### SGP.12a Specification

<table>
<thead>
<tr>
<th>Part No.</th>
<th>SGP.1575.12.4.A.02</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Name</strong></td>
<td>GPS SMT Patch Antenna</td>
</tr>
</tbody>
</table>
| **Features**      | 12mm*12mm*4.5mm  
|                   | 1575MHz Centre Frequency  
|                   | Patent Pending  
|                   | RoHS Compliant |
1. Introduction

This ceramic GPS patch antenna is based on smart XtremeGain™ technology. It is mounted via SMT process and has been selected as optimal solution for the 45x45mm ground plane.

2. Specification

Original Patch Specification tested on 45mm ground plane

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range of Receiving Frequency</td>
<td>1575.42 MHz ± 1.023 MHz</td>
<td></td>
</tr>
<tr>
<td>Center Frequency</td>
<td>1575.42 ± 3MHz</td>
<td>With 45*45mm ground plane</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>4MHz min</td>
<td>Return Loss ≤-10 dB</td>
</tr>
<tr>
<td>VSWR</td>
<td>1.5 max</td>
<td></td>
</tr>
<tr>
<td>Gain at Zenith</td>
<td>-1.0 dBi typ.</td>
<td></td>
</tr>
<tr>
<td>Gain at 10°elevation</td>
<td>-1.5 dBi typ.</td>
<td></td>
</tr>
<tr>
<td>Axial Ratio</td>
<td>4.0 dB max</td>
<td></td>
</tr>
<tr>
<td>Polarization</td>
<td>RHCP</td>
<td></td>
</tr>
<tr>
<td>Impedance</td>
<td>50 Ohms</td>
<td></td>
</tr>
<tr>
<td>Frequency Temperature Coefficient</td>
<td>0 ± 20ppm / °C</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-40°C to +85°C</td>
<td></td>
</tr>
</tbody>
</table>

**Changes in user groundplane and environment will offset centre frequency**
3. Electrical Specifications

3.1 Return Loss, SWR, Impedance, measured on the test fixture

MARKER 1
1. 575 42GHz
-14.479 dB

C.F = 1 576 309 756.8 Hz
L.F = 1 573 254 844.1 Hz
R.F = 1 829 364 669.6 Hz
BW = 55.2874 Hz
O = 55.874
SF =

Mkr 1: 1.575 42GHz
-14.479 dB
Mkr 1: 1.575 42GHz
41.014 Ω
14.917 Ω
4. Mechanical Specifications

4.1 Dimensions and Drawing

<table>
<thead>
<tr>
<th>Name</th>
<th>Part No.</th>
<th>Material</th>
<th>Finish</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 SGP.12 Patch 12x12x4</td>
<td>SGP.12</td>
<td>Ceramic</td>
<td>Clear</td>
<td>1</td>
</tr>
<tr>
<td>2 SGP.12 PCB</td>
<td>SGP.12</td>
<td>FR 0.5t</td>
<td>Green</td>
<td>1</td>
</tr>
</tbody>
</table>
4.2 Antenna footprint

4.2.1 Top Copper

Dimensions in mm

Copper Keepout Region

Pads 2 through 8 should be connected to GND.
Pads 1 and 5 are the same size (3.2 x 1.6 mm).
Pads 2, 4, 6, and 8 are the same size (1.6 x 3.1 mm).
Pads 3 and 7 are the same size (1.6 x 3.2 mm).
Pad 9 is a 1.70mm dia. non-plated thru-hole.
Copper Keepout Region should extend at least 2 mm down into PCB.
4.2.2 Solder Paste

Solder paste application is typically defined by the assembly house. These recommendations are merely a starting point and are subject to change.
4.2.3 Solder Mask

Dimensions in mm
4.2.4 Composite

**Dimensions in mm**

```
   5.70

   5.70

   4.45

   4.45

   5.70
```

Copper Keepout Region
4.3 Test Jig and Dimension
4.4 Test Fixture set up and measurements

![Diagram of Test Fixture and Antenna Setup](image-url)

- **Calibration Point**
- **Network Analyzer**
- **S11 Characteristics**
- **Log map**
- **Smith Chart**
- **SMA Adapter**
- **Ground Plane**

**Dimensions:**
- 45 by 45mm
5. Recommended Reflow Soldering Profile

AP.10H 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(ts) 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>
</tbody>
</table>

Time from 25°C to Peak Temperature: 8 minutes max.
Composition of solder paste: 96.5Sn/3Ag/0.5Cu
Solder Paste Model: SHENMAO PF606-P26

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 make cause component surface peeling or damage.
6. Packaging

500 pcs / reel / inner carton
5 reels in an outer carton (2500)

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