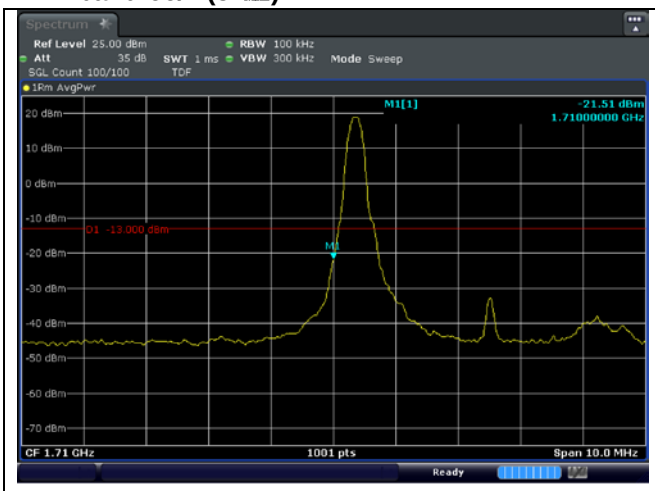
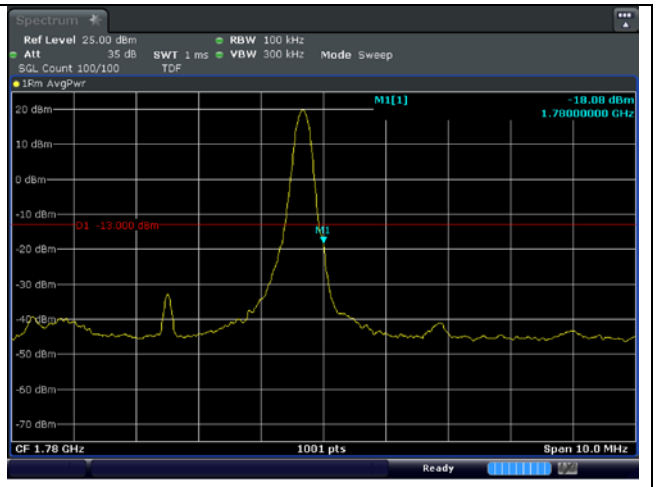
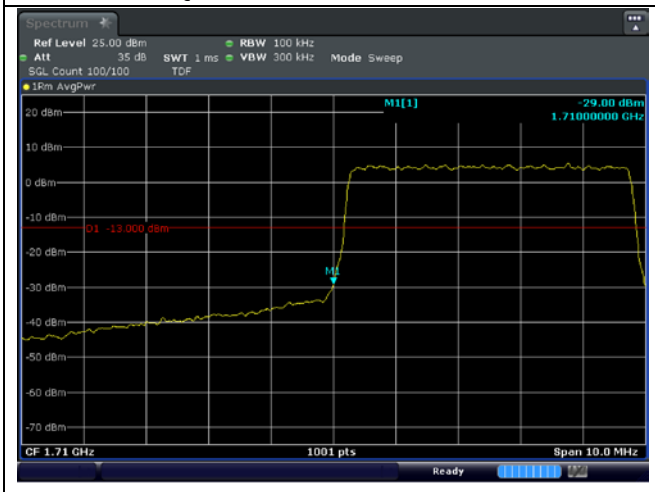
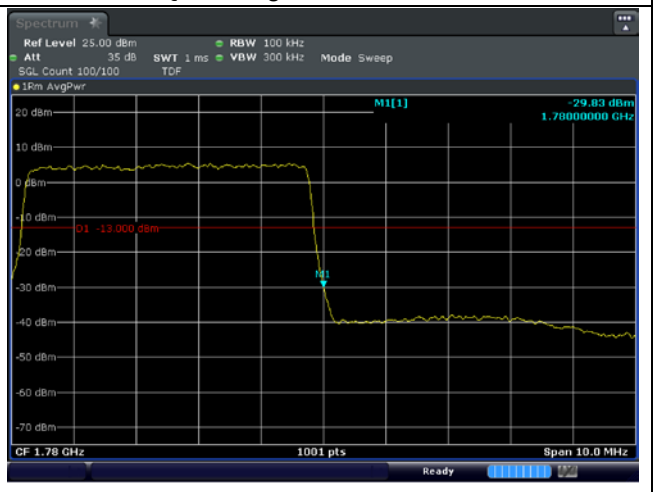
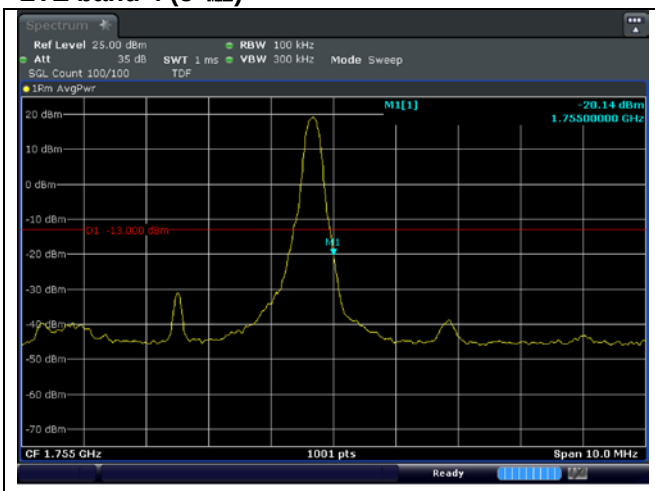
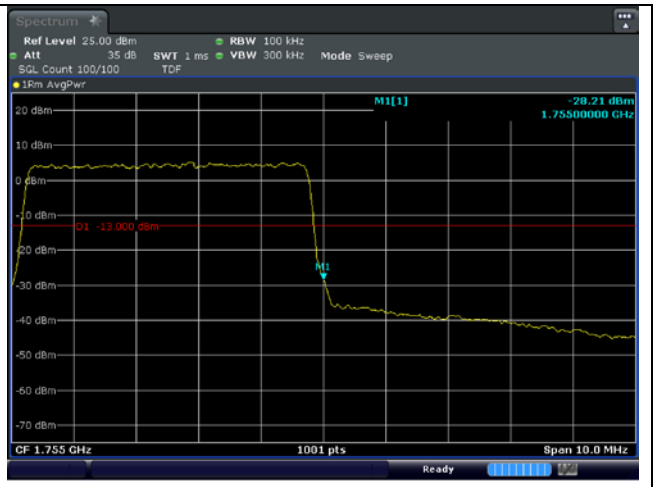
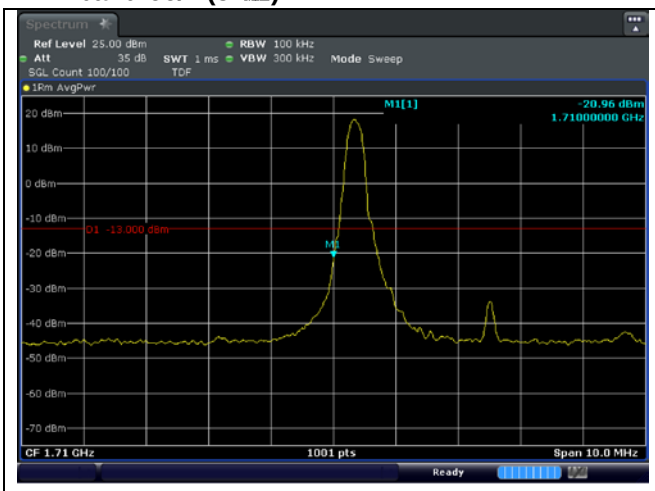
LTE band 66/4 (5 ㎒)

	
QPSK Low Channel - 1 RB	QPSK High Channel - 1 RB
	
QPSK Low Channel - Full RB	QPSK High Channel - Full RB

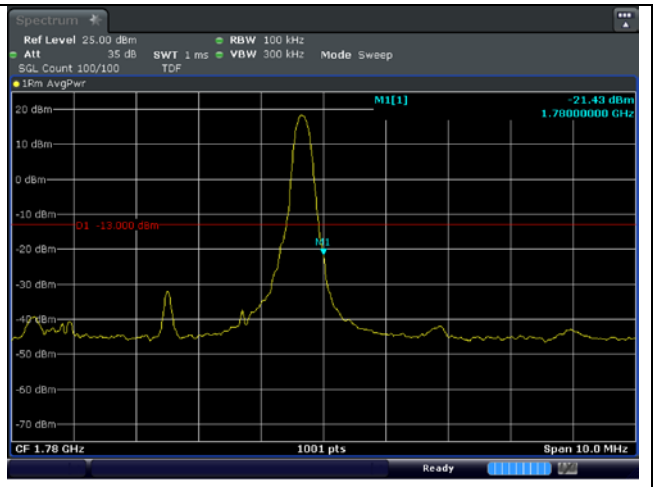
LTE band 4 (5 ㎒)

	
QPSK High Channel - 1 RB	QPSK High Channel - Full RB

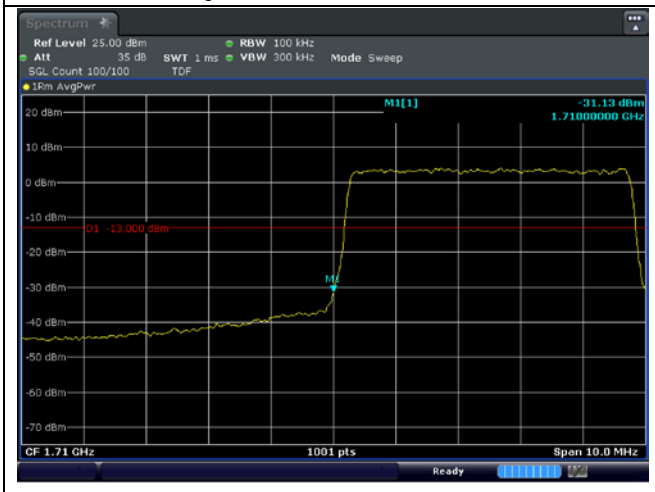
LTE band 66/4 (5 ㎒)



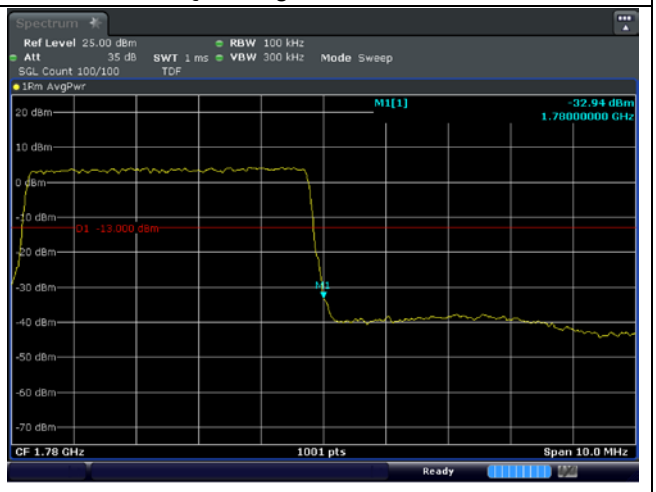
16QAM Low Channel - 1 RB



16QAM High Channel - 1 RB

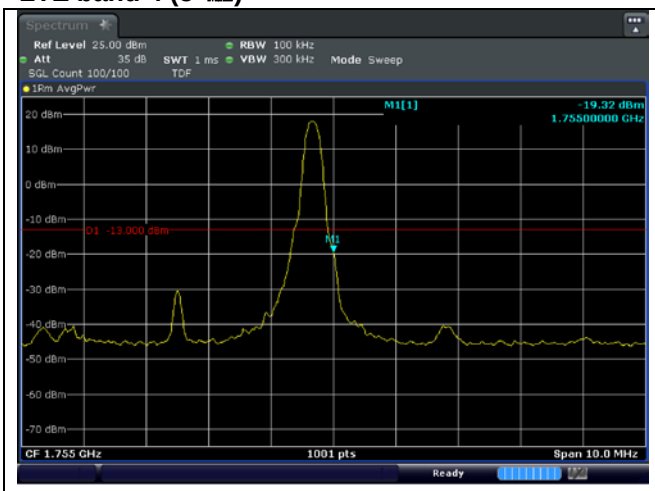


16QAM Low Channel - Full RB

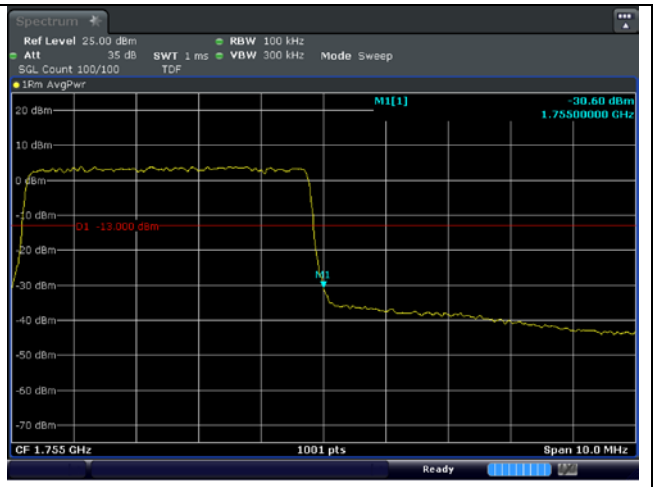


16QAM High Channel - Full RB

LTE band 4 (5 ㎒)

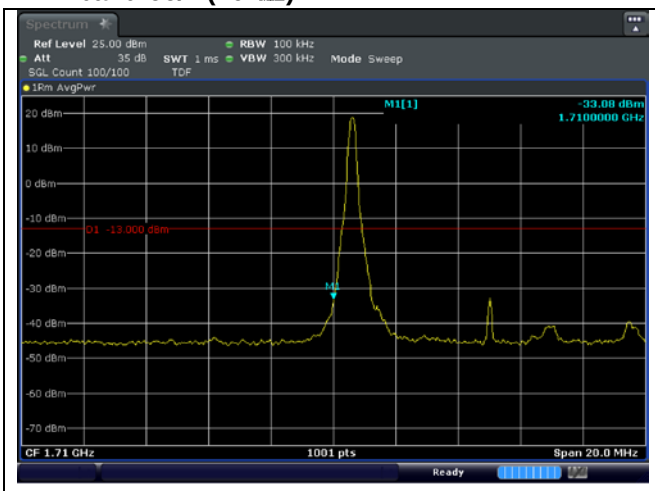
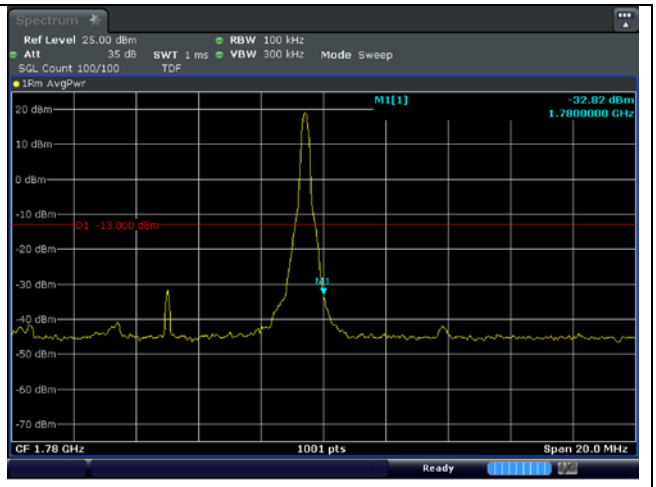
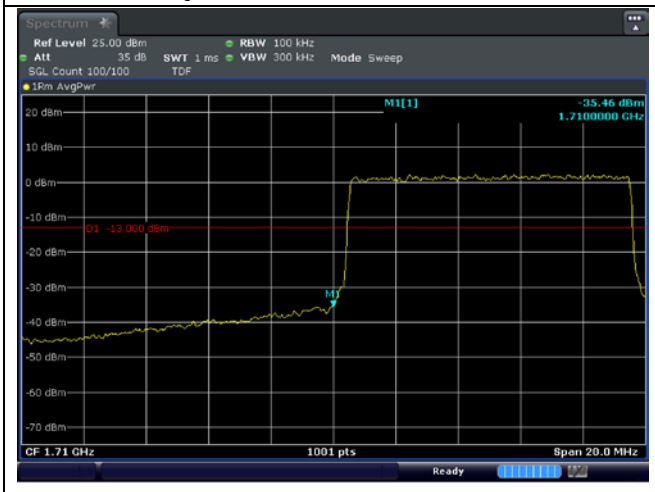
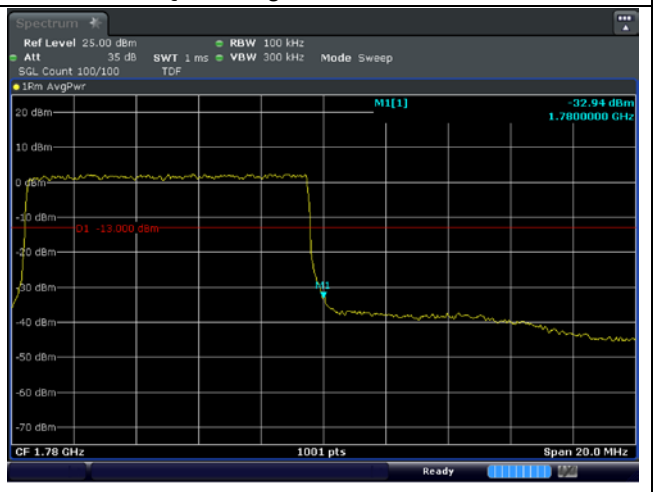


16QAM High Channel - 1 RB

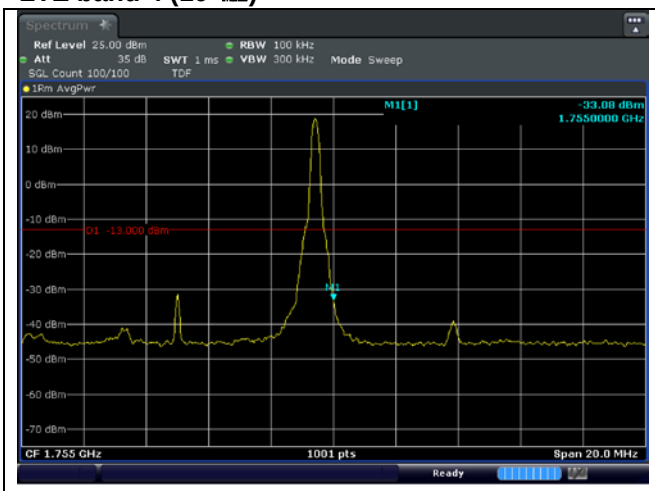
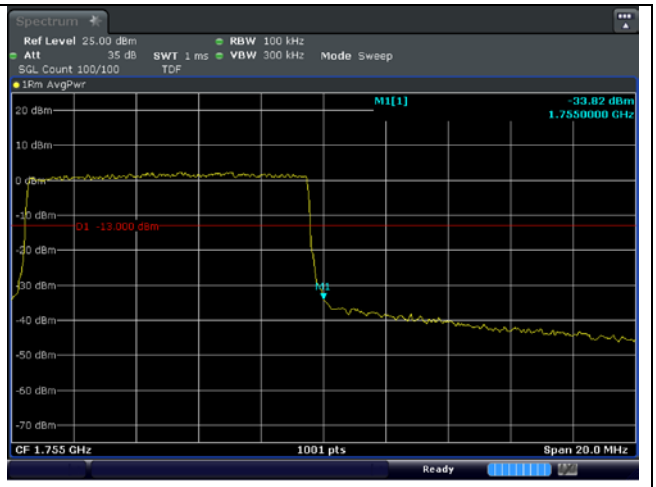


16QAM High Channel - Full RB

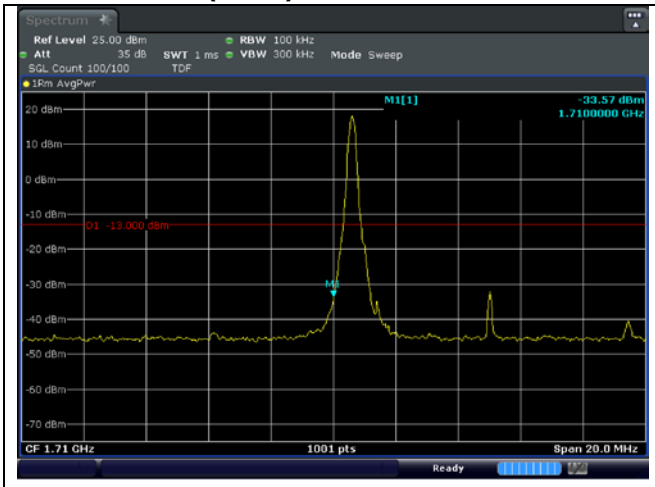
LTE band 66/4 (10 ㎒)

	
QPSK Low Channel - 1 RB	QPSK High Channel - 1 RB
	
QPSK Low Channel - Full RB	QPSK High Channel - Full RB

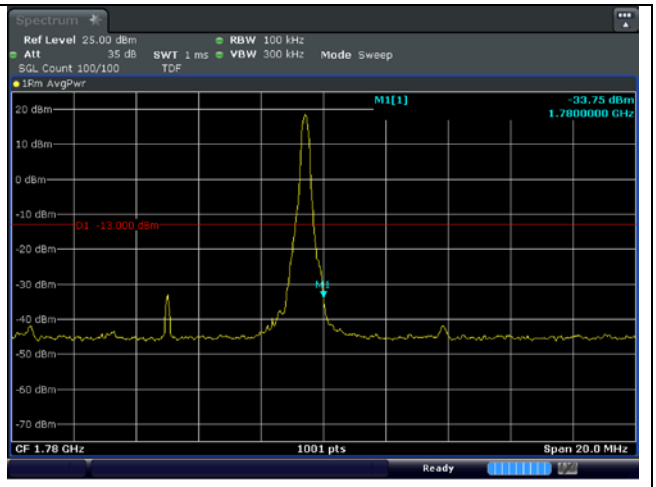
LTE band 4 (10 ㎒)

	
QPSK High Channel - 1 RB	QPSK High Channel - Full RB

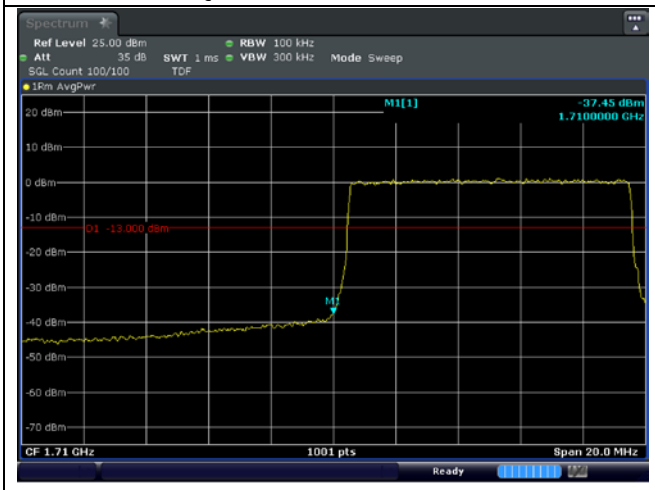
LTE band 66/4 (10 ㎒)



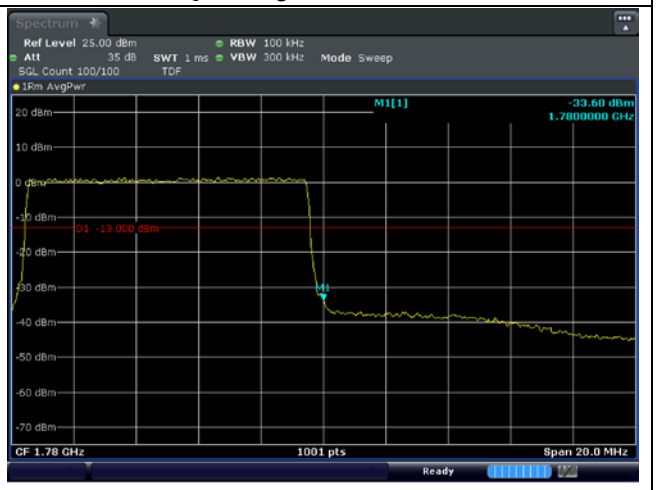
16QAM Low Channel - 1 RB



16QAM High Channel - 1 RB

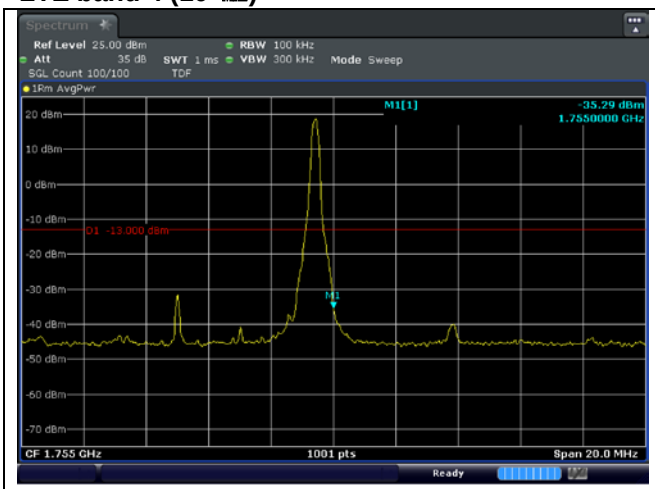


16QAM Low Channel - Full RB

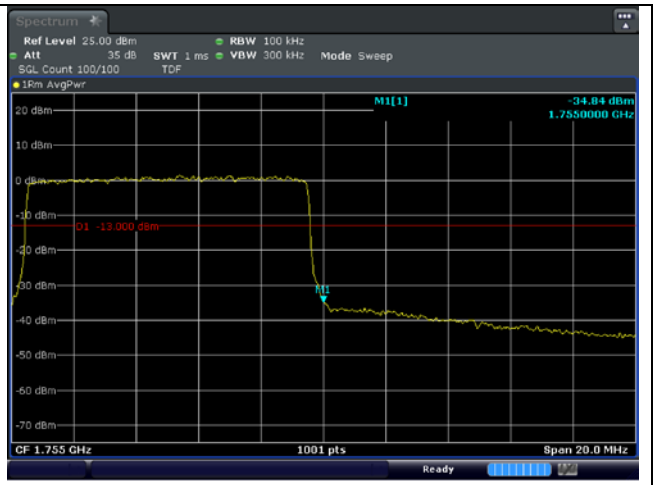


16QAM High Channel - Full RB

LTE band 4 (10 ㎒)

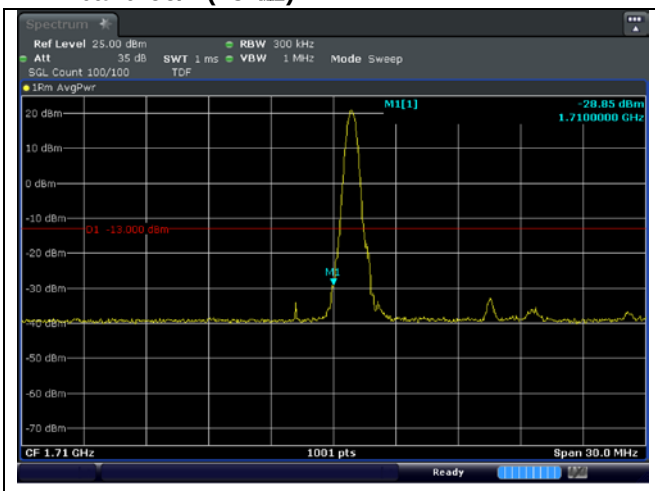
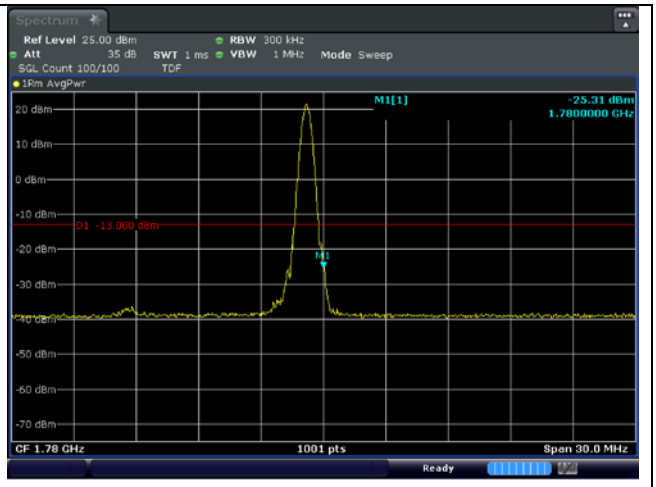
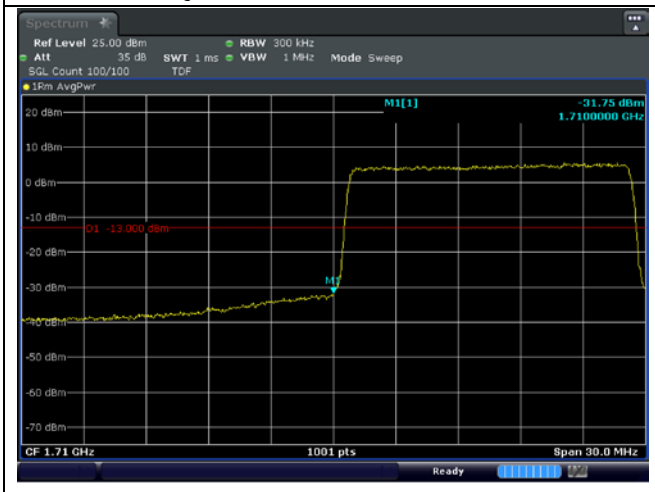
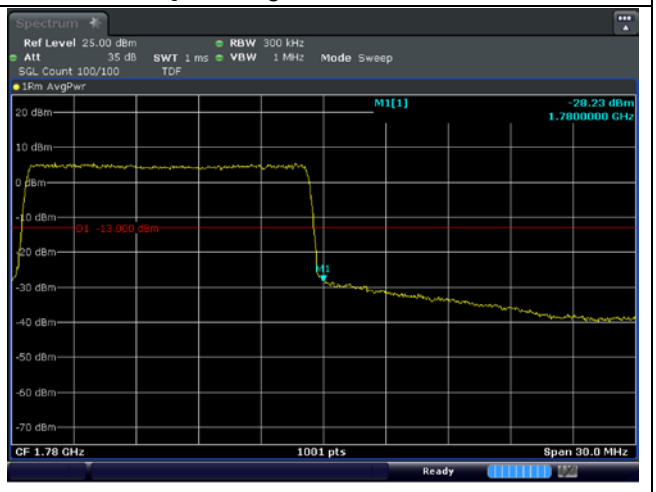


16QAM High Channel - 1 RB

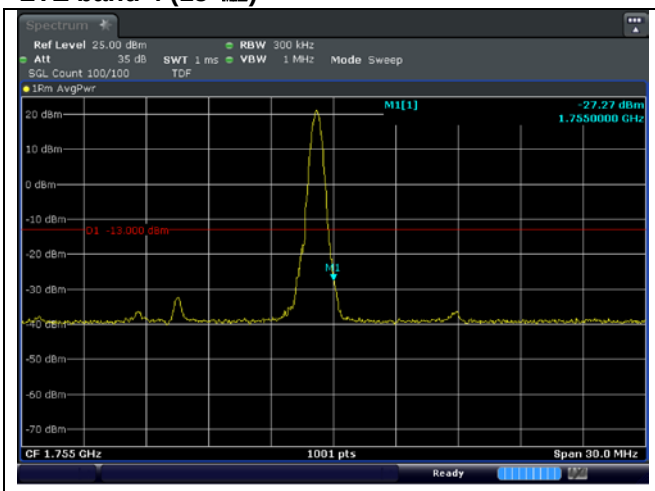
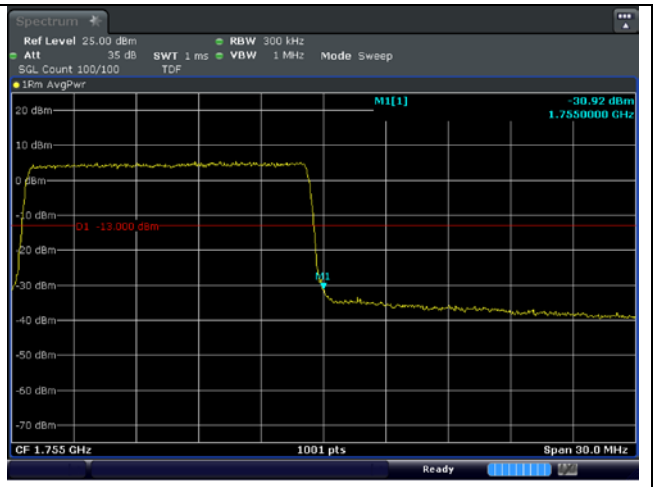


16QAM High Channel - Full RB

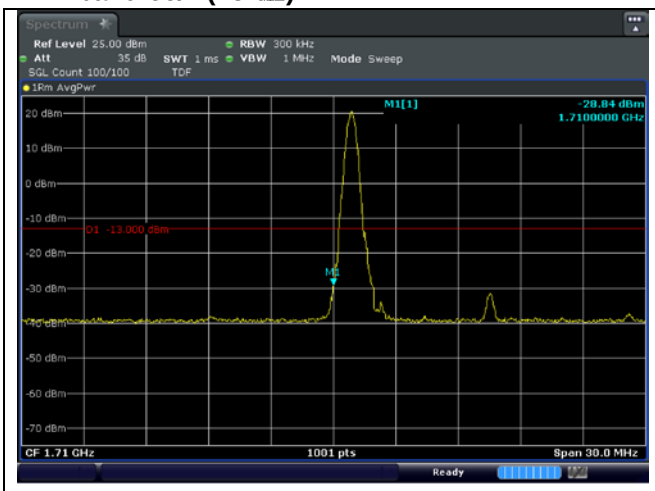
LTE band 66/4 (15 ㎒)

	
QPSK Low Channel - 1 RB	QPSK High Channel - 1 RB
	
QPSK Low Channel - Full RB	QPSK High Channel - Full RB

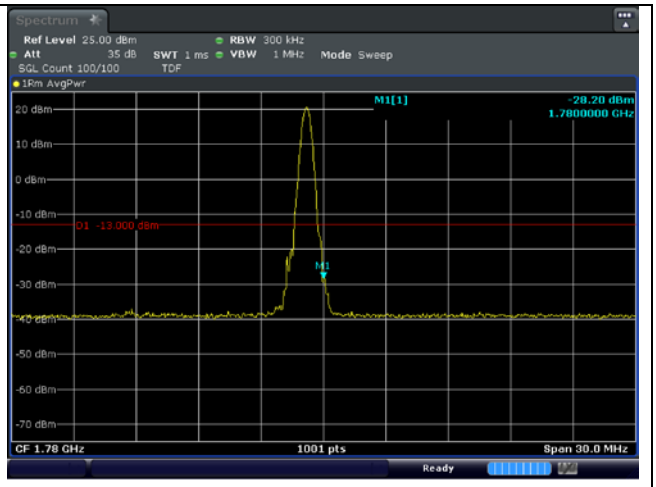
LTE band 4 (15 ㎒)

	
QPSK High Channel - 1 RB	QPSK High Channel - Full RB

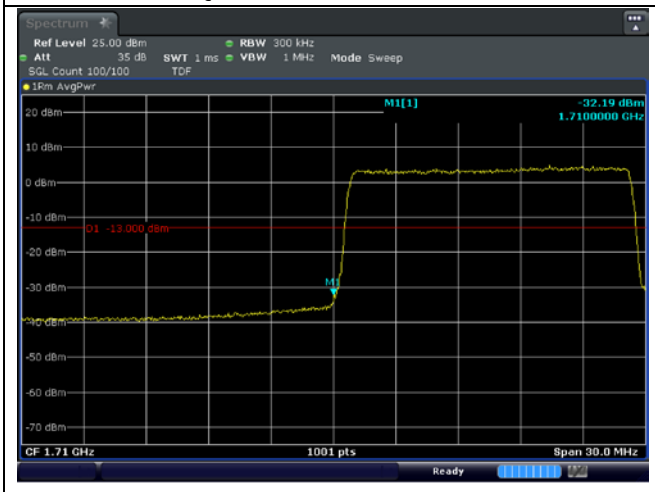
LTE band 66/4 (15 ㎒)



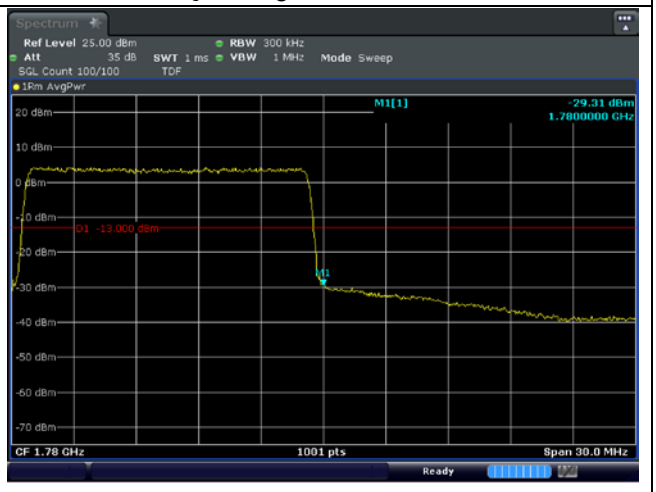
16QAM Low Channel - 1 RB



16QAM High Channel - 1 RB

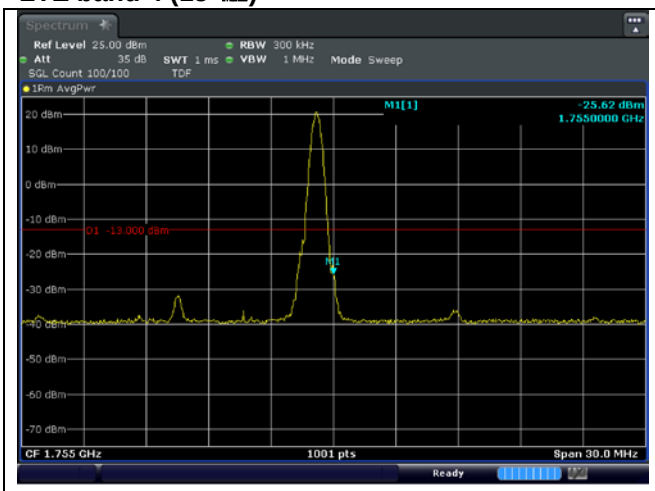


16QAM Low Channel - Full RB

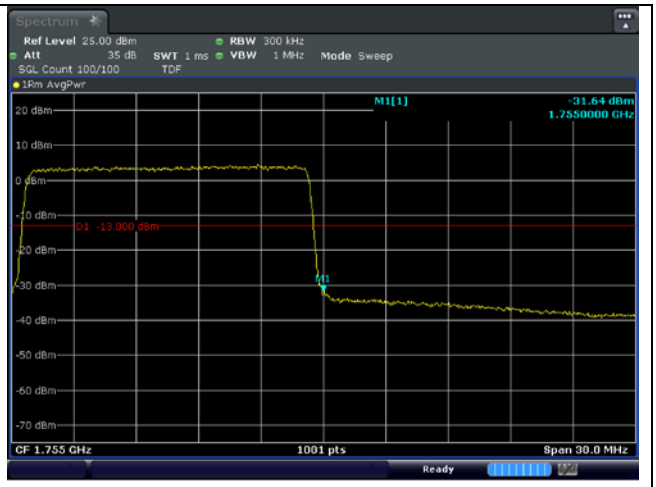


16QAM High Channel - Full RB

LTE band 4 (15 ㎒)

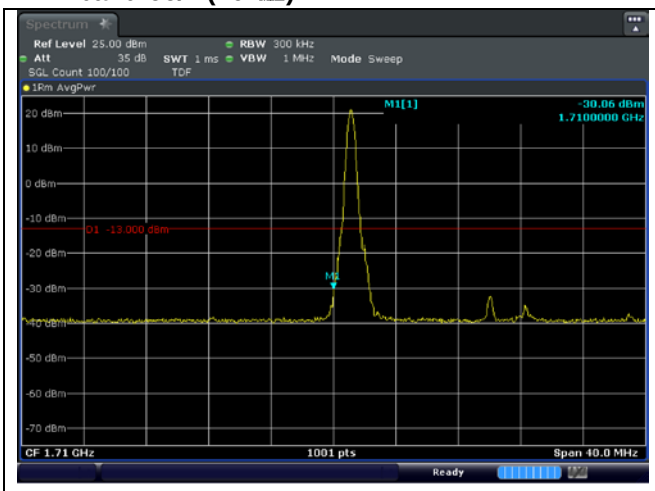
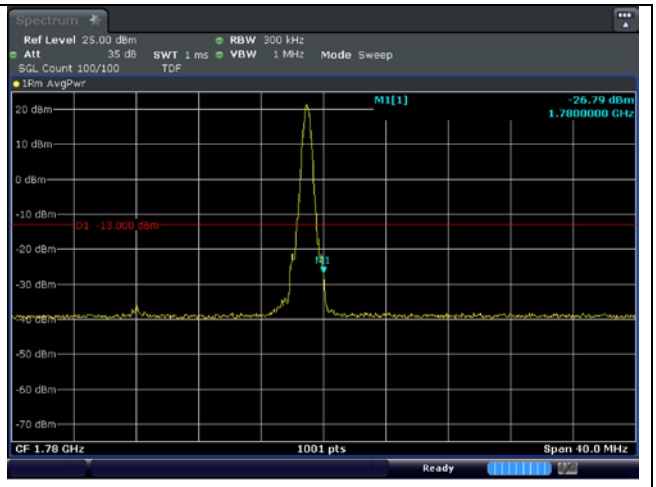
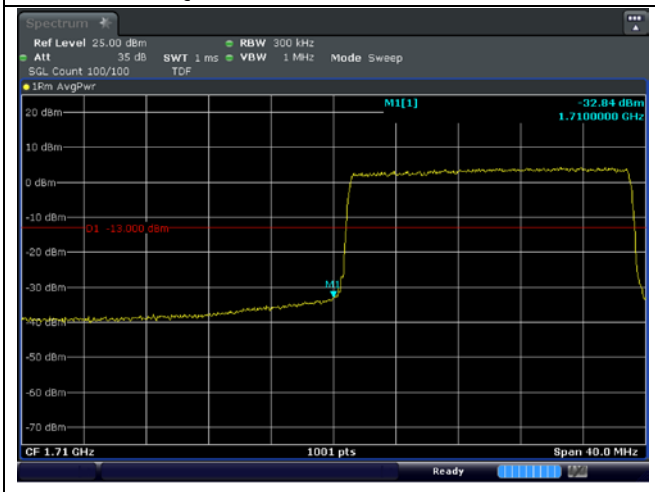
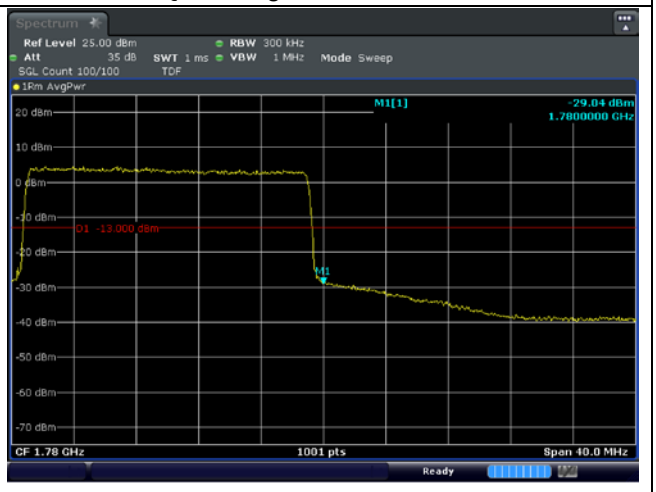


16QAM High Channel - 1 RB

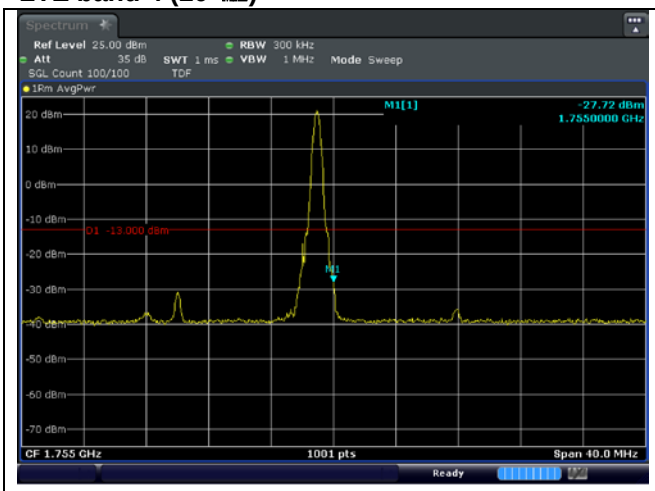
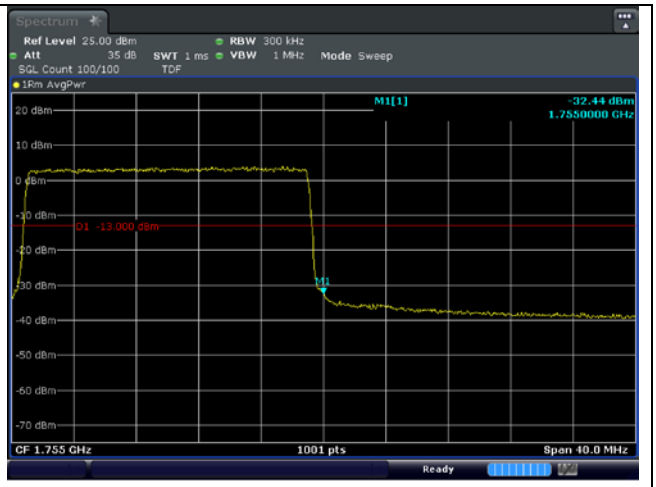


16QAM High Channel - Full RB

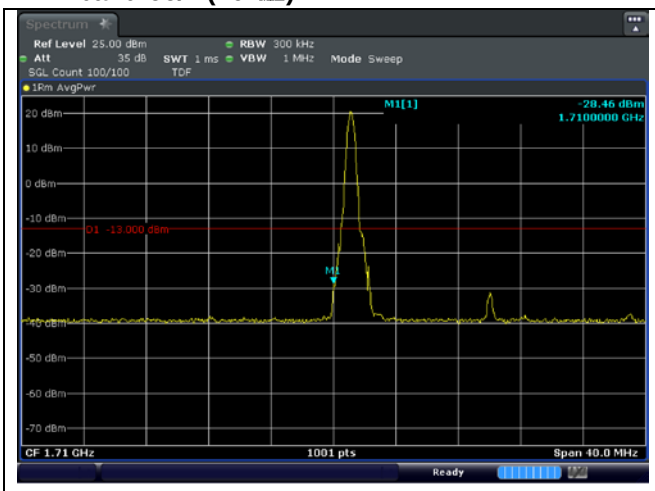
LTE band 66/4 (20 ㎒)

	
QPSK Low Channel - 1 RB	QPSK High Channel - 1 RB
	
QPSK Low Channel - Full RB	QPSK High Channel - Full RB

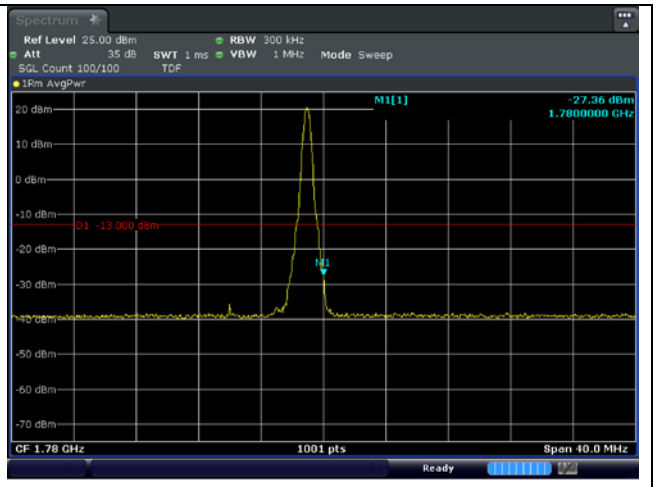
LTE band 4 (20 ㎒)

	
QPSK High Channel - 1 RB	QPSK High Channel - Full RB

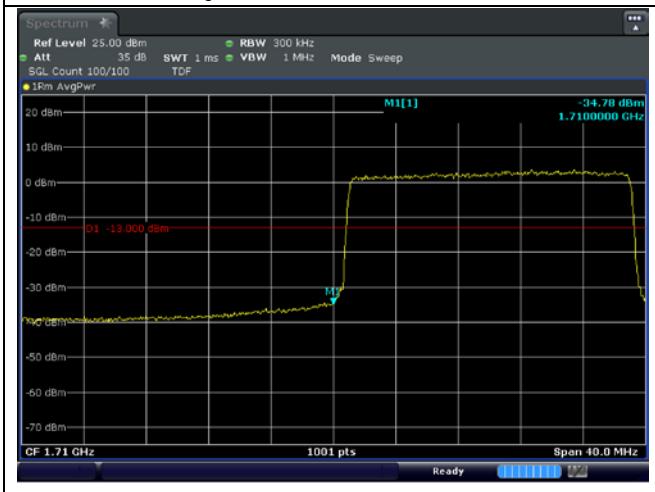
LTE band 66/4 (20 ㎒)



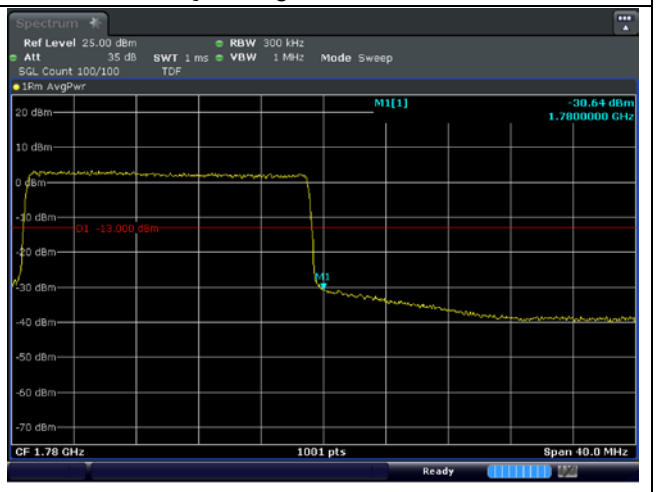
16QAM Low Channel - 1 RB



16QAM High Channel - 1 RB

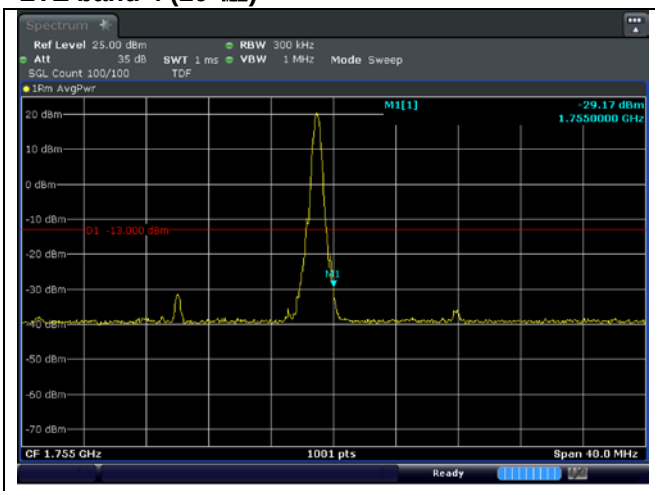


16QAM Low Channel - Full RB

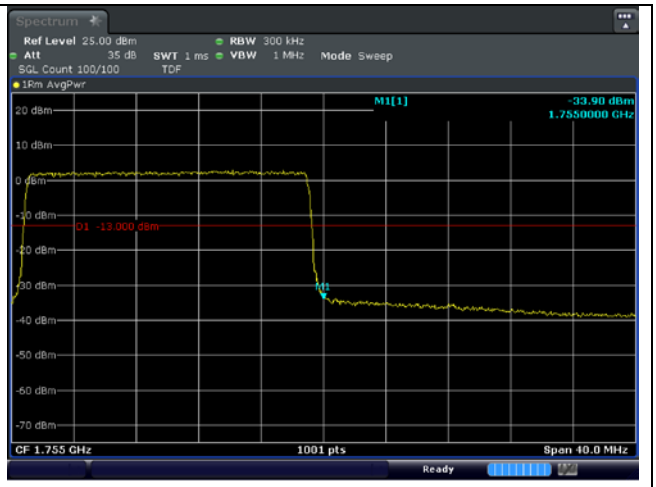


16QAM High Channel - Full RB

LTE band 4 (20 ㎒)



16QAM High Channel - 1 RB



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.

- §90.213, transmitters used in the services governed by this part must have a minimum frequency stability as specified in the following table.
For Mobile devices operating in the 809 to 824 ㎒ band at a power level 2 Watts or less, the limit specified in Table is +/- 2.5 ppm.

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 3
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 6
6.3, the carrier frequency shall not depart from the reference frequency, in excess of ±2.5 ppm for mobile stations and ±1.0 ppm for base stations.

- RSS-139 Issue 3
6.4, 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-140 Issue 1
4.2, 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.

- RSS-199 Issue 3
4.3, the transmitter frequency stability limit shall be determined as follows:

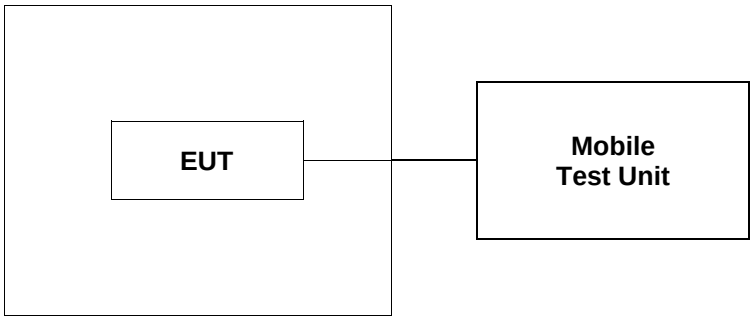
(a) the frequency offset shall be measured according to the procedure described in RSS-Gen and recorded.

(b) using a resolution bandwidth equal to that permitted within the 1 ㎒ band immediately outside the channel edge, as found in section 4.5, reference points will be selected at the unwanted emission limits, which comply with the attenuation specified in section 4.5 for the type of device under test, on the emission mask of the lowest and highest channels. The frequency at these points shall be recorded as f_L and f_H respectively.

The applicant shall ensure compliance with frequency stability requirements by showing that f_L minus the frequency offset and f_H plus the frequency offset is within the frequency range in which the equipment is designed to operate.

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 % R.H.

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	-5.50	-0.008 09
40		10.60	0.000 48
30		-5.00	-0.007 82
20(Ref.)		9.70	-
10		6.00	-0.001 97
0		6.50	-0.001 70
-10		-6.10	-0.008 40
-20		6.70	-0.001 60
-30		9.00	-0.000 37
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	3.32 (85%)	7.90	-0.000 96
	4.49 (115%)	7.20	-0.001 33

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	-2.60	-0.007 17
40		-3.60	-0.008 37
30		1.20	-0.002 63
20(Ref.)		3.40	-
10		1.70	-0.002 03
0		8.60	0.006 22
-10		7.40	0.004 78
-20		-1.20	-0.005 50
-30		-3.20	-0.007 89
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	3.32 (85%)	-2.90	-0.007 53
	4.49 (115%)	2.80	-0.000 72

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	-8.60	-0.006 51
40		-7.50	-0.006 07
30		-3.10	-0.004 34
20(Ref.)		7.90	-
10		6.20	-0.000 67
0		-4.40	-0.004 85
-10		3.80	-0.001 62
-20		6.20	-0.000 67
-30		4.40	-0.001 38
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	3.32 (85%)	9.90	0.000 79
	4.49 (115%)	8.10	0.000 08

LTE band 12 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	-0.80	0.001 55
40		3.20	0.007 21
30		-3.90	-0.002 83
20(Ref.)		-1.90	-
10		-1.40	0.000 71
0		3.80	0.008 06
-10		2.80	0.006 64
-20		3.50	0.007 63
-30		3.80	0.008 06
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	3.32 (85%)	4.50	0.009 05
	4.49 (115%)	1.70	0.005 09

LTE band 13 at middle channel

Reference Frequency: 782 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.90	2.80	0.007 54
40		-4.80	-0.002 17
30		3.60	0.008 57
20(Ref.)		-3.10	-
10		7.10	0.013 04
0		5.30	0.010 74
-10		4.50	0.009 72
-20		-1.50	0.002 05
-30		3.60	0.008 57
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	3.32 (85%)	2.50	0.007 16
	4.49 (115%)	-1.30	0.002 30

LTE band 14 at middle channel

Reference Frequency: 793 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.90	-0.90	-0.002 40
40		1.60	0.000 76
30		-1.90	-0.003 66
20(Ref.)		1.00	-
10		-2.40	-0.004 29
0		1.80	0.001 01
-10		2.20	0.001 51
-20		-1.20	-0.002 77
-30		1.80	0.001 01
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	3.32 (85%)	1.70	0.000 88
	4.49 (115%)	3.40	0.003 03

LTE band 66/4 at middle channel

Reference Frequency: 1 745.0 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	3.90	1.80	0.004 76
40		-1.80	0.002 69
30		5.60	0.006 93
20(Ref.)		-6.50	-
10		-6.10	0.000 23
0		-2.70	0.002 18
-10		-1.20	0.003 04
-20		1.70	0.004 70
-30		3.50	0.005 73
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V)**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
20	3.32 (85%)	9.50	0.009 17
	4.49 (115%)	-10.40	-0.002 23

- End of the Test Report -