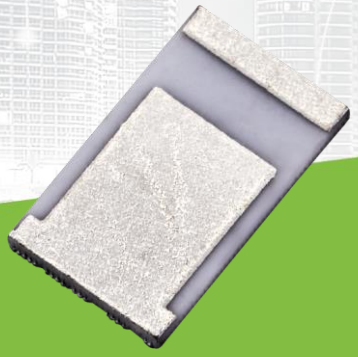
TAOGLAS



Datasheet

GLA.01 GPS/GALILEO 5*3*0.5mm Ceramic Loop Antenna

Part No:
GLA.01

Description:

1575.42MHz

Features:

L=5mm*W=3mm*H=0.5mm
Low profile SMT antenna
High performance Loop antenna
RoHS & REACH Compliant

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2.	Specifications	4
3.	Antenna Characteristics	5
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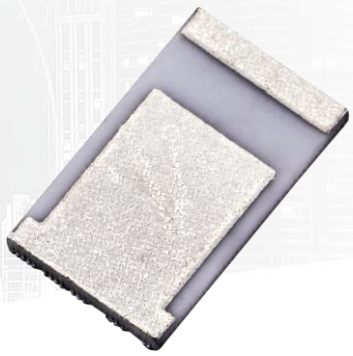
1. Introduction



Taoglas has developed a unique ceramic miniature loop antenna series for GPS/GALILEO applications. At 5.0*3.0*0.5mm, the GLA.01 GPS/GALILEO Loop antenna is a miniature edge mounted antenna designed for small space requirements. The radiation pattern is more omni-directional than traditional patch antennas. The GLA loop antenna series show at least three times the efficiency of traditional linear polarized 1575.42MHz MHz antennas. Efficiencies of 40% to 90% are achievable. A peak gain of 2.5dBi places this antenna's gain performance within the range of a much larger 15mm to 18mm patch antenna.

Mechanically, the GLA.01 at only 0.5mm in height has a very low profile, and with a footprint of 6.0 x 5.5mm needs less space on the board. It does require clearance of 6.0 x 5.5mm. Based on the loop effect, this antenna works best when placed on the center of the edge of the board, but can still work better than traditional linear polarized chip antennas even when placed at corners as a substitute.

The GLA.01 is delivered on tape and reel and now allows M2M customers to use an omni-directional antenna in devices where orientation of the product is unknown.

This antenna can be mounted with no performance degradation in either orientation as long as the antenna is soldered correctly via Surface mounting. Please see the integration instructions section for further detail regarding the optimum way to integrate this antenna into your device.

For further optimization to customer-specific device environments and for support to integrate and test this antennas performance in your device, contact your regional Taoglas Customer Services Team.

Applications:

Navigation or position tracking systems
Hand-held devices when GPS/GALILEO function is needed, e.g., smart phone. PDA

2. Specifications

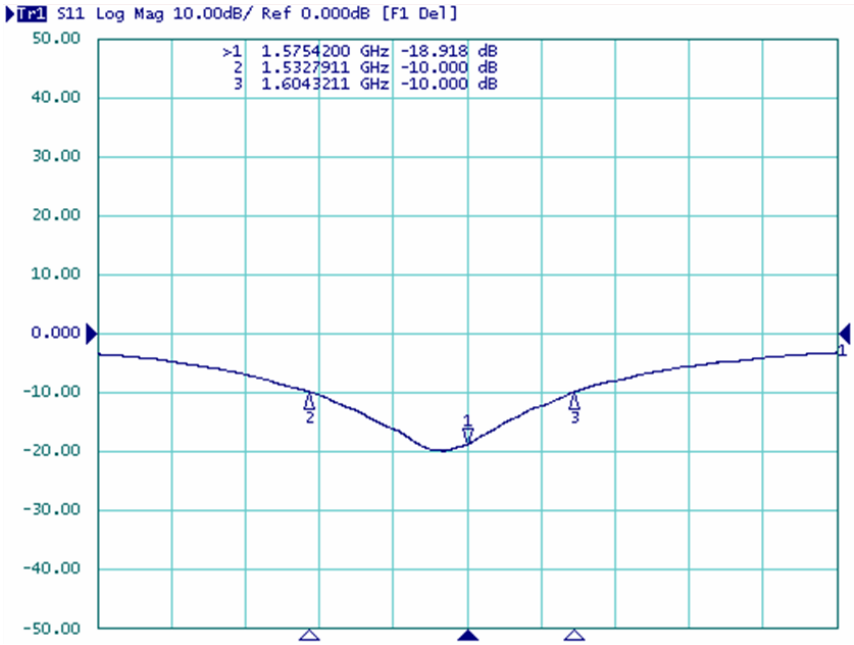
Antenna	
Frequency (MHz)	1575.42MHz*
Efficiency (%)	
80 x 40 mm Ground Plane	84% (Tyo.)
Peak Gain (dBi)	
80 x 40 mm Ground Plane	2.5 dBi (Typ.)
VSWR	2 max
Impedance (Ω)	50Ω
Polarization	Linear
Bandwidth	50MHz min.
Mechanical	
Dimensions (mm)	5.0 x 3.0 x 2.5
Material	Ceramic
Tested Ground Plane (mm)	80 x 40
Environmental	
Temperature Range	-40°C to 85°C
Storage Temperature	-40°C to 105°C
Temperature Coefficient （τf）	0 ± 20 ppm @-20ºC to +80ºC
Recommended Reel Storage Condition	5°C to 40°C Relative Humidity 20% to 70%
Moisture Sensitivity Level	3 (168 Hours)

The data was measured by A CTIA Authorized Test Lab.

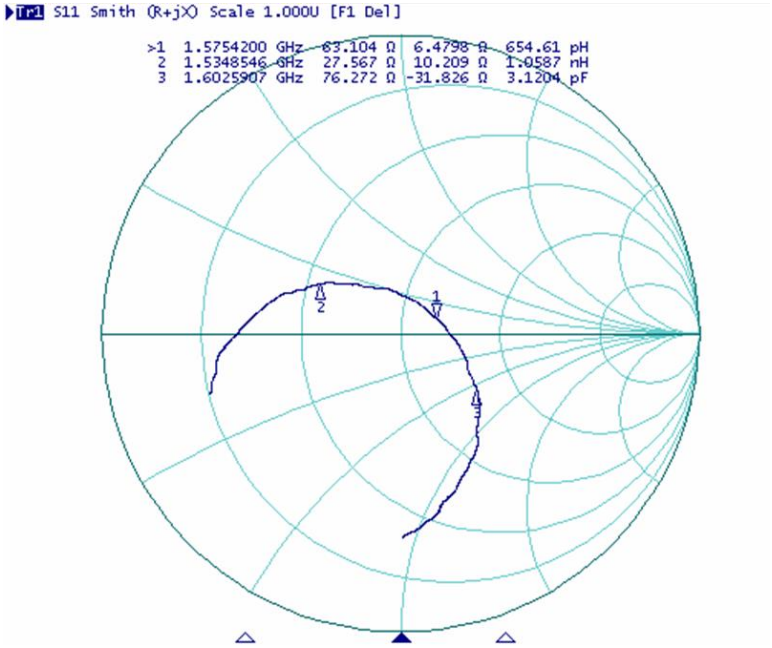
* Working frequency will be offset to another frequency according to the conditions of user's ground plane and radome.

3. Antenna Characteristics

3.1 Return Loss



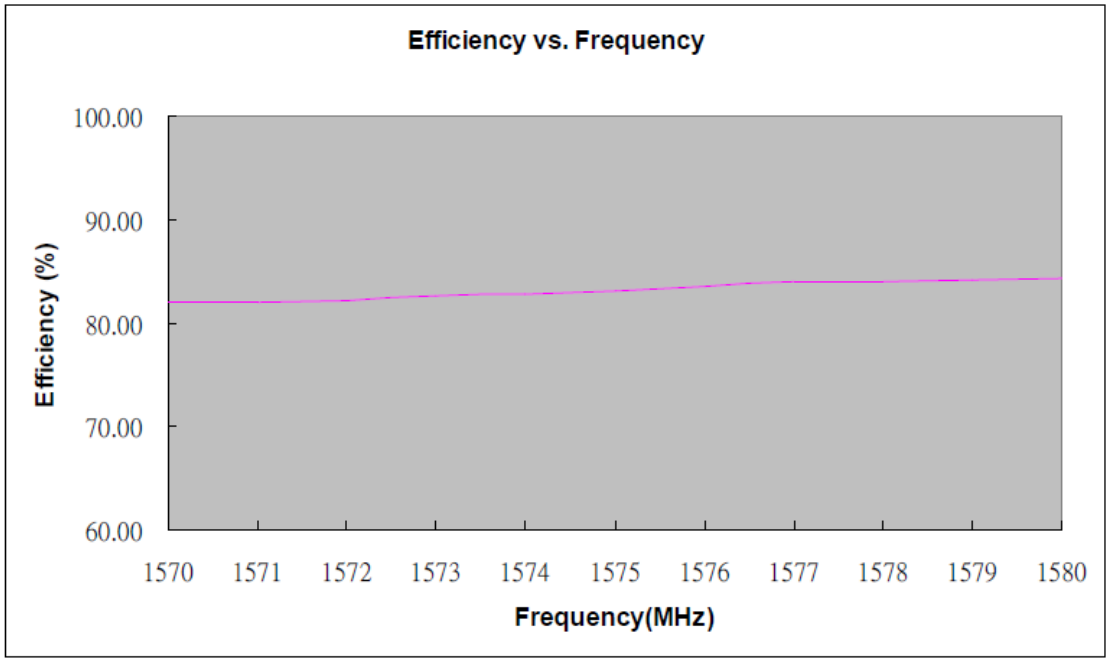
3.2 Impedance (Smith Chart)



3.3 Efficiency Table

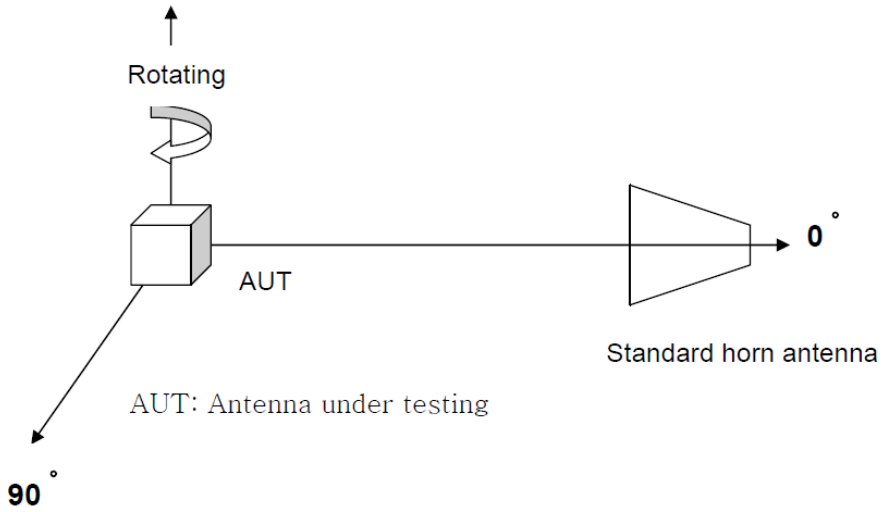
Frequency(MHz)	1570	1571	1572	1573	1574	1575	1576	1577	1578	1579	1580
Efficiency (dB)	-0.86	-0.86	-0.85	-0.83	-0.82	-0.80	-0.78	-0.76	-0.76	-0.75	-0.74
Efficiency (%)	82.00	82.03	82.21	82.61	82.70	83.15	83.60	83.95	84.03	84.18	84.28
Gain (dBi)	2.41	2.41	2.42	2.44	2.44	2.48	2.51	2.51	2.52	2.53	2.55

3.4 Efficiency vs. Frequency

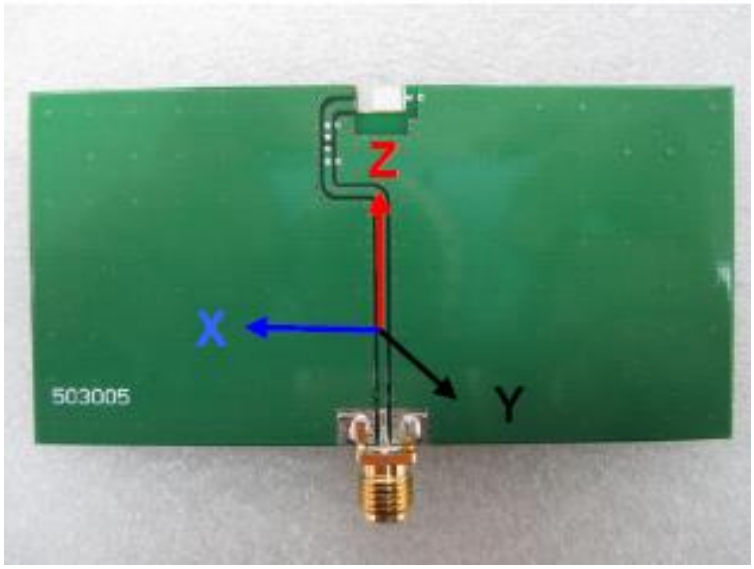


4. Radiation Patterns

4.1 Test Setup – Antenna on Evaluation Board

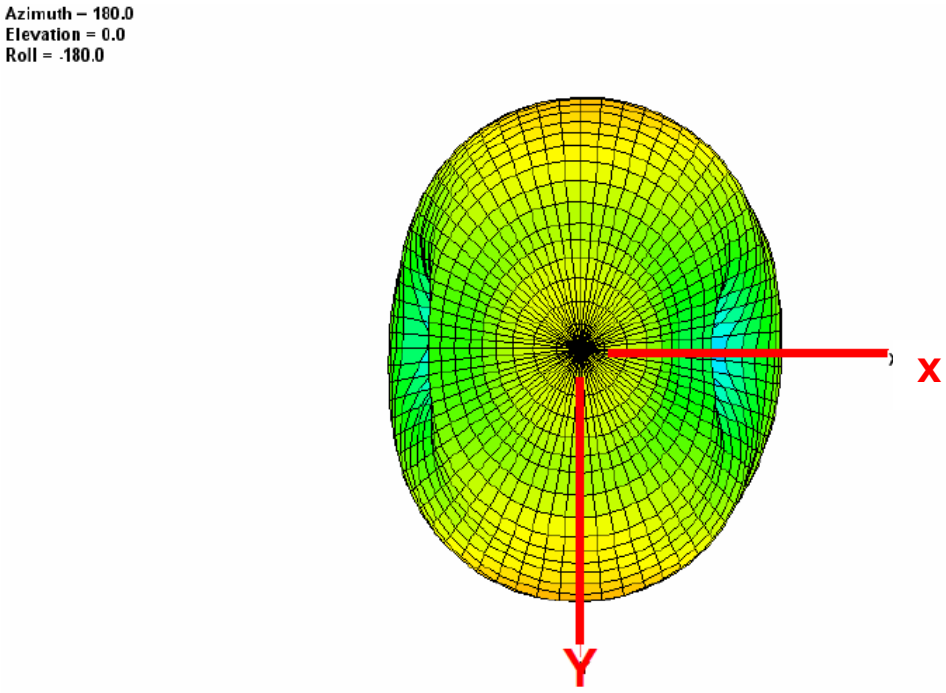


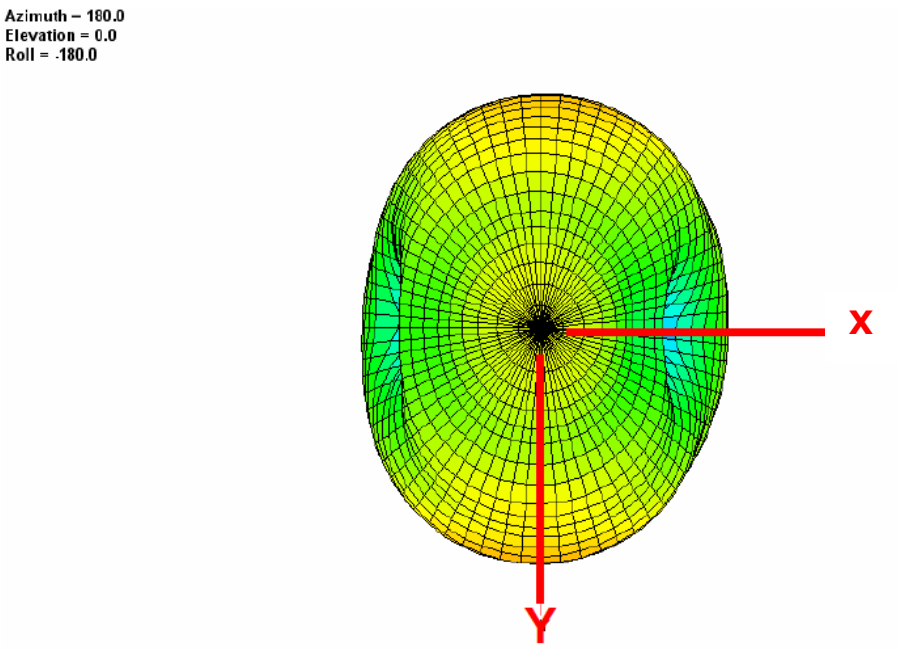
4.2 Radiation Pattern (80X40(mm)ground plane)



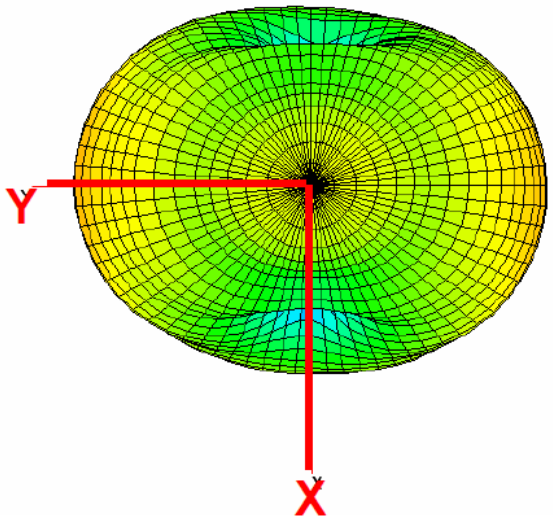
4.3 3D Radiation Pattern

1575 MHz

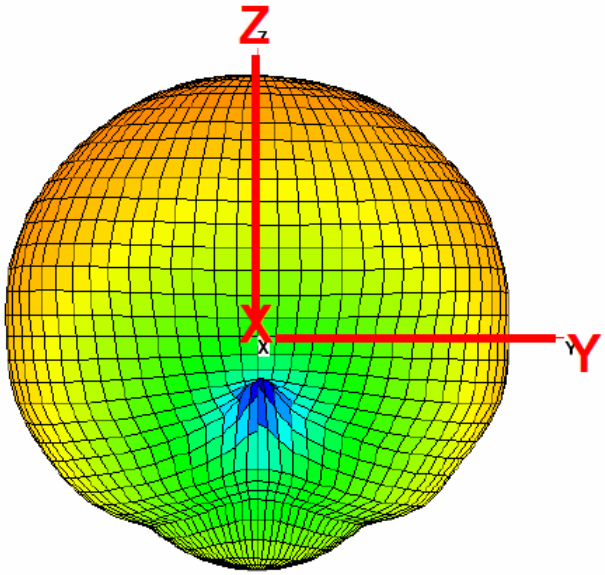




Azimuth = -90.0
Elevation = 0.0
Roll = 180.0



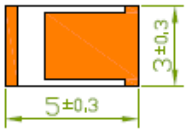
Azimuth = 90.0
Elevation = 0.0
Roll = -90.0



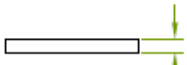
5. Mechanical Drawing – Antenna

5.1 Antenna Dimension and Drawing

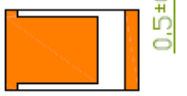
Top View



Side View



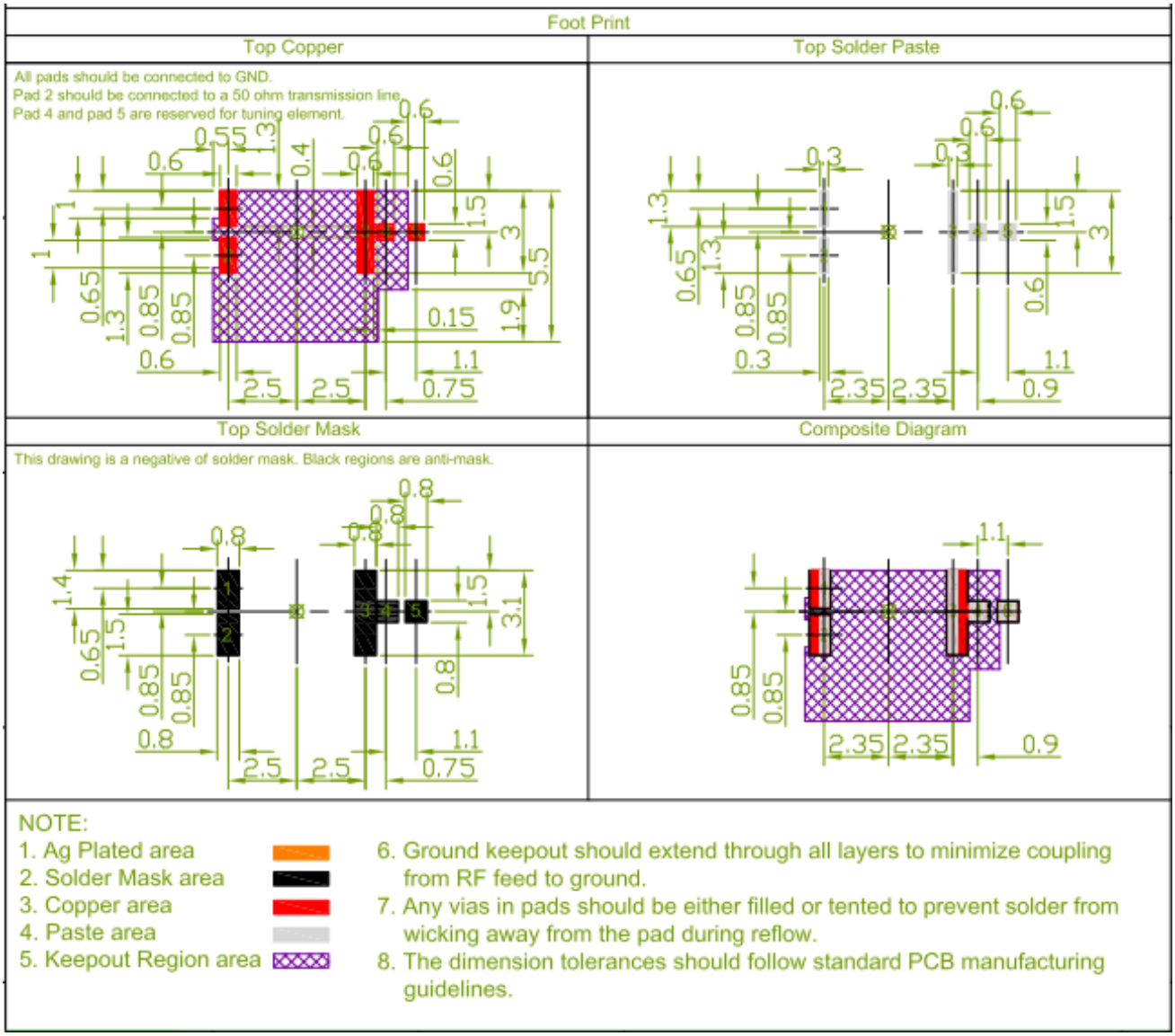
Bottom View



Unit: mm

NOTE:
1. Tin Plated area

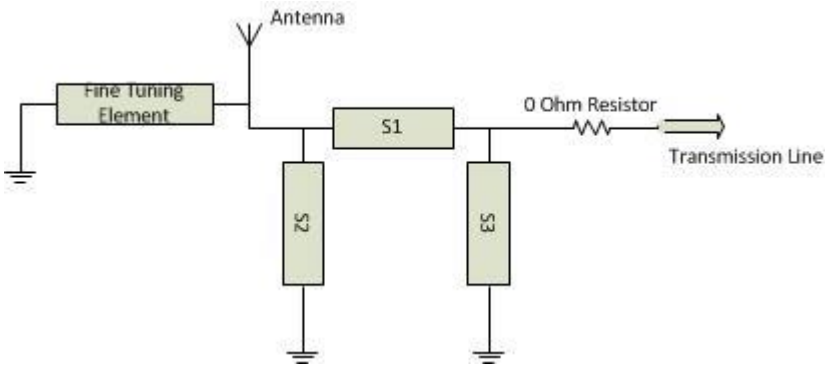
5.2 Antenna Footprint



*Taoglas is able to provide CAD drawing file to customers for evaluation.

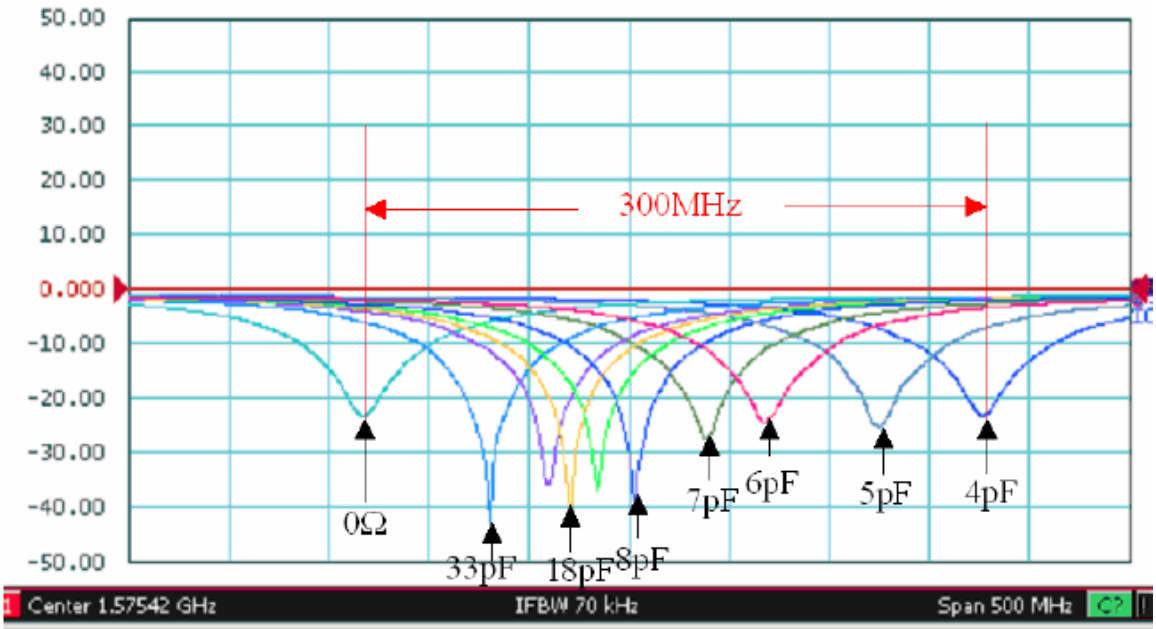
5.2 Matching Circuit

Like all antennas, surrounding components, enclosures, and changes to the GND plane dimensions can alter performance. A pi-matching network like the one shown below is required in case adjustments need to be made. The antenna EVB has a similar matching network. The components on the EVB are a good starting point for a new design, but will need to be adjusted upon integration for best performance. The zero ohm resistor is needed for the ability to solder down a coax pigtail to make measurements with a vector network analyzer.

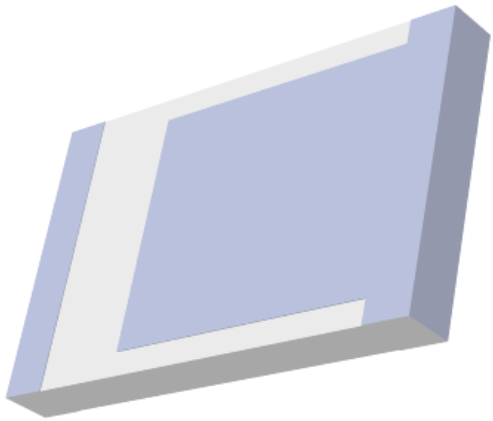


5.3 Fine Tuning Element vs. Centre Frequency

This antenna includes a fine tuning element (as shown in the land patterns above) that can be used to slightly shift antenna resonance.



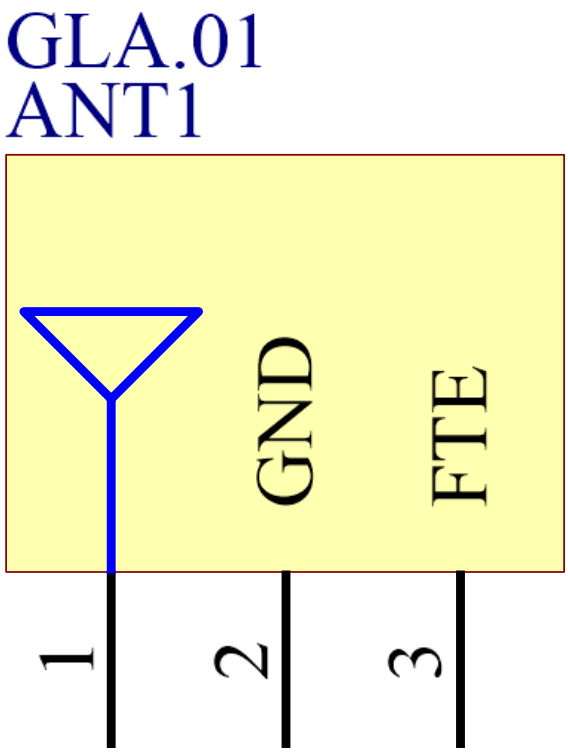
6. Antenna Intergration Guide



6.1 Schematic Symbol and Pin Definition

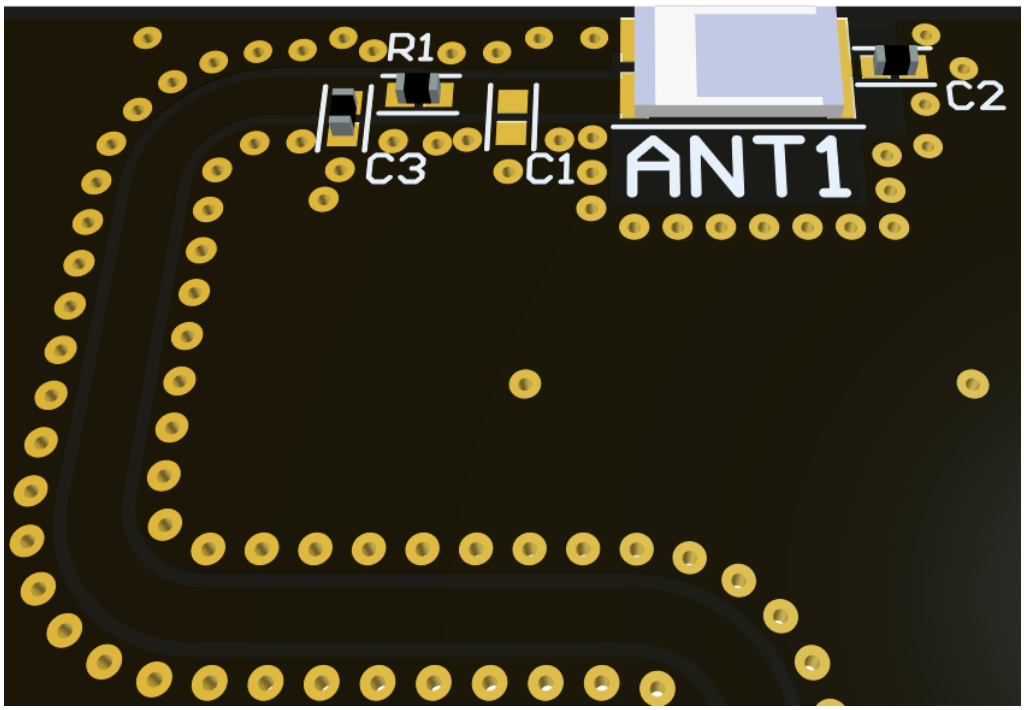
The circuit symbol for the antenna is shown below. The antenna has 3 pins with all three pins as functional.

Pin	Description
1	RF Feed
2	Ground
3	FTE

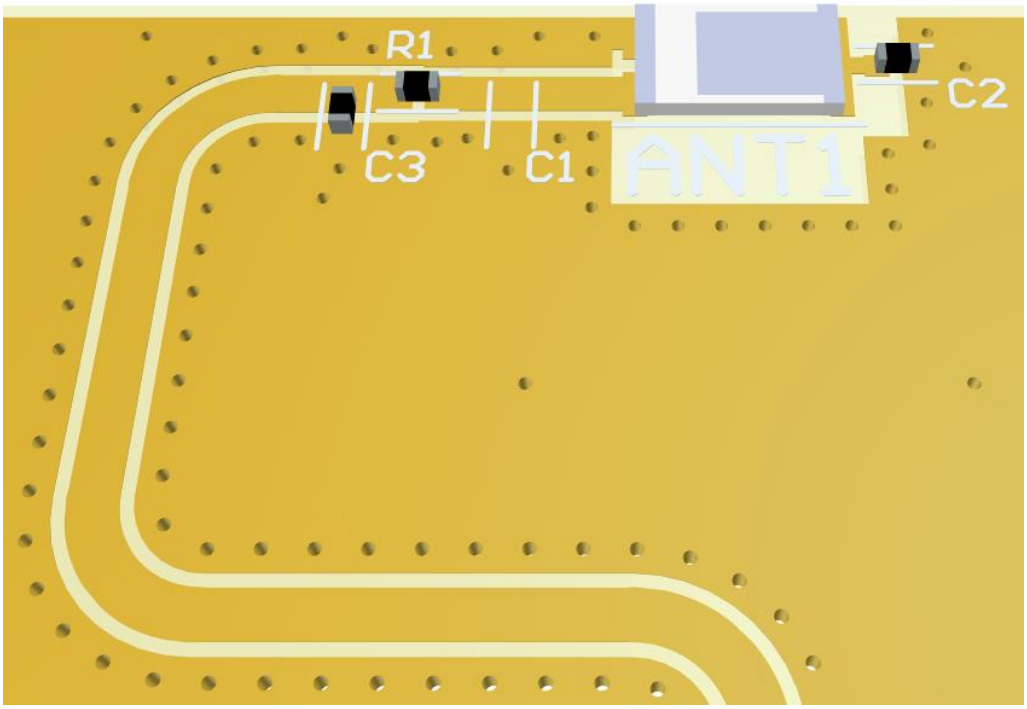


6.2 Antenna Integration

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



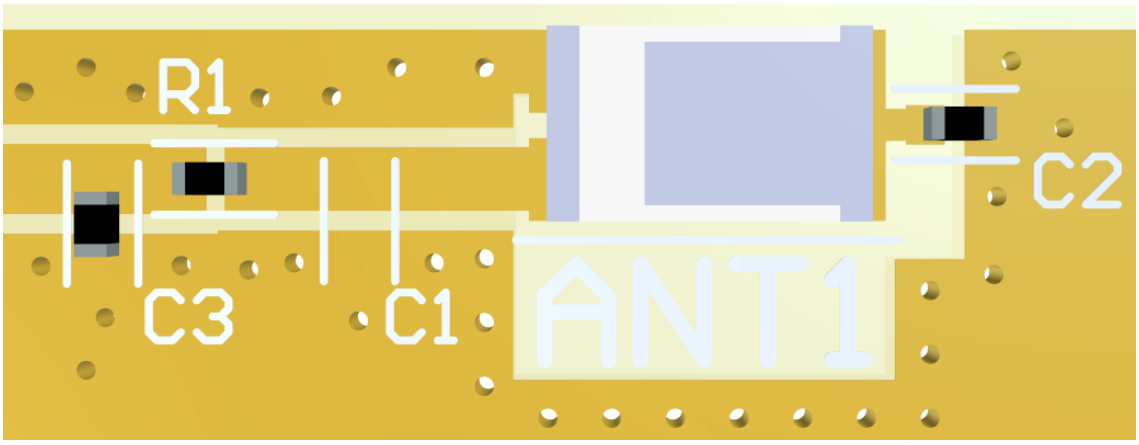
Top Side w/ Solder Mask



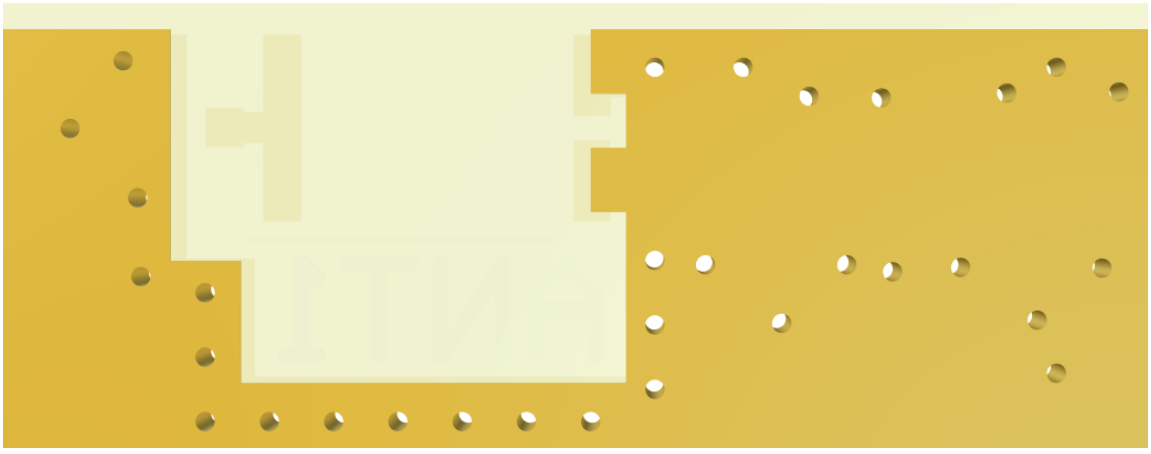
Top Side w/o Solder Mask

6.3 PCB Layout

The footprint and clearance on the PCB must meet the layout drawing in (Footprint Drawing). Note the placement of the optimized components. R1 is placed as close as possible to the RF feed (pad 1) but still within the transmission line. C3 is then placed tightly in parallel after that. C2 is placed as close as possible to the Tuning feed (pad 3). C1 is an optional component but the footprint is recommended in case it is needed.
.



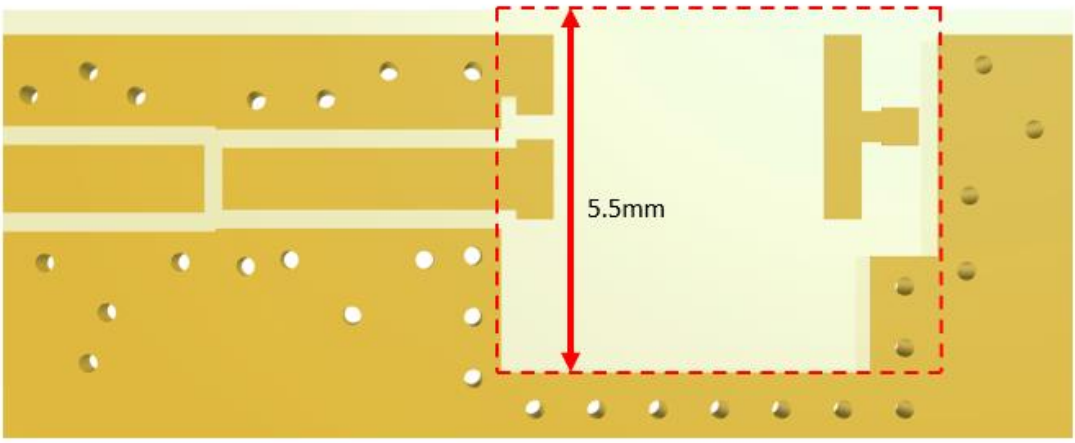
Topside



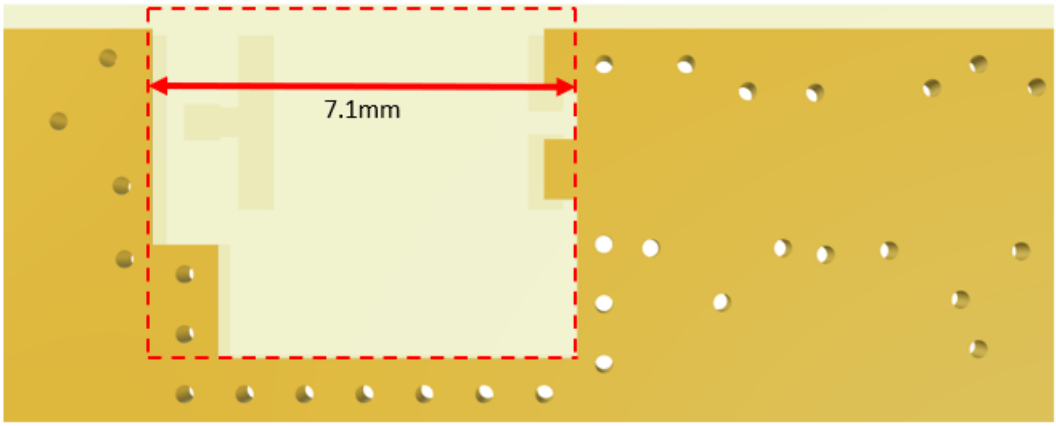
Bottom Side

6.4 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 5.5mm in length & 7.1mm in width from the top center of the PCB. This clearance area includes the bottom side and ALL internal layers on the PCB.

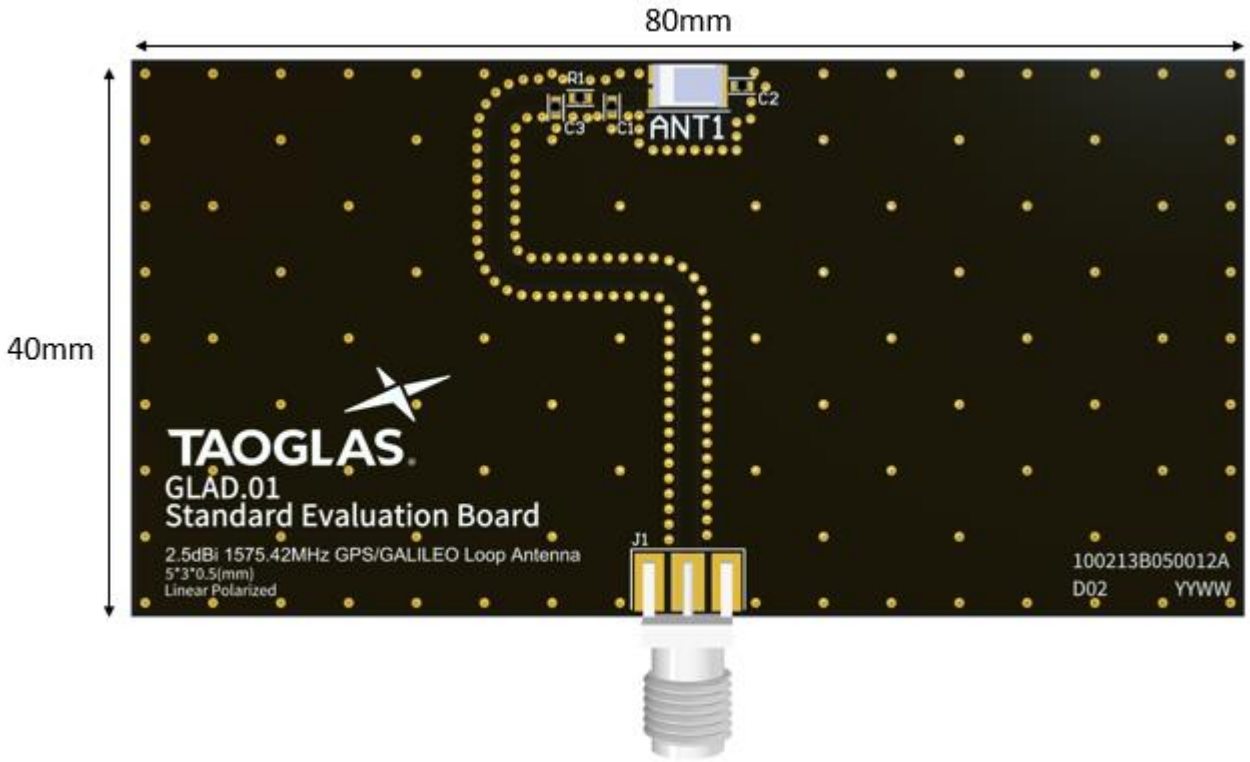


Topside

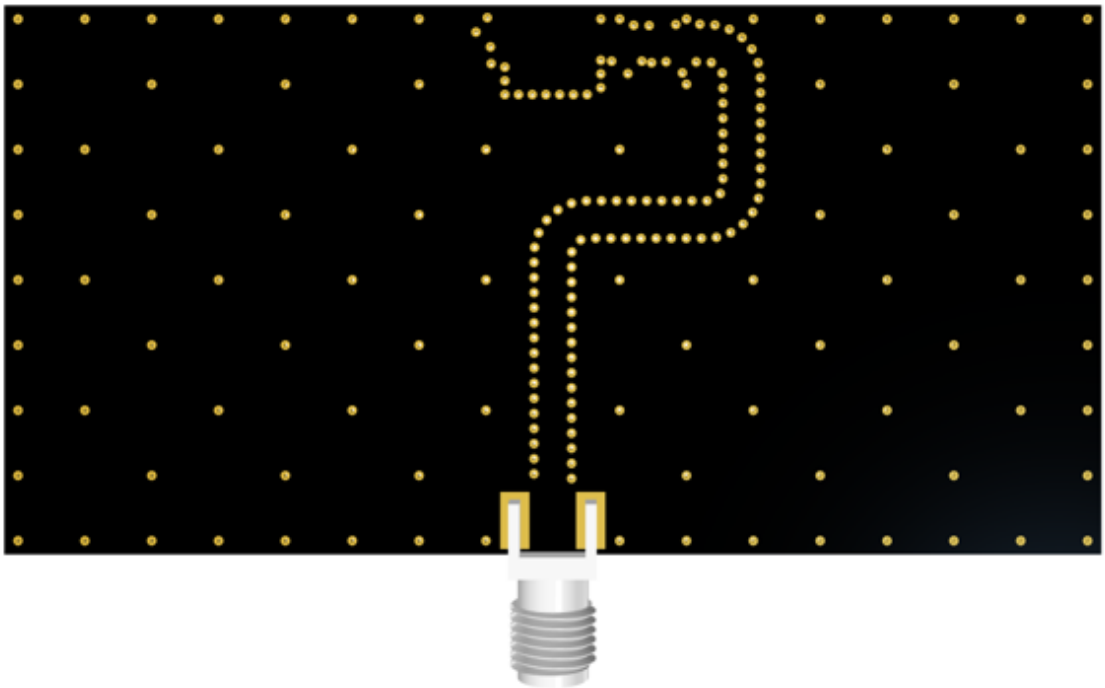


Bottom Side

6.5 Evaluation Board



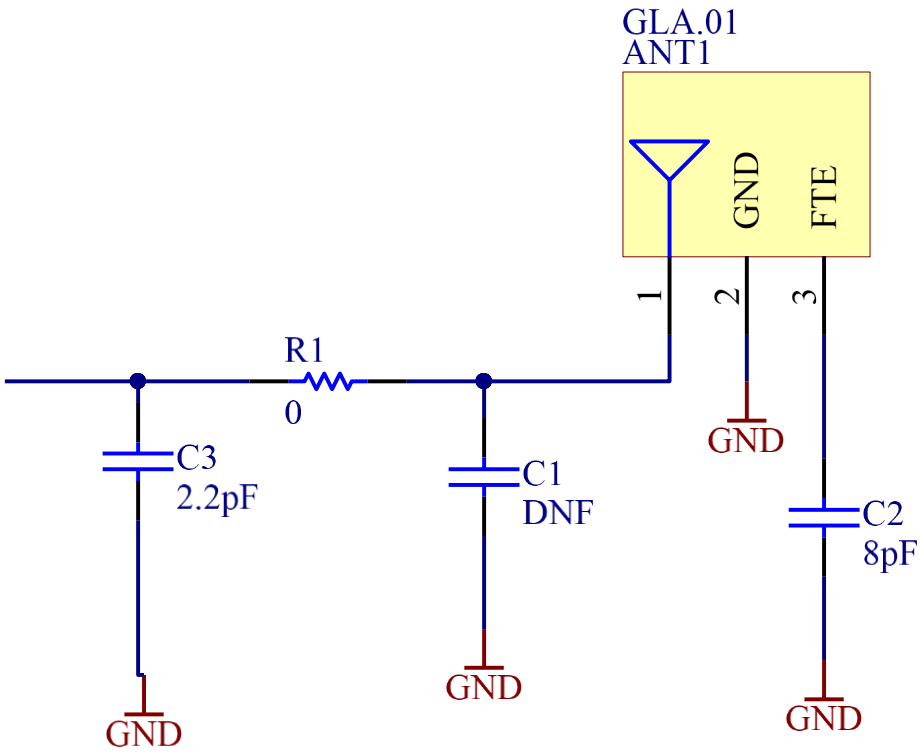
Topside



Bottom Side

6.6 Evaluation Board Matching Circuit

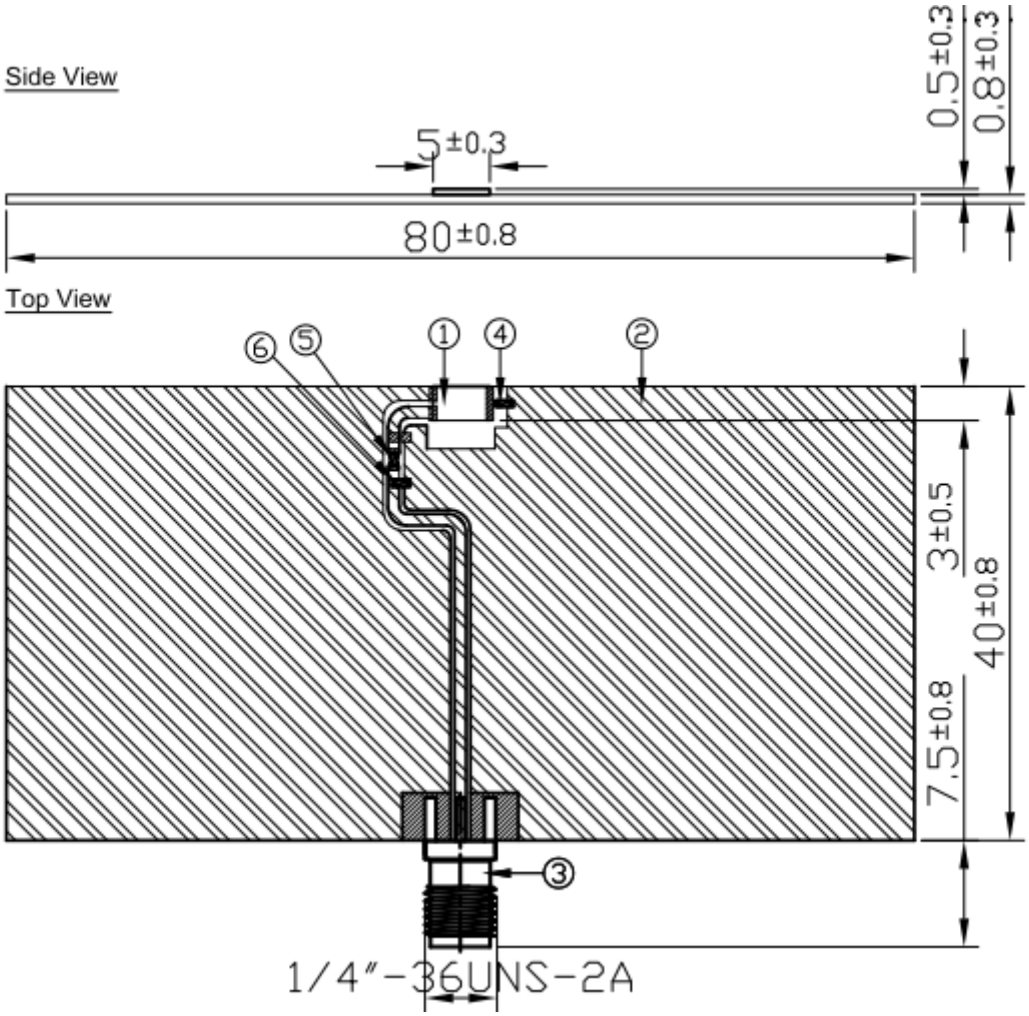
A matching component (R1) in series with the GLA.01 is required for the antenna to have optimal performance on the evaluation board, located outside of the ground plane in the space specified in the above images. Additional matching components may be necessary for your device, so we recommend incorporating 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
R1	Resistor	0 Ohms	Yageo	RC0402JR-070RL
C1	Capacitor	Not Fitted	-	-
C2	Capacitor	8pF	Murata	GRM1555D1H8R0DA01D
C3	Capacitor	2.2pF	Murata	GRM1555C1H2R2CA01D

7. Mechanical Drawing – Evaluation Board

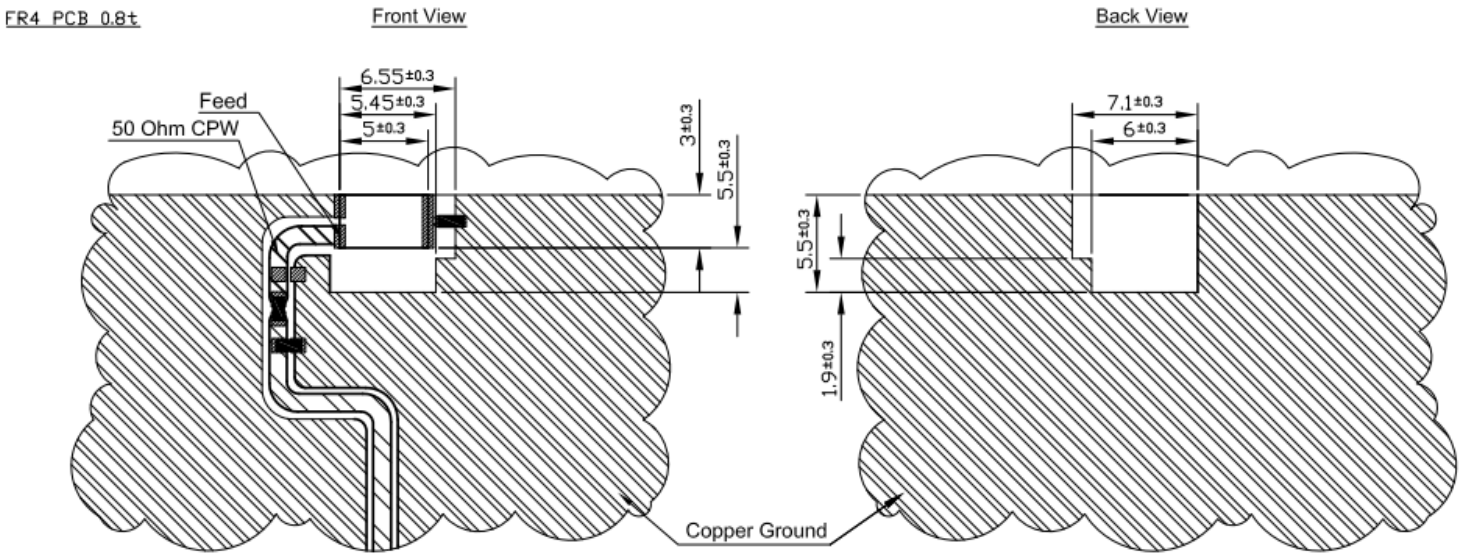
7.1 Antenna with EVB



	Name	Material	Finish	QTY
1	GLA.01 Antenna	Ceramic	N/A	1
2	GLAD.01 EVB Board	FR4 0.8t	Green	1
3	SMA(F) ST	Brass	Gold	1
4	Capacitor 8pF (0402)	Ceramic	N/A	1
5	Resistor 0Ω (0402)	Ceramic	N/A	1
6	Capacitor 2.2pF (0402)	Ceramic	N/A	1

NOTES:
1. Solder Area
2. Logo & Text Ink Printing : Black
3. Copper
4. Matching Component
5. Component 6 is the tuning element of this antenna.

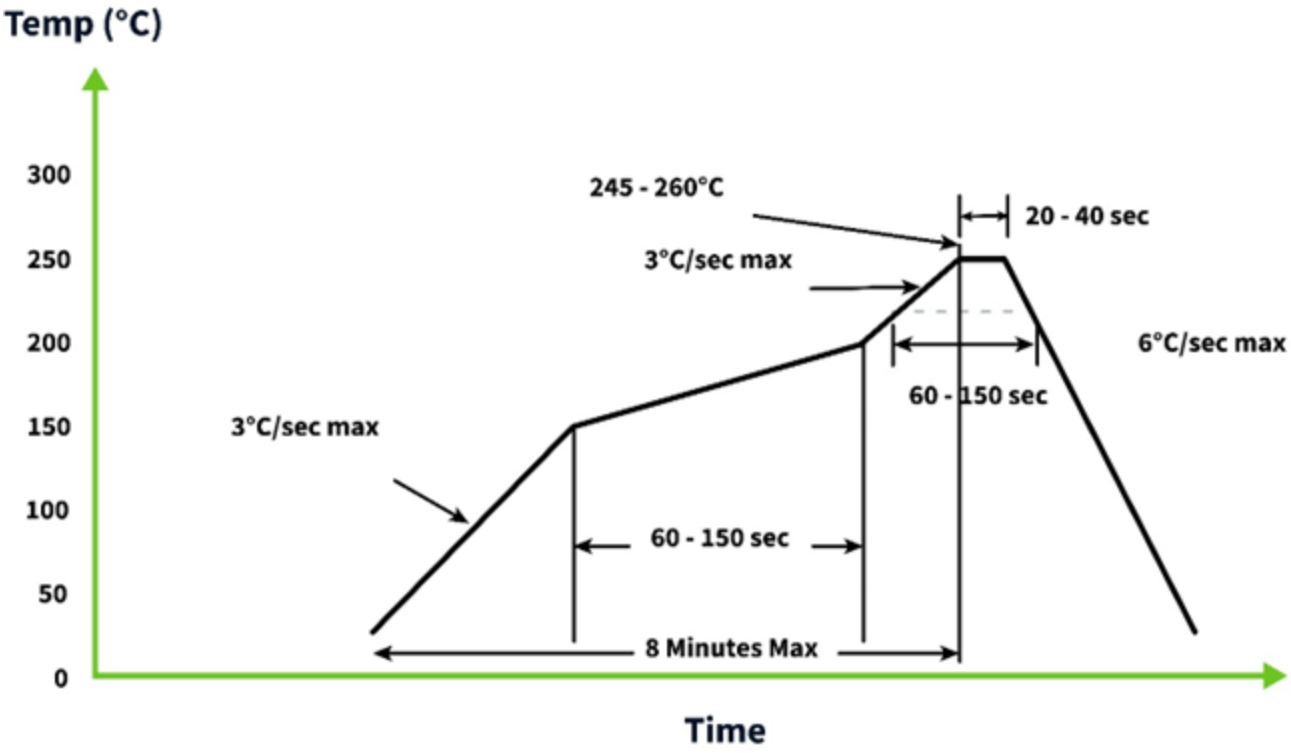
7.2 Footprint on EVB



NOTES:
1. Solder Area
2. Logo & Text Ink Printing : Black
3. Copper
4. Matching Component
5. Component 6 is the tuning element of this antenna.

8. Soldering Conditions

The GLA.01 can be assembled by following the recommended soldering temperatures are as follows:



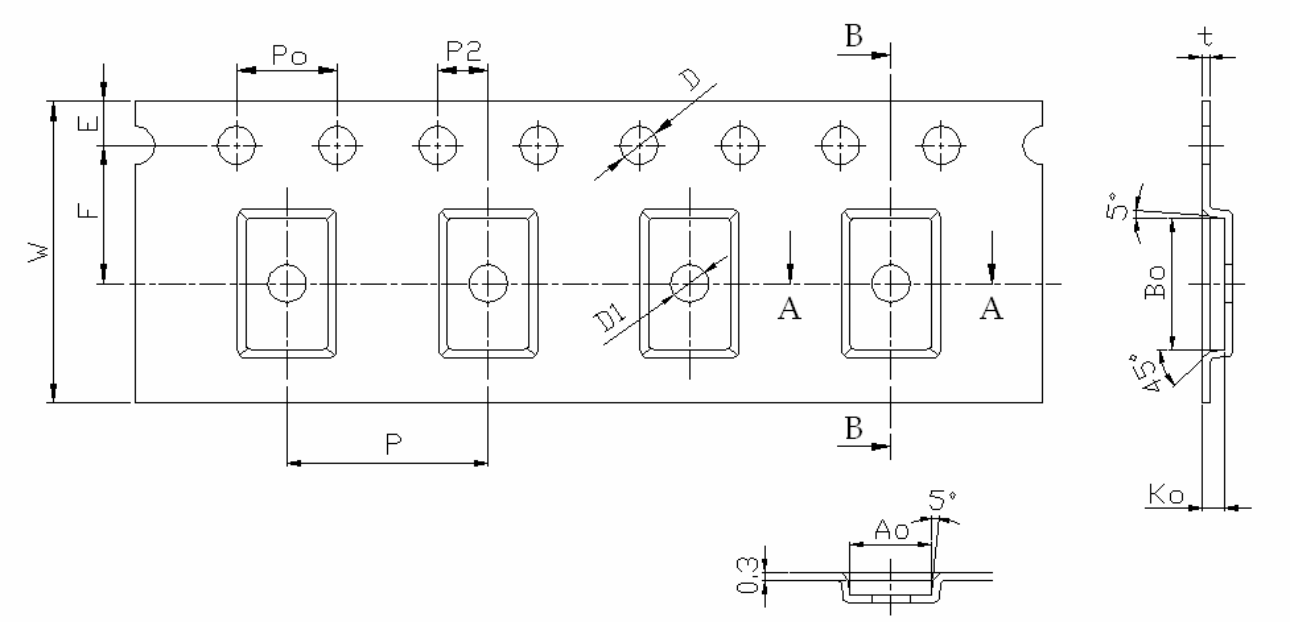
*Temperatures listed within a tolerance of +/- 10º C

Smaller components are typically mounted on the first pass, however, we do advise mounting the GLA.01 when placing larger components on the board during subsequent reflows.

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

9. Packaging

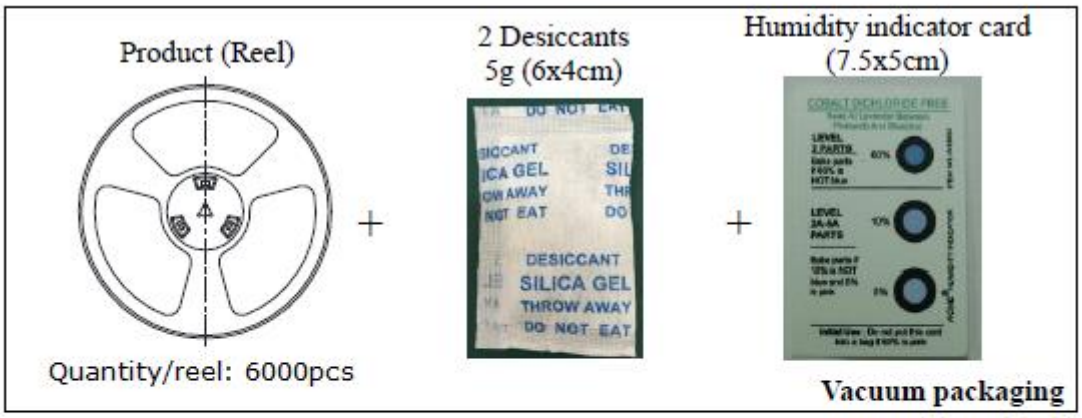
(1) Quantity/Reel: 6000pcs/Reel
(2) Plastic Tape

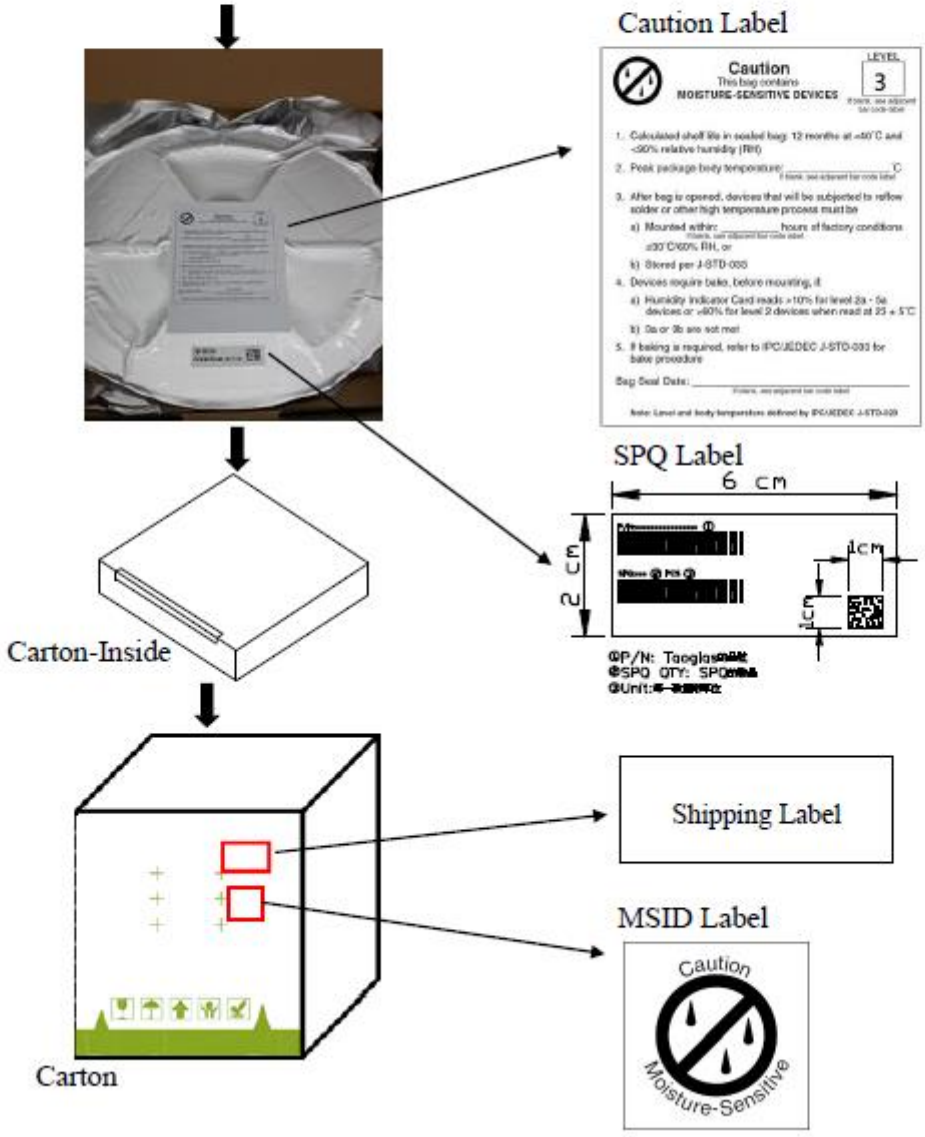


Feature	Specifications	Tolerances
W	12.00	±0.30
P	8.00	±0.10
E	1.75	±0.10
F	5.50	±0.10
P2	2.00	±0.10
D	1.20	+0.10 -0.00
Po	4.00	±0.10
10Po	40.00	±0.20

Feature	Specifications	Tolerances
Ao	3.25	±0.20
Bo	5.25	±0.10
Ko	0.90	±0.10
t	0.30	±0.05

1. Cumulative tolerance of 10 sprocket hole pitch: ±0.20mm
2. Carrier camber not to exceed 1mm in 250mm
3. Ao and Bo measured on a plane above the inside bottom of the pocket.
4. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
5. All dimensions meet EIA-481-B requirements.
6. Material: □ Clear Non Anti-Static Polystyrene.
   ■ Black Conductive Polystyrene.


Product (Reel)
2 Desiccants
5g (6x4cm)
Humidity indicator card
(7.5x5cm)
DESICCANT
SILICA GEL
THROW AWAY
DO NOT EAT
Quantity/reel: 6000pcs
Vacuum packaging


Caution Label
Caution
This bag contains
MOISTURE-SENSITIVE DEVICES
LEVEL
3
SPQ Label
6 cm
2 cm
1cm
1cm
Carton-Inside
Shipping Label
MSID Label
Caution
Moisture-Sensitive
Carton

Changelog for the datasheet

SPE-11-8-040 – GLA.01

Revision: J (Current Version)	
Date:	2023-05-09
Changes:	Updated Solder Reflow Information
Changes Made by:	Cesar Sousa

Previous Revisions

Revision: I	
Date:	2023-02-28
Changes:	Antenna Integration Guide Added
Changes Made by:	Cesar Sousa

Revision: H	
Date:	2021-11-1
Changes:	Format Change, MSL
Changes Made by:	Erik Landi

Revision: G	
Date:	
Changes:	No info
Changes Made by:	STAFF

Revision: F	
Date:	2014-04-14
Changes:	Updated by Wayne/Eddy
Changes Made by:	Aine Doyle

Revision: E	
Date:	2021-07-25
Changes:	added Note on Page 14 under close up image
Changes Made by:	Aine Doyle

Revision: D	
Date:	2013-07-18
Changes:	
Changes Made by:	STAFF

Revision: C	
Date:	2021-04-25
Changes:	
Changes Made by:	STAFF

Revision: B	
Date:	2011-07-18
Changes:	
Changes Made by:	STAFF

Revision: A (Original First Release)	
Date:	2009-09-25
Notes:	Initial Release
Author:	STAFF

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