

低功率射頻電機技術規範測試報告

報告編號	RT191128D12
申請者	台灣明尼蘇達礦業製造股份有限公司
產品名稱	Wireless headset
型號	MT15H7P3EWS6
製造廠商	3M Svenska AB, Sweden
商標或廠牌	3M
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電機技術規範 107 年 1 月 10 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 2 月 6 日

報告簽署人簽章:

賴正軒



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報告發行紀錄

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RT191128D12	Original release.	109 年 2 月 6 日

證 明 書

發行日期：109 年 2 月 6 日

產 品 名 稱： Wireless headset
商 標： 3M
型 號： MT15H7P3EWS6
申 請 者： 台灣明尼蘇達礦業製造股份有限公司
量 測 規 範： 低功率射頻電機技術規範 LP0002 (修訂日期：107 年 1 月 10 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：MT15H7P3EWS6)，收件日期 108 年 11 月 28 日，於 109 年 1 月 16 日至 2 月 2 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 ！

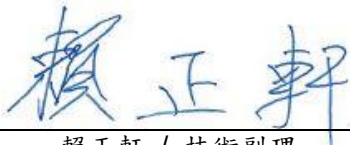
報告製作者：



， 日 期： 109 年 2 月 6 日

鄭 幸 如 / 高級專員

審 核 者：



， 日 期： 109 年 2 月 6 日

賴正軒 / 技術副理

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：台灣明尼蘇達礦業製造股份有限公司

製造廠商：3M Svenska AB, Sweden

申請廠商地址：台北市南港區經貿二路 198 號 3 樓

廠牌：3M

產品名稱：Wireless headset

型號：MT15H7P3EWS6

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

量測單位地址：新北市林口區嘉寶里 14 鄰 47-2 號

量測單位認可編號：TAF 2021 (9kHz~40GHz)

量測規範：低功率射頻電機技術規範 LP0002(修訂日期：107 年 1 月 10 日)

ANSI C63.10-2013

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	Note 1
3	20 dB 頻寬	低功率射頻電機技術規範 3.10.1.6 節	Note 2
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：1. 此待測設備使用 DC 電源，故無需執行電源線傳導干擾量測。

2. 此頻寬測試值為跳頻頻道間隔之量測參考值。

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：	Wireless headset
型號：	MT15H7P3EWS6
額定電源：	3Vdc from Batteries
Bluetooth 版本：	BT4.2 + EDR + LE
調變方式：	GFSK
傳輸速率：	1/ 2/ 3Mbps
載波頻率：	2402 ~ 2480MHz
頻道數：	79
發射功率(電場強度)：	1.08dBm
天線種類：	見註
電源/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：

Manufacture	Part No.	Antenna Type	Gain (dBi)	Connector Type
3M Svenska AB	K404A	PIFA	6.55	NA

註 2: 此報告中傳輸模式於場強輻射之量測1G以下，經過評估後以CH78(2480Hz)具有較大的干擾雜訊，因此僅以此傳輸模式(發射及接收)進行最終量測。

註 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		頻道
場強輻射量測 - 1GHz 以上量測	發射	GFSK: Ch 0, 39, 78 8DPSK: Ch 0, 39, 78
	接收	GFSK: Ch 78
場強輻射量測 - 其它不必要之訊號	發射/接收	GFSK: Ch 78

註 4: Bluetooth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，故僅以此傳輸模式進行最終量測。

註 5: 此待測設備，經評估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。

此裝置各頻道的中心頻率如下：

Bluetooth 頻段：

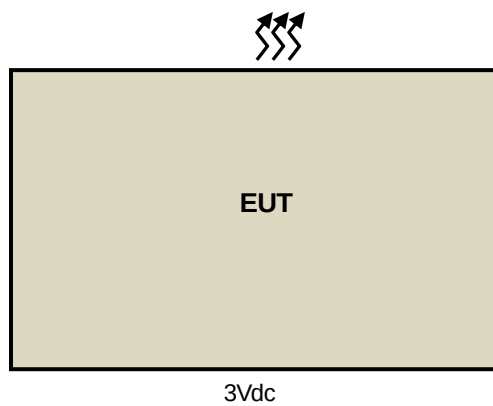
頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)	頻道	對應頻率 (MHz)
0	2402	14	2416	28	2430	42	2444	56	2458	70	2472
1	2403	15	2417	29	2431	43	2445	57	2459	71	2473
2	2404	16	2418	30	2432	44	2446	58	2460	72	2474
3	2405	17	2419	31	2433	45	2447	59	2461	73	2475
4	2406	18	2420	32	2434	46	2448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

詳細之規格請參考使用說明書，產品的照片請參照 BV 報告編號: 1911128D12。

2.2 輔助測試之週邊設備描述

此待測設備於受測時無須搭配一般用途之相關設備，故採獨立測試。

2.3 測試架構圖



3 適用規範

3.1 規範要求

(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 (MHz)	電場強度 (微伏特/公尺, uV/m)	測距 (公尺)
0.009 - 0.490 (含)	2,400/f(kHz)	300
0.490 (不含) - 1.705 (含)	24,000/f(kHz)	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 3.10.1.3 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。

(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：1W(含)以下。
- (b) 除(a)外，依 3.10.1.6 (1)(A)(a)之跳頻系統：0.125W(含)以下。
- (c) 數位調變技術系統：1W(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。

(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。

(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。

(9) 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。

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	

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

量測頻率 9kHz ~ 30MHz :

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米外離地1米的高度。測試桌面要360度旋轉，另外接收天線也要分別設置為Parallel軸性(Loop antenna面向EUT)與Perpendicular軸性(Loop antenna與EUT垂直)與Ground-parallel軸性(Loop antenna面向地板) 作量測，以找出最大的輻射電場強度。

量測頻率 30MHz 以上:

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。

備註: 對於 1GHz 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

4.3 量測儀器

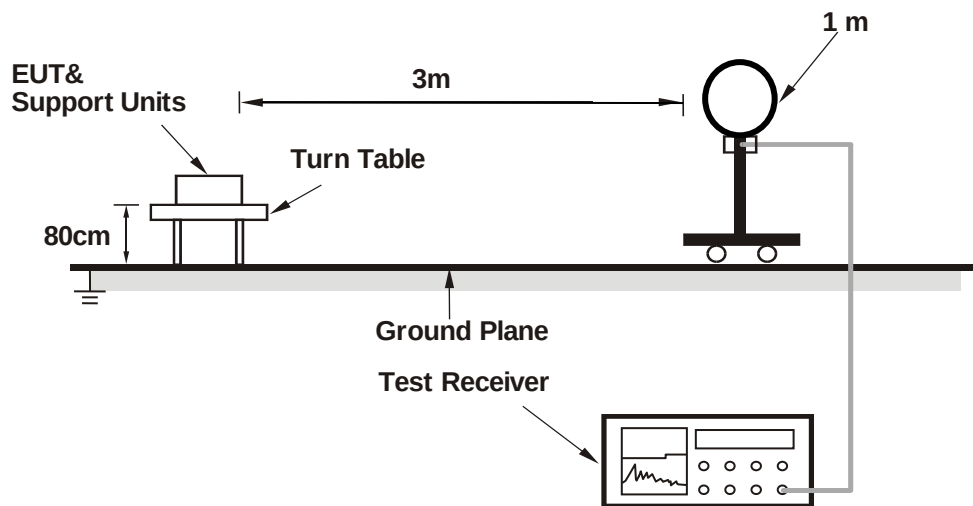
DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 20, 2019	Feb. 19, 2020
HP Preamplifier	8449B	3008A01201	Feb. 21, 2019	Feb. 20, 2020
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 20, 2019	Feb. 19, 2020
Agilent TEST RECEIVER	N9038A	MY51210129	Mar. 05, 2019	Mar. 04, 2020
Schwarzbeck Antenna	VULB 9168	139	Nov. 7, 2019	Nov. 6, 2020
Schwarzbeck Antenna	VHBA 9123	480	Jun. 3, 2019	Jun. 2, 2021
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_V7.6.15.9.5	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF102	Cable-CH6-01	Jul. 10, 2019	Jul. 9, 2020
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH8-3.6m	Jul. 10, 2019	Jul. 9, 2020
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	Jun. 11, 2019	Jun. 10, 2020
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Jul. 30, 2019	Jul. 29, 2020
Loop Antenna EMCI	LPA600	270	Aug. 23, 2019	Aug. 22, 2021
EMCO Horn Antenna	3115	00028257	Nov. 24, 2019	Nov. 23, 2020
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 23, 2019	Sep. 22, 2020
Anritsu Power Sensor	MA2411B	0738404	Apr. 16, 2019	Apr. 15, 2020
Anritsu Power Meter	ML2495A	0842014	Apr. 16, 2019	Apr. 15, 2020

- NOTE:** 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
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.

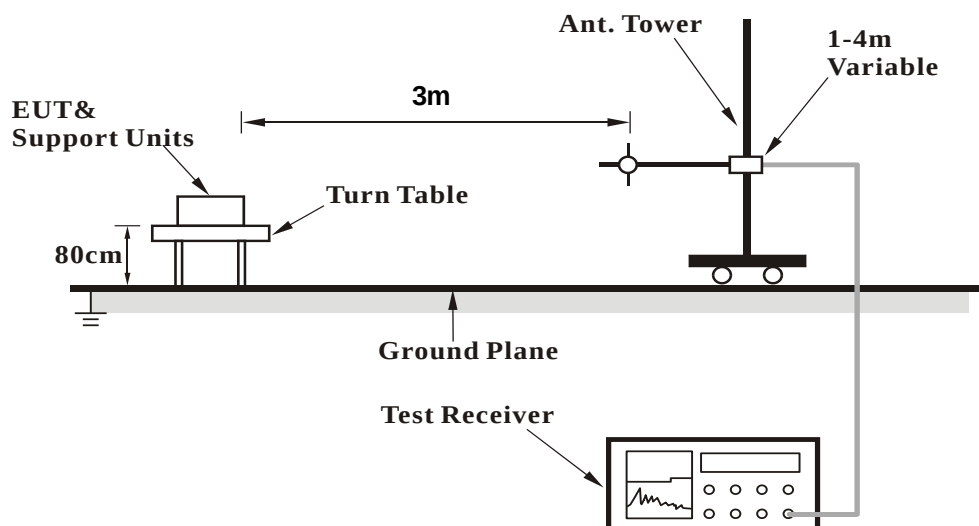
Measurement	Frequency	Uncertainty
Radiated emissions	9kHz ~ 30MHz	±2.61 dB
	30MHz ~ 1GHz	±5.43 dB
	Above 1GHz	±5.14 dB

4.4 測試配置

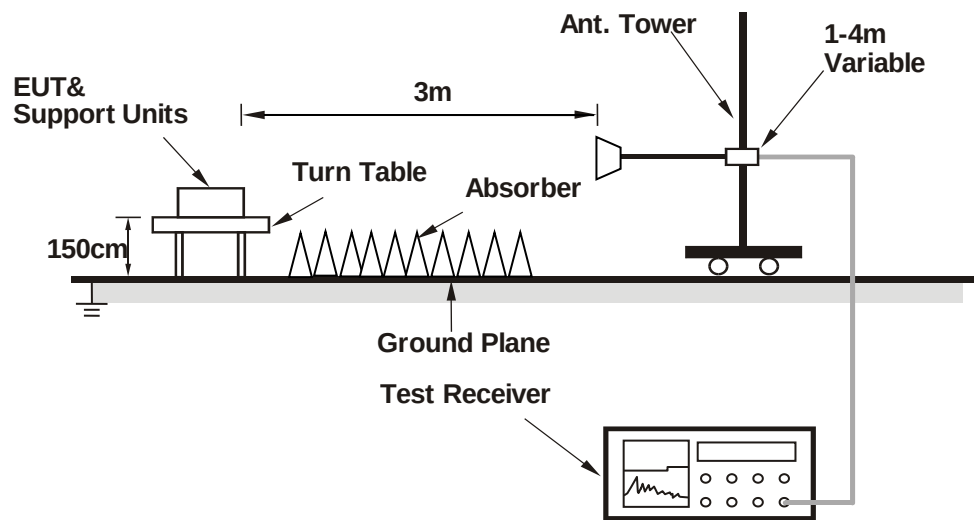
<Frequency Range 9kHz ~ 30MHz>



<Frequency Range 30MHz ~ 1GHz>



<Frequency Range above 1GHz>



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 Limitvalue (dBuV/m)

量測結果請見下頁。

4.6 量測結果

4.6.1 發射諧波

BT_GFSK

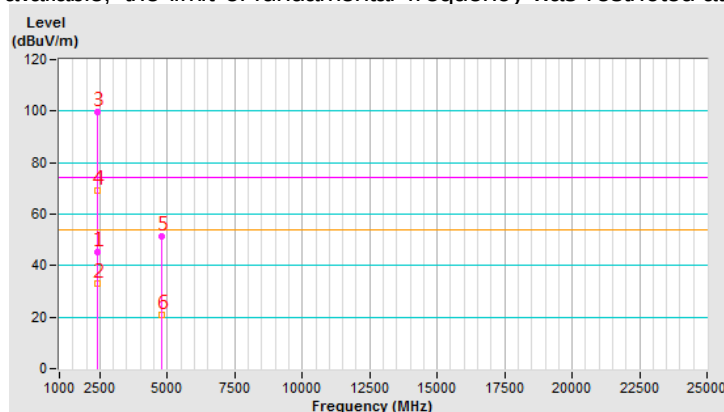
操作模式：	發射	調變技術：	BT_GFSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (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	45.23 PK	74.00	-28.77	1.31 H	140	44.79	0.44
2	2390.00	33.21 AV	54.00	-20.79	1.31 H	140	32.77	0.44
3	*2402.00	99.88 PK			1.31 H	140	99.41	0.47
4	*2402.00	69.38 AV			1.31 H	140	68.91	0.47
5	4804.00	51.25 PK	74.00	-22.75	1.00 H	2	43.12	8.13
6	4804.00	20.75 AV	54.00	-33.25	1.00 H	2	12.62	8.13
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 average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$
Please see page 29 for plotted duty.
8. " - ": The emission levels were too low to be detected.
9. The blank is not available, the limit of fundamental frequency was restricted at the output power.



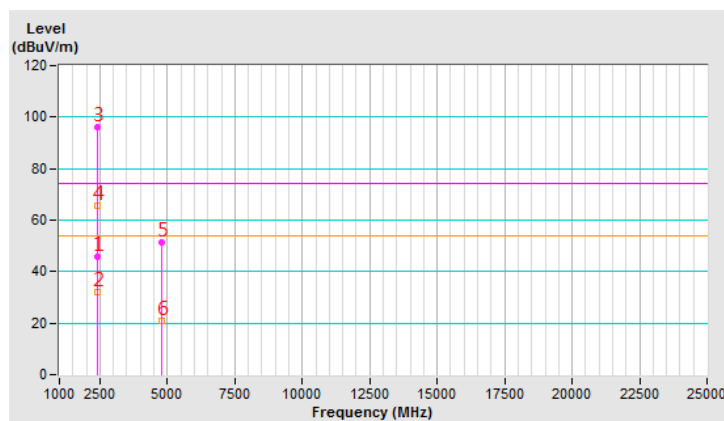
操作模式：	發射	調變技術：	BT_GFSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (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	45.63 PK	74.00	-28.37	3.30 V	264	45.19	0.44
2	2390.00	32.08 AV	54.00	-21.92	3.30 V	264	31.64	0.44
3	*2402.00	96.18 PK			1.00 V	284	95.71	0.47
4	*2402.00	65.68 AV			1.00 V	284	65.21	0.47
5	4804.00	51.53 PK	74.00	-22.47	1.00 V	128	43.40	8.13
6	4804.00	21.03 AV	54.00	-32.97	1.00 V	128	12.90	8.13
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 average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(3\text{ms} / 100 \text{ ms}) = -30.5 \text{ dB}$
Please see page 29 for plotted duty.
- "-": 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.



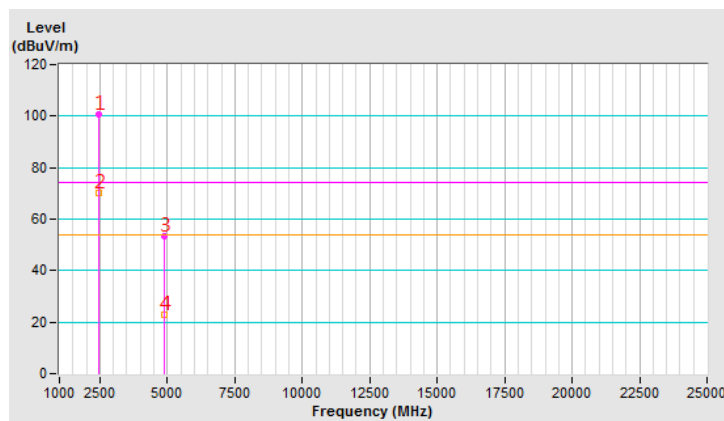
操作模式：	發射	調變技術：	BT_GFSK
基本波頻率：	CH 39：2441 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (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	100.43 PK			1.29 H	138	99.96	0.47
2	*2441.00	69.93 AV			1.29 H	138	69.46	0.47
3	4882.00	53.17 PK	74.00	-20.83	1.02 H	8	44.75	8.42
4	4882.00	22.67 AV	54.00	-31.33	1.02 H	8	14.25	8.42
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:

- 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 average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(3\text{ms} / 100 \text{ ms}) = -30.5 \text{ dB}$
Please see page 29 for plotted duty.
- "-": 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.



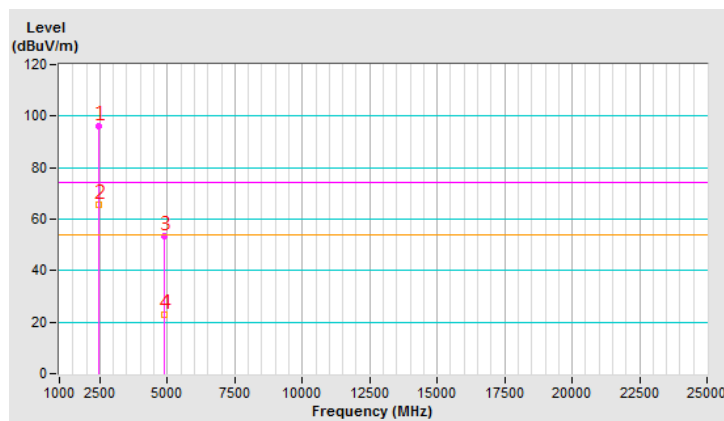
操作模式：	發射	調變技術：	BT_GFSK
基本波頻率：	CH 39：2441 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (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	96.28 PK			3.28 V	263	95.81	0.47
2	*2441.00	65.78 AV			3.28 V	263	65.31	0.47
3	4882.00	53.34 PK	74.00	-20.66	1.03 V	131	44.92	8.42
4	4882.00	22.84 AV	54.00	-31.16	1.03 V	131	14.42	8.42
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:

- 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 average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$
Please see page 29 for plotted duty.
- "-": 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.



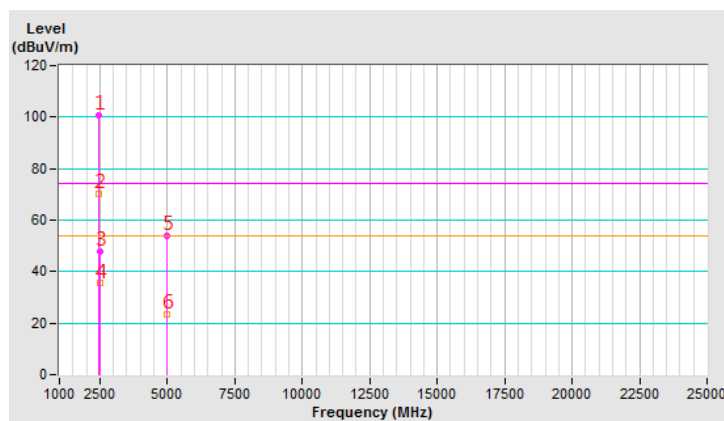
操作模式：	發射	調變技術：	BT_GFSK
基本波頻率：	CH 78：2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (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	100.75 PK			1.27 H	142	100.16	0.59
2	*2480.00	70.25 AV			1.27 H	142	69.66	0.59
3	2483.50	47.79 PK	74.00	-26.21	1.27 H	142	47.17	0.62
4	2483.50	35.39 AV	54.00	-18.61	1.27 H	142	34.77	0.62
5	4960.00	53.83 PK	74.00	-20.17	1.05 H	12	45.32	8.51
6	4960.00	23.33 AV	54.00	-30.67	1.05 H	12	14.82	8.51
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:

- 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 average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$
Please see page 29 for plotted duty.
- "-": 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.



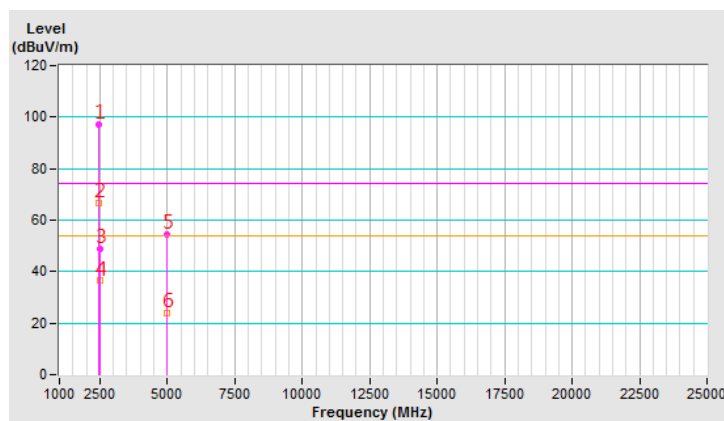
操作模式：	發射	調變技術：	BT_GFSK
基本波頻率：	CH 78：2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (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	97.36 PK			3.27 V	265	96.77	0.59
2	*2480.00	66.86 AV			3.27 V	265	66.27	0.59
3	2483.50	48.88 PK	74.00	-25.12	3.27 V	265	48.26	0.62
4	2483.50	36.36 AV	54.00	-17.64	3.27 V	265	35.74	0.62
5	4960.00	54.34 PK	74.00	-19.66	1.01 V	130	45.83	8.51
6	4960.00	23.84 AV	54.00	-30.16	1.01 V	130	15.33	8.51
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:

- 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 average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$
Please see page 29 for plotted duty.
- "-": 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.



BT_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) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

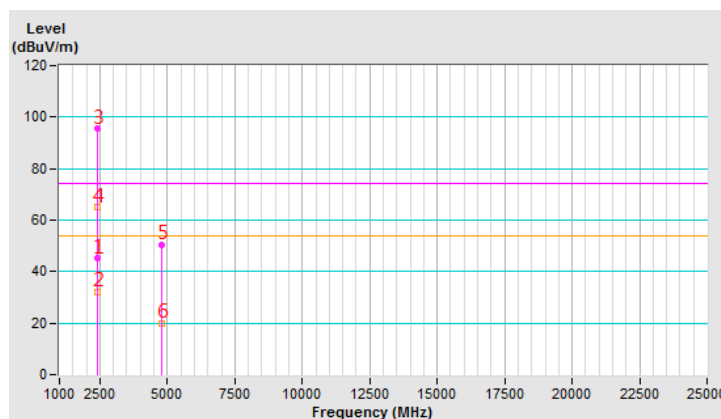
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (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	45.07 PK	74.00	-28.93	1.32 H	141	44.63	0.44
2	2390.00	31.96 AV	54.00	-22.04	1.32 H	141	31.52	0.44
3	*2402.00	95.37 PK			1.32 H	141	94.90	0.47
4	*2402.00	64.87 AV			1.32 H	141	64.40	0.47
5	4804.00	50.47 PK	74.00	-23.53	1.05 H	12	42.34	8.13
6	4804.00	19.97 AV	54.00	-34.03	1.05 H	12	11.84	8.13
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 average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:

$$20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$$
Please see page 29 for plotted duty.
- "-": 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.



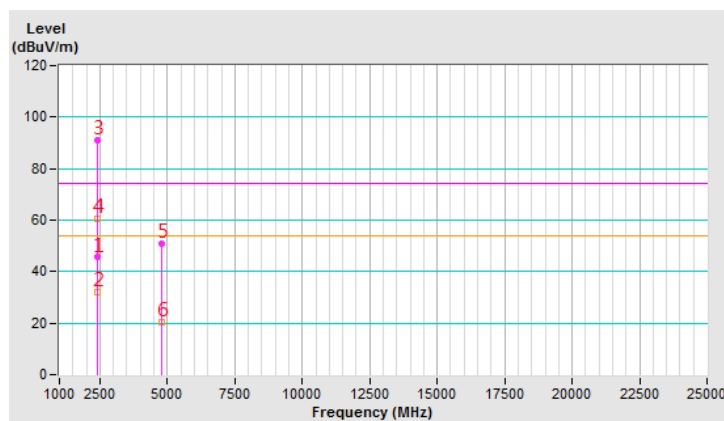
操作模式：	發射	調變技術：	BT_8DPSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (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	45.51 PK	74.00	-28.49	3.33 V	266	45.07	0.44
2	2390.00	31.96 AV	54.00	-22.04	3.33 V	266	31.52	0.44
3	*2402.00	91.09 PK			3.33 V	266	90.62	0.47
4	*2402.00	60.59 AV			3.33 V	266	60.12	0.47
5	4804.00	50.71 PK	74.00	-23.29	1.04 V	133	42.58	8.13
6	4804.00	20.21 AV	54.00	-33.79	1.04 V	133	12.08	8.13
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 average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$
Please see page 29 for plotted duty.
- "-": 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.



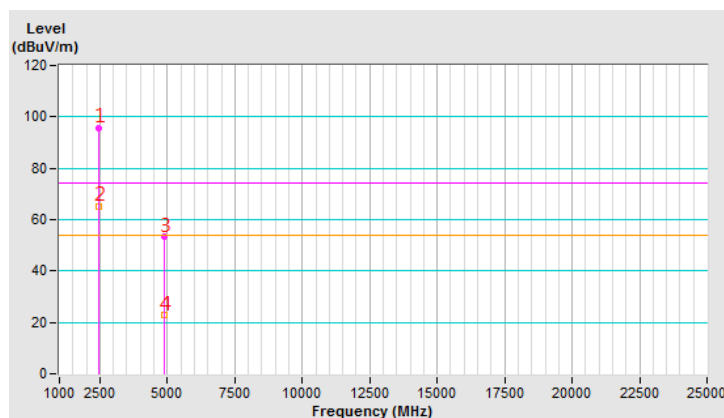
操作模式：	發射	調變技術：	BT_8DPSK
基本波頻率：	CH 39：2441 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (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	95.80 PK			1.30 H	142	95.33	0.47
2	*2441.00	65.30 AV			1.30 H	142	64.83	0.47
3	4882.00	53.14 PK	74.00	-20.86	1.12 H	20	44.72	8.42
4	4882.00	22.64 AV	54.00	-31.36	1.12 H	20	14.22	8.42
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:

- 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 average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$
Please see page 29 for plotted duty.
- "-": 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.



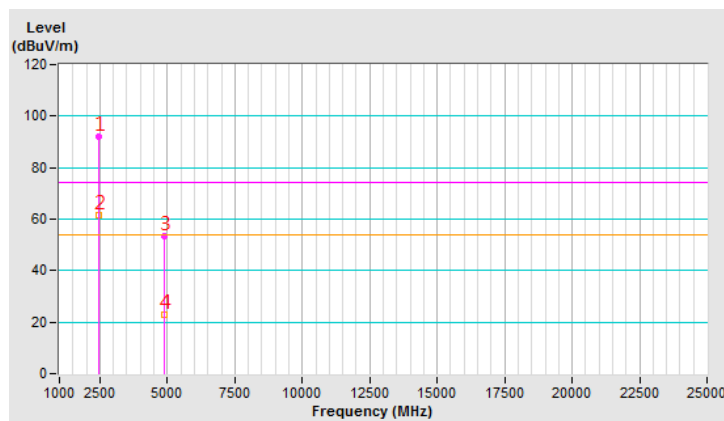
操作模式：	發射	調變技術：	BT_8DPSK
基本波頻率：	CH 39：2441 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (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	91.88 PK			3.34 V	265	91.41	0.47
2	*2441.00	61.38 AV			3.34 V	265	60.91	0.47
3	4882.00	53.59 PK	74.00	-20.41	1.09 V	135	45.17	8.42
4	4882.00	23.09 AV	54.00	-30.91	1.09 V	135	14.67	8.42
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:

- 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 average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$
Please see page 29 for plotted duty.
- "-": 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.



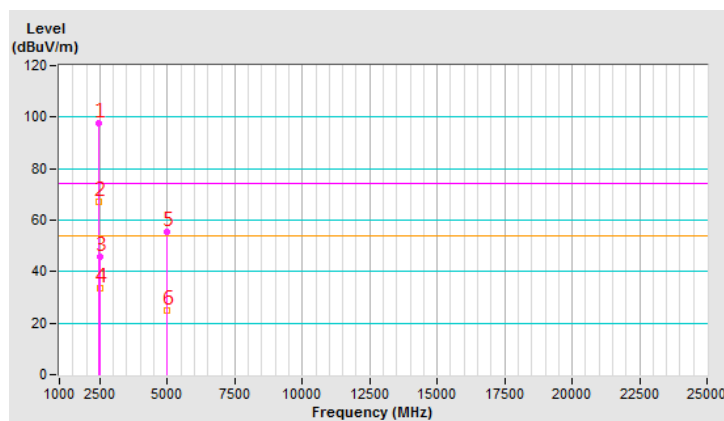
操作模式：	發射	調變技術：	BT_8DPSK
基本波頻率：	CH 78：2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (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	97.46 PK			1.28 H	145	96.87	0.59
2	*2480.00	66.96 AV			1.28 H	145	66.37	0.59
3	2483.50	45.89 PK	74.00	-28.11	1.28 H	145	45.27	0.62
4	2483.50	33.50 AV	54.00	-20.50	1.28 H	145	32.88	0.62
5	4960.00	55.39 PK	74.00	-18.61	1.07 H	15	46.88	8.51
6	4960.00	24.89 AV	54.00	-29.11	1.07 H	15	16.38	8.51
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:

- 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 average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$
Please see page 29 for plotted duty.
- "-": 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.



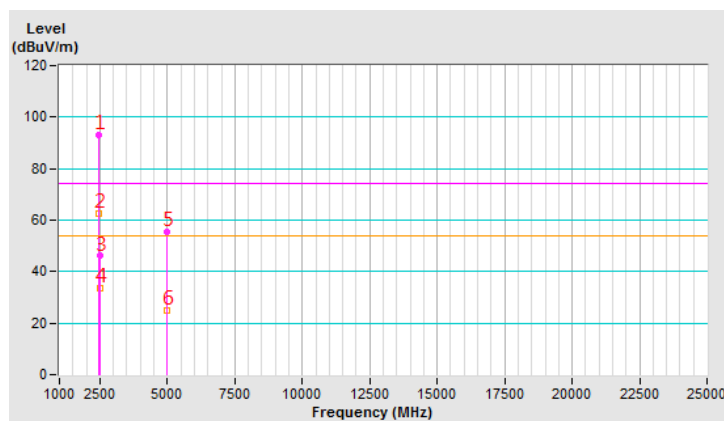
操作模式：	發射	調變技術：	BT_8DPSK
基本波頻率：	CH 78：2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

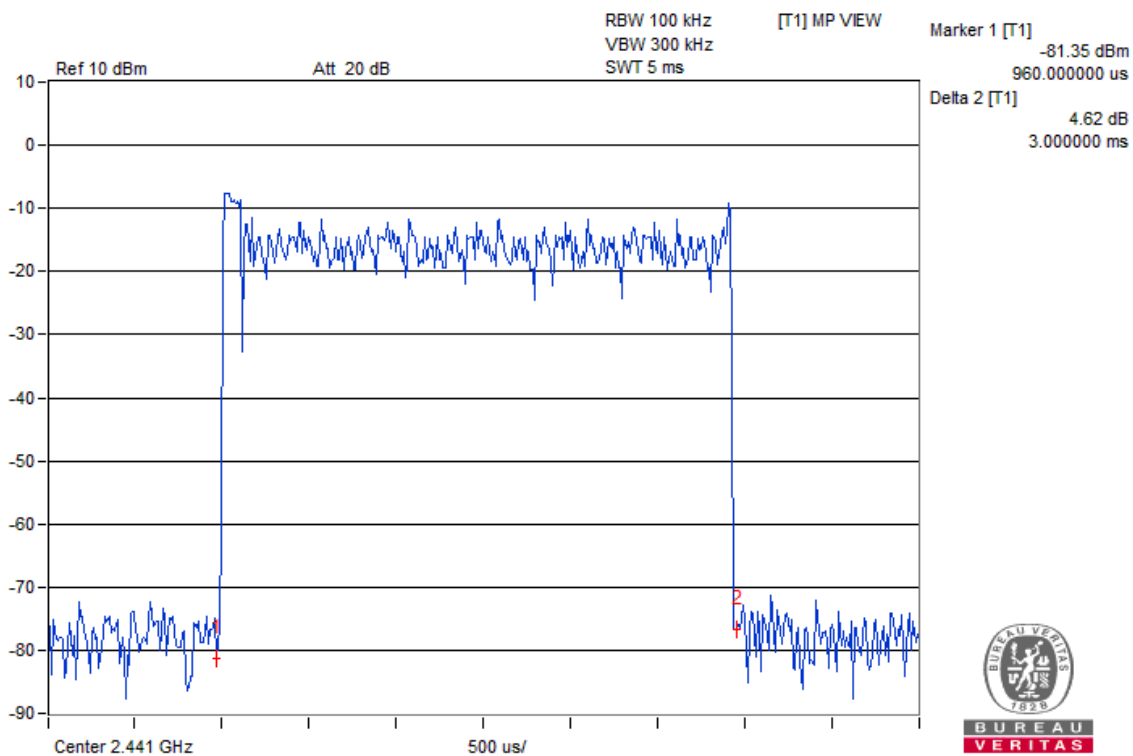
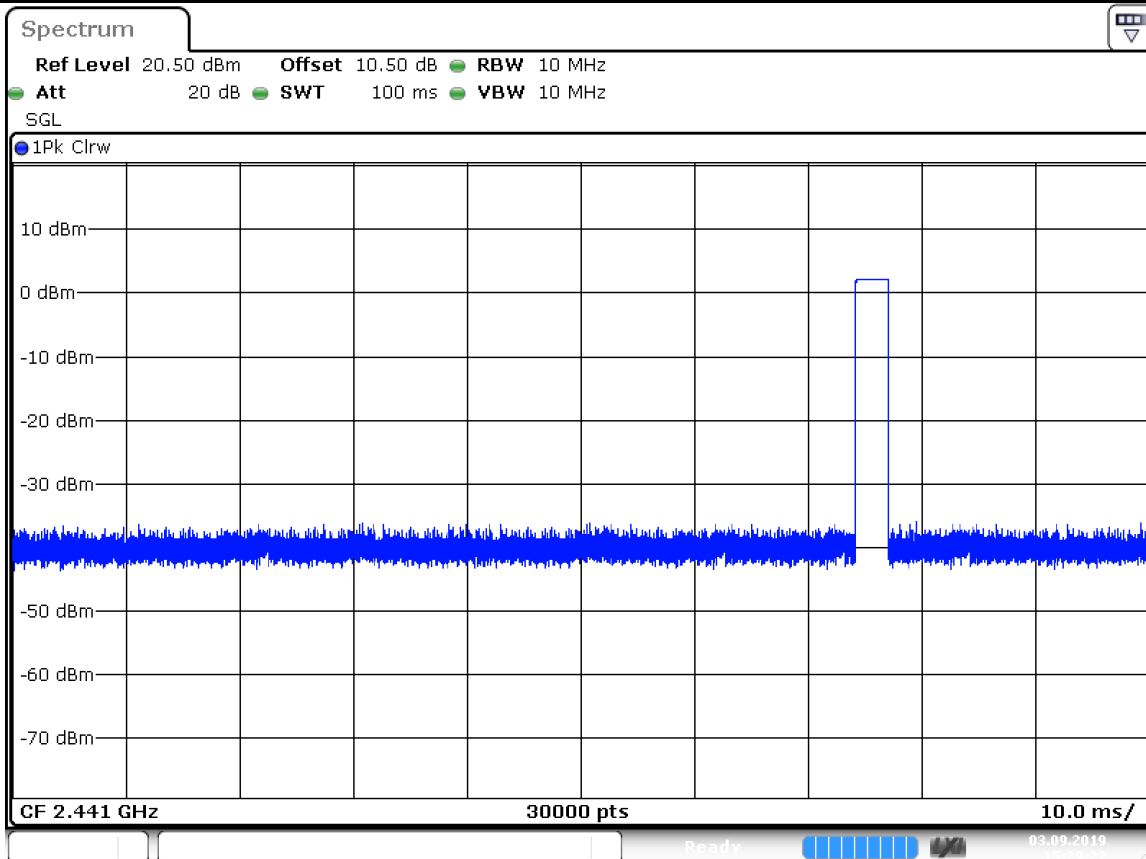
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	93.05 PK			3.37 V	261	92.46	0.59
2	*2480.00	62.55 AV			3.37 V	261	61.96	0.59
3	2483.50	46.08 PK	74.00	-27.92	3.37 V	261	45.46	0.62
4	2483.50	33.59 AV	54.00	-20.41	3.37 V	261	32.97	0.62
5	4960.00	55.64 PK	74.00	-18.36	1.08 V	138	47.13	8.51
6	4960.00	25.14 AV	54.00	-28.86	1.08 V	138	16.63	8.51
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:

- 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 average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
 $20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$
Please see page 29 for plotted duty.
- "-": 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.



Duty Cycle



Duty cycle = $(3\text{ms} * 1) / 100\text{ms} = 0.03$,
 Duty cycle correction factor (dB) = $20 \log (0.03) = -30.5$

4.6.1 接收諧波

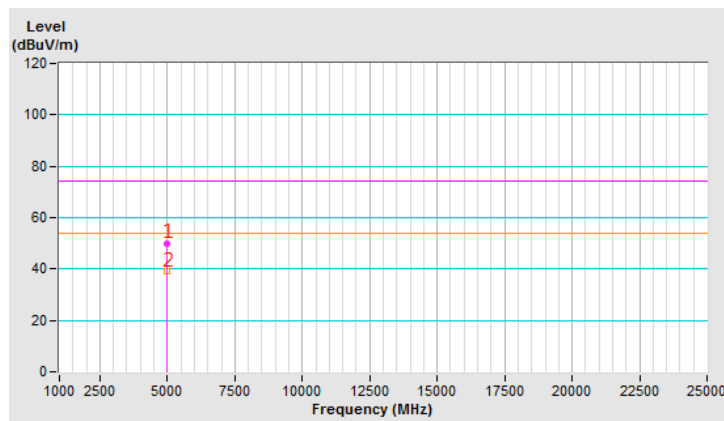
BT_GFSK

操作模式：	接收		
基本波頻率：	CH 78：2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4960.00	49.84 PK	74.00	-24.16	1.11 H	325	41.33	8.51
2	4960.00	38.90 AV	54.00	-15.10	1.11 H	325	30.39	8.51

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.

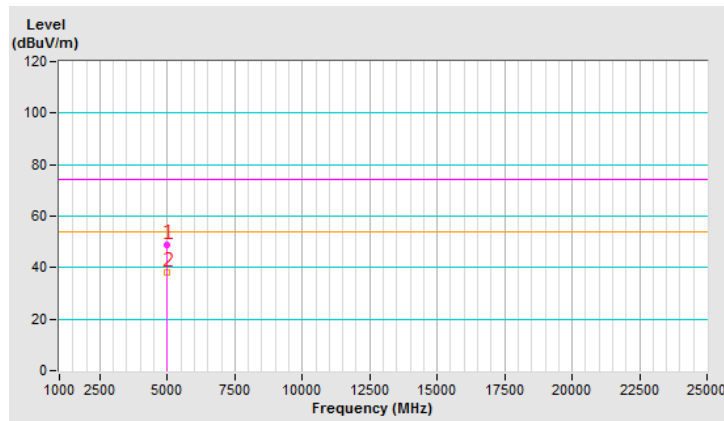


操作模式：	接收		
基本波頻率：	CH 78：2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) 1M/3M detector RMS trace AV
量測場地溫度：	19°C	量測場地濕度：	68%RH
測試日期：	109 年 1 月 16 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4960.00	48.79 PK	74.00	-25.21	2.31 V	247	40.28	8.51
2	4960.00	38.28 AV	54.00	-15.72	2.31 V	247	29.77	8.51

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.



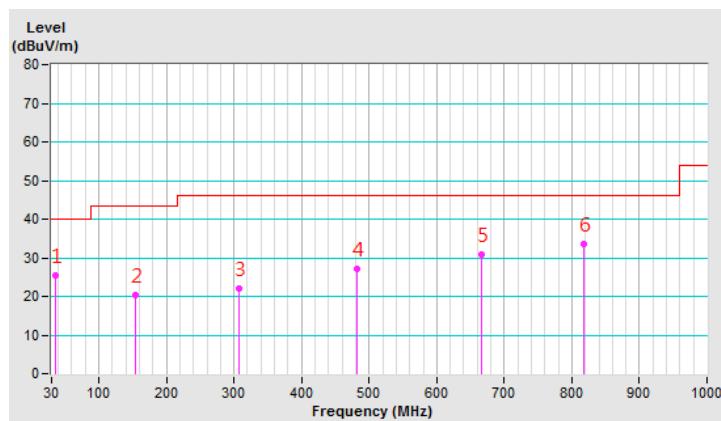
4.6.2 其它不必要之訊號

操作模式：	發射接收	調變技術：	BT_GFSK
基本波頻率：	CH 78：2480 MHz	測試儀器：	(QP) RB=120kHz
量測場地溫度：	22°C	量測場地濕度：	78%RH
測試日期：	109 年 1 月 18 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	36.01	25.58 QP	40.00	-14.42	1.23 H	0	34.01	-8.43
2	153.68	20.38 QP	43.50	-23.12	2.45 H	162	26.98	-6.60
3	307.81	22.09 QP	46.00	-23.91	2.10 H	305	26.74	-4.65
4	481.58	27.10 QP	46.00	-18.90	3.28 H	204	28.08	-0.98
5	666.32	30.94 QP	46.00	-15.06	2.30 H	84	28.06	2.88
6	817.83	33.62 QP	46.00	-12.38	1.00 H	128	27.83	5.79

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 of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

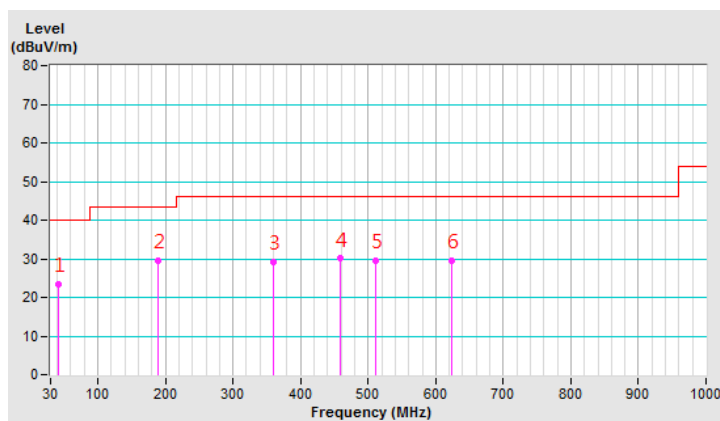


操作模式：	發射接收	調變技術：	BT_GFSK
基本波頻率：	CH 78：2480 MHz	測試儀器：	(QP) RB=120kHz
量測場地溫度：	22°C	量測場地濕度：	78%RH
測試日期：	109 年 1 月 18 日	測試者：	吳宗霖

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	40.91	23.48 QP	40.00	-16.52	2.57 V	360	31.03	-7.55
2	189.37	29.53 QP	43.50	-13.97	3.54 V	360	38.63	-9.10
3	359.46	29.28 QP	46.00	-16.72	3.64 V	360	33.13	-3.85
4	458.45	30.03 QP	46.00	-15.97	2.22 V	360	31.29	-1.26
5	511.80	29.48 QP	46.00	-16.52	1.25 V	360	29.86	-0.38
6	623.74	29.53 QP	46.00	-16.47	1.00 V	37	27.09	2.44

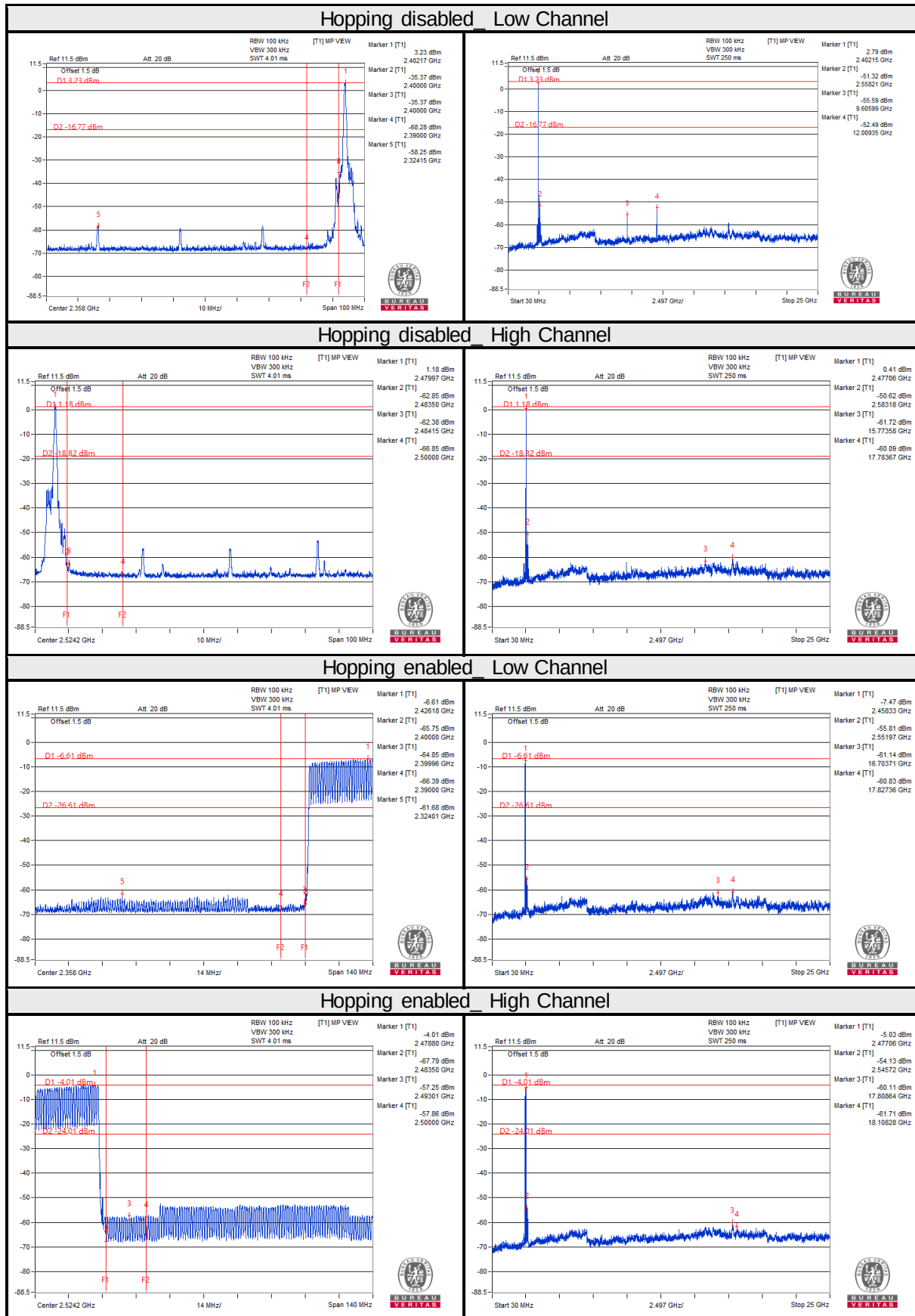
REMARKS:

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 of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



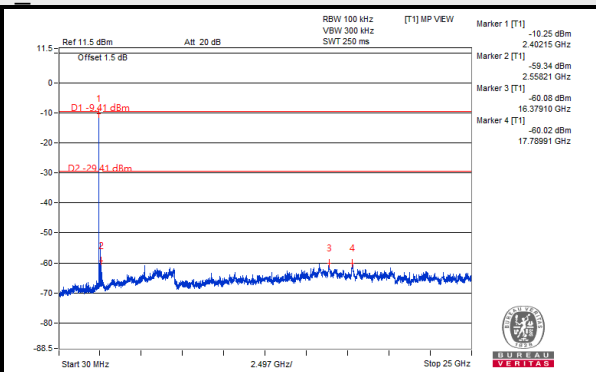
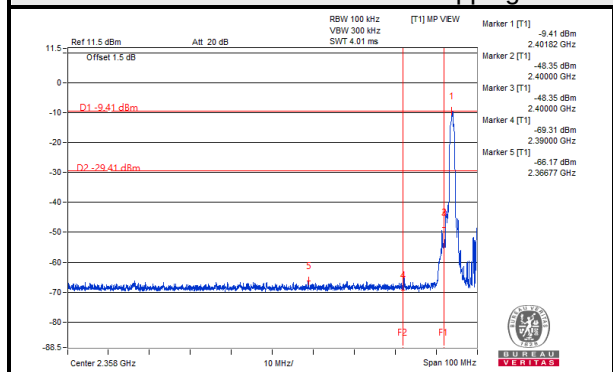
4.7 帶外發射之量測(傳導)

GFSK

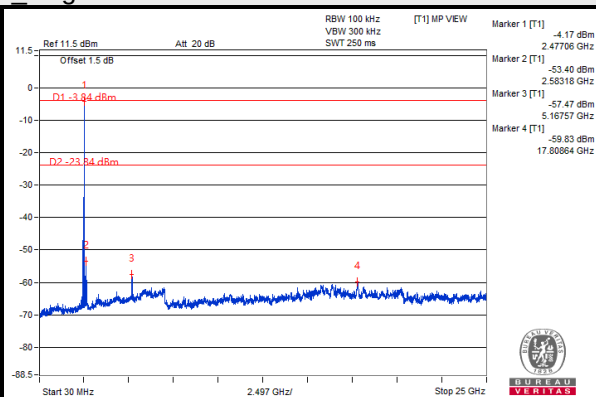
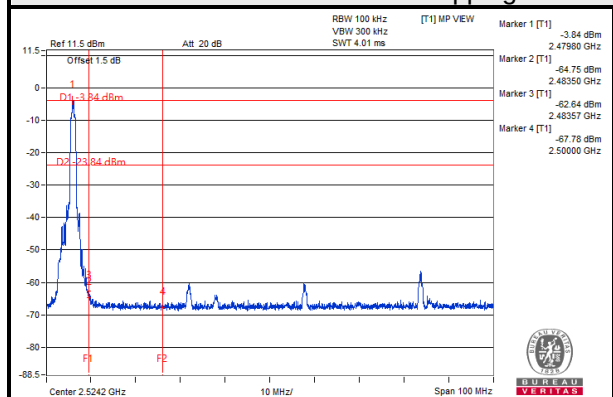


8DPSK

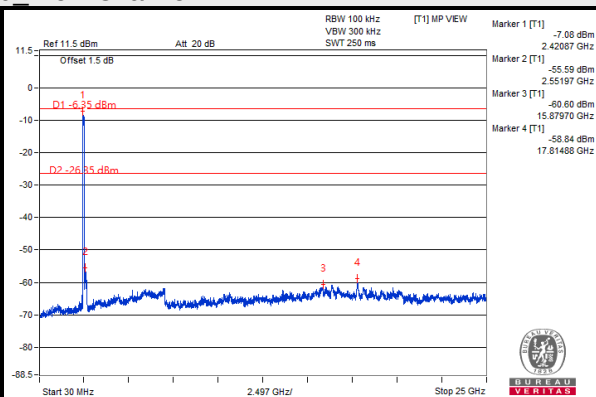
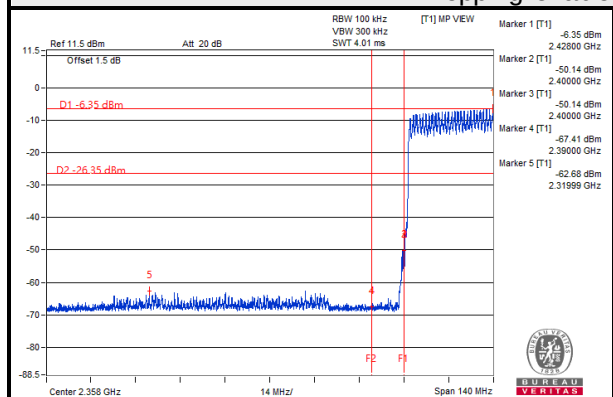
Hopping disabled Low Channel



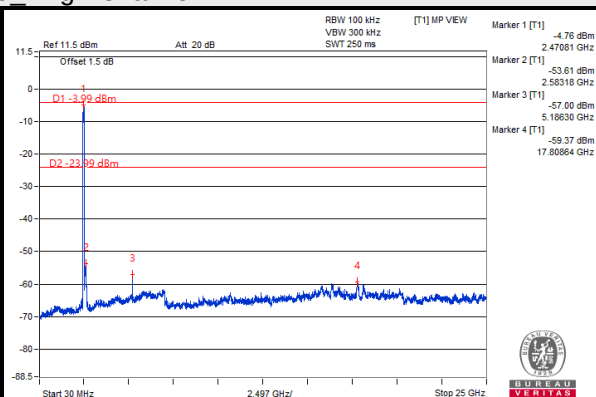
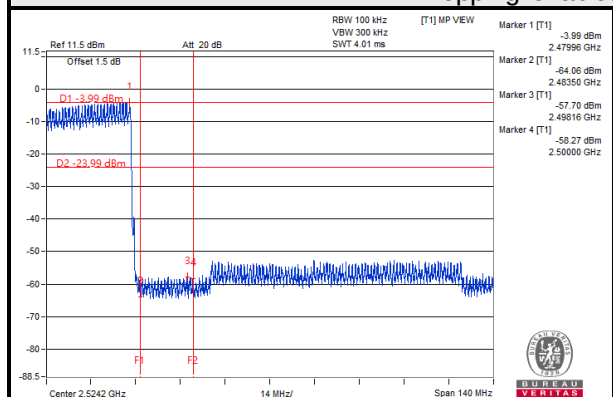
Hopping disabled High Channel



Hopping enabled Low Channel



Hopping enabled High Channel



4.8 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。

4.9 配置照片

請參閱附件(測試設置照片)

5 電源線傳導干擾之量測

N/A

6 20 dB 頻寬之量測

6.1 適用標準

請見本報告 3.1 節第 7 項的規定。

6.2 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 20dB 的最大頻率範圍。

6.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 23, 2019	Sep. 22, 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 $\pm 2.63\text{dB}$, 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



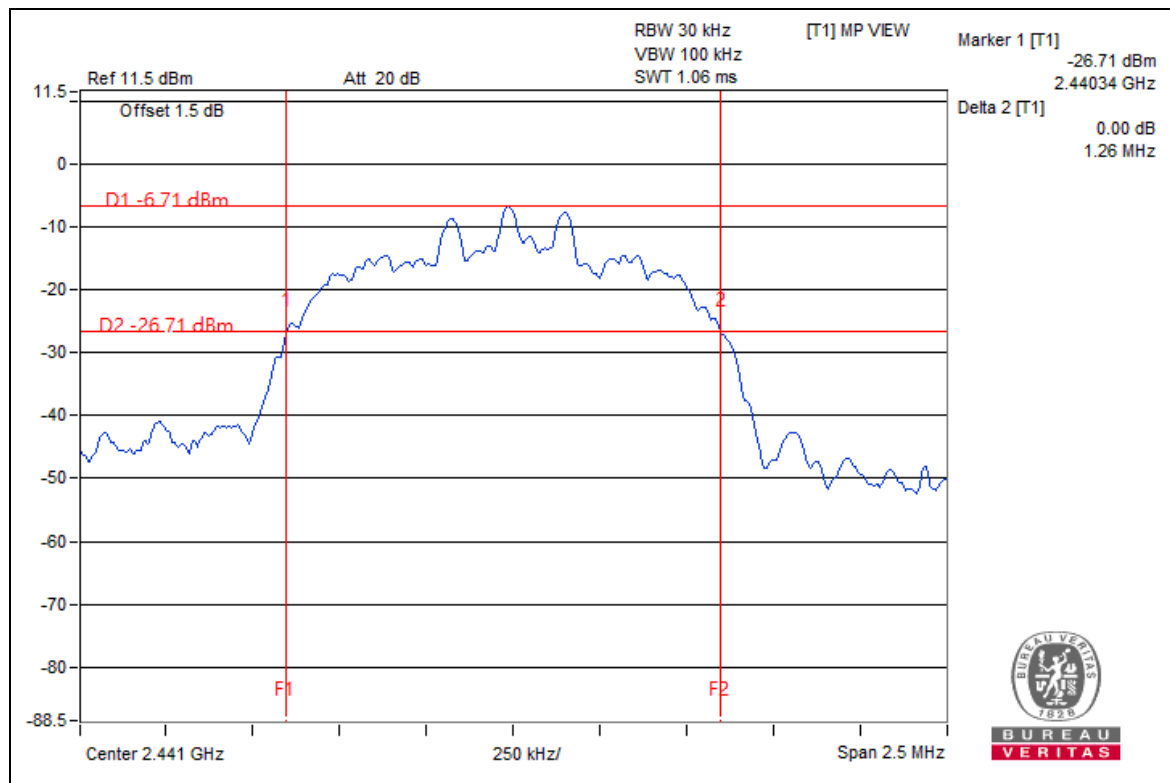
6.5 量測結果

操作模式	發射	測試日期	109 年 2 月 2 日
量測場地溫度	25°C	量測場地濕度	76%RH
測試者	李澤洋		

Channel	Channel Frequency (MHz)	20 dB Bandwidth (MHz)		>= 25kHz
		GFSK	8DPSK	
0	2402	0.94	1.25	YES
39	2441	0.95	1.26	YES
78	2480	0.95	1.26	YES

註：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。

**此測試圖僅放測試結果最差的頻道。



6.6 量測結果判定

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

7 峰值傳導輸出功率之量測

7.1 適用標準

請見本報告 3.1 節第 5 項的規定。

7.2 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。
- 計算其峰值傳導輸出功率。

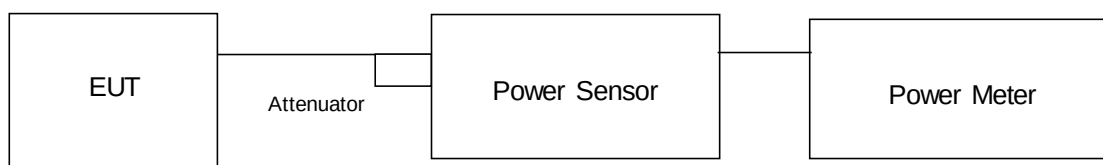
7.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Anritsu Power Sensor	MA2411B	0738404	Apr. 16, 2019	Apr. 15, 2020
Anritsu Power Meter	ML2495A	0842014	Apr. 16, 2019	Apr. 15, 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 $\pm 2.63\text{dB}$, 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 65MHz greater than 6dB bandwidth of emission.

7.4 測試配置



7.5 量測結果

操作模式	發射	測試日期	109 年 2 月 2 日
量測場地溫度	25°C	量測場地濕度	76%RH
測試者	李澤洋		

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)		Peak Power Limit (dBm)	Pass/Fail
		GFSK	8DPSK		
0	2402	-2.92	-5.05	20.45	Pass
39	2441	-0.08	-2.74	20.45	Pass
78	2480	1.80	-1.33	20.45	Pass

NOTE: Antenna gain = 6.55dBi > 6dBi, so the limit shall be reduced to $21 - (6.55 - 6) = 20.45\text{dBm}$.

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。

8 跳頻頻道數之量測

8.1 適用標準

請見本報告 3.1 節第 6 項的規定。

8.2 量測方法

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

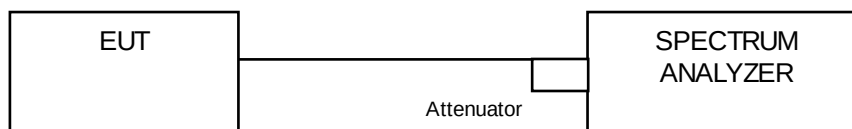
8.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 23, 2019	Sep. 22, 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 $\pm 2.63\text{dB}$, 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 $k=2$.

8.4 測試配置



8.5 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。



8.6 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。

9 跳頻頻道間隔之量測

9.1 適用標準

請見本報告 3.1 節第 7 項規定。

9.2 量測方法

- 將待測物輸出接到頻譜分析儀上。
- 設定待測物處於連續發射狀態。
- 設定 RBW= 300 kHz, VBW=300 kHz，量測相鄰兩個頻道間的時間。

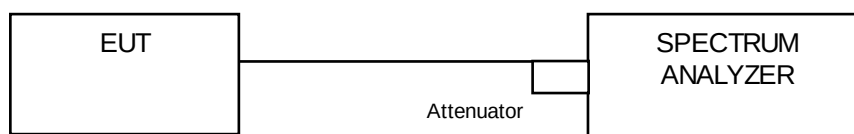
9.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 23, 2019	Sep. 22, 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 $\pm 2.63\text{dB}$, 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 $k=2$.

9.4 測試配置



9.5 量測結果

操作模式	發射	測試日期	109 年 2 月 2 日
量測場地溫度	25°C	量測場地濕度	76%RH
測試者	李澤洋		

GFSK

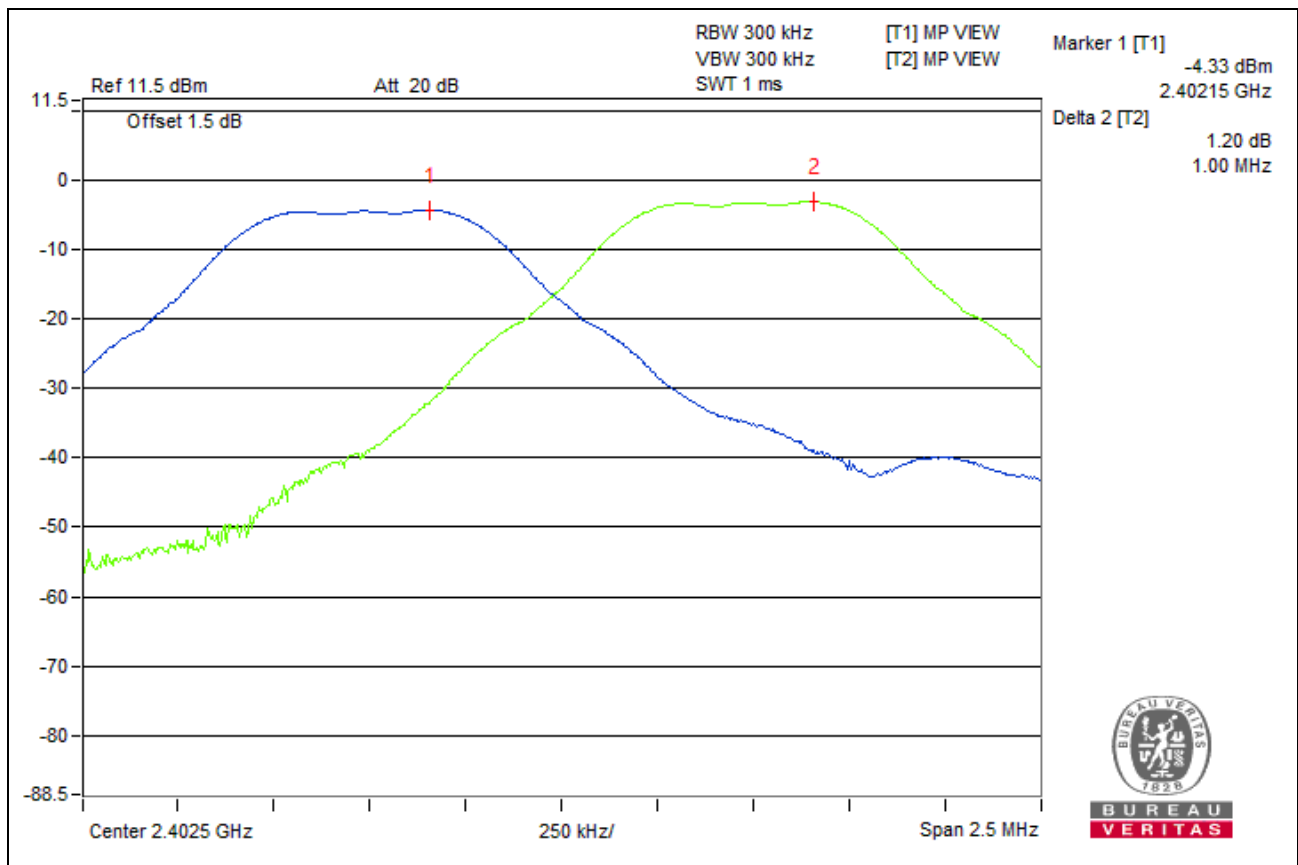
Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.00	0.94	0.63	PASS
39	2441	1.00	0.95	0.64	PASS
78	2480	1.00	0.95	0.64	PASS

8DPSK

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	20dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	1.00	1.25	0.84	PASS
39	2441	1.00	1.26	0.84	PASS
78	2480	1.00	1.26	0.84	PASS

Note: 本項測試的 limit 為至少為三分之二 20dB 頻寬。

**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，符合低功率射頻電機技術規範之要求。

10 每一頻道停留時間之量測

10.1 適用標準

請見本報告 3.1 節第 8 項的規定。

10.2 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= 100kHz, VBW=300kHz, 量測在不同傳輸模式下的頻道停留時間。

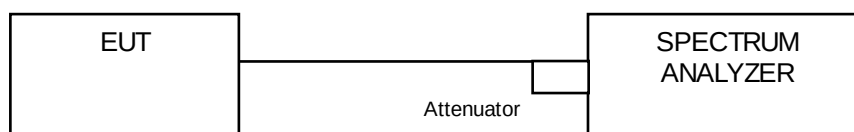
10.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 23, 2019	Sep. 22, 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 $\pm 2.63\text{dB}$, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

10.4 測試配置



10.5 量測結果

調變方式: GFSK

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) * 6.32 = 316.00 times	0.444	140.3	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.78	281.2	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	2.99	321.2	400

註：因為 Bluetooth 每秒跳 1600 次，會平均落在每個頻道，所以僅測試 Ch39 作為代表。

其掃描圖請參閱下圖

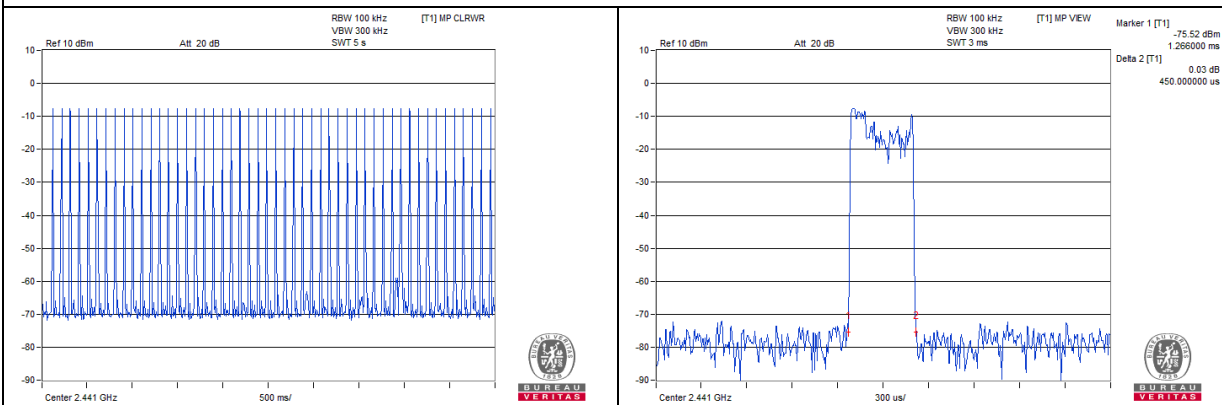


調變方式: 8DPSK

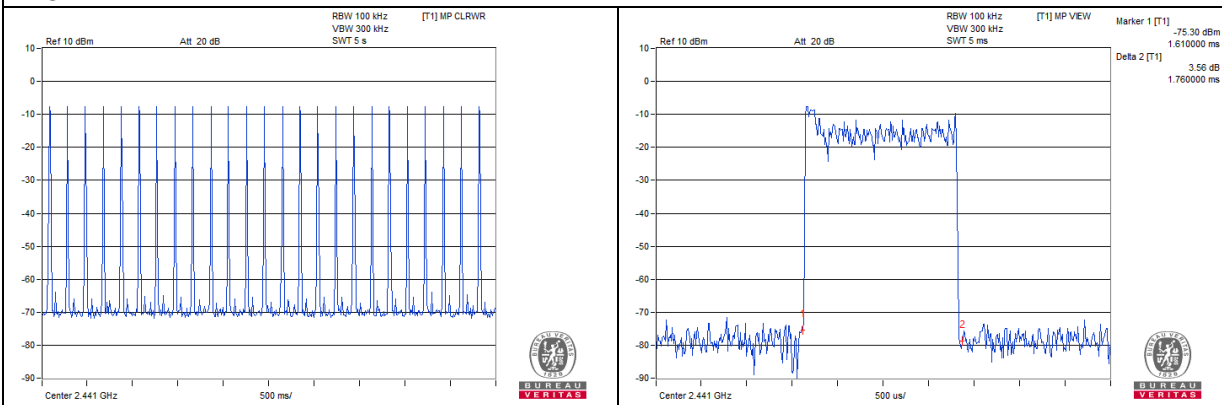
Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
DH1	50 (times / 5 sec) * 6.32 = 316.00 times	0.45	142.2	400
DH3	25 (times / 5 sec) * 6.32 = 158.00 times	1.76	278.1	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	3	322.3	400

註：因為 Bluetooth 每秒跳 1600 次，會平均落在每個頻道，所以僅測試 Ch39 作為代表。
其掃描圖請參閱下圖

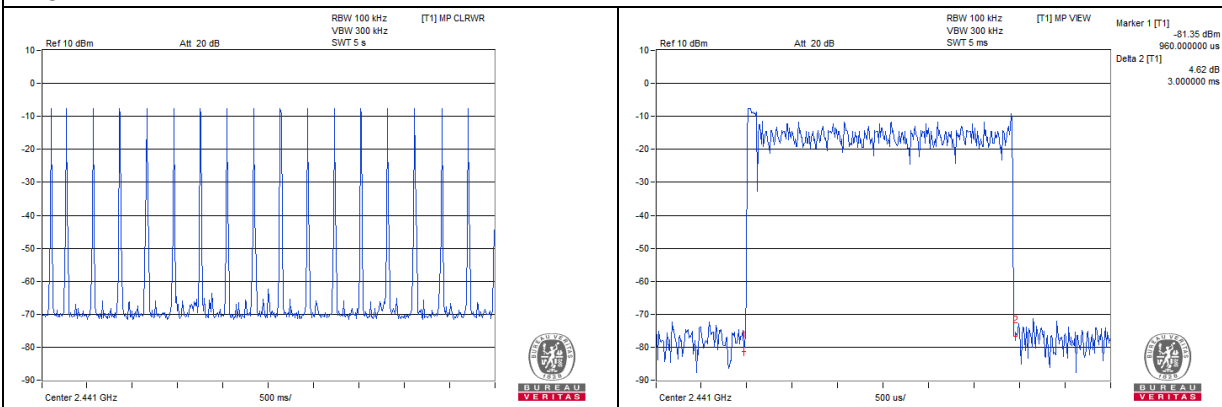
DH1



DH3



DH5



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 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

您也可以我們的網站內找到各實驗室的地圖。

---END---