TAOGLAS®

Datasheet

Low Profile 4G LTE / NTN SMD Dielectric Antenna

Part No:
PCS.26.A

Description

Low Profile 4G LTE / NTN SMD Dielectric Antenna

Features:

High Efficiency 4G LTE SMD antenna
Covers 600-3000MHz
Covers NTN Bands 23, n255 and n256
Band 71 – 600MHz Ready
Dimensions: 54.6*13*3mm
RoHS & Reach Compliant

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1. Introduction

The PCS.26.A is a low-profile SMD 4G/LTE embedded antenna designed for direct SMD mount on a device PCB. It provides high efficiency in a very small form factor, at 54.6*13*3mm. Its rectangular shape and very small size make it very easy to integrate. Packaged in tape and reel, it can be mounted via pick and place to reflow solder directly on the edge of the PCB board.

The antenna is a great match for lower cost cellular applications, particularly in the telematics and automotive sector, but also for IoT applications as it exhibits outstanding performance on variable ground plane lengths – meaning it can be used in small devices. The PCS.06 has been designed to incorporate NTN (Non-Terrestrial Network) bands B23, n255 and n256 for satellite based deployments

Typical Applications Include:

- IoT Sensors and devices
- Connected Health and Wearables
- NTN (Non-Terrestrial Network) Telecommunications Deployments

This antenna is recommended for use with longer ground-plane lengths of 100mm or more for maximum efficiency. Some tuning can be performed on this antenna to help optimize to the device environment.

Contact your regional Taoglas customer support team for information on how to integrate the PCS.26.A into your device or for further information.

2. Specification

LTE Electrical								
Band	Frequency (MHz)	Efficiency (%)	Average Gain (dB)	Peak Gain (dBi)	Impedance	Polarization	Radiation Pattern	Max. input power
5GNR/4G Band71	617-698	67.8	-1.69	2.36	50 Ω	Linear	Omni	2W
4G/3G Band 12,13,14,17,28,29	698-806	75.2	-1.24	3.66				
4G/3G/NB-IoT/Cat M Band 5,8,18,19,20,26,27	824-960	76.0	-1.19	3.99				
5GNR/4G Band 21,32,74,75,76	1427-1518	25.8	-5.88	0.84				
4G/3G/n256 Band 1,2,3,4,9,23,25,35,39,66	1710-2200	73.2	-1.36	6.44				
4G/3G Band 7,30,38,40,41	2300-2690	68.2	-1.66	4.85				

Mechanical	
Antenna Dimensions	54.6mm x 13mm x 3mm
Material	FR4
Soldering Type	SMD through Reflow

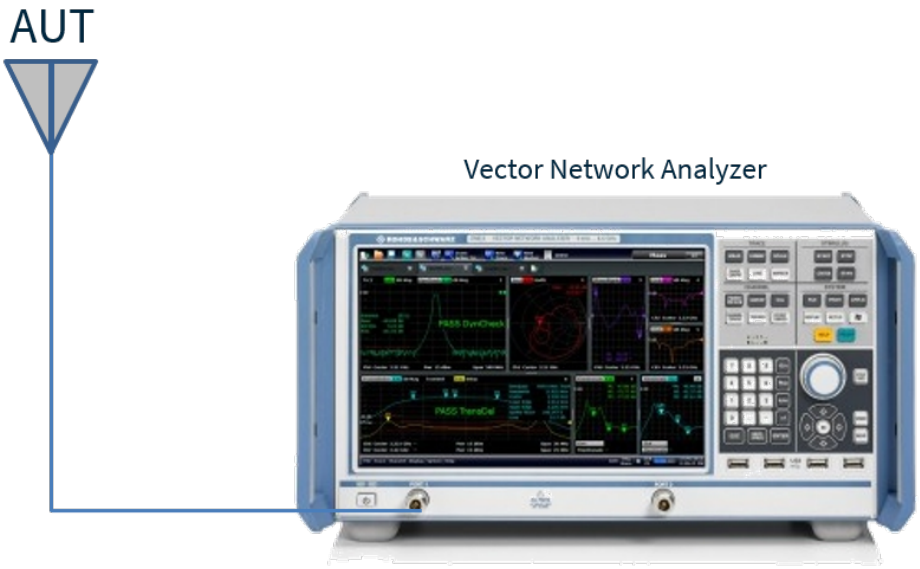
Environmental	
Operation Temperature	-40°C ~ +85°C
Storage Temperature	-40°C ~ +85°C
Moisture Sensitivity Level (MSL)	3 (168 Hours)

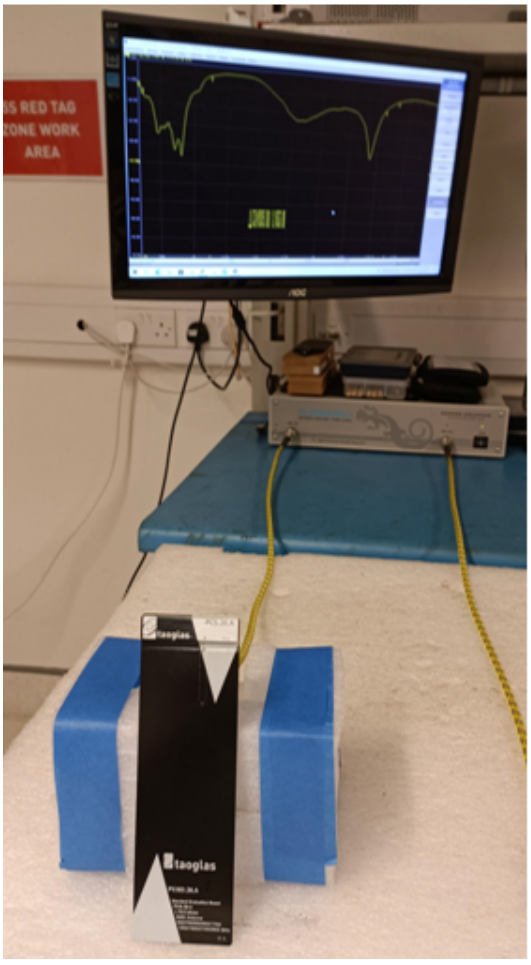
* All measurements were SMD on 178*55.6mm EVB board

5G/4G Bands			
Band Number	5GNR / 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 / n255	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 / n256	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	✖

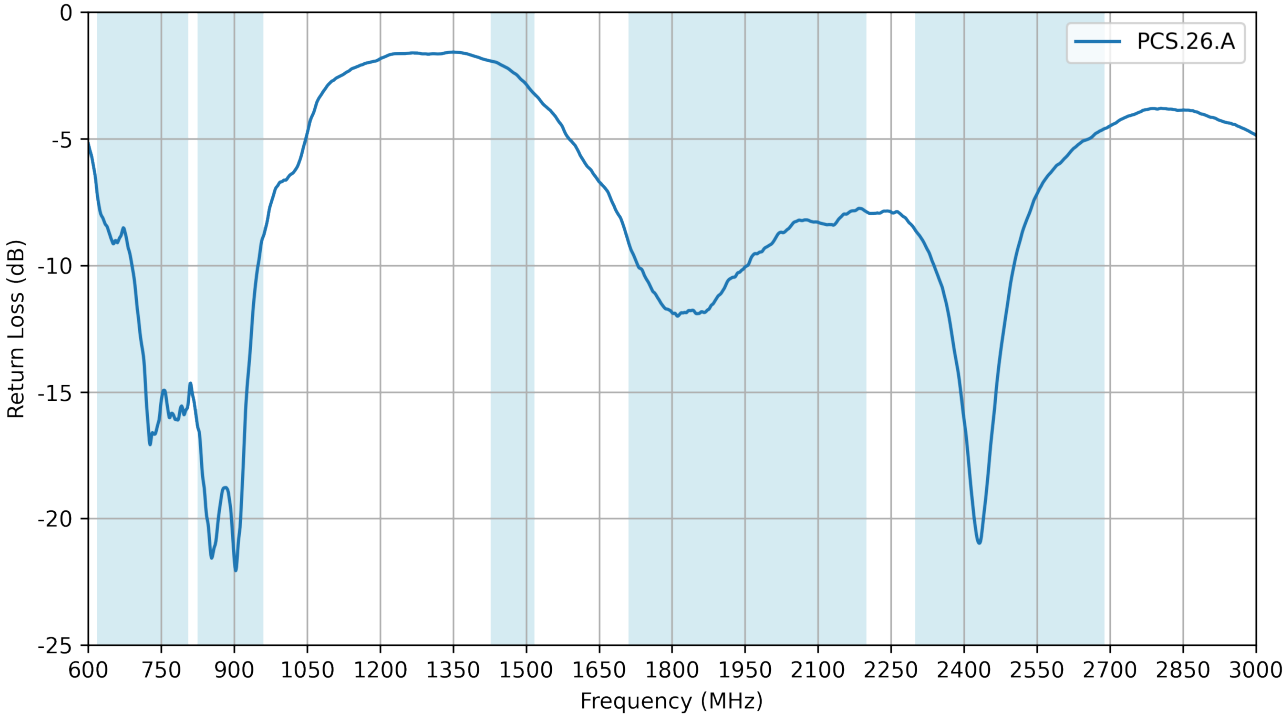
3. Antenna Characteristics

3.1 Test Setup

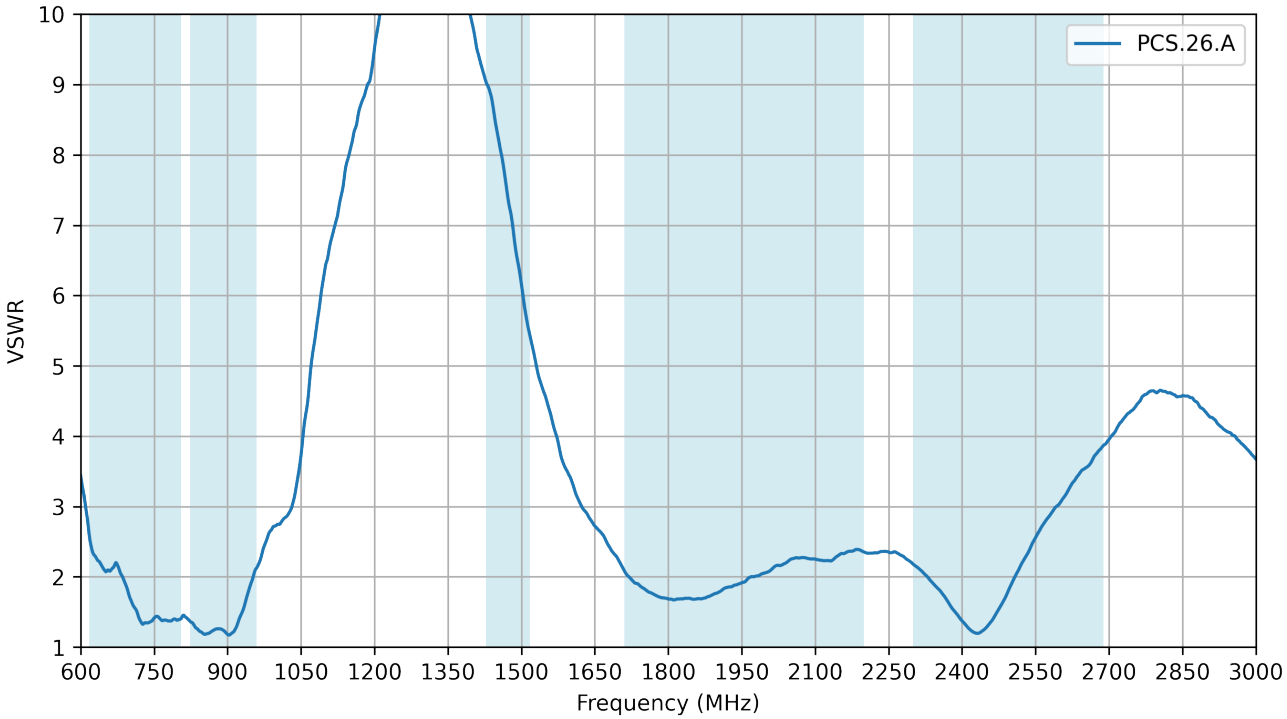




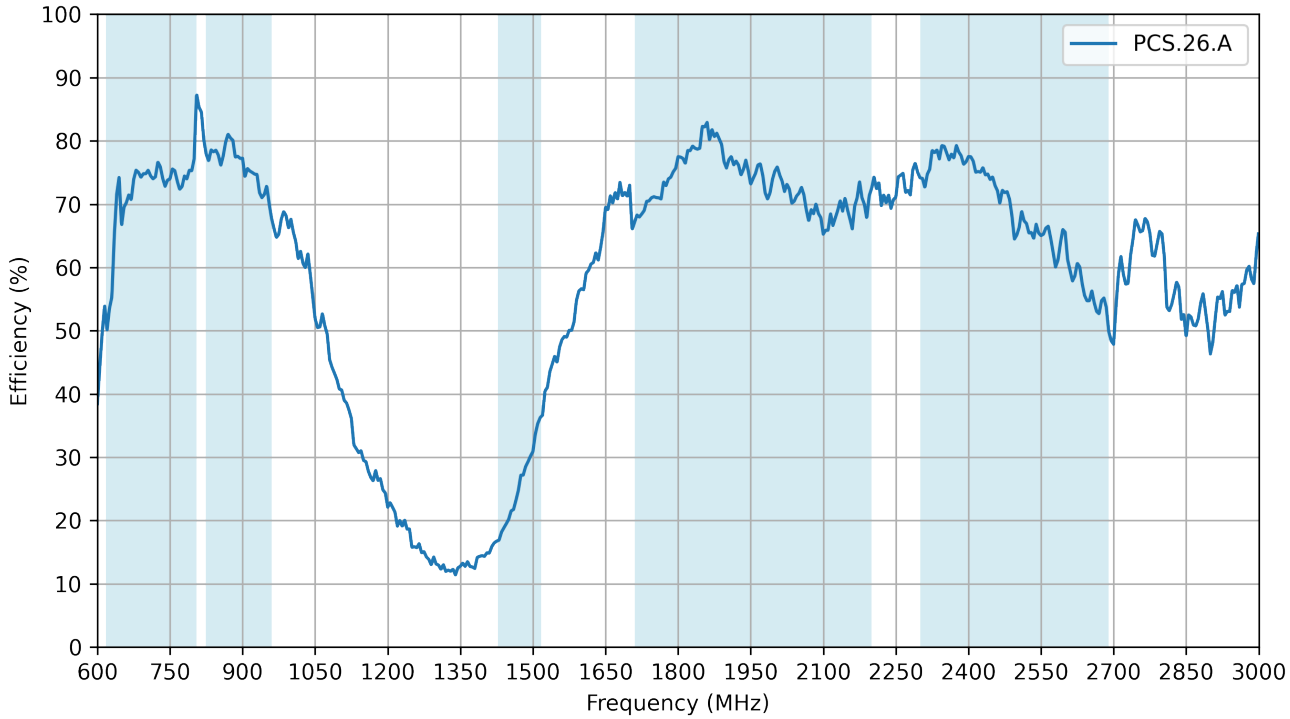
3.2 Return Loss



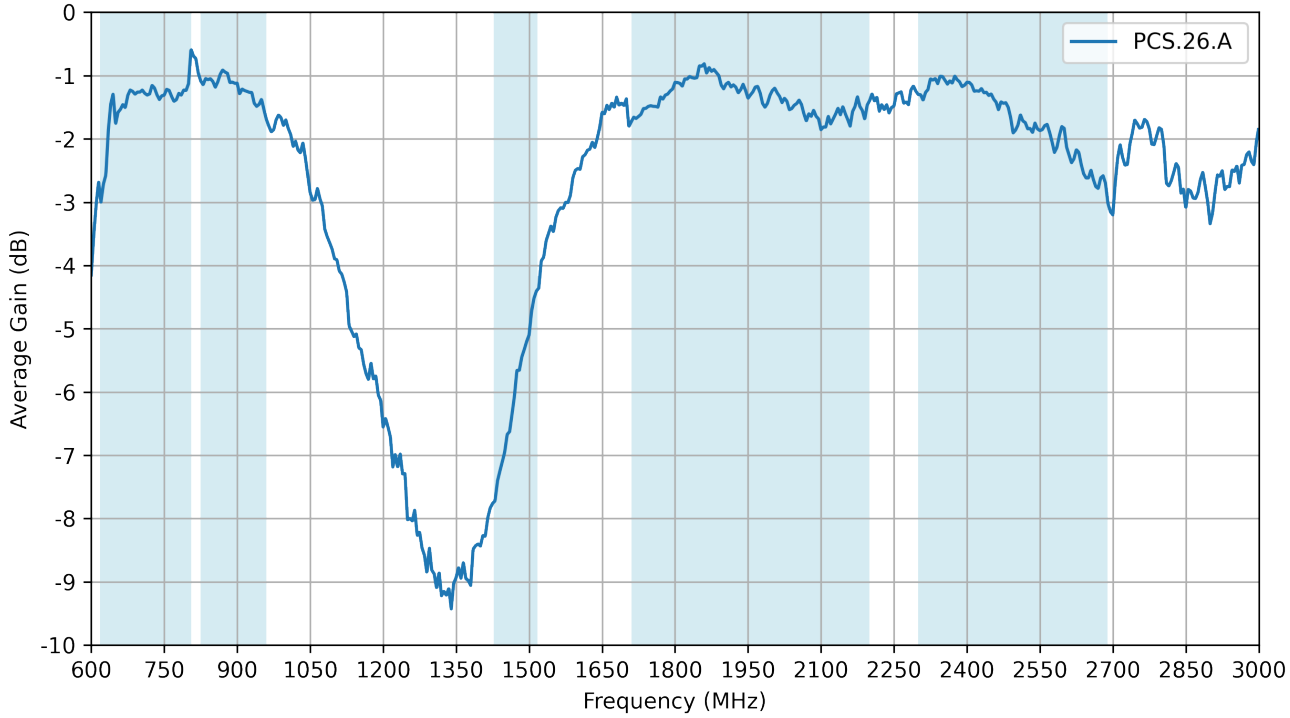
3.3 VSWR



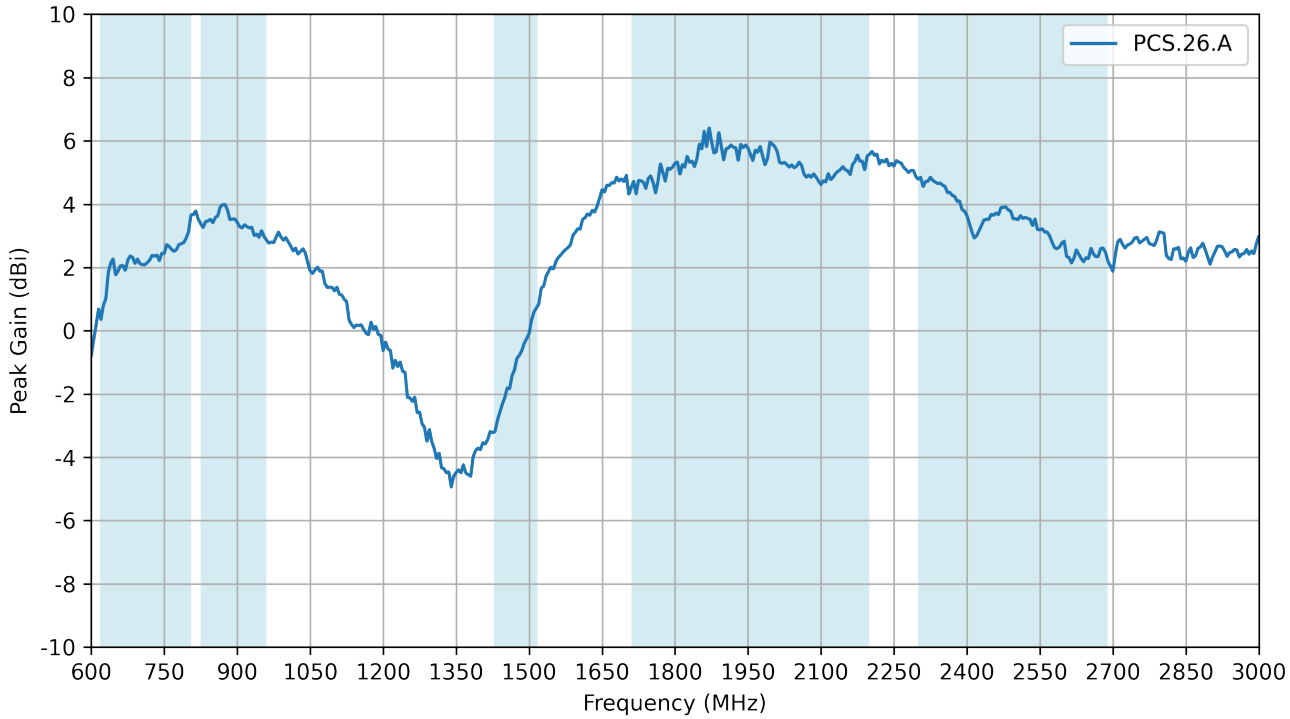
3.4 Efficiency



3.5 Average Gain

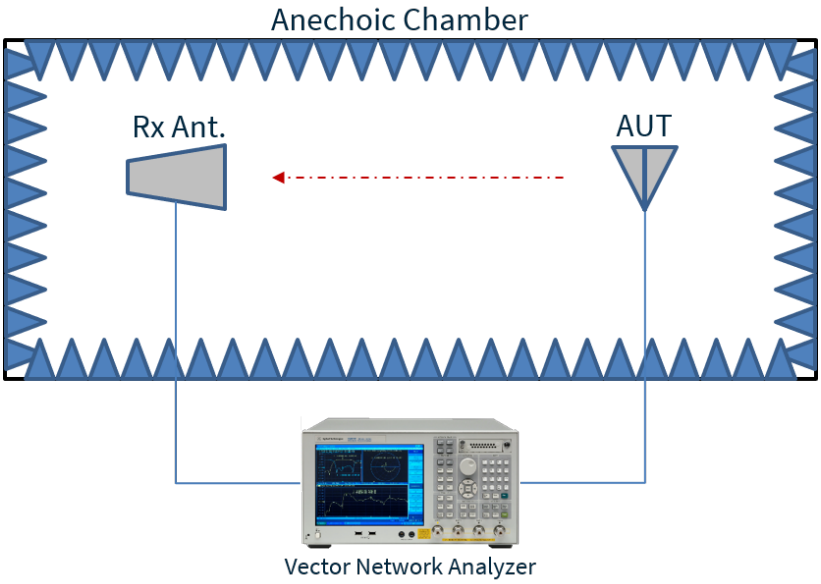


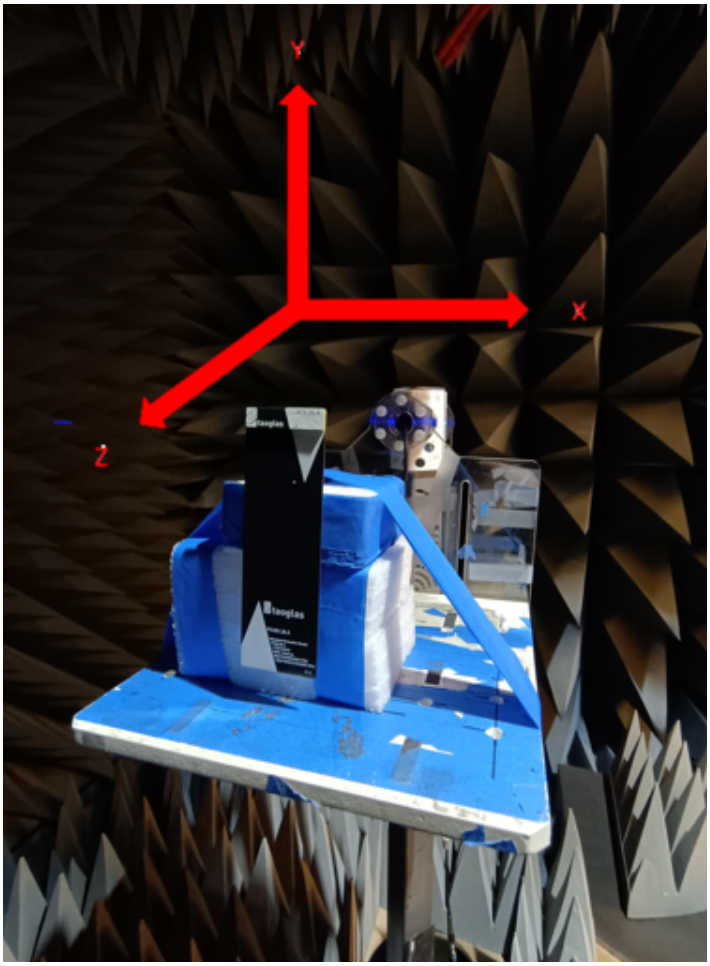
3.6 Peak Gain


PCS.26.A
Peak Gain (dBi)
10
8
6
4
2
0
-2
-4
-6
-8
-10
600
750
900
1050
1200
1350
1500
1650
1800
1950
2100
2250
2400
2550
2700
2850
3000
Frequency (MHz)

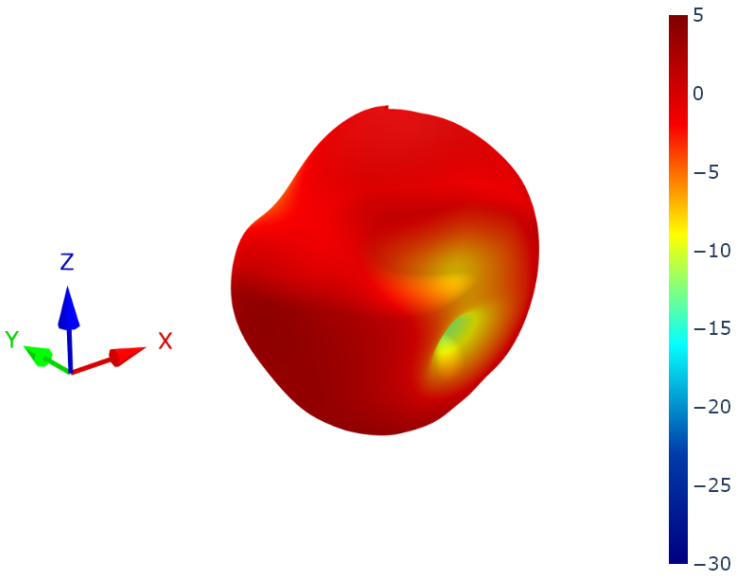
4. Radiation Patterns

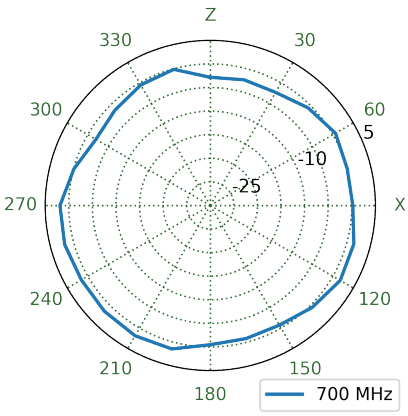
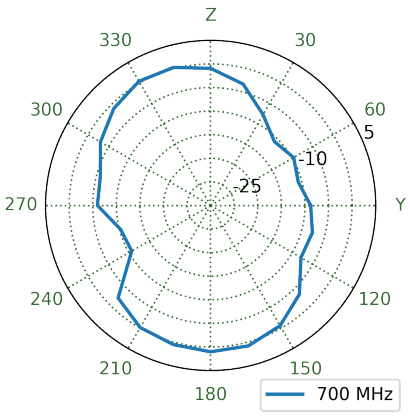
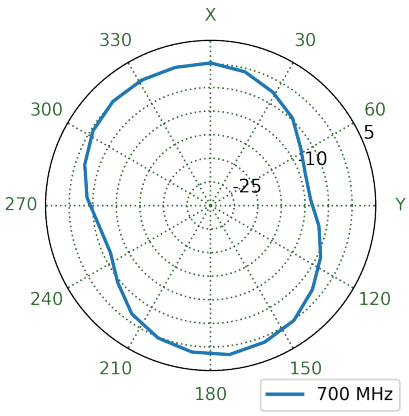
4.1 Test Setup



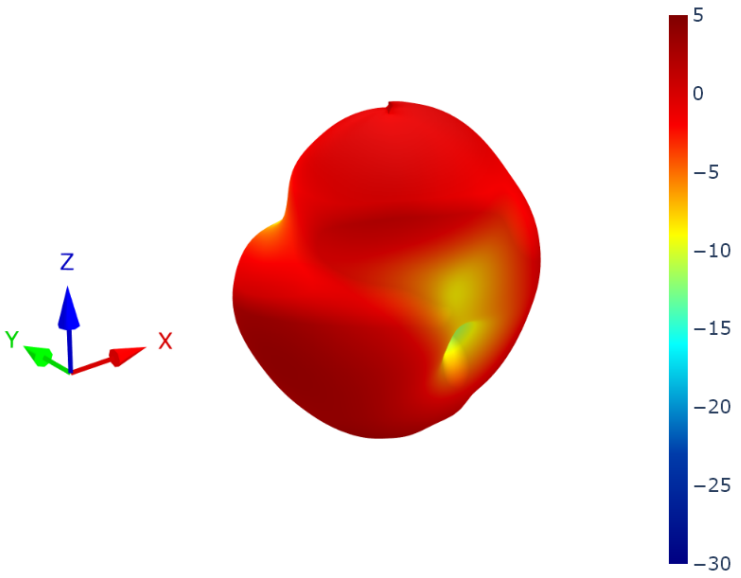


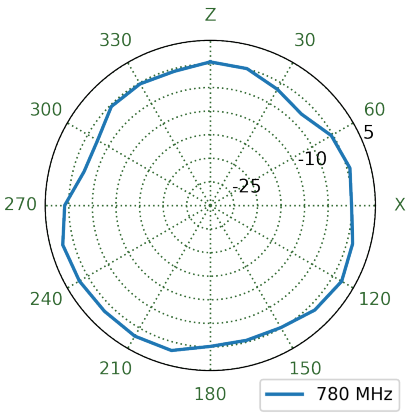
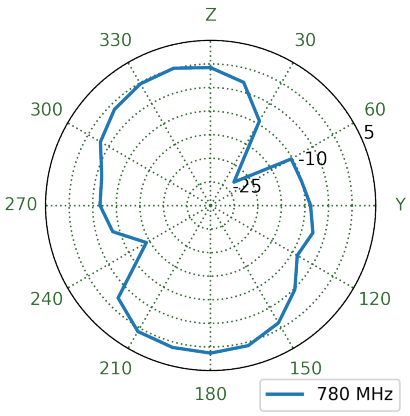
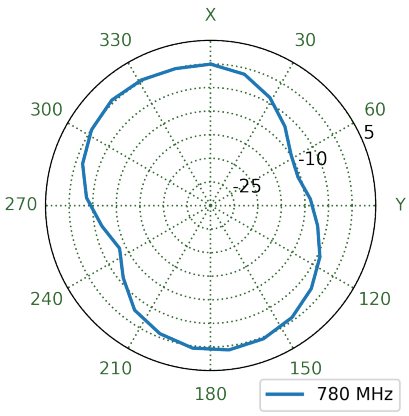
4.2 PCS.26.A - Patterns at 700 MHz



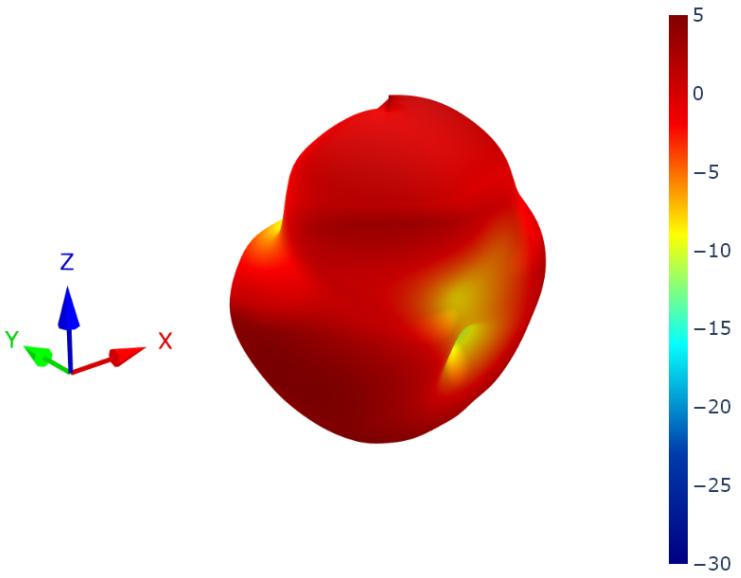
XZ Plane	YZ Plane	XY Plane
		

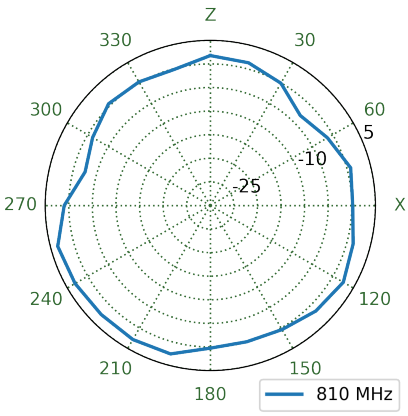
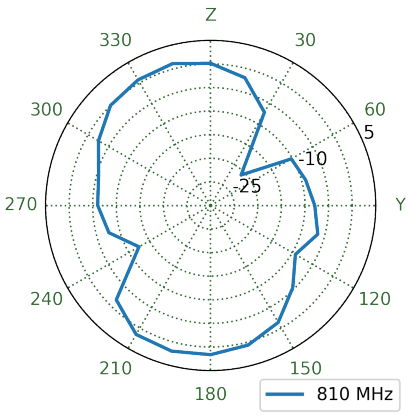
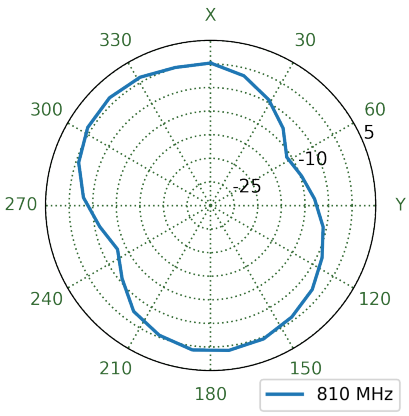
4.3 PCS.26.A - Patterns at 780 MHz



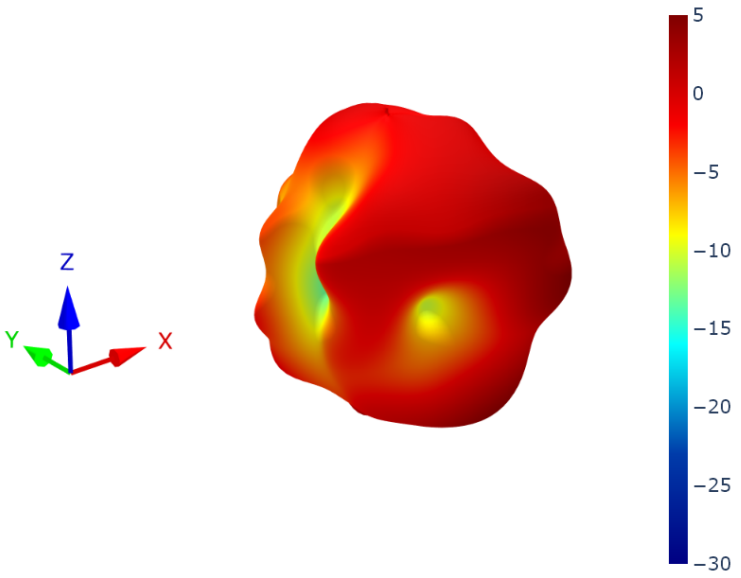
XZ Plane	YZ Plane	XY Plane
		

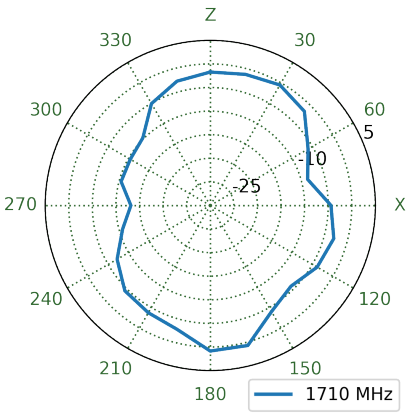
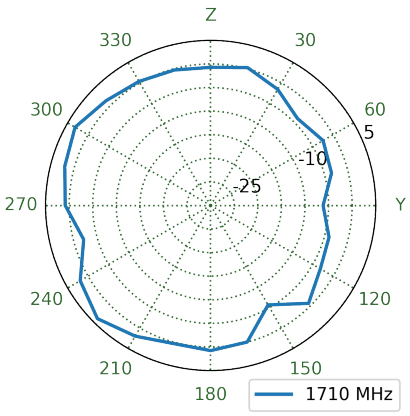
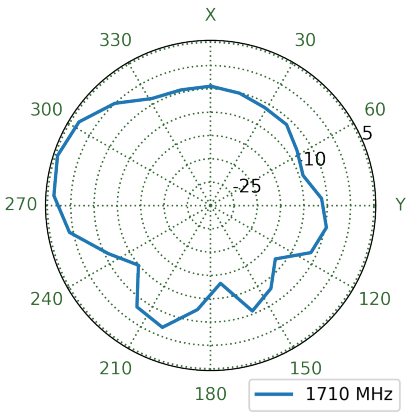
4.4 PCS.26.A - Patterns at 810 MHz



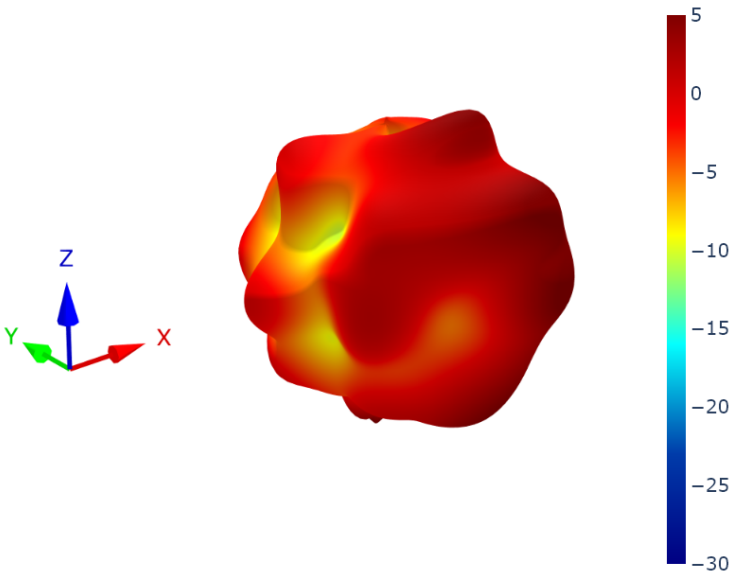
XZ Plane	YZ Plane	XY Plane
		

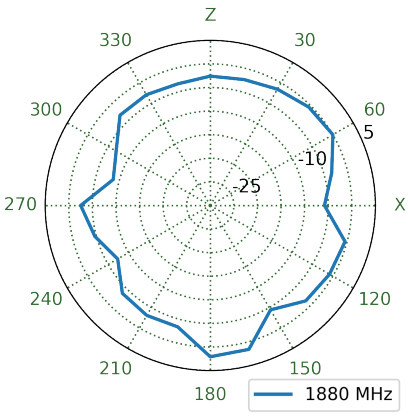
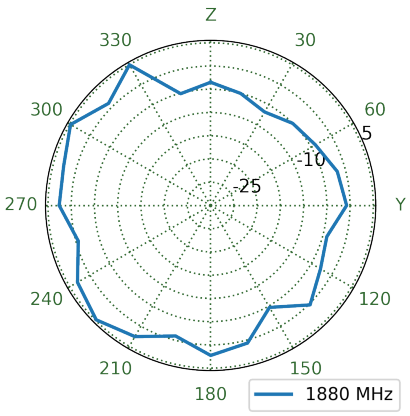
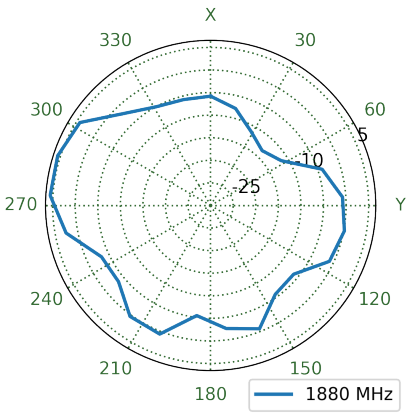
4.5 PCS.26.A - Patterns at 1710 MHz



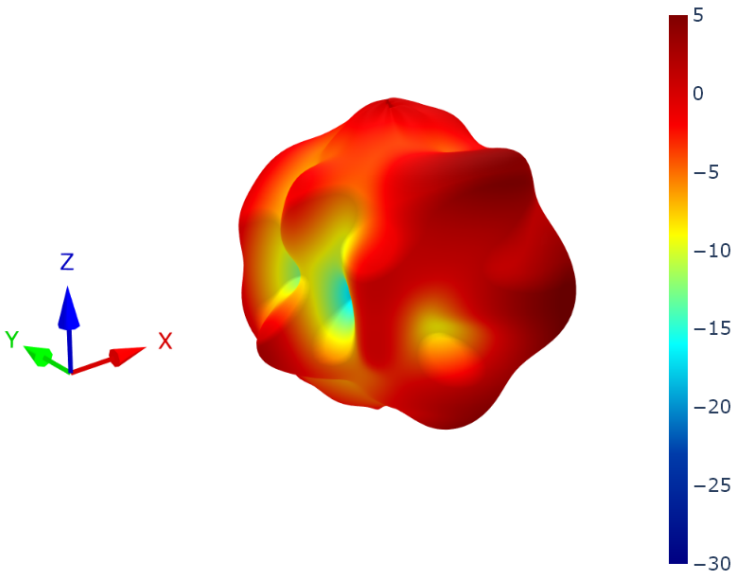
XZ Plane	YZ Plane	XY Plane
		

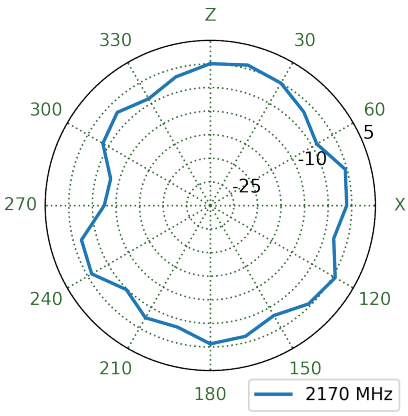
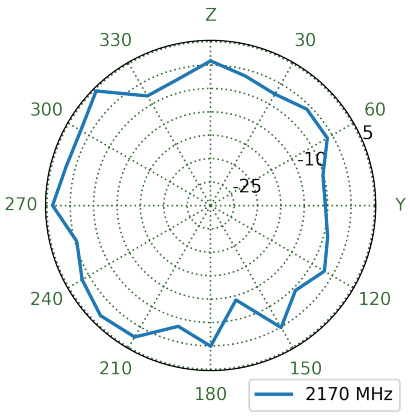
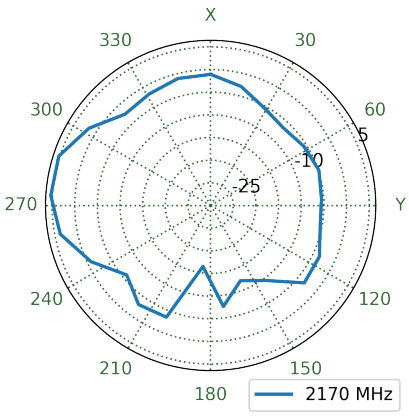
4.6 PCS.26.A - Patterns at 1880 MHz



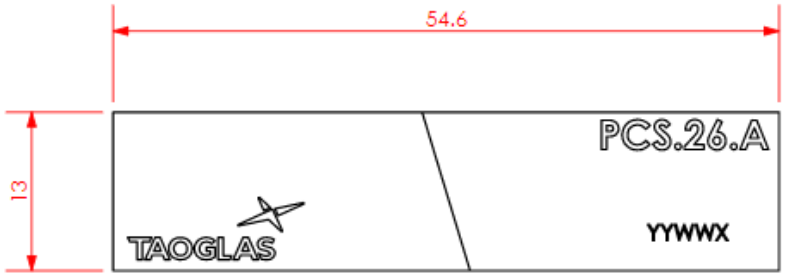
XZ Plane	YZ Plane	XY Plane
		

4.7 PCS.26.A - Patterns at 2170 MHz

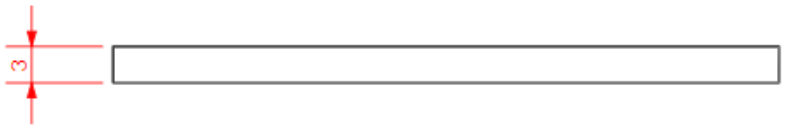


XZ Plane	YZ Plane	XY Plane
		

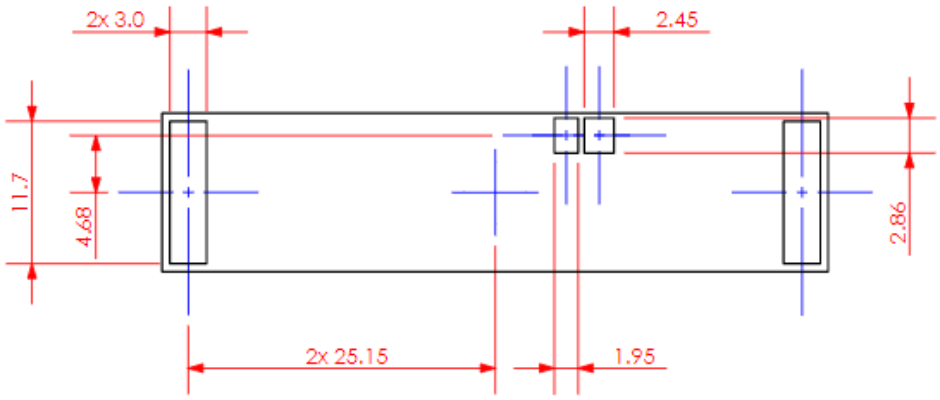
5. Mechanical Drawing



TOP VIEW



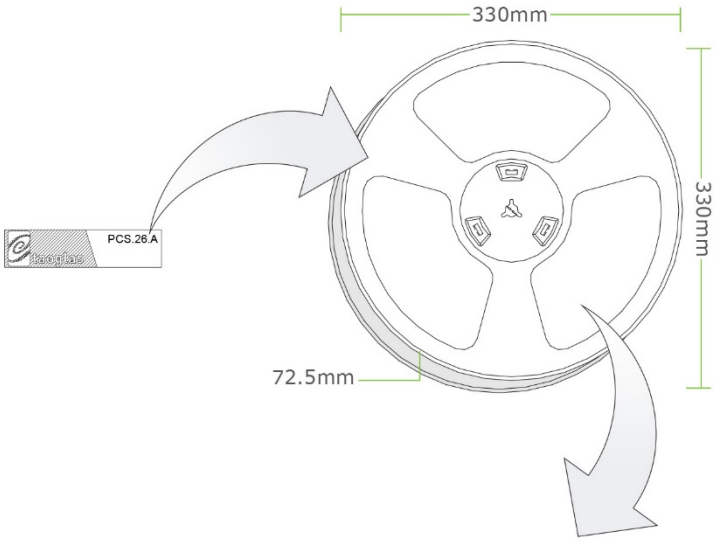
SIDE VIEW



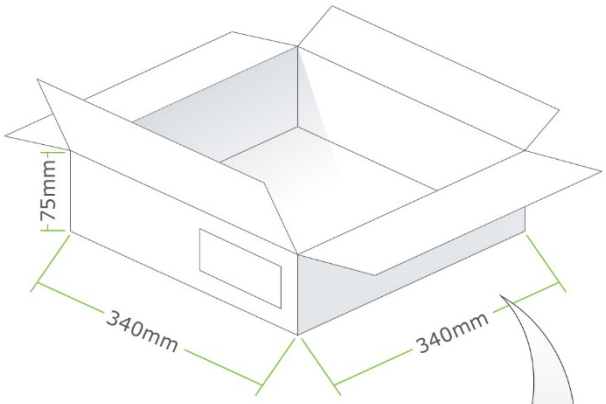
BOTTOM VIEW

6. Packaging

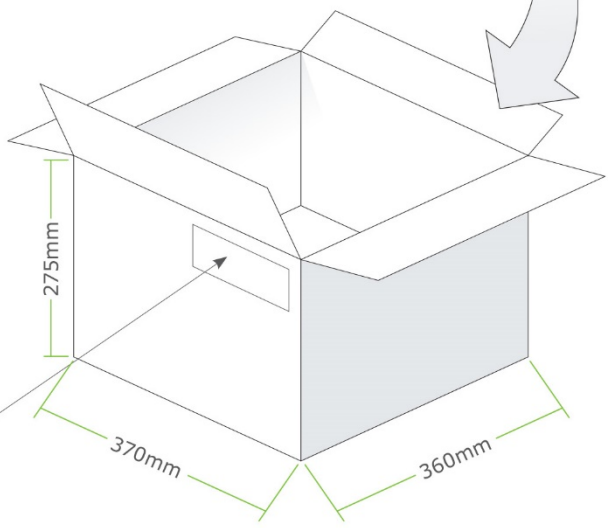
800pcs PCS.26.A per Tape & Reel
Dimensions - 330*72.5*330mm
Weight - 3.6Kg

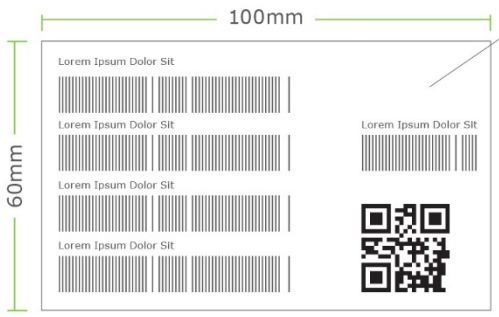


1 Tape & Reel per small box
Dimensions - 340*340*75mm
Weight - 3.6Kg

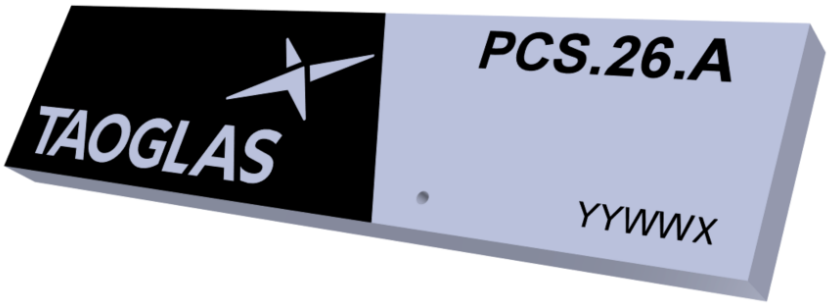


2400 Tape & Reel PCS.26.A per carton
Dimensions - 370*360*275mm
Weight - 10.8Kg





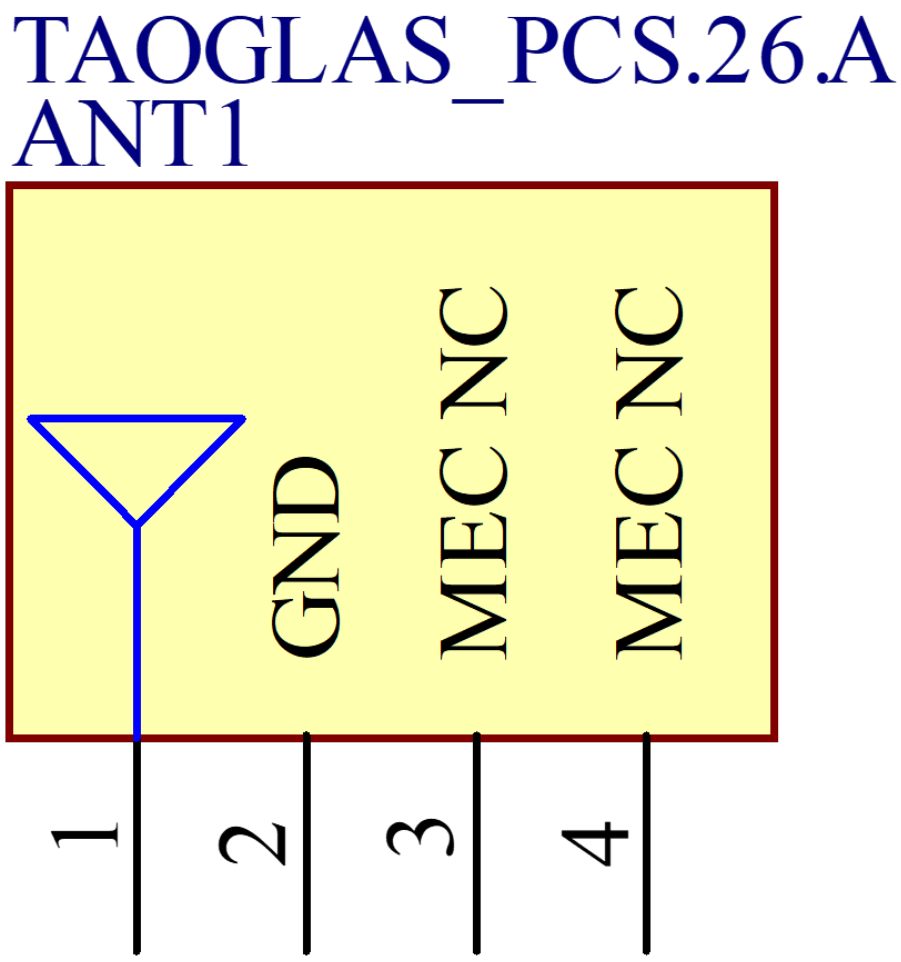
7. Antenna Integration Guide



7.1 Schematic and Symbol Definition

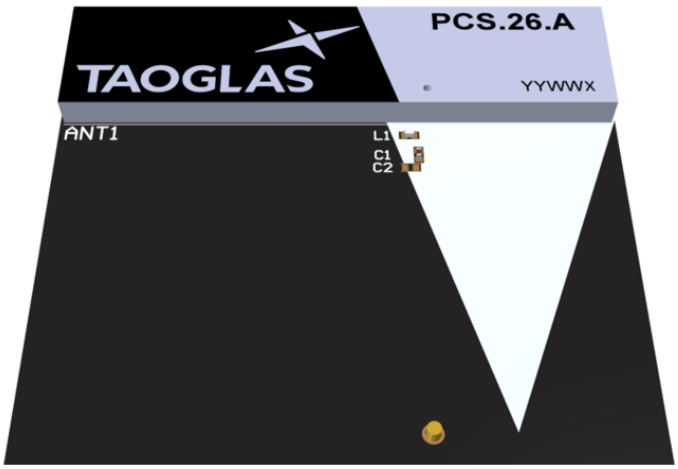
The circuit symbol for the antenna is shown below. The antenna has 4 pins with only two pins (Pin 1 and Pin 2) as functional. Pins 3 and 4 are for mechanical strength.

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

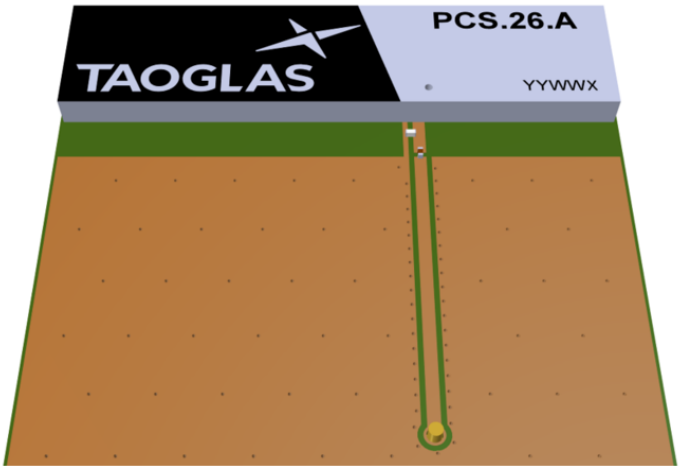


7.2 Antenna Integration

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.



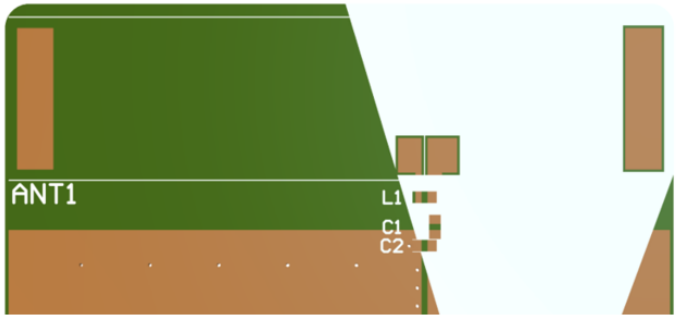
With Solder Mask



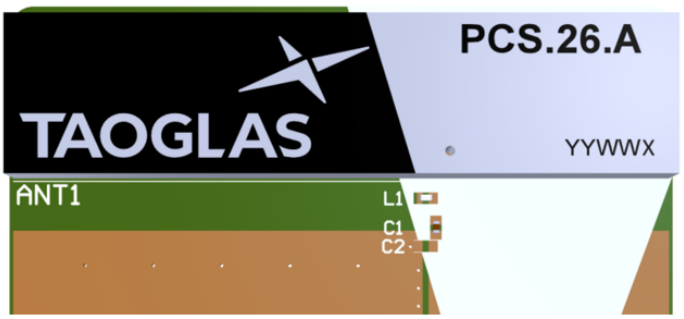
Without Solder Mask

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.



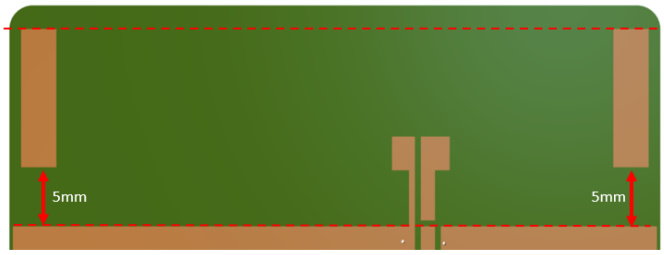
Without Antenna



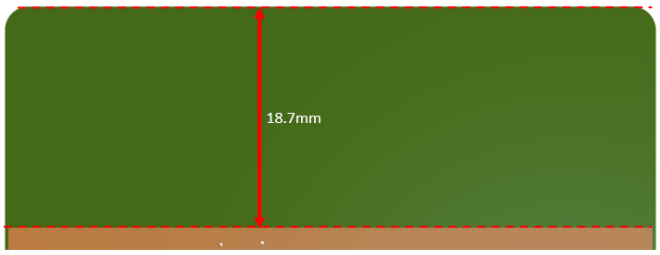
With Antenna

7.4 PCB Keep out

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.



Topside



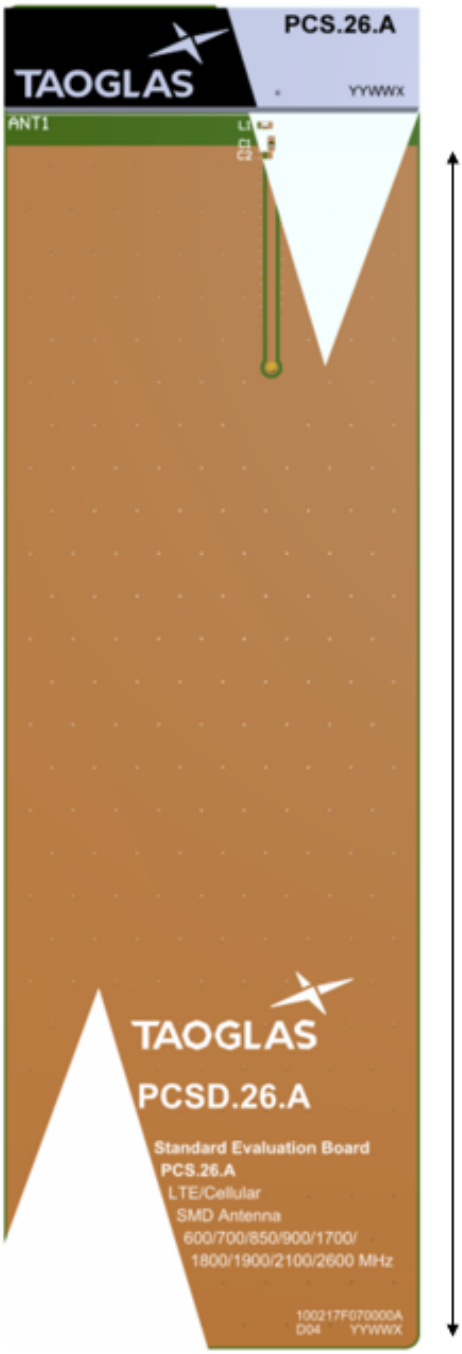
Bottom side

7.5 Evaluation Board

Topside

Bottom Side

7.6 Evaluation Board Ground Plane Length

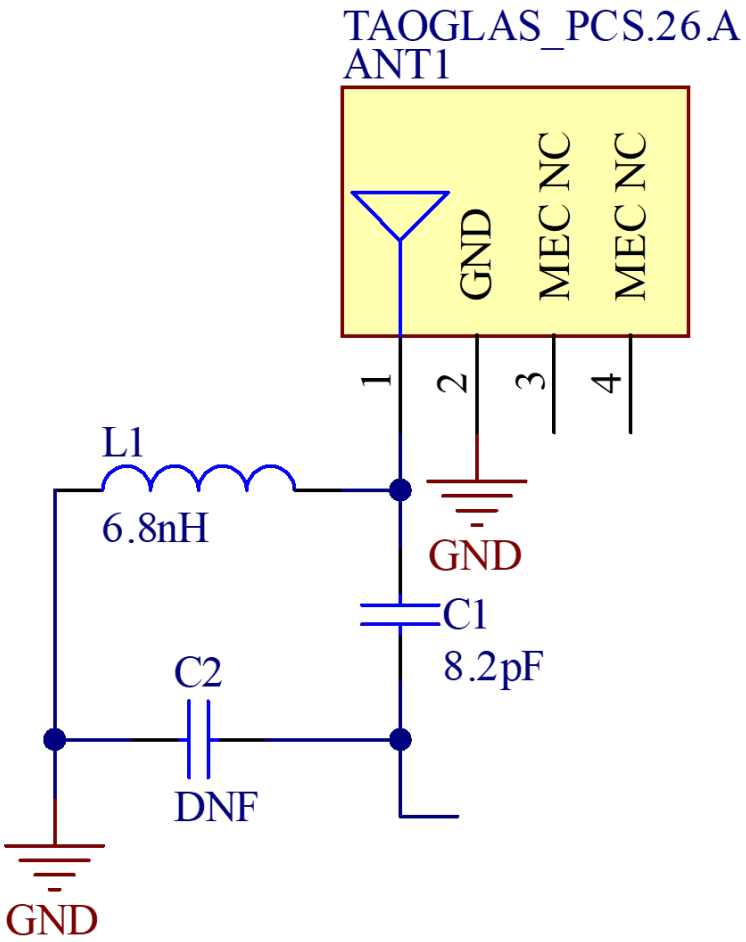


Ground Plane Length
159.7mm

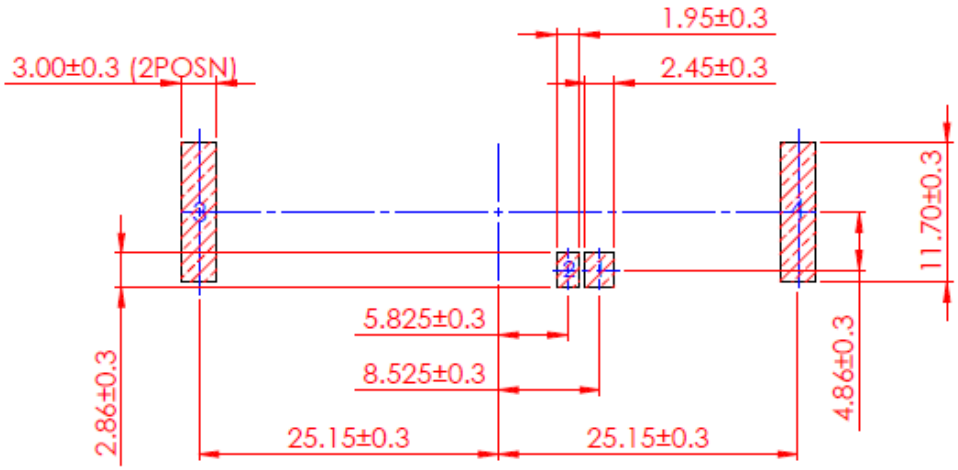
7.7 Matching Circuit

Matching components with the PCS.26.A are required 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.

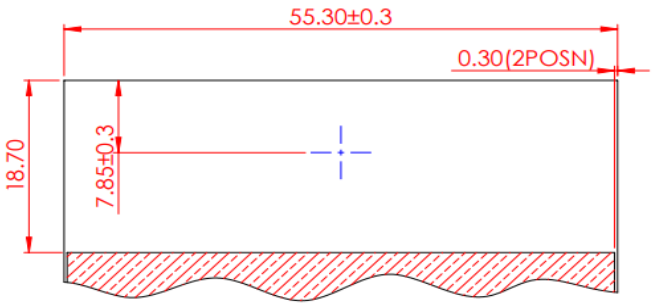
Designator	Type	Value	Manufacturer	Manufacturer Part Number
L1	Inductor	6.8nH	TDK Corporation	MLK1005S6N8JT000
C1	Capacitor	8.2pF	Murata Electronics	GRM1555C1H8R2DA01D
C2	Capacitor	Not Fitted	-	-



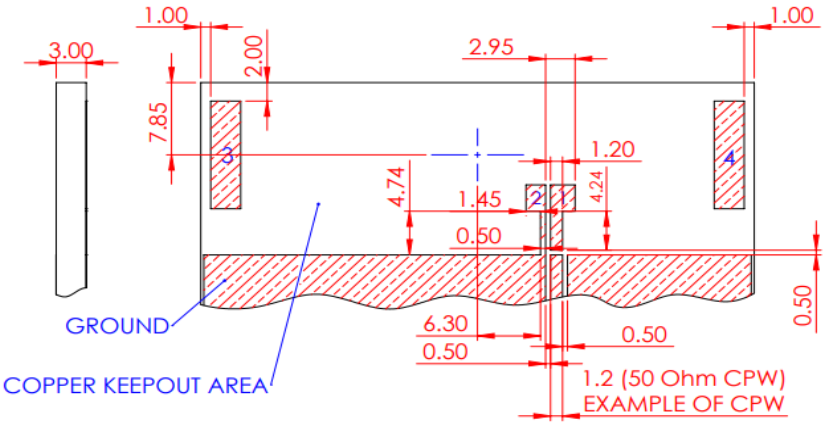
7.8 Footprint



FOOTPRINT PCB
SCALE 2:1



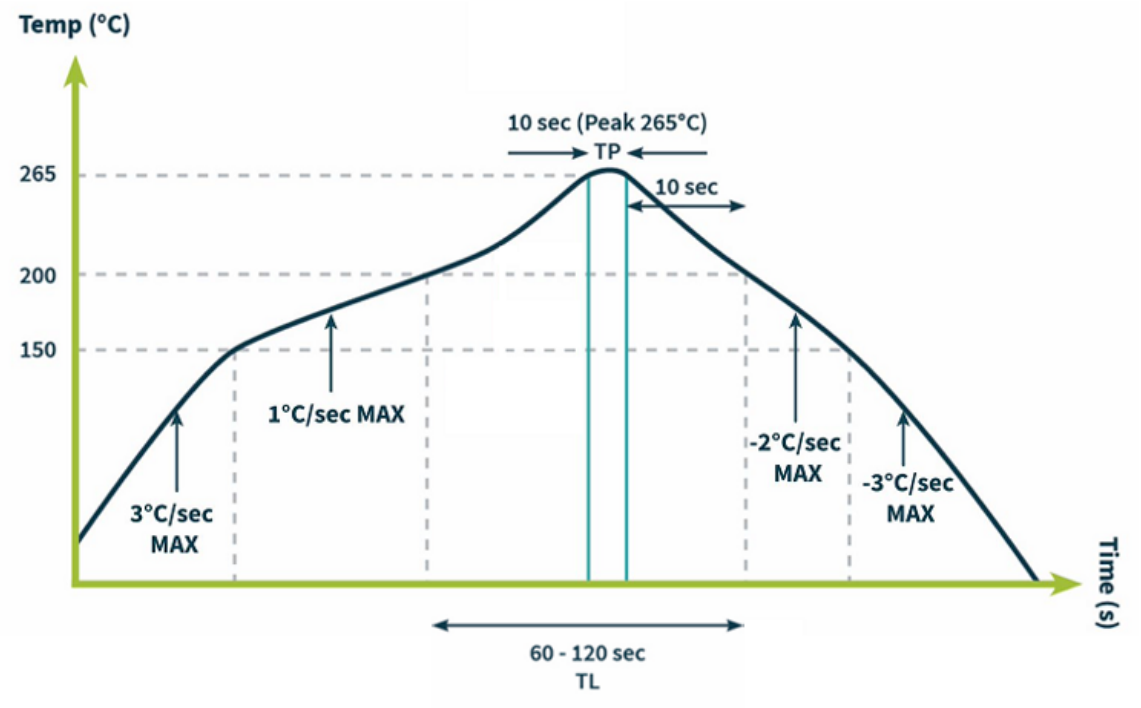
GROUND CLEARANCE BOTTOM VIEW
(SILKSCREEN NOT SHOWN)



GROUND CLEARANCE TOP VIEW
(SILKSCREEN NOT SHOWN)

8. Solder Reflow Profile

The PCS.26.A can be assembled by following the recommended soldering temperatures are as follows:



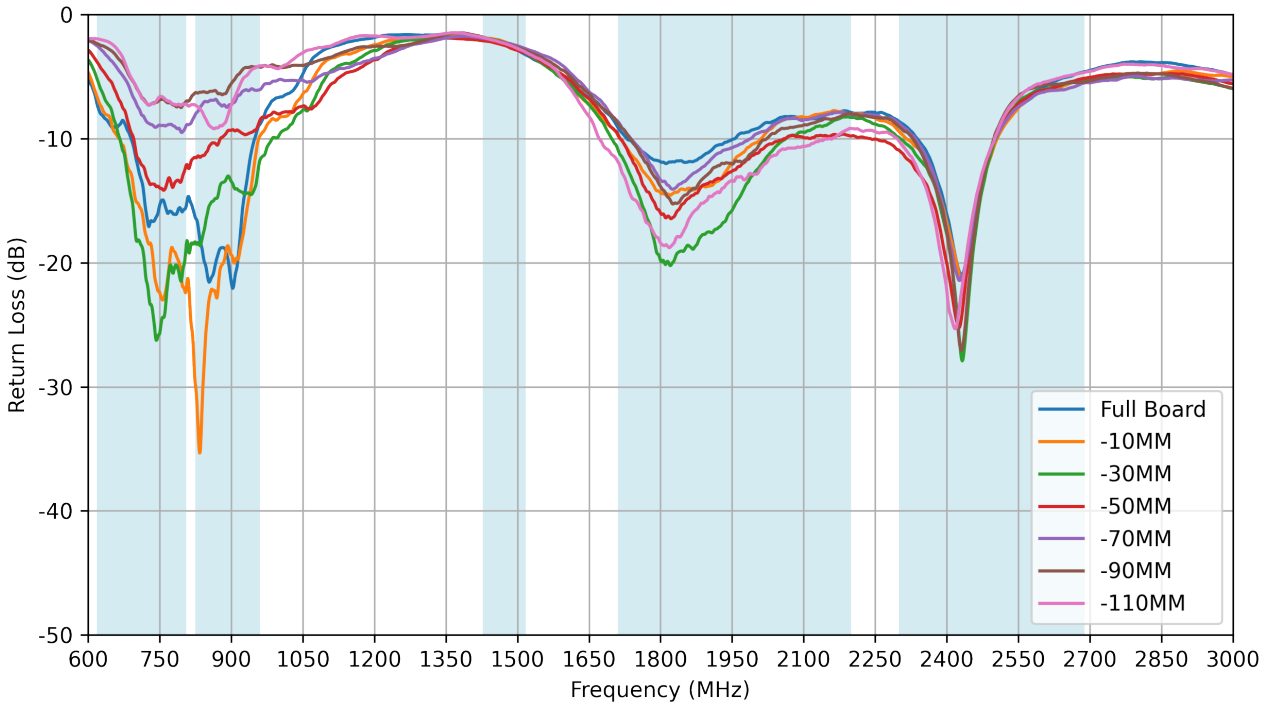
Smaller components are typically mounted on the first pass, however, we do advise mounting the PCS.06.A when placing larger components on the board during subsequent reflows.

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

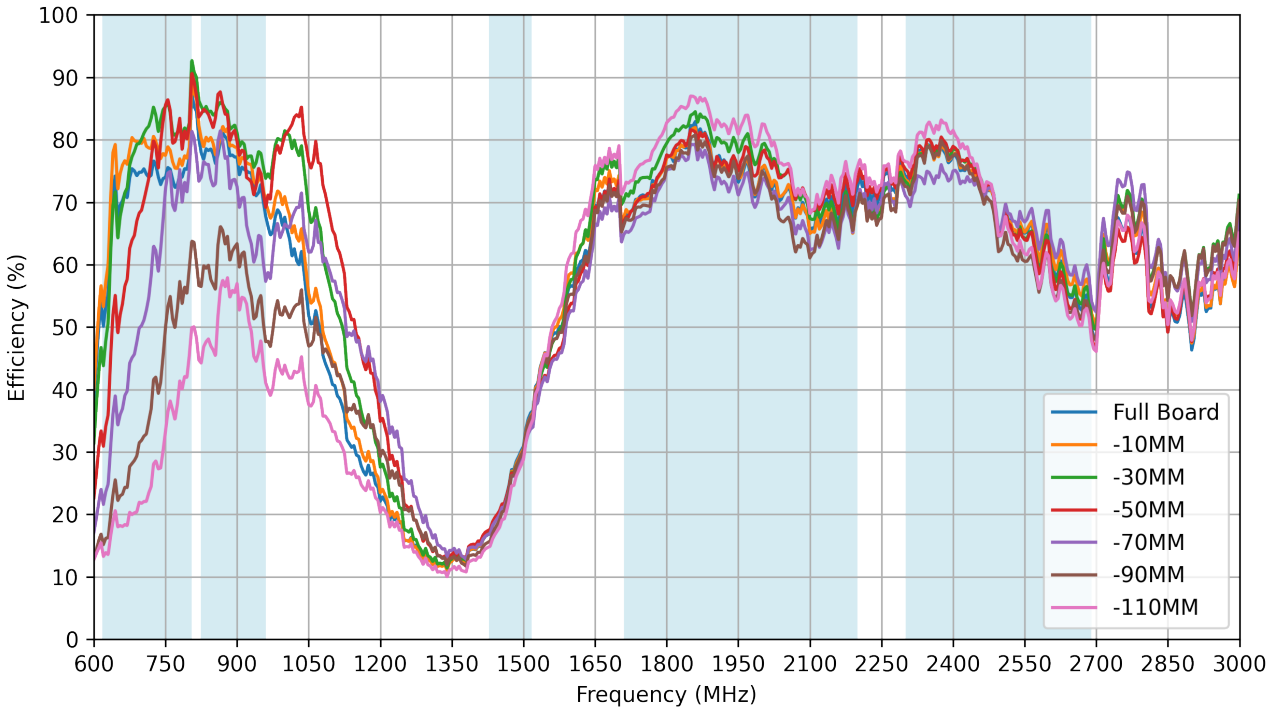
9. Application Note

This application note shows how changing the ground plane length effects the antenna performance.

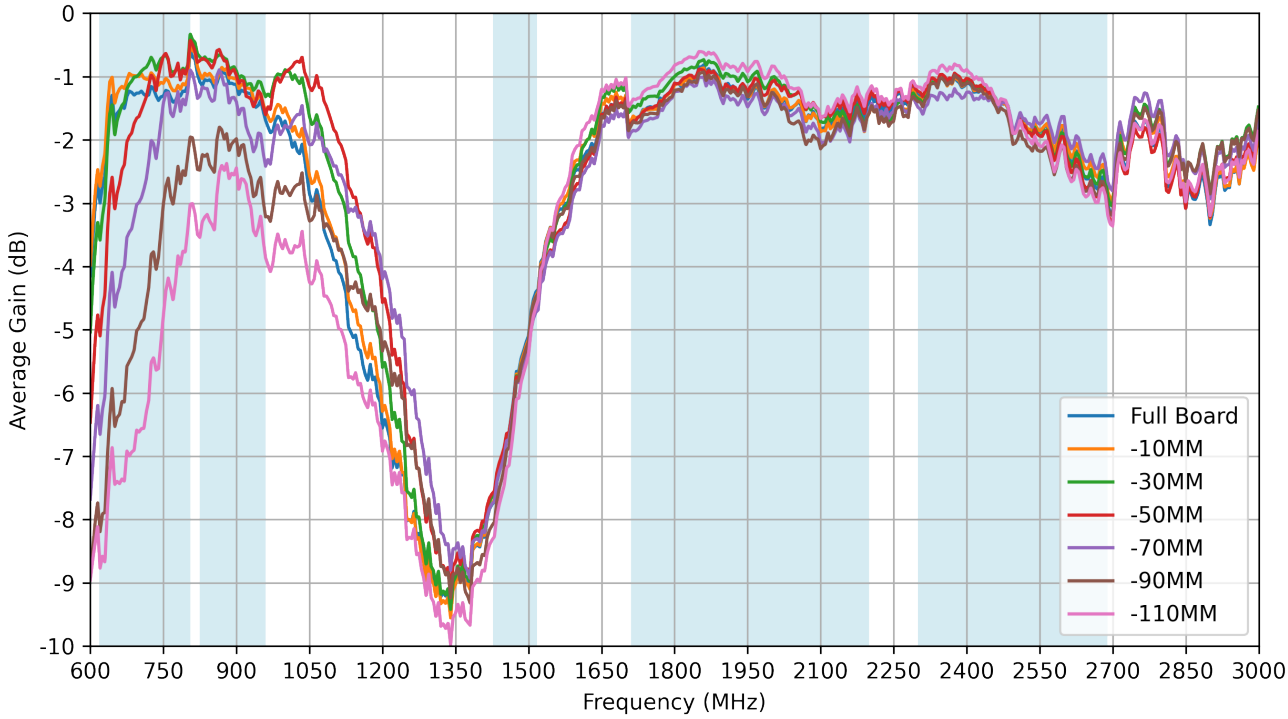
9.1 Return Loss



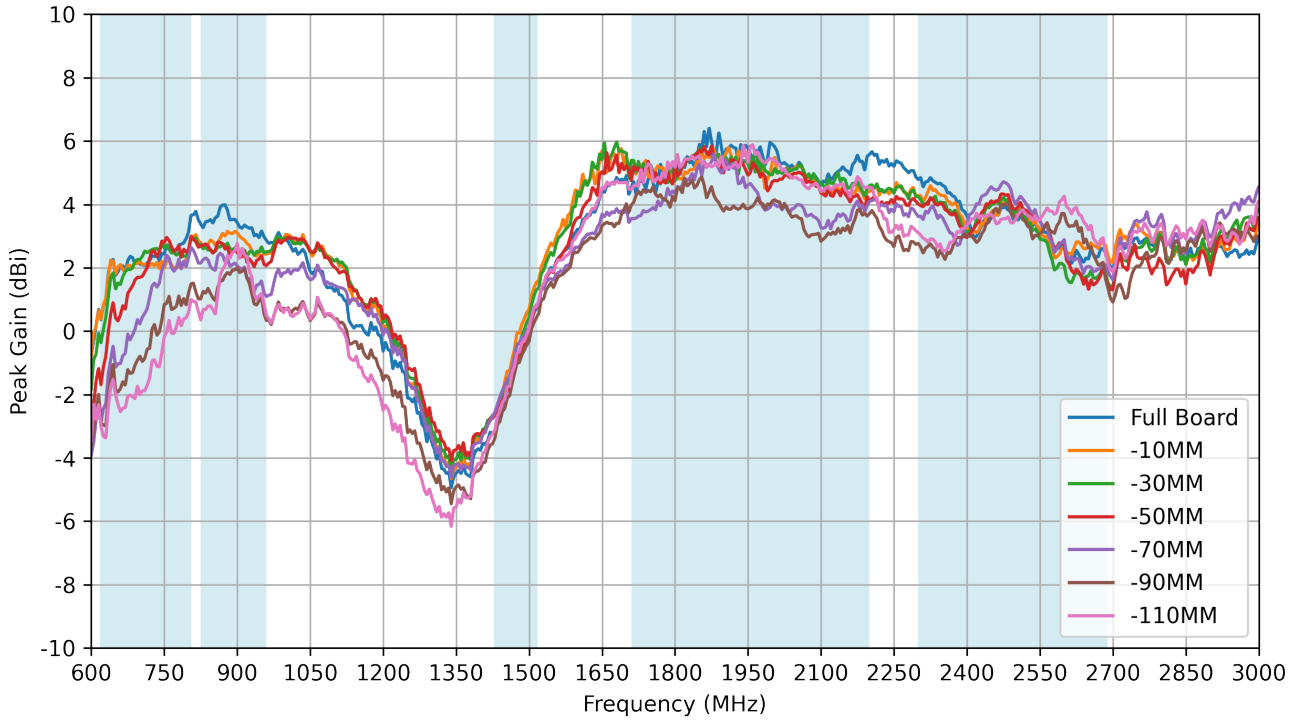
9.2 Efficiency



9.3 Average Gain



9.4 Peak Gain



Changelog for the datasheet

SPE-18-8-100 – PCS.26.A

Revision: H (Current Version)	
Date:	2023-09-11
Changes:	Updated Solder Reflow information
Changes Made by:	Cesar Sousa

Previous Revisions

Revision: G	
Date:	2023-06-30
Changes:	Full datasheet update
Changes Made by:	Gary West

Revision: F	
Date:	2022-08-12
Changes:	Updated antenna footprint drawing
Changes Made by:	Gary West

Revision: E	
Date:	2022-04-26
Changes:	Updated 3D Radiation Patterns
Changes Made by:	Gary West

Revision: D	
Date:	2021-10-07
Changes:	Updated datasheet template, addition of intergration guide, addition of application note & added MSL to spec table
Changes Made by:	Gary West

Revision: C	
Date:	
Changes:	
Changes Made by:	AW

Revision: B	
Date:	2018-11-19
Changes:	Amended EVB size
Changes Made by:	Jack Conroy

Revision: A (First Release)	
Date:	2018-09-11
Changes:	First Release
Changes Made by:	AW

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