低功率射頻電機試驗報告

申請廠商	SKULLCANDY, INC. 6301 N Landmark Dr Park City UT 84098, Utah United States of America
製造廠商	SKULLCANDY, INC.
產品名稱	Push Ultra
廠牌	Skullcandy
型號	S2BDW
發射功率	4.48 dBm (Peak)
工作頻率	2402MHz – 2480MHz
調變方式	BT BR(GFSK)+EDR(π/4 DQPSK, 8DPSK)
法規	LP0002: 3.10.1節

實驗室資訊

台灣檢驗科技股份有限公司 射頻實驗中心

新北市新北產業園區五工路134號

認證有效期間：107年06月14日起至110年06月13日止

試驗受理日期　民國109年05月26日

試驗執行日期　民國109年05月26日~ 民國109年06月20日

報告發行日期　民國109年07月13日

林耀鵬

Testing Laboratory
3702

報告簽署人
林耀鵬簽章

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Revision History				
Report Number	**Revision**	**Description**	**Issue Date**	**Remark**
E2/2020/50121	Rev.00	Original.	Jul. 13, 2020	Revised By: Elle Chang

Note:

1、 免責聲明
天線資訊由報告申請人提供，此報告之測試結果僅適用實際收取的樣品。

2、 電源線傳導干擾及 Fully System 測試模式在各個無線功能全開下進行測試，經評估為最差模式。

3、 測試報告 E2/2020/50123 之電源線傳導干擾及 Fully System 場強輻射測試數據，沿用於此報告中。

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測試標準

國家通訊傳播委員會低功率射頻電機技術規範

民國 107 年 1 月 10 日版本

待測裝置已於台灣檢驗科技股份有限公司射頻實驗中心，依據國家通訊傳播委員會於中華民國一百零七年一月頒佈之低功率射頻電機技術規範測試。

台灣檢驗科技股份有限公司根據此條文規範項目測試，測試各項數據皆能符合此規範規定之限度值。

台灣檢驗科技股份有限公司依低功率射頻電機技術規範審驗要點規範製作測試結果報告,測試結果評判為 合格。

備註：

1. 報告中所描述之測試結果和待測設備的架構組合，均根據實際量測情況作詳實的記錄，且本測試報告僅對上述待測設備樣品負責。
2. 此份報告未經本公司同意，不得部份摘錄複製使用。

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測試實驗室資料:

實驗室認可登錄	:	中華民國實驗室認證體系
認可編號	:	TAF 3702，認可頻率範圍9kHz ~ 200GHz
認證有效期間	:	107年06月14日起至110年06月13日止
測試場地	:	桃園市龜山區(華亞科技園區)科技一路2號
實驗室名稱	:	台灣檢驗科技股份有限公司 射頻實驗中心
實驗室地址	:	新北市新北產業園區五工路134號
電話	:	886-2-22993939
傳真	:	886-2-22982698

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實驗室之量測不確定度

量測項目	量測不確定度 (擴充不確定度)		
傳導干擾量測	電源線	0.15-30MHz	2.586 dB
輻射干擾量測 (3m測距)	水平極化	9kHz - 30MHz	2.3dB
		30-167MHz	4.22dB
		167-500MHz	3.44dB
		0.5-1GHz	3.39dB
		1-18GHz	4.08dB
		18-40GHz	4.08dB
	垂直極化	9kHz - 30MHz	2.3dB
		30-180MHz	3.37dB
		180-417MHz	3.19dB
		0.417-1GHz	3.19dB
		1-18GHz	4.04dB
		18-40GHz	4.04dB
頻率誤差量測	範例一	2.4 GHz	290 Hz
	範例二	5 GHz	724.3 Hz
輸出功率	傳導方式	2.4 GHz	1.3 dB
		5 GHz	1.55 dB
有效輻射功率 (輻射方式)	水平極化	2.4GHz	4.21 dB
		5 GHz	4.62 dB
	垂直極化	2.4 GHz	4.42 dB
		5 GHz	4.74 dB
功率頻譜密度	傳導方式	2.4GHz	1.3dB
		5GHz	1.67dB
鄰頻道功率量測 (輻射方式)	水平極化	30-167MHz	4.22dB
		167-500MHz	3.44dB
		0.5-1GHz	3.39dB
	垂直極化	30-180MHz	3.37dB
		180-417MHz	3.19dB
		0.417-1GHz	3.19dB

附註: 1. K=2 即代表測試結果具有95%的量測可信度。
2. 本報告中的符合性判定僅依據試驗結果，不考慮其試驗結果的量測不確定度。

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1 一般資料

1.1 產品特性

產品名稱	Push Ultra
型號	S2BDW
產品商標	Skullcandy
Hardware Version	N/A
Software Version	N/A
USB Cable	Model No.: CE-2068-USB, Supplier: Cosonic
使用電源	3.7Vdc from Rechargeable Li-polymer Battery

發射頻帶	2402MHz – 2480MHz
輸出功率	4.48 dBm (Peak)
調變方式	BT BR(GFSK)+EDR(π/4 DQPSK, 8DPSK)
頻道數	79
天線型式/天線增益	Integral Antenna, Gain: 0.64dBi Model No.: S2BDW; Supplier: SKULLCANDY, INC.

本報告針對藍牙(BR/EDR)測試。
本報告針對藍牙耳機之右耳測試。

本案經申請者切結器材不提供隨貨配件，配件由實驗室提供併同檢驗，產品名稱: Adapter，廠牌: HSHONGAHAING，型號: MUC-5K; 產品名稱: Wireless Charger，廠牌: MI，型號: WPC01ZM。

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1.2 測試方法之依據

本測試報告之所有項目皆依據國家通訊傳播委員會低功率射頻電機技術規範(LP0002, 107.1.10 版本)如無國家標準可適用者，得依美國 EIA、IEEE ANSI 檢驗法檢驗，及美國 FCC 47 CFR Part 2 有關檢驗之規定及參考 ANSI 63.10:2013、FCC CFR 47 15.247 之檢驗法。

項次	測試項目	適用規範	測試結果	量測設備	備註
1	電源線傳導干擾	低功率射頻電機技術規範 2.3節	請參閱5.5節	請參閱4.1節	合格
2	禁用頻道之輻射發射	低功率射頻電機技術規範 3.10.1.5節	請參閱6.5節	請參閱4.2節	合格
3	天線增益之要求	低功率射頻電機技術規範 3.10.1.3 (1) 節	請參閱7.2節	----------	合格
4	輸出峰值功率	低功率射頻電機技術規範 3.10.1.2.(A)、(B) 節	請參閱8.3節	請參閱4.3節	合格
5	頻帶邊緣之發射	低功率射頻電機技術規範 3.10.1.5節	請參閱9.3節	請參閱4.3節	合格
6	發頻頻寬	低功率射頻電機技術規範 3.10.1.6.(1) (A) 節	請參閱10.3節	請參閱4.3節	合格
7	載波頻率間隔	低功率射頻電機技術規範 3.10.1.6.(1) (A) 節	請參閱11.3節	請參閱4.3節	合格
8	載波頻率之佔用週期	低功率射頻電機技術規範 3.10.1.6.(1) (A)(a) 節	請參閱12.3節	請參閱4.3節	合格
9	頻道數量	低功率射頻電機技術規範 3.10.1.6.(1) (A)(a) 節	請參閱13.3節	請參閱4.3節	合格
	以下空白				

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*測試模式

RADIATED EMISSION TEST:

RADIATED EMISSION TEST (BELOW 1 GHz)				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
Bluetooth (TX)	0 to 78	39	GFSK	DH5
Bluetooth (RX)	0 to 78	39	GFSK	DH5
Fully system				
RADIATED EMISSION TEST (ABOVE 1 GHz)				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	DATA RATE (Mbps)
Bluetooth (TX)	0 to 78	0,39,78	GFSK	DH5
Bluetooth (RX)	0 to 78	39	GFSK	DH5

ANTENNA PORT CONDUCTED MEASUREMENT:

CONDUCTED TEST				
Peak Output Power, 20dB Band Width				
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION	PACKET TYPE
Bluetooth	0 to 78	0,39,78	GFSK	DH5
	0 to 78	0,39,78	π/4-DQPSK	2DH5
	0 to 78	0,39,78	8-DPSK	3DH5
Band Edge				
Bluetooth	0 to 78	0,78	GFSK / 8-DPSK	DH5/3DH5
Frequency Separation				
Bluetooth	0 to 78	0,1,2	GFSK	DH5
Number of hopping frequency				
Bluetooth	0 to 78	0 to 78	GFSK	DH5
Time of Occupancy (Dwell time)				
Bluetooth	0 to 78	39	GFSK	DH1/DH3/DH5

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2 適用規範

2.1 規範要求 (一般規定)

(1) 傳導之規定

依據NCC低功率射頻電機技術規範之2.3節，以市電為電源之低功率射頻電機，其傳導回電源線上頻率自150 kHz～30 百萬赫(MHz) 之射頻電壓(在電源端子每一電源線對接地點)應小於或等於下表所列之限制值。測量時應經過50 微亨利(uH)及50 歐姆(Ω)之電源線阻抗穩定網路(Line Impedance Stabilization Network；LISN)。頻率重疊處，以較低限制值為準。

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

(2) 輻射之規定

依據NCC低功率射頻電機技術規範3.10.5之要求，其他開放頻帶外不必要之輻射需符合2.8節之一般限制要求，其電場強度不得超過下表之限值，且其不必要之發射皆不得大於主波發射強度。各頻段重疊處，以較嚴格之限制值為準。

頻率 MHz	測試距離 m	干擾限制 μV/m	干擾限制 dBμV/m
0.009 – 0.490	300	2,400/頻率 (kHz)	
0.490 – 1.705	30	24,000/頻率 (kHz)	
1.705 - 30	30	30	
30 - 88	3	100	40.0
88 – 216	3	150	43.5
216 – 960	3	200	46.0
960以上	3	500	54.0

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(3) 禁用頻帶限制之規定

依據NCC低功率射頻電機技術規範2.7節之要求，任何低功率射頻電機之主波皆不得使用下表所列各頻帶內之頻率；低功率射頻電機落於下表所列頻帶內之混附發射，其電場強度必須符合第2.8節的限制規定。

頻率 (MHz)	頻率 (MHz)	頻率 (MHz)
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) 依據NCC低功率射頻電機技術規範2.11節之要求，收、發信機為成套銷售者，收、發信機應一併送審或提供經型式認證合格之對應收、發信機之送審資料；送信機之輻射電場強度不得超過第2.8節之發射規定，且不得接收、解調第2.7節所列之頻率。

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2.2 規範要求 (特殊規定)

依據NCC低功率射頻電機技術規範3.10節 跳頻 (frequency hopping) 之要求，使用頻率為2.4 G至2.4835 GHz 者

(1) 峰值輸出功率之要求：
依據NCC低功率射頻電機技術規範3.10.1.2 (A)之規定，操作於2400-2483.5 MHz，並至少使用75個跳頻頻道之跳頻系統，其峰值輸出功率不得大於1 Watt。

(2) 天線增益之要求：
依據NCC低功率射頻電機技術規範3.10.1.3之規定，進行固定式點對點操作時，應符合下列情現之一：依據NCC低功率射頻電機技術規範3.10.1.3 (1)之規定，操作頻率為2400-2483.5兆赫(MHz)者，其發射天線之方向性增益超過6dBi，每超過3dB應降低1dB之最大傳導輸出功率。
依據NCC低功率射頻電機技術規範3.10.1.3 (2)之規定，操作頻率為5725-5850兆赫(MHz)者，其發射天線之方向性增益超過6dBi，不需降低最大傳導輸出功率。
依據NCC低功率射頻電機技術規範3.10.1.3 (3)之規定，用於點對多點操作時，如其發射天線之方向性增益超過 6dBi，應依所超過之dB數等量降低最大傳導輸出功率。

(3) 頻帶邊緣之要求：
依據NCC低功率射頻電機技術規範3.10.1.5之規定，帶外發射限制：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。

(4) 其他限制事項：
依據NCC低功率射頻電機技術規範3.10.1.2跳頻系統之規定
3.10.1.6 (1)(A)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。

3.10.1.7 (1)(A)(a) 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。
註: 此產品為點對多點操作。

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3 受測裝置之系統說明

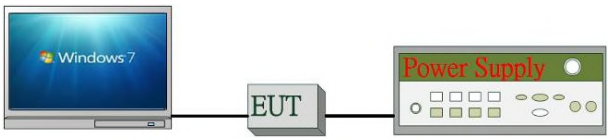
裝置名稱	製造者/申請者	型號
*Push Ultra	SKULLCANDY, INC./ SKULLCANDY, INC.	S2BDW

標記: “ * ”表欲申請之受測物。

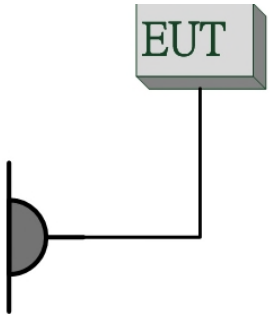
3.1 待測物與測試設備系統圖

3.1.1 量測配置圖

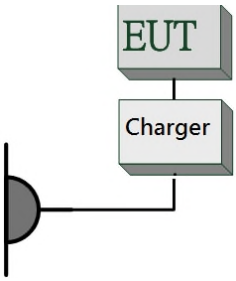
Conducted (Antenna Port)



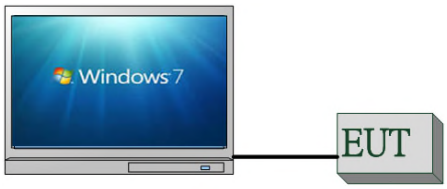
Radiated Emission & Conduction (System)



Conduction (AC Power Line)



Radiated Emission



3.2 輔助測試週邊設備名稱描述

編 號	產 品 別	商 標	型 號	序 號	信號線線長(米)	電源線長(米)
1	Bluetooth Test Software	N/A	N/A	N/A	N/A	N/A
2.	Notebook	Lenovo	L420	S0011721	N/A	N/A
3.	DC Power Supply	Agilent	E3640A	MY53130054	N/A	N/A
4.	Adapter	HSHONGA HAING	MUC-5K	AC-USB012	N/A	N/A
5.	Wireless Charger	MI	WPC01ZM	WPC01ZM	N/A	N/A
	WPC	Skullcandy	S2BDW	N/A	N/A	N/A

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4 量測儀器設備

4.1 AC 電源端傳導干擾之量測儀器

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
LISN	SCHWARZBECK Mess-Elektronik	NSLK8127	974	03/25/2020	03/24/2021
EMI Test Receiver	R&S	ESCI	101342	04/28/2020	04/27/2021
Adapter	HSHONGAHAING	MUC-5K	AC-USB012	N/A	N/A
WPC	MI	WPC01ZM	WPC01ZM	N/A	N/A

4.2 天線端傳導測試之量測儀器

SGS Conducted Room					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Power Supply	Agilent	E3640A	MY53130054	09/06/2019	09/05/2020
Spectrum Analyzer	KEYSIGHT	N9010B	MY59070196	03/22/2019	03/21/2021
DC Block	PASTERNACK	PE8210	RF256	11/20/2019	11/19/2020
Power Meter	Anritsu	ML2496A	1326001	08/05/2019	08/04/2020
Power Sensor	Anritsu	MA2411B	1315048	08/05/2019	08/04/2020
Power Sensor	Anritsu	MA2411B	1315049	08/05/2019	08/04/2020

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4.3 量測場強輻射之量測儀器

SGS SAC-III					
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Date**	**Calibration Due**
Broadband Antenna	TESEQ	CBL 6112D	35240	09/09/2019	09/08/2020
Horn Antenna	Schwarzbeck	BBHA9170	185	08/07/2019	08/06/2020
Horn Antenna	Schwarzbeck	BBHA9120D	1187	01/10/2020	01/09/2021
Loop Antenna	ETS.LINDGREN	6502	143303	04/28/2020	04/27/2021
EMI Test Receiver	R&S	ESU 40	100363	04/29/2020	04/28/2021
Pre-Amplifier	EMC Instruments	EMC330	980096	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC0011830	980199	11/20/2019	11/19/2020
Pre-Amplifier	EMC Instruments	EMC184045B	980135	11/20/2019	11/19/2020
Attenuator	Woken	WATT-218FS-10	RF25	11/20/2019	11/19/2020
Highpass Filter	Micro Tronics	BRM50701-01	G008	11/20/2019	11/19/2020
Coaxial Cable	Huber Suhner	SUCOFLEX 104	MY17388/4	11/20/2019	11/19/2020
Coaxial Cable	Huber Suhner	RG 214/U	W22.03	11/20/2019	11/19/2020
Notebook	Lenovo	L440	P0000367	N/A	N/A

註: 以上部份設備跟量測值沒有影響，且沒有直接關聯，因此不需要進行校正。

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5 電源線傳導干擾之量測

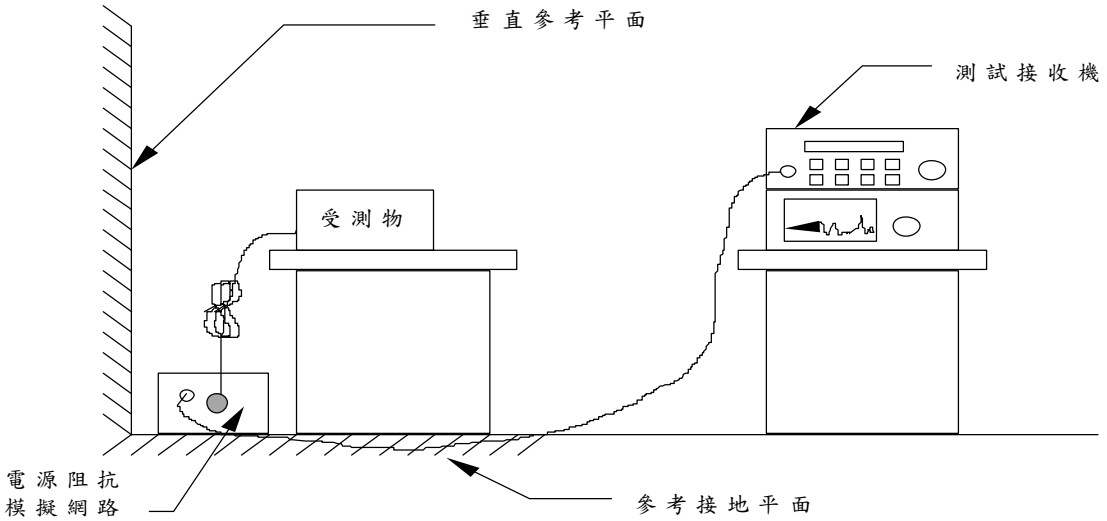
5.1 適用標準

依據NCC低功率射頻電機技術規範2.3節之要求。

5.2 測試方法

將待測物置於0.8米高的非金屬桌面，使其在工作狀態，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的峰值量側(Peak)並提供掃描圖, Mark 最大的六個頻率點進行準峰值量測(QP),如果準峰值QP結果值已低於AV限制值時將不再進行AV值的量測。

5.3 測試配置



5.4 干擾值之計算

電源傳導干擾電壓之計算公式如下

結果值(QP/AV Level) = 儀器讀值(QP/AV Reading) + 校正因子

其中校正因子為：

饋線損失 + 電源阻抗模擬網路損失

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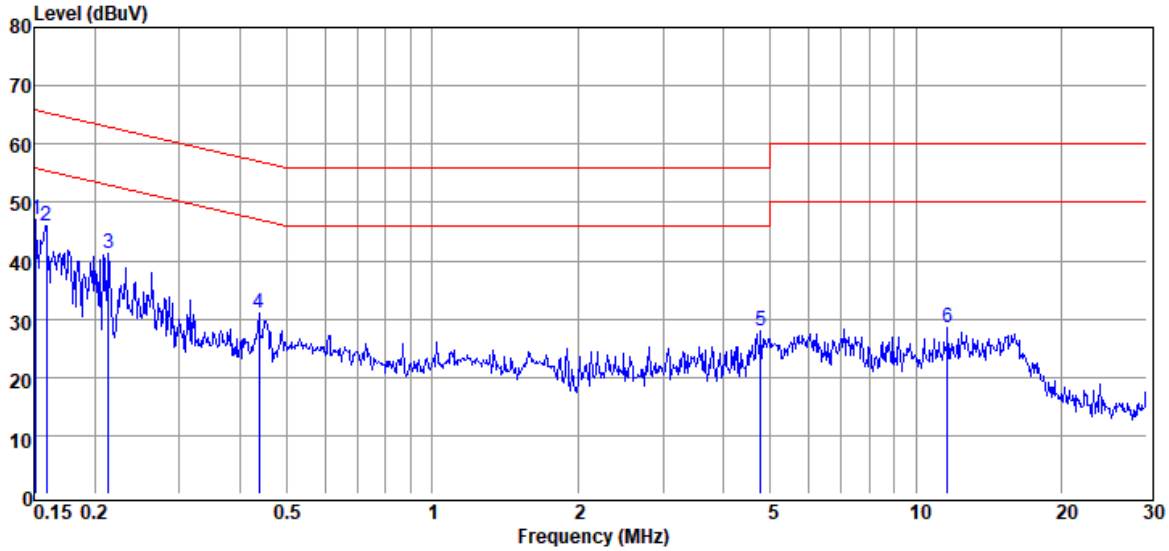
5.5 傳導干擾之量測結果:

WPC

Report Number	:E2/2020/50123	Test Date	:2020-06-17
Test Mode	:WPC	Temp./Humi.	:23.7/59
Power	:110V/60Hz	Engineer	:Ashton
Probe	:L1		
	:		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
0.15	Peak	36.78	10.22	47.00	65.91	-18.91
0.16	Peak	35.77	10.22	45.99	65.52	-19.53
0.21	Peak	31.10	10.22	41.32	63.05	-21.73
0.44	Peak	20.65	10.22	30.87	57.11	-26.24
4.77	Peak	17.54	10.50	28.04	56.00	-27.96
11.62	Peak	17.85	10.73	28.58	60.00	-31.42

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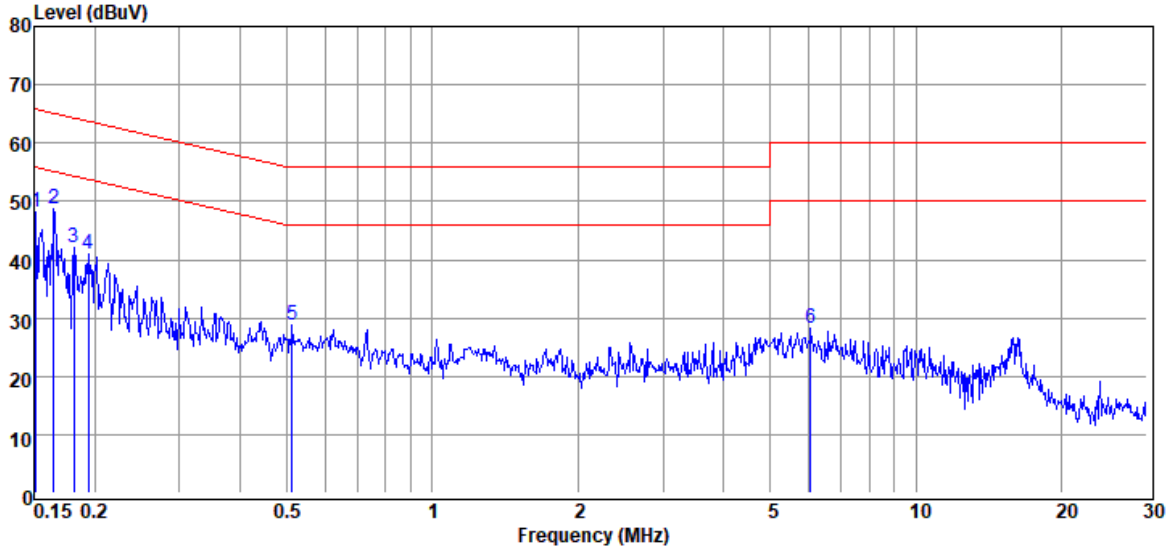
Report Number	:E2/2020/50123	Test Date	:2020-06-17
Test Mode	:WPC	Temp./Humi.	:23.7/59
Power	:110V/60Hz	Engineer	:Ashton
Probe	:N		
	:		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
0.15	Peak	37.96	10.21	48.17	65.91	-17.74
0.17	Peak	38.45	10.21	48.66	65.21	-16.55
0.18	Peak	31.80	10.21	42.01	64.42	-22.41
0.19	Peak	30.83	10.21	41.04	63.84	-22.80
0.51	Peak	18.70	10.22	28.92	56.00	-27.08
6.06	Peak	17.75	10.57	28.32	60.00	-31.68

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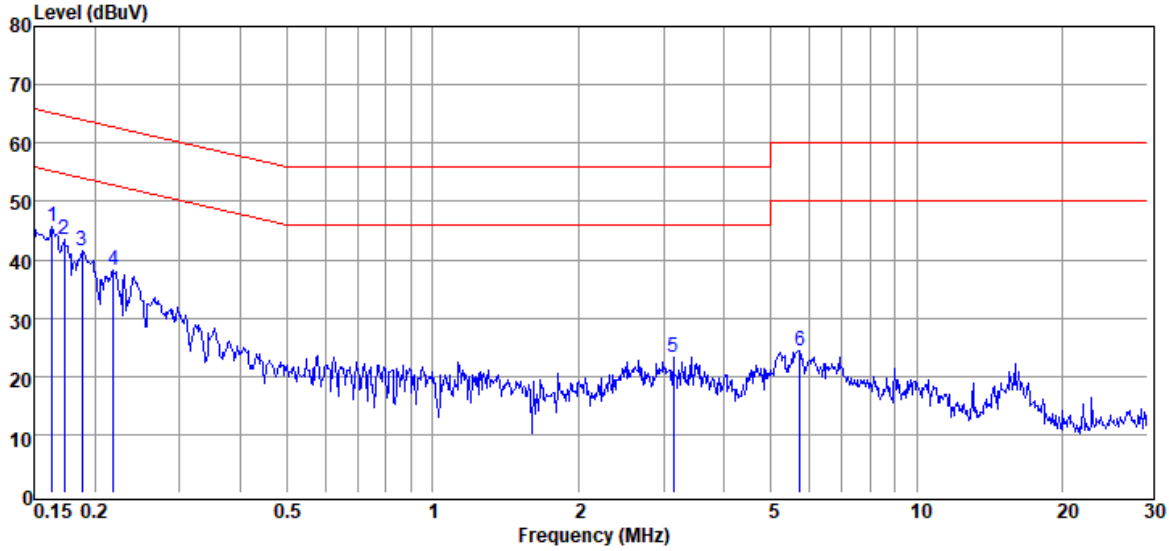
System

Report Number	:E2/2020/50123	Test Date	:2020-06-17
Test Mode	:System	Temp./Humi.	:23.6/59
Power	:110V/60Hz	Engineer	:Ashton
Probe	:L1		
	:		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
0.16	Peak	35.44	10.22	45.66	65.30	-19.64
0.17	Peak	33.18	10.22	43.40	64.81	-21.41
0.19	Peak	31.32	10.22	41.54	64.11	-22.57
0.22	Peak	27.97	10.22	38.19	62.88	-24.69
3.14	Peak	12.73	10.47	23.20	56.00	-32.80
5.74	Peak	13.79	10.55	24.34	60.00	-35.66

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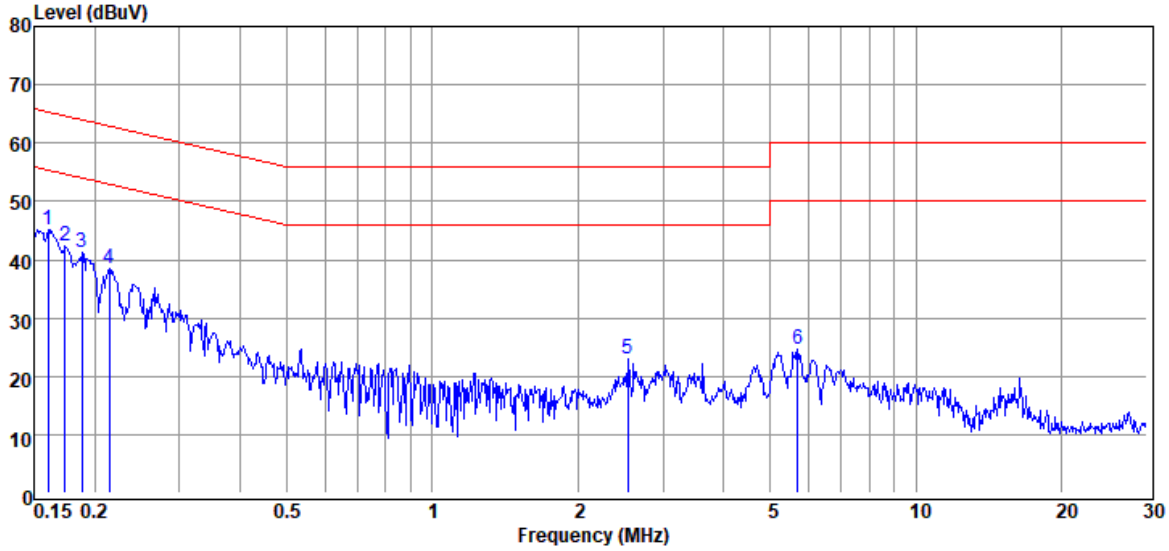
Report Number	:E2/2020/50123	Test Date	:2020-06-17
Test Mode	:System	Temp./Humi.	:23.6/59
Power	:110V/60Hz	Engineer	:Ashton
Probe	:N		
	:		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
0.16	Peak	34.84	10.21	45.05	65.43	-20.38
0.17	Peak	32.16	10.21	42.37	64.77	-22.40
0.19	Peak	31.14	10.21	41.35	64.11	-22.76
0.22	Peak	28.36	10.21	38.57	63.01	-24.44
2.54	Peak	12.49	10.46	22.95	56.00	-33.05
5.68	Peak	14.16	10.56	24.72	60.00	-35.28

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6 禁用頻帶輻射發射之量測

6.1 適用標準

依據NCC低功率射頻電機技術規範3.10.1.5之要求，其他開放頻帶外不必要之輻射干擾需符合2.8節之一般限制要求。

6.2 量測方法

將待測物置於非金屬桌面，測試頻率1GHz以下時，使用桌高0.8 米，1GHz以上時，使用桌高1.5米，使其在工作狀態，接收天線置於 3 米外相同的高度。待測物分別要垂直或水平放置，而且桌面要 360 度旋轉，另外接收天線也要從 1.0 米至 4.0 米升降變化，以找出最大的輻射電場強度，接收天線置於水平、垂直極向各執行測試一次。1GHz 以下先進行Peak 值量測, 若Peak 以低於QP 限制值將不在進行QP 量測, 否則, 則進行QP 值量測, 1GHz 以上先進行Peak 值量測, 若Peak 以低於AV 限制值將不在進行AV值量測, 否則, 則進行AV 值量測。

9kHz~150kHz 測試

解析頻寬:	300Hz	視訊頻寬:	300Hz
量測天線:	6502	檢測器:	Quasi-Peak

150kHz~30MHz 測試

解析頻寬:	10kHz	視訊頻寬:	10kHz
量測天線:	6502	檢測器:	Quasi-Peak

1GHz 以下測試

解析頻寬:	100kHz	視訊頻寬:	100kHz
量測天線:	CBL 6112D	檢測器:	Quasi-Peak

1GHz 以上測試

量測天線:	BBHA9170, BBHA9120D	檢測器:	Peak, Average
頻譜分析儀設定	Peak: RBW: 1MHz ; VBW: 1MHz，Average: RBW: 1MHz ; VBW: 10Hz		

註:輻射量測僅放最差模式（30MHz以上）。

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6.3 場強度之計算

場強之計算公式如

結果值 = 讀值 + 校正因子

其中校正因子為：

天線因子+ 饋線損失 + 濾波器損失（若有使用） - 放大器增益（若有使用）

量測結果請見下頁。

註: 此裝置有 EDR 功能，比較 BR mode 及 EDR mode 測試值後附上最差模式 BR mode 數據。

註:比較 H Plane、E1 Plane 和 E2 Plane 測試值後附上最差模式 H Plane 數據。

Note: Actual FS(dBµV/m) = SPA. Reading level(dBµV) + Factor(dB)
Factor(dB) = Antenna Factor(dBµV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

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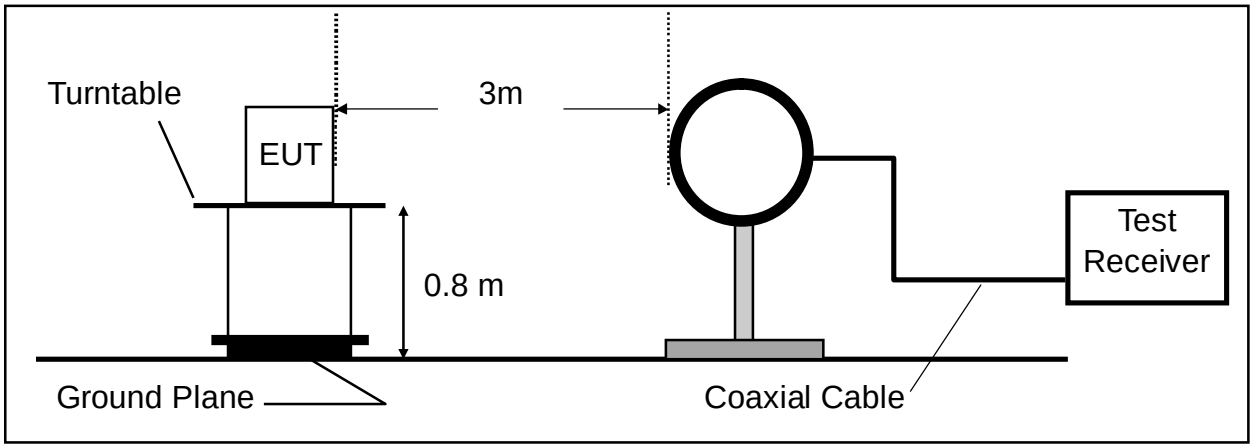
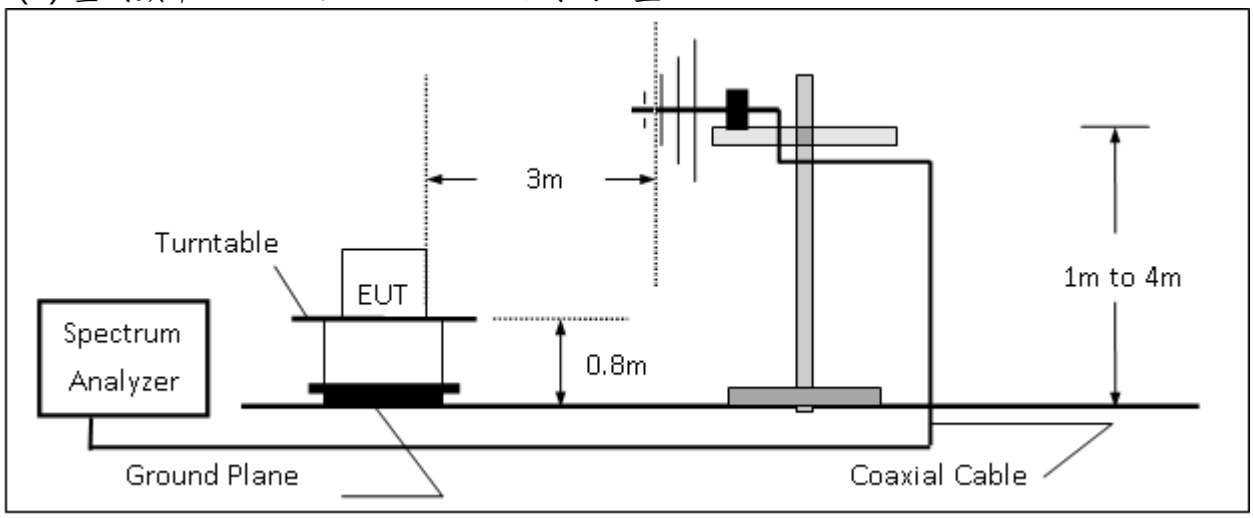
6.4 輻射之測試配置

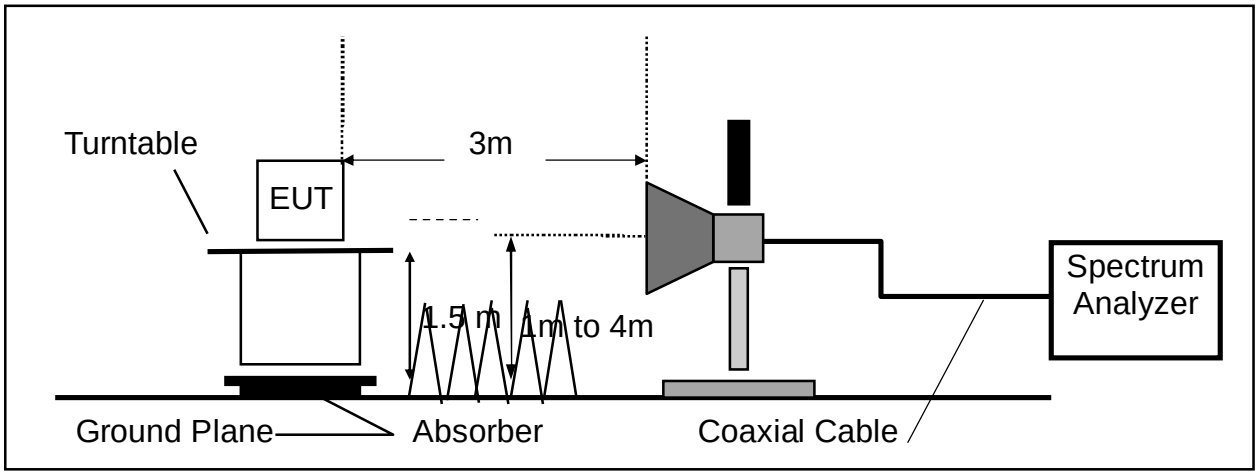
(A) 量測頻率低於 30MHz 以下之測試配置



(B) 量測頻率 30MHz 至 1000MHz 之測試配置



(C) 量測頻率 1000MHz 以上之測試配置



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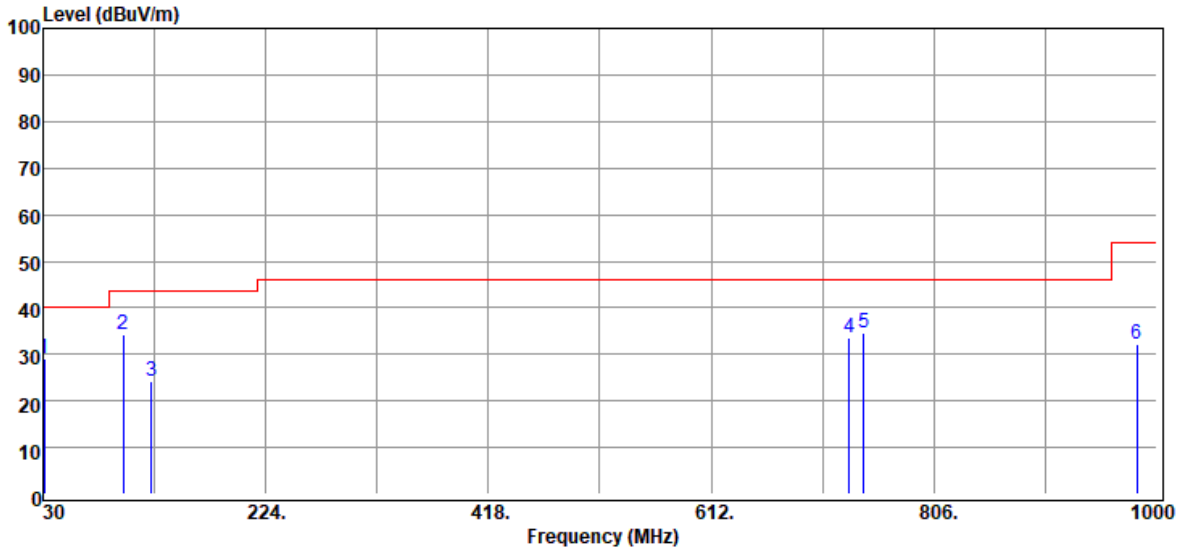
6.5 場強輻射之量測結果

6.5.1 發射機場強輻射之量測結果(1GHz 以下) 最差模式

Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.5/57
Test Frequency	:2441 MHz	Antenna Pol.	:VERTICAL
Test Mode	:TX CH MID	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
30.97	Peak	33.01	-3.89	29.12	40.00	-10.88
99.84	Peak	50.01	-15.66	34.35	43.50	-9.15
124.09	Peak	37.22	-12.85	24.37	43.50	-19.13
732.28	Peak	35.66	-1.99	33.67	46.00	-12.33
744.89	Peak	36.38	-1.64	34.74	46.00	-11.26
982.54	Peak	30.24	1.82	32.06	54.00	-21.94

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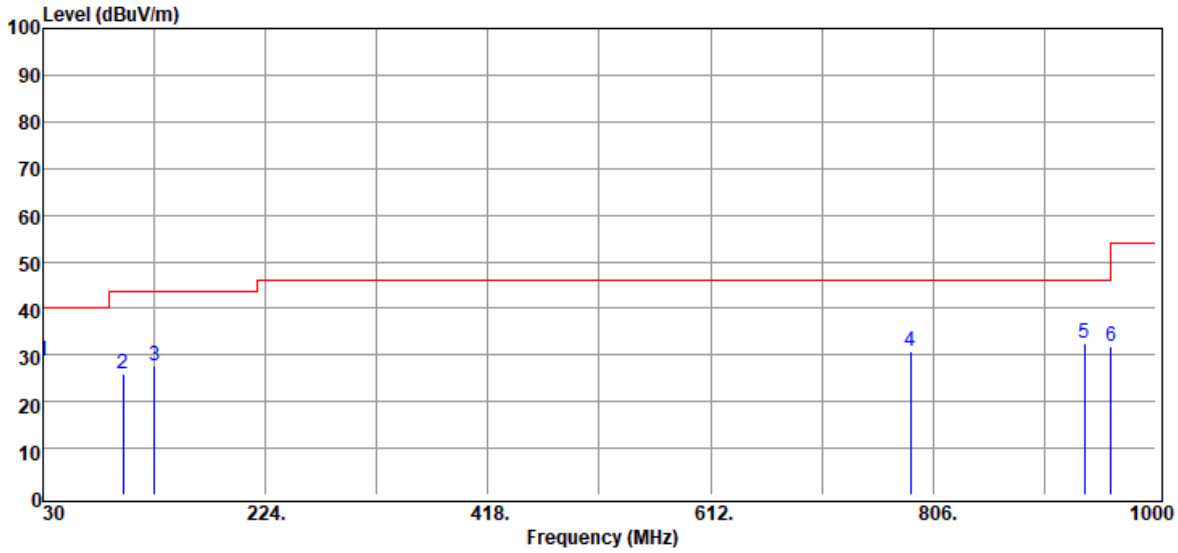
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.5/57
Test Frequency	:2441 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:TX CH MID	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
30.00	Peak	31.95	-3.33	28.62	40.00	-11.38
99.84	Peak	41.61	-15.66	25.95	43.50	-17.55
127.00	Peak	40.47	-12.79	27.68	43.50	-15.82
786.60	Peak	30.49	0.23	30.72	46.00	-15.28
937.92	Peak	31.08	1.36	32.44	46.00	-13.56
961.20	Peak	30.31	1.44	31.75	54.00	-22.25

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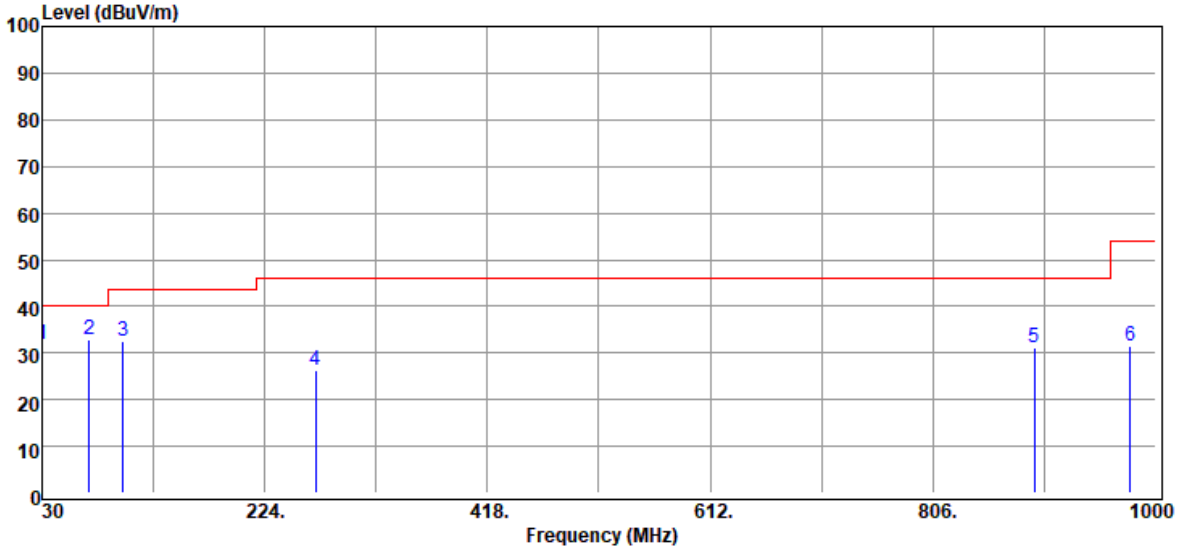
System Mode

Report Number	:E2/2020/50123	Test Date	:2020-06-10
Operation Mode	:System	Temp./Humi.	:22.5/59
Test Frequency	:System	Antenna Pol.	:VERTICAL
Test Mode	:System	Engineer	:Ashton
EUT Pol	:E2 Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
30.00	Peak	35.17	-3.33	31.84	40.00	-8.16
70.74	Peak	51.74	-18.71	33.03	40.00	-6.97
100.81	Peak	48.15	-15.47	32.68	43.50	-10.82
268.62	Peak	37.17	-11.04	26.13	46.00	-19.87
894.27	Peak	30.83	0.47	31.30	46.00	-14.70
977.69	Peak	29.61	1.75	31.36	54.00	-22.64

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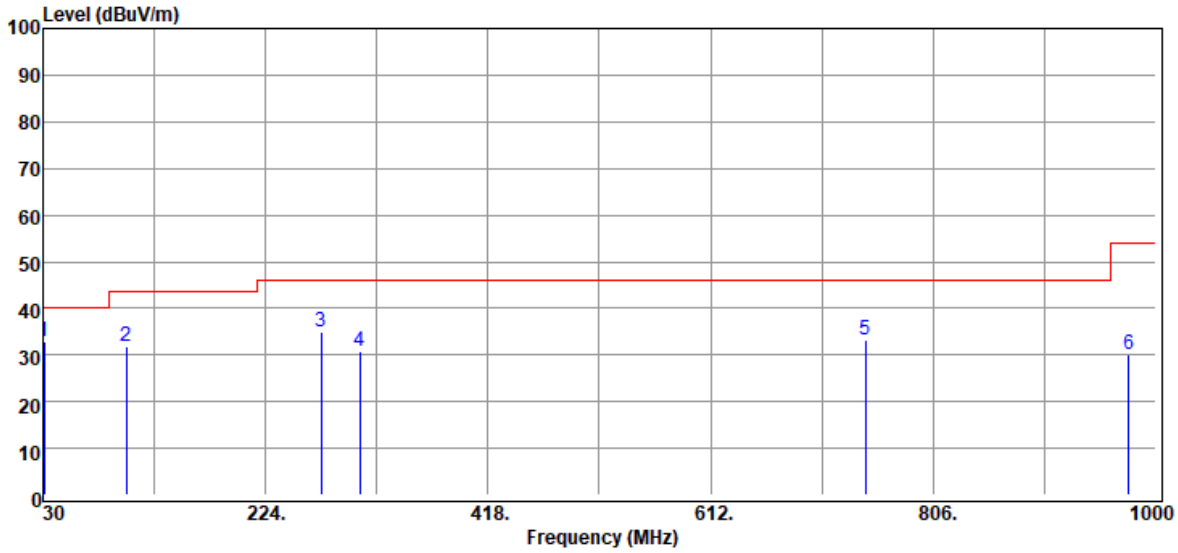
Report Number	:E2/2020/50123	Test Date	:2020-06-10
Operation Mode	:System	Temp./Humi.	:22.5/59
Test Frequency	:System	Antenna Pol.	:HORIZONTAL
Test Mode	:System	Engineer	:Ashton
EUT Pol	:E2 Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
30.97	Peak	36.79	-3.89	32.90	40.00	-7.10
102.75	Peak	46.93	-15.14	31.79	43.50	-11.71
272.50	Peak	46.06	-11.11	34.95	46.00	-11.05
306.45	Peak	41.28	-10.36	30.92	46.00	-15.08
746.83	Peak	34.94	-1.66	33.28	46.00	-12.72
976.72	Peak	28.56	1.69	30.25	54.00	-23.75

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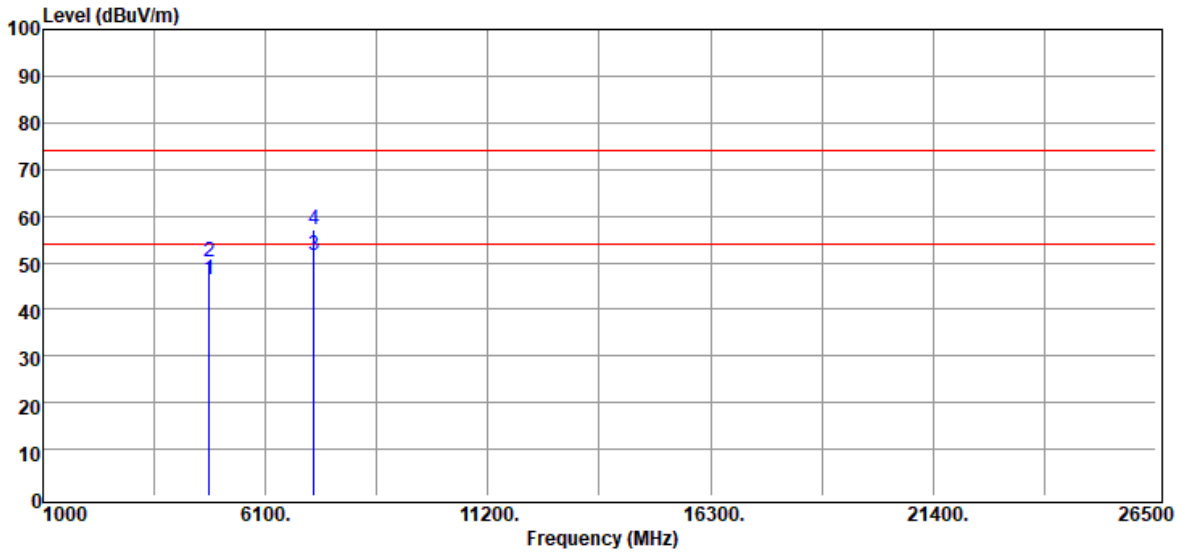
6.5.2 發射機場強輻射之量測結果(1GHz 以上)（最差模式）

Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.5/56
Test Frequency	:2402 MHz	Antenna Pol.	:VERTICAL
Test Mode	:TX CH LOW	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4804.00	Average	32.20	14.07	46.27	54.00	-7.73
4804.00	Peak	36.21	14.07	50.28	74.00	-23.72
7206.00	Average	30.79	20.82	51.61	54.00	-2.39
7206.00	Peak	36.16	20.82	56.98	74.00	-17.02

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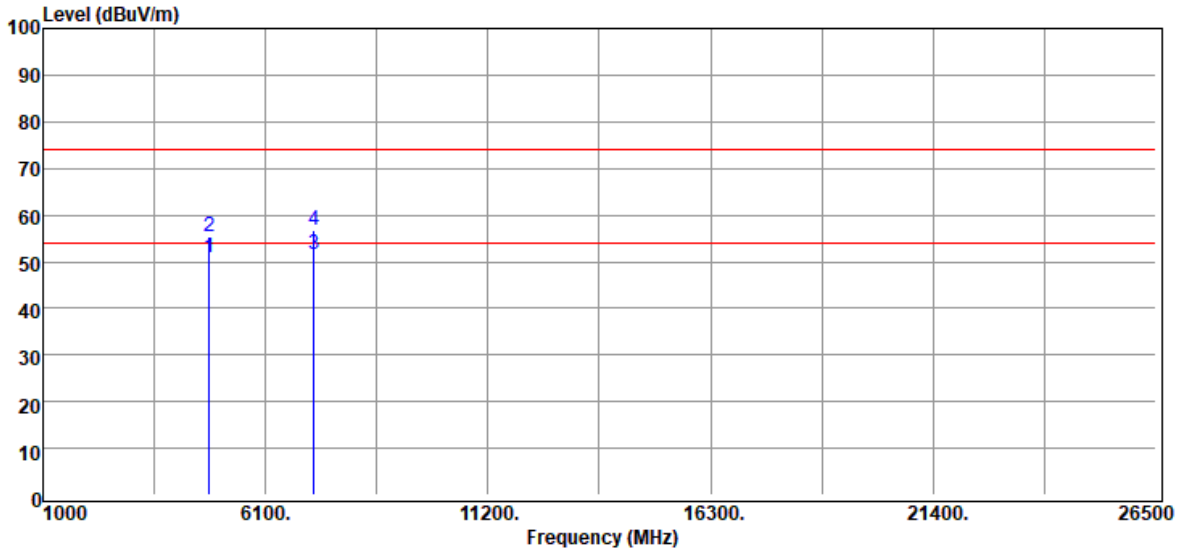
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.5/56
Test Frequency	:2402 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:TX CH LOW	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4804.00	Average	36.84	14.07	50.91	54.00	-3.09
4804.00	Peak	41.44	14.07	55.51	74.00	-18.49
7206.00	Average	30.58	20.82	51.40	54.00	-2.60
7206.00	Peak	36.01	20.82	56.83	74.00	-17.17

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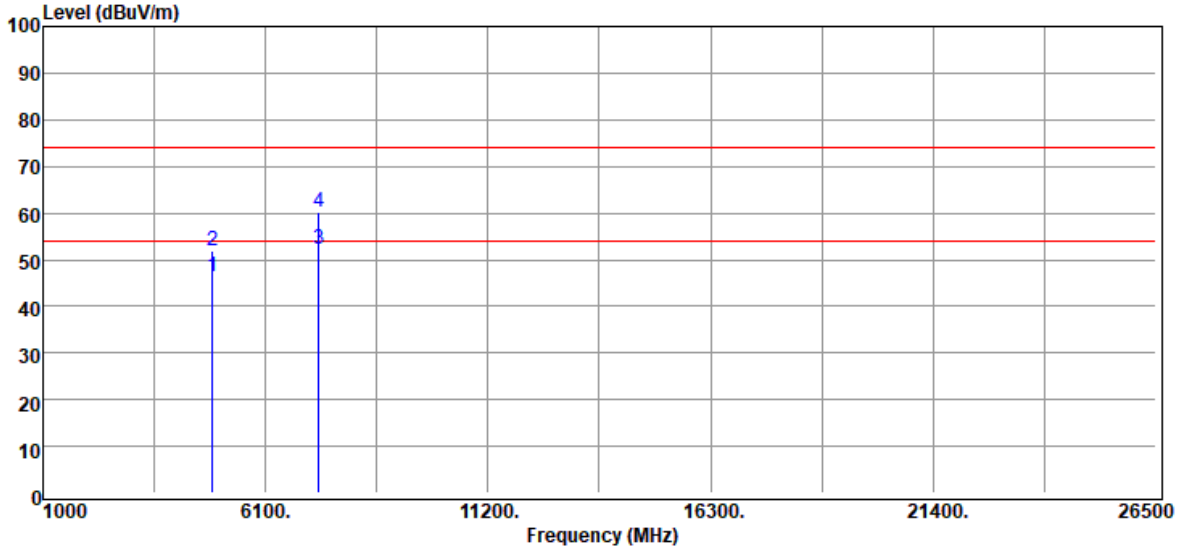
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.2/50
Test Frequency	:2441 MHz	Antenna Pol.	:VERTICAL
Test Mode	:TX CH MID	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4882.00	Average	32.31	14.21	46.52	54.00	-7.48
4882.00	Peak	37.76	14.21	51.97	74.00	-22.03
7323.00	Average	31.32	20.76	52.08	54.00	-1.92
7323.00	Peak	39.55	20.76	60.31	74.00	-13.69

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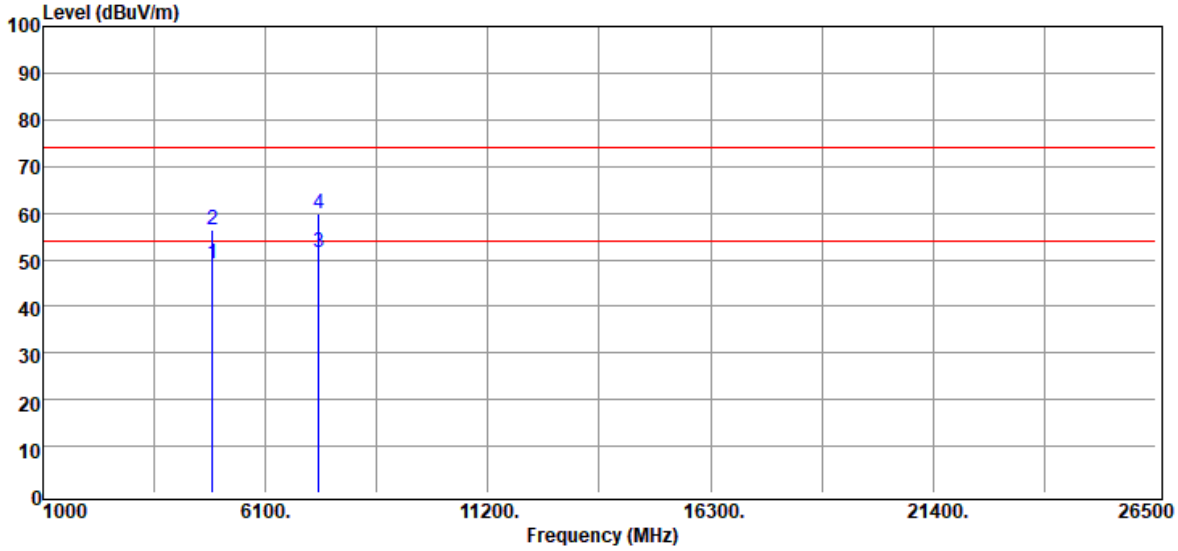
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.2/50
Test Frequency	:2441 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:TX CH MID	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4882.00	Average	34.97	14.21	49.18	54.00	-4.82
4882.00	Peak	42.04	14.21	56.25	74.00	-17.75
7323.00	Average	30.89	20.76	51.65	54.00	-2.35
7323.00	Peak	39.18	20.76	59.94	74.00	-14.06

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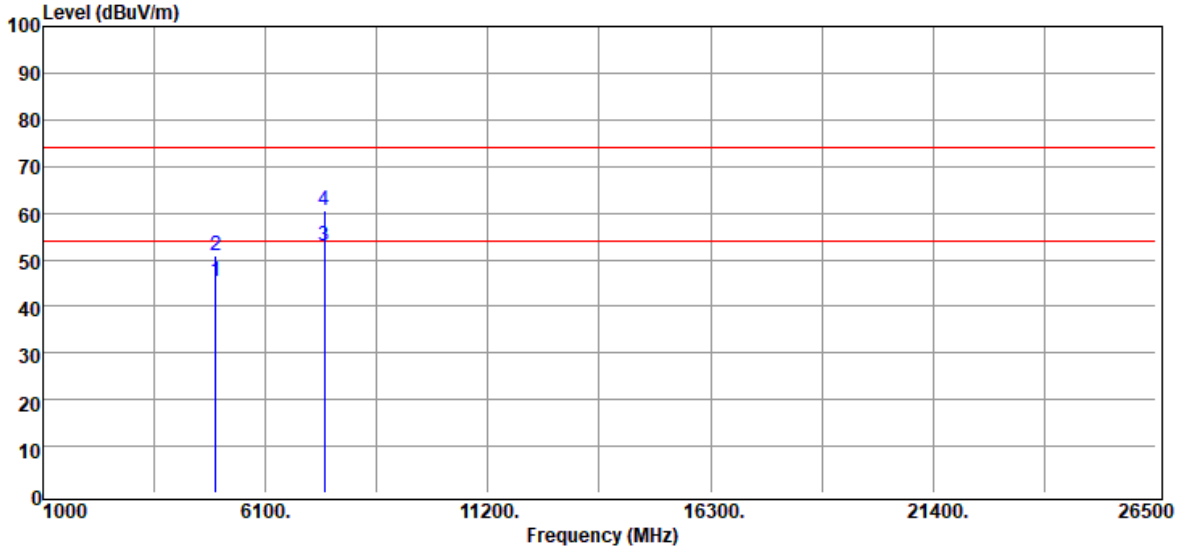
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.1/51
Test Frequency	:2480 MHz	Antenna Pol.	:VERTICAL
Test Mode	:TX CH HIGH	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4960.00	Average	31.14	14.13	45.27	54.00	-8.73
4960.00	Peak	36.66	14.13	50.79	74.00	-23.21
7440.00	Average	31.33	21.52	52.85	54.00	-1.15
7440.00	Peak	39.09	21.52	60.61	74.00	-13.39

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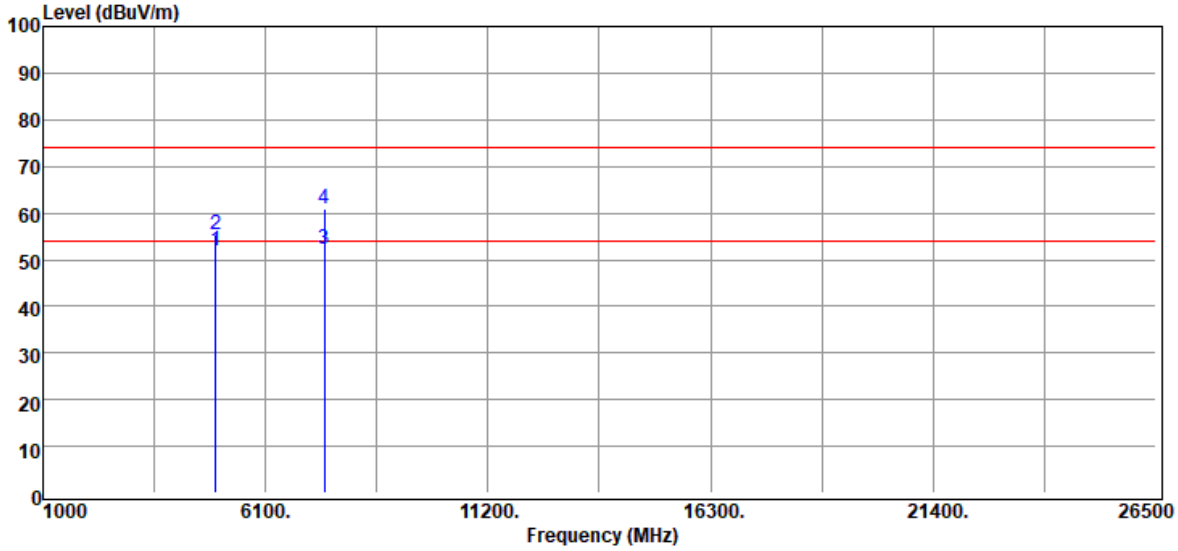
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.1/51
Test Frequency	:2480 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:TX CH HIGH	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4960.00	Average	37.77	14.13	51.90	54.00	-2.10
4960.00	Peak	41.07	14.13	55.20	74.00	-18.80
7440.00	Average	30.69	21.52	52.21	54.00	-1.79
7440.00	Peak	39.47	21.52	60.99	74.00	-13.01

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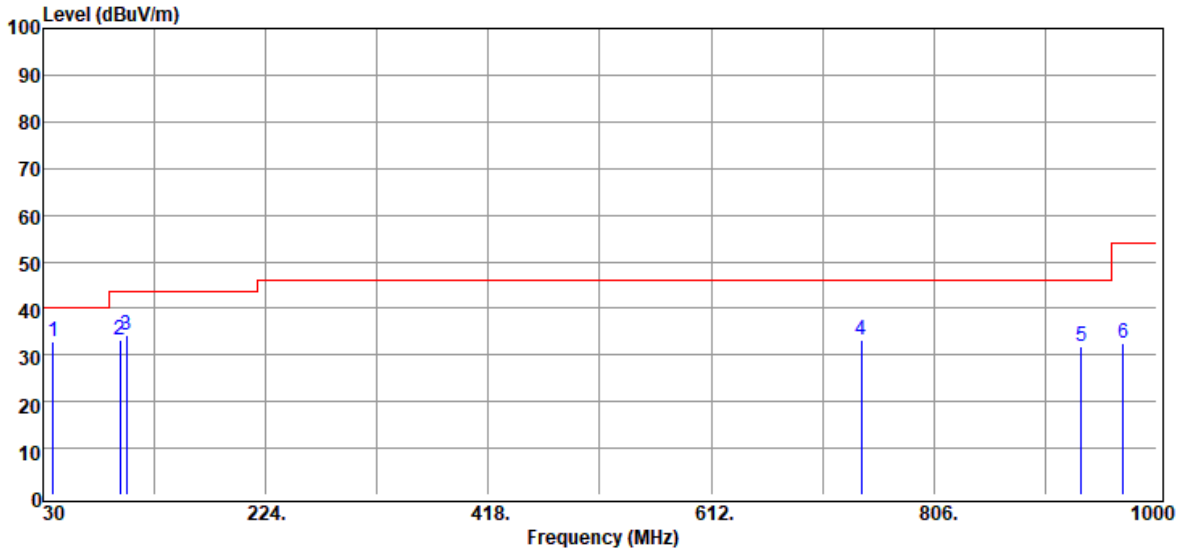
6.5.3 接收機場強輻射之量測結果(1GHz 以下)（最差模式

Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.5/59
Test Frequency	:2441 MHz	Antenna Pol.	:VERTICAL
Test Mode	:RX CH MID	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
38.73	Peak	40.71	-7.95	32.76	40.00	-7.24
96.93	Peak	49.47	-16.13	33.34	43.50	-10.16
102.75	Peak	49.38	-15.14	34.24	43.50	-9.26
742.95	Peak	34.92	-1.69	33.23	46.00	-12.77
934.04	Peak	30.56	1.33	31.89	46.00	-14.11
970.90	Peak	31.05	1.38	32.43	54.00	-21.57

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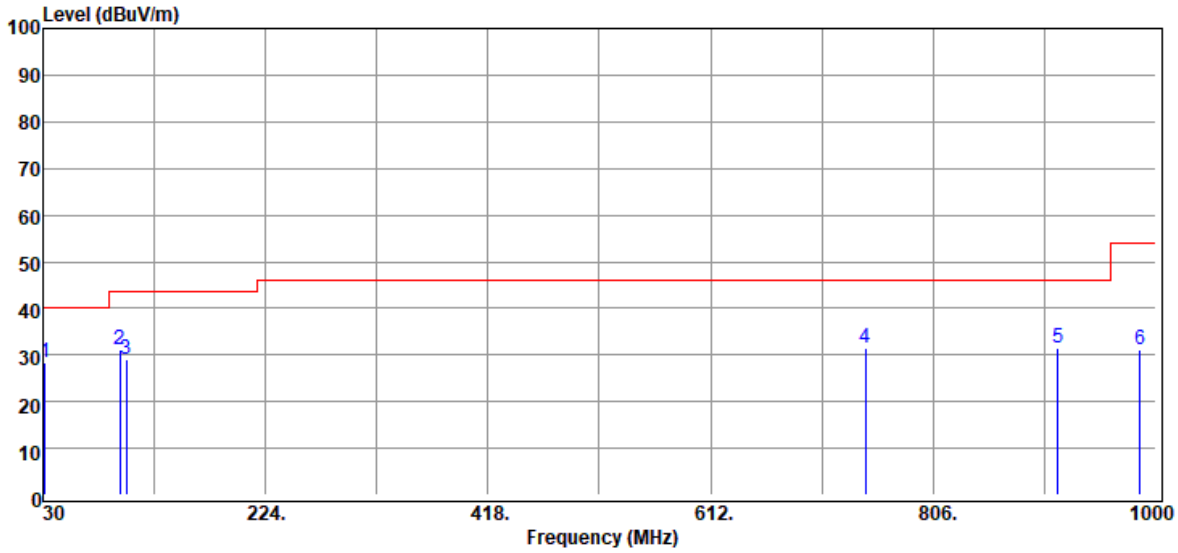
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.5/59
Test Frequency	:2441 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:RX CH MID	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
31.94	Peak	32.77	-4.26	28.51	40.00	-11.49
96.93	Peak	47.33	-16.13	31.20	43.50	-12.30
102.75	Peak	44.35	-15.14	29.21	43.50	-14.29
746.83	Peak	33.22	-1.66	31.56	46.00	-14.44
914.64	Peak	30.44	1.10	31.54	46.00	-14.46
986.42	Peak	29.29	1.76	31.05	54.00	-22.95

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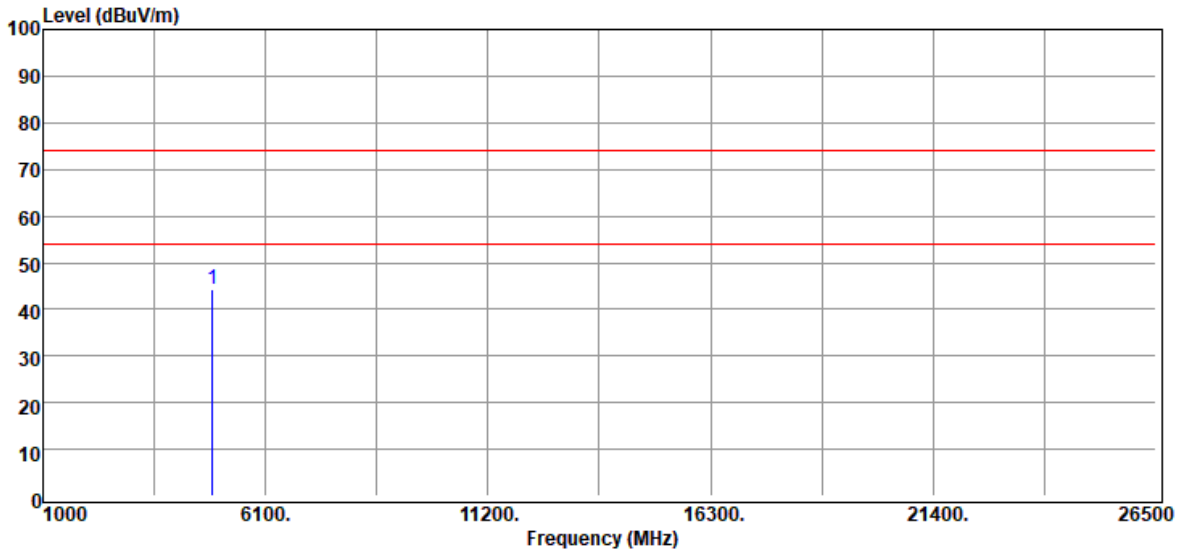
6.5.4 接收機場強輻射之量測結果(1GHz 以上)（最差模式）

Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.6/47
Test Frequency	:2441 MHz	Antenna Pol.	:VERTICAL
Test Mode	:RX CH MID	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4882.00	Peak	29.96	14.21	44.17	74.00	-29.83

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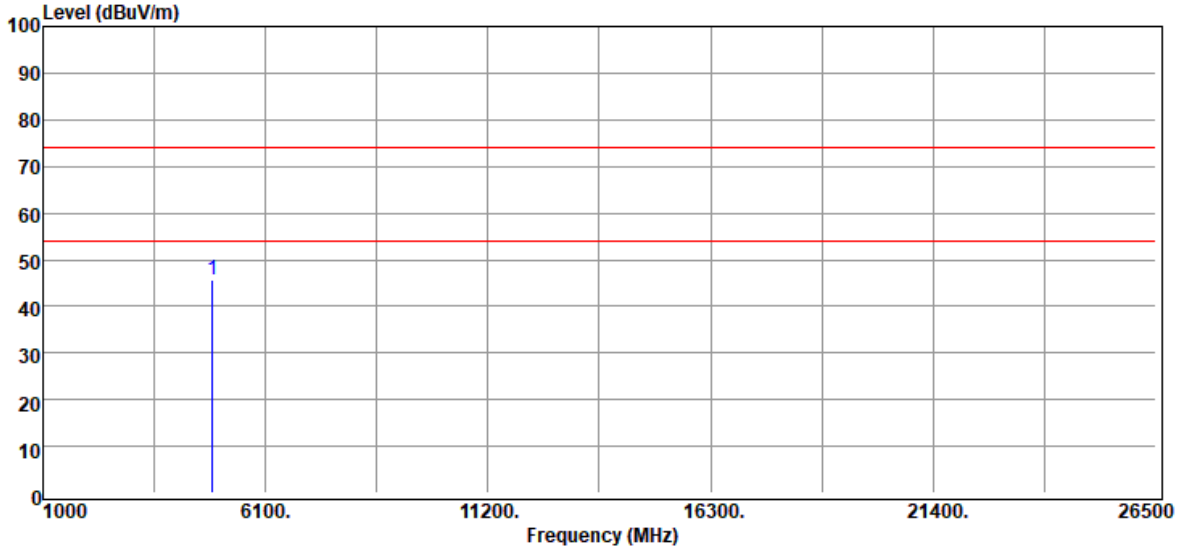
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.6/47
Test Frequency	:2441 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:RX CH MID	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
4882.00	Peak	31.50	14.21	45.71	74.00	-28.29

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7 天線增益之要求

7.1 適用標準

依據NCC低功率射頻電機技術規範3.10.1.3之規定，進行固定式點對點操作時，應符合下列情現之一：依據NCC低功率射頻電機技術規範3.10.1.3 (1)之規定，操作頻率為2400-2483.5兆赫(MHz)者，其發射天線之方向性增益超過6dBi，每超過3dB應降低1dB之最大傳導輸出功率。

依據NCC低功率射頻電機技術規範3.10.1.3 (2)之規定，操作頻率為5725-5850兆赫(MHz)者，其發射天線之方向性增益超過6dBi，不需降低最大傳導輸出功率。

依據NCC低功率射頻電機技術規範3.10.1.3 (3)之規定，用於點對多點操作時，如其發射天線之方向性增益超過 6dBi，應依所超過之dB數等量降低最大傳導輸出功率。

註：固定式點對點操作使用方式，並不包括使用點對多點之系統、全向性之應用以及發射相同資訊之共同安裝的多重發射機。展頻或數位調變之發射器需要專業安裝，該設備操作者或安裝者有責任確認該系統是限用於固定式、點對點之操作，隨機所附之使用手冊必須包含此訊息以告知使用者或安裝者須負之責任。

7.2 天線增益

此裝置使用天線如下

天線型式/天線增益	Integral Antenna, Gain: 0.64dBi Model No.: N/A; Supplier: SKULLCANDY, INC.

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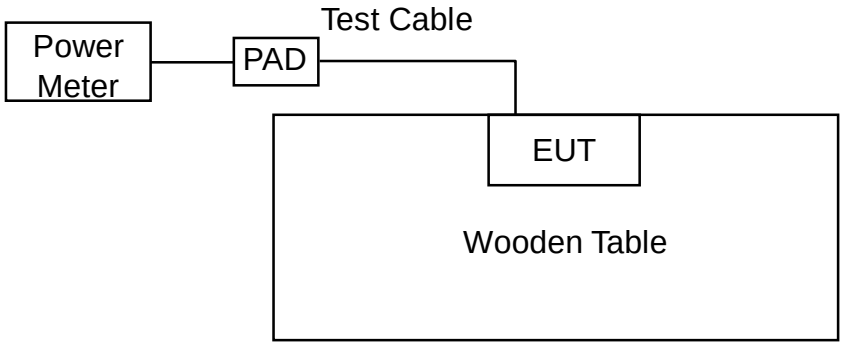
8 輸出峰值功率之量測

8.1 適用標準

依據 NCC 低功率射頻電機技術規範 3.10.1.2 (A)之規定，操作於 2400-2483.5 MHz，並至少使用 75 個跳頻頻道之跳頻系統，其峰值輸出功率不得大於 1 Watt。除前項 3.10.1.2 (A) 以外，依 3.10.1.6(2)(B)其他限制事項 3.10.1.6(1)(A)，所有操作於 2400-2483.5 兆赫(MHz)之跳頻系統：0.125 瓦(W)(含)以下，且其所使用天線之增益不可大於 6dBi；若使用大於 6dBi 增益之天線，則其輸出峰值功率相對需衰減天線增益所增加之量(單位為 dB)。

8.2 輸出功率之測試配置



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8.3 輸出功率之量測結果

1M BR mode (Peak):

Channel	Frequency (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	2.75	1.884	125
39	2441.00	3.70	2.344	125
78	2480.00	**4.48**	2.805	125

1M BR mode (Average):

Channel	Frequency (MHz)	Max. Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	2.70	1.861	125
39	2441.00	3.67	2.326	125
78	2480.00	4.42	2.765	125

2M EDR mode (Peak):

Channel	Frequency (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	2.68	1.854	125
39	2441.00	3.69	2.339	125
78	2480.00	**4.40**	2.754	125

2M EDR mode (Average):

Channel	Frequency (MHz)	Max. Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	2.58	1.810	125
39	2441.00	3.52	2.247	125
78	2480.00	4.33	2.708	125

3M EDR mode (Peak):

Channel	Frequency (MHz)	Peak Output Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	2.66	1.845	125
39	2441.00	3.68	2.333	125
78	2480.00	**4.42**	2.767	125

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3M EDR mode (Average):

Channel	Frequency (MHz)	Max. Output include tune up tolerance Power (dBm)	Output Power (mW)	Limit (mW)
0	2402.00	2.60	1.821	125
39	2441.00	3.61	2.298	125
78	2480.00	4.33	2.713	125

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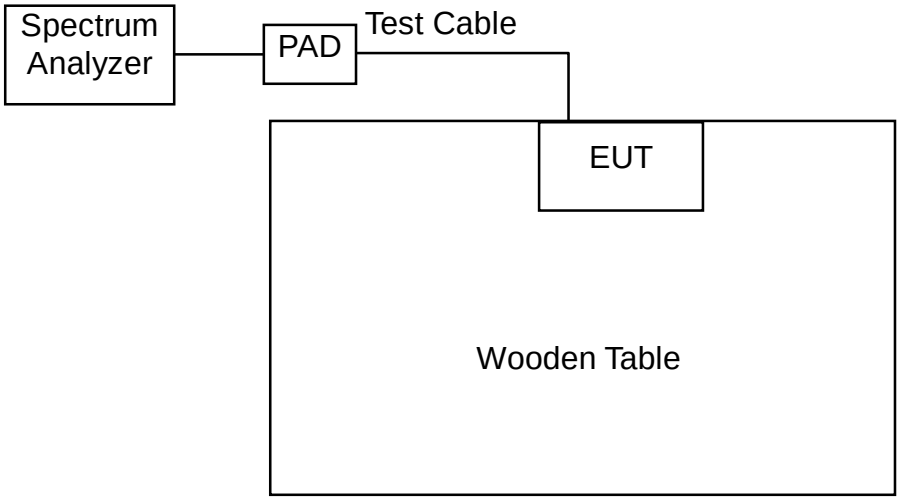
9 開放頻帶邊緣 100KHZ 頻寬內之限制

9.1 適用標準

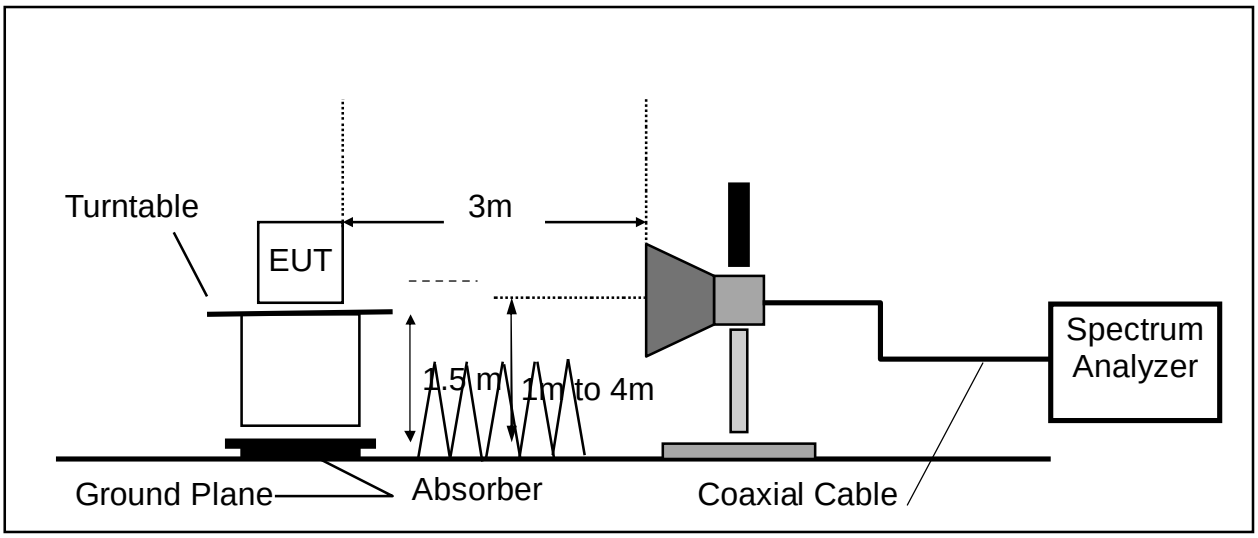
依據 NCC 低功率射頻電機技術規範 3.10.1.5 之規定，發射器所產生的射頻功率相較於使用頻帶範圍中包含最高所需功率之 100 千赫內的射頻功率，須衰減 20 分貝(dB)。

9.2 開放頻帶邊緣之測試配置

a. 頻帶外發射傳導量測值



b. 禁用頻帶輻射量測值之測試配置



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9.3 開放頻帶邊緣之量測結果

發射限制測試值 CH-1(下邊緣頻帶): 在 2400.00MHz 之 100kHz 頻寬內最大值皆比主波低 20dB 以上。
發射限制測試值 CH-79(上邊緣頻帶): 在 2483.5MHz 之 100kHz 頻寬內最大值皆比主波低 20dB 以上。
請參考附圖。

註: 此裝置有 EDR 功能，比較 BR mode 及 EDR mode 測試值後附上最差模式 BR mode 數據。

Note: Actual FS(dBµV/m) = SPA. Reading level(dBµV) + Factor(dB)
Factor(dB) = Antenna Factor(dBµV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

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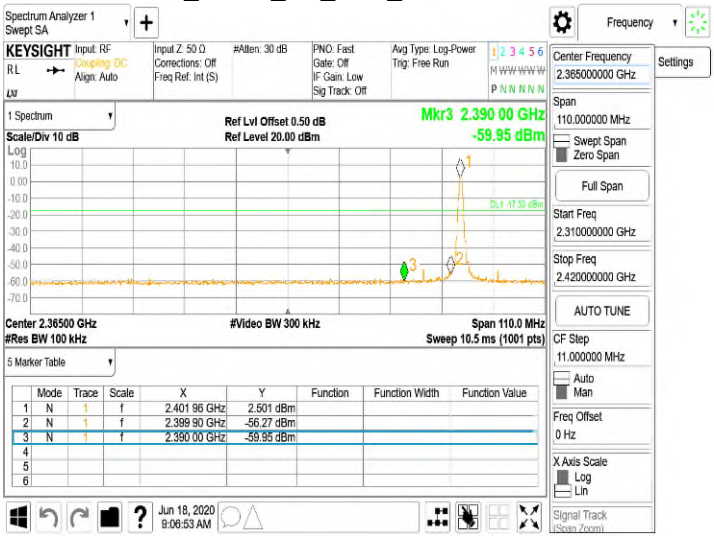
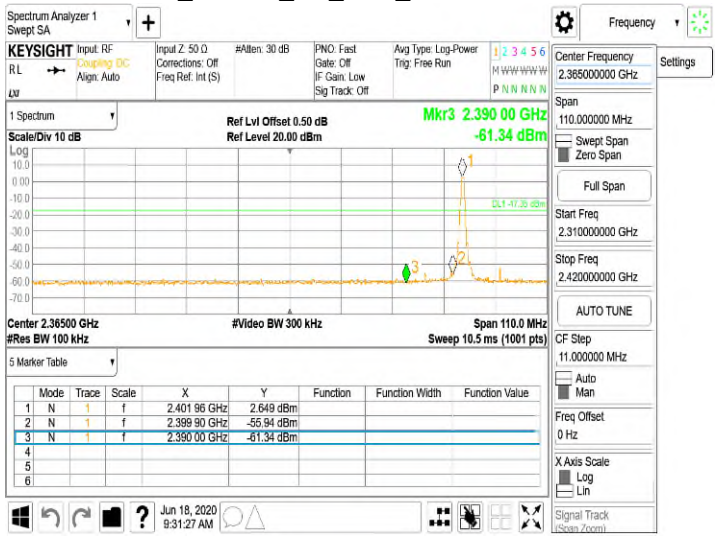
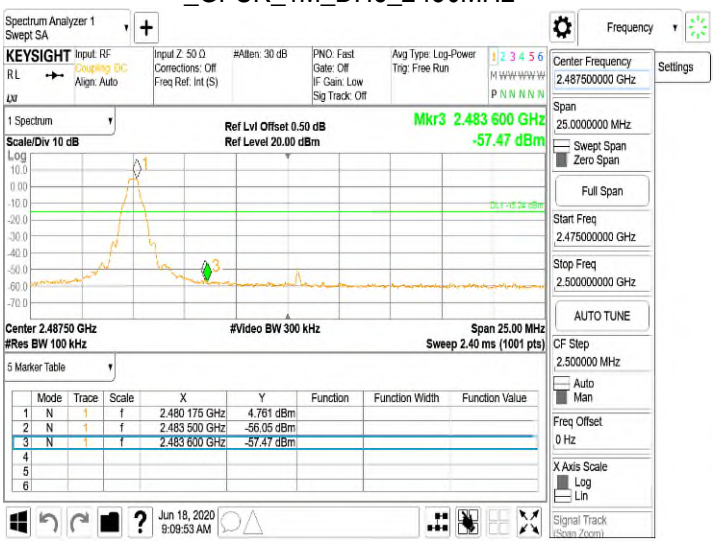
開放頻帶邊緣 100KHz 頻寬內之限制
_GFSK_1M_DH5_2402MHz



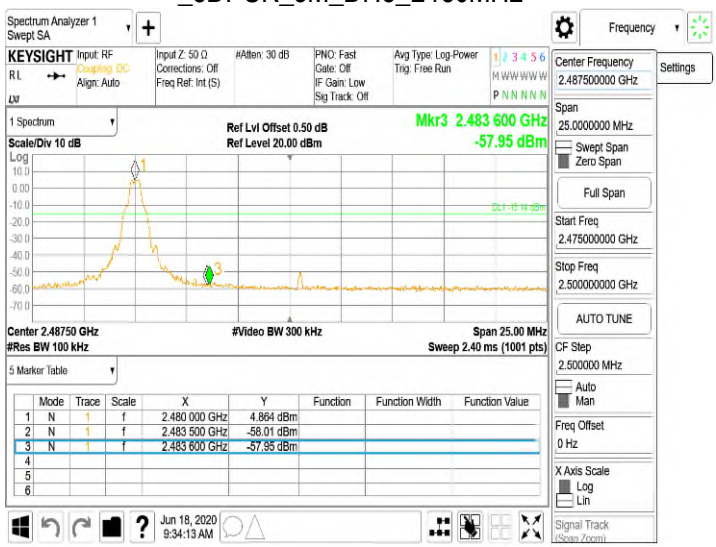
開放頻帶邊緣 100KHz 頻寬內之限制
_8DPSK_3M_DH5_2402MHz



開放頻帶邊緣 100KHz 頻寬內之限制
_GFSK_1M_DH5_2480MHz



開放頻帶邊緣 100KHz 頻寬內之限制
_8DPSK_3M_DH5_2480MHz



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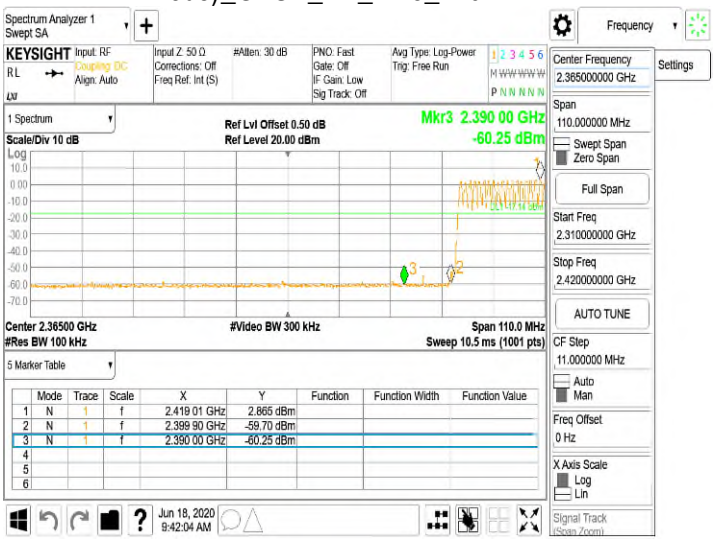
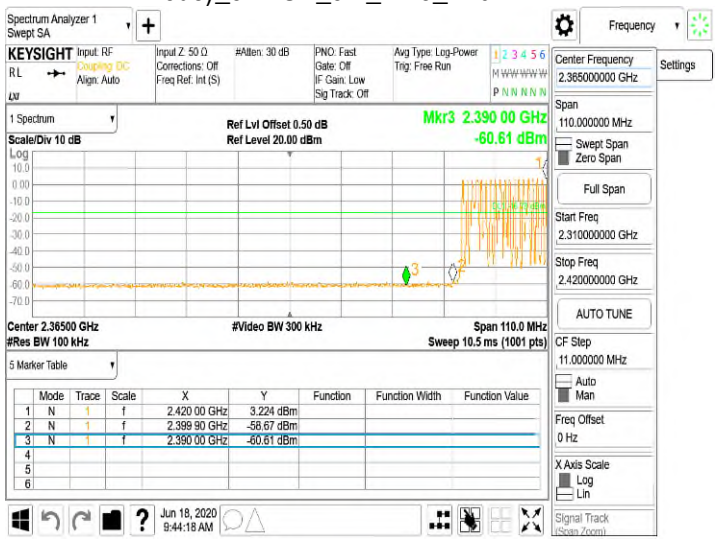
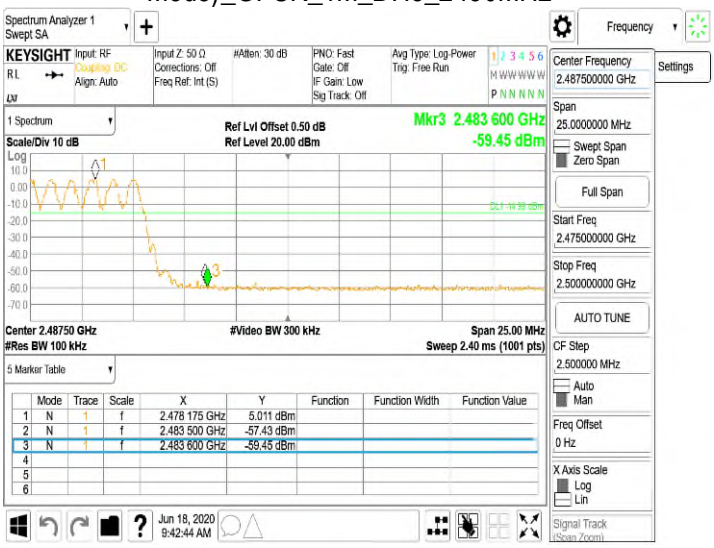
開放頻帶邊緣 100KHz 頻寬內之限制(Hopping Mode)_GFSK_1M_DH5_2402MHz



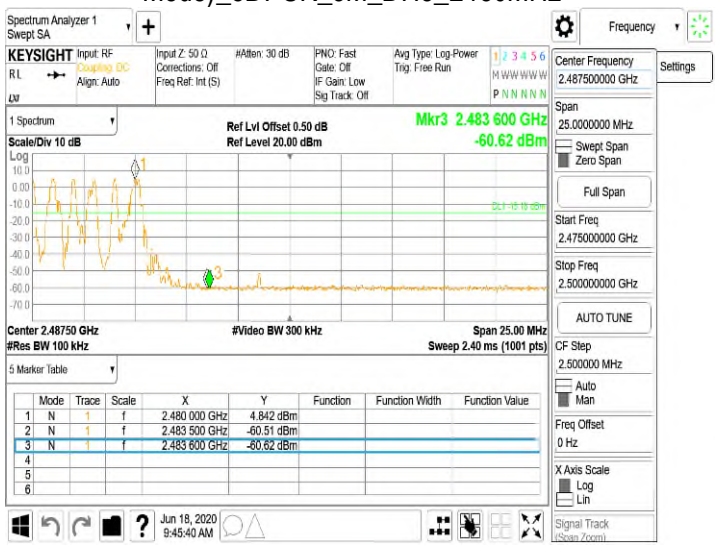
開放頻帶邊緣 100KHz 頻寬內之限制(Hopping Mode)_8DPSK_3M_DH5_2402MHz



開放頻帶邊緣 100KHz 頻寬內之限制(Hopping Mode)_GFSK_1M_DH5_2480MHz



開放頻帶邊緣 100KHz 頻寬內之限制(Hopping Mode)_8DPSK_3M_DH5_2480MHz



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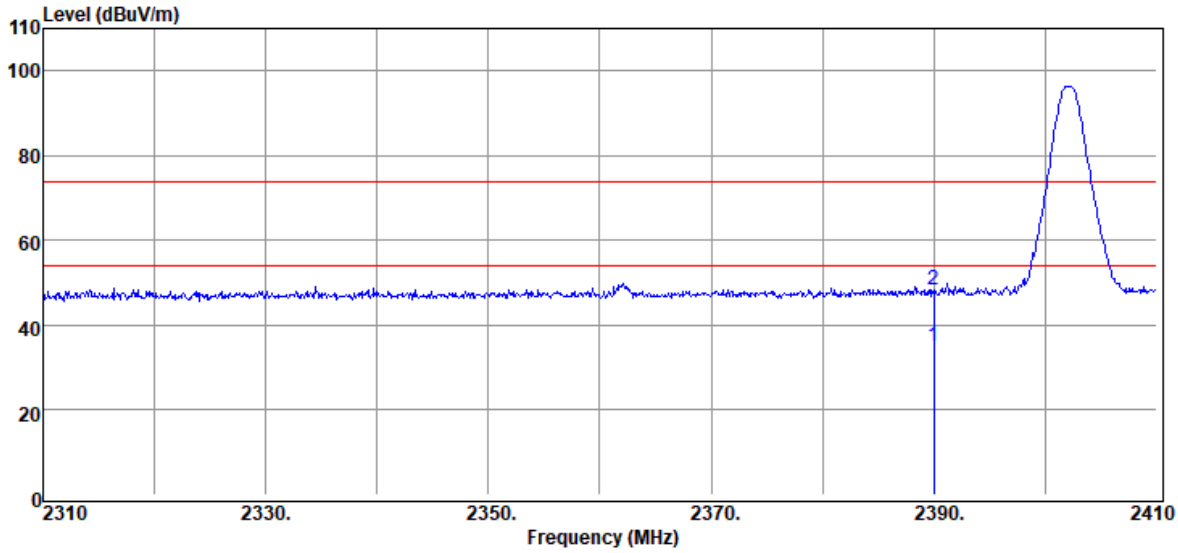
9.3.1 禁用頻帶輻射量測值

Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:23.1/49
Test Frequency	:2402 MHz	Antenna Pol.	:VERTICAL
Test Mode	:BE CH LOW	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	31.42	3.76	35.18	54.00	-18.82
2390.00	Peak	44.54	3.76	48.30	74.00	-25.70

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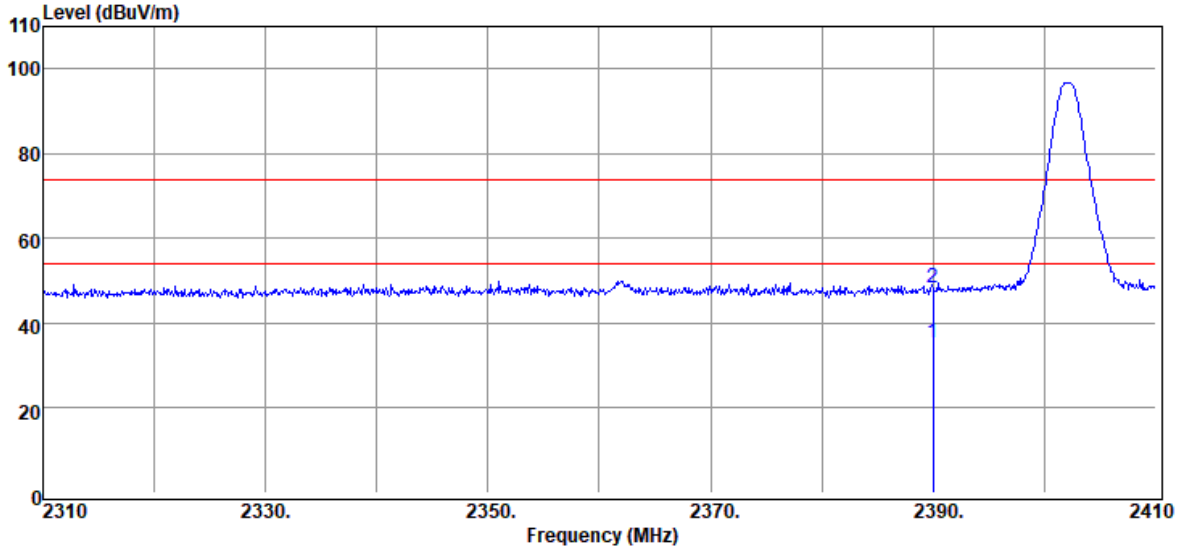
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:23.1/49
Test Frequency	:2402 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:BE CH LOW	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	31.61	3.76	35.37	54.00	-18.63
2390.00	Peak	44.53	3.76	48.29	74.00	-25.71

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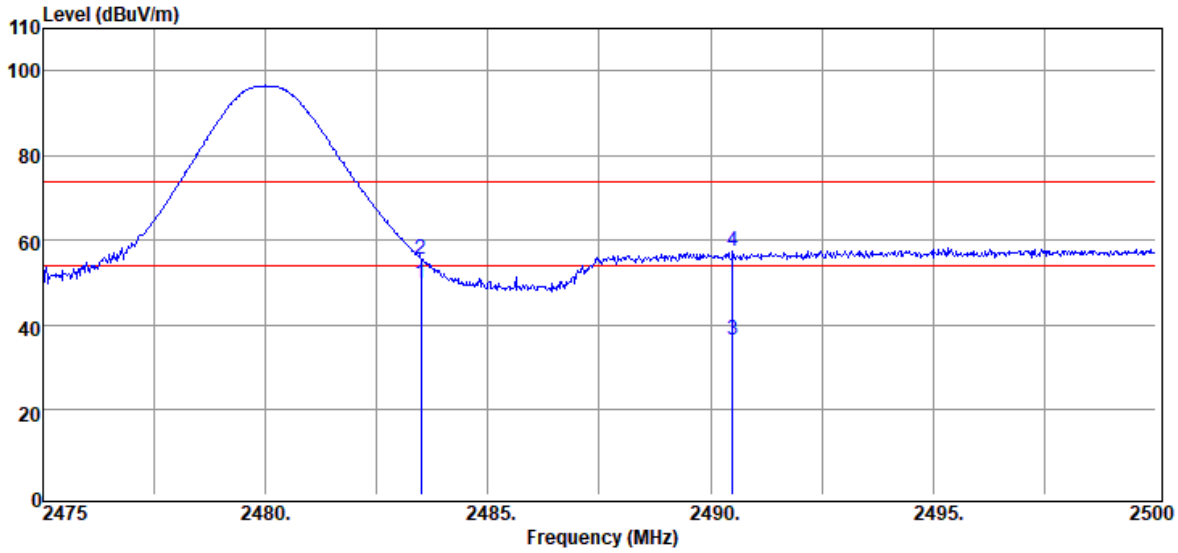
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.8/47
Test Frequency	:2480 MHz	Antenna Pol.	:VERTICAL
Test Mode	:BE CH HIGH	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	45.26	4.42	49.68	54.00	-4.32
2483.50	Peak	51.25	4.42	55.67	74.00	-18.33
2490.50	Average	32.19	4.49	36.68	54.00	-17.32
2490.50	Peak	52.82	4.49	57.31	74.00	-16.69

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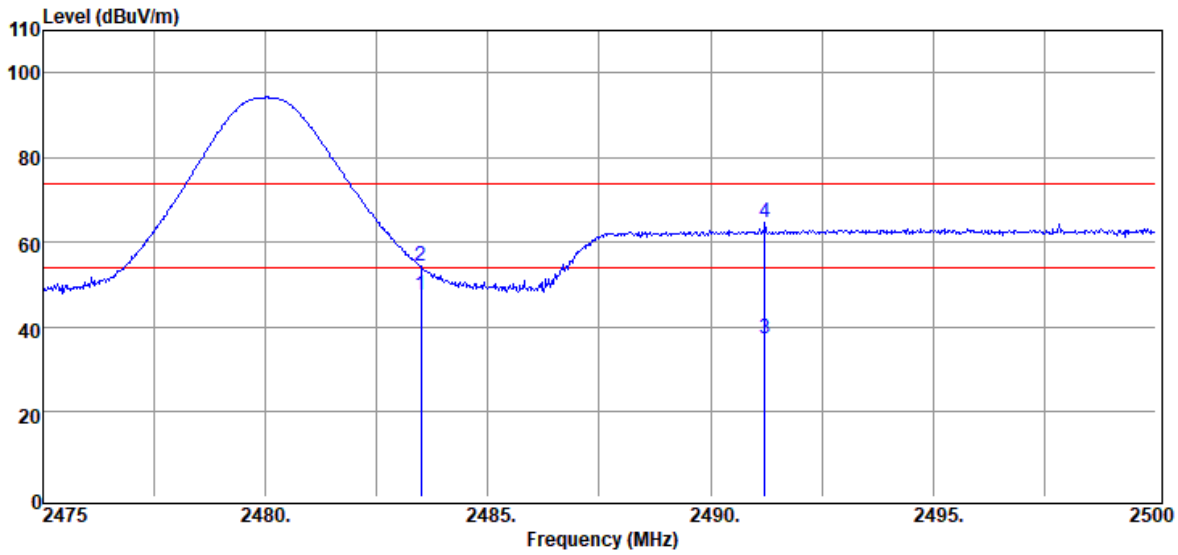
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR	Temp./Humi.	:22.8/47
Test Frequency	:2480 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:BE CH HIGH	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	43.30	4.42	47.72	54.00	-6.28
2483.50	Peak	49.87	4.42	54.29	74.00	-19.71
2491.23	Average	32.89	4.49	37.38	54.00	-16.62
2491.23	Peak	60.11	4.49	64.60	74.00	-9.40

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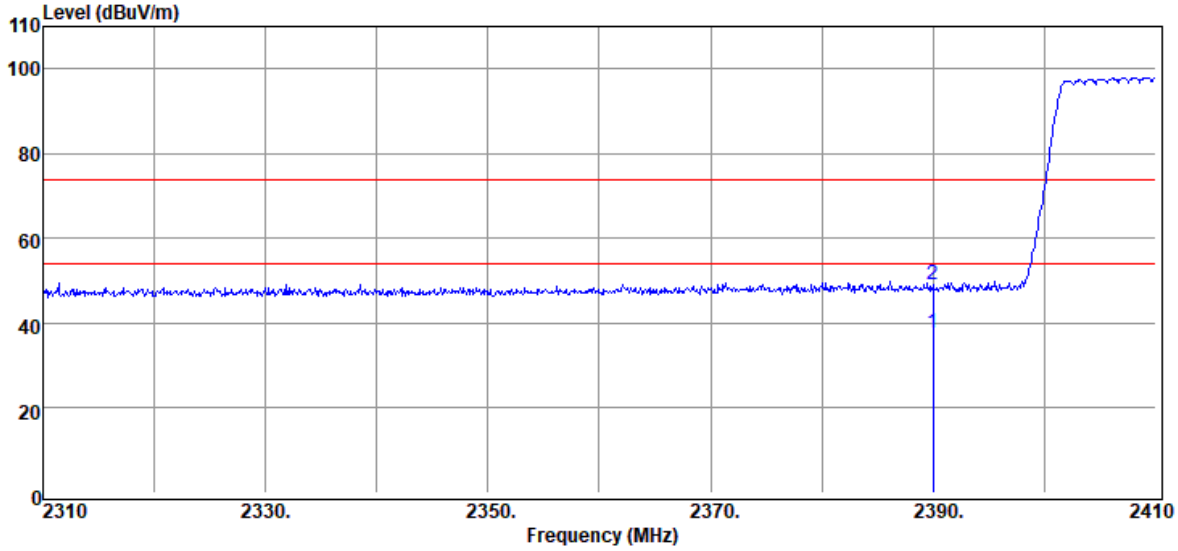
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR Hopping	Temp./Humi.	:22.7/47
Test Frequency	:2402 MHz	Antenna Pol.	:VERTICAL
Test Mode	:BE CH LOW	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	33.98	3.76	37.74	54.00	-16.26
2390.00	Peak	45.16	3.76	48.92	74.00	-25.08

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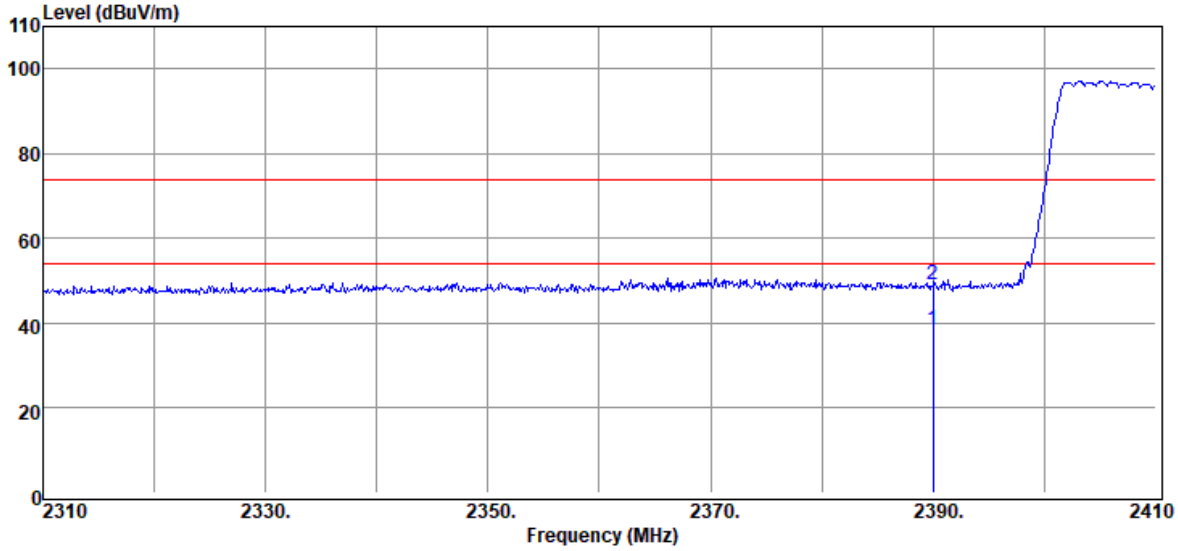
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR Hopping	Temp./Humi.	:22.7/47
Test Frequency	:2402 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:BE CH LOW	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	34.52	3.76	38.28	54.00	-15.72
2390.00	Peak	45.27	3.76	49.03	74.00	-24.97

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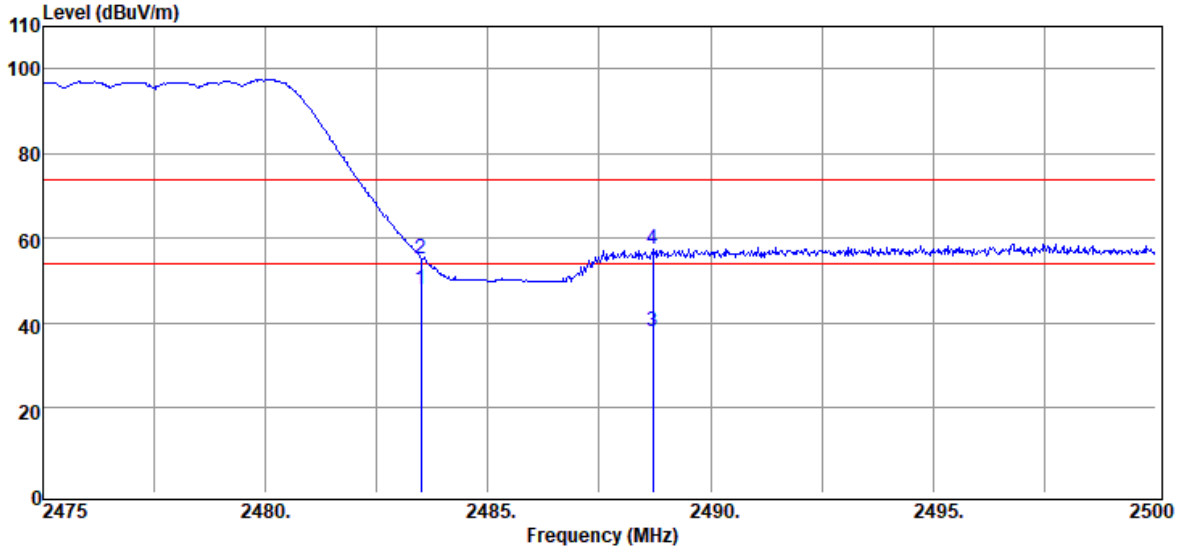
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR Hopping	Temp./Humi.	:22.7/47
Test Frequency	:2480 MHz	Antenna Pol.	:VERTICAL
Test Mode	:BE CH HIGH	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	43.54	4.48	48.02	54.00	-5.98
2483.50	Peak	50.94	4.42	55.36	74.00	-18.64
2488.70	Average	33.45	4.48	37.93	54.00	-16.07
2488.70	Peak	53.13	4.48	57.61	74.00	-16.39

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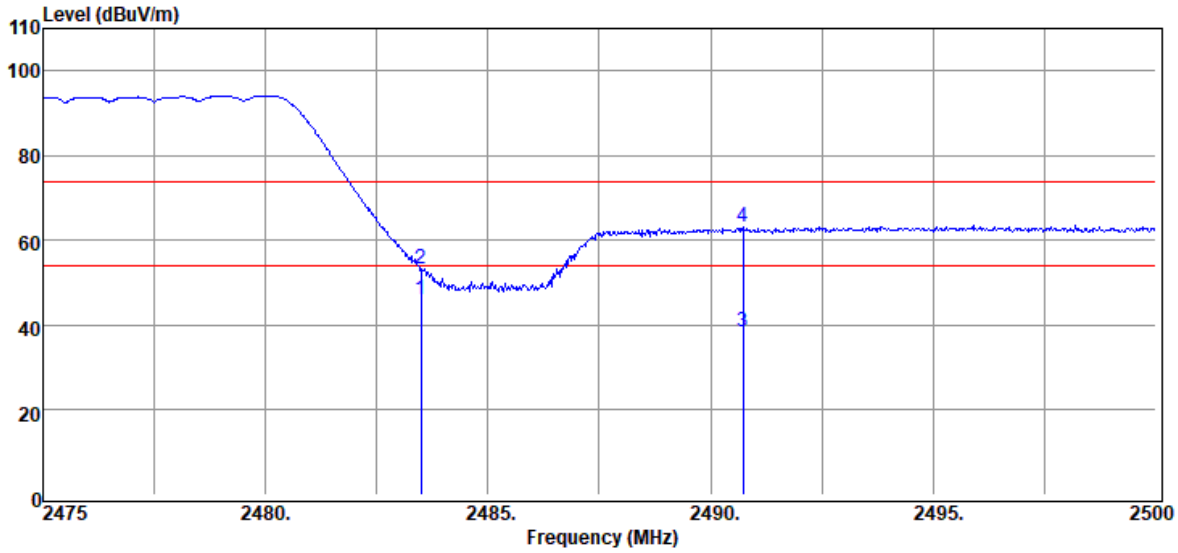
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT BR Hopping	Temp./Humi.	:22.7/47
Test Frequency	:2480 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:BE CH HIGH	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	41.76	4.42	46.18	54.00	-7.82
2483.50	Peak	49.04	4.42	53.46	74.00	-20.54
2490.73	Average	34.02	4.49	38.51	54.00	-15.49
2490.73	Peak	58.87	4.49	63.36	74.00	-10.64

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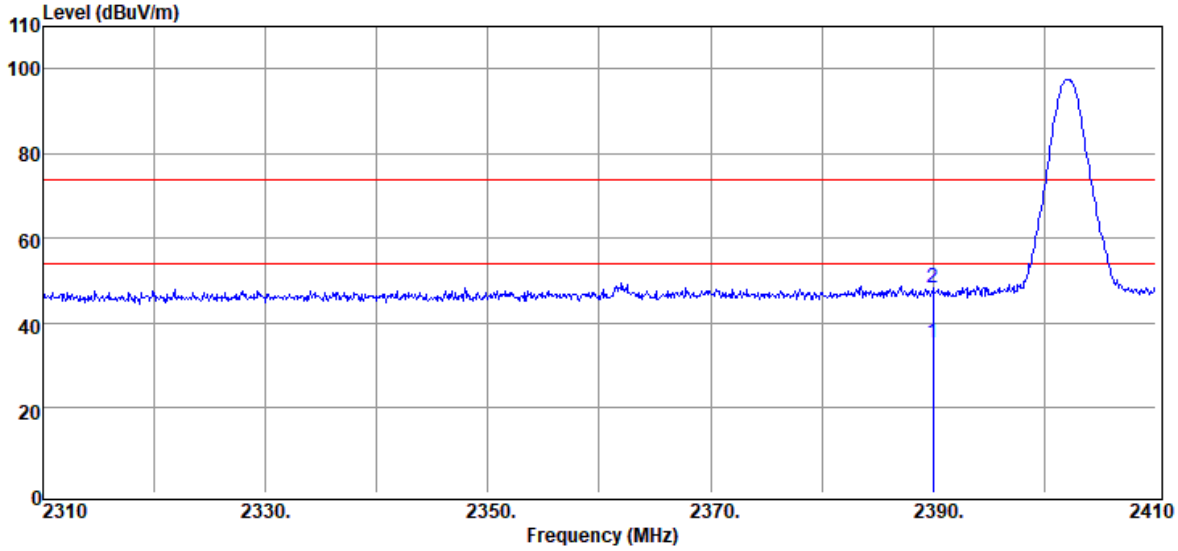
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT EDR	Temp./Humi.	:22.5/50
Test Frequency	:2402 MHz	Antenna Pol.	:VERTICAL
Test Mode	:BE CH LOW	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	31.59	3.76	35.35	54.00	-18.65
2390.00	Peak	44.59	3.76	48.35	74.00	-25.65

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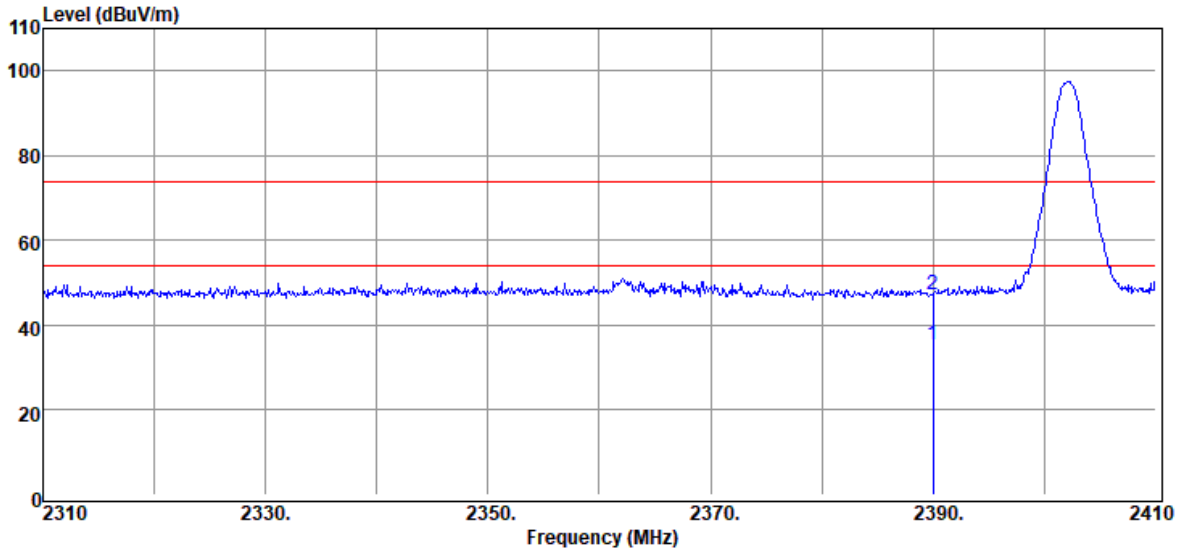
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT EDR	Temp./Humi.	:22.5/50
Test Frequency	:2402 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:BE CH LOW	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	31.80	3.76	35.56	54.00	-18.44
2390.00	Peak	43.53	3.76	47.29	74.00	-26.71

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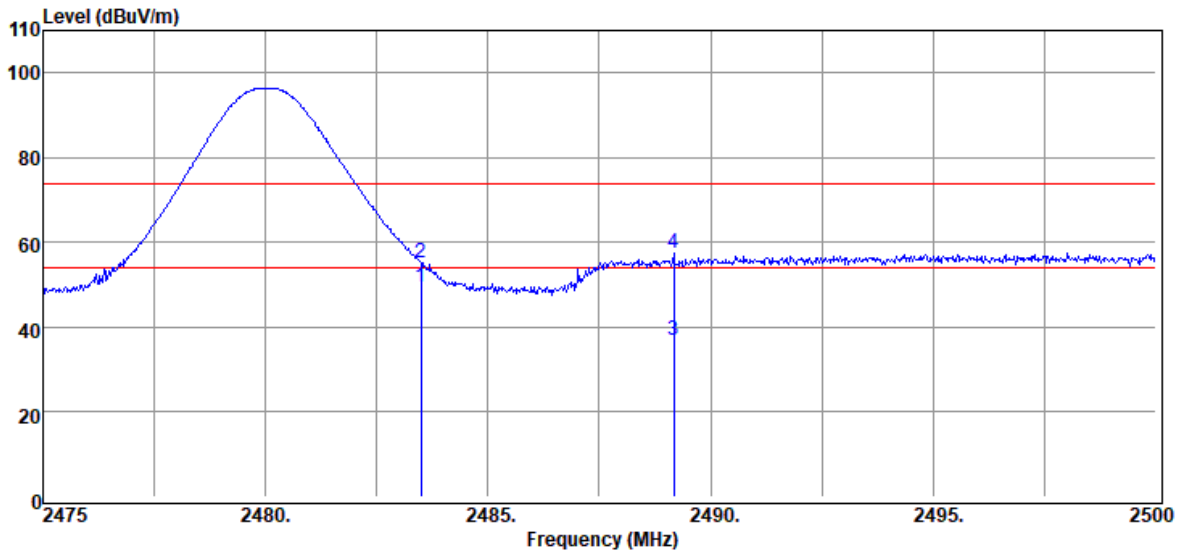
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT EDR	Temp./Humi.	:22.4/50
Test Frequency	:2480 MHz	Antenna Pol.	:VERTICAL
Test Mode	:BE CH HIGH	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	45.15	4.42	49.57	54.00	-4.43
2483.50	Peak	50.58	4.42	55.00	74.00	-19.00
2489.18	Average	32.39	4.48	36.87	54.00	-17.13
2489.18	Peak	53.06	4.48	57.54	74.00	-16.46

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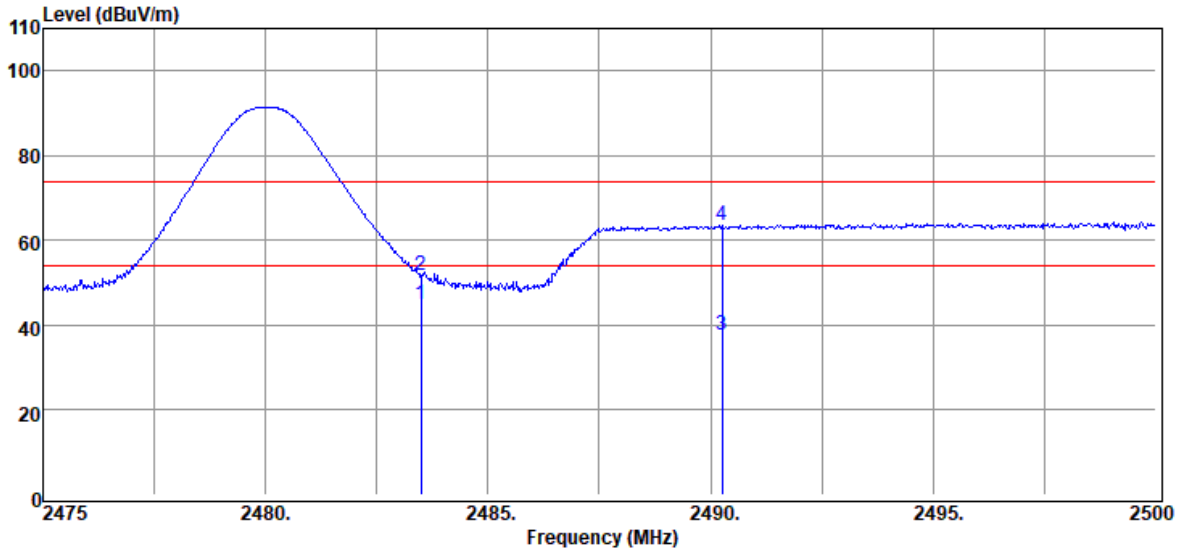
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT EDR	Temp./Humi.	:22.4/50
Test Frequency	:2480 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:BE CH HIGH	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	40.58	4.42	45.00	54.00	-9.00
2483.50	Peak	47.24	4.42	51.66	74.00	-22.34
2490.25	Average	33.14	4.49	37.63	54.00	-16.37
2490.25	Peak	59.13	4.49	63.62	74.00	-10.38

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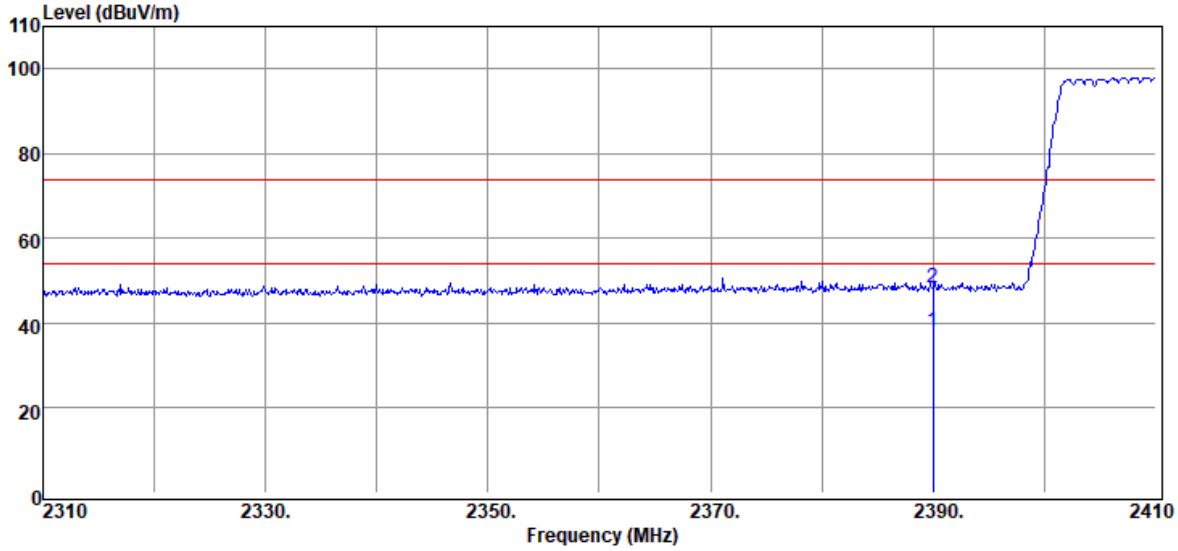
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT EDR Hopping	Temp./Humi.	:22.4/50
Test Frequency	:2402 MHz	Antenna Pol.	:VERTICAL
Test Mode	:BE CH LOW	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	34.35	3.76	38.11	54.00	-15.89
2390.00	Peak	44.51	3.76	48.27	74.00	-25.73

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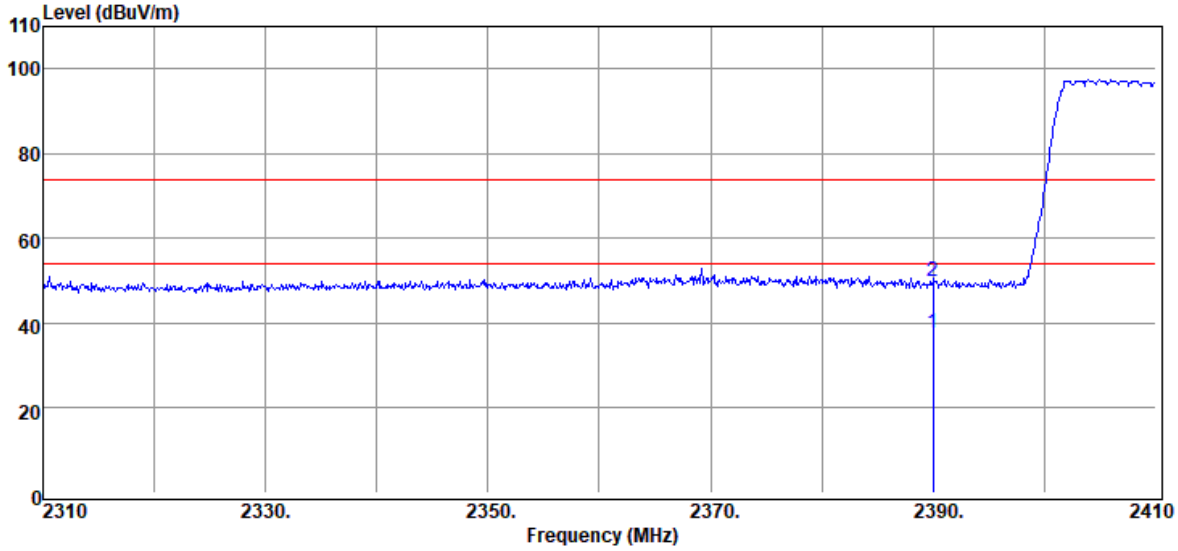
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT EDR Hopping	Temp./Humi.	:22.4/50
Test Frequency	:2402 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:BE CH LOW	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2390.00	Average	33.79	3.76	37.55	54.00	-16.45
2390.00	Peak	45.93	3.76	49.69	74.00	-24.31

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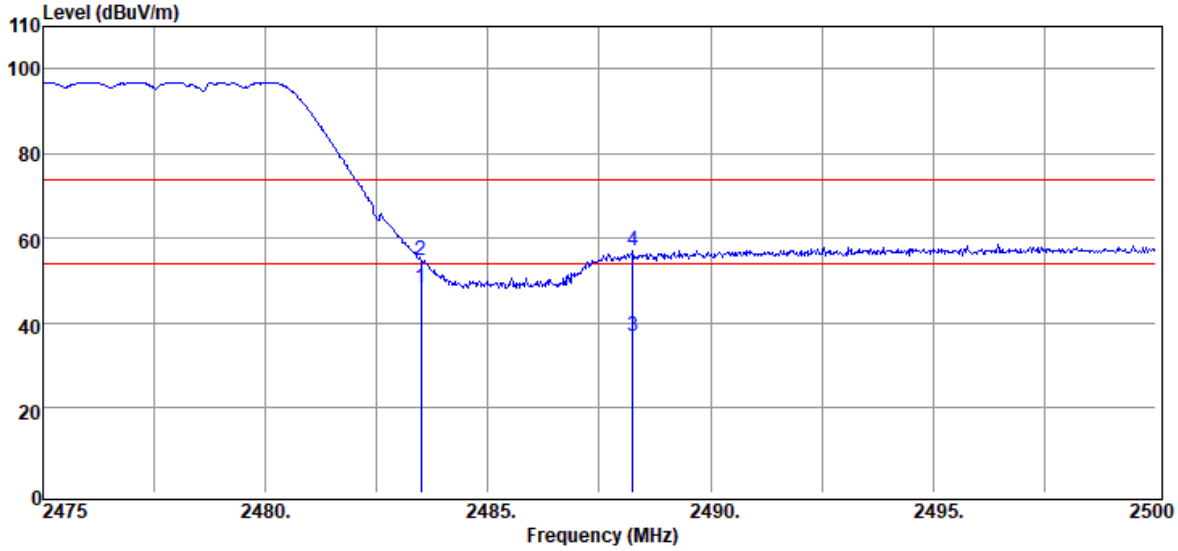
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT EDR Hopping	Temp./Humi.	:22.4/50
Test Frequency	:2480 MHz	Antenna Pol.	:VERTICAL
Test Mode	:BE CH HIGH	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	43.86	4.42	48.28	54.00	-5.72
2483.50	Peak	50.52	4.42	54.94	74.00	-19.06
2488.25	Average	32.47	4.46	36.93	54.00	-17.07
2488.25	Peak	52.80	4.46	57.26	74.00	-16.74

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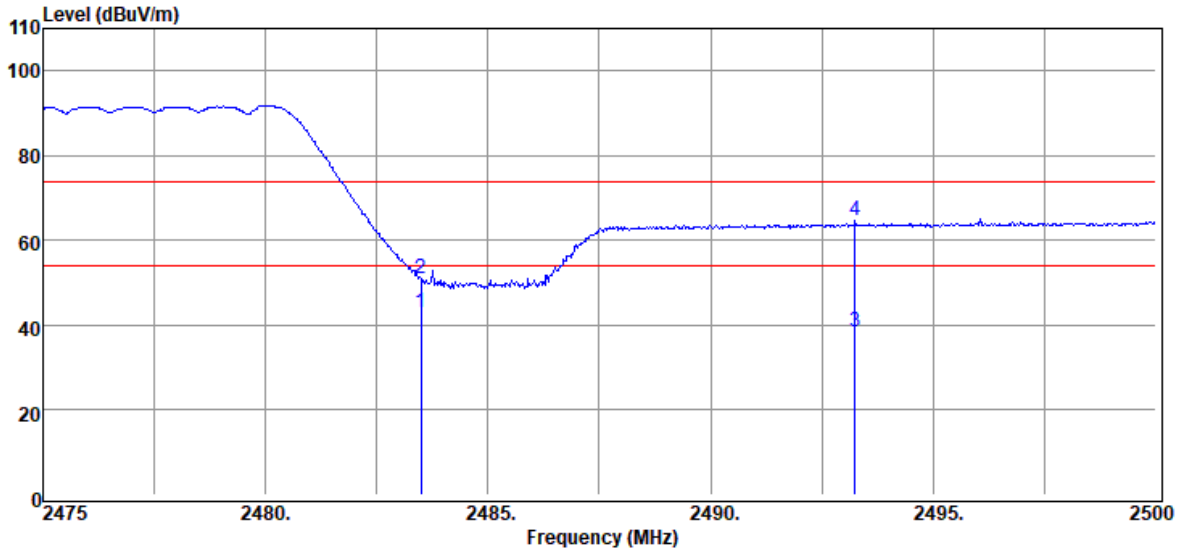
Report Number	:E2/2020/50121	Test Date	:2020-06-12
Operation Mode	:BT EDR Hopping	Temp./Humi.	:22.4/50
Test Frequency	:2480 MHz	Antenna Pol.	:HORIZONTAL
Test Mode	:BE CH HIGH	Engineer	:Ashton
EUT Pol	:H Plan		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Reading Level dBµV	Factor dB	Actual FS dBµV/m	Limit @3m dBµV/m	Margin dB
2483.50	Average	38.76	4.42	43.18	54.00	-10.82
2483.50	Peak	46.47	4.42	50.89	74.00	-23.11
2493.25	Average	33.87	4.52	38.39	54.00	-15.61
2493.25	Peak	60.22	4.52	64.74	74.00	-9.26

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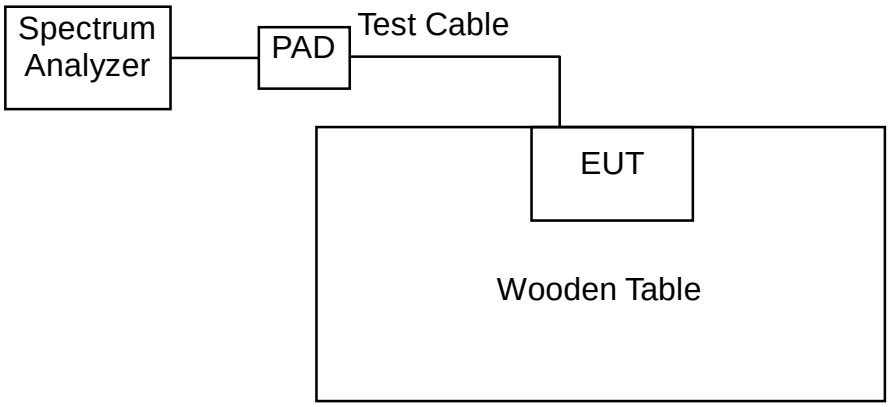
10 20dB 頻寬之要求

10.1 適用標準

NCC 低功率射頻電機技術規範 3.10.1.6(1)(A) 跳頻系統之載波頻率頻道間隔不得低於 25 千赫 (kHz)或跳頻頻道之 20dB 頻寬，兩者取較寬者。但操作頻率為 2400-2483.5 兆赫(MHz)頻帶且輸出功率不大於 125 毫瓦(mW)跳頻系統，其載波頻率頻道間隔不得小於 25 千赫 (kHz)或跳頻頻道 20dB 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，且應隨所發射之信號同步偏移接收頻率。

10.2 測試配置

圖 4: 發射頻寬之測試配置



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10.3 量測結果

20dB Bandwidth: BR mode

CH	(MHz)
Lower	0.9271
Mid	0.9257
Higher	0.9244

20dB Bandwidth: EDR mode (π/4-DQPSK)

CH	(MHz)	2/3 Bandwidth (MHz)
Lower	1.318	0.88
Mid	1.319	0.88
Higher	1.32	0.88

20dB Bandwidth: EDR mode (8-DPSK)

CH	(MHz)	2/3 Bandwidth (MHz)
Lower	1.312	0.87
Mid	1.315	0.88
Higher	1.312	0.87

*請參考附圖。

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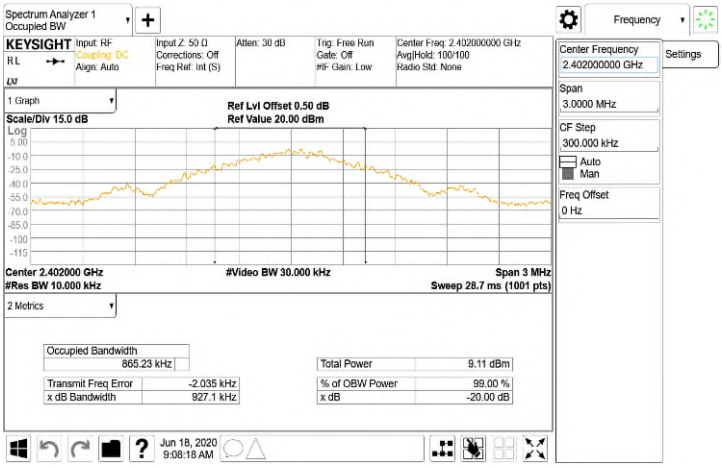
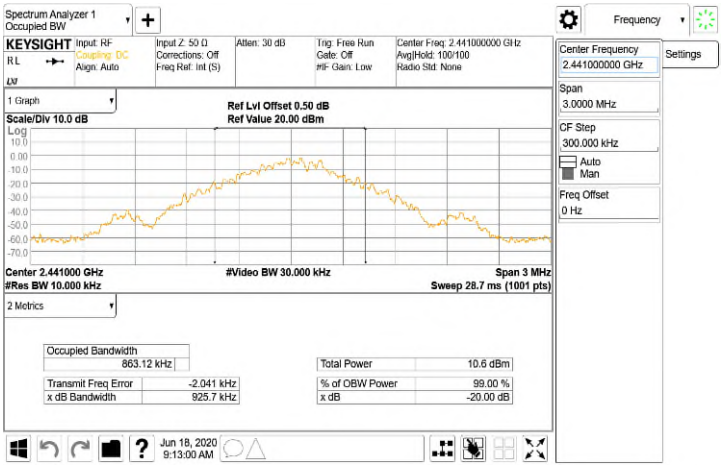
發射頻寬 20dB 之要求_GFSK_1M_DH5_2402MHz

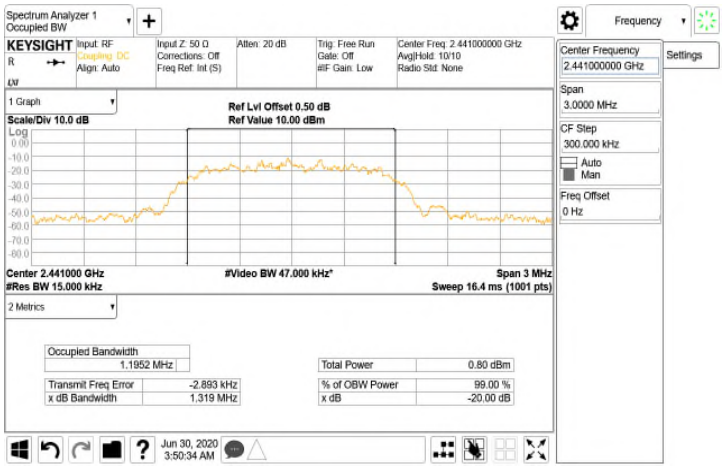


發射頻寬 20dB 之要求_π4DQPSK_2M_DH5_2402MHz

發射頻寬 20dB 之要求_GFSK_1M_DH5_2441MHz



發射頻寬 20dB 之要求_π4DQPSK_2M_DH5_2441MHz



發射頻寬 20dB 之要求_GFSK_1M_DH5_2480MHz

發射頻寬 20dB 之要求_π4DQPSK_2M_DH5_2480MHz

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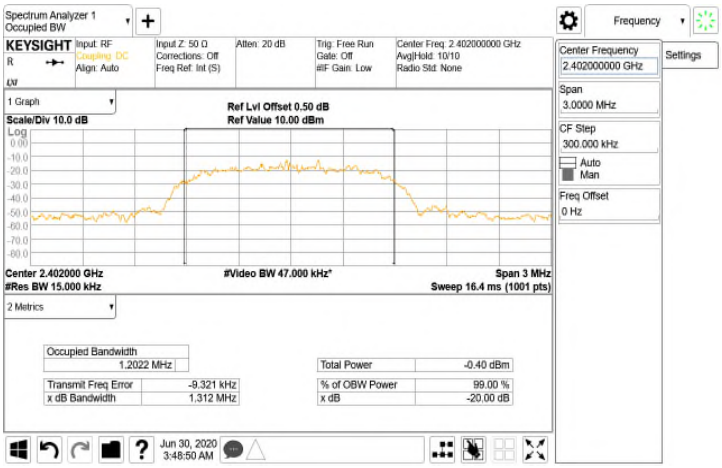
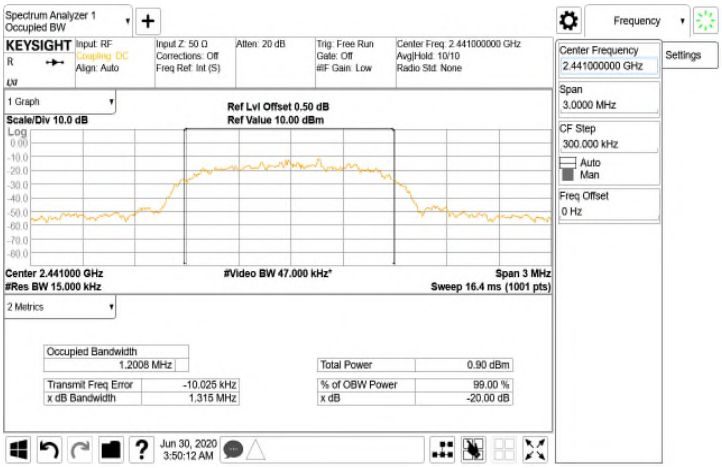
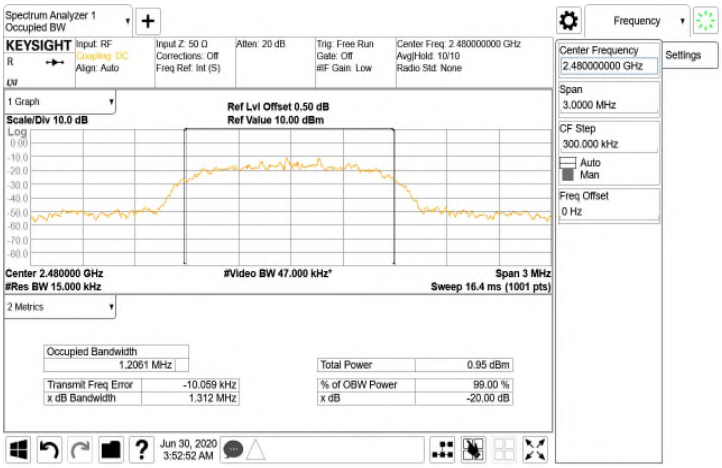
發射頻寬 20dB 之要求_8DPSK_3M_DH5_2402MHz



發射頻寬 20dB 之要求_8DPSK_3M_DH5_2441MHz



發射頻寬 20dB 之要求_8DPSK_3M_DH5_2480MHz



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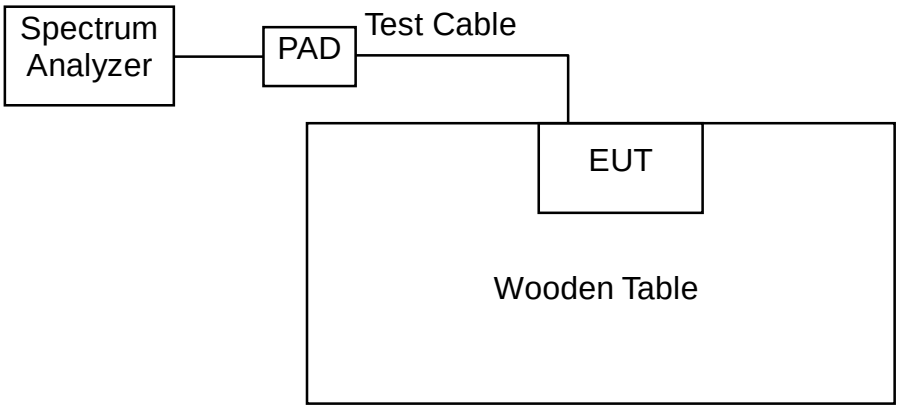
11 載波頻率間隔之量測

11.1 適用標準

NCC 低功率射頻電機技術規範 3.10.1.6(1)(A) 跳頻系統之載波頻率頻道間隔不得低於 25 千赫 (kHz)或跳頻頻道之 20dB 頻寬，兩者取較寬者。但操作頻率為 2400-2483.5 兆赫(MHz)頻帶且輸出功率不大於 125 毫瓦(mW)跳頻系統，其載波頻率頻道間隔不得小於 25 千赫 (kHz)或跳頻頻道 20dB 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，且應隨所發射之信號同步偏移接收頻率。

11.2 量測載波頻率間隔之配置



11.3 載波頻率間隔之量測結果

頻道	載波頻率間隔	最小限制值 (MHz)	依據 NCC 低功率射頻電機技術規範 3.10.1 節(6.1.(A))之標準，故取載波頻率間隔之量測值。
CH Low	1MHz	0.88	
CH Mid	1MHz	0.88	
Ch High	1MHz	0.88	

請參考附圖。

註:操作頻率為 2400-2483.5 兆赫(MHz)頻帶且輸出功率不大於 125 毫瓦(mW)跳頻系統，其載波頻率頻道間隔不得小於 25 千赫(kHz)或跳頻頻道 20dB 頻寬之三分之二

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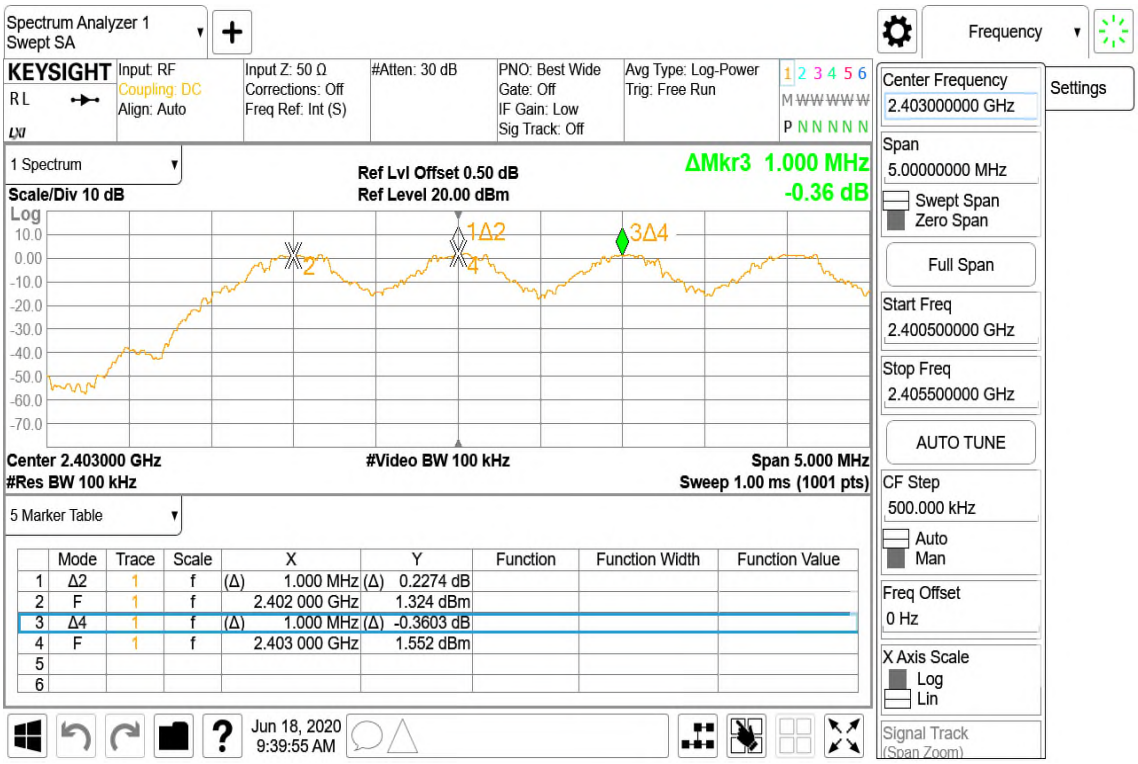
載波頻率間隔測試值

載波頻率間隔_GFSK_1M_DH5_2402MHz



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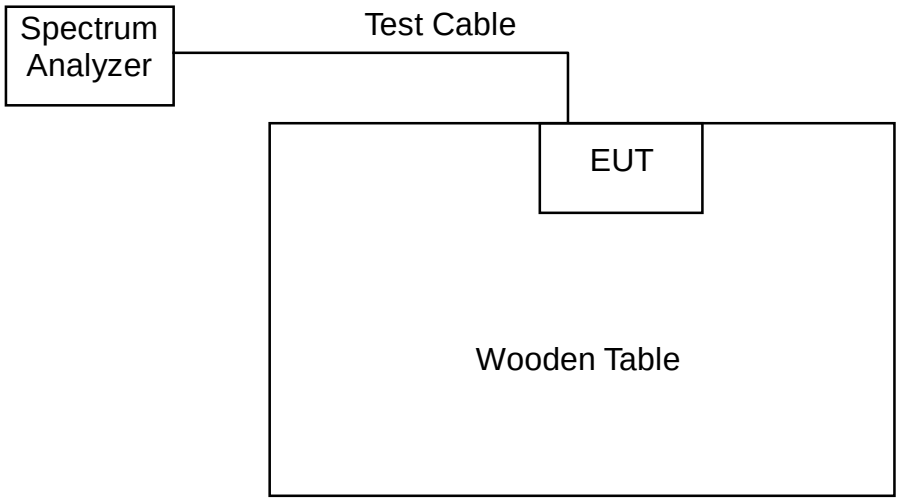
12 載波頻率佔用週期之量測

12.1 適用標準

NCC 低功率射頻電機技術規範 3.10.1.6(1)(A)(a) 在 0.4 秒乘以跳頻頻道數之週期內，任一頻率佔用之平均時間不得超過 0.4 秒。

12.2 量測物載波頻率佔用週期之配置



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12.3 開放載波頻率佔用週期之量測結果:

量測週期= 0.4 X 79 = 31.6 s

CH Low:

DH1 time slot 為1發1 收 Dwell Time
= 0.390 (ms) 每一個脈衝時間X (1600/(2*79)) 每秒在每一頻道發射次數X31.6量測週期124.80 (ms)
DH3 time slot 為1發1 收 Dwell Time
= 1.640 (ms) 每一個脈衝時間X (1600/(4*79)) 每秒在每一頻道發射次數X31.6量測週期262.40 (ms)
DH5 time slot 為1發1 收 Dwell Time
= 2.895 (ms) 每一個脈衝時間X (1600/(6*79)) 每秒在每一頻道發射次數X31.6量測週期308.80 (ms)

CH Mid:

DH1 time slot 為1發1 收 Dwell Time
= 0.385 (ms) 每一個脈衝時間X (1600/(2*79)) 每秒在每一頻道發射次數X31.6量測週期123.20 (ms)
DH3 time slot 為1發1 收 Dwell Time
= 1.640 (ms) 每一個脈衝時間X (1600/(4*79)) 每秒在每一頻道發射次數X31.6量測週期262.40 (ms)
DH5 time slot 為1發1 收 Dwell Time
= 2.880 (ms) 每一個脈衝時間X (1600/(6*79)) 每秒在每一頻道發射次數X31.6量測週期307.20 (ms)

CH High:

DH1 time slot 為1發1 收 Dwell Time
= 0.390 (ms) 每一個脈衝時間X (1600/(2*79)) 每秒在每一頻道發射次數X31.6量測週期124.80 (ms)
DH3 time slot 為1發1 收 Dwell Time
= 1.640 (ms) 每一個脈衝時間X (1600/(4*79)) 每秒在每一頻道發射次數X31.6量測週期262.40 (ms)
DH5 time slot 為1發1 收 Dwell Time
= 2.895 (ms) 每一個脈衝時間X (1600/(6*79)) 每秒在每一頻道發射次數X31.6量測週期308.80 (ms)

註: 此裝置有EDR功能，比較BR mode及EDR mode測試值後，附上最差模式BR（GFSK） mode數據。

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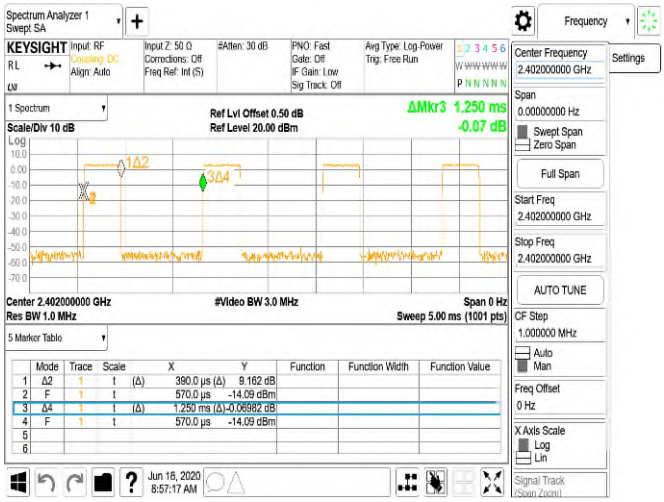
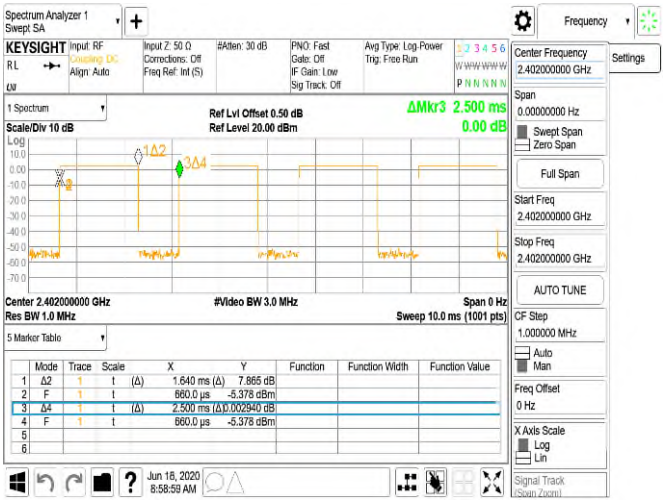
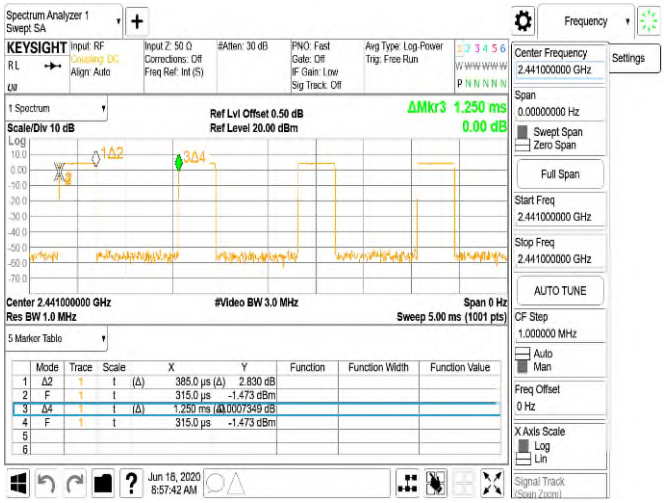
載波頻率週期_GFSK_1M_DH1_2402MHz



載波頻率週期_GFSK_1M_DH3_2402MHz



載波頻率週期_GFSK_1M_DH1_2441MHz



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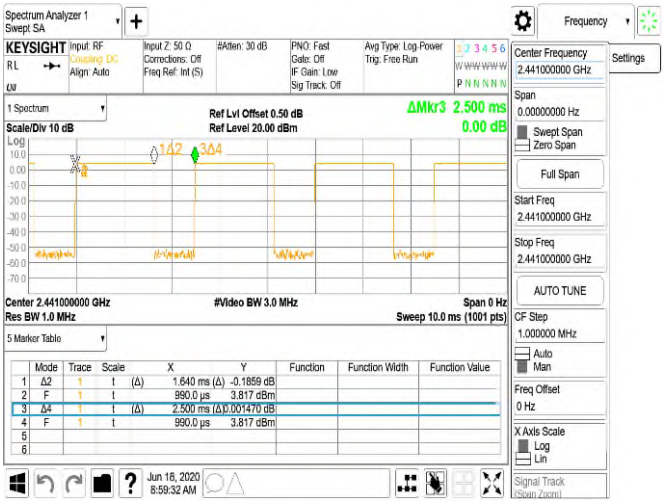

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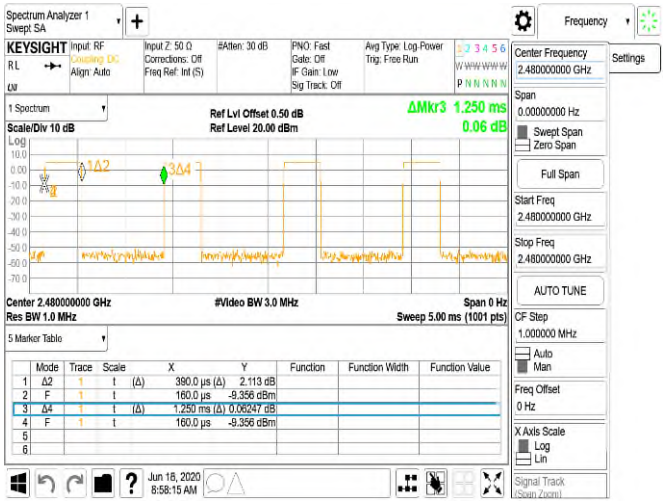

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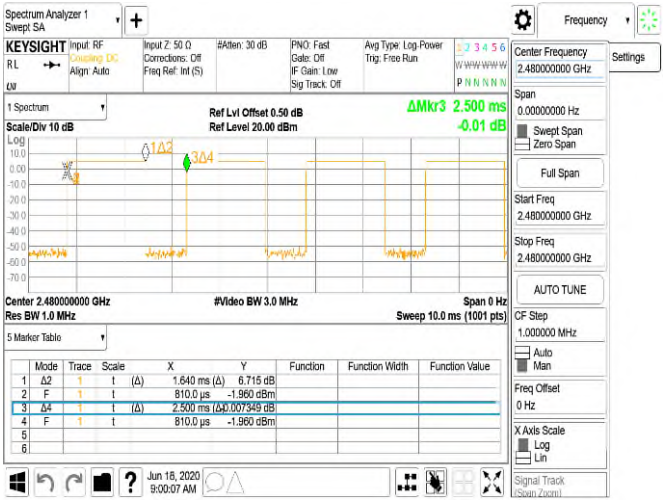

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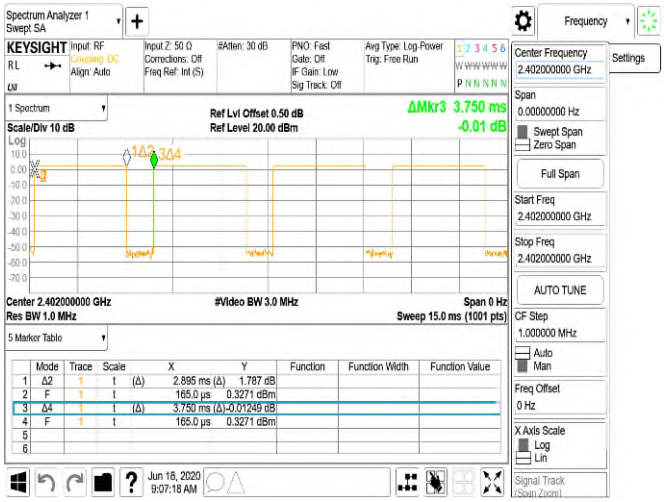
載波頻率週期_GFSK_1M_DH5_2402MHz



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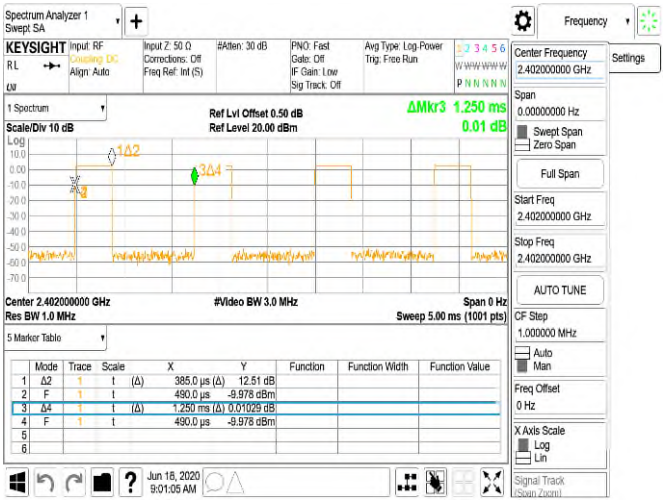

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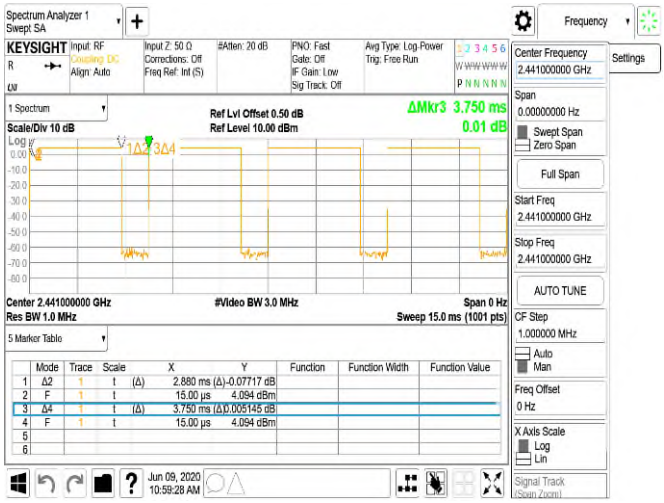

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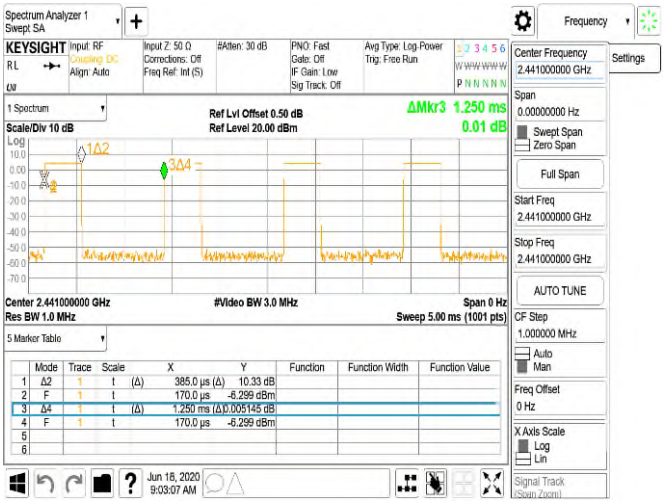

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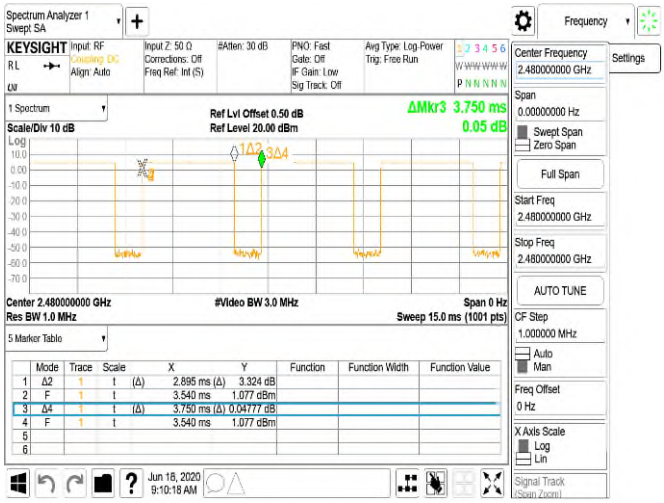

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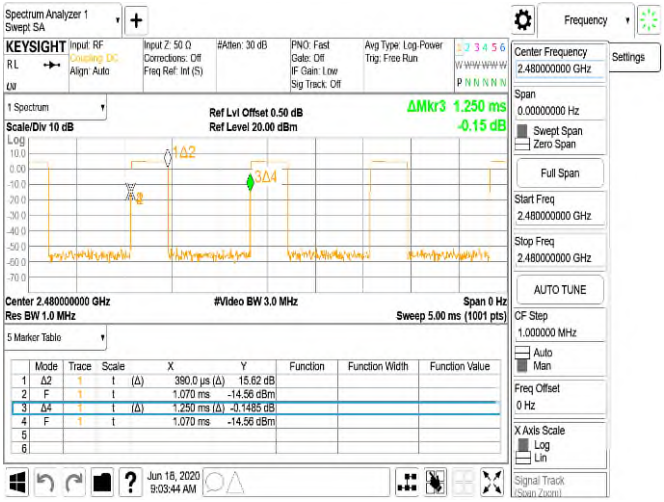

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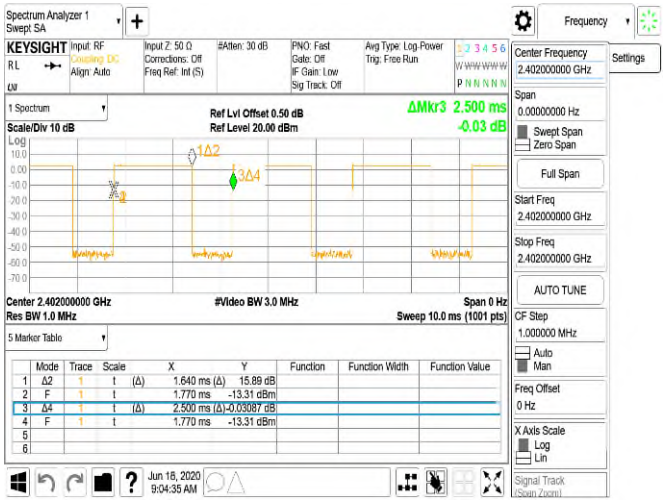
載波頻率週期_π4DQPSK_2M_DH3_2402MHz



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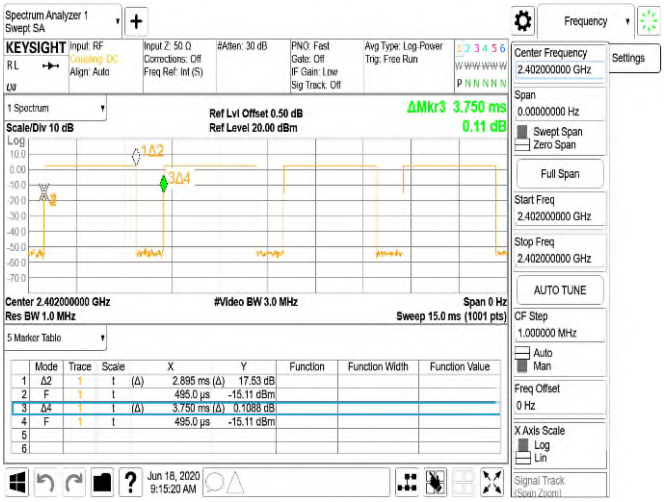

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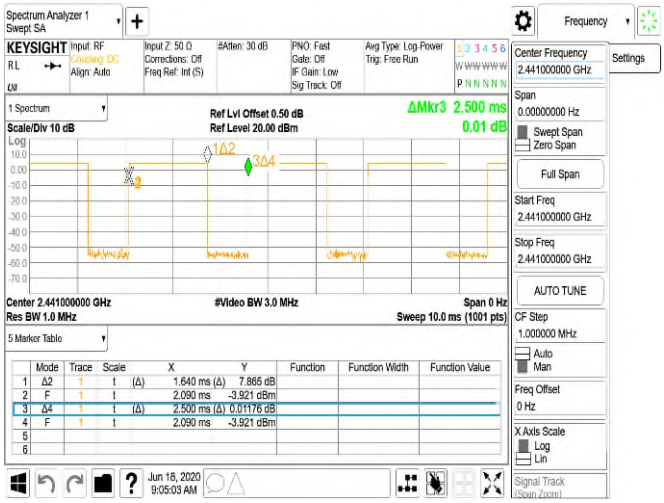

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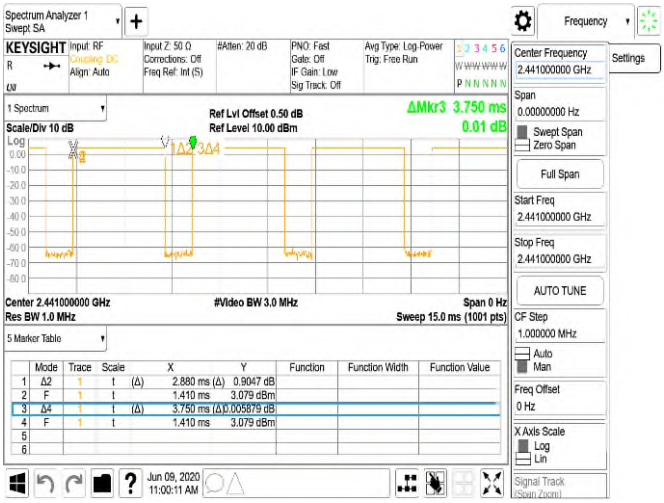

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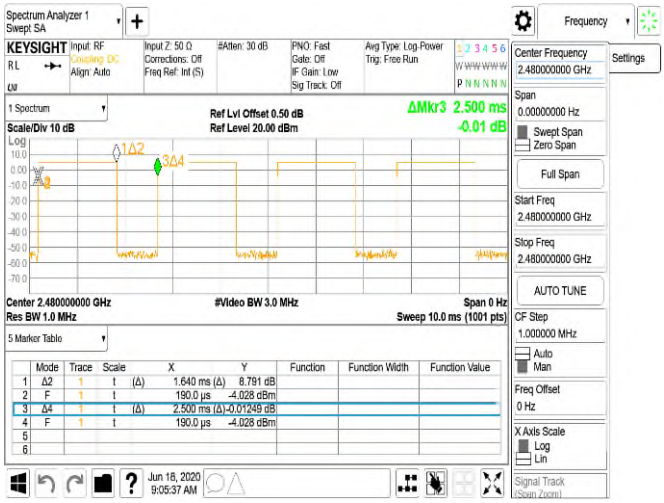

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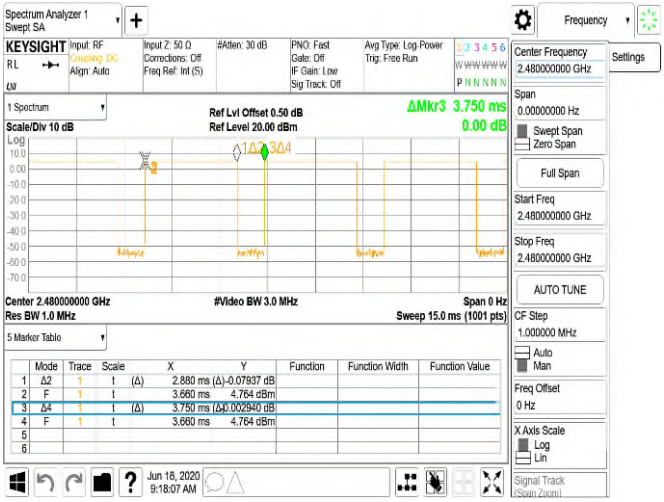

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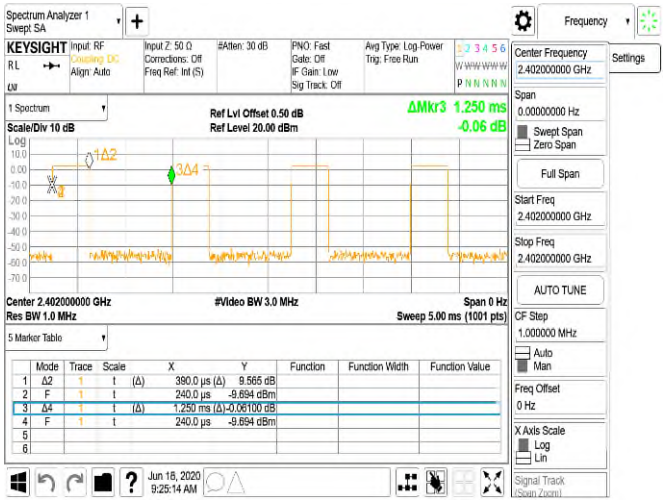
載波頻率週期_8DPSK_3M_DH1_2402MHz



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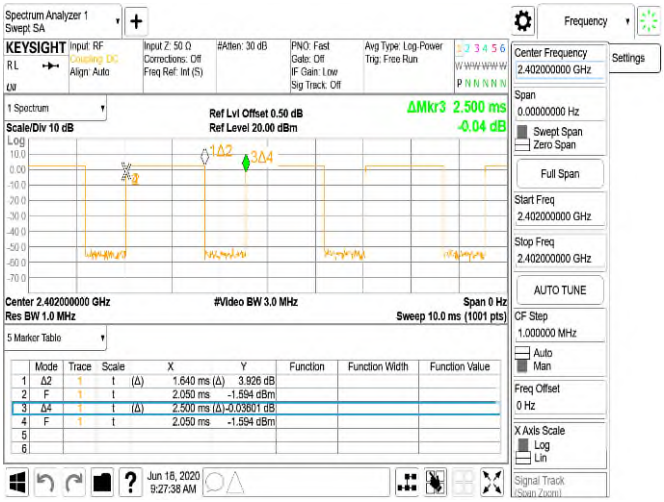

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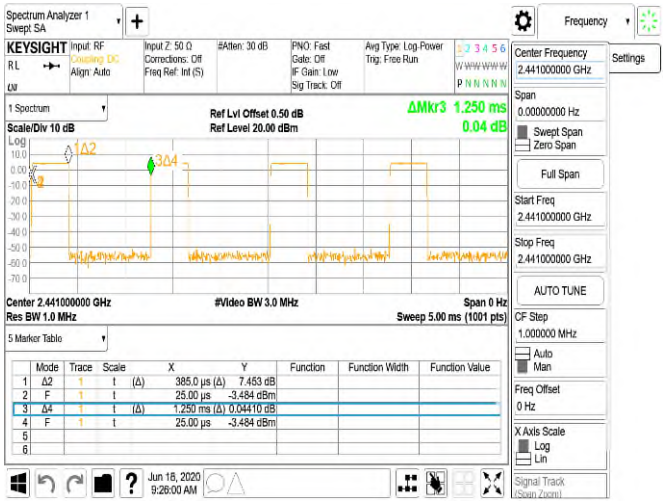

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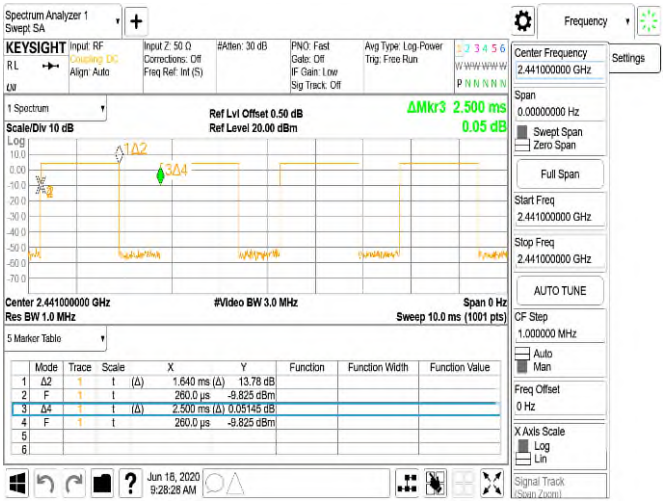

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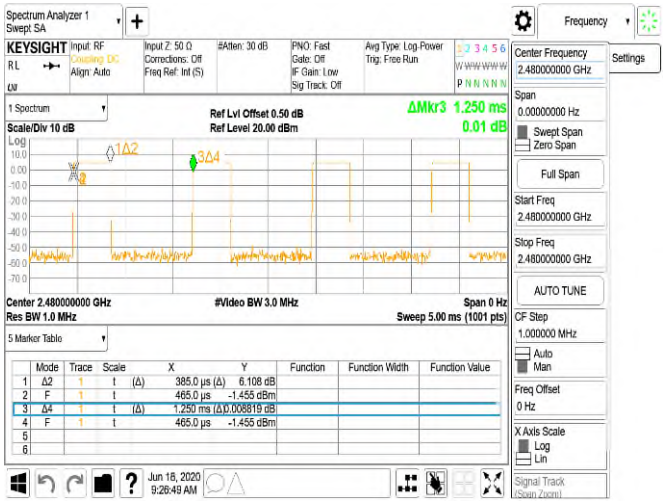

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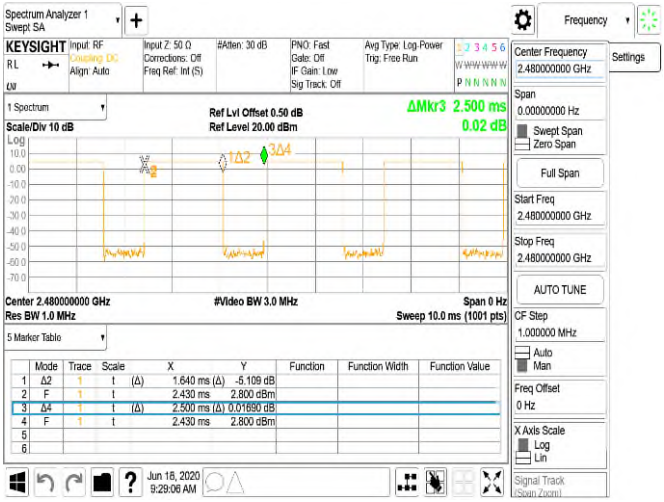

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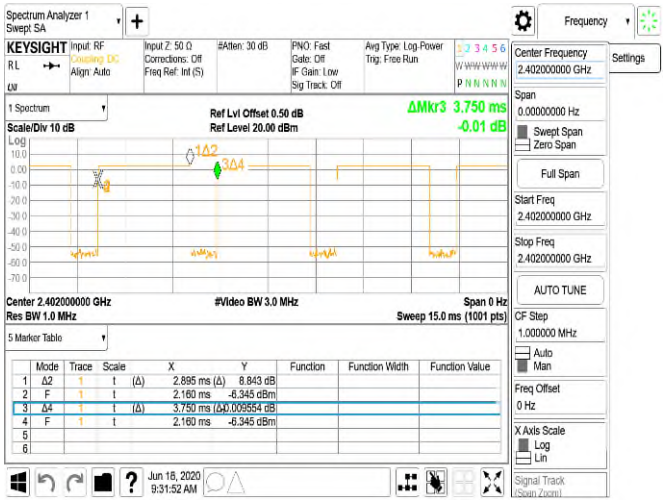
載波頻率週期_8DPSK_3M_DH5_2402MHz



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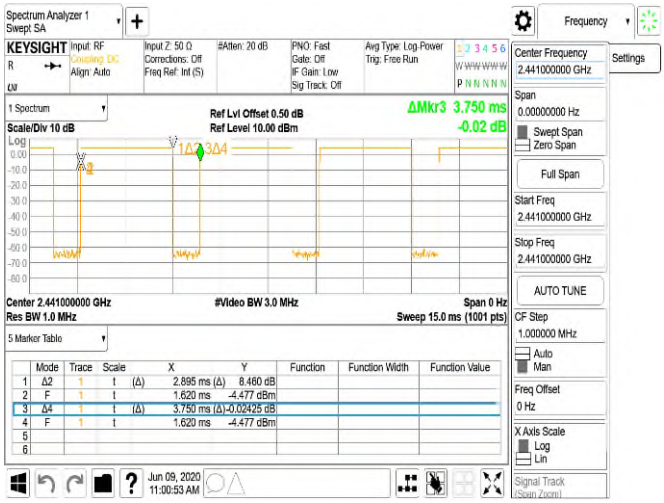

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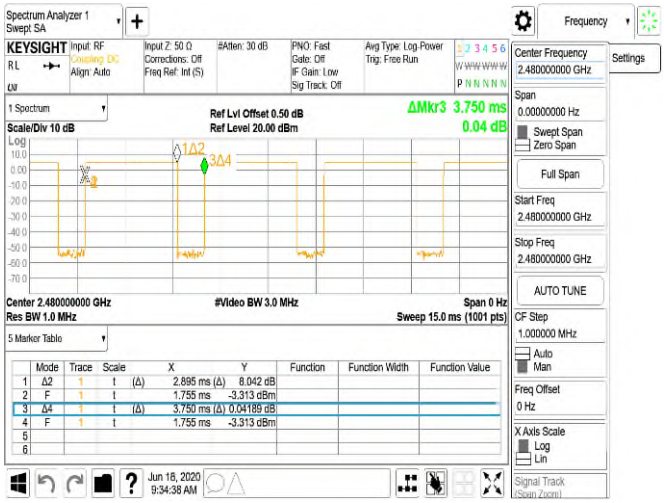

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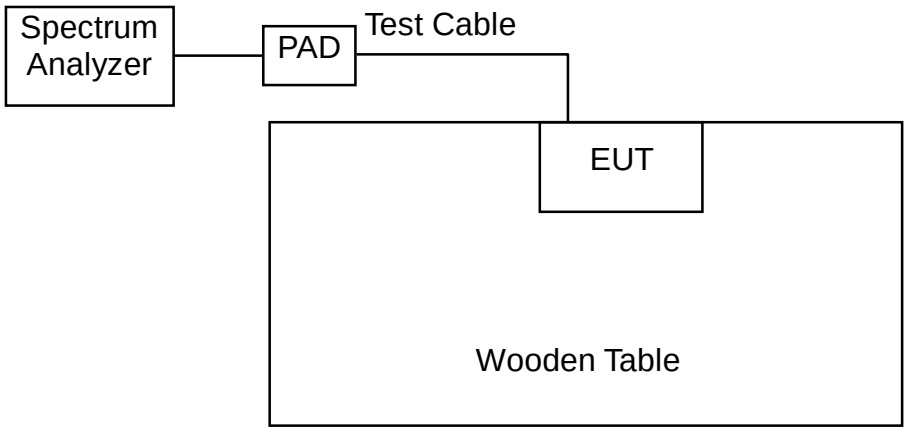
13 頻道數之量測

13.1 適用標準

依據NCC低功率射頻電機技術規範3.10.1.6(1)(A)(a)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。

13.2 量測頻道數之配置



13.3 頻道數之量測結果

頻道數	限制值 (CH)	量測值 (CH)	結果
	15	79	Pass

註: 此裝置有 EDR 功能，由於 BR mode 及 EDR mode 跳頻數相同，僅以 BR mode、GFSK 調變之數據為代表。

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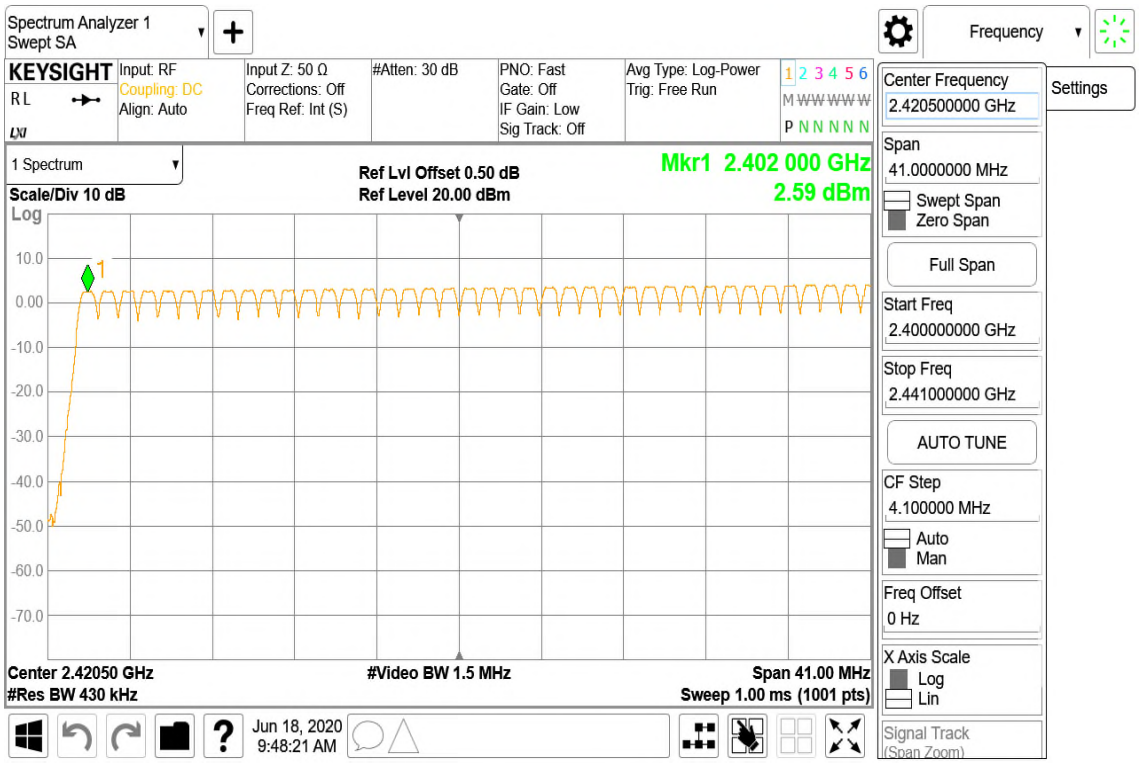
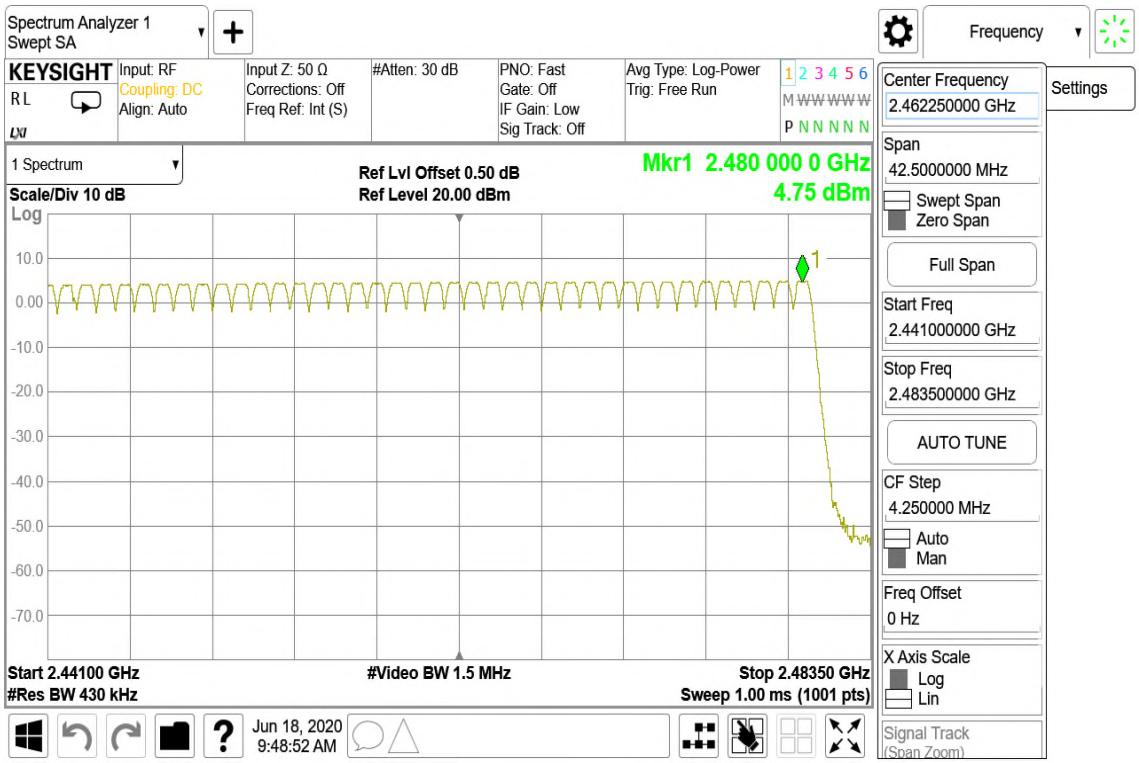
頻道數之量測值

頻道數_GFSK_1M_DH5_2400-2441



頻道數_GFSK_1M_DH5_2441-2480



~ End of Report ~

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