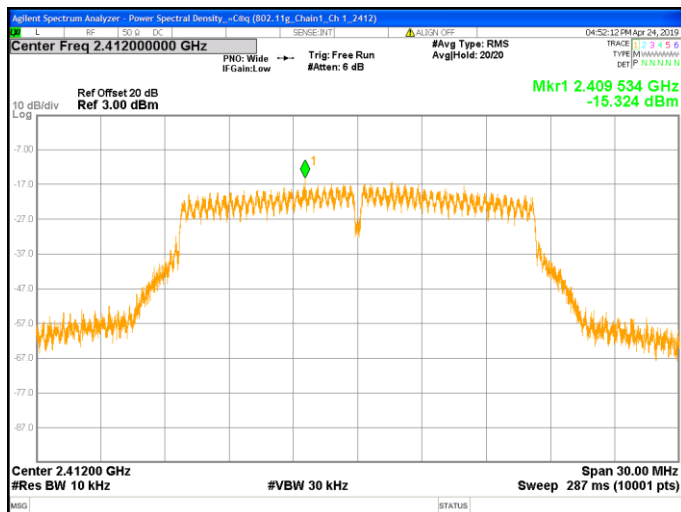
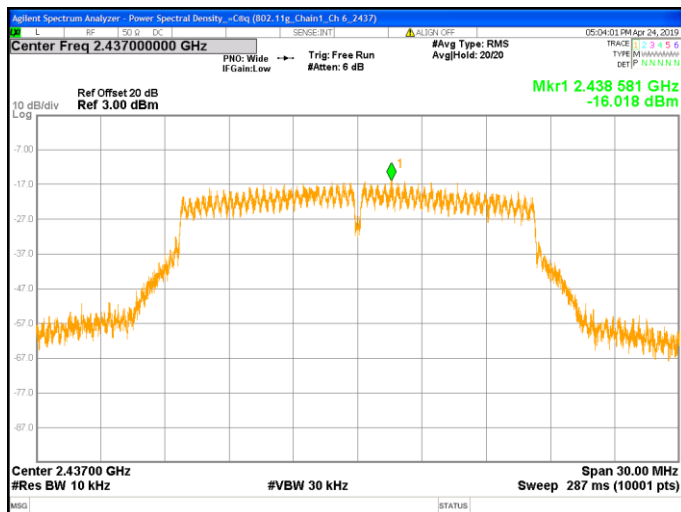


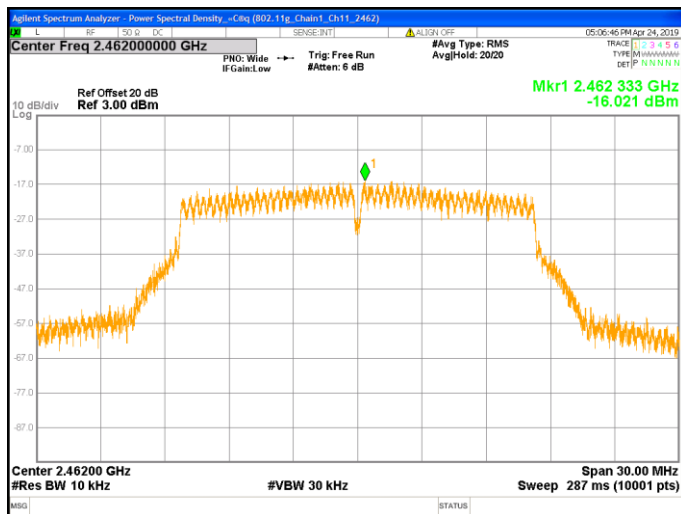
Chain1 : Power Spectral Density @ 802.11g Mode Ch 1



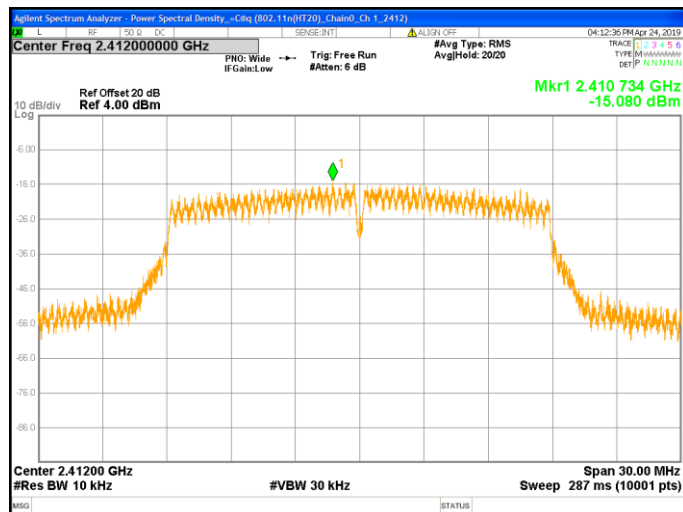
Chain1 : Power Spectral Density @ 802.11g Mode Ch 6



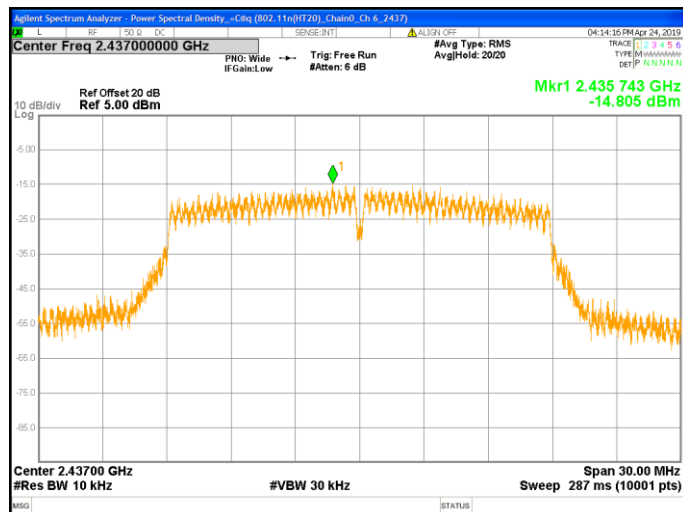
Chain1 : Power Spectral Density @ 802.11g Mode Ch11



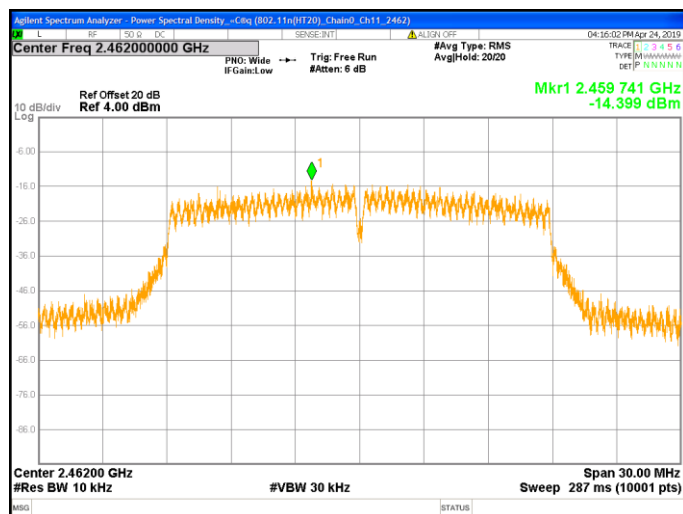
Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch 1



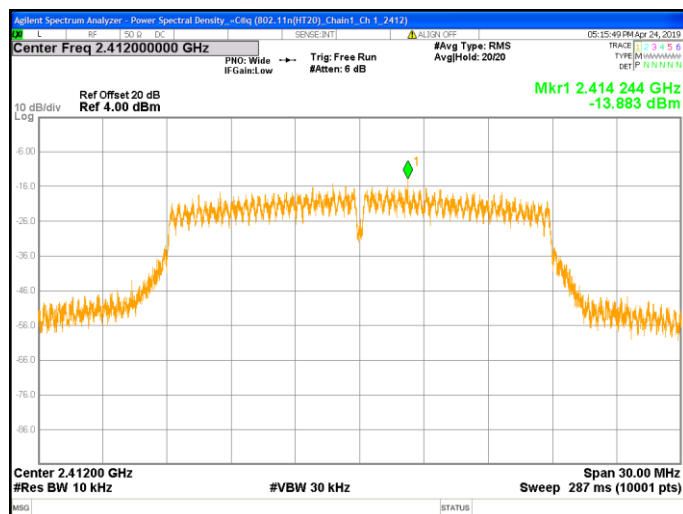
Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch 6



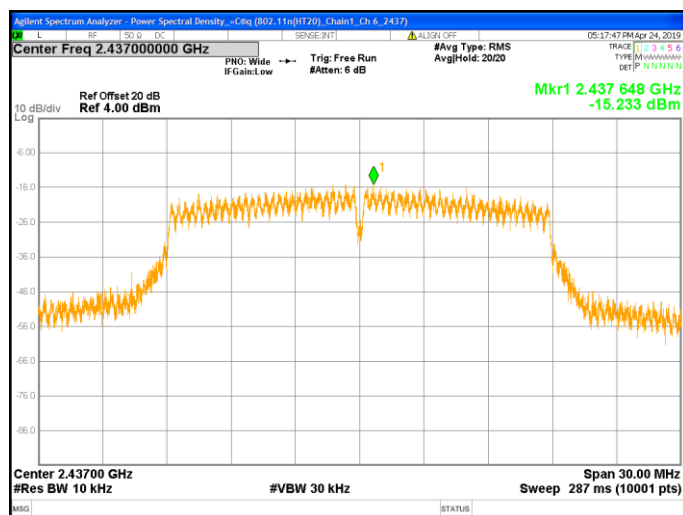
Chain0 : Power Spectral Density @ 802.11n(HT20) Mode Ch11



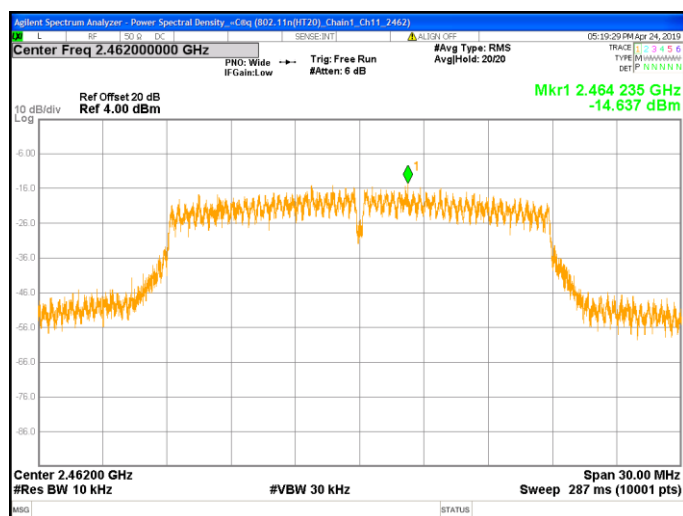
Chain1 : Power Spectral Density @ 802.11n(HT20) Mode Ch 1



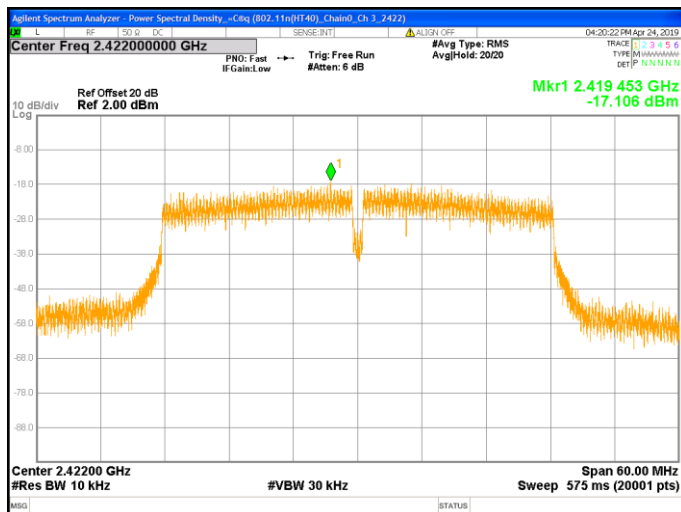
Chain1 : Power Spectral Density @ 802.11n(HT20) Mode Ch 6



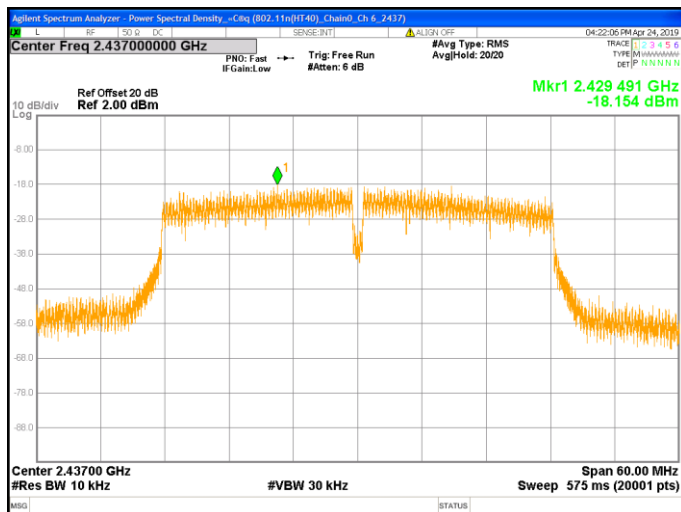
Chain1 : Power Spectral Density @ 802.11n(HT20) Mode Ch11



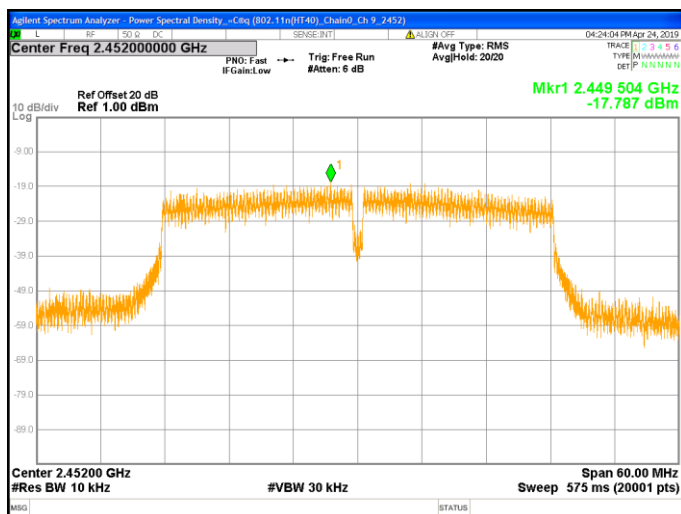
Chain0 : Power Spectral Density @ 802.11n(HT40) Mode Ch 3



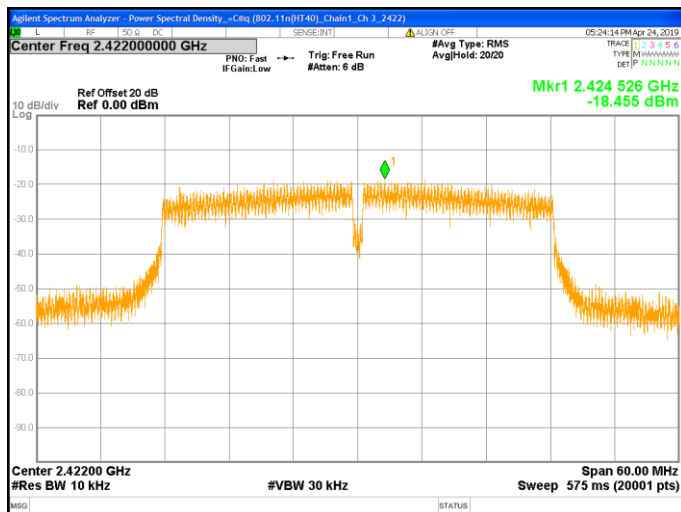
Chain0 : Power Spectral Density @ 802.11n(HT40) Mode Ch 6



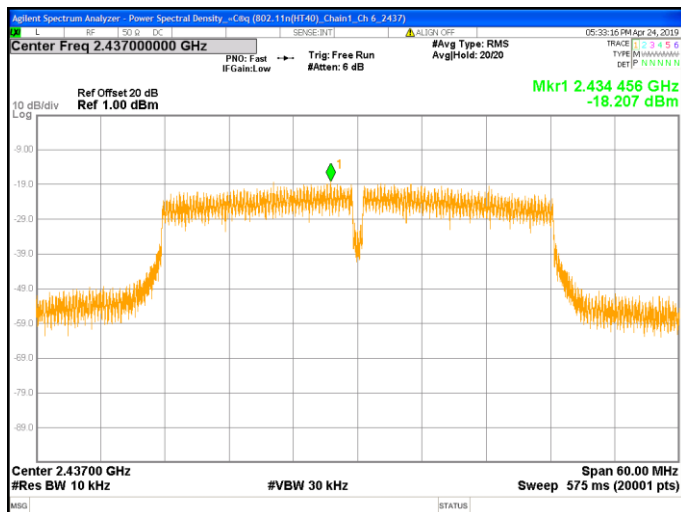
Chain0 : Power Spectral Density @ 802.11n(HT40) Mode Ch 9



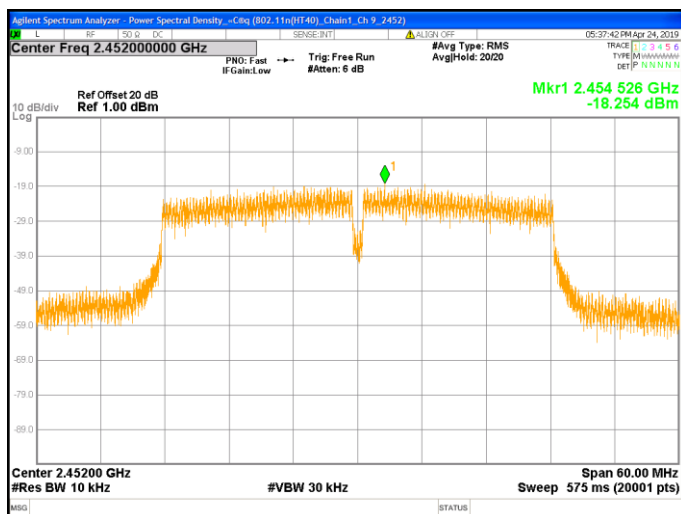
Chain1 : Power Spectral Density @ 802.11n(HT40) Mode Ch 3



Chain1 : Power Spectral Density @ 802.11n(HT40) Mode Ch 6



Chain1 : Power Spectral Density @ 802.11n(HT40) Mode Ch 9



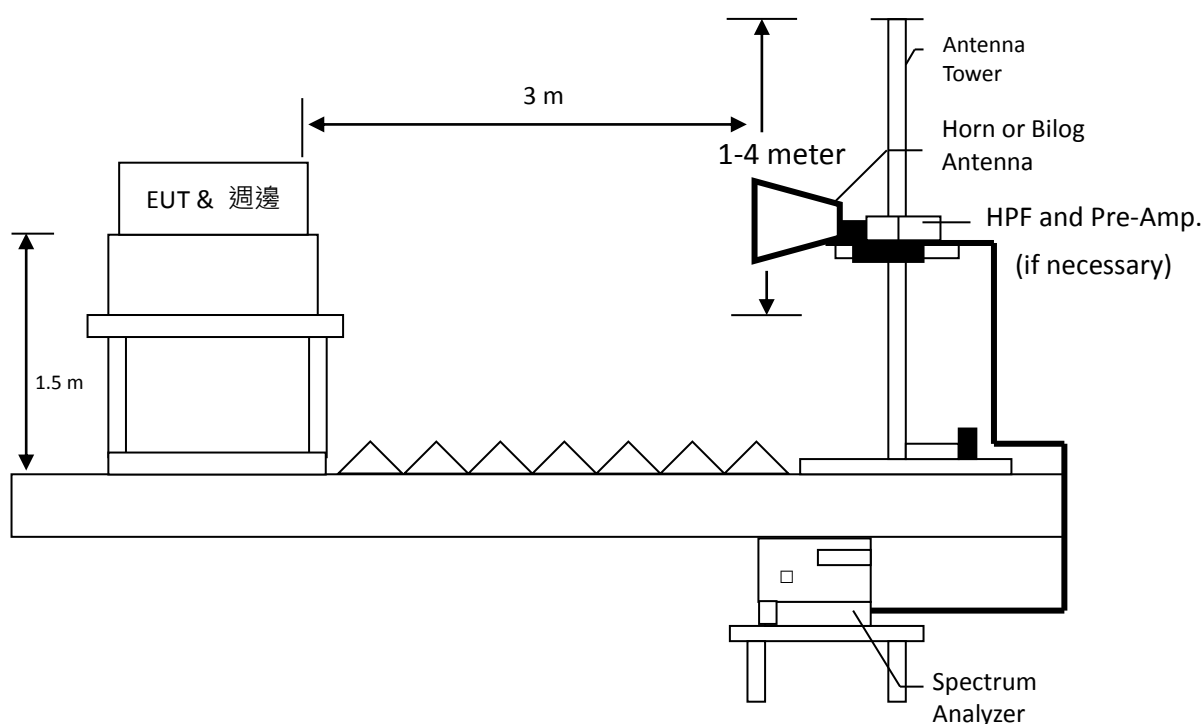
9. 頻帶邊緣測試

9.1 適用規範

依據國家通訊傳播委員會低功率射頻電機技術規範 3.10.1 節(5)之規定，使用頻帶範圍外之任意 100kHz 內，發射器所產生的射頻功率相較於頻帶範圍中包含最高所需功率之 100kHz 內的射頻功率，需衰減 20 分貝(dB)，以射頻傳導或輻射方式量測。此外，落於第 2.7 節禁用頻段之輻射發射，應符合第 2.8 節之規定。

9.2 測試配置圖

輻射方式量測：



9.3 測試結果

溫度 : 25 °C

相對濕度 : 50 %

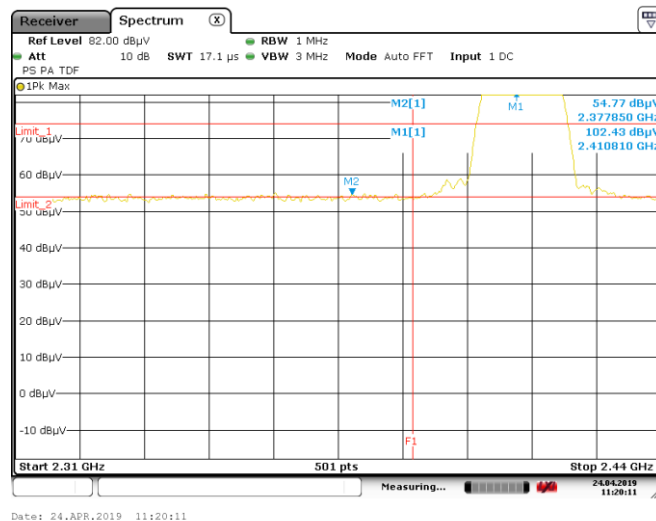
Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
802.11b Chain0	2377.85	PK	V	34.45	20.32	54.77	74	-19.23	2310~2390
	2390.00	AV	V	34.48	7.52	42.00	54	-12.00	
	2485.06	PK	V	34.71	20.41	55.12	74	-18.88	2483.5~2500
	2488.05	AV	V	34.72	7.56	42.28	54	-11.72	
802.11b Chain1	2388.18	PK	V	34.48	21.29	55.77	74	-18.23	2310~2390
	2390.00	AV	V	34.48	8.17	42.65	54	-11.35	
	2485.90	PK	V	34.72	21.08	55.80	74	-18.20	2483.5~2500
	2483.50	AV	V	34.71	8.18	42.89	54	-11.11	
802.11g Chain0	2390.00	PK	V	34.48	26.25	60.73	74	-13.27	2310~2390
	2390.00	AV	V	34.48	10.12	44.60	54	-9.40	
	2484.22	PK	V	34.71	28.55	63.26	74	-10.74	2483.5~2500
	2483.50	AV	V	34.71	12.73	47.44	54	-6.56	
802.11g Chain1	2390.00	PK	V	34.48	23.55	58.03	74	-15.97	2310~2390
	2390.00	AV	V	34.48	10.21	44.69	54	-9.31	
	2483.50	PK	V	34.71	24.54	59.25	74	-14.75	2483.5~2500
	2483.50	AV	V	34.71	9.71	44.42	54	-9.58	
802.11n (HT20) Chain0+1	2390.00	PK	V	34.48	28.41	62.89	74	-11.11	2310~2390
	2390.00	AV	V	34.48	14.62	49.10	54	-4.90	
	2484.01	PK	V	34.71	32.54	67.25	74	-6.75	2483.5~2500
	2483.50	AV	V	34.71	14.47	49.18	54	-4.82	
802.11n (HT40) Chain0+1	2386.93	PK	V	34.47	35.00	69.47	74	-4.53	2310~2390
	2390.00	AV	V	34.48	18.39	52.87	54	-1.13	
	2485.55	PK	V	34.71	38.09	72.80	74	-1.20	2483.5~2500
	2483.50	AV	V	34.71	16.63	51.34	54	-2.66	

Remark: Correction Factor = Antenna Factor + Cable Loss

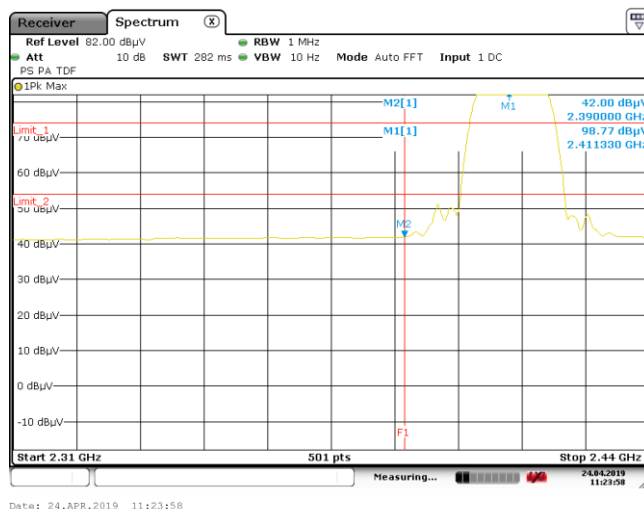
以上測試結果符合規範。

9.4 繪圖資料

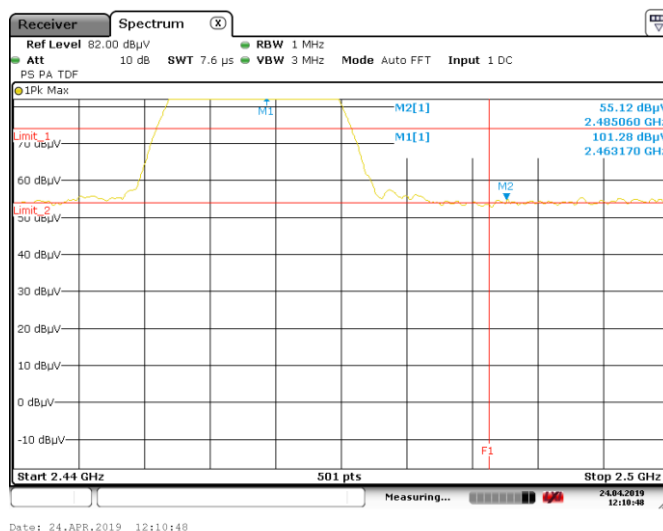
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch1 PK



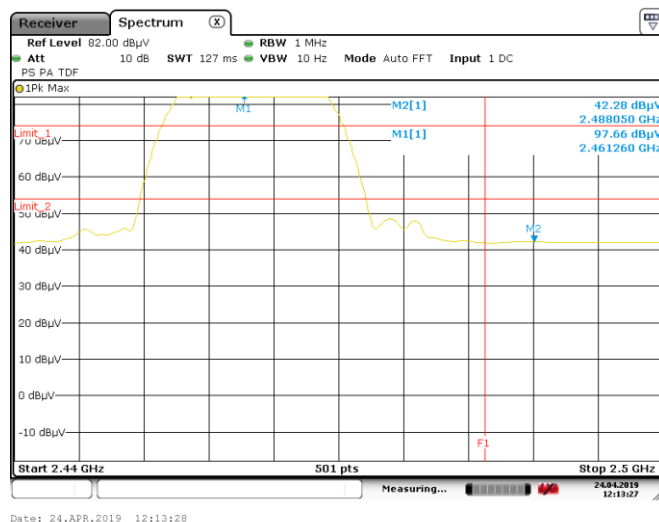
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch1 AV



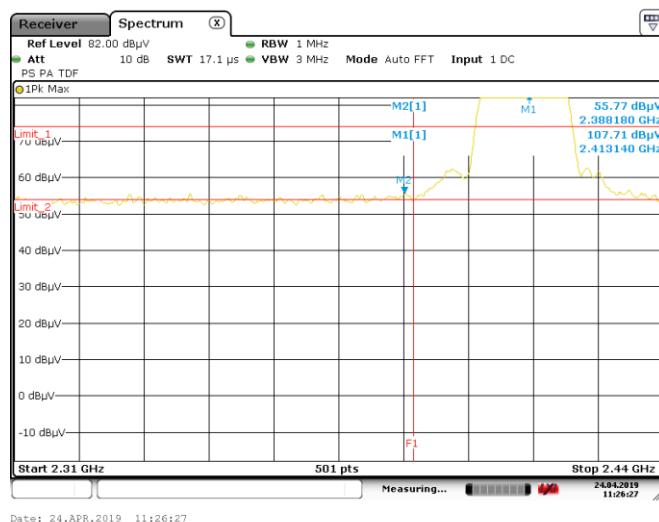
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch11 PK



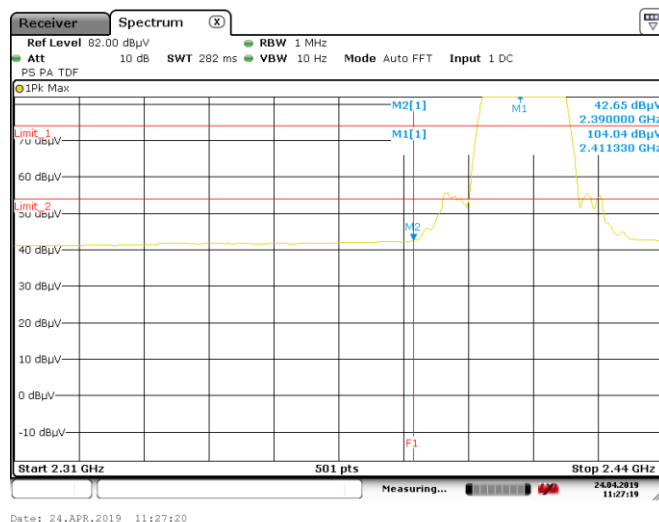
Chain0 : Restricted Band Bandedge @ 802.11b Mode Ch11 AV



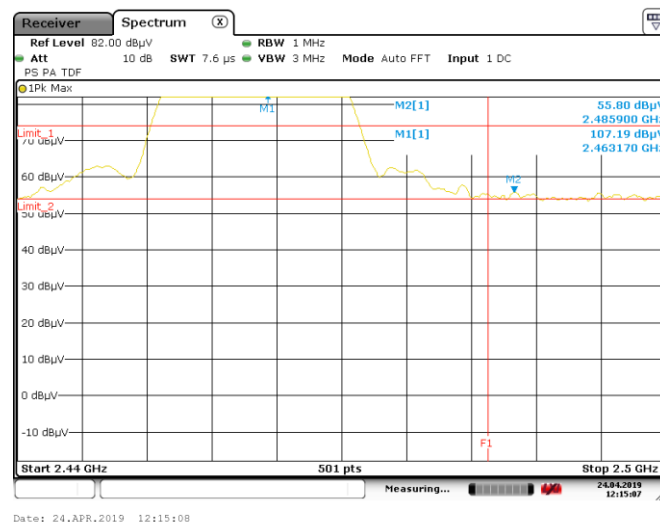
Chain1 : Restricted Band Bandedge @ 802.11b Mode Ch1 PK



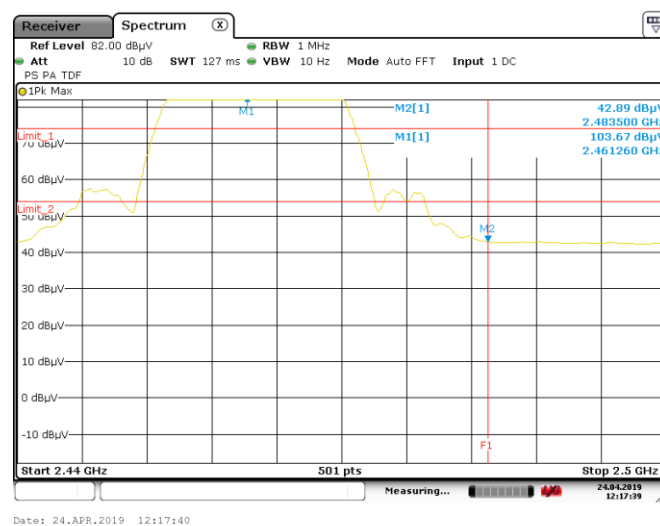
Chain1 : Restricted Band Bandedge @ 802.11b Mode Ch1 AV



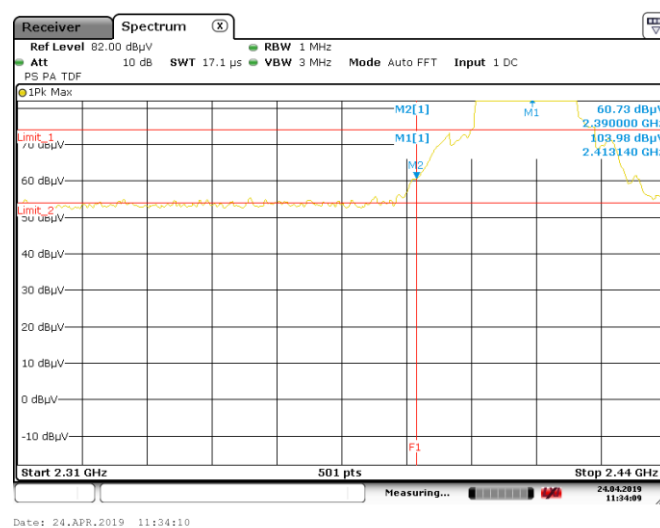
Chain1 : Restricted Band Bandedge @ 802.11b Mode Ch11 PK



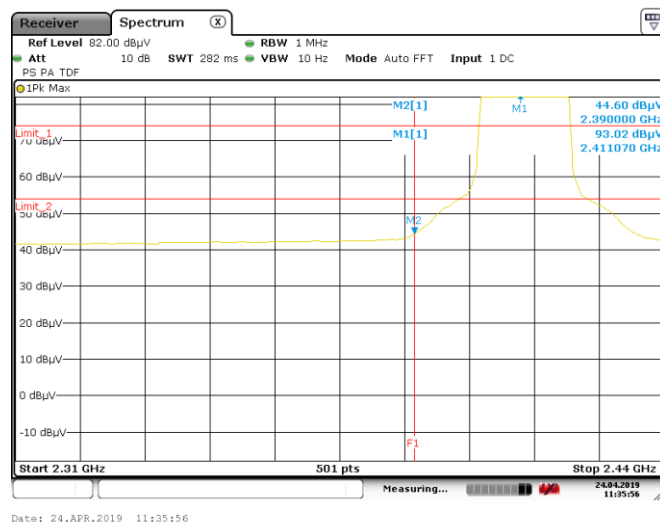
Chain1 : Restricted Band Bandedge @ 802.11b Mode Ch11 AV



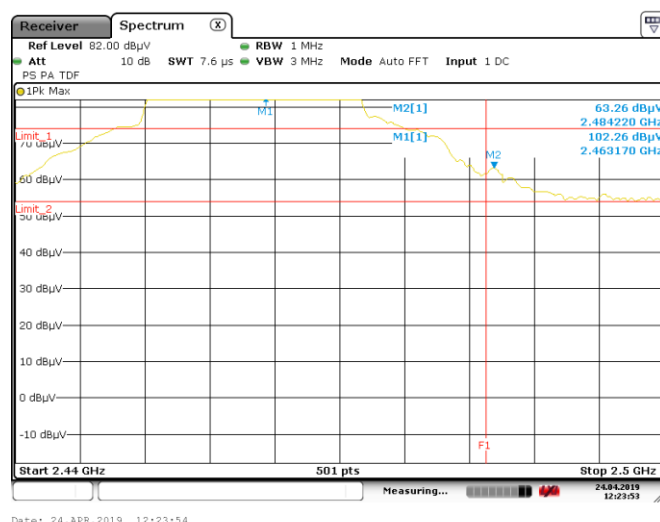
Chain0 : Restricted Band Bandedge @ 802.11g Mode Ch1 PK



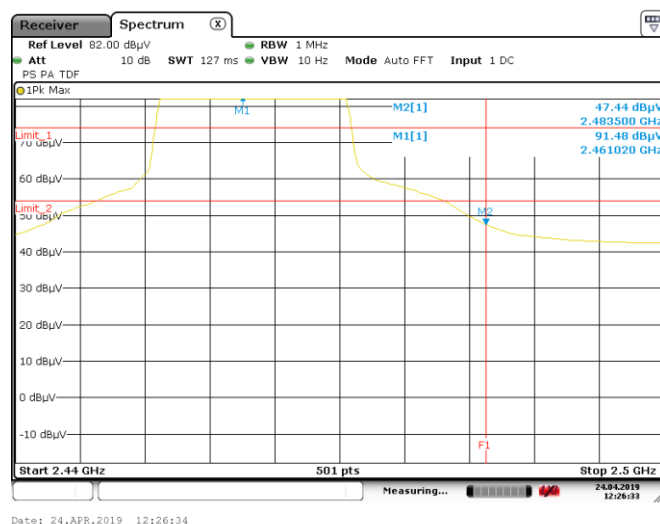
Chain0 : Restricted Band Bandedge @ 802.11g Mode Ch1 AV



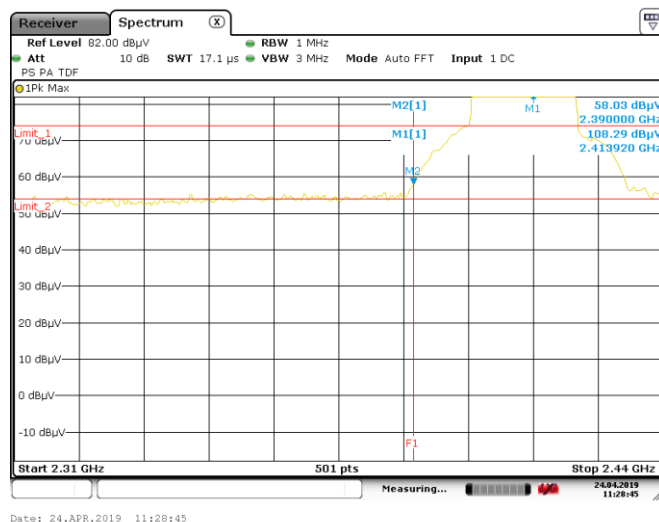
Chain0 : Restricted Band Bandedge @ 802.11g Mode Ch11 PK



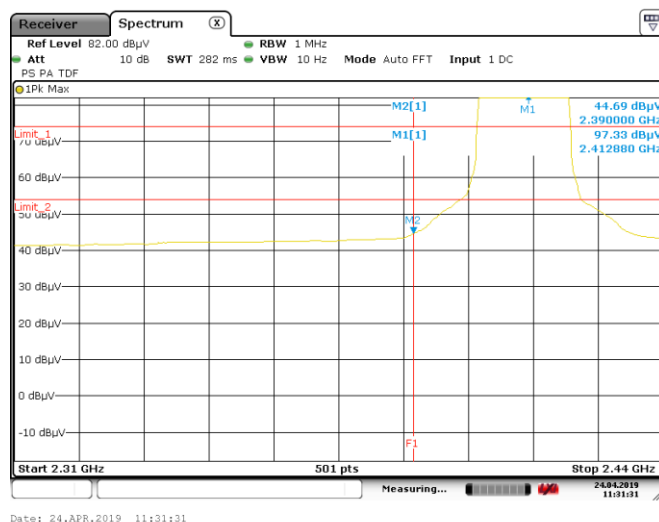
Chain0 : Restricted Band Bandedge @ 802.11g Mode Ch11 AV



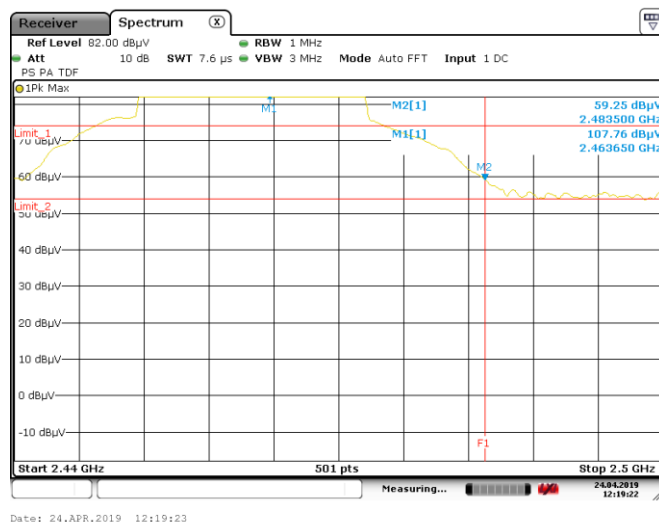
Chain1 : Restricted Band Bandedge @ 802.11g Mode Ch1 PK



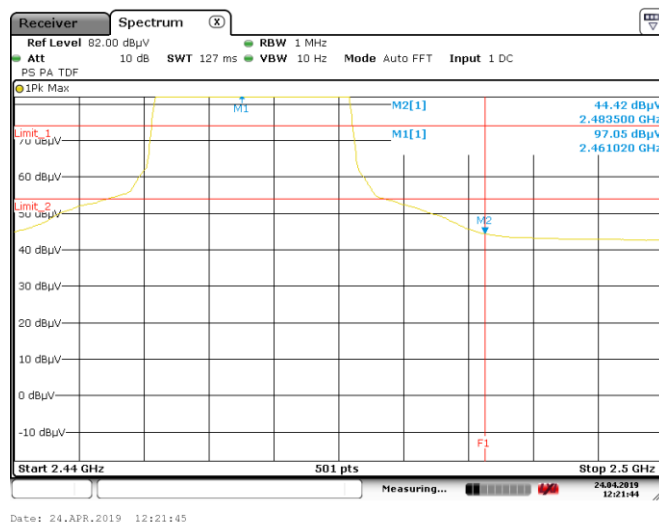
Chain1 : Restricted Band Bandedge @ 802.11g Mode Ch1 AV



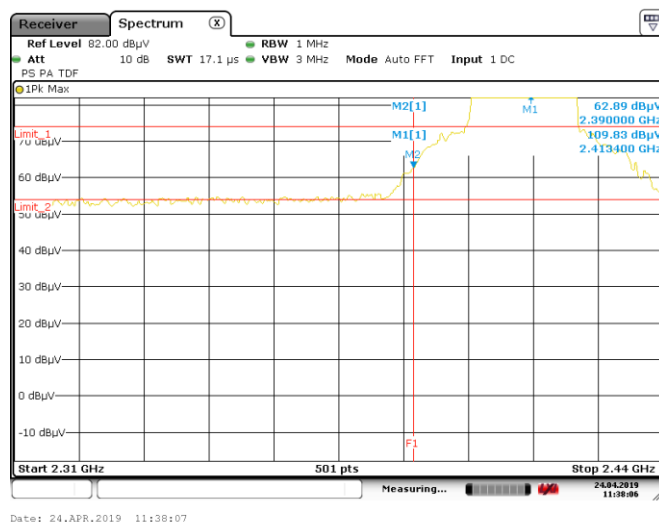
Chain1 : Restricted Band Bandedge @ 802.11g Mode Ch11 PK



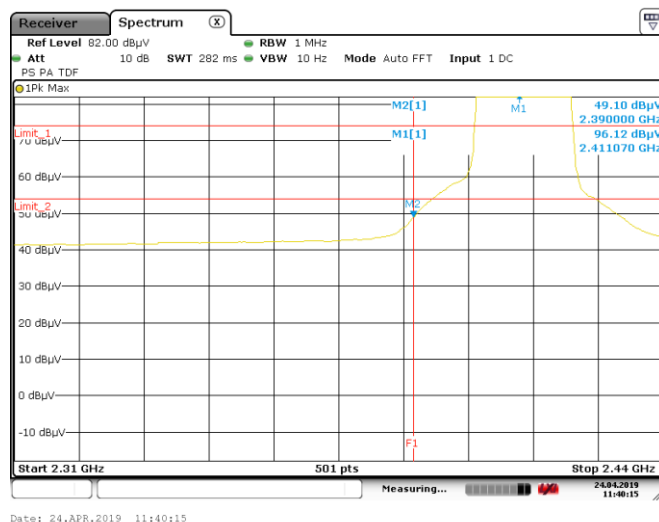
Chain1 : Restricted Band Bandedge @ 802.11g Mode Ch11 AV



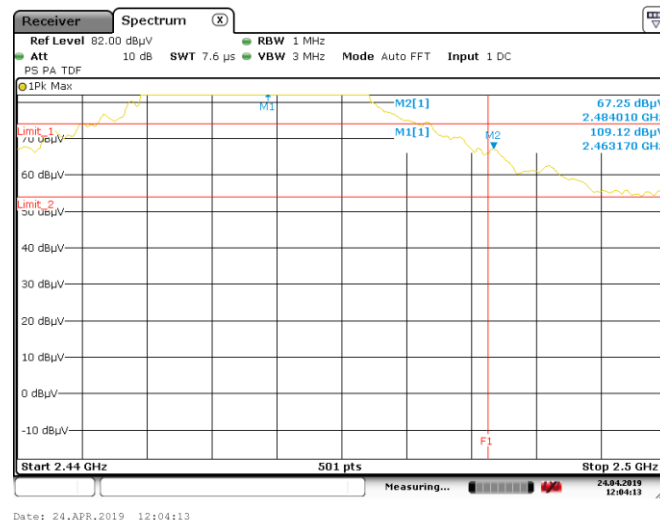
Chain0+1 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch1 PK



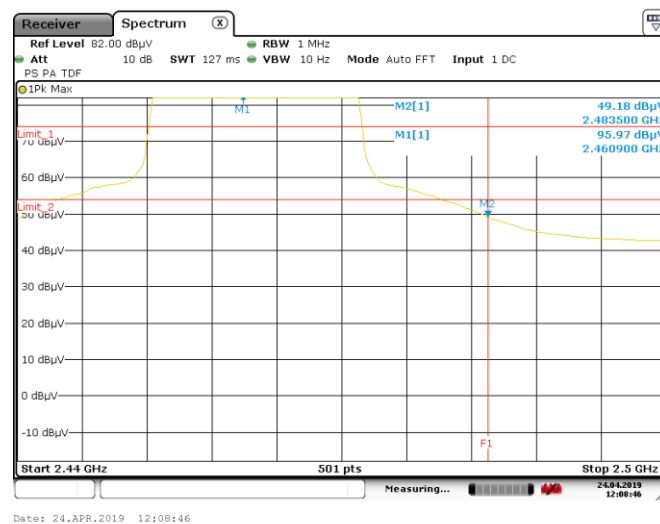
Chain0+1 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch1 AV



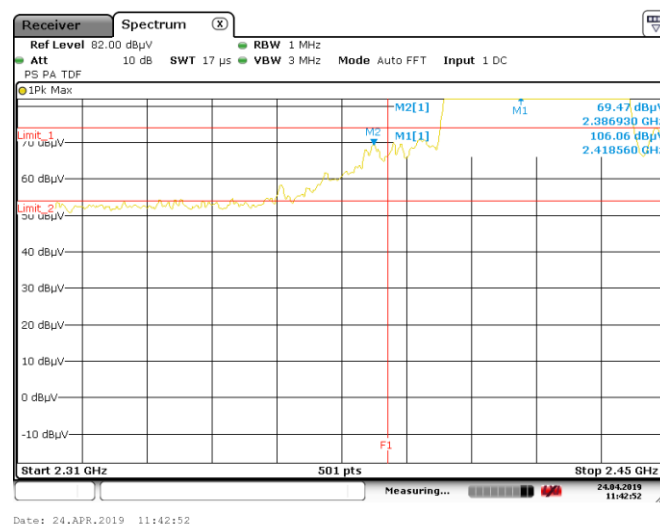
Chain0+1 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch11 PK



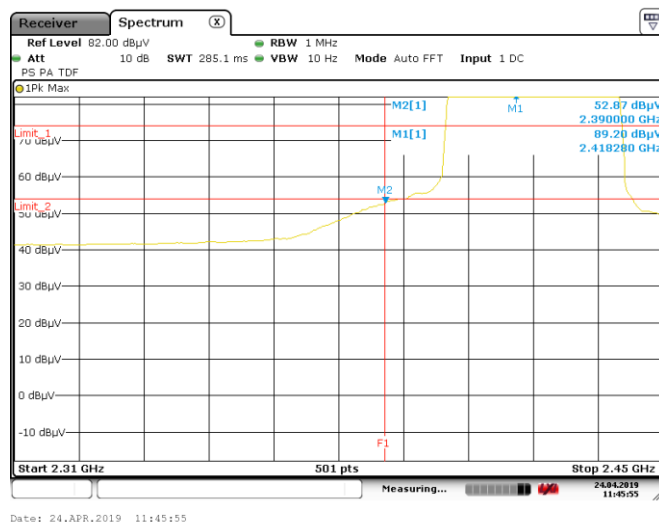
Chain0+1 : Restricted Band Bandedge @ 802.11n(HT20) Mode Ch11 AV



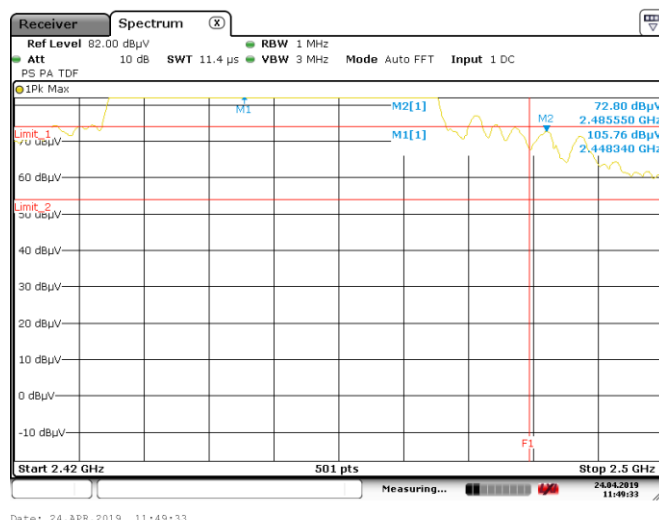
Chain0+1 : Restricted Band Bandedge @ 802.11n(HT40) Mode Ch3 PK



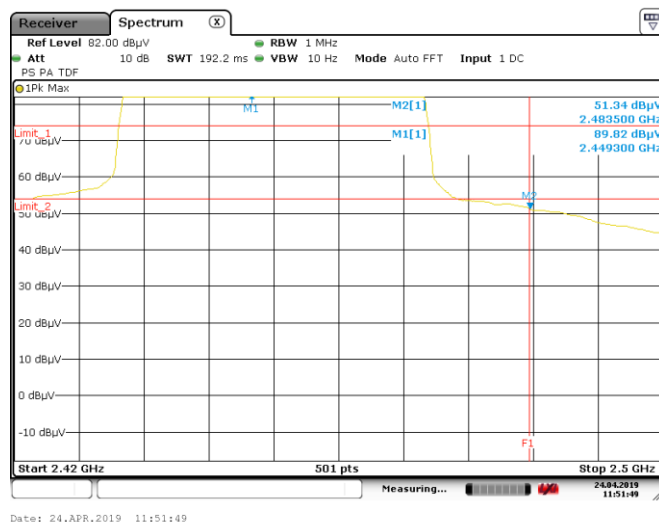
Chain0+1 : Restricted Band Bandedge @ 802.11n(HT40) Mode Ch3 AV



Chain0+1 : Restricted Band Bandedge @ 802.11n(HT40) Mode Ch9 PK



Chain0+1 : Restricted Band Bandedge @ 802.11n(HT40) Mode Ch9 AV



第二部份 BLE&BT2.1 測試項目：LP0002 3.10.2

10. 主波及輻射場強干擾測試

10.1 適用規範

依據國家通訊傳播委員會低功率射頻電機技術規範之 3.10.2.2 節之要求

主波頻率 (兆赫)	主波電場強度 (毫伏/公尺)	諧波電場強度 (微伏/公尺)	測距 (公尺)
2400-2483.5	50	500	3
5725-5875	50	500	3
24000-24250	250	2500	3

其他超出頻帶外之輻射，應符合 2.8 節之一般限制要求：

頻率 (MHz)	電場強度 (微伏/公尺)	測距 (公尺)
0.009-0.490 (含)	2,400/頻率(千赫)	300
0.490 (不含)-1.705 (含)	24,000/頻率(千赫)	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
Above 960	500	3

備註:

- 1.在交界頻率處，以數值較小者為標準。
- 2.測距是指待測物最靠近天線的點到天線的距離。

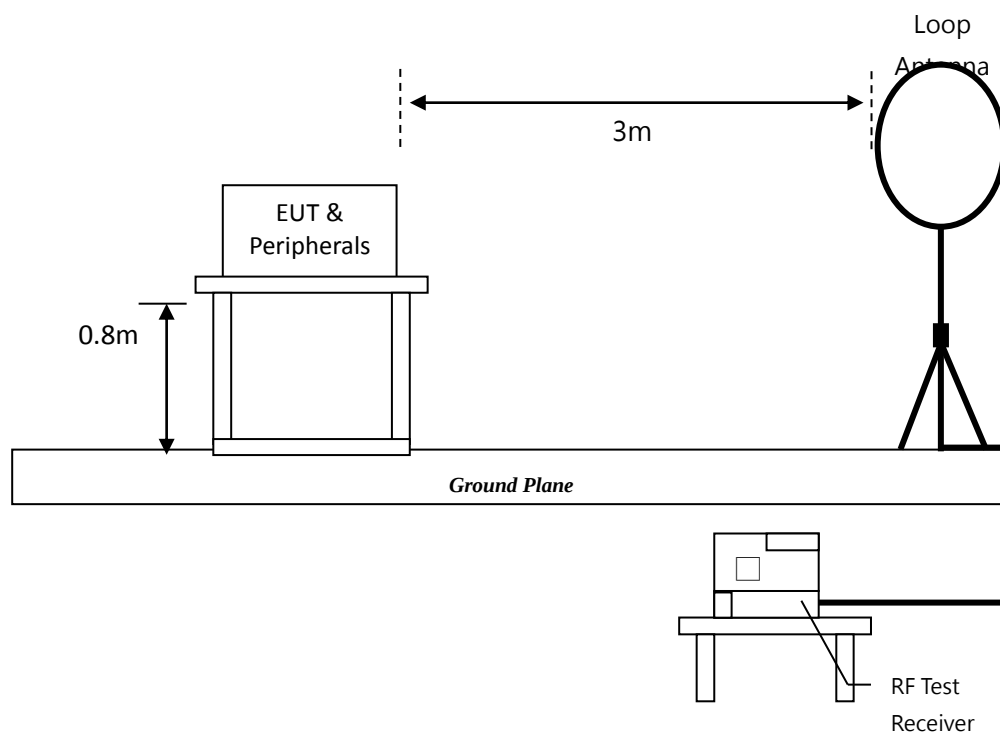
10.2 測試方法

如待測物須與週邊同時操作，則待測物須與週邊同時量測。在量測時，所有之連接線皆須擺設在最大的輻射場強下。待測物放在一個距離地面 0.8 公尺或 1.5 公尺、可 360°旋轉的旋轉桌上，待測物距離天線 3 米，天線可在距離地面 1~4 米之間升降，利用天線升降和桌子旋轉，找出待測物最大輻射場強，天線水平和垂直極化都須測量。

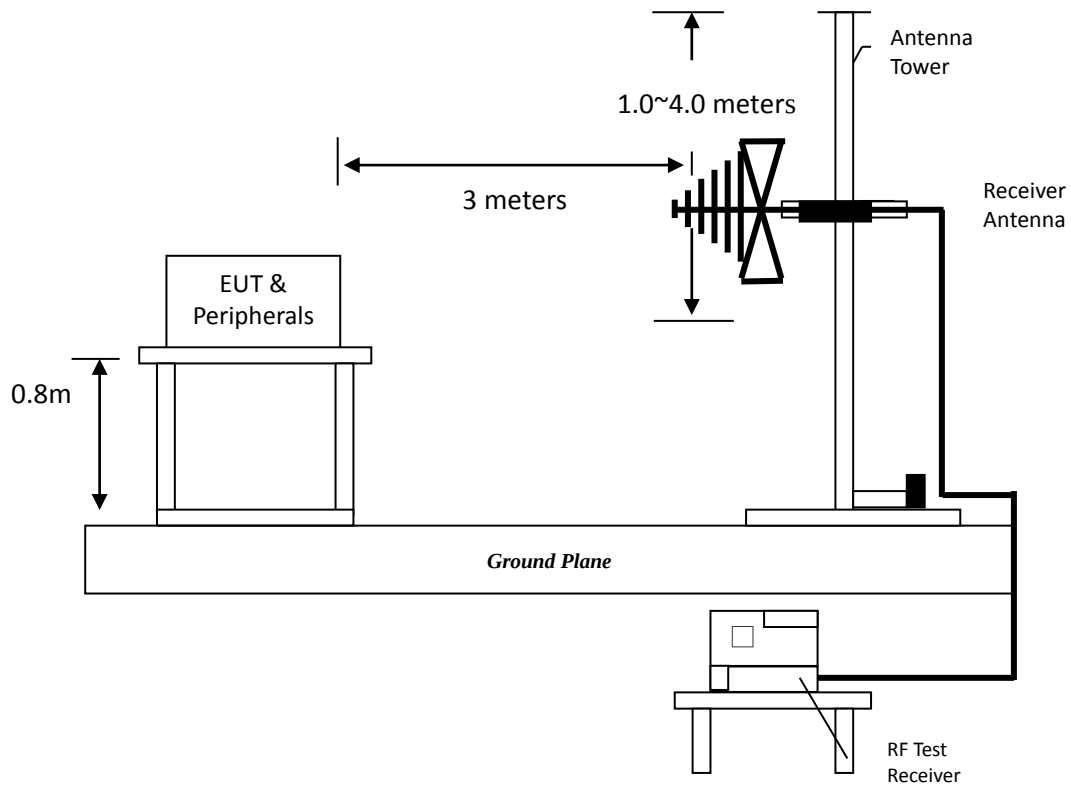
輻射場強量測是在 3 公尺測試距離下執行，除非輻射場強之強度太低以致無法在此一距離下量測。至於待測物之輻射場強強度低於儀器本身背景雜訊 (Noise floor) 之情況，則使用一放大器(Pre-amplifier)或將測試距離拉近，而後將所有之讀值反推至 3 米之量測值。

10.3 測試配置圖

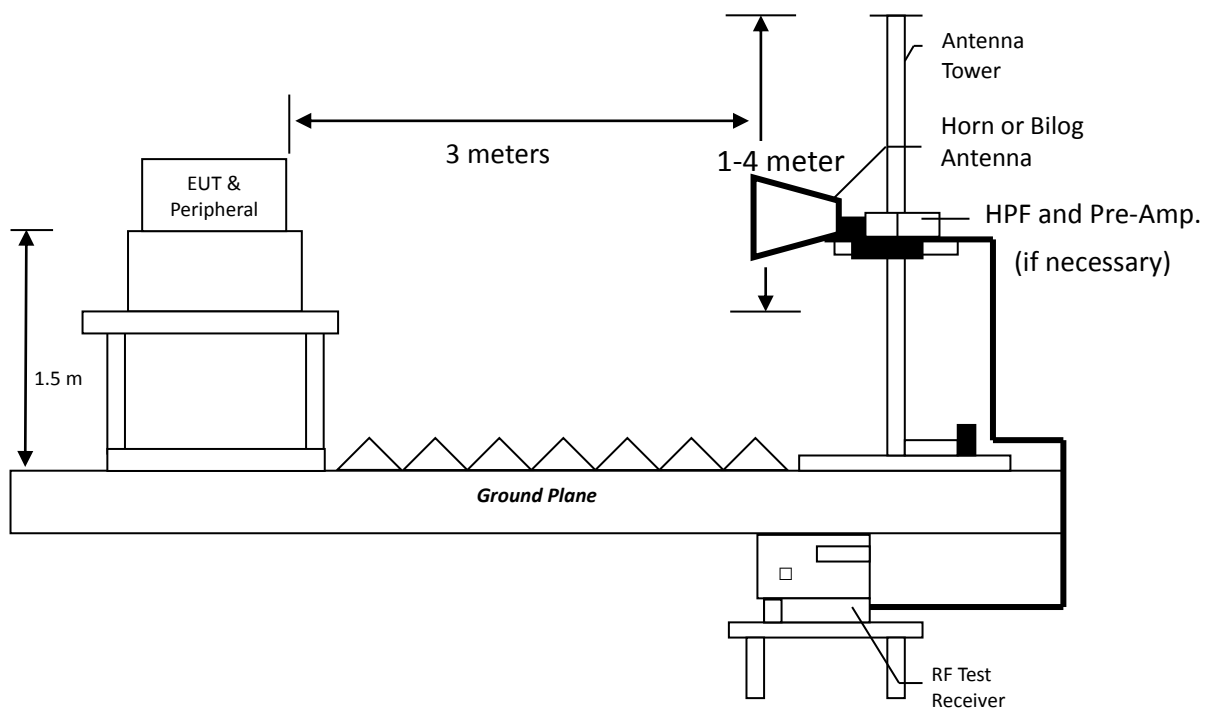
Radiated emission from 9 kHz to 30 MHz uses Loop Antenna:



Radiated emission from 30 MHz to 1 GHz uses Bilog Antenna:



Radiated emission above 1 GHz uses Horn Antenna:



10.4 測試結果

10.4.1 頻率範圍低於 1 GHz

經本實驗室證實，待測物在 802.11n(HT20) Chain0+1 Channel 6 為 EMI 最差之模式，其測試數據請參考報告第 6.4.1 & 6.4.2 章節。

10.4.2 頻率大於 1GHz

溫度 : 25 °C

相對濕度 : 50 %

儀器設定

Peak & Average

RBW : 1 MHz

VBW : 3 MHz

測試項目 : BLE 混附發射

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
BLE_Ch0	4804	PK	V	5.86	34.73	40.59	74.00	-33.41
	4804	PK	H	5.86	36.05	41.91	74.00	-32.09
BLE_Ch19	4880	PK	V	6.16	38.20	44.36	74.00	-29.64
	4880	PK	H	6.16	36.10	42.26	74.00	-31.74
BLE_Ch39	4960	PK	V	6.48	37.27	43.75	74.00	-30.25
	4960	PK	H	6.48	35.43	41.91	74.00	-32.09

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

測試項目 : BLE 主射發射

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
BLE_Ch0	2402	PK	V	34.51	51.73	86.24	114.00	-27.76
	2402	AV	V	34.51	5.18	39.69	94.00	-54.31
	2402	PK	H	34.51	50.00	84.51	114.00	-29.49
	2402	AV	H	34.51	4.99	39.50	94.00	-54.50
BLE_Ch19	2440	PK	V	34.60	50.72	85.32	114.00	-28.68
	2440	AV	V	34.60	5.21	39.81	94.00	-54.19
	2440	PK	H	34.60	53.84	88.44	114.00	-25.56
	2440	AV	H	34.60	5.81	40.41	94.00	-53.59
BLE_Ch39	2480	PK	V	34.70	51.93	86.63	114.00	-27.37
	2480	AV	V	34.70	5.32	40.02	94.00	-53.98
	2480	PK	H	34.70	56.98	91.68	114.00	-22.32
	2480	AV	H	34.70	5.96	40.66	94.00	-53.34

Remark: Correction Factor = Antenna Factor + Cable Loss

測試項目 : BT2.1 混附發射

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
GFSK_Ch0	3330	PK	V	1.48	43.58	45.06	74.00	-28.94
	4804	PK	V	5.86	36.51	42.37	74.00	-31.63
	3330	PK	H	1.48	48.38	49.86	74.00	-24.14
	4804	PK	H	5.86	36.43	42.29	74.00	-31.71
GFSK_Ch39	3330	PK	V	1.48	43.96	45.44	74.00	-28.56
	4880	PK	V	6.16	36.23	42.39	74.00	-31.61
	3330	PK	H	1.48	48.03	49.51	74.00	-24.49
	4880	PK	H	6.16	38.03	44.19	74.00	-29.81
GFSK_Ch78	3330	PK	V	1.48	43.25	44.73	74.00	-29.27
	4960	PK	V	6.48	36.67	43.15	74.00	-30.85
	3330	PK	H	1.48	47.17	48.65	74.00	-25.35
	4960	PK	H	6.48	35.42	41.90	74.00	-32.10
$\pi/4$ -DQPSK_Ch 0	3330	PK	V	1.48	44.51	45.99	74.00	-28.01
	4804	PK	V	5.86	36.13	41.99	74.00	-32.01
	3330	PK	H	1.48	47.90	49.38	74.00	-24.62
	4804	PK	H	5.86	36.62	42.48	74.00	-31.52
$\pi/4$ -DQPSK_Ch39	3330	PK	V	1.48	43.88	45.36	74.00	-28.64
	4880	PK	V	6.16	35.77	41.93	74.00	-32.07
	3330	PK	H	1.48	48.40	49.88	74.00	-24.12
	4880	PK	H	6.16	35.78	41.94	74.00	-32.06
$\pi/4$ -DQPSK_Ch78	3330	PK	V	1.48	43.94	45.42	74.00	-28.58
	4960	PK	V	6.48	35.56	42.04	74.00	-31.96
	3330	PK	H	1.48	48.88	50.36	74.00	-23.64
	4960	PK	H	6.48	36.97	43.45	74.00	-30.55
8DPSK_Ch 0	3330	PK	V	1.48	43.82	45.30	74.00	-28.70
	4804	PK	V	5.86	36.2	42.06	74.00	-31.94
	3330	PK	H	1.48	48.61	50.09	74.00	-23.91
	4804	PK	H	5.86	36.07	41.93	74.00	-32.07
8DPSK_Ch39	3330	PK	V	1.48	43.71	45.19	74.00	-28.81
	4880	PK	V	6.16	35.81	41.97	74.00	-32.03
	3330	PK	H	1.48	47.59	49.07	74.00	-24.93
	4880	PK	H	6.16	36.17	42.33	74.00	-31.67
8DPSK_Ch78	3330	PK	V	1.48	44.33	45.81	74.00	-28.19
	4960	PK	V	6.48	35.16	41.64	74.00	-32.36
	3330	PK	H	1.48	47.26	48.74	74.00	-25.26
	4960	PK	H	6.48	35.83	42.31	74.00	-31.69

Remark: Correction Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Pre_Amplifier Gain

測試項目 : BT2.1 主射發射

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
GFSK_Ch0	2402	PK	V	34.51	51.88	86.39	114.00	-27.61
		AV	V	34.51	4.99	39.50	94.00	-54.50
		PK	H	34.51	50.62	85.13	114.00	-28.87
		AV	H	34.51	4.33	38.84	94.00	-55.16
GFSK_Ch39	2441	PK	V	34.60	51.14	85.74	114.00	-28.26
		AV	V	34.60	4.02	38.62	94.00	-55.38
		PK	H	34.60	53.47	88.07	114.00	-25.93
		AV	H	34.60	5.64	40.24	94.00	-53.76
GFSK_Ch78	2480	PK	V	34.70	52.26	86.96	114.00	-27.04
		AV	V	34.70	4.61	39.31	94.00	-54.69
		PK	H	34.70	56.41	91.11	114.00	-22.89
		AV	H	34.70	6.13	40.83	94.00	-53.17
$\pi/4$ -DQPSK_Ch0	2402	PK	V	34.51	52.52	87.03	114.00	-26.97
		AV	V	34.51	5.35	39.86	94.00	-54.14
		PK	H	34.51	50.70	85.21	114.00	-28.79
		AV	H	34.51	4.21	38.72	94.00	-55.28
$\pi/4$ -DQPSK_Ch39	2441	PK	V	34.60	50.90	85.50	114.00	-28.50
		AV	V	34.60	3.97	38.57	94.00	-55.43
		PK	H	34.60	54.19	88.79	114.00	-25.21
		AV	H	34.60	5.66	40.26	94.00	-53.74
$\pi/4$ -DQPSK_Ch78	2480	PK	V	34.70	51.76	86.46	114.00	-27.54
		AV	V	34.70	4.97	39.67	94.00	-54.33
		PK	H	34.70	57.27	91.97	114.00	-22.03
		AV	H	34.70	7.35	42.05	94.00	-51.95
8DPSK_Ch0	2402	PK	V	34.51	52.39	86.90	114.00	-27.10
		AV	V	34.51	4.28	38.79	94.00	-55.21
		PK	H	34.51	50.84	85.35	114.00	-28.65
		AV	H	34.51	4.08	38.59	94.00	-55.41
8DPSK_Ch39	2441	PK	V	34.60	50.78	85.38	114.00	-28.62
		AV	V	34.60	3.86	38.46	94.00	-55.54
		PK	H	34.60	54.54	89.14	114.00	-24.86
		AV	H	34.60	6.27	40.87	94.00	-53.13
8DPSK_Ch78	2480	PK	V	34.70	52.39	87.09	114.00	-26.91
		AV	V	34.70	5.71	40.41	94.00	-53.59
		PK	H	34.70	57.40	92.10	114.00	-21.90
		AV	H	34.70	7.61	42.31	94.00	-51.69

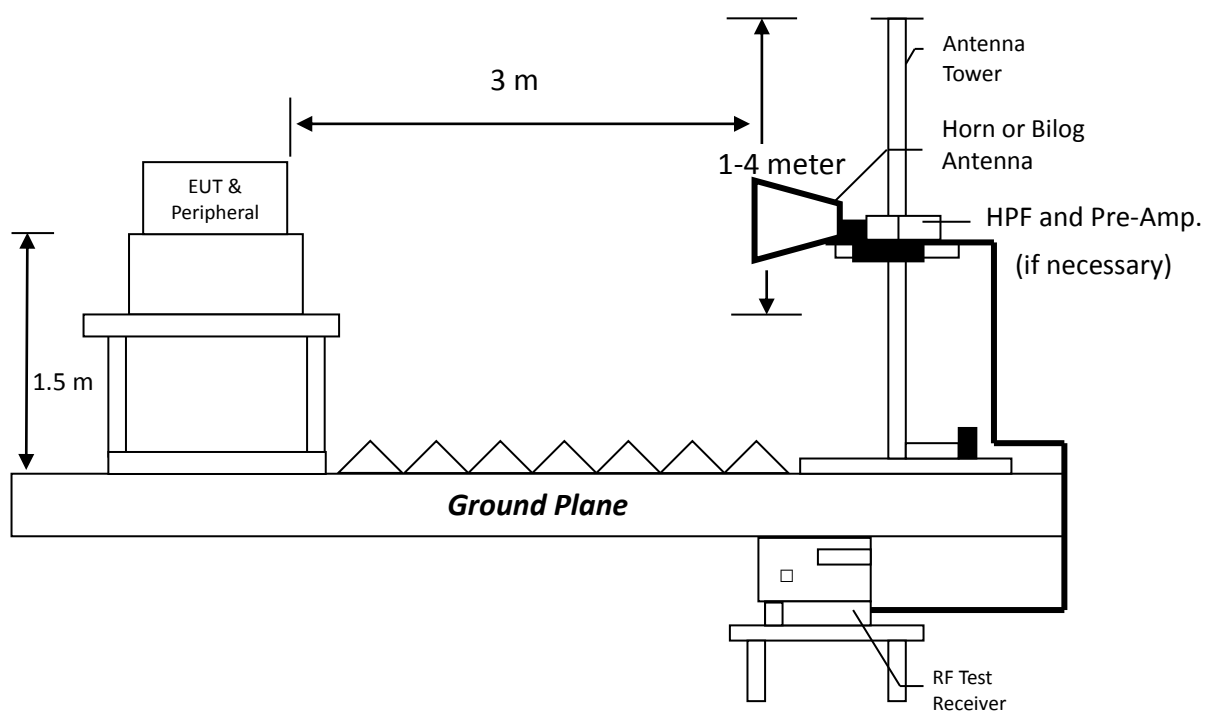
Remark: Correction Factor = Antenna Factor + Cable Loss

11. 頻帶邊緣測試

11.1 適用規範

依據國家通訊傳播委員會低功率射頻電機技術規範 3.10.2.2 節之規定，應低於主波至少 50 的 dB 或符合第 2.8 節之規格，取較寬鬆者。此外，落於第 2.7 節禁用頻段之輻射發射，應符合第 2.8 節之規定。

11.2 測試配置圖



11.3 測試結果

測試項目 : BLE

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
BLE	2388.71	PK	H	34.48	20.83	55.31	74	-18.69	2310~2390
	2382.35	AV	H	34.46	7.10	41.56	54	-12.44	
	2484.71	PK	H	34.71	21.14	55.85	74	-18.15	2483.5~2500
	2488.06	AV	H	34.72	7.12	41.84	54	-12.16	

Remark: Correction Factor = Antenna Factor + Cable Loss

測試項目 : BT2.1

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
GFSK	2354.65	PK	H	34.40	21.32	55.72	74	-18.28	2310~2390
	2383.19	AV	H	34.46	7.32	41.78	54	-12.22	
	2488.34	PK	H	34.72	21.53	56.25	74	-17.75	2483.5~2500
	2487.13	AV	H	34.72	7.49	42.21	54	-11.79	
π/4-DQPSK	2355.53	PK	H	34.40	21.31	55.71	74	-18.29	2310~2390
	2382.97	AV	H	34.46	7.36	41.82	54	-12.18	
	2495.03	PK	H	34.74	20.82	55.56	74	-18.44	2483.5~2500
	2488.45	AV	H	34.72	7.54	42.26	54	-11.74	
8DQPSK	2378.83	PK	H	34.45	20.89	55.34	74	-18.66	2310~2390
	2382.35	AV	H	34.46	7.32	41.78	54	-12.22	
	2491.57	PK	H	34.73	21.39	56.12	74	-17.88	2483.5~2500
	2488.28	AV	H	34.72	7.48	42.20	54	-11.80	

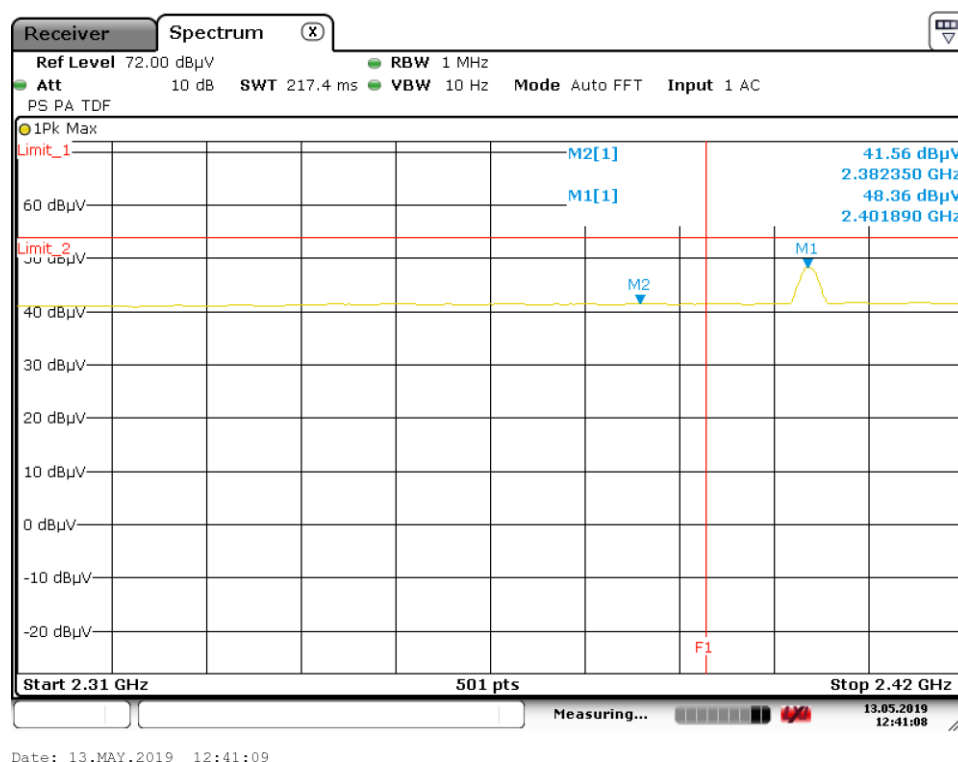
Remark: Correction Factor = Antenna Factor + Cable Loss

11.4 繪圖資料

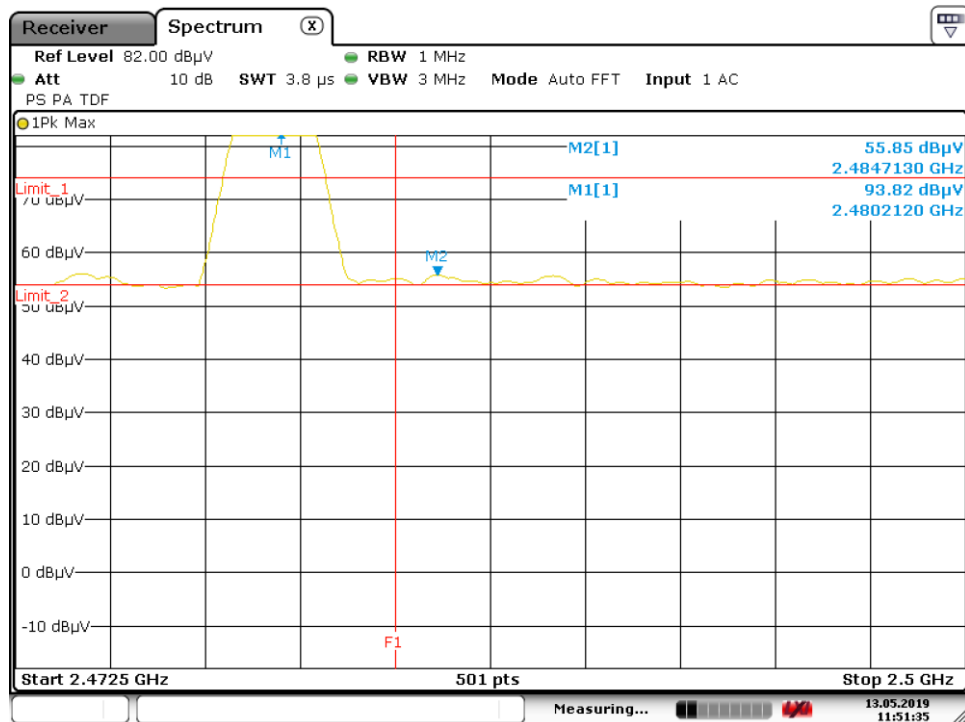
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Bandedge @ mode BLE Ch0 Average

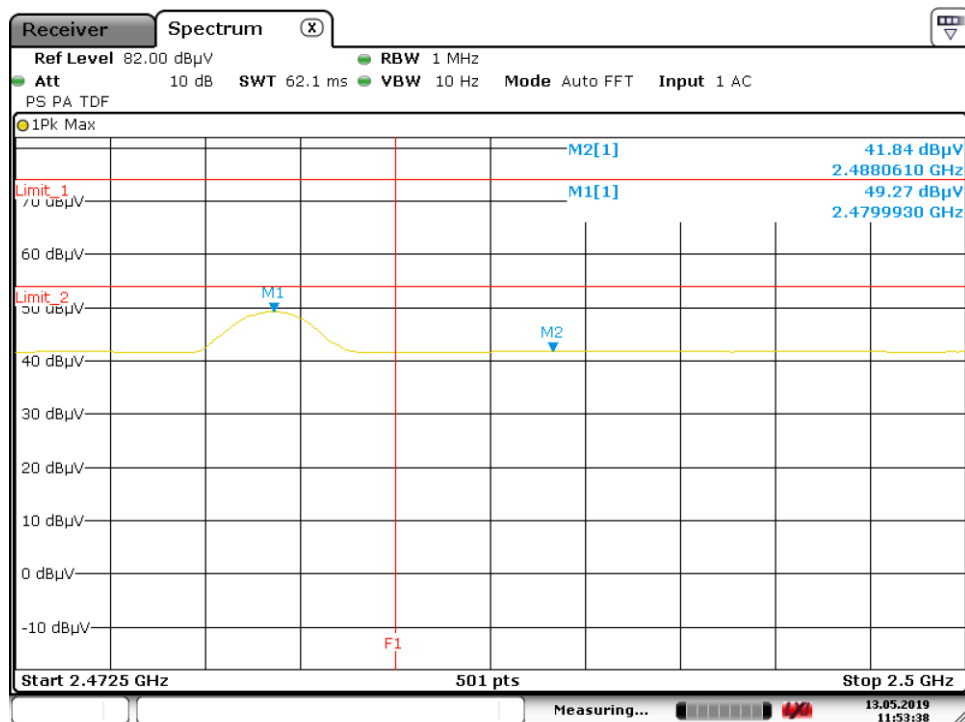


Bandedge @ mode BLE Ch39 Peak



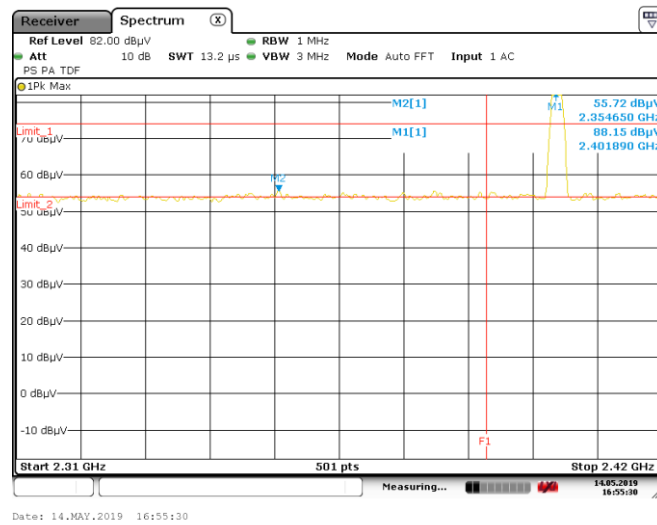
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Bandedge @ mode BLE Ch39 Average

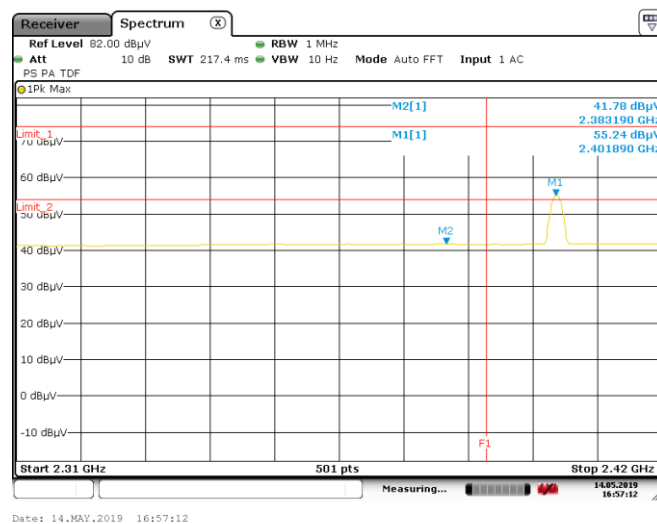


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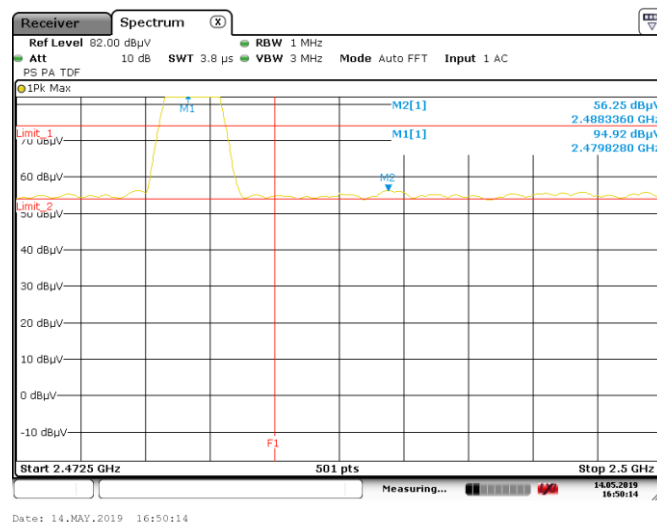
Bandedge @ mode GFSK Ch0 Peak



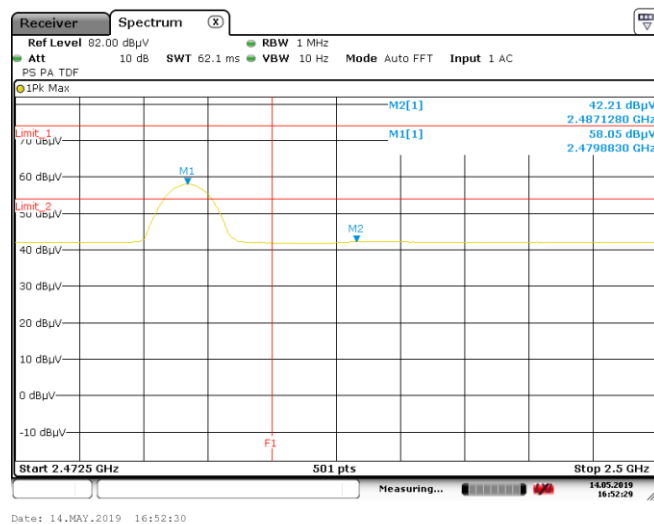
Bandedge @ mode GFSK Ch0 Average



Bandedge @ mode GFSK Ch78 Peak



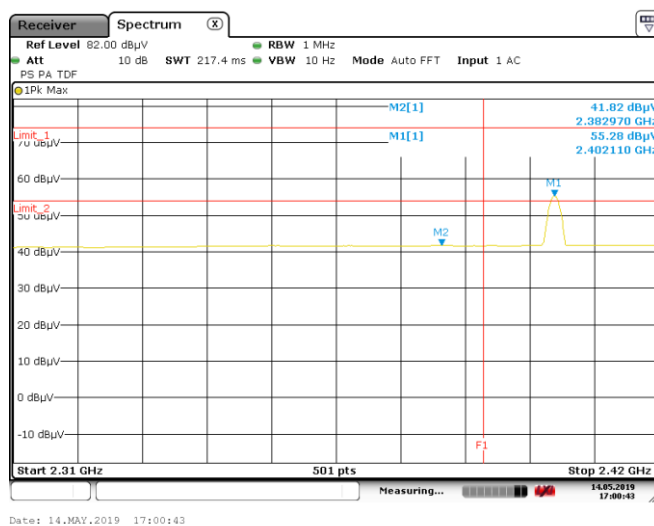
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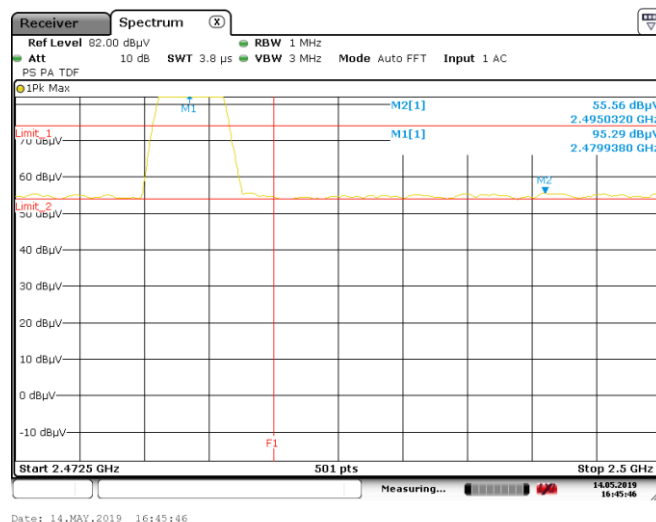
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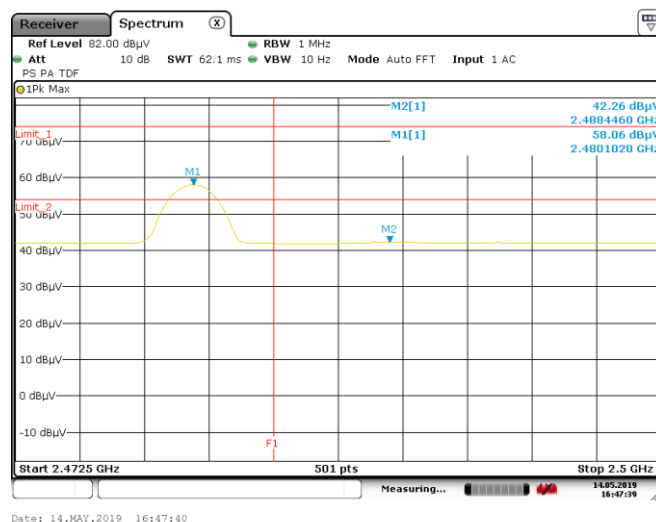
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Bandedge @ mode $\pi/4$ -DQPSK Ch78 Peak



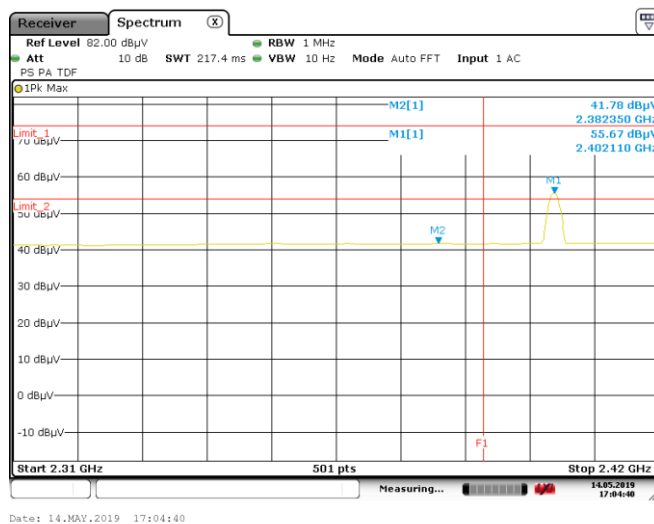
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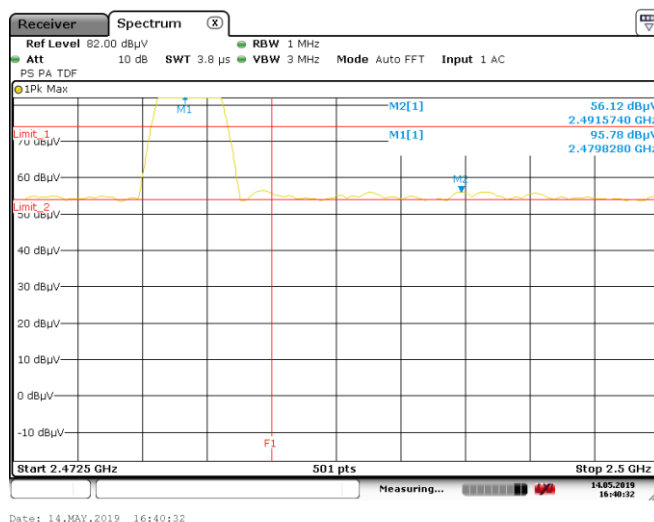
Bandedge @ mode 8DPSK Ch0 Peak



Bandedge @ mode 8DPSK Ch0 Average



Bandedge @ mode 8DPSK Ch78 Peak



Bandedge @ mode 8DPSK Ch78 Average

