

附錄一

受測裝置之測試結果

目錄	頁次
1. 場強輻射之量測.....	2
1.1. 30-1000MHz 頻率範圍，其他不必要發射量測.....	3
1.2. 1000MHz 以上頻率範圍，其他不必要發射量測.....	6
1.3. 禁用頻帶量測結果（其他不必要發射）.....	8
2. 發射頻寬之量測.....	12
2.1. 發射頻寬.....	12
2.2. 發射頻寬之量測圖.....	12
3. 峰值輸出功率之量測.....	13
3.1. 峰值輸出功率.....	13
3.2. 峰值輸出功率之量測圖.....	14
4. 頻帶邊緣之 RF 傳導發射之量測.....	15
5. 混附發射之 RF 傳導發射之量測.....	16
6. 功率密度之量測.....	19
6.1. 功率密度.....	19
6.2. 功率密度之量測圖.....	19

1. 場強輻射之量測

本裝置有兩種電源供應模式分別為(1)電池(DC 3.7V)、(2)USB (DC 5V)僅供充電使用，故實驗室以單機(電池供電)低、中、高頻率來進行量測，並將下列測試模式之測試數據檢附於附錄中；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：

【受測物裝置可分別搭配兩款電池，實驗室針對這兩款電池進行峰值輸出功率評估，擇取較差之電池 (廠家:Highpower)來進行本章節之測試。】

模式	動作狀態	基本頻率	量測頻率範圍
---	充電	---	30-1000MHz
---	Normal	---	30-1000MHz
			1000-25000MHz
BLE	發射	2402MHz(CH37)	1000-25000MHz
	發射	2440MHz (CH17)	1000-25000MHz
	發射	2480MHz(CH39)*	30-1000MHz
			1000-25000MHz
	接收	2440MHz (CH17)	30-1000MHz
			1000-25000MHz

註：*：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 章節的禁用頻率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
BLE	發射	2402MHz (CH37)	2310-2430MHz
		2480MHz (CH39)	2450-2530MHz

測試日期	2019/08/21	環境溫/濕度	23°C/47%
測試電壓	(1)DC 3.7V (透過內建鋰電池供電) (Normal 及 BT 模式) (2)DC 5V (透過 USB 由筆記型電腦供電) (充電模式)		

1.1. 30-1000MHz 頻率範圍，其他不必要發射量測

Mode	充電	Frequency	---
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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
36.79	21.29	0.50	7.43	29.22	40.00	10.78	Peak
94.99	16.11	0.83	12.43	29.37	43.50	14.13	Peak
199.75	16.20	1.25	14.74	32.19	43.50	11.31	Peak
483.96	23.43	2.07	5.62	31.12	46.00	14.88	Peak
828.31	26.63	2.88	7.63	37.14	46.00	8.86	Peak
987.39	27.79	3.24	8.89	39.92	54.00	14.08	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
31.94	24.03	0.47	9.59	34.09	40.00	5.91	Peak
140.58	17.58	1.02	14.13	32.73	43.50	10.77	Peak
665.35	25.30	2.52	12.35	40.17	46.00	5.83	Peak
829.28	26.65	2.89	4.80	34.34	46.00	11.66	Peak
886.51	27.10	2.99	4.38	34.47	46.00	11.53	Peak
997.09	27.86	3.26	2.40	33.52	54.00	20.48	Peak

Mode	Normal	Frequency	---
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
35.82	21.79	0.49	10.09	32.37	40.00	7.63	Peak
167.74	15.93	1.13	15.10	32.16	43.50	11.34	Peak
482.99	23.41	2.07	5.63	31.11	46.00	14.89	Peak
828.31	26.63	2.88	8.25	37.76	46.00	8.24	Peak
940.83	27.49	3.12	6.91	37.52	46.00	8.48	Peak
997.09	27.86	3.26	6.93	38.05	54.00	15.95	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
32.91	23.50	0.47	8.59	32.56	40.00	7.44	Peak
141.55	17.51	1.03	16.40	34.94	40.00	5.06	Peak
665.35	25.30	2.52	8.79	36.61	43.50	6.89	Peak
827.34	26.63	2.88	6.09	35.60	46.00	10.40	Peak
931.13	27.42	3.10	4.41	34.93	46.00	11.07	Peak
985.45	27.79	3.23	4.74	35.76	46.00	10.24	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 (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
36.79	21.29	0.50	8.03	29.82	40.00	10.18	Peak
126.03	18.21	0.96	0.54	19.71	43.50	23.79	Peak
585.81	24.57	2.34	0.57	27.48	46.00	18.52	Peak
736.16	25.89	2.68	1.65	30.22	46.00	15.78	Peak
857.41	26.86	2.94	1.46	31.26	46.00	14.74	Peak
995.15	27.86	3.26	0.83	31.95	54.00	22.05	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
31.94	24.03	0.47	8.28	32.78	40.00	7.22	Peak
141.55	17.51	1.03	15.28	33.82	43.50	9.68	Peak
145.43	17.26	1.04	13.19	31.49	43.50	12.01	Peak
599.39	24.72	2.38	1.49	28.59	46.00	17.41	Peak
950.53	27.56	3.15	1.86	32.57	46.00	13.43	Peak
996.12	27.86	3.26	0.99	32.11	54.00	21.89	Peak

Mode	---	Frequency	RX 2440MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
35.82	21.79	0.49	6.16	28.44	40.00	11.56	Peak
135.73	17.79	1.00	1.95	20.74	43.50	22.76	Peak
580.96	24.53	2.33	2.47	29.33	46.00	16.67	Peak
808.91	26.48	2.85	1.74	31.07	46.00	14.93	Peak
950.53	27.56	3.15	1.28	31.99	46.00	14.01	Peak
990.30	27.81	3.25	0.79	31.85	54.00	22.15	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
31.94	24.03	0.47	7.22	31.72	40.00	8.28	Peak
166.77	15.99	1.12	16.02	33.13	43.50	10.37	Peak
224.00	17.42	1.33	2.56	21.31	46.00	24.69	Peak
700.27	25.57	2.59	0.01	28.17	46.00	17.83	Peak
900.09	27.19	3.02	0.58	30.79	46.00	15.21	Peak
992.24	27.83	3.25	0.25	31.33	54.00	22.67	Peak

1.2. 1000MHz 以上頻率範圍，其他不必要發射量測

頻率範圍量測至主波發射的 10 倍諧波，其他未列在報告上乃因訊號太小無法量測。

Mode	Normal	Frequency	---
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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
2156.00	31.30	8.09	6.04	45.43	54.00	8.57	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
2260.00	32.20	8.13	5.34	45.67	54.00	8.33	Peak

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
4805.00	33.90	10.32	-3.65	40.57	54.00	13.43	Peak
7205.00	35.70	11.91	-4.62	42.99	54.00	11.01	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
4805.00	33.90	10.32	-1.72	42.50	54.00	11.50	Peak
7205.00	35.70	11.91	-2.12	45.49	54.00	8.51	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 (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
4880.00	34.37	10.38	-2.31	42.44	54.00	11.56	Peak
7320.00	35.90	12.02	-2.41	45.51	54.00	8.49	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
4880.00	34.37	10.38	-2.33	42.42	54.00	11.58	Peak
7320.00	35.90	12.02	-3.07	44.85	54.00	9.15	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 (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
4960.00	34.27	10.46	-0.98	43.75	54.00	10.25	Peak
7440.00	35.90	12.12	-2.88	45.14	54.00	8.86	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
4960.00	34.27	10.46	-3.15	41.58	54.00	12.42	Peak
7440.00	35.90	12.12	-3.44	44.58	54.00	9.42	Peak

Mode	---	Frequency	RX2440MHz
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Antenna at Horizontal Polarization

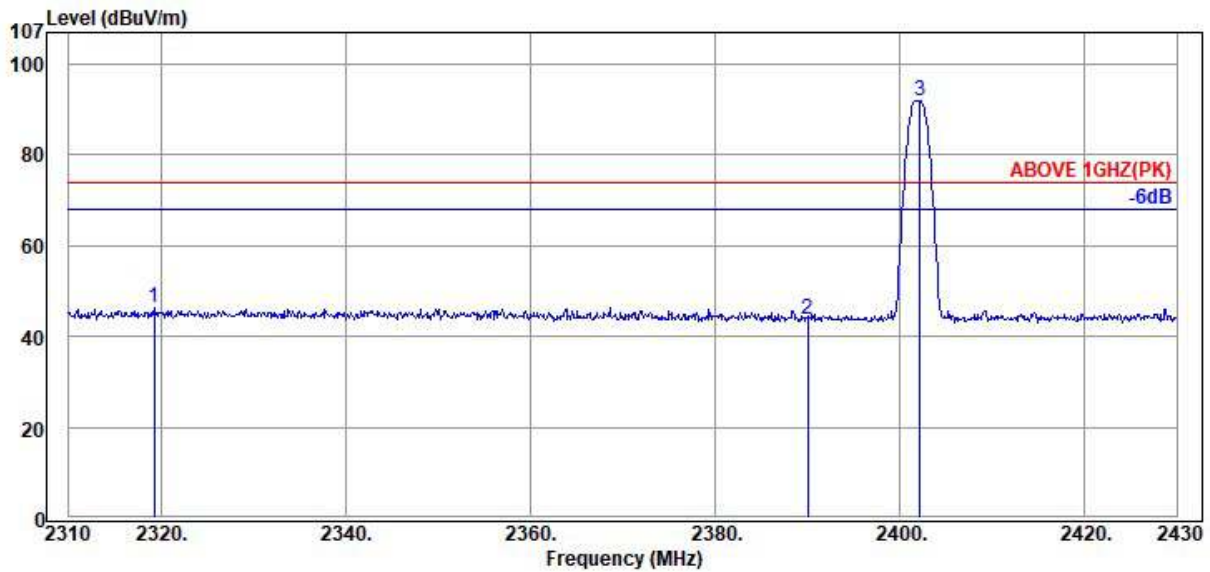
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
2194.00	31.37	8.10	6.66	46.13	54.00	7.87	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dB μ V)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector
2290.00	32.00	8.14	6.17	46.31	54.00	7.69	Peak

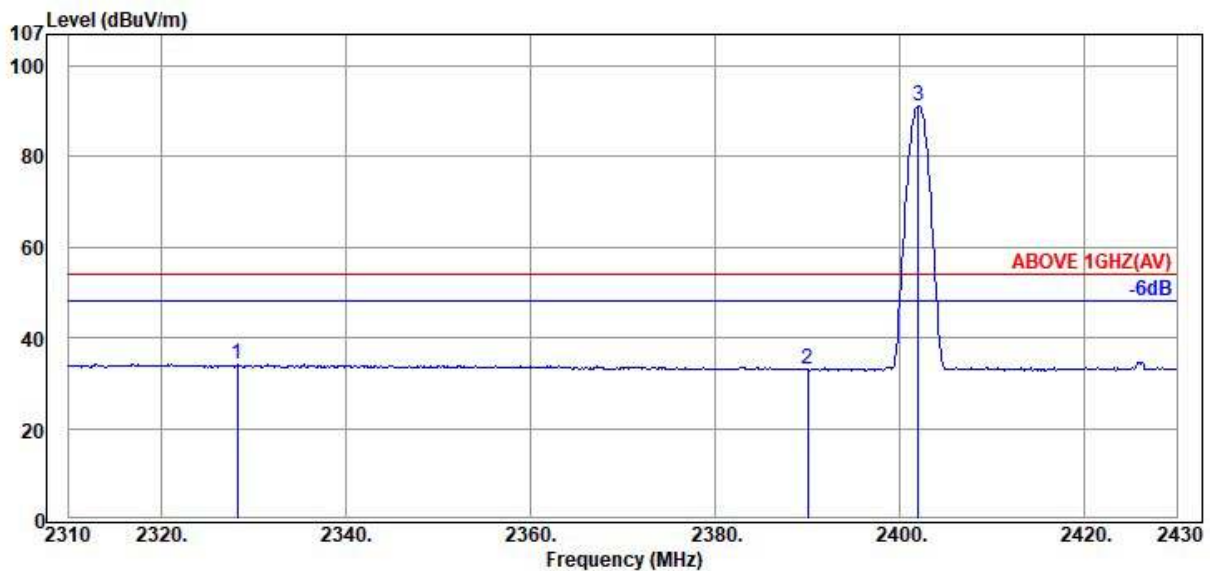
1.3. 禁用頻帶量測結果 (其他不必要發射)

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
2319.24	32.00	8.15	6.31	46.46	74.00	27.54	Peak
2390.04	32.00	8.17	3.73	43.90	74.00	30.10	Peak
@ 2402.16	32.00	8.17	51.76	91.93	---	---	Peak

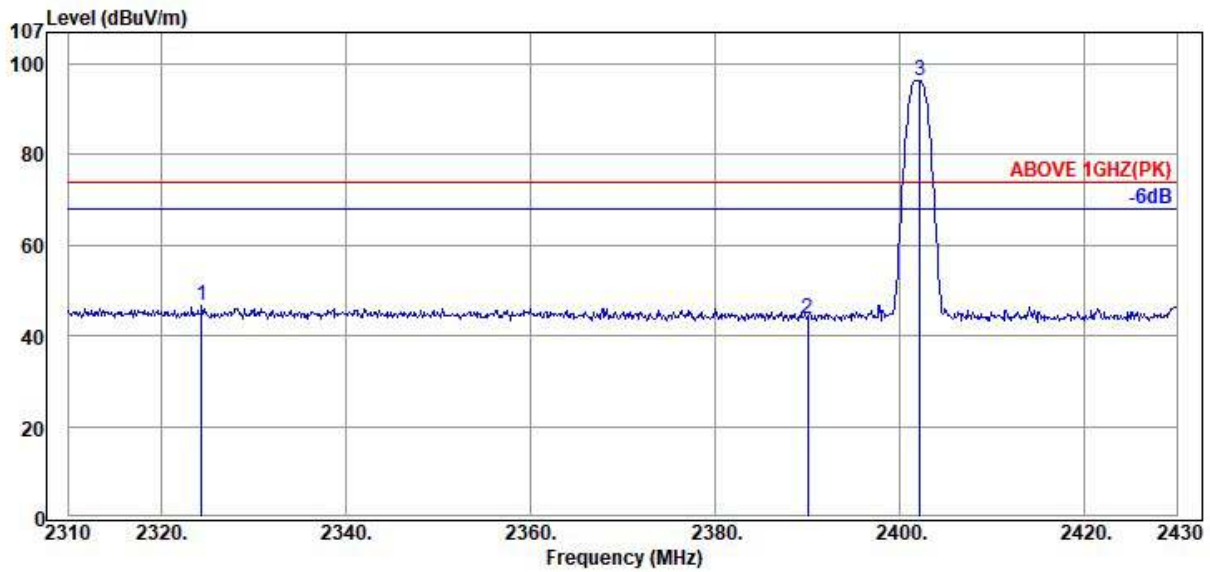


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2328.24	32.00	8.15	-5.81	34.34	54.00	19.66	Average
2390.04	32.00	8.17	-7.05	33.12	54.00	20.88	Average
@ 2402.04	32.00	8.17	51.02	91.19	---	---	Average

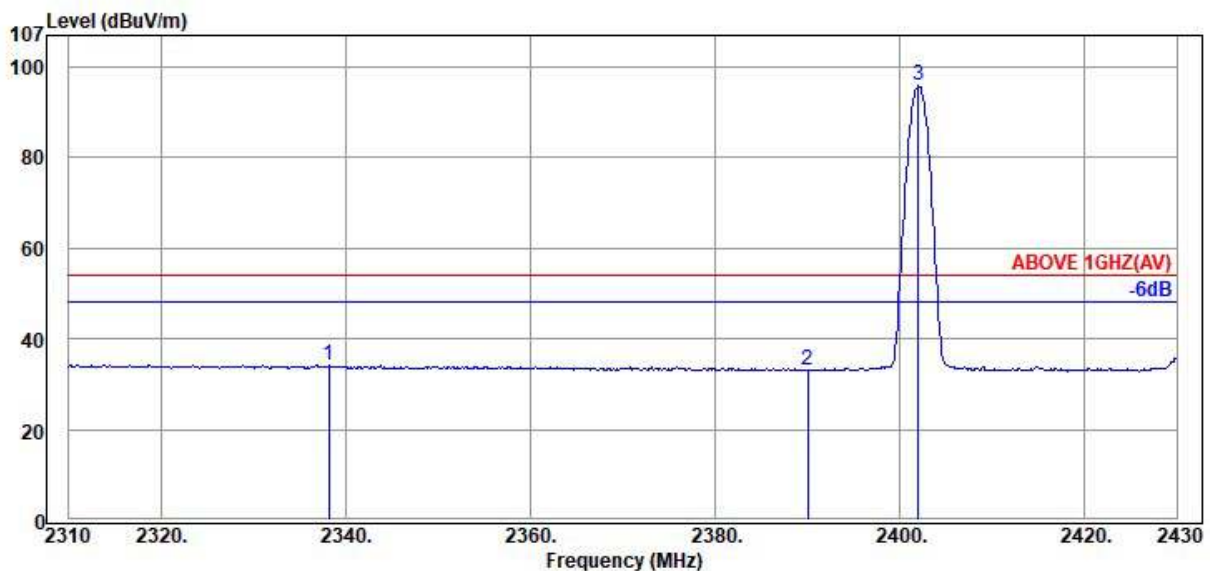
備註：“@”為主波，在此章節是不予以判定。

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
2324.40	32.00	8.15	6.37	46.52	74.00	27.48	Peak
2390.04	32.00	8.17	3.66	43.83	74.00	30.17	Peak
@ 2402.16	32.00	8.17	56.27	96.44	---	---	Peak

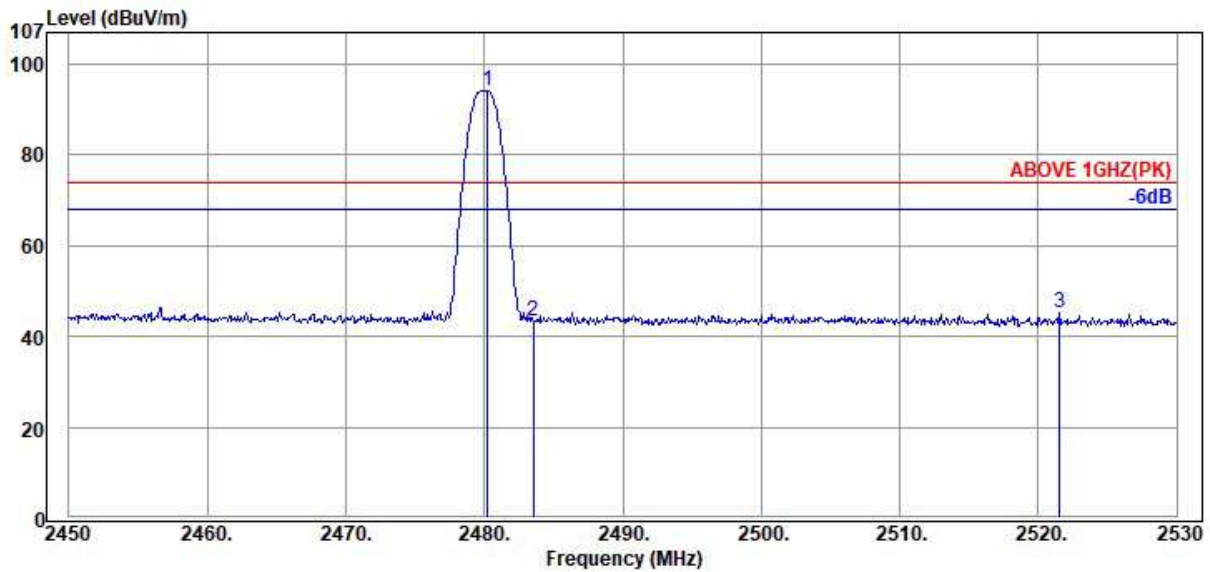


Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2338.20	32.00	8.16	-5.98	34.18	54.00	19.82	Average
2390.04	32.00	8.17	-7.02	33.15	54.00	20.85	Average
@ 2402.04	32.00	8.17	55.63	95.80	---	---	Average

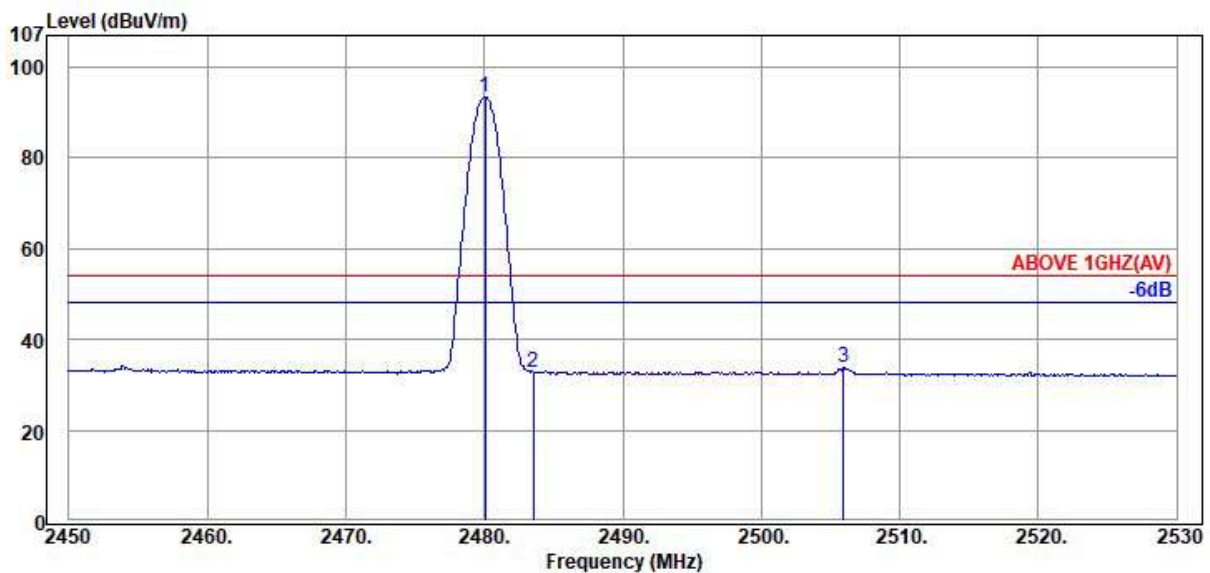
備註：“@”為主波，在此章節是不予以判定。

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
@	2480.24	32.57	8.20	53.29	94.06	---	---	Peak
	2483.52	32.57	8.20	2.61	43.38	74.00	30.62	Peak
	2521.52	32.10	8.24	5.05	45.39	74.00	28.61	Peak

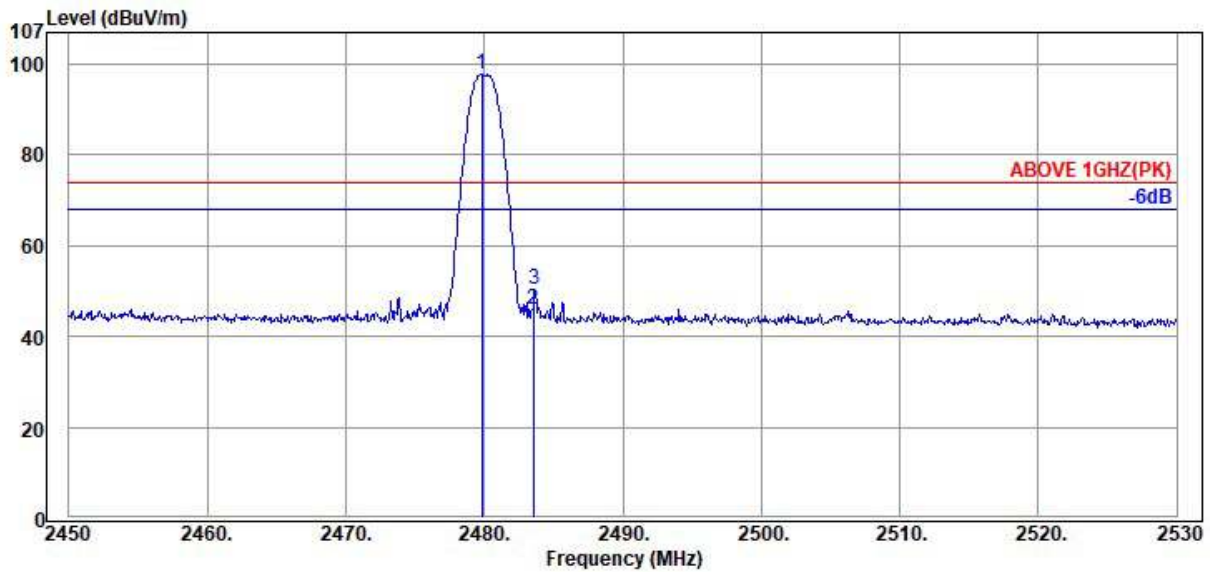


Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Meter Reading (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@	2480.08	32.57	8.20	52.74	93.51	---	---	Average
	2483.52	32.57	8.20	-7.99	32.78	54.00	21.22	Average
	2505.92	32.30	8.22	-6.69	33.83	54.00	20.17	Average

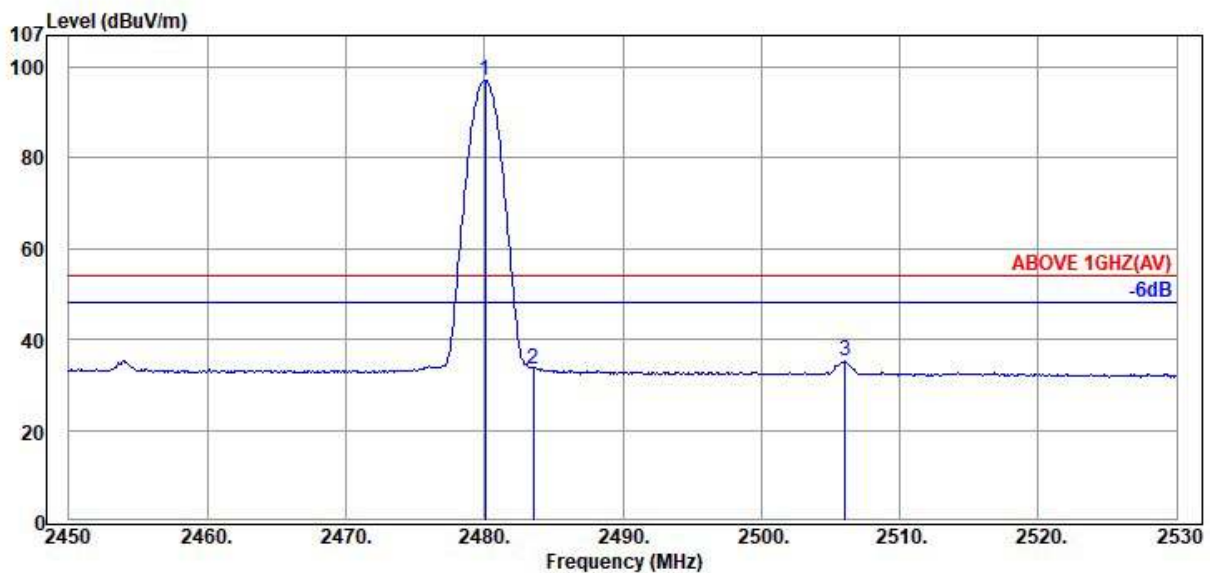
備註：“@”為主波，在此章節是不予以判定。

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
@	2479.84	32.57	8.20	56.88	97.65	---	---	Peak
	2483.52	32.57	8.20	5.10	45.87	74.00	28.13	Peak
	2483.60	32.57	8.20	9.44	50.21	74.00	23.79	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
@	2480.08	32.57	8.20	56.30	97.07	---	---	Average
	2483.52	32.57	8.20	-7.13	33.64	54.00	20.36	Average
	2506.08	32.30	8.22	-5.13	35.39	54.00	18.61	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	2019/08/19	環境溫/濕度	26°C/58%
電纜損失	0.20dB	測試電壓	DC 3.7V (透過內建鋰電池供電)

經實驗室行評估，擇取量測峰值輸出功率較差之電池 (廠家:Highpower)來進行本項之量測。

2.1. 發射頻寬

模式 (Mode)	測試頻率 (MHz)	6dB 頻寬 (MHz)	限制值 (kHz)
BLE	2402	0.7130	>500
	2440	0.7142	
	2480	0.7149	

2.2. 發射頻寬之量測圖



3. 峰值輸出功率之量測

測試日期	2019/08/06	環境溫/濕度	23°C/48%
電纜損失	0.20dB	測試電壓	DC 3.7V (透過內建鋰電池供電)

經實驗室行評估，擇取量測峰值輸出功率較差之電池 (廠家:Highpower)來進行本項之量測。

3.1. 峰值輸出功率

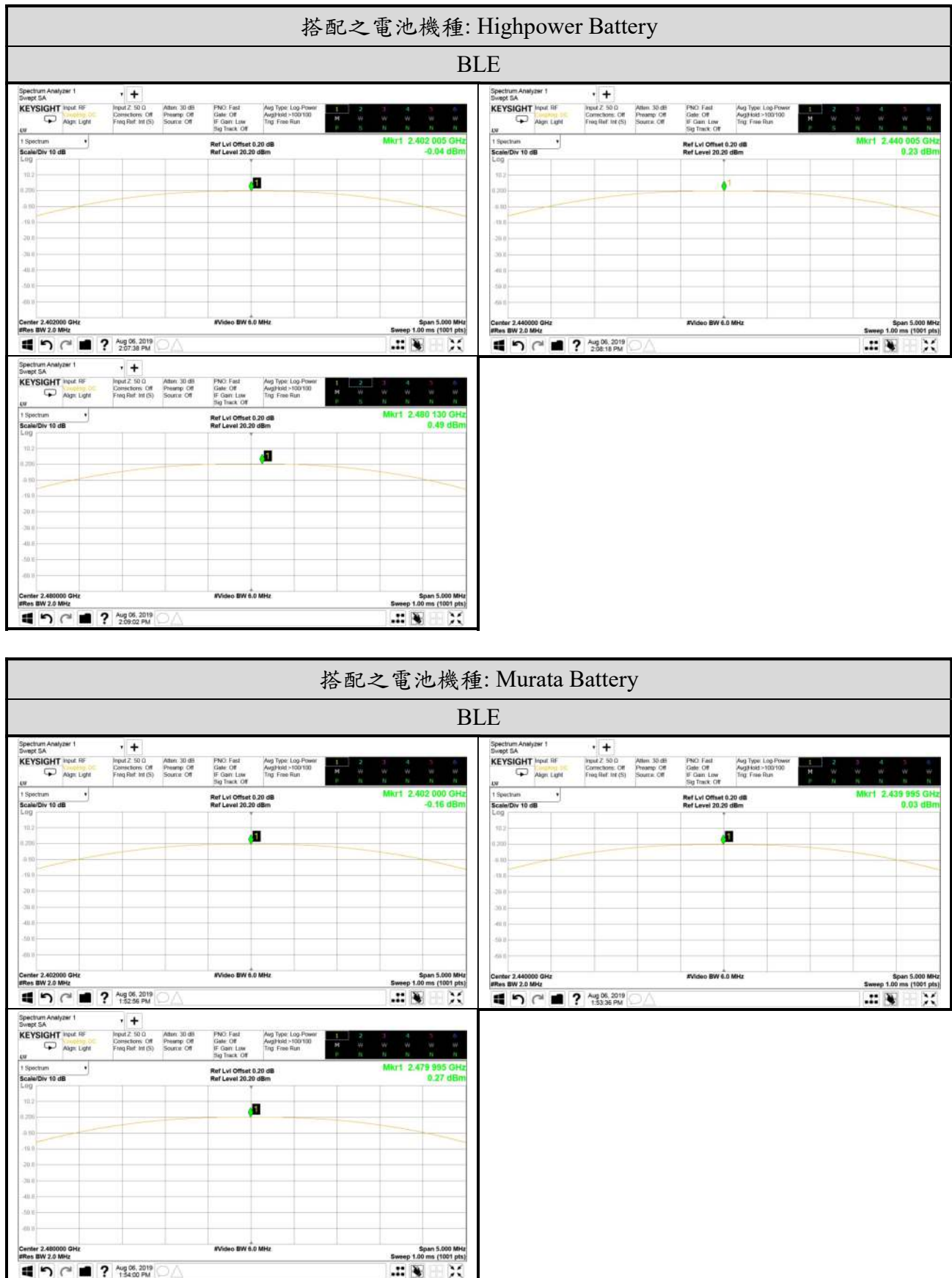
搭配之電池機種: Highpower Battery

模式 (Mode)	測試頻率 (MHz)	最大輸出功率 (dBm)	限制值 (dBm)
BLE	2402	-0.04	30
	2440	0.23	
	2480	0.49	

搭配之電池機種: Murata Battery

模式 (Mode)	測試頻率 (MHz)	最大輸出功率 (dBm)	限制值 (dBm)
BLE	2402	-0.16	30
	2440	0.03	
	2480	0.27	

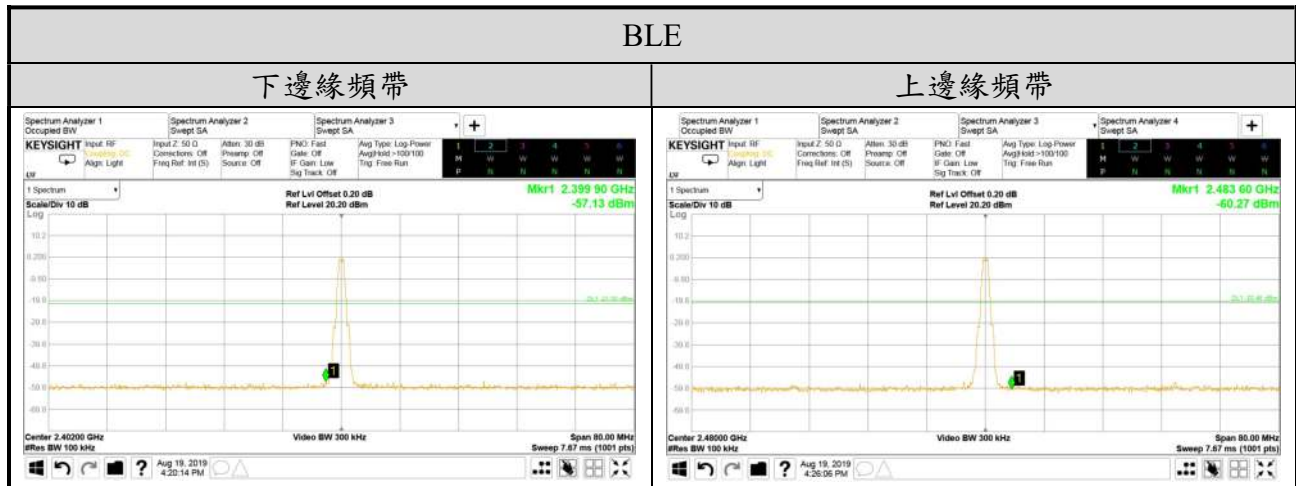
3.2. 峰值輸出功率之量測圖



4. 頻帶邊緣之 RF 傳導發射之量測

測試日期	2019/08/19	環境溫/濕度	26°C/58%
電纜損失	0.20dB	測試電壓	DC 3.7V (透過內建鋰電池供電)

經實驗室行評估，擇取量測峰值輸出功率較差之電池 (廠家:Highpower)來進行本項之量測。



5. 混附發射之 RF 傳導發射之量測

測試日期	2019/08/19	環境溫/濕度	26°C/58%
電纜損失	0.20dB	模式	BLE
測試電壓	DC 3.7V (透過內建鋰電池供電)	測試頻率	2402MHz

經實驗室行評估，擇取量測峰值輸出功率較差之電池 (廠家:Highpower)來進行本項之量測。



測試日期	2019/08/19	環境溫/濕度	26°C/58%
電纜損失	0.20dB	模式	BLE
測試電壓	DC 3.7V (透過內建鋰電池供電)	測試頻率	2440MHz



測試日期	2019/08/19	環境溫/濕度	26°C/58%
電纜損失	0.20dB	模式	BLE
測試電壓	DC 3.7V (透過內建鋰電池供電)	測試頻率	2480MHz



6. 功率密度之量測

測試日期	2019/08/19	環境溫/濕度	26°C/58%
電纜損失	0.20dB	測試電壓	DC 3.7V (透過內建鋰電池供電)

經實驗室行評估，擇取量測峰值輸出功率較差之電池 (廠家:Highpower)來進行本項之量測。

6.1. 功率密度

模式 (Mode)	測試頻率 (MHz)	功率密度(dBm)	限制值 (dBm)
BLE	2402	-1.00	8
	2440	-0.76	
	2480	-0.64	

測試結果係依照 FCC 公告之 KDB558074 D01V04，且解析頻寬以 100kHz 量測其測試結果較 3kHz 嚴格

6.2. 功率密度之量測圖

