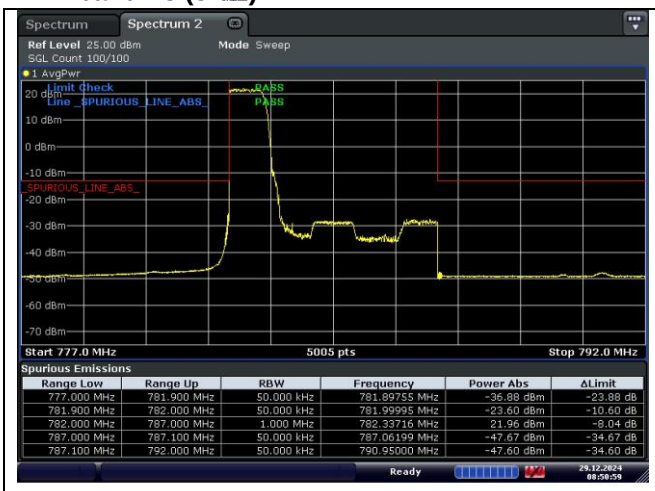
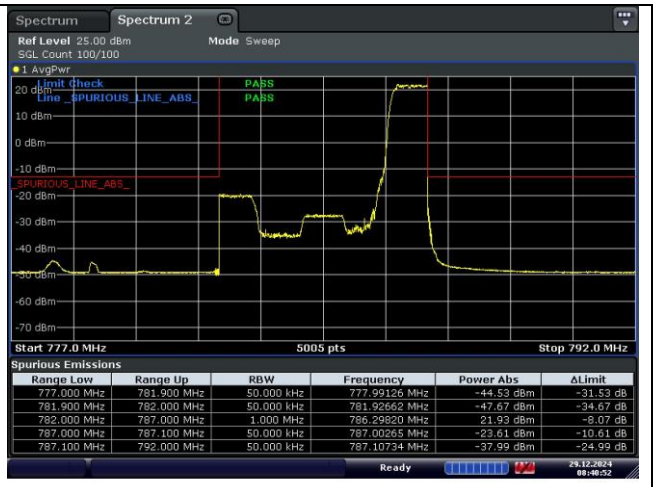
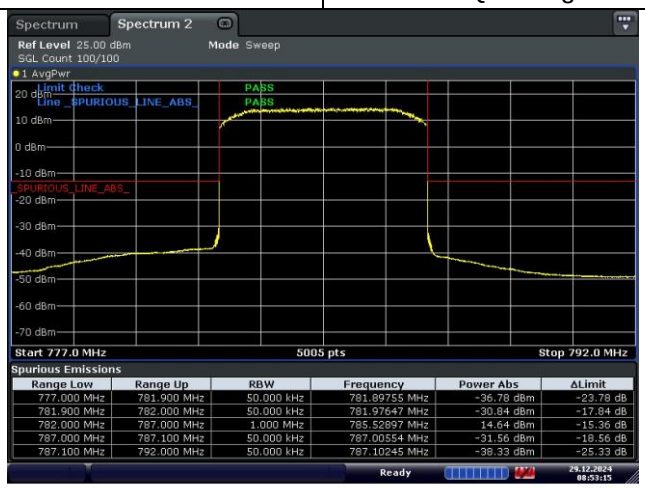
LTE band 13 (5 ㎒)



16QAM High Channel - 1 RB - Left

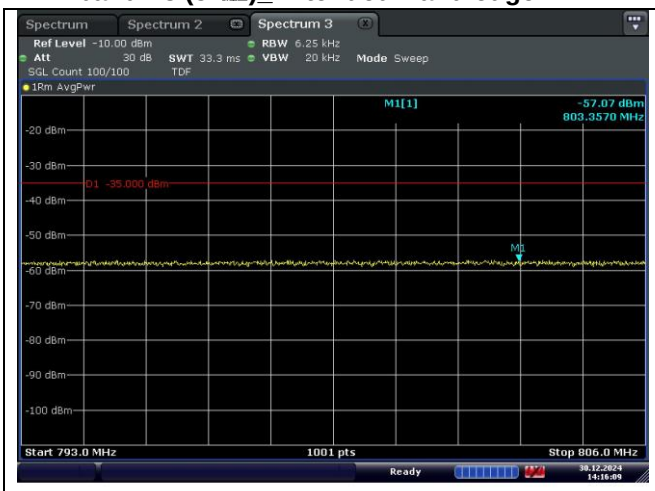


16QAM High Channel - 1 RB - Right

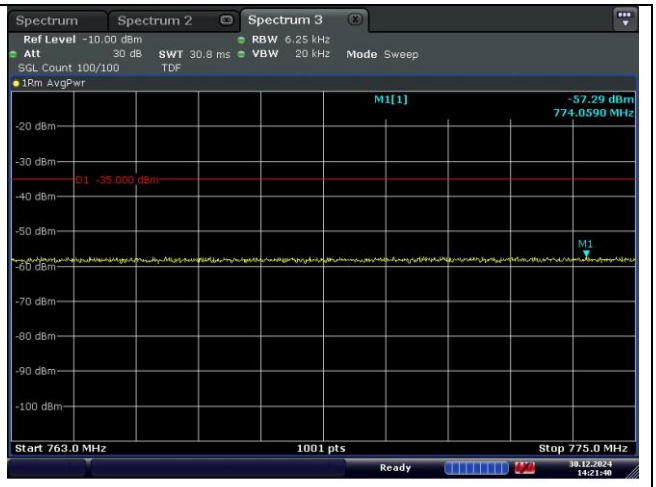


16QAM High Channel - Full RB

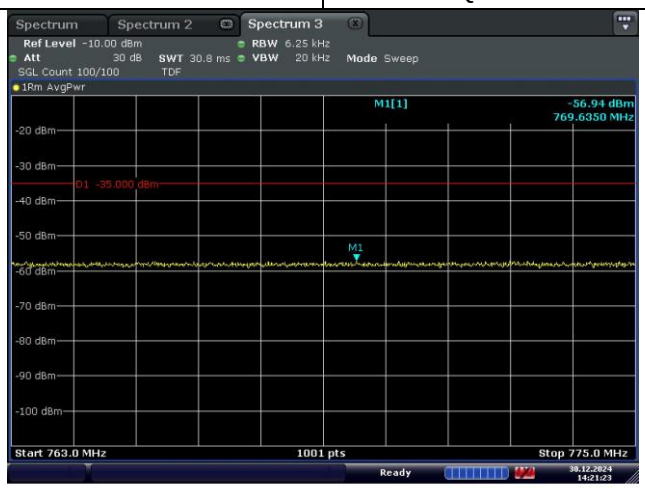
LTE band 13 (5 ㎒)_Extended Band edge



16QAM Low Channel - 1 RB - Left

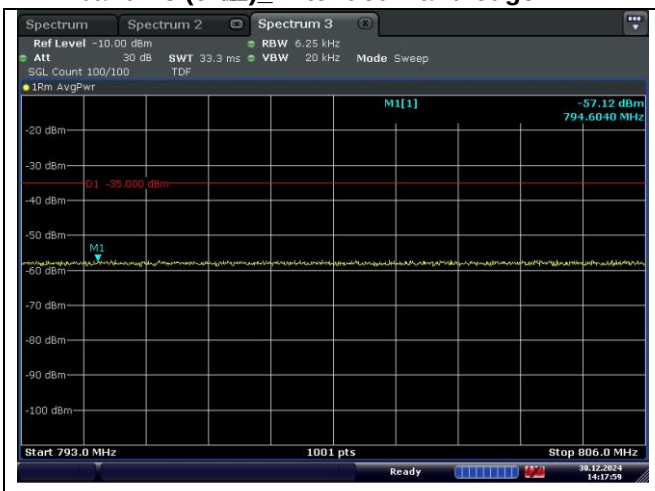


16QAM Low Channel - Full RB - Right

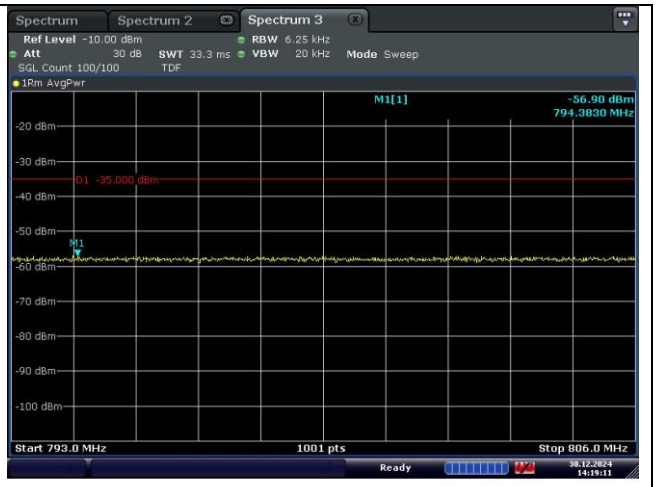


16QAM Low Channel - 1 RB

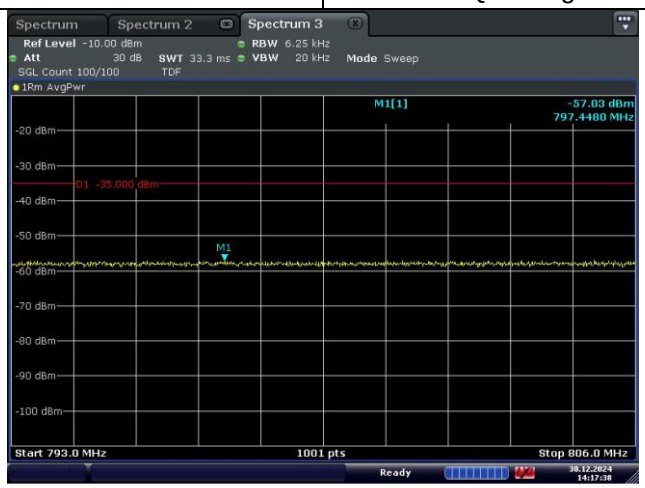
LTE band 13 (5 ㎒)_Extended Band edge



16QAM High Channel - 1 RB - Left

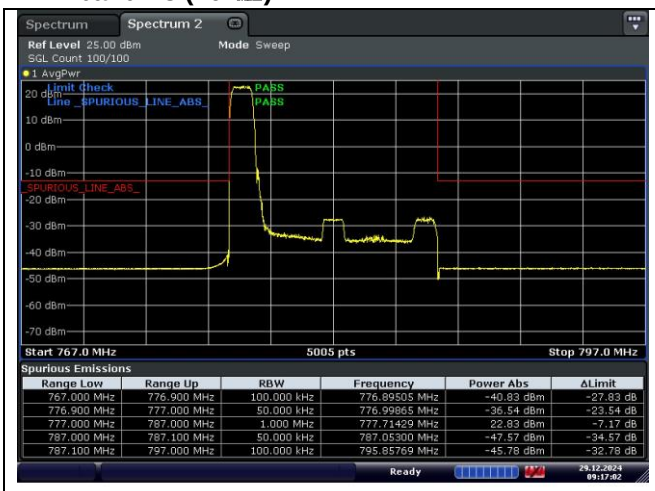


16QAM High Channel - 1 RB - Right

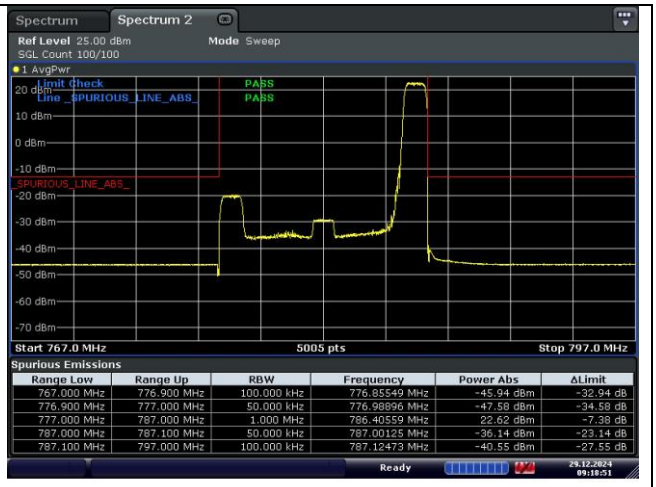


16QAM High Channel - Full RB

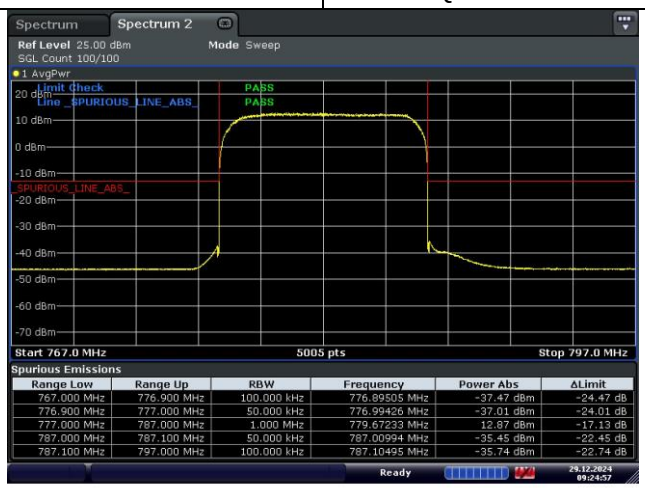
LTE band 13 (10 ㎒)



QPSK Middle Channel - 1 RB - Left

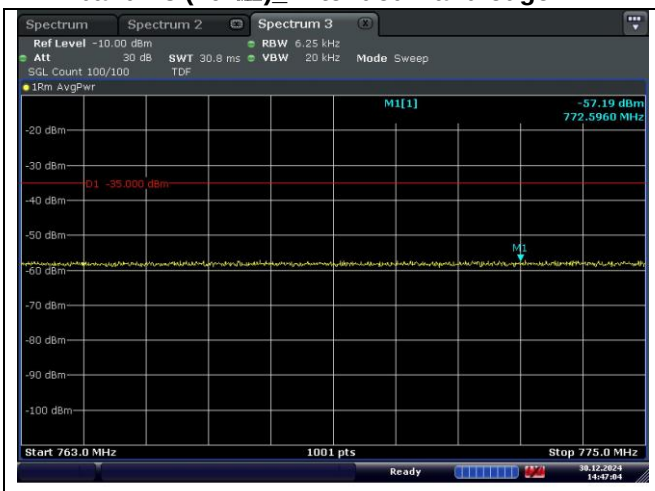


QPSK Middle Channel - 1 RB - Right

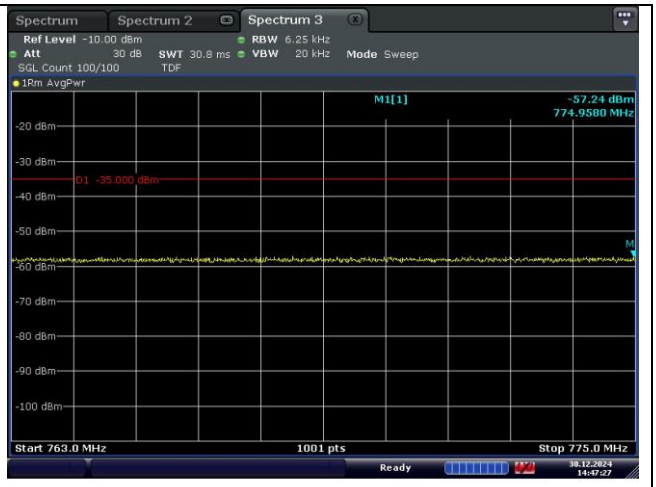


QPSK Middle Channel - Full RB

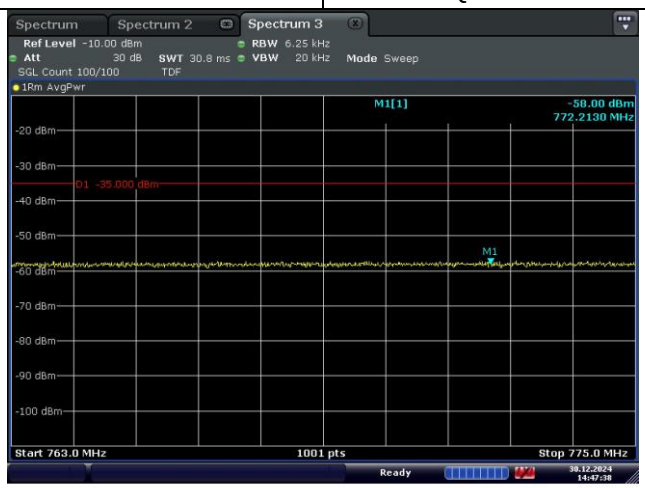
LTE band 13 (10 ㎒)_Extended Band edge



QPSK Low Channel - 1 RB - Left

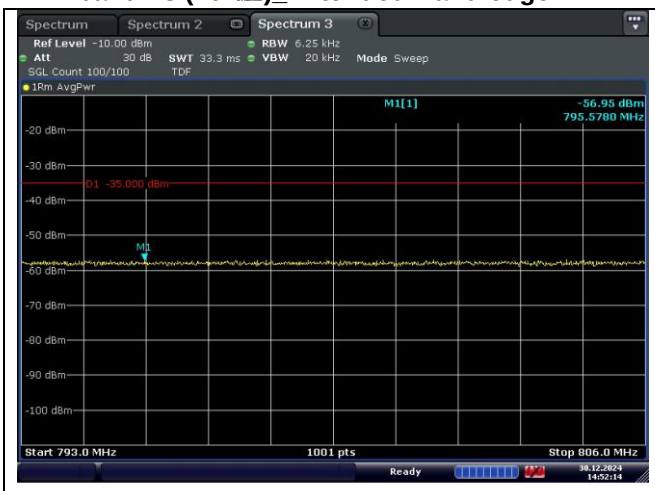


QPSK Low Channel - 1 RB - Right

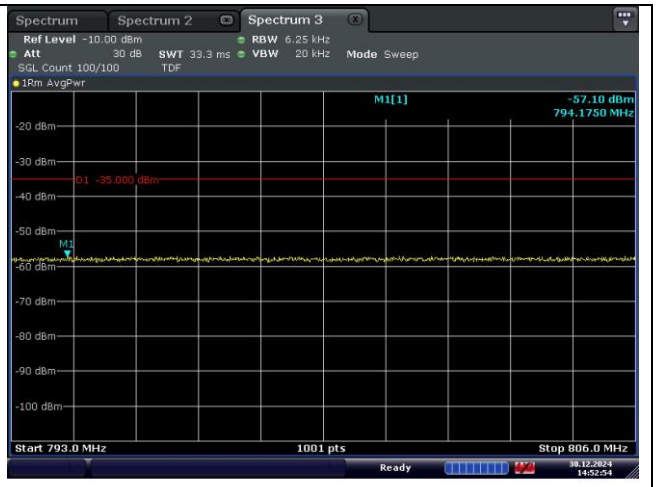


QPSK Low Channel – Full RB

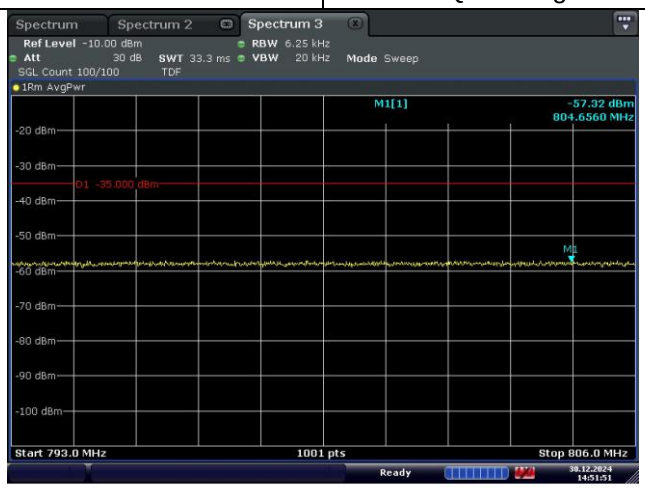
LTE band 13 (10 ㎒)_Extended Band edge



QPSK High Channel - 1 RB - Left

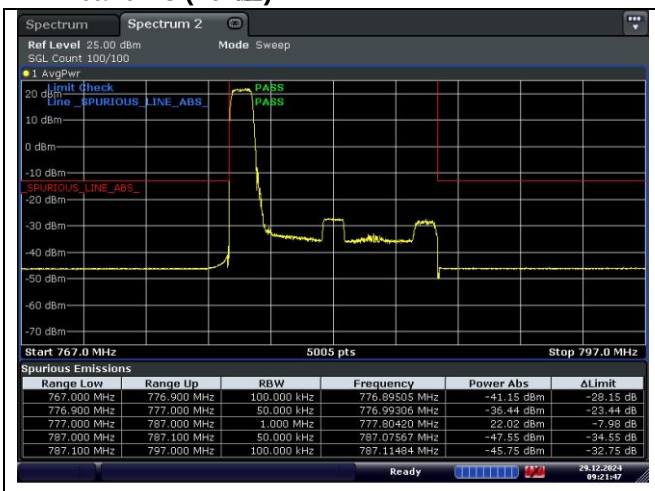


QPSK High Channel - 1 RB - Right

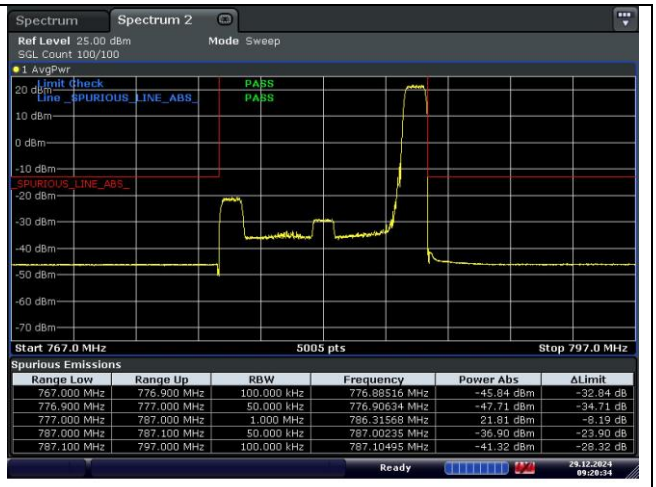


QPSK High Channel – Full RB

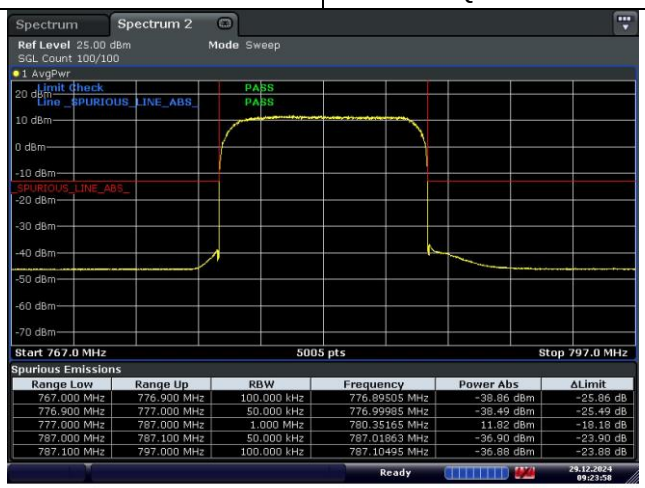
LTE band 13 (10 ㎒)



16QAM Middle Channel - 1 RB - Left

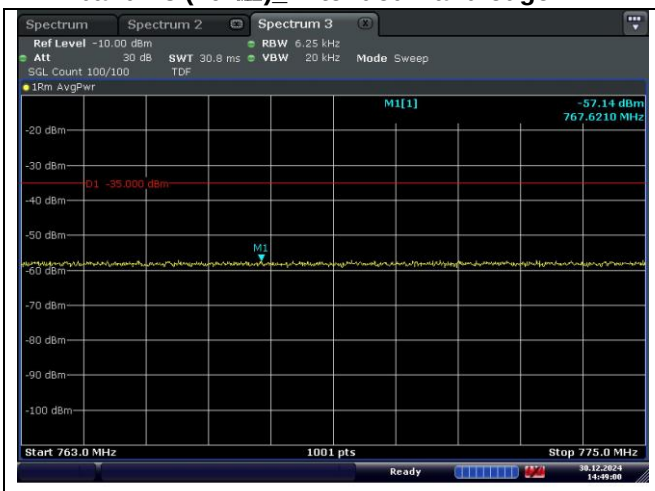


16QAM Middle Channel - 1 RB - Right

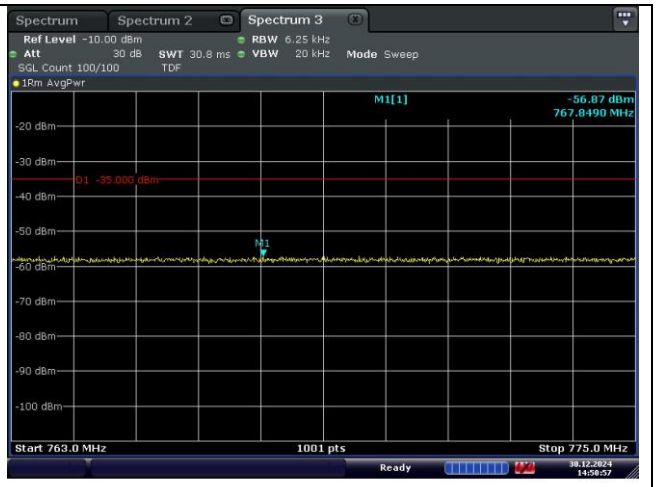


16QAM Middle Channel - Full RB

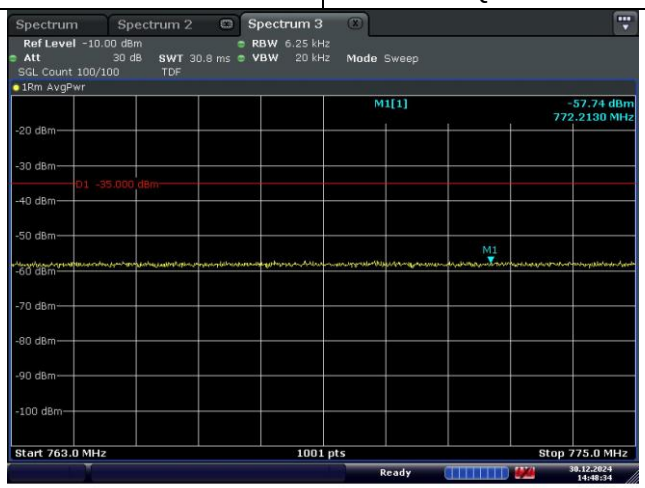
LTE band 13 (10 ㎒)_Extended Band edge



16QAM Low Channel - 1 RB - Left

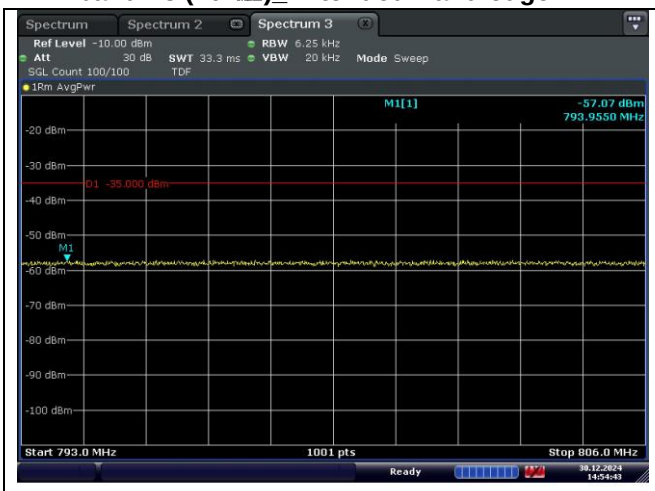


16QAM Low Channel - 1 RB - Right

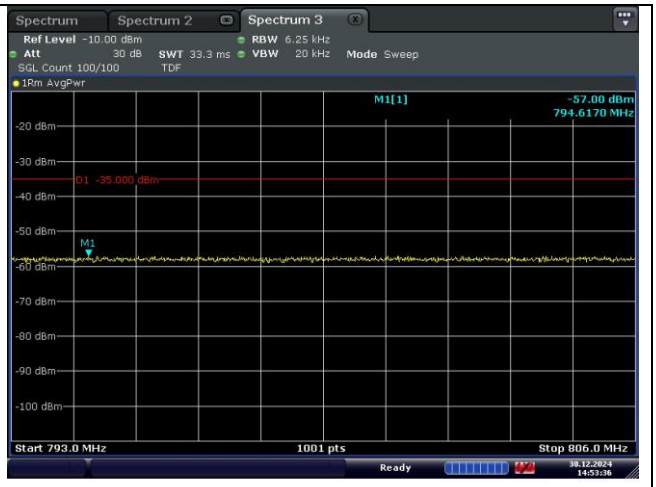


16QAM Low Channel - Full RB

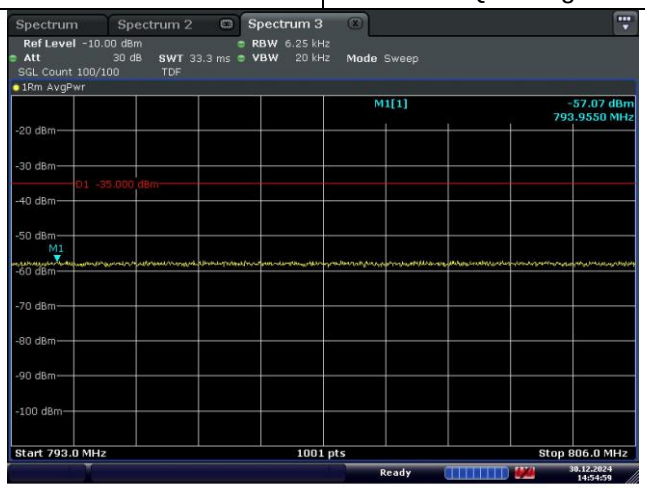
LTE band 13 (10 ㎒)_Extended Band edge



16QAM High Channel - 1 RB - Left



16QAM High Channel - 1 RB - Right



16QAM High Channel - Full RB

8. Frequency Stability

8.1. Limit

FCC
- § 2.1055 (a), § 2.1055 (d) & following:

- §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table of this section.
For Mobile devices operating in the 824 to 849 ㎒ band at a power level less than or equal to 3 Watts, the limit specified in Table C-1 is +/- 2.5 ppm.

- §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

- §27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

IC
- RSS-Gen Issue 5
6.11, for licensed devices, the following measurement conditions apply:
a. at the temperatures of -30°C (-22°F), +20°C (+68°F) and +50°C (+122°F), and at the manufacturer's rated supply voltage

- RSS-130 Issue 2
4.5, the transmitter frequency stability limit shall be determined as follows:

For equipment that is capable of transmitting numerous channels simultaneously for different applications (e.g. LTE and narrowband – internet of things (IoT)), the occupied bandwidth shall be the bandwidth representing the sum of the occupied bandwidths of these channels.

The frequency stability shall be sufficient to ensure that the occupied bandwidth remains within each frequency block range when tested at the temperature and supply voltage variations specified in RSS-Gen.

- RSS-132 Issue 4
5.3, the carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations and ±1.5 ppm for base stations.

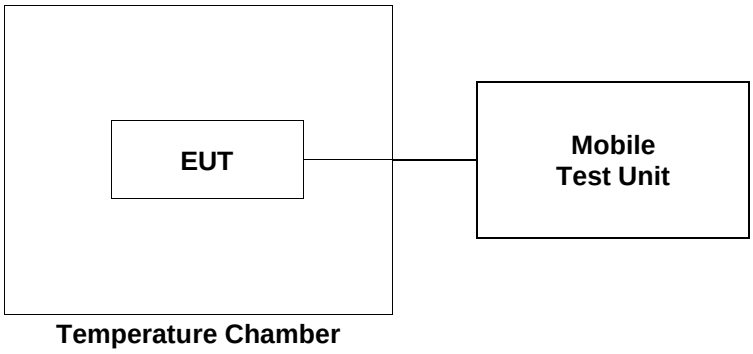
- RSS-133 Issue 7
5.4, The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block or frequency block group when tested to the temperature and supply voltage variations specified in RSS-Gen.

- RSS-139 Issue 4
5.4, the frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

- RSS-199 Issue 4
5.4, The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested at the temperature and supply voltage variations specified in RSS-Gen.

8.2. Test Procedure

1. Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a Mobile Test Unit via feed-through attenuators.
2. The EUT was placed inside the temperature chamber.
3. After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from Mobile Test Unit.



8.3. Test Results

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 %

LTE band 2 at middle channel

Reference Frequency: 1 880.0 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.90	3.80	-0.003 00
40		1.27	-0.004 35
30		16.82	0.003 93
20(Ref.)		9.44	-
10		5.59	-0.002 05
0		7.29	-0.001 14
-10		5.34	-0.002 18
-20		2.53	-0.003 68
-30		0.09	-0.004 97
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	4.49 (115%)	6.12	-0.001 77
	3.32 (85%)	3.97	-0.002 91

LTE band 4 at middle channel

Reference Frequency: 1 732.5 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.90	6.57	0.001 68
40		6.64	0.001 72
30		10.45	0.003 92
20(Ref.)		3.66	-
10		7.19	0.002 04
0		7.79	0.002 38
-10		2.28	-0.000 80
-20		9.84	0.003 57
-30		6.18	0.001 45
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	4.49 (115%)	9.26	-0.003 23
	3.32 (85%)	1.84	-0.001 05

LTE band 5 at middle channel

Reference Frequency: 836.5 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.90	8.85	0.004 67
40		6.33	0.001 66
30		8.84	0.004 66
20(Ref.)		4.94	-
10		2.97	-0.002 36
0		8.63	0.004 41
-10		11.18	0.007 46
-20		5.58	0.000 77
-30		3.39	-0.001 85
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	4.49 (115%)	8.42	0.004 16
	3.32 (85%)	2.29	-0.003 17

LTE band 7 at middle channel

Reference Frequency: 2 535.0 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.90	6.31	0.000 23
40		10.16	0.001 75
30		5.30	-0.000 17
20(Ref.)		5.72	-
10		4.01	-0.000 67
0		5.01	-0.000 28
-10		8.92	0.001 26
-20		11.08	0.002 11
-30		1.77	-0.001 56
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	4.49 (115%)	9.62	0.001 54
	3.32 (85%)	10.93	0.002 06

LTE band 12/17 at middle channel

Reference Frequency: 707.5 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.90	5.12	0.000 10
40		8.83	0.005 34
30		3.15	-0.002 69
20(Ref.)		5.05	-
10		1.38	-0.005 19
0		3.88	-0.001 65
-10		6.02	0.001 37
-20		11.20	0.008 69
-30		1.97	-0.004 35
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	4.49 (115%)	9.66	0.006 52
	3.32 (85%)	11.07	0.008 51

LTE band 13 at middle channel

Reference Frequency: 782.0 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.90	3.21	-0.003 18
40		6.95	0.001 60
30		2.60	-0.003 96
20(Ref.)		5.70	-
10		4.35	-0.001 73
0		7.21	0.001 93
-10		6.76	0.001 36
-20		9.68	0.005 09
-30		3.35	-0.003 01
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	4.49 (115%)	9.58	0.004 96
	3.32 (85%)	11.01	0.006 79

- End of the Test Report -