



TAOGLAS®



Datasheet

Part No:

PCS.07.A

Description:

Low Profile Cellular SMD Dielectric Antenna
824~960MHz/1710~2170MHz

Features:

High Efficiency Multi-Band SMD antenna
Low profile 35mm * 7mm * 3mm
CE Certified
RoHS & Reach Compliant



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1. Introduction



The PCS.07.A is a low profile SMT cellular antenna designed for direct SMT mount on the device PCB. It provides highest efficiency in very small factor 35*7*3mm. It is more resistant to detuning compared to other antenna integrations. If tuning is required it can be tuned for the device environment, while there is no need for new tooling. Its rectangular shape and very small size makes it very easy to integrate – can be mounted directly on the edge of the PCB board.

The PCS.07 antenna is suitable for lower cost cellular applications and is especially suitable for telematics and automotive sector. If higher efficiency or improved radiated spurious emissions are required, especially on smaller ground-planes, please use our PA series antennas, PA.26 or PA.710. For further information, please contact your regional Taoglas customer support team.

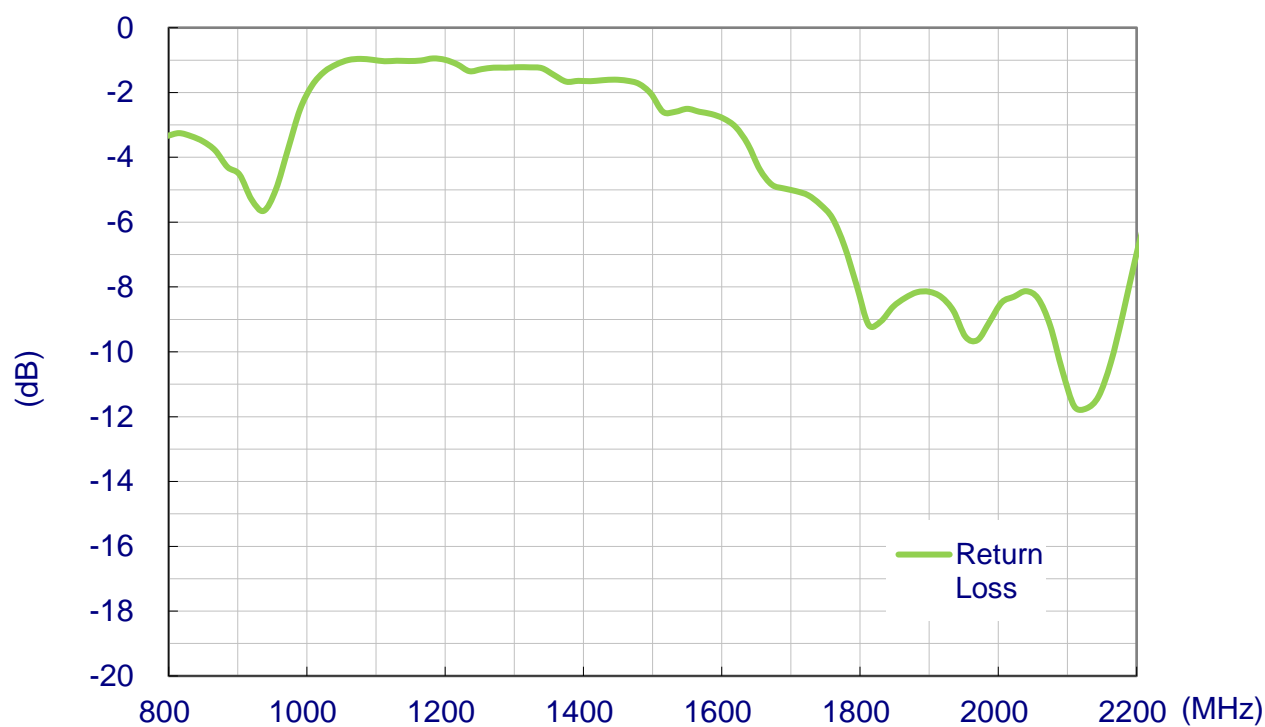
2. Specifications

Cellular					
Frequency (MHz)	824~896	880~960	1710~1880	1850~1990	1920~2170
Peak Gain (dBi)					
On EVB	-1.96	-1.77	2.90	2.83	2.57
Average Gain (dB)					
On EVB	-4.68	-4.44	-2.50	-2.68	-2.42
Efficiency (%)					
On EVB	32.02	31.06	45.14	52.82	50.11
Return Loss (dB)					
On EVB	< -3	< -4	< -5	< -7	< -6
Impedance	50Ω				
Polarization	Linear				
Radiation Pattern	Omni				
Mechanical					
Antenna Dimensions	35mm x 7mm x 3mm				
Material	Polymer				
Soldering Type	SMT through Reflow				
Environmental					
Temperature Range	-40°C to 85°C				
Moisture Sensitivity Level (MSL)	3 (168 Hours)				

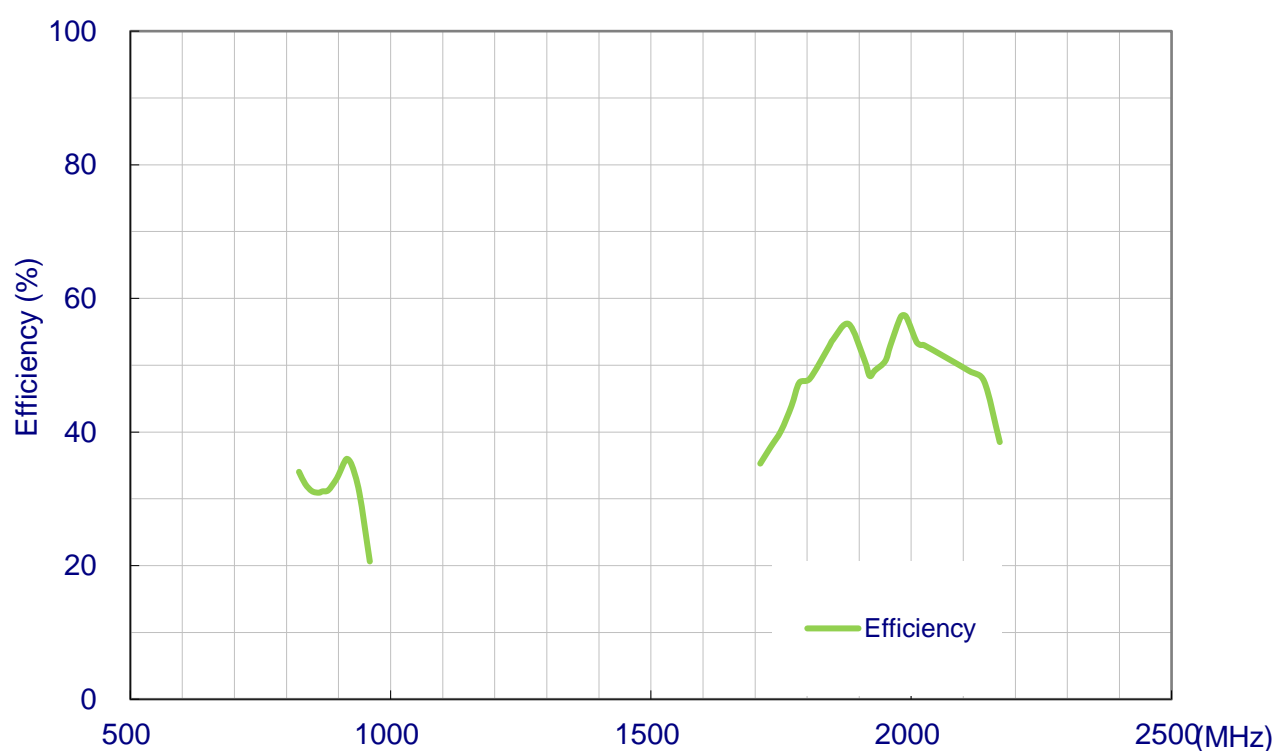
5G/4G Bands			
Band Number	5G NR / FR1 / LTE / LTE-Advanced / WCDMA / HSPA / HSPA+ / TD-SCDMA		
	Uplink	Downlink	Covered
1	UL: 1920 to 1980	DL: 2110 to 2170	✓
2	UL: 1850 to 1910	DL: 1930 to 1990	✓
3	UL: 1710 to 1785	DL: 1805 to 1880	✓
4	UL: 1710 to 1755	DL: 2110 to 2155	✓
5	UL: 824 to 849	DL: 869 to 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	✗
18	UL: 815 to 830	DL: 860 to 875	✓
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	✓
24	UL: 1625.5 to 1660.5	DL: 1525 to 1559	✗
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	✓
28	UL: 703 to 748	DL: 758 to 803	✗
29	UL: -	DL: 717 to 728	✗
30	UL: 2305 to 2315	DL: 2350 to 2360	✗
31	UL: 452.5 to 457.5	DL: 462.5 to 467.5	✗
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	✗
48		3550 to 3700	✗
66	UL: 1710-1780	DL: 2110-2200	✓
71		617 to 698	✗
74/75/76		1427 to 1518	✗
77		3300 to 4200	✗
78		3300 to 3800	✗
79		4400 to 5000	✗

3. Antenna Characteristics

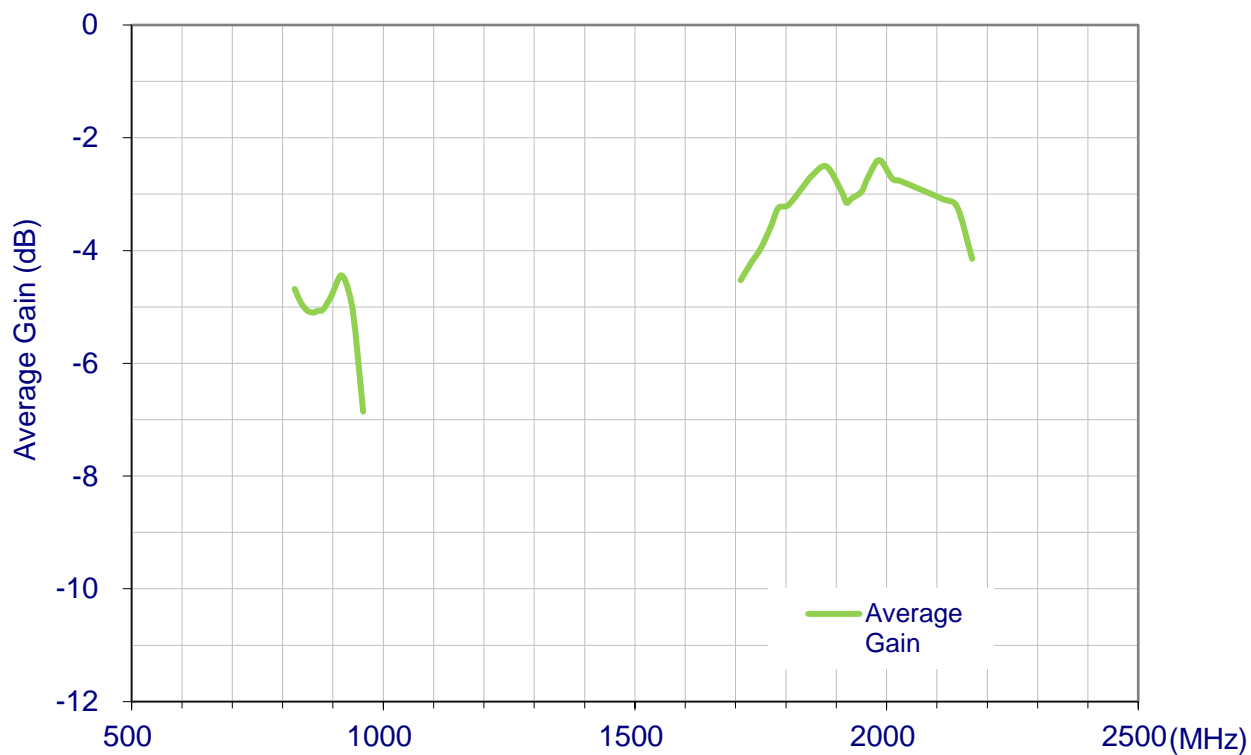
3.1 Return Loss



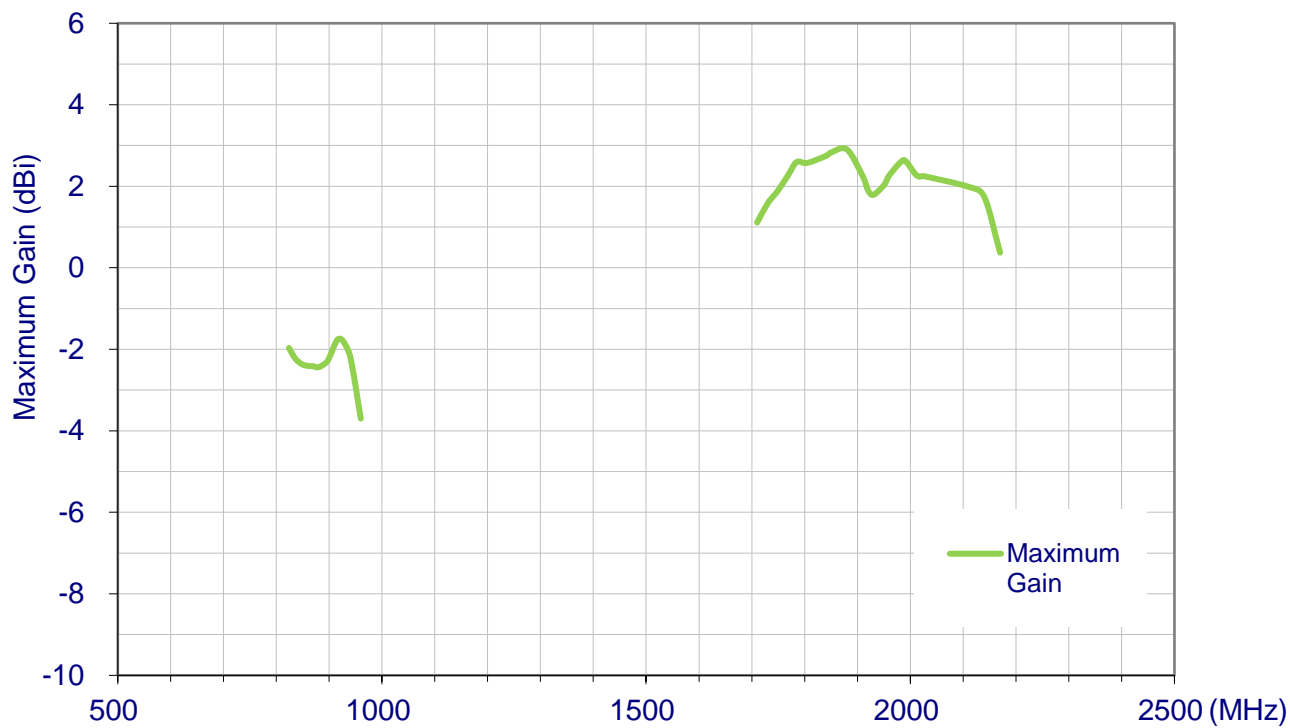
3.2 Efficiency



3.3 Average Gain

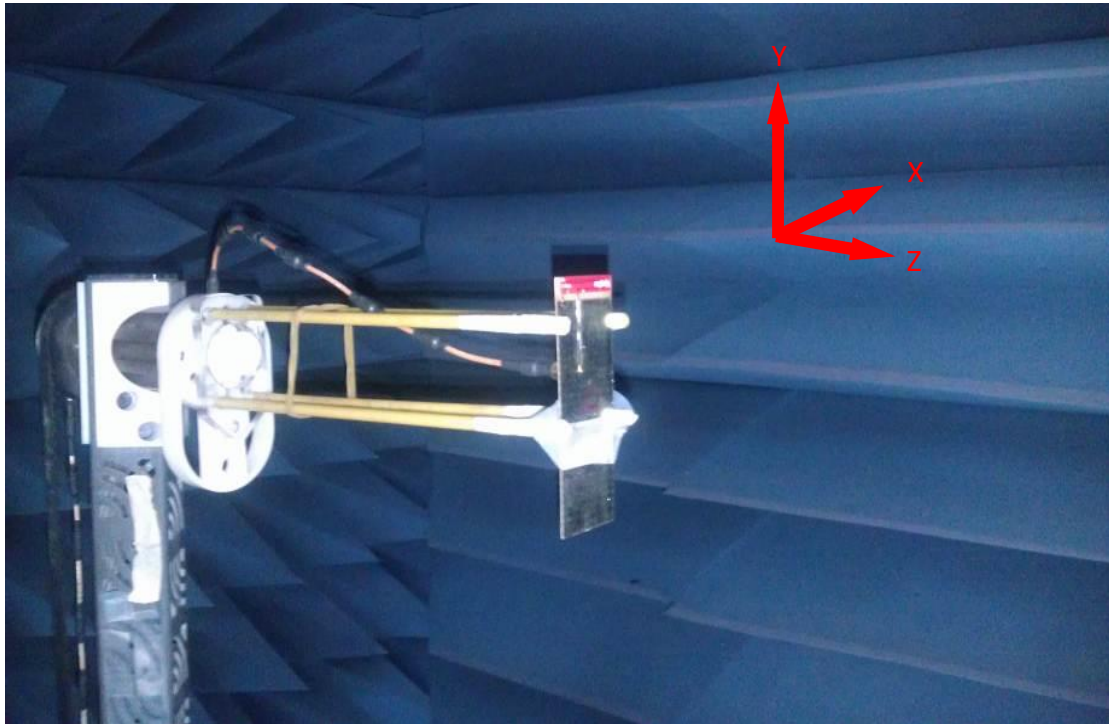


3.4 Peak Gain



4. Radiation Patterns

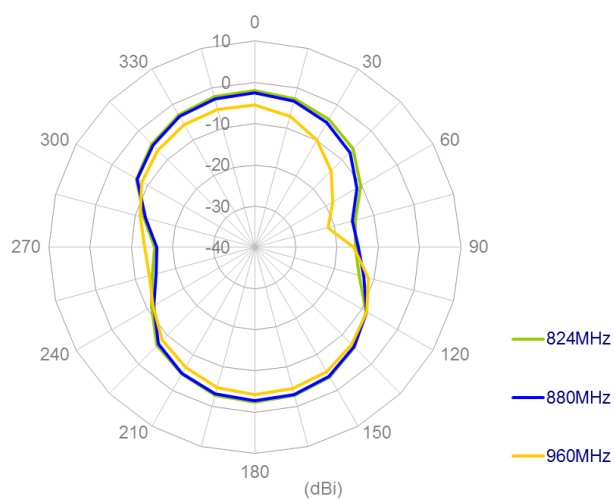
4.1 Test Setup on Evaluation Board



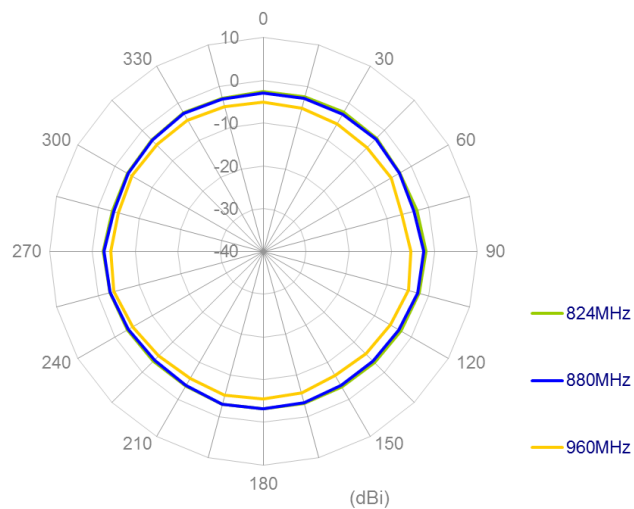
4.2 2D Radiation Patterns

824-960MHz

XY Plane

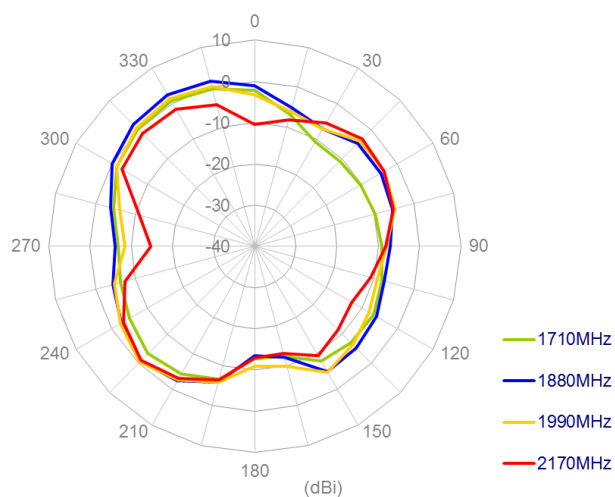


XZ Plane

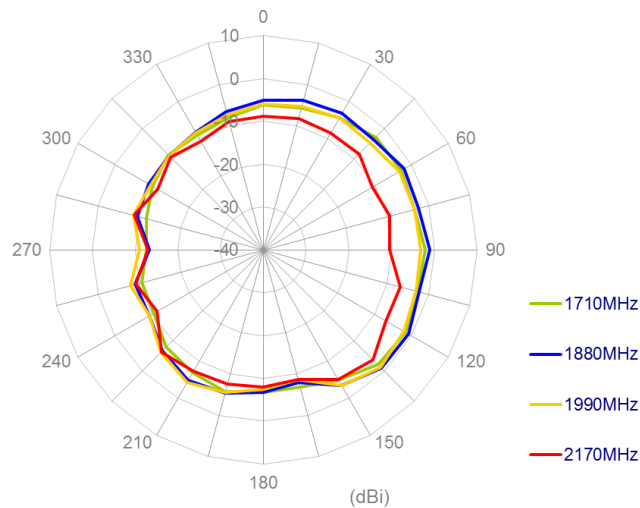


1710-2170MHz

XY Plane



XZ Plane



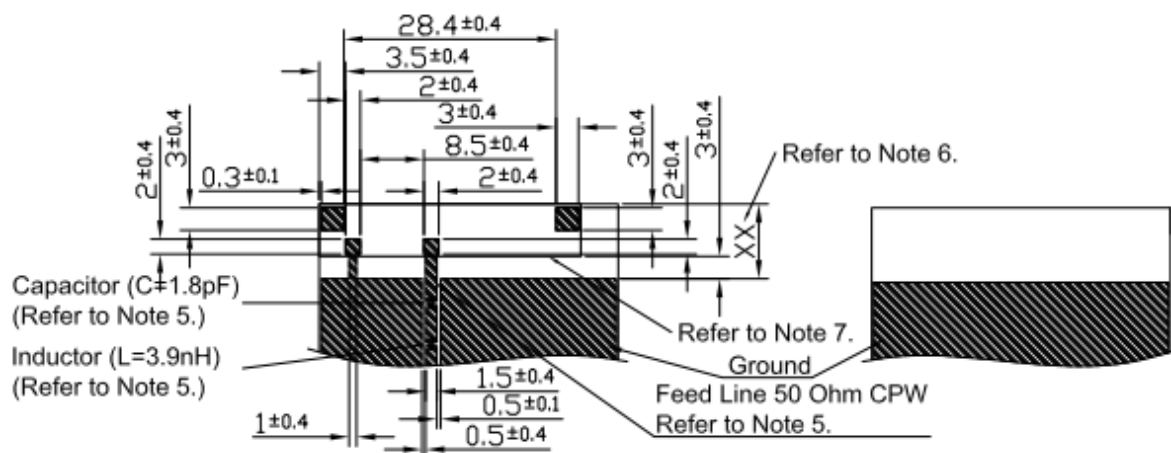
10

6. Footprint

Footprint 0.8t PCB

Top View

Bottom View



Notes

1. Tin Plated

2. Silkscreen (Black)

3. Soldermask (Gold)

4. Copper



5. Matching circuit - value changes according to ground and layout.

6. Antenna outline for placement reference.

7. Keep out area.

7. Antenna Integration Guide

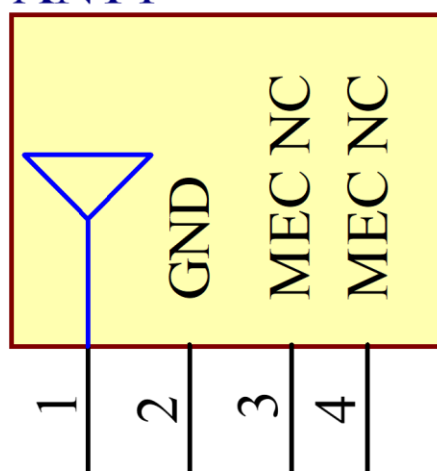


7.1 Schematic Symbol and Pin Definition

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.

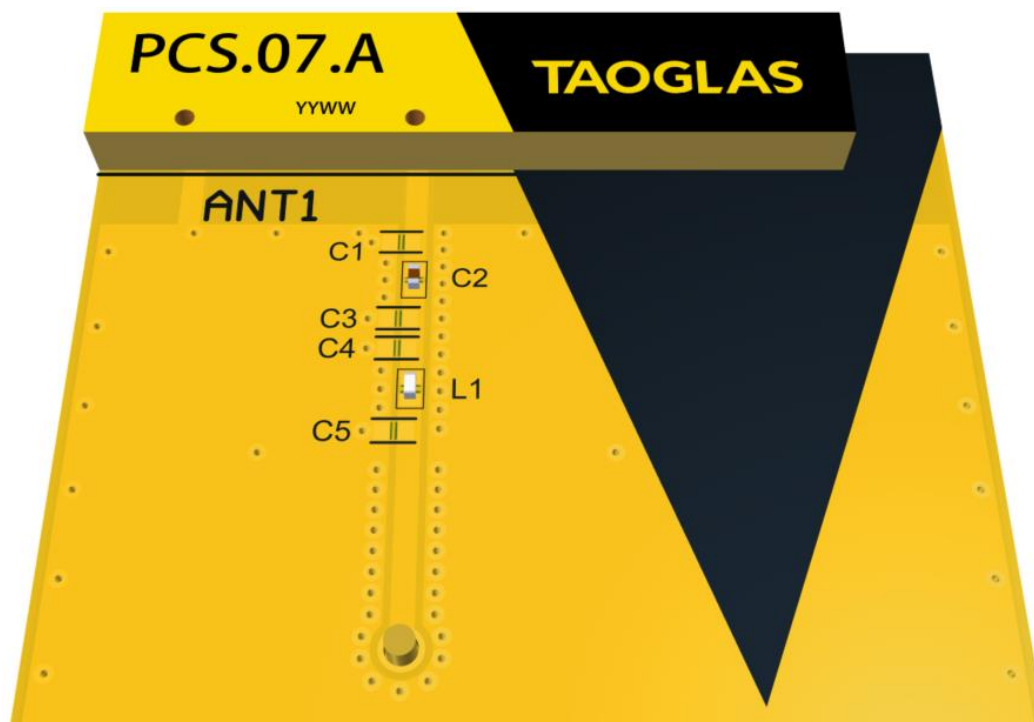
Pin	Description
1	RF Feed
2	Ground
3,4	Mechanical, Not Connected

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ANT1

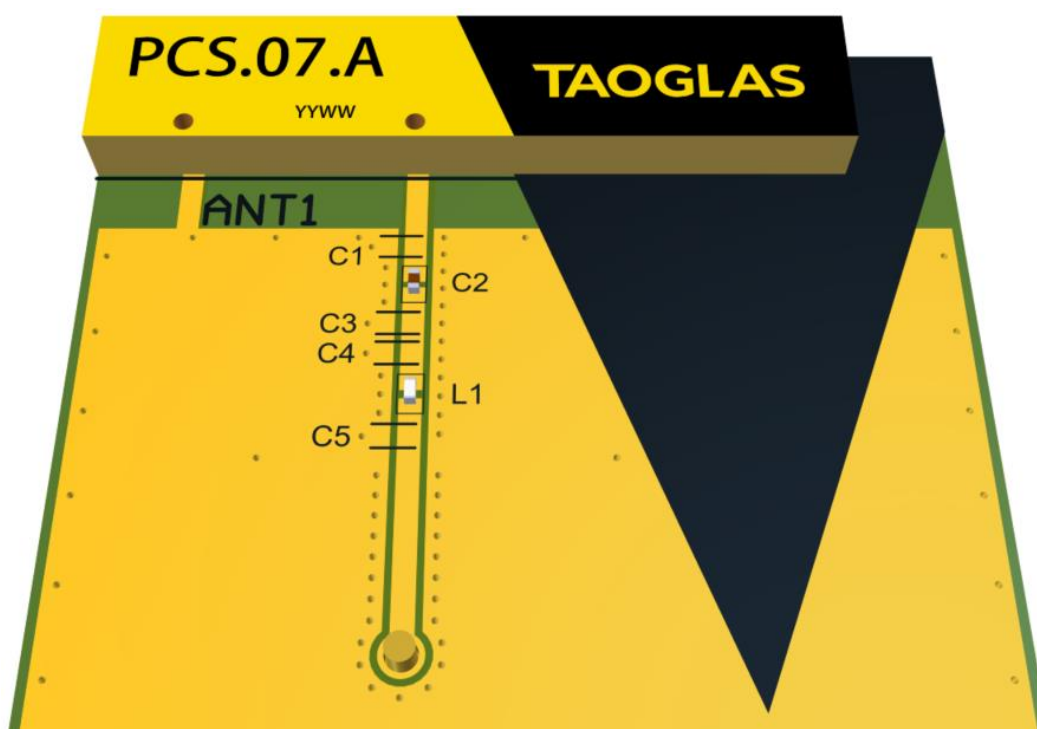


7.2 Antenna Integration

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.



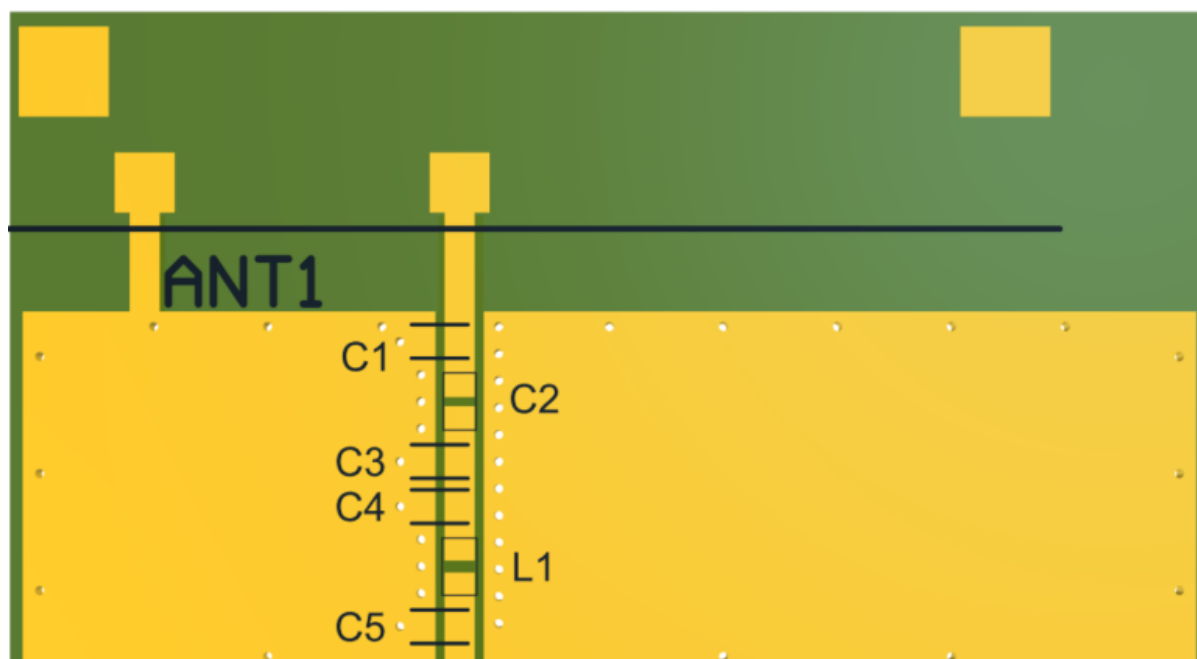
Top Side w/ Solder Mask



Top Side w/o 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. C1 is placed as close as possible to the RF feed (pad 1) but still within the transmission line. C2 & L1 are then placed tightly in series after that. C3, C4, & C5 are optional components but the footprints are recommended in case they are needed.



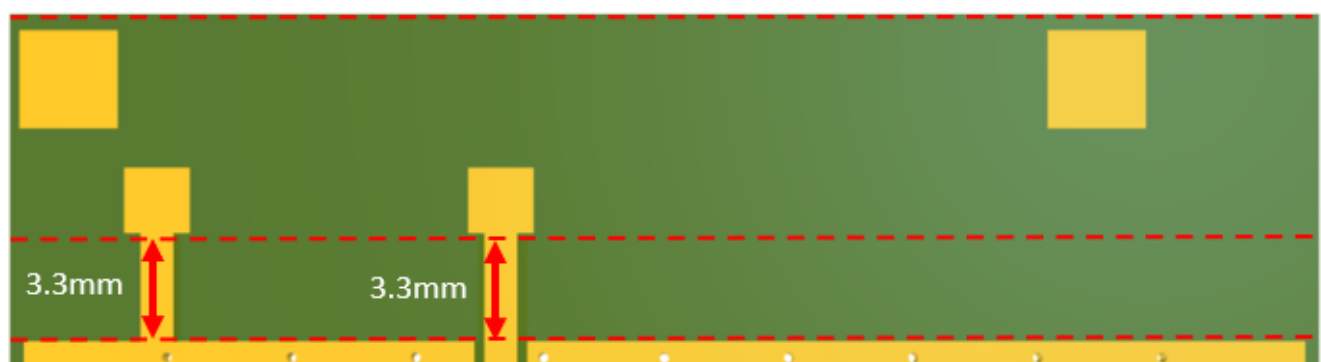
Topside



Bottom Side

7.4 PCB Clearance

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 2.8mm in length & 10.6mm in width from the centre of the PCB. This clearance area includes the bottom side and ALL internal layers on the PCB.



Topside



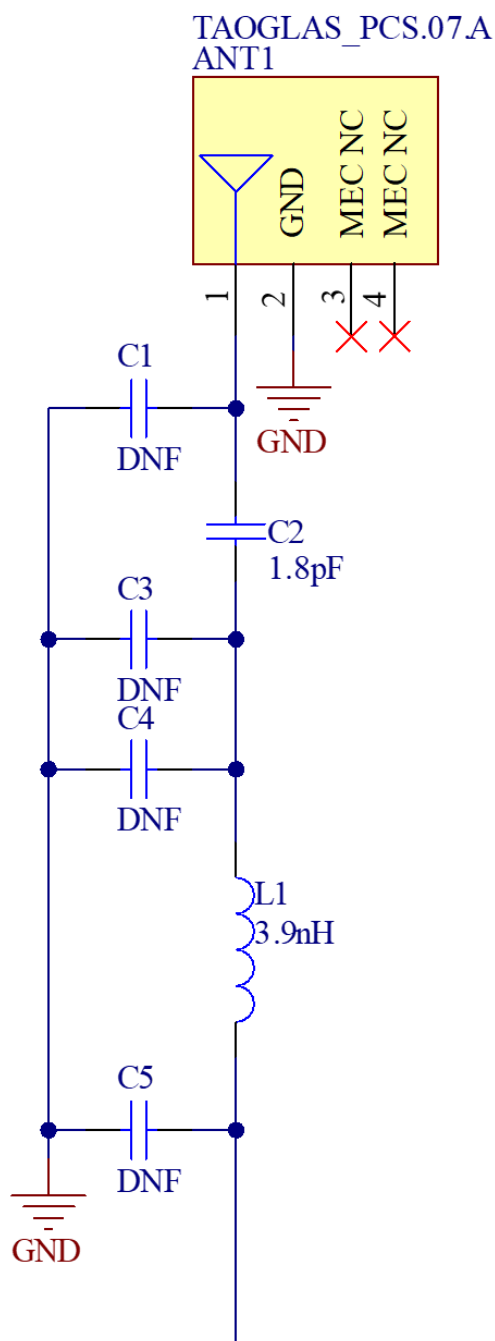
Bottom Side

7.5 Evaluation Board



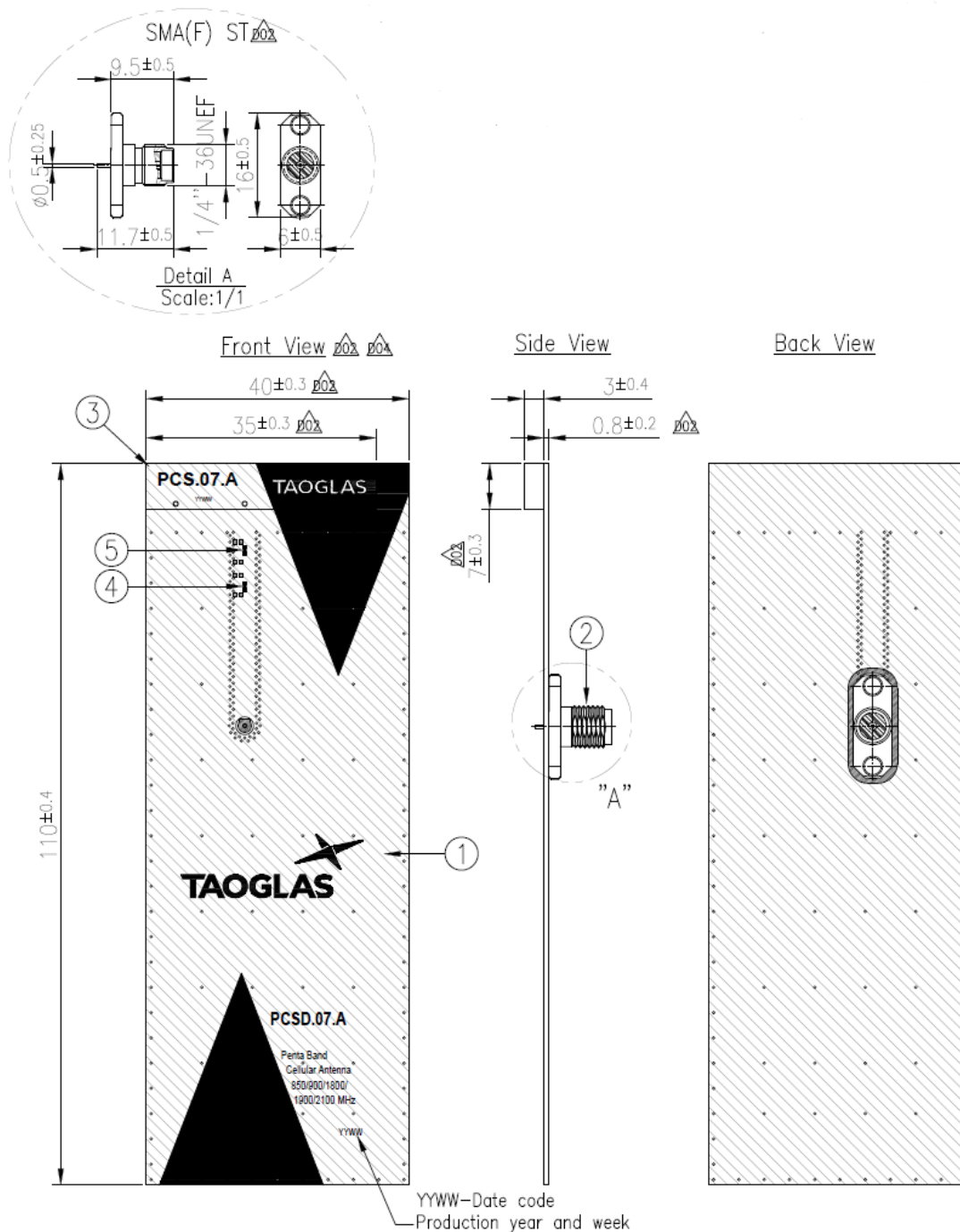
7.6 Evaluation Board Matching Circuit

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	3.9nH	TDK	MLK1005S3N9ST000
C2	Capacitor	1.8pF	Murata	GRM1555C1H1R8CA01D
C1, C3, C4, C5	Capacitor	Not Fitted	-	-

8. Evaluation Board Drawing (Units: mm)



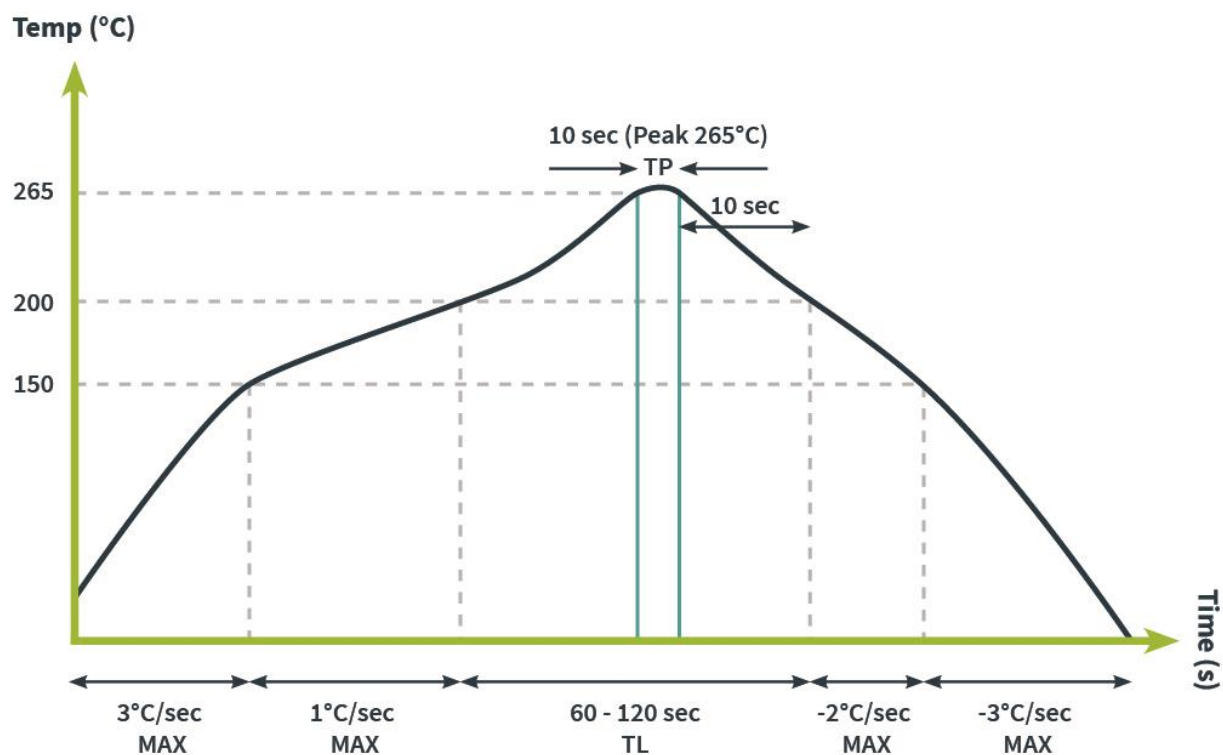
Note:

1. Week Batch Code
Example: 2013 Week 10=1310
2. Soldered area
3. Soldermask area(Gold)
4. Logo & Text Ink Printing : Black

	Name	P/N	Material	Finish	QTY
1	PCSD.07.A EVB PCB	100212I000052A	Composite 0.8t	Au Plated	1
2	SMA(F)ST PCB	200413B000002A	Brass	Au Plated	1
3	PCS.07.A PCB Antenna	100212I040052A	Composite 3t	Gold	1
4	3.9nH Inductor	001513C000055A	Ceramic	N/A	1
5	1.8pF Capacitor	001513C010055A	Ceramic	N/A	1

9. Solder Reflow Recommendations

The PCS.07.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 PCS.07.A when placing larger components on the board during subsequent reflows.

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

Technical drawing of a wheel rim, showing front, side, and detail views with dimensions.

Front View (Top):

- Overall diameter: $\varnothing 330.00 \pm 1.00$
- Hub diameter: $\varnothing 100.00 (REF)$
- Hub bore diameter: $\varnothing 13.100$
- Hub bore tolerance: -0.005
- Number of spokes: 5

Side View (Right):

- Flange thickness: 2.2 ± 0.3
- Hub thickness: 56 ± 1

Side View (Bottom):

- Overall width: 56 ± 0.3
- Hub width: 52.4 ± 0.1
- Flange width: 12 ± 0.1
- Spoke thickness: 4 ± 0.1
- Spoke spacing: 2 ± 0.15
- Spoke angle: $\varnothing 1.5 \pm 0.1$
- Flange outer diameter: $\varnothing 330.00 \pm 1.00$
- Flange inner diameter: $\varnothing 100.00$
- Flange thickness: 1.75 ± 0.1
- Flange outer radius: $R0.3 MAX$

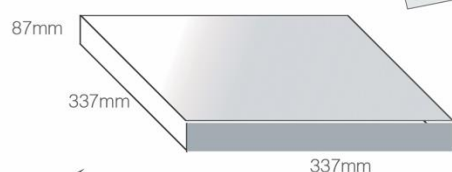
Detail View (Bottom Left):

- Spoke thickness: 7.50 ± 0.1
- Spoke width: 3.50 ± 0.1
- Spoke height: 0.30 ± 0.05

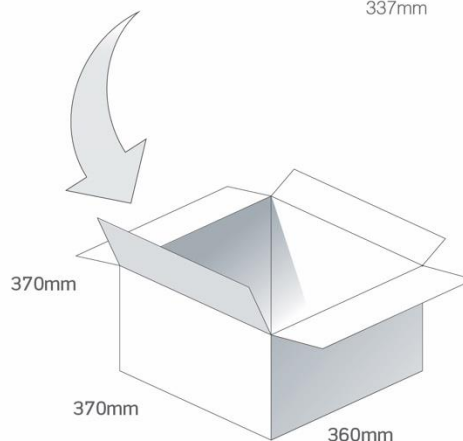
1000 pcs PCS.07.A reel
Dimensions - 330*330*60mm
Weight -2110g



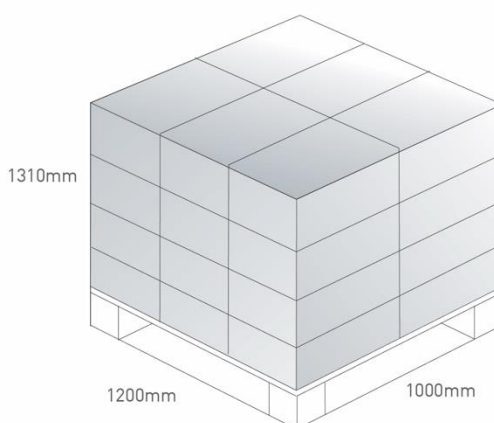
1000 pcs PCS.07.A / 1 Reel in small box
Dimensions - 337*337*87mm
Weight -2.39Kg



4 reels, 4000 pcs in one carton
Carton Dimensions - 370*360*370mm
Weight -10.44Kg



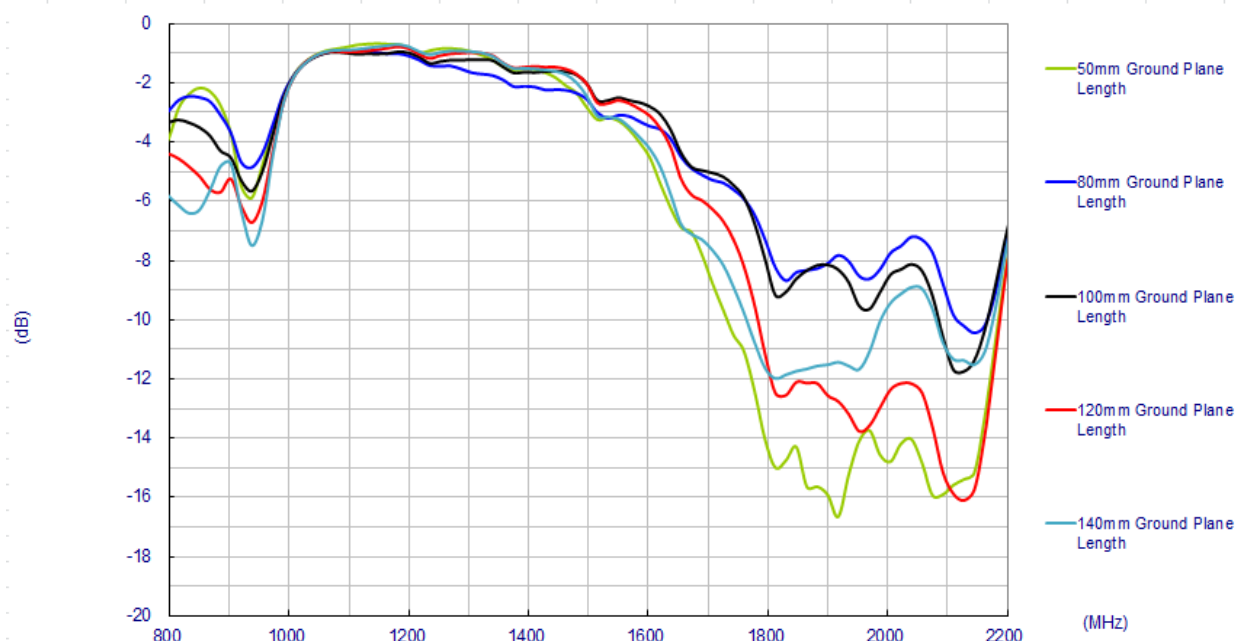
Pallet Dimensions 1200*1000*1310mm
18 Cartons per Pallet
6 Cartons per layer
4 Layers



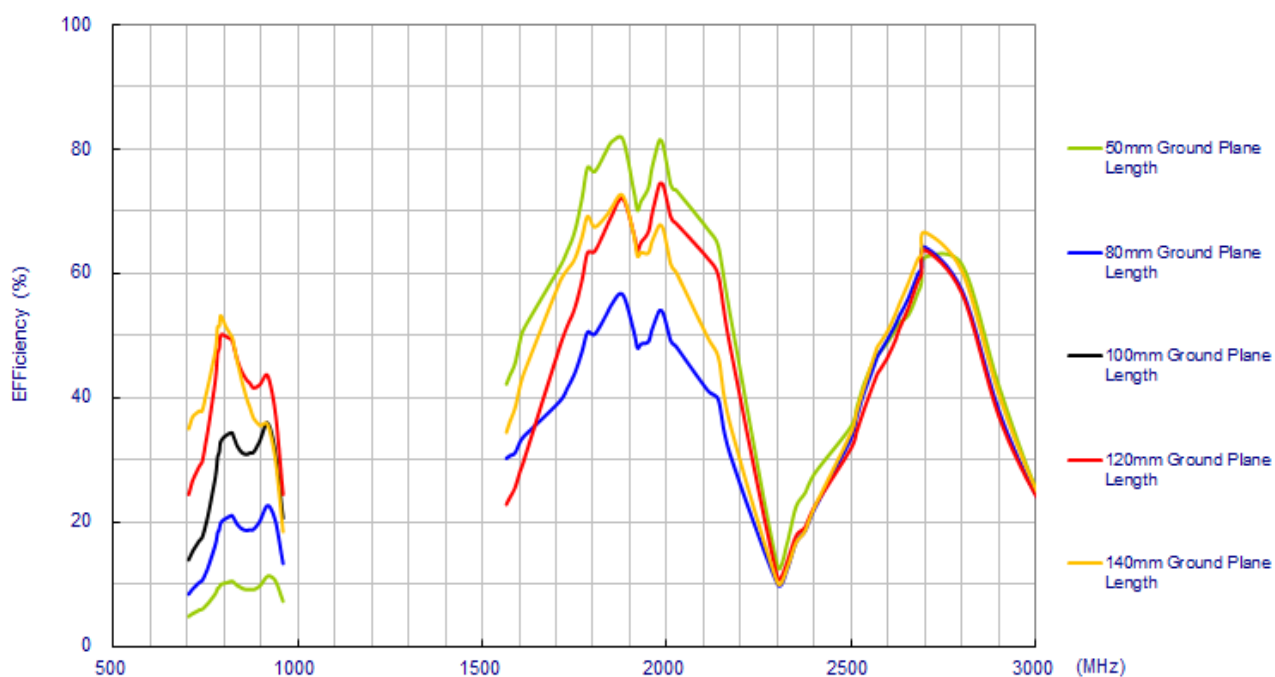
12. Application Note

Investigations of PCS.07.A antenna performance on different lengths of ground plane were conducted, the results are shown below.

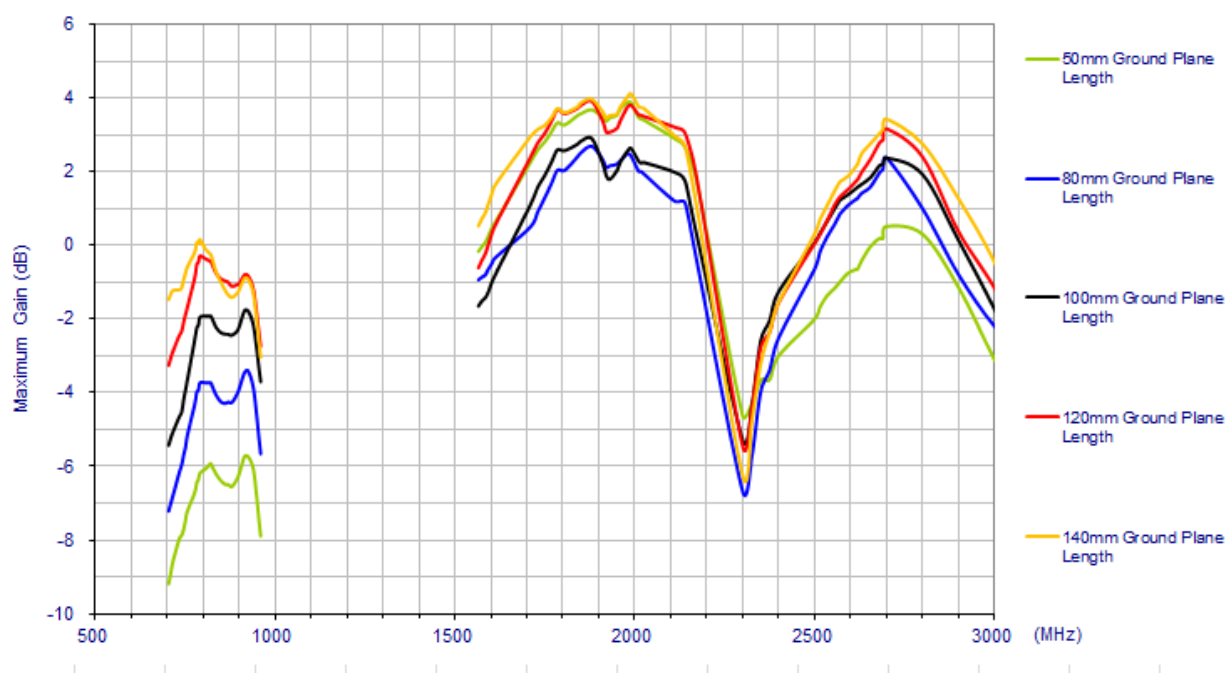
11.1 Return Loss



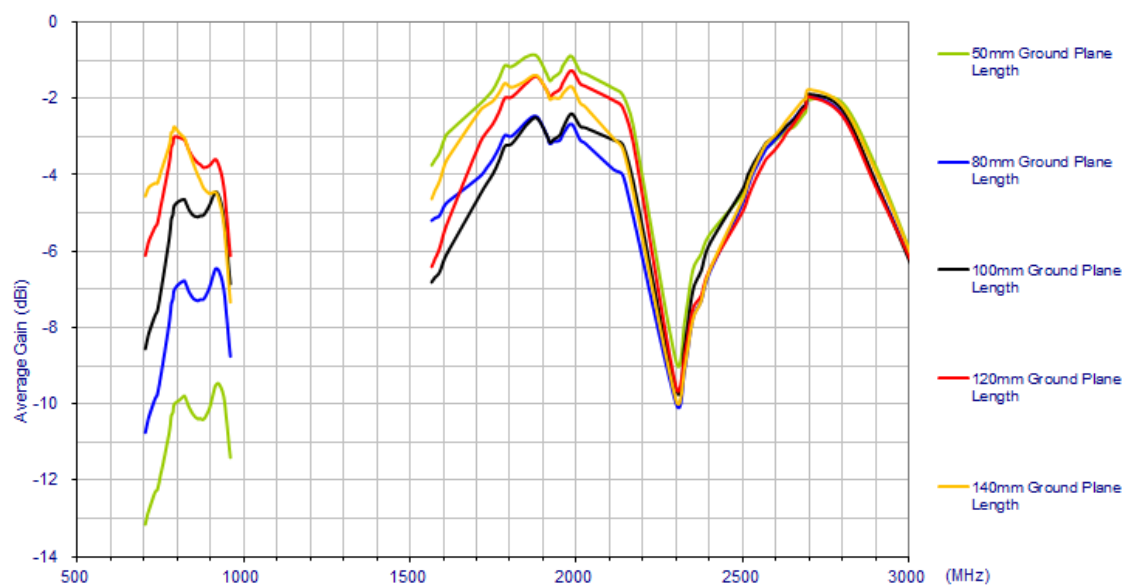
11.2 Efficiency



11.3 Peak Gain



11.4 Average Gain



Changelog for the datasheet

SPE-13-8-042 – PCS.07.A

Revision: H (Current Version)

Date:	2023-10-24
Changes:	Solder Reflow Recommendations Amended.
Changes Made by:	Cesar Sousa

Previous Revisions

Revision: G

Date:	2023-03-14
Changes:	Antenna Integration Guide Added
Changes Made by:	Cesar Sousa

Revision: B

Date:	2013-08-11
Changes:	Drawing Updated
Changes Made by:	Aine Doyle

Revision: F

Date:	2021-09-09
Changes:	Solder Reflow Recommendations Amended.
Changes Made by:	Gary West

Revision: A (Original First Release)

Date:	2013-04-11
Notes:	
Author:	Wayne Yang

Revision: E

Date:	2021-09-09
Changes:	Added MSL rating, updated font.
Changes Made by:	Erik Landi

Revision: D

Date:	2020-12-01
Changes:	Updated Format and Drawing
Changes Made by:	Jack Conroy

Revision: C

Date:	2018-10-23
Changes:	Updated Drawing
Changes Made by:	David Connolly



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