



TAOGLAS®



Datasheet

Part No:
SGPDF254B

Description

GPS/GLONASS/GALILEO/BEIDOU Dual Feed Ceramic Patch SMD Antenna

Features:

GPS/GLONASS/GALILEO/BEIDOU Dual Feed Ceramic Patch SMD Antenna

Bands Covered:

- BeiDou (B1I) 1561MHz
- GPS/QZSS (L1) 1575.42MHz
- GLONASS (G1) 1602MHz

Low profile at just 4mm in height

Dual-feed SMD configuration

Dimensions: 25 x 25 x 4mm

RoHS & Reach Compliant

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1. Introduction



The Taoglas SGPDF254B is a single band passive GNSS patch covering GPS/GLONASS/BeiDou/Galileo measuring just 25mm x 25mm with a low-profile height of 4mm. The SGPDF254.A has been designed with a dual feed patch to enhance performance by improving multipath rejection so signals can be received and sent more clearly.

The SGPDF254.A is mounted via SMD and includes an additional solder mask to enhance durability and prevent cracking due to heat expansion during high-volume, cost-sensitive assembly processes.

Typical Applications Include:

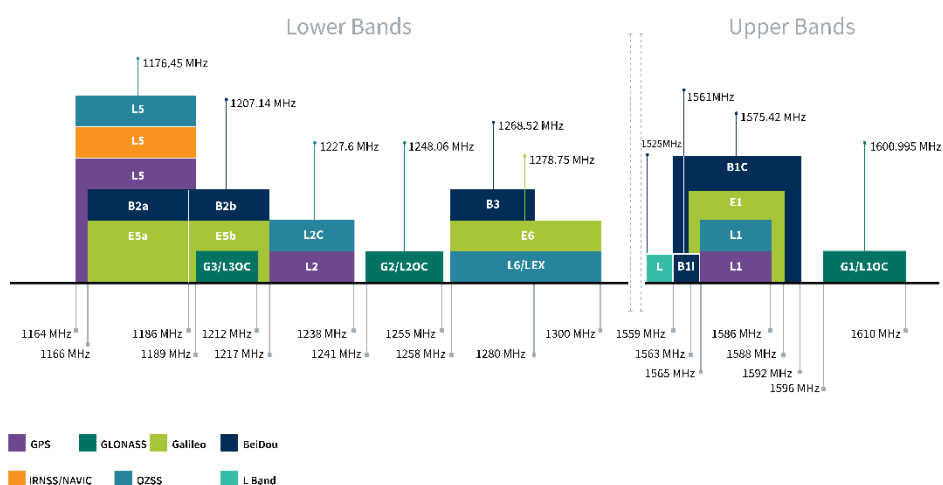
- Wearables
- Asset Tracking
- Navigation Systems

The SGPDF Series can be manufactured in a TS16949 first-tier automotive-approved facility and tested to AEC-Q200 certification if required. Further to this, full PPAP and IMDS documentation can be provided upon request. Please discuss your quality and reliability requirements with our team prior to ordering.

Taoglas also offers custom tuning service based on minimum order quantities, contact your regional Taoglas customer support team for further information.

2. Specification

GNSS Frequency Bands					
GPS	L1 1575.42 MHz	L2 1227.6 MHz	L5 1176.45 MHz		
	■	□	□		
GLONASS	G1 1602 MHz	G2 1248 MHz	G3 1207 MHz		
	■	□	□		
Galileo	E1 1575.24 MHz	E5a 1176.45 MHz	E5b 1201.5 MHz	E6 1278.75 MHz	
	■	□	□	□	
BeiDou	B1C 1575.42 MHz	B1I 1561 MHz	B2a 1176.45 MHz	B2b 1207.14 MHz	B3 1268.52 MHz
	■	■	□	□	□
L-Band	L-Band 1542 MHz				
	□				
QZSS (Regional)	L1 1575.42 MHz	L2C 1227.6 MHz	L5 1176.45 MHz	L6 1278.75e6	
	■	□	□	□	
IRNSS (Regional)	L5 1176.45 MHz				
	□				
SBAS	L1/E1/B1 1575.42 MHz	L5/B2a/E5a 1176.45 MHz	G1 1602 MHz	G2 1248 MHz	G3 1207 MHz
	■	□	■	□	□



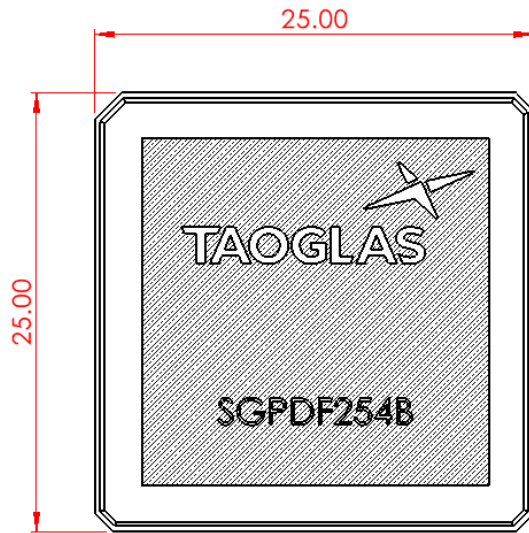
GNSS Bands and Constellations

GNSS Electrical			
Frequency (MHz)	B1I – 1561 MHz	L1/E1 - 1575.42 MHz	G1 – 1602 MHz
	1559-1565	1565-1586	1596-1610
Efficiency (%)	19.8	41.9	37.3
Average Gain (dB)	-7.04	-3.78	-4.29
Peak Gain (dBi)	-1.06	3.68	2.98
Axial Ratio (dB)	0.78	0.71	0.3
Polarization	RHCP		
Impedance	50 Ω		
*Tested on a 50x50mm Ground Plane			

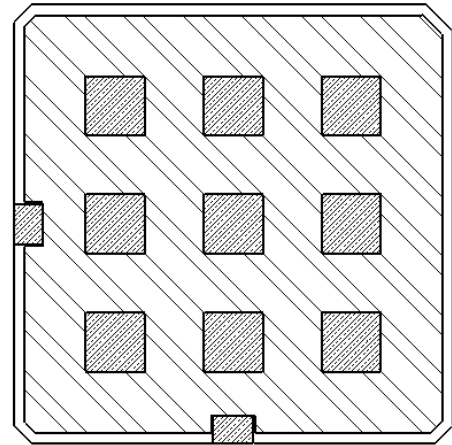
Mechanical	
Dimensions	25mm x 25mm x 4mm
Weight	10 g $\pm$ 3%
Material	Ceramic

Environmental	
Operation Temperature	-40°C to 105°C
Storage Temperature	-40°C to 105°C
Relative Humidity	Non-condensing 65°C 95% RH
Moisture Sensitivity	3 (168 hours)

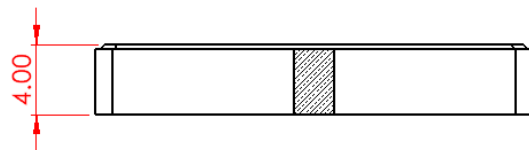
3. Mechanical Drawing



TOP



BOTTOM



SIDE

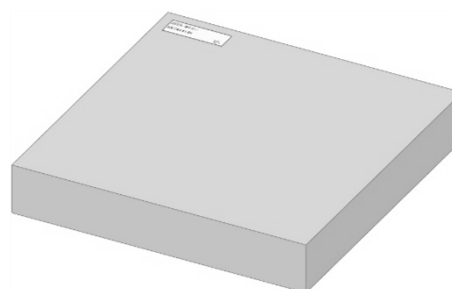


4. Packaging

200 pcs/ Reel/ Vacuum bag



200 pcs / Box
Box: 350x340x67mm
Weight: 2.55 ±3% Kg

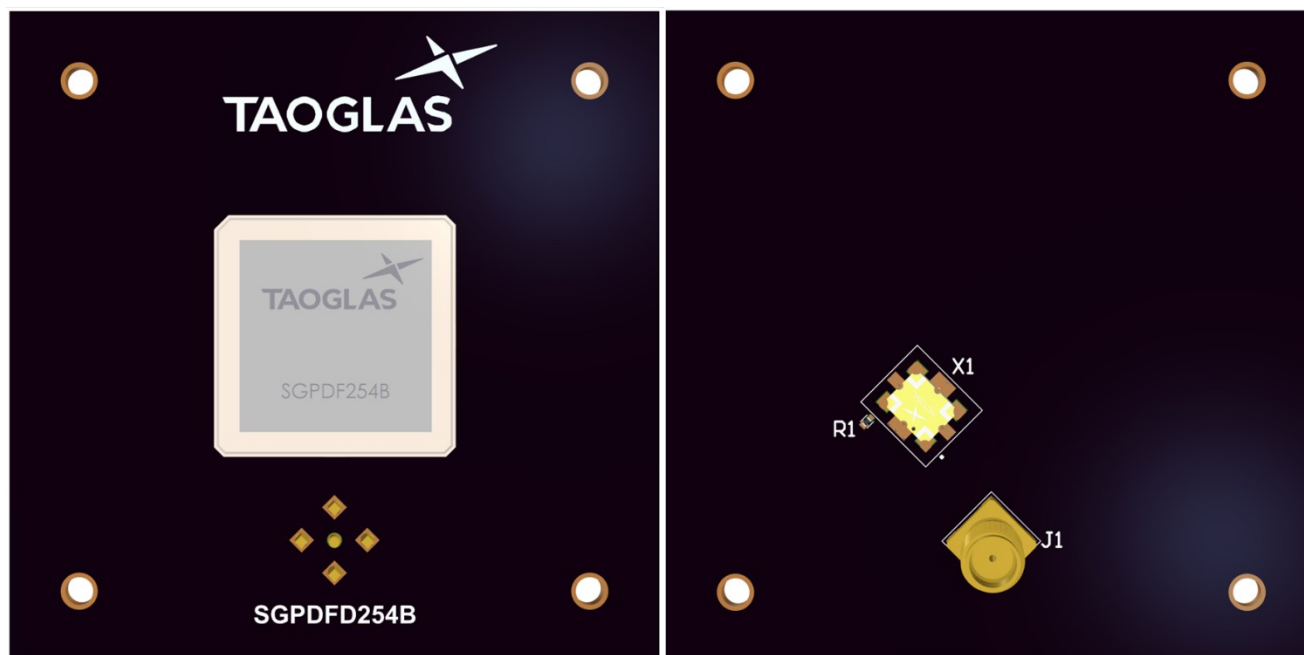


800 pcs / Carton
Carton: 370x370x300mm
Weight: 11 ±3% Kg



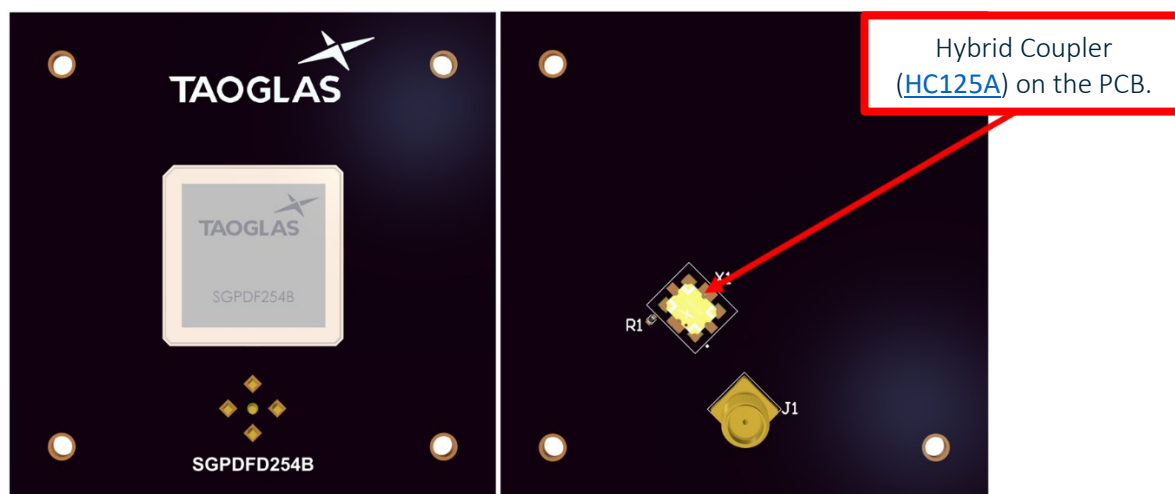
5. Antenna Integration Guide

The following is an example on how to integrate the SGPDF254B into a design. This antenna has 11 pins, two pins are used for the L1 band. A Hybrid coupler ([HC125A](#)) is used to combine the feeds for the L1 band, to create a linear polarized signal at the output of the hybrid coupler. Taoglas recommends using a minimum of 70x70mm ground plane (PCB) to ensure optimal performance.



Top and bottom view of Reference Design PCB.

5.2 Schematic and Symbol Definition

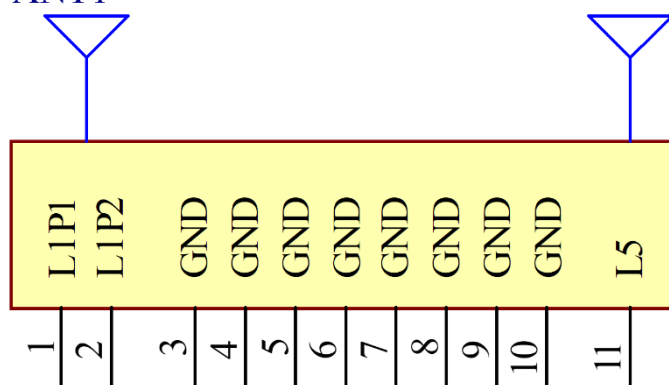


Above are the 3D models of the SGPDF254B and [HC125A](#) on a Reference Design PCB.

The circuit symbol for the SGPDF254B is shown below. The antenna has 11 pins as indicated below.

Pin	Description
1	L1 (0°)
2	L1(90°)
3-10	Ground
11	L5

TAOGLAS_HP5354.A
ANT1

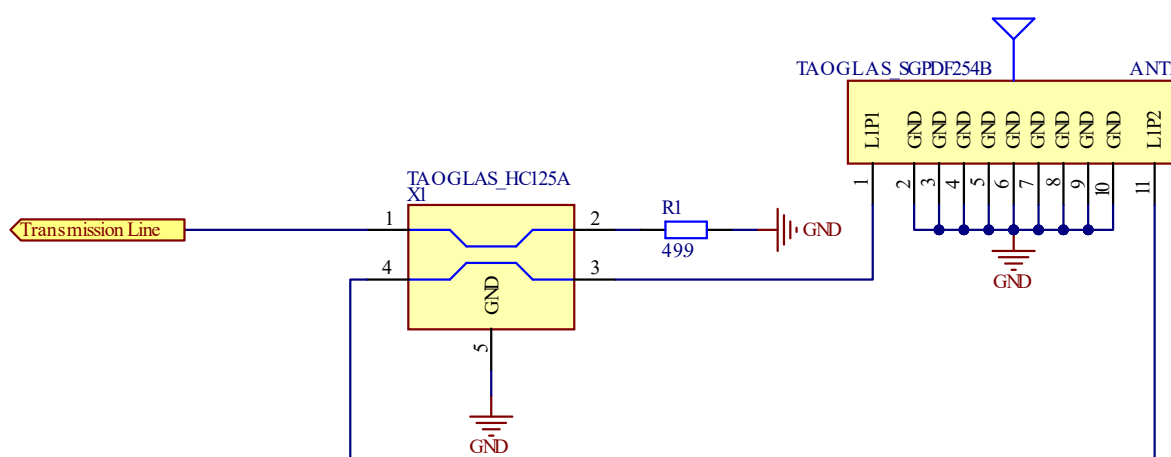


Above is a schematic symbol of SGPDF254B and a table of the pin definitions.

5.3 Schematic Layout

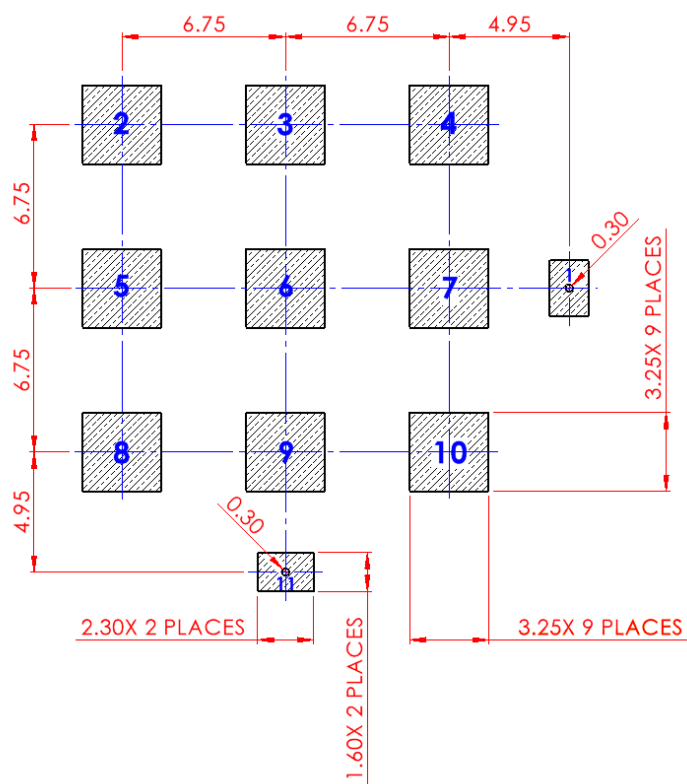
The SGPDF254B uses two orthogonal feeds that need to be combined in a hybrid coupler to ensure optimal axial ratio and Linear Gain is achieved. Taoglas recommends our HC125A, a high-performance hybrid coupler specifically engineered for use with our multi feed patches.

The HC125A is required for the high GNSS band of operation (1559-1610MHz) for this antenna. This hybrid coupler should be placed close to the antenna pins and terminated correctly using a 49.9 Ohm resistor.

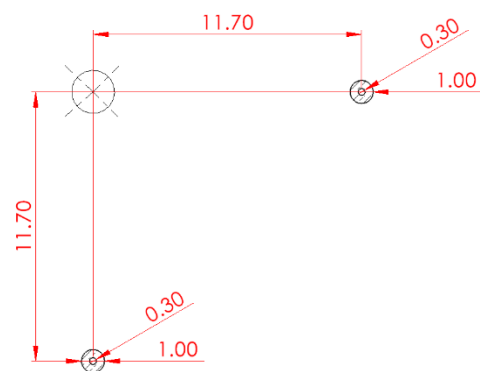


Designator	Type	Value	Manufacturer	Manufacturer Part Number
R1	Resistor	49.9 Ohms	YAGEO	RC0402FR-0749R9L

5.4 Antenna Footprint



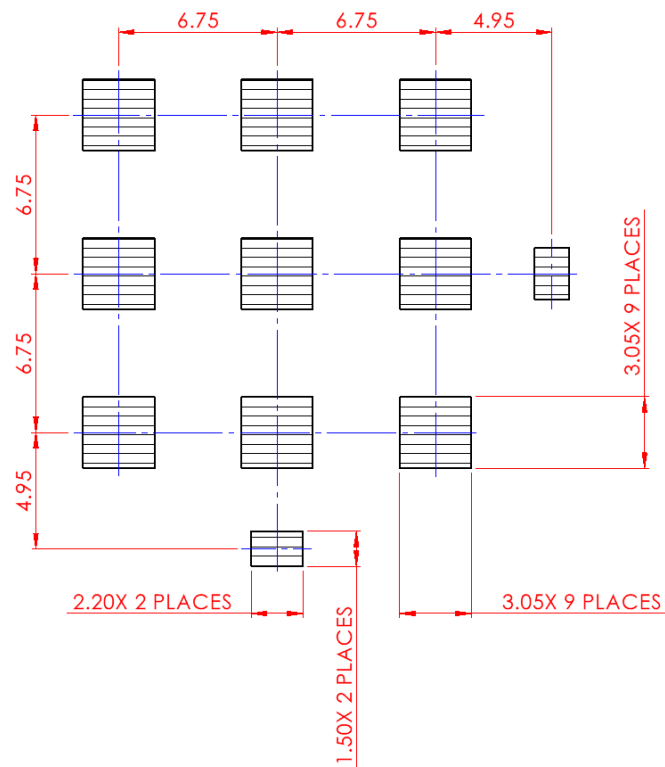
Top Side



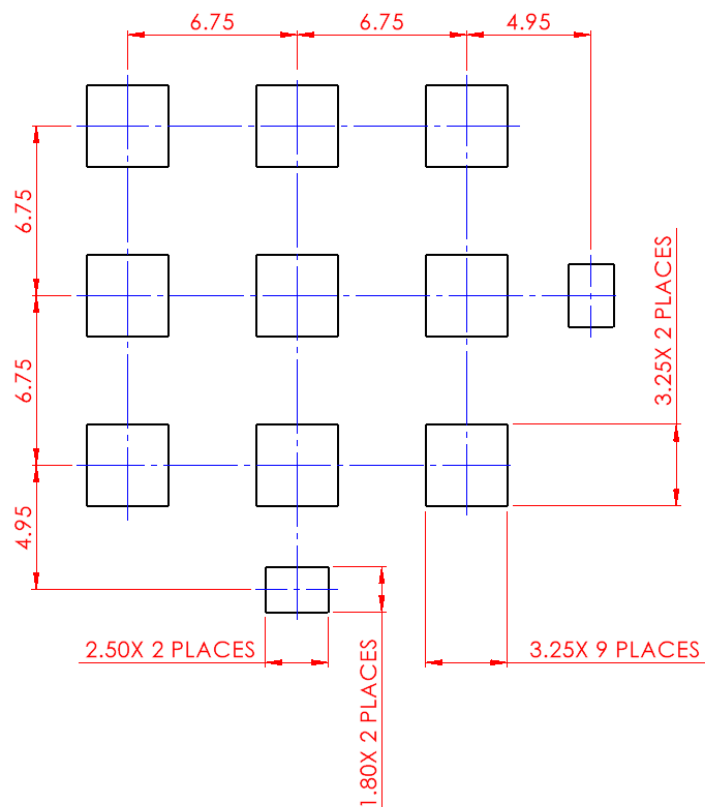
Bottom Side

Pin	Description
1	L1 (0°)
2-10	Ground
11	L1 (90°)

5.5 Top Solder Paste



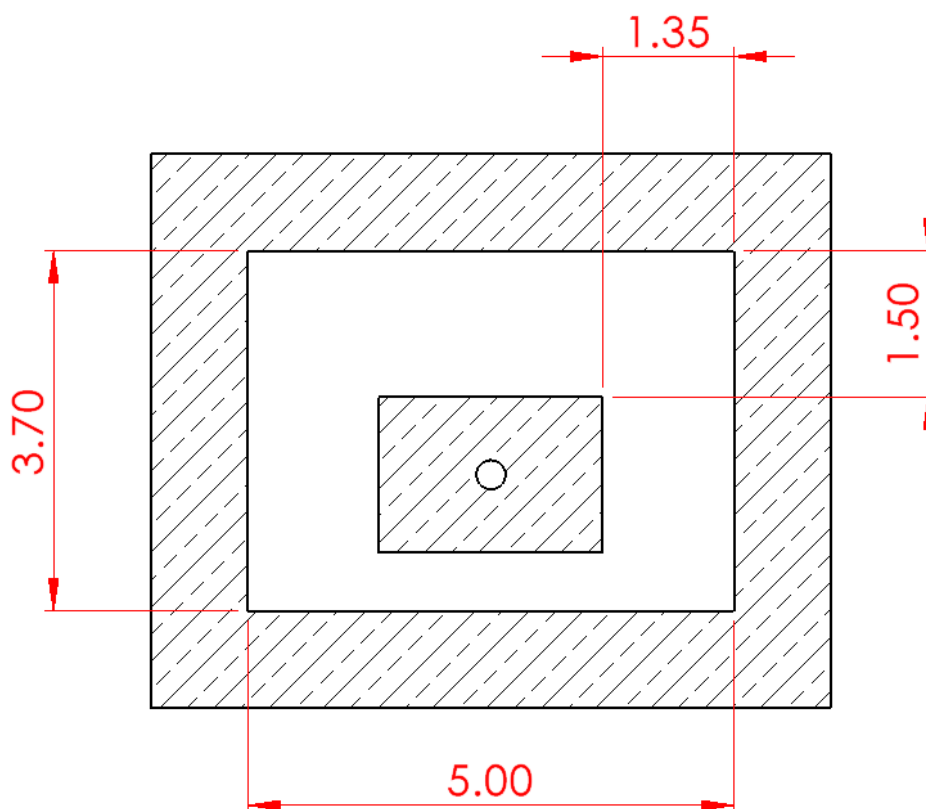
5.6 Top Solder Mask



5.7 Copper Clearance for SGPDF254B

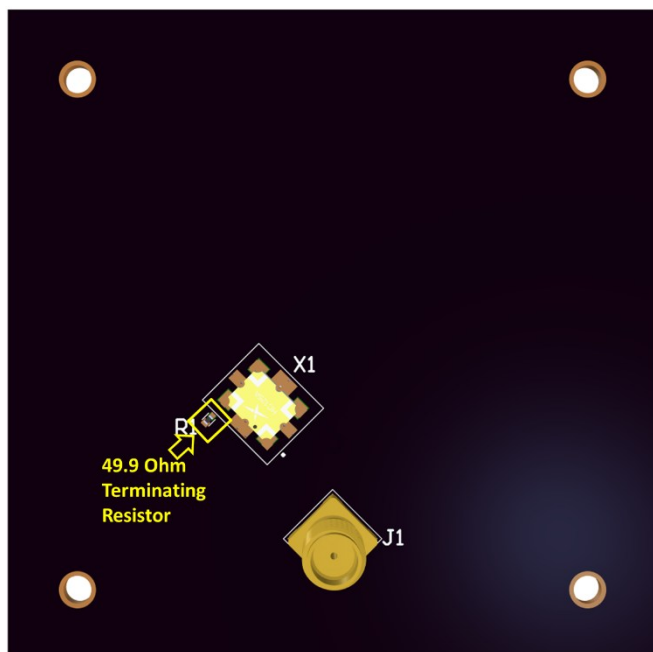
The footprint and clearance on the PCB must comply with the antenna's specification. The PCB layout shown in the diagrams below demonstrates the SGPDF254B clearance area for Pin 1 (L1P1(0°) Pad) and Pin 11 (L1P2(-90°) Pad). The copper keep out area applies to the top layer and all internal layers.

There should be a 5x3.7mm copper clearance area around the antenna pins on the PCB.

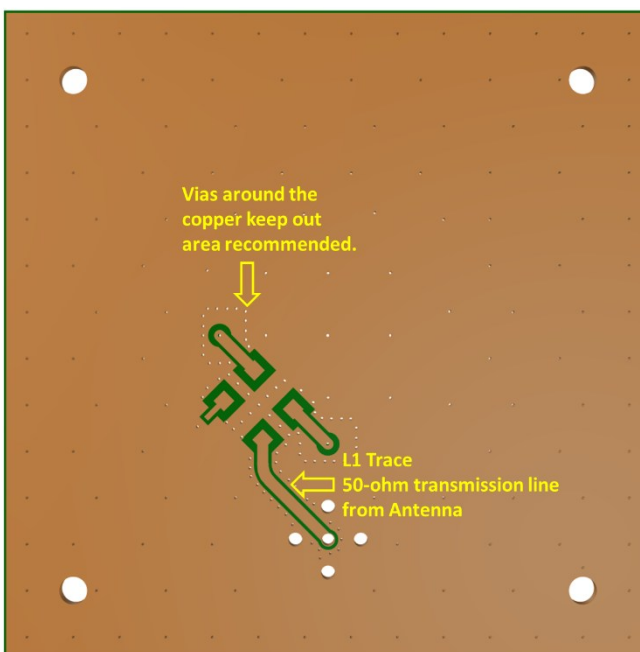


5.8 Antenna Integration

The SGPDF254B should be placed in the centre of the PCB to take advantage of the ground plane. The RF traces must maintain a 50 Ohm transmission line. Ground vias should be placed around the transmission lines and the copper clearance area.



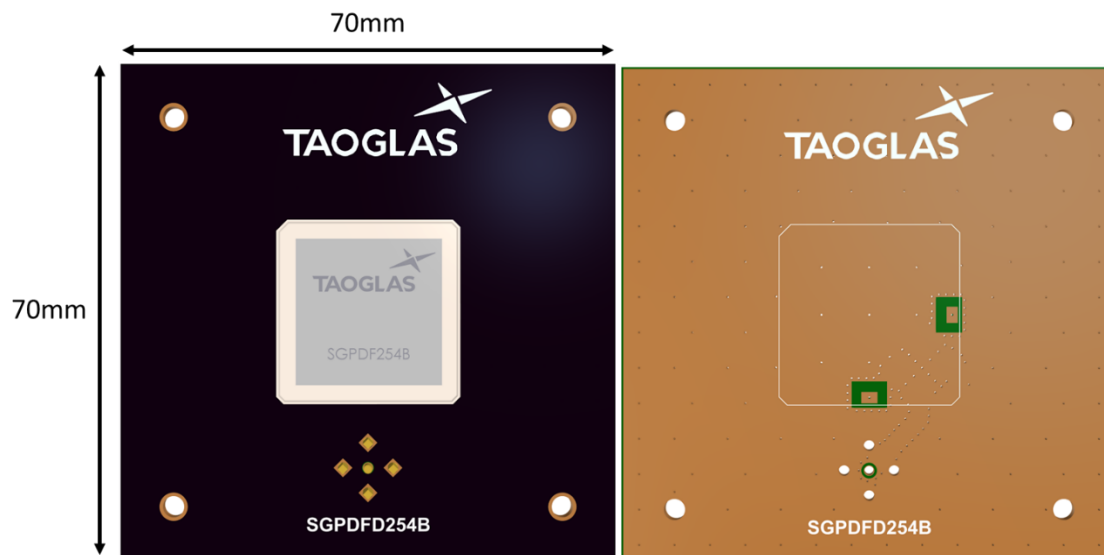
Bottom view of a PCB reference design, showing "Pi" matching network.



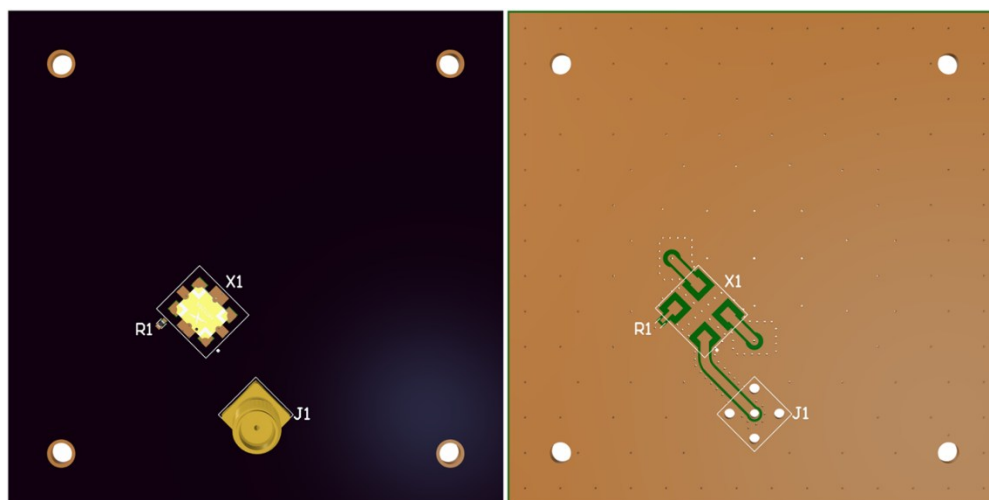
Bottom view of the PCB reference design, showing transmission lines and integration notes.

5.9 Final Integration

The bottom side image shown below highlights the antenna connection to the hybrid coupler ([HC125A](#)). It shows the 49.9 Ohm terminating resistor necessary for the hybrid coupler ([HC125A](#)). Taoglas recommends using a minimum of 70x70mm ground plane (PCB) to ensure optimal performance.



Top Side (SGPDF254B placement on 70x70mm Reference Design PCB)



Bottom side ([HC125A](#) placement)

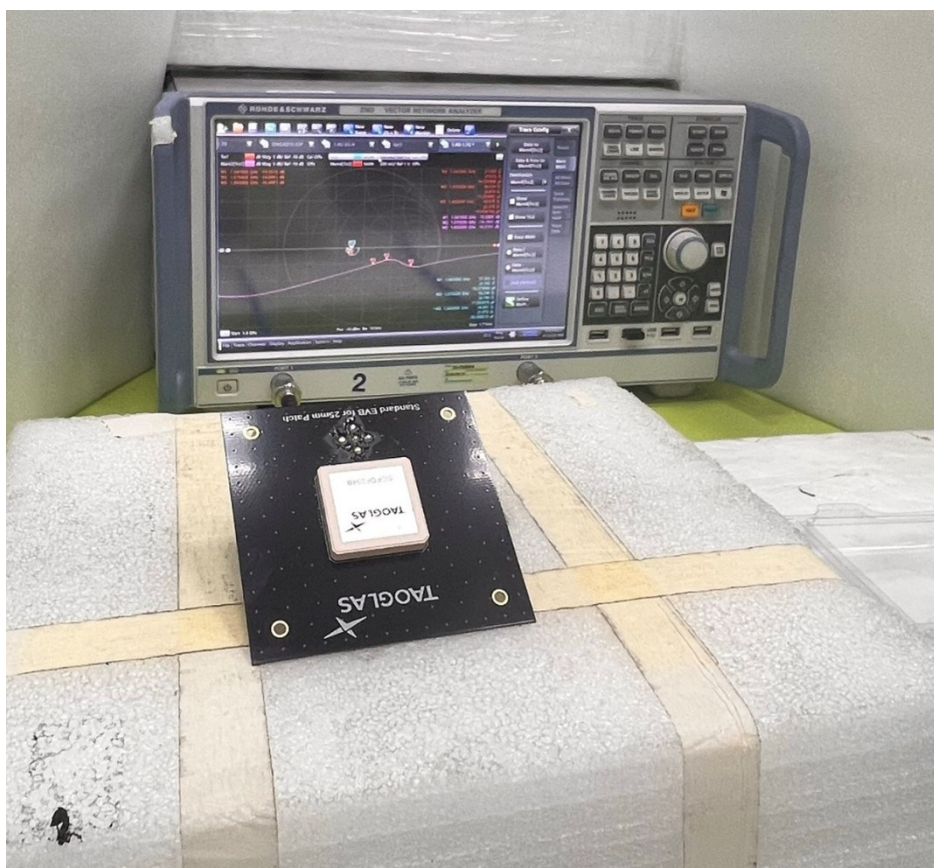
6. Antenna Characteristics

6.1 Test Setup

AUT

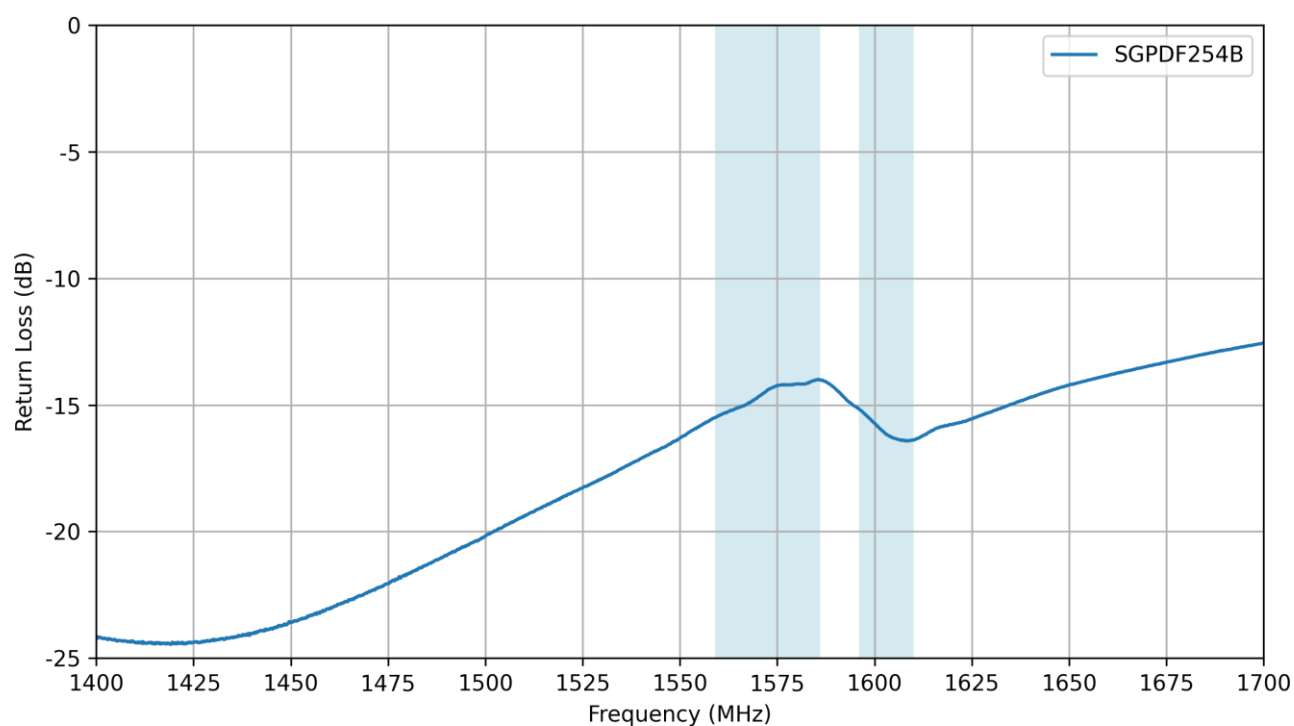


Vector Network Analyzer

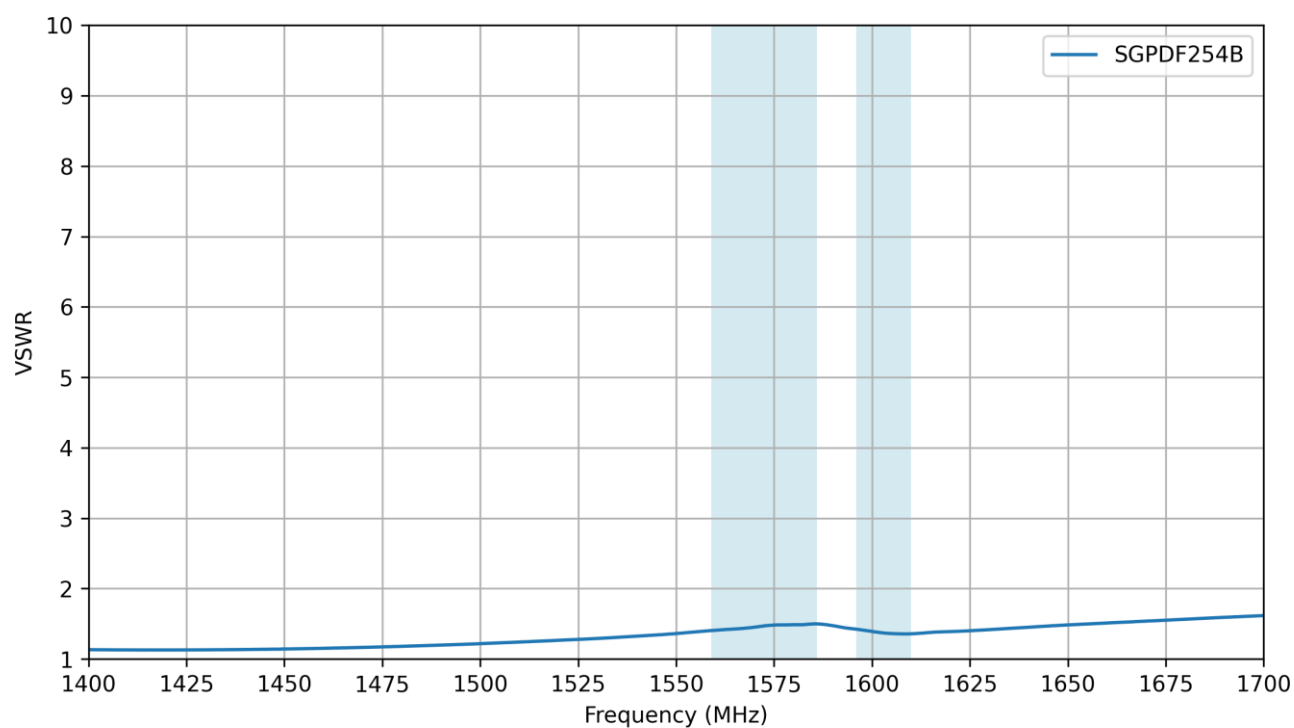


VNA Test Set-up

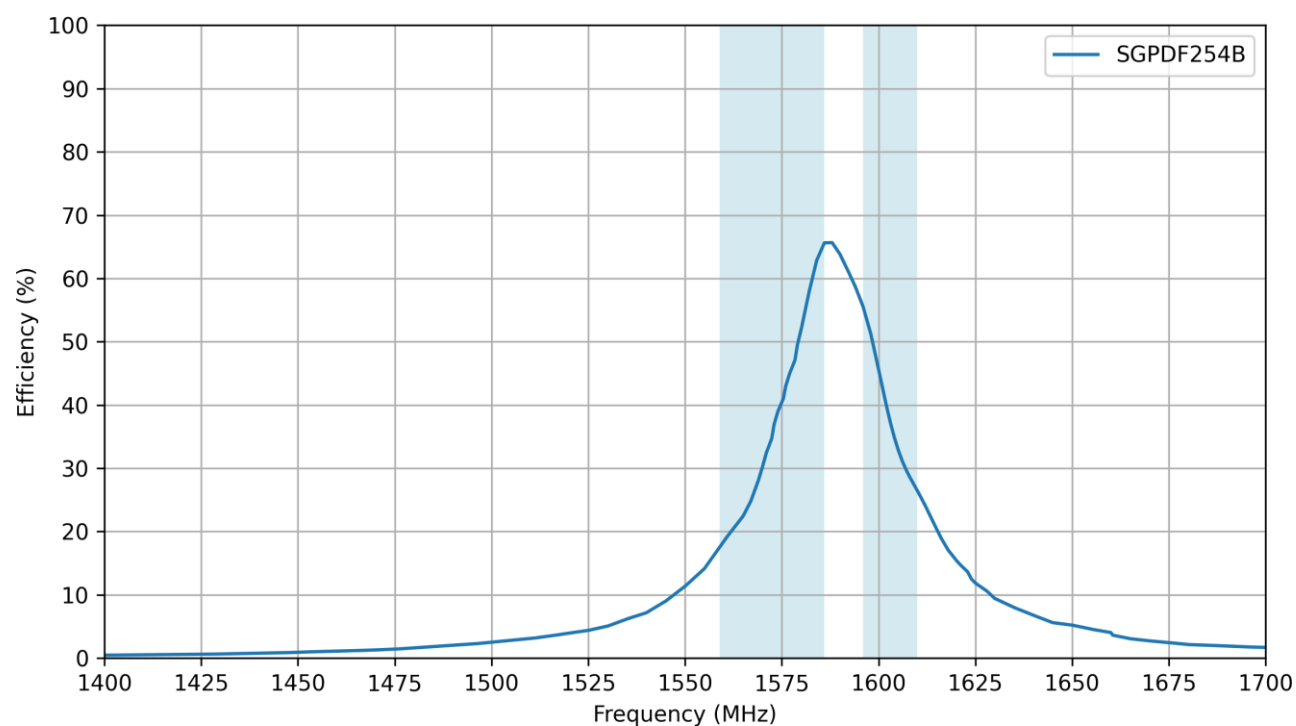
6.2 Return Loss



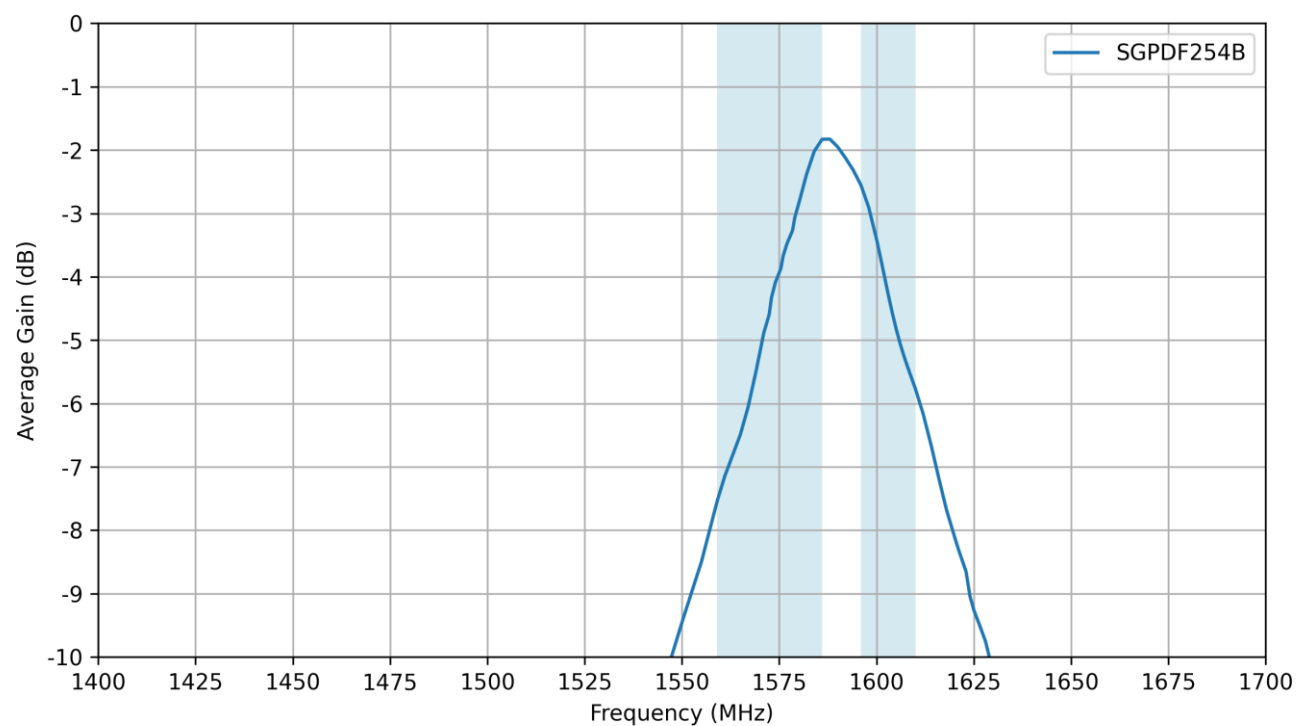
6.3 VSWR



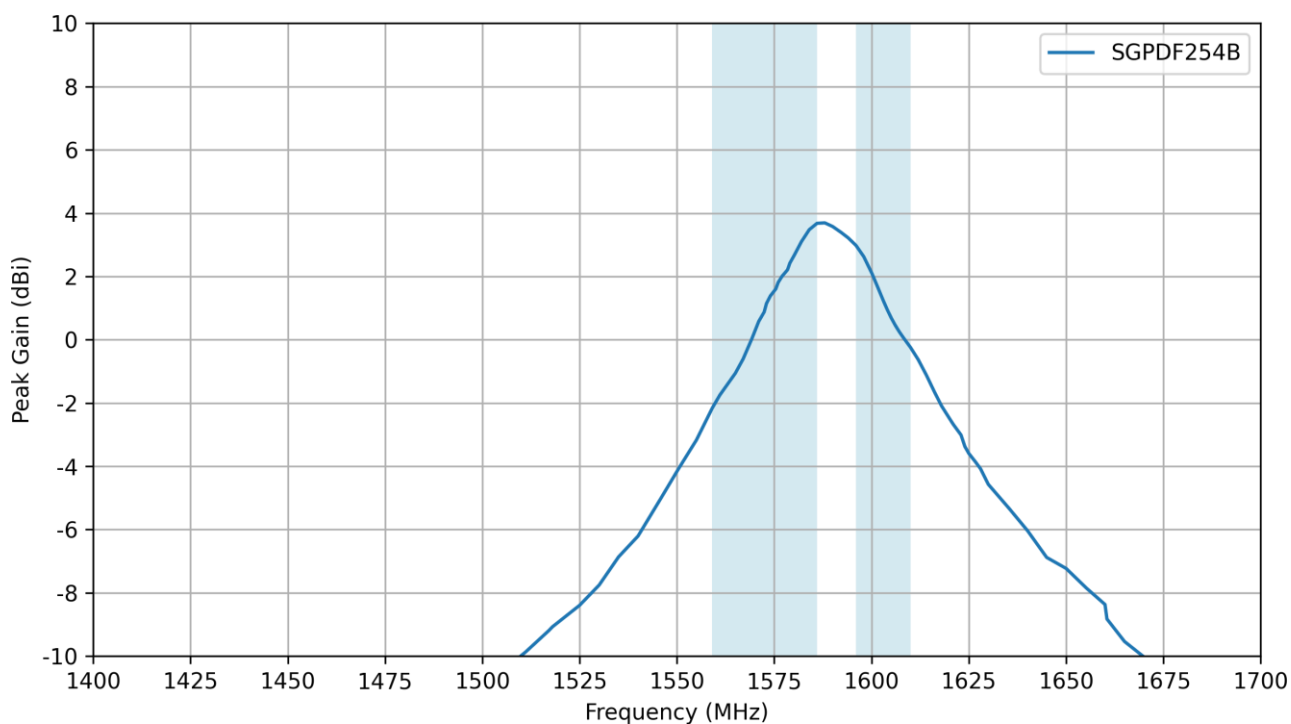
6.4 Efficiency



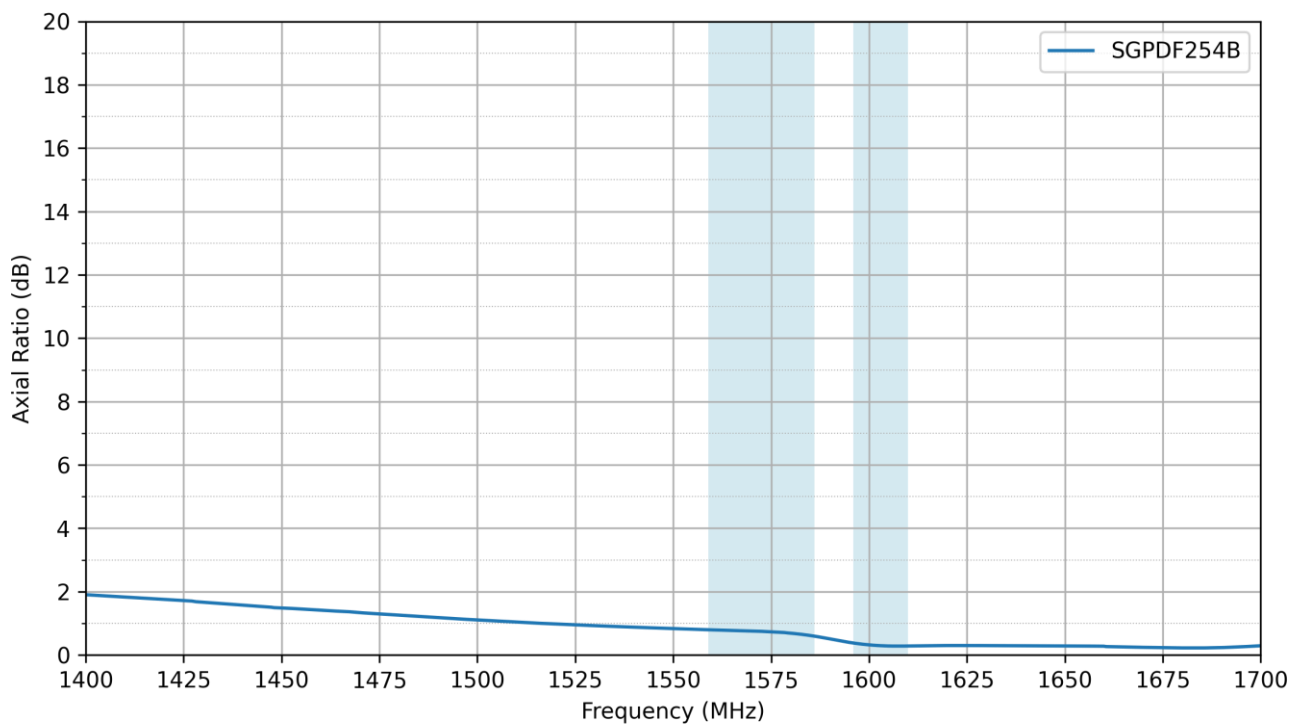
6.5 Average Gain



6.6 Peak Gain

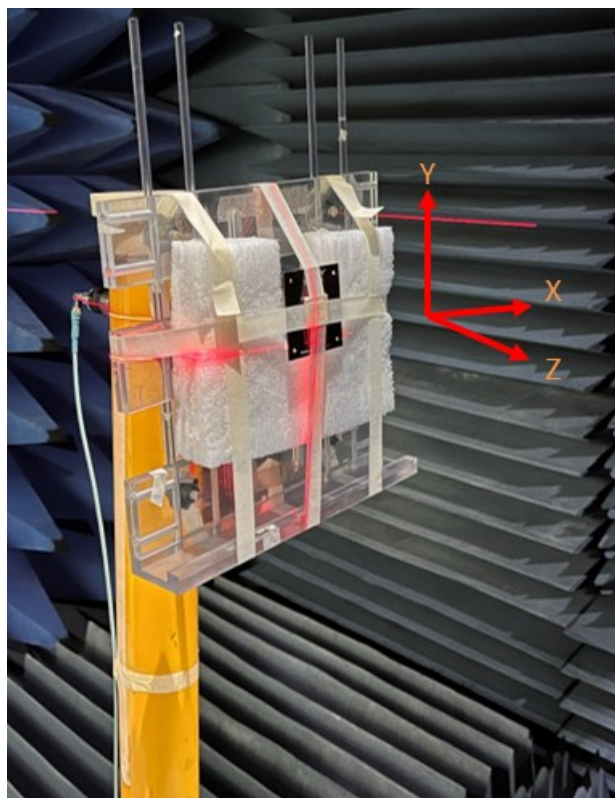
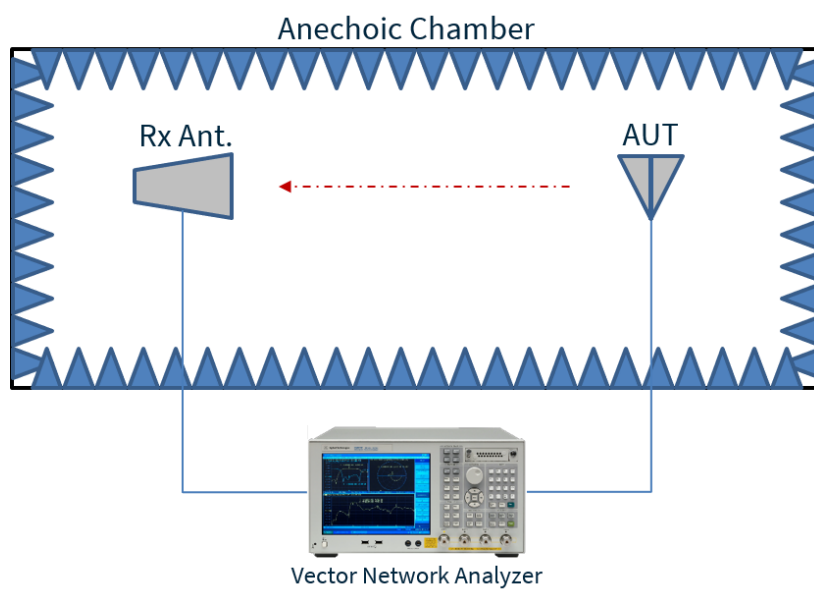


6.7 Axial Ratio



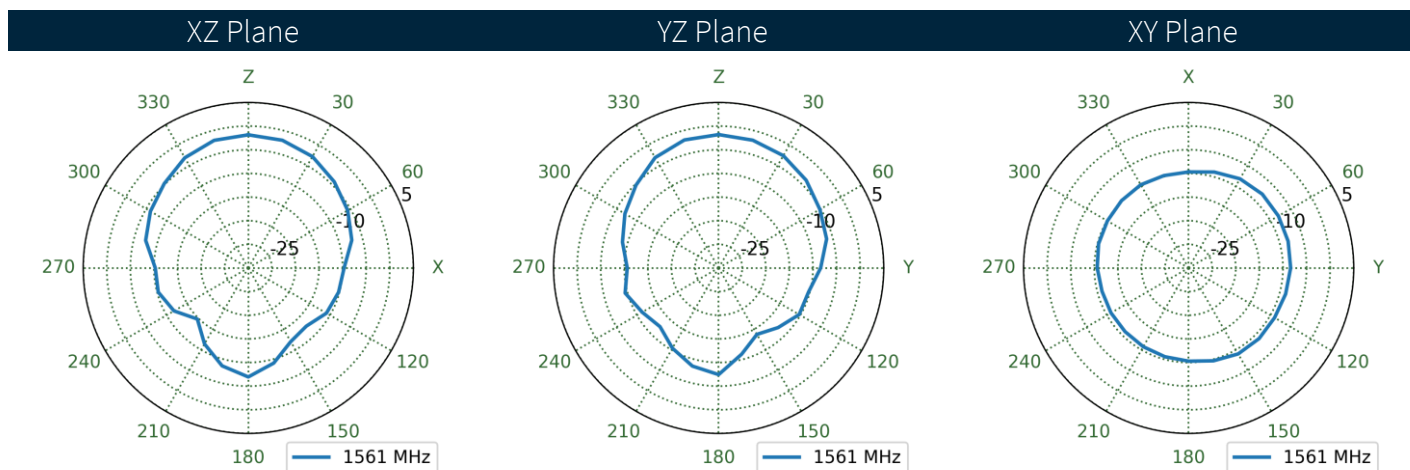
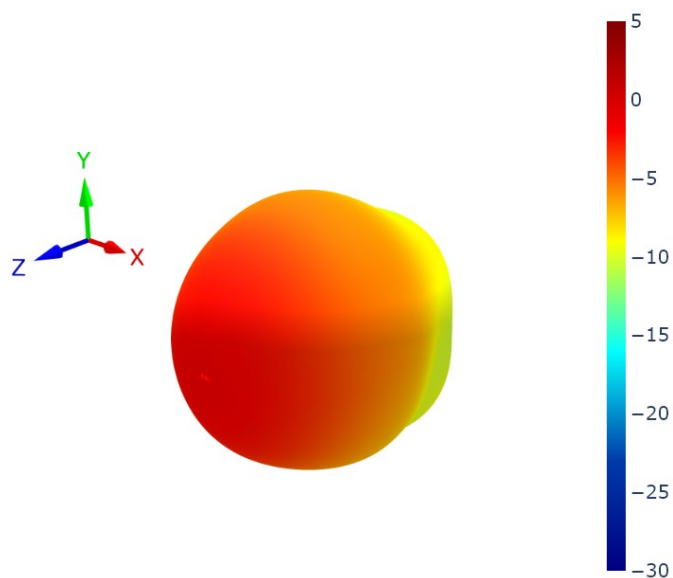
7. Radiation Patterns

7.1 Test Setup

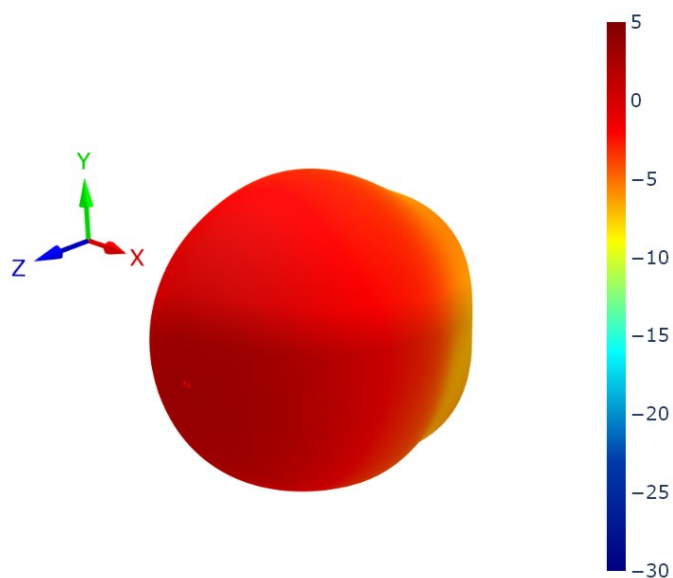


Chamber Test Set-up

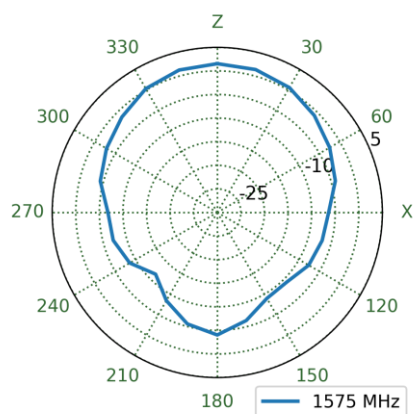
7.2 Patterns at 1561 MHz



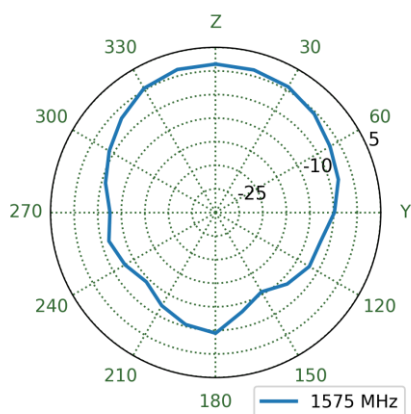
7.3 Patterns at 1575 MHz



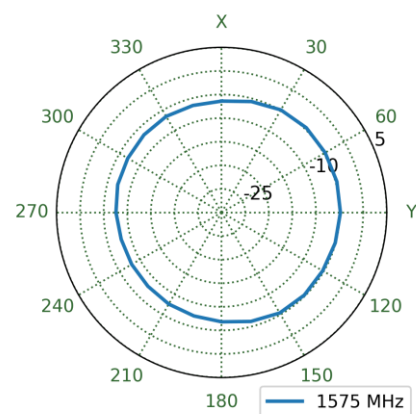
XZ Plane



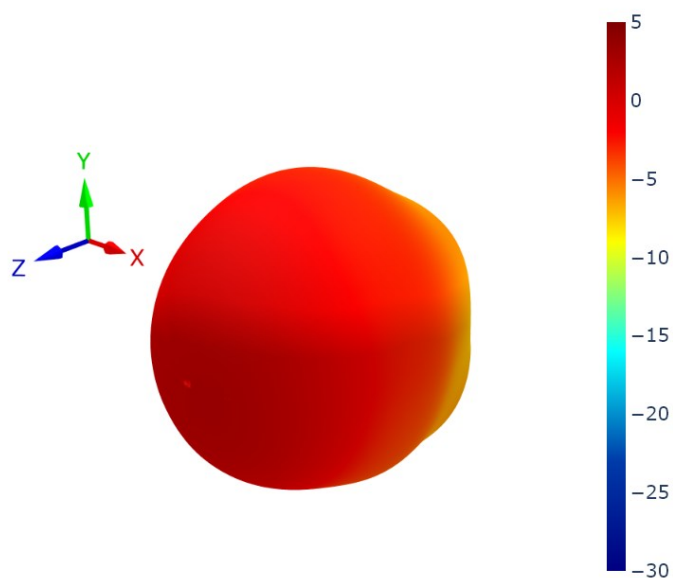
YZ Plane



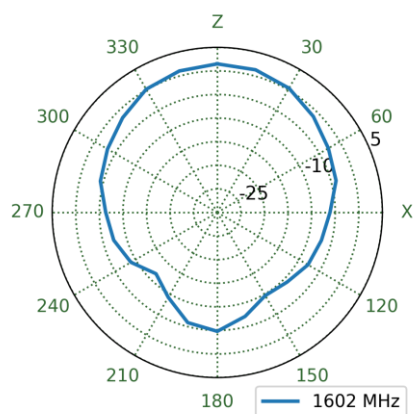
XY Plane



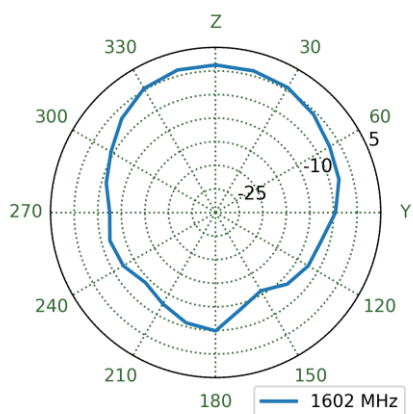
7.4 Patterns at 1602 MHz



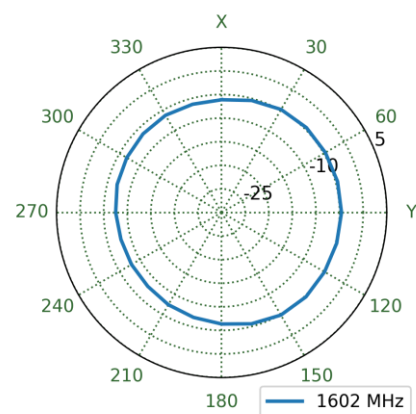
XZ Plane



YZ Plane

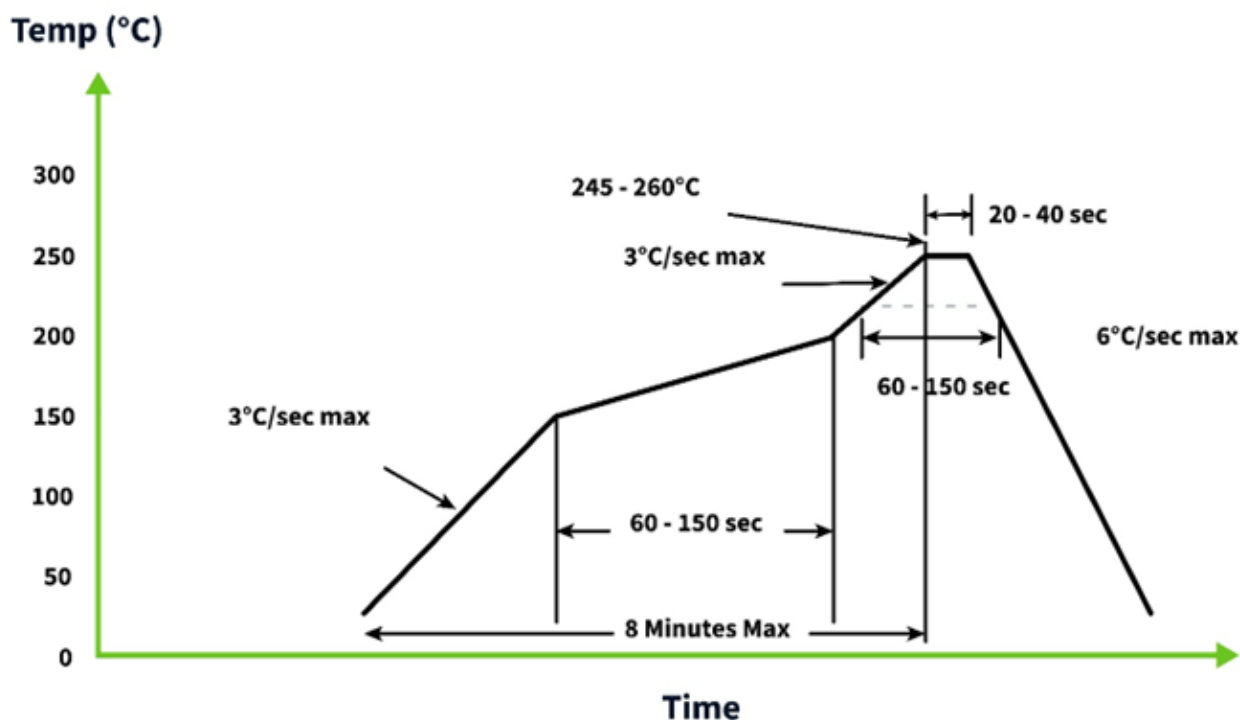


XY Plane



8. Solder Reflow Profile

The SGPDF254B can be assembled by following the recommended soldering temperatures are as follows:



*Temperatures listed within a tolerance of $\pm 10^{\circ}\text{C}$

Smaller components are typically mounted on the first pass, however, we do advise mounting the SGPDF254B when placing larger components on the board during subsequent reflows.

Note: Soldering flux classified ROL0 under IPC J-STD-004 is recommended.

Changelog for the datasheet

SPE-25-8-119 – SGPDF254B

Revision: A (Original First Release)	
Date:	2025-04-10
Notes:	Initial Release
Author:	Gary West



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