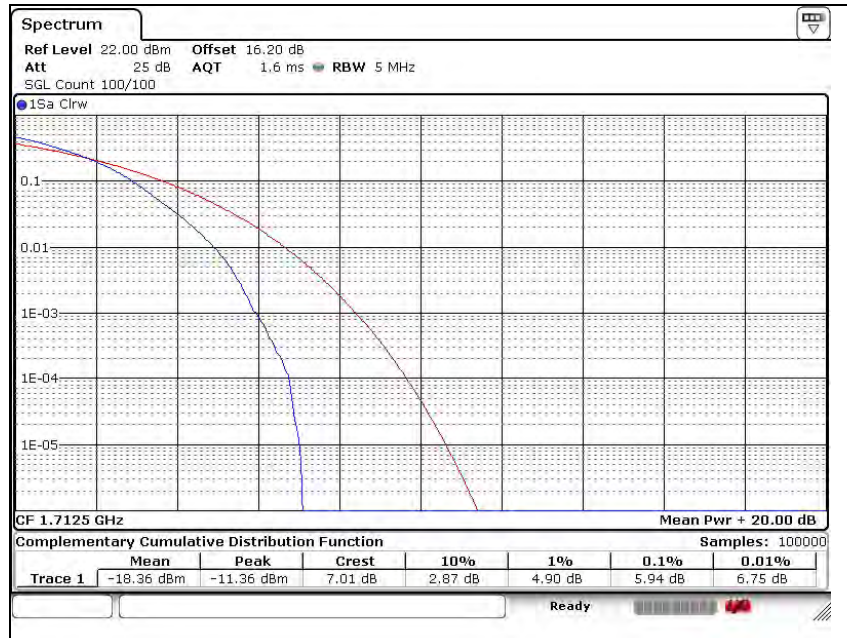
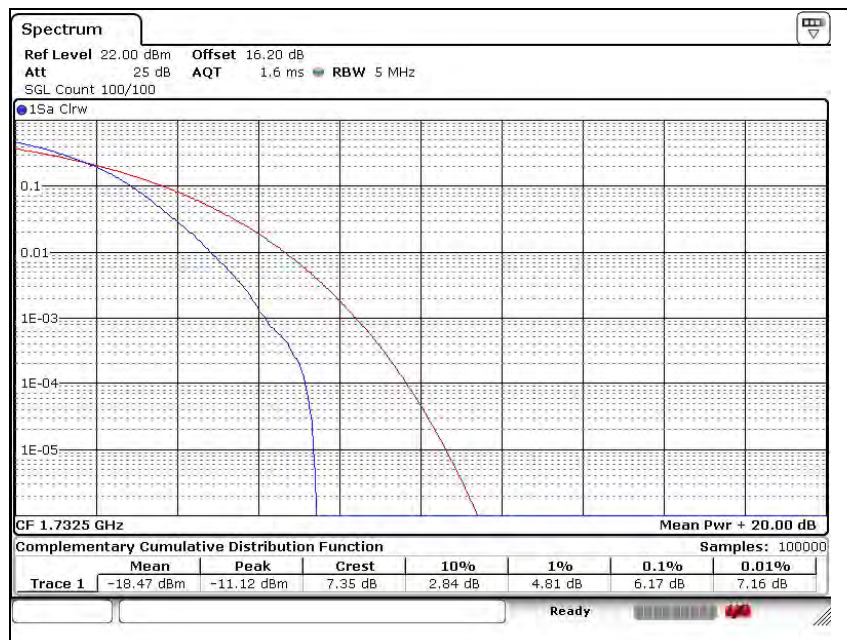


LTE band 4 (5 MHz – 16QAM_RB 25)

Low Channel

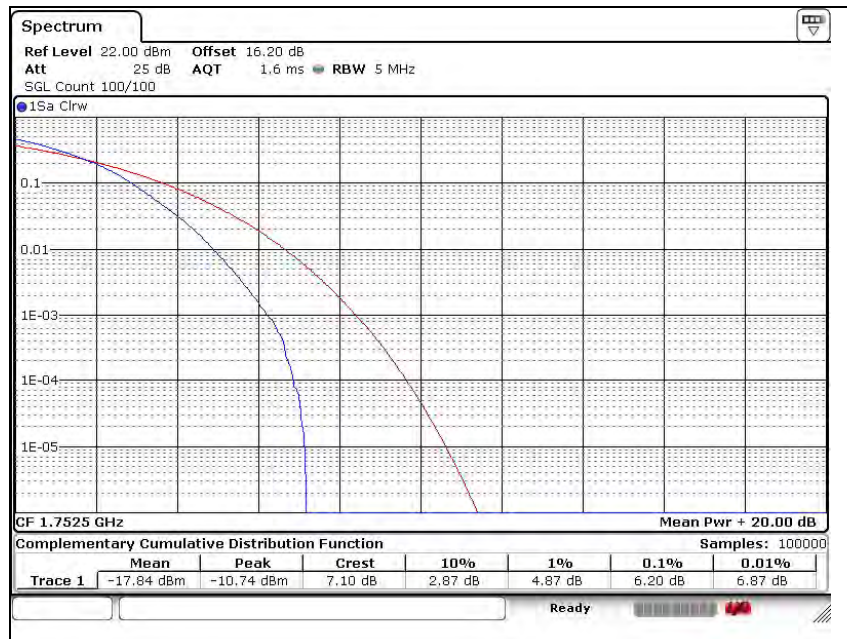


Middle Channel



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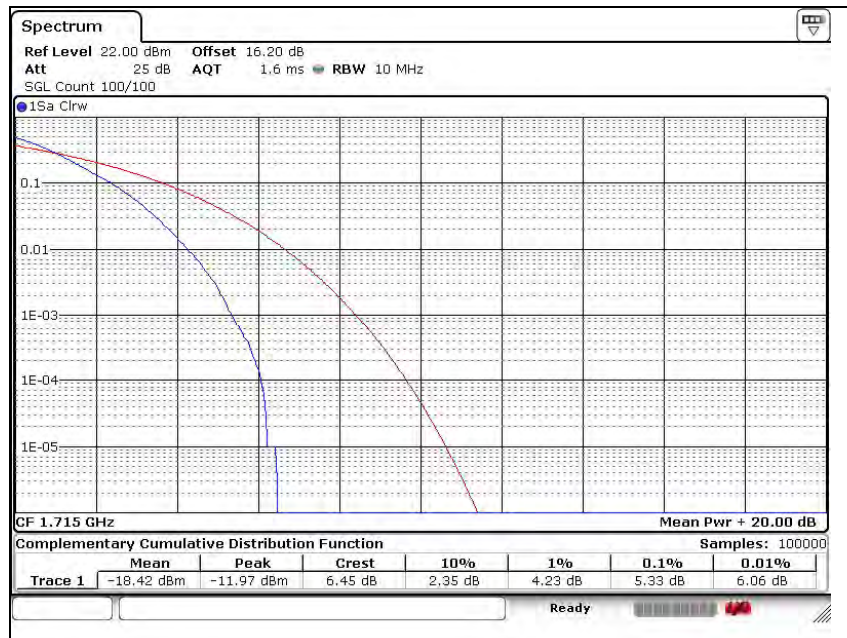
High Channel



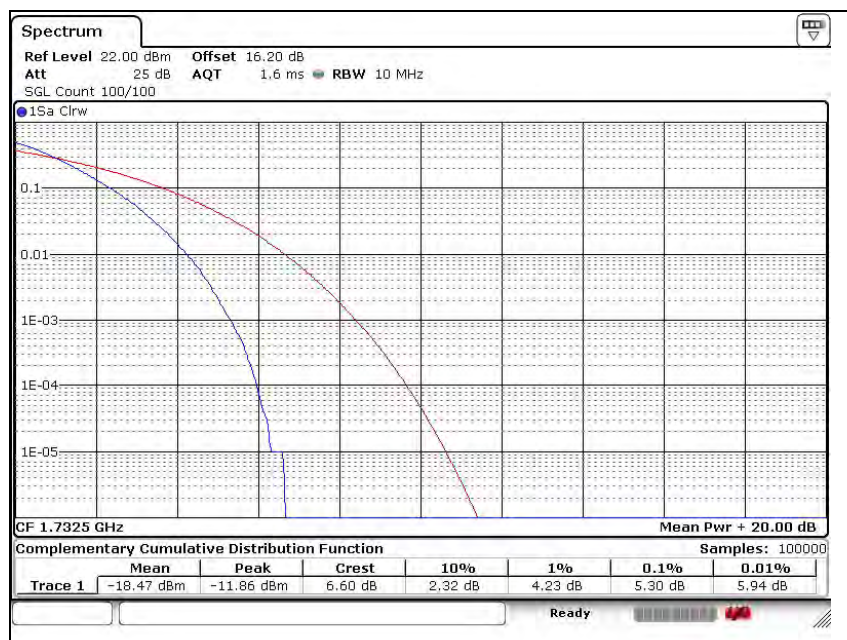
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

LTE band 4 (10 MHz – 16QAM_RB 50)

Low Channel

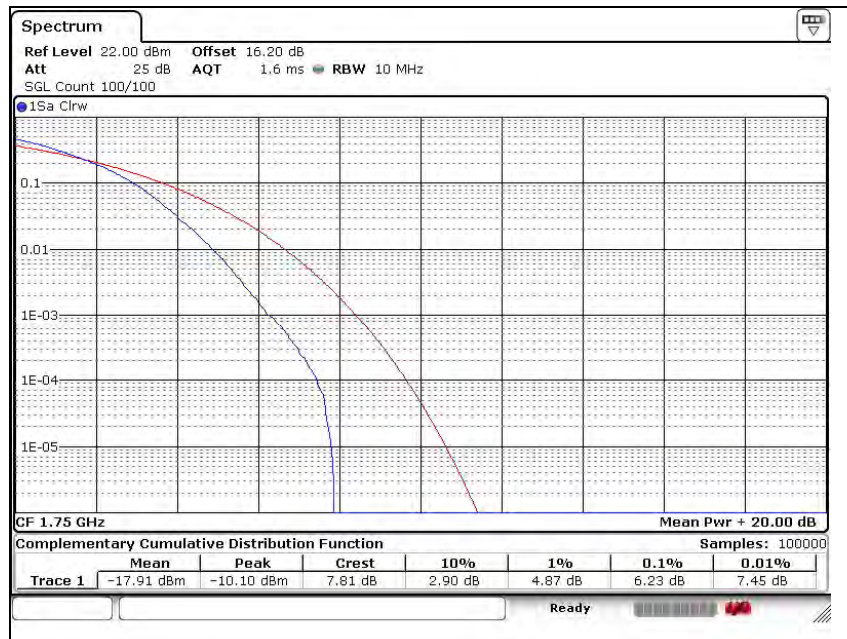


Middle Channel



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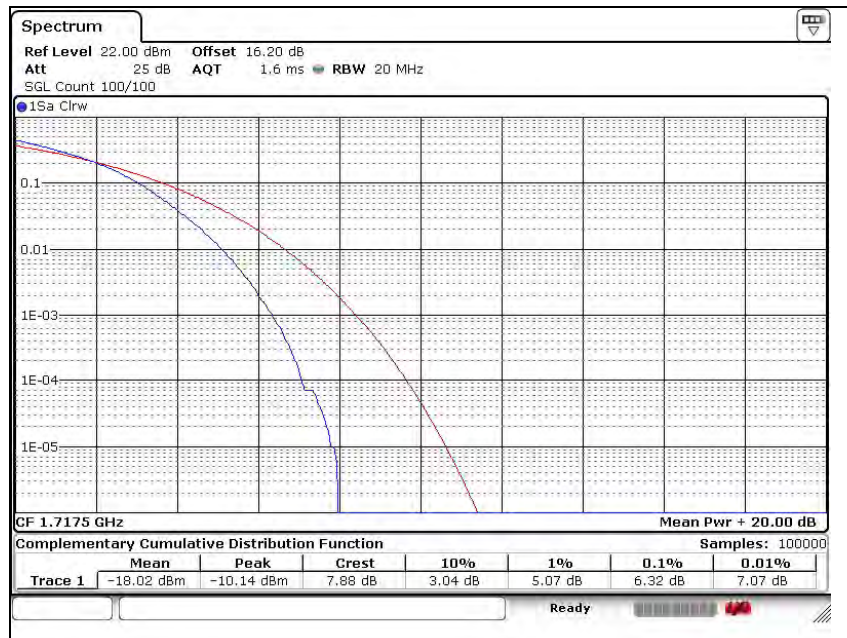
High Channel



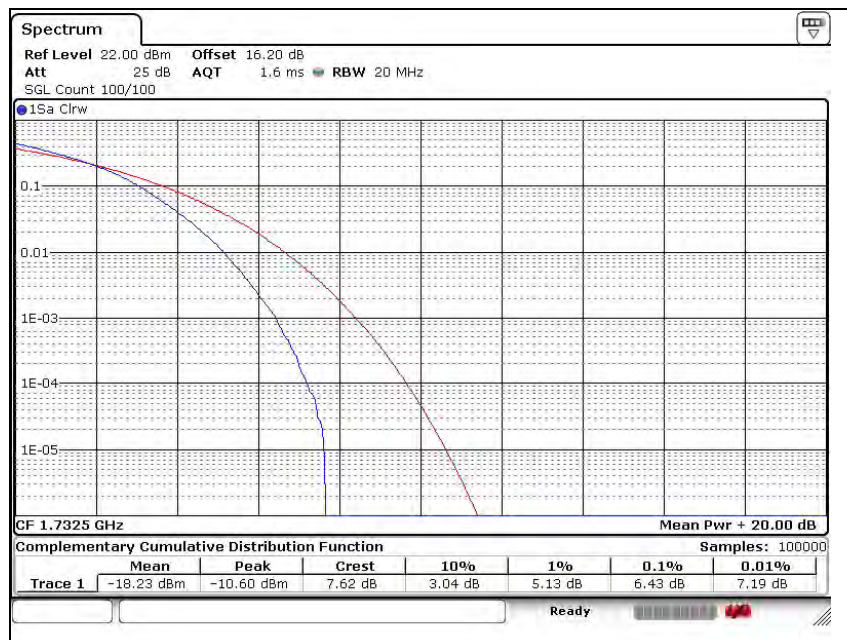
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

LTE band 4 (15 MHz – 16QAM_RB 75)

Low Channel

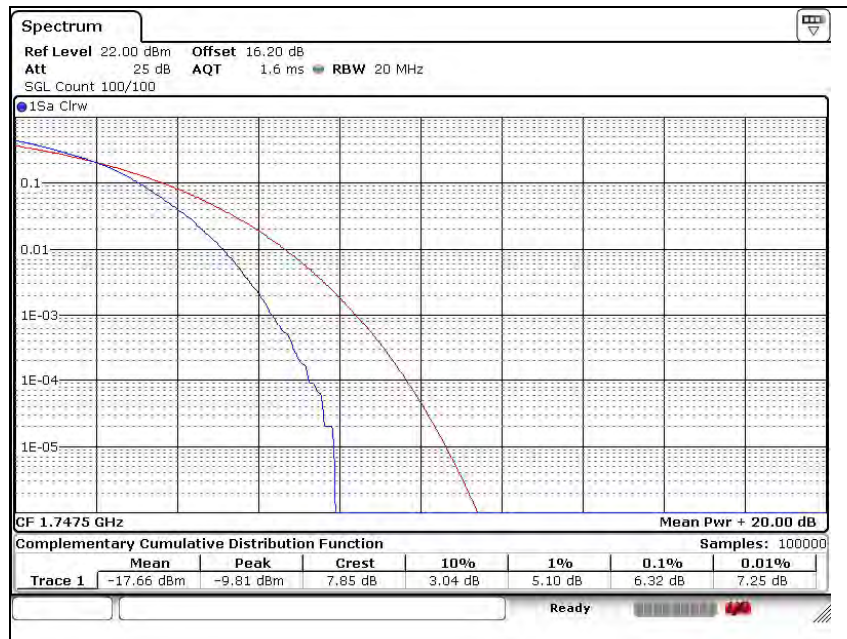


Middle Channel



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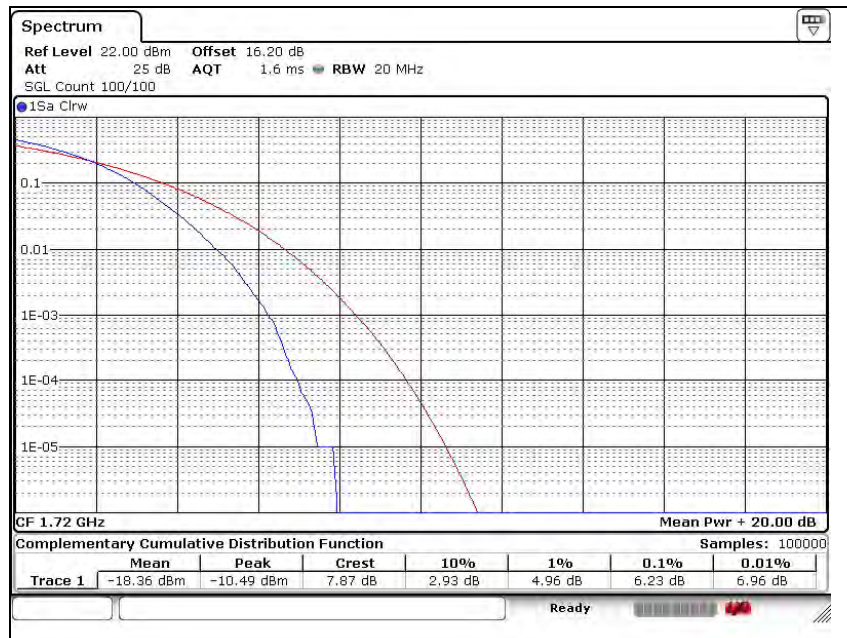
High Channel



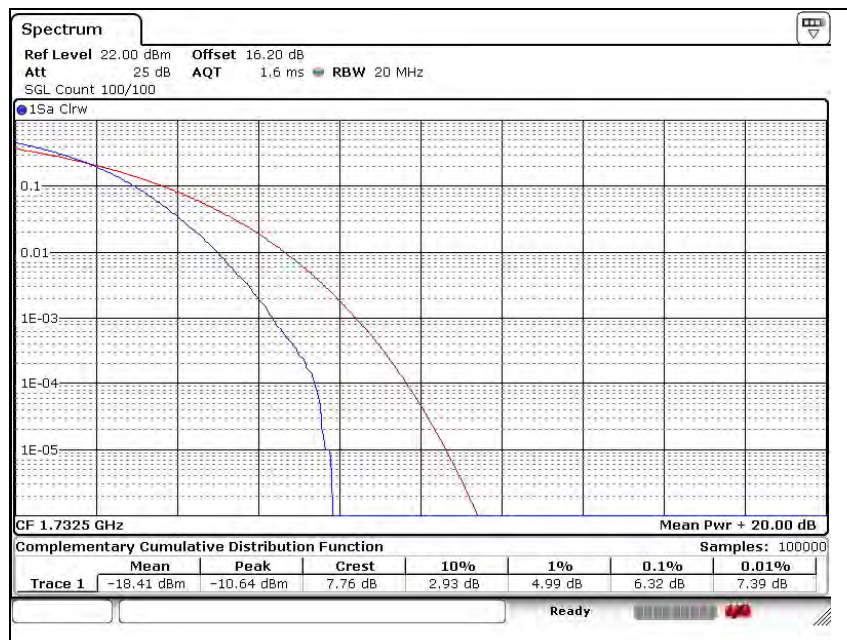
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

LTE band 4 (20 MHz – 16QAM_RB 100)

Low Channel

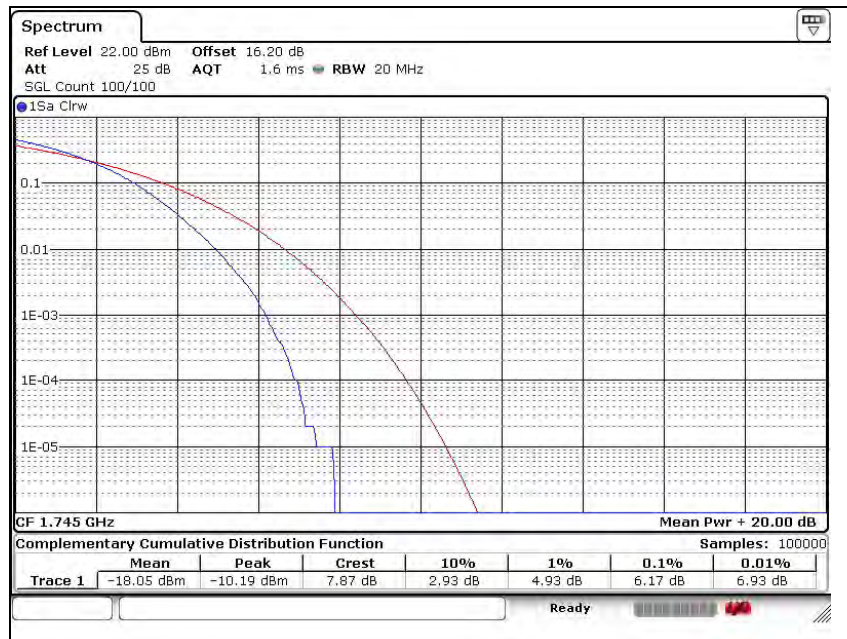


Middle Channel



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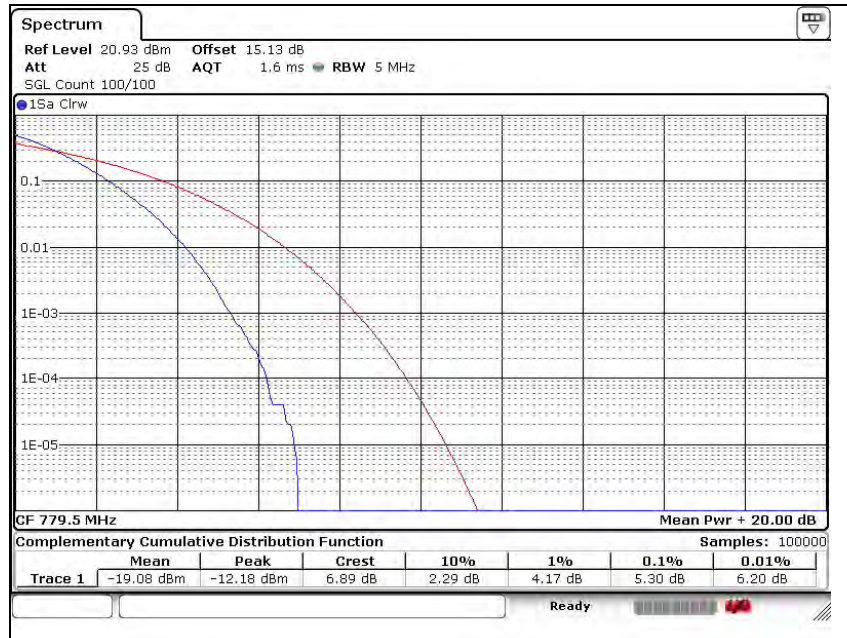
High Channel



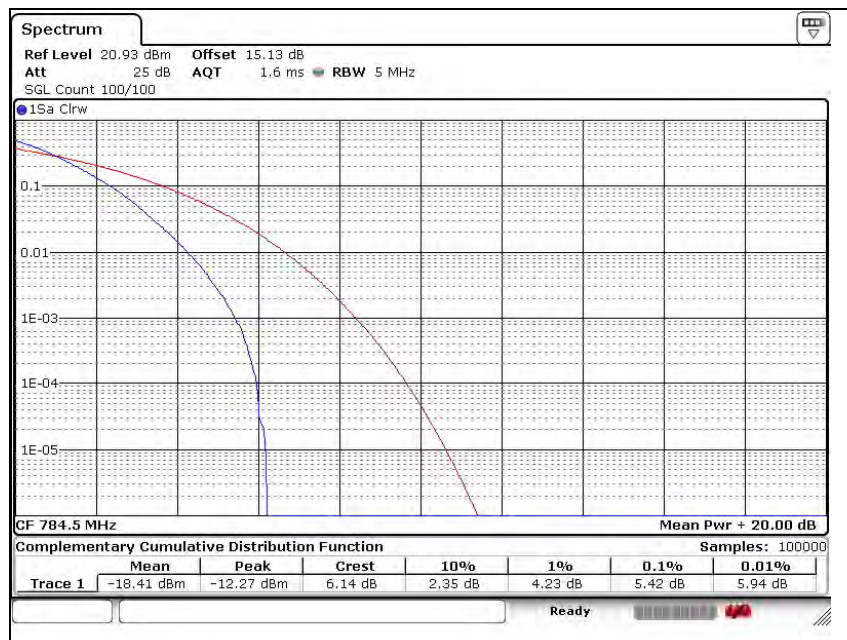
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LTE band 13 (5 MHz – QPSK_RB 25)

Low Channel



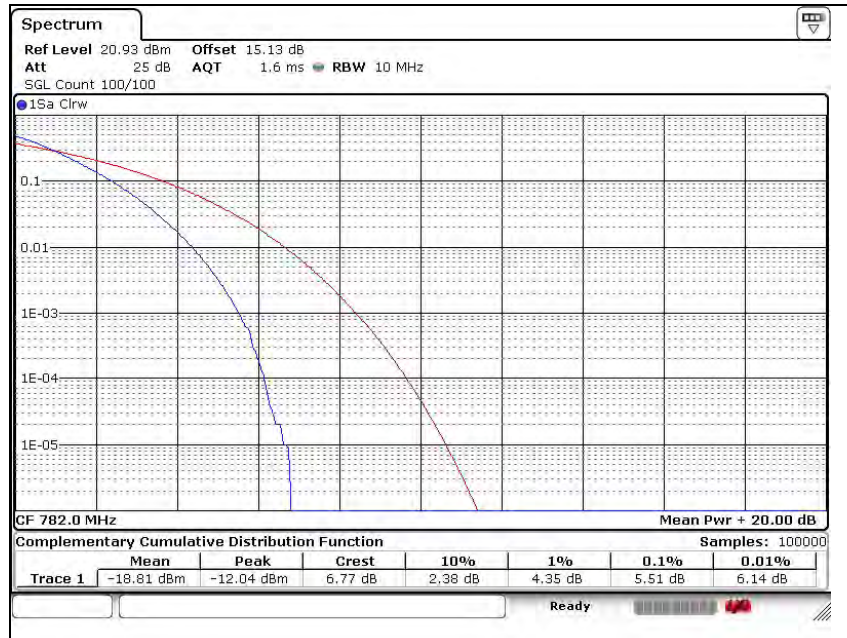
High Channel



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LTE band 13 (10 MHz – QPSK_RB 50)

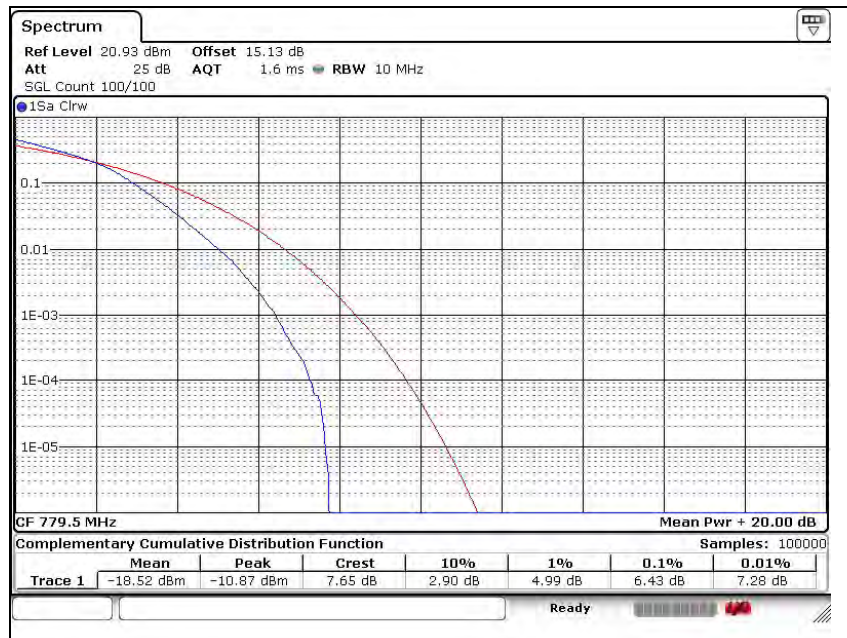
Middle Channel



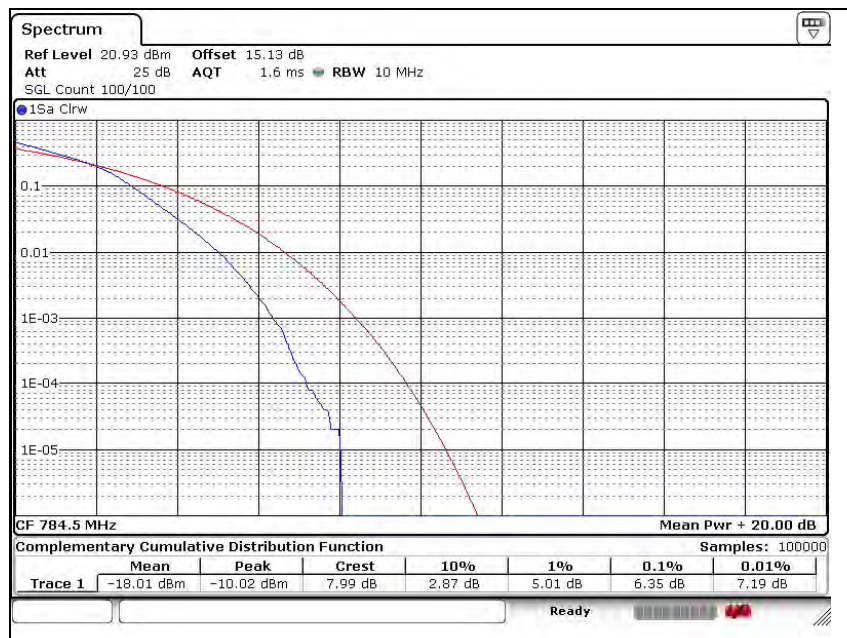
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LTE band 13 (5 MHz – 16QAM_RB 25)

Low Channel



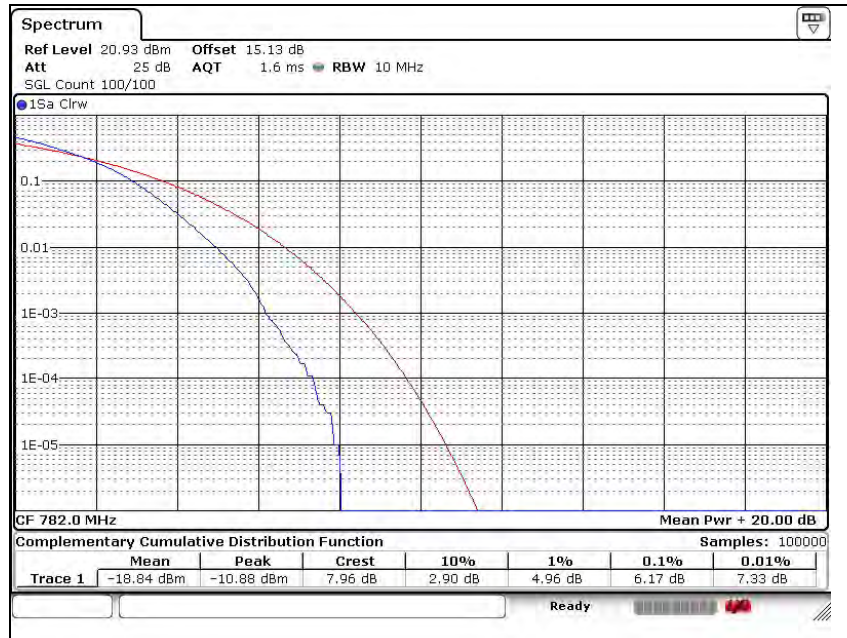
High Channel



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LTE band 13 (10 MHz – 16QAM_RB 50)

Middle Channel



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6. Spurious Emissions at Antenna Terminal

6.1. Limit

FCC §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB.

FCC §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

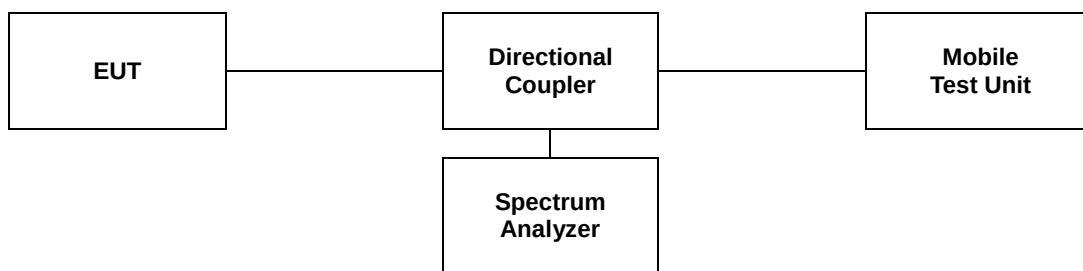
FCC §27.53(c), For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.

FCC §27.53(h)(1), Except as otherwise specified below, for operations in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz, and 2 180-2 200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

6.2. Test Procedure

The test follows section 6.0 of FCC KDB publication 971168 v02r02.

1. Start frequency was set to 30 MHz and stop frequency was set to at least 10* the fundamental frequency.
2. Detector = RMS.
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 30 MHz to 20 GHz, all path loss of wide frequency range was investigated and compensated to spectrum analyzer as Correction function.



Notes;

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for part 22, part 27 and 1 MHz or greater for part 24. However, in the 1 MHz 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 dB below the transmitter power.

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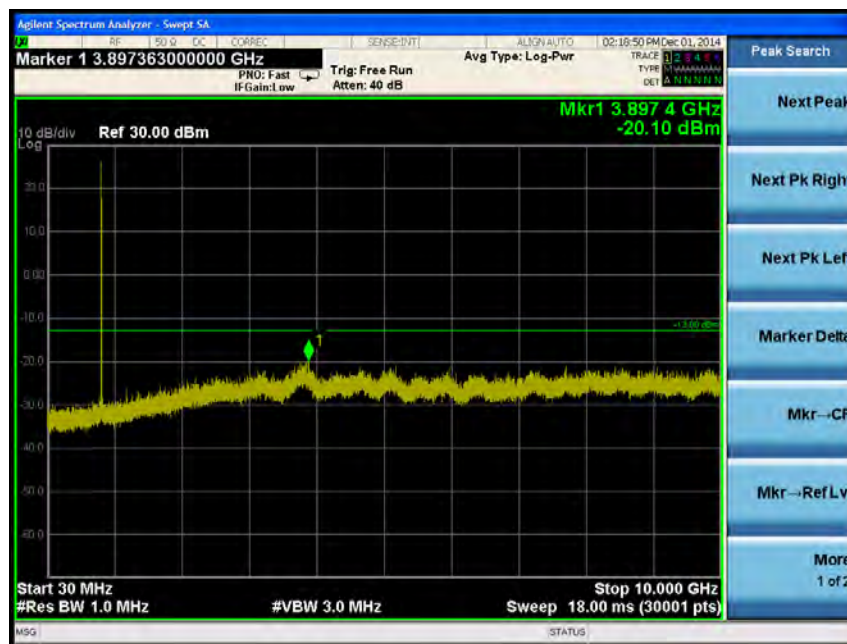
6.3. Test Results

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

Please refer to the following plots.

CDMA850 1xRTT

Low Channel



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SGS Korea Co., Ltd. (Gunpo Laboratory)

4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 435-040

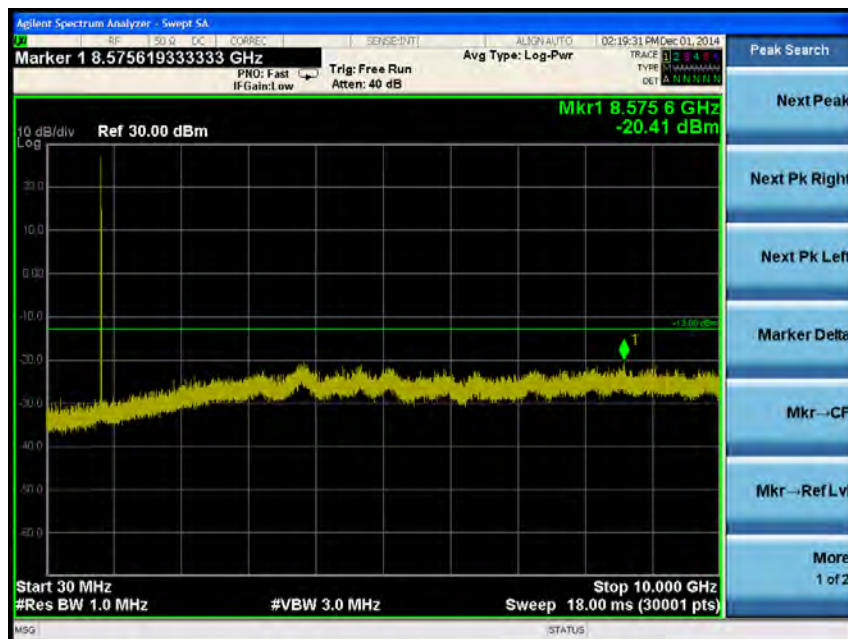
<http://www.sgsgroup.kr>

RTT5041-20(2014.01.20)(2)

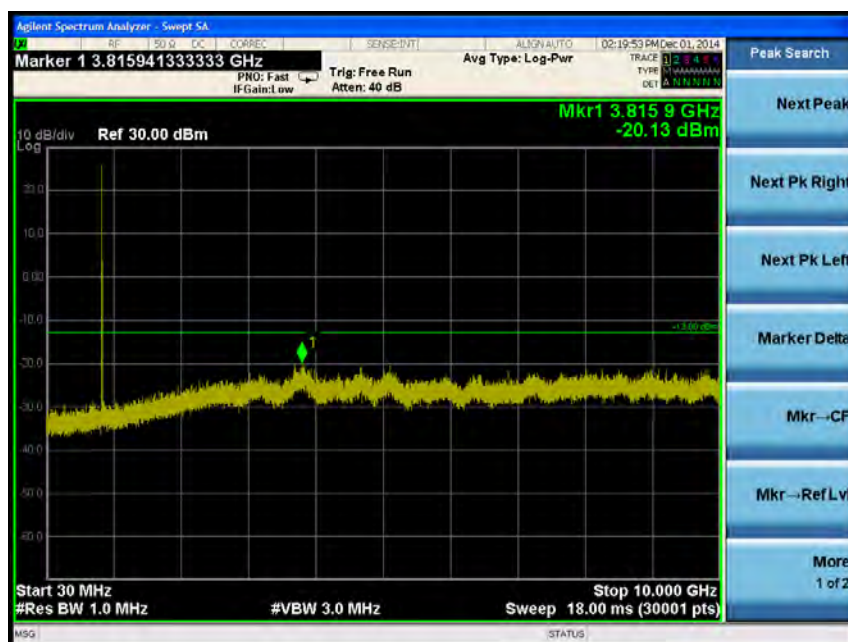
Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

Middle Channel



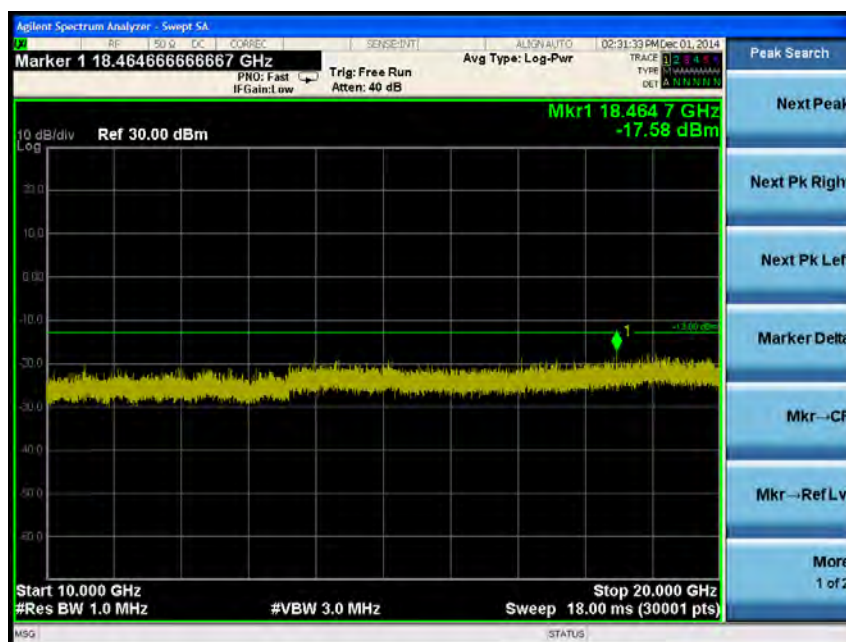
High Channel



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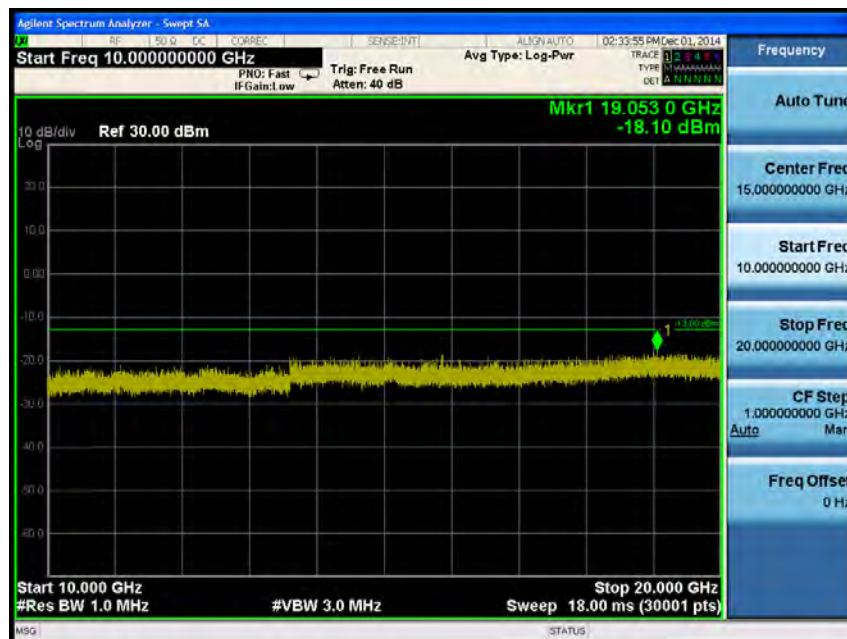
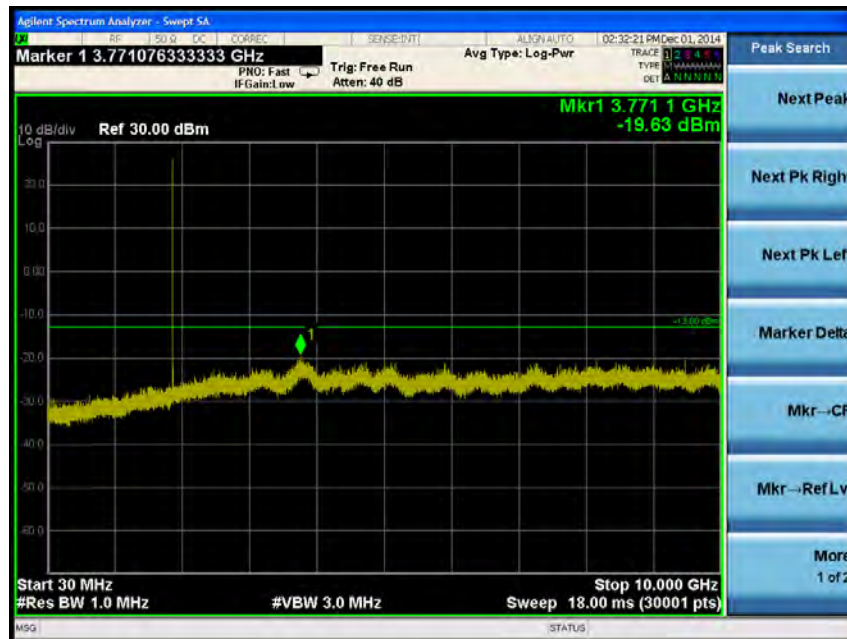
CDMA1 900 1xRTT

Low Channel



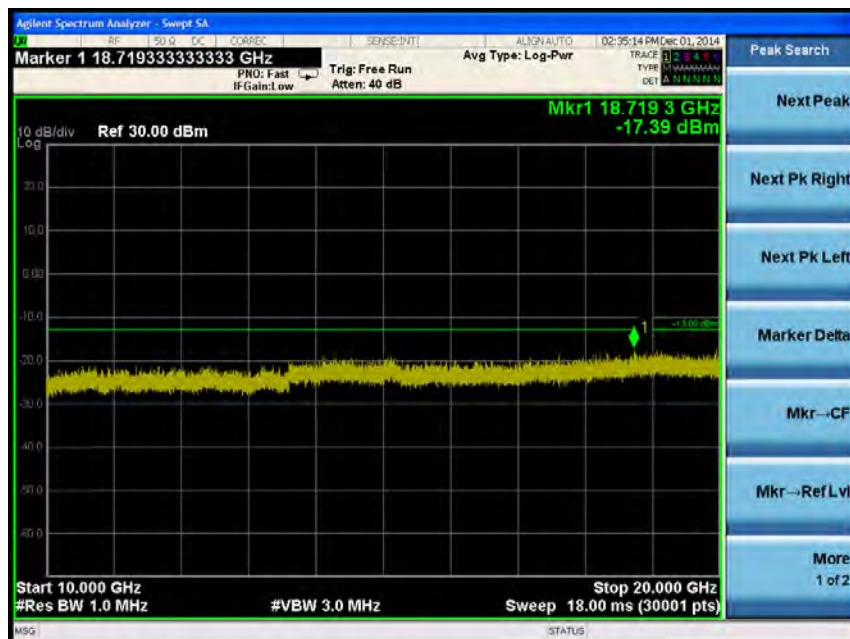
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Middle Channel



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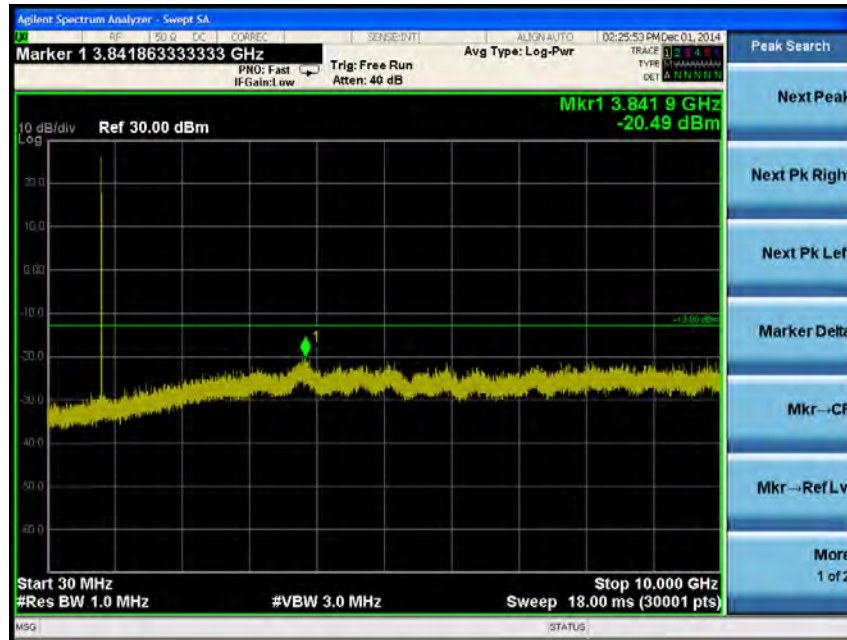
High Channel



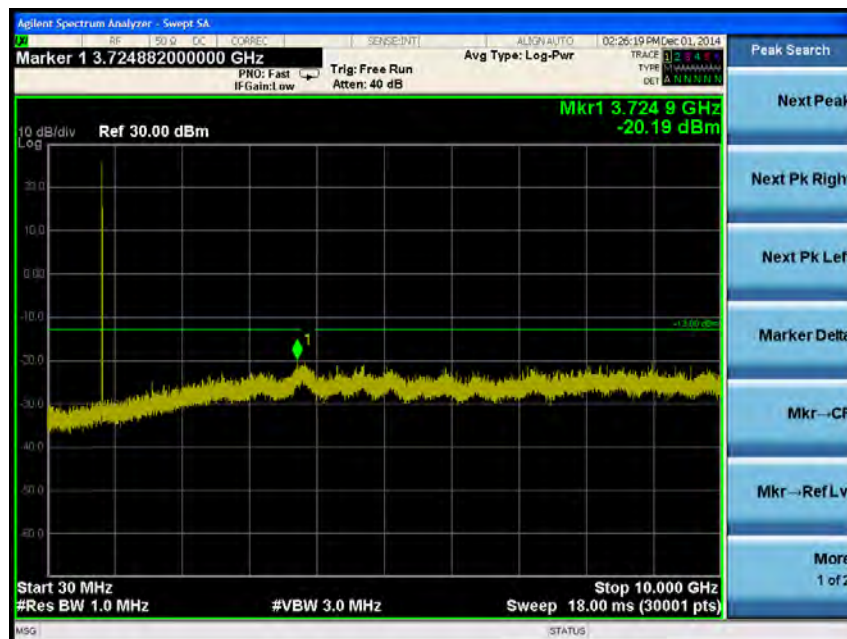
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

CDMA850 1xEV-DO

Low Channel

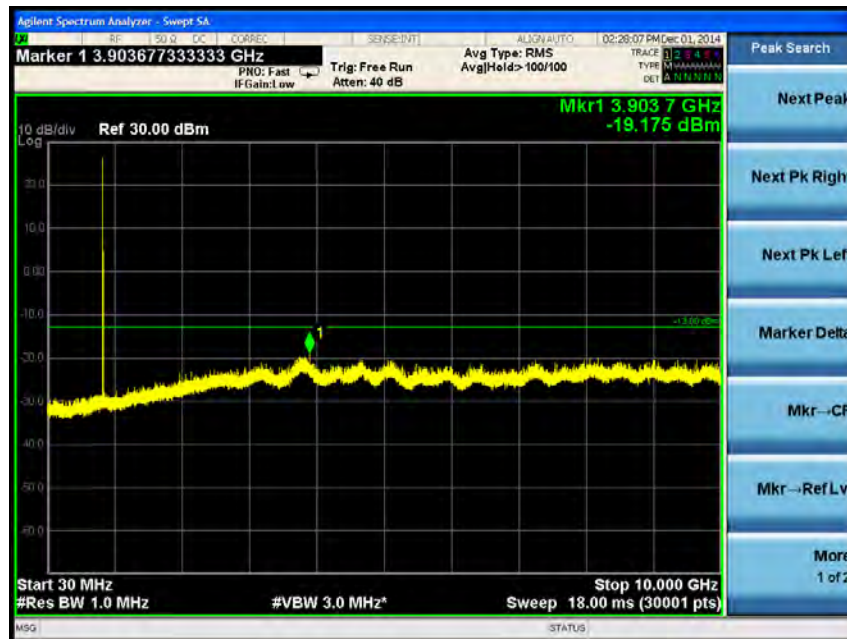


Middle Channel



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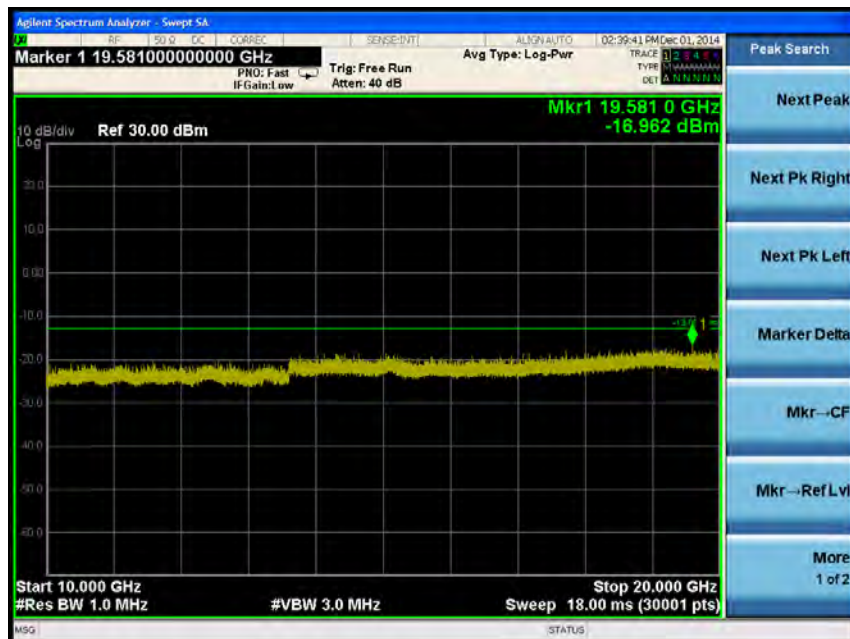
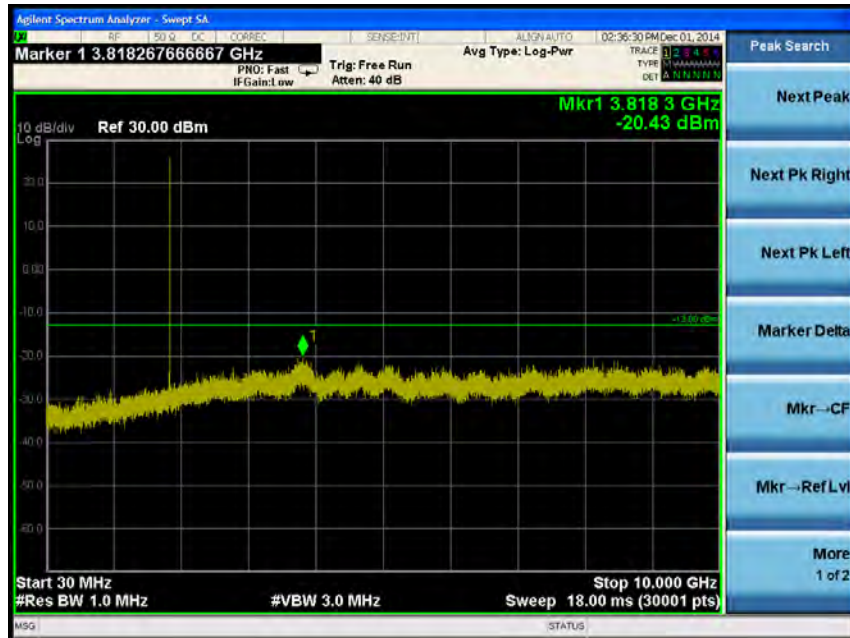
High Channel



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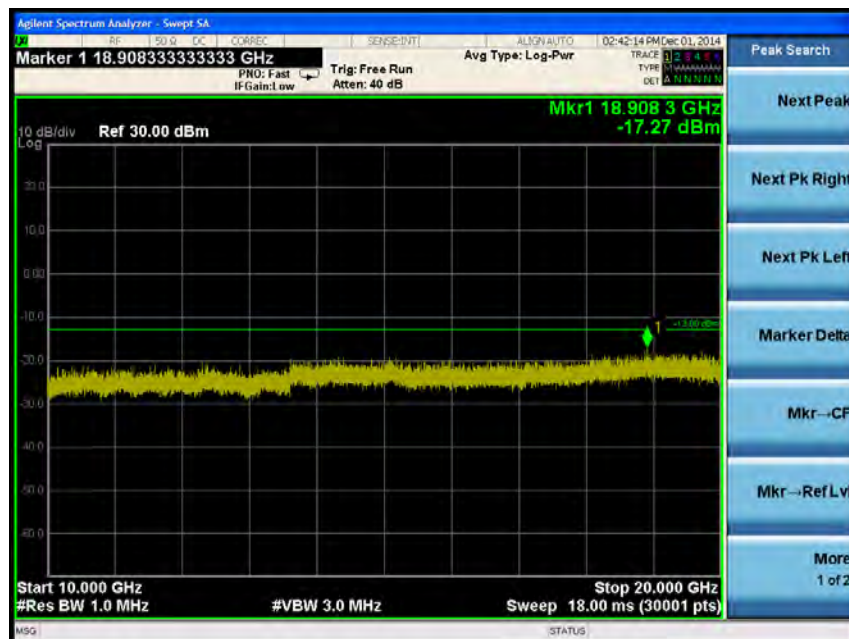
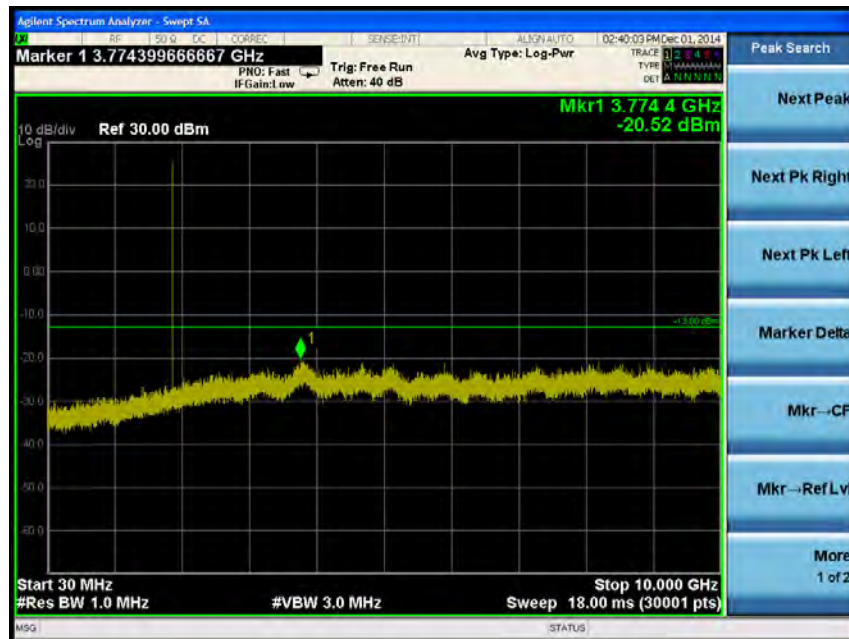
CDMA1 900 1xEV-DO

Low Channel



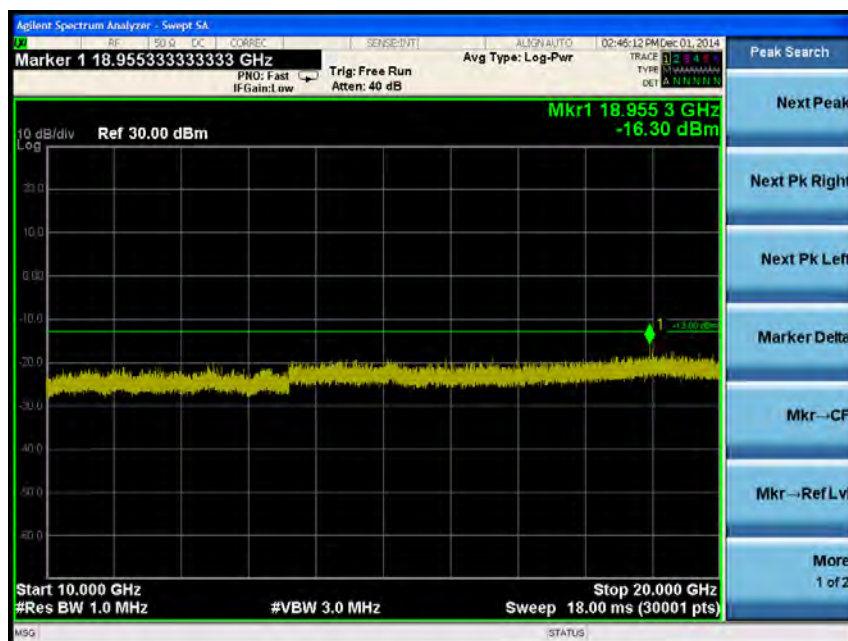
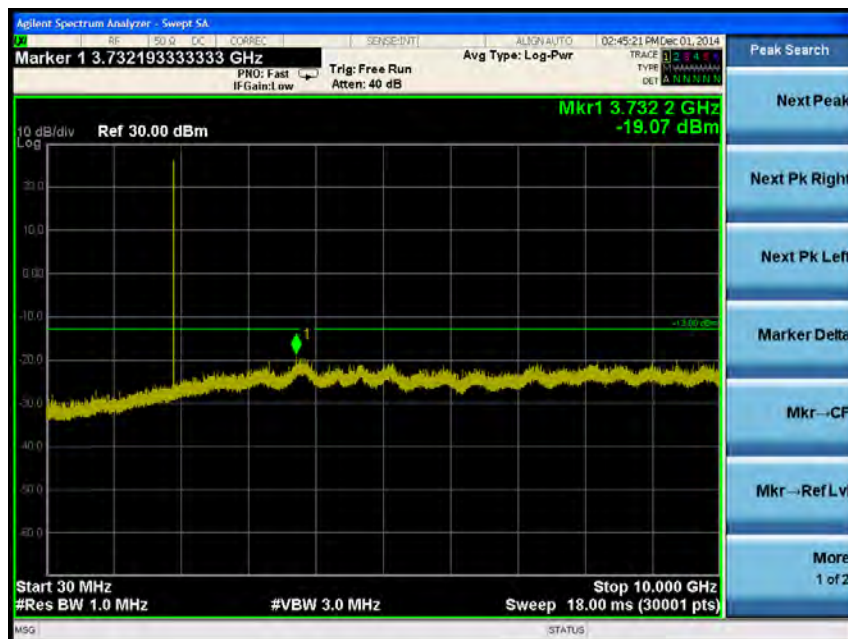
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Middle Channel



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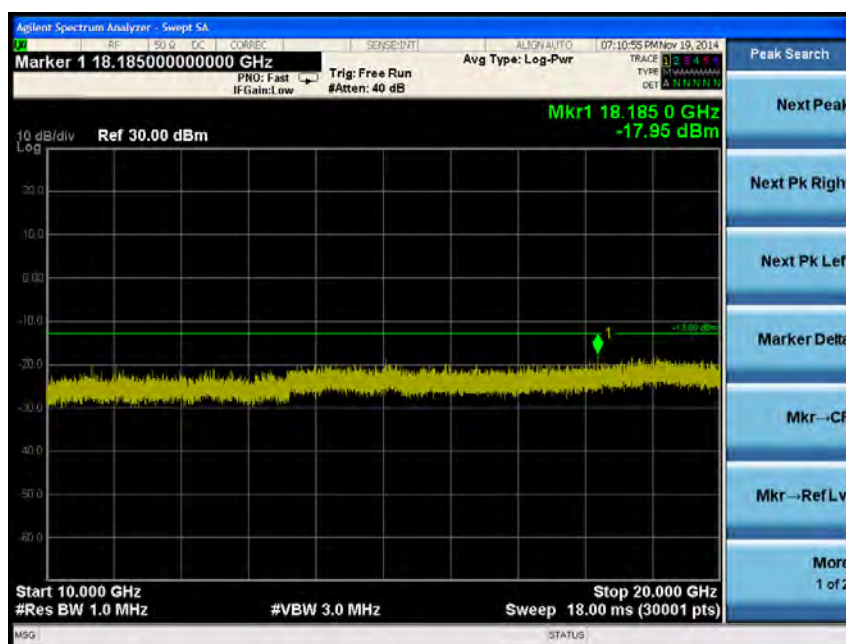
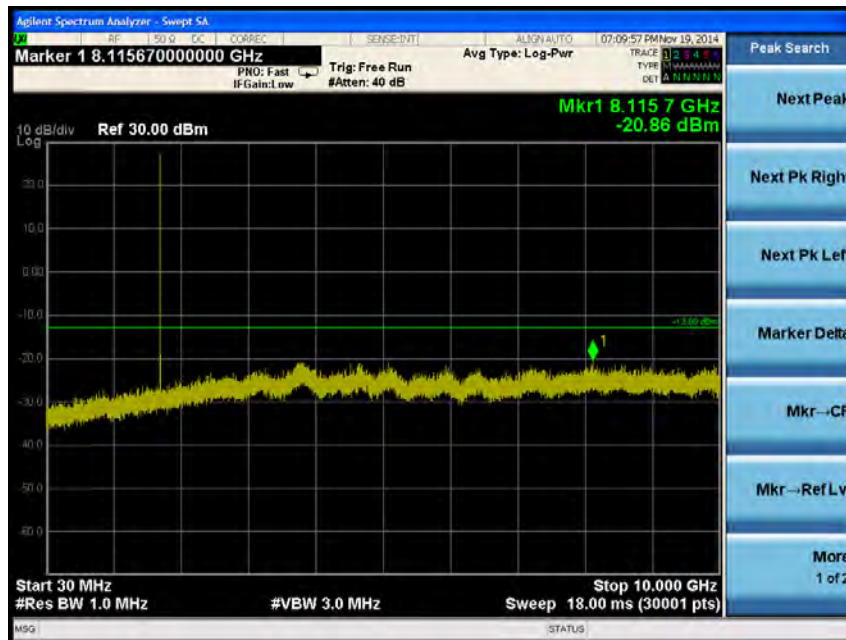
High Channel



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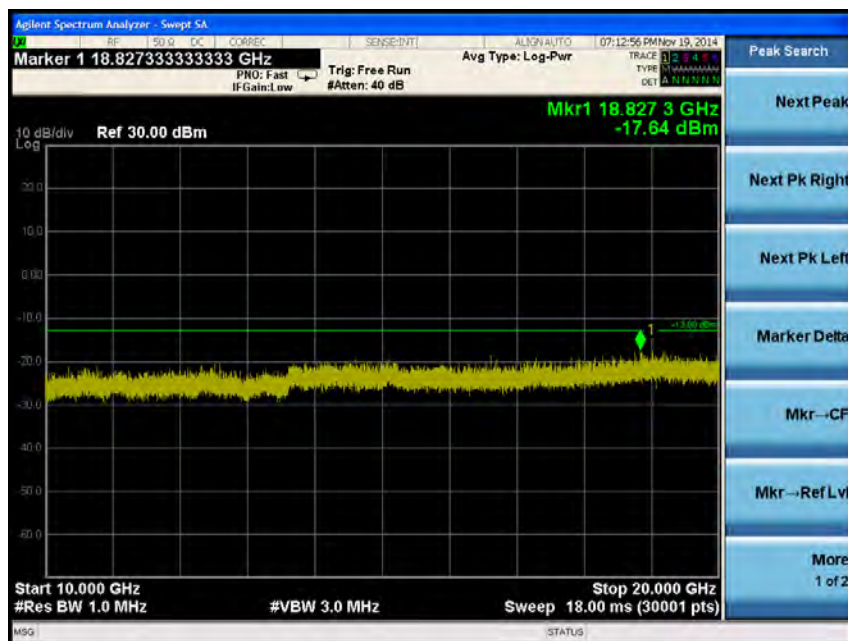
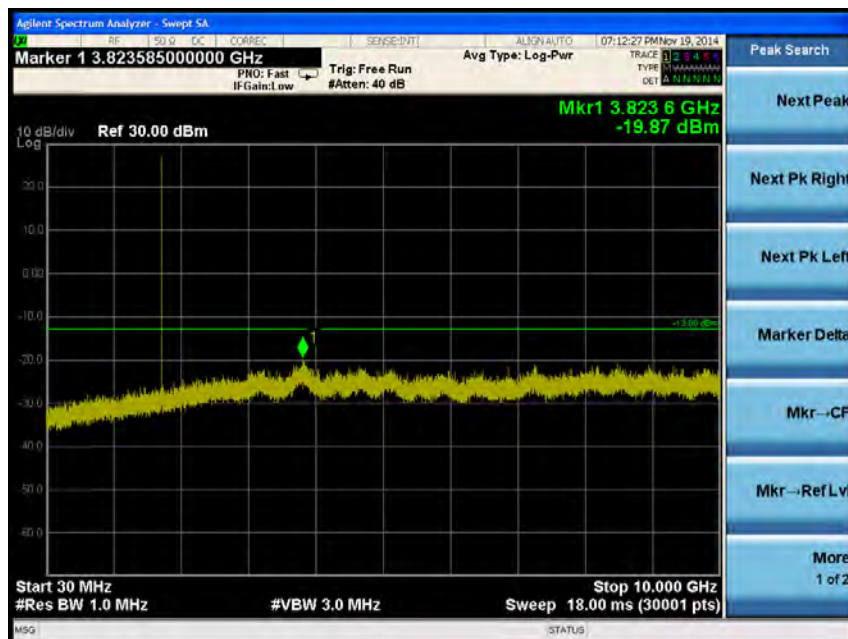
LTE band 4 (5 MHz – QPSK_RB 1_Offset 0)

Low Channel



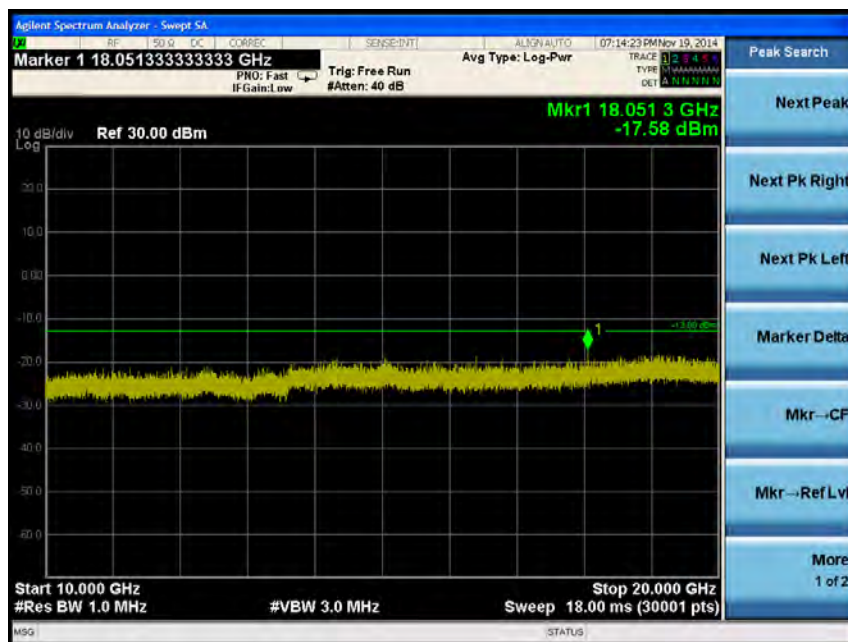
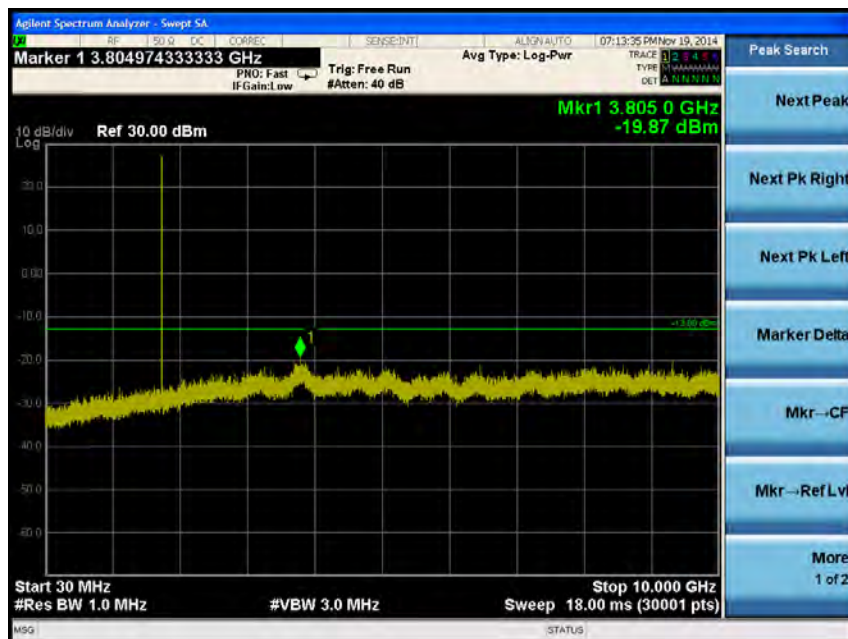
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Middle Channel



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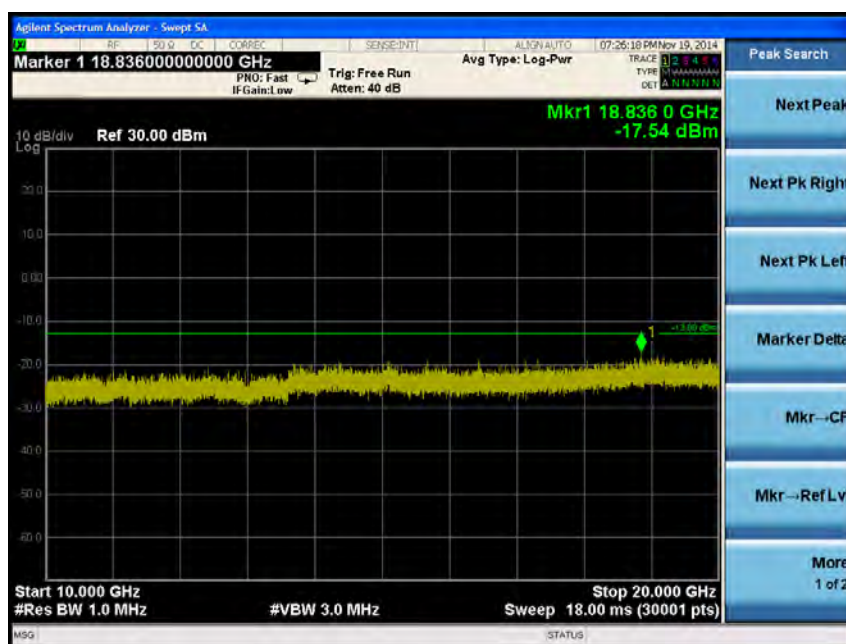
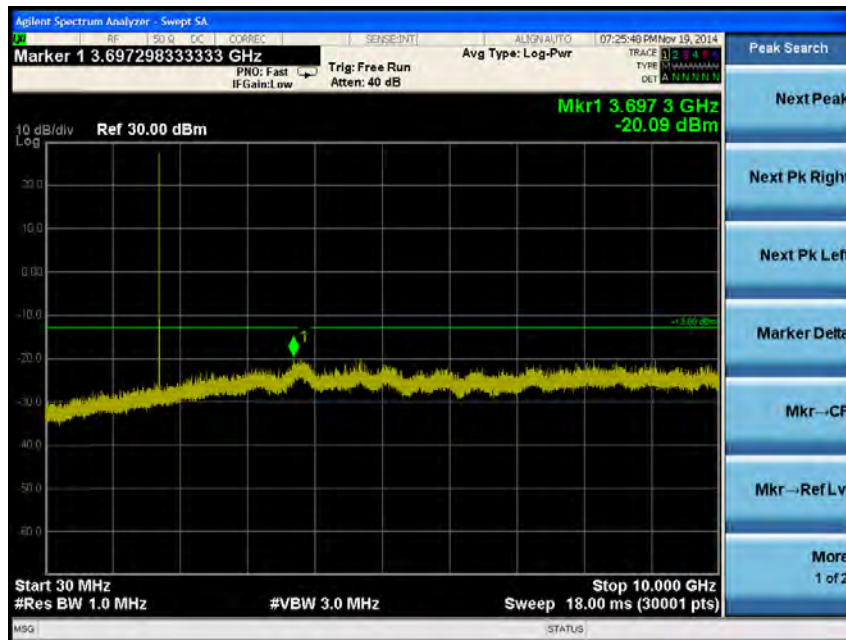
High Channel



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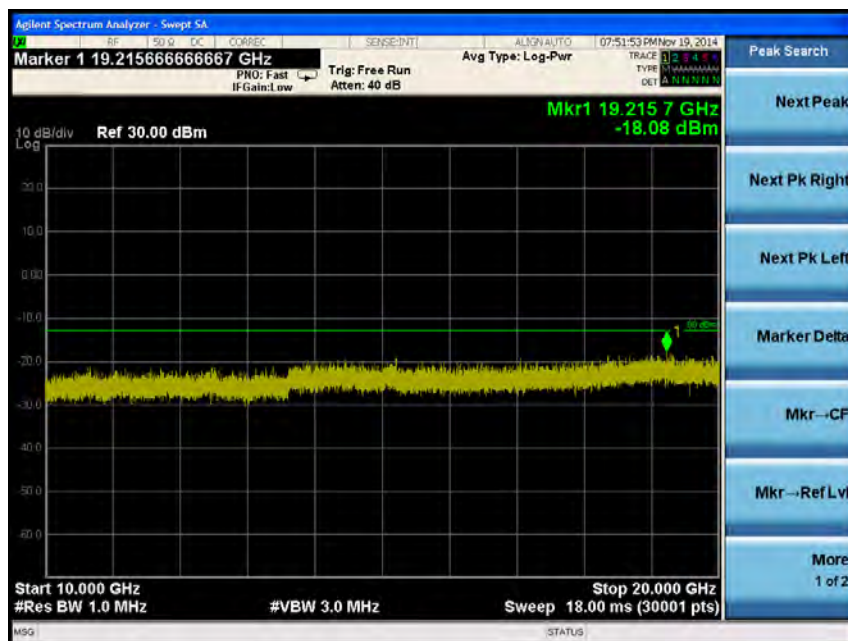
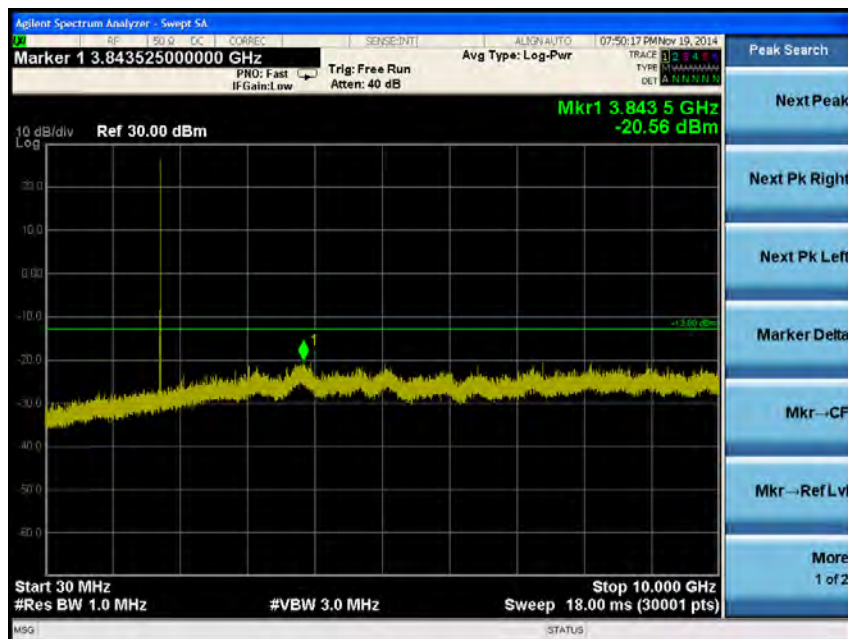
LTE band 4 (10 MHz – QPSK_RB 1_Offset 0)

Low Channel



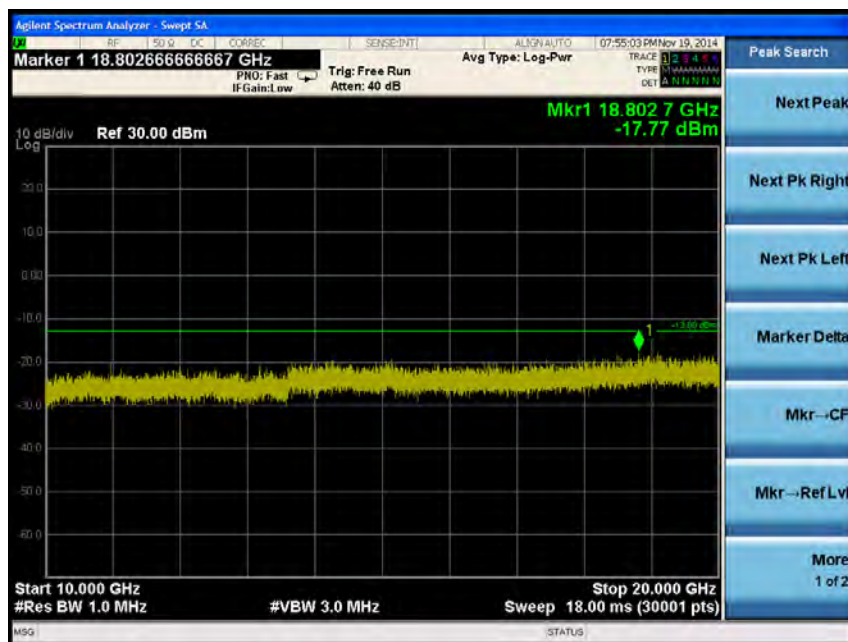
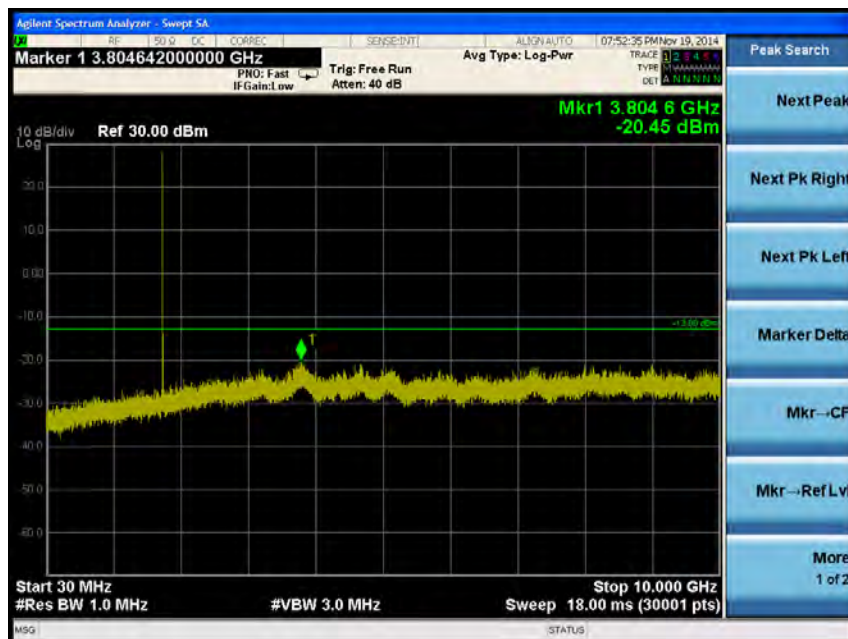
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Middle Channel



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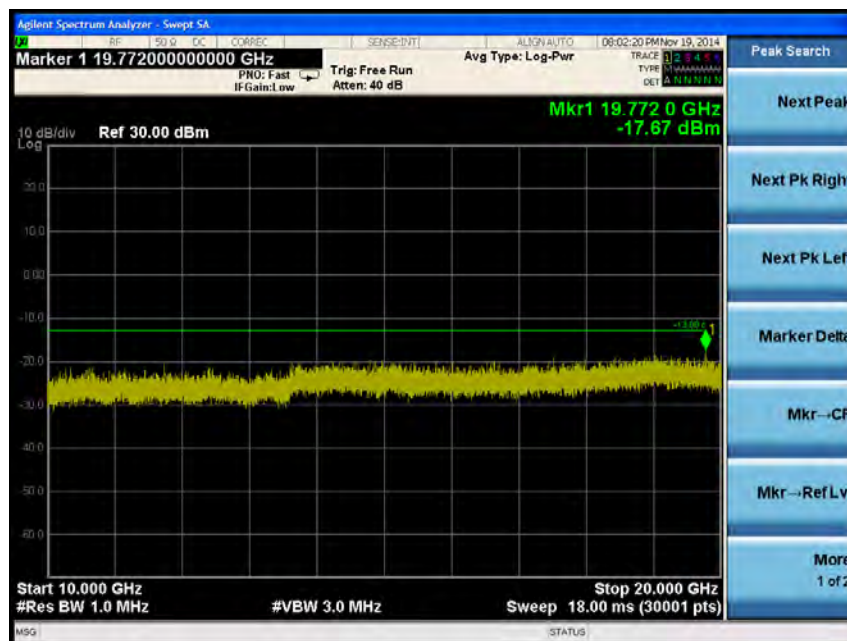
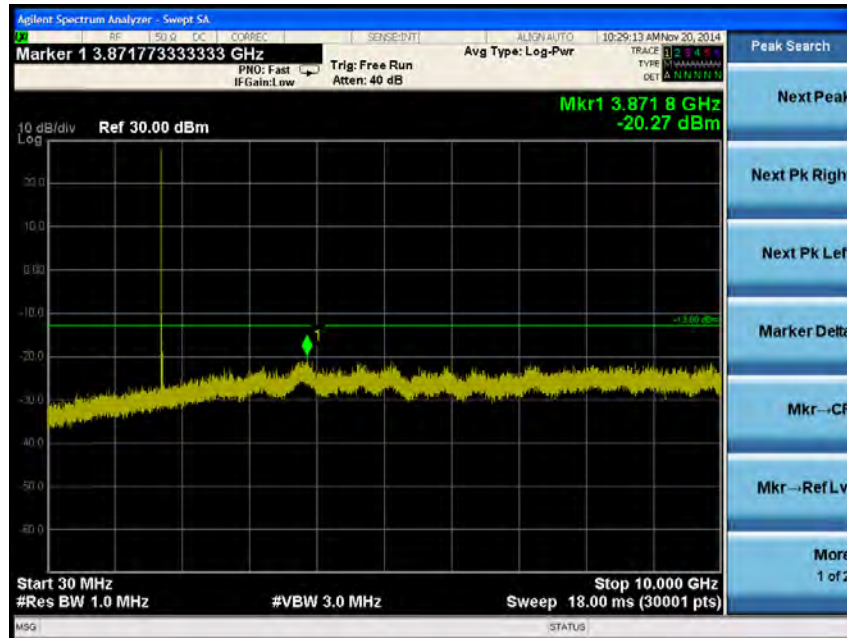
High Channel



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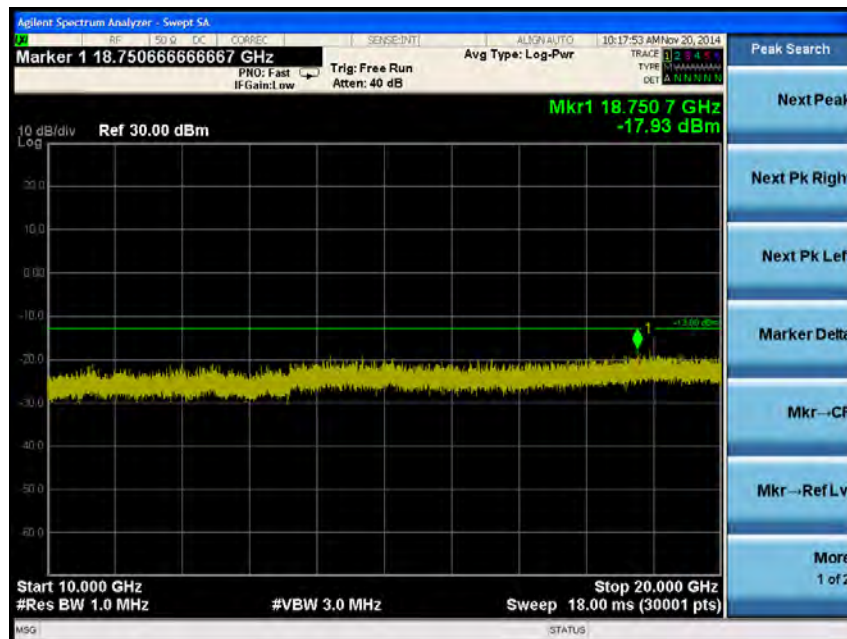
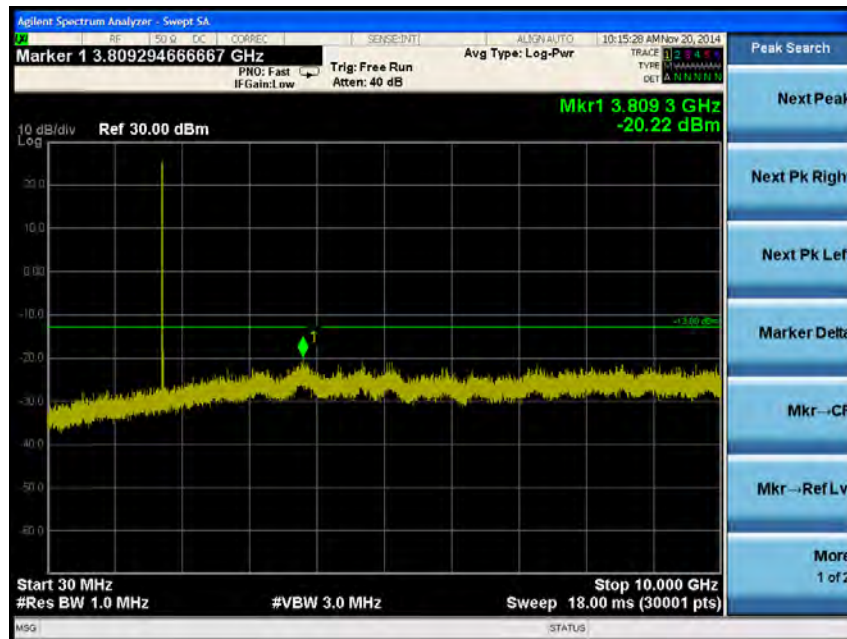
LTE band 4 (15 MHz – QPSK_RB 1_Offset 0)

Low Channel



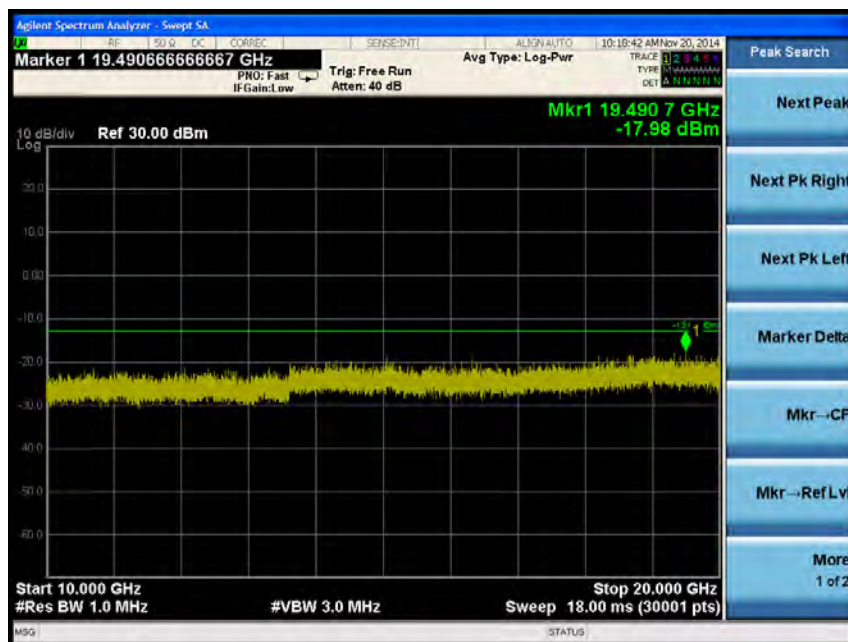
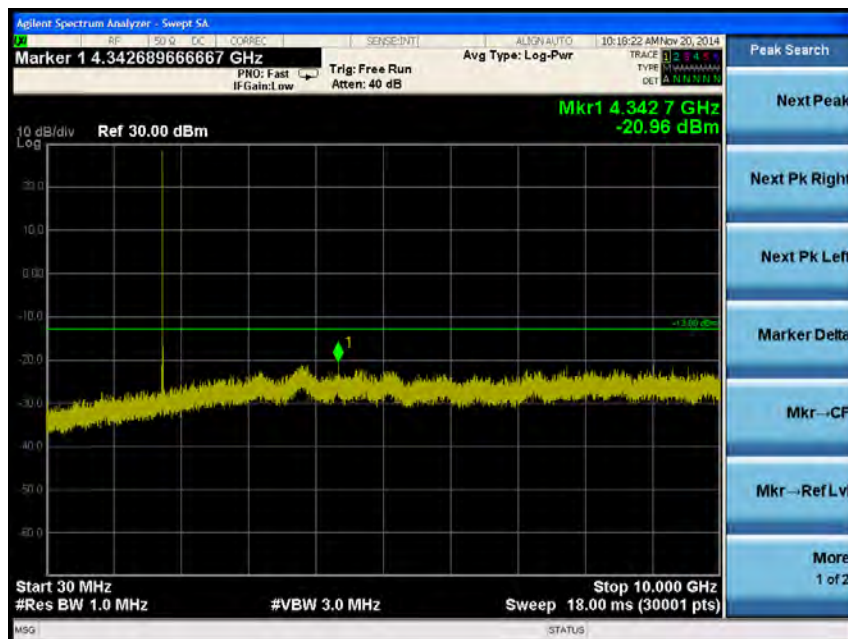
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Middle Channel



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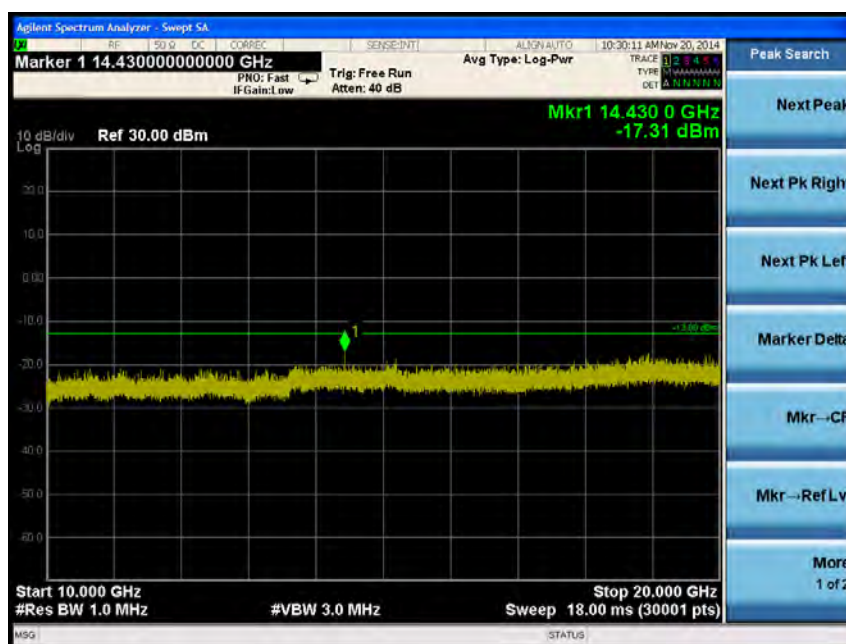
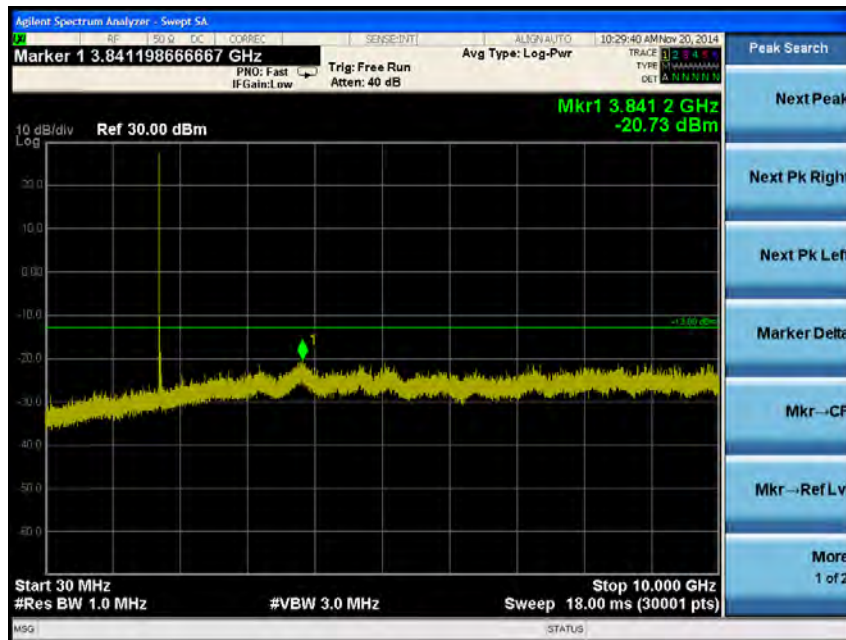
High Channel



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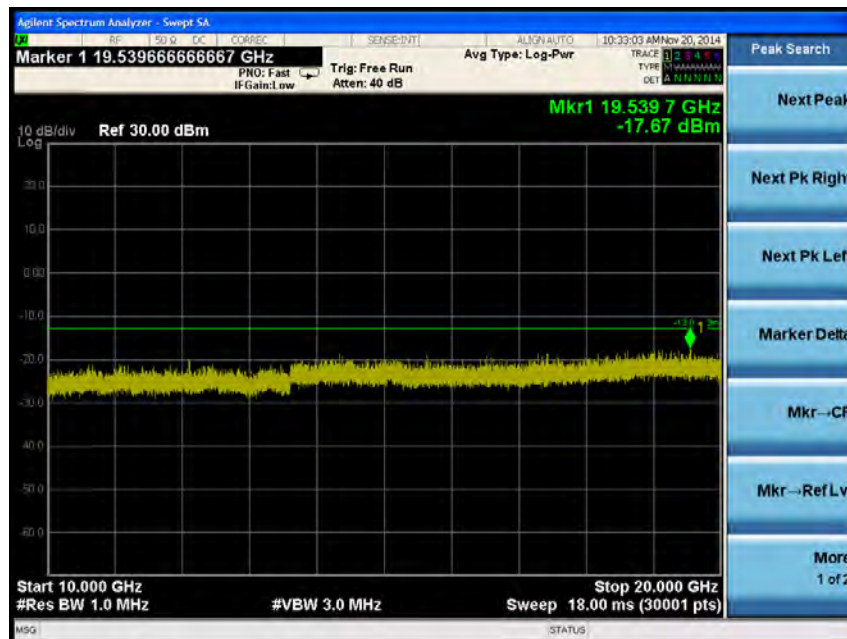
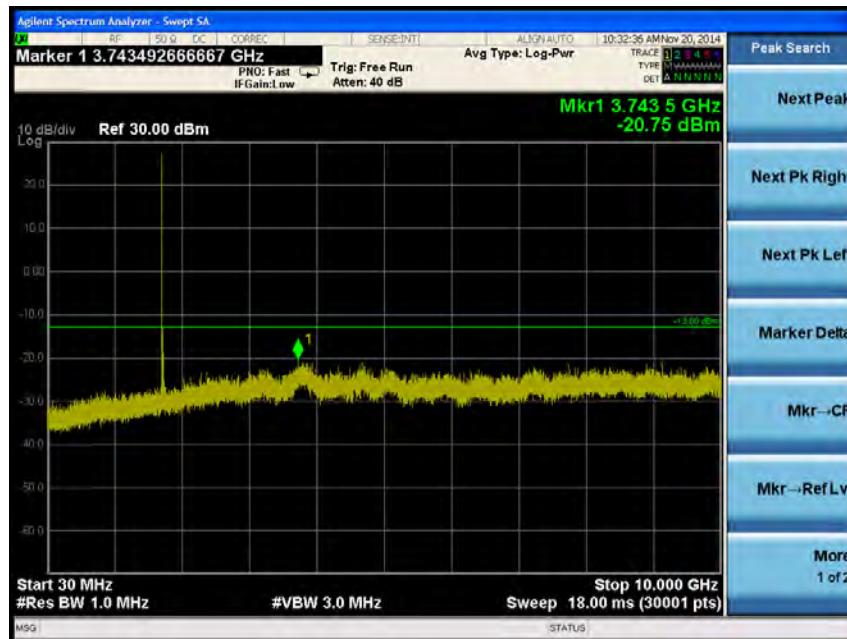
LTE band 4 (20 MHz – QPSK_RB 1_Offset 0)

Low Channel



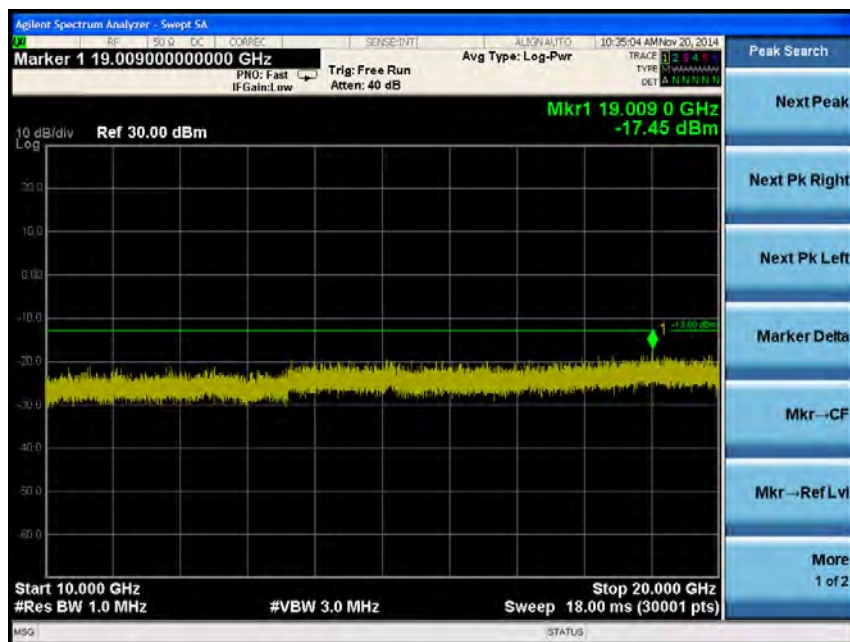
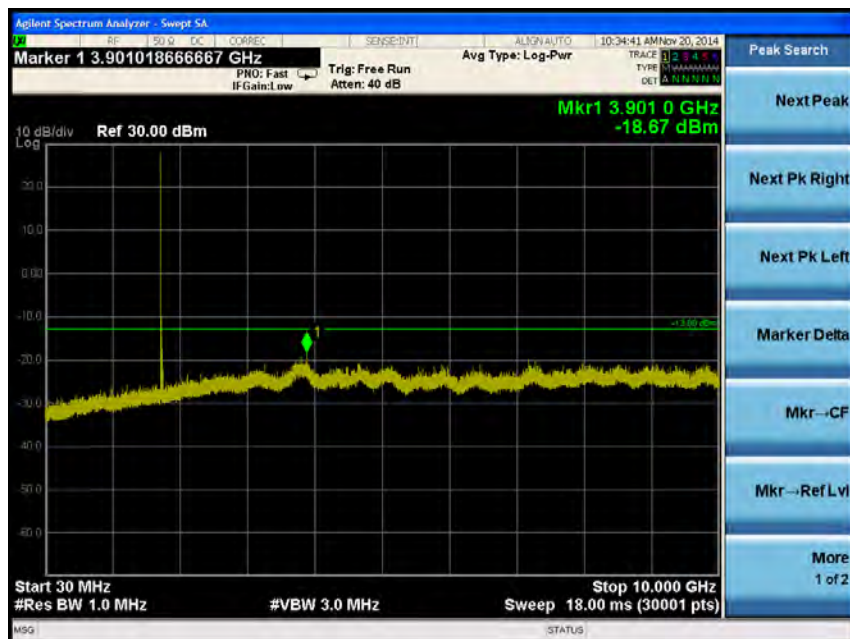
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Middle Channel



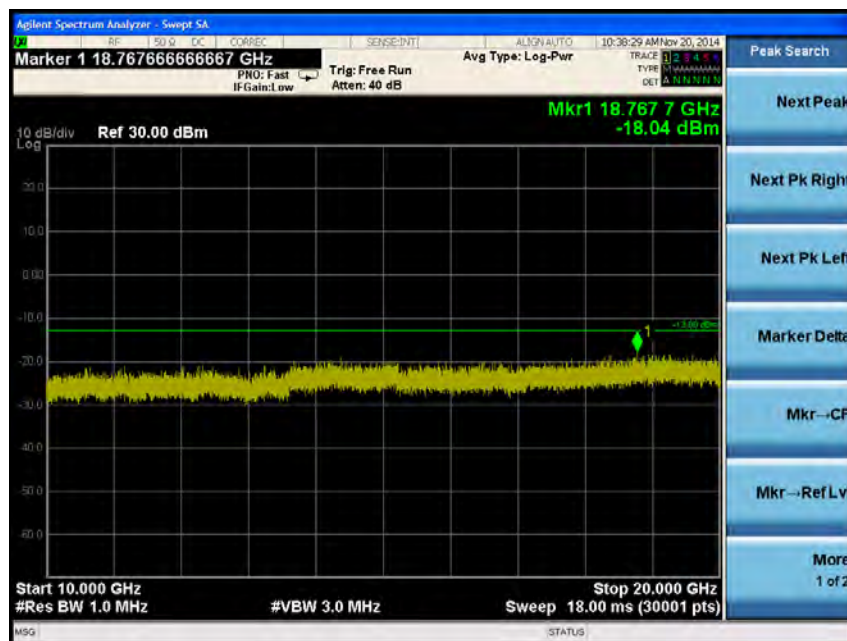
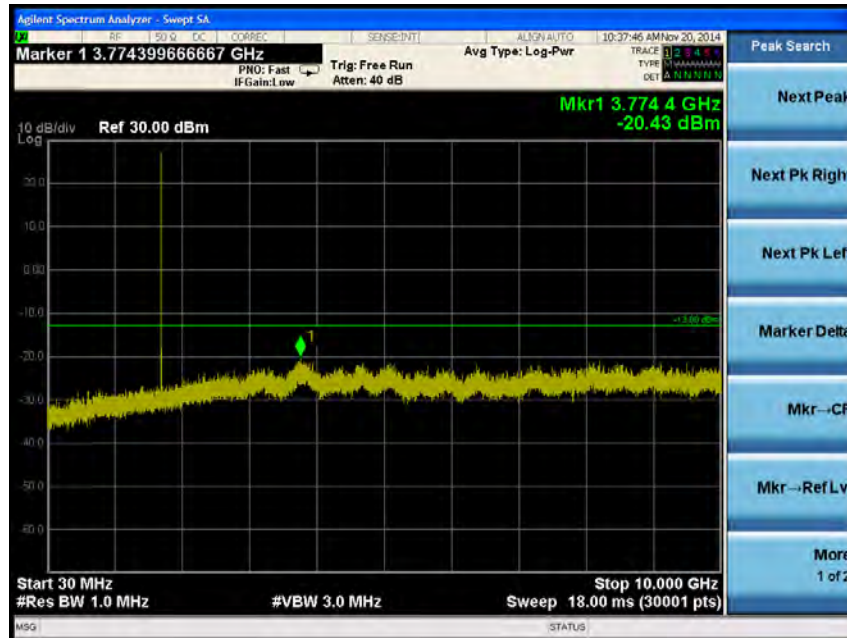
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High Channel



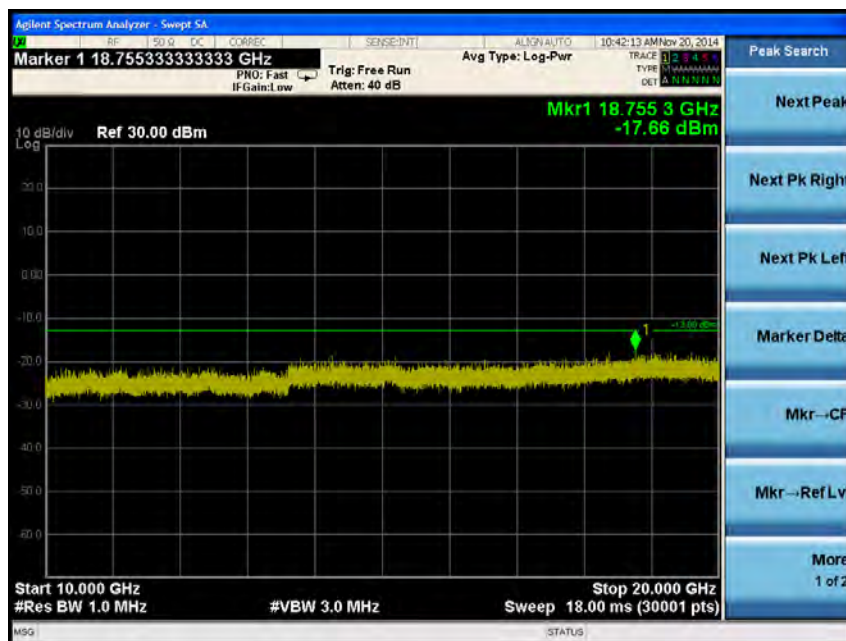
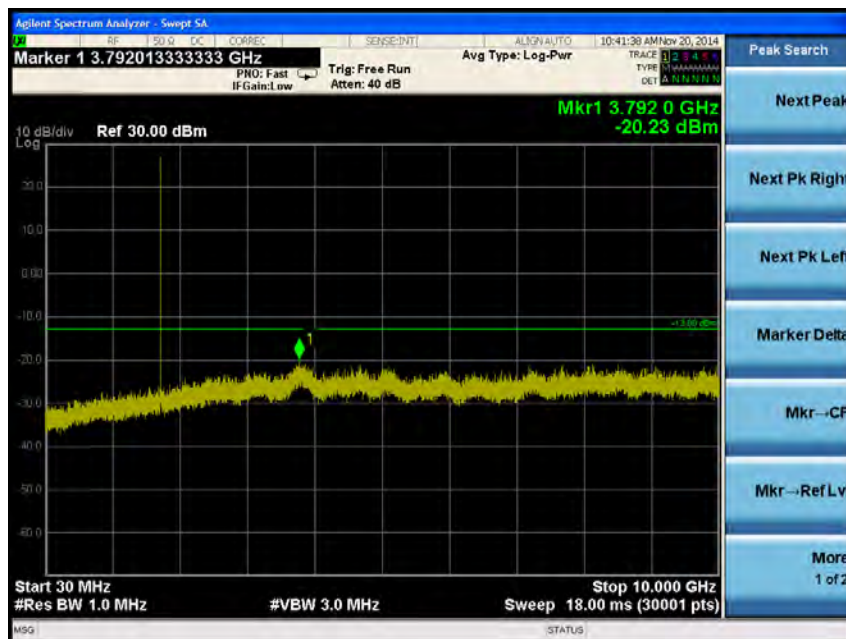
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LTE band 4 (5 MHz – 16QAM_RB 1_Offset 0) Low Channel



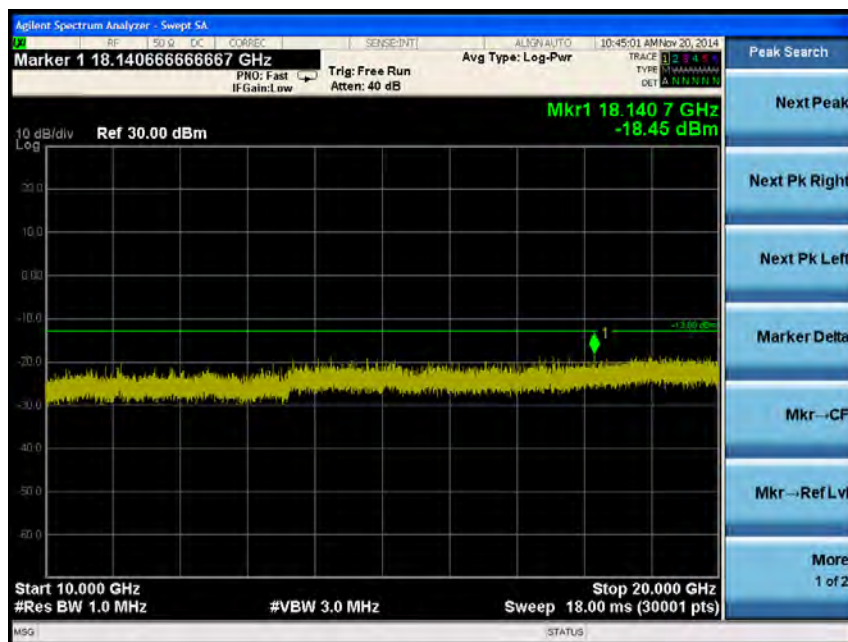
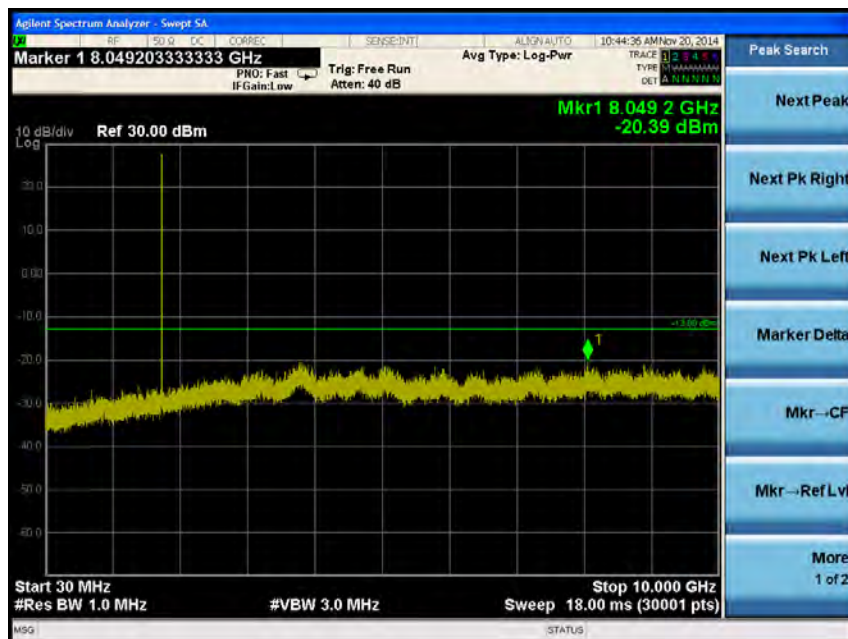
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Middle Channel



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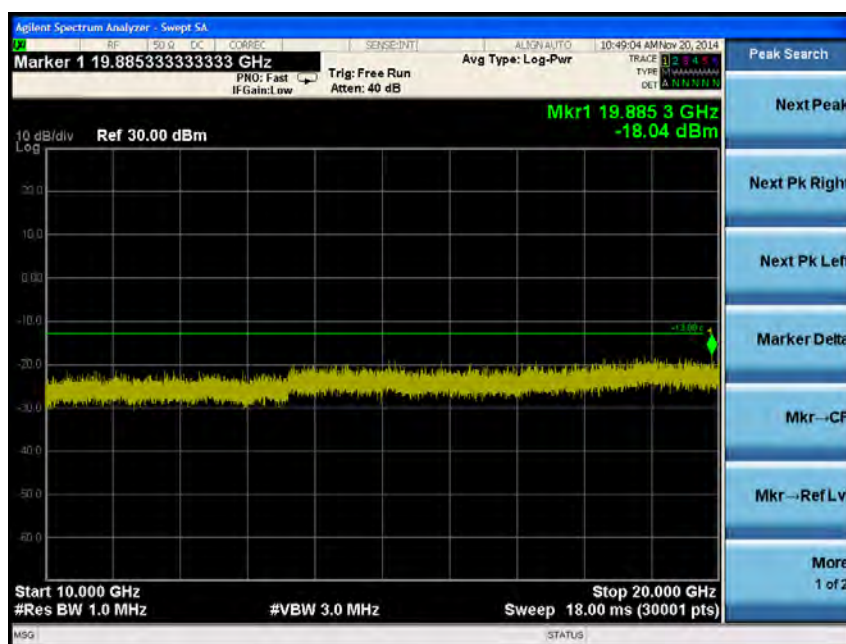
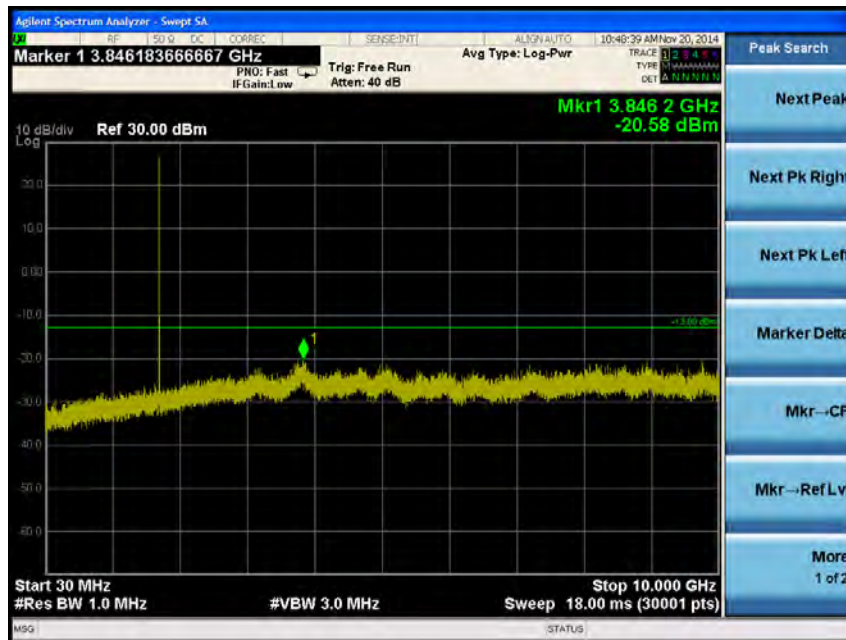
High Channel



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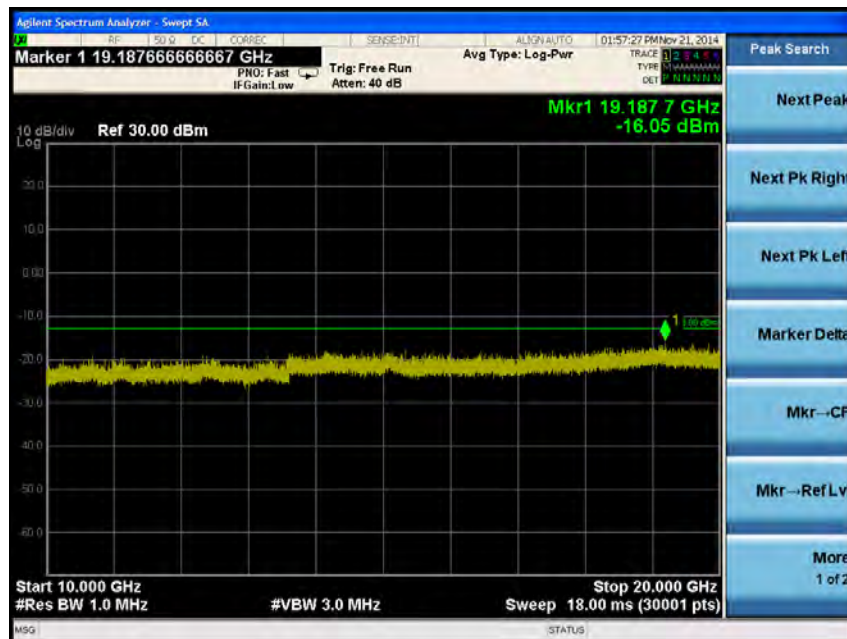
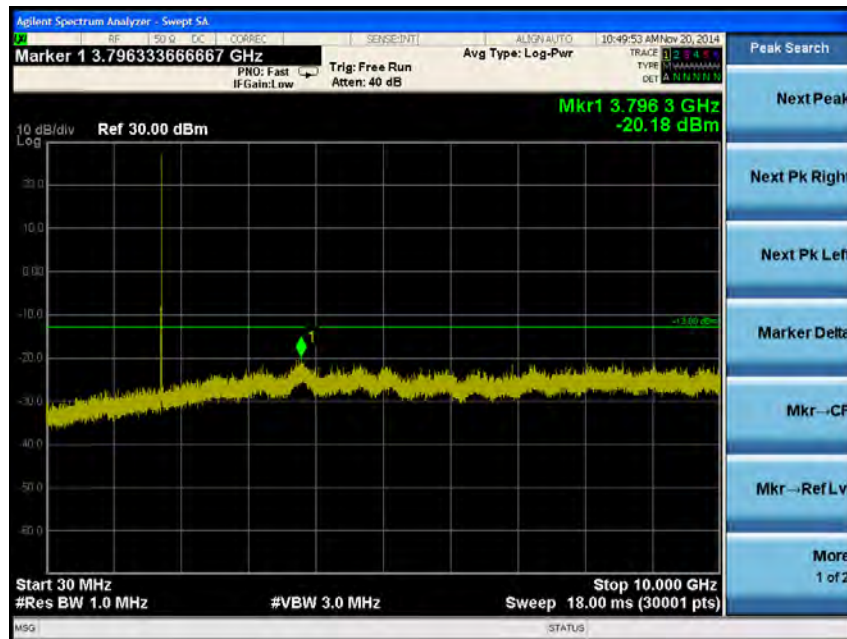
LTE band 4 (10 MHz – 16QAM_RB 1_Offset 0)

Low Channel



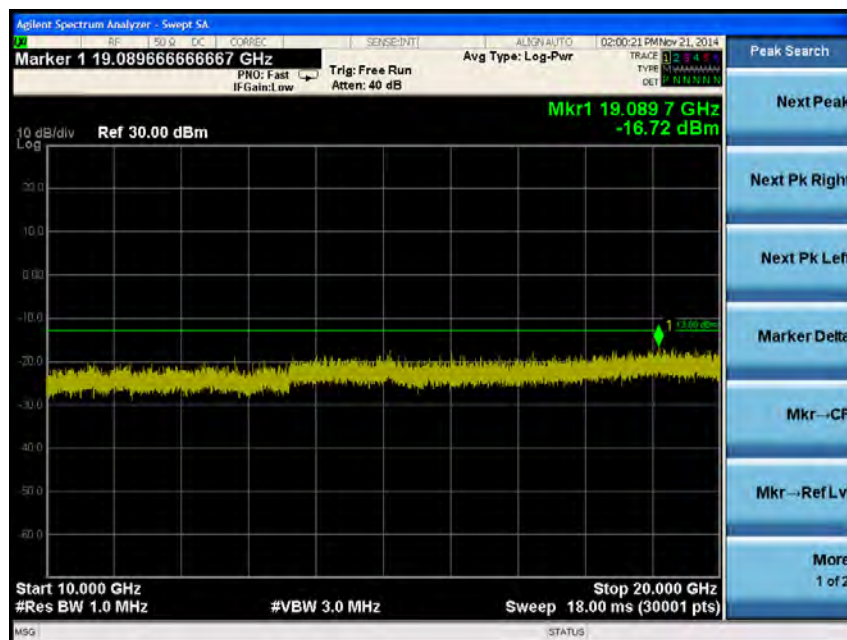
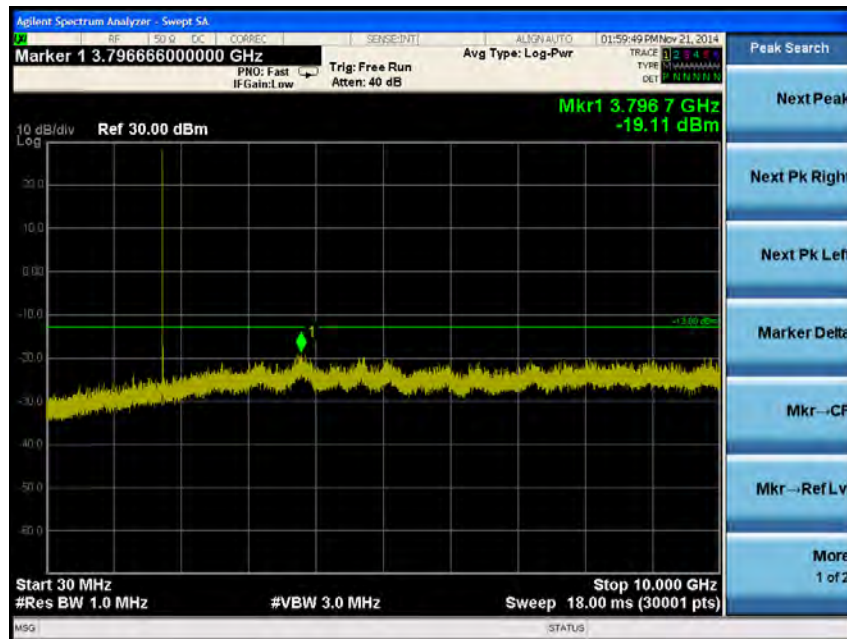
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

Middle Channel



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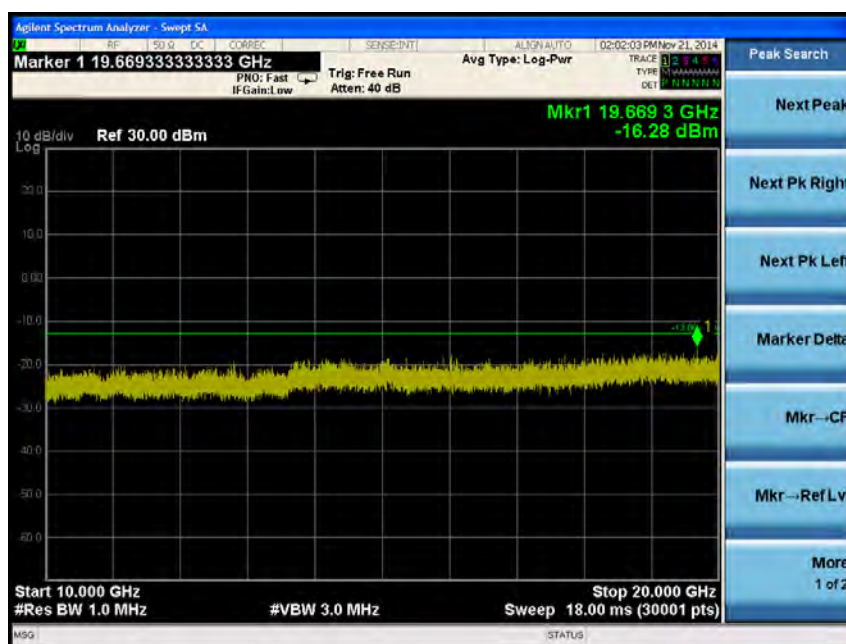
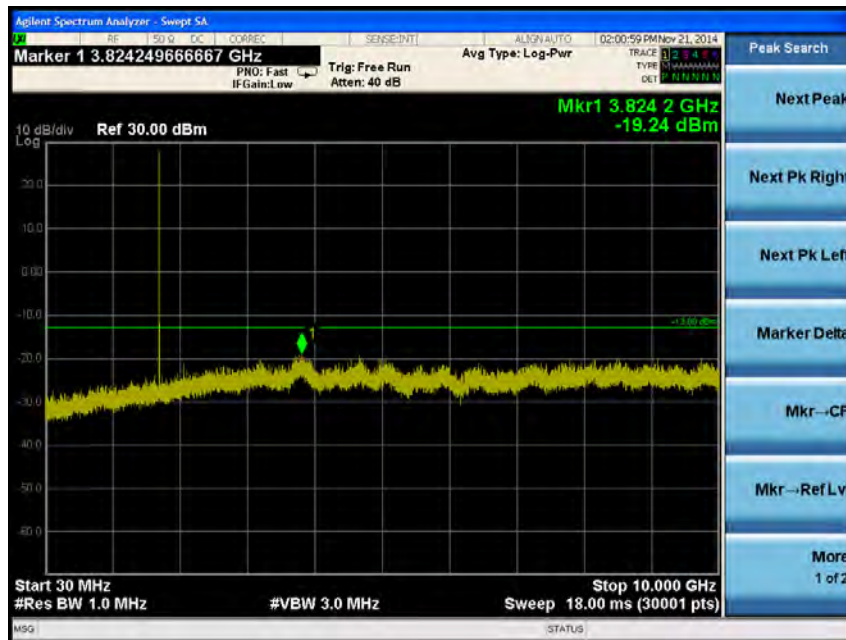
High Channel



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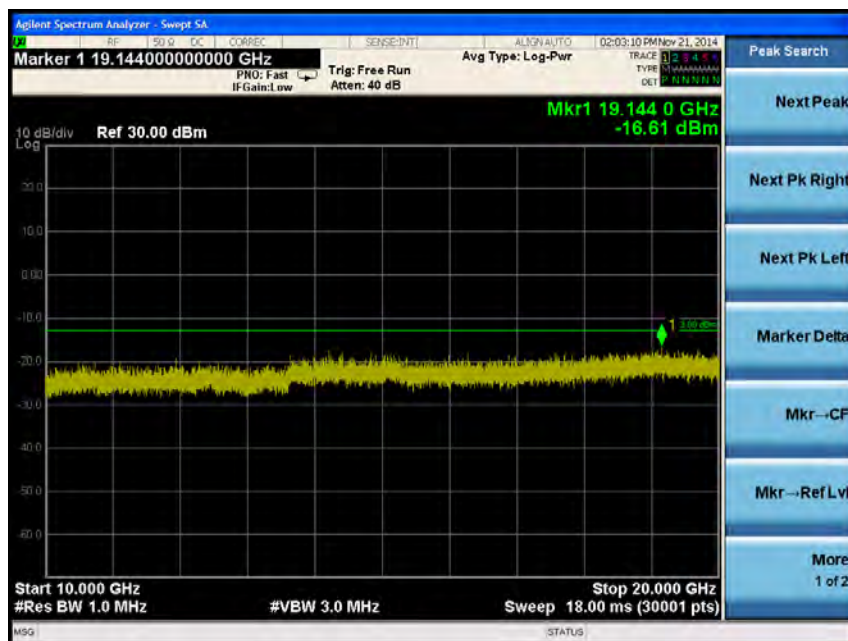
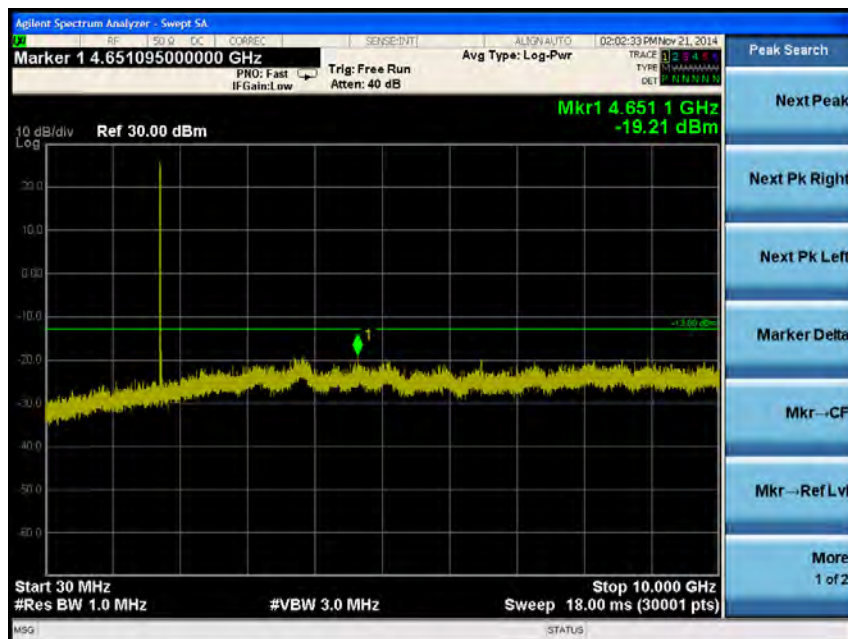
LTE band 4 (15 MHz – 16QAM_RB 1_Offset 0)

Low Channel



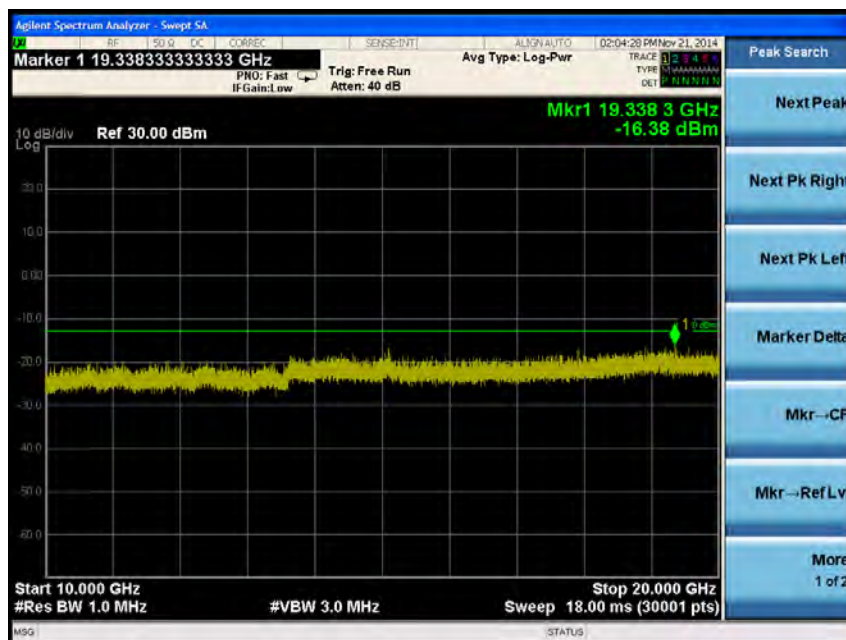
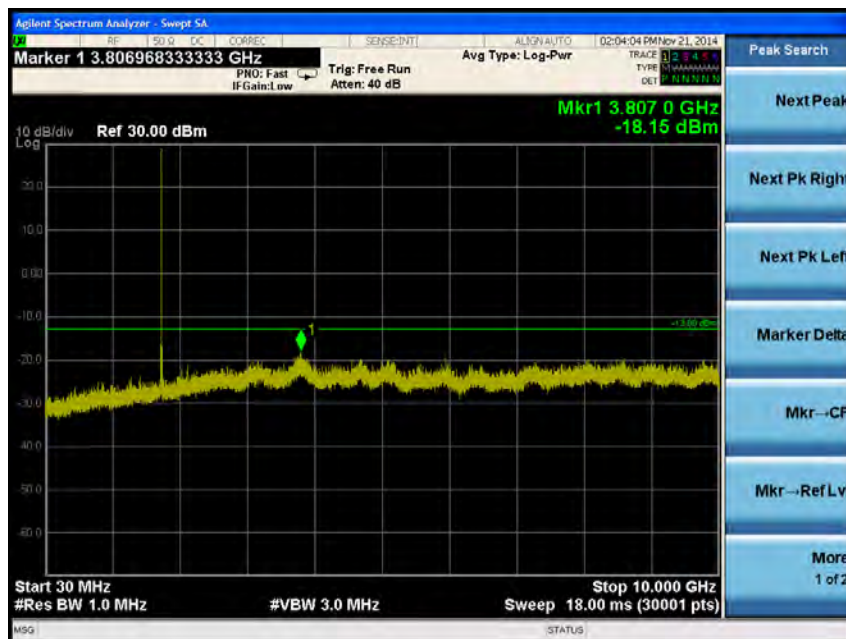
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Middle Channel



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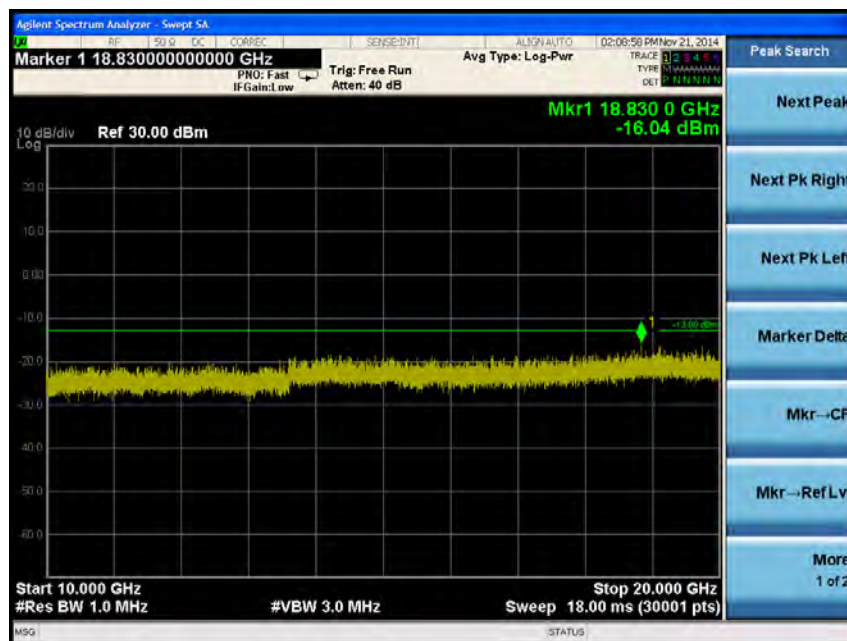
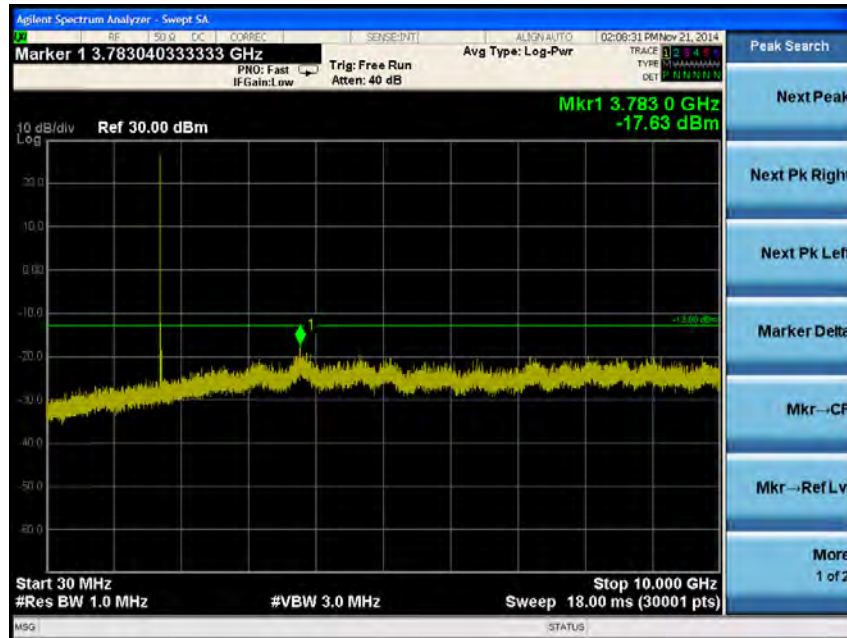
High Channel



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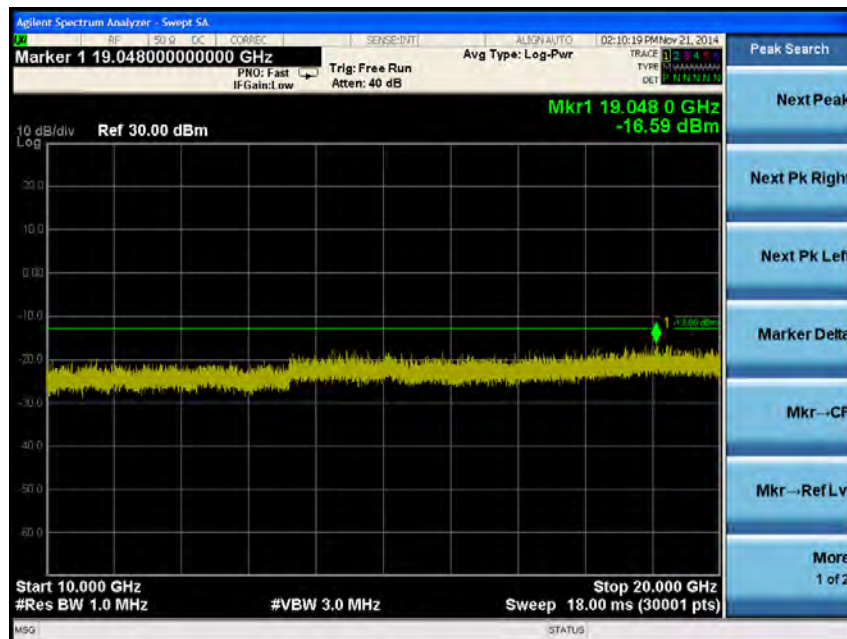
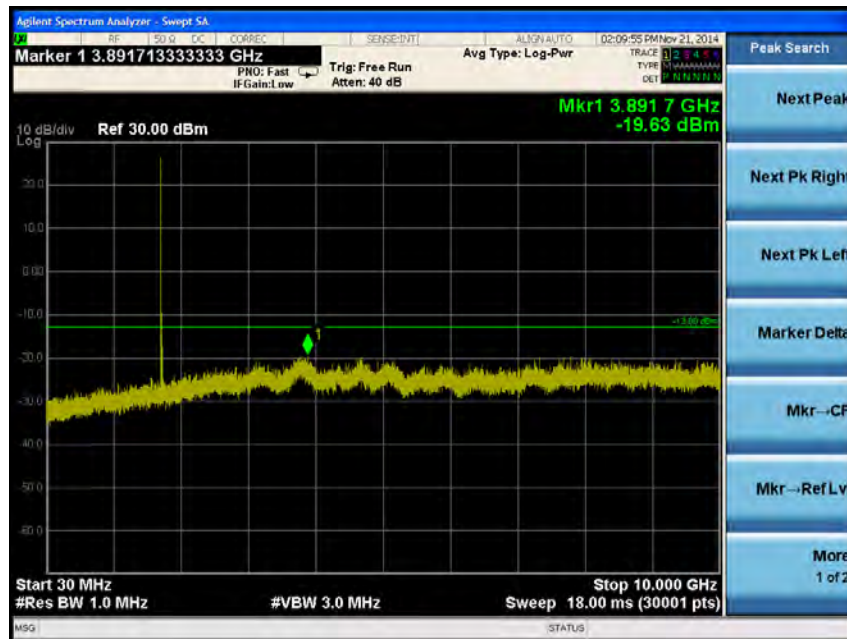
LTE band 4 (20 MHz – 16QAM_RB 1_Offset 0)

Low Channel



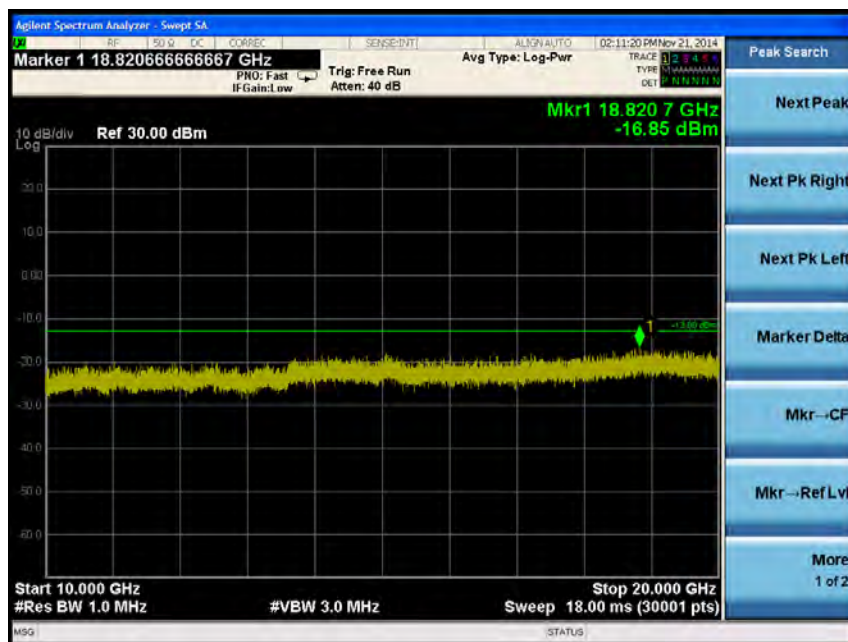
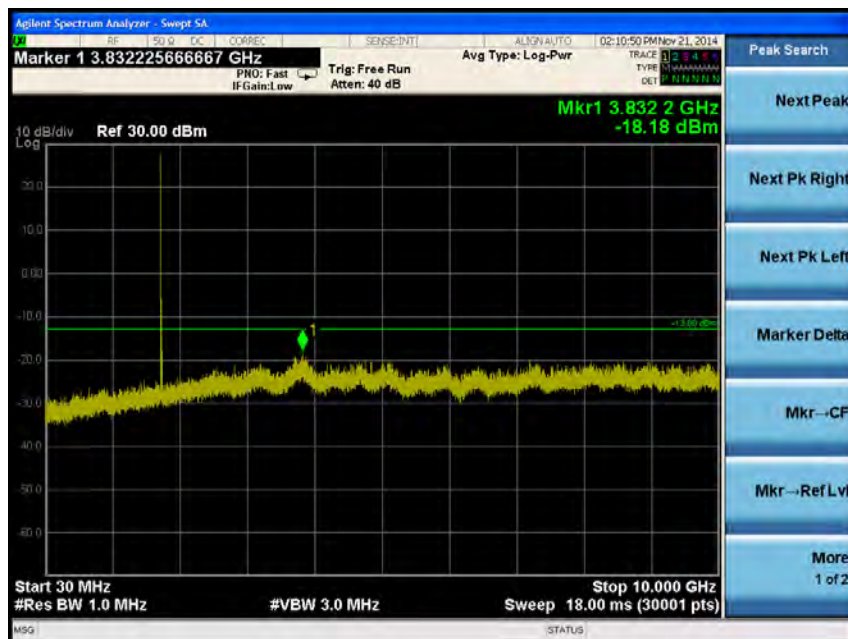
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

Middle Channel



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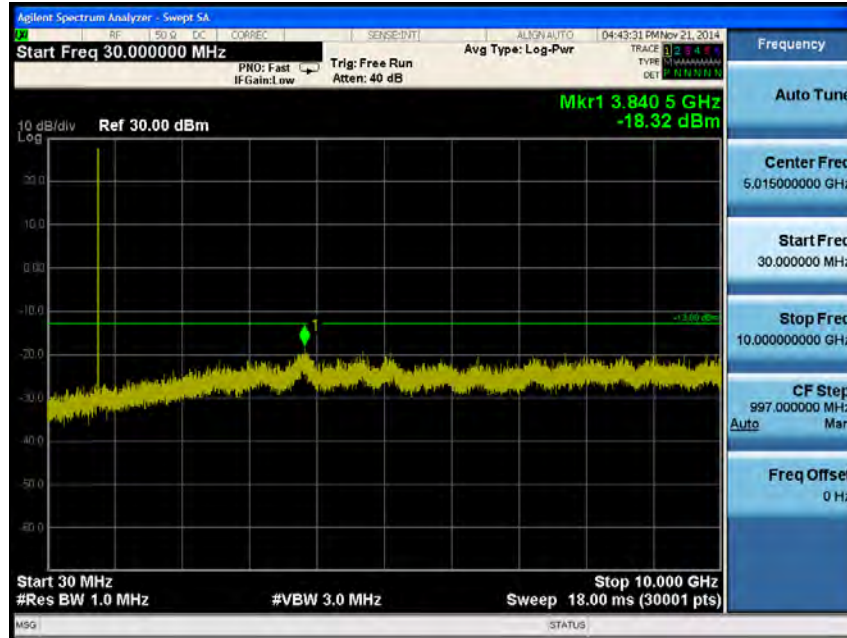
High Channel



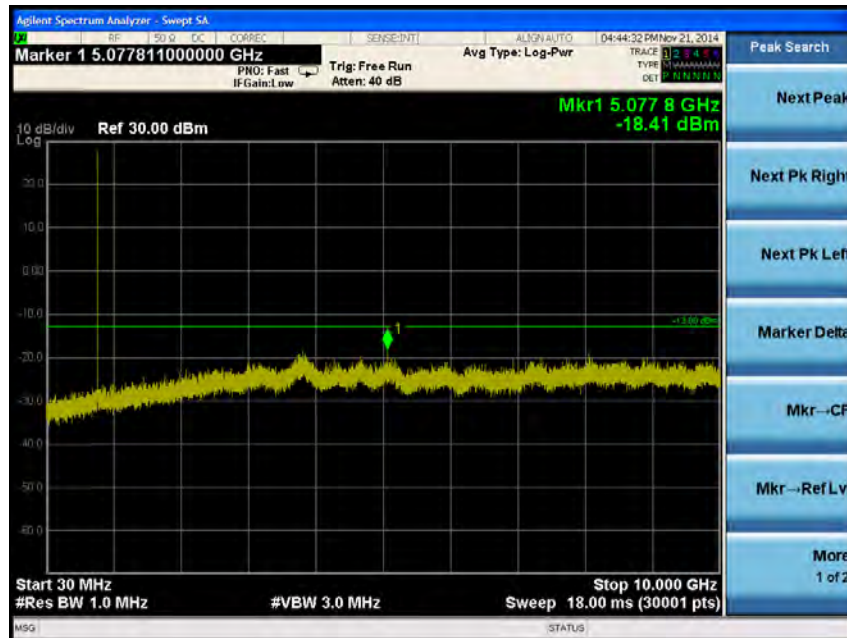
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

LTE band 13 (5 MHz – QPSK_RB 1_Offset 0)

Low Channel

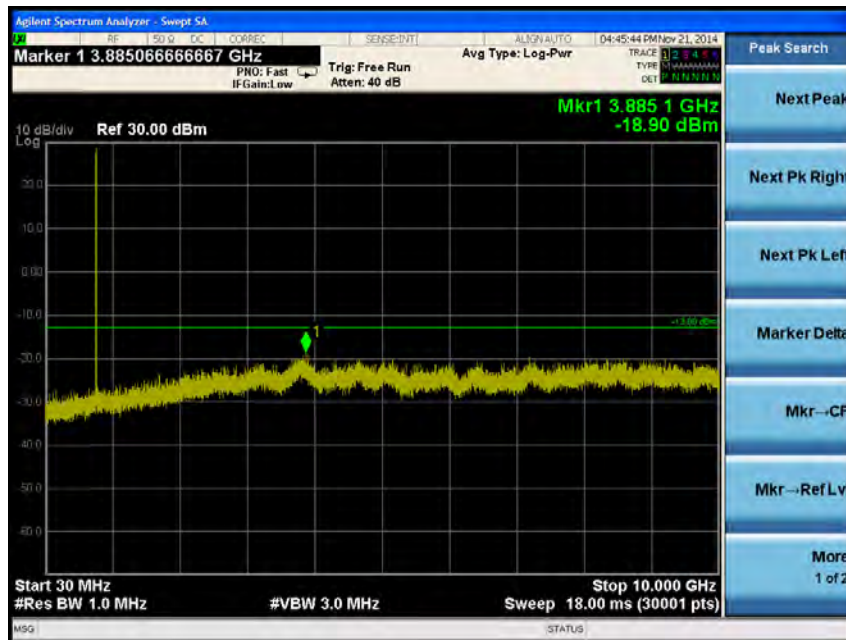


High Channel



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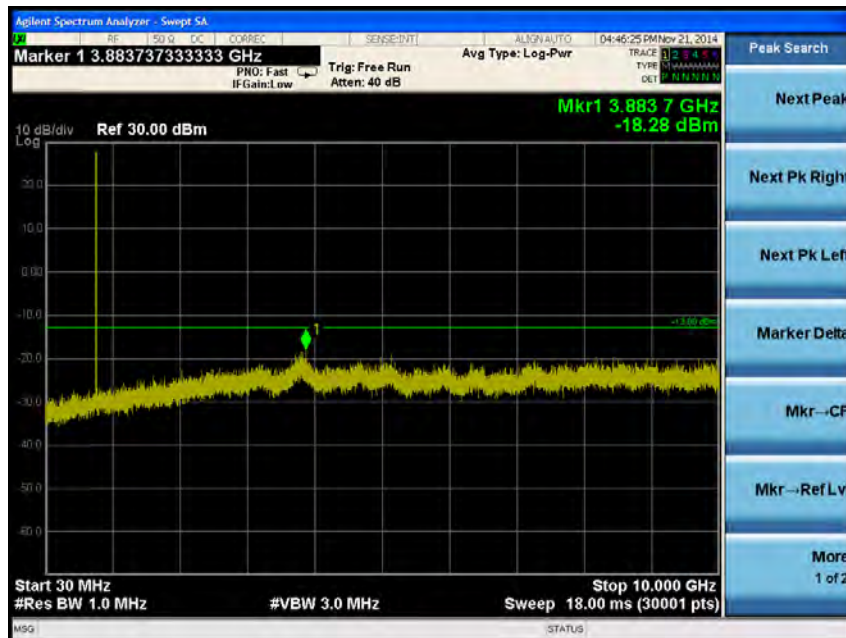
LTE band 13 (10 MHz – QPSK_RB 1_Offset 0)
Middle Channel



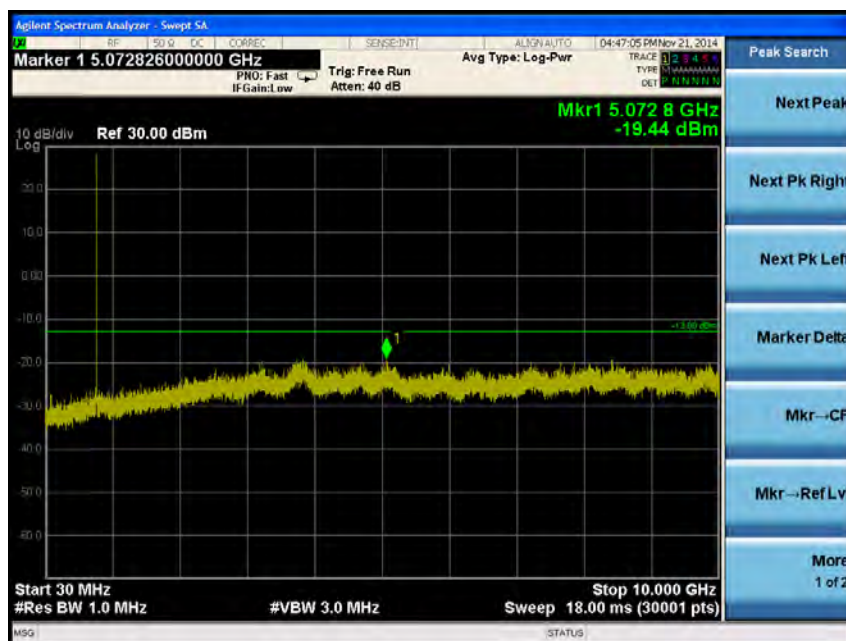
The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

LTE band 13 (5 MHz – 16QAM_RB 1_Offset 0)

Low Channel

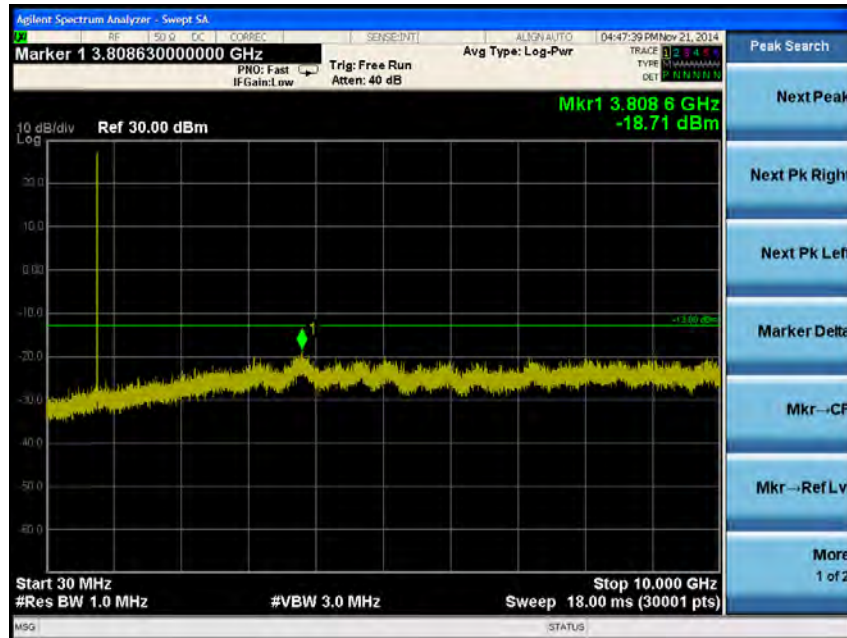


High Channel



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LTE band 4 (10 MHz – 16QAM_RB 1_Offset 0)
Middle Channel



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7. Band Edge

7.1. Limit

FCC §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10\log(P)$ dB.

FCC §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

FCC §27.53(c), For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB.

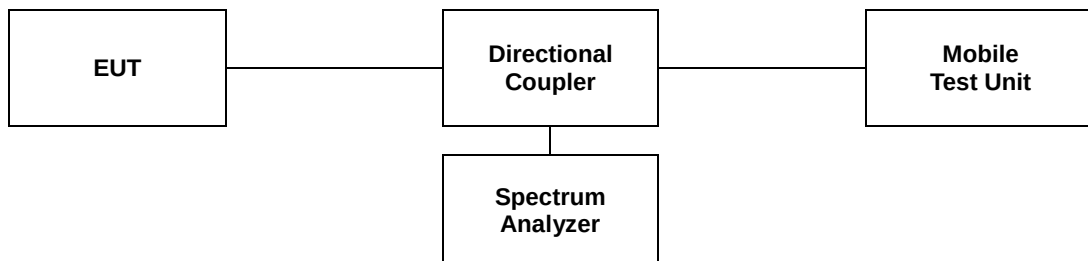
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.

FCC §27.53(h)(1), Except as otherwise specified below, for operations in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz, and 2 180-2 200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

7.2. Test Procedure

The test follows section 6.0 of FCC KDB publication 971168 v02r02.

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot.
2. Span was set large enough so as to capture all out of band emissions near the band edge.
3. RBW $\geq 1\%$ of OBW.
4. VBW $\geq$ RBW.
5. Detector = RMS.
6. Trace mode = max hold.
7. Sweep time = auto couple.
8. The trace was allowed to stabilize.
9. All path loss of frequency range was investigated and compensated to spectrum analyzer as Correction function.



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7.3. Test Results

Ambient temperature : (24 ± 1) °C

Relative humidity : 47 % R.H.

Please refer to the following plots.

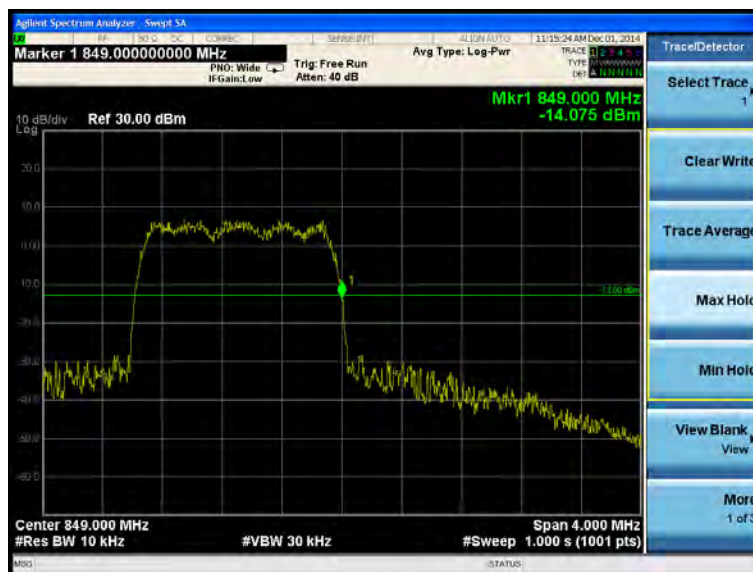
Band edge

CDMA850 1xRTT

Low Channel



High Channel



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CDMA1 900 1xRTT

Low Channel



High Channel



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4 MHz SPAN

CDMA850 1xRTT

Low Channel



High Channel



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CDMA1 900 1xRTT

Low Channel



High Channel



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Band edge

CDMA850 1xEV-DO

Low Channel



High Channel



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CDMA1 900 1xEV-DO

Low Channel



High Channel



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4 MHz SPAN

CDMA850 1xEV-DO

Low Channel



High Channel



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CDMA1 900 1xEV-DO

Low Channel



High Channel



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Band edge

LTE band 4 (5 MHz – QPSK_RB 25)

Low Channel



High Channel



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Band edge

LTE band 4 (10 MHz – QPSK_RB 50)

Low Channel



High Channel



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Band edge

LTE band 4 (15 MHz – QPSK_RB 75)

Low Channel



High Channel



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Band edge

LTE band 4 (20 MHz – QPSK_RB 100)

Low Channel



High Channel



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Band edge

LTE band 4 (5 MHz – 16QAM_RB 25)

Low Channel



High Channel



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Band edge

LTE band 4 (10 MHz – 16QAM_RB 50)

Low Channel



High Channel



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Band edge

LTE band 4 (15 MHz – 16QAM_RB 75)

Low Channel



High Channel



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Band edge

LTE band 4 (20 MHz – 16QAM_RB 100)

Low Channel



High Channel



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Band edge

LTE band 13 (5 MHz – QPSK_RB 25)

Low Channel



High Channel



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LTE band 13 (10 MHz – QPSK_RB 50)

Middle Channel

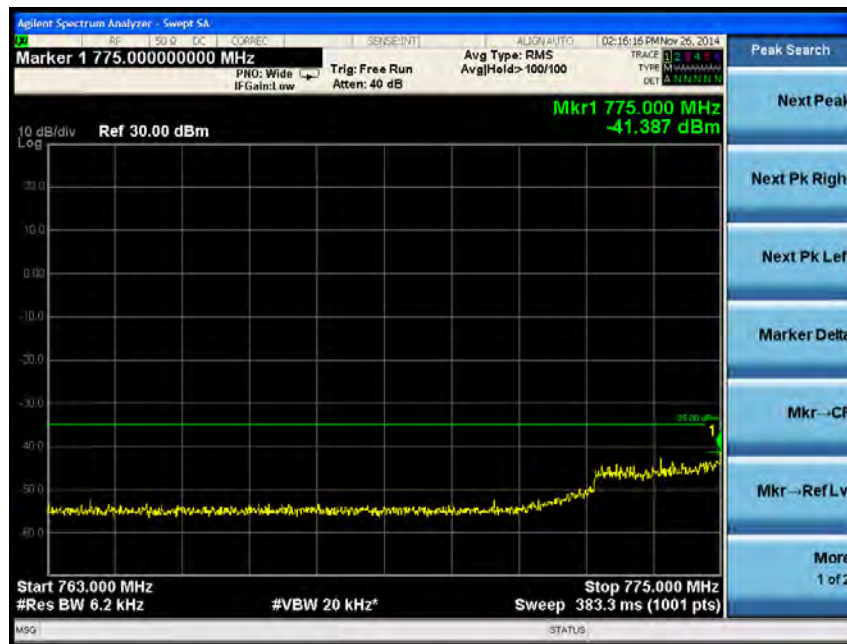


The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.

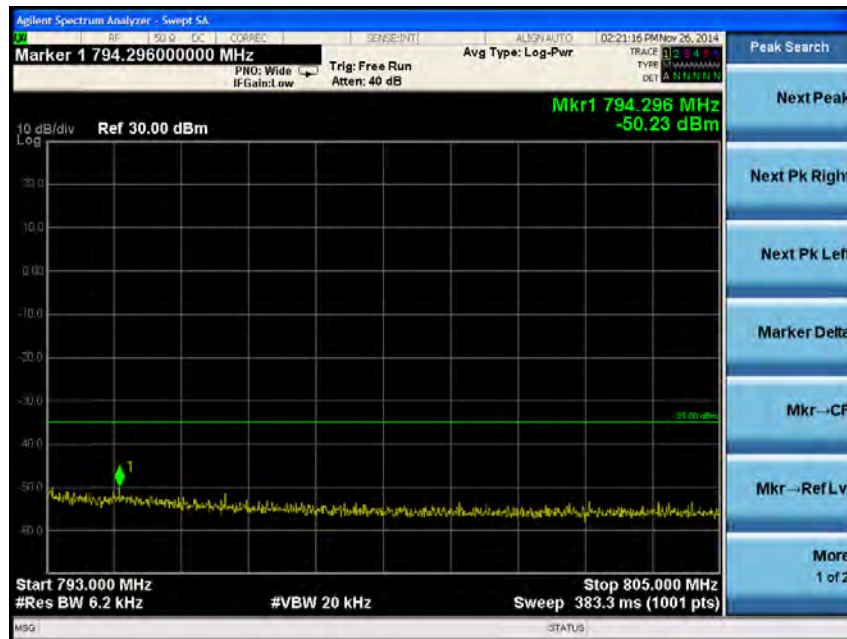
12 MHz SPAN

LTE band 13 (5 MHz – QPSK_RB 25)

Low Channel



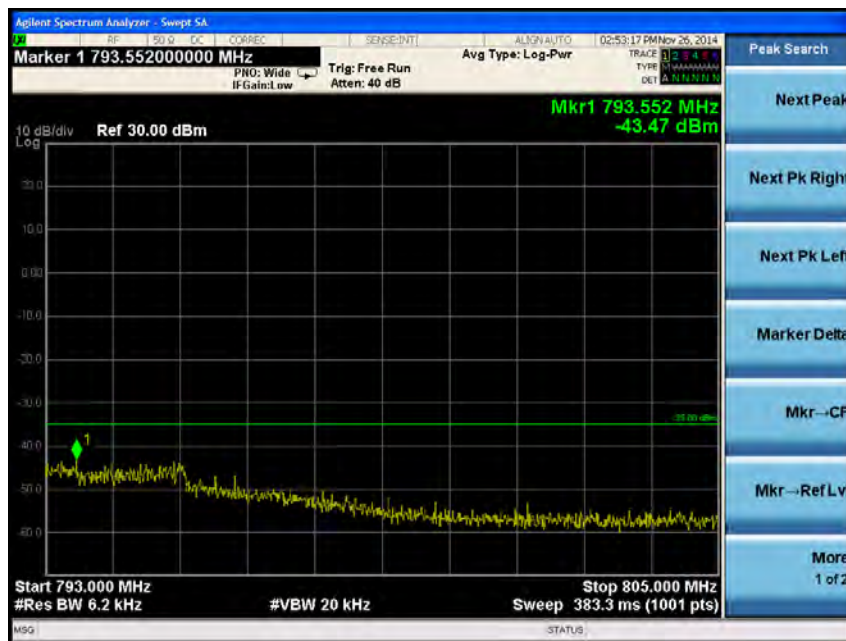
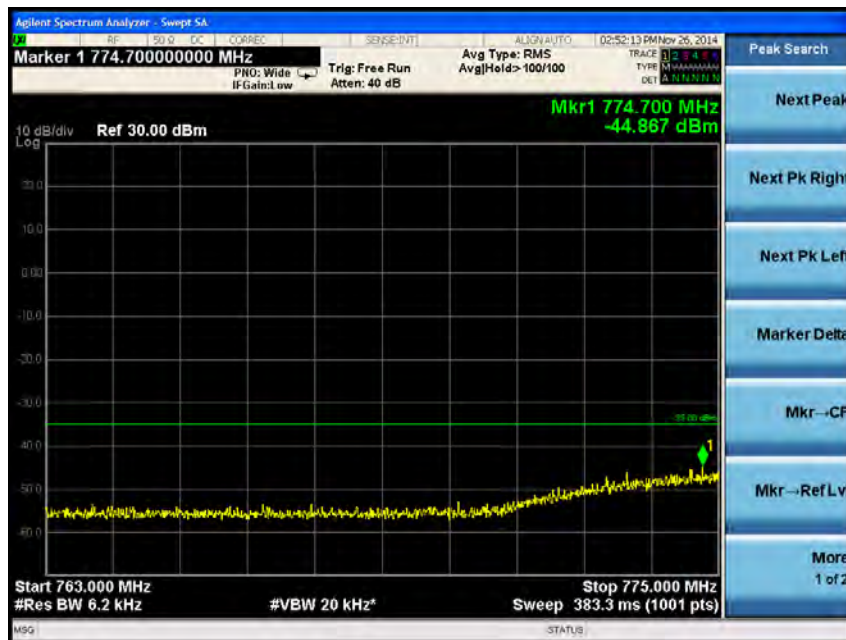
High Channel



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LTE band 13 (10 MHz – QPSK_RB 50)

Middle Channel



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Band edge

LTE band 13 (5 MHz – 16QAM_RB 25)

Low Channel



High Channel



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LTE band 13 (10 MHz – 16QAM_RB 50)

Middle Channel

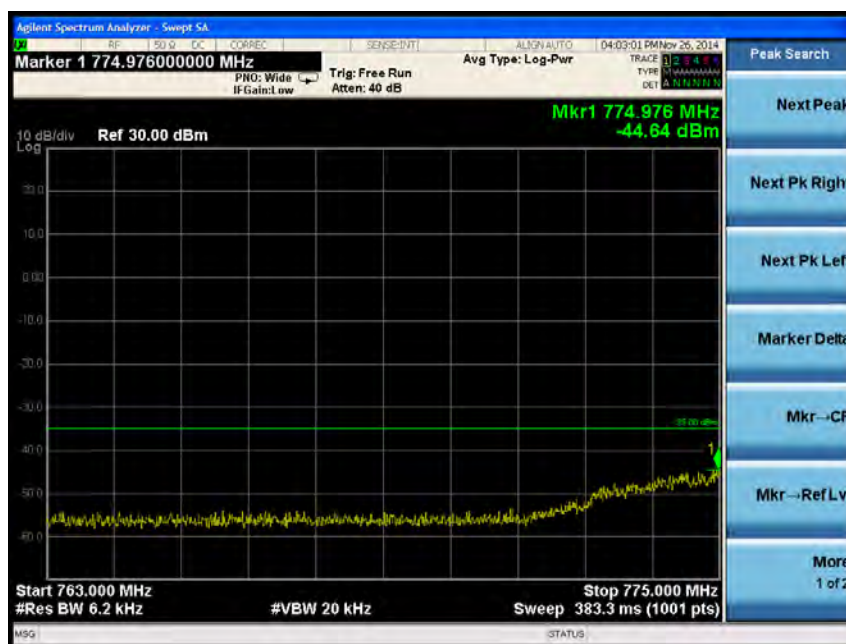


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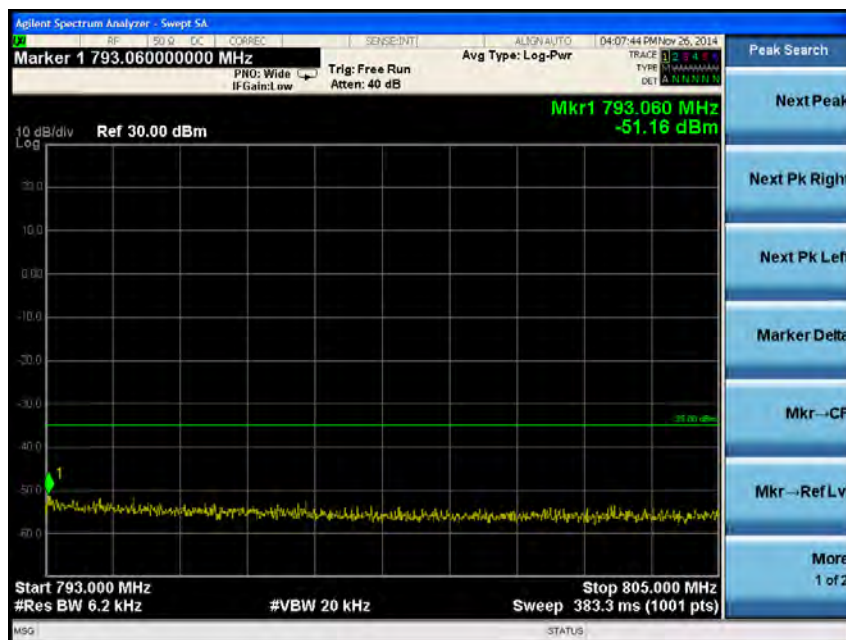
12 MHz SPAN

LTE band 13 (5 MHz – 16QAM_RB 25)

Low Channel



High Channel



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SGS Korea Co., Ltd. (Gunpo Laboratory)

4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 435-040

<http://www.sgsgroup.kr>

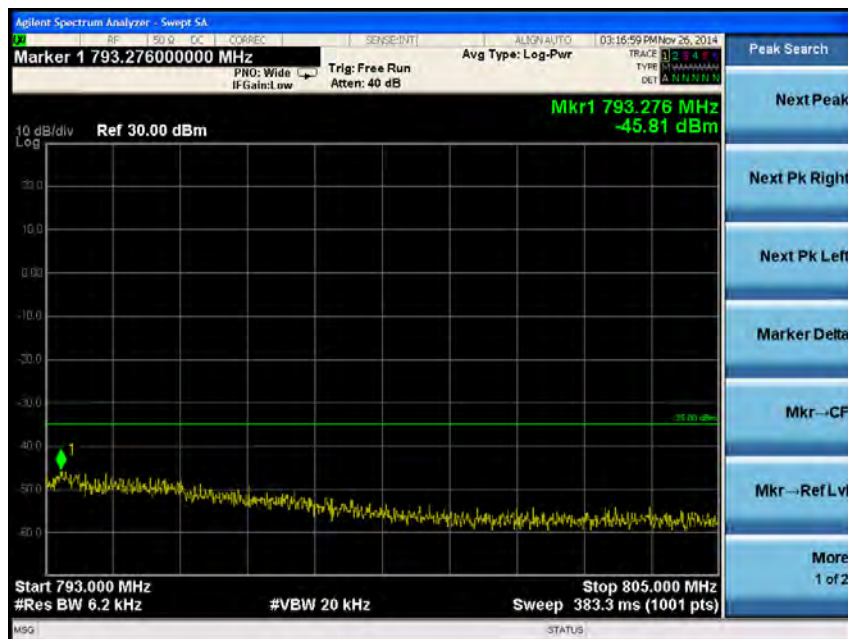
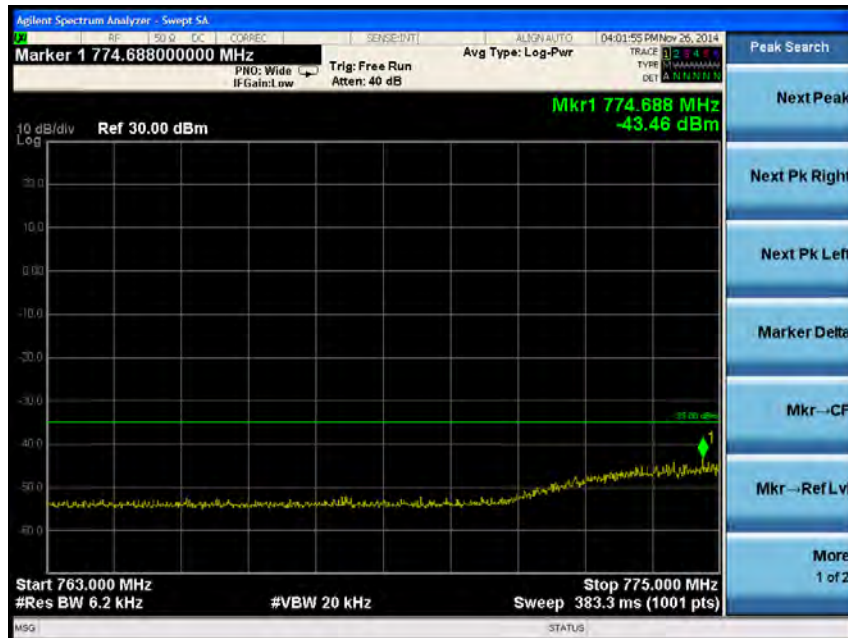
RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

LTE band 13 (10 MHz – 16QAM_RB 50)

Middle Channel



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8. Frequency Stability

8.1. Limit

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

FCC §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.

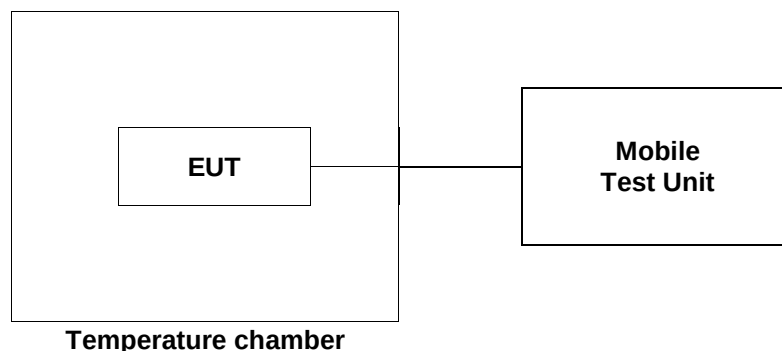
For Mobile devices operating in the 824 to 849 MHz band at a power level less than or equal to 3 Watts, the limit specified in Table C-1 is +/- 2.5 ppm.

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

FCC §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 : (24 ± 1) °C

Relative humidity : 47 % R.H.

CDMA850 mode at middle channel

Reference Frequency: 836.52 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V _{dc})	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
-30	14.4	10	0.010 759
-20		-14	-0.017 931
-10		-15	-0.019 127
0		15	0.016 736
10		-11	-0.014 345
24		1	Ref.
30		6	0.005 977
40		-12	-0.015 541
50		9	0.009 563
Frequency Stability versus power Supply			
Environment Temperature (°C)	Power Supplied (V _{dc})	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
24	16.56 (+15 %)	14	0.015 541
	12.24 (-15 %)	-1	-0.002 391

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CDMA1 900 mode at middle channel

Reference Frequency: 1 880.0 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V _{dc})	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
-30	14.4	18	0.011 702
-20		10	0.007 447
-10		-8	-0.002 128
0		13	0.009 043
10		-13	-0.004 787
24		-4	Ref.
30		-9	-0.002 660
40		1	0.002 660
50		3	0.003 723
Frequency Stability versus power Supply			
Environment Temperature (°C)	Power Supplied (V _{dc})	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
24	16.56 (+15 %)	-1	0.001 596
	12.24 (-15 %)	-2	0.001 064

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LTE band 4 at middle channel

Reference Frequency: 1 732.5 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V _{dc})	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
-30	14.4	2	0.004 040
-20		1	0.003 463
-10		-7	-0.001 154
0		-9	-0.002 309
10		-7	-0.001 154
24		-5	Ref.
30		1	0.003 463
40		-11	-0.003 463
50		-6	-0.000 577
Frequency Stability versus Power Supply			
Environment Temperature (°C)	Power Supplied (V _{dc})	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
24	16.56 (+15 %)	-13	-0.004 618
	12.24 (-15 %)	-7	-0.001 154

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LTE band 13 at middle channel

Reference Frequency: 782.0 MHz			
Frequency Stability versus Temperature			
Environment Temperature (°C)	Power Supplied (V _{dc})	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
-30	14.4	10	0.026 854
-20		13	0.030 691
-10		-15	-0.005 115
0		-5	0.007 673
10		-5	0.007 673
24		-11	Ref.
30		-25	-0.017 903
40		-18	-0.008 951
50		-17	-0.007 673
Frequency Stability versus Power Supply			
Environment Temperature (°C)	Power Supplied (V _{dc})	Frequency Measure with Time Elapse	
		Frequency Error (Hz)	ppm
24	16.56 (+15 %)	-16	-0.006 394
	12.24 (-15 %)	-7	0.005 115

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