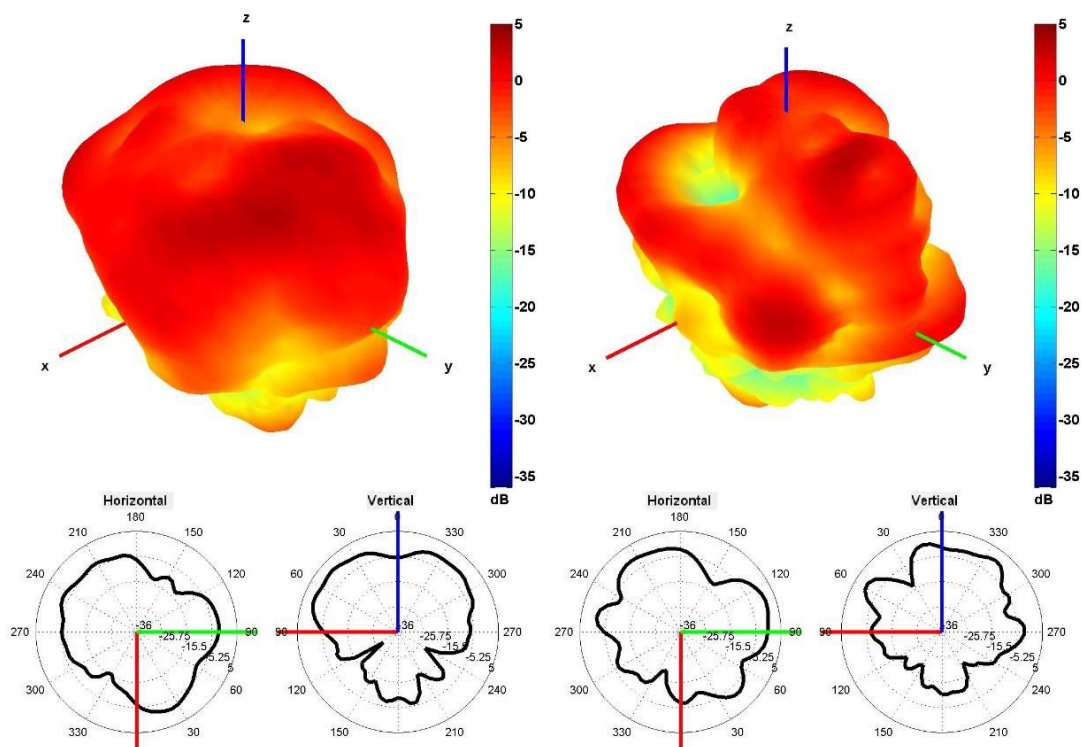


Radiation pattern reference

Cable 1: 5GNR

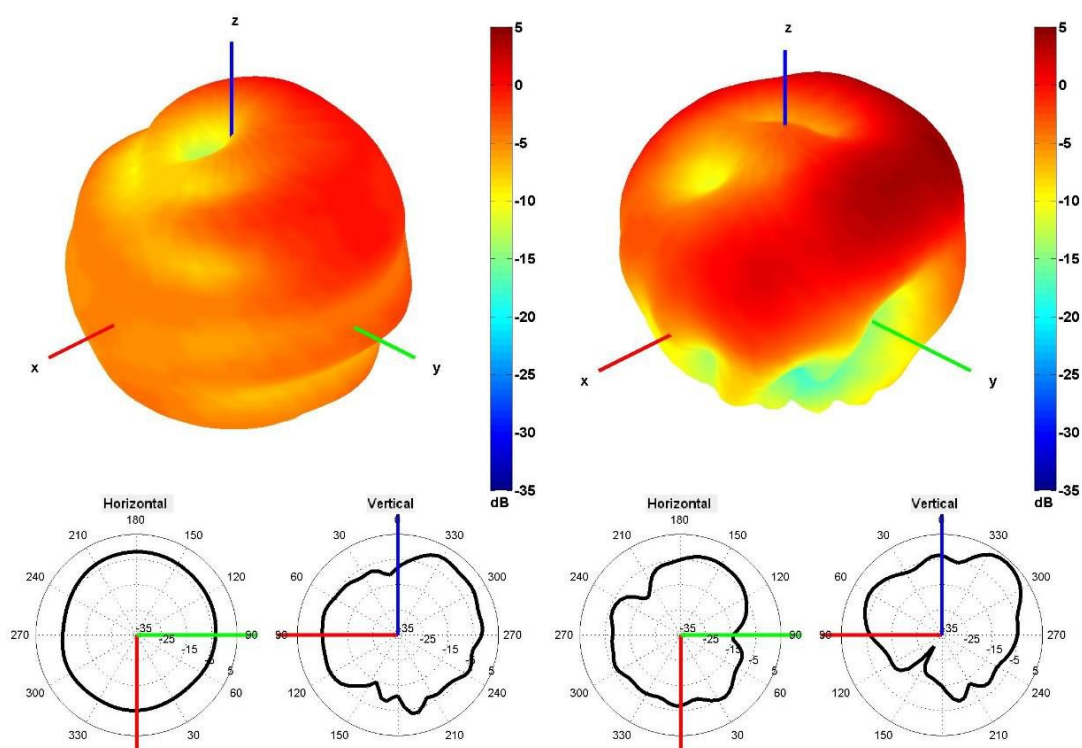


740 and 2500 MHz Radiation pattern

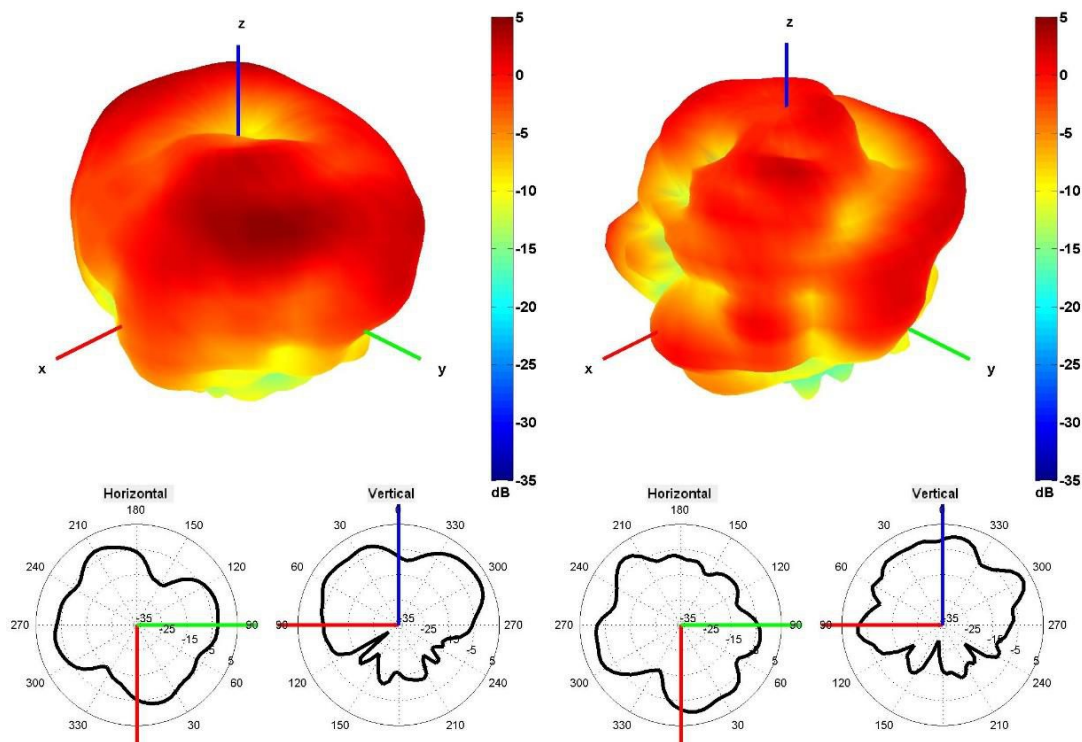


Cable 2: 5GNR

4500 and 5500 MHz Radiation pattern

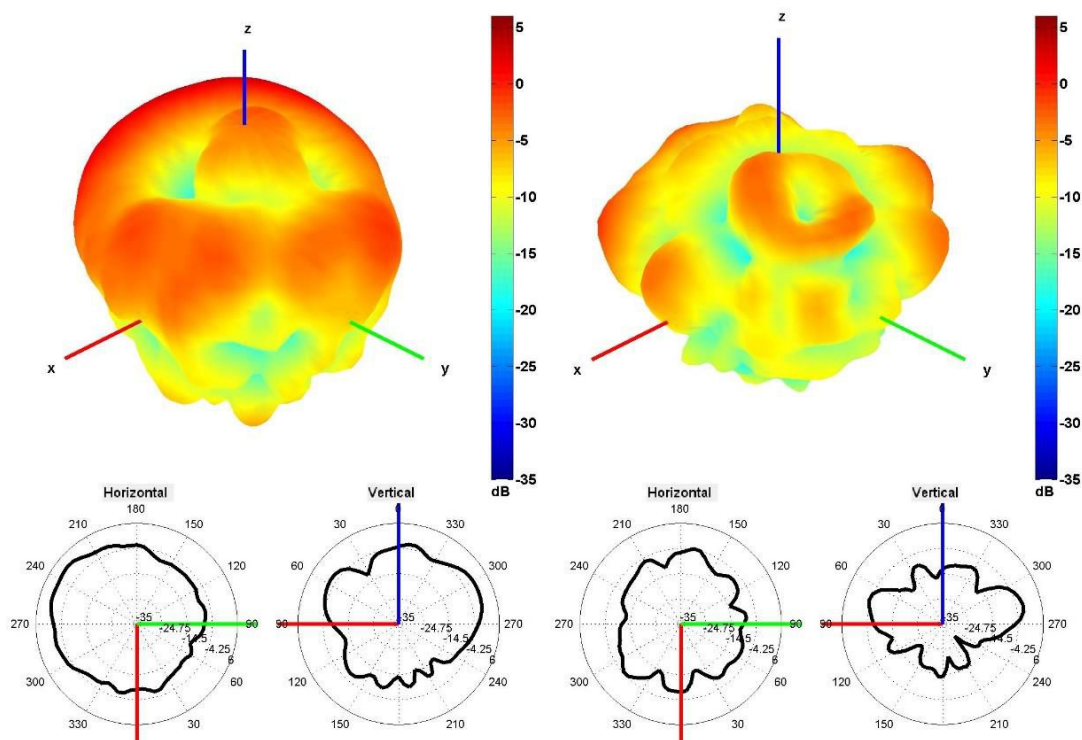


740 and 2500 MHz Radiation pattern

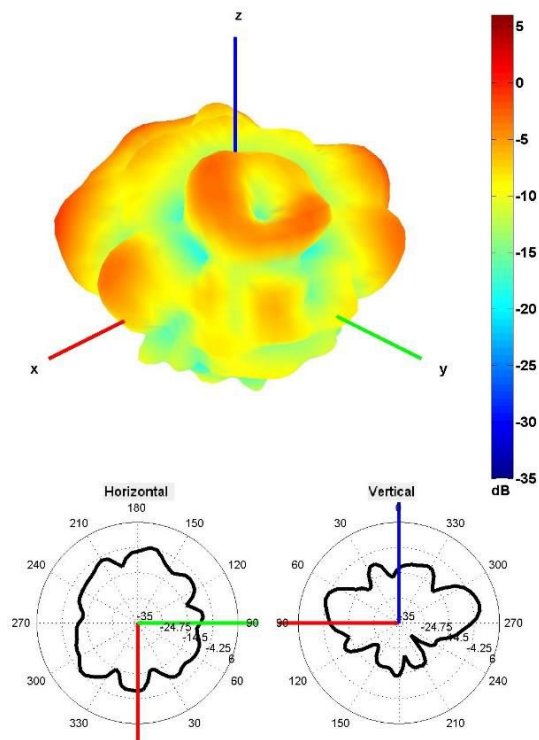


4500 and 5500 MHz Radiation pattern

Cable 3: 2.4/5.0/6.0 GHz ISM

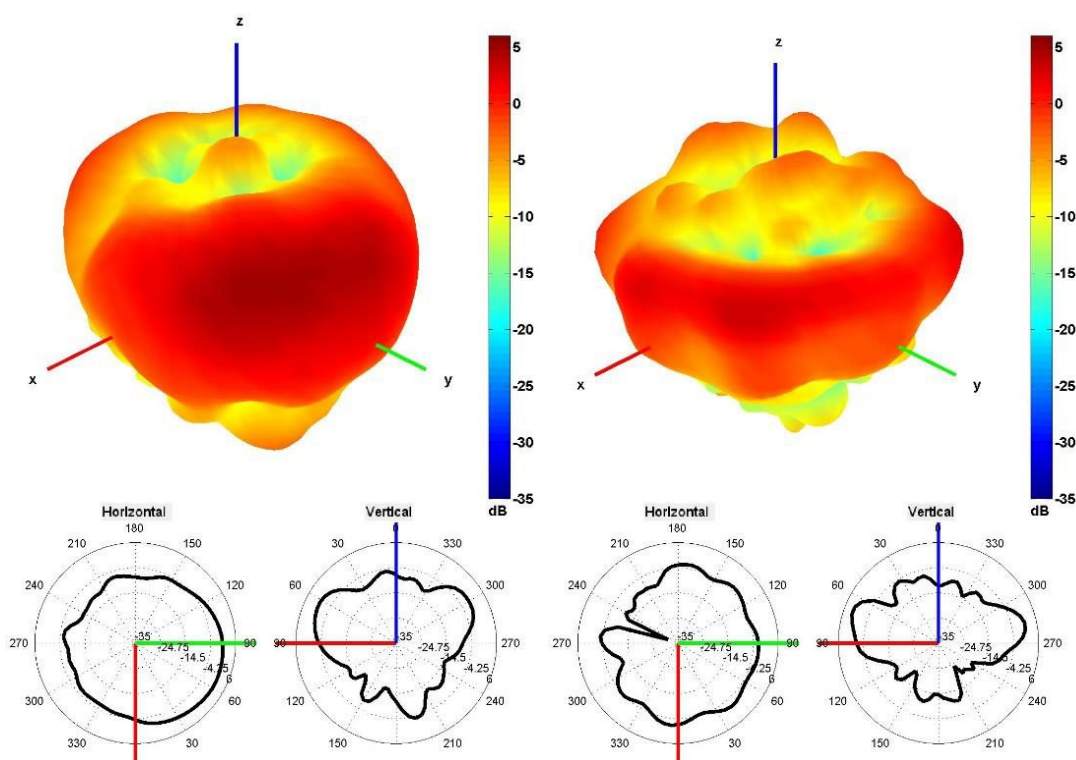


2450 and 5500 MHz Radiation pattern

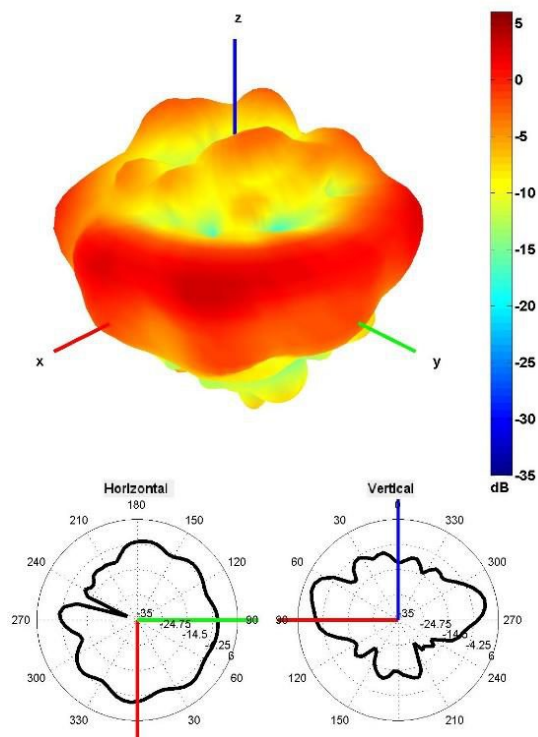


6500 MHz Radiation pattern

Cable 4: 2.4/5.0/6.0 GHz ISM

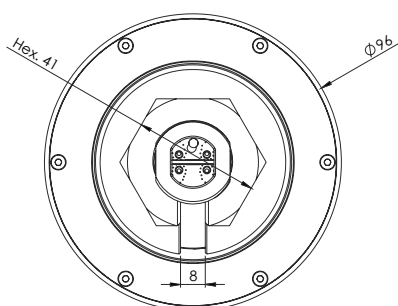
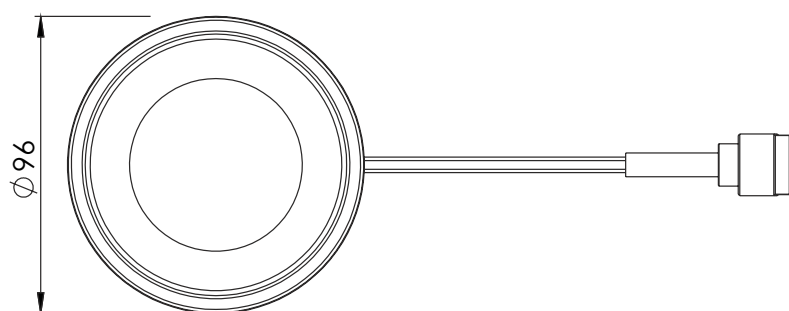
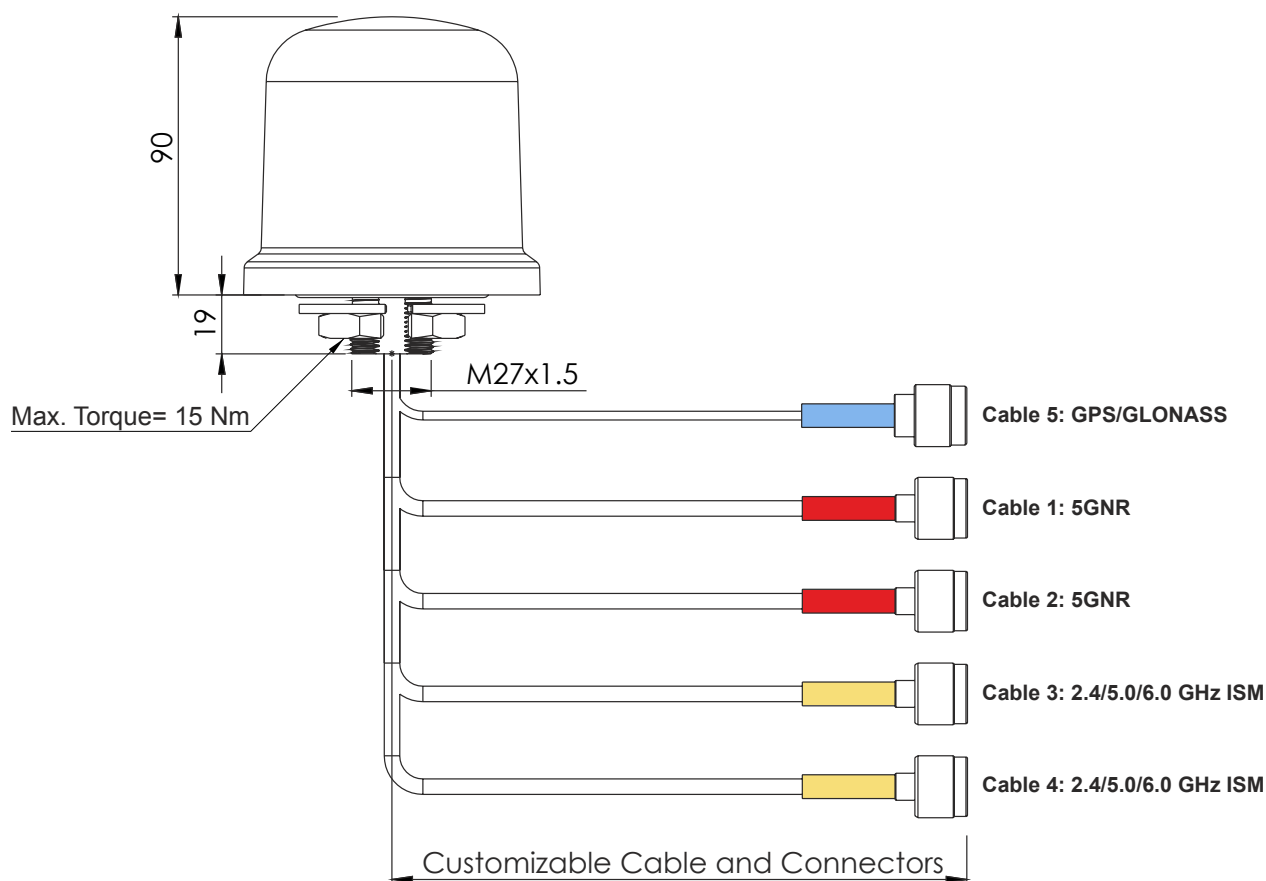


2450 and 5500 MHz Radiation pattern

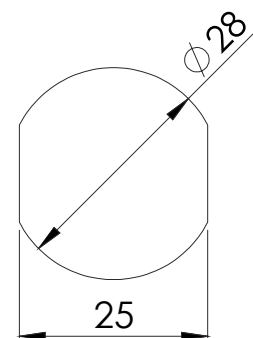


6500 MHz Radiation pattern

4. Antenna drawings



Mounting hole

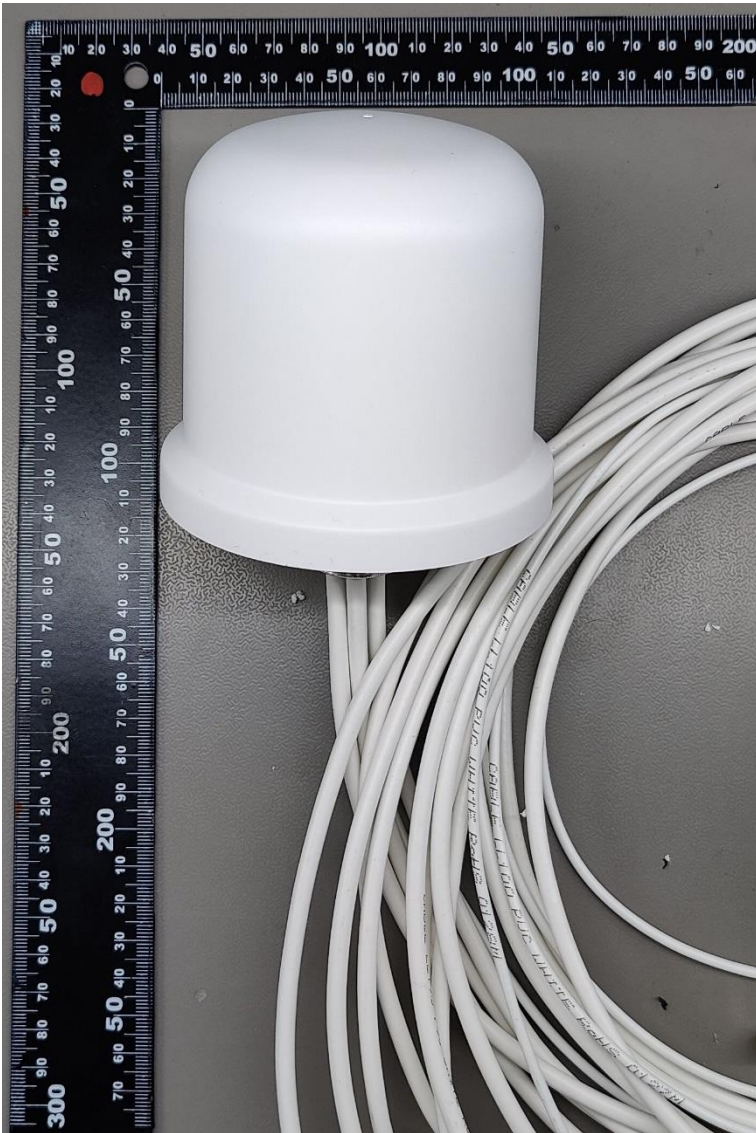


Note: Dimensions are in millimeters
***Dimensions are after mounting**
****Max. Torque= 15 Nm**

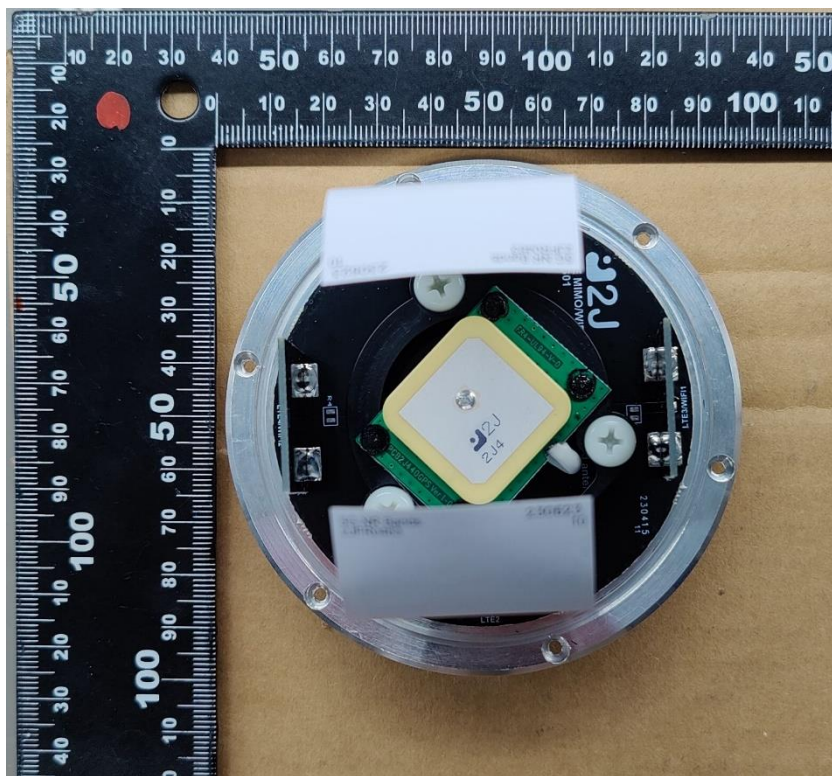
5. Antenna Images



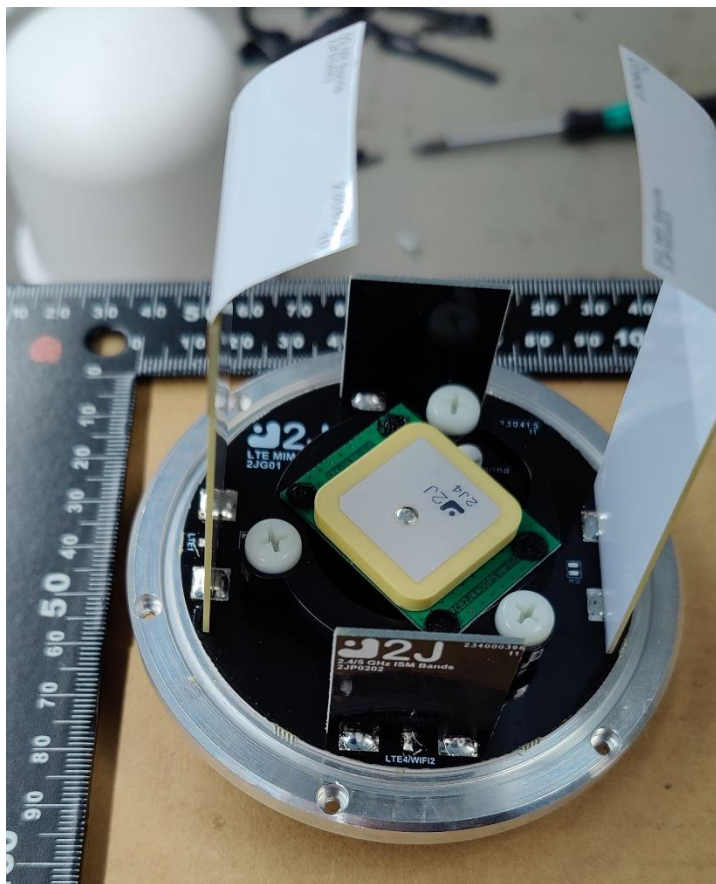
ANTENNA PHOTOGRAPHS



Picture 1 Assembled antenna



Picture 2 Antenna cover removed, top view



Picture 3 Antenna cover removed, side view