

### **TITLE**

# **WIFI 6E FLEX CABLE BALANCE ANTENNA**

### **TABLE OF CONTENTS**

- 1.0 SCOPE
- 2.0 PRODUCT DESCRIPTION
- 3.0 APPLICABLE DOCUMENTS
- **4.0 ANTENNA PERFORMANCE**
- **5.0 ASSEMBLY GUIDELINE**
- 6.0 RF PERFORMANCE AS A FUNCTION OF IMPLEMENTATION
- 7.0 THE ANTENNA PERFORMANCE VARIATION WITH CABLE LENGTH
- **8.0 CHANGE HISTORY**

<b>REVISION</b> :	ECR/ECN INFORMATION:				SHEET No.		
Н	EC No: <b>641299</b>	WIFI 6E FLEX	<b>1</b> of <b>30</b>				
11	DATE: <b>2020/07/15</b>	ALLEC	APPLICATION SPECIFICATION				
DOCUMENT NUMBER:		CREATED / REVISED BY:	CHECKED BY:	<u>APPROV</u>	/ED BY:		
AS-1461530100		Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07		



### **WIFI 6E FLEX CABLE BALANCE 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 cable balance antenna

Series Number: 146153

### 2.2 DESCRIPTION

Series 146153 is a balanced, dipole-type, high efficiency antenna for 2.4/5/6 GHz applications, including WiFi 6E, Bluetooth, Zigbee and others. This antenna is made from poly flexible material with small size 35\*9\*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-1461530100 for full information.



ANTENNA 3D VIEW

REVISION:	ECR/ECN INFORMATION: EC No: 641299  DATE: 2020/07/15	WIFI 6E FLEX APPLIC		2 of 30	
DOCUMENT NUMBER:		CREATED / REVISED BY:	CHECKED BY:	APPROVED BY:	
AS-1461530100		Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07



### 3.0 APPLICABLE DOCUMENTS

DOCUMENT	NUMBER	DESCRIPTION	
Solo Drawing (SD)	SD-1461530050	Machanical Dimension of the product	
Sale Drawing (SD)	SD-1461531050	Mechanical Dimension of the product	
Product Specification (PS)	PS-1461530100	Product Specification	
Packing Drawing (PK)	PK-1461530100	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.1461530100 with a cable length of 100mm.



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

REVISION:	ECR/ECN INFORMATION: EC No: 641299  DATE: 2020/07/15	WIFI 6E FLEX APPLIC	3 of 30		
DOCUMENT NUMBER:		CREATED / REVISED BY:	CHECKED BY:	<u>APPROV</u>	ED BY:
AS-1461530100		Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07



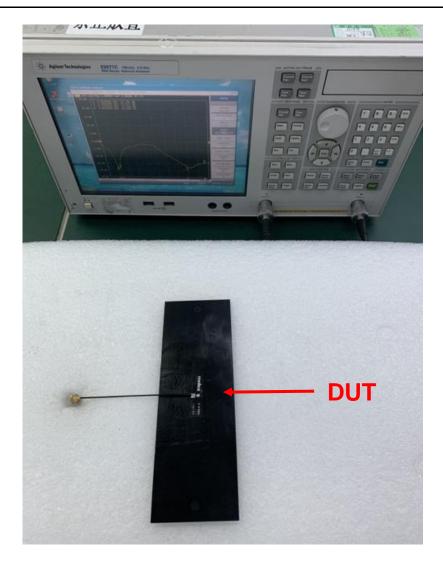


FIGURE4.1.2 ANTENNA LOADED WITH PC/ABS BLOCK OF 1.5 MM THICKNESS WITH VNA

REVISION:	ECR/ECN INFORMATION:				SHEET No.	
н	EC No: <b>641299</b>	=	CABLE BALANCE		<b>4</b> of <b>30</b>	
П	DATE: 2020/07/15	APPLIC	APPLICATION SPECIFICATION			
DOCUMENT NUMBER:		CREATED / REVISED BY:	CHECKED BY:	APPRO\	/ED BY:	
AS-1461530100		Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07	



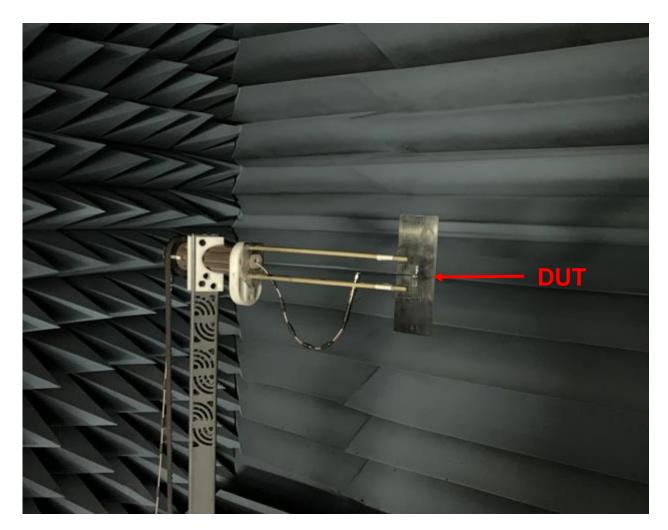


FIGURE4.1.3 ANTENNA LOADED WITH PC/ABS BLOCK OF 1.5 MM THICKNESS WITH OTA CHAMBER

<b>REVISION:</b>	<b>ECR/ECN INFORMATION:</b>	TITLE:			SHEET No.
Н	EC No: 641299  DATE: 2020/07/15		WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION		
DOCUMENT NUMBER:		CREATED / REVISED BY:	CHECKED BY:	APPROV	/ED BY:

Liu Hai 2020/07/07

AS-1461530100

TEMPLATE FILENAME: APPLICATION\_SPEC[SIZE\_A](V.1).DOC

Chris Zhong 2020/07/07

Andy Zhang 2020/07/07



### **4.2 ANTENNA PERFORMANCE**

All measurements in this document are done with the part no.1461530100 with a cable length of 100mm

DESCRIPTION	EQUIPMENT	REQUIREMENT			
Frequency Range	VNA E5071C	2.4-2.5GHz	2.4-2.5GHz 5.15-5.85GHz		
Return Loss	VNA E5071C	<- 10dB			
Peak Gain (Max)	OTA Chamber	3.0dBi	4.0dBi	5.5dBi	
Average Total Efficiency	OTA Chamber	>75%	>75%	>70%	
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.

REVISION:	ECR/ECN INFORMATION:	TITLE:			SHEET No.		
н	EC No: <b>641299</b>	WIFI 6E FLEX APPLIC	<b>6</b> of <b>30</b>				
• •	DATE: <b>2020/07/15</b>	7 1 2.0	APPLICATION SPECIFICATION				
DOCUMENT NUMBER:		CREATED / REVISED BY:	CHECKED BY:	<u>APPROV</u>	/ED BY:		
AS-1461530100		Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07		



### 4.3 RETURN LOSS PLOT

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

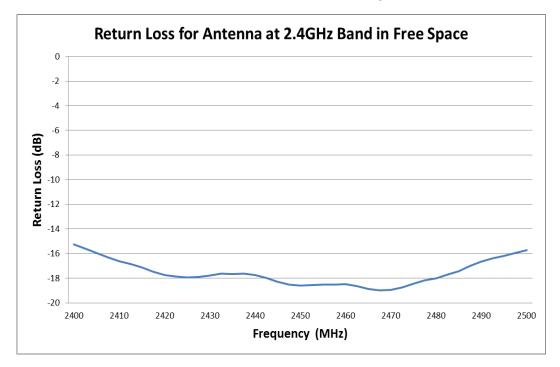


FIGURE 4.3.1 RETURN LOSS OF ANTENNA AT 2.4GHZ BAND IN FREE SPACE

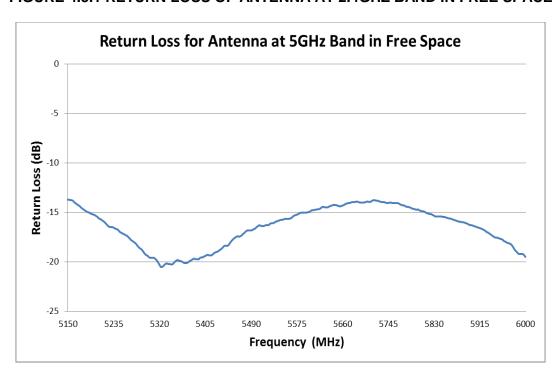


FIGURE 4.3.2 RETURN LOSS OF ANTENNA AT 5GHZ BAND IN FREE SPACE

AS-1461530100		-1461530100	Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07	
	DOCUMEN'	T NUMBER:	CREATED / REVISED BY:	CHECKED BY:	<u>APPROV</u>	'ED BY:	
	Н	EC No: 641299  DATE: 2020/07/15	APPLIC	<b>7</b> of <b>30</b>			
	REVISION:	ECR/ECN INFORMATION:		WIFI 6E FLEX CABLE BALANCE ANTENNA			
	DE//ISION:	LECD/ECN INFORMATION:	ITITI C.			SHEET No.	



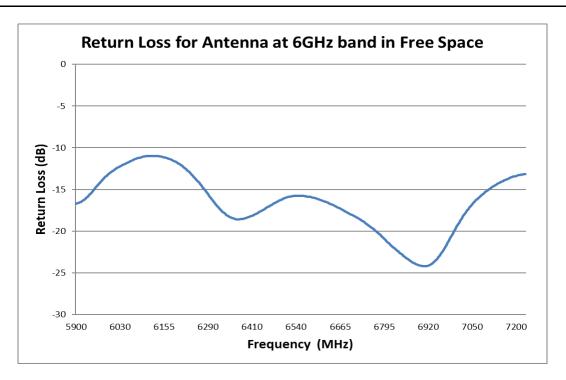


FIGURE 4.3.3 RETURN LOSS OF ANTENNA AT 6GHZ BAND IN FREE SPACE

### **4.4 EFFICIENCY PLOT**

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

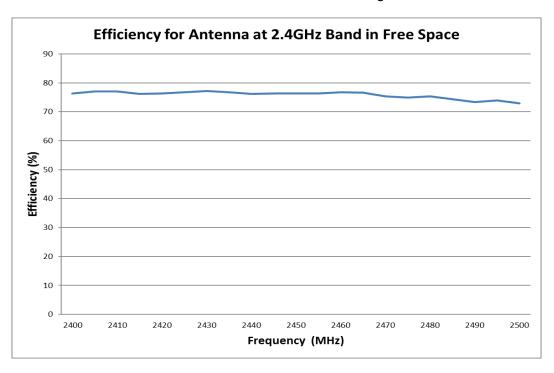
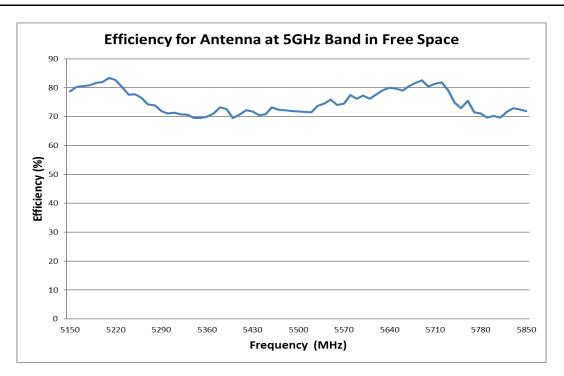


FIGURE 4.4.1 EFFICIENCY OF ANTENNA AT 2.4GHZ BAND IN FREE SPACE

REVISION:	ECR/ECN INFORMATION:				SHEET No.			
Н	EC No: <b>641299</b>	WIFI 6E FLEX	<b>8</b> of <b>30</b>					
П	DATE: <b>2020/07/15</b>	ALLEO	APPLICATION SPECIFICATION					
DOCUMENT NUMBER:		CREATED / REVISED BY:	CHECKED BY:	APPRO\	/ED BY:			
AS-1461530100		Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07			





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

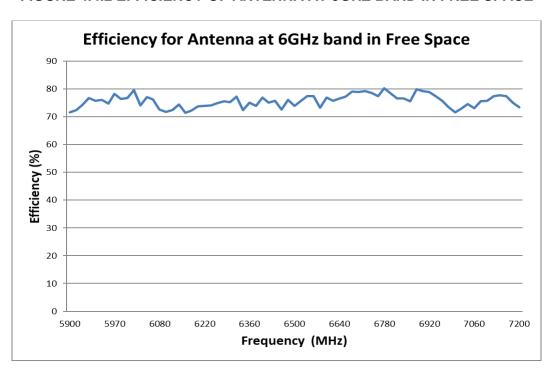


FIGURE 4.4.3 EFFICIENCY OF ANTENNA AT 6GHZ BAND IN FREE SPACE

AS-1461530100		Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07
DOCUMENT NUMBER:		CREATED / REVISED BY:	CHECKED BY:	APPRO\	/ED BY:
Н	DATE: 2020/07/15	APPLIC	<b>9</b> of <b>30</b>		
	EC No: <b>641299</b>	WIFI 6E FLEX			
REVISION	ECR/ECN INFORMATION:	TITLE:			SHEET No.



### 4.5 RADIATION PATTERN

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

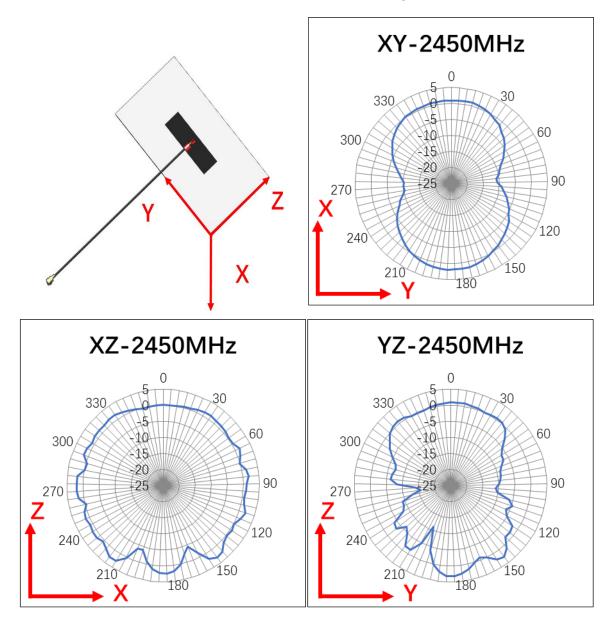


FIGURE 4.5.1 2D RADIATION PATTERN OF ANTENNA AT 2450MHZ IN FREE SPACE

REVISION:	ECR/ECN INFORMATION:				SHEET No.	
ш	EC No: <b>641299</b>	_	WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION			
Н	DATE: <b>2020/07/15</b>	APPLIC				
DOCUMENT NUMBER:		CREATED / REVISED BY:	TED / REVISED BY: CHECKED BY: APPRO		/ED BY:	
AS-1461530100		Liu Hai 2020/07/07	Liu Hai 2020/07/07 Andy Zhang 2020/07/07 Chris Zhong		2020/07/07	



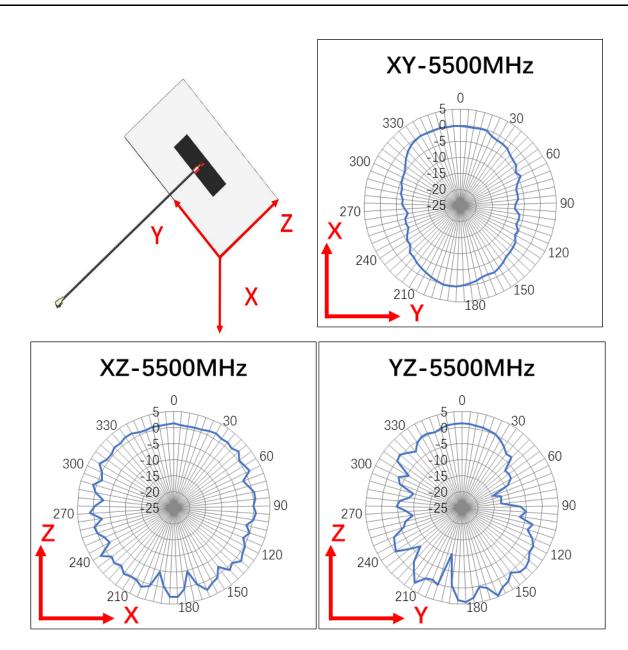


FIGURE 4.5.2 2D RADIATION PATTERN OF ANTENNA AT 5500MHZ IN FREE SPACE

REVISION:	ECR/ECN INFORMATION:	TITLE:			SHEET No.		
Н	EC No: <b>641299</b>	_	WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION		<b>11</b> of <b>30</b>		
П	DATE: 2020/07/15	APPLIC	APPLICATION SPECIFICATION				
DOCUMEN	T NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPRO\	/ED BY:		
AS	-1461530100	Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07		



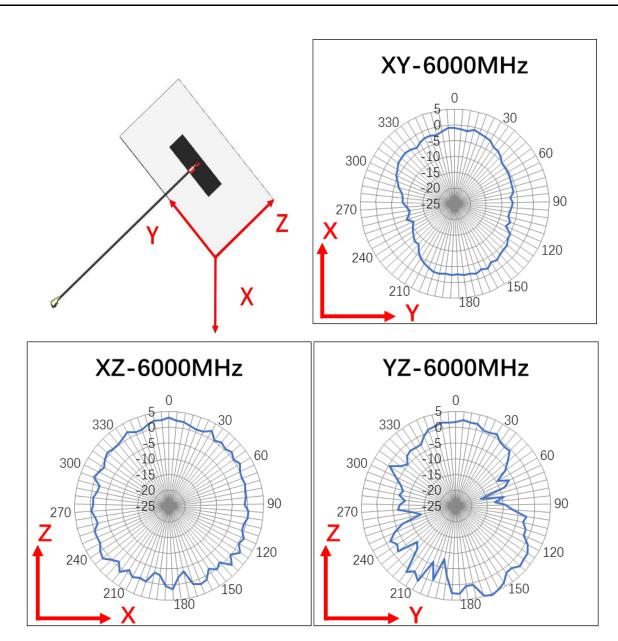


FIGURE 4.5.3 2D RADIATION PATTERN OF ANTENNA AT 6000MHZ IN FREE SPACE

REVISION:	ECR/ECN INFORMATION:	TITLE:			SHEET No.		
Н	EC No: <b>641299</b>	_	WIFI 6E FLEX CABLE BALANCE ANTENNA				
П	DATE: 2020/07/15	APPLIC	APPLICATION SPECIFICATION				
DOCUMEN	T NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPRO\	/ED BY:		
AS	-1461530100	Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07		



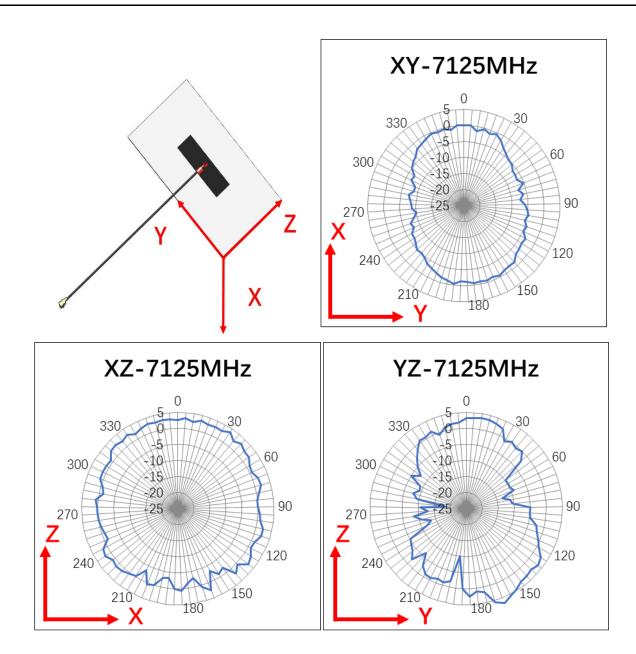


FIGURE 4.5.4 2D RADIATION PATTERN OF ANTENNA AT 7125MHZ IN FREE SPACE

REVISION:	ECR/ECN INFORMATION:	TITLE:			SHEET No.		
Н	EC No: <b>641299</b>	=	WIFI 6E FLEX CABLE BALANCE ANTENNA				
П	DATE: 2020/07/15	APPLIC	APPLICATION SPECIFICATION				
DOCUMEN	T NUMBER:	CREATED / REVISED BY:	CHECKED BY:	<u>APPRO\</u>	/ED BY:		
AS-1461530100		Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07		



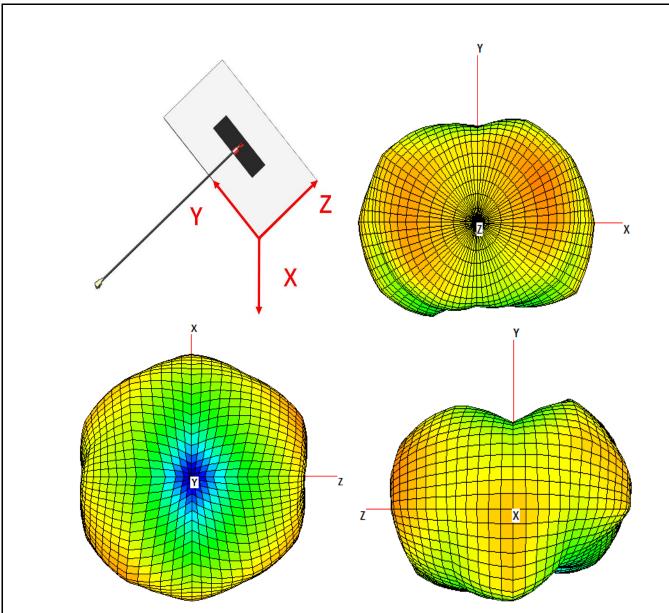


FIGURE 4.5.5 3D RADIATION PATTERN OF ANTENNA AT 2450MHZ BAND IN FREE SPACE

REVISION: ECR/ECN INFORMATION: TITLE:

WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION

DATE: 2020/07/15

MIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION

14 of 30

CREATED / REVISED BY: CHECKED BY: APPROVED BY:

AS-1461530100 Liu Hai 2020/07/07 Andy Zhang 2020/07/07 Chris Zhong 2020/07/07



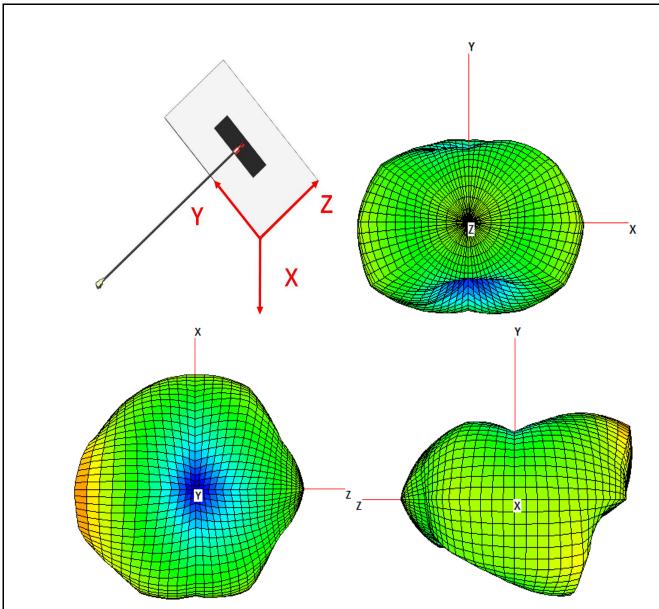


FIGURE 4.5.6 3D RADIATION PATTERN OF ANTENNA AT 5500MHZ BAND IN FREE SPACE

REVISION: ECR/ECN INFORMATION: TITLE:

WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION

DATE: 2020/07/15

MIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION

15 of 30

CREATED / REVISED BY: CHECKED BY: APPROVED BY:

Liu Hai 2020/07/07

AS-1461530100

TEMPLATE FILENAME: APPLICATION\_SPEC[SIZE\_A](V.1).DOC

Chris Zhong 2020/07/07

Andy Zhang 2020/07/07



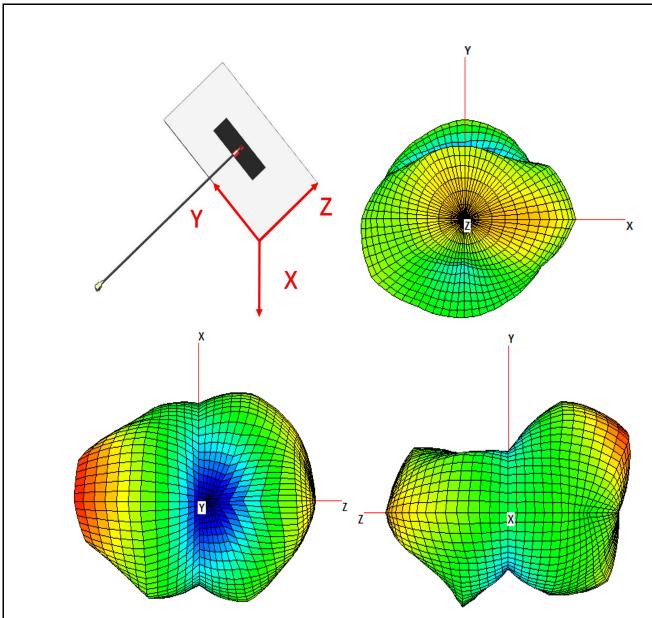


FIGURE 4.5.7 3D RADIATION PATTERN OF ANTENNA AT 6000MHZ BAND IN FREE SPACE

REVISION:	ECR/ECN INFORMATION:				SHEET No.
ш	EC No: <b>641299</b>		WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION		16 -4 20
Н	DATE: 2020/07/15	APPLIC	ATION SPECIFICATI	ION	<b>16</b> of <b>30</b>
DOCUMEN	T NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPRO\	ED BY:
AS-1461530100		Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07



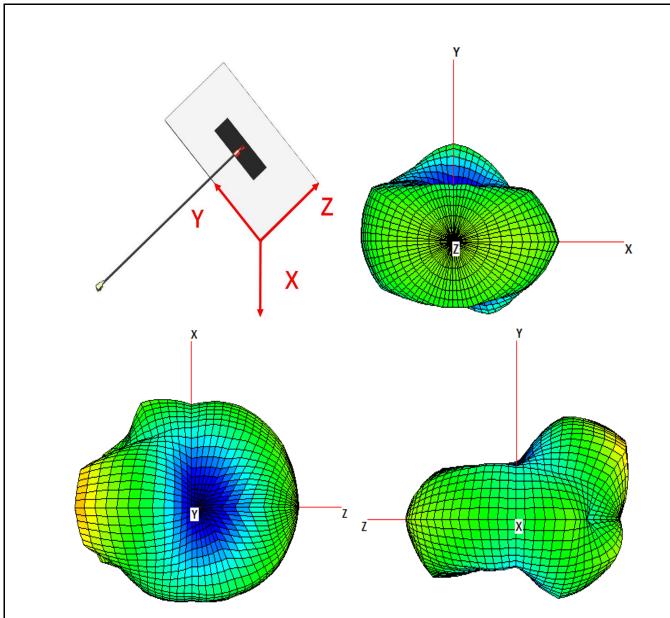


FIGURE 4.5.8 3D RADIATION PATTERN OF ANTENNA AT 7125MHZ BAND IN FREE SPACE

REVISION:	ECR/ECN INFORMATION: EC No: 641299  DATE: 2020/07/15	WIFI 6E FLEX	CABLE BALANCE A		17 of 30
DOCUMEN	T NUMBER:	CREATED / REVISED BY:	CHECKED BY:	<u>APPROV</u>	ED BY:
AS-1461530100		Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07



#### 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.

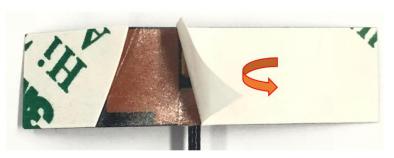
#### 5.1 HOW TO TEAR FLEX RELEASE PAPER



1. Find cut line on flex back side



2. Bend flex slight along cut line



3. Tear release paper

REVISION: BCR/ECN INFORMATION: TITLE: WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION

DATE: 2020/07/15

| CR/ECN INFORMATION: TITLE: WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION 18 of 30



### 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.

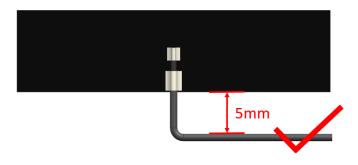


FIGURE 5.2.1 RECOMMENDED CABLE BENDING RANGE

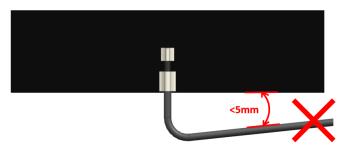


FIGURE 5.2.2 UNRECOMMENDED CABLE BENDING RANGE

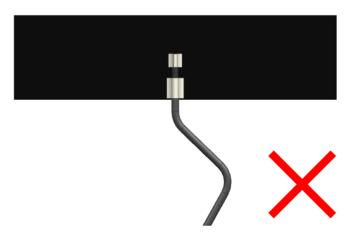


FIGURE 5.2.3 MULTIPLE BENDING OF CABLES IS NOT RECOMMENDED

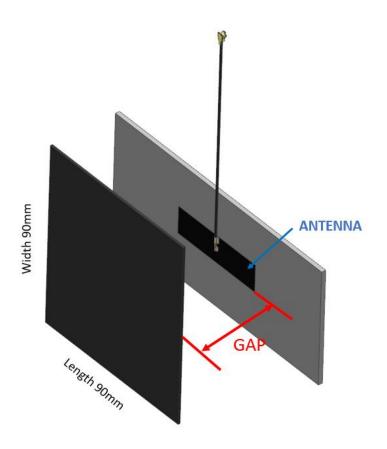
REVISION: BCR/ECN INFORMATION: TITLE: WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION 19 of 30



### 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.

REVISION:	ECR/ECN INFORMATION:	TITLE:				
ш	EC No: <b>641299</b>	_	WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION			
П	DATE: <b>2020/07/15</b>	AFFLIC	ATION SPECIFICATI	ION	<b>20</b> of <b>30</b>	
DOCUMENT	T NILIMDED.	CDEATED / DEVISED BY: CHECKED BY: ADDROVE		/CD DV:		



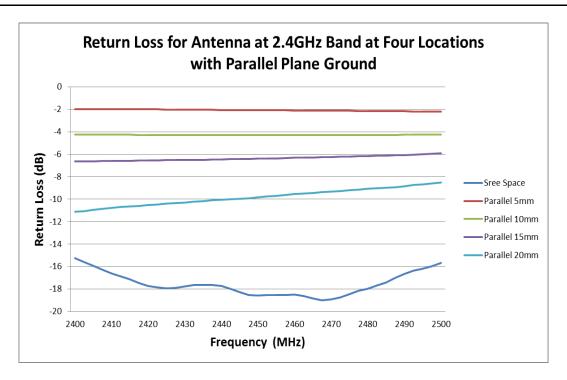


FIGURE 6.1.2 RETURN LOSS OF ANTENNA AT 2.4GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

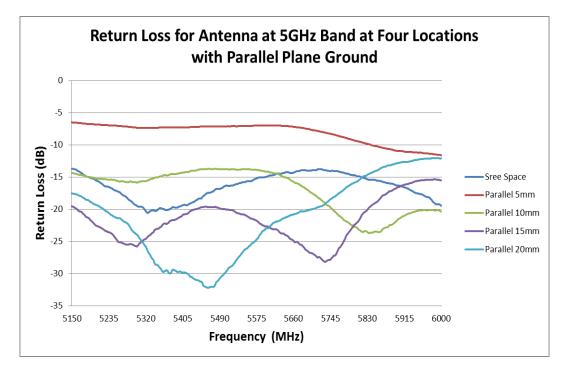


FIGURE 6.1.3 RERURN LOSS OF ANTENNA AT 5GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION:	ECR/ECN INFORMATION: EC No: 641299  DATE: 2020/07/15		CABLE BALANCE A		21 of 30
DOCUMEN	T NUMBER:	CREATED / REVISED BY:	CHECKED BY:	<u>APPROV</u>	<u>'ED BY:</u>
AS	-1461530100	Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07



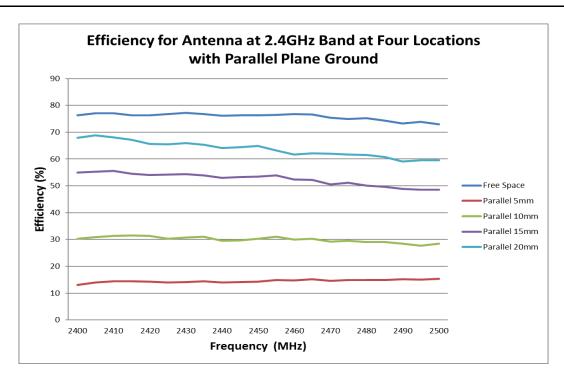


FIGURE 6.1.4 EFFICIENCY OF ANTENNA AT 2.4GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

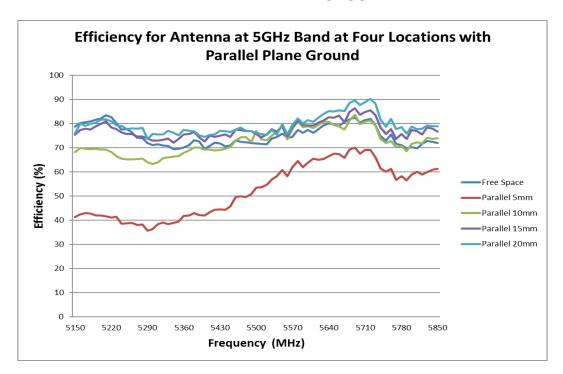


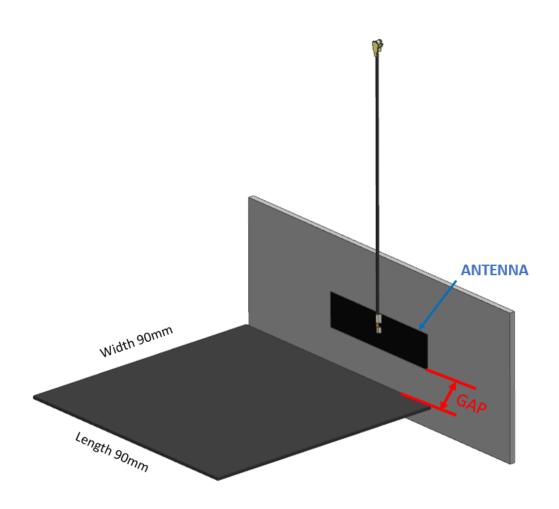
FIGURE 6.1.5 EFFICIENCY OF ANTENNA AT 5GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION:	ECR/ECN INFORMATION: EC No: 641299  DATE: 2020/07/15		CABLE BALANCE A		SHEET No.  22 of 30
<b>DOCUMEN</b>	T NUMBER:	CREATED / REVISED BY:	CHECKED BY:	<u>APPROV</u>	<u>'ED BY:</u>
AS	-1461530100	Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07



# 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.

REVISION:	ECR/ECN INFORMATION:	TITLE:			SHEET No.
	EC No: <b>641299</b>		WIFI 6E FLEX CABLE BALANCE ANTENNA		
Н	DATE: 2020/07/15	APPLIC	ATION SPECIFICAT	ION	<b>23</b> of <b>30</b>
DOCUMENT NUMBER: CD		CDEATED / DEVICED BV:	CHECKED BA	\ DDDO\\	/ED DV:



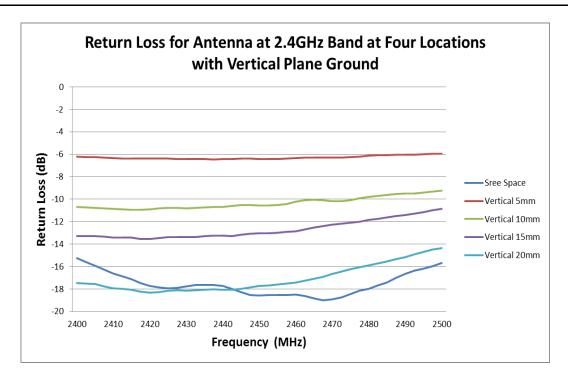


FIGURE 6.2.2 RETURN LOSS OF ANTENNA AT 2.4GHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

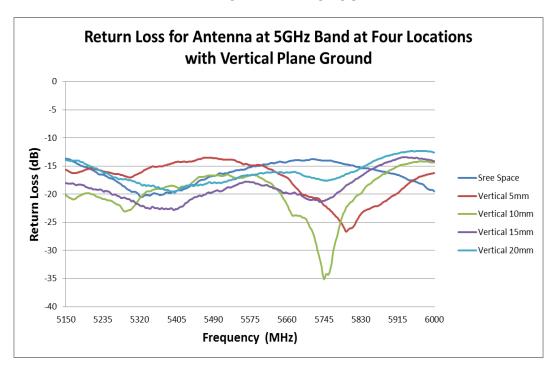


FIGURE 6.2.3 RETURN LOSS OF ANTENNA AT 5GHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

REVISION:	ECR/ECN INFORMATION:	TITLE:			SHEET No.
ш	H EC No: 641299 WIFI 6E FLEX CABLE BALANCE A			<b>24</b> of <b>30</b>	
Н	DATE: 2020/07/15	APPLIC	ATION SPECIFICATI	ION	24 01 30
DOCUMEN	T NUMBER:	CREATED / REVISED BY: CHECKED BY: APPROVE		/ED BY:	
AS-1461530100		Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07



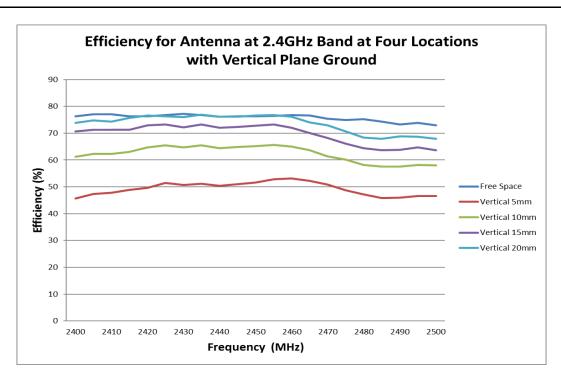


FIGURE 6.2.4 EFFICIENCY OF ANTENNA AT 2.4GHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

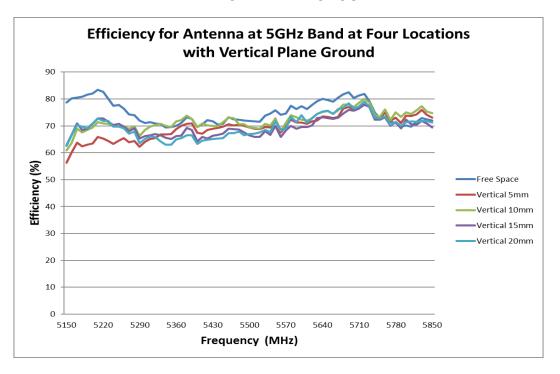


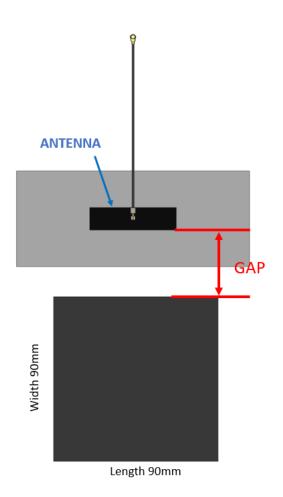
FIGURE 6.2.5 EFFICIENCY OF ANTENNA AT 5GHZ BAND AT FOUR LOCATIONS WITH VERTICAL PLANE GROUND

REVISION:	ECR/ECN INFORMATION: EC No: 641299  DATE: 2020/07/15	WIFI 6E FLEX	WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION			
DOCUMEN	T NUMBER:	CREATED / REVISED BY:	CHECKED BY:	<u>APPROV</u>	'ED BY:	
AS	-1461530100	Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07	



# 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.

<b>REVISION:</b>	<b>ECR/ECN INFORMATION:</b>	TITLE:			SHEET No.
н	EC No: <b>641299</b>	_	WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION		
• •	DATE: <b>2020/07/15</b>				
DOCHMEN.	T NI IMBER:	CREATED / REVISED BV:	REATED / REVISED BY: CHECKED BY: APPROVE		/ED BV·

AS-1461530100 | CREATED / REVISED BY: CHECKED BY: APPROVED BY: APPROVE



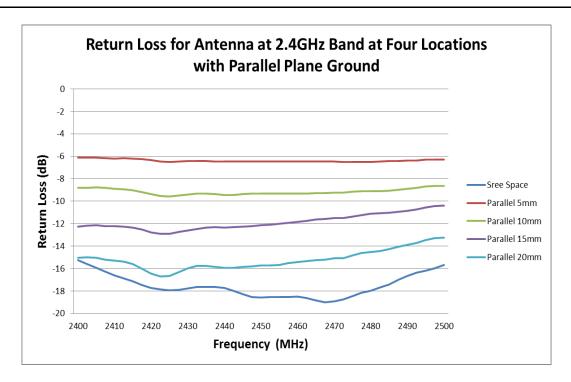


FIGURE 6.3.2 RETURN LOSS OF ANTENNA AT 2.4GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

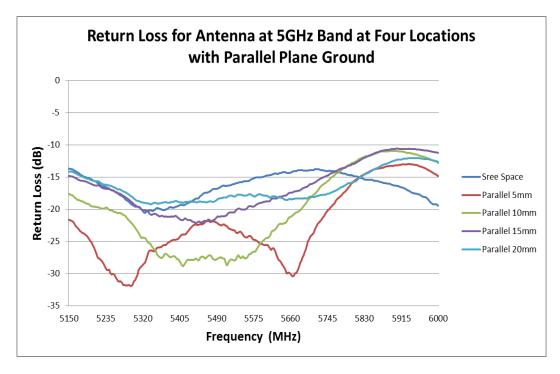


FIGURE 6.3.3 RETURN LOSS OF ANTENNA AT 5GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

REVISION:	ECR/ECN INFORMATION:	TITLE:			SHEET No.	
Н	EC No: <b>641299</b>		WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION		<b>27</b> of <b>30</b>	
П	DATE: <b>2020/07/15</b>	APPLIC	APPLICATION SPECIFICATION			
DOCUMENT NUMBER:		CREATED / REVISED BY:	TED / REVISED BY: CHECKED BY: APPRO		/ED BY:	
AS-1461530100		Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07	



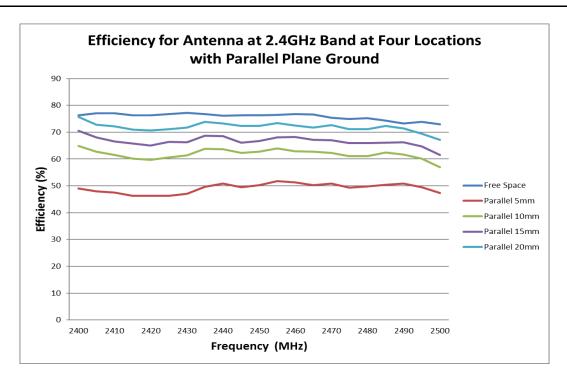


FIGURE 6.3.4 EFFICIENCY OF ANTENNA AT 2.4GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

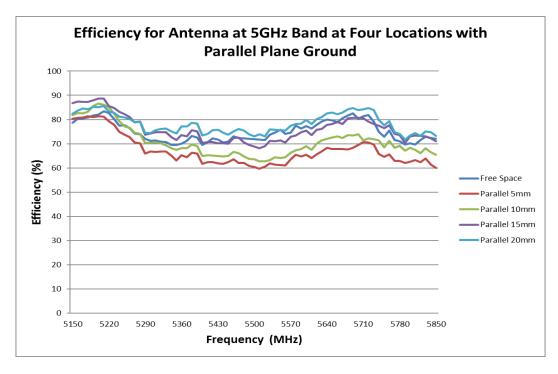


FIGURE 6.3.5 EFFICIENCY OF ANTENNA AT 5GHZ BAND AT FOUR LOCATIONS WITH PARALLEL PLANE GROUND

<b>REVISION:</b>	ECR/ECN INFORMATION:	TITLE:			SHEET No.		
н	EC No: <b>641299</b>	_	WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION				
П	DATE: 2020/07/15	APPLIC	APPLICATION SPECIFICATION				
DOCUMENT NUMBER:		CREATED / REVISED BY:	CHECKED BY:	APPRO\	/ED BY:		
AS-1461530100		Liu Hai 2020/07/07	Andy Zhang 2020/07/07	Chris Zhong	2020/07/07		

TEMPLATE FILENAME: APPLICATION\_SPEC[SIZE\_A](V.1).DOC



### 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

AS-1461530100

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

	100mm	n cable		300mm cable	
Frequency (MHz)	Efficiency (dB)	Efficiency (%)	cable loss	Efficiency (dB)	Efficiency (%)
	Х		X-LOSS=Y	Υ	
2400	-1.09	77.77	0.2m*3.5dB/m	-1.79	66.19
2420	-1.05	78.43		-1.75	66.76
2440	-1.15	76.82		-1.85	65.38
2460	-1.17	76.41		-1.87	65.03
2480	-1.19	76.00		-1.89	64.68
2500	-1.23	75.37		-1.93	64.15
5150	-1.10	77.71	0.2*5.5dB/m	-2.20	60.32
5200	-1.13	77.08		-2.23	59.83
5250	-1.13	77.11		-2.23	59.85
5300	-1.20	75.88		-2.30	58.90
5350	-1.33	73.54		-2.43	57.08
5400	-1.23	75.30		-2.33	58.45
5450	-1.16	76.50		-2.26	59.38
5500	-0.92	80.93		-2.02	62.82
5550	-0.92	80.95		-2.02	62.84
5600	-0.95	80.42		-2.05	62.42
5650	-0.97	79.94		-2.07	62.05
5700	-1.00	79.37		-2.10	61.61
5750	-1.06	78.38		-2.16	60.84
5800	-1.20	75.94		-2.30	58.95
5850	-1.11	77.51		-2.21	60.17
5900	-1.27	74.69		-2.37	57.98
5925	-1.30	74.20		-2.40	57.60
5950	-1.19	76.11		-2.29	59.08

REVISION:	ECR/ECN INFORMATION: EC No: 641299  DATE: 2020/07/15	WIFI 6E FLEX	WIFI 6E FLEX CABLE BALANCE ANTENNA APPLICATION SPECIFICATION		29 of 30
DOCUMENT NUMBER:		CREATED / REVISED BY:	CHECKED BY:	<u>APPROV</u>	/ED BY:

Liu Hai 2020/07/07

TEMPLATE FILENAME: APPLICATION\_SPEC[SIZE\_A](V.1).DOC

Chris Zhong 2020/07/07

Andy Zhang 2020/07/07



	100mm	n cable		300mm	r cable
Frequency (MHz)	Efficiency (dB)	Efficiency (%)	cable loss	Efficiency (dB)	Efficiency (%)
	Х		X-LOSS=Y	Υ	
6000	-1.00	79.43	0.2*6.5dB/m	-2.30	58.88
6100	-1.44	71.71		-2.74	53.16
6200	-1.32	73.73		-2.62	54.66
6300	-1.23	75.26		-2.53	55.79
6400	-1.14	76.91		-2.44	57.01
6500	-1.32	73.72		-2.62	54.65
6600	-1.12	77.19		-2.42	57.22
6700	-1.03	78.87		-2.33	58.46
6800	-1.05	78.50		-2.35	58.20
6900	-1.01	79.23		-2.31	58.73
7000	-1.45	71.60		-2.75	53.07
7100	-1.20	75.84		-2.50	56.22
7125	-1.11	77.44		-2.41	57.41

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			
Н	2020/06/18	Update 2D Figure and add 6-7.125GHz band			

AS-1461530100		Liu Hai 2020/07/07 Andy Zhang 2020/07/07 Chris Zhong 20			2020/07/07		
DOCUMEN	IT NUMBER:	CREATED / REVISED BY:	CHECKED BY:	APPRO\	/ED BY:		
Н	DATE: 2020/07/15	APPLIC	APPLICATION SPECIFICATION				
ш	EC No: <b>641299</b>	WIFI 6E FLEX CABLE BALANCE AN			<b>30</b> of <b>30</b>		
REVISION:	ECR/ECN INFORMATION:	l ———			SHEET No.		