

附錄 一

受測裝置之測試結果

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1. 場強輻射之量測

對受測物裝置之其他不必要之發射(測至本地振盪頻率之 10 次諧波)依下列測試模式分別於電波暗室內進行量測，實驗室先將發射機分別以三種不同的擺設方式(站立、平放、側立)進行量試評估，最後選取最大場強值的擺設方式(平放)以低、中、高頻率來進行量測，並將下列測試模式之掃頻圖檢附於附錄中。最後，選擇較差模式進行讀值之測量，所得讀值資料請見章節 1.1 ~1.2：

模式	動作狀態	基本頻率	量測頻率範圍
1	發射	2402MHz (CH37)	1000-3000MHz
2			3000-5000MHz
3			5000-8000MHz
4			8000-18000MHz
5			18000-25000MHz
6		2440MHz* (CH17)	30-1000MHz
7			1000-3000MHz
8			3000-5000MHz
9			5000-8000MHz
10			8000-18000MHz
11			18000-25000MHz
12		2480MHz (CH39)	1000-3000MHz
13			3000-5000MHz
14			5000-8000MHz
15			8000-18000MHz
16			18000-25000MHz
17	接收	2440MHz (CH17)	30-1000MHz
18			1000-3000MHz
19			3000-5000MHz
20			5000-8000MHz
21			8000-18000MHz
22			18000-25000MHz

註：1. 以上所有模式之掃頻圖是檢附於附錄中。

2.*: 經評估後，以最差頻率進行 30-1000MHz 量測。

對受測物裝置落於技術規範第 2.7 章節的禁用頻帶之混附發射以下列測試模式依規定分別進行量測，所得量測資料請見章節 1.3。

模式	動作狀態	基本頻率	量測頻率範圍
1	發射	2402MHz (CH37)	2310-2420MHz
2		2480MHz (CH39)	2470-2530MHz

測試日期	2018/11/06	環境溫/濕度	23°C/50%
測試電壓	DC 3.0V(經電池供電)		

1.1. 30-1000MHz 頻率範圍，其他不必要發射量測

Mode	BLE	Frequency	TX 2440MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
31.9400	23.76	1.25	2.85	27.86	40.00	12.14	Peak
93.0500	16.17	2.18	6.08	24.43	43.50	19.07	Peak
469.4100	22.83	6.17	2.74	31.74	46.00	14.26	Peak
600.3600	24.64	6.75	2.51	33.90	46.00	12.10	Peak
892.3300	26.76	8.14	3.05	37.95	46.00	8.05	Peak
984.4800	27.69	8.74	1.68	38.11	54.00	15.89	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
38.7300	20.27	1.38	2.59	24.24	40.00	15.76	Peak
115.3600	18.53	2.45	4.20	25.18	43.50	18.32	Peak
328.7600	20.31	4.71	4.80	29.82	46.00	16.18	Peak
600.3600	24.64	6.75	1.88	33.27	46.00	12.73	Peak
773.0200	25.66	7.48	3.60	36.74	46.00	9.26	Peak
977.6900	27.63	8.70	2.04	38.37	54.00	15.63	Peak

Mode	BLE	Frequency	RX 2440MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
35.8200	21.82	1.33	2.08	25.23	40.00	14.77	Peak
93.0500	16.17	2.18	6.49	24.84	43.50	18.66	Peak
373.3800	21.44	5.26	2.62	29.32	46.00	16.68	Peak
591.6300	24.52	6.72	2.66	33.90	46.00	12.10	Peak
789.5100	25.83	7.56	2.55	35.94	46.00	10.06	Peak
975.7500	27.59	8.68	2.51	38.78	54.00	15.22	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
39.7000	19.78	1.40	3.01	24.19	40.00	15.81	Peak
118.2700	18.72	2.48	3.84	25.04	43.50	18.46	Peak
328.7600	20.31	4.71	5.06	30.08	46.00	15.92	Peak
534.4000	23.69	6.54	2.03	32.26	46.00	13.74	Peak
826.3700	26.17	7.77	2.35	36.29	46.00	9.71	Peak
969.9300	27.52	8.63	1.65	37.80	54.00	16.20	Peak

1.2. 1000MHz 以上頻率範圍，其他不必要發射量測

Mode	BLE	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4804.0000	34.22	11.42	5.62	51.26	54.00	2.74	Peak
7406.0000	35.80	15.55	-2.86	48.49	54.00	5.51	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4804.0000	34.22	11.42	-0.52	45.12	54.00	8.88	Peak
7406.0000	35.80	15.55	-0.32	51.03	54.00	2.97	Peak

Mode	BLE	Frequency	TX 2440MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4880.0000	34.25	13.00	4.61	51.86	54.00	2.14	Peak
7322.0000	35.80	15.47	1.59	52.86	54.00	1.14	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4880.0000	34.25	13.00	-1.67	45.58	54.00	8.42	Peak
7322.0000	35.80	15.47	-1.89	49.38	54.00	4.62	Peak

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

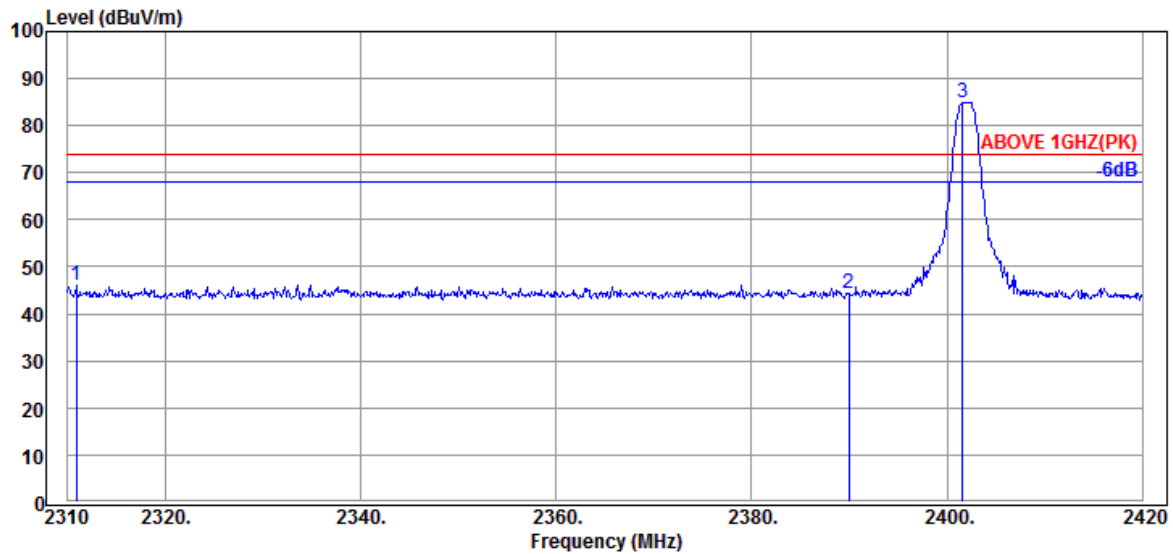
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4960.0000	34.29	13.21	3.20	50.70	54.00	3.30	Peak
7440.0000	35.80	15.58	1.85	53.23	54.00	0.77	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4960.0000	34.29	13.21	-1.88	45.62	54.00	8.38	Peak
7440.0000	35.80	15.58	-0.46	50.92	54.00	3.08	Peak

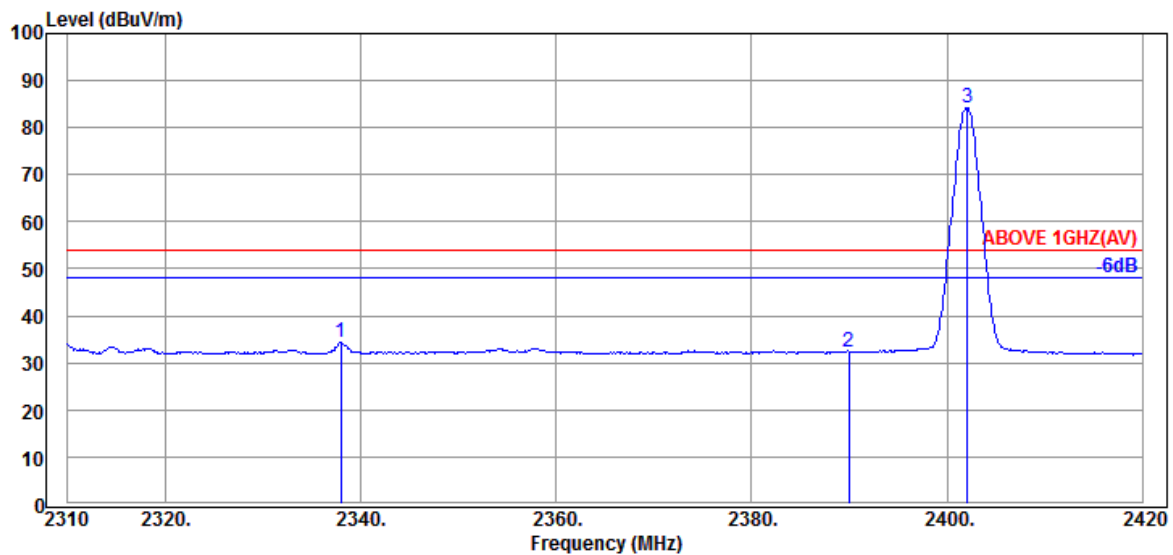
1.3. 禁用頻帶量測結果 (其他不必要發射)

Mode	BLE	Frequency	TX 2402MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2310.8800	32.03	7.76	6.29	46.08	74.00	27.92	Peak
2389.9700	32.16	7.92	4.40	44.48	74.00	29.52	Peak
@ 2401.6300	32.16	7.92	44.96	85.04	---	---	Peak

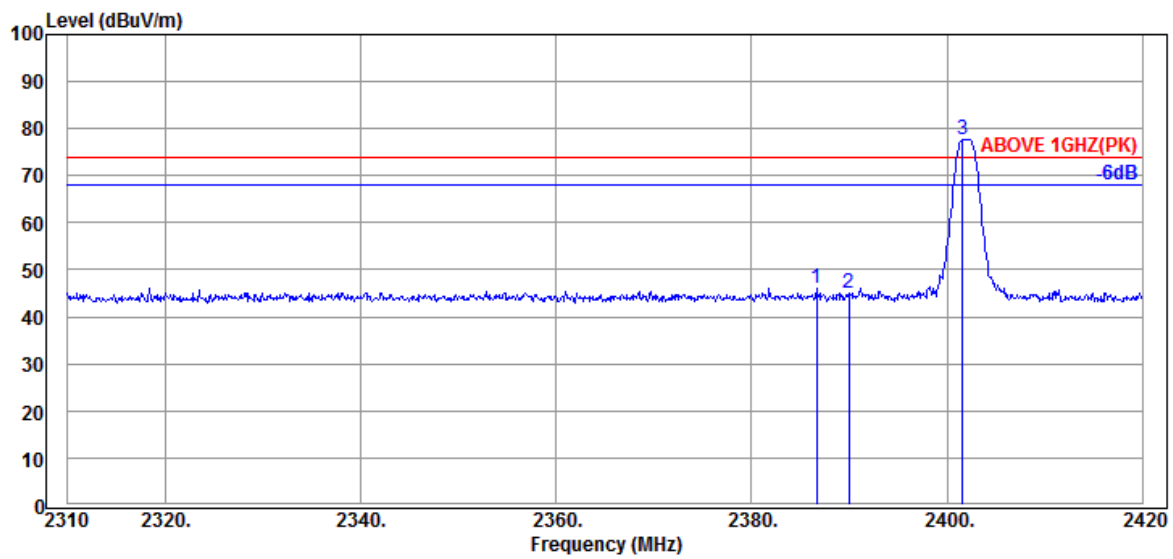


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2337.9400	32.08	7.82	-5.66	34.24	54.00	19.76	Average
2389.9700	32.16	7.92	-7.75	32.33	54.00	21.67	Average
@ 2402.0700	32.16	7.92	44.06	84.14	---	---	Average

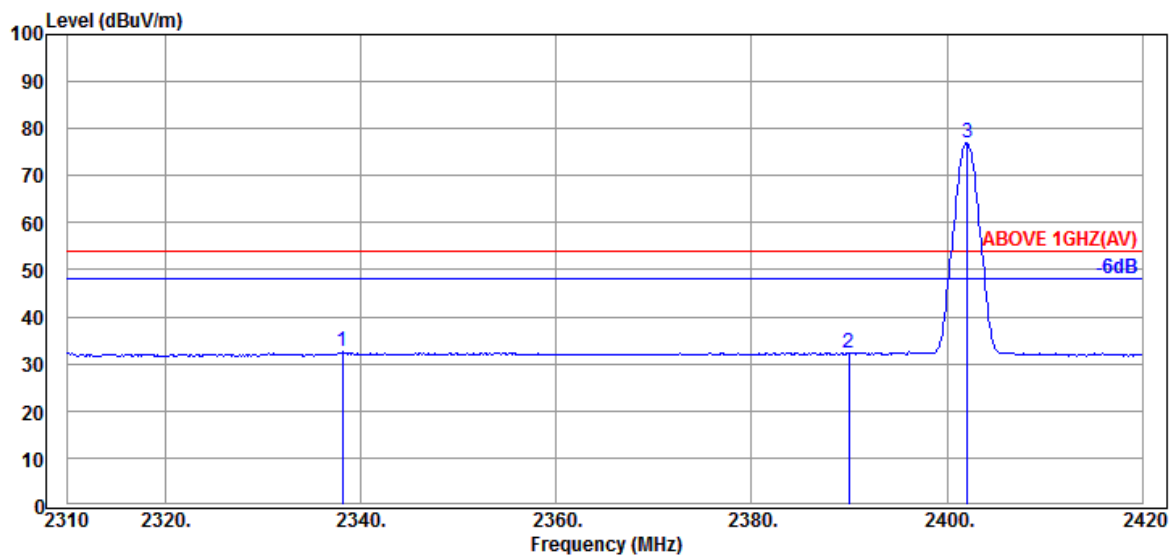
備註: “@”為主波，在此章節是不予以判定。

Mode	BLE	Frequency	TX 2402MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2386.6700	32.16	7.92	6.06	46.14	74.00	27.86	Peak
2389.9700	32.16	7.92	4.84	44.92	74.00	29.08	Peak
@ 2401.6300	32.16	7.92	37.66	77.74	---	---	Peak

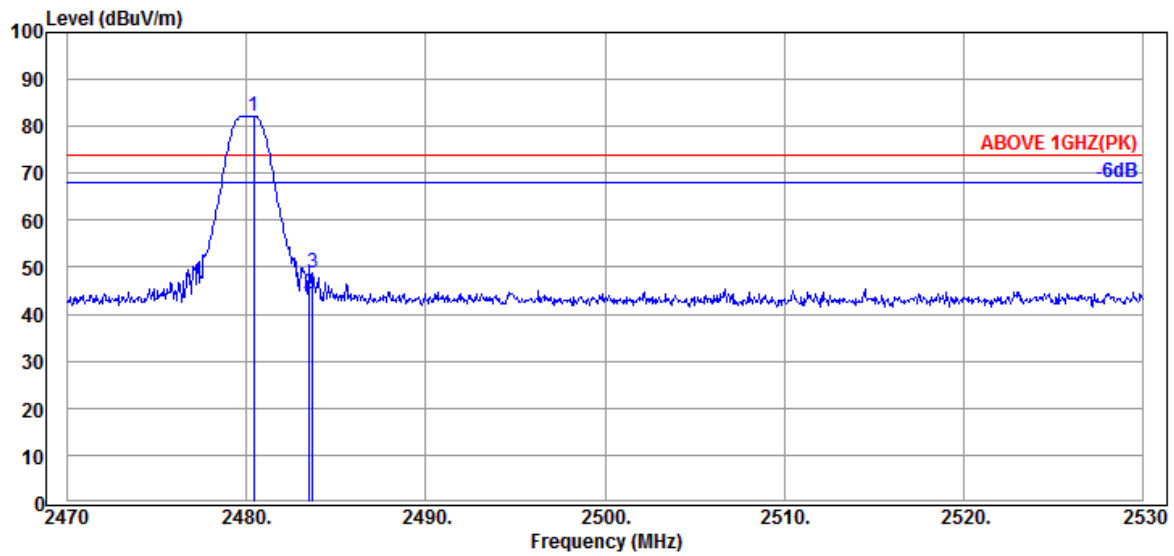


Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2338.1600	32.08	7.82	-7.36	32.54	54.00	21.46	Average
2389.9700	32.16	7.92	-7.72	32.36	54.00	21.64	Average
@ 2402.0700	32.16	7.92	36.75	76.83	---	---	Average

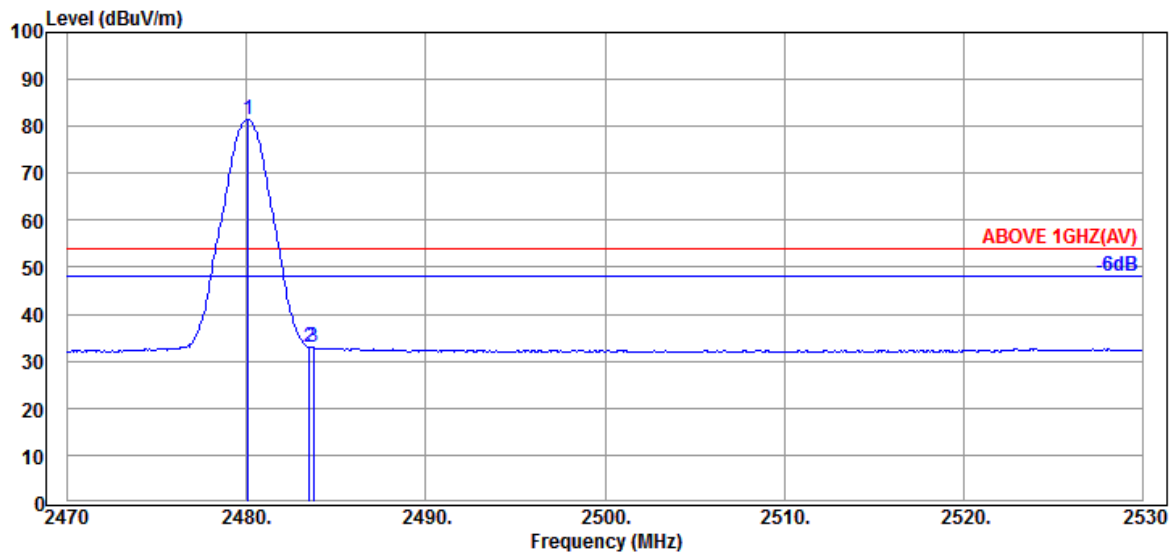
備註：“@”為主波，在此章節是不予以判定。

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@	2480.3800	32.28	7.90	41.99	82.17	---	---	Peak
	2483.5000	32.28	7.90	4.23	44.41	74.00	29.59	Peak
	2483.6800	32.28	7.90	8.70	48.88	74.00	25.12	Peak

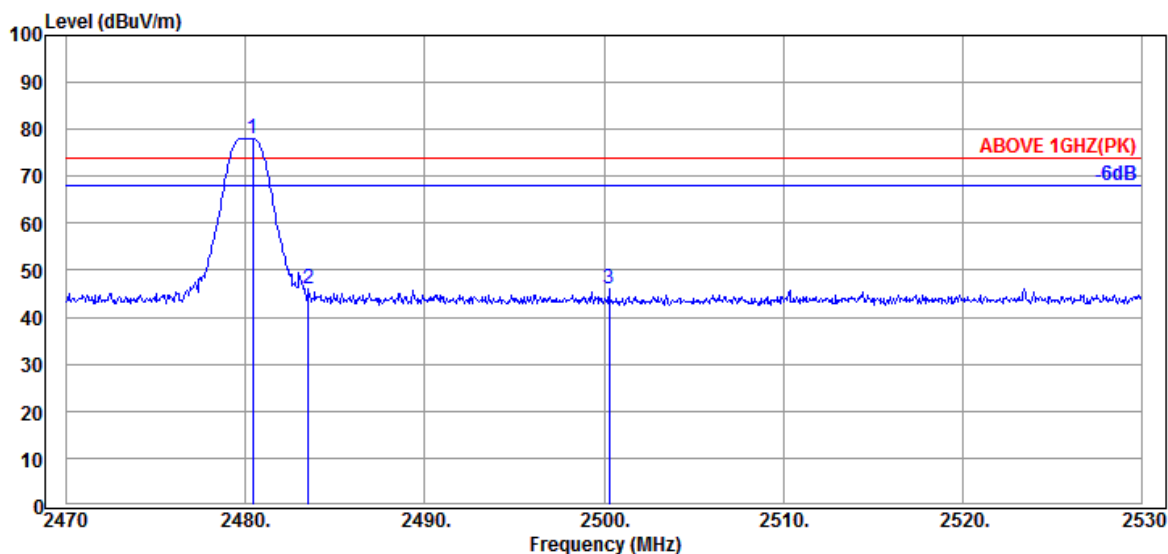


Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@	2480.0800	32.28	7.90	41.18	81.36	---	---	Average
	2483.5000	32.28	7.90	-7.17	33.01	54.00	20.99	Average
	2483.7400	32.28	7.90	-7.26	32.92	54.00	21.08	Average

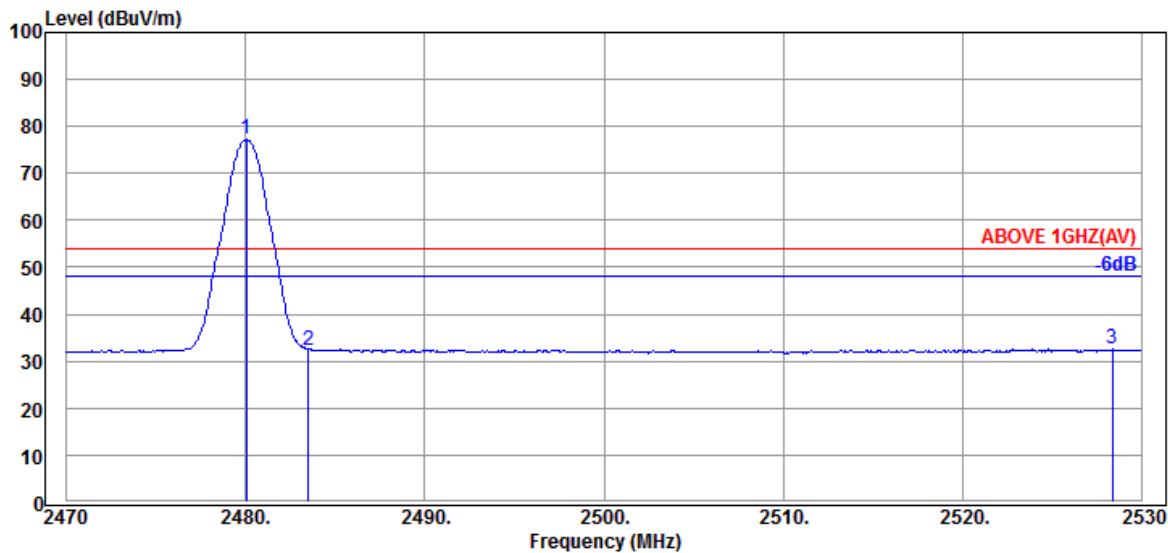
備註：“@”為主波，在此章節是不予以判定。

Mode	BLE	Frequency	TX 2480MHz
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Antenna at Vertical Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@	2480.3800	32.28	7.90	37.88	78.06	---	---	Peak
	2483.5000	32.28	7.90	5.73	45.91	74.00	28.09	Peak
	2500.3000	32.30	7.90	6.00	46.20	74.00	27.80	Peak



Antenna at Vertical Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@	2480.0200	32.28	7.90	37.00	77.18	---	---	Average
	2483.5000	32.28	7.90	-7.71	32.47	54.00	21.53	Average
	2528.3800	32.34	7.98	-7.77	32.55	54.00	21.45	Average

備註：“@”為主波，在此章節是不予以判定。

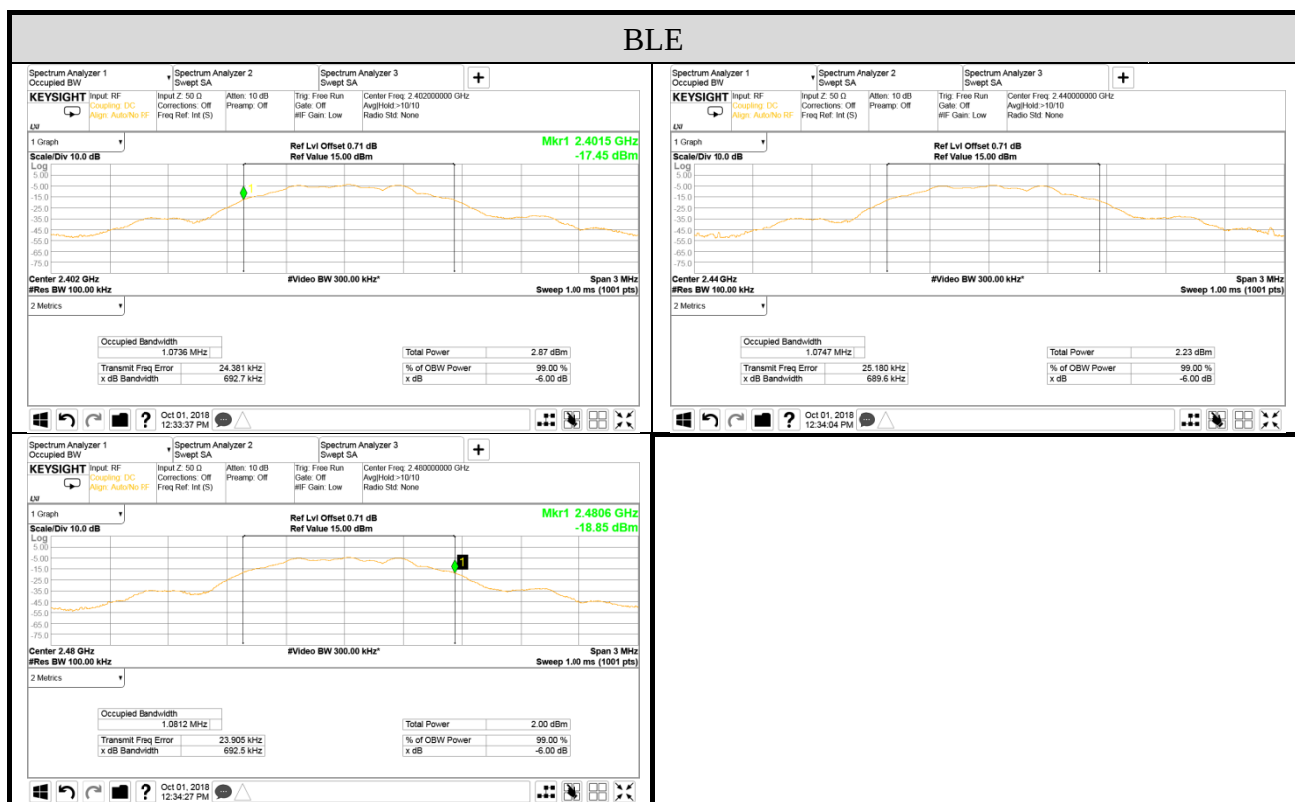
2. 發射頻寬之量測

測試日期	2018/10/01	環境溫/濕度	25°C/52%
測試電壓	DC 3.0V(經電池供電)		

2.1. 發射頻寬

模式 (Mode)	測試頻率 (MHz)	6dB 頻寬 (MHz)	限制值 (kHz)
BLE	2402	0.6927	>500
	2440	0.6896	
	2480	0.6925	

2.2. 發射頻寬之量測圖



3. 峰值輸出功率之量測

測試日期	2018/10/01	環境溫/濕度	25°C/52%
測試電壓	DC 3.0V(經電池供電)		

3.1. 峰值輸出功率

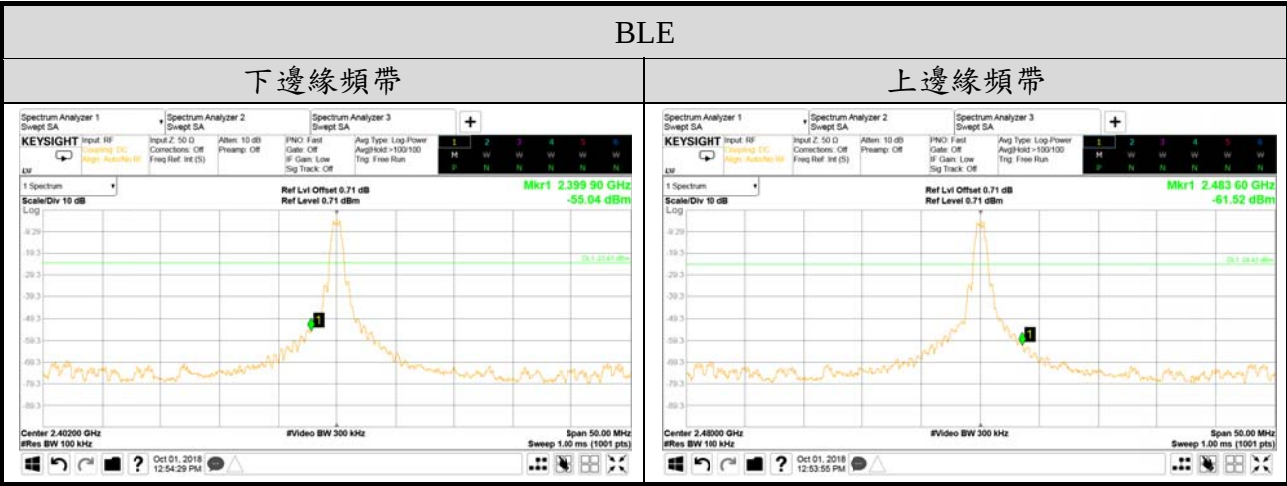
模式 (Mode)	測試頻率 (MHz)	最大輸出功率 (dBm)	限制值 (dBm)
BLE	2402	-3.52	30
	2440	-4.02	
	2480	-4.36	

3.2. 峰值輸出功率之量測圖



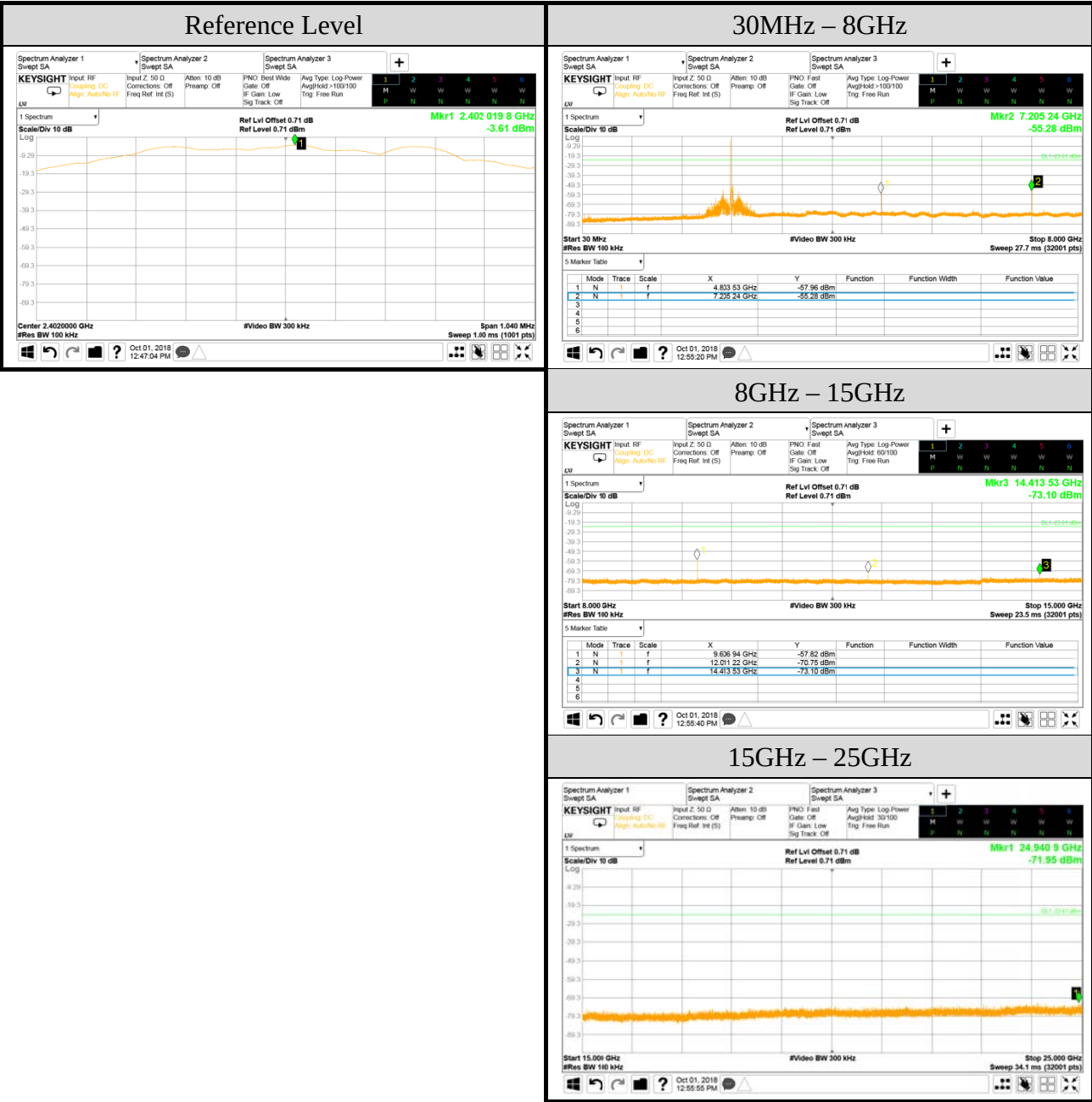
4. 頻帶邊緣之 RF 傳導發射之量測

測試日期	2018/10/01	環境溫/濕度	25°C/52%
測試電壓	DC 3.0V(經電池供電)		

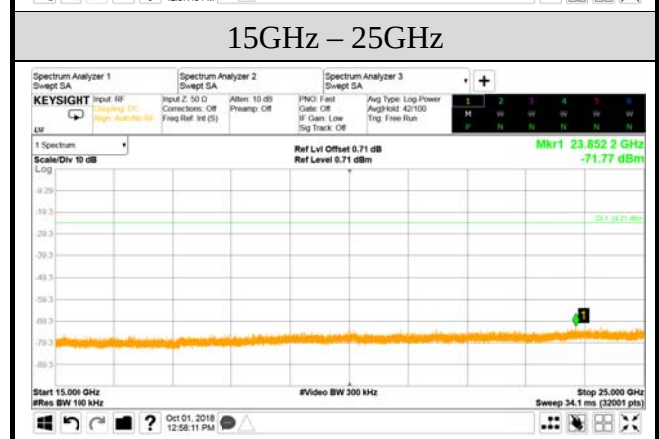
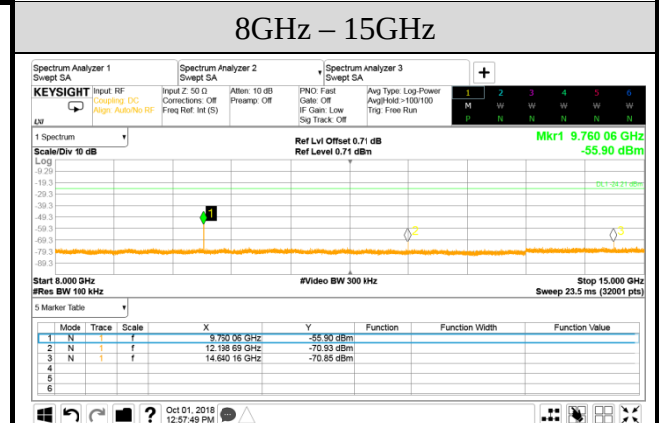
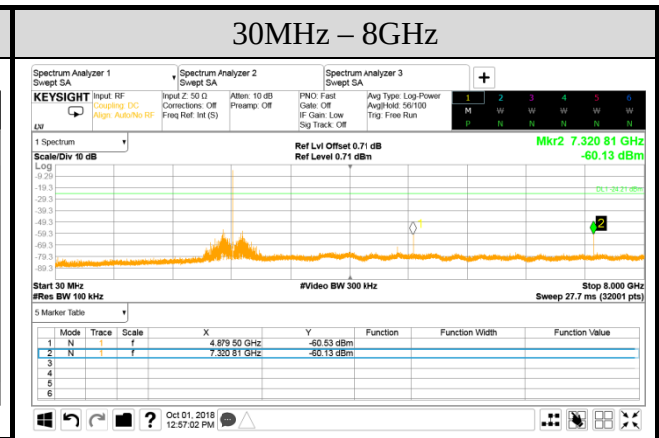
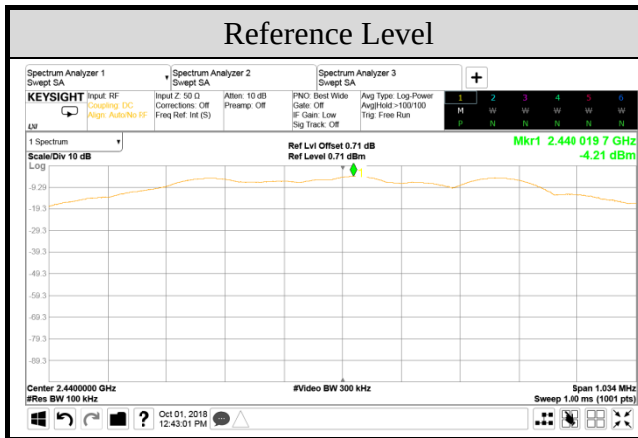


5. 混附發射之 RF 傳導發射之量測

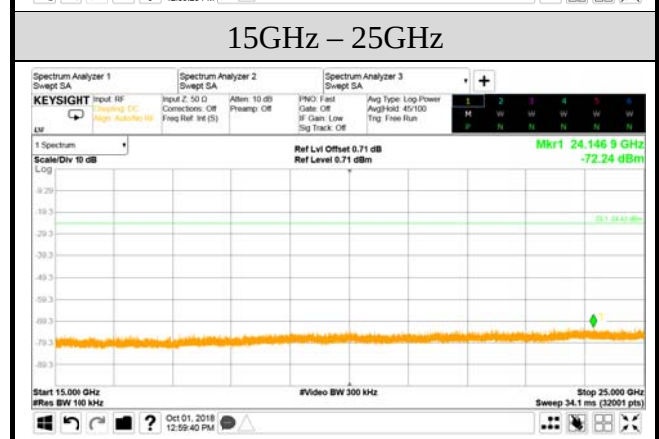
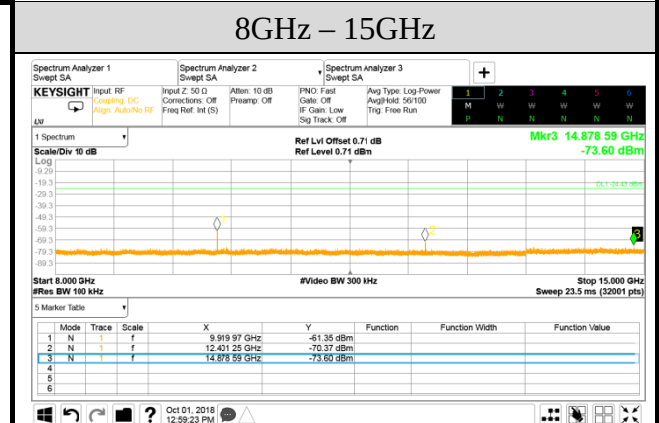
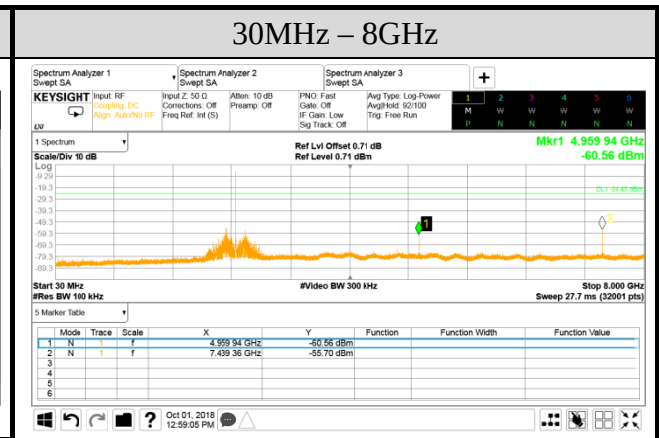
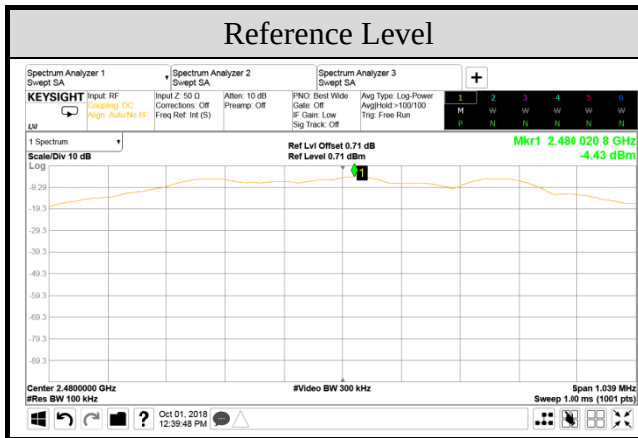
測試日期	2018/10/01	環境溫/濕度	25°C/52%
測試電壓	DC 3.0V(經電池供電)	模式	BLE
		測試頻率	2402MHz



測試日期	2018/10/01	環境溫/濕度	25°C/52%
測試電壓	DC 3.0V(經電池供電)	模式	BLE
		測試頻率	2440MHz



測試日期	2018/10/01	環境溫/濕度	25°C/52%
測試電壓	DC 3.0V(經電池供電)	模式	BLE
		測試頻率	2480MHz



測試日期	2018/10/01	環境溫/濕度	25°C/52%
測試電壓	DC 3.0V(經電池供電)		

模式 (Mode)	測試頻率 (MHz)	功率密度 (dBm)	限制值 (dBm)
BLE	2402	-3.61	8
	2440	-4.21	
	2480	-4.43	

BLE

Spectrum Analyzer 1
Sweep SA

KEYSIGHT

Input: RF
Coupling: DC
Align: Auto/No RF

Spectrum Analyzer 2
Sweep SA

Input Z: 50 Ω
Attenu: 10 dB
Preamp: Off

Correction: Off
Freq Ref: Int (S)

Spectrum Analyzer 3
Sweep SA

PNO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off

Avg Type: Log Power
Avalt: 100100
Trig: Free Run

1 2 3 4 5 6

M W W W W W

P N N N N N

1 Spectrum

Scale/Div 10 dB

Log

Ref Lvl Offset 0.71 dB
Ref Level 0.71 dBm

Mkr1 2.402 019 8 GHz
-3.61 dBm

Center 2.4020000 GHz
#Res BW 100 kHz

Span 1.040 MHz
Sweep 1.00 ms (1001 pts)

Windows Icons

Oct 01, 2018
12:47:04 PM

Navigation Icons

Spectrum Analyzer 1
Sweep SA

KEYSIGHT

Input: RF
Coupling: DC
Align: Auto/No RF

Spectrum Analyzer 2
Sweep SA

Input Z: 50 Ω
Attenu: 10 dB
Preamp: Off

Correction: Off
Freq Ref: Int (S)

Spectrum Analyzer 3
Sweep SA

PNO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off

Avg Type: Log Power
Avalt: 100100
Trig: Free Run

1 2 3 4 5 6

M W W W W W

P N N N N N

1 Spectrum

Scale/Div 10 dB

Log

Ref Lvl Offset 0.71 dB
Ref Level 0.71 dBm

Mkr1 2.440 019 7 GHz
-4.21 dBm

Center 2.4400000 GHz
#Res BW 100 kHz

Span 1.034 MHz
Sweep 1.00 ms (1001 pts)

Windows Icons

Oct 01, 2018
12:43:01 PM

Navigation Icons

Spectrum Analyzer 1
Sweep SA

KEYSIGHT

Input: RF
Coupling: DC
Align: Auto/No RF

Spectrum Analyzer 2
Sweep SA

Input Z: 50 Ω
Attenu: 10 dB
Preamp: Off

Correction: Off
Freq Ref: Int (S)

Spectrum Analyzer 3
Sweep SA

PNO: Best Wide
Gate: Off
IF Gain: Low
Sig Track: Off

Avg Type: Log Power
Avalt: 100100
Trig: Free Run

1 2 3 4 5 6

M W W W W W

P N N N N N

1 Spectrum

Scale/Div 10 dB

Log

Ref Lvl Offset 0.71 dB
Ref Level 0.71 dBm

Mkr1 2.480 020 8 GHz
-4.43 dBm

Center 2.4800000 GHz
#Res BW 100 kHz

Span 1.039 MHz
Sweep 1.00 ms (1001 pts)

Windows Icons

Oct 01, 2018
12:39:48 PM

Navigation Icons