

低功率射頻電機技術規範測試報告

報告編號	RT180312C08
申請者	Sennheiser electronic GmbH & Co. KG
產品名稱	Bluetooth Audio Transmitter
型號	BT T100
製造廠商	Sennheiser electronic GmbH & Co. KG / Germany
商標或廠牌	SENNHEISER
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 107 年 06 月 11 日

報告簽署人簽章:

陳志偉



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報告發行紀錄

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證 明 書

發行日期：107 年 06 月 11 日

產 品 名 稱：Bluetooth Audio Transmitter
商 標：SENNHEISER
型 號：BT T100
申 請 者：Sennheiser electronic GmbH & Co. KG
量 測 規 範：低功率射頻電機技術規範 LP0002
ANSI C63.10-2013

香港商立德國際商品試驗有限公司桃園分公司在此證明上述待測設備樣品一組(型號：BT T100)，收件日期 107 年 03 月 31 日，於 107 年 04 月 25 日至 107 年 06 月 08 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：



留品葳 / 專員

， 日 期：

107 年 06 月 11 日

審 核 者：



陳志偉 / 專案工程師

， 日 期：

107 年 06 月 11 日

香港商立德國際商品試驗有限公司桃園分公司

實驗室地址：新北市林口區嘉寶里 14 鄰 47-2 號

此份報告不得摘錄複製，除全份
複製外，需經實驗室書面同意。



1 低功率射頻電機量測記錄表

申請廠商: Sennheiser electronic GmbH & Co. KG

製造廠商: Sennheiser electronic GmbH & Co. KG / Germany

申請廠商地址: Am Labor 1 D-30900 Wedemark, Germany

廠牌: SENNHEISER

產品名稱: Bluetooth Audio Transmitter

型號: BT T100

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 (9kHz~40GHz)

量測規範: 低功率射頻電機技術規範 LP0002

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

Note: 此頻寬測試值為跳頻頻道間隔之量測參考值。

2 一般敘述

2.1 待測設備

產品名稱：	Bluetooth Audio Transmitter
型號：	BT T100
額定電源：	5Vdc (from USB interface)
調變方式：	GFSK, $\pi/4$ -DQPSK, 8DPSK
傳輸速率：	1Mbps (BDR) & 2Mbps/3Mbps (EDR)
載波頻率：	2402~2480MHz
頻道數：	79
發射功率(電場強度)：	2.99dBm
天線種類：	PIFA antenna with +3.73dBi gain (見註 1)
電源線類別：	NA
信號線類別：	1.2m shielded USB cable 1.5m shielded audio cable 1.5m non-shielded optical cable
配件：	NA

註1: 待測設備搭配使用以下天線。

Brand	S/N	Antenna Type	Connector	Gain (dBi)		
				2400MHz	2445MHz	2485MHz
SAGE	DESIGN00001	PIFA	NA	3.73	3.59	3.12

註2: 待測設備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
2402~2480MHz (Bluetooth EDR)			
場強輻射	1GHz 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	
電源線傳導干擾		GFSK: Ch 0	

註3: 此報告中傳輸模式，場強輻射1G以下量測和電源線傳導干擾，以GFSK調變技術具有較大干擾值，其餘測項皆以GFSK調變和8DPSK調變分別進行測試。

註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，故僅以此傳輸模式進行最終量測。

註5: 待測設備經評估三個正交軸方位評估測試擺設方式：平躺、側放、垂直，其中以側放擺放擁有最大干擾值，故以此進行最終量測並記錄於報告中。

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)	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 CPS 報告編號 180312C08_EUT Photo。

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。

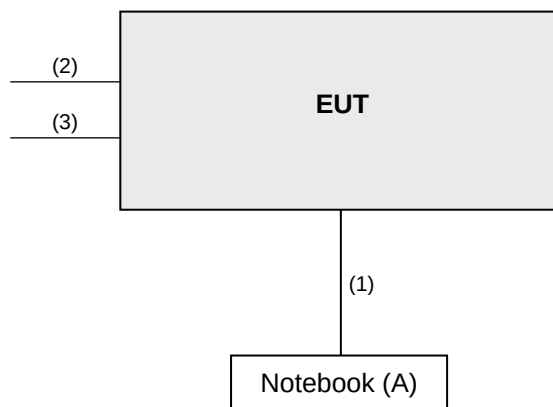
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5420	BPQ7MQ1	NA	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	1.2	Y	0	Accessory
2.	Audio cable	1	1.5	Y	0	Accessory
3.	Optical cable	1	1.5	N	0	Accessory

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：

(a) 至少使用 75 個跳頻頻道之跳頻系統：1 W(含)以下。

(b) 除(a)外，依 3.10.1.6 (1)(A)(a)之跳頻系統：0.125 W(含)以下。

(c) 數位調變技術系統：1 W(含) 以下。

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

(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。

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

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 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

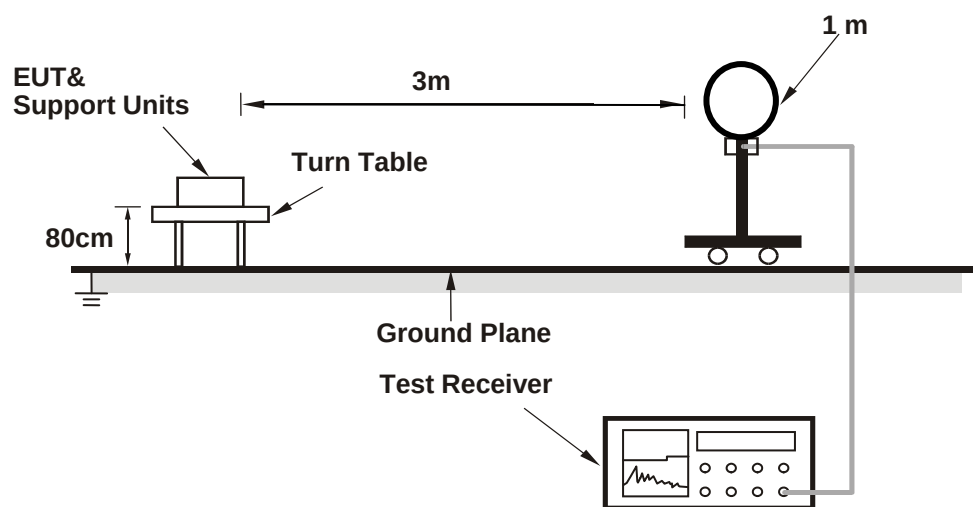
Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 17, 2017	Oct. 16, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Dec. 12, 2017	Dec. 11, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Dec. 11, 2017	Dec. 10, 2018
HORN Antenna SCHWARZBECK	9120D	209	Dec. 13, 2017	Dec. 12, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 01, 2017	Nov. 30, 2018
Loop Antenna EMCI	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 21, 2017	Aug. 20, 2018
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Apr. 03, 2018	Apr. 02, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 21, 2017	Aug. 20, 2018
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM-SM- 8000	Cable-CH3-03 (309224+170907)	Sep.11, 2017	Sep. 10, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
5. The IC Site Registration No. is IC 7450F-3.
6. The following table is for the measurement uncertainty, which is calculated as per the document CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

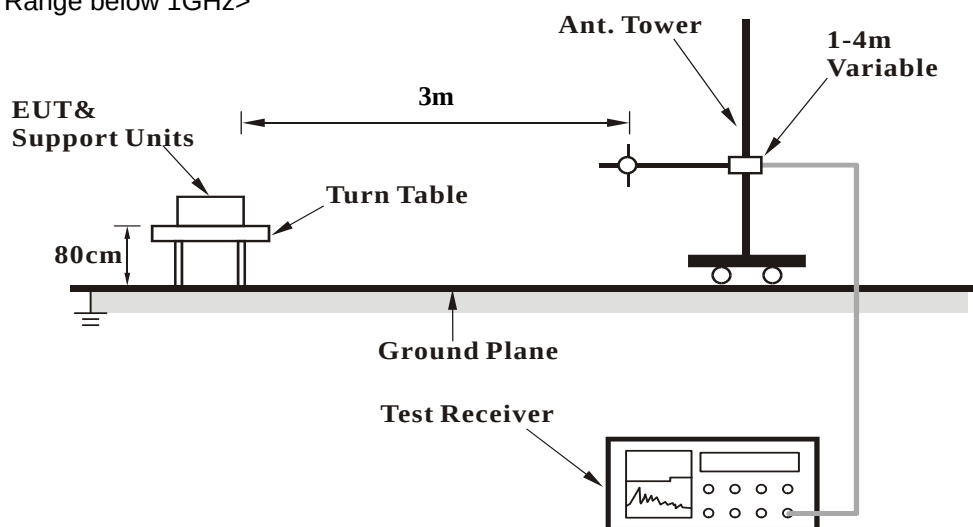
Measurement	Frequency	Uncertainty
Radiated emissions	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB
	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

4.4 測試配置

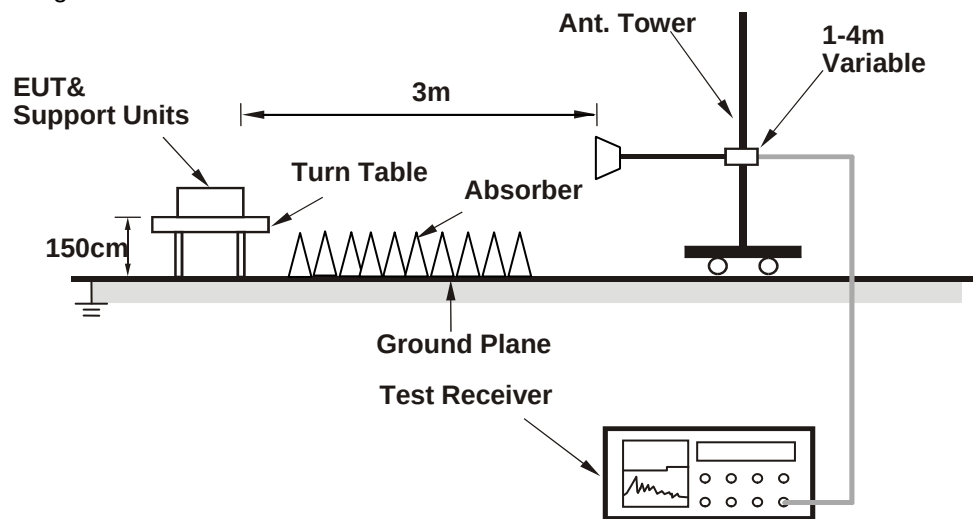
<Frequency Range below 30MHz>



<Frequency Range below 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 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

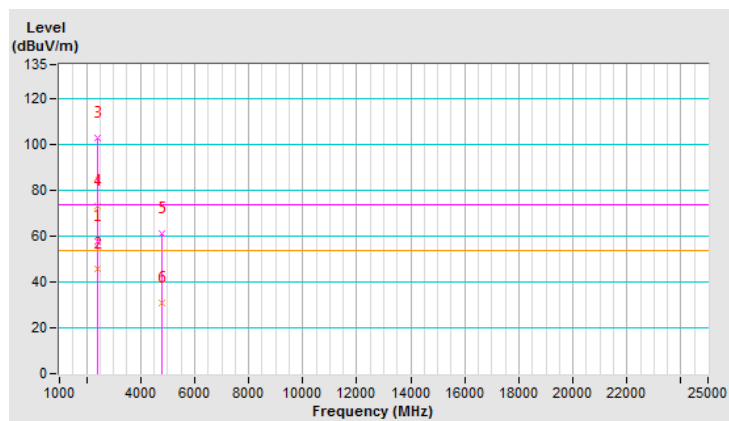
GFSK

操作模式：	發射	調變技術：	GFSK
基本波頻率：	CH 0 : 2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	58.0 PK	74.0	-16.0	1.83 H	196	24.5	33.5
2	2390.00	45.9 AV	54.0	-8.1	1.83 H	196	12.4	33.5
3	*2402.00	103.1 PK			1.71 H	204	69.7	33.4
4	*2402.00	73.0 AV			1.71 H	204	39.6	33.4
5	4804.00	61.0 PK	74.0	-13.0	2.54 H	184	57.1	3.9
6	4804.00	30.9 AV	54.0	-23.1	2.54 H	184	27.0	3.9
	7206.00	-	-	-	-	-	-	-
	9608.00	-	-	-	-	-	-	-
	12010.00	-	-	-	-	-	-	-
	14412.00	-	-	-	-	-	-	-
	16814.00	-	-	-	-	-	-	-
	19216.00	-	-	-	-	-	-	-
	21618.00	-	-	-	-	-	-	-
	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. “*” : Fundamental Frequency (主頻)
5. “-” : The emission levels were too low to be detected.
6. The other emission levels were very low against the limit.
7. “#” : The radiated frequency is out of the restricted band.
8. The blank is not available, the limit of fundamental frequency was restricted at the peak output power (see LP0002 3.10.1.2)
9. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: $20\log(3.125/100) = -30.1 \text{ dB}$
10. Average value = peak reading + $20\log(\text{duty cycle})$



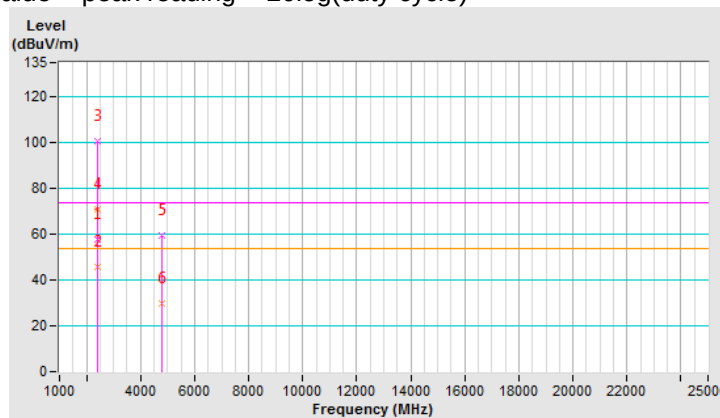
操作模式：	發射	調變技術：	GFSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	57.9 PK	74.0	-16.1	1.88 V	172	24.4	33.5
2	2390.00	45.7 AV	54.0	-8.3	1.88 V	172	12.2	33.5
3	*2402.00	100.9 PK			2.09 V	112	67.5	33.4
4	*2402.00	70.8 AV			2.09 V	112	37.4	33.4
5	4804.00	59.7 PK	74.0	-14.3	1.71 V	359	55.8	3.9
6	4804.00	29.6 AV	54.0	-24.4	1.71 V	359	25.7	3.9
	7206.00	-	-	-	-	-	-	-
	9608.00	-	-	-	-	-	-	-
	12010.00	-	-	-	-	-	-	-
	14412.00	-	-	-	-	-	-	-
	16814.00	-	-	-	-	-	-	-
	19216.00	-	-	-	-	-	-	-
	21618.00	-	-	-	-	-	-	-
	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. “*” : Fundamental Frequency (主頻)
5. “-” : The emission levels were too low to be detected.
6. The other emission levels were very low against the limit.
7. “#” : The radiated frequency is out of the restricted band.
8. The blank is not available, the limit of fundamental frequency was restricted at the peak output power (see LP0002 3.10.1.2)
9. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: $20\log(3.125/100) = -30.1$ dB
10. Average value = peak reading + $20\log(\text{duty cycle})$

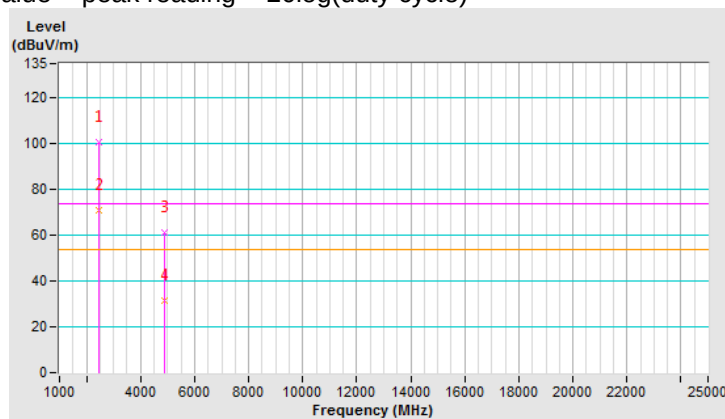


操作模式：	發射	調變技術：	GFSK
基本波頻率：	CH 39：2441 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	100.8 PK			1.03 H	155	67.4	33.4
2	*2441.00	70.7 AV			1.03 H	155	37.3	33.4
3	4882.00	61.3 PK	74.0	-12.7	1.34 H	190	57.7	3.6
4	4882.00	31.2 AV	54.0	-22.8	1.34 H	190	27.6	3.6
	7323.00	-	-	-	-	-	-	-
	9764.00	-	-	-	-	-	-	-
	12205.00	-	-	-	-	-	-	-
	14646.00	-	-	-	-	-	-	-
	17087.00	-	-	-	-	-	-	-
	19528.00	-	-	-	-	-	-	-
	21969.00	-	-	-	-	-	-	-
	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. “*” : Fundamental Frequency (主頻)
5. “-” : The emission levels were too low to be detected.
6. The other emission levels were very low against the limit.
7. “#” : The radiated frequency is out of the restricted band.
8. The blank is not available, the limit of fundamental frequency was restricted at the peak output power (see LP0002 3.10.1.2)
9. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: $20\log(3.125/100) = -30.1$ dB
10. Average value = peak reading + $20\log(\text{duty cycle})$

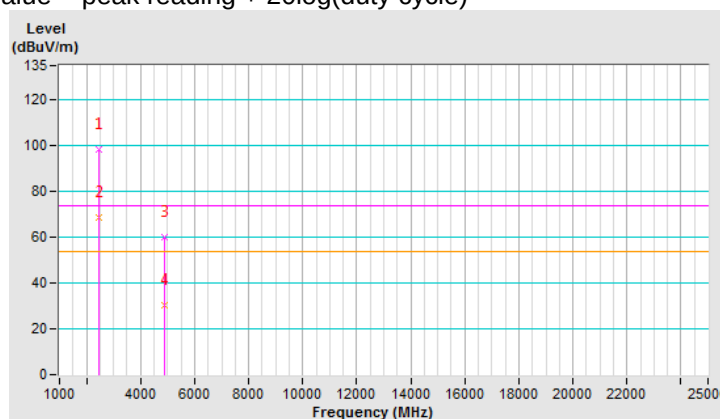


操作模式：	發射	調變技術：	GFSK
基本波頻率：	CH 39 : 2441 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	98.6 PK			1.55 V	136	65.2	33.4
2	*2441.00	68.5 AV			1.55 V	136	35.1	33.4
3	4882.00	60.3 PK	74.0	-13.7	2.36 V	296	56.7	3.6
4	4882.00	30.2 AV	54.0	-23.8	2.36 V	296	26.6	3.6
	7323.00	-	-	-	-	-	-	-
	9764.00	-	-	-	-	-	-	-
	12205.00	-	-	-	-	-	-	-
	14646.00	-	-	-	-	-	-	-
	17087.00	-	-	-	-	-	-	-
	19528.00	-	-	-	-	-	-	-
	21969.00	-	-	-	-	-	-	-
	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. “ * “ : Fundamental Frequency (主頻)
5. “ - “ : The emission levels were too low to be detected.
6. The other emission levels were very low against the limit.
7. “ # “ : The radiated frequency is out of the restricted band.
8. The blank is not available, the limit of fundamental frequency was restricted at the peak output power (see LP0002 3.10.1.2)
9. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: $20\log(3.125/100) = -30.1$ dB
10. Average value = peak reading + $20\log(\text{duty cycle})$

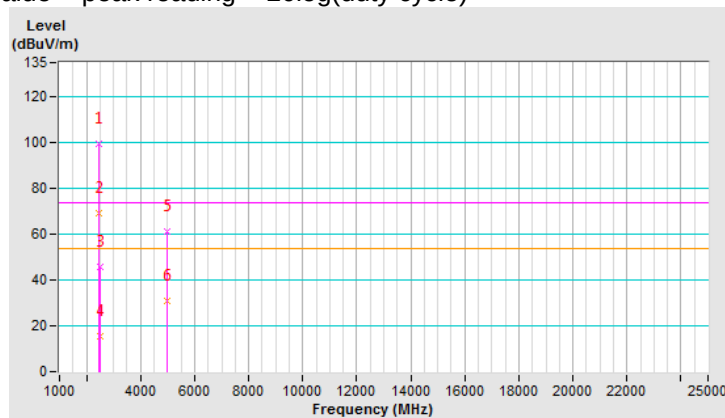


操作模式：	發射	調變技術：	GFSK
基本波頻率：	CH 78：2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	99.5 PK			2.39 H	189	66.3	33.2
2	*2480.00	69.4 AV			2.39 H	189	36.2	33.2
3	2483.50	45.8 PK	74.0	-28.2	2.40 H	189	48.8	-3.0
4	2483.50	15.7 AV	54.0	-38.3	2.40 H	189	18.7	-3.0
5	4960.00	61.0 PK	74.0	-13.0	2.49 H	185	57.3	3.7
6	4960.00	30.9 AV	54.0	-23.1	2.49 H	185	27.2	3.7
	7440.00	-	-	-	-	-	-	-
	9920.00	-	-	-	-	-	-	-
	12400.00	-	-	-	-	-	-	-
	14880.00	-	-	-	-	-	-	-
	17360.00	-	-	-	-	-	-	-
	19840.00	-	-	-	-	-	-	-
	22320.00	-	-	-	-	-	-	-
	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. “*” : Fundamental Frequency (主頻)
5. “-” : The emission levels were too low to be detected.
6. The other emission levels were very low against the limit.
7. “#” : The radiated frequency is out of the restricted band.
8. The blank is not available, the limit of fundamental frequency was restricted at the peak output power (see LP0002 3.10.1.2)
9. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: $20\log(3.125/100) = -30.1 \text{ dB}$
10. Average value = peak reading + $20\log(\text{duty cycle})$

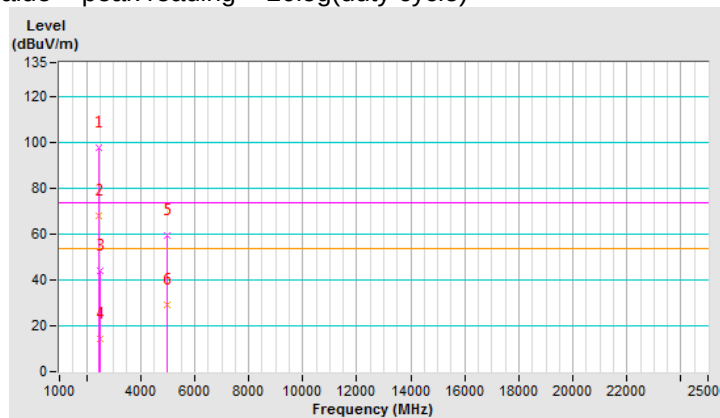


操作模式：	發射	調變技術：	GFSK
基本波頻率：	CH 78 : 2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	98.0 PK			1.76 V	151	64.8	33.2
2	*2480.00	67.9 AV			1.76 V	151	34.7	33.2
3	2483.50	44.2 PK	74.0	-29.8	1.67 V	153	47.2	-3.0
4	2483.50	14.2 AV	54.0	-39.8	1.67 V	153	17.2	-3.0
5	4960.00	59.3 PK	74.0	-14.7	1.69 V	344	55.6	3.7
6	4960.00	29.2 AV	54.0	-24.8	1.69 V	344	25.5	3.7
	7440.00	-	-	-	-	-	-	-
	9920.00	-	-	-	-	-	-	-
	12400.00	-	-	-	-	-	-	-
	14880.00	-	-	-	-	-	-	-
	17360.00	-	-	-	-	-	-	-
	19840.00	-	-	-	-	-	-	-
	22320.00	-	-	-	-	-	-	-
	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. “ * ” : Fundamental Frequency (主頻)
5. “ - ” : The emission levels were too low to be detected.
6. The other emission levels were very low against the limit.
7. “ # ” : The radiated frequency is out of the restricted band.
8. The blank is not available, the limit of fundamental frequency was restricted at the peak output power (see LP0002 3.10.1.2)
9. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: $20\log(3.125/100) = -30.1 \text{ dB}$
10. Average value = peak reading + $20\log(\text{duty cycle})$



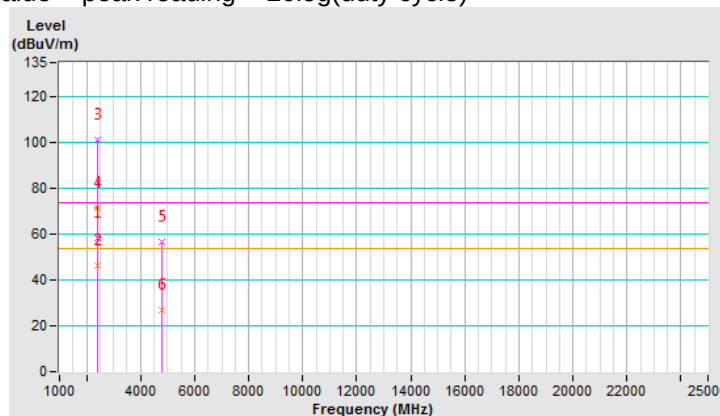
8DPSK

操作模式：	發射	調變技術：	8DPSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	58.2 PK	74.0	-15.8	2.33 H	172	24.7	33.5
2	2390.00	46.1 AV	54.0	-7.9	2.33 H	172	12.6	33.5
3	*2402.00	101.5 PK			2.50 H	155	68.1	33.4
4	*2402.00	71.4 AV			2.50 H	155	38.0	33.4
5	4804.00	56.7 PK	74.0	-17.3	1.38 H	189	52.8	3.9
6	4804.00	26.6 AV	54.0	-27.4	1.38 H	189	22.7	3.9
	7206.00	-	-	-	-	-	-	-
	9608.00	-	-	-	-	-	-	-
	12010.00	-	-	-	-	-	-	-
	14412.00	-	-	-	-	-	-	-
	16814.00	-	-	-	-	-	-	-
	19216.00	-	-	-	-	-	-	-
	21618.00	-	-	-	-	-	-	-
	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. “*” : Fundamental Frequency (主頻)
5. “-” : The emission levels were too low to be detected.
6. The other emission levels were very low against the limit.
7. “#” : The radiated frequency is out of the restricted band.
8. The blank is not available, the limit of fundamental frequency was restricted at the peak output power (see LP0002 3.10.1.2)
9. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: $20\log(3.125/100) = -30.1 \text{ dB}$
10. Average value = peak reading + $20\log(\text{duty cycle})$



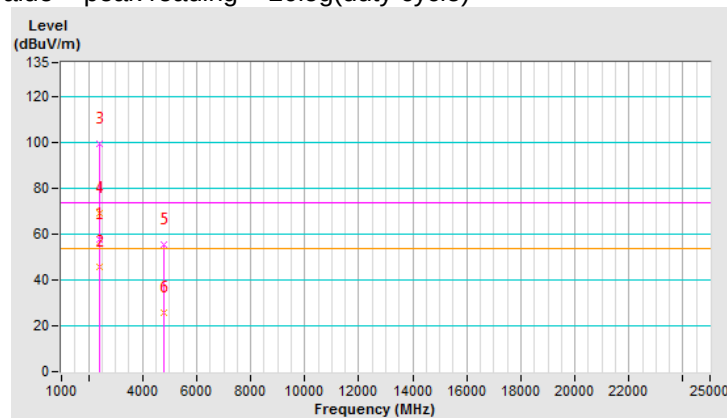
操作模式：	發射	調變技術：	8DPSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	57.7 PK	74.0	-16.3	1.68 V	201	24.2	33.5
2	2390.00	45.9 AV	54.0	-8.1	1.68 V	201	12.4	33.5
3	*2402.00	99.4 PK			1.72 V	259	66.0	33.4
4	*2402.00	69.3 AV			1.72 V	259	35.9	33.4
5	4804.00	55.6 PK	74.0	-18.4	1.68 V	2	51.7	3.9
6	4804.00	25.5 AV	54.0	-28.5	1.68 V	2	21.6	3.9
	7206.00	-	-	-	-	-	-	-
	9608.00	-	-	-	-	-	-	-
	12010.00	-	-	-	-	-	-	-
	14412.00	-	-	-	-	-	-	-
	16814.00	-	-	-	-	-	-	-
	19216.00	-	-	-	-	-	-	-
	21618.00	-	-	-	-	-	-	-
	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. “*” : Fundamental Frequency (主頻)
5. “-” : The emission levels were too low to be detected.
6. The other emission levels were very low against the limit.
7. “#” : The radiated frequency is out of the restricted band.
8. The blank is not available, the limit of fundamental frequency was restricted at the peak output power (see LP0002 3.10.1.2)
9. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: $20\log(3.125/100) = -30.1$ dB
10. Average value = peak reading + $20\log(\text{duty cycle})$

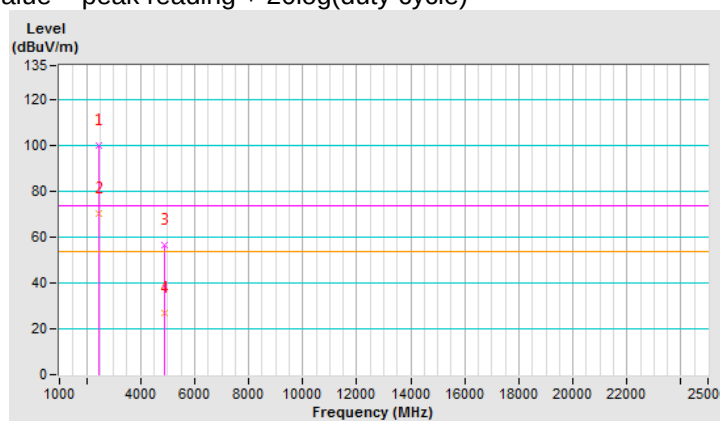


操作模式：	發射	調變技術：	8DPSK
基本波頻率：	CH 39：2441 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	100.3 PK			1.03 H	155	66.9	33.4
2	*2441.00	70.2 AV			1.03 H	155	36.8	33.4
3	4882.00	56.9 PK	74.0	-17.1	1.35 H	190	53.3	3.6
4	4882.00	26.8 AV	54.0	-27.2	1.35 H	190	23.2	3.6
	7323.00	-	-	-	-	-	-	-
	9764.00	-	-	-	-	-	-	-
	12205.00	-	-	-	-	-	-	-
	14646.00	-	-	-	-	-	-	-
	17087.00	-	-	-	-	-	-	-
	19528.00	-	-	-	-	-	-	-
	21969.00	-	-	-	-	-	-	-
	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. “*”: Fundamental Frequency (主頻)
5. “-”: The emission levels were too low to be detected.
6. The other emission levels were very low against the limit.
7. “#”: The radiated frequency is out of the restricted band.
8. The blank is not available, the limit of fundamental frequency was restricted at the peak output power (see LP0002 3.10.1.2)
9. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: $20\log(3.125/100) = -30.1$ dB
10. Average value = peak reading + $20\log(\text{duty cycle})$



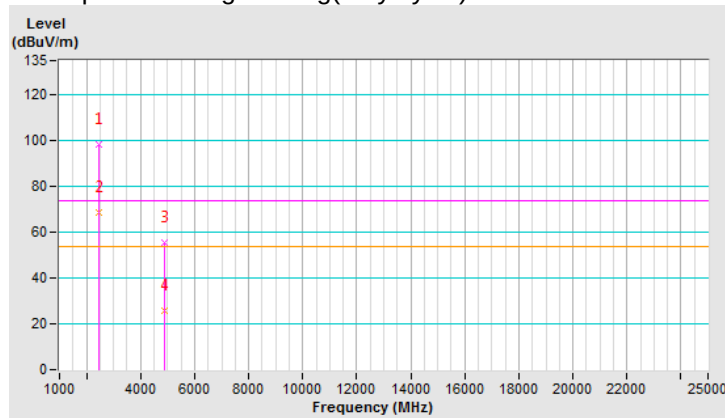
操作模式：	發射	調變技術：	8DPSK
基本波頻率：	CH 39：2441 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	98.5 PK			1.89 V	282	65.1	33.4
2	*2441.00	68.4 AV			1.89 V	282	35.0	33.4
3	4882.00	55.7 PK	74.0	-18.3	1.77 V	9	52.1	3.6
4	4882.00	25.6 AV	54.0	-28.4	1.77 V	9	22.0	3.6
	7323.00	-	-	-	-	-	-	-
	9764.00	-	-	-	-	-	-	-
	12205.00	-	-	-	-	-	-	-
	14646.00	-	-	-	-	-	-	-
	17087.00	-	-	-	-	-	-	-
	19528.00	-	-	-	-	-	-	-
	21969.00	-	-	-	-	-	-	-
	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. “*”: Fundamental Frequency (主頻)
5. “-”: The emission levels were too low to be detected.
6. The other emission levels were very low against the limit.
7. “#”: The radiated frequency is out of the restricted band.
8. The blank is not available, the limit of fundamental frequency was restricted at the peak output power (see LP0002 3.10.1.2)
9. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: $20\log(3.125/100) = -30.1$ dB
10. Average value = peak reading + $20\log(\text{duty cycle})$

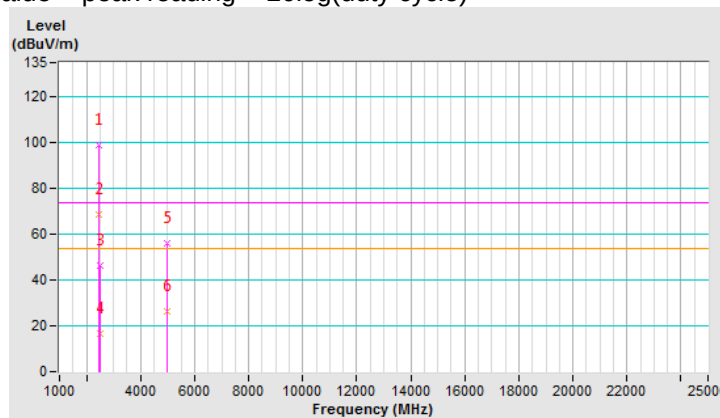


操作模式：	發射	調變技術：	8DPSK
基本波頻率：	CH 78：2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	98.8 PK			1.84 H	149	65.6	33.2
2	*2480.00	68.7 AV			1.84 H	149	35.5	33.2
3	2483.50	46.6 PK	74.0	-27.4	1.84 H	150	49.6	-3.0
4	2483.50	16.5 AV	54.0	-37.5	1.84 H	150	19.5	-3.0
5	4960.00	56.2 PK	74.0	-17.8	2.47 H	184	52.5	3.7
6	4960.00	26.1 AV	54.0	-27.9	2.47 H	184	22.4	3.7
	7440.00	-	-	-	-	-	-	-
	9920.00	-	-	-	-	-	-	-
	12400.00	-	-	-	-	-	-	-
	14880.00	-	-	-	-	-	-	-
	17360.00	-	-	-	-	-	-	-
	19840.00	-	-	-	-	-	-	-
	22320.00	-	-	-	-	-	-	-
	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. “*” : Fundamental Frequency (主頻)
5. “-” : The emission levels were too low to be detected.
6. The other emission levels were very low against the limit.
7. “#” : The radiated frequency is out of the restricted band.
8. The blank is not available, the limit of fundamental frequency was restricted at the peak output power (see LP0002 3.10.1.2)
9. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: $20\log(3.125/100) = -30.1$ dB
10. Average value = peak reading + $20\log(\text{duty cycle})$



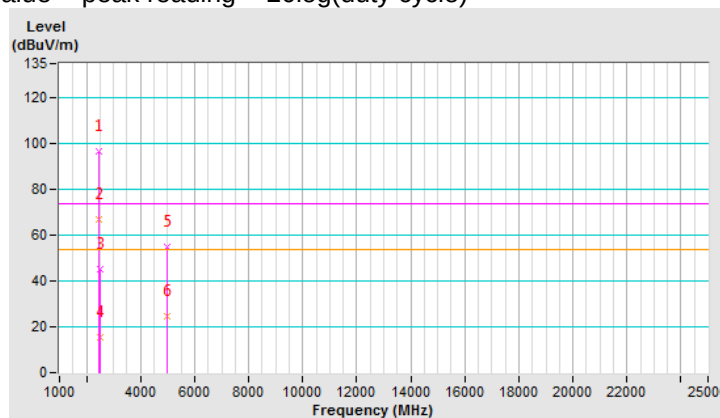
操作模式：	發射	調變技術：	8DPSK
基本波頻率：	CH 78：2480 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	96.9 PK			1.64 V	231	63.7	33.2
2	*2480.00	66.8 AV			1.64 V	231	33.6	33.2
3	2483.50	45.3 PK	74.0	-28.7	1.91 V	186	48.3	-3.0
4	2483.50	15.2 AV	54.0	-38.8	1.91 V	186	18.2	-3.0
5	4960.00	54.9 PK	74.0	-19.1	1.77 V	359	51.2	3.7
6	4960.00	24.8 AV	54.0	-29.2	1.77 V	359	21.1	3.7
	7440.00	-	-	-	-	-	-	-
	9920.00	-	-	-	-	-	-	-
	12400.00	-	-	-	-	-	-	-
	14880.00	-	-	-	-	-	-	-
	17360.00	-	-	-	-	-	-	-
	19840.00	-	-	-	-	-	-	-
	22320.00	-	-	-	-	-	-	-
	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. “*” : Fundamental Frequency (主頻)
5. “-” : The emission levels were too low to be detected.
6. The other emission levels were very low against the limit.
7. “#” : The radiated frequency is out of the restricted band.
8. The blank is not available, the limit of fundamental frequency was restricted at the peak output power (see LP0002 3.10.1.2)
9. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625*5 per 296.25 ms per channel. Therefore, the duty cycle correction factor be equal to: $20\log(3.125/100) = -30.1$ dB
10. Average value = peak reading + 20log(duty cycle)



4.6.2 接收諧波

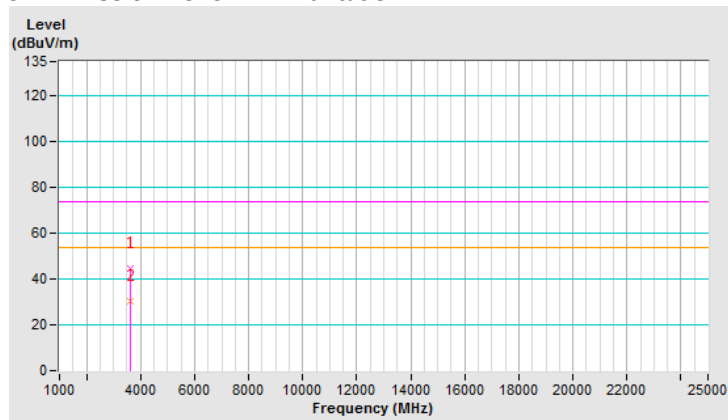
GFSK

操作模式：	接收	調變技術：	GFSK
基本波頻率：	CH 0 : 2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	3603.00	44.8 PK	74.0	-29.2	1.96 H	238	45.3	-0.5
2	3603.00	30.4 AV	54.0	-23.6	1.96 H	238	30.9	-0.5

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



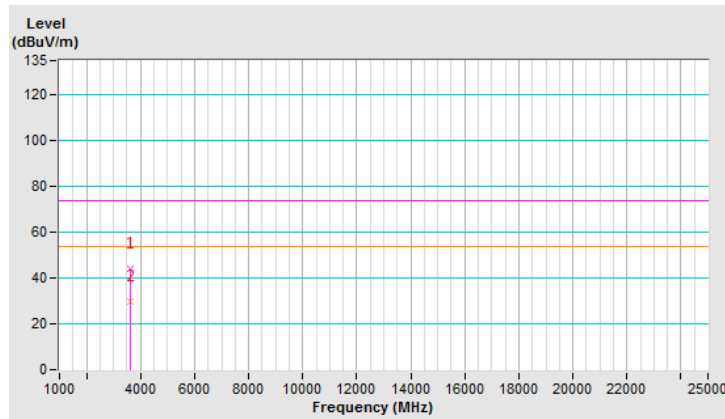
操作模式：	接收	調變技術：	GFSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(PK) RB=1MHz, VB=3MHz (AV) RB=1MHz, VB=1kHz
量測場地溫度：	25℃	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	3603.00	44.3 PK	74.0	-29.7	2.52 V	183	44.8	-0.5
2	3603.00	30.0 AV	54.0	-24.0	2.52 V	183	30.5	-0.5

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



4.6.3 其它不必要之訊號

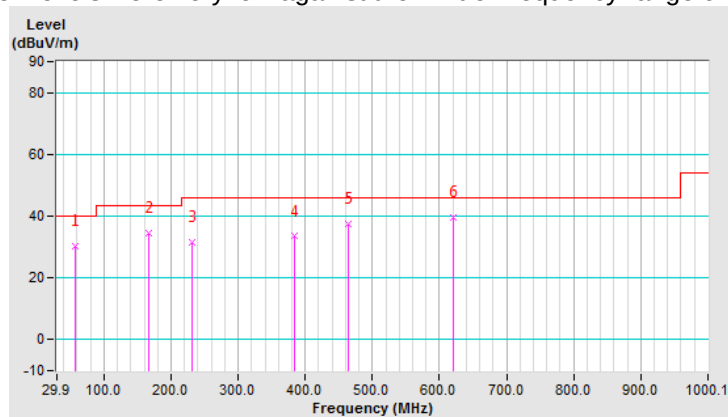
GFSK

操作模式：	發射/接收	調變技術：	GFSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(QP) RB=VB=120kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	57.12	30.1 QP	40.0	-9.9	2.00 H	317	39.6	-9.5
2	166.00	34.3 QP	43.5	-9.2	2.00 H	87	43.2	-8.9
3	232.11	31.6 QP	46.0	-14.4	1.01 H	69	42.2	-10.6
4	383.76	33.4 QP	46.0	-12.6	1.01 H	156	38.9	-5.5
5	463.48	37.5 QP	46.0	-8.5	1.50 H	17	41.2	-3.7
6	620.96	39.6 QP	46.0	-6.4	1.50 H	143	39.7	-0.1

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. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

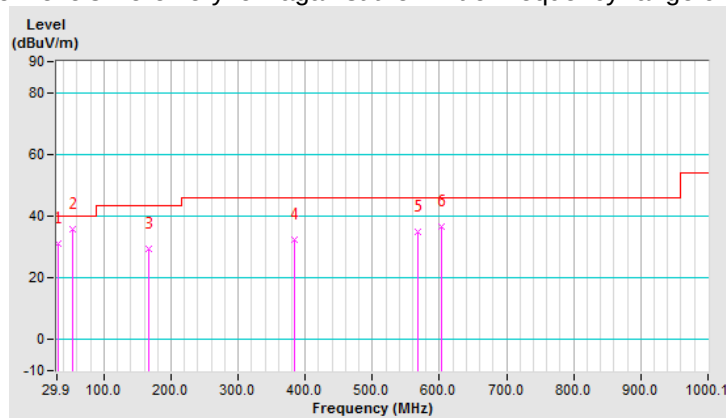


操作模式：	發射/接收	調變技術：	GFSK
基本波頻率：	CH 0：2402 MHz	測試儀器：	(QP) RB=VB=120kHz
量測場地溫度：	25°C	量測場地濕度：	67%RH
測試日期：	107 年 6 月 8 日	測試者：	鄭詠璋

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	31.84	30.9 QP	40.0	-9.1	1.00 V	172	41.9	-11.0
2	53.23	35.6 QP	40.0	-4.4	1.00 V	38	44.9	-9.3
3	166.00	29.2 QP	43.5	-14.3	1.00 V	138	38.1	-8.9
4	383.76	32.3 QP	46.0	-13.7	1.49 V	156	37.8	-5.5
5	568.47	34.8 QP	46.0	-11.2	1.00 V	119	36.4	-1.6
6	603.47	36.8 QP	46.0	-9.2	1.49 V	33	37.2	-0.4

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. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.



4.7 量測結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

4.8 配置照片

請參閱附件(RT180312C08_Test Setup Photo)。

5 電源線傳導干擾之量測

5.1 適用標準

請見本報告 3.1 節第 1 項的規定。

5.2 量測方法

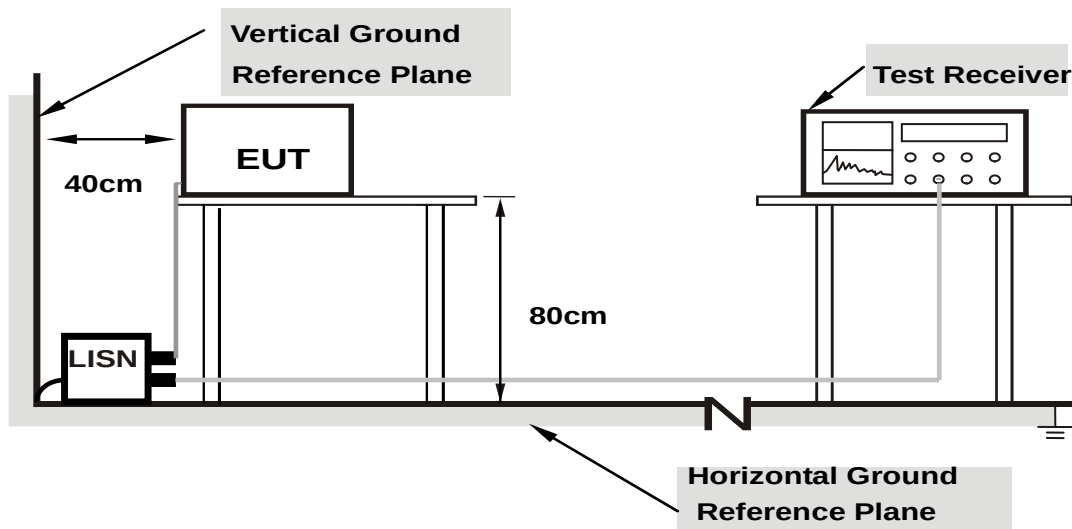
將待測物置於 0.8 米高的非金屬桌面，使其操作在工作狀態，待測物電源線接至電源線阻抗穩定網路上，從測試接收機記錄頻率由 0.15MHz 至 30MHz 之間之電源線傳導放射強度。

5.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 23, 2017	Nov. 22, 2018
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2017	Sep. 04, 2018
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 06, 2018	Mar. 05, 2019
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 15, 2017	Aug. 14, 2018
Software ADT	BV ADT_Conf_ V7.3.7.4	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 1.
 3. The VCCI Site Registration No. is C-2040.
 4. The measurement uncertainty is 2.94 dB, which is calculated as per the document CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

5.4 測試配置



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

5.5 干擾值之計算

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

電源傳導干擾電壓之計算公式如下

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

其中校正因子 Correction Factor (dB)為：

饋線損失+電源阻抗模擬網路損失

5.6 量測結果

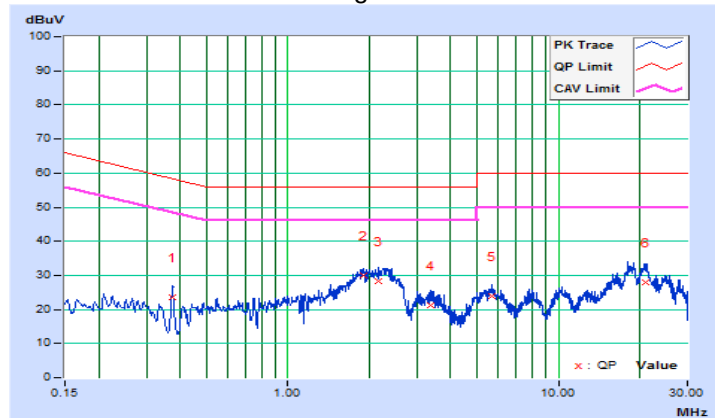
GFSK

操作模式	發射/接收	測試日期	107 年 5 月 3 日
基本波頻率	CH 0 : 2402 MHz	量測場地溫度	20°C
調變技術	GFSK	量測場地濕度	68%RH
測試者	鄭詠璋		

輻射頻率 [MHz]	校正因子 [dB]	6 dB Bandwidth: 9kHz				PHASE: LINE (L)			
		儀器讀值		結果值		限制值		餘裕度	
		[dB (uV)]		[dB (uV)]		[dB (uV)]		[dB]	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
0.37678	10.11	13.54	10.86	23.65	20.97	58.35	48.35	-34.70	-27.38
1.90168	10.18	19.74	13.16	29.92	23.34	56.00	46.00	-26.08	-22.66
2.15583	10.19	18.15	13.07	28.34	23.26	56.00	46.00	-27.66	-22.74
3.37184	10.25	10.84	3.71	21.09	13.96	56.00	46.00	-34.91	-32.04
5.65528	10.38	13.44	6.26	23.82	16.64	60.00	50.00	-36.18	-33.36
21.04504	11.23	16.55	11.09	27.78	22.32	60.00	50.00	-32.22	-27.68

Note:

- 1.Q.P. and AV. are abbreviations of quasi-peak and average individually.
- 2.The emission levels of other frequencies were very low against the limit.
- 3.Margin value = Emission level - Limit value
- 4.Correction factor = Insertion loss + Cable loss
- 5.Emission Level = Correction Factor + Reading Value.

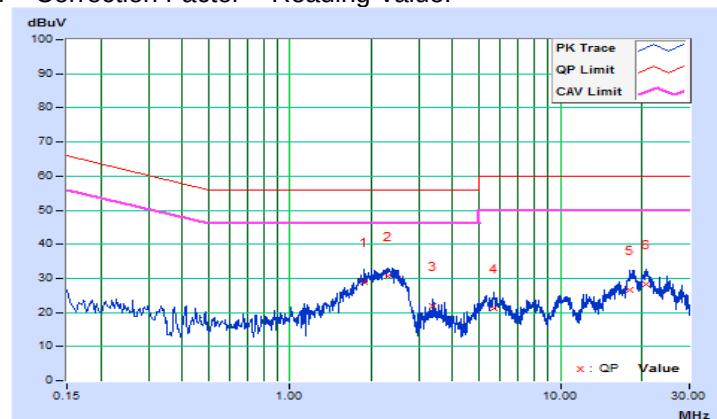


操作模式	發射/接收	測試日期	107 年 5 月 3 日
基本波頻率	CH 0 : 2402 MHz	量測場地溫度	20°C
調變技術	GFSK	量測場地濕度	68%RH
測試者	鄭詠璋		

		6 dB Bandwidth: 9kHz				PHASE: NEUTRAL (N)			
輻射頻率	校正因子	儀器讀值		結果值		限制值		餘裕度	
[MHz]	[dB]	[dB (uV)]		[dB (uV)]		[dB (uV)]		[dB]	
		Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1.88213	10.17	18.95	11.45	29.12	21.62	56.00	46.00	-26.88	-24.38
2.31617	10.19	20.61	14.45	30.80	24.64	56.00	46.00	-25.20	-21.36
3.38496	10.24	11.71	6.68	21.95	16.92	56.00	46.00	-34.05	-29.08
5.68265	10.34	10.85	3.66	21.19	14.00	60.00	50.00	-38.81	-36.00
18.14382	10.86	15.90	10.77	26.76	21.63	60.00	50.00	-33.24	-28.37
20.73615	10.95	17.49	11.78	28.44	22.73	60.00	50.00	-31.56	-27.27

Note:

- 1.Q.P. and AV. are abbreviations of quasi-peak and average individually.
- 2.The emission levels of other frequencies were very low against the limit.
- 3.Margin value = Emission level - Limit value
- 4.Correction factor = Insertion loss + Cable loss
- 5.Emission Level = Correction Factor + Reading Value.



5.7 量測結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

5.8 配置照片

請參閱附件(RT180312C08_Test Setup Photo)。

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

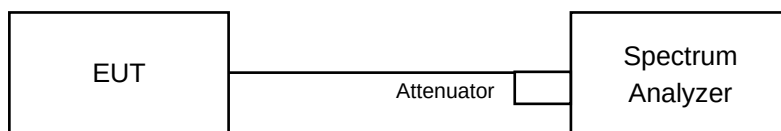
- a) 將待測物輸出經由衰減器接到頻譜分析儀上。
- b) 設定待測物處於連續發射狀態。
- c) 計算由最大輸出功率峰值減 20dB 的最大頻率範圍。

6.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 18, 2017	Aug. 17, 2018

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The measurement uncertainty is 207Hz, 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



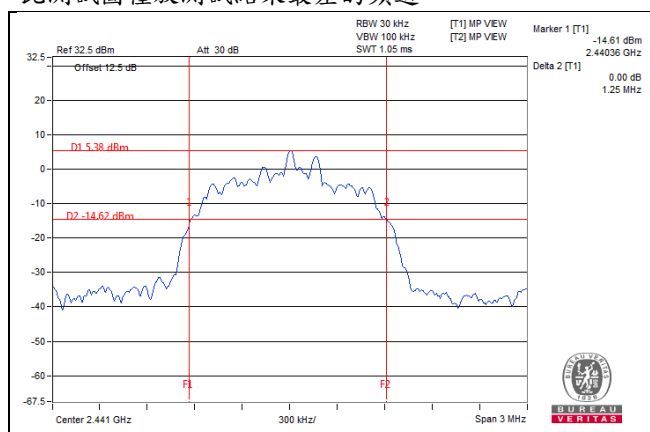
6.5 量測結果

操作模式	發射	測試日期	107 年 4 月 25 日
量測場地溫度	25°C	量測場地濕度	60%RH
測試者	邱智勇		

Channel	Channel Frequency (MHz)	20 dB Bandwidth (MHz)		>= 25kHz
		GFSK	8DPSK	
0	2402	0.88	1.24	Yes
39	2441	0.89	1.25	Yes
78	2480	0.88	1.24	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

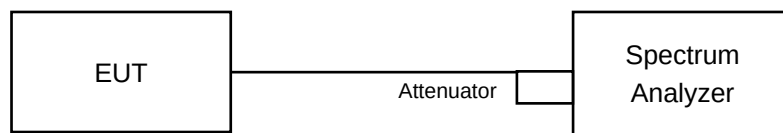
- 將待測物輸出經由衰減器接到頻譜分析儀上。
- 設定待測物處於連續發射狀態。
- 計算其峰值傳導輸出功率。

7.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 18, 2017	Aug. 17, 2018

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The measurement uncertainty is 207Hz, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

7.4 測試配置

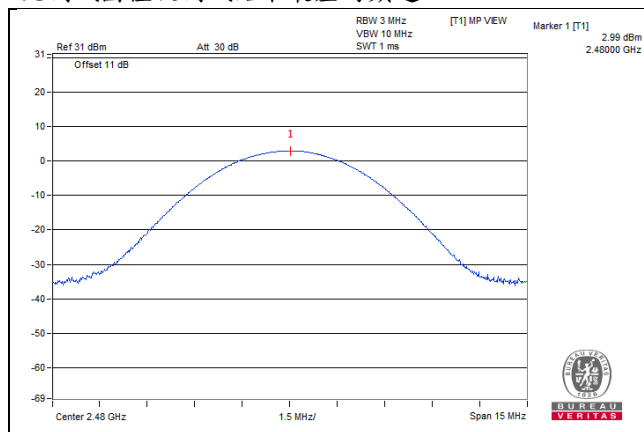


7.5 量測結果

操作模式	發射	測試日期	107 年 4 月 25 日
量測場地溫度	25°C	量測場地濕度	60%RH
測試者	邱智勇		

Channel	Channel Frequency (MHz)	Peak Power Output (dBm)		Peak Power Limit (dBm)	Pass / Fail
		GFSK	8DPSK		
0	2402	0.73	1.90	21	Pass
39	2441	1.19	2.43	21	Pass
78	2480	1.66	2.99	21	Pass

*此測試圖僅放測試結果最差的頻道。



7.6 量測結果判定

依據測試數據結果，符合低功率射頻電機技術規範之要求。

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

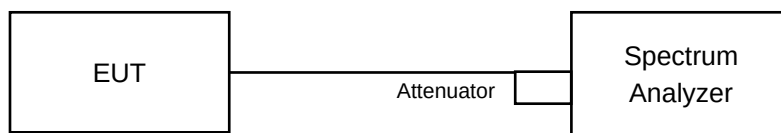
- 將待測物輸出接到頻譜分析儀上。
- 設定待測物處於正常傳輸跳頻模式下。
- 設定 RBW= 100kHz，VBW=300kHz，量測跳頻頻道數。

8.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 18, 2017	Aug. 17, 2018

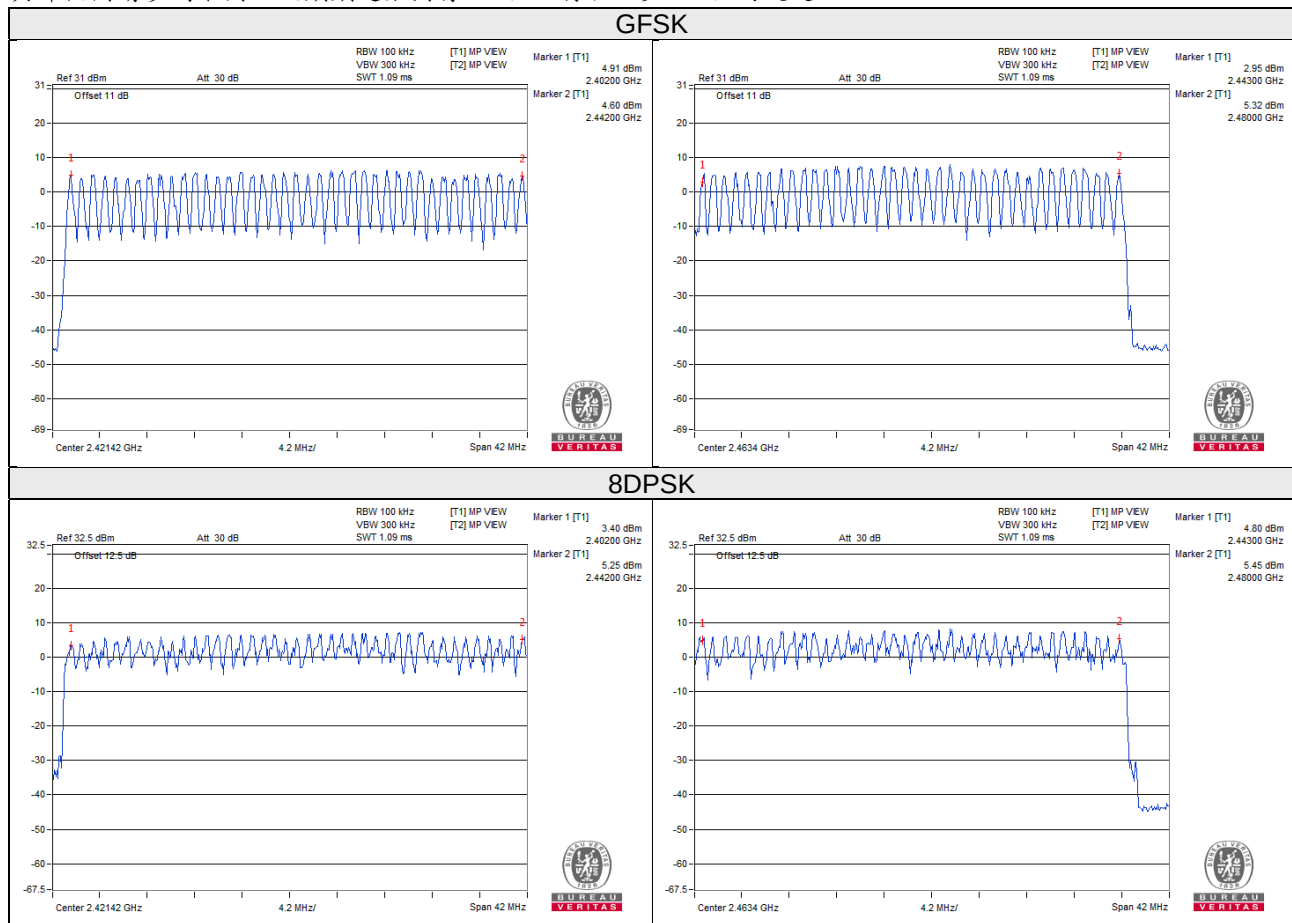
Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The measurement uncertainty is 207Hz, which is calculated as per the document ETSI TR 100 028. This uncertainty represents an expanded uncertainty expressed at approximately 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

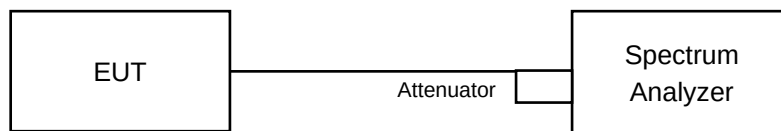
- 將待測物輸出接到頻譜分析儀上。
- 設定待測物處於連續發射狀態。
- 設定 RBW= 30kHz, VBW=300kHz，量測相鄰兩個頻道間的間隔。

9.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 18, 2017	Aug. 17, 2018

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The measurement uncertainty is 207Hz, 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



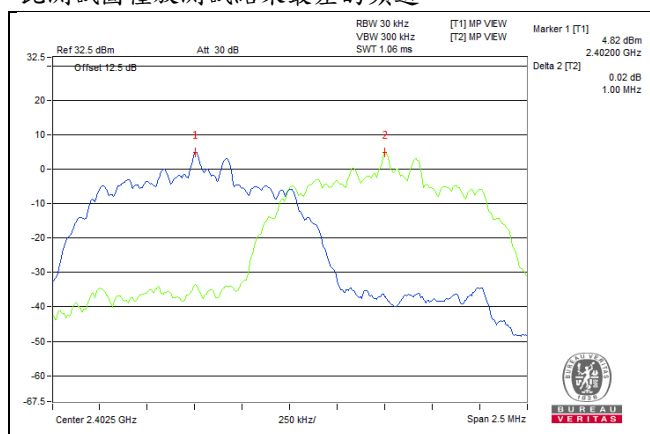
9.5 量測結果

操作模式	發射	測試日期	107 年 4 月 25 日
量測場地溫度	25°C	量測場地濕度	60%RH
測試者	邱智勇		

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)		20dB Bandwidth (MHz)		Minimum Limit (MHz)		Pass / Fail
		GFSK	8DPSK	GFSK	8DPSK	GFSK	8DPSK	
0	2402	1.00	1.00	0.88	1.24	0.59	0.83	Pass
39	2441	1.00	1.00	0.89	1.25	0.60	0.84	Pass
78	2480	1.00	1.00	0.88	1.24	0.59	0.83	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

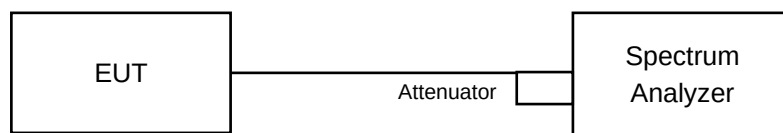
- a) 將待測物輸出接到頻譜分析儀上。
- b) 設定待測物處於正常傳輸跳頻模式下。
- c) 設定 RBW= 100kHz, VBW=300kHz，量測在不同傳輸模式下的頻道停留時間。

10.3 量測儀器

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 18, 2017	Aug. 17, 2018

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The measurement uncertainty is 207Hz, 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

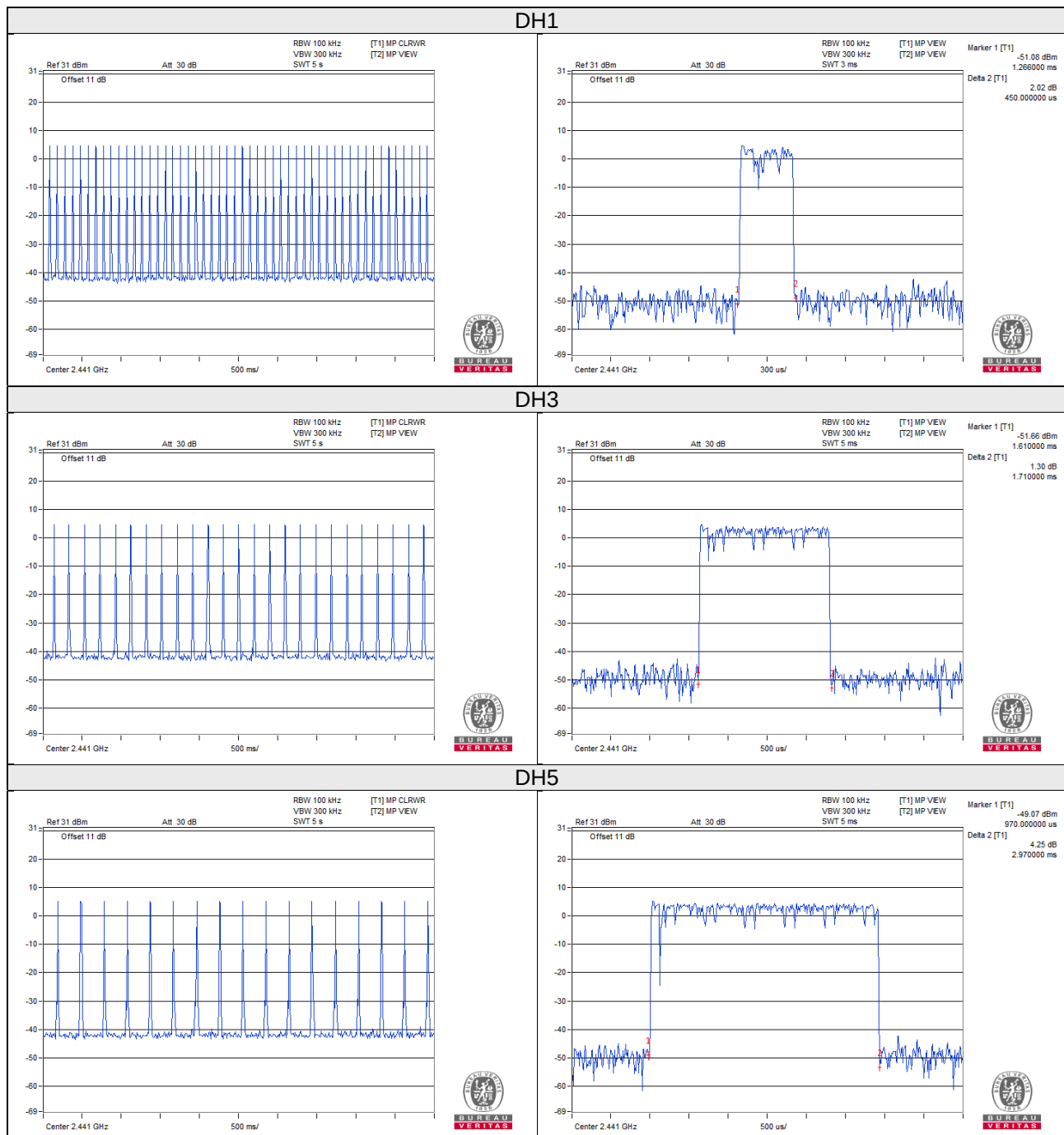


10.5 量測結果

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 times	0.45	142.2	400
DH3	25 (times / 5 sec) * 6.32 = 158 times	1.71	270.18	400
DH5	17 (times / 5 sec) * 6.32 = 107.44 times	2.97	319.1	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。其掃描圖如下所示。



8DPSK

Mode	Number of transmission in a 31.6 (79Hopping*0.4)	Length of transmission time (msec)	Result (msec)	Limit (msec)
3DH1	50 (times / 5 sec) * 6.32 = 316 times	0.456	144.1	400
3DH3	25 (times / 5 sec) * 6.32 = 158 times	1.72	271.76	400
3DH5	17 (times / 5 sec) * 6.32 = 107.44 times	3.02	324.47	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。其掃描圖如下所示。



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 / Telecom 實驗室：
Tel: 886-3-6668565
Fax: 886-3-6668323

華亞 EMC / RF / Safety 實驗室：
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

您也可以在我們的網站內找到各實驗室的地圖。

---END---