

附錄一

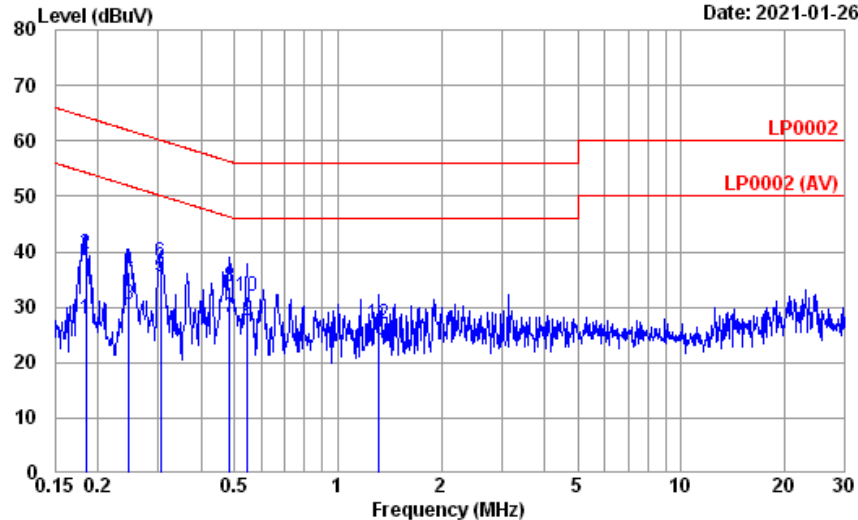
受測裝置之測試結果

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1. 電源線傳導干擾之量測

測試日期	2021/01/26	環境溫/濕度	22°C/60%
測試電壓	DC 3.3V (經治具連接電源供應器供電)		

Data: 2 File: D:\test data\REPORT\2021\1M2101XXX\1M2101262-C-D-RF.EM6 (2) Date: 2021-01-26



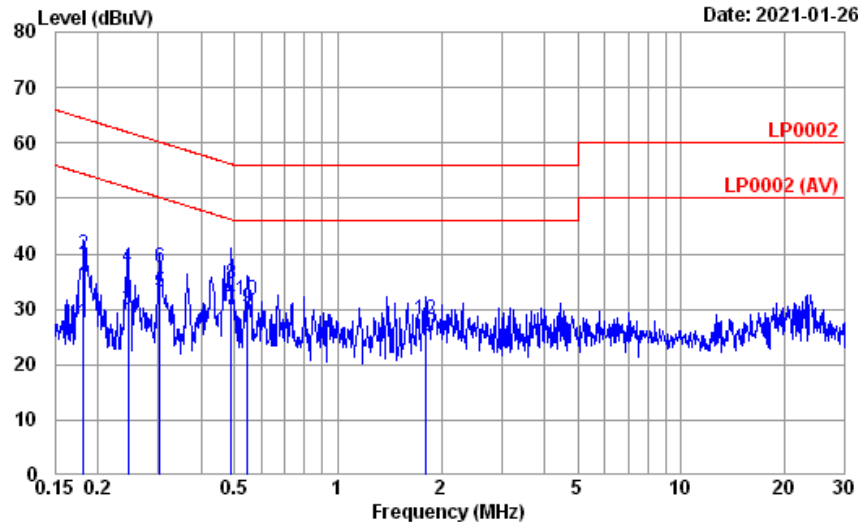
Site No. : No.8 Shielded Room Data No. : 2
 Instrument 1 : Receiver ESR(774)
 Instrument 2 : ENH432 (567)(A)|CE-08|ESH3-Z2 (354)
 Limit : LP0002 Phase : NEUTRAL
 Environment : 22°C / 60% Engineer : Chucky Chiu
 EUT Model : E32-915T20D Test Rating : 110Vac/60Hz
 Test Mode : Operating

	Freq. (MHz)	AMF Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.184	10.20	0.03	9.85	7.69	27.77	54.28	26.51	Average
2	0.184	10.20	0.03	9.85	19.61	39.69	64.28	24.59	QP
3	0.247	10.20	0.03	9.85	10.40	30.48	51.86	21.38	Average
4	0.247	10.20	0.03	9.85	16.31	36.39	61.86	25.47	QP
5	0.305	10.20	0.03	9.85	15.35	35.43	50.10	14.67	Average
6	0.305	10.20	0.03	9.85	18.07	38.15	60.10	21.95	QP
7	0.484	10.20	0.03	9.86	7.96	28.05	46.27	18.22	Average
8	0.484	10.20	0.03	9.86	13.49	33.58	56.27	22.69	QP
9	0.546	10.20	0.03	9.86	7.58	27.67	46.00	18.33	Average
10	0.546	10.20	0.03	9.86	11.83	31.92	56.00	24.08	QP
11	1.317	10.24	0.05	9.86	2.21	22.36	46.00	23.64	Average
12	1.317	10.24	0.05	9.86	6.92	27.07	56.00	28.93	QP

Remarks: 1. Emission Level= AMF Factor + Cable Loss + Pulse Att. + Reading.
 2. If the average limit is met when using a quasi-peak detector,
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

測試日期	2021/01/26	環境溫/濕度	22°C/60%
測試電壓	DC 3.3V (經治具連接電源供應器供電)		

Data: 1 File: D:\test data\REPORT\2021\1M2101XXX\1M2101262-C-D-RF-EM6 (2)



Site No. : No.8 Shielded Room Data No. : 1
 Instrument 1 : Receiver ESR(774)
 Instrument 2 : ENH432 (567)(A)|CE-08|ESH3-Z2 (354)
 Limit : LP0002 Phase : LINE
 Environment : 22°C / 60% Engineer : Chucky Chiu
 EUT Model : E32-915T20D Test Rating : 110Vac/60Hz
 Test Mode : Operating

	Freq. (MHz)	AMN Factor (dB)	Cable Loss (dB)	Pulse Att. (dB)	Reading (dBμV)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
1	0.182	10.20	0.03	9.85	7.56	27.64	54.42	26.78	Average
2	0.182	10.20	0.03	9.85	19.70	39.78	64.42	24.64	QP
3	0.246	10.20	0.03	9.85	9.84	29.92	51.91	21.99	Average
4	0.246	10.20	0.03	9.85	17.36	37.44	61.91	24.47	QP
5	0.303	10.20	0.03	9.85	13.13	33.21	50.15	16.94	Average
6	0.303	10.20	0.03	9.85	17.46	37.54	60.15	22.61	QP
7	0.489	10.20	0.03	9.86	9.78	29.87	46.19	16.32	Average
8	0.489	10.20	0.03	9.86	14.52	34.61	56.19	21.58	QP
9	0.546	10.20	0.03	9.86	10.22	30.31	46.00	15.69	Average
10	0.546	10.20	0.03	9.86	11.54	31.63	56.00	24.37	QP
11	1.810	10.30	0.06	9.86	3.33	23.55	46.00	22.45	Average
12	1.810	10.30	0.06	9.86	7.99	28.21	56.00	27.79	QP

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.
 2. If the average limit is met when using a quasi-peak detector,
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

2. 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測試數據隨案件所附。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 2.1 ~2.2：

模式	動作狀態	基本頻率	量測頻率範圍
LoRa™	發射	921MHz*	30-1000MHz
			1000-25000MHz
	發射	923MHz	1000-25000MHz
	發射	924MHz	1000-25000MHz
	接收	923MHz	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器材技術規範第 3.5 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 2.3。

模式	動作狀態	基本頻率	量測頻率範圍
LoRa™	發射	921MHz	825-925MHz
		924MHz	923-1000MHz

測試日期	2021/01/25	環境溫/濕度	20°C/71%
測試電壓	DC 3.3V (經治具連接電源供應器供電)	測試人員	Kuper Hsu

2.1. 30-1000MHz 頻率範圍，其他不必要發射量測

Mode	LoRa™	Frequency	TX 921MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	CaLoR a Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
32.910	22.98	1.29	28.14	28.71	24.84	40.00	15.16	Peak
108.570	17.65	2.54	28.00	35.73	27.92	43.50	15.58	Peak
239.520	18.02	3.92	27.63	39.52	33.83	46.00	12.17	Peak
385.020	21.50	5.81	28.34	41.89	40.86	46.00	5.14	Peak
540.220	24.04	6.97	29.29	34.90	36.62	46.00	9.38	Peak
994.180	27.36	9.13	28.59	30.07	37.97	54.00	16.03	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	CaLoR a Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
36.790	20.99	1.40	28.13	36.64	30.90	40.00	9.10	Peak
108.570	17.65	2.54	28.00	37.38	29.57	43.50	13.93	Peak
384.050	21.47	5.79	28.31	32.54	31.49	46.00	14.51	Peak
540.220	24.04	6.97	29.29	33.44	35.16	46.00	10.84	Peak
872.930	26.63	8.56	28.93	34.47	40.73	46.00	5.27	Peak
997.090	27.38	9.15	28.59	29.17	37.11	54.00	16.89	Peak

Mode	---	Frequency	RX 923MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	CaLoR a Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
101.780	16.92	2.45	28.04	36.45	27.78	43.50	15.72	Peak
383.080	21.44	5.78	28.31	42.30	41.21	46.00	4.79	Peak
477.170	23.14	6.72	29.05	36.96	37.77	46.00	8.23	Peak
813.760	26.21	8.21	29.08	31.61	36.95	46.00	9.05	Peak
912.700	26.90	8.78	28.81	30.61	37.48	46.00	8.52	Peak
959.260	27.17	8.98	28.69	29.83	37.29	46.00	8.71	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	CaLoR a Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
54.250	13.69	1.72	28.12	40.98	28.27	40.00	11.73	Peak
107.600	17.53	2.53	28.01	37.10	29.15	43.50	14.35	Peak
383.080	21.44	5.78	28.31	31.66	30.57	46.00	15.43	Peak
533.430	23.96	6.96	29.28	34.72	36.36	46.00	9.64	Peak
778.840	25.89	8.02	29.17	29.94	34.68	46.00	11.32	Peak
968.960	27.23	9.02	28.66	29.21	36.80	54.00	17.20	Peak

2.2. 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	LoRa™	Frequency	TX 921MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1842.000	26.86	4.88	40.00	65.53	57.27	74.00	16.73	Peak
2763.000	28.93	6.20	39.98	53.32	48.47	74.00	25.53	Peak

Frequency (MHz)	Peak Value (dBμV/m)	Duty Cycle Correction Factor (dB)	Average Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
1842.00	57.27	-9.12	48.15	54.00	5.85	Average
2763.00	48.47	-9.12	39.35	54.00	14.65	Average

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1842.000	26.86	4.88	40.00	65.10	56.84	74.00	17.16	Peak

Frequency (MHz)	Peak Value (dBμV/m)	Duty Cycle Correction Factor (dB)	Average Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
1842.00	56.84	-9.12	47.72	54.00	6.28	Average

Mode	LoRa™	Frequency	TX 923MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1848.000	26.88	4.88	39.99	64.73	56.50	74.00	17.50	Peak
2769.000	28.93	6.20	39.98	52.05	47.20	74.00	26.80	Peak

Frequency (MHz)	Peak Value (dBμV/m)	Duty Cycle Correction Factor (dB)	Average Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
1846.00	56.50	-9.12	47.38	54.00	6.62	Average
2769.00	47.20	-9.12	38.08	54.00	15.92	Average

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1846.000	26.88	4.88	39.99	65.15	56.92	74.00	17.08	Peak
2769.000	28.93	6.20	39.98	49.99	45.14	74.00	28.86	Peak

Frequency (MHz)	Peak Value (dBμV/m)	Duty Cycle Correction Factor (dB)	Average Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
1846.00	56.92	-9.12	47.80	54.00	6.20	Average
2769.00	45.14	-9.12	36.02	54.00	17.98	Average

Mode	LoRa™	Frequency	TX924MHz
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Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1848.000	26.88	4.88	39.99	65.22	56.99	74.00	17.01	Peak
2772.000	29.00	6.20	39.98	50.18	45.40	74.00	28.60	Peak

Frequency (MHz)	Peak Value (dBμV/m)	Duty Cycle Correction Factor (dB)	Average Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
1848.00	56.99	-9.12	47.87	54.00	6.13	Average
2772.00	45.40	-9.12	36.28	54.00	17.72	Average

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1848.000	26.88	4.88	39.99	65.67	57.44	74.00	16.56	Peak
2772.000	29.00	6.20	39.98	50.22	45.44	74.00	28.56	Peak

Frequency (MHz)	Peak Value (dBμV/m)	Duty Cycle Correction Factor (dB)	Average Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
1848.00	57.44	-9.12	48.32	54.00	5.68	Average
2772.00	45.44	-9.12	36.32	54.00	17.68	Average

Mode	---	Frequency	RX 923MHz
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Antenna at Horizontal Polarization

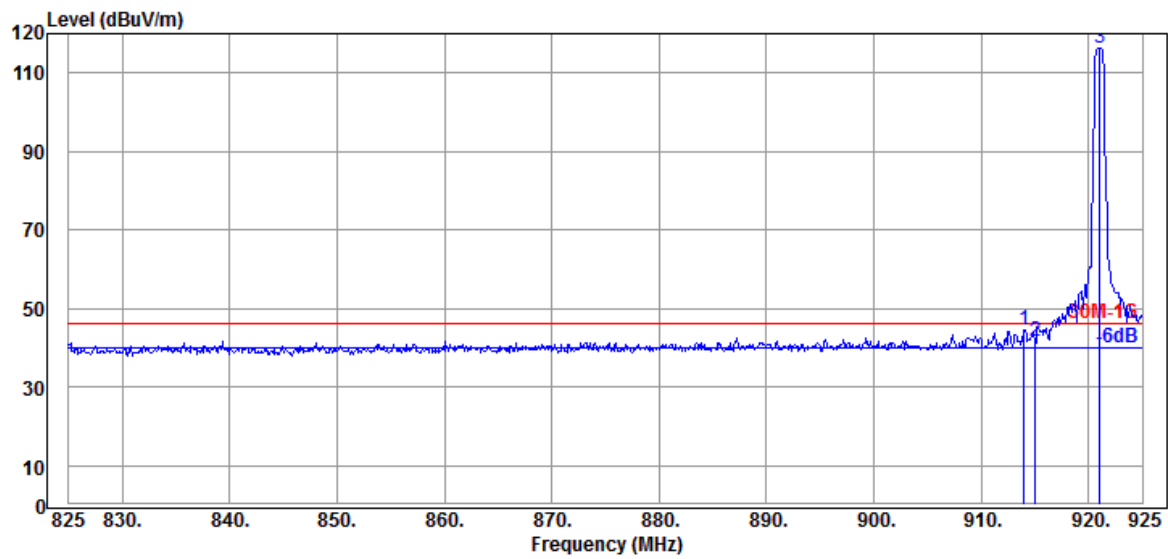
Emission Frequency (MHz)	Antenna Factor (dB/m)	CaLoRa Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1846.000	26.88	4.88	39.99	47.20	38.97	54.00	15.03	Peak

Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	CaLoRa Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
1846.000	26.88	4.88	39.99	47.21	38.98	54.00	15.02	Peak

2.3. 禁用頻帶量測結果 (其他不必要發射)

Mode	LoRa™	Frequency	TX 921MHz
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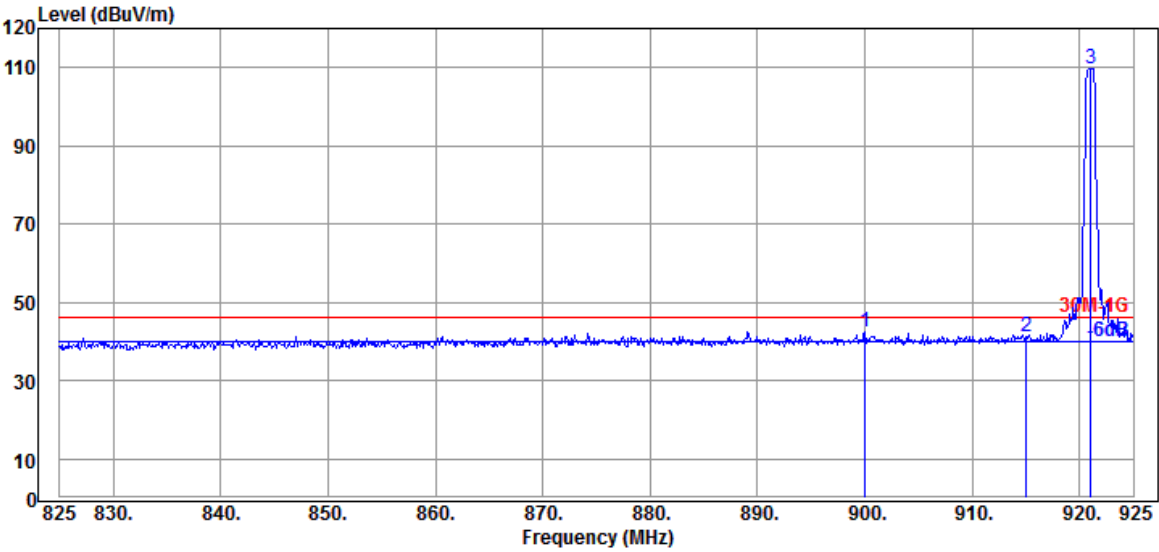
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
914.000	26.90	8.78	28.81	37.83	44.70	46.00	1.30	Peak
915.000	26.92	8.78	28.81	34.83	41.72	46.00	4.28	Peak
@ 921.000	26.96	8.81	28.79	109.27	116.25	---	---	Peak

Frequency (MHz)	Peak Value (dBμV/m)	Duty Cycle Correction Factor (dB)	Average Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
914.00	44.70	-9.12	35.58	46.00	10.42	Average
915.00	41.72	-9.12	32.60	46.00	13.40	Average

備註：“@”為主波，在此章節是不予以判定。

Mode	LoRa™	Frequency	TX 921MHz
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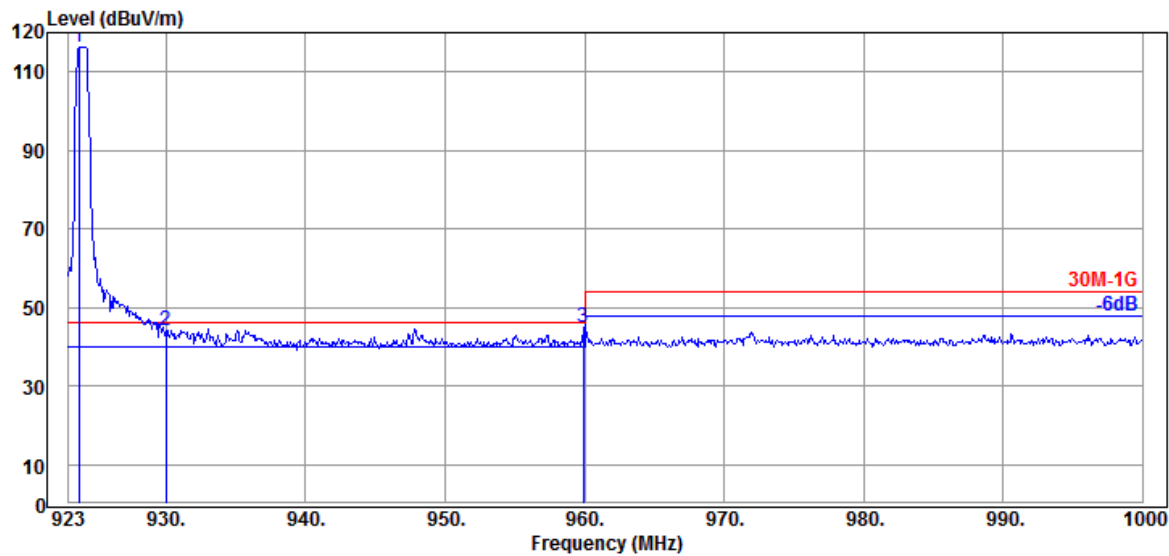
Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
900.000	26.82	8.72	28.86	35.79	42.47	46.00	3.53	Peak
915.000	26.92	8.78	28.81	34.42	41.31	46.00	4.69	Peak
@ 921.000	26.96	8.81	28.79	102.88	109.86	---	---	Peak

Frequency (MHz)	Peak Value (dBμV/m)	Duty Cycle Correction Factor (dB)	Average Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
900.00	42.47	-9.12	33.35	46.00	12.65	Average
915.00	41.31	-9.12	32.19	46.00	13.81	Average

備註：“@”為主波，在此章節是不予以判定。

Mode	LoRa™	Frequency	TX 924MHz
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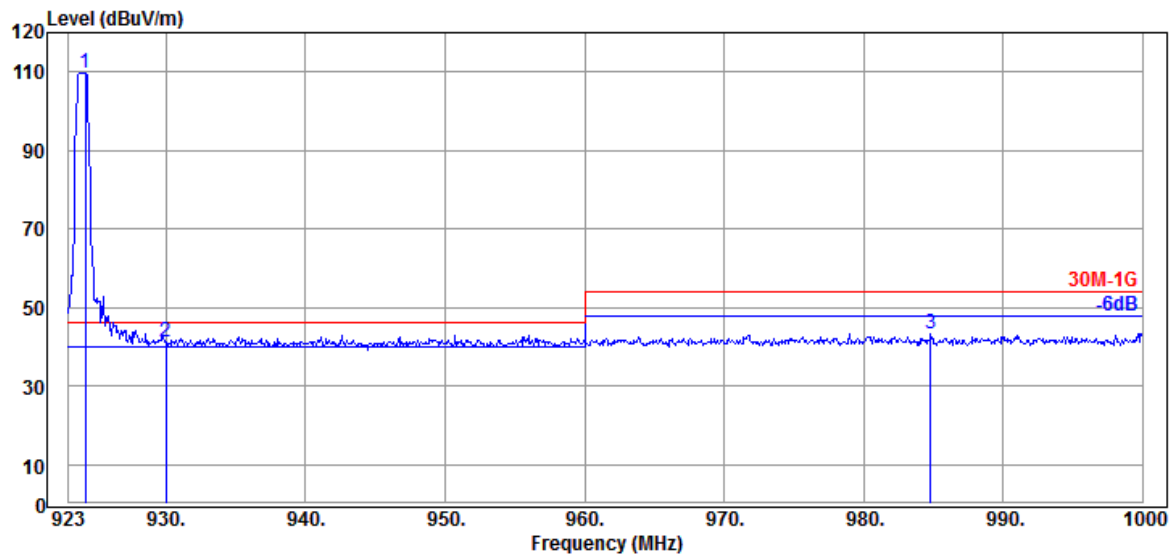
Antenna at Horizontal Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	CaLoR a Loss (dB)	Preamp Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 923.770	26.96	8.82	28.79	109.23	116.22	---	---	Peak
930.007	26.99	8.85	28.76	37.19	44.27	46.00	1.73	Peak
959.883	27.17	8.98	28.69	37.43	44.89	46.00	1.11	Peak

Frequency (MHz)	Peak Value (dBμV/m)	Duty Cycle Correction Factor (dB)	Average Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
930.007	44.27	-9.12	35.15	46.00	10.85	Average
959.883	44.89	-9.12	35.77	46.00	10.23	Average

備註：“@”為主波，在此章節是不予以判定。

Mode	LoRa™	Frequency	TX 924MHz
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Antenna at Vertical Polarization

Emission Frequency (MHz)	Antenna Factor (dB/m)	CaLoR a Loss (dB)	Preamplifier Gain (dB)	Read Level (dBμV)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector
@ 924.232	26.97	8.83	28.79	102.70	109.71	---	---	Peak
930.007	26.99	8.85	28.76	34.25	41.33	46.00	4.67	Peak
984.831	27.32	9.09	28.61	35.41	43.21	46.00	2.79	Peak

Frequency (MHz)	Peak Value (dBμV/m)	Duty Cycle Correction Factor (dB)	Average Value (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
930.007	41.33	-9.12	32.21	46.00	13.79	Average
984.831	43.21	-9.12	34.09	46.00	11.91	Average

備註：“@”為主波，在此章節是不予以判定。

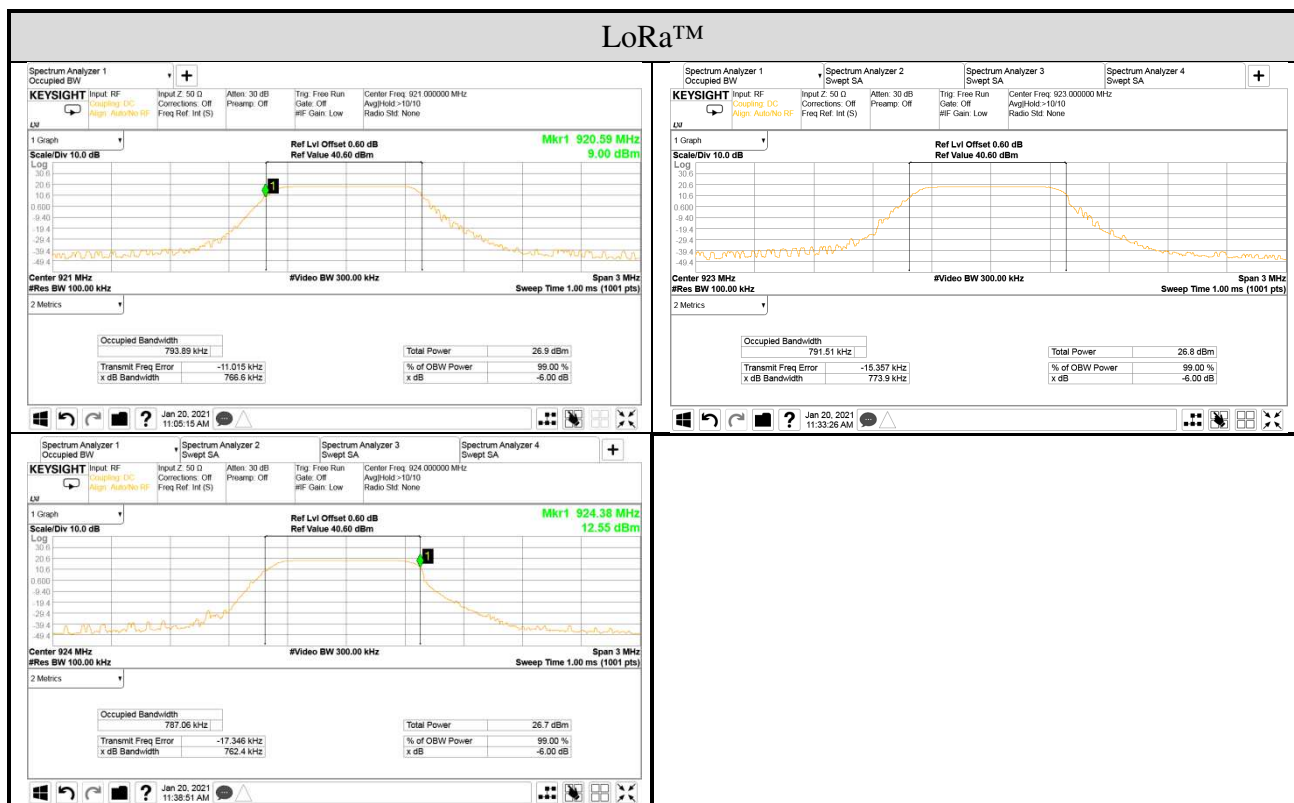
3. 發射頻寬之量測

測試日期	2021/01/20	環境溫/濕度	22°C/54%
電纜損失	0.60dB	測試人員	Kuper Hsu
測試電壓	DC 3.3V (經治具連接電源供應器供電)		

3.1. 發射頻寬

模式 (Mode)	測試頻率 (MHz)	6dB 頻寬 (kHz)	限制值 (kHz)
LoRa™	921	0.7666	>500
	923	0.7739	
	924	0.7624	

3.2. 發射頻寬之量測圖



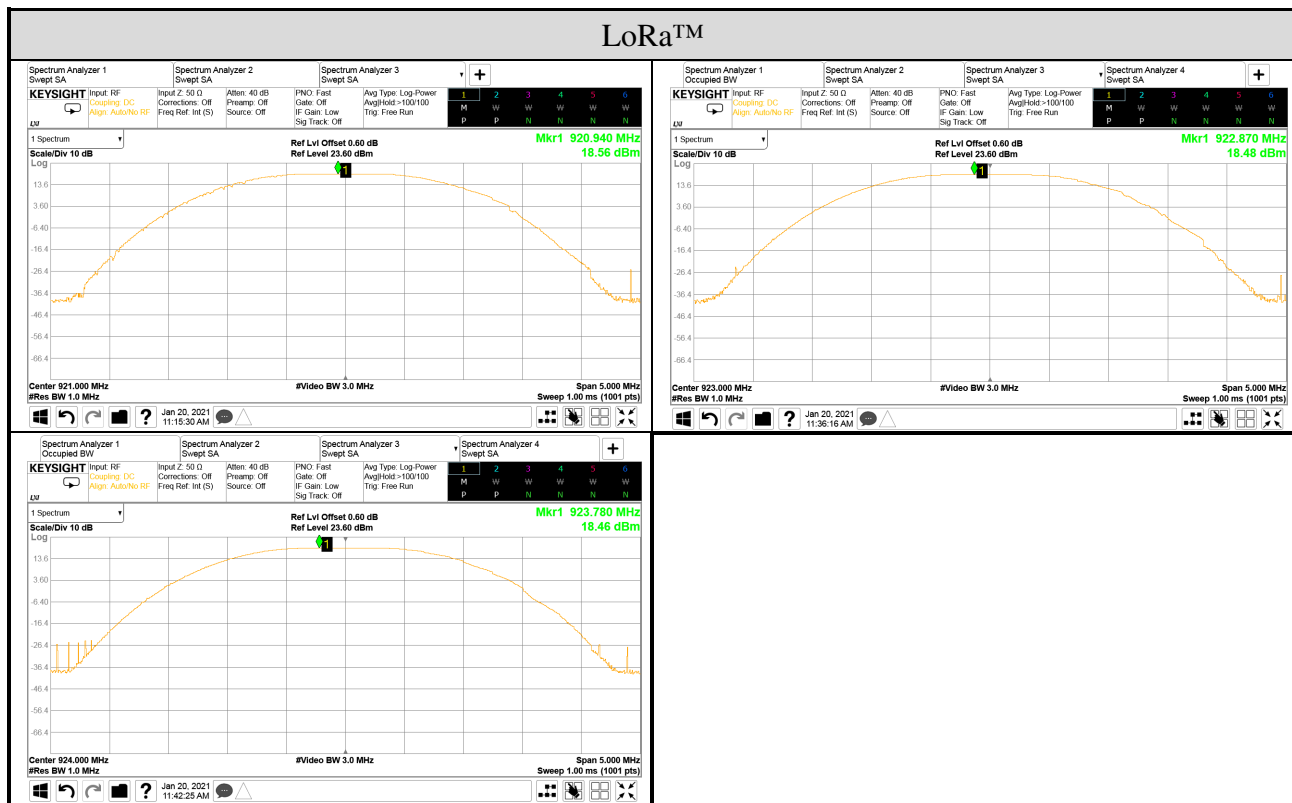
4. 峰值輸出功率之量測

測試日期	2021/01/20	環境溫/濕度	22°C/54%
電纜損失	0.60dB	測試人員	Kuper Hsu
測試電壓	DC 3.3V (經治具連接電源供應器供電)		

4.1. 峰值輸出功率

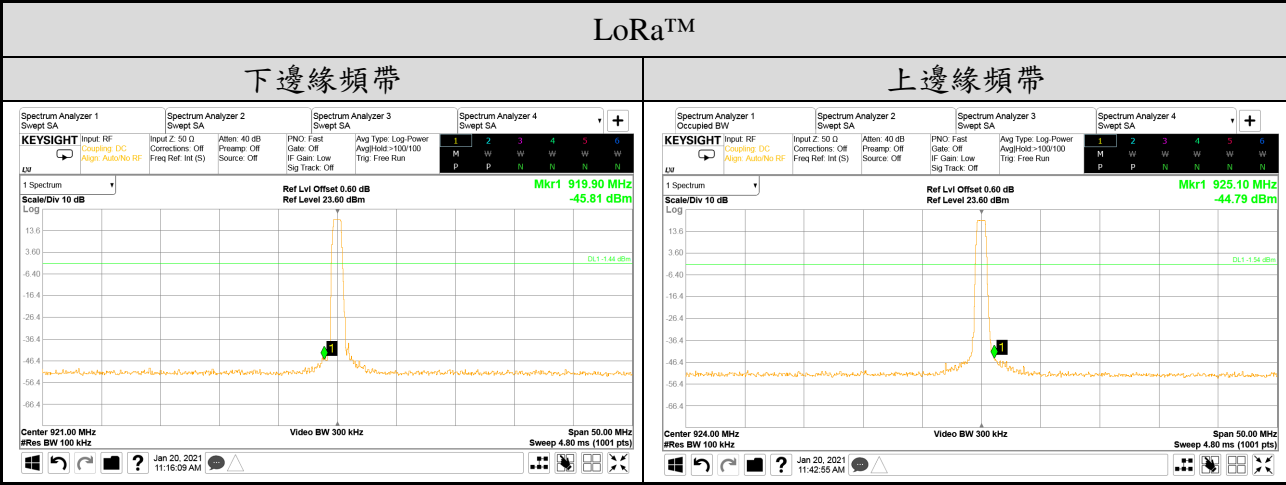
模式 (Mode)	測試頻率 (MHz)	最大輸出功率 (dBm)	限制值 (dBm)
LoRa™	921	18.56	27
	923	18.48	
	924	18.46	

4.2. 峰值輸出功率之量測圖



5. 頻帶邊緣之 RF 傳導發射之量測

測試日期	2021/01/20	環境溫/濕度	22°C/54%
電纜損失	0.60dB	測試人員	Kuper Hsu
測試電壓	DC 3.3V (經治具連接電源供應器供電)		

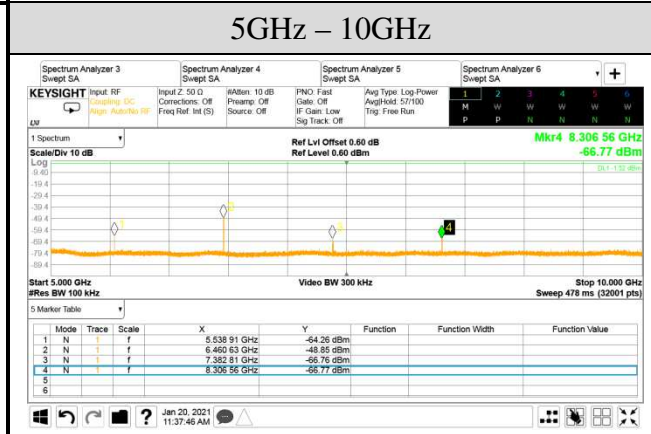
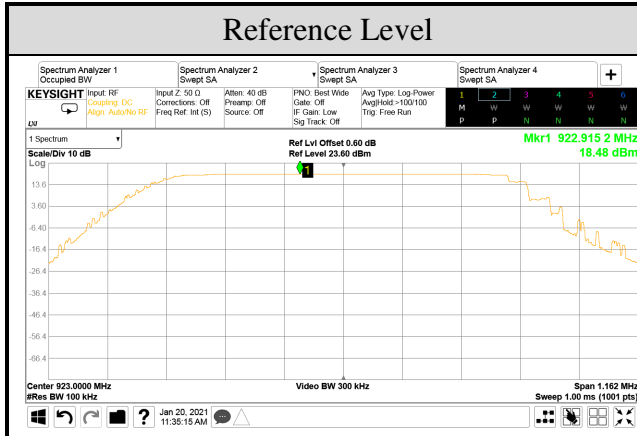


6. 混附發射之 RF 傳導發射之量測

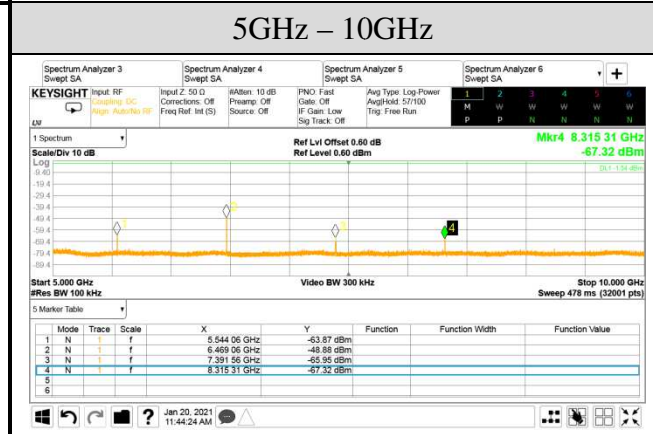
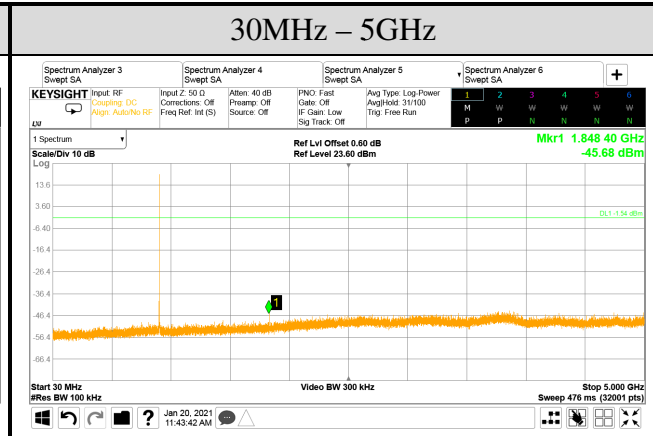
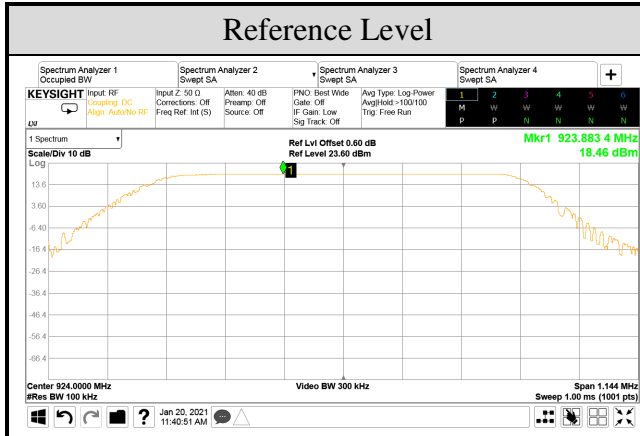
測試日期	2021/01/20	環境溫/濕度	22°C/54%
電纜損失	0.60dB	測試頻率	921MHz
測試電壓	DC 3.3V (經治具連接電源供應器供電)	測試人員	Kuper Hsu



測試日期	2021/01/20	環境溫/濕度	22°C/54%
電纜損失	0.60dB	測試頻率	923MHz
測試電壓	DC 3.3V (經治具連接電源供應器供電)	測試人員	Kuper Hsu



測試日期	2021/01/20	環境溫/濕度	22°C/54%
電纜損失	0.60dB	測試頻率	924MHz
測試電壓	DC 3.3V (經治具連接電源供應器供電)	測試人員	Kuper Hsu



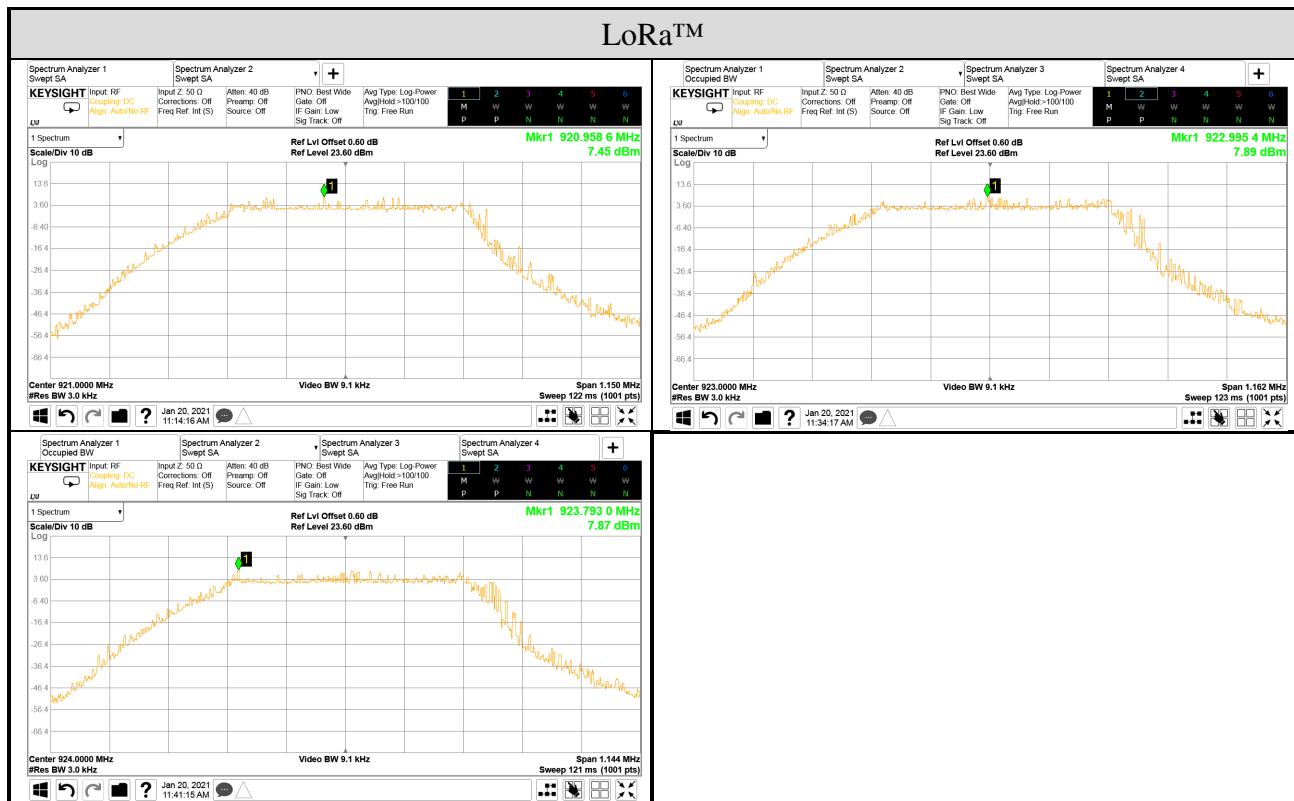
7. 功率密度之量測

測試日期	2021/01/20	環境溫/濕度	22°C/54%
電纜損失	0.60dB	測試人員	Kuper Hsu
測試電壓	DC 3.3V (經治具連接電源供應器供電)		

7.1. 功率密度

模式 (Mode)	測試頻率 (MHz)	功率密度(dBm)	限制值 (dBm)
LoRa™	921	7.45	8
	923	7.89	
	924	7.87	

7.2. 功率密度之量測圖



8. 電波暴露量之量測

測試日期	2021/01/20	環境溫/濕度	22°C/54%
測試電壓	DC 3.3V (經治具連接電源供應器供電)	測試人員	Kuper Hsu

距離人體(r):	20	cm	
最大發射功率(P):	18.56	dBm	= 71.779 mW
最大天線增益(G):	2.0	dBd	= 1.585 Numerical
MPE (S) = (P*G) / (4* π *r ²) =	0.0226		mW/cm ²
註：1. 最大發射功率系指LoRa™各模式/頻道中最大之發射功率功率。			
2. 電磁波曝露量MPE標準值0.616mW/cm ² ，送測產品實測值為：0.0226mW/cm ²			