

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，選擇低、中、高頻率來進行量測，並將下列測試模式之測試數據隨案件所附；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
ZigBee	發射	2405MHz(CH11)	1000-25000MHz
	發射	2440MHz (CH18)*	30-1000MHz
			1000-25000MHz
	發射	2475MHz(CH25)	1000-25000MHz
	接收	2440MHz (CH18)	30-1000MHz
			1000-25000MHz

註：*：經評估後，以最差頻率進行 30-1000MHz 量測。

對受測物裝置落於低功率射頻電機技術規範 LP0002 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
ZigBee	發射	2405MHz (CH11)	2310-2430MHz
		2475MHz (CH25)	2450-2900MHz

測試日期	2020/03/17-19	環境溫/濕度	20-22°C/58-67%
測試電壓	DC 3V (經電池供電)	測試人員	Sean Wang

1.1. 30-1000MHz 頻率範圍，其他不必要發射量測

Mode	ZigBee	Frequency	TX 2440MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
84.320	13.81	2.23	21.25	37.29	40.00	2.71	Peak
156.100	16.82	3.13	20.34	40.29	43.50	3.21	Peak
280.260	19.05	4.34	11.81	35.20	46.00	10.80	Peak
498.510	23.45	6.91	3.22	33.58	46.00	12.42	Peak
823.460	26.29	8.27	1.57	36.13	46.00	9.87	Peak
965.080	27.21	9.01	1.85	38.07	54.00	15.93	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
84.320	13.81	2.23	14.38	30.42	40.00	9.58	Peak
131.850	18.33	2.84	9.04	30.21	43.50	13.29	Peak
379.200	21.35	5.72	3.93	31.00	46.00	15.00	Peak
639.160	24.87	7.26	3.72	35.85	46.00	10.15	Peak
932.100	27.01	8.86	1.97	37.84	46.00	8.16	Peak
989.330	27.34	9.11	0.45	36.90	54.00	17.10	Peak

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

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
71.710	12.61	2.05	14.07	28.73	40.00	11.27	Peak
156.100	16.82	3.13	20.41	40.36	43.50	3.14	Peak
362.710	20.97	5.48	14.13	40.58	46.00	5.42	Peak
497.540	23.45	6.90	4.14	34.49	46.00	11.51	Peak
854.500	26.50	8.45	1.69	36.64	46.00	9.36	Peak
996.120	27.38	9.14	0.92	37.44	54.00	16.56	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
32.910	22.98	1.29	-0.20	24.07	40.00	15.93	Peak
95.960	15.95	2.38	18.58	36.91	43.50	6.59	Peak
382.110	21.44	5.76	6.63	33.83	46.00	12.17	Peak
534.400	23.96	6.96	2.46	33.38	46.00	12.62	Peak
935.010	27.03	8.87	1.23	37.13	46.00	8.87	Peak
980.600	27.28	9.07	1.29	37.64	54.00	16.36	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	ZigBee	Frequency	TX 2405MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4810.000	33.90	10.22	-2.62	41.50	54.00	12.50	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4810.000	33.90	10.22	-2.31	41.81	54.00	12.19	Peak

Mode	ZigBee	Frequency	TX 2440MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4880.000	34.37	10.24	-3.64	40.97	54.00	13.03	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4880.000	34.37	10.24	-4.80	39.81	54.00	14.19	Peak

Mode	ZigBee	Frequency	TX 2475MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4950.000	34.40	10.26	-3.78	40.88	54.00	13.12	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4950.000	34.40	10.26	-5.81	38.85	54.00	15.15	Peak

Mode	---	Frequency	RX2440MHz
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Antenna at Horizontal Polarization

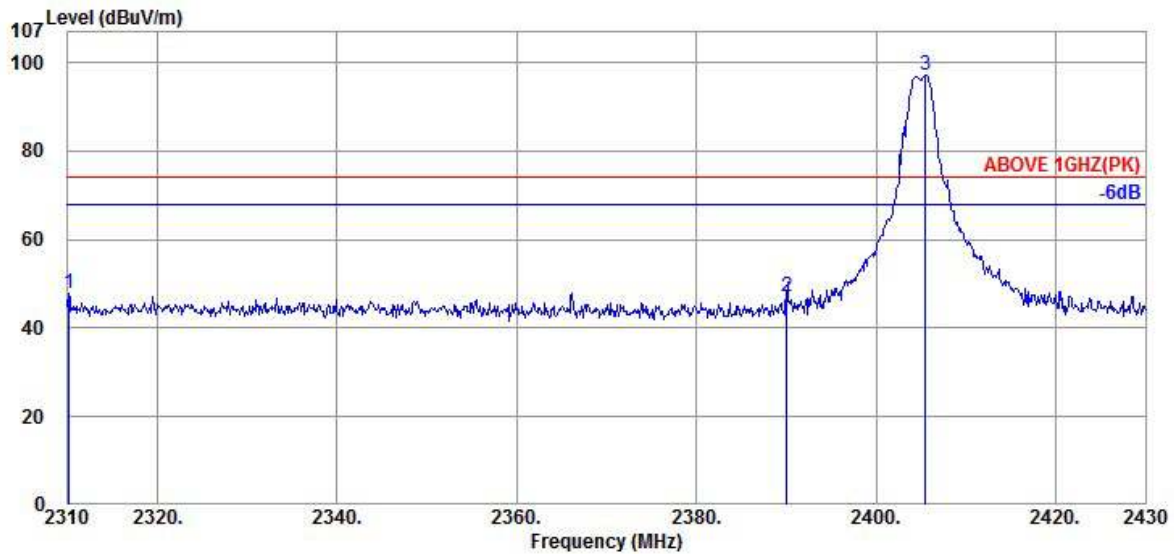
Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4880.000	34.37	10.24	-2.21	42.40	54.00	11.60	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
4880.000	34.37	10.24	-4.16	40.45	54.00	13.55	Peak

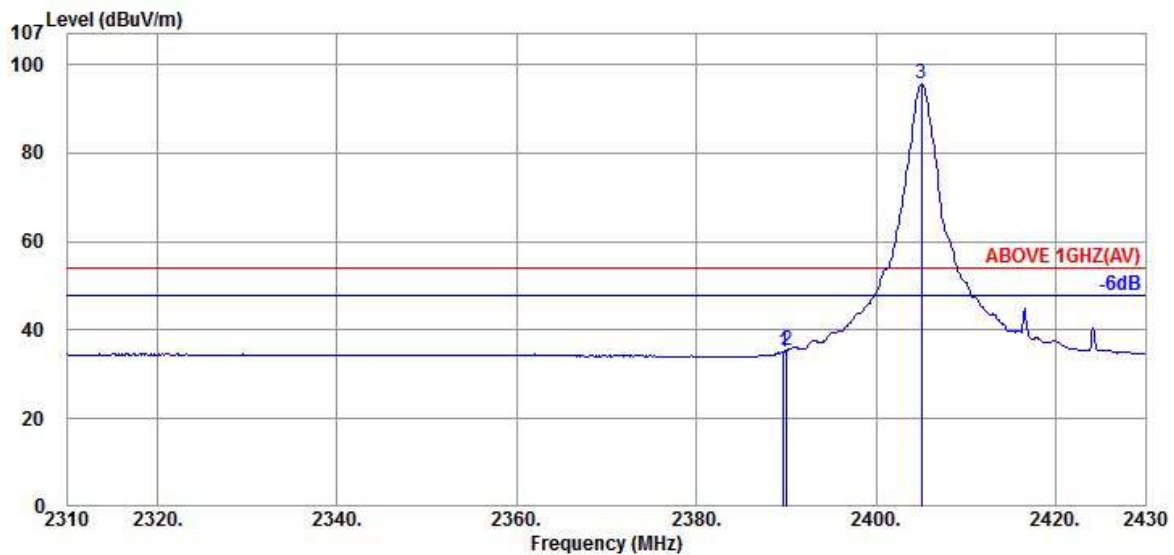
1.4. 禁用頻帶量測結果 (其他不必要發射)

Mode	ZigBee	Frequency	TX 2405MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2310.120	32.00	8.46	7.51	47.97	74.00	26.03	Peak
2390.040	32.00	8.52	6.49	47.01	74.00	26.99	Peak
@ 2405.520	32.23	8.53	56.30	97.06	---	---	Peak

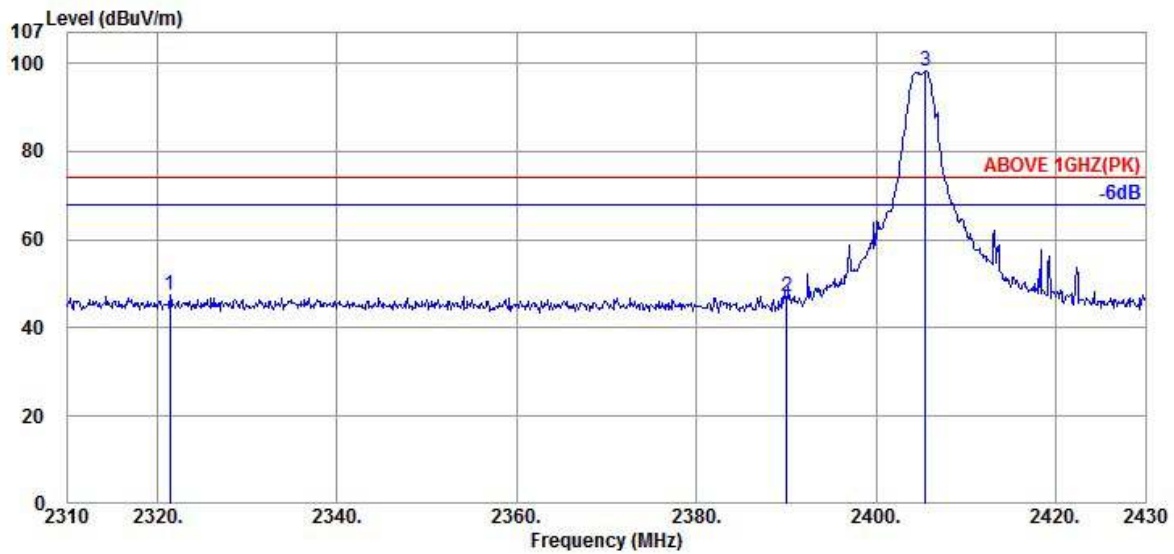


Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.680	32.00	8.52	-5.62	34.90	54.00	19.10	Average
2390.040	32.00	8.52	-5.52	35.00	54.00	19.00	Average
@ 2405.160	32.23	8.53	53.97	94.73	---	---	Average

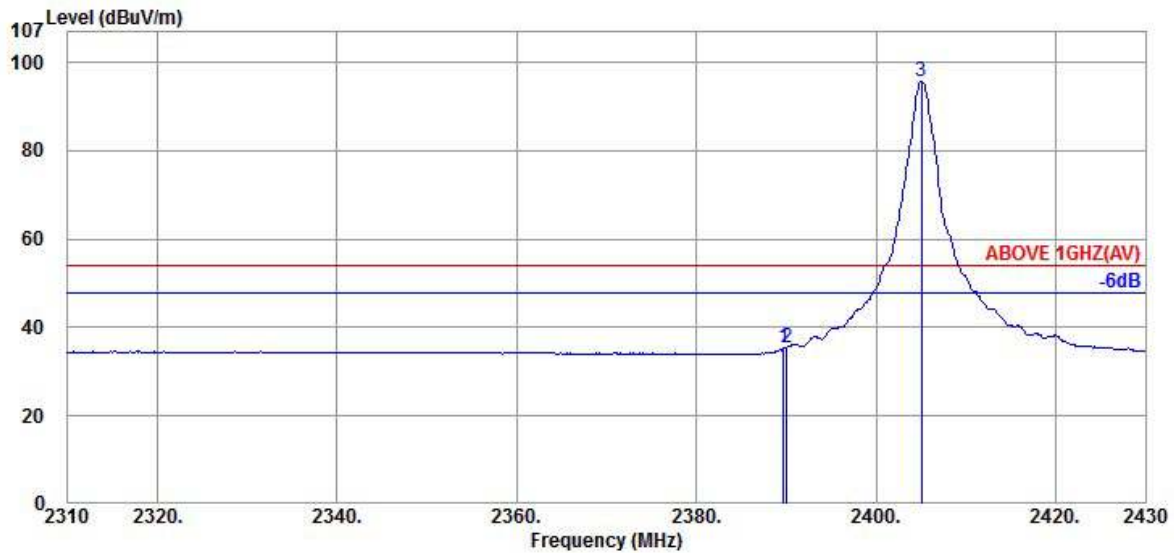
備註：“@”為主波，在此章節是不予以判定。

Mode	ZigBee	Frequency	TX 2405MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2321.400	32.00	8.47	7.02	47.49	74.00	26.51	Peak
2390.040	32.00	8.52	6.49	47.01	74.00	26.99	Peak
@ 2405.520	32.23	8.53	57.40	98.16	---	---	Peak

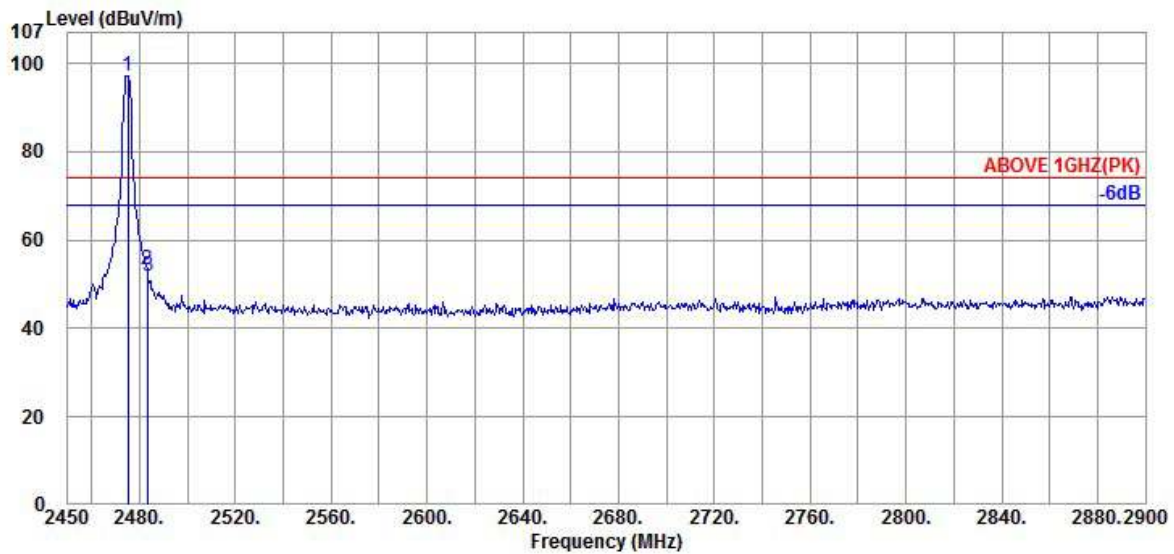


Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
2389.680	32.00	8.52	-5.22	35.30	54.00	18.70	Average
2390.040	32.00	8.52	-5.01	35.51	54.00	18.49	Average
@ 2405.040	32.23	8.53	55.08	95.84	---	---	Average

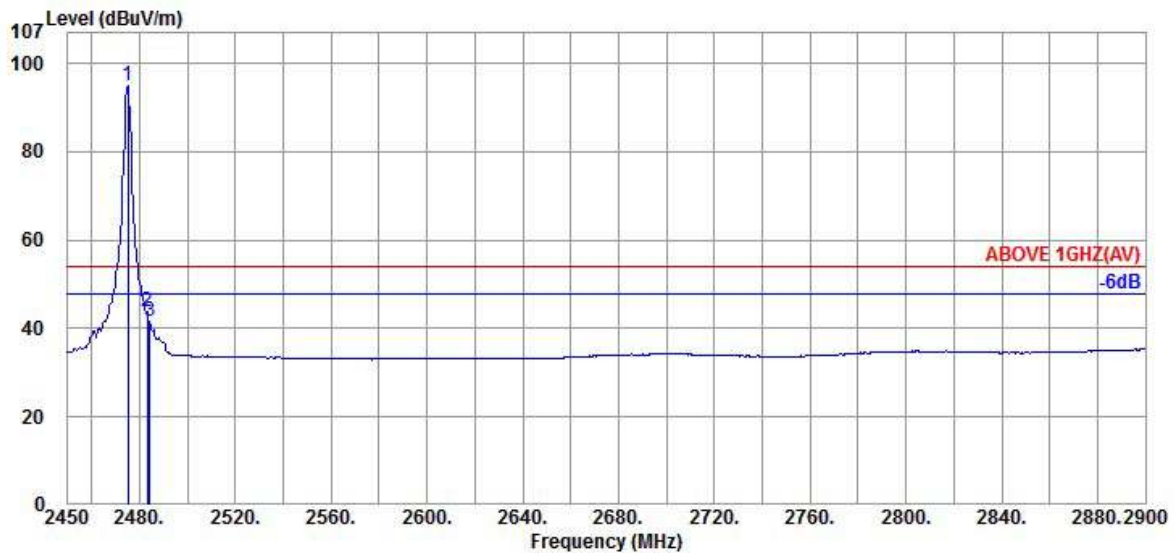
備註：“@”為主波，在此章節是不予以判定。

Mode	ZigBee	Frequency	TX 2475MHz
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Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@	2475.200	32.57	8.58	56.00	97.15	---	---	Peak
	2483.300	32.57	8.58	12.20	53.35	74.00	20.65	Peak
	2483.750	32.57	8.58	10.70	51.85	74.00	22.15	Peak

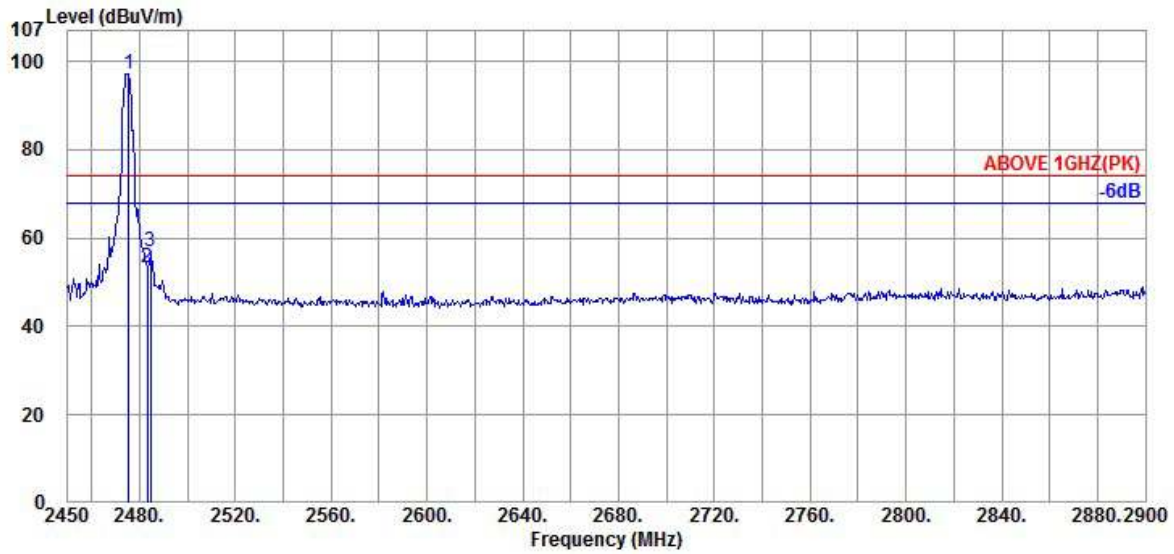


Antenna at Horizontal Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@	2475.200	32.57	8.58	53.79	94.94	---	---	Average
	2483.300	32.57	8.58	2.49	43.64	54.00	10.36	Average
	2484.200	32.57	8.58	0.34	41.49	54.00	12.51	Average

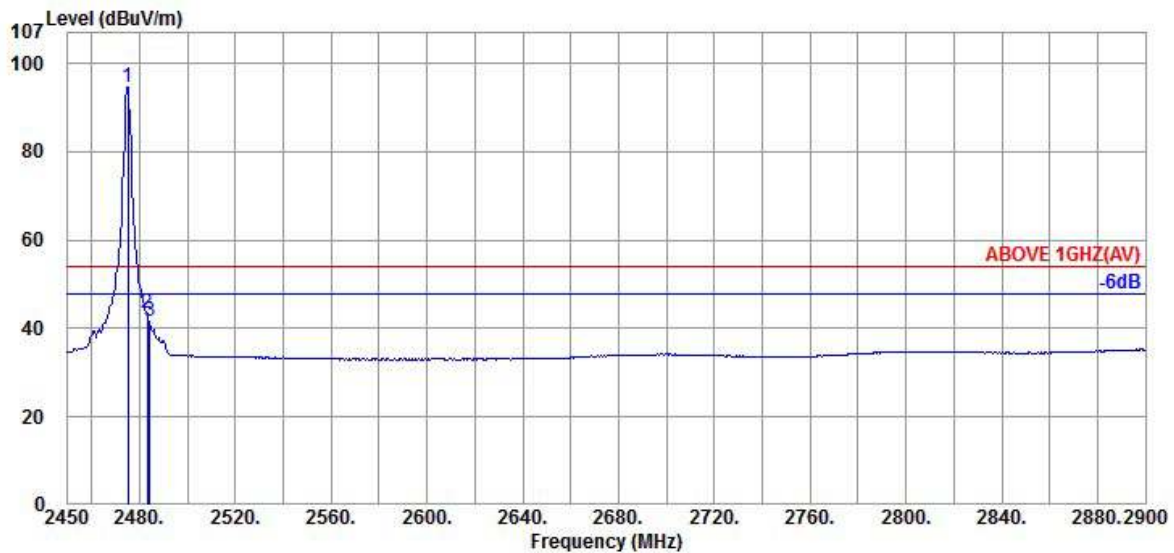
備註：“@”為主波，在此章節是不予以判定。

Mode	ZigBee	Frequency	TX 2475MHz
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Antenna at Vertical Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@	2475.650	32.57	8.58	55.95	97.10	---	---	Peak
	2483.300	32.57	8.58	12.30	53.45	74.00	20.55	Peak
	2484.650	32.57	8.58	15.85	57.00	74.00	17.00	Peak



Antenna at Vertical Polarization

	Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@	2475.200	32.57	8.58	53.54	94.69	---	---	Average
	2483.300	32.57	8.58	2.21	43.36	54.00	10.64	Average
	2484.200	32.57	8.58	0.32	41.47	54.00	12.53	Average

備註：“@”為主波，在此章節是不予以判定。

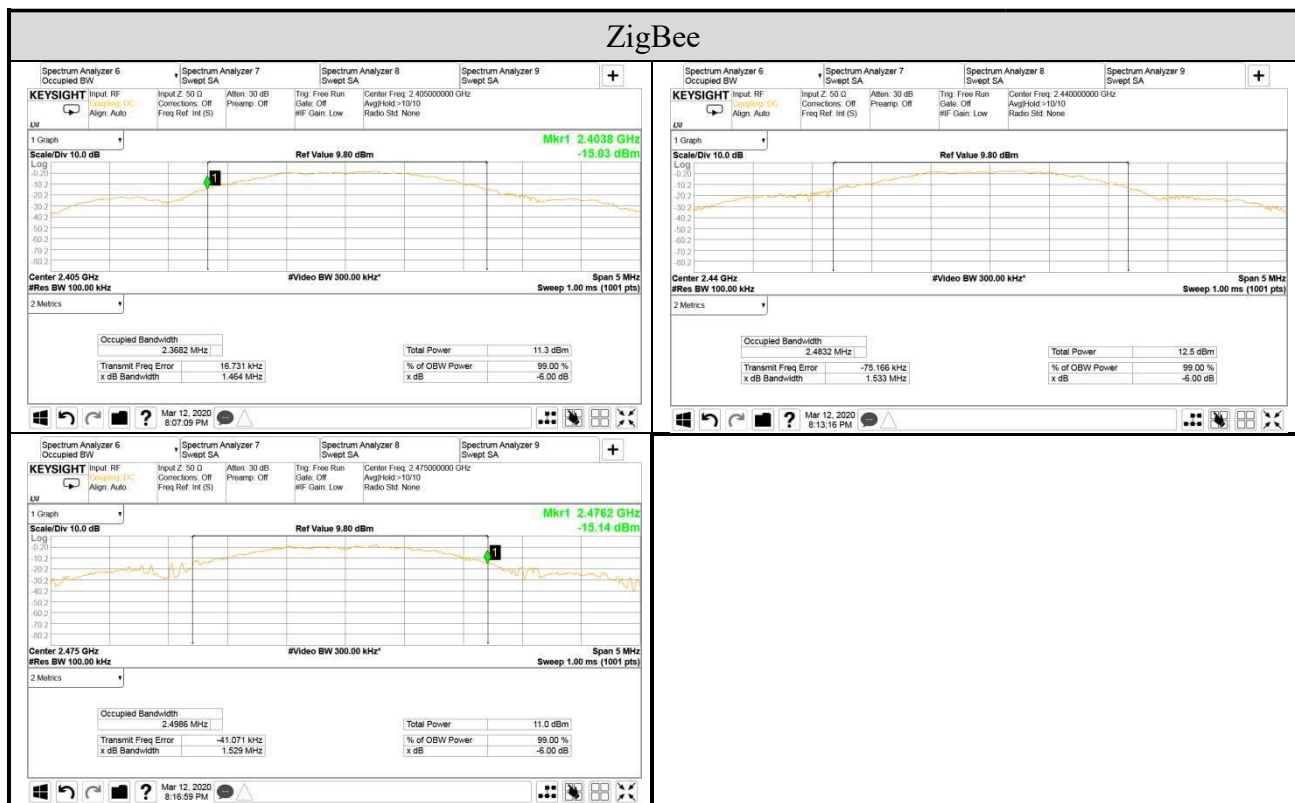
2. 發射頻寬之量測

測試日期	2020/03/12	環境溫/濕度	20°C/63%
電纜損失	2.00dB	測試人員	Sean Wang
測試電壓	DC 3V (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)
ZigBee	2405	1.464	>500
	2440	1.533	
	2475	1.529	

2.2. 發射頻寬之量測圖



測試日期	2020/03/12	環境溫/濕度	20°C/63%
電纜損失	2.00dB	測試人員	Sean Wang
測試電壓	DC 3V (經電池供電)		

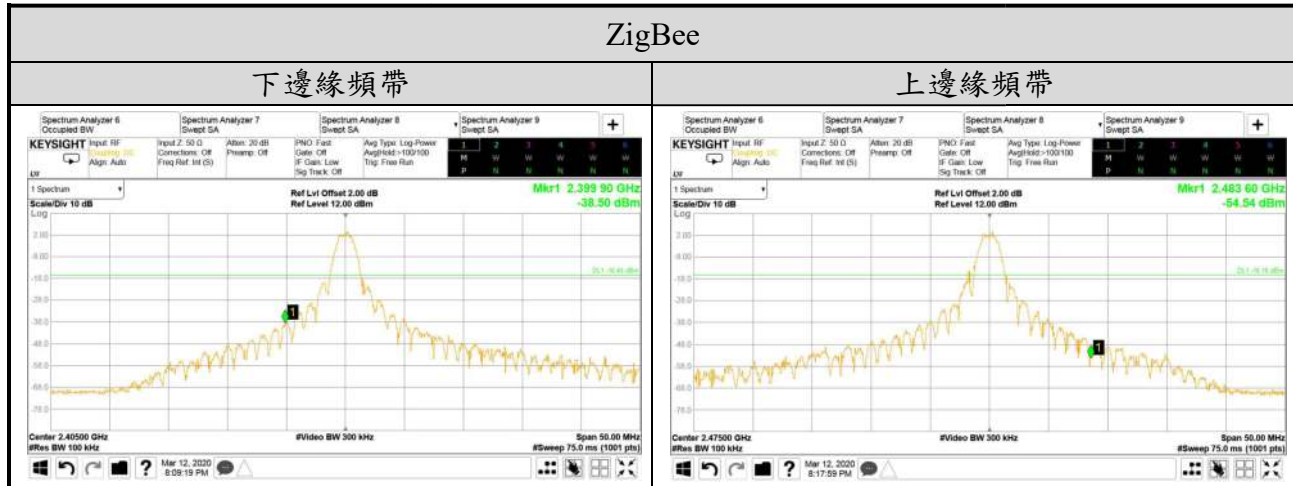
模式 (Mode)	測試頻率 (MHz)	最大輸出功率(dBm)	限制值 (dBm)
ZigBee	2405	6.36	30
	2440	7.64	
	2475	6.81	

The figure displays four screenshots of a Spectrum Analyzer interface, showing frequency response plots for different antenna configurations. Each plot shows a yellow curve representing the frequency response, with a green marker indicating a specific frequency and power level. The plots are labeled 'Mkr1' and show values for frequency and power in dBm.

- Top Left Plot:** Spectrum Analyzer 8. Input RF: 2.405 GHz. Scale/Div 10 dB. Ref Lvl Offset 2.00 dB. Ref Level 12.00 dBm. Mkr1 2.405 485 GHz, 6.36 dBm.
- Top Right Plot:** Spectrum Analyzer 9. Input RF: 2.405 GHz. Scale/Div 10 dB. Ref Lvl Offset 2.00 dB. Ref Level 22.00 dBm. Mkr1 2.405 510 GHz, 7.64 dBm.
- Bottom Left Plot:** Spectrum Analyzer 9. Input RF: 2.475 GHz. Scale/Div 10 dB. Ref Lvl Offset 2.00 dB. Ref Level 22.00 dBm. Mkr1 2.474 440 GHz, 6.81 dBm.
- Bottom Right Plot:** Spectrum Analyzer 13. Input RF: 2.475 GHz. Scale/Div 10 dB. Ref Lvl Offset 2.00 dB. Ref Level 22.00 dBm. Mkr1 2.474 440 GHz, 6.81 dBm.

4. 頻帶邊緣之 RF 傳導發射之量測

測試日期	2020/03/12	環境溫/濕度	20°C/63%
電纜損失	2.00dB	測試人員	Sean Wang
測試電壓	DC 3V (經電池供電)		



5. 混附發射之 RF 傳導發射之量測

測試日期	2020/03/12	環境溫/濕度	20°C/63%
電纜損失	2.00dB	模式	ZigBee
測試人員	Sean Wang	測試頻率	2405MHz
測試電壓	DC 3V (經電池供電)		



測試日期	2020/03/12	環境溫/濕度	20°C/63%
電纜損失	2.00dB	模式	ZigBee
測試人員	Sean Wang	測試頻率	2440MHz
測試電壓	DC 3V (經電池供電)		



測試日期	2020/03/12	環境溫/濕度	20°C/63%
電纜損失	2.00dB	模式	ZigBee
測試人員	Sean Wang	測試頻率	2475MHz
測試電壓	DC 3V (經電池供電)		



6. 功率密度之量測

測試日期	2020/03/12	環境溫/濕度	20°C/63%
電纜損失	2.00dB	測試人員	Sean Wang
測試電壓	DC 3V (經電池供電)		

6.1. 功率密度

模式 (Mode)	測試頻率 (MHz)	功率密度(dBm)	限制值 (dBm)
ZigBee	2405	3.55	8
	2440	4.53	
	2475	3.82	

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

