

低功率射頻器材技術規範測試報告

報告編號.	RT200311C22
申請者	MiTek Corporation
產品名稱	Audio system
型號	F4N-U826A
製造廠商	MiTek Corporation
商標或廠牌	Yamaha
該產品樣品試驗 依據之試驗標準	國家通訊傳播委員會低功率射頻器材技術規範 109 年 7 月 1 日修訂
試驗結果	合格

香港商立德國際商品試驗有限公司桃園分公司 林口實驗室
日期 109 年 09 月 01 日

報告簽署人簽章:



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報告發行紀錄

Issue No.	Description	Date Issued
RT200311C22	Original release	109 年 09 月 01 日

證 明 書

發行日期：109 年 09 月 01 日

產 品 名 稱：Audio system
商 標：Yamaha
型 號：F4N-U826A
申 請 者：MiTek Corporation
量 測 規 範：低功率射頻器材技術規範 LP0002 (修訂日期：109 年 7 月 1 日)
ANSI C63.10-2013

香港商立德國際商品試驗有限公司桃園分公司在此證明上述待測設備樣品一組(型號：F4N-U826A)，收件日期 109 年 03 月 11 日，於 109 年 07 月 22 日至 109 年 08 月 18 日，已在本公司的標準測試場地完成量測。報告中所描述之測試結果和待測設備的架構組合，均根據樣品實際的量測情況作詳實的記錄。

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

特 此 證 明 ！

報告製作者：



王秀眉 / 專員

， 日 期： 109 年 09 月 01 日

審 核 者：



邱碧民 / 高級專案工程師

， 日 期： 109 年 09 月 01 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 低功率射頻器材量測記錄表

申請廠商: MiTek Corporation

製造廠商: MiTek Corporation

申請廠商地址: 1 Mitek Plaza, Winslow, IL 61089

產品名稱: Audio system

廠牌: Yamaha

型號: F4N-U826A

量測單位名稱: 香港商立德國際商品試驗有限公司桃園分公司
林口實驗室華亞檢測部

量測單位地址: 桃園市龜山區文化里華亞二路 19 號

量測單位認可編號: TAF 2021 (9 kHz ~ 40 GHz)

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

Bluetooth EDR 頻段概要

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

Note : 此頻寬測試值為跳頻頻道間隔之量測參考值。

註: 此待測設備使用 DC 電源, 故無需執行電源線傳導干擾量測。

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：	Audio system	
型號：	F4N-U826A	
額定電源：	12 Vdc (battery)	
調變方式：	Bluetooth EDR	GFSK, $\pi/4$ -DQPSK, 8DPSK
傳輸速率：	Bluetooth EDR	1/ 2/ 3 Mbps
載波頻率：	Bluetooth EDR	2402 ~ 2480 MHz
頻道數：	Bluetooth EDR	79
發射功率：	Bluetooth EDR	-2.51 dBm
天線種類：	見註 1	
電源線類別：	N/A	
信號線類別：	N/A	
配件：	N/A	

註：

1. 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)
Bluetooth	2402 ~ 2480	PCB	BM20SPKXYNBZ(X=A-Z, 0-9; Z=A-Z, 0-9), BM20SPKS1NBC	Microchip	N/A	1.927

2. 上述天線的規格資訊由申請者聲明，實驗室不承擔任何責任。

3. 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。

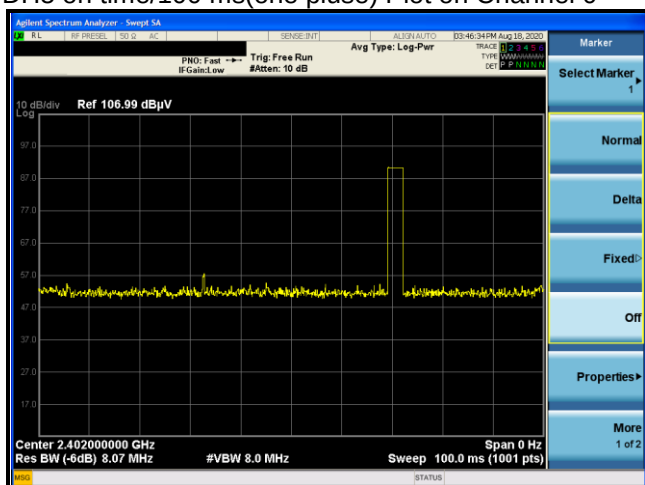
量測項目	發射	接收
2402 ~ 2480 MHz (Bluetooth EDR)		
1 GHz 以上量測	GFSK: Ch 0, 39, 78 8DPSK: Ch 0, 39, 78	GFSK: Ch 0
其它不必要之訊號	GFSK: Ch 0	GFSK: Ch 0

4. 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。

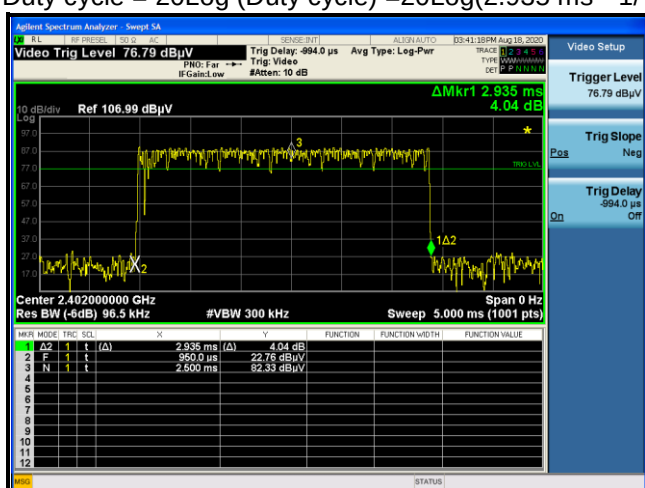
5. 此待測設備，經評估三個正交軸方位評估測試擺設方式：平躺、垂直、側放，其中以平躺擺放擁有最大干擾值，故以此擺放方式進行最終量測，並將測試結果紀錄。

6. Duty cycle of test signal.

DH5 on time/100 ms(one pluse) Plot on Channel 0



$$\text{Duty cycle} = 20\text{Log}(\text{Duty cycle}) = 20\text{Log}(2.935 \text{ ms} * 1 / 100 \text{ ms}) = -30.6$$



此裝置各頻道的中心頻率如下：

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		

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
A	Battery	RISING	SMF NX120-7I	N/A	N/A

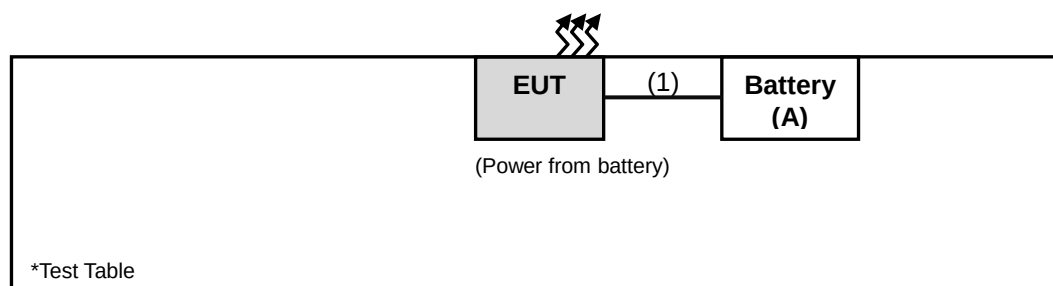
ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	2.5	N	0	--

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. 本案經申請者切結器材不提供隨貨配件，配件由實驗室提供併同檢驗

2.3 測試架構圖

<Bluetooth EDR>



3 適用規範

3.1 規範要求和參考

► Bluetooth EDR 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器材技術規範之 3.3 節，電源傳導干擾之限制要求如下：

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

(註)：隨頻率之對數遞減。

(2) 帶外發射之規定

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

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

(3) 天線之規定

天線規格不受第 3.2 節規定之限制。

(4) 天線增益之要求

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

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

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

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

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

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

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

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

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

(5) 峰值傳導輸出功率之要求

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.2 節之規定：

操作於 2400 MHz~2483.5 MHz 者

(a) 至少使用 75 個跳頻頻道之跳頻系統：1 W(含)以下。

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

(c) 數位調變技術系統：1 W(含)以下。

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

(6) 跳頻頻道數之量測

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

(7) 跳頻頻道間隔之量測

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

(8) 每一頻道停留時間之量測

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

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 3.6 之限制規定。

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

BLUETOOTH EDR 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(2)項的規定。

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 為 RBW = 1 MHz, VBW = 3 MHz or Peak Value +Duty Correction factor

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, 3 MHz (RMS)

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
Agilent Spectrum	E4446A	MY51100009	Jun. 23, 2020	Jun. 22, 2021
Agilent Test Receiver	N9038A	MY51210129	Mar. 18, 2020	Mar. 17, 2021
Agilent Preamplifier	8449B	3008A01201	Feb. 20, 2020	Feb. 19, 2021
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 20, 2020	Feb. 19, 2021
EMCI Preamplifier	EMC184045B	980235	Feb. 20, 2020	Feb. 19, 2021
ETS Preamplifier	3117-PA	00215857	Nov. 24, 2019	Nov. 23, 2020
Schwarzbeck Horn Antenna	BBHA-9170	212	Nov. 24, 2019	Nov. 23, 2020
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Nov. 24, 2019	Nov. 23, 2020
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V8.7.08	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF102	Cable-CH6-01	Jul. 9, 2020	Jul. 08, 2021
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH8-02 (3.6m)	Jul. 9, 2020	Jul. 08, 2021
MICRO-TRONICS Notch filter	BRC50703-01	010	May 29, 2020	May 28, 2021
MICRO-TRONICS Band Pass Filter	BRM17690	005	May 29, 2020	May 28, 2021
Agilent Preamplifier	8447D	2432A03504	Feb. 19, 2020	Feb. 18, 2021
Agilent Test Receiver	N9038A	MY51210129	Mar. 18, 2020	Mar. 17, 2021
Schwarzbeck Antenna	VULB9168	137	Nov. 8, 2019	Nov. 07, 2020
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V8.7.08	NA	NA	NA
WOKEN RF cable With 5dB PAD	8D	CABLE-CH6-02	Jul. 14, 2020	Jul. 13, 2021

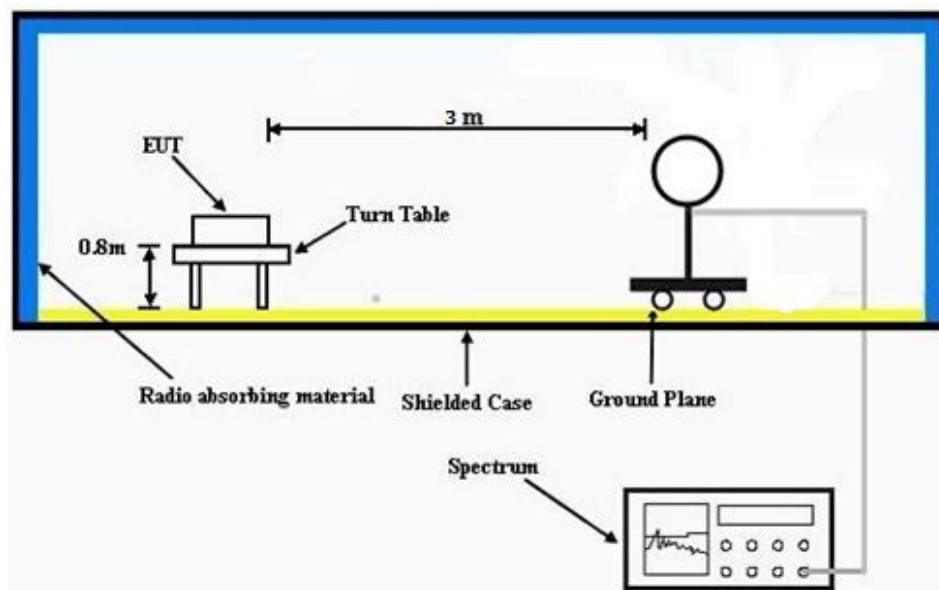
NOTE:

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 3dB beamwidth of the horn antenna is minimum 29 degree (or $w = 1.55m$ at 3m distance) for 1~6 GHz.
3. The test was performed in Chamber No. 6.
4. 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 $k=2$.

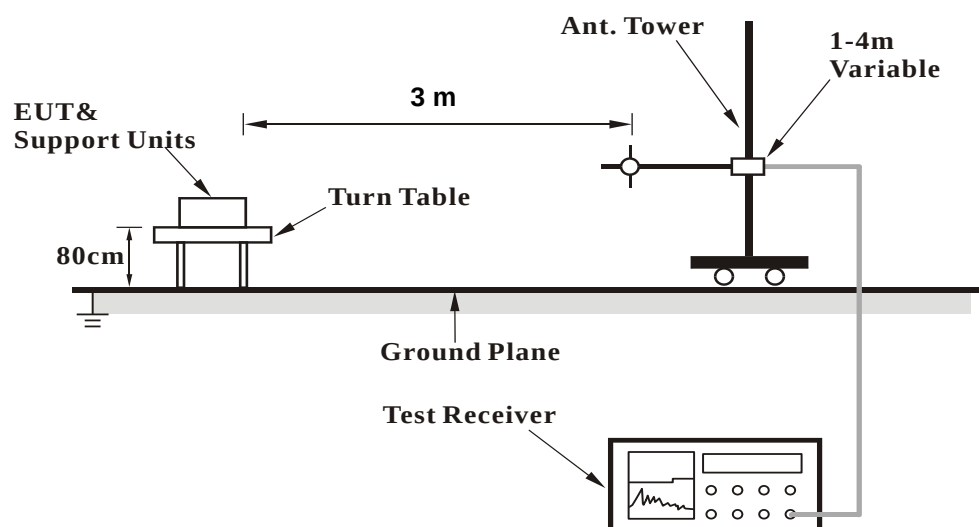
Measurement	Frequency	Uncertainty
Radiated emissions	9 kHz ~ 30 MHz	± 2.61 dB
	30 MHz ~ 1000 MHz	± 5.43 dB
	1 GHz ~ 40 GHz	± 5.42 dB

4.4 測試配置

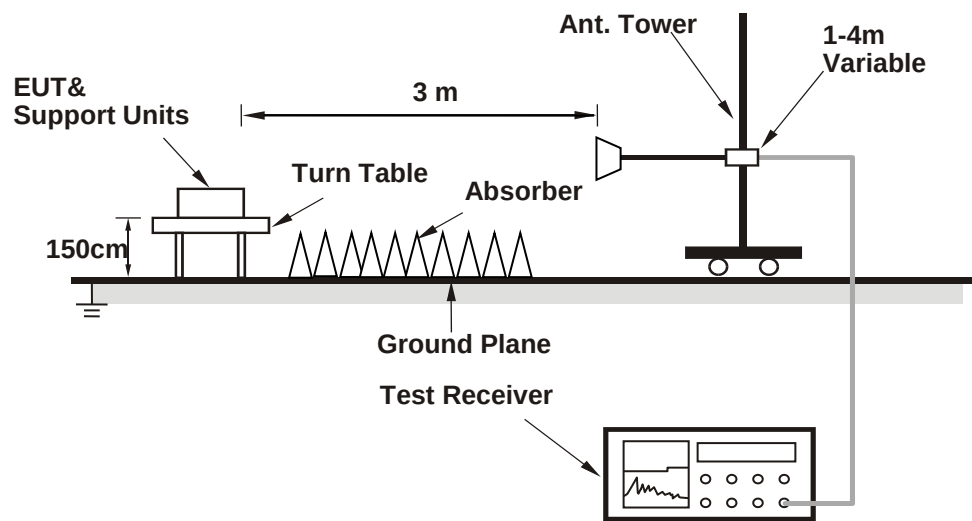
<Frequency Range 9 kHz ~ 30 MHz>



<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

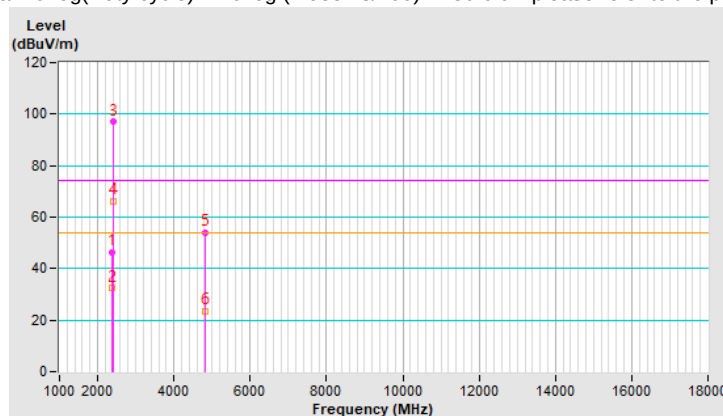
GFSK

操作模式：	發射	調變技術：	BT_GFSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	46.36 PK	74.00	-27.64	1.34 H	205	45.04	1.32
2	2390.00	32.34 AV	54.00	-21.66	1.34 H	205	31.02	1.32
3	*2402.00	96.89 PK			1.34 H	205	95.51	1.38
4	*2402.00	66.29 AV			1.34 H	205	64.91	1.38
5	4804.00	54.04 PK	74.00	-19.96	1.23 H	21	44.87	9.17
6	4804.00	23.44 AV	54.00	-30.56	1.23 H	21	14.27	9.17
7	#7206.00	-	-	-	-	-	-	-
8	#9608.00	-	-	-	-	-	-	-
9	12010.00	-	-	-	-	-	-	-
10	#14412.00	-	-	-	-	-	-	-
11	#16814.00	-	-	-	-	-	-	-
12	19216.00	-	-	-	-	-	-	-
13	#21618.00	-	-	-	-	-	-	-
14	#24020.00	-	-	-	-	-	-	-

Remarks:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- "*": Fundamental frequency (主頻).
- "#": The radiated frequency is out of the restricted band.
- "-": The emission levels were too low to be detected.
- The blank is not available, the limit of fundamental frequency was restricted at the output power.
- The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: $20\log(\text{Duty cycle}) = 20\log(2.935\text{ms}/100) = -30.6\text{ dB}$ please refer to the plotted dut y(see 2.1 章節註 7)

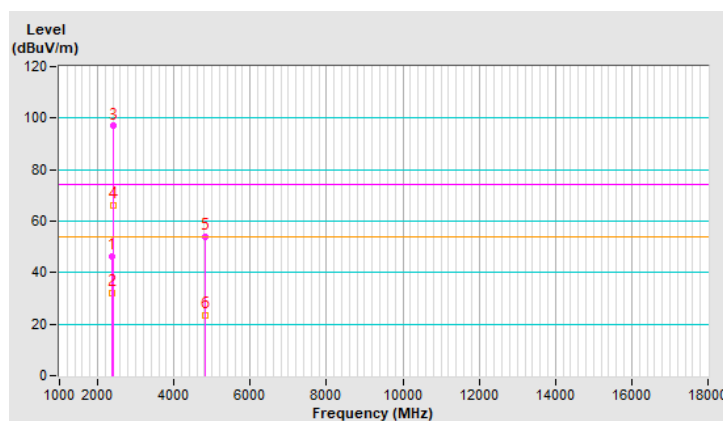


操作模式：	發射	調變技術：	BT_GFSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	46.21 PK	74.00	-27.79	1.41 V	285	44.89	1.32
2	2390.00	32.24 AV	54.00	-21.76	1.41 V	285	30.92	1.32
3	*2402.00	96.87 PK			1.41 V	285	95.49	1.38
4	*2402.00	66.27 AV			1.41 V	285	64.89	1.38
5	4804.00	53.93 PK	74.00	-20.07	1.18 V	326	44.76	9.17
6	4804.00	23.33 AV	54.00	-30.67	1.18 V	326	14.16	9.17
7	#7206.00	-	-	-	-	-	-	-
8	#9608.00	-	-	-	-	-	-	-
9	12010.00	-	-	-	-	-	-	-
10	#14412.00	-	-	-	-	-	-	-
11	#16814.00	-	-	-	-	-	-	-
12	19216.00	-	-	-	-	-	-	-
13	#21618.00	-	-	-	-	-	-	-
14	#24020.00	-	-	-	-	-	-	-

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency (主頻).
6. " # ": The radiated frequency is out of the restricted band.
7. " - ": The emission levels were too low to be detected.
8. The blank is not available, the limit of fundamental frequency was restricted at the output power.
9. The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: 20Log(Duty cycle) = 20 log (2.935ms/100) = -30.6 dB please refer to the plotted dut y(see 2.1 章節註 7)

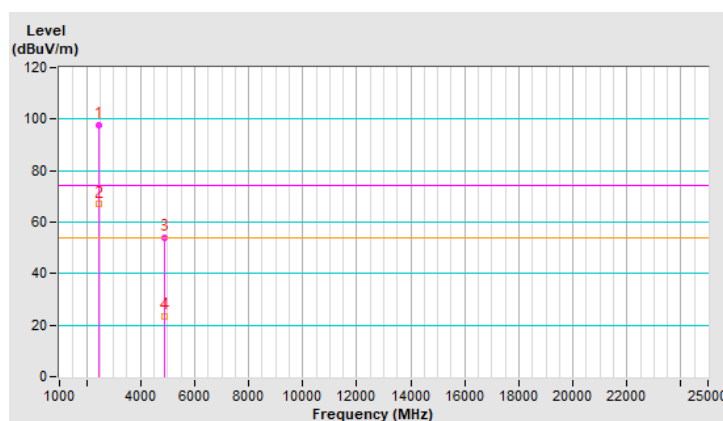


操作模式：	發射	調變技術：	BT_GFSK
基本波頻率：	CH 39：2441 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	97.51 PK			1.36 H	29	96.04	1.47
2	*2441.00	66.91 AV			1.36 H	29	65.44	1.47
3	4882.00	53.94 PK	74.00	-20.06	1.22 H	36	44.69	9.25
4	4882.00	23.34 AV	54.00	-30.66	1.22 H	36	14.09	9.25
5	7323.00	-	-	-	-	-	-	-
6	#9764.00	-	-	-	-	-	-	-
7	12205.00	-	-	-	-	-	-	-
8	#14646.00	-	-	-	-	-	-	-
9	#17087.00	-	-	-	-	-	-	-
10	19528.00	-	-	-	-	-	-	-
11	#21969.00	-	-	-	-	-	-	-
12	#24410.00	-	-	-	-	-	-	-

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency (主頻).
6. " # ": The radiated frequency is out of the restricted band.
7. " - ": The emission levels were too low to be detected.
8. The blank is not available, the limit of fundamental frequency was restricted at the output power.
9. The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: $20\text{Log}(\text{Duty cycle}) = 20 \log (2.935\text{ms}/100) = -30.6 \text{ dB}$ please refer to the plotted dut y(see 2.1 章節註 7)

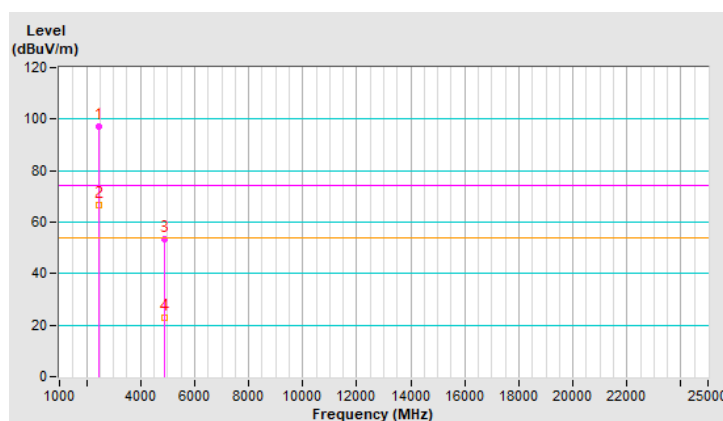


操作模式：	發射	調變技術：	BT_GFSK
基本波頻率：	CH 39：2441 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	97.14 PK			1.49 V	288	95.67	1.47
2	*2441.00	66.54 AV			1.49 V	288	65.07	1.47
3	4882.00	53.63 PK	74.00	-20.37	1.21 V	336	44.38	9.25
4	4882.00	23.03 AV	54.00	-30.97	1.21 V	336	13.78	9.25
5	7323.00	-	-	-	-	-	-	-
6	#9764.00	-	-	-	-	-	-	-
7	12205.00	-	-	-	-	-	-	-
8	#14646.00	-	-	-	-	-	-	-
9	#17087.00	-	-	-	-	-	-	-
10	19528.00	-	-	-	-	-	-	-
11	#21969.00	-	-	-	-	-	-	-
12	#24410.00	-	-	-	-	-	-	-

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency (主頻).
6. " # ": The radiated frequency is out of the restricted band.
7. " - ": The emission levels were too low to be detected.
8. The blank is not available, the limit of fundamental frequency was restricted at the output power.
9. The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: $20\text{Log}(\text{Duty cycle}) = 20 \log (2.935\text{ms}/100) = -30.6 \text{ dB}$ please refer to the plotted dut y(see 2.1 章節註 7)

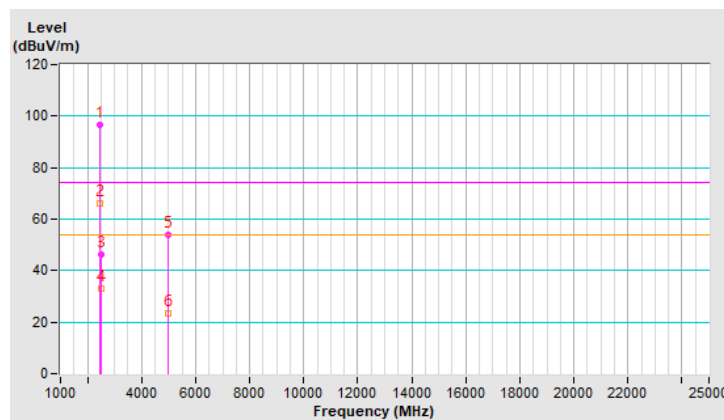


操作模式：	發射	調變技術：	BT_GFSK
基本波頻率：	CH 78：2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	96.65 PK			1.03 H	38	94.97	1.68
2	*2480.00	66.05 AV			1.03 H	38	64.37	1.68
3	2483.50	46.22 PK	74.00	-27.78	1.03 H	38	44.51	1.71
4	2483.50	32.91 AV	54.00	-21.09	1.03 H	38	31.20	1.71
5	4960.00	53.92 PK	74.00	-20.08	1.28 H	27	44.69	9.23
6	4960.00	23.32 AV	54.00	-30.68	1.28 H	27	14.09	9.23
7	7440.00	-	-	-	-	-	-	-
8	#9920.00	-	-	-	-	-	-	-
9	12400.00	-	-	-	-	-	-	-
10	#14880.00	-	-	-	-	-	-	-
11	#17360.00	-	-	-	-	-	-	-
12	19840.00	-	-	-	-	-	-	-
13	22320.00	-	-	-	-	-	-	-
14	#24800.00	-	-	-	-	-	-	-

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency (主頻).
6. " # ": The radiated frequency is out of the restricted band.
7. " - ": The emission levels were too low to be detected.
8. The blank is not available, the limit of fundamental frequency was restricted at the output power.
9. The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: 20Log(Duty cycle) = 20 log (2.935ms/100) = -30.6 dB please refer to the plotted dut y(see 2.1 章節註 7)

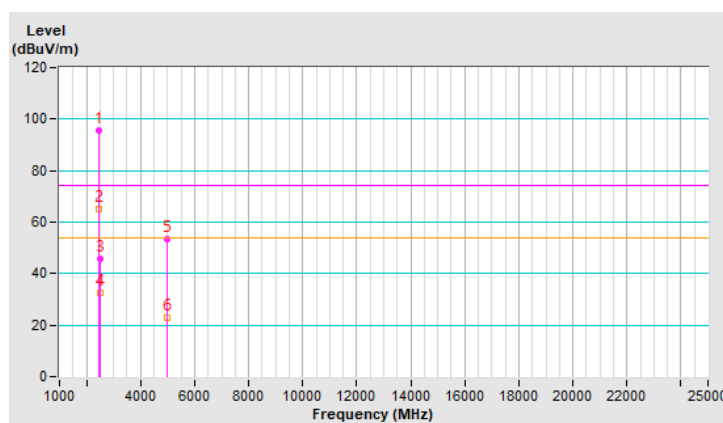


操作模式：	發射	調變技術：	BT_GFSK
基本波頻率：	CH 78：2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	95.84 PK			1.49 V	278	94.16	1.68
2	*2480.00	65.24 AV			1.49 V	278	63.56	1.68
3	2483.50	45.76 PK	74.00	-28.24	1.49 V	278	44.05	1.71
4	2483.50	32.58 AV	54.00	-21.42	1.49 V	278	30.87	1.71
5	4960.00	53.39 PK	74.00	-20.61	1.22 V	220	44.16	9.23
6	4960.00	22.79 AV	54.00	-31.21	1.22 V	220	13.56	9.23
7	7440.00	-	-	-	-	-	-	-
8	#9920.00	-	-	-	-	-	-	-
9	12400.00	-	-	-	-	-	-	-
10	#14880.00	-	-	-	-	-	-	-
11	#17360.00	-	-	-	-	-	-	-
12	19840.00	-	-	-	-	-	-	-
13	22320.00	-	-	-	-	-	-	-
14	#24800.00	-	-	-	-	-	-	-

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency (主頻).
6. " # ": The radiated frequency is out of the restricted band.
7. " - ": The emission levels were too low to be detected.
8. The blank is not available, the limit of fundamental frequency was restricted at the output power.
9. The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: $20\text{Log}(\text{Duty cycle}) = 20 \log (2.935\text{ms}/100) = -30.6 \text{ dB}$ please refer to the plotted dut y(see 2.1 章節註 7)



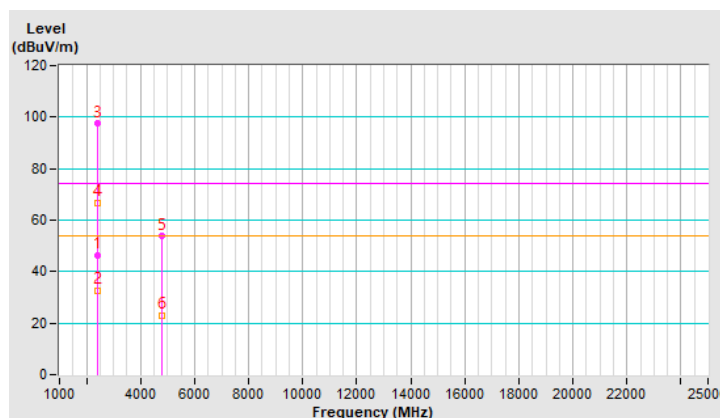
8DPSK

操作模式：	發射	調變技術：	BT_8DPSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	46.16 PK	74.00	-27.84	1.03 H	39	44.84	1.32
2	2390.00	32.39 AV	54.00	-21.61	1.03 H	39	31.07	1.32
3	*2402.00	97.44 PK			1.03 H	39	96.06	1.38
4	*2402.00	66.84 AV			1.03 H	39	65.46	1.38
5	4804.00	53.69 PK	74.00	-20.31	1.52 H	241	44.52	9.17
6	4804.00	23.09 AV	54.00	-30.91	1.52 H	241	13.92	9.17
7	#7206.00	-	-	-	-	-	-	-
8	#9608.00	-	-	-	-	-	-	-
9	12010.00	-	-	-	-	-	-	-
10	#14412.00	-	-	-	-	-	-	-
11	#16814.00	-	-	-	-	-	-	-
12	19216.00	-	-	-	-	-	-	-
13	#21618.00	-	-	-	-	-	-	-
14	#24020.00	-	-	-	-	-	-	-

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency (主頻).
6. " # ": The radiated frequency is out of the restricted band.
7. " - ": The emission levels were too low to be detected.
8. The blank is not available, the limit of fundamental frequency was restricted at the output power.
9. The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: 20Log(Duty cycle) = 20 log (2.935ms/100) = -30.6 dB please refer to the plotted dut y(see 2.1 章節註 7)

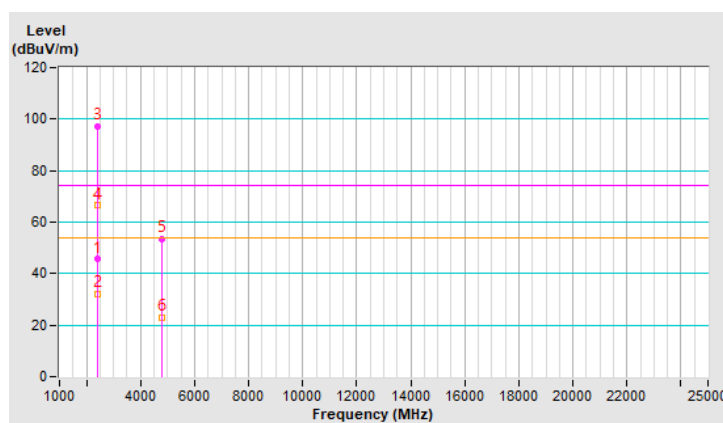


操作模式：	發射	調變技術：	BT_8DPSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	45.53 PK	74.00	-28.47	1.23 V	282	44.21	1.32
2	2390.00	32.08 AV	54.00	-21.92	1.23 V	282	30.76	1.32
3	*2402.00	97.01 PK			1.23 V	282	95.63	1.38
4	*2402.00	66.41 AV			1.23 V	282	65.03	1.38
5	4804.00	53.33 PK	74.00	-20.67	1.63 V	214	44.16	9.17
6	4804.00	22.73 AV	54.00	-31.27	1.63 V	214	13.56	9.17
7	#7206.00	-	-	-	-	-	-	-
8	#9608.00	-	-	-	-	-	-	-
9	12010.00	-	-	-	-	-	-	-
10	#14412.00	-	-	-	-	-	-	-
11	#16814.00	-	-	-	-	-	-	-
12	19216.00	-	-	-	-	-	-	-
13	#21618.00	-	-	-	-	-	-	-
14	#24020.00	-	-	-	-	-	-	-

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency (主頻).
6. " # ": The radiated frequency is out of the restricted band.
7. " - ": The emission levels were too low to be detected.
8. The blank is not available, the limit of fundamental frequency was restricted at the output power.
9. The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: 20Log(Duty cycle) = 20 log (2.935ms/100) = -30.6 dB please refer to the plotted dut y(see 2.1 章節註 7)

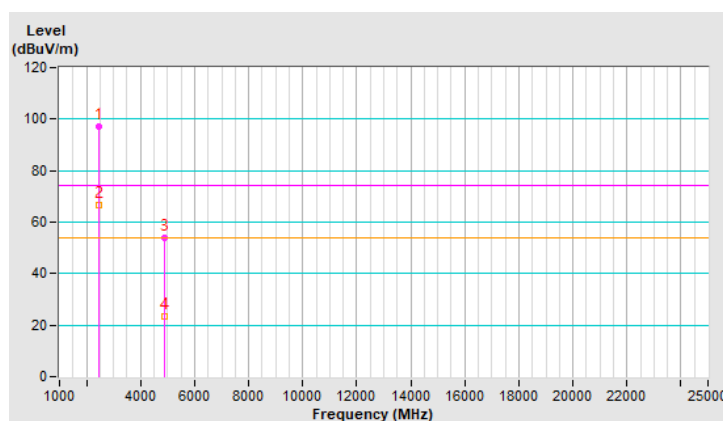


操作模式：	發射	調變技術：	BT_8DPSK
基本波頻率：	CH 39：2441 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	97.05 PK			1.04 H	39	95.58	1.47
2	*2441.00	66.45 AV			1.04 H	39	64.98	1.47
3	4882.00	53.88 PK	74.00	-20.12	1.63 H	265	44.63	9.25
4	4882.00	23.28 AV	54.00	-30.72	1.63 H	265	14.03	9.25
5	7323.00	-	-	-	-	-	-	-
6	#9764.00	-	-	-	-	-	-	-
7	12205.00	-	-	-	-	-	-	-
8	#14646.00	-	-	-	-	-	-	-
9	#17087.00	-	-	-	-	-	-	-
10	19528.00	-	-	-	-	-	-	-
11	#21969.00	-	-	-	-	-	-	-
12	#24410.00	-	-	-	-	-	-	-

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency (主頻).
6. " # ": The radiated frequency is out of the restricted band.
7. " - ": The emission levels were too low to be detected.
8. The blank is not available, the limit of fundamental frequency was restricted at the output power.
9. The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: $20\text{Log}(\text{Duty cycle}) = 20 \log (2.935\text{ms}/100) = -30.6 \text{ dB}$ please refer to the plotted dut y(see 2.1 章節註 7)

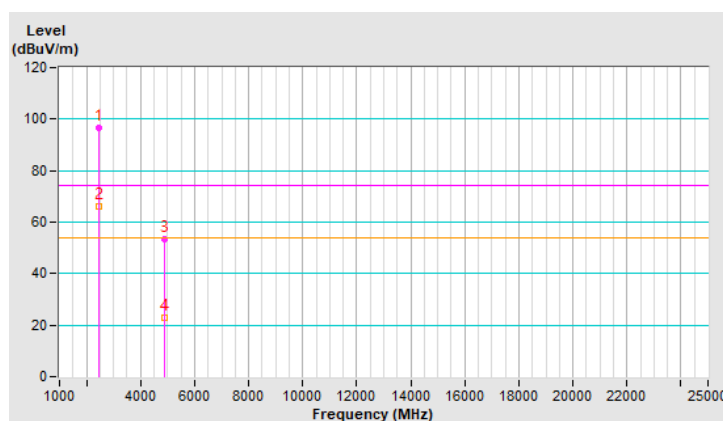


操作模式：	發射	調變技術：	BT_8DPSK
基本波頻率：	CH 39：2441 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	96.63 PK			1.24 V	284	95.16	1.47
2	*2441.00	66.03 AV			1.24 V	284	64.56	1.47
3	4882.00	53.39 PK	74.00	-20.61	1.44 V	251	44.14	9.25
4	4882.00	22.79 AV	54.00	-31.21	1.44 V	251	13.54	9.25
5	7323.00	-	-	-	-	-	-	-
6	#9764.00	-	-	-	-	-	-	-
7	12205.00	-	-	-	-	-	-	-
8	#14646.00	-	-	-	-	-	-	-
9	#17087.00	-	-	-	-	-	-	-
10	19528.00	-	-	-	-	-	-	-
11	#21969.00	-	-	-	-	-	-	-
12	#24410.00	-	-	-	-	-	-	-

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency (主頻).
6. " # ": The radiated frequency is out of the restricted band.
7. " - ": The emission levels were too low to be detected.
8. The blank is not available, the limit of fundamental frequency was restricted at the output power.
9. The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: $20\text{Log}(\text{Duty cycle}) = 20 \log (2.935\text{ms}/100) = -30.6 \text{ dB}$ please refer to the plotted dut y(see 2.1 章節註 7)

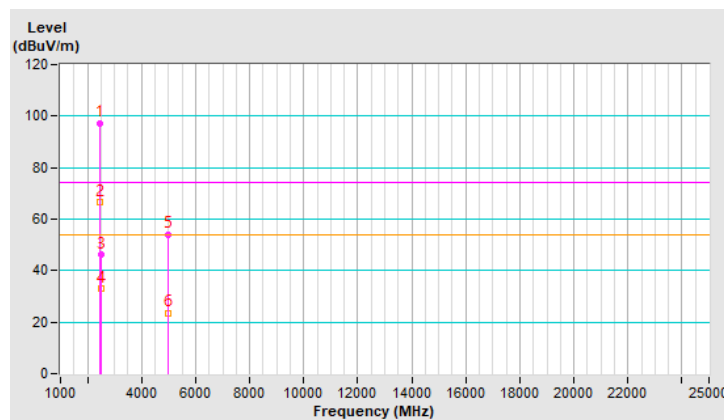


操作模式：	發射	調變技術：	BT_8DPSK
基本波頻率：	CH 78：2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	97.04 PK			1.03 H	31	95.36	1.68
2	*2480.00	66.44 AV			1.03 H	31	64.76	1.68
3	2483.50	46.05 PK	74.00	-27.95	1.03 H	31	44.34	1.71
4	2483.50	32.81 AV	54.00	-21.19	1.03 H	31	31.10	1.71
5	4960.00	53.88 PK	74.00	-20.12	1.35 H	268	44.65	9.23
6	4960.00	23.28 AV	54.00	-30.72	1.35 H	268	14.05	9.23
7	7440.00	-	-	-	-	-	-	-
8	#9920.00	-	-	-	-	-	-	-
9	12400.00	-	-	-	-	-	-	-
10	#14880.00	-	-	-	-	-	-	-
11	#17360.00	-	-	-	-	-	-	-
12	19840.00	-	-	-	-	-	-	-
13	22320.00	-	-	-	-	-	-	-
14	#24800.00	-	-	-	-	-	-	-

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency (主頻).
6. " # ": The radiated frequency is out of the restricted band.
7. " - ": The emission levels were too low to be detected.
8. The blank is not available, the limit of fundamental frequency was restricted at the output power.
9. The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: 20Log(Duty cycle) = 20 log (2.935ms/100) = -30.6 dB please refer to the plotted dut y(see 2.1 章節註 7)

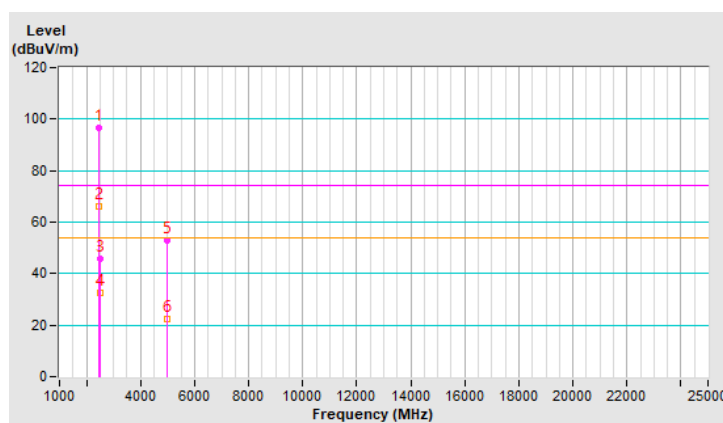


操作模式：	發射	調變技術：	BT_8DPSK
基本波頻率：	CH 78：2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	96.68 PK			1.23 V	288	95.00	1.68
2	*2480.00	66.08 AV			1.23 V	288	64.40	1.68
3	2483.50	45.73 PK	74.00	-28.27	1.23 V	288	44.02	1.71
4	2483.50	32.53 AV	54.00	-21.47	1.23 V	288	30.82	1.71
5	4960.00	53.12 PK	74.00	-20.88	1.41 V	211	43.89	9.23
6	4960.00	22.52 AV	54.00	-31.48	1.41 V	211	13.29	9.23
7	7440.00	-	-	-	-	-	-	-
8	#9920.00	-	-	-	-	-	-	-
9	12400.00	-	-	-	-	-	-	-
10	#14880.00	-	-	-	-	-	-	-
11	#17360.00	-	-	-	-	-	-	-
12	19840.00	-	-	-	-	-	-	-
13	22320.00	-	-	-	-	-	-	-
14	#24800.00	-	-	-	-	-	-	-

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency (主頻).
6. " # ": The radiated frequency is out of the restricted band.
7. " - ": The emission levels were too low to be detected.
8. The blank is not available, the limit of fundamental frequency was restricted at the output power.
9. The average value of fundamental frequency is :average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: $20\text{Log}(\text{Duty cycle}) = 20 \log (2.935\text{ms}/100) = -30.6 \text{ dB}$ please refer to the plotted dut y(see 2.1 章節註 7)



4.6.2 接收諧波

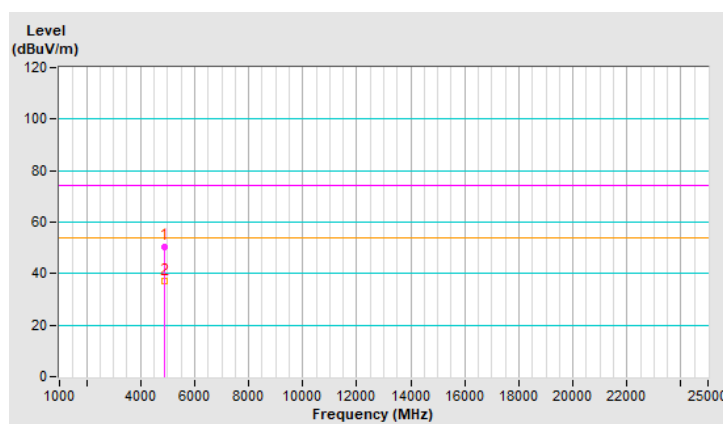
GFSK

操作模式：	接收		
基本波頻率：	CH 0 : 2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz (RMS)
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	4882.00	50.51 PK	74.00	-23.49	1.62 H	134	41.26	9.25
2	4882.00	36.88 AV	54.00	-17.12	1.62 H	134	27.63	9.25

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.

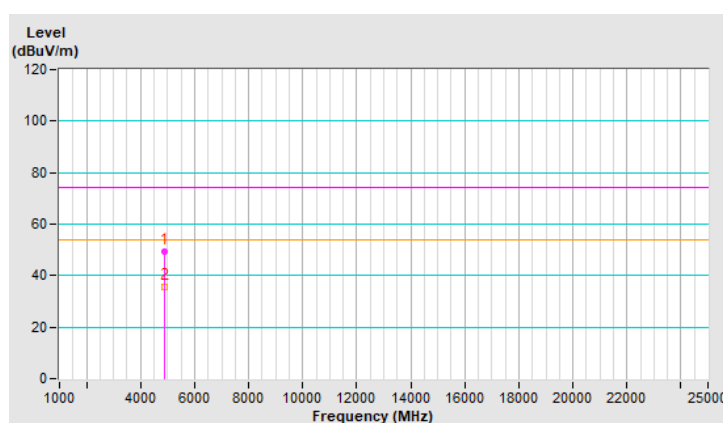


操作模式：	接收		
基本波頻率：	CH 0：2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=3MHz (RMS)
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	4882.00	49.51 PK	74.00	-24.49	1.85 V	274	40.26	9.25
2	4882.00	35.61 AV	54.00	-18.39	1.85 V	274	26.36	9.25

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. 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.

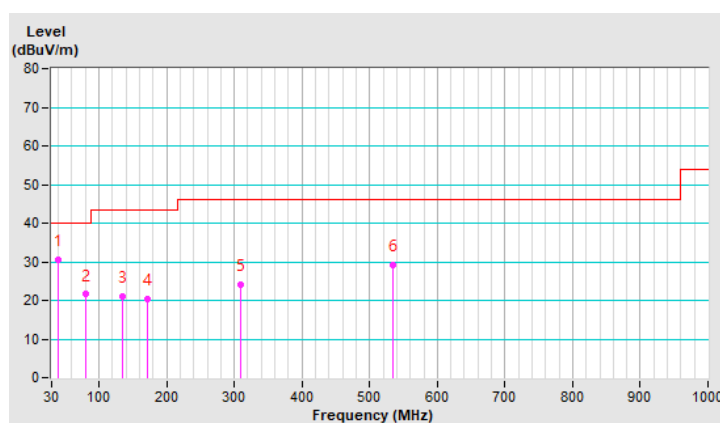
30 MHz ~ 1 GHz Data:

操作模式：	發射接收	調變技術：	BT_GFSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(QP) RB=120kHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	40.14	30.60 QP	40.00	-9.40	1.95 H	86	38.10	-7.50
2	80.00	21.54 QP	40.00	-18.46	2.15 H	173	32.91	-11.37
3	134.95	21.16 QP	43.50	-22.34	2.21 H	21	28.68	-7.52
4	171.47	20.26 QP	43.50	-23.24	1.84 H	108	26.92	-6.66
5	309.89	24.04 QP	46.00	-21.96	1.37 H	110	27.99	-3.95
6	533.58	29.09 QP	46.00	-16.91	1.85 H	190	28.59	0.50

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value of frequency range 30MHz~1000MHz
4. The other emission levels were very low against the limit.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz.

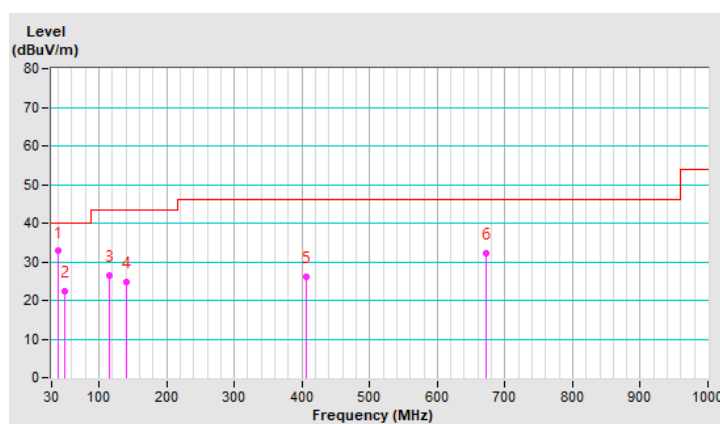


操作模式：	發射接收	調變技術：	BT_GFSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(QP) RB=120kHz
量測場地溫度：	23°C	量測場地濕度：	63%RH
測試日期：	109 年 8 月 18 日	測試者：	Ian Chang

Antenna Polarity & Test Distance : Vertical at 3m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	40.09	32.74 QP	40.00	-7.26	1.12 V	211	40.24	-7.50
2	49.35	22.30 QP	40.00	-17.70	1.34 V	44	29.25	-6.95
3	114.58	26.52 QP	43.50	-16.98	1.28 V	211	36.02	-9.50
4	141.36	24.79 QP	43.50	-18.71	1.47 V	276	31.74	-6.95
5	406.85	26.25 QP	46.00	-19.75	1.69 V	308	28.35	-2.10
6	671.46	32.34 QP	46.00	-13.66	1.08 V	109	28.87	3.47

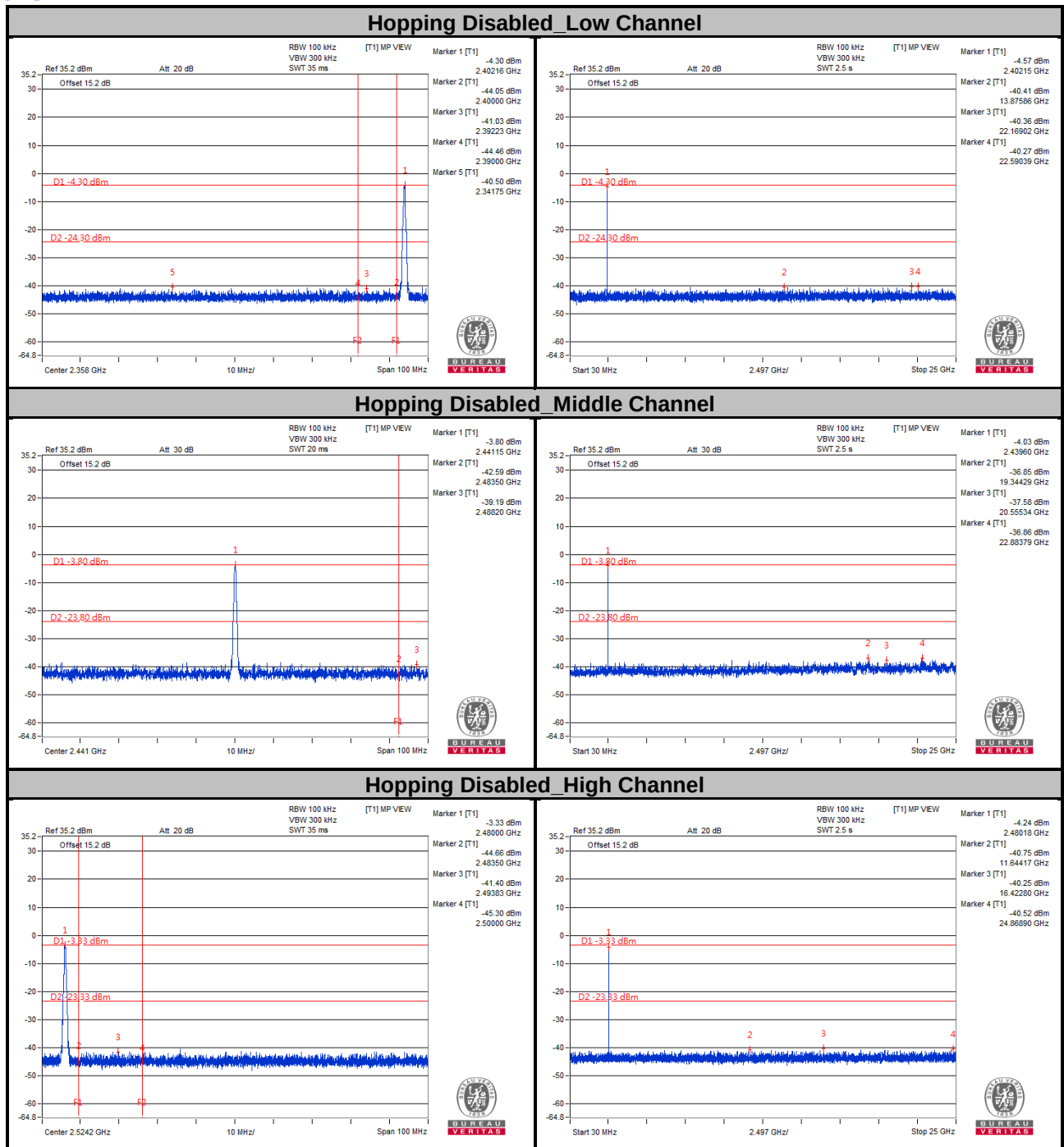
Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value of frequency range 30MHz~1000MHz
4. The other emission levels were very low against the limit.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz.

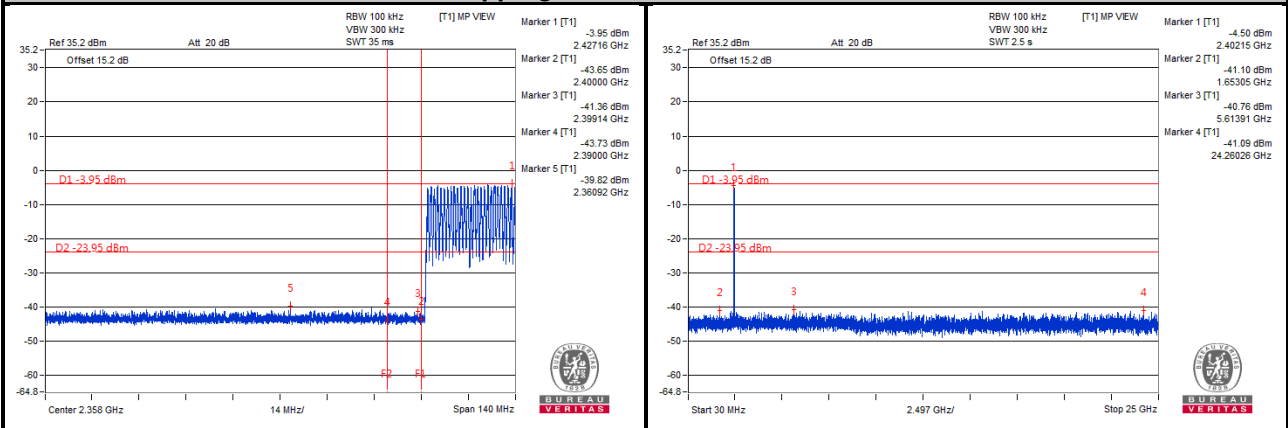


4.7 帶外發射之量測 (傳導)

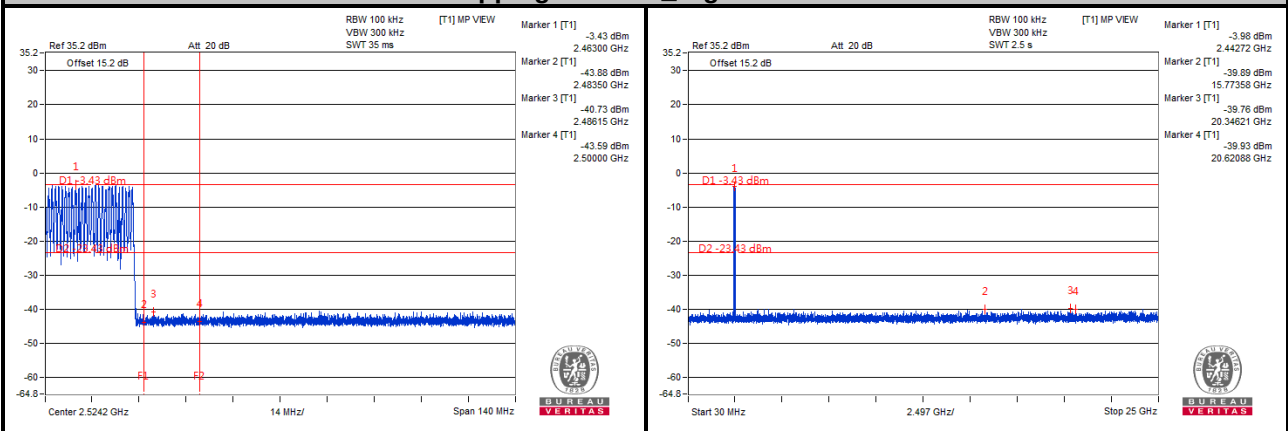
GFSK



Hopping Enabled_Low Channel

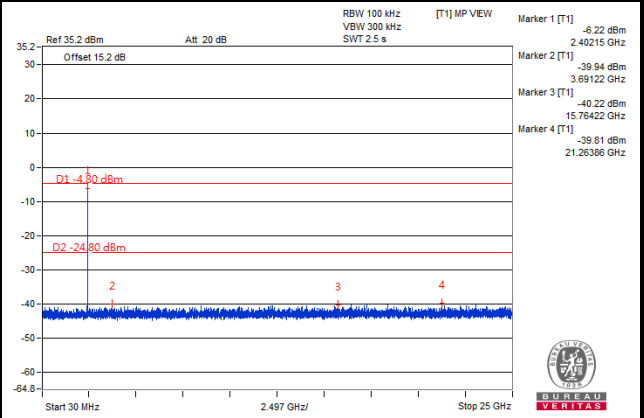
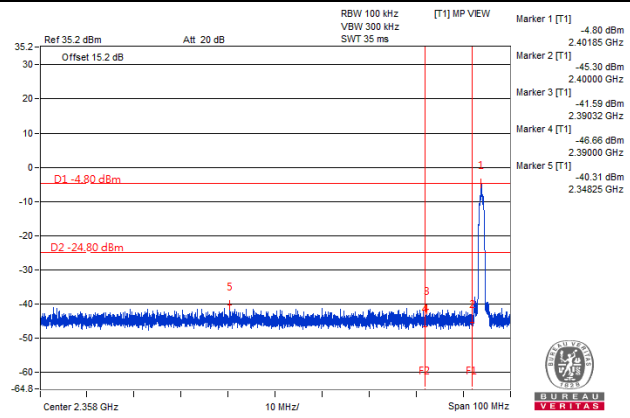


Hopping Enabled_High Channel

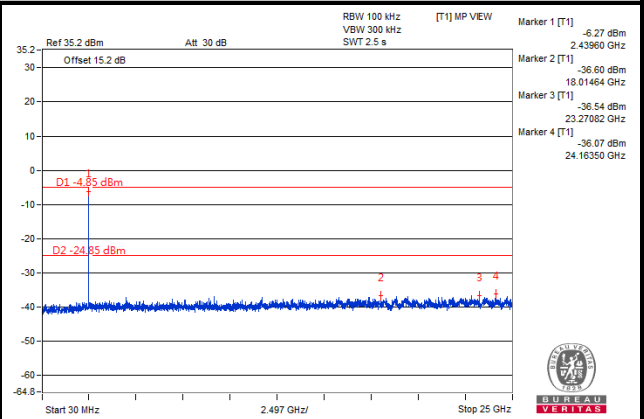
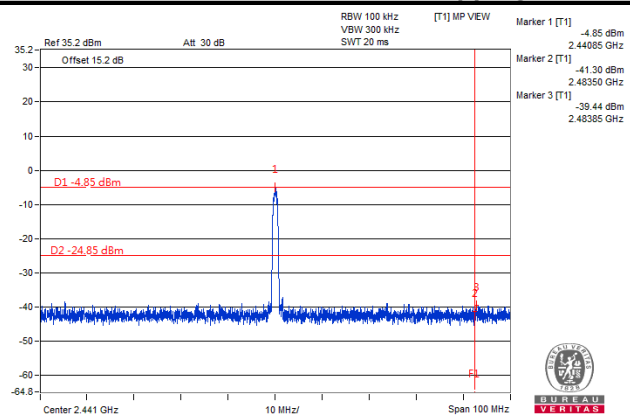


8DPSK

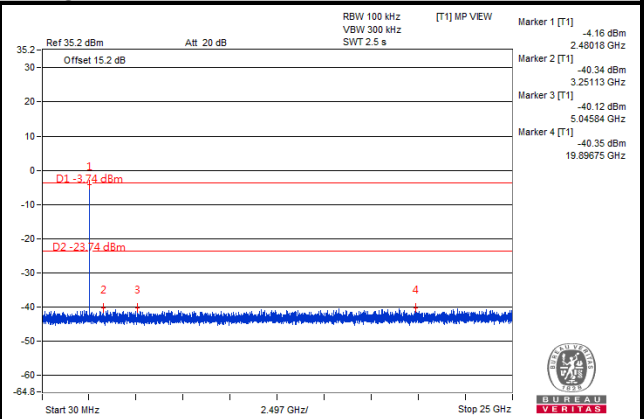
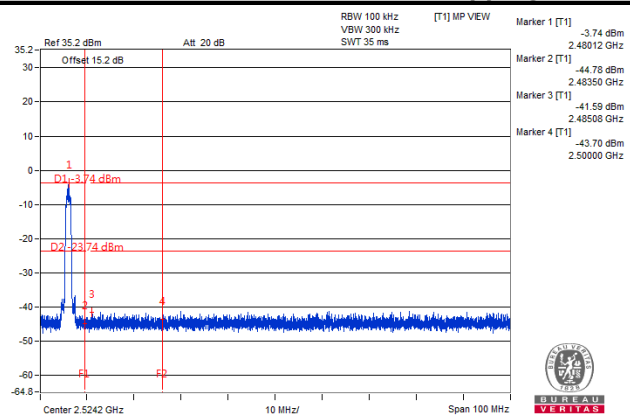
Hopping Disabled Low Channel



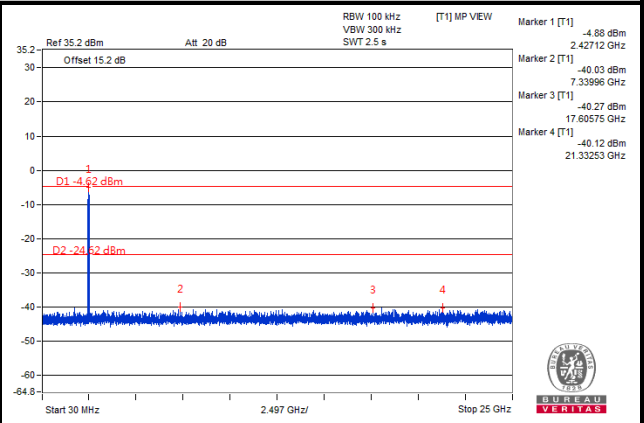
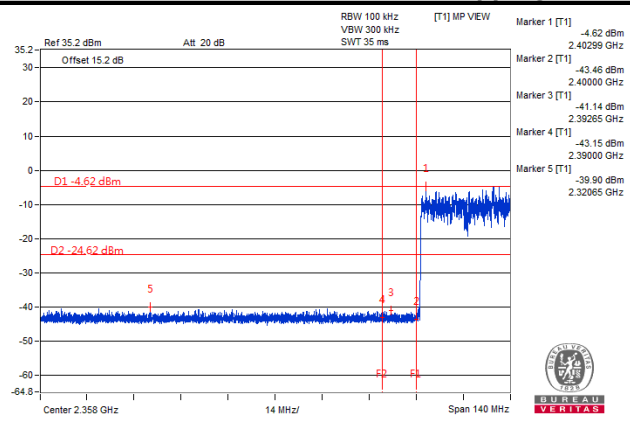
Hopping Disabled Middle Channel

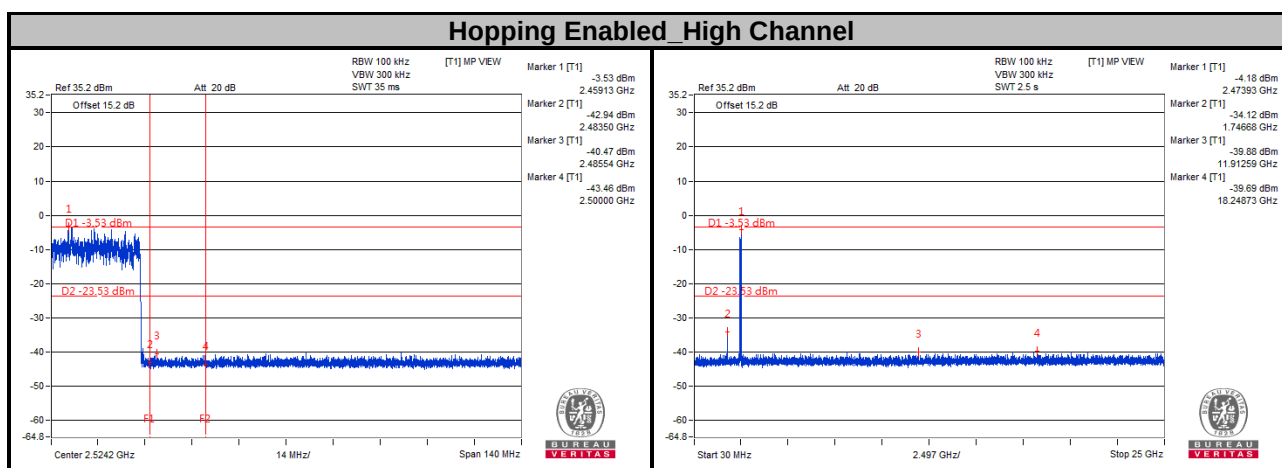


Hopping Disabled High Channel



Hopping Enabled Low Channel





4.8 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

5 20 dB 頻寬之要求

5.1 適用標準

請見本報告 3.1 節第(7)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。
- 計算由最大輸出功率峰值減 20 dB 的最大頻率範圍。

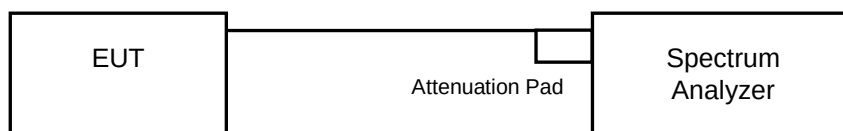
5.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 16, 2020	Apr. 15, 2021

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 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



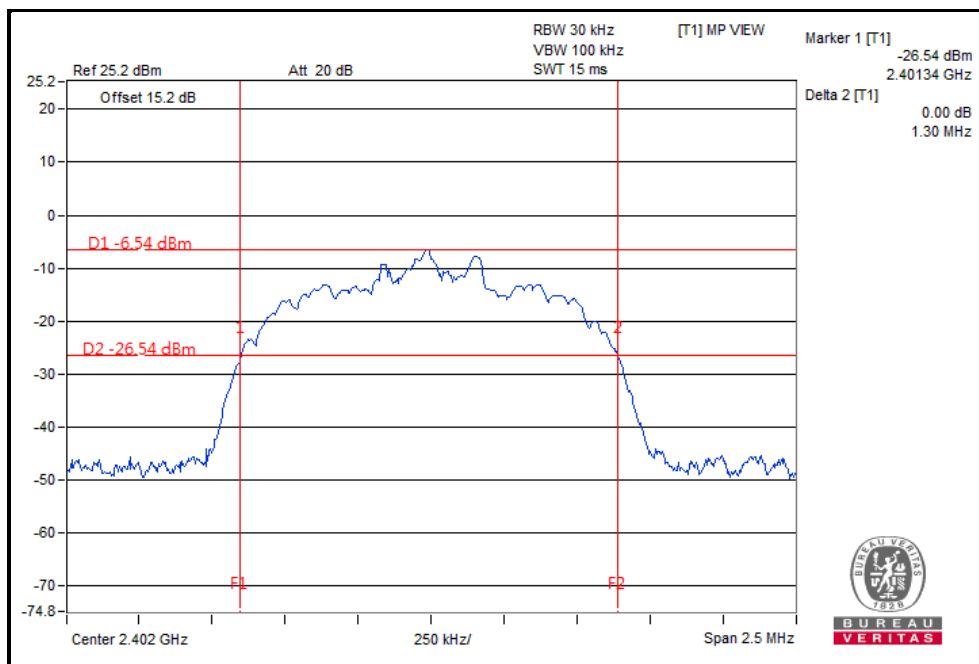
5.5 量測結果

操作模式	發射	測試日期	109 年 07 月 22 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	Gavin Wu		

Channel	Channel Frequency (MHz)	20 dB Bandwidth (MHz)		>= 25 kHz
		GFSK	8DPSK	
0	2402	0.96	1.30	Yes
39	2441	0.96	1.30	Yes
78	2480	0.96	1.30	Yes

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

**此測試圖僅放測試結果最差的頻道。



5.6 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。

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(5)項的規定。

6.2 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。

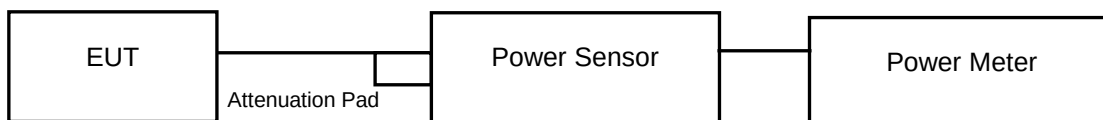
6.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Power Meter Anritsu	ML2495A	1232002	Dec. 10, 2019	Dec. 09, 2020
Power Sensor Anritsu	MA2411B	1207325	Dec. 10, 2019	Dec. 09, 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 1.393 dB, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of $k=2$.

6.4 測試配置



6.5 量測結果

操作模式	發射	測試日期	109 年 07 月 22 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	Gavin Wu		

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)		Peak Power Limit (dBm)	Pass / Fail
		GFSK	8DPSK		
0	2402	-3.84	-3.00	21	Pass
39	2441	-3.55	-2.71	21	Pass
78	2480	-3.40	-2.51	21	Pass

6.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

7 跳頻頻道數之量測

7.1 適用標準

請見本報告 3.1 節第(6)項的規定。

7.2 量測方法

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

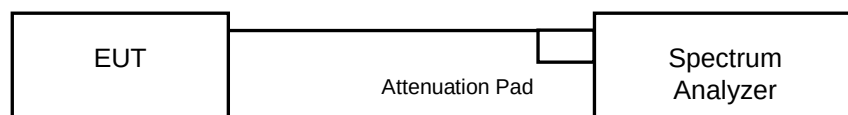
7.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 16, 2020	Apr. 15, 2021

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 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.

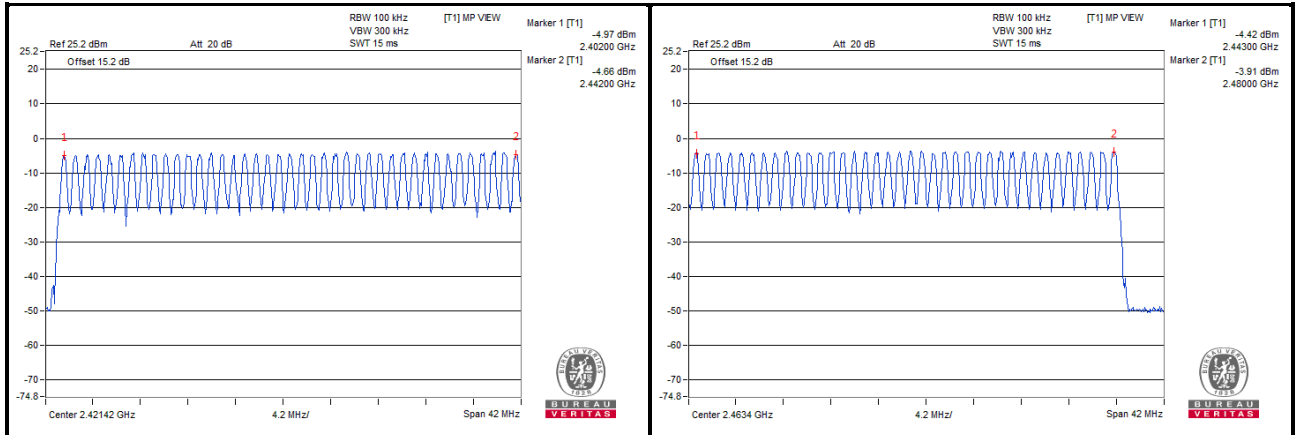
7.4 測試配置



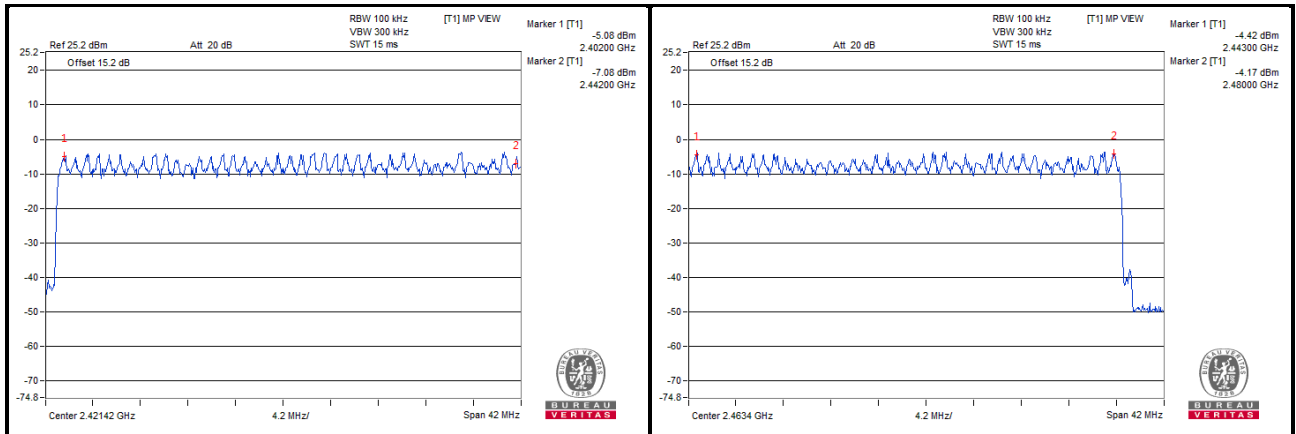
7.5 量測結果

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



7.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

8 跳頻頻道間隔之量測

8.1 適用標準

請見本報告 3.1 節第(6)項規定。

8.2 量測方法

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

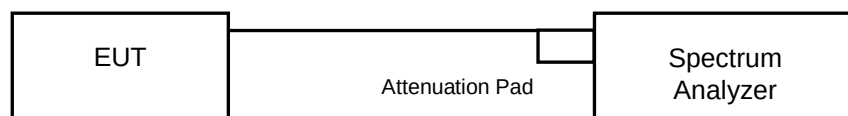
8.3 量測場強輻射之儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 16, 2020	Apr. 15, 2021

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 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.

8.4 測試配置



8.5 量測結果

操作模式	發射	測試日期	109 年 07 月 22 日
量測場地溫度	25 °C	量測場地濕度	60 % RH
測試者	Gavin Wu		

GFSK

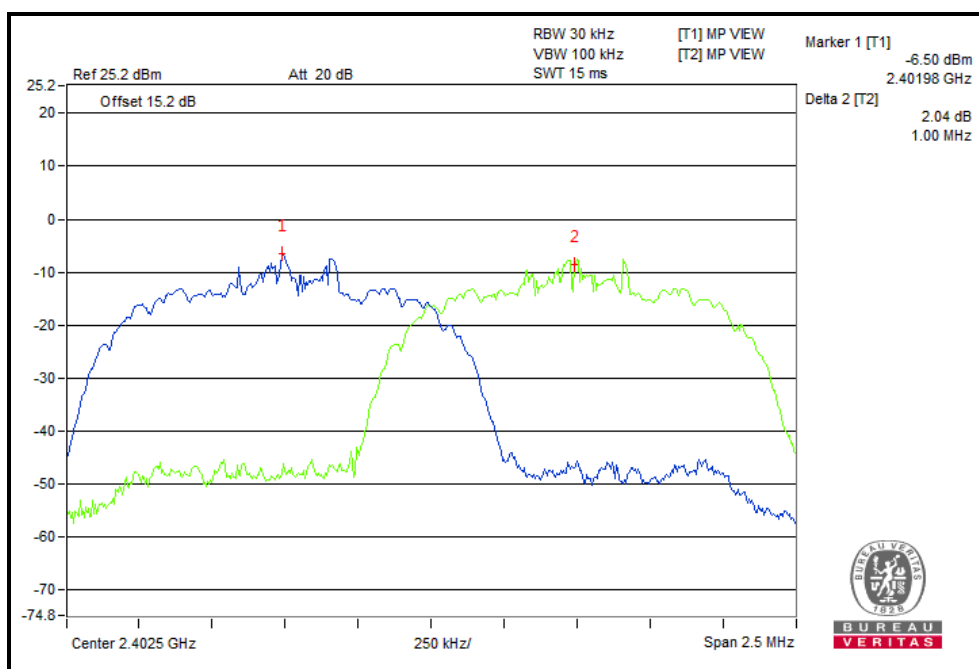
Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.00	0.96	0.64	Pass
39	2441	1.00	0.96	0.64	Pass
78	2480	1.00	0.96	0.64	Pass

8DPSK

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.30	1.00	0.87	Pass
39	2441	1.30	1.00	0.87	Pass
78	2480	1.30	1.00	0.87	Pass

本項測試的 limit 為至少為三分之二 20 dB 頻寬。

**此測試圖僅放測試結果最差的頻道。



8.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

9 每一頻道停留時間之量測

9.1 適用標準

請見本報告 3.1 節第(8)項的規定。

9.2 量測方法

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

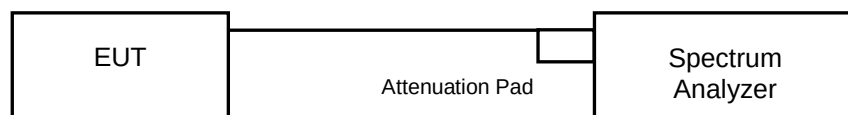
9.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Spectrum Analyzer R&S	FSU43	101261	Apr. 16, 2020	Apr. 15, 2021

Note:

- The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
- The measurement uncertainty is 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

GFSK

Mode	Number of transmission in a 31.6 (79 Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (sec)
DH1	50 (times / 5 sec) * 6.32 = 316 times	0.456	144.1	0.4
DH3	27 (times / 5 sec) * 6.32 = 170.64 times	1.7	290.09	0.4
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	2.992	321.46	0.4

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

其掃描圖請參閱下方



8DPSK

Mode	Number of transmission in a 31.6 (79 Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (sec)
3DH1	51 (times / 5 sec) * 6.32 = 322.32 times	0.444	143.11	0.4
3DH3	27 (times / 5 sec) * 6.32 = 170.64 times	1.7	290.09	0.4
3DH5	16 (times / 5 sec) * 6.32 = 101.12 times	3.024	305.79	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



9.6 量測結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

10 待測物照片

請參照 BV CPS 報告編號：200311C22

11 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。

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