

NCC

低功率射頻電機型式試驗報告

產品名稱: 無線基地台
英文名稱: OmniAccess Stellar
型號: OAW-AP1311
廠牌: Alcatel-Lucent Enterprise
申請者: 皇輝科技股份有限公司
申請者地址: 台北市內湖區民權東路六段 11 巷 43 之 1 號 3 樓
測試標準: LP0002 (107 年版) 3.10.1 章節
參考法規: ANSI C63.10-2013
測試結果: 符合
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修訂紀錄

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1. 一般資訊

申請者	皇輝科技股份有限公司
申請者地址	台北市內湖區民權東路六段 11 巷 43 之 1 號 3 樓
製造商	ALE USA Inc.
製造商地址	26801 West Agoura Road, Calabasas, CA 91301, United States
實驗室	台灣曼瑞檢測科技有限公司
實驗室地址	33377 台灣桃園市龜山區復興二路 38 號
實驗室資訊	1. MRT facility is an FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm. 2. MRT facility is an IC registered (MRT Reg. No. 21723) test laboratory with the site description on file at Industry Canada. 3. MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC, Industry Taiwan, EU and TELEC Rules.
實驗室測試環境條件	溫度 (°C) : 20-35 / 濕度 (%RH) : 30-65

2. 產品描述

2.1 產品資訊

產品名稱	無線基地台
產品型號	OAW-AP1311
產品廠牌	Alcatel-Lucent Enterprise
無線規格	802.11a/b/g/n/ac/ax
藍牙規格	v5.1 BLE only
工作溫度	0 ~ 50 °C
待測物額定電壓	PoE input or AC adapter input
工作環境	Indoor Use
EUT 識別號	20200824Sample#01 (Conducted) 20200824Sample#02 (Radiated & AC conducted emission)
頻率範圍	2400~2483.5MHz
信道數量	40
調變模式	GFSK
傳輸速率	Up to 2Mbps

2.2 產品規格

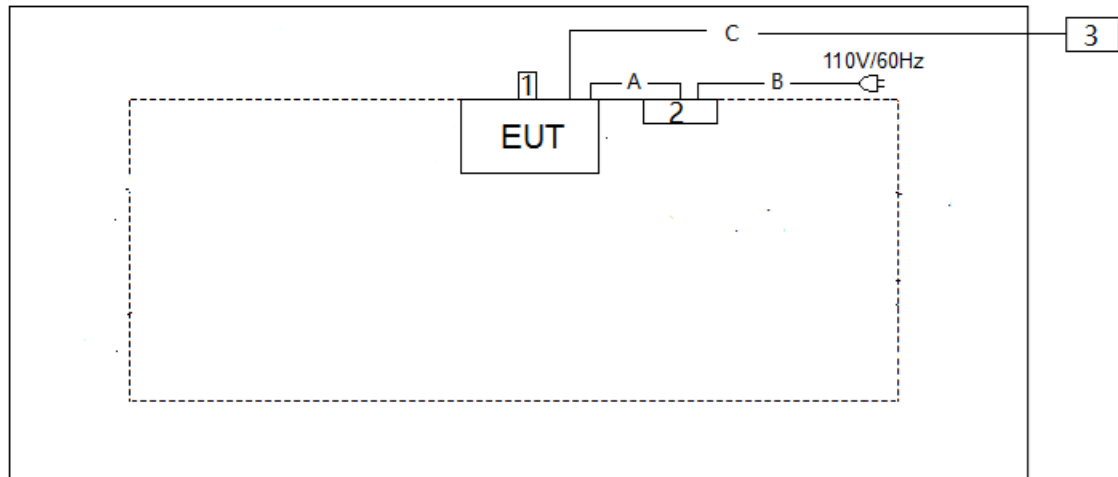
Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2404 MHz	02	2406 MHz
03	2408 MHz	04	2410 MHz	05	2412 MHz
06	2414 MHz	07	2416 MHz	08	2418 MHz
09	2420 MHz	10	2422 MHz	11	2424 MHz
12	2426 MHz	13	2428 MHz	14	2430 MHz
15	2432 MHz	16	2434 MHz	17	2436 MHz
18	2438 MHz	19	2440 MHz	20	2442 MHz
21	2444 MHz	22	2446 MHz	23	2448 MHz
24	2450 MHz	25	2452 MHz	26	2454 MHz
27	2456 MHz	28	2458 MHz	29	2460 MHz
30	2462 MHz	31	2464 MHz	32	2466 MHz
33	2468 MHz	34	2470 MHz	35	2472 MHz
36	2474 MHz	37	2476 MHz	38	2478 MHz
39	2480 MHz	--	--	--	--

2.3 測試模式

Test Mode	Mode 1: 發射器- BT5.1 - 1Mbps
	Mode 2: 發射器- BT5.1 - 2Mbps

2.4 測試配置

Connection Diagram



Signal Cable Type		Signal Cable Description
A	Power Cable	Non-Shielding, 1.5m
B	Power Cable	Non-Shielding, 1.5m
C	LAN Cable	Non-Shielding, > 10m

Note: 為了評估較嚴謹的數據,故使用大於 10m 的網路線來測試.

2.5 測試周邊

Item	周邊	Manufacturer	Model No.	Serial No.	Power Cord
1	USB Dongle	SanDisk	BL161025264V	N/A	N/A
2	AC Adapter	DELTA	ADP-30HR B	1WMD05S00T5	Non-Shielded, 1.8m
3	Notebook	ASUS	PRO45V	N/A	Non-Shielded, 1.8m

2.6 操作程序

1.	Turn on the power of all equipment.
2.	Execute "Console" program.
3.	Configure the test channel and the data rate.
4.	Start test.

3. 測試設備明細

Radiated Disturbance :

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2021/10/5
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	MRTTWA00002	1 year	2021/4/27
Broadband Hornantenna	SCHWARZBECK	BBHA 9120D	MRTTWA00003	1 year	2021/4/24
BreitbandHornantenna	SCHWARZBECK	BBHA 9170	MRTTWA00004	1 year	2021/4/24
Broadband Preamplifier	SCHWARZBECK	BBV 9718	MRTTWA00005	1 year	2021/4/24
Broadband Amplifier	SCHWARZBECK	BBV 9721	MRTTWA00006	1 year	2021/4/24
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2021/3/24
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2021/3/25
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2021/10/14
EXA Signal Analyzer	KEYSIGHT	N9010B	MRTTWA00074	1 year	2021/7/14
Antenna Cable	HUBERSUHNER	SF106	MRTTWE00010	1 year	2021/6/16
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00032	1 year	2021/5/29
Cable	Rosnol	K1K50-UP0264-K1K50-4M	MRTTWE00012	1 year	2021/6/21

Conducted Emissions :

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Two-Line V-Network	R&S	ENV216	MRTTWA00019	1 year	2021/3/26
Two-Line V-Network	R&S	ENV216	MRTTWA00020	1 year	2021/4/24
8-Wire ISN (T8-Cat6)	R&S	ENY81 CA6	MRTTWA00017	1 year	2021/5/25
8-Wire ISN (T8)	R&S	ENY81	MRTTWA00018	1 year	2021/5/25
8-Wire ISN	TESEQ	CDN ST08AS	MRTTWA00083	1 year	2021/9/2
EMI Test Receiver	R&S	ESR3	MRTTWA00045	1 year	2021/5/26
Conducted Cable	Rosnol	N1C50-RG400-B1C50-500CM	MRTTWE00013	1 year	2021/6/21
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00033	1 year	2021/5/28

Conducted Test Equipment:

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00014	1 year	2021/4/24
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00015	1 year	2021/3/26
Wideband Radio Communication Taster	R&S	CMW 500	MRTTWA00041	1 year	2021/1/7
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2021/10/14
EXA Signal Analyzer	KEYSIGHT	N9010B	MRTTWA00074	1 year	2021/7/14
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2021/3/24
Temperature & Humidity Chamber	TEN BILLION	TTH-B3UP	MRTTWA00036	1 year	2021/6/9
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00033	1 year	2021/5/28

Software	Version	Function
e3	9.160520a	EMI Test Software

4. 量測不確定度

電源傳導量測-電源線 (Conducted Emission- Power Line)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 2.53dB
電源傳導量測-通訊埠 (Conducted Emission- Impedance Stabilization Network Measurement)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 3.96dB
輻射干擾量測(Radiated Spurious Emission)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 3.92dB (Below 30M)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 4.25dB (30M~1G)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 4.40dB (1G~18G)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 4.45dB (18G~40G)
頻率誤差量測 (Frequency Error)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): $\pm 78.4\text{Hz}$
傳導功率量測 (Conducted Power)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): $\pm 0.84\text{dB}$
傳導干擾量測 (Conducted Spurious Emission)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): $\pm 2.65\text{ dB}$
佔用頻寬量測 (Occupied Bandwidth)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 3.3%
溫度 / 濕度 (Temp. / Humidity)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): $\pm 0.82^\circ\text{C}/ \pm 3\%$
直流電源 (DC Voltage)
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): $\pm 0.3\%$

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

5. 測試結果

產品名稱 無線基地台
型號 OAW-AP1311

法規章節	量測項目	限制值	測試結果	測試數據
2.3	電源傳導	低功率射頻電機技術規範 2.3 節	符合	第 5.1 章節
3.10.1.2	峰值傳導輸出功率	$\leq 30.00\text{dBm}$	符合	第 5.2 章節
3.10.1.3	天線之要求	低功率射頻電機技術規範 3.10.1.3 節	符合	第 5.3 章節
3.10.1.5	帶外發射限制	$\leq 30\text{dBc(Average)}$	參考原始報告	第 5.4 章節
2.8	輻射電場強度	低功率射頻電機技術規範 2.8 節	符合	第 5.5 章節
2.7	頻帶邊緣	$\leq 74\text{dBuV/m(Peak)}$ $\leq 54\text{dBuV/m(Average)}$	參考原始報告	第 5.6 章節
3.10.1.6(2)(A)	占用頻寬	$\geq 500\text{KHz}$	參考原始報告	第 5.7 章節
3.10.1.6(2)(B)	功率頻譜密度	$\leq 8\text{dBm}$	參考原始報告	第 5.8 章節

備註：符合性的判定是基於測試結果符合規範的限制值或客戶的宣告要求，測試結果的判定是不考慮測量不確定度的值。

5.1 電源傳導測試

5.1.1 量測方法

待測物放置於1m*2m*0.8m之非導體桌面並離垂直牆面40cm(落地型產品置於地上)，將待測物之電源線接至電源阻抗網路器(LISN)，同時保持待測物至LISN距80公分，並將電源線多餘部份以30至40公分之八字形捆綁於電源線中央並離地40cm，於在正常工作狀態下，執行待測物之火線(Line)及地線(neutral)各一次量測。

電源端點場強之測量範圍由 0.15MHz –30MHz，所量測之讀值皆為準尖峰值(Quasi-Peak Value)及平均值(Average Value)。場強接收機之解析頻寬為9kHz。

備註：經初測驗證過，電源端點干擾測試對測試頻道數並無差異，因此檢附其中一個測試頻道之測試數。

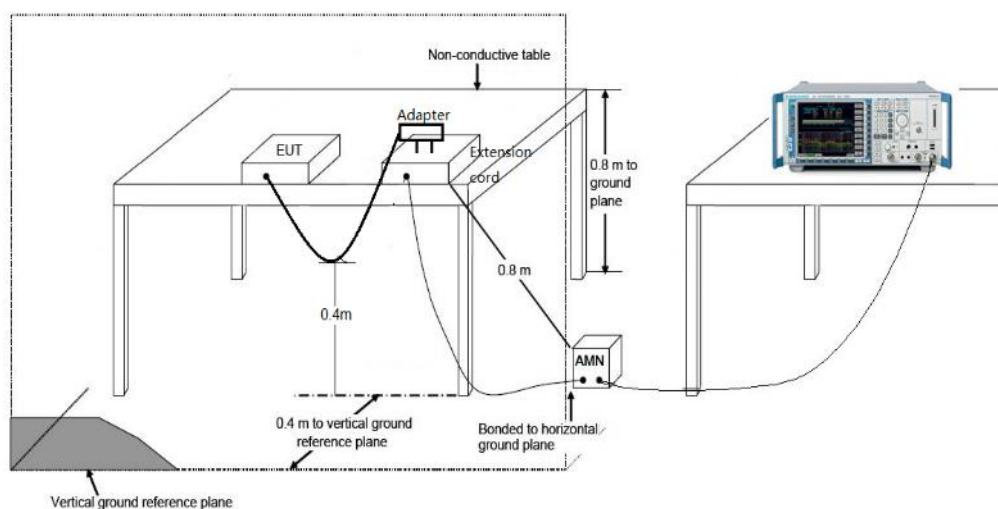
5.1.2 限制要求

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150kHz至30MHz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值。測量時應經過50微亨利(μ H)及50歐姆(Ω)之電源線阻抗模擬網路(LISN)。頻率重疊處，以較低限值為準。

Frequency 頻率範圍 MHz	傳導限制值(dBuV)	
	準尖峰值	平均值
0.15 - 0.50	66-56 ^(註)	56-46 ^(註)
0.50 - 5.0	56	46
5.0 - 30	60	50

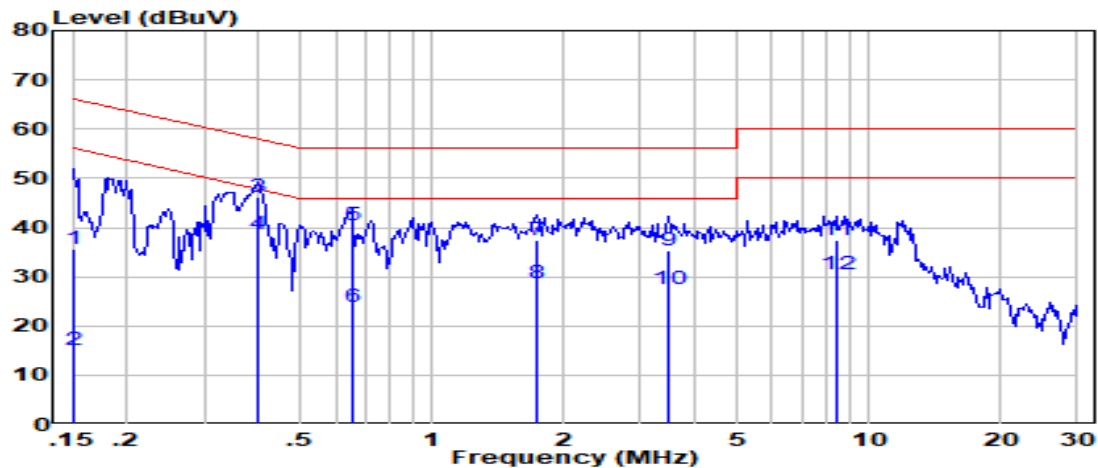
註：隨頻率之對數遞減

5.1.3 測試架構圖



5.1.4 電源傳導測試結果

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	CE_ENV216-L1 (Filter ON)	Temp. / Humidity	23.2°C /51.6%
Polarity	Line1	Site / Test Engineer	SR2 / Kevin Ker
Test Mode	Transmit by BLE at channel 2402MHz Bandwidth=2M	Test Voltage	110V/60Hz

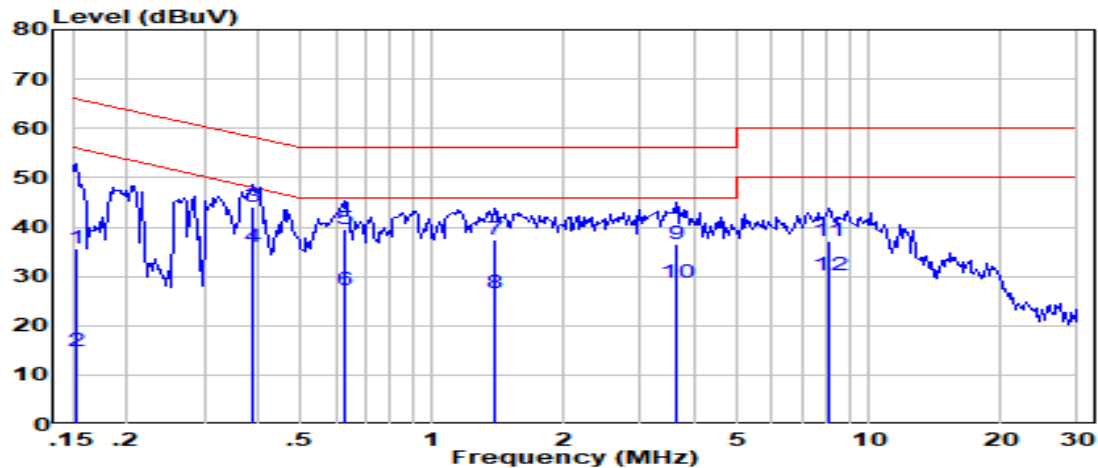


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1		0.150	25.95	9.61	35.56	-30.44	66.00	QP
2		0.150	5.45	9.61	15.06	-40.94	56.00	AV
3		0.397	36.52	9.62	46.14	-11.77	57.92	QP
4	*	0.397	29.12	9.62	38.74	-9.17	47.92	AV
5		0.653	30.75	9.64	40.39	-15.61	56.00	QP
6		0.653	14.25	9.64	23.89	-22.11	46.00	AV
7		1.730	27.85	9.68	37.54	-18.46	56.00	QP
8		1.730	18.85	9.68	28.54	-17.46	46.00	AV
9		3.470	25.74	9.71	35.45	-20.55	56.00	QP
10		3.470	17.64	9.71	27.35	-18.65	46.00	AV
11		8.400	27.65	9.84	37.49	-22.51	60.00	QP
12		8.400	20.55	9.84	30.39	-19.61	50.00	AV

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	CE_ENV216-N (Filter ON)	Temp. / Humidity	23.2°C /51.6%
Polarity	Neutral	Site / Test Engineer	SR2 / Kevin Ker
Test Mode	Transmit by BLE at channel 2402MHz Bandwidth=2M	Test Voltage	110V/60Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1		0.153	26.01	9.62	35.63	-30.20	65.84	QP
2		0.153	5.21	9.62	14.83	-41.00	55.84	AV
3		0.385	34.43	9.63	44.06	-14.11	58.17	QP
4	*	0.385	26.43	9.63	36.06	-12.11	48.17	AV
5		0.627	30.02	9.65	39.67	-16.33	56.00	QP
6		0.627	17.52	9.65	27.17	-18.83	46.00	AV
7		1.390	27.76	9.68	37.44	-18.56	56.00	QP
8		1.390	16.96	9.68	26.64	-19.36	46.00	AV
9		3.610	26.78	9.72	36.51	-19.49	56.00	QP
10		3.610	19.08	9.72	28.81	-17.19	46.00	AV
11		8.080	27.33	9.84	37.16	-22.84	60.00	QP
12		8.080	20.43	9.84	30.26	-19.74	50.00	AV

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).

5.2 峰值傳導輸出功率

5.2.1 適用標準

依據國家通訊傳播委員會低功率射頻電機技術規範之第 3.10.1.2(1)(C)節，操作於 2400-2483.5 MHz 之數位調變的發射器材：1 瓦(W)(含)以下。

依據國家通訊傳播委員會低功率射頻電機技術規範之第 3.10.1.3 節，天線增益限制如下：

(1) 操作於 2400 MHz～2483.5 MHz 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) 除第 (A) 節外，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。

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

(a) 非同時發射多向波束者，所有載波或頻道傳輸至所有天線陣列或陣列群之總和傳導輸出功率應符合 3.10.1.2 之功率限制值。如天線/天線陣列群之方向性增益超過 6 dBi，每超過 3 dBi，總和傳導輸出功率限制值應降低 1 dB。方向性增益值應計算如下：

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

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

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)。

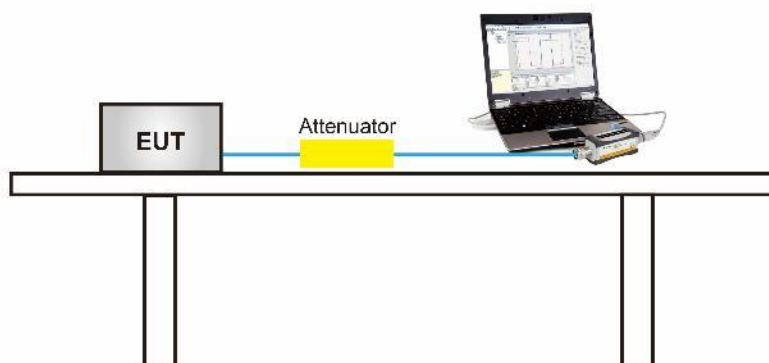
(c) 發射機之天線具備單向波束功能者，應符合(1)(A)及(3)後段之規定。

5.2.2 量測方法

待測物之天線埠經由適當之衰減直接連至頻譜分析儀 RF 輸入端，設定頻譜分析儀之解析度頻寬大於 6dB 發射頻寬或使用峰值功率表。

待測物之天線埠經由適當之衰減直接連至頻譜分析儀 RF 輸入端，設定頻譜分析儀之解析度頻寬大於 6dB 發射頻寬或使用峰值功率表。除使用上述測量方式外,並得使用以最大傳導輸出功率作為測量方式。

5.2.3 測試架構圖



5.2.4 峰值傳導輸出功率測試結果

Product	OmniAccess Stellar	Temperature	26°C
Test Engineer	Kevin Ker	Relative Humidity	61%
Test Site	SR1	Test Date	2020/09/27
Test Mode	OAW-AP1311-BLE		

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Average Power (dBm)	Limit (dBm)	Result
BLE	1	00	2402	17.39	≤ 30.00	Pass
		19	2440	17.32	≤ 30.00	Pass
		39	2480	17.16	≤ 30.00	Pass
	2	00	2402	17.41	≤ 30.00	Pass
		19	2440	17.35	≤ 30.00	Pass
		39	2480	17.17	≤ 30.00	Pass

5.3 天線之要求

5.3.1 限制要求

依據國家通訊傳播委員會低功率射頻電機技術規範之第3.10.1.4節規定，天線之規格可不受下述規定之限制。

低功率射頻電機之發射機或收發信機所使用之天線，應為全固定、半固定式或以獨特之耦合(unique coupling)方式連接機體。製造者可設計供使用者因損壞而替換之天線，但不得設計或使用原認證以外之天線或可供引接各類電纜之標準天線插座或電氣連接頭，如：BNC、F type、N type、M type、UG type、RCA、SMA、SMB...等及其他各類工業或通訊標準接頭。

5.3.2 天線樣式

Model No.: OAW-AP1311

Antenna Type	Frequency Band(GHz)	Tx Paths	Bandwidth (MHz)	MaxPeak Gain (dBi)		Directional Gain(dBi)		Beamforming Directional Gain (dBi)
				Ant 0	Ant 1	Power	PSD	
Wi-Fi Internal Antenna List (2.4GHz 2*2 MIMO, 5GHz 2*2 MIMO)								
PIFA	2412 ~ 2462	2	20, 40	3.20	3.30	3.30	6.31	6.26
Antenna	5150 ~ 5850	2	20, 40, 80	3.10	3.30	3.30	6.31	6.21
BluetoothInternal Antenna								
Antenna Type		Frequency Band (GHz)			Max Peak Gain (dBi)			
PIFA Antenna		2400 ~ 2483.5			3.20			
Scan Antenna((1 Tx)								
Antenna Type		Frequency Band (GHz)			Max Peak Gain (dBi)			
PIFA Antenna		2412 ~ 2462			3.20			
		5150 ~ 5250			3.30			
		5725~5850			3.30			

Note 1: The EUT supports Cyclic Delay Diversity (CDD) technology for 802.11a/b/g/n/ac/ax and Beam Forming technology for 802.11n/ac/ax.

Note 2: When the EUT supports Cyclic Delay Diversity (CDD) and it is correlated.

If all antennas have the same gain, G_{ANT} , Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,

$$\text{Array Gain} = 10 \log(N_{ANT}/N_{SS}) \text{ dB} = 3.01;$$

- For power measurements on IEEE 802.11 devices,

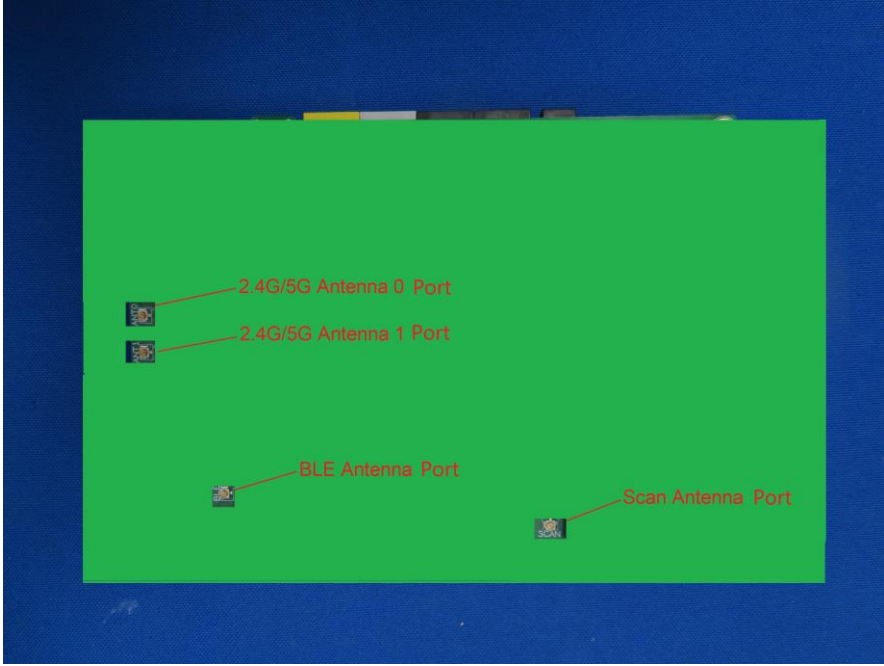
$$\text{Array Gain} = 0 \text{ dB for } N_{ANT} \leq 4;$$

If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

Note 3: The EUT also supports Beam Forming mode, and the Beam Forming support 802.11n/ac/ax, not include 802.11a/b/g. The directional gain = $10 \cdot \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] \text{ dBi}$.

Note 4: All the antenna gains are declared by manufacture.

Note 5: Antenna Kit : MFR : SERCOM ; M/N : HAN_AP311

Antenna RF Port						
Software Control Port	2.4G RF Port		5G RF Port		Scan RF Port	BLE RF Port
	Ant 0	Ant 1	Ant 0	Ant 1	Ant 0	Ant 0
						

5.4 帶外發射限制

5.4.1 量測方法

待測物之天線埠經由適當之衰減直接連至頻譜分析儀 RF 輸入端：

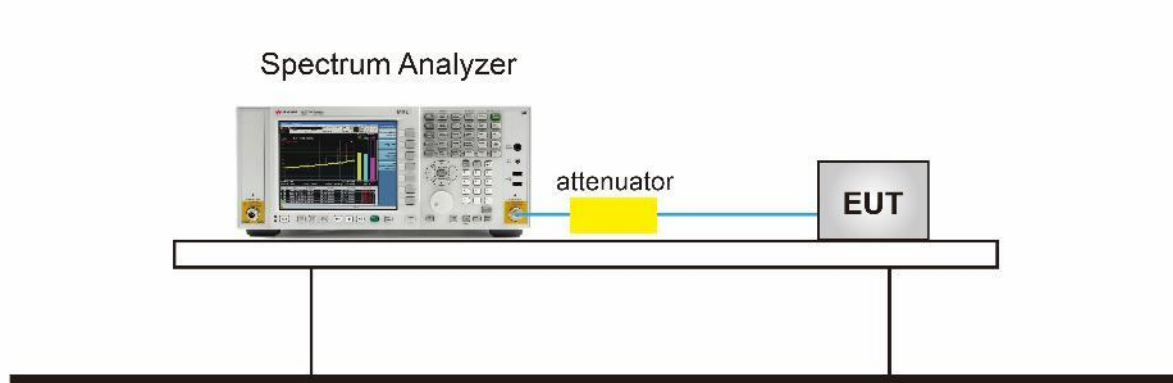
- (1) 頻率掃描範圍足以檢測頻帶內的發射波峰位準以及由受測物產生之最低頻率到第 10 次諧波的所有混附發射，通常需要分幾段以涵蓋全部頻率範圍。
- (2) 解析頻寬為 100 kHz，視訊頻寬不小於解析頻寬。
- (3) 掃描時間為自動，檢波功能為峰值，訊號軌跡為最大保留(Max Hold)。
- (4) 將標記設定於任何欲紀錄之波峰上，所顯示之位準值必須符合指定之限制值。

5.4.2 限制要求

使用頻帶範圍外之任意 100 千赫 (kHz) 內，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 (kHz) 內的射頻功率，衰減值限制如下：

- (1) 輸出功率以低功率射頻電機技術規範附件二之峰值輸出功率方式量測者，至少須衰減 20 dB，可使用射頻傳導或輻射方式測量。
- (2) 輸出功率以數位調變技術系統之最大傳導輸出功率量測方式者，至少須衰減 30 dB。
- (3) 若落於禁用頻段之輻射發射，應符合低功率射頻電機技術規範第 2.8 節之規定。

5.4.3 測試架構圖



5.4.4 帶外輻射測試結果

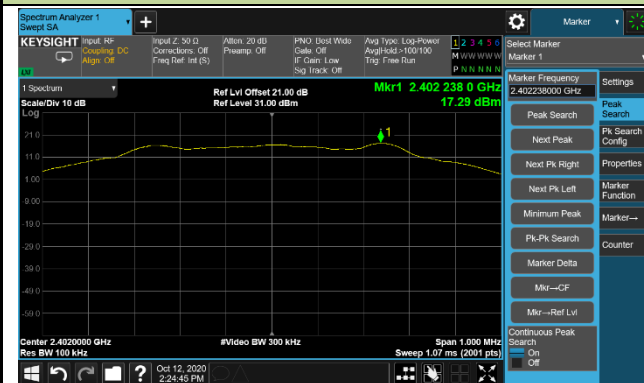
Product	OmniAccess Stellar	Temperature	26°C
Test Engineer	Kevin Ker	Relative Humidity	61%
Test Site	SR1	Test Date	2020/10/12~2020/10/15
Test Mode	OAW-AP1311-BLE		

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	Limit	Result
BLE	1	00	2402	30dBc	Pass
		19	2440	30dBc	Pass
		39	2480	30dBc	Pass
	2	00	2402	30dBc	Pass
		19	2440	30dBc	Pass
		39	2480	30dBc	Pass

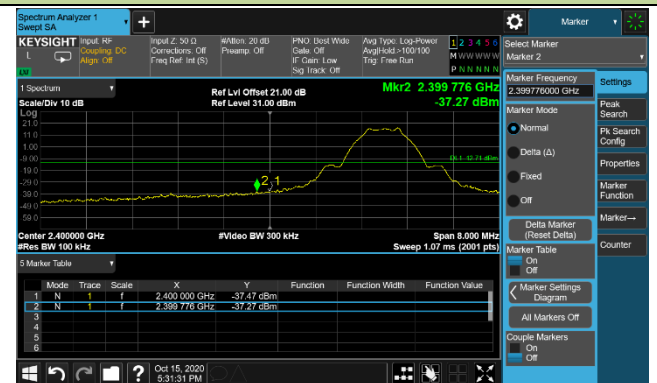
BLE- 1Mbps Out-of-Band Emissions

Channel 00 (2402MHz)

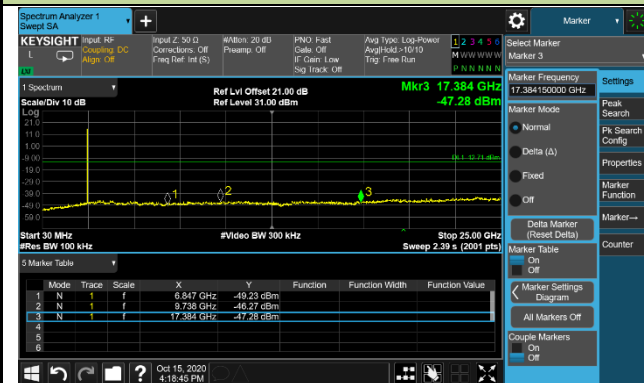
100kHz PSD reference Level



Low Band Edge

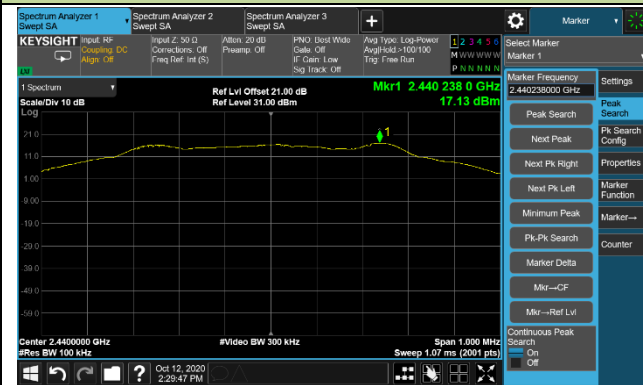


Spurious Emission 30MHz ~ 25GHz

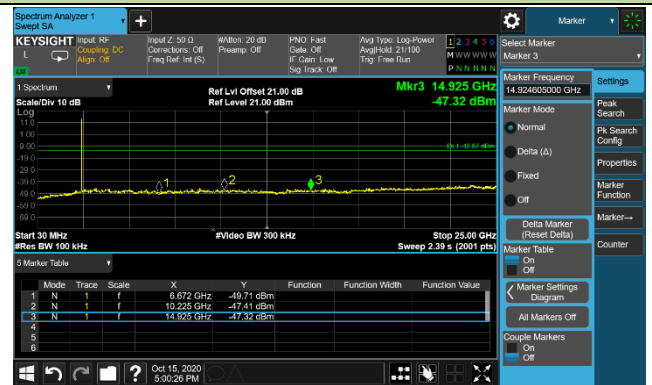


Channel 19 (2440MHz)

100kHz PSD reference Level

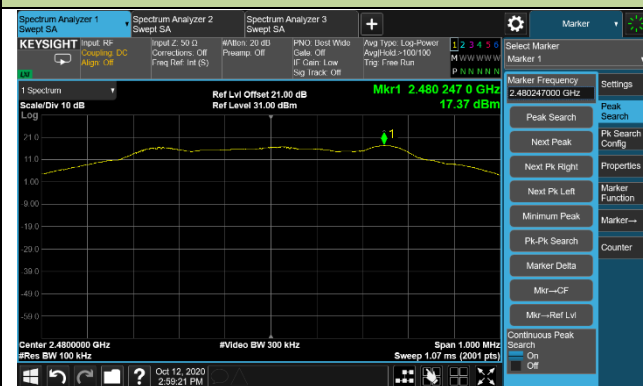


Spurious Emission 30MHz ~ 25GHz

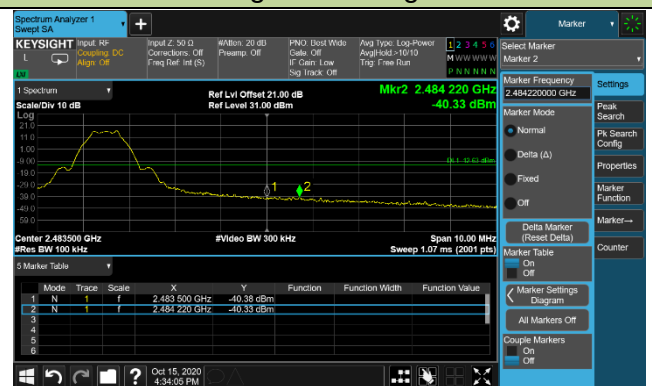


Channel 39 (2480MHz)

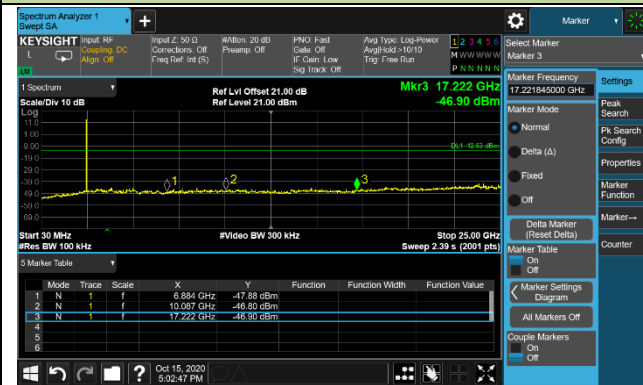
100kHz PSD reference Level



High Band Edge



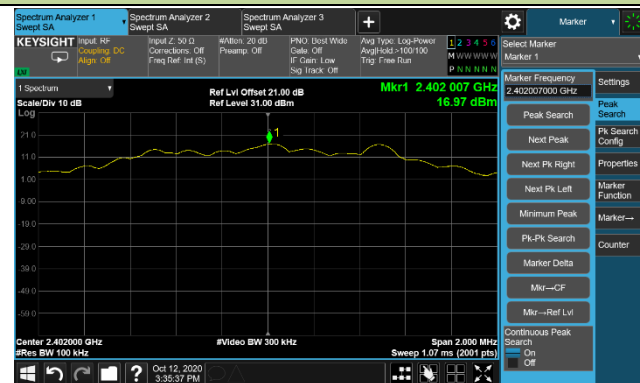
Spurious Emission 30MHz ~ 25GHz



BLE- 2Mbps Out-of-Band Emissions

Channel 00 (2402MHz)

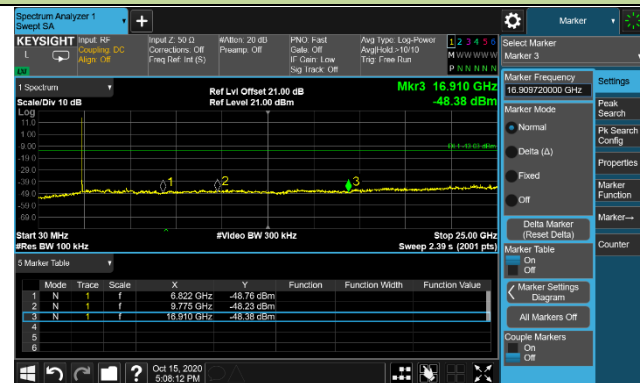
100kHz PSD reference Level



Low Band Edge

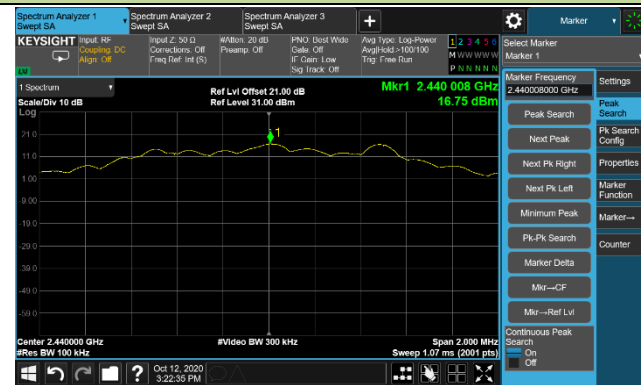


Spurious Emission 30MHz ~ 25GHz

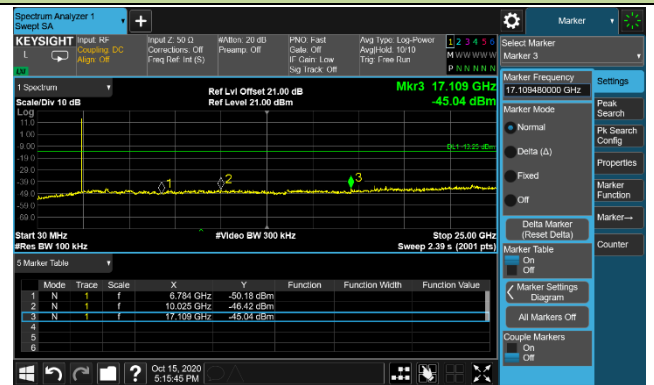


Channel 19 (2440MHz)

100kHz PSD reference Level

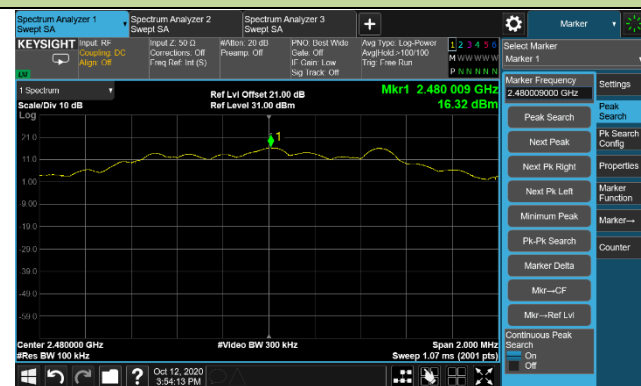


Spurious Emission 30MHz ~ 25GHz

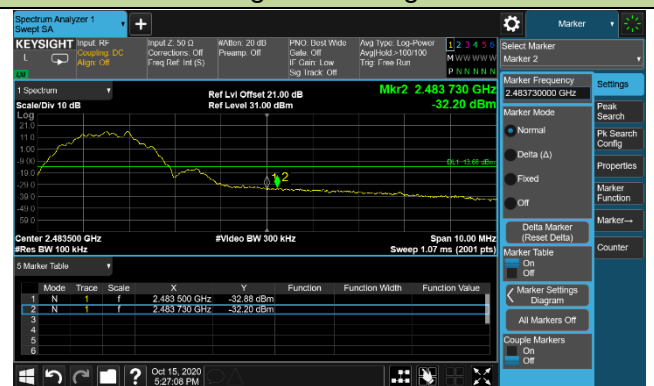


Channel 39 (2480MHz)

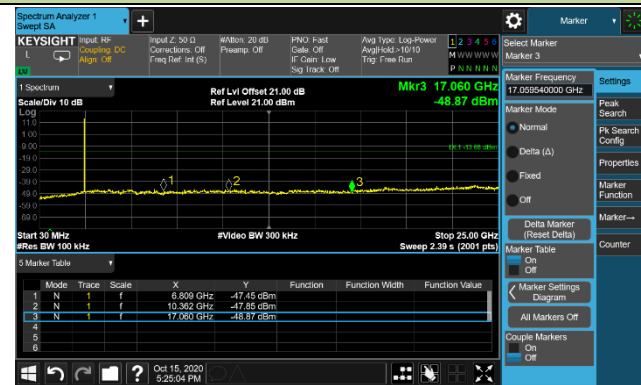
100kHz PSD reference Level



High Band Edge



Spurious Emission 30MHz ~ 25GHz



5.5 輻射電場強度

5.5.1 量測方法

待測物置於非導體桌面（落地型產品置於地上），受測物使用交流電源時，將其與任何配件設備之電源線連接至位於旋轉桌的交流電源。受測物使用電池時，測試時應裝置新電池或充電完全的電池。受測物與配件設備之電源線無須束綁，桌面上受測設備的所有電源線由桌子的後緣垂下沿旋轉桌表面接至交流插座。落地型設備的交流電源線可以方便的型態走線。桌面可 360 度旋轉，接收天線置於距待測物 3m 距離，高度可在 1 至 4 公尺間變動，以量測待測物之最大輻射電場強度，接收天線並應於水平及垂直極化方向各量測一次。（待測物擺設方式根據 ANSI C63.10-2013 版本，待測物放置桌中心，1G 以下擺設高度為 80cm/1G 以上擺設高度為 150cm）

- (1) 任一頻率小於或等於 1000 MHz 之訊號,使用 CISPR 準峰值檢波器
- (2) 任一頻率大於 1000 MHz 之訊號，使用平均值檢波器測量，當規定之發射限制值為平均值時(含 1000 MHz 以下)，受測訊號藉由峰值檢波器(RBW:1MHz,VBW:3MHz)所測量之峰值，亦須符合峰值發射限制值，其峰值發射限制值為最大容許平均值加 20 dB。

5.5.2 限制要求

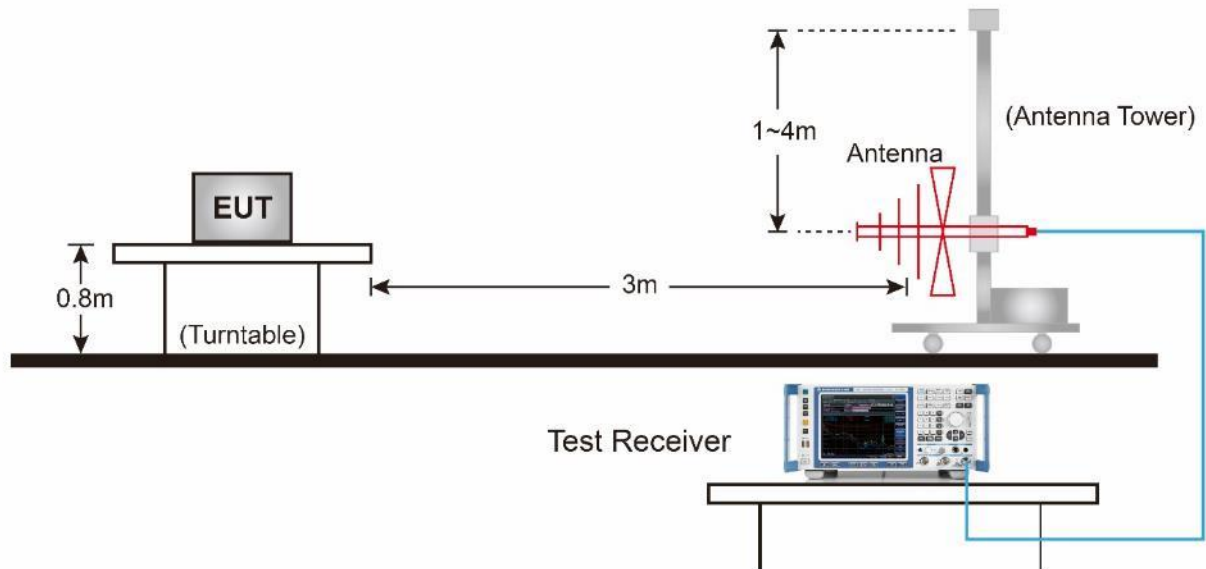
其電場強度不得超過下表之限值，且其不必要之發射皆不得大於主波發射強度。各頻段重疊處，以較嚴格之限制值為準。

頻率(MHz)	電場強度(uV/m)	測距(m)
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

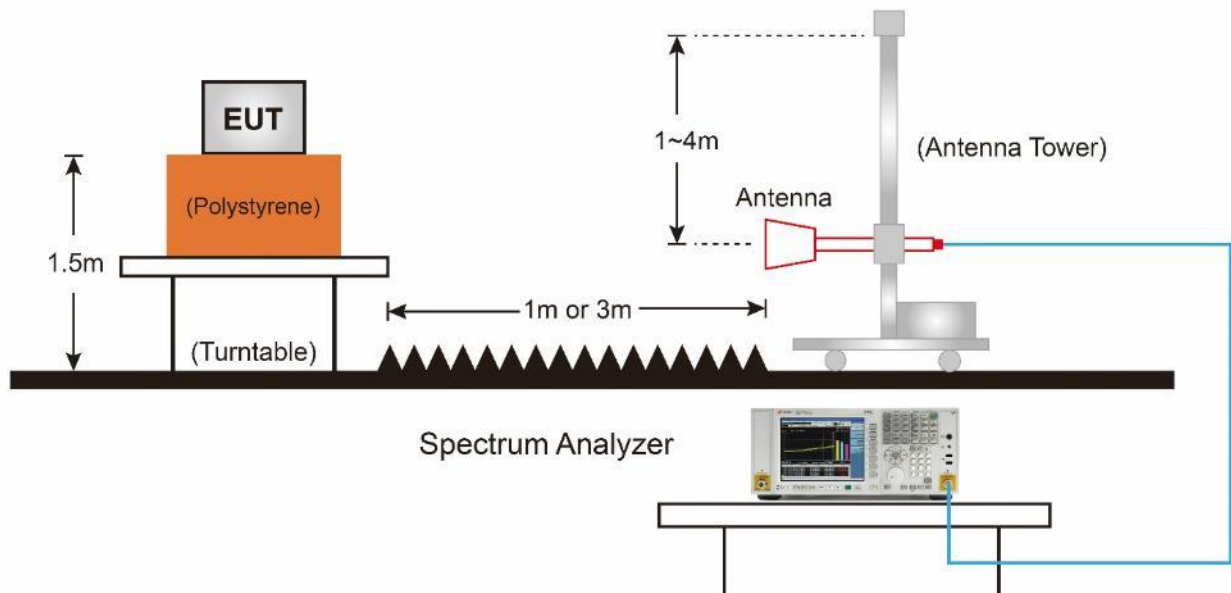
上表規定之電場強度，頻率在 9-90kHz 千赫(kHz)、110-490 千赫(kHz)以及 1000 兆赫(MHz)以上之發射，其量測以平均值檢波器為基準，且須符合低功率射頻電機技術規範第 5.14 節之規定；其他頻率之發射，應以 CISPR 準峰值(quasi-peak) 檢波器測量；非以上表所指定之距離測量時須符合低功率射頻電機技術規範第 5.5 節之規定，而輻射發射之量測頻率範圍須符合低功率射頻電機技術規範第 5.12 節之規定。

5.5.3 測試架構圖

Below 1GHz Test Setup:

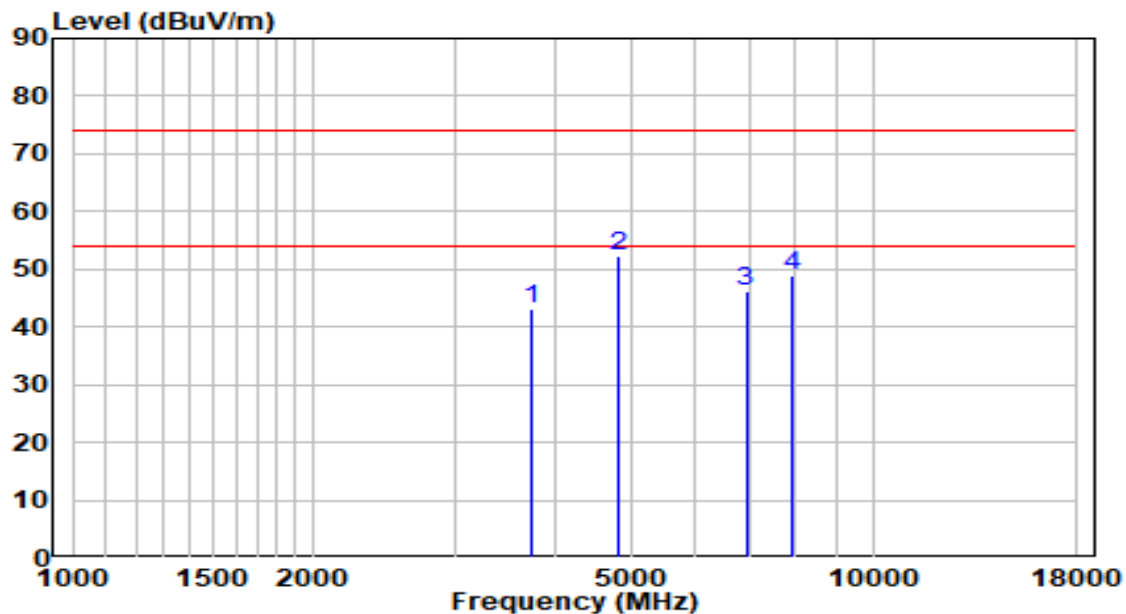


Above 1GHz Test Setup:



5.5.4 輻射電場強度測試結果

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	BBHA 9120D	Temp. / Humidity	25.8°C/48.0%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2402MHz	Test Voltage	110V/60Hz

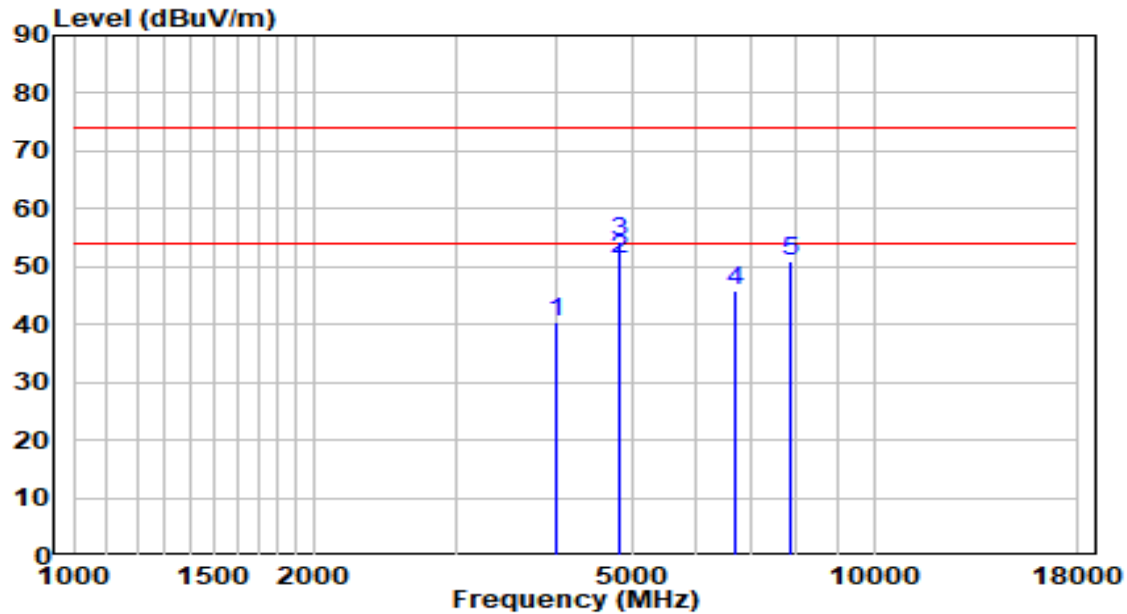


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	3745.500	43.04	0.00	43.05	-30.95	74.00	Peak
2	* 4808.000	48.97	3.29	52.26	-21.74	74.00	Peak
3	6941.500	36.30	10.04	46.35	-27.65	74.00	Peak
4	7953.000	36.55	12.45	49.00	-25.00	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB)– Preamplifier(dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	BBHA 9120D	Temp. / Humidity	25.8°C/48.0%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2402MHz	Test Voltage	110V/60Hz

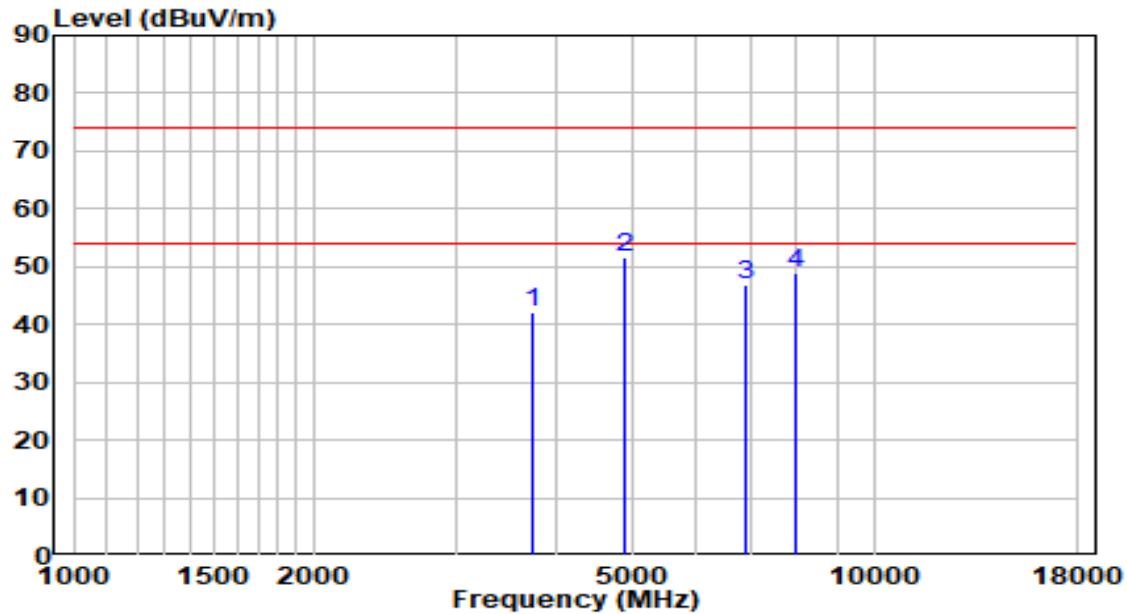


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	4000.500	39.57	0.88	40.45	-33.55	74.00	Peak
2	* 4808.000	51.16	3.29	54.45	-19.55	74.00	Peak
3	4804.000	47.93	3.29	51.22	-2.78	54.00	Average
4	6703.500	36.91	8.99	45.90	-28.10	74.00	Peak
5	7876.500	38.47	12.33	50.79	-23.21	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB)– Preamplifier(dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	BBHA 9120D	Temp. / Humidity	25.8°C/48.0%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2440MHz	Test Voltage	110V/60Hz

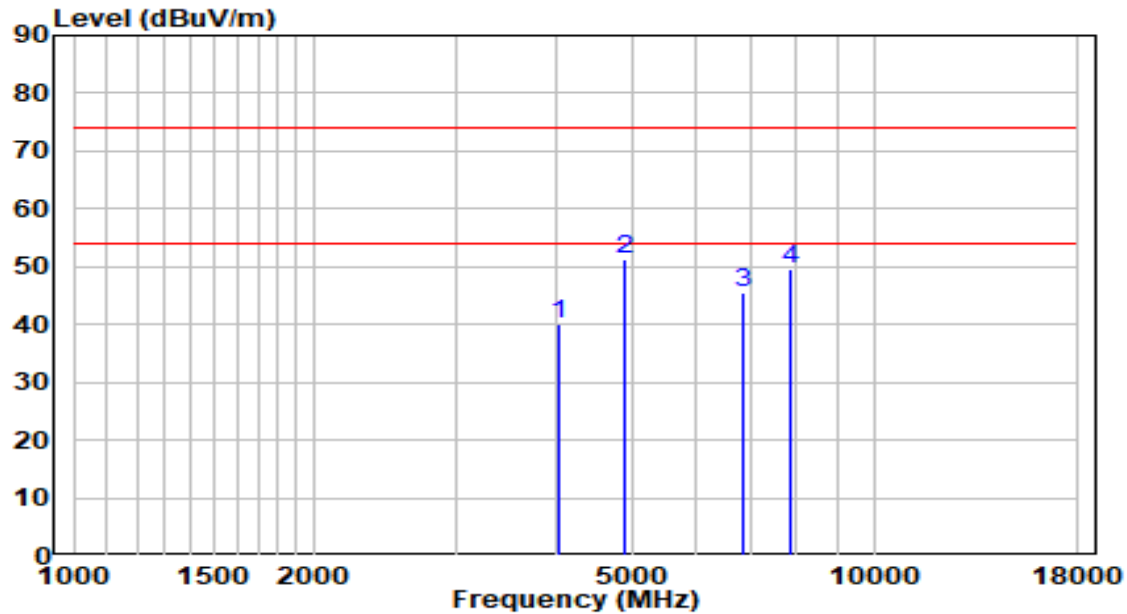


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	3737.000	42.24	-0.02	42.22	-31.78	74.00	Peak
2	* 4884.500	48.02	3.47	51.50	-22.50	74.00	Peak
3	6916.000	36.99	9.93	46.92	-27.08	74.00	Peak
4	7961.500	36.31	12.47	48.78	-25.22	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB)– Preamplifier(dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	BBHA 9120D	Temp. / Humidity	25.8°C/48.0%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2440MHz	Test Voltage	110V/60Hz

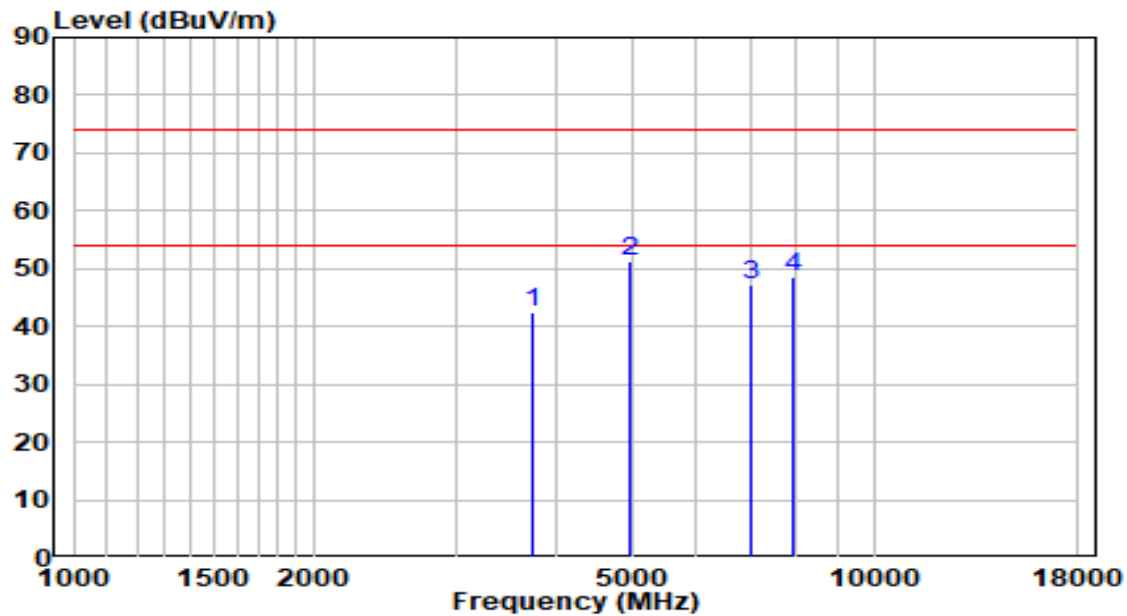


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	4034.500	39.21	1.00	40.21	-33.79	74.00	Peak
2	* 4884.500	47.67	3.47	51.14	-22.86	74.00	Peak
3	6865.000	35.95	9.70	45.65	-28.35	74.00	Peak
4	7859.500	37.22	12.30	49.52	-24.48	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB)– Preamplifier(dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	BBHA 9120D	Temp. / Humidity	25.8°C/48.0%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2480MHz	Test Voltage	110V/60Hz

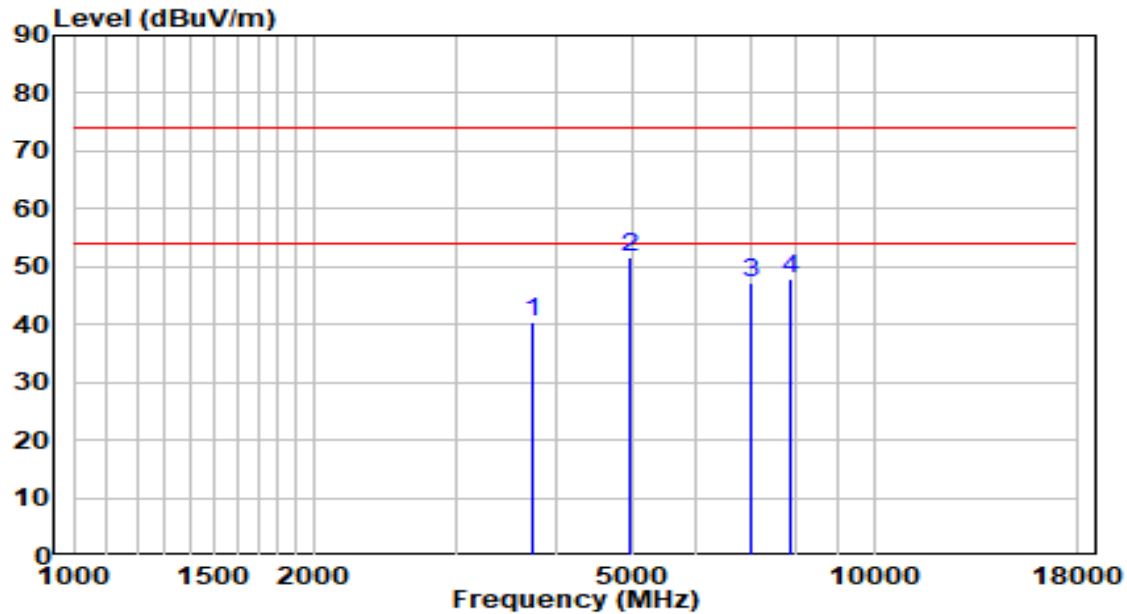


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	3754.000	42.26	0.03	42.29	-31.71	74.00	Peak
2	* 4961.000	47.63	3.66	51.29	-22.71	74.00	Peak
3	7009.500	36.81	10.33	47.14	-26.86	74.00	Peak
4	7944.500	36.17	12.44	48.61	-25.39	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB)– Preamplifier(dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	BBHA 9120D	Temp. / Humidity	25.8°C/48.0%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2480MHz	Test Voltage	110V/60Hz

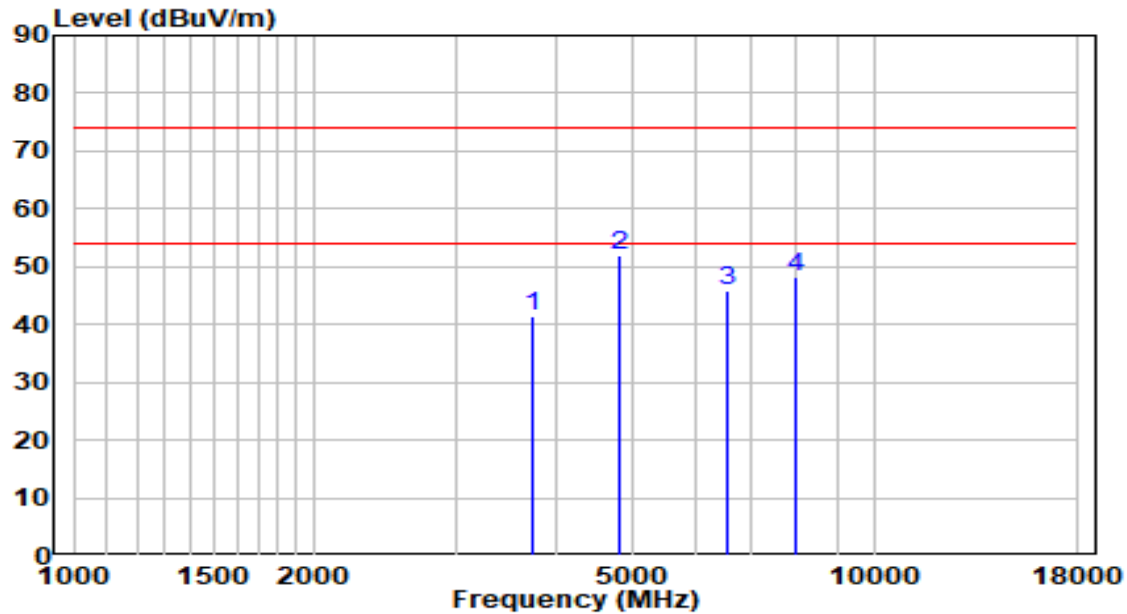


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	3754.000	40.41	0.03	40.45	-33.55	74.00	Peak
2	* 4961.000	47.92	3.66	51.58	-22.42	74.00	Peak
3	7026.500	36.68	10.37	47.06	-26.94	74.00	Peak
4	7876.500	35.49	12.33	47.82	-26.18	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB)– Preamplifier(dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	BBHA 9120D	Temp. / Humidity	25.8°C/48.0%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2402MHz	Test Voltage	110V/60Hz

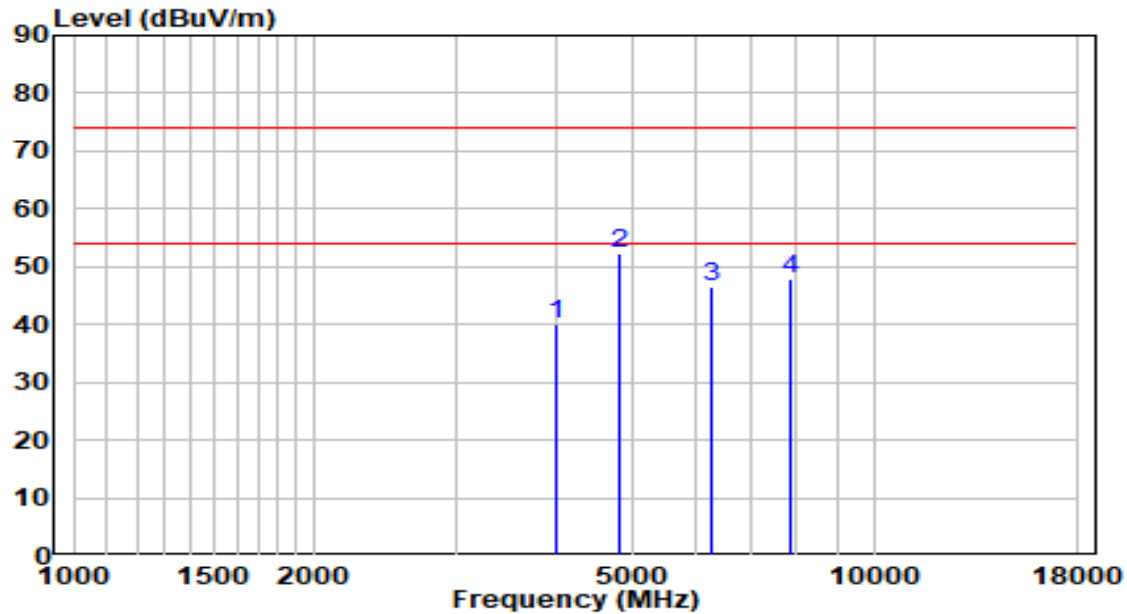


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	3754.000	41.42	0.03	41.45	-32.55	74.00	Peak
2	* 4799.500	48.67	3.27	51.94	-22.06	74.00	Peak
3	6542.000	37.65	8.28	45.93	-28.07	74.00	Peak
4	7961.500	35.69	12.47	48.16	-25.84	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB)– Preamplifier(dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	BBHA 9120D	Temp. / Humidity	25.8°C/48.0%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2402MHz	Test Voltage	110V/60Hz

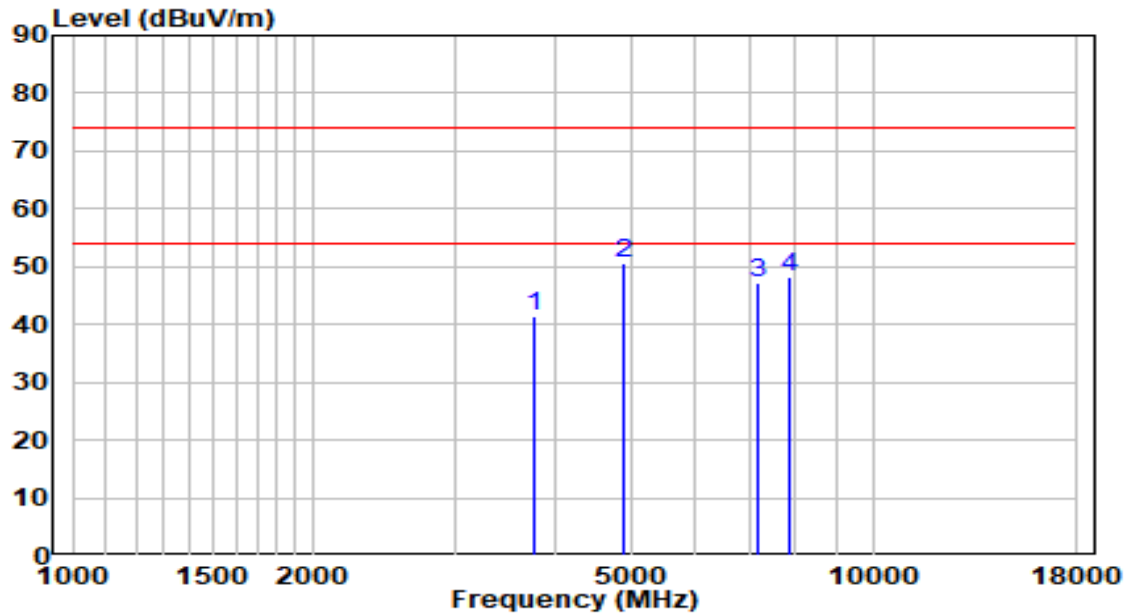


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	4017.500	39.31	0.94	40.24	-33.76	74.00	Peak
2	* 4799.500	49.05	3.27	52.32	-21.68	74.00	Peak
3	6253.000	39.69	7.01	46.69	-27.31	74.00	Peak
4	7868.000	35.66	12.31	47.97	-26.03	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB)– Preamplifier(dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	BBHA 9120D	Temp. / Humidity	25.8°C/48.0%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2440MHz	Test Voltage	110V/60Hz

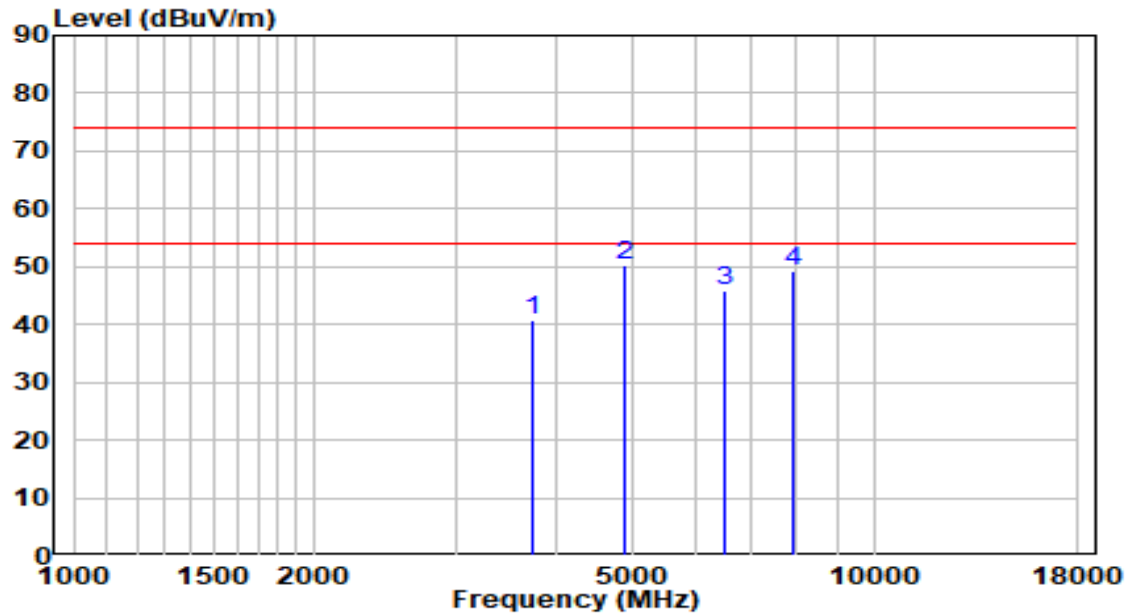


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	3762.500	41.47	0.06	41.53	-32.47	74.00	Peak
2	* 4884.500	47.23	3.47	50.71	-23.29	74.00	Peak
3	7188.000	36.23	10.83	47.06	-26.94	74.00	Peak
4	7893.500	35.70	12.36	48.06	-25.94	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB)– Preamplifier(dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	BBHA 9120D	Temp. / Humidity	25.8°C/48.0%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2440MHz	Test Voltage	110V/60Hz

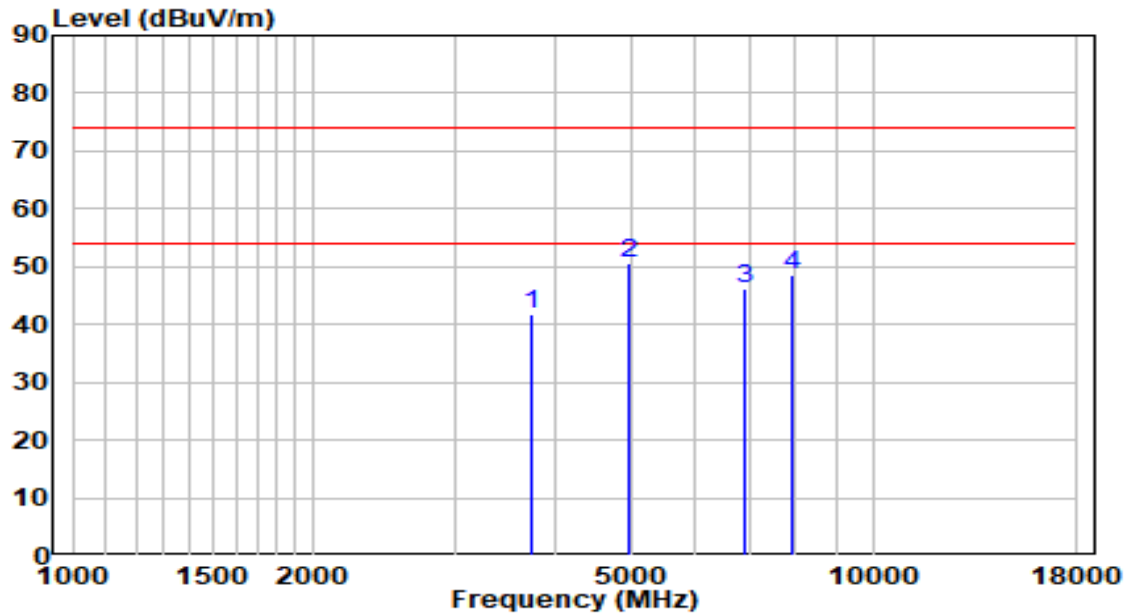


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	3754.000	40.66	0.03	40.69	-33.31	74.00	Peak
2	* 4884.500	46.91	3.47	50.38	-23.62	74.00	Peak
3	6525.000	37.51	8.21	45.72	-28.28	74.00	Peak
4	7927.500	36.79	12.41	49.21	-24.79	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB)– Preamplifier(dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	BBHA 9120D	Temp. / Humidity	25.8°C/48.0%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2480MHz	Test Voltage	110V/60Hz

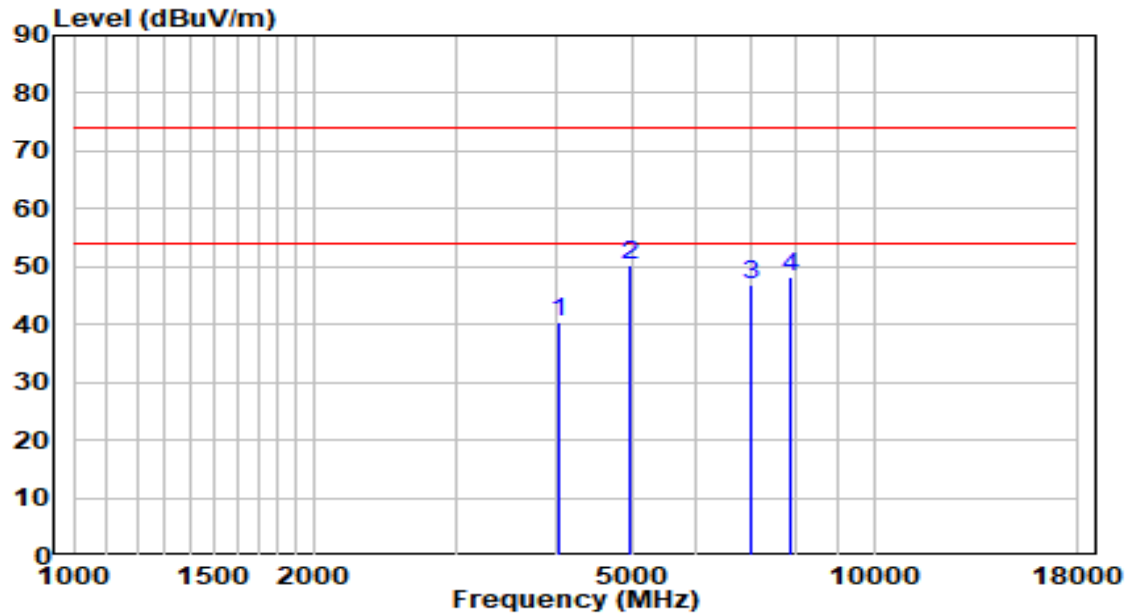


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	3745.500	41.69	0.00	41.69	-32.31	74.00	Peak
2	* 4961.000	46.85	3.66	50.51	-23.49	74.00	Peak
3	6916.000	36.09	9.93	46.02	-27.98	74.00	Peak
4	7953.000	36.01	12.45	48.46	-25.54	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB)– Preamplifier(dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-10-12
Factor	BBHA 9120D	Temp. / Humidity	25.8°C/48.0%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2480MHz	Test Voltage	110V/60Hz



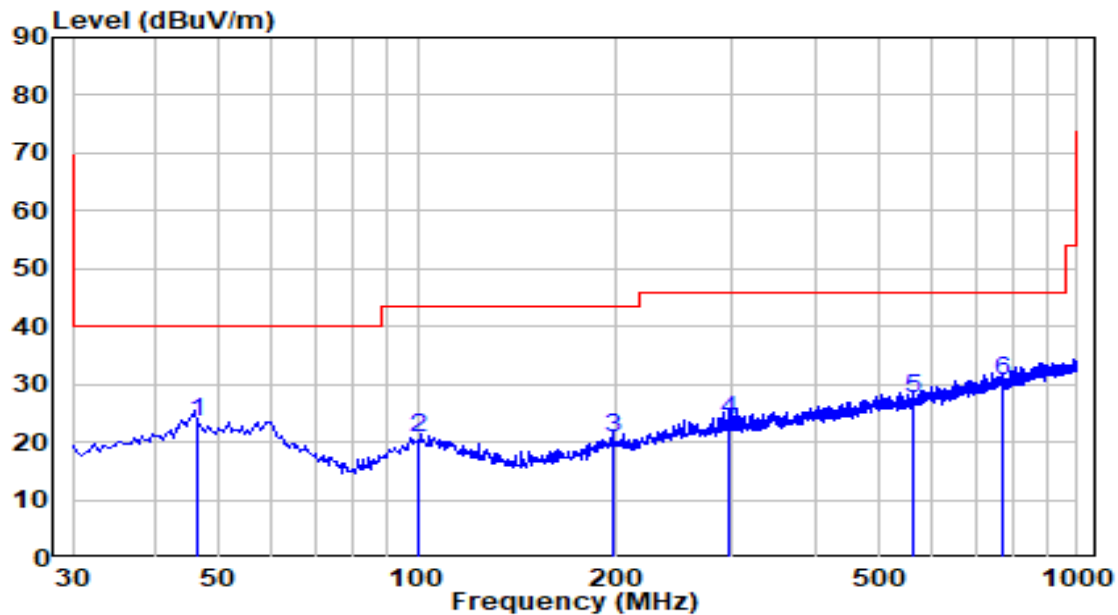
No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	4034.500	39.49	1.00	40.49	-33.51	74.00	Peak
2	* 4961.000	46.69	3.66	50.35	-23.65	74.00	Peak
3	7026.500	36.41	10.37	46.78	-27.22	74.00	Peak
4	7868.000	36.04	12.31	48.35	-25.65	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB)– Preamplifier(dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

The worst case of Radiated Emission below 1GHz:

EUT	OAW-AP1311	Date of Test	2020-10-13
Factor	VULB 9162	Temp. / Humidity	25°C /54%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE at channel 2402MHz Bandwidth=2M	Test Voltage	110V/60Hz

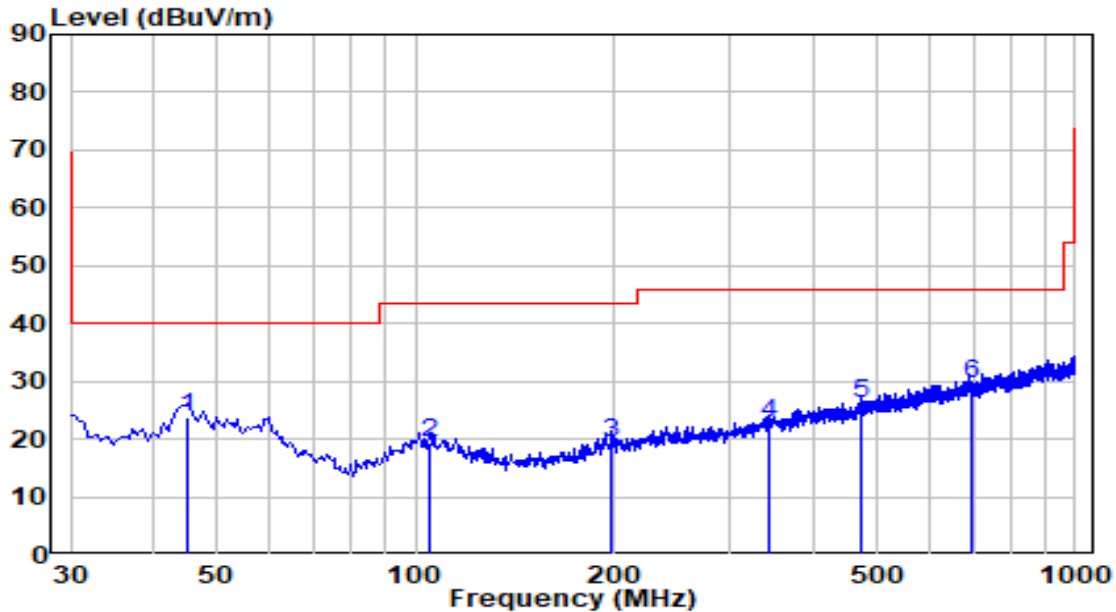


No	Frequency (MHz)	Reading (dBUV)	C.F (dB)	Measurement (dBUV/m)	Margin (dB)	Limit (dBUV/m)	Remark (QP/PK/AV)
1	46.520	2.03	21.48	23.51	-16.49	40.00	QP
2	100.210	0.94	19.66	20.60	-22.90	43.50	QP
3	197.360	1.73	18.89	20.62	-22.88	43.50	QP
4	297.650	2.44	21.37	23.81	-22.19	46.00	QP
5	563.210	0.69	26.85	27.54	-18.46	46.00	QP
6	* 769.500	0.40	30.00	30.40	-15.60	46.00	QP

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBUV/m) = Reading(dBUV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.
- 5.The amplitude of Radiated emissions (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), is that proximityto ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

EUT	OAW-AP1311	Date of Test	2020-10-13
Factor	VULB 9162	Temp. / Humidity	25°C /54%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE at channel 2402MHz Bandwidth=2M	Test Voltage	110V/60Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	*	45.210	2.48	21.42	23.90	-16.10	40.00	QP
2		105.210	0.33	19.17	19.50	-24.00	43.50	QP
3		198.650	0.52	18.92	19.44	-24.06	43.50	QP
4		344.210	-0.29	23.19	22.90	-23.10	46.00	QP
5		475.630	0.69	25.37	26.06	-19.94	46.00	QP
6		695.200	0.35	29.13	29.48	-16.52	46.00	QP

Note:

- "*", means this data is the worst emission level.
- C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
- Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- The emission levels of other frequencies are very lower than the limit and not show in test report.
- The amplitude of Radiated emissions (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), is that proximityto ambient noise, which also are attenuated more than 20 dB below the permissible value. Therefore, the data is not presented in the report.

5.6 頻帶邊緣

5.6.1 量測方法

待測物置於非導體桌面（落地型產品置於地上），受測物使用交流電源時，將其與任何配件設備之電源線連接至位於旋轉桌的交流電源。受測物使用電池時，測試時應裝置新電池或充電完全的電池。受測物與配件設備之電源線無須束綁，桌面上受測設備的所有電源線由桌子的後緣垂下沿旋轉桌表面接至交流插座。落地型設備的交流電源線可以方便的型態走線。桌面可360度旋轉，接收天線置於距待測物3m距離，高度可在1至4公尺間變動，以量測待測物之最大輻射電場強度，接收天線並應於水平及垂直極化方向各量測一次。（待測物擺設方式根據ANSI C63.10-2013版本，待測物放置桌中心，1G以下擺設高度為80cm/1G以上擺設高度為150cm）

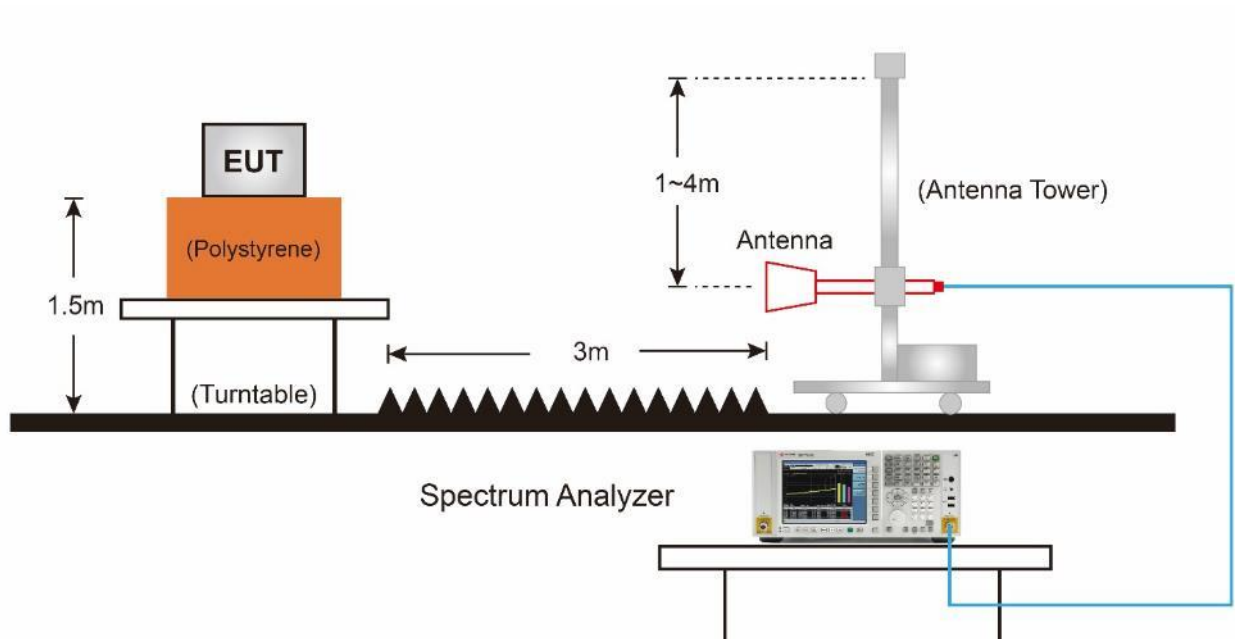
- (1) 任一頻率小於或等於1000 MHz 之訊號,使用CISPR準峰值檢波器
- (2) 任一頻率大於1000 MHz 之訊號，使用平均值檢波器測量，當規定之發射限制值為平均值時(含1000 MHz 以下)，受測訊號藉由峰值檢波器(RBW:1MHz,VBW:3MHz)所測量之峰值，亦須符合峰值發射限制值，其峰值發射限制值為最大容許平均值加20 dB。

5.6.2 限制要求

除低功率射頻電機技術規範另有規定外，任何低功率射頻電機之主波皆不得使用下表所列各頻段之頻率低功率射頻電機落於下表所列頻帶內之混附發射，其電場強度必須符合低功率射頻電機技術規範之第2.8節限制規定

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

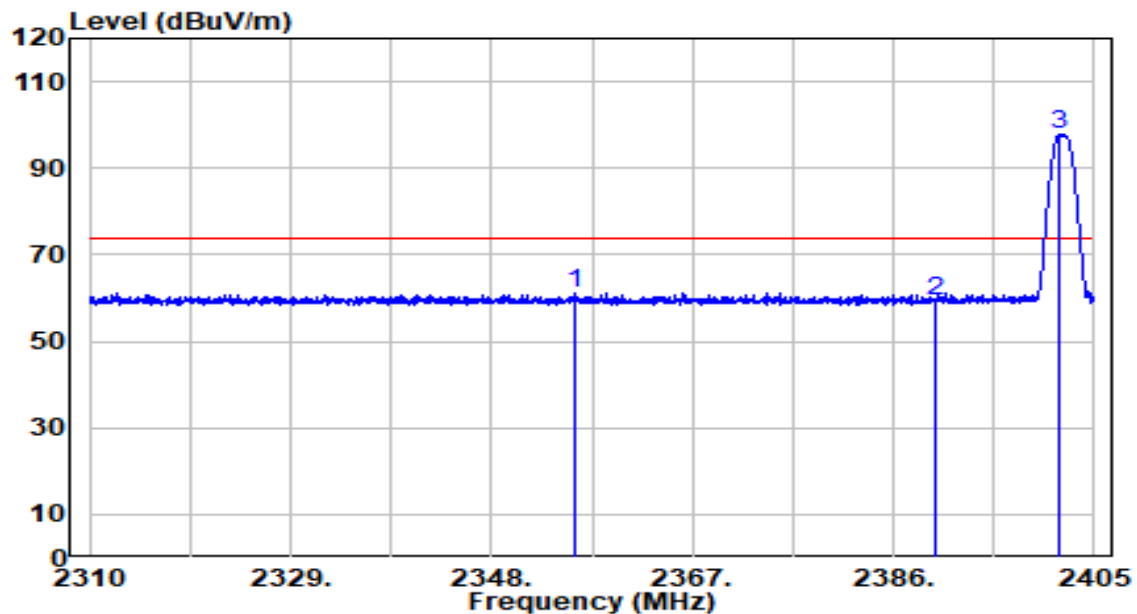
5.6.3 測試架構圖



備註: 使用頻率範圍外之任意 100 千赫雜訊, 使用輻射方式測量, 6 dB 頻寬使用 1MHz 遠大於 100kHz 仍可 PASS, 檢附其測試數據。

5.6.4 頻帶邊緣測試結果

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2402MHz	Test Voltage	110V/60Hz

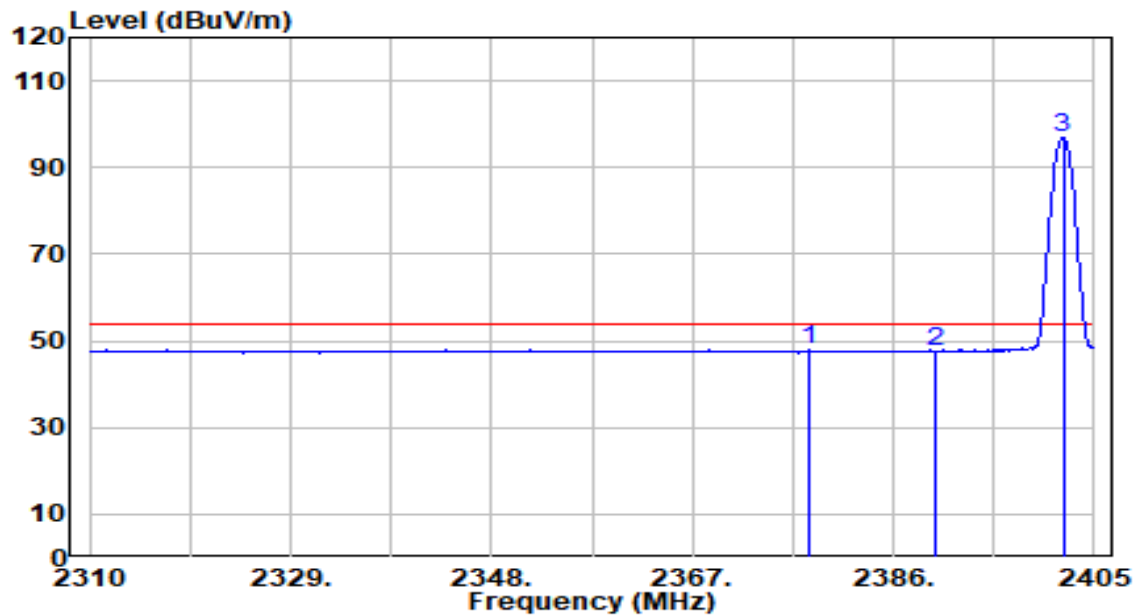


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	2355.837	29.00	32.15	61.15	-12.85	74.00	Peak
2	2390.000	26.99	32.30	59.29	-14.71	74.00	Peak
3	* 2401.770	65.33	32.35	N/A	N/A	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2402MHz	Test Voltage	110V/60Hz

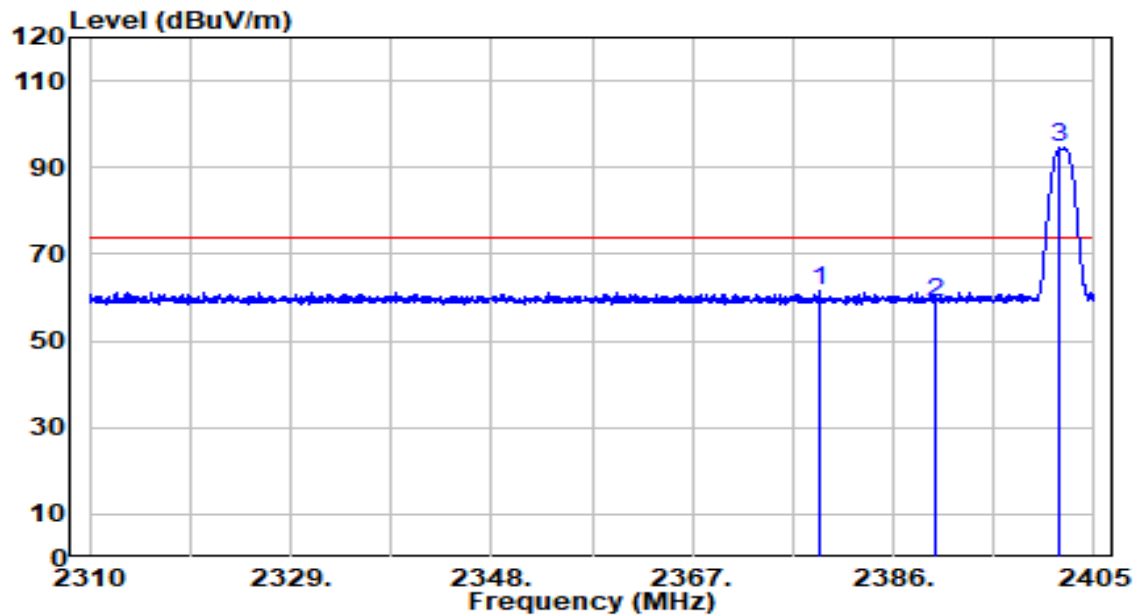


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	2377.925	15.57	32.24	47.81	-6.19	54.00	Average
2	2390.000	15.27	32.30	47.57	-6.43	54.00	Average
3	* 2402.055	64.43	32.35	N/A	N/A	54.00	Average

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2402MHz	Test Voltage	110V/60Hz

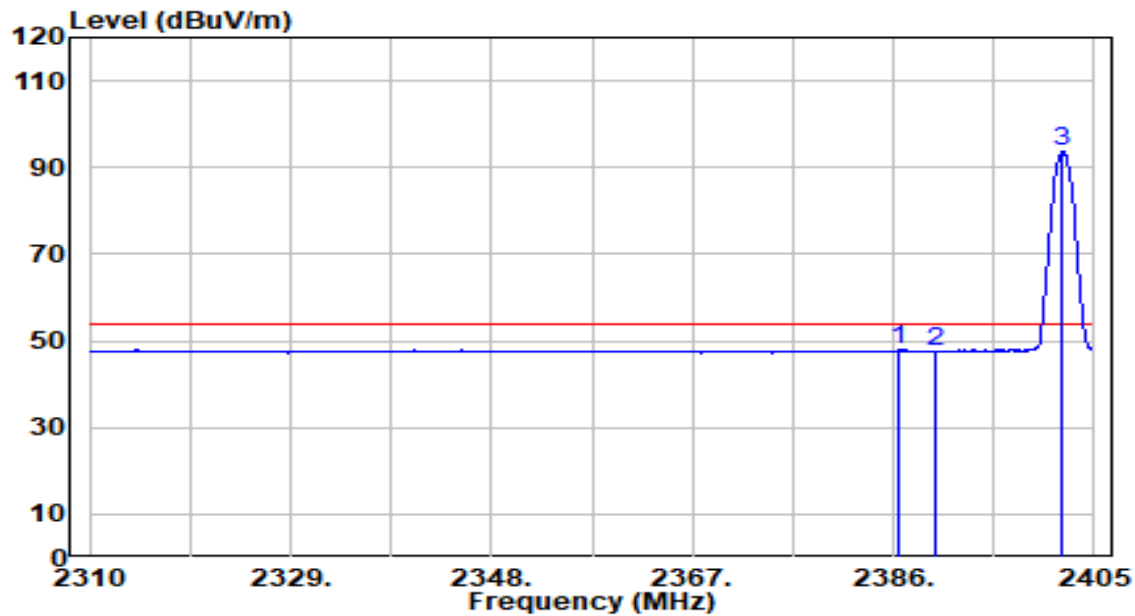


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	2378.923	29.27	32.25	61.52	-12.48	74.00	Peak
2	2390.000	26.77	32.30	59.06	-14.94	74.00	Peak
3	* 2401.770	62.07	32.35	N/A	N/A	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2402MHz	Test Voltage	110V/60Hz

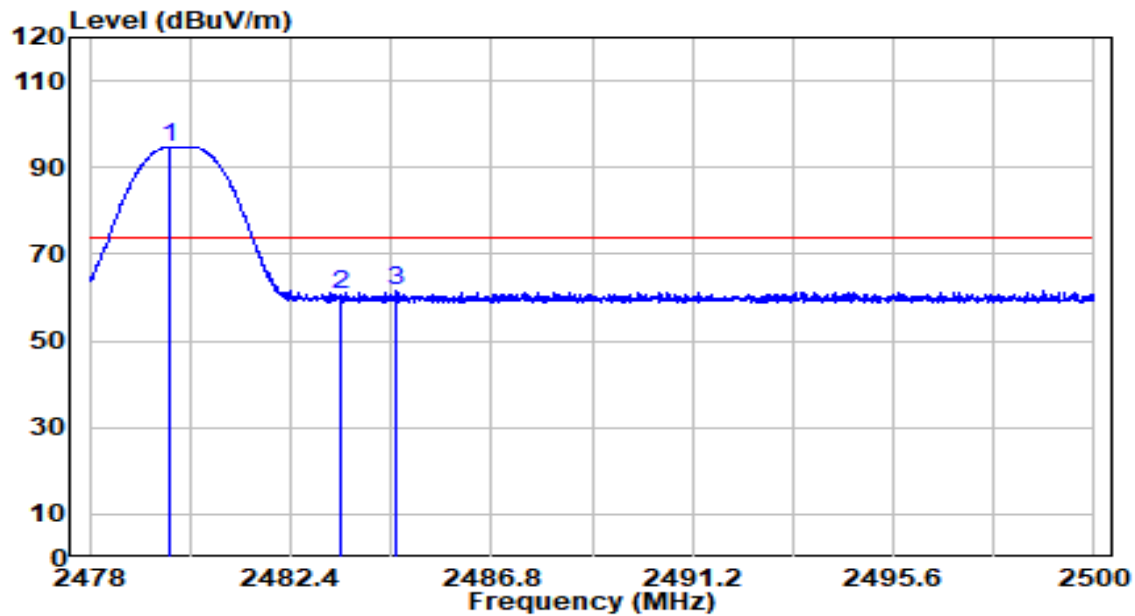


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	2386.475	15.68	32.28	47.96	-6.04	54.00	Average
2	2390.000	15.29	32.30	47.59	-6.41	54.00	Average
3	* 2402.008	61.33	32.35	N/A	N/A	54.00	Average

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2480MHz	Test Voltage	110V/60Hz

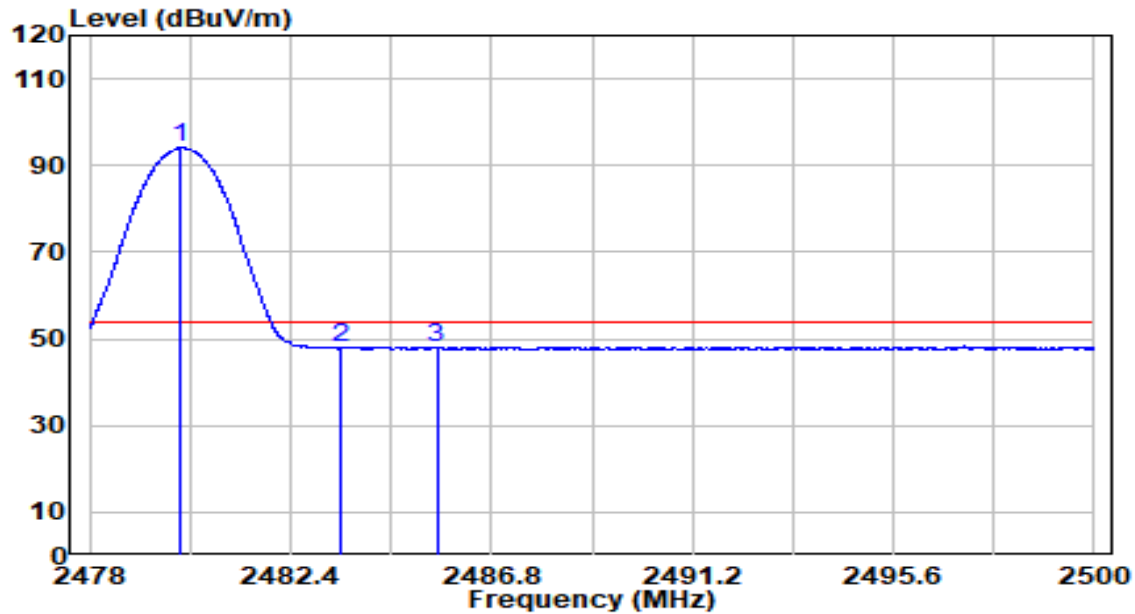


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	*	2479.760	62.10	32.69	N/A	N/A	74.00	Peak
2		2483.500	28.15	32.71	60.85	-13.15	74.00	Peak
3		2484.721	28.76	32.71	61.48	-12.52	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2480MHz	Test Voltage	110V/60Hz

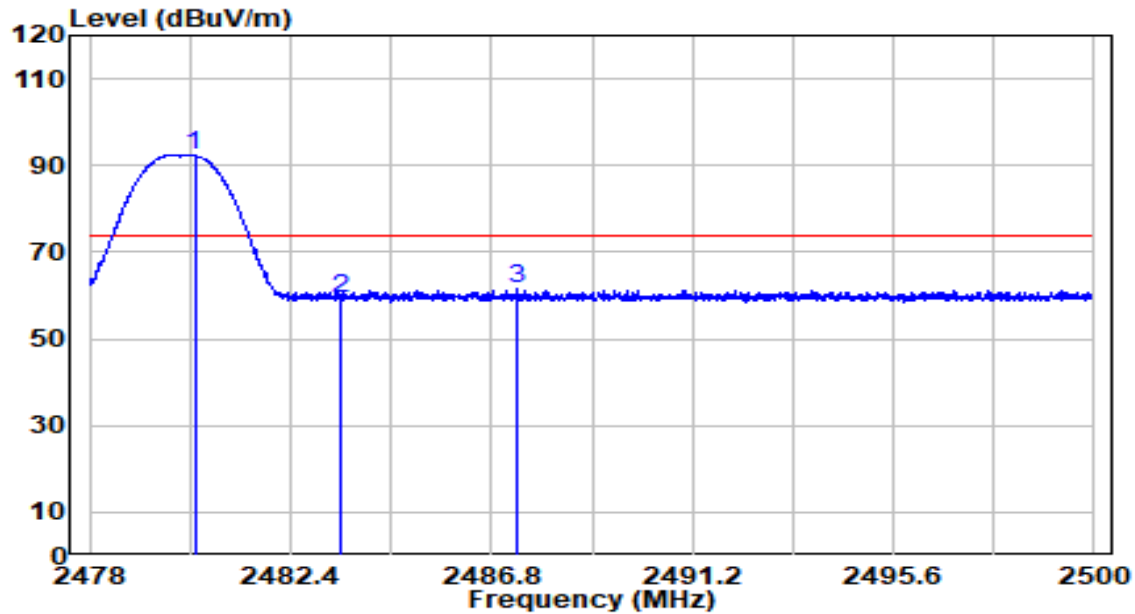


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	* 2480.002	61.38	32.69	N/A	N/A	54.00	Average
2	2483.500	15.17	32.71	47.87	-6.13	54.00	Average
3	2485.601	15.38	32.72	48.10	-5.90	54.00	Average

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2480MHz	Test Voltage	110V/60Hz

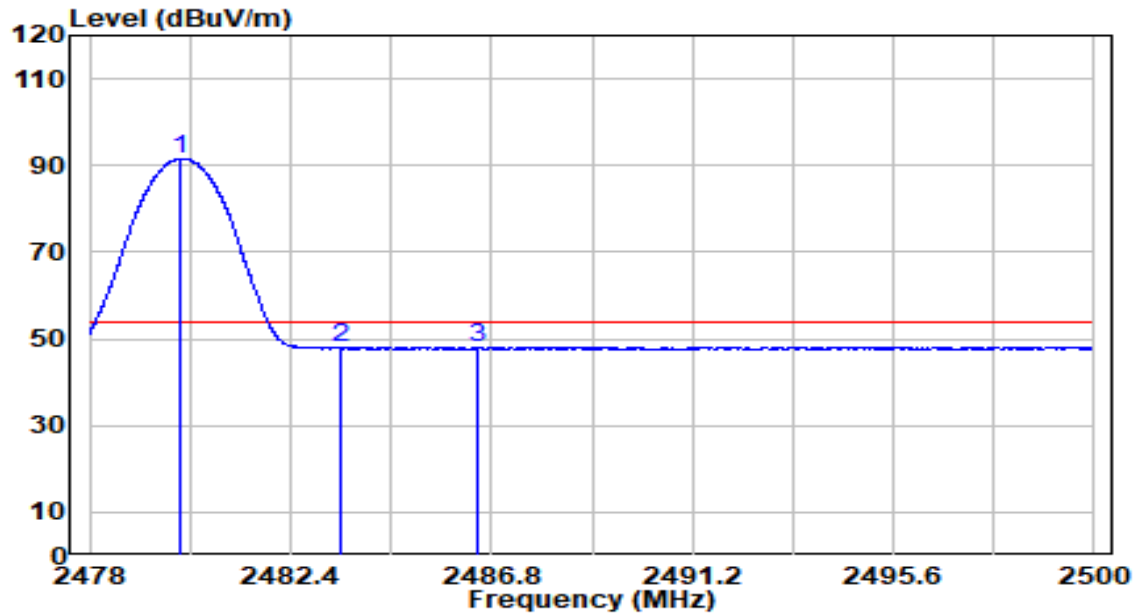


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	* 2480.299	59.64	32.69	N/A	N/A	74.00	Peak
2	2483.500	26.79	32.71	59.49	-14.51	74.00	Peak
3	2487.361	28.77	32.72	61.49	-12.51	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 1M at Channel 2480MHz	Test Voltage	110V/60Hz

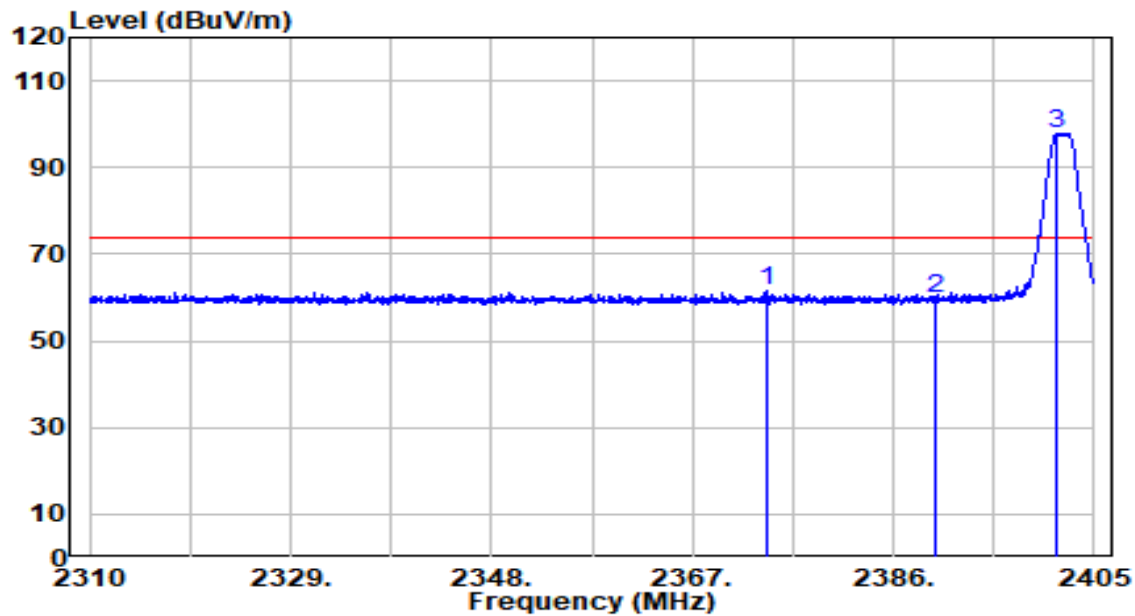


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	* 2480.002	58.98	32.69	N/A	N/A	54.00	Average
2	2483.500	15.18	32.71	47.89	-6.11	54.00	Average
3	2486.492	15.24	32.72	47.96	-6.04	54.00	Average

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2402MHz	Test Voltage	110V/60Hz

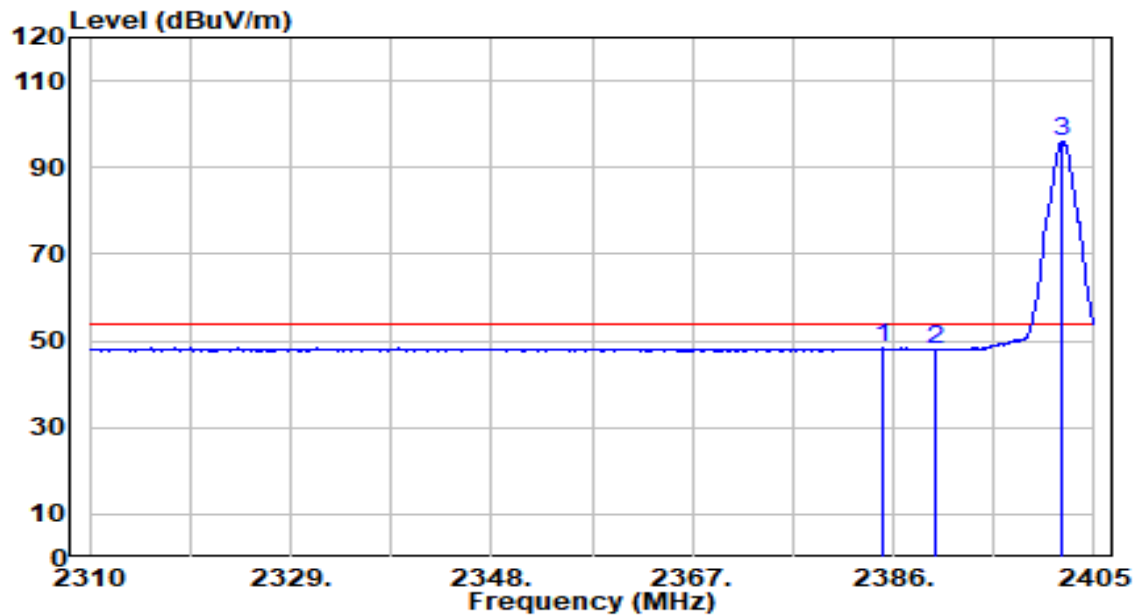


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	2374.030	29.50	32.23	61.72	-12.28	74.00	Peak
2	2390.000	27.32	32.30	59.61	-14.39	74.00	Peak
3	* 2401.485	65.49	32.35	N/A	N/A	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2402MHz	Test Voltage	110V/60Hz

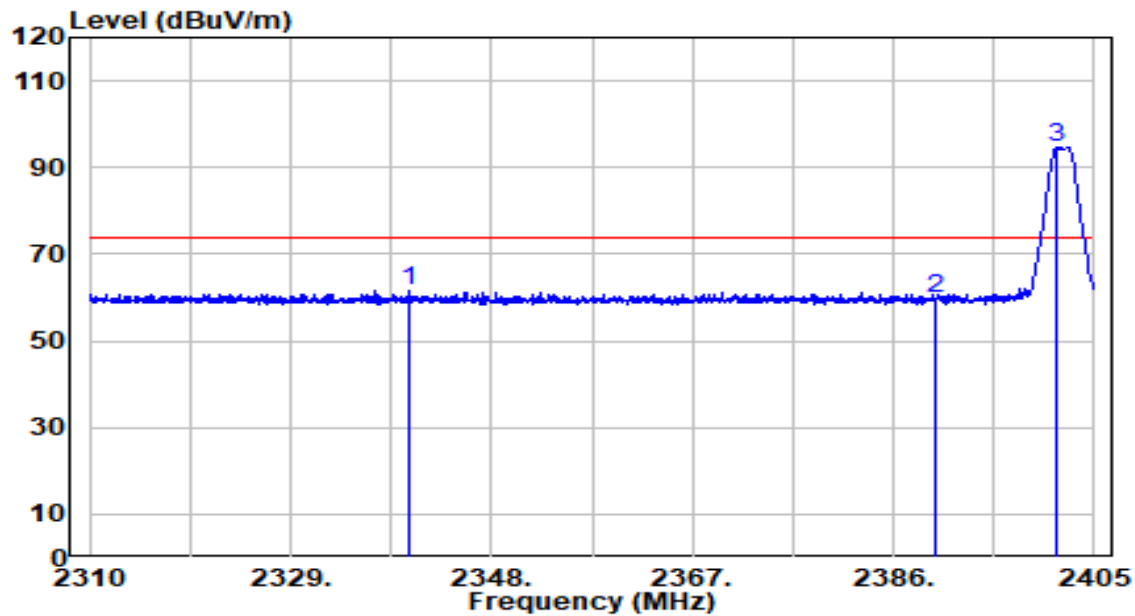


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	2385.050	16.03	32.27	48.31	-5.69	54.00	Average
2	2390.000	15.71	32.30	48.01	-5.99	54.00	Average
3	* 2402.008	63.48	32.35	N/A	N/A	54.00	Average

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2402MHz	Test Voltage	110V/60Hz

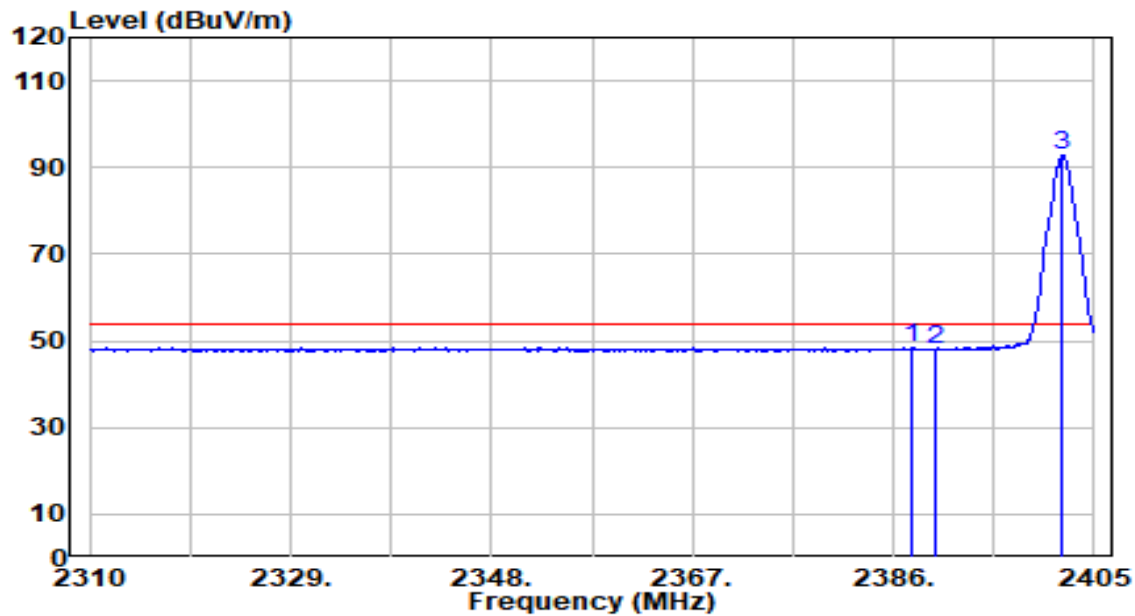


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	2340.115	29.50	32.08	61.57	-12.43	74.00	Peak
2	2390.000	27.52	32.30	59.82	-14.18	74.00	Peak
3	* 2401.485	62.27	32.35	N/A	N/A	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2402MHz	Test Voltage	110V/60Hz

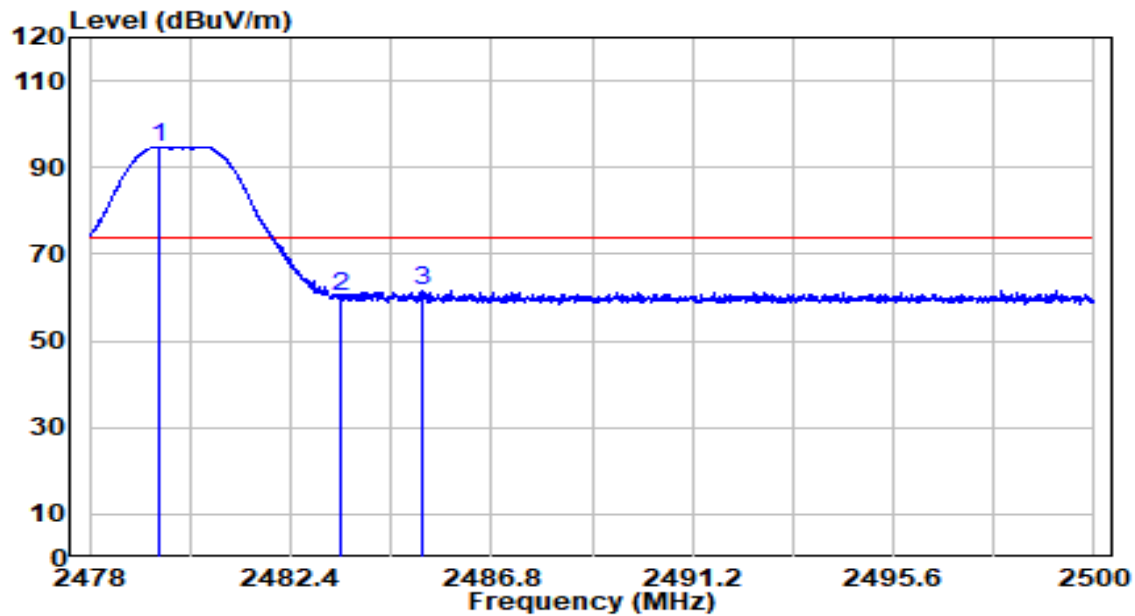


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	2387.853	16.08	32.29	48.36	-5.64	54.00	Average
2	2390.000	15.49	32.30	47.79	-6.21	54.00	Average
3	* 2401.960	60.39	32.35	N/A	N/A	54.00	Average

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2480MHz	Test Voltage	110V/60Hz

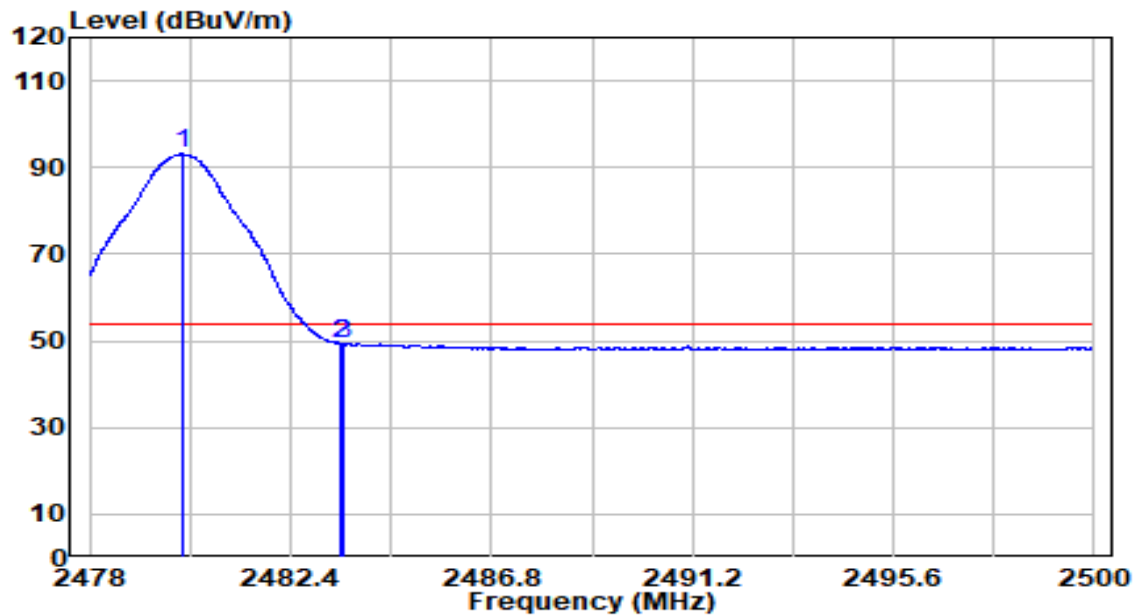


No	Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	* 2479.540	62.17	32.69	N/A	N/A	74.00	Peak
2	2483.500	27.56	32.71	60.27	-13.73	74.00	Peak
3	2485.260	28.82	32.72	61.54	-12.46	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Horizontal	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2480MHz	Test Voltage	110V/60Hz

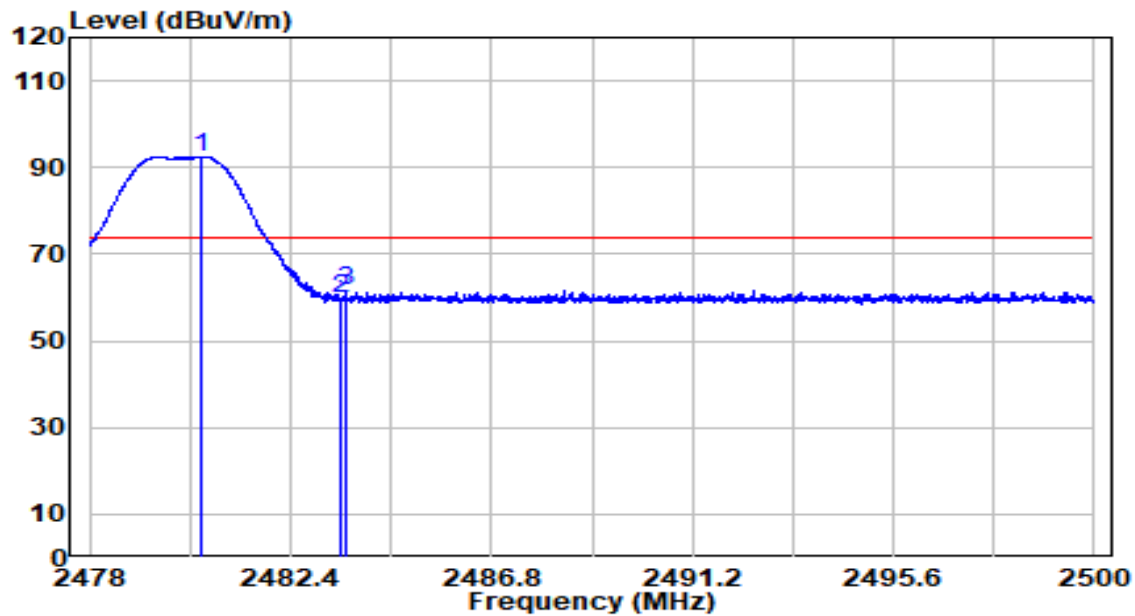


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	*	2480.046	60.47	32.69	N/A	N/A	54.00	Average
2		2483.500	16.71	32.71	49.42	-4.58	54.00	Average
3		2483.566	16.76	32.71	49.47	-4.53	54.00	Average

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2480MHz	Test Voltage	110V/60Hz

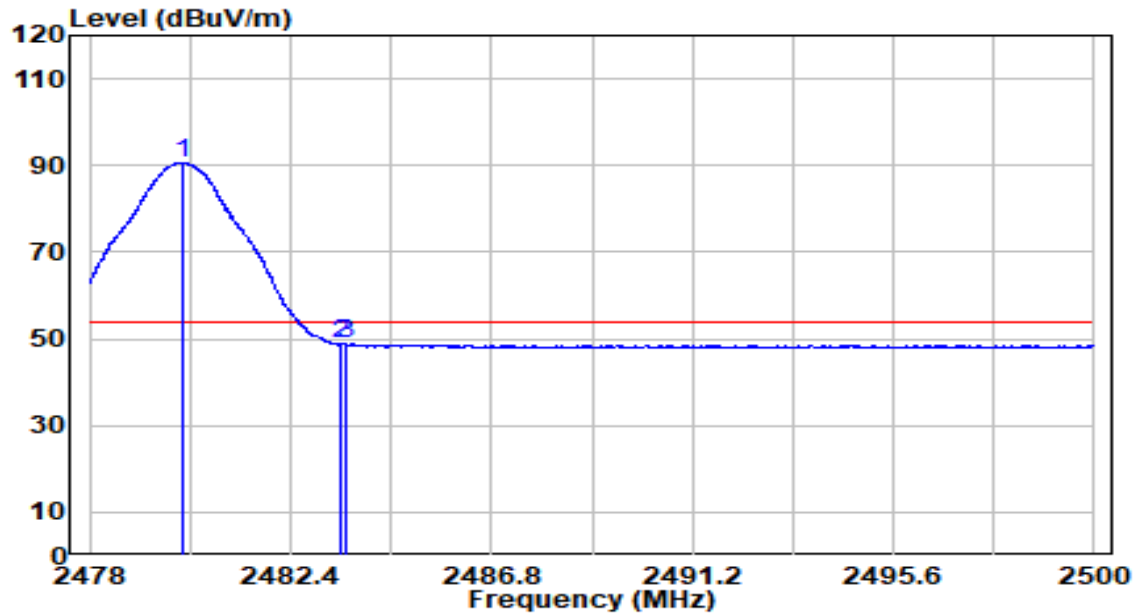


No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	*	2480.442	59.83	32.69	N/A	N/A	74.00	Peak
2		2483.500	26.88	32.71	59.59	-14.41	74.00	Peak
3		2483.588	28.84	32.71	61.55	-12.45	74.00	Peak

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

EUT	OAW-AP1311	Date of Test	2020-09-27
Factor	BBHA 9120D	Temp. / Humidity	26.3°C/49.5%
Polarity	Vertical	Site / Test Engineer	AC1 / Kevin Ker
Test Mode	Transmit by BLE 2M at Channel 2480MHz	Test Voltage	110V/60Hz



No		Frequency (MHz)	Reading (dBuV)	C.F (dB)	Measurement (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Remark (QP/PK/AV)
1	*	2480.035	58.01	32.69	N/A	N/A	54.00	Average
2		2483.500	16.11	32.71	48.82	-5.18	54.00	Average
3		2483.599	16.14	32.71	48.84	-5.16	54.00	Average

Note:

1. " *", means this data is the worst emission level.
2. C.F (Correction Factor) = Antenna Factor (dB)+ Cable Loss (dB).
3. Measurement(dBuV/m) = Reading(dBuV) + C.F (Correction Factor).
- 4.The emission levels of other frequencies are very lower than the limit and not show in test report.

5.7. 占用頻寬

5.7.1 量測方法

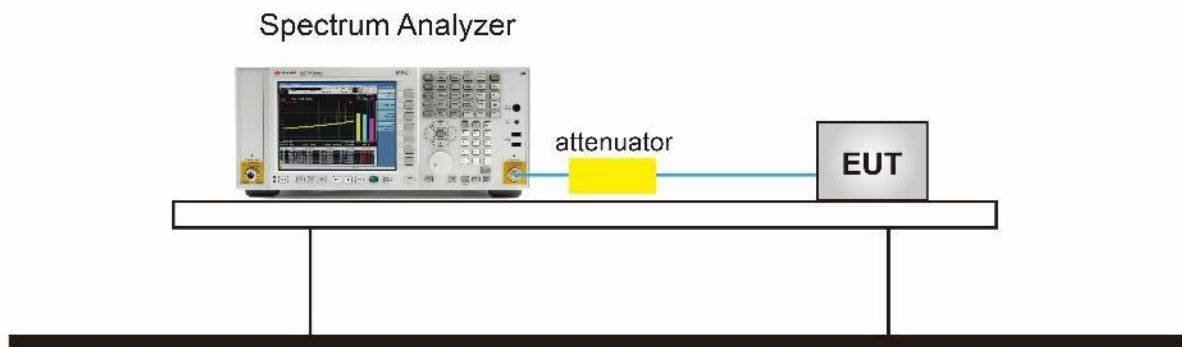
待測物之天線埠經由適當之衰減直接連至頻譜分析儀RF輸入端，頻譜分析儀之設定,參考如下:

- (1) Set RBW = 100 kHz
- (2) VBW $\geq 3 \times$ RBW
- (3) Detector = Peak
- (4) Trace mode = max hold
- (5) Sweep = auto couple

5.7.2 限制要求

6dB頻寬至少應有500kHz。

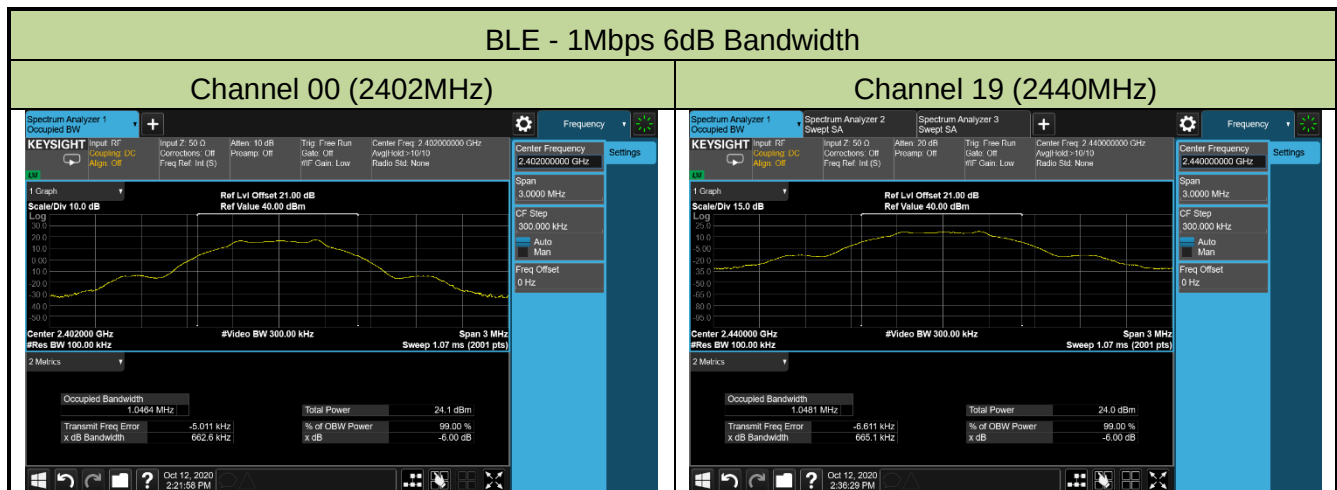
5.7.3 測試架構圖



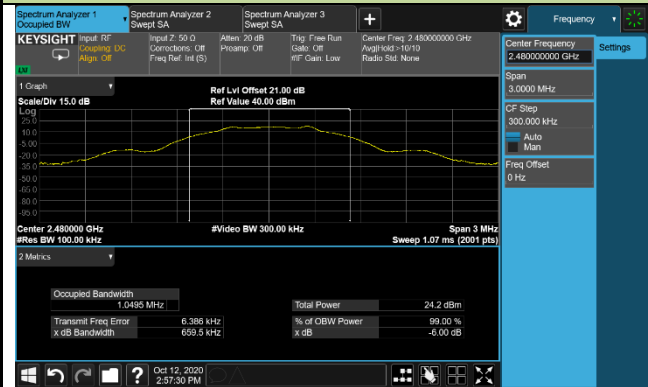
5.7.4 占用頻寬測試結果

Product	OmniAccess Stellar	Temperature	26°C
Test Engineer	Kevin Ker	Relative Humidity	61%
Test Site	SR1	Test Date	2020/10/12
Test Mode	OAW-AP1311-BLE		

Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
BLE	1	00	2402	0.663	≥0.5	Pass
		19	2440	0.665	≥0.5	Pass
		39	2480	0.660	≥0.5	Pass
	2	00	2402	1.170	≥0.5	Pass
		19	2440	1.182	≥0.5	Pass
		39	2480	1.180	≥0.5	Pass



Channel 39 (2480MHz)

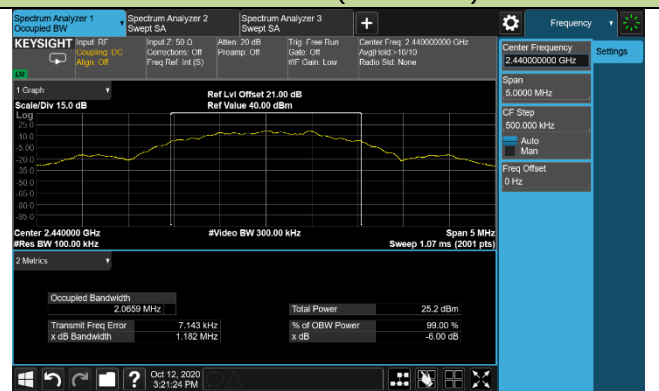


BLE - 2Mbps 6dB Bandwidth

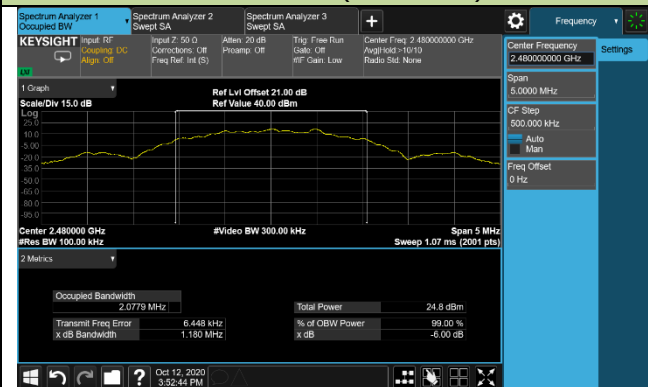
Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



5.8. 功率頻譜密度

5.8.1 量測方法

將發射機之天線埠經由適當之衰減直接連至測試儀器。找出發射峰值並擴展於通帶內，設定解析頻寬為3 kHz，視訊頻寬大於解析頻寬，掃描時間為頻率掃描範圍除以3 kHz。所測得之峰值位準必須應小於或等於8 dBm。

若受測裝置之頻譜線間隔小於3 kHz，測量時應將解析頻寬降低以使頻譜線間隔大於3kHz，所測得之數據再藉加總3 kHz 頻帶內所有個別頻譜線之功率(即標準化至3 kHz)以決定是否符合規定。

5.8.2 限制要求

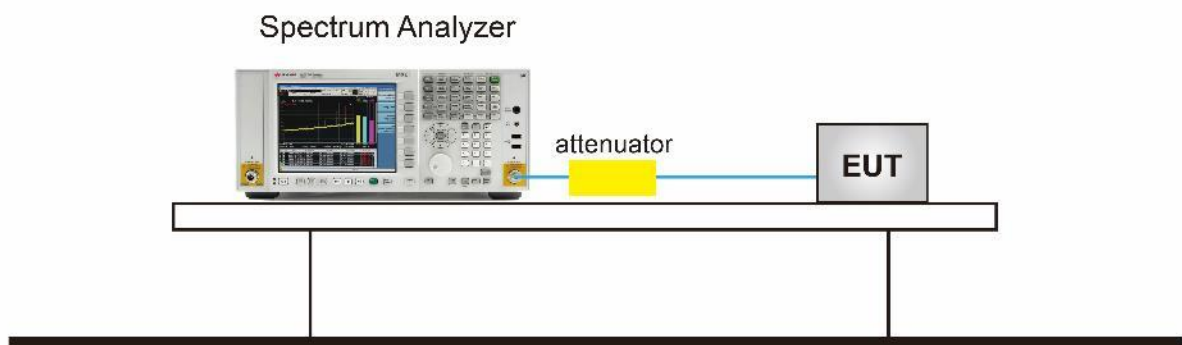
在使用頻率範圍之任意3千赫(kHz)頻寬內，由發射機傳導至天線之峰值發射電功率密度在任意期間內，皆不得大於8dBm。

若用於非固定式點對點操作時，若其發射天線之方向性增益超過6dBi，應依所超過之dB數等量降低峰值輸出功率。如用於固定式點對點(註)操作時，應符合下列情形之一：

(1)操作於2400-2483.5兆赫(MHz)者，其發射天線之方向性增益超過6dBi，應於每超過3dB降低1dB之峰值輸出功率。

(2) 操作於5725-5850兆赫(MHz)者，其發射天線之方向性增益超過6dBi，不需降低峰值輸出功率。

5.8.3 測試架構圖



5.8.4 功率頻譜密度測試結果

Product	OmniAccess Stellar	Temperature	26°C
Test Engineer	Kevin Ker	Relative Humidity	61%
Test Site	SR1	Test Date	2020/10/15
Test Mode	OAW-AP1311-BLE		

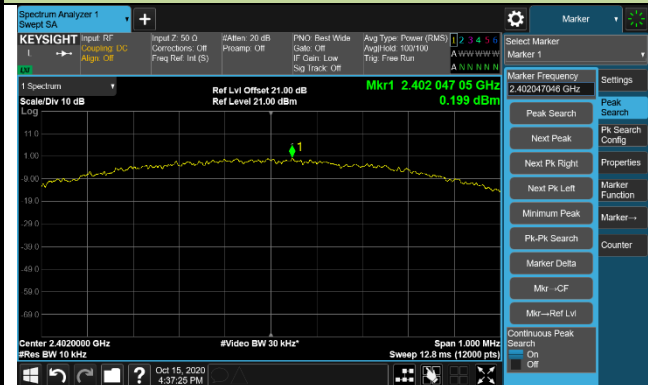
Test Mode	Data Rate (Mbps)	Channel No.	Frequency (MHz)	PSD Result (dBm/10kHz)	DutyCycle(%)	Final PSD Result (dBm/10kHz)	Limit (dBm/3kHz)	Result
BLE	1	00	2402	0.20	85.2	0.90	≤8.00	Pass
		19	2440	-0.10	85.2	0.60	≤8.00	Pass
		39	2480	0.53	85.2	1.23	≤8.00	Pass
	2	00	2402	-2.43	55.8	0.10	≤ 8.00	Pass
		19	2440	-2.82	55.8	-0.29	≤ 8.00	Pass
		39	2480	-3.41	55.8	-0.88	≤ 8.00	Pass

Note:

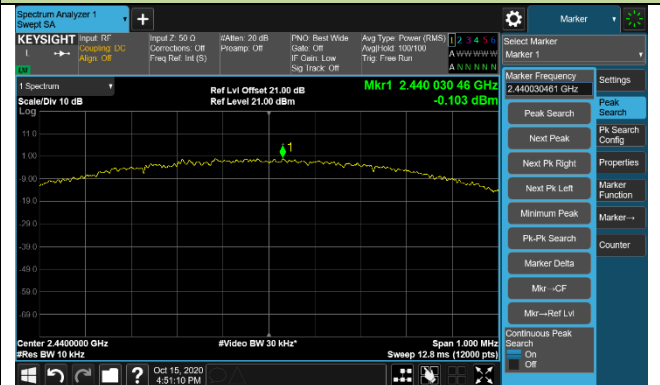
When EUT duty cycle < 98%, The total PSD (dBm/MHz) = $10 \cdot \log \{10^{(\text{Ant 0 PSD}/10)} + 10^{(\text{Ant 1 PSD}/10)}\}$ (dBm/MHz) + $10 \cdot \log (1/\text{Duty Cycle})$.

BLE - 1Mbps PSD

Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)

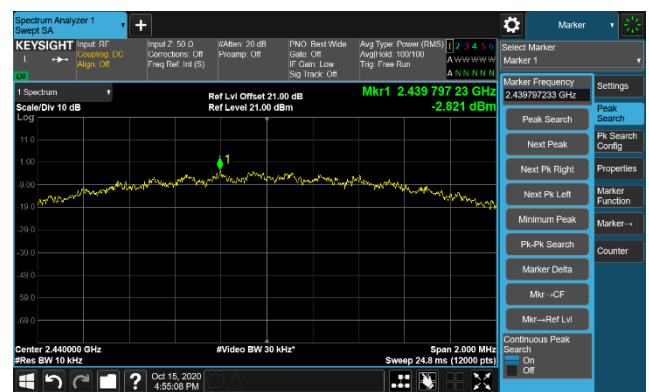


BLE - 2Mbps PSD

Channel 00 (2402MHz)



Channel 19 (2440MHz)



Channel 39 (2480MHz)



The End