



APPLICATION SPECIFICATION

TITLE

868/915MHZ ISM STAND ALONE ANTENNA

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REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
B	EC No: 636121 DATE: 2020/04/21	865/915MHz ISM Stand Alone Antenna Application Specification	1 of 20
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-1052620001	Liu Hai 2020/04/18	Cheng Kang 2020/04/18	Andy Zhang 2020/04/18

865/915MHZ ISM STAND ALONE 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: 865/915MHz ISM Stand Alone Antenna

Series Number: 105262

2.2 DESCRIPTION

Series 105262 is a ISM standard alone antenna for 868/915 MHz applications, including LoRa, Neul, SigFox, Z-Wave, Zigbee and others. This antenna is made from poly flexible material with size 79*10*0.1mm, and has double-sided adhesive tape for easy "peel and stick" mounting. This balanced antenna with ground plane independent design offers various cable length options for ease of integration into various devices.

2.3 PRODUCT STRUCTURE INFORMATION

Please refer to PS-1052620100 for full information.



MOLEX ANTENNA 3D VIEW

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3.0 APPLICABLE DOCUMENTS

DOCUMENT	NUMBER	DESCRIPTION
Sale Drawing (SD)	SD-1052620001	Mechanical Dimension of the product
Product Specification (PS)	PS-1052620001	Product Specification
Packing Drawing (PK)	PK-1052620001	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 2mm thickness with VNA Agilent 5071C and Over-The-Air (OTA) chamber. All measurements in this document are done with the part No.1052620001 with a cable length of 100mm.

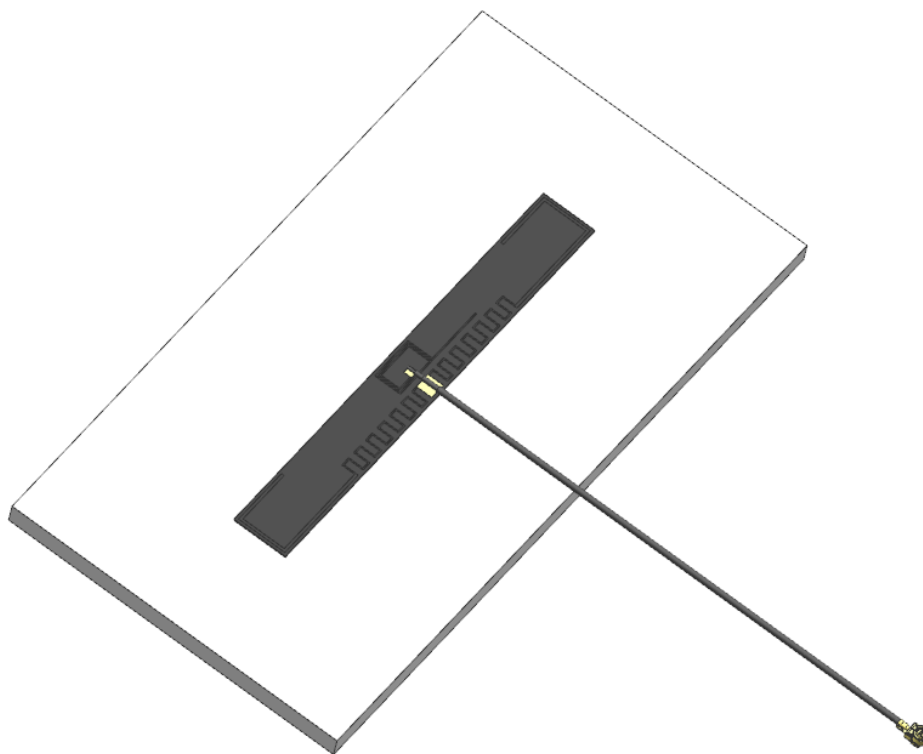


FIGURE4.1.1 ANTENNA LOADED WITH PC/ABS BLOCK OF 2MM THICKNESS

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FIGURE4.1.2 ANTENNA LOADED WITH PC/ABS BLOCK OF 2MM THICKNESS TESTED WITH VNA E5071C

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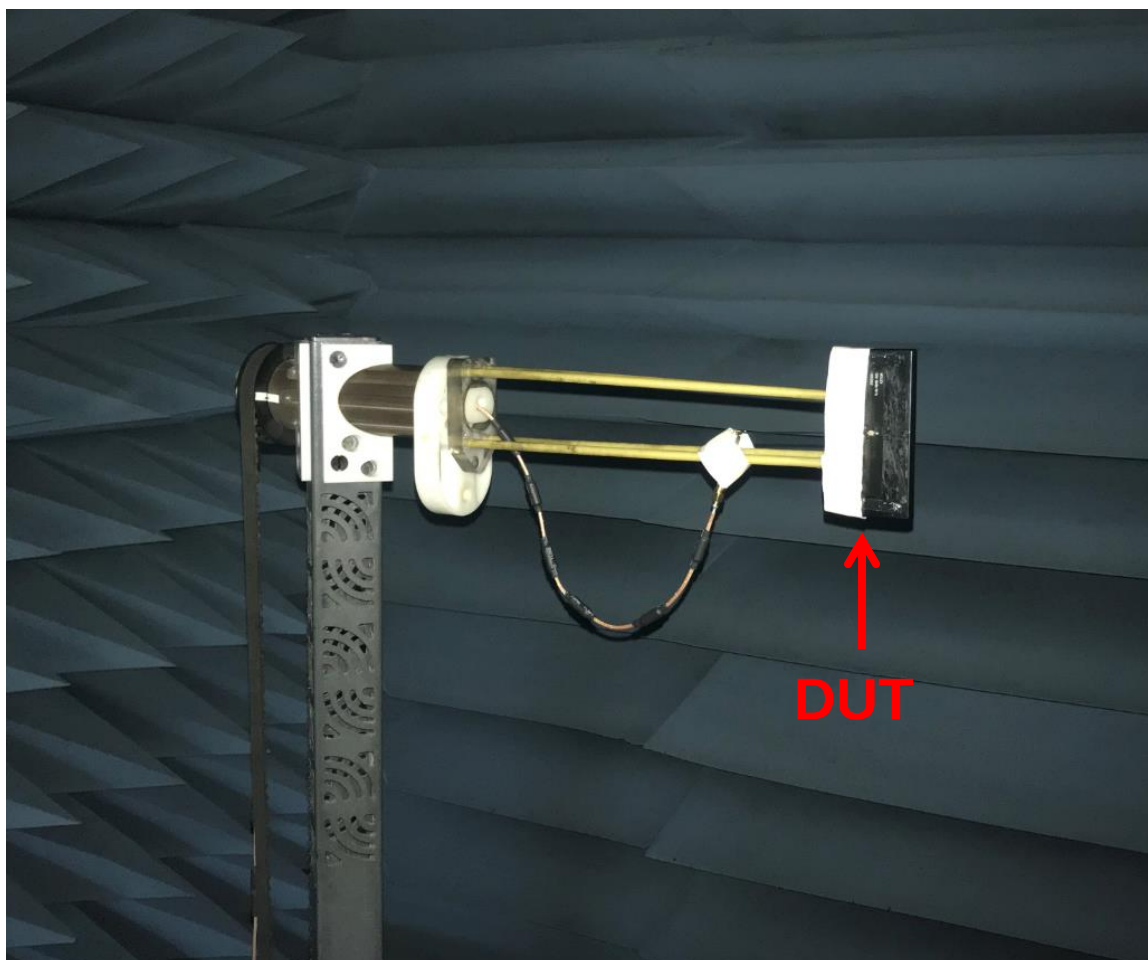


FIGURE4.1.3 ANTENNA LOADED WITH PC/ABS BLOCK OF 2MM THICKNESS TESTED IN OTA CHAMBER

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APPLICATION SPECIFICATION

4.2 ANTENNA PERFORMANCE

DESCRIPTION	EQUIPMENT	REQUIREMENT (CABLE LENGTH:100MM)	
Frequency Range	VNA E5071C	868-870MHz	902-928MHz
Return Loss	VNA E5071C	< -6 dB	
Peak Gain (Max)	OTA Chamber	0.4 dBi	1.6 dBi
Average Total Efficiency	OTA Chamber	>55%	>65%
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.

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4.3 RETURN LOSS PLOT

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

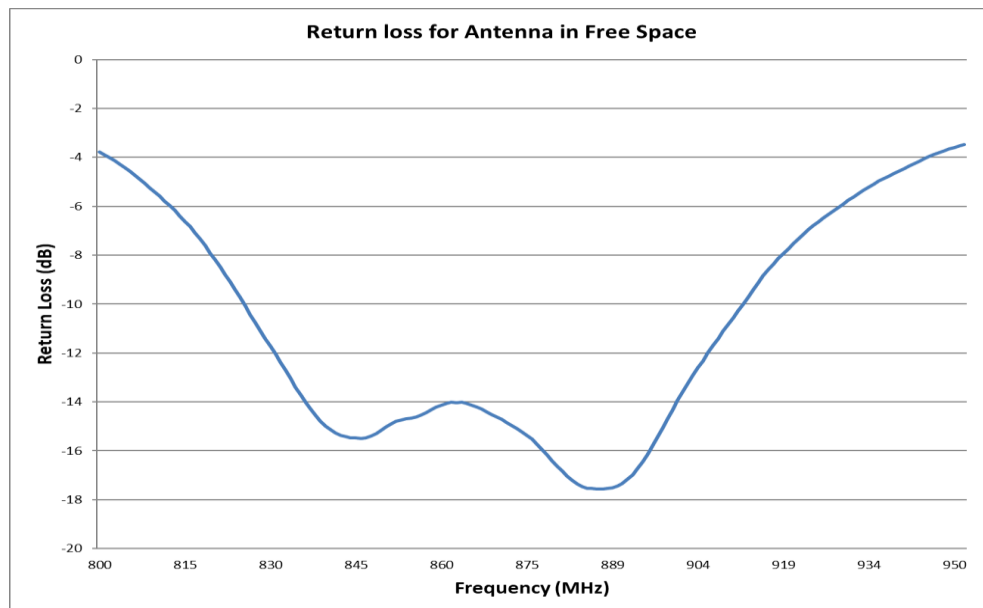


FIGURE 4.3.1 RETURN LOSS OF ANTENNA IN FREE SPACE WITH

4.4 EFFICIENCY PLOT

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

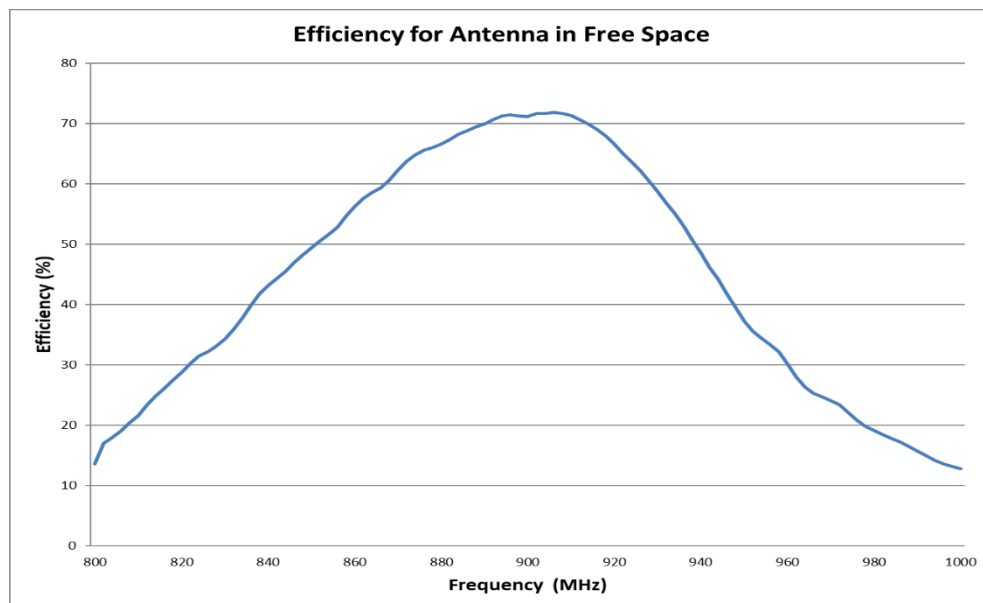


FIGURE 4.4.1 EFFICIENCY OF ANTENNA IN FREE SPACE

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4.5 2D RADIATION PATTERN

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

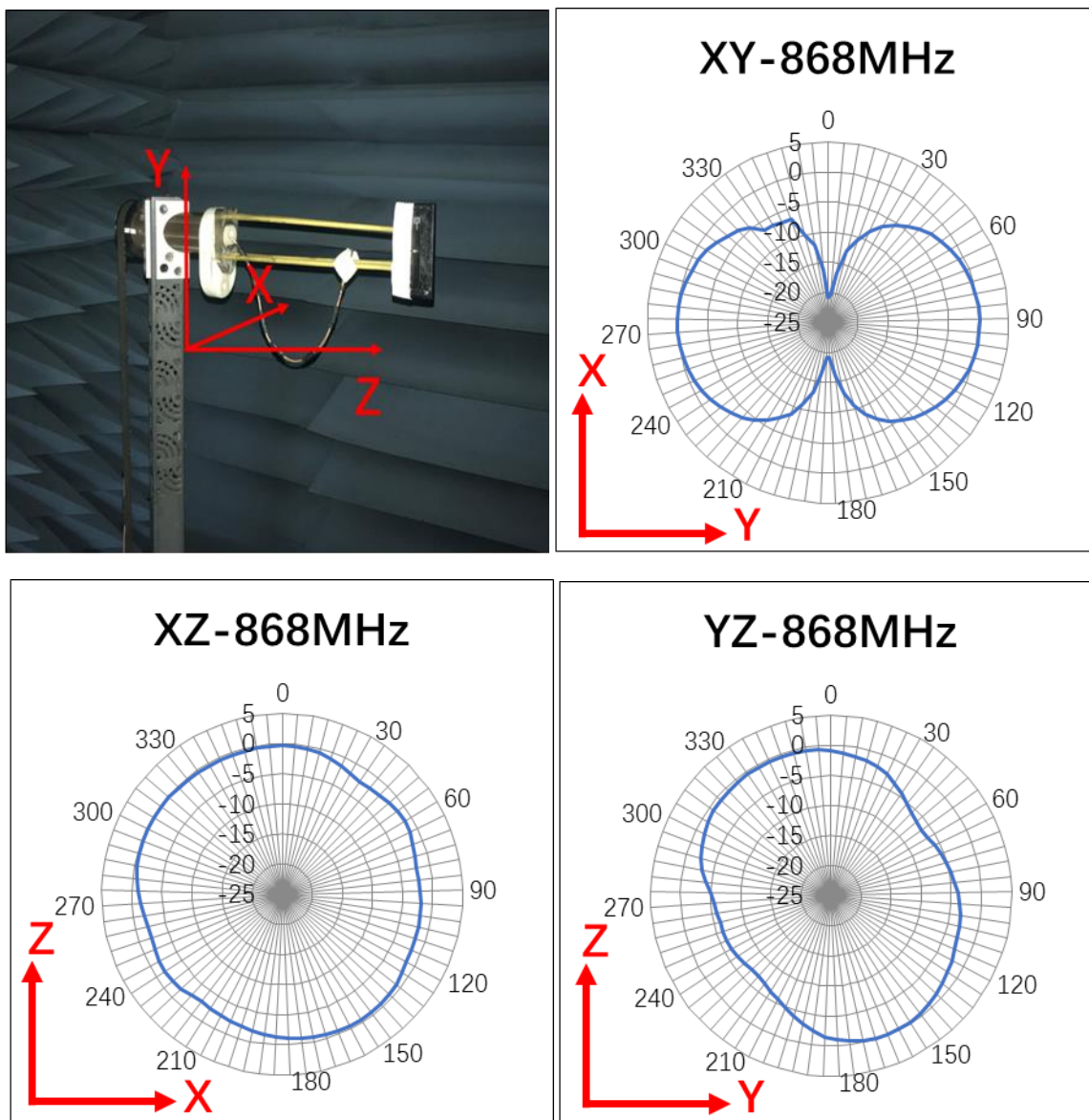


FIGURE 4.5.1 2D RADIATION PATTERN OF ANTENNA AT 868MHZ IN FREE SPACE

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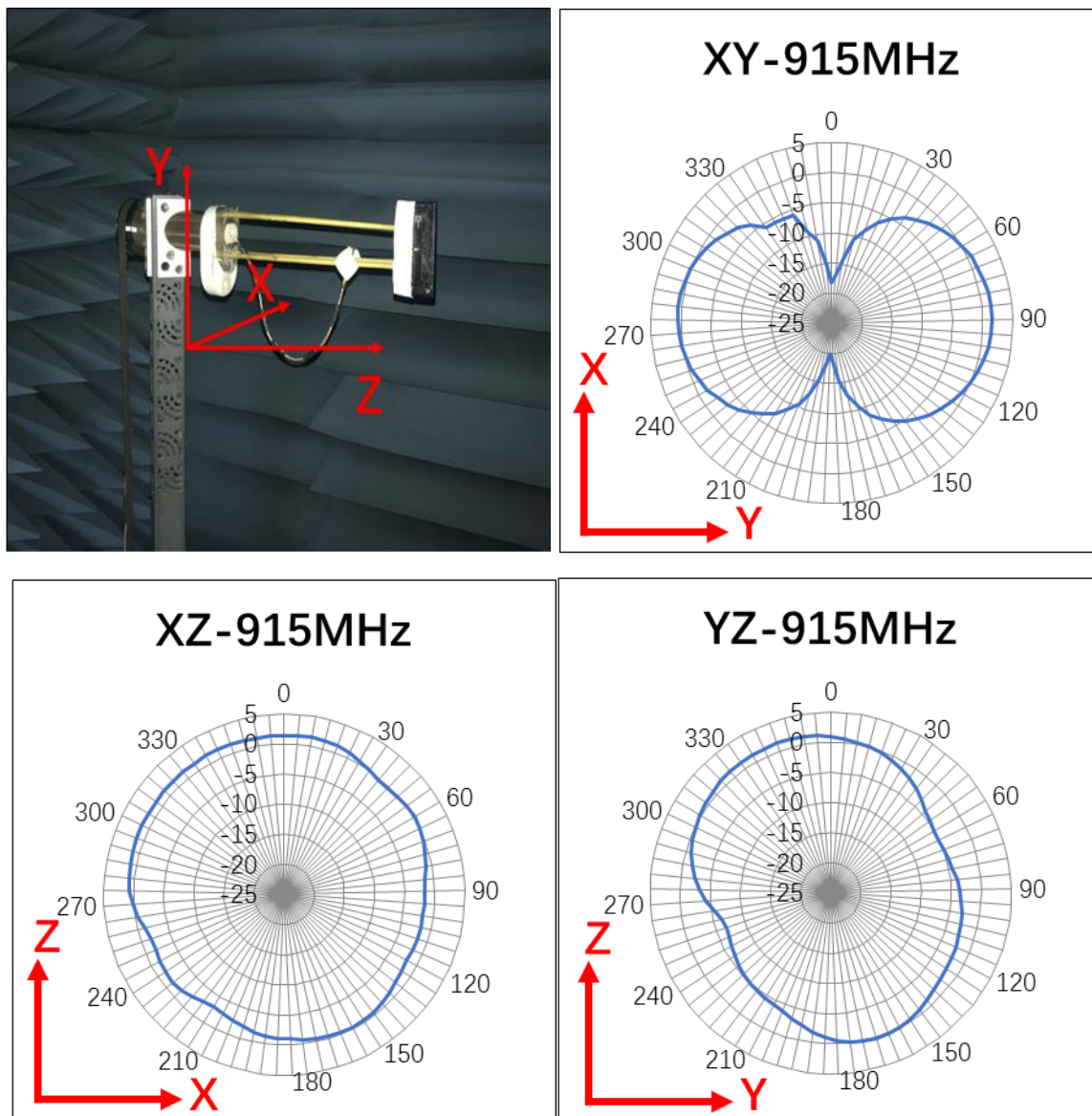


FIGURE 4.5.2 2D RADIATION PATTERN OF ANTENNA AT 915MHZ IN FREE SPACE

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4.6 3D RADIATION PATTERN

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

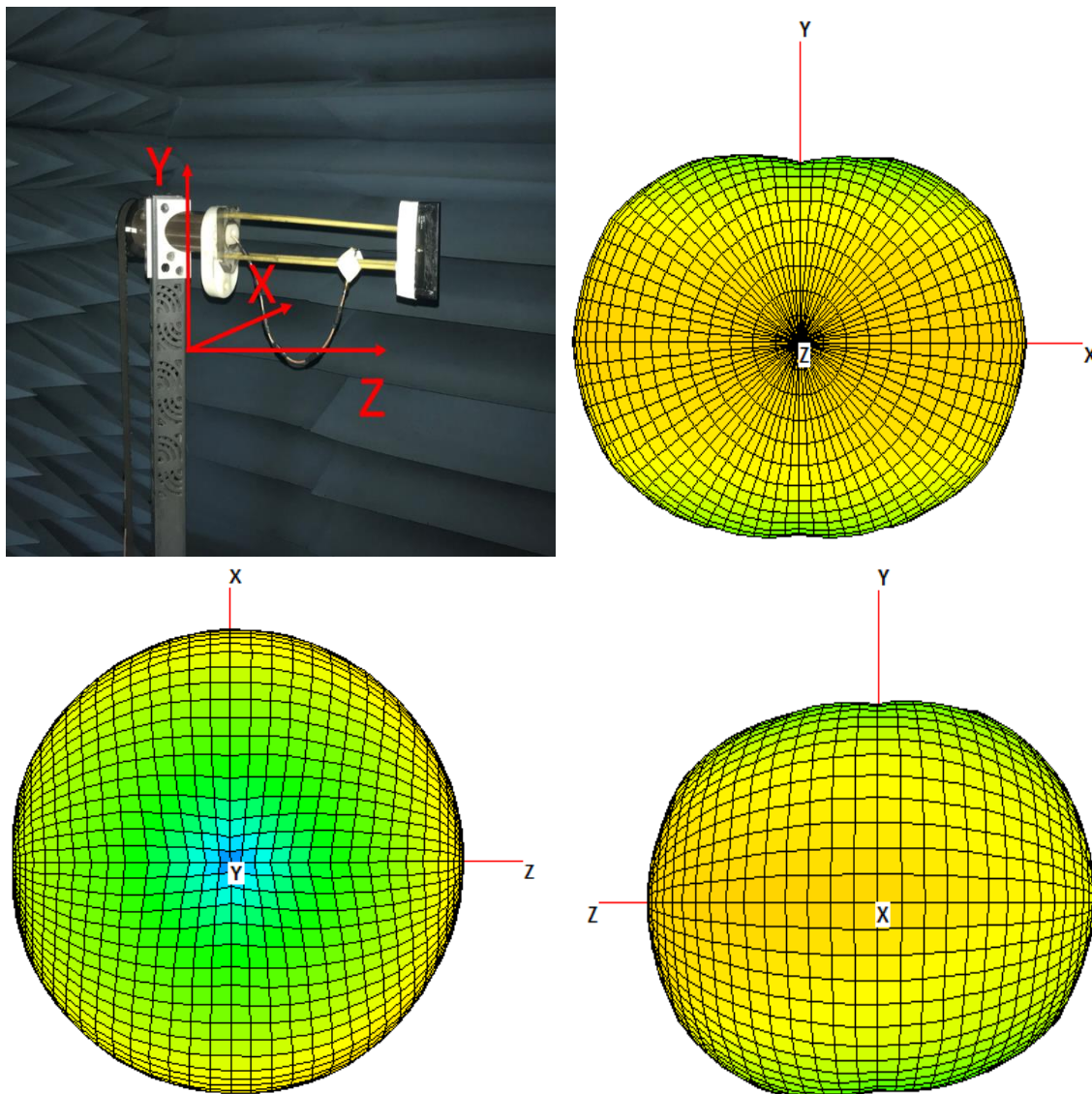


FIGURE 4.6.1 3D RADIATION PATTERN OF ANTENNA AT 868MHZ IN FREE SPACE

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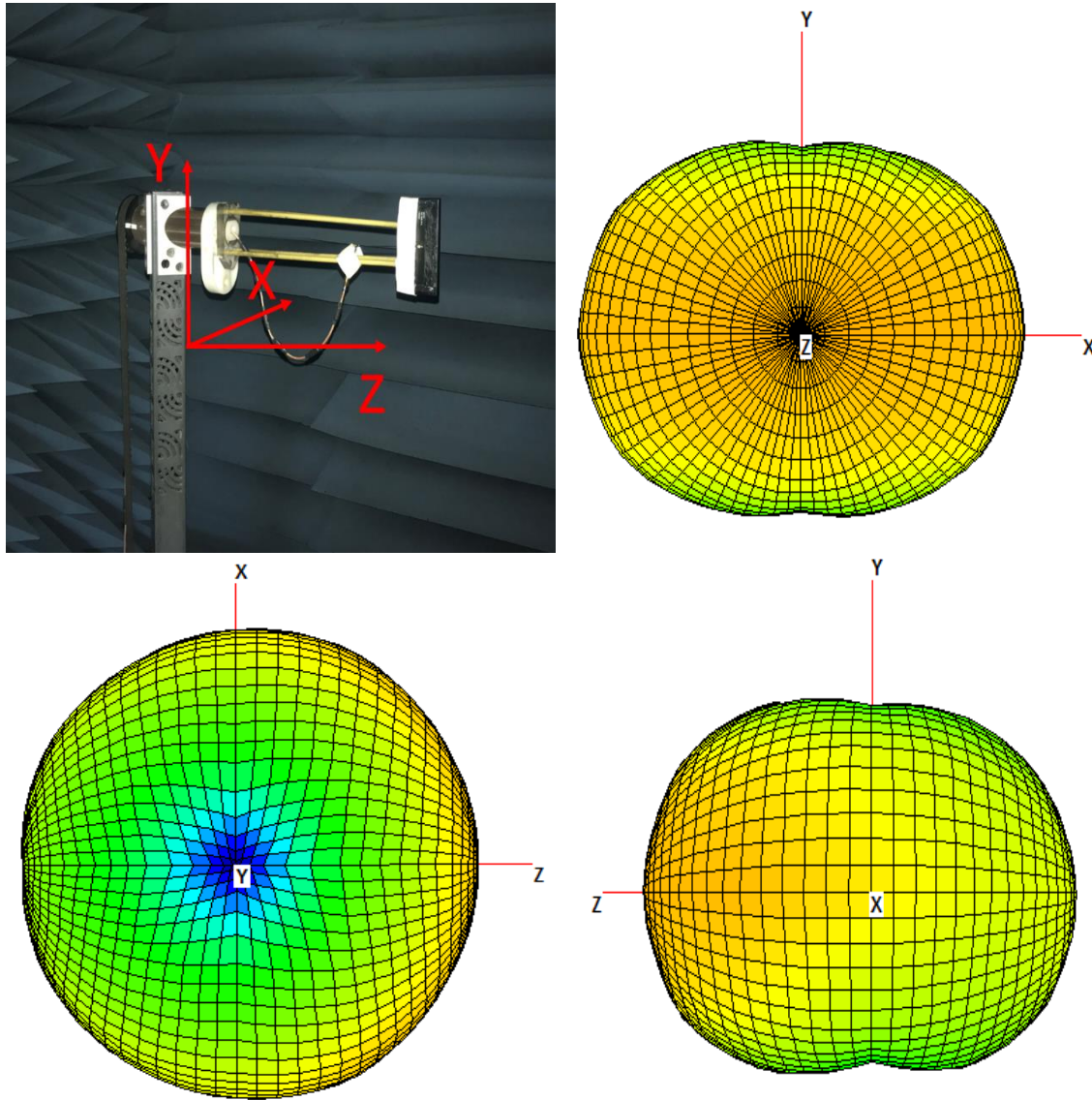


FIGURE 4.6.2 3D RADIATION PATTERN OF ANTENNA AT 915MHZ IN FREE SPACE

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5.0 ASSEMBLY GUIDELINE

The flex antenna comes with an adhesive 3M 9077 for assemble onto the plastic wall of the system. The surface should be smooth with $Ra < 1.6\mu m$, and need to clean the surface before sticking this product. The antenna cannot be placed on a metallic surface.

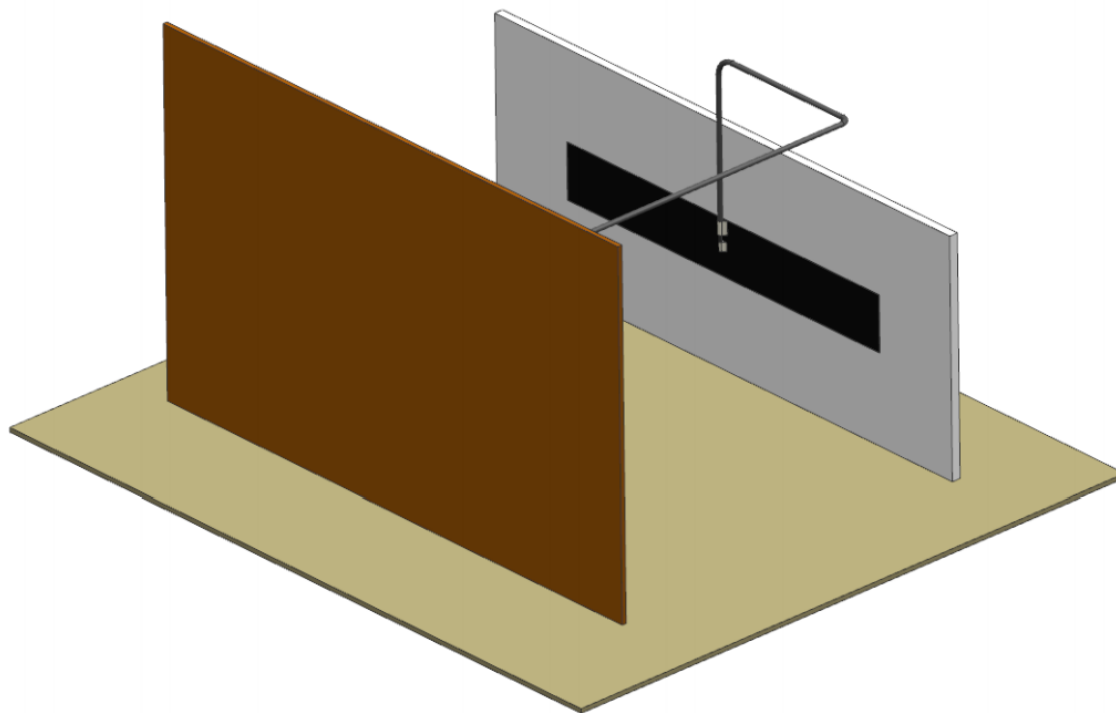


FIGURE 5.1 ASSEMBLY GUIDELINE

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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 pattern at least 5mm as shown in figure 5.2. If the cable crosses into the antenna flex, the antenna performance will be degraded.

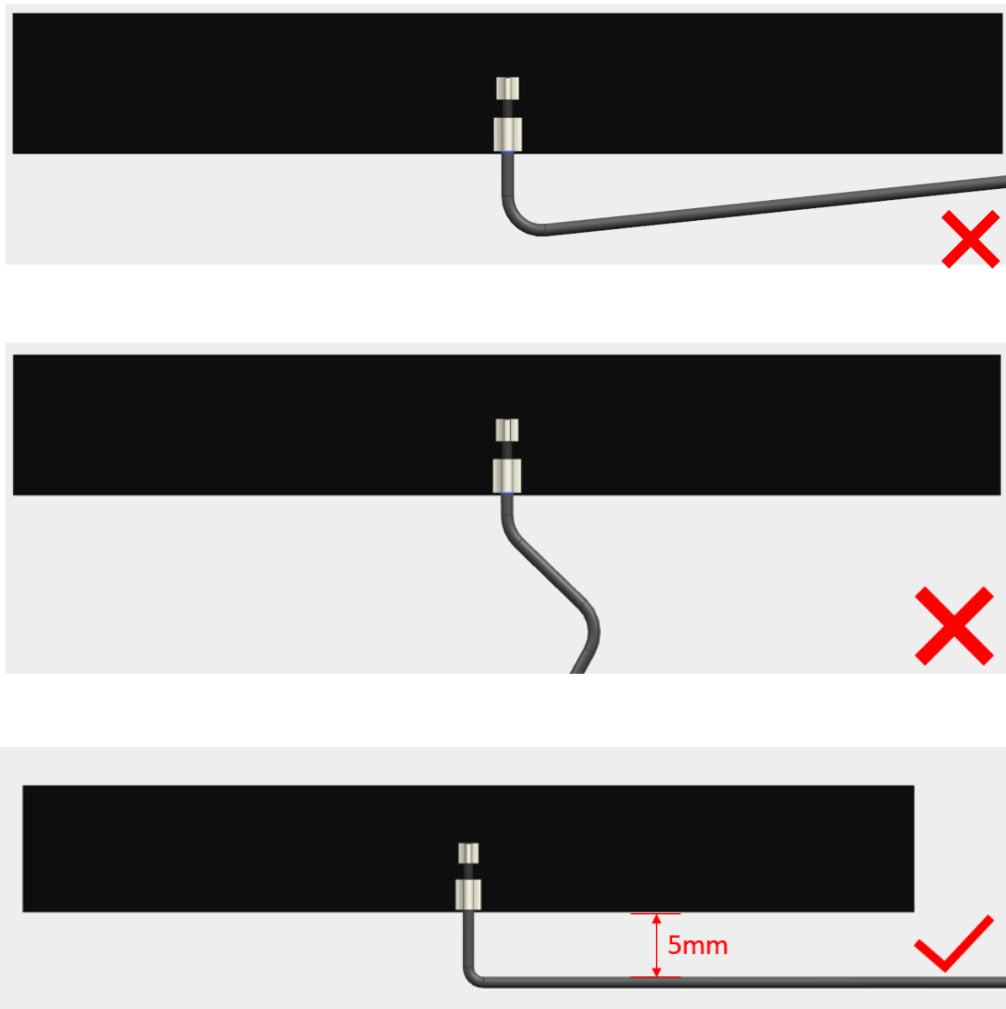


FIGURE 5.2 CABLE BENDING

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APPLICATION SPECIFICATION

6.0 THE ANTENNA PERFORMANCE VARIATION WITH CABLE LENGTH

6.0.1 CABLE LOSS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT
6.0.1.1	Frequency Range	500MHz~1GHz	500MHz~1GHz
6.0.1.2	Attenuation	1m cable measured by VNA5071C	$\leq 1.8\text{dB/m}$

6.0.2 CABLE LENGTH AFFECT THE ANTENNA PERFORMANCE

Balance antenna resonance is insensitive by cable length, but the cable loss will affect the total efficiency. Refer to 6.0.1

6.0.3 FOR EXAMPLE

Base on the 100mm cable performance, we can mostly compute the 300mm cable's.

	100mm cable			300mm cable	
Frequency (MHz)	Efficiency (dB)	Efficiency (%)	cable loss	Efficiency (dB)	Efficiency (%)
	X		X-LOSS=Y	Y	
868	-2.18	60.58	0.2m*1.8dB/m	-2.54	55.76
870	-2.06	62.27		-2.42	57.32
902	-1.45	71.66		-1.81	65.96
904	-1.44	71.70		-1.80	66.00
906	-1.44	71.86		-1.80	66.14
908	-1.45	71.62		-1.81	65.92
910	-1.47	71.31		-1.83	65.64
912	-1.51	70.63		-1.87	65.01
914	-1.55	69.94		-1.91	64.37
916	-1.61	69.04		-1.97	63.55
918	-1.68	67.94		-2.04	62.54
920	-1.76	66.61		-2.12	61.31
922	-1.87	64.99		-2.23	59.82
924	-1.96	63.66		-2.32	58.60
926	-2.06	62.18		-2.42	57.23
928	-2.18	60.59		-2.54	55.77
868	-2.18	60.58		-2.54	55.76

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7.0 RF PERFORMANCE AS A FUNCTION OF IMPLEMENTATION

7.1 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 7.1. 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 at high band. The minimum distance between antenna and plane ground is recommended to be 20mm to achieve acceptable RF performance.

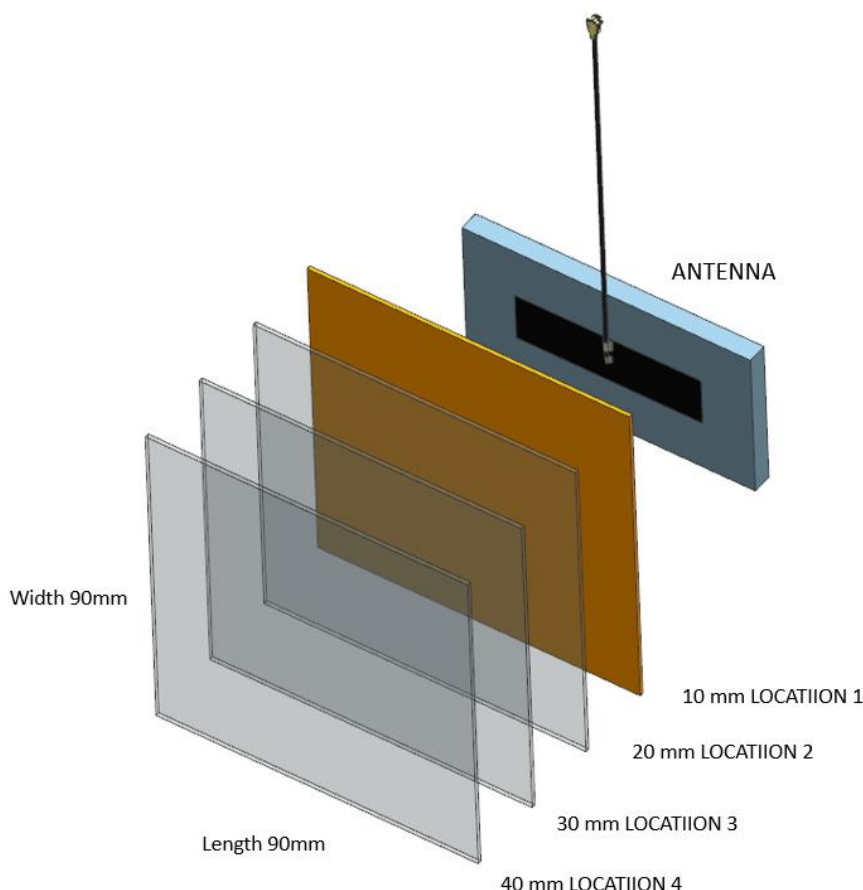


FIGURE 7.1 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

Ground Size: 90mm*90mm;

Location 1: Distance between antenna and plane ground is about 10mm;

Location 2: Distance between antenna and plane ground is about 20mm;

Location 3: Distance between antenna and plane ground is about 30mm;

Location 4: Distance between antenna and plane ground is about 40mm.

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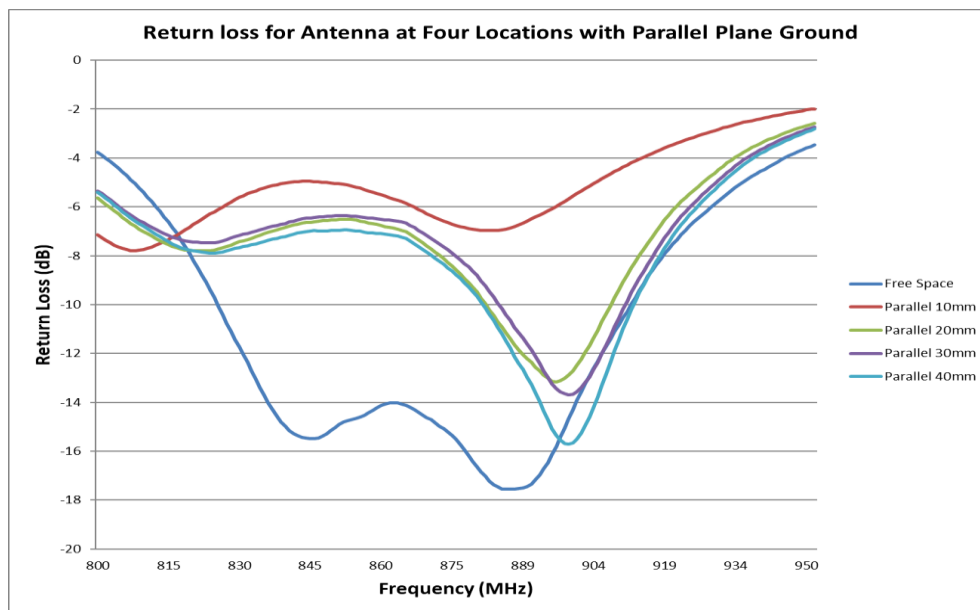


FIGURE 7.1.1 RETURN LOSS OF ANTENNA AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

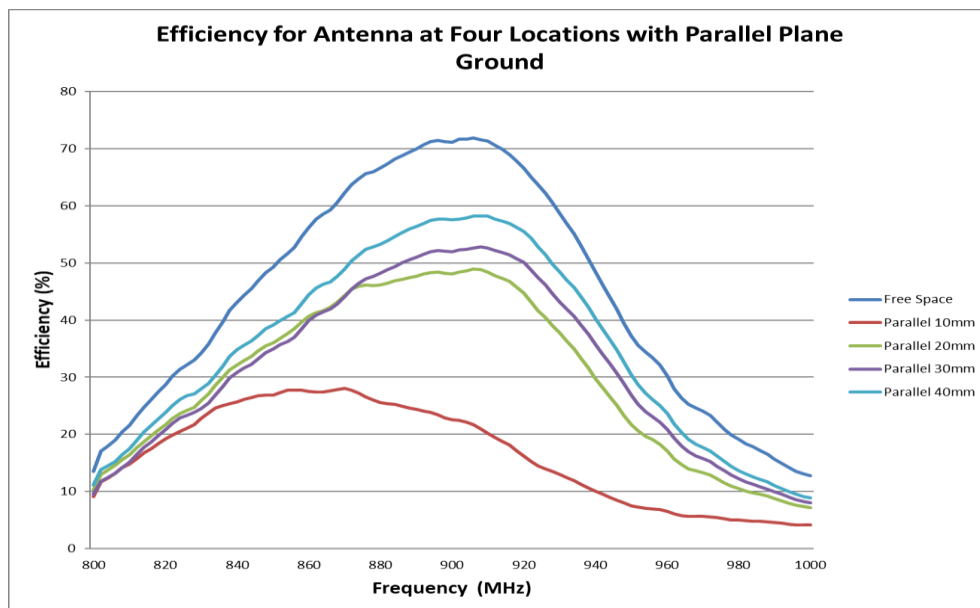


FIGURE 7.1.2 EFFICIENCY OF ANTENNA AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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7.2 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 7.2. The plane ground size is 90mm*90mm and we move the plane ground to four locations for each test. The distance between antenna and vertical plane ground affect the antenna performance slightly. We still suggest the minimum distance between antenna and plane ground is recommended to be 10mm.

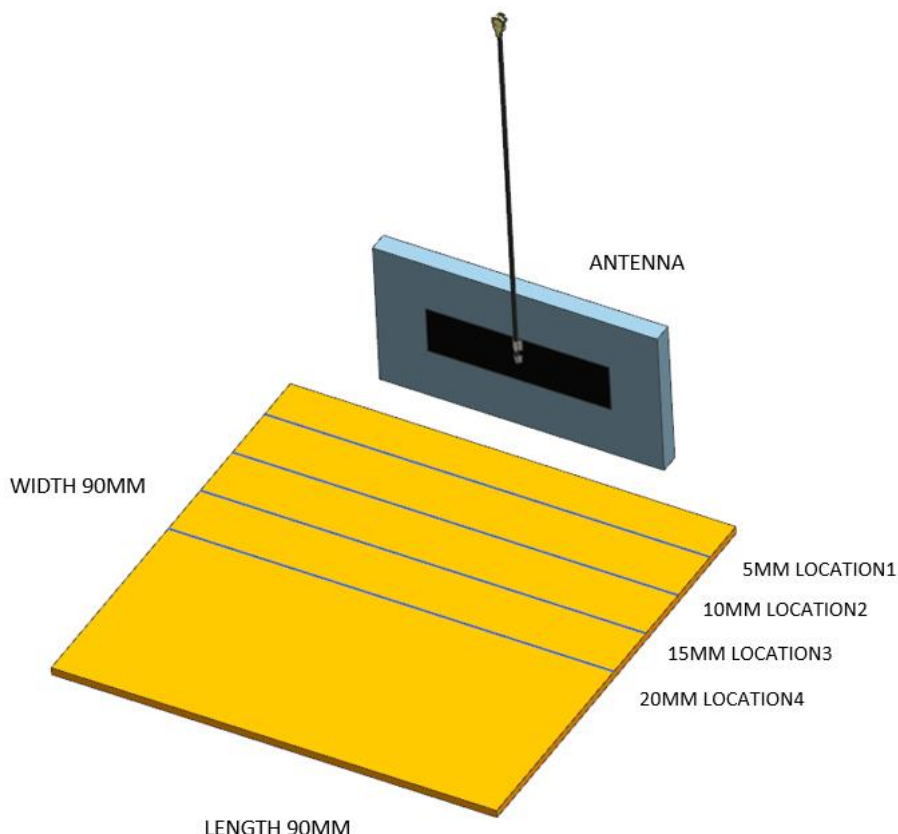


FIGURE 7.2 FOUR LOCATIONS WITH VERTICAL PLANE GROUND

Ground Size: 90mm*90mm;

Location 1: Distance between antenna and plane ground is about 5mm;

Location 2: Distance between antenna and plane ground is about 10mm;

Location 3: Distance between antenna and plane ground is about 15mm;

Location 4: Distance between antenna and plane ground is about 20mm.

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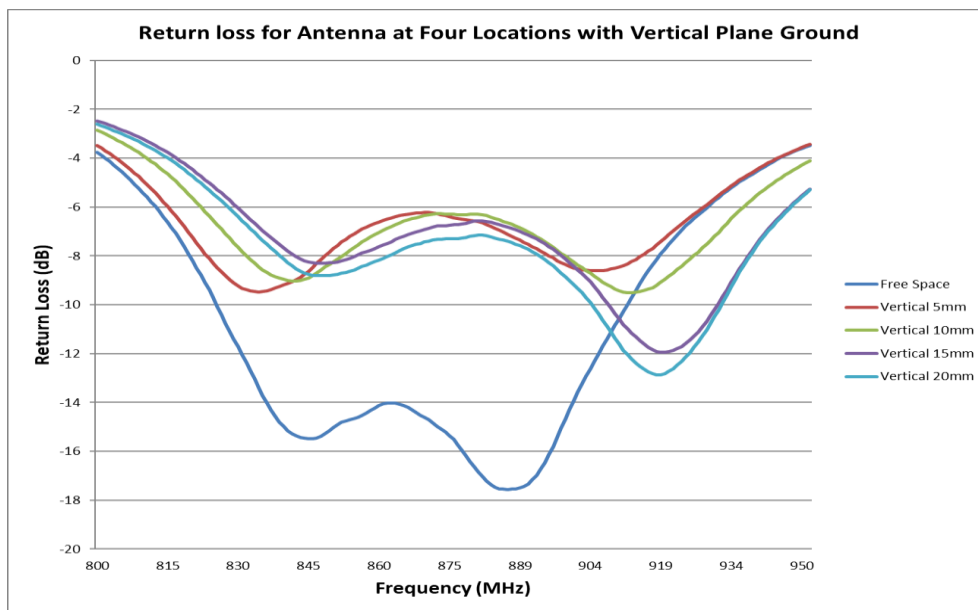


FIGURE 7.2.1 RETURN LOSS OF ANTENNA AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

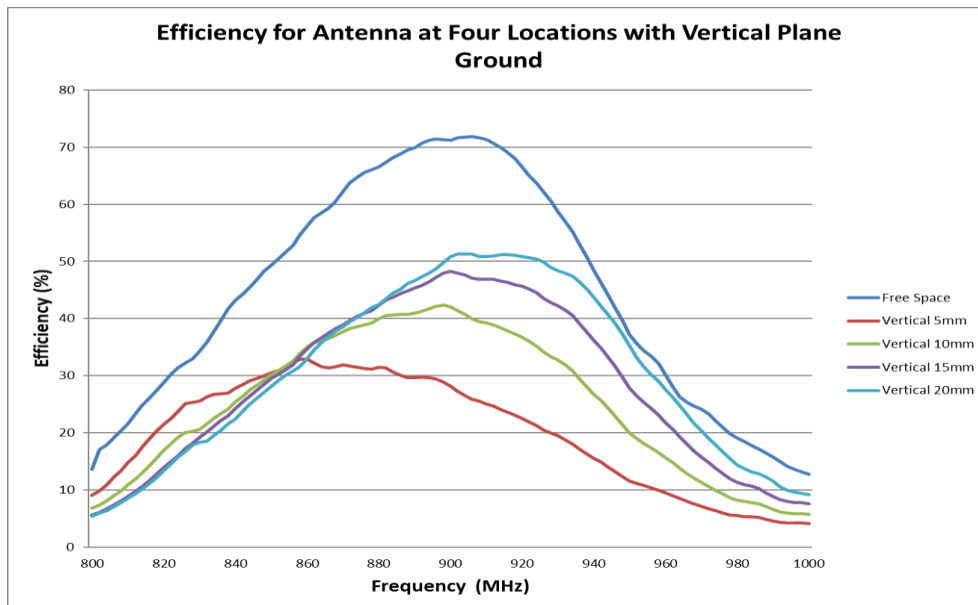


FIGURE 7.2.2 EFFICIENCY OF ANTENNA AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

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7.3 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 7.3. The plane ground size is 90mm*90mm and we move the plane ground to four locations for each test. The distance between the antenna and the parallel plane ground affect the antenna performance slightly. We still suggest the minimum distance between the antenna and the plane ground is recommended to be 15mm.

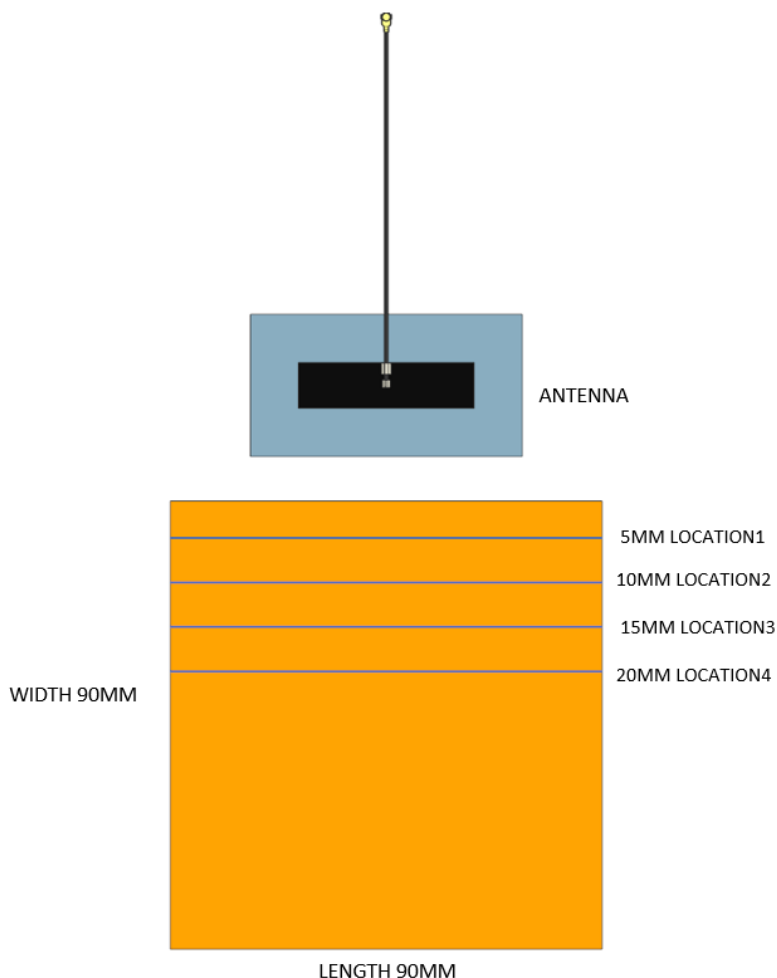


FIGURE 7.3 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

Ground Size: 90mm*90mm;

Location 1: Distance between antenna and plane ground is about 5mm;

Location 2: Distance between antenna and plane ground is about 10mm;

Location 3: Distance between antenna and plane ground is about 15mm;

Location 4: Distance between antenna and plane ground is about 20mm.

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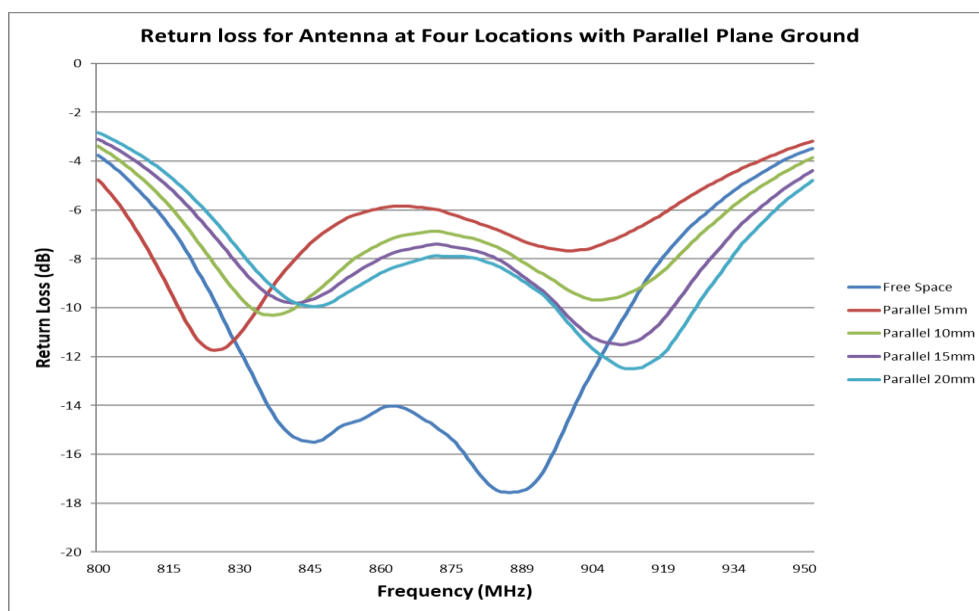


FIGURE 7.3.1 RETURN LOSS OF ANTENNA AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

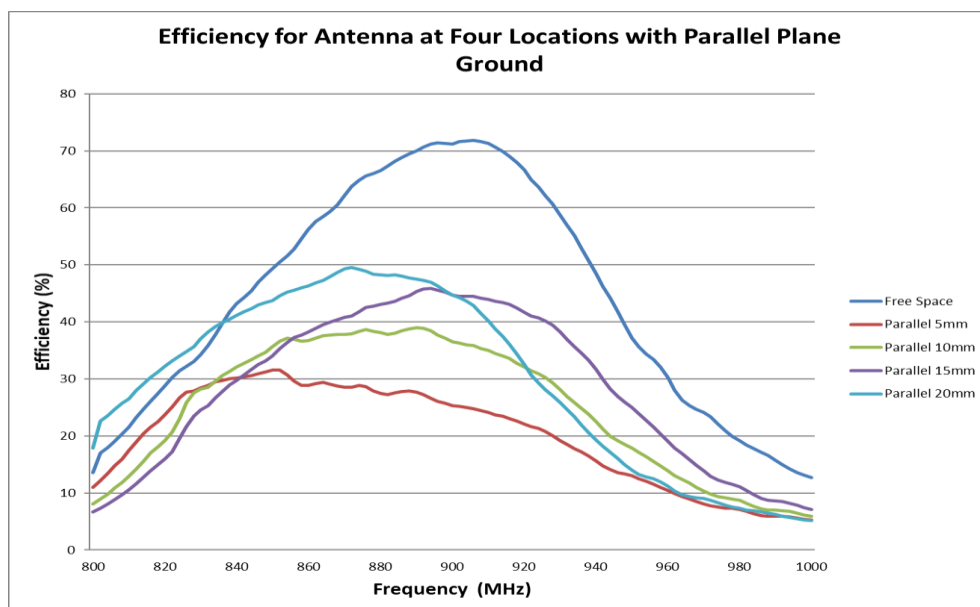


FIGURE 7.3.2 EFFICIENCY OF ANTENNA AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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PRODUCT SPECIFICATION

TITLE

865/915MHZ ISM STAND ALONE ANTENNA

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8. PACKING
9. CHANGED HISTORY

Address: 2222 Wellington Court, Lisle, IL 60532, USA

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PRODUCT SPECIFICATION

824/915MHz ISM STAND ALONE ANTENNA

1.0 SCOPE

This Product Specification covers the mechanical, electrical and environmental performances specification for 865/915MHz ISM Stand Alone Antenna.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBER (S)

Product name: 865/915MHz ISM Stand Alone Antenna

Series Number: 105262

2.2 DESCRIPTION

Series 105262 is a ISM standard alone antenna for 868/915 MHz applications, including LoRa, Neul, SigFox, Z-Wave, Zigbee and others. This antenna is made from poly flexible material with size 79*10*0.1mm, and has double-sided adhesive tape for easy “peel and stick” mounting. This balanced antenna with ground plane independent design offers various cable length options for ease of integration into various devices.

2.3 FEATURES

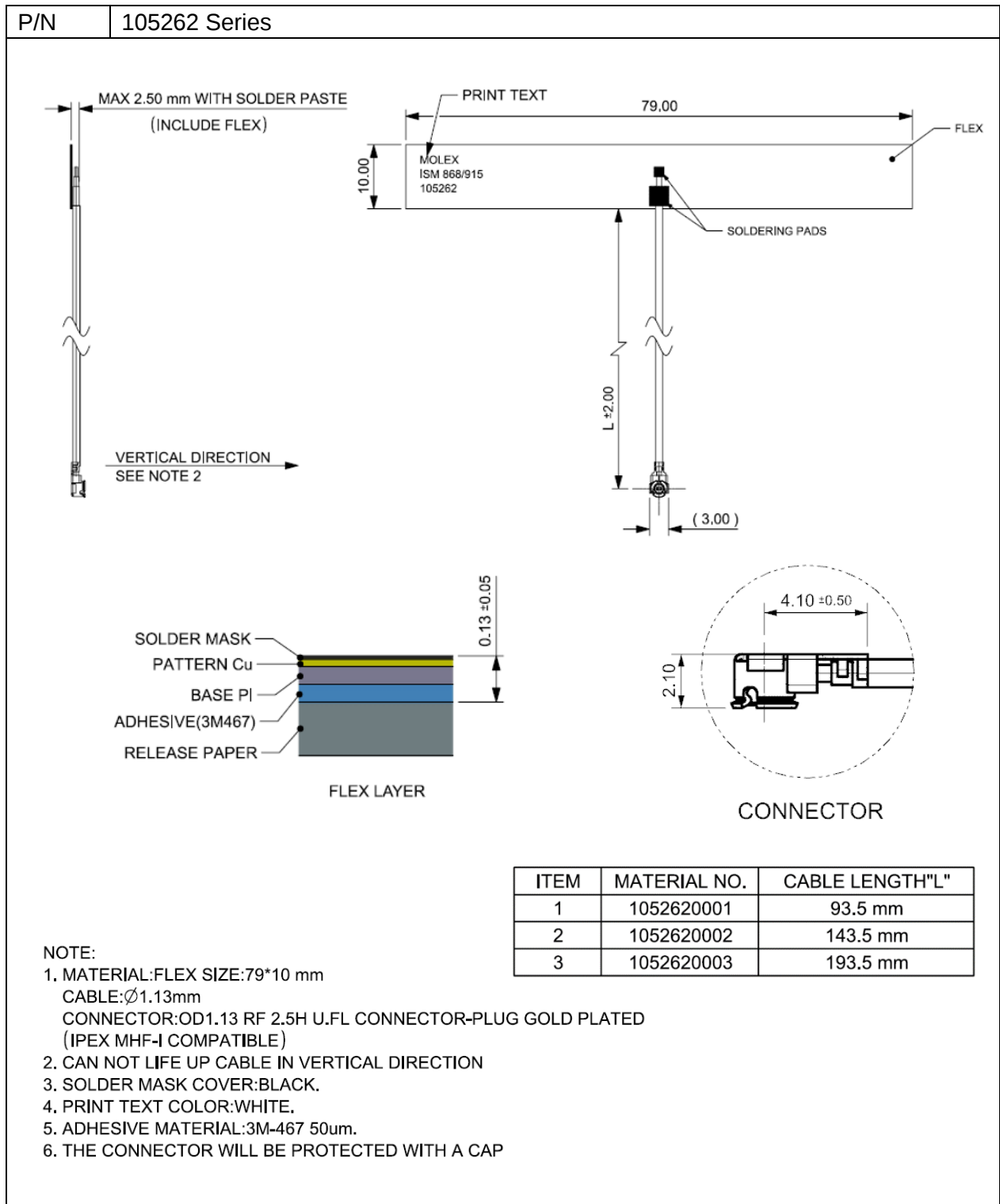
- 868/915MHz, Linear polarization
- Flex size:79x10x0.1mm
- MHF (U.FL compatible) connector
- Cable OD1.13mm, 3 standard length options (100/150/200mm)
- Cable and connector can be customized
- RoHS Compliant



MOLEX ANTENNA 3D VIEW

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PS-1052620001	Cheng Kang	Chris Zhong	Benson Hung

2.4 PRODUCT STRUCTURE INFORMATION



MECHANICAL STRUCTURE INFORMATION FOR 105262 SERIES

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DOCUMENT NUMBER: PS-1052620001		CREATED / REVISED BY: Cheng Kang	CHECKED BY: Chris Zhong
		APPROVED BY: Benson Hung	



PRODUCT SPECIFICATION

3.0 APPLICABLE DOCUMENTS

Document	Number	Description
Sale Drawing(SD)	SD-1052620001	Mechanical Dimension of the product
Application Guide(AS)	AS-1052620001	Antenna Application and surrounding
Packing Drawing(PK)	PK-1052620001	Product packaging specifications

4.0 GENERAL SPECIFICATION

Product name	865/915MHz ISM Stand Alone Antenna
Part number	105262 Series
Frequency	868/915 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	Monopole
Connector type	Compatible MHF-1&U.FL
User Implementation type	Adhesive 3M467
Cable	Ø1.13mm
Cable length	100mm (Molex p/n:1052620001)
	150mm (Molex p/n:1052620002)
	200mm (Molex p/n:1052620003)

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5.0 ANTENNA SPECIFICATION.

5.1 ELECTRICAL REQUIREMENT

5.1.1 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 100mm		
P/N	1052620001	
Frequency Range	868-870MHz	902-928MHz
Peak Gain(Max)	0.4 dBi	1.6 dBi
Average Total efficiency	>55%	>65%
Return Loss	< -6 dB	

5.1.2 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 150mm		
P/N	1052620002	
Frequency Range	868-870MHz	902-928MHz
Peak Gain(Max)	0.3 dBi	1.5 dBi
Average Total efficiency	>53%	>63%
Return Loss	< -6 dB	

5.1.3 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 200mm		
P/N	1052620003	
Frequency Range	868-870MHz	902-928MHz
Peak Gain(Max)	0.2 dBi	1.4 dBi
Average Total efficiency	>52%	>62%
Return Loss	< -6 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.

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5.2 CABLE LOSS

DESCRIPTION	TEST CONDITION	REQUIREMENTS	
Frequency Range	2.4GHz/5GHz	2.0GHz~3.0GHz	5.0GHz~6.0GHz
Attenuation	1m cable measured by VNA5071C	≤3.5dB/m	≤5.5dB/m

Balance antenna resonance is insensitive to cable's length, but the cable's loss will affect the total efficiency.

6.0 MECHANICAL SPECIFICATION

All measurements in this document are done with the part no.1052620001 for different cable length.

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

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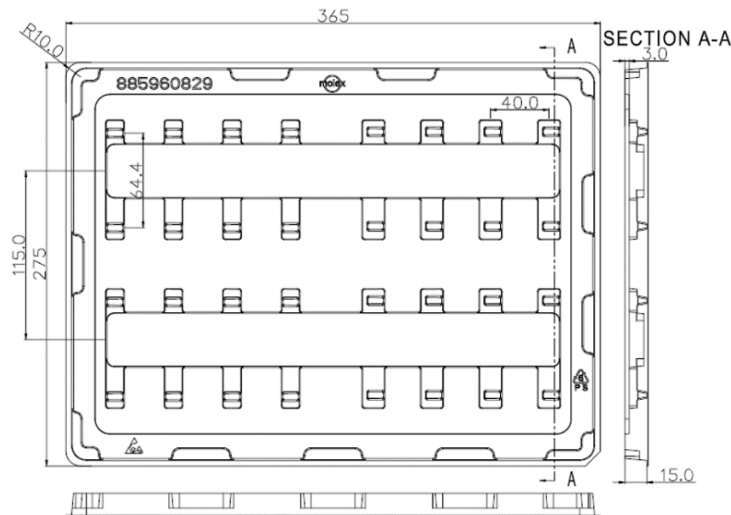
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7.0 ENVIRONMENTAL SPECIFICATION

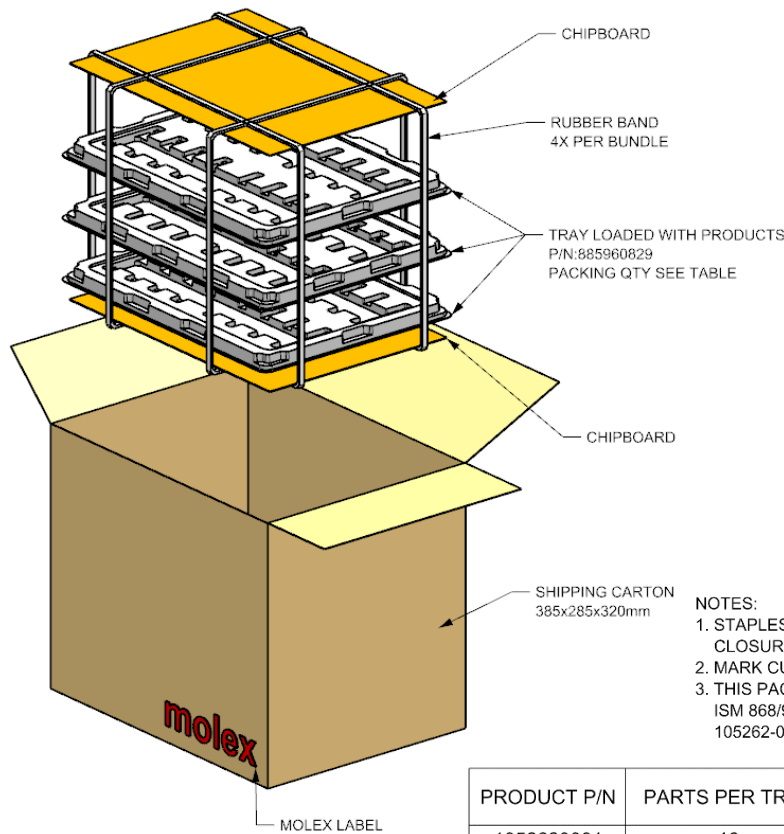
DESCRIPTION	SPECIFICATION
Temperature /Humidity cycling	1.The device under test is kept for 30 mins in an environment with a temperature of -40 °C. 2. Kept for 4 Hours in an environment with a temperature of 85 degrees and a relative humidity of 95%. 3. Kept for 2 Hours in an environment with a temperature 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. 5. Parts meet antenna performance per section 5.0 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 °C⇔125 °C 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°C, 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 accepted.

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8.0 PACKING



TRAY



- NOTES:
1. STAPLES MUST BE USED TO SET UP CARTON CLOSURES MUST BE DONE WITH TAPE.
 2. MARK CUSTOMER LABEL WITH PART NUMBER AND DATA CODE.
 3. THIS PACKAGING SPECIFICATION TO BE USED WITH ISM 868/915 MHz STAND ALONE ANTENNA (P/N: 105262-0001, 105262-0002, 105262-0003)

PRODUCT P/N	PARTS PER TRAY	TOTAL TRAY PER CARTON	TOTAL PARTS PER SHIPPING CARTON
1052620001	16	26+1	416
1052620002	16	26+1	416
1052620003	12	26+1	312

PACKAGING INFORMATION FOR 105262 SERIES

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9.0 CHANGED HISTORY

REV	DATE	DESCRIPTION
E	2022/10/10	Updated page 5 (Return loss <-10 changed to <-6)

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