

低功率射頻器材技術規範測試報告

報告編號.	RTBFRX-WTW-P21040185
申請者	u-blox AG
產品名稱	Stand-alone Wi-Fi and Bluetooth module
型號	NINA-W106
系列型號	NINA-W136, NINA-W156, NINA-B226
製造廠商	u-blox AG
商標或廠牌	u-blox
該產品樣品試驗 依據之試驗標準	國家通訊傳播委員會低功率射頻器材技術規範 109 年 7 月 1 日修訂
試驗結果	合格

香港商立德國際商品試驗有限公司桃園分公司 林口實驗室
日期 110 年 05 月 25 日

報告簽署人簽章:



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報告發行紀錄

Issue No.	Description	Date Issued
RTBFRX-WTW-P21040185	Original release	110 年 05 月 25 日

證 明 書

發行日期：110 年 05 月 25 日

產 品 名 稱：Stand-alone Wi-Fi and Bluetooth module
商 標：u-blox
型 號：NINA-W106
系 列 型 號：NINA-W136, NINA-W156, NINA-B226
申 請 者：u-blox AG
量 測 規 範：低功率射頻器材技術規範 LP0002 (修訂日期：109 年 7 月 1 日)
ANSI C63.10-2013

香港商立德國際商品試驗有限公司桃園分公司在此證明上述待測設備樣品一組(型號：NINA-W106)，收件日期 110 年 04 月 12 日，於 110 年 04 月 20 日至 110 年 05 月 12 日，已在本公司的標準測試場地完成量測。報告中所描述之測試結果和待測設備的架構組合，均根據樣品實際的量測情況作詳實的記錄。

立德桃園分公司依“低功率射頻器材技術規範”及“電信管制射頻器材審驗管理辦法”製作測試結果報告。

特 此 證 明 ！

報告製作者： 王秀眉，日期： 110 年 05 月 25 日

王秀眉 / 專員

審 核 者： 邱碧民，日期： 110 年 05 月 25 日

邱碧民 / 高級專案工程師

香港商立德國際商品試驗有限公司桃園分公司

實驗室地址：新北市林口區嘉寶里 14 鄰 47-2 號

此份報告不得摘錄複製，除全份複製外，需經實驗室書面同意。



1 低功率射頻器材量測記錄表

申請廠商： u-blox AG

製造廠商： u-blox AG

申請廠商地址： Zuercherstrasse 68, CH-8800 Thalwil, Switzerland

產品名稱： Stand-alone Wi-Fi and Bluetooth module

廠牌： u-blox

型號： NINA-W106

系列型號： NINA-W136, NINA-W156, NINA-B226

量測單位名稱： 香港商立德國際商品試驗有限公司桃園分公司

林口實驗室華亞檢測部

量測單位地址： 桃園市龜山區文化里華亞二路 19 號

量測單位認可編號： TAF 2021 (9 kHz ~ 40 GHz)

量測規範： 低功率射頻器材技術規範 LP0002 (修訂日期： 109 年 7 月 1 日)
ANSI C63.10-2013

WLAN 2.4 GHz 頻段概要

項次	量測項目	規 範	量測結果判定
1	帶外發射	低功率射頻器材技術規範 4.10.1.5 節	合格
2	電源線傳導干擾	低功率射頻器材技術規範 3.3 節	合格
3	6 dB 頻寬	低功率射頻器材技術規範 4.10.1.6 節	合格
4	峰值傳導輸出功率	低功率射頻器材技術規範 4.10.1.2 節	合格
5	功率頻譜密度	低功率射頻器材技術規範 4.10.1.6 節	合格

Bluetooth EDR 頻段概要

項次	量測項目	規 範	量測結果判定
1	帶外發射	低功率射頻器材技術規範 4.10.1.5	合格
2	電源線傳導干擾	低功率射頻器材技術規範 3.3 節	合格
3	20 dB 頻寬	低功率射頻器材技術規範 4.10.1.6 節	Note
4	峰值傳導輸出功率	低功率射頻器材技術規範 4.10.1.2 節	合格
5	跳頻頻道數之量測	低功率射頻器材技術規範 4.10.1.6 節	合格
6	跳頻頻道間隔之量測	低功率射頻器材技術規範 4.10.1.6 節	合格
7	每一頻道停留時間之量測	低功率射頻器材技術規範 4.10.1.6 節	合格

Note：此頻寬測試值為跳頻頻道間隔之量測參考值。

Bluetooth LE 頻段概要

項次	量測項目	規 範	量測結果判定
1	帶外發射	低功率射頻器材技術規範 4.10.1.5 節	合格
2	電源線傳導干擾	低功率射頻器材技術規範 3.3 節	合格
3	6 dB 頻寬	低功率射頻器材技術規範 4.10.1.6 節	合格
4	峰值傳導輸出功率	低功率射頻器材技術規範 4.10.1.2 節	合格
5	功率頻譜密度	低功率射頻器材技術規範 4.10.1.6 節	合格

最大暴露允許值(Maximum Permissible Exposure, MPE)

項次	量測項目	規 範	量測結果判定
1	電波暴露量	低功率射頻器材技術規範 6.20.2 節	合格

備註：量測結果之判定不考慮量測不確定度的貢獻。

2 一般敘述

2.1 待測設備

產品名稱：	Stand-alone Wi-Fi and Bluetooth module	
型號：	NINA-W106	
系列型號：	NINA-W136, NINA-W156, NINA-B226	
額定電源：	3.3 Vdc (adapter or host equipment)	
調變方式：	Wireless LAN	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
	Bluetooth EDR	GFSK, $\pi/4$ -DQPSK, 8DPSK
	Bluetooth LE	GFSK
傳輸速率：	Wireless LAN	802.11b: 11.0/ 5.5/ 2.0/ 1.0 Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0 Mbps 802.11n: up to 150.0 Mbps
	Bluetooth EDR	1/ 2/ 3 Mbps
	Bluetooth LE	1 Mbps
載波頻率：	Wireless LAN	2.4 GHz: 2412 ~ 2462 MHz
	Bluetooth EDR	2402 ~ 2480 MHz
	Bluetooth LE	2402 ~ 2480 MHz
頻道數：	Wireless LAN	2.4 GHz: 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7
	Bluetooth EDR	79
	Bluetooth LE	40
發射功率：	Wireless LAN	2.4 GHz: 802.11b: 19.55 dBm 802.11g: 23.55 dBm 802.11n (HT20): 23.07 dBm 802.11n (HT40): 21.99 dBm
	Bluetooth EDR	7.06 dBm
	Bluetooth LE	6.86 dBm
天線種類：	見註 3	
電源線類別：	N/A	
信號線類別：	見註 6	
配件：	見註 6	

註：

1. 此待測物之技術的種類為1Tx / 1Rx之組合。

Modulation Mode	Tx Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	1TX
802.11n (HT40)	1TX

2. 待測設備所有型號如下:

商標	型號	差異說明
u-blox	NINA-W106	OEM開發應用軟體
	NINA-W156	模組廠預設應用軟體
	NINA-W136	
	NINA-B226	

3. 此待測設備搭配測試的天線，其資料如下：

	頻帶 (MHz)	天線型式	天線型號	商標	接頭型式	增益 (dBi)
WLAN	2412 ~ 2462	PCB	u-blox PCB Trace Antenna	Proant	N/A	3
Bluetooth	2402 ~ 2480				N/A	3

4. 上述天線的規格資訊由申請者聲明，實驗室不承擔任何責任。

5. 此待測設備搭配使用之配件請參閱產品照編號: BFRX-WTW-P21040185，測試照片請參照BV CPS編號: RTBFRX-WTW-P21040185_TSup。

6. 輔助測試之周邊如下。

配件	廠牌	型號	規格
Test Fixture	u-blox	EVB-NINA-W1x6	-

7. 此報告中，場強輻射量測經過評估後以下列測試模式進行最終量測。

量測項目	發射	接收
2412 ~ 2462 MHz		
1 GHz 以上量測	802.11b: Ch 1, 6, 11 802.11g: Ch 1, 6, 11 802.11n (HT20): Ch 1, 6, 11 802.11n (HT40): Ch 3, 6, 9	802.11b: Ch 11
其它不必要之訊號	802.11b: Ch 11	802.11b: Ch 11
2402 ~ 2480 MHz (Bluetooth EDR)		
1 GHz 以上量測	GFSK: Ch 0, 39, 78 8DPSK: Ch 0, 39, 78	8DPSK: Ch 0
其它不必要之訊號	8DPSK: Ch 0	8DPSK: Ch 0
2402 ~ 2480 MHz (Bluetooth LE)		
1 GHz 以上量測	Ch 0, 19, 39	Ch 39
其它不必要之訊號	Ch 39	Ch 39

8. 此報告中傳輸模式，場強輻射量測及電源線傳導干擾量測之外的測試項目，以DSSS調變技術和OFDM調變技術分別進行測試並記錄最終量測結果於報告中。

9. Bluetooth EDR傳輸模式DH1、DH3及DH5皆經過預測試，其中以DH5的傳輸模式具有較大干擾雜訊，因此僅以此傳輸模式進行最終量測。

10. Bluetooth LE傳輸模式，場強輻射量測及電源線傳導干擾量測之外的測試項目，以GFSK調變技術進行測試並記錄最終量測結果於報告中。

11. 此報告中，測試模式評估如下

(1) 電源線傳導干擾量測經預掃後以模式1具有較大干擾值，故以其模式進行最終測試。

(2) 場強輻射量測以模式1~3評估完整測試。

模式	測試狀態
1	TX/RX BT Mode + Notebook + USB Cable
2	TX/RX BT LE Mode + Notebook + USB Cable
3	TX/RX WiFi 2.4G Mode + Notebook + USB Cable

12. 此待測設備，經評估三個正交軸方位評估測試擺設方式：平躺、垂直、側放，其中以平躺擺放擁有最大干擾值，故以此擺放方式進行最終量測，並將測試結果紀錄。

13. Duty cycle of test signal.

Duty cycle of test signal is < 98 %, duty factor is required.

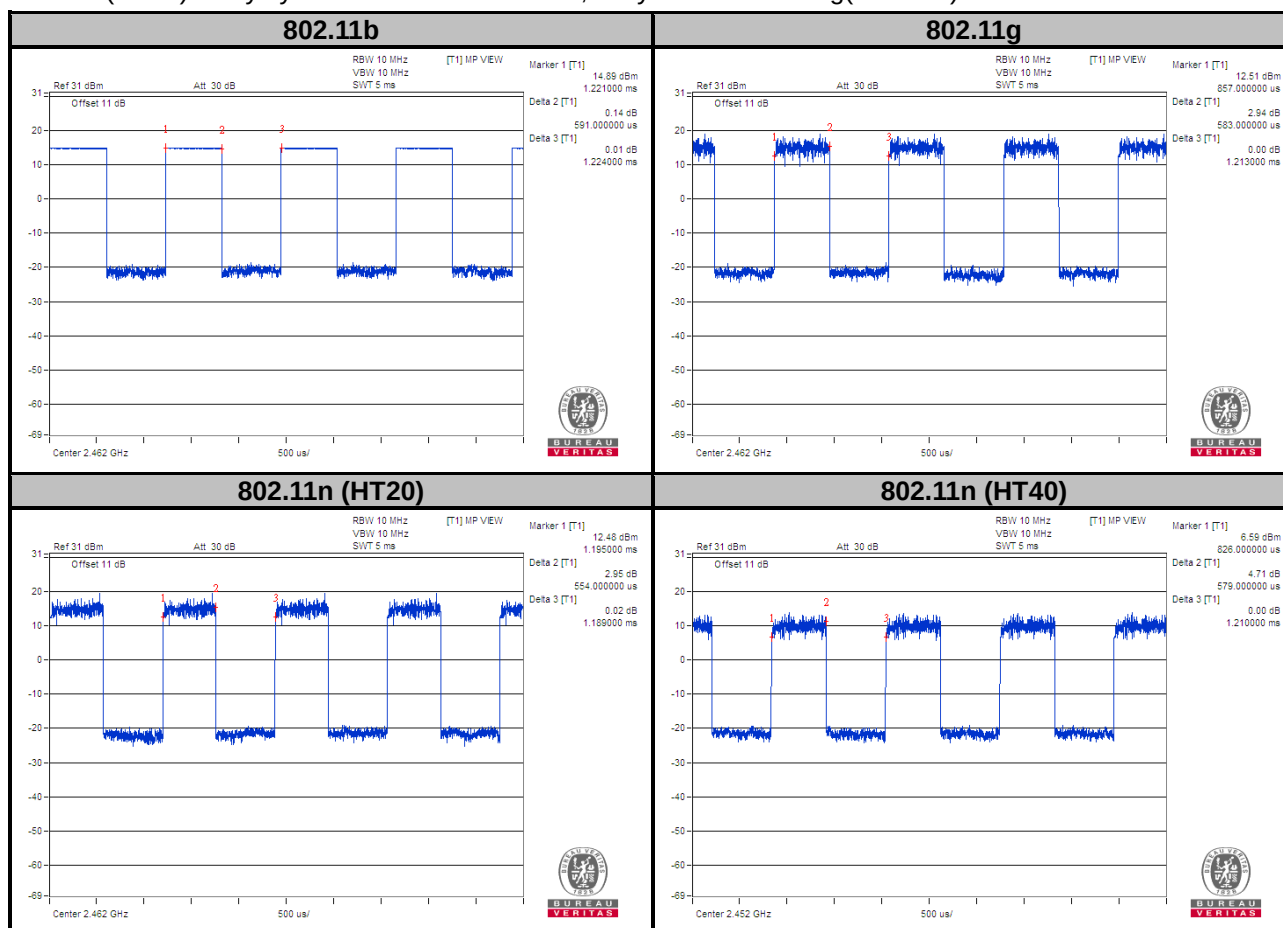
2.4 GHz 频段

802.11b: Duty cycle = $0.591/1.224 = 0.483$, Duty factor = $10 * \log(1/0.483) = 3.16$

802.11g: Duty cycle = $0.583/1.213 = 0.481$, Duty factor = $10 * \log(1/0.481) = 3.18$

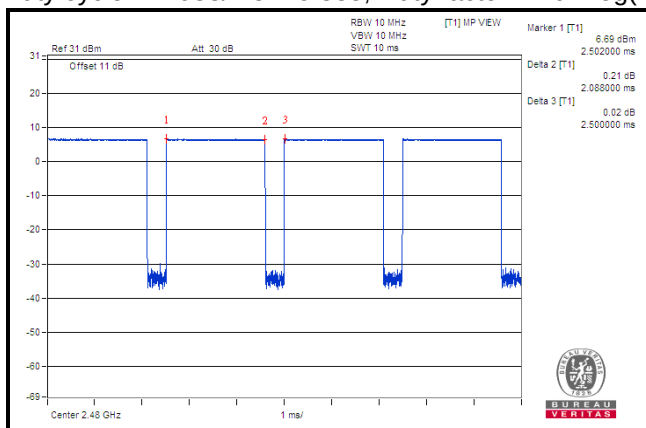
802.11n (HT20): Duty cycle = $0.554/1.189 = 0.466$, Duty factor = $10 * \log(1/0.466) = 3.32$

802.11n (HT40): Duty cycle = $0.579/1.21 = 0.479$, Duty factor = $10 * \log(1/0.479) = 3.20$



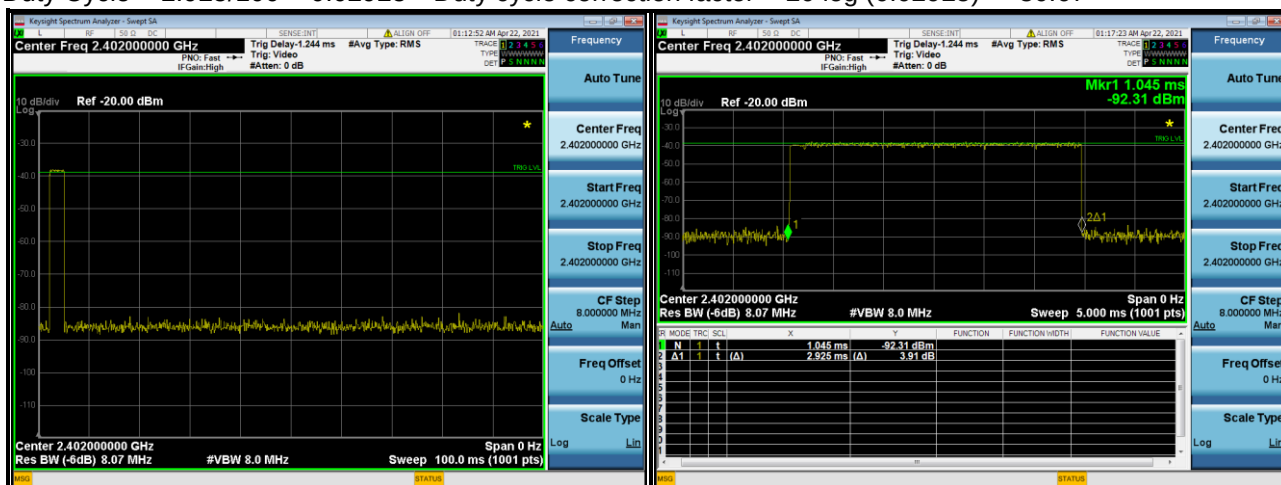
BT LE频段

Duty cycle = $2.088/2.5 = 0.835$, Duty factor = $10 * \log(1/0.835) = 0.78$



BT EDR频段

Duty Cycle = $2.925/100 = 0.02925$, Duty cycle correction factor = $20 \log(0.02925) = -30.67$



此裝置各頻道的中心頻率如下：

2.4 GHz 頻段：

802.11b, 802.11g, 802.11n (HT20):

頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437		

802.11n (HT40):

頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)
03	2422	07	2442
04	2427	08	2447
05	2432	09	2452
06	2437		

Bluetooth EDR 頻段:

頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)
0	2402	17	2419	34	2436	51	2453	68	2470
1	2403	18	2420	35	2437	52	2454	69	2471
2	2404	19	2421	36	2438	53	2455	70	2472
3	2405	20	2422	37	2439	54	2456	71	2473
4	2406	21	2423	38	2440	55	2457	72	2474
5	2407	22	2424	39	2441	56	2458	73	2475
6	2408	23	2425	40	2442	57	2459	74	2476
7	2409	24	2426	41	2443	58	2460	75	2477
8	2410	25	2427	42	2444	59	2461	76	2478
9	2411	26	2428	43	2445	60	2462	77	2479
10	2412	27	2429	44	2446	61	2463	78	2480
11	2413	28	2430	45	2447	62	2464		
12	2414	29	2431	46	2448	63	2465		
13	2415	30	2432	47	2449	64	2466		
14	2416	31	2433	48	2450	65	2467		
15	2417	32	2434	49	2451	66	2468		
16	2418	33	2435	50	2452	67	2469		

Bluetooth LE 頻段:

頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)
0	2402	8	2418	16	2434	24	2450	32	2466
1	2404	9	2420	17	2436	25	2452	33	2468
2	2406	10	2422	18	2438	26	2454	34	2470
3	2408	11	2424	19	2440	27	2456	35	2472
4	2410	12	2426	20	2442	28	2458	36	2474
5	2412	13	2428	21	2444	29	2460	37	2476
6	2414	14	2430	22	2446	30	2462	38	2478
7	2416	15	2432	23	2448	31	2464	39	2480

詳細之規格請參考使用說明書。

2.2 輔助測試之週邊設備描述

待測設備於受測時均接上其所屬的配件或一般用途之相關設備；下列輔助設備或配件測試中所使用的配備，以形成一個代表待測物實際運作的受測系統。

No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	Bluetooth Tester	R&S	CBT	100980	N/A	Provided by lab
B	Test Fixture	u-blox	EVN-NINA-W1x6	N/A	N/A	Provided by client
C	Notebook	DELL	E5520	8Y4DMQ1	N/A	Provided by lab
D	Adapter	DELL	LA65NS2-01	N/A	N/A	Provided by lab

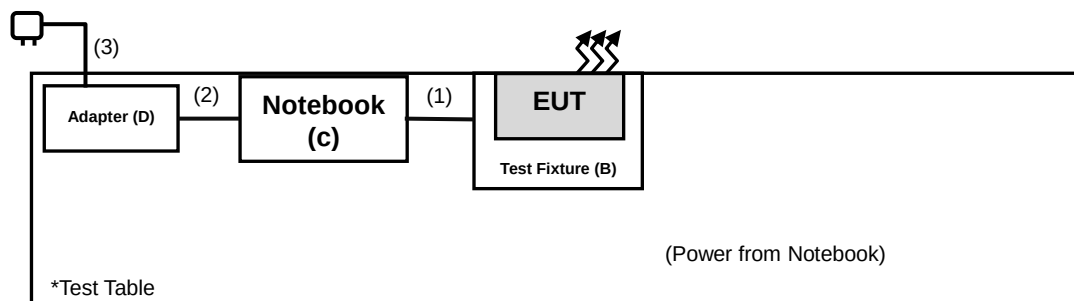
No.	Signal Cable Description Of The Above Support Units
1	USB Cable: 1.1m, Provided by lab
2	DC Cable: 1m, Provided by lab
3	AC Cable: 0.75m, Provided by lab

NOTE:

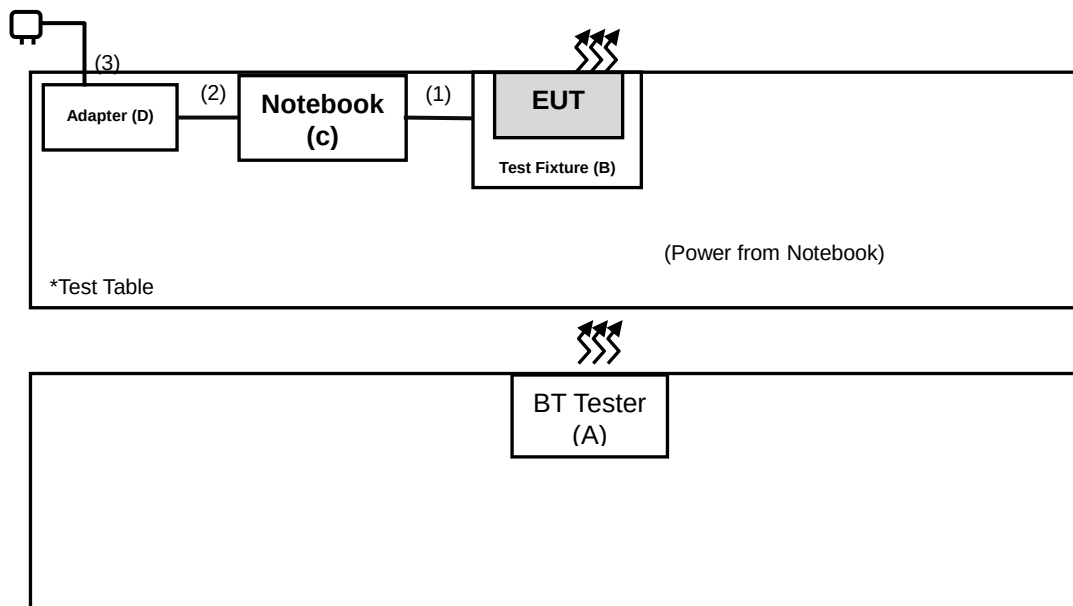
1. All power cords of the above support units are non shielded (1.8m).
2. Item C acted as a communication partner to transfer data.
3. 本案器材申請者切結不提供隨貨配件，配件由實驗室及申請者提供的非隨貨配件併同檢測。不提供隨貨配件之照片請參閱附件。(BV CPS 報告編號: BFRX-WTW-P21040185_SU)

2.3 測試架構圖

<WLAN & Bluetooth LE>



<Bluetooth EDR>



3 適用規範

3.1 規範要求和參考

► Bluetooth LE 頻段部份：

(1) 傳導之規定

依據國家通訊傳播委員會低功率射頻器材技術規範之 3.3 節，電源傳導干擾之限制要求如下：

頻率(MHz)	傳導限制值 (dBuV)	
	準峰值(Quasi-peak)	平均值(Average)
0.15-0.5	66-56 (註)	56-46 (註)
0.5-5	56	46
5-30	60	50

(註)：隨頻率之對數遞減。

(2) 帶外發射之規定

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.5 節之要求，操作頻帶範圍外之任意 100 kHz 內，發射機所產生的射頻功率相較於使用頻帶範圍中包含最高所需功率之 100 kHz 內的射頻功率，其衰減值限制如下：(1) 輸出功率以附件二之峰值輸出功率方式測量者，至少須衰減 20 dB，可使用射頻傳導或輻射方式測量。(2) 輸出功率以 4.10.1.2(1)(C)之最大傳導輸出功率測量方式者，至少須衰減 30 dB。此外，落於 3.5 禁用頻段之輻射發射，應符合 3.6 之規定。

頻率(MHz)	電場強度(微伏特/公尺, uV/m)	測距(公尺)
$0.009 \leq f \leq 0.490$	$2,400/f(\text{kHz})$	300
$0.490 < f \leq 1.705$	$24,000/f(\text{kHz})$	30
$1.705 < f < 30$	30	30
$30 \leq f \leq 88$	100	3
$88 < f \leq 216$	150	3
$216 < f \leq 960$	200	3
$960 < f$	500	3

(3) 天線之規定

天線規格不受第 3.2 節規定之限制。

(4) 天線增益之要求

低功率發射機，依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.3 節之規定如下：

(A) 進行固定式點對點操作時，其發射天線之方向性增益超過 6 dBi，每超過 3 dBi，最大傳導輸出功率限制值應降低 1 dB。

(B) 天線以多向波束發射方式(含同時發射或循序發射)將訊號導向多個接收機或接收機群組時，應符合下列規定：

(a) 非同時發射多向波束者，所有載波或頻道傳輸至所有天線陣列或陣列群之總和傳導輸出功率應符合 4.10.1.2 之功率限制值。如天線/天線陣列群之方向性增益超過 6 dBi，每超過 3 dBi，總和傳導輸出功率限制值應降低 1 dB。方向性增益值應計算如下：

(i) 方向性增益值 = $10\log(\text{天線陣列之單元數目}) + \text{各單元中最高之方向性增益值}$ 。

(ii) 天線陣列間之遮蔽效應或波束干涉損失能充分佐證時，方向性增益得低於(i)計算數值。

(b) 同時發射多向波束於相同或不同頻道者，其每一波束功率應符合(a)之功率限制值。如發射波束有重疊現象，功率應降低，以確保總和傳導輸出功率符合(a)之限制值。同時發射的所有波束總和傳導輸出功率不大於(a) 總和傳導輸出功率限制值加 8 dB。方向性增益值計算同(a)。

(c) 發射機之天線具備單向波束功能者，應符合(1)(A)及(3)後段之規定。

除(A)及(B)外，使用超過 6 dBi 方向增益之發射天線時，應依超過 6 dBi 天線方向增益的 dBi 總量，等量減少最大傳導輸出功率限制值。

(5) 6 dB 頻寬之要求

對使用數位調變技術(digital modulation techniques)系統之低功率發射機，依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.6 節之規定，6 dB 頻寬至少應有 500 kHz。

(6) 峰值傳導輸出功率之要求

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.2 節之規定：

數位調變技術系統：1 W(含)以下。

(7) 功率頻譜密度之要求

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.6 節之規定，在使用頻率範圍之任一 3 kHz 頻寬內，由發射機傳導至天線之功率頻譜密度在任意傳輸期間內，皆小於或等於 8 毫分貝(dBm)，且應依 4.10.1.3 之方式降低功率頻譜密度限制值。

(8) 電波暴露量之評估

依據國家通訊傳播委員會低功率射頻器材技術規範 6.20.2 節之規定，若受測物於正常操作模式下，其發射機距離人體 20 公分以上者，可測試最大暴露允許值(Maximum Permissible Exposure, MPE)以證明其符合電波暴露量之要求。

限制值如下：

(1) 職業性/可控制之暴露

頻率範圍 (MHz)	電場強度 (V/m)	磁場強度 (A/m)	功率密度 (mW/cm ²)	平均時間 (minutes)
0.3 - 3.0	614	1.63	*100	6
3 - 30	1842/f	4.89/f	*900/f ²	6
30 - 300	61.4	0.163	1.0	6
300 - 1,500	---	---	f/300	6
1,500 - 100,000	---	---	5.0	6

註 1：標記*表平面波等效功率密度。

註 2：f 表測試頻率，單位：MHz。

(2) 一般人/不可控制之暴露

頻率範圍 (MHz)	電場強度 (V/m)	磁場強度 (A/m)	功率密度 (mW/cm ²)	平均時間 (minutes)
0.3 - 1.34	614	1.63	*100	30
1.34 - 30	824/f	2.19/f	*180/f ²	30
30 - 300	27.5	0.073	0.2	30
300 - 1,500	---	---	f/1500	30
1,500 - 100,000	---	---	1.0	30

註 1：標記*表平面波等效功率密度。

註 2：f 表測試頻率，單位：MHz。

►WLAN 頻段部份:

(9) 傳導之規定

依據國家通訊傳播委員會低功率射頻器材技術規範之 3.3 節，電源傳導干擾之限制要求如下：

頻率(MHz)	傳導限制值 (dBuV)	
	準峰值(Quasi-peak)	平均值(Average)
0.15-0.5	66-56 (註)	56-46 (註)
0.5-5	56	46
5-30	60	50

(註)：隨頻率之對數遞減。

(10) 帶外發射之規定

(1) 操作於 2.4000~2.4835 GHz band:

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.5 節之要求，操作頻帶範圍外之任意 100 kHz 內，發射機所產生的射頻功率相較於使用頻帶範圍中包含最高所需功率之 100 kHz 內的射頻功率，其衰減值限制如下：(1) 輸出功率以附件二之峰值輸出功率方式測量者，至少須衰減 20 dB，可使用射頻傳導或輻射方式測量。(2) 輸出功率以 4.10.1.2(1)(C)之最大傳導輸出功率測量方式者，至少須衰減 30 dB。

(2) 在 1 GHz 以下不必要之發射，應符合 3.6 之規定。此外，落於 3.5 禁用頻段之輻射發射，應符合 3.6 之規定。

頻率(MHz)	電場強度(微伏特/公尺, uV/m)	測距(公尺)
$0.009 \leq f \leq 0.490$	$2,400/f(\text{kHz})$	300
$0.490 < f \leq 1.705$	$24,000/f(\text{kHz})$	30
$1.705 < f < 30$	30	30
$30 \leq f \leq 88$	100	3
$88 < f \leq 216$	150	3
$216 < f \leq 960$	200	3
$960 < f$	500	3

(11) 天線之規定

天線規格不受第 3.2 節規定之限制。

(12) 天線增益之要求

低功率發射機，依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.3 節之規定如下：

(1) 操作於 2.400~2.4835 GHz 頻段：

- (A) 進行固定式點對點操作時，其發射天線之方向性增益超過 6 dBi，每超過 3 dBi，最大傳導輸出功率限制值應降低 1 dB。
- (B) 天線以多向波束發射方式(含同時發射或循序發射)將訊號導向多個接收機或接收機群組時，應符合下列規定：
 - (a) 非同時發射多向波束者，所有載波或頻道傳輸至所有天線陣列或陣列群之總和傳導輸出功率應符合 4.10.1.2 之功率限制值。如天線/天線陣列群之方向性增益超過 6 dBi，每超過 3 dBi，總和傳導輸出功率限制值應降低 1 dB。方向性增益值應計算如下：
 - (i) 方向性增益值 = $10\log(\text{天線陣列之單元數目}) + \text{各單元中最高之方向性增益值}$ 。
 - (ii) 天線陣列間之遮蔽效應或波束干涉損失能充分佐證時，方向性增益得低於(i)計算數值。
 - (b) 同時發射多向波束於相同或不同頻道者，其每一波束功率應符合(a)之功率限制值。如發射波束有重疊現象，功率應降低，以確保總和傳導輸出功率符合(a)之限制值。同時發射的所有波

束總和傳導輸出功率不大於(a) 總和傳導輸出功率限制值加 8 dB。方向性增益值計算同(a)。

(c) 發射機之天線具備單向波束功能者，應符合(1)(A)及(3)後段之規定。

除(A)及(B)外，使用超過 6 dBi 方向增益之發射天線時，應依超過 6 dBi 天線方向增益的 dBi 總量，等量減少最大傳導輸出功率限制值。

(13) 6 dB 頻寬之要求

(1) 操作於 2.400~2.4835 GHz 頻段：

對使用數位調變技術(digital modulation techniques)系統之低功率發射機，依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.6 節之規定，6 dB 頻寬至少應有 500 kHz。

(14) 傳導輸出功率之要求

(1) 操作於 2.4000~2.4835 GHz band:

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.2 節之規定：

數位調變技術系統：1 W(含)以下。

(15) 功率頻譜密度之要求

(1) 操作於 2.4000~2.4835 GHz band:

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.6 節之規定，在使用頻率範圍之任一 3 kHz 頻寬內，由發射機傳導至天線之功率頻譜密度在任意傳輸期間內，皆小於或等於 8 毫分貝(dBm)，且應依 4.10.1.3 之方式降低功率頻譜密度限制值。

(16) 電波暴露量之評估

依據國家通訊傳播委員會低功率射頻器材技術規範 6.20.2 節之規定，若受測物於正常操作模式下，其發射機距離人體 20 公分以上者，可測試最大暴露允許值(Maximum Permissible Exposure, MPE)以證明其符電波暴露量之要求。

限制值如下：

(1) 職業性/可控制之暴露

頻率範圍 (MHz)	電場強度 (V/m)	磁場強度 (A/m)	功率密度 (mW/cm ²)	平均時間 (minutes)
0.3 - 3.0	614	1.63	*100	6
3 - 30	1842/f	4.89/f	*900/f ²	6
30 - 300	61.4	0.163	1.0	6
300 - 1,500	---	---	f/300	6
1,500 - 100,000	---	---	5.0	6

註 1：標記*表平面波等效功率密度。

註 2：f 表測試頻率，單位：百萬赫(MHz)。

(2) 一般人/不可控制之暴露

頻率範圍 (MHz)	電場強度 (V/m)	磁場強度 (A/m)	功率密度 (mW/cm ²)	平均時間 (minutes)
0.3 - 1.34	614	1.63	*100	30
1.34 - 30	824/f	2.19/f	*180/f ²	30
30 - 300	27.5	0.073	0.2	30
300 - 1,500	---	---	f/1500	30
1,500 - 100,000	---	---	1.0	30

註 1：標記*表平面波等效功率密度。

註 2：f 表測試頻率，單位：百萬赫(MHz)。

► Bluetooth EDR 頻段部分：

(17) 傳導之規定

依據國家通訊傳播委員會低功率射頻器材技術規範之 3.3 節，電源傳導干擾之限制要求如下：

頻率(MHz)	傳導限制值 (dBuV)	
	準峰值(Quasi-peak)	平均值(Average)
0.15-0.5	66-56 (註)	56-46 (註)
0.5-5	56	46
5-30	60	50

(註)：隨頻率之對數遞減。

(18) 帶外發射之規定

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.5 節之要求，操作頻帶範圍外之任意 100 kHz 內，發射機所產生的射頻功率相較於使用頻帶範圍中包含最高所需功率之 100 kHz 內的射頻功率，其衰減值限制如下：(1) 輸出功率以附件二之峰值輸出功率方式測量者，至少須衰減 20 dB，可使用射頻傳導或輻射方式測量。(2) 輸出功率以 4.10.1.2(1)(C)之最大傳導輸出功率測量方式者，至少須衰減 30 dB。此外，落於 3.5 禁用頻段之輻射發射，應符合 3.6 之規定。

頻率(MHz)	電場強度(微伏特/公尺, uV/m)	測距(公尺)
$0.009 \leq f \leq 0.490$	$2,400/f(\text{kHz})$	300
$0.490 < f \leq 1.705$	$24,000/f(\text{kHz})$	30
$1.705 < f < 30$	30	30
$30 \leq f \leq 88$	100	3
$88 < f \leq 216$	150	3
$216 < f \leq 960$	200	3
$960 < f$	500	3

(19) 天線之規定

天線規格不受第 3.2 節規定之限制。

(20) 天線增益之要求

低功率發射機，依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.3 節之規定如下：

(A) 進行固定式點對點操作時，其發射天線之方向性增益超過 6 dBi，每超過 3 dBi，最大傳導輸出功率限制值應降低 1 dB。

(B) 天線以多向波束發射方式(含同時發射或循序發射)將訊號導向多個接收機或接收機群組時，應符合下列規定：

(a) 非同時發射多向波束者，所有載波或頻道傳輸至所有天線陣列或陣列群之總和傳導輸出功率應符合 4.10.1.2 之功率限制值。如天線/天線陣列群之方向性增益超過 6 dBi，每超過 3 dBi，總和傳導輸出功率限制值應降低 1 dB。方向性增益值應計算如下：

(i) 方向性增益值 = $10\log(\text{天線陣列之單元數目}) + \text{各單元中最高之方向性增益值}$ 。

(ii) 天線陣列間之遮蔽效應或波束干涉損失能充分佐證時，方向性增益得低於(i)計算數值。

(b) 同時發射多向波束於相同或不同頻道者，其每一波束功率應符合(a)之功率限制值。如發射波束有重疊現象，功率應降低，以確保總和傳導輸出功率符合(a)之限制值。同時發射的所有波束總和傳導輸出功率不大於(a)總和傳導輸出功率限制值加 8 dB。方向性增益值計算同(a)。

(c) 發射機之天線具備單向波束功能者，應符合(1)(A)及(3)後段之規定。

除(A)及(B)外，使用超過 6 dBi 方向增益之發射天線時，應依超過 6 dBi 天線方向增益的 dBi 總量，等量減少最大傳導輸出功率限制值。

(21) 峰值傳導輸出功率之要求

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.2 節之規定：

操作於 2400 MHz~2483.5 MHz 者

(a) 至少使用 75 個跳頻頻道之跳頻系統：1 W(含)以下。

(b) 除(a)外，依 4.10.1.6 (1)(A)(a)之跳頻系統：0.125 W(含)以下。

(c) 數位調變技術系統：1 W(含)以下。

除使用附件二之峰值輸出功率測量方式外，並得使用以最大傳導輸出功率(Maximum Conducted Output Power)作為測量方式。

(22) 跳頻頻道數之量測

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.6 節之規定，操作於 2400-2483.5 MHz 之展頻跳頻系統，須使用至少 15 個無重疊的頻道。應使用智慧型跳頻技術，以避免占用於特定跳頻頻道。

(23) 跳頻頻道間隔之量測

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.6 節之規定，跳頻系統之載波頻率頻道間隔應大於或等於 25 kHz 或跳頻頻道之 20 dB 頻寬，兩者取較寬者。但操作頻率為 2400 MHz~2483.5 MHz 頻段且輸出功率應小於或等於 125 mW 跳頻系統，其載波頻率頻道間隔不得小於 25 kHz 或跳頻頻道 20 dB 頻寬之三分之二，兩者取較寬者。系統之跳頻頻道應依虛擬亂數排列，在各頻率之跳頻頻道上跳躍。每一發射機必須均等的使用每一頻率。系統接收機應具有與發射機跳躍頻道頻寬相匹配之輸入頻寬，且應隨所發射之訊號同步偏移接收頻率。

(24) 每一頻道停留時間之量測

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.6 節之規定，操作於 2400 MHz~2483.5 MHz 之展頻跳頻系統，須使用至少 15 個無重疊的頻道，在 0.4 秒乘以跳頻頻道數之週期內，任一頻率占用之平均時間應小於或等於 0.4 秒。應使用智慧型跳頻技術，以避免占用於特定跳頻頻道。

(25) 電波暴露量之評估

依據國家通訊傳播委員會低功率射頻器材技術規範 6.20.2 節之規定，若受測物於正常操作模式下，其發射機距離人體 20 公分以上者，可測試最大暴露允許值(Maximum Permissible Exposure, MPE)以證明其符合電波暴露量之要求。

限制值如下：

(1) 職業性/可控制之暴露

頻率範圍 (MHz)	電場強度 (V/m)	磁場強度 (A/m)	功率密度 (mW/cm ²)	平均時間 (minutes)
0.3 - 3.0	614	1.63	*100	6
3 - 30	1842/f	4.89/f	*900/f ²	6
30 - 300	61.4	0.163	1.0	6
300 - 1,500	---	---	f/300	6
1,500 - 100,000	---	---	5.0	6

註 1：標記*表平面波等效功率密度。

註 2：f 表測試頻率，單位：MHz。

(2) 一般人/不可控制之暴露

頻率範圍 (MHz)	電場強度 (V/m)	磁場強度 (A/m)	功率密度 (mW/cm ²)	平均時間 (minutes)
0.3 – 1.34	614	1.63	*100	30
1.34 - 30	824/f	2.19/f	*180/f ²	30
30 - 300	27.5	0.073	0.2	30
300 - 1,500	---	---	f/1500	30
1,500 – 100,000	---	---	1.0	30

註 1：標記*表平面波等效功率密度。

註 2：f 表測試頻率，單位：MHz。

參考國際標準指南：

KDB 558074

3.2 限制使用之頻帶

除本規範另有規定外，任何低功率射頻器材之主波皆不得使用下表所列各頻段之頻率；低功率射頻器材落於下表所列頻段之混附發射，其電場強度必須符合 3.6 之限制規定。

頻率(兆赫)	頻率(兆赫)	頻率(兆赫)
0.090~0.110	240.00~285.00	3332.0~3339.0
0.490~0.510	322.00~335.40	3345.8~3358.0
2.172~2.198	399.90~410.00	3500.0~4400.0
3.013~3.033	485.00~510.00	4500.0~5250.0
4.115~4.198	608.00~614.00	5350.0~5460.0
5.670~5.690	703.00~748.00	7250.0~7750.0
6.200~6.300	758.00~803.00	8025.0~8500.0
8.230~8.400	825.00~915.00	9000.0~9200.0
12.265~12.600	930.00~1240.0	9300.0~9500.0
13.340~13.430	1300.0~1427.0	10600~12700
14.965~15.020	1435.0~1626.5	13250~13400
16.700~16.755	1660.0~1785.0	14470~14500
19.965~20.020	1805.0~1880.0	15350~16200
25.500~25.700	1885.0~1900.0	17700~21400
37.475~38.275	1905.0~1985.0	22010~23120
73.500~75.400	2010.0~2025.0	23600~24000
108.00~138.00	2110.0~2170.0	31200~31800
149.90~150.05	2200.0~2300.0	36430~36500
156.70~156.90	2310.0~2390.0	38600 以上
162.01~167.17	2483.5~2900.0	
167.72~173.20	3260.0~3267.0	

2.4 GHz 頻段測試紀錄結果

4 帶外發射之量測

4.1 適用標準

請見本報告 3.1 節第(10)的規定。

4.2 量測方法

在電波暗室，將待測物置於 0.8 米高的非金屬桌面，使其操作在工作狀態。接收天線置於 3 米距離。桌面要 360 度旋轉，另外接收天線從離地 1 米至 4 米升降變化，以找出最大的輻射電場強度，接收天線分別置於水平、垂直極化各執行測試一次。

Note: 對於 1 GHz 以上場強輻射的測試，待測物則置於 1.5 米高的非金屬桌面

發射諧波：

Peak 為 RBW = 1 MHz, VBW = 3 MHz ;

Average

802.11b 為 RBW = 1 MHz, VBW = 2 kHz

802.11g 為 RBW = 1 MHz, VBW = 2 kHz

802.11n (HT20) 為 RBW = 1 MHz, VBW = 2 kHz

802.11n (HT40) 為 RBW = 1 MHz, VBW = 2 kHz

接收諧波：

Below 1 GHz

Peak 為 RBW = 120 kHz, VBW = 360 kHz ; Quasi-Peak 為 RBW = 120 kHz, VBW = 120 kHz

Above 1 GHz:

Peak 為 RBW = 1 MHz, VBW = 3 MHz ; Average 為 RBW = 1 MHz, VBW = 3 MHz ; Detector: RMS ; Sweep time: Auto ; Trace count: trace average of at least 100 traces.

其它不必要之訊號

Peak 為 RBW = 120 kHz, VBW = 360 kHz ; Quasi-Peak 為 RBW = 120 kHz, VBW = 120 kHz

4.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer Agilent	N9010A	MY56070348	Sep. 16, 2020	Sep. 15, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 22, 2020	Nov. 21, 2021
Broadband HORN Antenna SCHWARZBECK	BBHA 9170	148	Nov. 22, 2020	Nov. 21, 2021
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 06, 2020	Nov. 05, 2021
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 13, 2021	Apr. 12, 2022
Preamplifier EMCI	EMC001340	980201	Oct. 21, 2020	Oct. 20, 2021
Bluetooth Tester	CBT	100946	Aug. 06, 2020	Aug. 05, 2022
Preamplifier EMCI	EMC 330H	980112	Oct. 07, 2020	Oct. 06, 2021
Power Meter Anritsu	ML2495A	1012010	Sep. 01, 2020	Aug. 31, 2021
Power Sensor Anritsu	MA2411B	1315050	Sep. 01, 2020	Aug. 31, 2021
RF Coaxial Cable EMCI	EMC104-SM-SM-8000	171005	Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 07, 2020	Oct. 06, 2021
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

NOTE:

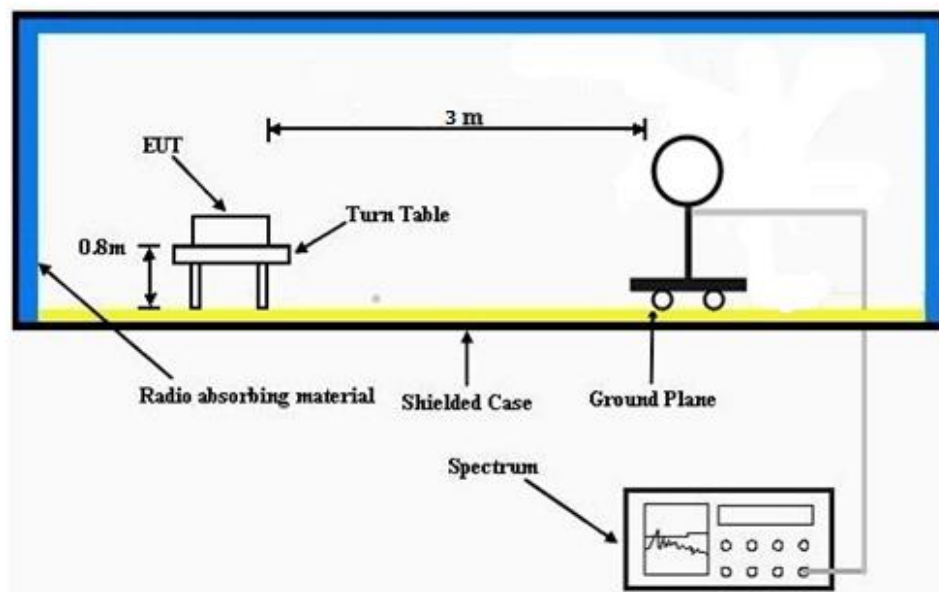
1. The calibration interval of the above test instruments is 12 or 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.
3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.

5. The following table is for the measurement uncertainty, which is calculated as per the document CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

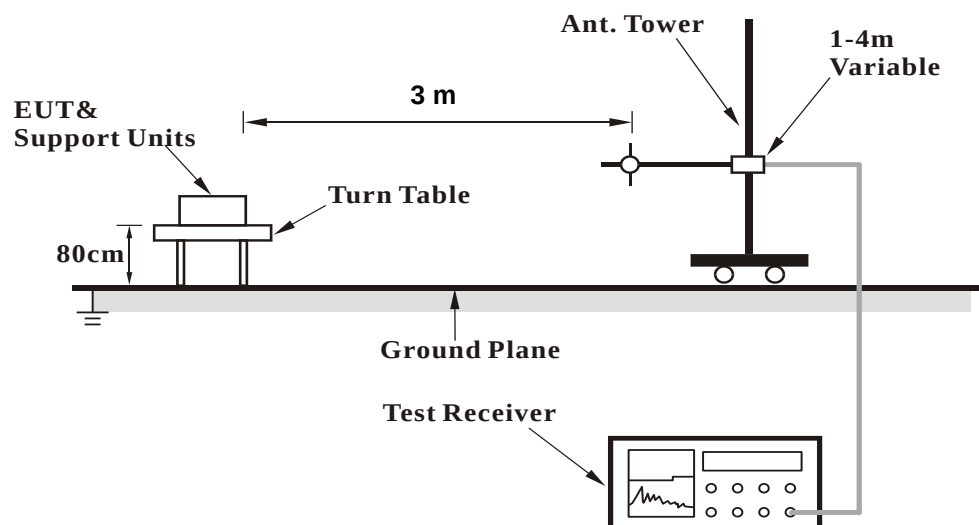
Measurement	Frequency	Uncertainty
Radiated emissions	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~1000 MHz	2.95 dB
	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

4.4 測試配置

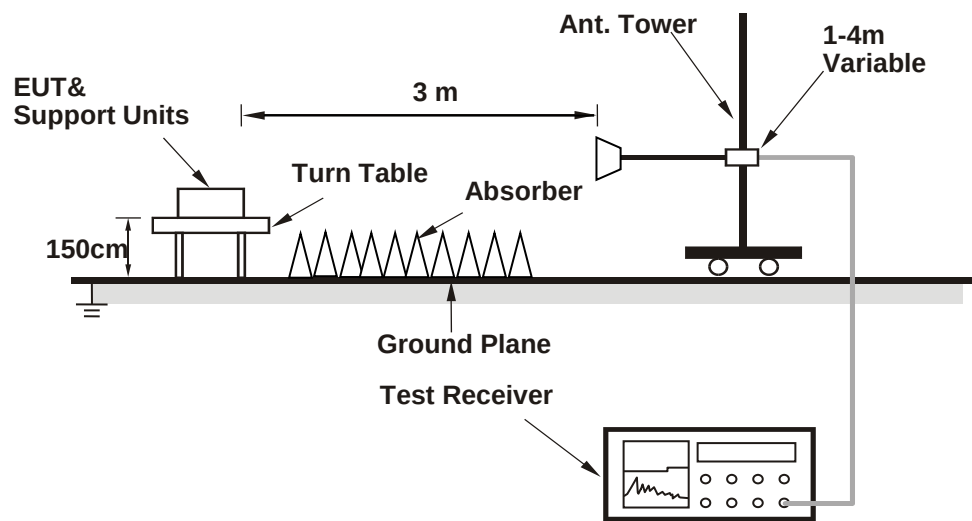
<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range below 1 GHz>



<Frequency Range above 1 GHz>



4.5 場強度之計算

場強之計算公式如下：

結果值 Emission level (dBuV/m) = 機器讀值 Raw Value (dBuV) +校正因子 Correction Factor (dB/m)

餘裕度 Margin(dB) = 結果值 Emission level (dBuV/m)-限制值 Limit value (dBuV/m)

量測結果請見下頁。

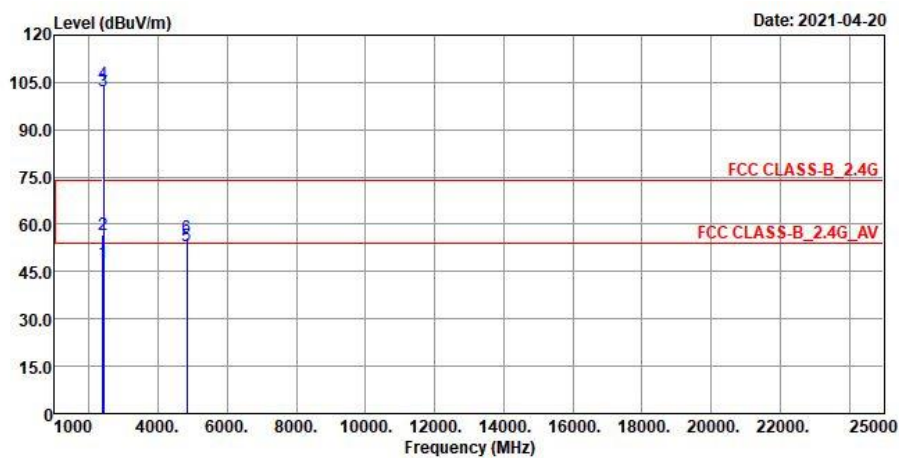
4.6 量測結果

4.6.1 發射諧波

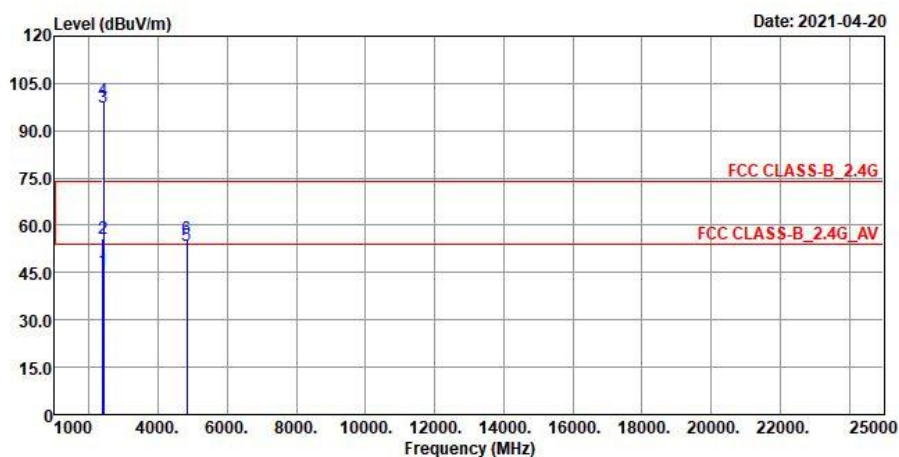
802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



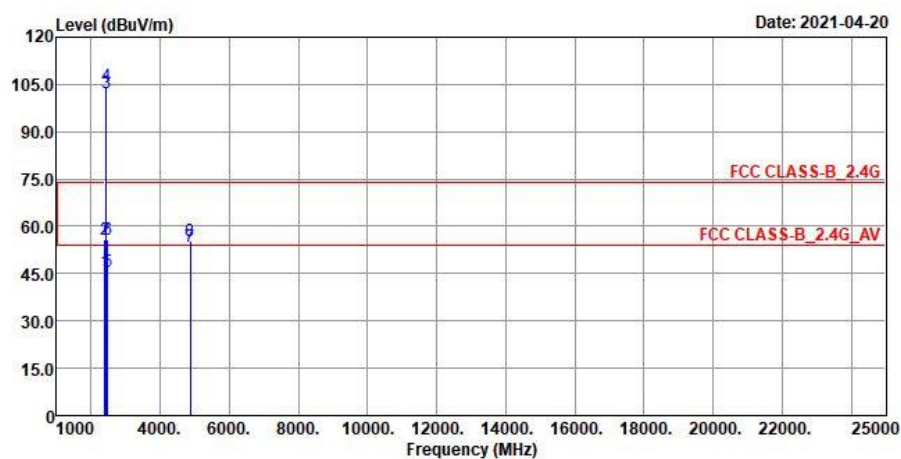
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386.3	47.98	55.01	-7.03	54	-6.02	163	170	Average
2386.3	56.5	63.53	-7.03	74	-17.5	163	170	Peak
2412	102.38	109.43	-7.05	-----	-----	163	170	Average
2412	104.5	111.55	-7.05	-----	-----	163	170	Peak
4824	53.21	69.06	-15.85	54	-0.79	100	333	Average
4824	55.69	71.54	-15.85	74	-18.31	100	333	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386	45.71	52.74	-7.03	54	-8.29	298	219	Average
2386	55.83	62.86	-7.03	74	-18.17	298	219	Peak
2412	97.54	104.59	-7.05	-----	-----	298	219	Average
2412	99.68	106.73	-7.05	-----	-----	298	219	Peak
4824	53.41	69.26	-15.85	54	-0.59	251	64	Average
4824	55.84	71.69	-15.85	74	-18.16	251	64	Peak

Remarks:

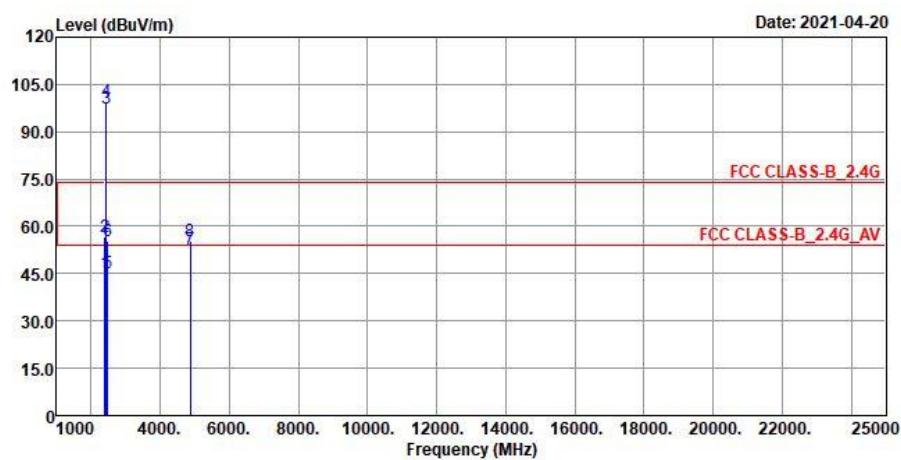
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2412 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



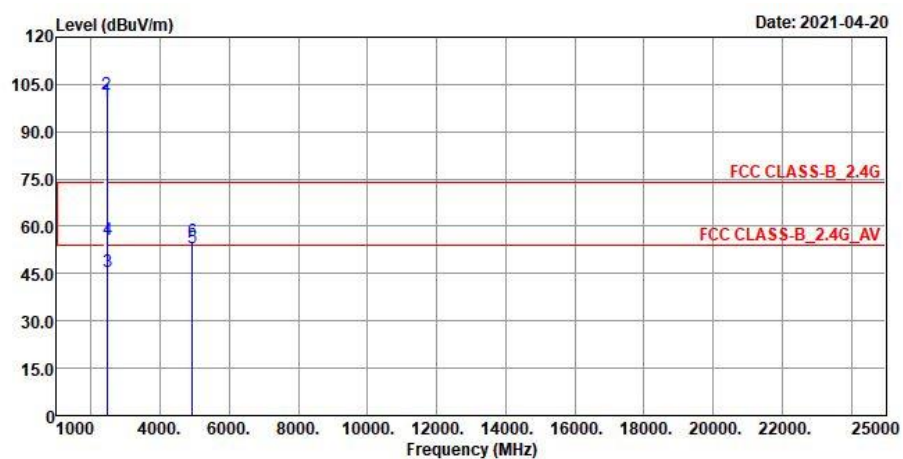
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	45.68	52.73	-7.05	54	-8.32	160	173	Average
2390	56	63.05	-7.05	74	-18	160	173	Peak
2437	102.21	109.21	-7	-----	-----	160	173	Average
2437	104.62	111.62	-7	-----	-----	160	173	Peak
2483.5	45.66	52.52	-6.86	54	-8.34	160	173	Average
2483.5	55.67	62.53	-6.86	74	-18.33	160	173	Peak
4874	53.44	69.38	-15.94	54	-0.56	100	334	Average
4874	55.39	71.33	-15.94	74	-18.61	100	334	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	45.25	52.3	-7.05	54	-8.75	295	221	Average
2390	56.46	63.51	-7.05	74	-17.54	295	221	Peak
2437	97.29	104.29	-7	-----	-----	295	221	Average
2437	99.54	106.54	-7	-----	-----	295	221	Peak
2483.5	45.23	52.09	-6.86	54	-8.77	295	221	Average
2483.5	55.35	62.21	-6.86	74	-18.65	295	221	Peak
4874	52.9	68.84	-15.94	54	-1.1	234	54	Average
4874	55.18	71.12	-15.94	74	-18.82	234	54	Peak

Remarks:

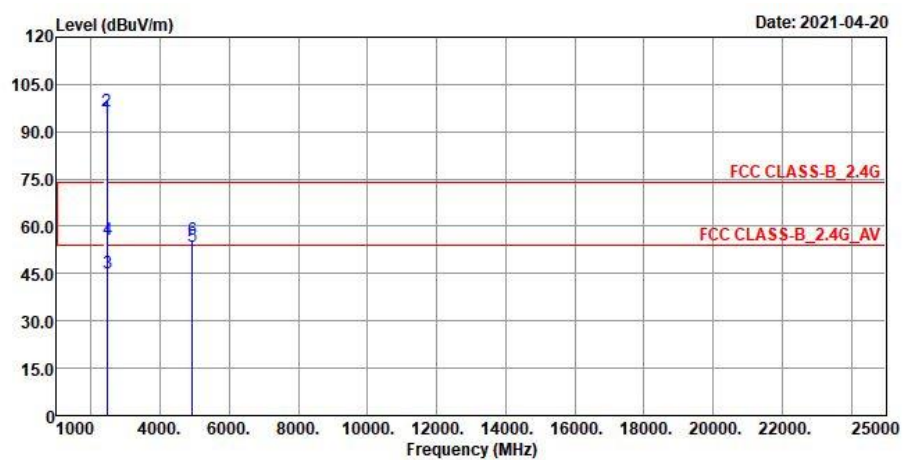
- Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
- 2437 MHz: Fundamental Frequency.
- The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	99.52	106.45	-6.93	-----	-----	158	172	Average
2462	101.71	108.64	-6.93	-----	-----	158	172	Peak
2483.5	45.76	52.62	-6.86	54	-8.24	158	172	Average
2483.5	55.9	62.76	-6.86	74	-18.1	158	172	Peak
4924	53.07	68.94	-15.87	54	-0.93	114	332	Average
4924	55.41	71.28	-15.87	74	-18.59	114	332	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	94.35	101.28	-6.93	-----	-----	357	211	Average
2462	96.55	103.48	-6.93	-----	-----	357	211	Peak
2483.5	45.27	52.13	-6.86	54	-8.73	357	211	Average
2483.5	55.81	62.67	-6.86	74	-18.19	357	211	Peak
4924	53.49	69.36	-15.87	54	-0.51	271	56	Average
4924	55.68	71.55	-15.87	74	-18.32	271	56	Peak

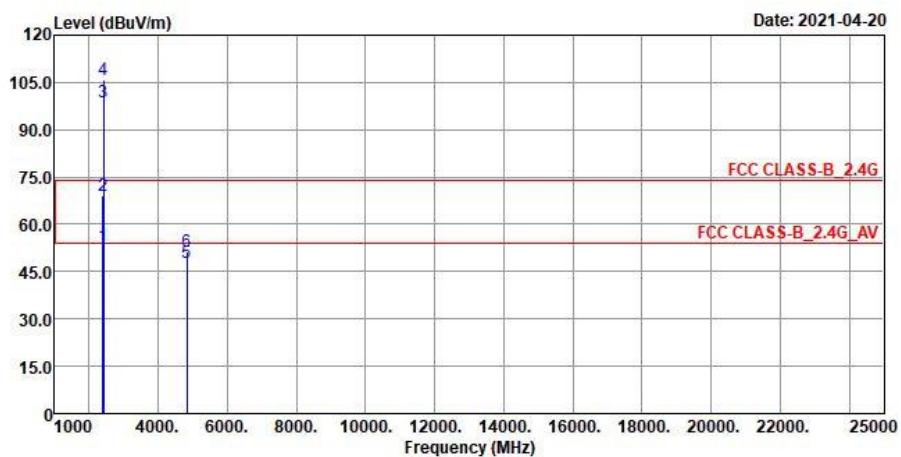
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2462 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

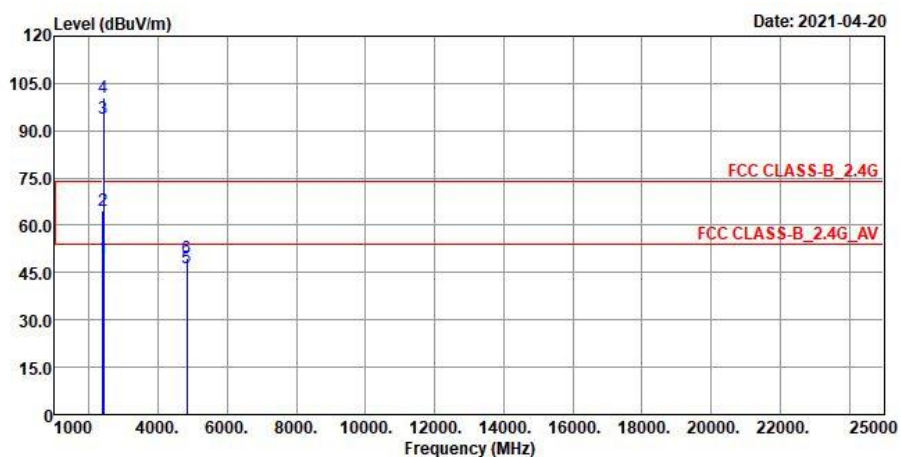
802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



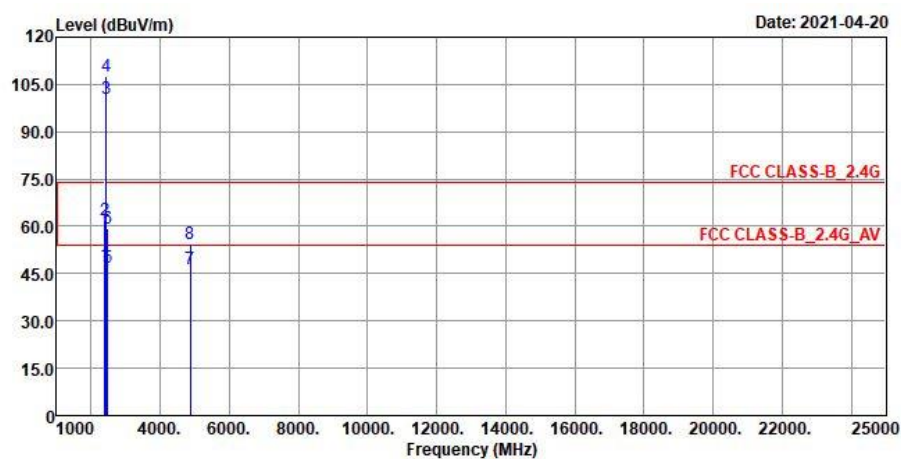
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	53.26	60.31	-7.05	54	-0.74	138	172	Average
2390	69.16	76.21	-7.05	74	-4.84	138	172	Peak
2412	98.71	105.76	-7.05	-----	-----	138	172	Average
2412	105.74	112.79	-7.05	-----	-----	138	172	Peak
4824	47.94	63.79	-15.85	54	-6.06	108	329	Average
4824	51.2	67.05	-15.85	74	-22.8	108	329	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	49.43	56.48	-7.05	54	-4.57	298	219	Average
2390	64.82	71.87	-7.05	74	-9.18	298	219	Peak
2412	93.88	100.93	-7.05	-----	-----	298	219	Average
2412	100.73	107.78	-7.05	-----	-----	298	219	Peak
4824	46.57	62.42	-15.85	54	-7.43	258	69	Average
4824	49.75	65.6	-15.85	74	-24.25	258	69	Peak

Remarks:

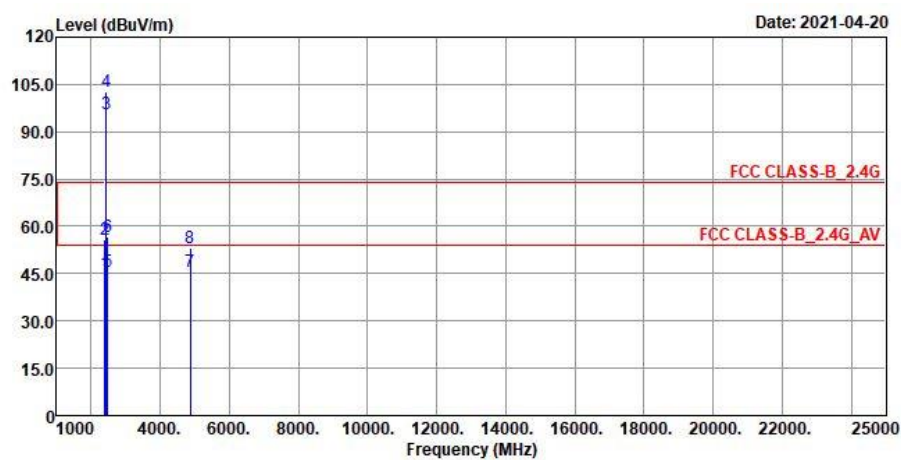
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2412 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



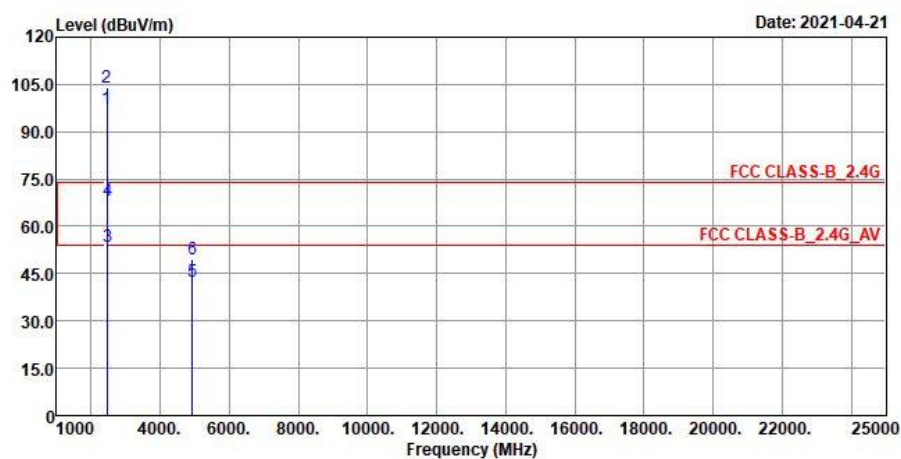
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	47.66	54.71	-7.05	54	-6.34	159	172	Average
2390	61.94	68.99	-7.05	74	-12.06	159	172	Peak
2437	100.31	107.31	-7	-----	-----	159	172	Average
2437	107.6	114.6	-7	-----	-----	159	172	Peak
2483.5	47	53.86	-6.86	54	-7	159	172	Average
2483.5	59.19	66.05	-6.86	74	-14.81	159	172	Peak
4874	46.56	62.5	-15.94	54	-7.44	100	333	Average
4874	54.35	70.29	-15.94	74	-19.65	100	333	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	45.09	52.14	-7.05	54	-8.91	369	220	Average
2390	55.97	63.02	-7.05	74	-18.03	369	220	Peak
2437	95.74	102.74	-7	-----	-----	369	220	Average
2437	102.73	109.73	-7	-----	-----	369	220	Peak
2483.5	45.51	52.37	-6.86	54	-8.49	369	220	Average
2483.5	56.85	63.71	-6.86	74	-17.15	369	220	Peak
4874	45.61	61.55	-15.94	54	-8.39	265	64	Average
4874	53.14	69.08	-15.94	74	-20.86	265	64	Peak

Remarks:

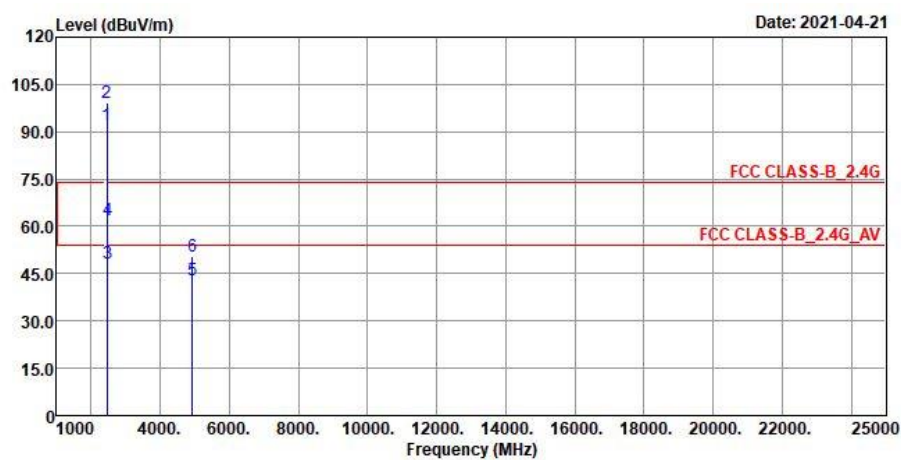
- Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
- 2437 MHz: Fundamental Frequency.
- The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	97.25	104.18	-6.93	-----	-----	133	172	Average
2462	104.12	111.05	-6.93	-----	-----	133	172	Peak
2483.5	53.37	60.23	-6.86	54	-0.63	133	172	Average
2483.5	68.1	74.96	-6.86	74	-5.9	133	172	Peak
4924	42.36	58.23	-15.87	54	-11.64	111	334	Average
4924	49.6	65.47	-15.87	74	-24.4	111	334	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	91.91	98.84	-6.93	-----	-----	363	215	Average
2462	99.02	105.95	-6.93	-----	-----	363	215	Peak
2483.5	48.39	55.25	-6.86	54	-5.61	363	215	Average
2483.5	62.1	68.96	-6.86	74	-11.9	363	215	Peak
4924	43.14	59.01	-15.87	54	-10.86	262	49	Average
4924	50.3	66.17	-15.87	74	-23.7	262	49	Peak

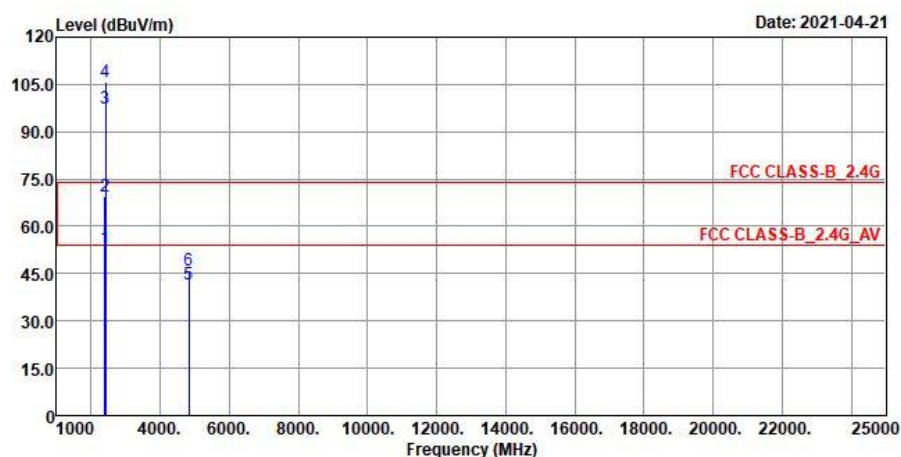
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2462 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

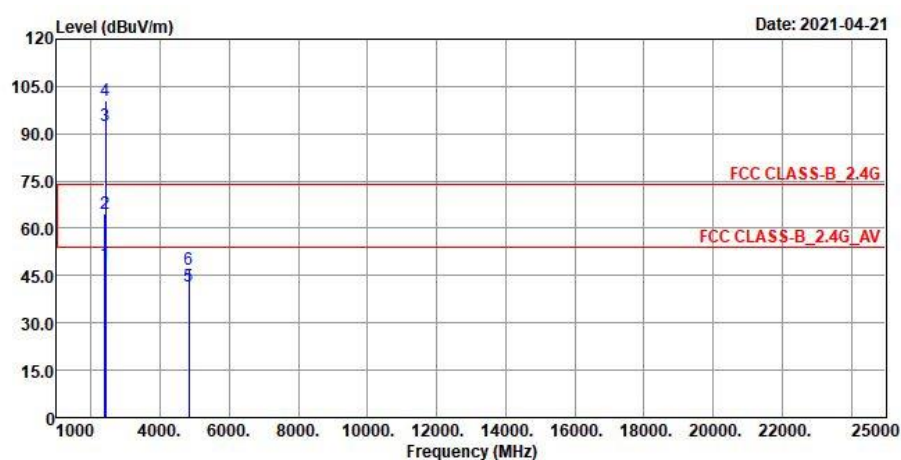
802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



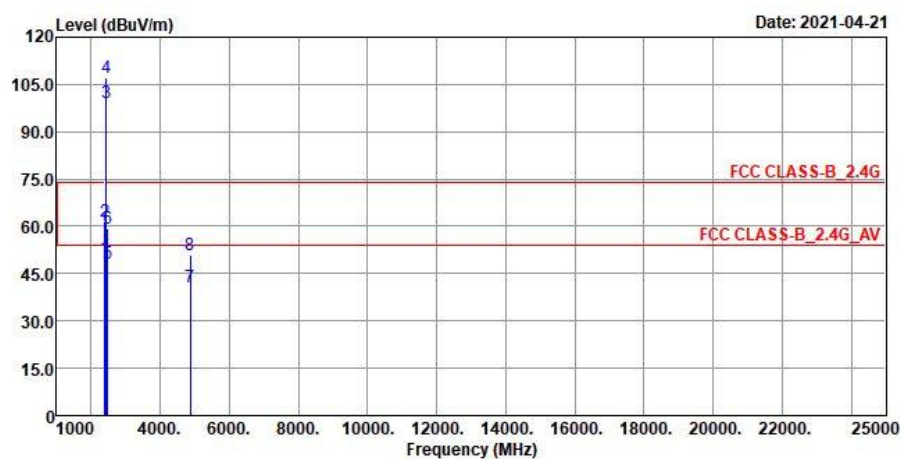
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	53.13	60.18	-7.05	54	-0.87	141	169	Average
2390	69.66	76.71	-7.05	74	-4.34	141	169	Peak
2412	97.29	104.34	-7.05	-----	-----	141	169	Average
2412	105.62	112.67	-7.05	-----	-----	141	169	Peak
4824	41.7	57.55	-15.85	54	-12.3	103	166	Average
4824	46.27	62.12	-15.85	74	-27.73	103	166	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	48.82	55.87	-7.05	54	-5.18	299	217	Average
2390	64.82	71.87	-7.05	74	-9.18	299	217	Peak
2412	92.65	99.7	-7.05	-----	-----	299	217	Average
2412	100.46	107.51	-7.05	-----	-----	299	217	Peak
4824	41.78	57.63	-15.85	54	-12.22	102	144	Average
4824	46.77	62.62	-15.85	74	-27.23	102	144	Peak

Remarks:

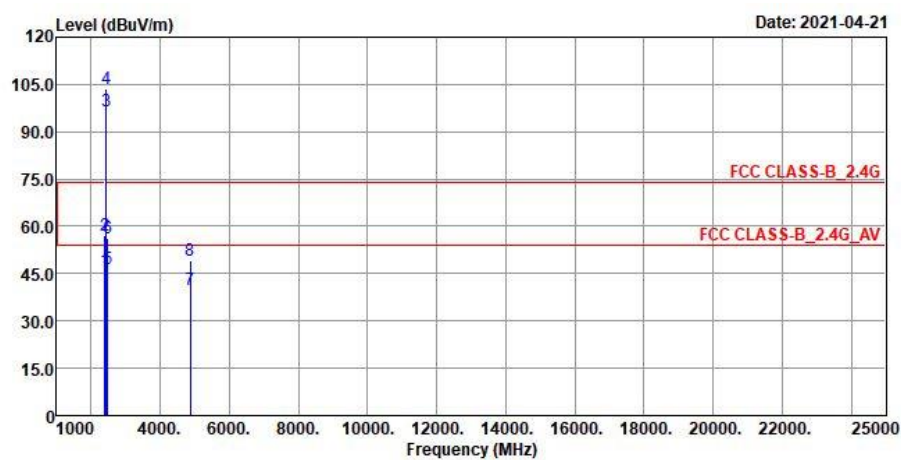
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2412 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



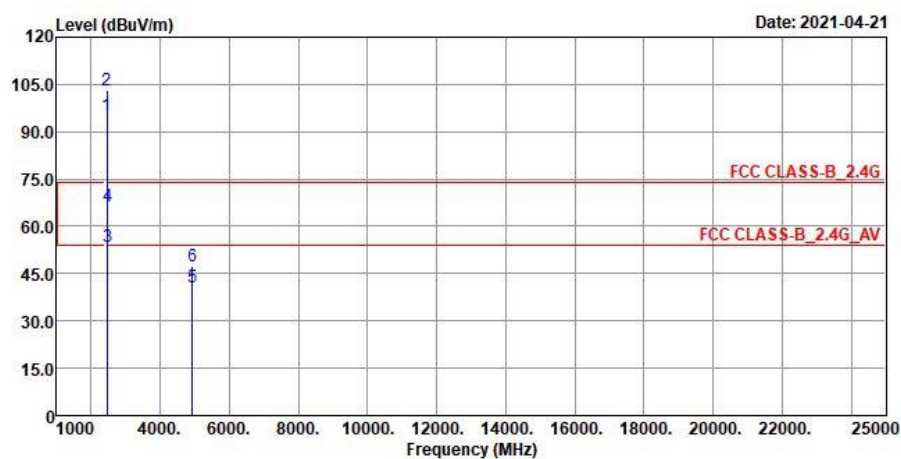
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	50.19	57.24	-7.05	54	-3.81	141	168	Average
2390	61.49	68.54	-7.05	74	-12.51	141	168	Peak
2437	99.35	106.35	-7	-----	-----	141	168	Average
2437	107.31	114.31	-7	-----	-----	141	168	Peak
2483.5	48.19	55.05	-6.86	54	-5.81	141	168	Average
2483.5	59.4	66.26	-6.86	74	-14.6	141	168	Peak
4874	40.81	56.75	-15.94	54	-13.19	121	332	Average
4874	51.06	67	-15.94	74	-22.94	121	332	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	45.96	53.01	-7.05	54	-8.04	365	216	Average
2390	56.96	64.01	-7.05	74	-17.04	365	216	Peak
2437	96.48	103.48	-7	-----	-----	365	216	Average
2437	103.44	110.44	-7	-----	-----	365	216	Peak
2483.5	46.29	53.15	-6.86	54	-7.71	365	216	Average
2483.5	56.3	63.16	-6.86	74	-17.7	365	216	Peak
4874	39.74	55.68	-15.94	54	-14.26	100	324	Average
4874	49.31	65.25	-15.94	74	-24.69	100	324	Peak

Remarks:

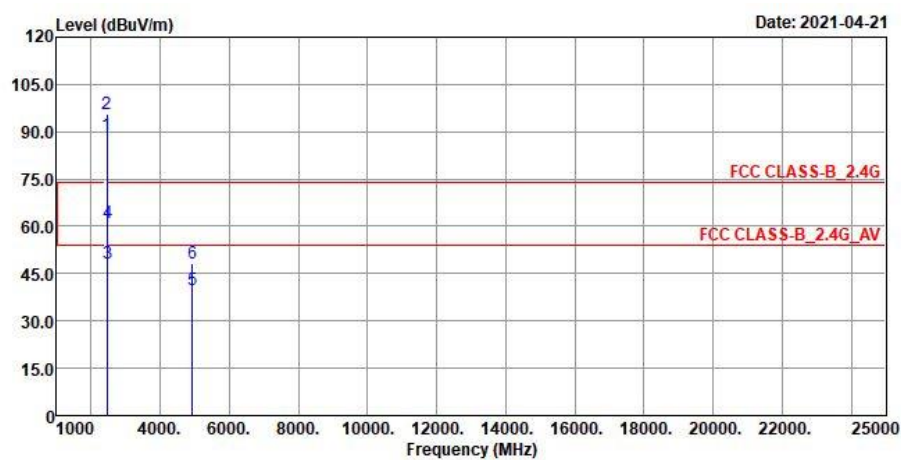
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2437 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	95.13	102.06	-6.93	-----	-----	136	166	Average
2462	103.26	110.19	-6.93	-----	-----	136	166	Peak
2483.5	53.38	60.24	-6.86	54	-0.62	136	166	Average
2483.5	66.55	73.41	-6.86	74	-7.45	136	166	Peak
4924	40.87	56.74	-15.87	54	-13.13	103	201	Average
4924	47.21	63.08	-15.87	74	-26.79	103	201	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	88.97	95.9	-6.93	-----	-----	100	249	Average
2462	95.71	102.64	-6.93	-----	-----	100	249	Peak
2483.5	48.27	55.13	-6.86	54	-5.73	100	249	Average
2483.5	61.11	67.97	-6.86	74	-12.89	100	249	Peak
4924	39.91	55.78	-15.87	54	-14.09	100	178	Average
4924	48.14	64.01	-15.87	74	-25.86	100	178	Peak

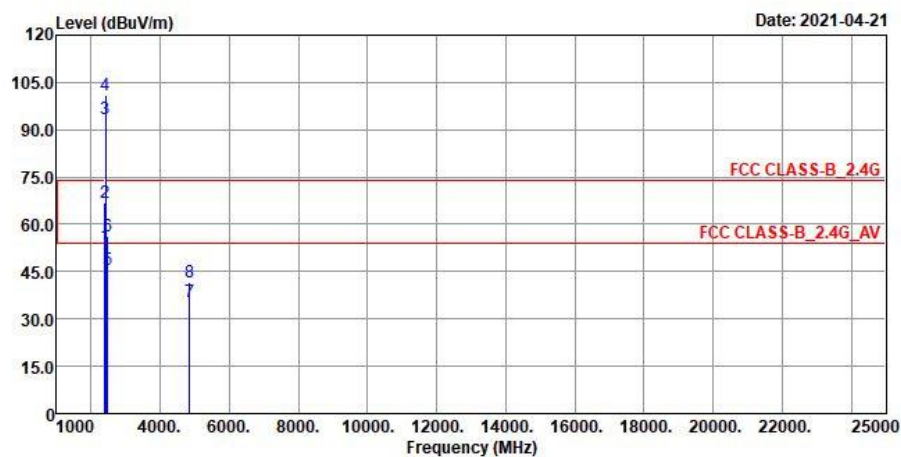
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2462 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

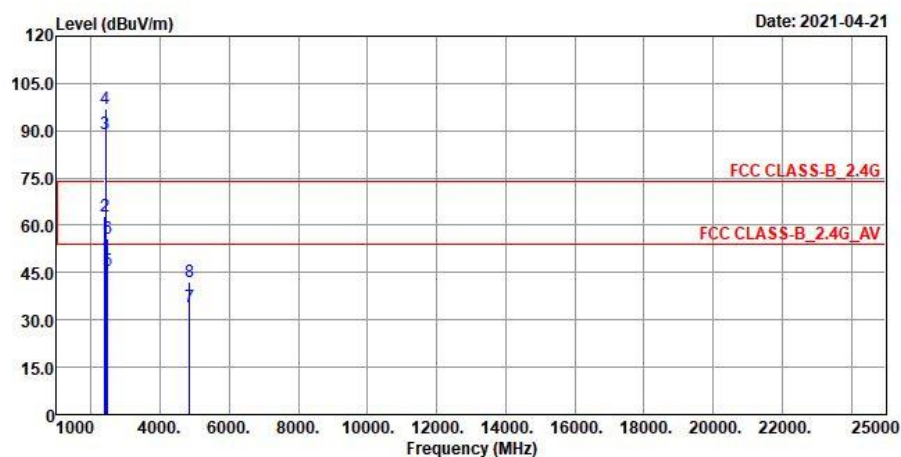
802.11n (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 3	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



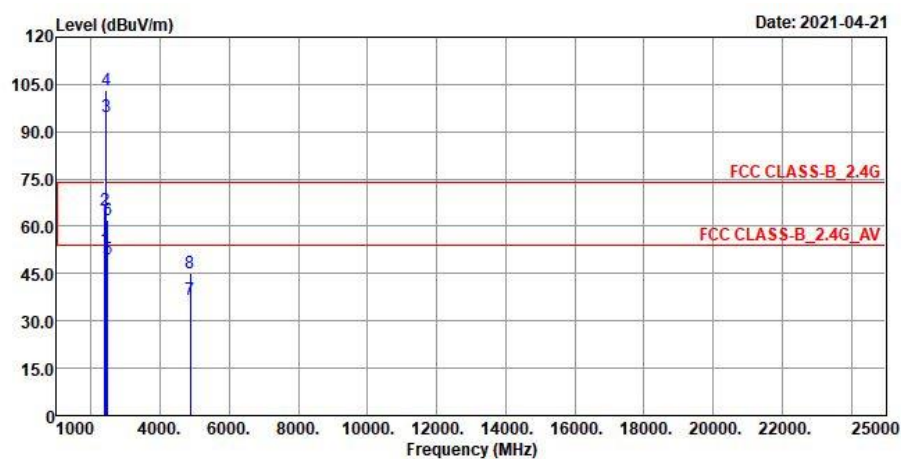
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388.09	53.23	60.26	-7.03	54	-0.77	163	171	Average
2388.09	66.82	73.85	-7.03	74	-7.18	163	171	Peak
2422	93.56	100.55	-6.99	-----	-----	163	171	Average
2422	101.05	108.04	-6.99	-----	-----	163	171	Peak
2483.5	45.56	52.42	-6.86	54	-8.44	163	171	Average
2483.5	56.11	62.97	-6.86	74	-17.89	163	171	Peak
4844	35.46	51.34	-15.88	54	-18.54	103	165	Average
4844	41.41	57.29	-15.88	74	-32.59	103	165	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	49.54	56.59	-7.05	54	-4.46	297	216	Average
2390	62.78	69.83	-7.05	74	-11.22	297	216	Peak
2422	88.86	95.85	-6.99	-----	-----	297	216	Average
2422	97.12	104.11	-6.99	-----	-----	297	216	Peak
2483.5	45.54	52.4	-6.86	54	-8.46	297	216	Average
2483.5	55.81	62.67	-6.86	74	-18.19	297	216	Peak
4844	34.2	50.08	-15.88	54	-19.8	162	102	Average
4844	41.87	57.75	-15.88	74	-32.13	162	102	Peak

Remarks:

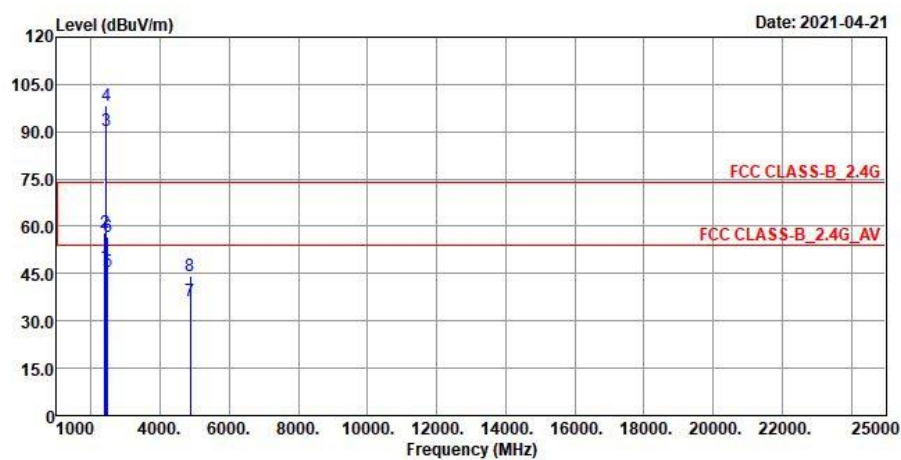
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2422 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	52.68	59.73	-7.05	54	-1.32	164	169	Average
2390	65.05	72.1	-7.05	74	-8.95	164	169	Peak
2437	94.87	101.87	-7	-----	-----	164	169	Average
2437	103.03	110.03	-7	-----	-----	164	169	Peak
2483.5	49.77	56.63	-6.86	54	-4.23	164	169	Average
2483.5	62.18	69.04	-6.86	74	-11.82	164	169	Peak
4874	36.76	52.7	-15.94	54	-17.24	186	245	Average
4874	44.97	60.91	-15.94	74	-29.03	186	245	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	47.2	54.25	-7.05	54	-6.8	365	235	Average
2390	58.07	65.12	-7.05	74	-15.93	365	235	Peak
2437	90.3	97.3	-7	-----	-----	365	235	Average
2437	98.36	105.36	-7	-----	-----	365	235	Peak
2483.5	45.77	52.63	-6.86	54	-8.23	365	235	Average
2483.5	56.61	63.47	-6.86	74	-17.39	365	235	Peak
4874	36.42	52.36	-15.94	54	-17.58	103	158	Average
4874	44.2	60.14	-15.94	74	-29.8	103	158	Peak

Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2437 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 9	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	47.2	54.25	-7.05	54	-6.8	142	164	Average
2390	57.42	64.47	-7.05	74	-16.58	142	164	Peak
2452	93.14	100.07	-6.93	-----	-----	142	164	Average
2452	100.87	107.8	-6.93	-----	-----	142	164	Peak
2483.5	53.43	60.29	-6.86	54	-0.57	142	164	Average
2483.5	66.35	73.21	-6.86	74	-7.65	142	164	Peak
4904	39.08	55.03	-15.95	54	-14.92	125	266	Average
4904	45.54	61.49	-15.95	74	-28.46	125	266	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	45.31	52.36	-7.05	54	-8.69	370	216	Average
2390	55.89	62.94	-7.05	74	-18.11	370	216	Peak
2452	88.44	95.37	-6.93	-----	-----	370	216	Average
2452	96.66	103.59	-6.93	-----	-----	370	216	Peak
2483.5	48.19	55.05	-6.86	54	-5.81	370	216	Average
2483.5	60.15	67.01	-6.86	74	-13.85	370	216	Peak
4904	40.7	56.65	-15.95	54	-13.3	157	301	Average
4904	47.14	63.09	-15.95	74	-26.86	157	301	Peak

Remarks:

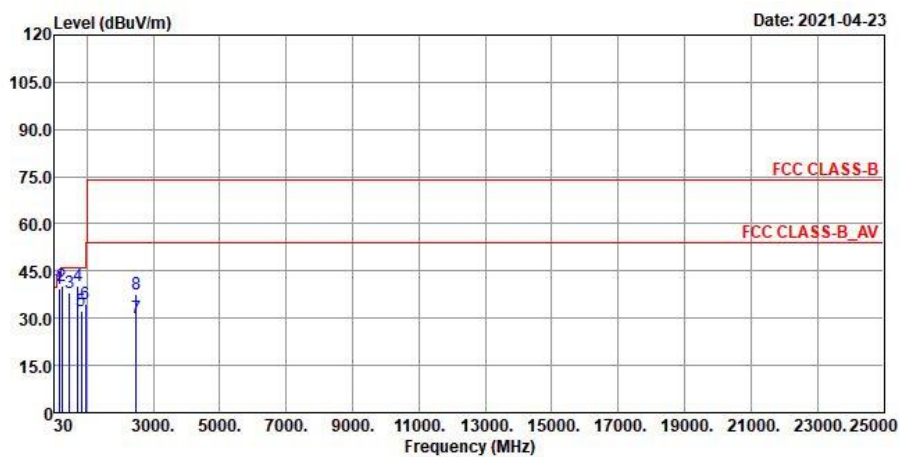
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2452 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

4.6.2 接收諧波

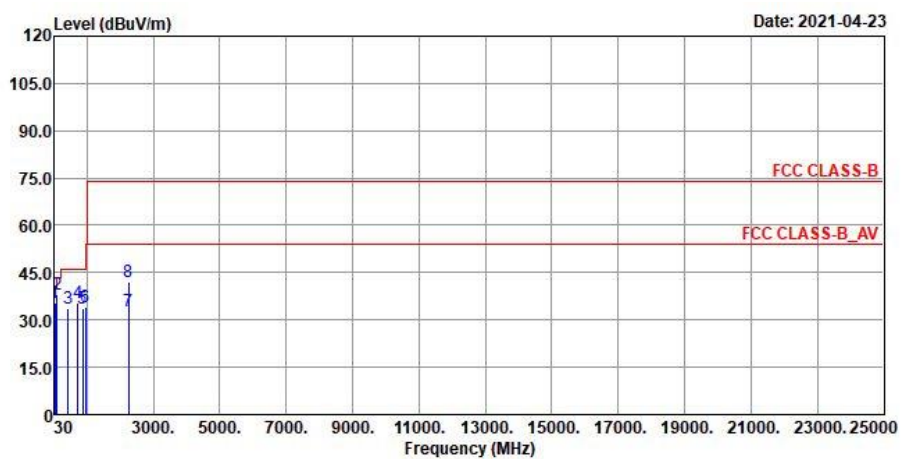
802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	30 MHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Above 1 GHz: Peak (PK) & Average (AV) Below 1 GHz: Peak (PK) or Quasi-Peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
165.8	39.27	52.6	-13.33	43.5	-4.23	111	283	QP
240	40.11	54.22	-14.11	46	-5.89	153	86	QP
480	38.09	44.23	-6.14	46	-7.91	144	136	QP
720	40.31	41.24	-0.93	46	-5.69	110	231	QP
836.07	32.45	31.16	1.29	46	-13.55	129	120	QP
960	34.69	31.27	3.42	46	-11.31	100	111	QP
2477.63	29.99	52.48	-22.49	54	-24.01	159	32	Average
2477.63	37.82	60.31	-22.49	74	-36.18	159	32	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
33.88	35.46	48.53	-13.07	40	-4.54	135	241	QP
99.84	38.28	54.63	-16.35	43.5	-5.22	134	266	QP
431.58	33.46	41.12	-7.66	46	-12.54	114	108	QP
720	35.4	36.33	-0.93	46	-10.6	163	244	QP
878.75	33.82	32	1.82	46	-12.18	182	30	QP
960	33.97	30.55	3.42	46	-12.03	101	163	QP
2254.13	32.84	55.03	-22.19	54	-21.16	136	247	Average
2254.13	42.03	64.22	-22.19	74	-31.97	136	247	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
- The other emission levels were very low against the limit.

4.6.3 其它不必要之訊號

9 kHz ~ 30 MHz Data:

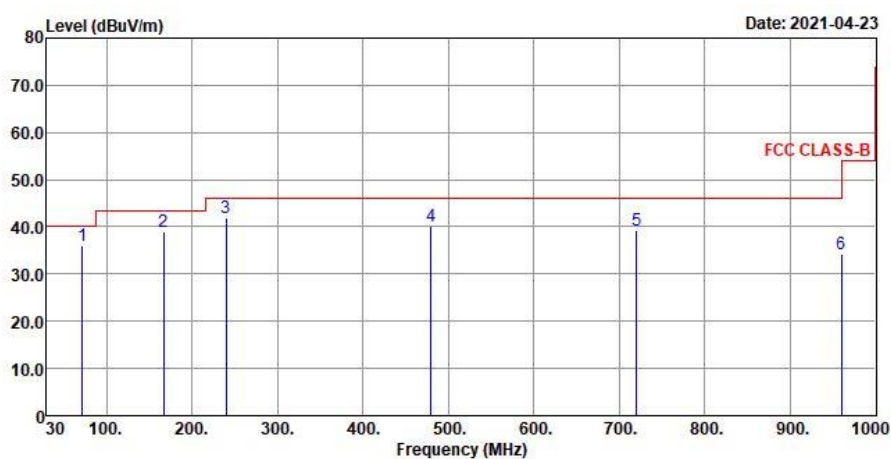
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Data:

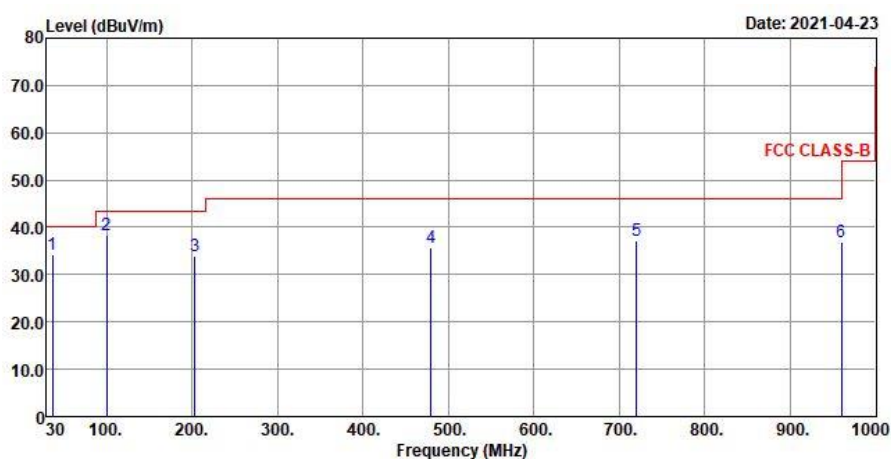
802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	30 MHz ~ 1 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) or Quasi-Peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



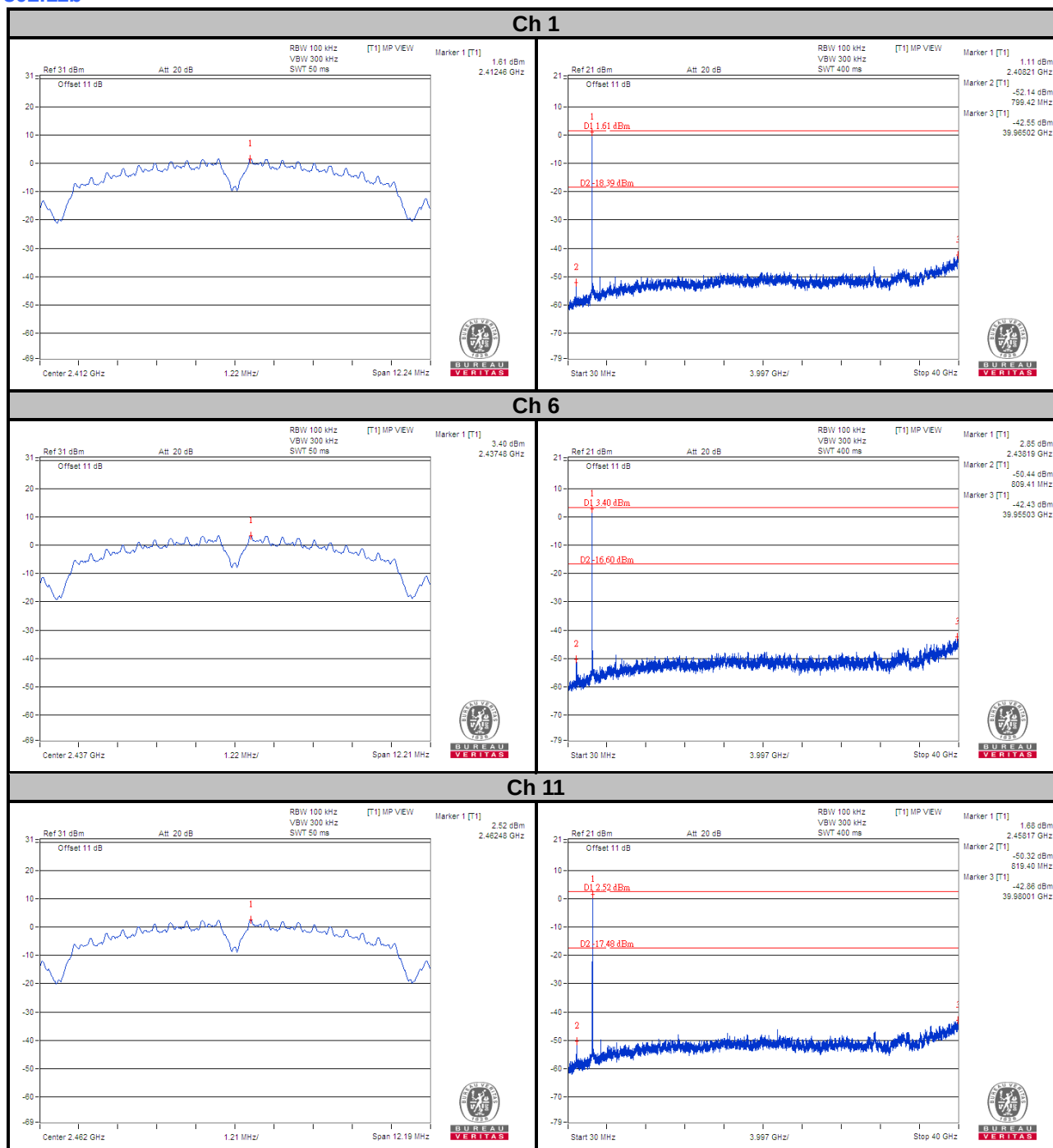
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
71.71	35.99	51.19	-15.2	40	-4.01	153	288	QP
166.77	38.92	52.23	-13.31	43.5	-4.58	179	343	QP
240	41.9	55.97	-14.07	46	-4.1	137	255	QP
480	40.15	46.29	-6.14	46	-5.85	113	313	QP
720	39.31	40.24	-0.93	46	-6.69	105	138	QP
960	34.37	30.98	3.39	46	-11.63	154	214	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
36.79	34.16	47.13	-12.97	40	-5.84	143	96	QP
99.84	38.36	54.71	-16.35	43.5	-5.14	118	274	QP
203.63	33.94	49.84	-15.9	43.5	-9.56	112	148	QP
480	35.83	41.97	-6.14	46	-10.17	100	34	QP
720	37.33	38.26	-0.93	46	-8.67	151	266	QP
960	36.93	33.51	3.42	54	-17.07	198	255	QP

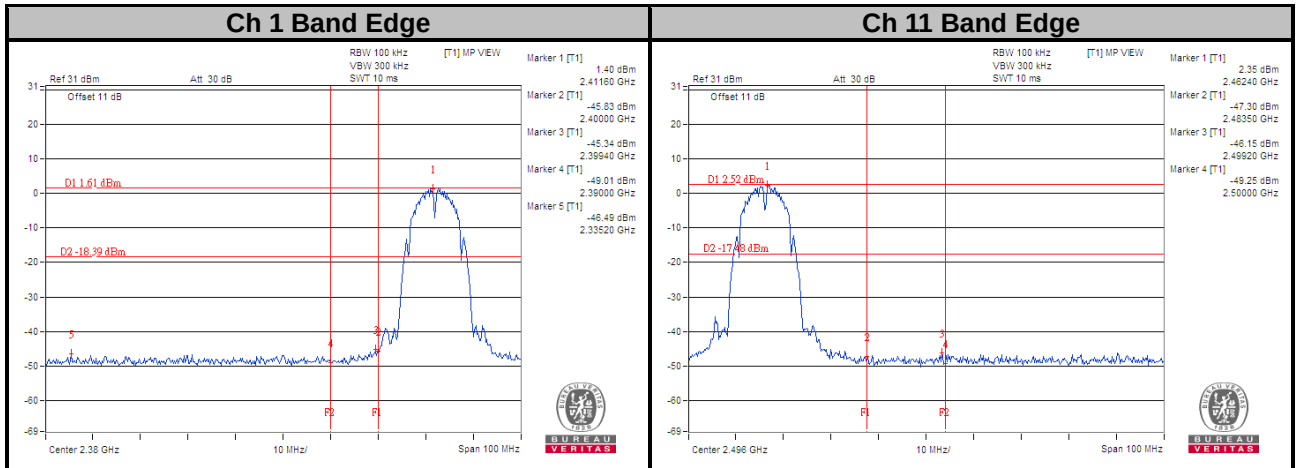
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. The other emission levels were very low against the limit.

4.7 帶外發射之量測 (傳導)

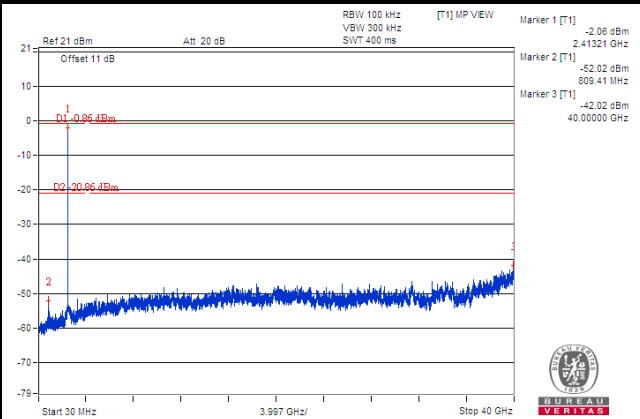
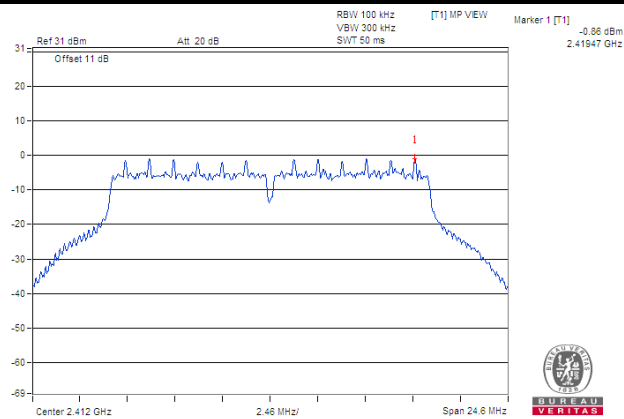
802.11b



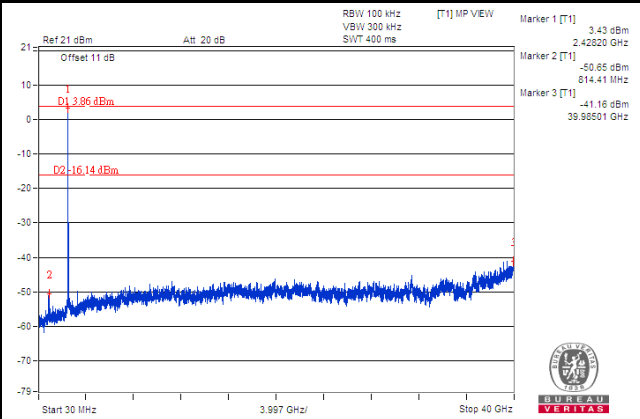
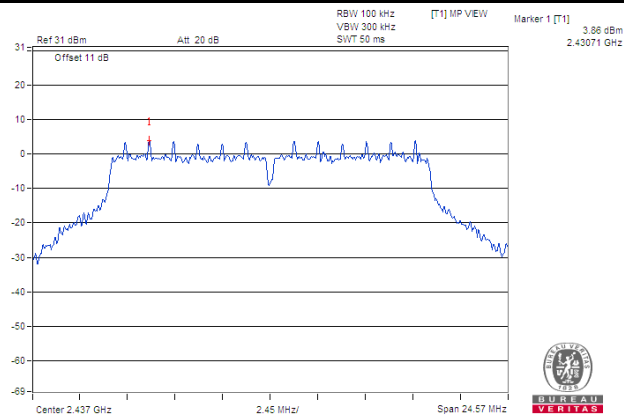


802.11g

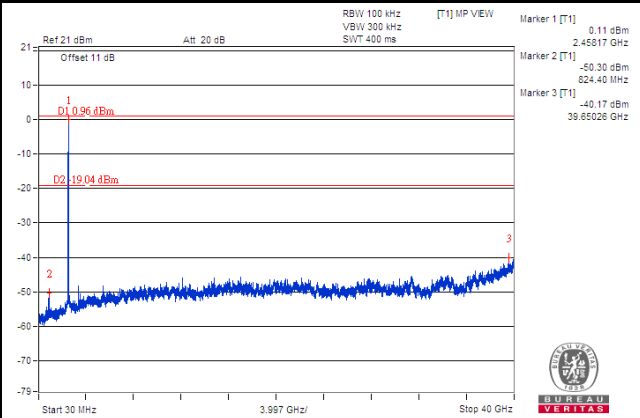
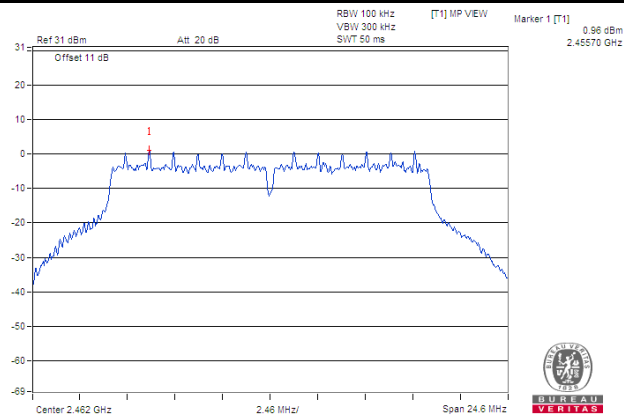
Ch 1

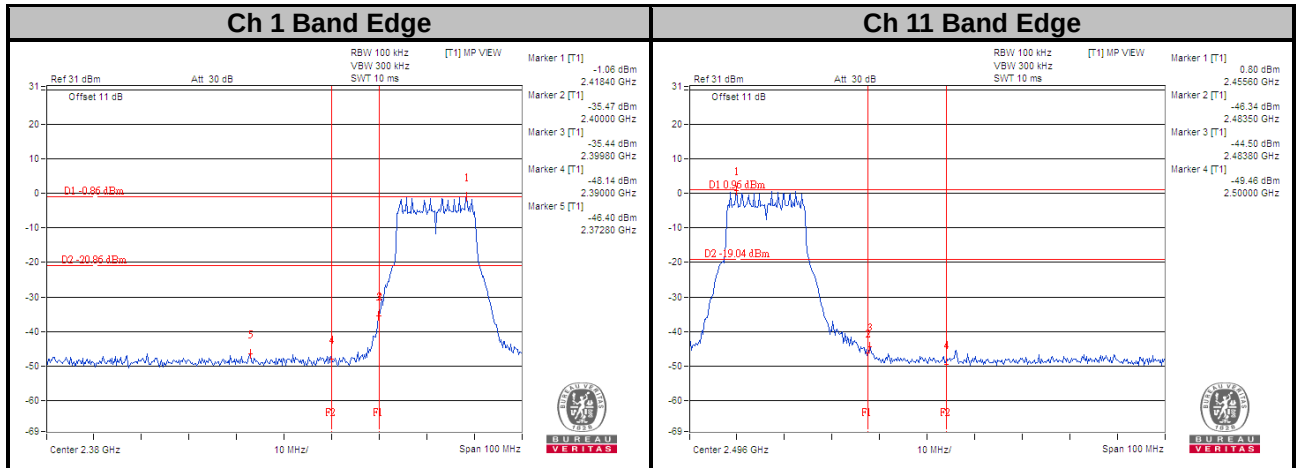


Ch 6



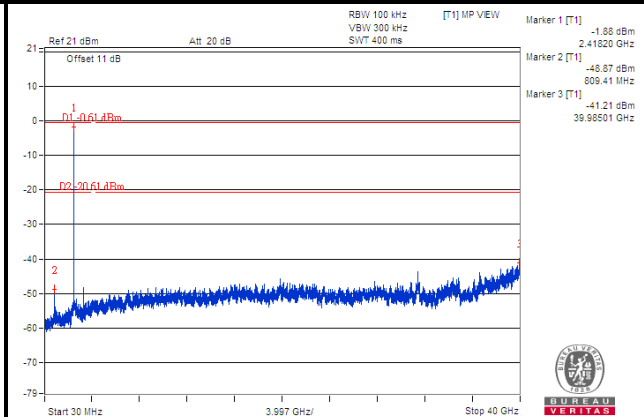
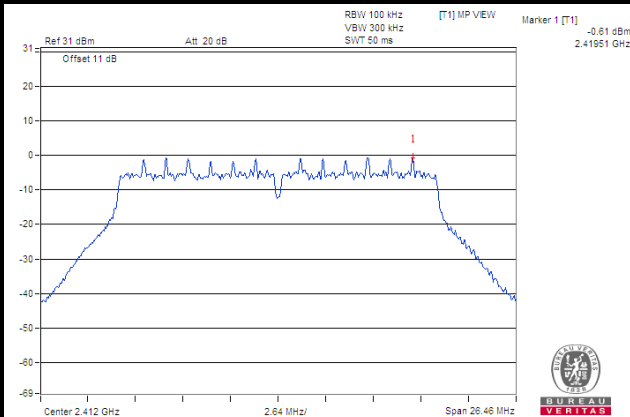
Ch 11



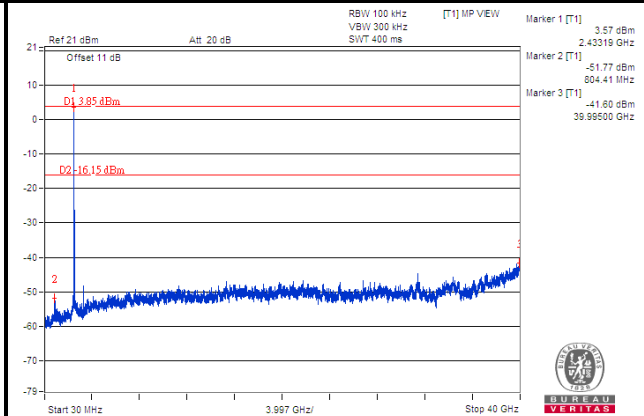
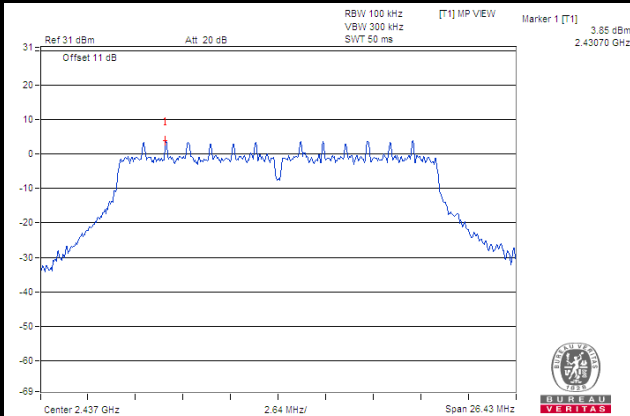


802.11n (HT20)

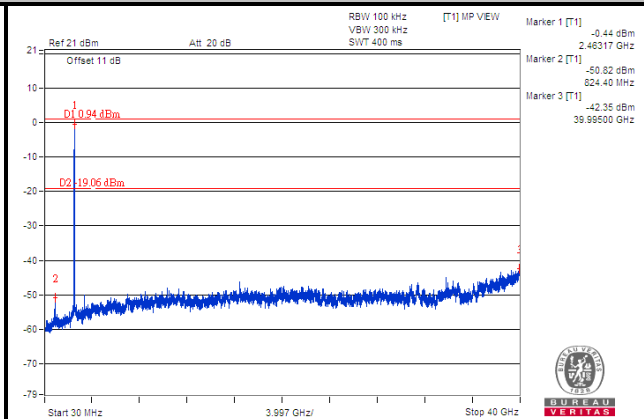
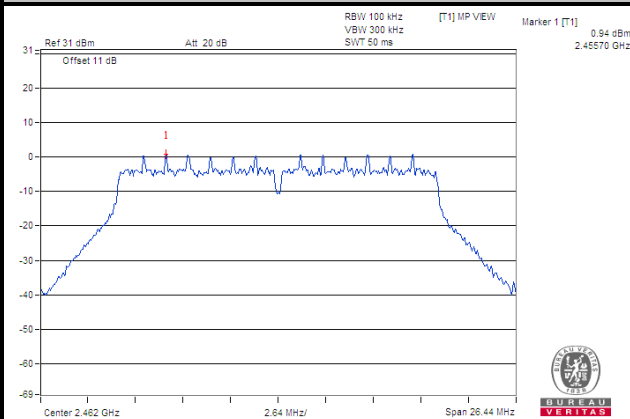
Ch 1

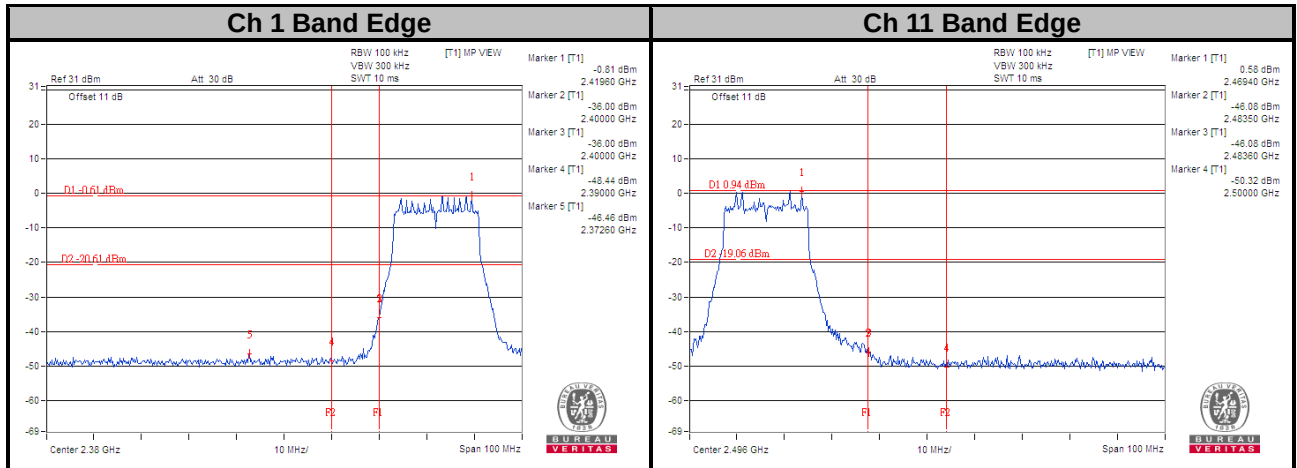


Ch 6



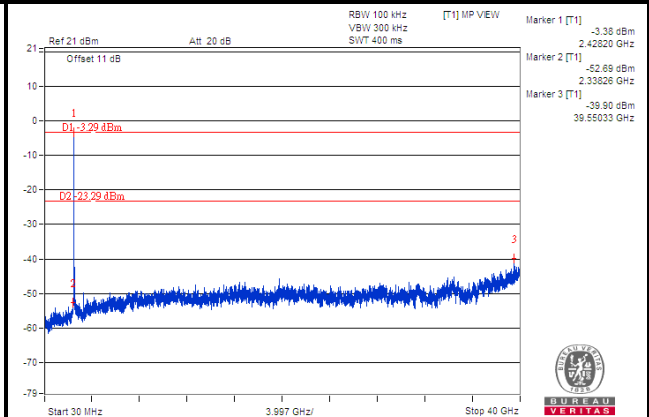
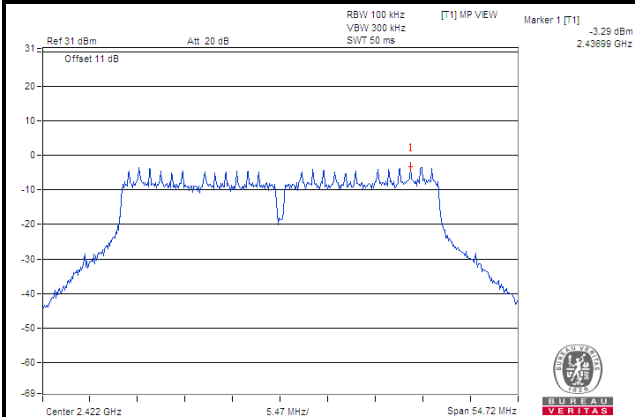
Ch 11



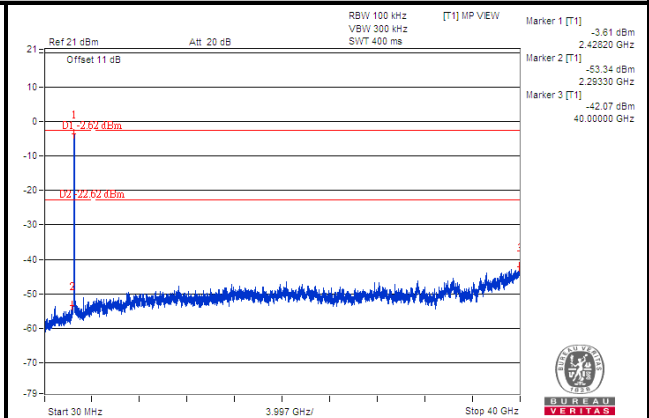
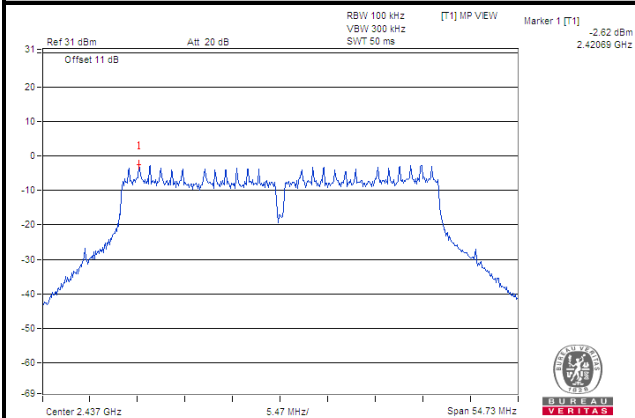


802.11n (HT40)

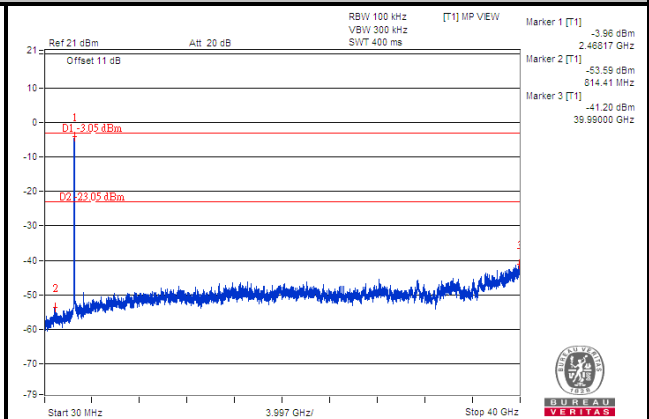
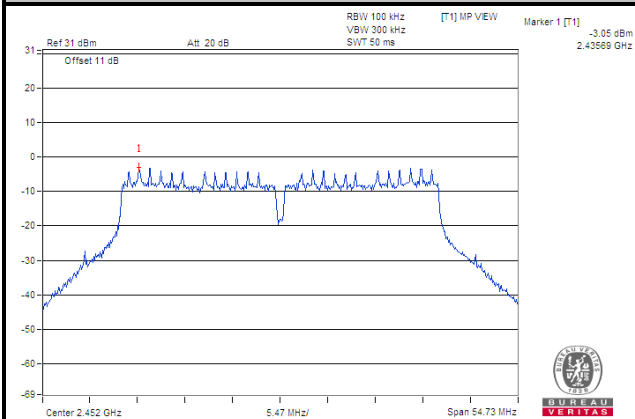
Ch 3

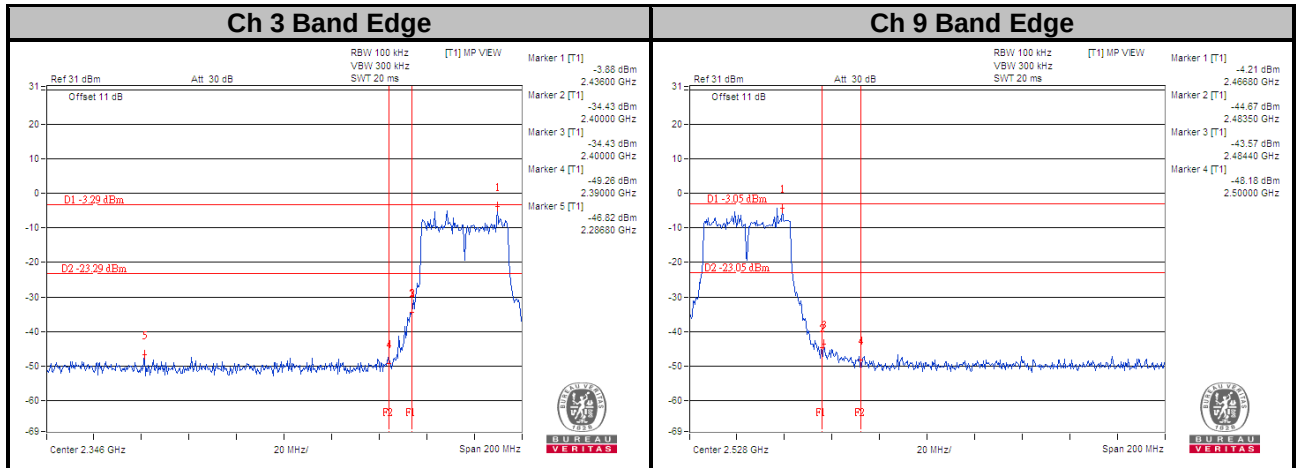


Ch 6



Ch 9





4.8 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

5 6 dB 頻寬之要求

5.1 適用標準

請見本報告 3.1 節第(13)項的規定。

5.2 量測方法

- 將待測物輸出經由衰減器接到頻譜分析儀上。
- 設定待測物處於連續發射狀態。
- 計算最大輸出功率峰值減 6 dB 的最大頻率範圍。

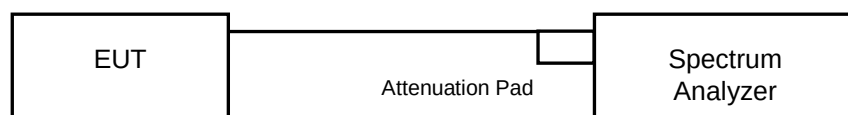
5.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 12, 21	Apr. 11, 2022

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 207 Hz, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k=2$.

5.4 測試配置



5.5 量測結果

操作模式	發射	測試日期	110 年 04 月 28 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	Jlsyong Wang		

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	8.16	0.5	Pass
6	2437	8.14	0.5	Pass
11	2462	8.13	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.40	0.5	Pass
6	2437	16.38	0.5	Pass
11	2462	16.40	0.5	Pass

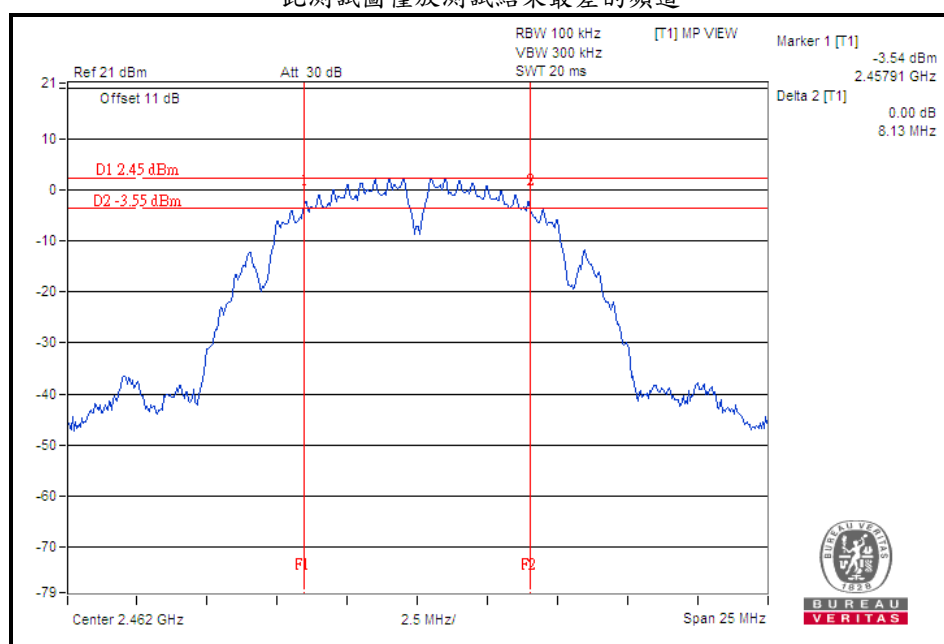
802.11n (HT20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.64	0.5	Pass
6	2437	17.62	0.5	Pass
11	2462	17.63	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	36.48	0.5	Pass
6	2437	36.49	0.5	Pass
9	2452	36.49	0.5	Pass

**此測試圖僅放測試結果最差的頻道。



5.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

6 峰值傳導輸出功率之量測

6.1 適用標準

請見本報告 3.1 節第(12)及(14)項的規定。

6.2 量測方法

- 將待測物輸出經由衰減器接到功率計上。
- 設定待測物處於連續發射狀態。
- 計算其輸出功率峰值。

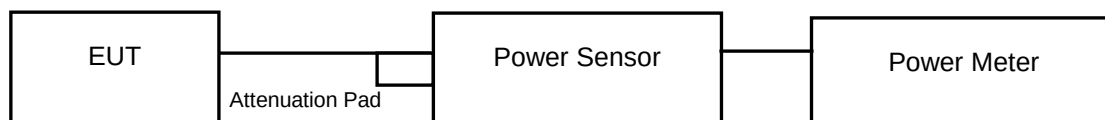
6.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Power Meter Anritsu	ML2495A	1232002	Dec. 09, 2020	Dec. 08, 2021
Power Sensor Anritsu	MA2411B	1207325	Dec. 09, 2020	Dec. 08, 2021

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 1.393 dB, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

6.4 測試配置



6.5 量測結果

操作模式	發射	測試日期	110 年 04 月 28 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	Jlsyong Wang		

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	78.343	18.94	37.844	15.78	30	Pass
6	2437	90.157	19.55	43.752	16.41	30	Pass
11	2462	55.208	17.42	26.669	14.26	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	155.955	21.93	28.445	14.54	30	Pass
6	2437	226.464	23.55	48.865	16.89	30	Pass
11	2462	114.025	20.57	22.646	13.55	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	158.855	22.01	36.058	15.57	30	Pass
6	2437	202.768	23.07	47.643	16.78	30	Pass
11	2462	127.057	21.04	23.659	13.74	30	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
3	2422	133.968	21.27	23.933	13.79	30	Pass
6	2437	158.125	21.99	28.445	14.54	30	Pass
9	2452	122.462	20.88	20.989	13.22	30	Pass

6.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

7 功率頻譜密度之量測

7.1 適用標準

請見本報告 3.1 節第(15)項的規定。

7.2 量測方法

- 將待測物之天線埠經由適當之衰減直接連至測試儀器。
- 設定解析頻寬為 3 kHz，視訊頻寬為 10 kHz，掃描時間為 auto
- 掃描頻寬設於足夠觀察發射機所產生的主頻信號，並找到最大的峰值準位。

7.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 207 Hz, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

7.4 測試配置



7.5 量測結果

操作模式	發射	測試日期	110 年 04 月 28 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	Jlsyong Wang		

802.11b

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-11.31	8	Pass
6	2437	-8.98	8	Pass
11	2462	-10.46	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-16.83	8	Pass
6	2437	-11.73	8	Pass
11	2462	-14.67	8	Pass

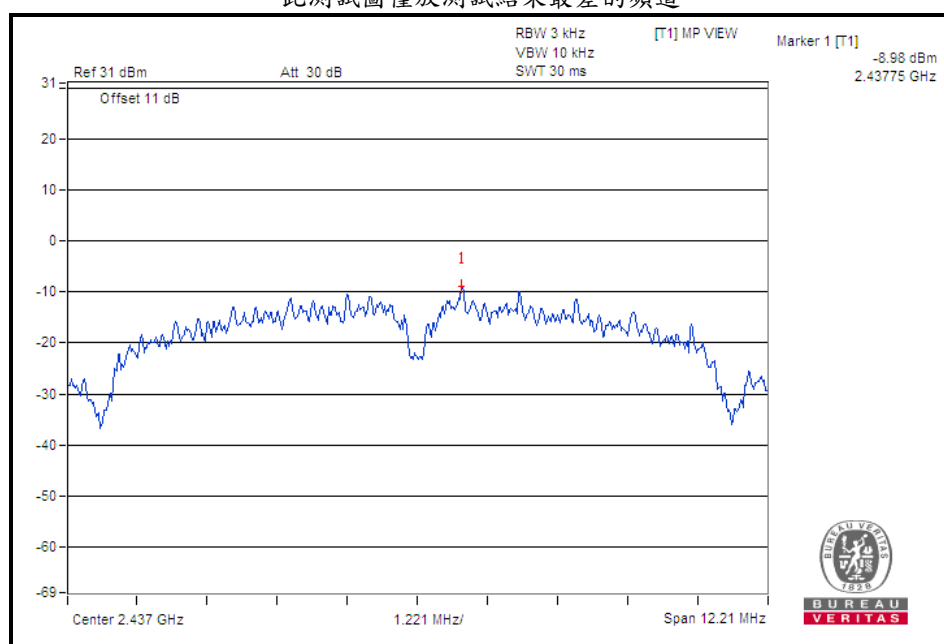
802.11n (HT20)

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-15.61	8	Pass
6	2437	-12.4	8	Pass
11	2462	-14.51	8	Pass

802.11n (HT40)

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
3	2422	-19.2	8	Pass
6	2437	-18.15	8	Pass
9	2452	-18.62	8	Pass

**此測試圖僅放測試結果最差的頻道。



7.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

BLUETOOTH EDR 頻段測試紀錄結果

8 帶外發射之量測

8.1 適用標準

請見本報告 3.1 節第(18)項的規定。

8.2 量測方法

在電波暗室，將待測物置於 0.8 米高的非金屬桌面，使其操作在工作狀態。接收天線置於 3 米距離。桌面要 360 度旋轉，另外接收天線從離地 1 米至 4 米升降變化，以找出最大的輻射電場強度，接收天線分別置於水平、垂直極化各執行測試一次。

Note: 對於 1 GHz 以上場強輻射的測試，待測物則置於 1.5 米高的非金屬桌面。

發射諧波:

Peak 為 RBW = 1 MHz, VBW = 3 MHz ;

For Fundamental and Harmonic signal:

Average 為 Peak Value + Duty Cycle Correction Factor

Duty Cycle = $(2.925) / 100 = 0.02925$, Correction Factor = $20 \log (\text{Duty Cycle}) = 20 \log (0.02925) = -30.67$,

Duty cycle photo refer 本報告 2.1 章節 註 13

For other signal:

Average 為 RBW = 1 MHz, VBW = 3 MHz ; Detector: RMS ; Sweep time: Auto ; Trace count: trace average of at least 100 traces.

接收諧波:

Below 1 GHz

Peak 為 RBW = 120 kHz, VBW = 360 kHz ; Quasi-Peak 為 RBW = 120 kHz, VBW = 120 kHz

Above 1 GHz:

Peak 為 RBW = 1 MHz, VBW = 3 MHz ; Average 為 RBW = 1 MHz, VBW = 3 MHz ; Detector: RMS ; Sweep time: Auto ; Trace count: trace average of at least 100 traces.

其它不必要之訊號

Peak 為 RBW = 120 kHz, VBW = 360 kHz ; Quasi-Peak 為 RBW = 120 kHz, VBW = 120 kHz

8.3 量測儀器

同 4.3 節

8.4 測試配置

同 4.4 節

8.5 場強度之計算

同 4.5 節

量測結果請見下頁。

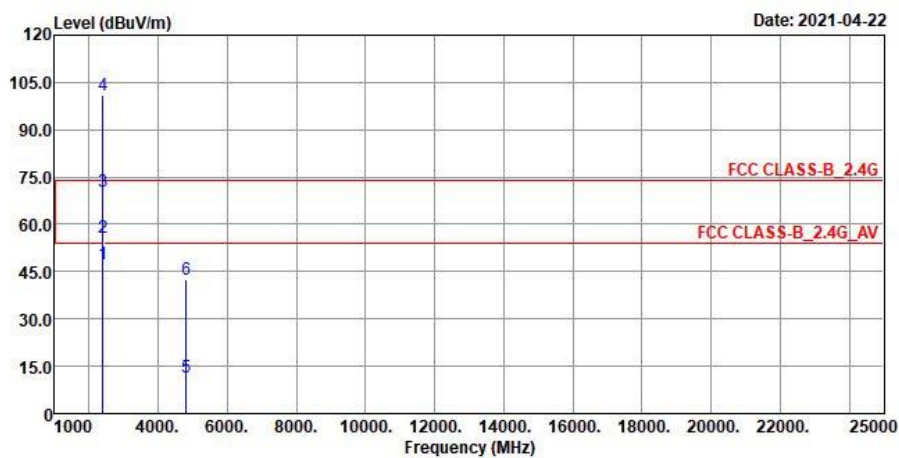
8.6 量測結果

8.6.1 發射諧波

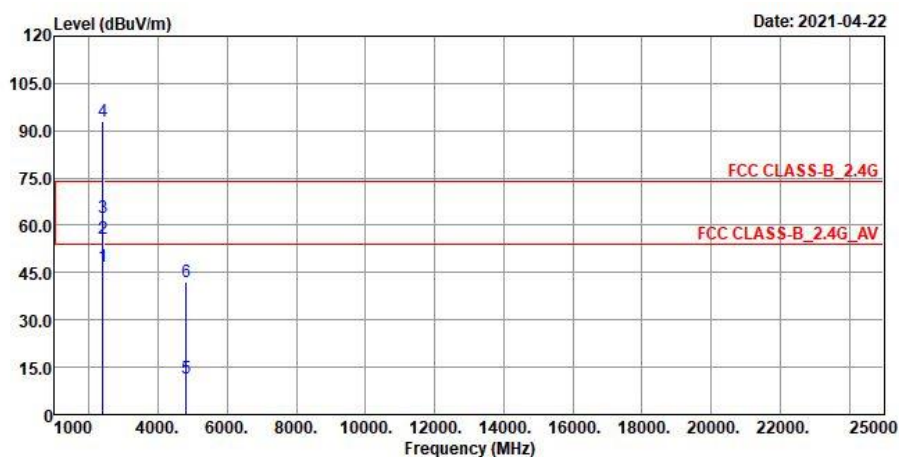
GFSK

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Horizontal



Vertical



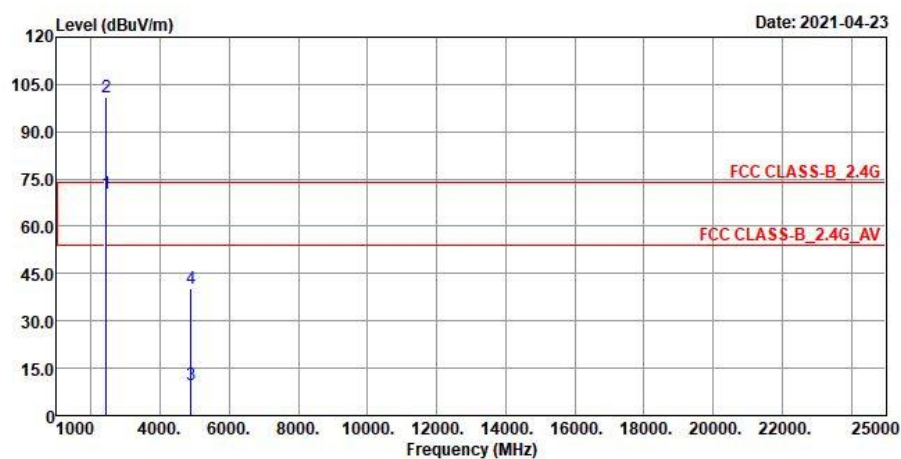
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	47.57	54.62	-7.05	54	-6.43	138	184	Average
2390	55.76	62.81	-7.05	74	-18.24	138	184	Peak
2402	70.29	77.34	-7.05	-----	-----	138	184	Average
2402	100.96	108.01	-7.05	-----	-----	138	184	Peak
4804	11.65	27.46	-15.81	54	-42.35	103	245	Average
4804	42.32	58.13	-15.81	74	-31.68	103	245	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	47.13	54.18	-7.05	54	-6.87	100	247	Average
2390	55.86	62.91	-7.05	74	-18.14	100	247	Peak
2402	62.45	69.5	-7.05	-----	-----	100	247	Average
2402	93.12	100.17	-7.05	-----	-----	100	247	Peak
4804	11.5	27.31	-15.81	54	-42.5	123	304	Average
4804	42.17	57.98	-15.81	74	-31.83	123	304	Peak

Remarks:

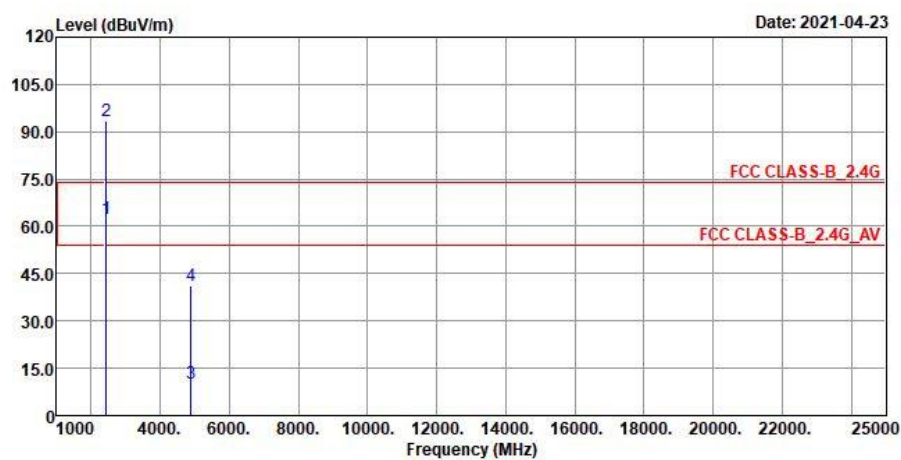
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2402 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 39	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Horizontal



Vertical



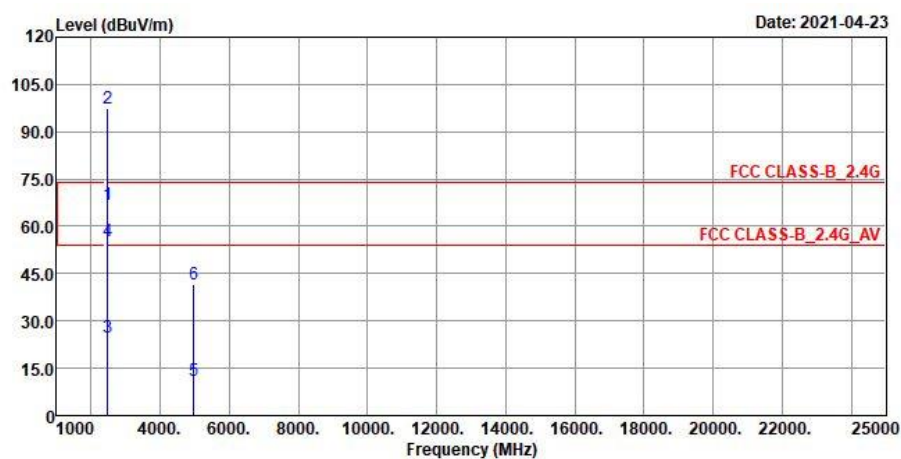
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2441	70.26	77.19	-6.93	-----	-----	161	175	Average
2441	100.93	107.86	-6.93	-----	-----	161	175	Peak
4882	9.6	25.54	-15.94	54	-44.4	123	164	Average
4882	40.27	56.21	-15.94	74	-33.73	123	164	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2441	62.56	69.49	-6.93	-----	-----	100	237	Average
2441	93.23	100.16	-6.93	-----	-----	100	237	Peak
4882	10.39	26.33	-15.94	54	-43.61	104	189	Average
4882	41.06	57	-15.94	74	-32.94	104	189	Peak

Remarks:

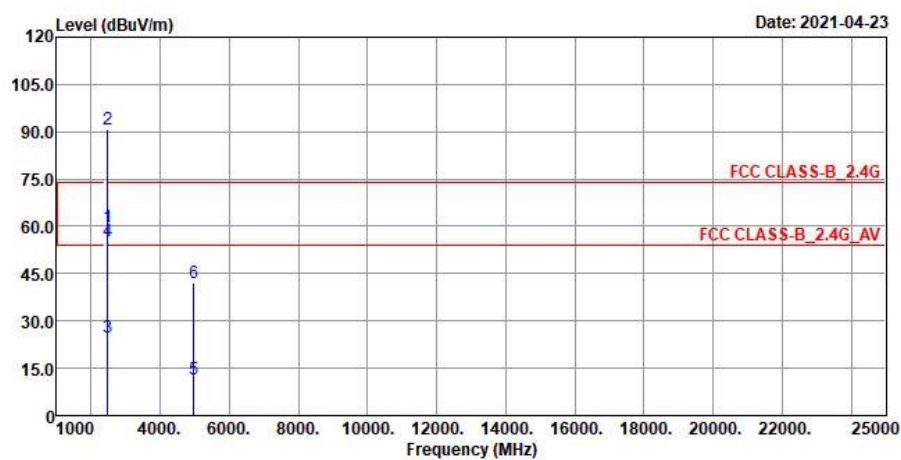
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2441 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 78	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	66.89	73.75	-6.86	-----	-----	128	177	Average
2480	97.56	104.42	-6.86	-----	-----	128	177	Peak
2483.5	24.88	31.74	-6.86	74	-49.12	128	177	Average
2483.5	55.55	62.41	-6.86	74	-18.45	128	177	Peak
4960	10.93	26.63	-15.7	54	-43.07	153	164	Average
4960	41.6	57.3	-15.7	74	-32.4	153	164	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	59.98	66.84	-6.86	-----	-----	100	238	Average
2480	90.65	97.51	-6.86	-----	-----	100	238	Peak
2483.5	24.84	31.7	-6.86	74	-49.16	100	238	Average
2483.5	55.51	62.37	-6.86	74	-18.49	100	238	Peak
4960	11.46	27.16	-15.7	54	-42.54	125	307	Average
4960	42.13	57.83	-15.7	74	-31.87	125	307	Peak

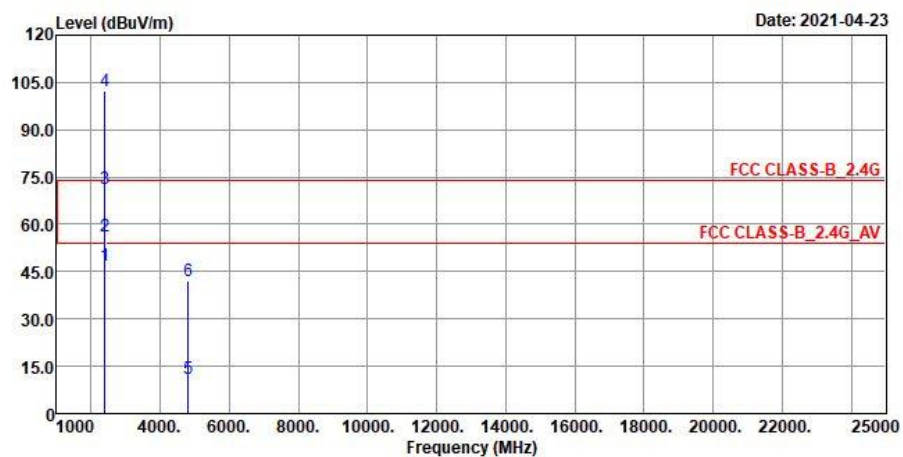
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2480 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

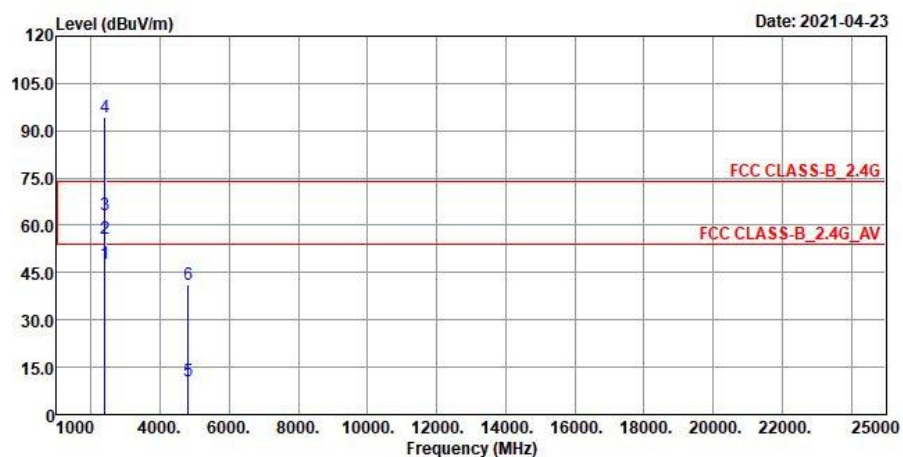
8DPSK

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Horizontal



Vertical



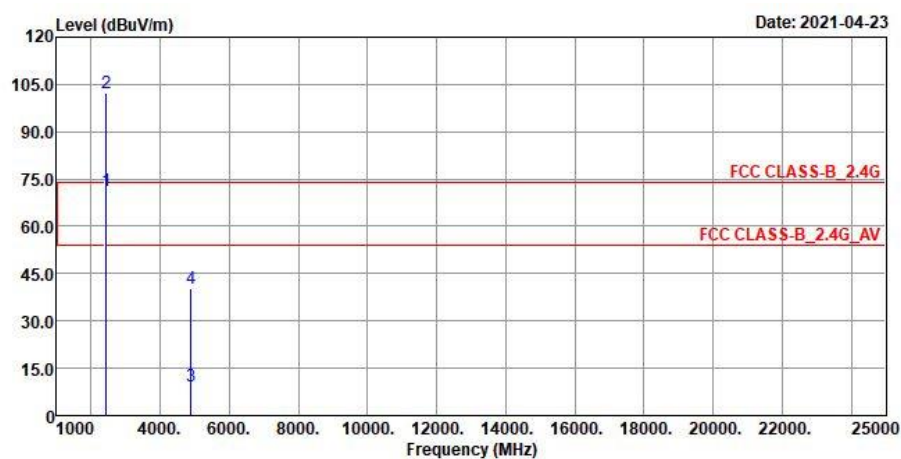
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	47.15	54.2	-7.05	54	-6.85	121	180	Average
2390	56.12	63.17	-7.05	74	-17.88	121	180	Peak
2402	71.43	78.48	-7.05	-----	-----	121	180	Average
2402	102.1	109.15	-7.05	-----	-----	121	180	Peak
4804	11.2	27.01	-15.81	54	-42.8	103	157	Average
4804	41.87	57.68	-15.81	74	-32.13	103	157	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	47.7	54.75	-7.05	54	-6.3	100	236	Average
2390	55.74	62.79	-7.05	74	-18.26	100	236	Peak
2402	63.47	70.52	-7.05	-----	-----	100	236	Average
2402	94.14	101.19	-7.05	-----	-----	100	236	Peak
4804	10.56	26.37	-15.81	54	-43.44	111	161	Average
4804	41.23	57.04	-15.81	74	-32.77	111	161	Peak

Remarks:

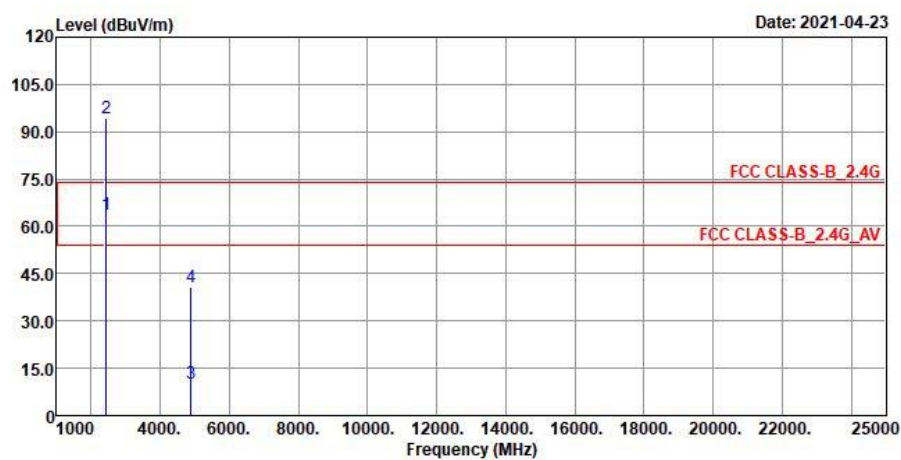
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2402 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 39	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Horizontal



Vertical



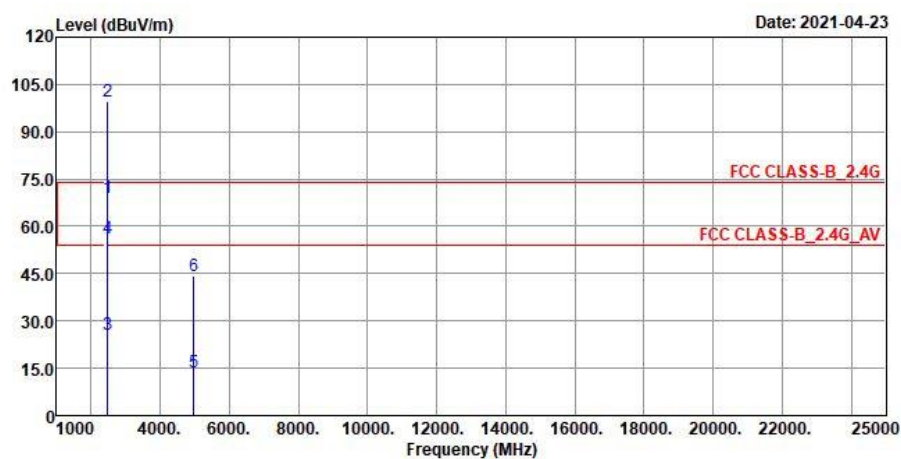
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2441	71.47	78.4	-6.93	-----	-----	160	177	Average
2441	102.14	109.07	-6.93	-----	-----	160	177	Peak
4882	9.41	25.35	-15.94	54	-44.59	132	57	Average
4882	40.08	56.02	-15.94	74	-33.92	132	57	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2441	63.59	70.52	-6.93	-----	-----	100	236	Average
2441	94.26	101.19	-6.93	-----	-----	100	236	Peak
4882	10.1	26.04	-15.94	54	-43.9	116	197	Average
4882	40.77	56.71	-15.94	74	-33.23	116	197	Peak

Remarks:

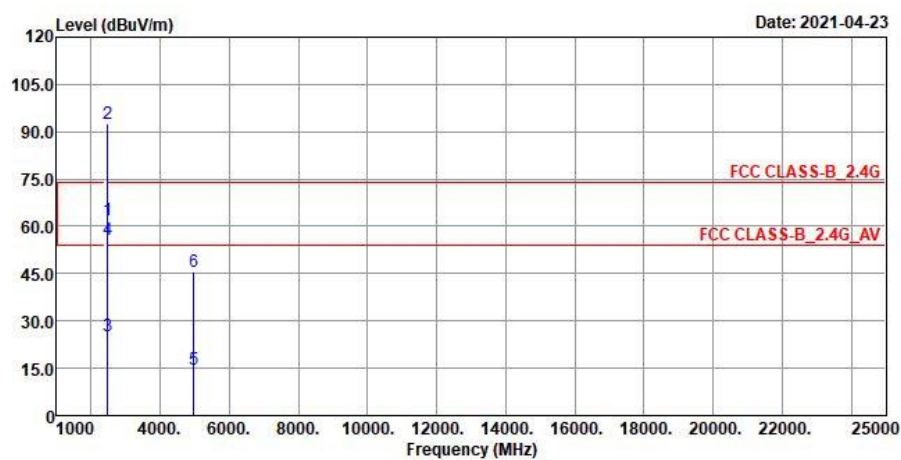
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2441 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 78	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	69.13	75.99	-6.86	-----	-----	132	179	Average
2480	99.8	106.66	-6.86	-----	-----	132	179	Peak
2483.5	25.52	32.38	-6.86	74	-48.48	132	179	Average
2483.5	56.19	63.05	-6.86	74	-17.81	132	179	Peak
4960	13.55	29.25	-15.7	54	-40.45	163	274	Average
4960	44.22	59.92	-15.7	74	-29.78	163	274	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	61.86	68.72	-6.86	-----	-----	100	237	Average
2480	92.53	99.39	-6.86	-----	-----	100	237	Peak
2483.5	25.34	32.2	-6.86	74	-48.66	100	237	Average
2483.5	56.01	62.87	-6.86	74	-17.99	100	237	Peak
4960	14.76	30.46	-15.7	54	-39.24	103	168	Average
4960	45.43	61.13	-15.7	74	-28.57	103	168	Peak

Remarks:

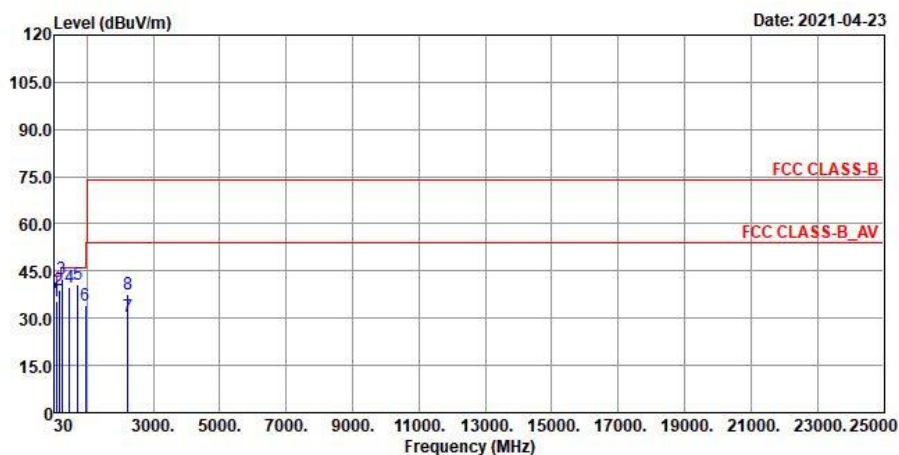
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2480 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

8.6.2 接收諧波

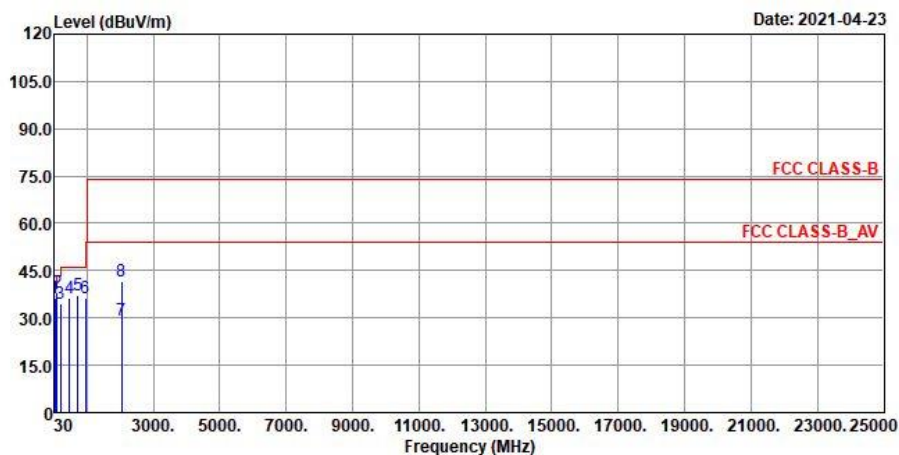
8DPSK

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	30 MHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Above 1 GHz: Peak (PK) & Average (AV) Below 1 GHz: Peak (PK) or Quasi-Peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
72	35.56	50.76	-15.2	40	-4.44	193	288	QP
165.8	38.82	52.15	-13.33	43.5	-4.68	171	302	QP
240	42.63	56.74	-14.11	46	-3.37	102	141	QP
480	39.72	45.86	-6.14	46	-6.28	132	214	QP
720	40.75	41.68	-0.93	46	-5.25	143	214	QP
960	34.24	30.82	3.42	46	-11.76	104	183	QP
2223.487	30.61	52.86	-22.25	54	-23.39	105	167	Average
2223.487	37.79	60.04	-22.25	74	-36.21	105	167	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
34.85	36.42	49.75	-13.33	40	-3.58	106	173	QP
99.84	37.94	54.29	-16.35	43.5	-5.56	121	104	QP
202.66	34.47	50.37	-15.9	43.5	-9.03	111	86	QP
480	36.11	42.25	-6.14	46	-9.89	106	278	QP
720	37.41	38.34	-0.93	46	-8.59	186	237	QP
960	36.51	33.09	3.42	46	-9.49	114	104	QP
2054.637	29.32	53.64	-24.32	54	-24.68	100	271	Average
2054.637	41.7	66.02	-24.32	74	-32.3	100	271	Peak

Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. The other emission levels were very low against the limit.

8.6.3 其它不必要之訊號

9 kHz ~ 30 MHz Data:

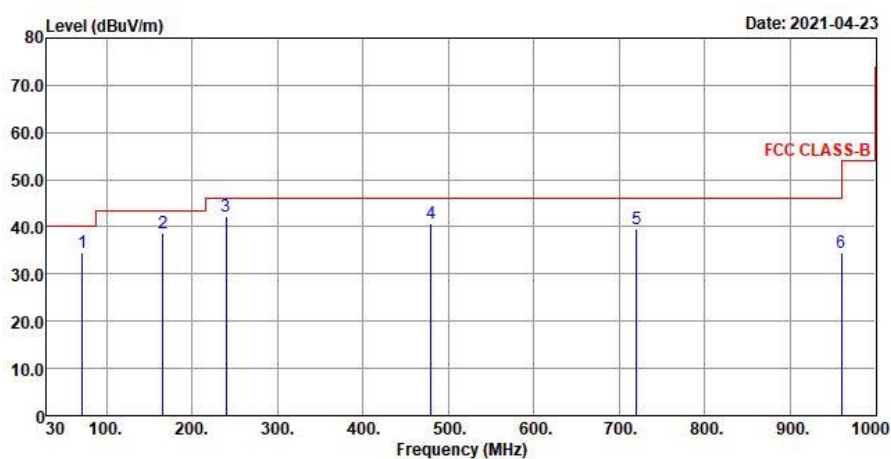
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Data:

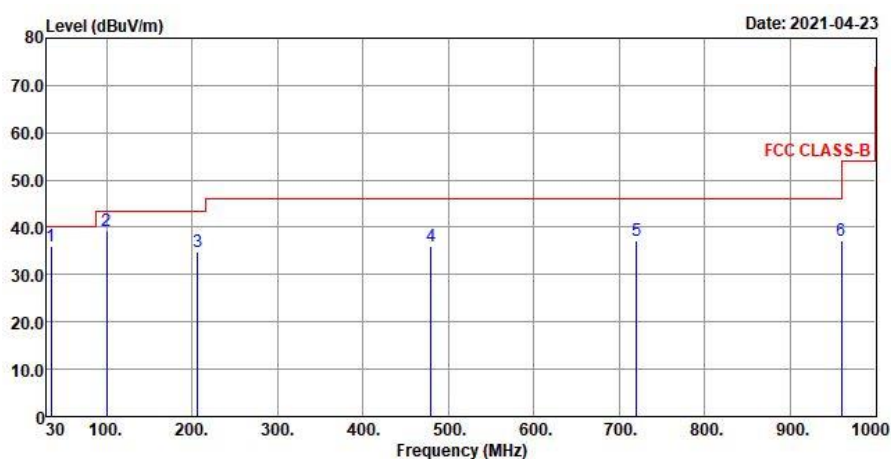
8DPSK

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	30 MHz ~ 1 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) or Quask-Peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Horizontal



Vertical



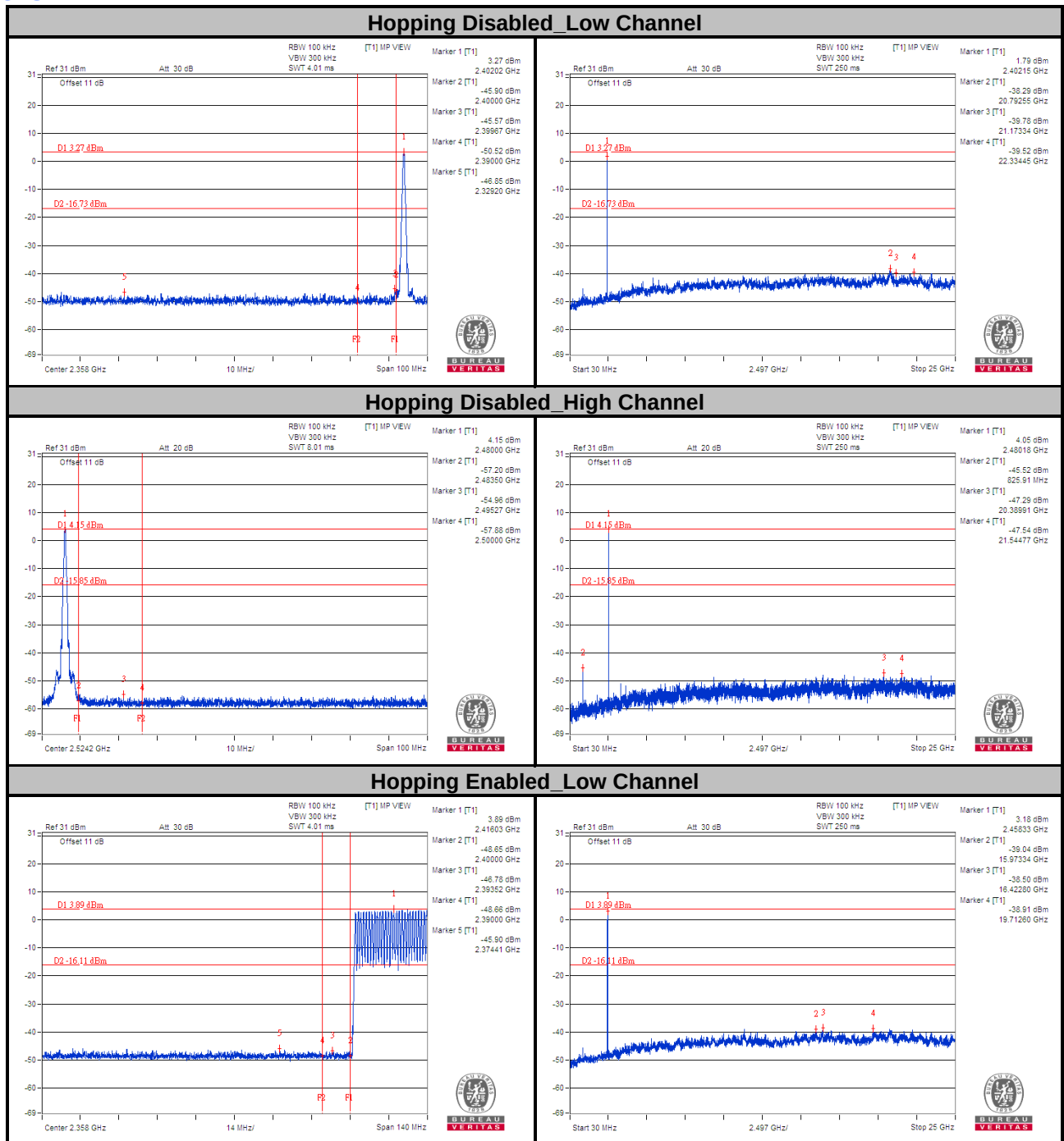
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
72	34.44	49.64	-15.2	40	-5.56	117	143	QP
165.8	38.58	51.91	-13.33	43.5	-4.92	119	36	QP
240	42.31	56.38	-14.07	46	-3.69	168	232	QP
480	40.7	46.84	-6.14	46	-5.3	132	172	QP
720	39.55	40.48	-0.93	46	-6.45	106	113	QP
960	34.59	31.15	3.44	54	-19.41	169	202	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
34.85	35.92	49.25	-13.33	40	-4.08	163	241	QP
99.84	39.32	55.67	-16.35	43.5	-4.18	127	104	QP
206.54	34.76	50.63	-15.87	43.5	-8.74	124	104	QP
480	36.11	42.25	-6.14	46	-9.89	169	322	QP
720	37.33	38.26	-0.93	46	-8.67	112	346	QP
960	37.31	33.89	3.42	54	-16.69	153	201	QP

Remarks:

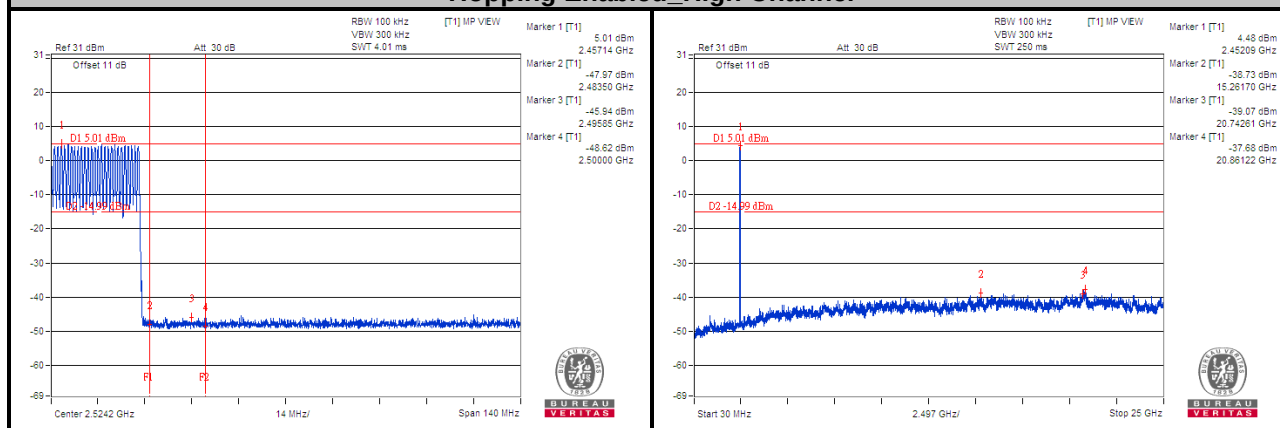
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. The other emission levels were very low against the limit.

8.7 帶外發射之量測 (傳導)

GFSK

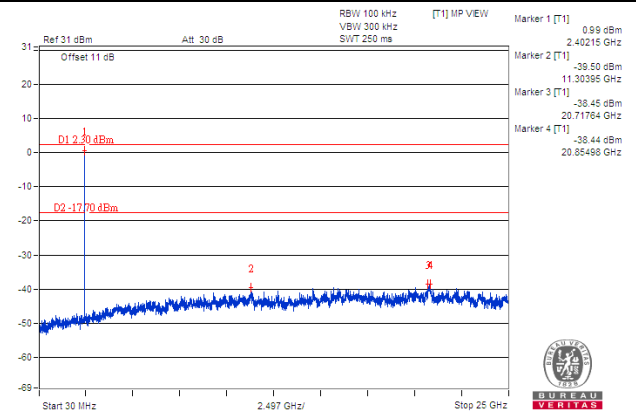
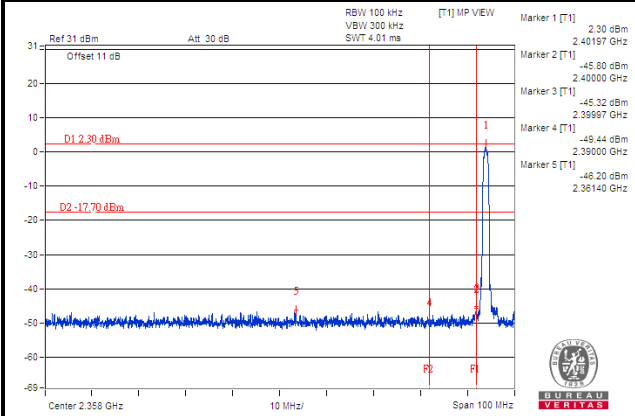


Hopping Enabled_High Channel

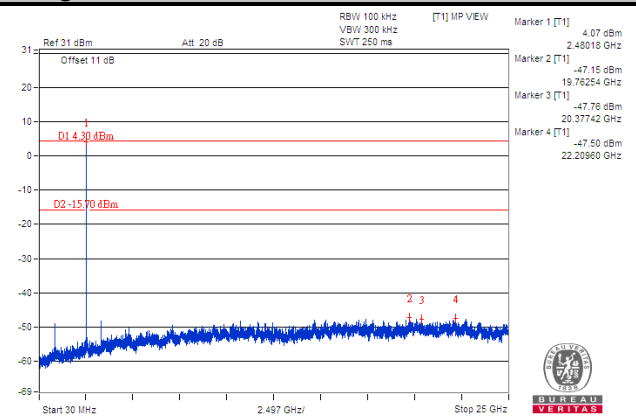
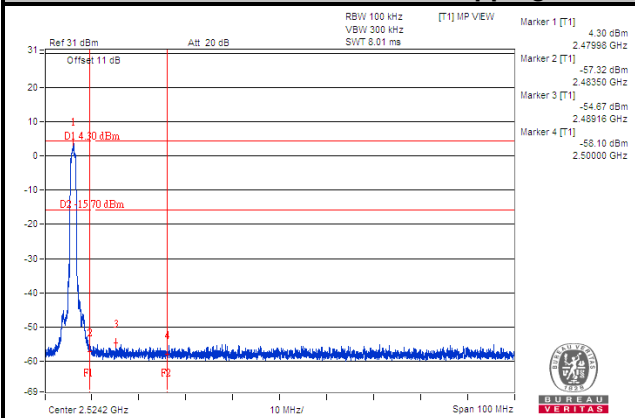


8DPSK

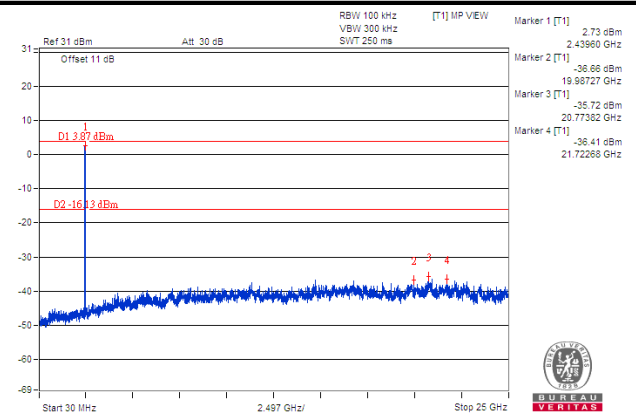
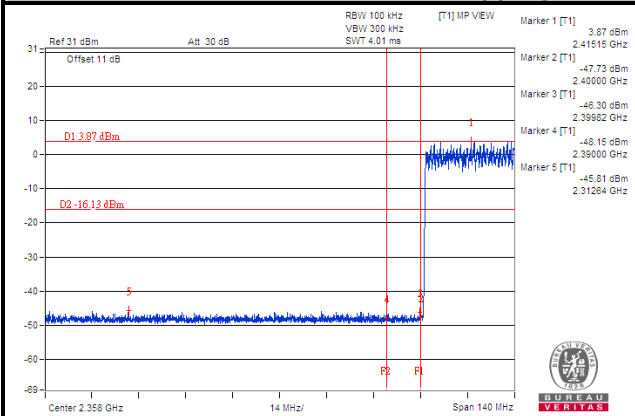
Hopping Disabled_Low Channel



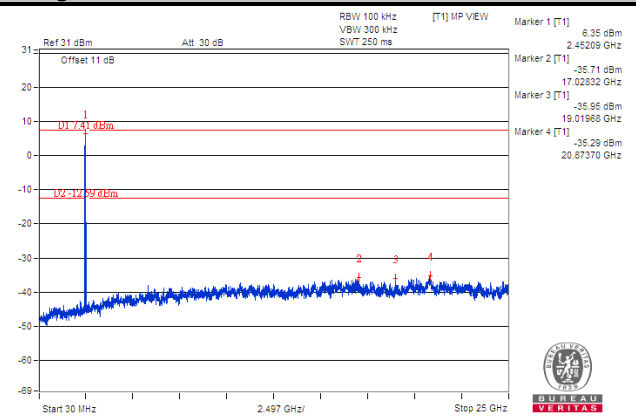
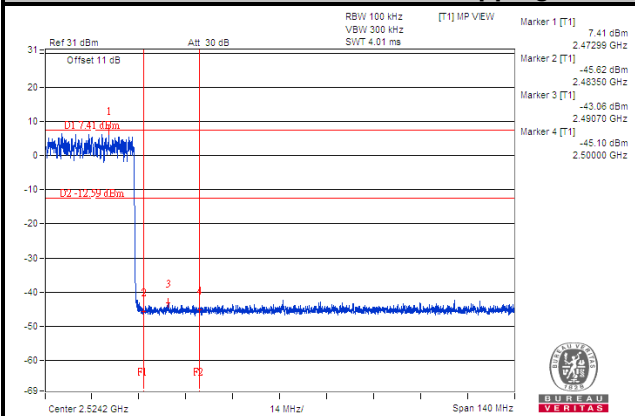
Hopping Disabled_High Channel



Hopping Enabled_Low Channel



Hopping Enabled_High Channel



8.8 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

9 20 dB 頻寬之要求

9.1 適用標準

請見本報告 3.1 節第(23)項的規定。

9.2 量測方法

- 將待測物輸出經由衰減器接到頻譜分析儀上。
- 設定待測物處於連續發射狀態。
- 計算由最大輸出功率峰值減 20 dB 的最大頻率範圍。

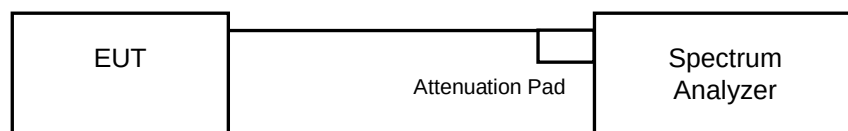
9.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 207 Hz, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

9.4 測試配置



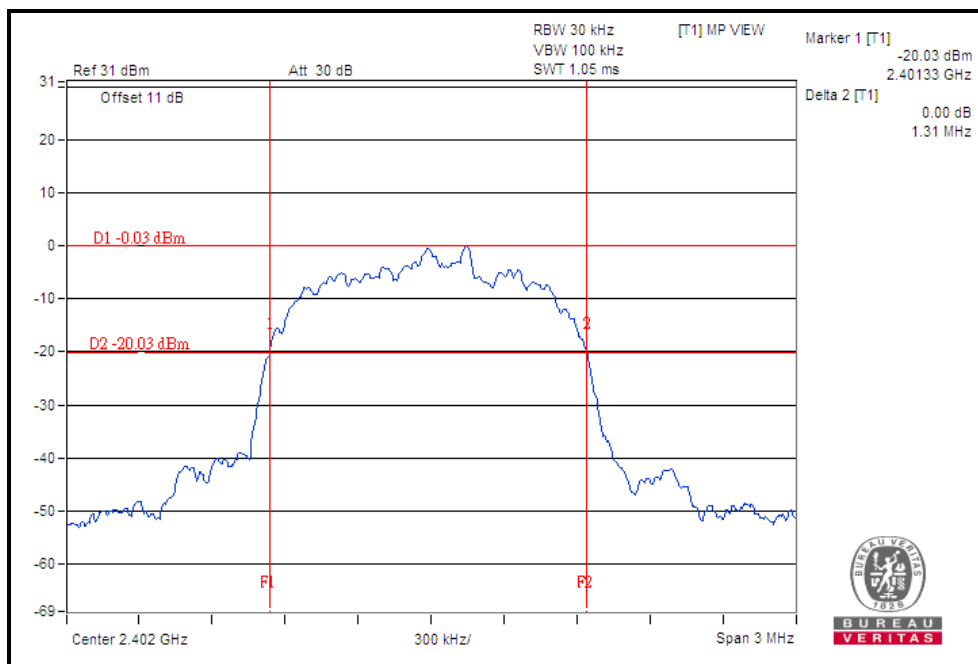
9.5 量測結果

操作模式	發射	測試日期	110 年 05 月 12 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	Jisyong Wang		

Channel	Channel Frequency (MHz)	20 dB Bandwidth (MHz)		>= 25 kHz
		GFSK	8DPSK	
0	2402	0.95	1.31	Yes
39	2441	0.95	1.31	Yes
78	2480	0.95	1.31	Yes

註：對操作於 2400~2483.5 MHz 頻段的跳頻系統技術之低功率發射機，依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.6 節之(1)(A)條規定，跳頻系統之載波頻率頻道間隔應至少 25 千赫(kHz)或跳頻頻道之 20 dB 頻寬之三分之二，兩者取較寬者。依據上述條文之規定，對操作於 2400~2483.5 MHz 頻段的跳頻產品之頻寬乃為該產品載波頻率頻道間隔的判定限制之一。

**此測試圖僅放測試結果最差的頻道。



9.6 量測結果判定

依據測試數據結果，三分之二 20 dB 頻寬值乃為此產品之載波頻率頻道間隔的判定限制值。

10 峰值傳導輸出功率之量測

10.1 適用標準

請見本報告 3.1 節第(21)項的規定。

10.2 量測方法

- 將待測物輸出接到功率計上。
- 設定待測物處於連續發射狀態。
- 量測待測物輸出功率峰值。

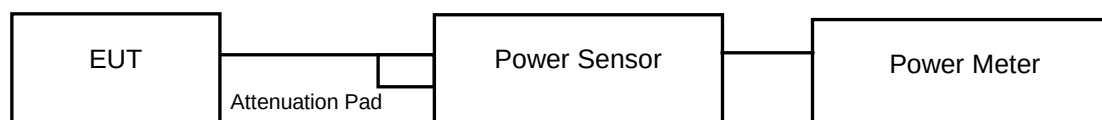
10.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Power Meter Anritsu	ML2495A	1232002	Dec. 09, 2020	Dec. 08, 2021
Power Sensor Anritsu	MA2411B	1207325	Dec. 09, 2020	Dec. 08, 2021

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 1.393 dB, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k=2$.

10.4 測試配置



10.5 量測結果

操作模式	發射	測試日期	110 年 05 月 12 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	Jisyong Wang		

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)		Peak Power Limit (dBm)	Pass / Fail
		GFSK	8DPSK		
0	2402	6.17	6.15	21	Pass
39	2441	6.92	6.98	21	Pass
78	2480	7.02	7.06	21	Pass

Channel	Channel Frequency (MHz)	Average Power Output (dBm)		Peak Power Limit (dBm)	Pass / Fail
		GFSK	8DPSK		
0	2402	5.92	5.98	21	Pass
39	2441	6.71	6.75	21	Pass
78	2480	6.82	6.85	21	Pass

Note: 待測物操作頻率為 2400 MHz~2483.5 MHz 頻段，且輸出功率應小於或等於 125 mW 跳頻系統，其載波頻率頻道間隔不得小於跳頻頻道 20 dB 頻寬之三分之二,參考 12.5 章節量測結果。

10.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

11 跳頻頻道數之量測

11.1 適用標準

請見本報告 3.1 節第(22)項的規定。

11.2 量測方法

- 將待測物輸出接到頻譜分析儀上。
- 設定待測物處於正常傳輸跳頻模式下。
- 設定 RBW = 100 kHz，VBW = 300 kHz，量測跳頻頻道數。

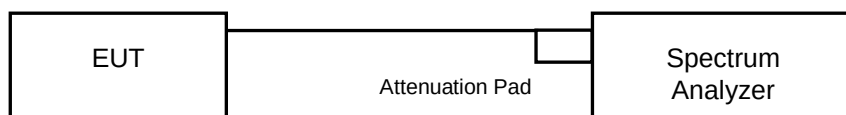
11.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 207 Hz, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

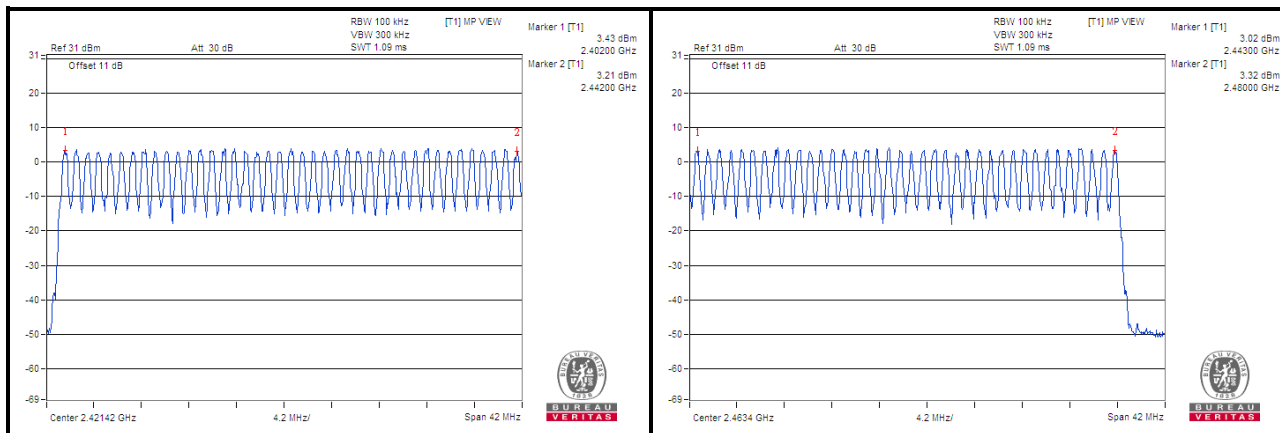
11.4 測試配置



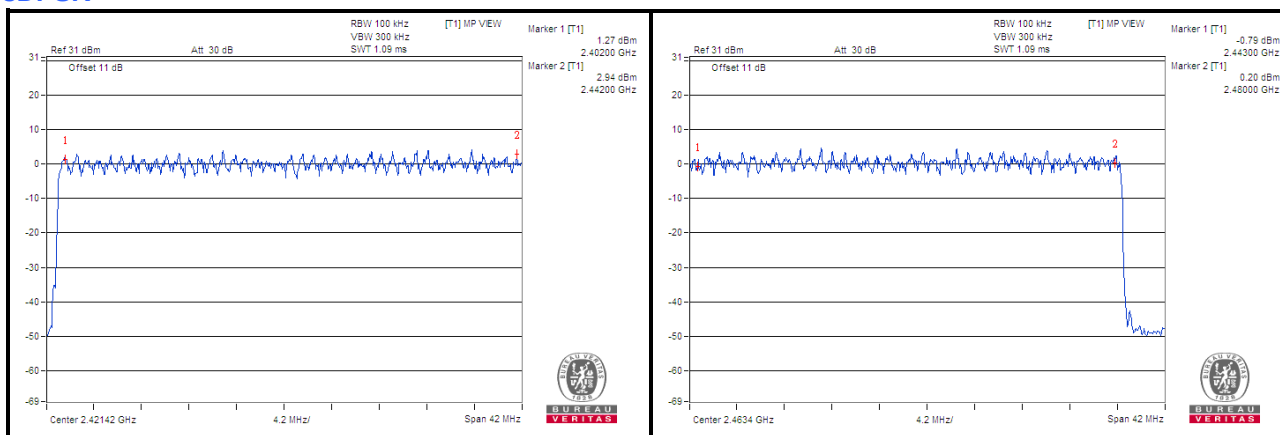
11.5 量測結果

其掃描圖請參閱下圖。跳頻頻道數共有 79 個，符合至少 15 個的規定。

GFSK



8DPSK



11.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

12 跳頻頻道間隔之量測

12.1 適用標準

請見本報告 3.1 節第(23)項規定。

12.2 量測方法

- 將待測物輸出接到頻譜分析儀上。
- 設定待測物處於連續發射狀態。
- 設定 RBW = 30 kHz，VBW = 100 kHz，量測相鄰兩個頻道間的間隔。

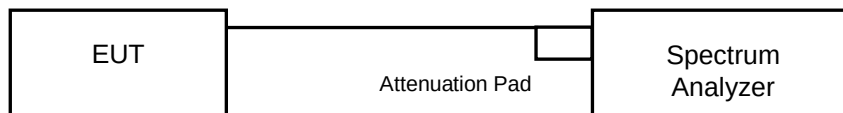
12.3 量測場強輻射之儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 207 Hz, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

12.4 測試配置



12.5 量測結果

操作模式	發射	測試日期	110 年 05 月 12 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	Jisyong Wang		

GFSK

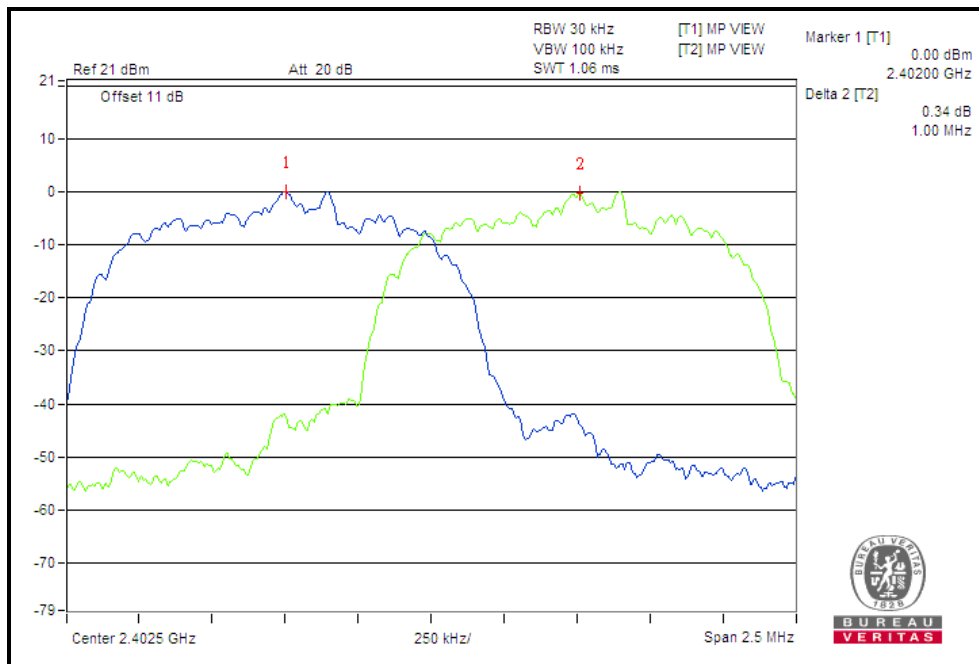
Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.00	0.95	0.64	Pass
39	2441	1.00	0.95	0.64	Pass
78	2480	1.00	0.95	0.64	Pass

8DPSK

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.00	1.31	0.88	Pass
39	2441	1.00	1.31	0.88	Pass
78	2480	1.00	1.31	0.88	Pass

本項測試的 limit 為至少為三分之二 20 dB 頻寬。

**此測試圖僅放測試結果最差的頻道。



12.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

13 每一頻道停留時間之量測

13.1 適用標準

請見本報告 3.1 節第(24)項的規定。

13.2 量測方法

- 將待測物輸出接到頻譜分析儀上。
- 設定待測物處於正常傳輸跳頻模式下。
- 設定 RBW = 100 kHz，VBW = 300 kHz，量測在不同傳輸模式下的頻道停留時間。

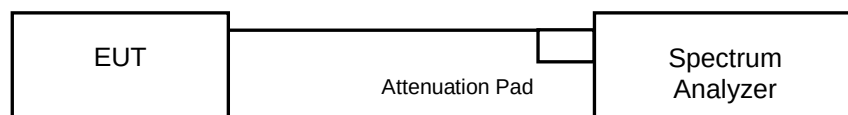
13.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 207 Hz, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

13.4 測試配置



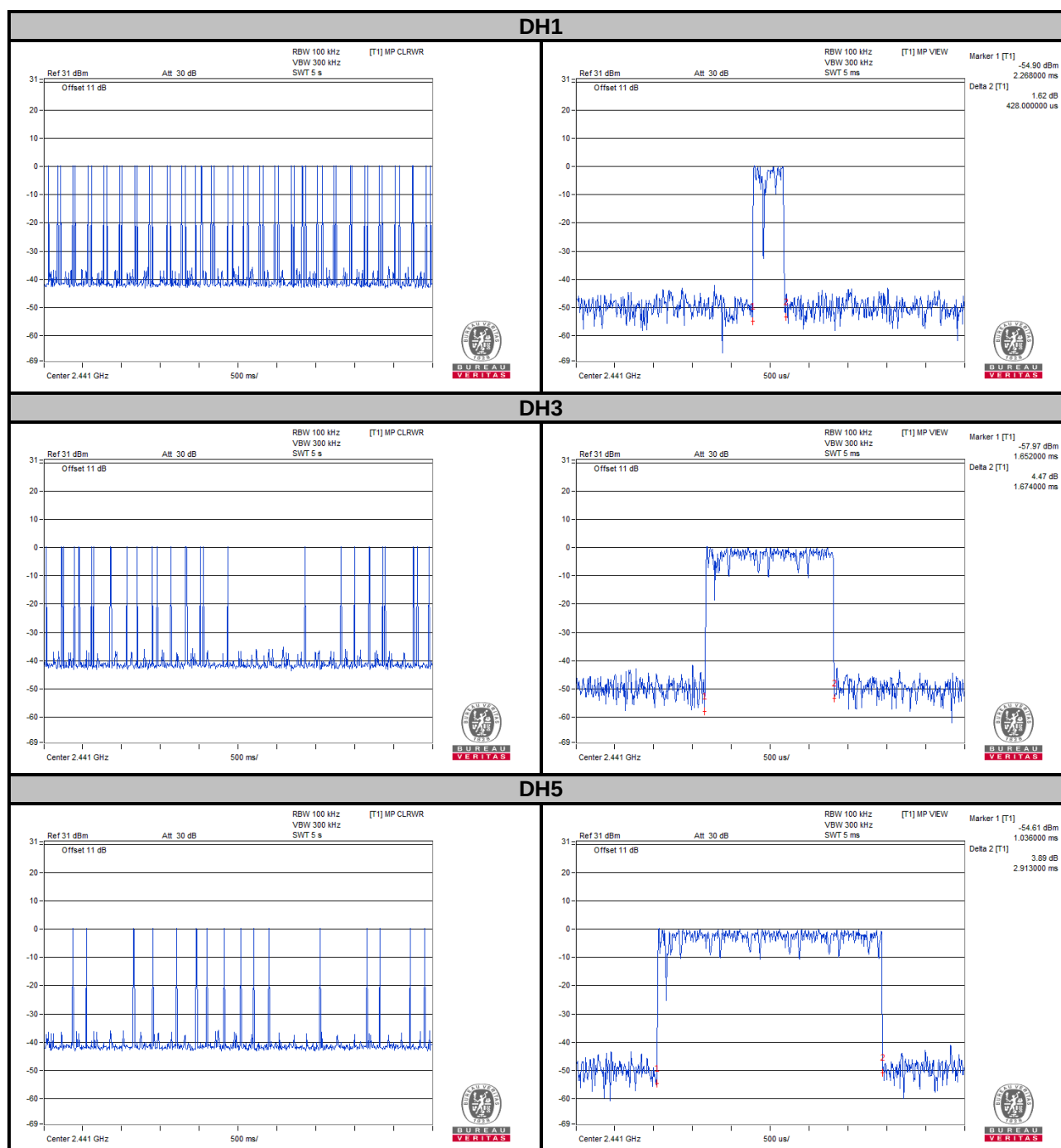
13.5 量測結果

GFSK

Mode	Number of transmission in a 31.6 (79 Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (sec)
DH1	51 (times / 5 sec) * 6.32 = 323 times	0.428	138.24	0.4
DH3	26 (times / 5 sec) * 6.32 = 165 times	1.674	276.21	0.4
DH5	16 (times / 5 sec) * 6.32 = 102 times	2.913	297.13	0.4

註:因為 Bluetooth 每秒跳 1600 次，會平均落在每個頻道，所以僅測試 Ch 39 作為代表。

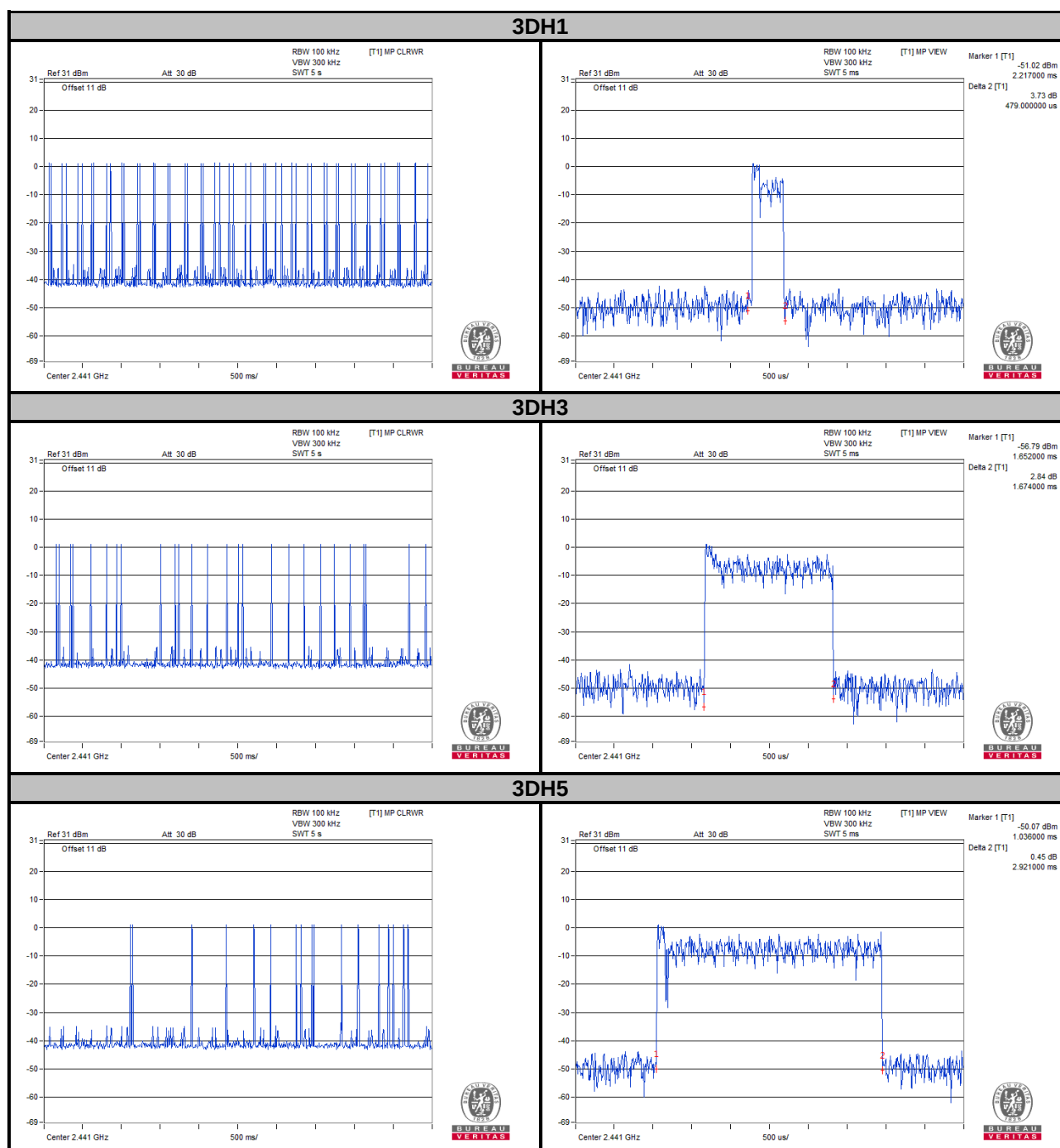
其掃描圖請參閱下方



8DPSK

Mode	Number of transmission in a 31.6 (79 Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (sec)
3DH1	51 (times / 5 sec) * 6.32 = 323 times	0.479	154.72	0.4
3DH3	26 (times / 5 sec) * 6.32 = 165 times	1.674	276.21	0.4
3DH5	17 (times / 5 sec) * 6.32 = 108 times	2.921	315.47	0.4

註:因為 Bluetooth 每秒跳 1600 次，會平均落在每個頻道，所以僅測試 Ch 39 作為代表。
其掃描圖請參閱下方



13.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

BLUETOOTH LE 頻段測試紀錄結果

14 帶外發射之量測

14.1 適用標準

請見本報告 3.1 節第(2)項的規定。

14.2 量測方法

在電波暗室，將待測物置於 0.8 米高的非金屬桌面，使其操作在工作狀態。接收天線置於 3 米距離。桌面要 360 度旋轉，另外接收天線從離地 1 米至 4 米升降變化，以找出最大的輻射電場強度，接收天線分別置於水平、垂直極化各執行測試一次。

Note: 對於 1 GHz 以上場強輻射的測試，待測物則置於 1.5 米高的非金屬桌面。

發射諧波：

Peak 為 RBW = 1 MHz, VBW = 3 MHz ;

Average 為 RBW = 1 MHz, VBW = 1 kHz

接收諧波：

Below 1 GHz

Peak 為 RBW = 120 kHz, VBW = 360 kHz ; Quasi-Peak 為 RBW = 120 kHz, VBW = 120 kHz

Above 1 GHz:

Peak 為 RBW = 1 MHz, VBW = 3 MHz ; Average 為 RBW = 1 MHz, VBW = 3 MHz (RMS) ; Detector: (RMS) ; Sweep time: Auto ; Trace count: trace average of at least 100 traces.

其它不必要之訊號

Peak 為 RBW = 120 kHz, VBW = 360 kHz ; Quasi-Peak 為 RBW = 120 kHz, VBW = 120 kHz

14.3 量測儀器

同 4.3 節

14.4 測試配置

同 4.4 節

14.5 場強度之計算

同 4.5 節

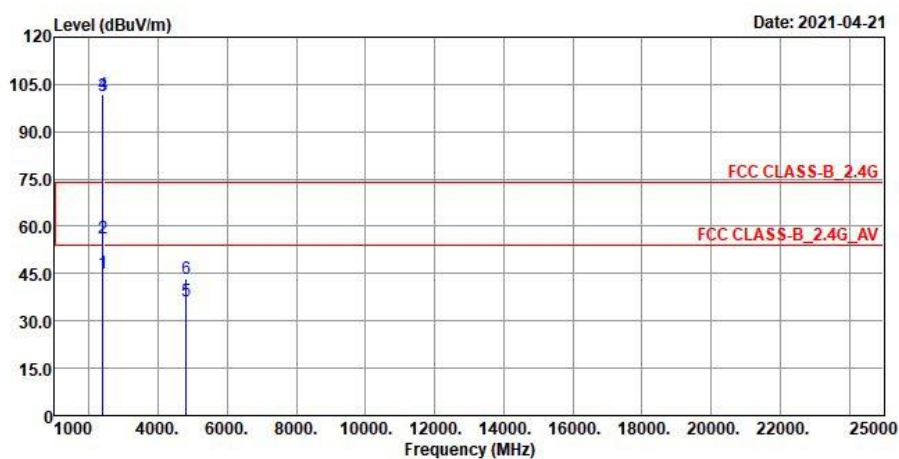
量測結果請見下頁。

14.6 量測結果

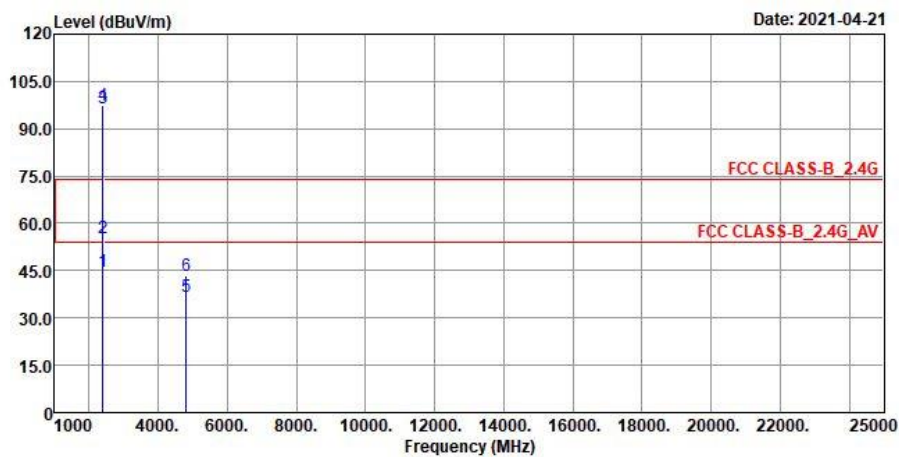
14.6.1 發射諧波

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



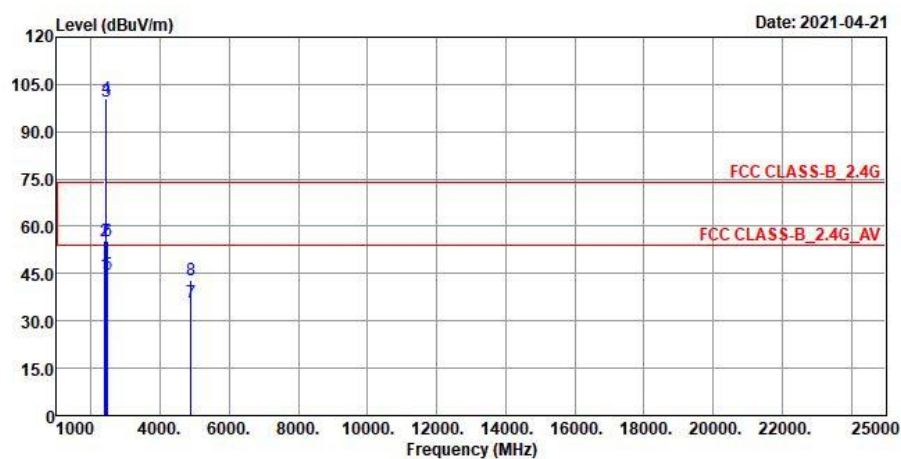
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	44.95	52	-7.05	54	-9.05	139	172	Average
2390	56.25	63.3	-7.05	74	-17.75	139	172	Peak
2402	101.26	108.31	-7.05	-----	-----	139	172	Average
2402	102	109.05	-7.05	-----	-----	139	172	Peak
4804	36.53	52.34	-15.81	54	-17.47	145	213	Average
4804	43.39	59.2	-15.81	74	-30.61	145	213	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	44.65	51.7	-7.05	54	-9.35	341	215	Average
2390	55.49	62.54	-7.05	74	-18.51	341	215	Peak
2402	96.6	103.65	-7.05	-----	-----	341	215	Average
2402	97.4	104.45	-7.05	-----	-----	341	215	Peak
4804	36.67	52.48	-15.81	54	-17.33	189	67	Average
4804	43.53	59.34	-15.81	74	-30.47	189	67	Peak

Remarks:

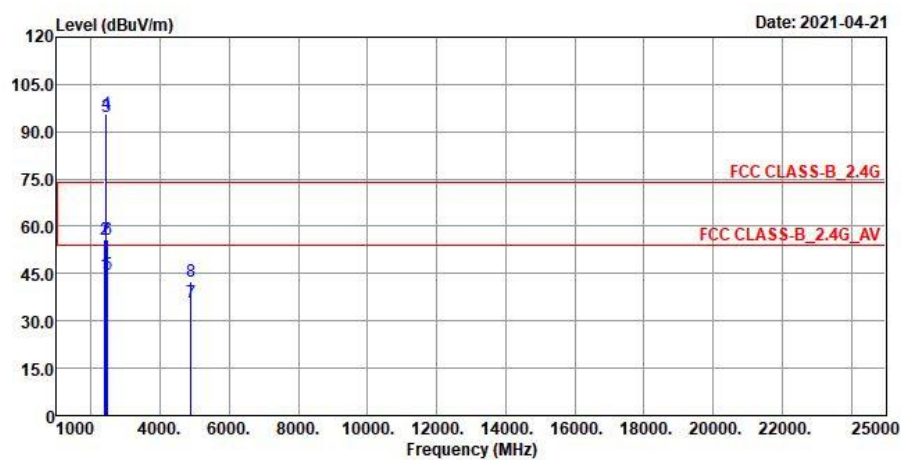
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2402 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 19	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



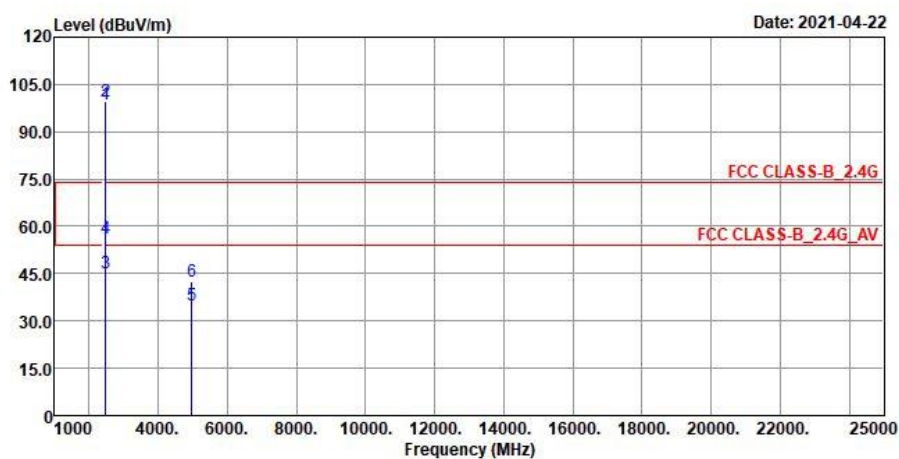
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	44.85	51.9	-7.05	54	-9.15	198	164	Average
2390	55.26	62.31	-7.05	74	-18.74	198	164	Peak
2440	99.57	106.57	-7	-----	-----	198	164	Average
2440	100.31	107.31	-7	-----	-----	198	164	Peak
2483.5	44.94	51.8	-6.86	54	-9.06	198	164	Average
2483.5	55.37	62.23	-6.86	74	-18.63	198	164	Peak
4880	36.03	51.97	-15.94	54	-17.97	177	205	Average
4880	42.94	58.88	-15.94	74	-31.06	177	205	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	44.76	51.81	-7.05	54	-9.24	369	215	Average
2390	55.86	62.91	-7.05	74	-18.14	369	215	Peak
2440	94.9	101.9	-7	-----	-----	369	215	Average
2440	95.72	102.72	-7	-----	-----	369	215	Peak
2483.5	44.91	51.77	-6.86	54	-9.09	369	215	Average
2483.5	55.87	62.73	-6.86	74	-18.13	369	215	Peak
4880	35.74	51.68	-15.94	54	-18.26	214	139	Average
4880	42.55	58.49	-15.94	74	-31.45	214	139	Peak

Remarks:

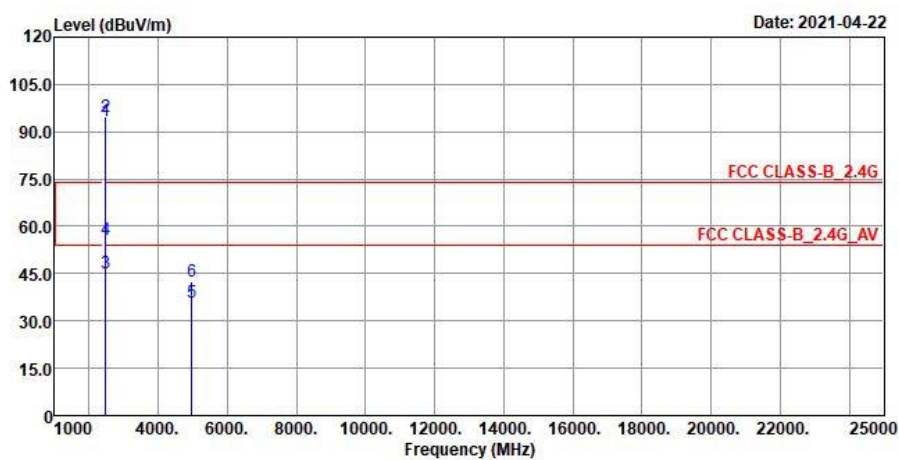
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2440 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 39	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Cookie Ku

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	98.65	105.51	-6.86	-----	-----	133	166	Average
2480	99.65	106.51	-6.86	-----	-----	133	166	Peak
2483.5	45.01	51.87	-6.86	54	-8.99	133	166	Average
2483.5	56.07	62.93	-6.86	74	-17.93	133	166	Peak
4960	35.14	50.84	-15.7	54	-18.86	164	345	Average
4960	42.29	57.99	-15.7	74	-31.71	164	345	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	93.64	100.5	-6.86	-----	-----	352	215	Average
2480	94.62	101.48	-6.86	-----	-----	352	215	Peak
2483.5	44.99	51.85	-6.86	54	-9.01	352	215	Average
2483.5	55.8	62.66	-6.86	74	-18.2	352	215	Peak
4960	35.76	51.46	-15.7	54	-18.24	159	283	Average
4960	42.54	58.24	-15.7	74	-31.46	159	283	Peak

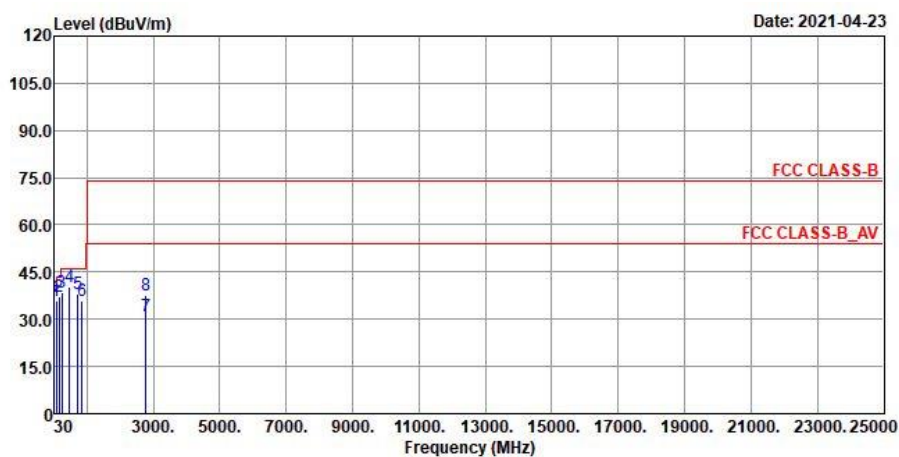
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2480 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

14.6.2 接收諧波

EUT Test Condition		Measurement Detail	
Channel	Channel 39	Frequency Range	30 MHz ~ 25 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Above 1 GHz: Peak (PK) & Average (AV) Below 1 GHz: Peak (PK) or Quasi-Peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Horizontal



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
72	35.97	51.17	-15.2	40	-4.03	265	3	QP
166.77	37.28	50.59	-13.31	43.5	-6.22	114	103	QP
240	38.63	52.74	-14.11	46	-7.37	106	43	QP
480	40.26	46.4	-6.14	46	-5.74	207	199	QP
720	38.25	39.18	-0.93	46	-7.75	159	67	QP
852.56	35.92	34.45	1.47	46	-10.08	174	145	QP
2768.87	30.89	52.37	-21.48	54	-23.11	162	341	Average
2768.87	37.72	59.2	-21.48	74	-36.28	162	341	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
74.62	33.29	49.17	-15.88	40	-6.71	178	12	QP
99.84	36.38	52.73	-16.35	43.5	-7.12	171	189	QP
240	30.33	44.44	-14.11	46	-15.67	195	227	QP
480	40.52	46.66	-6.14	46	-5.48	106	299	QP
720	34.55	35.48	-0.93	46	-11.45	163	241	QP
960	35.95	32.53	3.42	46	-10.05	100	237	QP
1697.91	28.11	53.49	-25.38	54	-25.89	116	231	Average
1697.91	41.31	66.69	-25.38	74	-32.69	116	231	Peak

Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. The other emission levels were very low against the limit.

14.6.3 其它不必要之訊號

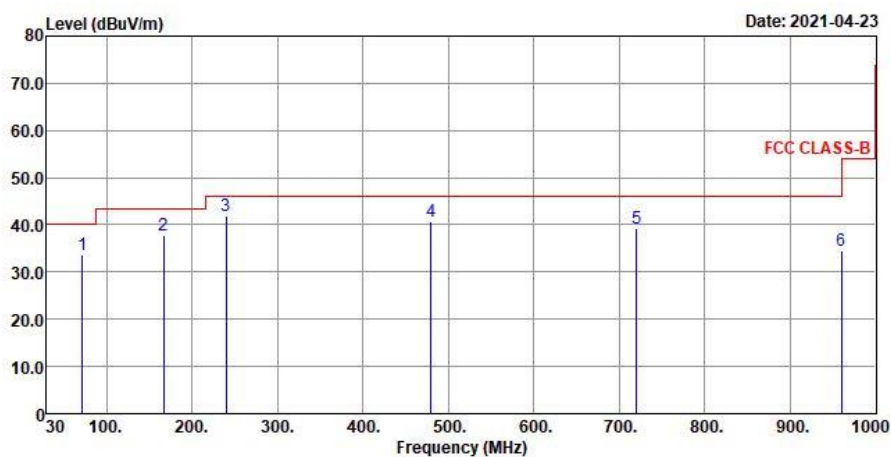
9 kHz ~ 30 MHz Data:

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

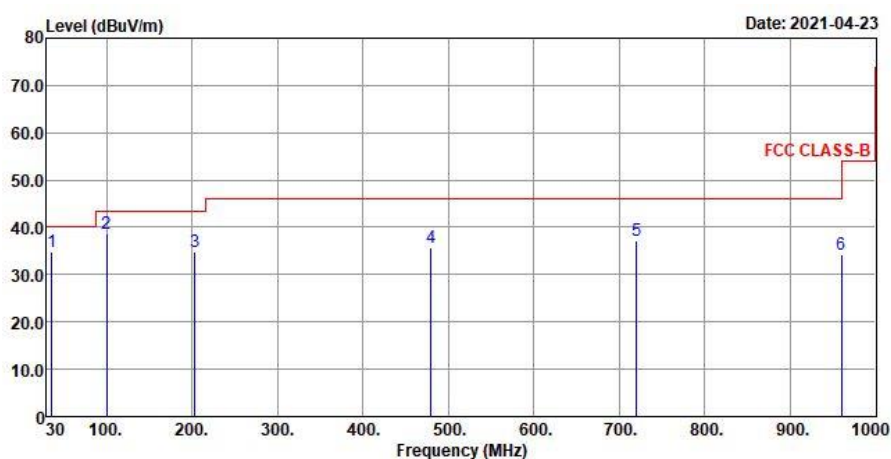
30 MHz ~ 1 GHz Data:

EUT Test Condition		Measurement Detail	
Channel	Channel 39	Frequency Range	30 MHz ~ 1 GHz
Input Power	110 Vac, 60 Hz (system)	Detector Function	Peak (PK) or Quasi-Peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

Horizontal



Vertical

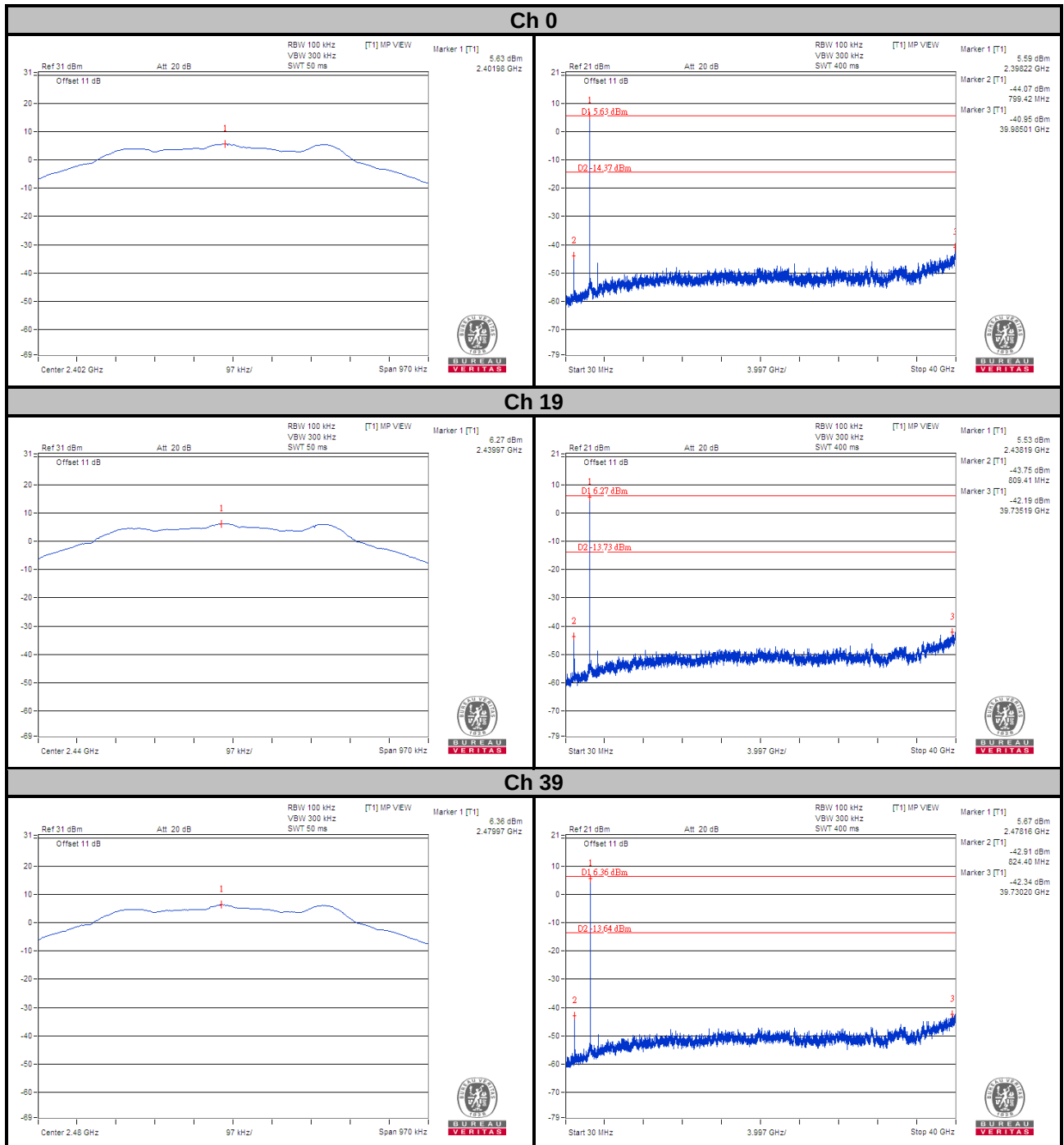


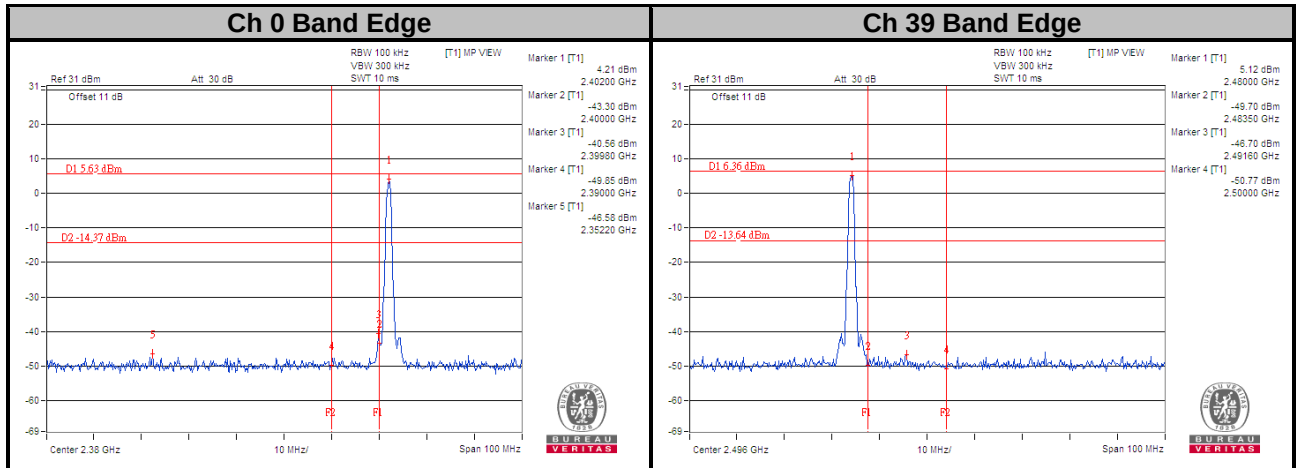
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
71.71	33.73	48.93	-15.2	40	-6.27	113	227	QP
166.77	37.84	51.15	-13.31	43.5	-5.66	139	148	QP
240	41.98	56.05	-14.07	46	-4.02	156	67	QP
480	40.8	46.94	-6.14	46	-5.2	138	332	QP
720	39.38	40.31	-0.93	46	-6.62	116	78	QP
960	34.58	31.23	3.35	46	-11.42	104	131	QP
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
35.82	34.86	47.97	-13.11	40	-5.14	139	315	QP
99.84	38.62	54.97	-16.35	43.5	-4.88	144	173	QP
203.63	34.69	50.59	-15.9	43.5	-8.81	122	37	QP
480	35.81	41.95	-6.14	46	-10.19	197	83	QP
720	37.23	38.16	-0.93	46	-8.77	145	123	QP
960	34.13	31.1	3.03	46	-11.87	164	153	QP

Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. The other emission levels were very low against the limit.

14.7 帶外發射之量測 (傳導)





14.8 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

15 6 dB 頻寬之要求

15.1 適用標準

請見本報告 3.1 節第(5)項的規定。

15.2 量測方法

- 將待測物輸出經由衰減器接到頻譜分析儀上。
- 設定待測物處於連續發射狀態。
- 計算由最大輸出功率峰值減 6 dB 的最大頻率範圍。

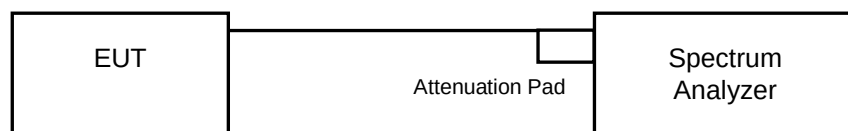
15.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 207 Hz, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

15.4 測試配置

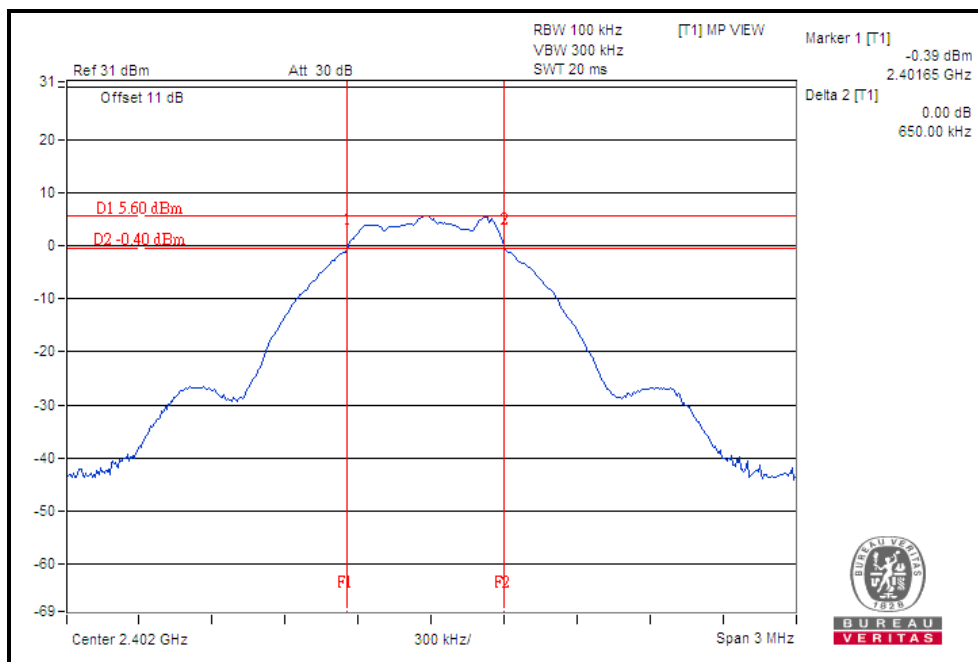


15.5 量測結果

操作模式	發射	測試日期	110 年 05 月 12 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	Jisyong Wang		

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	0.65	0.5	Pass
19	2440	0.65	0.5	Pass
39	2480	0.65	0.5	Pass

**此測試圖僅放測試結果最差的頻道。



15.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

16 峰值傳導輸出功率之量測

16.1 適用標準

請見本報告 3.1 節第(4)及(6)項的規定。

16.2 量測方法

- 將待測物輸出經由衰減器接到功率計上。
- 設定待測物處於連續發射狀態。
- 計算其輸出功率峰值。

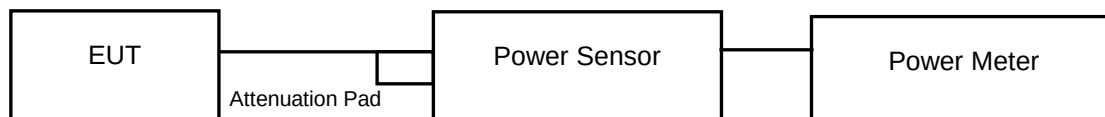
16.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Power Meter Anritsu	ML2495A	1232002	Dec. 09, 2020	Dec. 08, 2021
Power Sensor Anritsu	MA2411B	1207325	Dec. 09, 2020	Dec. 08, 2021

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 1.393 dB, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k=2$.

16.4 測試配置



16.5 量測結果

操作模式	發射	測試日期	110 年 05 月 12 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	Jisyong Wang		

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
0	2402	3.589	5.55	3.459	5.39	30	Pass
19	2440	4.742	6.76	4.529	6.56	30	Pass
39	2480	4.853	6.86	4.613	6.64	30	Pass

16.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

17 功率頻譜密度之量測

17.1 適用標準

請見本報告 3.1 節第(7)項的規定。

17.2 量測方法

- 將待測物之天線埠經由適當之衰減直接連至測試儀器。
- 設定解析頻寬為 3 kHz，視訊頻寬為 10 kHz，掃描時間為 auto。
- 掃描頻寬設於足夠觀察發射機所產生的主頻信號，並找到最大的峰值準位。
- 其峰值位準必須不大於 8 dBm / per 3kHz。

17.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 207 Hz, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

17.4 測試配置

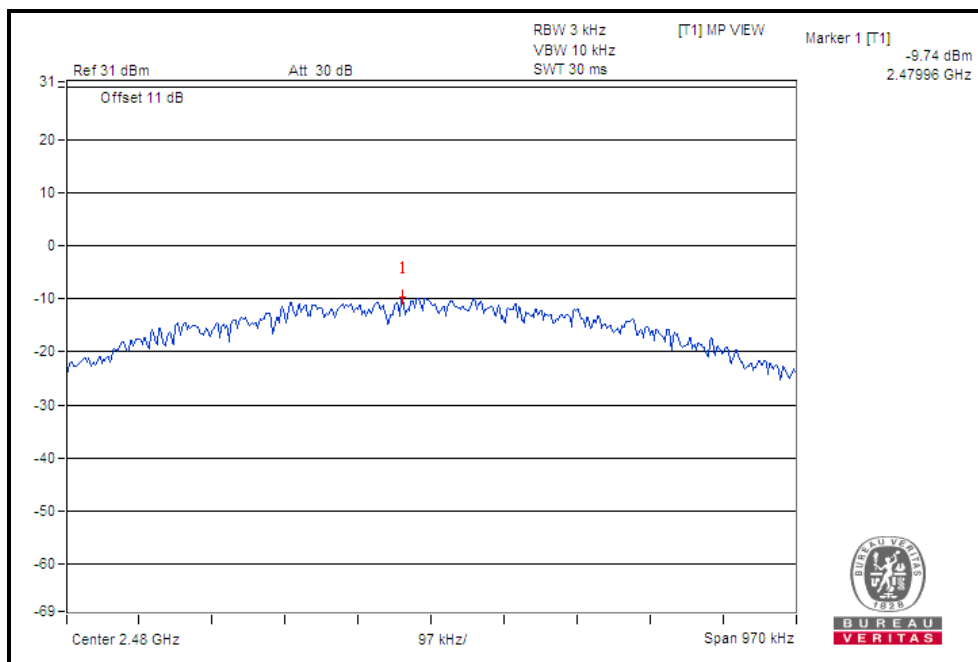


17.5 量測結果

操作模式	發射	測試日期	110 年 05 月 12 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	Jisyong Wang		

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	2402	-10.29	8	Pass
19	2440	-9.81	8	Pass
39	2480	-9.74	8	Pass

**此測試圖僅放測試結果最差的頻道。



17.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

18 電源線傳導干擾之量測

18.1 適用標準

請見本報告 3.1 節第(1)項的規定。

18.2 量測方法

將待測物置於 0.8 米高的非金屬桌面，使其操作在工作狀態，待測物電源線接至電源線阻抗穩定網路上，從測試接收機記錄頻率由 0.15 MHz 至 30 MHz 之間之電源線傳導放射強度。

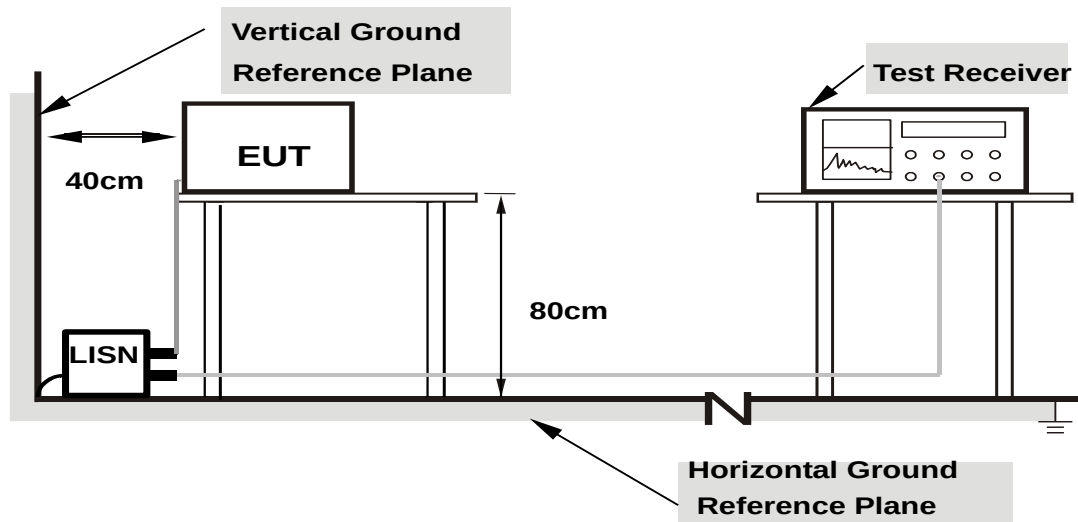
18.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESR3	102783	Dec. 21, 2020	Dec. 20, 2021
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 04, 2020	Sep. 03, 2021
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 28, 2021	Jan. 27, 2022
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 18, 2020	Aug. 17, 2021
Software ADT	BV ADT_Conf_ V7.3.7.4	NA	NA	NA

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 2 (Conduction 2).
3. The VCCI Site Registration No. is C-12047.
4. The measurement uncertainty is 2.79 dB, which is calculated as per the document CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

18.4 測試配置



Note: 1.Support units were connected to second LISN.
 2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

18.5 干擾值之計算

餘裕度 Margin(dB)= 結果值 Emission level (dBuV)-限制值 Limit value (dBuV)

電源傳導干擾電壓之計算公式如下

結果值 Emission level (dBuV)=校正因子 Correction Factor (dB)+儀器讀值 Reading value (dBuV)

其中校正因子 Correction Factor (dB)為：

饋線損失+電源阻抗模擬網路損失

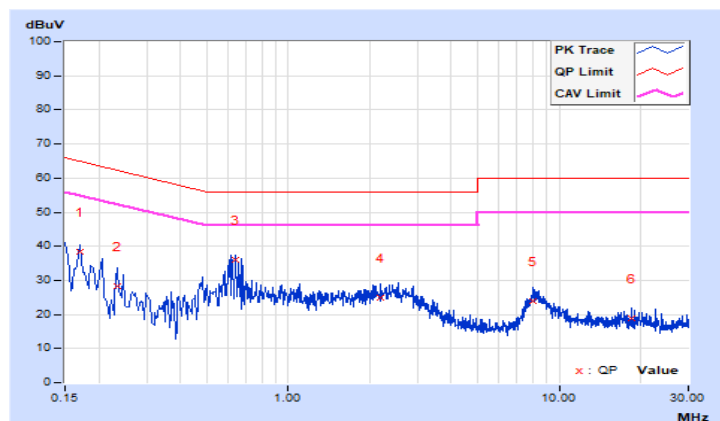
18.6 量測結果

量測頻率範圍	150kHz ~ 30MHz	檢測器與頻寬	準峰值 (QP) / 平均值 (AV), 9kHz
量測電壓值	110Vac, 60Hz (system)	量測場地溫濕度	23°C, 66%RH
測試者	Cookie Ku	測試日期	2021/4/22
測試模式	Mode 1		

量測電源端點：火線 (L1)										
No	頻率 (MHz)	修正因子 (dB)	量測讀值 (dBuV)		干擾值 (dBuV)		限制值 (dBuV)		餘裕 (dB)	
			準峰值	平均值	準峰值	平均值	準峰值	平均值	準峰值	平均值
1	0.17000	10.07	28.28	15.34	38.35	25.41	64.96	54.96	-26.61	-29.55
2	0.23400	10.08	18.16	7.55	28.24	17.63	62.31	52.31	-34.07	-34.68
3	0.64200	10.11	26.07	13.45	36.18	23.56	56.00	46.00	-19.82	-22.44
4	2.18200	10.17	14.58	6.87	24.75	17.04	56.00	46.00	-31.25	-28.96
5	7.99800	10.29	13.51	4.22	23.80	14.51	60.00	50.00	-36.20	-35.49
6	18.51400	10.43	8.36	0.55	18.79	10.98	60.00	50.00	-41.21	-39.02

附註：

1. 其它頻率的干擾值對限制值而言非常低，所以未記錄。
2. 餘裕值(dB) = 干擾值(dBuV) - 限制值(dBuV)
3. 干擾值(dBuV) = 修正因子(dB) + 量測讀值(dBuV)

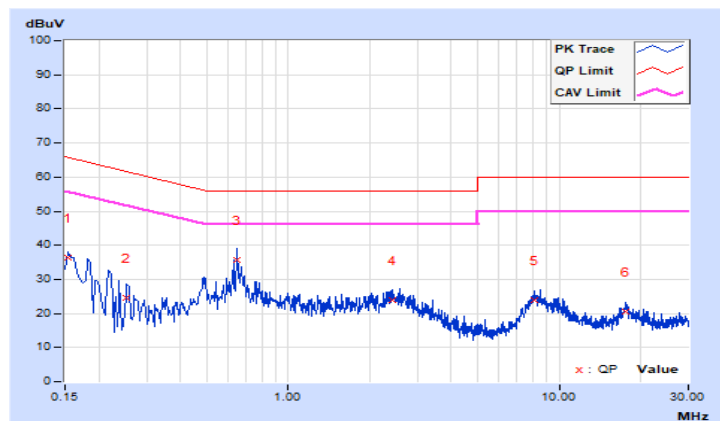


量測頻率範圍	150kHz ~ 30MHz	檢測器與頻寬	準峰值 (QP) / 平均值 (AV), 9kHz
量測電壓值	110Vac, 60Hz (system)	量測場地溫濕度	23°C, 66%RH
測試者	Cookie Ku	測試日期	2021/4/22
測試模式	Mode 1		

量測電源端點：中性線 (N)										
No	頻率 (MHz)	修正因子 (dB)	量測讀值 (dBuV)		干擾值 (dBuV)		限制值 (dBuV)		餘裕 (dB)	
			準峰值	平均值	準峰值	平均值	準峰值	平均值	準峰值	平均值
1	0.15400	10.08	26.30	19.84	36.38	29.92	65.78	55.78	-29.40	-25.86
2	0.25400	10.09	14.65	5.63	24.74	15.72	61.63	51.63	-36.89	-35.91
3	0.64600	10.12	25.47	10.99	35.59	21.11	56.00	46.00	-20.41	-24.89
4	2.42200	10.19	13.58	4.70	23.77	14.89	56.00	46.00	-32.23	-31.11
5	8.12600	10.36	13.38	4.22	23.74	14.58	60.00	50.00	-36.26	-35.42
6	17.69000	10.59	9.85	1.13	20.44	11.72	60.00	50.00	-39.56	-38.28

附註：

1. 其它頻率的干擾值對限制值而言非常低，所以未記錄。
2. 餘裕值(dB) = 干擾值(dBuV) - 限制值(dBuV)
3. 干擾值(dBuV) = 修正因子(dB) + 量測讀值(dBuV)



18.7 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

19 電波暴露量之評估

19.1 適用標準

請見本報告 3.1 節第(8)&(16)&(25)項的規定。

19.2 評估方法

a) 以 6.5、10.5、16.5 節所測得的最大輸出功率值再加上待測物天線的增益值(Gain)帶入下面公式換算出待測物所輻射的功率密度。

$$b) P_d = (P_{out} * G) / (4 * \pi * r^2)$$

where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

19.3 評估結果

Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
2412 ~ 2462 WLAN	16.89	3	20	0.019	1	Pass
2402 ~ 2480 Bluetooth	6.85	3	20	0.002	1	Pass

Note: The WLAN and Bluetooth cannot transmit simultaneously.

20 待測物測試設置照片

請參照 BV CPS 報告編號：RTBFRX-WTW-P21040185_TSup

21 待測物照片

請參照 BV CPS 報告編號：BFRX-WTW-P21040185

22 檢測實驗室基本資料

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林口 EMC / RF 實驗室：

Tel: 886-2-26052180

Fax: 886-2-26051924

新竹 EMC / RF 及通訊實驗室：

Tel: 886-3-6668565

Fax: 886-3-6668323

華亞 EMC / RF / Safety 實驗室：

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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