

NCC

低功率射頻電機型式試驗報告

產品名稱 : Talk Switch
型號 : AD651B
廠牌 : SHURE
申請者 : Shure Incorporated
申請者地址 : 5800 West Touhy Avenue, Niles, IL 60714-4608, USA
測試標準 : LP0002 (107 年版)
參考法規 : ANSI C63.10-2013
測試結果 : 符合
測試日期 : August 02 ~ 15, 2018
發行日期 : 2018/08/20

測試工程師 : 
(柯文凱)
報告審核人 : 
(陳柏均)
報告簽屬人 : 
(柯承志)



CONTENTS

Description	Page
1. 一般資訊.....	5
2. 產品描述.....	6
2.1 產品資訊.....	6
2.2 產品通道清單.....	6
2.3 測試模式.....	6
2.4 操作程式.....	6
3. 測試設備明細.....	7
4. 量測不確定度.....	9
5. 測試結果.....	10
5.1 電源傳導測試.....	11
5.1.1 量測方法.....	11
5.1.2 限制要求.....	11
5.1.3 測試架構圖.....	11
5.1.4 電源端點測試結果.....	12
5.2 峰值傳導輸出功率.....	13
5.2.1 量測方法.....	13
5.2.2 限制要求.....	13
5.2.3 測試架構圖.....	13
5.2.4 峰值傳導輸出功率測試結果.....	14
5.3 天線之要求.....	15
5.3.1 限制要求.....	15
5.3.2 天線樣式.....	15
5.4 帶外發射限制.....	16
5.4.1 量測方法.....	16
5.4.2 限制要求.....	16
5.4.3 測試架構圖.....	16
5.4.4 帶外輻射測試結果.....	17
5.5 輻射電場強度.....	19
5.5.1 量測方法.....	19
5.5.2 限制要求.....	19
5.5.3 測試架構圖.....	20
5.5.4 輻射電場強度測試結果.....	22
5.6 頻帶邊緣.....	27
5.6.1 量測方法.....	27
5.6.2 限制要求.....	27

5.6.3 測試架構圖	28
5.6.4 頻帶邊緣測試結果	30
5.7 佔用頻寬	38
5.7.1 量測方法	38
5.7.2 限制要求	38
5.7.3 測試架構圖	38
5.7.4 佔用頻寬測試結果	39
5.8. 功率頻譜密度	40
5.8.1 量測方法	40
5.8.2 限制要求	40
5.8.3 測試架構圖	40
5.8.4 功率頻譜密度測試結果	41

修訂紀錄

報告編號	版本	描述	發行日期
1808TW0104-T1	1.0	Original Report	2018-08-20

1. 一般資訊

申請者	Shure Incorporated
申請者地址	5800 West Touhy Avenue, Niles, IL 60714-4608, USA
製造商	SHURE ELECTRONICA S A DE C V
製造商地址	CALLE GUILIERMO GRIFFIN 7025 PARQUE INDUSTRIAL OMEGA 32410 CD JUAREZ CHIH MEXICO
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 a FCC registered (Reg. No. 153292) test facility with the site description report on file and is designated by the FCC as an Accredited Test Film. 2. MRT facility is an IC registered (MRT Reg. No. 21723-1) test laboratory with the site description on file at Industry Canada. 3. MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (TAF) under the American Association for Laboratory Accreditation Program (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC, Industry Taiwan, EU and TELEC Rules.

2. 產品描述

2.1 產品資訊

產品名稱	Talk Switch
產品型號	AD651B
廠牌	SHURE
頻率範圍	For 802.15.4: 2405 ~ 2480 MHz
調變模式	O-QPSK
待測物電壓	DC 1.55V

2.2 產品通道清單

Channel	Frequency	Channel	Frequency	Channel	Frequency
11	2405 MHz	12	2410 MHz	13	2415 MHz
14	2420 MHz	15	2425 MHz	16	2430 MHz
17	2435 MHz	18	2440 MHz	19	2445 MHz
20	2450 MHz	21	2455 MHz	22	2460 MHz
23	2465 MHz	24	2470 MHz	25	2475 MHz
26	2480 MHz	--	--	--	--

2.3 測試模式

Test Mode	Mode 1: Transmit by 802.15.4
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2.4 操作程式

1.	Turn on the power of all equipment.
2.	The test utility software used during testing was "Tera Term", and the test command was provided by the customer.
3.	Configure the test channel and the data rate.
4.	Start test.

3. 測試設備明細

電源傳導 - SR2

儀器名稱	製造商	型號	財產編號	校正日期	有效日期
EMI Test Receiver	R&S	ESR3	MRTTWA00045	1 year	2019/03/17
Two-Line V-Network	R&S	ENV216	MRTTWA00019	1 year	2019/03/23
Two-Line V-Network	R&S	ENV216	MRTTWA00020	1 year	2019/03/23

輻射干擾 - AC1

儀器名稱	製造商	型號	財產編號	校正日期	有效日期
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2019/03/03
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2019/03/16
Broadband Preamplifier	SCHWARZBECK	BBV 9718	MRTTWA00005	1 year	2019/04/06
Broadband Amplifier	SCHWARZBECK	BBV 9721	MRTTWA00006	1 year	2019/04/06
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	MRTTWA00002	1 year	2019/04/06
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2019/04/06
Broadband Hornantenna	SCHWARZBECK	BBHA 9120D	MRTTWA00003	1 year	2019/04/06
Breitband Hornantenna	SCHWARZBECK	BBHA 9170	MRTTWA00004	1 year	2019/04/06
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00033	1 year	2019/06/08

傳導量測 - SR1

儀器名稱	製造商	型號	財產編號	校正日期	有效日期
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2019/07/10
PSA Series Spectrum Analyzer	Agilent	E4447A	MRTTWA00060	1 year	2018/12/11
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00014	1 year	2019/03/18
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00015	1 year	2019/03/18
Programmable Temperature & Humidity Chamber	TEN BILLION	TTH-B3UP	MRTTWA00036	1 year	2019/05/10
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00033	1 year	2019/06/08

EMI 測試軟體

軟體名稱	製造商	版本
e3	Audix	9.160520a
EMI	Quietek	V3

4. 量測不確定度

電源傳導量測 - SR2
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 2.42dB
輻射干擾量測 - AC1
Measuring Uncertainty for a Level of Confidence of 95% ($U=2U_c(y)$): 4.22dB

5. 測試結果

產品名稱 Talk Switch
型號 AD651B

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	N/A	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	$\leq 20\text{dBc (Peak)}$	符合	第 5.4 章節
2.7	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	$\leq 74\text{dBuV/m (Peak)}$ $\leq 54\text{dBuV/m (Average)}$	符合	第 5.6 章節
3.10.1.6(2)(A)	佔用頻寬	$\geq 500\text{KHz}$	符合	第 5.7 章節
3.10.1.6(2)(B)	功率頻譜密度	$\leq 8\text{dBm}$	符合	第 5.8 章節
備註: 測試樣品是由 SR44 button battery 供電的, 所以“電源傳導”這個測試項目不適用。				

5.1.4 電源端點測試結果

測試樣品是由SR44 button battery供電的，所以這個測試項目不適用。

5.2 峰值傳導輸出功率

5.2.1 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，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。

5.2.2 限制要求

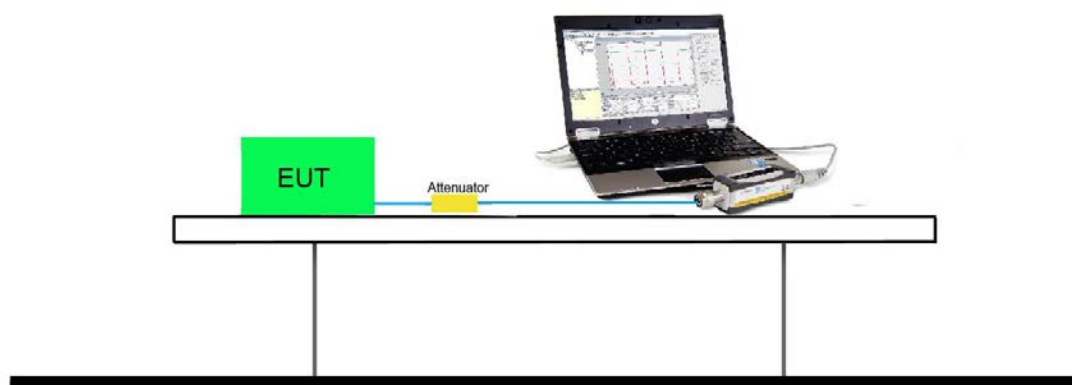
國家通訊傳播委員會低功率射頻電機技術規範之第3.10.1.2節 峰值傳導輸出功率：

- (1) 操作於 2400 MHz～2483.5 MHz 者
 - (A) 至少使用75 個跳頻頻道之跳頻系統：1 W(含)以下。
 - (B) 除(A)外，依 3.10.1.6 (1)(A)(a)之跳頻系統：0.125 W(含)以下。
 - (C) 數位調變技術系統：1 W(含) 以下。
- (2) 操作於5725 MHz～5850 MHz 之所有跳頻系統：1 W(含)以下。

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

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。

5.2.3 測試架構圖



5.2.4 峰值傳導輸出功率測試結果

待測物名稱	Talk Switch	測試日期	2018/08/09
待測物型號	AD651B	溫度 / 濕度	25°C / 66%
測試場地	AC1	測試工程師	Kevin Ker

Test Result of Peak Output Power

Test Mode	Modulation Mode	Channel No.	Freq. (MHz)	Peak Power (dBm)	Limit (dBm)	Result
802.15.4	O-QPSK	11	2405	-14.76	≤ 30.00	Pass
802.15.4	O-QPSK	18	2440	-14.42	≤ 30.00	Pass
802.15.4	O-QPSK	26	2480	-13.51	≤ 30.00	Pass

Test Result of Average Output Power (Reporting Only)

Test Mode	Modulation Mode	Channel No.	Freq. (MHz)	Average Power (dBm)	Limit (dBm)	Result
802.15.4	O-QPSK	11	2405	-15.81	≤ 30.00	Pass
802.15.4	O-QPSK	18	2440	-15.39	≤ 30.00	Pass
802.15.4	O-QPSK	26	2480	-14.32	≤ 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

此接收機其天線為PCB Antenna，(檢附天線規格書)

Antenna Type	Frequency Band (MHz)	Manufacturer	Model	Max Antenna Gain (dBi)
PCB Antenna	2400 ~ 2500	SHURE Incorporated	N/A	-1.7

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。

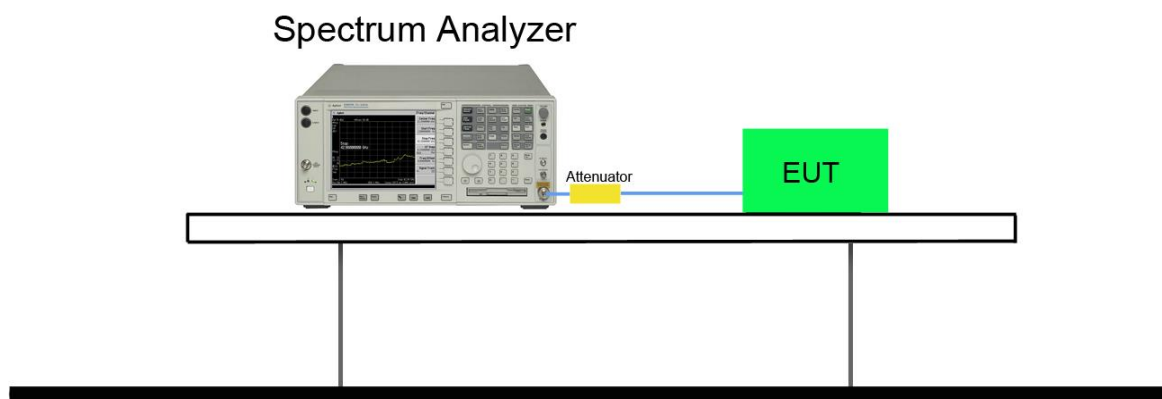
5.4.2 限制要求

依據國家通訊傳播委員會低功率射頻電機技術規範之第 3.10.1.5 節規定。

帶外發射限制：操作頻帶範圍外之任意 100 kHz 內，發射機所產生的射頻功率相較於使用頻帶範圍中包含最高所需功率之 100 kHz 內的射頻功率，其衰減值限制如下：

- (1) 輸出功率以附件二之峰值輸出功率方式測量者，至少須衰減 20 dB，可使用射頻傳導或輻射方式測量。
- (2) 輸出功率以 3.10.1.2(1)(C)之最大傳導輸出功率測量方式者，至少須衰減 30 dB。

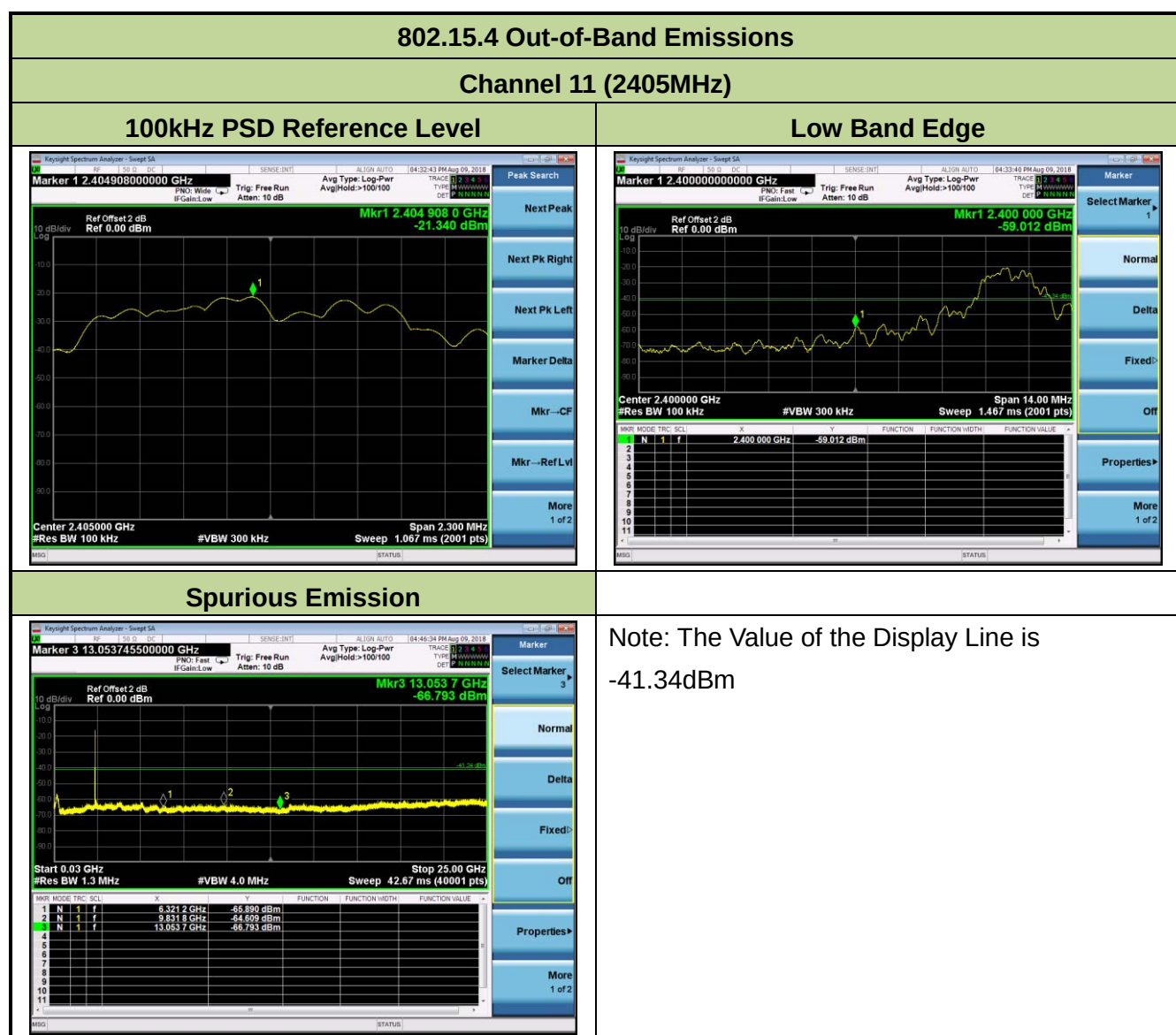
5.4.3 測試架構圖



5.4.4 帶外輻射測試結果

待測物名稱	Talk Switch	測試日期	2018/08/09
待測物型號	AD651B	溫度 / 濕度	25°C / 66%
測試場地	AC1	測試工程師	Kevin Ker

Test Mode	Channel No.	Frequency (MHz)	Limit	Result
802.15.4	11	2405	20dBc	Pass
802.15.4	18	2440	20dBc	Pass
802.15.4	26	2480	20dBc	Pass

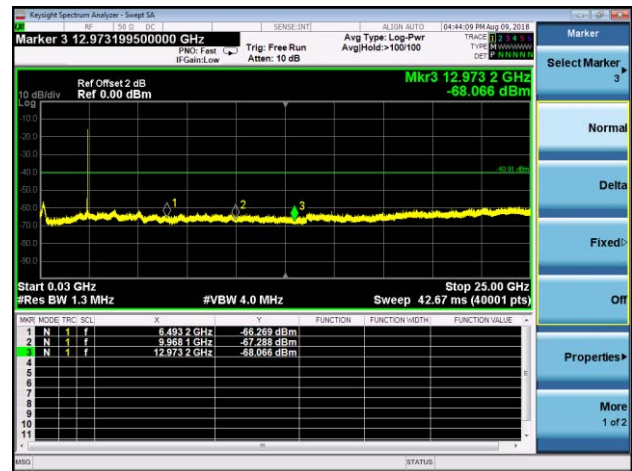


Channel 18 (2440MHz)

100kHz PSD Reference Level



Spurious Emission



Note: The Value of the Display Line is -40.91dBm

Channel 26 (2480MHz)

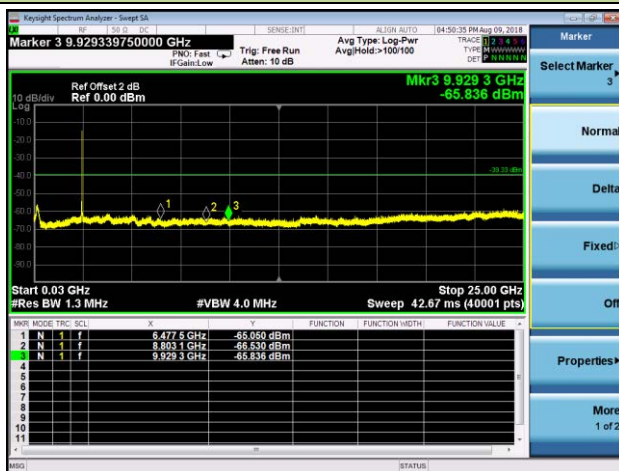
100kHz PSD Reference Level



High Band Edge



Spurious Emission



Note: The Value of the Display Line is -39.33dBm

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，接收天線並應於水準及垂直極化方向各量測一次。（待測物擺設方式根據 ANSI C63.10-2014 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(RBW:1MHz,VBW:10Hz)，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

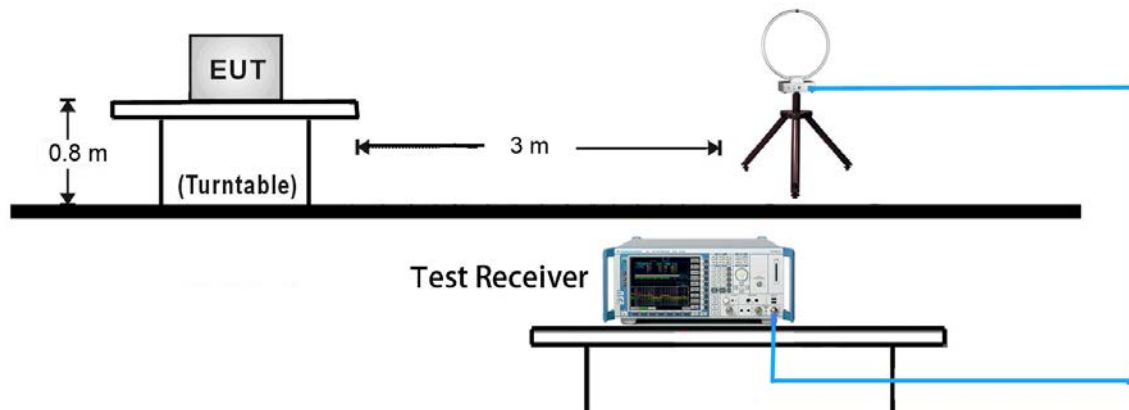
其電場強度不得超過下表之限值，且其不必要之發射皆不得大於主波發射強度。各頻段重疊處，以較嚴格之限制值為準。

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

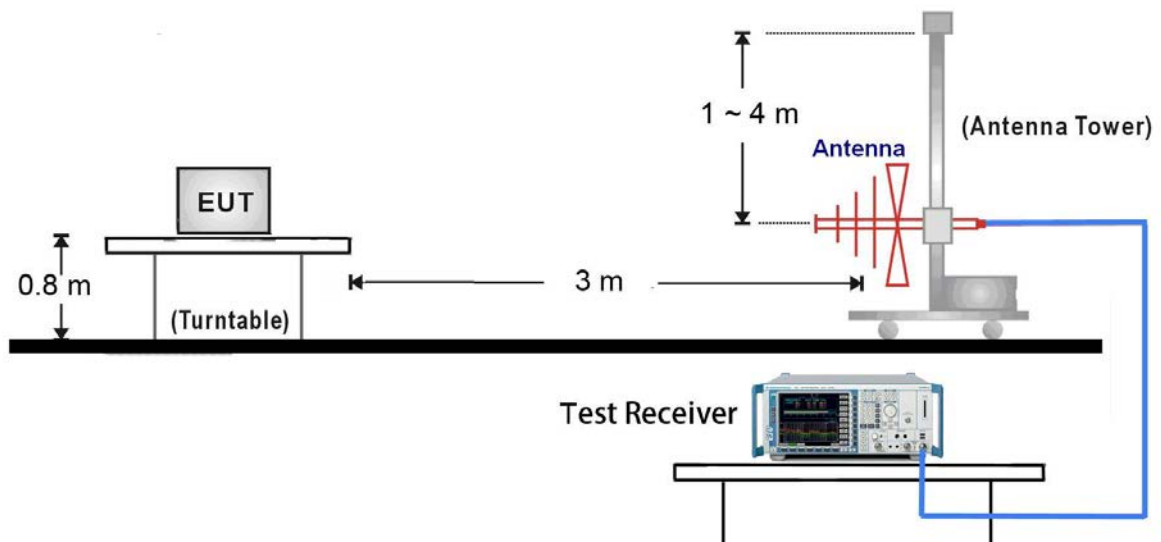
上表規定之電場強度，頻率在 9-90kHz 千赫(kHz)、110-490 千赫(kHz)以及 1000 兆赫(MHz)以上之發射，其量測以平均值檢波器為基準，且須符合低功率射頻電機技術規範第 5.14 節之規定；其他頻率之發射，應以 CISPR 準峰值(quasi-peak) 檢波器測量；非以上表所指定之距離測量時須符合低功率射頻電機技術規範第 5.5 節之規定，而輻射發射之量測頻率範圍須符合低功率射頻電機技術規範第 5.12 節之規定。

5.5.3 測試架構圖

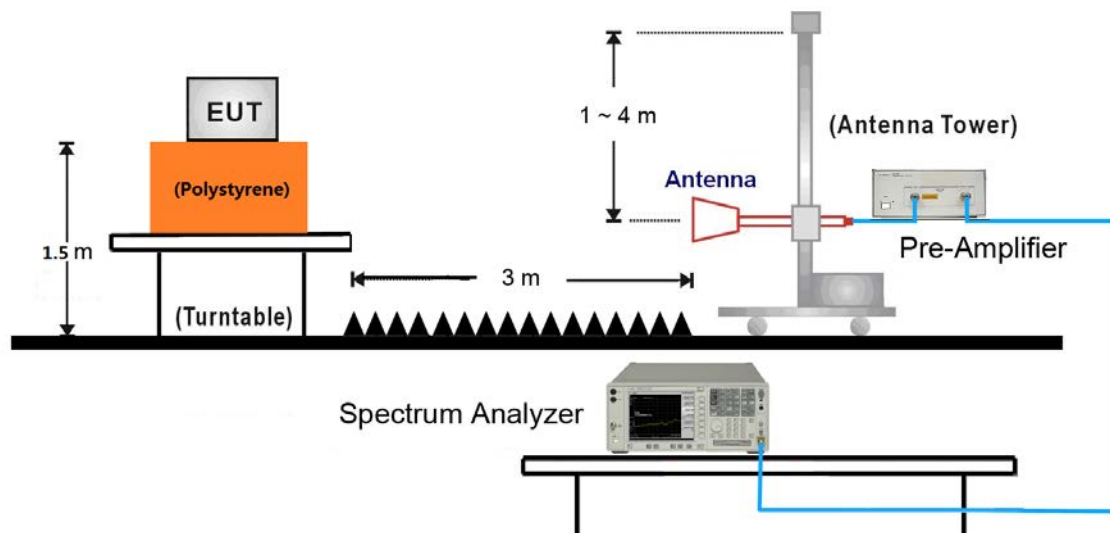
Under 30MHz Test Setup:



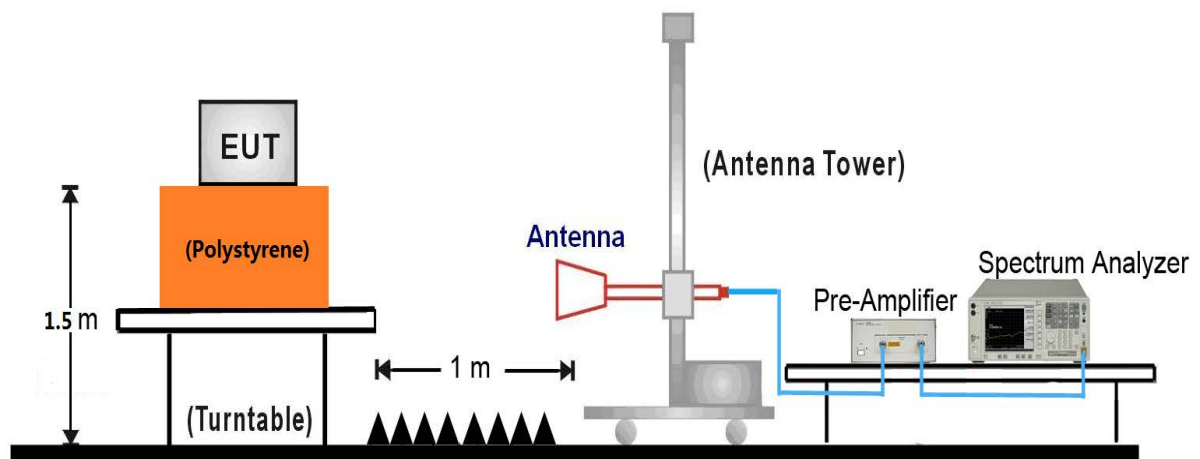
Under 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:



18GHz ~ 25GHz Test Setup:



5.5.4 輻射電場強度測試結果

Product	Talk Switch	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	58%
Test Site	AC1	Test Date	2018/08/09
Test Mode:	802.15.4	Test Channel:	11
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	6542.0	38.5	8.6	47.1	74.0	26.9	Peak	Horizontal
*	8684.0	35.2	13.7	48.9	74.0	25.1	Peak	Horizontal
	11098.0	34.2	18.6	52.8	74.0	21.2	Peak	Horizontal
	12288.0	33.6	18.6	52.2	74.0	21.8	Peak	Horizontal
*	6380.5	38.9	7.6	46.5	74.0	27.5	Peak	Vertical
*	8786.0	35.0	13.9	48.9	74.0	25.1	Peak	Vertical
	10919.5	34.9	18.4	53.3	74.0	20.7	Peak	Vertical
	12237.0	34.1	18.7	52.8	74.0	21.2	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (73.01dBμV/m) or FCC 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	Talk Switch	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	58%
Test Site	AC1	Test Date	2018/08/09
Test Mode:	802.15.4	Test Channel:	18
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	6924.5	37.4	10.0	47.4	74.0	26.6	Peak	Horizontal
*	8794.5	35.5	13.9	49.4	74.0	24.6	Peak	Horizontal
	10885.5	34.7	18.3	53.0	74.0	21.0	Peak	Horizontal
	11412.5	33.9	19.1	53.0	74.0	21.0	Peak	Horizontal
*	8752.0	33.7	13.9	47.6	74.0	26.4	Peak	Vertical
*	10137.5	35.9	15.9	51.8	74.0	22.2	Peak	Vertical
	11412.5	33.9	19.1	53.0	74.0	21.0	Peak	Vertical
	11931.0	34.8	18.6	53.4	74.0	20.6	Peak	Vertical

Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (74.54dBμV/m) or FCC 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

Product	Talk Switch	Temperature	25°C
Test Engineer	Kevin Ker	Relative Humidity	58%
Test Site	AC1	Test Date	2018/08/09
Test Mode:	802.15.4	Test Channel:	26
Remark:	1. Average measurement was not performed if peak level lower than average limit. 2. Other frequency was 20dB below limit line within 1-18GHz, there is not show in the report.		

Mark	Frequency (MHz)	Reading Level (dBμV)	Factor (dB)	Measure Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector	Polarization
*	6542.0	38.5	8.6	47.1	74.0	26.9	Peak	Horizontal
*	9942.0	35.4	15.3	50.7	74.0	23.3	Peak	Horizontal
	11480.5	32.2	19.3	51.5	74.0	22.5	Peak	Horizontal
	11914.0	34.3	18.6	52.9	74.0	21.1	Peak	Horizontal
*	6941.5	37.2	10.1	47.3	74.0	26.7	Peak	Vertical
*	10001.5	36.9	15.4	52.3	74.0	21.7	Peak	Vertical
	10851.5	35.1	18.1	53.2	74.0	20.8	Peak	Vertical
	11650.5	32.6	19.3	51.9	74.0	22.1	Peak	Vertical

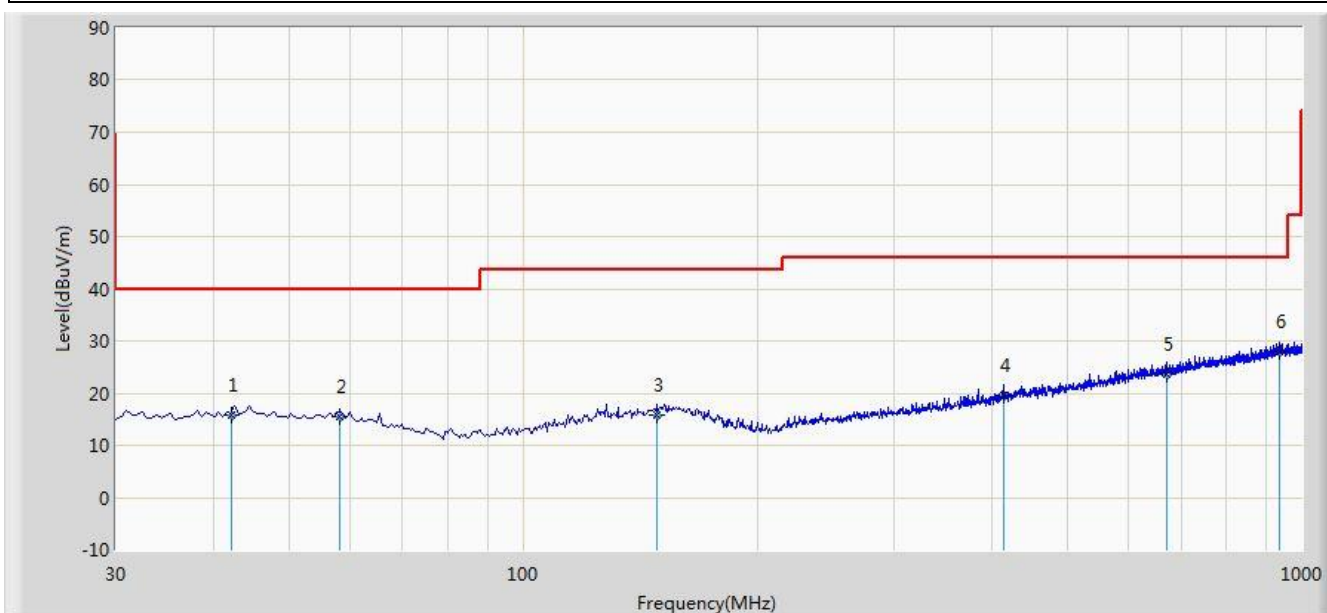
Note 1: "*" is not in restricted band, its limit is 20dBc of the fundamental emission level (77.05dBμV/m) or FCC 15.209 which is higher.

Note 2: Measure Level (dBμV/m) = Reading Level (dBμV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m) - Pre_Amplifier Gain (dB)

The Worst Case of Radiated Emission below 1GHz:

Site: AC1	Time: 2018/08/03 - 14:10
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: VULB9162_0.03GHz_8GHz	Polarity: Horizontal
EUT: Talk switch	Power: By Battery
Worst Case Mode: Transmit by 802.15.4 at Channel 2440MHz	



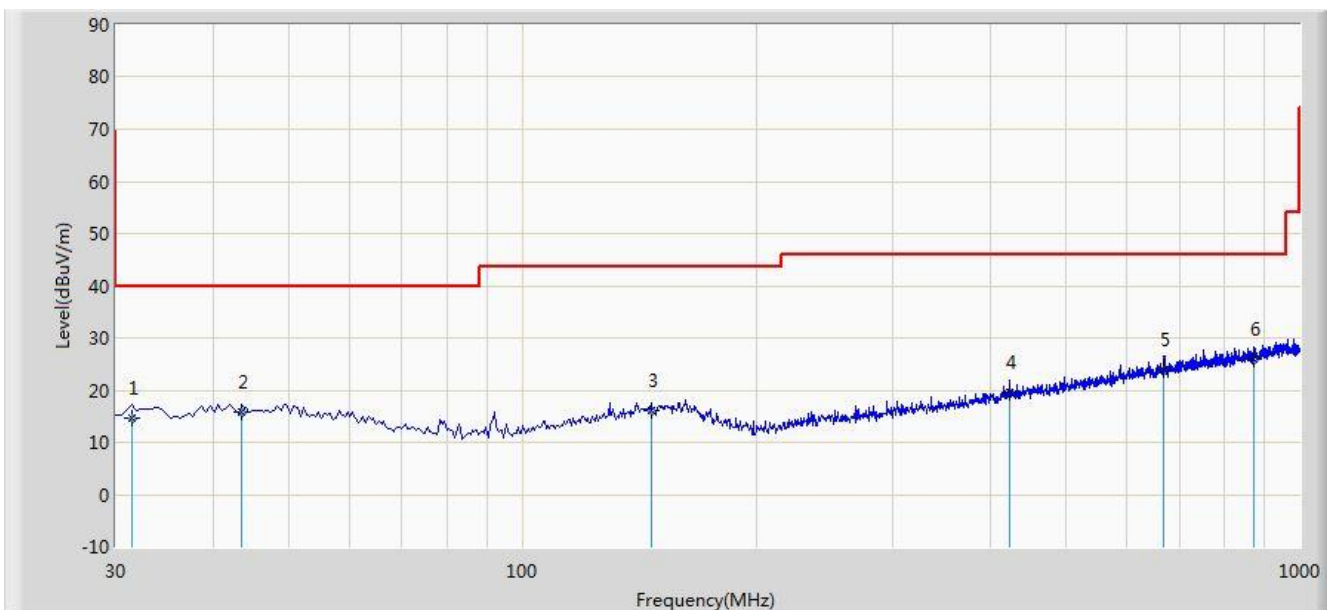
No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		42.160	15.737	1.450	-24.263	40.000	14.288	QP
2		58.130	15.418	1.200	-24.582	40.000	14.219	QP
3		148.825	15.895	6.320	-27.605	43.500	9.575	QP
4		413.635	19.469	2.320	-26.531	46.000	17.149	QP
5		671.170	23.661	2.320	-22.339	46.000	21.340	QP
6	*	935.010	27.875	3.200	-18.125	46.000	24.675	QP

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

Site: AC1	Time: 2018/08/03 - 14:14
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: VULB9162_0.03GHz_8GHz	Polarity: Vertical
EUT: Talk switch	Power: By Battery
Worst Case Mode: Transmit by 802.15.4 at Channel 2440MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		31.455	14.515	2.210	-25.485	40.000	12.305	QP
2		43.580	15.659	1.100	-24.341	40.000	14.559	QP
3		146.400	16.016	6.450	-27.484	43.500	9.566	QP
4		422.850	19.676	2.400	-26.324	46.000	17.276	QP
5		668.260	23.846	2.560	-22.154	46.000	21.286	QP
6	*	873.415	25.799	1.600	-20.201	46.000	24.199	QP

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear 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，接收天線並應於水準及垂直極化方向各量測一次。（待測物擺設方式根據 ANSI C63.10-2014版，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(RBW:1MHz,VBW:10Hz)，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。

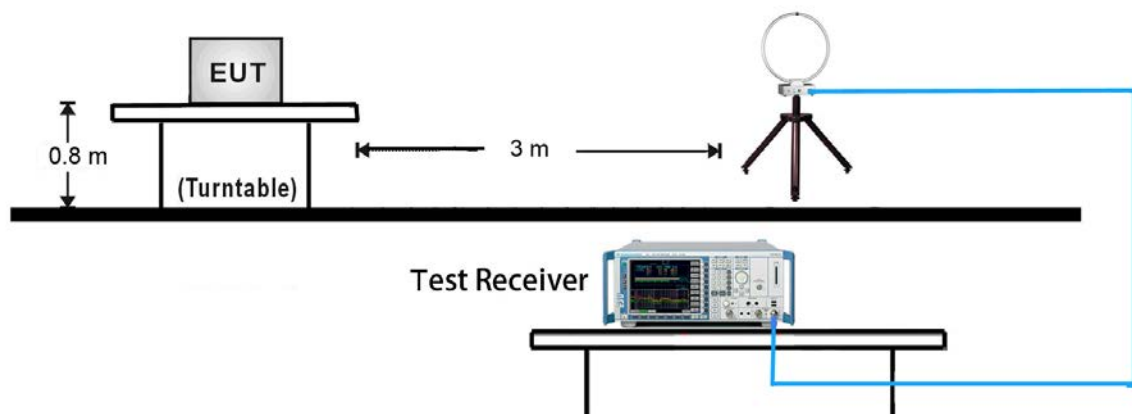
5.6.2 限制要求

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

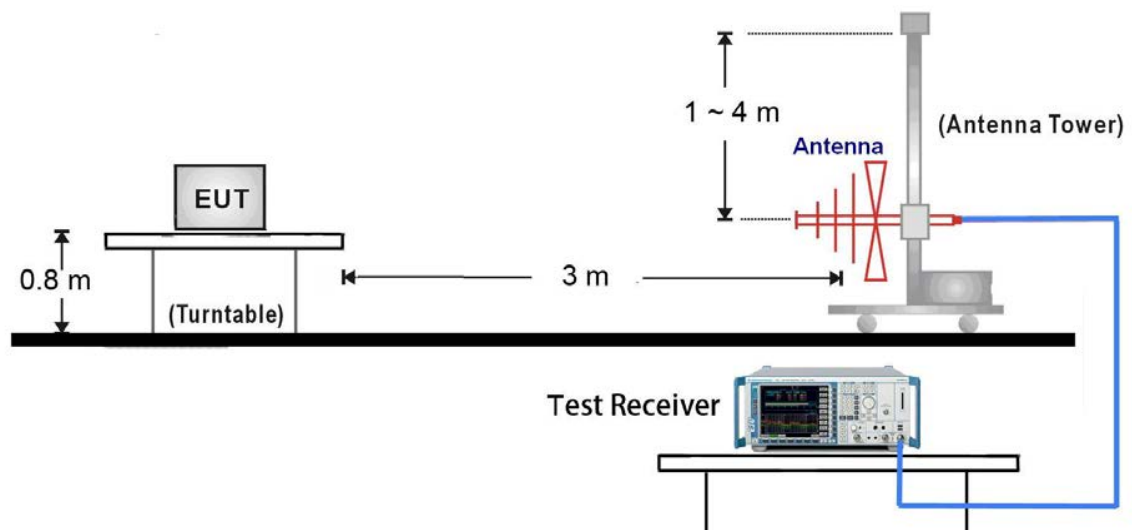
頻 率(MHz)	頻 率(MHz)	頻 率(MHz)	頻 率(MHz)	頻 率(MHz)
0.090~0.110	25.500~25.700	703.00~748.00	2310.0~2390.0	13250~13400
0.490~0.510	37.475~38.275	758.00~803.00	2483.5~2900.0	14470~14500
2.172~2.198	73.500~75.400	825.00~915.00	3260.0~3267.0	15350~16200
3.013~3.033	108.00~138.00	930.00~1240.0	3332.0~3339.0	17700~21400
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

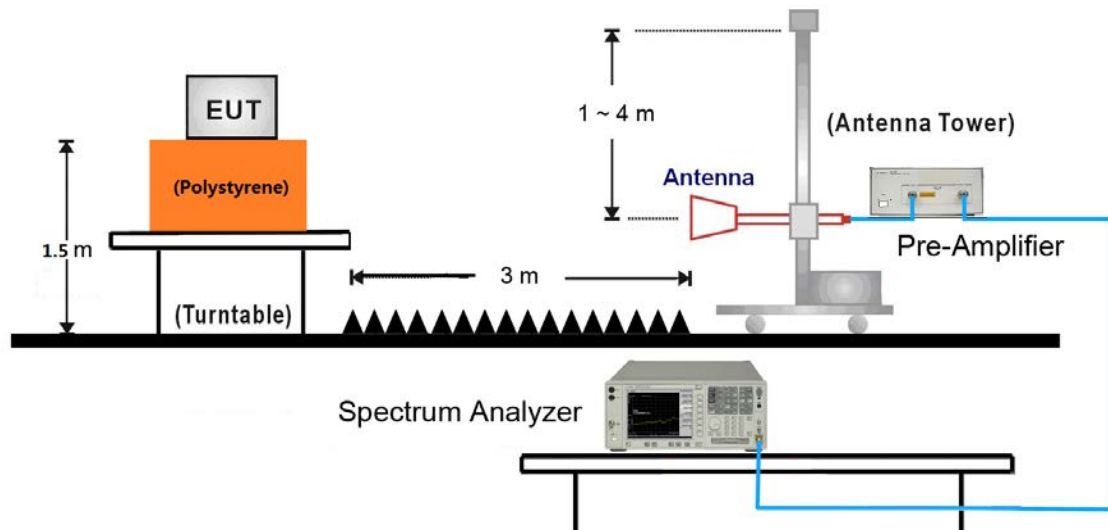
Under 30MHz Test Setup



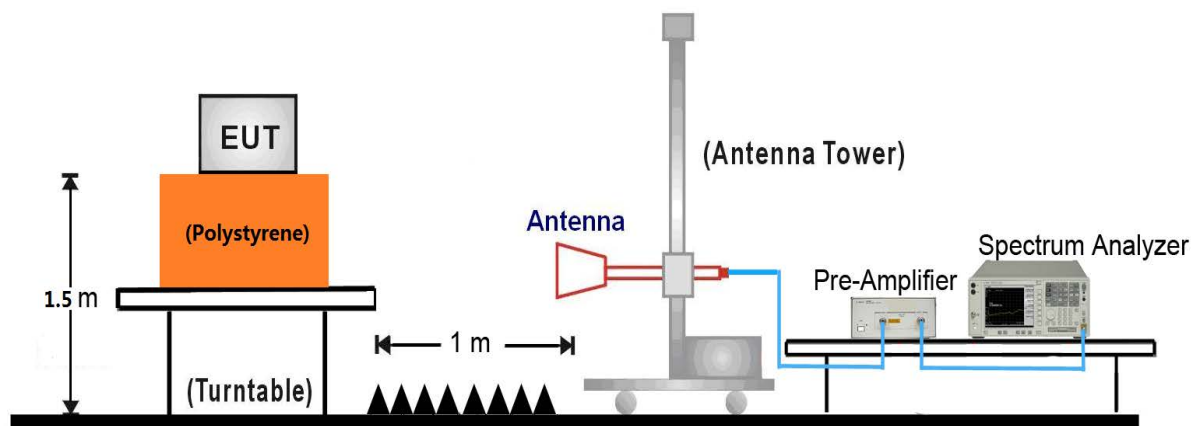
Under 1GHz Test Setup



1GHz ~ 18GHz Test Setup:

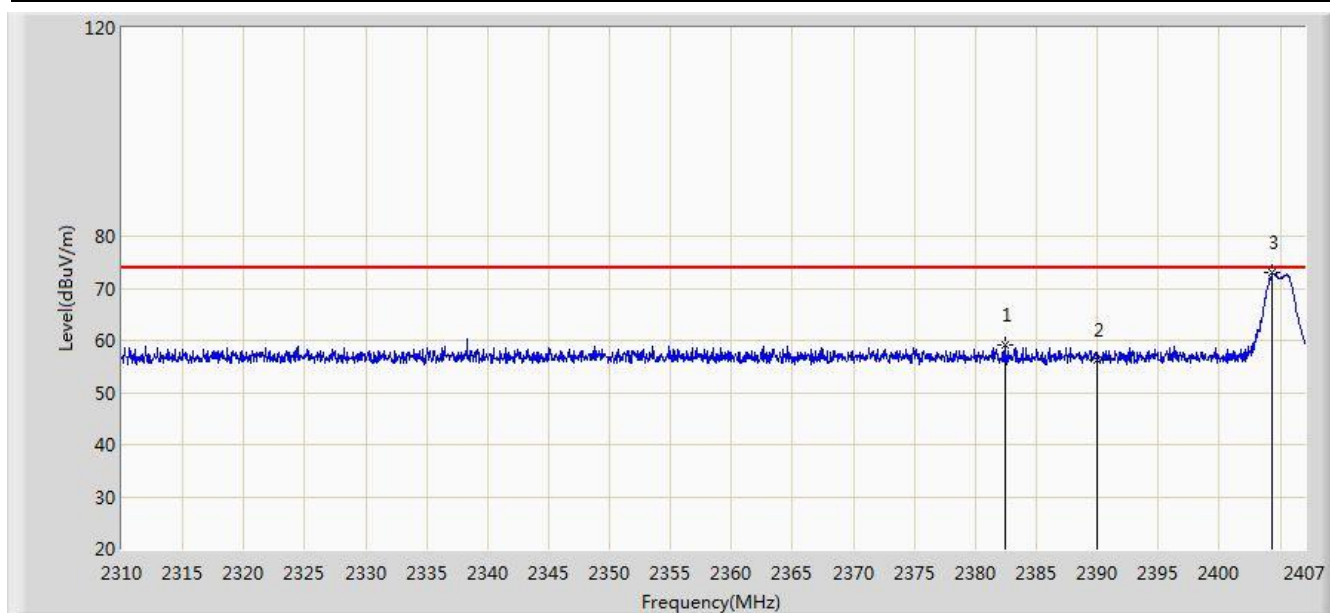


18GHz ~25GHz Test Setup:



5.6.4 頻帶邊緣測試結果

Site: AC1	Time: 2018/08/03 - 11:05
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz_TW	Polarity: Horizontal
EUT: Talk Switch	Power: By Battery
Test Mode: Transmit by 802.15.4 at channel 2405MHz	

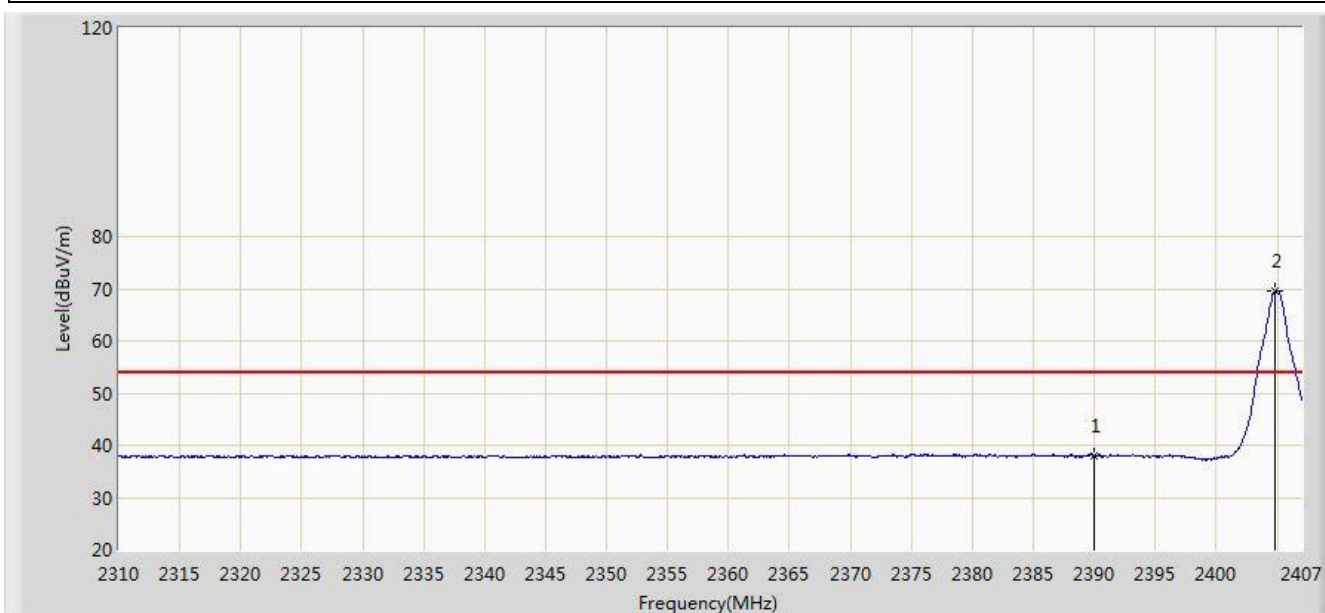


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2382.410	58.992	26.427	-15.008	74.000	32.565	PK
2		2390.000	56.233	23.679	-17.767	74.000	32.554	PK
3	*	2404.333	73.010	40.474	-0.990	74.000	32.535	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2018/08/03 - 11:07
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz_TW	Polarity: Horizontal
EUT: Talk Switch	Power: By Battery
Test Mode: Transmit by 802.15.4 at channel 2405MHz	

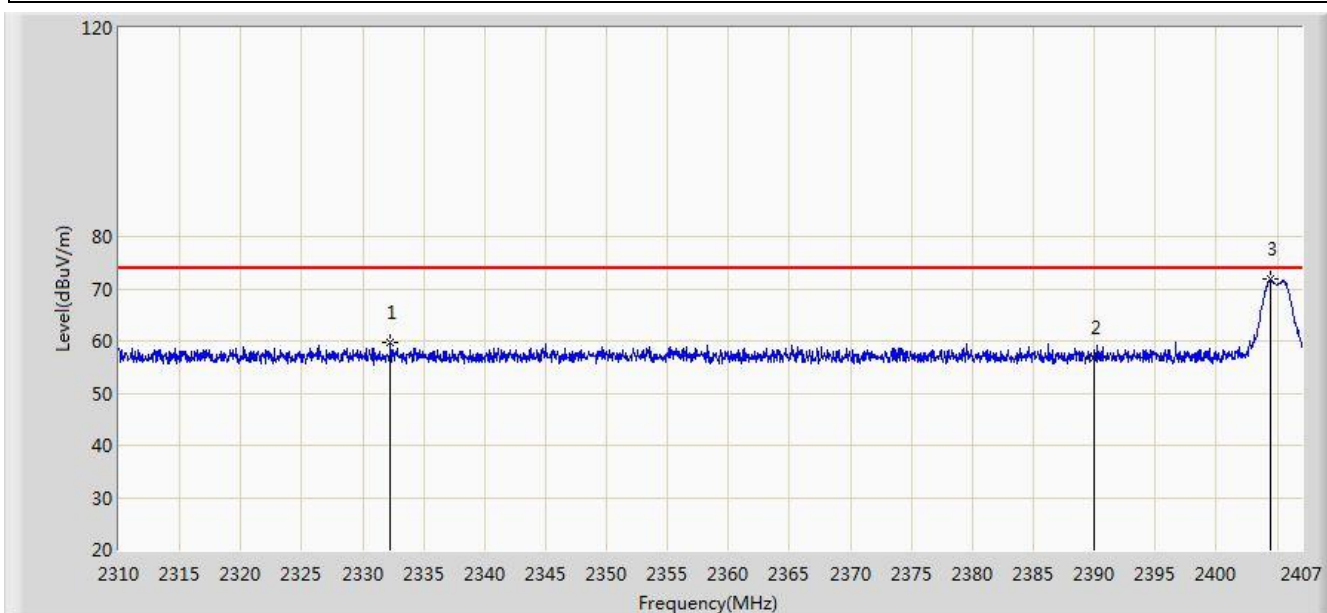


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	38.044	5.717	-15.956	54.000	32.327	AV
2	*	2404.866	69.635	37.337	15.635	54.000	32.299	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2018/08/03 - 11:07
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz_TW	Polarity: Vertical
EUT: Talk Switch	Power: By Battery
Test Mode: Transmit by 802.15.4 at channel 2405MHz	

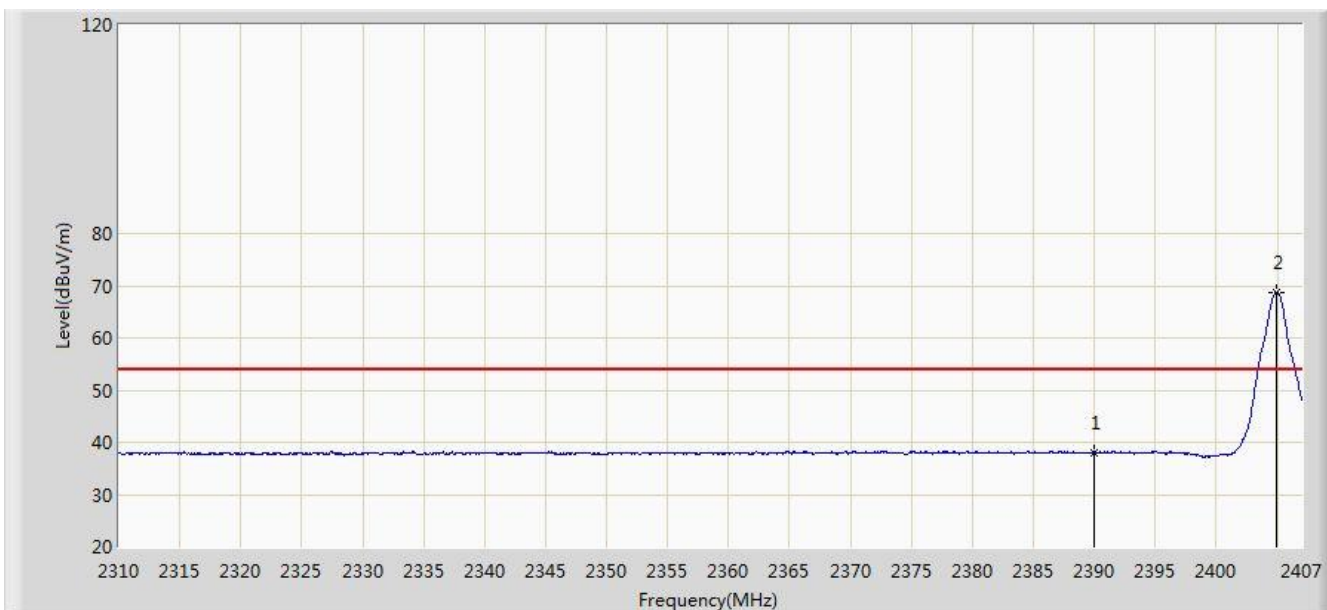


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2332.261	59.592	26.907	-14.408	74.000	32.685	PK
2		2390.000	56.780	24.226	-17.220	74.000	32.554	PK
3	*	2404.429	71.862	39.327	-2.138	74.000	32.535	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2018/08/03 - 11:09
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz_TW	Polarity: Vertical
EUT: Talk Switch	Power: By Battery
Test Mode: Transmit by 802.15.4 at channel 2405MHz	

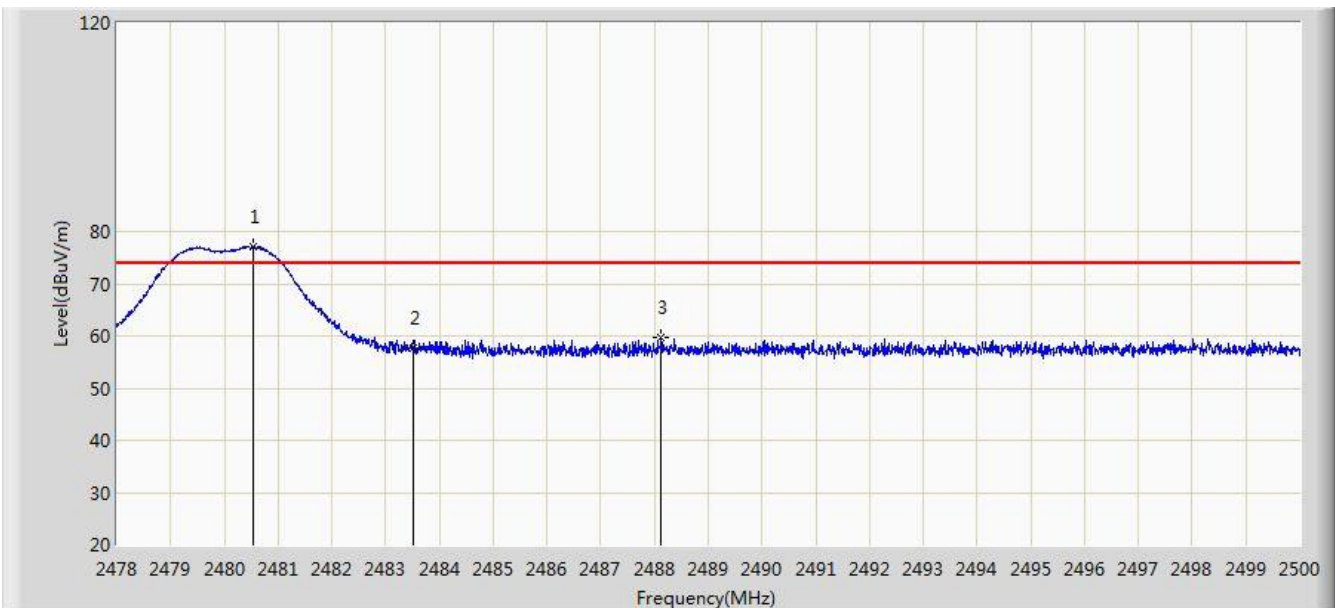


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1		2390.000	38.105	5.551	-15.895	54.000	32.554	AV
2	*	2404.963	68.645	36.110	14.645	54.000	32.535	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2018/08/03 - 10:52
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz_TW	Polarity: Horizontal
EUT: Talk Switch	Power: By Battery
Test Mode: Transmit by 802.15.4 at channel 2480MHz	

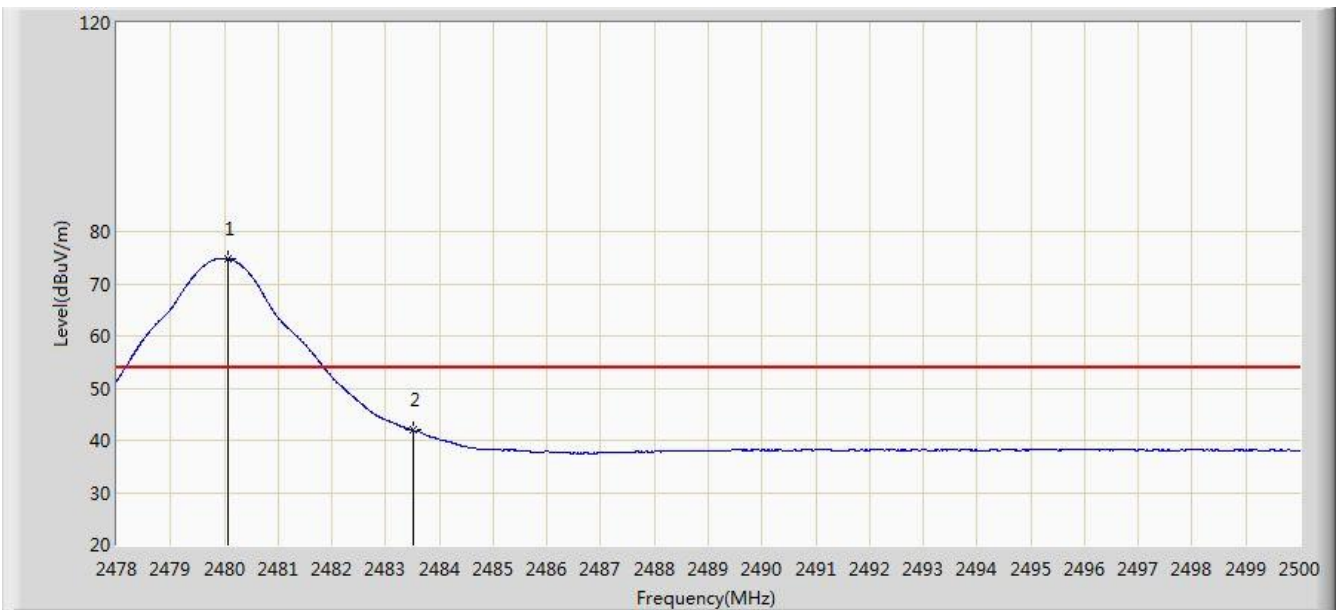


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.541	77.050	44.478	3.050	74.000	32.572	PK
2		2483.500	57.628	25.047	-16.372	74.000	32.580	PK
3		2488.120	59.683	27.089	-14.317	74.000	32.595	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2018/08/03 - 10:58
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz_TW	Polarity: Horizontal
EUT: Talk Switch	Power: By Battery
Test Mode: Transmit by 802.15.4 at channel 2480MHz	

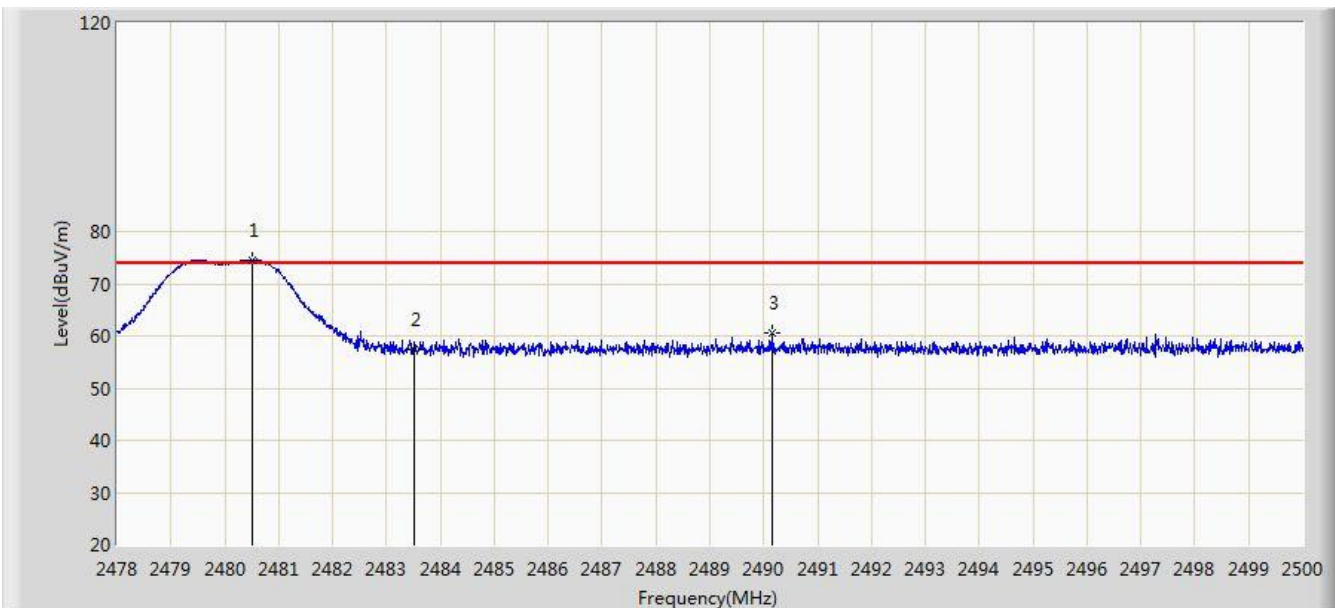


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.057	74.834	42.264	20.834	54.000	32.570	AV
2		2483.500	41.893	9.312	-12.107	54.000	32.580	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2018/08/03 - 10:59
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz_TW	Polarity: Vertical
EUT: Talk Switch	Power: By Battery
Test Mode: Transmit by 802.15.4 at channel 2480MHz	

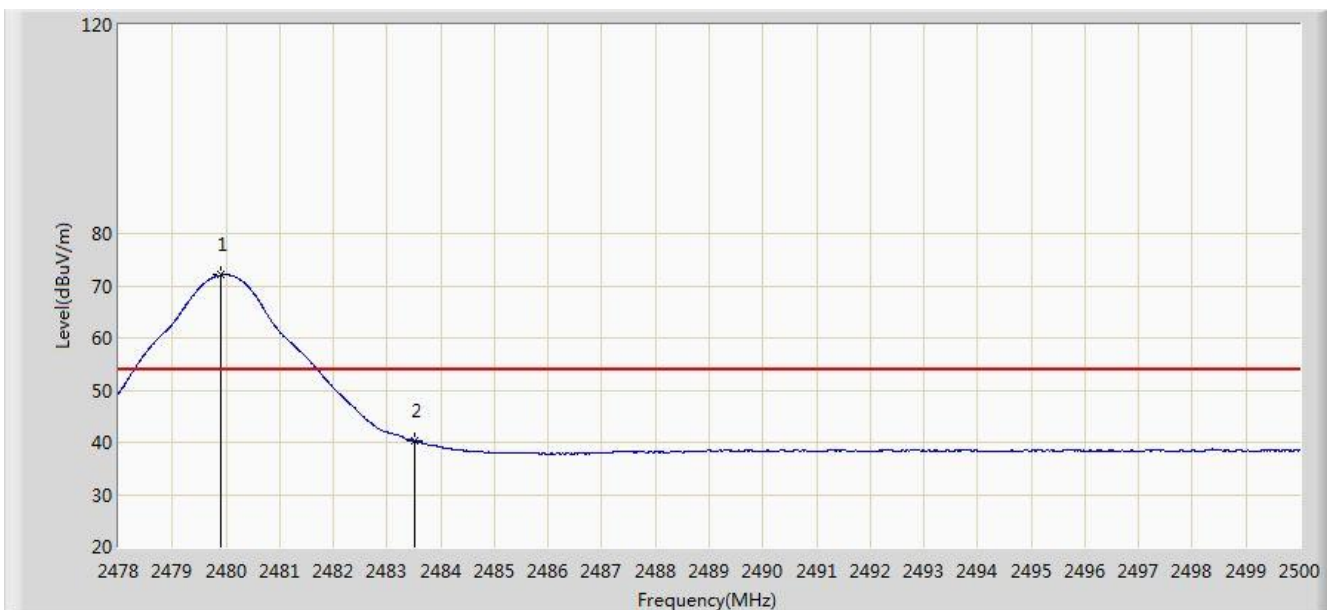


No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2480.497	74.619	42.048	0.619	74.000	32.572	PK
2		2483.500	57.476	24.895	-16.524	74.000	32.580	PK
3		2490.155	60.441	27.840	-13.559	74.000	32.600	PK

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

Site: AC1	Time: 2018/08/03 - 11:02
Limit: FCC_Part15.209_RE(3m)	Engineer: Kevin Ker
Probe: BBHA9120D_1GHz_18GHz_TW	Polarity: Vertical
EUT: Talk Switch	Power: By Battery
Test Mode: Transmit by 802.15.4 at channel 2480MHz	



No	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
1	*	2479.914	72.078	39.508	18.078	54.000	32.570	AV
2		2483.500	40.324	7.743	-13.676	54.000	32.580	AV

Note: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m).

5.7 佔用頻寬

5.7.1 量測方法

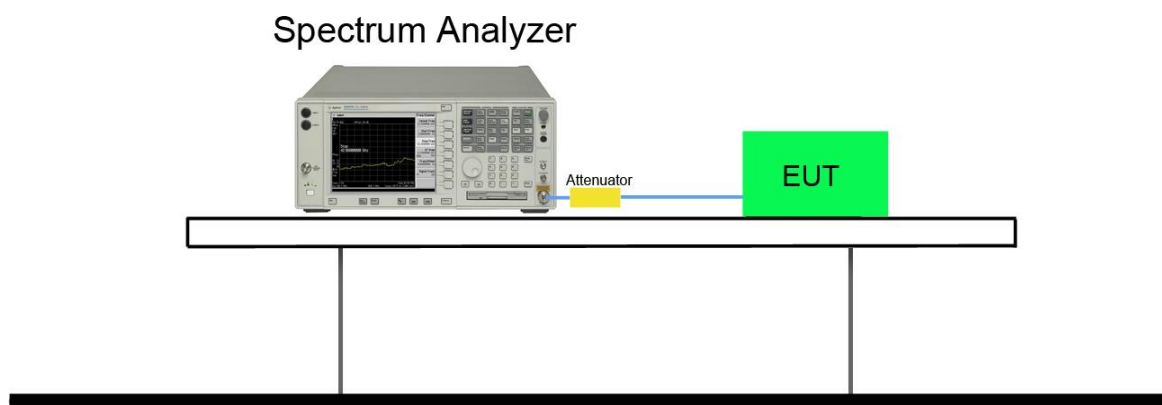
待測物之天線埠經由適當之衰減直接連至頻譜分析儀RF輸入端，頻譜分析儀之設定,參考如下:

- (1) 解析頻寬為 100 kHz，視訊頻寬不小於解析頻寬。
- (2) 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)。
- (3) 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。

5.7.2 限制要求

6dB頻寬至少應有500kHz。

5.7.3 測試架構圖



5.7.4 佔用頻寬測試結果

待測物名稱	Talk Switch	測試日期	2018/08/09
待測物型號	AD651B	溫度 / 濕度	25°C / 66%
測試場地	AC1	測試工程師	Kevin Ker

Test Mode	Modulation Mode	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
802.15.4	O-QPSK	11	2405	1.475	≥ 0.5	Pass
802.15.4	O-QPSK	18	2440	1.443	≥ 0.5	Pass
802.15.4	O-QPSK	26	2480	1.471	≥ 0.5	Pass



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。

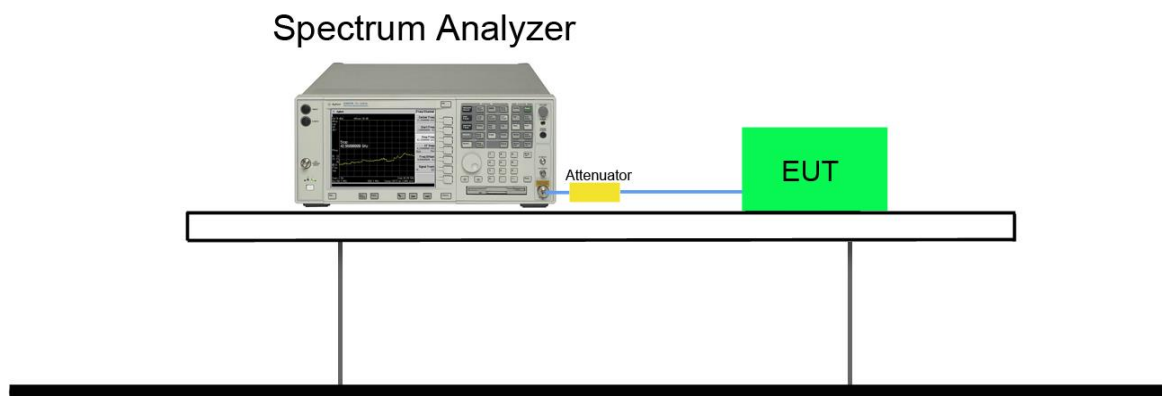
若受測裝置之頻譜線間隔小於3 kHz，測量時應將解析頻寬降低以使頻譜線間隔大於3kHz，所測得之數據再藉加總3 kHz 頻帶內所有個別頻譜線之功率(即標準化至3 kHz)以決定是否符合規定。

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。

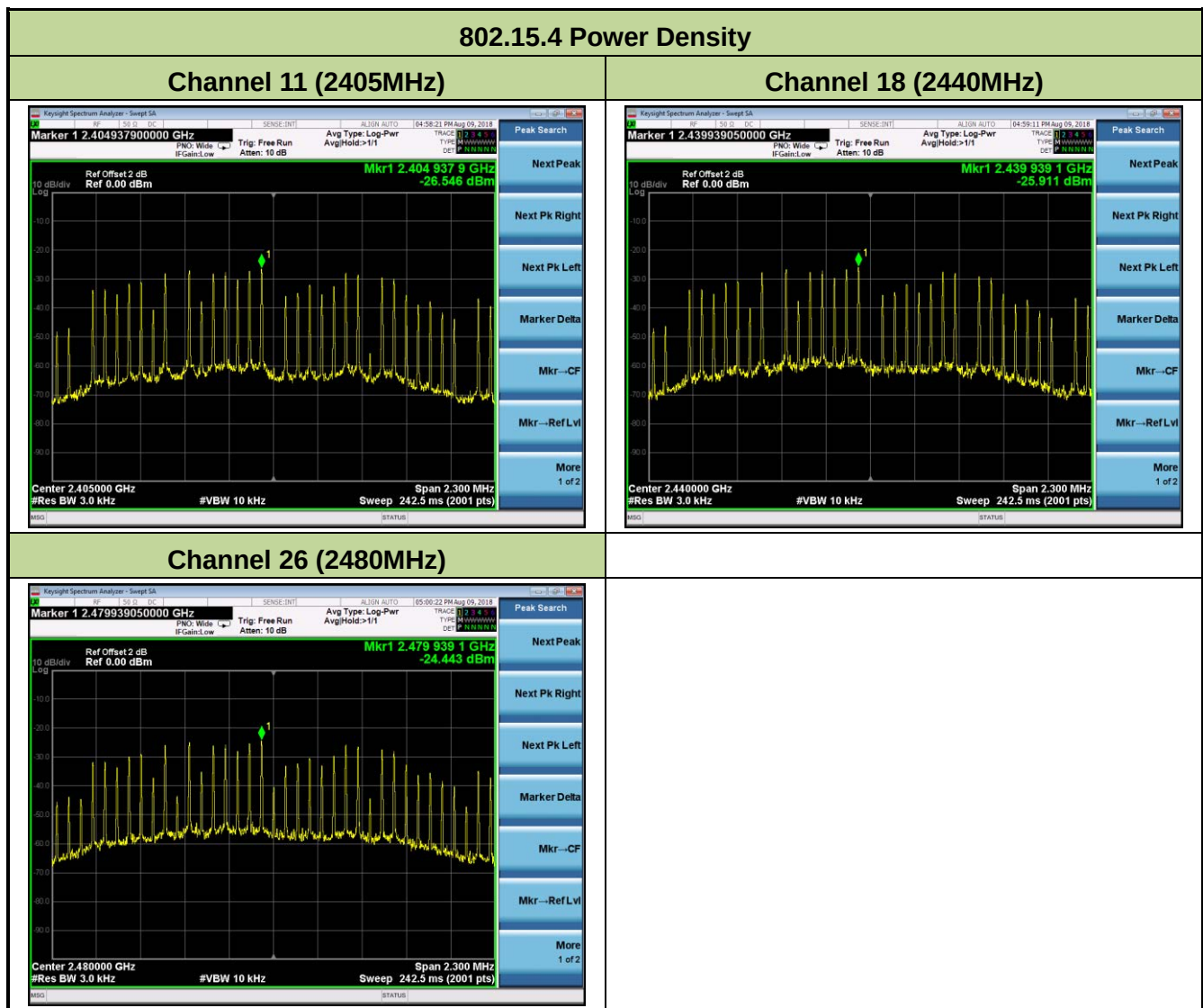
5.8.3 測試架構圖



5.8.4 功率頻譜密度測試結果

待測物名稱	Talk Switch	測試日期	2018/08/09
待測物型號	AD651B	溫度 / 濕度	25°C / 66%
測試場地	AC1	測試工程師	Kevin Ker

Test Mode	Modulation Mode	Channel No.	Frequency (MHz)	PSD Result (dBm / 3kHz)	Limit (dBm / 3kHz)	Result
802.15.4	O-QPSK	11	2405	-26.546	≤ 8	Pass
802.15.4	O-QPSK	18	2440	-25.911	≤ 8	Pass
802.15.4	O-QPSK	26	2480	-24.443	≤ 8	Pass



The End