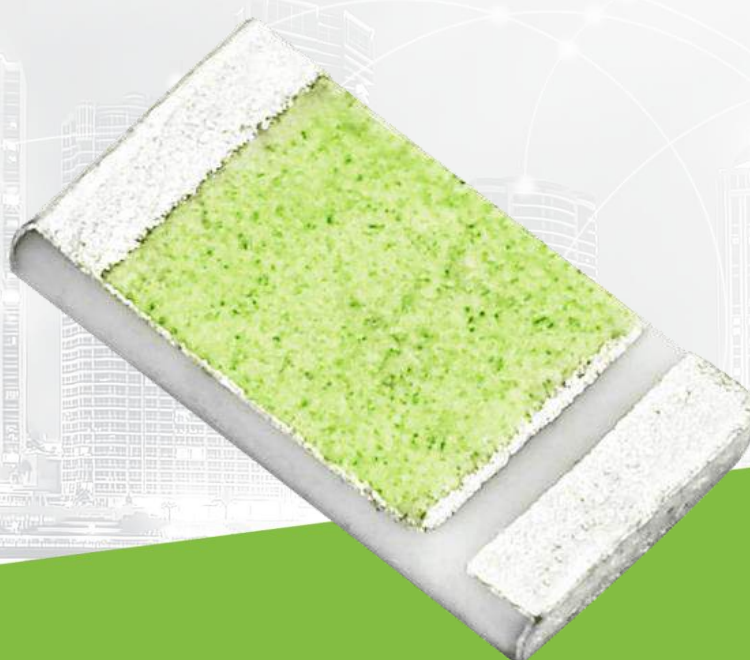




# TAOGLAS®



## Datasheet

### Unifier GPS/GLONASS/Galileo/BeiDou Ceramic SMD Antenna

**Part No:**  
GGBLA.01.A

**Features:**

Covering:

- GPS L1/Galileo E1
- BeiDou B1
- GLONASS G1

Dimensions: 3.2mm x 1.6mm x 0.5mm

Low profile Ceramic Loop antenna

Omnidirectional

CE Certified

RoHS and REACH Compliant

|                              |    |
|------------------------------|----|
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## 1. Introduction



Taoglas have developed a unique ceramic miniature loop antenna series for GPS-GLONASS-Galileo-BeiDou applications. At 3.2\*1.6\*0.5mm, the Unifier GGBLA.01.A Loop antenna is a miniature edge mounted SMD antenna, designed for small space requirements. Typical applications are small sized automotive navigation or position tracking systems and hand-held devices when GNSS function is needed.

The radiation pattern is more omnidirectional than traditional patch antennas. The Unifier antenna series wide bandwidth allows high efficiency, stable reception on all three GPS, GLONASS and BeiDou bands from 1555MHz to 1602MHz.

Efficiencies of 64% to 85% are achievable. Peak gain of 3.3dBi places this antenna gain performance within the range of a much larger 15mm to 18mm patch antennas.

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 substitute.

The Unifier GGBLA.01.A is delivered on tape and reel and now allows M2M customers to use an omnidirectional antenna in devices where orientation of the product is unknown. Like all small antennas, care must be taken to ensure the device ground-plane layout and antenna matching has been done correctly, Taoglas offers professional Gerber review, transmission line design, general integration support and final matching service of the GGBLA.01.A on your device board at our regional labs worldwide.

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.

## 2. Specifications

| GNSS Frequency Bands Covered |                               |                           |                  |                    |                  |               |                  |
|------------------------------|-------------------------------|---------------------------|------------------|--------------------|------------------|---------------|------------------|
| GPS/QZSS                     | L1<br>1575.42MHz              | L2<br>1227.6MHz           | L5<br>1176.45MHz | L6<br>1278.75MHz   |                  |               |                  |
|                              | ■                             | □                         | □                | □                  |                  |               |                  |
| GLONASS                      | L5R<br>1176.45MHz             | L3PT<br>1201.5MHz         | L2PT<br>1246MHz  | L1CR<br>1575.42MHz | L1PT<br>1602MHz  |               |                  |
|                              | □                             | □                         | □                | ■                  | ■                |               |                  |
| Galileo                      | E5a<br>1176.45MHz             | E5b<br>1201.5MHz          | E4<br>1215MHz    | E3<br>1256MHz      | E6<br>1278.75MHz | E2<br>1561MHz | L1<br>1575.42MHz |
|                              | □                             | □                         | □                | □                  | □                | ■             | ■                |
| BeiDou                       | B1<br>1561MHz                 | B2<br>1207.14MHz          | B3<br>1268.52MHz |                    |                  |               |                  |
|                              | ■                             | □                         | □                |                    |                  |               |                  |
| Compass                      | E5B(B2)/ E6(B3)<br>1268.56MHz | E2(B1)<br>1561MHz         |                  |                    |                  |               |                  |
|                              | □                             | ■                         |                  |                    |                  |               |                  |
| SBAS                         | Omnistar<br>1542.5MHz         | WAAS/EGN OS<br>1575.42MHz |                  |                    |                  |               |                  |
|                              | □                             | ■                         |                  |                    |                  |               |                  |

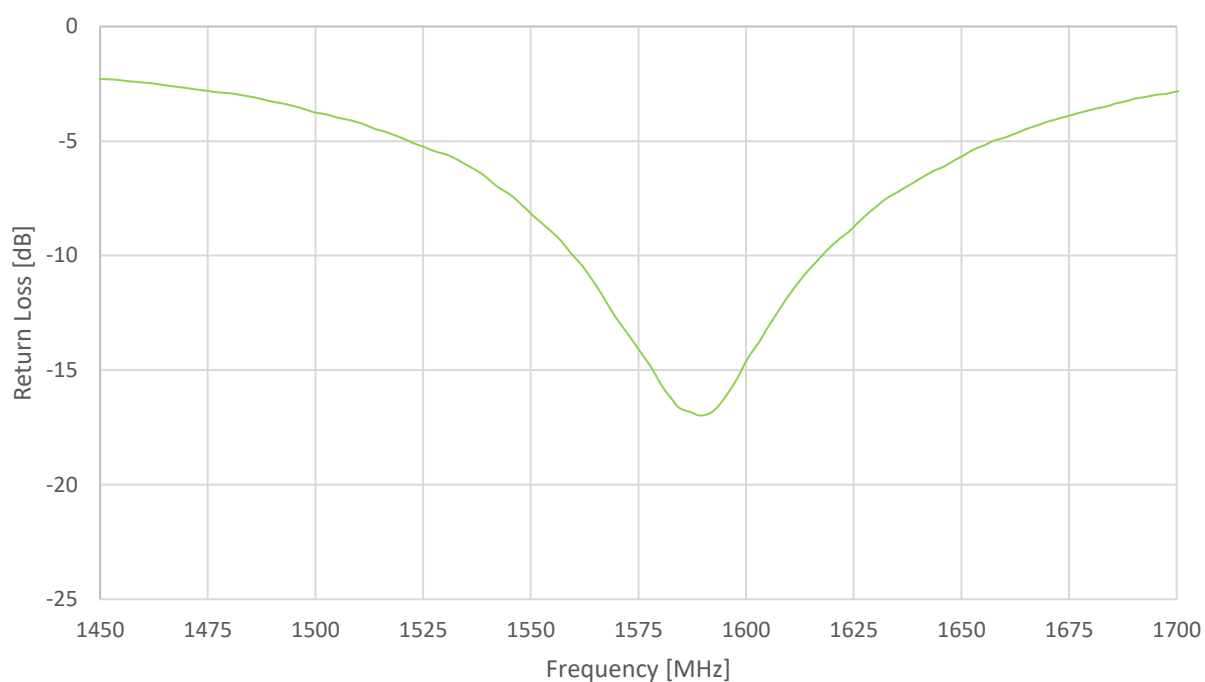
| GNSS Electrical |           |           |           |
|-----------------|-----------|-----------|-----------|
| Frequency (MHz) | 1561      | 1575.42   | 1602      |
| VSWR (max.)     | 2.0:1 max | 2.0:1 max | 2.0:1 max |
| Efficiency (dB) | -1.29     | -0.79     | -1.65     |
| Efficiency (%)  | 74.32     | 83.43     | 71.98     |
| Gain (dBi)      | 2.90      | 3.29      | 2.58      |
| Polarization    | Linear    |           |           |
| Impedance       | 50 Ω      |           |           |

| Mechanical                        |                        |
|-----------------------------------|------------------------|
| Dimensions                        | 3.2mm x 1.6mm x 0.5 mm |
| Material                          | Ceramic                |
| Environmental                     |                        |
| Operation Temperature             | -40°C to 85°C          |
| Storage Temperature               | -40°C to 85°C          |
| Humidity                          | 20% to 70%             |
| Moisture Senseitivity Level (MSL) | 3 (168 Hours)          |

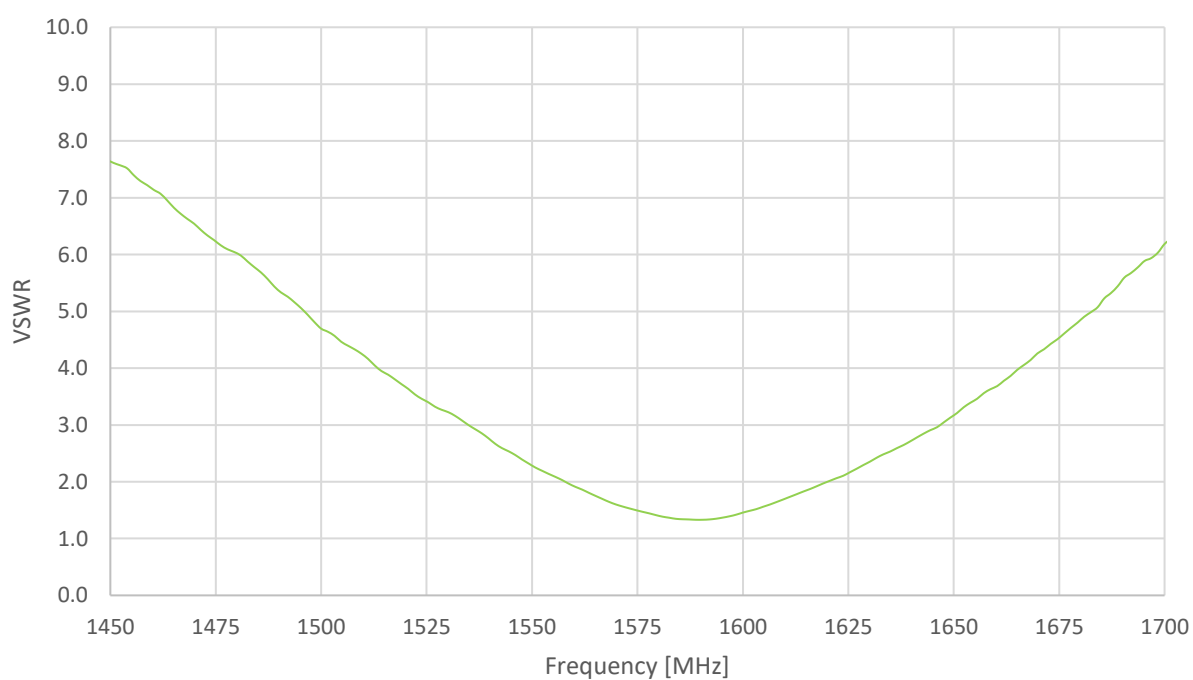
\*Measured on a 80mm x 40mm Ground Plane

## 3. Antenna Characteristics

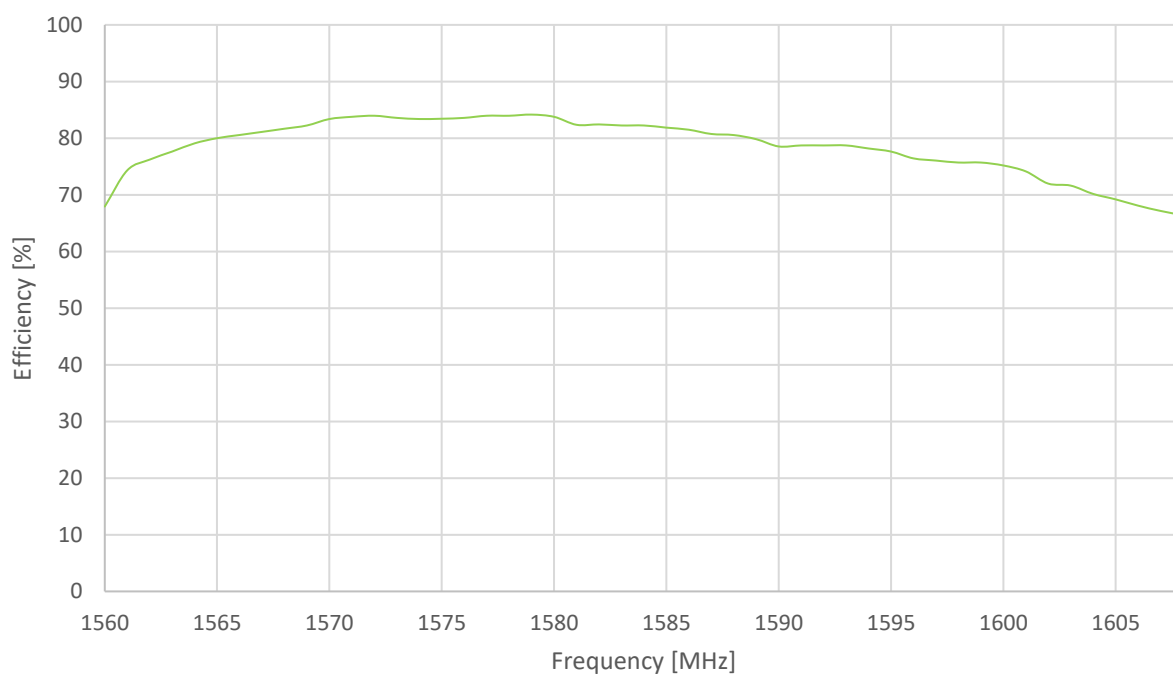
### 3.1 Return Loss



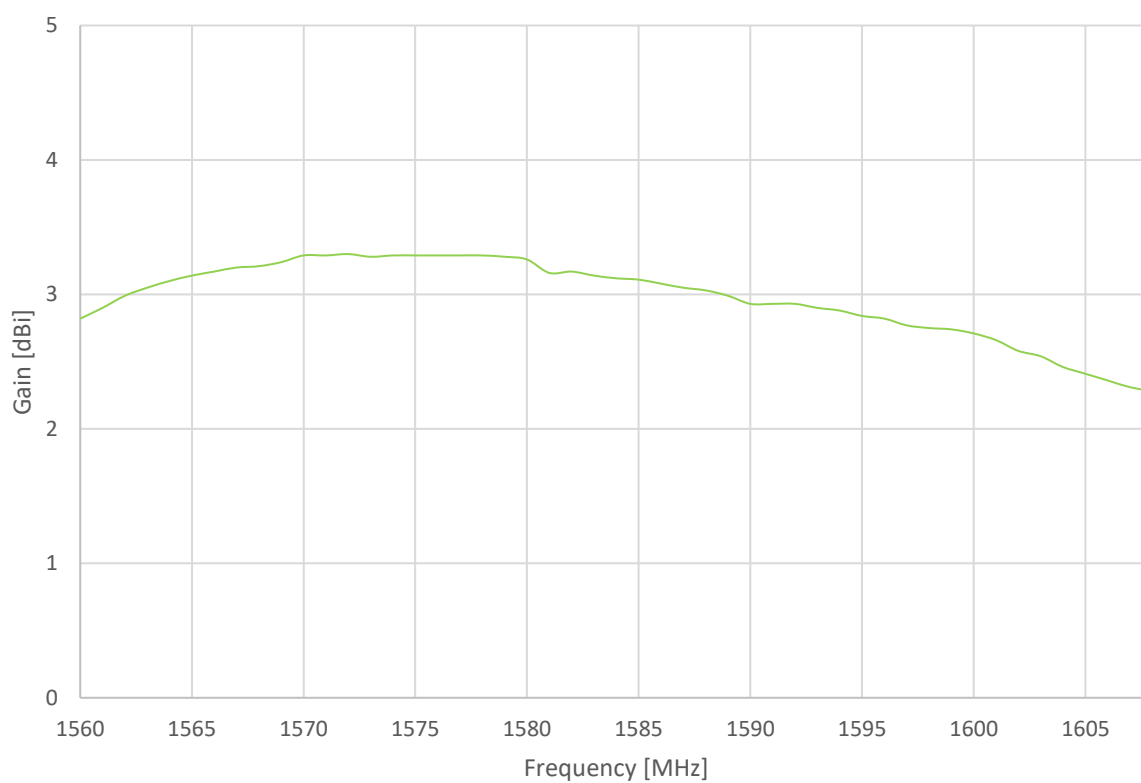
### 3.2 VSWR



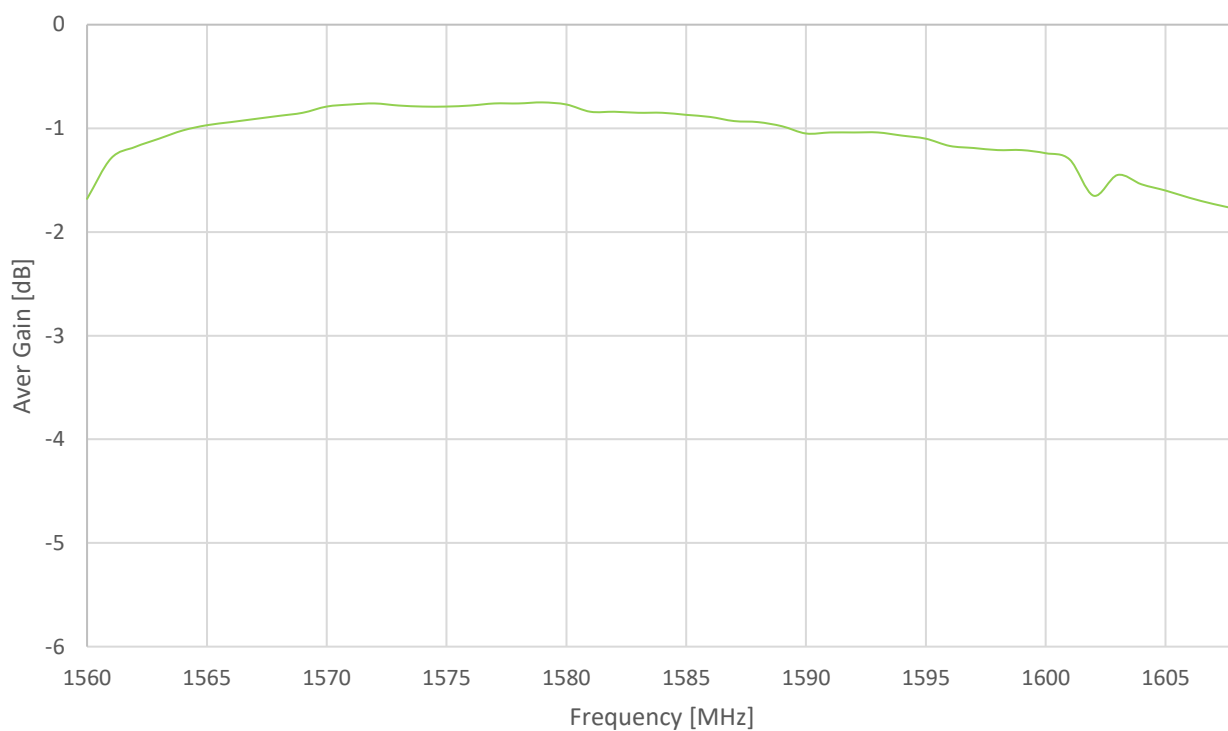
### 3.3 Efficiency



### 3.4 Peak Gain

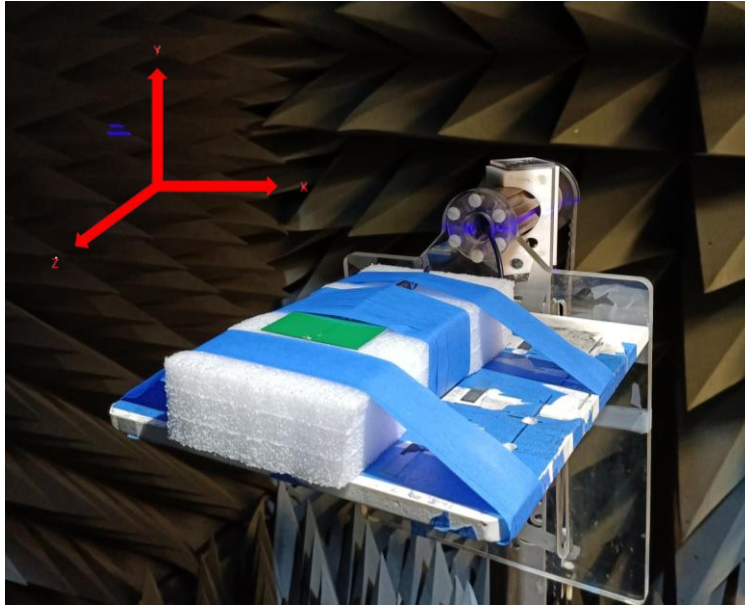


### 3.5 Average Gain

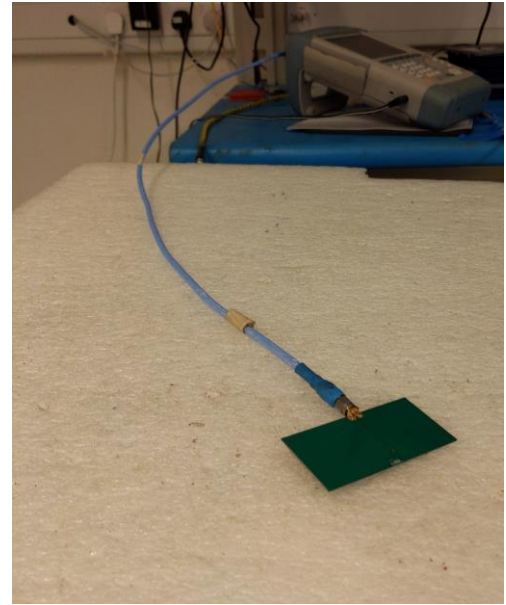


## 4. Radiation Patterns

### 4.1 Test Setup

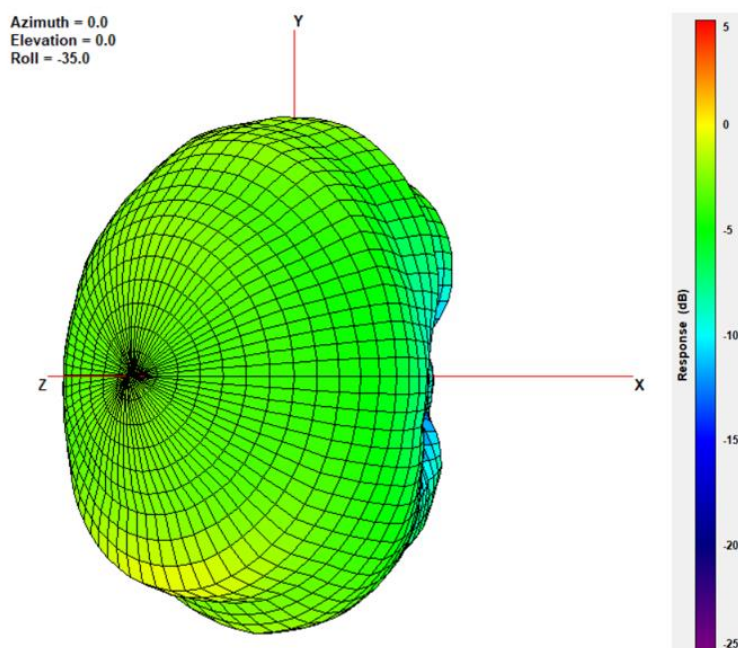


Chamber Set-up



VNA Set-up

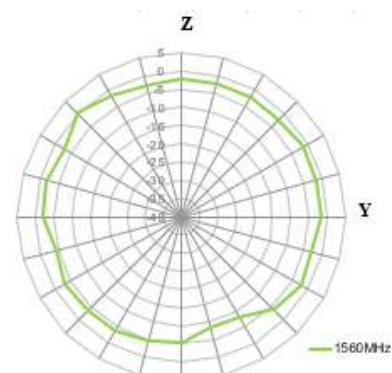
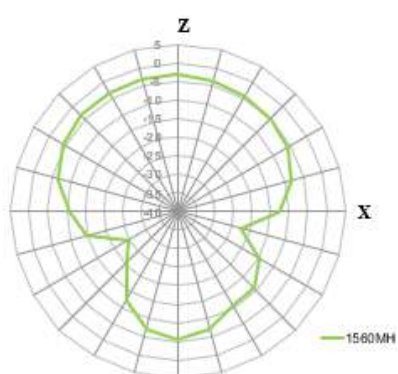
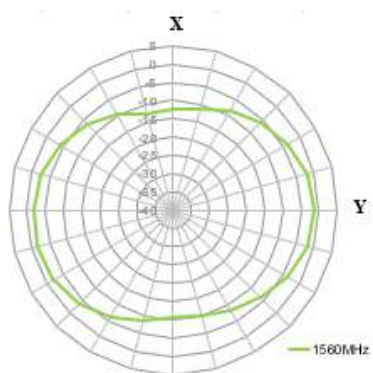
## 4.2 1560MHz 3D and 2D Radiation Patterns



XY Plane

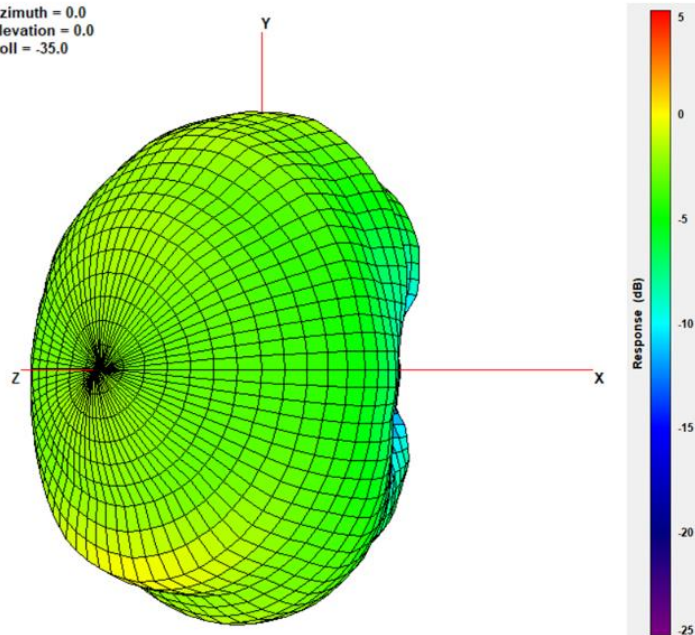
XZ Plane

YZ Plane



1575MHz

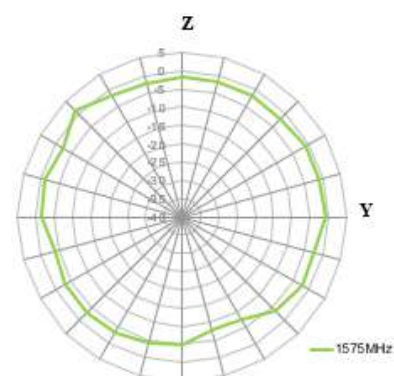
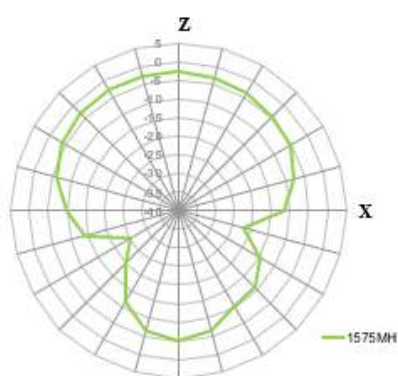
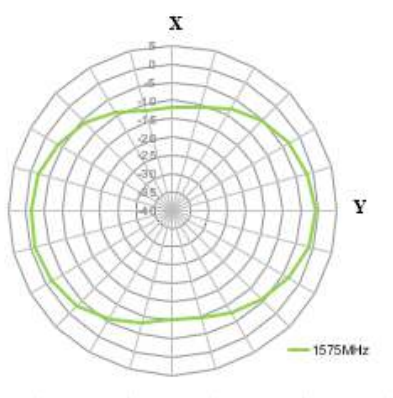
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Elevation = 0.0  
Roll = -35.0



XY Plane

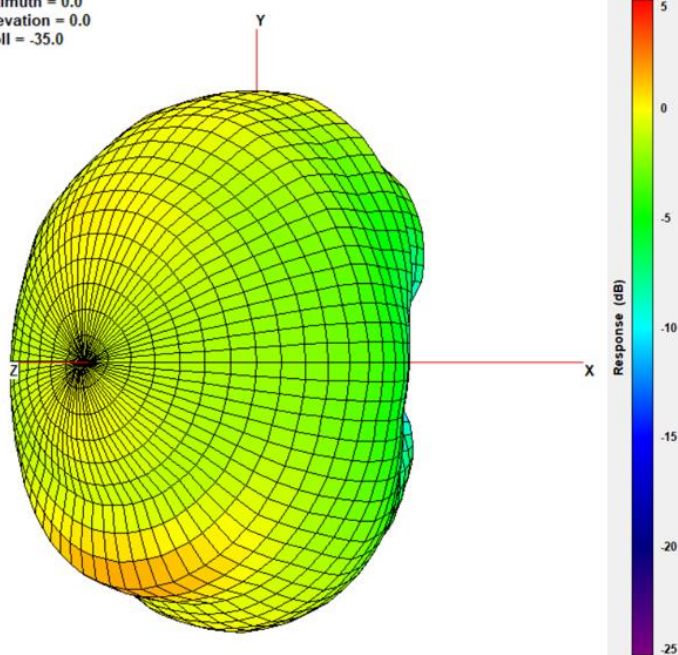
XZ Plane

YZ Plane

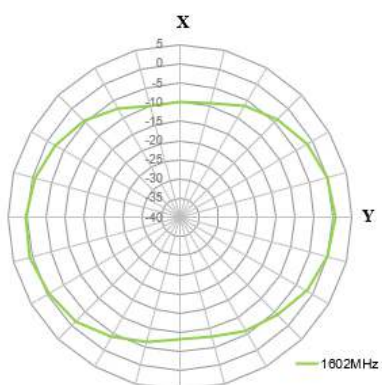


1602MHz

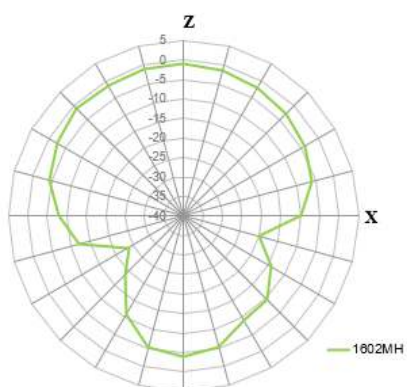
Azimuth = 0.0  
Elevation = 0.0  
Roll = -35.0



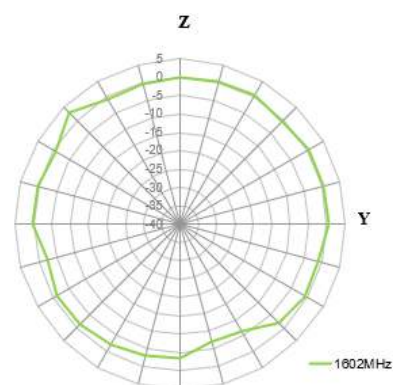
XY Plane



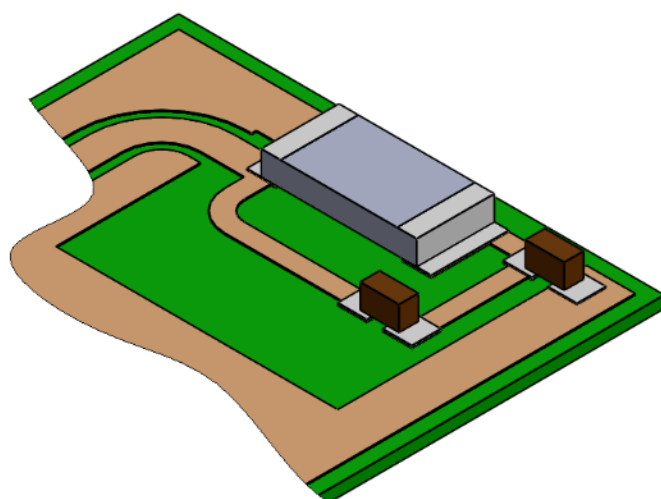
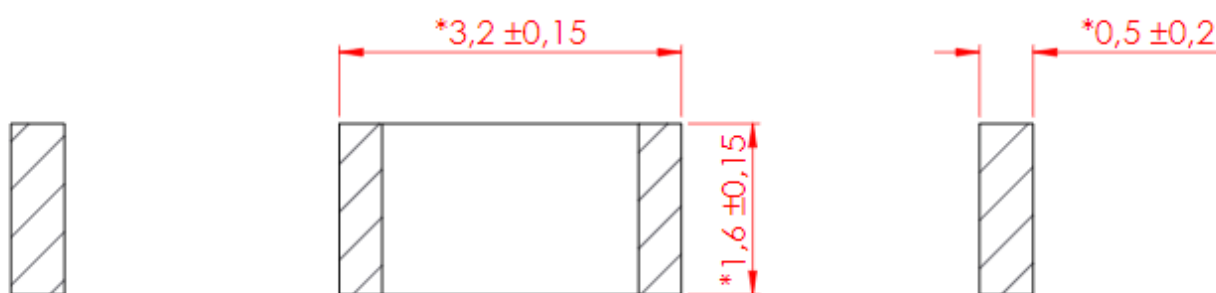
XZ Plane



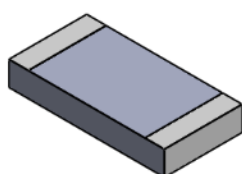
YZ Plane



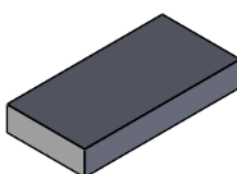
## 5. Mechanical Drawing (Units: mm)



ANTENNA ON FOOTPRINT PCB VIEW



ANTENNA VIEW



ANTENNA VIEW

## 6. Antenna Integration Guide

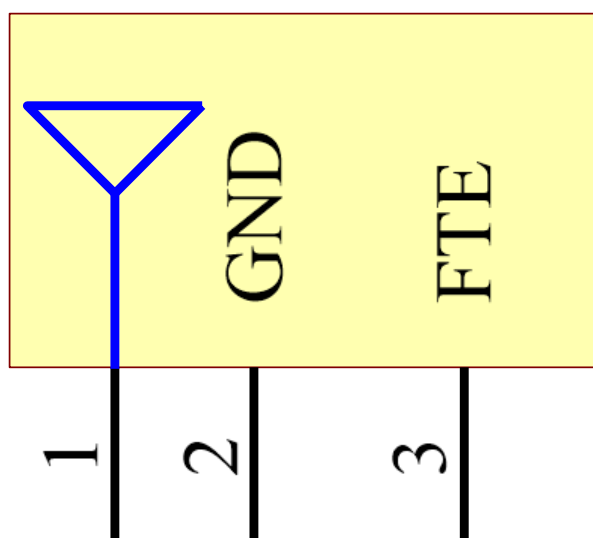


## 6.1 Schematic Symbol and Pin Definition

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

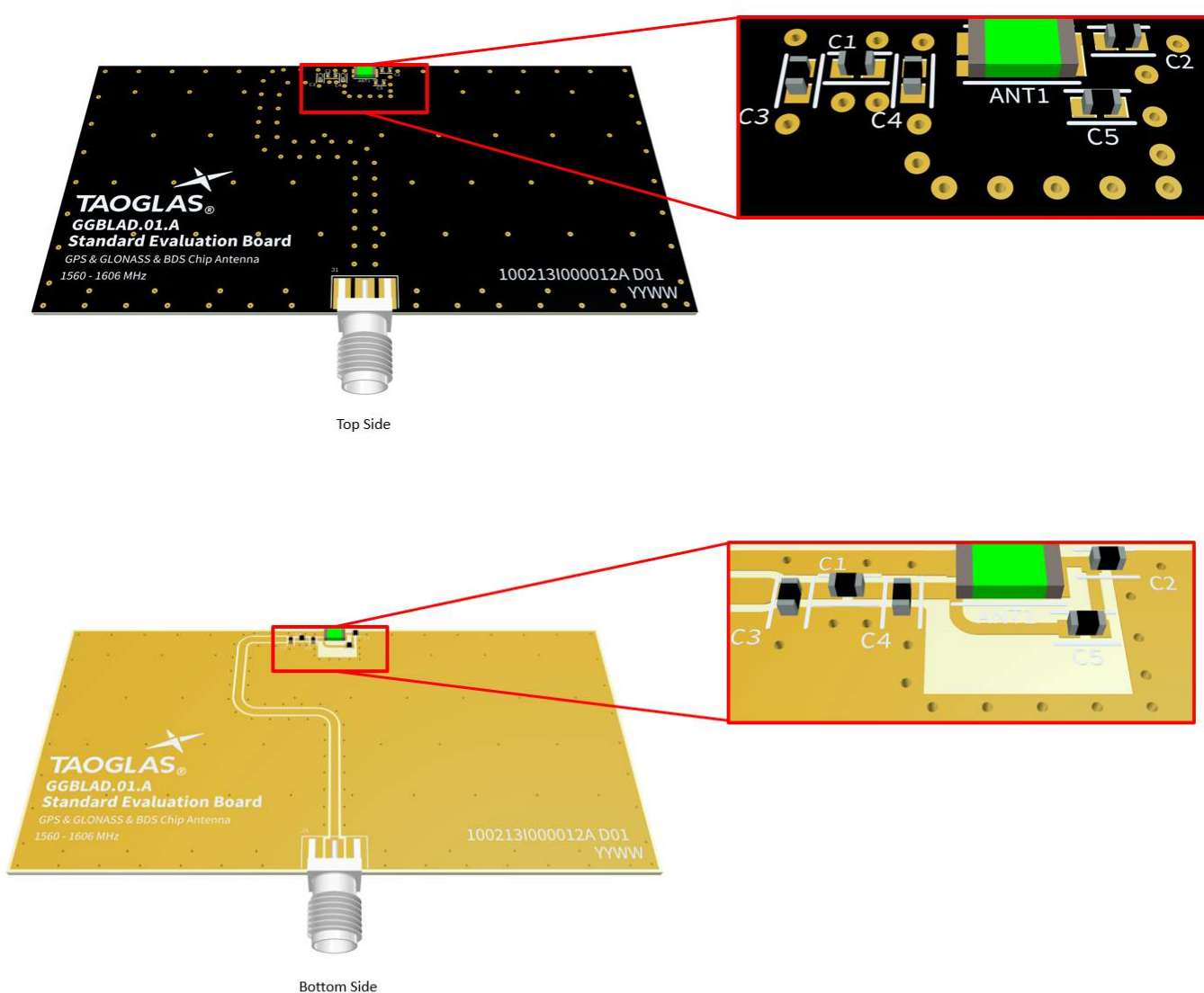
| Pin | Description |
|-----|-------------|
| 1   | RF Feed     |
| 2   | Ground      |
| 3   | FTE         |

ANT1 GGBLA.01.A



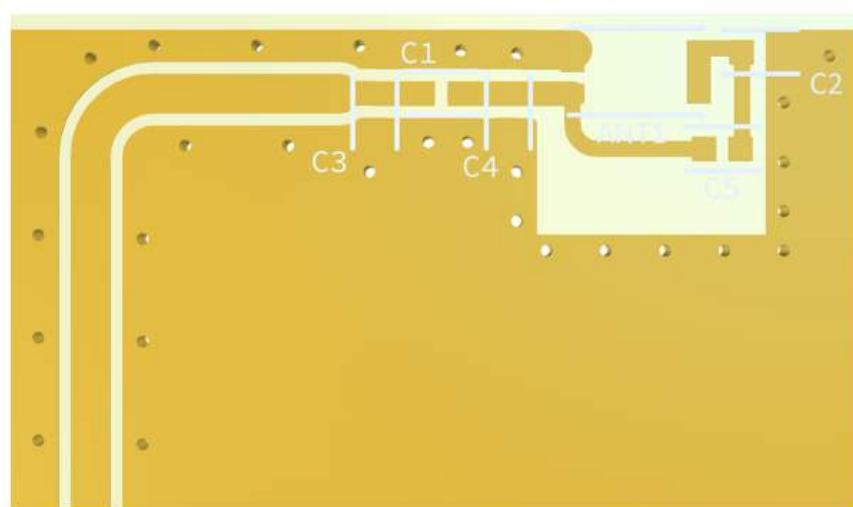
## 6.2 Antenna Integration

Whatever the size of the PCB, 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.



## 6.3 PCB Layout

The footprint and clearance on the PCB must meet the antenna specification. An example of the PCB layout shows the antenna footprint with clearance. Note the placement of the optimized components. C1 is positioned outside the ground plane, C2 is sitting across the ground plane and the copper clearance area and C5 sits within the copper clearance area.



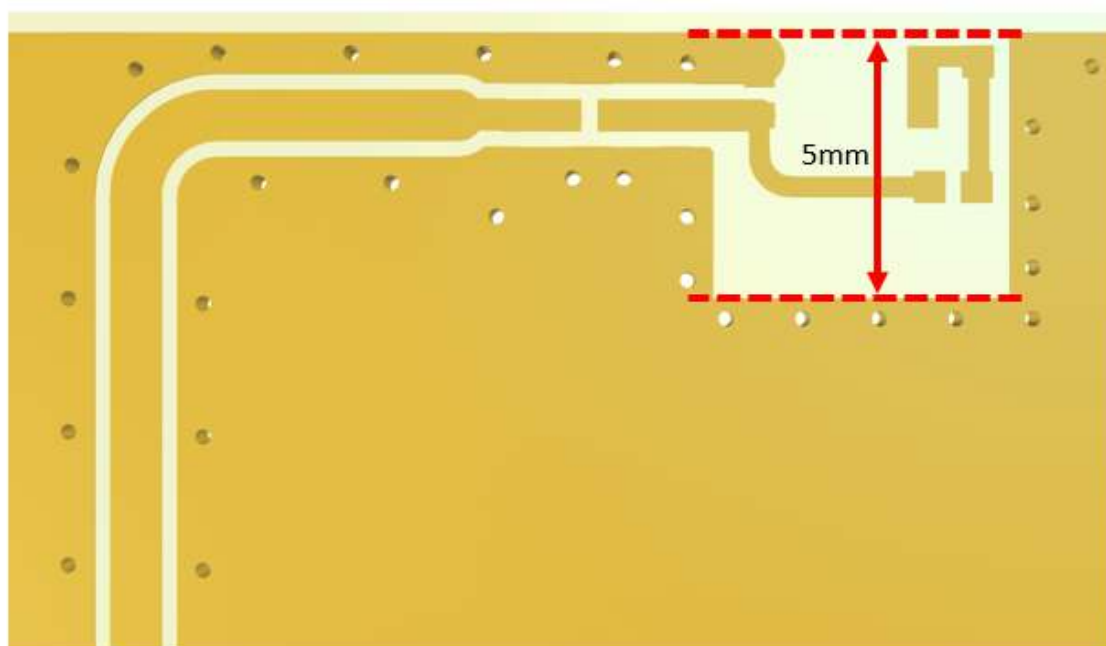
Top side



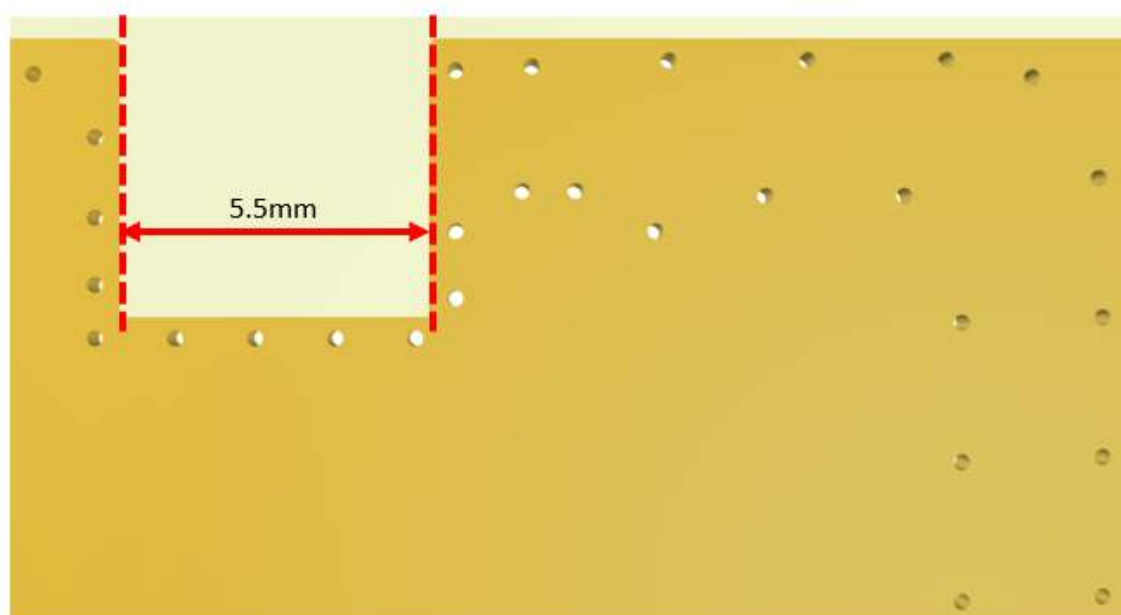
Bottom Side

## 6.4 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 in length and 5.5mm in width from the antenna mechanical pads to the ground area. This clearance area includes the bottom side and ALL internal layers on the PCB.

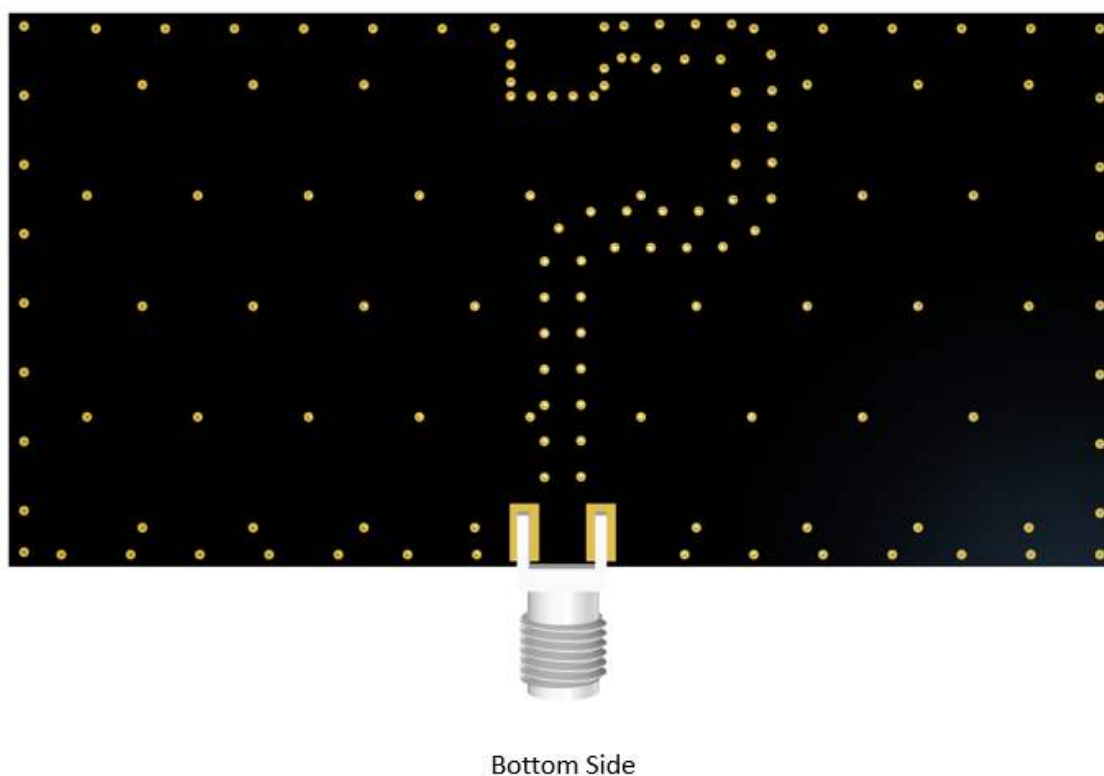
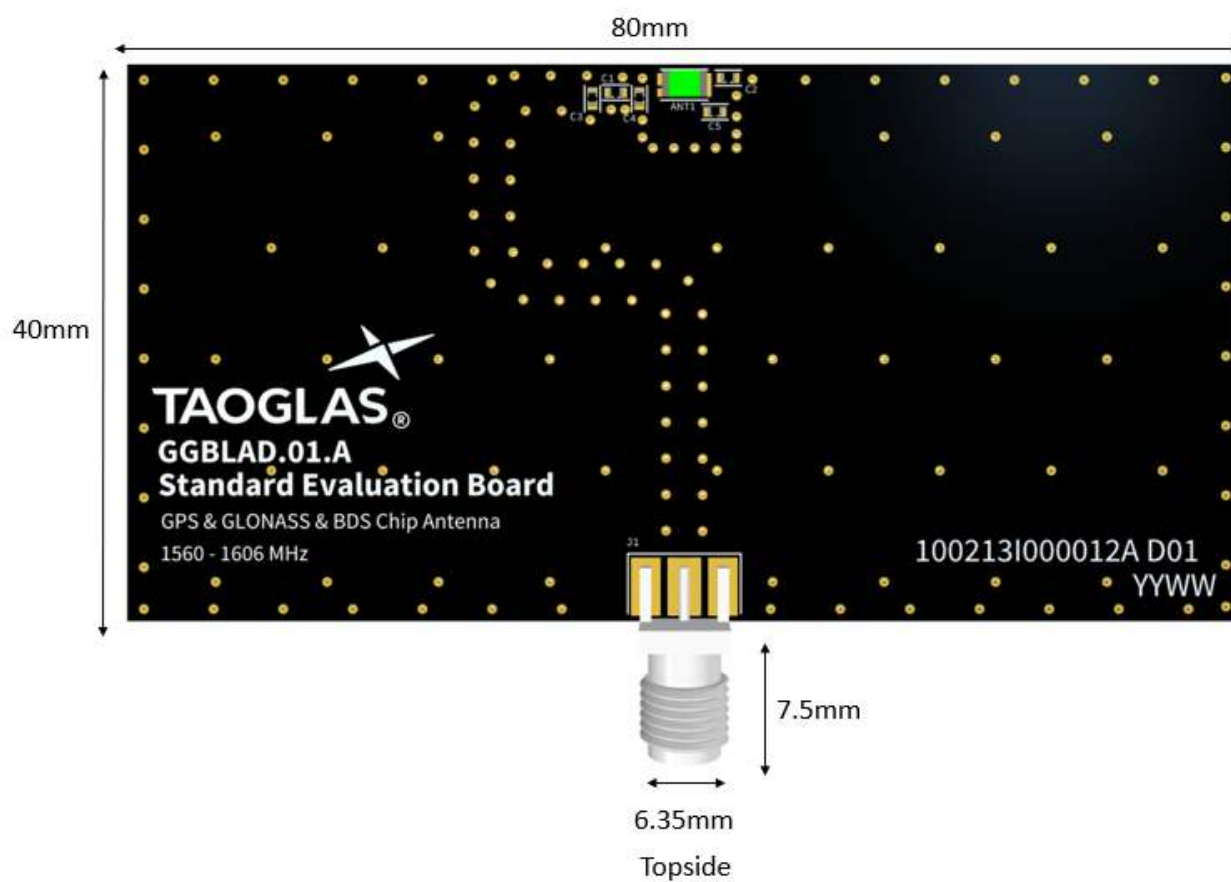


Topside



Bottom Side

## 6.5 Evaluation Board

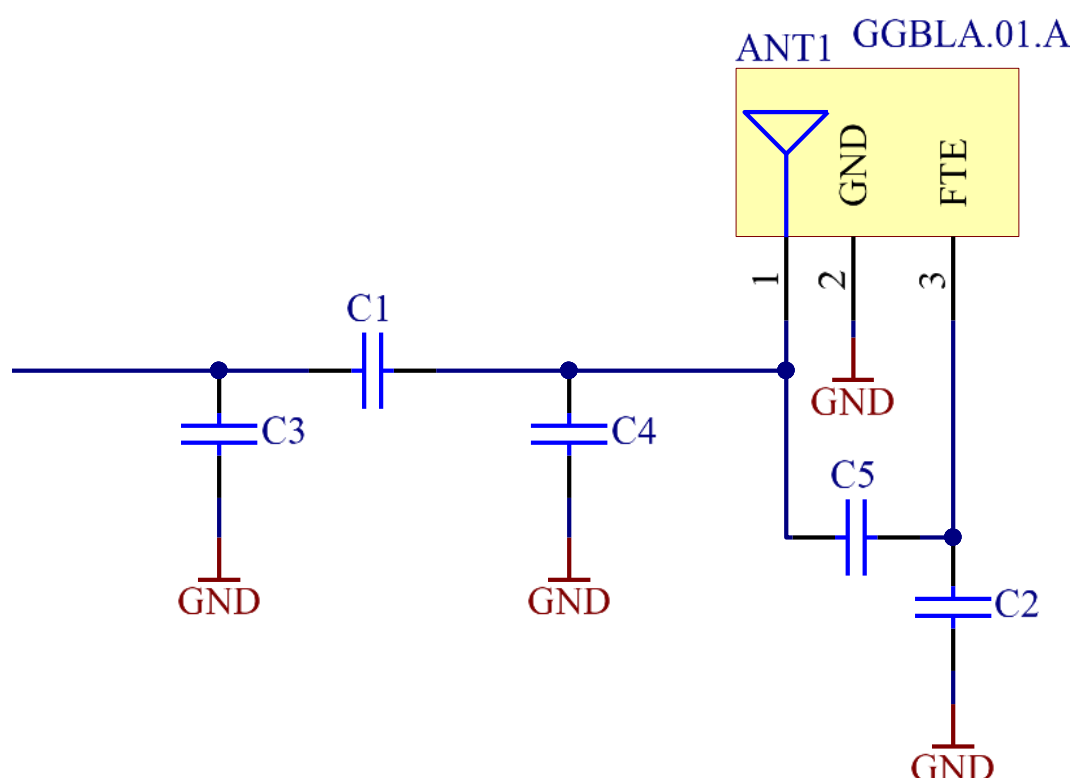


## 6.6 Evaluation Board Matching Circuit

Matching components C1, C3 and C4 form a “pi” network. 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 the same 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.

| Designator | Type      | Value      | Manufacturer | *Manufacturer Part Number |
|------------|-----------|------------|--------------|---------------------------|
| C1         | Capacitor | 2.7pF      | Murata       | GRM1555C1H2R7CA01D        |
| C2         | Capacitor | 22pF       | Murata       | GRM1555C1H220JA01D        |
| C3         | Capacitor | Not Fitted | -            | -                         |
| C4         | Capacitor | 0.8pF      | Murata       | GRM1555C1HR80CA01D        |
| C5         | Capacitor | 0.5pF      | Murata       | GRM1555C1HR50CA01D        |

\*Manufacturers part number above or latest version.



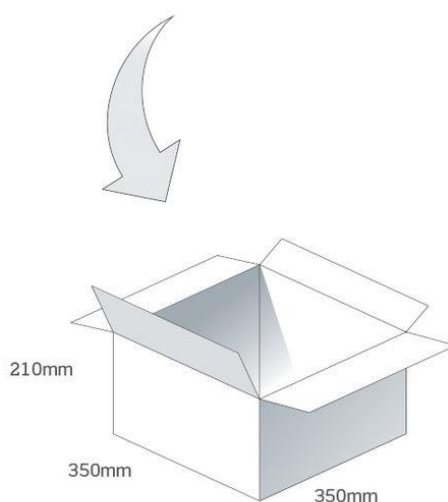


## 7. Packaging

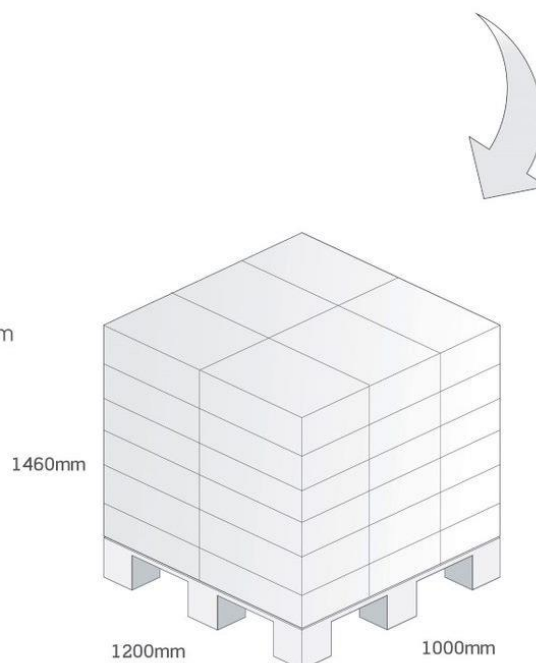
6000 pc GGBLA.01.A per reel  
Dimensions - Ø330\*20mm  
Weight - 700g



9 Reels / 54000 pcs in one carton  
Carton Dimensions - 350\*350\*210mm  
Weight - 5.6Kg



Pallet Dimensions 1200mm\*1000mm\*1460mm  
36 Cartons per pallet  
6 Cartons per layer  
6 Layers



## Changelog for the datasheet

### SPE-13-8-092 – GGBLA.01.A

#### Revision: M (Current Version)

|                  |                                          |
|------------------|------------------------------------------|
| Date:            | 2022-03-04                               |
| Changes:         | Updated Mechanical & Footprint drawings. |
| Changes Made by: | Gary West                                |

#### Previous Revisions

#### Revision: L (Current Version)

|                  |                   |
|------------------|-------------------|
| Date:            | 2021-09-21        |
| Changes:         | Added MSL rating. |
| Changes Made by: | Erik Landi        |

#### Revision: G

|                  |                  |
|------------------|------------------|
| Date:            | 2017-06-26       |
| Changes:         |                  |
| Changes Made by: | Technical Writer |

#### Revision: K

|                  |                                             |
|------------------|---------------------------------------------|
| Date:            | 2021-05-20                                  |
| Changes:         | Template Updated & Integration Guide Added. |
| Changes Made by: | Gary West                                   |

#### Revision: F

|                  |                  |
|------------------|------------------|
| Date:            | 2017-05-12       |
| Changes:         |                  |
| Changes Made by: | Technical Writer |

#### Revision: J

|                  |                   |
|------------------|-------------------|
| Date:            | 2020-07-31        |
| Changes:         | Packaging update. |
| Changes Made by: | David Connolly    |

#### Revision: E

|                  |                                                                  |
|------------------|------------------------------------------------------------------|
| Date:            | 2017-01-06                                                       |
| Changes:         | Updated spec as per amended drawing on PCN and added disclaimer. |
| Changes Made by: | Andy Mahoney                                                     |

#### Revision: I

|                  |                                    |
|------------------|------------------------------------|
| Date:            | 2018-03-19                         |
| Changes:         | Updating max storage temp to 105C. |
| Changes Made by: | Technical Writer                   |

#### Revision: D

|                  |                  |
|------------------|------------------|
| Date:            | 2014-11-24       |
| Changes:         |                  |
| Changes Made by: | Technical Writer |

#### Revision: H

|                  |                       |
|------------------|-----------------------|
| Date:            | 2018-03-13            |
| Changes:         | New Packaging drawing |
| Changes Made by: | Carol Faughnan        |

#### Revision: C

|                  |                               |
|------------------|-------------------------------|
| Date:            | 2014-01-31                    |
| Changes:         | Removed U from antenna photo. |
| Changes Made by: | Aine Doyle                    |

Previous Revisions (Continued)

|                  |                        |
|------------------|------------------------|
| Revision: B      |                        |
| Date:            | 2014-01-13             |
| Changes:         | Added in product name. |
| Changes Made by: | Aine Doyle             |

|                                      |            |
|--------------------------------------|------------|
| Revision: A (Original First Release) |            |
| Date:                                | 2017-08-10 |
| Notes:                               |            |
| Author:                              |            |



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