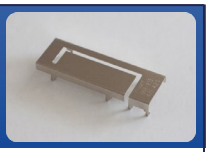
OnBoard 868/915 MHz - Antenna



PRO-OB-471

Request Samples | Check Inventory

34.00 x 11.53 x 4.93 mm
RoHS/RoHS II Compliant
MSL Level = 1

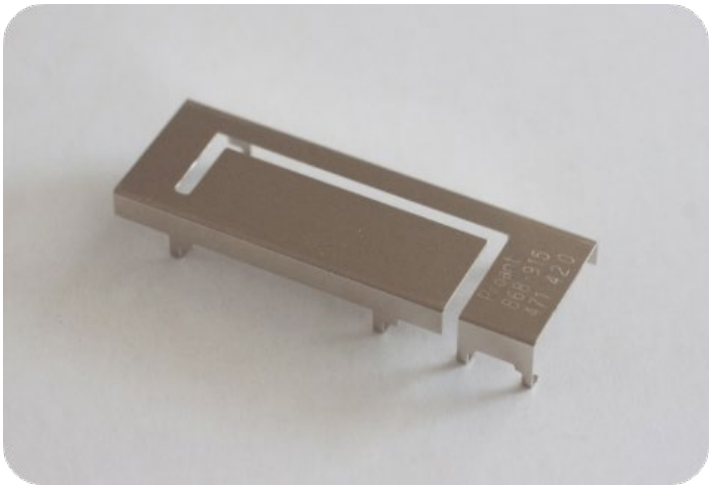
Features

- Supports 868 MHz or 915 MHz
- Profile of 4.93 mm
- Linear Polarization
- Gain of 2.4 dBi
- Efficiency > 50%
- Surface Mount
- Durable-Shelf life of upto 10 years

Applications

- LPWA/LoRA/SigFox/ISM Applications
- IoT, M2M
  - Industrial
  - Infrastructure
  - Medical
- Remote Technology / Monitoring
- Network devices
- Consumer Tracking
- Smart Metering

Product Image



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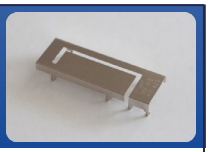

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34.00 x 11.53 x 4.93 mm
RoHS/RoHS II Compliant
MSL Level = 1

Electrical Specification

Parameter	Specification		Unit
	870 MHz	928 MHz	
Operating Frequency	860 - 870	902 - 928	MHz
Center Frequency	865	915	
Return Loss	< -9.9	< -6.6	dB
Polarization	Linear		
Peak Gain	> 1.7	> 2.4	dBi
Efficiency	> 63	> 50	%
Impedance	50		Ω

Note: All test measurements were conducted with the antenna on a 120 x 50 mm Evaluation board (PRO-EB-472 & PRO-EB-476). Please note that the performance is dependent on the ground plane dimensions, tuning components and application environment.

Mechanical Specification

Parameter	Specification
Antenna Dimension	34.00 x 11.53 x 4.93 mm
Evaluation board Dimension	120 x 50 mm
Mounting Type	Surface Mount

Environmental Specification

Parameter	Specification
Operating Temperature	-40˚C to +125˚C
Storage Temperature	
Maximum Temperature	400˚C
RoHS Compliance	Yes Compliant with EU directive 2011/65/EU and 2015/863
Shelf life	10 years
MSL	Level 1, unlimited
Mechanical resistance	Immunity to vibrations IEC/EN 60068-2-6, Fc test Immunity to shock IEC/EN 60068-2-27, Ea test

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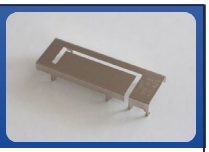

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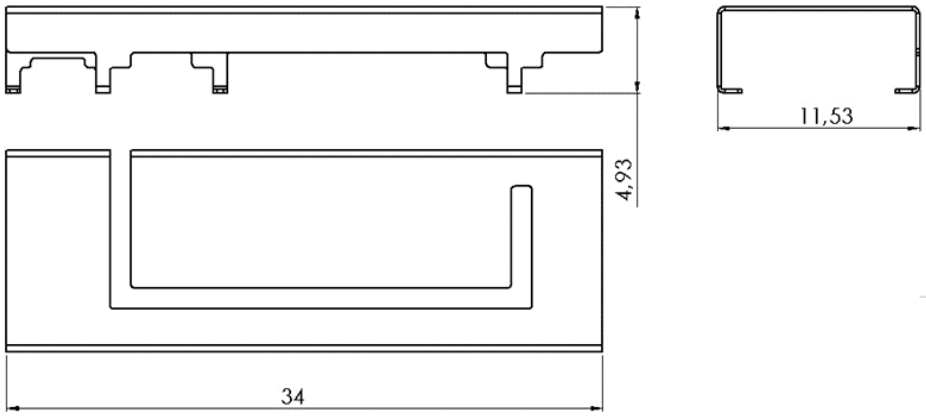
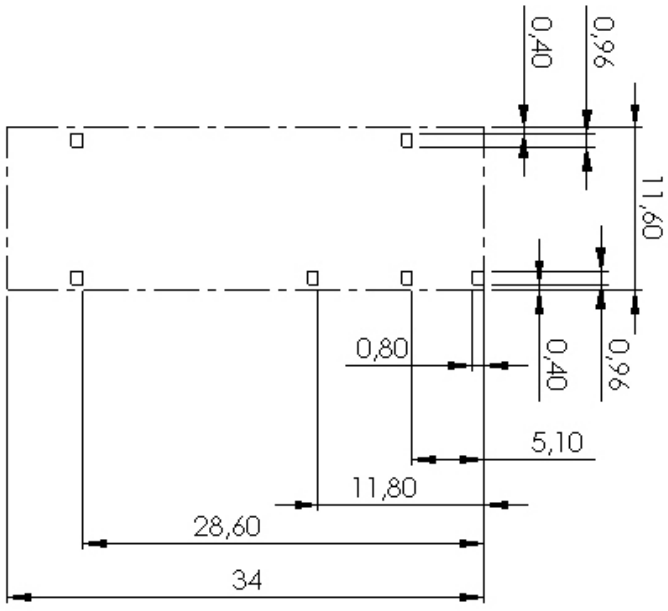
RoHS/RoHS II Compliant
MSL Level = 1

Product Dimension



Unit : mm

Antenna pins and keep-out block



Unit : mm

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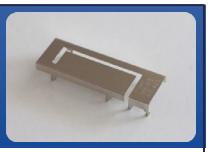

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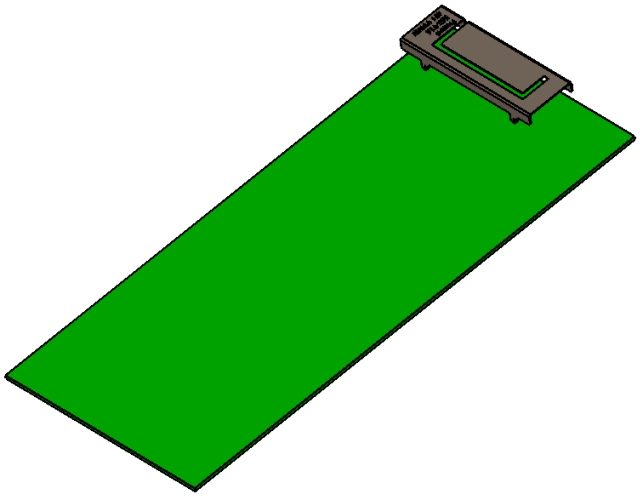
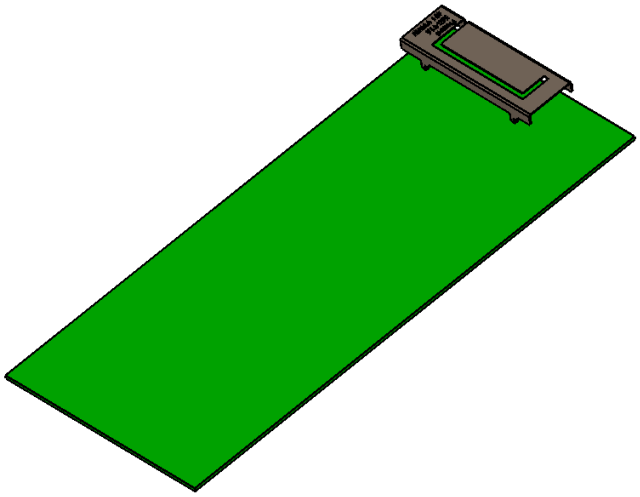
34.00 x 11.53 x 4.93 mm
RoHS/RoHS II Compliant
MSL Level = 1

Measurement Setup

The antenna measurements were done with the OnBoard SMD 868 MHz evaluation board (PRO-EB-472, 120 x 50 mm) - measured in free space.



The antenna measurements were done with the OnBoard SMD 915 MHz evaluation board (PRO-EB-476, 120 x 50 mm) - measured in free space.



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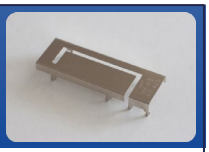

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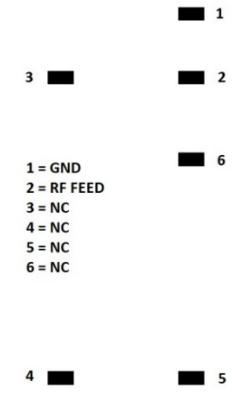
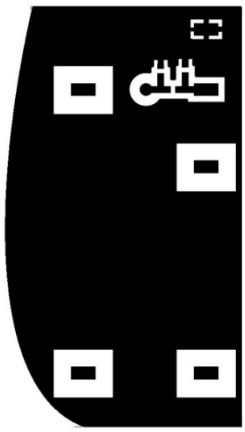
34.00 x 11.53 x 4.93 mm
RoHS/RoHS II Compliant
MSL Level = 1

PCB Layout

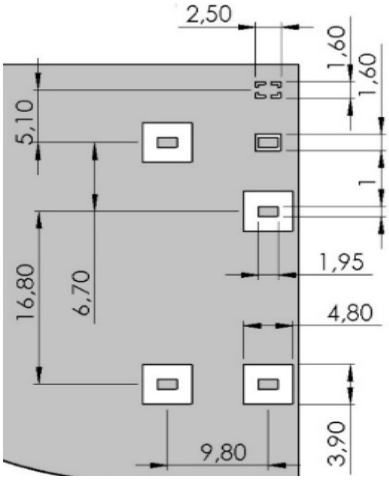
The antenna is developed for optimum performance when mounted on a ground plane, and is therefore very suitably mounted on a printed circuit board, where all empty space in the layout shall be filled solid copper. This also means that no ground cutout area is required under the antenna. If there are several layers in the PCB, there is an advantage to add via holes for interconnection of the ground areas. It is also very important that there is a ground clearance around the NC pads and the RF feed pad, through all layers of the PCB. Otherwise there will be capacitive coupling which may detune the antenna.



Pin configuration

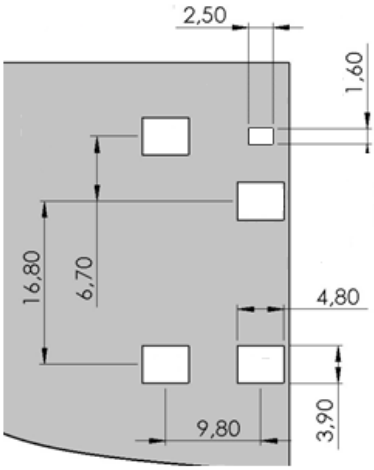


PCB Layout (from evaluation board)



The antenna is preferably positioned along one side of the PCB ground plane, where pin 1 shall be as close as possible to the layout corner.

It is also recommended to implement a pi-matching network as seen in the PCB layout to compensate for eventual mismatch due to the practical implementation. The components can be positioned below the antenna next to the feed pad. See Evaluation Board Outline & Matching Circuit section for more details.



Clearance through all layers

Unit: mm

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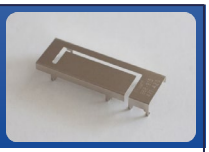

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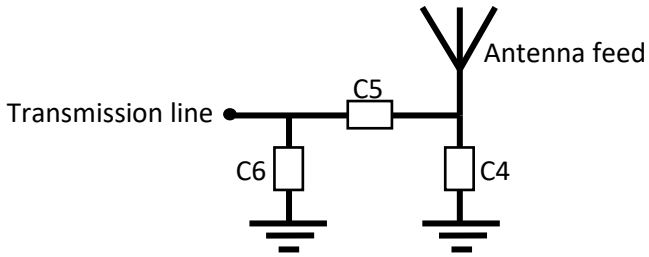
RoHS/RoHS II Compliant
MSL Level = 1

Evaluation Board Outline & Matching Circuit (868 MHz)

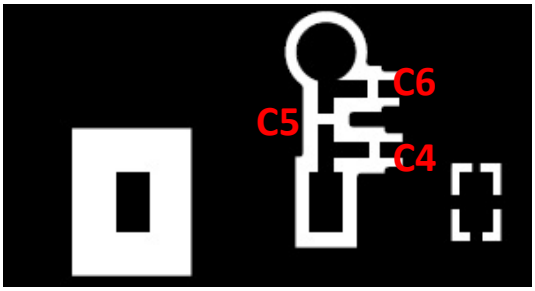
The evaluation board is developed to simplify antenna testing and evaluation. It has an arbitrary size of 120 x 50 mm and includes an SMA connector. The purpose is to give a reference design for an optimal antenna implementation. The evaluation board can also be used to test other implementations by cutting and soldering the PCB into any device.

Evaluation board outline

The evaluation board has a matching circuit implemented next to the antenna. This is aimed to enable optimization possibilities for the user. The component positions are sized for 0402 (1005 metric) SMD components.



Matching circuit



The antenna needs a matching circuit to adjust the resonant frequency balance. When delivered, the evaluation board is tuned for optimum balance at the 860-870 MHz frequency bands using three components. The component values for this setup are:

C4 = N/A
C5 = 5.6 pF (Murata GJM1555C1H5R6WB01)
C6 = 2.2 pF (Murata GJM1555C1H2R2WB01)

However, it is common that the resonant frequency will shift during implementation in an arbitrary device. Therefore, this matching may be changed for compensation of such effects. See General Implementation Guidelines section for more details.

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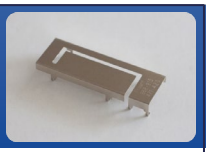

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Request Samples | Check Inventory

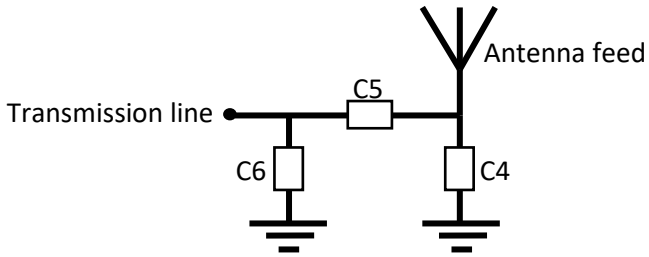
34.00 x 11.53 x 4.93 mm
RoHS/RoHS II Compliant
MSL Level = 1

Evaluation Board Outline & Matching Circuit (915 MHz)

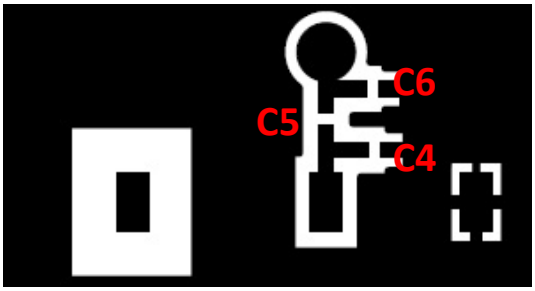
The evaluation board is developed to simplify antenna testing and evaluation. It has an arbitrary size of 120 x 50 mm and includes an SMA connector. The purpose is to give a reference design for an optimal antenna implementation. The evaluation board can also be used to test other implementations by cutting and soldering the PCB into any device.

Evaluation board outline

The evaluation board has a matching circuit implemented next to the antenna. This is aimed to enable optimization possibilities for the user. The component positions are sized for 0402 (1005 metric) SMD components.



Matching circuit



The antenna needs a matching circuit to adjust the resonant frequency balance. When delivered, the evaluation board is tuned for optimum balance at the 902-928 MHz frequency bands using three components. The component values for this setup are:

C4 = N/A
C5 = 1.5nH (Murata LQW15AN1N5B00)
C6 = 5.6pF (Murata GJM1555C1H5R6WB01)

However, it is common that the resonant frequency will shift during implementation in an arbitrary device. Therefore, this matching may be changed for compensation of such effects. See General Implementation Guidelines section for more details.

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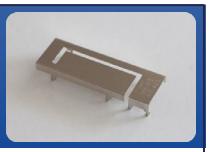

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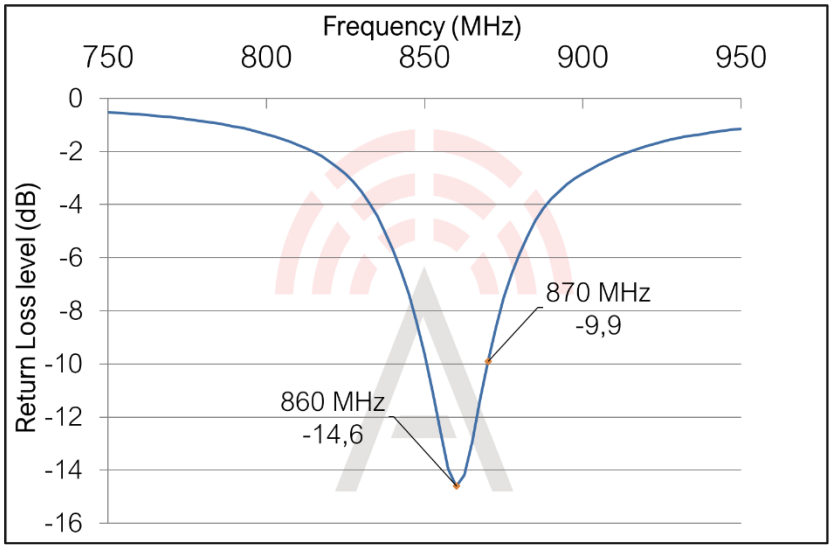
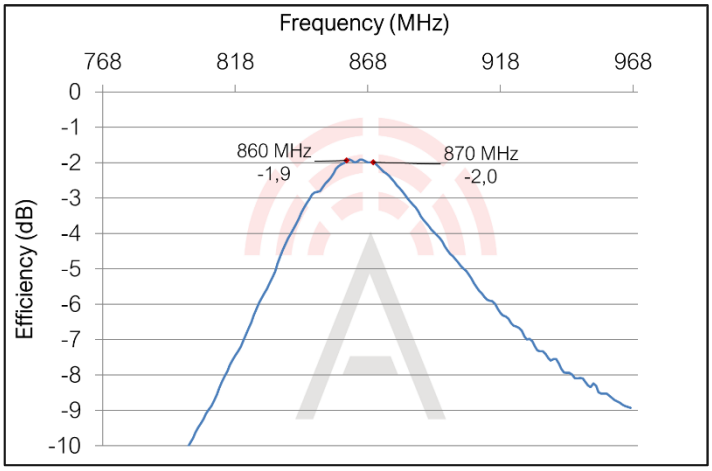
34.00 x 11.53 x 4.93 mm
RoHS/RoHS II Compliant
MSL Level = 1

Reflection Characteristics (868 MHz) - Return Loss

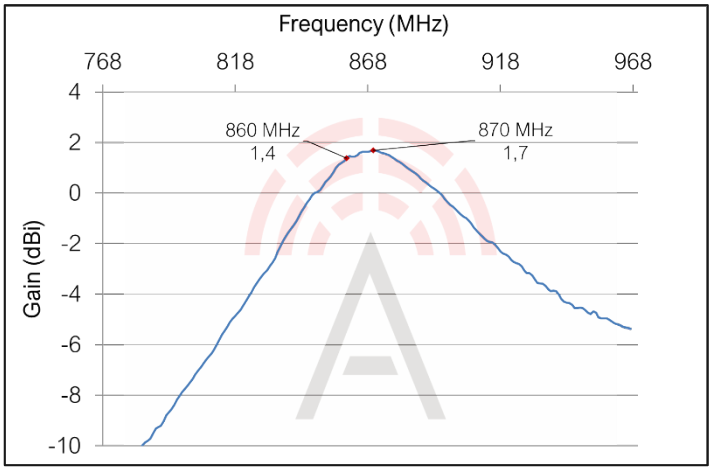
All results are measured with the antenna mounted on the evaluation board.



Total Radiation Efficiency



Maximum Radiation Gain



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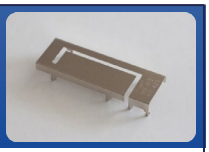

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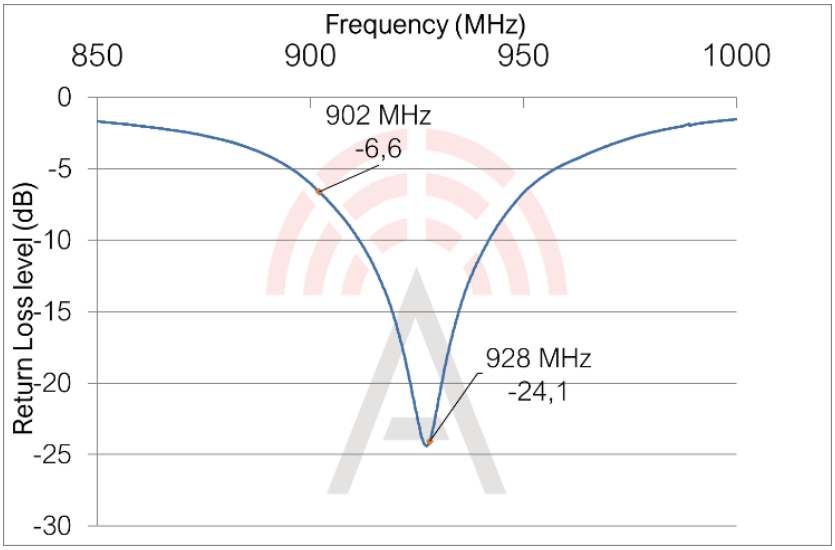
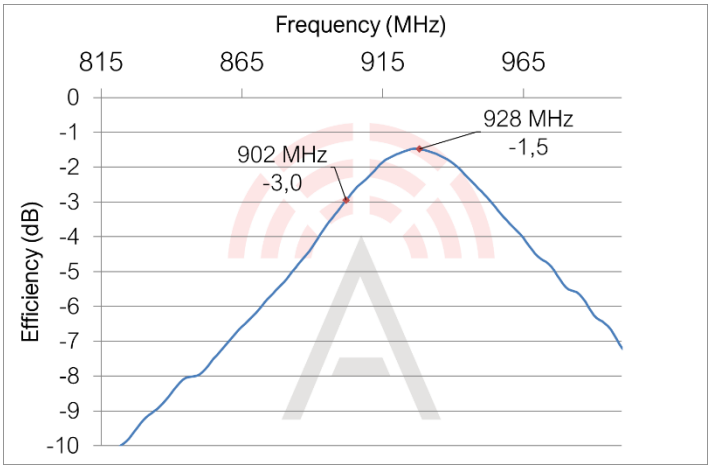
RoHS/RoHS II Compliant
MSL Level = 1

Reflection Characteristics (915 MHz) - Return Loss

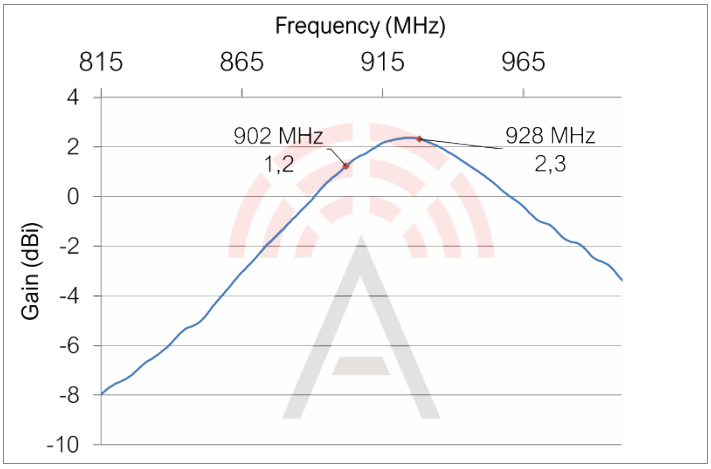
All results are measured with the antenna mounted on the evaluation board.



Total Radiation Efficiency



Maximum Radiation Gain



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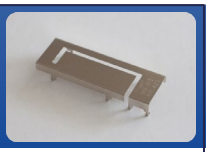

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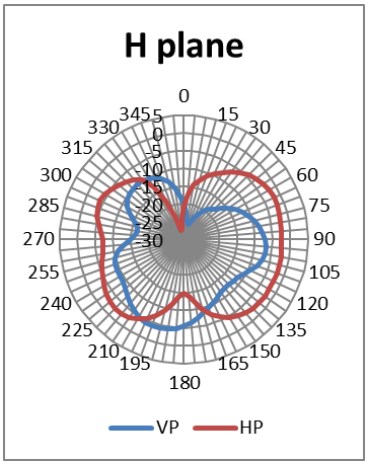
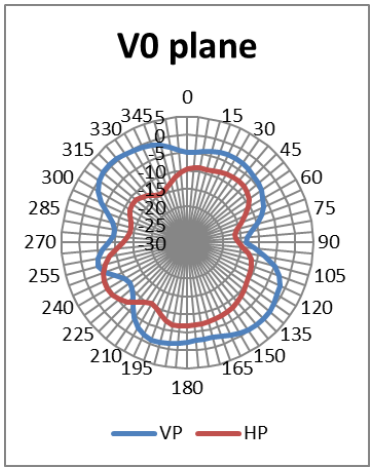
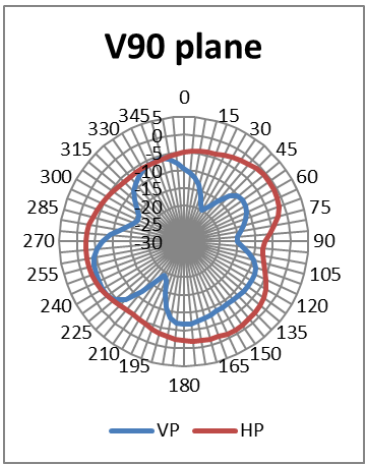
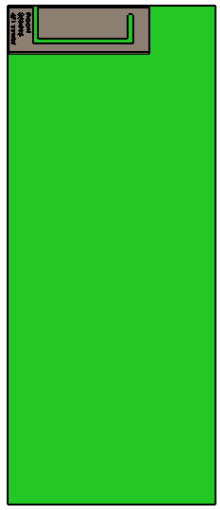
MSL Level = 1

Radiation Characteristics - 2D Pattern (868 MHz)









VP: Vertical Polarization
HP: Horizontal Polarization

Unit: dBi

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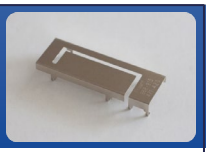

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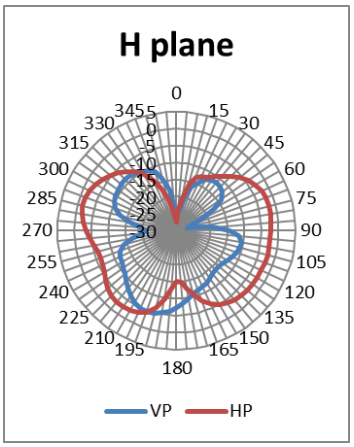
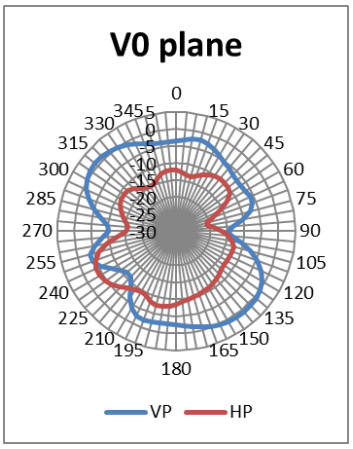
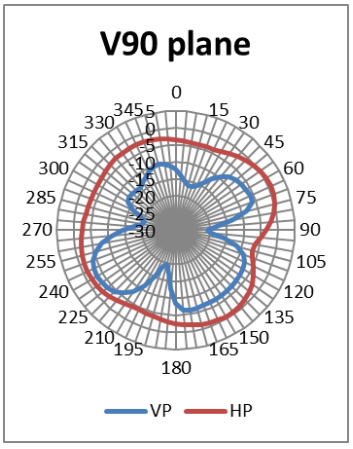
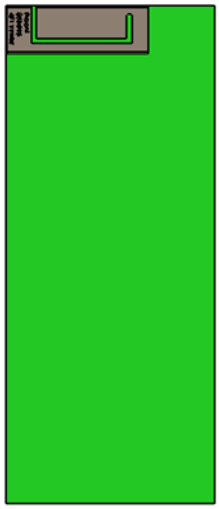
RoHS/RoHS II Compliant
MSL Level = 1

Radiation Characteristics - 2D Pattern (915 MHz)









VP: Vertical Polarization
HP: Horizontal Polarization

Unit: dBi

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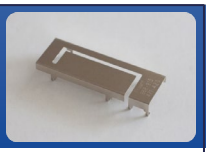


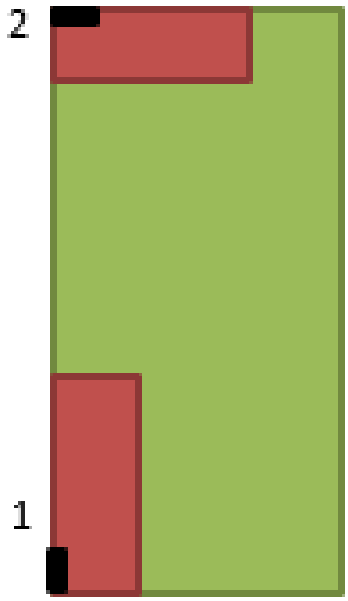
PRO-OB-471

Request Samples | Check Inventory

34.00 x 11.53 x 4.93 mm
RoHS/RoHS II Compliant
MSL Level = 1

General Implementation Guidelines

The antenna can be positioned in many ways, although there are some positions which are more beneficial. Below picture shows a typical PCB with two possible antenna positions that give good radiation performance.



▬ = feed section (pin 1 & pin 2)

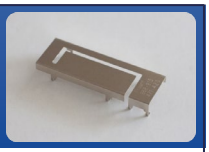
The antenna should be aligned with the PCB edge if possible. It is also important to align pin 1 & 2 along the outer side of the PCB, and even more preferably close to a corner.

The OnBoard SMD 868/915 antenna enables that small electrical components are mounted inside the antenna keep-out block. This may have an impact on the antenna tuning and radiated performance, but is fully possible if there is limited space on the PCB.

Another general aspect on surface mounted antennas is regarding the PCB population. If other electrical components are positioned in the surrounding area of the antenna, some impact on the antenna tuning and radiated performance may be expected. It is recommended that such components are distributed below a topographical slope that starts on PCB level at the antenna keep-out block, and slowly increases the height.

It shall also be highlighted that plastic and metal parts in the near proximity of antennas may influence the antenna tuning and/or performance. This aspect should be noted as a general guideline for all antennas. The effects are difficult to estimate without detailed information, but it is common that a plastic housing above the antenna shifts the resonant frequency down. It is recommended to measure the antenna in the actual device after implementation.

OnBoard 868/915 MHz - Antenna



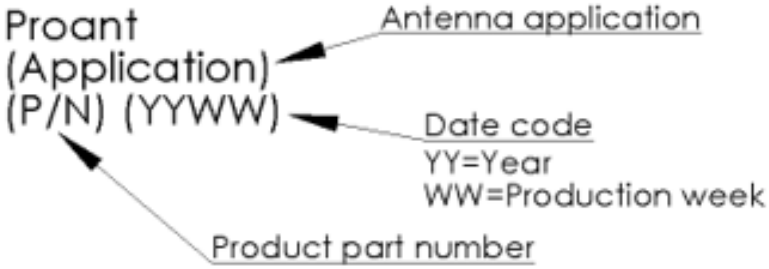
PRO-OB-471

Request Samples | Check Inventory

34.00 x 11.53 x 4.93 mm
RoHS/RoHS II Compliant
MSL Level = 1

Park Marking

The top marking of the antenna is arranged according to the following illustration.

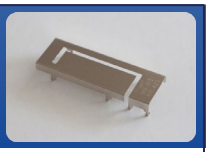


Example top marking

Ordering Information

Part number	Part name	Details
PRO-OB-471	OnBoard SMD 868/915 MHz	Antenna for 860-870 MHz or 902-928 MHz
PRO-EB-472	Evaluation board, Onboard SMD 868 MHz	Evaluation board with PRO-OB-471, operation in 860-870 MHz
PRO-EB-476	Evaluation board, Onboard SMD 915 MHz	Evaluation board with PRO-OB-471, operation in 902-928 MHz

OnBoard 868/915 MHz - Antenna



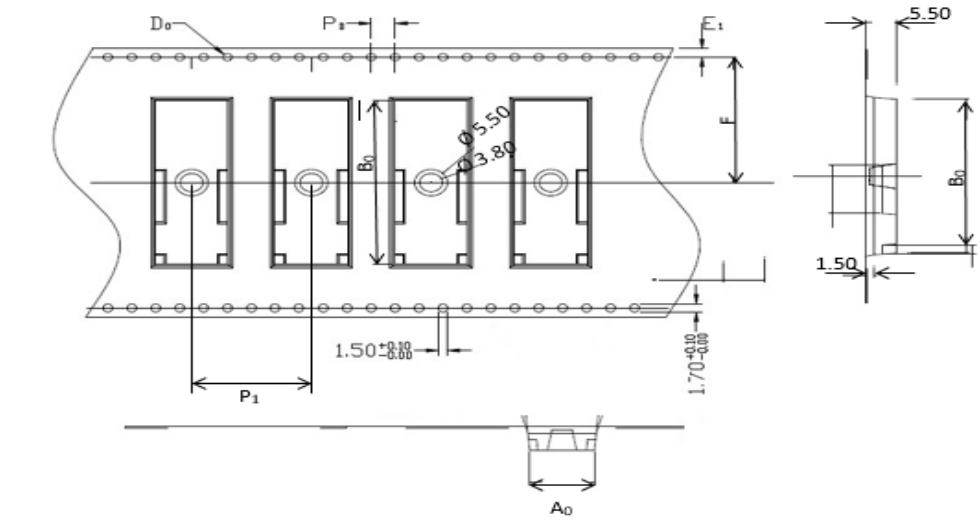
PRO-OB-471

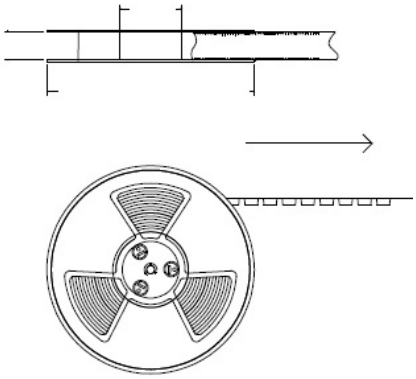
Request Samples | Check Inventory

34.00 x 11.53 x 4.93 mm
RoHS/RoHS II Compliant
MSL Level = 1

Packaging

The antenna is delivered on tape and reel according to following specifications. The quantity per 13” reel is 250 pcs.





A_0	12.2±0.1
B_0	34.2±0.1
D_0	ø1.5 $^{+0.10}_{-0.00}$
E_1	1.75±0.1
F	26.2±0.15
K_0	5.5±0.1
P_0	4.0 ±0.1
P_1	20.0±0.1
P_2	2.0±0.15
S_0	
T	0.40±0.05
W	56.0±0.3

- 10 sprocket hole pitch cumulative tolerance ±0.2
- Camber not to exceed 1mm in 100m
- A0 and B0 measured on a plane 0.35mm above the Bottom of the pocket
- K0 measured from a plane on the inside bottom of the Pocket to the top surface of the carrier
- Pocket position relative to sprocket hole measured as true Position of pocket, not pocket hole
- Component load per 13” reel: 250 pcs

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