



報告編號 : 4790000791-TW-R0-V3

頁碼 : 1 of 72

報告發行日期 : 2021/7/28

低功率射頻器材試驗報告

產品名稱：諾基亞真無線藍牙耳機

型號：E3101

系列型號：E3102

申請廠商：雙全國際股份有限公司

申請者地址：新北市汐止區新台五路1段77號10樓之4

製造廠商：瑞伸通智能科技（深圳）有限公司

實驗室名稱：優力國際安全認證有限公司

實驗室地址：新竹縣竹東鎮中興路四段372-7號B戶、E戶

試驗受理日期：2021/6/30

試驗完成日期：2021/7/2 ~ 2021/7/8

待測物接收日期：2021/6/30

依據標準：低功率射頻器材技術規範 (LP0002) 109 年 7 月版



備註：

- 1.此份報告未經優力國際安全認證有限公司書面同意，不得部分複製。
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- 3.本測試報告需加負責人簽名始可生效。
- 4.此案產品內外觀照請參考報告編號 4790000791-EP-V1, 4790000791-1-EP-V1。

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認可報告之試驗機構

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財團法人全國認證基金會

認證編號：3398

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認可能量範圍：低功率射頻器材技術規範(LP0002)

報告製作者：

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，日期：

2021/7/28

審核者：

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，日期：

2021/7/28

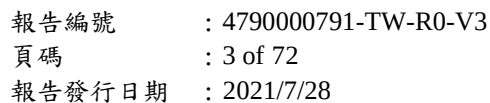
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測試項目與結果判定總表

項次	測試項目	適用規範	結果判定
1	峰值傳導輸出功率	低功率射頻器材技術規範 4.10.1.2 節	合格
2	發射頻寬	低功率射頻器材技術規範 4.10.1.6 節	合格
3	跳頻頻道數之量測	低功率射頻器材技術規範 4.10.1.6 節	合格
4	跳頻頻道間隔之量測	低功率射頻器材技術規範 4.10.1.6 節	合格
5	每一頻道停留時間之量測	低功率射頻器材技術規範 4.10.1.6 節	合格
6	混附波及頻帶邊緣之傳導發射	低功率射頻器材技術規範 4.10.1.5 節	合格
7	場強輻射	低功率射頻器材技術規範 3.6 節、 4.10.1.5 節	合格
8	電源線傳導干擾	低功率射頻器材技術規範 3.3 節	合格
9	電波暴露量	低功率射頻器材技術規範 6.20.2 節	合格

Note:

1. 對於頻帶邊緣輻射測試圖記錄在附錄 I，混附波輻射測試圖記錄在附錄 II。

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1. 一般資料

1.1 產品描述

產 品 名 稱	諾基亞真無線藍牙耳機
廠 牌	NOKIA
型 號	E3101
系 列 型 號	E3102
額 定 電 壓	3.7Vdc from battery
調 變 方 式	GFSK, $\pi/4$ -DQPSK
傳 輸 速 率	Up to 2Mbps
頻 率 使 用 範 圍	2402 MHz ~ 2480 MHz
頻 道 數 量	79
發 射 功 率	-2.77dBm
Sample ID	Conducted Test : 4030606 Radiated Test : 4030605
測 試 軟 體	FCC_assist_1.0.1.2
天 線 型 態	見註 2

註:

1. 系列型號E3102，與主型號E3101差異僅在於耳機顏色、外觀及搭配的充電盒不同，其餘不論機板結構、電路均相同。

2. 此待測設備搭配測試的天線，其資料如下：

Ant. No.	天線型式	天線型號	商標	接頭型式	增益 (dBi)
1	SMD CHIP	LTA312450-P3M	GLEAD ELECTRONICS	N/A	5.54
Note : 1. 適用規範請見本報告 3.1 節第 (6)、(7) 的規定。 2. 依據測試數據結果，符合低功率射頻器材技術規範之要求。 3. 此天線資訊由客戶提供，詳請參閱製造商的產品規格或使用手冊。					

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3. 此待測設備內建電池，其資料如下：

廠牌	型號	規格
Shenzhen Mitacbattery Technology Co., Ltd.	501012	3.7V,40mAh,0.15Wh

4. 配件清單如下：

產品型號	配件名稱	配件廠牌	配件型號	配件規格
E3101	Type-C cable	深圳市誠線達電子有限公司	E434	0.25m
	充電盒	NOKIA	E3101	350mAh Li-ion Polymer
E3102	Type-C cable	深圳市誠線達電子有限公司	E434	0.25m
	充電盒	NOKIA	E3102	350mAh Li-ion Polymer

5. 此待測設備之主型號: E3101與系列型號: E3102，經評估過後其強輻射之1 GHz以上量測為主型號: E3101 具備最大場強輻射量測干擾值，場強輻射之1 GHz以下測試結果為系列型號: E3102具備最大場強輻射量測干擾值，因此電源線傳導干擾量測以型號: E3102為最差條件進行最終量測，並將測試結果記錄於報告中。

6. 此待測設備，經評估供電模式：Battery mode、Charging mode with charger box，其中場強輻射之1 GHz以上量測為Battery mode具備最大場強輻射量測干擾值，場強輻射之1 GHz以下量測與電源線傳導干擾量測為Charging mode with charger box具備最大場強輻射量測干擾值，故以其最差條件進行最終量測，並將測試結果記錄於報告中。

7. 此報告中待測物測試模式評估如下表：

模式	測試狀態
模式 1	Bluetooth (1Mbps) TX_Ch00,39,78
模式 2	Bluetooth EDR (2Mbps) TX_Ch00,39,78
模式 3	Bluetooth RX_1M_Ch39
模式 4	Charging mode with charger box

當待測物在發射模式，場強輻射之1 GHz以上量測以模式1~2進行最終量測，場強輻射之1 GHz以下其他不必要之訊號量測與電源線傳導干擾量測以模式4進行最終量測。

當待測物在接收模式，場強輻射之1 GHz以上量測以模式3進行最終量測，場強輻射之1 GHz以下其他不必要之訊號量測與電源線傳導干擾量測以模式4進行最終量測。

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

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9. 測試選擇右耳與左耳進行預測試。經評估過後以左耳為最差模式，場強輻射之1G以上量測與直量測試項目以左耳進行最終量測並記錄於報告中。
10. 傳輸模式DH1、DH3及DH5皆經過預測試，其中以DH5的傳輸模式具有最大干擾雜訊，故僅以此傳輸模式進行最終量測並記錄於報告中。
11. 由於待測物為藍芽裝置，自適應性的跳頻模式(AFH mode) 與非自適應性跳頻模式(non-AFH mode)遵循藍芽時序協議，相同的時序等級有相同時間間隔，但在滯留時間(Dwell Time)則為非自適應性跳頻模式有較差的結果，因此測試結果以非自適應性跳頻模式作為測試代表。
12. 此裝置各頻道的中心頻率如下：

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。

13. 此裝置的功率設置如下：

頻道	功率設置
0	10
39	10
78	10

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1.2 輔助測試之週邊設備

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。

Battery mode

Support Equipment

ID	裝置名稱	廠牌	型號	序號	Remark
A	Laptop	DELL	Latitude E5470	CXSKWF2	Provide by Lab
B	Test Tool	AFUIOT	FT232RL	N/A	Supplied by Client

I/O Cables

ID	裝置名稱	廠牌	型號	線長 (m)	Remark
1	Console Cable	taiwaniot	1046C-10	0.1	Supplied by Client

Charging mode

Support Equipment

ID	裝置名稱	廠牌	型號	序號	Remark
A	Charger Box	NOKIA	E3101	N/A	Supplied by Client
B	USB adapter	HTC	TCP900-US	79H00130-01M	Provide by Lab

I/O Cables

ID	裝置名稱	廠牌	型號	線長 (m)	Remark
1	Type-C cable	深圳市誠線達電子有限公司	E434	0.25	Supplied by Client

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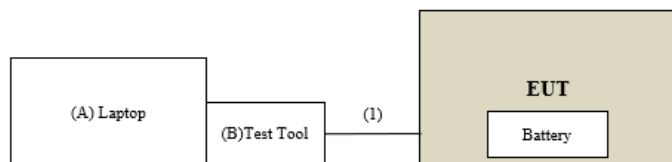
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1.3 測試架構圖

在測試筆電上開啟測試軟體（FCC_assist_1.0.1.2）進行控制。該測試軟體用於啟用連續傳輸或接收模式，並根據需要選擇測試通道，數據速率，調變方式和功率設置。

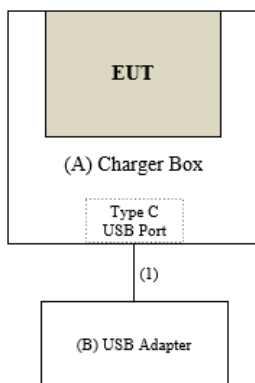
Battery mode



Under Table

Remote Site

Charging mode



Under Table

Remote Site

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2. 量測儀器及測試配置說明

2.1 量測設備

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070827	2020/11/11	2021/11/10
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	2020/12/11	2021/12/10
Loop Antenna	ETS lindgren	6502	00213440	2020/12/25	2021/12/24
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	2021/1/13	2022/1/12
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	2020/12/30	2021/12/29
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	2020/12/30	2021/12/29
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	2021/6/8	2022/6/7
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	2021/2/3	2022/2/2
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	2021/5/19	2022/5/18
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	2021/1/22	2022/1/21
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	2021/1/22	2022/1/21

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Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Expired date
Antenna Port Conducted Measurement					
Spectrum Analyzer	Keysight	N9010A	MY56070834	2020/11/6	2021/11/5
Pulse Power Sensor	Anritsu	MA2411B	1531202	2020/12/21	2021/12/20
Power Meter	Anritsu	ML2495A	1645002	2020/12/21	2021/12/20
AC power Line Conducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	2020/11/17	2021/11/16
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	2020/8/19	2021/8/18
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	2020/8/12	2021/8/11
Cables	TITAN	CFD200	T0732ACFD20 020A300-1	2021/3/2	2022/3/1

UL Software

Software	Test Item	Version
e3	Radiated measurement	6.191211 (V6)
RF Conducted Test Tools	Conducted measurement	ver 2.4.0.620b
EZ EMC	AC power Line Conducted Emission	UL-3A1.2

2.2 測試應用參考標準

本報告中記錄的測試程序參照如下：

KDB558074 D01 Meas Guidance v05r02, KDB414788 D01 Radiated Test Site v01r01 and ANSI C63.10-2013.

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2.3 量測不確定度

此報告中關於量測之符合性聲明，採用 ISO Guide 98-4 的 8.2.4 與 8.2.5 章節中描述的準確度方法為判定規則。

下列量測不確定水準是參照量測儀器 CISPR 16-4-2 所規定之不確定度。

Measurement	Frequency	Uncertainty
Conducted disturbance at mains terminals ports	150kHz ~ 30MHz	±3.1 dB
RF Conducted	9 kHz - 40GHz	±1.9 dB
Radiated disturbance below 30MHz	9 kHz - 30 MHz	±1.9 dB
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	±5.4 dB
Radiated disturbance above 1 GHz	1GHz ~ 40GHz	±4.7 dB

2.4 試驗環境

產品測試時之環境條件如下：

測試項目	環境條件	輸入電壓	測試日期	測試人員
峰值傳導輸出功率	23.5~24.3°C/ 65~69%RH	3.7Vdc	2021/07/05~ 2021/07/06	官聲宇
發射頻寬	23.5~24.3°C/ 65~69%RH	3.7Vdc	2021/07/05~ 2021/07/06	官聲宇
跳頻頻道數之量測	23.5~24.3°C/ 65~69%RH	3.7Vdc	2021/07/05~ 2021/07/06	官聲宇
跳頻頻道間隔之量測	23.5~24.3°C/ 65~69%RH	3.7Vdc	2021/07/05~ 2021/07/06	官聲宇
每一頻道停留時間之量測	23.5~24.3°C/ 65~69%RH	3.7Vdc	2021/07/05~ 2021/07/06	官聲宇
混附波及頻帶邊緣之傳導發射	23.5~24.3°C/ 65~69%RH	3.7Vdc	2021/07/05~ 2021/07/06	官聲宇
場強輻射	24~25°C/ 65~68%RH	110Vac / 3.7Vdc	2021/07/02~ 2021/07/06	官聲宇
電源線傳導干擾	24~25°C/ 65~68%RH	110Vac	2021/07/08~ 2021/07/08	官聲宇

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3. 適用規範

3.1 規範要求

(1) 峰值傳導輸出功率之要求

操作於 2.4000~2.4835 GHz 頻段:

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.2 節之規定：

(a) 至少使用 75 個跳頻頻道之跳頻系統：1 W(含)以下。

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

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。

(2) 跳頻頻道數之量測

操作於 2.400~2.4835 GHz 頻段：

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

(3) 跳頻頻道間隔之量測

操作於 2.400~2.4835 GHz 頻段：

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

(4) 每一頻道停留時間之量測

操作於 2.400~2.4835 GHz 頻段：

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

**(5) 帶外發射之要求**

操作於 2.400~2.4835 GHz 頻段：

依據國家通訊傳播委員會低功率射頻器材技術規範 4.10.1.5 節之要求，操作頻帶範圍外之任意 100 kHz 內，發射機所產生的射頻功率相較於使用頻帶範圍中包含最高所需功率之 100 kHz 內的射頻功率，其衰減值限制如下：

(1) 輸出功率以附件二之峰值輸出功率方式測量者，至少須衰減 20 dB，可使用射頻傳導或輻射方式測量。

(2) 輸出功率以 4.10.1.2(1)(C)之最大傳導輸出功率測量方式者，至少須衰減 30 dB。

此外，落於 3.5 禁用頻段之輻射發射，應符合 3.6 之規定。

頻率(f) (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

(6) 天線之規定

天線規格不受第 3.2 節規定之限制。



(7) 天線增益之要求

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

操作於 2.400~2.4835 GHz 頻段：

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

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

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

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

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

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

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

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

**(8) 傳導之規定**

依據國家通訊傳播委員會低功率射頻器材技術規範之 3.3 節，電源傳導干擾之限制要求如下：

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

(註)：隨頻率之對數遞減。

(9) 無線資訊傳輸設備必須擁有安全功能之要求

依據國家通訊傳播委員會低功率射頻器材技術規範 5.7.7.3 節之規定，無線資訊傳輸設備必須擁有安全功能，以保護未經授權之一方更改軟體。製造商應提出符合本節規定之相關證明文件或符合性聲明。



(10) 限制使用之頻帶

除本規範另有規定外，任何低功率射頻器材之主波皆不得使用下表所列各頻段之頻率；低功率射頻器材落於下表所列頻段之混附發射，其電場強度必須符合 3.6 之限制規定。

頻率(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	-

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(11) 電波暴露量之評估

依據國家通訊傳播委員會低功率射頻器材技術規範 6.20.2 節之規定，若受測物於正常操作模式下，其發射機距離人體 20 公分以上者，可測試最大暴露允許值 (Maximum Permissible Exposure, MPE) 以證明其符電波暴露量之要求。

限制值如下：

(1) 職業性/可控制之暴露

頻率範圍 (MHz)	電場強度 (V/m)	磁場強度 (A/m)	功率密度 (mW/cm ²)	平均時間 (minutes)
0.3 - 3.0	614	1.63	@100	6
3 - 30	1842/f	4.89/f	@900/f ²	6
30 - 300	61.4	0.163	1.0	6
300 - 1,500	---	---	f/300	6
1,500 - 100,000	---	---	5.0	6

註 1：標記@表平面波等效功率密度。

註 2：f 表測試頻率，單位：(MHz)。

(2) 一般人/不可控制之暴露

頻率範圍 (MHz)	電場強度 (V/m)	磁場強度 (A/m)	功率密度 (mW/cm ²)	平均時間 (minutes)
0.3 - 1.34	614	1.63	@100	30
1.34 - 30	842/f	2.19/f	@180/f ²	30
30 - 300	27.5	0.073	0.2	30
300 - 1,500	---	---	f/1500	30
1,500 - 100,000	---	---	1.0	30

註 1：標記@表平面波等效功率密度。

註 2：f 表測試頻率，單位：(MHz)。

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4. 測試紀錄結果

4.1 峰值傳導輸出功率

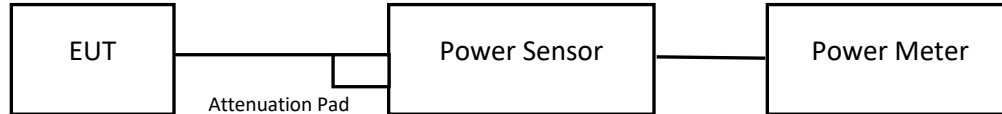
4.1.1 適用標準

請見本報告 3.1 節第 (1) 的規定。

4.1.2 測試方法

- 將待測物之天線埠經由適當之衰減器接到功率計上。
- 設定待測物處於連續發射狀態。
- 計算其峰值傳導輸出功率。

4.1.3 測試配置圖



The loss between RF output port of the EUT and the input port of the Power Meter has been taken into consideration.



4.1.4 測試結果

Peak Power

BT GFSK

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2402	0.303	-5.19	20.97	PASS
39	2441	0.367	-4.35	20.97	PASS
78	2480	0.434	-3.63	20.97	PASS

BT- $\pi/4$ -DQPSK

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2402	0.36	-4.44	20.97	PASS
39	2441	0.455	-3.42	20.97	PASS
78	2480	0.528	-2.77	20.97	PASS

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Average Power (Reference Only)

BT GFSK

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	0.244	-6.13
39	2441	0.314	-5.03
78	2480	0.373	-4.28

BT- $\pi/4$ -DQPSK

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	0.178	-7.49
39	2441	0.229	-6.40
78	2480	0.274	-5.63

4.1.5 測試結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

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4.2 跳頻頻道數之量測

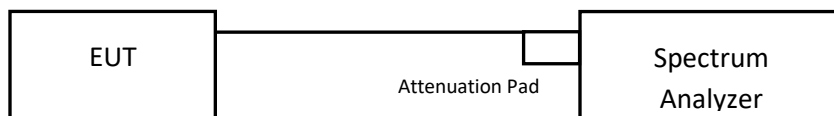
4.2.1 適用標準

請見本報告 3.1 節第 (2) 的規定。

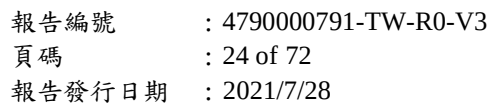
4.2.2 測試方法

- 將待測物之天線埠經由適當之衰減器接到頻譜分析儀上。
- 設定待測物處於正常傳輸跳頻模式下，量測跳頻頻道數。

4.2.3 測試配置圖



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.



GFSK

Spectrum

Ref Level 20.00 dBm Offset 10.50 dB RBW 100 kHz
Att 30 dB SWT 94.7 μ s VBW 300 kHz Mode Auto FFT

1Pk Max

Start 2.4415 GHz 1001 pts Stop 2.4835 GHz

Date: 5.JUL.2021 15:20:59

Spectrum

Ref Level 20.00 dBm Offset 10.50 dB RBW 100 kHz
Att 30 dB SWT 94.9 μ s VBW 300 kHz Mode Auto FFT

1Pk Max

Start 2.4 GHz 1001 pts Stop 2.4415 GHz

Date: 5.JUL.2021 15:20:35

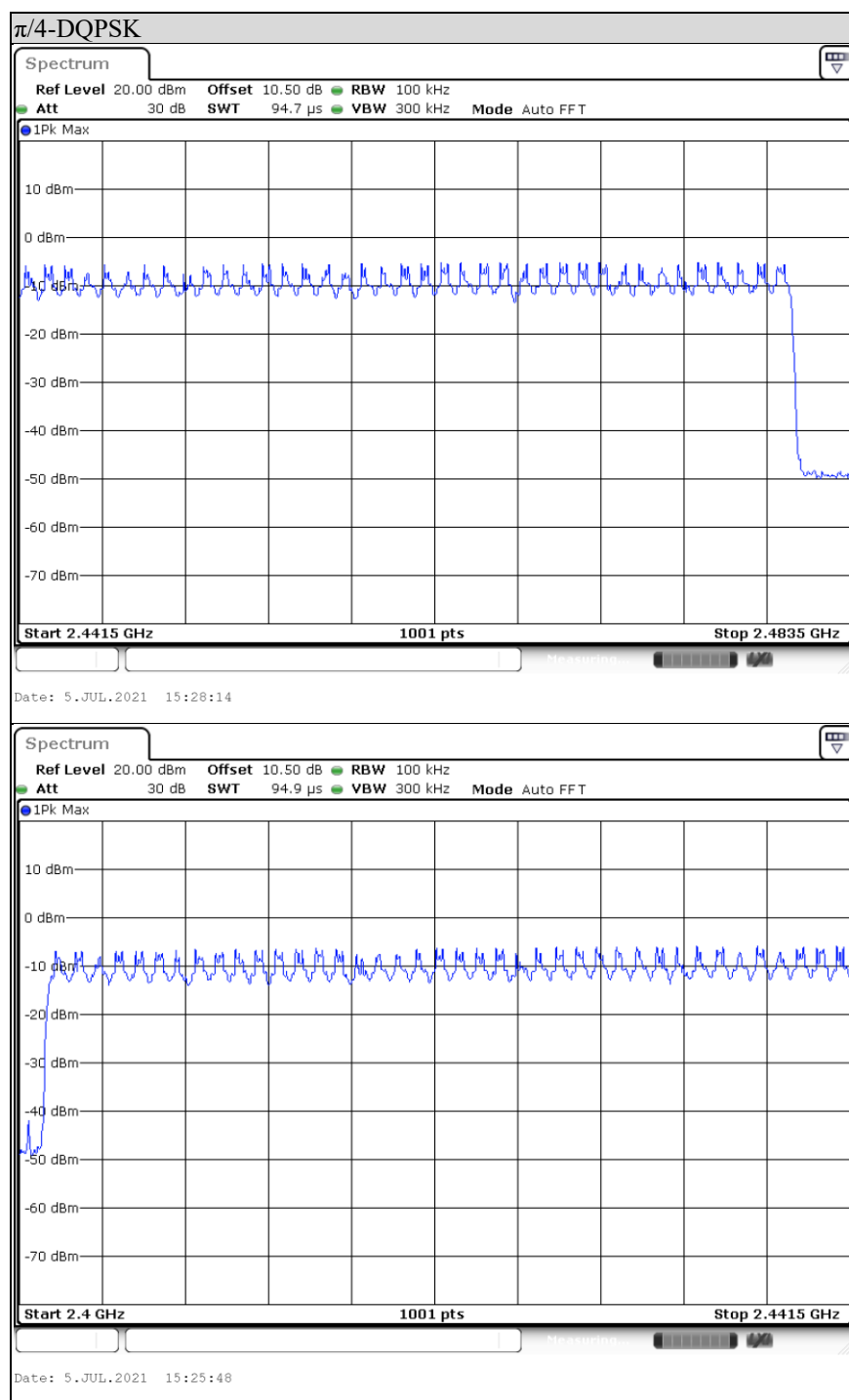
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4.2.5 測試結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

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4.3 跳頻頻道間隔之量測

4.3.1 適用標準

請見本報告 3.1 節第 (3) 的規定。

4.3.2 測試方法

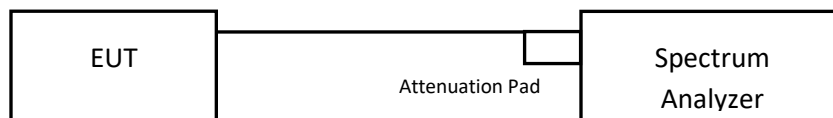
跳頻頻道間隔

- 將待測物之天線埠經由適當之衰減器接到頻譜分析儀上。
- 設定待測物處於連續發射狀態，量測相鄰兩個頻道間的間隔。

20dB 頻寬

- 將待測物之天線埠經由適當之衰減器接到頻譜分析儀上。
- 設定待測物處於連續發射狀態，將測量儀器上的參考水平設置為等於最高峰值。
測量從參考水平衰減 20dB 的兩個頻率的頻率差。

4.3.3 測試配置圖



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

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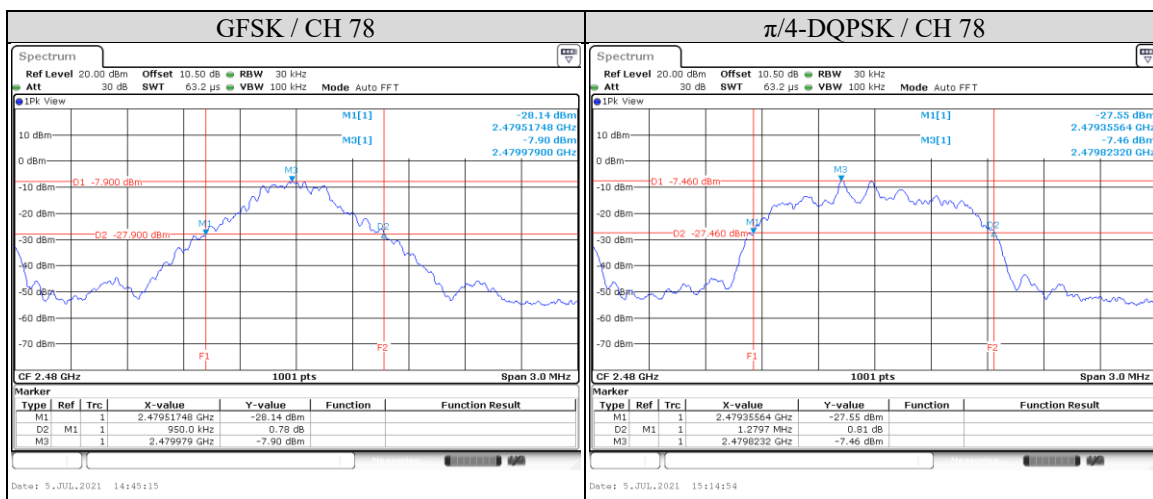
報告發行日期 : 2021/7/28

4.3.4 測試結果

20dB 頻寬

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	
		GFSK	$\pi/4$ -DQPSK
0	2402	0.95	1.2797
39	2441	0.95	1.2797
78	2480	0.95	1.2797

此測試圖僅放測試結果最差的頻道



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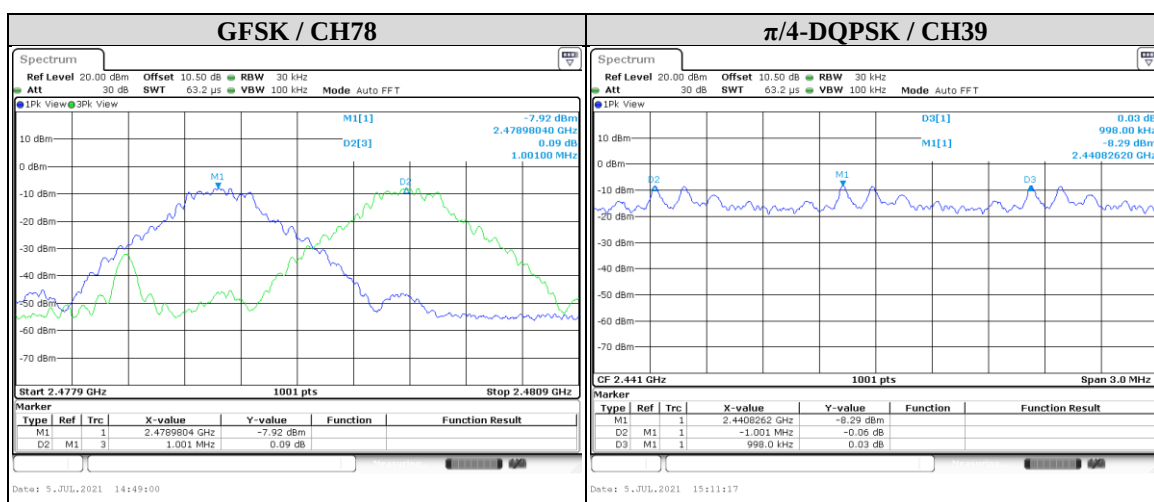


跳頻頻道間隔

Mode	Channel	Frequency (MHz)	Adjacent Hopping Channel Separation (MHz)	Limit (MHz)	Result
GFSK	00	2402	1.001	0.63333	PASS
	39	2441	1.001	0.63333	PASS
	78	2480	1.001	0.63333	PASS
$\pi/4$ -DQPSK	00	2402	0.998	0.85313	PASS
	39	2441	0.998	0.85313	PASS
	78	2480	1.001	0.85313	PASS

Note: 本項測試的 limit 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



4.3.5 測試結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

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4.4 每一頻道停留時間之量測

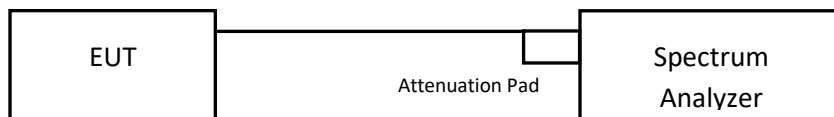
4.4.1 適用標準

請見本報告 3.1 節第 (4) 的規定。

4.4.2 測試方法

- 將待測物之天線埠經由適當之衰減器接到頻譜分析儀上。
- 設定待測物處於正常傳輸跳頻模式下，量測在不同傳輸模式下的頻道停留時間。

4.4.3 測試配置圖



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.



4.4.4 測試結果

跳頻模式：

GFSK

Modulation	Channel	Frequency (MHz)	Length of transmission time (msec)	Result (msec)	Limit (msec)	Result
DH1	39	2441	0.3768	120.640	≤ 400	PASS
DH3	39	2441	1.6232	259.680	≤ 400	PASS
DH5	39	2441	2.8841	307.636	≤ 400	PASS

$\pi/4$ -DQPSK

Modulation	Channel	Frequency (MHz)	Length of transmission time (msec)	Result (msec)	Limit (msec)	Result
2DH1	39	2441	0.3768	120.640	≤ 400	PASS
2DH3	39	2441	1.6377	262.080	≤ 400	PASS
2DH5	39	2441	2.8841	307.636	≤ 400	PASS

Note：

1. In normal mode:

DH1 hopping rate is 1600 hops/s with 2 slots in 79 hopping channels. With channel hopping rate $(1600 / 2 / 79)$ in Occupancy Time Limit (0.4×79) (s), Hops Over Occupancy Time comes to $(1600 / 2 / 79) \times (0.4 \times 79) = 320.08$ hops.

DH3 hopping rate is 1600 hops/s with 4 slots in 79 hopping channels. With channel hopping rate $(1600 / 4 / 79)$ in Occupancy Time Limit (0.4×79) (s), Hops Over Occupancy Time comes to $(1600 / 4 / 79) \times (0.4 \times 79) = 160$ hops.

DH5 hopping rate is 1600 hops/s with 6 slots in 79 hopping channels. With channel hopping rate $(1600 / 6 / 79)$ in Occupancy Time Limit (0.4×79) (s), Hops Over Occupancy Time comes to $(1600 / 6 / 79) \times (0.4 \times 79) = 106.67$ hops.

2. Dwell time (ms) = Hops Over Occupancy Time (hops) x Length of transmission time (ms).
3. 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。

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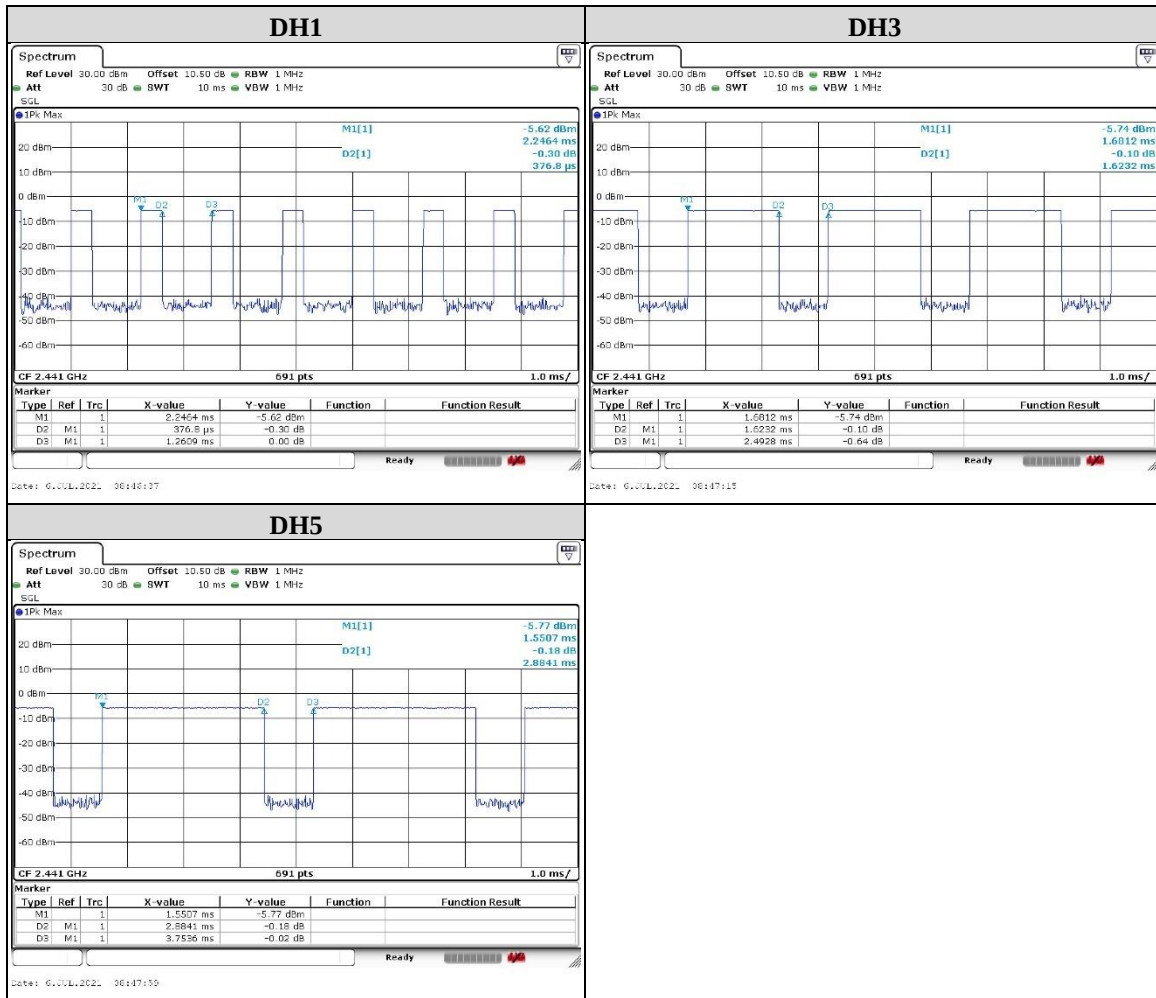


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Doc No: 17-EM-F0880 / 6.0

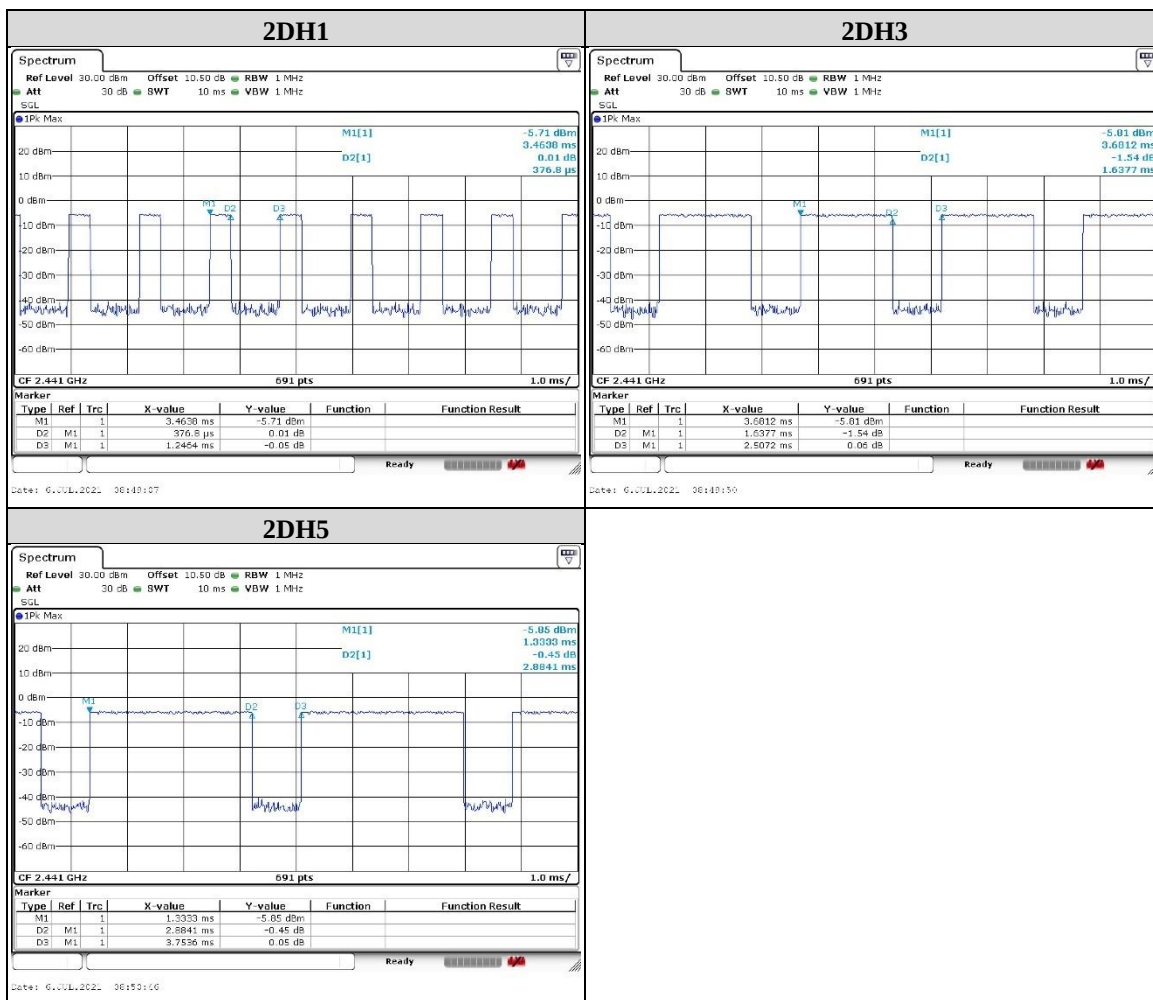


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$\pi/4$ -DQPSK



4.4.5 測試結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

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4.5 混附波及頻帶邊緣之傳導發射

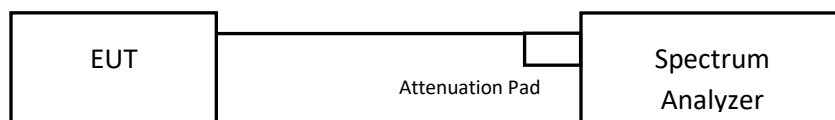
4.5.1 適用標準

請見本報告 3.1 節第 (5) 的規定。

4.5.2 測試方法

將射頻輸出連接到頻譜分析儀，設定頻譜分析儀之解析頻寬為 100 kHz，視訊頻寬不小於解析頻寬，所有諧波與混附波必須比許可頻段中最高發射峰值至少低 20dB，並評估許可頻段之最高與最低的頻帶邊緣發射及混附波發射。

4.5.3 測試配置圖



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.



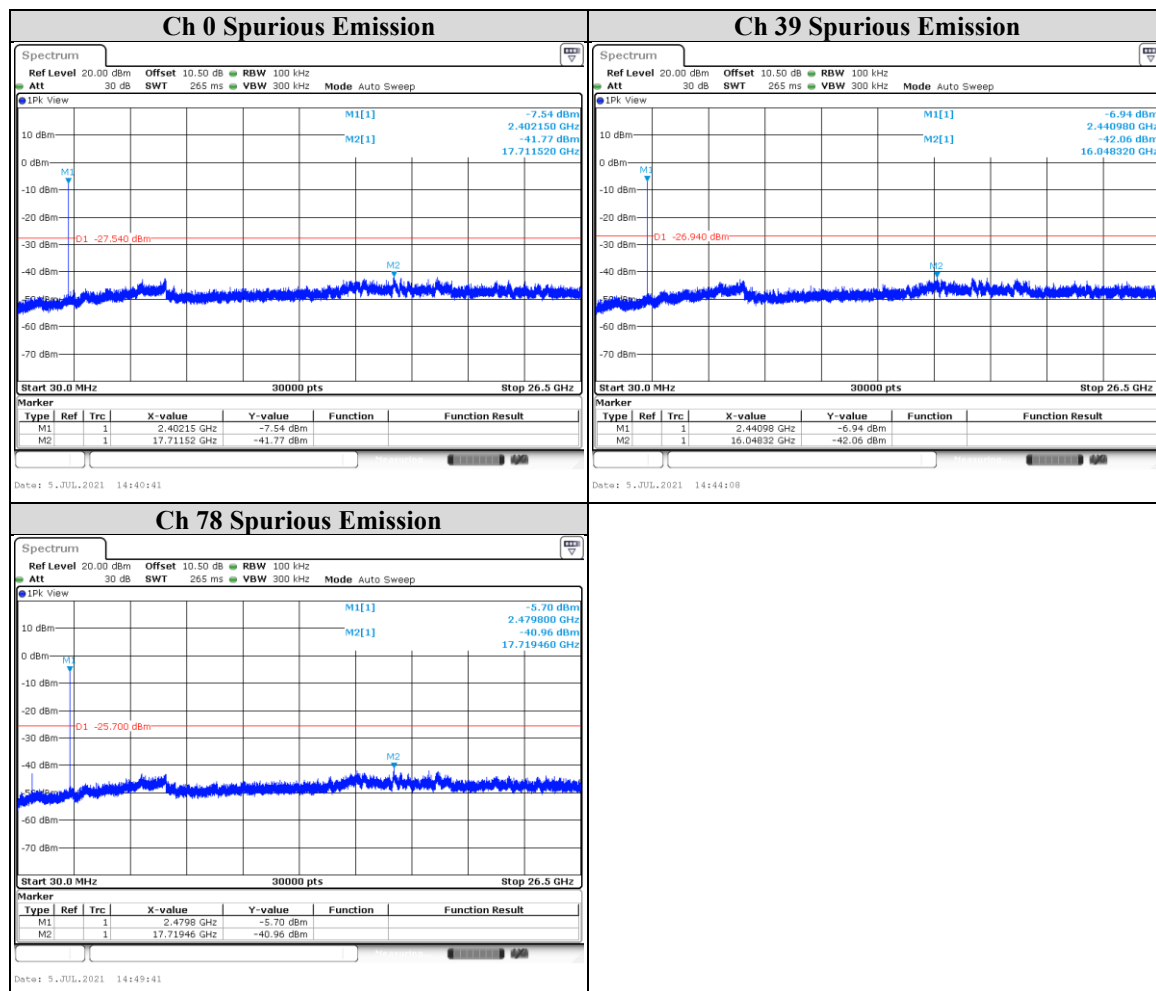
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4.5.4 測試結果

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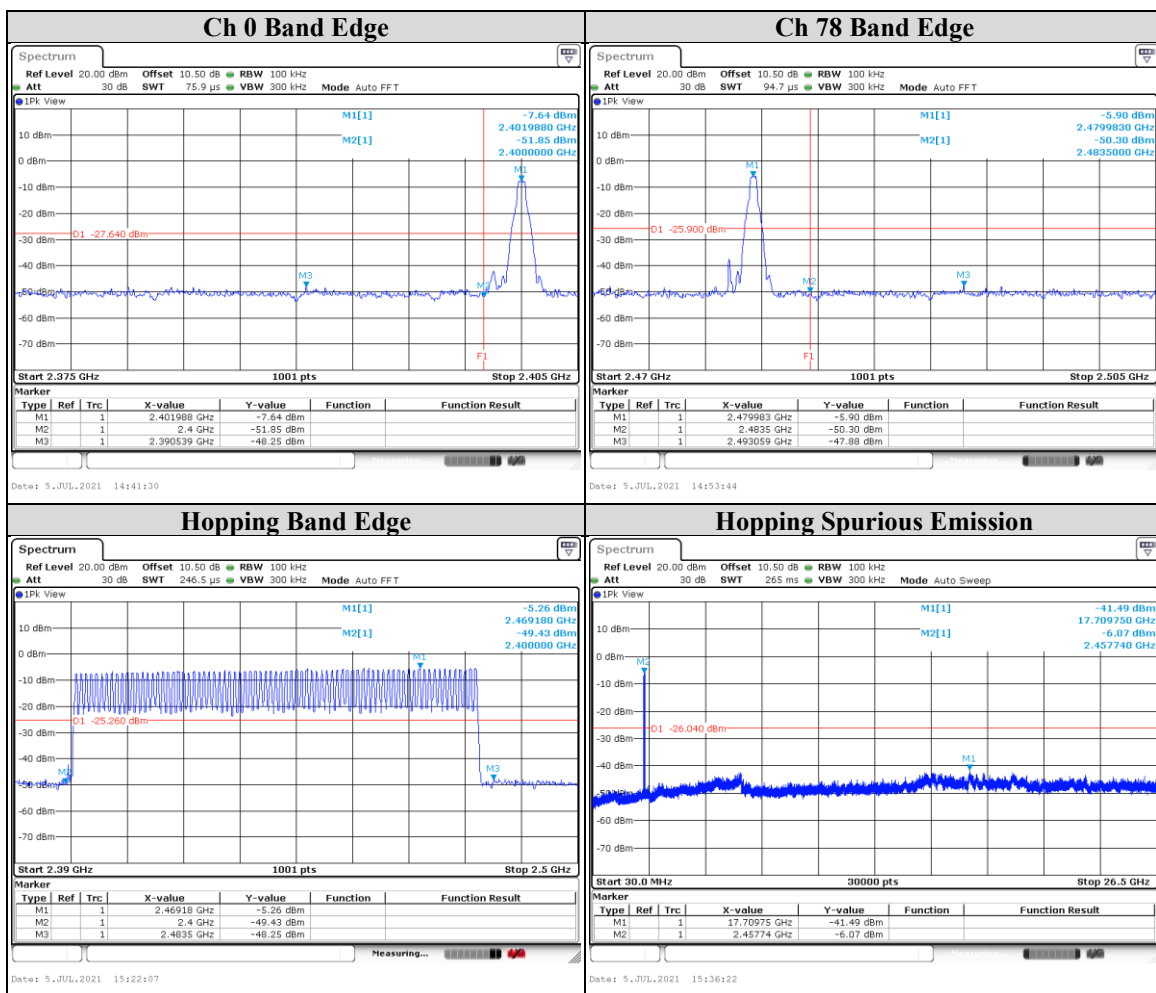
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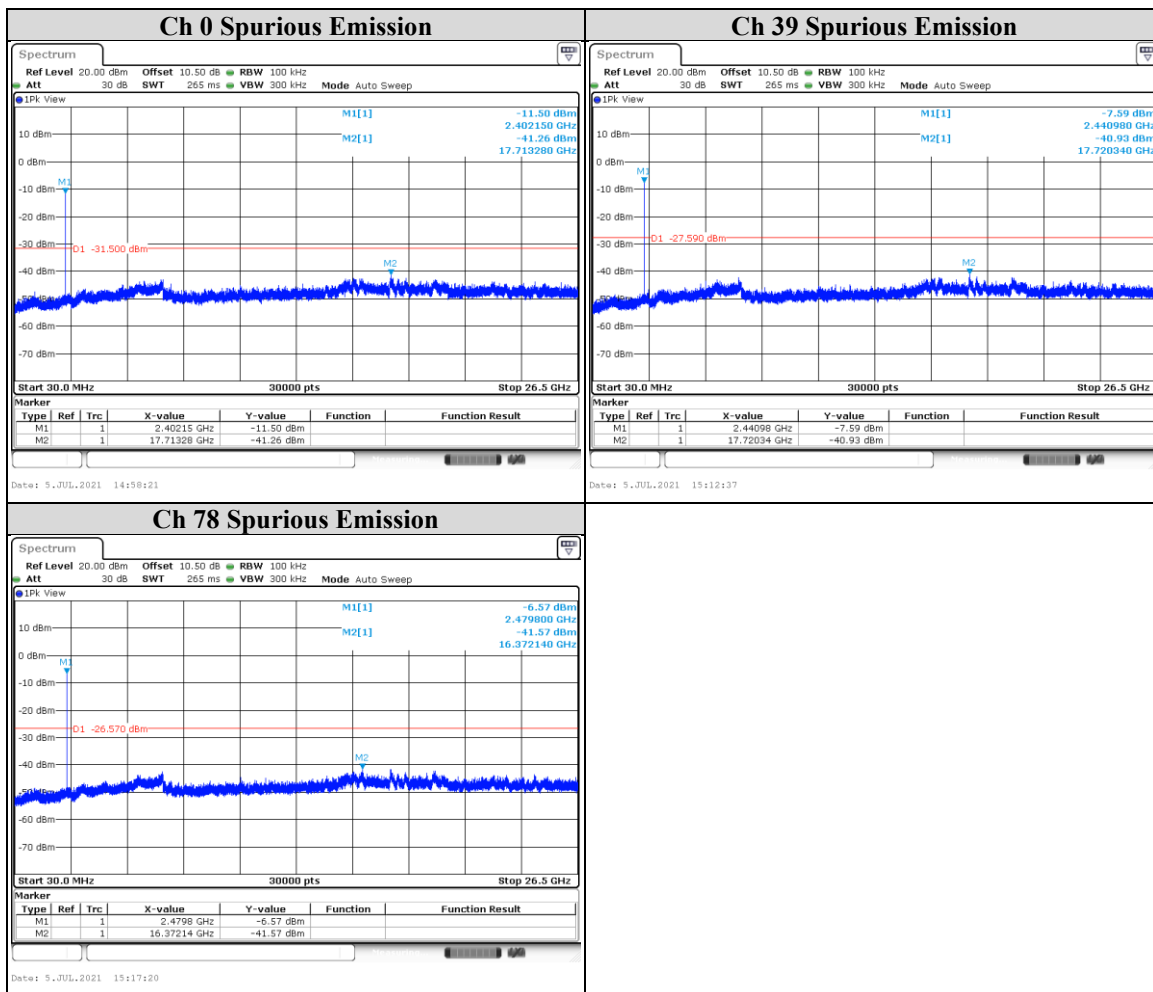


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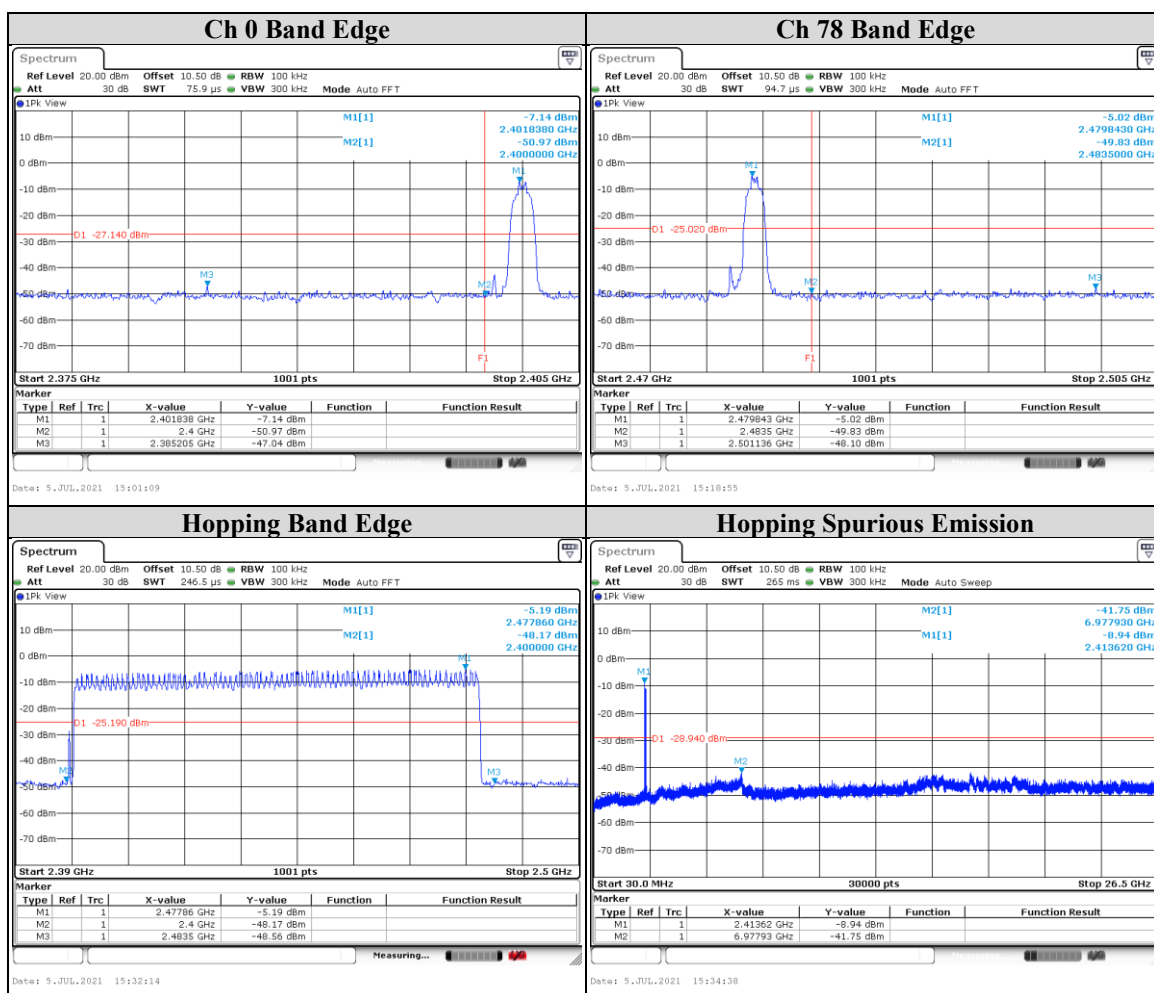
Doc No: 17-EM-F0880 / 6.0



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4.5.5 測試結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

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4.6 場強輻射

4.6.1 適用標準

請見本報告 3.1 節第 (5)、(10) 的規定。

4.6.2 測試方法

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

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

頻譜設定如下：

Peak

頻率範圍	RBW	VBW
9 kHz~150 kHz	200 Hz	600 Hz
150 kHz~30 MHz	10 kHz	30 kHz
30 MHz~1 GHz	120 kHz	360 kHz
Above 1GHz	1 MHz	3 MHz

Average

調變方式	RBW	VBW
Bluetooth EDR	1 MHz	510Hz

Note:

- Quasi-Peak RBW = 120 kHz
- The BT-GFSK Duty cycle = $(2.8841/3.7536)*100\% = 76.84 < 98\%$, so video bandwidth is $1/2.8841 = 0.347$ kHz. Therefore VBW configuration is 510Hz for testing.
- The BT- $\pi/4$ -DQPSK Duty cycle = $(2.8841/3.7536)*100\% = 76.84 < 98\%$, so video bandwidth is $1/2.8841 = 0.347$ kHz. Therefore VBW configuration is 510Hz for testing.
- Refer to section 4.4 for duty cycle plots.

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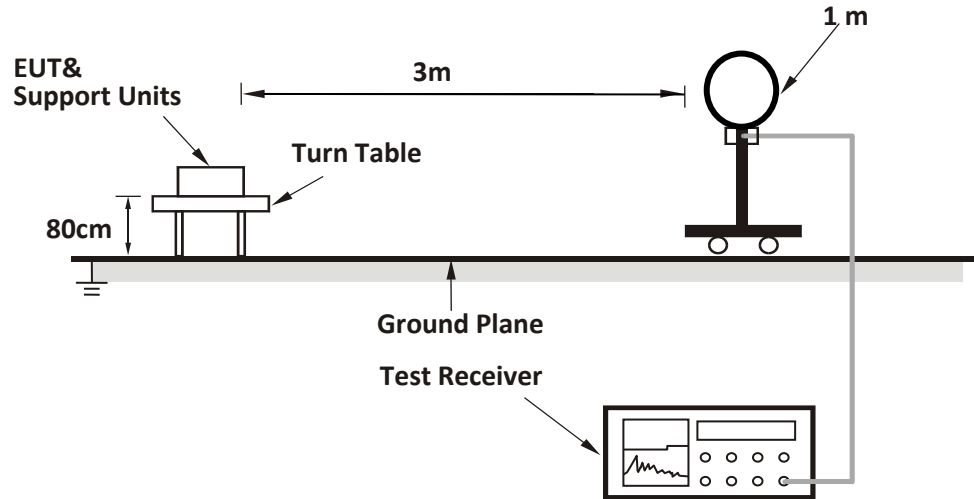
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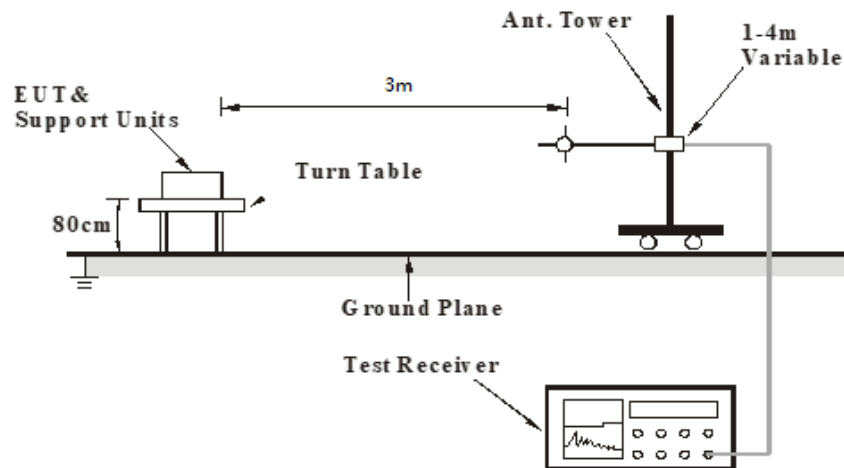
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4.6.3 測試配置圖

<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >



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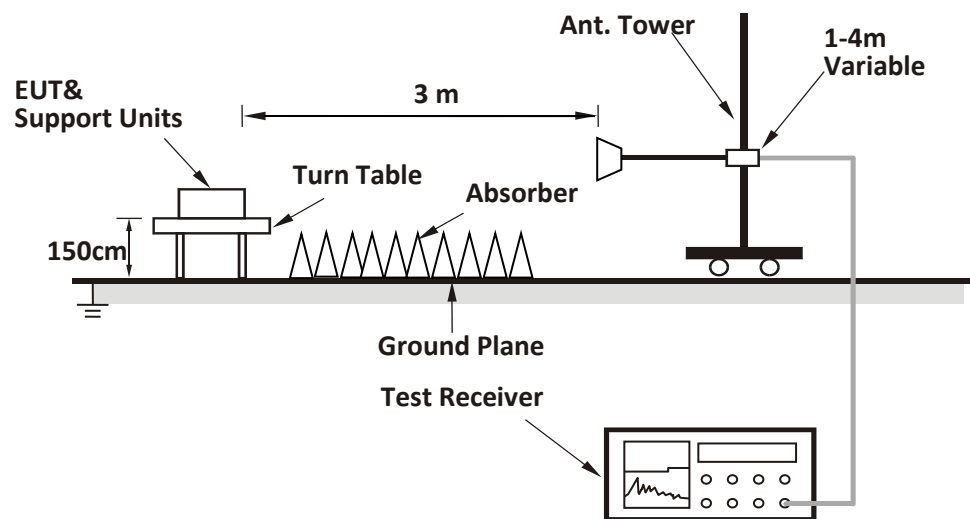
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<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Appendix III.

4.6.4 場強之計算公式

結果值 Result value (dBuV/m) = 機器讀值 Reading value (dBuV/m) + 校正因子
 Correction Factor (dB/m)

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



4.6.5 測試結果

發射模式

Above 1GHz Data

EUT Test Condition		Measurement Detail	
Mode 1	Channel 0	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	4804	43.48	2.46	45.94	74	-28.06	Peak
-	2380.49	30.9	16.08	46.98	54	-7.02	Average
@	2402	74.66	16.13	90.79	-	-	Average
-	2340.78	41.1	16.07	57.17	74	-16.83	Peak
@	2402	74.78	16.13	90.91	-	-	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	4804	41.26	2.46	43.72	74	-30.28	Peak
-	2319.31	30.41	16.16	46.57	54	-7.43	Average
@	2402	68.74	16.13	84.87	-	-	Average
-	2374.79	40.34	16.08	56.42	74	-17.58	Peak
@	2402	68.86	16.13	84.99	-	-	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Mode 1	Channel 39	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	4882	43.67	2.66	46.33	74	-27.67	Peak
-	2344.96	30.34	16.05	46.39	54	-7.61	Average
@	2441	75.65	16.11	91.76	-	-	Average
-	2500	30.25	16.1	46.35	54	-7.65	Average
-	2322.35	40.81	16.15	56.96	74	-17.04	Peak
@	2441	75.8	16.11	91.91	-	-	Peak
-	2486.51	40.91	16.1	57.01	74	-16.99	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	4882	39.43	2.66	42.09	74	-31.91	Peak
-	2324.44	30.43	16.14	46.57	54	-7.43	Average
@	2441	71.47	16.11	87.58	-	-	Average
-	2491.45	30.36	16.1	46.46	54	-7.54	Average
-	2316.46	40.31	16.17	56.48	74	-17.52	Peak
@	2441	71.97	16.11	88.08	-	-	Peak
-	2486.89	40.48	16.1	56.58	74	-17.42	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Mode 1	Channel 78	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	4960	40.76	2.62	43.38	74	-30.62	Peak
@	2480	73.9	16.1	90	-	-	Average
-	2493.92	30.42	16.1	46.52	54	-7.48	Average
@	2480	76.35	16.1	92.45	-	-	Peak
-	2494.11	39.21	16.1	55.31	74	-18.69	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	4960	39.38	2.62	42	74	-32	Peak
@	2480	72.01	16.1	88.11	-	-	Average
-	2486.7	30.46	16.1	46.56	54	-7.44	Average
@	2480	72.3	16.1	88.4	-	-	Peak
-	2484.42	39.92	16.1	56.02	74	-17.98	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Mode 2	Channel 0	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	4804	43.14	2.46	45.6	74	-28.4	Peak
-	2389.04	30.37	16.1	46.47	54	-7.53	Average
@	2402	72.53	16.13	88.66	-	-	Average
-	2348	40.67	16.04	56.71	74	-17.29	Peak
@	2402	74.35	16.13	90.48	-	-	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	4804	41.12	2.46	43.58	74	-30.42	Peak
-	2319.88	30.29	16.16	46.45	54	-7.55	Average
@	2402	65.29	16.13	81.42	-	-	Average
-	2363.01	41.22	16.06	57.28	74	-16.72	Peak
@	2402	66.69	16.13	82.82	-	-	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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EUT Test Condition		Measurement Detail	
Mode 2	Channel 39	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	4882	42.75	2.66	45.41	74	-28.59	Peak
-	2329.19	30.31	16.11	46.42	54	-7.58	Average
@	2441	72.72	16.11	88.83	-	-	Average
-	2490.12	30.21	16.1	46.31	54	-7.69	Average
-	2379.73	41.1	16.08	57.18	74	-16.82	Peak
@	2441	76.05	16.11	92.16	-	-	Peak
-	2496.01	40.01	16.1	56.11	74	-17.89	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	4882	39.94	2.66	42.6	74	-31.4	Peak
-	2326.34	30.41	16.12	46.53	54	-7.47	Average
@	2441	68.68	16.11	84.79	-	-	Average
-	2484.23	30.32	16.1	46.42	54	-7.58	Average
-	2358.64	40.37	16.05	56.42	74	-17.58	Peak
@	2441	70.47	16.11	86.58	-	-	Peak
-	2494.3	39.66	16.1	55.76	74	-18.24	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.
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EUT Test Condition		Measurement Detail	
Mode 2	Channel 78	Frequency Range	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	4960	42.38	2.62	45	74	-29	Peak
@	2480	73.67	16.1	89.77	-	-	Average
-	2498.48	30.55	16.1	46.65	54	-7.35	Average
@	2480	75.37	16.1	91.47	-	-	Peak
-	2496.39	40.39	16.1	56.49	74	-17.51	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	4960	39.04	2.62	41.66	74	-32.34	Peak
@	2480	70.72	16.1	86.82	-	-	Average
-	2489.93	30.34	16.1	46.44	54	-7.56	Average
@	2480	72.26	16.1	88.36	-	-	Peak
-	2489.17	40.93	16.1	57.03	74	-16.97	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

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其他不必要之訊號

9 kHz ~ 30 MHz Data:

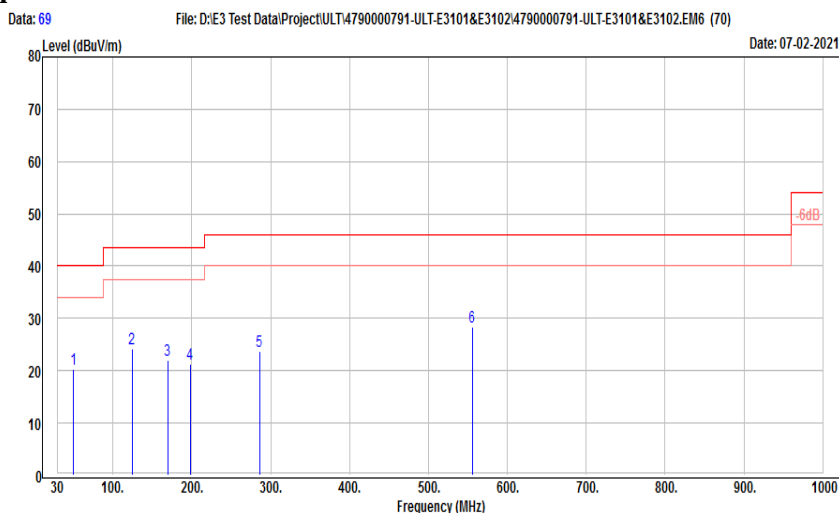
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Data:

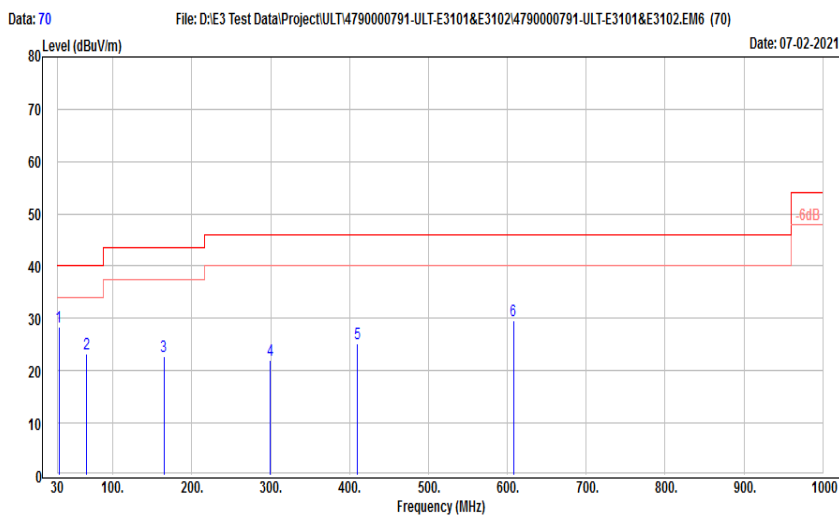
型號: E3101

EUT Test Condition		Measurement Detail	
Mode 4	Charging mode	Frequency Range	30 MHz ~ 1 GHz

Horizontal



Vertical



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Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	50.37	31.43	-11.1	20.33	40	-19.67	Peak
-	124.09	38.21	-13.97	24.24	43.5	-19.26	Peak
-	169.68	33.35	-11.38	21.97	43.5	-21.53	Peak
-	197.81	35.15	-13.82	21.33	43.5	-22.17	Peak
-	286.08	34.09	-10.39	23.7	46	-22.3	Peak
-	555.74	31.62	-3.27	28.35	46	-17.65	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	31.94	41.05	-12.64	28.41	40	-11.59	Peak
-	66.86	36.72	-13.38	23.34	40	-16.66	Peak
-	164.83	33.85	-11.13	22.72	43.5	-20.78	Peak
-	299.66	32.01	-9.93	22.08	46	-23.92	Peak
-	410.24	32.02	-6.83	25.19	46	-20.81	Peak
-	608.12	31.57	-1.9	29.67	46	-16.33	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The peak result complies with QP limit, QP result is deemed to comply with QP limit.
5. The other emission levels were very low against the limit.

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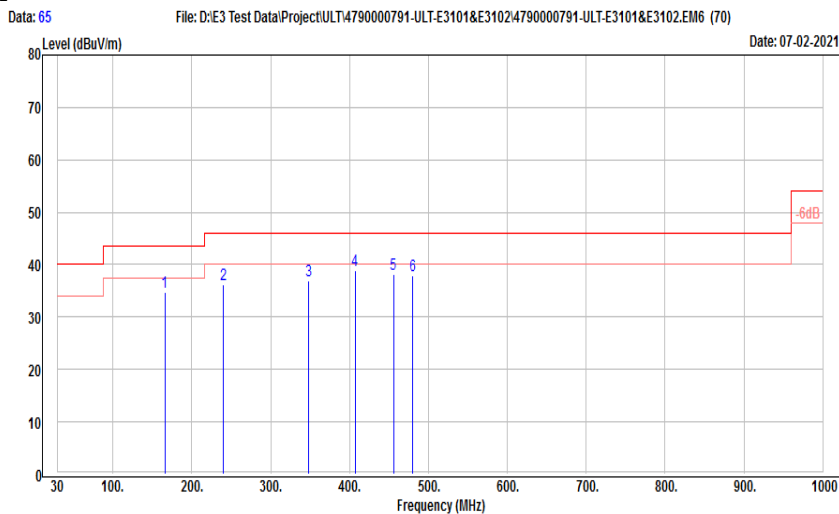
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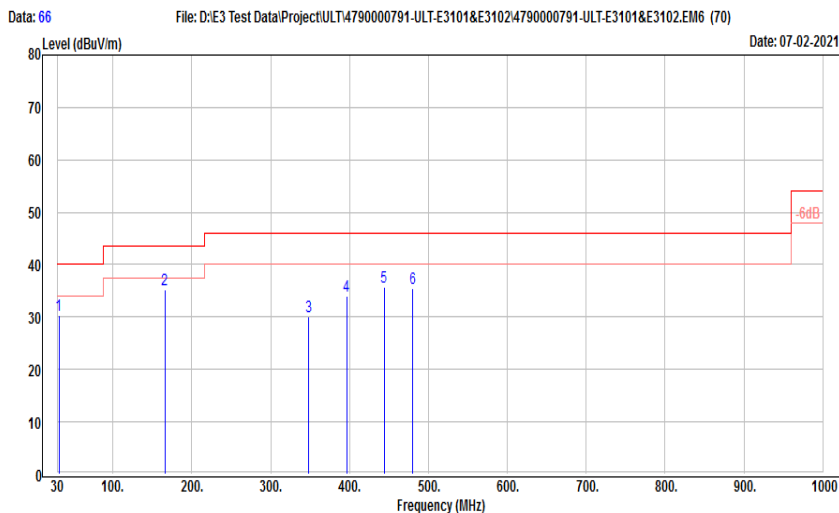
型號: E3102

EUT Test Condition		Measurement Detail	
Mode 4	Charging mode	Frequency Range	30 MHz ~ 1 GHz

Horizontal



Vertical



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Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	165.8	45.94	-11.14	34.8	43.5	-8.7	Peak
-	240.49	48.27	-12.1	36.17	46	-9.83	Peak
-	348.16	45.64	-8.6	37.04	46	-8.96	Peak
-	407.33	45.76	-6.84	38.92	46	-7.08	Peak
-	455.83	43.79	-5.5	38.29	46	-7.71	Peak
-	480.08	43.09	-5.18	37.91	46	-8.09	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
-	31.94	43.05	-12.64	30.41	40	-9.59	Peak
-	165.8	46.28	-11.14	35.14	43.5	-8.36	Peak
-	348.16	38.68	-8.6	30.08	46	-15.92	Peak
-	396.66	41.12	-7.14	33.98	46	-12.02	Peak
-	444.19	41.59	-5.82	35.77	46	-10.23	Peak
-	480.08	40.66	-5.18	35.48	46	-10.52	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The peak result complies with QP limit, QP result is deemed to comply with QP limit.
5. The other emission levels were very low against the limit.

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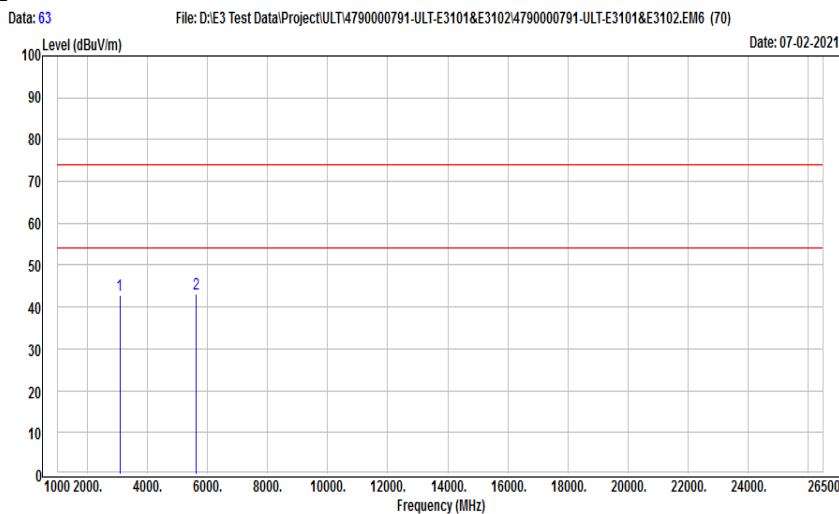


接收模式

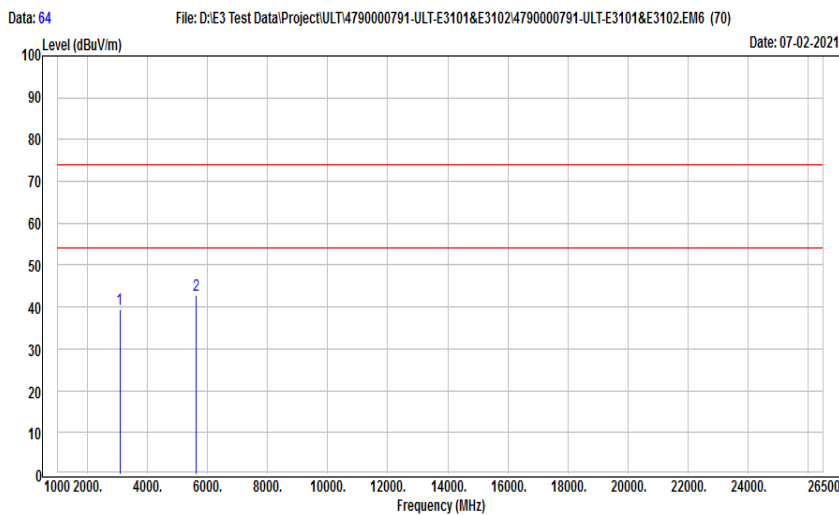
Above 1 GHz Data

EUT Test Condition		Measurement Detail	
Mode 3	Bluetooth RX	Frequency Range	1 GHz ~ 26.5 GHz

Horizontal



Vertical



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Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	3074	44.72	-1.76	42.96	74	-31.04	Peak
*	5624	39.22	4.02	43.24	74	-30.76	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
*	3074	41.24	-1.76	39.48	74	-34.52	Peak
*	5624	38.88	4.02	42.9	74	-31.1	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. " * ": The peak result under 20 dB above and complies with AVG limit, AVG result is deemed to comply with AVG limit.
5. The other emission levels were very low against the limit.

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其他不必要之訊號

9 kHz ~ 30 MHz Data

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

30 MHz ~ 1 GHz Data

因模式 4 : Charging mode with charger box 為一般正常使用之操作狀況，此測試結果併同發射模式之 30 MHz ~ 1 GHz Data，因此測試數據參照發射模式 30 MHz ~ 1 GHz Data 測試結果。

4.6.6 測試結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

4.7 電源線傳導干擾

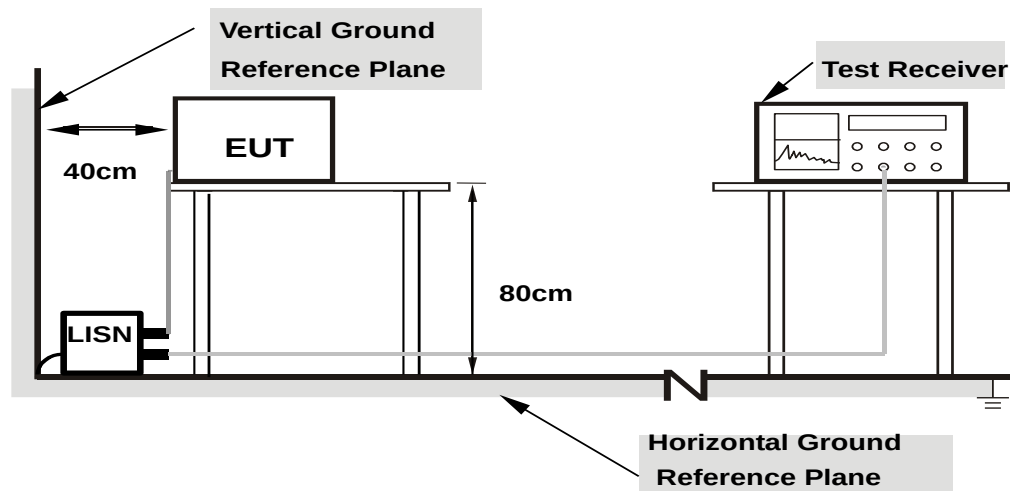
4.7.1 適用標準

請見本報告 3.1 節第 (8) 的規定。

4.7.2 測試方法

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

4.7.3 測試配置圖



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

For the actual test configuration, please refer to the Appendix IV.



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4.7.4 電源傳導干擾電壓值之計算

結果值 Result value (dBuV) = 機器讀值 Reading value (dBuV) + 校正因子 Correction Factor (dB)

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

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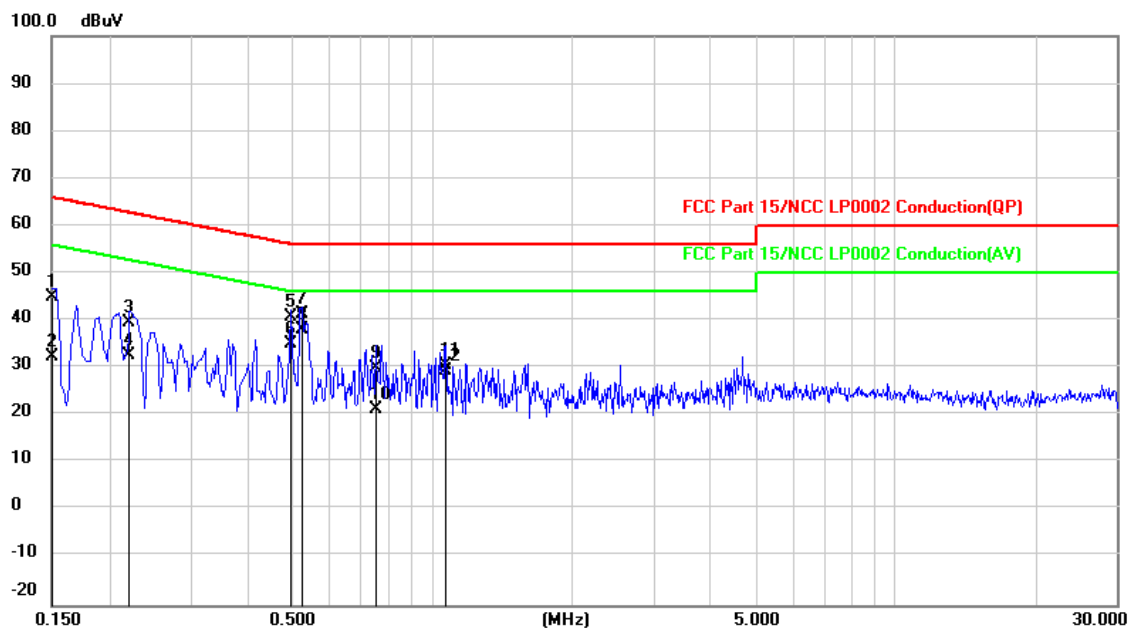


4.7.5 測試結果

發射模式

EUT Test Condition		Measurement Detail	
Mode 4	Charging mode	Frequency Range	150 kHz ~ 30 MHz

Phase of Power : Line (L)



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No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	dB	(dBuV)	(dBuV)	(dB)	
1	0.1500	25.35	19.50	44.85	66.00	-21.15	QP
2	0.1500	12.87	19.50	32.37	56.00	-23.63	AVG
3	0.2220	20.06	19.49	39.55	62.74	-23.19	QP
4	0.2220	13.07	19.49	32.56	52.74	-20.18	AVG
5	0.4940	21.24	19.48	40.72	56.10	-15.38	QP
6	0.4940	15.57	19.48	35.05	46.10	-11.05	AVG
7	0.5220	21.91	19.49	41.40	56.00	-14.60	QP
8	0.5220	18.67	19.49	38.16	46.00	-7.84	AVG
9	0.7539	10.32	19.51	29.83	56.00	-26.17	QP
10	0.7539	1.83	19.51	21.34	46.00	-24.66	AVG
11	1.0700	11.01	19.51	30.52	56.00	-25.48	QP
12	1.0700	9.83	19.51	29.34	46.00	-16.66	AVG

Remarks:

1. Result value (dBuV) = Reading value (dBuV) + Correction Factor (dB)
2. Margin(dB) = Result value (dBuV) - Limit value (dBuV)
3. Correction Factor(dB) = Insertion loss(dB) + Cable loss(dB)
4. The other emission levels were very low against the limit.

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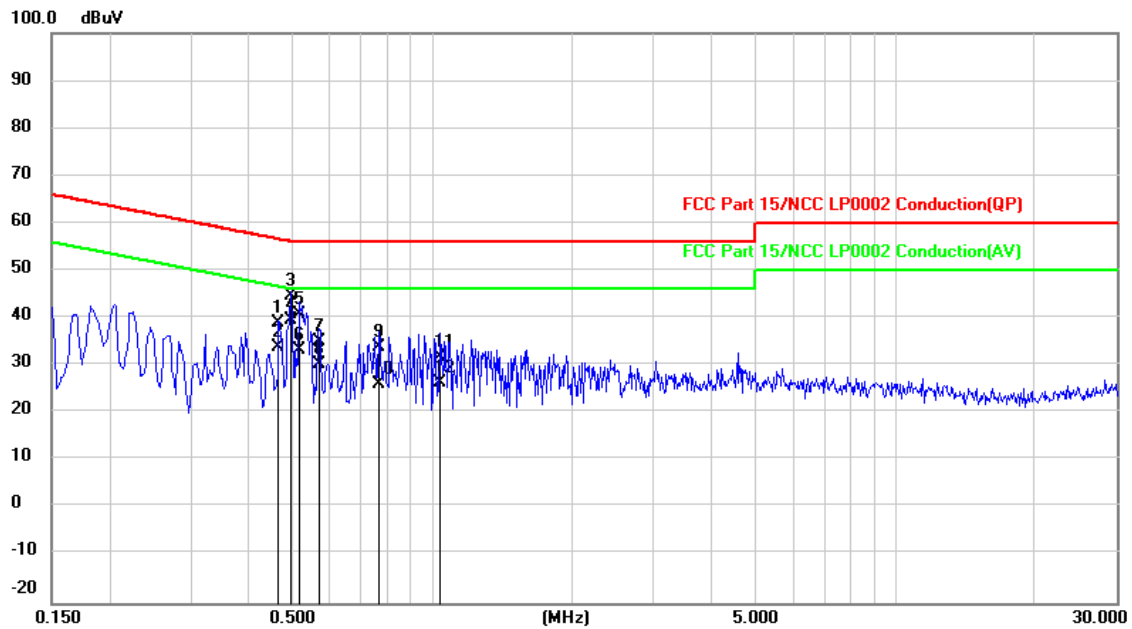


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Phase of Power : Neutral (N)



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No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	dB	(dBuV)	(dBuV)	(dB)	
1	0.4660	19.39	19.48	38.87	56.58	-17.71	QP
2	0.4660	14.35	19.48	33.83	46.58	-12.75	AVG
3	0.4940	25.12	19.48	44.60	56.10	-11.50	QP
4	0.4940	20.17	19.48	39.65	46.10	-6.45	AVG
5	0.5140	21.30	19.49	40.79	56.00	-15.21	QP
6	0.5140	13.86	19.49	33.35	46.00	-12.65	AVG
7	0.5700	15.57	19.49	35.06	56.00	-20.94	QP
8	0.5700	10.88	19.49	30.37	46.00	-15.63	AVG
9	0.7660	14.35	19.50	33.85	56.00	-22.15	QP
10	0.7660	6.51	19.50	26.01	46.00	-19.99	AVG
11	1.0420	12.23	19.50	31.73	56.00	-24.27	QP
12	1.0420	6.98	19.50	26.48	46.00	-19.52	AVG

Remarks:

1. Result value (dBuV) = Reading value (dBuV) + Correction Factor (dB)
2. Margin(dB) = Result value (dBuV) - Limit value (dBuV)
3. Correction Factor(dB) = Insertion loss(dB) + Cable loss(dB)
4. The other emission levels were very low against the limit.

4.7.6 測試結果判定

依據測試數據結果，符合低功率射頻器材技術規範之要求。

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4.8 電波暴露量之評估

4.8.1 適用標準

請見本報告 3.1 節第 (11) 的規定。

4.8.2 測試方法

a) 以 4.1.4 節所測得的最大輸出功率值再加上待測物天線的增益值(Gain)帶入下面公式換算出待測物所輻射的功率密度。

$$b) P_d = (P_{out} * G) / (4 * \pi * r^2)$$

where

P_d = power density in mW/cm^2

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

4.8.2 評估結果

Evaluation Frequency	Max. Average Power	Antenna Gain	Max. EIRP	Max. EIRP	Power Density @20cm	limit	PASS / FAIL
(MHz)	(dBm)	(dBi)	(dBm)	(mW)	(mW/cm ²)	(mW/cm ²)	
2402 ~ 2480	-4.28	5.54	1.26	1.337	0.00027	1.00	PASS

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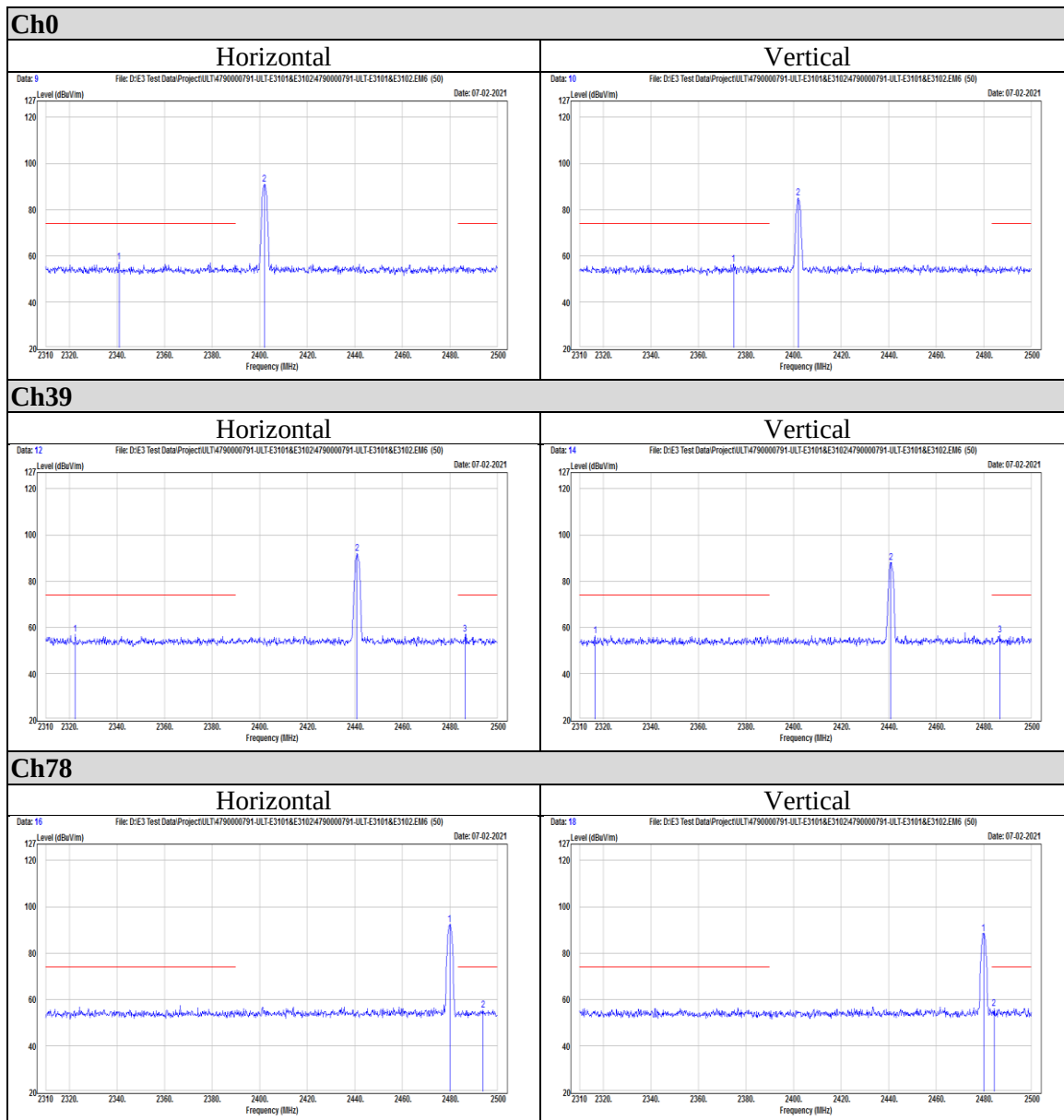
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附錄 I 頻帶邊緣輻射量測

GFSK

Peak



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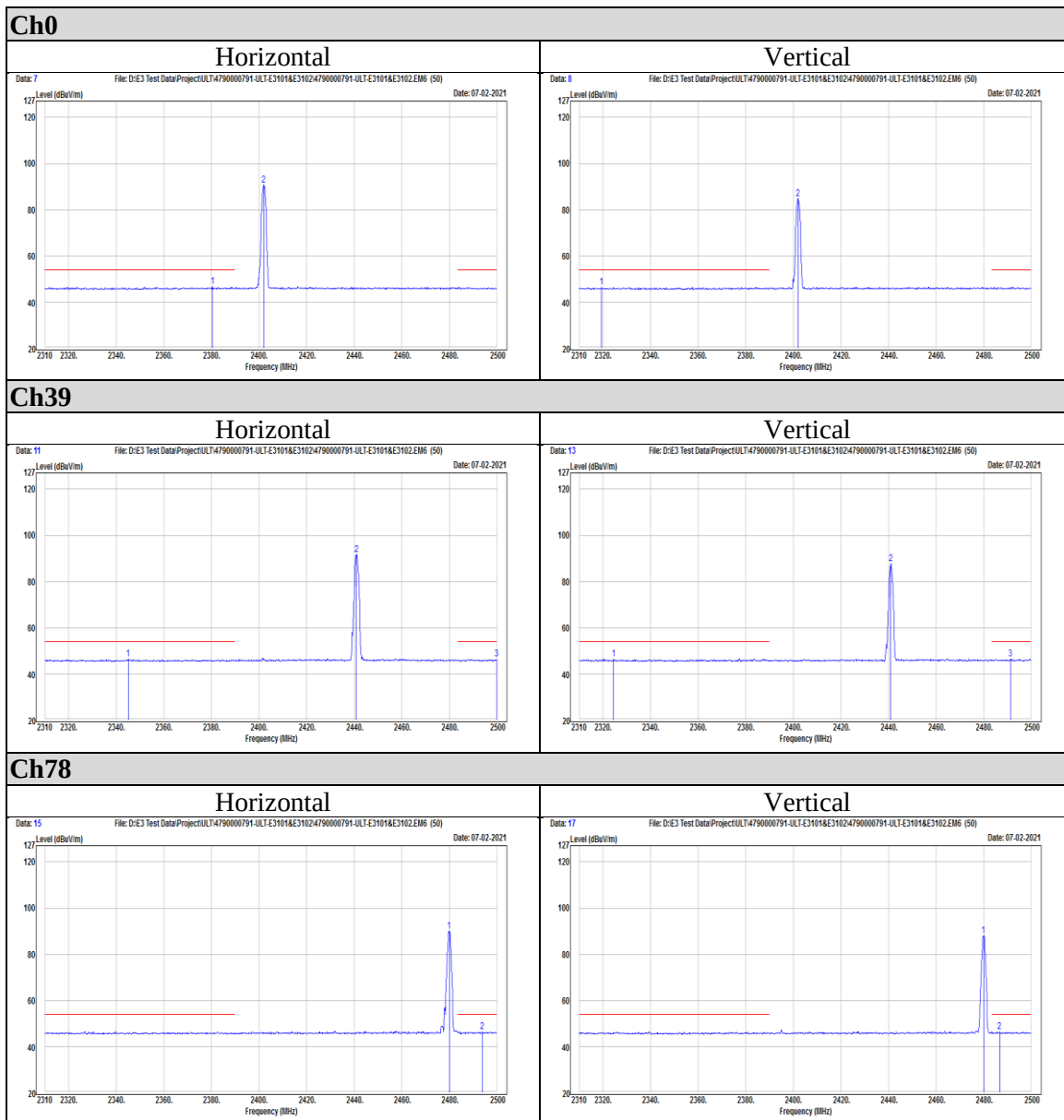


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Average



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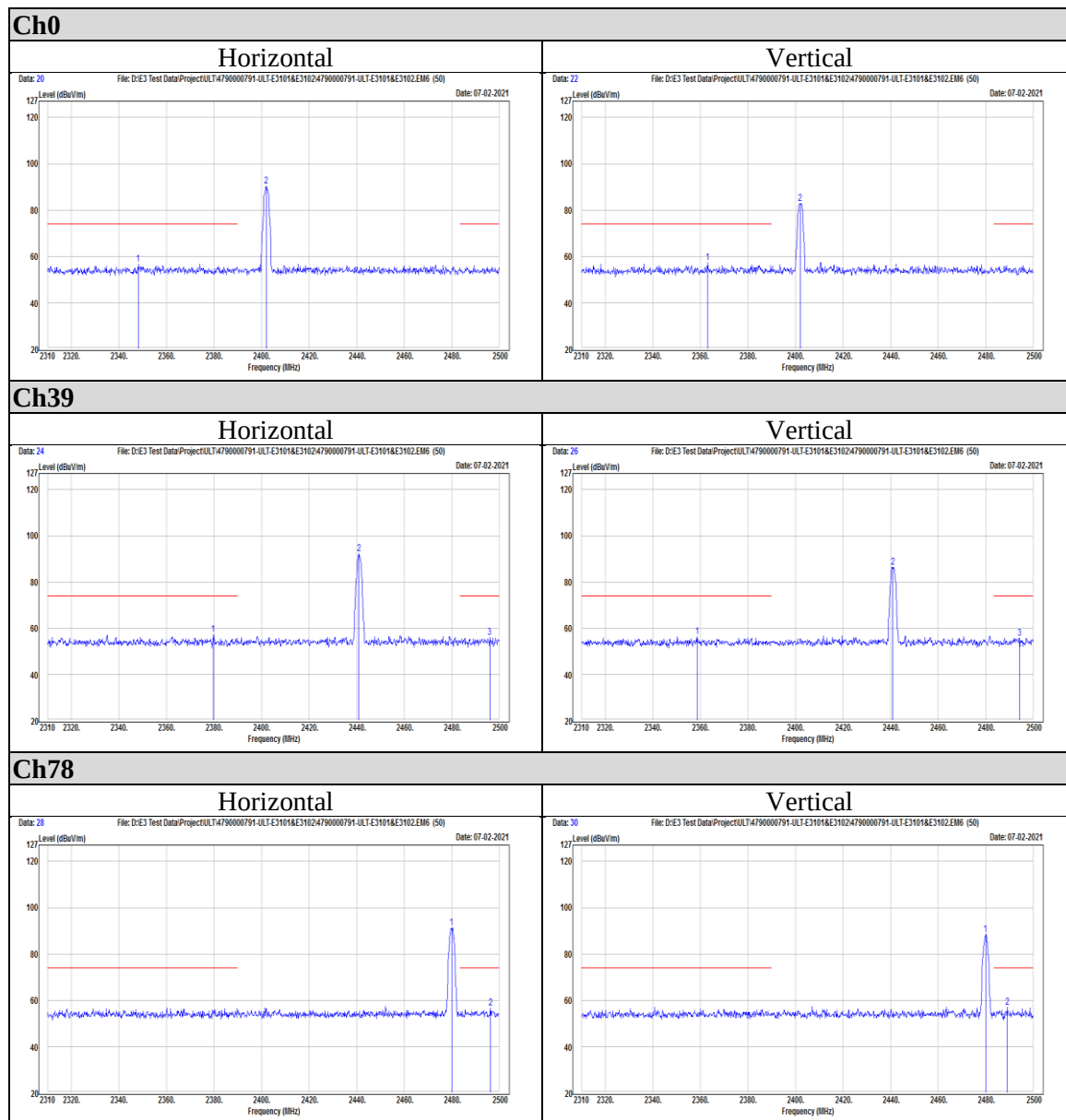
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$\pi/4$ -DQPSK

Peak



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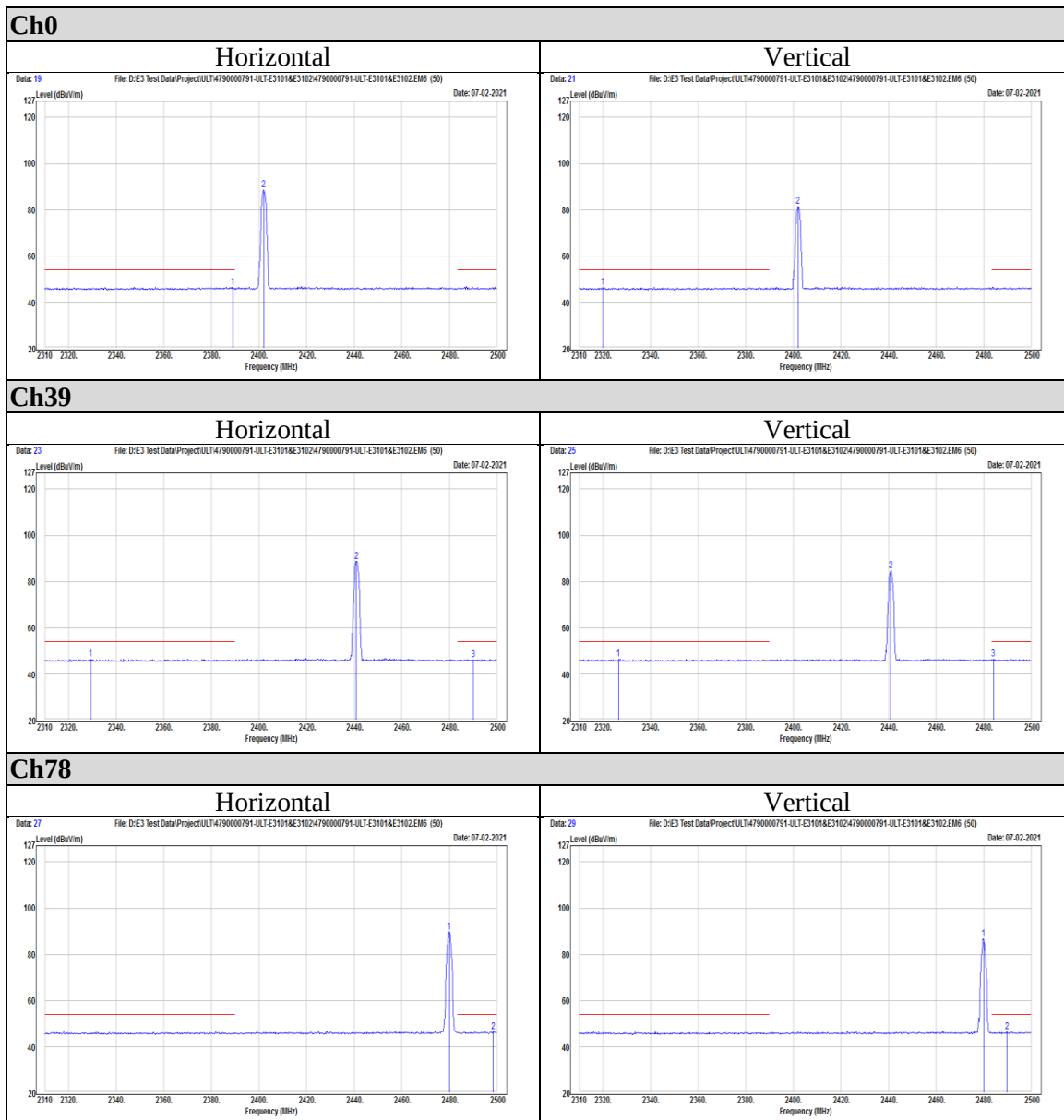


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Average



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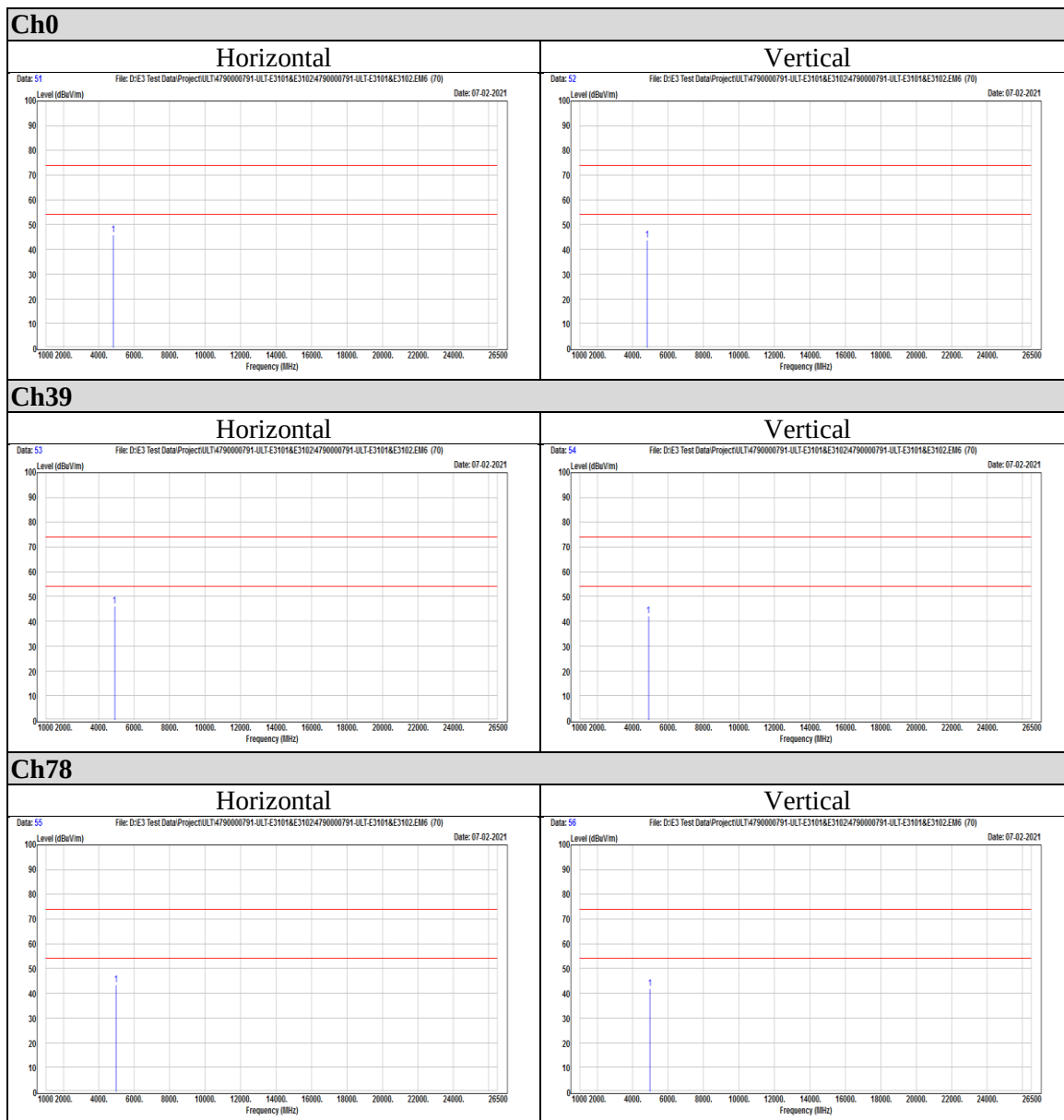
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附錄 II 混附波輻射量測

GFSK



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Doc No: 17-EM-F0880 / 6.0

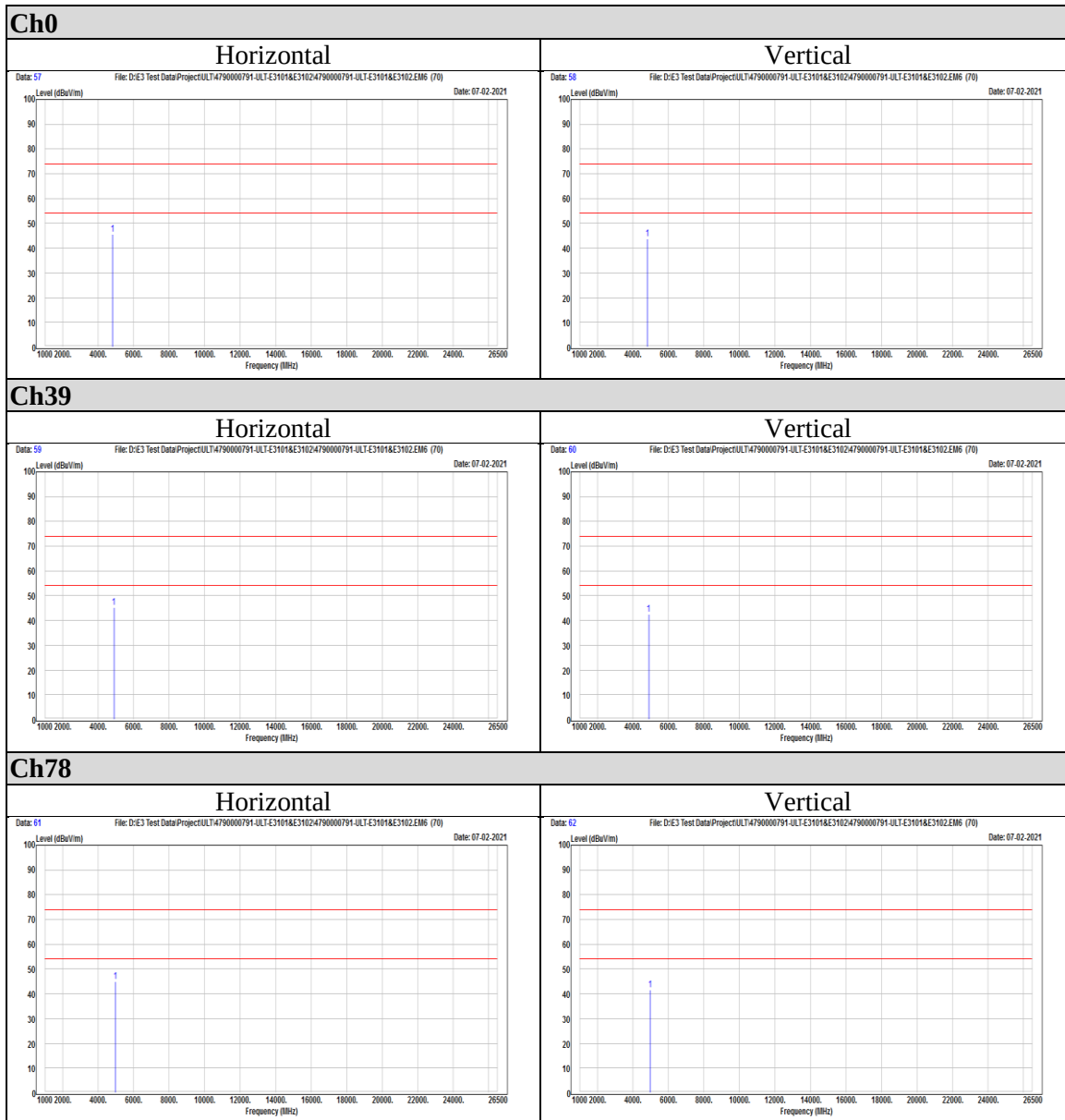


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$\pi/4$ -DQPSK



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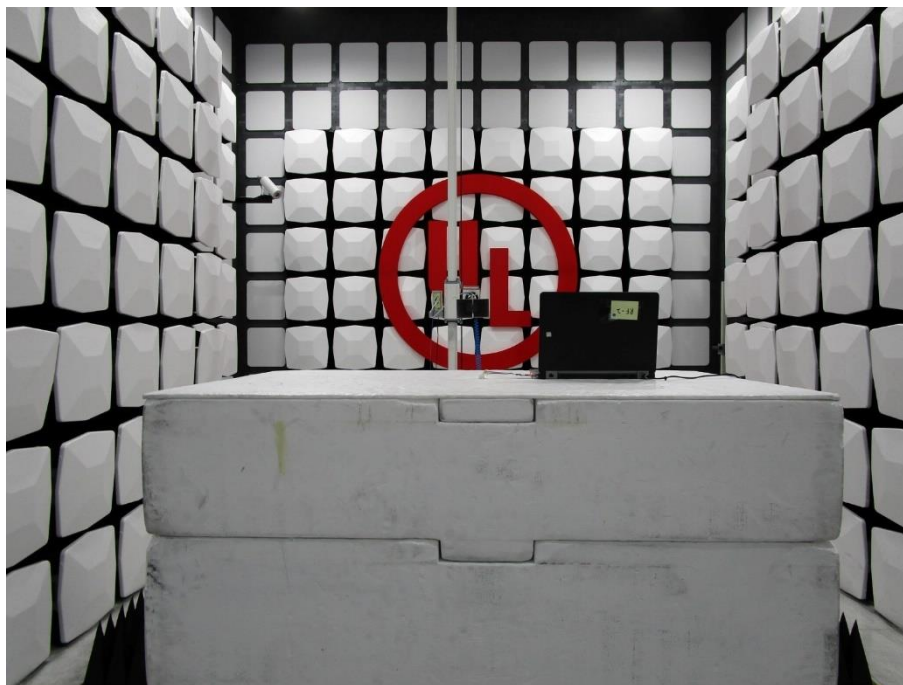
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附錄 III 場強輻射配置照片

Above 1GHz



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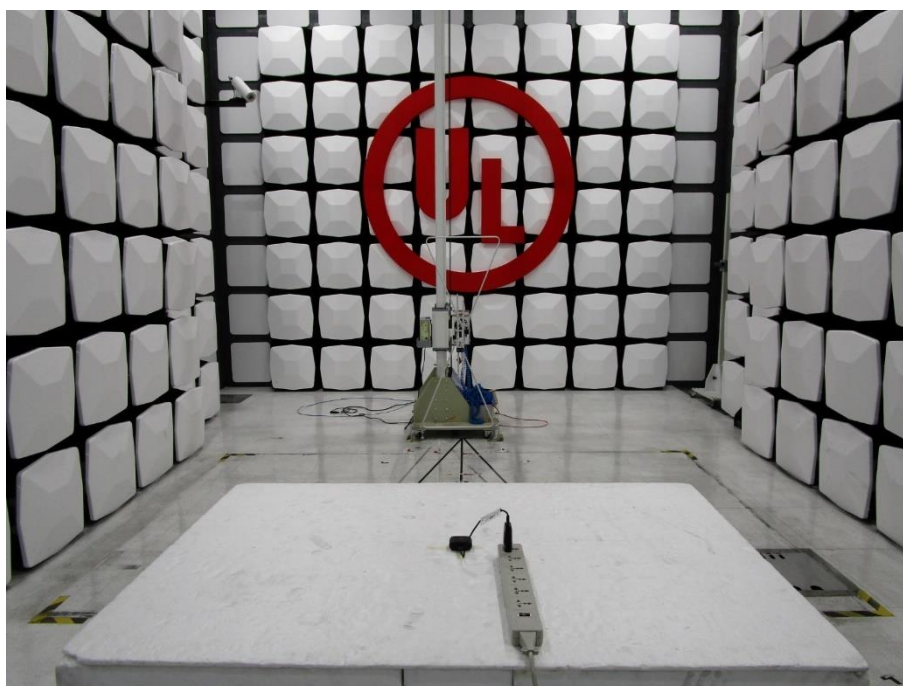
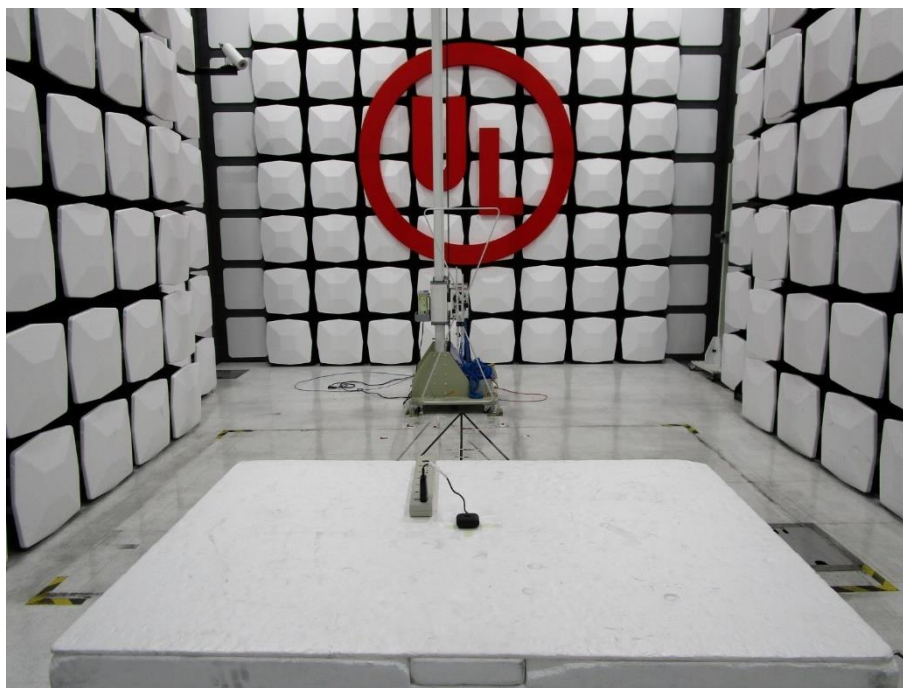
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30 MHz ~ 1 GHz

Charger Mode



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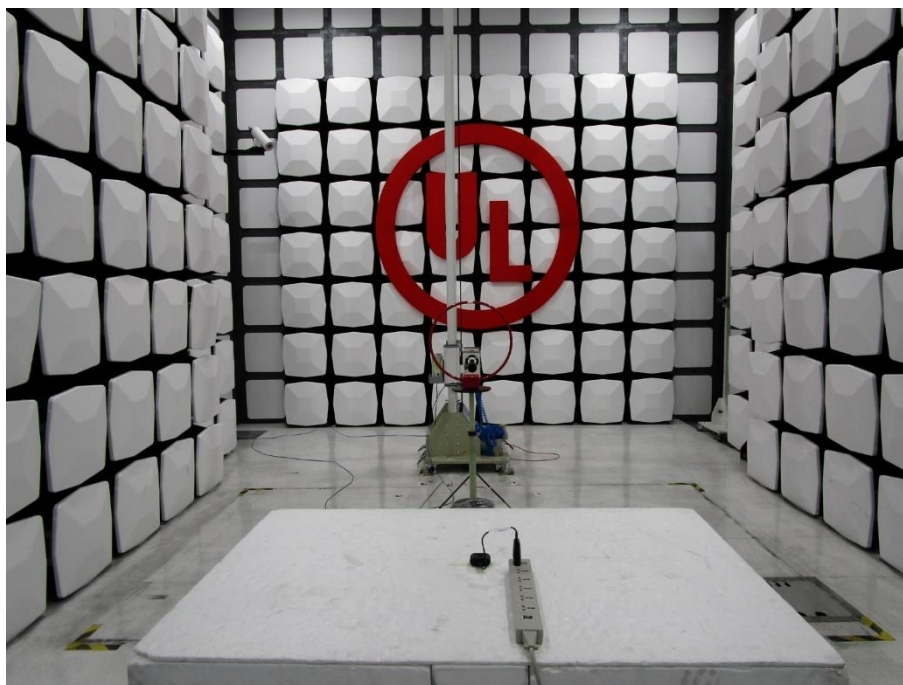
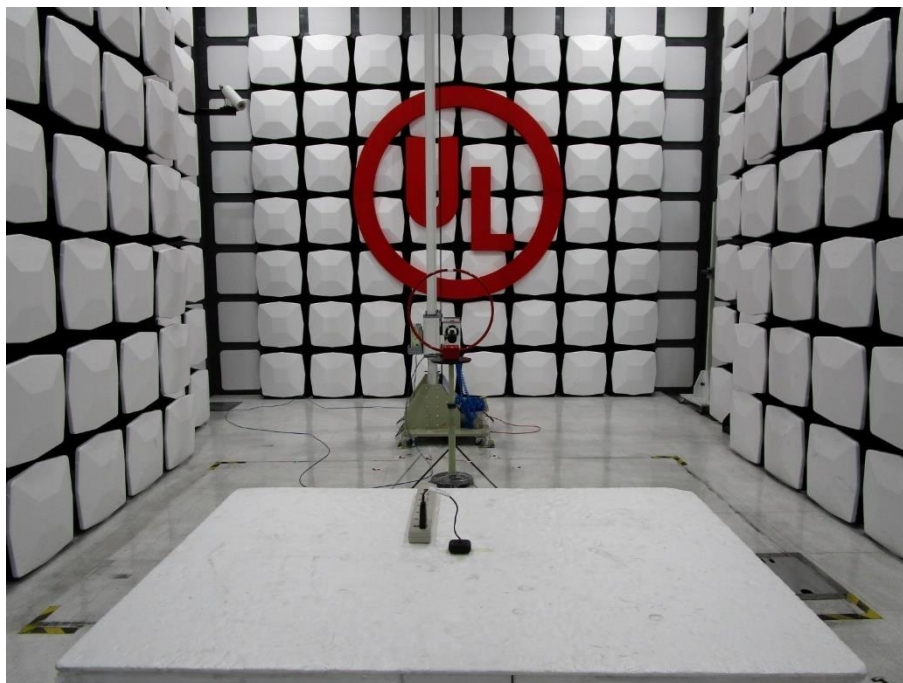
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9 kHz ~ 30 MHz
Charger Mode



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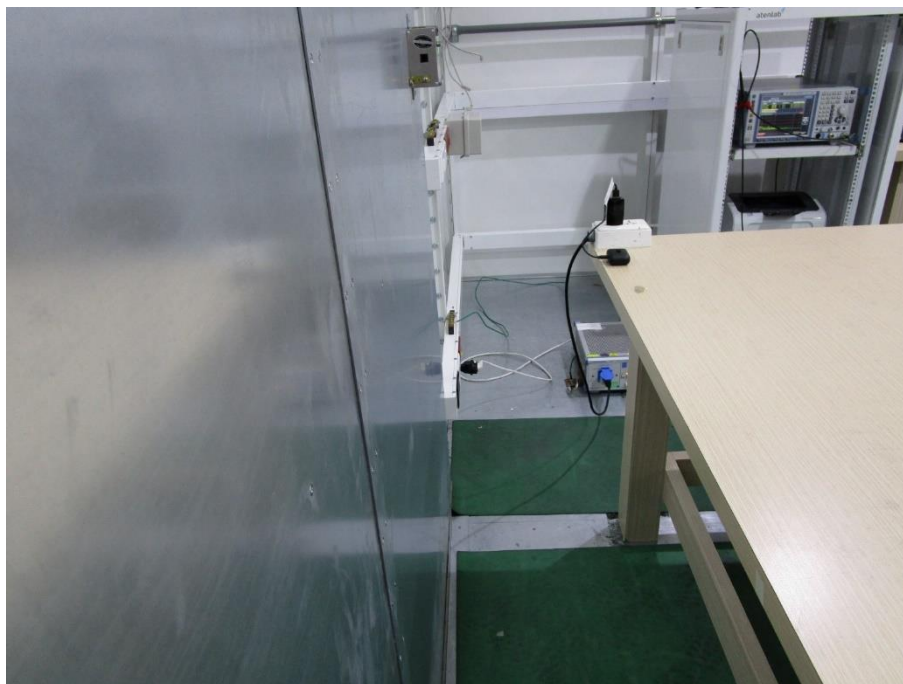
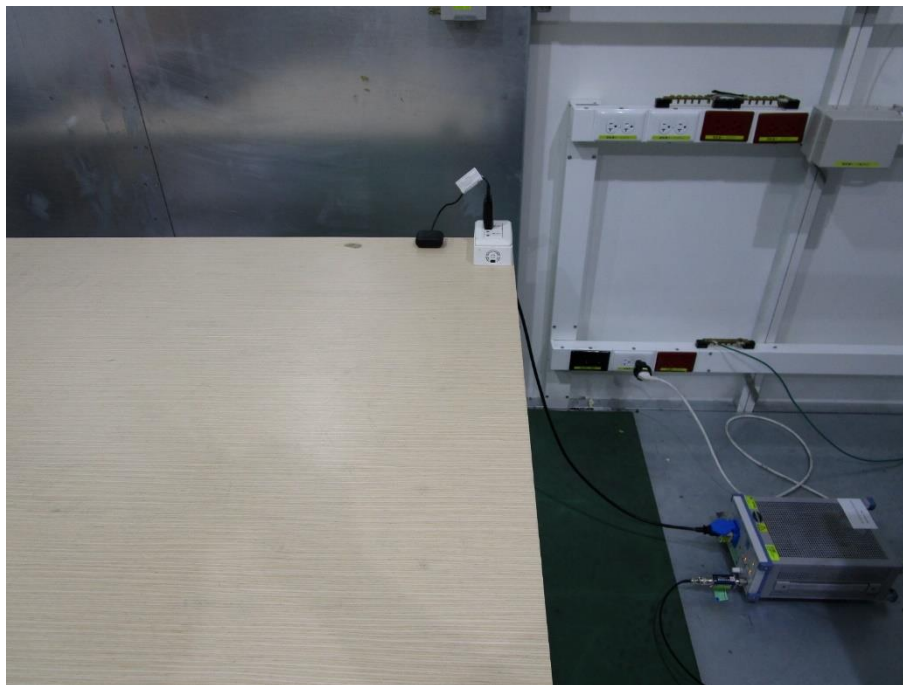
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附錄 IV 電源線傳導干擾配置照片

Charger Mode



END OF REPORT

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