GGBLA.125.A

Description:
GGBLA.125.A – GPS L1/L2/L5/L6, GLONASS, BeiDou Ceramic Loop Antenna for cm-Level with RTK

Features:
Low Profile, Small Footprint Embedded Loop Antenna
Centimeter-level accuracy achievable with RTK Systems
GPS/QZSS (L1/L2)
GPS/QZSS/IRNSS (L5)
Galileo (E1/E5a/E5b/E6)
GLONASS (G1/G2/G3)
BeiDou (B1/B2a/B2b)
Tuned for SMD Mounting on 80x40mm Ground Plane
High efficiency, up to 80%
Dimensions: 10 * 3.2 * 1.5 mm
RoHS & Reach Compliant
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The Taoglas GGBLA.125.A is a unique embedded ceramic miniature loop antenna designed for GPS L1, L2, L5 and L6 applications. It also covers all GNSS requirements including GLONASS (L1PT, L1CR, L5R), Galileo (E1, E2, E5a, E5b, E6), BeiDou (B1, B2, B3), IRNSS (L5) & QZSS Frequencies.

With dimensions of just 10 x 3.2 x 1.5mm, a keep out area of just 15 x 9.8mm on the PCB, the GGBLA.125 makes an ideal multi band GNSS antenna solution for compact high precision automotive navigation or asset tracking devices where board space is at a premium. An SMD component, delivered on tape and reel, the middle edge-of-board mounted antenna, has an omnidirectional radiation pattern that allows customers to use an omnidirectional antenna in devices where orientation of the product may be unknown, or subject to frequent movement.

The wide bandwidth maintains high efficiency and reception stability on all GNSS bands from 1164MHz to 1602MHz. The GGBLA.125 exhibits efficiencies of between 60% and 80%, depending on the band used. With a peak gain of 2.6-3.6dBi, the gain performance compares with the ranges of much larger patch antennas of up to 18 x 18mm. Based on the loop antenna electrical effect, this antenna works best when placed in the center of the edge of the board.

Typical Applications Include:
- Navigation & RTK Systems
- Autonomous Vehicles
- IOT Devices
- Transportation, Marine & Agriculture
- UAVs and Robotics
- Location based applications

As with all onboard SMD antennas, care must be taken to ensure the device ground-plane layout and antenna matching has been done correctly. At any of our global design and test facilities, Taoglas can offer professional Gerber review, transmission line design, general integration support and final matching services of the GGBLA.125.A on your device board.

Contact your regional Taoglas customer support team for more information about this product, its integration or immediate support.
2. Specifications

<table>
<thead>
<tr>
<th>GNSS Frequency Bands Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPS</td>
</tr>
<tr>
<td>GLONASS</td>
</tr>
<tr>
<td>Galileo</td>
</tr>
<tr>
<td>BeiDou</td>
</tr>
<tr>
<td>QZSS (Regional)</td>
</tr>
<tr>
<td>IRNSS (Regional)</td>
</tr>
<tr>
<td>SBAS</td>
</tr>
</tbody>
</table>

*SBAS systems: WASS(L1/L5), EGNOS(E1/E5a), SDCM(G1/G2/G3), SNAS(B1/B2a), GAGAN(L1/L5), QZSS(L1/L5), KAZZ(L1/L5).
## GNSS Electrical

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>GPS L5/ Galileo E5a</th>
<th>GPS L2</th>
<th>GPS L6/ Galileo E6</th>
<th>BeiDou B1/ Galileo E2</th>
<th>GPS L1/ Galileo E1</th>
<th>GLONASS L1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1176.45</td>
<td>1227.6</td>
<td>1278.8</td>
<td>1561</td>
<td>1575.42</td>
<td>1602</td>
<td></td>
</tr>
</tbody>
</table>

Efficiency (%)  
- 80 Typ.  
- 70 Typ.  
- 60 Typ.  
- 60 Typ.  
- 60 Typ.  

Average Gain (dB)  
- -0.7  
- -0.8  
- -1.2  
- -2.0  
- -1.8  
- -1.7  

Peak Gain (dBi)  
- 3.6  
- 3.3  
- 3.3  
- 2.6  
- 2.8  
- 3.0  

Return loss (dB)  
- < -10  
- < -10  
- < -5  
- < -10  
- < -10  
- < -10  

Group Delay  
- 1  
- 1  
- 1.2  
- 3  
- 3  
- 3  

PCO (cm)  
- 1.46  
- 2.44  
- 2.3  
- 0.34  
- 0.34  
- 0.40  

PCV (cm)  
- 9.8  
- 10.3  
- 9.5  
- 7  
- 7.2  
- 7.2  

Polarization  
- Linear  

Impedance  
- 50Ω  

## Mechanical

<table>
<thead>
<tr>
<th>Dimensions (mm)</th>
<th>10 x 3.2 x 1.5 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (g)</td>
<td>0.17 g</td>
</tr>
</tbody>
</table>

## Environmental

<table>
<thead>
<tr>
<th>Operating Temperature</th>
<th>-40°C to 85°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>-25°C to 85°C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>20°C to 70°C</td>
</tr>
<tr>
<td>Moisture Sensitivity Level (MSL)</td>
<td>3 (168 Hours)</td>
</tr>
</tbody>
</table>
3. Antenna Characteristics

3.1 Return Loss

![Graph showing Return Loss vs Frequency]

3.2 Efficiency

![Graph showing Efficiency vs Frequency]
3.3 Average Gain

3.4 Peak Gain
4. 2D Radiation Patterns

4.1 Test Setup – on 80*40mm Evaluation Board
4.2 2D Plots

XY Plane

X

Y

Z Plane

X

Y

YZ Plane

X

Y
5. 3D Radiation Patterns

5.1 GGBLA.125.A

[Images of 3D radiation patterns for different frequencies are shown, each with a color-coded scale indicating the power levels in dB. The patterns are visual representations of how the antenna radiates energy in three dimensions.]
6. Field Test Results

6.1 Rooftop test

In this section Taoglas will present the field test result for GGBLA.125A antenna. The test was performed when the antenna was mounted on a static rooftop test set up in an open sky environment for at least 6 hours.

Taoglas will show the field test results using the following receiver:

1. **U-blox ZED-F9P**

   **Receiver features:**
   - Multi-band RTK with fast convergence times and reliable performance
   - Nav. update rate RTK up to 20 Hz
   - Position accuracy = RTK 0.01 m + 1 ppm CEP

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Correction Service</th>
<th>CEP (50%)</th>
<th>DRMS (68%)</th>
<th>2DRMS (95-98.2%)</th>
<th>TTFF (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVB</td>
<td>RTK DISABLED</td>
<td>106.72 cm</td>
<td>134.17 cm</td>
<td>268.34 cm</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>RTL ENABLED</td>
<td>10.59 cm</td>
<td>12.88 cm</td>
<td>25.75 cm</td>
<td>32</td>
</tr>
</tbody>
</table>

**Positioning Accuracy Table (2D Accuracy)**

**RTK Availability**

- No RTK
- Float
- Fixed
7. **Mechanical Drawing (Units: mm)**

7.1 **Antenna Drawing**

**Front View**

![Antenna Diagram](image)

**Back View**

7.2 **Antenna Dimensions**

**Bottom Pin and View Definition – Back View**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Feed (50 ohm)</td>
</tr>
<tr>
<td>2.3</td>
<td>Ground Feed</td>
</tr>
</tbody>
</table>
Clearance Area

Top View

Bottom View

Copper area

Ground Clearance Area

Soldered area
<table>
<thead>
<tr>
<th></th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GGBLA.125.A Antenna</td>
</tr>
<tr>
<td>2</td>
<td>GGBLAD.125.A EVB PCB</td>
</tr>
<tr>
<td>3</td>
<td>0 hm Resistor (0402)</td>
</tr>
<tr>
<td>4</td>
<td>1.2pF Capacitor (0402)</td>
</tr>
<tr>
<td>5</td>
<td>3.9pF Capacitor (0402)</td>
</tr>
<tr>
<td>6</td>
<td>SMA(F) ST PCB</td>
</tr>
</tbody>
</table>
Evaluation Board Matching Circuit

Matching Circuit

<table>
<thead>
<tr>
<th>Component</th>
<th>Component Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>0 ohm</td>
</tr>
<tr>
<td>R2</td>
<td>0 ohm</td>
</tr>
<tr>
<td>R3</td>
<td>0 ohm</td>
</tr>
<tr>
<td>C1</td>
<td>1.2 pF</td>
</tr>
<tr>
<td>C2</td>
<td>3.9 pF</td>
</tr>
</tbody>
</table>
8. Packaging

2000pcs GGBLA.125.A per Tape & Reel
Dimensions - Ø330*28.4
Weight - 1Kg

2000pcs GGBLA.125.A per carton
Dimensions - 350*340*47mm
Weight - 1.2Kg

10000pcs GGBLA.125.A per carton
Dimensions - 360*370*275mm
Weight - 6.8Kg

Pallet Dimensions:
1100*1100*1300mm
36 Cartons Per Pallet
9 Cartons Per Layer, 4 Layers
# Changelog for the datasheet

## Revision: F (Current Version)

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

## Previous Revisions

### Revision: E

**Date:** 2021-05-06  
**Changes:** Added L6 band to spec table.  
**Changes Made by:** Gary West

### Revision: D

**Date:** 2020-06-04  
**Changes:** Added Field Test Results  
**Changes Made by:** Victor Pinazo

### Revision: C

**Date:** 2020-03-18  
**Changes:** Modified RTK Table  
**Changes Made by:** Yu Kai Yeung

### Revision: B

**Date:** 2019-12-08  
**Changes:** Added GNSS Frequency Matrix and RTK Data  
**Changes Made by:** Yu Kai Yeung

### Revision: A (Original First Release)

**Date:** 2019-04-04  
**Notes:** Initial Specification Release  
**Author:** Yu Kai Yeung