5. Peak-Average Ratio

5.1. Limit

- §27.50(d)(5), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 ㏈.

5.2. Test Procedure

The test follows section 5.2.3.4 of ANSI C63.26-2015.

See instrumentation-specific application literature for further guidance regarding use of the CCDF capability. The following guidelines are offered for performing a CCDF measurement.

a. Set resolution/measurement bandwidth ≥ OBW or specified reference bandwidth.

b. Set the number of counts to a value that stabilizes the measured CCDF curve.

c. Set the measurement interval as follows:

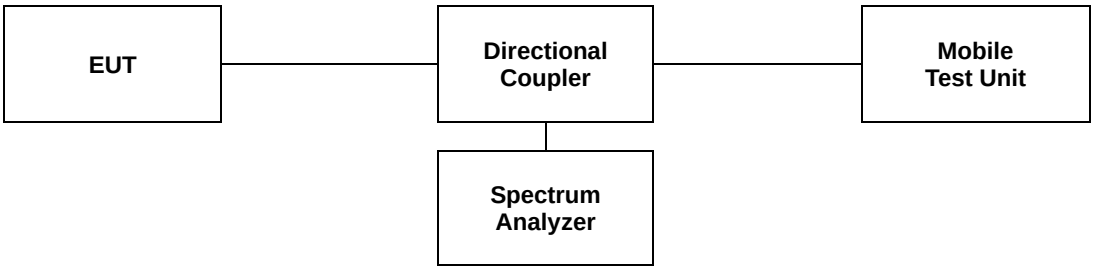
1) For continuous transmissions, set to greater of [10 x (number of points in sweep) x (transmission symbol period)] or 1 ㎳.

2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.

3) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.

d. Record the maximum PAPR level associated with a probability of 0.1 %.

e. The peak power level is calculated form the sum of the PAPR value from step d) to the measured average power.



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5.3 Test Results

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

Band	Bandwidth (㎒)	Mode	Frequency (㎒)	PAR (dB)
7	5	QPSK	2 502.5	4.32
			2 535.0	4.29
			2 567.5	4.52
	10	QPSK	2 505.0	4.35
			2 535.0	4.20
			2 565.0	4.55
	15	QPSK	2 507.5	4.72
			2 535.0	4.55
			2 562.5	4.84
	20	QPSK	2 510.0	4.55
			2 535.0	4.38
			2 560.0	4.61

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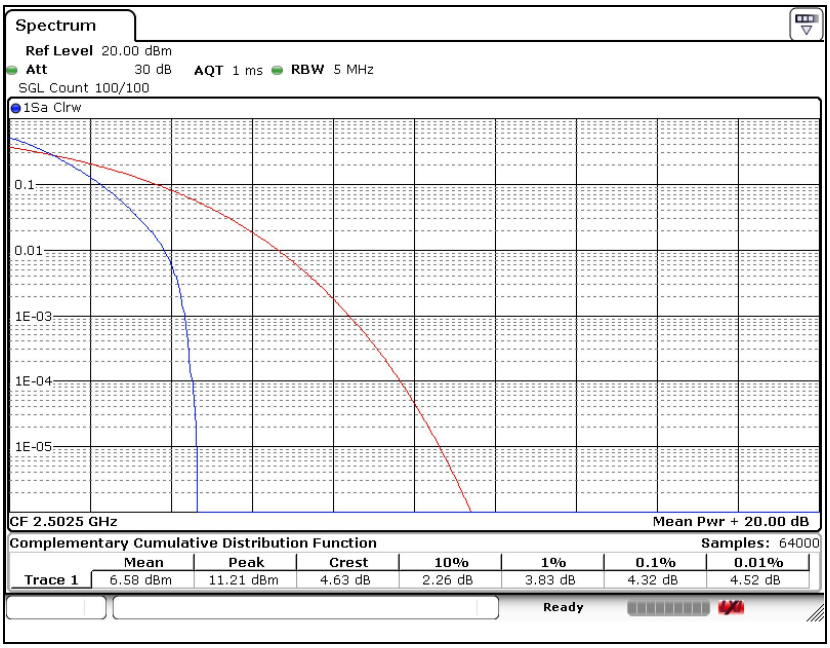
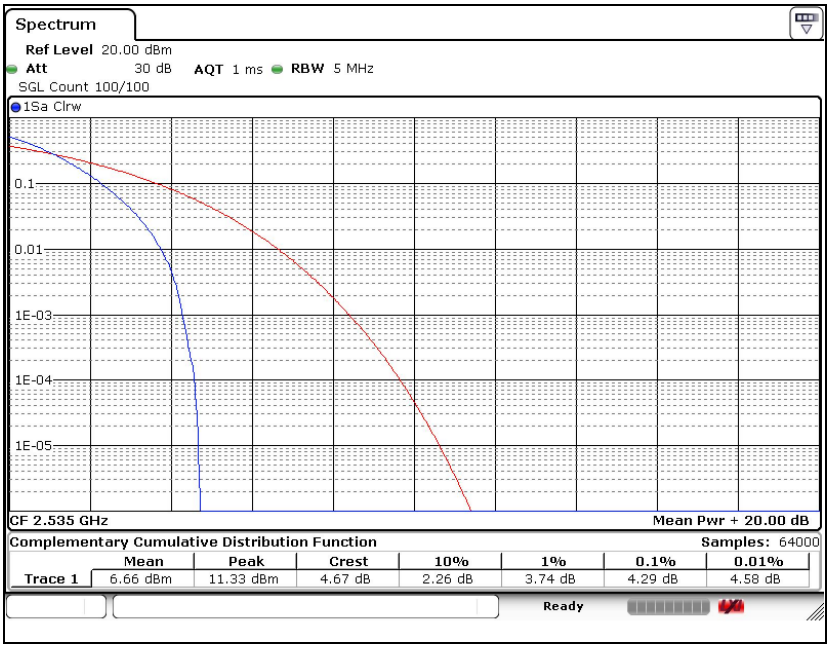
- Test plots

LTE band 7 (5 ㎒ - QPSK)

Low Channel



Middle Channel



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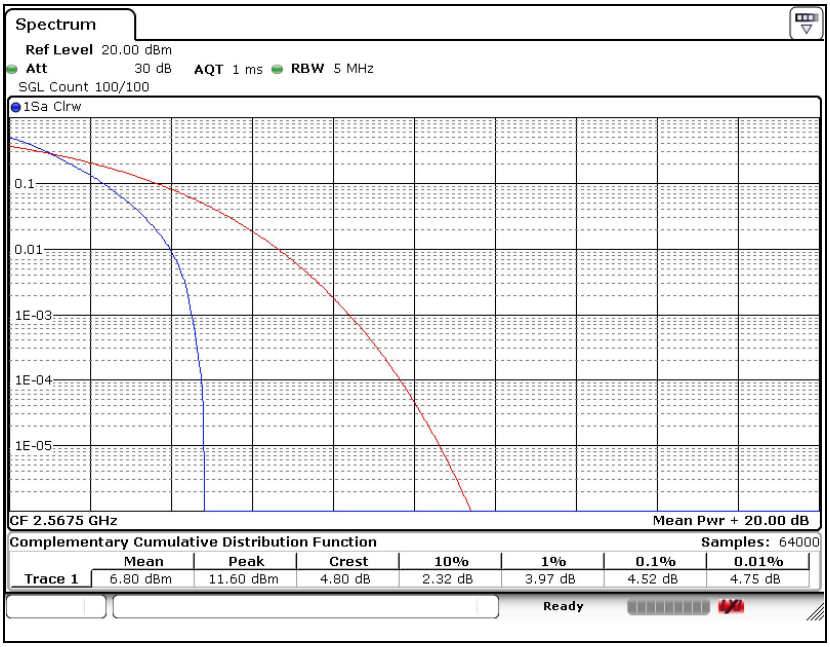
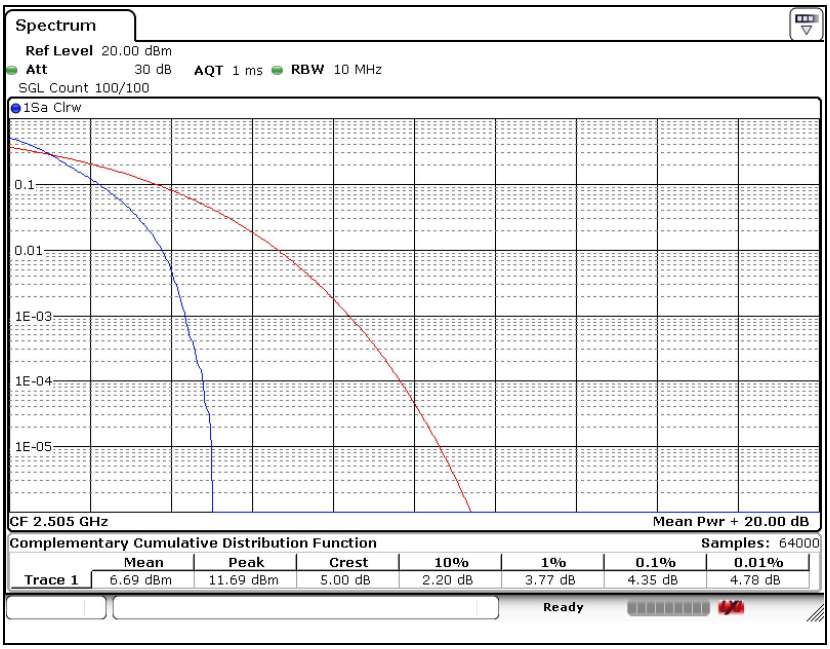
High Channel



LTE band 7 (10 ㎒ - QPSK)

Low Channel



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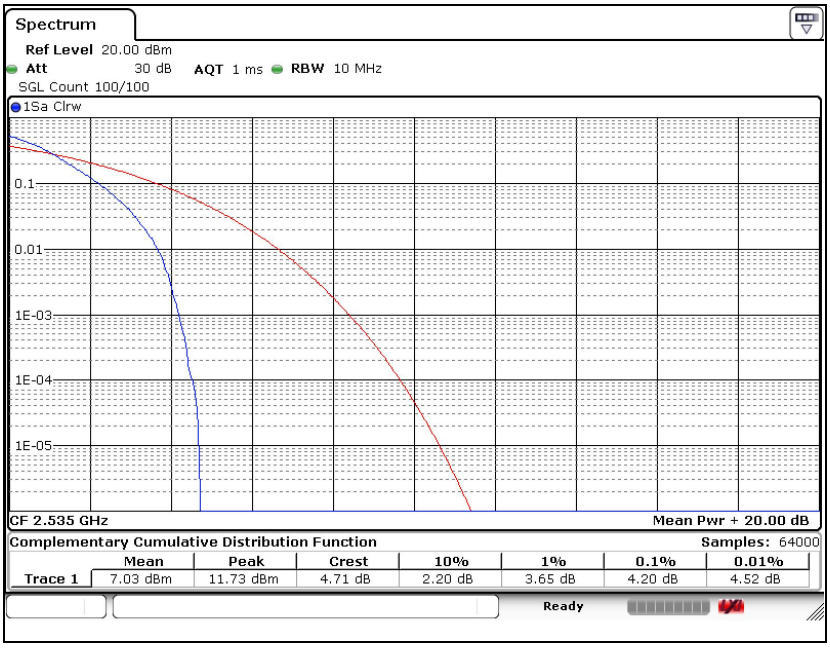
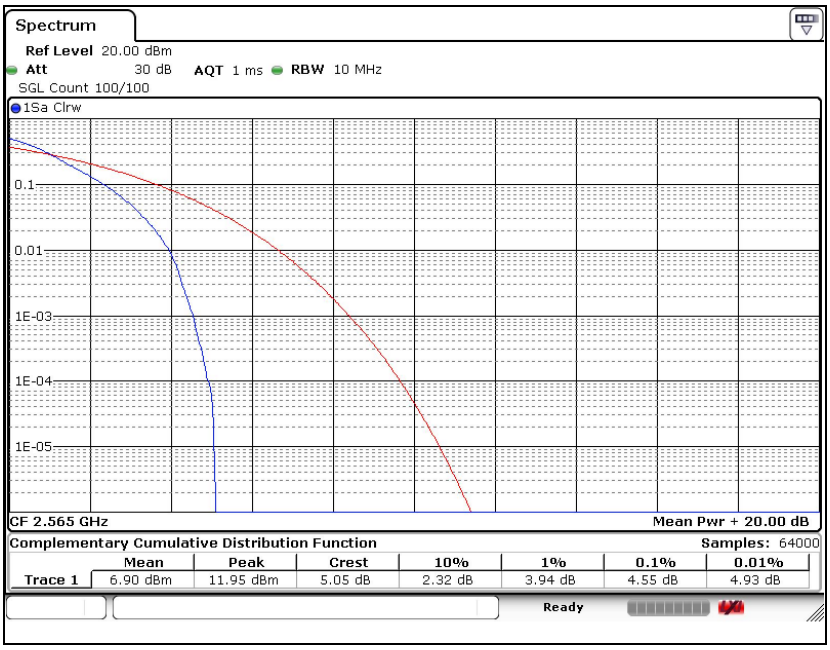
Middle Channel



High Channel



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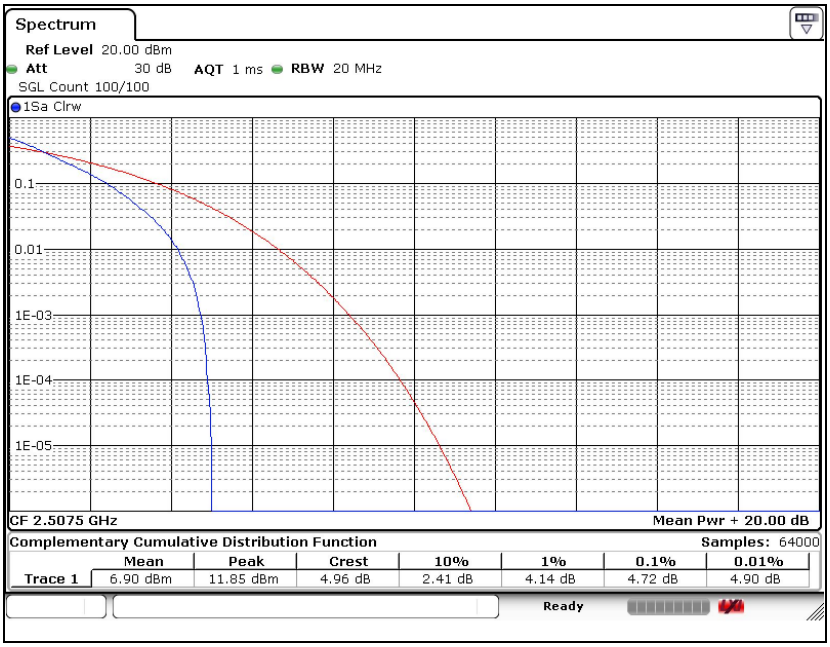
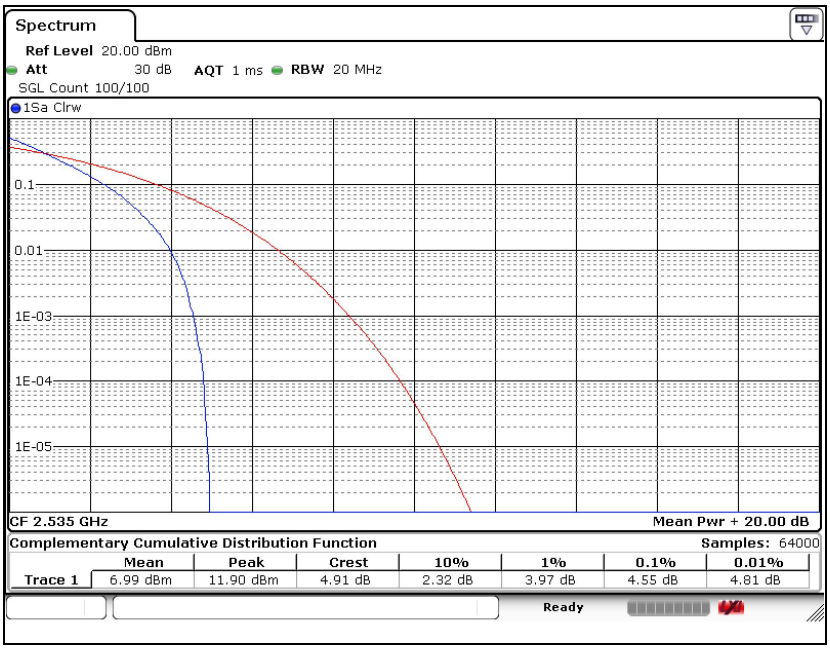
LTE band 7 (15 ㎒ - QPSK)

Low Channel



Middle Channel



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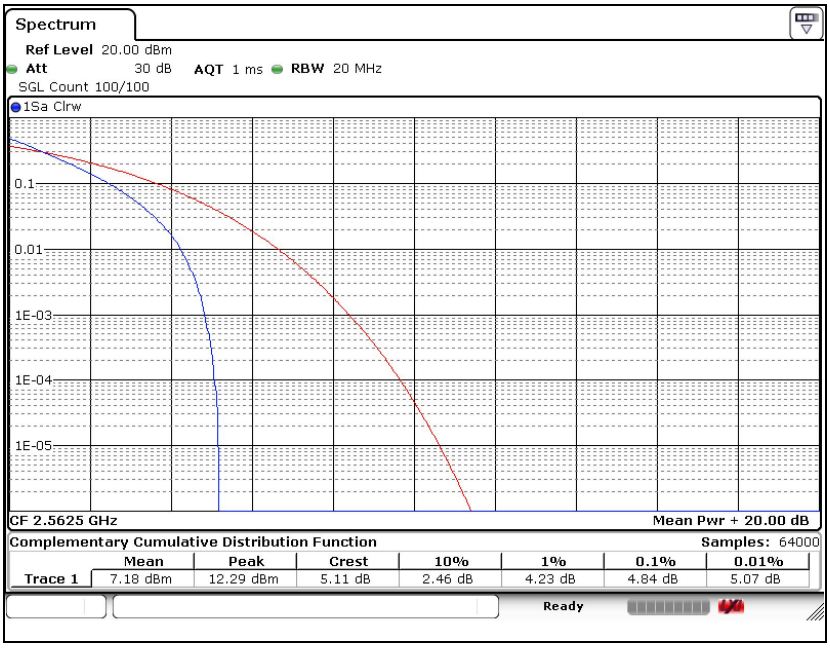
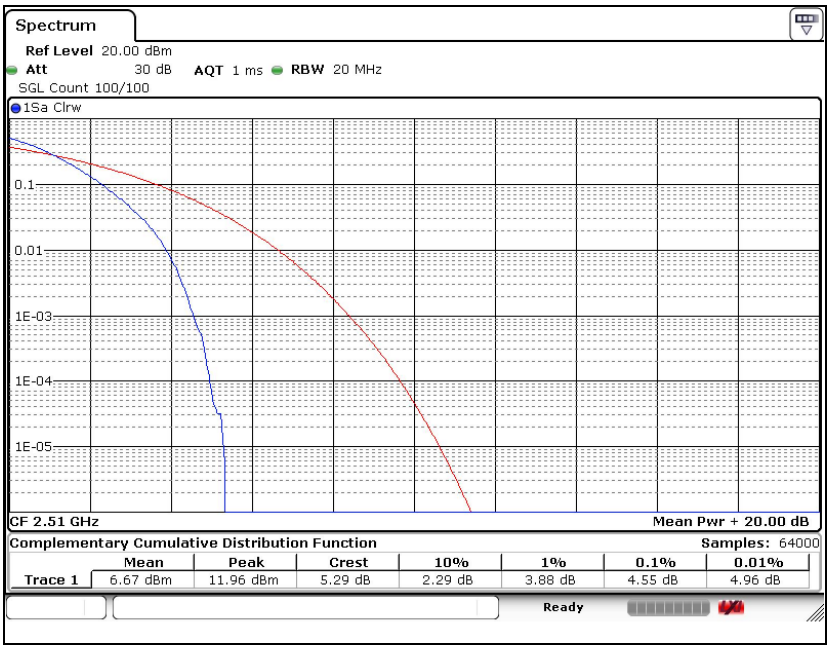
High Channel



LTE band 7 (20 ㎒ - QPSK)

Low Channel



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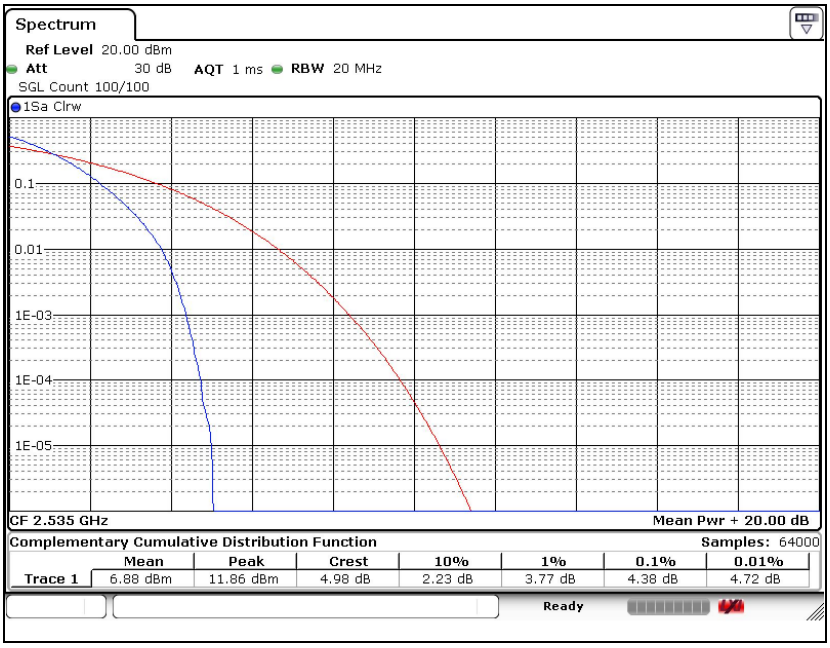
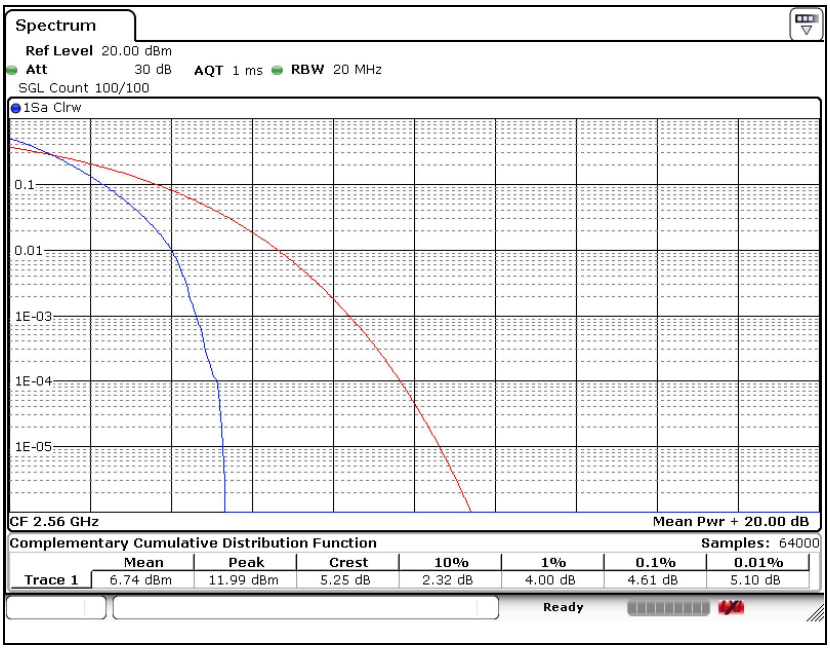
Middle Channel



High Channel



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6. Spurious Emissions at Antenna Terminal

6.1. Limit

- §27.53(m)(4), For mobile digital stations, the attenuation factor shall be not less than 40 + 10 $\log_{10}$ (P) ㏈ on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 $\log_{10}$ (P) ㏈ on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 $\log_{10}$ (P) ㏈ on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 $\log_{10}$ (P) ㏈ on all frequencies between 2 490.5 ㎒ and 2 496 ㎒ and 55 + 10 $\log_{10}$ (P) ㏈ at or below 2 490.5 ㎒. Mobile Satellite Service licensees operating on frequencies below 2 495 ㎒ may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees

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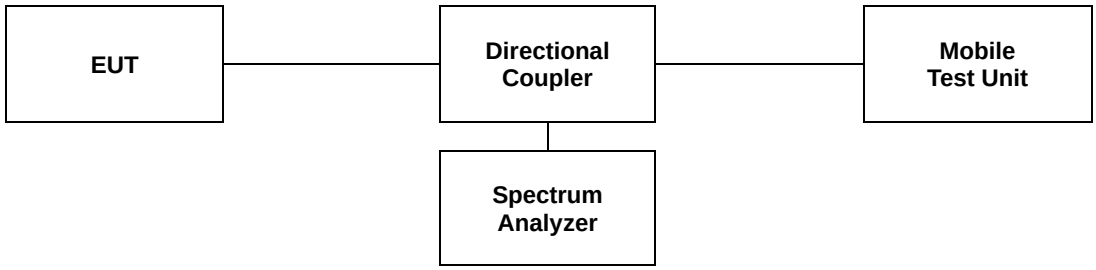
6.2. Test Procedure

The test follows section 5.7 of ANSI C63.26-2015.

1. Start frequency was set to 9 ㎑ and stop frequency was set to at least 10* the fundamental frequency.
2. Detector = Peak.
3. Trace mode = Max hold.
4. Sweep time = Auto couple.
5. The trace was allowed to stabilize.
6. Please see notes below for RBW and VBW settings.
7. For plots showing conducted spurious emissions from 9 ㎑ to 26 ㎓, all path loss of wide frequency range was investigated and compensated to spectrum analyzer as correction factor.



Note;

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 ㎑ or greater for frequencies less than 1 ㎓ and frequencies greater than 1 ㎓. However, in the 1 ㎒ bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two point, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 ㏈ below the transmitter power.

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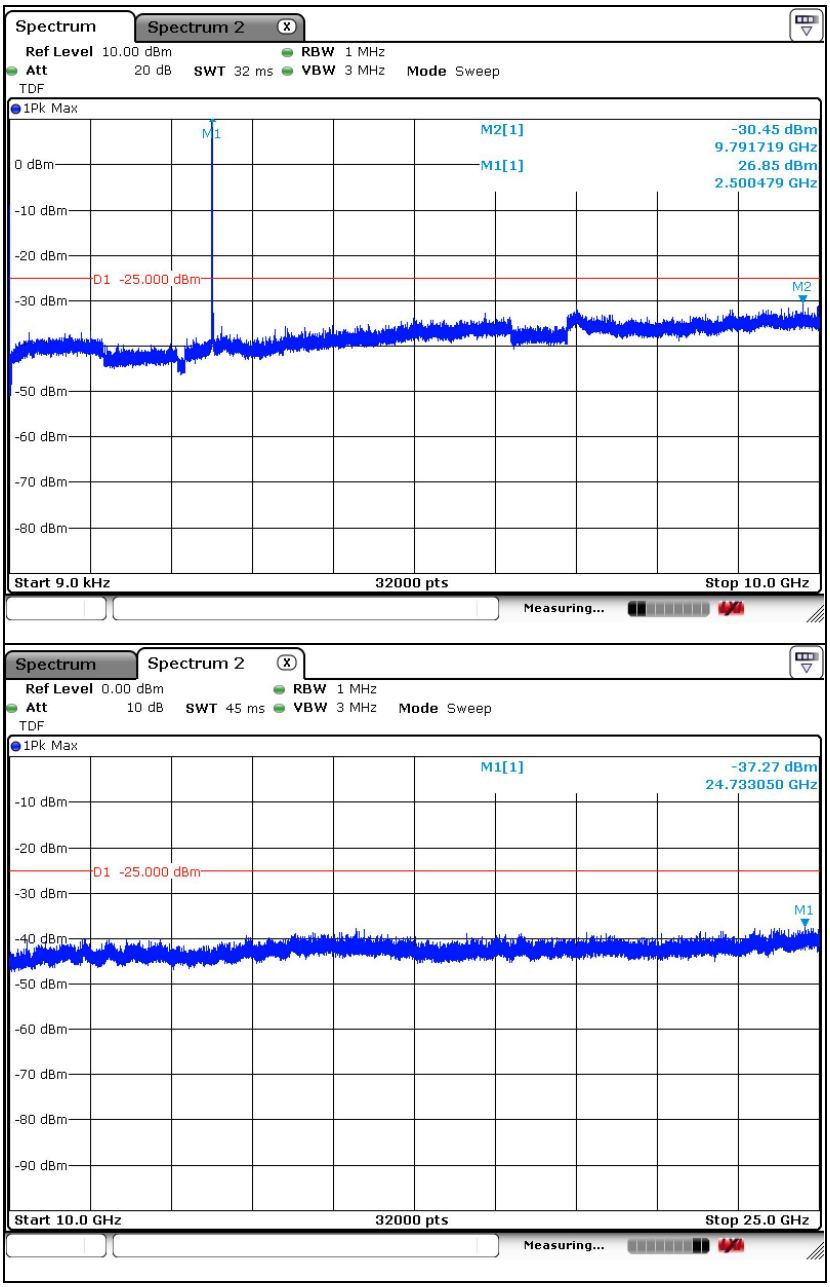
6.3. Test Results

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

- Test plots

LTE band 7 (5 ㎒ - QPSK)

Low Channel



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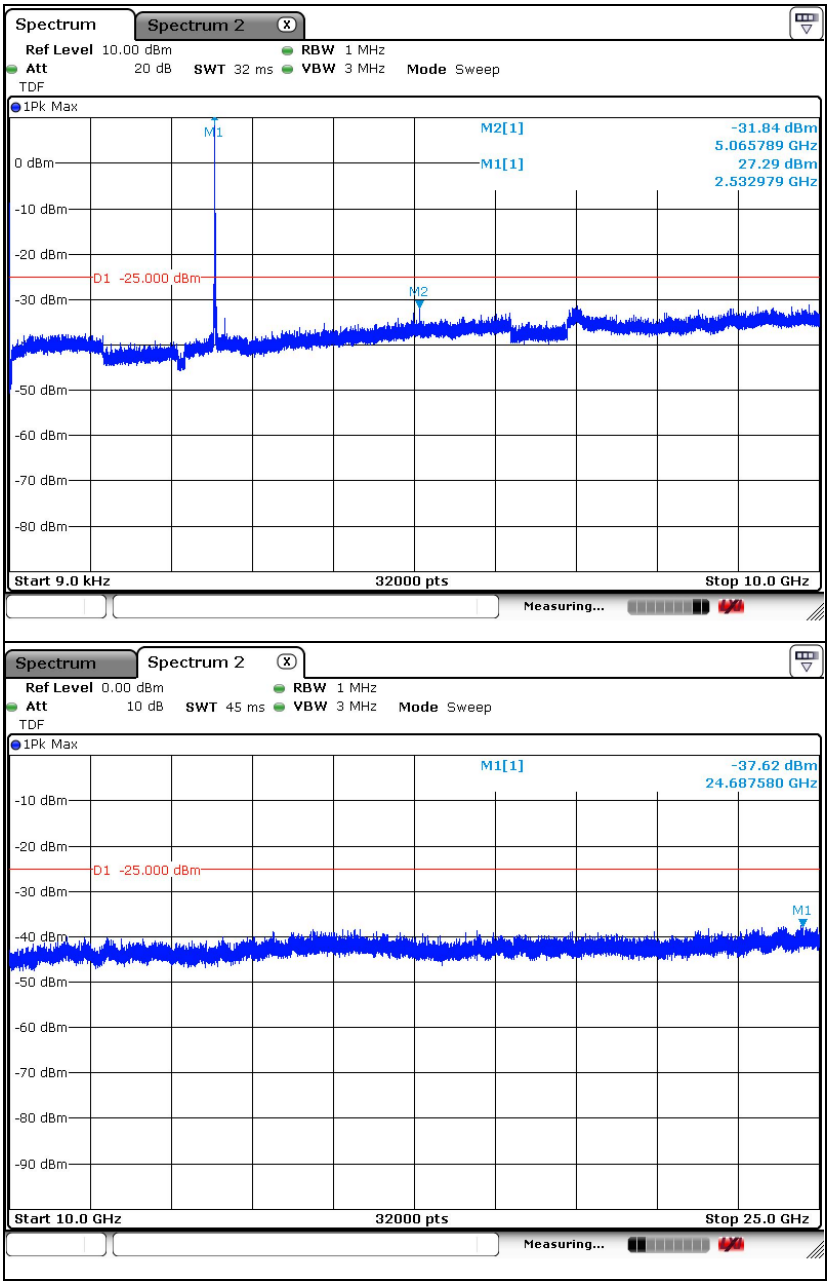
Middle Channel



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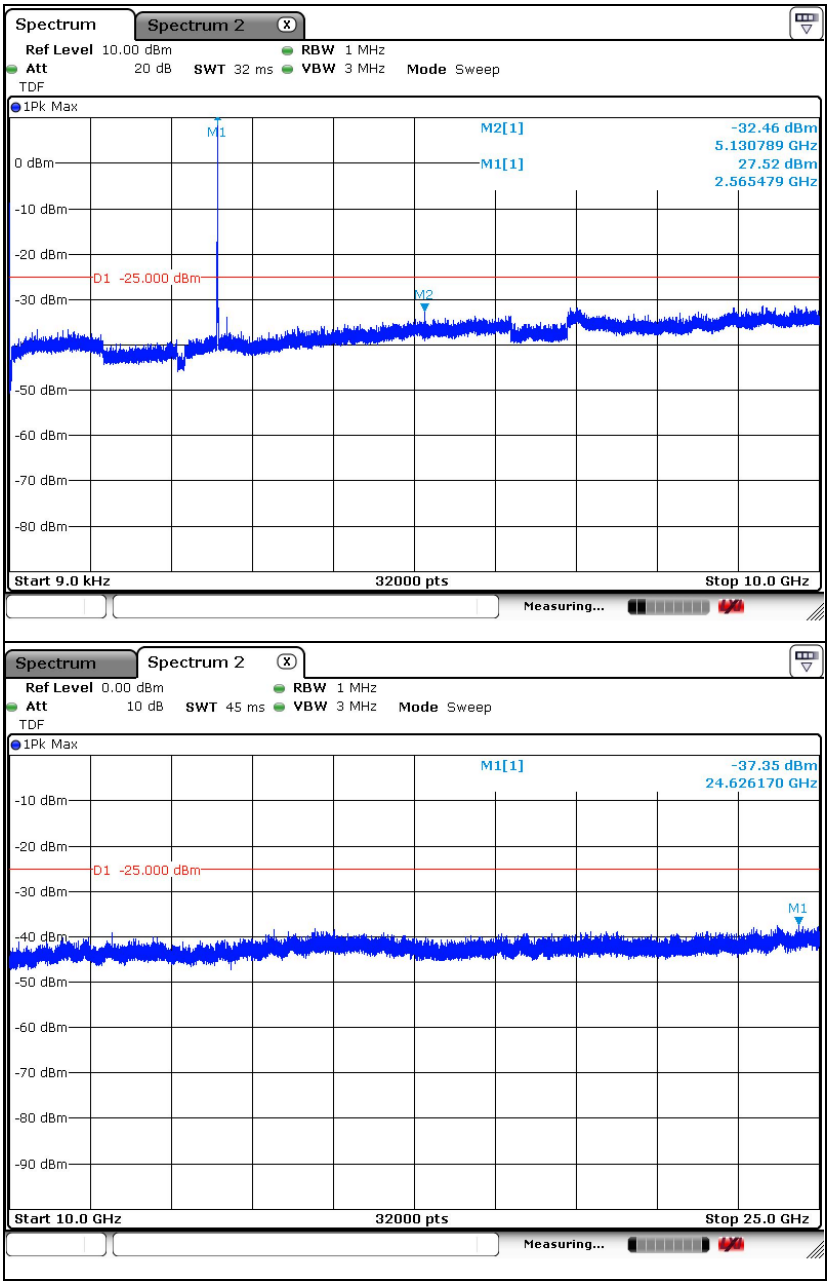
High Channel



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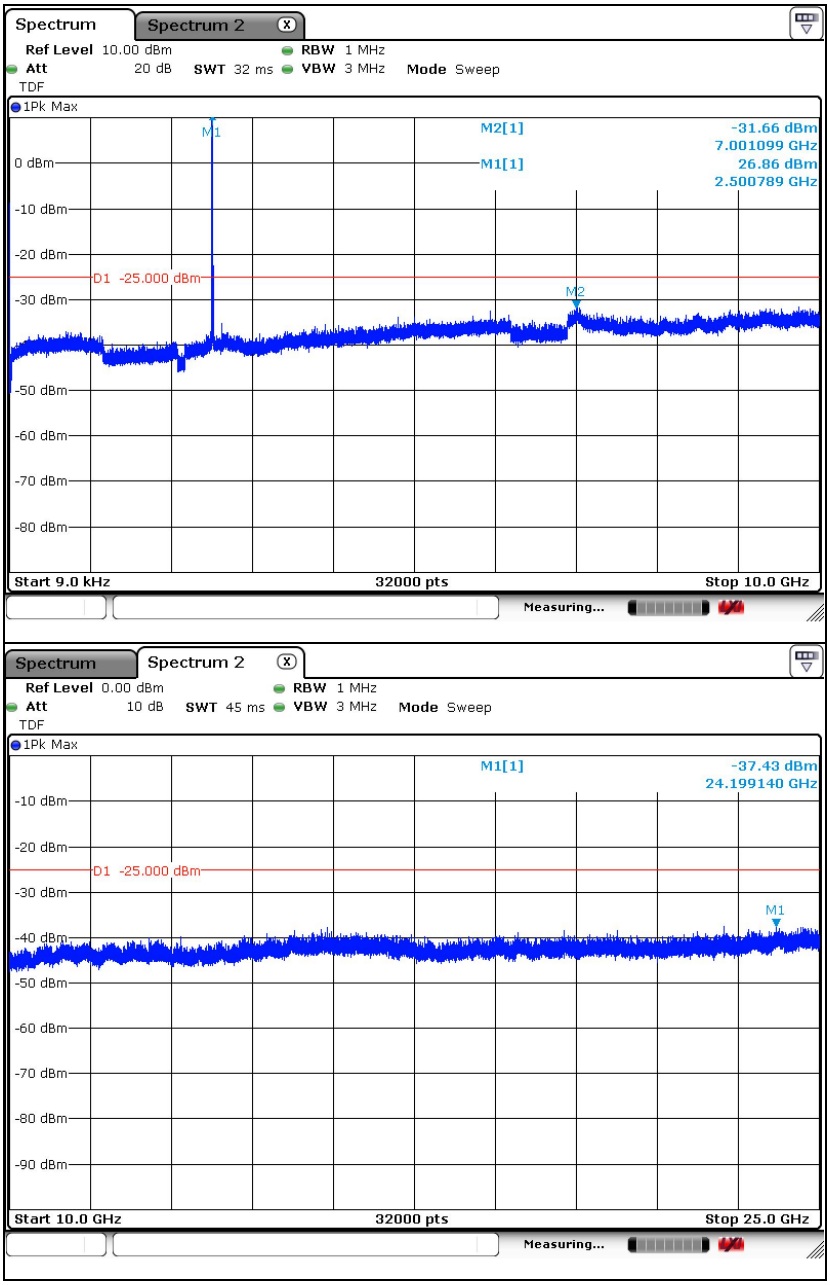
LTE band 7 (10 ㎒ - QPSK)

Low Channel



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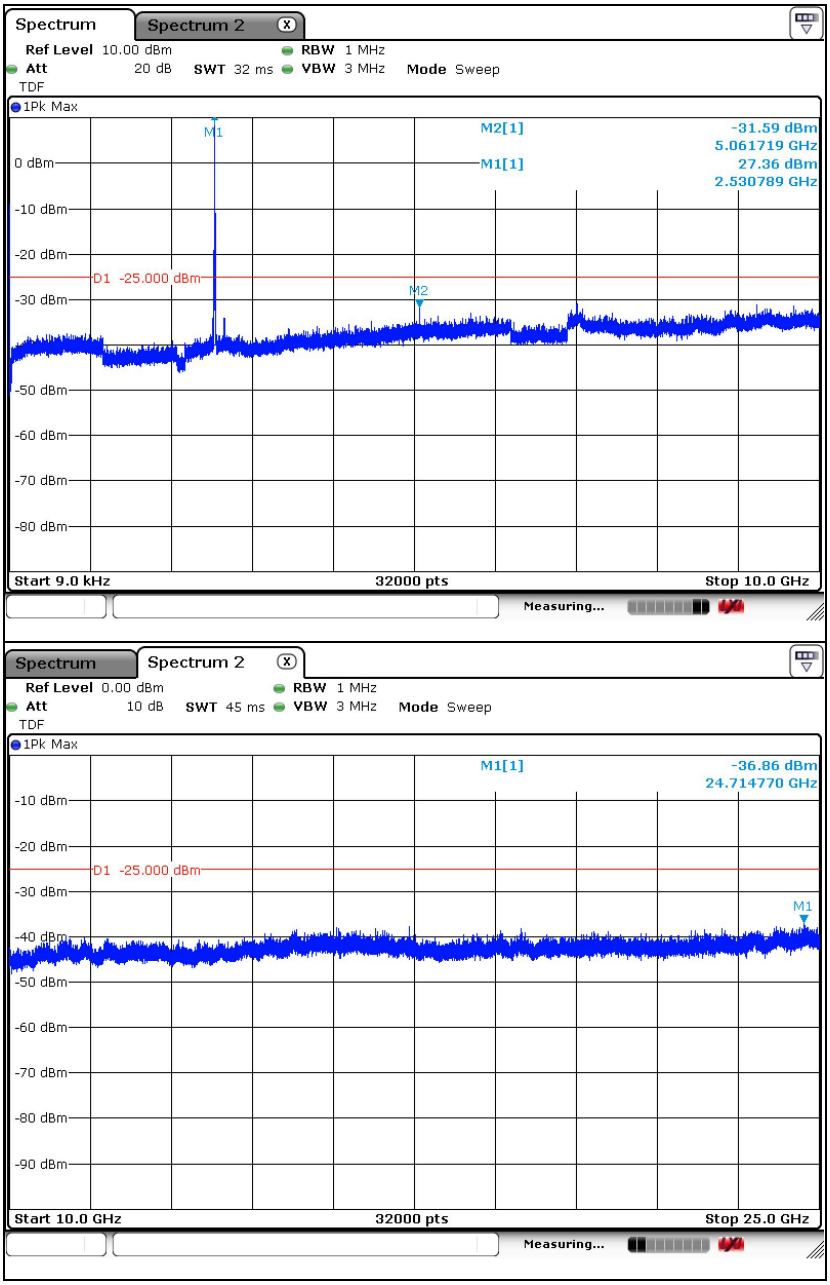
Middle Channel



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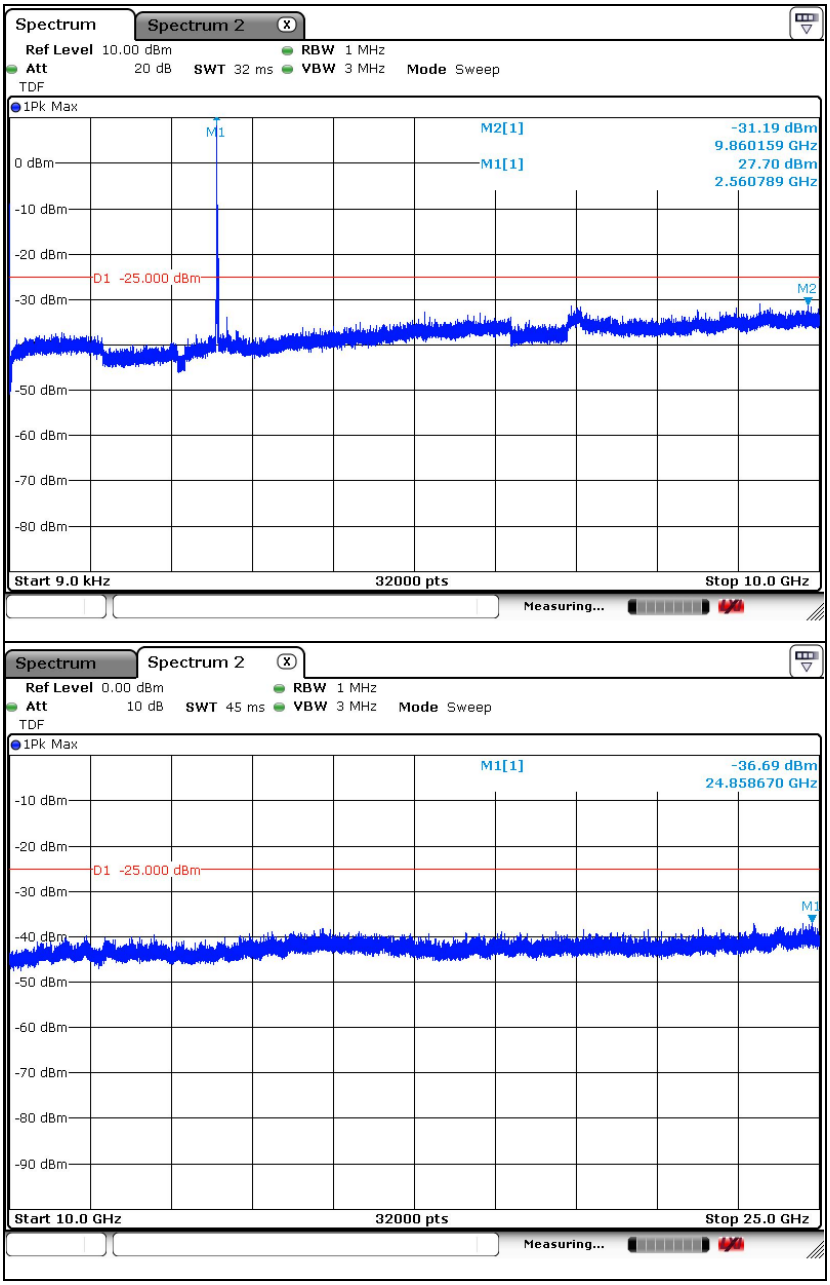
High Channel



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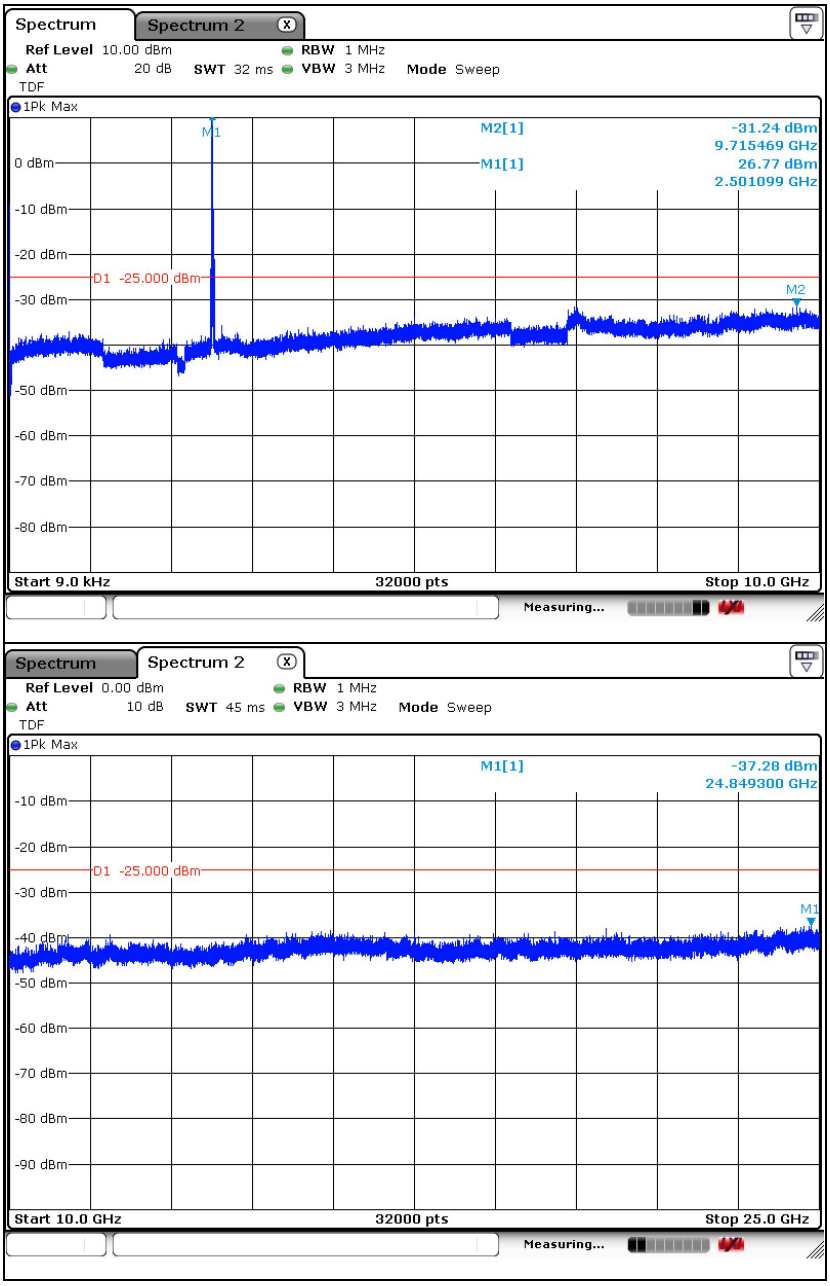
LTE band 7 (15 ㎒ - QPSK)

Low Channel



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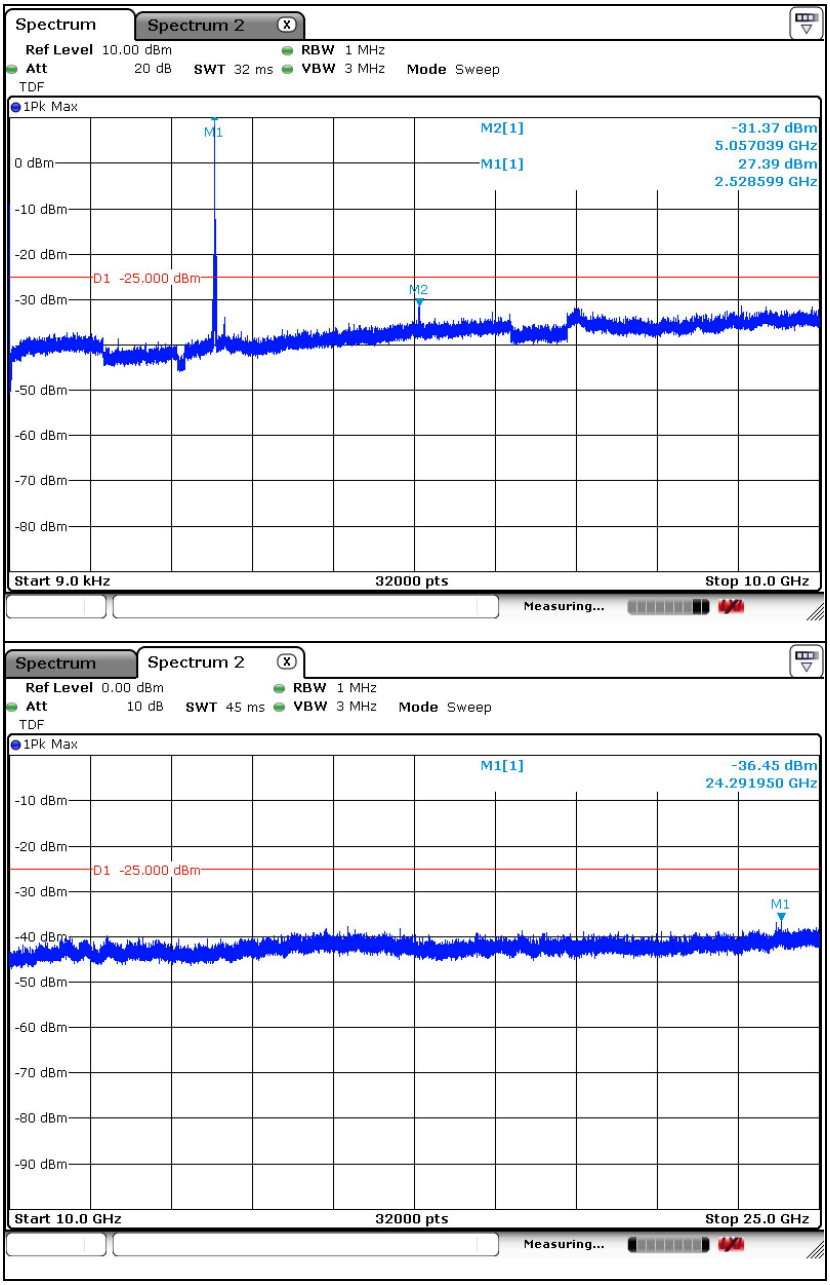
Middle Channel



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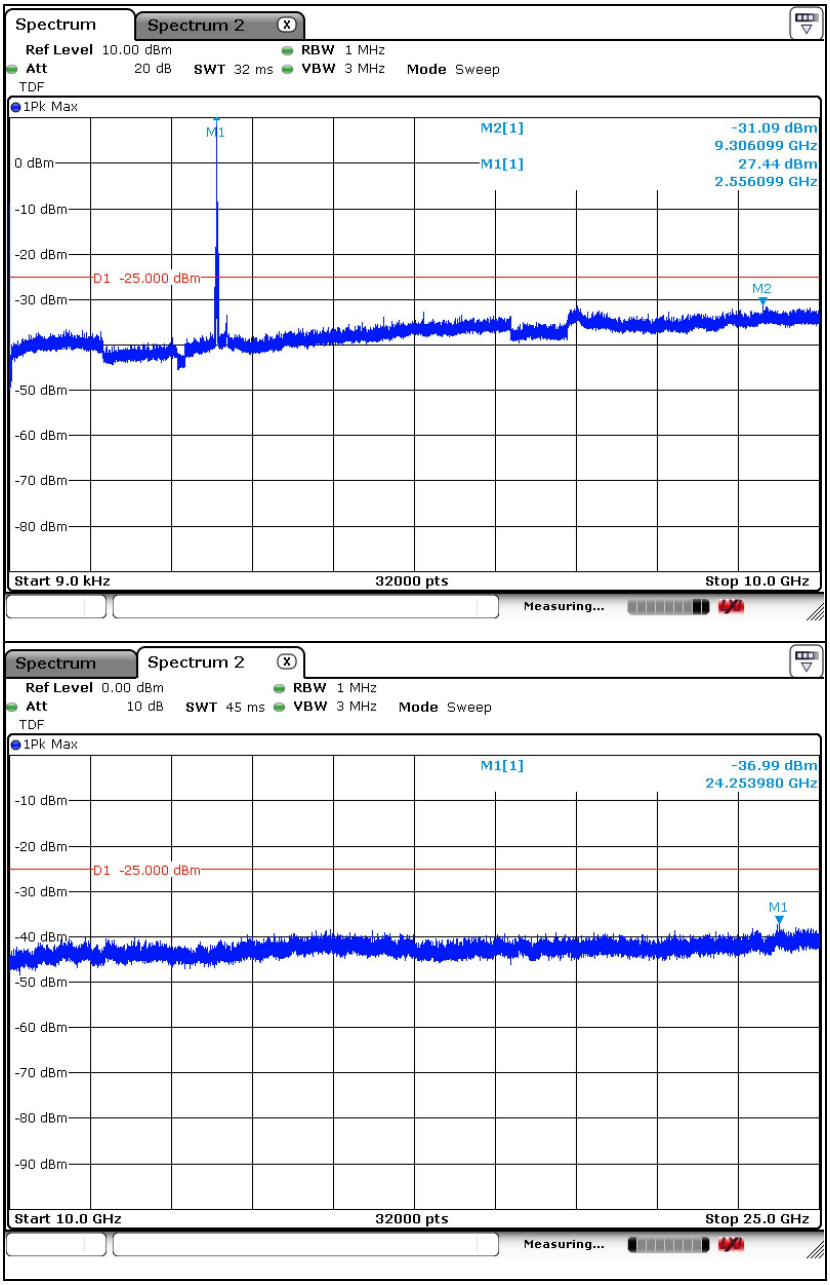
High Channel



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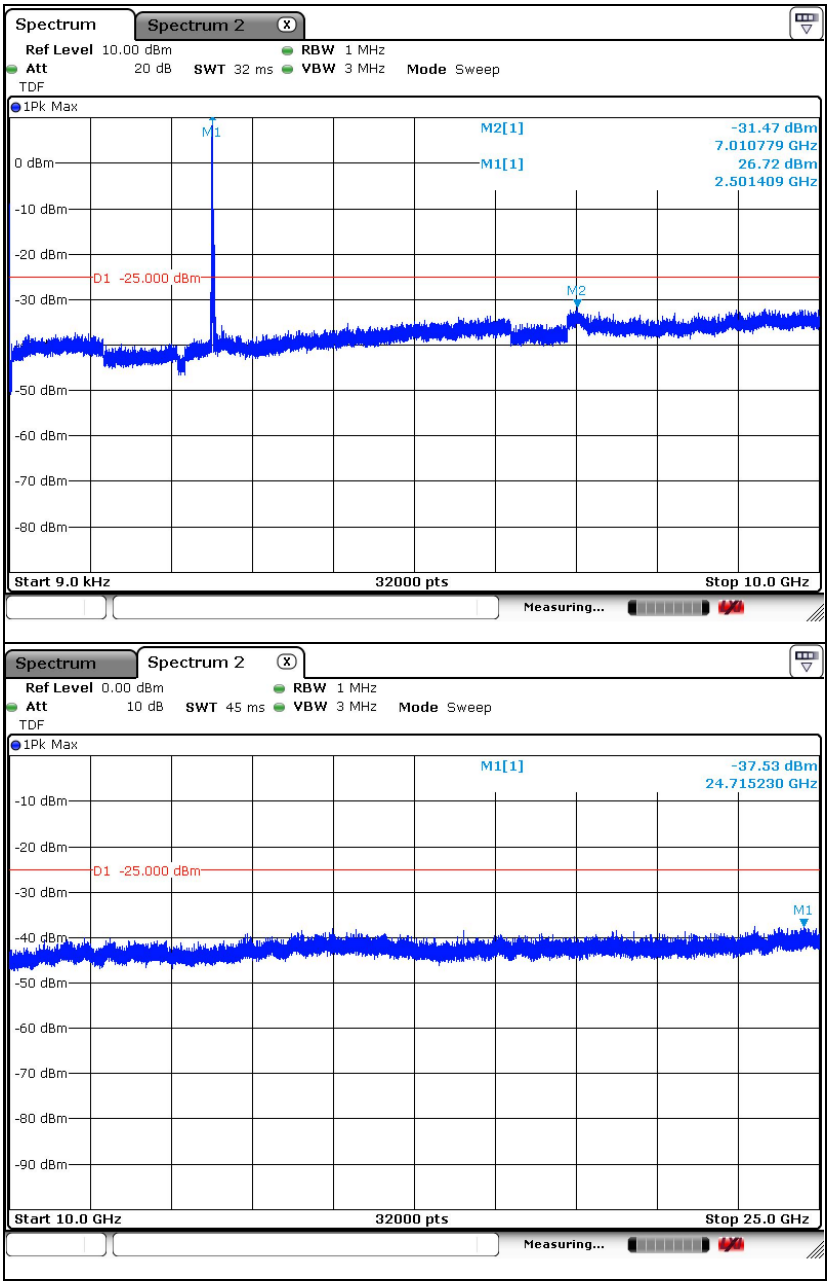
LTE band 7 (20 ㎒ - QPSK)

Low Channel



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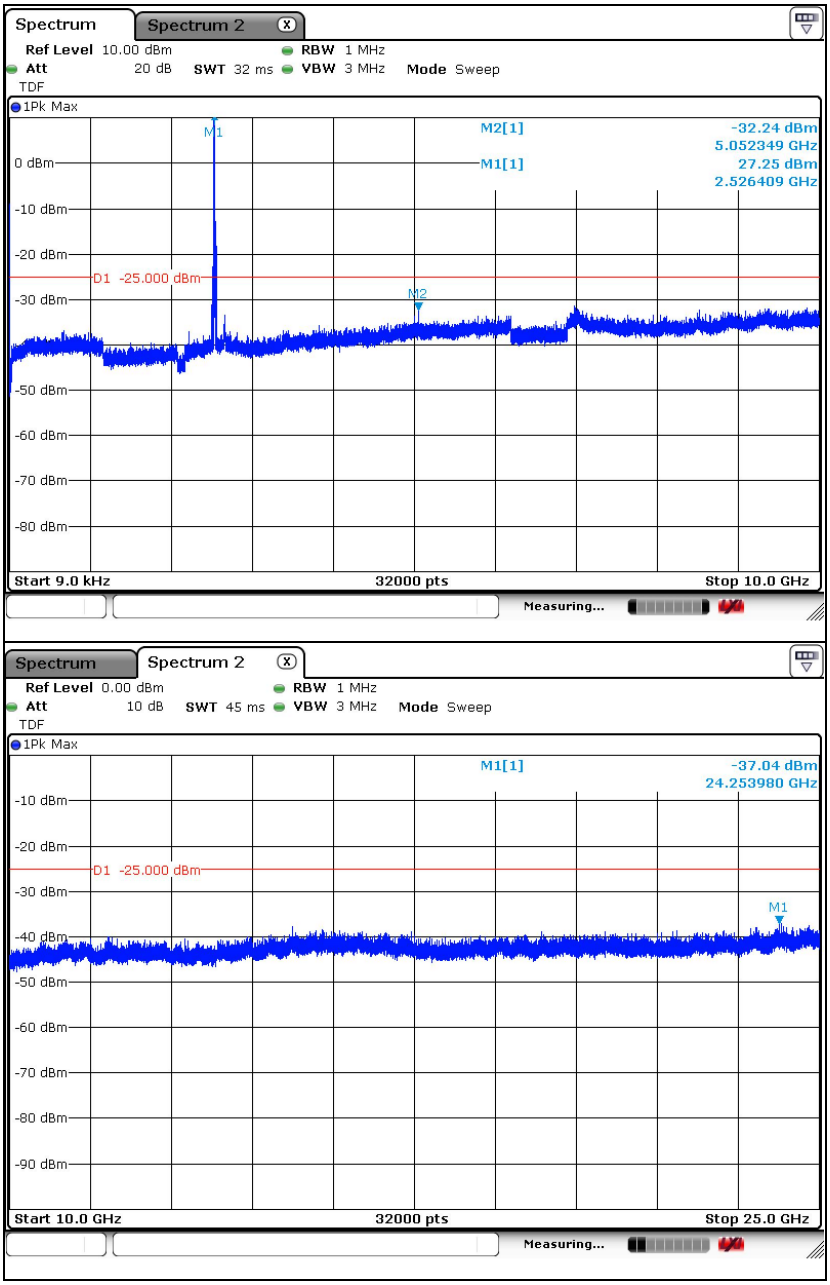
Middle Channel



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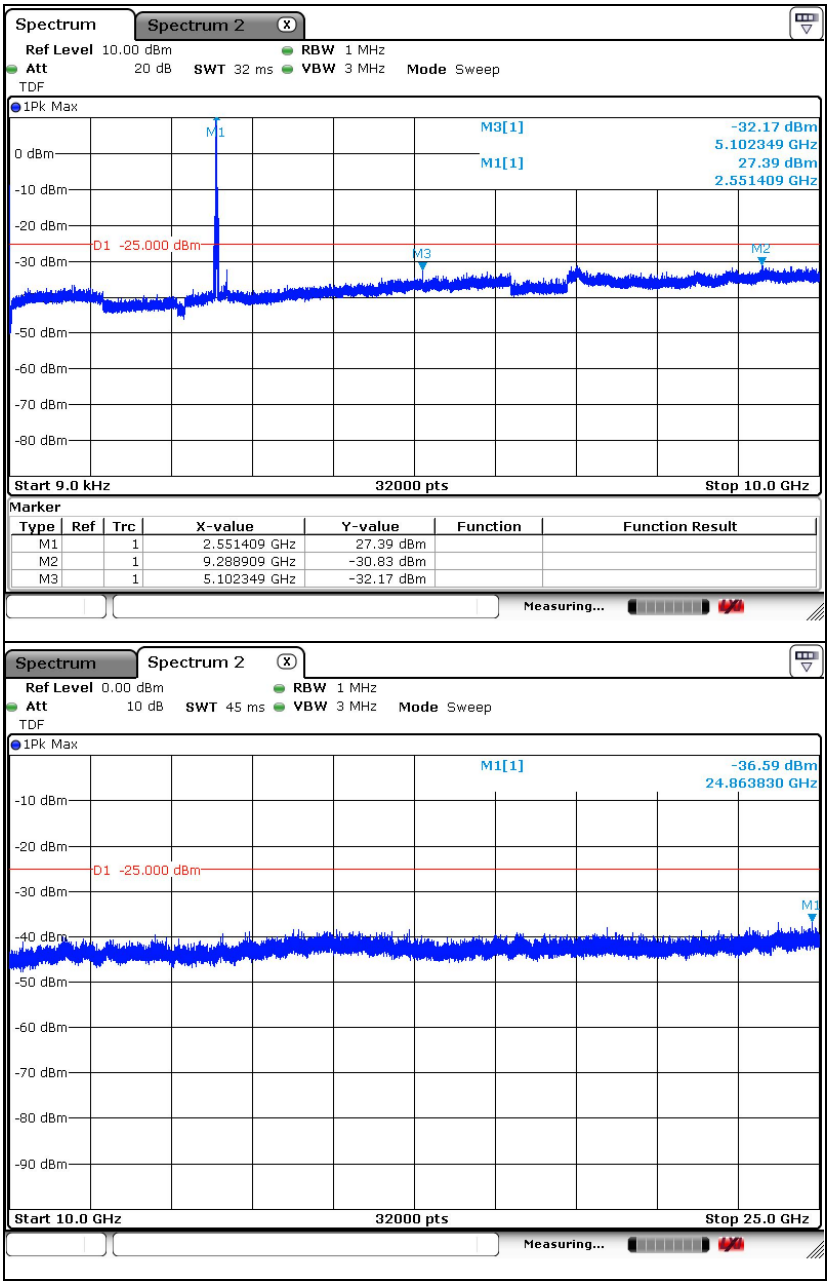
High Channel



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7. Band Edge

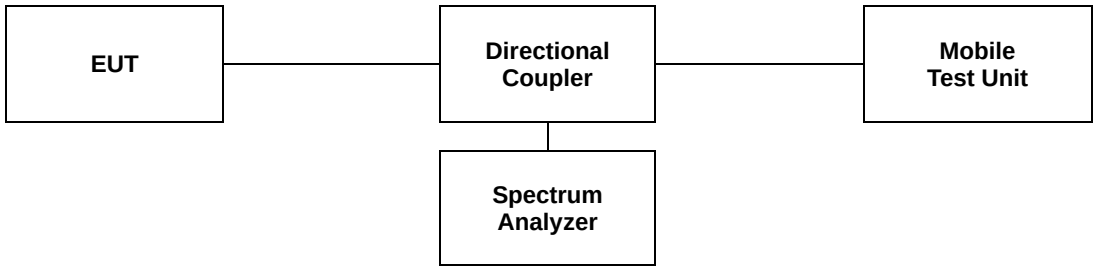
7.1. Limit

- §27.53(m)(4), For mobile digital stations, the attenuation factor shall be not less than 40 + 10 $\log_{10}$ (P) ㏈ on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 $\log_{10}$ (P) ㏈ on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 $\log_{10}$ (P) ㏈ on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 $\log_{10}$ (P) ㏈ on all frequencies between 2 490.5 ㎒ and 2 496 ㎒ and 55 + 10 $\log_{10}$ (P) ㏈ at or below 2 490.5 ㎒. Mobile Satellite Service licensees operating on frequencies below 2 495 ㎒ may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

7.2. Test Procedure

The test follows section 5.7.3 of ANSI C63.26-2015.

a. Span was set large enough so as to capture all out of band emissions near the band edge.
b. RBW ≥ 1 % of OBW
c. VBW ≥ 3 x RBW.
d. Detector = RMS.
e. Trace mode = Average.
f. Sweep time = Auto.
g. The trace was allowed to stabilize.
h. All path loss of frequency range was investigated and compensated to spectrum analyzer as TDF function.



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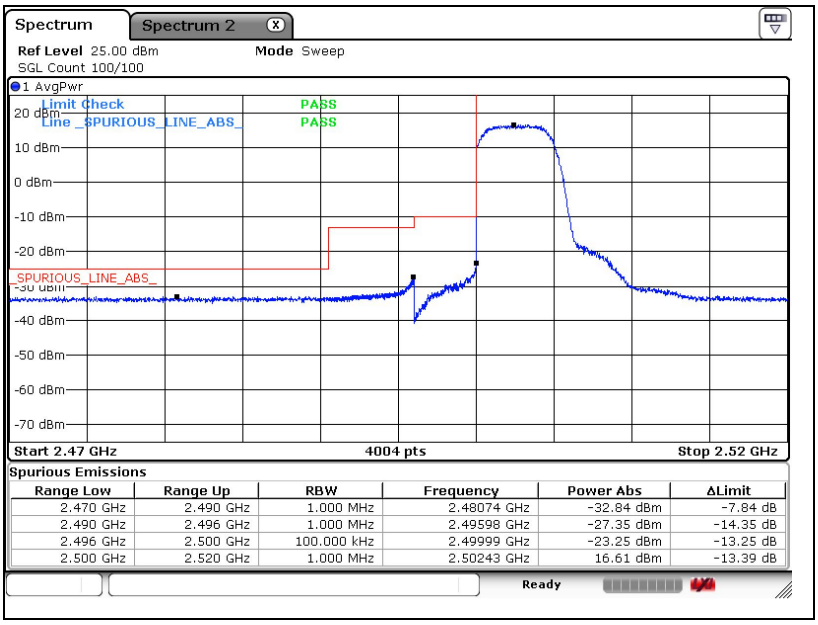
7.3. Test Results

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

- Test plots

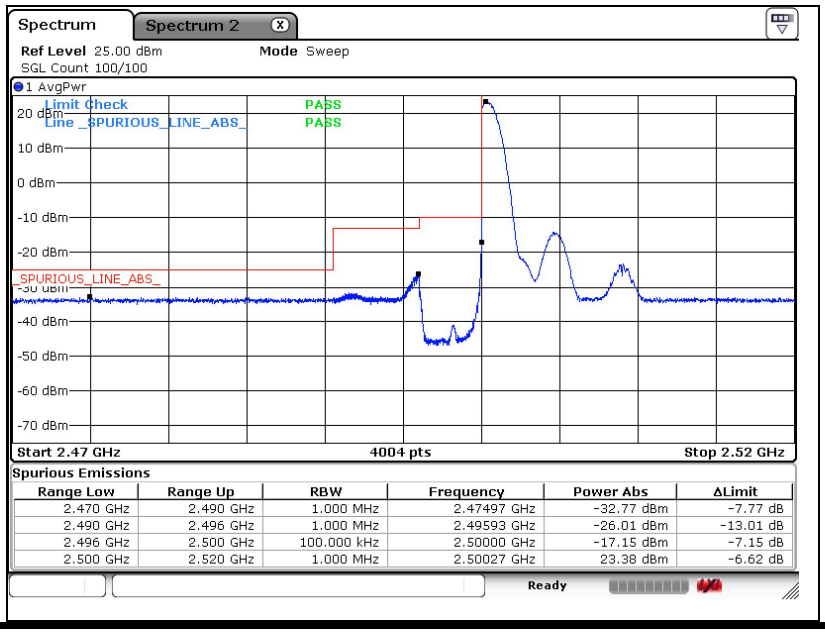
LTE band 7 (5 ㎒ - QPSK_Full RB)

Low Channel



LTE band 7 (5 ㎒ - QPSK_1 RB)

Low Channel



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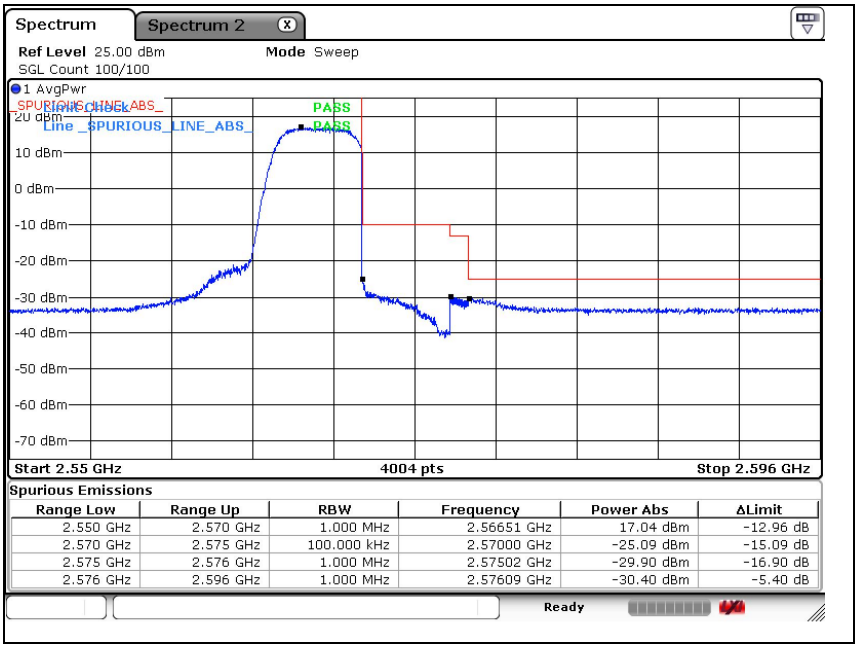
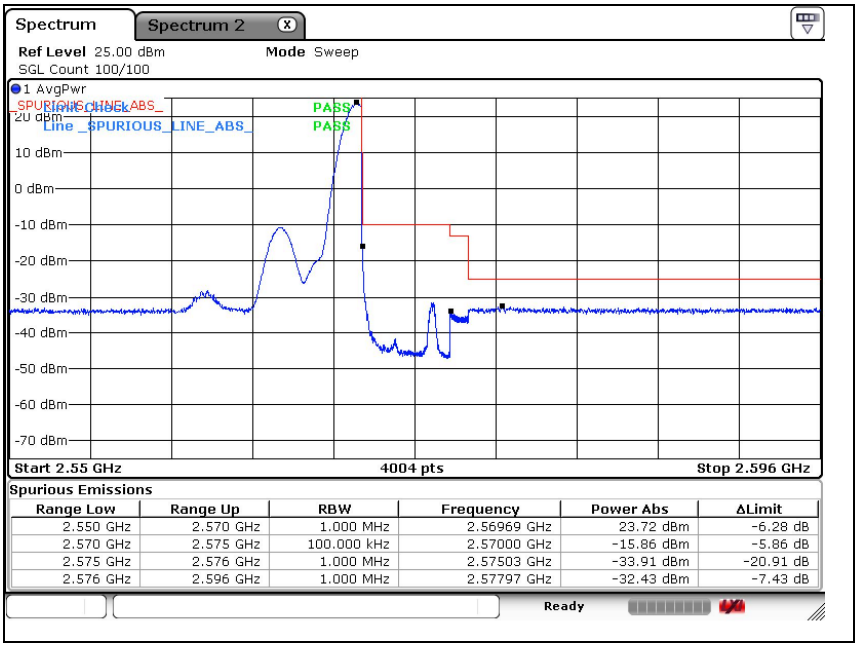
LTE band 7 (5 ㎒ - QPSK_Full RB)

High Channel



LTE band 7 (5 ㎒ - QPSK_1 RB)

High Channel



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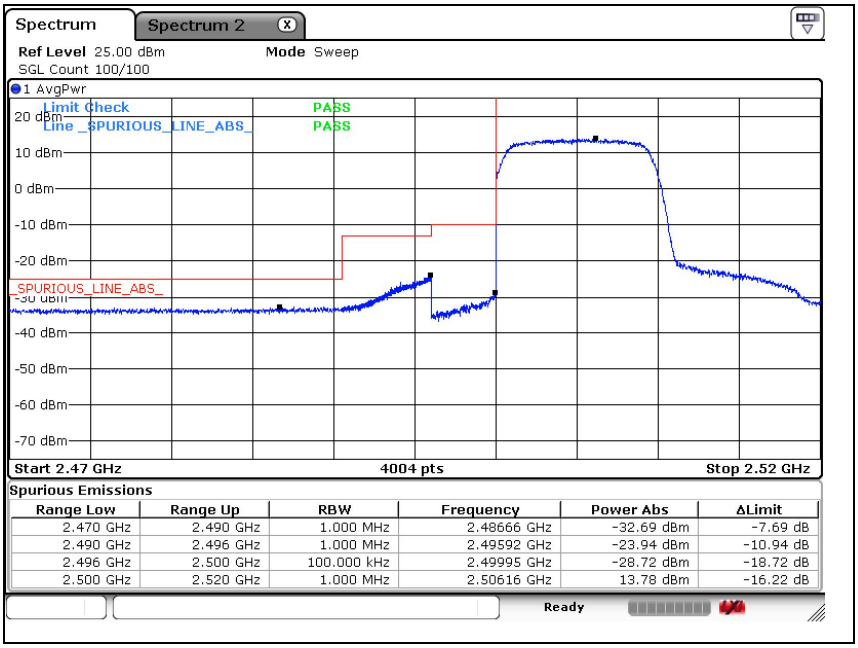
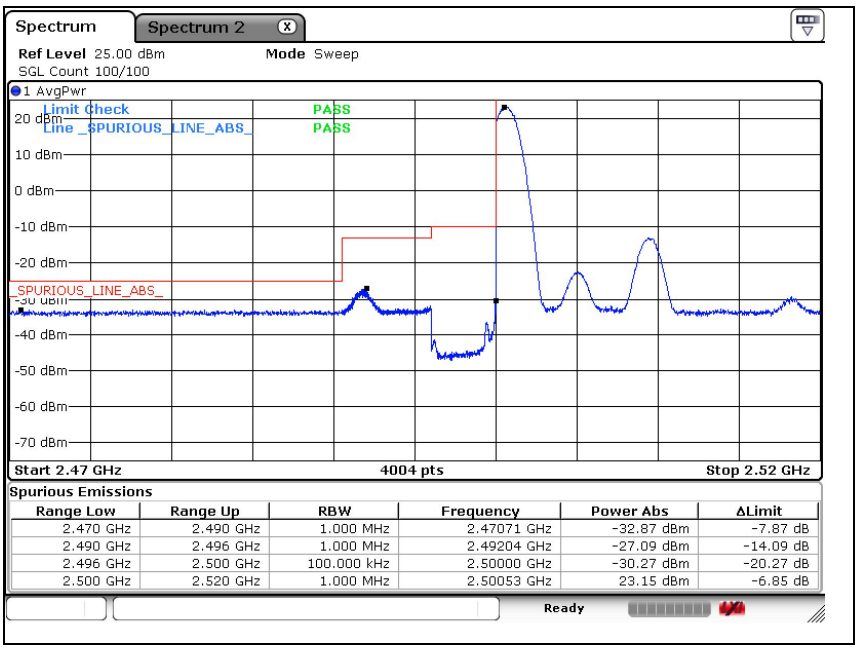
LTE band 7 (10 ㎒ - QPSK_Full RB)

Low Channel



LTE band 7 (10 ㎒ - QPSK_1 RB)

Low Channel



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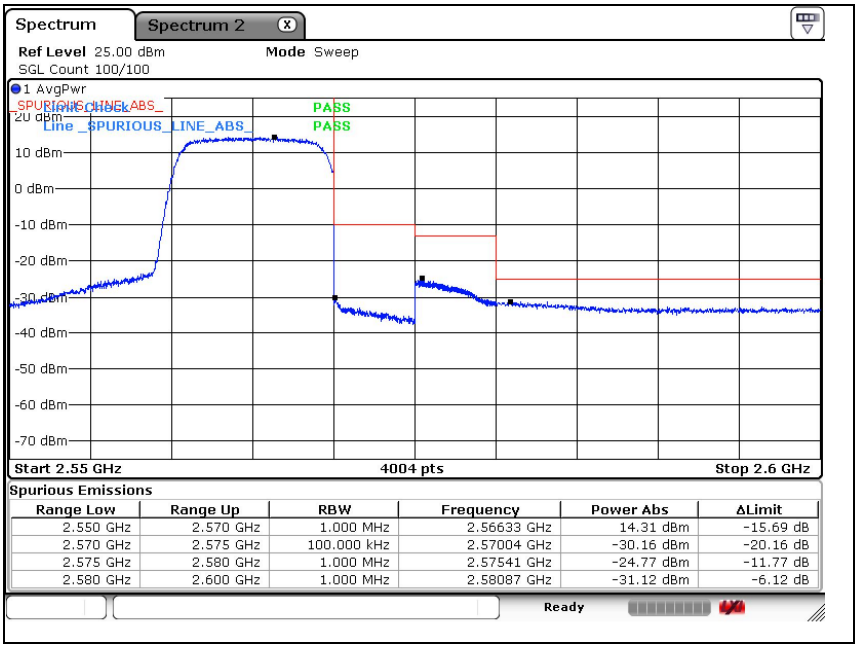
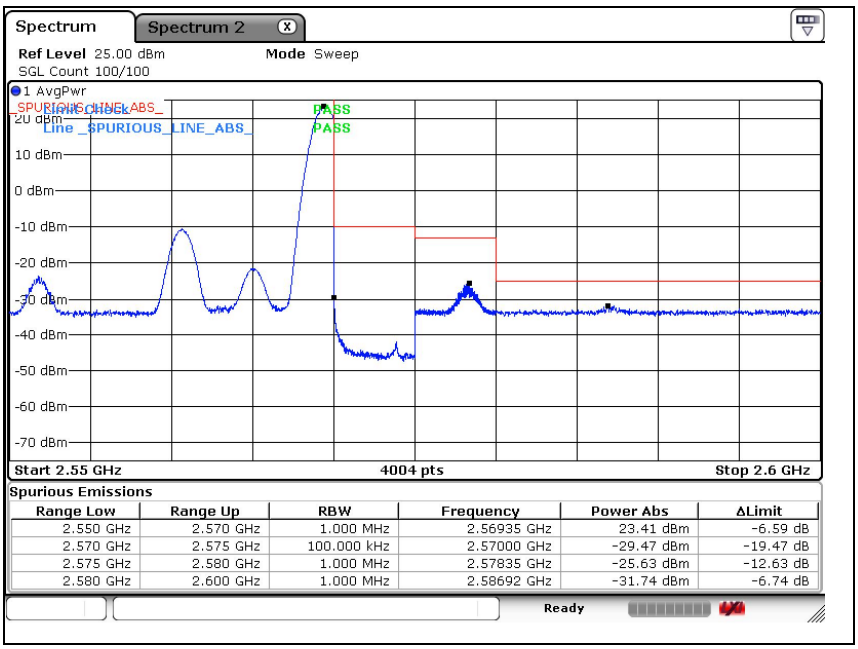
LTE band 7 (10 ㎒ - QPSK_Full RB)

High Channel



LTE band 7 (10 ㎒ - QPSK_1 RB)

High Channel



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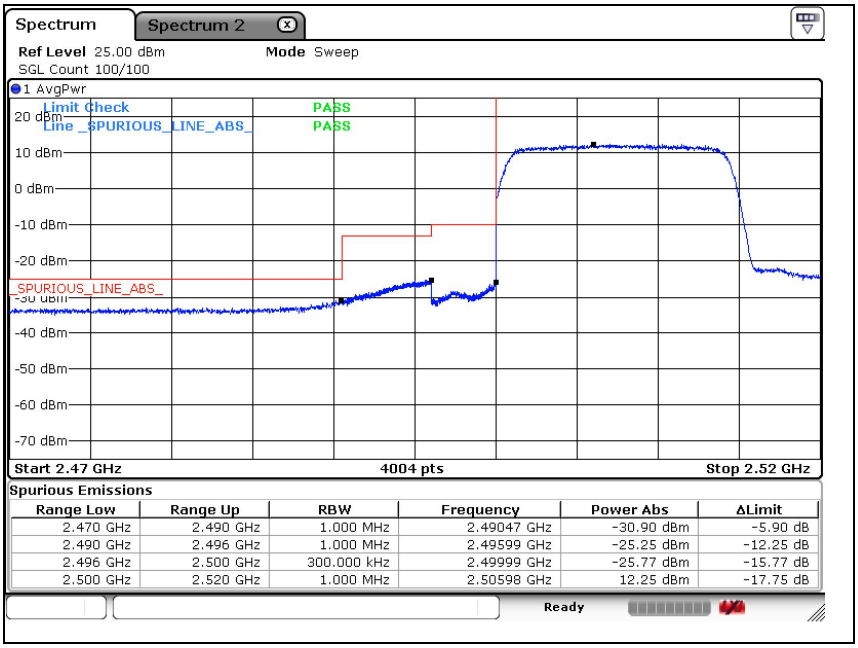
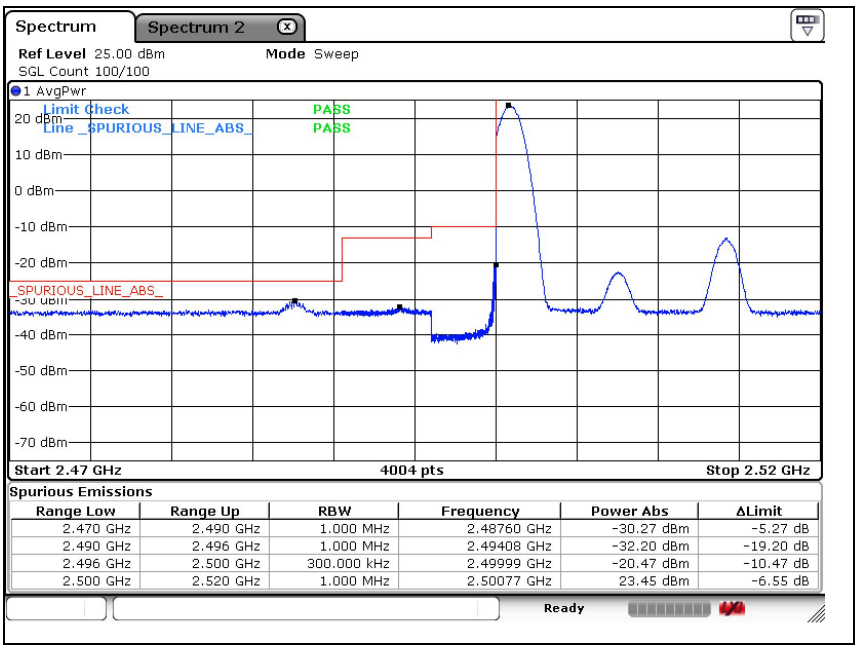
LTE band 7 (15 ㎒ - QPSK_Full RB)

Low Channel



LTE band 7 (15 ㎒ - QPSK_1 RB)

Low Channel



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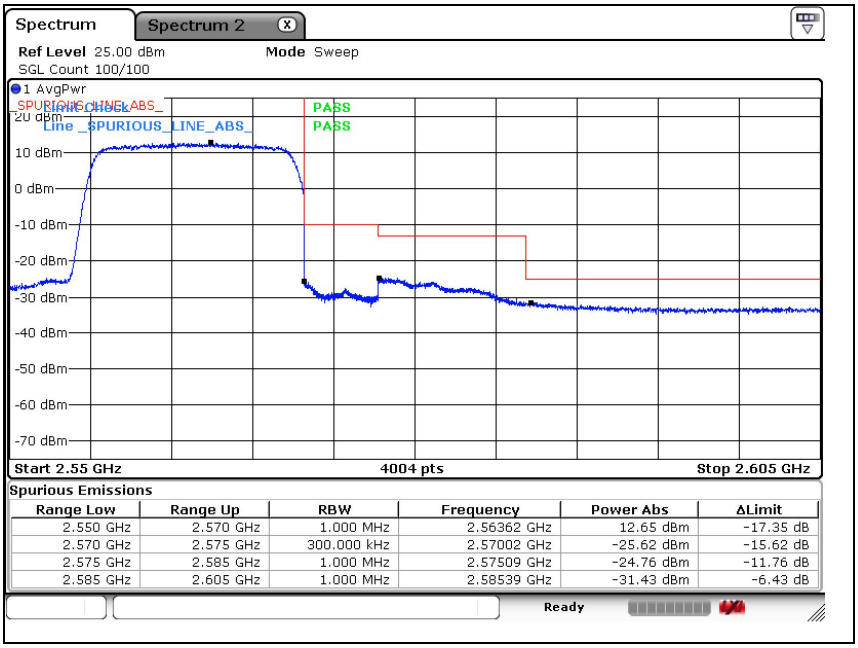
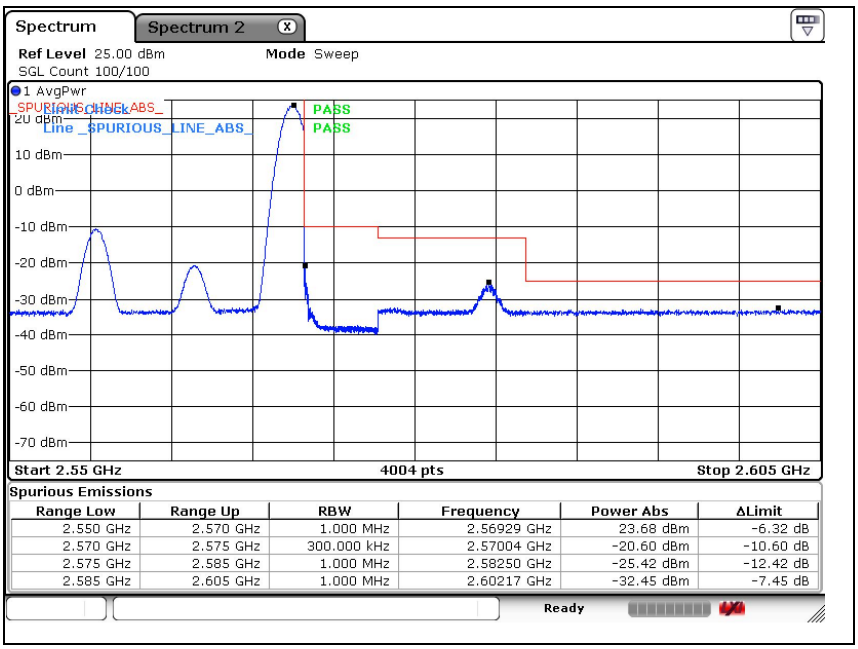
LTE band 7 (15 ㎒ - QPSK_Full RB)

High Channel



LTE band 7 (15 ㎒ - QPSK_1 RB)

High Channel



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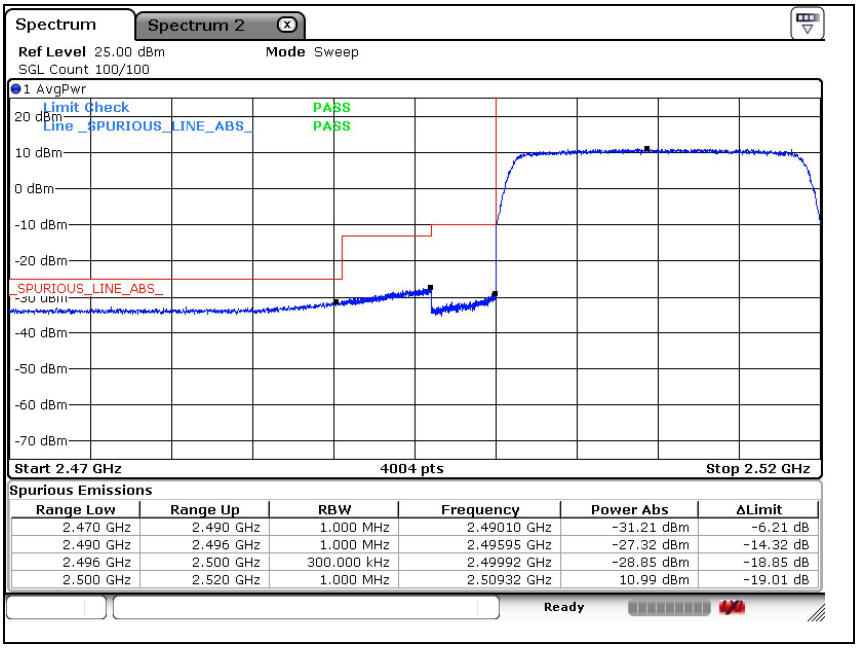
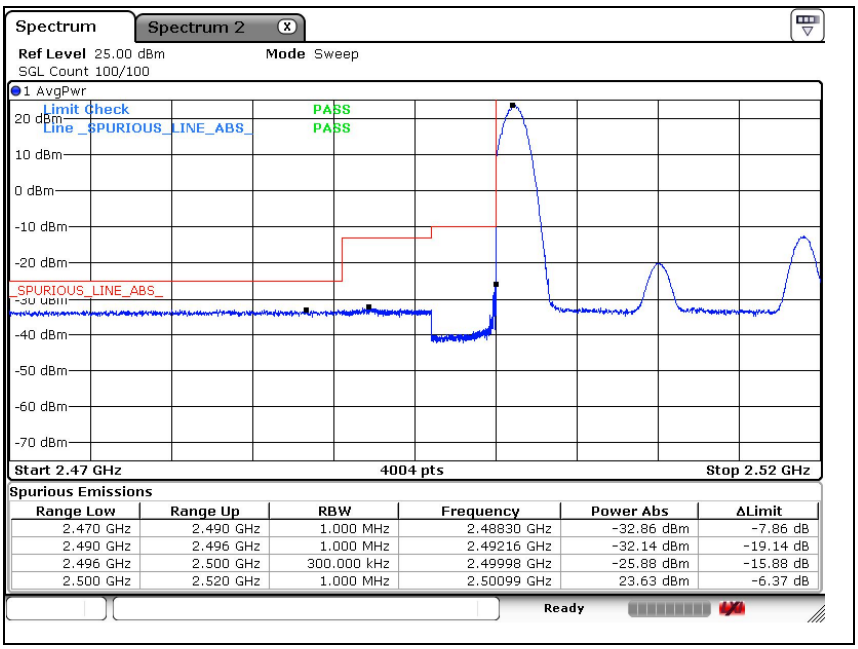
LTE band 7 (20 ㎒ - QPSK_Full RB)

Low Channel



LTE band 7 (20 ㎒ - QPSK_1 RB)

Low Channel



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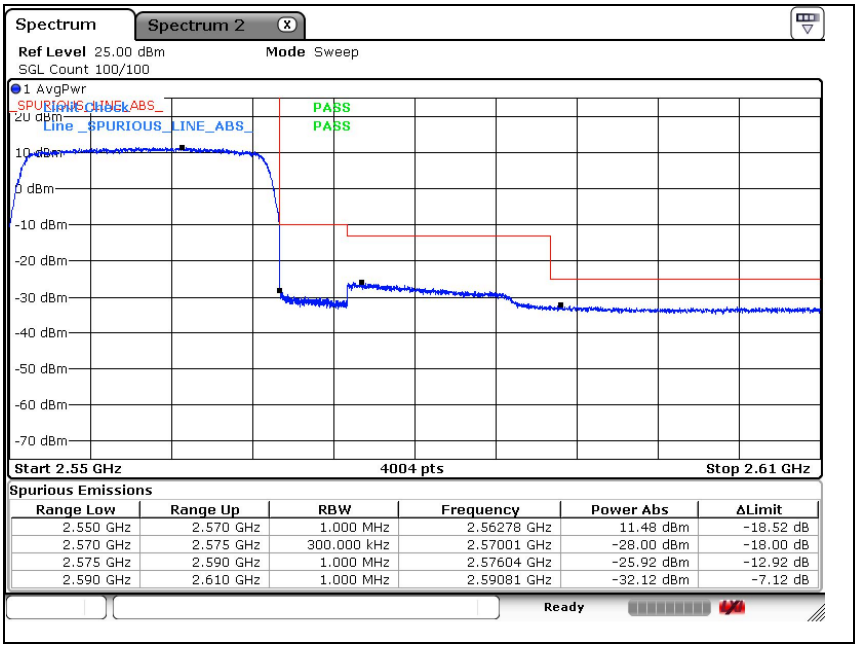
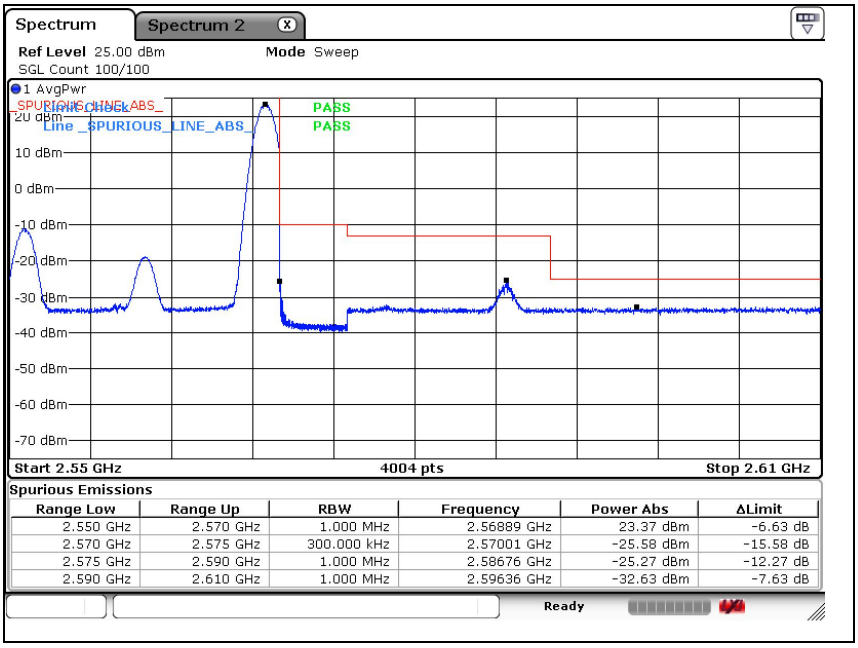
LTE band 7 (20 ㎒ - QPSK_Full RB)

High Channel



LTE band 7 (20 ㎒ - QPSK_1 RB)

High Channel



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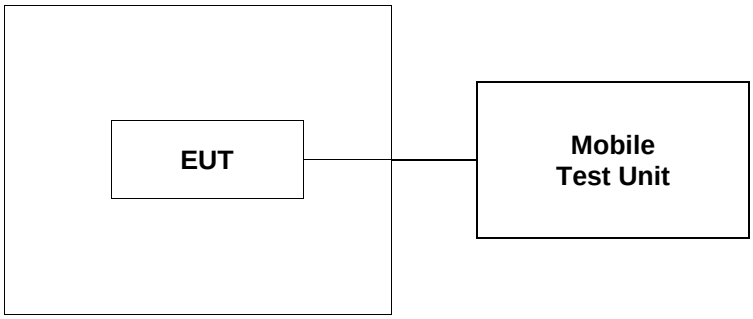
8. Frequency Stability

8.1. Limit

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

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.



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8.3. Test Results

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

LTE band 7 at middle channel

Reference Frequency: 2 535.0 ㎒			
Frequency Stability versus Temperature			
Environment Temperature (℃)	**Power Supplied (V_{dc})**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
50	12.0	3	0.001 2
40		2	0.000 8
30		1	0.000 4
23		1	0.000 4
10		1	0.000 4
0		1	0.000 4
-10		-1	-0.000 4
-20		-1	-0.000 4
-30		-3	-0.001 2
Frequency Stability versus Power Supply			
Environment Temperature (℃)	**Power Supplied (V_{dc})**	**Frequency Measure with Time Elapse**	
		Frequency Error (㎐)	**ppm**
23	13.8	1	0.000 4
	10.2	2	0.000 8

- End of the Test Report -

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