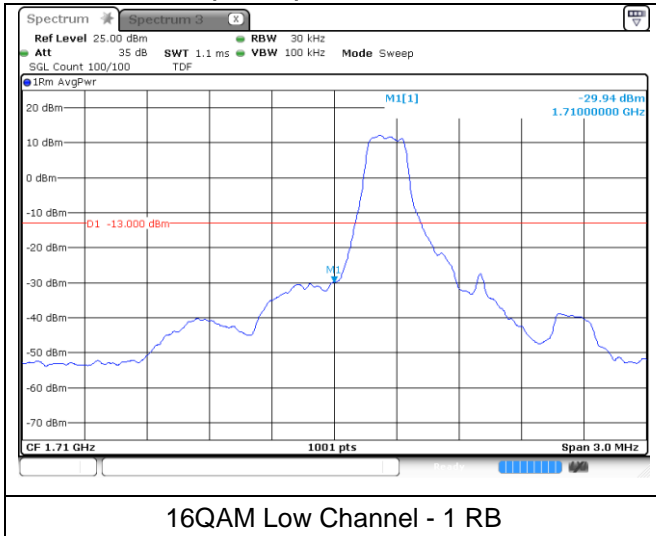
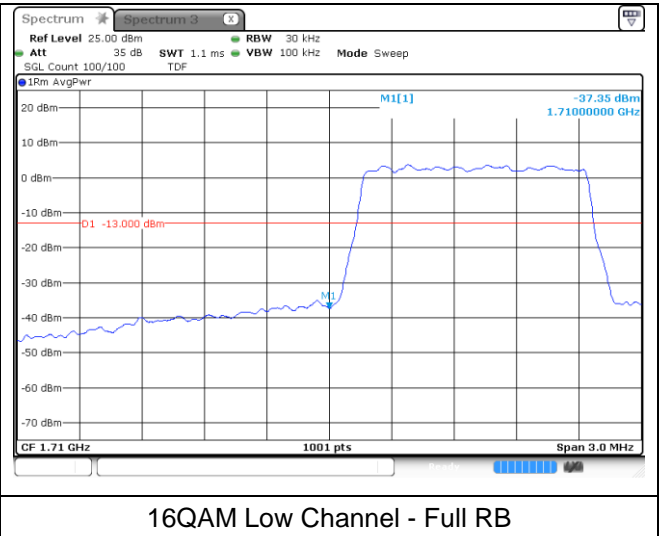


**LTE band 66/4 (1.4 MHz)**

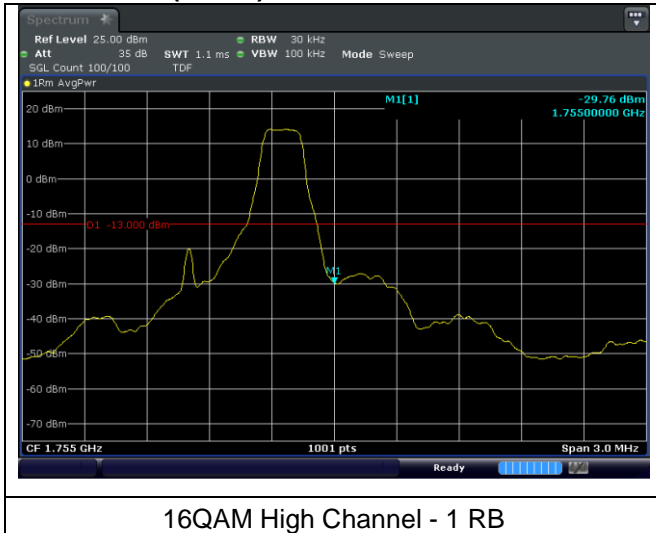


16QAM Low Channel - 1 RB

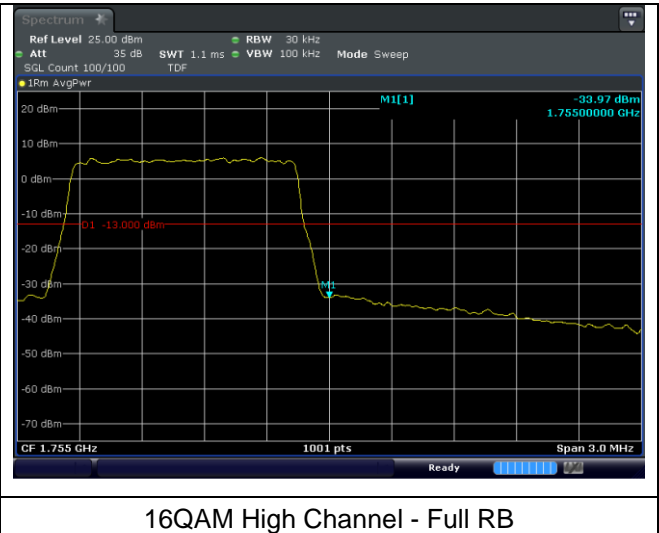


16QAM Low Channel - Full RB

**LTE band 4 (1.4 MHz)**

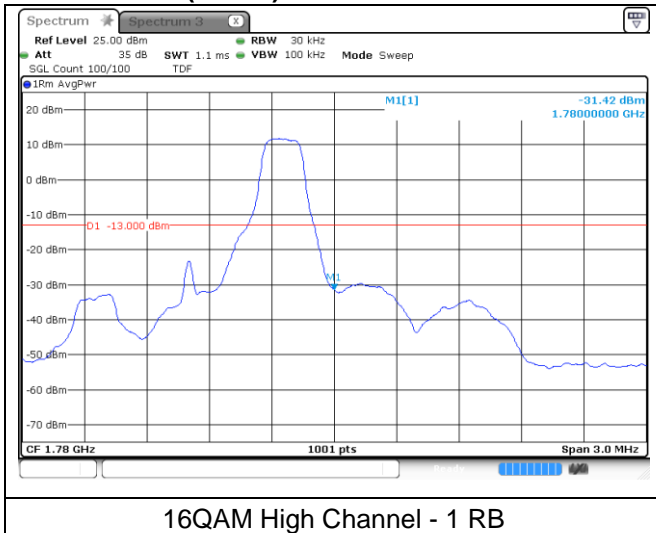


16QAM High Channel - 1 RB

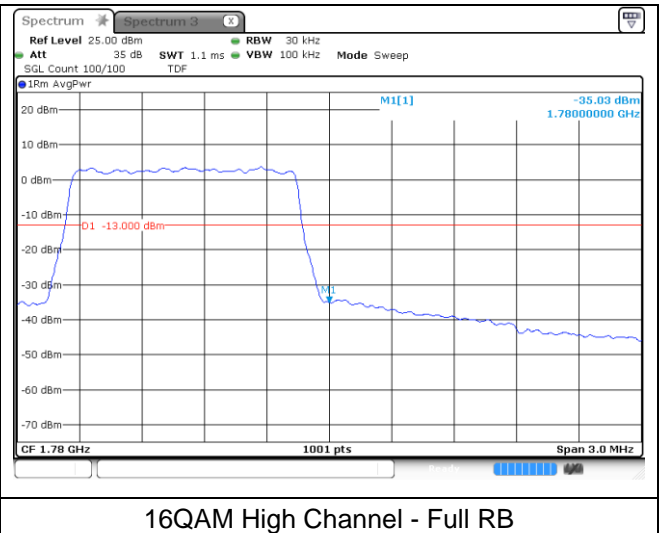


16QAM High Channel - Full RB

**LTE band 66 (1.4 MHz)**

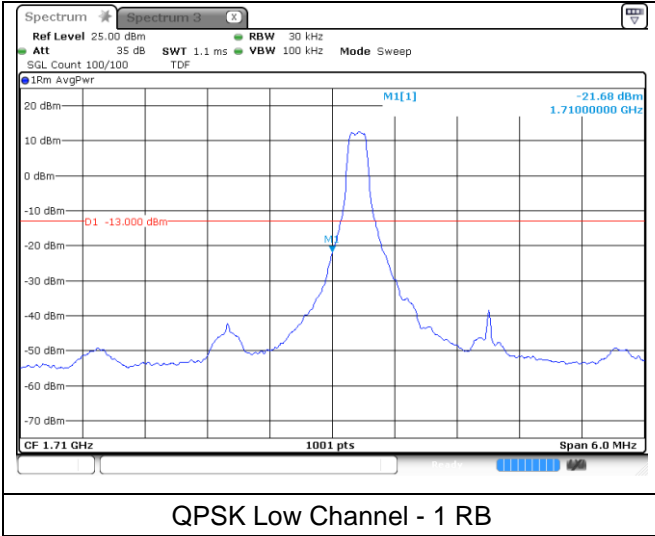


16QAM High Channel - 1 RB

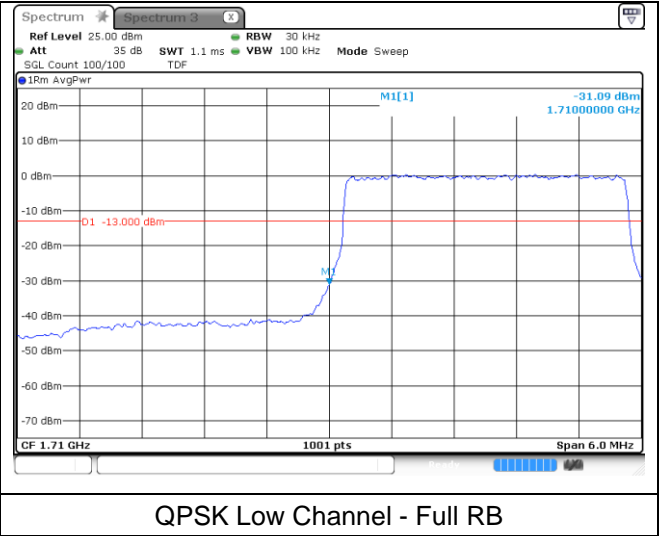


16QAM High Channel - Full RB

**LTE band 66/4 (3 MHz)**

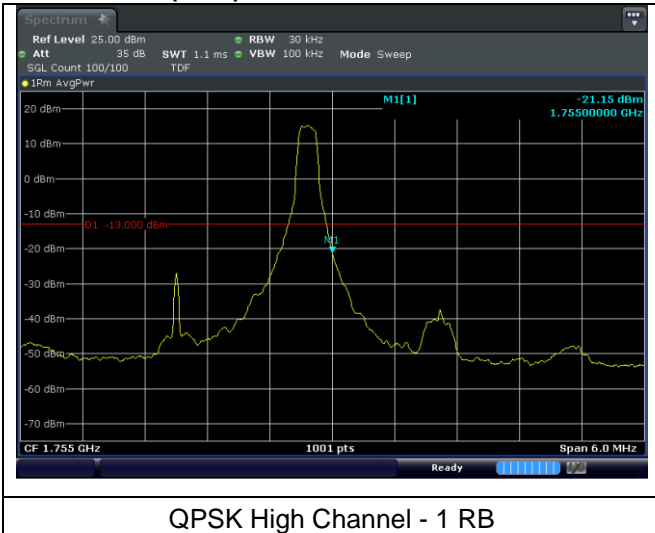


QPSK Low Channel - 1 RB

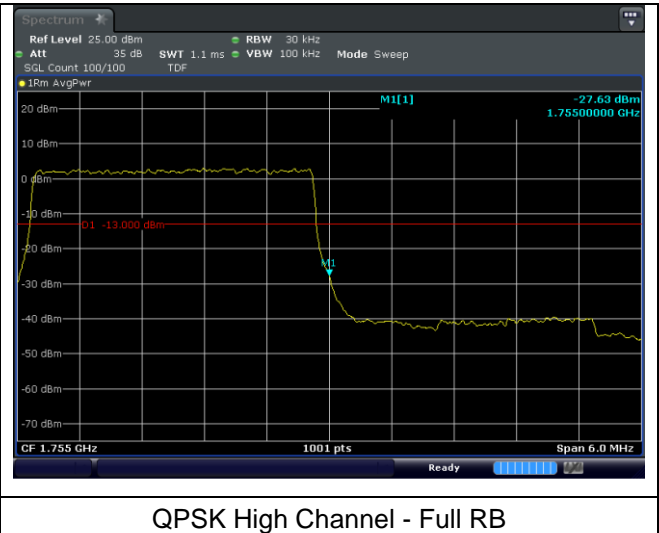


QPSK Low Channel - Full RB

**LTE band 4 (3 MHz)**

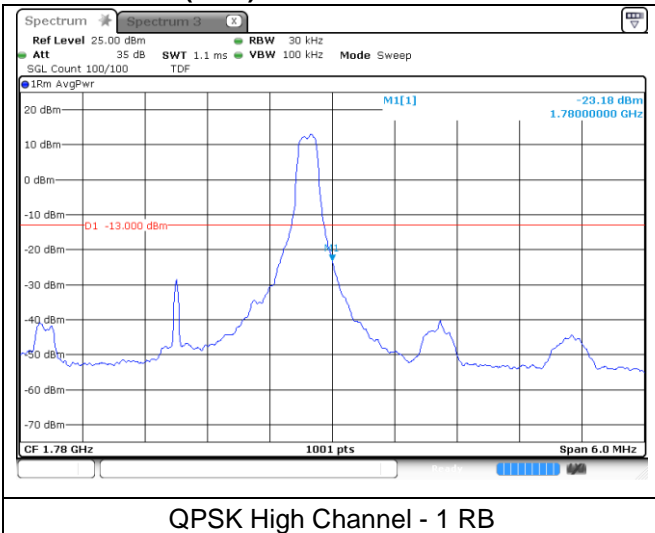


QPSK High Channel - 1 RB

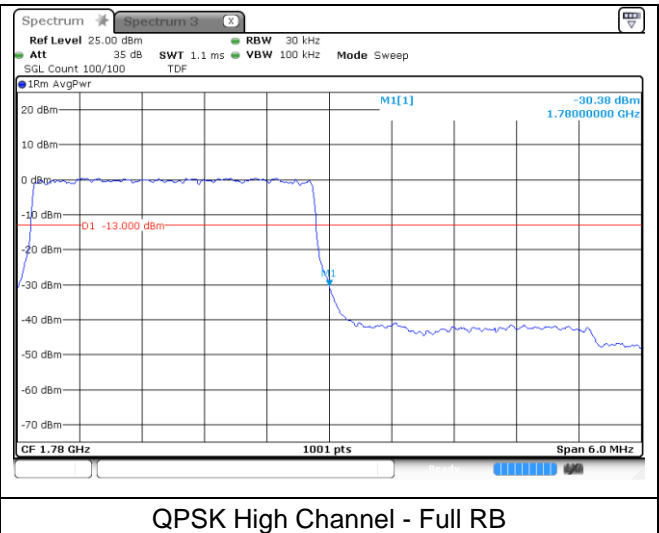


QPSK High Channel - Full RB

**LTE band 66 (3 MHz)**

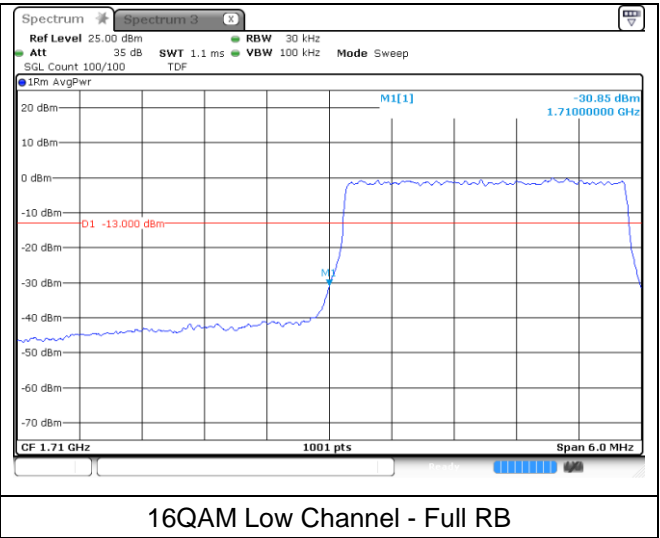
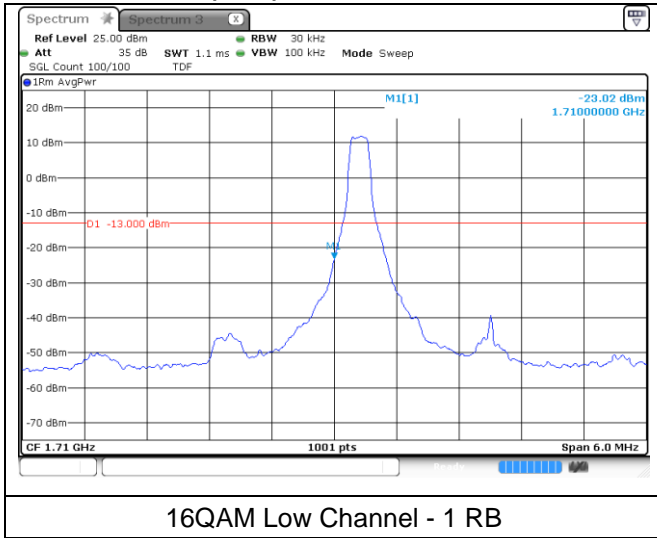


QPSK High Channel - 1 RB

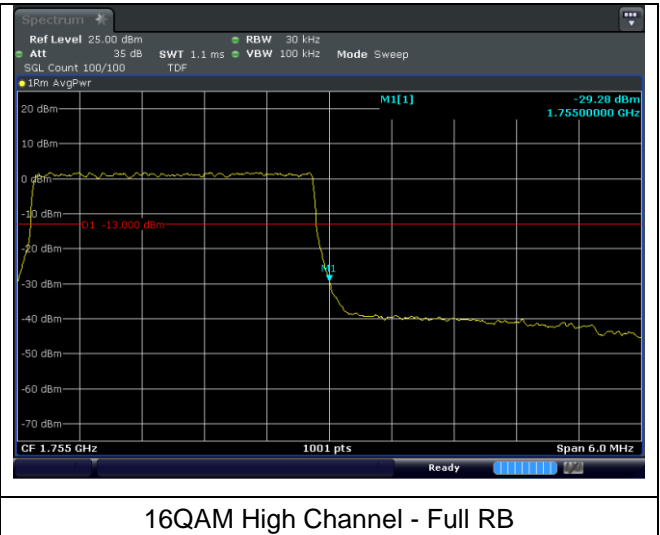
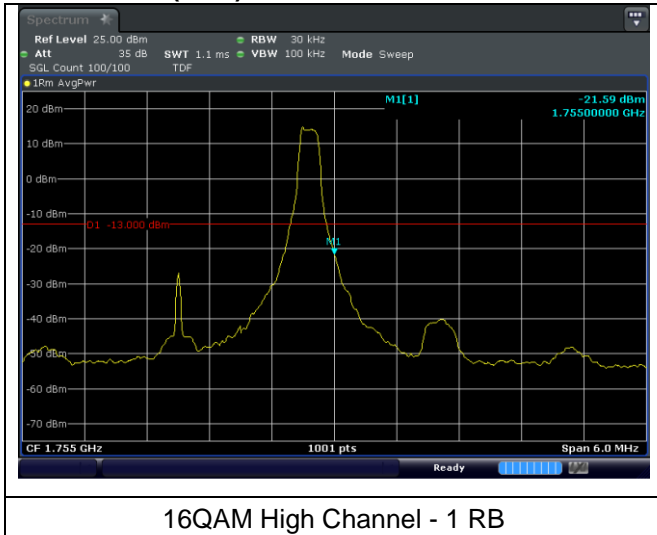


QPSK High Channel - Full RB

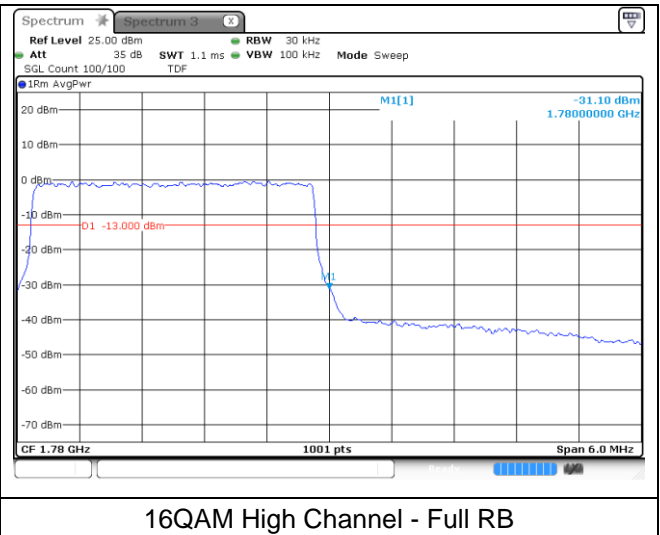
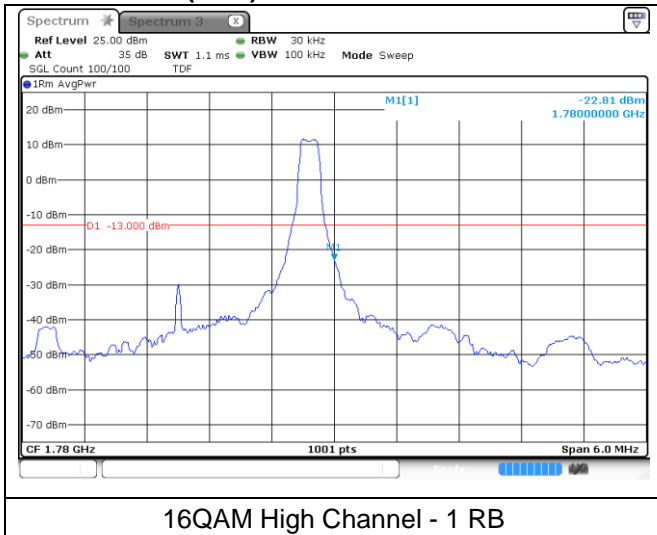
**LTE band 66/4 (3 MHz)**



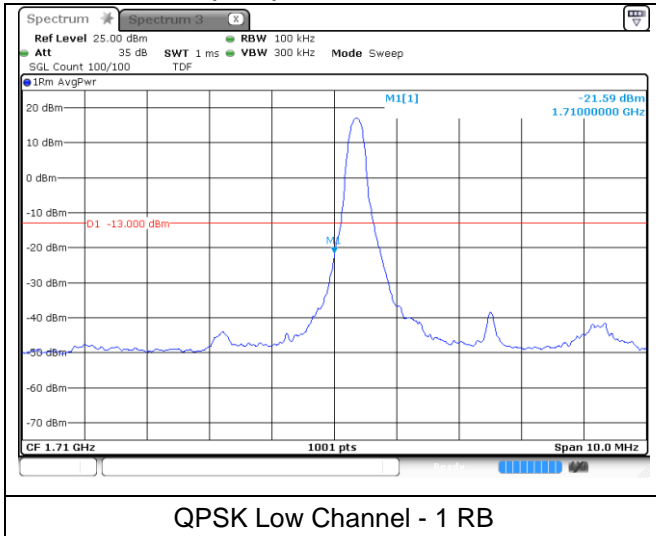
**LTE band 4 (3 MHz)**



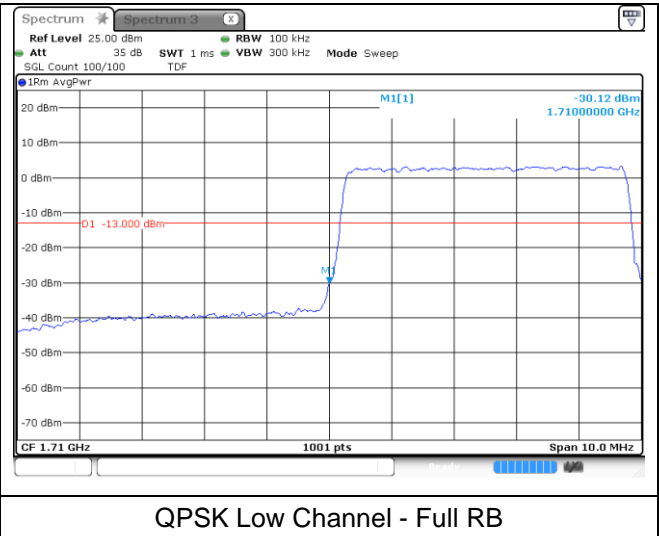
**LTE band 66 (3 MHz)**



**LTE band 66/4 (5 MHz)**

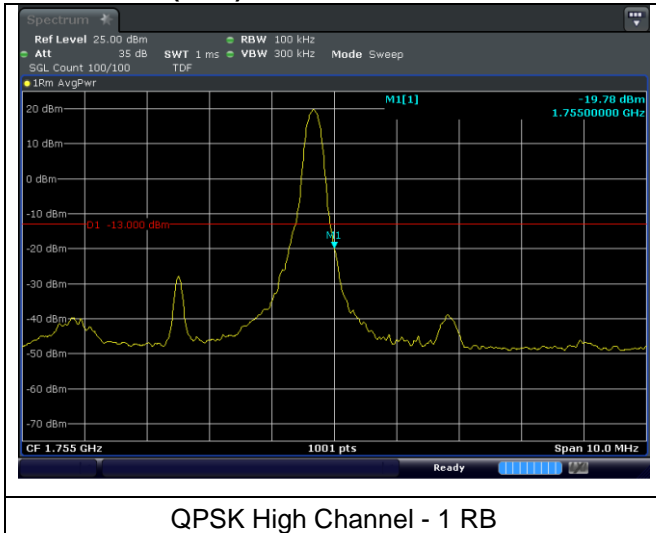


QPSK Low Channel - 1 RB

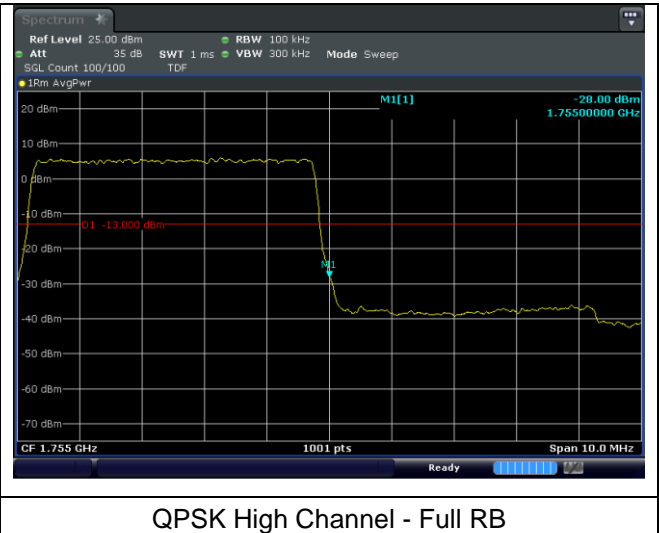


QPSK Low Channel - Full RB

**LTE band 4 (5 MHz)**

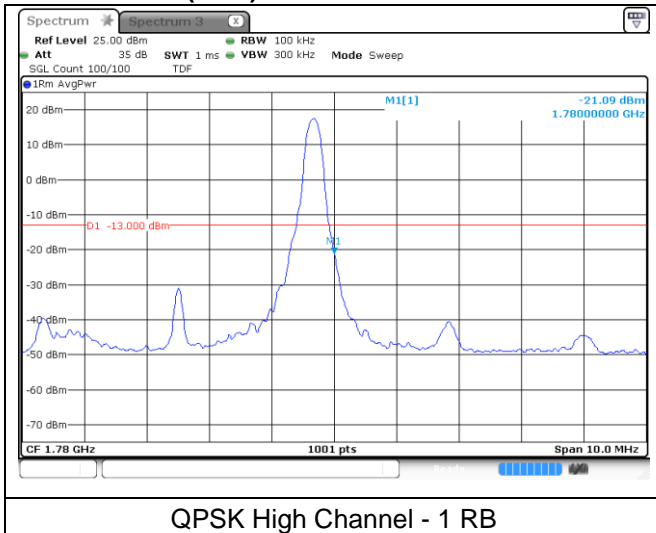


QPSK High Channel - 1 RB

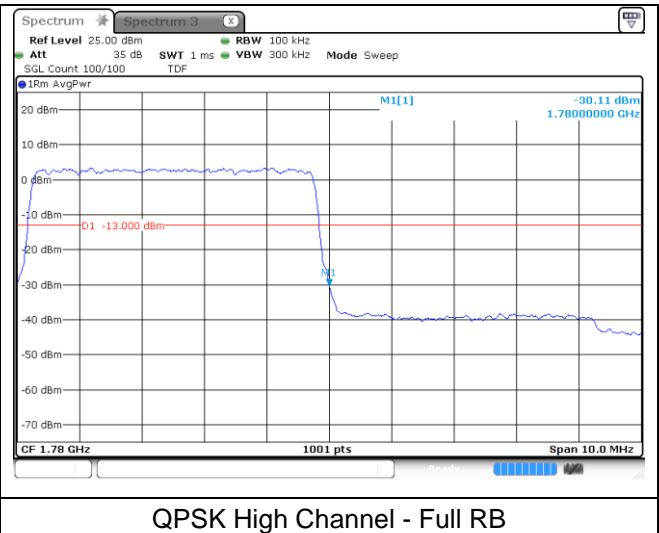


QPSK High Channel - Full RB

**LTE band 66 (5 MHz)**

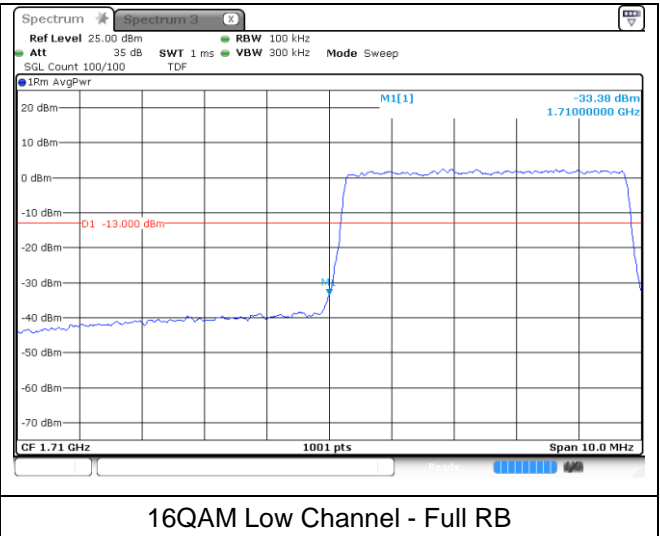
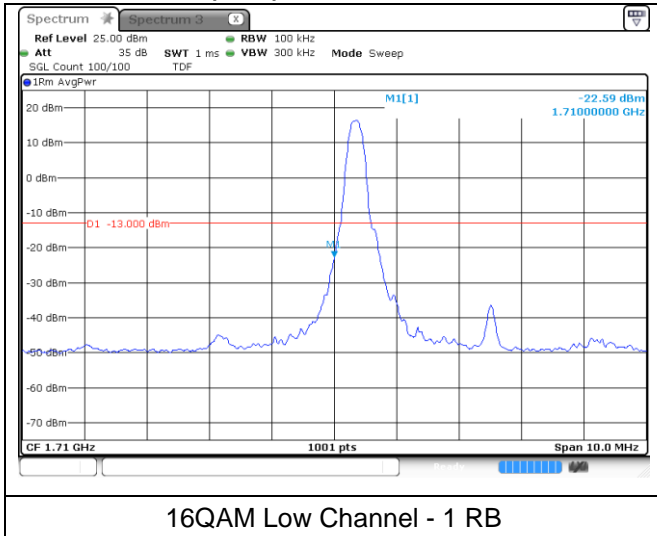


QPSK High Channel - 1 RB

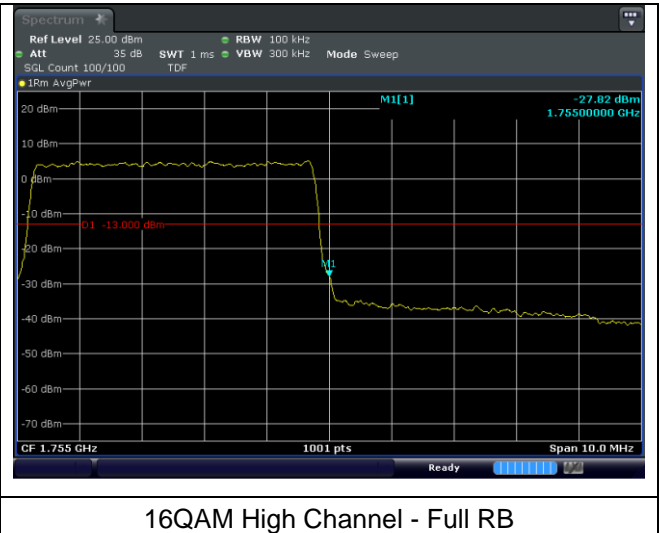
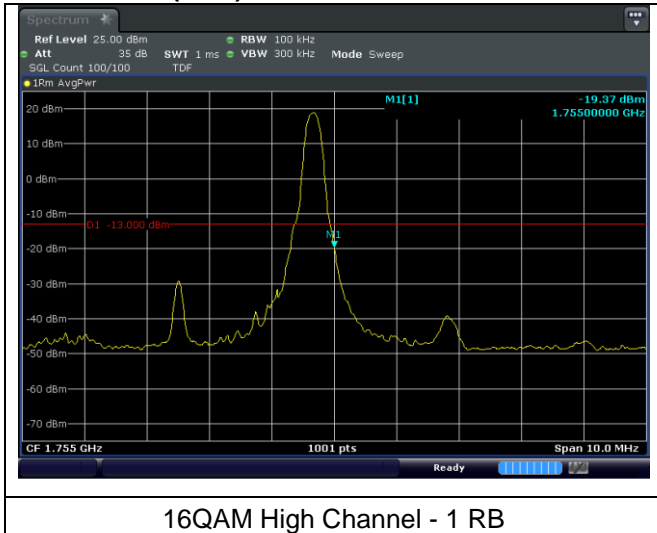


QPSK High Channel - Full RB

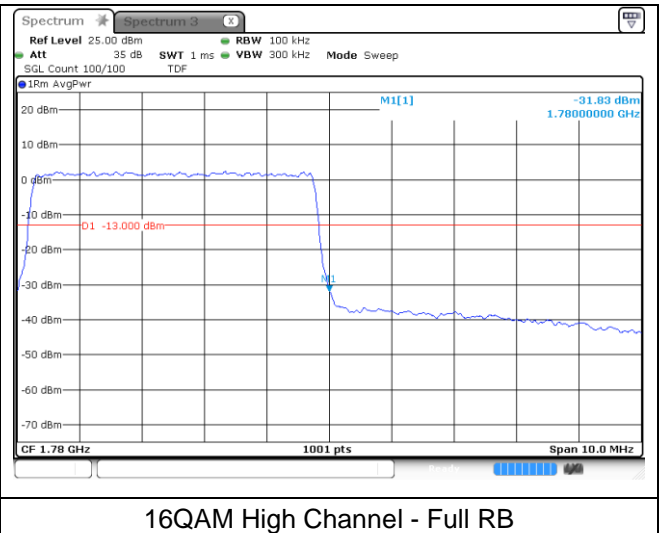
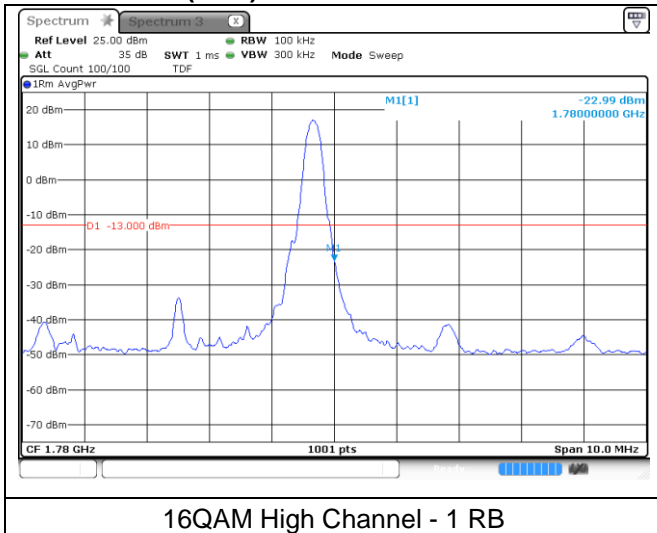
**LTE band 66/4 (5 MHz)**



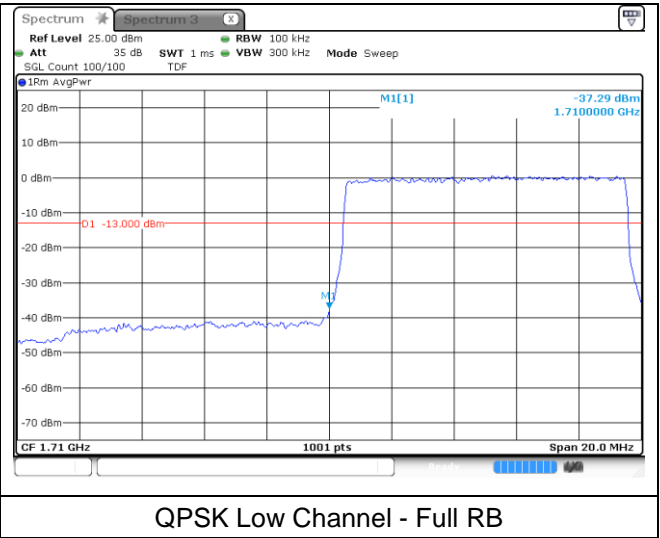
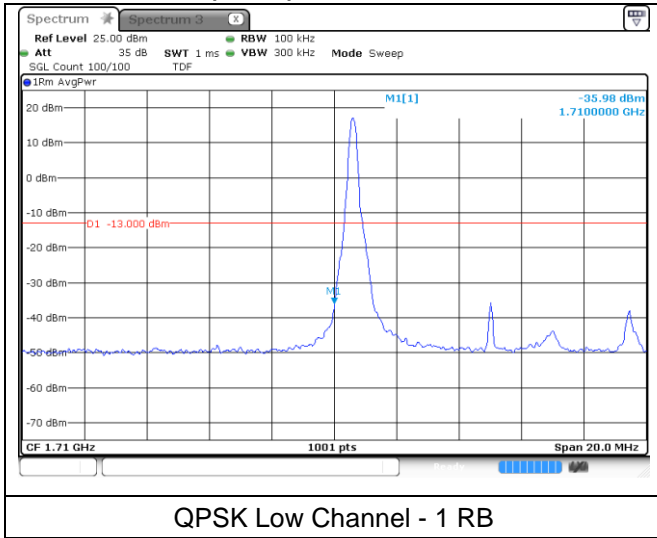
**LTE band 4 (5 MHz)**



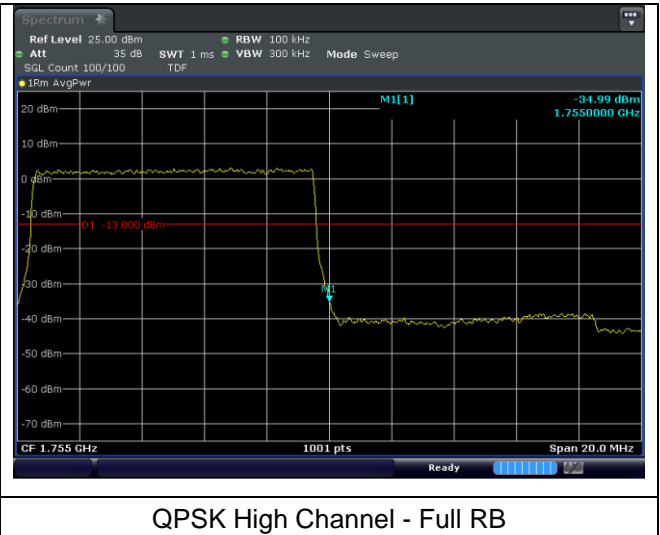
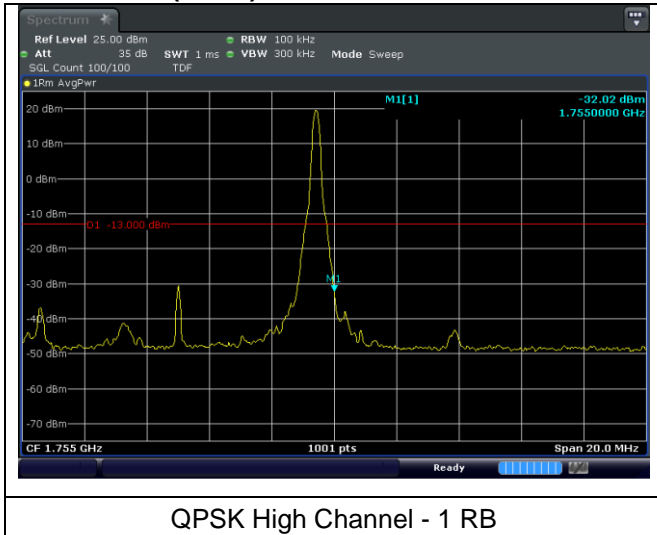
**LTE band 66 (5 MHz)**



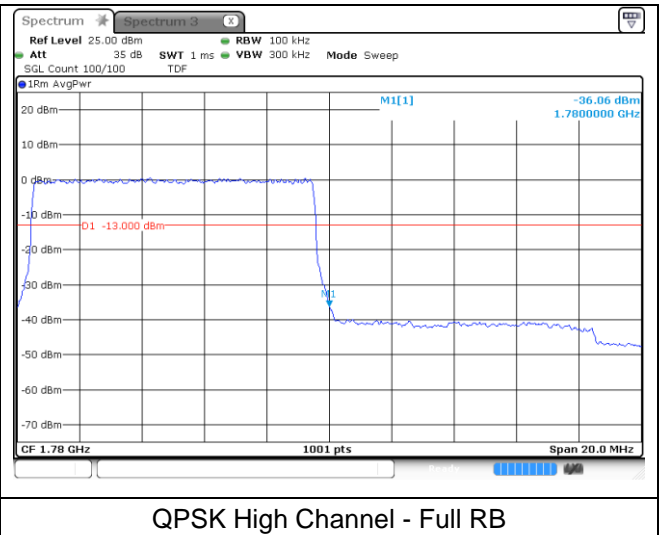
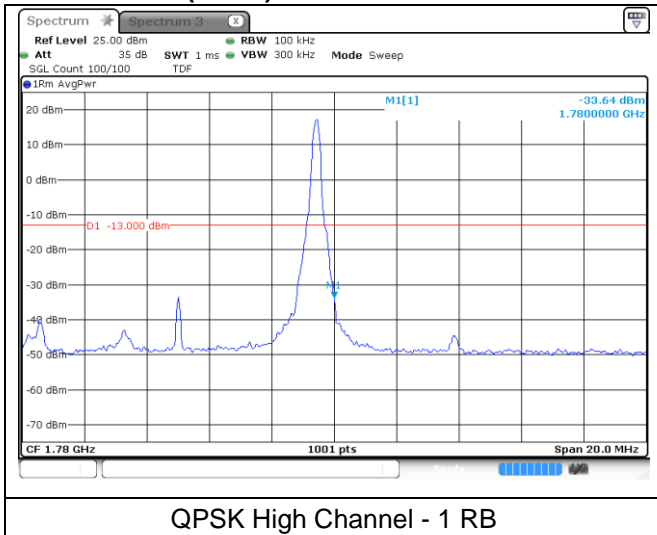
**LTE band 66/4 (10 MHz)**



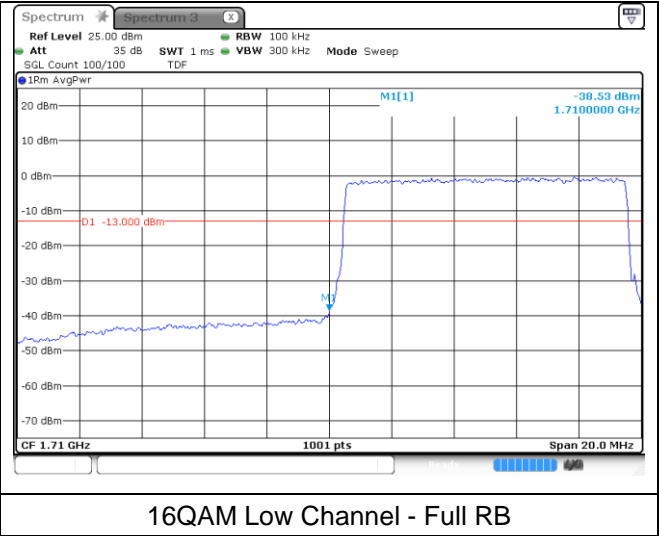
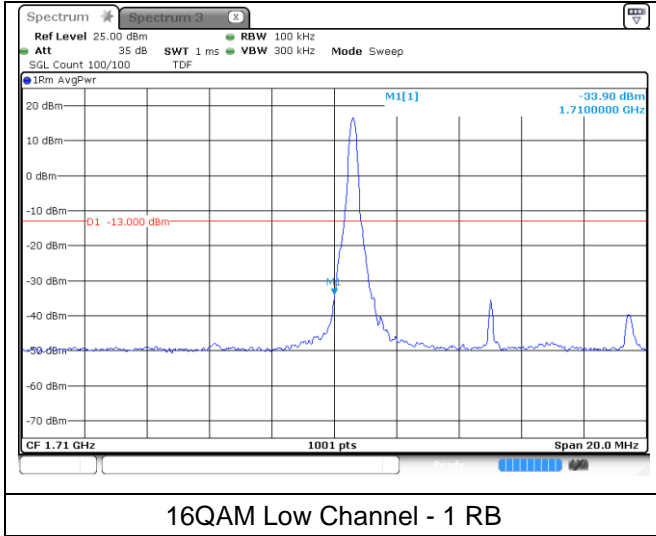
**LTE band 4 (10 MHz)**



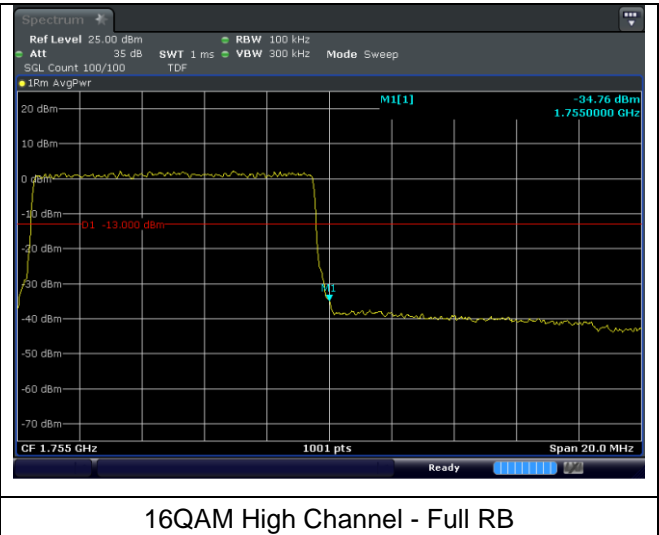
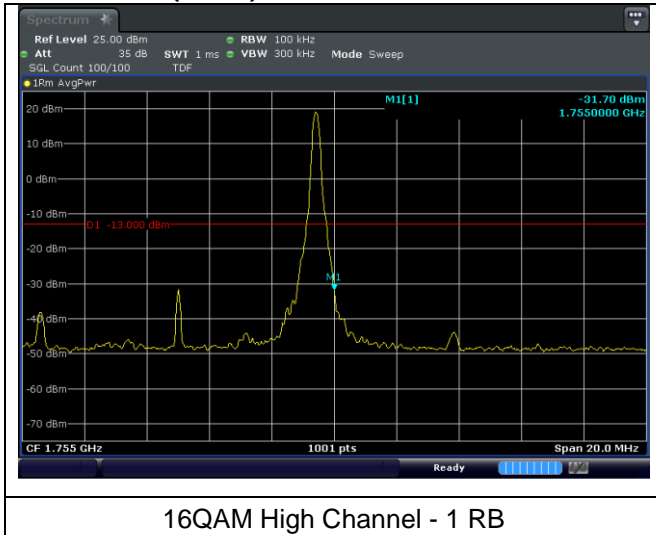
**LTE band 66 (10 MHz)**



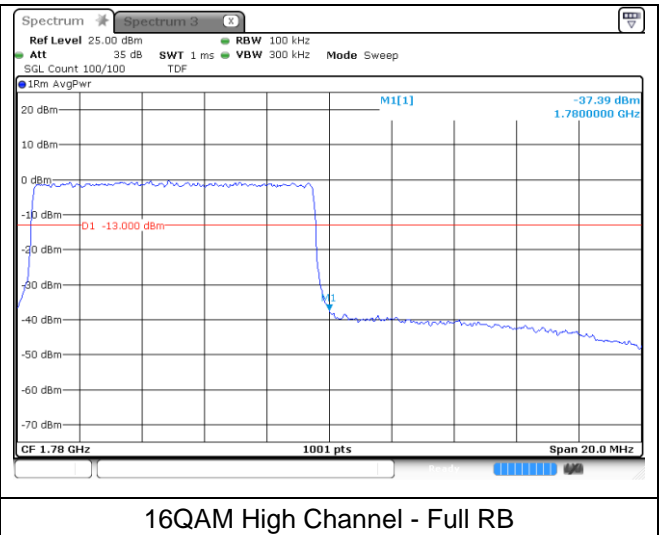
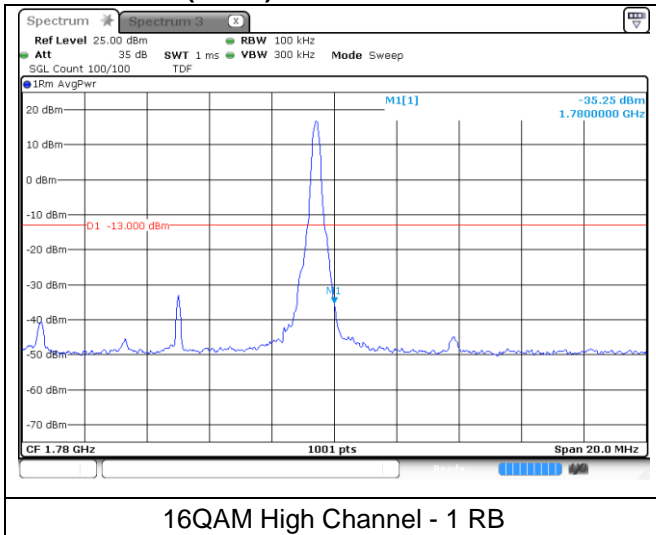
**LTE band 66/4 (10 MHz)**



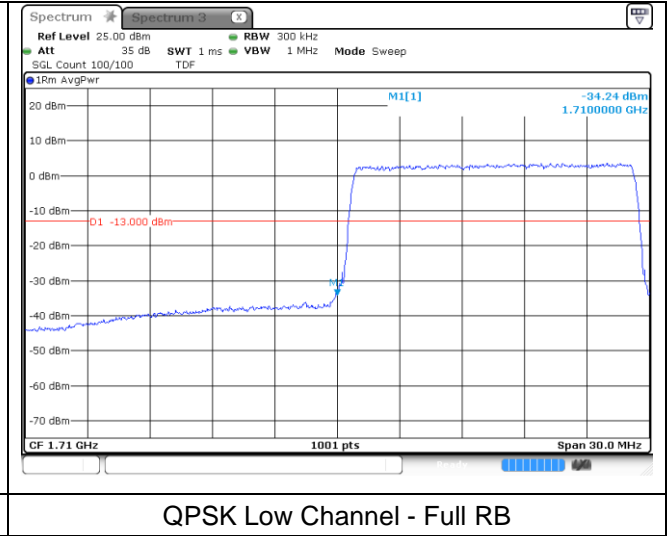
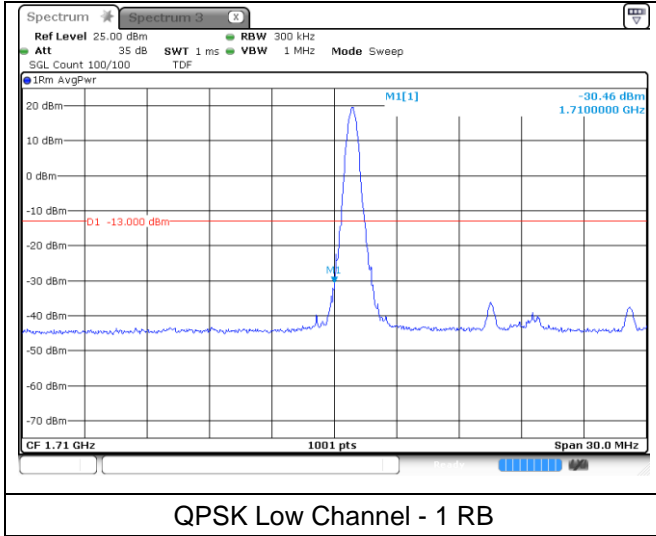
**LTE band 4 (10 MHz)**



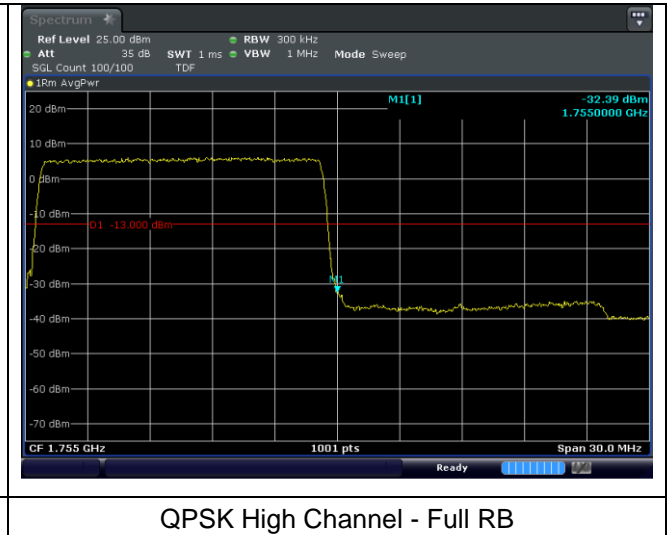
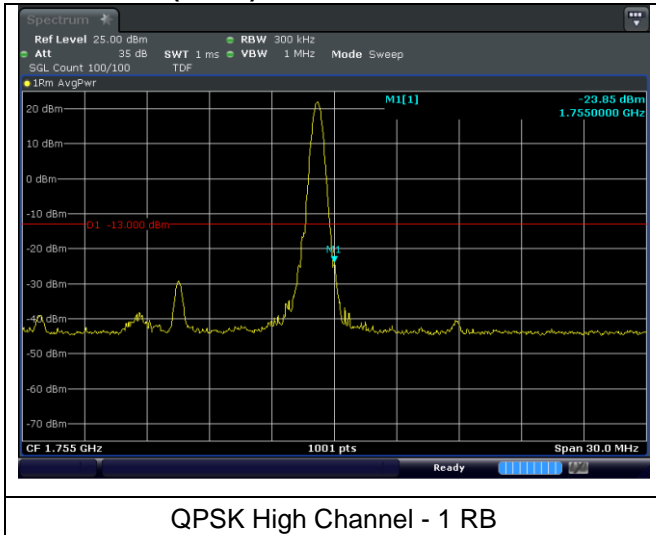
**LTE band 66 (10 MHz)**



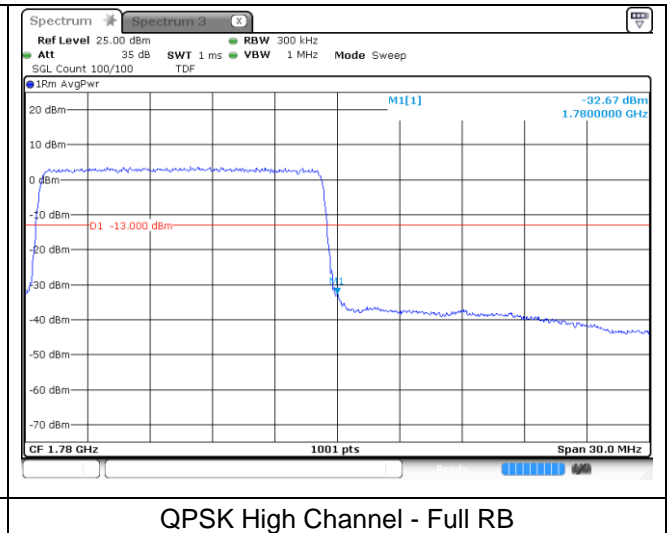
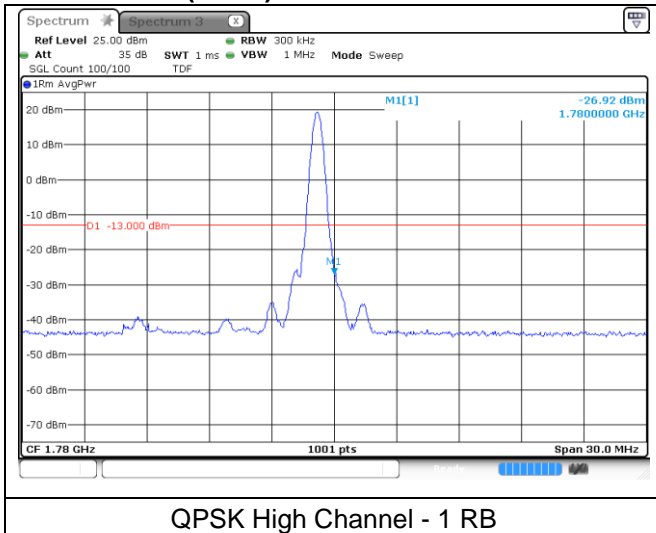
**LTE band 66/4 (15 MHz)**



**LTE band 4 (15 MHz)**

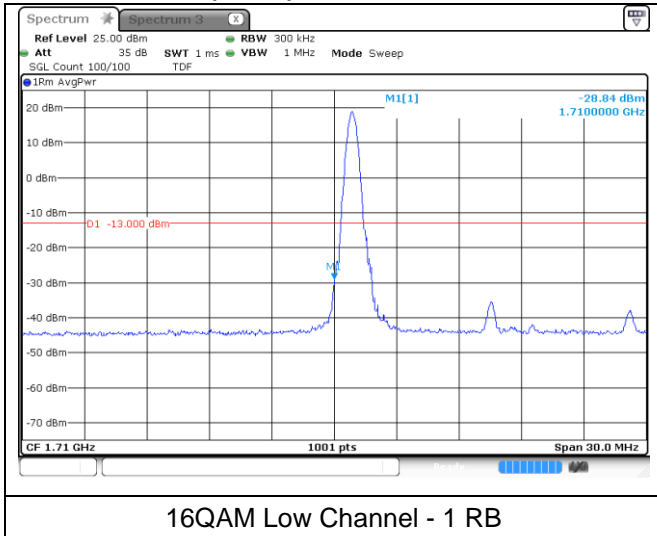


**LTE band 66 (15 MHz)**

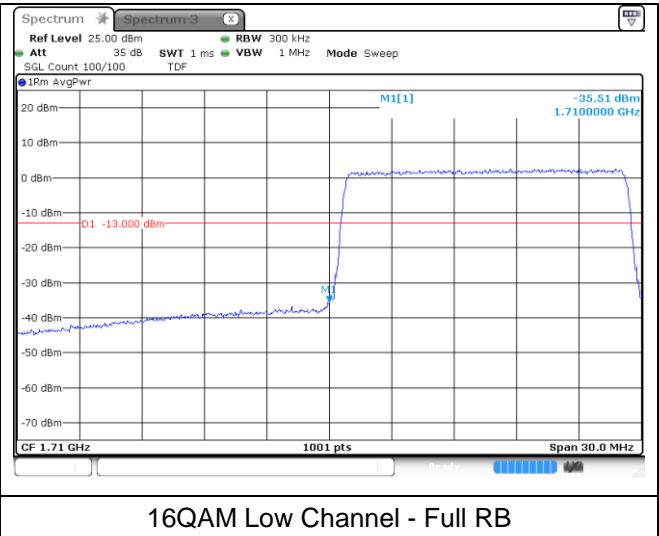




**LTE band 66/4 (15 MHz)**

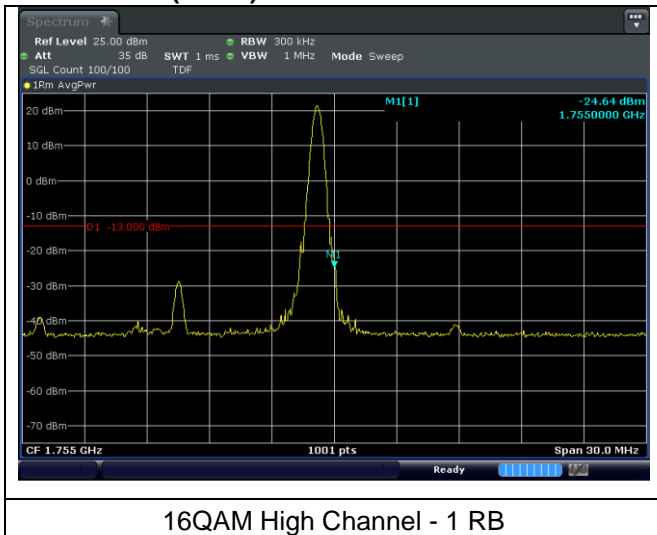


16QAM Low Channel - 1 RB

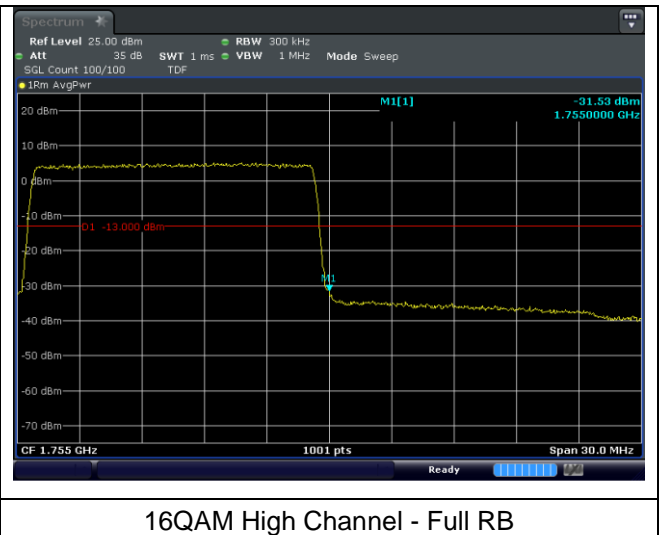


16QAM Low Channel - Full RB

**LTE band 4 (15 MHz)**

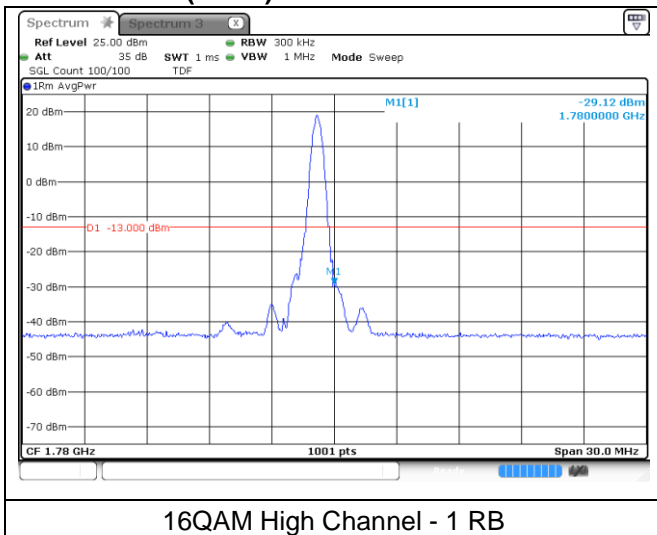


16QAM High Channel - 1 RB

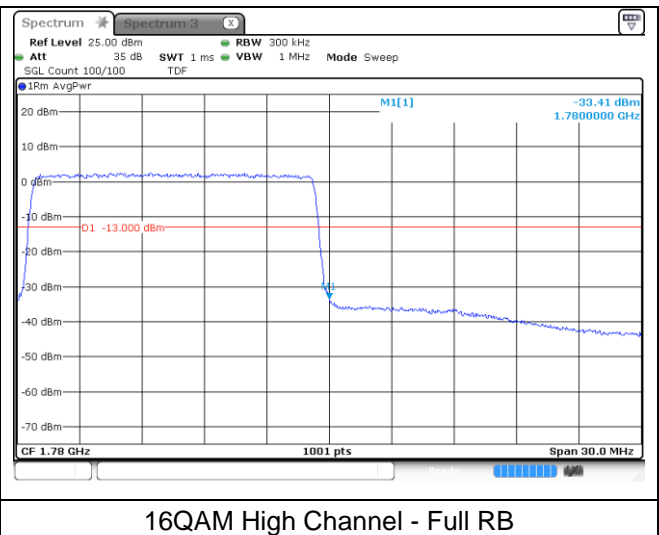


16QAM High Channel - Full RB

**LTE band 66 (15 MHz)**

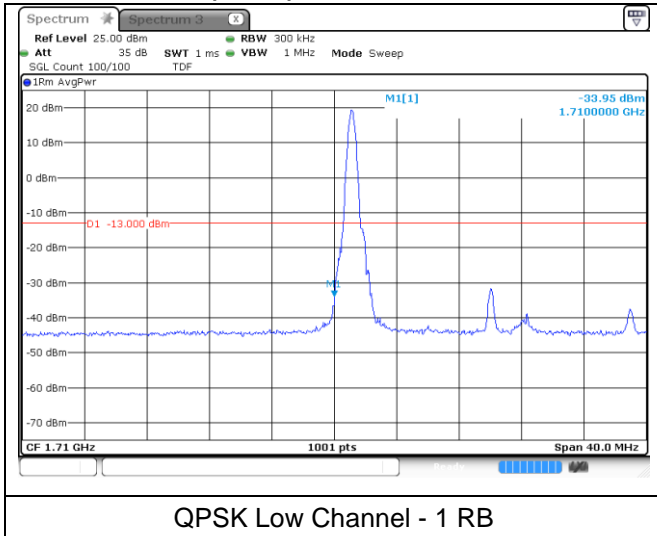


16QAM High Channel - 1 RB

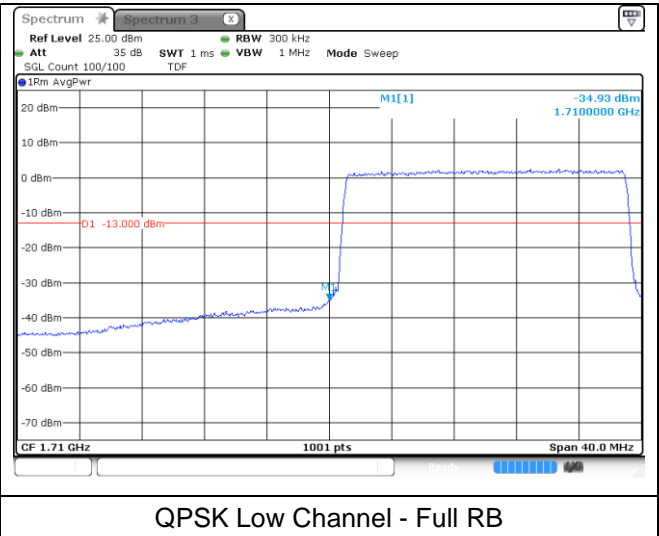


16QAM High Channel - Full RB

**LTE band 66/4 (20 MHz)**

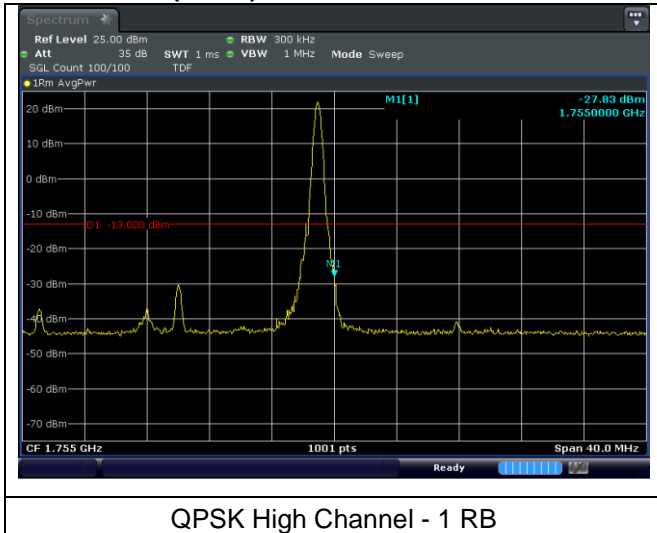


QPSK Low Channel - 1 RB

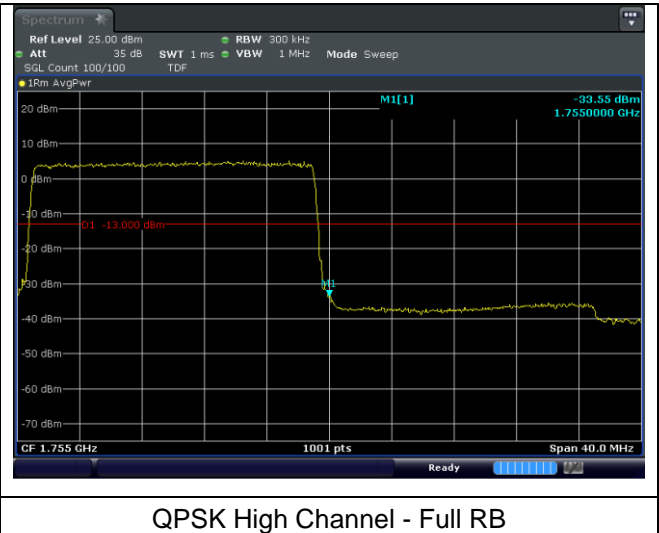


QPSK Low Channel - Full RB

**LTE band 4 (20 MHz)**

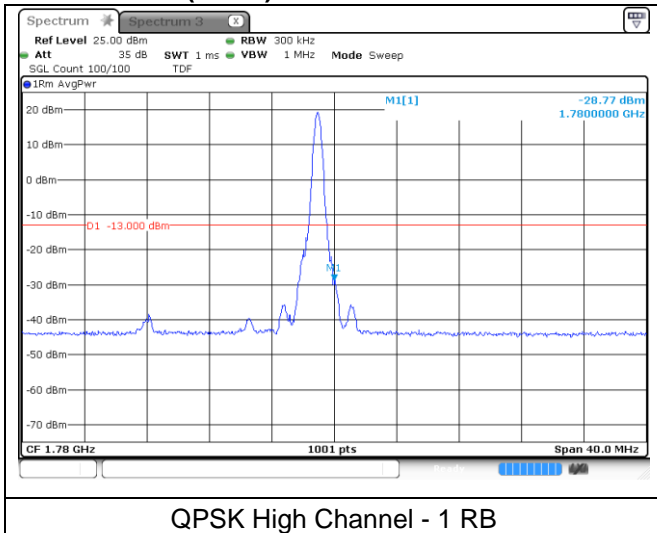


QPSK High Channel - 1 RB

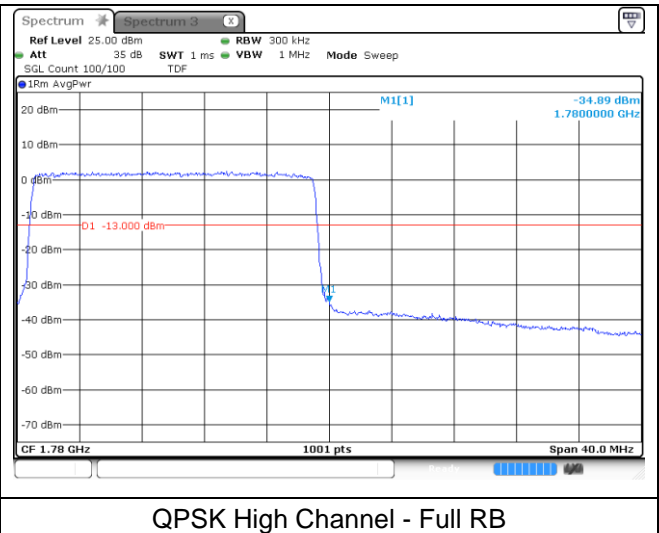


QPSK High Channel - Full RB

**LTE band 66 (20 MHz)**

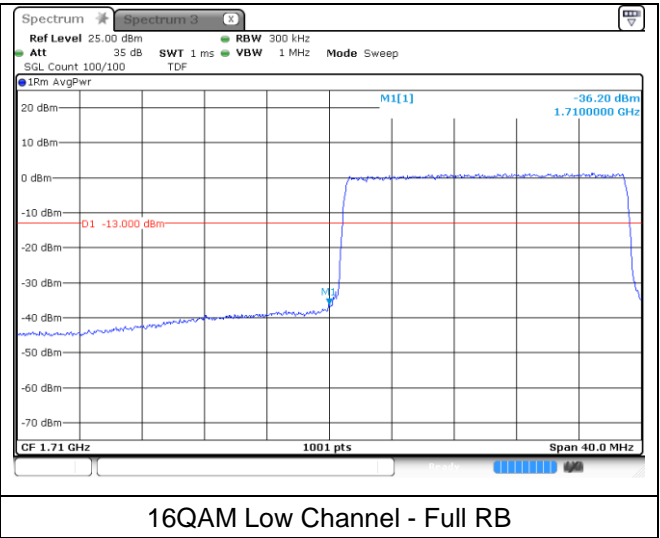
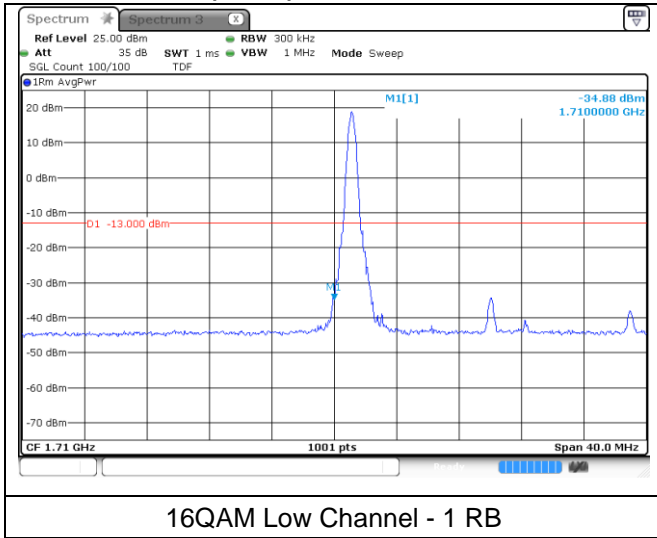


QPSK High Channel - 1 RB

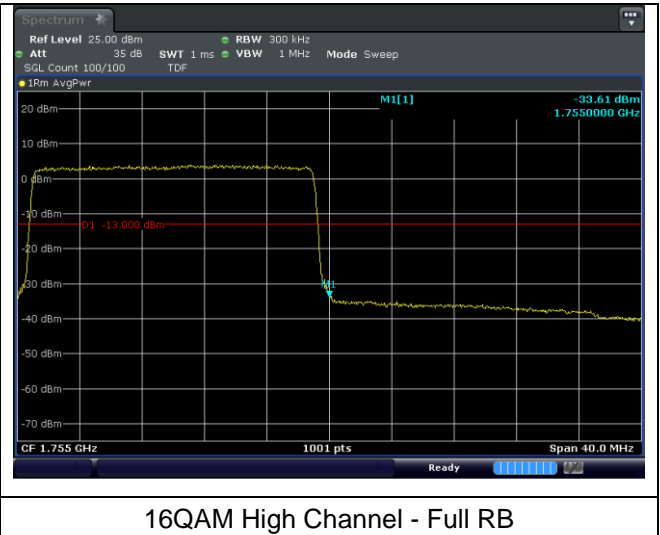
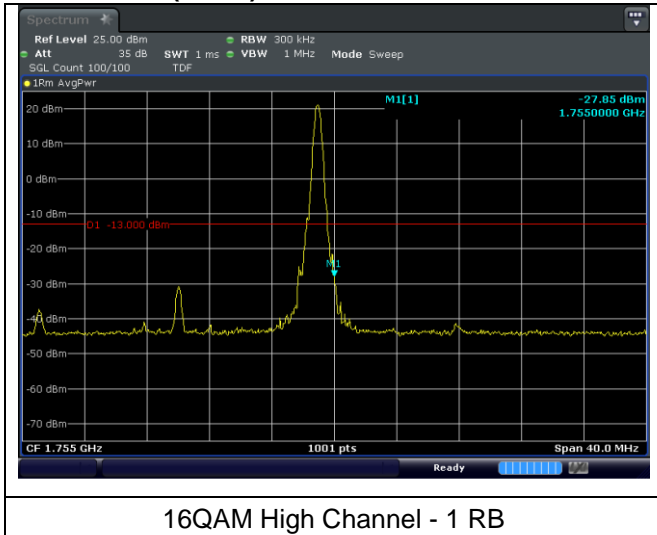


QPSK High Channel - Full RB

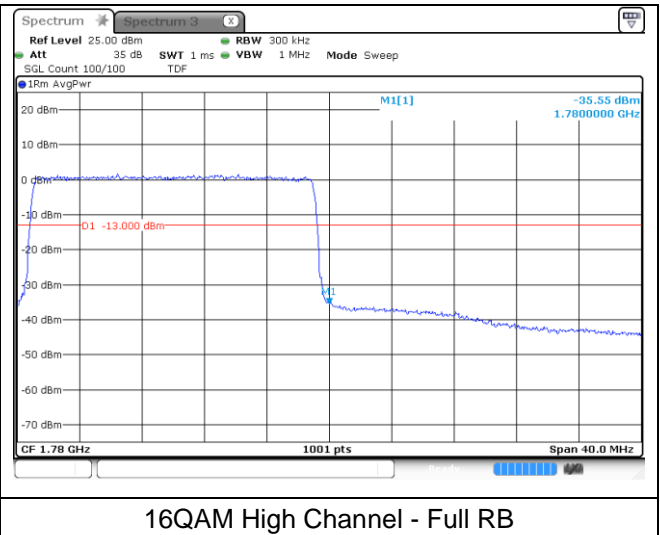
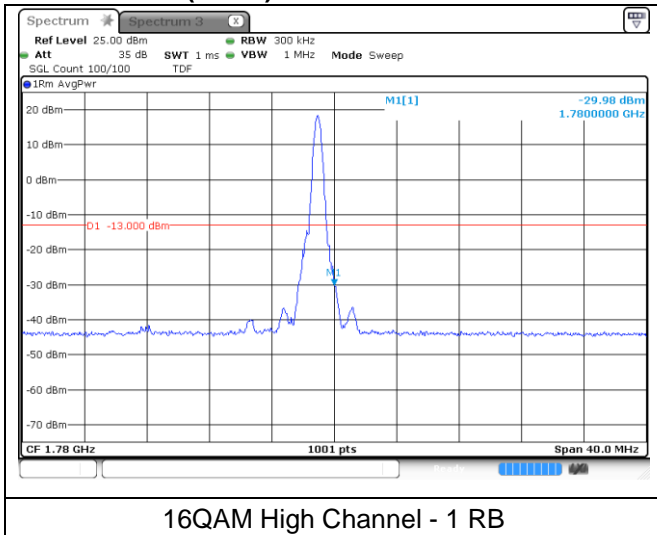
**LTE band 66/4 (20 MHz)**



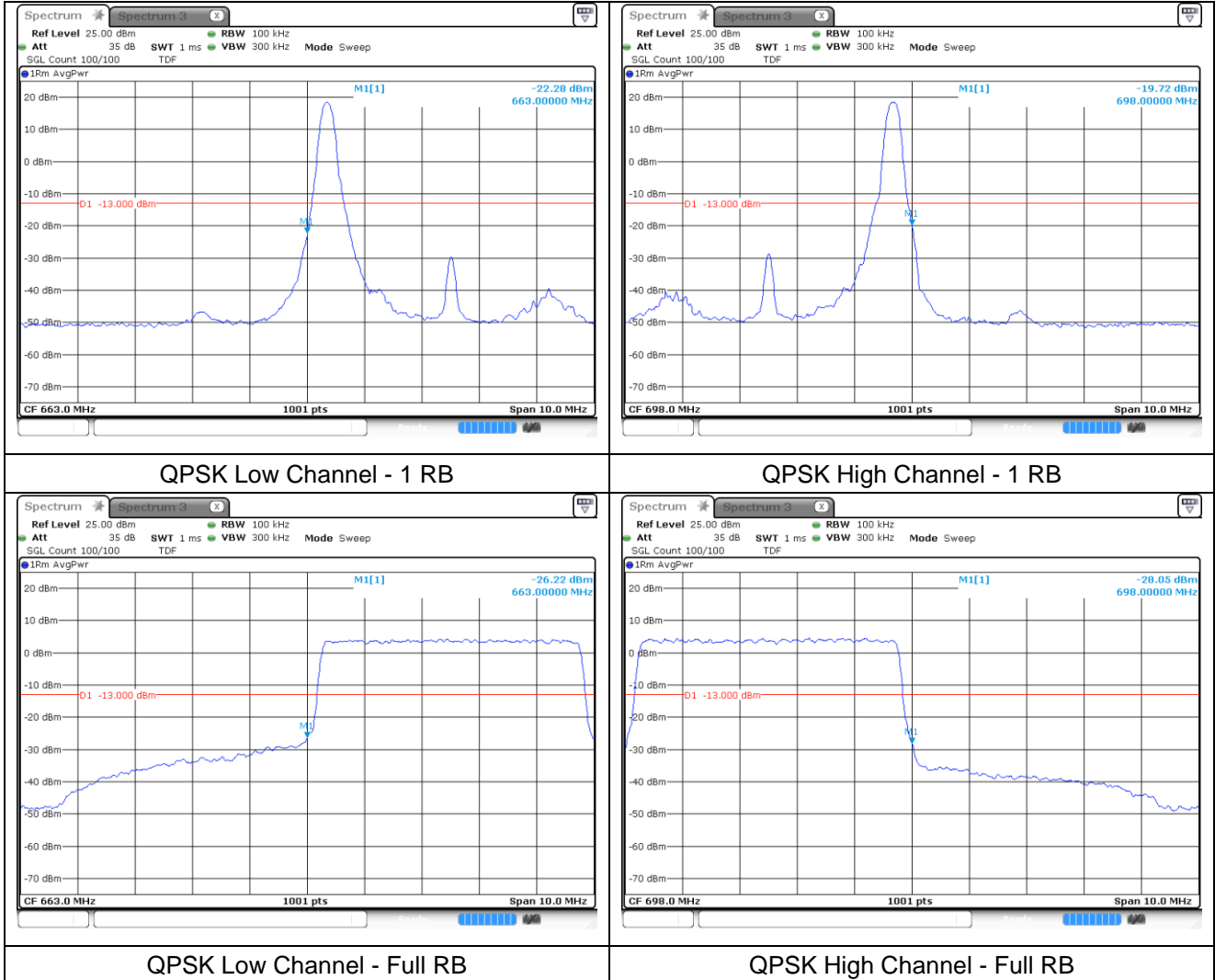
**LTE band 4 (20 MHz)**



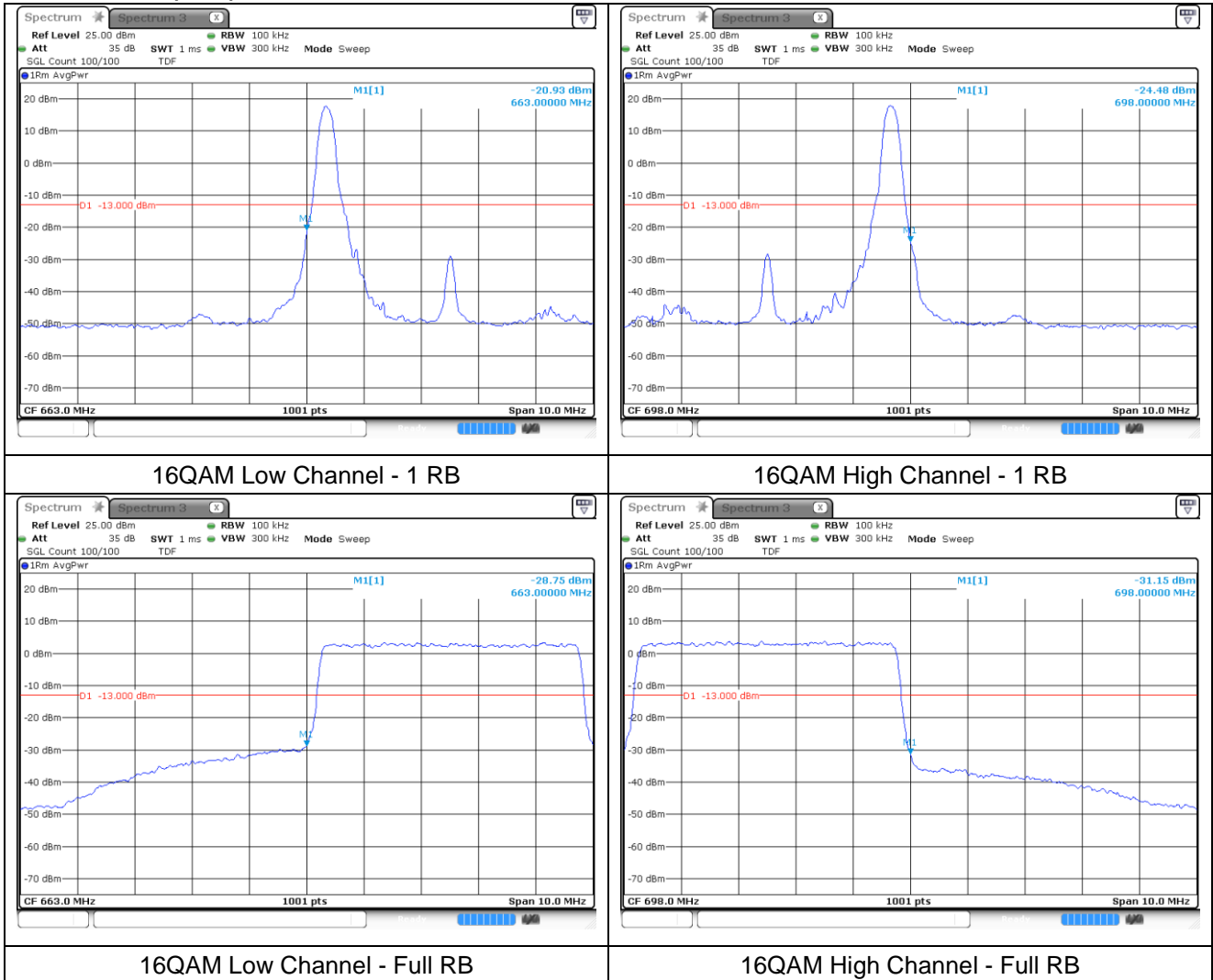
**LTE band 66 (20 MHz)**



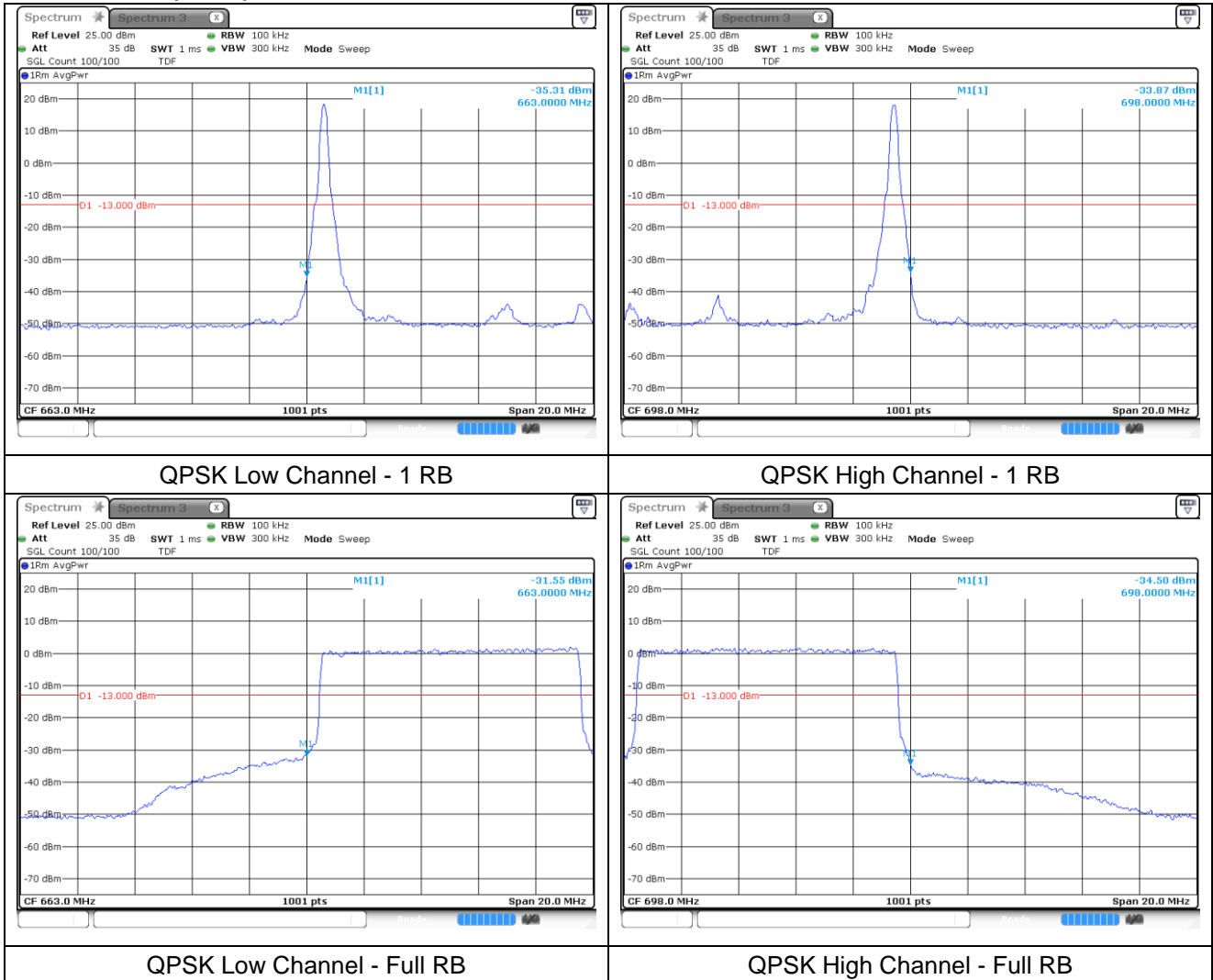
**LTE band 71 (5 MHz)**



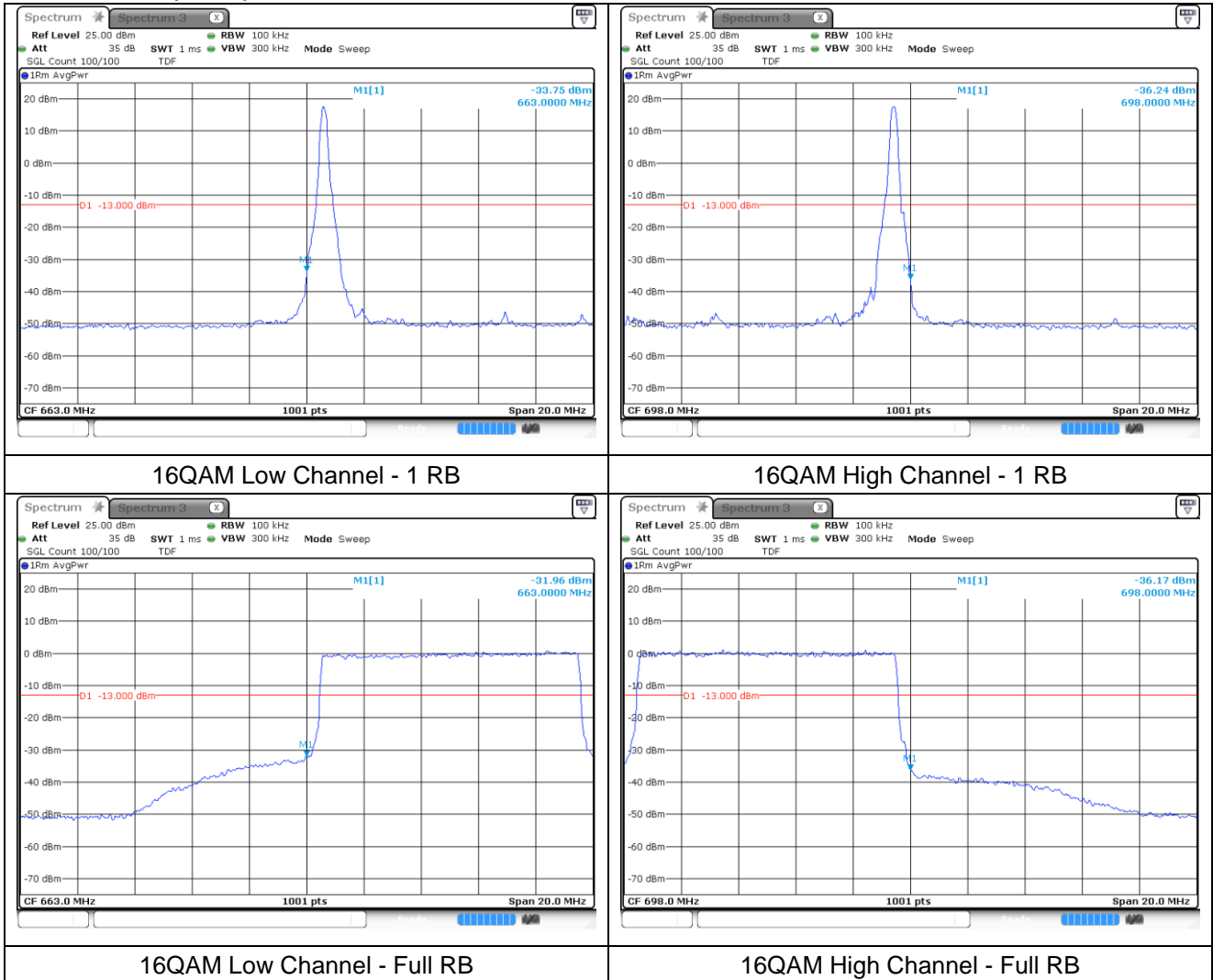
**LTE band 71 (5 MHz)**



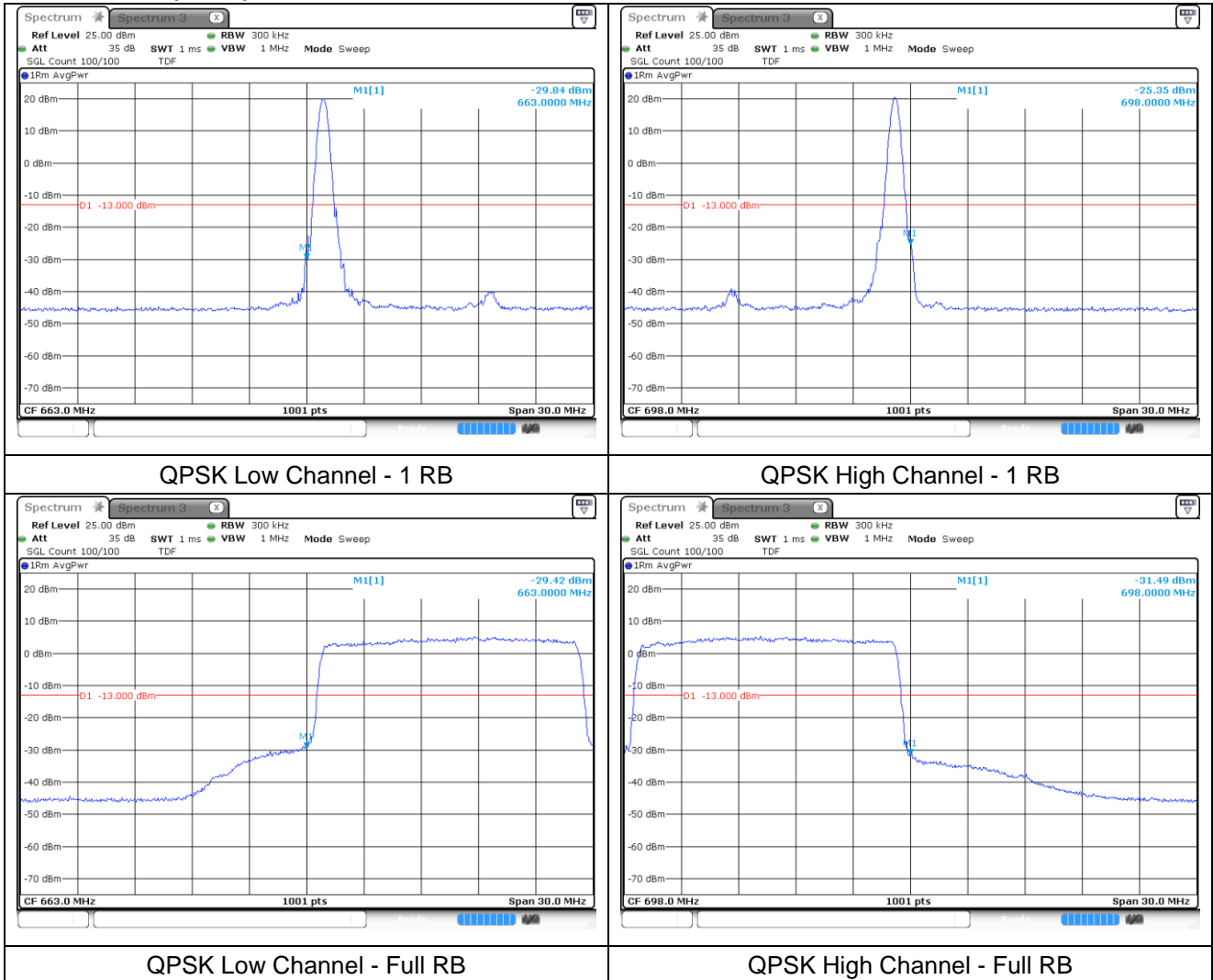
**LTE band 71 (10 MHz)**



**LTE band 71 (10 MHz)**

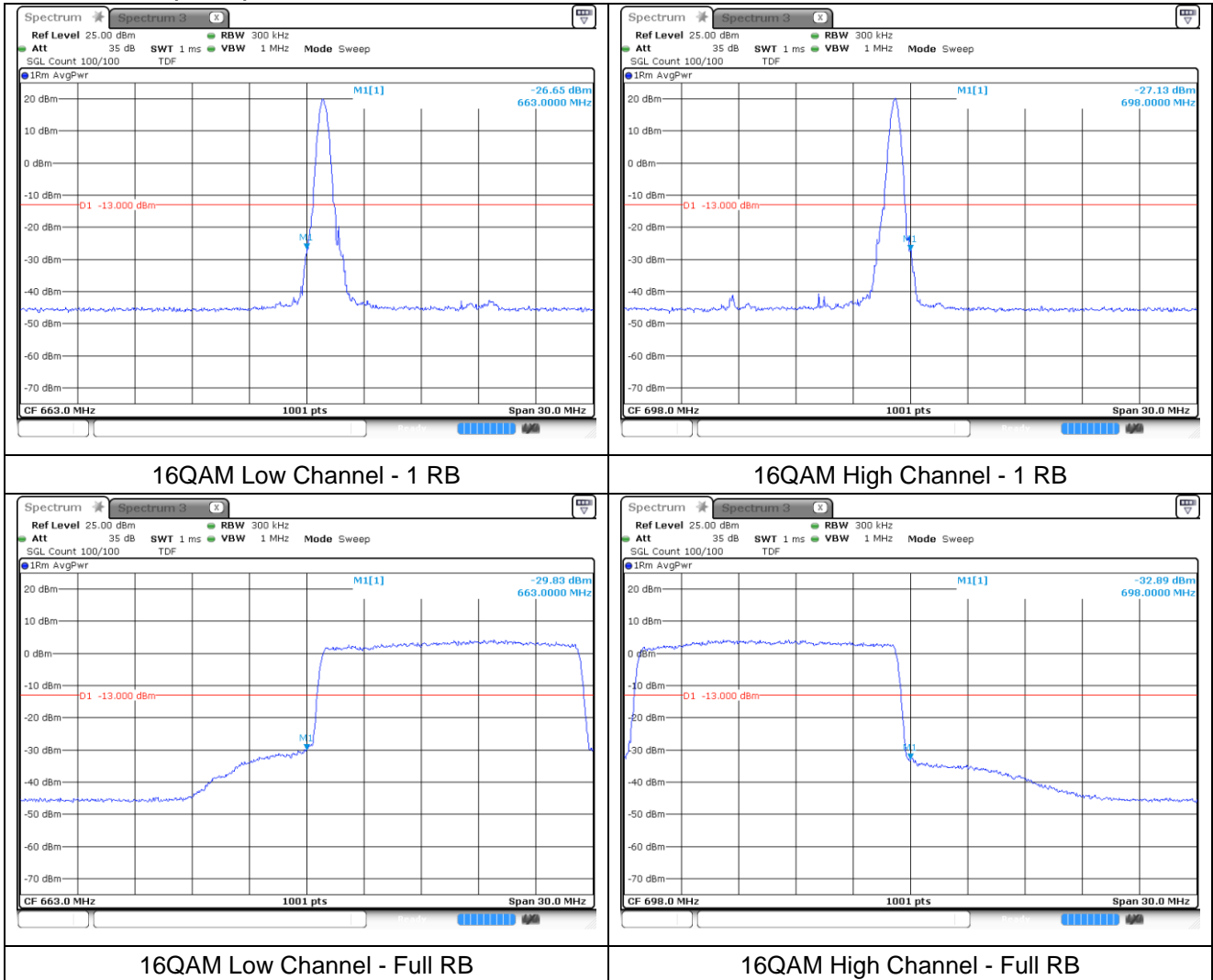


**LTE band 71 (15 MHz)**

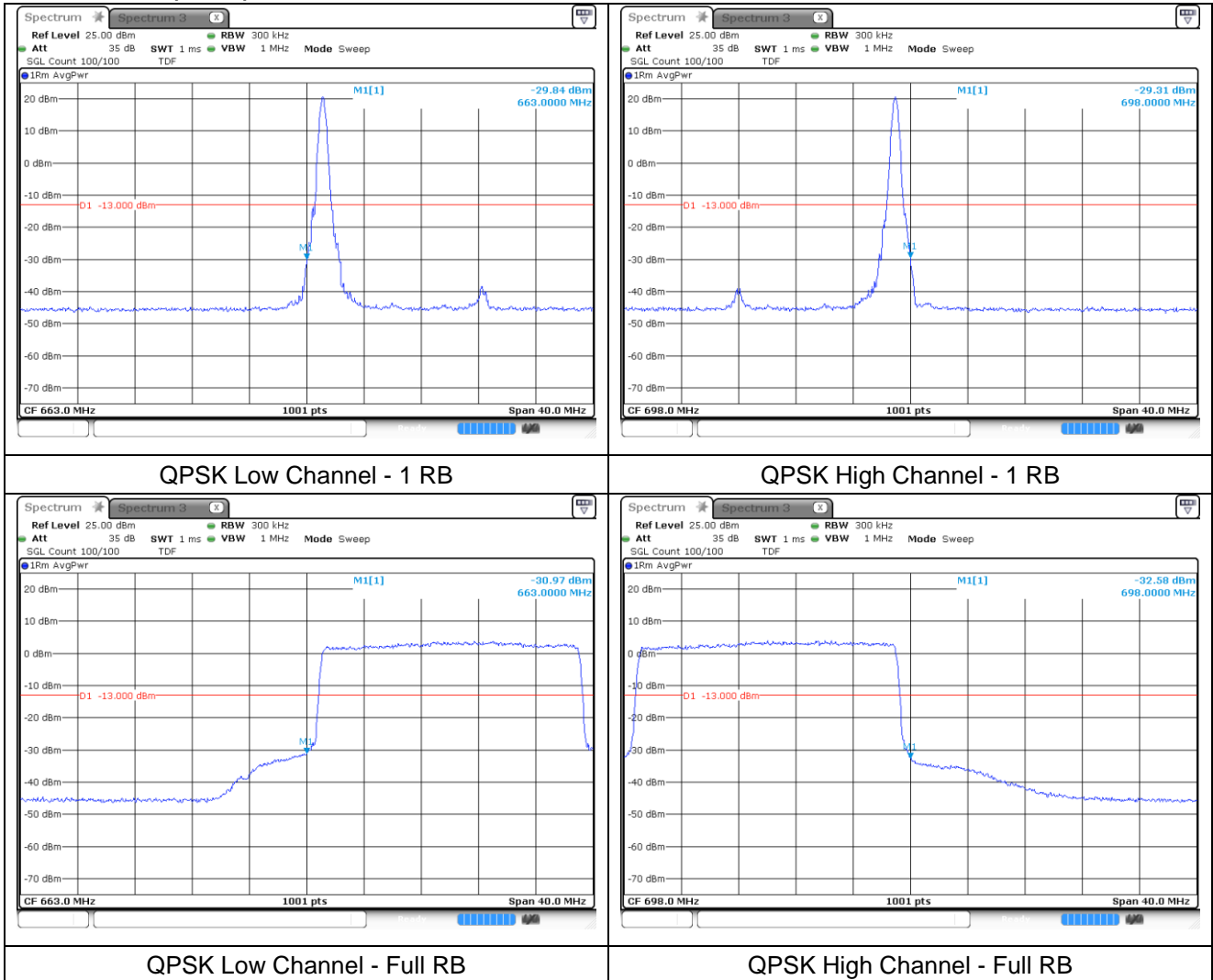




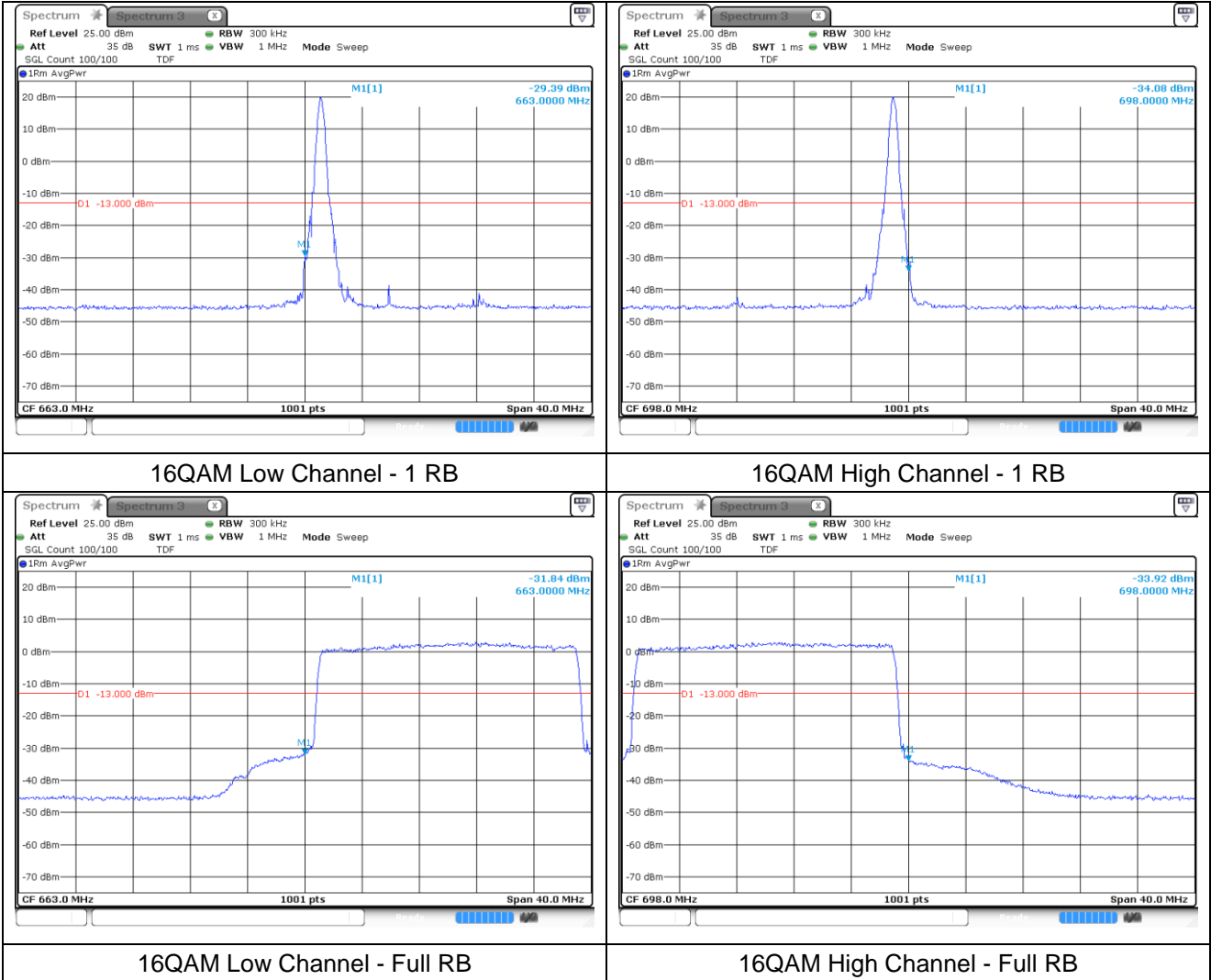
**LTE band 71 (15 MHz)**



**LTE band 71 (20 MHz)**



**LTE band 71 (20 MHz)**



## 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 MHz 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 MHz 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 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-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:

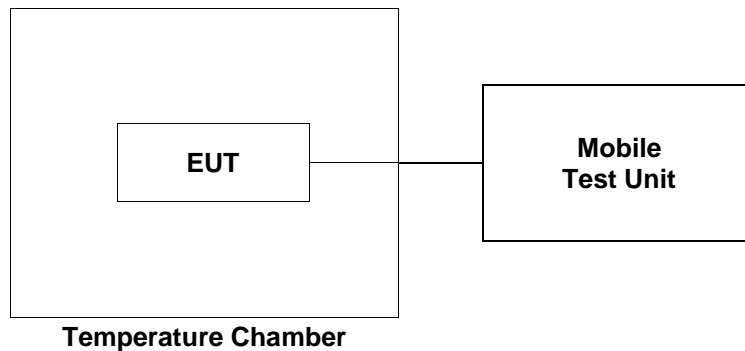
(a) the frequency offset shall be measured according to the procedure described in RSS-Gen and recorded.

(b) using a resolution bandwidth equal to that permitted within the 1 MHz 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) °C  
 Relative humidity : 47 % R.H.

#### LTE band 7 at middle channel

Reference Frequency: 2 535.0 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	12.7	1.20	-0.003 12
40		-14.90	-0.009 47
30		-11.10	-0.007 97
20(Ref.)		9.10	-
10		-5.90	-0.005 92
0		13.70	0.001 81
-10		1.10	-0.003 16
-20		-10.70	-0.007 81
-30		0.40	-0.003 43
Frequency Stability versus Power Supply			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
20	10.80 (85%)	4.80	-0.001 70
	14.61 (115%)	-11.60	-0.008 17

**LTE band 12 at middle channel**

Reference Frequency: 707.5 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	12.7	0.90	-0.004 38
40		1.80	-0.003 11
30		2.40	-0.002 26
20(Ref.)		4.00	-
10		0.10	-0.005 51
0		-1.50	-0.007 77
-10		-2.20	-0.008 76
-20		-1.20	-0.007 35
-30		-3.00	-0.009 89
Frequency Stability versus Power Supply			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
20	10.80 (85%)	-4.60	-0.012 16
	14.61 (115%)	-2.40	-0.009 05

**LTE band 13 at middle channel**

Reference Frequency: 782 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	12.7	-3.80	-0.006 14
40		-2.90	-0.004 99
30		2.60	0.002 05
20(Ref.)		1.00	-
10		-4.20	-0.006 65
0		-1.00	-0.002 56
-10		4.70	0.004 73
-20		-0.90	-0.002 43
-30		1.80	0.001 02
Frequency Stability versus Power Supply			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
20	10.80 (85%)	2.90	0.002 43
	14.61 (115%)	1.10	0.000 13



**LTE band 14 at middle channel**

Reference Frequency: 793 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	12.7	1.90	-0.000 50
40		-0.20	-0.003 15
30		0.20	-0.002 65
20(Ref.)		2.30	-
10		-2.10	-0.005 55
0		1.30	-0.001 26
-10		1.90	-0.000 50
-20		3.40	0.001 39
-30		3.20	0.001 13
Frequency Stability versus Power Supply			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
20	10.80 (85%)	2.80	0.000 63
	14.61 (115%)	7.10	0.006 05

**LTE band 25/2 at middle channel**

Reference Frequency: 1 882.5 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	12.7	10.90	0.007 81
40		-4.30	-0.000 27
30		-7.90	-0.002 18
20(Ref.)		-3.80	-
10		-1.00	0.001 49
0		-1.90	0.001 01
-10		-3.60	0.000 11
-20		-1.00	0.001 49
-30		-0.10	0.001 97
Frequency Stability versus Power Supply			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
20	10.80 (85%)	8.40	0.006 48
	14.61 (115%)	-1.30	0.001 33

**LTE band 26/5\_part22 at middle channel**

Reference Frequency: 836.5 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	12.7	-6.00	-0.006 34
40		4.50	0.006 22
30		-2.10	-0.001 67
20(Ref.)		-0.70	-
10		0.40	0.001 32
0		3.10	0.004 54
-10		0.20	0.001 08
-20		-1.70	-0.001 20
-30		5.30	0.007 17
Frequency Stability versus Power Supply			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
20	10.80 (85%)	4.80	0.006 58
	14.61 (115%)	6.20	0.008 25

**LTE band 26\_part90 at middle channel**

Reference Frequency: 819 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	12.7	-3.70	0.000 98
40		-5.00	-0.000 61
30		-3.70	0.000 98
20(Ref.)		-4.50	-
10		-3.50	0.001 22
0		1.90	0.007 81
-10		-1.20	0.004 03
-20		2.20	0.008 18
-30		-3.10	0.001 71
Frequency Stability versus Power Supply			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
20	10.80 (85%)	5.40	0.012 09
	14.61 (115%)	2.10	0.008 06

**LTE band 66/4 at middle channel**

Reference Frequency: 1 745.0 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	12.7	-5.40	-0.001 60
40		3.50	0.003 50
30		-5.90	-0.001 89
20(Ref.)		-2.60	-
10		6.00	0.004 93
0		5.70	0.004 76
-10		7.20	0.005 62
-20		-9.90	-0.004 18
-30		0.20	0.001 60
Frequency Stability versus Power Supply			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
20	10.80 (85%)	4.50	0.004 07
	14.61 (115%)	-3.60	-0.000 57

**LTE band 71 at middle channel**

Reference Frequency: 680.5 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
50	12.7	-1.00	-0.007 79
40		-0.40	-0.006 91
30		1.60	-0.003 97
20(Ref.)		4.30	-
10		0.50	-0.005 58
0		-1.10	-0.007 94
-10		0.90	-0.005 00
-20		-0.20	-0.006 61
-30		2.20	-0.003 09
Frequency Stability versus Power Supply			
Environment Temperature (°C)	Power Supplied (V)	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
20	10.80 (85%)	5.40	0.001 62
	14.61 (115%)	2.20	-0.003 09

**- End of the Test Report -**