

低功率射頻電機測試報告

報告編號:

RT190923C21

申請者

Fossil Group, Inc.

產品名稱

Smart Watch/智慧型手錶

型號

DW10E2

製造廠商

Fossil Group, Inc.

商標或廠牌

EMPORIO ARMANI

該產品樣品試驗

國家通訊傳播委員會低功率射頻電機技術規範

依據之試驗標準

107 年 1 月修訂

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

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報告簽署人簽章:



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報告發行紀錄

Issue No.	Description	Date Issued
RT190923C21	Original release	108 年 10 月 16 日

證 明 書

發行日期：108 年 10 月 16 日

產 品 名 稱：Smart Watch/智慧型手錶
商 標：EMPORIO ARMANI
型 號：DW10E2
申 請 者：Fossil Group, Inc.
量 測 規 範：低功率射頻電機技術規範 LP0002
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：DW10E2)，收件日期 108 年 09 月 23 日，於 108 年 09 月 26 日至 108 年 10 月 13 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“低功率射頻電機技術規範”、“低功率電波輻射性電機管理辦法”及“電信管制射頻器材審驗辦法”製作測試結果報告。

特 此 證 明 ！

報告製作者：



陳美如 / 專員

， 日 期： 108 年 10 月 16 日

審 核 者：



邱碧民 / 專案工程師

， 日 期： 108 年 10 月 16 日

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 低功率射頻電機量測記錄表

申請廠商: Fossil Group, Inc.

製造廠商: Fossil Group, Inc.

申請廠商地址: 901 S. Central Expressway, Richardson, TX 75080, USA

產品名稱: Smart Watch/智慧型手錶

廠牌: EMPORIO ARMANI

型號: DW10E2

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: 低功率射頻電機技術規範 LP0002

ANSI C63.10-2013

KDB 558074

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	低功率射頻電機技術規範 3.10.1.5 節	合格
2	電源線傳導干擾	低功率射頻電機技術規範 2.3 節	合格
3	6 dB 頻寬	低功率射頻電機技術規範 3.10.1.6 節	合格
4	峰值傳導輸出功率	低功率射頻電機技術規範 3.10.1.2 節	合格
5	功率頻譜密度	低功率射頻電機技術規範 3.10.1.6 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	低功率射頻電機技術規範 3.10.1.5 節	合格
2	電源線傳導干擾	低功率射頻電機技術規範 2.3 節	合格
3	20 dB 頻寬	低功率射頻電機技術規範 3.10.1.6 節	Note
4	峰值傳導輸出功率	低功率射頻電機技術規範 3.10.1.2 節	合格
5	跳頻頻道數之量測	低功率射頻電機技術規範 3.10.1.6 節	合格
6	跳頻頻道間隔之量測	低功率射頻電機技術規範 3.10.1.6 節	合格
7	每一頻道停留時間之量測	低功率射頻電機技術規範 3.10.1.6 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	低功率射頻電機技術規範 3.10.1.5 節	合格
2	電源線傳導干擾	低功率射頻電機技術規範 2.3 節	合格
3	6 dB 頻寬	低功率射頻電機技術規範 3.10.1.6 節	合格
4	峰值傳導輸出功率	低功率射頻電機技術規範 3.10.1.2 節	合格
5	功率頻譜密度	低功率射頻電機技術規範 3.10.1.6 節	合格

NFC 頻段概要

項次	量測項目	規 範	量測結果判定
1	主波發射	低功率射頻電機技術規範 3.2.1.1 節	合格
1	不必要之發射	低功率射頻電機技術規範 2.8 節, 3.2.1.2 節	合格
2	電源線傳導干擾	低功率射頻電機技術規範 2.3 節	合格
3	天線之要求	低功率射頻電機技術規範 2.2 節	合格
4	頻率容許差度	低功率射頻電機技術規範 3.2.1.3 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	低功率射頻電機技術規範第 5.20.2 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：	Smart Watch/智慧型手錶	
型號：	DW10E2	
額定電源：	5 Vdc (adapter or host equipment) 3.85 Vdc (battery)	
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
	NFC	ASK
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 72.2 Mbps
	Bluetooth EDR	1/ 2/ 3 Mbps
	Bluetooth LE	1 Mbps
	NFC	Type A: 106 kbit/s Type B: 106 kbit/s Type F: 212 kbit/s, 424 kbit/s
載波頻率：	Wireless LAN	2412 ~ 2472 MHz
	Bluetooth EDR	2402 ~ 2480 MHz
	Bluetooth LE	2402 ~ 2480 MHz
	NFC	13.56 MHz
頻道數：	Wireless LAN	802.11b, 802.11g, 802.11n (HT20): 13
	Bluetooth EDR	79
	Bluetooth LE	40
	NFC	1
發射功率：	Wireless LAN	802.11b: 18.13 dBm 802.11g: 19.12 dBm 802.11n (HT20): 19.17 dBm
	Bluetooth EDR	11.46 dBm
	Bluetooth LE	2.59 dBm
	NFC	58.47 dBuV/m (於 3 公尺距離) (QP)
發射功率 (電場強度)：	NFC	58.47 dBuV/m (於 3 公尺距離) (QP)
天線種類：	見註 2	
電源線類別：	N/A	
信號線類別：	見註 3	
配件：	見註 3	

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

2. 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 ~ 2472	Loop	N/A	N/A	N/A	-5.50
Bluetooth	2402 ~ 2480				N/A	-5.50
NFC	13.56	Loop	N/A	N/A	N/A	-

3. 待測設備主要內裝元件及配件如下。

配件	廠牌	型號	規格
Battery	APACK	APP00296	3.85 Vdc, 310 mAh
CPU	Qualcomm	APQ8009W	575 Pin
LCD Panel	N/A	UL128BLX01.0	1.28"
eMMC	N/A	N/A	CMP=1GB RAM/ 8GB Flash (ePOP)
Main Board	MULTEK	GA-575	--
BT/WLAN Module	Qualcomm	WCN3620	--
Charging Dock	Simula Technology Inc.	CB846E-6040-102	Voltage Rating: 5V

4. 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 ~ 2472 MHz		
1 GHz 以上量測	802.11b: Ch 1, 6, 11, 12, 13 802.11g: Ch 1, 6, 11, 12, 13 802.11n (HT20): Ch 1, 6, 11, 12, 13	802.11n (HT20): Ch 13
其它不必要之訊號	802.11n (HT20): Ch 13	802.11n (HT20): Ch 13
2402 ~ 2480 MHz (Bluetooth EDR)		
1 GHz 以上量測	GFSK: Ch 0, 39, 78 8DPSK: Ch 0, 39, 78	8DPSK: Ch 78
其它不必要之訊號	8DPSK: Ch 78	8DPSK: Ch 78
2402 ~ 2480 MHz (Bluetooth LE)		
1 GHz 以上量測	Ch 0, 19, 39	Ch 0
其它不必要之訊號	Ch 0	Ch 0
NFC		
主波發射之量測	Ch 1	Ch 1
不必要發射之量測	Ch 1	Ch 1

5. 此報告中傳輸模式，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。

6. 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。

7. 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。

8. NFC傳輸模式Type A / Type B / Type F皆經過預測試，其中以Type A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。

9. 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4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1~4評估完整測試。

模式	測試狀態
1	WLAN (2.4G) + USB Cable (with charging dock) + Adapter
2	BT + USB Cable (with charging dock) + Adapter
3	BT LE + USB Cable (with charging dock) + Adapter
4	NFC + USB Cable (with charging dock) + Adapter

10. 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，其各擺放最大干擾值之位置如下表，故以此擺放方式進行最終量測，並將測試結果紀錄。

	WLAN 2.4 GHz	Bluetooth EDR	Bluetooth LE	NFC
擺放方式	垂直	垂直	垂直	垂直

11. Duty cycle of test signal.

2.4 GHz 频段

802.11b: Duty cycle = $8.212/8.418 = 0.976$, Duty factor = $10 * \log(1/0.976) = 0.11$

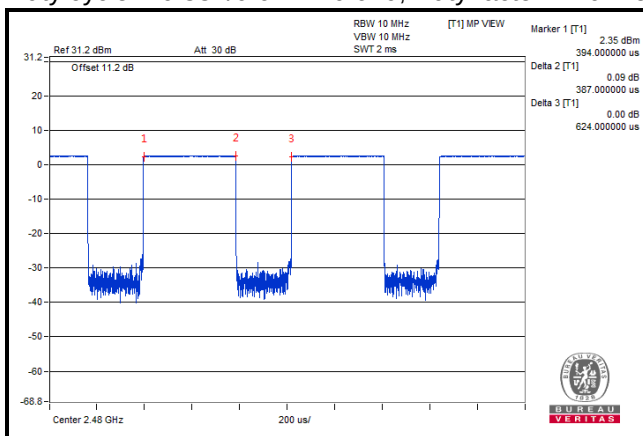
802.11g: Duty cycle = $1.364/1.570 = 0.869$, Duty factor = $10 * \log(1/0.869) = 0.61$

802.11n (HT20): Duty cycle = $1.275/1.475 = 0.864$, Duty factor = $10 * \log(1/0.864) = 0.63$



BT LE 频段

Duty cycle = $0.387/0.624 = 0.620$, Duty factor = $10 * \log(1/0.620) = 2.07$



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	08	2447
02	2417	09	2452
03	2422	10	2457
04	2427	11	2462
05	2432	12	2467
06	2437	13	2472
07	2442		

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

NFC 頻段:

頻道	對應頻率 (MHz)
1	13.56

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
1	Adapter	SALCOMP	TC U250	N/A	N/A

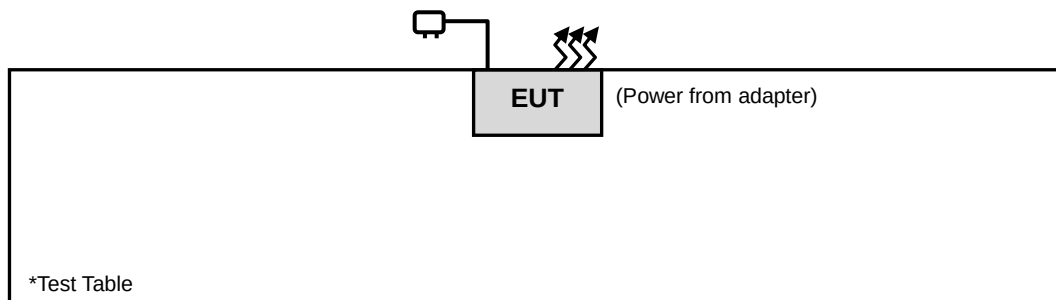
No.	Signal Cable Description Of The Above Support Units
1	1m shielded cable

NOTE:

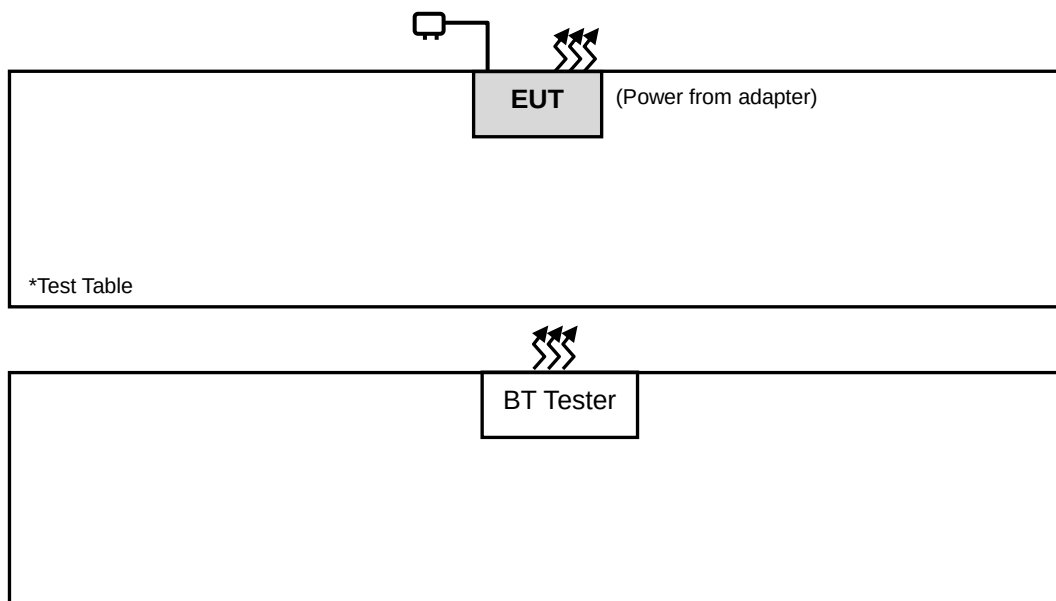
1. All power cords of the above support units are non shielded (1.8m).

2.3 測試架構圖

<WLAN & Bluetooth LE & NFC>



<Bluetooth EDR>



3 適用規範

3.1 規範要求

► Bluetooth LE 頻段部分：

(1) 傳導之規定

依據國家通訊傳播委員會低功率射頻電機技術規範之 2.3 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電機技術規範 3.10.1.5 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 3.10.1.2(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 2.7 禁用頻段之輻射發射，應符合 2.8 之規定。

頻率(兆赫)	電場強度(微伏/公尺)	測距(公尺)
0.009 - 0.490 (含)	2,400/頻率(千赫)	300
0.490 (不含) - 1.705 (含)	24,000/頻率(千赫)	30
1.705 (不含) - 30 (不含)	30	30
30 (含) - 88 (含)	100	3
88 (不含) - 216 (含)	150	3
216 (不含) - 960 (含)	200	3
960 (不含)以上	500	3

(3) 天線之規定

天線規格不受第 2.2 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電機技術規範 3.10.1 節(3)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 3.10.1.2 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電機技術規範 3.10.1.6 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電機技術規範 3.10.1.2 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電機技術規範 3.10.1.6 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 3.10.1.3 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電機技術規範 5.20.2 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 - 3.0	614	1.63	*100	30
3 - 30	1842/f	4.89/f	*180/f ²	30
30 - 300	27.5	0.073	1.0	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 頻段部分:

(9) 傳導之規定

依據國家通訊傳播委員會低功率射頻電機技術規範之 2.3 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電機技術規範 3.10.1.5 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 3.10.1.2(1)(C)之最大傳導輸出功率測量方式者，至少須衰減 30 dB。

在 1 GHz 以下不必要之發射，應符合 2.8 之規定。此外，落於 2.7 禁用頻段之輻射發射，應符合 2.8 之規定。

頻率(兆赫)	電場強度(微伏/公尺)	測距(公尺)
0.009 - 0.490 (含)	2,400/頻率(千赫)	300
0.490 (不含) - 1.705 (含)	24,000/頻率(千赫)	30
1.705 (不含) - 30 (不含)	30	30
30 (含) - 88 (含)	100	3
88 (不含)- 216 (含)	150	3
216 (不含)- 960 (含)	200	3
960 (不含)以上	500	3

(11) 天線之規定

天線規格不受第 2.2 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電機技術規範 3.10.1.3 節及 4.7.3 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 3.10.1.2 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= 10log(天線陣列之單元數目)+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電機技術規範 3.10.1.6 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電機技術規範 3.10.1.2 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電機技術規範 3.10.1.6 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 3.10.1.3 之方式降低功率頻譜密度限制值。

(16) 無線資訊傳輸設備必須擁有安全功能之要求

依據國家通訊傳播委員會低功率射頻電機技術規範 4.7.7.3 節之規定，無線資訊傳輸設備必須擁有安全功能，以保護未經授權之一方更改軟體。製造商應提出符合本節規定之相關證明文件或符合性聲明。

(17) 依據國家通訊傳播委員會低功率射頻電機技術規範 4.7.7.4 節之規定，製造商必須在操作於 U-NII 頻段上之數位調變系統中提供安全功能，使第三方團體無法重寫程式，使其操作於非經認證之設定。該軟體必須避免發射機操作於非經認證之頻率、輸出功率、調變形式或其他射頻參數。製造商可使用私有網路，只有經授權的用戶能下載軟體、進行軟體式電子簽章或硬體式的韌體更新，新的軟體可以被合法的載入到設備中，同時又能符合上述事項，並於應用程式中描述設備授權的方法。

(18) 依據國家通訊傳播委員會低功率射頻電機技術規範 4.7.7.5 節之規定，製造商必須確保 DFS 功能無法被無線資訊傳輸設備之操作者取消。

(19) 電波暴露量之評估

依據國家通訊傳播委員會低功率射頻電機技術規範 5.20.2 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 - 3.0	614	1.63	*100	30
3 - 30	1842/f	4.89/f	*180/f ²	30
30 - 300	27.5	0.073	1.0	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：

(20) 傳導之規定

依據國家通訊傳播委員會低功率射頻電機技術規範之 2.3 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。

(21) 帶外發射之規定

依據國家通訊傳播委員會低功率射頻電機技術規範 3.10.1.5 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 3.10.1.2(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 2.7 禁用頻段之輻射發射，應符合 2.8 之規定。

頻率(兆赫)	電場強度(微伏/公尺)	測距(公尺)
0.009 - 0.490 (含)	2,400/頻率(千赫)	300
0.490 (不含) - 1.705 (含)	24,000/頻率(千赫)	30
1.705 (不含) - 30 (不含)	30	30
30 (含) - 88 (含)	100	3
88 (不含)- 216 (含)	150	3
216 (不含)- 960 (含)	200	3
960 (不含)以上	500	3

(22) 天線之規定

天線規格不受第 2.2 節規定之限制。

(23) 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電機技術規範 3.10.1.3 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 3.10.1.2 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。

(24) 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電機技術規範 3.10.1.2 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 3.10.1.6 (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。

(25) 跳頻頻道數之量測

依據國家通訊傳播委員會低功率射頻電機技術規範 3.10.1.6 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。

(26) 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電機技術規範 3.10.1.6 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。

(27) 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電機技術規範 3.10.1.6 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。

(28) 電波暴露量之評估

依據國家通訊傳播委員會低功率射頻電機技術規範 5.20.2 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 - 3.0	614	1.63	*100	30
3 - 30	1842/f	4.89/f	*180/f ²	30
30 - 300	27.5	0.073	1.0	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。

► NFC 頻段部分：

(29) 傳導之規定

依據國家通訊傳播委員會低功率射頻電機技術規範之 2.3 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。

(30) 主波發射之規定

依據國家通訊傳播委員會低功率射頻電機技術規範 3.2.1.1 節之要求，距器材 30 公尺處之主波電場強度應小於或等於 15848 uV/m。

(31) 不必要之發射之規定

依據國家通訊傳播委員會低功率射頻電機技術規範 3.2.1.2 節之要求，應符合第 2.8 節之規定：

頻率(兆赫)	電場強度(微伏/公尺)	測距(公尺)
0.009 - 0.490 (含)	2,400/頻率(千赫)	300
0.490 (不含) - 1.705 (含)	24,000/頻率(千赫)	30
1.705 (不含) - 30 (不含)	30	30
30 (含) - 88 (含)	100	3
88 (不含) - 216 (含)	150	3
216 (不含) - 960 (含)	200	3
960 (不含)以上	500	3

(32) 頻率容許差度之規定

依據國家通訊傳播委員會低功率射頻電機技術規範 3.2.1.3 節之要求，應維持在主波頻率之 $\pm 0.01\%$ 以內。在正常供應電壓下，溫度在攝氏零下二十度至攝氏五十度間變化；及在攝氏二十度下，供應電壓在額定值之 $\pm 15\%$ 內變化時。以電池作業者，應以新電池測試，須符合第 5.18 節之規定。

(33) 天線之規定

低功率射頻電機之發射機或收發信機所使用之天線，除本規範章節中另有規定外，應為全固定、半固定式或以獨特之耦合(unique coupling)方式連接機體。製造者可設計供使用者因損壞而替換之天線，但不得設計或使用原認證以外之天線或可供引接各類電纜之標準天線插座或電氣連接頭，如：BNC、F type、N type、M type、UG type、RCA、SMA、SMB...等及其他各類工業或通訊標準接頭。

3.2 限制使用之頻帶

除本規範另有規定外，任何低功率射頻電機之主波皆不得使用下表所列各頻段之頻率；低功率射頻電機落於下表所列頻段之混附發射，其電場強度必須符合 2.8 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 = 300 Hz

802.11g 為 RBW = 1 MHz, VBW = 1 kHz

802.11n (HT20) 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 = 1 kHz

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
Test Receiver Agilent Technologies	N9038A	MY52260177	Aug. 26, 2019	Aug. 25, 2020
HORN Antenna ETS-Lindgren	3117	00143293	Nov. 25, 2018	Nov. 24, 2019
BILOG Antenna SCHWARZBECK	VULB 9168	9168-616	Nov. 27, 2018	Nov. 26, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Nov. 25, 2018	Nov. 24, 2019
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020
Bluetooth Tester	CBT	100980	Jul. 14, 2019	Jul. 13, 2020
Loop Antenna	EM-6879	269	Sep. 16, 2019	Sep. 15, 2020
Preamplifier Agilent	310N	187226	Jun. 18, 2019	Jun. 17, 2020
Preamplifier Agilent	83017A	MY39501357	Jun. 18, 2019	Jun. 17, 2020
Preamplifier EMCI	EMC 184045	980116	Oct. 12, 2018 Oct. 08, 2019	Oct. 11, 2019 Oct. 07, 2020
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC -SMS-100-SMS-120 +RFC-SMS-100-SM S-400)	Jun. 18, 2019	Jun. 17, 2020
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC -SMS-100-SMS-24)	Jun. 18, 2019	Jun. 17, 2020
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

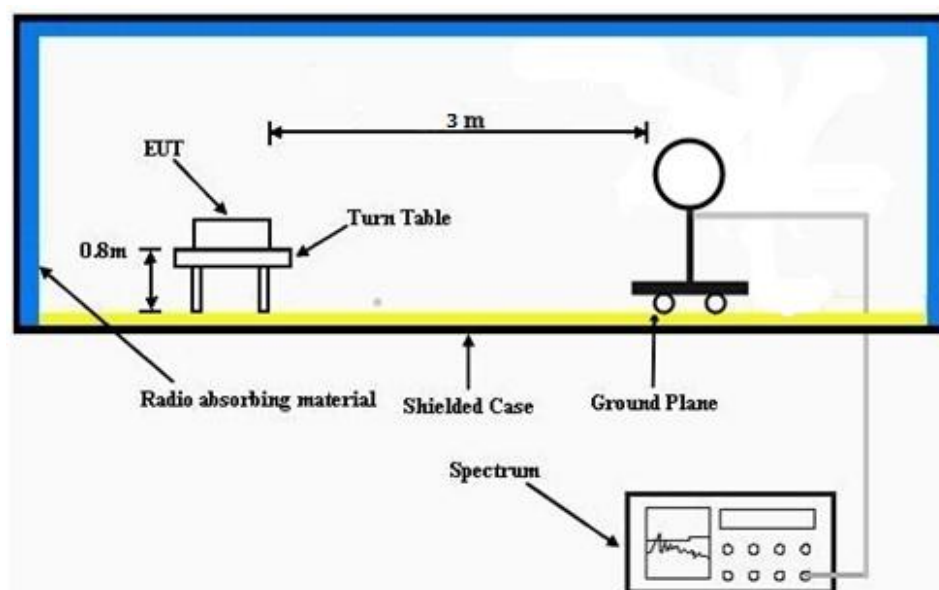
NOTE:

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 HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The FCC Designation Number is TW0011. The number will be varied with the Lab location and scope as attached.
5. The IC Site Registration No. is 7450I-1.
6. 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.

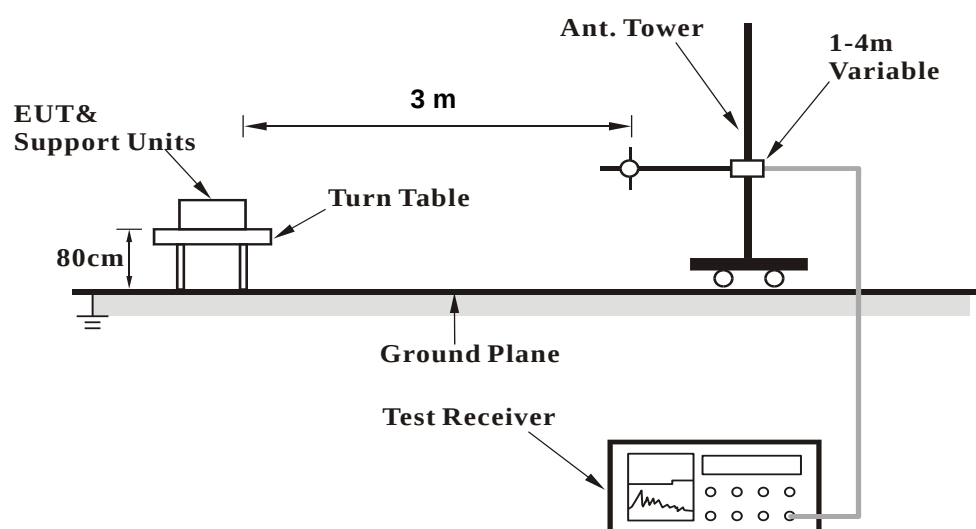
Measurement	Frequency	Uncertainty
Radiated emissions	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.94 dB

4.4 測試配置

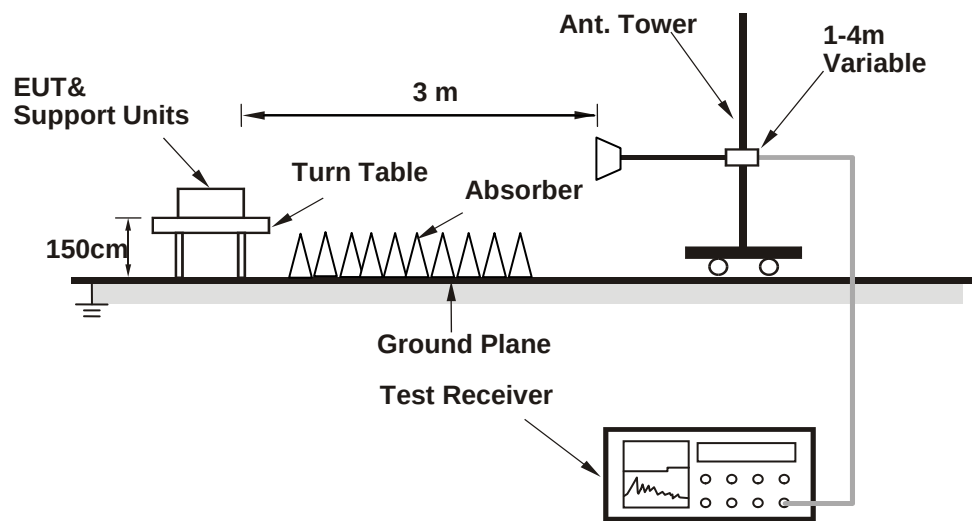
<Frequency Range 9 kHz ~ 30 MHz>



<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。

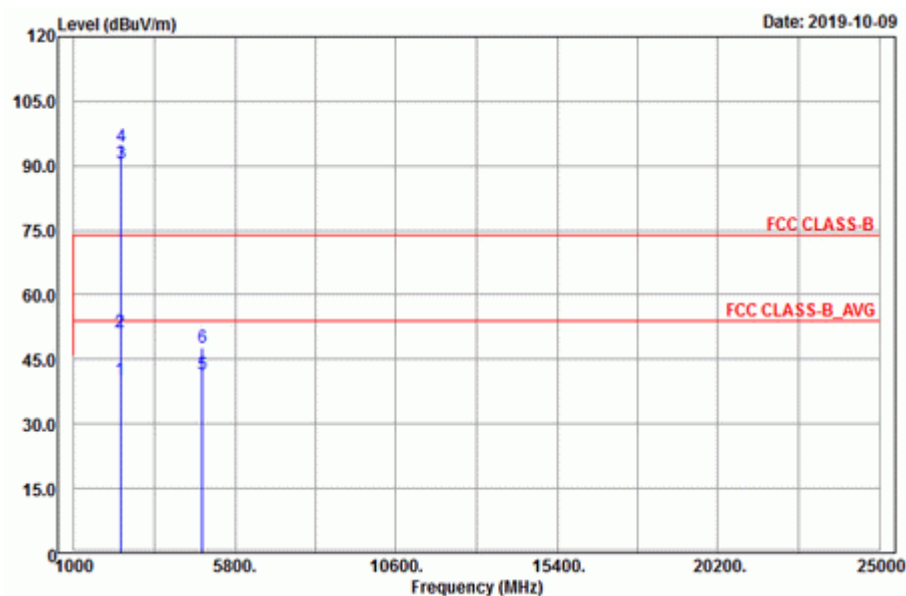
4.6 量測結果

4.6.1 發射諧波

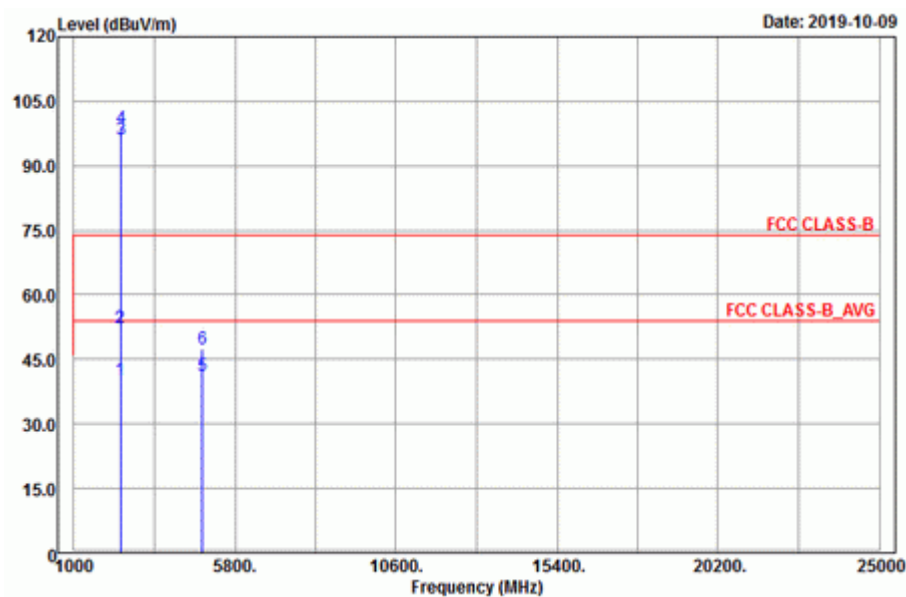
802.11b (調變技術 - DSSS)

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

Horizontal



Vertical



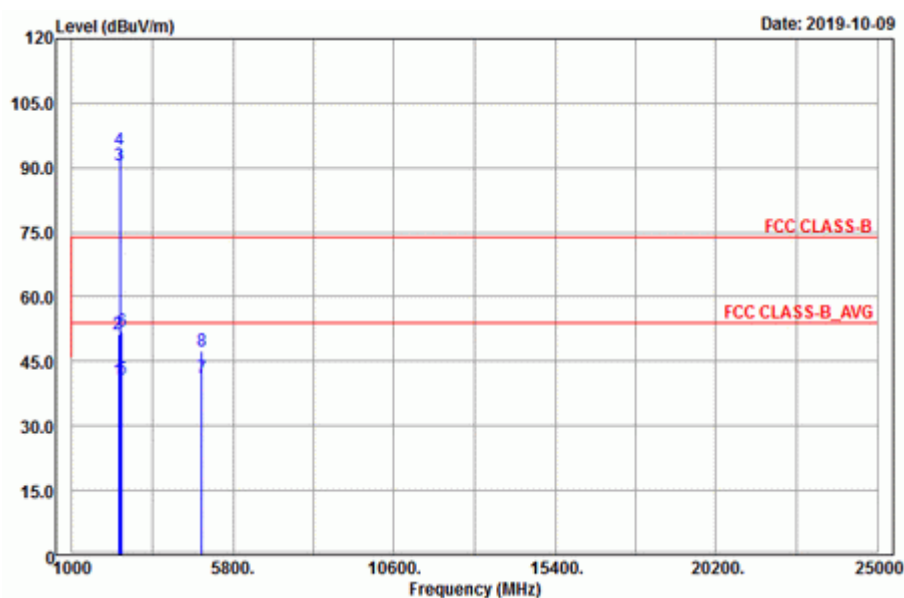
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388.93	40.19	35.7	4.49	54	-13.81	279	139	Average
2388.93	51.18	46.69	4.49	74	-22.82	279	139	Peak
2412	90.57	86.02	4.55			279	139	Average
2412	94.34	89.79	4.55			279	139	Peak
4824	41.54	31.25	10.29	54	-12.46	156	294	Average
4824	47.64	37.35	10.29	74	-26.36	156	294	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
2389.2	40.36	35.87	4.49	54	-13.64	211	360	Average
2389.2	52.35	47.86	4.49	74	-21.65	211	360	Peak
2412	95.97	91.42	4.55			211	360	Average
2412	98.87	94.32	4.55			211	360	Peak
4824	41.16	30.87	10.29	54	-12.84	145	127	Average
4824	47.51	37.22	10.29	74	-26.49	145	127	Peak

Remarks:

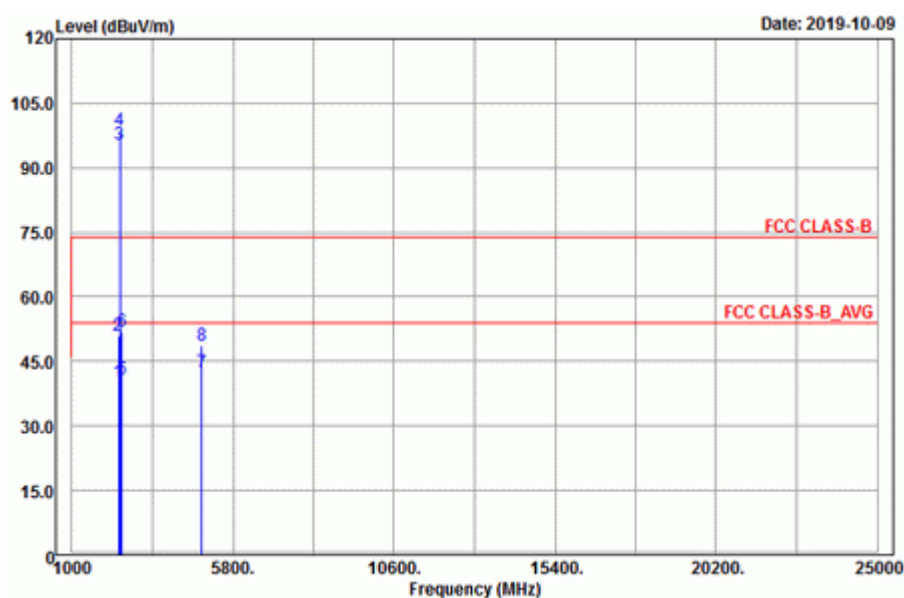
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2412 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



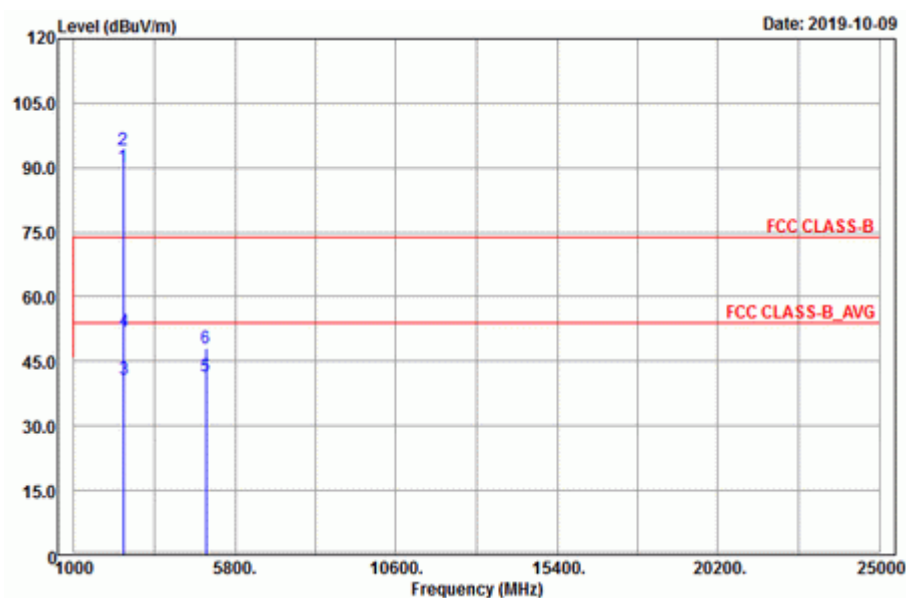
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2381.73	40.39	35.92	4.47	54	-13.61	279	139	Average
2381.73	51.48	47.01	4.47	74	-22.52	279	139	Peak
2437	90.62	86.03	4.59			279	139	Average
2437	94.26	89.67	4.59			279	139	Peak
2493.48	40.73	36.06	4.67	54	-13.27	279	139	Average
2493.48	52.12	47.45	4.67	74	-21.88	279	139	Peak
4874	41.35	31.14	10.21	54	-12.65	141	127	Average
4874	47.48	37.27	10.21	74	-26.52	141	127	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
2381.82	40.17	35.7	4.47	54	-13.83	211	360	Average
2381.82	50.96	46.49	4.47	74	-23.04	211	360	Peak
2437	95.62	91.03	4.59			211	360	Average
2437	98.78	94.19	4.59			211	360	Peak
2491.88	40.78	36.11	4.67	54	-13.22	211	360	Average
2491.88	52.1	47.43	4.67	74	-21.9	211	360	Peak
4874	42.54	32.33	10.21	54	-11.46	104	131	Average
4874	48.87	38.66	10.21	74	-25.13	104	131	Peak

Remarks:

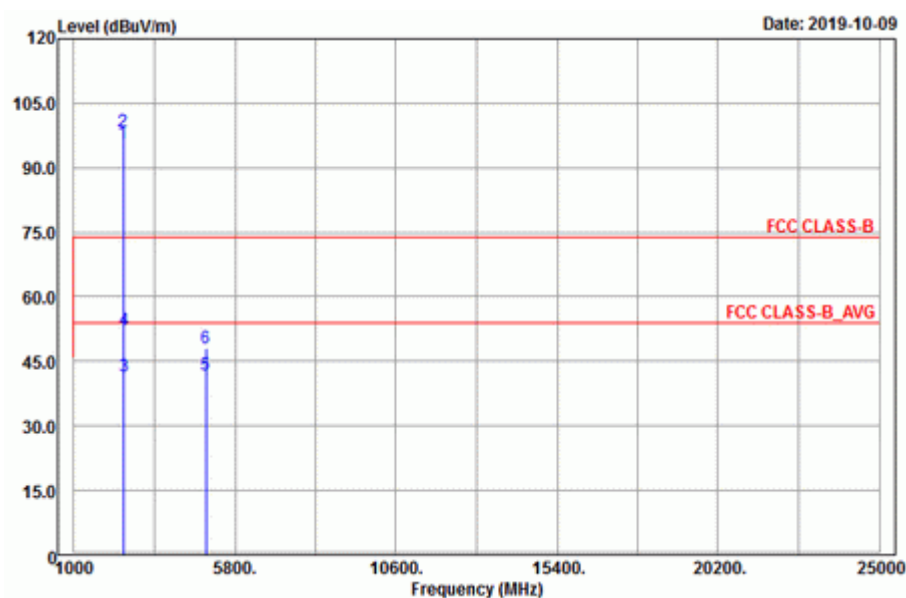
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2437 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



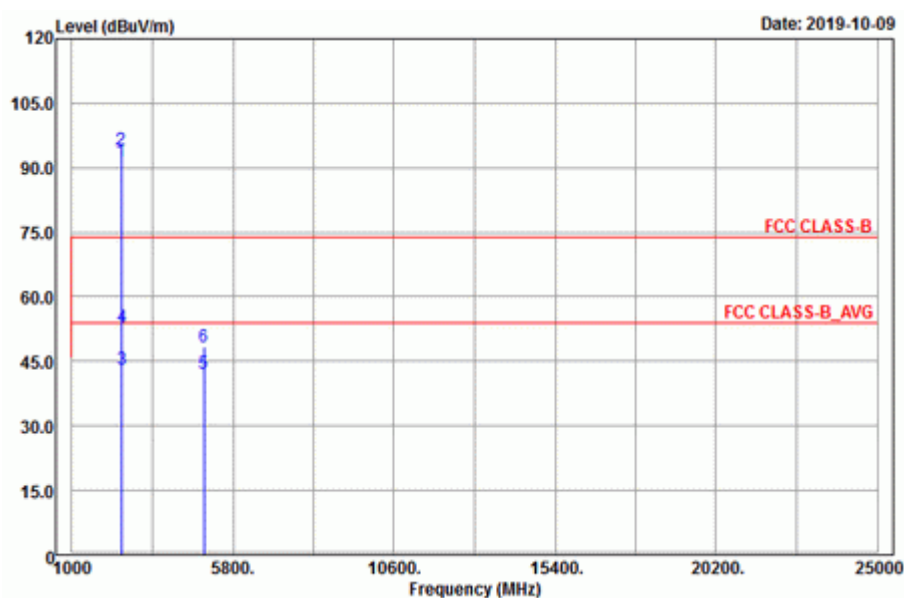
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	90.32	85.7	4.62			280	139	Average
2462	94.22	89.6	4.62			280	139	Peak
2495.44	40.71	36.04	4.67	54	-13.29	280	139	Average
2495.44	51.89	47.22	4.67	74	-22.11	280	139	Peak
4924	41.62	31.37	10.25	54	-12.38	148	110	Average
4924	47.92	37.67	10.25	74	-26.08	148	110	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	95.65	91.03	4.62			211	360	Average
2462	98.38	93.76	4.62			211	360	Peak
2483.64	41.44	36.78	4.66	54	-12.56	211	360	Average
2483.64	52.24	47.58	4.66	74	-21.76	211	360	Peak
4924	41.89	31.64	10.25	54	-12.11	106	128	Average
4924	48.11	37.86	10.25	74	-25.89	106	128	Peak

Remarks:

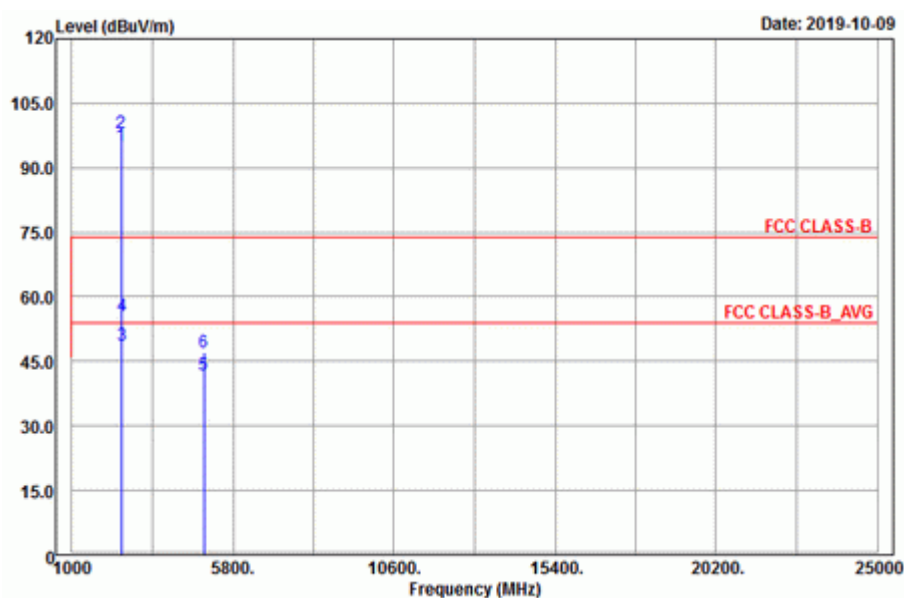
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2462 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Horizontal



Vertical



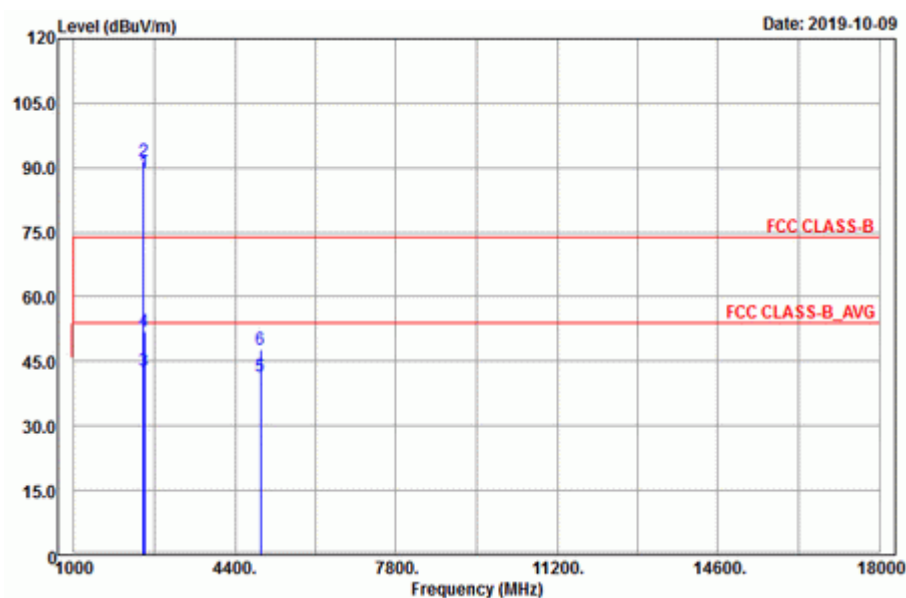
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	91.57	86.94	4.63			280	139	Average
2467	94.03	89.4	4.63			280	139	Peak
2484.44	43.2	38.54	4.66	54	-10.8	280	139	Average
2484.44	52.87	48.21	4.66	74	-21.13	280	139	Peak
4934	42.15	31.89	10.26	54	-11.85	148	55	Average
4934	48.5	38.24	10.26	74	-25.5	148	55	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
2467	95.19	90.56	4.63			211	360	Average
2467	98.2	93.57	4.63			211	360	Peak
2484.64	48.64	43.98	4.66	54	-5.36	211	360	Average
2484.64	55.49	50.83	4.66	74	-18.51	211	360	Peak
4934	41.81	31.55	10.26	54	-12.19	133	329	Average
4934	47.04	36.78	10.26	74	-26.96	133	329	Peak

Remarks:

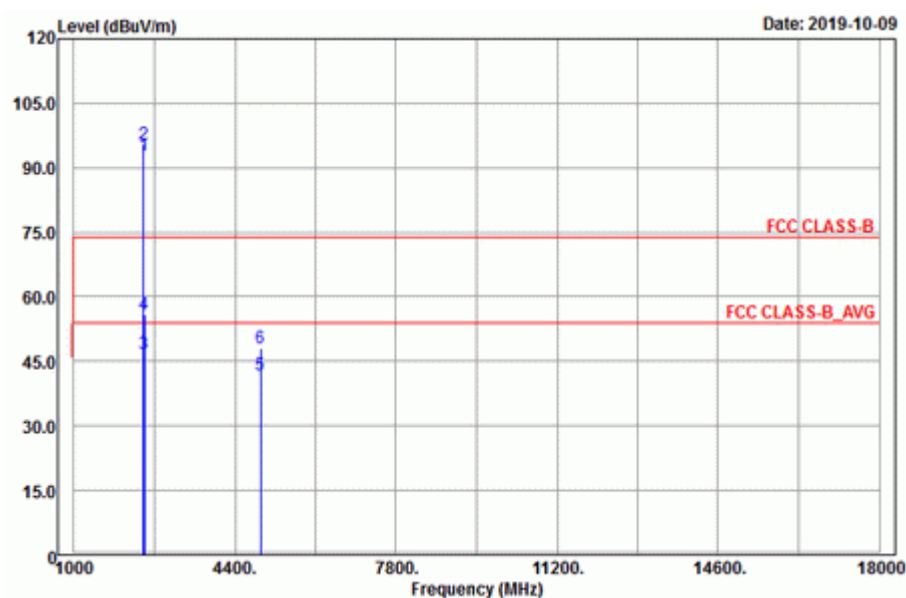
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2467 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

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
2472	88.79	84.15	4.64			280	158	Average
2472	91.45	86.81	4.64			280	158	Peak
2485.48	42.81	38.15	4.66	54	-11.19	280	158	Average
2485.48	52.06	47.4	4.66	74	-21.94	280	158	Peak
4944	41.63	31.28	10.35	54	-12.37	109	325	Average
4944	47.85	37.5	10.35	74	-26.15	109	325	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
2472	92.78	88.14	4.64			190	357	Average
2472	95.45	90.81	4.64			190	357	Peak
2486.72	46.6	41.94	4.66	54	-7.4	190	357	Average
2486.72	55.84	51.18	4.66	74	-18.16	190	357	Peak
4944	42.01	31.66	10.35	54	-11.99	146	115	Average
4944	48.21	37.86	10.35	74	-25.79	146	115	Peak

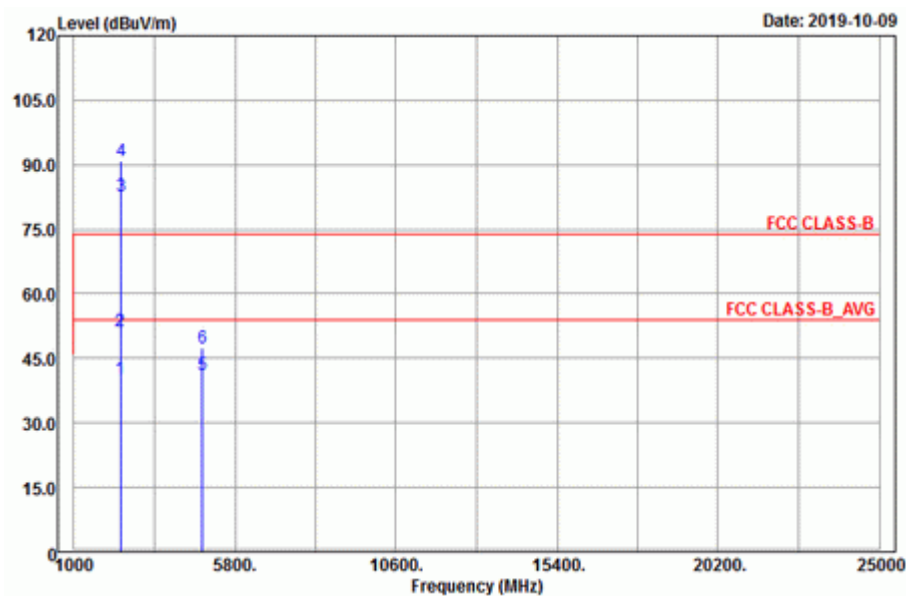
Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2472 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

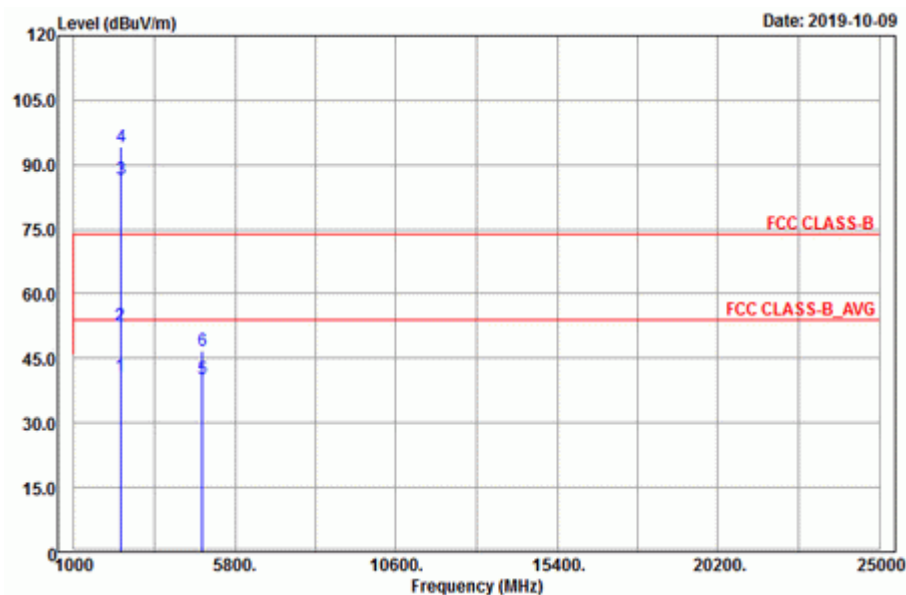
802.11g (調變技術 - OFDM)

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

Horizontal



Vertical



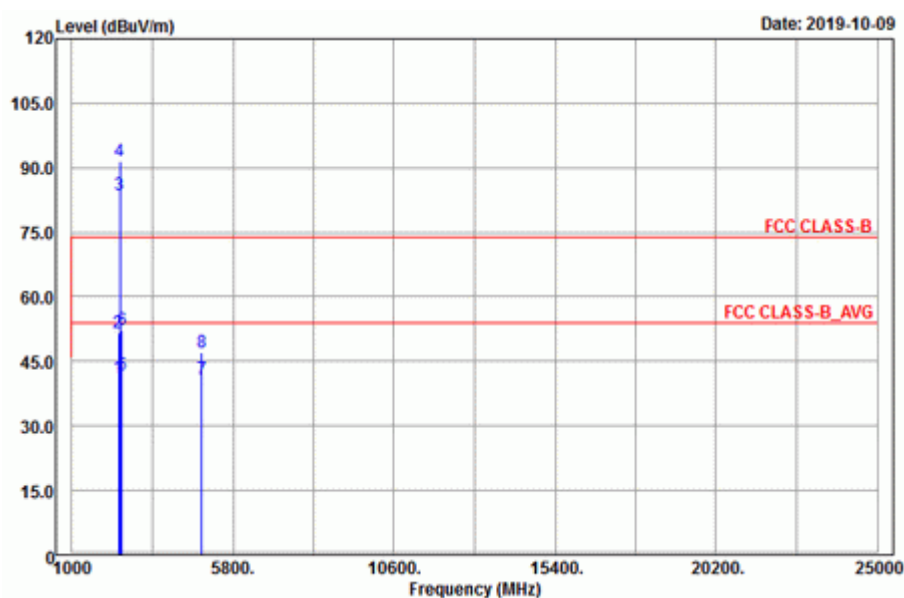
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2379.75	40.25	35.78	4.47	54	-13.75	280	139	Average
2379.75	51.42	46.95	4.47	74	-22.58	280	139	Peak
2412	82.57	78.02	4.55			280	139	Average
2412	90.81	86.26	4.55			280	139	Peak
4824	41.17	30.88	10.29	54	-12.83	190	264	Average
4824	47.54	37.25	10.29	74	-26.46	190	264	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
2389.38	40.87	36.38	4.49	54	-13.13	211	360	Average
2389.38	52.67	48.18	4.49	74	-21.33	211	360	Peak
2412	86.57	82.02	4.55			211	360	Average
2412	94.16	89.61	4.55			211	360	Peak
4824	40.36	30.07	10.29	54	-13.64	104	187	Average
4824	46.75	36.46	10.29	74	-27.25	104	187	Peak

Remarks:

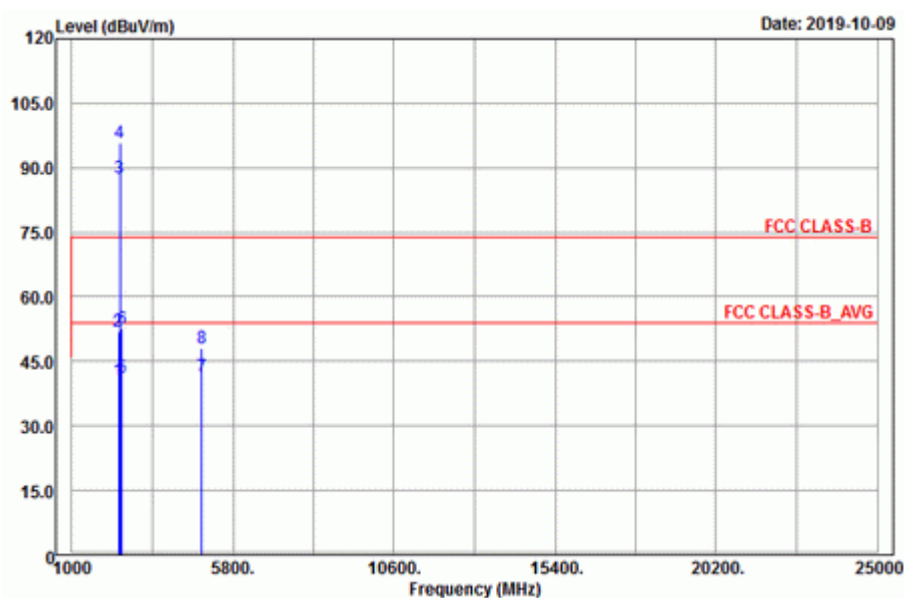
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2412 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



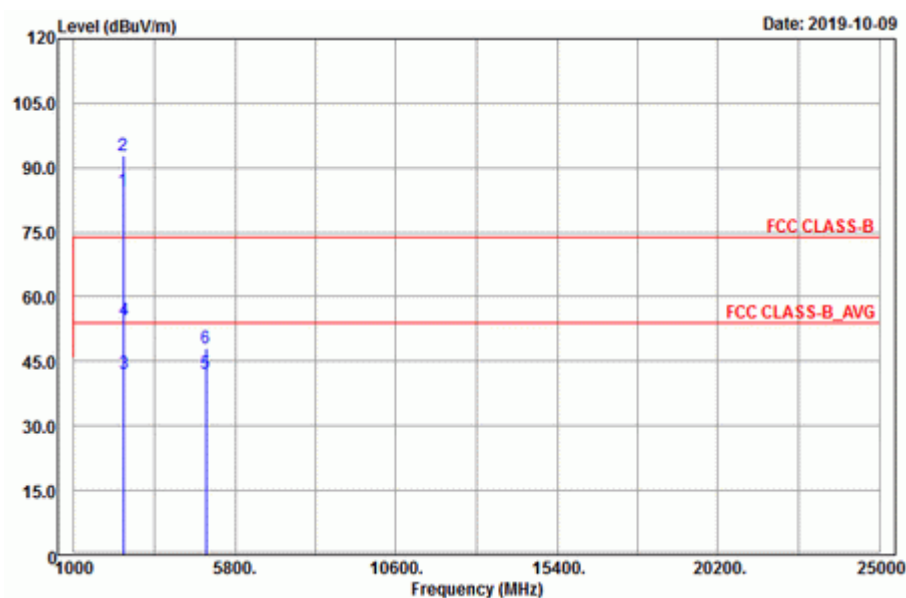
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388.39	41.17	36.68	4.49	54	-12.83	280	136	Average
2388.39	51.57	47.08	4.49	74	-22.43	280	136	Peak
2437	83.64	79.05	4.59			280	136	Average
2437	91.43	86.84	4.59			280	136	Peak
2489.16	41.79	37.11	4.68	54	-12.21	280	136	Average
2489.16	52.24	47.56	4.68	74	-21.76	280	136	Peak
4874	40.92	30.71	10.21	54	-13.08	150	63	Average
4874	47.09	36.88	10.21	74	-26.91	150	63	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
2385.15	40.5	36.03	4.47	54	-13.5	148	6	Average
2385.15	52.05	47.58	4.47	74	-21.95	148	6	Peak
2437	87.63	83.04	4.59			148	6	Average
2437	95.89	91.3	4.59			148	6	Peak
2488.28	41.34	36.66	4.68	54	-12.66	148	6	Average
2488.28	52.68	48	4.68	74	-21.32	148	6	Peak
4874	41.68	31.47	10.21	54	-12.32	150	174	Average
4874	47.93	37.72	10.21	74	-26.07	150	174	Peak

Remarks:

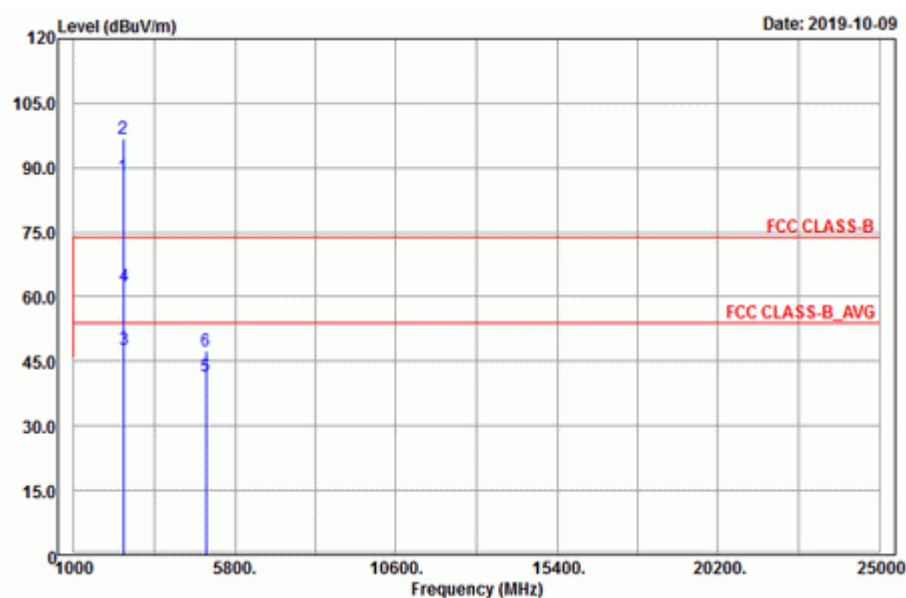
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2437 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



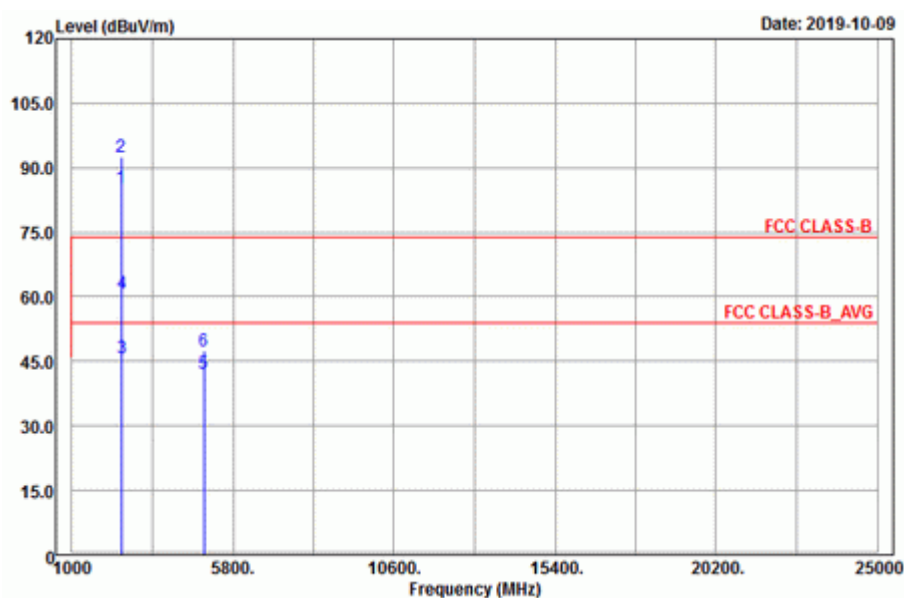
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	84.56	79.94	4.62			280	136	Average
2462	92.79	88.17	4.62			280	136	Peak
2483.84	42.09	37.43	4.66	54	-11.91	280	136	Average
2483.84	54.63	49.97	4.66	74	-19.37	280	136	Peak
4924	42.03	31.78	10.25	54	-11.97	100	360	Average
4924	48.12	37.87	10.25	74	-25.88	100	360	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	87.79	83.17	4.62			148	6	Average
2462	96.65	92.03	4.62			148	6	Peak
2483.52	47.85	43.19	4.66	54	-6.15	148	6	Average
2483.52	62.44	57.78	4.66	74	-11.56	148	6	Peak
4924	41.37	31.12	10.25	54	-12.63	136	154	Average
4924	47.56	37.31	10.25	74	-26.44	136	154	Peak

Remarks:

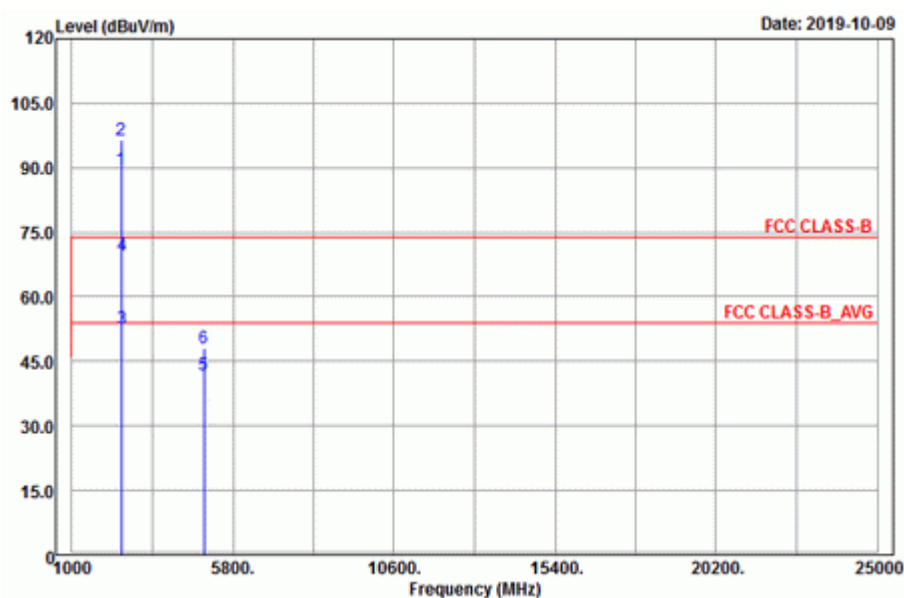
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2462 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Horizontal



Vertical



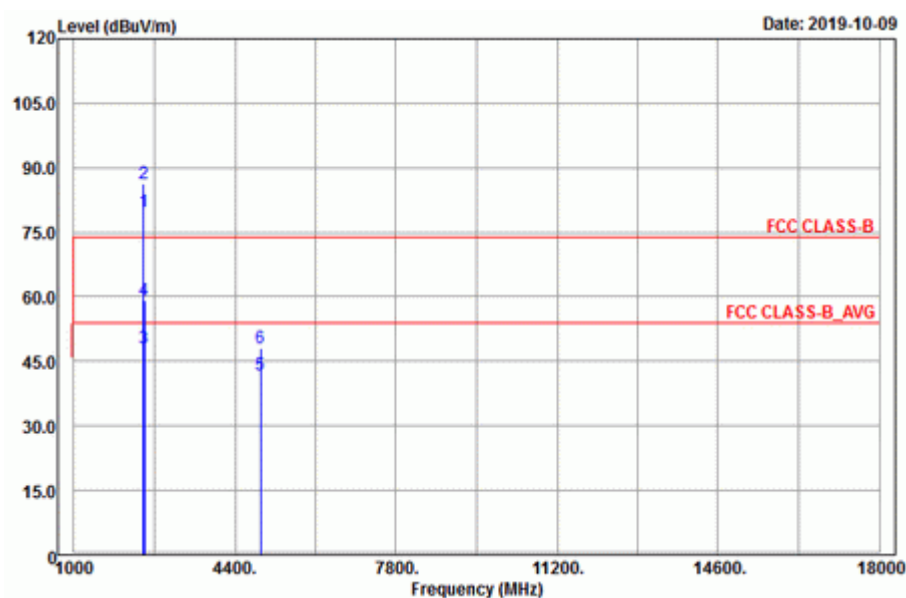
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	85.28	80.65	4.63			280	136	Average
2467	92.58	87.95	4.63			280	136	Peak
2483.64	45.77	41.11	4.66	54	-8.23	280	136	Average
2483.64	60.9	56.24	4.66	74	-13.1	280	136	Peak
4934	42.04	31.78	10.26	54	-11.96	145	1	Average
4934	47.28	37.02	10.26	74	-26.72	145	1	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
2467	89.71	85.08	4.63			148	6	Average
2467	96.36	91.73	4.63			148	6	Peak
2483.72	52.77	48.11	4.66	54	-1.23	148	6	Average
2483.72	69.61	64.95	4.66	74	-4.39	148	6	Peak
4934	41.85	31.59	10.26	54	-12.15	132	178	Average
4934	48.09	37.83	10.26	74	-25.91	132	178	Peak

Remarks:

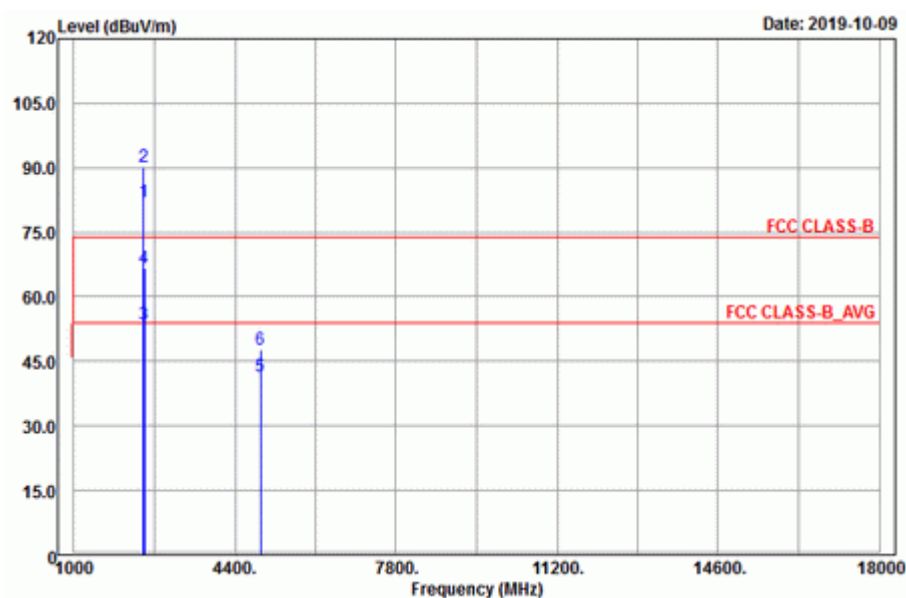
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2467 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

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
2472	79.65	75.01	4.64			280	158	Average
2472	86.4	81.76	4.64			280	158	Peak
2483.52	48.05	43.39	4.66	54	-5.95	280	158	Average
2483.52	59.3	54.64	4.66	74	-14.7	280	158	Peak
4944	41.96	31.61	10.35	54	-12.04	131	26	Average
4944	48.15	37.8	10.35	74	-25.85	131	26	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
2472	82.15	77.51	4.64			101	359	Average
2472	90.33	85.69	4.64			101	359	Peak
2483.52	53.49	48.83	4.66	54	-0.51	101	359	Average
2483.52	66.63	61.97	4.66	74	-7.37	101	359	Peak
4944	41.48	31.13	10.35	54	-12.52	152	173	Average
4944	47.87	37.52	10.35	74	-26.13	152	173	Peak

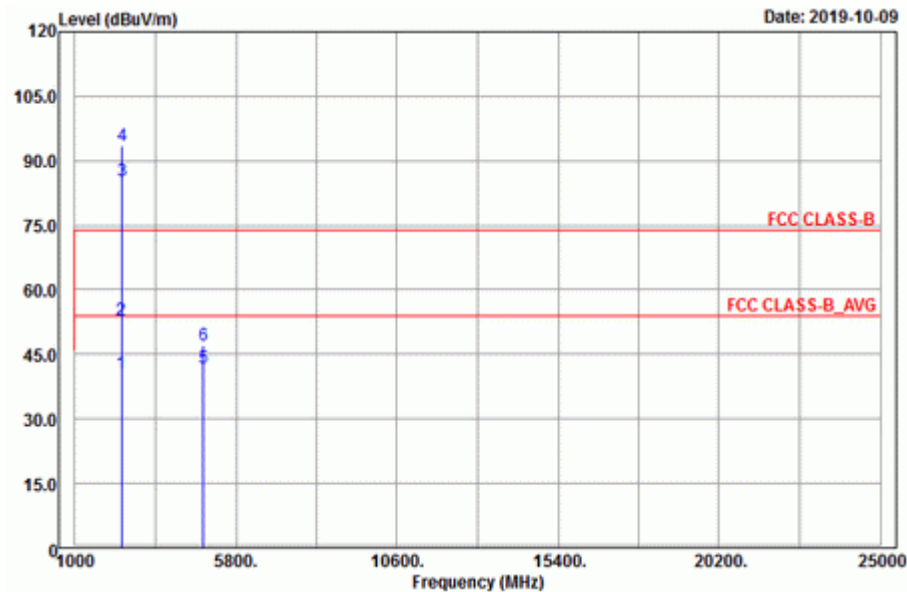
Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2472 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

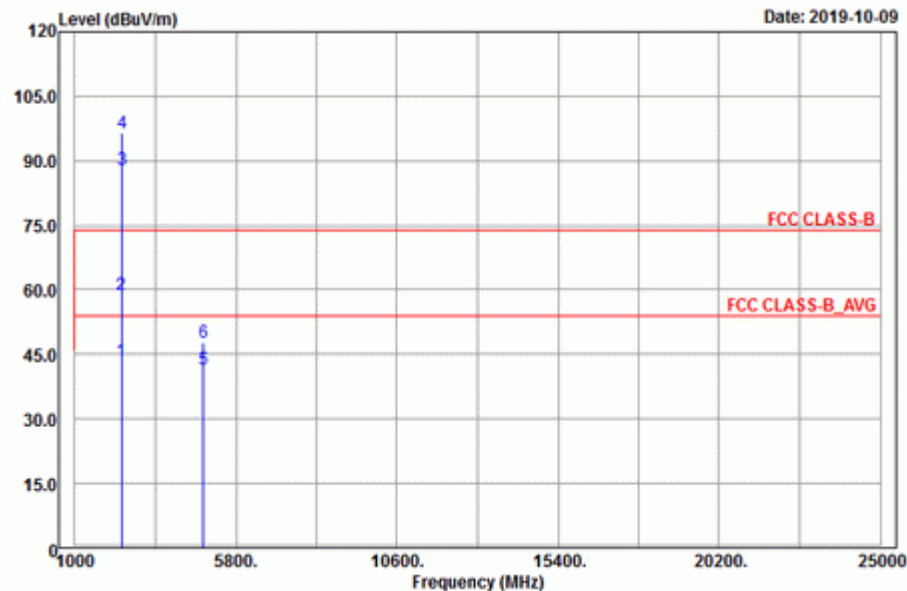
802.11n (HT20) (調變技術 – OFDM)

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

Horizontal



Vertical



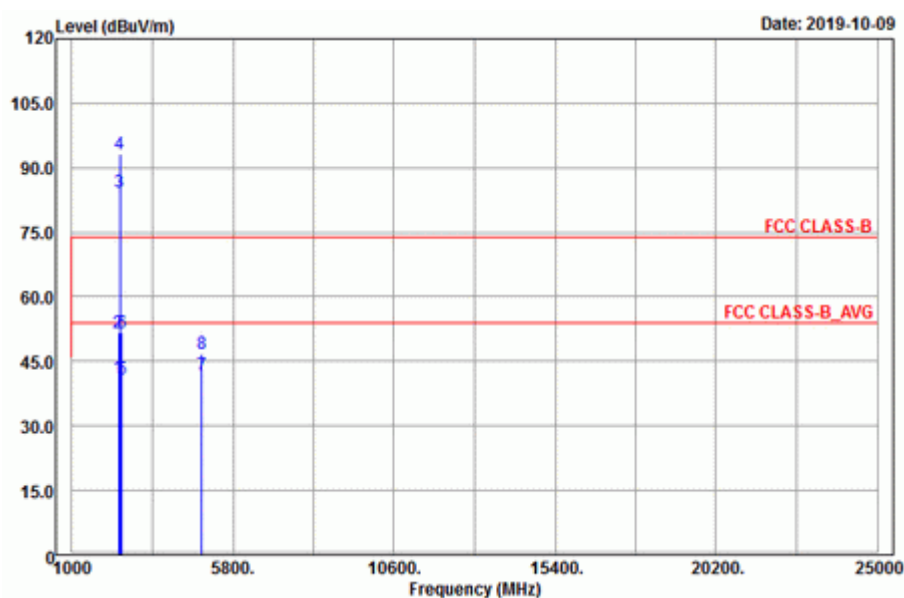
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2389.92	40.68	36.18	4.5	54	-13.32	280	136	Average
2389.92	52.83	48.33	4.5	74	-21.17	280	136	Peak
2412	85.21	80.66	4.55			280	136	Average
2412	93.58	89.03	4.55			280	136	Peak
4824	41.75	31.46	10.29	54	-12.25	113	325	Average
4824	46.97	36.68	10.29	74	-27.03	113	325	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
2389.83	43.34	38.84	4.5	54	-10.66	148	6	Average
2389.83	58.74	54.24	4.5	74	-15.26	148	6	Peak
2412	88	83.45	4.55			148	6	Average
2412	96.43	91.88	4.55			148	6	Peak
4824	41.55	31.26	10.29	54	-12.45	113	324	Average
4824	47.76	37.47	10.29	74	-26.24	113	324	Peak

Remarks:

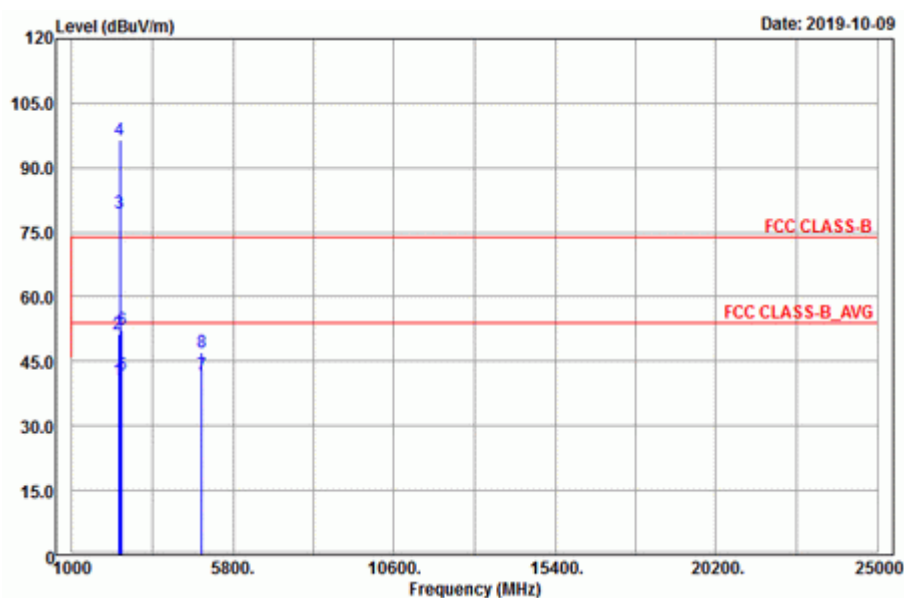
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2412 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



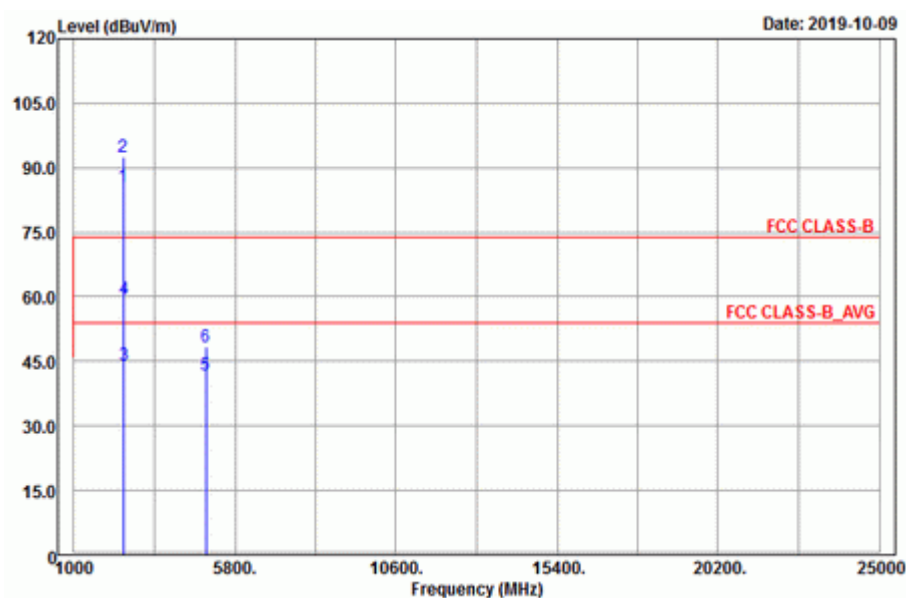
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2385.78	41.08	36.59	4.49	54	-12.92	280	136	Average
2385.78	51.67	47.18	4.49	74	-22.33	280	136	Peak
2437	84.31	79.72	4.59			280	136	Average
2437	93.28	88.69	4.59			280	136	Peak
2489.04	40.8	36.12	4.68	54	-13.2	280	136	Average
2489.04	51.67	46.99	4.68	74	-22.33	280	136	Peak
4874	41.76	31.55	10.21	54	-12.24	174	159	Average
4874	46.69	36.48	10.21	74	-27.31	174	159	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
2385.6	40.62	36.13	4.49	54	-13.38	148	6	Average
2385.6	51.24	46.75	4.49	74	-22.76	148	6	Peak
2437	79.31	74.72	4.59			148	6	Average
2437	96.6	92.01	4.59			148	6	Peak
2488.6	41.81	37.13	4.68	54	-12.19	148	6	Average
2488.6	52.22	47.54	4.68	74	-21.78	148	6	Peak
4874	41.77	31.56	10.21	54	-12.23	133	325	Average
4874	47.07	36.86	10.21	74	-26.93	133	325	Peak

Remarks:

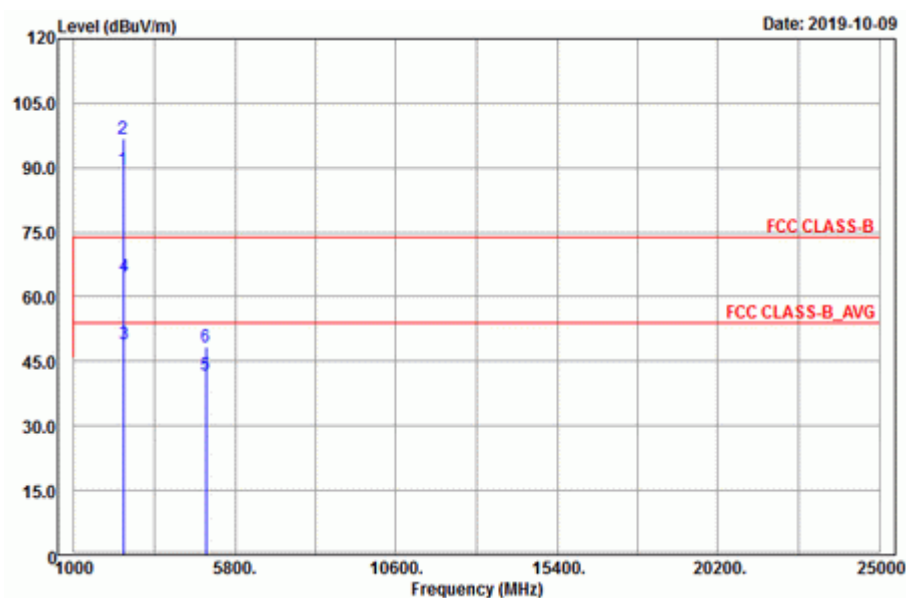
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2437 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



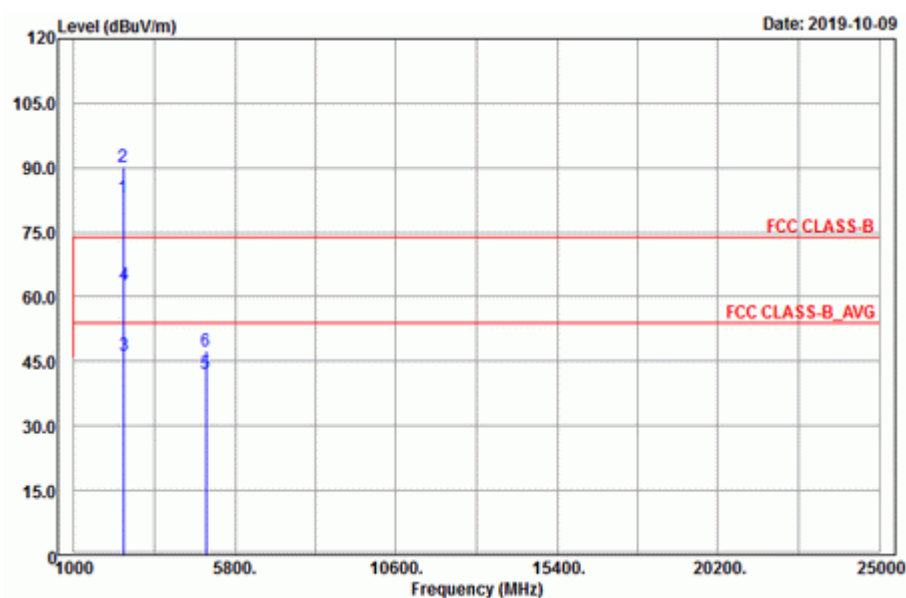
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	85.61	80.99	4.62			230	136	Average
2462	92.66	88.04	4.62			230	136	Peak
2483.56	44.25	39.59	4.66	54	-9.75	230	136	Average
2483.56	59.54	54.88	4.66	74	-14.46	230	136	Peak
4924	41.79	31.54	10.25	54	-12.21	157	222	Average
4924	48.37	38.12	10.25	74	-25.63	157	222	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	89.44	84.82	4.62			148	6	Average
2462	96.85	92.23	4.62			148	6	Peak
2483.52	48.9	44.24	4.66	54	-5.1	148	6	Average
2483.52	64.69	60.03	4.66	74	-9.31	148	6	Peak
4924	41.81	31.56	10.25	54	-12.19	124	205	Average
4924	48.55	38.3	10.25	74	-25.45	124	205	Peak

Remarks:

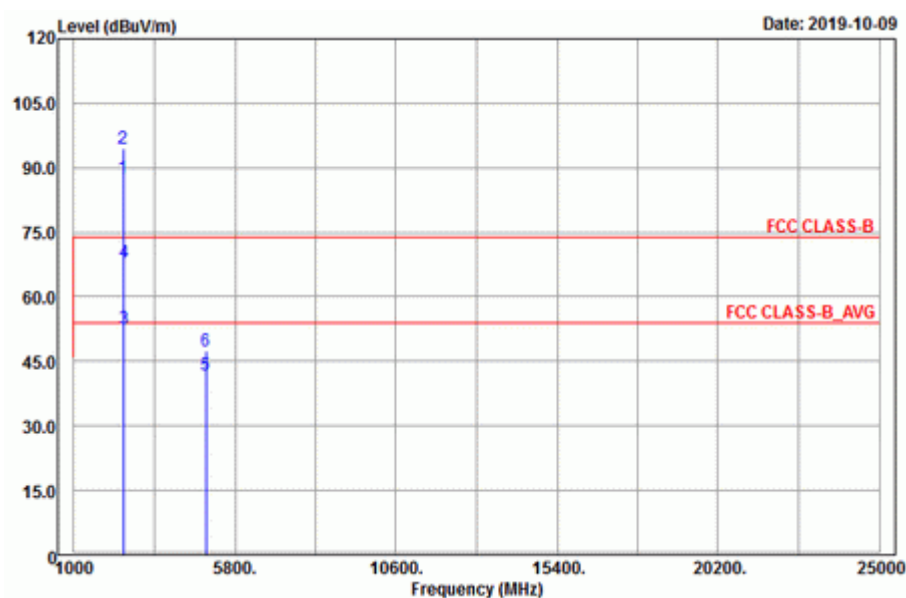
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2462 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Horizontal



Vertical



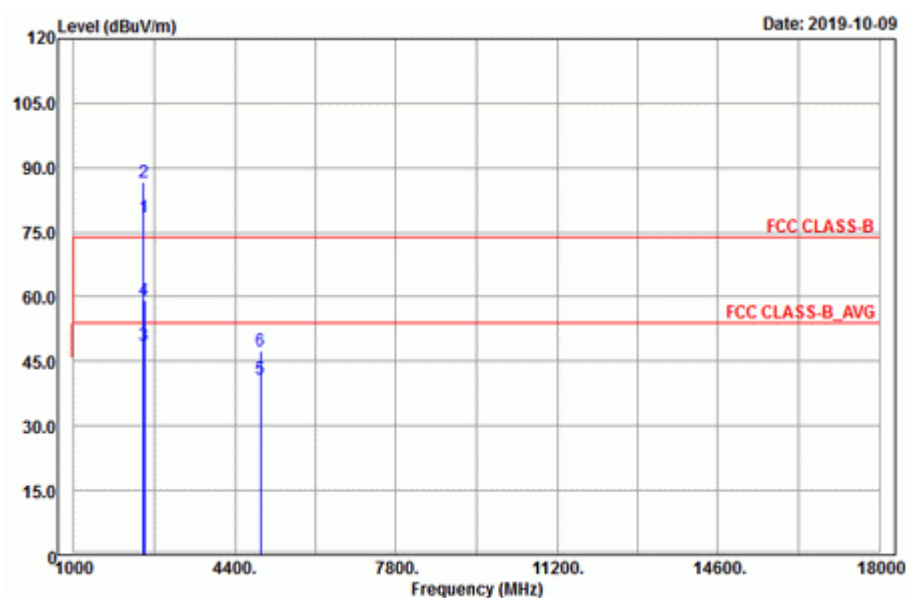
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	83.11	78.48	4.63			230	136	Average
2467	90.22	85.59	4.63			230	136	Peak
2483.6	46.41	41.75	4.66	54	-7.59	230	136	Average
2483.6	62.91	58.25	4.66	74	-11.09	230	136	Peak
4934	42.11	31.85	10.26	54	-11.89	118	256	Average
4934	47.48	37.22	10.26	74	-26.52	118	256	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
2467	87.49	82.86	4.63			148	6	Average
2467	94.65	90.02	4.63			148	6	Peak
2483.64	52.56	47.9	4.66	54	-1.44	148	6	Average
2483.64	68.07	63.41	4.66	74	-5.93	148	6	Peak
4934	41.72	31.46	10.26	54	-12.28	147	341	Average
4934	47.3	37.04	10.26	74	-26.7	147	341	Peak

Remarks:

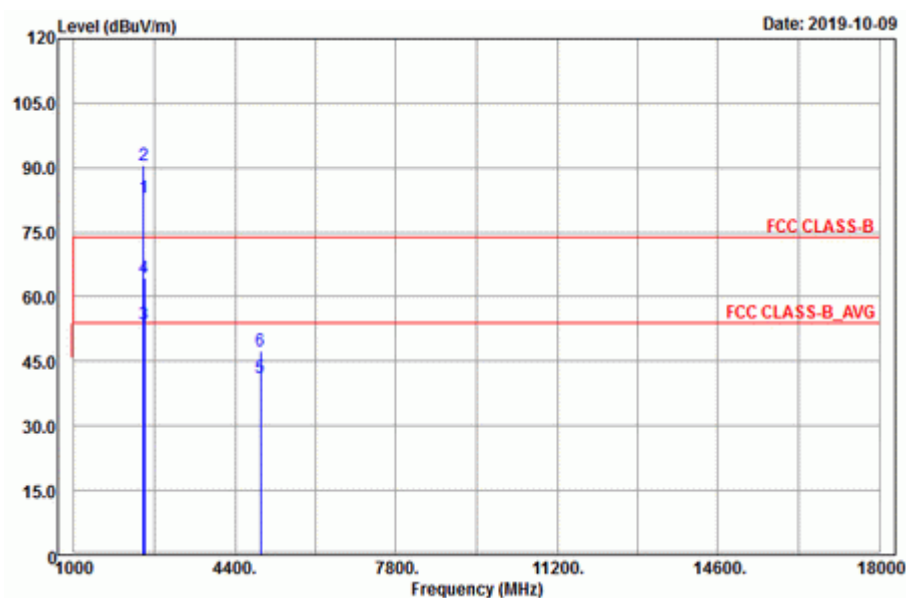
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2467 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	1 GHz ~ 25 GHz
Input Power	110 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

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
2472	78.48	73.84	4.64			280	158	Average
2472	86.64	82	4.64			280	158	Peak
2483.52	48.71	44.05	4.66	54	-5.29	280	158	Average
2483.52	59.35	54.69	4.66	74	-14.65	280	158	Peak
4944	40.92	30.57	10.35	54	-13.08	152	27	Average
4944	47.55	37.2	10.35	74	-26.45	152	27	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
2472	83.11	78.47	4.64			101	359	Average
2472	90.72	86.08	4.64			101	359	Peak
2483.52	53.66	49	4.66	54	-0.34	101	359	Average
2483.52	64.57	59.91	4.66	74	-9.43	101	359	Peak
4944	41.3	30.95	10.35	54	-12.7	181	86	Average
4944	47.56	37.21	10.35	74	-26.44	181	86	Peak

Remarks:

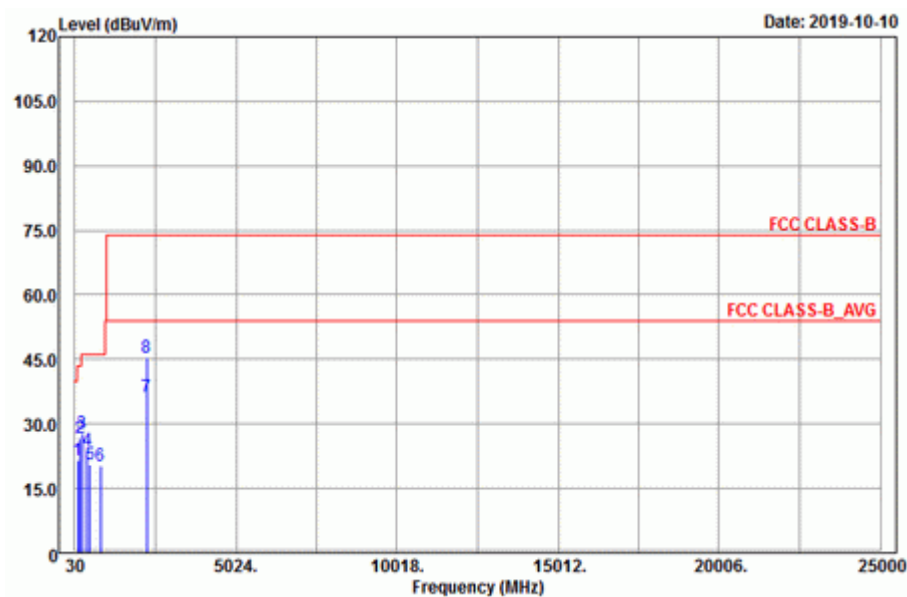
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2472 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

4.6.2 接收諧波

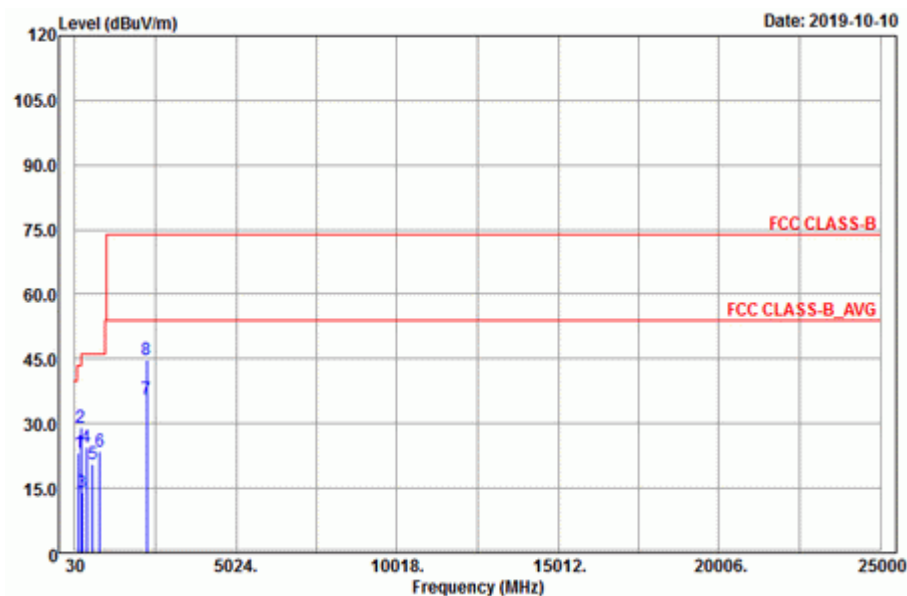
802.11n (HT20) (調變技術 – OFDM)

EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	30 MHz ~ 25 GHz
Input Power	110 Vac, 60 Hz	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	Karl Lee

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
129.09	21.54	41.89	-20.35	43.5	-21.96	129	9	Peak
197.94	26.73	45.04	-18.31	43.5	-16.77	197	194	Peak
267.06	27.94	44.51	-16.57	46	-18.06	105	25	Peak
409.9	24.02	37.77	-13.75	46	-21.98	149	95	Peak
499.5	20.59	32.9	-12.31	46	-25.41	124	205	Peak
814.5	20.42	27.87	-7.45	46	-25.58	181	115	Peak
2260	36.33	31.74	4.59	54	-17.67	126	326	Average
2260	45.59	41	4.59	74	-28.41	126	326	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
139.35	23.28	44.28	-21	43.5	-20.22	139	335	Peak
209.01	29.09	47.24	-18.15	43.5	-14.41	115	214	Peak
255.72	14.06	30.79	-16.73	46	-31.94	180	28	Peak
384	24.38	38.56	-14.18	46	-21.62	138	314	Peak
581.4	20.58	31.5	-10.92	46	-25.42	176	5	Peak
804.7	23.57	31.1	-7.53	46	-22.43	124	56	Peak
2248	35.58	31.03	4.55	54	-18.42	124	174	Average
2248	44.72	40.17	4.55	74	-29.28	124	174	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:

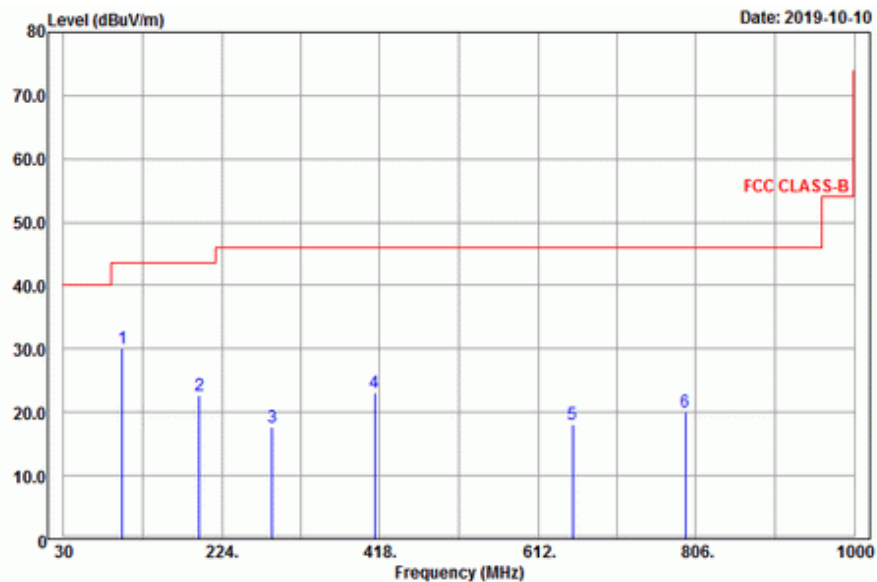
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Data:

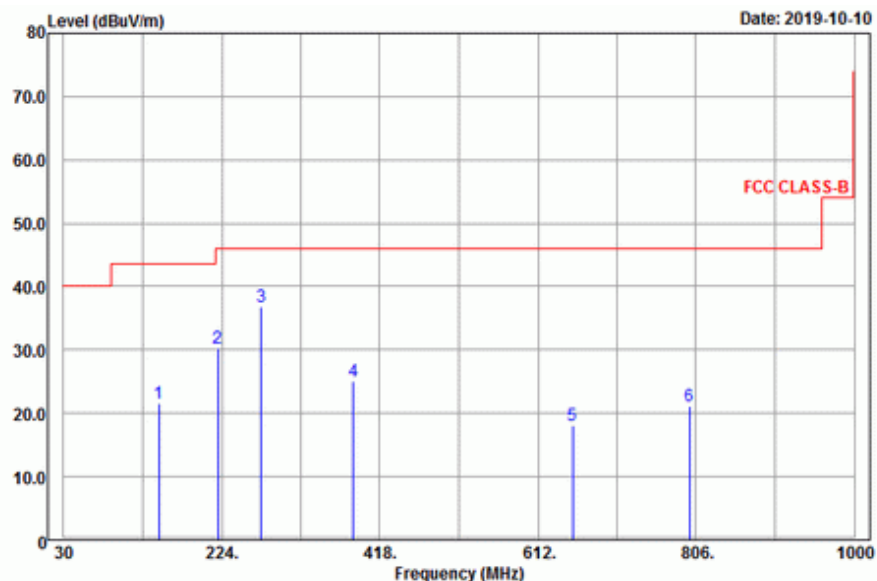
802.11n (HT20) (調變技術 – OFDM)

EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	30 MHz ~ 1 GHz
Input Power	110 Vac, 60 Hz	Detector Function	Peak (PK) or Quasi-Peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

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
102.36	30.1	47.25	-17.15	43.5	-13.4	126	32	Peak
196.86	22.78	41.11	-18.33	43.5	-20.72	164	225	Peak
286.23	17.74	34	-16.26	46	-28.26	188	195	Peak
412	23.2	36.92	-13.72	46	-22.8	141	145	Peak
654.9	18.09	28.07	-9.98	46	-27.91	105	185	Peak
792.8	20.07	27.87	-7.8	46	-25.93	195	222	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
146.91	21.5	42.5	-21	43.5	-22	146	215	Peak
219	30.22	48.1	-17.88	46	-15.78	165	6	Peak
272.46	36.8	53.31	-16.51	46	-9.2	127	178	Peak
385.4	25.08	39.25	-14.17	46	-20.92	100	0	Peak
654.9	18.19	28.17	-9.98	46	-27.81	100	0	Peak
798.4	21.21	28.84	-7.63	46	-24.79	100	0	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.

4.7 量測結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

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。

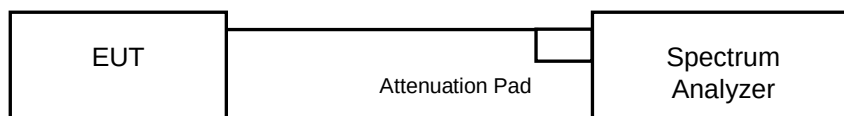
5.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020

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	108 年 09 月 26 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	林冠澤		

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	8.56	0.5	Pass
6	2437	8.09	0.5	Pass
11	2462	8.58	0.5	Pass
12	2467	8.58	0.5	Pass
13	2472	8.10	0.5	Pass

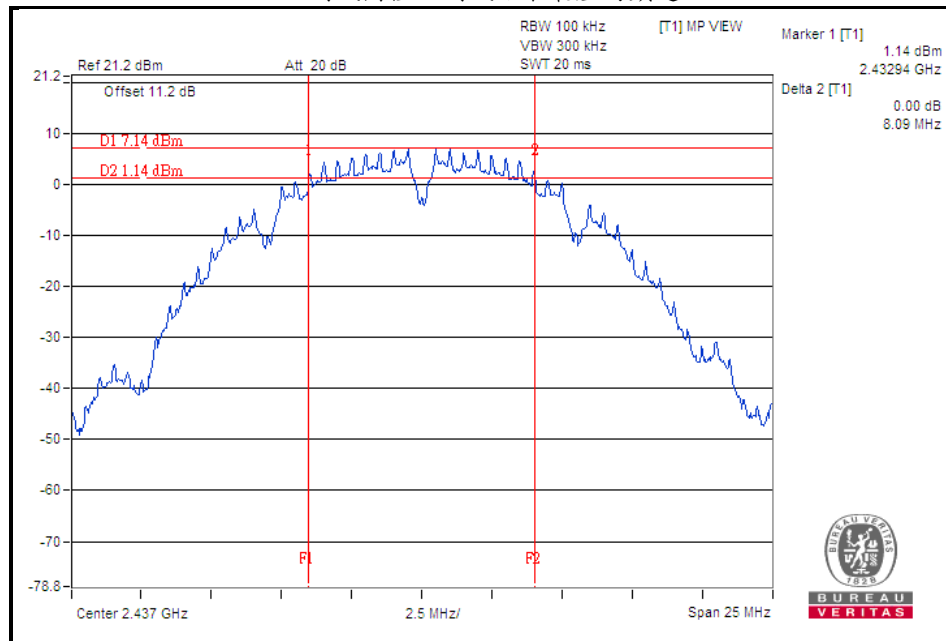
802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.40	0.5	Pass
6	2437	16.39	0.5	Pass
11	2462	16.39	0.5	Pass
12	2467	16.39	0.5	Pass
13	2472	16.40	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.61	0.5	Pass
6	2437	17.61	0.5	Pass
11	2462	17.61	0.5	Pass
12	2467	17.62	0.5	Pass
13	2472	17.62	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，符合低功率射頻電機技術規範之要求。

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。

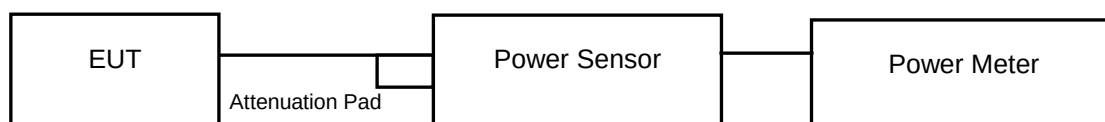
6.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Power Meter Anritsu	ML2495A	1232002	Dec. 17, 2018	Dec. 16, 2019
Power Sensor Anritsu	MA2411B	1207325	Dec. 17, 2018	Dec. 16, 2019

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.
- Measurement Bandwidth of ML2495A is 65 MHz greater than 6 dB bandwidth of emission.

6.4 測試配置



6.5 量測結果

操作模式	發射	測試日期	108 年 09 月 26 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	林冠澤		

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	62.806	17.98	30	Pass
6	2437	62.517	17.96	30	Pass
11	2462	65.013	18.13	30	Pass
12	2467	61.518	17.89	30	Pass
13	2472	39.628	15.98	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	78.343	18.94	30	Pass
6	2437	76.913	18.86	30	Pass
11	2462	81.658	19.12	30	Pass
12	2467	73.282	18.65	30	Pass
13	2472	54.576	17.37	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	80.353	19.05	30	Pass
6	2437	78.524	18.95	30	Pass
11	2462	82.604	19.17	30	Pass
12	2467	75.162	18.76	30	Pass
13	2472	58.076	17.64	30	Pass

6.6 量測結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

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. 15, 2019	Apr. 14, 2020

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	108 年 09 月 26 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	林冠澤		

802.11b

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-5.78	8	Pass
6	2437	-5.85	8	Pass
11	2462	-5.38	8	Pass
12	2467	-5.05	8	Pass
13	2472	-7.57	8	Pass

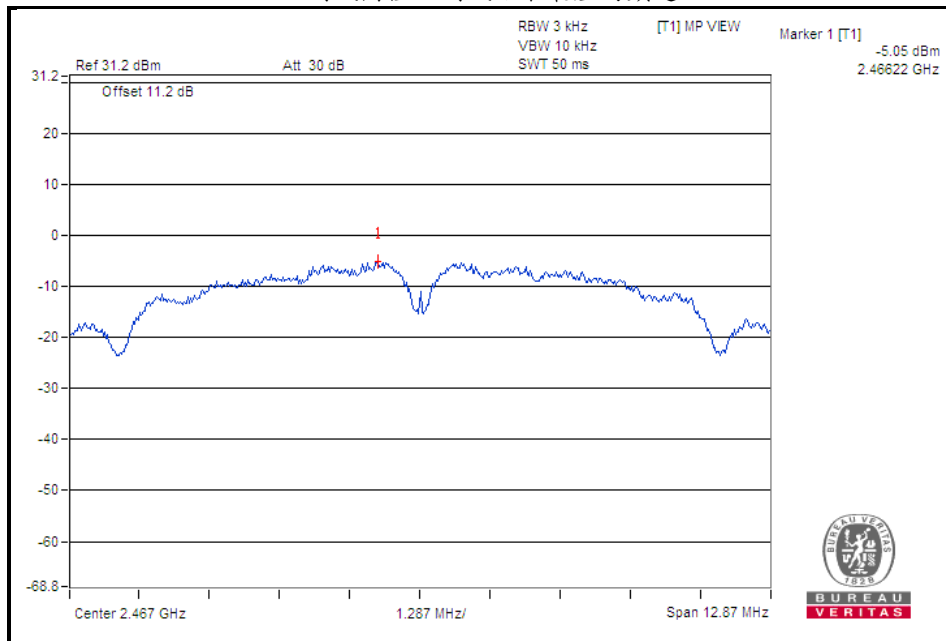
802.11g

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-12.69	8	Pass
6	2437	-12.32	8	Pass
11	2462	-12.83	8	Pass
12	2467	-12.35	8	Pass
13	2472	-13.37	8	Pass

802.11n (HT20)

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-12.04	8	Pass
6	2437	-12.87	8	Pass
11	2462	-12.53	8	Pass
12	2467	-12.81	8	Pass
13	2472	-13.82	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，符合低功率射頻電機技術規範之要求。

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(21)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；

Average 為 RBW = 1 MHz, VBW = 10 Hz

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 = 10 Hz

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。

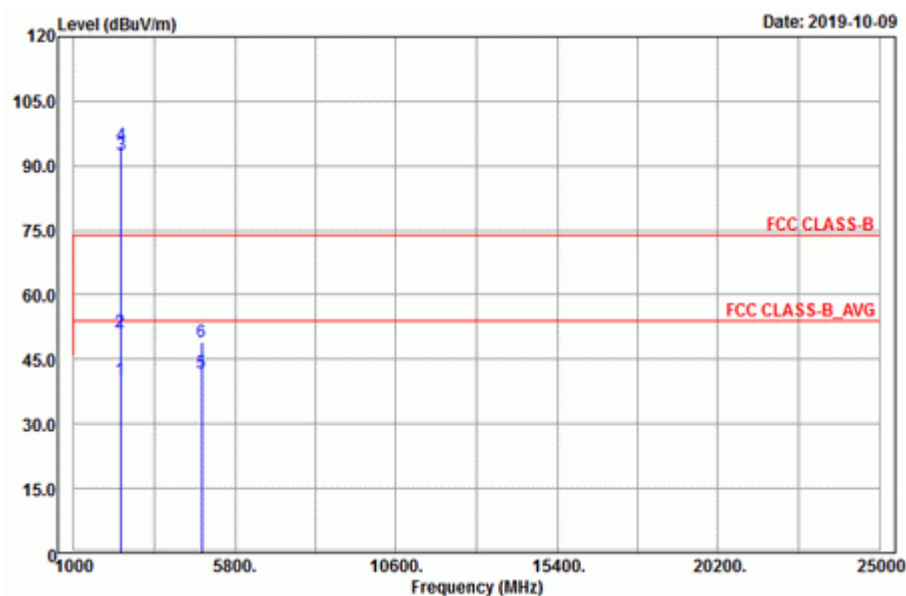
8.6 量測結果

8.6.1 發射諧波

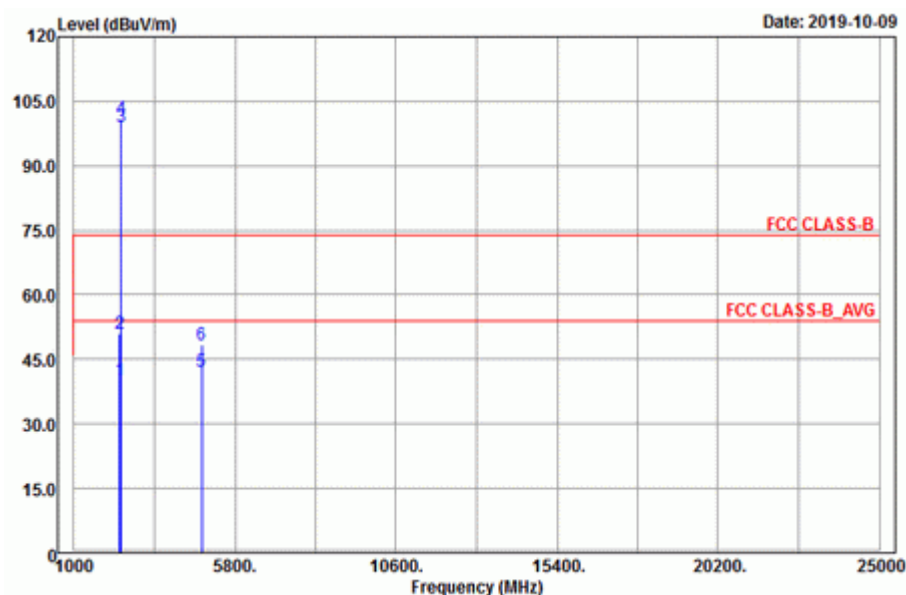
GFSK

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

Horizontal



Vertical



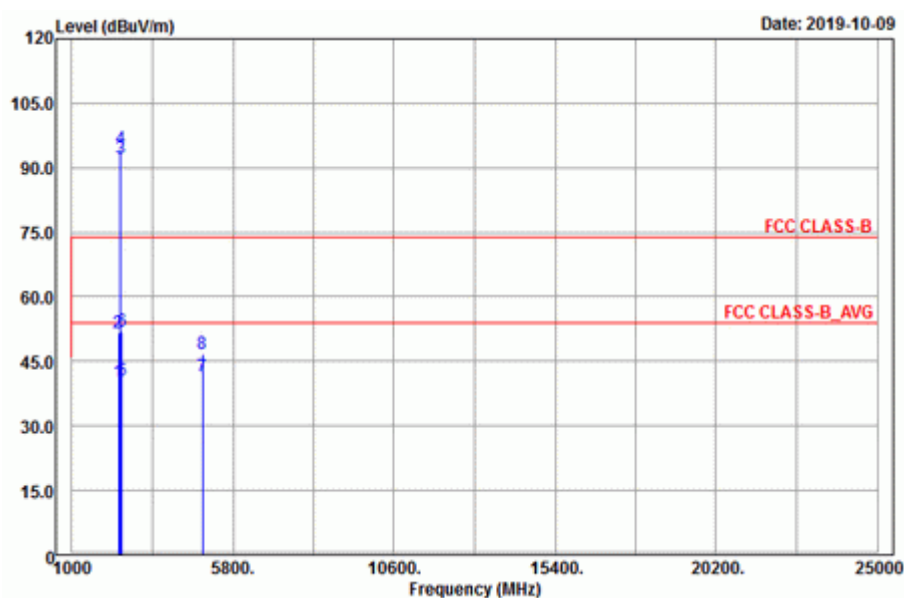
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2387.94	40.2	35.71	4.49	54	-13.8	163	165	Average
2387.94	51.42	46.93	4.49	74	-22.58	163	165	Peak
2402	92.44	87.92	4.52			163	165	Average
2402	94.79	90.27	4.52			163	165	Peak
4804	41.99	31.64	10.35	54	-12.01	154	4	Average
4804	49.03	38.68	10.35	74	-24.97	154	4	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
2371.83	40.21	35.76	4.45	54	-13.79	147	7	Average
2371.83	51.15	46.7	4.45	74	-22.85	147	7	Peak
2402	99.22	94.7	4.52			147	7	Average
2402	101.18	96.66	4.52			147	7	Peak
4804	42.15	31.8	10.35	54	-11.85	141	187	Average
4804	48.41	38.06	10.35	74	-25.59	141	187	Peak

Remarks:

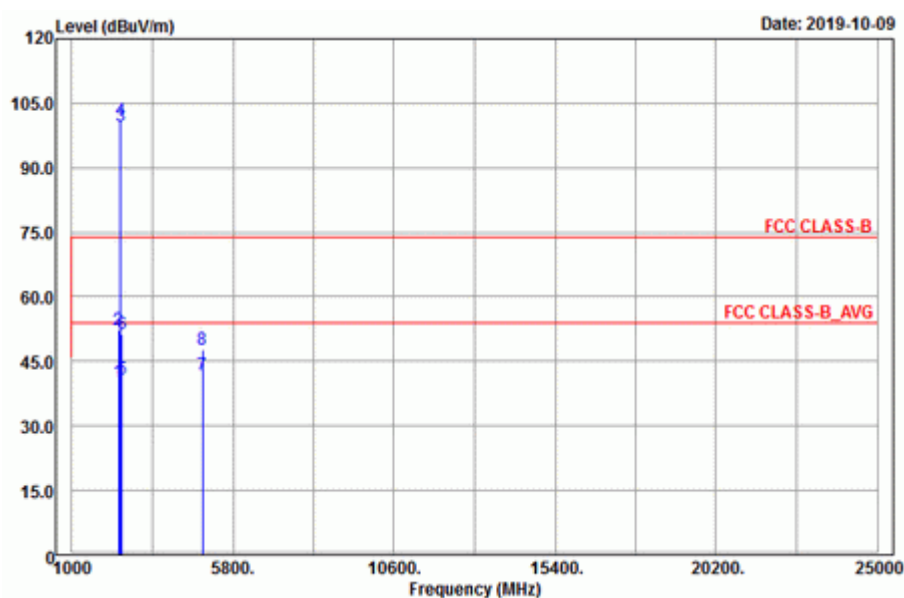
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2402 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



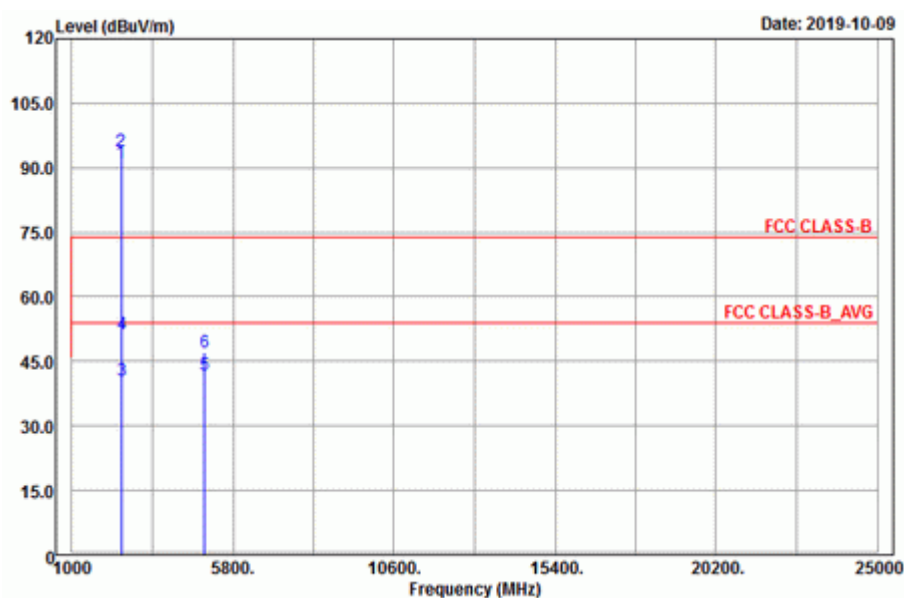
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2385.33	40.07	35.6	4.47	54	-13.93	163	165	Average
2385.33	51.79	47.32	4.47	74	-22.21	163	165	Peak
2441	92.28	87.7	4.58			163	165	Average
2441	94.39	89.81	4.58			163	165	Peak
2488.72	40.66	35.98	4.68	54	-13.34	163	165	Average
2488.72	51.98	47.3	4.68	74	-22.02	163	165	Peak
4882	41.64	31.43	10.21	54	-12.36	104	11	Average
4882	46.89	36.68	10.21	74	-27.11	104	11	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
2384.88	40.12	35.65	4.47	54	-13.88	147	7	Average
2384.88	52.31	47.84	4.47	74	-21.69	147	7	Peak
2441	99.69	95.11	4.58			147	7	Average
2441	101.19	96.61	4.58			147	7	Peak
2497.24	40.78	36.11	4.67	54	-13.22	147	7	Average
2497.24	51.37	46.7	4.67	74	-22.63	147	7	Peak
4882	41.84	31.63	10.21	54	-12.16	134	315	Average
4882	47.74	37.53	10.21	74	-26.26	134	315	Peak

Remarks:

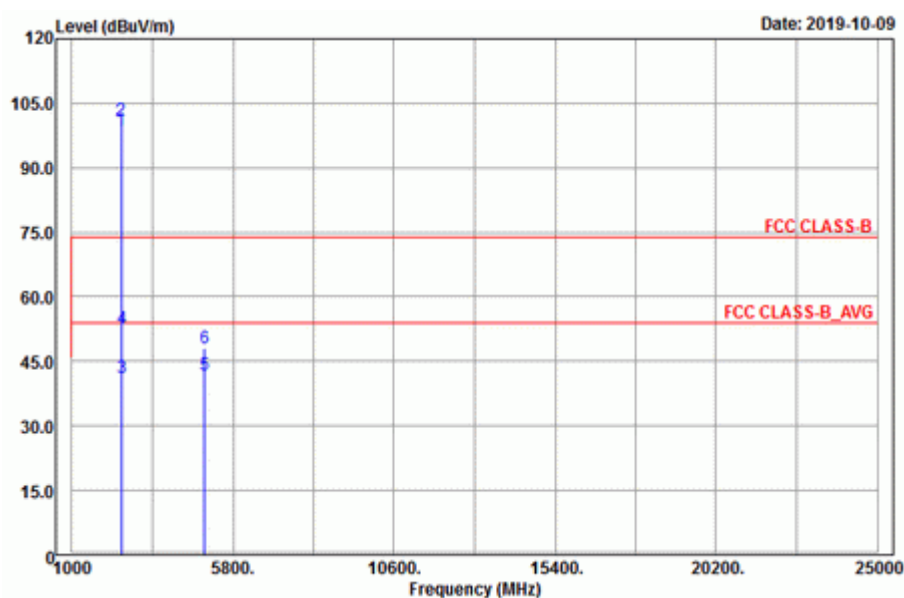
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2441 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

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	91.37	86.73	4.64			163	165	Average
2480	93.81	89.17	4.64			163	165	Peak
2497.2	40.59	35.92	4.67	54	-13.41	163	165	Average
2497.2	51.43	46.76	4.67	74	-22.57	163	165	Peak
4960	41.84	31.48	10.36	54	-12.16	110	210	Average
4960	47.1	36.74	10.36	74	-26.9	110	210	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	98.74	94.1	4.64			147	7	Average
2480	100.9	96.26	4.64			147	7	Peak
2483.8	41.04	36.38	4.66	54	-12.96	147	7	Average
2483.8	52.7	48.04	4.66	74	-21.3	147	7	Peak
4960	41.87	31.51	10.36	54	-12.13	148	326	Average
4960	48.03	37.67	10.36	74	-25.97	148	326	Peak

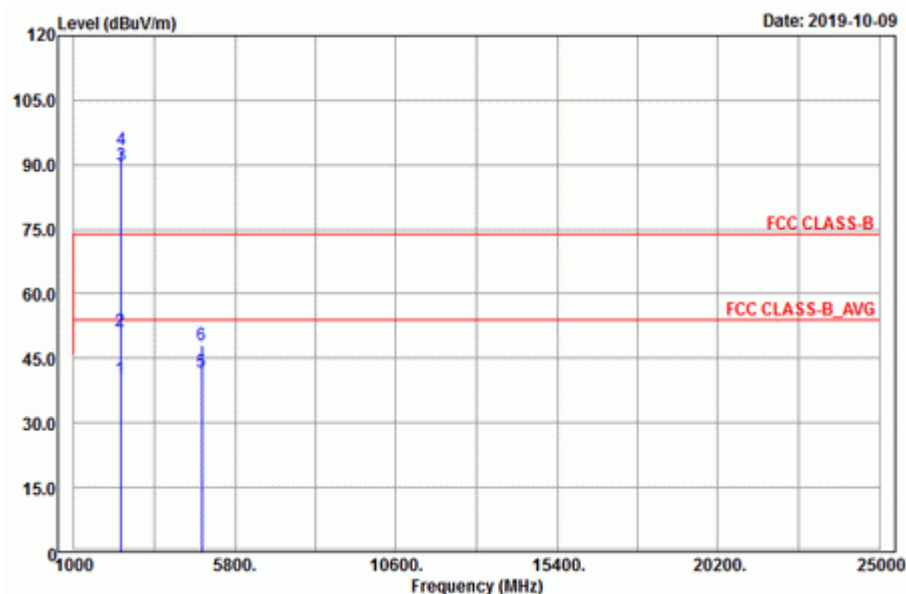
Remarks:

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.

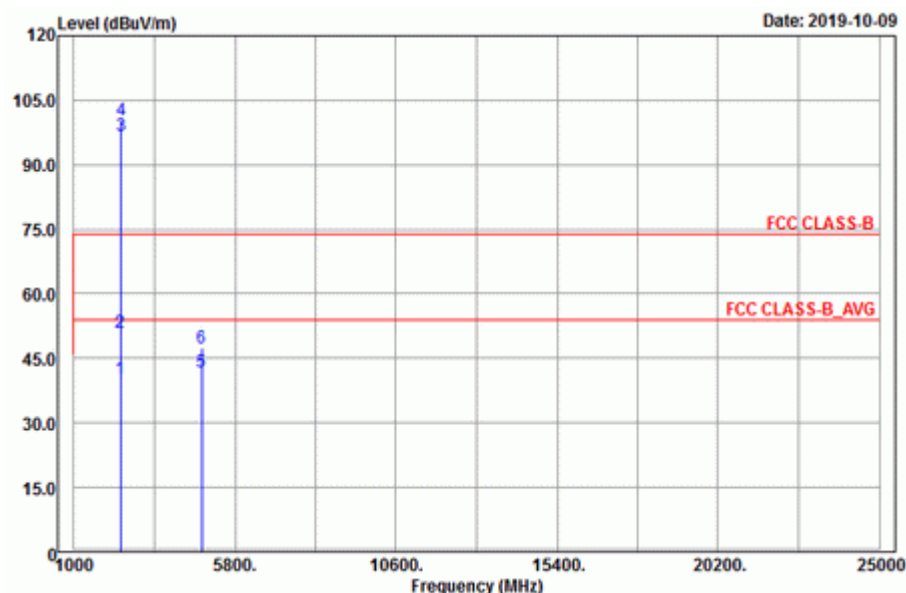
8DPSK

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

Horizontal



Vertical



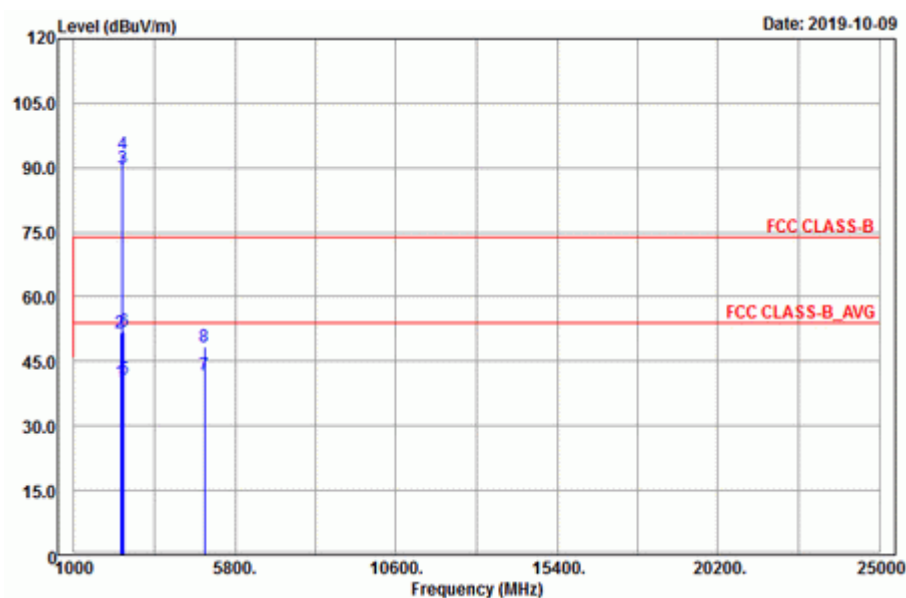
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2383.89	40.21	35.74	4.47	54	-13.79	163	165	Average
2383.89	51.32	46.85	4.47	74	-22.68	163	165	Peak
2402	89.81	85.29	4.52			163	165	Average
2402	93.46	88.94	4.52			163	165	Peak
4804	41.85	31.5	10.35	54	-12.15	165	255	Average
4804	48.07	37.72	10.35	74	-25.93	165	255	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
2387.85	40.37	35.88	4.49	54	-13.63	147	7	Average
2387.85	51.11	46.62	4.49	74	-22.89	147	7	Peak
2402	96.7	92.18	4.52			147	7	Average
2402	100.28	95.76	4.52			147	7	Peak
4804	41.89	31.54	10.35	54	-12.11	151	11	Average
4804	47.4	37.05	10.35	74	-26.6	151	11	Peak

Remarks:

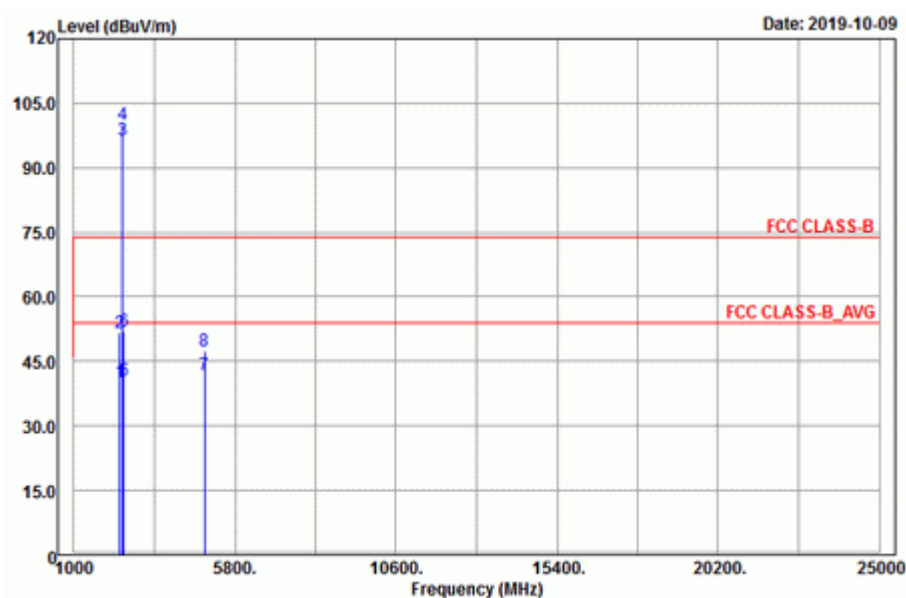
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2402 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



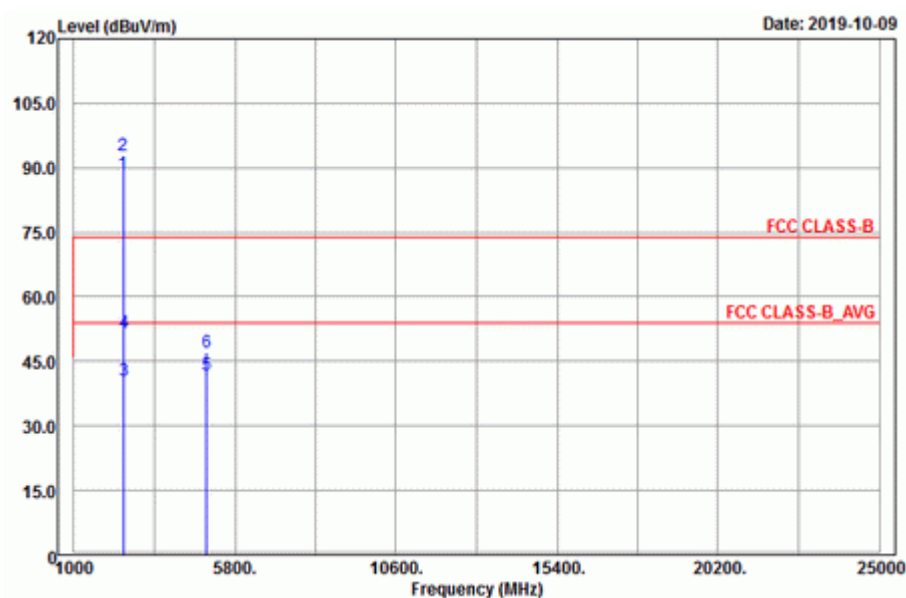
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2389.92	40.12	35.62	4.5	54	-13.88	163	165	Average
2389.92	51.55	47.05	4.5	74	-22.45	163	165	Peak
2441	89.84	85.26	4.58			163	165	Average
2441	93.24	88.66	4.58			163	165	Peak
2498.56	40.74	36.07	4.67	54	-13.26	163	165	Average
2498.56	51.92	47.25	4.67	74	-22.08	163	165	Peak
4882	41.84	31.63	10.21	54	-12.16	199	208	Average
4882	48.4	38.19	10.21	74	-25.6	199	208	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
2373.27	40.1	35.65	4.45	54	-13.9	147	7	Average
2373.27	51.6	47.15	4.45	74	-22.4	147	7	Peak
2441	96.49	91.91	4.58			147	7	Average
2441	100	95.42	4.58			147	7	Peak
2489.8	40.65	35.97	4.68	54	-13.35	147	7	Average
2489.8	52.01	47.33	4.68	74	-21.99	147	7	Peak
4882	41.75	31.54	10.21	54	-12.25	165	78	Average
4882	47.38	37.17	10.21	74	-26.62	165	78	Peak

Remarks:

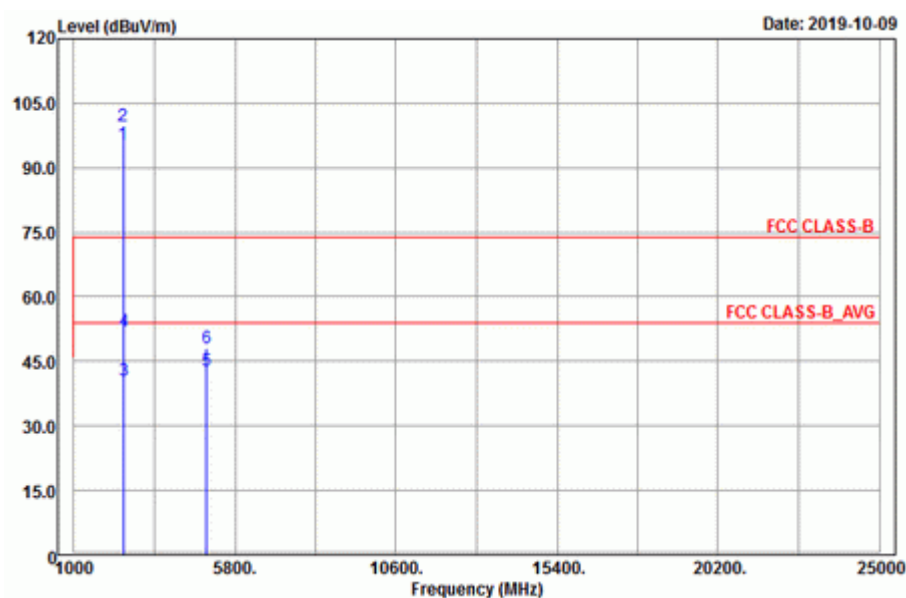
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2441 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

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	88.47	83.83	4.64			163	165	Average
2480	92.96	88.32	4.64			163	165	Peak
2498.48	40.56	35.89	4.67	54	-13.44	163	165	Average
2498.48	51.71	47.04	4.67	74	-22.29	163	165	Peak
4960	41.76	31.4	10.36	54	-12.24	154	15	Average
4960	47.01	36.65	10.36	74	-26.99	154	15	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	95.64	91	4.64			147	7	Average
2480	99.79	95.15	4.64			147	7	Peak
2483.56	40.67	36.01	4.66	54	-13.33	147	7	Average
2483.56	52.09	47.43	4.66	74	-21.91	147	7	Peak
4960	42.74	32.38	10.36	54	-11.26	165	55	Average
4960	47.93	37.57	10.36	74	-26.07	165	55	Peak

Remarks:

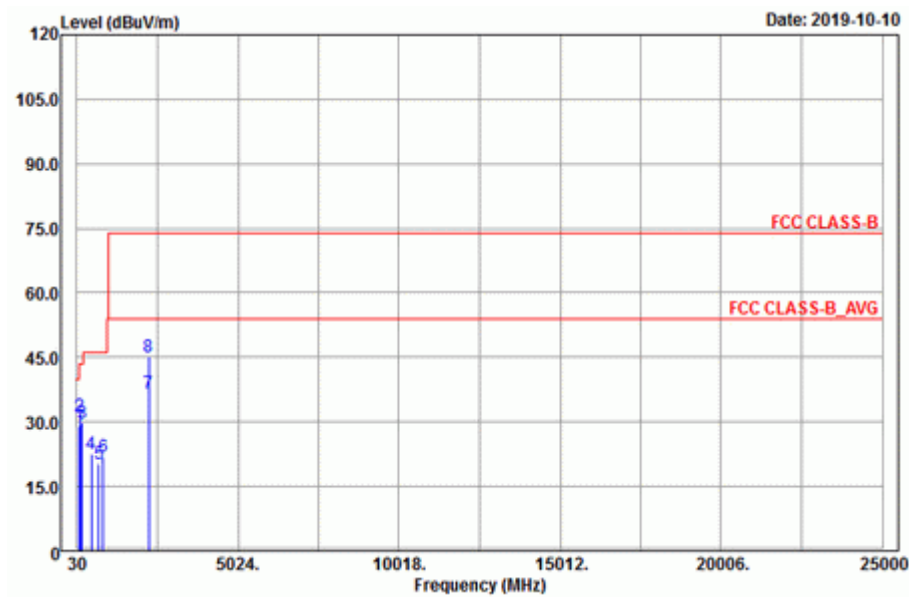
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2480 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

8.6.2 接收諧波

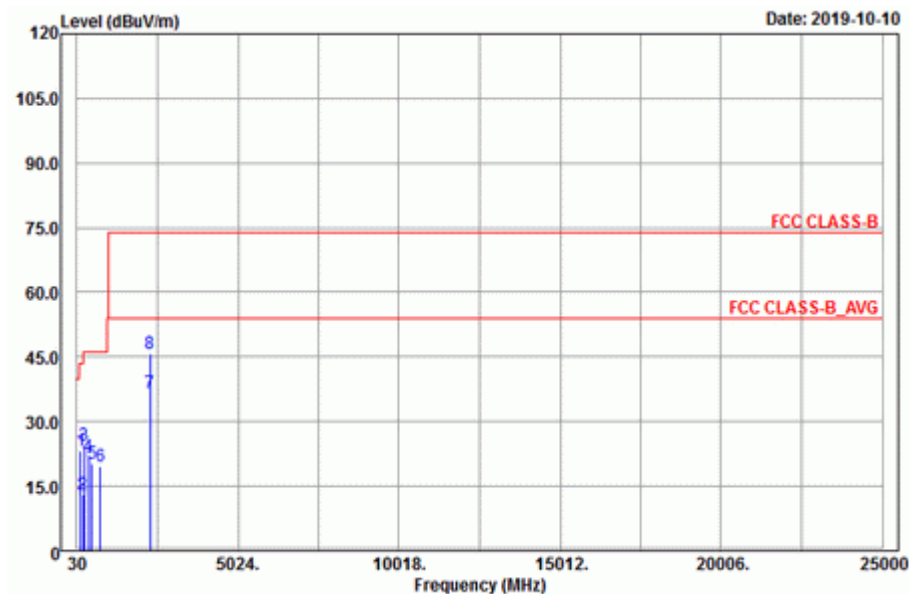
8DPSK

EUT Test Condition		Measurement Detail	
Channel	Channel 78	Frequency Range	30 MHz ~ 25 GHz
Input Power	110 Vac, 60 Hz	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	Charles Hsiao

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
99.12	28.94	46.27	-17.33	43.5	-14.56	197	2	Peak
138.54	31.3	52.25	-20.95	43.5	-12.2	154	352	Peak
195.51	29.7	48.06	-18.36	43.5	-13.8	109	228	Peak
471.5	22.51	35.43	-12.92	46	-23.49	124	215	Peak
724.2	20.13	28.85	-8.72	46	-25.87	195	262	Peak
839.7	21.95	28.92	-6.97	46	-24.05	139	315	Peak
2254	36.55	31.96	4.59	54	-17.45	154	145	Average
2254	45.18	40.59	4.59	74	-28.82	154	145	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
149.88	23.09	44.06	-20.97	43.5	-20.41	185	59	Peak
224.13	13.19	30.85	-17.66	46	-32.81	154	224	Peak
261.93	24.46	41.11	-16.65	46	-21.54	161	263	Peak
383.3	22.05	36.24	-14.19	46	-23.95	164	155	Peak
487.6	20.35	32.92	-12.57	46	-25.65	185	203	Peak
750.8	19.69	28.2	-8.51	46	-26.31	124	17	Peak
2290	36.5	31.74	4.76	54	-17.5	154	4	Average
2290	45.83	41.07	4.76	74	-28.17	154	4	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:

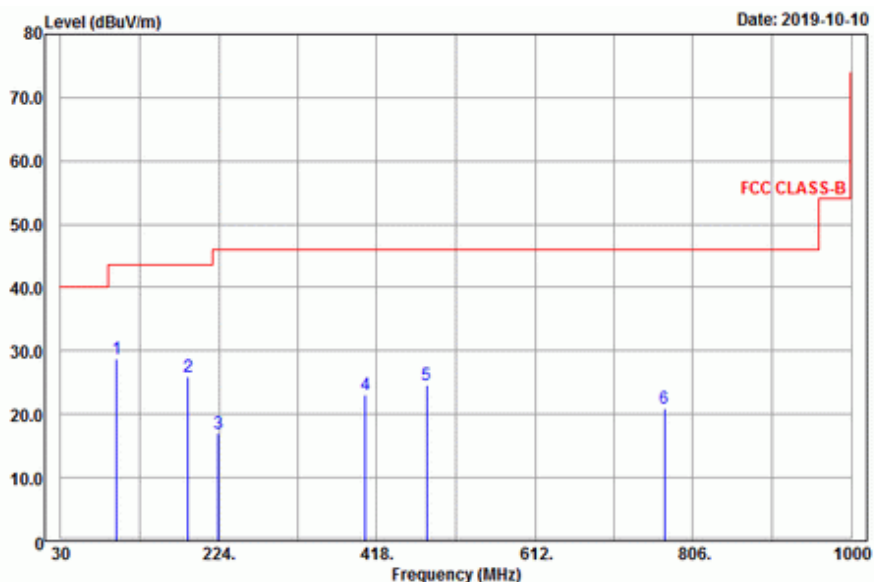
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Data:

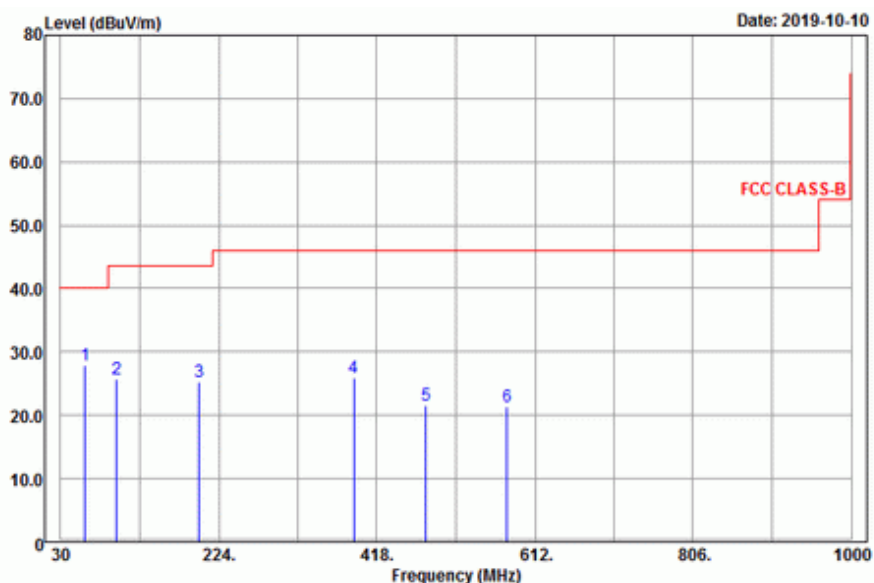
8DPSK

EUT Test Condition		Measurement Detail	
Channel	Channel 78	Frequency Range	30 MHz ~ 1 GHz
Input Power	110 Vac, 60 Hz	Detector Function	Peak (PK) or Quask-Peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

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
98.58	28.87	46.2	-17.33	43.5	-14.63	159	198	Peak
186.33	25.89	44.96	-19.07	43.5	-17.61	164	156	Peak
223.59	17.02	34.68	-17.66	46	-28.98	100	144	Peak
404.3	23.07	36.92	-13.85	46	-22.93	180	240	Peak
479.2	24.56	37.28	-12.72	46	-21.44	156	255	Peak
771.1	21.02	29.26	-8.24	46	-24.98	171	124	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
60.24	27.93	44.07	-16.14	40	-12.07	160	255	Peak
99.12	25.75	43.08	-17.33	43.5	-17.75	187	199	Peak
199.56	25.21	43.46	-18.25	43.5	-18.29	105	110	Peak
389.6	25.89	39.99	-14.1	46	-20.11	164	256	Peak
478.5	21.48	34.22	-12.74	46	-24.52	180	156	Peak
577.9	21.42	32.4	-10.98	46	-24.58	164	44	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.

8.7 量測結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

9 20 dB 頻寬之要求

9.1 適用標準

請見本報告 3.1 節第(26)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。

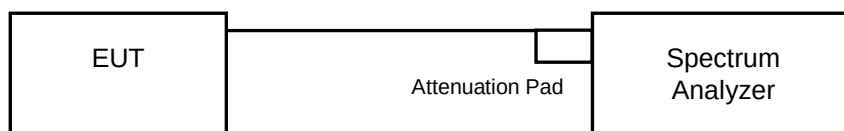
9.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020

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



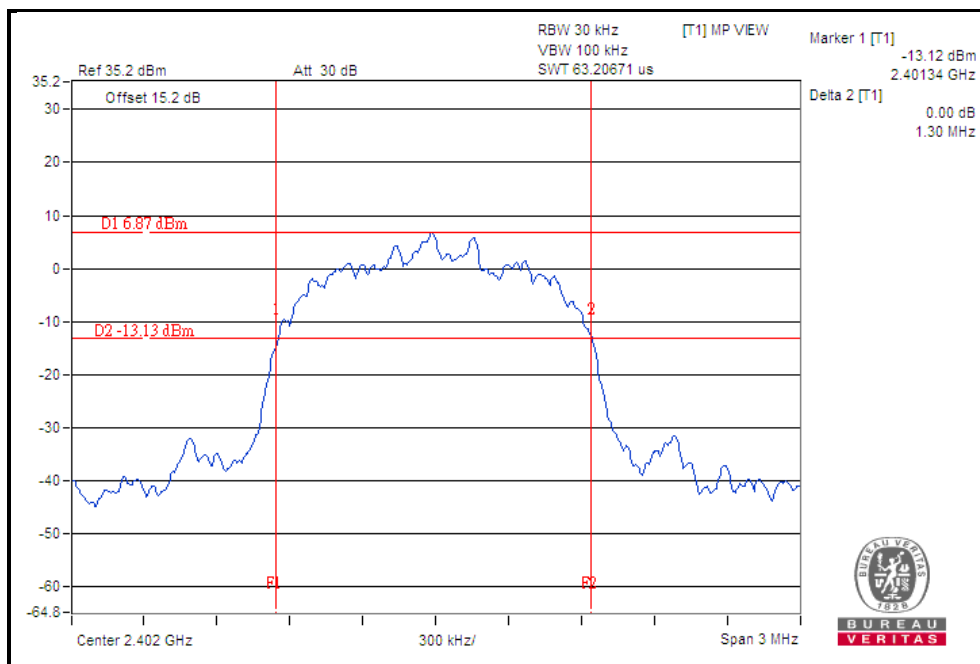
9.5 量測結果

操作模式	發射	測試日期	109 年 09 月 26 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	林冠澤		

Channel	Channel Frequency (MHz)	20 dB Bandwidth (MHz)		>= 25 kHz
		GFSK	8DPSK	
0	2402	0.96	1.30	Yes
39	2441	0.99	1.30	Yes
78	2480	1.00	1.30	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電機技術規範 3.10.1.6 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(24)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。

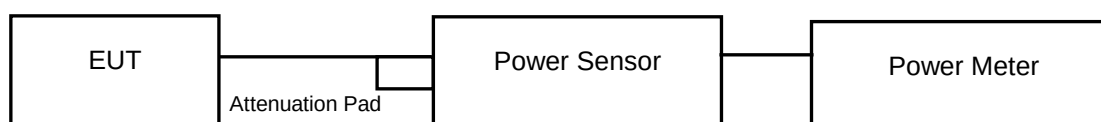
10.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Power Meter Anritsu	ML2495A	1232002	Dec. 17, 2018	Dec. 16, 2019
Power Sensor Anritsu	MA2411B	1207325	Dec. 17, 2018	Dec. 16, 2019

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.
- Measurement Bandwidth of ML2495A is 65 MHz greater than 6 dB bandwidth of emission.

10.4 測試配置



10.5 量測結果

操作模式	發射	測試日期	109 年 09 月 26 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	林冠澤		

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)		Peak Power Limit (dBm)	Pass / Fail
		GFSK	8DPSK		
0	2402	10.97	11.23	21	Pass
39	2441	10.99	11.46	21	Pass
78	2480	10.85	11.17	21	Pass

10.6 量測結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

11 跳頻頻道數之量測

11.1 適用標準

請見本報告 3.1 節第(25)項的規定。

11.2 量測方法

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

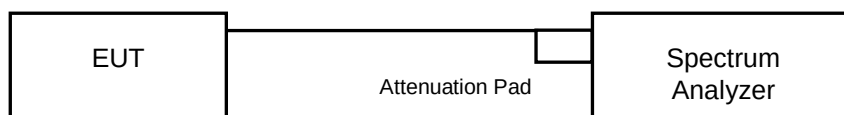
11.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020

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.

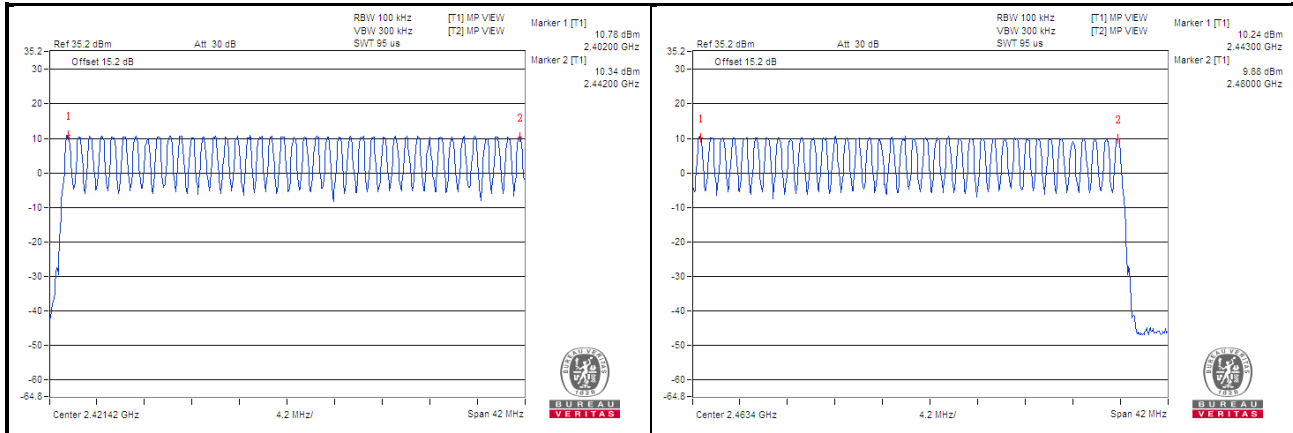
11.4 測試配置



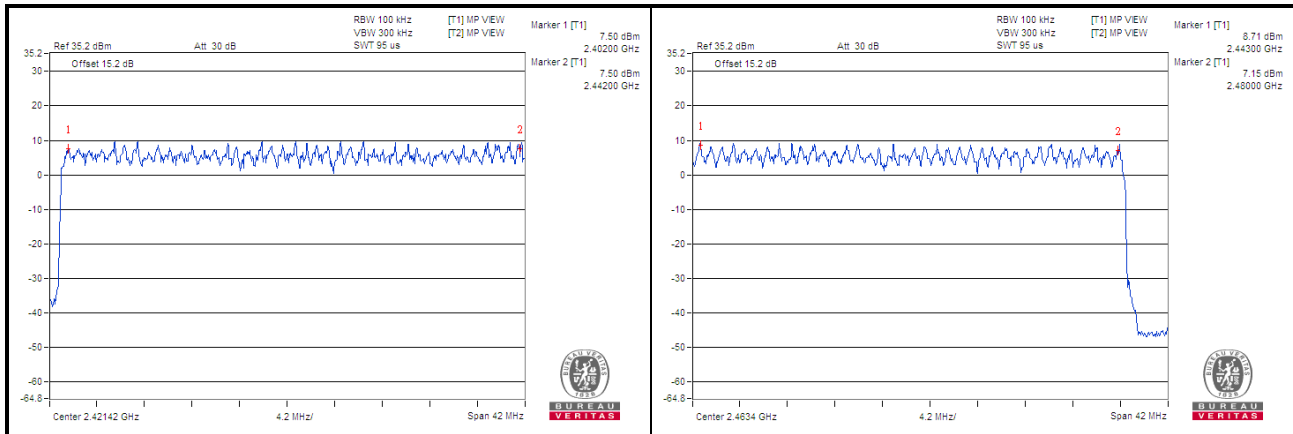
11.5 量測結果

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，符合低功率射頻電機技術規範之要求。

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(25)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 = 300 kHz，量測相鄰兩個頻道間的間隔。

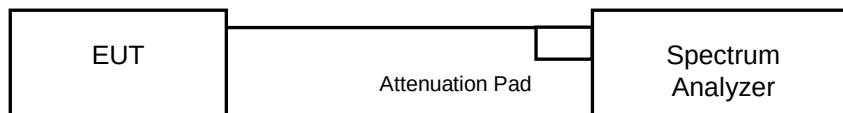
12.3 量測場強輻射之儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020

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	109 年 09 月 26 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	林冠澤		

GFSK

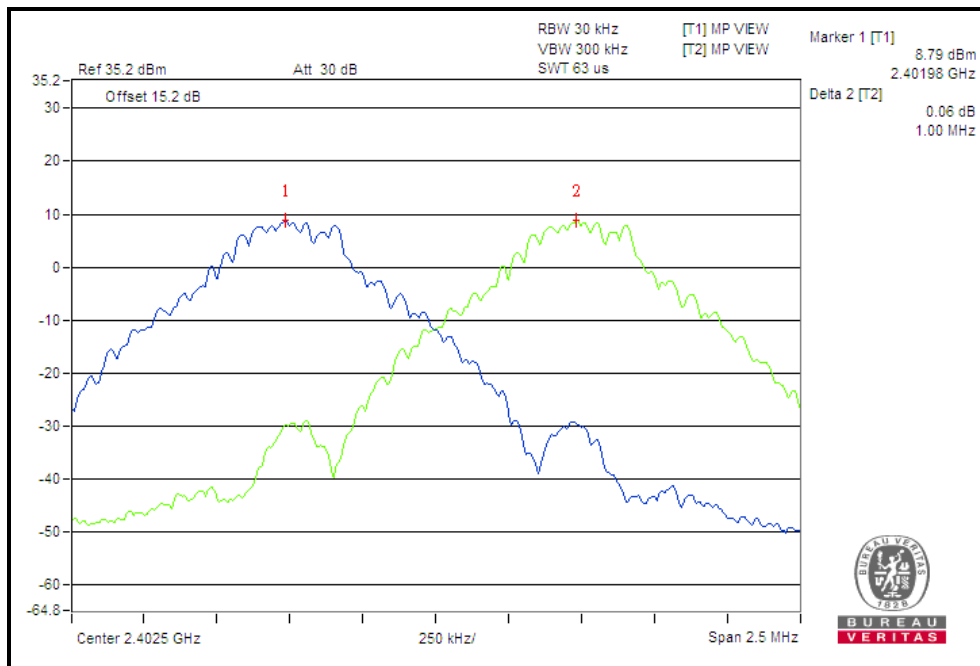
Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.00	0.96	0.64	Pass
39	2441	1.00	0.99	0.66	Pass
78	2480	1.00	1.00	0.67	Pass

8DPSK

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.00	1.30	0.87	Pass
39	2441	1.00	1.30	0.87	Pass
78	2480	1.00	1.30	0.87	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，符合低功率射頻電機技術規範之要求。

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(27)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。

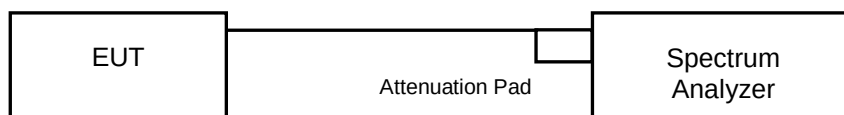
13.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020

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 = 322.32 times	0.444	143.1	0.4
DH3	27 (times / 5 sec) * 6.32 = 170.64 times	1.68	286.7	0.4
DH5	18 (times / 5 sec) * 6.32 = 113.76 times	2.949	335.5	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	50 (times / 5 sec) * 6.32 = 316 times	0.432	136.5	0.4
3DH3	26 (times / 5 sec) * 6.32 = 164.32 times	1.7	279.3	0.4
3DH5	16 (times / 5 sec) * 6.32 = 101.12 times	2.96	299.3	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，符合低功率射頻電機技術規範之要求。

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 = 3 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 kHz

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。

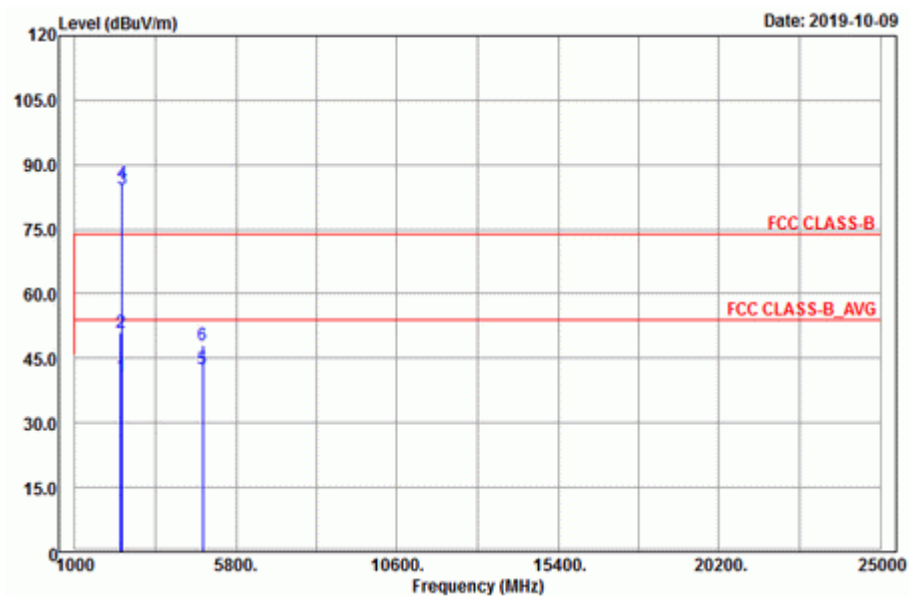
14.6 量測結果

14.6.1 發射諧波

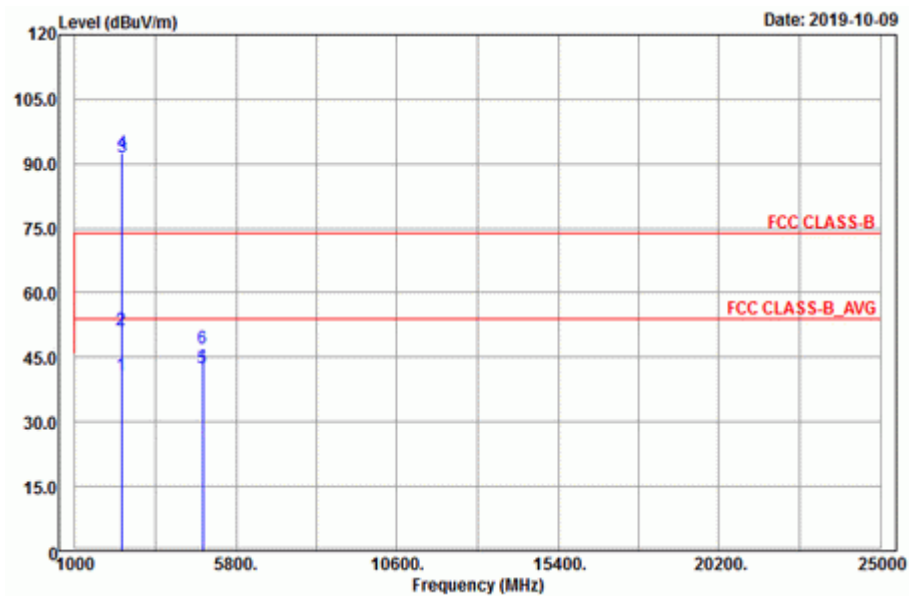
GFSK

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

Horizontal



Vertical



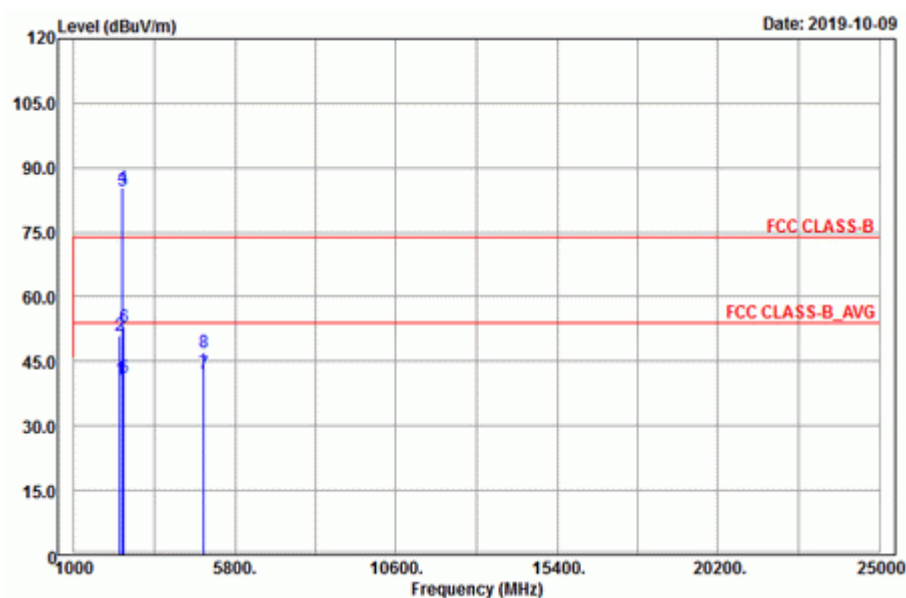
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2372.37	40.88	36.43	4.45	54	-13.12	163	165	Average
2372.37	51.14	46.69	4.45	74	-22.86	163	165	Peak
2402	84.35	79.83	4.52			163	165	Average
2402	85.74	81.22	4.52			163	165	Peak
4804	42.57	32.22	10.35	54	-11.43	164	188	Average
4804	48.07	37.72	10.35	74	-25.93	164	188	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
2389.47	40.8	36.31	4.49	54	-13.2	147	7	Average
2389.47	51.37	46.88	4.49	74	-22.63	147	7	Peak
2402	91.44	86.92	4.52			147	7	Average
2402	92.63	88.11	4.52			147	7	Peak
4804	42.37	32.02	10.35	54	-11.63	164	44	Average
4804	47.2	36.85	10.35	74	-26.8	164	44	Peak

Remarks:

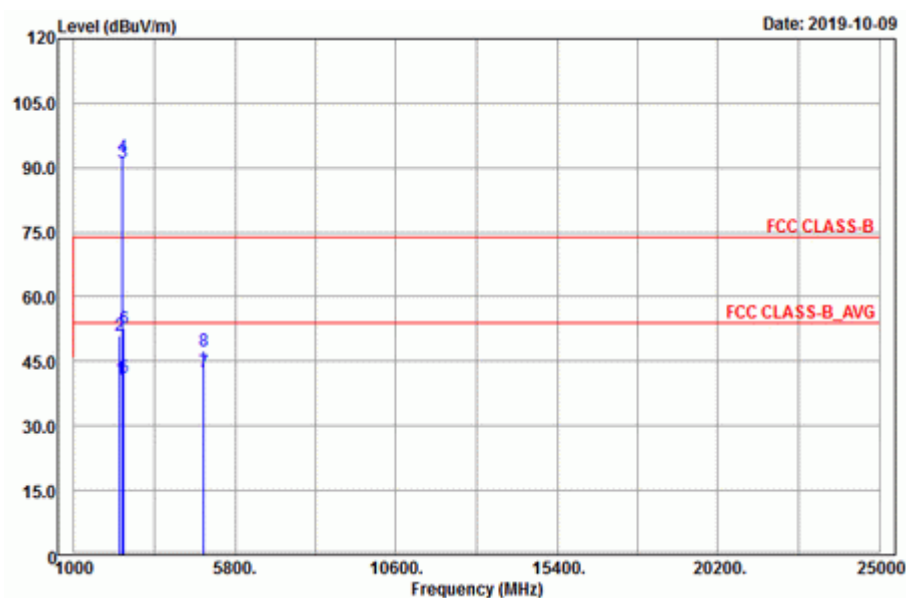
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2402 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



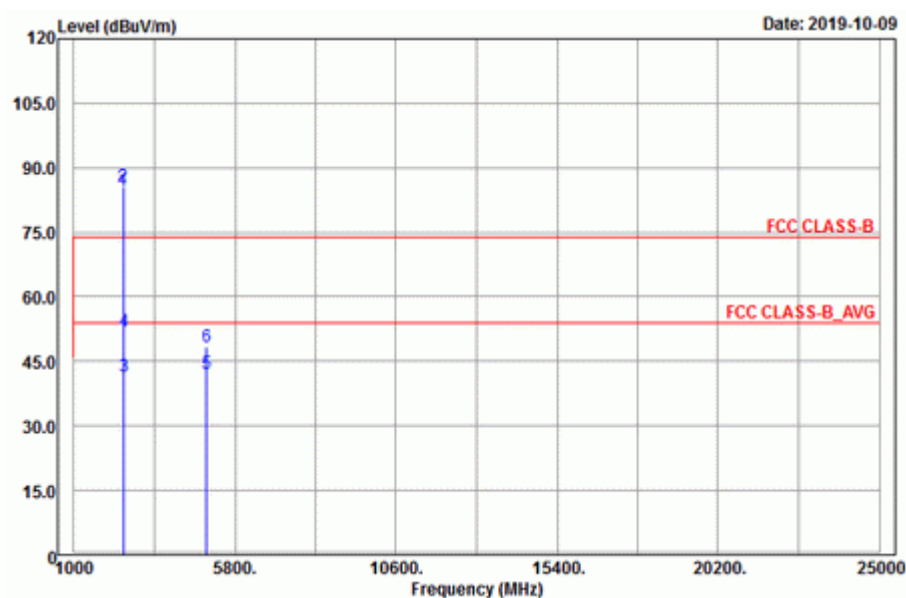
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2366.43	40.82	36.39	4.43	54	-13.18	163	165	Average
2366.43	50.87	46.44	4.43	74	-23.13	163	165	Peak
2440	84.59	80	4.59			163	165	Average
2440	85.27	80.68	4.59			163	165	Peak
2484.76	41.26	36.6	4.66	54	-12.74	163	165	Average
2484.76	52.85	48.19	4.66	74	-21.15	163	165	Peak
4880	42.07	31.86	10.21	54	-11.93	105	255	Average
4880	47.1	36.89	10.21	74	-26.9	105	255	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
2375.97	40.81	36.34	4.47	54	-13.19	147	7	Average
2375.97	51.06	46.59	4.47	74	-22.94	147	7	Peak
2440	91.38	86.79	4.59			147	7	Average
2440	92.56	87.97	4.59			147	7	Peak
2496.56	41.36	36.69	4.67	54	-12.64	147	7	Average
2496.56	52.5	47.83	4.67	74	-21.5	147	7	Peak
4880	42.36	32.15	10.21	54	-11.64	133	325	Average
4880	47.54	37.33	10.21	74	-26.46	133	325	Peak

Remarks:

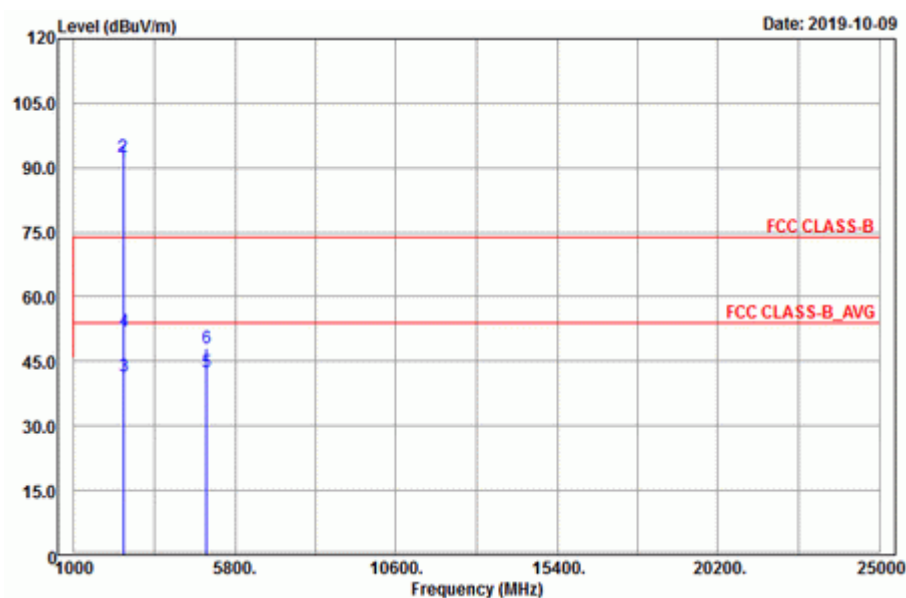
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2440 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

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	84.59	79.95	4.64			163	165	Average
2480	85.54	80.9	4.64			163	165	Peak
2498.16	41.42	36.75	4.67	54	-12.58	163	165	Average
2498.16	51.83	47.16	4.67	74	-22.17	163	165	Peak
4960	42.15	31.79	10.36	54	-11.85	154	44	Average
4960	48.48	38.12	10.36	74	-25.52	154	44	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	91.28	86.64	4.64			147	7	Average
2480	92.66	88.02	4.64			147	7	Peak
2490.12	41.4	36.72	4.68	54	-12.6	147	7	Average
2490.12	51.92	47.24	4.68	74	-22.08	147	7	Peak
4960	42.37	32.01	10.36	54	-11.63	133	325	Average
4960	47.95	37.59	10.36	74	-26.05	133	325	Peak

Remarks:

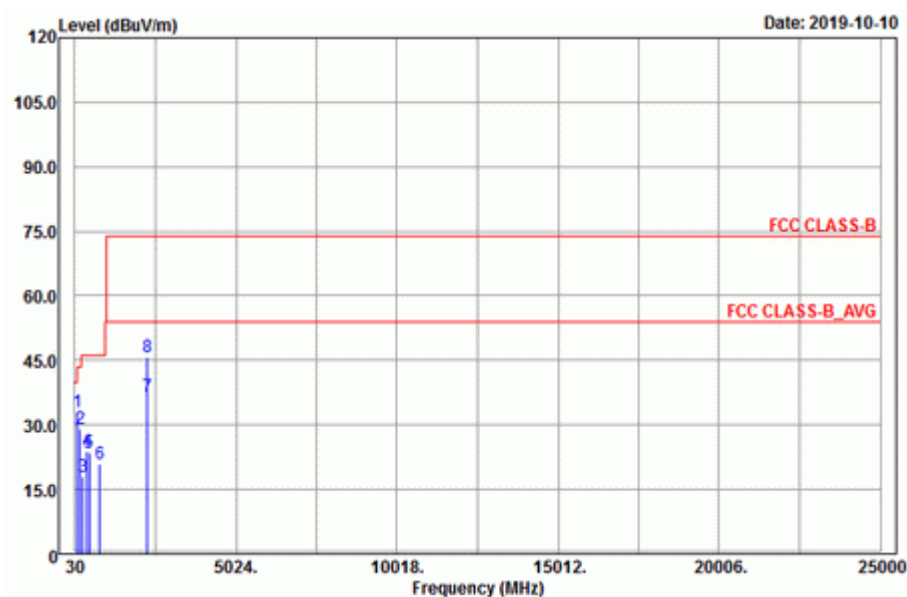
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2480 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

14.6.2 接收諧波

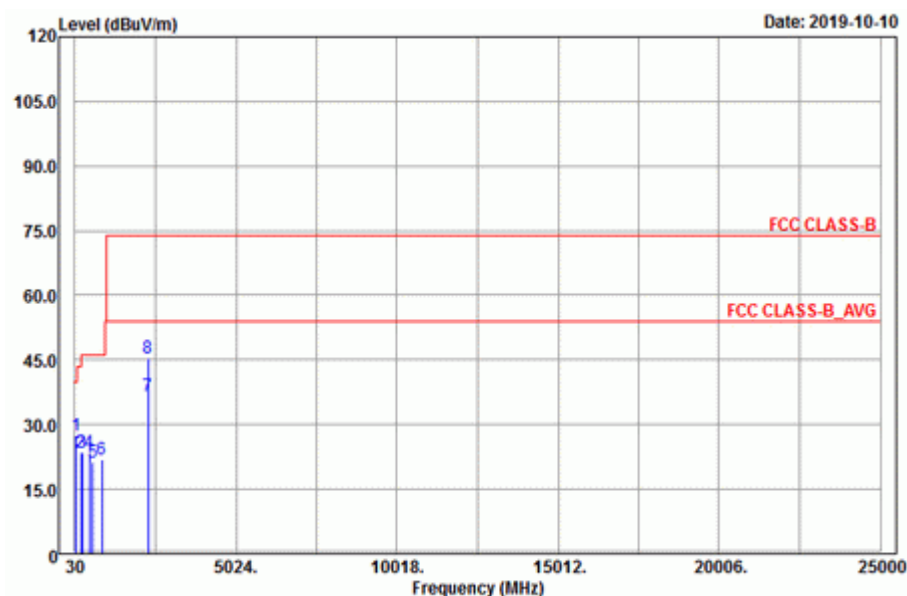
GFSK

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	30 MHz ~ 25 GHz
Input Power	110 Vac, 60 Hz	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	Charles Hsiao

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
98.85	32.99	50.32	-17.33	43.5	-10.51	124	155	Peak
192.54	29.1	47.62	-18.52	43.5	-14.4	192	54	Peak
275.97	17.85	34.3	-16.45	46	-28.15	175	275	Peak
411.3	23.87	37.6	-13.73	46	-22.13	141	113	Peak
477.8	23.69	36.43	-12.74	46	-22.31	126	265	Peak
803.3	21	28.55	-7.55	46	-25	180	25	Peak
2284	36.5	31.81	4.69	54	-17.5	124	118	Average
2284	45.92	41.23	4.69	74	-28.08	124	118	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
65.91	27.38	45.3	-17.92	40	-12.62	165	191	Peak
208.2	23.46	41.61	-18.15	43.5	-20.04	120	208	Peak
261.66	23.58	40.23	-16.65	46	-22.42	118	216	Peak
475	23.44	36.26	-12.82	46	-22.56	180	5	Peak
582.8	21.41	32.32	-10.91	46	-24.59	164	144	Peak
860	21.91	28.47	-6.56	46	-24.09	186	29	Peak
2290	36.64	31.88	4.76	54	-17.36	128	229	Average
2290	45.51	40.75	4.76	74	-28.49	128	229	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:

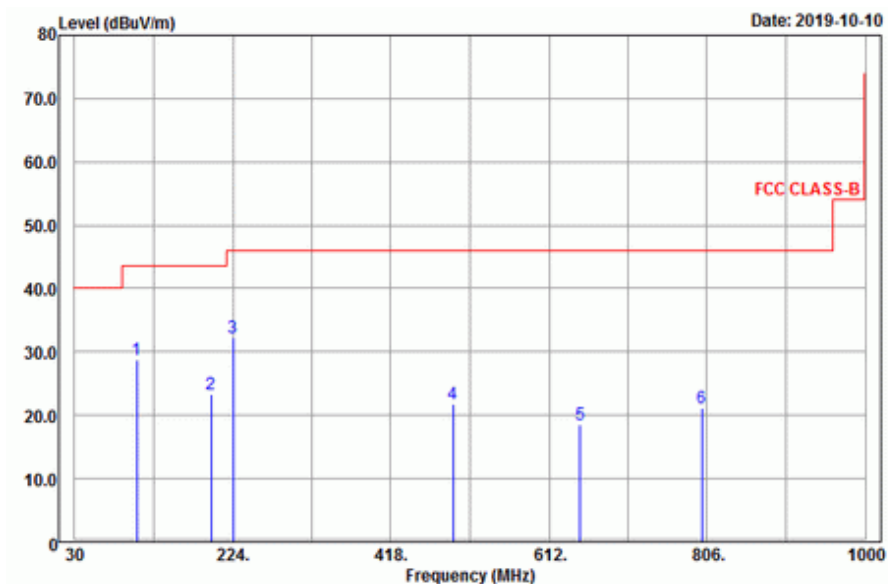
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Data:

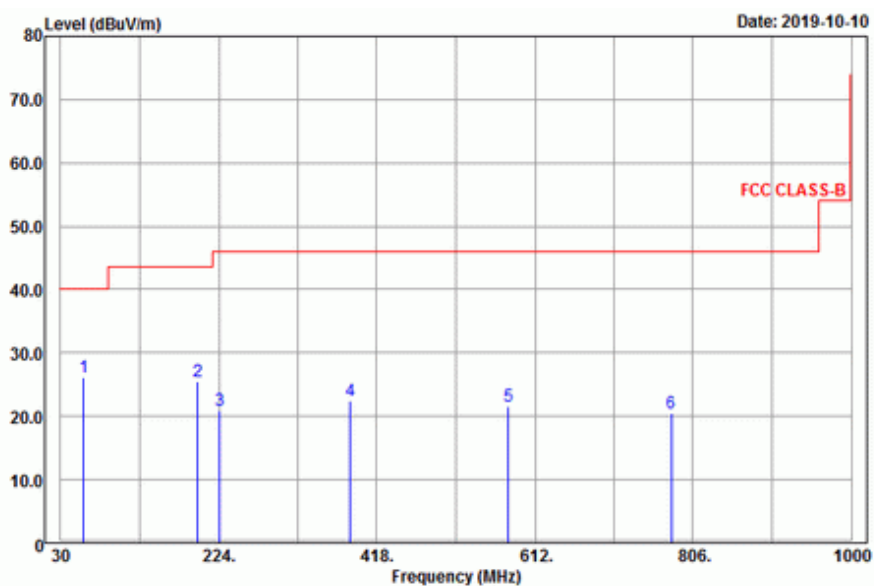
GFSK

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

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
106.14	28.8	46	-17.2	43.5	-14.7	101	1	Peak
197.4	23.42	41.73	-18.31	43.5	-20.08	154	185	Peak
224.67	32.19	49.81	-17.62	46	-13.81	167	155	Peak
494.6	21.78	34.19	-12.41	46	-24.22	164	15	Peak
650	18.53	28.6	-10.07	46	-27.47	105	285	Peak
799.8	21.08	28.67	-7.59	46	-24.92	199	295	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
58.08	26.09	41.95	-15.86	40	-13.91	136	265	Peak
198.48	25.58	43.86	-18.28	43.5	-17.92	164	189	Peak
224.94	20.94	38.56	-17.62	46	-25.06	154	224	Peak
385.4	22.47	36.64	-14.17	46	-23.53	165	85	Peak
579.3	21.64	32.58	-10.94	46	-24.36	164	292	Peak
779.5	20.43	28.55	-8.12	46	-25.57	180	8	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.

14.7 量測結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

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。

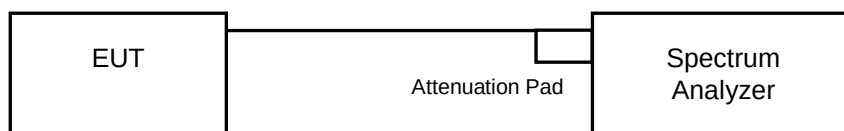
15.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020

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

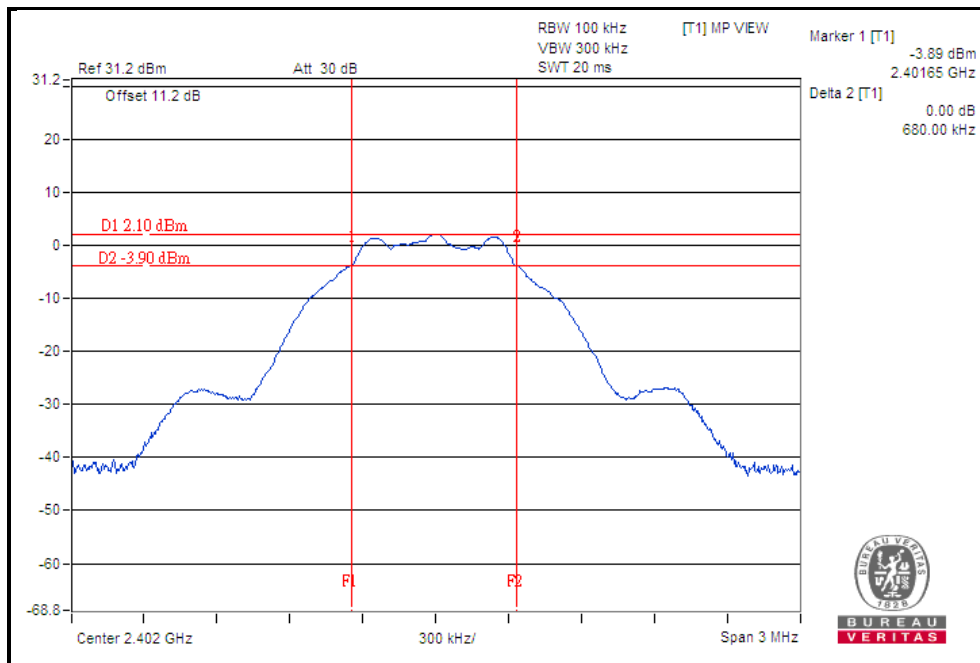


15.5 量測結果

操作模式	發射	測試日期	108 年 09 月 26 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	林冠澤		

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	0.68	0.5	Pass
19	2440	0.69	0.5	Pass
39	2480	0.69	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，符合低功率射頻電機技術規範之要求。

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。

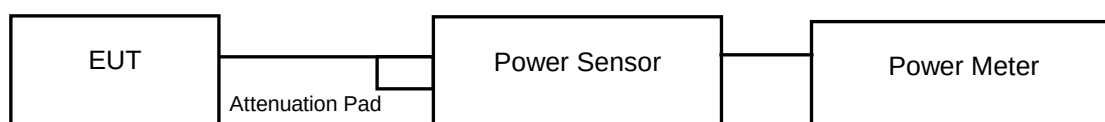
16.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Power Meter Anritsu	ML2495A	1232002	Dec. 17, 2018	Dec. 16, 2019
Power Sensor Anritsu	MA2411B	1207325	Dec. 17, 2018	Dec. 16, 2019

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.
- Measurement Bandwidth of ML2495A is 65 MHz greater than 6 dB bandwidth of emission.

16.4 測試配置



16.5 量測結果

操作模式	發射	測試日期	108 年 09 月 26 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	林冠澤		

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
0	2402	1.807	2.57	30	Pass
19	2440	1.816	2.59	30	Pass
39	2480	1.77	2.48	30	Pass

16.6 量測結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

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。

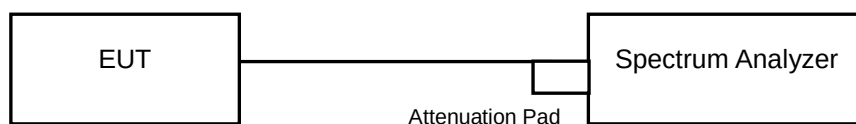
17.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020

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

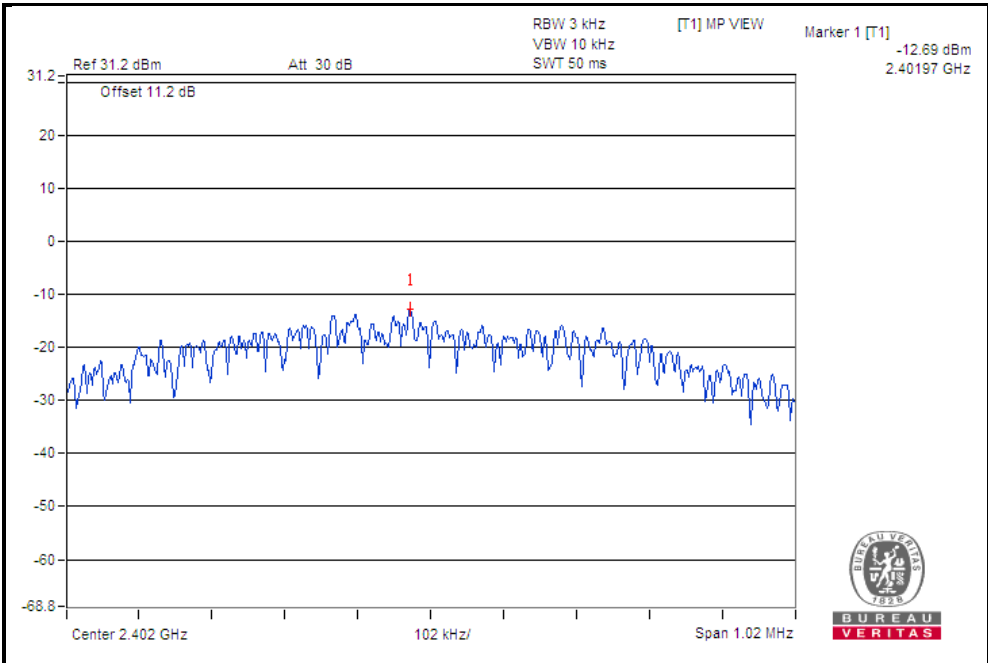


17.5 量測結果

操作模式	發射	測試日期	108 年 09 月 26 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	林冠澤		

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	2402	-12.69	8	Pass
19	2440	-12.71	8	Pass
39	2480	-13.04	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，符合低功率射頻電機技術規範之要求。

NFC 頻段測試紀錄結果

18 主波發射之量測

18.1 適用標準

請見本報告 3.1 節第(30)項規定。

18.2 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，另外接收天線分別置於 Parallel、Perpendicular、Ground-parallel 極化各執行測試一次，以紀錄最大場強值。

Measurement Instrument Setting

The following table is the setting of receiver

Frequency Range	Setting
9 kHz ~ 150 kHz	Quasi-Peak: RBW = 200 Hz
150 kHz ~ 30 MHz	Quasi-Peak: RBW = 9 kHz or 10 kHz
30 MHz ~ 1000 MHz	Peak: RBW = 120 kHz; Quasi-Peak: RBW = 120 kHz

18.3 量測儀器

Test Date: 2019/10/13

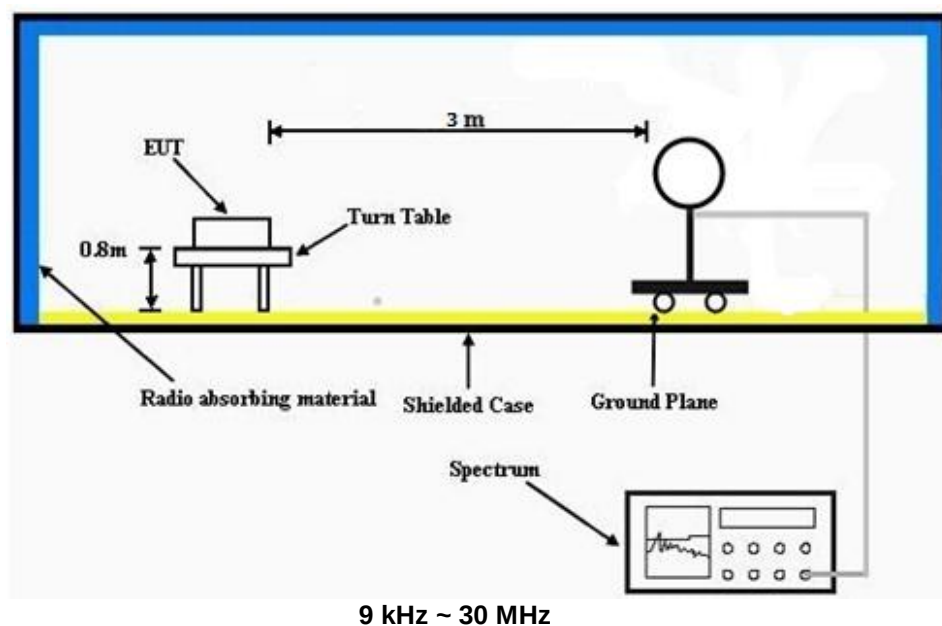
Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 18, 2019	Mar. 17, 2020
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 13, 2018	Dec. 12, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 23, 2018	Nov. 22, 2019
Loop Antenna	EM-6879	269	Sep. 16, 2019	Sep. 15, 2020
Preamplifier EMCI	EMC001340	980269	Jun. 17, 2019	Jun. 16, 2020
Preamplifier EMCI	EMC 330H	980112	Oct. 08, 2019	Oct. 07, 2020
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 08, 2019	Oct. 07, 2020
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
Temperature & Humidity Chamber	GTH-120-40-CP-AR	MAA1306-019	Sep. 06, 2019	Sep. 05, 2020
Power Supply Anritsu	2303	1341402	Oct. 18, 2018	Oct. 17, 2019

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 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 IC Site Registration No. is 7450F-10.
6. 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

18.4 測試配置



18.5 場強度之計算

場強之計算公式如下：

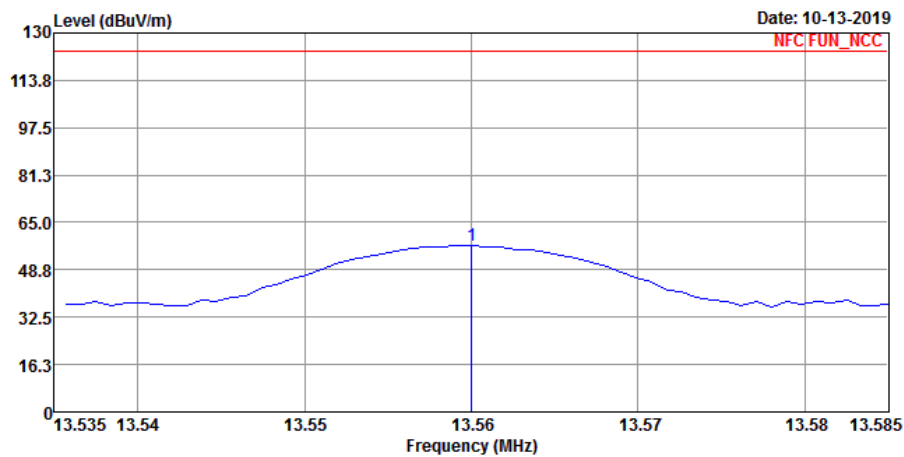
結果值 Emission level (dBuV/m)=機器讀值 Raw Value (dBuV) +校正因子 Correction Factor (dB/m)

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。

18.6 量測結果

EUT Test Condition		Measurement Detail	
Input Power	110 Vac, 60 Hz	Frequency Range	13.553 ~ 13.567 MHz
Environmental Conditions	25 deg. C, 65 % RH	Detector Function	Quasi-Peak (QP)
Tested By	Jisyoung Wang		

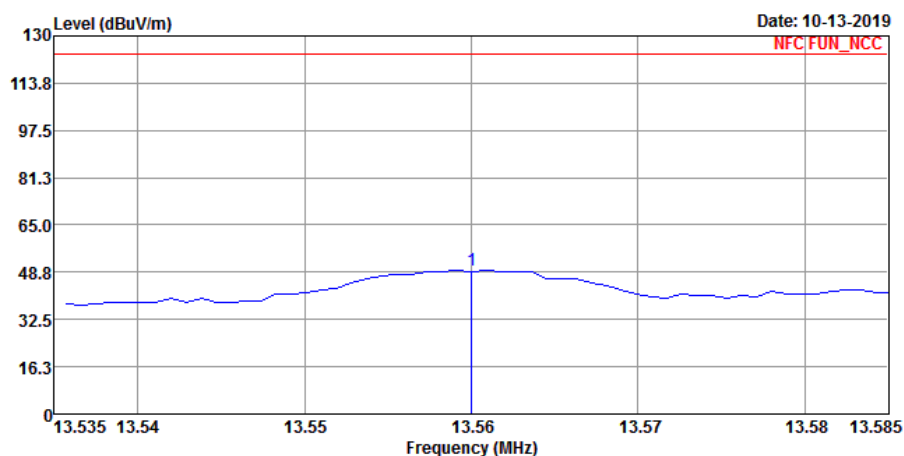


Antenna Polarity & Test Distance: Loop Antenna Parallel at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
13.56	57.08	35.23	21.85	124	-66.92	100	0	QP

Note:

- Emission level (dBuV/m) = Read Level (dBuV) + Factor (dB/m)
- The other emission levels were very low against the limit.
- Margin value = Emission level - Limit value
- 當測試距離較規定距離為近時，測試結果應以插補係數換算至規定距離之值
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
- Parallel: loop antenna 面向 EUT
 Perpendicular: loop antenna 與 EUT 垂直
 Ground-parallel: loop antenna 與地面平行

EUT Test Condition		Measurement Detail	
Input Power	110 Vac, 60 Hz	Frequency Range	13.553 ~ 13.567 MHz
Environmental Conditions	25 deg. C, 65 % RH	Detector Function	Quasi-Peak (QP)
Tested By	Jisyong Wang		

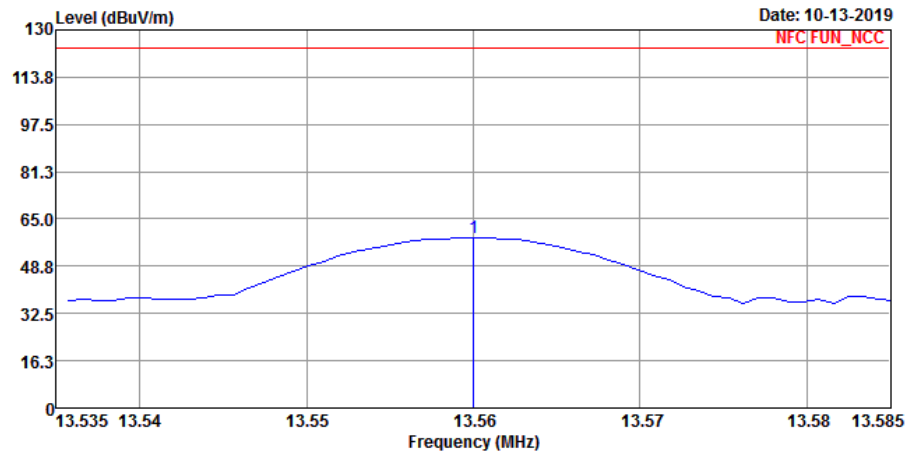


Antenna Polarity & Test Distance: Loop Antenna Perpendicular at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
13.56	49.23	27.38	21.85	124	-74.77	100	0	QP

Note:

1. Emission level (dBuV/m) = Read Level (dBuV) + Factor (dB/m)
2. The other emission levels were very low against the limit.
3. Margin value = Emission level - Limit value
4. 當測試距離較規定距離為近時，測試結果應以插補係數換算至規定距離之值
Limit @ 3 m = Limit @ 30 m + 40log(30 / 3) = Limit @ 30 m + 40
5. Parallel: loop antenna 面向 EUT
Perpendicular: loop antenna 與 EUT 垂直
Ground-parallel: loop antenna 與地面平行

EUT Test Condition		Measurement Detail	
Input Power	110 Vac, 60 Hz	Frequency Range	13.553 ~ 13.567 MHz
Environmental Conditions	25 deg. C, 65 % RH	Detector Function	Quasi-Peak (QP)
Tested By	Jisyong Wang		



Antenna Polarity & Test Distance: Loop Antenna Ground-parallel 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
13.56	58.47	36.62	21.85	124	-65.53	100	0	QP

Note:

1. Emission level (dBuV/m) = Read Level (dBuV) + Factor (dB/m)
2. The other emission levels were very low against the limit.
3. Margin value = Emission level - Limit value
4. 當測試距離較規定距離為近時，測試結果應以插補係數換算至規定距離之值
Limit @ 3 m = Limit @ 30 m + 40log(30 / 3) = Limit @ 30 m + 40
5. Parallel: loop antenna 面向 EUT
Perpendicular: loop antenna 與 EUT 垂直
Ground-parallel: loop antenna 與地面平行

18.7 量測結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

19 不必要之發射量測

19.1 適用標準

請見本報告 3.1 節第(31)項規定。

19.2 量測方法

9 kHz ~ 30 MHz 量測：

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，另外接收天線分別置於 Parallel、Perpendicular、Ground-parallel 極化各執行測試一次，以紀錄最大場強值。

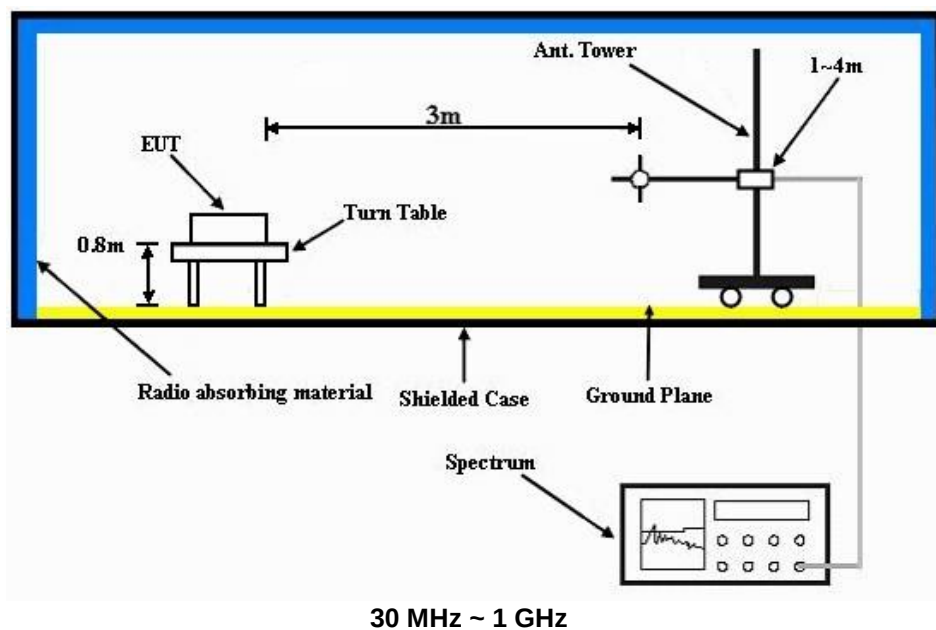
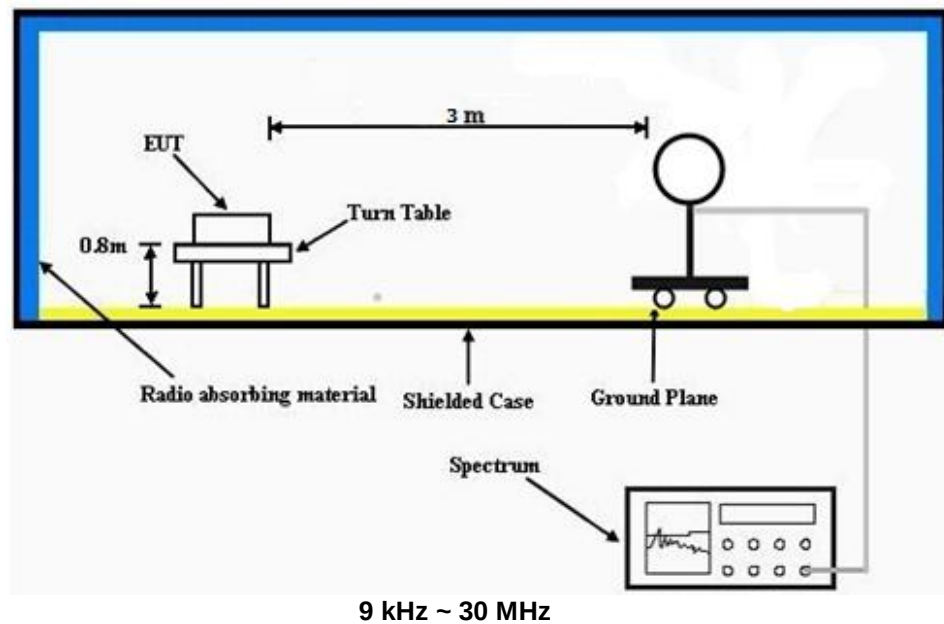
30 MHz ~ 1 GHz 量測：

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。

19.3 量測儀器

同 4.3 節

19.4 測試配置



19.5 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)

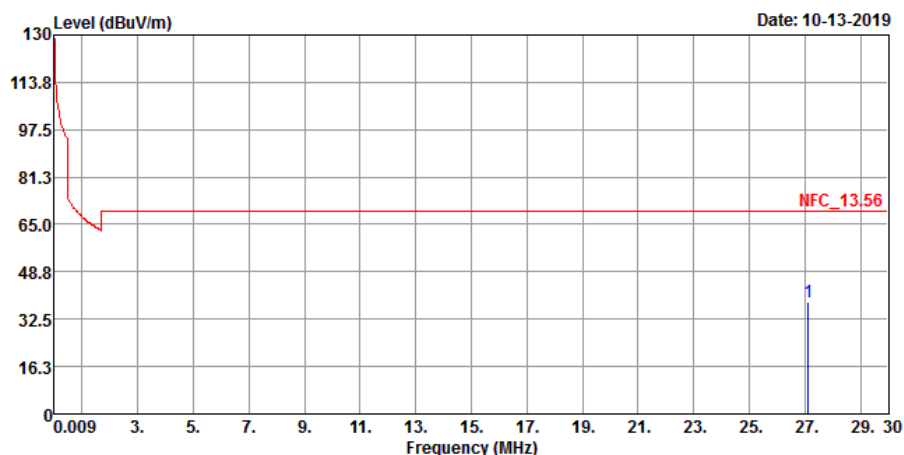
餘裕度 Margin(dB) = 結果值 Emission level (dBuV/m) - 限制值 Limit value (dBuV/m)

量測結果請見下頁。

19.6 量測結果

<Below 30 MHz>

EUT Test Condition		Measurement Detail	
Input Power	110 Vac, 60 Hz	Operating Method	Transmitter
Environmental Conditions	25 deg. C, 65 % RH	Detector Function	Quasi-Peak (QP)
Tested By	Jisyong Wang		

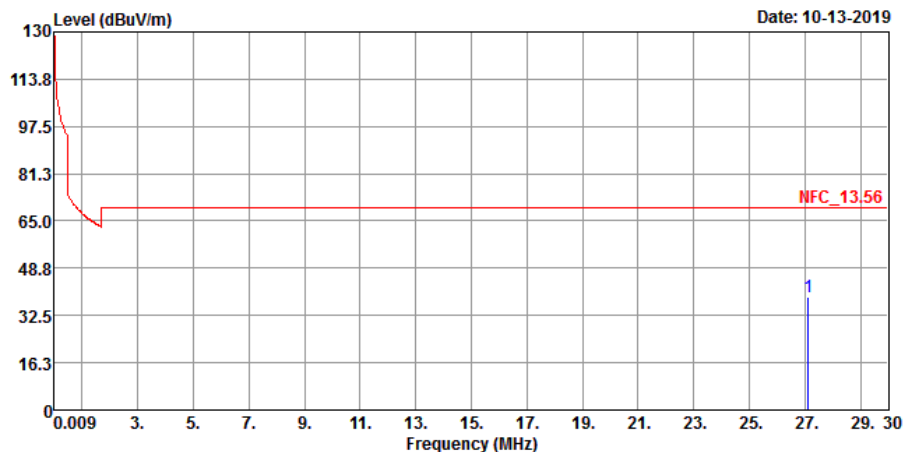


Antenna Polarity & Test Distance: Loop Antenna Parallel at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
27.12	38.31	16.15	22.16	69.54	-31.23	100	0	QP

Note:

- Emission level (dBuV/m) = Read Level (dBuV) + Factor (dB/m)
- The other emission levels were very low against the limit.
- Margin value = Emission level - Limit value
- 當測試距離較規定距離為近時，測試結果應以插補係數換算至規定距離之值
 $\text{Limit @ 3 m} = \text{Limit @ 300 m} + 40\log(300 / 3) = \text{Limit @ 300 m} + 80$
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
- Parallel: loop antenna 面向 EUT
 Perpendicular: loop antenna 與 EUT 垂直
 Ground-parallel: loop antenna 與地面平行

EUT Test Condition		Measurement Detail	
Input Power	110 Vac, 60 Hz	Operating Method	Transmitter
Environmental Conditions	25 deg. C, 65 % RH	Detector Function	Quasi-Peak (QP)
Tested By	Jisyong Wang		

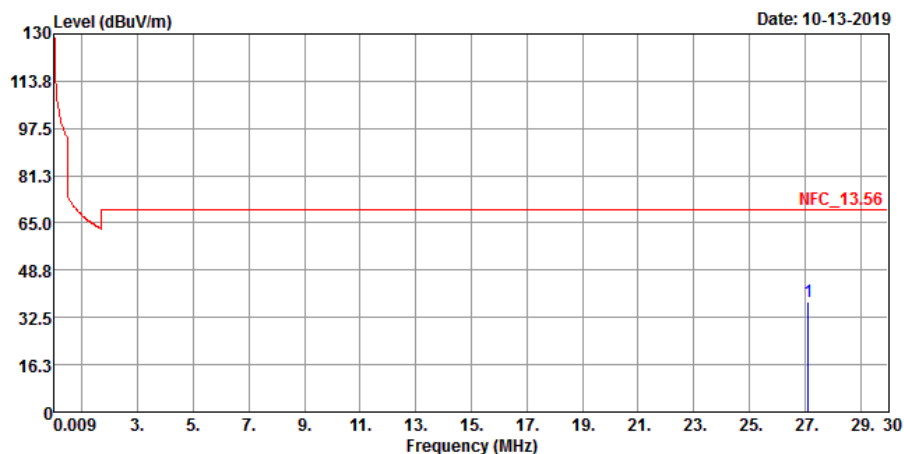


Antenna Polarity & Test Distance: Loop Antenna Perpendicular at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
27.12	38.92	16.76	22.16	69.54	-30.62	100	360	QP

Note:

1. Emission level (dBuV/m) = Read Level (dBuV) + Factor (dB/m)
2. The other emission levels were very low against the limit.
3. Margin value = Emission level - Limit value
4. 當測試距離較規定距離為近時，測試結果應以插補係數換算至規定距離之值
 $\text{Limit @ 3 m} = \text{Limit @ 300 m} + 40\log(300 / 3) = \text{Limit @ 300 m} + 80$
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
5. Parallel: loop antenna 面向 EUT
 Perpendicular: loop antenna 與 EUT 垂直
 Ground-parallel: loop antenna 與地面平行

EUT Test Condition		Measurement Detail	
Input Power	110 Vac, 60 Hz	Operating Method	Transmitter
Environmental Conditions	25 deg. C, 65 % RH	Detector Function	Quasi-Peak (QP)
Tested By	Jisyong Wang		

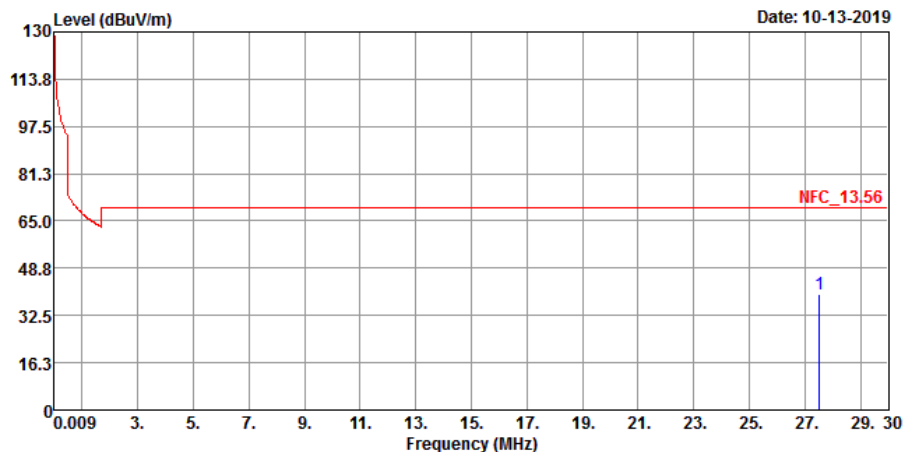


Antenna Polarity & Test Distance: Loop Antenna Ground-parallel at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
27.12	38.04	15.88	22.16	69.54	-31.5	100	0	QP

Note:

- Emission level (dBuV/m) = Read Level (dBuV) + Factor (dB/m)
- The other emission levels were very low against the limit.
- Margin value = Emission level - Limit value
- 當測試距離較規定距離為近時，測試結果應以插補係數換算至規定距離之值
 $\text{Limit @ 3 m} = \text{Limit @ 300 m} + 40\log(300 / 3) = \text{Limit @ 300 m} + 80$
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
- Parallel: loop antenna 面向 EUT
 Perpendicular: loop antenna 與 EUT 垂直
 Ground-parallel: loop antenna 與地面平行

EUT Test Condition		Measurement Detail	
Input Power	110 Vac, 60 Hz	Operating Method	Receiver
Environmental Conditions	25 deg. C, 65 % RH	Detector Function	Quasi-Peak (QP)
Tested By	Jisyong Wang		

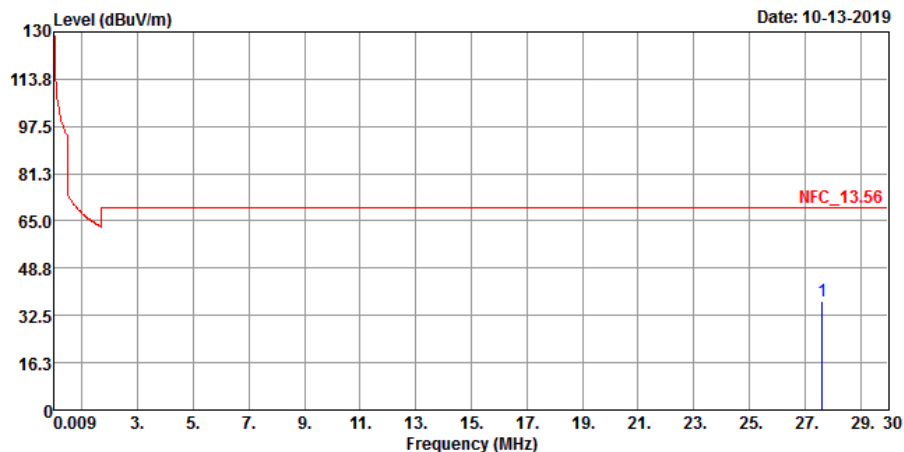


Antenna Polarity & Test Distance: Loop Antenna Parallel at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
27.541	39.77	17.61	22.16	69.54	-29.77	100	360	QP

Note:

1. Emission level (dBuV/m) = Read Level (dBuV) + Factor (dB/m)
2. The other emission levels were very low against the limit.
3. Margin value = Emission level - Limit value
4. 當測試距離較規定距離為近時，測試結果應以插補係數換算至規定距離之值
 $\text{Limit @ 3 m} = \text{Limit @ 300 m} + 40\log(300 / 3) = \text{Limit @ 300 m} + 80$
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
5. Parallel: loop antenna 面向 EUT
 Perpendicular: loop antenna 與 EUT 垂直
 Ground-parallel: loop antenna 與地面平行

EUT Test Condition		Measurement Detail	
Input Power	110 Vac, 60 Hz	Operating Method	Receiver
Environmental Conditions	25 deg. C, 65 % RH	Detector Function	Quasi-Peak (QP)
Tested By	Jisyong Wang		

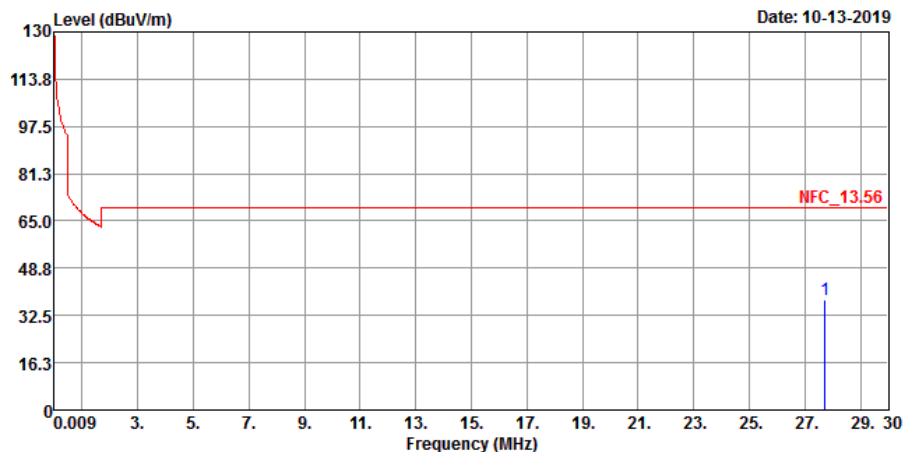


Antenna Polarity & Test Distance: Loop Antenna Perpendicular at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
27.623	37.33	15.17	22.16	69.54	-32.21	100	360	QP

Note:

- Emission level (dBuV/m) = Read Level (dBuV) + Factor (dB/m)
- The other emission levels were very low against the limit.
- Margin value = Emission level - Limit value
- 當測試距離較規定距離為近時，測試結果應以插補係數換算至規定距離之值
 $\text{Limit @ 3 m} = \text{Limit @ 300 m} + 40\log(300 / 3) = \text{Limit @ 300 m} + 80$
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
- Parallel: loop antenna 面向 EUT
 Perpendicular: loop antenna 與 EUT 垂直
 Ground-parallel: loop antenna 與地面平行

EUT Test Condition		Measurement Detail	
Input Power	110 Vac, 60 Hz	Operating Method	Receiver
Environmental Conditions	25 deg. C, 65 % RH	Detector Function	Quasi-Peak (QP)
Tested By	Jisyong Wang		



Antenna Polarity & Test Distance: Loop Antenna Ground-parallel 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
27.72	37.77	15.61	22.16	69.54	-31.77	100	0	QP

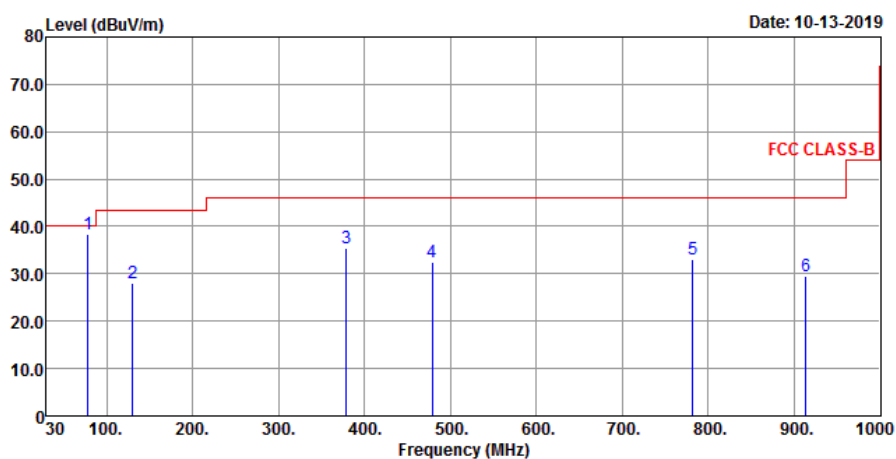
Note:

- Emission level (dBuV/m) = Read Level (dBuV) + Factor (dB/m)
- The other emission levels were very low against the limit.
- Margin value = Emission level - Limit value
- 當測試距離較規定距離為近時，測試結果應以插補係數換算至規定距離之值
 $\text{Limit @ 3 m} = \text{Limit @ 300 m} + 40\log(300 / 3) = \text{Limit @ 300 m} + 80$
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
- Parallel: loop antenna 面向 EUT
 Perpendicular: loop antenna 與 EUT 垂直
 Ground-parallel: loop antenna 與地面平行

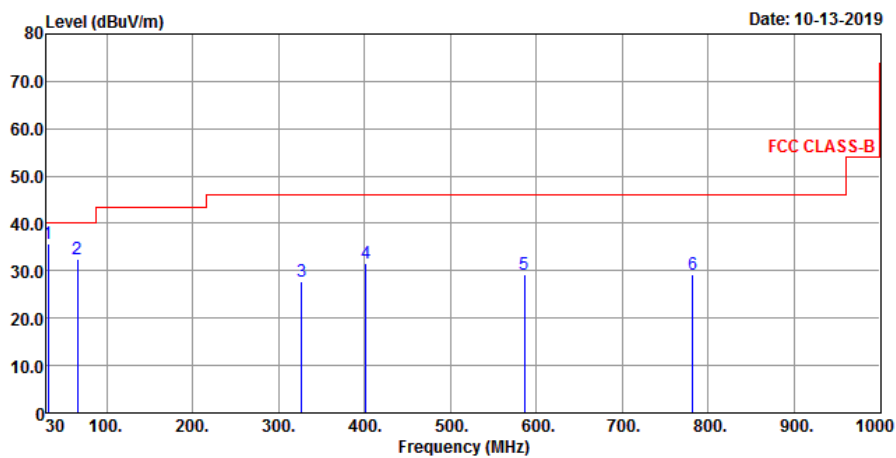
<Above 30 MHz>

EUT Test Condition		Measurement Detail	
Input Power	110 Vac, 60 Hz	Operating Method	Transmitter
Environmental Conditions	25 deg. C, 65 % RH	Detector Function	Quasi-Peak (QP)
Tested By	Jisyong Wang		

Horizontal



Vertical



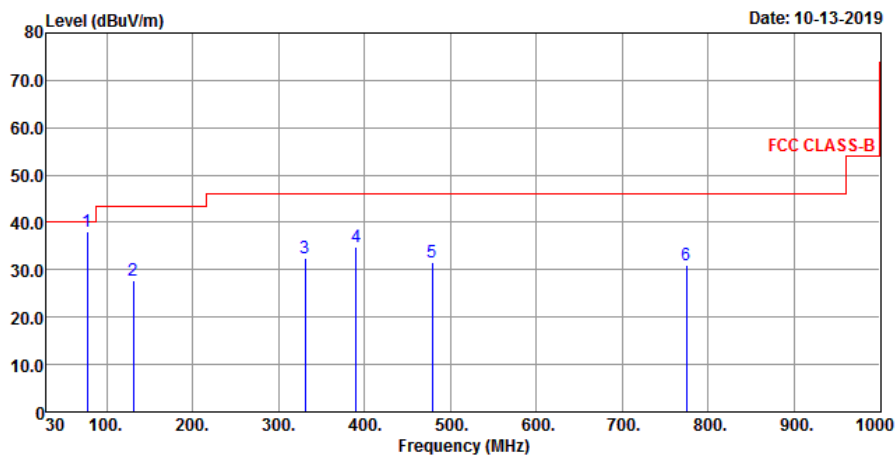
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
78.5	38.25	59.56	-21.31	40	-1.75	165	111	QP
129.91	28.1	46.92	-18.82	43.5	-15.4	154	251	QP
379.2	35.46	50.19	-14.73	46	-10.54	195	285	QP
479.11	32.4	44.31	-11.91	46	-13.6	145	231	QP
781.75	32.96	37.53	-4.57	46	-13.04	195	284	QP
913.67	29.44	33.28	-3.84	46	-16.56	145	232	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
31.94	35.82	53.03	-17.21	40	-4.18	154	251	QP
65.89	32.56	51.75	-19.19	40	-7.44	165	231	QP
326.82	27.78	43.1	-15.32	46	-18.22	195	265	QP
401.51	31.45	45.38	-13.93	46	-14.55	184	145	QP
585.81	29.12	37.88	-8.76	46	-16.88	132	265	QP
781.75	29.18	33.75	-4.57	46	-16.82	145	152	QP

Remarks:

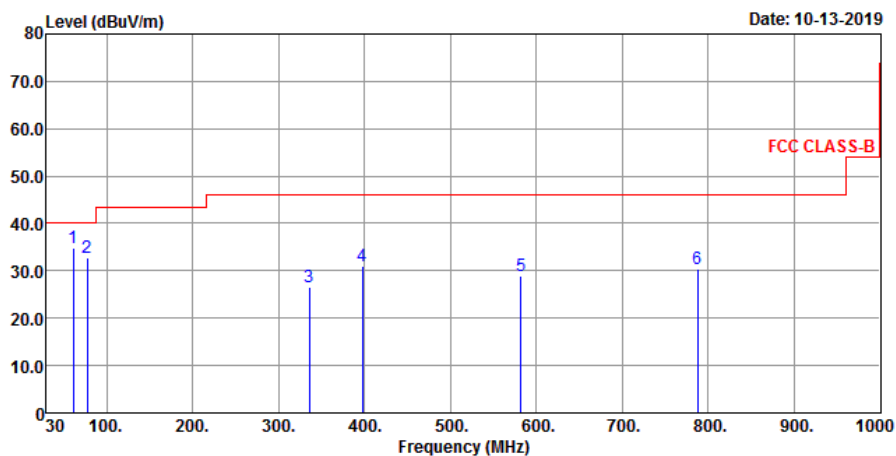
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Input Power	110 Vac, 60 Hz	Operating Method	Receiver
Environmental Conditions	25 deg. C, 65 % RH	Detector Function	Quasi-Peak (QP)
Tested By	Jisyong Wang		

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
77.53	38.21	59.45	-21.24	40	-1.79	165	231	QP
130.88	27.85	46.85	-19	43.5	-15.65	185	265	QP
330.7	32.33	47.45	-15.12	46	-13.67	145	123	QP
389.87	34.98	49.48	-14.5	46	-11.02	102	265	QP
479.11	31.67	43.58	-11.91	46	-14.33	185	265	QP
774.96	30.99	35.46	-4.47	46	-15.01	145	132	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
61.04	34.86	53.66	-18.8	40	-5.14	195	265	QP
77.53	32.72	53.96	-21.24	40	-7.28	102	265	QP
335.55	26.64	41.64	-15	46	-19.36	145	285	QP
397.63	31.03	45.15	-14.12	46	-14.97	132	232	QP
581.93	29.04	38.11	-9.07	46	-16.96	158	265	QP
787.57	30.37	35.14	-4.77	46	-15.63	198	265	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.

19.7 量測結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

20 天線之要求

20.1 適用標準

請見本報告 3.1 節第(33)項的規定。

20.2 天線規格

此待測物使用 Loop 天線，無使用天線接頭。

20.3 結果判定

符合低功率射頻電機技術規範之要求。

21 頻率容許差度之量測

21.1 適用標準

請見本報告 3.1 節第(32)項的規定。

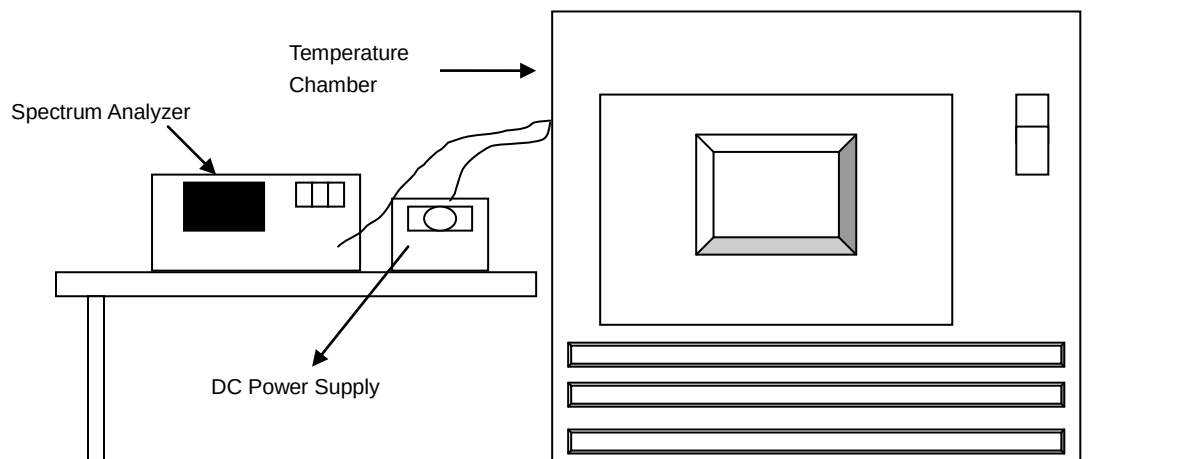
21.2 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020
Temperature & Humidity Chamber	GTH-120-40-C P-AR	MAA1306-019	Sep. 06, 2019	Sep. 05, 2020
Power Supply Anritsu	2303	1341402	Oct. 18, 2018	Oct. 17, 2019

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 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 $k=2$.

21.3 測試配置



21.4 量測結果

操作模式	發射	測試日期	109 年 10 月 13 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	王紀雄		

AFC Frequency Error vs. Temperature Limit : $\pm 0.01\%$									
Temp. (°C)	Power Supply (Vdc)	0 minute		2 minute		5 minute		10 minute	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	3.85	13.56006	0.00044	13.56006	0.00044	13.56005	0.00037	13.56007	0.00052
40	3.85	13.56005	0.00037	13.56005	0.00037	13.56005	0.00037	13.56005	0.00037
30	3.85	13.56	0.00000	13.56	0.00000	13.56	0.00000	13.56	0.00000
20	3.85	13.55992	-0.00059	13.55994	-0.00044	13.55993	-0.00052	13.55993	-0.00052
10	3.85	13.56006	0.00044	13.56006	0.00044	13.56006	0.00044	13.56005	0.00037
0	3.85	13.55995	-0.00037	13.55995	-0.00037	13.55995	-0.00037	13.55995	-0.00037
-10	3.85	13.55998	-0.00015	13.55998	-0.00015	13.55997	-0.00022	13.55998	-0.00015

AFC Frequency Error vs. Voltage Limit : $\pm 0.01\%$									
Temp. (°C)	Power Supply (Vdc)	0 minute		2 minute		5 minute		10 minute	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	4.428	13.55992	-0.00059	13.55994	-0.00044	13.55993	-0.00052	13.55993	-0.00052
	3.85	13.55992	-0.00059	13.55994	-0.00044	13.55993	-0.00052	13.55993	-0.00052
	3.273	13.55992	-0.00059	13.55994	-0.00044	13.55993	-0.00052	13.55993	-0.00052

註 1：此待測物電源輸入使用 Dummy Battery 進行測試

註 2：此電壓為客戶宣告

註 3：The EUT would shut down automatically as below -20°C.

21.5 量測結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

22 電源線傳導干擾之量測

22.1 適用標準

請見本報告 3.1 節第(1)項的規定。

22.2 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。

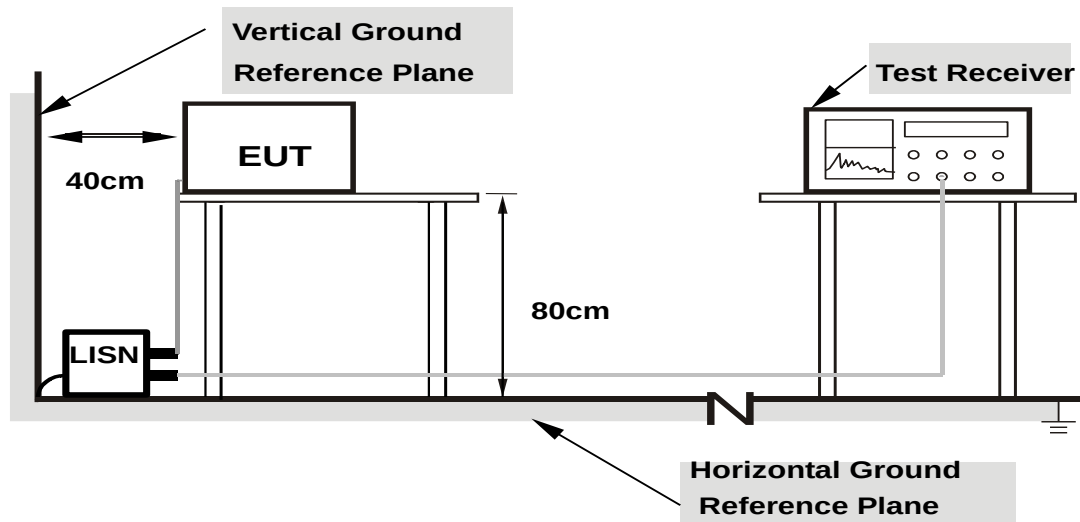
22.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 10, 2018	Dec. 09, 2019
RF signal cable Woken	5D-FB	Cable-cond1-01	Sep. 05, 2019	Sep. 04, 2020
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 21, 2019	Feb. 20, 2020
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 22, 2019	Aug. 21, 2020
Software ADT	BV ADT_Cond_ 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 1.
3. The VCCI Site Registration No. is C-12040.
4. The measurement uncertainty is 2.94 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.

22.4 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

22.5 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

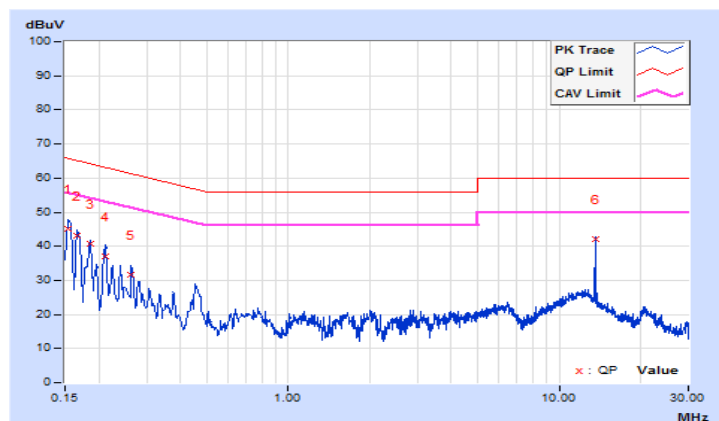
22.6 量測結果

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	量測場地溫濕度	25°C, 65%RH
測試者	王紀雄	測試日期	2019/10/13

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	0.15391	9.67	35.31	18.40	44.98	28.07	65.79	55.79	-20.81	-27.72
2	0.16569	9.67	33.51	16.78	43.18	26.45	65.17	55.17	-21.99	-28.72
3	0.18508	9.66	30.97	15.35	40.63	25.01	64.25	54.25	-23.62	-29.24
4	0.21170	9.66	27.23	11.60	36.89	21.26	63.14	53.14	-26.25	-31.88
5	0.26346	9.67	22.14	1.96	31.81	11.63	61.32	51.32	-29.51	-39.69
6	13.56130	9.95	32.09	20.17	42.04	30.12	60.00	50.00	-17.96	-19.88

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)

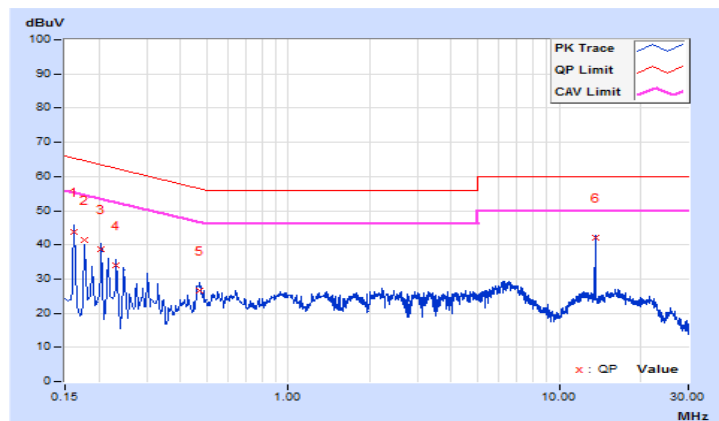


量測頻率範圍	150kHz ~ 30MHz	檢測器與頻寬	準峰值 (QP) / 平均值 (AV), 9kHz
量測電壓值	110Vac, 60Hz	量測場地溫濕度	25°C, 65%RH
測試者	王紀雄	測試日期	2019/10/13

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	0.16173	9.64	33.98	17.14	43.62	26.78	65.37	55.37	-21.75	-28.59
2	0.17744	9.64	31.92	15.75	41.56	25.39	64.60	54.60	-23.04	-29.21
3	0.20474	9.64	29.07	14.95	38.71	24.59	63.42	53.42	-24.71	-28.83
4	0.23216	9.64	24.50	10.45	34.14	20.09	62.37	52.37	-28.23	-32.28
5	0.47062	9.66	16.94	1.00	26.60	10.66	56.50	46.50	-29.90	-35.84
6	13.56130	9.97	32.03	20.06	42.00	30.03	60.00	50.00	-18.00	-19.97

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)



22.7 量測結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

23 電波暴露量之評估

23.1 適用標準

請見本報告 3.1 節第(8)&(19)&(28)項的規定。

23.2 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/cm^2

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

23.3 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
WLAN 2412 ~ 2472	19.17	-5.50	20	0.005	1	Pass
Bluetooth 2402 ~ 2480	11.46	-5.50	20	0.001	1	Pass

24 待測物照片

請參照 BV CPS 報告編號：190923C21

25 檢測實驗室基本資料

立德國際商品試驗有限公司桃園分公司提供產業界最佳的檢測以及諮詢服務。
本公司為 ISO/IEC 17025 認可實驗室。

如您有任何問題或建議，請與下列實驗室聯絡：

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

您也可以在我們的網站內找到各實驗室的地圖。

---END---