



PRODUCT SPECIFICATION

TITLE

WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA

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REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
E	EC No: 644053 DATE: 2020/08/26	WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA PRODUCT SPECIFICATION	1 of 11
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
PS-2042810100	Kang Cheng 2020/08/26	Cooper Zhou 2020/08/26	Stary Song 2020/08/26



PRODUCT SPECIFICATION

WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA

1.0 SCOPE

This Product Specification covers the mechanical, electrical and environmental performances specification for WIFI 6E flex cabled side-fed balanced antenna.

2.0 PRODUCT DESCRIPTION

2.1 PRODUCT NAME AND SERIES NUMBER (S)

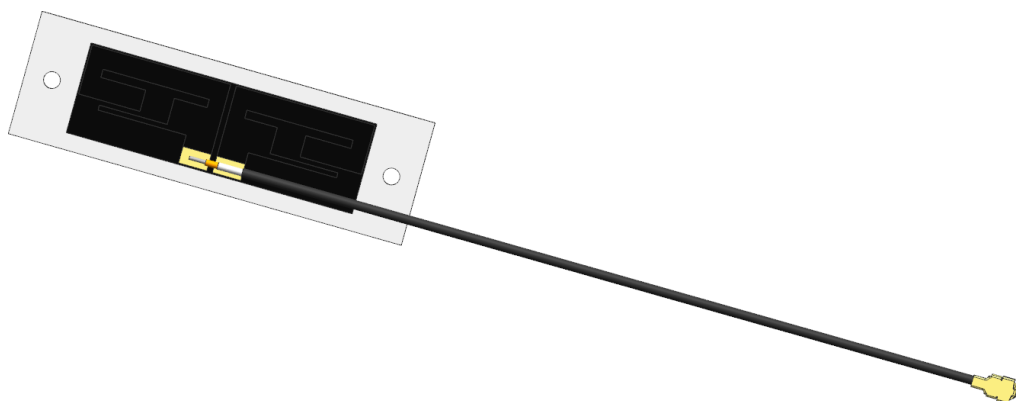
Product name: WIFI 6E flex cabled side-fed balanced antenna
Series Number: 204281

2.2 DESCRIPTION

Series 204281 is a balanced, dipole-type, high efficiency antenna for 2.4/5/6 GHz applications, including Wi-Fi 6E, Bluetooth, Zigbee and others. This antenna is made from poly flexible material with small size 35*11*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

- Ground plane independent, balanced dual band antenna
- Flex size 35 x 11 x 0.1mm (not contain solder area)
- I-PEX MHF (U.FL compatible) connector (Such as MHF1/MHF4)
- Cable OD1.13mm, 6 standard length options (50/100/150/200/250/300mm)
- Cable and connector can be customized
- RoHS Compliant



Molex 204281 SERIES 3D VIEW

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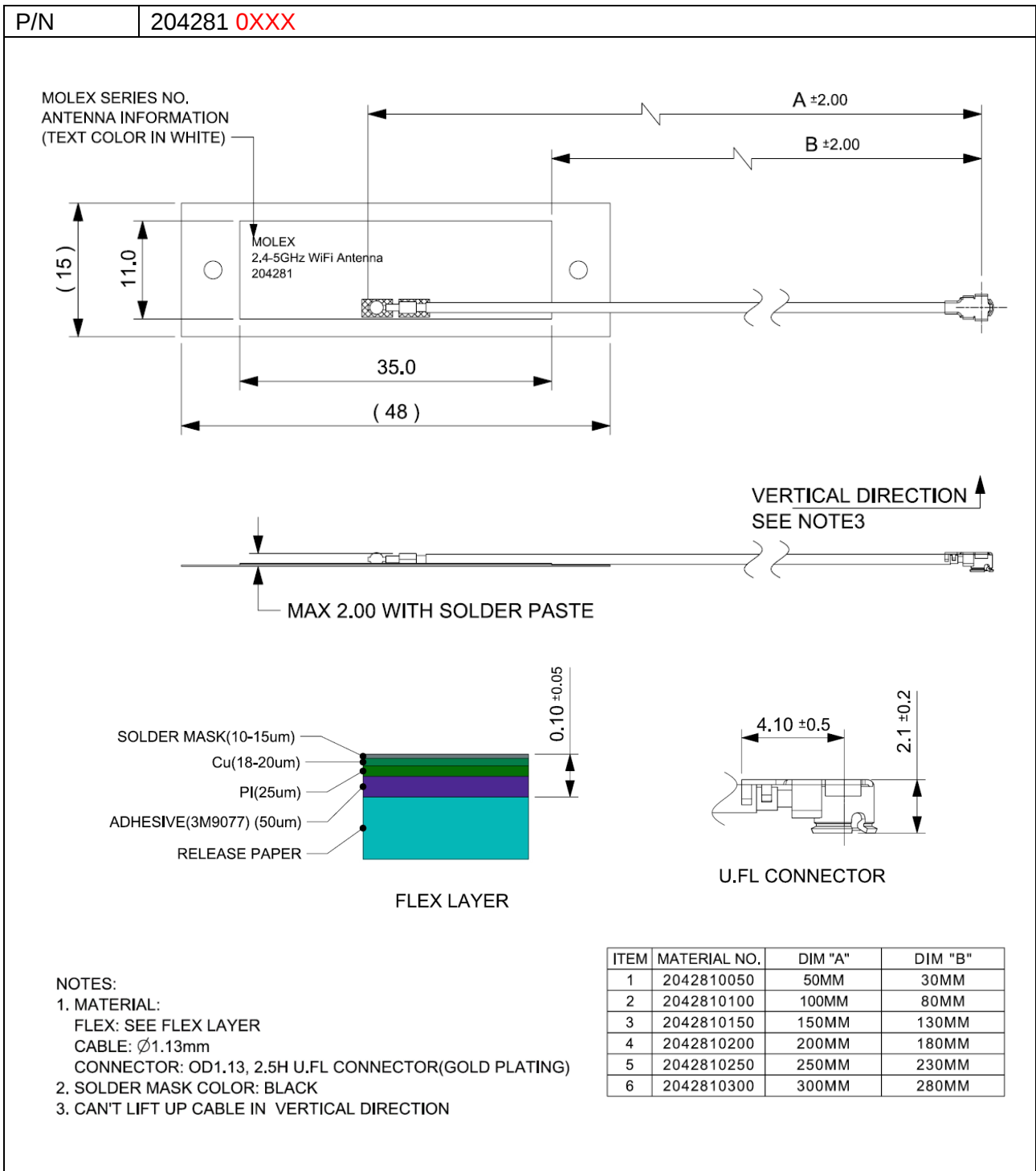
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3.0 GENERAL SPECIFICATION

Product name	WIFI 6E flex cabled side-fed balanced antenna.		
Part number	204281		
Frequency	2.4GHz-2.5GHz	5.15GHz-5.85GHz	5.925GHz-7.125GHz
Polarization	Linear		
Operating with matching	-40°C to 85°C		
Storage with matching	-40°C to 85°C		
RF Power	2 Watts		
Impedance with matching	50 Ohms		
Antenna type	Dipole (Flex)		
Connector type	204281 0XXX	204281 1XXX	
	Compatible MHF-1	Compatible MHF-4	
User Implementation type	Adhesive 3M9077		
Cable diameter	Ø1.13mm		
Cable length	50 mm (P/N for 2042810050/2042811050)		
	100 mm (P/N for 2042810100/2042811100)		
	150 mm (P/N for 2042810150/2042811150)		
	200 mm (P/N for 2042810200/2042811200)		
	250 mm (P/N for 2042810250/2042811250)		
	300 mm (P/N for 2042810300/2042811300)		

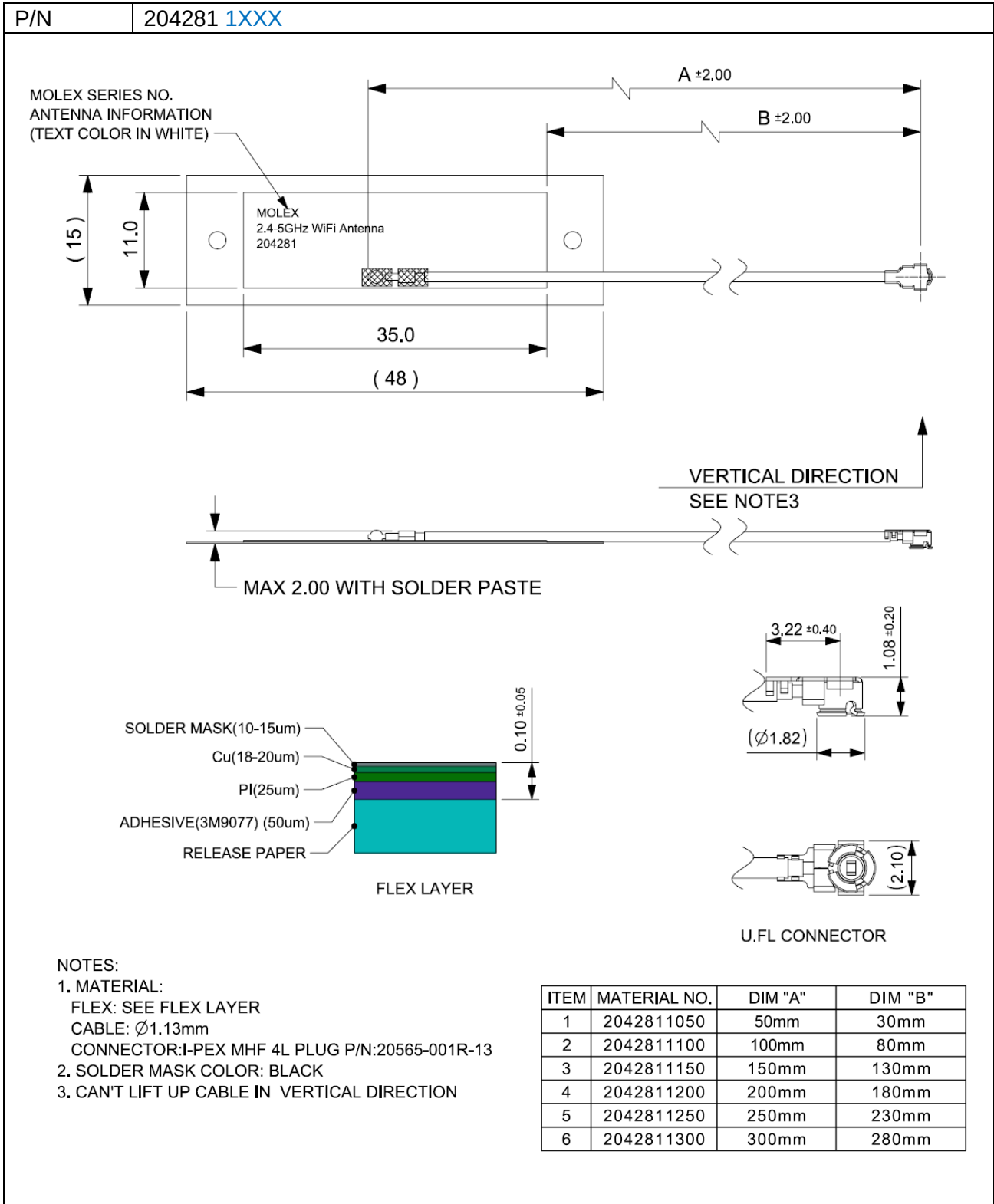
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4.0 PRODUCT STRUCTURE INFORMATION



Mechanical Structure Information for 204281 0XXX

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Mechanical Structure Information for 204281 1XXX

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DOCUMENT NUMBER: PS-2042810100	CREATED / REVISED BY: Kang Cheng 2020/08/26	CHECKED BY: Cooper Zhou 2020/08/26	APPROVED BY: Sary Song 2020/08/26



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5.0 APPLICABLE DOCUMENTS

DOCUMENT	NUMBER	DESCRIPTION
Sale Drawing (SD)	SD-2042810050	Mechanical Dimension of the product
	SD-2042811050	
Application Guide (AS)	AS-2042810100	Antenna Application and surrounding
Packing Drawing (PK)	PK-2042810100	Product packaging specifications

6.0 ANTENNA SPECIFICATION

All measurements are done of the antenna mounted on a PC/ABS material block of 1.5 mm thickness with VNA Agilent E5071C and Over-The-Air (OTA) chamber. All measurements in this document are done with the part no.2042810100 for different cable length.

6.1 ELECTRICAL REQUIREMENT

6.1.1 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 50mm			
P/N	2042810050		
Frequency Range	2.4GHz-2.5GHz	5.15GHz-5.85GHz	5.925-7.125GHz
Peak Gain (Max)	2.2dBi	3.5dBi	4.8dBi
Average Total efficiency	>68%	>70%	>54%
Return Loss	< -10 dB	< -10 dB	< -5 dB

6.1.2 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 100mm			
P/N	2042810100		
Frequency Range	2.4GHz-2.5GHz	5.15GHz-5.85GHz	5.925-7.125GHz
Peak Gain (Max)	2.0dBi	3.3dBi	4.5dBi
Average Total efficiency	>65%	>68%	>50%
Return Loss	< -10 dB	< -10 dB	< -5 dB

6.1.3 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 150mm			
P/N	2042810150		
Frequency Range	2.4GHz-2.5GHz	5.15GHz-5.85GHz	5.925-7.125GHz
Peak Gain (Max)	1.8dBi	3.0dBi	4.2dBi
Average Total efficiency	>62%	>65%	>46%
Return Loss	< -10 dB	< -10 dB	< -5 dB

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6.1.4 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 200mm

P/N	2042810200		
Frequency Range	2.4GHz-2.5GHz	5.15GHz-5.85GHz	5.925-7.125GHz
Peak Gain (Max)	1.6dBi	2.8dBi	3.8dBi
Average Total efficiency	>59%	>60%	>43%
Return Loss	< -10 dB	< -10 dB	< -5 dB

6.1.5 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 250mm

P/N	2042810250		
Frequency Range	2.4GHz-2.5GHz	5.15GHz-5.85GHz	5.925-7.125GHz
Peak Gain (Max)	1.5dBi	2.6dBi	3.5dBi
Average Total efficiency	>56%	>55%	>40%
Return Loss	< -10 dB	< -10 dB	< -5 dB

6.1.6 ELECTRICAL REQUIREMENTS FOR CABLE LENGTH 300mm

P/N	2042810300		
Frequency Range	2.4GHz-2.5GHz	5.15GHz-5.85GHz	5.925-7.125GHz
Peak Gain (Max)	1.3dBi	2.3dBi	3.2dBi
Average Total efficiency	>53%	>50%	>37%
Return Loss	< -10 dB	< -10 dB	< -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.

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6.2 CABLE LOSS

DESCRIPTION	TEST CONDITION	REQUIREMENTS		
Frequency Range	2 GHz~7.125GHz	2.0GHz~3.0GHz	5GHz~6GHz	6GHz~7.125G Hz
Attenuation	1m cable measured by VNA5071C	≤3.5dB/m	≤5.5dB/m	≤6.5dB/m

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

7.0 MECHANICAL SPECIFICATION

All measurements in this document are done with the part no.2042810100 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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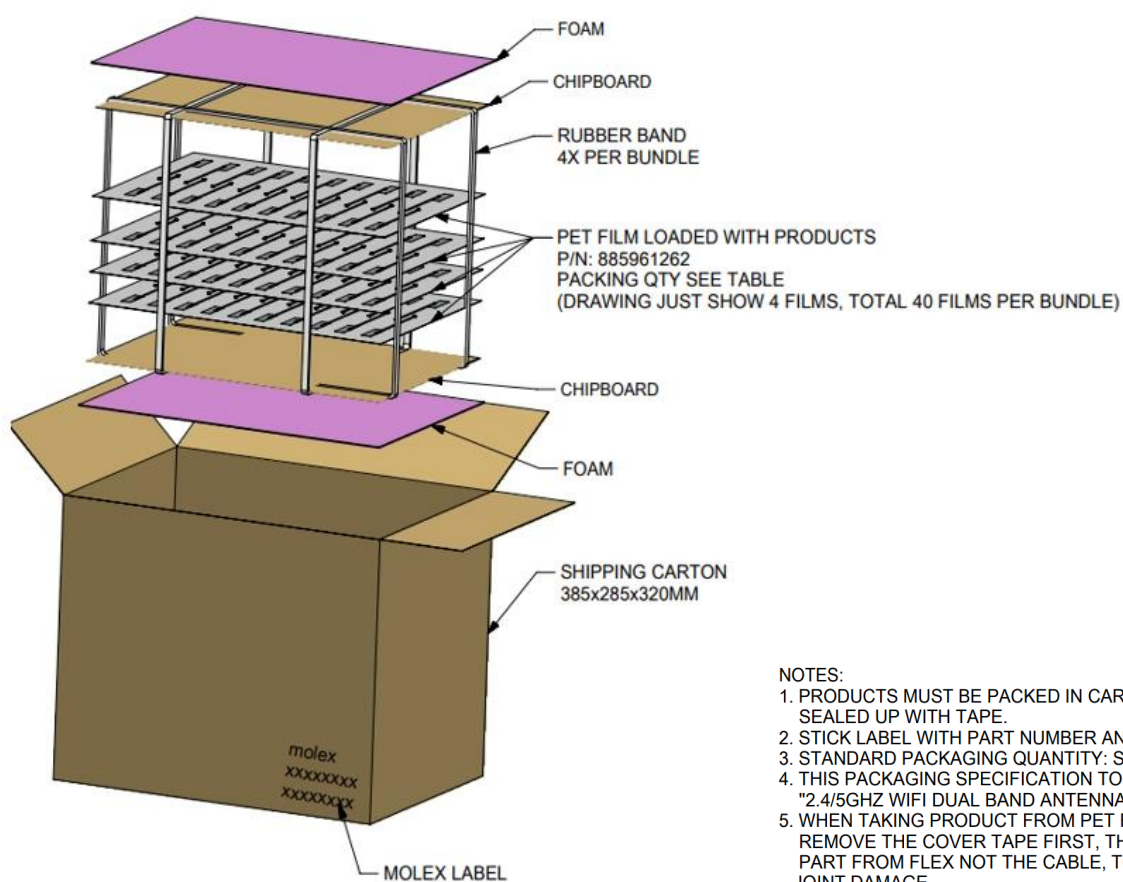
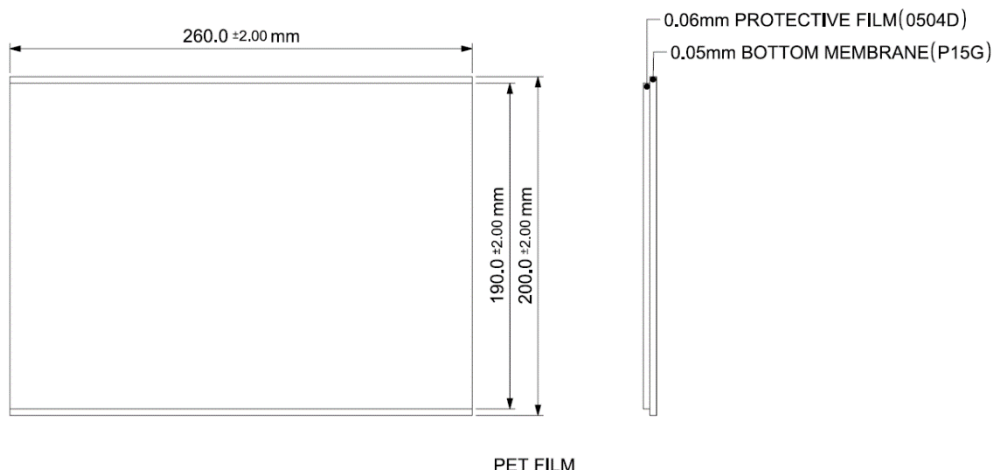
PRODUCT SPECIFICATION

8.0 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 °C. 3. Kept for 2 Hours in an environment with a temperature of 125 °C. 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°C 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 °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 accept.

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9.0 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 "2.4/5GHZ WIFI DUAL BAND 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	FILMS/BUNDLE	BUNDLES/CARTON	PCS/CARTON
2042810050/2042811050	30	40	4	4800PCS
2042810100/2042811100	20	40	5	4000PCS
2042810150/2042811150	12	40	5	2400PCS
2042810200/2042811200	12	40	5	2400PCS
2042810250/2042811250	6	40	5	1200PCS
2042810300/2042811300	6	40	5	1200PCS

PACKAGING INFORMATION FOR 204281 Series

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10.0 CHANGE HISTORY

CHANGE HISTORY		
REV	DATA	DESCRIPTION
D	2020/06/30	Add 6-7.125GHz frequency range
E	2020/08/26	Version D is invalid, please refer to version E

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APPLICATION SPECIFICATION

TITLE

WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA

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8.0 CHANGE HISTORY

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APPLICATION SPECIFICATION

WIFI 6E FLEX CABLED SIDE-FED BALANCED 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: WiFi 6E Flex Cabled Side-fed Balanced Antenna

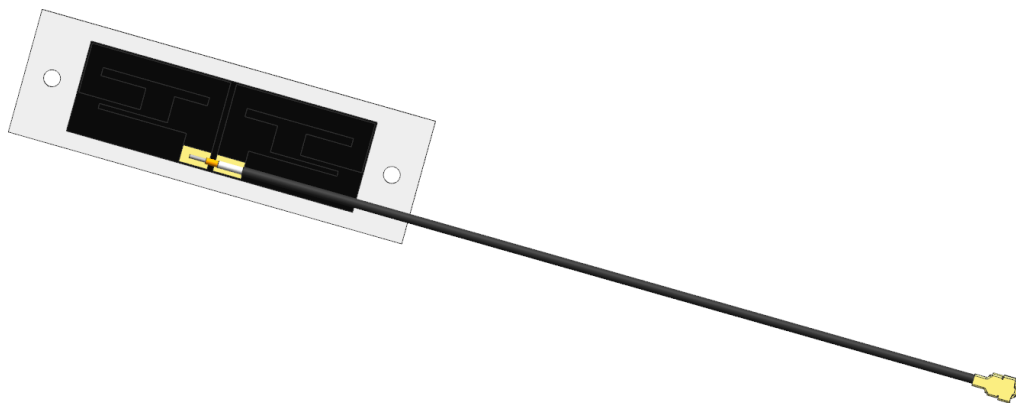
Series Number: 204281

2.2 DESCRIPTION

Series 204281 is a balanced, dipole-type, high efficiency antenna for 2.4/5/6 GHz applications, including Wi-Fi 6E, Bluetooth, Zigbee and others. This antenna is made from poly flexible material with small size 35*11*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-2042810100 for full information.



Molex Antenna 3D View

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3.0 APPLICABLE DOCUMENTS

DOCUMENT	NUMBER	DESCRIPTION
Sale Drawing (SD)	SD-2042810050	Mechanical Dimension of the product
	SD-2042811050	
Product Specification (PS)	PS-2042810100	Product Specification
Packing Drawing (PK)	PK-2042810100	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 E5071C and Over-The-Air (OTA) chamber. All measurements in this document are done with the part no.2042810100 with a cable length of 100mm.

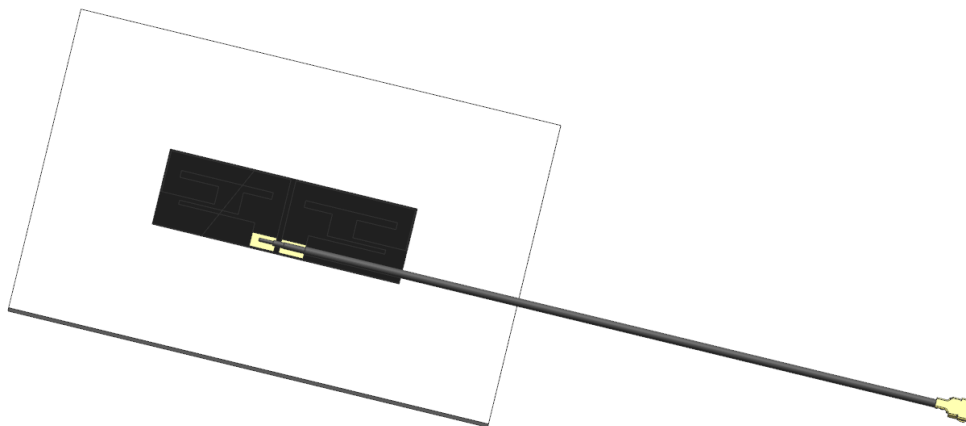


FIGURE4.1.1 ANTENNA LOADED WITH PC/ABS BLOCK OF 1.5 MM THICKNESS

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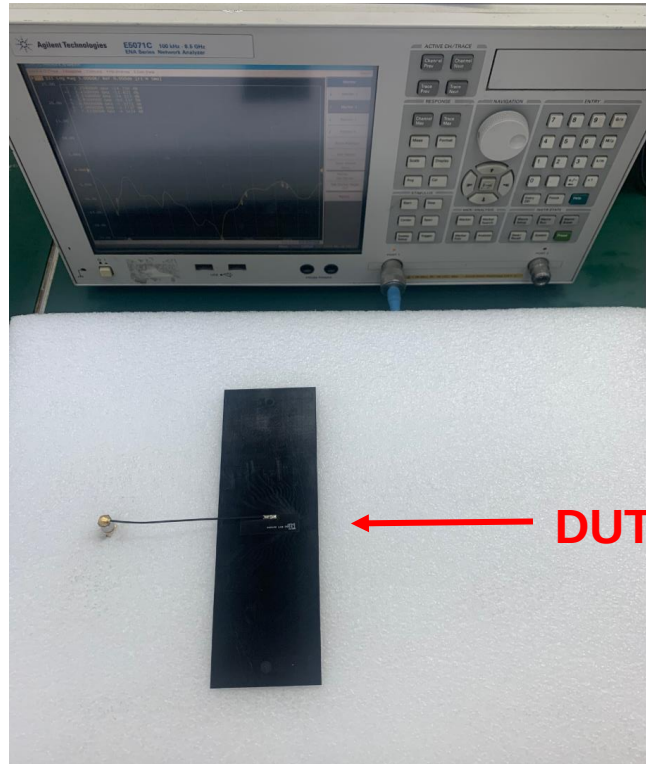


FIGURE4.1.2 ANTENNA LOADED WITH PC/ABS BLOCK OF 1.5 MM THICKNESS WITH VNA

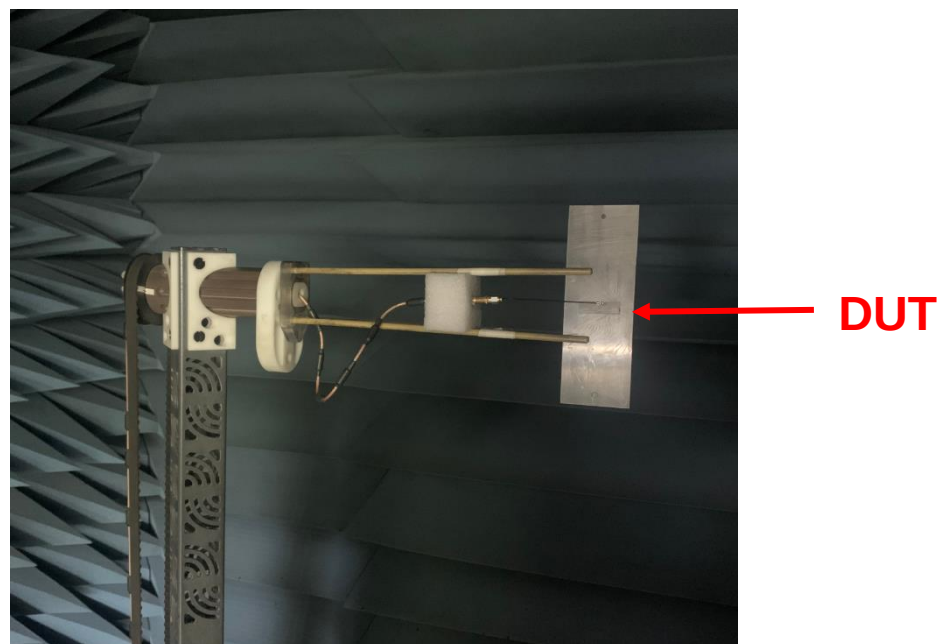


FIGURE4.1.3 ANTENNA LOADED WITH PC/ABS BLOCK OF 1.5 MM THICKNESS WITH OTA CHAMBER

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APPLICATION SPECIFICATION

4.2 ANTENNA PERFORMANCE

DESCRIPTION	EQUIPMENT	REQUIREMENT		
Frequency Range	VNA E5071C	2.4-2.5GHz	5.15-5.85GHz	5.925-7.125GHz
Return Loss	VNA E5071C	< -10 dB	< -10 dB	< -5 dB
Peak Gain (Max)	OTA Chamber	2.0dBi	3.3dBi	4.5dBi
Average Total Efficiency	OTA Chamber	>65%	>68%	>50%
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 a cable length of 100mm.

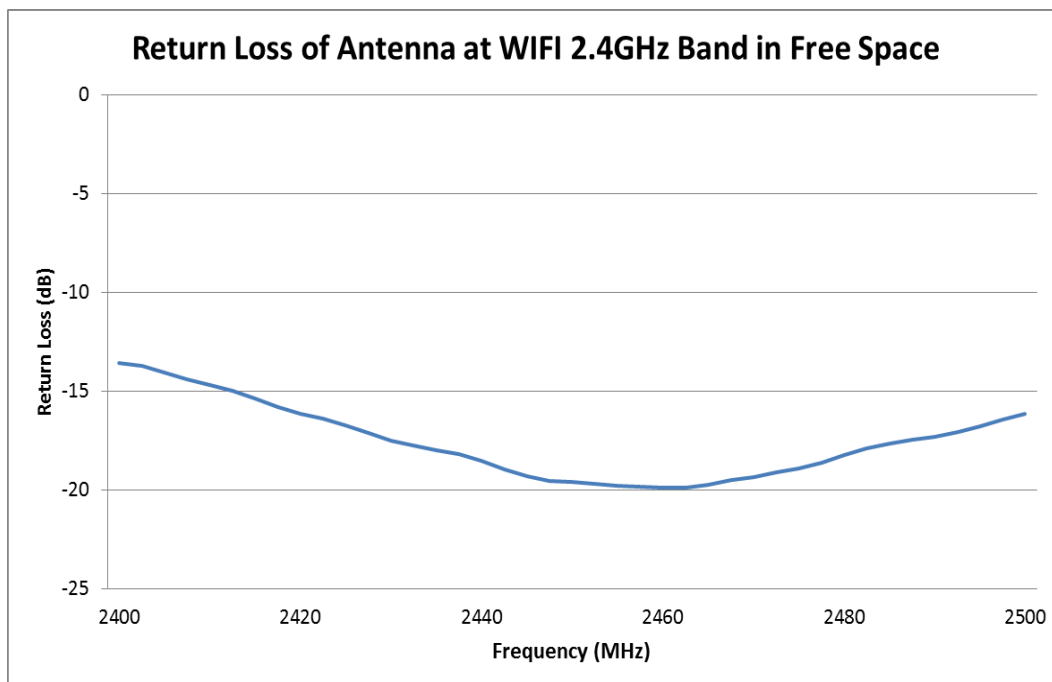


FIGURE 4.3.1 RETURN LOSS OF ANTENNA AT 2.4GHZ BAND IN FREE SPACE

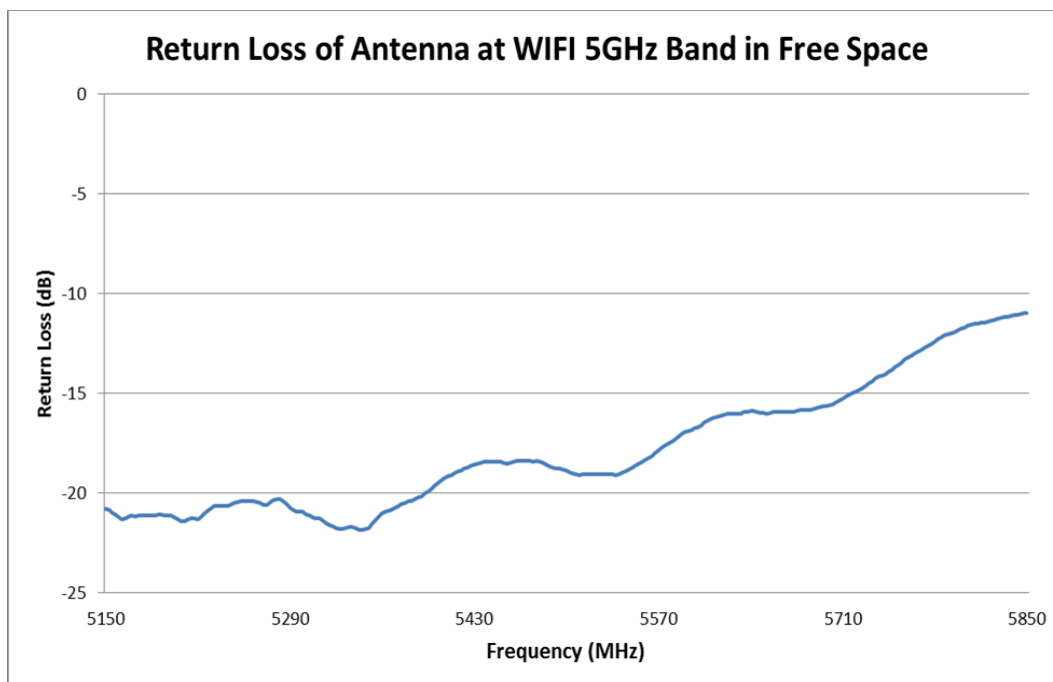


FIGURE 4.3.2 RETURN LOSS OF ANTENNA AT 5GHZ BAND IN FREE SPACE

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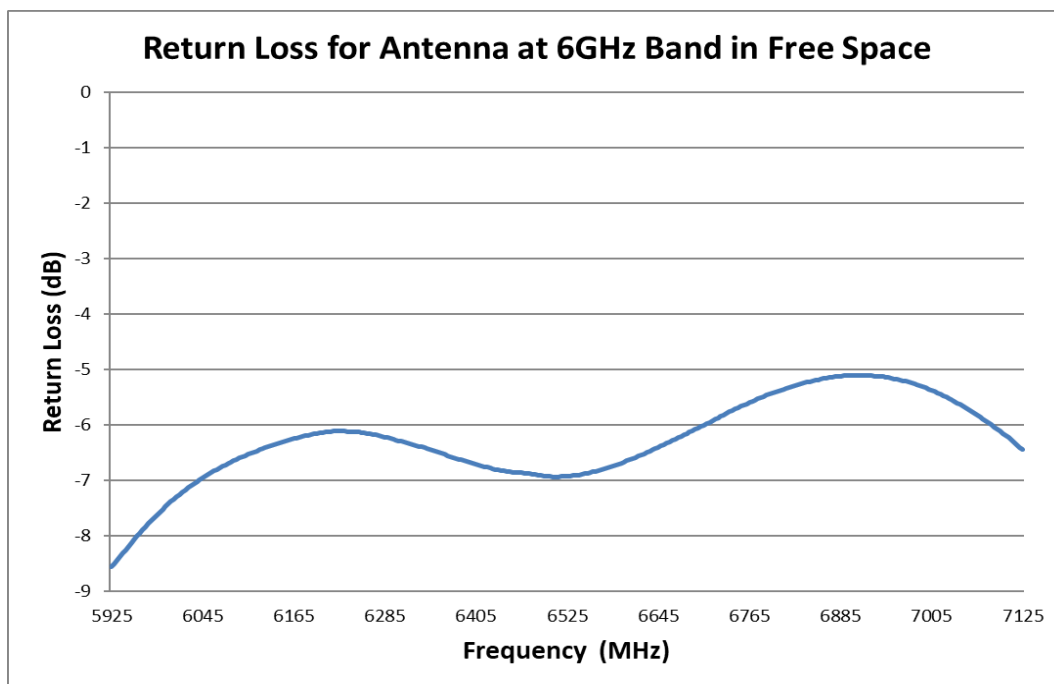


FIGURE 4.3.3 RETURN LOSS OF ANTENNA AT 6GHZ BAND IN FREE SPACE

4.4 EFFICIENCY PLOT

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

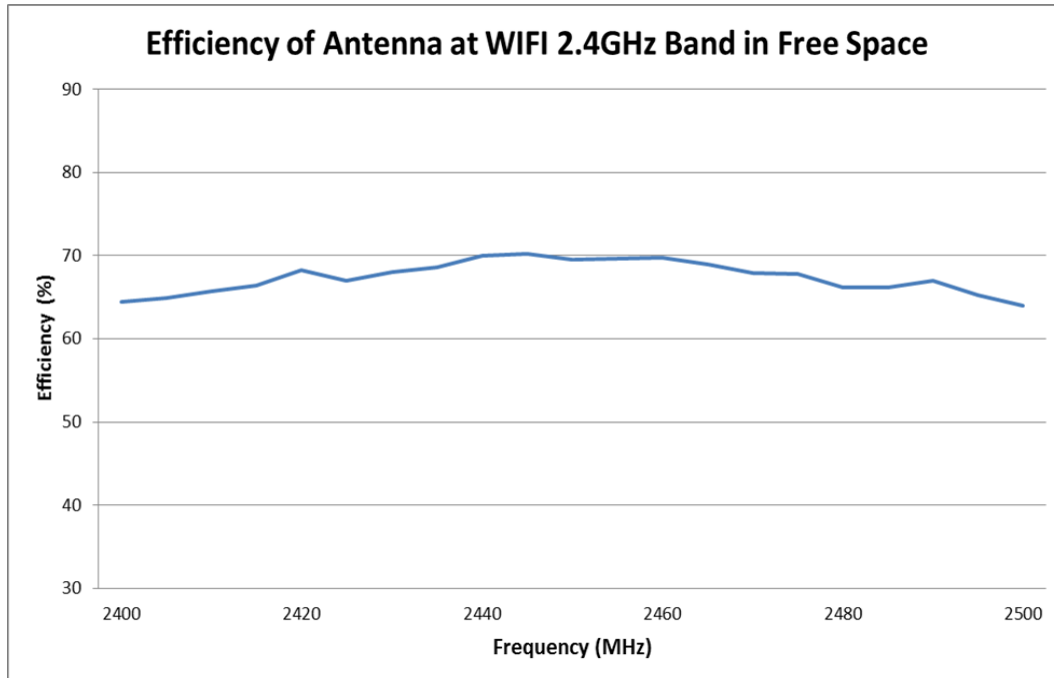


FIGURE 4.4.1 EFFICIENCY OF ANTENNA AT 2.4GHZ BAND IN FREE SPACE

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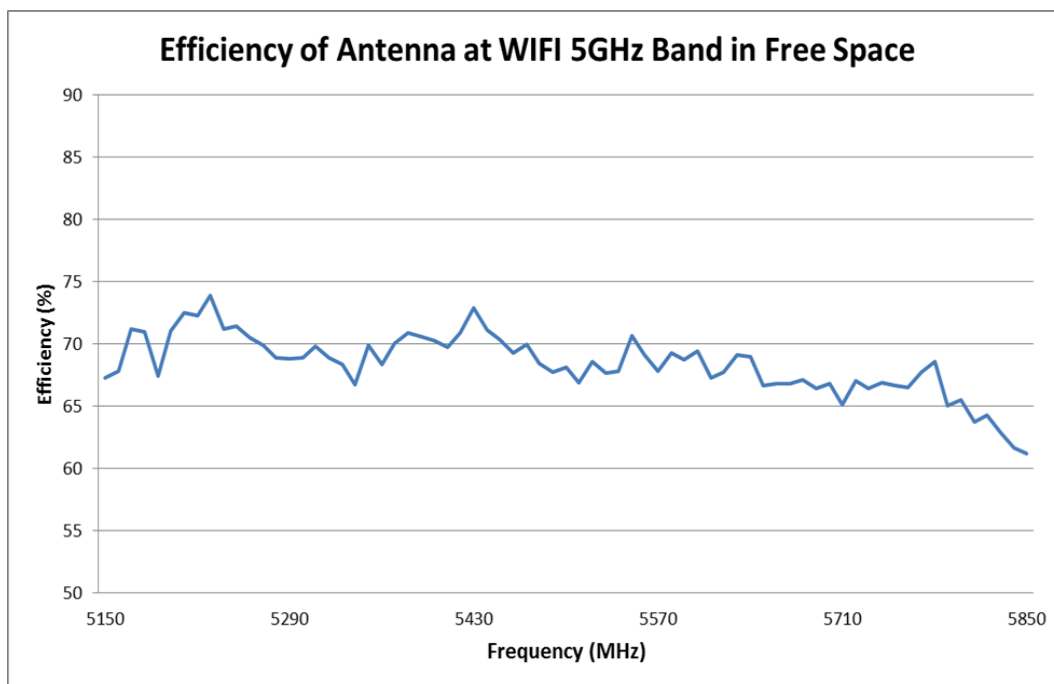


FIGURE 4.4.2 EFFICIENCY OF ANTENNA AT 5GHZ BAND IN FREE SPACE

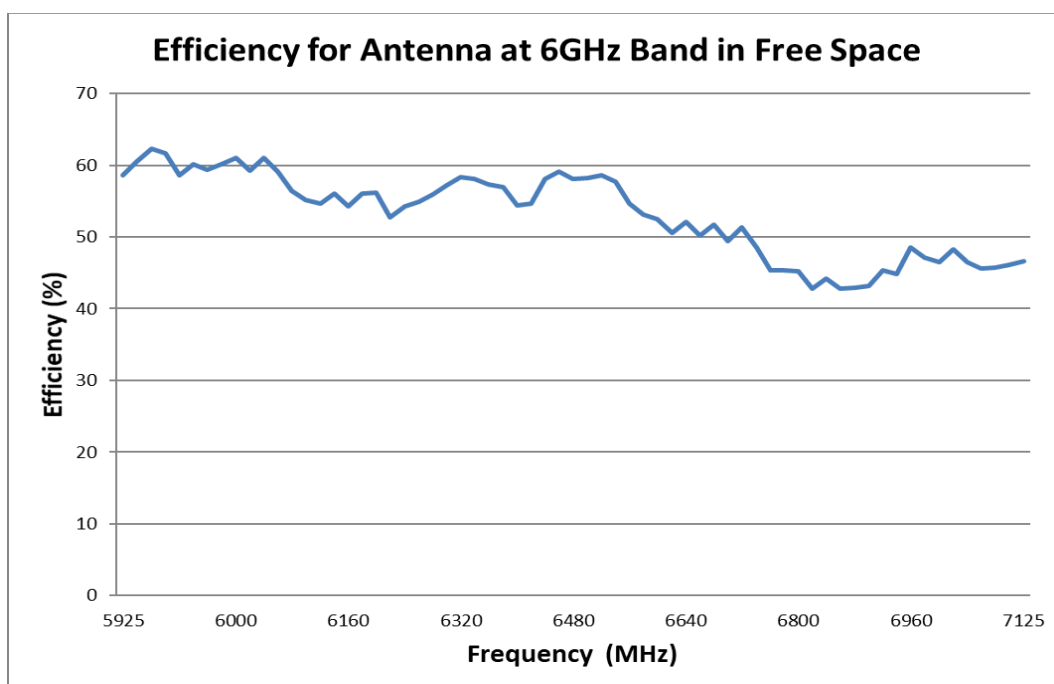


FIGURE 4.4.3 EFFICIENCY OF ANTENNA AT 6GHZ BAND IN FREE SPACE

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4.5 RADIATION PATTERN

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

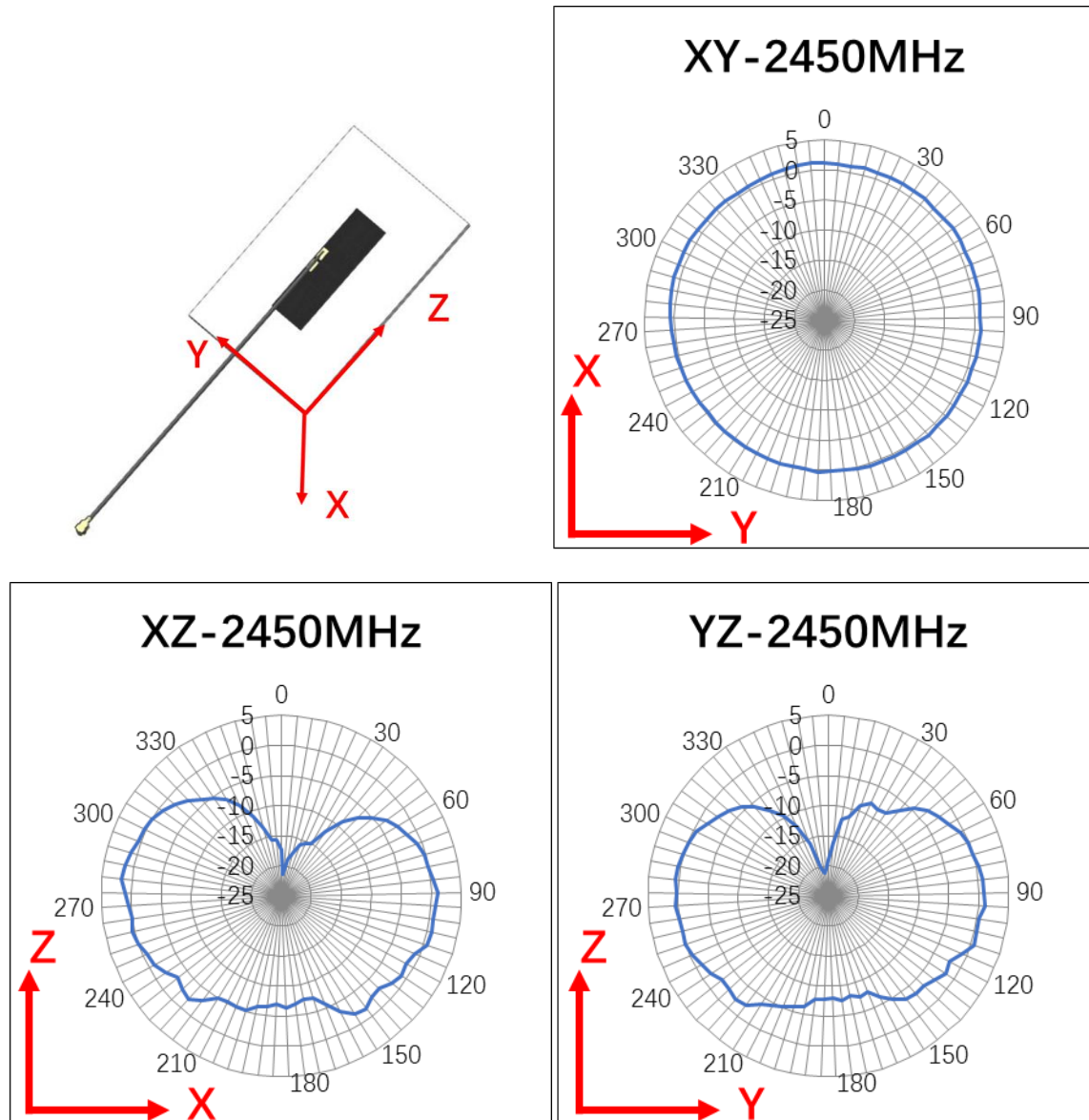


FIGURE 4.5.1 2D RADIATION PATTERN OF ANTENNA AT 2450MHZ IN FREE SPACE

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
E	EC No: 644053 DATE: 2020/08/26	WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	9 of 28
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2042810100	Liu Hai 2020/08/26	Cheng Kang 2020/08/26	Andy Zhang 2020/08/26

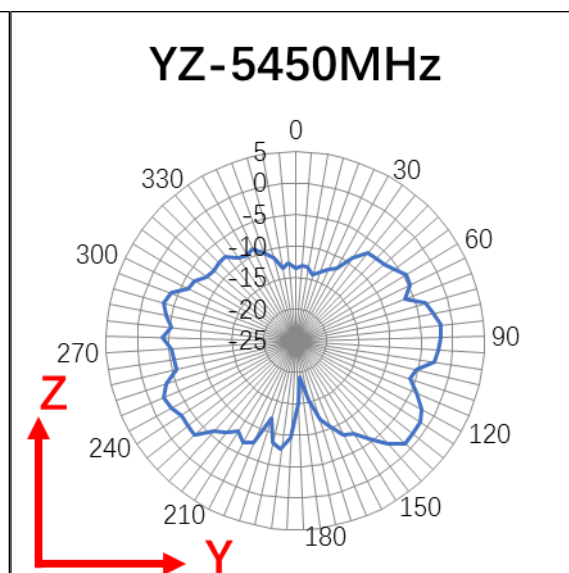
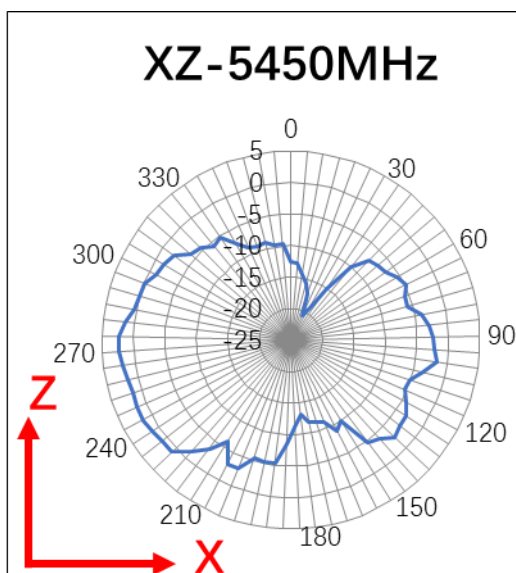
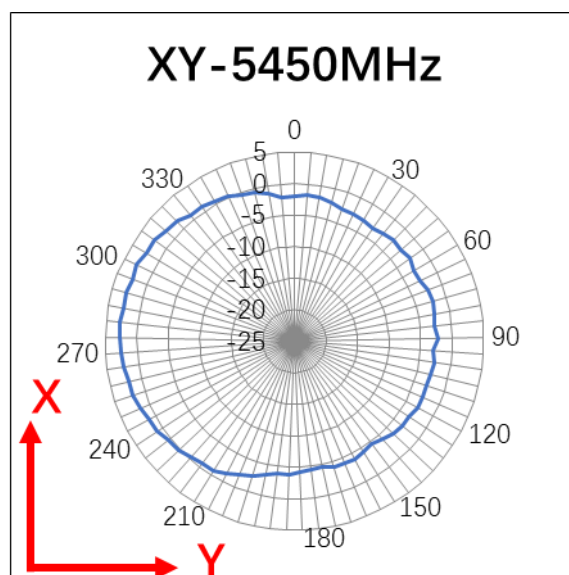
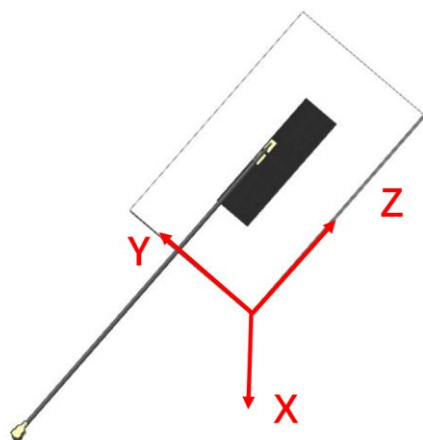


FIGURE 4.5.2 2D RADIATION PATTERN OF ANTENNA AT 5450MHZ IN FREE SPACE

REVISION: E	ECR/ECN INFORMATION: EC No: 644053 DATE: 2020/08/26	TITLE: WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	SHEET No. 10 of 28
DOCUMENT NUMBER: AS-2042810100	CREATED / REVISED BY: Liu Hai 2020/08/26	CHECKED BY: Cheng Kang 2020/08/26	APPROVED BY: Andy Zhang 2020/08/26

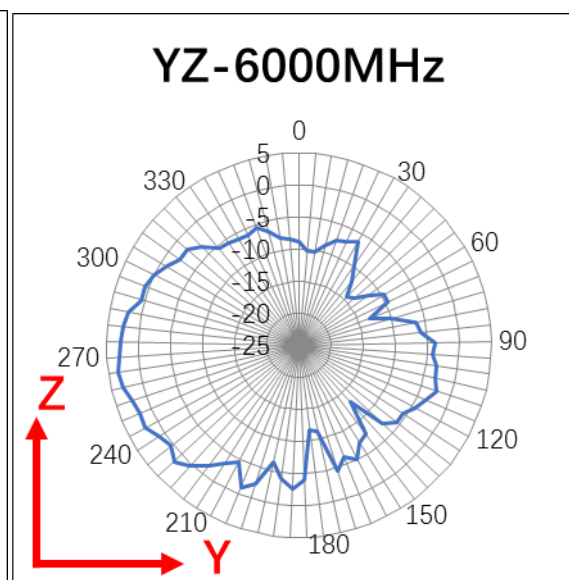
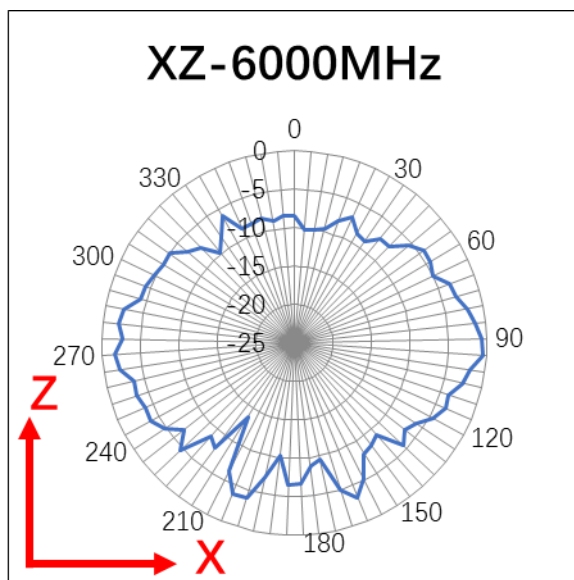
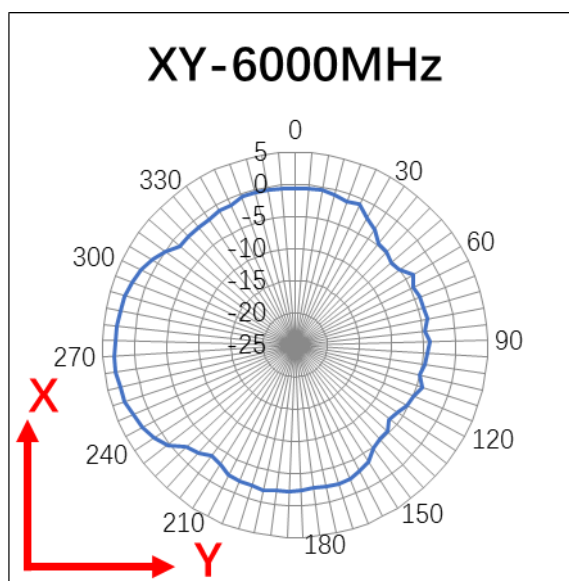
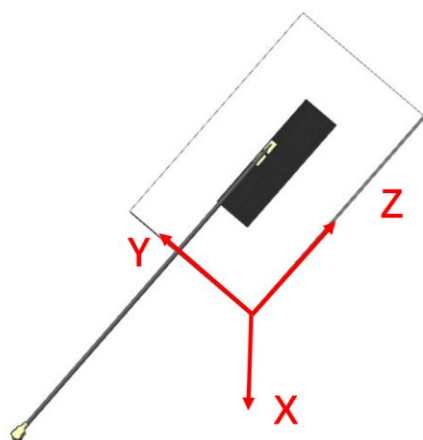


FIGURE 4.5.3 2D RADIATION PATTERN OF ANTENNA AT 6000MHZ IN FREE SPACE

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
E	EC No: 644053 DATE: 2020/08/26	WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	11 of 28
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2042810100	Liu Hai 2020/08/26	Cheng Kang 2020/08/26	Andy Zhang 2020/08/26

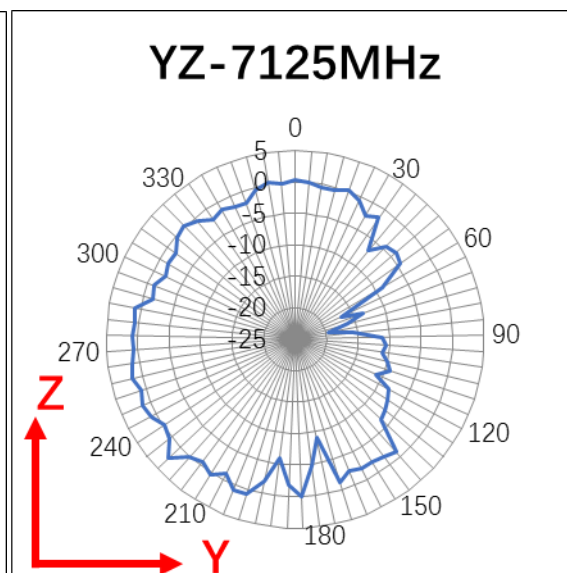
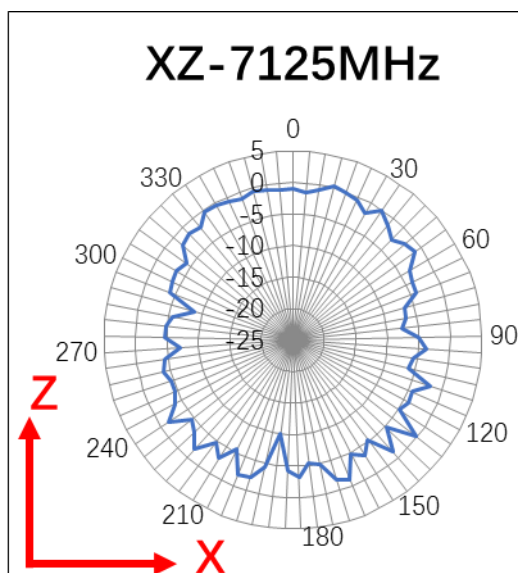
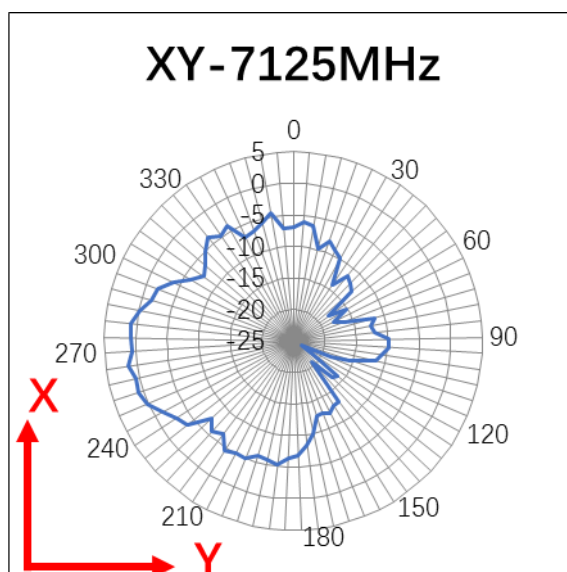
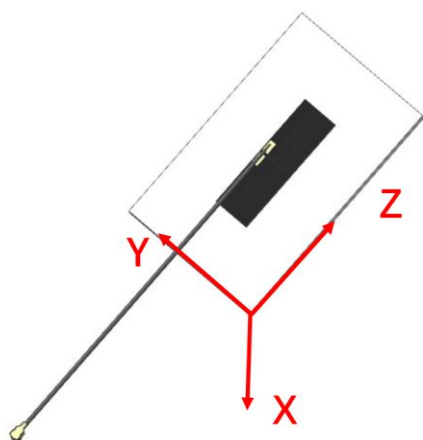


FIGURE 4.5.4 2D RADIATION PATTERN OF ANTENNA AT 7125MHZ IN FREE SPACE

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
E	EC No: 644053 DATE: 2020/08/26	WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	12 of 28
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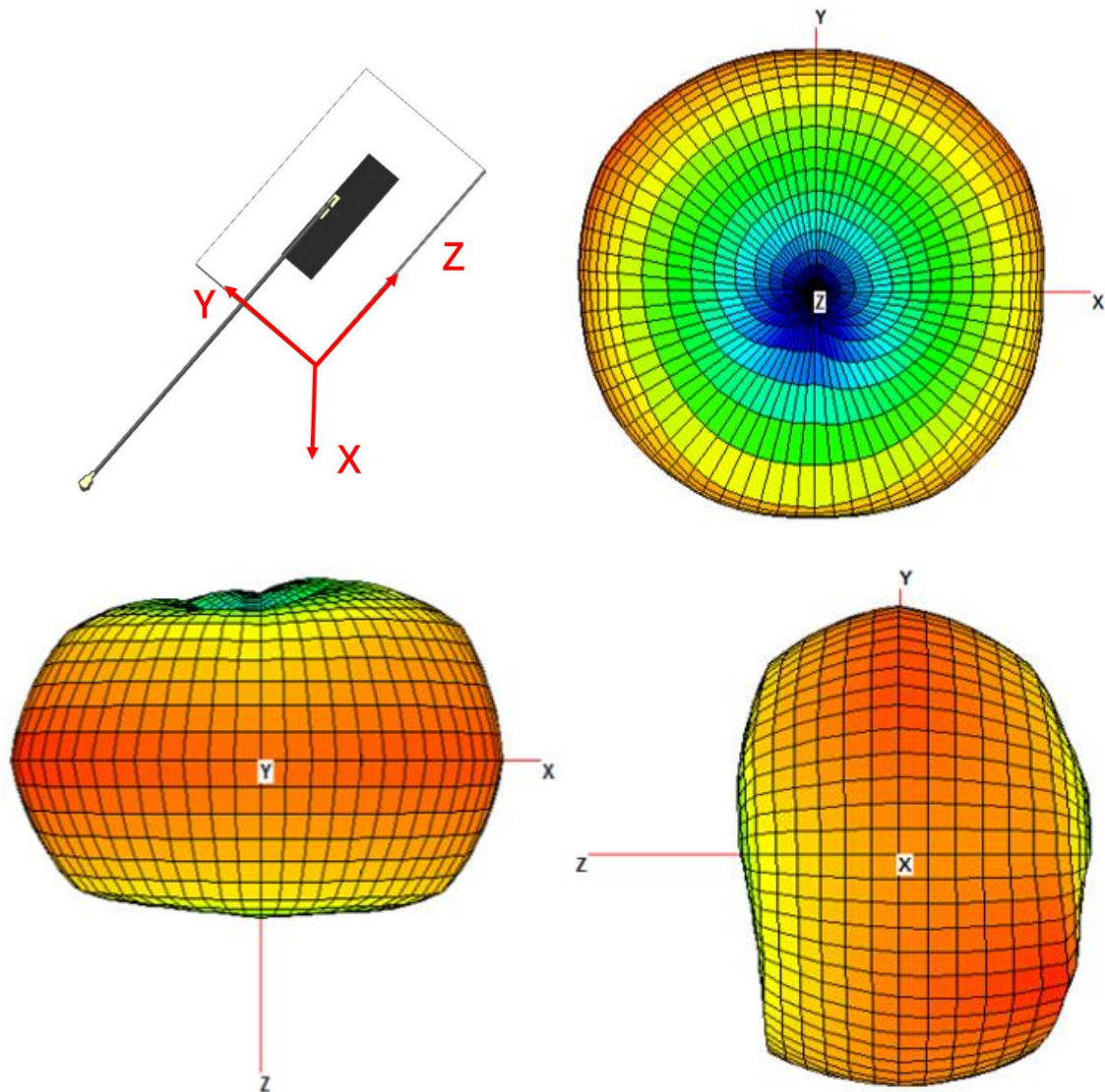


FIGURE 4.5.5 3D RADIATION PATTERN OF ANTENNA AT 2450MHZ BAND IN FREE SPACE

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
E	EC No: 644053 DATE: 2020/08/26	WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	13 of 28
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2042810100	Liu Hai 2020/08/26	Cheng Kang 2020/08/26	Andy Zhang 2020/08/26

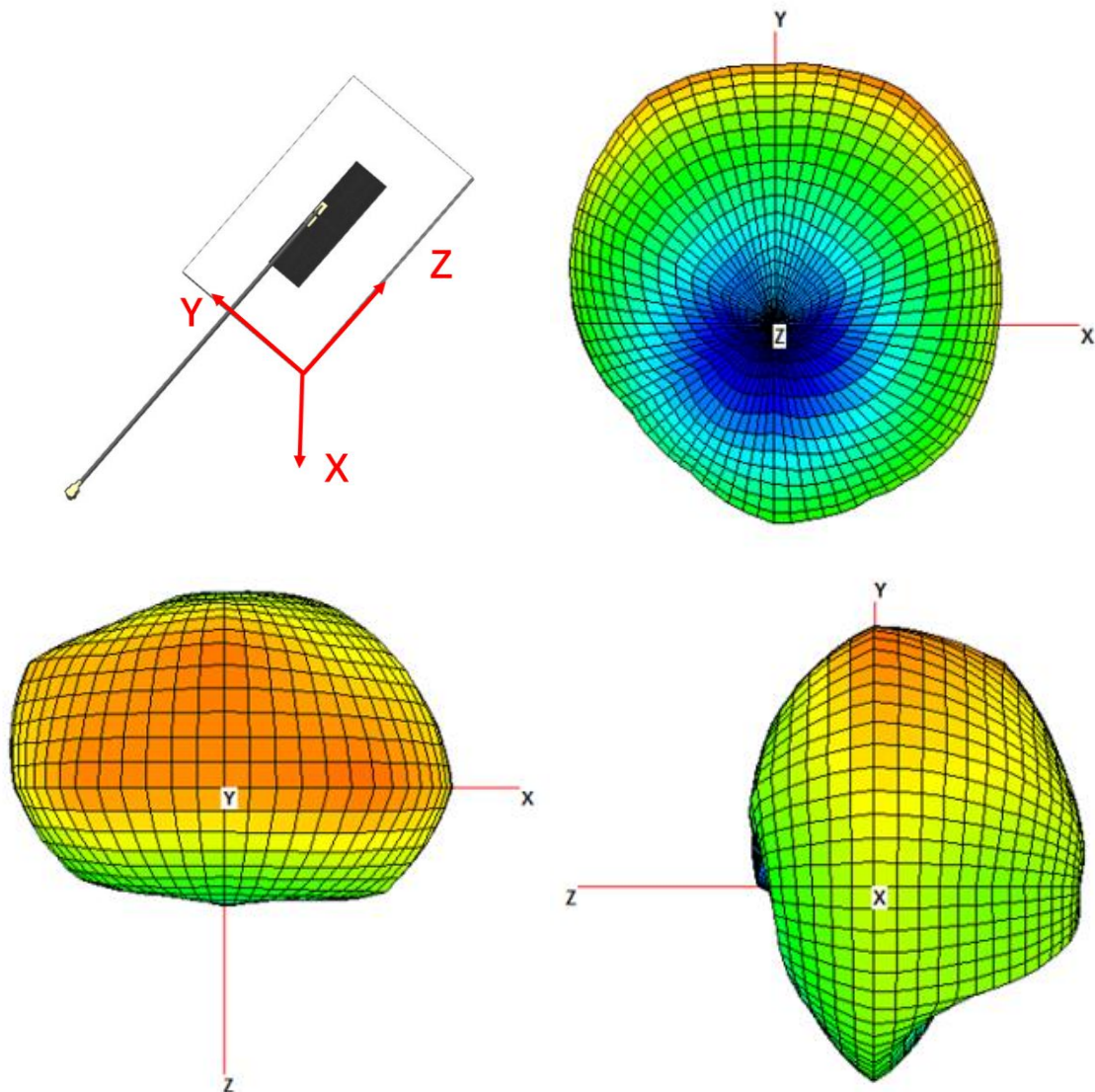


FIGURE 4.5.6 3D RADIATION PATTERN OF ANTENNA AT 5450MHZ BAND IN FREE SPACE

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
E	EC No: 644053 DATE: 2020/08/26	WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	14 of 28
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
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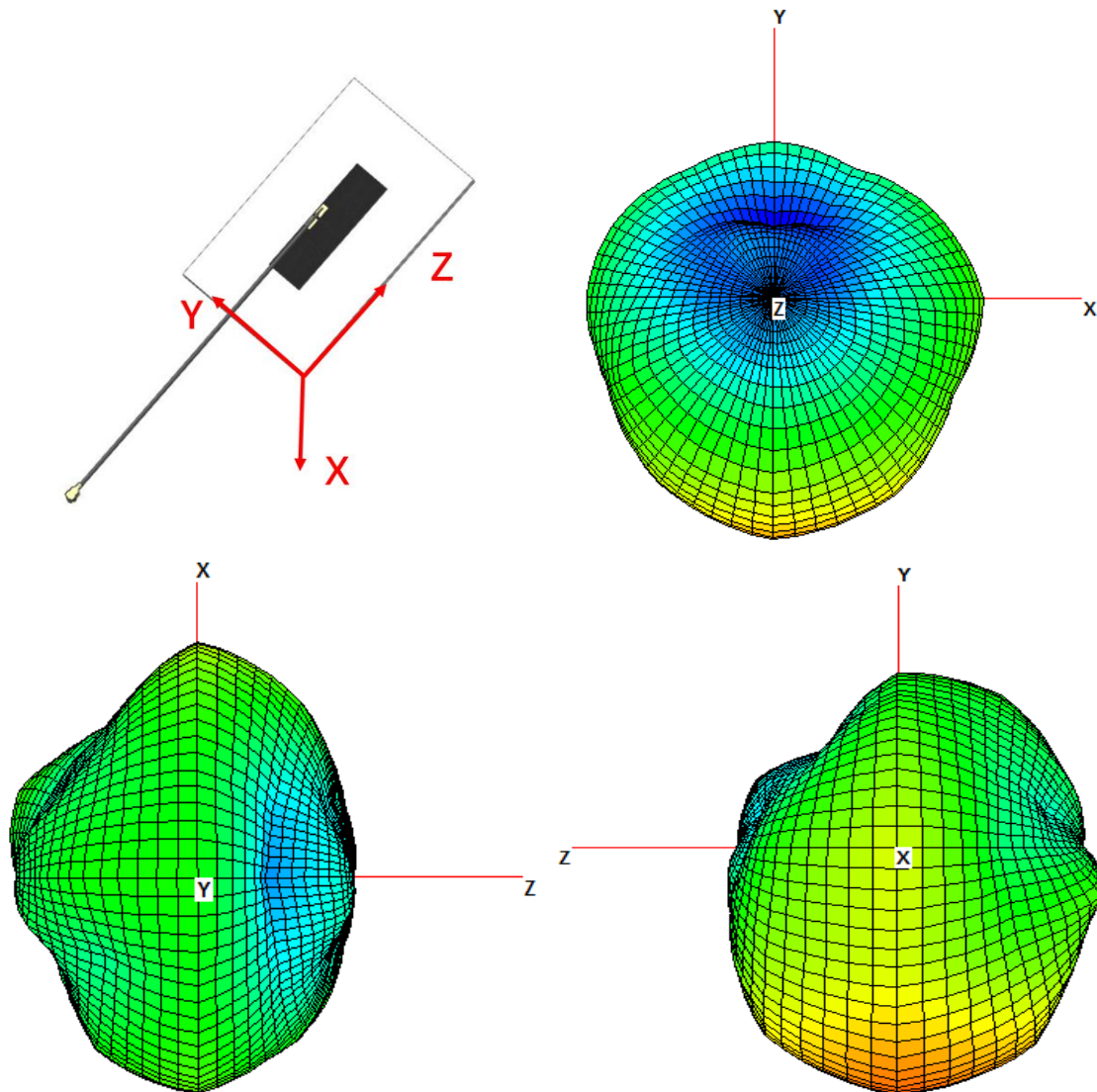


FIGURE 4.5.7 3D RADIATION PATTERN OF ANTENNA AT 6000MHZ BAND IN FREE SPACE

REVISION: E	ECR/ECN INFORMATION: EC No: 644053 DATE: 2020/08/26	TITLE: WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	SHEET No. 15 of 28
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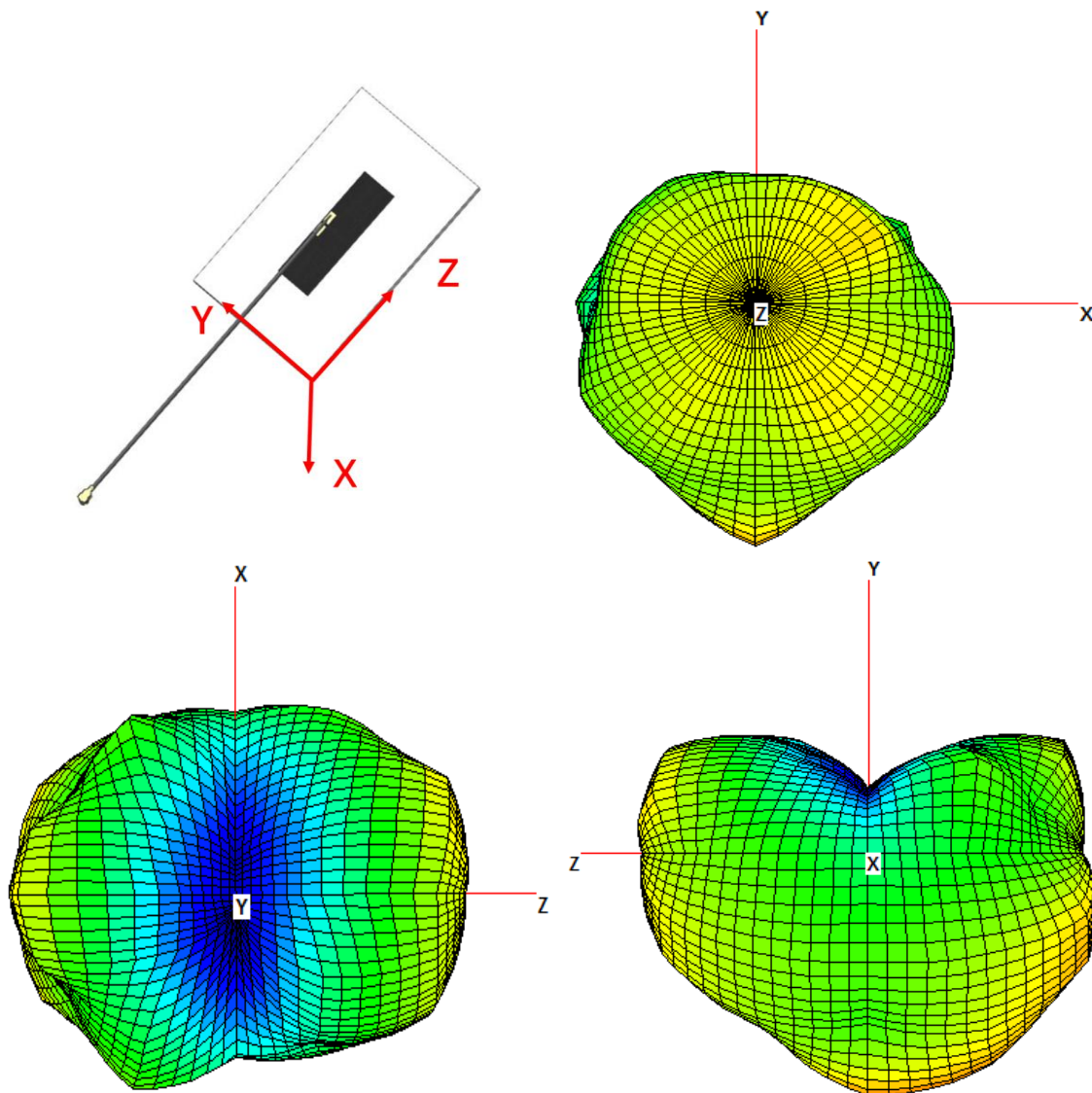


FIGURE 4.5.8 3D RADIATION PATTERN OF ANTENNA AT 7125MHZ BAND IN FREE SPACE

REVISION: E	ECR/ECN INFORMATION: EC No: 644053 DATE: 2020/08/26	TITLE: WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	SHEET No. 16 of 28
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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 $ra < 1.6\mu m$ and need to clean the surface before sticking this product. The antenna cannot be placed on a metallic surface.

5.1 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 RECOMMENDED CABLE BENDING RANGE



FIGURE 5.2.2 UNRECOMMENDED CABLE BENDING

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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 15mm to achieve acceptable RF performance.

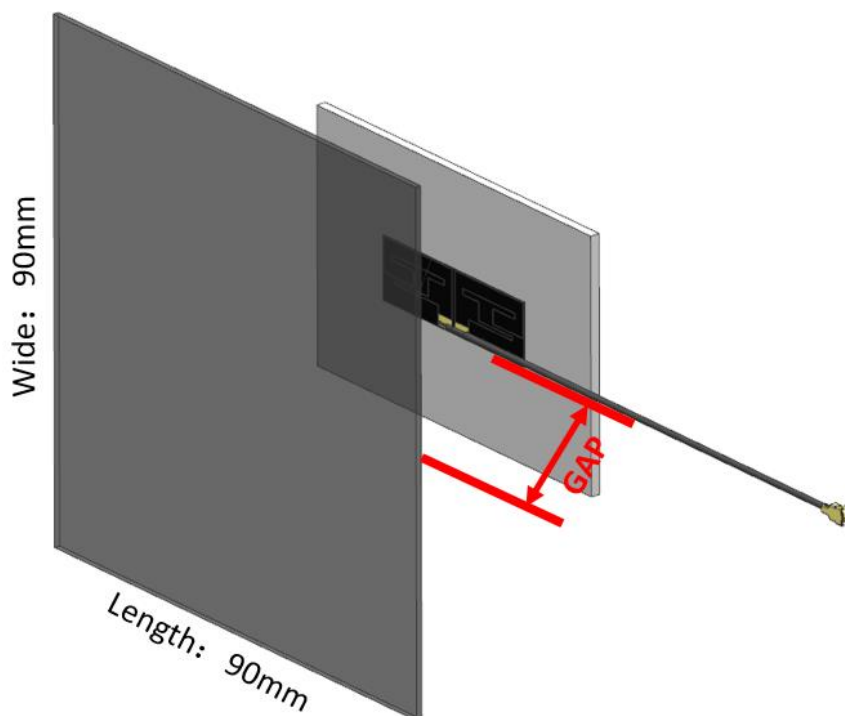


FIGURE 6.1.1 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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.

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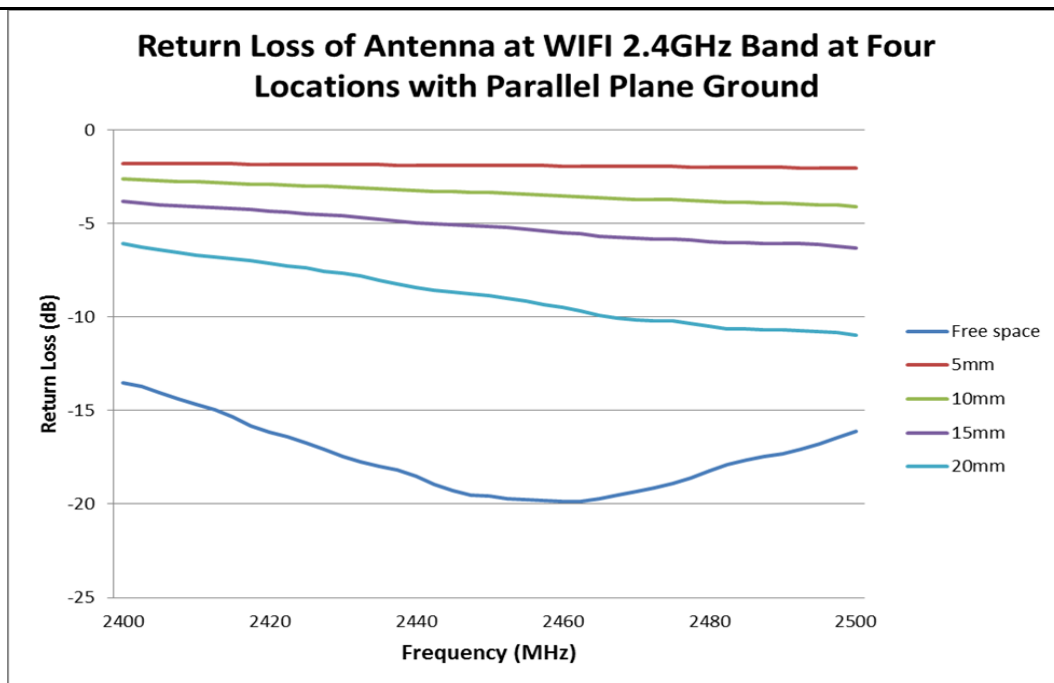


FIGURE 6.1.2 RETURN LOSS OF ANTENNA AT 2.4GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

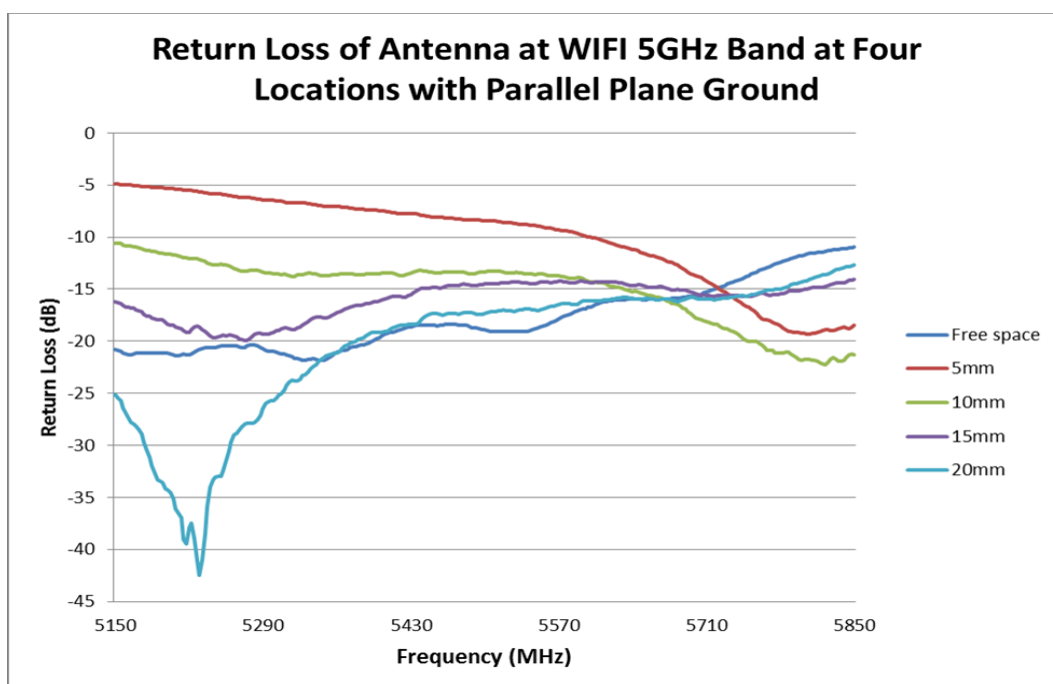


FIGURE 6.1.3 RETURN LOSS OF ANTENNA AT 5GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION: E	ECR/ECN INFORMATION: EC No: 644053 DATE: 2020/08/26	TITLE: WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	SHEET No. 19 of 28
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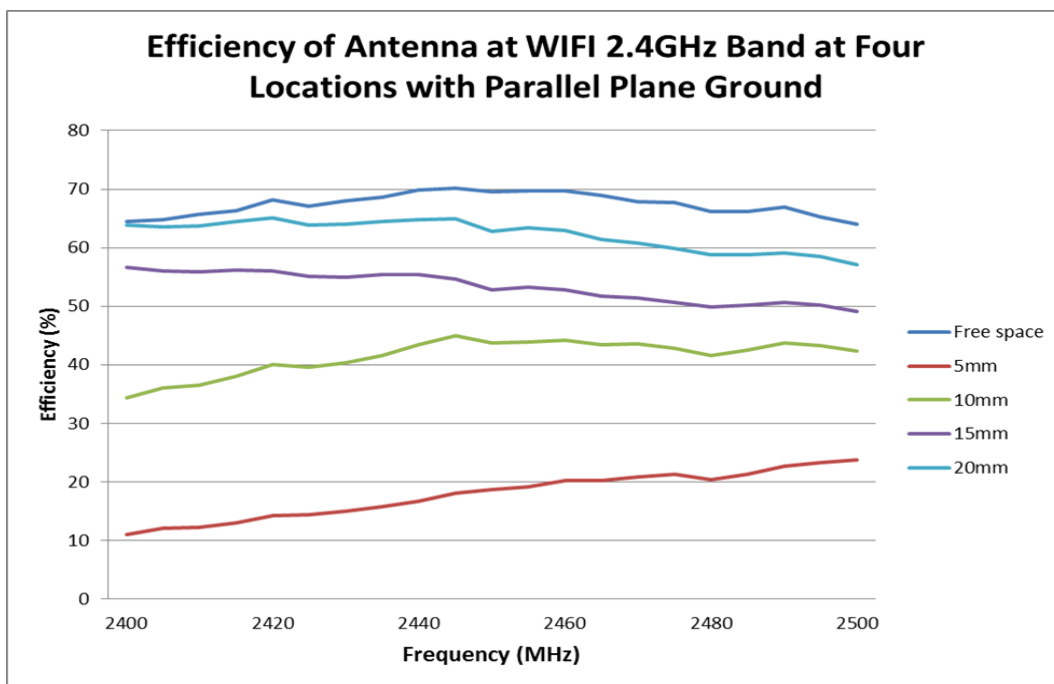


FIGURE 6.1.4 EFFICIENCY OF ANTENNA AT 2.4GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

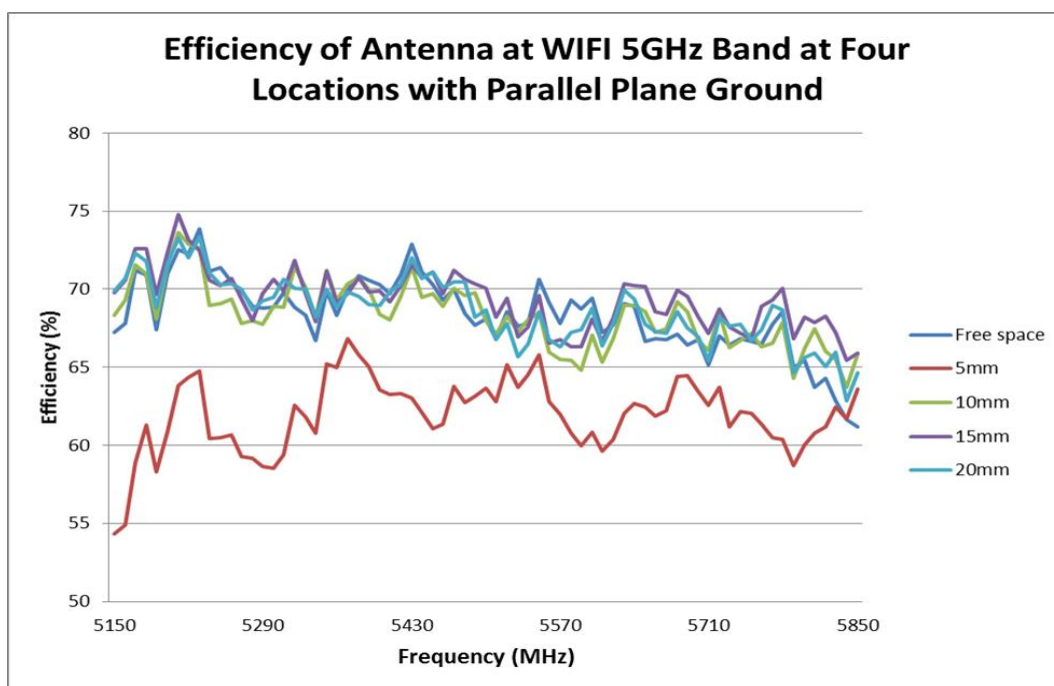


FIGURE 6.1.5 EFFICIENCY OF ANTENNA AT 5GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION: E	ECR/ECN INFORMATION: EC No: 644053 DATE: 2020/08/26	TITLE: WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	SHEET No. 20 of 28
DOCUMENT NUMBER: AS-2042810100	CREATED / REVISED BY: Liu Hai 2020/08/26	CHECKED BY: Cheng Kang 2020/08/26	APPROVED BY: Andy Zhang 2020/08/26

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 15mm to achieve acceptable RF performance.

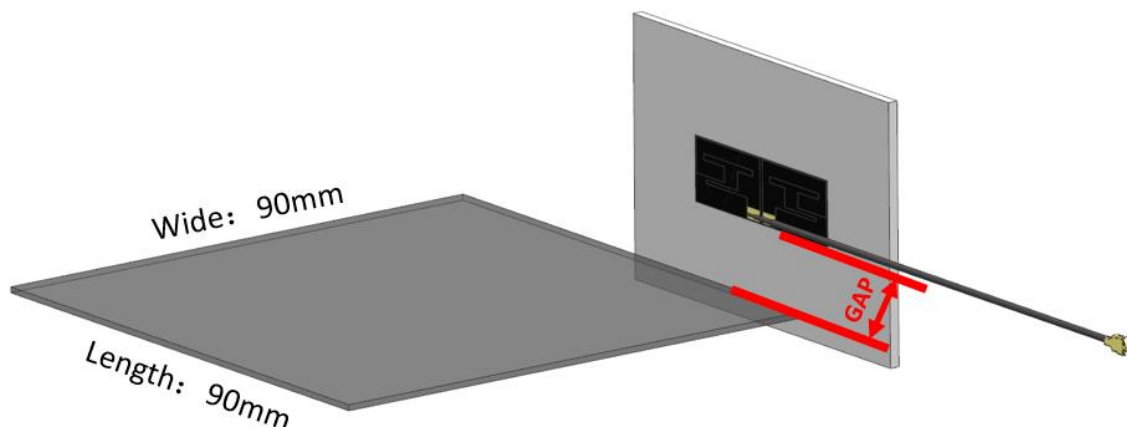


FIGURE 6.2.1 FOUR LOCATIONS WITH VERTICAL PLANE GROUND

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.

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AS-2042810100	Liu Hai 2020/08/26	Cheng Kang 2020/08/26	Andy Zhang 2020/08/26

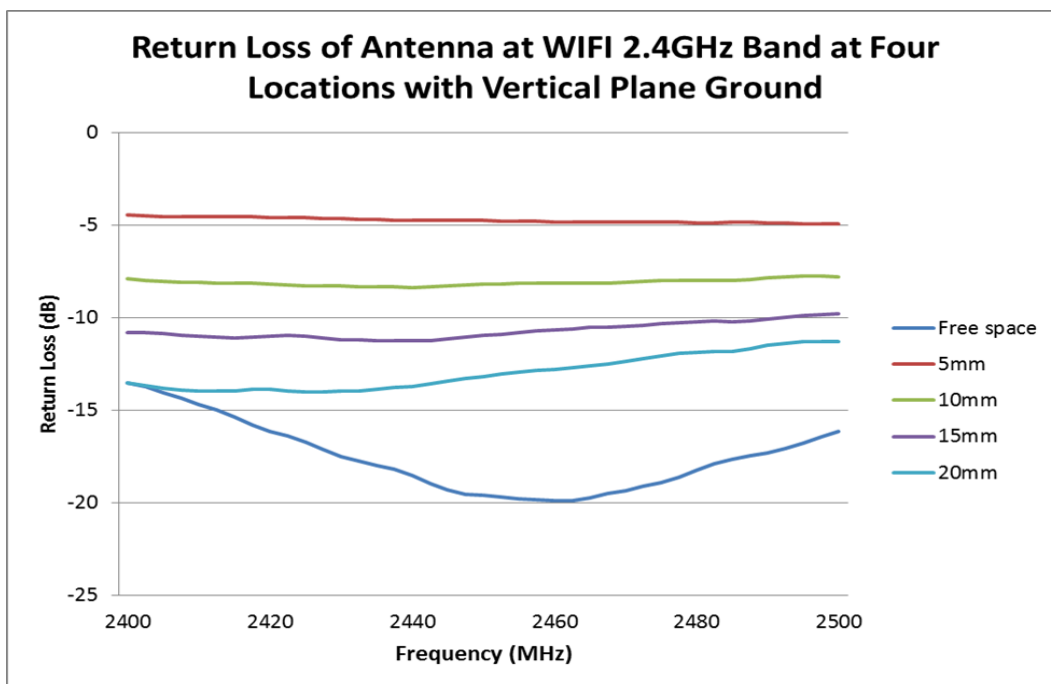


FIGURE 6.2.2 RETURN LOSS OF ANTENNA AT 2.4GHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

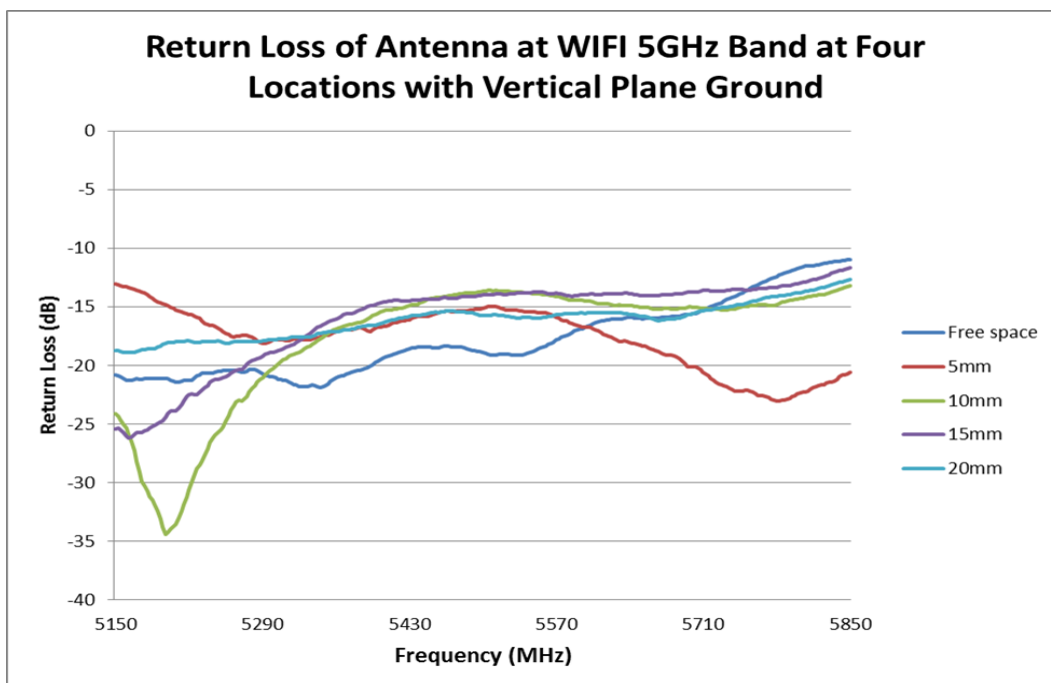


FIGURE 6.2.3 RETURN LOSS OF ANTENNA AT 5GHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

REVISION: E	ECR/ECN INFORMATION: EC No: 644053 DATE: 2020/08/26	TITLE: WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	SHEET No. 22 of 28
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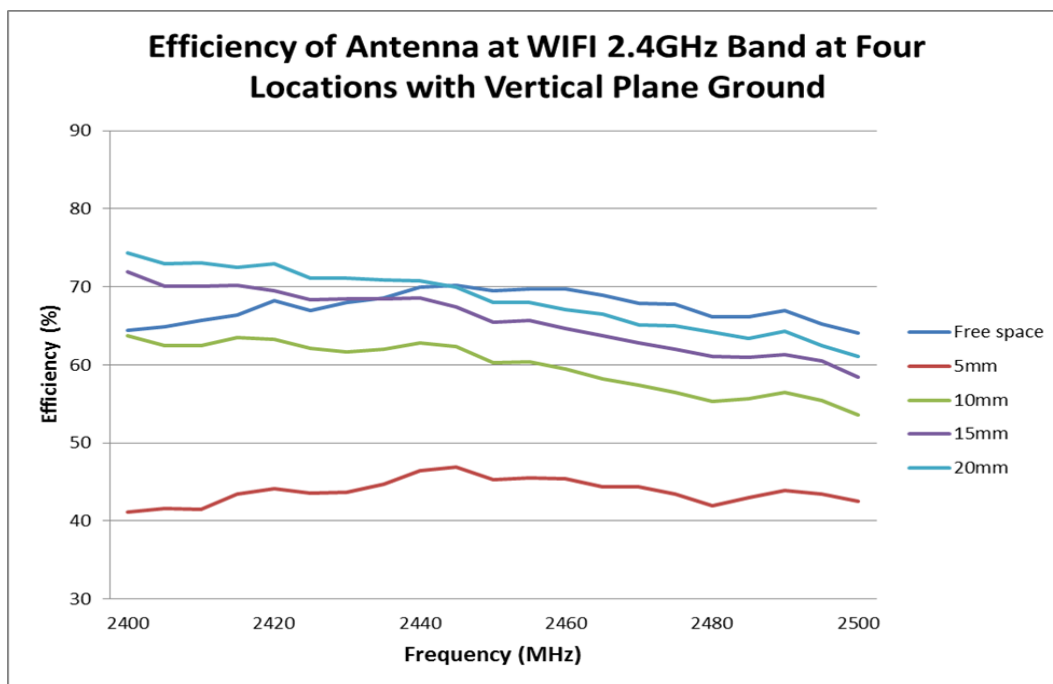


FIGURE 6.2.4 EFFICIENCY OF ANTENNA AT 2.4GHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

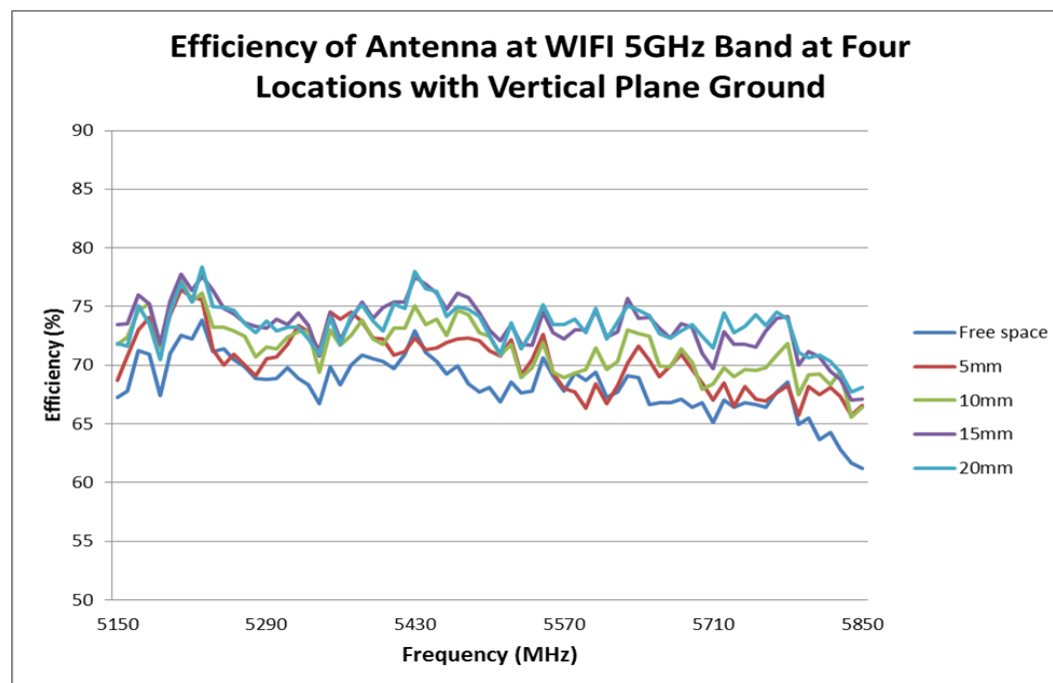


FIGURE 6.2.5 EFFICIENCY OF ANTENNA AT 5GHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

REVISION: E	ECR/ECN INFORMATION: EC No: 644053 DATE: 2020/08/26	TITLE: WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	SHEET No. 23 of 28
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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.

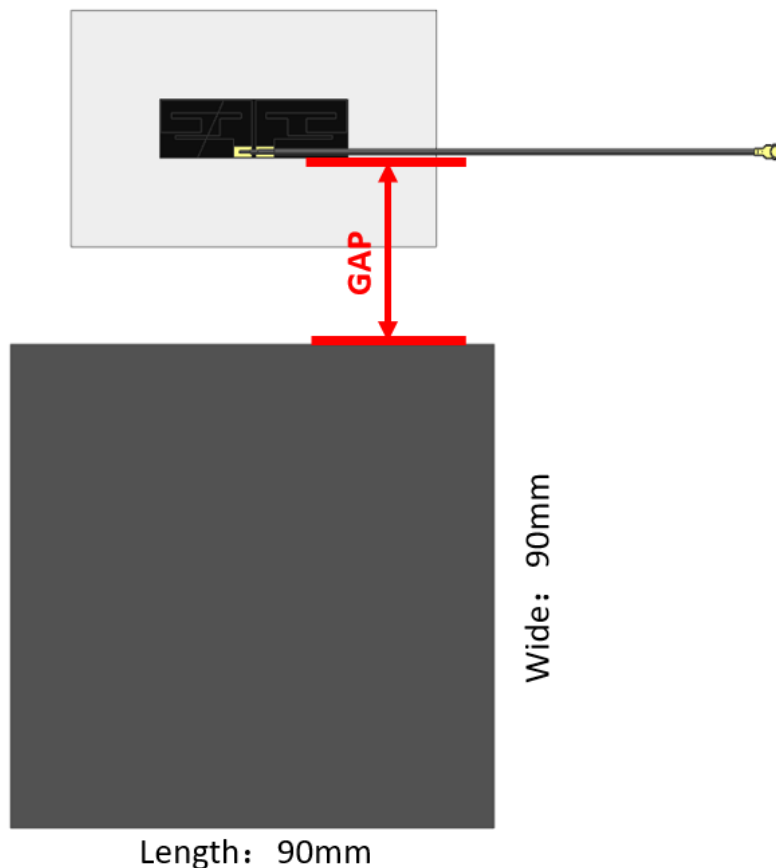


FIGURE 6.3.1 FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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.

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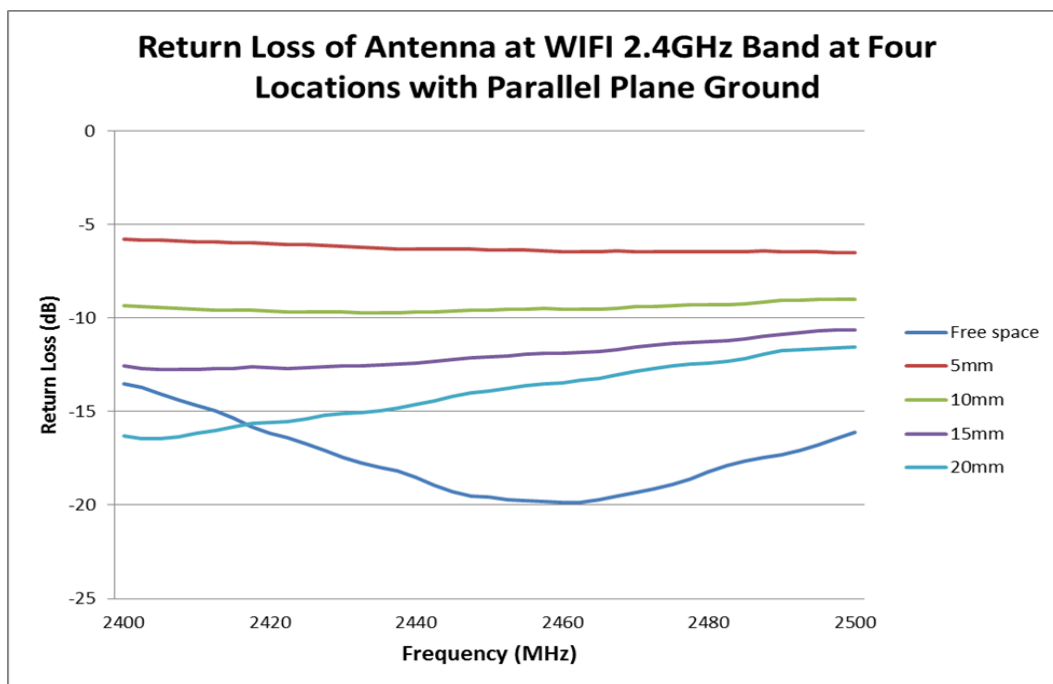


FIGURE 6.3.2 RETURN LOSS OF ANTENNA AT 2.4GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

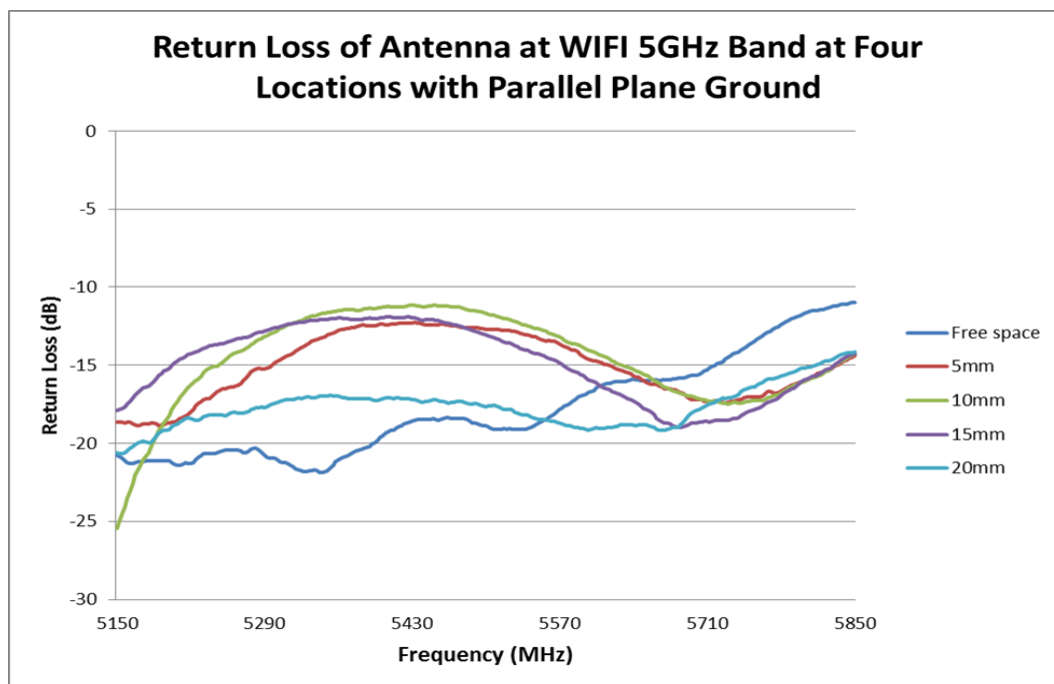


FIGURE 6.3.3 RETURN LOSS OF ANTENNA AT 5GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
E	EC No: 644053 DATE: 2020/08/26	WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	25 of 28
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AS-2042810100	Liu Hai 2020/08/26	Cheng Kang 2020/08/26	Andy Zhang 2020/08/26

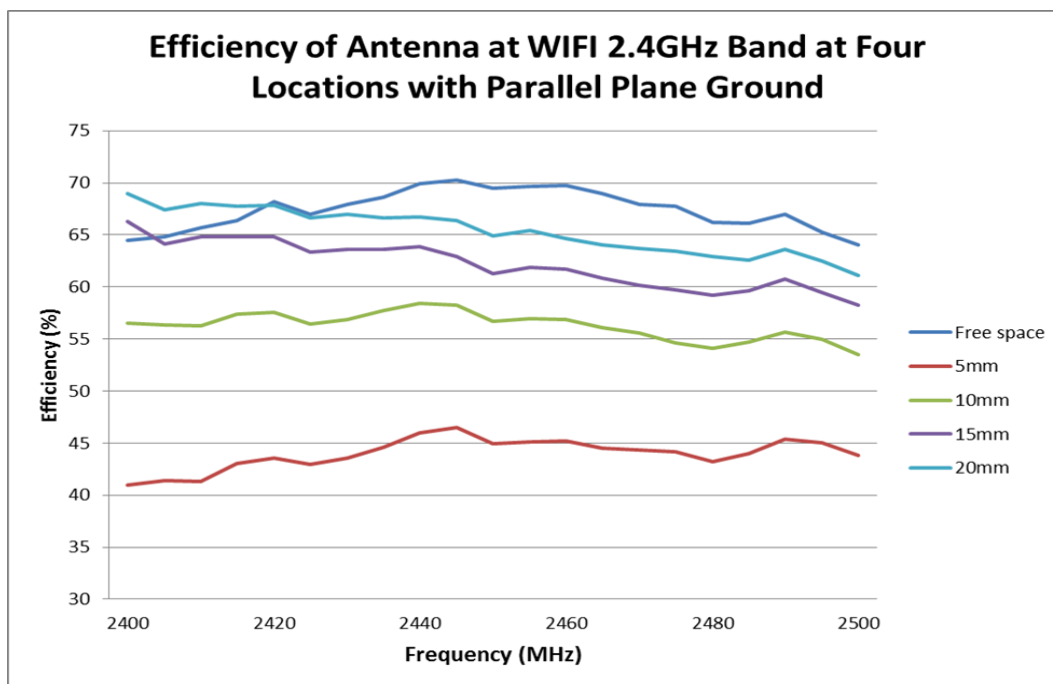


FIGURE 6.3.4 EFFICIENCY OF ANTENNA AT 2.4GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

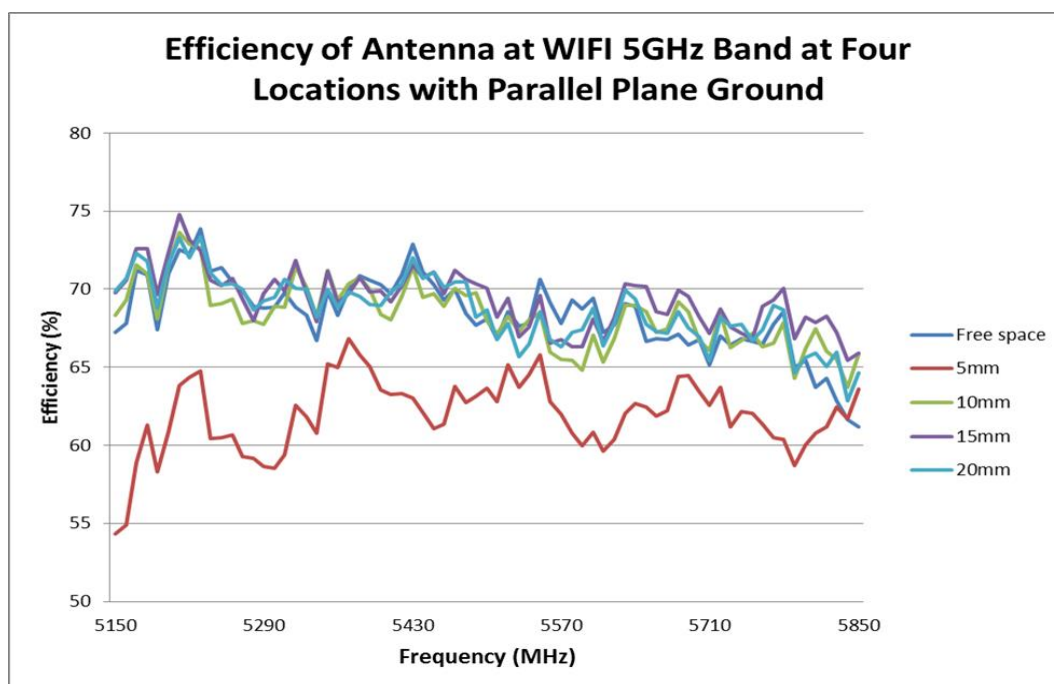


FIGURE 6.3.5 EFFICIENCY OF ANTENNA AT 5GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

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DOCUMENT NUMBER: AS-2042810100	CREATED / REVISED BY: Liu Hai 2020/08/26	CHECKED BY: Cheng Kang 2020/08/26	APPROVED BY: Andy Zhang 2020/08/26



APPLICATION SPECIFICATION

7.0 THE ANTENNA PERFORMANCE VARIATION WITH CABLE LENGTH

7.0.1 CABLE LOSS

ITEM	DESCRIPTION	TEST CONDITION	REQUIREMENT		
7.0.1.1	Frequency Range	2 GHz~7.125GHz	2GHz~3GHz	5GHz~6GHz	6-7.125GHz
7.0.1.2	Attenuation	1m cable measured by VNA5071C	≤3.5dB/m	≤5.5dB/m	≤6.5dB/m

7.0.2 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 7.0.1

7.0.3 FOR EXAMPLE

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

Frequency (MHz)	100mm cable		cable loss	300mm cable	
	Efficiency (dB)	Efficiency (%)		Efficiency (dB)	Efficiency (%)
	X		X-LOSS=Y	Y	
2400	-1.91	64.44	0.2m*3.5dB/m	-2.61	54.85
2420	-1.66	68.21		-2.36	58.06
2440	-1.55	69.92		-2.25	59.52
2460	-1.56	69.74		-2.26	59.36
2480	-1.79	66.18		-2.49	56.33
2500	-1.94	64.02		-2.64	54.49
5150	-1.72	67.25	0.2*5.5dB/m	-2.72	53.42
5200	-1.49	71.00		-2.49	56.40
5250	-1.46	71.40		-2.46	56.71
5300	-1.62	68.86		-2.62	54.69
5350	-1.56	69.89		-2.56	55.52
5400	-1.53	70.30		-2.53	55.84
5450	-1.53	70.32		-2.53	55.85
5500	-1.67	68.08		-2.67	54.08
5550	-1.51	70.63		-2.51	56.10
5600	-1.59	69.40		-2.59	55.13
5650	-1.76	66.66		-2.76	52.95
5700	-1.75	66.78		-2.75	53.04
5750	-1.76	66.67		-2.76	52.96
5800	-1.84	65.48		-2.84	52.01
5850	-2.13	61.21		-3.13	48.62
5925	-2.32	58.63		-3.42	45.51
5950	-2.10	61.68		-3.20	47.88

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APPLICATION SPECIFICATION

Frequency (MHz)	100mm cable		cable loss	300mm cable	
	Efficiency (dB)	Efficiency (%)		Efficiency (dB)	Efficiency (%)
6000	-2.14	61.03	X-LOSS=Y	Y	
6100	-2.58	55.19	0.2*6.5dB/m	-3.44	45.24
6200	-2.51	56.15		-3.88	40.92
6300	-2.43	57.15		-3.81	41.62
6400	-2.64	54.40		-3.73	42.37
6500	-2.35	58.23		-3.94	40.33
6600	-2.81	52.41		-3.65	43.17
6700	-3.05	49.59		-4.11	38.85
6800	-3.46	45.06		-4.35	36.76
6900	-3.63	43.32		-4.76	33.40
7000	-3.32	46.55		-4.93	32.11
7100	-3.36	46.12		-4.62	34.51
7125	-3.33	46.47		-4.66	34.19

The data is just for your reference, all accurate performance should be according to the test results in the OTA chamber

8.0 CHANGE HISTORY

CHANGE HISTORY		
REV	DATA	DESCRIPTION
D	2020/06/30	Update file layout and add 6-7.125GHz band
E	2020/08/26	Version D is invalid, please refer to version E

REVISION:	ECR/ECN INFORMATION:	TITLE:	SHEET No.
E	EC No: 644053 DATE: 2020/08/26	WIFI 6E FLEX CABLED SIDE-FED BALANCED ANTENNA APPLICATION SPECIFICATION	28 of 28
DOCUMENT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:
AS-2042810100	Liu Hai 2020/08/26	Cheng Kang 2020/08/26	Andy Zhang 2020/08/26