



TO: UBEE

SPECIFICATION FOR APPROVAL

CUSTOMER DWG. No./PART No. : NA REV. : NA

DESCRIPTION : Ubee _U10C149-WIF3

FOXCONN PART. No. : ANTP2M2-CUB17-EH REV. : X1

ATTACHMENTS:

- | | |
|---------------------|------------|
| 1. CUSTOMER DRAWING | 2 |
| 2. TEST REPORT | 3~20 |
| 3. SPP | 21~24 |

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APPROVED SIGNATURES

Approved by : Minda Liu

Checked by: Erin Dong

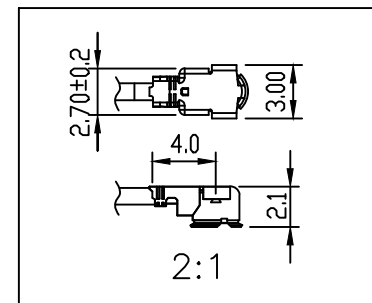
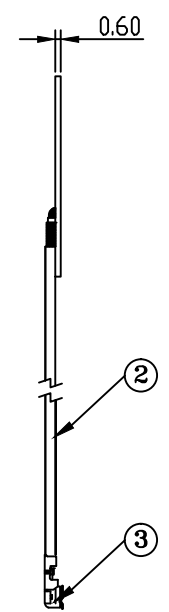
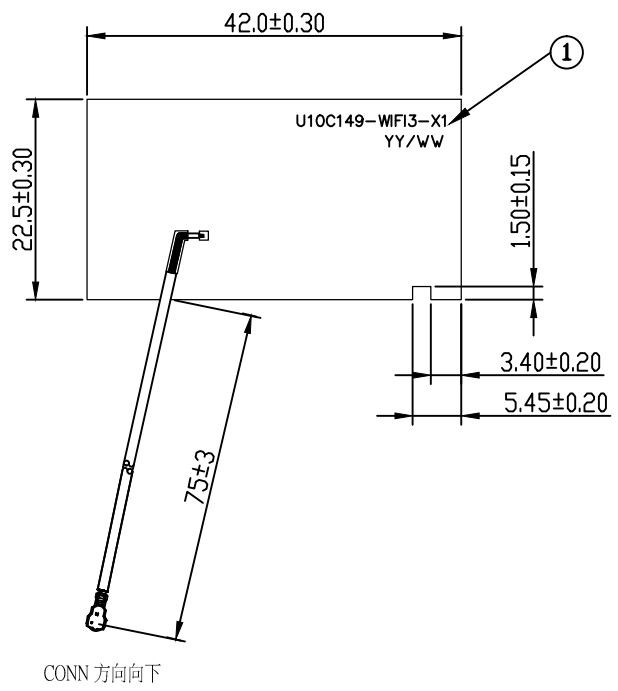
Prepared by: Wang Qin

File No.: ANTP2M2-CUB17-EH

Revision No.: X1

Date: 2019/12/3

REV.	ECN. NO.	APPD.



NOTES :

- 1. HARMFUL MATERIAL CONTROL PLEASE FOLLOW "RoHS".
- 2. HALOGEN FREE (Br<900ppm,Cl<900ppm,Br+Cl<1500ppm).

3	Connector	MHF Plug,Gold Plated,Halogen Free Type,I-PEX1
2	Cable	ø1.13mm Coaxial Cable,FEP Black Jacket
1	PCB	PCB Size:42*22.5*0.6mm
NO	ITEM	DESCRIPTION

X.± 1.00	X.*±	UNITS mm	NAME<INTENDED USE> CUSTOMER	 FOXCONN INTERCONNECT TECHNOLOGY LIMITED.
.X± 0.25	.X*±	MAT'L	PART NO.<INTENDED USE> ANTP2M2-CUB17-EH	
.XX± 0.12	.XX*±		APPD: Martin Li 12/02'19	
.XXX±	.XXX*±	FINISH	CHKD: yun-qi.chen 12/02'19	TITLE: Ubee_U10C149-WIFI3
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				SCALE: 1:1 SHEET: 3/4 REV: X1

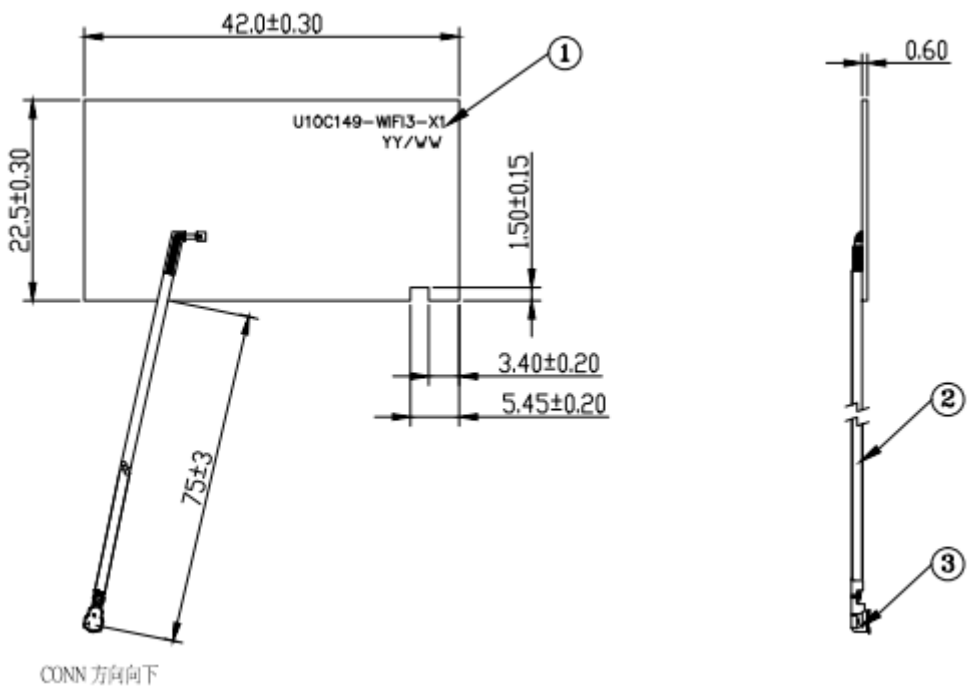
1. Specifications for antennas

Frequency Range(GHz)	2.4GHz ~ 2.5GHz; 5.05GHz~5.85GHz
VSWR	< 2
Efficiency (%)	≥70%
Peak Gain (dBi)	@2GHz< 4 [dBi] @5GHz< 5 [dBi]
Radio Connector	IPEX MHF I or Compatible
Impedance	50Ω Nominal
Cable Diameter	1.13mm cable
Cable color	Black
Antenna Type	Dipole
Cable Loss	0.165dB @ 2.4GHz ; 0.256dB @ 5GHz
Polarization	Linear

2. Antenna Dimension / Cable length

Product	U10C149
WLAN Antenna	PCB W/ 75mm Cable,

3. Antenna Pictures





Project Name: **U10C149**

Rev. V1

Test Date: 11-25-2019

Report Date: 11-28-2019

Contact Information:

Charles Lee[charles.ch.lee@fit-foxconn.com]

Project: U10C149	Date: 2019/11/28
Antenna Designer: Charles Lee	
Rev.: V1	Note:

History

Revision	Date	Description
V1	2019/11/28	Initial Release.

Project: U10C149	Date: 2019/11/28
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Project: U10C149	Date: 2019/11/28
Antenna Designer: Charles Lee	
Rev.: V1	Note:

1. Summary

This report summarizes all antennas performance to support U10C149 project.

WIFI X 4

2. General Description

Model: Cable Modem.

Antennas are designed on PCB.

Coaxial cable connected PCB directly, which placed on the side wall.

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2.2. Test Fixture Setup

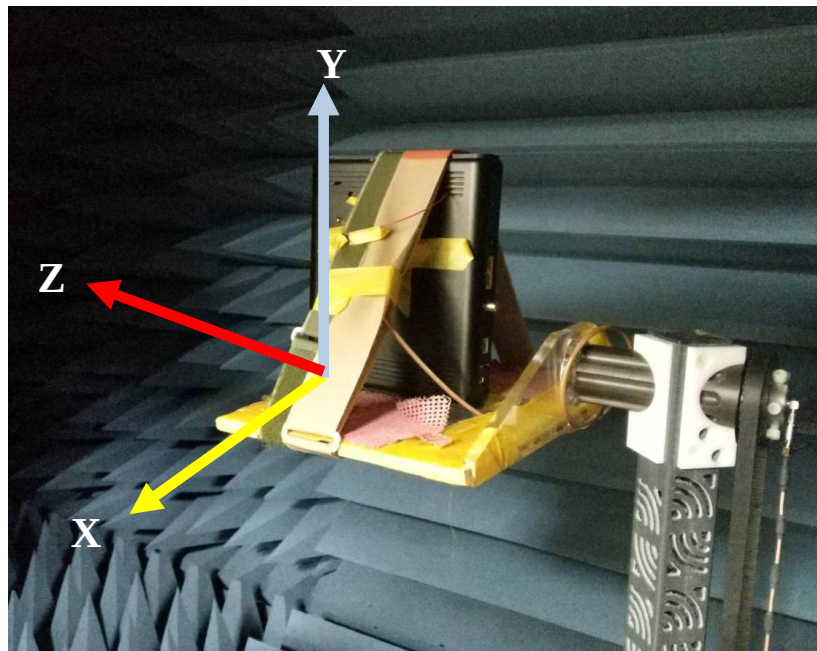
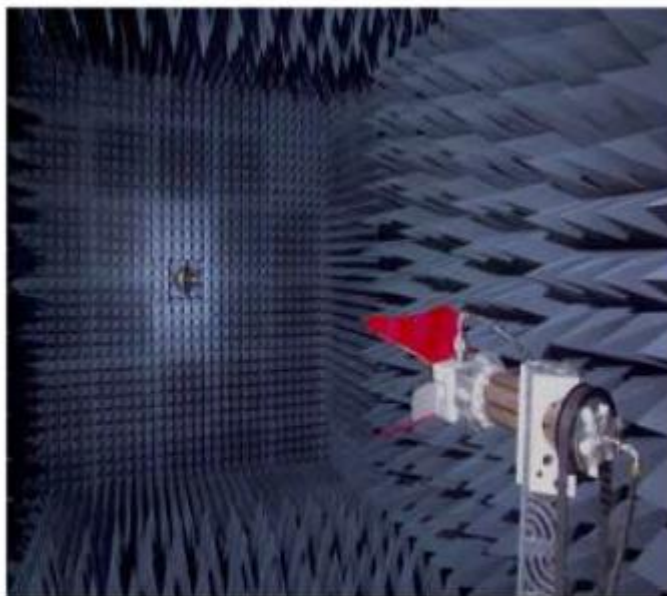


Figure 3 Environment of Setup.

3. Antenna Test Environment



Chamber Dimension: 7.3 * 3.66 * 3.66 m

Frequency Range: 700 MHz~6 GHz

- 3D Antenna Chamber adopted ETS-Lindgren's AMS-8500 system which is authorized by CTIA and it can satisfy test items of different antenna products, such as NB, cellular phone, AP, GPS...etc.
- It can support passive antenna measurement function for antenna designer to verify antenna characteristics such as 2D/3D radiation pattern measurement, efficiency, VSWR, and Isolation.
- Certification by TAF in 2010
- Add active antenna measurement function for OTA testing items such as TRP, TIS in 2010 4Q.

Figure 4 3D Chamber

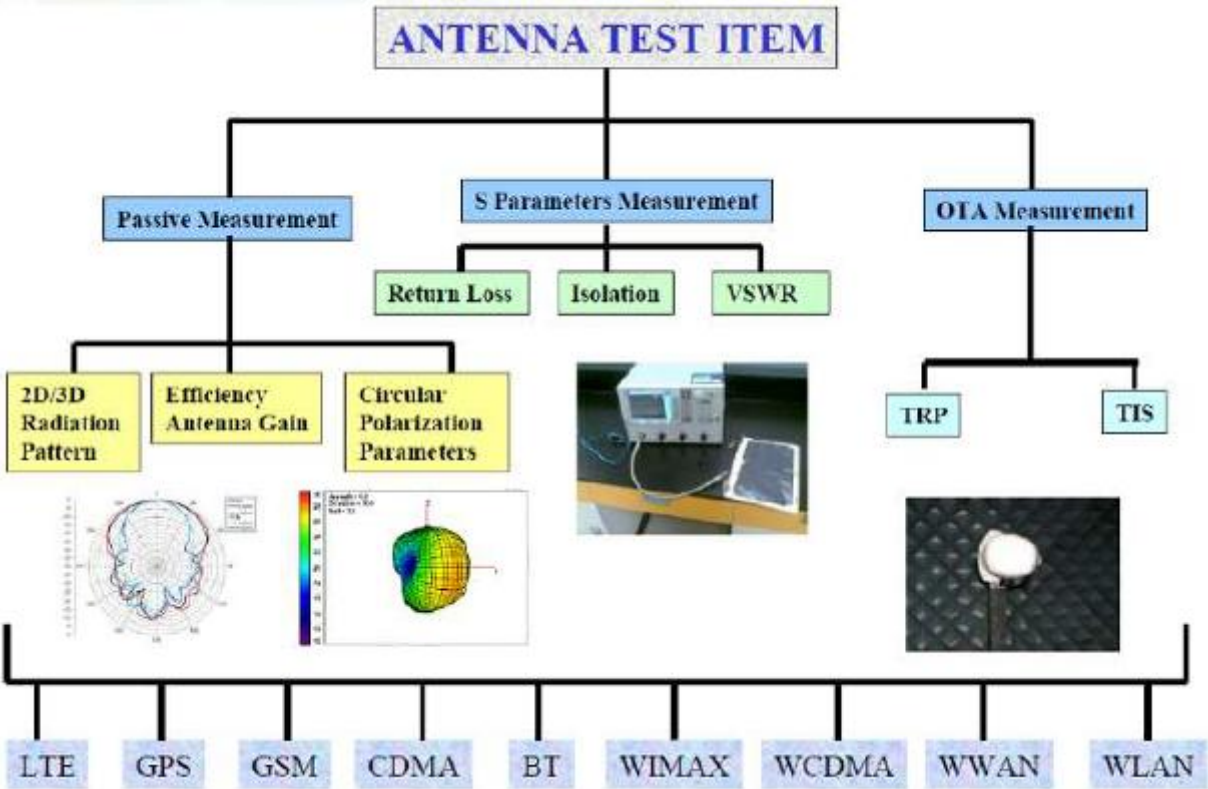
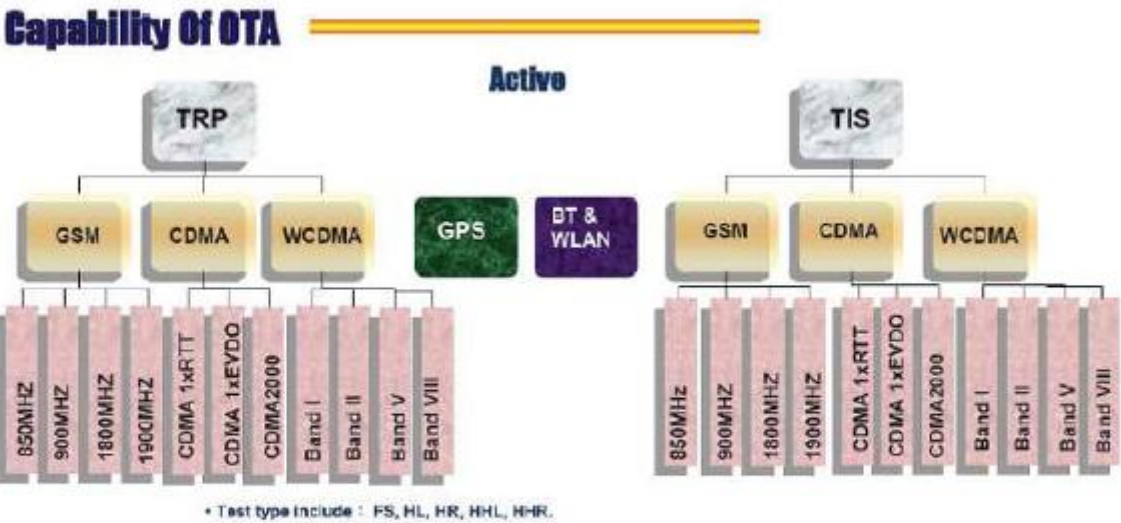


Figure 5 Chamber Compatibility



OTA test function will be certificate by TAF in 2011 4Q

Figure 6 Chamber Capability

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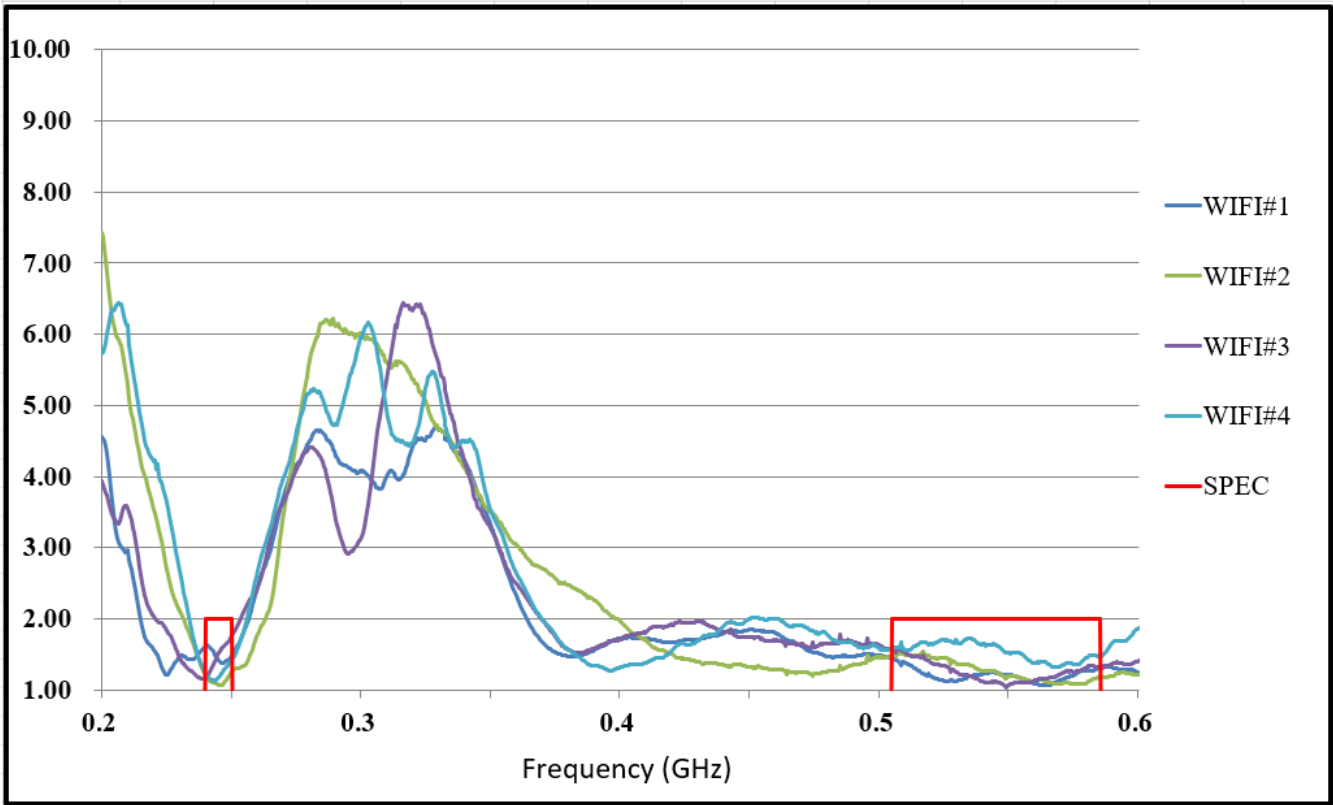
4. Measurement Data

4.1. Antenna Specification

Specifications	
Items	Ant.1 ~ Ant.4 (WIFI)
Antenna Type	Dipole Antenna
Frequency	2.4/5 [GHz]
VSWR	< 2
Efficiency	≥70%
Isolation	> 20 [dB]
Peak Gain	@2GHz< 4 [dBi] @5GHz< 5 [dBi]
Impedances	50 ohms
Cable Length	WIFI#1: 155mm WIFI#2: 87mm WIFI#3: 75mm WIFI#4: 100mm
Antenna Size	WIFI#1: 42X22.5X0.6mm ³ WIFI#2: 35X26.5X0.6mm ³ WIFI#3: 42X22.5X0.6mm ³ WIFI#4: 42X22.5X0.6mm ³

Figure 7Antenna Criteria and measured items

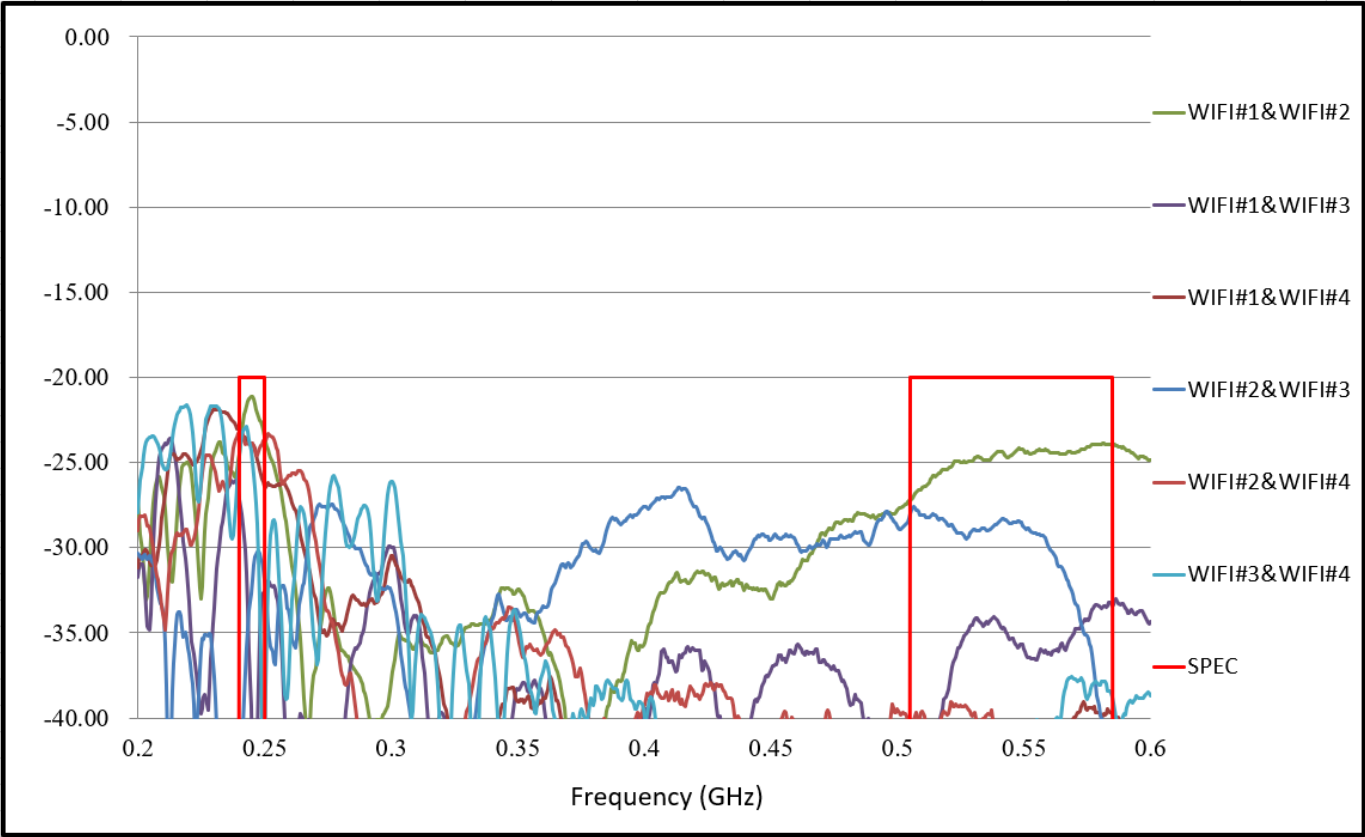
4.2. Antenna VSWR



Freq [MHz]	2400	2450	2500	5050	5150	5350	5725	5825
WIFI#1	1.62	1.42	1.47	1.44	1.28	1.20	1.17	1.28
WIFI#2	1.20	1.07	1.25	1.48	1.50	1.35	1.10	1.15
WIFI#3	1.18	1.52	1.77	1.58	1.47	1.20	1.26	1.34
WIFI#4	1.23	1.18	1.42	1.58	1.64	1.73	1.37	1.49

Figure 8 Chart of VSWR

4.3. Antenna Isolations



Freq [MHz]	2400	2450	2500	5050	5150	5350	5725	5825
WIFI#1&WIFI#2	-24.52	-21.13	-23.43	-27.19	-25.82	-24.86	-24.19	-23.95
WIFI#1&WIFI#3	-27.16	-43.07	-32.62	-45.28	-41.17	-34.43	-34.57	-33.46
WIFI#1&WIFI#4	-23.09	-23.96	-26.36	-51.67	-52.40	-49.19	-39.35	-39.72
WIFI#2&WIFI#3	-41.19	-31.94	-31.91	-27.99	-28.08	-28.93	-34.48	-42.30
WIFI#2&WIFI#4	-23.16	-23.90	-23.68	-40.53	-41.58	-39.88	-44.45	-50.64
WIFI#3&WIFI#4	-24.61	-24.98	-43.00	-42.01	-43.06	-44.30	-37.64	-38.00

Figure 9 Chart of Isolation

Project: U10C149	Date: 2019/11/28
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4.4. Chart of Antenna Peak Gain

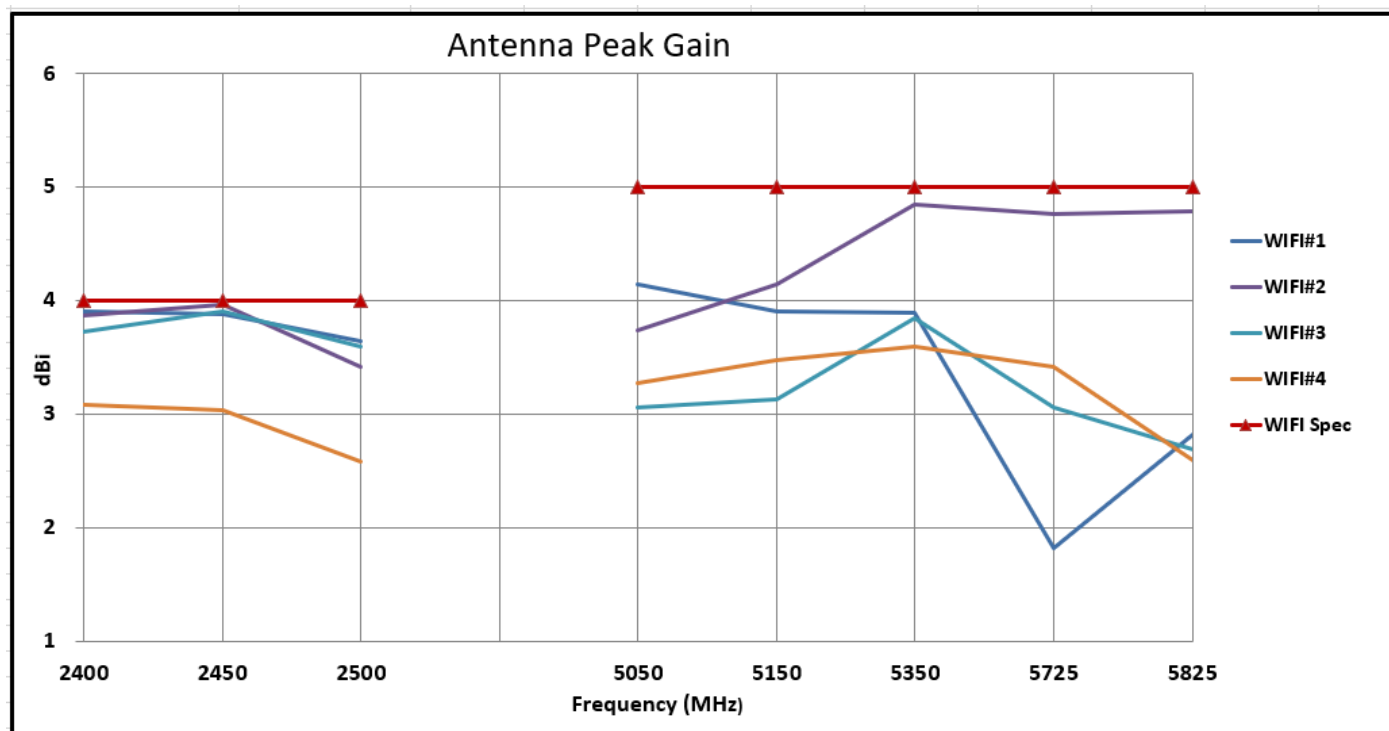


Figure 10 Chart of Peak Gain

4.5. Table of Antenna Performance

Antenna	Frequency(MHz)	2400	2450	2500	5050	5150	5350	5725	5825
WiFi#1	Peak Gain	3.90	3.88	3.64	4.14	3.90	3.90	1.82	2.82
	Avg. Gain	-1.35	-1.11	-1.30	-1.29	-1.32	-1.19	-1.32	-1.49
	Efficiency%	73.34	77.45	74.15	74.27	73.76	76.01	73.74	70.96
WiFi#2	Peak Gain	3.87	3.97	3.41	3.74	4.15	4.84	4.76	4.78
	Avg. Gain	-1.29	-1.30	-1.24	-1.30	-1.11	-1.22	-1.31	-1.35
	Efficiency%	74.26	74.20	75.09	74.18	77.45	75.45	73.94	73.35
WiFi#3	Peak Gain	3.73	3.90	3.59	3.05	3.13	3.85	3.05	2.69
	Avg. Gain	-1.22	-1.30	-1.29	-1.32	-1.37	-1.28	-1.19	-1.14
	Efficiency%	75.58	74.15	74.22	73.77	72.90	74.46	76.11	76.84
WiFi#4	Peak Gain	3.08	3.04	2.58	3.28	3.47	3.59	3.42	2.60
	Avg. Gain	-1.48	-1.21	-1.42	-1.29	-1.26	-1.20	-1.21	-1.44
	Efficiency%	71.18	75.65	72.13	74.26	74.77	75.84	75.65	71.74

Figure 11 Table of Antenna Performance

Antenna	Frequency(MHz)	2400	2450	2500	5050	5150	5350	5725	5825
WiFi Spec	Peak Gain	4.0	4.0	4.0	5.0	5.0	5.0	5.0	5.0
	Avg. Gain	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6	-1.6
	Efficiency%	70.0	70.0	70.0	70.0	70.0	70.0	70.0	70.0

Figure 12 Antenna Criteria

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Antenna Designer: Charles Lee	
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5. Conclusion

There are 4 dipole WIFI antennas in this project. We suggest that all the cable routings need to separate independently, so as to reduce antenna isolation interference from each other(WIFI#1: 155mm; WIFI#2: 87mm; WIFI#3: 75mm; WIFI#4: 100mm). Thus, the antenna performance can meet the specifications. Next, we will maintain the antenna efficiency to the following up schedule.

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Antenna Designer: Charles Lee	
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6. Appendices A

6.1. Cable Attenuation

Frequency(GHz)	1GHz	2GHz	3GHz	4GHz	5GHz	6GHz
1.13mm	1.57dB/M	2.26dB/M	2.79dB/M	3.24dB/M	3.5dB/M	4.05dB/M

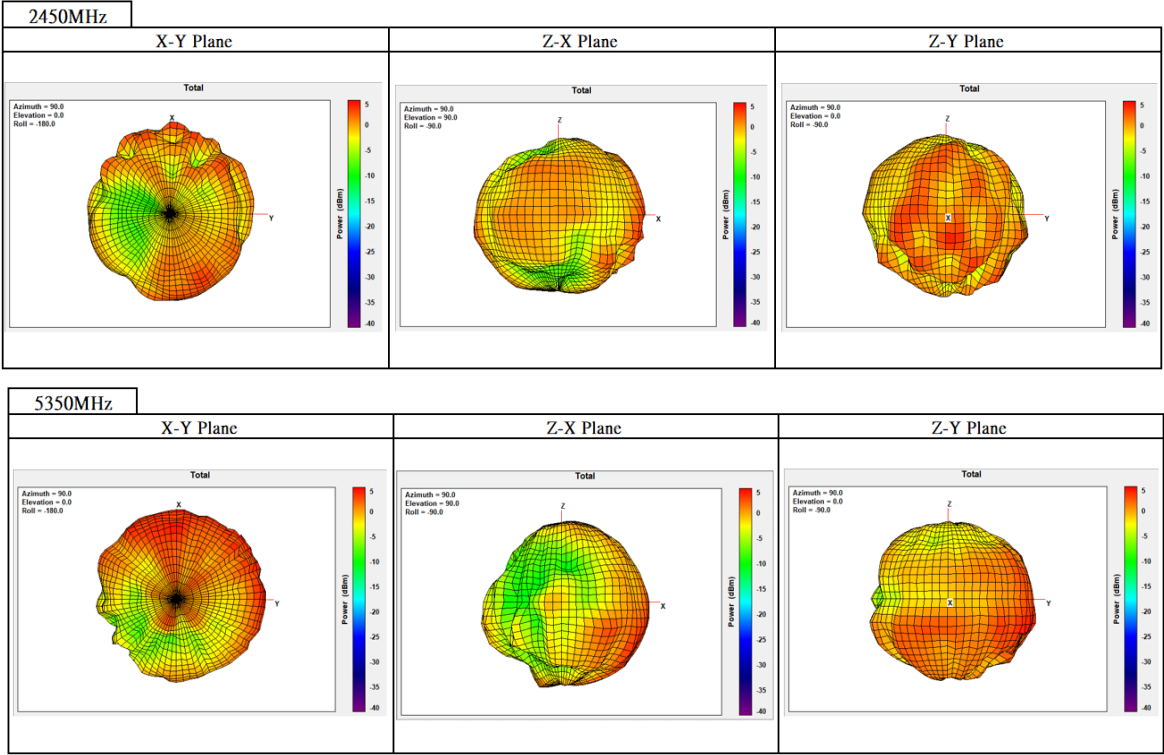
1.13mm	Ant#1	2.4G	0.407 dB
coaxial	180mm	5G	0.630 dB
1.13mm	Ant#2	2.4G	0.197 dB
coaxial	87mm	5G	0.305 dB
1.13mm	Ant#3	2.4G	0.165 dB
coaxial	73mm	5G	0.256 dB
1.13mm	Ant#4	2.4G	0.212 dB
coaxial	94mm	5G	0.329 dB

Figure 13 Attenuation Table

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6.2. Antenna 3D graph

6.2.1. WiFi#3



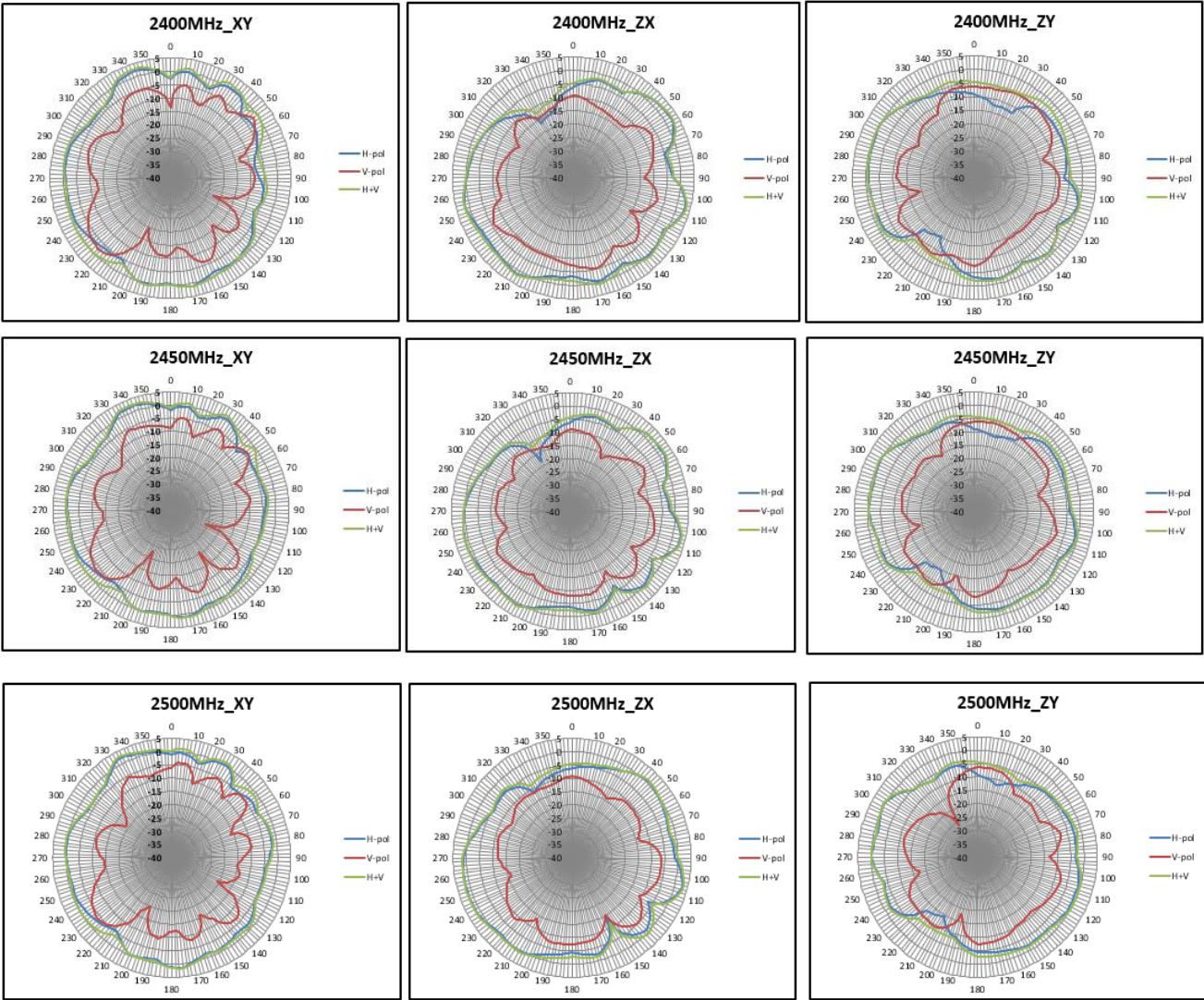
6.3. Antenna 2D graph

6.3.1. WiFi#3

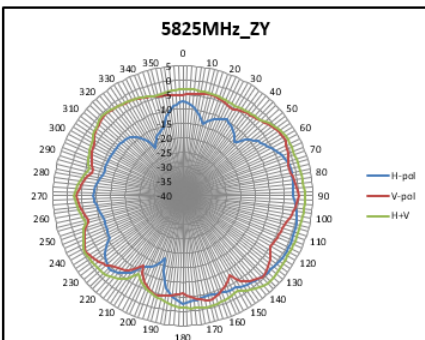
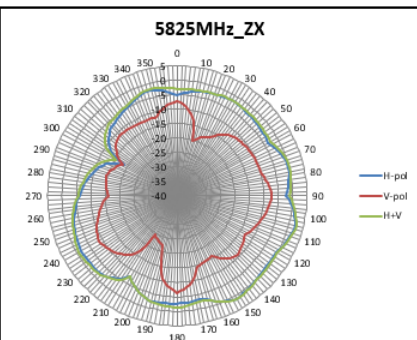
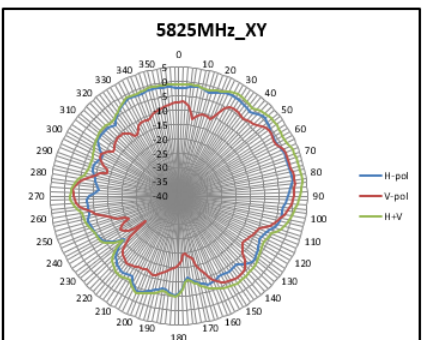
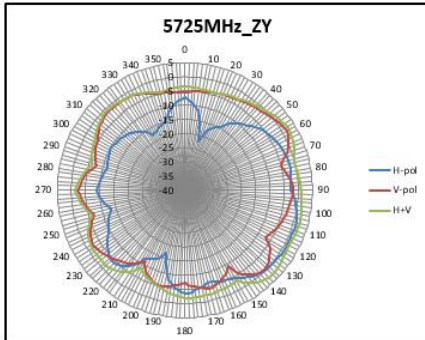
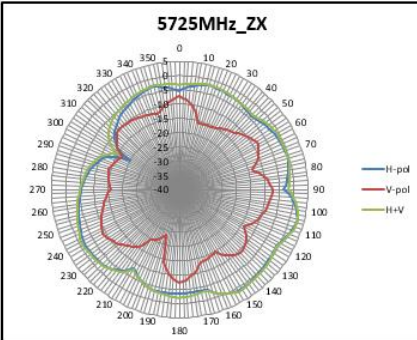
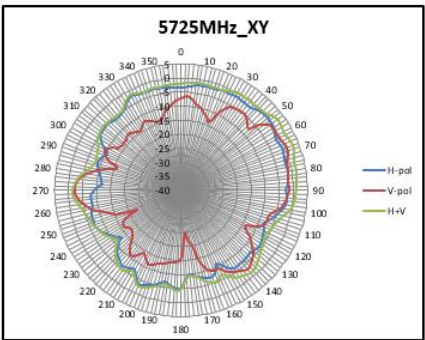
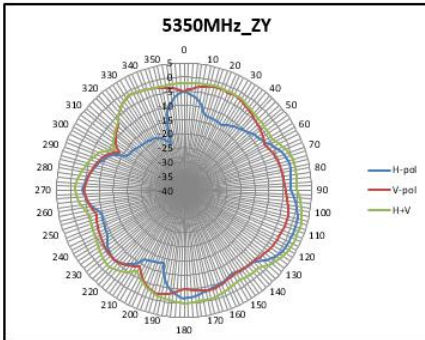
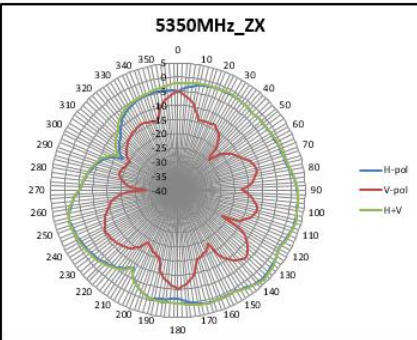
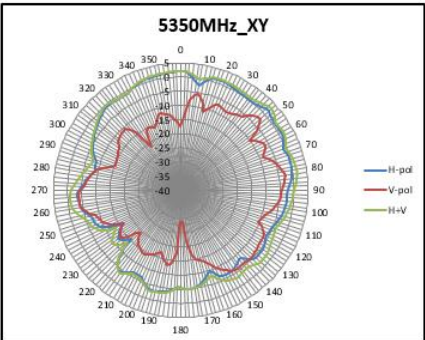
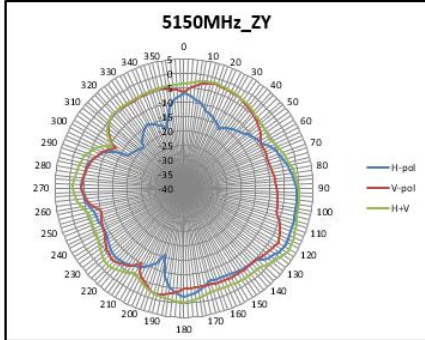
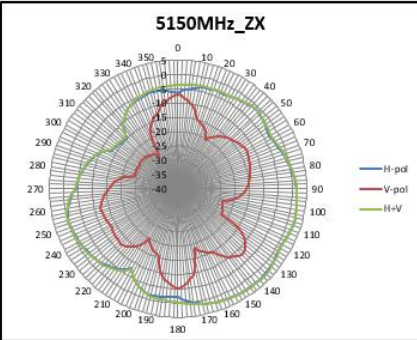
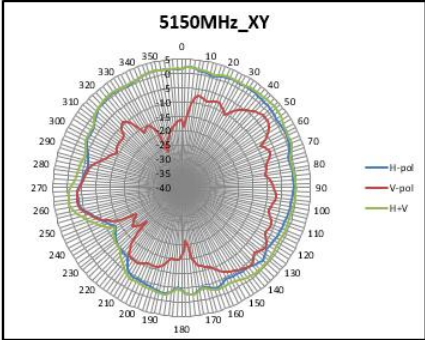
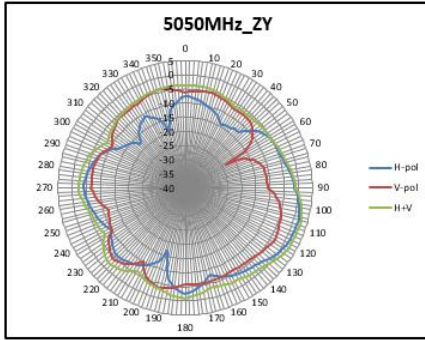
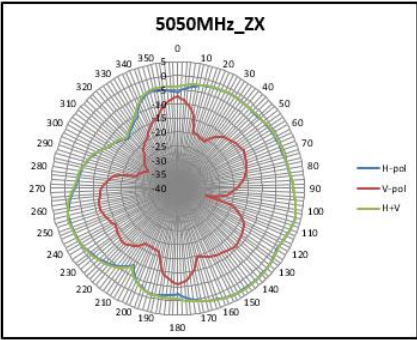
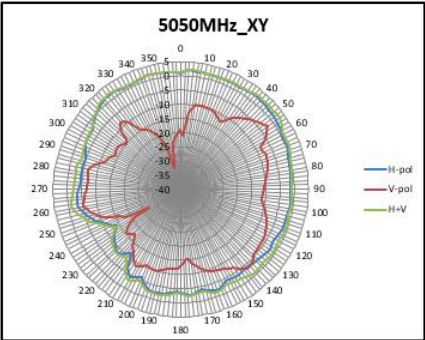
Frequency (MHz)	XY-Plane					
	H-pol		V-pol		Total-pol	
	peak	Avg	peak	Avg	peak	Avg
2400	2.16	-1.54	-1.75	-7.56	2.88	-0.57
2450	2.09	-1.53	-3.42	-8.46	2.66	-0.73
2500	2.30	-1.41	-3.87	-8.82	2.92	-0.69
5050	2.26	-1.13	-2.36	-9.01	3.01	-0.48
5150	2.49	-1.33	-1.99	-7.98	3.07	-0.48
5350	2.15	-2.24	-2.23	-8.32	3.17	-1.28
5725	0.13	-4.26	0.75	-6.43	3.03	-2.21
5825	0.57	-3.87	0.98	-5.95	3.65	-1.78

Frequency (MHz)	ZX-Plane					
	H-pol		V-pol		Total-pol	
	peak	Avg	peak	Avg	peak	Avg
2400	3.38	-1.10	-5.30	-9.63	3.73	-0.53
2450	3.56	-1.35	-5.74	-10.07	3.90	-0.80
2500	3.15	-1.56	-4.80	-9.75	3.59	-0.94
5050	3.05	-1.08	-5.72	-13.24	3.05	-0.83
5150	2.76	-1.27	-4.98	-12.83	3.13	-0.98
5350	3.38	-1.14	-5.08	-11.86	3.85	-0.79
5725	2.79	-2.44	-7.21	-11.20	3.05	-1.89
5825	2.42	-2.35	-6.36	-11.25	2.69	-1.82

Frequency (MHz)	ZY-Plane					
	H-pol		V-pol		Total-pol	
	peak	Avg	peak	Avg	peak	Avg
2400	-0.07	3.66	-5.11	-9.11	0.40	-2.57
2450	0.32	-3.54	-5.92	-9.88	0.47	-2.63
2500	0.53	-3.54	-6.27	-6.40	0.69	-2.70
5050	1.80	-4.89	-3.24	-5.16	2.64	-2.57
5150	0.60	-5.54	-1.76	-5.16	2.47	-2.34
5350	1.44	-4.94	-1.25	-4.37	3.02	-1.64
5725	0.91	-5.01	1.55	-3.41	3.04	-1.12
5825	0.81	-4.98	0.49	-3.24	2.39	-1.01



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Rev.: V1	Note:



Project: U10C149	Date: 2019/11/28
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Rev.: V1	Note:

7. Antenna Total Performance

Antenna	Frequency(MHz)	2400	2450	2500	5050	5150	5350	5725	5825
WIFI#1	Peak Gain	3.90	3.88	3.64	4.14	3.90	3.90	1.82	2.82
	Avg. Gain	-1.35	-1.11	-1.30	-1.29	-1.32	-1.19	-1.32	-1.49
	Efficiency%	73.34	77.45	74.15	74.27	73.76	76.01	73.74	70.96
WIFI#2	Peak Gain	3.87	3.97	3.41	3.74	4.15	4.84	4.76	4.78
	Avg. Gain	-1.29	-1.30	-1.24	-1.30	-1.11	-1.22	-1.31	-1.35
	Efficiency%	74.26	74.20	75.09	74.18	77.45	75.45	73.94	73.35
WIFI#3	Peak Gain	3.73	3.90	3.59	3.05	3.13	3.85	3.05	2.69
	Avg. Gain	-1.22	-1.30	-1.29	-1.32	-1.37	-1.28	-1.19	-1.14
	Efficiency%	75.58	74.15	74.22	73.77	72.90	74.46	76.11	76.84
WIFI#4	Peak Gain	3.08	3.04	2.58	3.28	3.47	3.59	3.42	2.60
	Avg. Gain	-1.48	-1.21	-1.42	-1.29	-1.26	-1.20	-1.21	-1.44
	Efficiency%	71.18	75.65	72.13	74.26	74.77	75.84	75.65	71.74



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環保要求
符合 EPI12 規定

規範編號		TBD				保密等級		☐ 機密 ☐ 密 ☒ 一般					
						PAGE		1 / 4		REV.		X1	
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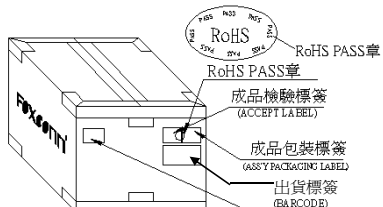
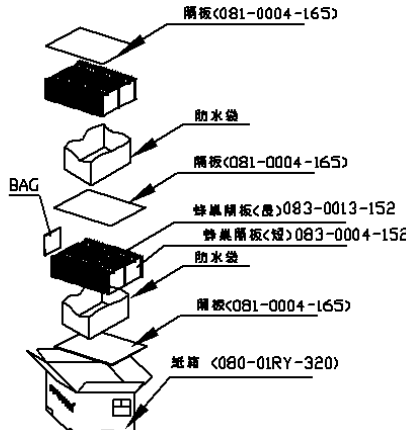
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		生產單位	品保單位			
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包裝作業規範

環保要求
符合 EPI12 規定

				保密等級	☐ 機密 ☐ 密 ☒ 一般		
				PAGE	2 / 4	REV.	X1
規範編號	TBD			包裝類別	蜂巢隔板		
適用客戶	UBEE	適用產品	ANTP2M2-CUB15-EH ANTP2M2-CUB16-EH ANTP2M2-CUB17-EH ANTP2M2-CUB18-EH				
包裝作業圖示及說明				備 注			
一：1.每20PCS產品用PE BAG 包裝起來，.將100PCS(5個PE BAG)包裝好的產品疊放在一起,放入隔板中.(圖示供參考)  三：外箱標籤粘貼方式，具體的Barcode 要求依據出貨管制. 				二： 1.在外箱(080-02RZ-320)內放入隔板（081-0004-165） 2.在外箱內放入防水袋（080-0016-038）， 並敞開袋口. 3.分別放入蜂巢隔板（083-0013-152）3PCS,及蜂巢隔板（083-0004-152）11PCS,成蜂巢狀放入袋中,每1隔間內放入100PCS 產品. 4.包好防水袋,在上面放入隔板（081-0004-165）,再放1PC防水袋(080-0016-038),並敞開袋口. 5.如上重複3.4, 上下兩層各2000PCS,共4000PCS. 6.封好防水袋, 在頂層放1隔板（081-0004-165）, 封箱. 7.封箱后,在外箱上貼上標籤. 如圖：  1.標籤張貼位置及填寫注意事項,請參照生產管理作業標準: (THE STICKING POSITION OF LABEL AND THE POINTS FOR ATTENTION). 外裝瓦楞紙箱及標籤應用管理辦法(文件編號:P103-P01). REFER TO FILE: P103-P01.) 2.外箱封箱請依據ESH-KKG-003成品出貨之封箱作業標準文件, (HOW TO SEAL THE BOX, REFER TO FILE: ESH-KKG-003.) 3.封後之外箱,在棧板上最高堆疊高度： 5層. (THERE ARE FIVE STOREYS AT MOST ON THE PALLET AFTER SEALED BOX.) 4.包裝標籤: <PACKAGING LABEL> FOXCONN® P/N: FOXCONN P/N C.P/N: CUSTOMER P/N # DATE: MM/DD/YYYY ☐ Q'TY: ____ PCS W'T: ____ 1.標籤中"#"表客戶版次, FOXCONN料號,客戶料號及版次依計劃表為準.;如CISCO無鉛料號, 版次後加*; 2.標籤中MM/DD/YYYY表示: 生產月份/日期/年份 (例如: 12/13/2009) 3.標籤中"□"表UL認可製造地代碼. 例如: B: 龍華; T:台灣; K:昆山 H:淮安 4.Q'TY:裝箱數量, 依包規; 零數箱依實際為準. 5.W'T:產品標重, 依系統為準. 備注：如產品出國外，標籤需帶"Made in china". * 若出貨為成品時,每箱實重應以實測重量為準.			

備
注:

*若出貨為成品時,每箱實重應以實測重量為準.

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FOXCONN INTERCONNECT TECHNOLOGY LIMITED

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				保密等級		☐ 機密 ☐ 密 ☒ 一般	
規範編號		TBD		PAGE		3/4	REV. X1
適用客戶		UBEE		適用產品		ANTP2M2-CUB15-EH ANTP2M2-CUB16-EH ANTP2M2-CUB17-EH ANTP2M2-CUB18-EH	
				包裝類別		蜂巢隔板	
包裝作業圖示及說明						備 注	
						1. 木棧板上放滿後, 在4個角各放1PC角板, 之後於四周纏繞打包膜; 打包膜至少纏繞 3 層.(打包膜一定要從棧板底部一直纏繞到貨物頂部) 2. 棧板尺寸為1.2M×1.0M×0.12M,0.12M為支承木塊的高度. 3. 棧板必須為木質的,包括原木和膠合木. 4. 棧板連同貨物堆積高度不大于1.7M. 5. 木棧板上每层最多擺放8箱,每棧板最多放5层,共40箱. (棧板連同貨物堆積高度不大于1.7M) . ***本產品,制程之原物料/零件必須符合EPI12環境管理物質規定.	

備注: "包裝作業圖示及說明"欄位內應包括但不限於: 整箱包裝模式設計、整棧板包裝模式設計、可替代包裝模式設計等.

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規範編號				TBD				PAGE			
適用料號				ANTP2M2-CUB15-EH ANTP2M2-CUB16-EH ANTP2M2-CUB17-EH ANTP2M2-CUB18-EH				重 量 (Kg)			
材料名稱 (/替代材料名稱)				料號 (/替代材料料號)				淨重			
用量				產品型號				包裝容量			
最內層包裝產品數量				每箱最內層包裝數				每箱包裝產品總數量			
每PCS淨重				每箱淨重				每箱毛重			
外 箱(576*450*360mm)				080-02RZ-320				1.79			
隔板				081-0004-165				0.08			
防水袋				080-0016-038				0.06			
封箱膠帶				090-0060-510				N/A			
蜂巢隔板（長）				083-0013-152				0.05021			
蜂巢隔板（短）				083-0004-152				0.039			
成品包裝標籤				080-1011-319				0.0006			
內箱BARCODE				080-2019-319				N/A			
外箱BARCODE				080-2019-319				N/A			
PE袋				084-0001-8957				N/A			
備注：				1. 外箱的長*寬*高是520mm*400mm*300mm				2. 本產品,制程之原物料/零件必須符合EPI12環境管理物質規定			
								3. 實際重量以出貨為準(即以TIPTOP系統中標重為準)			

說明:

- 1) 包裝箱/袋上的安規標示要求需在包裝作業規範上注明,如張貼安規標籤,需注明張貼標籤類型/數量/張貼位置.
- 2) 當存在可用於臨時狀態的替代材料時,應於上表中予以界定.

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