LoRa Antenna Information Mode# NN02-224

RUN mXTEND™ (NN02-224)

The RUN mXTEND™ cellular embedded **IoT antenna** is an example of the new generation of tiny antenna boosters available for multiband connectivity. The miniature antenna booster is connected to the RF transceiver through a matching network that shapes the frequency response of the wireless platform such as **2G, 3G, 4G** bands, but also for other regions of the spectrum for example **GNSS and Bluetooth**.

Product Benefits

- **Top performance**: Top multiband IoT performance in a ultracompact form factor: 12.0 mm x 3.0 mm x 2.4 mm.
- **Multiband & Multiport:** 2G/3G/4G/5G, LTE-M and NB-IoT applications
- **Global reach:** Through multiband performance (compatible with multiple regional standards).
- **Reliability**: Off-the-Shelf standard product, no antenna part customization (electronic optimization).
- **Use cases:** Small tracking devices, IoT sensors and IoT cellular/ISM modules, mobile devices.

Operation Bands Summary

- GSM, UMTS, 4G, GNSS, Bluetooth, Wi-Fi Dual Band (824 – 960MHz, 1710 – 2690MHz, 1561 – 1606MHz, 2400 – 2500MHz and 4900 – 5875MHz)

1. AVAILABLE SOLUTIONS SUMMARY

Class	Frequency Regions	Frequency range	More detailed info
1 Port	2	824 – 960 MHz & 1710 – 2690 MHz	CELLULAR LTE
1 Port	1	863 – 928 MHz	ISM
1 Port	2	863 – 928 MHz & 2400 – 2500MHz	ISM + BLUETOOTH
1 Port	3	1561 MHz, 1575 MHz & 1598 – 1606 MHz	GNSS
1 Port	1	2400 – 2500MHz	BLUETOOTH
1 Port	2	2400 – 2500MHz & 4900 – 5875MHz	Wi-Fi DUAL BAND

2. DETAILED AVAILABLE SOLUTIONS

2.1. LTE SOLUTION

Technical features	824 – 960 MHz	1710 – 2690 MHz
Average Efficiency	> 65 %	> 70 %
Peak Gain	1.8 dBi	1.9 dBi
VSWR	< 3:1	
Radiation Pattern	Omnidirectional	
Polarization	Linear	
Weight (approx.)	0.19 g	
Temperature	-40 to + 125 ºC	
Impedance	50 Ω	
Dimensions (L x W x H)	12.0 mm x 3.0 mm x 2.4 mm	

Technical features. Measures from the evaluation board (131 mm x 60 mm x 1 mm).

2.2 ISM SOLUTION

Technical features	863 – 870 MHz	902 – 928 MHz	863 – 928 MHz
Average Efficiency	> 85 %	> 85 %	> 85 %
Peak Gain	2.1 dBi	2.1 dBi	2.2 dBi
VSWR	< 2:1	< 2:1	< 2:1
Radiation Pattern	Omnidirectional		
Polarization	Linear		
Weight (approx.)	0.19 g		
Temperature	-40 to +125 ºC		
Impedance	50 Ω		
Dimensions (L x W x H)	12.0 mm x 3.0 mm x 2.4 mm		

Technical features. Measures from the evaluation board with UFL cables (131 mm x 60 mm x 1 mm).

2.3 GNSS SOLUTION

Technical features	1561 MHz	1575 MHz	1598 – 1606 MHz
Average Efficiency	> 75 %	> 75 %	> 80 %
Peak Gain	2.9 dBi	3.0 dBi	3.3 dBi
VSWR	< 1.5:1		
Radiation Pattern	Omnidirectional		
Polarization	Linear		
Weight (approx.)	0.19 g		
Temperature	-40 to +125 ºC		
Impedance	50 Ω		
Dimensions (L x W x H)	12.0 mm x 3.0 mm x 2.4 mm		

Technical features. Measures from the evaluation board with UFL cables (126.5 mm x 60 mm x 1 mm).

2.4 BLUETOOTH SOLUTION

Technical features	2400 – 2500MHz
Average Efficiency	> 75%
Peak Gain	4.2 dBi
VSWR	< 1.5:1
Radiation Pattern	Omnidirectional
Polarization	Linear
Weight (approx.)	0.19 g
Temperature	-40 to +125 ºC
Impedance	50 Ω
Dimensions (L x W x H)	12.0 mm x 3.0 mm x 2.4 mm

Technical features. Measures from the evaluation board with UFL cables (126.5 mm x 60 mm x 1 mm).

2.5 Wi-Fi-DUAL BAND SOLUTION

Technical features	2400 – 2500 MHz	4900 – 5875 MHz
Average Efficiency	> 70 %	> 70 %
Peak Gain	2.9 dBi	3.1 dBi
VSWR	< 2.5:1	
Radiation Pattern	Omnidirectional	
Polarization	Linear	
Weight (approx.)	0.19 g	
Temperature	-40 to + 125 ºC	
Impedance	50 Ω	
Dimensions (L x W x H)	12.0 mm x 3.0 mm x 2.4 mm	

Technical features. Measures from the evaluation board with a coplanar grounded transmission line (126.5 mm x 60 mm x 1 mm).

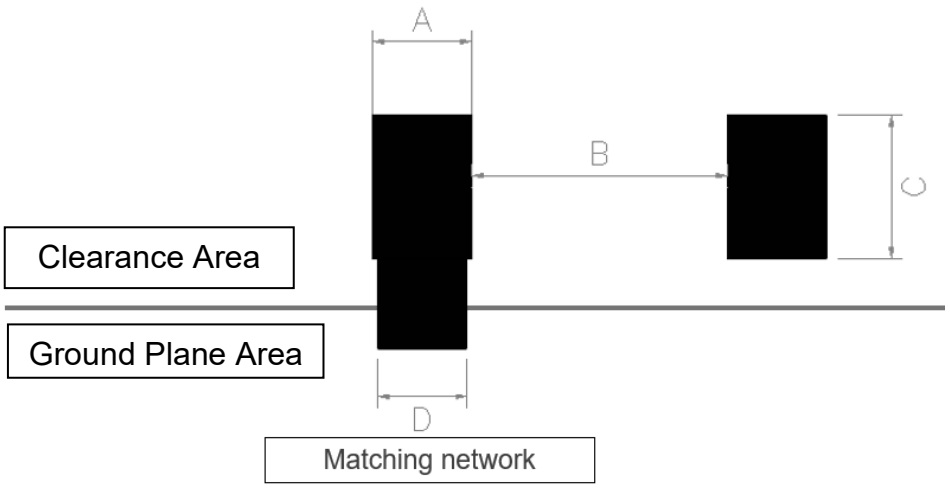
2.6 ISM + BLUETOOTH SOLUTION

Technical features	863 – 870 MHz	902 – 928 MHz	863 – 928 MHz
Average Efficiency	> 75 %	> 75 %	> 75 %
Peak Gain	1.4 dBi	1.6 dBi	1.6 dBi
VSWR	< 2:1	< 2:1	< 2:1
Radiation Pattern	Omnidirectional		
Polarization	Linear		
Weight (approx.)	0.19 g		
Temperature	-40 to +125 ºC		
Impedance	50 Ω		
Dimensions (L x W x H)	12.0 mm x 3.0 mm x 2.4 mm		

Technical features	2400 – 2500MHz
Average Efficiency	> 80 %
Peak Gain	2.9 dBi
VSWR	< 2:1
Radiation Pattern	Omnidirectional
Polarization	Linear
Weight (approx.)	0.19 g
Temperature	-40 to +125 ºC
Impedance	50 Ω
Dimensions (L x W x H)	12.0 mm x 3.0 mm x 2.4 mm

Technical features. Measures from the evaluation board with UFL cables (131 mm x 60 mm x 1 mm).

2.7 ANTENNA FOOTPRINT



Measure	mm
A	2.2
B	7.8
C	3.2
D	2.0

Tolerance: ±0.2 mm

Footprint dimensions for the single booster.

BLE Antenna Information Model# W3008

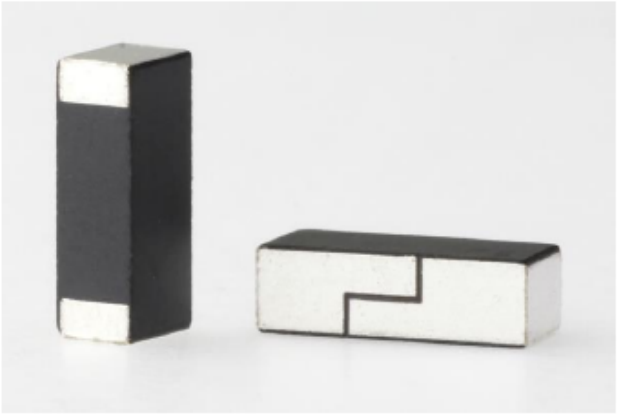
PulseLARSEN Antennas

Series: Chip Antenna

TECHNICAL DATA SHEET

Description: 2.4-2.4835GHz Ceramic SMT antenna, 4x4.25mm keep out area

PART NUMBER: W3008



Features:

- 2400-2483.5MHz
- Size: 3.2 x 1.6 x 1.1mm
- Efficiency: 66 %
- Gain: 1.1 dBi
- Polarization: Linear
- Power Handling: 5W
- RoHS Compliant
- Moisture Sensitivity Level MSL3

Applications:

- Bluetooth, BLE, Zigbee, WiFi
- 2.4GHz ISM band radios

All dimensions are in mm / inches

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ELECTRICAL SPECIFICATIONS

Frequency	2400-2483.5MHz
Nominal Impedance	50 Ω
Return Loss	-4dB
Radiation Pattern	Omni
Gain	1.1dBi
Efficiency	66%
Polarization	linear
Power Withstanding	5W

MECHANICAL SPECIFICATIONS

Overall Length	3.2x1.6x1.1mm
Weight	33mg
Antenna Color / Material	Ceramic

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-40~+85° C
Storage Temperature	-40~+85° C
RoHS Compliant	Yes

(*) All RF parameters measured on 80*37mm PCB with 4*4.25mm clearance in free space. No matching component used.

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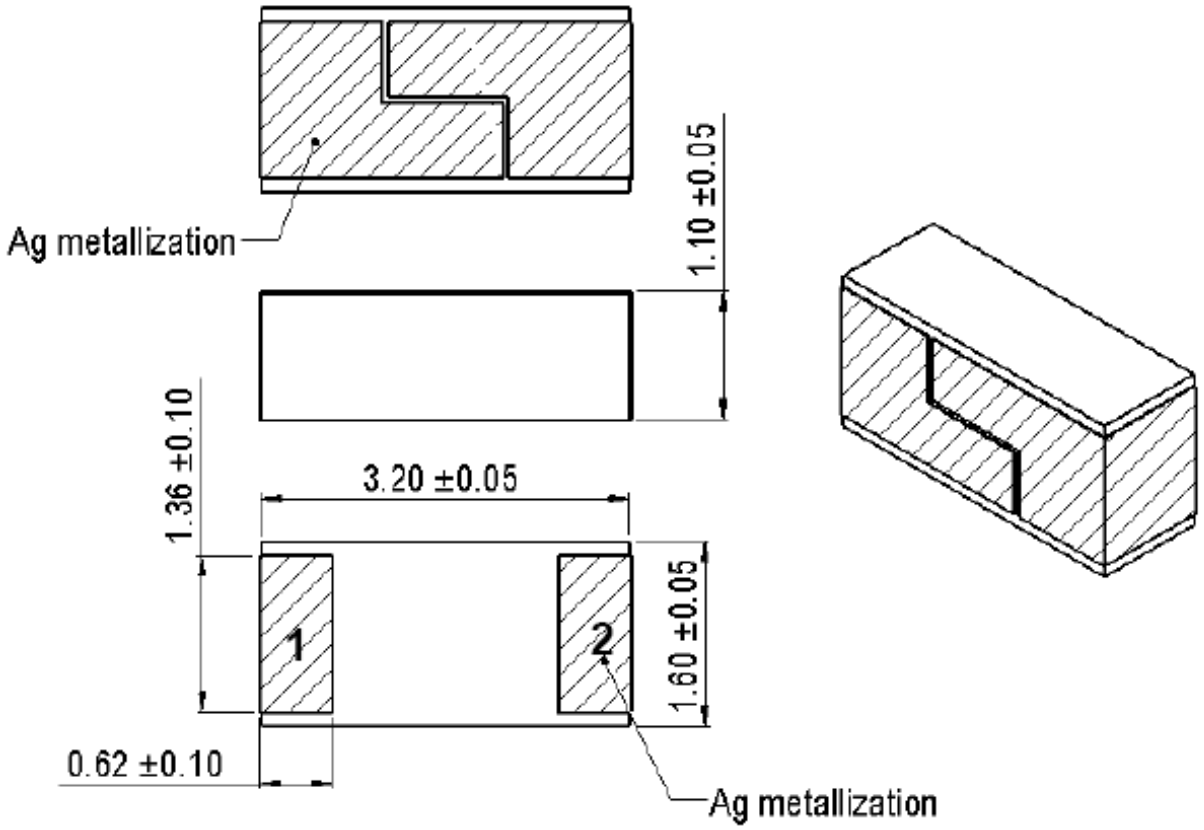
MECHANICAL DRAWING AND TERMINAL CONFIGURATION



No.	Terminal Name	Terminal Dimensions
1	Feed /GND	0.62 x 1.36 mm
2	Feed /GND	0.62 x 1.36 mm
Antenna is symmetrical, either one of pads 1 or 2 can be used as feed terminal		

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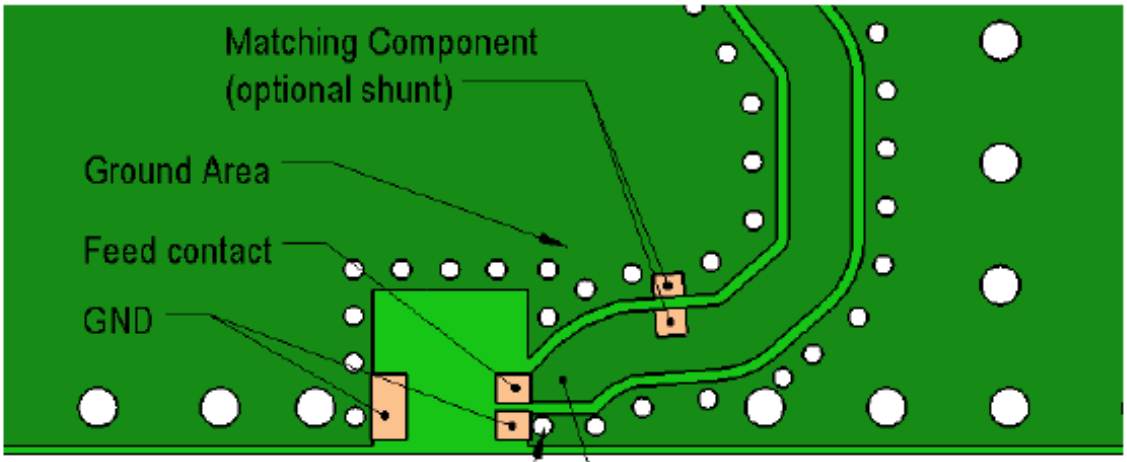
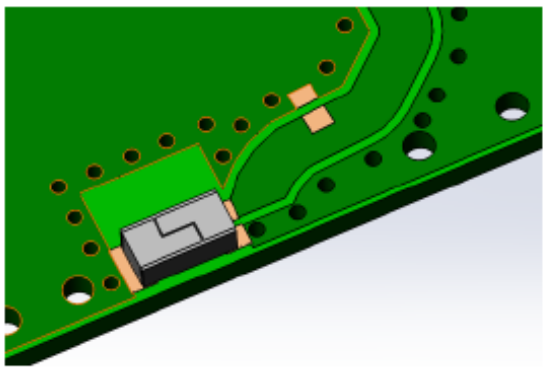
MECHANICAL DRAWING AND TERMINAL CONFIGURATION

Ground cleared under antenna, clearance area 4 mm x 4.25mm



Ground Via Hole
Ground area should be surround with ground via holes

Feed line 50Ohm
Any type of 50 Ohm feed line can be used. inner layers on feed line area need to designed to give 50 Ohm characteristics to feed line.



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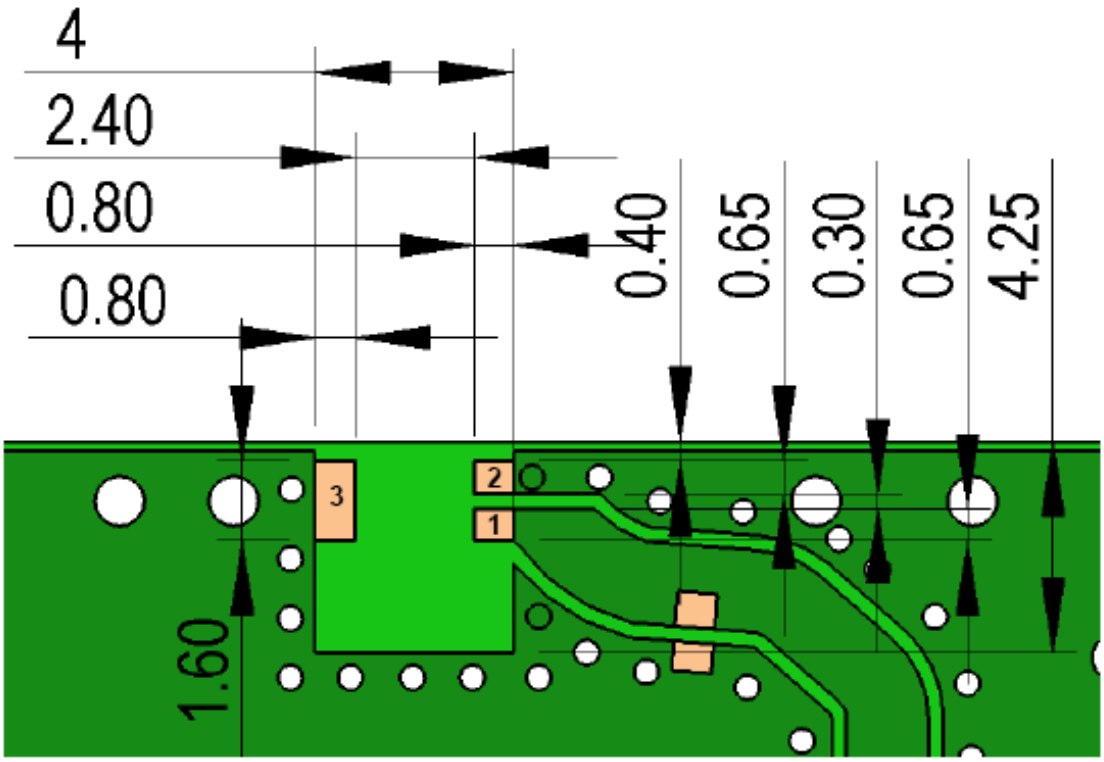
MECHANICAL DRAWING AND TERMINAL CONFIGURATION

Recommended Antenna Pad Dimensions on PCB Layout (top surface)
Ground cleared under antenna, clearance area 4 mm x 4.25 mm



PCB contact pads		
No.	Terminal Name	Terminal Dimensions
1	Feed	0,80 x 0,65 mm
2	GND	0,80 x 0,65 mm
3	GND	0,80 x 1,60 mm

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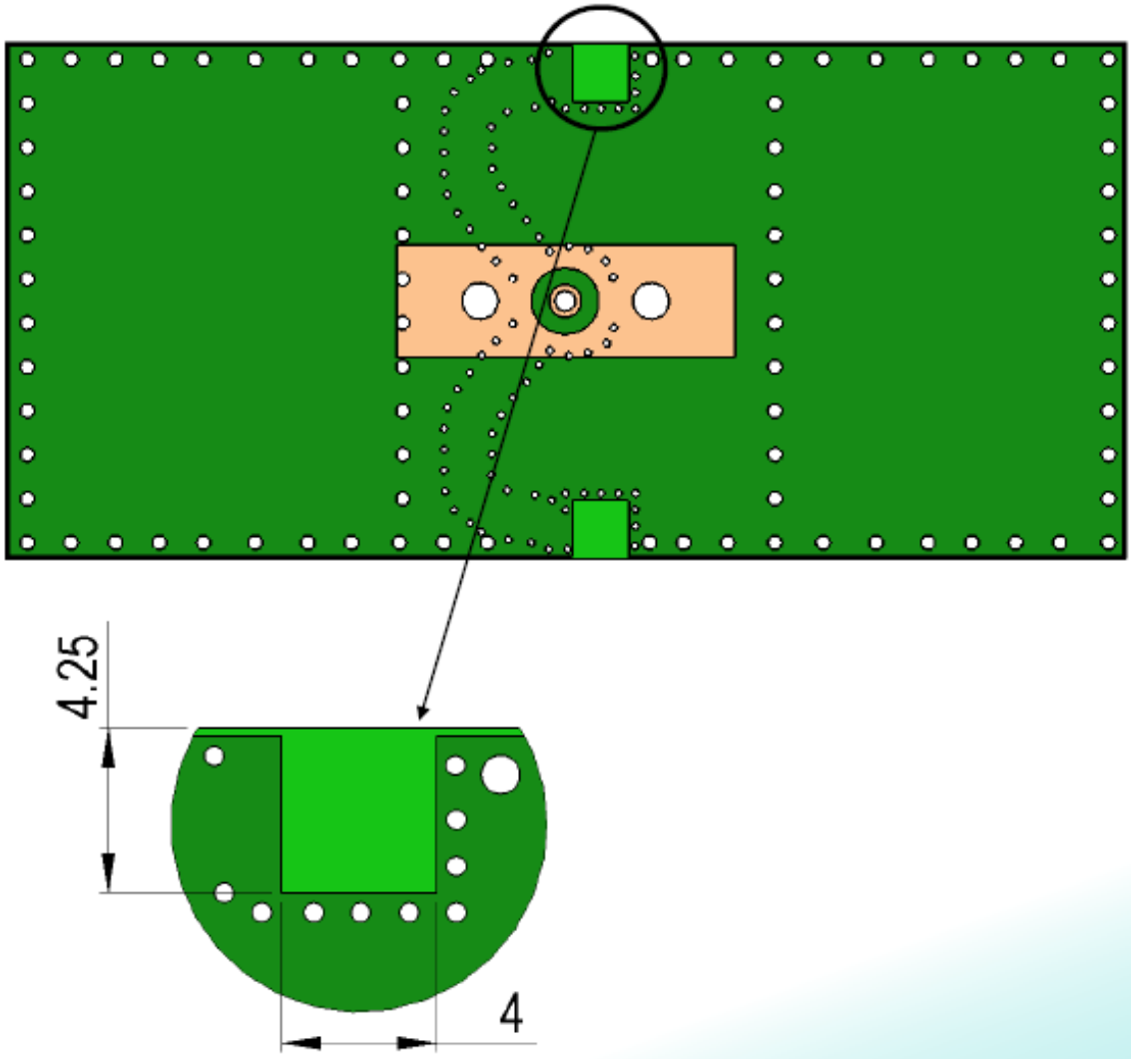
PART NUMBER: W3008

MECHANICAL DRAWING AND TERMINAL CONFIGURATION

Recommended Antenna Pad Dimensions on PCB Layout (bottom surface)
Ground cleared under antenna, clearance area 4 mm x 4.25 mm



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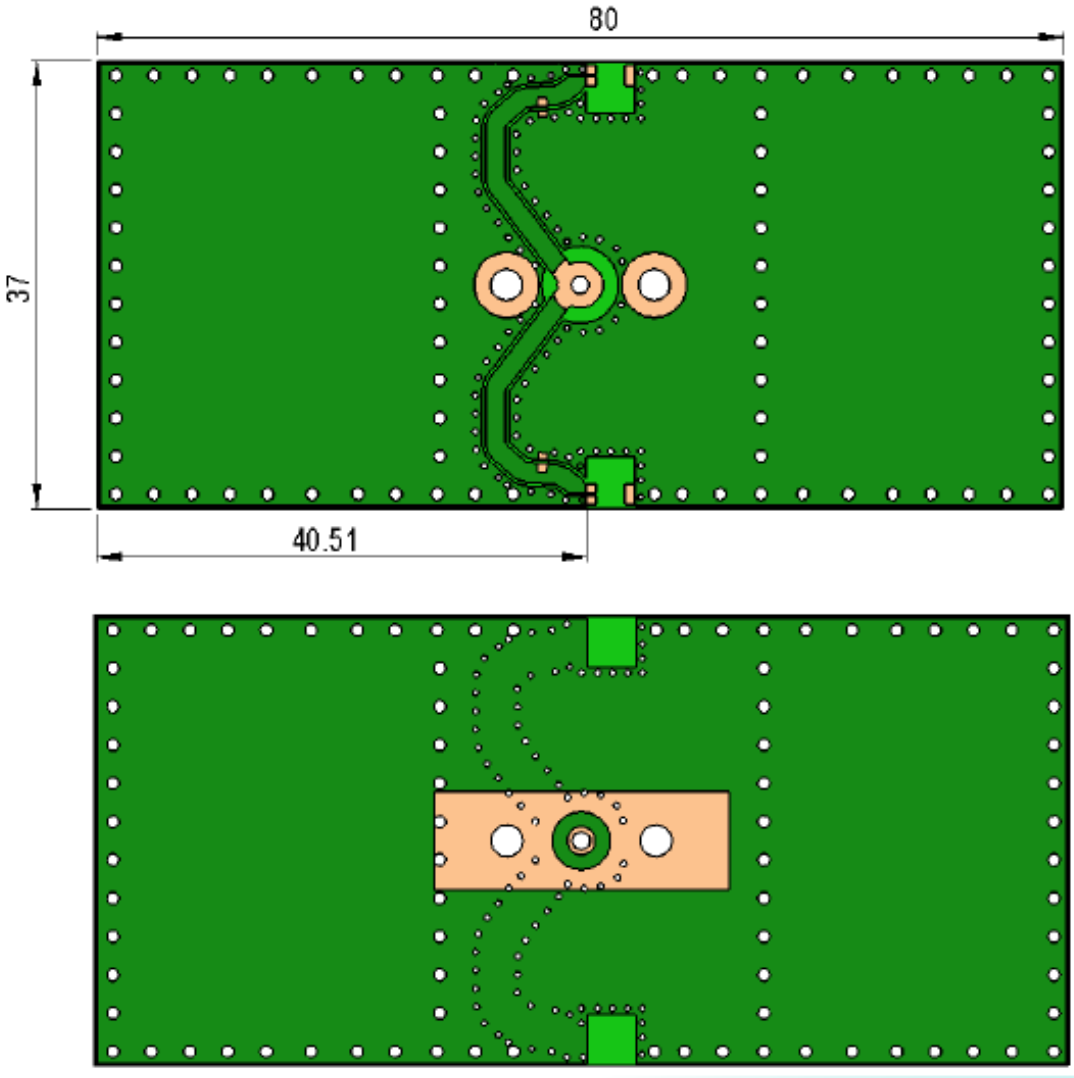
MECHANICAL DRAWING AND TERMINAL CONFIGURATION

Recommended test board layout for electrical characteristic measurement, test board outline size 80 x 37mm



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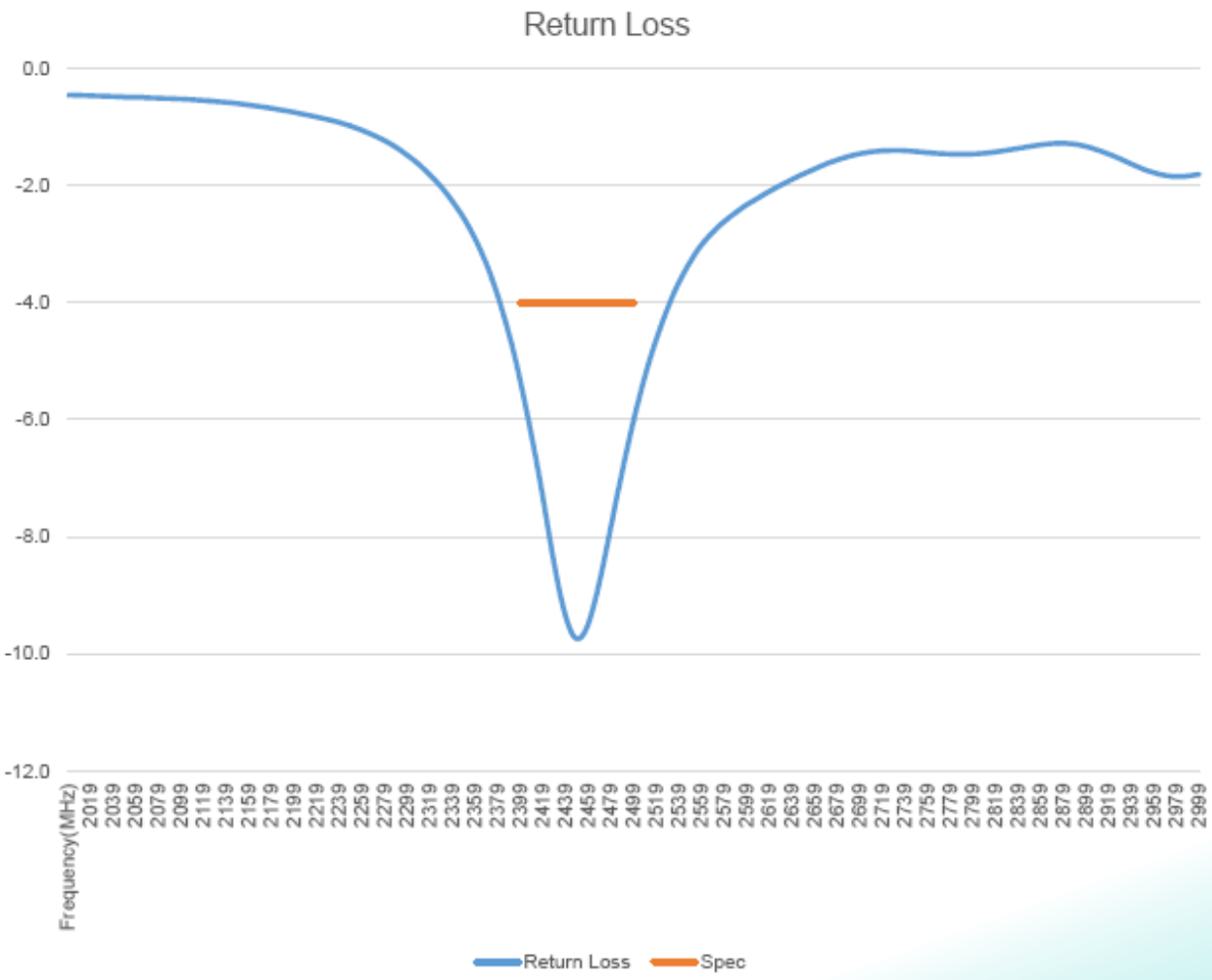
CHARTS

Return loss



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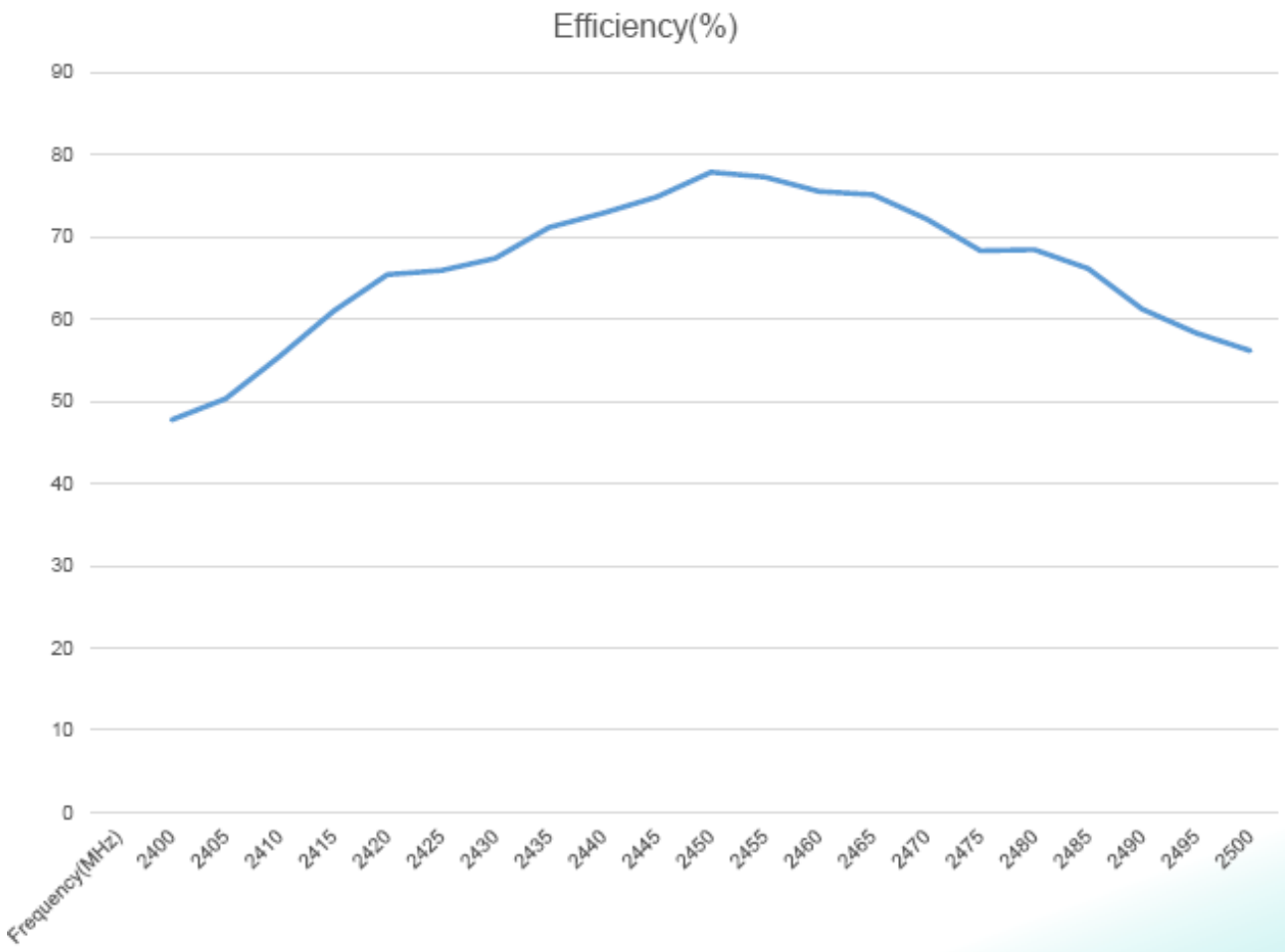
CHARTS

Efficiency(%)



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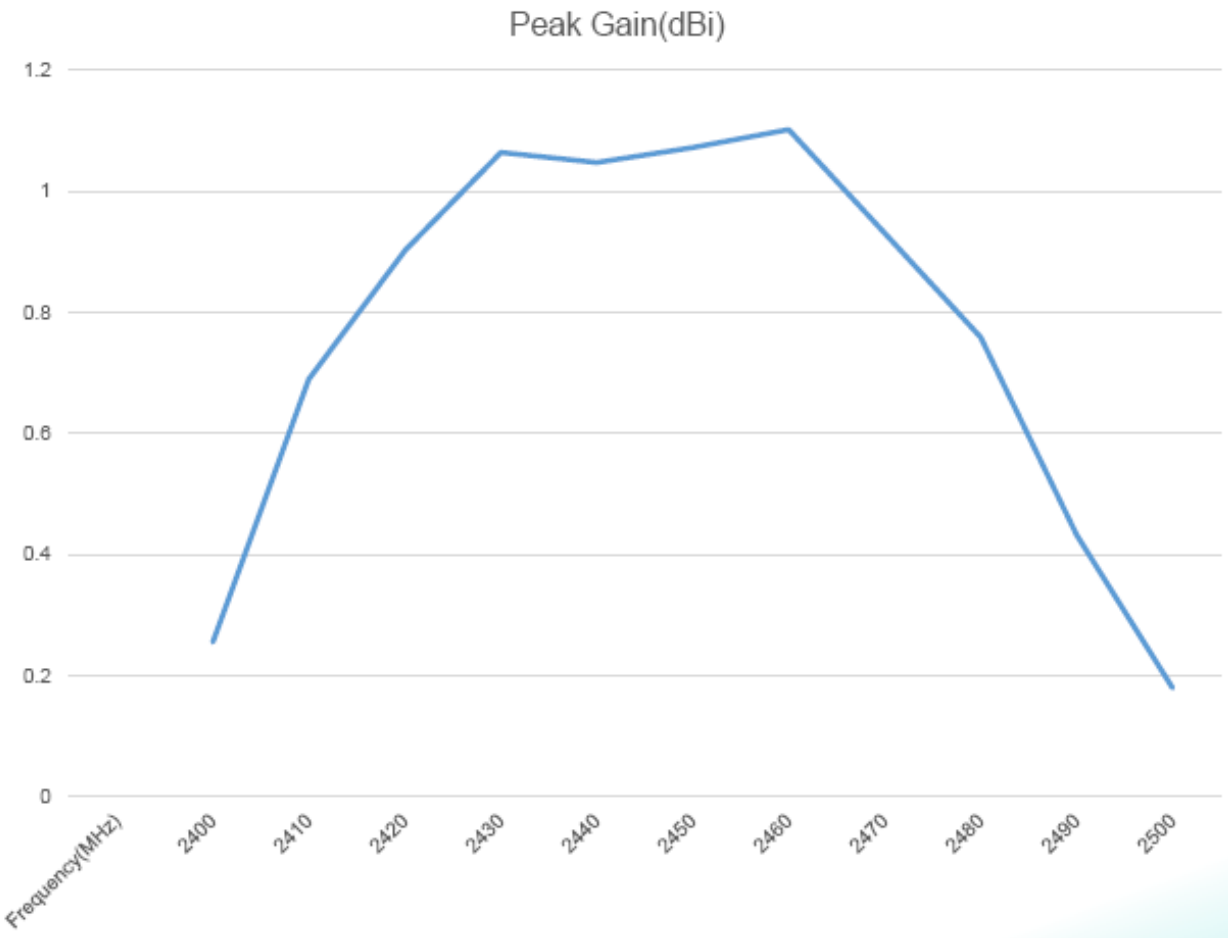
CHARTS

Peak Gain(dBi)



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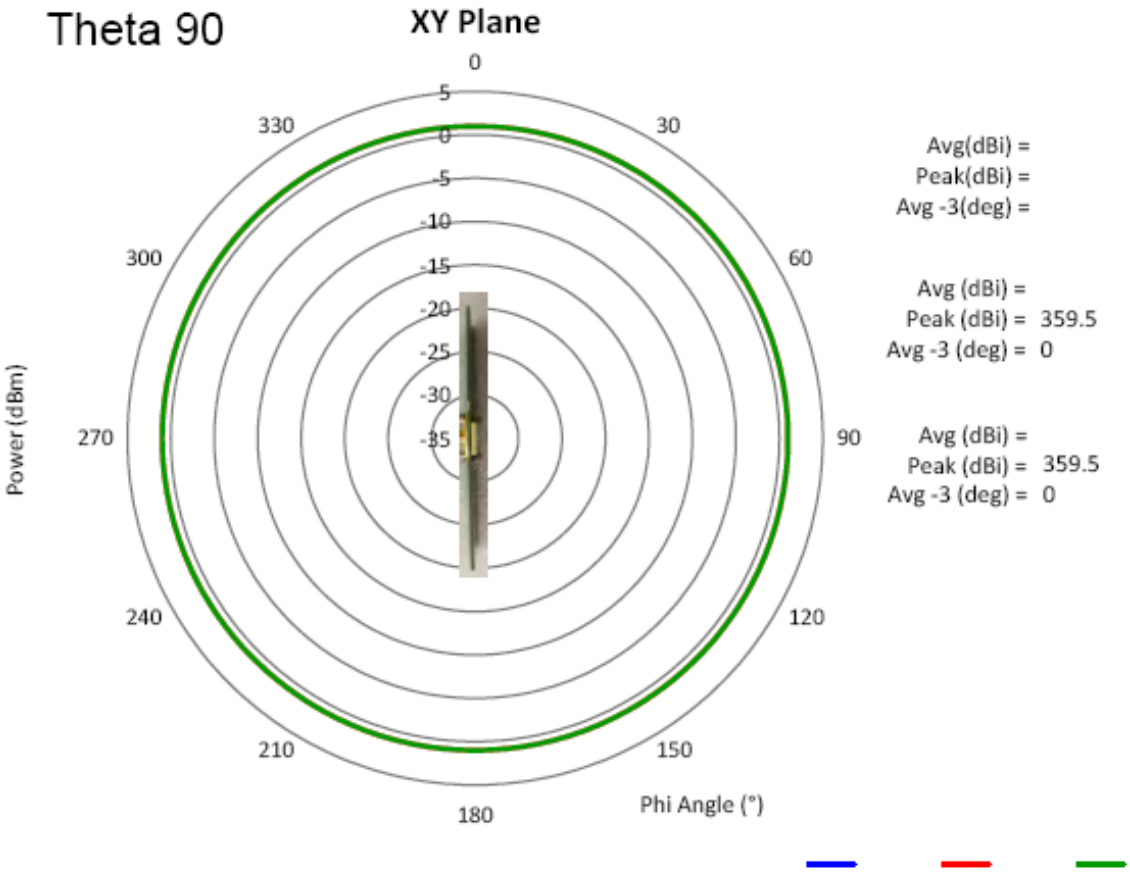
CHARTS

Free Space Radiation Pattern



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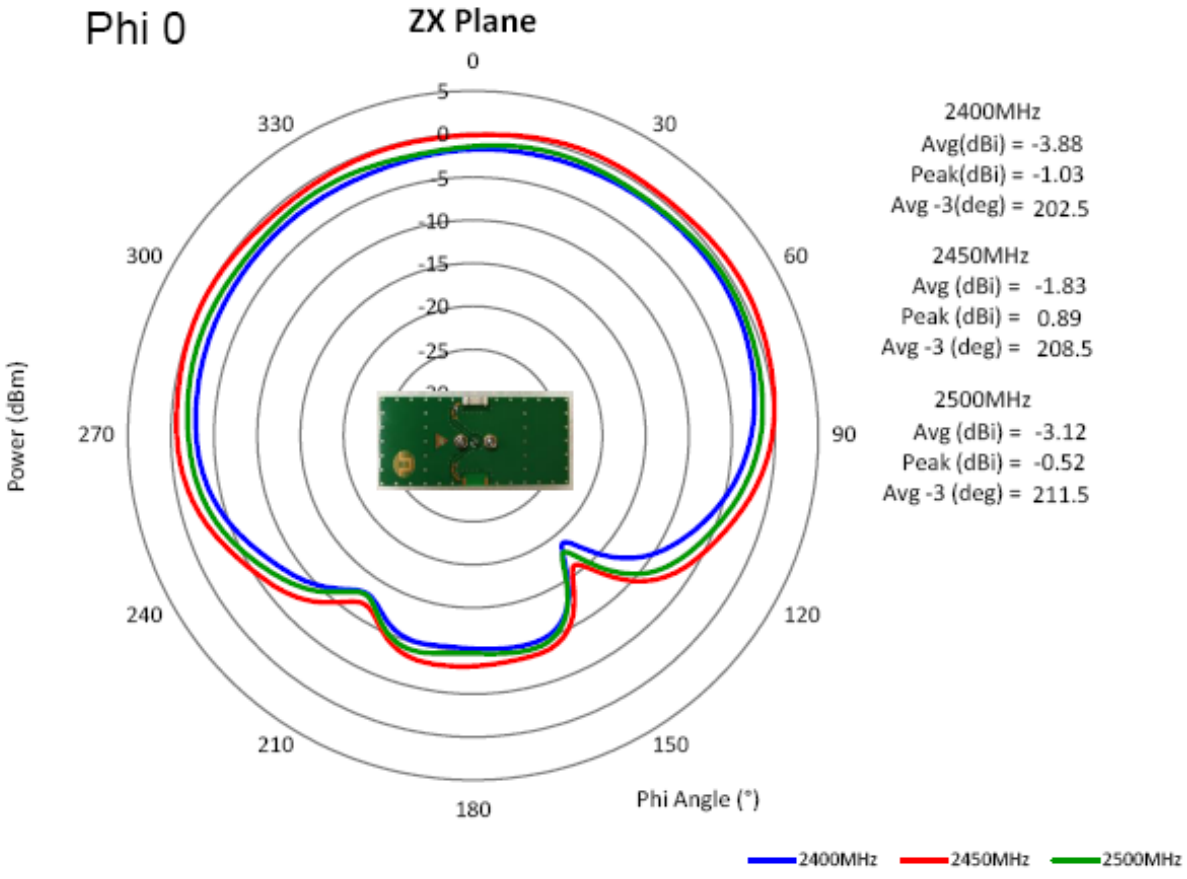
CHARTS

Free Space Radiation Pattern



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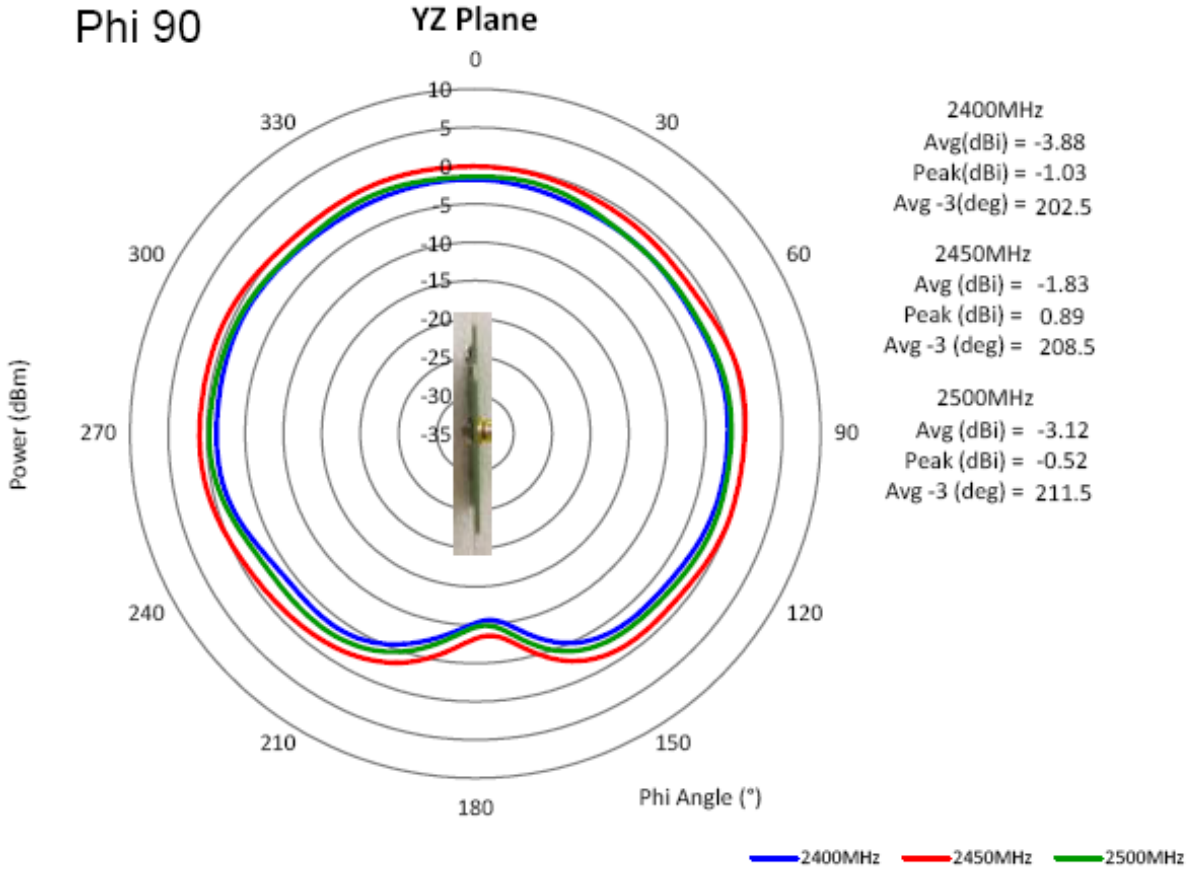
CHARTS

Free Space Radiation Pattern



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PACKAGING

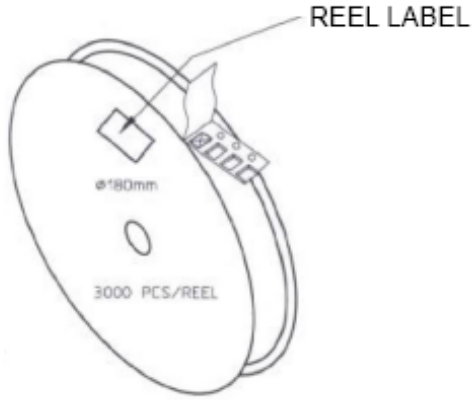
3000pcs antennas per 7" reel

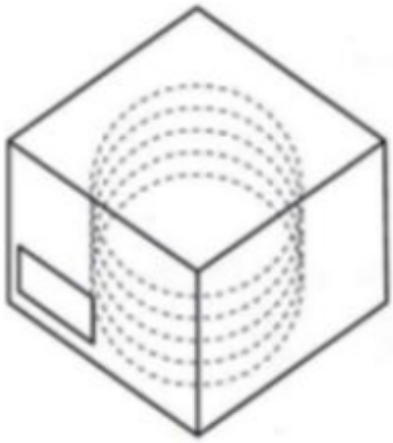
5pcs 7" reel per inner package box

2pcs inner box per out box

Total 30000pcs antenna per out box

Out box size: 390mmx215mmx165mm





According to MSL3 packing requirement, MBB-Moisture Barrel Bag, Desiccant, HIC-Humidity Indicator Card, MSID Label, Caution Label are required.

Antenna Information