

低功率射頻電機測試報告

報告編號:

RT190409C28

申請者

Fossil Group, Inc.

產品名稱

Smart Watch/智慧型手錶

型號

DW10M2

製造廠商

Fossil Group, Inc.

商標或廠牌

MICHAEL KORS

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
RT190409C28	Original release	108 年 05 月 15 日

證 明 書

發行日期：108 年 05 月 15 日

產 品 名 稱：Smart Watch/智慧型手錶
商 標：MICHAEL KORS
型 號：DW10M2
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：DW10M2)，收件日期 108 年 03 月 13 日，於 108 年 03 月 13 日至 108 年 05 月 09 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 05 月 15 日

審 核 者：



邱碧民 / 專案工程師

， 日 期： 108 年 05 月 15 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, TEXAS 75080 USA

產品名稱: Smart Watch/智慧型手錶

廠牌: MICHAEL KORS

型號: DW10M2

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	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：	DW10M2		
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,π/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	
發射功率：	Wireless LAN	Peak Power	Average Power
		802.11b: 18.36 dBm 802.11g: 19.39 dBm 802.11n (HT20): 19.14 dBm	802.11b: 15.56 dBm 802.11g: 10.63 dBm 802.11n (HT20): 10.61 dBm
		Bluetooth EDR	11.90 dBm
	Bluetooth LE	2.88 dBm	2.36 dBm
發射功率 (電場強度)：	NFC	49.1 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	-6.21
Bluetooth	2402 ~ 2480				N/A	-6.21
NFC	13.56	Loop	N/A	N/A	N/A	-

3. 此待測設備搭配使用之配件請參閱產品照編號: 190409C28

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	GFSK: Ch 78
其它不必要之訊號	GFSK: Ch 78	GFSK: Ch 78
2402 ~ 2480 MHz (Bluetooth LE)		
1 GHz 以上量測	Ch 0, 19, 39	Ch 39
其它不必要之訊號	Ch 39	Ch 39
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 F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	BT + USB Cable (with charging dock) + Adapter
2	BT LE + USB Cable (with charging dock) + Adapter
3	WLAN 2.4G (802.11n (HT20) Ch 13) + 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 = $8.210/8.415 = 0.976$, Duty factor = $10 * \log(1/0.976) = 0.11$

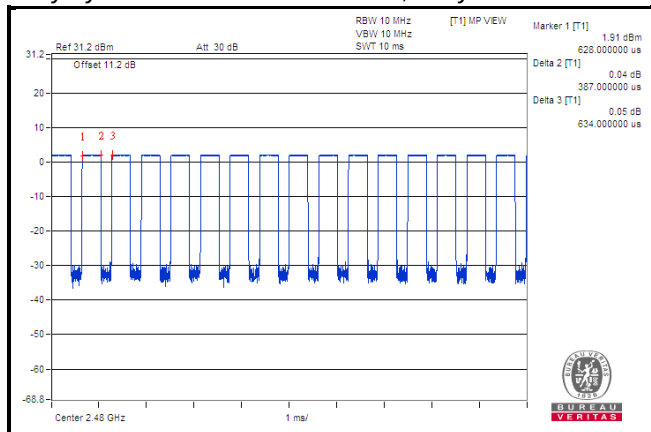
802.11g: Duty cycle = $1.360/1.562 = 0.871$, Duty factor = $10 * \log(1/0.871) = 0.60$

802.11n (HT20): Duty cycle = $1.267/1.477 = 0.858$, Duty factor = $10 * \log(1/0.858) = 0.67$



BT LE 频段

Duty cycle = $0.387/0.634 = 0.610$, Duty factor = $10 * \log(1/0.610) = 2.15$



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

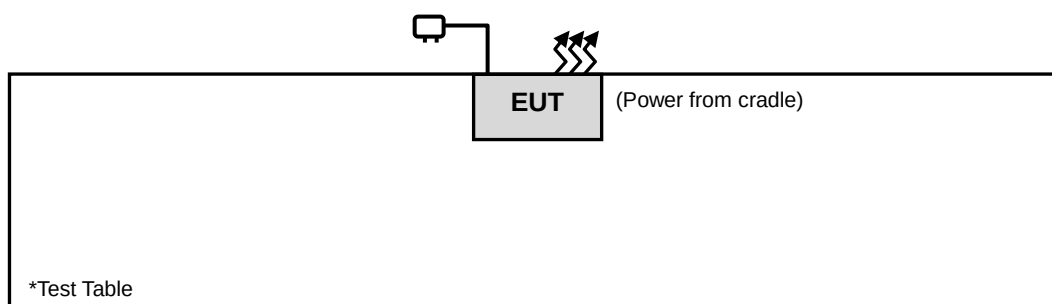
待測設備於受測時均接上其所屬的配件或一般用途之相關設備；下列輔助設備或配件測試中所使用的配備，以形成一個代表待測物實際運作的受測系統。

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Adapter	SALCOMP	TC U250	N/A	N/A
2.	Cradle	Simula Technology Inc.	CB846E-6040-102	N/A	N/A

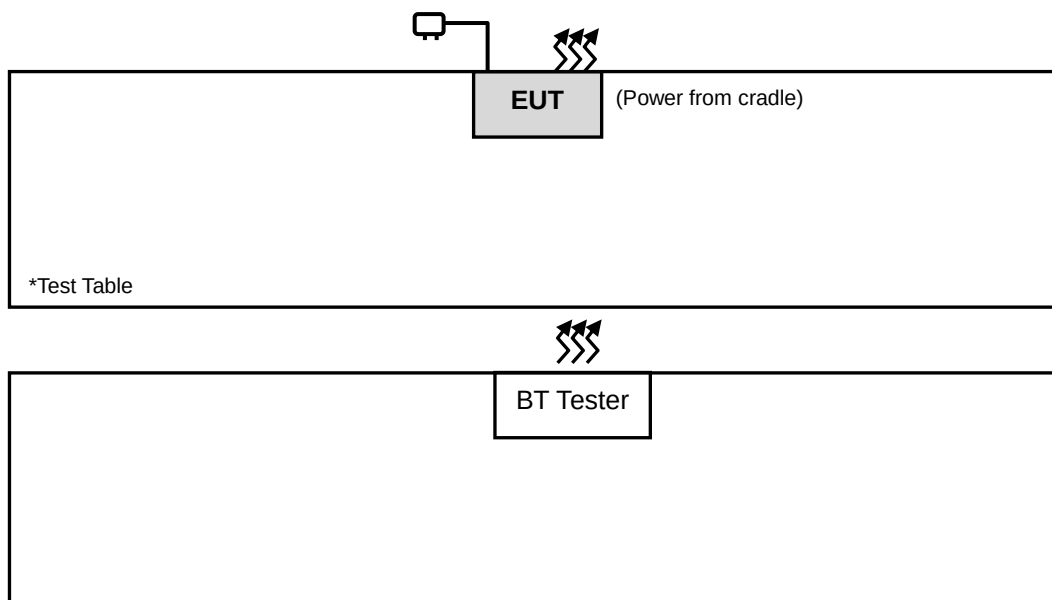
No.	Signal Cable Description Of The Above Support Units
1.	1m shielded cable attached on cradle

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) 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：

(17) 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。

(18) 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

(19) 天線之規定

天線規格不受第 2.2 節規定之限制。

(20) 天線增益之要求

低功率發射機，依據國家通訊傳播委員會低功率射頻電機技術規範 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。

(21) 峰值傳導輸出功率之要求

依據國家通訊傳播委員會低功率射頻電機技術規範 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。

(22) 跳頻頻道數之量測

依據國家通訊傳播委員會低功率射頻電機技術規範 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。

(23) 跳頻頻道間隔之量測

依據國家通訊傳播委員會低功率射頻電機技術規範 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。

(24) 每一頻道停留時間之量測

依據國家通訊傳播委員會低功率射頻電機技術規範 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。

(25) 電波暴露量之評估

依據國家通訊傳播委員會低功率射頻電機技術規範 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：

(26) 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。

(27) 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。

(28) 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

(29) 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。

(30) 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. 20, 2018	Aug. 19, 2019
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. 16, 2018	Apr. 15, 2019
			Apr. 15, 2019	Apr. 14, 2020
Bluetooth Tester	CBT	100980	Jun. 28, 2017	Jun. 27, 2019
Loop Antenna	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
Preamplifier Agilent	310N	187226	Jun. 19, 2018	Jun. 18, 2019
Preamplifier Agilent	83017A	MY39501357	Jun. 19, 2018	Jun. 18, 2019
Preamplifier EMCI	EMC 184045	980116	Oct. 12, 2018	Oct. 11, 2019
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC -SMS-100-SMS-120 +RFC-SMS-100-SM S-400)	Jun. 19, 2018	Jun. 18, 2019
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC -SMS-100-SMS-24)	Jun. 19, 2018	Jun. 18, 2019
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

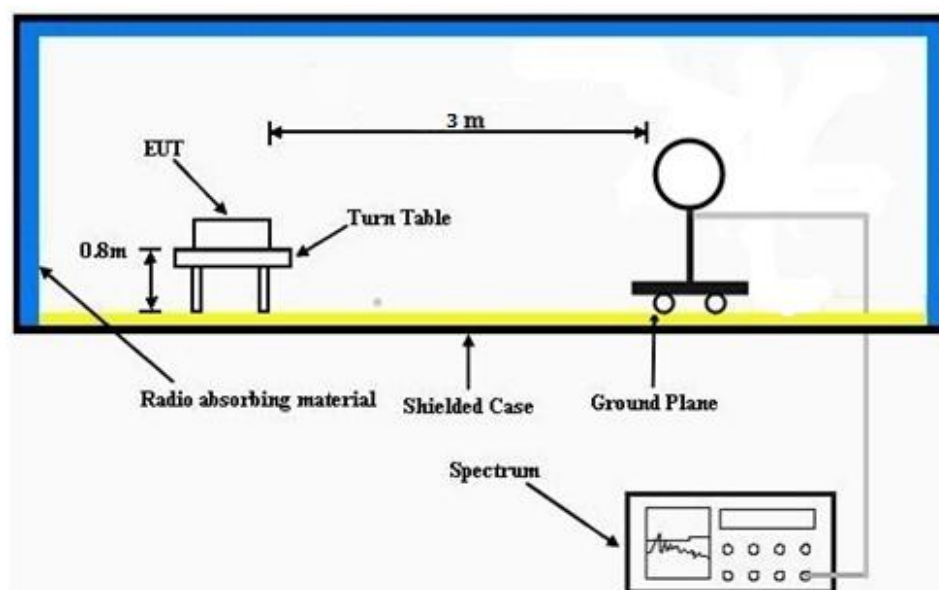
NOTE:

- The calibration interval of the above test instruments is 12 or 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The test was performed in HsinTien Chamber 1.
- The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
- The FCC Designation Number is TW0011. The number will be varied with the Lab location and scope as attached.
- 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.

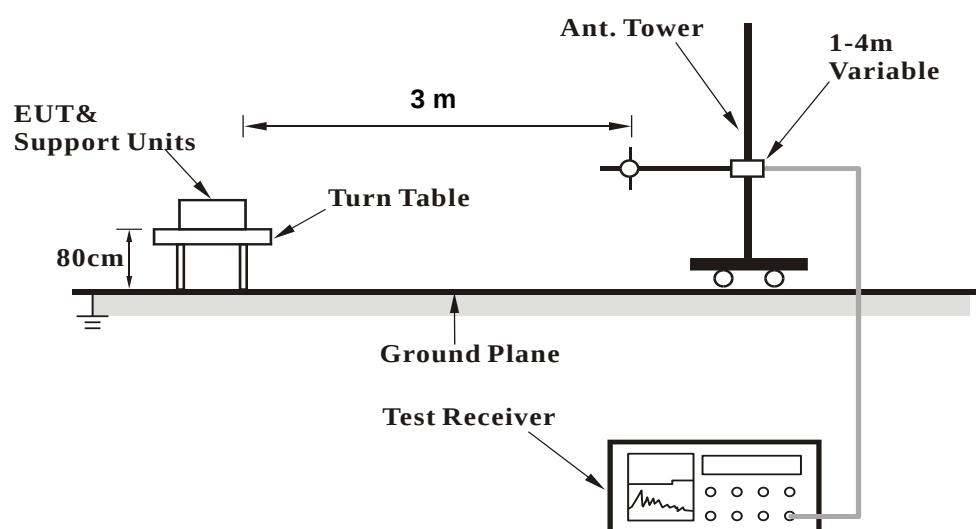
Measurement	Frequency	Uncertainty
Radiated emissions	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.94 dB

4.4 測試配置

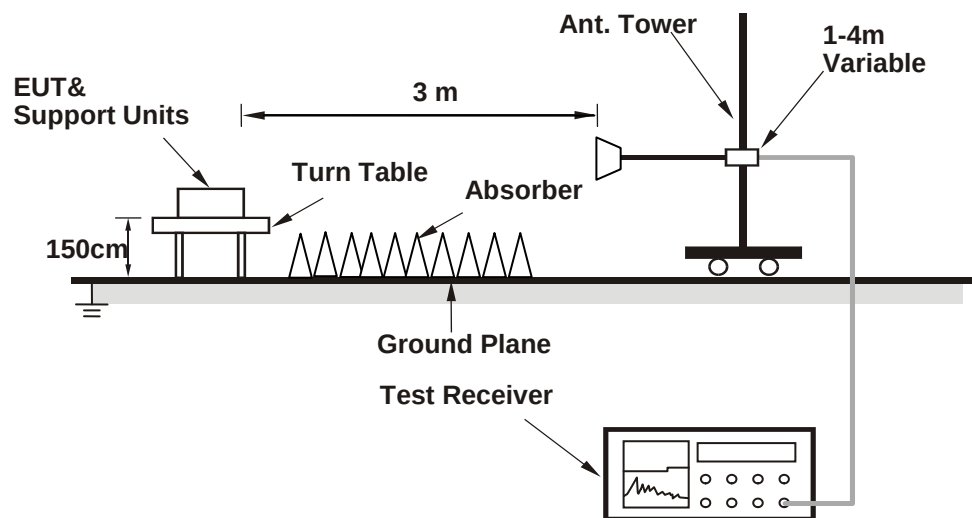
<Frequency Range 9 kHz ~ 30 MHz>



<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。

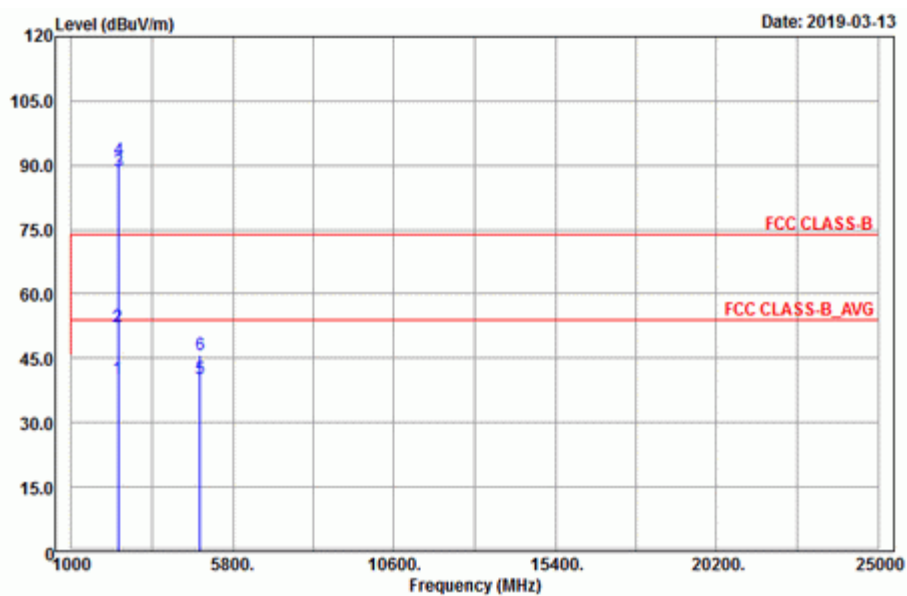
4.6 量測結果

4.6.1 發射諧波

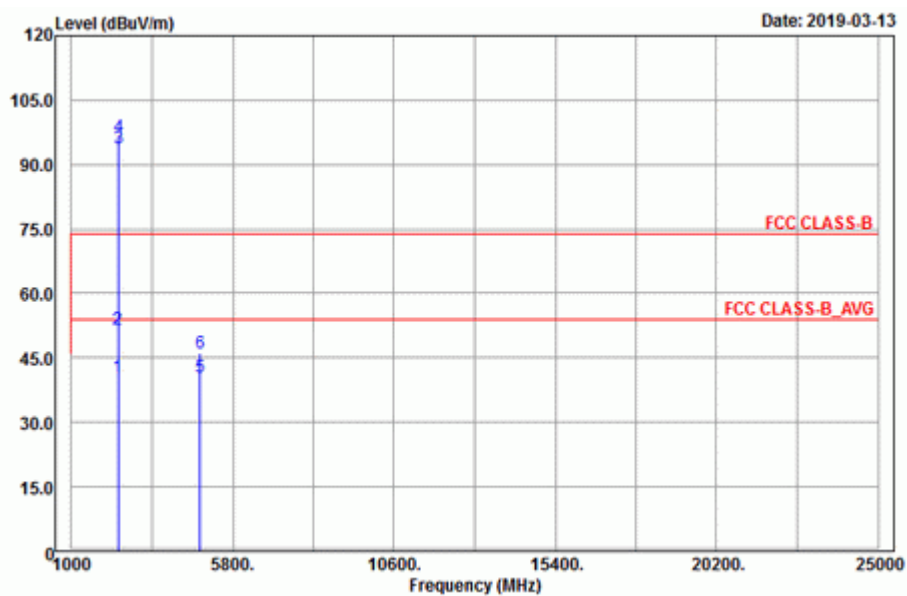
802.11b (調變技術 – DSSS)

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	Harry Hsueh

Horizontal



Vertical



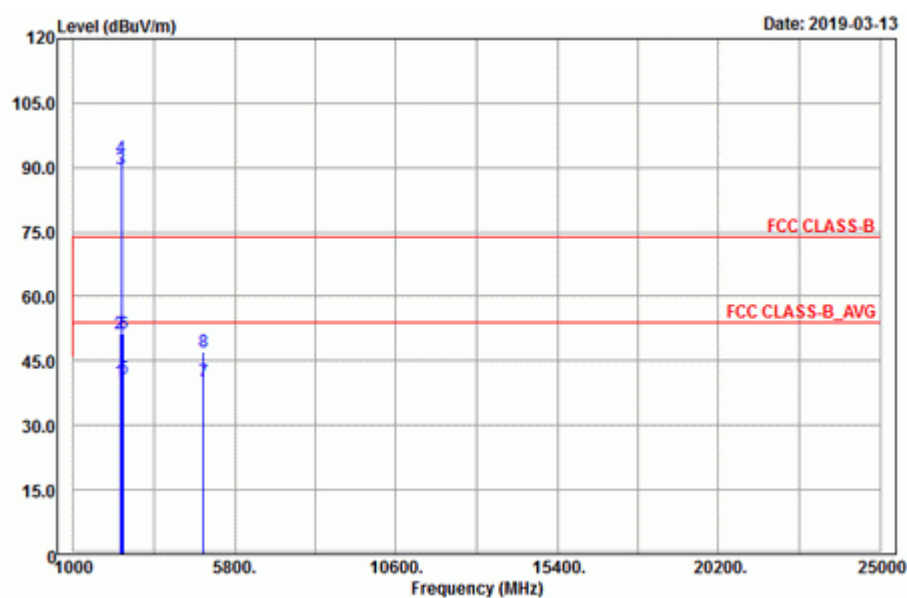
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2387.58	40.35	38.64	1.71	54	-13.65	129	237	Average
2387.58	52.17	50.46	1.71	74	-21.83	129	237	Peak
2412	88.46	86.69	1.77			129	237	Average
2412	91.11	89.34	1.77			129	237	Peak
4824	40.29	32.16	8.13	54	-13.71	153	26	Average
4824	45.75	37.62	8.13	74	-28.25	153	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
2386.95	40.51	38.8	1.71	54	-13.49	182	350	Average
2386.95	51.57	49.86	1.71	74	-22.43	182	350	Peak
2412	93.77	92	1.77			182	350	Average
2412	96.5	94.73	1.77			182	350	Peak
4824	40.55	32.42	8.13	54	-13.45	125	219	Average
4824	46.06	37.93	8.13	74	-27.94	125	219	Peak

Remarks:

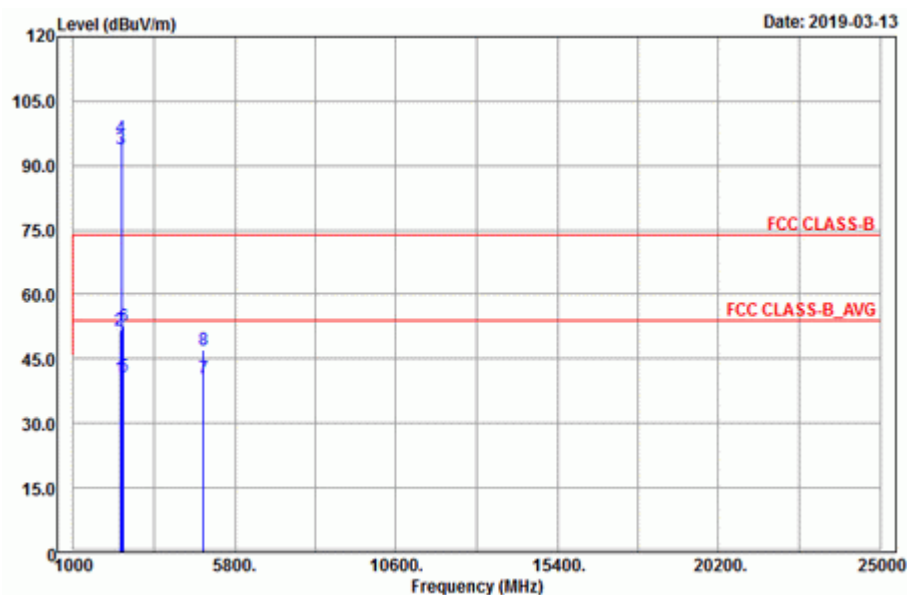
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2412 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



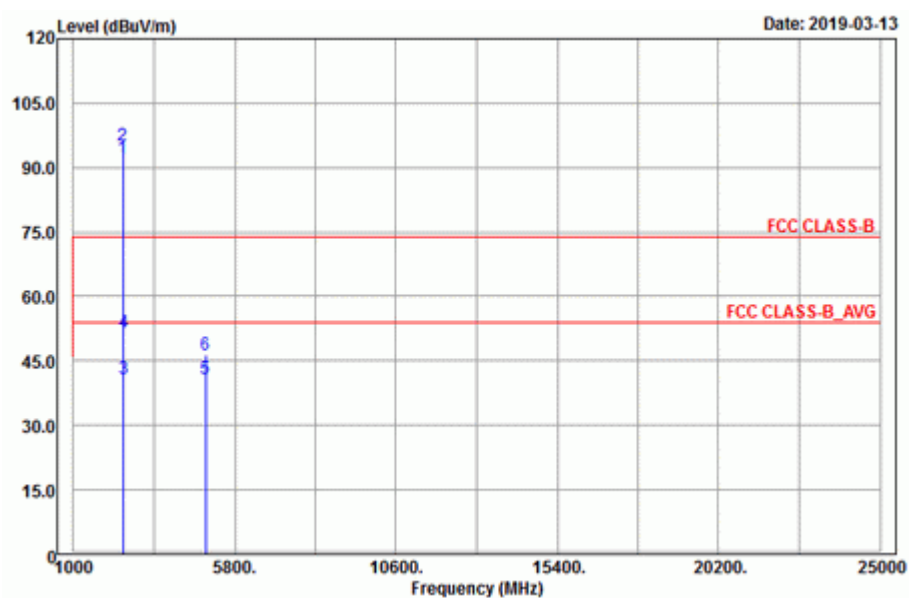
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2383.98	40.29	38.6	1.69	54	-13.71	129	237	Average
2383.98	51.37	49.68	1.69	74	-22.63	129	237	Peak
2437	89.57	87.72	1.85			129	237	Average
2437	92.18	90.33	1.85			129	237	Peak
2496.72	40.83	38.81	2.02	54	-13.17	129	237	Average
2496.72	51.44	49.42	2.02	74	-22.56	129	237	Peak
4874	40.33	32.14	8.19	54	-13.67	195	5	Average
4874	47	38.81	8.19	74	-27	195	5	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386.59	40.42	38.71	1.71	54	-13.58	182	350	Average
2386.59	51.56	49.85	1.71	74	-22.44	182	350	Peak
2437	93.84	91.99	1.85			182	350	Average
2437	96.56	94.71	1.85			182	350	Peak
2492.52	41.02	39	2.02	54	-12.98	182	350	Average
2492.52	52.71	50.69	2.02	74	-21.29	182	350	Peak
4874	40.52	32.33	8.19	54	-13.48	124	285	Average
4874	47.14	38.95	8.19	74	-26.86	124	285	Peak

Remarks:

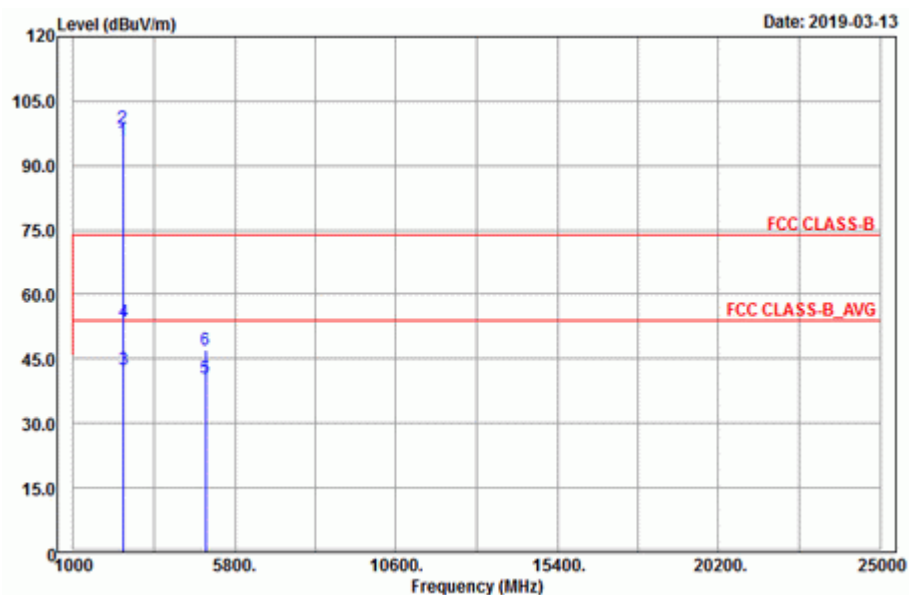
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2437 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



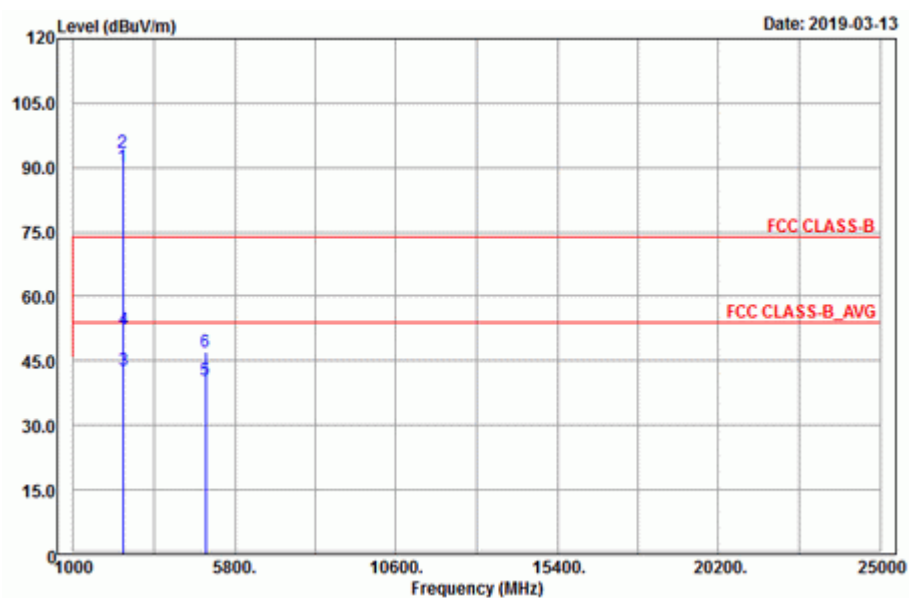
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	92.16	90.23	1.93			129	237	Average
2462	95.08	93.15	1.93			129	237	Peak
2489.88	40.86	38.85	2.01	54	-13.14	129	237	Average
2489.88	51.62	49.61	2.01	74	-22.38	129	237	Peak
4924	40.81	32.56	8.25	54	-13.19	159	9	Average
4924	46.52	38.27	8.25	74	-27.48	159	9	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	95.9	93.97	1.93			215	360	Average
2462	98.87	96.94	1.93			215	360	Peak
2483.6	42.6	40.64	1.96	54	-11.4	215	360	Average
2483.6	53.48	51.52	1.96	74	-20.52	215	360	Peak
4924	40.46	32.21	8.25	54	-13.54	133	265	Average
4924	47.05	38.8	8.25	74	-26.95	133	265	Peak

Remarks:

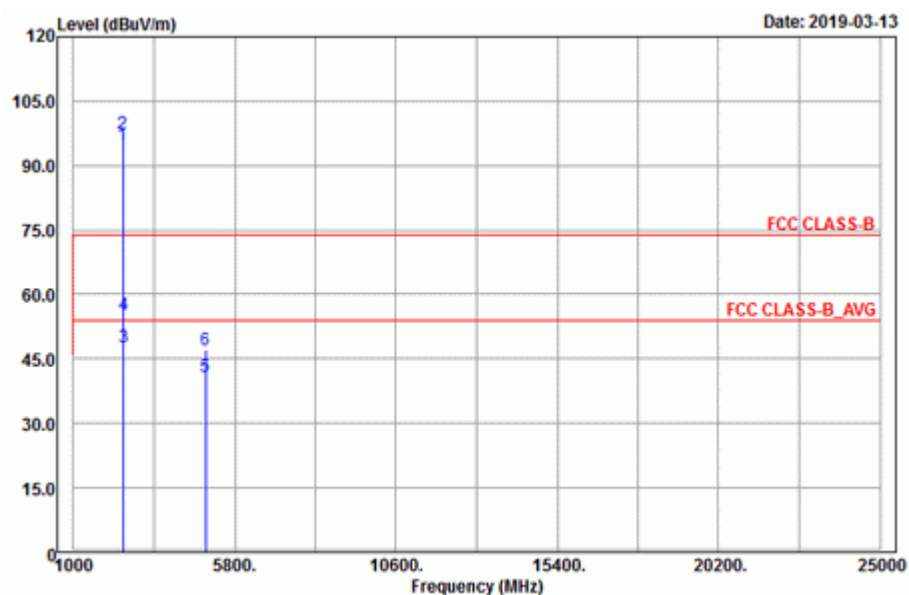
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2462 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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	Harry Hsueh

Horizontal



Vertical



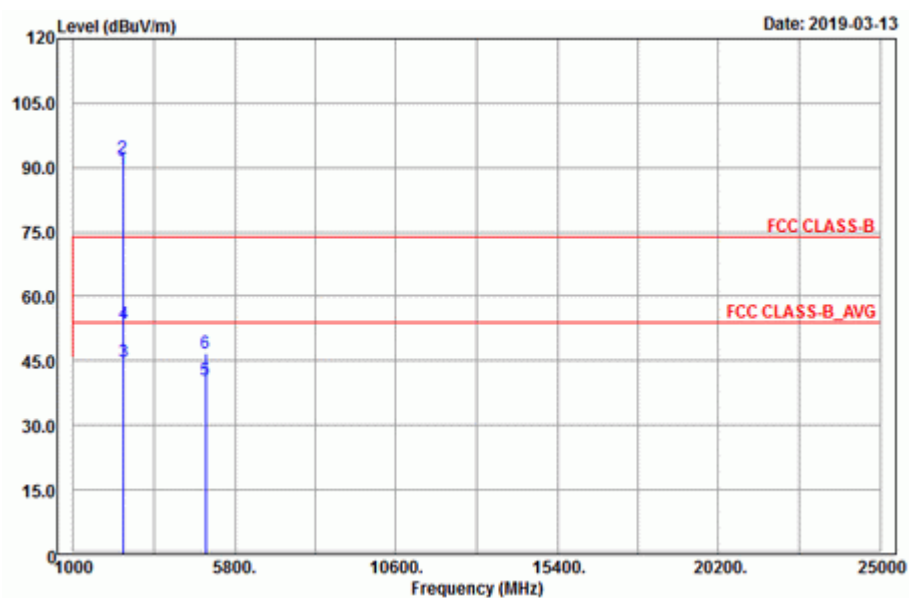
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	90.21	88.26	1.95			215	41	Average
2467	93.37	91.42	1.95			215	41	Peak
2484.72	42.85	40.86	1.99	54	-11.15	215	41	Average
2484.72	52.42	50.43	1.99	74	-21.58	215	41	Peak
4934	40.49	32.23	8.26	54	-13.51	111	147	Average
4934	47.06	38.8	8.26	74	-26.94	111	147	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	94.9	92.95	1.95			101	350	Average
2467	97.47	95.52	1.95			101	350	Peak
2484.68	47.9	45.91	1.99	54	-6.1	101	350	Average
2484.68	55.22	53.23	1.99	74	-18.78	101	350	Peak
4934	40.77	32.51	8.26	54	-13.23	109	213	Average
4934	47.21	38.95	8.26	74	-26.79	109	213	Peak

Remarks:

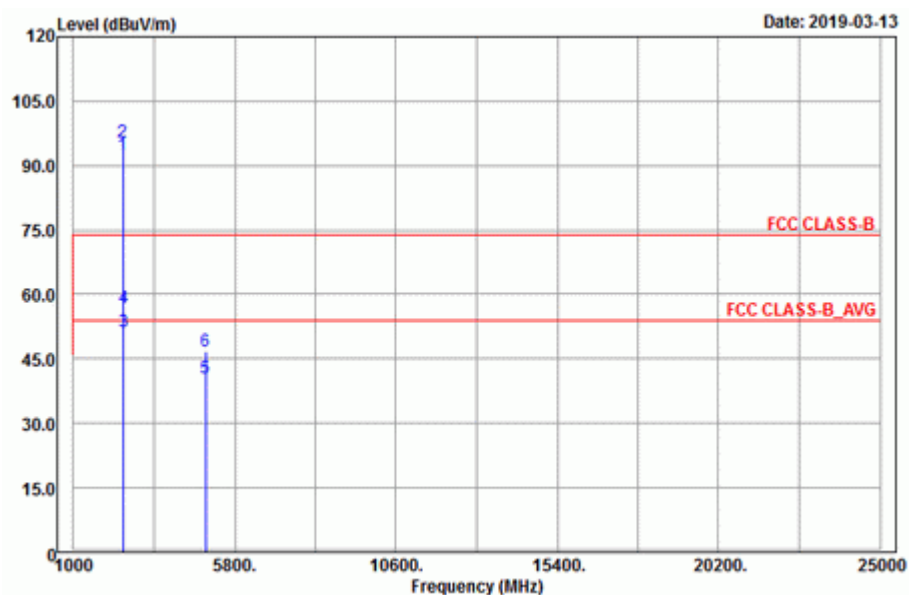
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2467 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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	Harry Hsueh

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	89.6	87.64	1.96			294	128	Average
2472	92.14	90.18	1.96			294	128	Peak
2486.6	44.83	42.84	1.99	54	-9.17	294	128	Average
2486.6	53.58	51.59	1.99	74	-20.42	294	128	Peak
4944	40.43	32.16	8.27	54	-13.57	132	3	Average
4944	46.83	38.56	8.27	74	-27.17	132	3	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	92.67	90.71	1.96			182	350	Average
2472	95.46	93.5	1.96			182	350	Peak
2486.68	51.23	49.24	1.99	54	-2.77	182	350	Average
2486.68	57	55.01	1.99	74	-17	182	350	Peak
4944	40.64	32.37	8.27	54	-13.36	165	285	Average
4944	46.67	38.4	8.27	74	-27.33	165	285	Peak

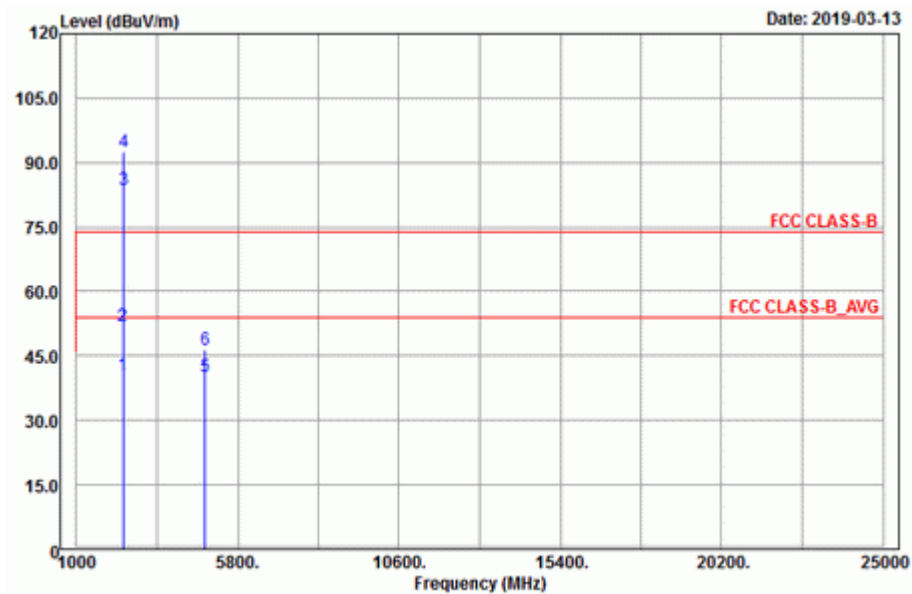
Remarks:

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

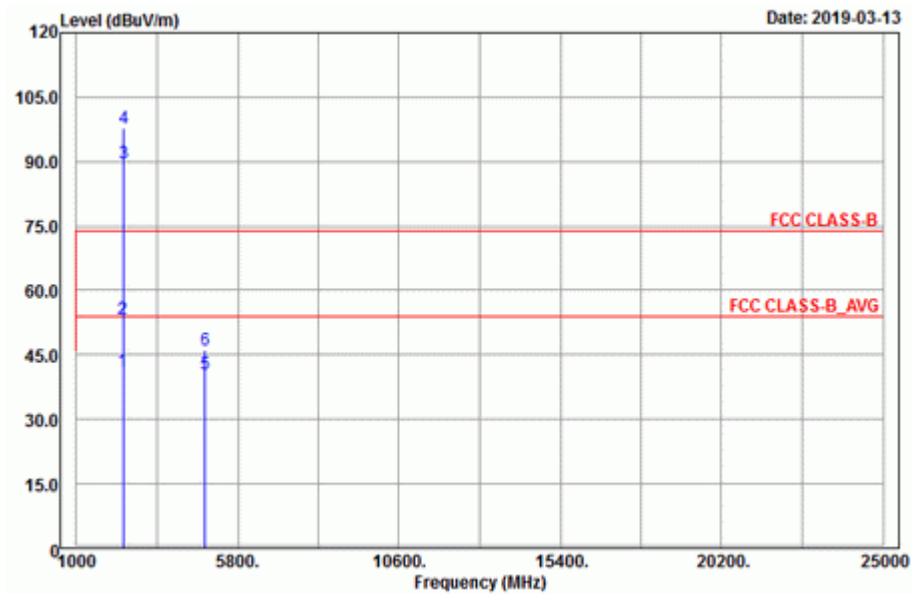
802.11g (調變技術 - OFDM)

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	Harry Hsueh

Horizontal



Vertical



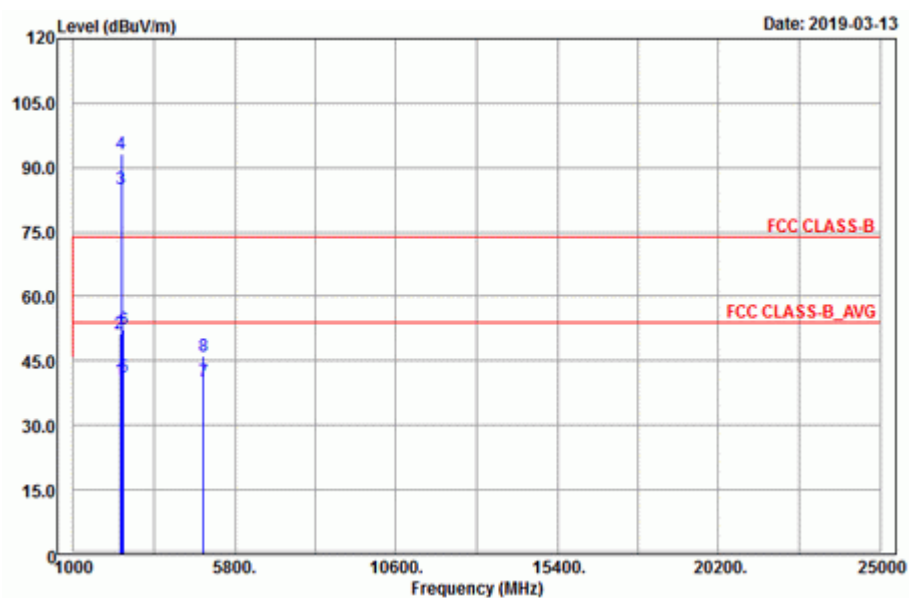
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2389.92	40.59	38.86	1.73	54	-13.41	129	237	Average
2389.92	51.89	50.16	1.73	74	-22.11	129	237	Peak
2412	83.86	82.09	1.77			129	237	Average
2412	92.39	90.62	1.77			129	237	Peak
4824	40.34	32.21	8.13	54	-13.66	154	340	Average
4824	46.49	38.36	8.13	74	-27.51	154	340	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
2389.92	41.12	39.39	1.73	54	-12.88	182	350	Average
2389.92	53.29	51.56	1.73	74	-20.71	182	350	Peak
2412	89.45	87.68	1.77			182	350	Average
2412	97.83	96.06	1.77			182	350	Peak
4824	40.39	32.26	8.13	54	-13.61	152	199	Average
4824	46.19	38.06	8.13	74	-27.81	152	199	Peak

Remarks:

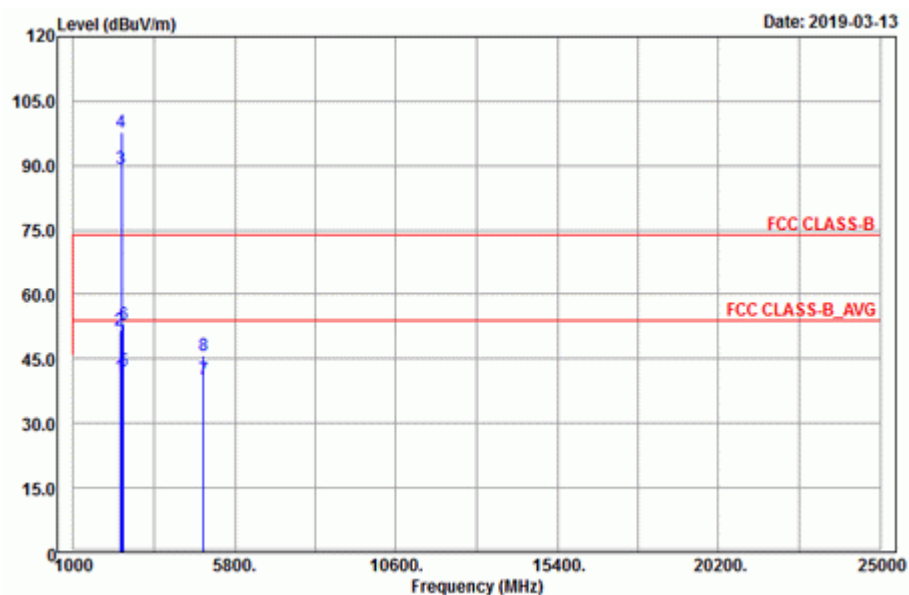
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2412 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



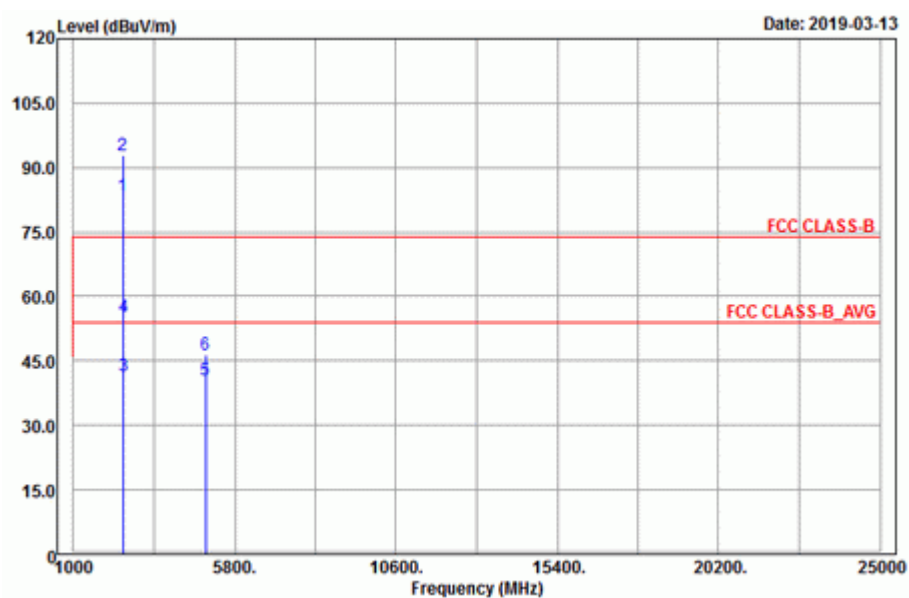
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386.77	40.5	38.79	1.71	54	-13.5	129	237	Average
2386.77	51.41	49.7	1.71	74	-22.59	129	237	Peak
2437	85.09	83.24	1.85			129	237	Average
2437	93.14	91.29	1.85			129	237	Peak
2489.6	41.04	39.03	2.01	54	-12.96	129	237	Average
2489.6	52.24	50.23	2.01	74	-21.76	129	237	Peak
4874	40.31	32.12	8.19	54	-13.69	124	134	Average
4874	46.08	37.89	8.19	74	-27.92	124	134	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
2384.97	40.73	39.04	1.69	54	-13.27	182	350	Average
2384.97	51.55	49.86	1.69	74	-22.45	182	350	Peak
2437	89.38	87.53	1.85			182	350	Average
2437	97.81	95.96	1.85			182	350	Peak
2489.32	42.14	40.13	2.01	54	-11.86	182	350	Average
2489.32	52.88	50.87	2.01	74	-21.12	182	350	Peak
4874	40.38	32.19	8.19	54	-13.62	145	184	Average
4874	45.84	37.65	8.19	74	-28.16	145	184	Peak

Remarks:

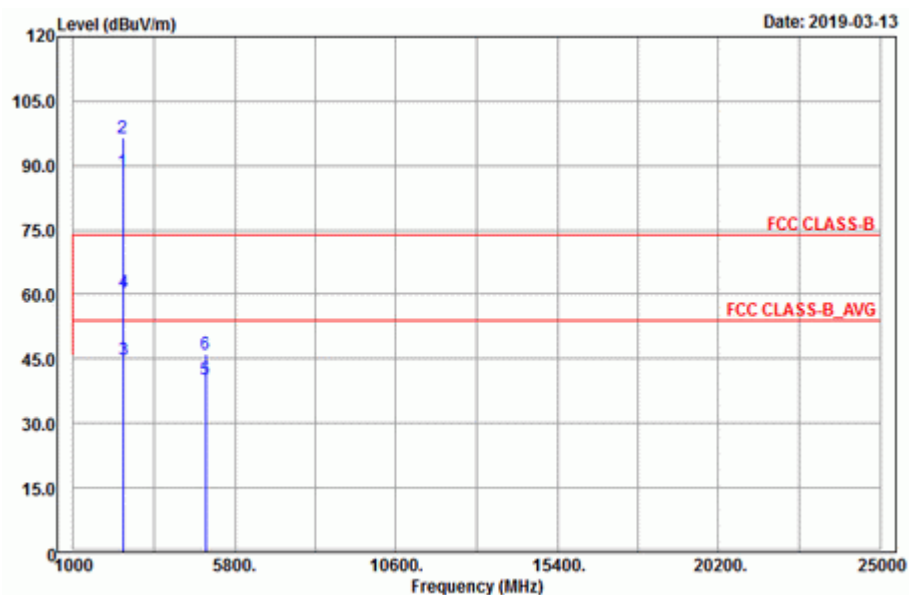
- Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
- 2437 MHz: Fundamental Frequency.
- The other emission levels were very low against the limit.

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

Horizontal



Vertical



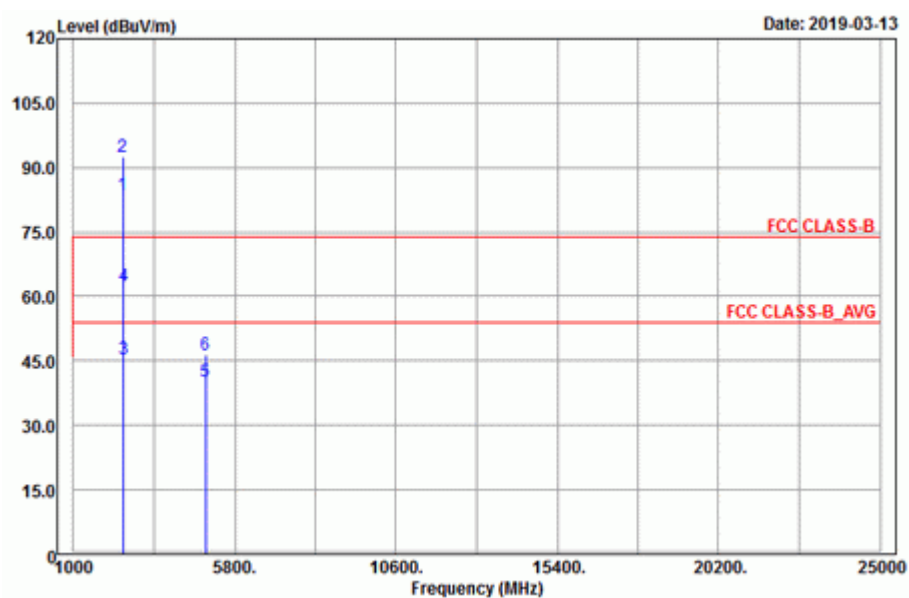
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	83.38	81.45	1.93			129	237	Average
2462	92.78	90.85	1.93			129	237	Peak
2483.52	41.4	39.44	1.96	54	-12.6	129	237	Average
2483.52	55.28	53.32	1.96	74	-18.72	129	237	Peak
4924	40.44	32.19	8.25	54	-13.56	182	255	Average
4924	46.39	38.14	8.25	74	-27.61	182	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
2462	88.53	86.6	1.93			215	360	Average
2462	96.61	94.68	1.93			215	360	Peak
2483.52	44.79	42.83	1.96	54	-9.21	215	360	Average
2483.52	60.38	58.42	1.96	74	-13.62	215	360	Peak
4924	40.38	32.13	8.25	54	-13.62	163	346	Average
4924	46.16	37.91	8.25	74	-27.84	163	346	Peak

Remarks:

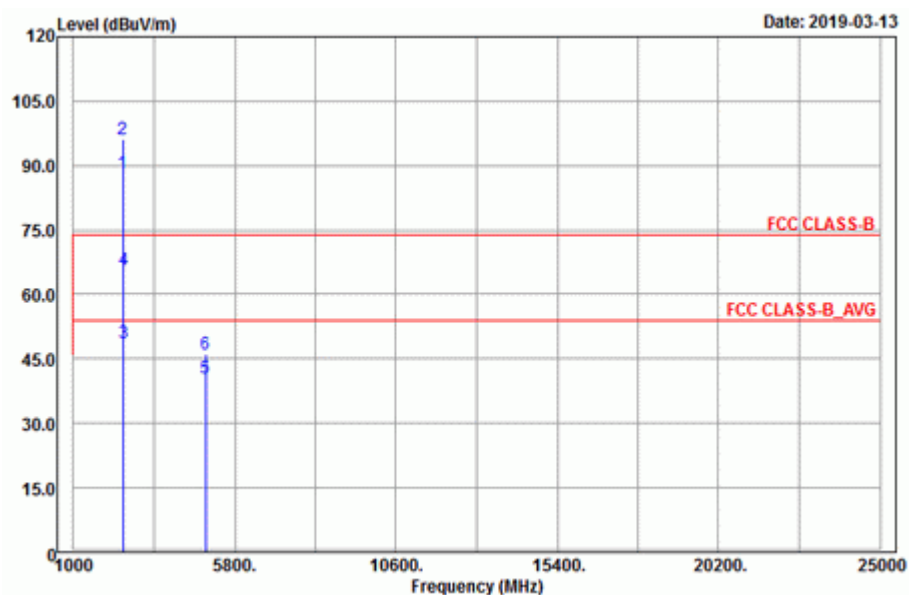
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2462 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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	Harry Hsueh

Horizontal



Vertical



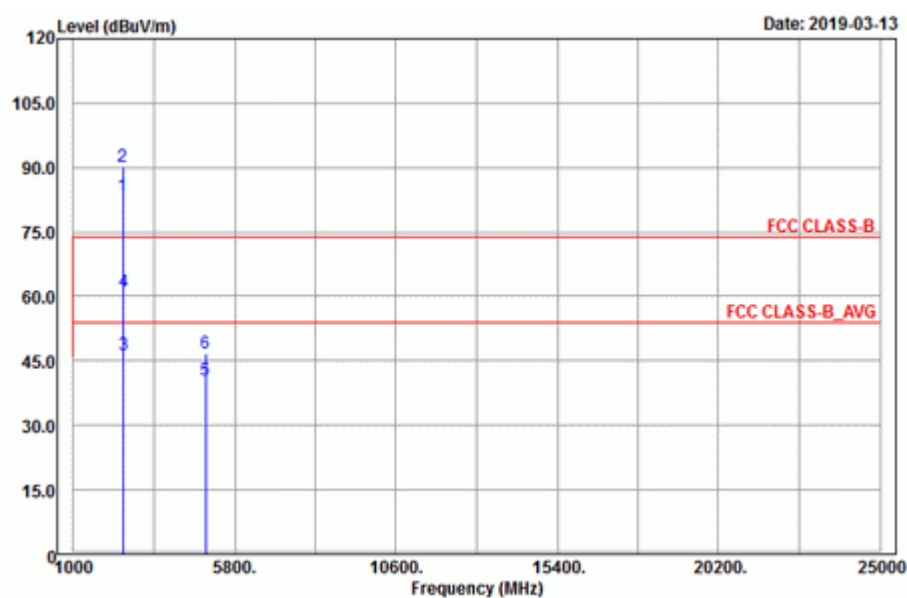
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	83.67	81.72	1.95			215	41	Average
2467	92.49	90.54	1.95			215	41	Peak
2483.52	45.49	43.53	1.96	54	-8.51	215	41	Average
2483.52	62.54	60.58	1.96	74	-11.46	215	41	Peak
4934	40.28	32.02	8.26	54	-13.72	124	222	Average
4934	46.48	38.22	8.26	74	-27.52	124	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
2467	88.18	86.23	1.95			164	358	Average
2467	96.21	94.26	1.95			164	358	Peak
2483.52	48.8	46.84	1.96	54	-5.2	164	358	Average
2483.52	65.76	63.8	1.96	74	-8.24	164	358	Peak
4934	40.42	32.16	8.26	54	-13.58	286	99	Average
4934	46.21	37.95	8.26	74	-27.79	286	99	Peak

Remarks:

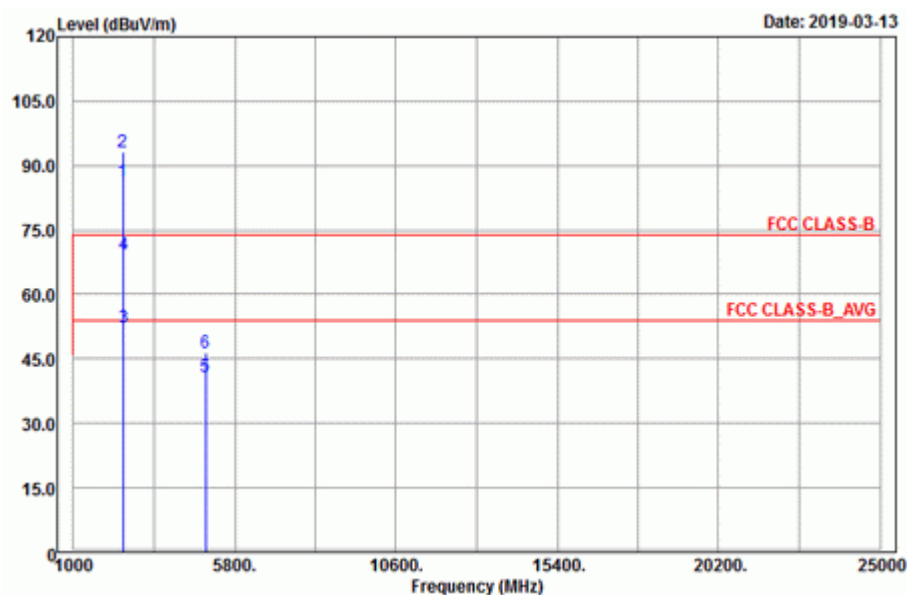
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2467 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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	Harry Hsueh

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	83.49	81.53	1.96			294	46	Average
2472	90.29	88.33	1.96			294	46	Peak
2483.52	46.46	44.5	1.96	54	-7.54	294	46	Average
2483.52	61.26	59.3	1.96	74	-12.74	294	46	Peak
4944	40.41	32.14	8.27	54	-13.59	154	216	Average
4944	46.73	38.46	8.27	74	-27.27	154	216	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	86.37	84.41	1.96			182	350	Average
2472	93.34	91.38	1.96			182	350	Peak
2483.52	52.32	50.36	1.96	54	-1.68	182	350	Average
2483.52	69.28	67.32	1.96	74	-4.72	182	350	Peak
4944	40.77	32.5	8.27	54	-13.23	185	7	Average
4944	46.39	38.12	8.27	74	-27.61	185	7	Peak

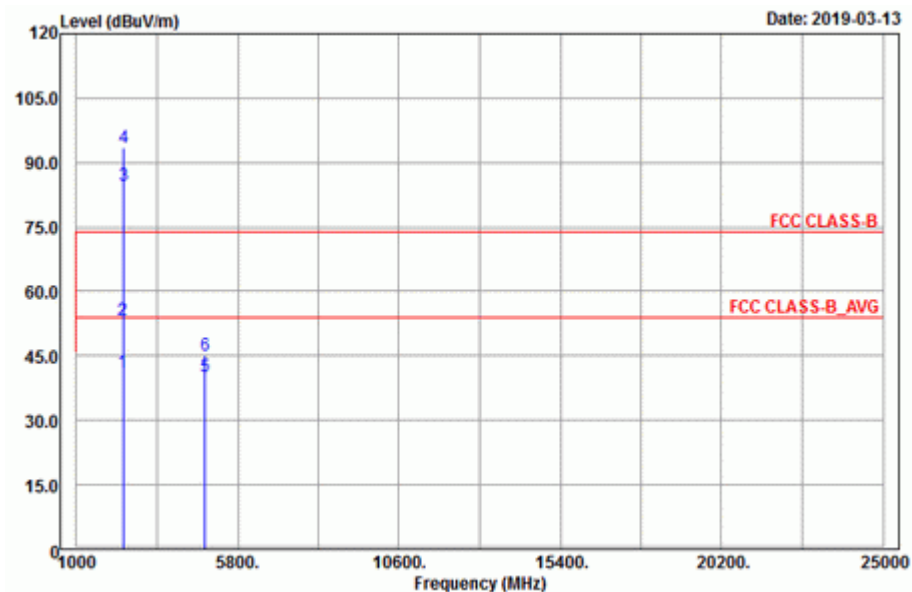
Remarks:

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

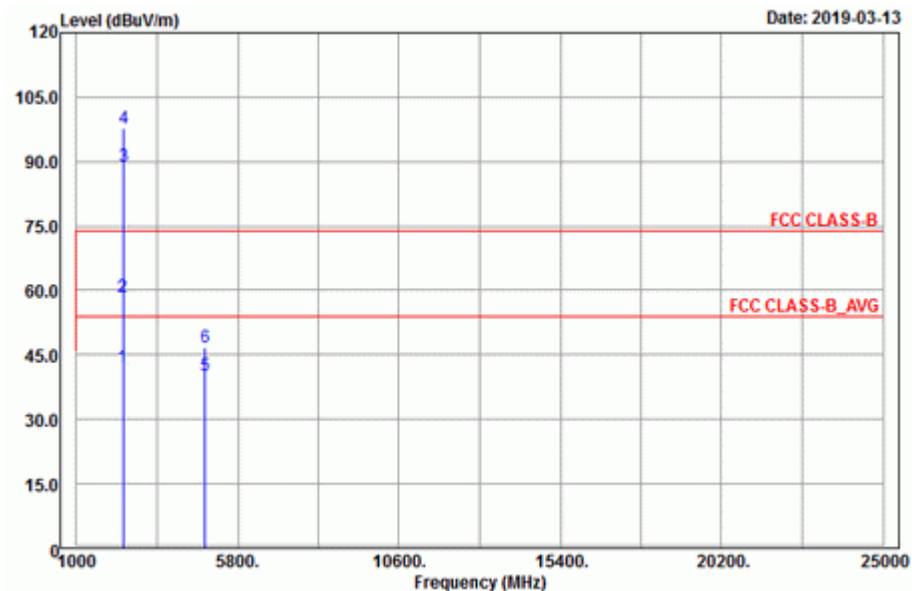
802.11n (HT20) (調變技術 – OFDM)

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	Harry Hsueh

Horizontal



Vertical



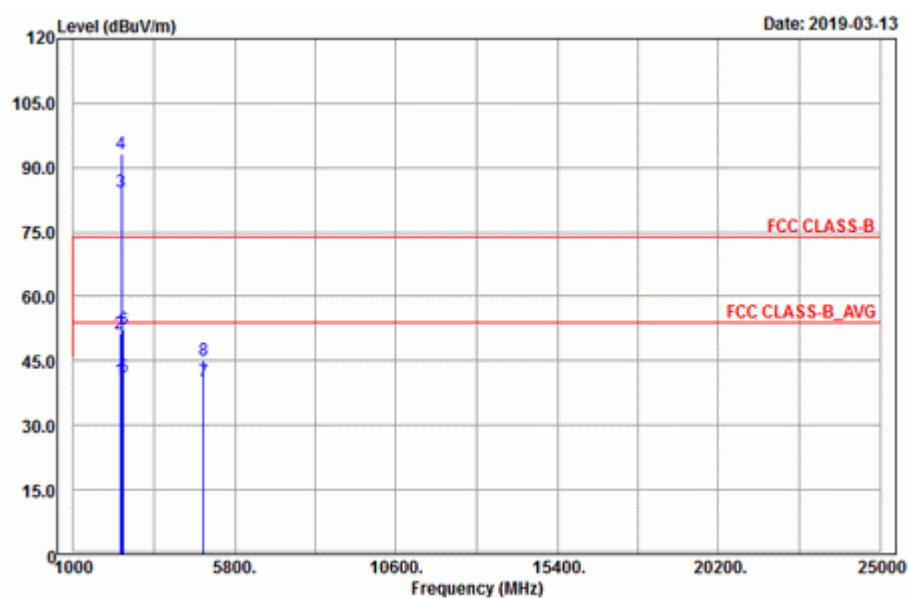
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2389.92	41.08	39.35	1.73	54	-12.92	129	237	Average
2389.92	53.41	51.68	1.73	74	-20.59	129	237	Peak
2412	84.75	82.98	1.77			129	237	Average
2412	93.55	91.78	1.77			129	237	Peak
4824	40.13	32	8.13	54	-13.87	145	5	Average
4824	45.01	36.88	8.13	74	-28.99	145	5	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
2389.92	42.05	40.32	1.73	54	-11.95	182	350	Average
2389.92	58.49	56.76	1.73	74	-15.51	182	350	Peak
2412	88.89	87.12	1.77			182	350	Average
2412	97.88	96.11	1.77			182	350	Peak
4824	40.15	32.02	8.13	54	-13.85	133	326	Average
4824	46.71	38.58	8.13	74	-27.29	133	326	Peak

Remarks:

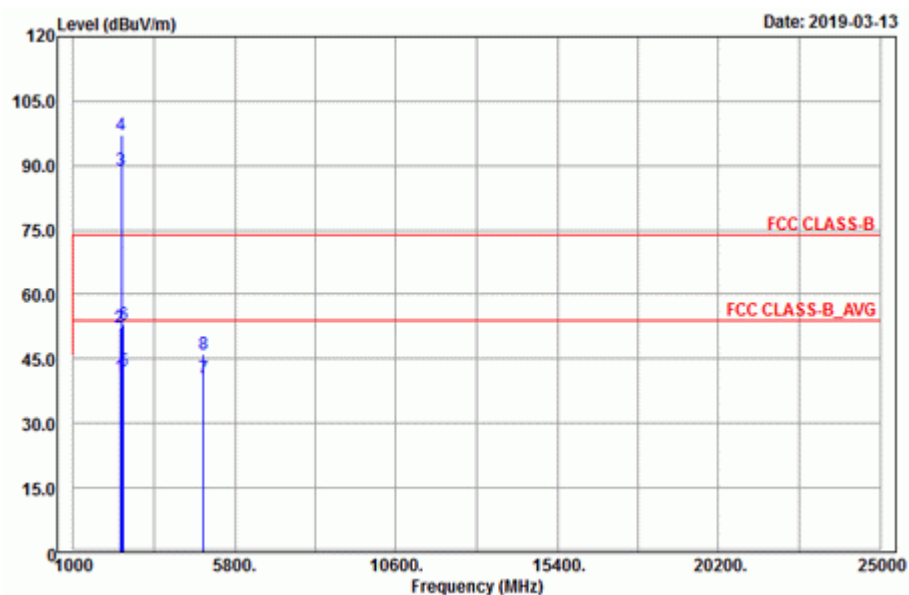
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2412 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



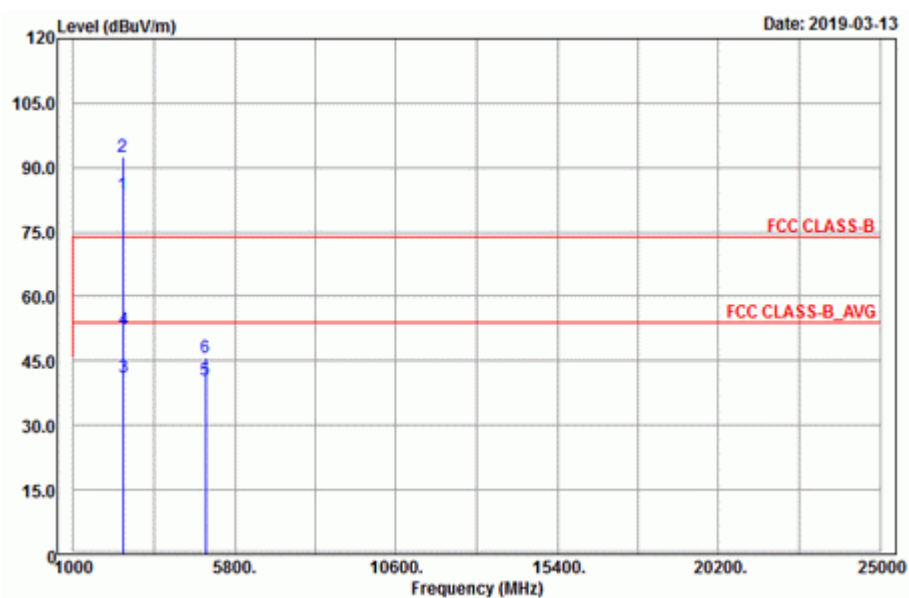
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386.14	40.45	38.74	1.71	54	-13.55	129	237	Average
2386.14	51.21	49.5	1.71	74	-22.79	129	237	Peak
2437	84.33	82.48	1.85			129	237	Average
2437	93.03	91.18	1.85			129	237	Peak
2491.24	41.05	39.04	2.01	54	-12.95	129	237	Average
2491.24	52.34	50.33	2.01	74	-21.66	129	237	Peak
4874	40.33	32.14	8.19	54	-13.67	150	240	Average
4874	45.15	36.96	8.19	74	-28.85	150	240	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	40.75	39.06	1.69	54	-13.25	182	350	Average
2384.88	52.37	50.68	1.69	74	-21.63	182	350	Peak
2437	88.89	87.04	1.85			182	350	Average
2437	97.06	95.21	1.85			182	350	Peak
2488.6	42.16	40.15	2.01	54	-11.84	182	350	Average
2488.6	52.97	50.96	2.01	74	-21.03	182	350	Peak
4874	40.48	32.29	8.19	54	-13.52	124	175	Average
4874	45.94	37.75	8.19	74	-28.06	124	175	Peak

Remarks:

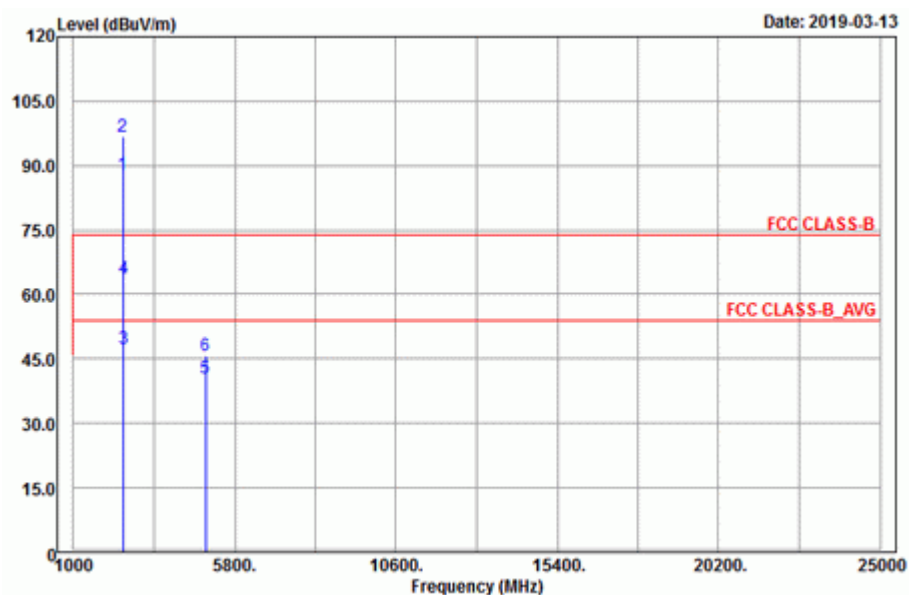
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2437 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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

Horizontal



Vertical



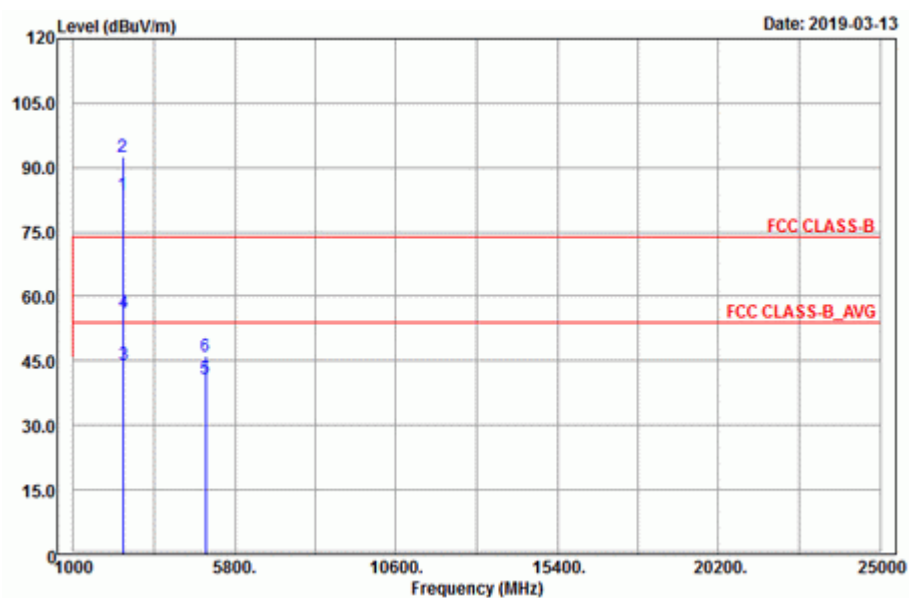
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	83.78	81.85	1.93			129	237	Average
2462	92.49	90.56	1.93			129	237	Peak
2494.52	41.04	39.02	2.02	54	-12.96	129	237	Average
2494.52	52.17	50.15	2.02	74	-21.83	129	237	Peak
4924	40.47	32.22	8.25	54	-13.53	145	55	Average
4924	45.7	37.45	8.25	74	-28.3	145	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
2462	88.05	86.12	1.93			215	360	Average
2462	96.68	94.75	1.93			215	360	Peak
2483.52	47.25	45.29	1.96	54	-6.75	215	360	Average
2483.52	63.65	61.69	1.96	74	-10.35	215	360	Peak
4924	40.58	32.33	8.25	54	-13.42	154	185	Average
4924	45.82	37.57	8.25	74	-28.18	154	185	Peak

Remarks:

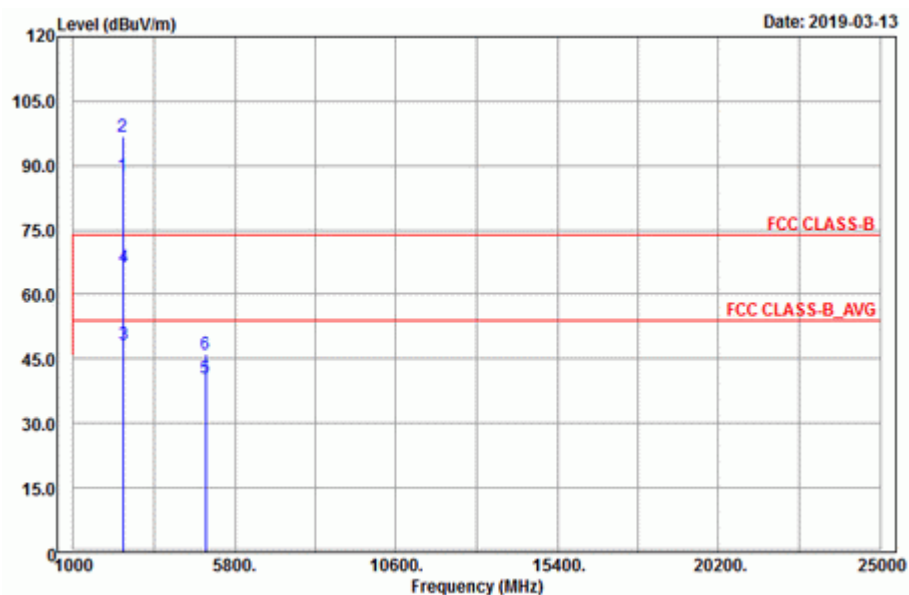
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2462 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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	Harry Hsueh

Horizontal



Vertical



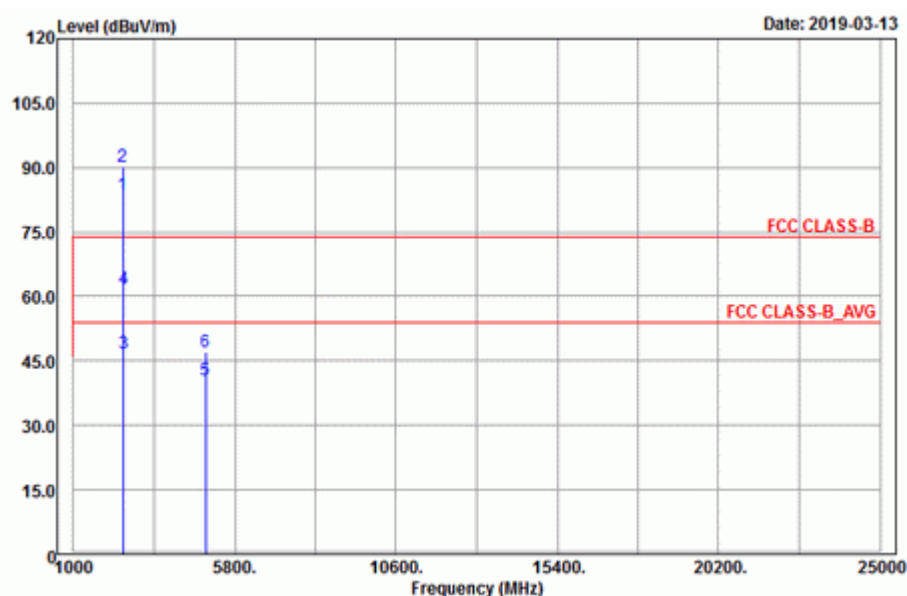
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	83.81	81.86	1.95			215	41	Average
2467	92.59	90.64	1.95			215	41	Peak
2483.64	44.22	42.26	1.96	54	-9.78	215	41	Average
2483.64	56.35	54.39	1.96	74	-17.65	215	41	Peak
4934	40.82	32.56	8.26	54	-13.18	158	8	Average
4934	45.94	37.68	8.26	74	-28.06	158	8	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	87.71	85.76	1.95			101	350	Average
2467	96.68	94.73	1.95			101	350	Peak
2483.72	48.25	46.29	1.96	54	-5.75	101	350	Average
2483.72	66.48	64.52	1.96	74	-7.52	101	350	Peak
4934	40.51	32.25	8.26	54	-13.49	152	22	Average
4934	46	37.74	8.26	74	-28	152	22	Peak

Remarks:

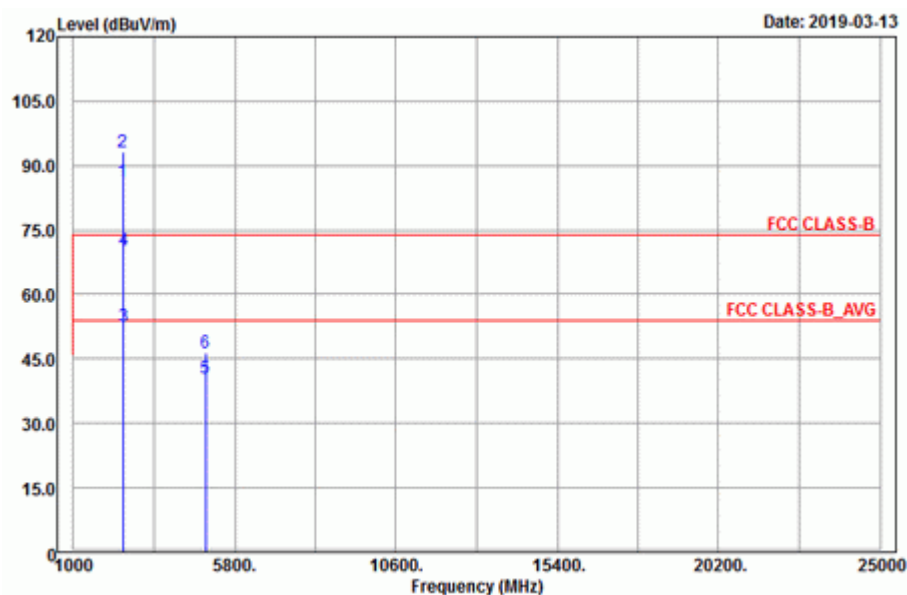
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2467 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

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	Harry Hsueh

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	83.6	81.64	1.96			294	46	Average
2472	90.4	88.44	1.96			294	46	Peak
2483.52	46.61	44.65	1.96	54	-7.39	294	46	Average
2483.52	61.87	59.91	1.96	74	-12.13	294	46	Peak
4944	40.47	32.2	8.27	54	-13.53	190	9	Average
4944	46.94	38.67	8.27	74	-27.06	190	9	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	86.44	84.48	1.96			182	350	Average
2472	93.3	91.34	1.96			182	350	Peak
2483.52	52.67	50.71	1.96	54	-1.33	182	350	Average
2483.52	70.2	68.24	1.96	74	-3.8	182	350	Peak
4944	40.42	32.15	8.27	54	-13.58	164	265	Average
4944	46.55	38.28	8.27	74	-27.45	164	265	Peak

Remarks:

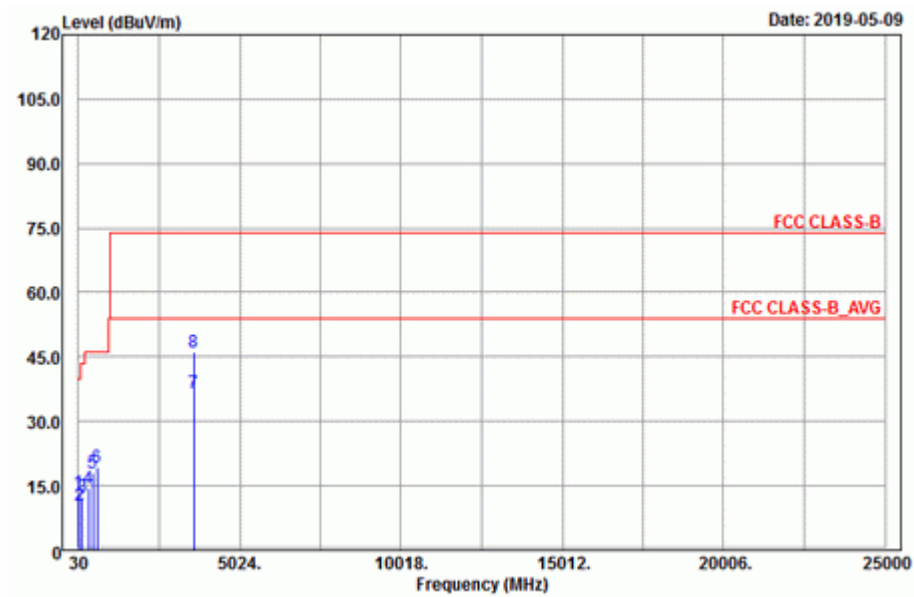
1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2472 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

4.6.2 接收諧波

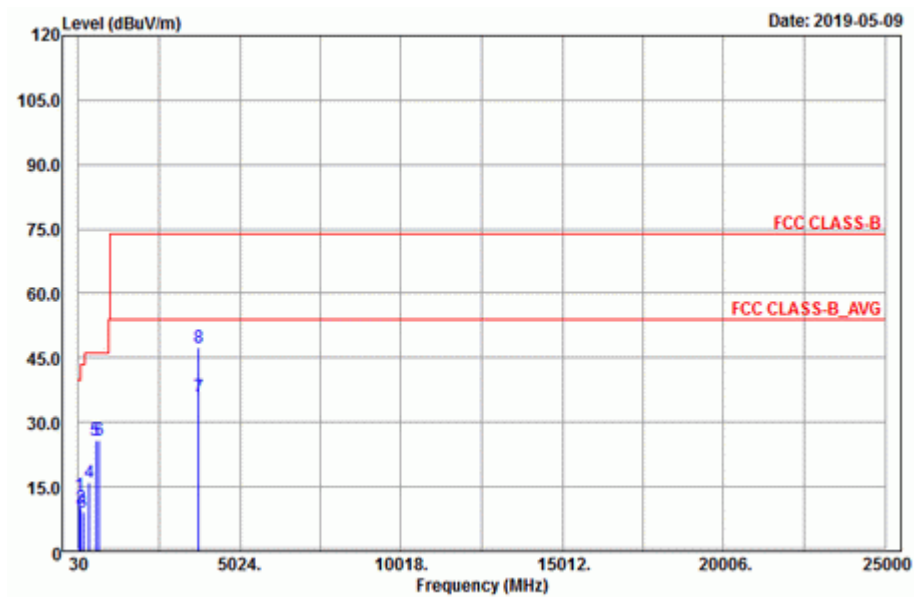
802.11n (HT20) (調變技術 – OFDM)

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	Harry Hsueh

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
41.34	13.37	31.07	-17.7	40	-26.63	199	187	Peak
63.21	10.49	29.22	-18.73	40	-29.51	142	157	Peak
143.94	12.45	34.95	-22.5	43.5	-31.05	105	188	Peak
344.8	14.37	30.1	-15.73	46	-31.63	196	132	Peak
479.9	17.82	31.31	-13.49	46	-28.18	168	195	Peak
599.6	19.42	30.82	-11.4	46	-26.58	155	187	Peak
3592	36.47	31.52	4.95	54	-17.53	101	121	Average
3592	46.1	41.15	4.95	74	-27.9	101	121	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
56.46	12.93	30.27	-17.34	40	-27.07	166	154	Peak
101.55	10.09	28.73	-18.64	43.5	-33.41	159	187	Peak
169.86	9.06	30.69	-21.63	43.5	-34.44	133	20	Peak
360.2	16.14	31.63	-15.49	46	-29.86	171	356	Peak
565.3	25.76	37.76	-12	46	-20.24	165	142	Peak
668.9	25.76	36.08	-10.32	46	-20.24	126	201	Peak
3760	36.01	30.58	5.43	54	-17.99	196	185	Average
3760	47.27	41.84	5.43	74	-26.73	196	185	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.

4.6.3 其它不必要之訊號

9 kHz ~ 30 MHz Data:

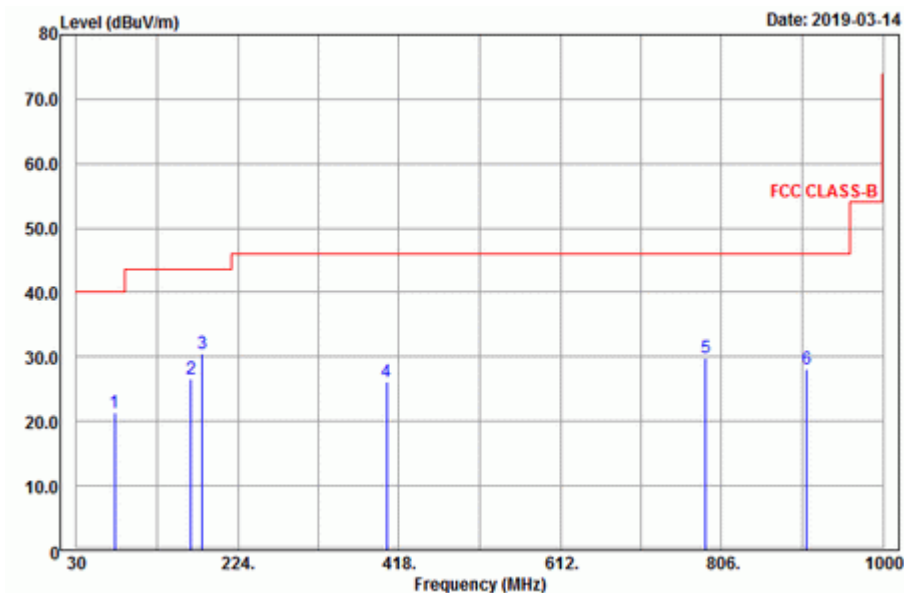
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Data:

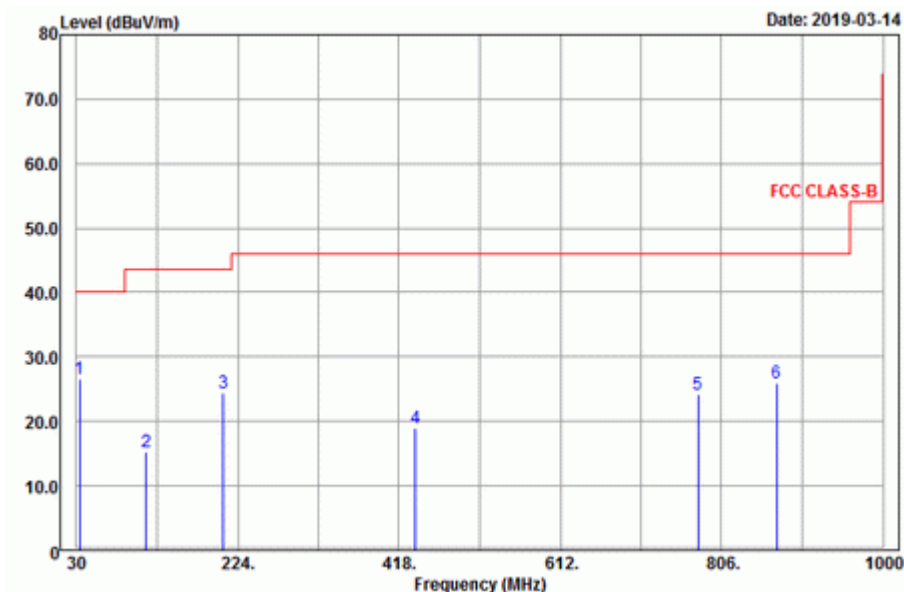
802.11n (HT20) (調變技術 – OFDM)

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	Harry Hsueh

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
76.17	21.33	44.07	-22.74	40	-18.67	159	33	Peak
167.7	26.58	48.29	-21.71	43.5	-16.92	105	32	Peak
181.2	30.45	51.25	-20.8	43.5	-13.05	157	161	Peak
402.9	26.11	40.97	-14.86	46	-19.89	154	240	Peak
787.2	29.95	38.55	-8.6	46	-16.05	189	255	Peak
908.3	28.03	34.42	-6.39	46	-17.97	105	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
33.51	26.64	46.31	-19.67	40	-13.36	105	183	Peak
114.24	15.18	34.73	-19.55	43.5	-28.32	189	114	Peak
206.58	24.47	43.96	-19.49	43.5	-19.03	124	244	Peak
437.9	18.89	33.16	-14.27	46	-27.11	145	191	Peak
778.1	24.2	32.92	-8.72	46	-21.8	144	7	Peak
872.6	25.99	32.93	-6.94	46	-20.01	109	95	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。

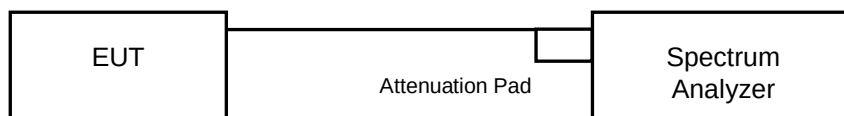
5.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	100115	Jan. 21, 2019	Jan. 20, 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 03 月 21 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	吳俊樺		

802.11b

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

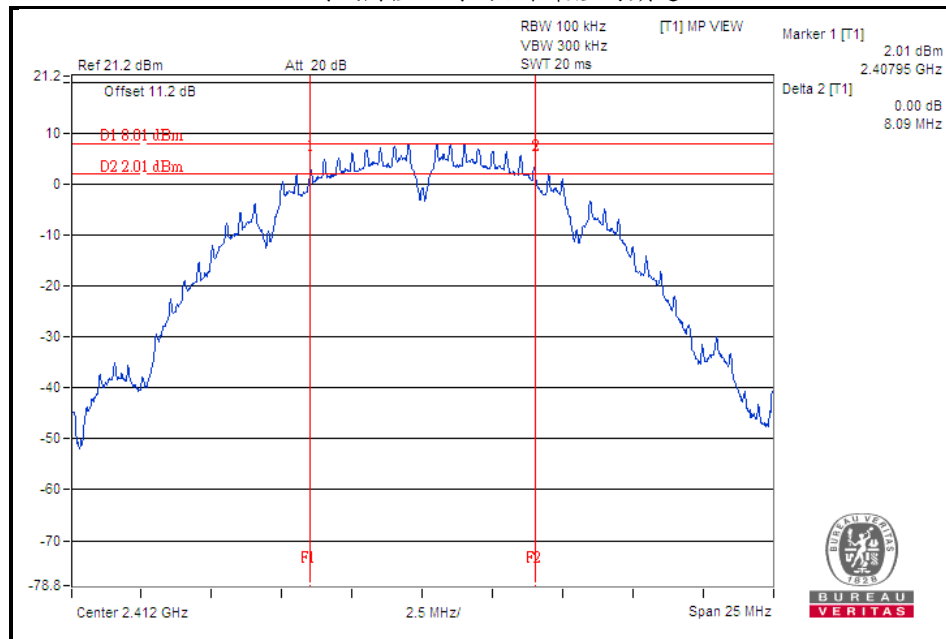
802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.38	0.5	Pass
6	2437	16.37	0.5	Pass
11	2462	16.37	0.5	Pass
12	2467	16.38	0.5	Pass
13	2472	16.39	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.60	0.5	Pass
6	2437	17.59	0.5	Pass
11	2462	17.61	0.5	Pass
12	2467	17.61	0.5	Pass
13	2472	17.61	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。

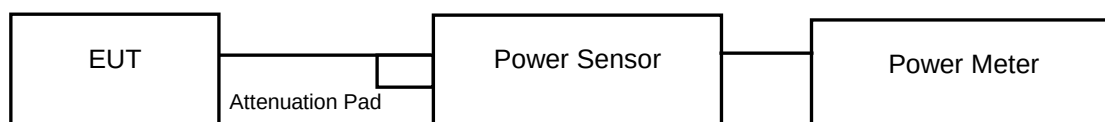
6.3 量測儀器

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 03 月 21 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	吳俊樺		

<Peak Power>

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	68.549	18.36	30	Pass
6	2437	67.608	18.30	30	Pass
11	2462	66.527	18.23	30	Pass
12	2467	67.143	18.27	30	Pass
13	2472	42.073	16.24	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	85.31	19.31	30	Pass
6	2437	84.333	19.26	30	Pass
11	2462	83.753	19.23	30	Pass
12	2467	86.896	19.39	30	Pass
13	2472	52.845	17.23	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	81.096	19.09	30	Pass
6	2437	79.799	19.02	30	Pass
11	2462	82.035	19.14	30	Pass
12	2467	81.283	19.10	30	Pass
13	2472	56.885	17.55	30	Pass

<Average Power>

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	35.975	15.56	30	Pass
6	2437	35.563	15.51	30	Pass
11	2462	35.727	15.53	30	Pass
12	2467	35.481	15.50	30	Pass
13	2472	21.038	13.23	30	Pass

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	11.561	10.63	30	Pass
6	2437	11.246	10.51	30	Pass
11	2462	11.429	10.58	30	Pass
12	2467	11.272	10.52	30	Pass
13	2472	7.261	8.61	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	11.35	10.55	30	Pass
6	2437	11.272	10.52	30	Pass
11	2462	11.508	10.61	30	Pass
12	2467	11.246	10.51	30	Pass
13	2472	7.551	8.78	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	100115	Jan. 21, 2019	Jan. 20, 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 03 月 21 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	吳俊樺		

802.11b

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-4.43	8	Pass
6	2437	-5.21	8	Pass
11	2462	-4.23	8	Pass
12	2467	-5.14	8	Pass
13	2472	-7.27	8	Pass

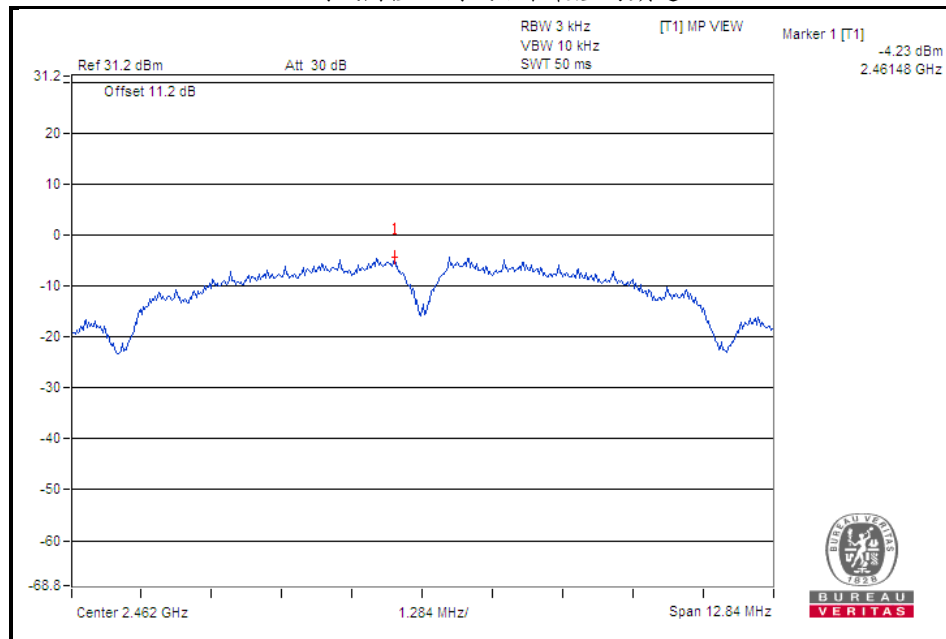
802.11g

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-12.86	8	Pass
6	2437	-12.32	8	Pass
11	2462	-11.65	8	Pass
12	2467	-11.80	8	Pass
13	2472	-14.26	8	Pass

802.11n (HT20)

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-11.95	8	Pass
6	2437	-12.78	8	Pass
11	2462	-13.80	8	Pass
12	2467	-12.48	8	Pass
13	2472	-15.05	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(18)項的規定。

8.2 量測方法

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

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

發射諧波：

Peak 為 RBW = 1 MHz, VBW = 3 MHz；

Average 為 RBW = 1 MHz, VBW = 1 kHz

接收諧波：

Below 1 GHz

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

Above 1 GHz:

Peak 為 RBW = 1 MHz, VBW = 3 MHz；Average 為 RBW = 1 MHz, VBW = 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

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。

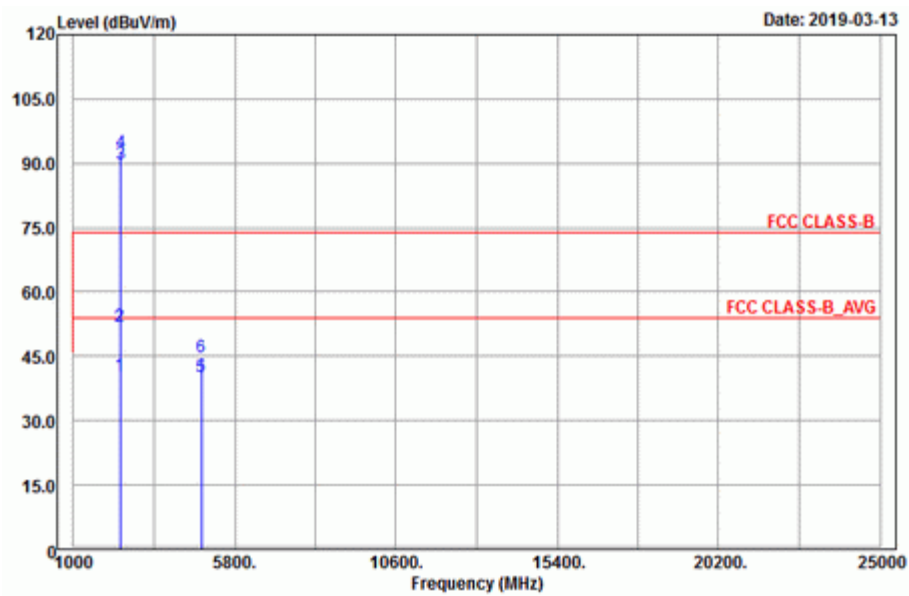
8.6 量測結果

8.6.1 發射諧波

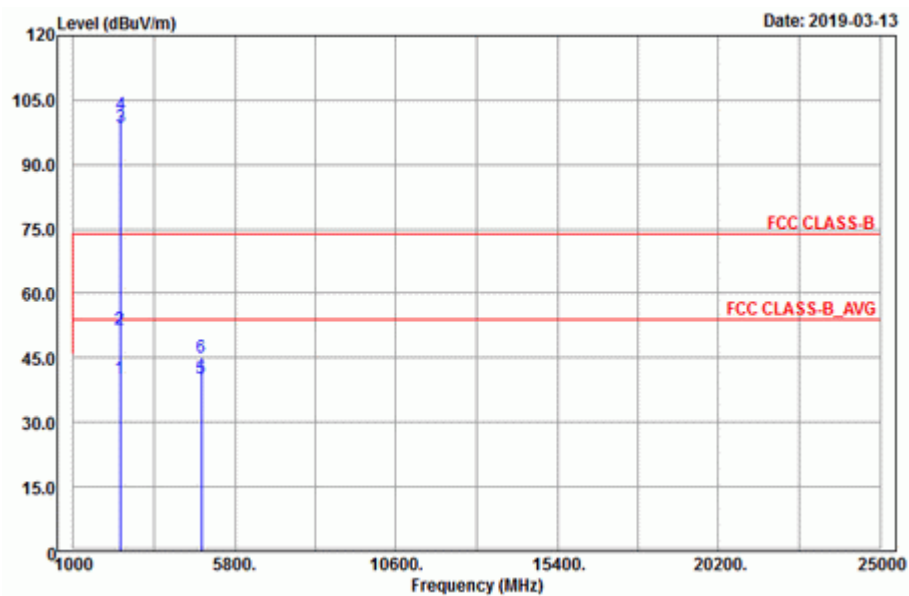
GFSK

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



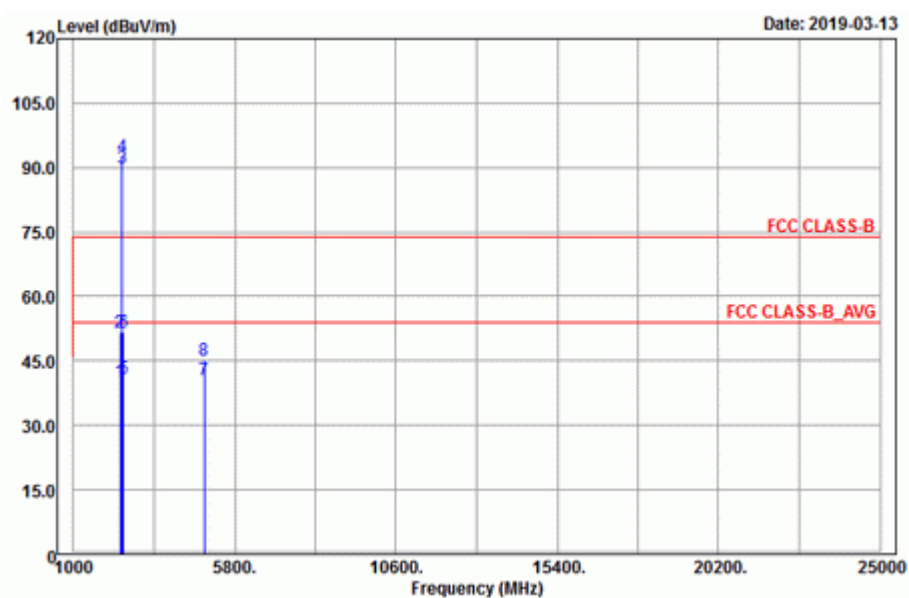
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2377.95	40.4	38.74	1.66	54	-13.6	220	236	Average
2377.95	51.92	50.26	1.66	74	-22.08	220	236	Peak
2402	89.87	88.14	1.73			220	236	Average
2402	92.52	90.79	1.73			220	236	Peak
4804	40.2	32.11	8.09	54	-13.8	118	2	Average
4804	44.94	36.85	8.09	74	-29.06	118	2	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	38.65	1.71	54	-13.64	149	8	Average
2389.2	51.69	49.98	1.71	74	-22.31	149	8	Peak
2402	98.59	96.86	1.73			149	8	Average
2402	101.59	99.86	1.73			149	8	Peak
4804	40.36	32.27	8.09	54	-13.64	124	206	Average
4804	45.19	37.1	8.09	74	-28.81	124	206	Peak

Remarks:

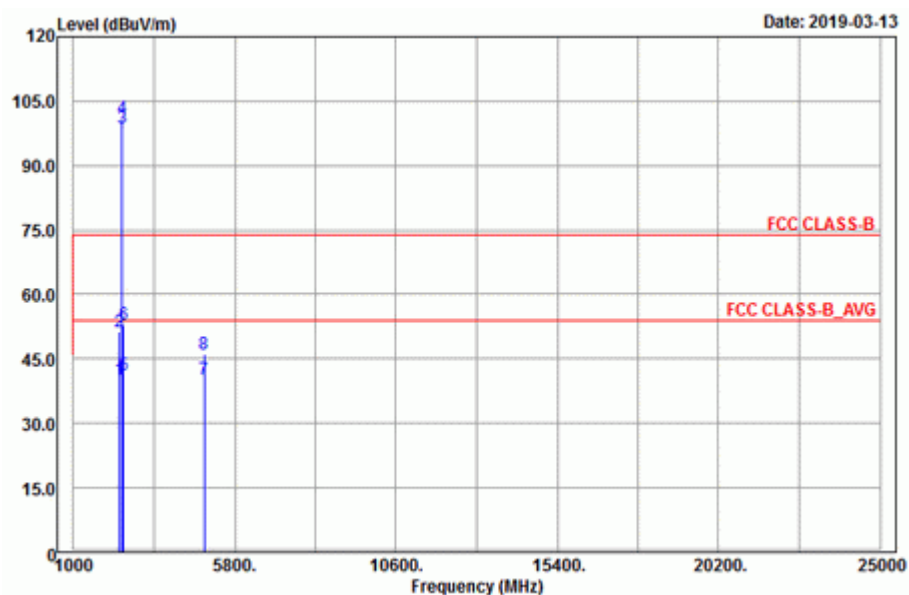
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2402 MHz: Fundamental Frequency
3. The other emission levels were very low against the limit.

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



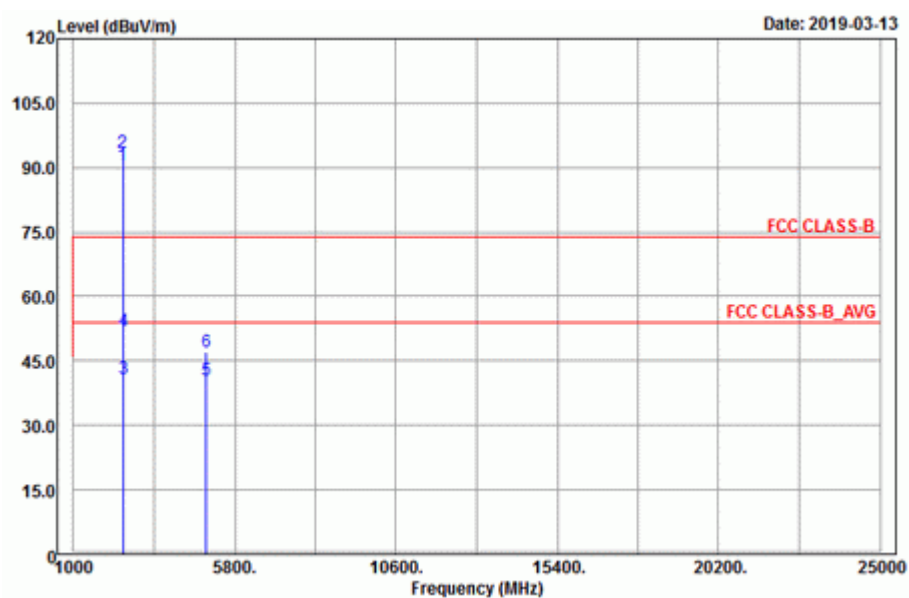
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2384.88	40.31	38.62	1.69	54	-13.69	220	236	Average
2384.88	51.71	50.02	1.69	74	-22.29	220	236	Peak
2441	89.87	88	1.87			220	236	Average
2441	92.55	90.68	1.87			220	236	Peak
2496.76	40.89	38.87	2.02	54	-13.11	220	236	Average
2496.76	51.56	49.54	2.02	74	-22.44	220	236	Peak
4882	40.49	32.3	8.19	54	-13.51	124	276	Average
4882	45.27	37.08	8.19	74	-28.73	124	276	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
2359.86	40.32	38.69	1.63	54	-13.68	149	8	Average
2359.86	51.21	49.58	1.63	74	-22.79	149	8	Peak
2441	98.66	96.79	1.87			149	8	Average
2441	101.15	99.28	1.87			149	8	Peak
2484	41.1	39.14	1.96	54	-12.9	149	8	Average
2484	52.87	50.91	1.96	74	-21.13	149	8	Peak
4882	40.34	32.15	8.19	54	-13.66	125	175	Average
4882	46.24	38.05	8.19	74	-27.76	125	175	Peak

Remarks:

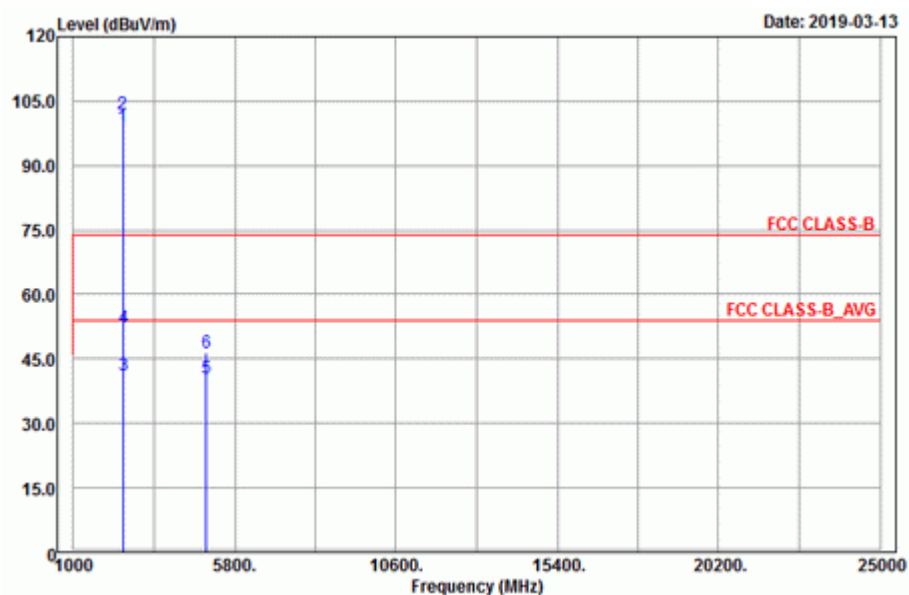
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2441 MHz: Fundamental Frequency
3. The other emission levels were very low against the limit.

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	90.57	88.61	1.96			220	236	Average
2480	93.36	91.4	1.96			220	236	Peak
2497.4	40.95	38.93	2.02	54	-13.05	220	236	Average
2497.4	51.97	49.95	2.02	74	-22.03	220	236	Peak
4960	40.61	32.34	8.27	54	-13.39	134	14	Average
4960	47.01	38.74	8.27	74	-26.99	134	14	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	99.22	97.26	1.96			149	8	Average
2480	102.01	100.05	1.96			149	8	Peak
2483.64	41.21	39.25	1.96	54	-12.79	149	8	Average
2483.64	52.34	50.38	1.96	74	-21.66	149	8	Peak
4960	40.48	32.21	8.27	54	-13.52	215	5	Average
4960	46.53	38.26	8.27	74	-27.47	215	5	Peak

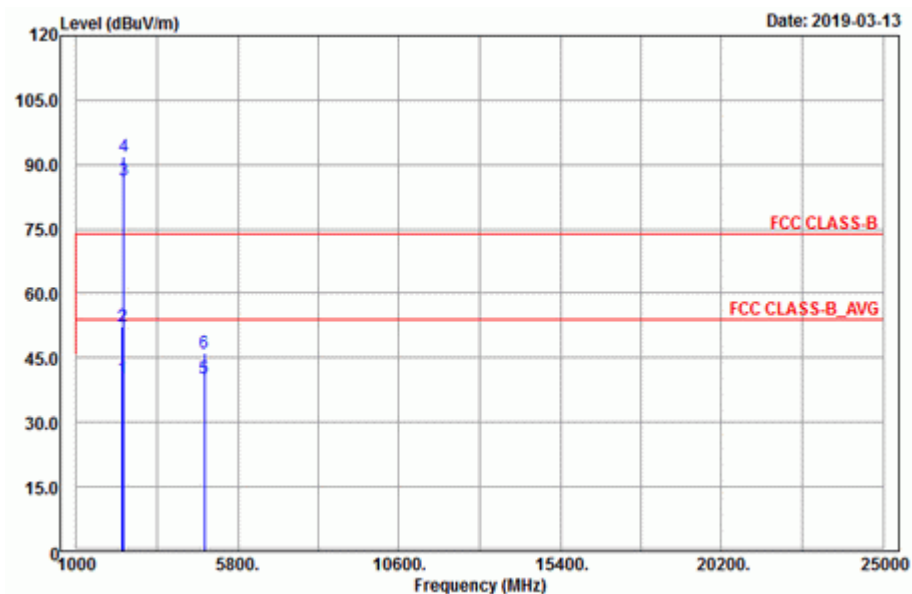
Remarks:

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

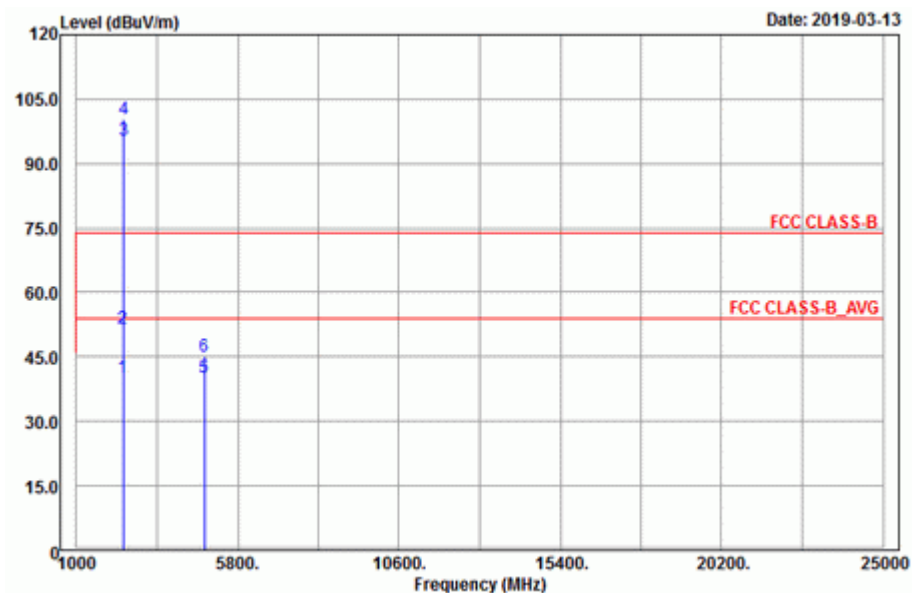
8DPSK

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



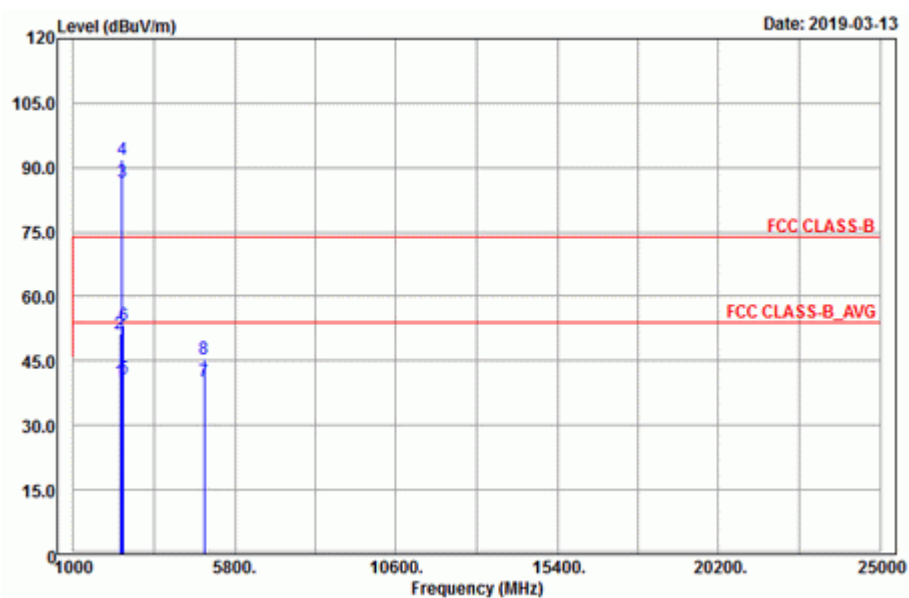
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2371.56	40.36	38.7	1.66	54	-13.64	220	236	Average
2371.56	52.2	50.54	1.66	74	-21.8	220	236	Peak
2402	86.44	84.71	1.73			220	236	Average
2402	91.93	90.2	1.73			220	236	Peak
4804	40.14	32.05	8.09	54	-13.86	189	99	Average
4804	45.98	37.89	8.09	74	-28.02	189	99	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
2387.58	40.32	38.61	1.71	54	-13.68	149	8	Average
2387.58	51.68	49.97	1.71	74	-22.32	149	8	Peak
2402	95.5	93.77	1.73			149	8	Average
2402	100.26	98.53	1.73			149	8	Peak
4804	40.15	32.06	8.09	54	-13.85	215	118	Average
4804	45.28	37.19	8.09	74	-28.72	215	118	Peak

Remarks:

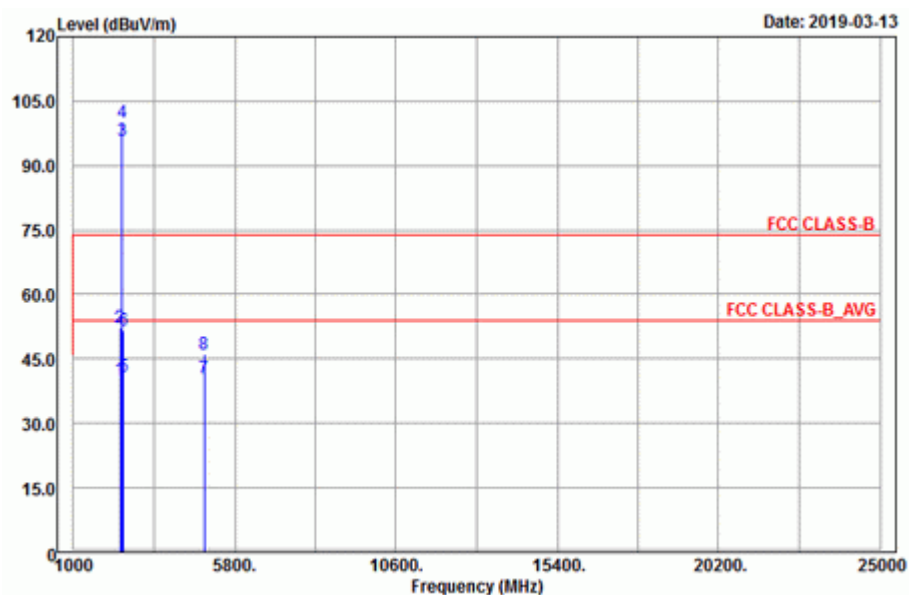
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2402 MHz: Fundamental Frequency
3. The other emission levels were very low against the limit.

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



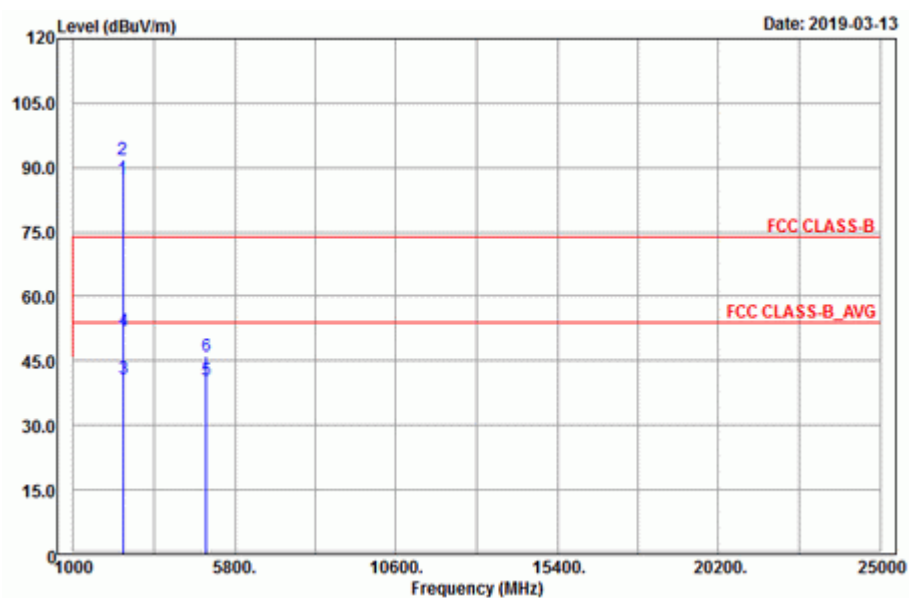
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388.66	40.37	38.66	1.71	54	-13.63	220	236	Average
2388.66	51.23	49.52	1.71	74	-22.77	220	236	Peak
2441	86.52	84.65	1.87			220	236	Average
2441	91.84	89.97	1.87			220	236	Peak
2487.68	40.92	38.91	2.01	54	-13.08	220	236	Average
2487.68	53.27	51.26	2.01	74	-20.73	220	236	Peak
4882	40.27	32.08	8.19	54	-13.73	159	97	Average
4882	45.35	37.16	8.19	74	-28.65	159	97	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
2385.51	40.38	38.67	1.71	54	-13.62	149	8	Average
2385.51	52.35	50.64	1.71	74	-21.65	149	8	Peak
2441	95.8	93.93	1.87			149	8	Average
2441	100.15	98.28	1.87			149	8	Peak
2486.12	40.91	38.92	1.99	54	-13.09	149	8	Average
2486.12	51.73	49.74	1.99	74	-22.27	149	8	Peak
4882	40.55	32.36	8.19	54	-13.45	185	5	Average
4882	46.13	37.94	8.19	74	-27.87	185	5	Peak

Remarks:

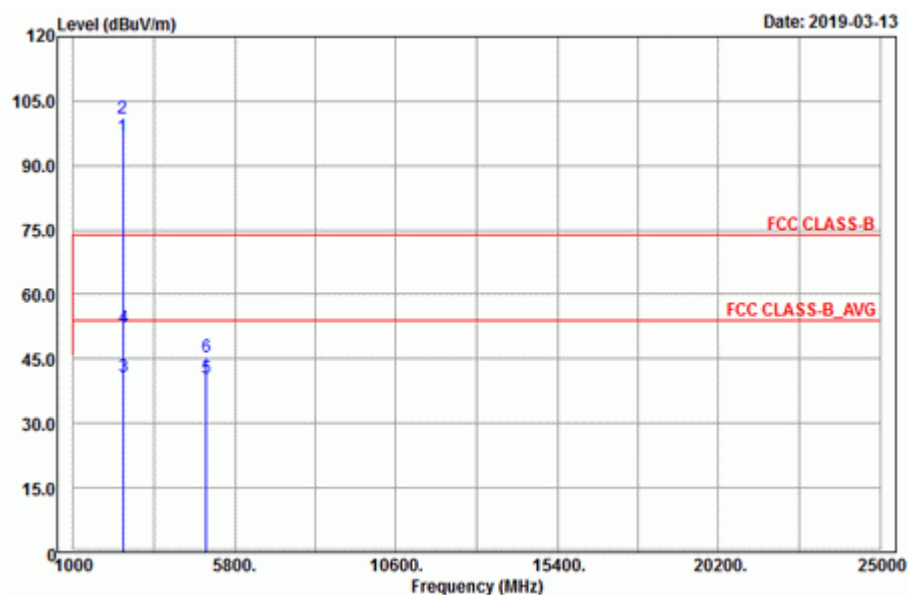
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2441 MHz: Fundamental Frequency
3. The other emission levels were very low against the limit.

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	87.14	85.18	1.96			220	236	Average
2480	92	90.04	1.96			220	236	Peak
2498.68	40.84	38.82	2.02	54	-13.16	220	236	Average
2498.68	52.03	50.01	2.02	74	-21.97	220	236	Peak
4960	40.59	32.32	8.27	54	-13.41	111	121	Average
4960	46.21	37.94	8.27	74	-27.79	111	121	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	96.64	94.68	1.96			149	8	Average
2480	101.02	99.06	1.96			149	8	Peak
2483.84	41.01	39.05	1.96	54	-12.99	149	8	Average
2483.84	52.46	50.5	1.96	74	-21.54	149	8	Peak
4960	40.44	32.17	8.27	54	-13.56	183	334	Average
4960	45.3	37.03	8.27	74	-28.7	183	334	Peak

Remarks:

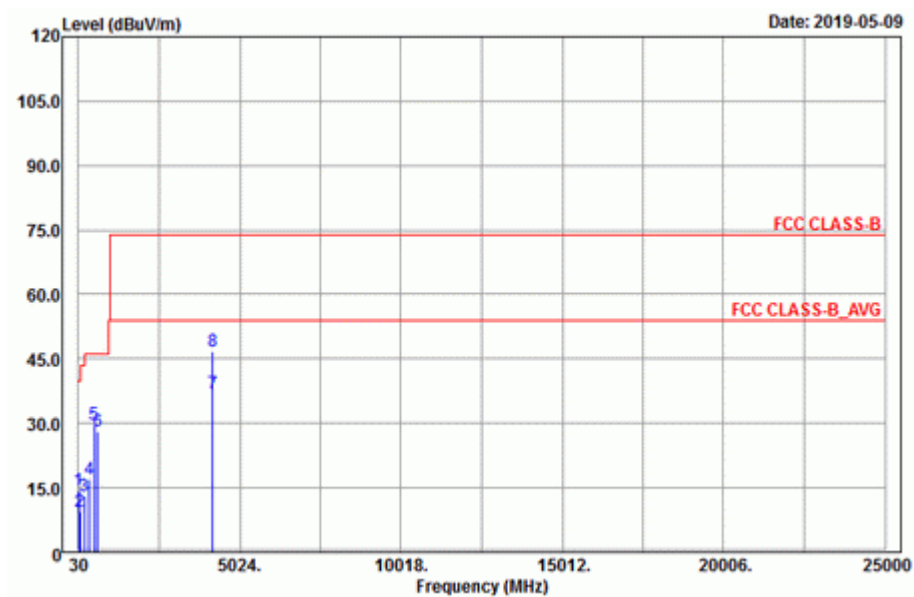
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2480 MHz: Fundamental Frequency
3. The other emission levels were very low against the limit.

8.6.2 接收諧波

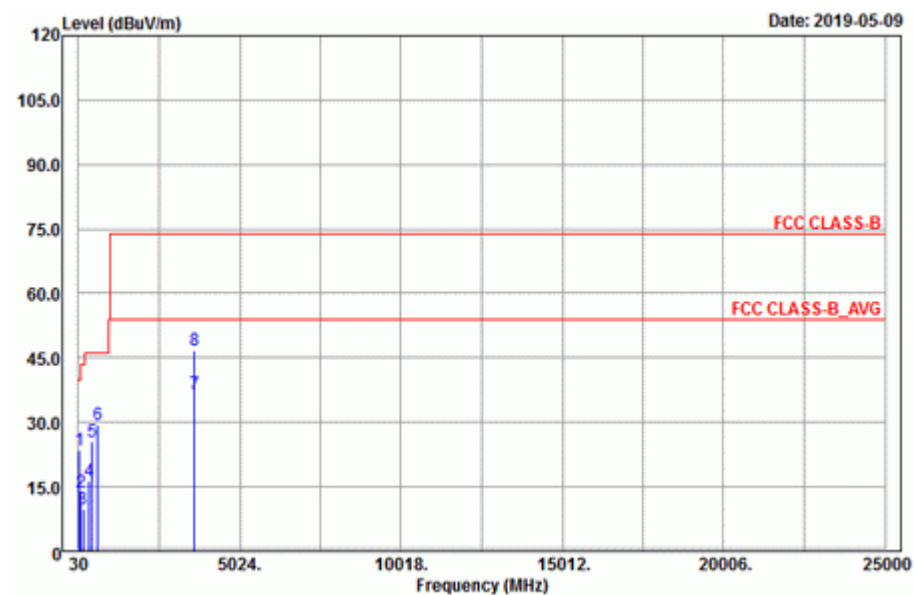
GFSK

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
51.33	14.36	31.23	-16.87	40	-25.64	155	162	Peak
93.72	9.64	29.07	-19.43	43.5	-33.86	104	158	Peak
205.77	13.23	32.73	-19.5	43.5	-30.27	123	162	Peak
374.9	17	32.36	-15.36	46	-29	155	169	Peak
514.2	29.83	42.72	-12.89	46	-16.17	187	195	Peak
617.1	28.05	39.2	-11.15	46	-17.95	142	187	Peak
4192	36.98	30.23	6.75	54	-17.02	101	121	Average
4192	46.79	40.04	6.75	74	-27.21	101	121	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
54.3	23.56	40.67	-17.11	40	-16.44	159	165	Peak
102.9	13.83	32.45	-18.62	43.5	-29.67	104	154	Peak
161.76	9.68	31.6	-21.92	43.5	-33.82	118	155	Peak
360.2	16.19	31.68	-15.49	46	-29.81	121	154	Peak
462.4	25.48	39.29	-13.81	46	-20.52	187	195	Peak
617.1	29.42	40.57	-11.15	46	-16.58	126	198	Peak
3616	36.56	31.53	5.03	54	-17.44	121	101	Average
3616	46.78	41.75	5.03	74	-27.22	121	101	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp 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:

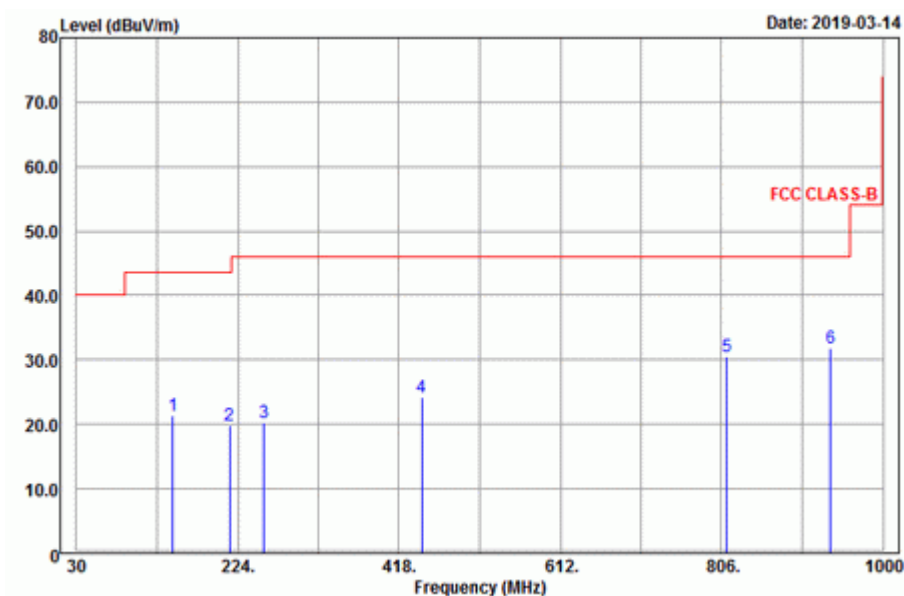
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Data:

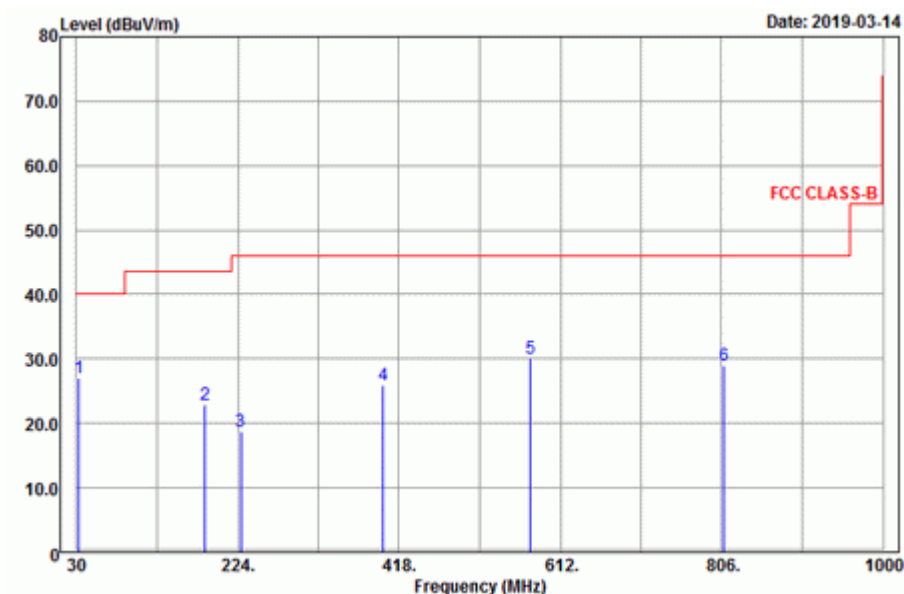
GFSK

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
146.37	21.31	43.82	-22.51	43.5	-22.19	134	26	Peak
214.68	19.9	39.26	-19.36	43.5	-23.6	102	221	Peak
255.72	20.32	38.06	-17.74	46	-25.68	158	88	Peak
445.6	24.3	38.47	-14.17	46	-21.7	124	244	Peak
812.4	30.41	38.55	-8.14	46	-15.59	189	264	Peak
937	31.93	37.87	-5.94	46	-14.07	105	2	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
32.97	26.97	46.74	-19.77	40	-13.03	105	213	Peak
184.98	22.92	43.35	-20.43	43.5	-20.58	124	6	Peak
228.18	18.82	37.48	-18.66	46	-27.18	118	249	Peak
399.4	25.84	40.73	-14.89	46	-20.16	142	299	Peak
576.5	30.14	41.95	-11.81	46	-15.86	124	142	Peak
808.9	29.07	37.29	-8.22	46	-16.93	105	28	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp 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(23)項的規定。

9.2 量測方法

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

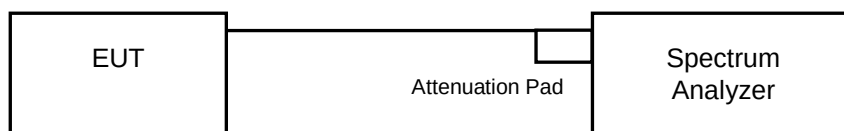
9.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	100115	Jan. 21, 2019	Jan. 20, 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



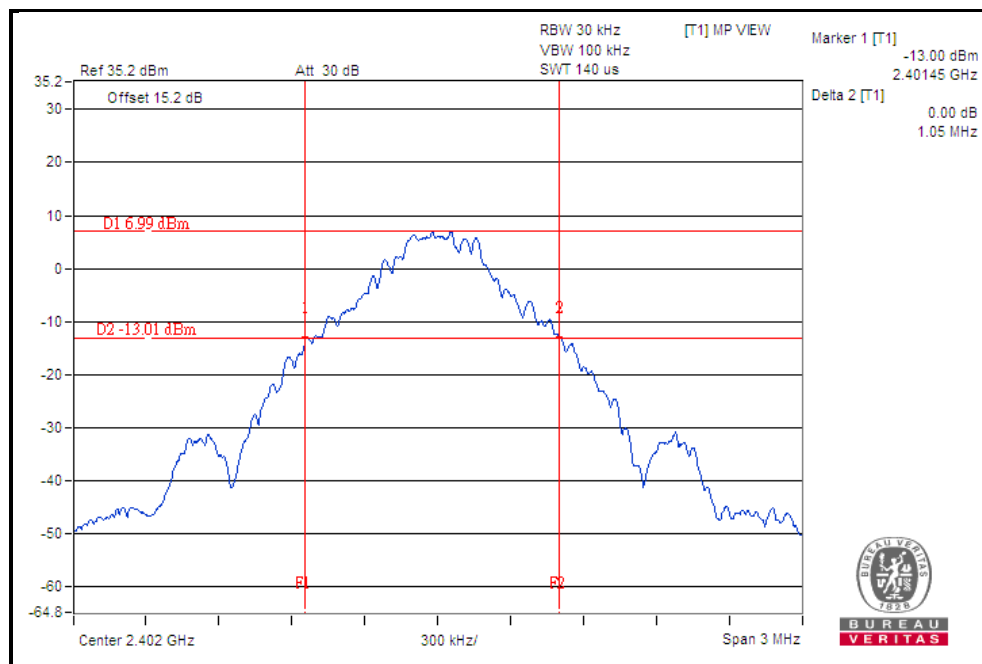
9.5 量測結果

操作模式	發射	測試日期	108 年 03 月 21 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	吳俊樺		

Channel	Channel Frequency (MHz)	20 dB Bandwidth (MHz)		>= 25 kHz
		GFSK	8DPSK	
0	2402	1.05	1.31	Yes
39	2441	1.05	1.31	Yes
78	2480	1.05	1.31	Yes

註：對操作於 2400~2483.5 MHz 頻段的跳頻系統技術之低功率發射機，依據國家通訊傳播委員會低功率射頻電機技術規範 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(21)項的規定。

10.2 量測方法

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

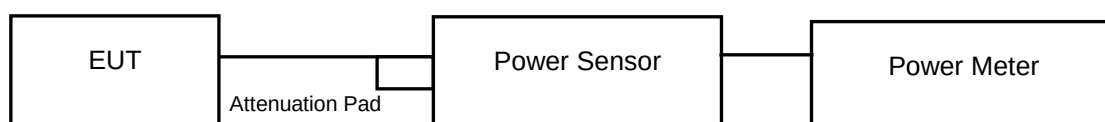
10.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Power Meter Anritsu	ML2495A	1232002	Dec. 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	108 年 03 月 21 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	吳俊樺		

<Peak Power>

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)		Peak Power Limit (dBm)	Pass / Fail
		GFSK	8DPSK		
0	2402	11.65	11.90	30	Pass
39	2441	11.35	11.45	30	Pass
78	2480	10.97	11.11	30	Pass

<Average Power>

Channel	Channel Frequency (MHz)	Average Power Output (dBm)		Peak Power Limit (dBm)	Pass / Fail
		GFSK	8DPSK		
0	2402	11.03	8.76	30	Pass
39	2441	10.72	8.43	30	Pass
78	2480	10.34	8.02	30	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(22)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。

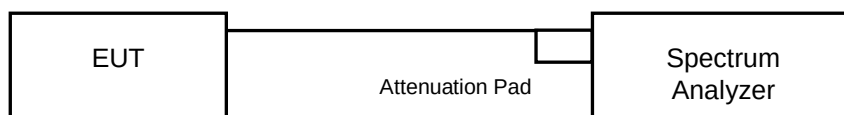
11.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	100115	Jan. 21, 2019	Jan. 20, 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.

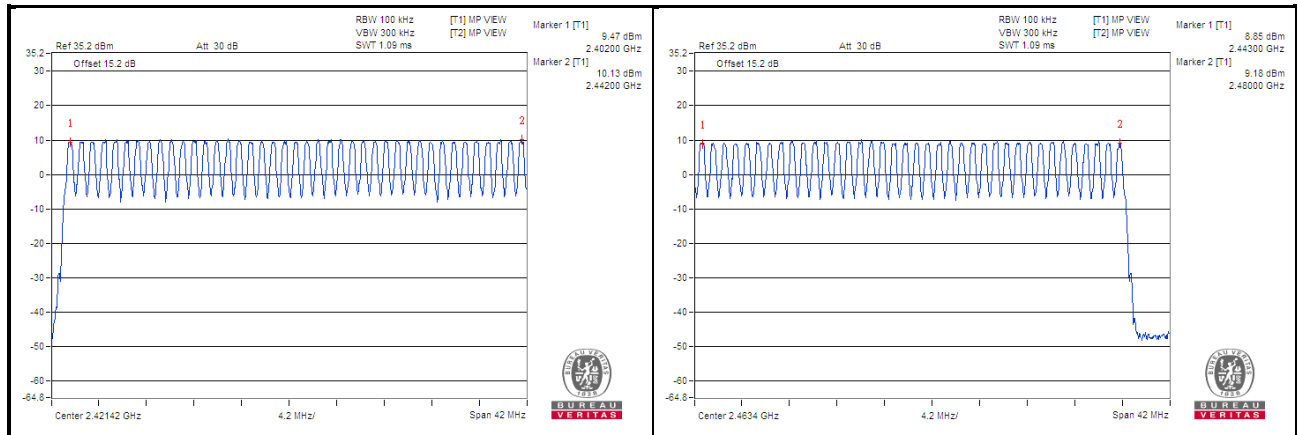
11.4 測試配置



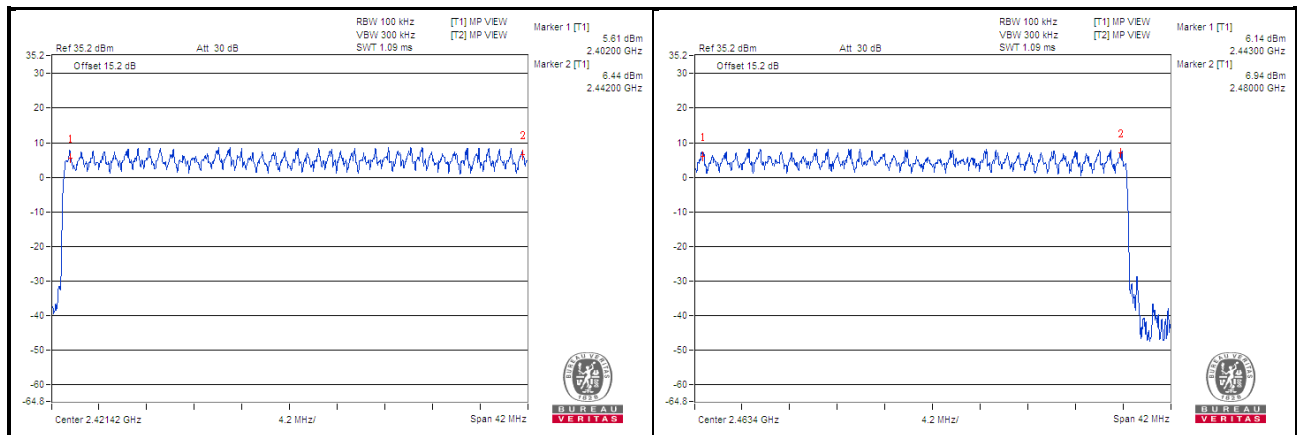
11.5 量測結果

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(22)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。

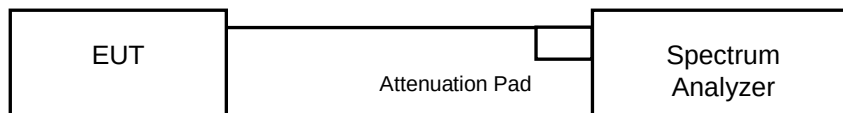
12.3 量測場強輻射之儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	100115	Jan. 21, 2019	Jan. 20, 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	108 年 03 月 21 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	吳俊樺		

GFSK

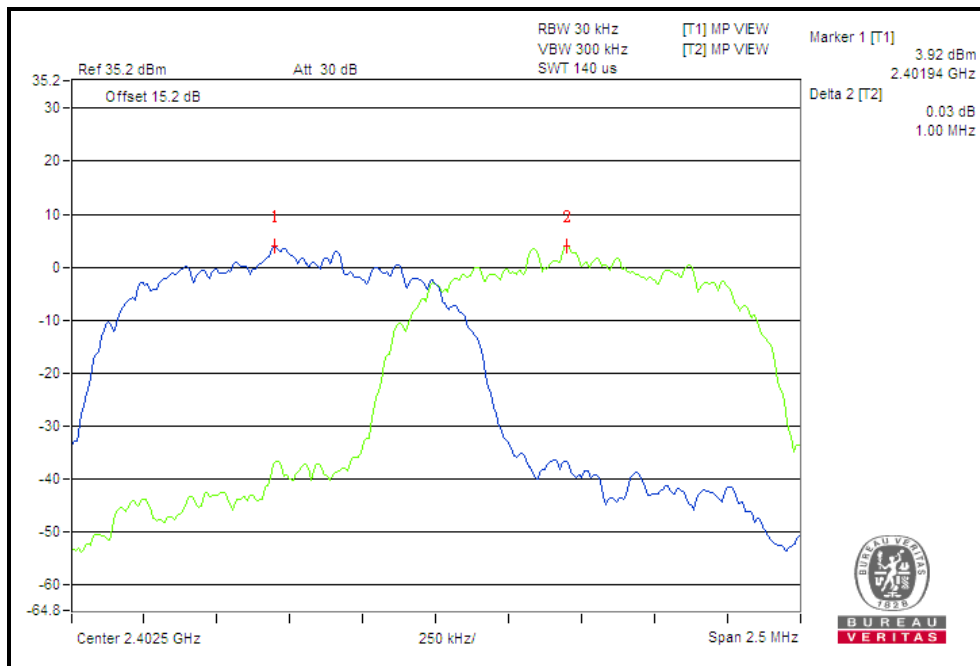
Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.00	1.05	0.70	Pass
39	2441	1.00	1.05	0.70	Pass
78	2480	1.00	1.05	0.70	Pass

8DPSK

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

本項測試的 limit 為至少為三分之二 20 dB 頻寬。

**此測試圖僅放測試結果最差的頻道。



12.6 量測結果判定

依據測試數據結果，符合低功率射頻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(24)項的規定。

13.2 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。

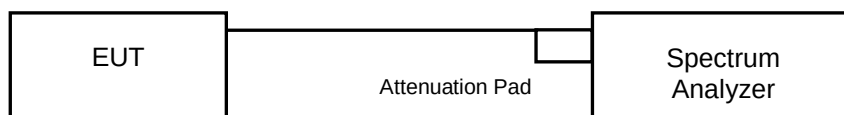
13.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	100115	Jan. 21, 2019	Jan. 20, 2020

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.

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	0.432	139.2	0.4
DH3	26 (times / 5 sec) * 6.32 = 164.32 times	1.73	284.3	0.4
DH5	18 (times / 5 sec) * 6.32 = 113.76 times	2.96	336.7	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	25 (times / 5 sec) * 6.32 = 158 times	1.69	267	0.4
3DH5	18 (times / 5 sec) * 6.32 = 113.76 times	2.95	335.6	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。

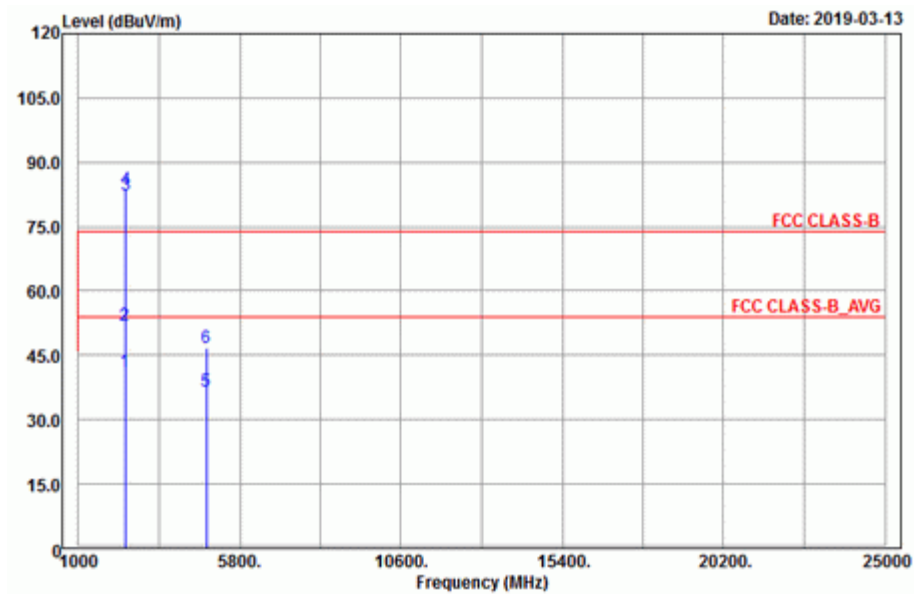
14.6 量測結果

14.6.1 發射諧波

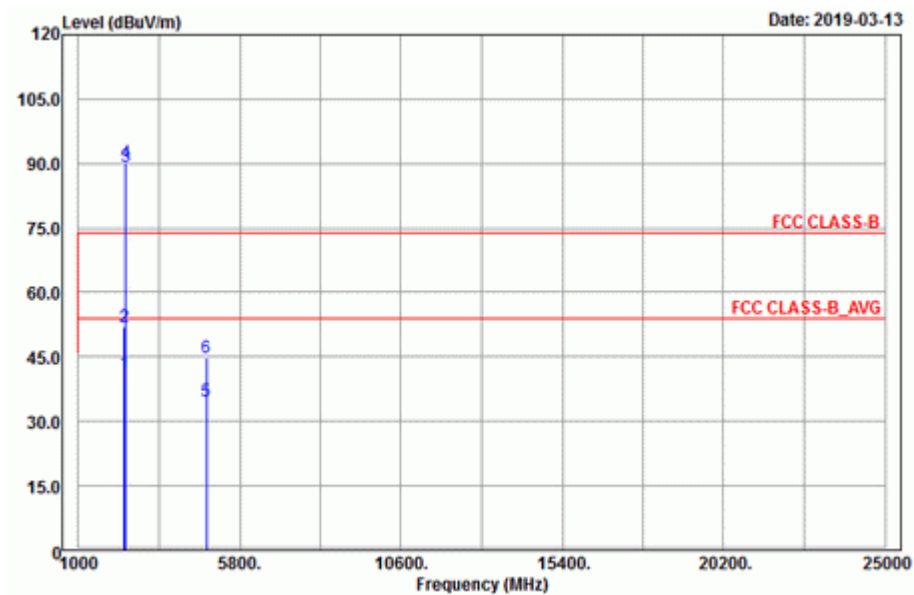
GFSK

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	Karl Lee

Horizontal



Vertical



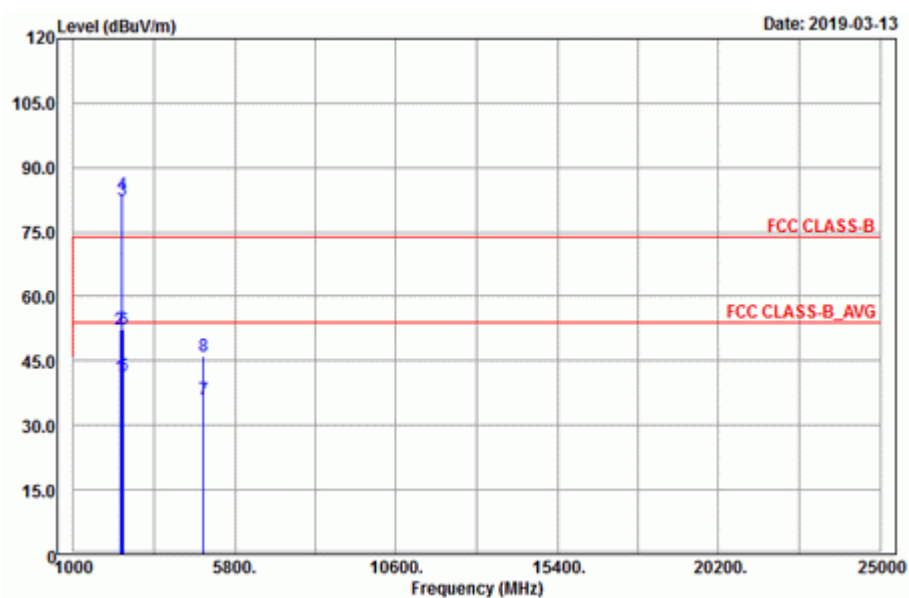
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386.5	41.27	39.56	1.71	54	-12.73	278	268	Average
2386.5	51.85	50.14	1.71	74	-22.15	278	268	Peak
2402	82.52	80.79	1.73			278	268	Average
2402	83.61	81.88	1.73			278	268	Peak
4804	36.53	28.44	8.09	54	-17.47	150	165	Average
4804	46.7	38.61	8.09	74	-27.3	150	165	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2374.62	41.08	39.42	1.66	54	-12.92	184	352	Average
2374.62	51.89	50.23	1.66	74	-22.11	184	352	Peak
2402	89.37	87.64	1.73			184	352	Average
2402	90.22	88.49	1.73			184	352	Peak
4804	34.76	26.67	8.09	54	-19.24	185	274	Average
4804	44.88	36.79	8.09	74	-29.12	185	274	Peak

Remarks:

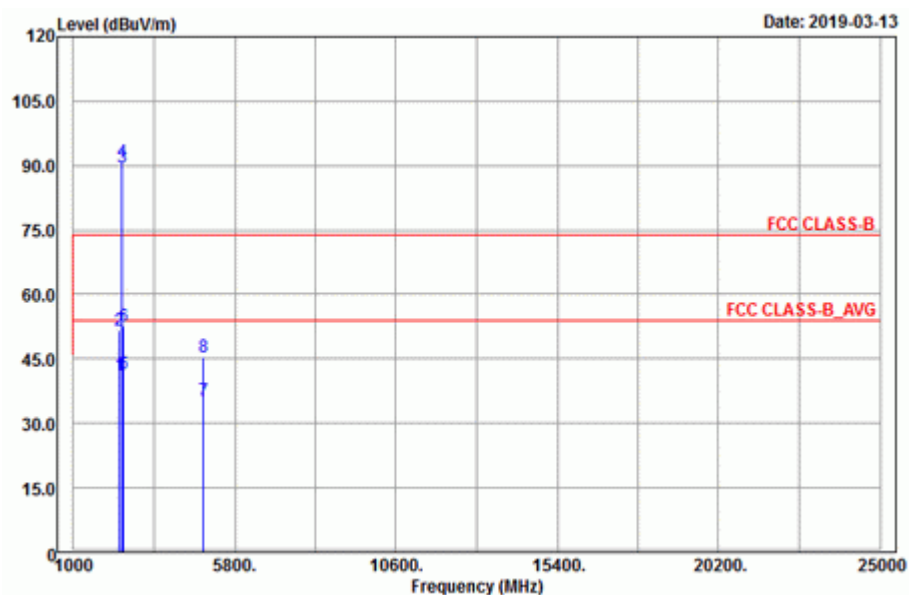
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2402 MHz: Fundamental Frequency
3. The other emission levels were very low against the limit.

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	Karl Lee

Horizontal



Vertical



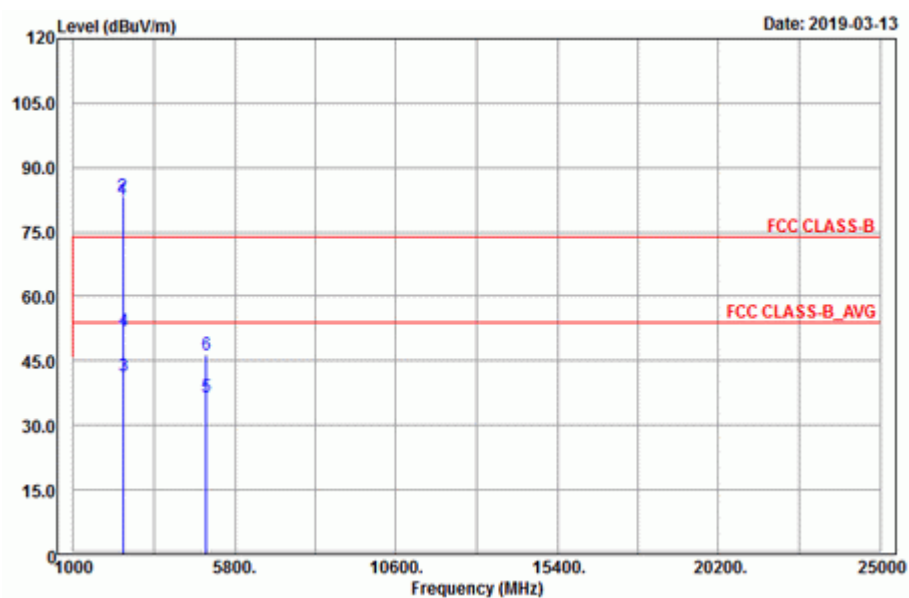
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2382.72	41.1	39.41	1.69	54	-12.9	278	268	Average
2382.72	52.24	50.55	1.69	74	-21.76	278	268	Peak
2440	82.46	80.61	1.85			278	268	Average
2440	83.63	81.78	1.85			278	268	Peak
2490.08	41.52	39.51	2.01	54	-12.48	278	268	Average
2490.08	52.29	50.28	2.01	74	-21.71	278	268	Peak
4880	36.12	27.93	8.19	54	-17.88	138	117	Average
4880	46.05	37.86	8.19	74	-27.95	138	117	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
2370.48	41.18	39.52	1.66	54	-12.82	184	352	Average
2370.48	51.77	50.11	1.66	74	-22.23	184	352	Peak
2440	89.75	87.9	1.85			184	352	Average
2440	90.78	88.93	1.85			184	352	Peak
2484.44	41.61	39.62	1.99	54	-12.39	184	352	Average
2484.44	52.54	50.55	1.99	74	-21.46	184	352	Peak
4880	35.24	27.05	8.19	54	-18.76	165	226	Average
4880	45.31	37.12	8.19	74	-28.69	165	226	Peak

Remarks:

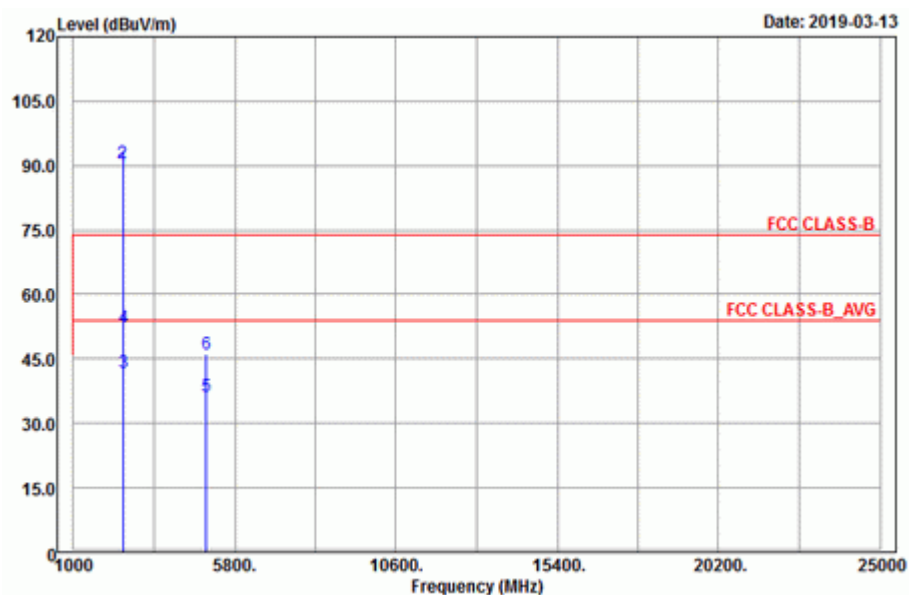
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2440 MHz: Fundamental Frequency
3. The other emission levels were very low against the limit.

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	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
2480	82.37	80.41	1.96			270	224	Average
2480	83.27	81.31	1.96			270	224	Peak
2483.56	41.58	39.62	1.96	54	-12.42	270	224	Average
2483.56	52.04	50.08	1.96	74	-21.96	270	224	Peak
4960	36.47	28.2	8.27	54	-17.53	168	205	Average
4960	46.52	38.25	8.27	74	-27.48	168	205	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	89.24	87.28	1.96			184	352	Average
2480	90.6	88.64	1.96			184	352	Peak
2483.88	41.7	39.74	1.96	54	-12.3	184	352	Average
2483.88	52.33	50.37	1.96	74	-21.67	184	352	Peak
4960	36.15	27.88	8.27	54	-17.85	120	95	Average
4960	46.23	37.96	8.27	74	-27.77	120	95	Peak

Remarks:

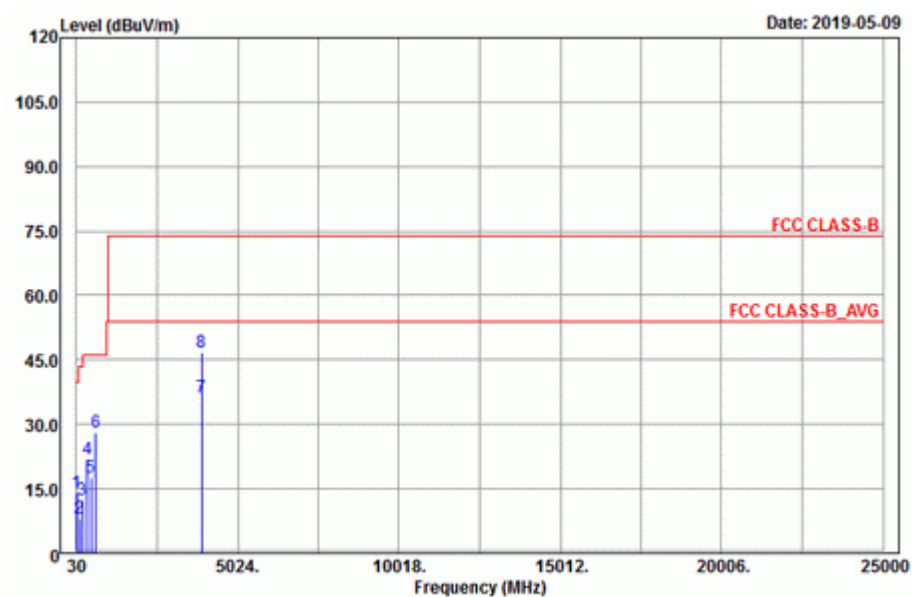
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
2. 2480 MHz: Fundamental Frequency
3. The other emission levels were very low against the limit.

14.6.2 接收諧波

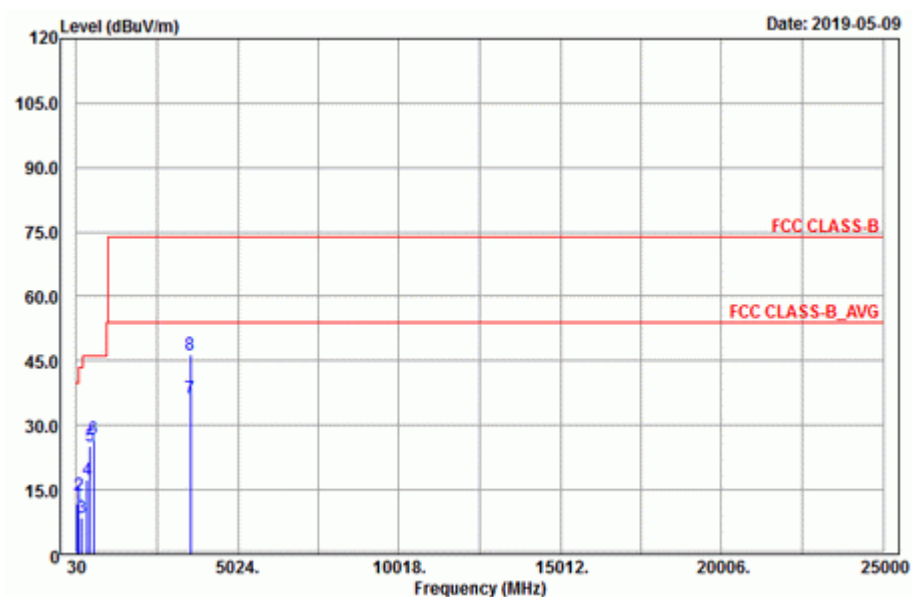
GFSK

EUT Test Condition		Measurement Detail	
Channel	Channel 39	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
51.33	14.06	30.93	-16.87	40	-25.94	156	102	Peak
118.02	8.09	28.44	-20.35	43.5	-35.41	155	198	Peak
205.77	12.55	32.05	-19.5	43.5	-30.95	172	100	Peak
360.2	21.91	37.4	-15.49	46	-24.09	159	168	Peak
479.9	17.72	31.21	-13.49	46	-28.28	188	20	Peak
617.1	28.05	39.2	-11.15	46	-17.95	159	165	Peak
3910	36.39	30.53	5.86	54	-17.61	199	198	Average
3910	46.71	40.85	5.86	74	-27.29	199	198	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
57	11.64	29.14	-17.5	40	-28.36	188	174	Peak
102.9	13.78	32.4	-18.62	43.5	-29.72	104	154	Peak
184.71	8.35	28.87	-20.52	43.5	-35.15	199	186	Peak
360.2	17.2	32.69	-15.49	46	-28.8	158	195	Peak
462.4	25.11	38.92	-13.81	46	-20.89	126	132	Peak
565.3	26.66	38.66	-12	46	-19.34	157	184	Peak
3562	36.4	31.52	4.88	54	-17.6	155	195	Average
3562	46.38	41.5	4.88	74	-27.62	155	195	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp 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:

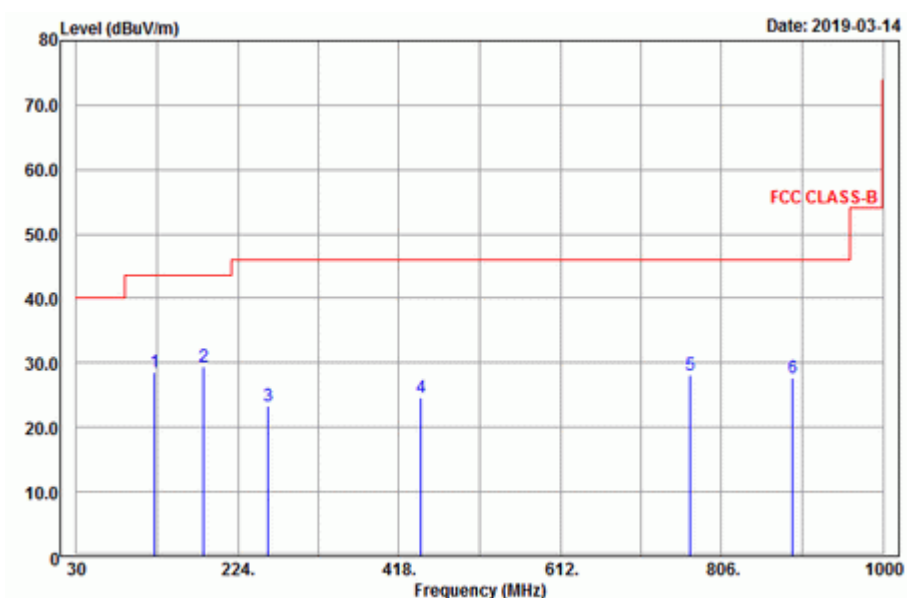
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Data:

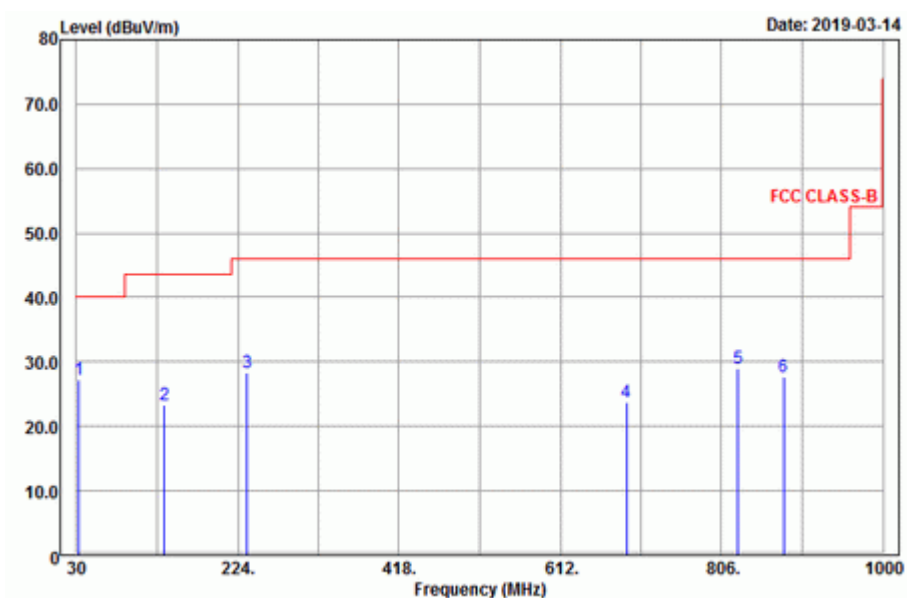
GFSK

EUT Test Condition		Measurement Detail	
Channel	Channel 39	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
123.69	28.54	49.73	-21.19	43.5	-14.96	149	65	Peak
183.09	29.5	50.11	-20.61	43.5	-14	110	114	Peak
260.58	23.29	40.95	-17.66	46	-22.71	124	255	Peak
444.9	24.6	38.77	-14.17	46	-21.4	157	77	Peak
768.3	28.04	36.93	-8.89	46	-17.96	136	200	Peak
891.5	27.59	34.24	-6.65	46	-18.41	195	5	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
32.97	27.32	47.09	-19.77	40	-12.68	145	222	Peak
136.11	23.38	45.6	-22.22	43.5	-20.12	124	326	Peak
235.47	28.35	46.7	-18.35	46	-17.65	119	59	Peak
691.3	23.75	33.69	-9.94	46	-22.25	124	174	Peak
825.7	29.1	36.93	-7.83	46	-16.9	154	199	Peak
881	27.69	34.46	-6.77	46	-18.31	187	77	Peak

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp 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。

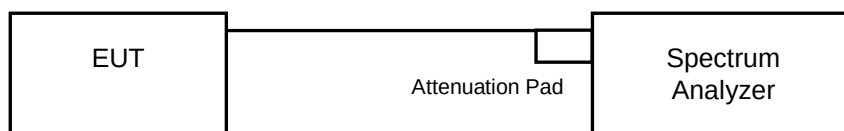
15.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	100115	Jan. 21, 2019	Jan. 20, 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

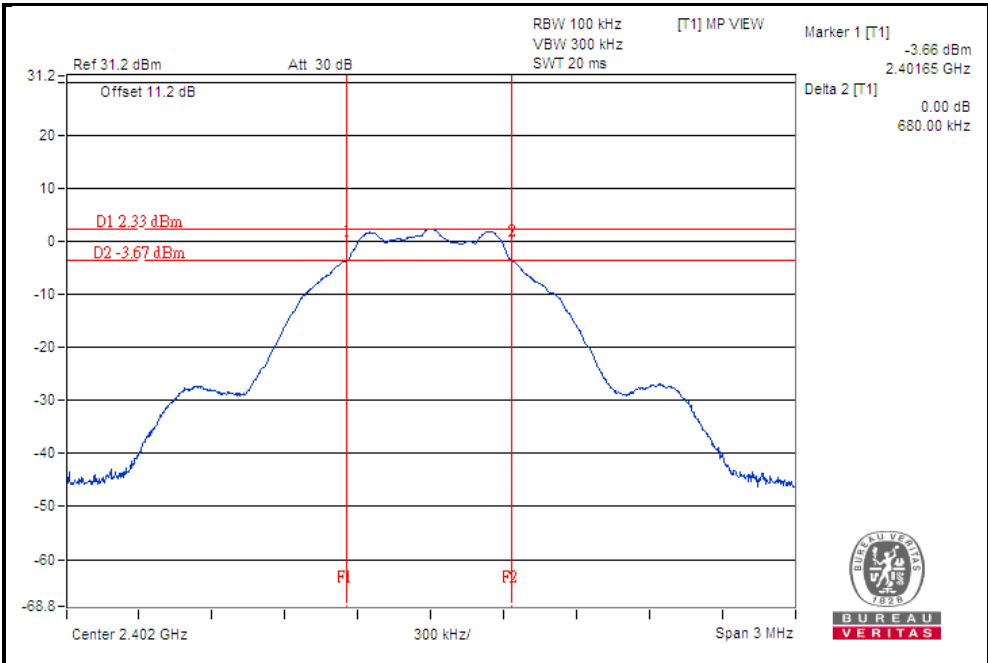


15.5 量測結果

操作模式	發射	測試日期	108 年 03 月 21 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	吳俊樺		

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	0.68	0.5	Pass
19	2440	0.70	0.5	Pass
39	2480	0.68	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。

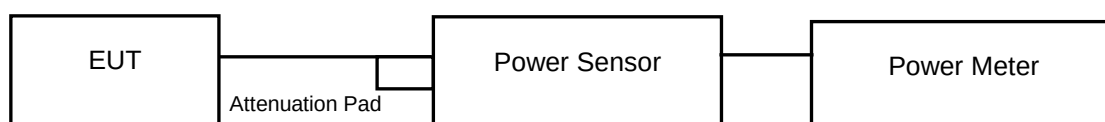
16.3 量測儀器

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 03 月 21 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	吳俊樺		

<Peak Power>

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
0	2402	1.941	2.88	30	Pass
19	2440	1.858	2.69	30	Pass
39	2480	1.75	2.43	30	Pass

<Average Power>

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
0	2402	1.722	2.36	30	Pass
19	2440	1.622	2.10	30	Pass
39	2480	1.528	1.84	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。

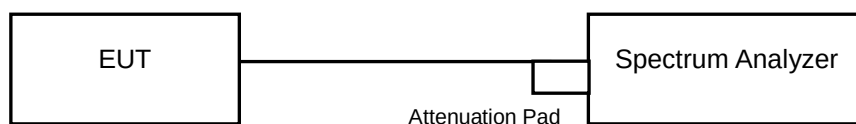
17.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	100115	Jan. 21, 2019	Jan. 20, 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

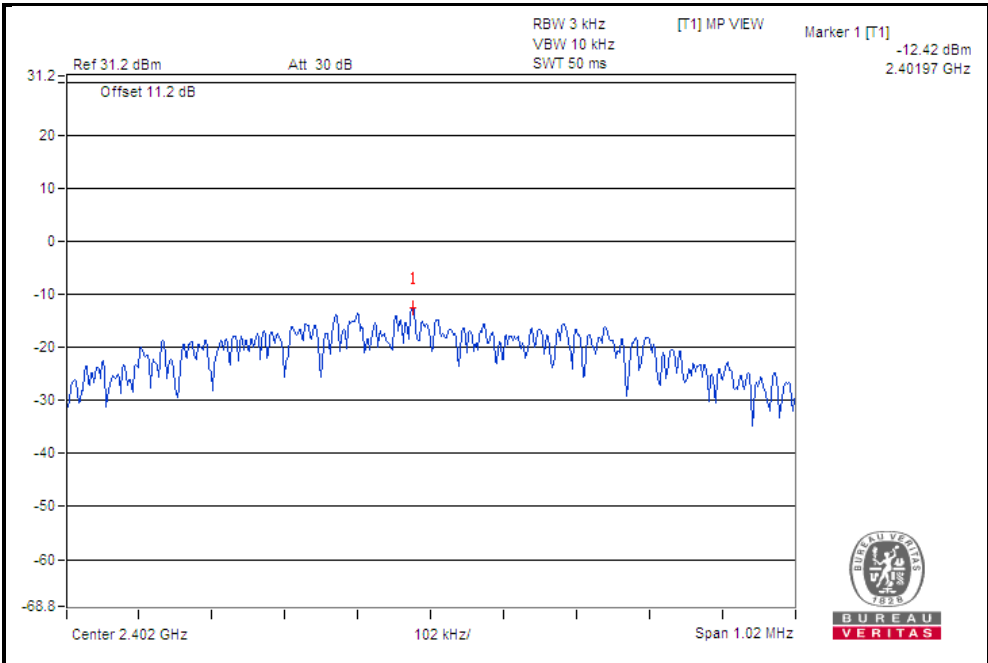


17.5 量測結果

操作模式	發射	測試日期	108 年 03 月 21 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	吳俊樺		

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	2402	-12.42	8	Pass
19	2440	-12.76	8	Pass
39	2480	-13.28	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(27)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 OPEN、CLOSE、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

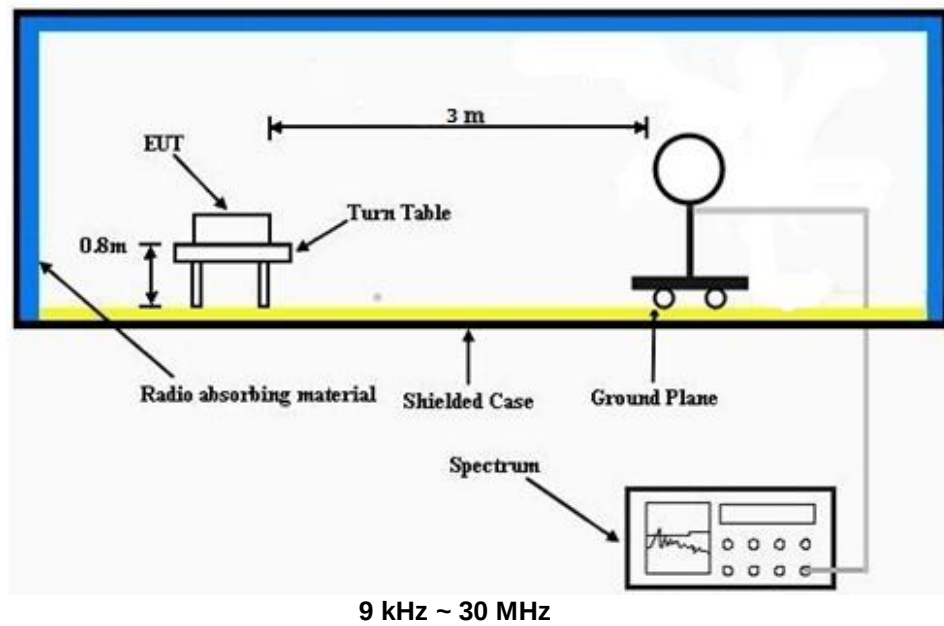
Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 18, 2019	Mar. 17, 2020
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 13, 2018	Dec. 12, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	100115	Jan. 21, 2019	Jan. 20, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 23, 2018	Nov. 22, 2019
Loop Antenna	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
Preamplifier EMCI	EMC001340	980201	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC 330H	980112	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 12, 2018	Oct. 11, 2019
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. 05, 2018	Sep. 04, 2019
DC Power Supply Topward	33010D	807748	Oct. 24, 2018	Oct. 23, 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 FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
4. The IC Site Registration No. is 7450F-10.
5. The following table is for the measurement uncertainty, which is calculated as per the document CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

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

18.4 測試配置



18.5 場強度之計算

場強之計算公式如下：

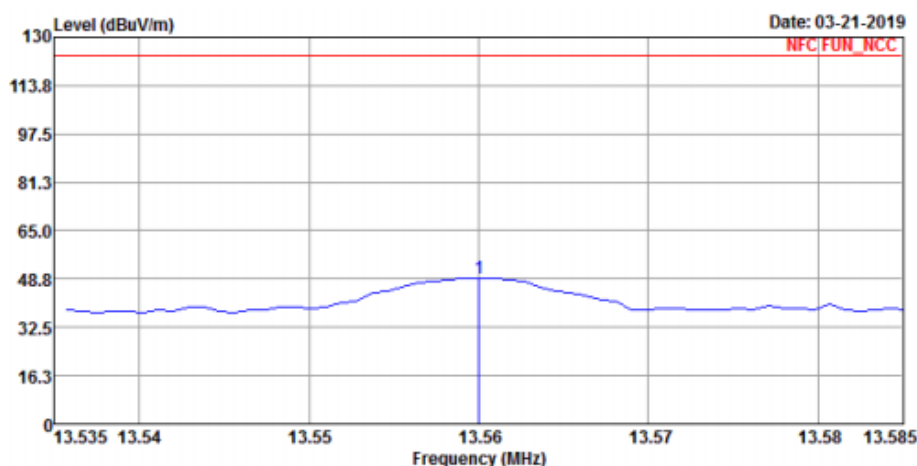
結果值 Emission level (dBuV/m) = 機器讀值 Raw Value (dBuV) + 校正因子 Correction Factor (dB/m)

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	Jisyong Wang		

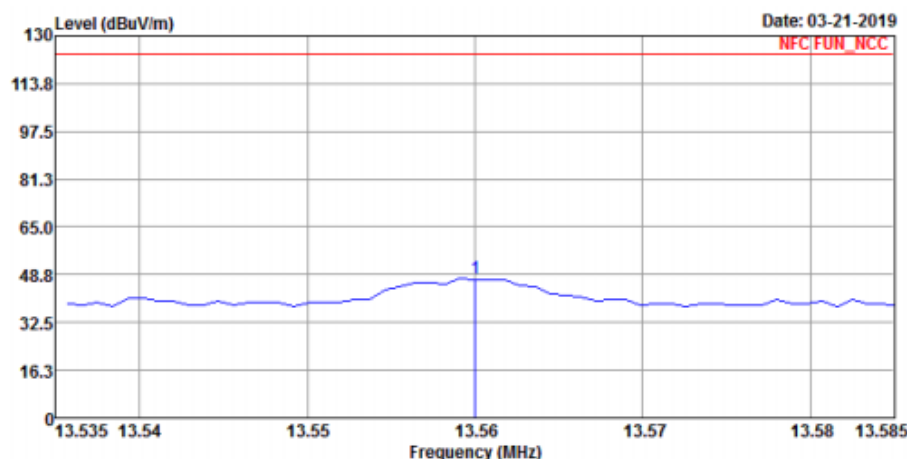


Antenna Polarity & Test Distance: Loop Antenna Open at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
13.56	49.1	27.28	21.82	124	-74.9	120	360	QP

Note:

- Emission level (dBuV/m) = Read Level (dBuV) + Correction Factor (dB/m)
- Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Preamp Factor (dB)
- 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
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
- Open: loop antenna 面向 EUT
 Close: 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		



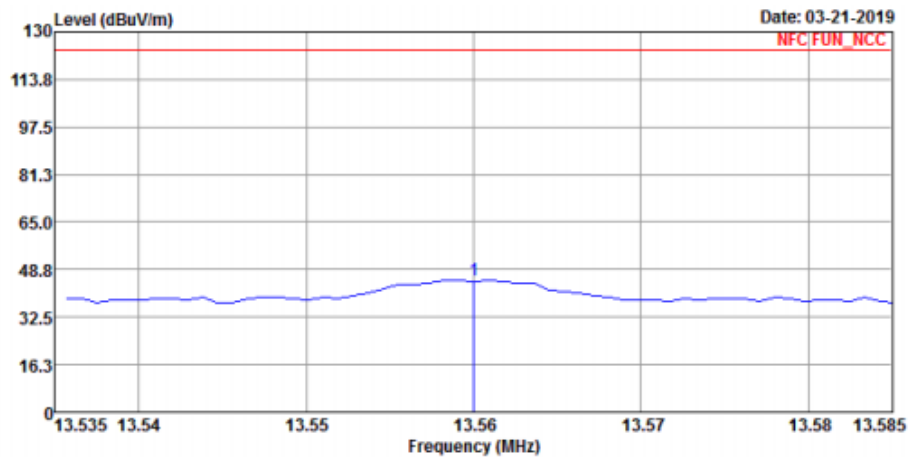
Antenna Polarity & Test Distance: Loop Antenna Close at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
13.56	47.7	25.88	21.82	124	-76.3	120	0	QP

Note:

1. Emission level (dBuV/m) = Read Level (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Preamp Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value
5. 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

$$\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$$
6. Open: loop antenna 面向 EUT
 Close: 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	45.18	23.36	21.82	124	-78.82	120	0	QP

Note:

1. Emission level (dBuV/m) = Read Level (dBuV) + Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Preamp Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value
5. 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

$$\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$$
6. Open: loop antenna 面向 EUT
 Close: 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(28)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 OPEN、CLOSE、GROUND-PARALLEL 極化各執行測試一次，以紀錄最大場強值。

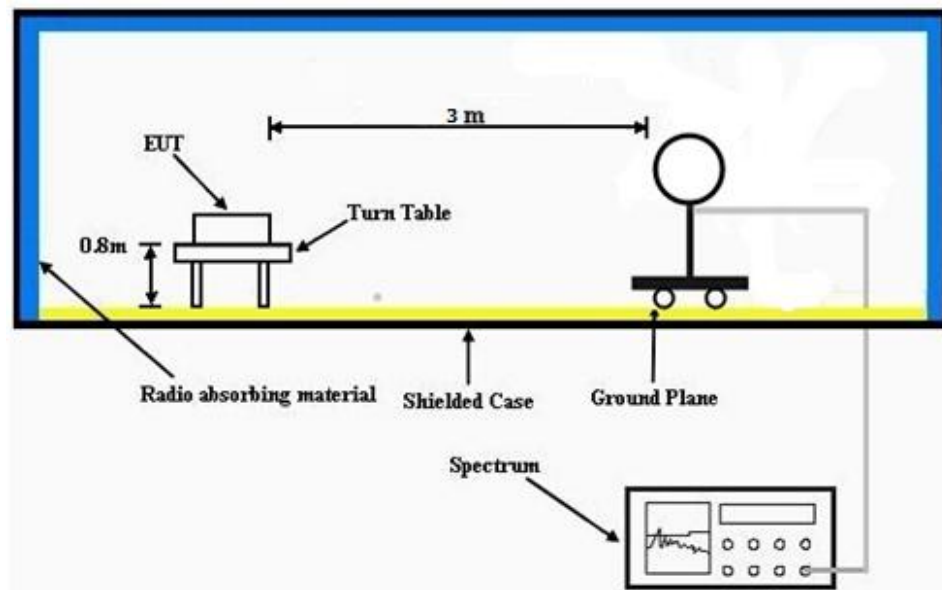
30 MHz ~ 1 GHz 量測：

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。

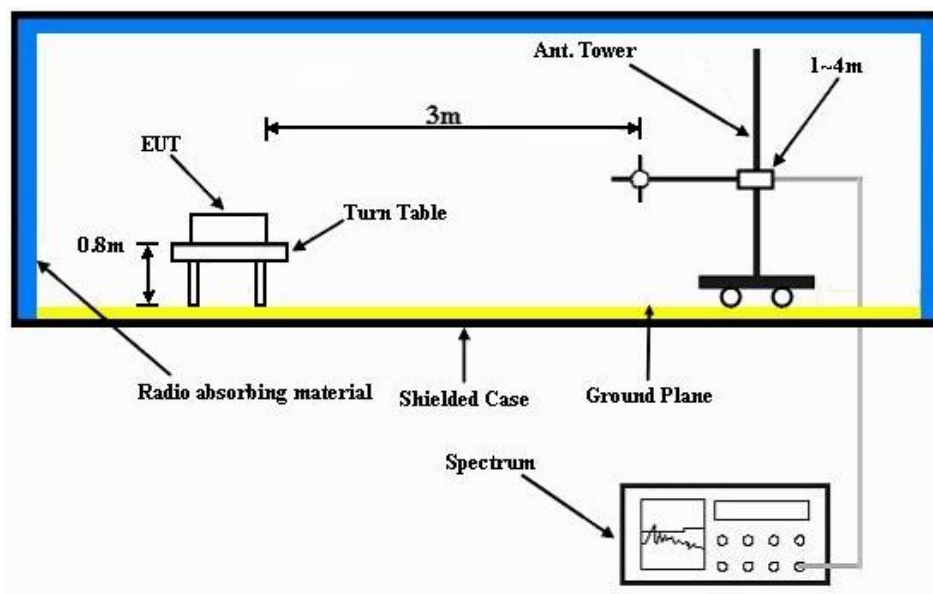
19.3 量測儀器

同 4.3 節

19.4 測試配置



9 kHz ~ 30 MHz



30 MHz ~ 1 GHz

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)

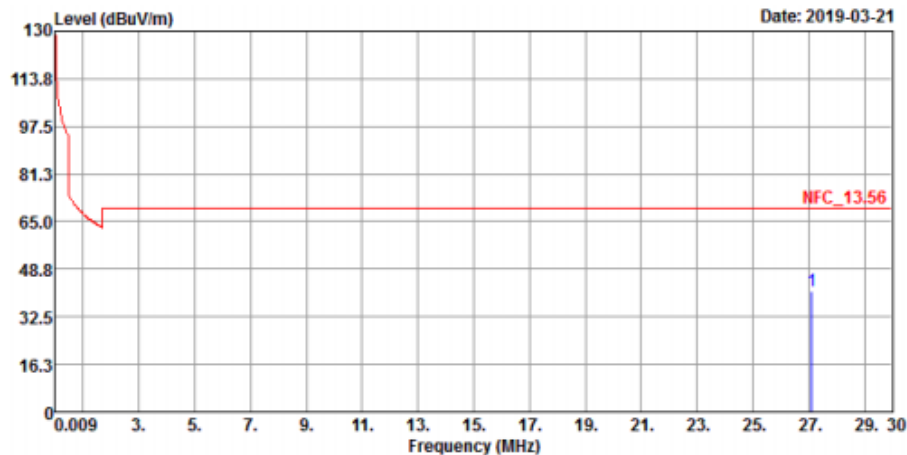
餘裕度 Margin(dB) = 結果值 Emission level (dBuV/m) - 限制值 Limit value (dBuV/m)

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		

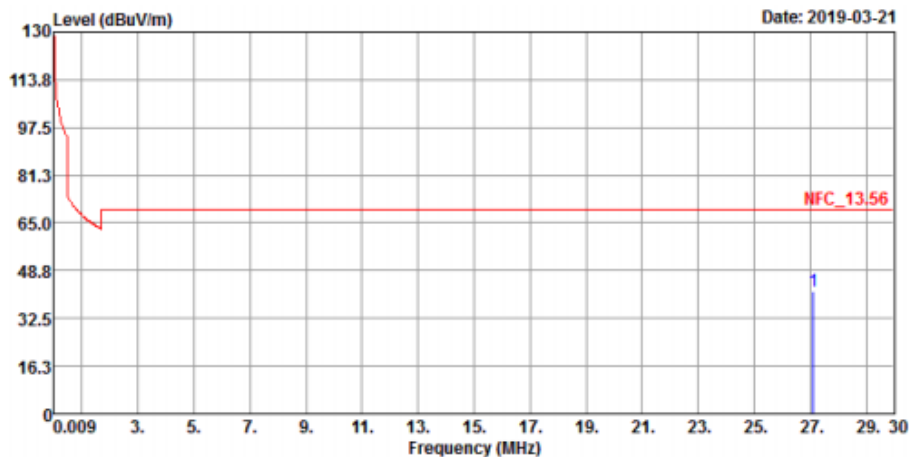


Antenna Polarity & Test Distance: Loop Antenna Open at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
27.12	41.25	19.13	22.12	69.54	-28.29	120	360	QP

Note:

- Emission level (dBuV/m) = Read Level (dBuV) + Correction Factor (dB/m)
- Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Preamp Factor (dB)
- 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
 $\text{Limit @ 3 m} = \text{Limit @ 300 m} + 40\log(300 / 3) = \text{Limit @ 300 m} + 80$
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
- Open: loop antenna 面向 EUT
 Close: 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		

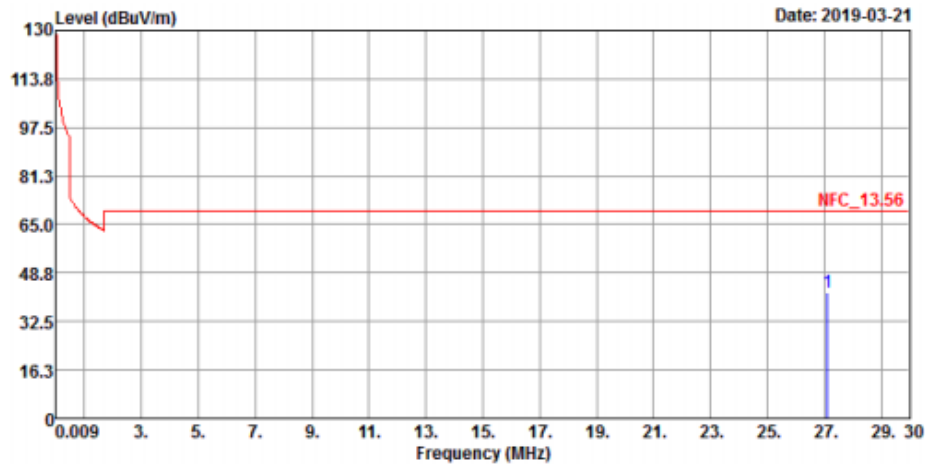


Antenna Polarity & Test Distance: Loop Antenna Close at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
27.12	41.65	19.53	22.12	69.54	-27.89	120	0	QP

Note:

- Emission level (dBuV/m) = Read Level (dBuV) + Correction Factor (dB/m)
- Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Preamp Factor (dB)
- 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
 $\text{Limit @ 3 m} = \text{Limit @ 300 m} + 40\log(300 / 3) = \text{Limit @ 300 m} + 80$
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
- Open: loop antenna 面向 EUT
 Close: 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		

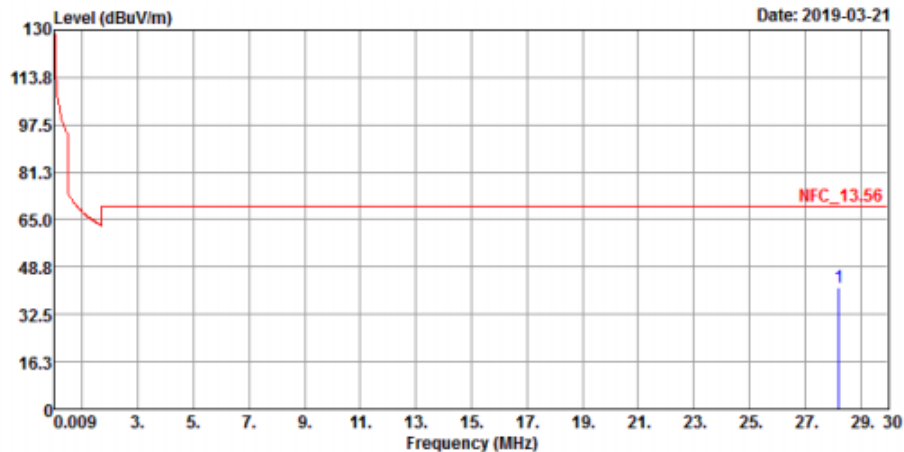


Antenna Polarity & Test Distance: Loop Antenna Ground-Parallel at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
27.12	42.25	20.13	22.12	69.54	-27.29	120	360	QP

Note:

- Emission level (dBuV/m) = Read Level (dBuV) + Correction Factor (dB/m)
- Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Preamp Factor (dB)
- 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
 $\text{Limit @ 3 m} = \text{Limit @ 300 m} + 40\log(300 / 3) = \text{Limit @ 300 m} + 80$
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
- Open: loop antenna 面向 EUT
 Close: 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		

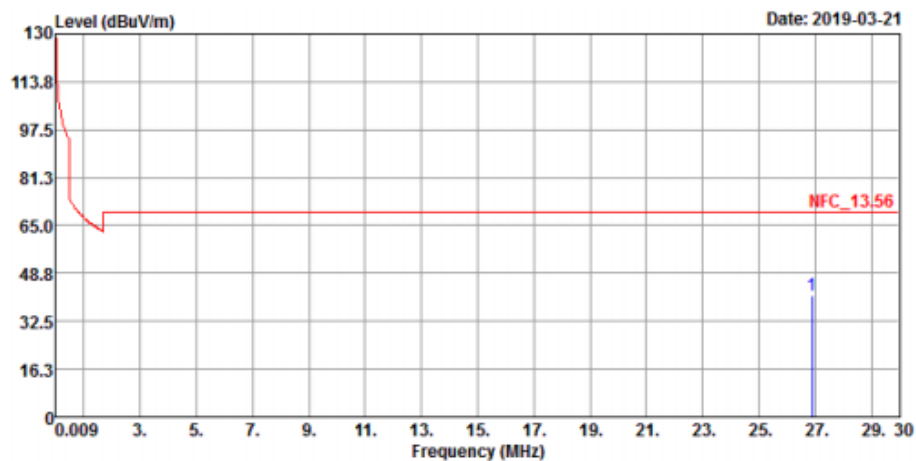


Antenna Polarity & Test Distance: Loop Antenna Open at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
28.23	41.52	19.38	22.14	69.54	-28.02	120	360	QP

Note:

- Emission level (dBuV/m) = Read Level (dBuV) + Correction Factor (dB/m)
- Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Preamp Factor (dB)
- 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
 $\text{Limit @ 3 m} = \text{Limit @ 300 m} + 40\log(300 / 3) = \text{Limit @ 300 m} + 80$
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
- Open: loop antenna 面向 EUT
Close: 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		

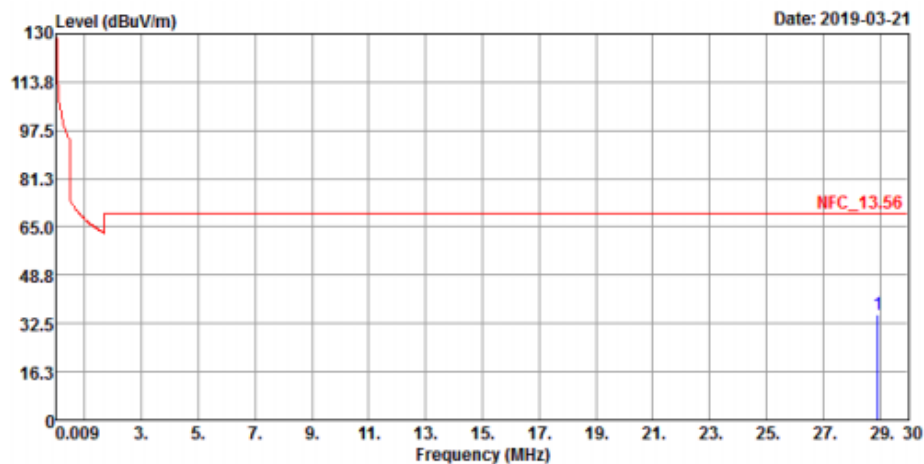


Antenna Polarity & Test Distance: Loop Antenna Close at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
26.89	41.25	19.16	22.09	69.54	-28.29	120	360	QP

Note:

- Emission level (dBuV/m) = Read Level (dBuV) + Correction Factor (dB/m)
- Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Preamp Factor (dB)
- 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
 $\text{Limit @ 3 m} = \text{Limit @ 300 m} + 40\log(300 / 3) = \text{Limit @ 300 m} + 80$
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
- Open: loop antenna 面向 EUT
Close: 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
28.94	35.62	13.48	22.14	69.54	-33.92	120	360	QP

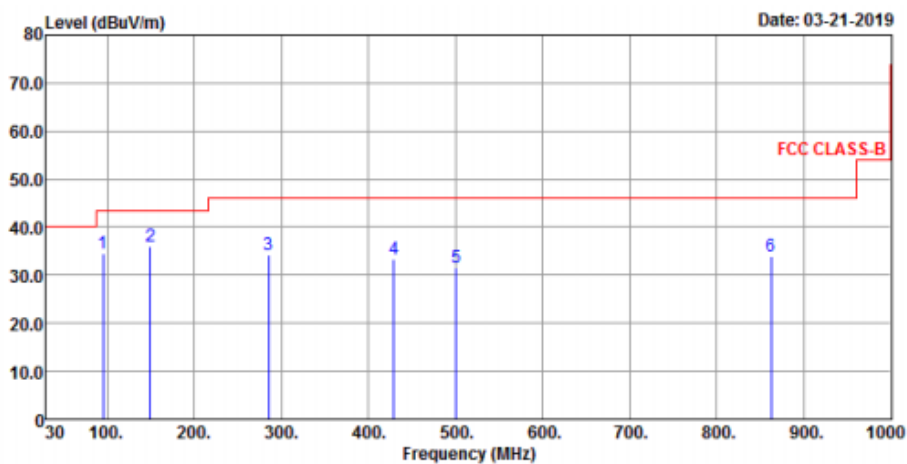
Note:

- Emission level (dBuV/m) = Read Level (dBuV) + Correction Factor (dB/m)
- Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) - Preamp Factor (dB)
- 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
 $\text{Limit @ 3 m} = \text{Limit @ 300 m} + 40\log(300 / 3) = \text{Limit @ 300 m} + 80$
 $\text{Limit @ 3 m} = \text{Limit @ 30 m} + 40\log(30 / 3) = \text{Limit @ 30 m} + 40$
- Open: loop antenna 面向 EUT
Close: loop antenna 與 EUT 垂直
Ground-parallel: loop antenna 與地面平行

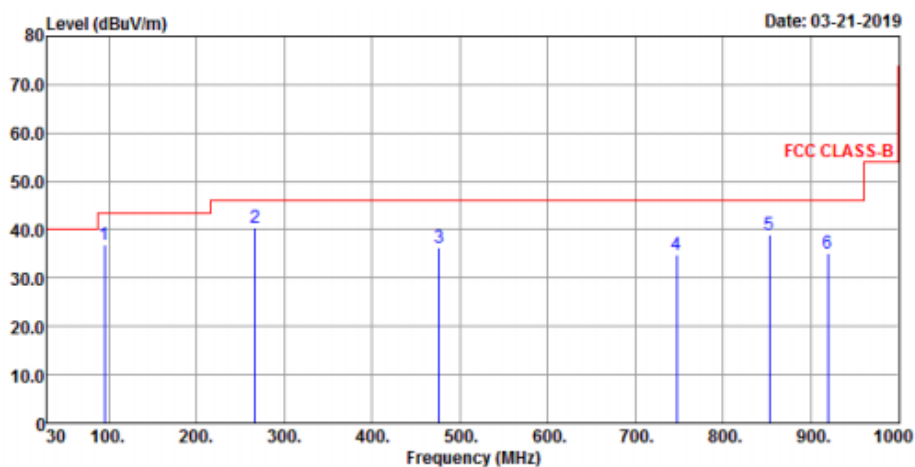
<Above 30 MHz>

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



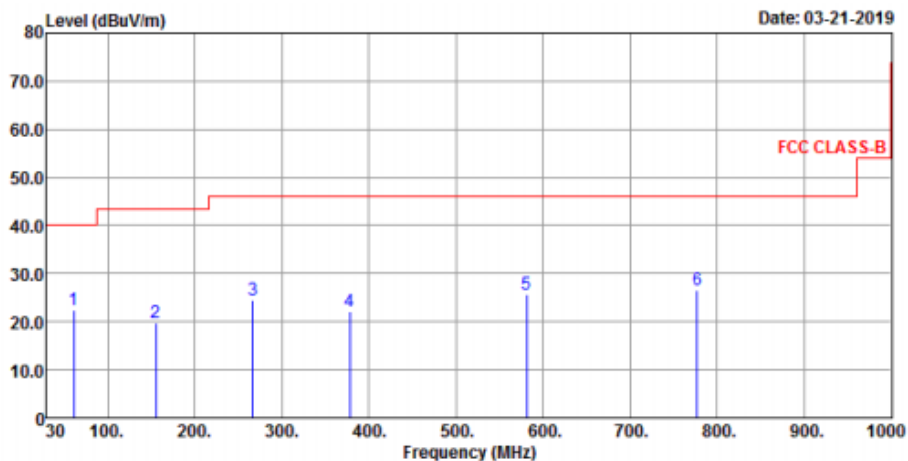
Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
94.99	34.53	56.49	-21.96	43.5	-8.97	155	111	QP
149.31	35.96	53.24	-17.28	43.5	-7.54	165	231	QP
285.11	34.27	51.03	-16.76	46	-11.73	195	285	QP
429.64	33.5	45.8	-12.3	46	-12.5	147	152	QP
500.45	31.59	42.1	-10.51	46	-14.41	165	295	QP
862.26	33.84	38.03	-4.19	46	-12.16	132	265	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
94.99	36.94	58.9	-21.96	43.5	-6.56	145	285	QP
266.68	40.54	57.52	-16.98	46	-5.46	165	231	QP
476.2	36.35	48.35	-12	46	-9.65	195	284	QP
746.83	34.76	40.03	-5.27	46	-11.24	145	285	QP
852.56	38.88	43.04	-4.16	46	-7.12	165	231	QP
919.49	35.1	38.63	-3.53	46	-10.9	195	285	QP

Remarks:

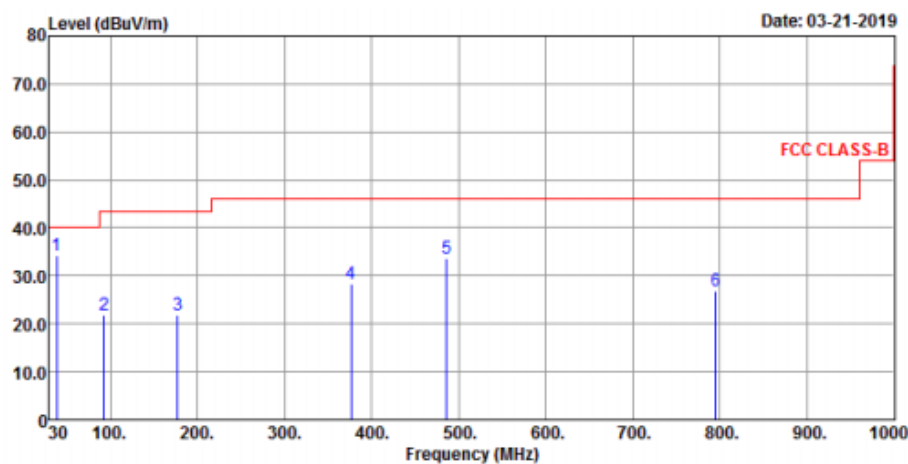
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
- The other emission levels were very low against the limit.

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
61.04	22.58	42.15	-19.57	40	-17.42	185	265	QP
155.13	19.87	38.37	-18.5	43.5	-23.63	165	265	QP
266.68	24.54	43.37	-18.83	46	-21.46	147	152	QP
378.23	22.29	39.44	-17.15	46	-23.71	192	285	QP
580.96	25.76	38.33	-12.57	46	-20.24	174	152	QP
776.9	26.62	35.32	-8.7	46	-19.38	165	231	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
38.73	34.13	51.55	-17.42	40	-5.87	185	265	QP
93.05	21.99	45.07	-23.08	43.5	-21.51	111	152	QP
177.44	21.79	41.43	-19.64	43.5	-21.71	165	231	QP
376.29	28.31	45.56	-17.25	46	-17.69	147	152	QP
485.9	33.62	48.03	-14.41	46	-12.38	165	231	QP
795.33	26.98	36.25	-9.27	46	-19.02	195	285	QP

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin Value = Emission Level – Limit value
- 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(30)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(29)項的規定。

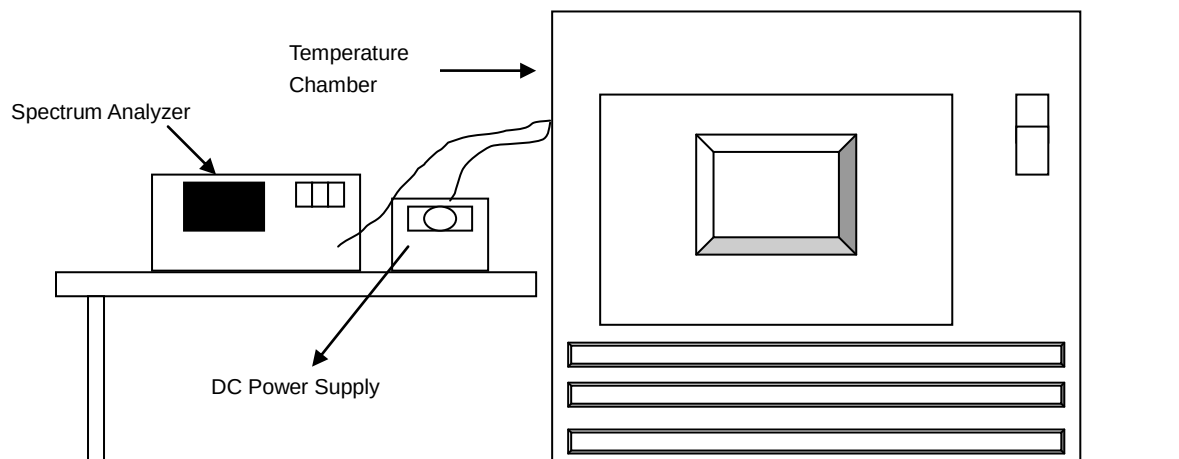
21.2 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	100115	Jan. 21, 2019	Jan. 20, 2020
Temperature & Humidity Chamber	GTH-120-40-C P-AR	MAA1306-019	Sep. 05, 2018	Sep. 04, 2019
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	108 年 03 月 21 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	韋佑豪		

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	3.8	13.55997	-0.00022	13.55995	-0.00037	13.55995	-0.00037	13.55996	-0.00029
40	3.8	13.55998	-0.00015	13.55999	-0.00007	13.55999	-0.00007	13.55999	-0.00007
30	3.8	13.56003	0.00022	13.56004	0.00029	13.56003	0.00022	13.56004	0.00029
20	3.8	13.56001	0.00007	13.56001	0.00007	13.56001	0.00007	13.56001	0.00007
10	3.8	13.55999	-0.00007	13.55998	-0.00015	13.55999	-0.00007	13.55998	-0.00015
0	3.8	13.56006	0.00044	13.56007	0.00052	13.56007	0.00052	13.56007	0.00052
-10	3.8	13.55995	-0.00037	13.55996	-0.00029	13.55997	-0.00022	13.55995	-0.00037
-20	3.8	13.55996	-0.00029	13.55997	-0.00022	13.55997	-0.00022	13.55997	-0.00022

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	4.3	13.56001	0.00007	13.56001	0.00007	13.56001	0.00007	13.56001	0.00007
	3.8	13.56001	0.00007	13.56001	0.00007	13.56001	0.00007	13.56001	0.00007
	3.45	13.56001	0.00007	13.56001	0.00007	13.56001	0.00007	13.56001	0.00007

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

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。

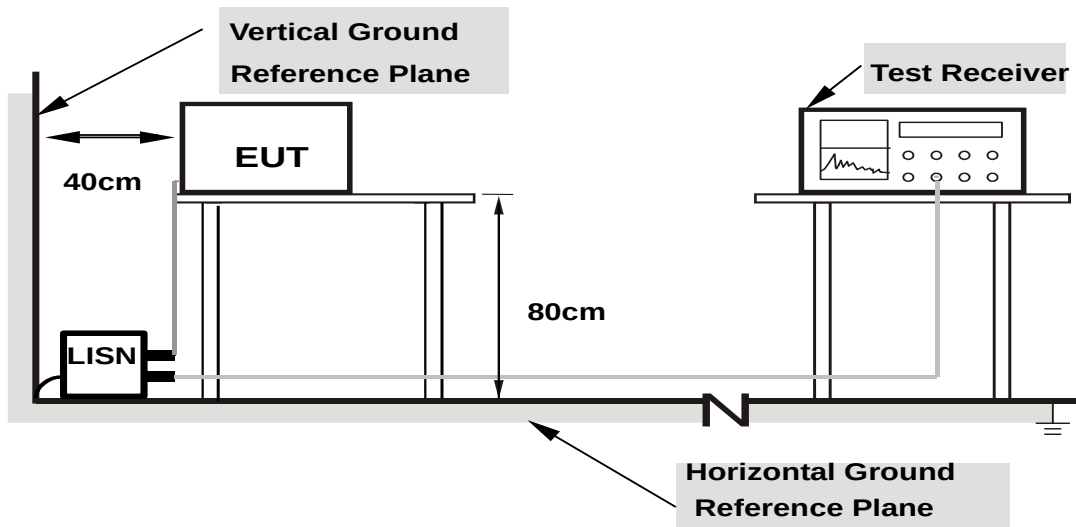
22.3 量測儀器

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, 2018	Sep. 04, 2019
LISN/AMN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 21, 2019	Feb. 20, 2020
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 19, 2018	Aug. 18, 2019
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

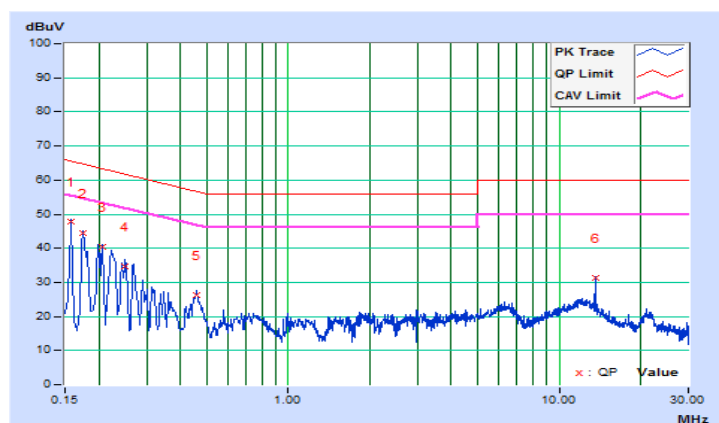
22.6 量測結果

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	韋佑豪	測試日期	2019/3/15

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	0.15800	9.69	37.97	19.17	47.66	28.86	65.57	55.57	-17.91	-26.71
2	0.17400	9.69	34.61	16.69	44.30	26.38	64.77	54.77	-20.47	-28.39
3	0.20600	9.68	30.66	14.37	40.34	24.05	63.37	53.37	-23.03	-29.32
4	0.25006	9.68	25.08	10.33	34.76	20.01	61.76	51.76	-27.00	-31.75
5	0.45800	9.68	16.69	2.71	26.37	12.39	56.73	46.73	-30.36	-34.34
6	13.56200	9.89	21.41	7.94	31.30	17.83	60.00	50.00	-28.70	-32.17

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)

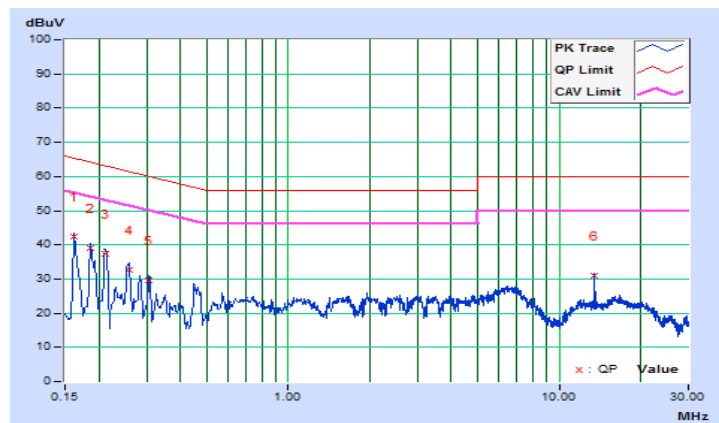


量測頻率範圍	150kHz ~ 30MHz	檢測器與頻寬	準峰值 (QP) / 平均值 (AV), 9kHz
量測電壓值	110Vac, 60Hz	量測場地溫濕度	25°C, 65%RH
測試者	韋佑豪	測試日期	2019/3/15

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	0.16200	9.66	32.68	16.08	42.34	25.74	65.36	55.36	-23.02	-29.62
2	0.18600	9.66	29.44	13.72	39.10	23.38	64.21	54.21	-25.11	-30.83
3	0.21015	9.66	27.66	11.94	37.32	21.60	63.20	53.20	-25.88	-31.60
4	0.25800	9.66	23.03	8.25	32.69	17.91	61.50	51.50	-28.81	-33.59
5	0.30630	9.65	20.07	6.18	29.72	15.83	60.07	50.07	-30.35	-34.24
6	13.55800	9.91	21.00	6.90	30.91	16.81	60.00	50.00	-29.09	-33.19

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)&(16)&(25)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	19.39	-6.21	20	0.004	1	Pass
Bluetooth 2402 ~ 2480	11.90	-6.21	20	0.001	1	Pass

24 待測物照片

請參照 BV CPS 報告編號：190409C28

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---