**SPECIFICATION**

**PATENT PENDING**

Part No. : **SGGP.12A**

Description : 12mm GPS/GLONASS/GALILEO SMT Mount Ceramic Patch Antenna

12*12*4mm

Features :

1575.42 /1602 MHz GPS/GLONASS Antenna

2.67 dBi Peak Gain for GPS/GALILEO Band

2.94 dBi Peak Gain for GLONASS Band

12 x 12 x 4mm dimension

SMT direct mount ceramic patch antenna

Automotive TS16949 Production and Quality Approved

RoHS compliant
1. Introduction

The SGGP.12.4.A.02 is a ceramic GPS/GLONASS/GALILEO passive patch antenna with low-profile thickness of 4mm. It is designed for applications in navigation devices, vehicle tracking/fleet management systems, and telematics devices. Typical applicable industries are transportation, defense, marine, agriculture, and navigation.

The antenna has been tuned on a 50 x 50 mm ground plane, working at 1575.42MHz and 1602MHz, with a 2.67 dBi gain and 2.94 dBi gain, respectively. The ceramic patch is mounted via SMT process. It is manufactured and tested in a TS16949 first tier automotive approved facility.

For customer specific device environments, custom tuned patch antennas are highly recommended, subject to potential NRE and MOQ. Contact your regional Taoglas sales office for details.
2. Specification

<table>
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<tr>
<th>ELECTRICAL</th>
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<tbody>
<tr>
<td>Application Bands</td>
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<tr>
<td>Operation Frequency (MHz)</td>
</tr>
<tr>
<td>Return Loss (dB)</td>
</tr>
<tr>
<td>Gain at Zenith (dBi)</td>
</tr>
<tr>
<td>Efficiency (%)</td>
</tr>
<tr>
<td>Impedance</td>
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</table>

<table>
<thead>
<tr>
<th>MECHANICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceramic Dimension (mm)</td>
</tr>
<tr>
<td>Weight (g)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ENVIRONMENTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation Temperature</td>
</tr>
<tr>
<td>Humidity</td>
</tr>
</tbody>
</table>

* Antenna properties were measured with the antenna mounted on 50*50mm Ground Plane
  Taoglas Part # SGGPD.12A
3. Antenna Characteristics

3.1. Return Loss

![Graph showing Return Loss](image)

3.2. Efficiency

![Graph showing Efficiency](image)
3.3. Average Gain

![Graph showing Average Gain with frequency range from 1500 MHz to 1640 MHz and gain in dB from -25 dB to 0 dB.]

3.4. Peak Gain

![Graph showing Peak Gain with frequency range from 1500 MHz to 1640 MHz and gain in dB from -20 dB to 10 dB.]
4. Antenna Radiation Pattern

4.1. Measurement Setup

The SGGP.12.4.A.02 antenna is tested with 50mm*50mm ground plane in a CTIA certified ETS-Lindgren Anechoic Chamber. The test setup is shown below.
4.2. **2D Radiation Pattern**

**XY Plane**

**XZ Plane**
4.3. 3D Radiation Pattern

1575.42MHz

1602MHz
5. Mechanical Drawing

Top View

Side View

Bottom View

Unit: mm
6. Evaluation Board (SGGPD.12A)

![Evaluation Board Diagram]

**Top View**

**Side View**

**Bottom View**

**Unit:mm**

<table>
<thead>
<tr>
<th>Notes</th>
<th>Name</th>
<th>Material</th>
<th>Finish</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PCB SMA(F) ST</td>
<td>Brass</td>
<td>Gold</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>SGGP.12.4.A.02 Antenna</td>
<td>Ceramic</td>
<td>Clear</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>PCB (50x50x1mm)</td>
<td>FR4 1.0t</td>
<td>Black</td>
<td>1</td>
</tr>
</tbody>
</table>
7. PCB Footprint Recommendation

7.1. Footprint Copper Keepout Area (unit: mm)

Pads 1, 2, 3, 4, 5, 6, 7 and 9 are the same size. They should be connected to GND.

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<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>B</td>
<td>9</td>
</tr>
</tbody>
</table>
```

NOTE:
1. Ag Plated area
2. Solder Mask area
3. Copper area
4. Paste area
5. Copper Keepout Area
6. Copper keepout should extend through all PCB layers.
7. Any vias in pads should be either filled or tented to prevent solder from wicking away from the pad during reflow.
8. The dimension tolerances should follow standard PCB manufacturing guidelines
7.2. **Paste Area (unit: mm)**

Pads 1, 2, 3, 4, 5, 6, 7 and 9 are the same size.

![Paste Area Diagram](image)

**NOTE:**
1. Ag Plated area
2. Solder Mask area
3. Copper area
4. Paste area
5. Copper Keepout Area
6. Copper keepout should extend through all PCB layers.
7. Any vias in pads should be either filled or tented to prevent solder from wicking away from the pad during reflow.
8. The dimension tolerances should follow standard PCB manufacturing guidelines.
7.3. Top Solder Mask (unit: mm)

Pads 1, 2, 3, 4, 5, 6, 7 and 9 are the same size. This drawing is a negative of solder mask. Black regions are anti-mask.

NOTE:
1. Ag Plated area
2. Solder Mask area
3. Copper area
4. Paste area
5. Copper Keepout Area
6. Copper keepout should extend through all PCB layers.
7. Any vias in pads should be either filled or tented to prevent solder from wicking away from the pad during reflow.
8. The dimension tolerances should follow standard PCB manufacturing guidelines.
7.4. Composite Diagram (unit: mm)

NOTE:
1. Ag Plated area
2. Solder Mask area
3. Copper area
4. Paste area
5. Copper Keepout Area
6. Copper keepout should extend through all PCB layers.
7. Any vias in pads should be either filled or tented to prevent solder from wicking away from the pad during reflow.
8. The dimension tolerances should follow standard PCB manufacturing guidelines.
8. Recommended Reflow Soldering Profile

SGGP.12A can be assembled following Pb-free assembly. According to the Standard IPC/JEDEC J-STD-020C, the temperature profile suggested is as follows:

<table>
<thead>
<tr>
<th>Phase</th>
<th>Profile Features</th>
<th>Pb-Free Assembly (SnAgCu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREHEAT</td>
<td>Temperature Min(Tsmin)</td>
<td>150°C</td>
</tr>
<tr>
<td></td>
<td>Temperature Max(Tsmax)</td>
<td>200°C</td>
</tr>
<tr>
<td></td>
<td>Time(t) from (Tsmin to Tsmax)</td>
<td>60-120 seconds</td>
</tr>
<tr>
<td>RAMP-UP</td>
<td>Avg. Ramp-up Rate (Tsmax to TP)</td>
<td>3°C/second(max)</td>
</tr>
<tr>
<td>REFLOW</td>
<td>Temperature(TL)</td>
<td>217°C</td>
</tr>
<tr>
<td></td>
<td>Total Time above TL (TL)</td>
<td>30-100 seconds</td>
</tr>
<tr>
<td>PEAK</td>
<td>Temperature(TP)</td>
<td>260°C</td>
</tr>
<tr>
<td></td>
<td>Time(tp)</td>
<td>2-5 seconds</td>
</tr>
<tr>
<td>RAMP-DOWN</td>
<td>Rate</td>
<td>3°C/second(max)</td>
</tr>
<tr>
<td></td>
<td>Time from 25°C to Peak Temperature</td>
<td>8 minutes max.</td>
</tr>
<tr>
<td>Composition</td>
<td>96.5Sn/3Ag/0.5Cu</td>
<td></td>
</tr>
<tr>
<td>Solder Paste</td>
<td>Model</td>
<td>SHENMAO PF606-F26</td>
</tr>
</tbody>
</table>

The graphic shows temperature profile for component assembly process in reflow ovens.

Soldering Iron condition: Soldering iron temperature 270°C±10°C. Apply preheating at 120°C for 2-3 minutes. Finish soldering for each terminal within 3 seconds, if soldering iron temperature over 270°C±10°C or 3 seconds, it will cause component surface pooling or damage.
9. Packaging

9.1. Inner Tray

500 pc SGGP.12.4.A.02 per reel
Dimensions - Ø330*38mm
Weight - 2.0Kg
1 pc reel in small inner box
Dimensions - 350*340*70mm
Weight - 2.3Kg

4 Reels / 2000 pcs in one carton
Carton Dimensions - 370*370*300mm
Weight - 9.7Kg

Pallet Dimensions 1100*1100*1270mm
36 Cartons per Pallet
9 Cartons per layer
4 Layers

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