



LODESTAR

GNSS SMD Antenna

SZP-C-0G02

Key Features

- GNSS coverage from 1559 to 1610 MHz (GPS, GLONASS, Galileo, BeiDou)
- Ultra compact 6.0 x 5.0 x 0.9 mm footprint
- Highly resistant to detuning
- Clean resonance with no unwanted out of band response
- Near omnidirectional radiation pattern
- Performance comparable to large ceramic patch antennas
- Simple design in with no additional clearance needed
- SMD component supplied in tape and reel
- Suitable for sealing with resin or potting compounds
- Patent pending design

1 Introduction

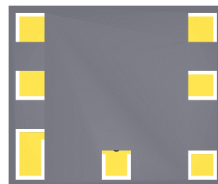
LODESTAR is a highly compact, high performance SMD antenna for embedded GNSS designs, covering GPS, GLONASS, Galileo and BeiDou from 1559 to 1610 MHz. Measuring only 6.0 x 5.0 x 0.9 mm, it simplifies the design in process so engineers can focus on the product. Placed at the center of the longest PCB edge, LODESTAR produces a near omnidirectional radiation pattern, unlike patch antennas, making device orientation far less critical. Its clean resonance has no unwanted out of band response, and the design is highly resistant to detuning, delivering performance comparable to much larger ceramic patch antennas in wearables and other small devices.

Features

- GNSS coverage from 1559 to 1610 MHz (GPS, GLONASS, Galileo, BeiDou)
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- Clean resonance with no unwanted out of band response
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Applications

- Asset tracking
- M2M and industrial
- Tablets
- Wearable devices
- Headsets
- Healthcare
- Drones
- Telematics
- OBD-II



2 Mechanical Specifications

Part Number	SZP-C-0G02
Name	LODESTAR
Dimensions (mm)	6.0 x 5.0 x 0.9
Required Clearance Area (mm)	6 x 5
Weight	< 0.2 g
Antenna Type	Surface Mount Device (SMD)
Polarization	Linear

Patent pending design. All dimensions in mm.

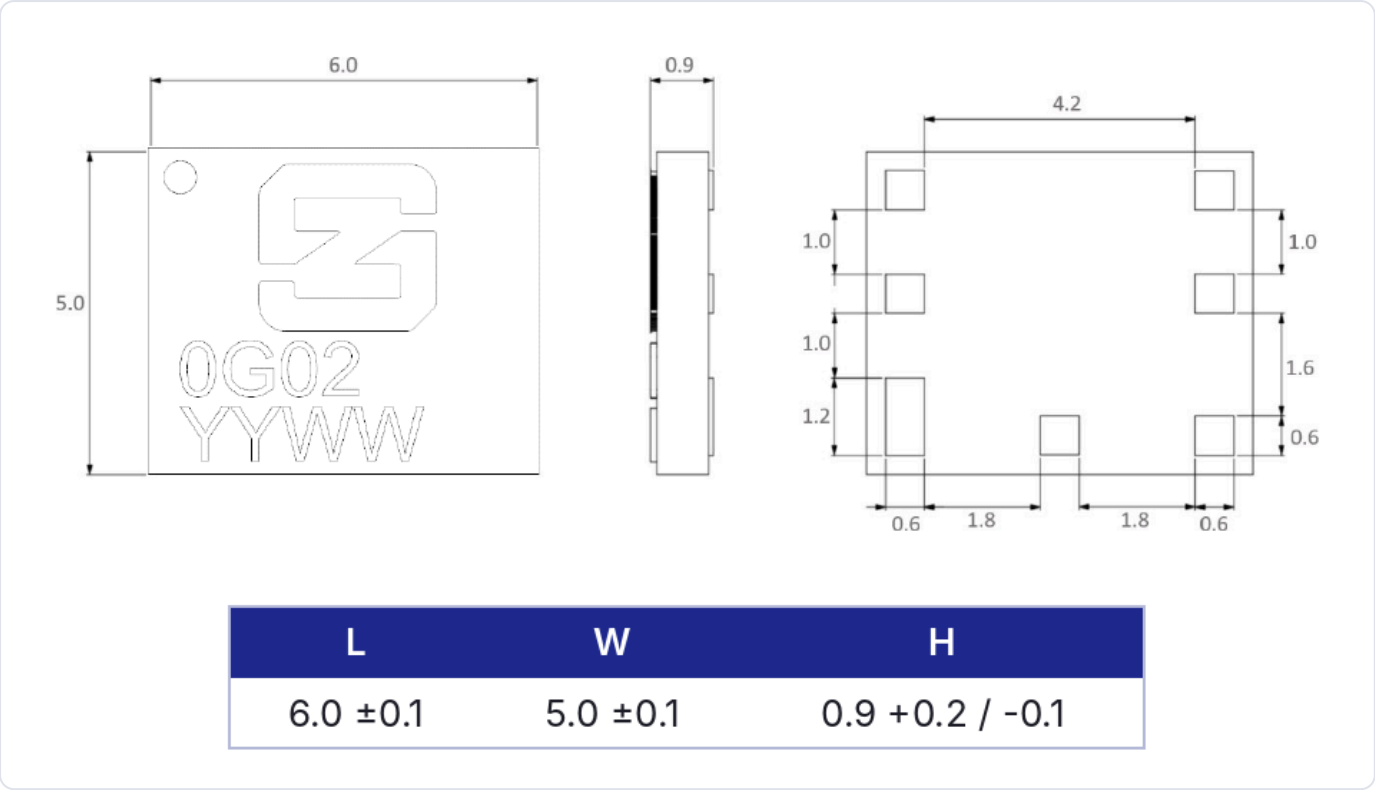
3 Electrical / RF Specifications

Band	Frequency Range (MHz)	Avg Efficiency	Peak Gain (dBi)	S11 max (dB)	VSWR max	Impedance
GNSS: GPS L1, GLONASS G1, Galileo E1, BeiDou B1	1559-1610	>60% (Linear), >30% (RHCP)	0.5	<-11.8	1.70:1	50 ohm

4 Environmental

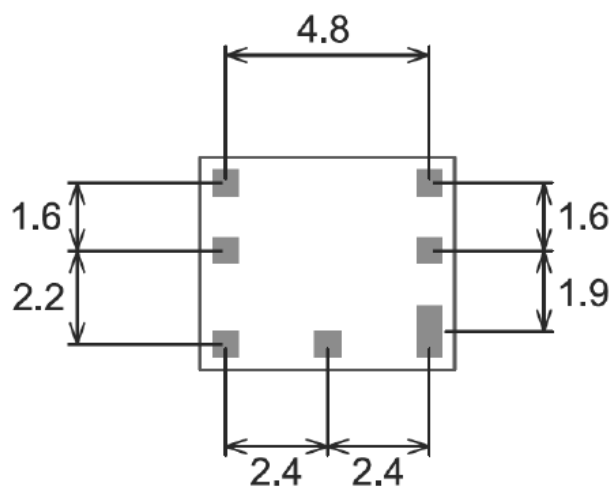
Operational Temperature	-40 to +125°C
Storage Temperature	-10 to +40°C
Relative Humidity	≤75%
Moisture Sensitivity Level	MSL 1
RoHS compliant	Yes
Halogen free	Yes

5 Mechanical Drawing



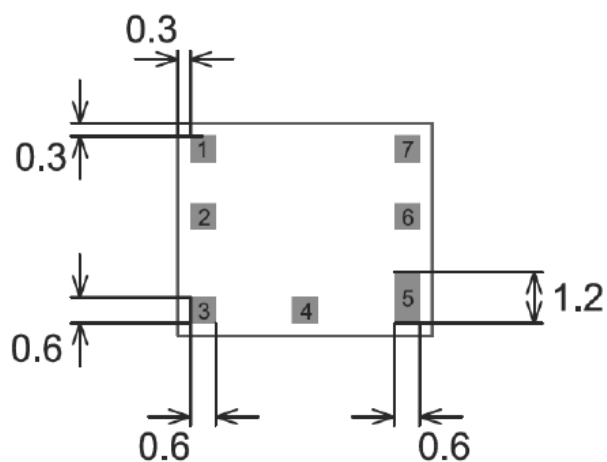
6 Required Host PCB Footprint

The host PCB requires the footprint shown below. PCB library files and DXF are available on request.

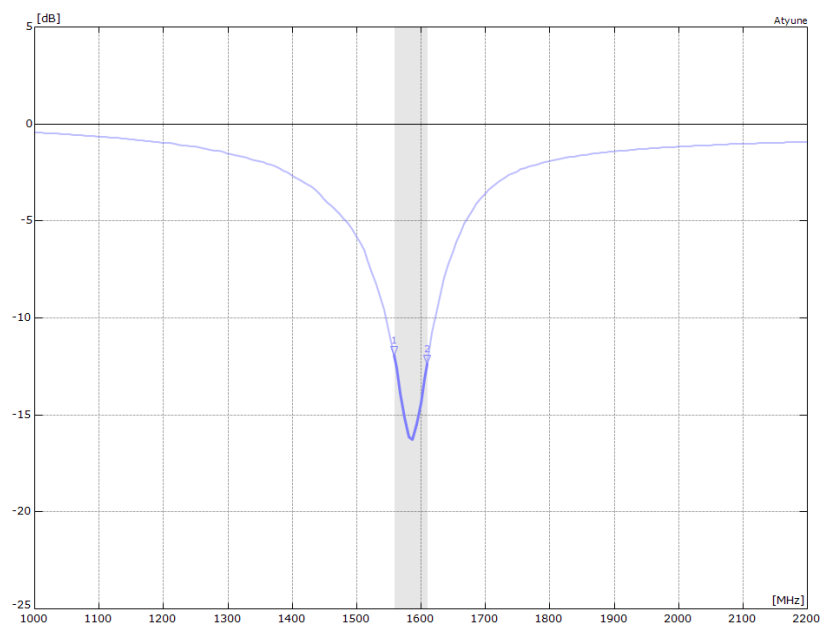


Pins 1,2,3,4,6,7 = 0.6 x 0.6 (mm)

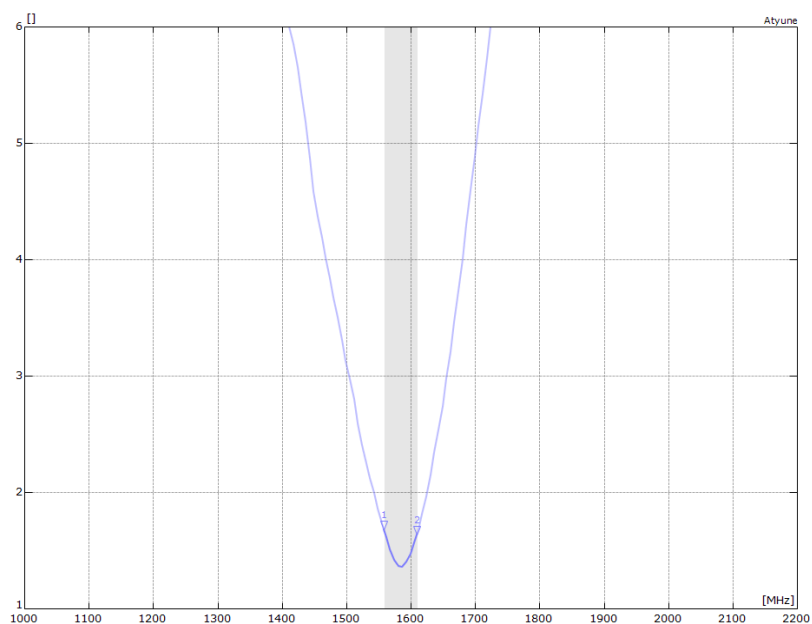
Pin 5 = 1.2 x 0.6 (mm)



7 Return Loss (S11)

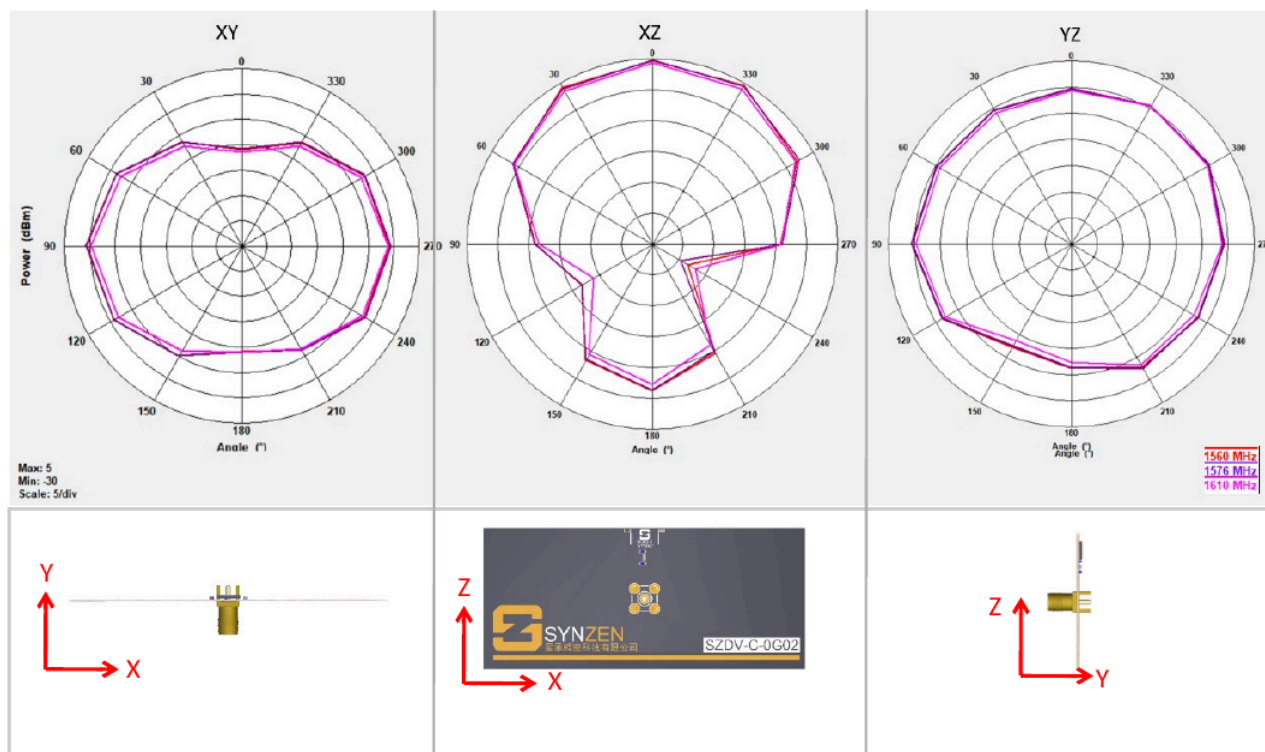


8 VSWR



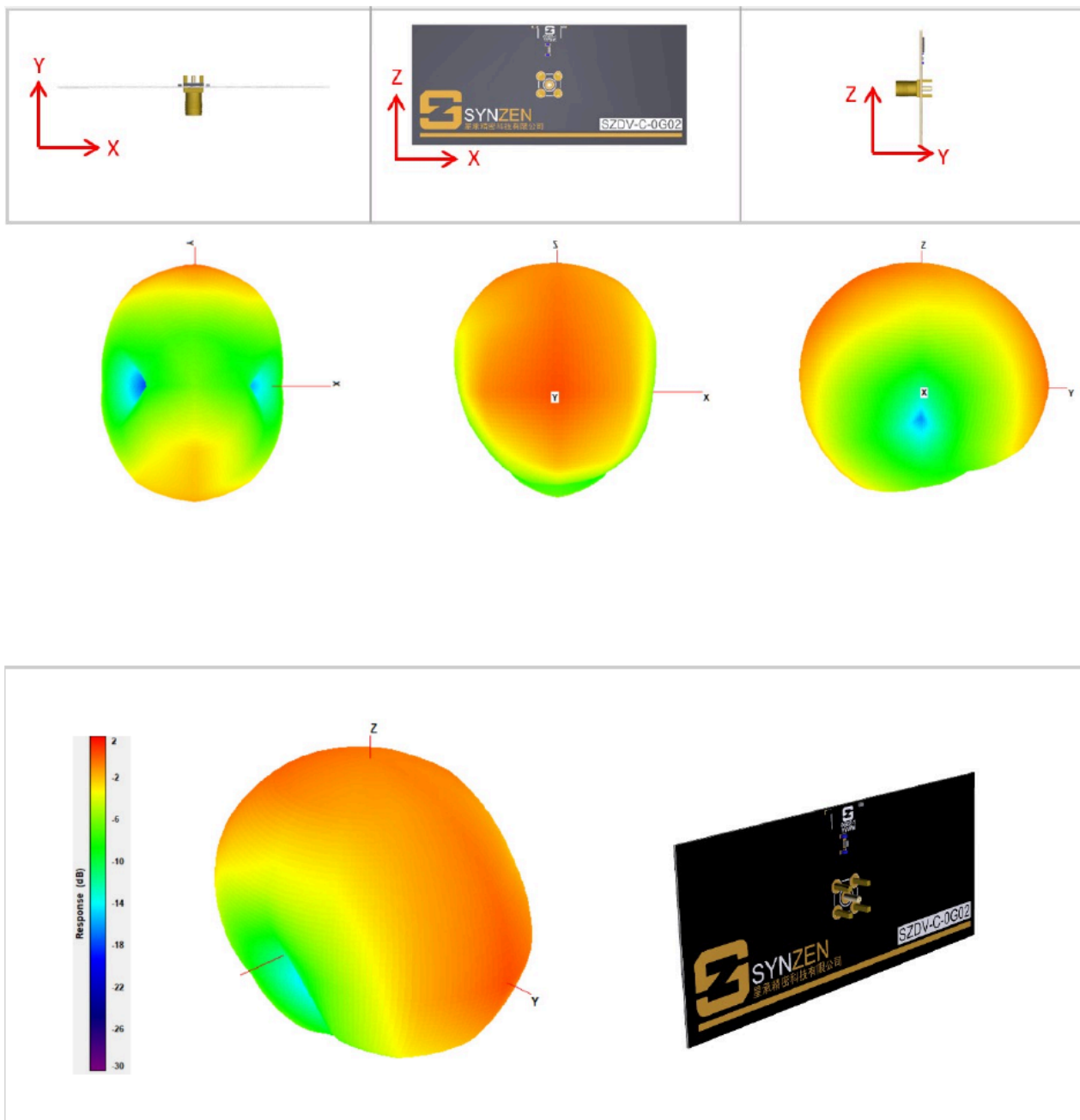
9 2D Polar Plot

The data shown was measured on the Synzen development kit (SZDV-C-0G02).



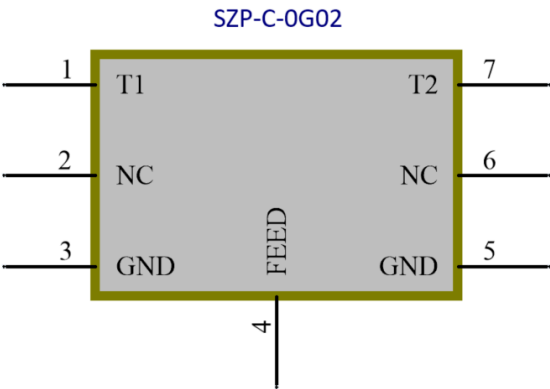
10 3D Radiation Pattern

The data shown was measured on the Synzen development kit (SZDV-C-0G02) at 1575.42 MHz.



11 Schematic Symbol and Pinout

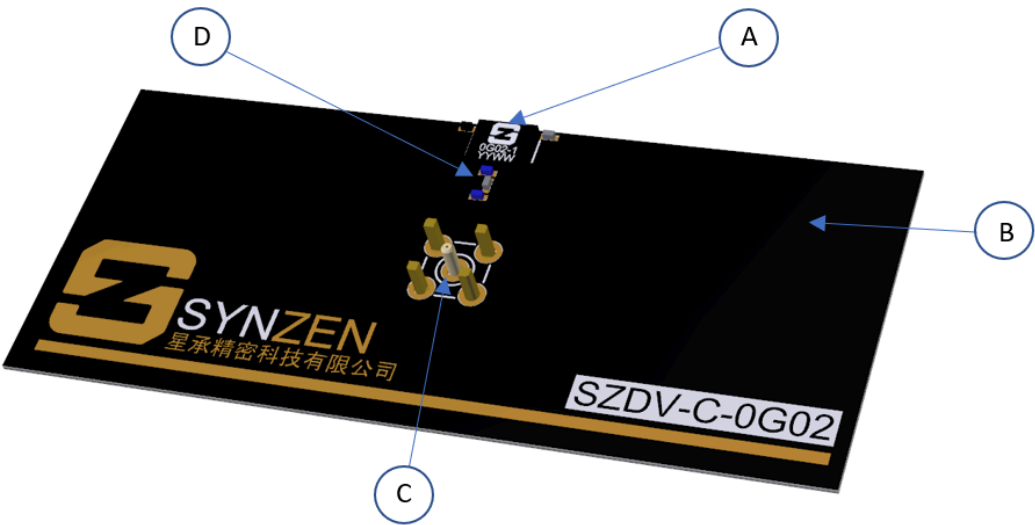
The schematic symbol for the antenna is shown below with a description of each pin.



Pin	Description
1, 7	Tuning pins
2, 3, 6	Not used, leave unconnected
4	Feed to matching network
5	Ground

12 Development Kit

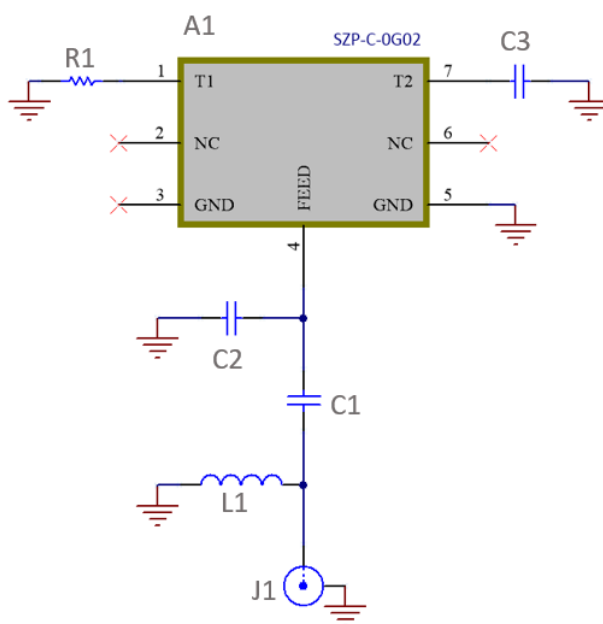
The development kit is a PCBA with the antenna fitted and optimized with a matching network. Connection to the antenna is made using the fitted female SMA connector.



Item	Description
A	SZP-C-0G02 (LODESTAR antenna)
B	Host PCB
C	SMA connector
D	Matching circuit

13 Development Kit Matching Circuit

The development kit circuit and BOM are shown below. The matching network topology should be used on the device host PCB, although the matching values will depend on the host PCB and device environment. Synzen provides an antenna optimization service (AOS) to tune your device for best performance; please contact sales@synzen.com.tw for more information.



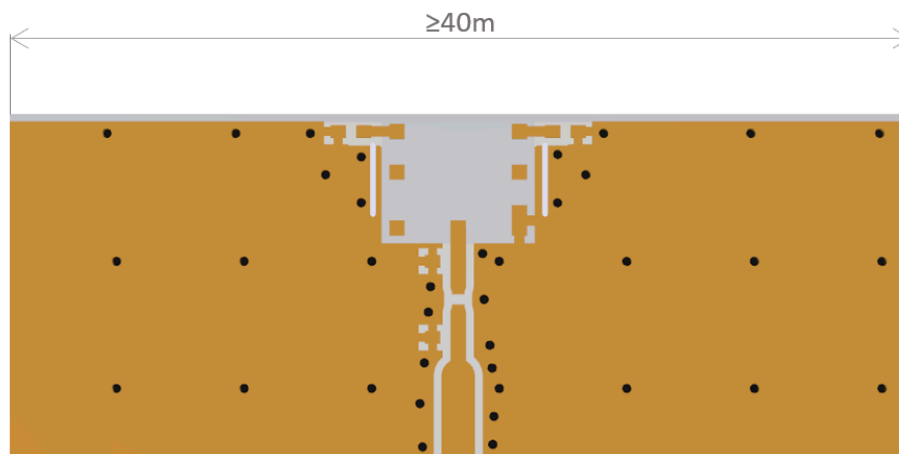
Designator	Component Type	Value	Size	Manufacturer Part No.
A1	Antenna	LODESTAR	-	SZP-C-0G02
C1	Capacitor	8.2 pF	0402	GRM0335C1H8R2DA01D
C2	Capacitor	1.0 pF	0402	GRM0335C1H1R0CA01D
L1	Inductor	Not fitted	0402	Do not place
R1	Resistor	0R	0402	Non-specific part
C3	Capacitor	15 pF	0402	GRM0335C1H150JA01D
J1	SMA connector	-	-	ACE Solution A3SAFTST135

14 Placement and Clearance

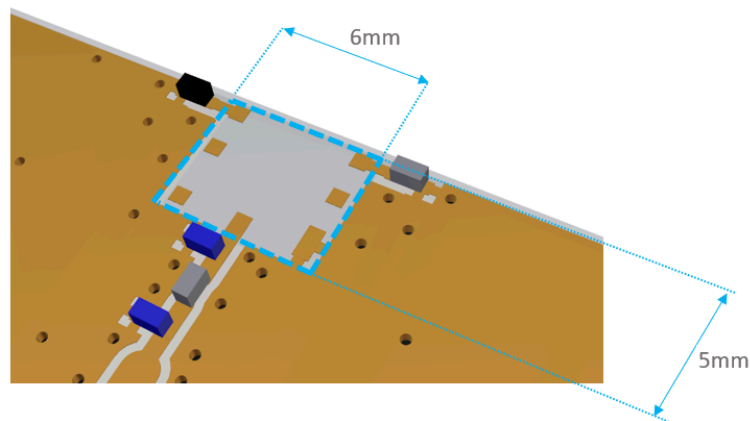
Placement: the antenna is designed to be placed at the center of the longest PCB edge, equidistant from either side as shown. Where possible, the top and bottom layers of the PCB should be flooded with GND; this optimizes antenna performance and also helps prevent noise, to which GNSS systems are sensitive.

Clearance: a clearance of 6 x 5 mm is required through all PCB layers for the precise area shown. Components such as the battery or display must also avoid this area. The rest of the area under the antenna should be filled with GND.

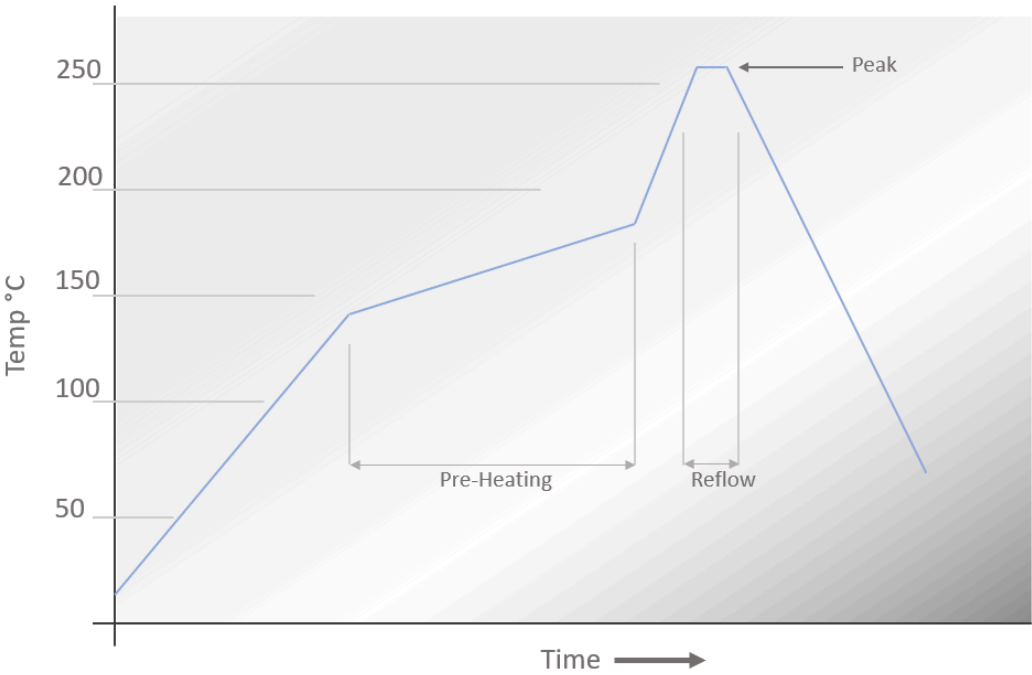
Placement



Clearance

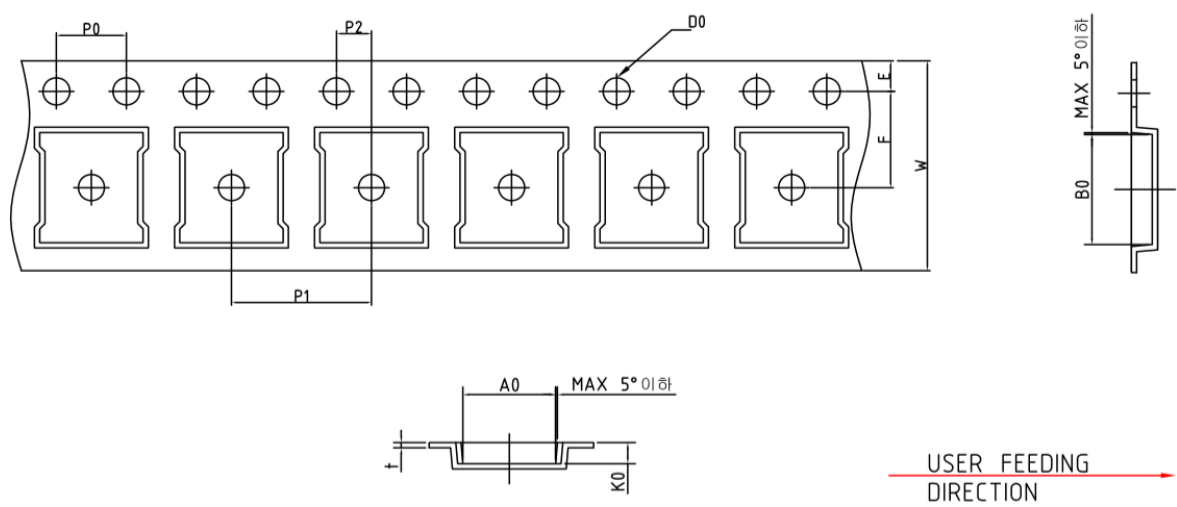


15 Reflow Profile

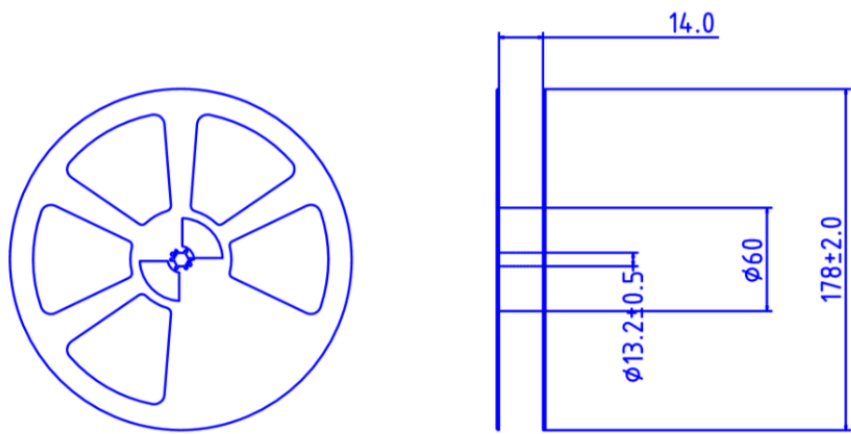


Stage	Temperature	Time
Pre-heating	130 to 180°C	50 to 190 seconds
Reflow	>220°C	50 to 160 seconds
Peak temperature	260°C	15 to 45 seconds

16 Tape and Reel



- 1. 10 sprocket hole pitch cumulative tolerance ± 0.2
- 2. Camber not to exceed 1mm in 100mm.
- 3. Ao and Bo measured on a plane 0.1mm above the bottom of the pocket
- 4. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.



ANTI-STATIC

REEL DIMENSION	Type	Color	Size	Hub
	PS	White	$\phi 178$	$\phi 60$

17 Packaging

Supplied in tape and reel (anti-static PS reel, white, Ø178 mm, hub Ø60 mm)

Each reel is vacuum sealed in a moisture barrier bag with desiccant and a humidity indicator card, then shipped in a reel box.

18 Material Regulation

The antenna has been tested to conform to RoHS requirements. A certificate of conformance is available upon request. This product is halogen free.

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