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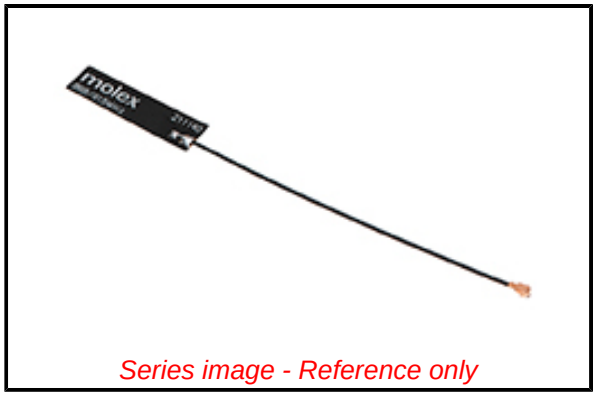
Part Number: 2111400100

Status: Active

Overview: Industrial, Scientific and Medical (ISM) Antennas

Description: ISM 868/915MHz Flexible Antenna, 100.00mm Cable Length, Compatible with U.FL / I-PEX MHF Connectors



Series image - Reference only

Documents:

- 3D Model
- 3D Model (PDF)
- Drawing (PDF)
- Product Specification 2111400100-001 (PDF)
- Application Specification 2111400100-000 (PDF)
- Packaging Specification 2111400100-001 (PDF)
- Datasheet (PDF)
- RoHS Certificate of Compliance (PDF)

General

Product Family	Antennas
Series	211140
Component Type	Flexible Antenna with Cable
Function	Signal
Overview	Industrial, Scientific and Medical (ISM) Antennas
Product Name	ISM 868/915 MHz Stand Alone
Protocol	LoRa, Neul, SigFox, Z-Wave, Zigbee
Taxonomy	Antennas
Type	ISM Antenna, LPWAN
UPC	191130157419

Physical

Cable Length	100.00mm
Length	38.00mm
Mounting Style	Adhesive
Net Weight	0.626/g
Packaging Type	PET Film
Polarization	Linear
Radiation Pattern	Omnidirectional
Thickness	0.10mm
Width	10.00mm

Electrical

Band#1 F_End (MHz)	870
Band#1 F_Start (MHz)	868
Band#2 F_End (MHz)	928
Band#2 F_Start (MHz)	902
Electrical Connectivity	Cable
Peak Gain (dBi)	0.3 @ 868 MHz, 1.0 @ 902 MHz
Return Loss - S11 (dB)	< -5
Total Efficiency	>55% @ 868 MHz, >60% @ 902 MHz

Material Info

Reference - Drawing Numbers

Application Specification	2111400100-000
Packaging Specification	2111400100-001
Product Specification	2111400100-001
Sales Drawing	2111400100-000

EU ELV
Not Relevant

EU RoHS
Compliant

China RoHS

REACH SVHC
Not Contained Per - D(2022)4187-DC (10 June 2022)

Halogen-Free Status
Low-Halogen

For more information, please visit Contact US

China ROHS	Green Image
ELV	Not Relevant
RoHS Phthalates	Not Contained

Search Parts in this Series
211140 Series

Mates With
734120110 Microcoaxial RF, 50 Ohm

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TITLE

868/915MHZ FLEXIBLE ANTENNA

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868/915 MHZ FLEXIBLE ANTENNA

1.0 SCOPE

This Product Specification covers the mechanical, electrical and environmental performances specification for 868/915 MHz Flexible Antenna.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBER (S)

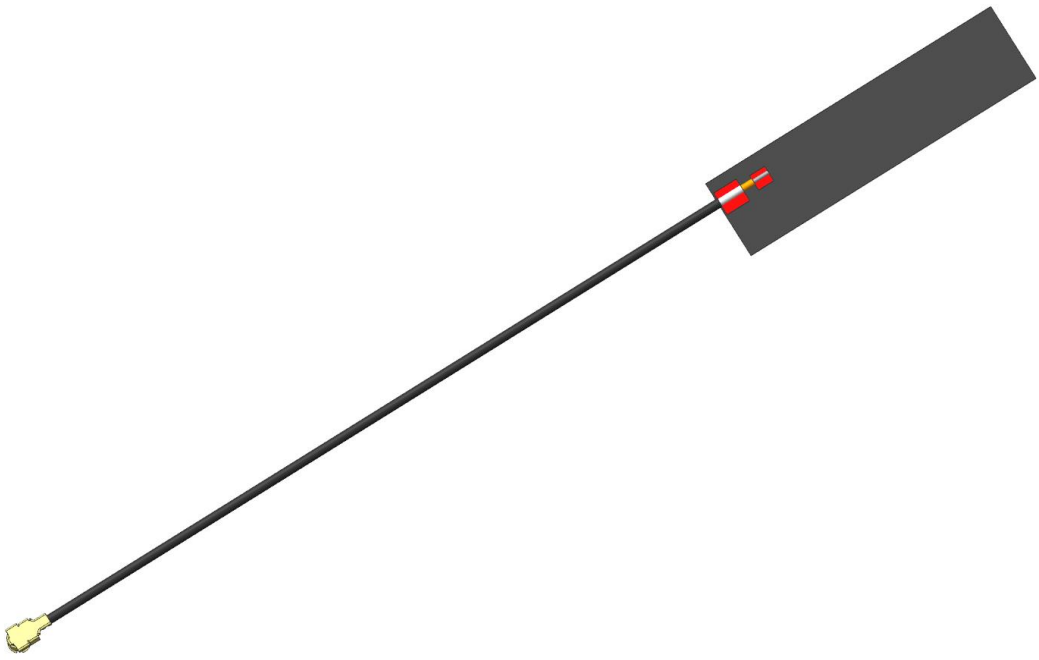
Product name: 868/915MHz Flexible Antenna
Series Number: 211140*

2.2 DESCRIPTION

211140 is a monopole flexible antenna for ISM 868/915MHz dual band. Antenna size 38x10x0.1mm is made from flexible polymer material, cable standard length 100mm. It can be easily installed by simply “peel and stick” on non-metal surface.

2.3 FEATURES

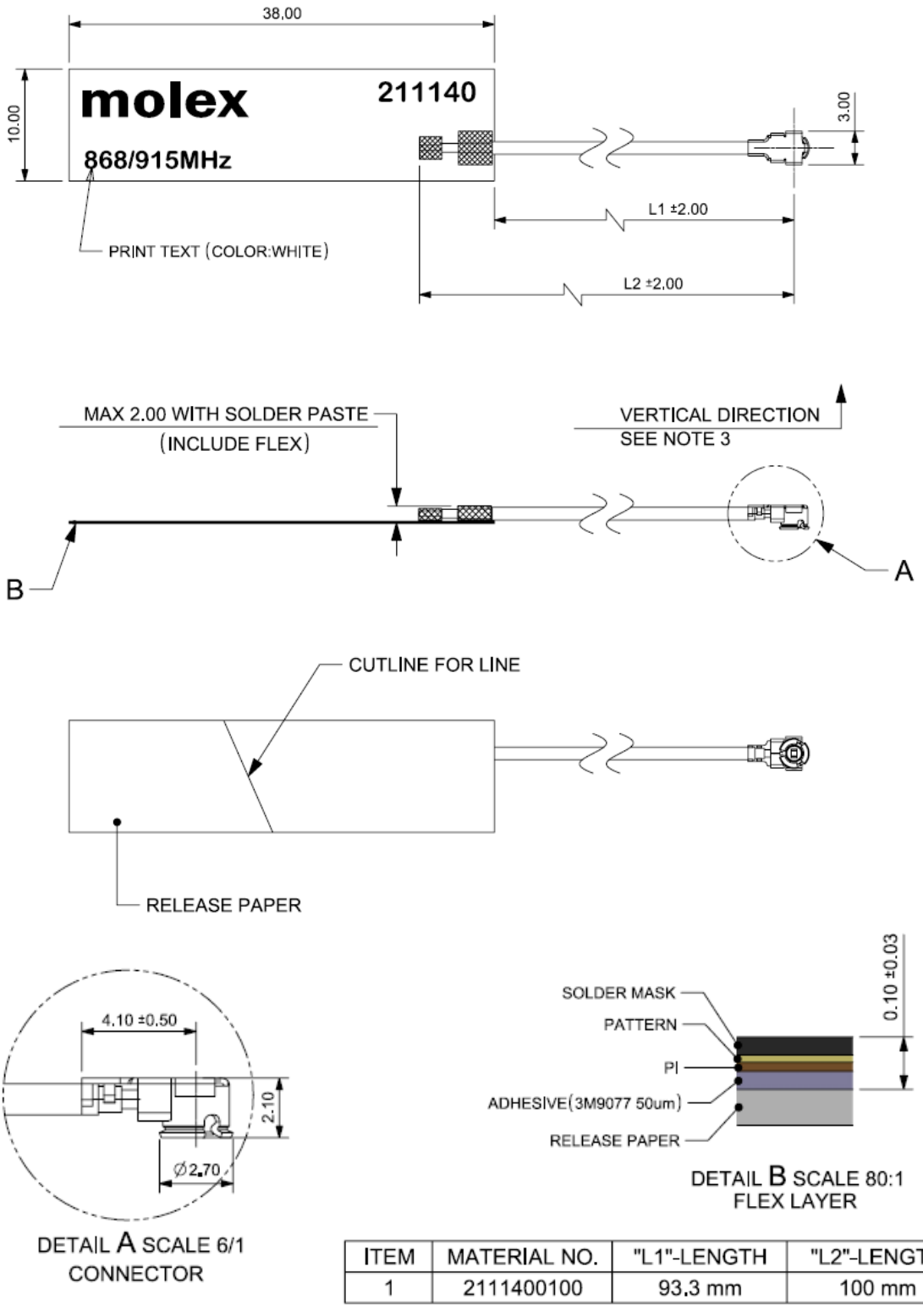
- ISM 868/915MHz dual band
- Antenna size 38x10x0.1mm
- IPEX MHF (U.FL compatible) connector
- Cable OD1.13mm, standard length options for 100 mm
- Cable and connector can be customized
- RoHS Compliant



Molex 2111400100 868/915 MHz FLEXIBLE ANTENNA MODULE 3D VIEW

2.4 PRODUCT STRUCTURE INFORMATION

P/N	2111400100



ITEM	MATERIAL NO.	"L1"-LENGTH	"L2"-LENGTH
1	2111400100	93.3 mm	100 mm

Mechanical Structure Information for 2111400100

3.0 APPLICABLE DOCUMENTS

Document	Number	Description
Sale Drawing(SD)	SD-2111400100	Mechanical Dimension of the product
Application Guide(AS)	AS-2111400100	Antenna Application and surrounding
Packing Drawing(PK)	PK-2111400100	Product packaging specifications

4.0 GENERAL SPECIFICATION

Product name	868/915 MHz Flexible Antenna	
Part number	2111400100	
Frequency	868-870 MHz	902-928 MHz
Polarization	Linear	
Operating with matching	-40℃ to 85℃	
Storage with matching	-40℃ to 85℃	
RF Power	2 Watts	
Impedance with matching	50 Ohms	
Antenna type	Flex	
Connector type	U.FL (MHF compatible)	
User Implementation type	Adhesive 3M 9077	
Cable diameter	Ø1.13mm	
Single weight	0.626 g (P/N For 2111400100)	
Cable length	100 mm (P/N for 2111400100)	

5.0 ANTENNA SPECIFICATION.

5.1 ELECTRICAL REQUIREMENT

5.1.1 ELECTRICAL REQUIREMENTS FOR CABLE LENGHTH 100mm		
P/N	2111400100	
Frequency Range	868-870MHz	902-928MHz
Peak Gain(Max)	0.3dBi	1.0dBi
Average Total efficiency	>55%	>60%
Return Loss	< -5 dB	

Note that the above antenna performance is measured with just the antenna mounted on a PC/ABS block to similar a free-space condition. When implement into the system, the frequency resonant might be off-tune due to the loading of surrounding components especially metal plane. This off-tune can be compensated through matching. Although module manufacturers specify a peak gain limit, it is based on free-space conditions. The peak gain will be degraded by 1 to 2dBi in the actual implementation as the radiation pattern will change due to the surround components. As such, during selection of antenna, you can select one with high peak gain to compensate for the loss. Molex can offer assistant to choose the best location and best tuning in-order to meet this peak gain requirement.

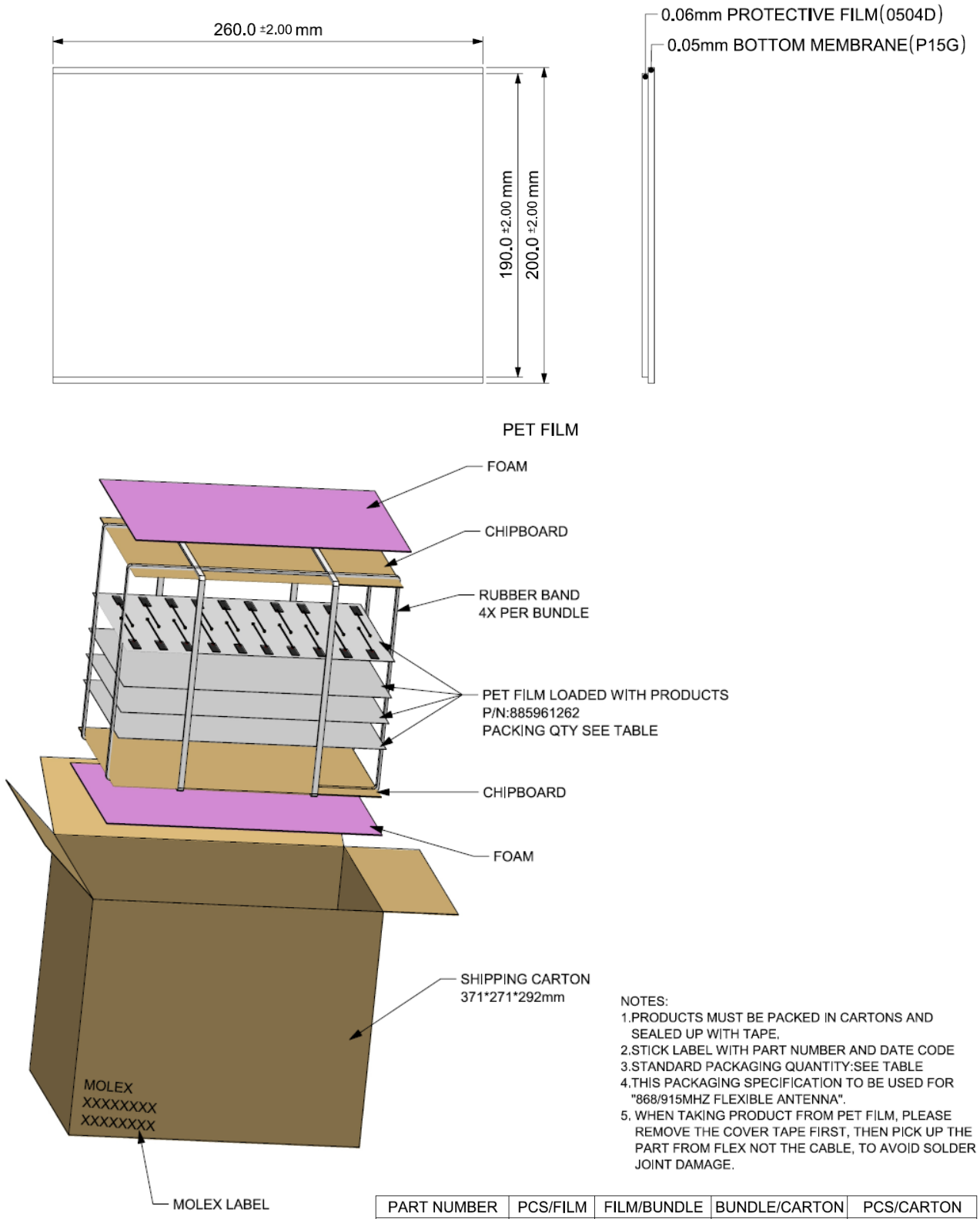
6.0 MECHANICAL SPECIFICATION

DESCRIPTION	TEST CONDITION	TEST RESULT
Pull Test	1. Test machine: Max intelligent load tester 2. Stick the flex antenna on a plastic board, pull cable in axial direction.	Pull force >8N
Un-mating force (connector)	Solder the receptacle connector to the test board ,then place the board and plug on push-on/pull-off machine, and repeat mating and un-mating 30 cycles at a speed 25±3mm/min. along the mating axis.	Un-mating force : 0.5 kgf min

7.0 ENVIRONMENTAL SPECIFICATION

DESCRIPTION	SPECIFICATION
Temperature /Humidity cycling	1.The device under test is kept for 30 mins in an environment with a temperature of -40 ℃. 2. Kept for 4 Hours in an environment with a temperature of 85 degrees and a relative humidity of 95%. 3. Kept for 2 Hours in an environment with a temperature of 125 degrees and a relative humidity of 95%. 4. The cycle is repeated until a total of 40 cycles have been completed. Hereafter the conditions are stabilized at room temperature. Transfer temperature 8℃ per min. 5. Parts should meet RF spec before and after test. 6. No cosmetic problem (No soldering problem; No adhesion problem of glue.)
Temperature Shock	1.The device under test at -40 ℃⇔125 ℃ by 100 cycles, Dwell of 30 mins, transition time between Dwell 30 secs (~ 61 mins / cycle) and each item should be measured after exposing them in normal temperature and humidity for 24 h. 2. Parts should meet RF spec before and after test. 3. No cosmetic problem（No soldering problem；No adhesion problem of glue）.
High Temperature	1.Temperature:125℃, time:1008 hours 2.There is no substantial obstruction to air flow across and around the samples, and the samples are not touching each other 3. Parts should meet RF spec before and after test. 4. No cosmetic problem（No soldering problem；No adhesion problem of glue）.
Salt mist test	1. The device under test is exposed to a spray of a 5% (by volume) resolution of NACL in water for 2 hours. Thereafter the device under test is left for 1 week in room temperature at a relative humidity of 95%. The cycle is repeated until a total of 2 cycles have been completed. Here after the conditions are stabilized at room temperature. 2. Parts should meet RF spec before and after test. 3. No visible corrosion. Discoloration accept.

8.0 PACKING



NOTES:
1.PRODUCTS MUST BE PACKED IN CARTONS AND SEALED UP WITH TAPE.
2.STICK LABEL WITH PART NUMBER AND DATE CODE
3.STANDARD PACKAGING QUANTITY:SEE TABLE
4.THIS PACKAGING SPECIFICATION TO BE USED FOR "868/915MHZ FLEXIBLE ANTENNA".
5. WHEN TAKING PRODUCT FROM PET FILM, PLEASE REMOVE THE COVER TAPE FIRST, THEN PICK UP THE PART FROM FLEX NOT THE CABLE, TO AVOID SOLDER JOINT DAMAGE.

PART NUMBER	PCS/FILM	FILM/BUNDLE	BUNDLE/CARTON	PCS/CARTON
2111400100	20	40	4	3200PCS

PACKAGING INFORMATION FOR 2111400100

868/915MHZ FLEXIBLE ANTENNA

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868/915MHZ FLEXIBLE ANTENNA

1.0 SCOPE

This specification describes the antenna application and surrounding. The information in this document is for reference and benchmark purposes only. The user is responsible for validating antenna rf performance based on the user's actual implementation.

Antenna illustrations in this document are generic representations. They are not intended to be an image of any antenna listed in the scope.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBER (S)

Product name: 868/915MHz Flexible Antenna

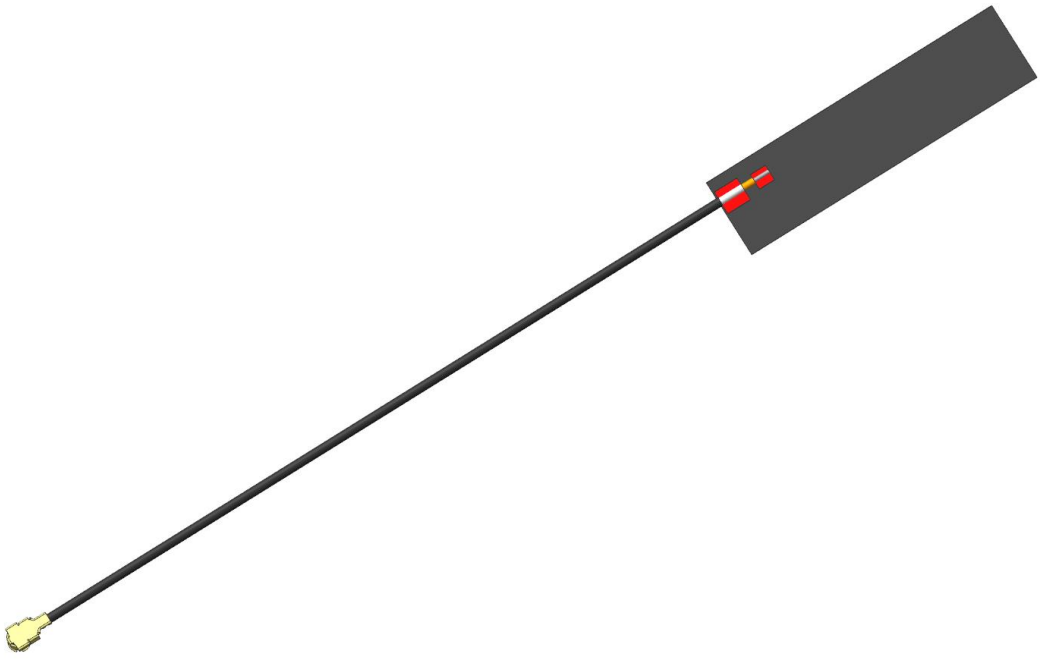
Series Number: 211140

2.2 DESCRIPTION

211140 is a monopole flexible antenna for ISM 868/915MHz dual band. Antenna size 38x10x0.1mm is made from flexible polymer material, cable standard length 100mm. It can be easily installed by simply "peel and stick" on non-metal surface.

2.3 PRODUCT STRUCTURE INFORMATION

Please refer to PS-2111400100 for full information.



Molex 2111400100 868/915MHz Flexible Antenna 3D View

3.0 APPLICABLE DOCUMENTS

DOCUMENT	NUMBER	DESCRIPTION
Sale Drawing(SD)	SD-2111400100	Mechanical Dimension of the product
Product Specification (PS)	PS-2111400100	Product Specification
Packing Drawing(PK)	PK-2111400100	Product packaging specifications

4.0 ANTENNA PERFORMANCE

4.1 RF TEST CONDITIONS

All measurements are done of the antenna mounted on a PC/ABS material block of 1.5mm thickness with VNA Agilent 5071C and Over-The-Air (OTA) chamber. All measurements in this document are done with the part no.2111400100 with a cable length of 100mm.

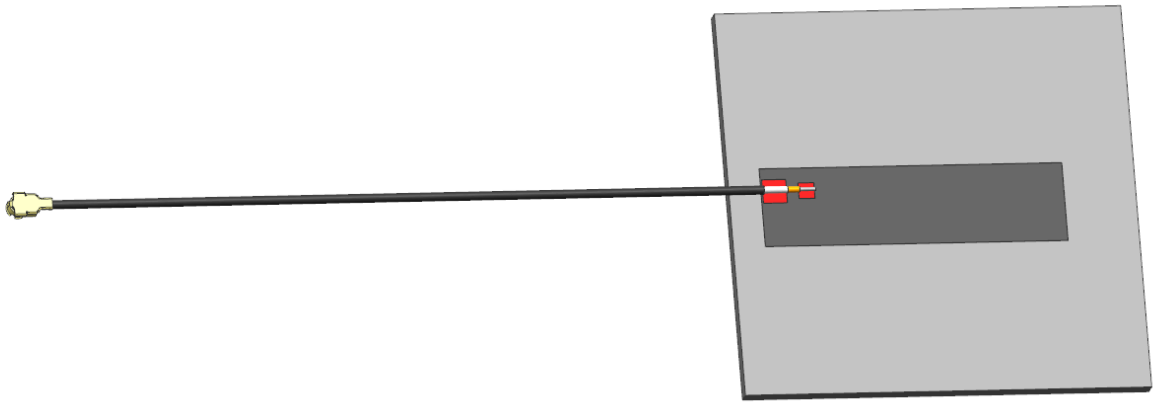


FIGURE4.1.1 ANTENNA LOADED WITH PC/ABS BLOCK OF 1.5 MM THICKNESS

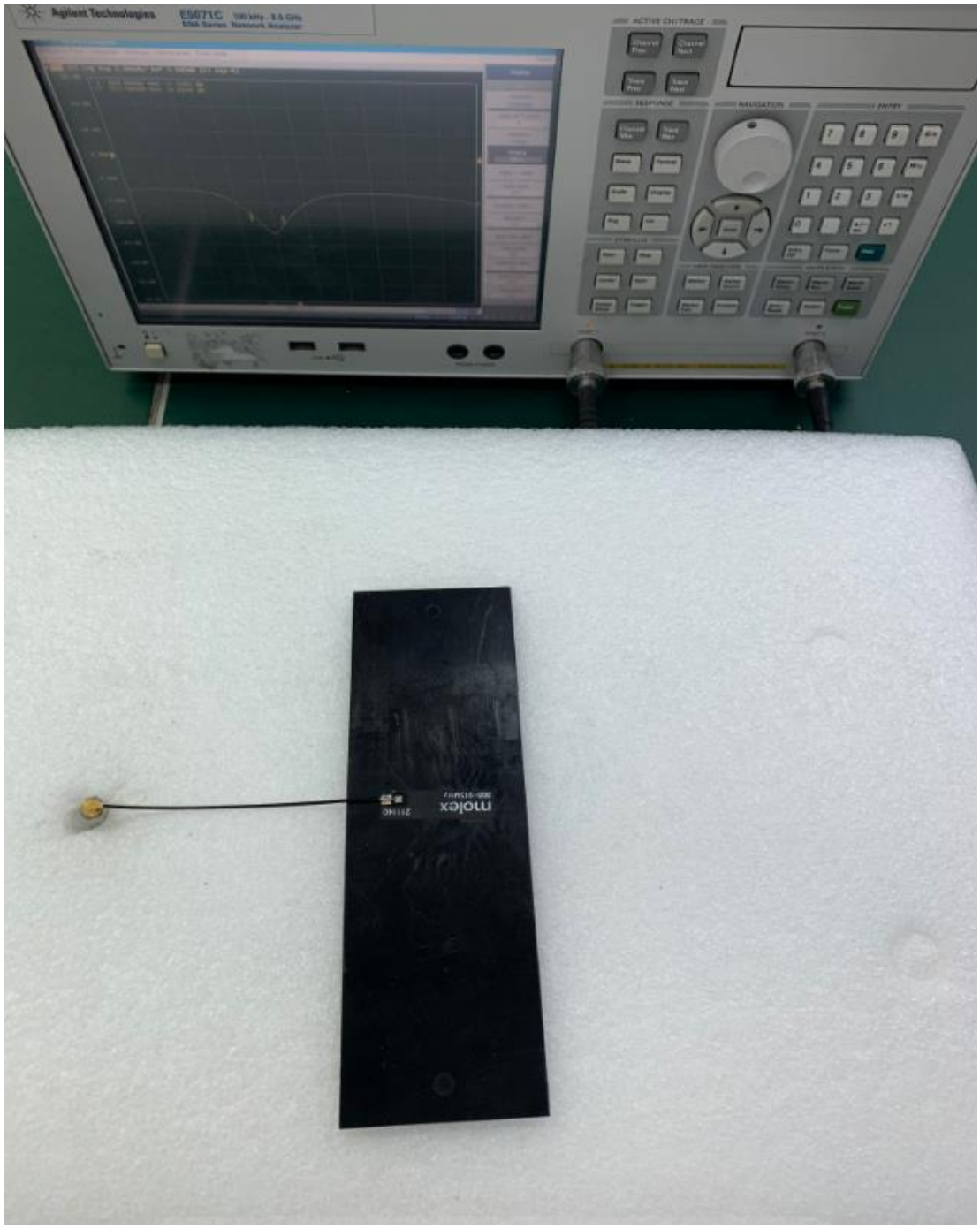


FIGURE4.1.2 ANTENNA LOADED WITH PC/ABS BLOCK OF 1.5 MM THICKNESS WITH VNA

FIGURE4.1.3 ANTENNA LOADED WITH PC/ABS BLOCK OF 1.5 MM THICKNESS WITH OTA CHAMBER

4.2 ANTENNA PERFORMANCE

DESCRIPTION	EQUIPMENT	REQUIREMENT	
Frequency Range	VNA E5071C	868-870MHz	902-928MHz
Return Loss	VNA E5071C	<- 5dB	
Peak Gain (Max)	OTA Chamber	0.3dBi	1.0dBi
Average Total Efficiency	OTA Chamber	>55%	>60%
Polarization	OTA Chamber	Linear	
Input Impedance	VNA E5071C	50 ohms	

Note that the above antenna performance is measured with just the antenna mounted on a PC/ABS block to similar a free-space condition. When implement into the system, the frequency resonant might be off-tune due to the loading of surrounding components especially metal plane. This off-tune can be compensated through matching. Although module manufacturers specify a peak gain limit, it is based on free-space conditions. The peak gain will be degraded by 1 to 2dBi in the actual implementation as the radiation pattern will change due to the surround components. As such, during selection of antenna, you can select one with high peak gain to compensate for the loss. Molex can offer assistant to choose the best location and best tuning in-order to meet this peak gain requirement.

4.3 RETURN LOSS PLOT

All measurements in this document are done with a cable length of 100mm.

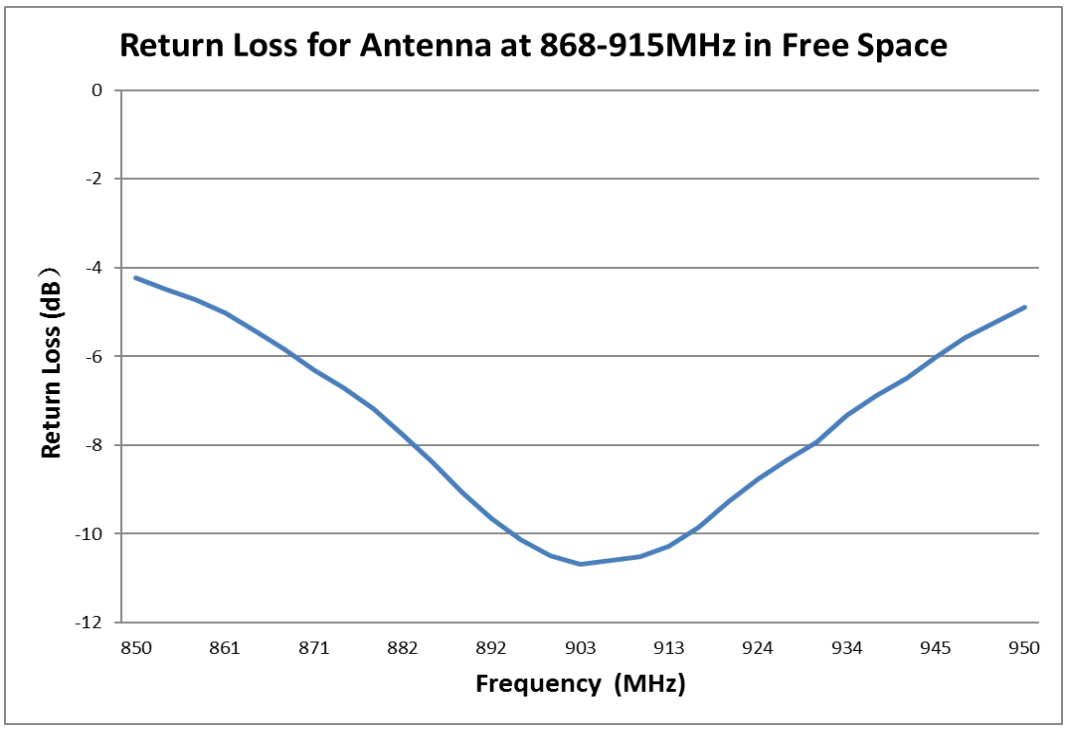


FIGURE 4.3.1 RETURN LOSS OF ANTENNA AT 868/915MHZ IN FREE SPACE

4.4 EFFICIENCY PLOT

All measurements in this document are done with a cable length of 100mm.

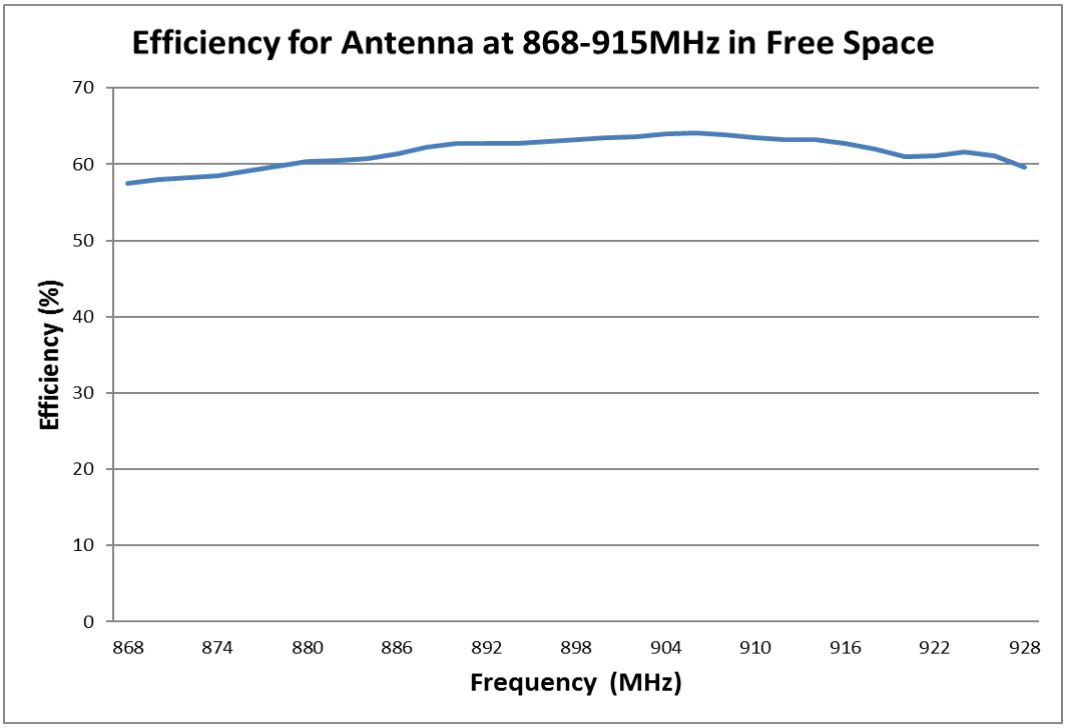
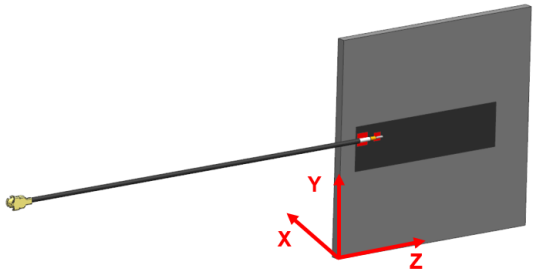
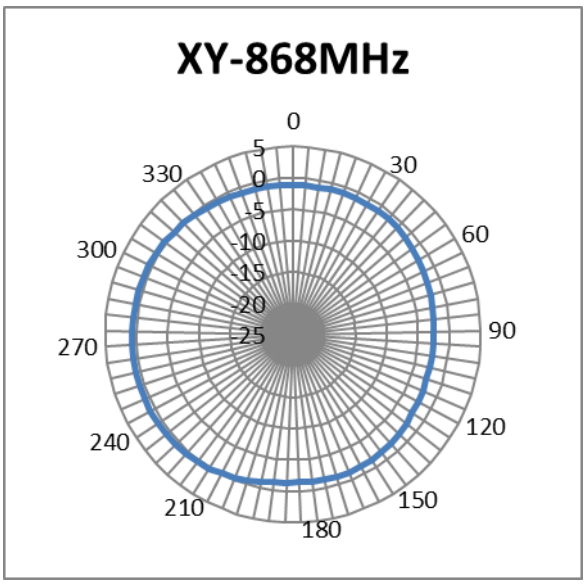


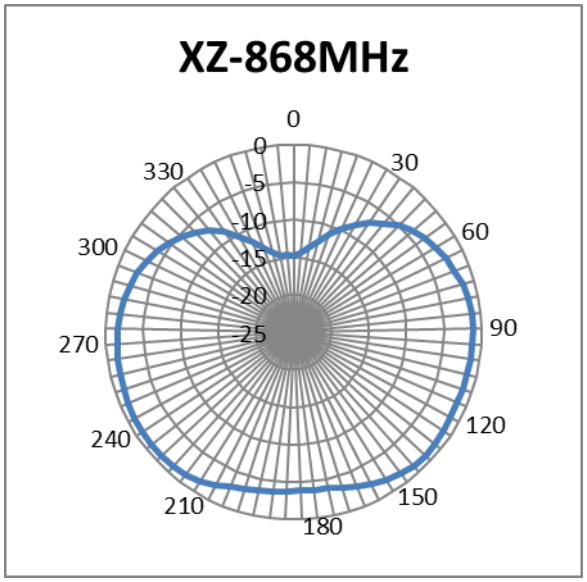
FIGURE 4.4.1 EFFICIENCY OF ANTENNA AT 868/915MHZ IN FREE SPACE

4.5 RADIATION PATTERN

All measurements in this document are done with a cable length of 100mm.







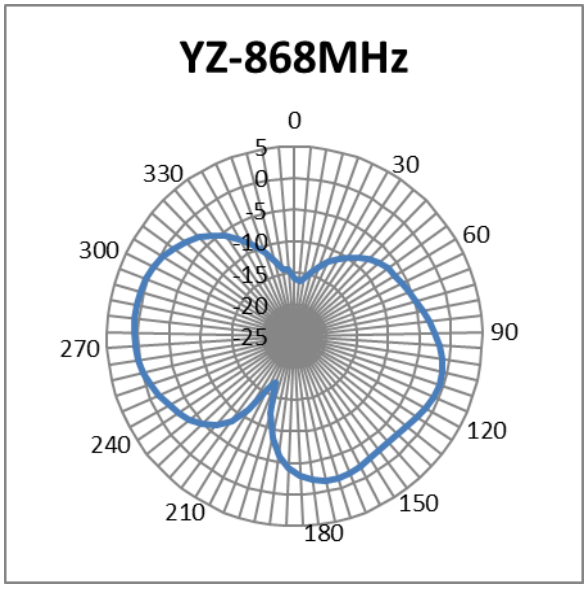
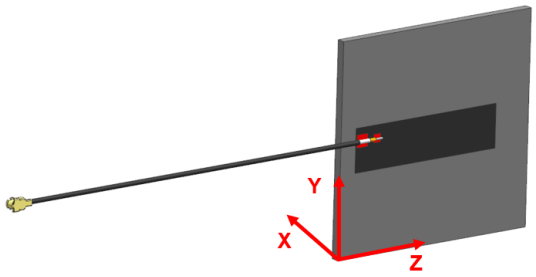
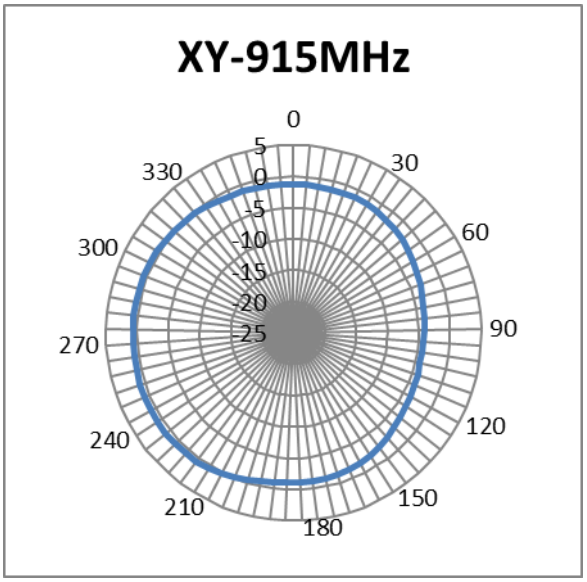
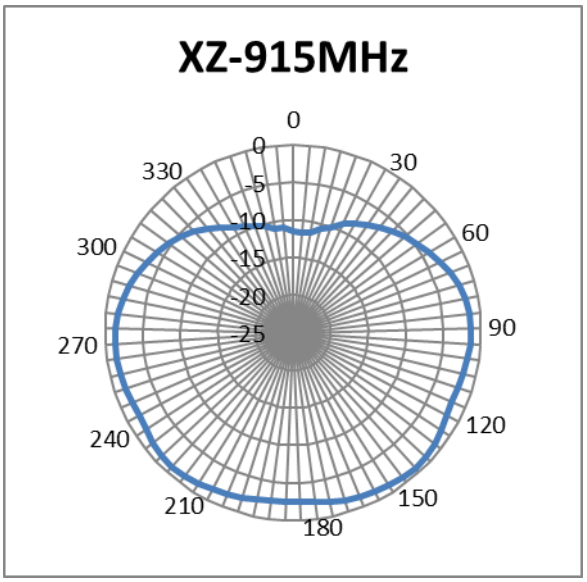


FIGURE 4.5.1 2D RADIATION PATTERN OF ANTENNA AT 868MHZ IN FREE SPACE







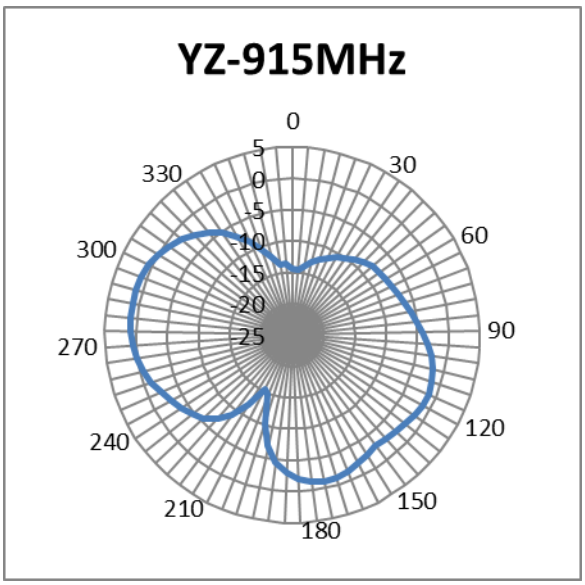


FIGURE 4.5.2 2D RADIATION PATTERN OF ANTENNA AT 915MHZ IN FREE SPACE

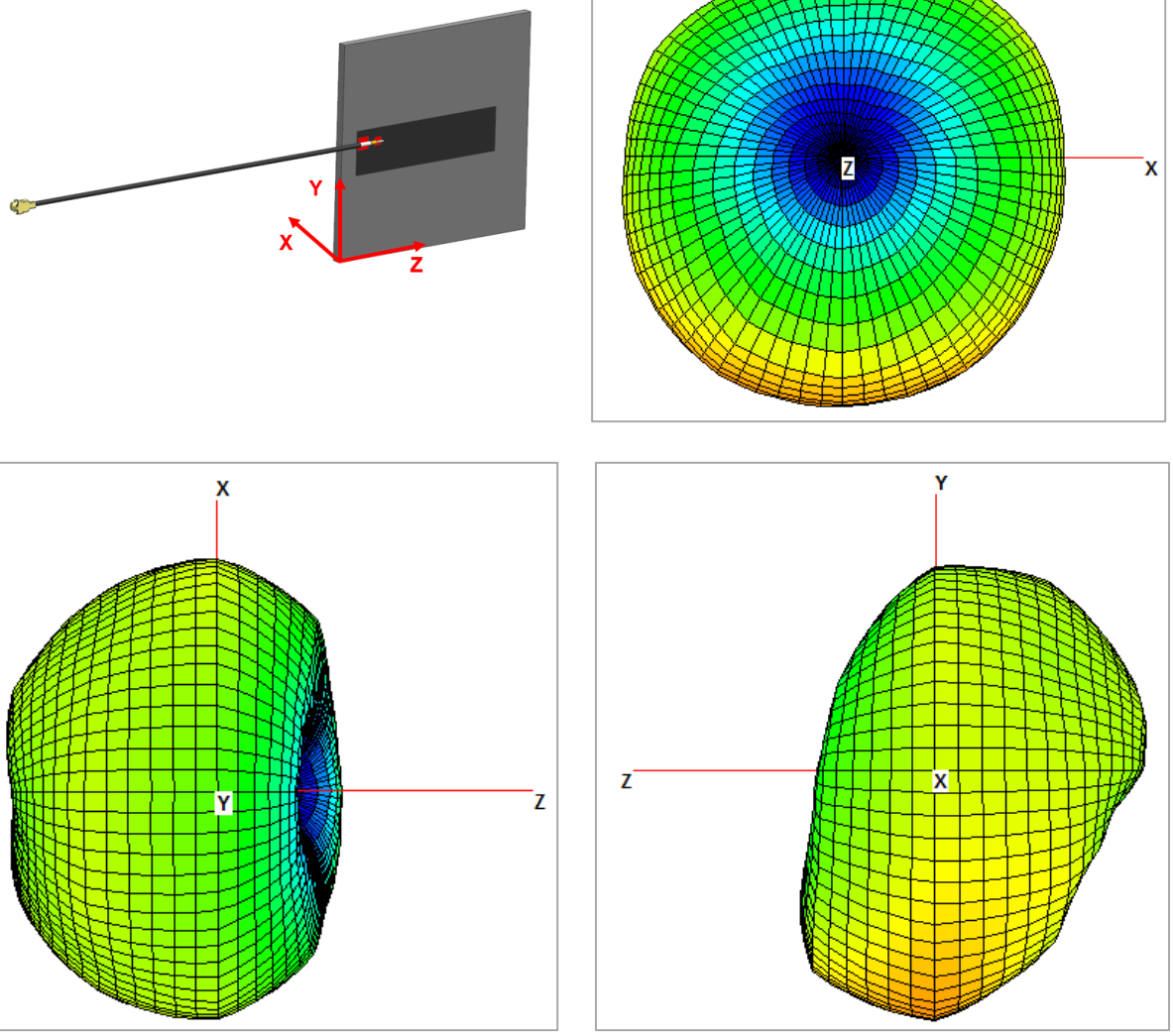


FIGURE 4.5.3 3D RADIATION PATTERN OF ANTENNA AT 868MHZ IN FREE SPACE

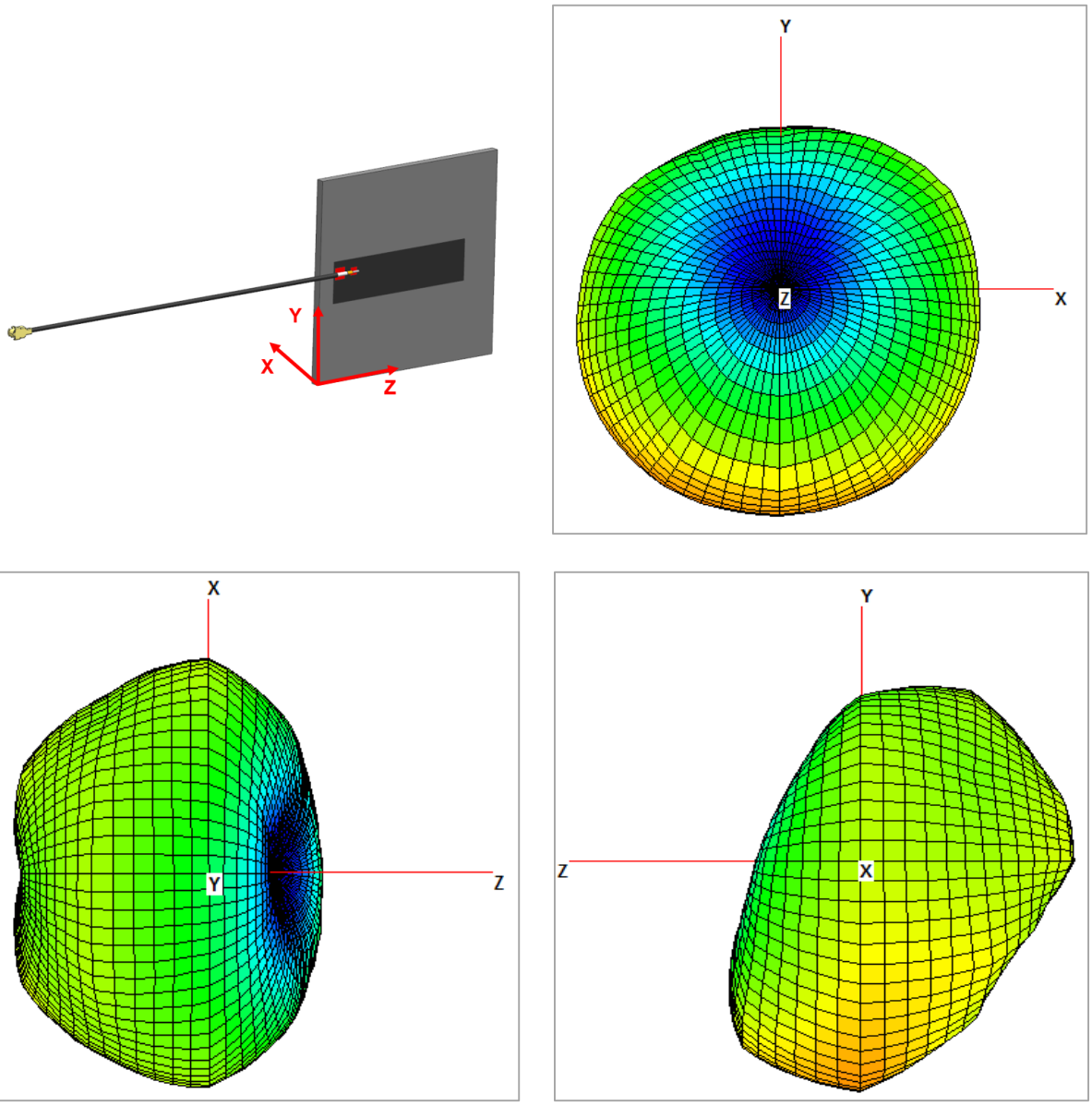


FIGURE 4.5.4 3D RADIATION PATTERN OF ANTENNA AT 915MHZ IN FREE SPACE

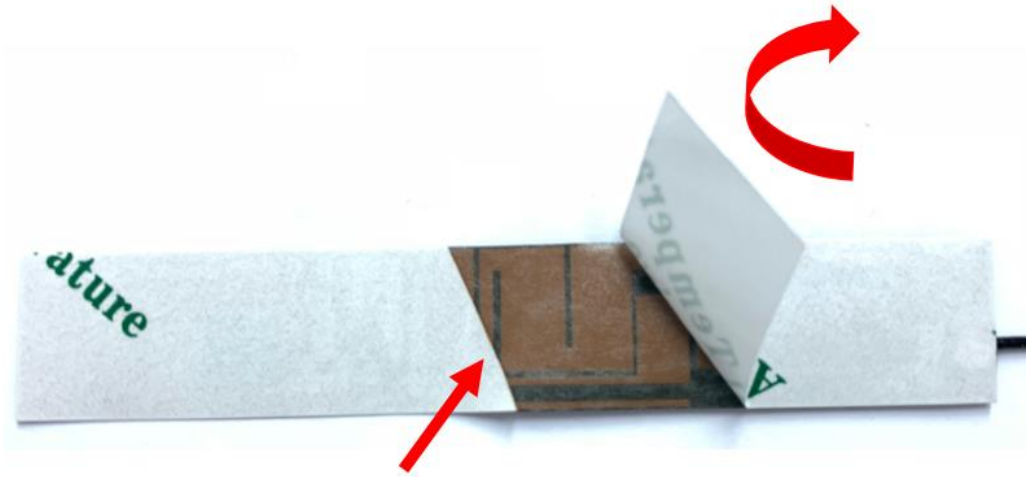
5.0 ASSEMBLY GUIDELINE

The flex antenna comes with an adhesive 3m9077 for assemble onto the plastic wall of the system. The surface should be smooth with ra<1.6um and need to clean the surface before sticking this product. The antenna cannot be placed on a metallic surface.

5.1 HOW TO TEAR FLEX RELEASE PAPER

1. **Find cut line on flex back side**

2. **Bend flex slight along cut line**



3. **Tear release paper**

5.2 CABLE BENDING

During the assembly of the antenna in a device, the cable needs to be positioned away from the antenna flex to achieve best performance. The cable must be away from the Flex edge at least 5mm as shown in figure 5.2.1. If the cable bends into the antenna flex, the antenna performance will be degraded.

FIGURE 5.2.1 CABLE BENDING

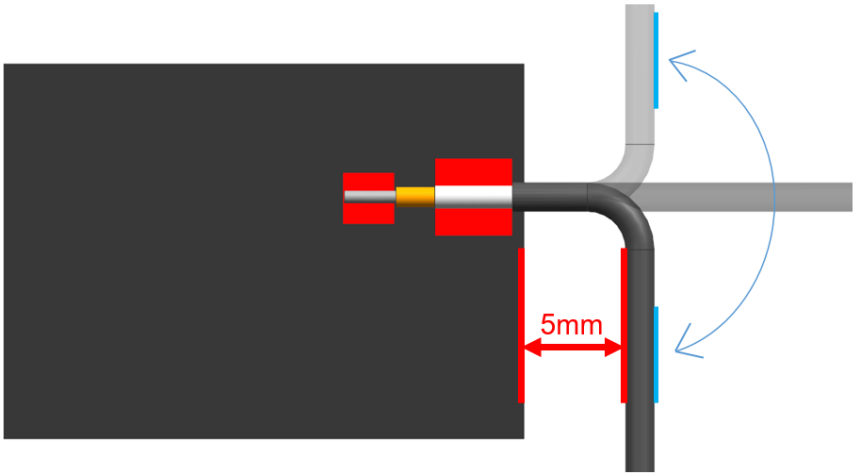


FIGURE 5.2.2 CABLE ACTIVITY RANGE

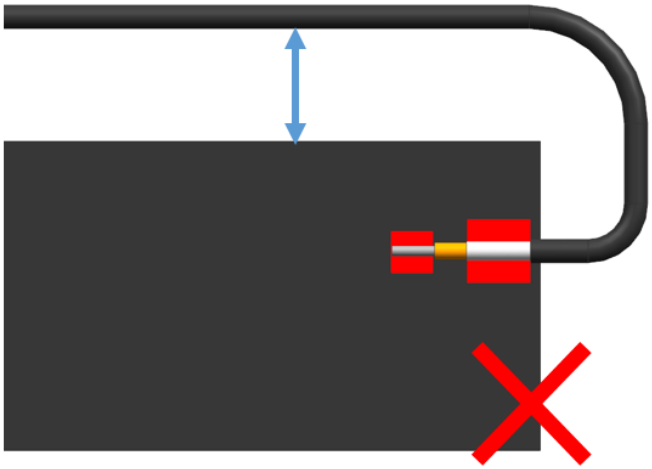


FIGURE 5.2.3 CABLE BENDING

6.0 RF PERFORMANCE AS A FUNCTION OF IMPLEMENTATION

6.1 ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT LOCATIONS WITH PARALLEL PLANE GROUND

Four locations with parallel plane ground have been evaluated and these locations are shown in figure 6.1.1. The plane ground size is 90mm*90mm and we move the plane ground to four locations for each test. The antenna performance is better with larger distance between antenna and parallel plane ground. The minimum distance between antenna and plane ground is recommended to be 5mm to achieve acceptable RF performance.

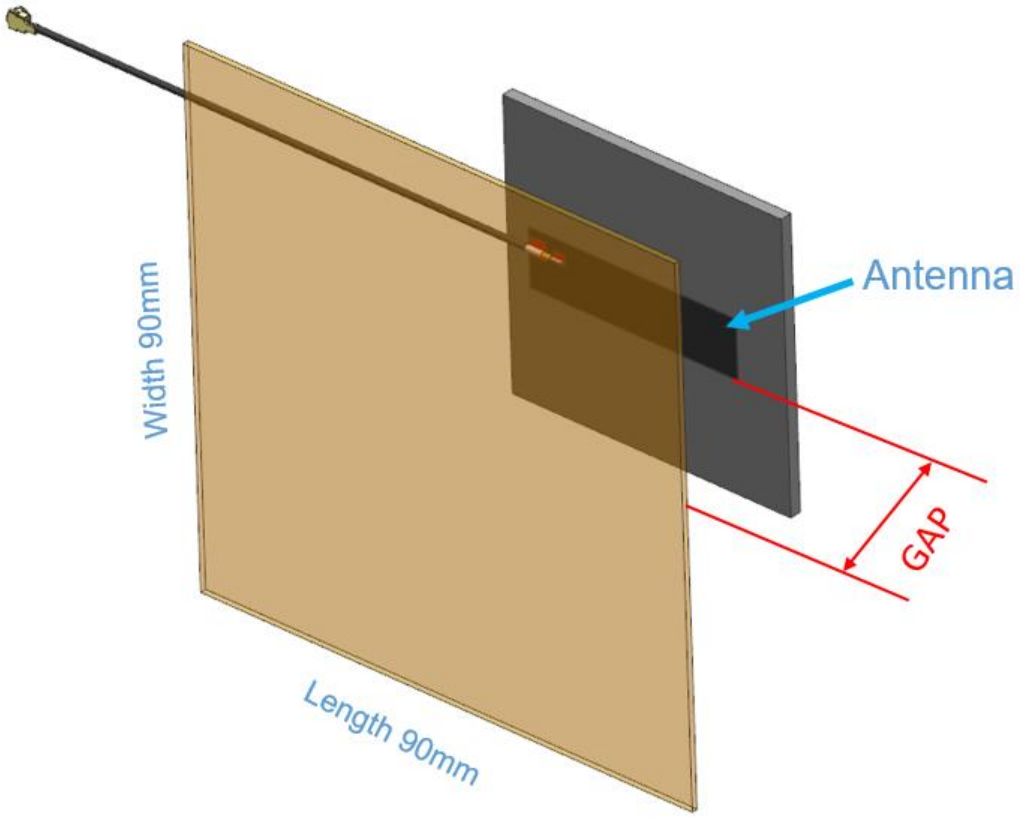


FIGURE 6.1.1 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

Ground Size: 90mm*90mm;
Location 1: Distance between antenna and plane (GAP) ground is about 5mm;
Location 2: Distance between antenna and plane (GAP) ground is about 10mm;
Location 3: Distance between antenna and plane (GAP) ground is about 15mm;
Location 4: Distance between antenna and plane (GAP) ground is about 20mm.

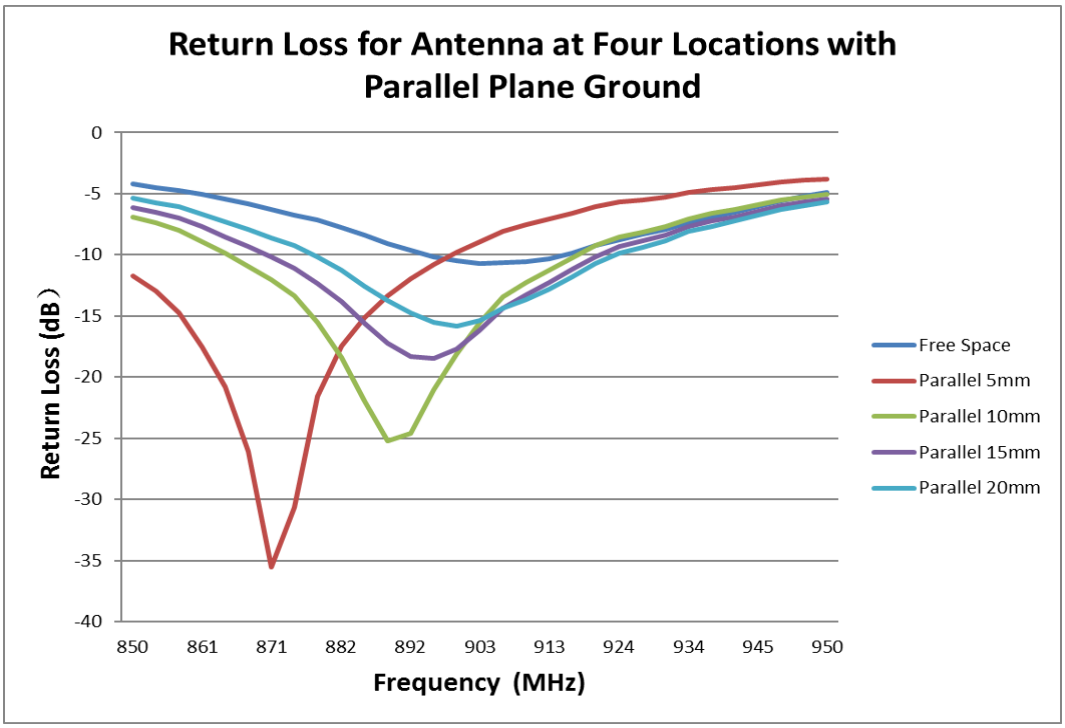


FIGURE 6.1.2 RETURN LOSS OF ANTENNA AT 868/915MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

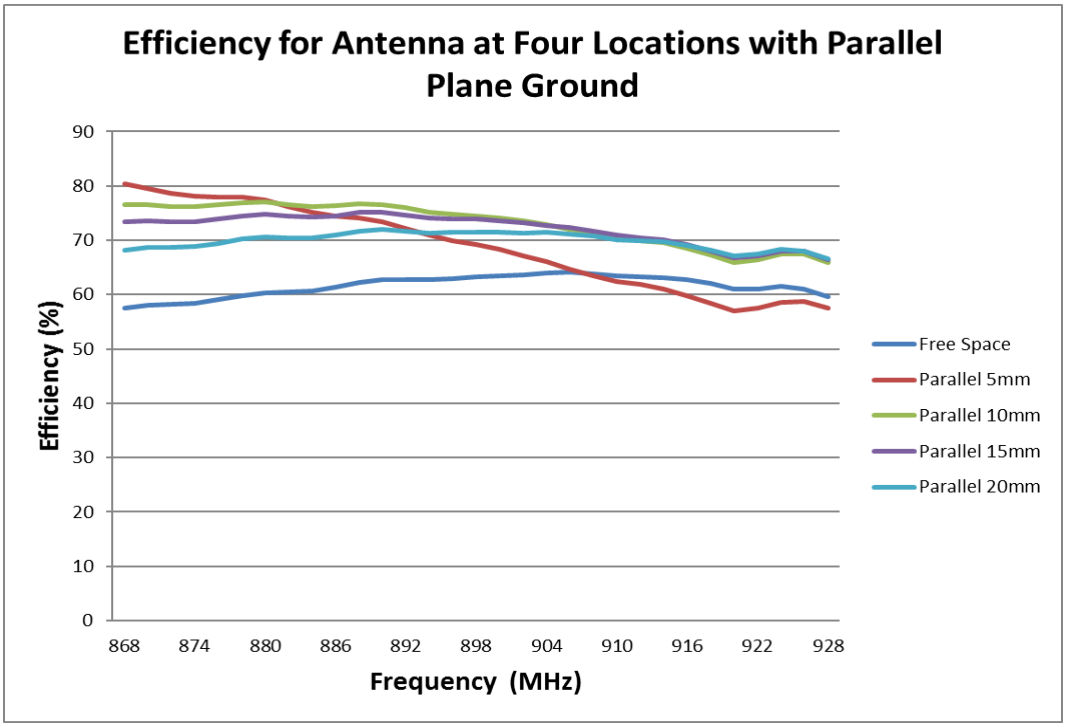


FIGURE 6.1.3 EFFICIENCY OF ANTENNA AT 868/915MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

6.2 ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT LOCATIONS WITH VERTICAL PLANE GROUND

Four locations with vertical plane ground have been evaluated and these locations are shown in figure 6.2.1. The plane ground size is 90mm*90mm and we move the plane ground to four locations for each test. The antenna performance is better with larger distance between antenna and vertical plane ground. The minimum distance between antenna and plane ground is recommended to be 5mm to achieve acceptable RF performance.

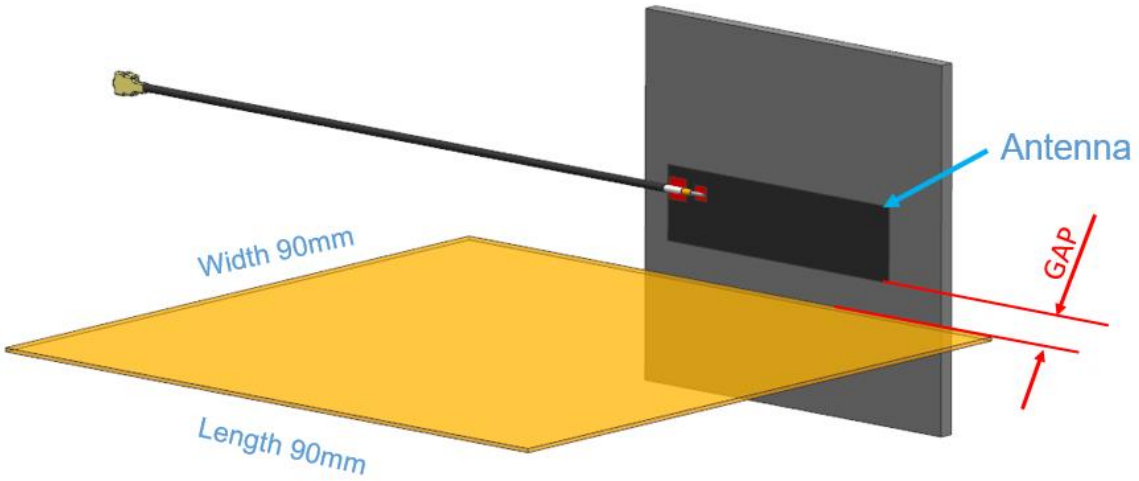


FIGURE 6.2.1 FOUR LOCATIONS WITH VERTICAL PLANE GROUND

Ground Size: 90mm*90mm;
Location 1: Distance between antenna and plane (GAP) ground is about 5mm;
Location 2: Distance between antenna and plane (GAP) ground is about 10mm;
Location 3: Distance between antenna and plane (GAP) ground is about 15mm;
Location 4: Distance between antenna and plane (GAP) ground is about 20mm.

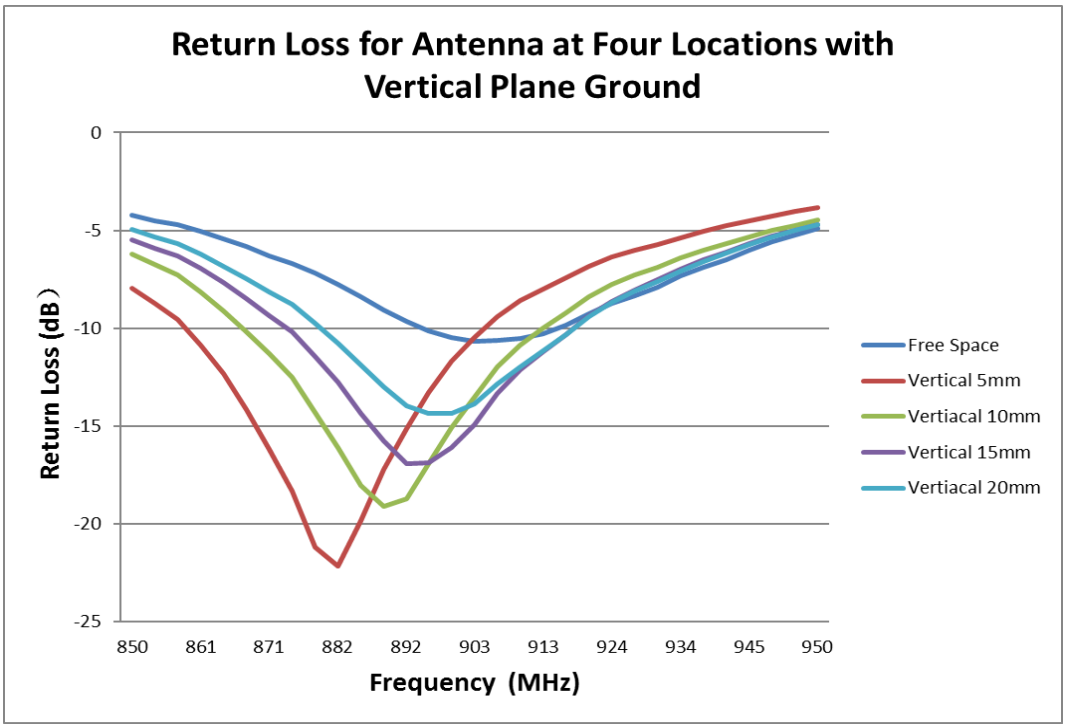


FIGURE 6.2.2 RETURN LOSS OF ANTENNA AT 868/915MHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

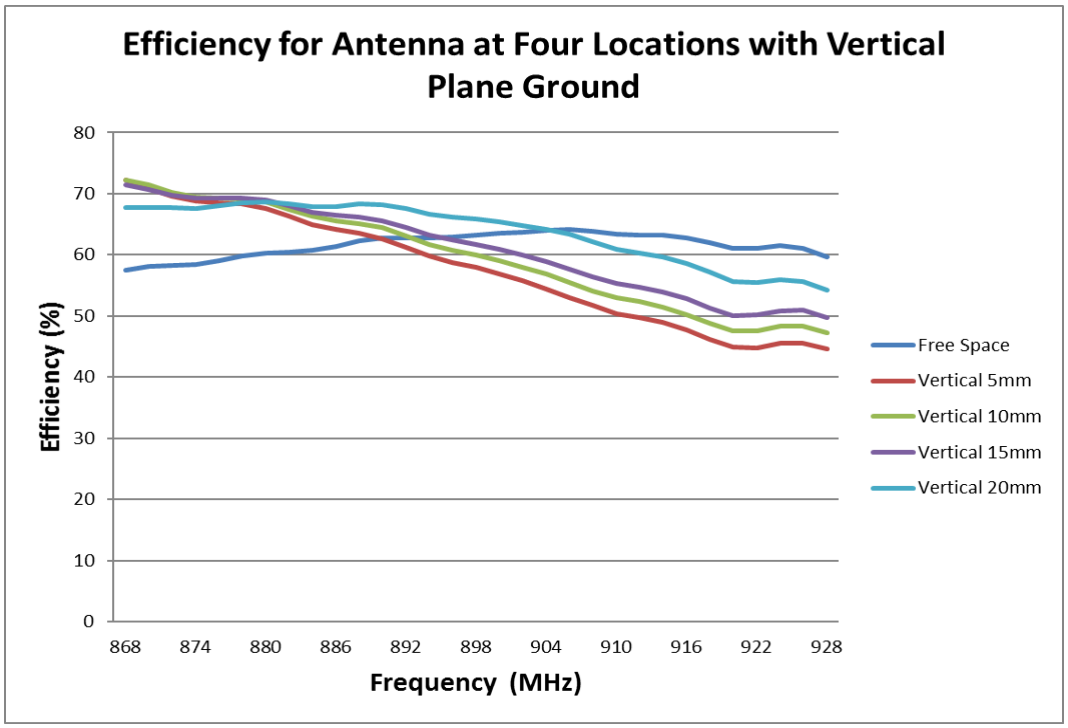


FIGURE 6.2.3 EFFICIENCY OF ANTENNA AT 868/915MHZ AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

6.3 ANTENNA RF PERFORMANCE AS A FUNCTION OF DIFFERENT DISTANCES WITH PARALLEL PLANE GROUND

Four locations with the parallel plane ground have been evaluated and these locations are shown in figure 6.3.1. The plane ground size is 90mm*90mm and we move the plane ground to four locations for each test. The antenna performance is better with larger distance between the antenna and the parallel plane ground. The minimum distance between the antenna and the plane ground is recommended to be 5mm to achieve acceptable RF performance.

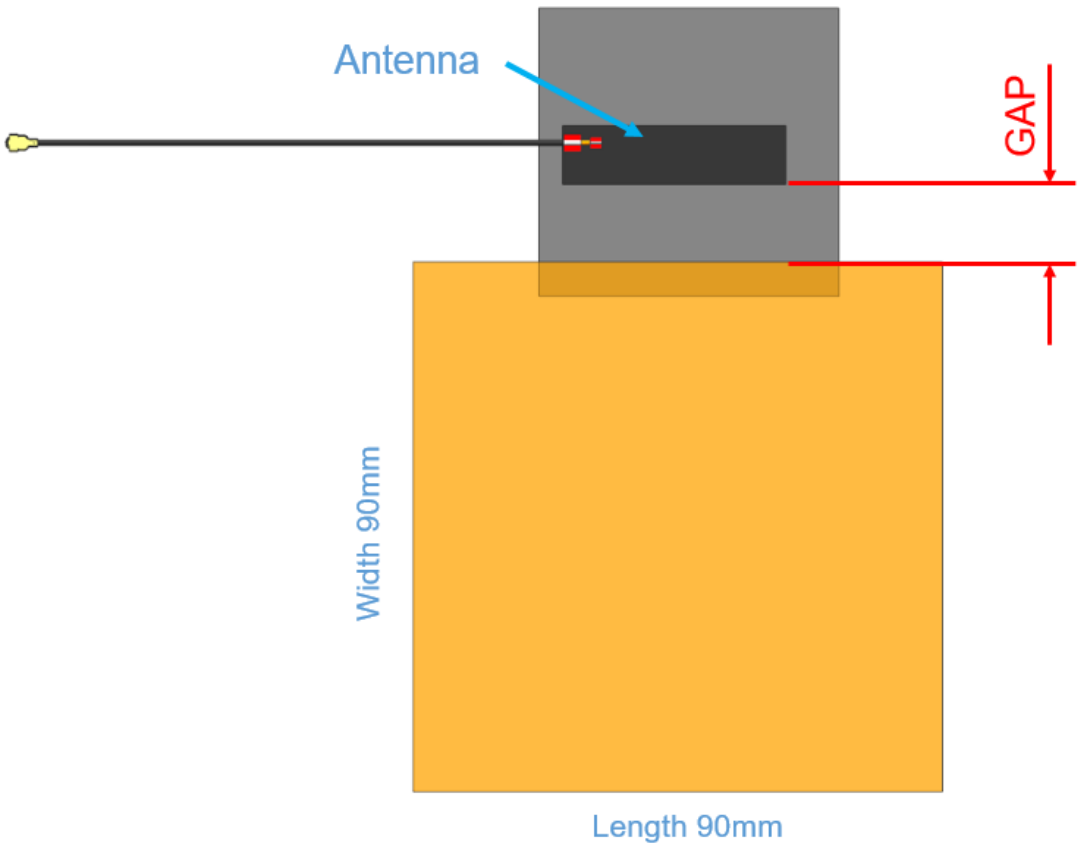


FIGURE 6.3.1 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

Ground Size: 90mm*90mm;
Location 1: Distance between antenna and plane (GAP) ground is about 5mm;
Location 2: Distance between antenna and plane (GAP) ground is about 10mm;
Location 3: Distance between antenna and plane (GAP) ground is about 15mm;
Location 4: Distance between antenna and plane (GAP) ground is about 20mm.

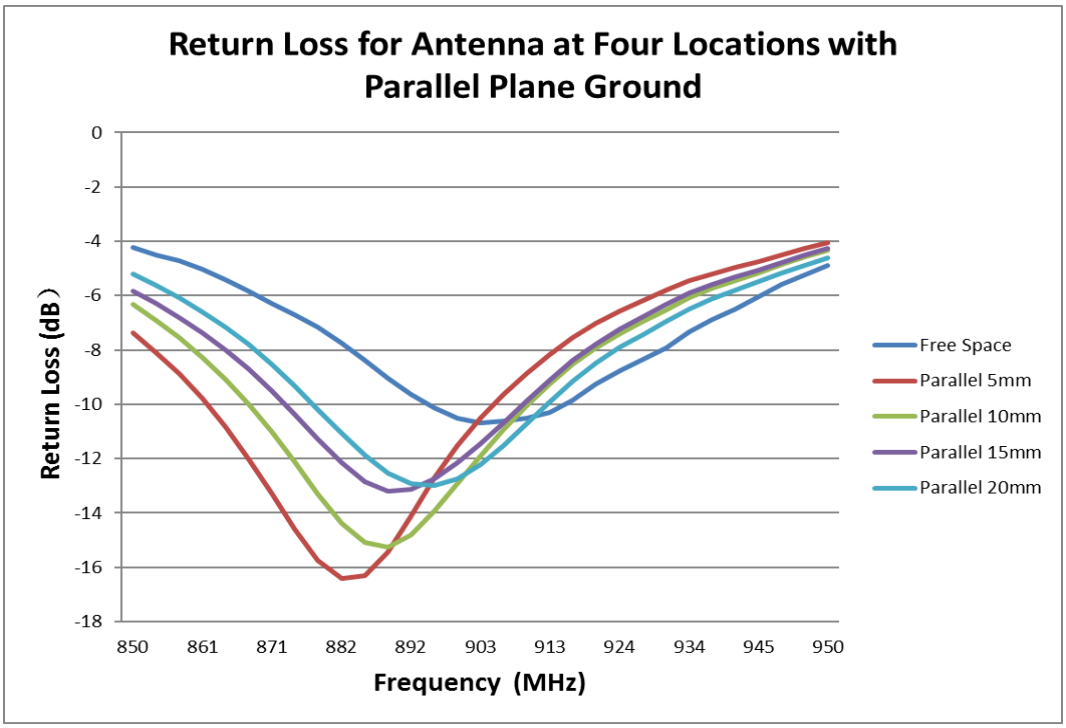


FIGURE 6.3.2 RETURN LOSS OF ANTENNA AT 868/915MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

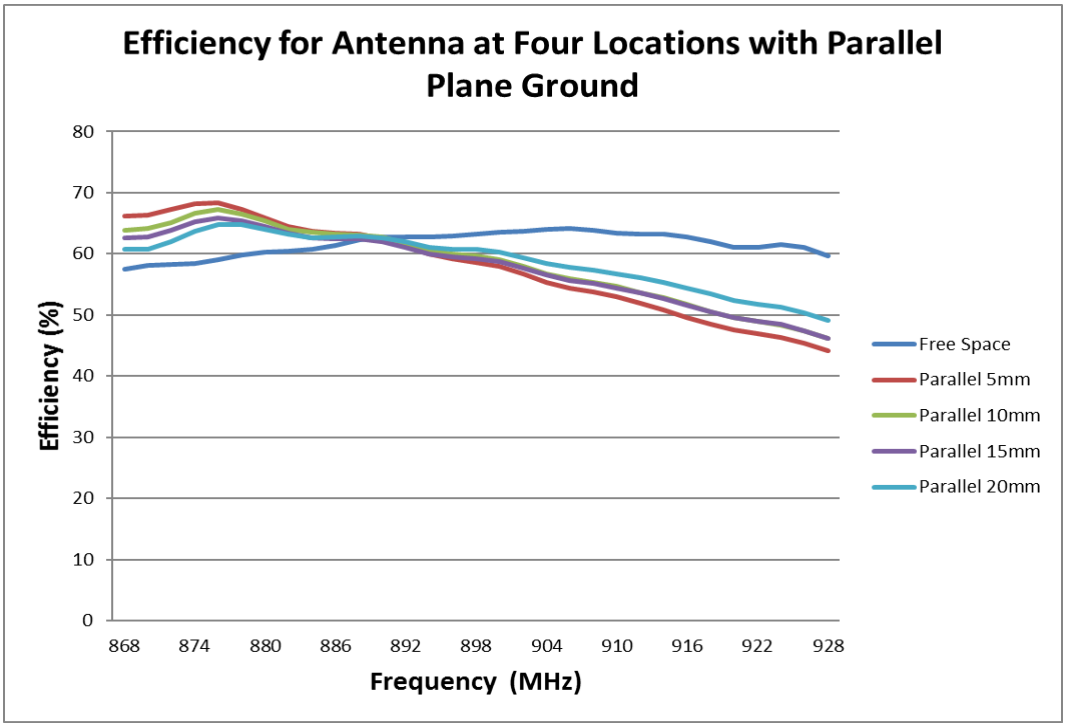


FIGURE 6.3.3 EFFICIENCY OF ANTENNA AT 868/915MHZ AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND