antenova

DATASHEET

Raptor

SR4G053• IamiiANT®

Features

- Antenna for 1164-1249 MHz, 1559-1609 MHz, GNSS for embedded applications
- GNSS bands covered are GPS L1, L2, L5; GLONASS L1, L2, L3; Galileo E1,E5a/b;
- BeiDou B1I, B2I, B3, B2a; QZSS L1, L1C, L1S, L2C, L5
- Solution for all global public constellations: GPS, GLONASS, Beidou and GALILEO.
- Maintains high performance on device: DFI (Designed For Integration)
- Designed for SMD mounting
- Supplied on Tape and Reel

1. Description

Raptor is intended for use with all positioning applications. The antenna has RHCP characteristics suitable for GNSS signals. A novel multi-band low-profile antenna that has similar performance to a small ceramic patch.

2. Applications

- Trackers
- Portable Devices
- Drones
- Wearable devices
- Positioning

3. Part number

SR4G053

4. General data

Frequency	1164 – 1249MHz 1559 – 1609 MHz
Polarization	Linear
Operating temperature	-40°C to 140°C
Environmental condition test	ISO16750-4 5.1.1.1/5.1.2.1/5.3.2
Impedance with matching	50 Ω
Weight	<0.2g
Antenna type	SMD
Dimensions	16.0 x 8.0 x 1.7 (mm)

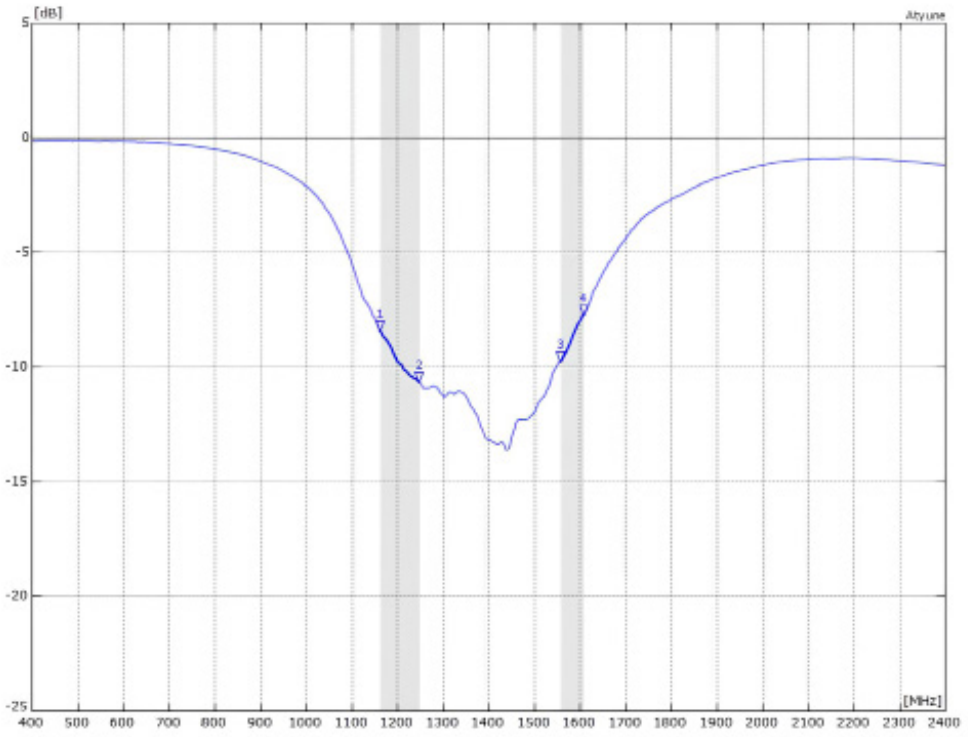
5. RF characteristics

Frequency	1164-1249MHz	1559-1609MHz
Peak gain	2.3 dBi	2.2 dBi
Average gain (Linear)	-0.9 dBi	-1.50 dBi
Average efficiency (Linear)	75 %	65%
Maximum return loss	-8.5dB	-7.5dB
Maximum VSWR	2.3:1	2.4:1

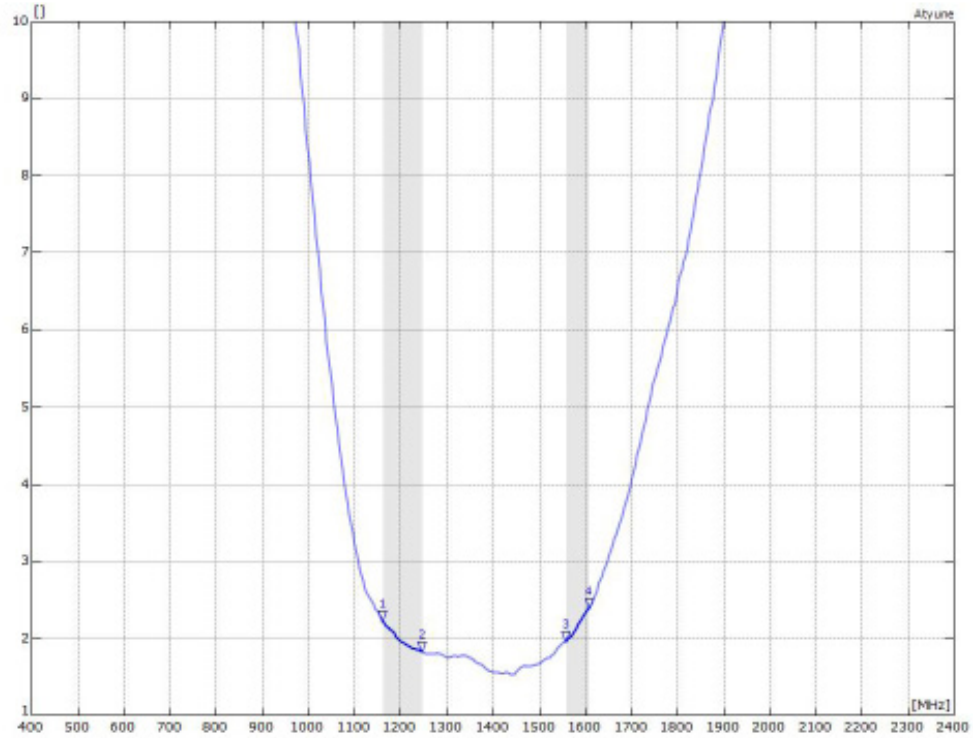
All data measured on Antenova's evaluation PCB
Part No. SR4G053-EVB-1

6. RF performance

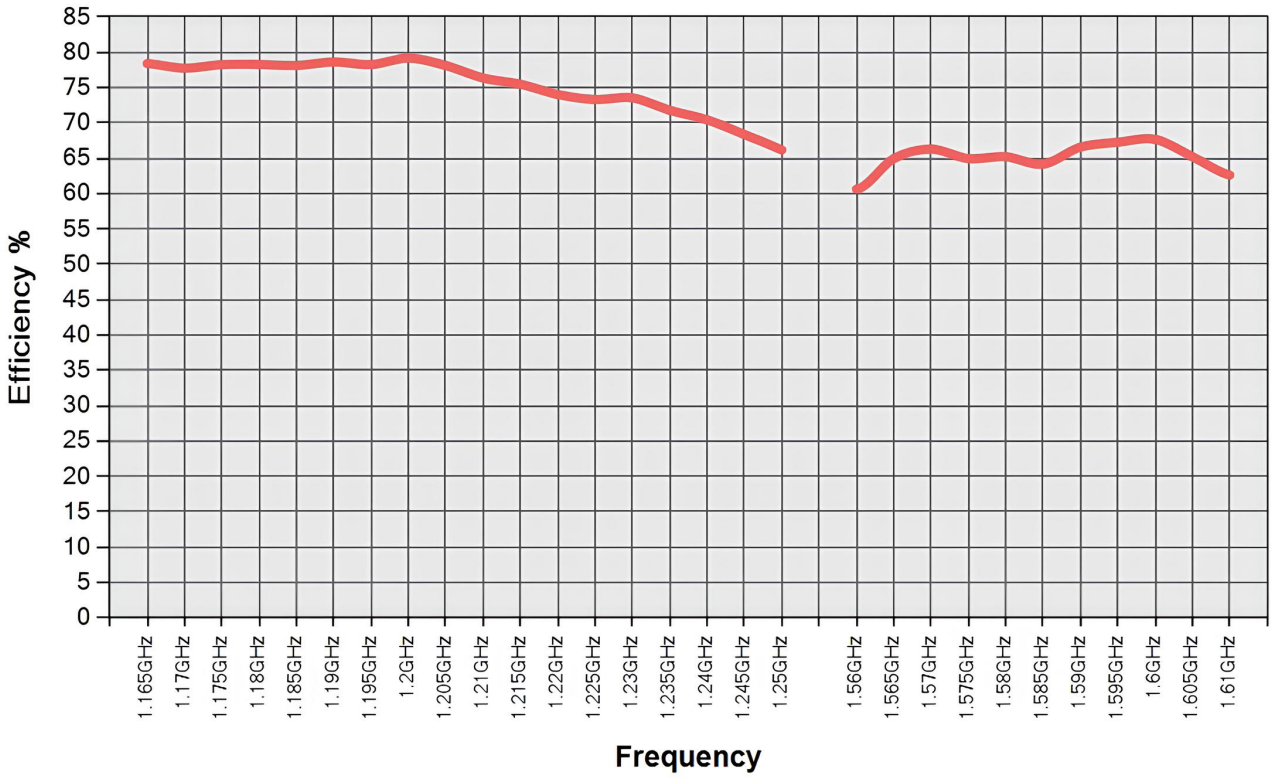
6.1. Return loss



6.2. VSWR



6.3. Efficiency

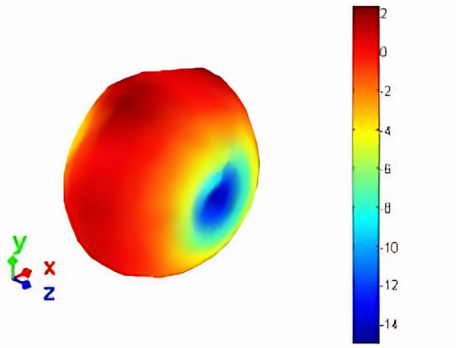


All data measured on Antenova's evaluation PCB
Part No. SR4G053-EVB-1

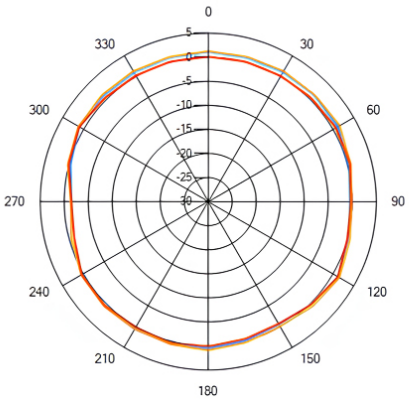
6.4. Antenna pattern

6.4.1. 1164 MHz - 1249 MHz

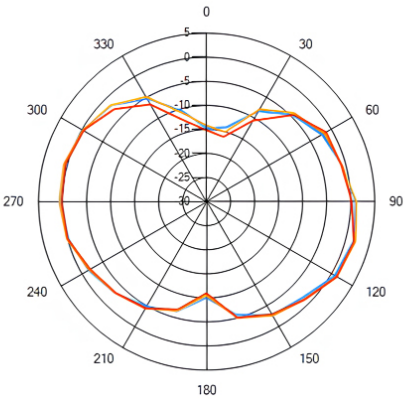
3D pattern at 1200 MHz

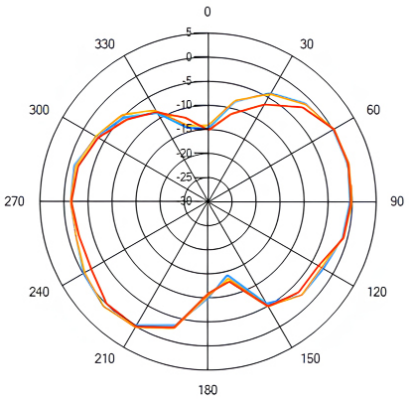


XY



XZ

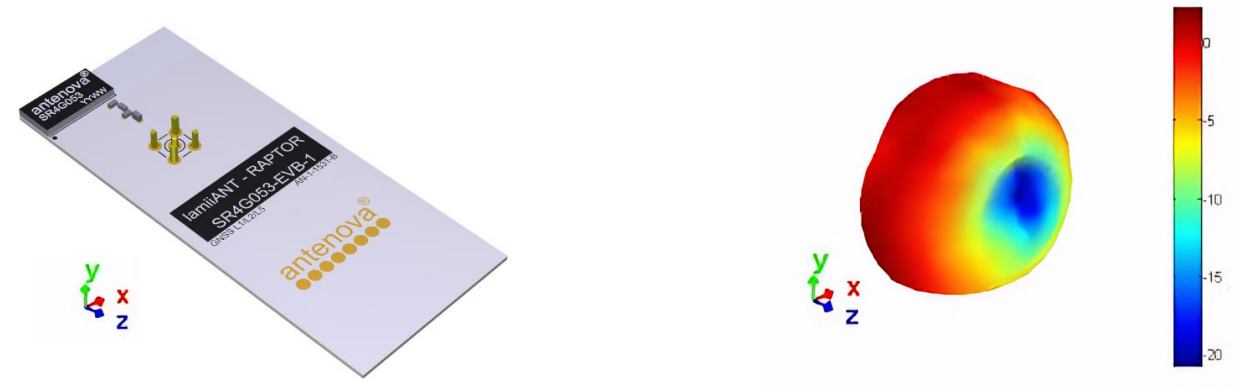




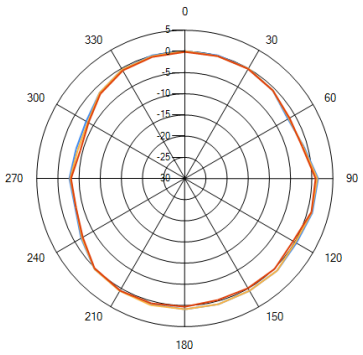
1.165GHz 1.2GHz 1.25GHz

6.4.2. 1559 MHz - 1609 MHz

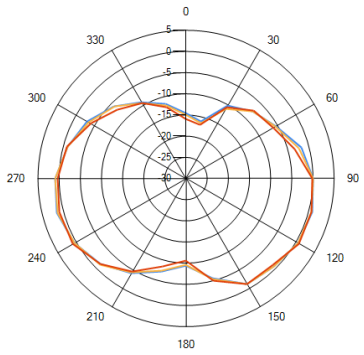
3D pattern at 1575 MHz



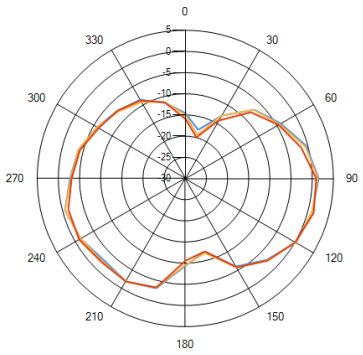
XY



XZ



YZ

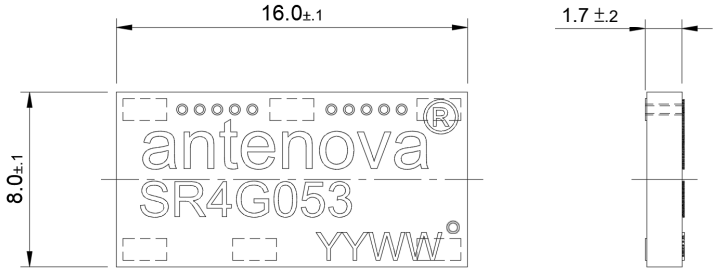


1.56GHz 1.575GHz 1.61GHz

7. Antenna dimensions

7.1. Dimensions Assembled

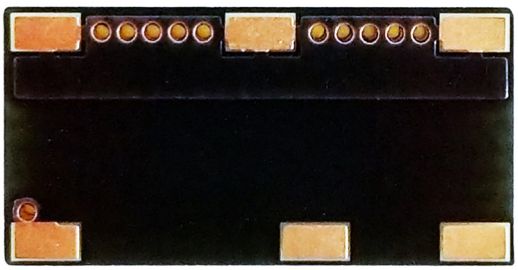
Top view

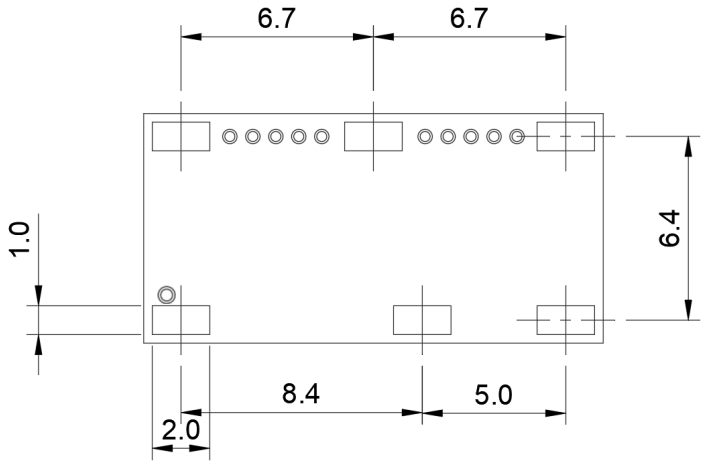


L	W	H
Length	Width	Height
16.0 ± 0.1	8.0 ± 0.1	1.7 ± 0.2

All dimensions in (mm)

Bottom view



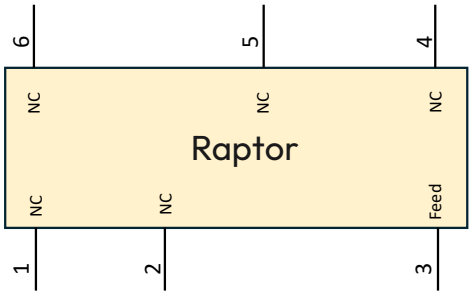


6 solder pads (2.0 x 1.0 mm)

8. Schematic symbol and pin definition

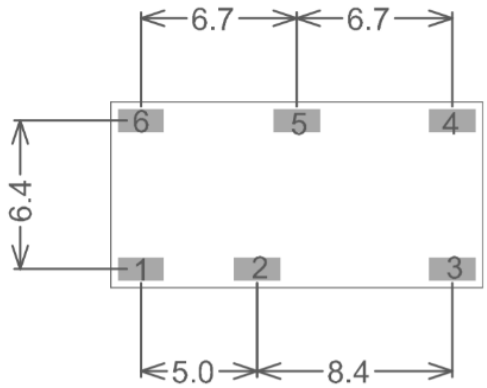
The circuit symbol for the antenna is shown below. The antenna has 6 pins with Pin 3 as functional. All other pins are for mechanical strength.

Pin	Description
3	Feed
Others	Not used (Mechanical only)



9. Host PCB footprint

The recommended host PCB footprint is below.



All pads = 2.0 x 1.0 (mm)

10. Electrical interface

10.1. Transmission line

All transmission lines should be designed to have a characteristic impedance of 50Ω.

- The length of each transmission lines should be kept to a minimum
- All other parts of the RF system like transceivers, power ampliffers, etc, should also be designed to have a 50 Ω impedance

A co-planar transmission line can be designed using an online transmission line calculator tool, such as:

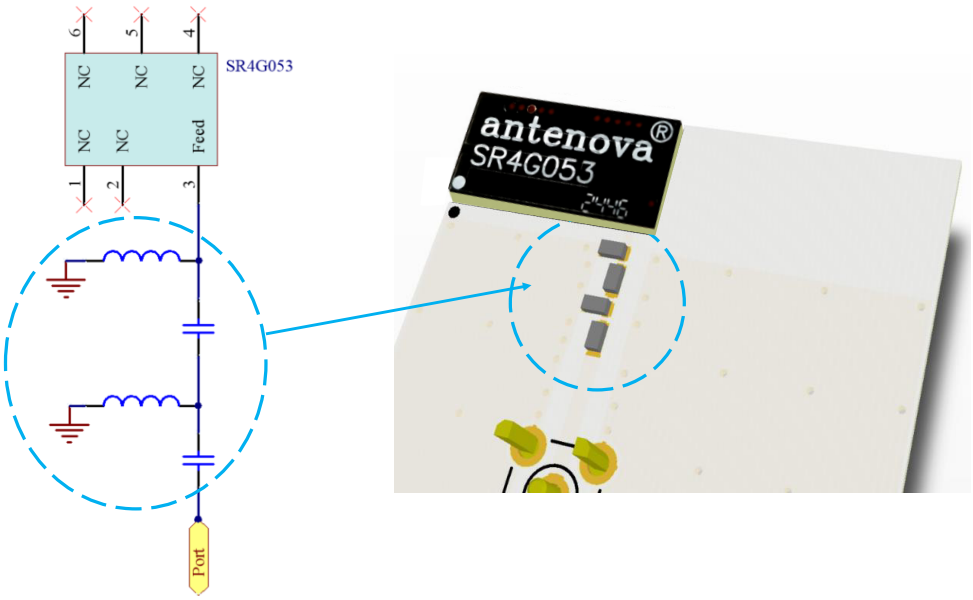
https://blog.antenova.com/rf-transmission-line-calculator

The PCB thickness, copper thickness and substrate dielectric constant are entered, then the tool calculates the transmission line width and gaps on either side of the track to give a 50 Ω impedance.

10.2. Matching circuit

The antenna requires a matching circuit that must be optimized for each product. The matching circuit will require up to four components and the following pad layout should be designed into the device so the correct circuit can be installed.

The matching network must be placed close to the antenna feed to ensure it is more effective in tuning the antenna.

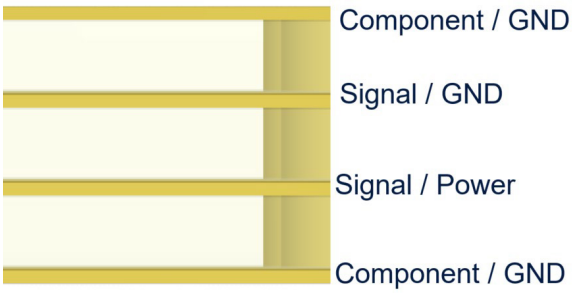


11. Antenna integration guide

We recommend the following during the design phase to maximise antenna performance and minimize noise:

- Minimum 4 layer PCB
- Route signals and power internally where possible
- Flood all layers with ground
- Knit ground on all layers together with plenty of vias

Follow placement guidance carefully, in addition Antenova provide technical support to help you through all stages of your design. Register for an account on https://ask.antenova.com/ to access technical support.



11.1. Antenna placement

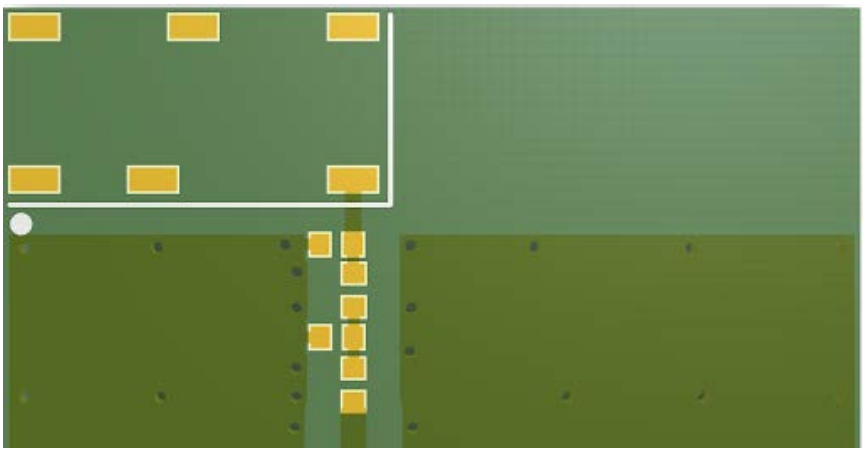
The best position for the antenna is to be placed at left side edge on the shortest side of the PCB as shown below.

The Antenova placement tool can be used to advise on antenna placement, see:

https://blog.antenova.com/intelligent-antenna-selection-and-placement-tool-antenova

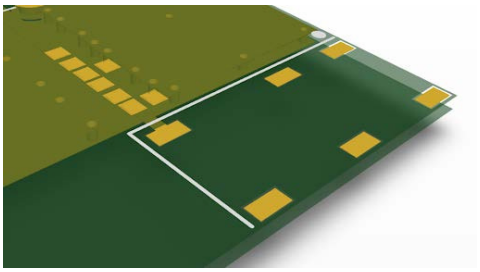
11.2. Host PCB Layout

The footprint and clearance of the host PCB must meet the antenna speciffcation. An example of the PCB layout below shows the antenna footprint with clearance. Pins 1, 2, 4, 5 and 6 are shown floating. The feed (Pin 3) connects to the matching circuit close to the antenna.

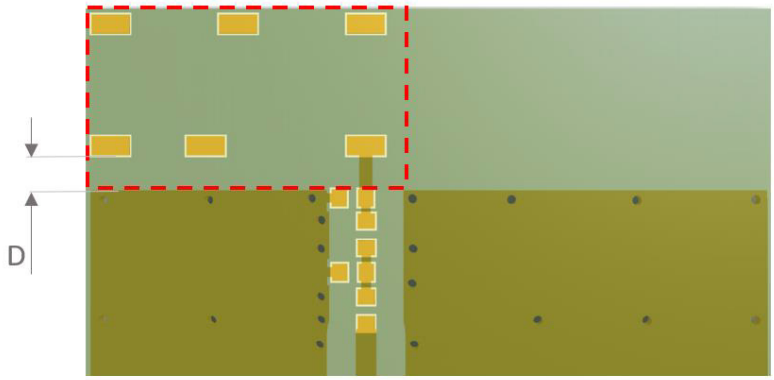


11.3. Host PCB Clearance

The diagram below shows the antenna's footprint and clearance through all of the layers on the PCB. Only the antenna pads and connections to the feed are present within this clearance area.



The ideal clearance area adjacent to the antenna is across the full width of the PCB. Ideally the antenna requires full clearance in the area adjacent to it for the entire board width on all layers. Implementing with the minimal GND clearance will result in a lower performance than stated.



12. Reference board

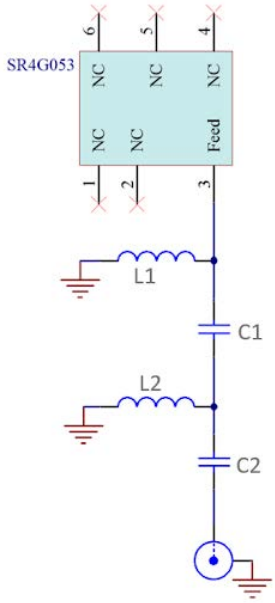
The reference board has been designed for the purpose of evaluating the SR4G053 antenna, and includes a SMA female connector. (Part No. SR4G053-EVB-1)

To order a reference board please see antenova.com

12.1. Reference board matching circuit

The reference board has been designed for evaluation of the SR4G053 antenna, and is fitted with an SMA female connector.

Designator	Type	Value	Description
C1	Capacitor	1.8pF	Murata GJM15 series
L1	Inductor	5.6nH	Murata LQG15HN series
L2	Not fftted	Not fftted	Not fftted
C2	Resistor	0R	Non-speciffc



13. Soldering

This antenna is suitable for lead free soldering. The reffow proffle should be adjusted to suit the device, oven and solder paste, while observing the following conditions:

- For leaded soldering, the maximum temperature should not exceed 240 °C.
- For lead free soldering, a maximum temperature of 255 °C for no more than 20 seconds is permitted.
- The antenna should not be exposed to temperatures exceeding 120 °C more than 3 times during the soldering process.

14. Hazardous material regulation conformance

The antenna has been tested to conform to RoHS and REACH requirements. A certificate of conformance is available from Antenova's website.

15. Packaging

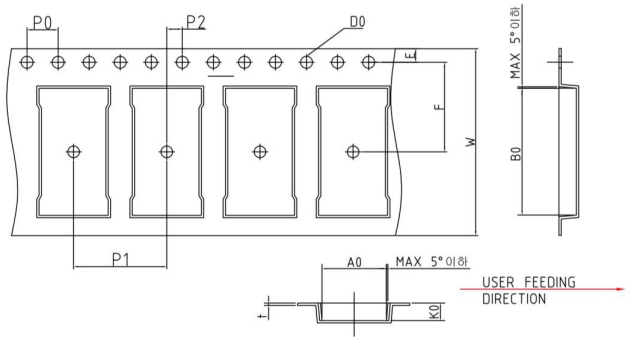
15.1. Optimal storage conditions

Temperature	-10°C to 40°C
Humidity	Less than 75% RH
Shelf life	24 Months
Storage place	Away from corrosive gas and direct sunlight
Packaging	Reels should be stored in unopened sealed manufacturer's plastic packaging.
MSL level	1

Note: Storage of open reels of antennas is not recommended due to possible oxidization of pads on antennas. If short term storage is necessary, then it is highly recommended that the bag containing the antenna reel is re-sealed and stored in conditions as described in the table above .

The shelf life of the antenna is 2 years provided the factory seal on the package has not been broken.

15.2. Tape characteristics

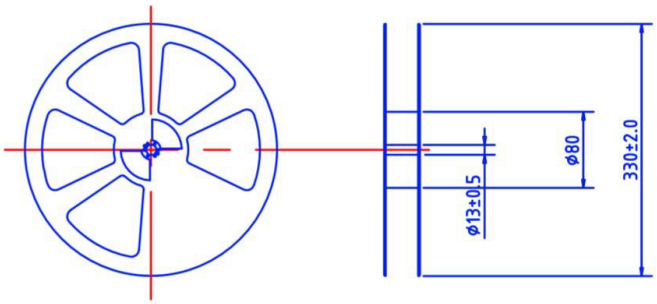


D0	A0	B0	P0	P1	P2
1.55 +0.1	8.30 ± 0.1	16.30 ± 0.1	4.00 ± 0.1	12.00 ± 0.1	2.00 ± 0.1

E	F	W	K0	T
1.75 ± 0.1	11.50 ± 0.1	24.00 ± 0.3	2.25 ± 0.1	0.3±0.05

All dimensions in (mm)

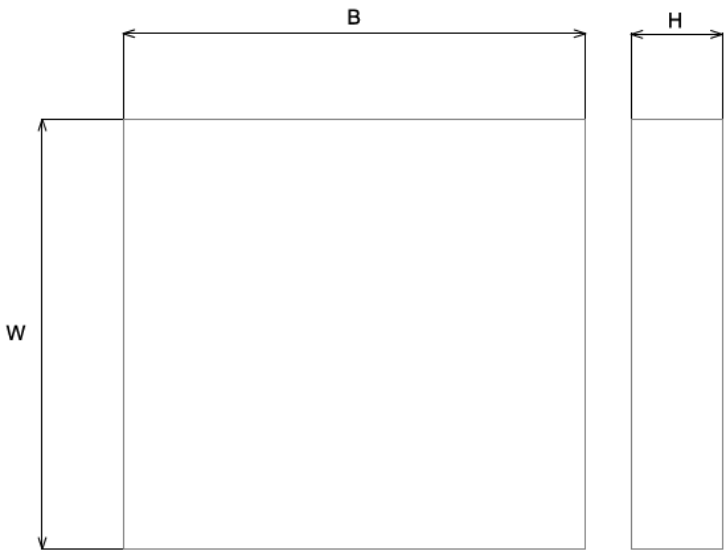
15.3. Reel Dimensions



Reel	Type	Color	Size	Hub
Dimension	PS	Black	Ø330	Ø80

All dimensions in (mm)

15.4. Box Dimensions



Width (W)	Breadth (B)	Height (H)
340 mm	360 mm	45 mm

15.5. Bag properties

Reels are supplied in protective plastic packaging.

15.6. Reel label information

Quality statements

Antenova's products conform to REACH and RoHS legislation. For our statements regarding these and other quality standards, please see

antenova.com

Datasheet version

3.01 released 30 April 2025

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Antenna design, integration and test resources

Product designers – the details contained in this datasheet will help you to complete your embedded antenna design. Please follow our technical advice carefully to obtain optimum antenna performance.

We aim to support our customers to create high performance wireless products. You will find a wealth of design resources, calculators and case studies to aid your design on our website.

Antenova's design laboratories are equipped with the latest antenna design tools and test chambers. We provide antenna design, test and technical integration services to help you complete your design and obtain the required certifications.

If you cannot find the antenna you require in our product range, please contact us to discuss creating a custom antenna to meet your exact requirements.

Share knowledge with RF Experts around the world

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sales@antenova.com

+ 44 (0) 23 9400 1023

Global headquarters

Antenova Ltd, 7 The Briars, Waterberry Drive, Waterlooville, Hampshire, PO7 7YH