antenova

DATASHEET

Grandis

SR421010-L / SR421010-R • IamiiANT®

Features

- Antenna for ISM 868 and 915 MHz applications including LoRa, SigFox, and Weightless-P.
- Frequency bands from 863- 928MHz
- Maintains high performance on device: DFI (Designed for Integration)
- Corner placement to save space
- Low profile innovative design.
- SMD mounting
- Supplied in Tape and Reel
- Automotive temperature rating

1. Description

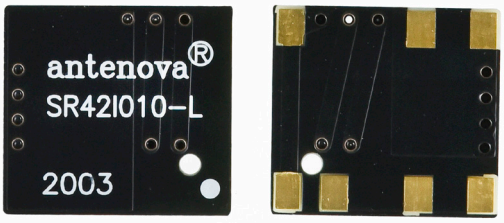
Grandis uses a ground plane on the host PCB to radiate effectively. The antenna itself requires a clearance underneath. An external matching circuit is used to optimise the antenna within a device to the required bands. Designed specifically for 868/915 ISM applications that require a small robust solution. Grandis comes in Left and Right hand versions to optimise placement on a host PCB.

2. Applications

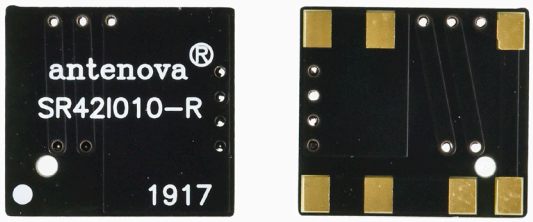
- Industrial/Scientific/Medical (ISM)
- Remote monitoring/ Smart meters
- Network Devices
- Manufacturing automation
- Agriculture/Environment
- Consumer tracking

3. Part number

Grandis Left
SR42I010-L



Grandis Right
SR42I010-R



4. General data

Frequency	863 – 928MHz
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	<2g
Antenna type	SMD
Dimensions	12.0 x 11.0 x 1.7 (mm)

5. RF characteristics

All data measured on Antenova's evaluation PCB Part NO. SR42I010-EVB-1

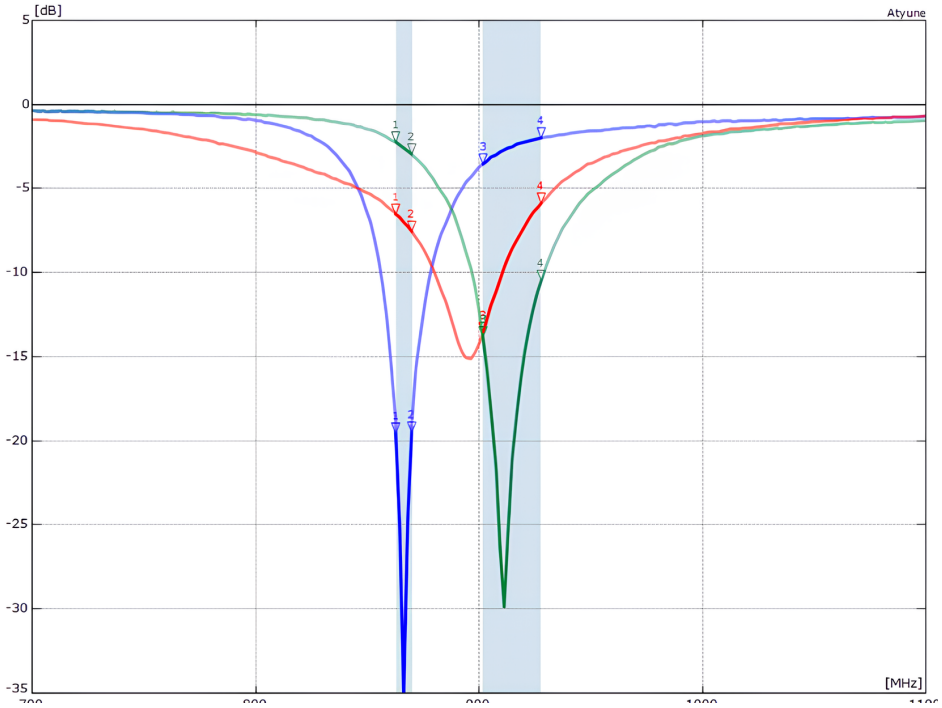
Frequency	ISM 868 863 – 870 MHz	ISM 915 902 – 928 MHz	Dual band mode 863 – 928MHz
Peak gain	0.2dBi	0.4dBi	0.2dBi
Average gain (Linear)	-2.50dBi	-2.20dBi	-4.0dBi
Average efficiency	>60%	>65%	>45%
Maximum return loss	<-18dB	<-10dB	<-6dB
Maximum VSWR	1.2:1	1.8:1	3.1:1

6. RF performance

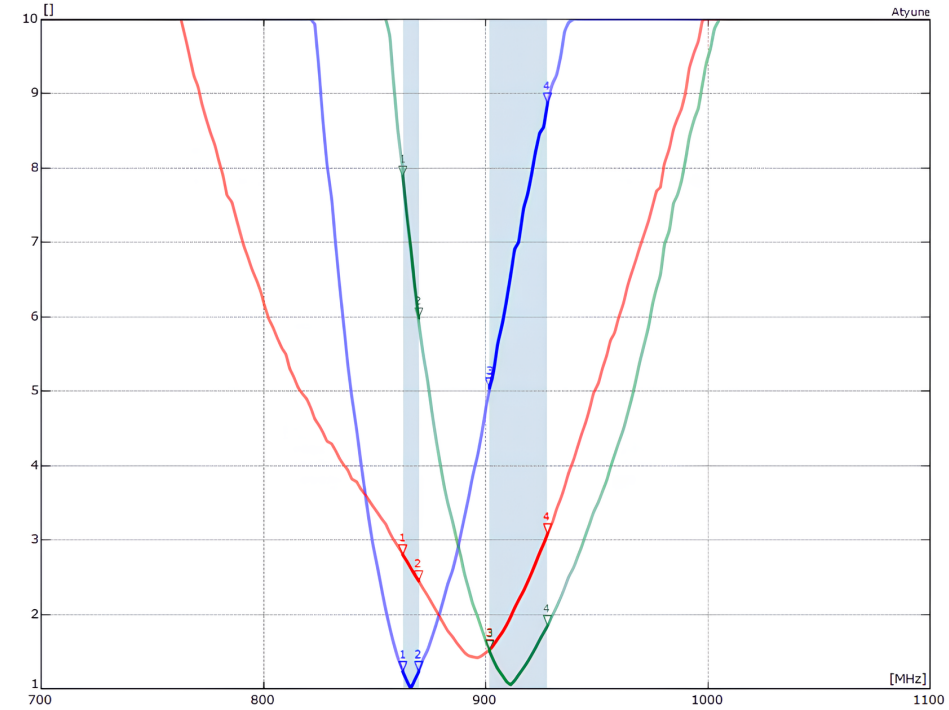
The performance is shown for two tuned variants (Tuning dependant on required band). Matching circuit is used for band selection.

Dual band tuning: 863 – 928MHz
ISM 868 only: 863-870MHz
ISM 915 only: 902-928MHz

6.1. Return loss



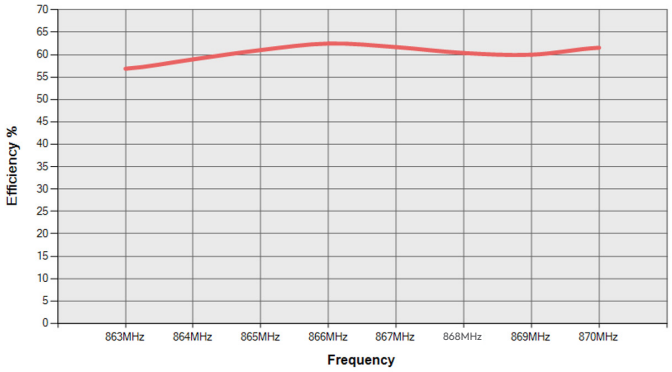
6.2. VSWR



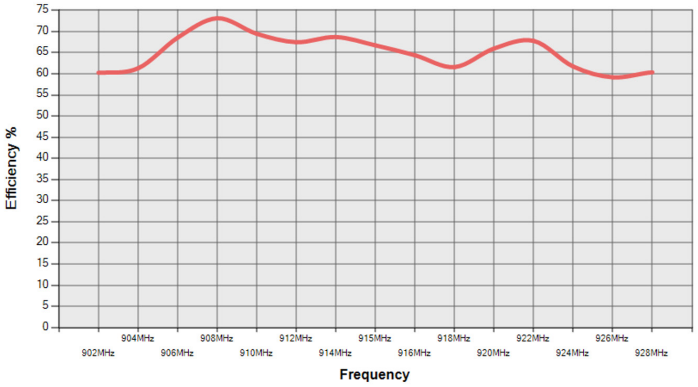
All data measured on Antenova's evaluation PCB Part NO. SR42I010-EVB-1

6.3. Efficiency

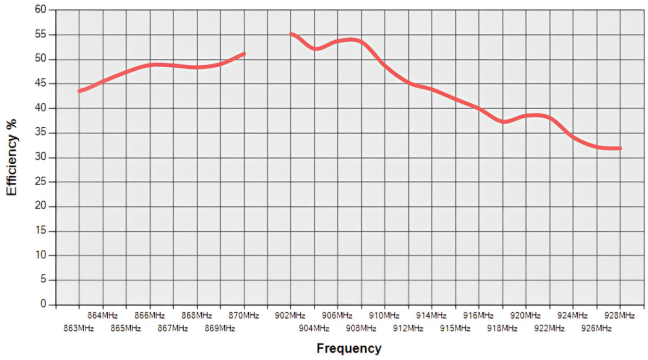
ISM 868
863-870 MHz



ISM 915
902-928 MHz



Dual band
863-928 MHz

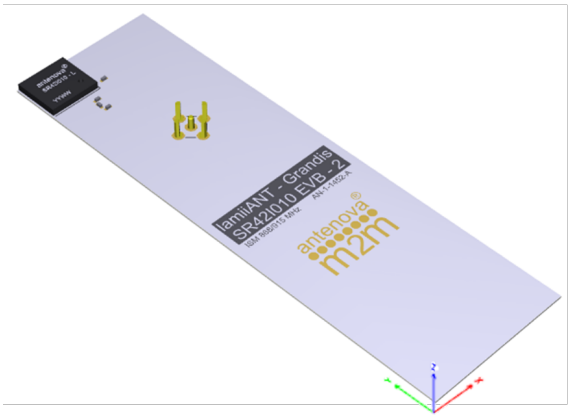


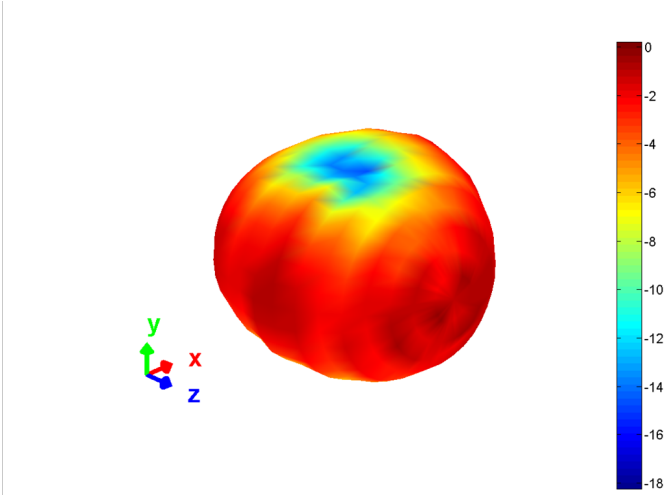
All data measured on Antenova's evaluation PCB Part NO. SR421010-EVB-1

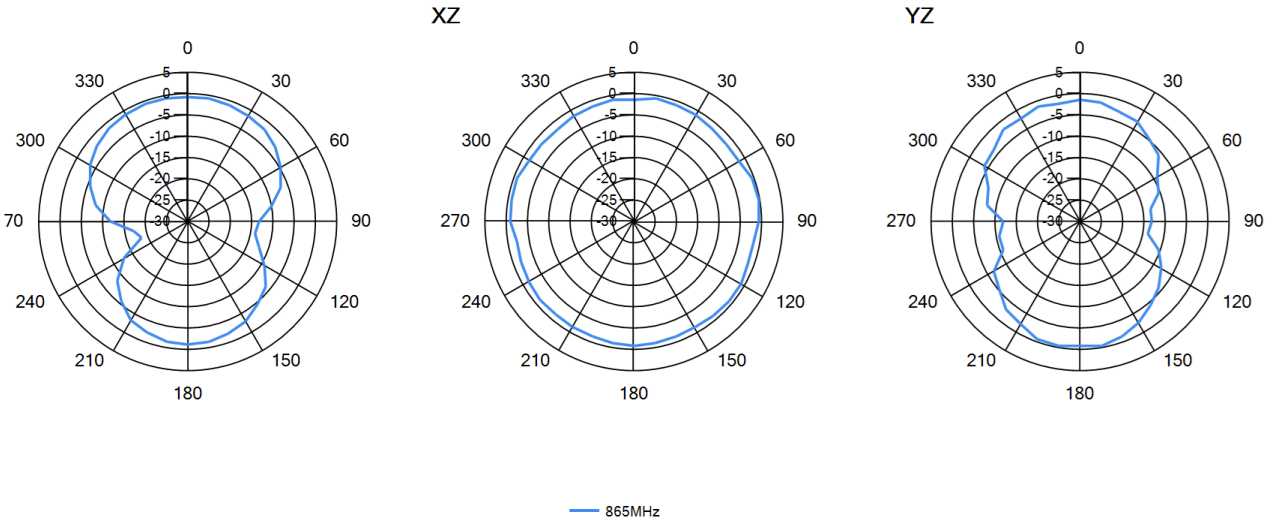
6.4. Antenna patterns

6.4.1. 863 - 870 MHz

3D pattern at 867MHz

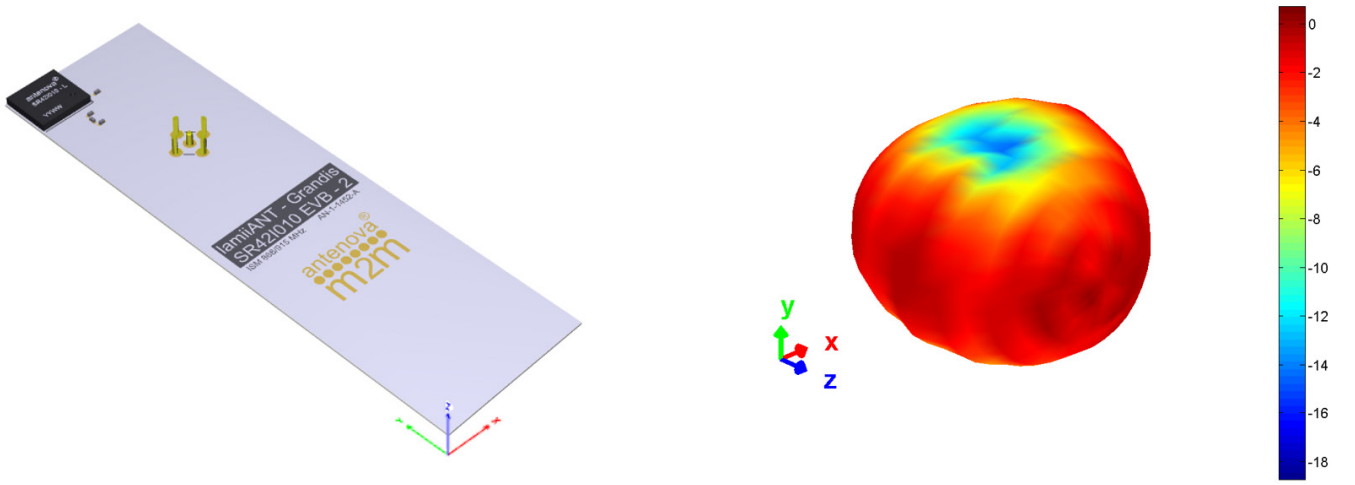




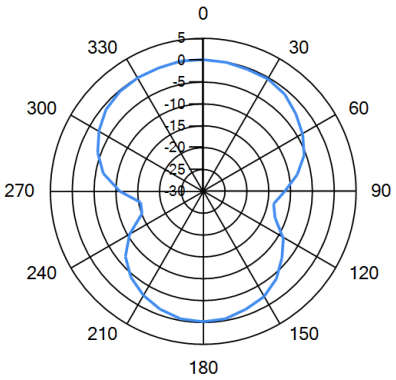


6.4.2. 902 - 928 MHz

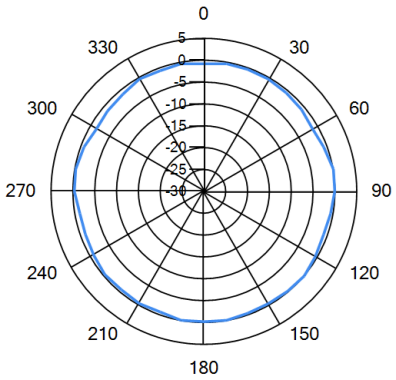
3D pattern at 915MHz



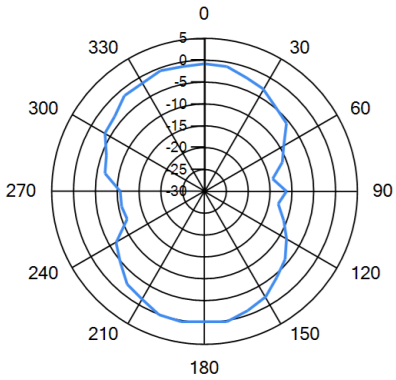
XY



XZ



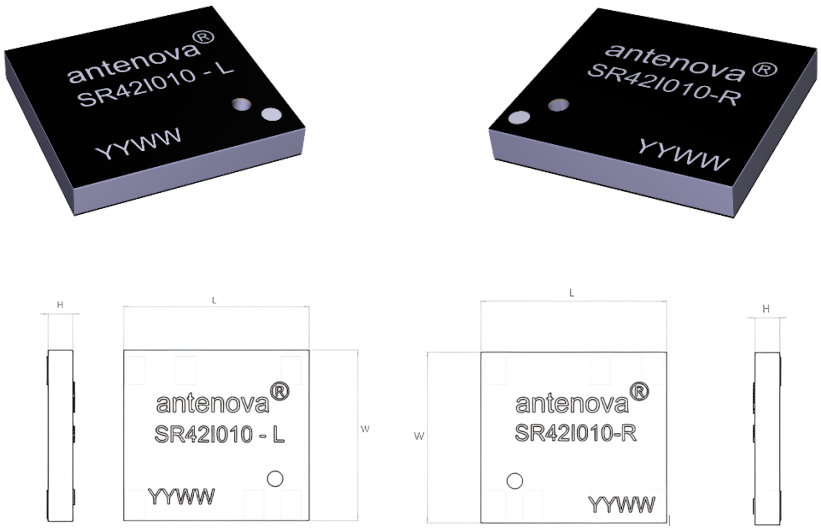
YZ



915MHz

7. Antenna dimensions

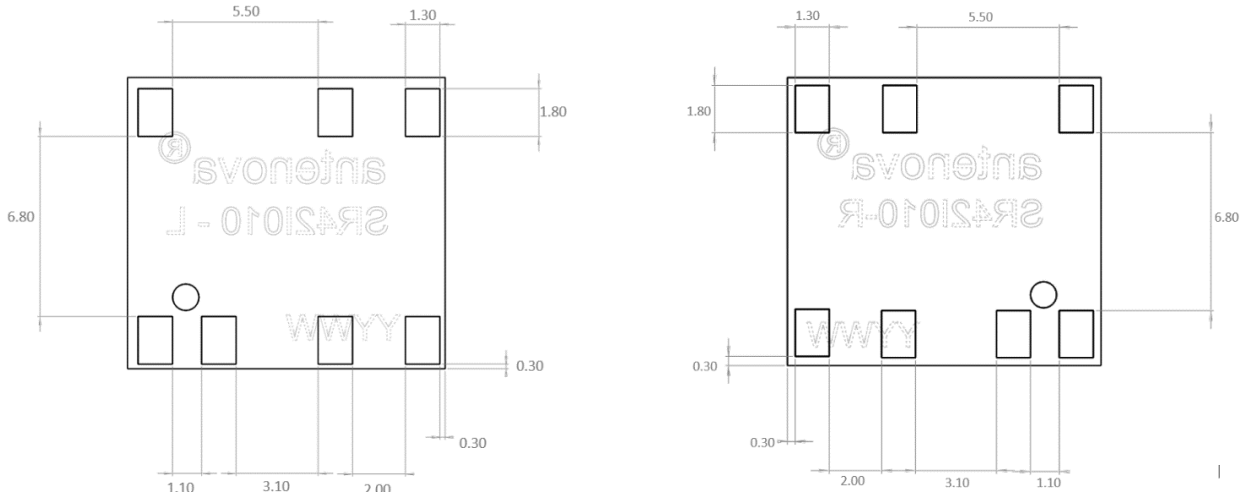
Top view



All dimensions in (mm)

L	W	H
Length	Weight	Height
12.0 ±0.1	11.0 ±0.1	1.7 ±/0.1

Bottom view

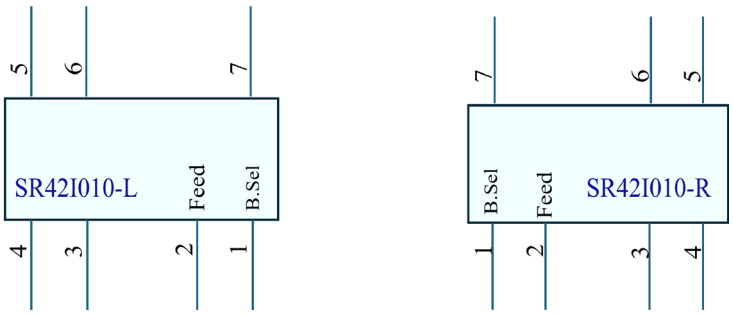


All dimensions in (mm)

8. Schematic symbol and pin definition

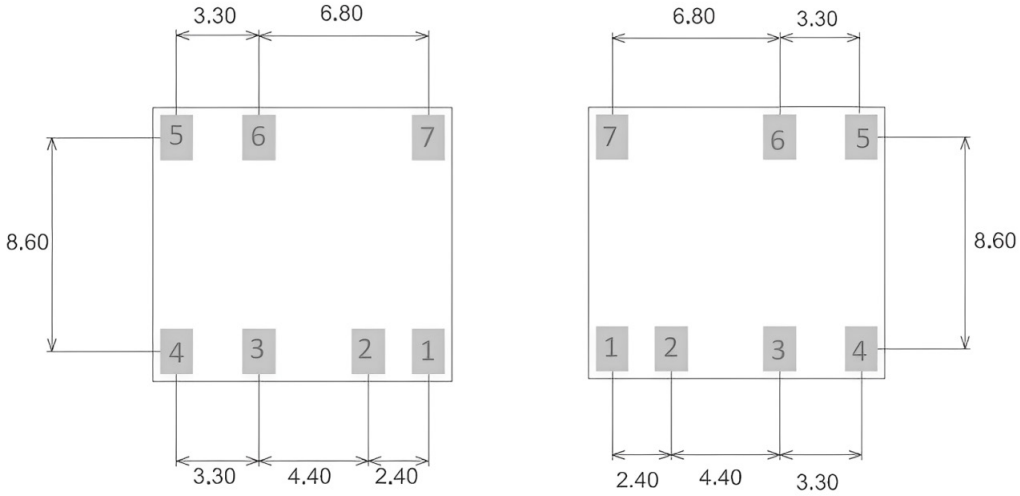
The circuit symbol for the antenna is shown below. The antenna has 7 pins with only 2 as functional. All other pins are for mechanical strength.

Pin	Description
2	Feed
1	Band Select (B.SEL)
3,4,5,6,7	Not used (Mechanical only)



9. Host PCB footprint

The recommended host PCB footprint is below.



Copper pads all 1.8 x 1.3 (mm)
All Dimensions in 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 amplifiers, etc, should also be designed to have a 50 Ω impedance

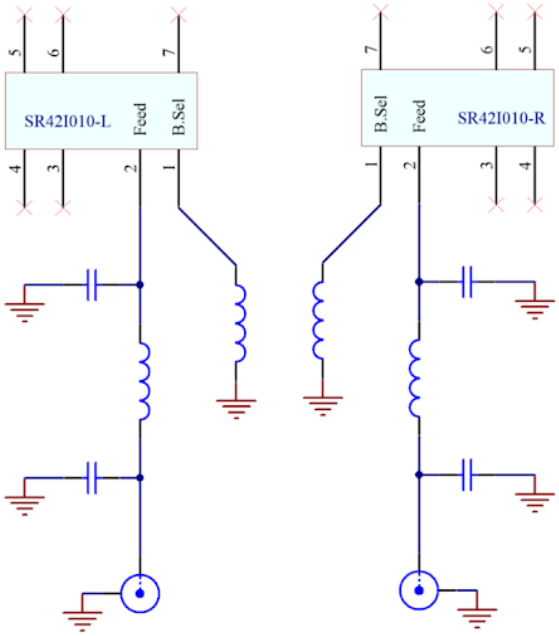
A co-planar transmission line can be designed using an online transmission line calculator tool, such as:

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 circuit should be designed into the host PCB. Not all components may be required but should be included as a precaution. The matching network should be placed close to the antenna feed to ensure it is optionally effective in tuning the antenna.

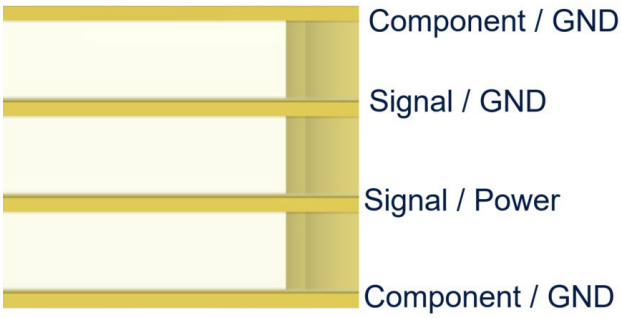


11. Antenna integration guide

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

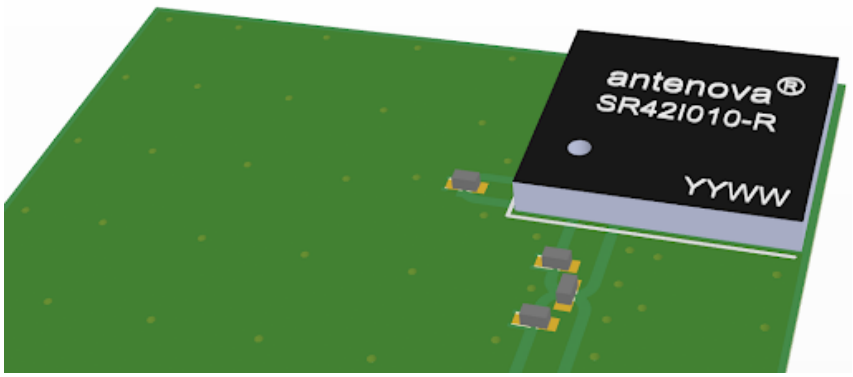
Follow placement guidance carefully. Antenova provide technical support to help you with your design, and also provide design assistance on PTCRB certification. Register for an account on https://ask.antenova.com/ to access technical support.



11.1. Antenna placement

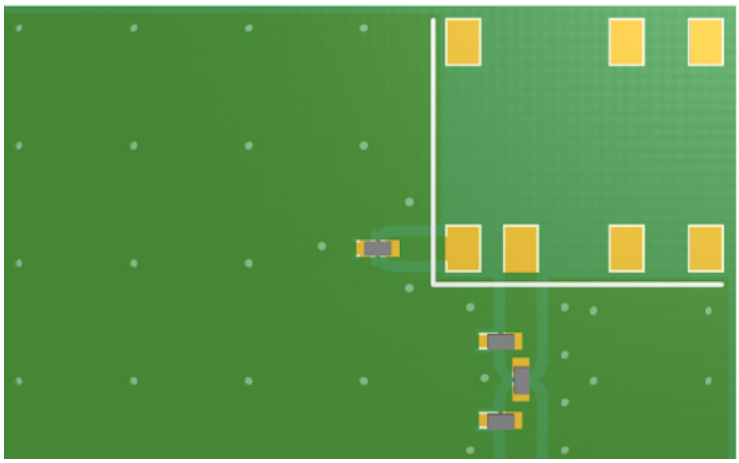
Whatever the size of the host PCB, the antenna should be placed ideally on the host PCB's shortest side in the corner. The antenna should be placed in the corresponding corner: SR42I010-L (Left corner) and SR42I010-R (Right Corner).

The Antenova placement tool can be used to advise on antenna placement, see: https://blog.antenova.com/intelligent-antenna-selection-and-placement-tool-antenova



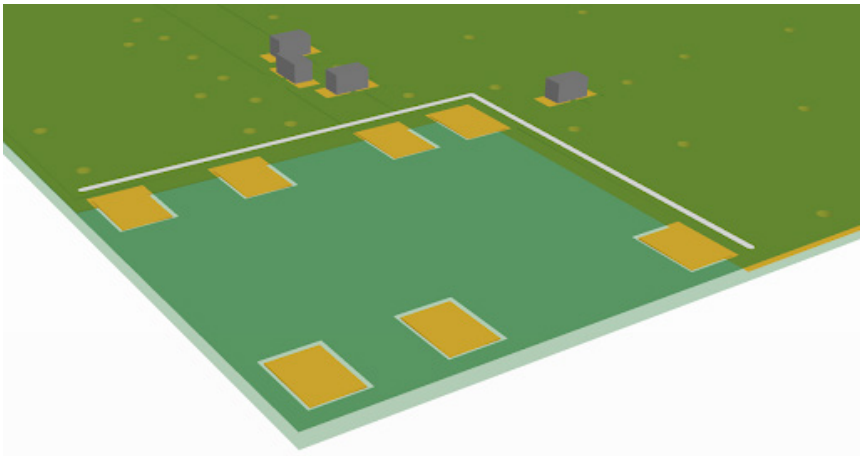
11.2. Host PCB layout

The design for the host PCB must ensure that the footprint and clearance meets the antenna specification. An example of the PCB layout shows the antenna footprint with clearance. The feed (Pin 2) connects to the matching circuit close to the antenna. For Pin 1 (B.SEL) the component should be close to this pin.

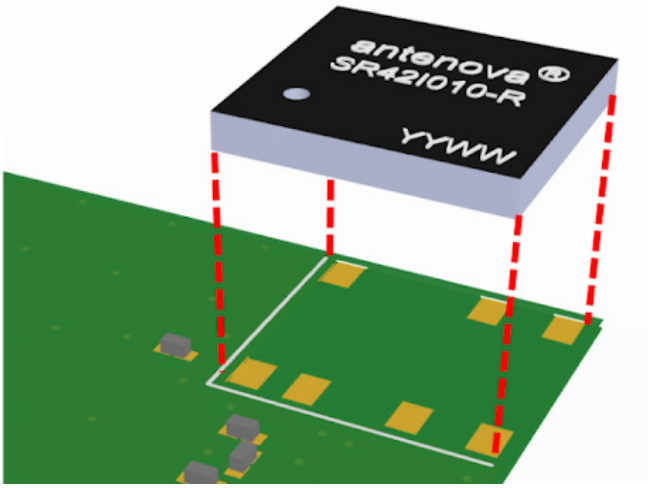


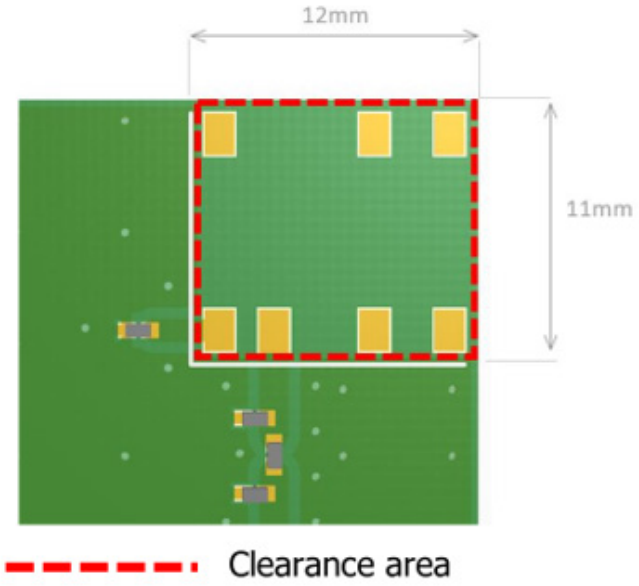
11.3. Host PCB clearance

Below shows the antenna footprint and clearance through all layers on the PCB. Only the antenna pads and connections to feed and GND are present within this clearance area. The clearance area required is 12.0 x 11.0 (mm).



The clear-out area is simply defined as the same size as the antenna. No additional clearance is required.

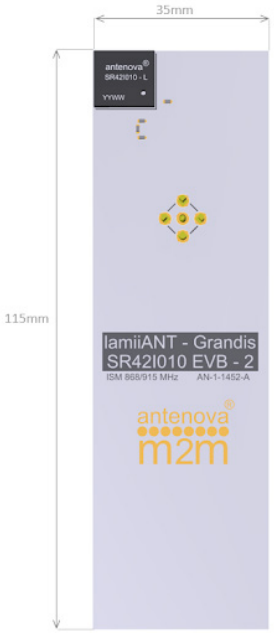




12. Reference board

The reference board has been designed for the purpose of evaluating the SR42I010 antenna and includes a SMA female connector.

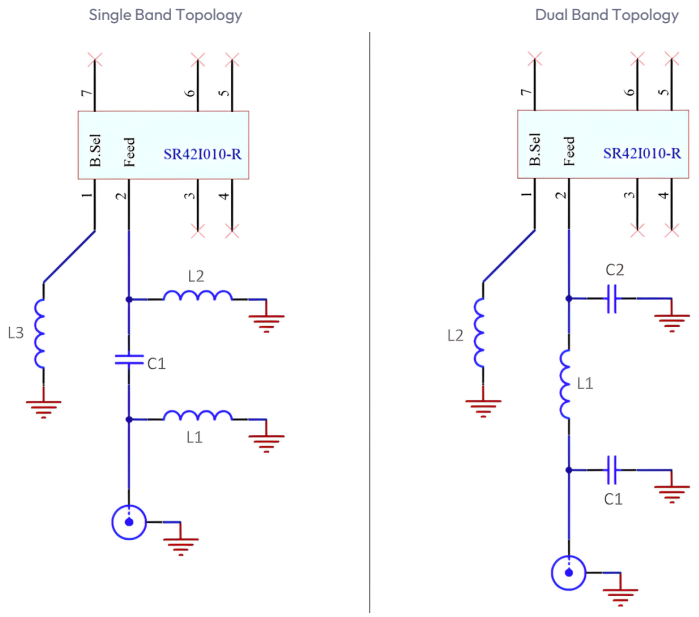
To order a reference board please see antenova.com



SR42I010-EVB-2
(For SR42I010-L)

SR42I010-EVB-1
(For SR42I010-R)

12.1. Reference board matching circuit



Single Band Matching

Designator	Type	Value	Description
C1	Capacitor	2.7pF	Murata GJM15HN series
L1, L2	Not Fitted	Not Fitted	Not Fitted

	B.SEL(Band Selection pin component)			
Frequency band	Designer	Type	Value	Description
ISM 868	L3	Inductor	3.9nH	Murata LQG15 series
ISM 915	L3	Inductor	1.8nH	Murata LQG15 series

Dual Band Matching

Designator	Type	Value	Description
C1	Capacitor	6.8pF	Murata GJM15HN series
C2	Capacitor	10pF	Murata GJM15HN series
L1	Inductor	4.7nH	Murata LQG15 series
L2	Inductor	1.8nH	Murata LQG15 series

13. Soldering

This antenna is suitable for lead free soldering. The reflow profile 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

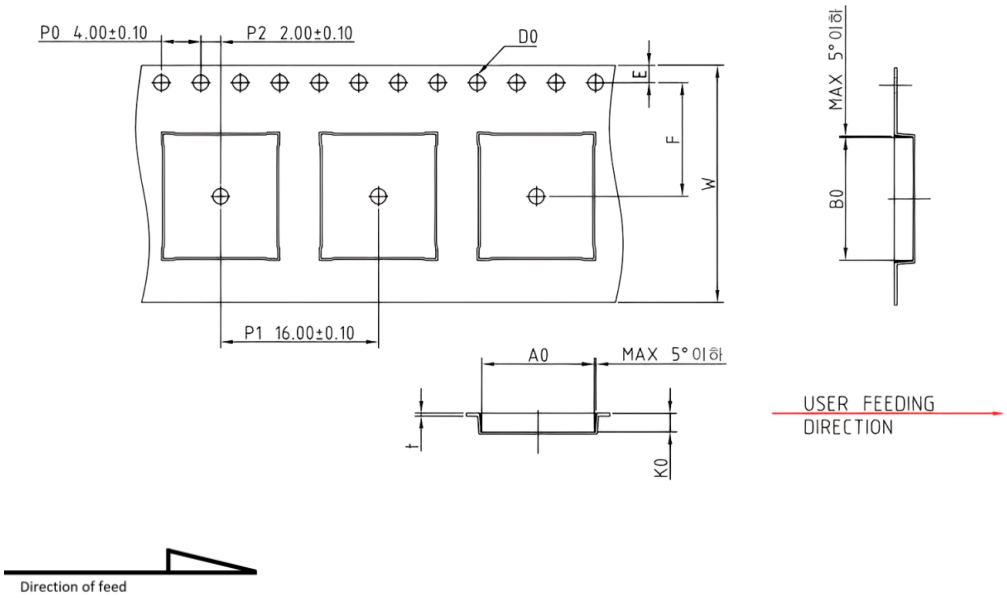
15.1. Optimal storage conditions

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.

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

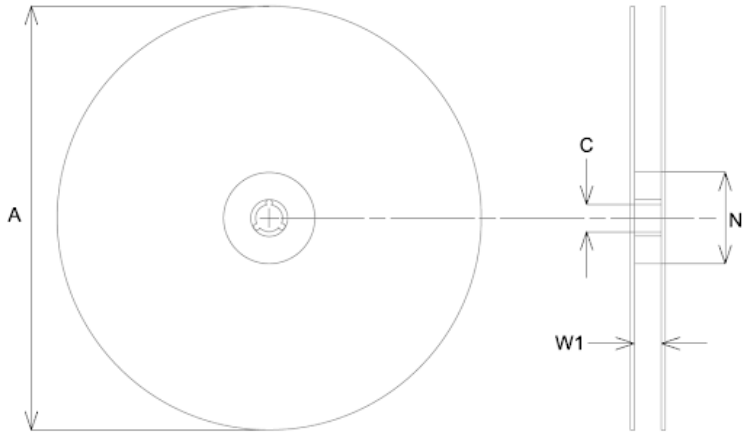


Ko	Ao	Bo	P0	P1	P2	Do
1.90	11.40 ± 0.1	12.40 ± 0.1	4.00 ± 0.1	16.00 ± 0.1	2.00 ± 0.1	1.50 ± 0.1

E	F	W
1.75 ± 0.1	11.5 ± 0.15	24.00 ± 0.3

All dimensions in (mm)

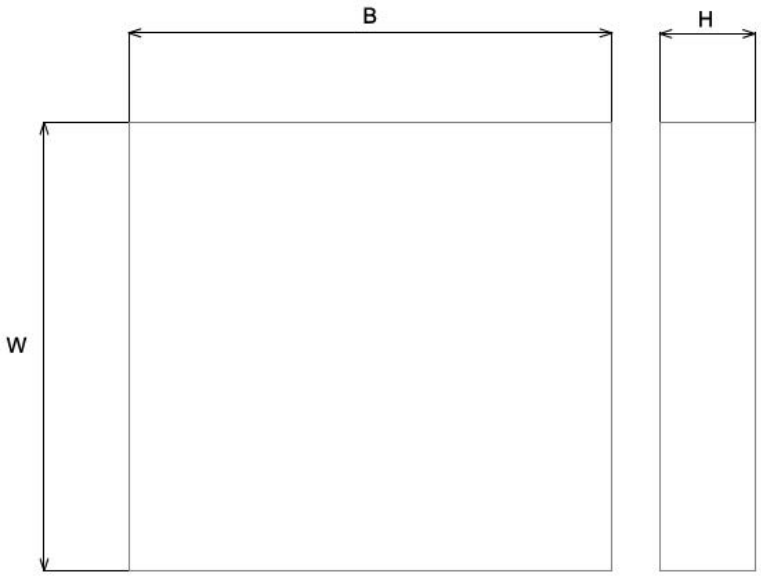
15.3. Reel dimensions



A	C	N	W1
330.0 ± 2.0	13.2 ± 0.5	178.0 ± 0.2	26.0 ± 0.3

All dimensions in (mm)

15.4. Box dimensions



Width	Breadth	Thickness
350mm	355mm	70mm

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

2.01 released Aug 2024

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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

ask.antenova is a global forum for designers and engineers working with wireless technology

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