



TAOGLAS®



Datasheet

Warrior II LTE/Cellular SMD

Part No:
PA.711.A

Description

Pairs with the PA.710.A Warrior for 4G MIMO applications
698MHz to 960MHz, 1710MHz to 2690MHz, 5000 to 5850MHz

Features:

- Supplied as one part of a MIMO pair with PA.710.A on MIMO applications
- High isolation and ECC when used with PA.710.A on specific board layouts
- High Efficiency Antenna
- Patent Pending
- Surface Mount Technology
- Dimensions: 40x6x5mm
- RoHS and REACH Compliant

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1. Introduction



The Taoglas PA.711.A is the culmination of a multi-year research effort into LTE MIMO SMD antennas. It has been designed specifically to be used as the second antenna in a 2*2 or higher MIMO setup in conjunction with our standard PA.710.A LTE antenna. The PA.711.A has all the same attributes of the PA.710.A, a high efficiency SMD Ceramic antenna, operating at 698MHz to 960MHz and 1710MHz to 2690MHz.

Due to subtle variation of radiation pattern it delivers high isolation and ECC <0.3 when used with the PA.710.A in certain layouts. This decreases the footprint required for LTE MIMO applications compared to using other antennas.

The PA.711.A is delivered on tape and reel and mounted securely during the device PCB reflow process. For further information, or assistance with integration, contact your regional Taoglas customer support team.

Note for single LTE antenna applications please use the PA.710.A.

2. Specification

LTE Electrical								
Band	Frequency (MHz)	Efficiency (%)	Average Gain (dB)	Peak Gain (dBi)	Impedance	Polarization	Radiation Pattern	Max. input power
4G/3G Band 5,8,12,13,14,17,18,19,20,26,27,28,29	698-960	56.0	-2.52	1.69	50 Ω	Linear	Omni	2W
4G/3G Band 1,2,3,4,9,23,25,35,39,66	1710-2170	64.0	-1.94	4.72				
4G/3G Band 40	2300-2400	61.6	-2.10	4.12				
5GNR/4G Band 38,41	2490-2690	63.4	-1.98	4.75				
LTE5200/Wi-Fi5800 Band 46	5000-5850	65.1	-1.86	4.65				

Mechanical	
Dimensions (mm)	40 x 6 x 5 mm
Material	Ceramic
Termination	Ag (environmental-friendly Pb free)
EVB Connector	SMA-Female

Environmental	
Operation Temperature	-40°C to 85°C
Storage Temperature	-40°C to 105°C
Relative Humidity	Non-condensing 65°C 95% RH
Moisture Sensitivity	3
RoHs & REACH Compliant	Yes

5G/4G Bands			
Band Number	5G NR / FR1 / LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA		
	Uplink	Downlink	Covered
B1	1920 to 1980	2110 to 2170	✓
B2	1850 to 1910	1930 to 1990	✓
B3	1710 to 1785	1805 to 1880	✓
B4	1710 to 1755	2110 to 2155	✓
B5	824 to 849	869 to 894	✓
B7	2500 to 2570	2620 to 2690	✓
B8	880 to 915	925 to 960	✓
B9*	1749.9 to 1784.9	1844.9 to 1879.9	✓
B11	1427.9 to 1447.9	1475.9 to 1495.9	✗
B12	699 to 716	729 to 746	✓
B13	777 to 787	746 to 756	✓
B14	788 to 798	758 to 768	✓
B17	704 to 716	734 to 746	✓
B18	815 to 830	860 to 875	✓
B19	830 to 845	875 to 890	✓
B20	832 to 862	791 to 821	✓
B21	1447.9 to 1462.9	1495.9 to 1510.9	✗
B22*	3410 to 3490	3510 to 3590	✗
B23*	2000 to 2020	2180 to 2200	✓
B24	1626.5 to 1660.5	1525 to 1559	✓
B25	1850 to 1915	1930 to 1995	✓
B26	814 to 849	859 to 894	✓
B27*	807 to 824	852 to 869	✓
B28	703 to 748	758 to 803	✓
B29		717 to 728	✓
B30	2305 to 2315	2350 to 2360	✓
B31	452.5 to 457.5	462.5 to 467.5	✗
B32		1452 to 1496	✗
B34		2010 to 2025	✓
B35		1850 to 1910	✓
B36		1930 to 1990	✓
B37		1910 to 1930	✓
B38		2570 to 2620	✓
B39		1880 to 1920	✓
B40		2300 to 2400	✓
B41		2496 to 2690	✓
B42		3400 to 3600	✓
B43		3600 to 3800	✓
B45		1447 to 1467	✗
B46		5150 to 5925	✓
B47		5855 to 5925	✓
B48		3550 to 3700	✗
B49		3550 to 3700	✗
B50		1432 to 1517	✗
B51		1427 to 1432	✗
B52		3300 to 3400	✗
B53		2483.5 to 2495	✓
B65	1920 to 2010	2110 to 2200	✓
B66	1710 to 1780	2110 to 2200	✓
B68	698 to 728	753 to 783	✓
B69		2570 to 2620	✓
B70	1695 to 1710	1995 to 2020	✓
B71	663 to 698	617 to 652	✗
B72	451 to 456	461 to 466	✗
B73	450 to 455	460 to 465	✗
B74	1427 to 1470	1475 to 1518	✗
B75		1432 to 1517	✗
B76		1427 to 1432	✗
B77		3300 to 4200	✓
B78		3300 to 3800	✓
B79		4400 to 5000	✓
B85	698 to 716	728 to 746	✓
B87	410 to 415	420 to 425	✗
B88	412 to 417	422 to 427	✗

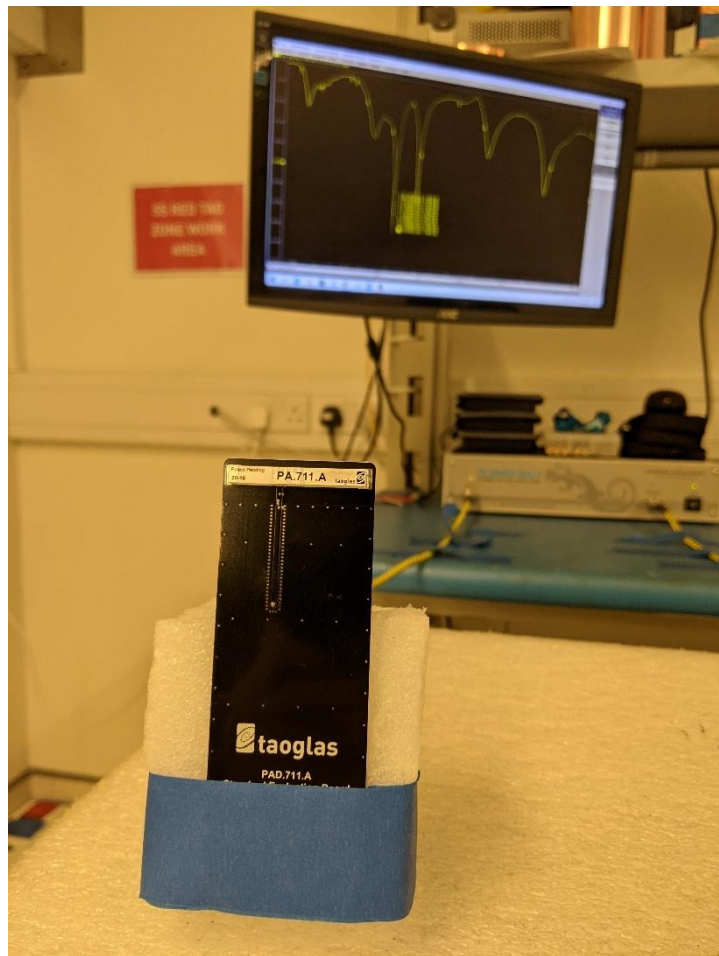
3. Antenna Characteristics

3.1 Test Setup

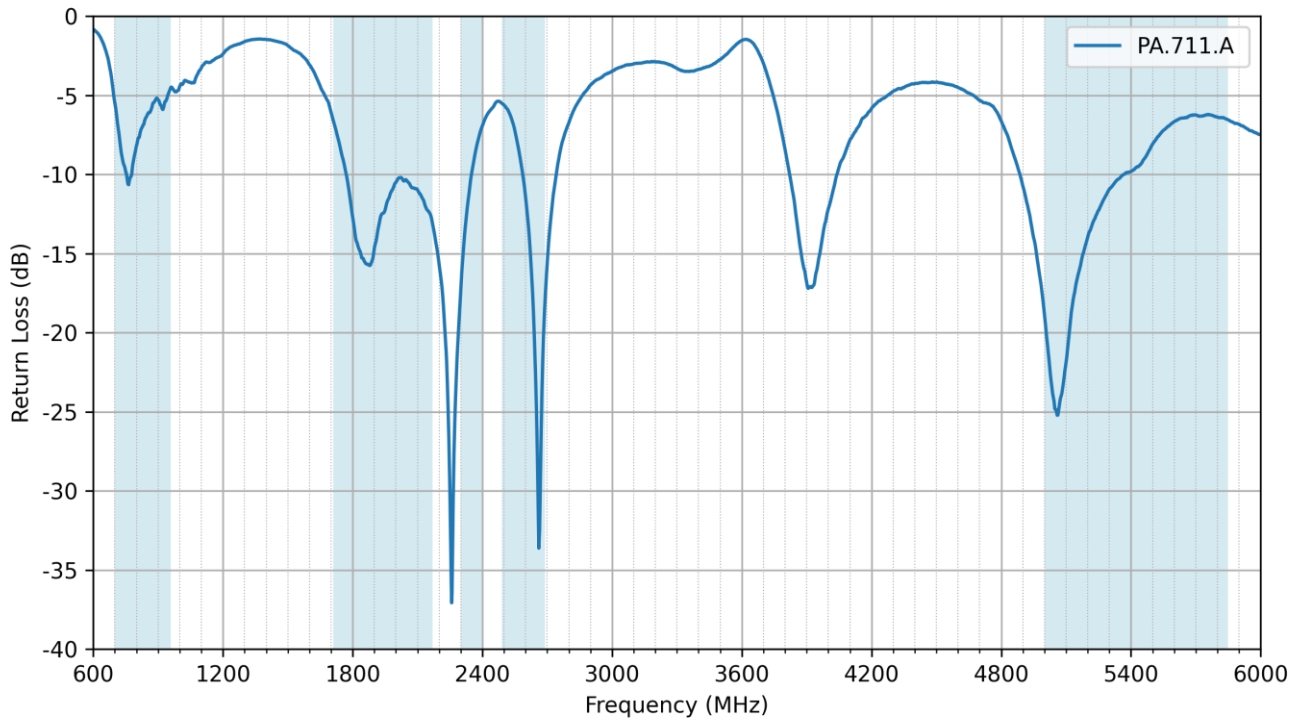
AUT



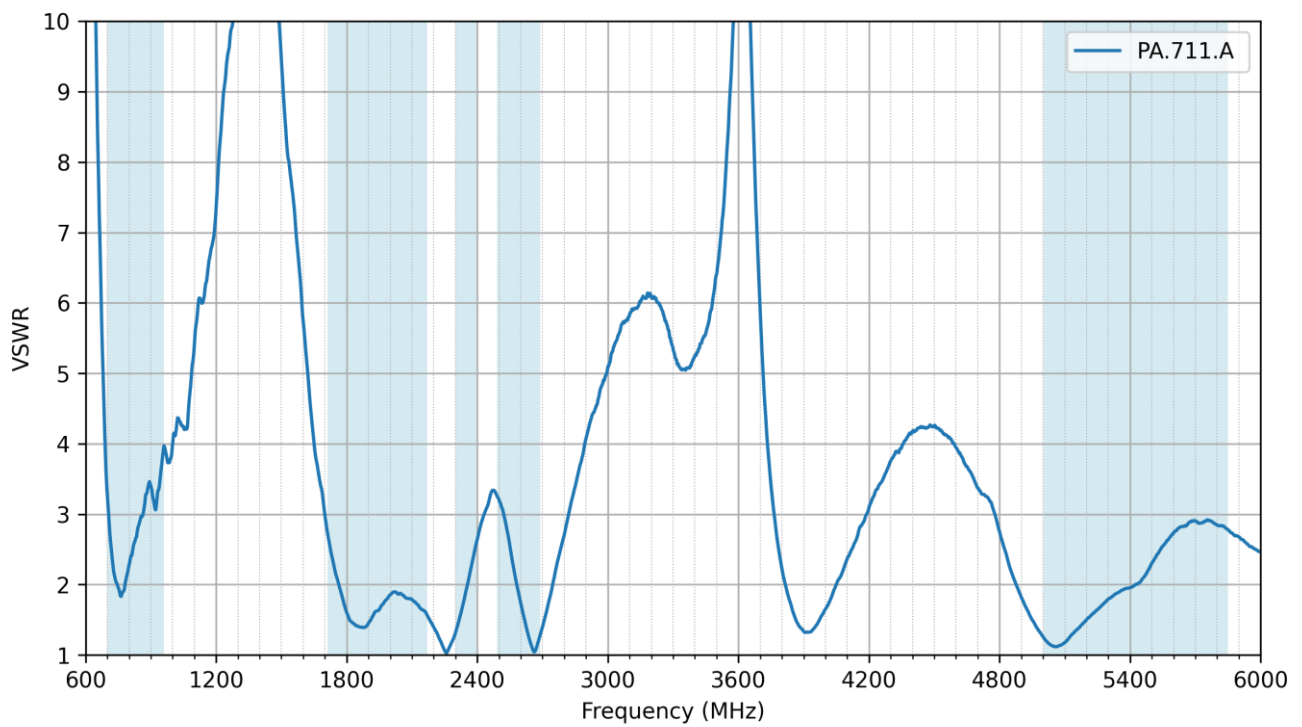
Vector Network Analyzer



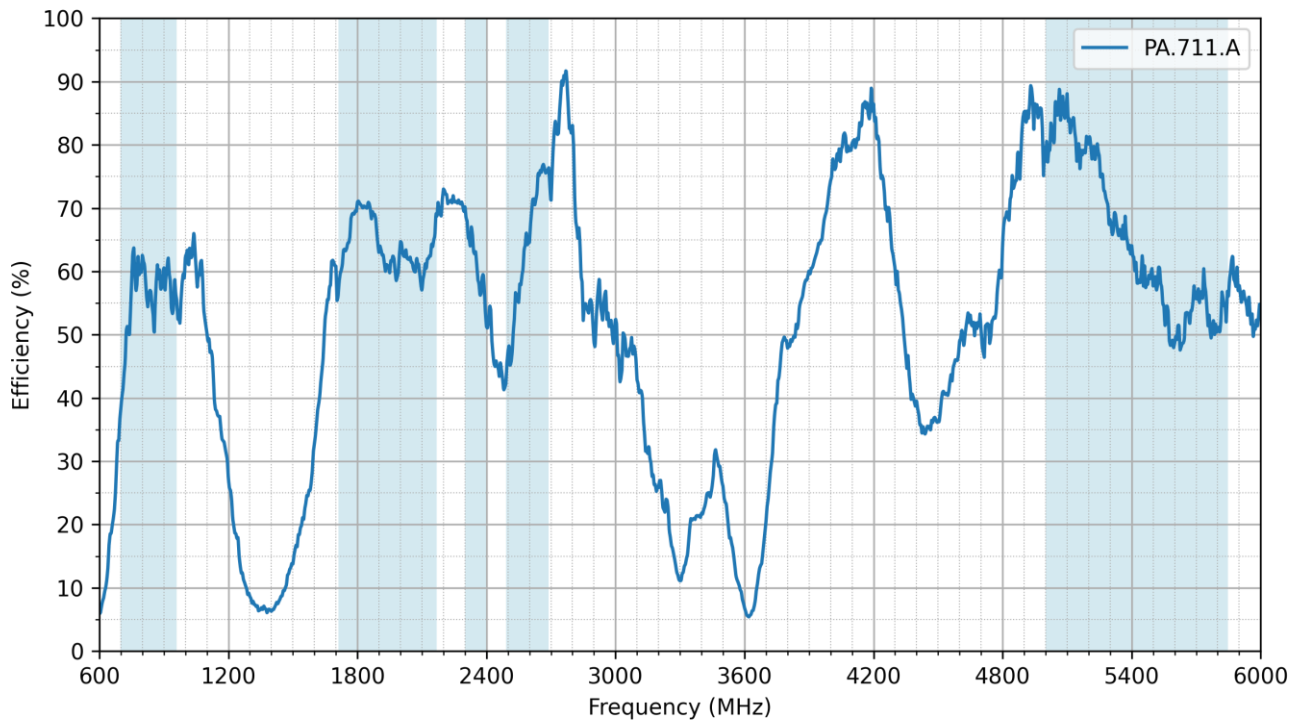
3.2 Return Loss



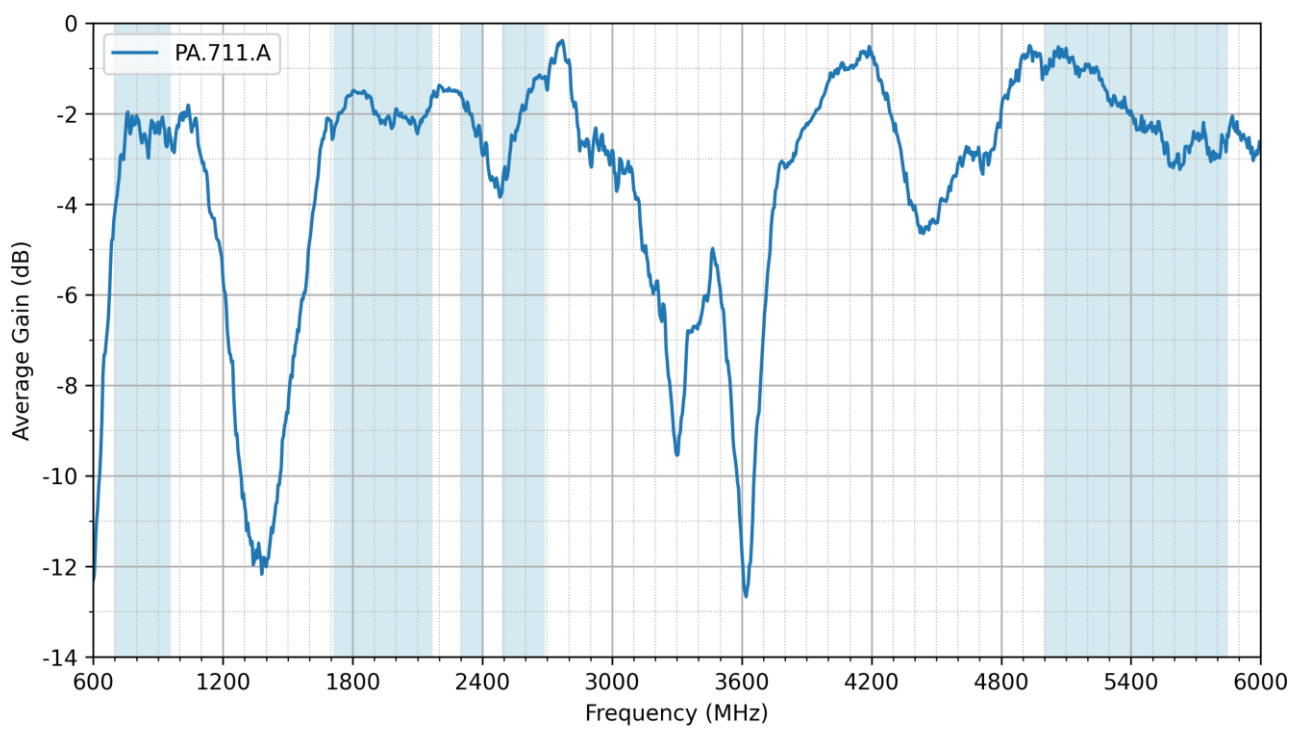
3.3 VSWR



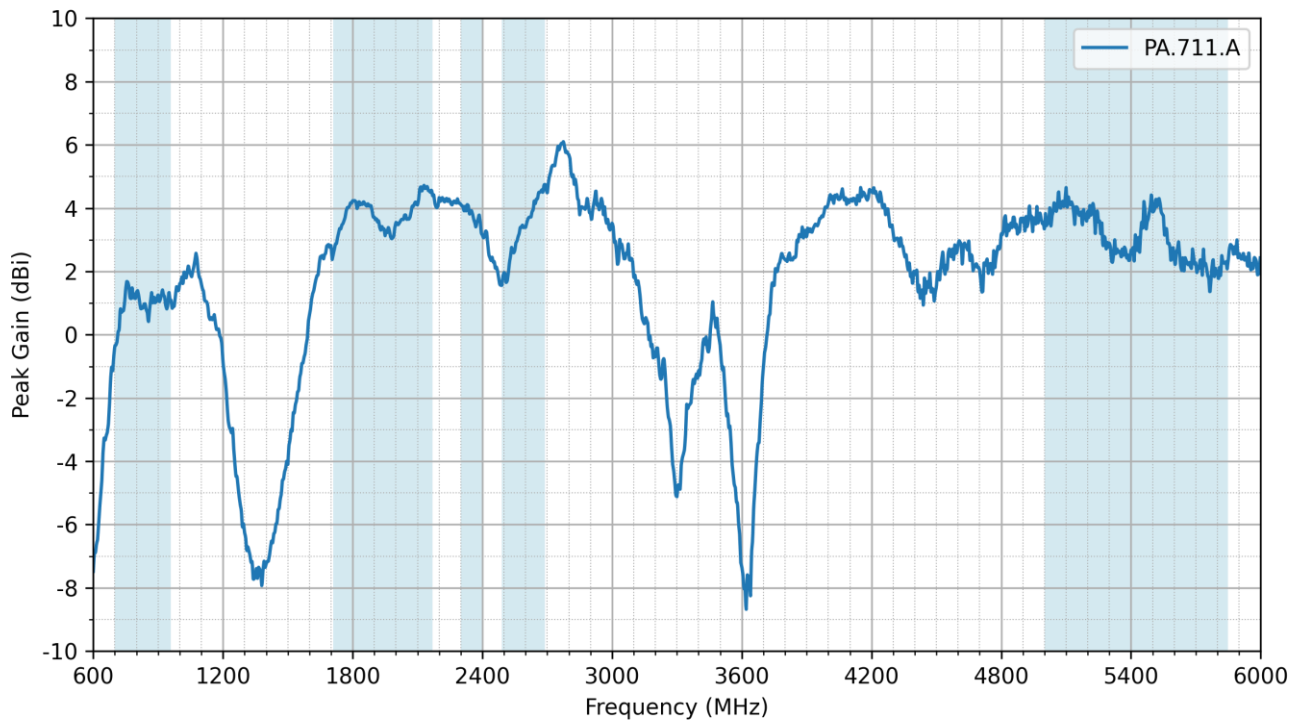
3.4 Efficiency



3.5 Average Gain

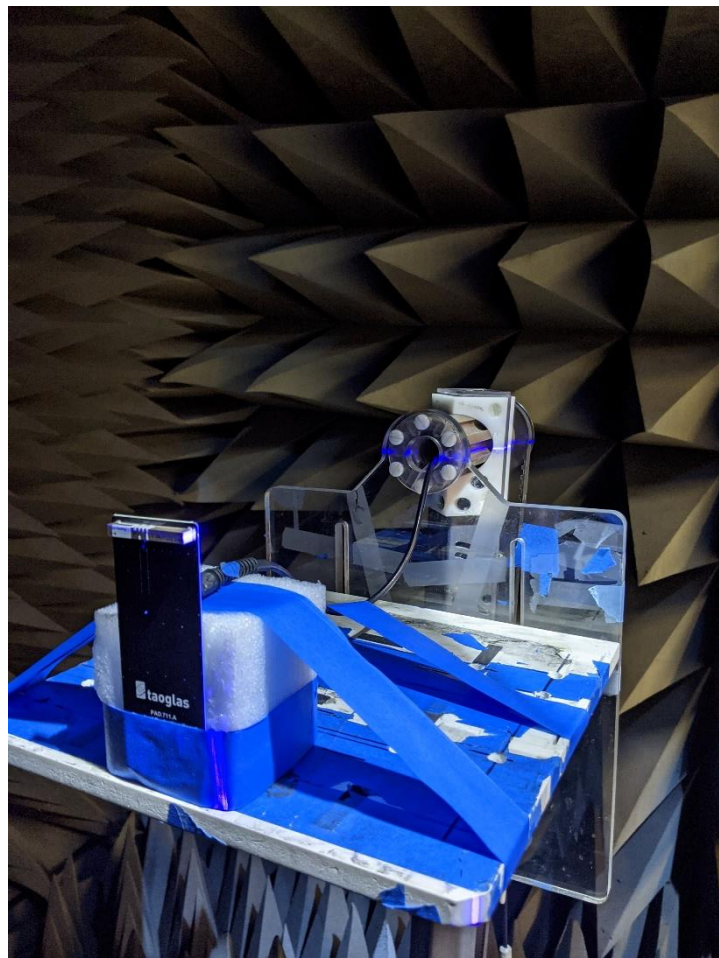
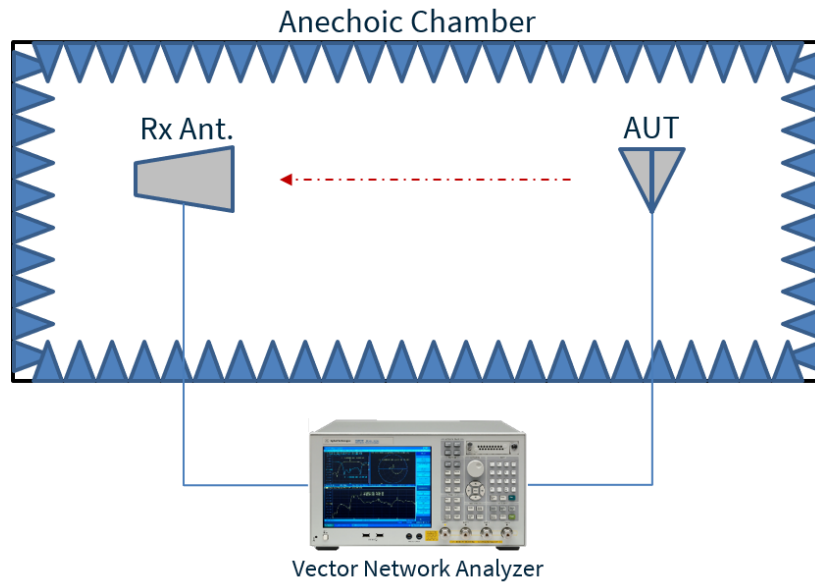


3.6 Peak Gain

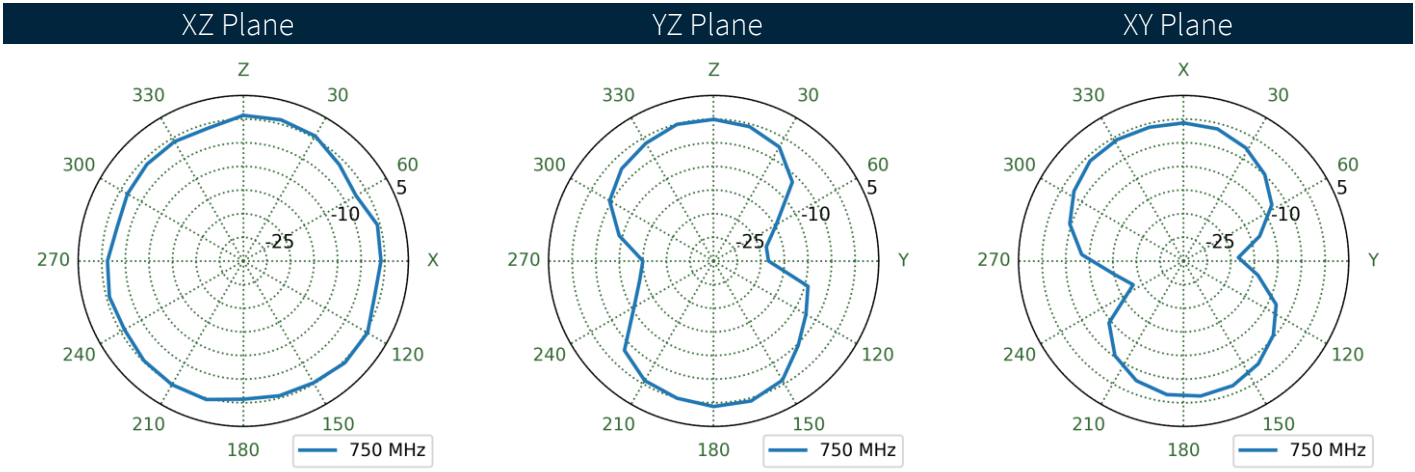
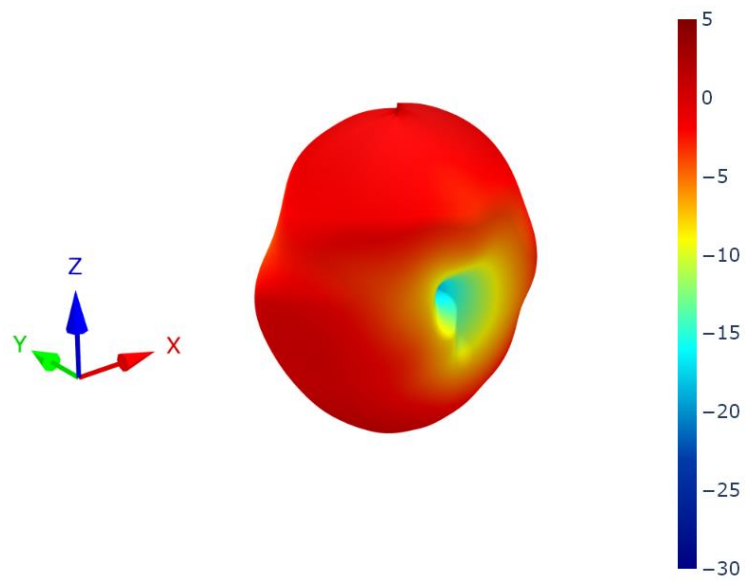


4. Radiation Patterns

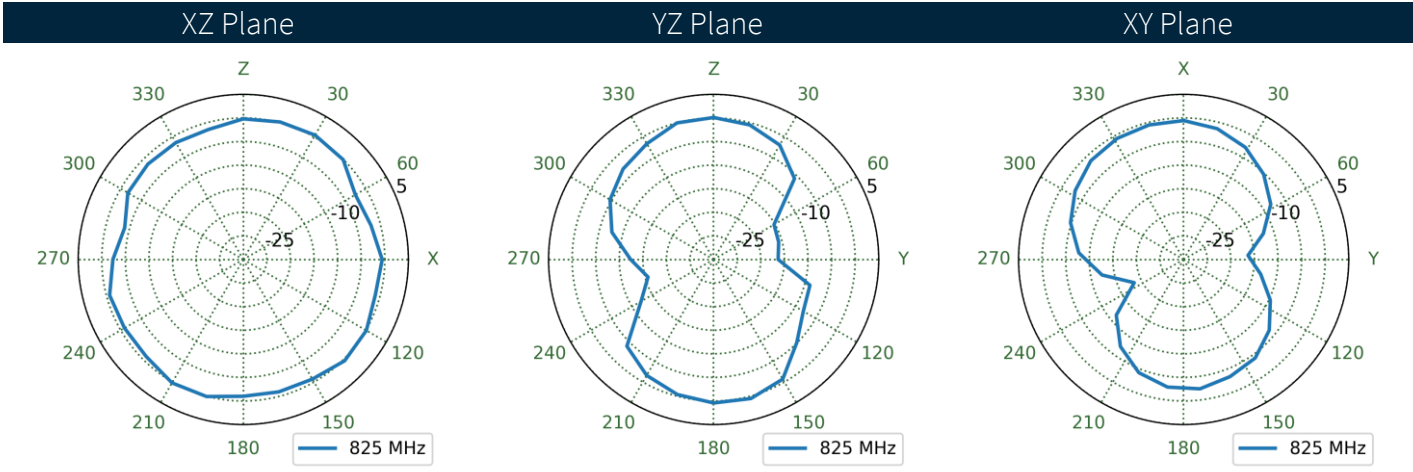
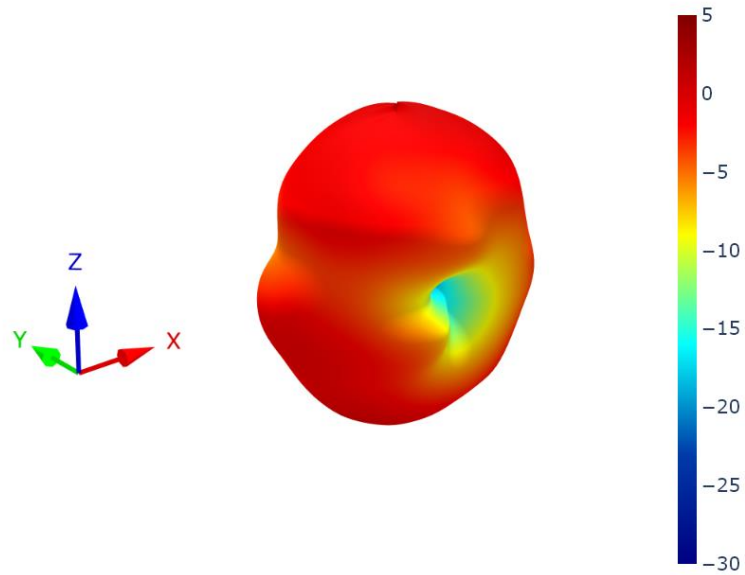
4.1 Test Setup



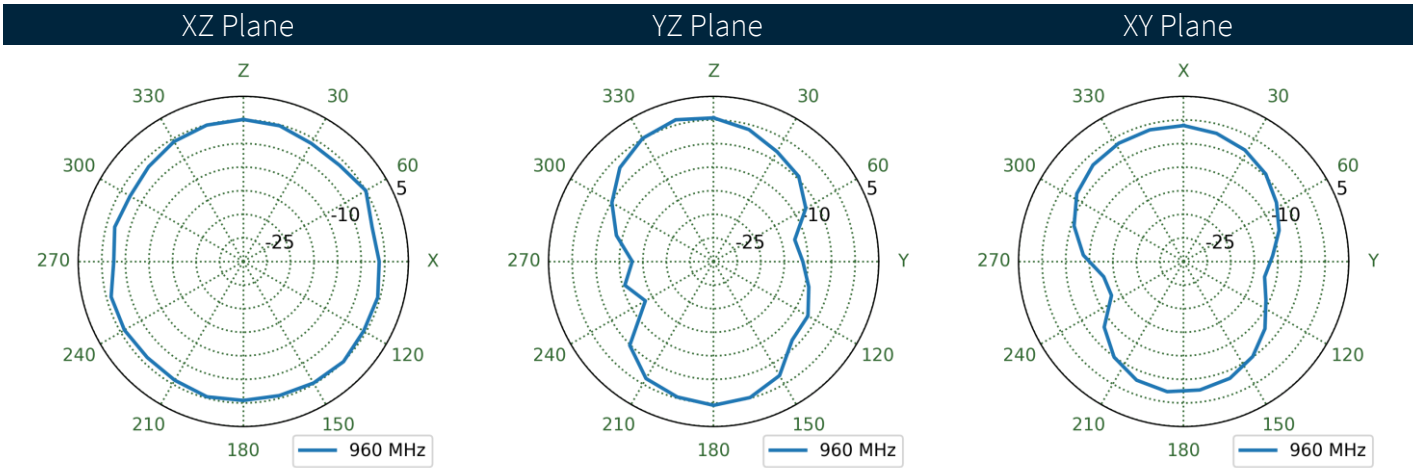
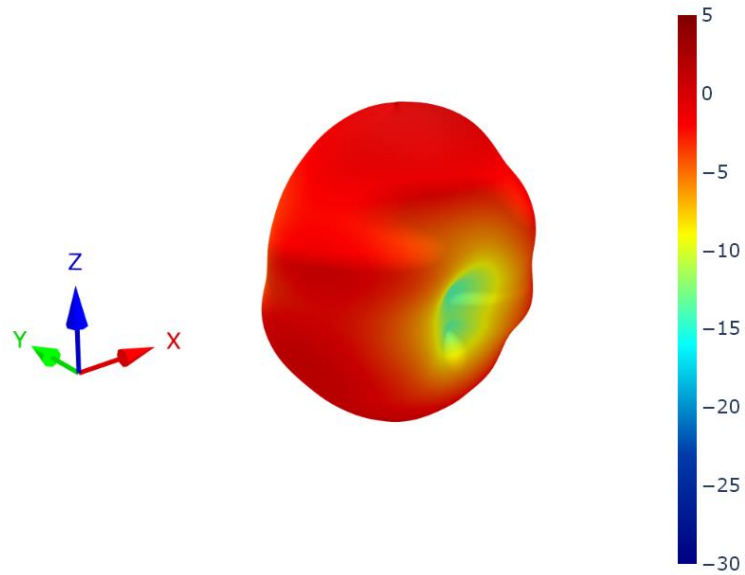
4.2 PA.711.A Patterns at 750 MHz



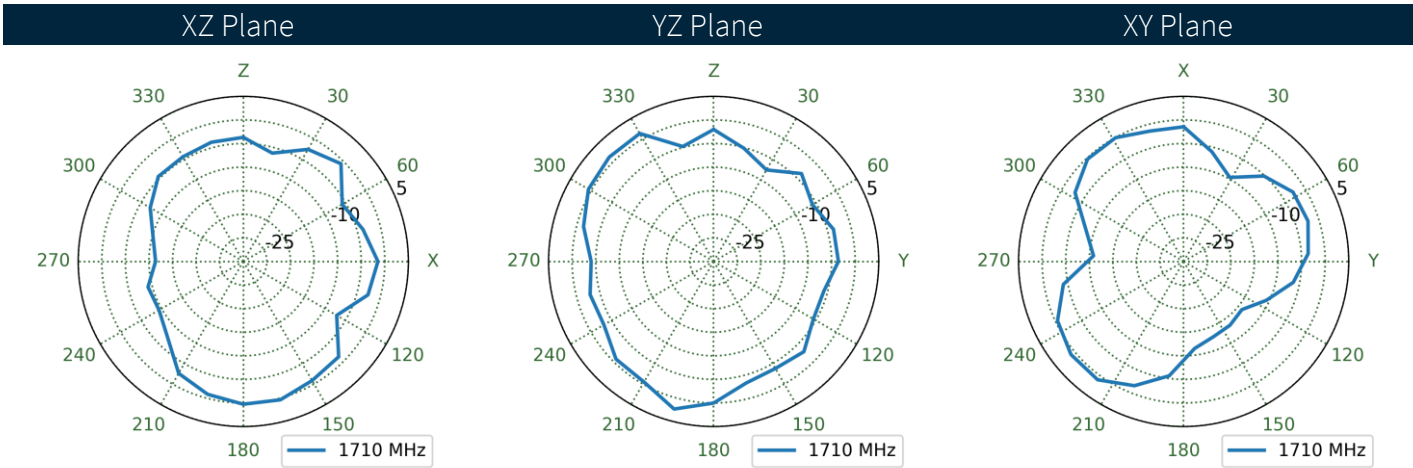
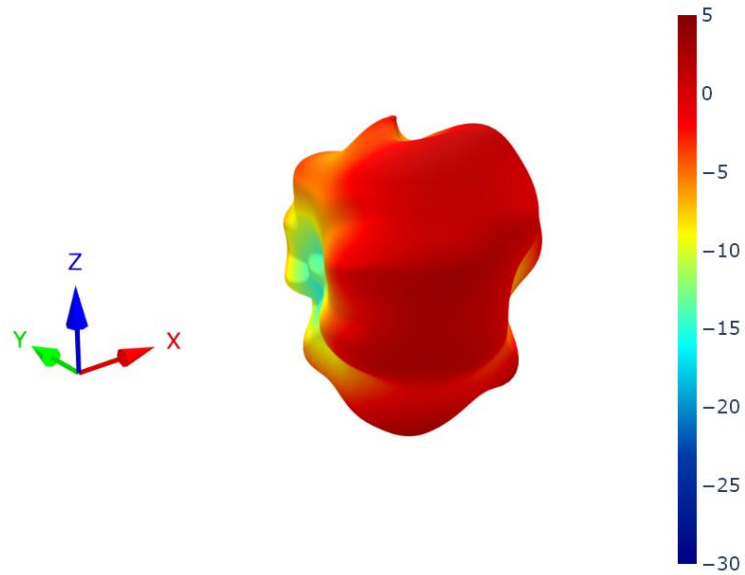
4.3 PA.711.A Patterns at 825 MHz



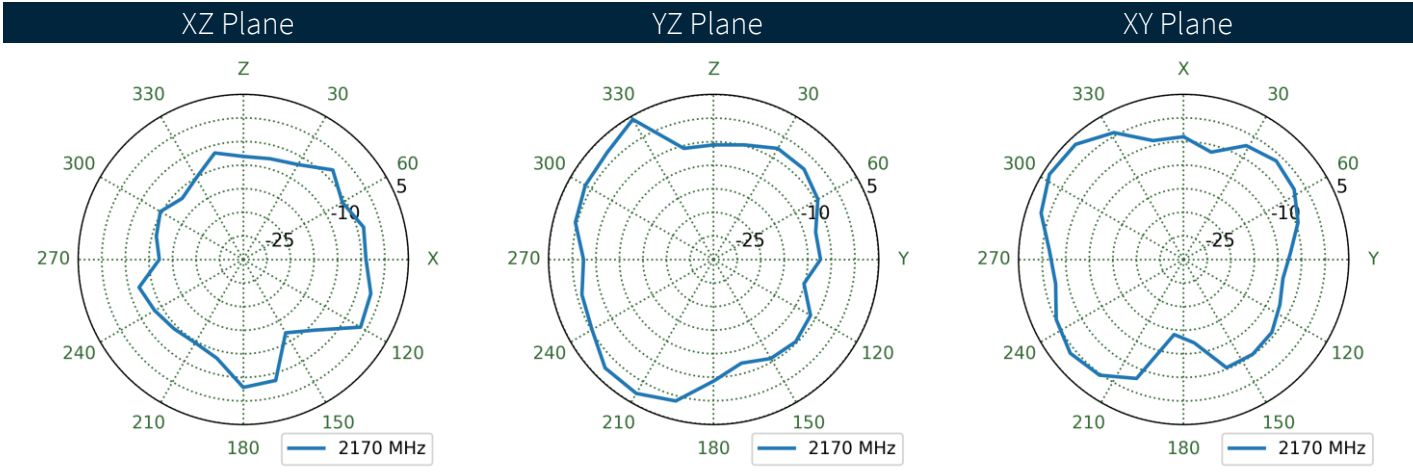
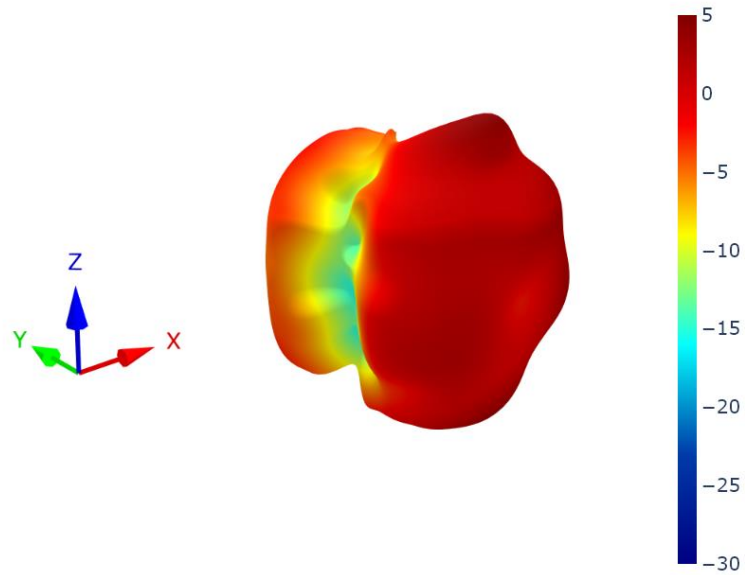
4.4 PA.711.A Patterns at 960 MHz



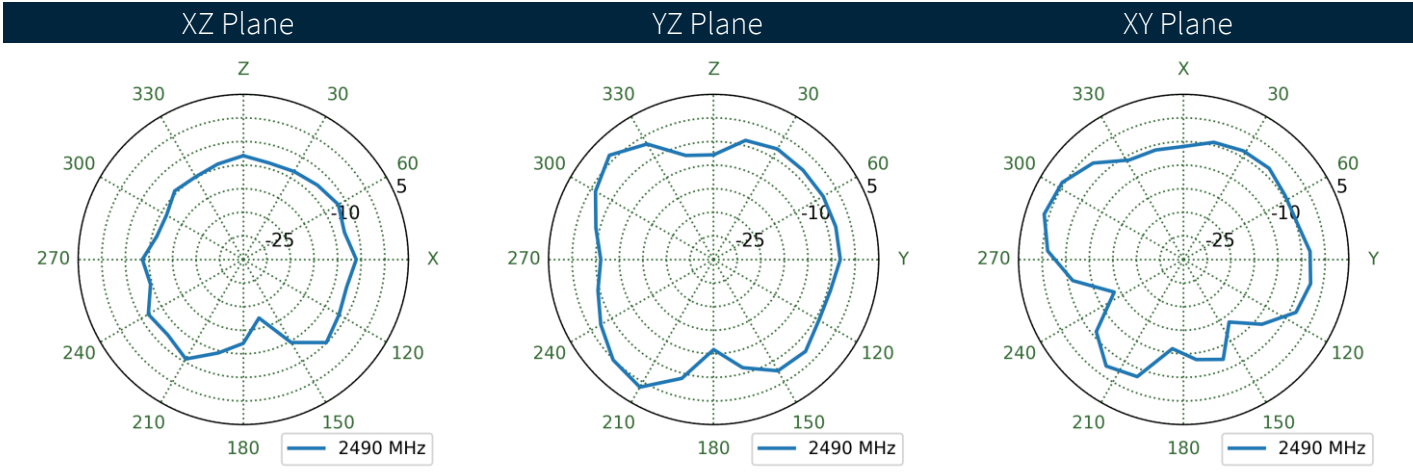
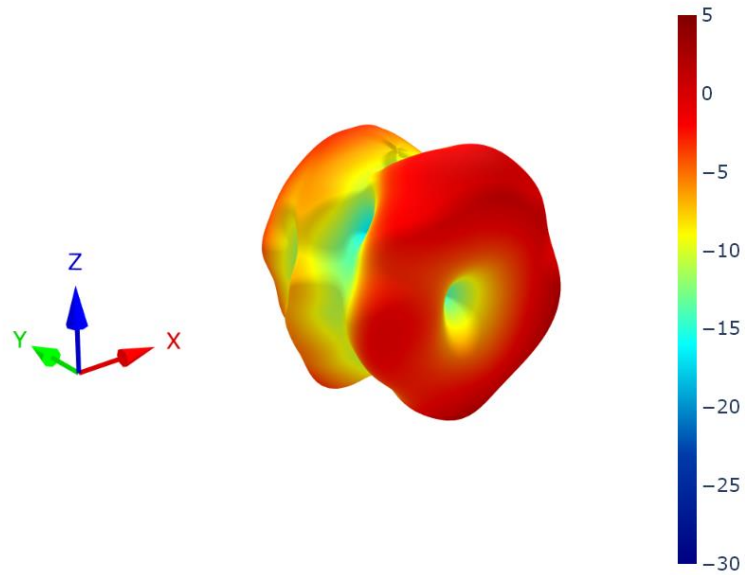
4.5 PA.711.A Patterns at 1710 MHz



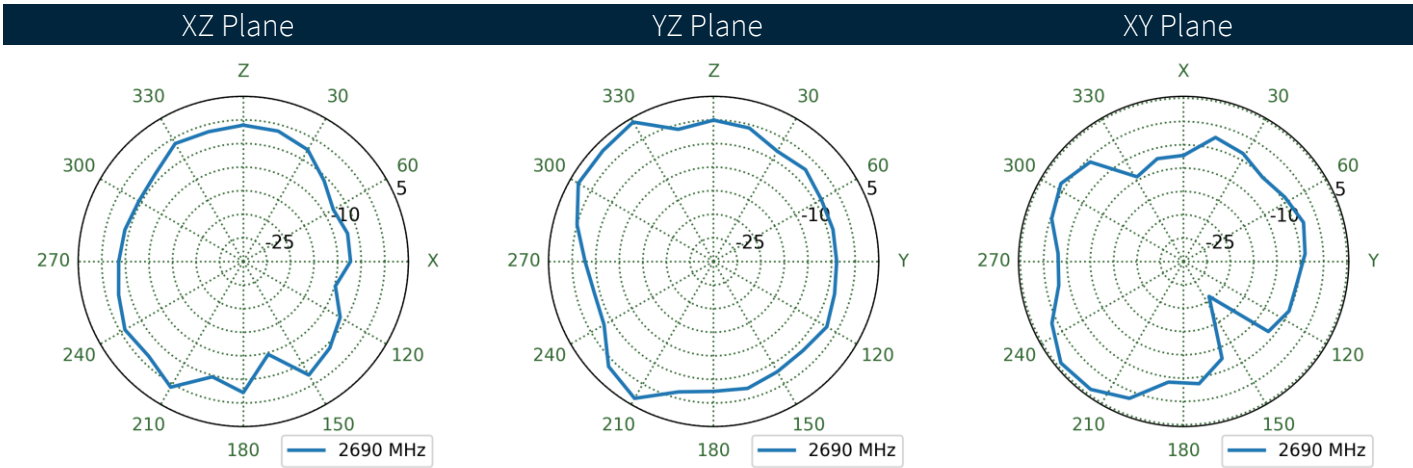
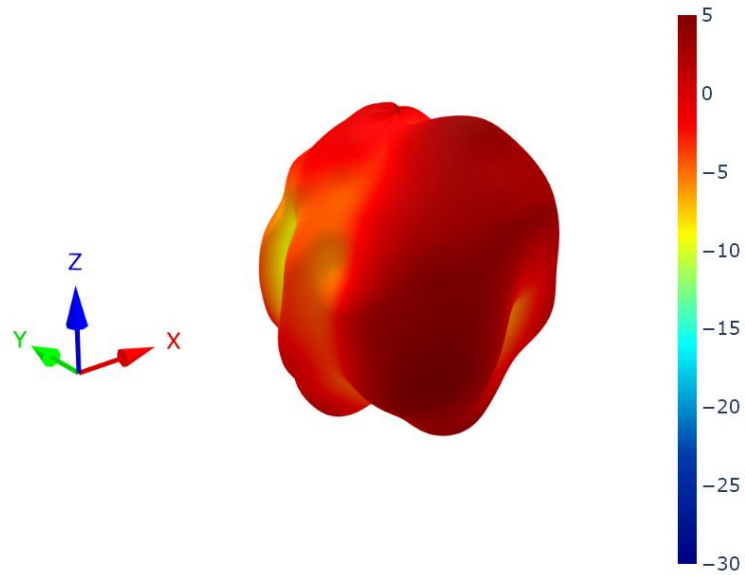
4.6 PA.711.A Patterns at 2170 MHz



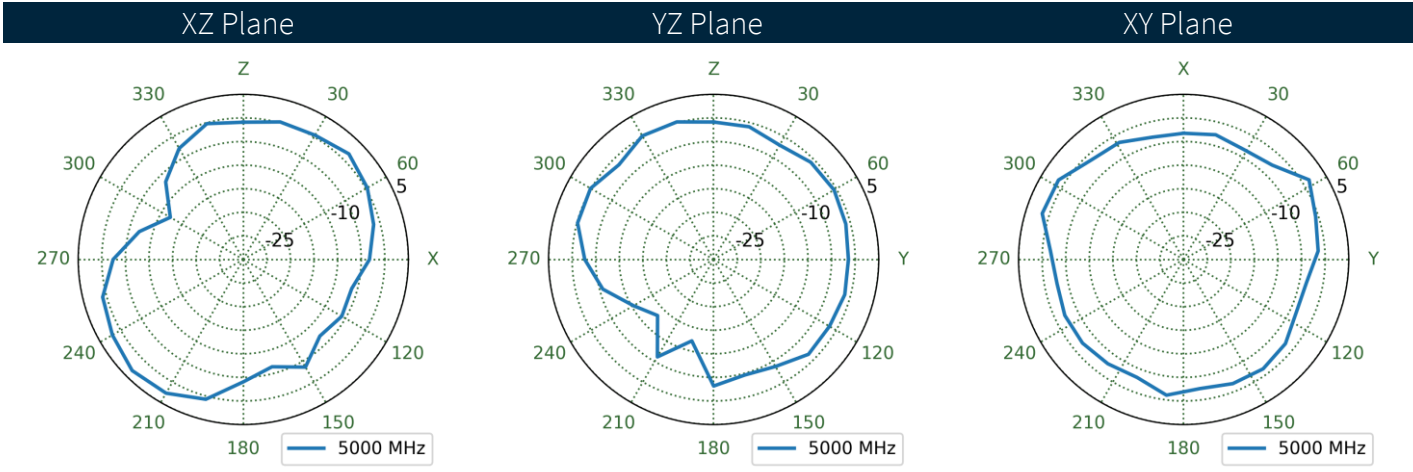
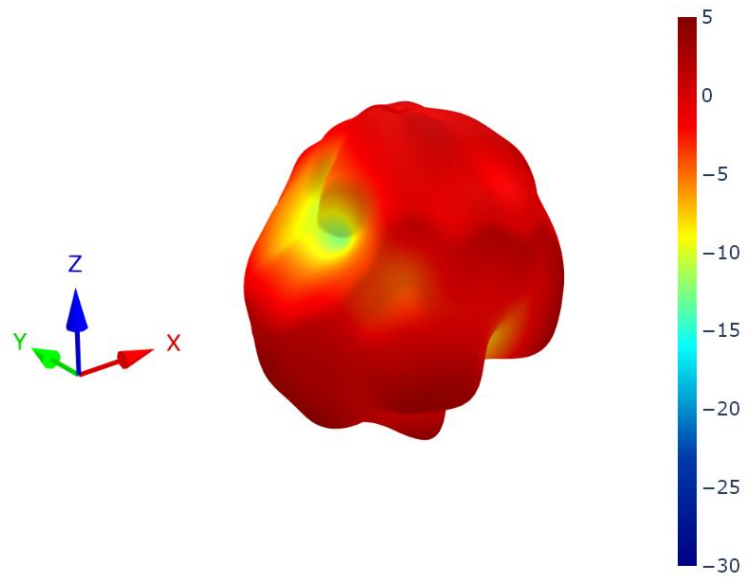
4.7 PA.711.A Patterns at 2490 MHz



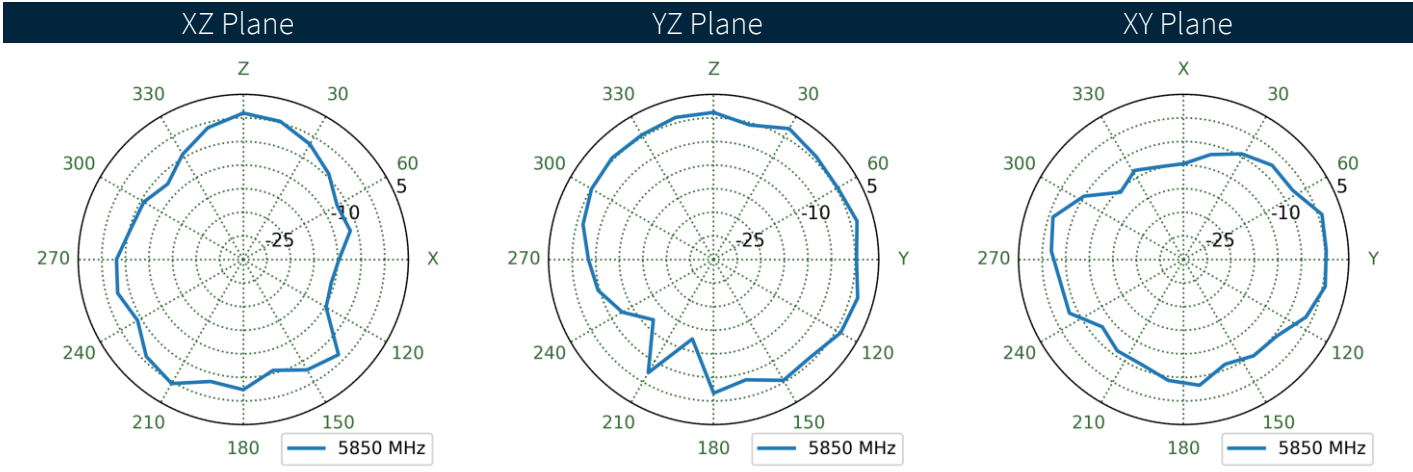
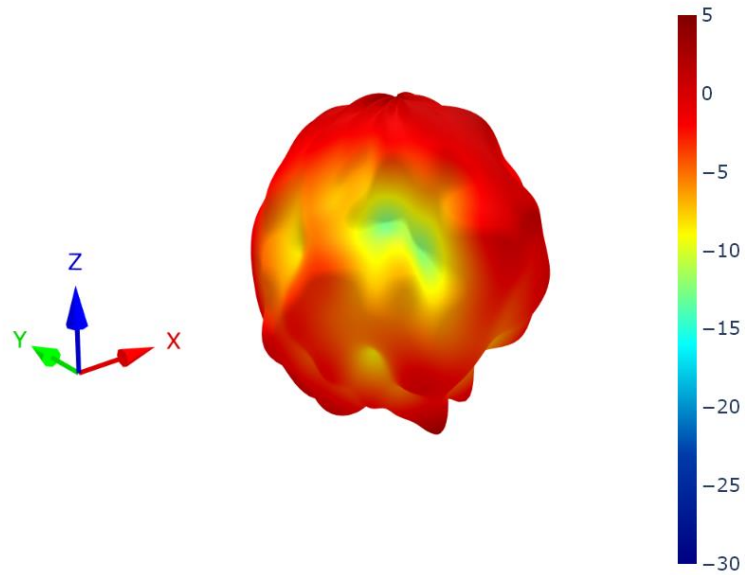
4.8 PA.711.A Patterns at 2690 MHz



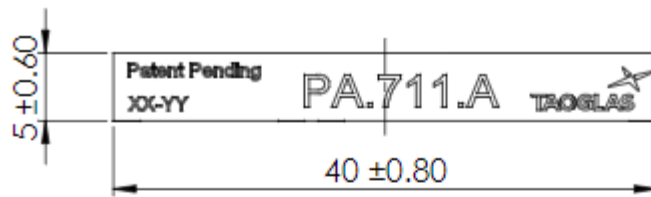
4.9 PA.711.A Patterns at 5000 MHz



4.10 PA.711.A Patterns at 5850 MHz



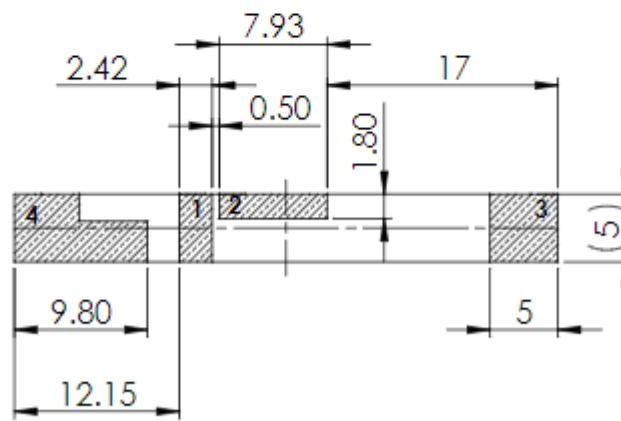
5. Mechanical Drawing



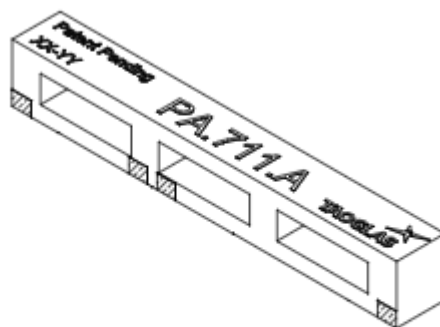
TOP VIEW



FRONT VIEW

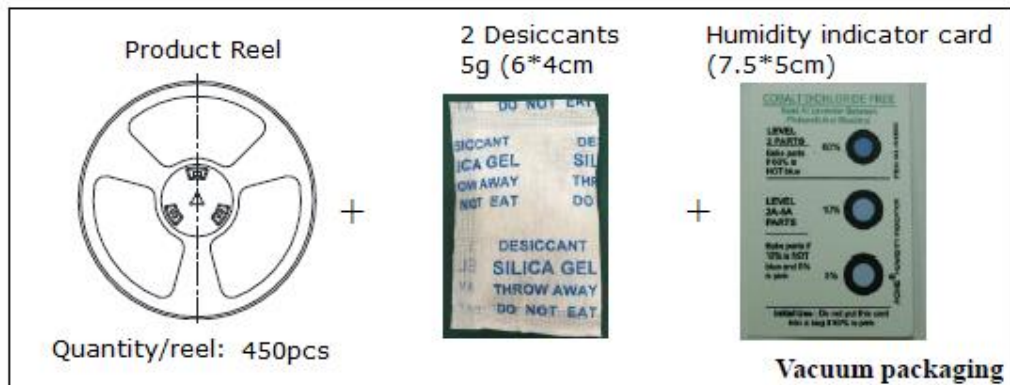


BOTTOM VIEW

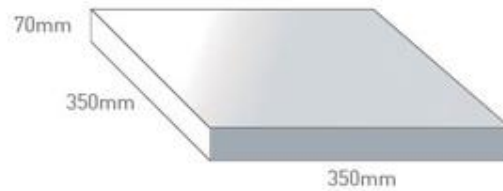


ISOMETRIC VIEW

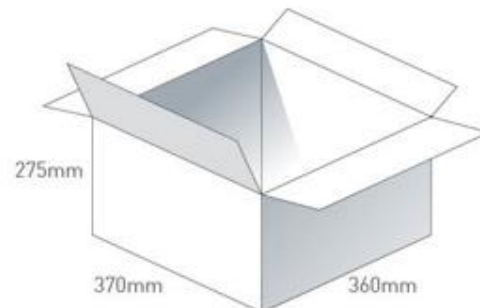
6. Packaging



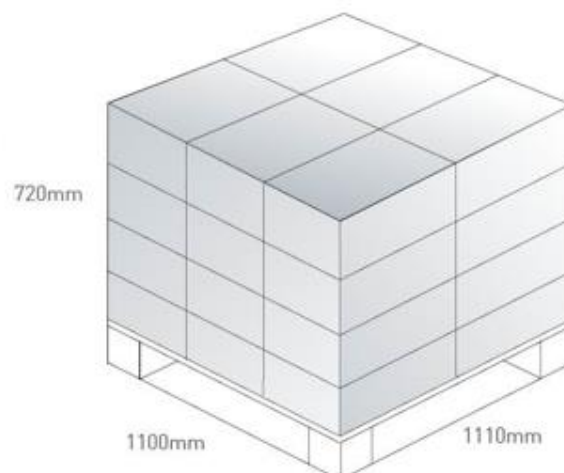
450 pc PA.711.A
1 reel in small inner box
Dimensions - 350*350*70
Weight - 2.4Kg



3 boxes / 1350 pcs in one carton
Carton Dimensions - 370*360*275
Weight - 7.9Kg



Pallet Dimensions 1110mm*720mm*1100mm
24 Cartons per Pallet
6 Cartons per layer
4 Layers



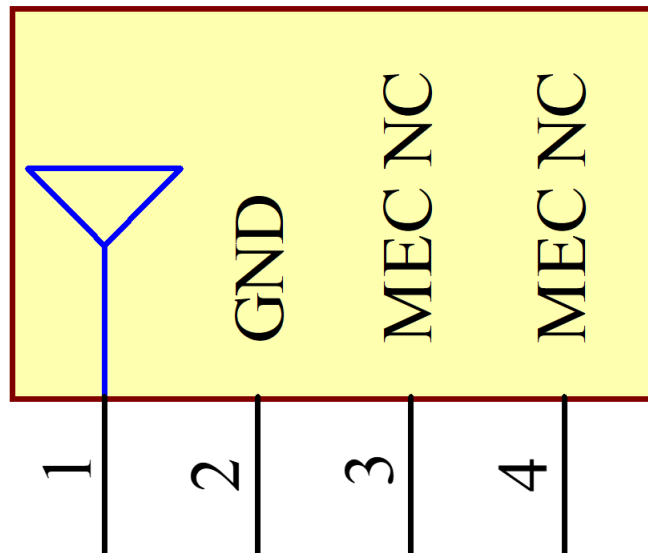
7. Antenna Integration Guide



7.1 Schematic and Symbol Definition

The circuit symbol for the antenna is shown below. The antenna has 4 pins with only two pins (Pin 1 and Pin 2) as functional. Pins 3 and 4 are for mechanical strength.

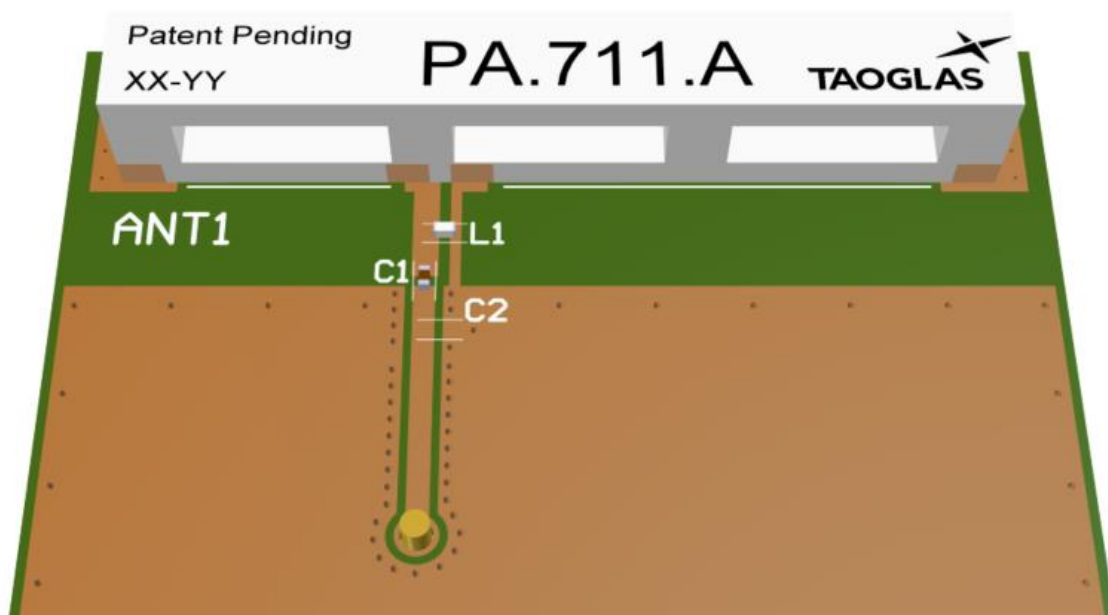
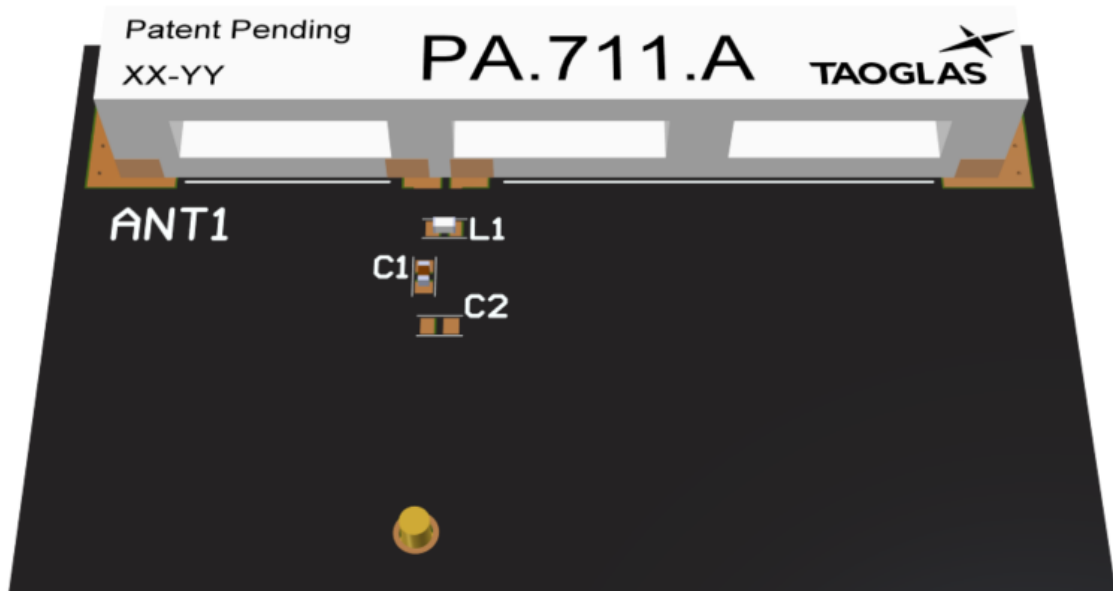
TAOGLAS_PA.711.A ANT1



Pin	Description
1	RF Feed
2	Ground
3,4	Mechanical, Not Connected

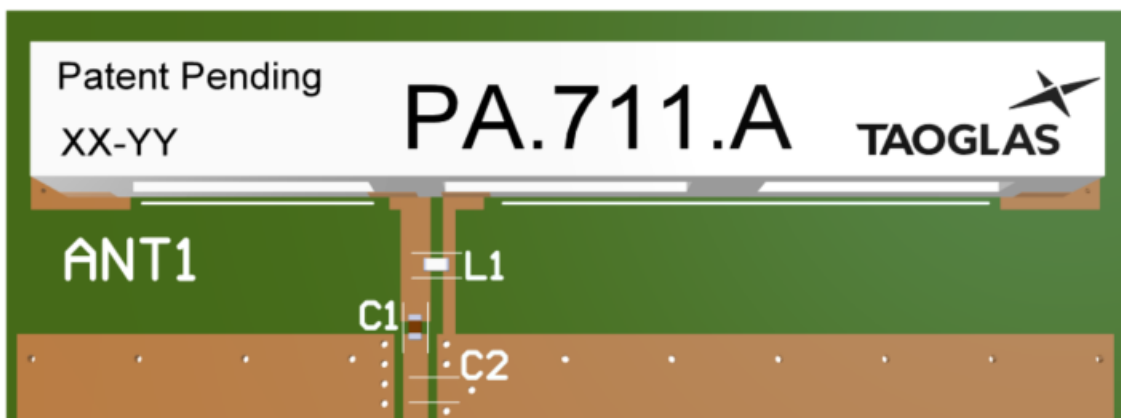
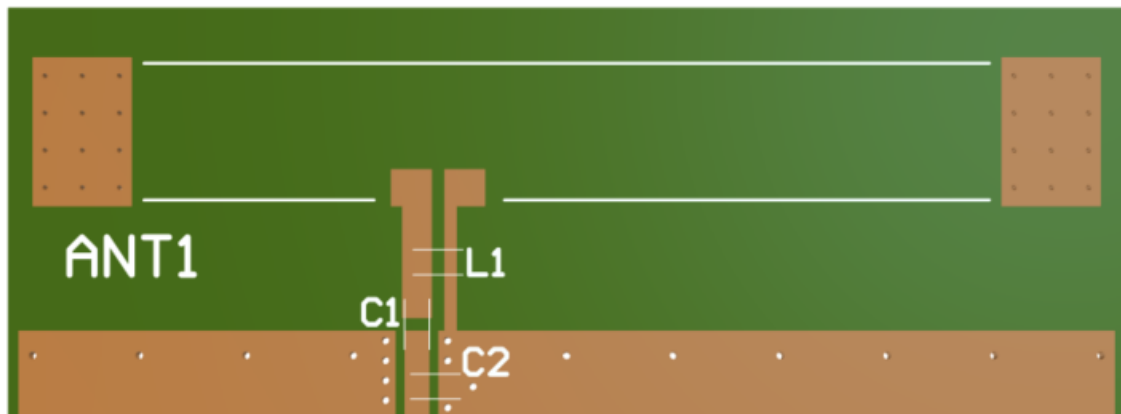
7.2 Antenna Integration

For any given PCB size, the antenna should ideally be placed on the PCB's shortest side, to take advantage of the ground plane. Optimized matching components can be placed as shown.



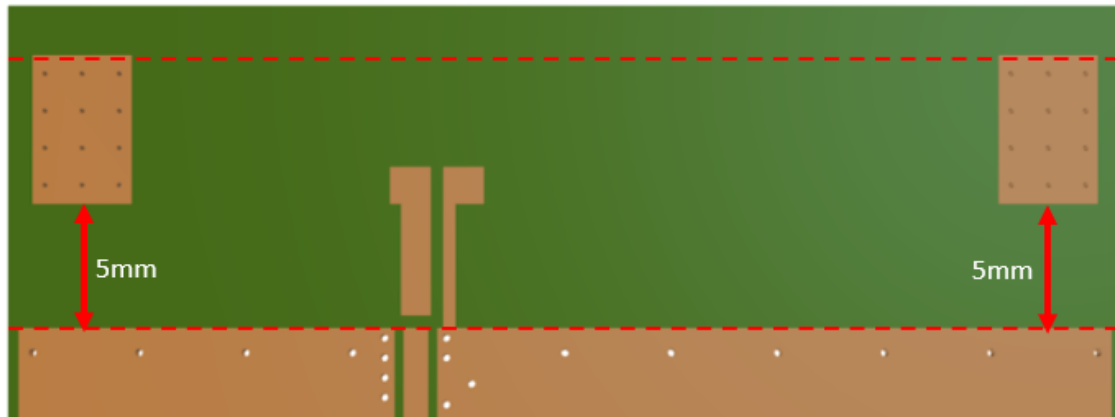
7.3 PCB Layout

The footprint and clearance on the PCB must meet the layout drawing in section (Footprint Drawing). Note the placement of the optimized components. L1 is placed as close as possible to the RF feed (pad 1) within the copper keep out area. C1 is then placed tightly in series after that. C2 is an optional component but the footprint is recommended in case it is needed.



7.4 PCB Keepout

Below shows the antenna footprint and clearance through ALL layers on the PCB. Only the antenna pads and connections to feed and GND are present within this clearance area (marked RED). The clearance area extends to 5mm from the antenna mechanical pads to the ground area. This clearance area includes the bottom side and ALL internal layers on the PCB.



Top Side

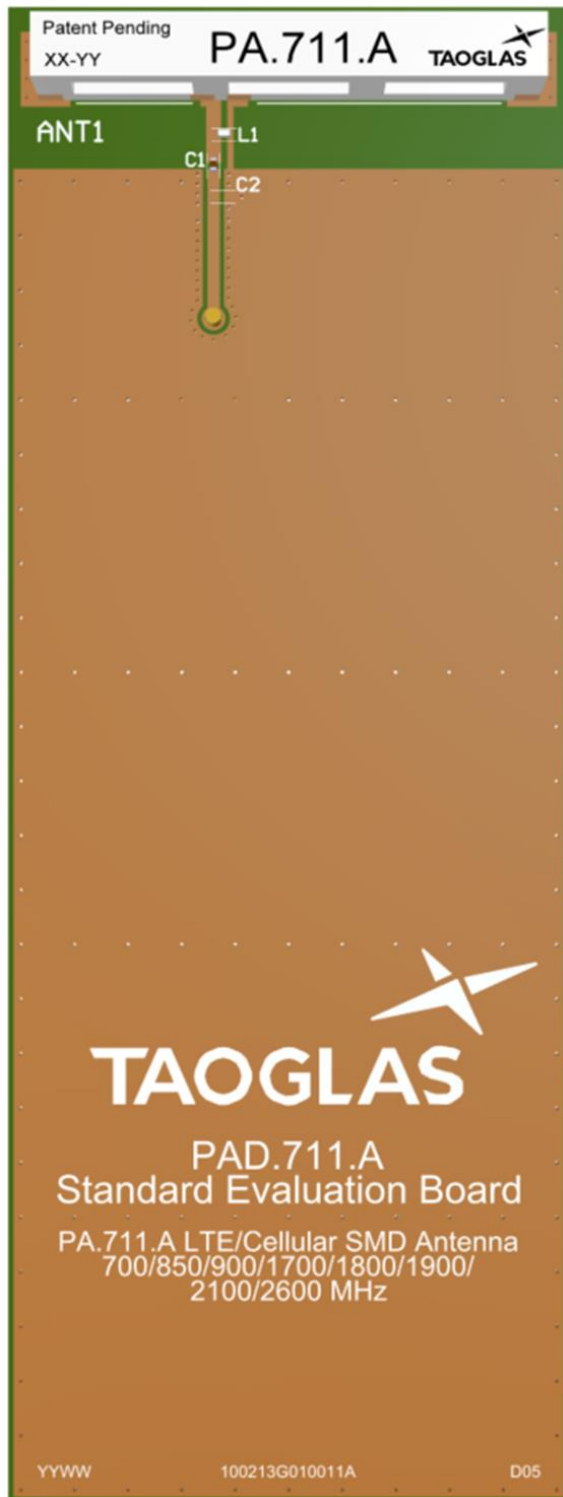


Bottom Side

7.5 Evaluation Board



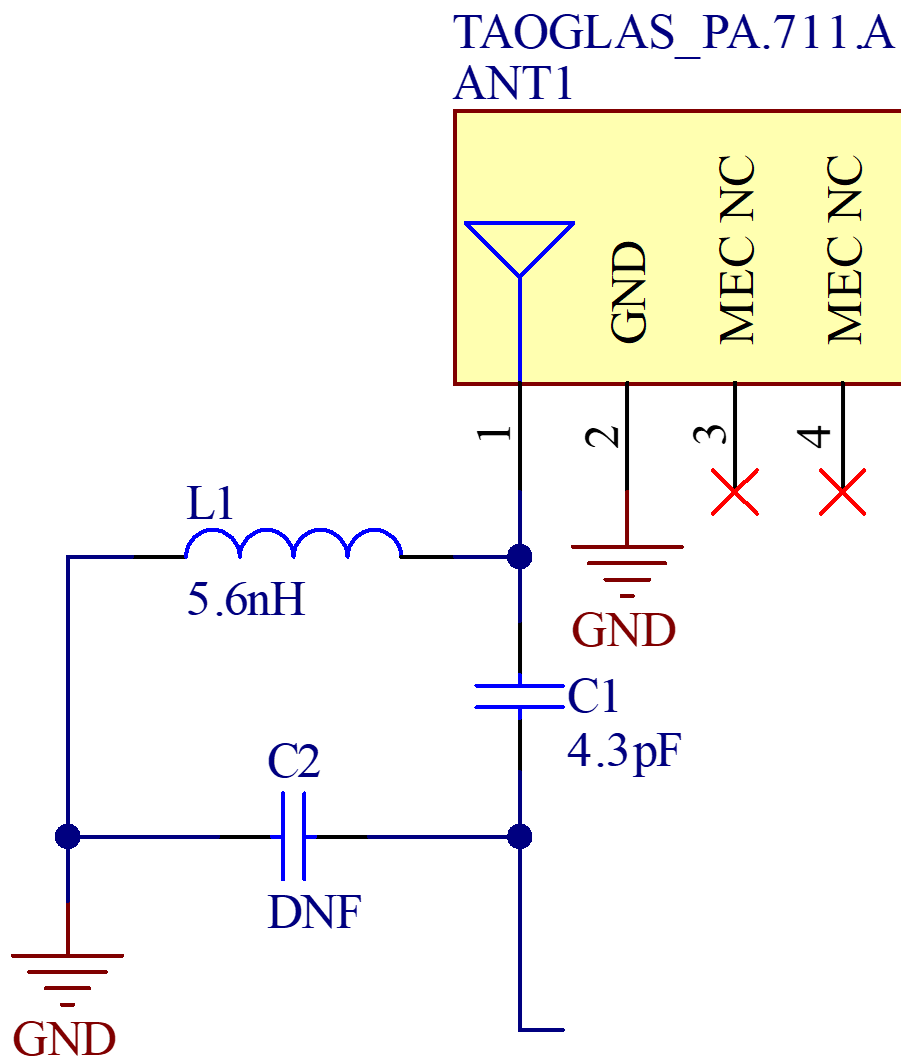
7.6 Evaluation Board Ground Plane Length



Ground Plane Length
106.565mm

7.7 Evaluation Board Matching Circuit

Matching components with the PA.711.A are recommended for the antenna to have optimal performance on the evaluation board, located outside of the ground plane in the space specified in the above images. Additional matching components may be necessary for your device, so we recommend incorporating extra component footprints, forming a “pi” network, between the cellular module and the edge of the ground plane.



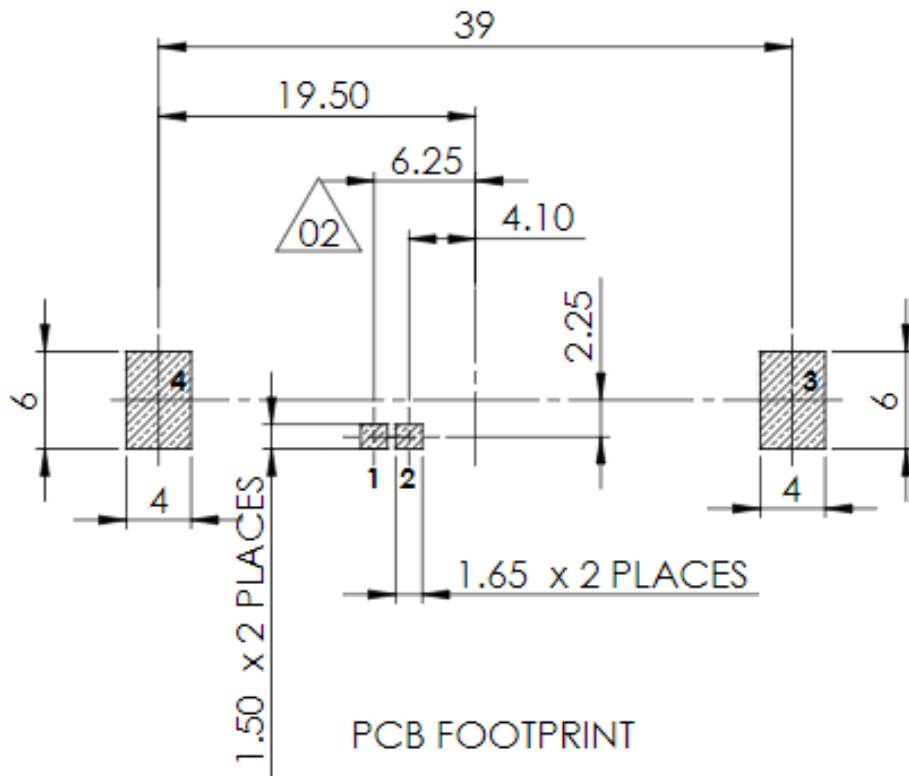
Designator	Type	Value	Manufacturer	Manufacturer Part Number
L1	Inductor	5.6nH	TDK Corporation	MLK1005S5N6ST000
C1	Capacitor	4.3pF	Murata Electronics	GJM1555C1H4R3BB01D
C2	Capacitor	Not Fitted	-	-

7.8 Vias in Mechanical Pads

Vias are placed in the “no-connect” pads to provide mechanical strength for the pad. These vias are 0.2mm and plated. These vias should be filled with a non-conductive material. Please ensure that the topside surface finish is flat on these pads and the RF Feed and Ground Pad. Vias are covered with solder mask (tenting) on the bottom side.



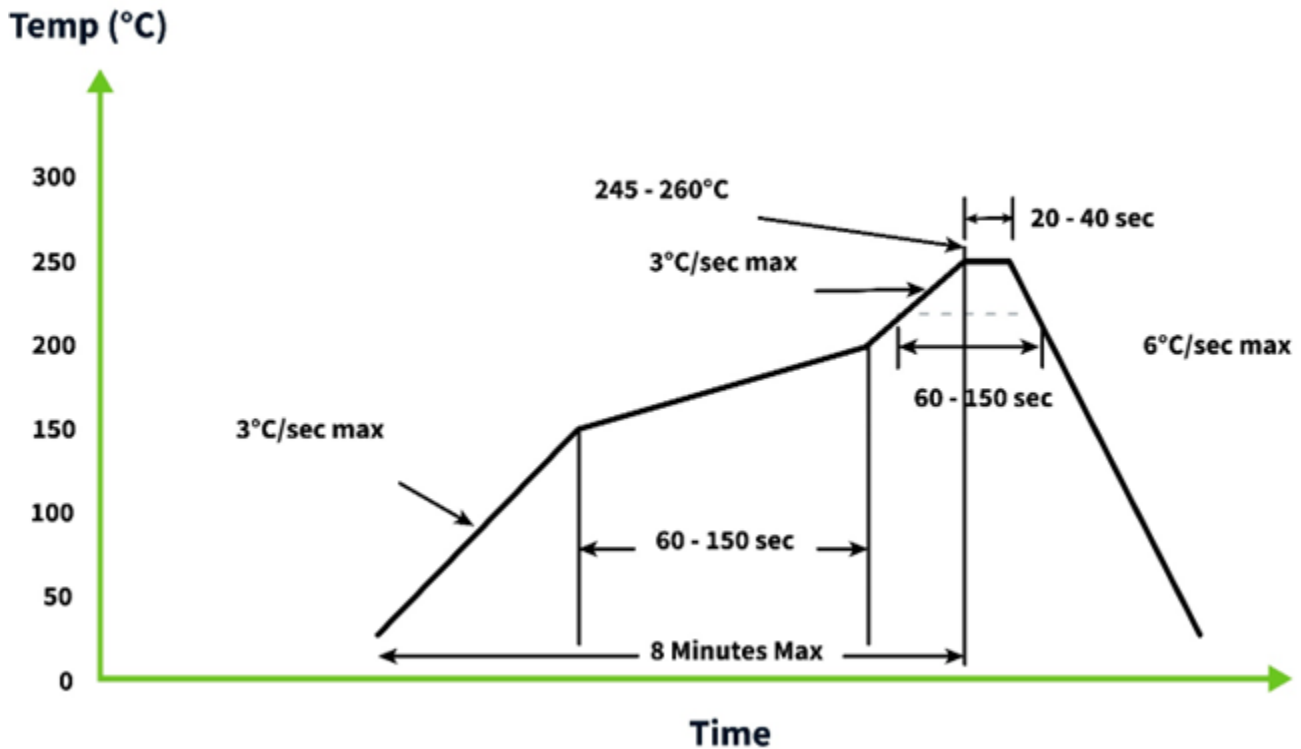
7.9 Footprint



<u>PIN:</u>	<u>DESCRIPTION:</u>
1	FEED (50 OHM)
2	GND
3,4	NC

8. Solder Reflow Profile

The PA.711.A can be assembled by following the recommended soldering temperatures are as follows:



*Temperatures listed within a tolerance of +/- 10° C

Smaller components are typically mounted on the first pass, however, we do advise mounting the PA.711.A when placing larger components on the board during subsequent reflows.

Note: Soldering flux classified ROL0 under IPC J-STD-004 is recommended.

Changelog for the datasheet

SPE-14-8-063 - PA.711.A

Revision: H (Current Version)

Date:	2023-10-24
Changes:	Added Solder Reflow Profile
Changes Made by:	Cesar Sousa

Previous Revisions

Revision: G

Date:	2023-03-30
Changes:	Full datasheet update
Changes Made by:	Gary West

Revision: B

Date:	2015-01-20
Changes:	Removed PAD.71Y
Changes Made by:	Aine Doyle

Revision: F

Date:	2022-01-05
Changes:	Amended footprint drawing
Changes Made by:	Gary West

Revision: A (Original First Release)

Date:	2014-08-20
Notes:	First Release
Author:	Yaqiang Liu

Revision: E

Date:	2021-02-17
Changes:	Update datasheet template and added antenna integration guide.
Changes Made by:	Gary West

Revision: D

Date:	2020-06-11
Changes:	Replaced Row Humidity Non-condensing 65°C 95% RH with Moisture Sensitivity Level 3 in Specification Table Updated Datasheet to current format
Changes Made by:	Dan Cantwell

Revision: C

Date:	2016-06-01
Changes:	Updated spec to 6GHz
Changes Made by:	Aine Doyle



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