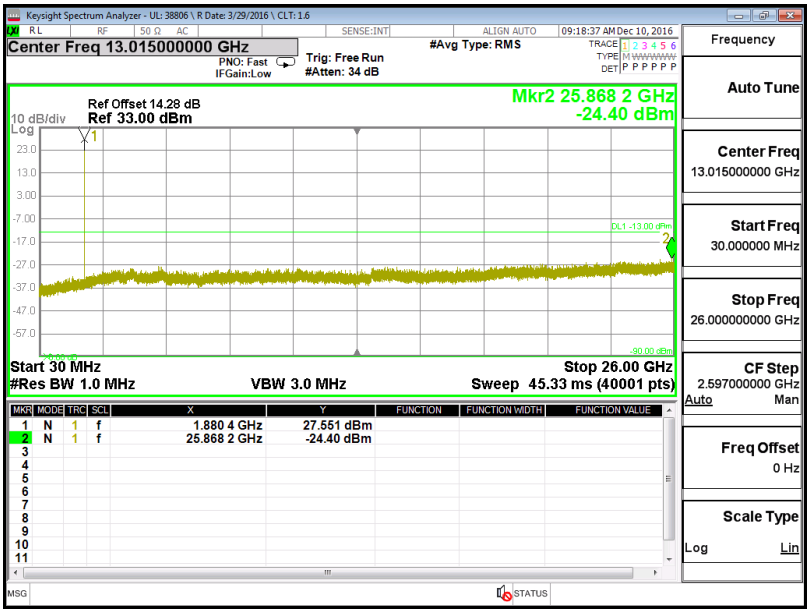
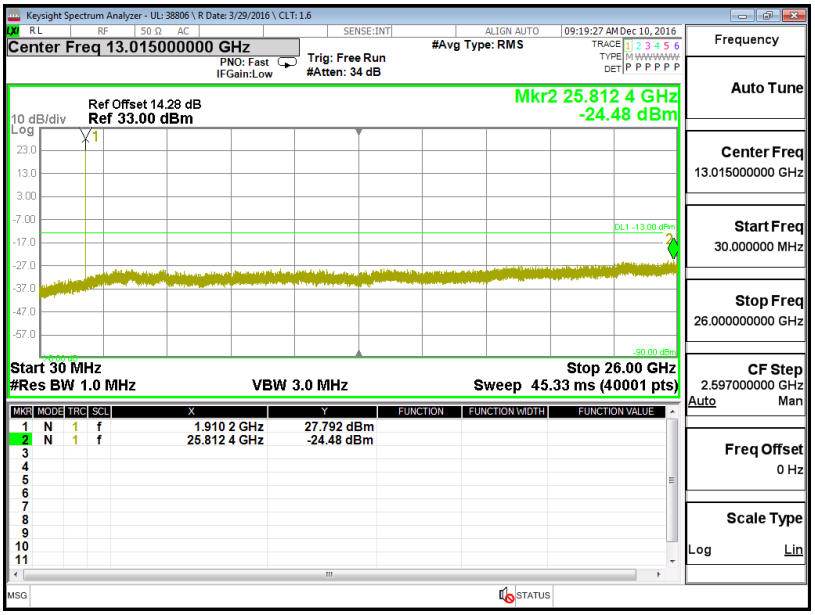
MID, RB1-0, 30 TO 26000 MHz



HIGH, RB1-0, 30 TO 26000 MHz



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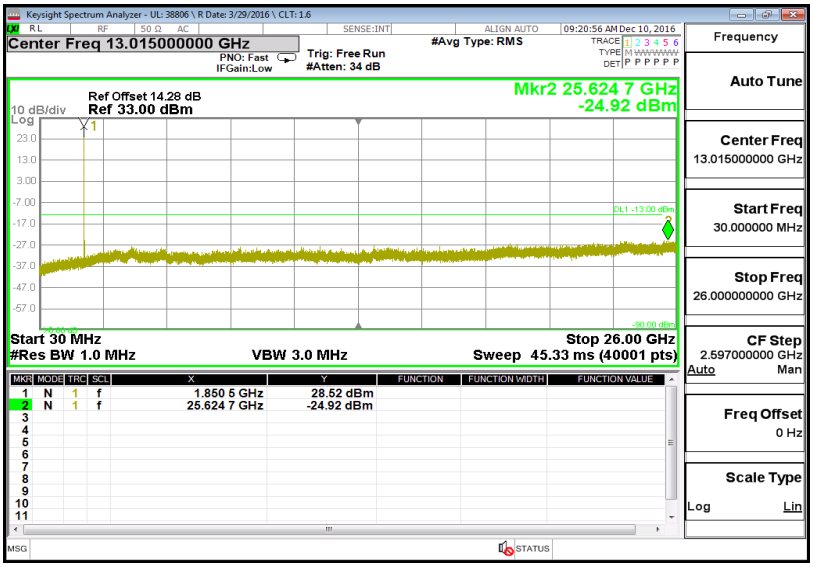
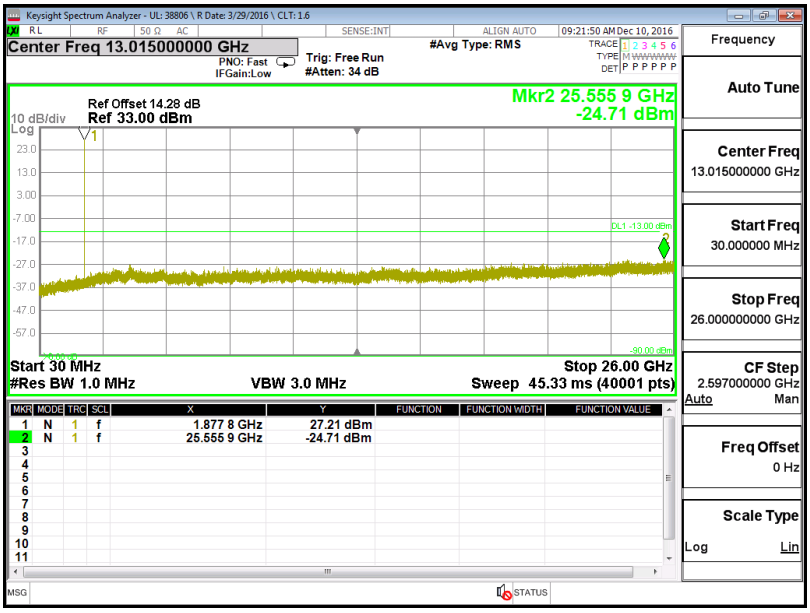
QPSK, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz



MID, RB1-0, 30 TO 26000 MHz



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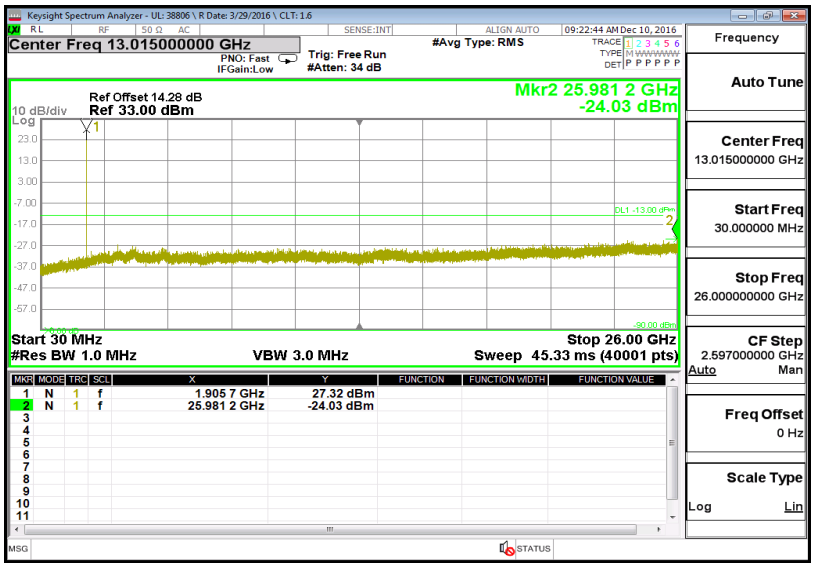
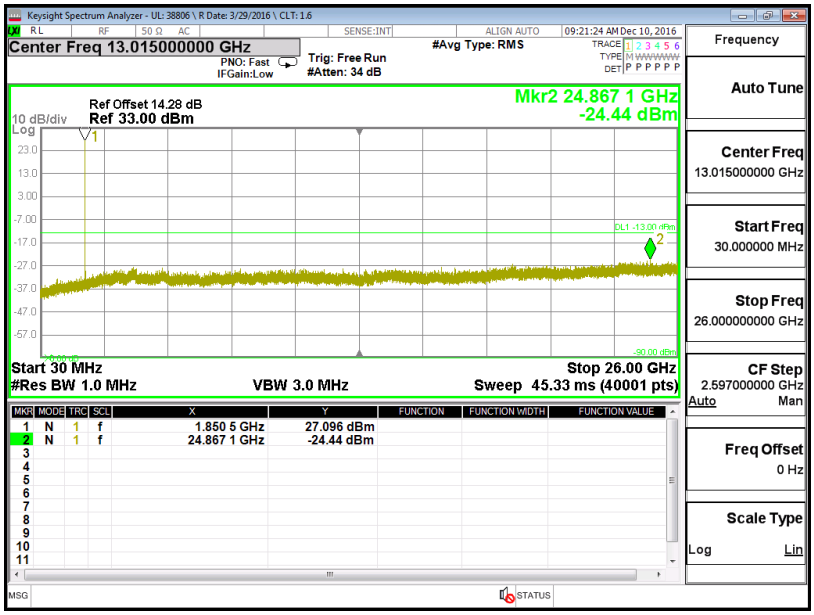
HIGH, RB1-0, 30 TO 26000 MHz



16QAM, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz



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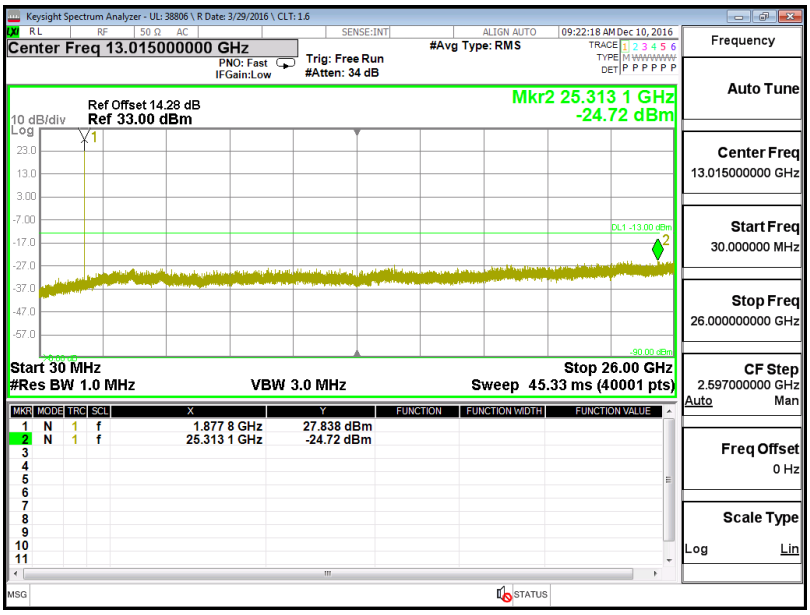
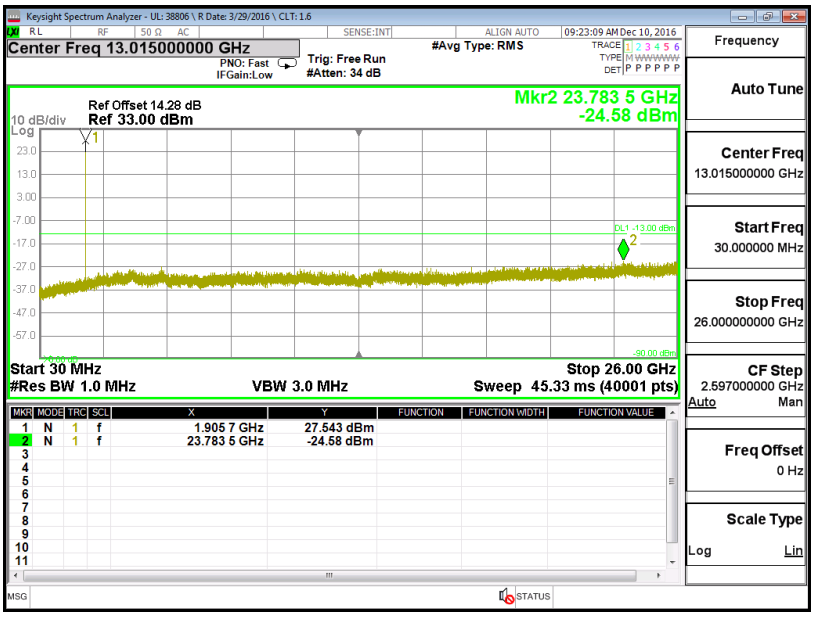
MID, RB1-0, 30 TO 26000 MHz



HIGH, RB1-0, 30 TO 26000 MHz



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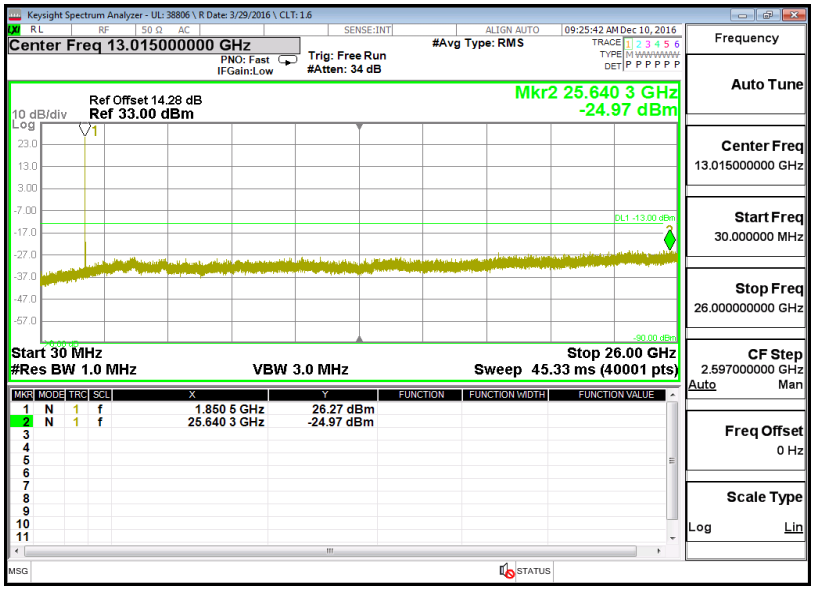
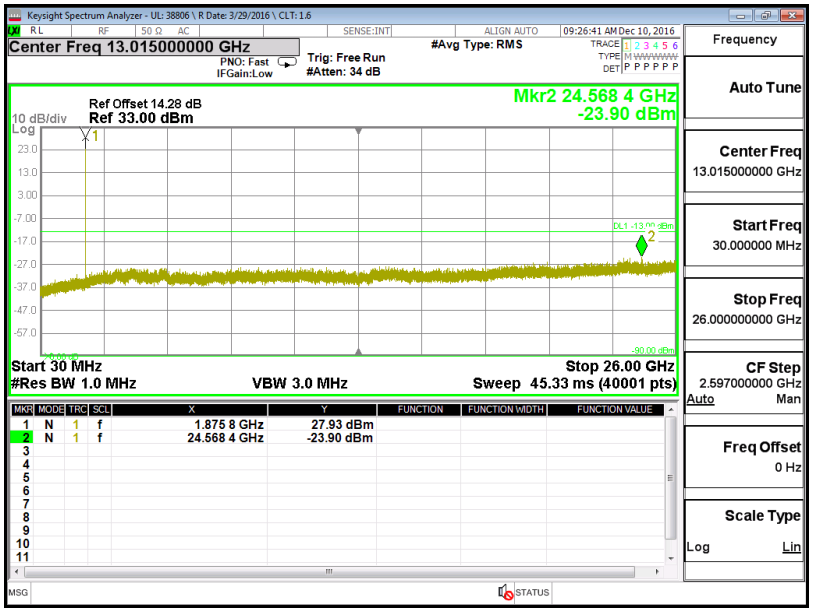
QPSK, (15.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz



MID, RB1-0, 30 TO 26000 MHz



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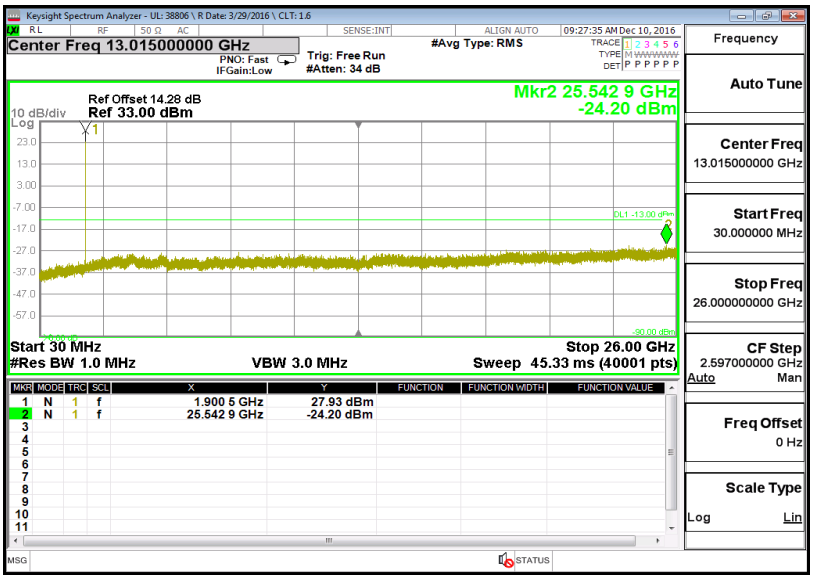
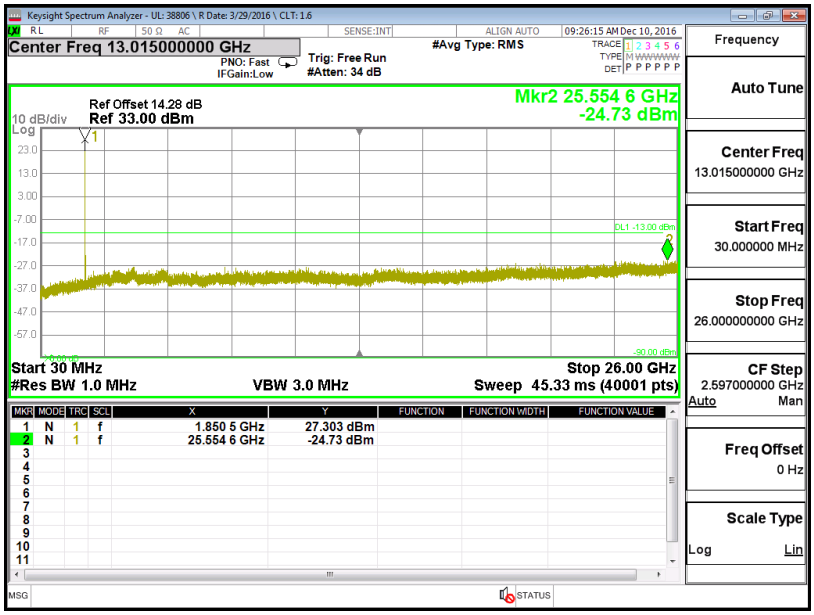
HIGH, RB1-0, 30 TO 26000 MHz



16QAM, (15.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz



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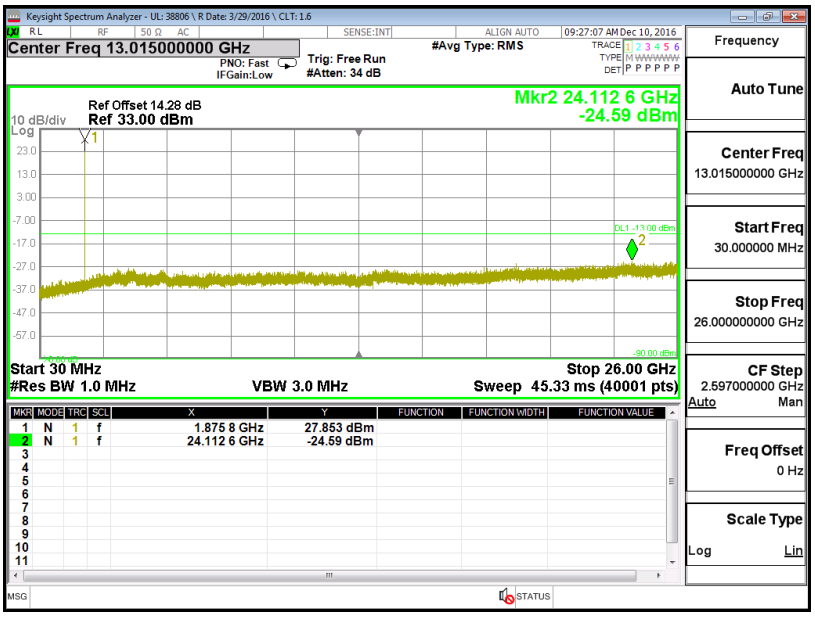
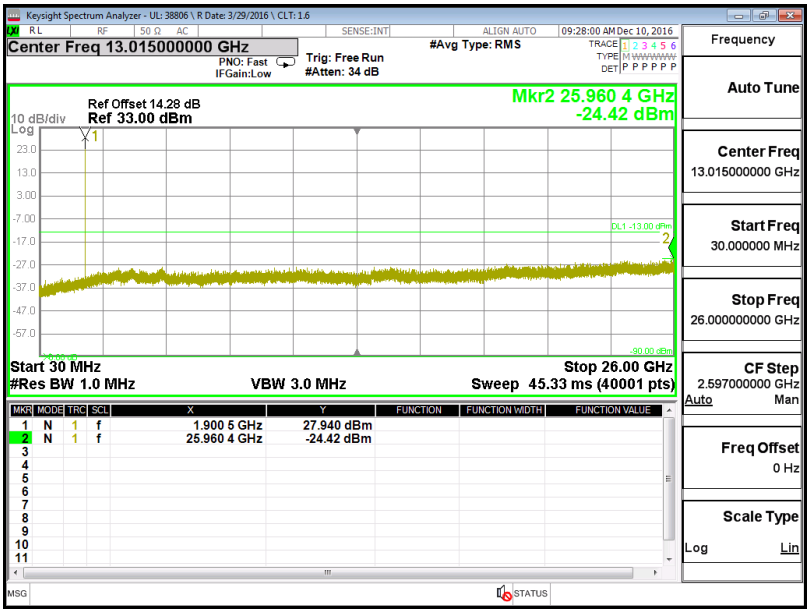
MID, RB1-0, 30 TO 26000 MHz



HIGH, RB1-0, 30 TO 26000 MHz



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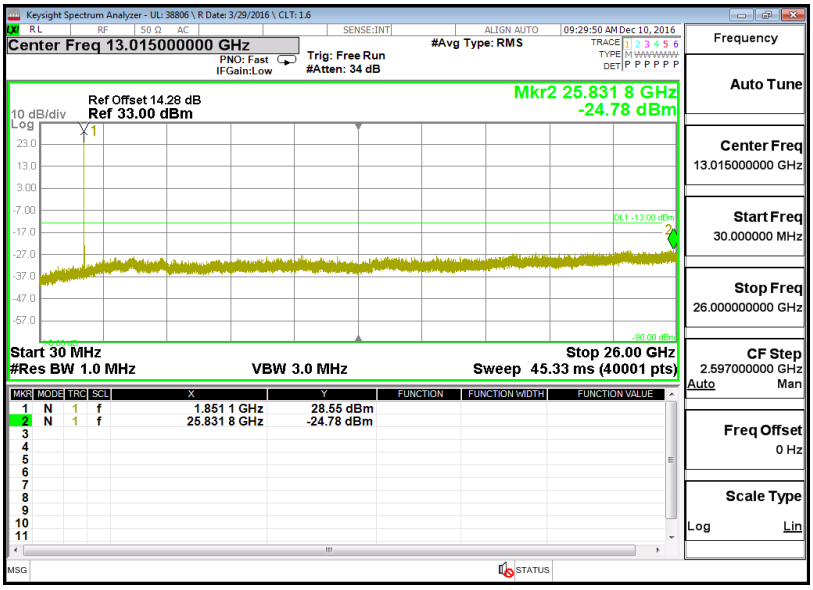
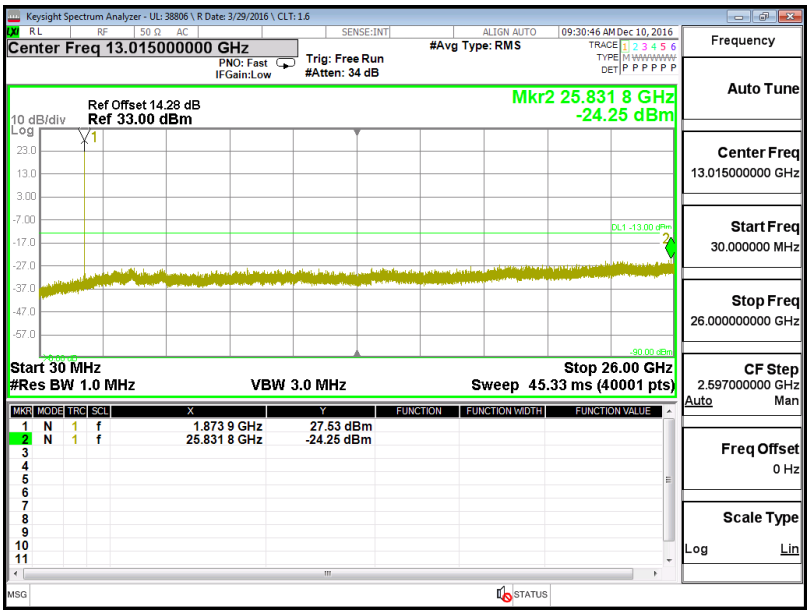
QPSK, (20.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz



MID, RB1-0, 30 TO 26000 MHz



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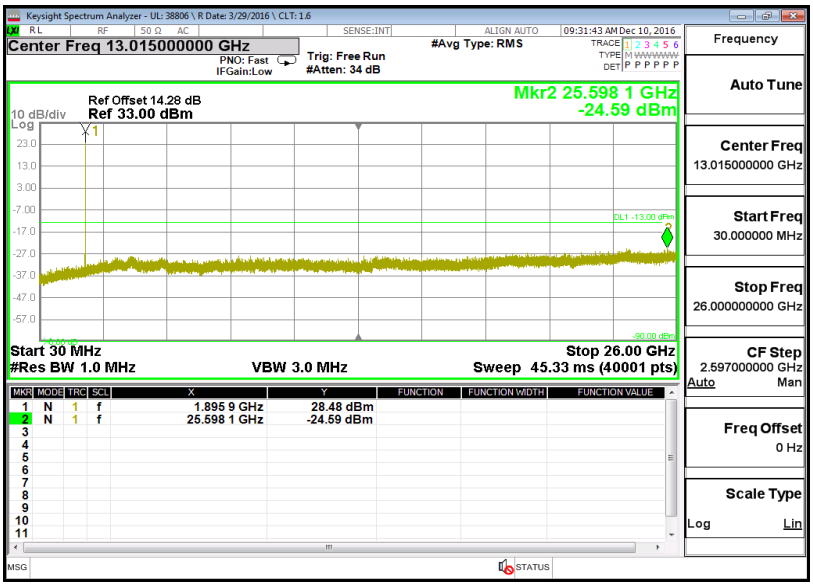
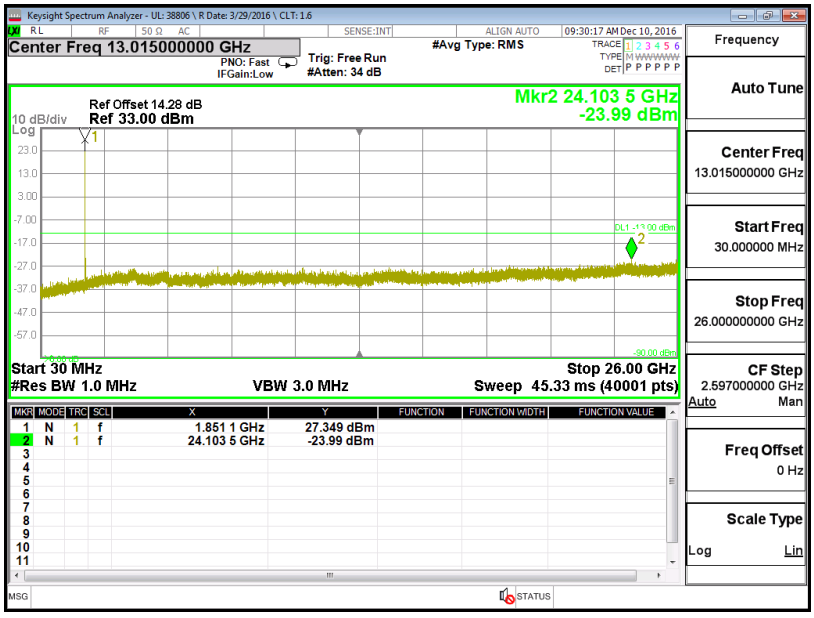
HIGH, RB1-0, 30 TO 26000 MHz



16QAM, (20.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 26000 MHz



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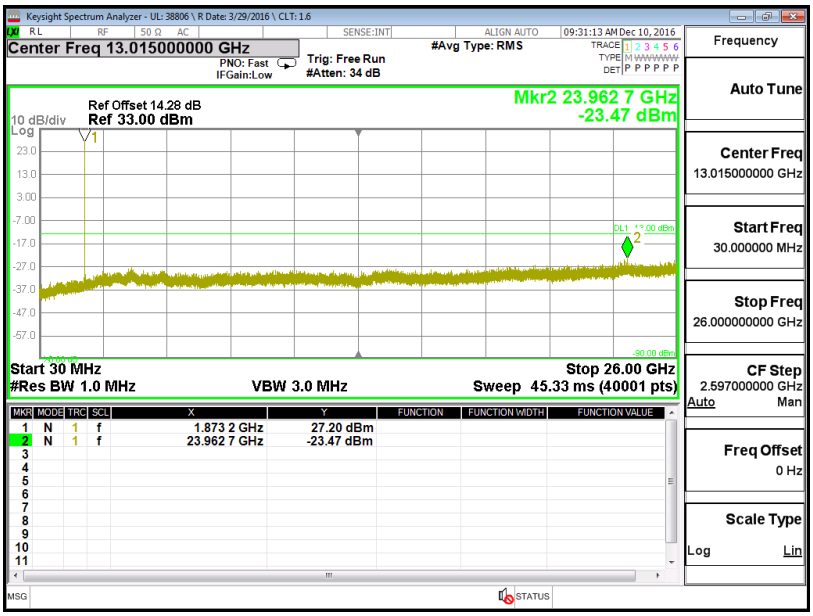
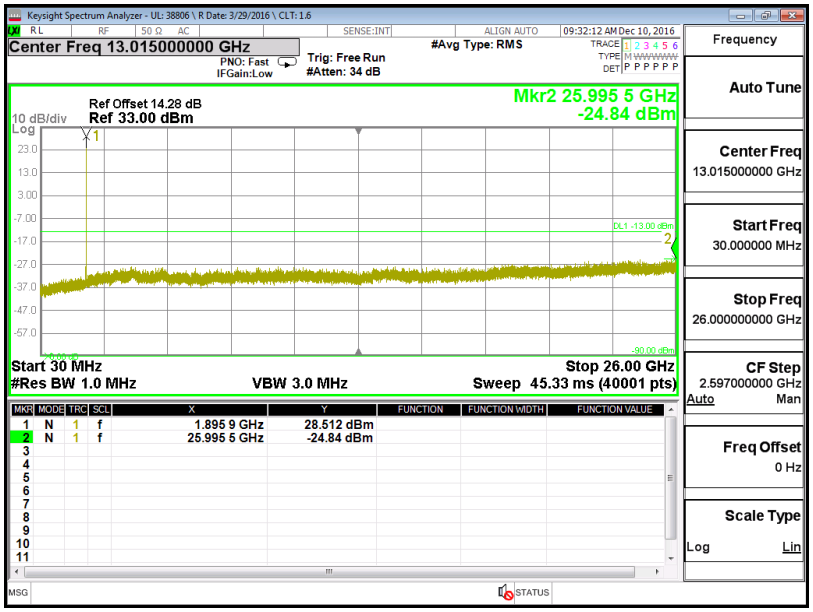
MID, RB1-0, 30 TO 26000 MHz



HIGH, RB1-0, 30 TO 26000 MHz



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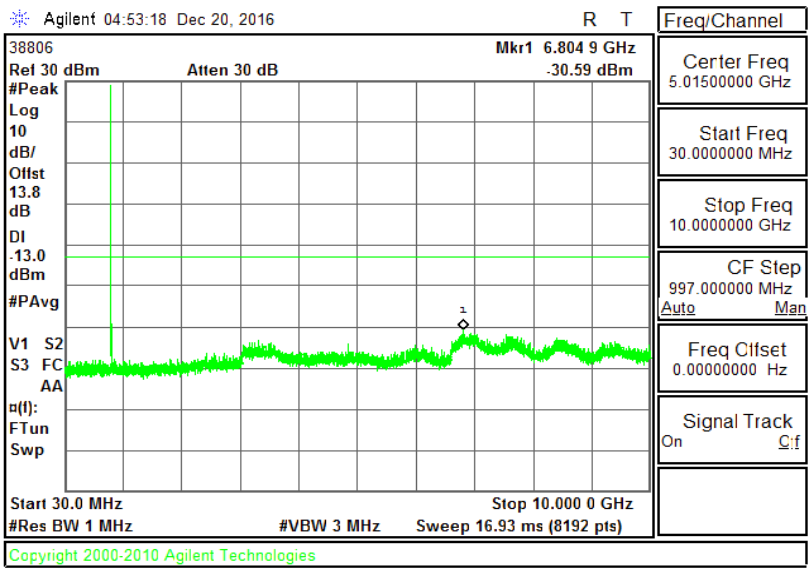
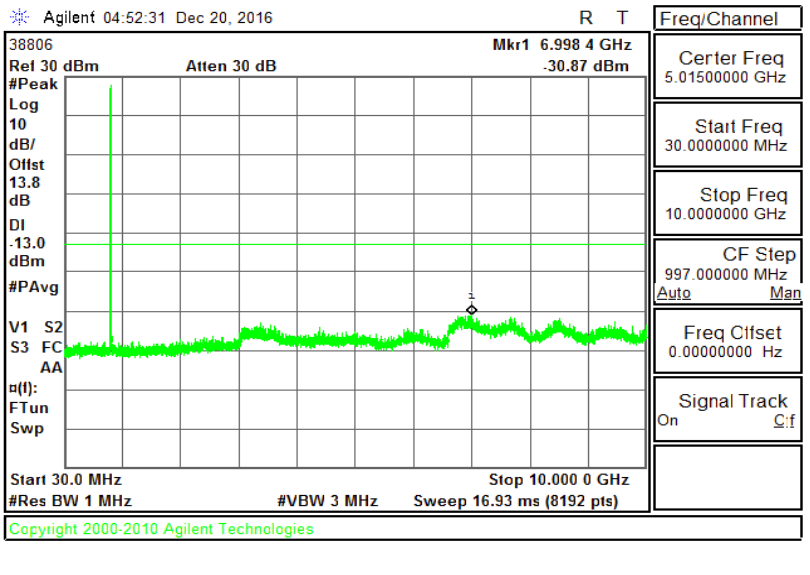
8.3.9. **LTE BAND 26**

QPSK, (1.4 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000 MHz



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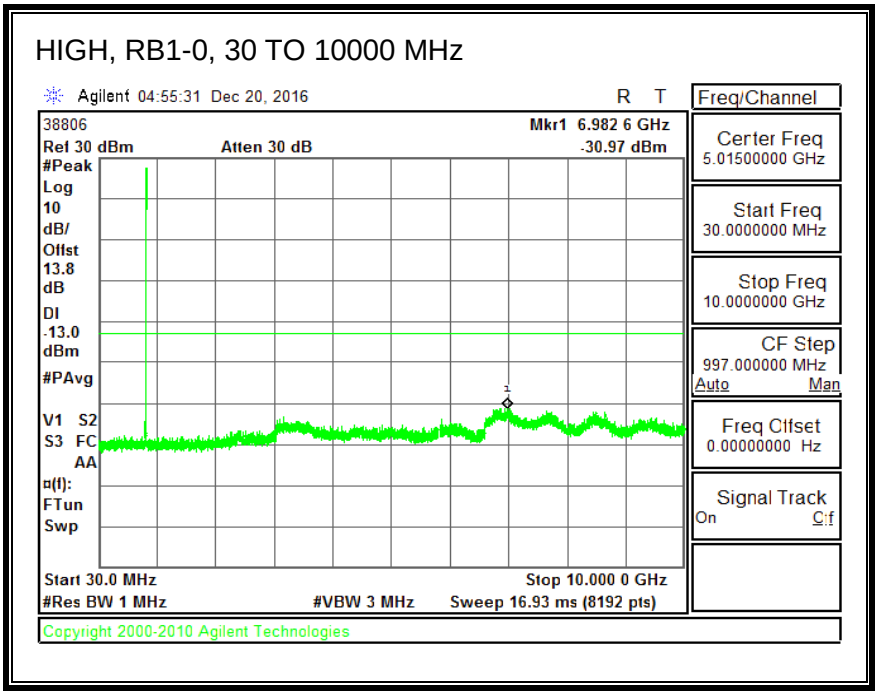
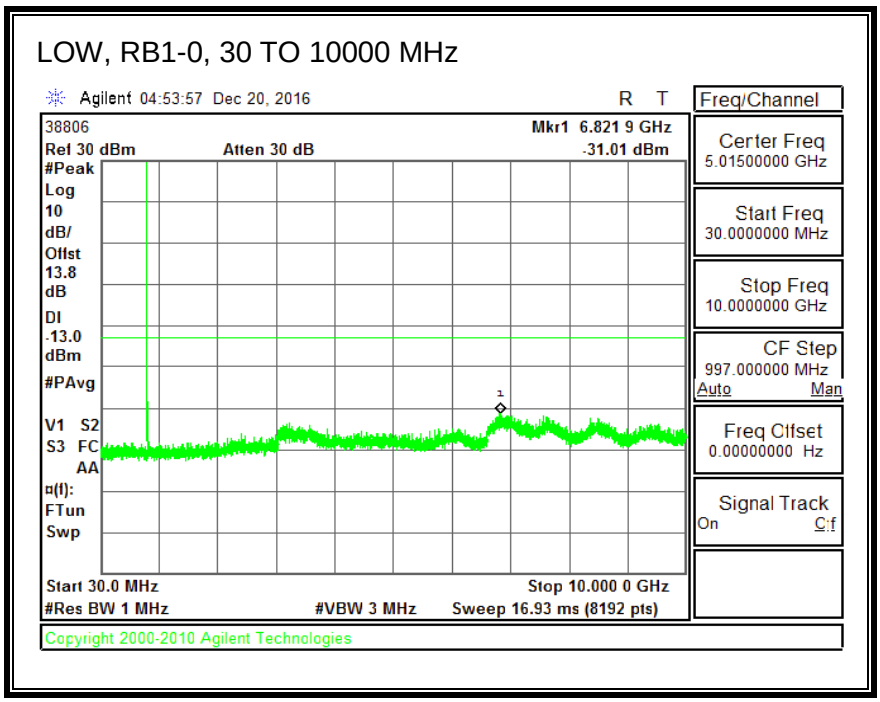


16QAM, (1.4 MHz BAND WIDTH)



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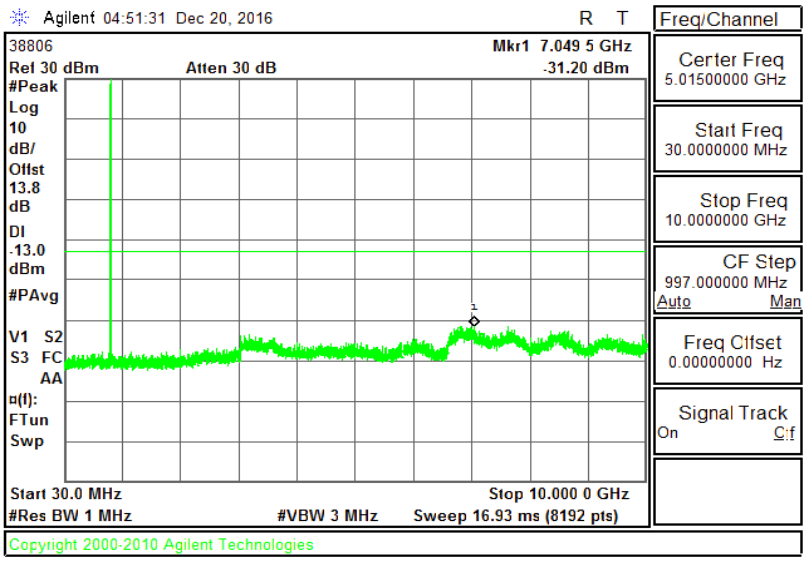
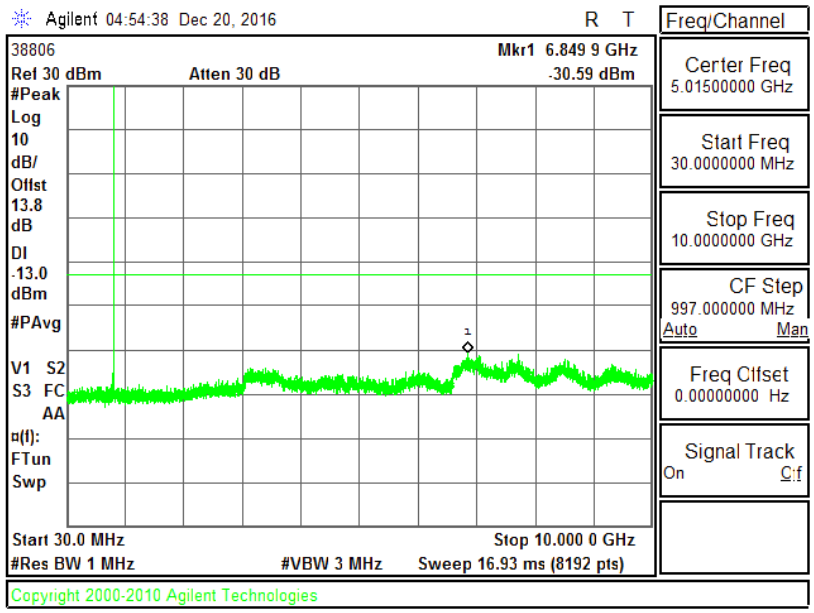
MID, RB1-0, 30 TO 10000 MHz



HIGH, RB1-0, 30 TO 10000 MHz



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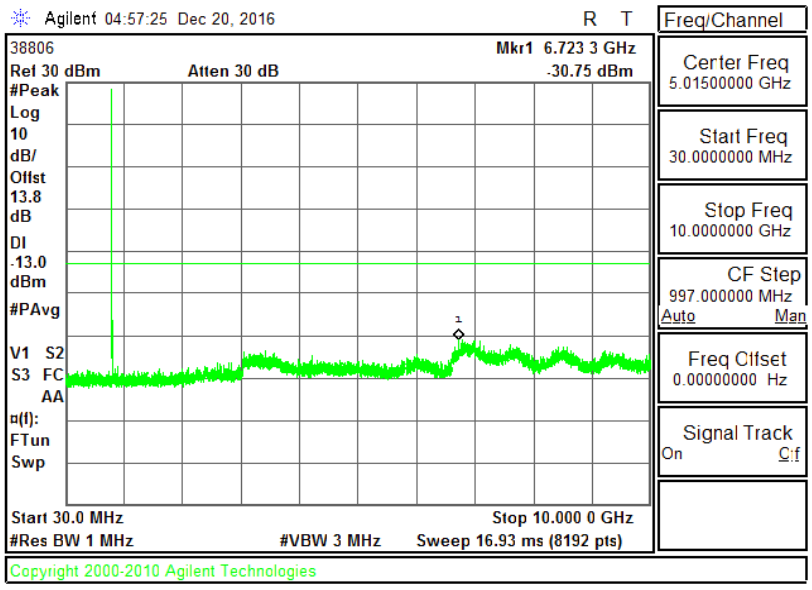
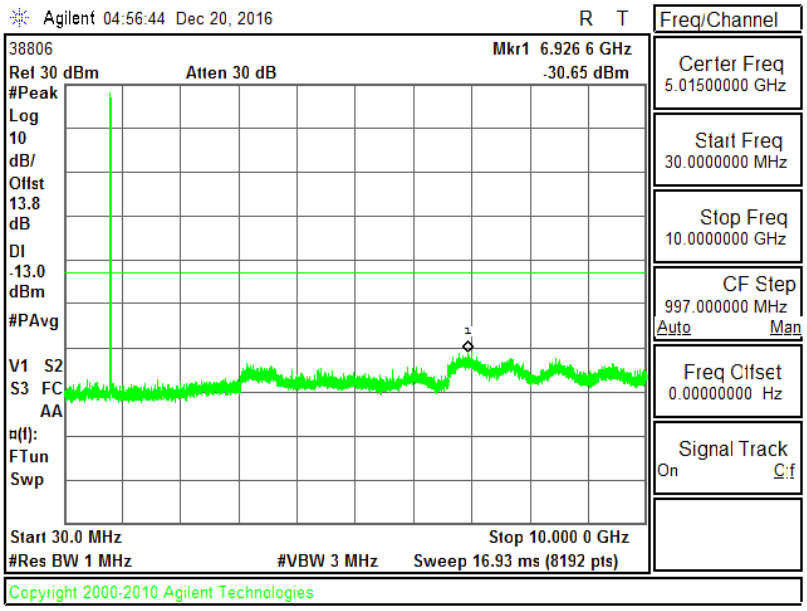
QPSK, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000 MHz



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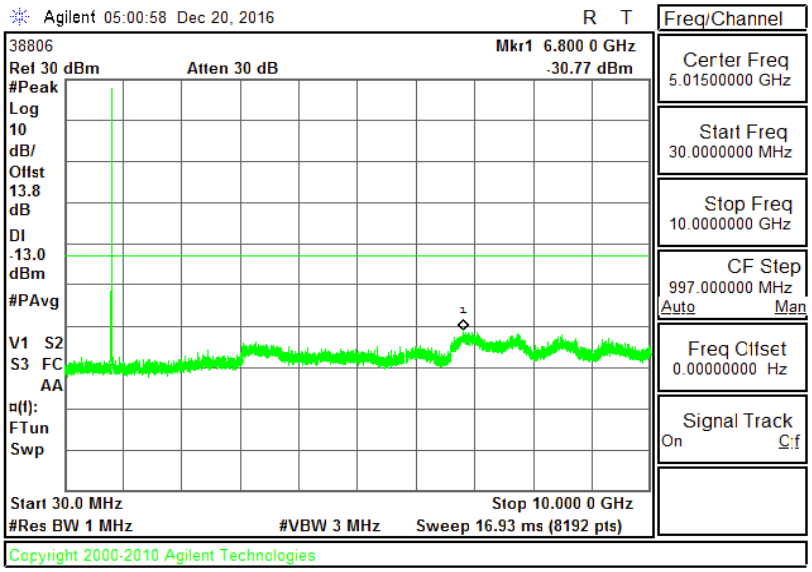
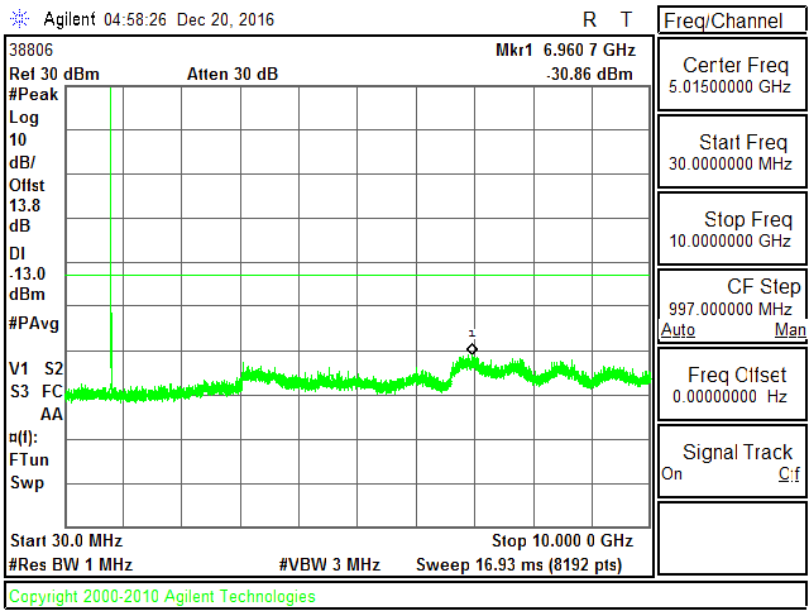
HIGH, RB1-0, 30 TO 10000 MHz



16QAM, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz



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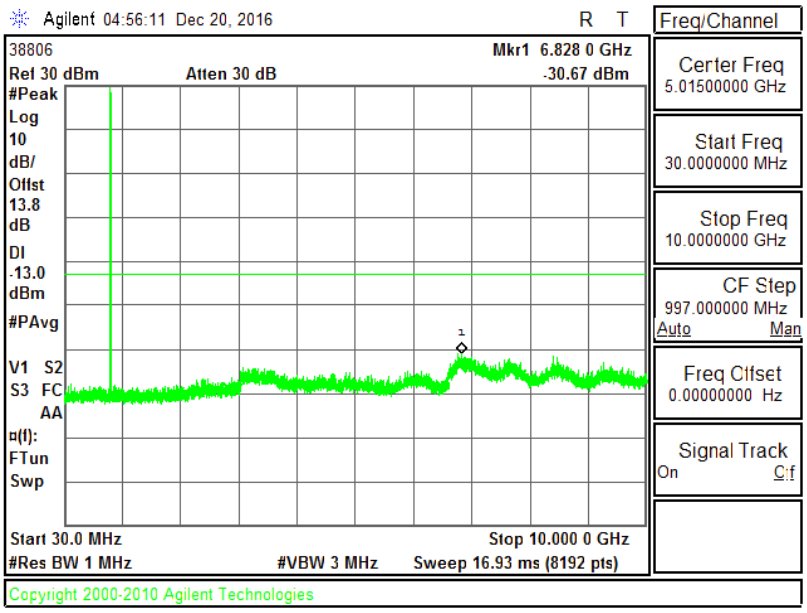
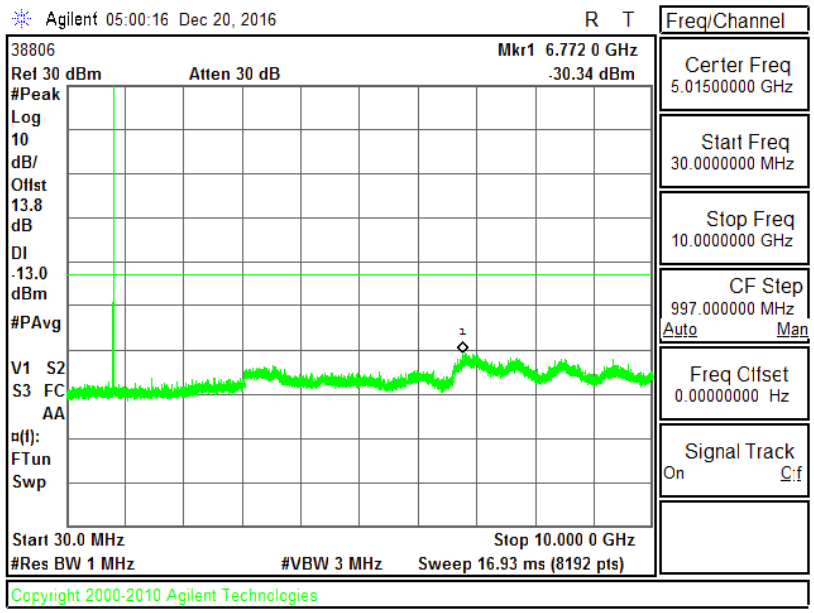
MID, RB1-0, 30 TO 10000 MHz



HIGH, RB1-0, 30 TO 10000 MHz



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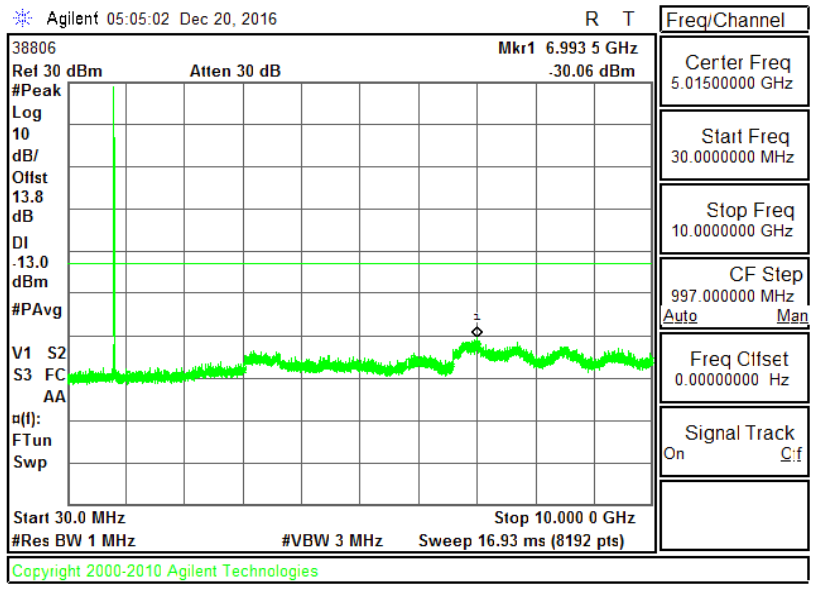
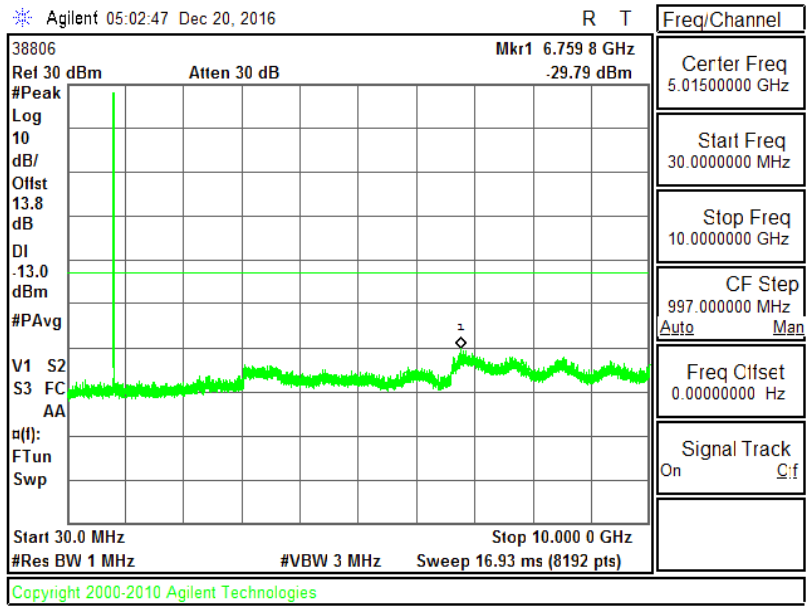
QPSK, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000 MHz



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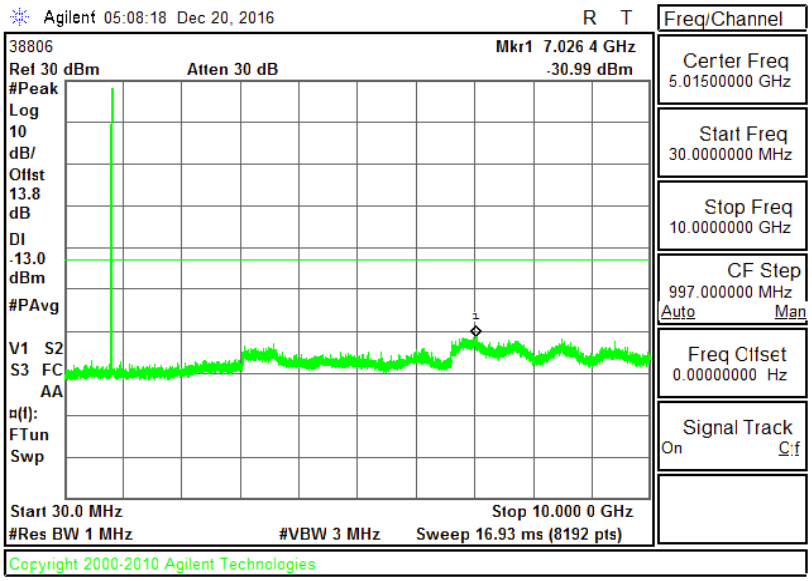
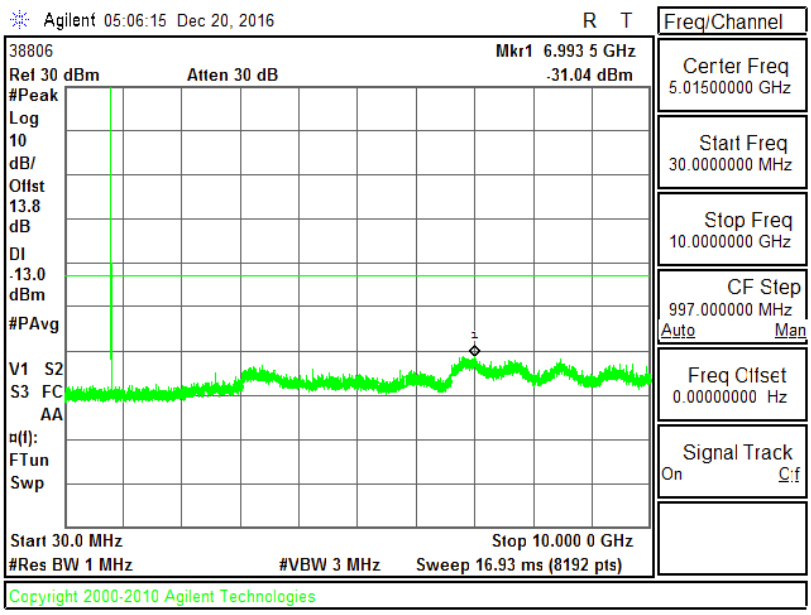
HIGH, RB1-0, 30 TO 10000 MHz



16QAM, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz



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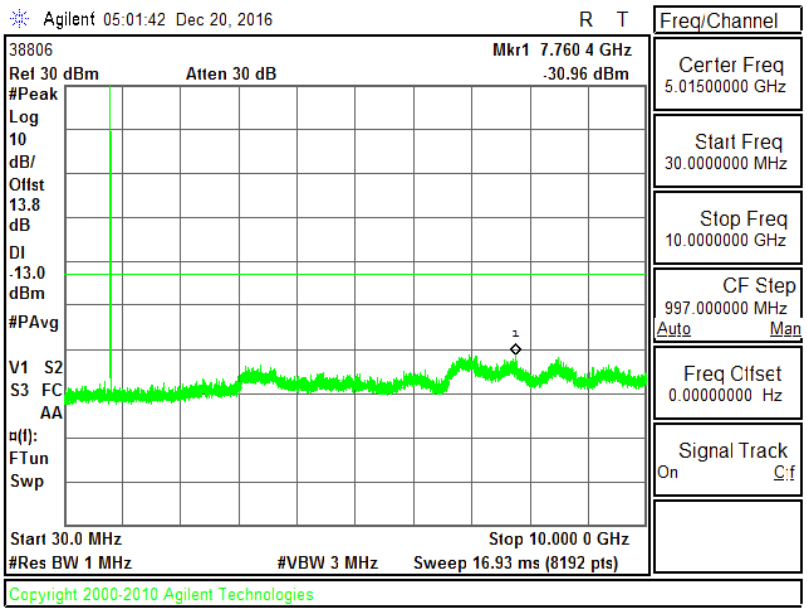
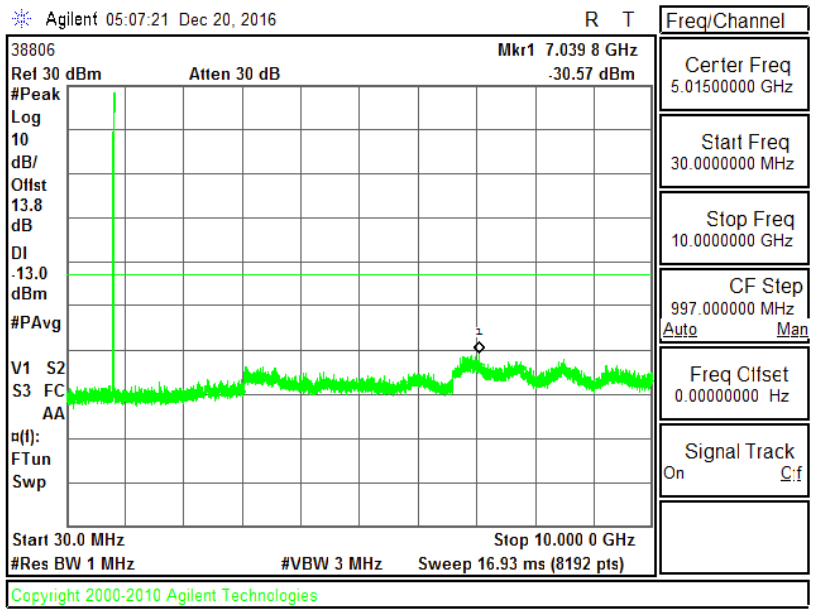
MID, RB1-0, 30 TO 10000 MHz



HIGH, RB1-0, 30 TO 10000 MHz



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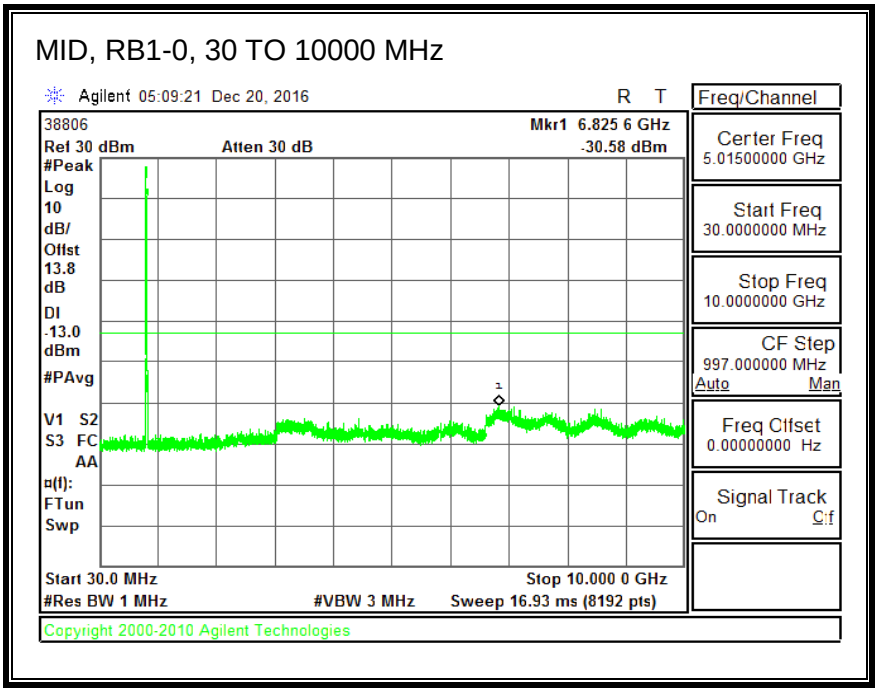
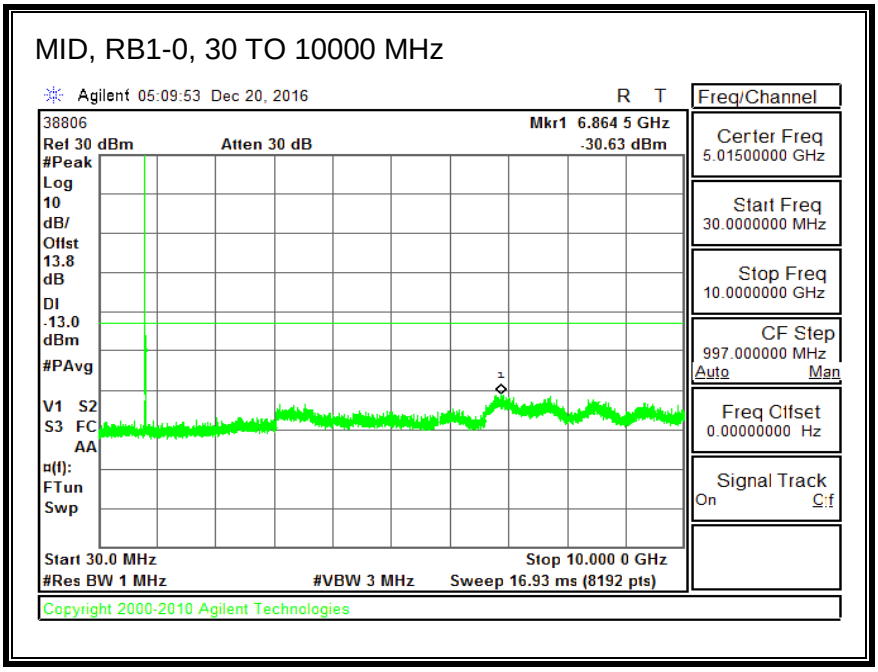
QPSK, (10.0 MHz BAND WIDTH)



16QAM, (10.0 MHz BAND WIDTH)



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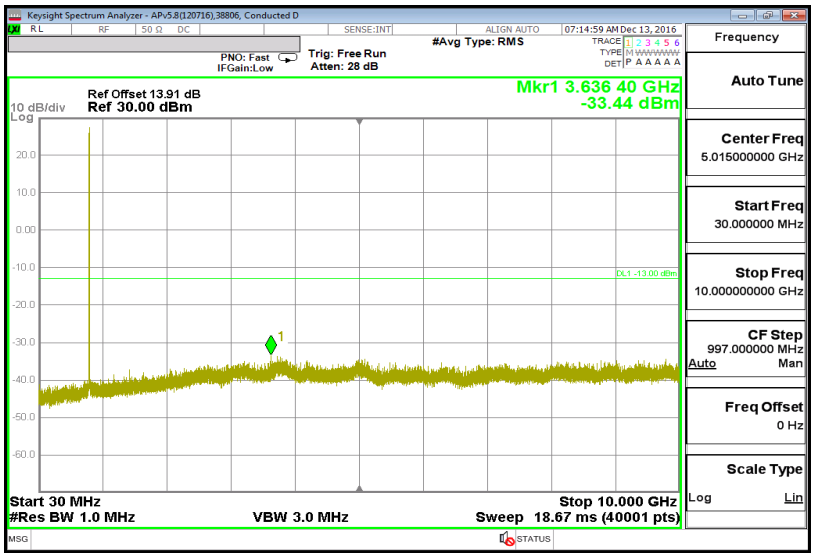
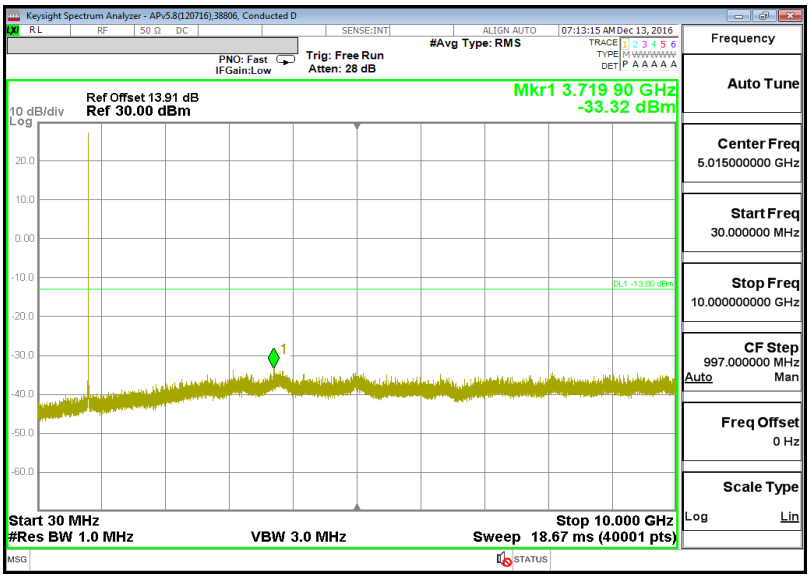
8.3.10. LTE BAND 27

QPSK, (1.4 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000 MHz



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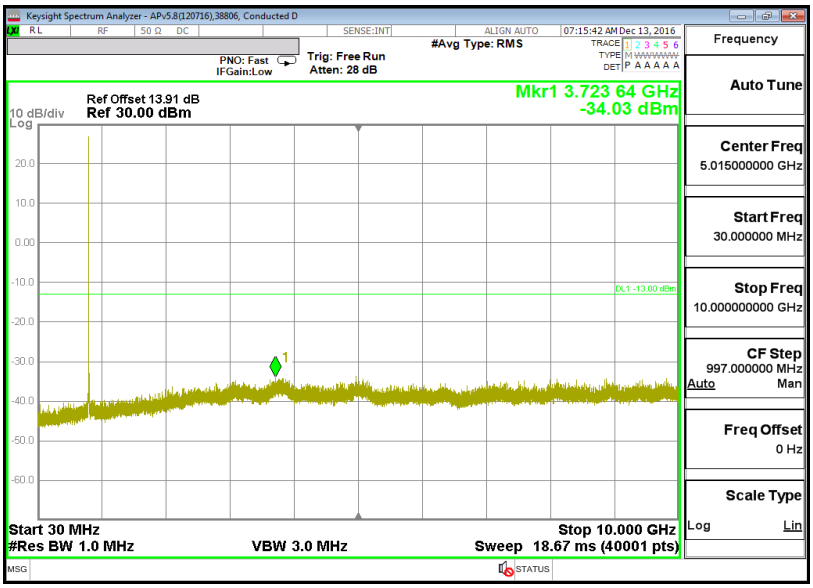
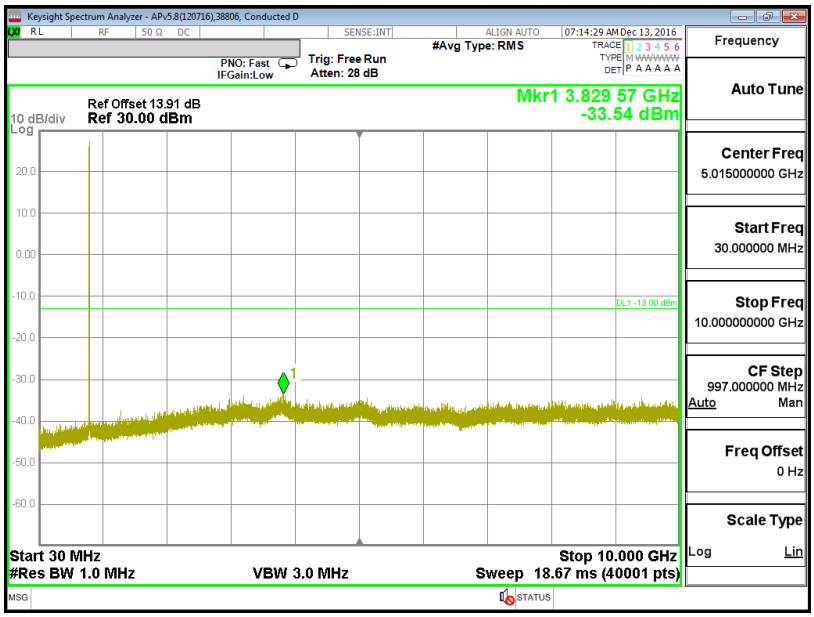
HIGH, RB1-0, 30 TO 10000 MHz



16QAM, (1.4 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz



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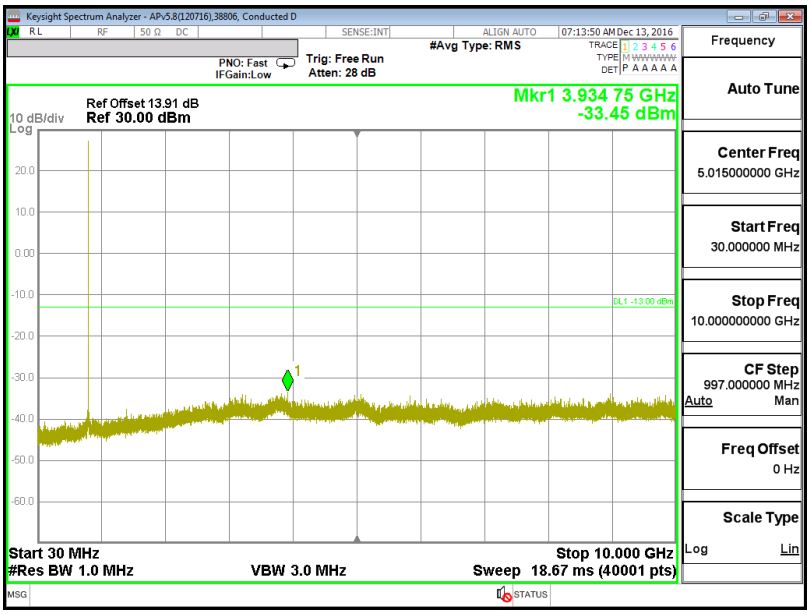
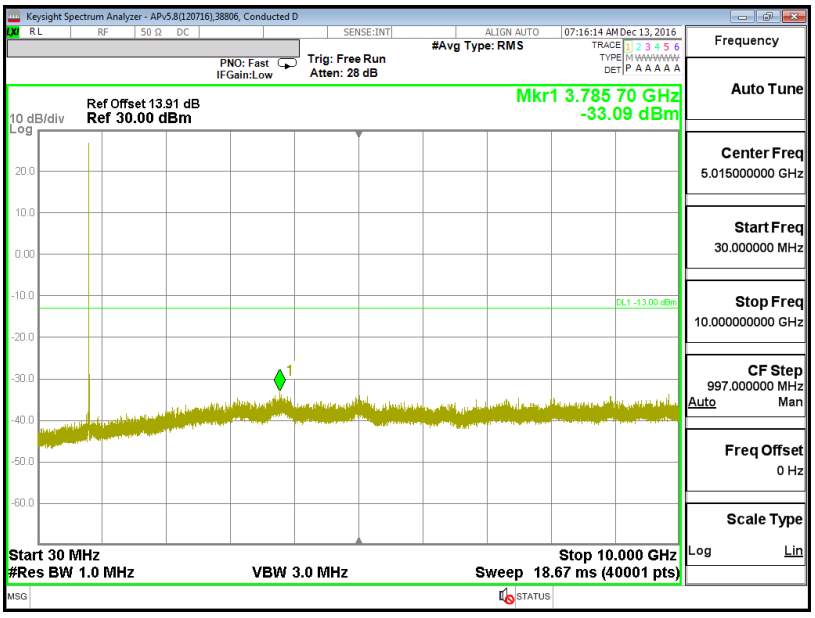
MID, RB1-0, 30 TO 10000 MHz



HIGH, RB1-0, 30 TO 10000 MHz



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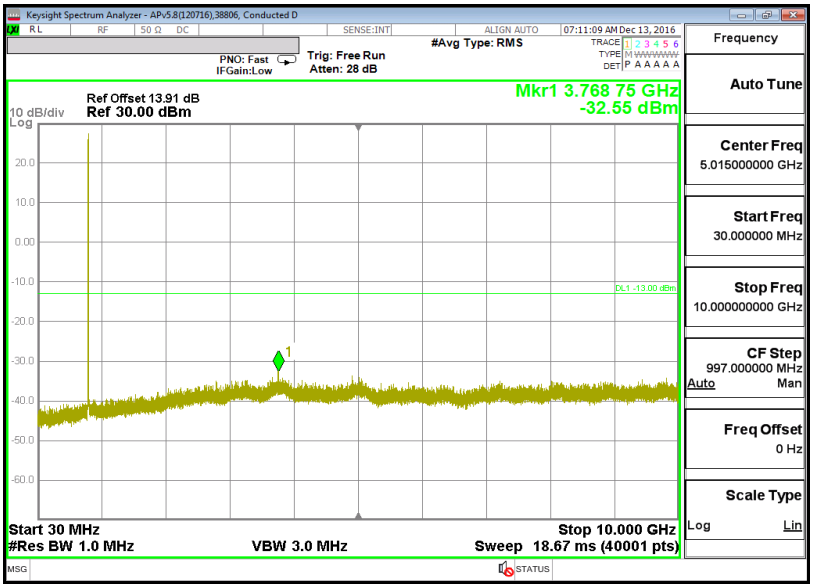
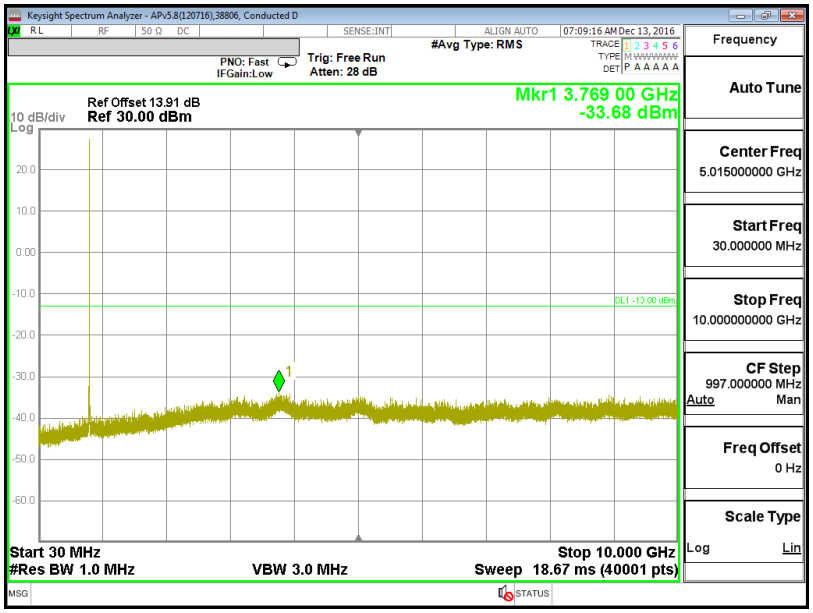
QPSK, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000MHz



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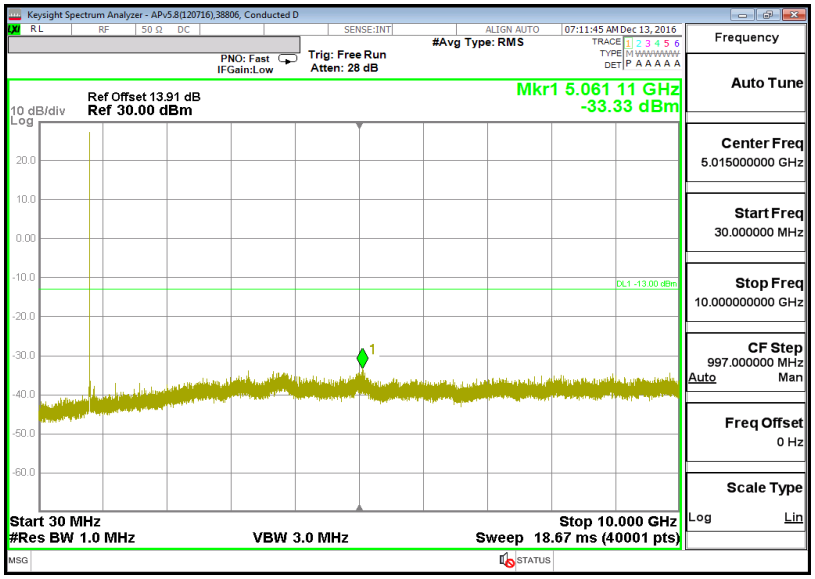
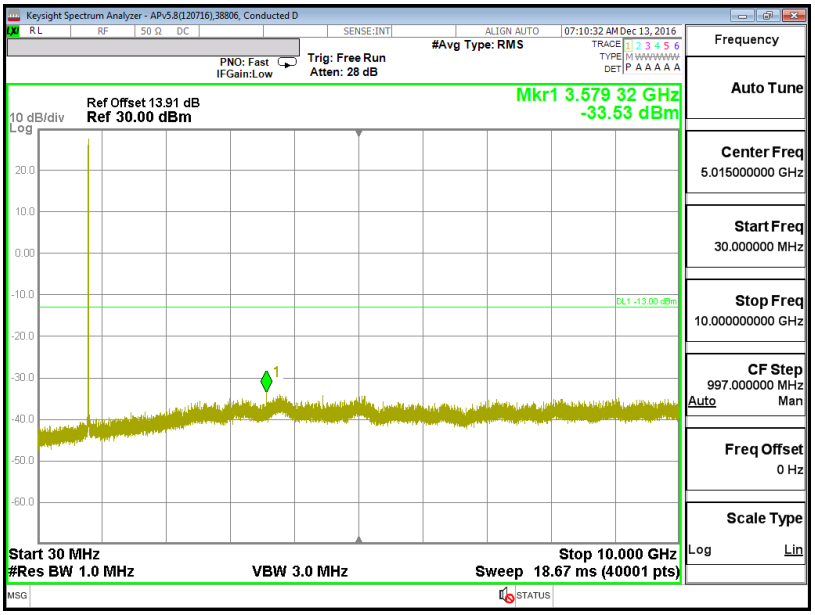
HIGH, RB1-0, 30 TO 10000 MHz



16QAM, (3.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz



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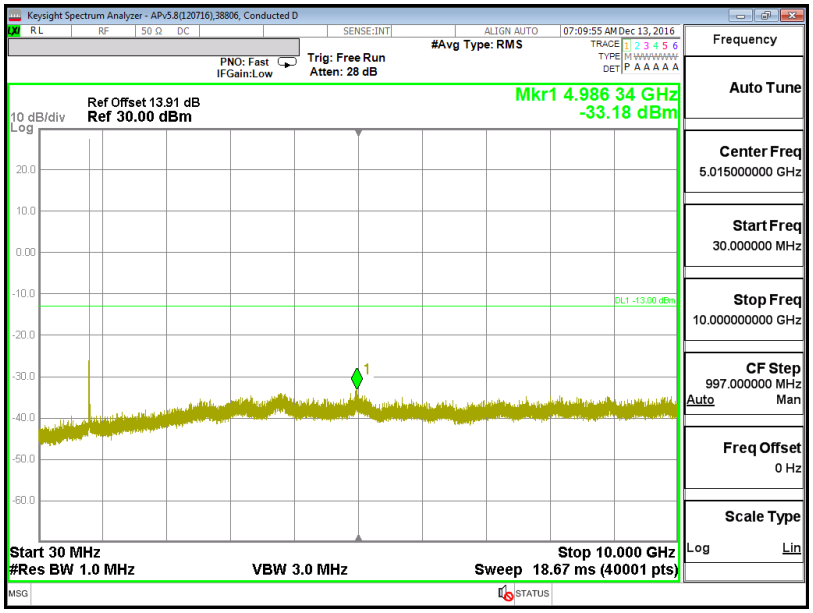
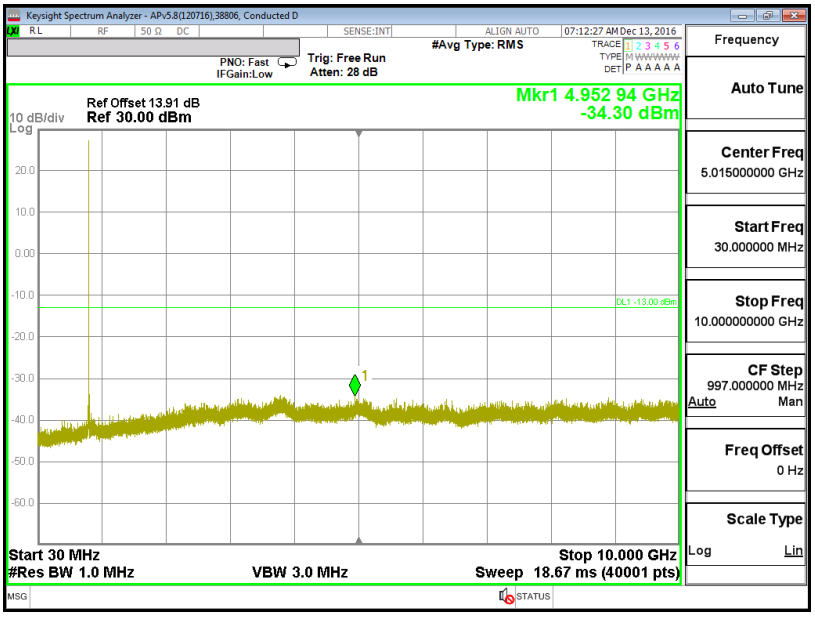
MID, RB1-0, 30 TO 10000 MHz



HIGH, RB1-0, 30 TO 10000 MHz



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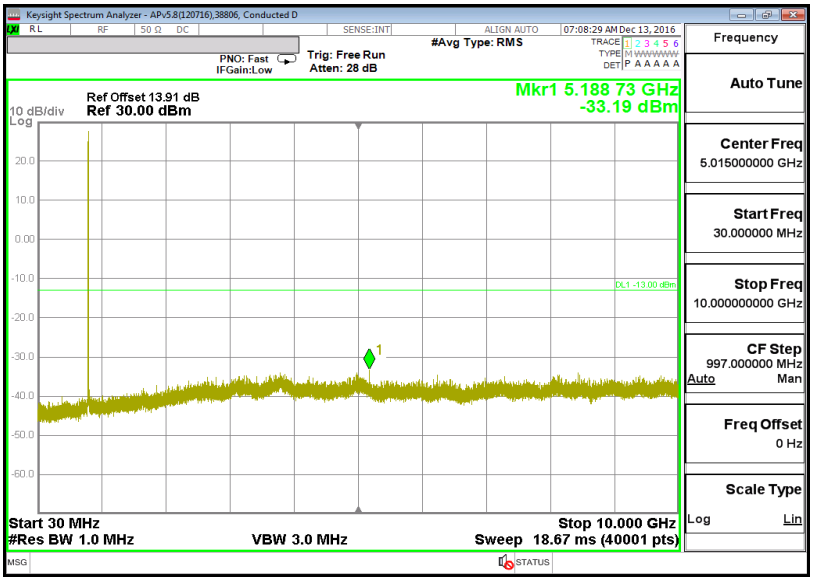
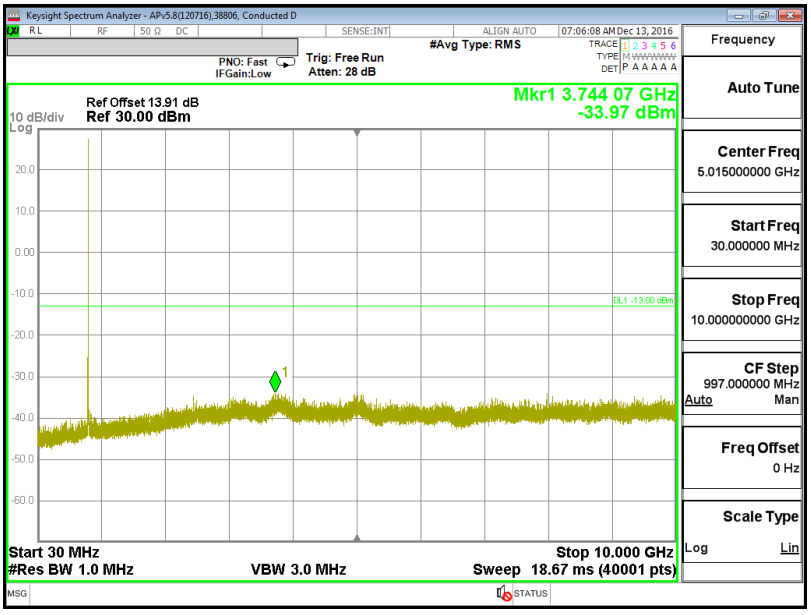
QPSK, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz



MID, RB1-0, 30 TO 10000 MHz



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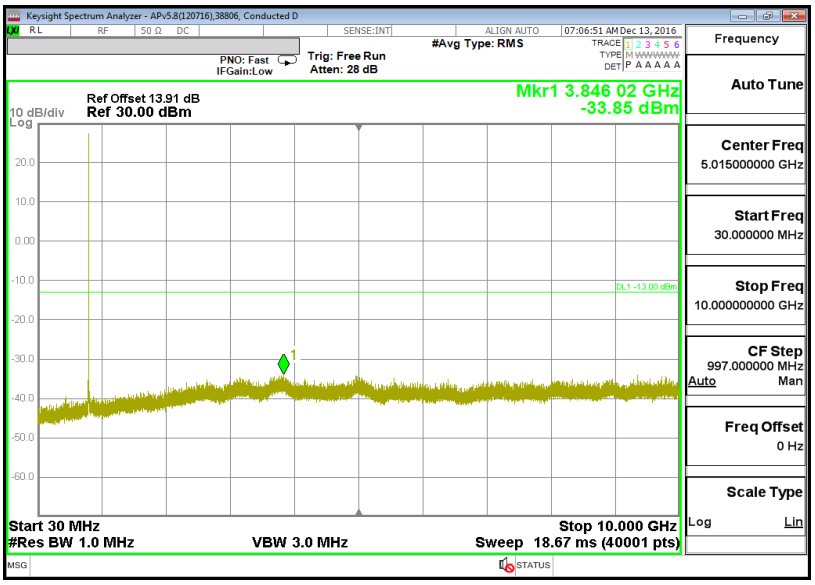
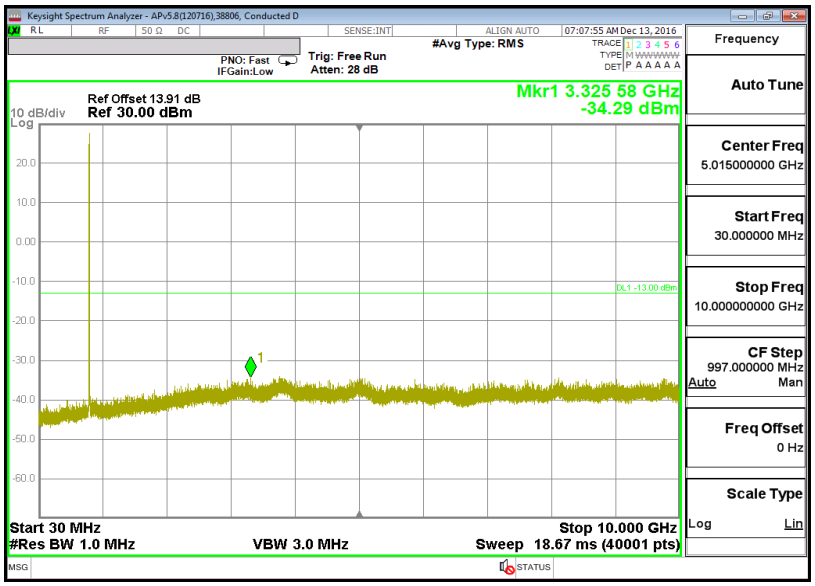
HIGH, RB1-0, 30 TO 10000 MHz



16QAM, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 10000 MHz



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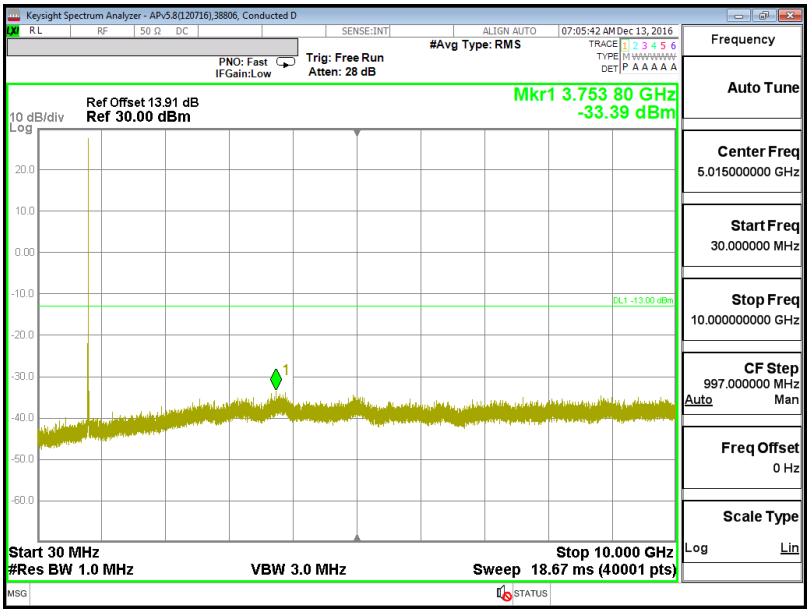
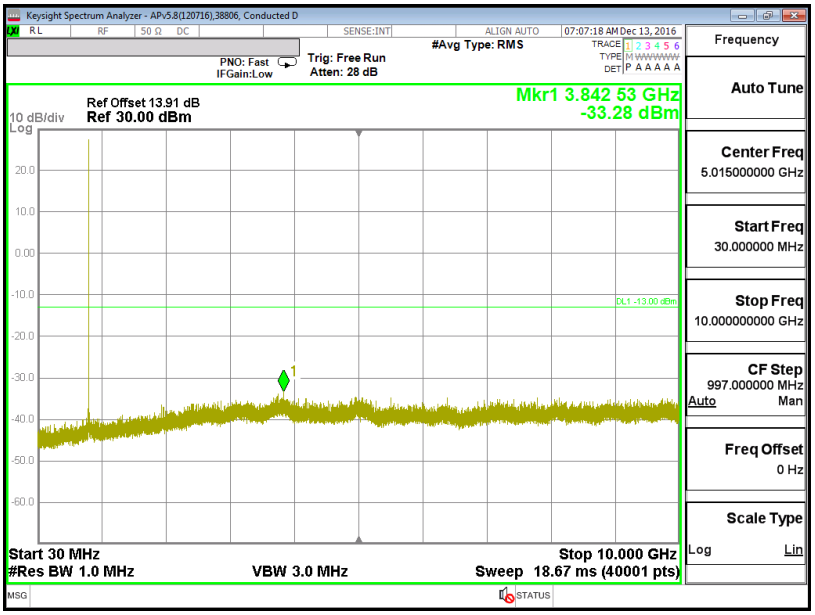
MID, RB1-0, 30 TO 10000 MHz



HIGH, RB1-0, 30 TO 10000 MHz



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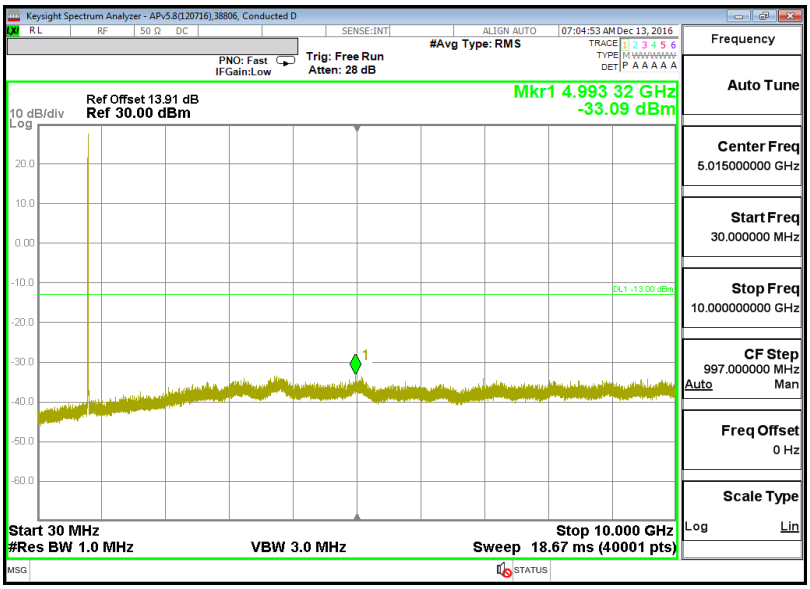
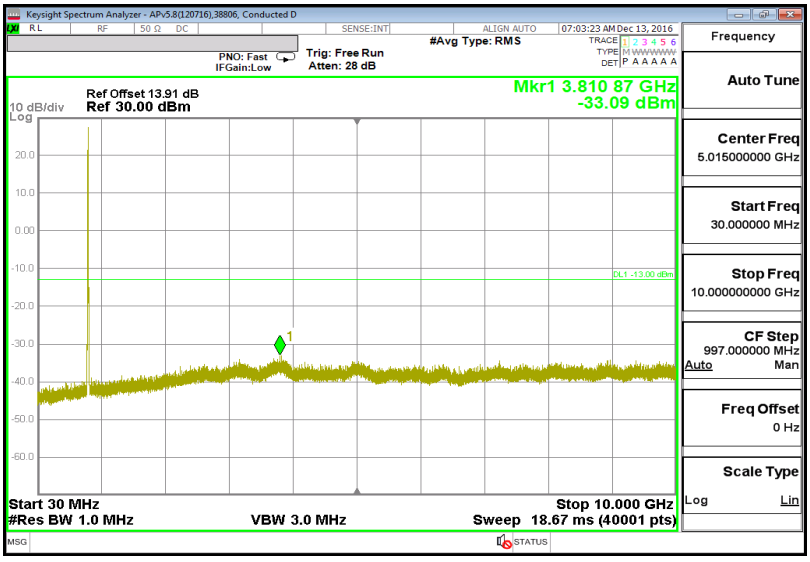
QPSK, (10.0 MHz BAND WIDTH)

MID, RB1-0, 30 TO 10000 MHz



16QAM, (10.0 MHz BAND WIDTH)

MID, RB1-0, 30 TO 10000 MHz



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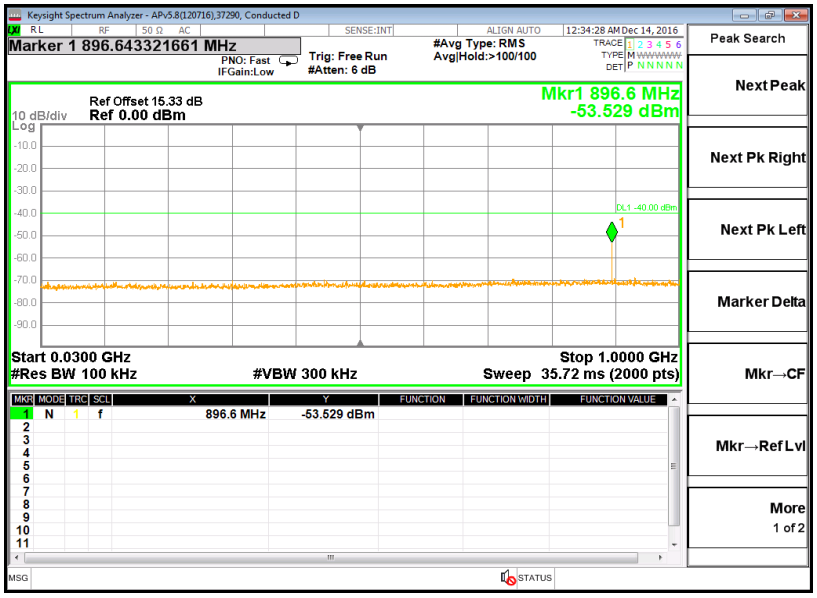
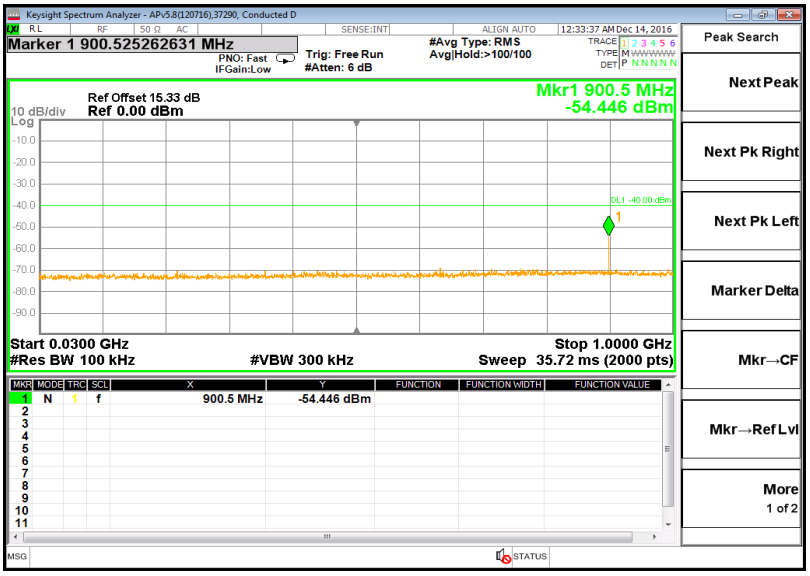
8.3.11. LTE BAND 30

QPSK, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 1000 MHz



MID, RB1-0, 30 TO 1000 MHz



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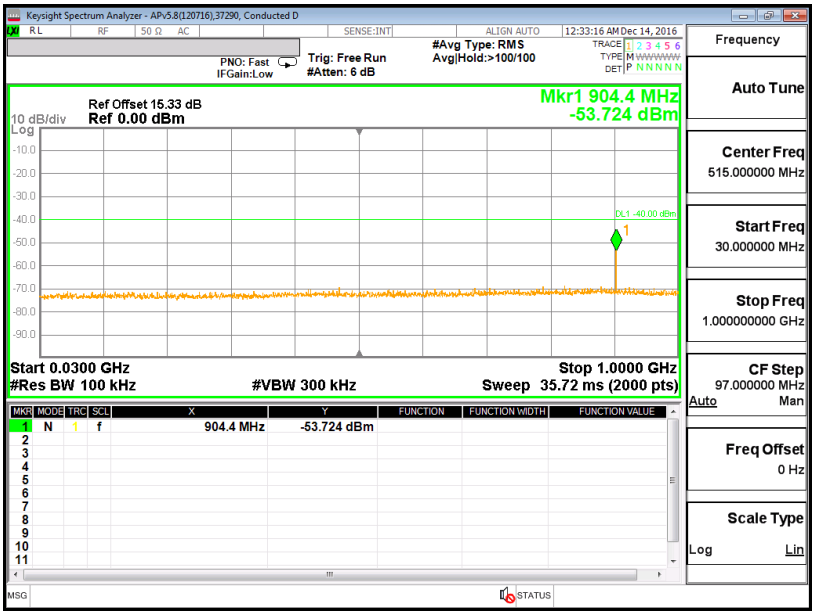
HIGH, RB1-0, 30 TO 1000 MHz



LOW, RB1-0, 1000 TO 2400 MHz

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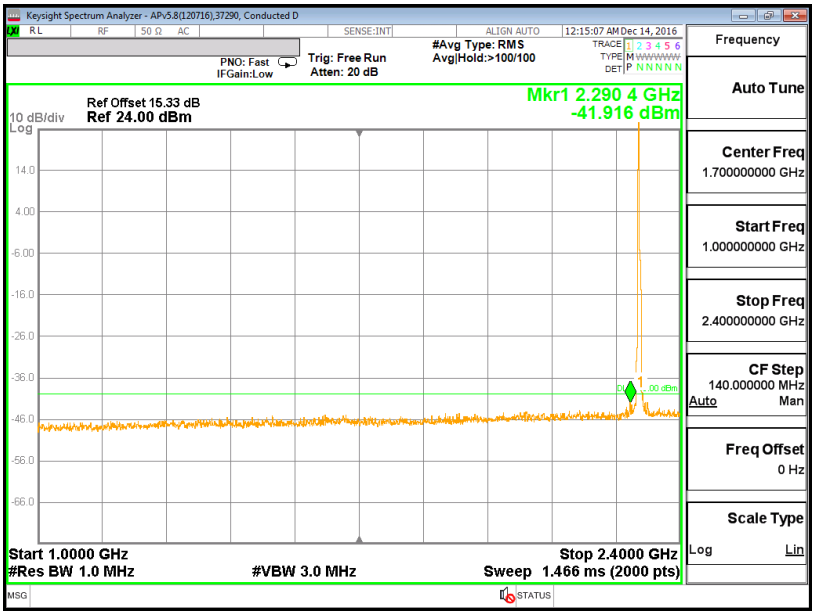
MID, RB1-0, 1000 TO 2400 MHz



HIGH, RB1-0, 1000 TO 2400 MHz

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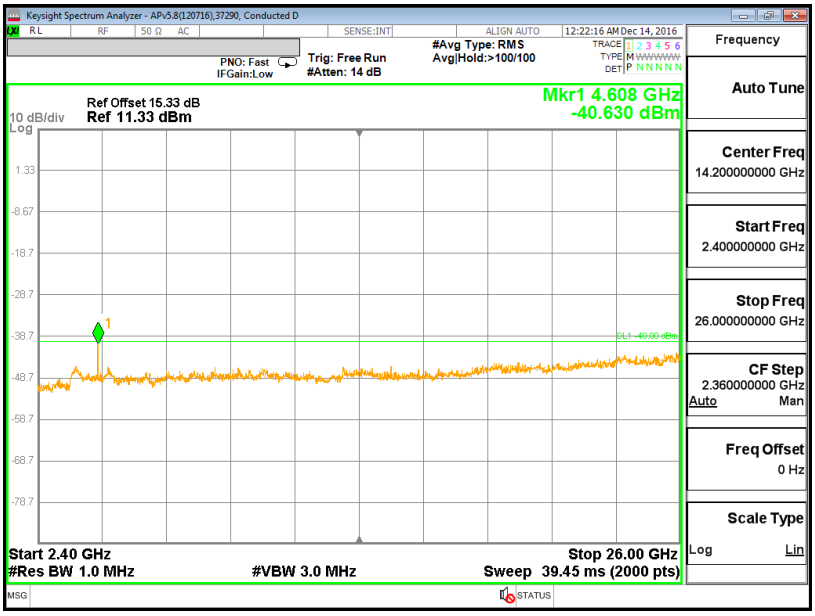
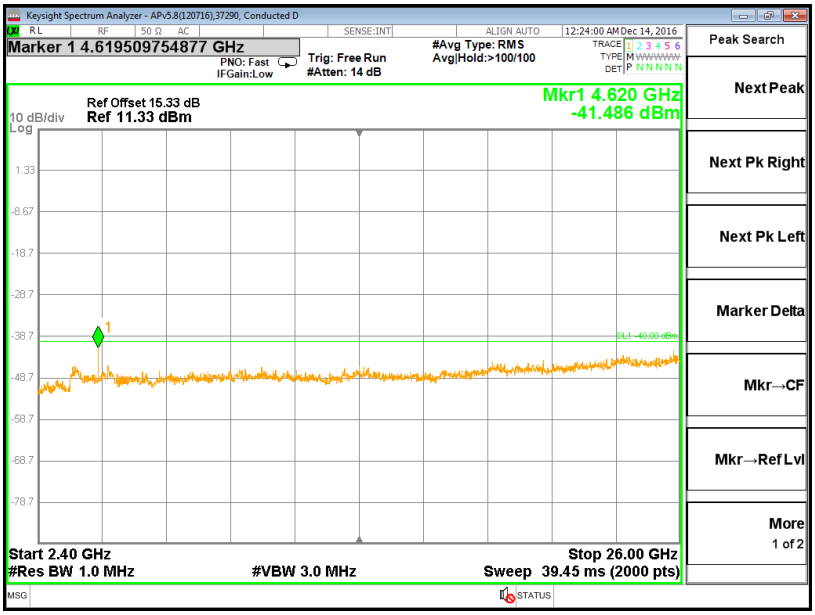
LOW, RB1-0, 2400 TO 26000 MHz



MID, RB1-0, 2400 TO 26000 MHz



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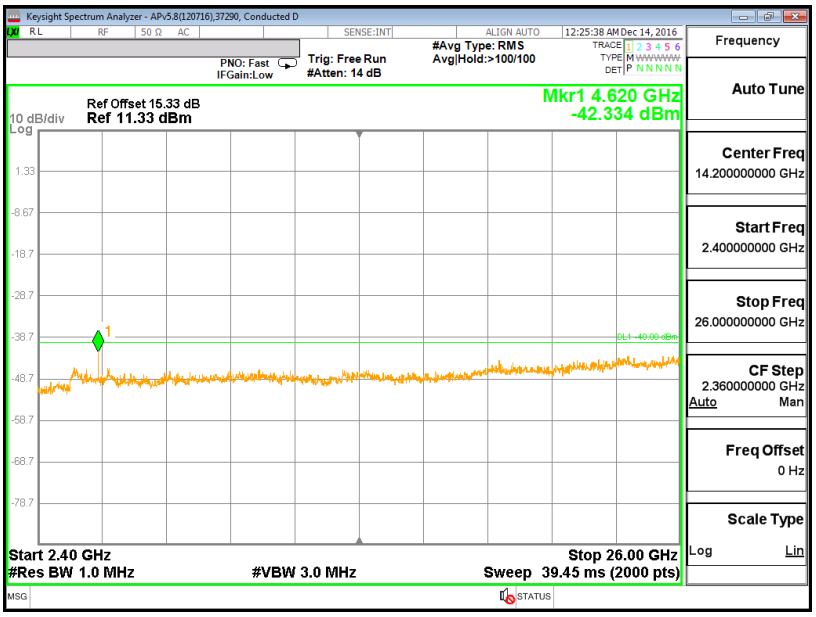
HIGH, RB1-0, 2400 TO 26000 MHz



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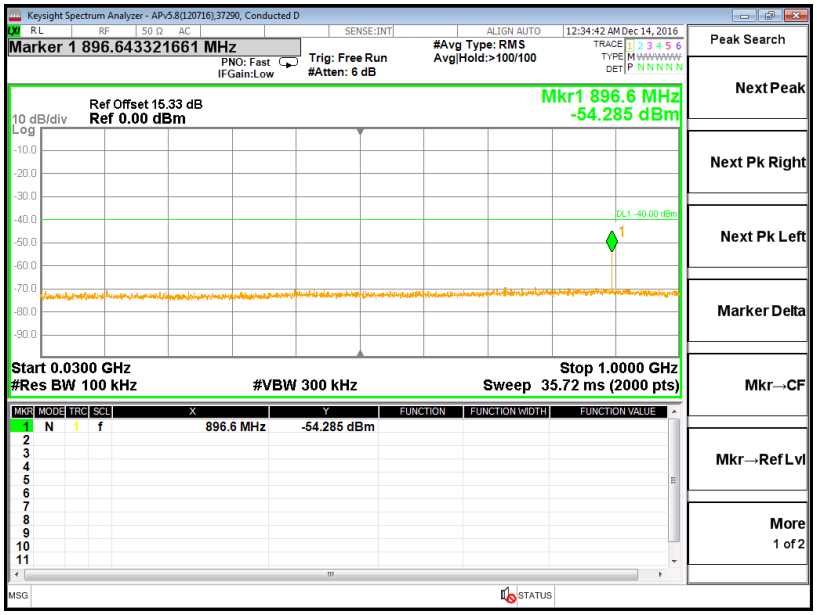
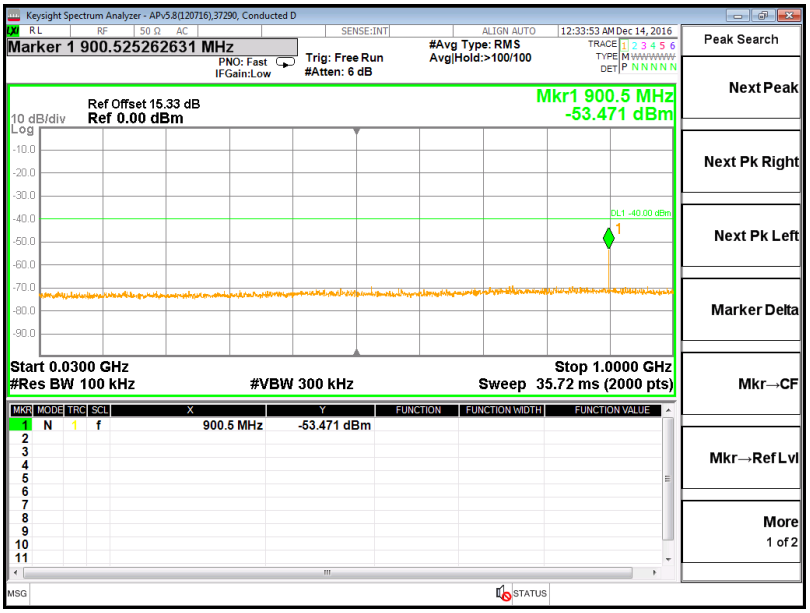
16QAM, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 1000 MHz



MID, RB1-0, 30 TO 1000 MHz



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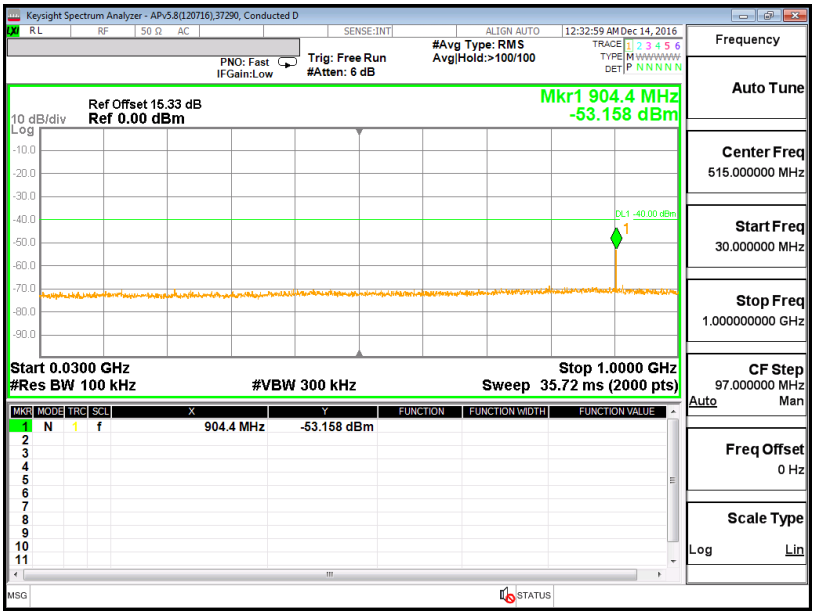
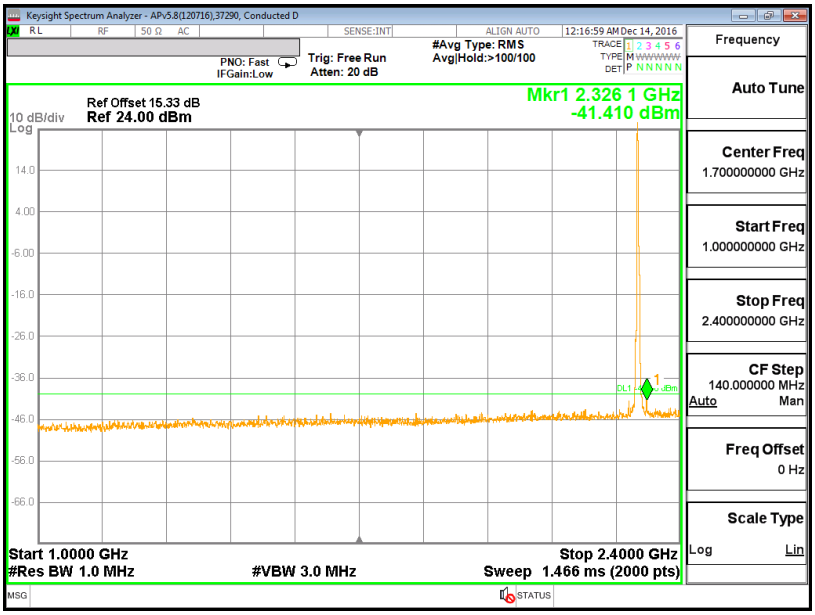
HIGH, RB1-0, 30 TO 1000 MHz



LOW, RB1-0, 1000 TO 2400 MHz



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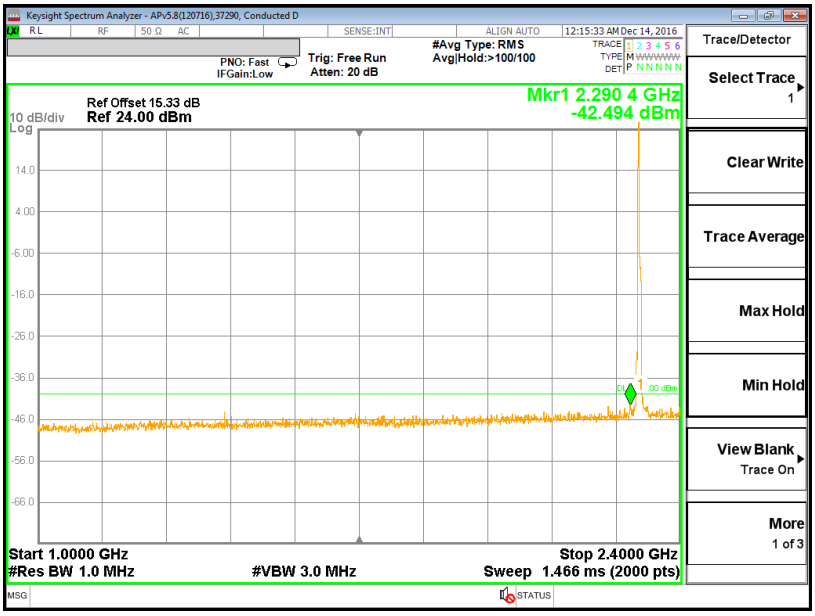
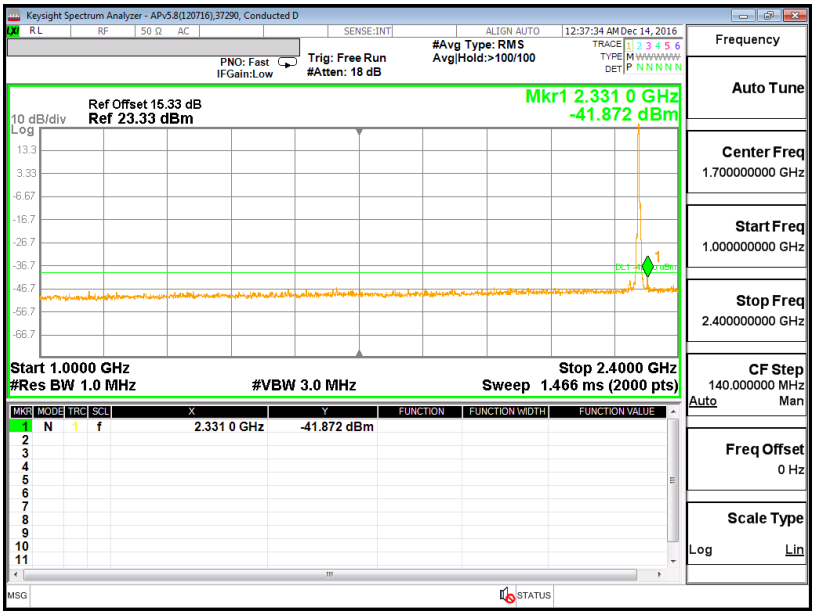
MID, RB1-0, 1000 TO 2400 MHz



HIGH, RB1-0, 1000 TO 2400 MHz



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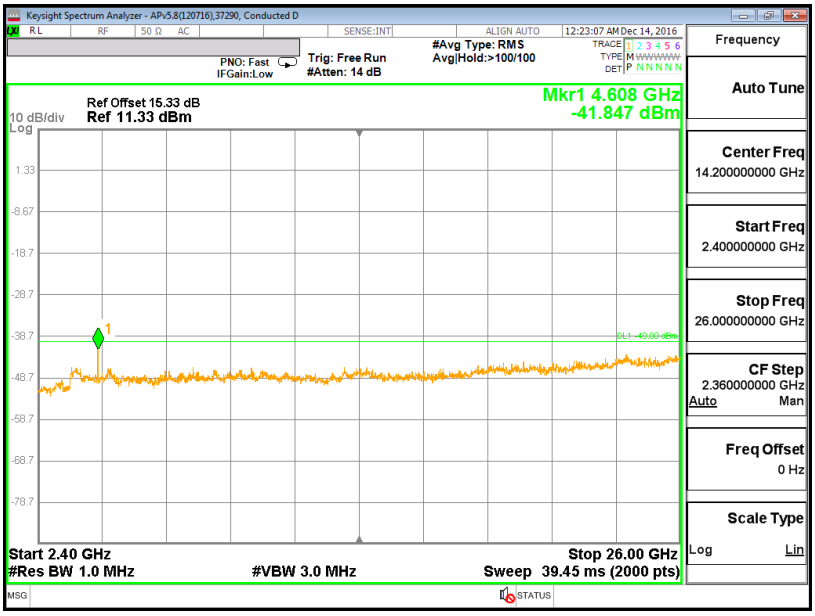
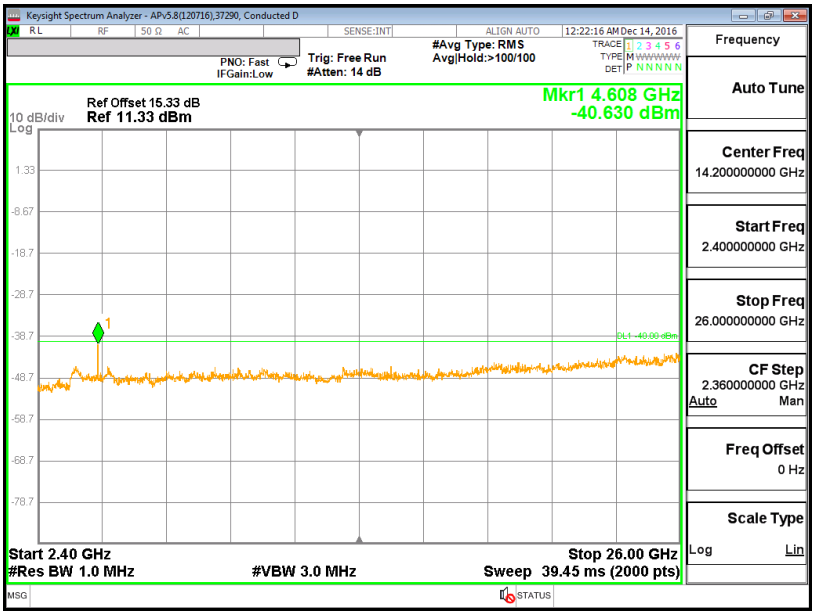
LOW, RB1-0, 2400 TO 26000 MHz



MID, RB1-0, 2400 TO 26000 MHz



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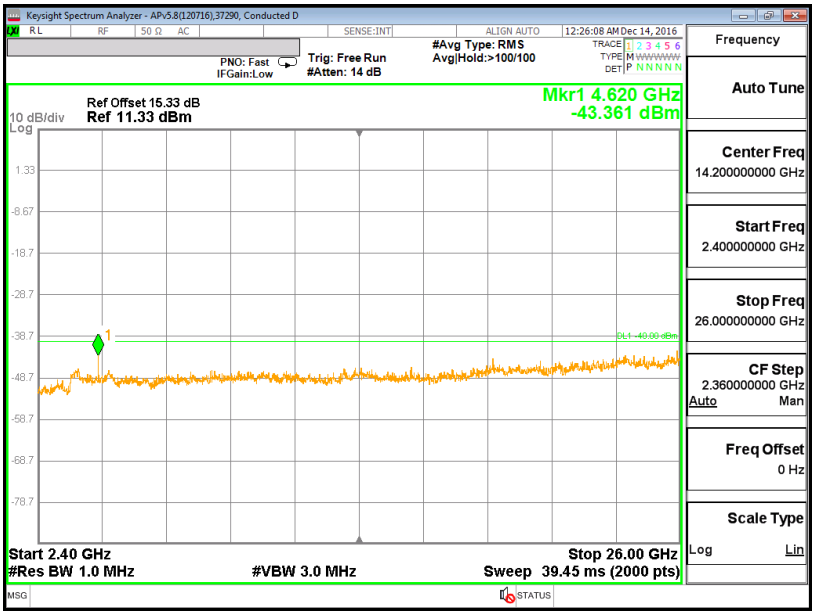
HIGH, RB1-0, 2400 TO 26000 MHz



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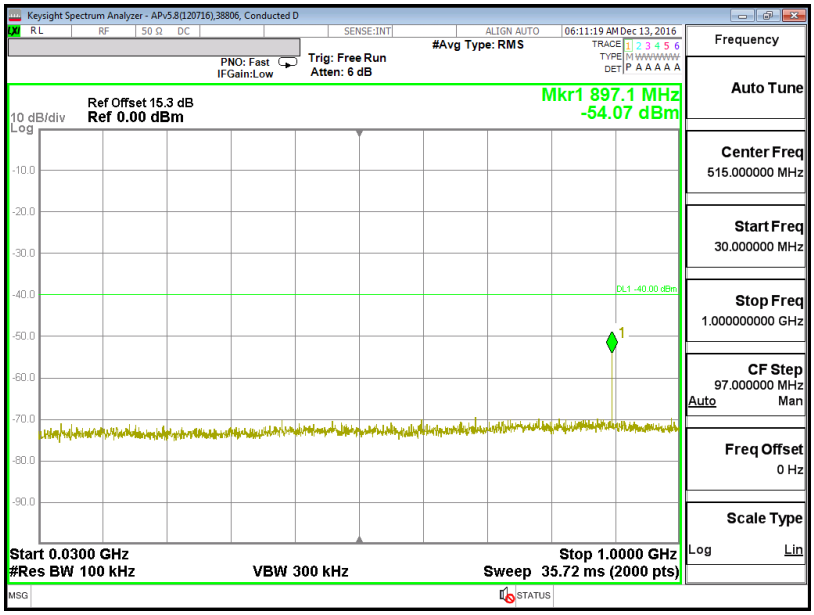
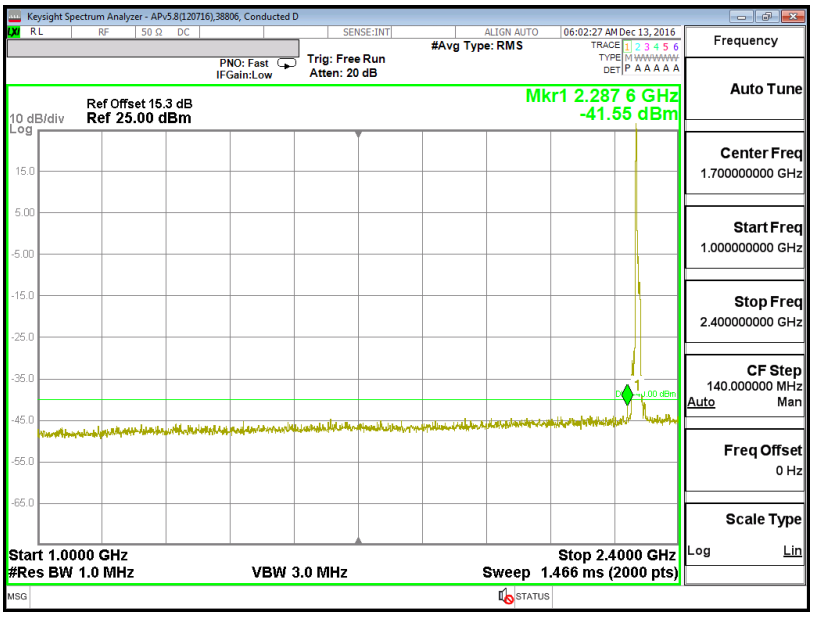
QPSK, (10.0 MHz BAND WIDTH)

MID, RB1-0, 30 TO 1000 MHz



MID, RB1-0, 1000 TO 2400 MHz



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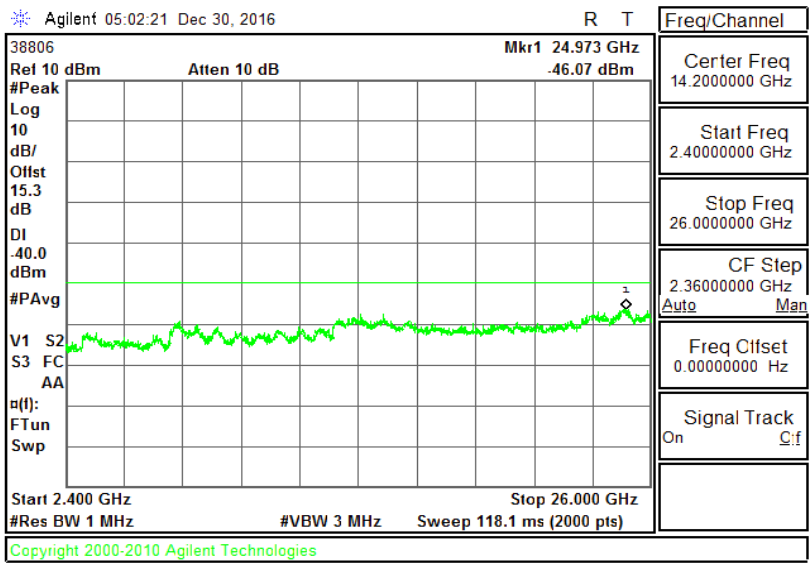
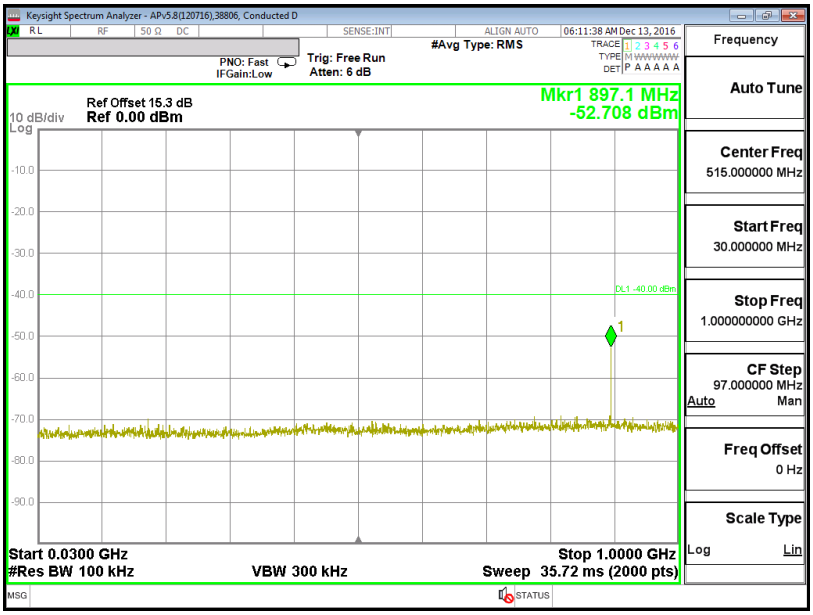
MID, RB1-0, 2400 TO 26000 MHz



16QAM, (10.0 MHz BAND WIDTH)

MID, RB1-0, 30 TO 1000 MHz



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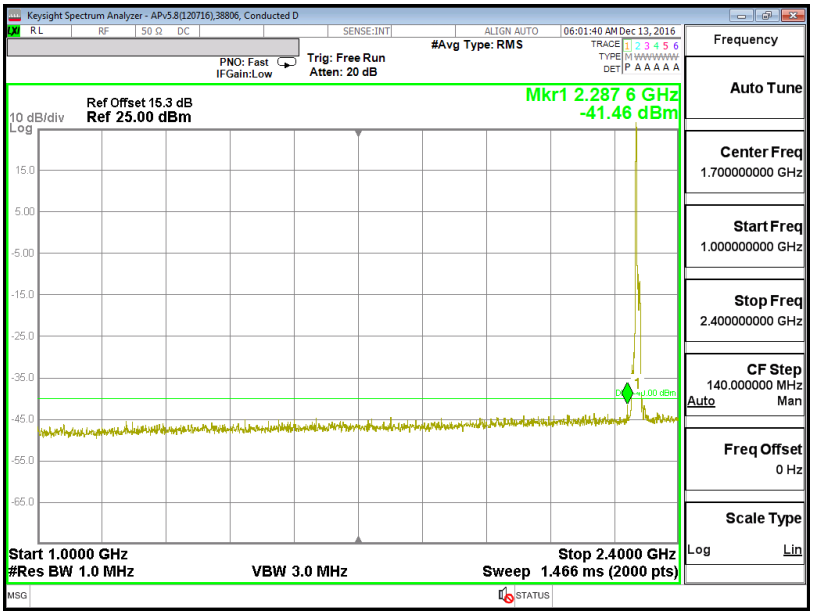
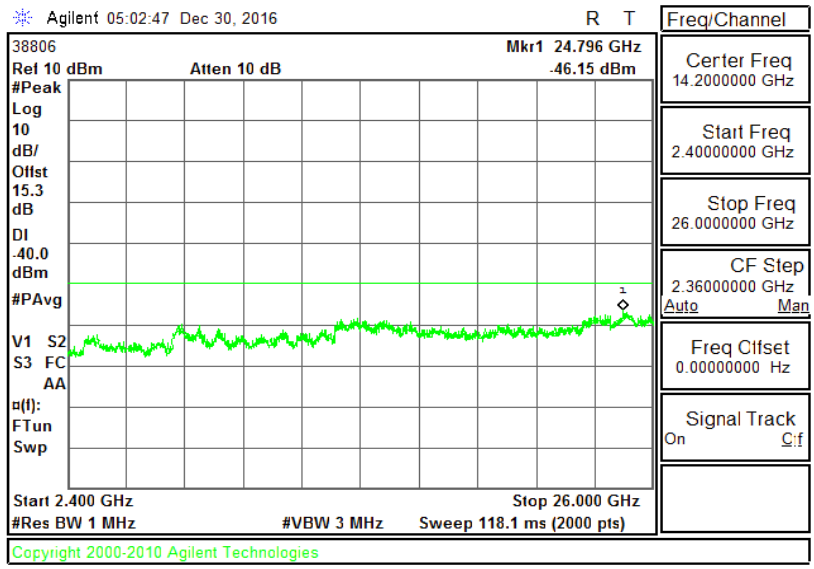
MID, RB1-0, 1000 TO 2400 MHz



MID, RB1-0, 2400 TO 26000 MHz



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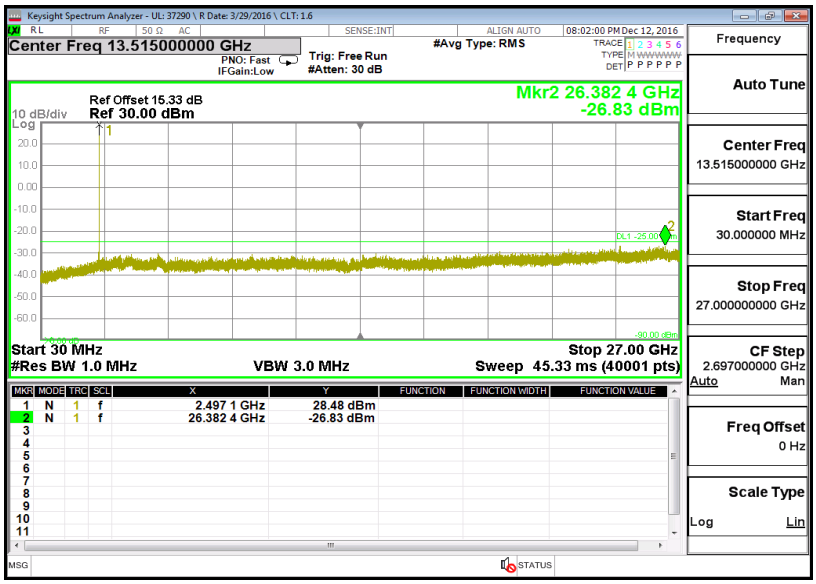
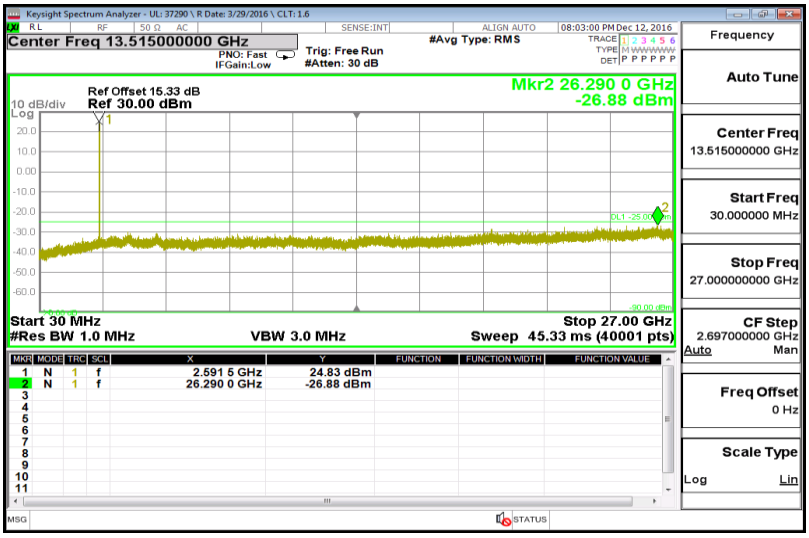
8.3.12. LTE BAND 41

QPSK, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 27000 MHz



MID, RB1-0, 30 TO 27000 MHz



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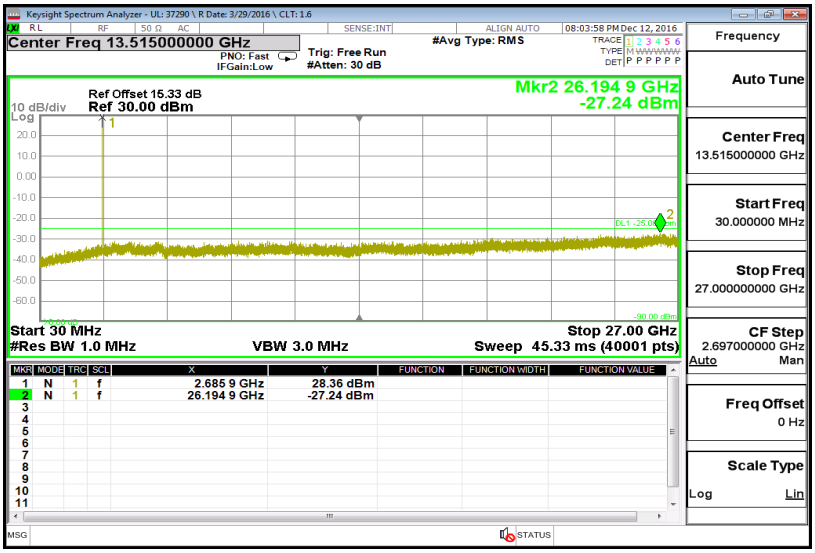
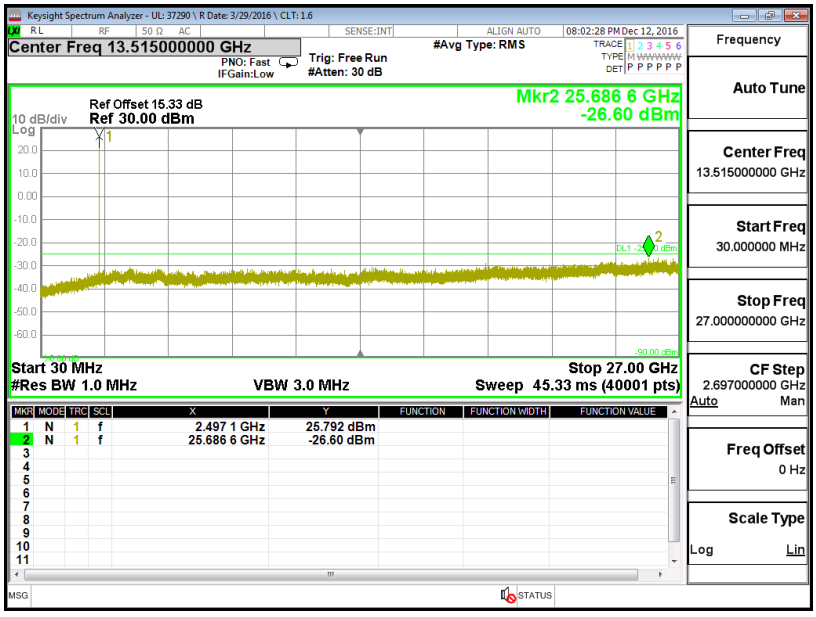
HIGH, RB1-0, 30 TO 27000 MHz



16QAM, (5.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 27000 MHz



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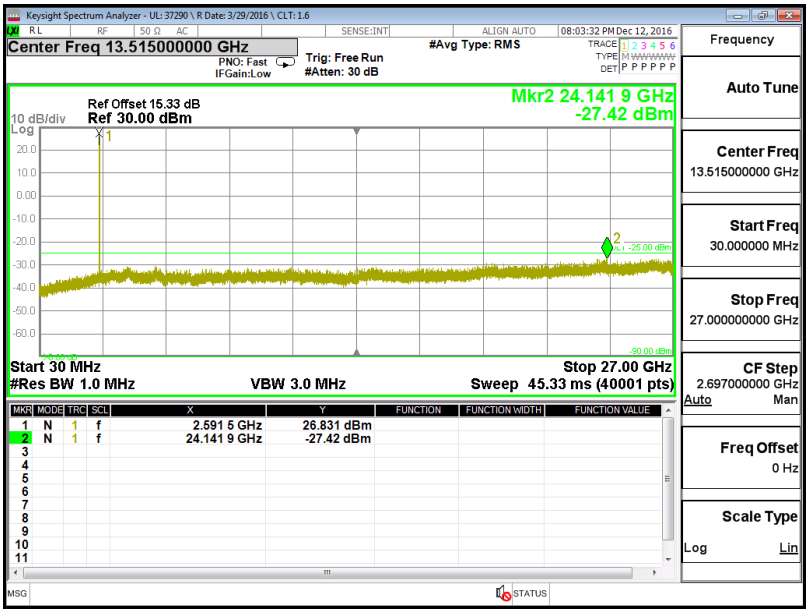
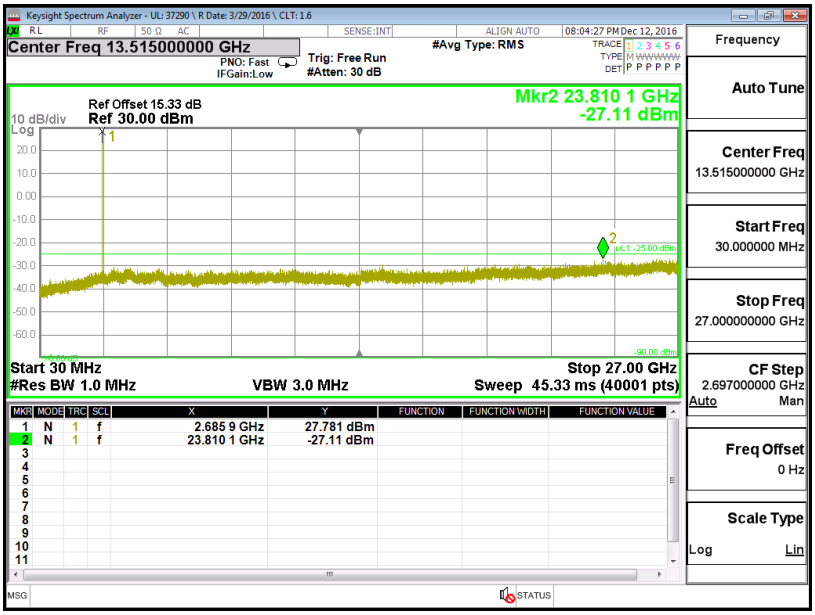
MID, RB1-0, 30 TO 27000 MHz



HIGH, RB1-0, 30 TO 27000 MHz



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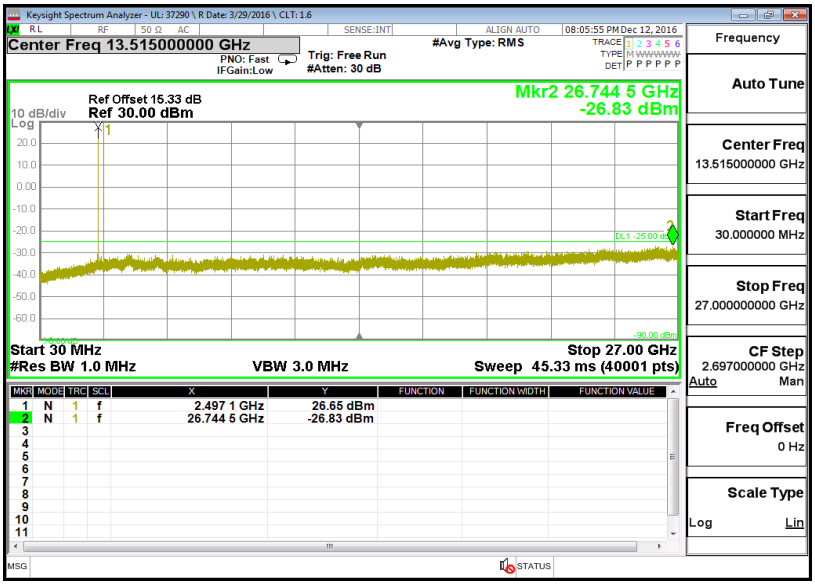
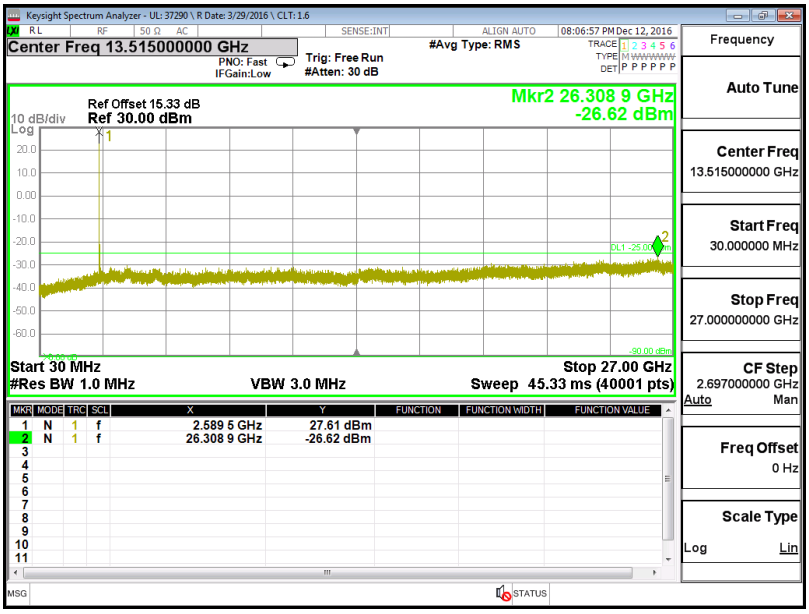
QPSK, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 27000 MHz



MID, RB1-0, 30 TO 27000 MHz



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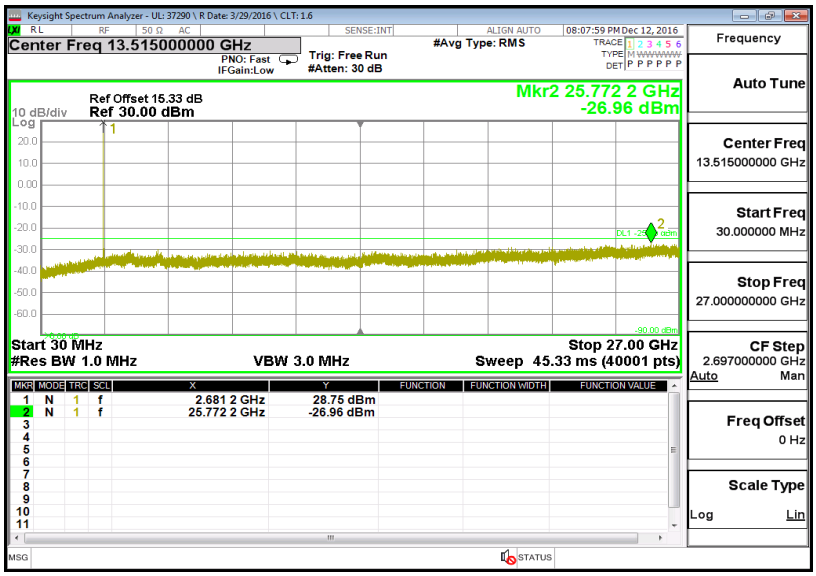
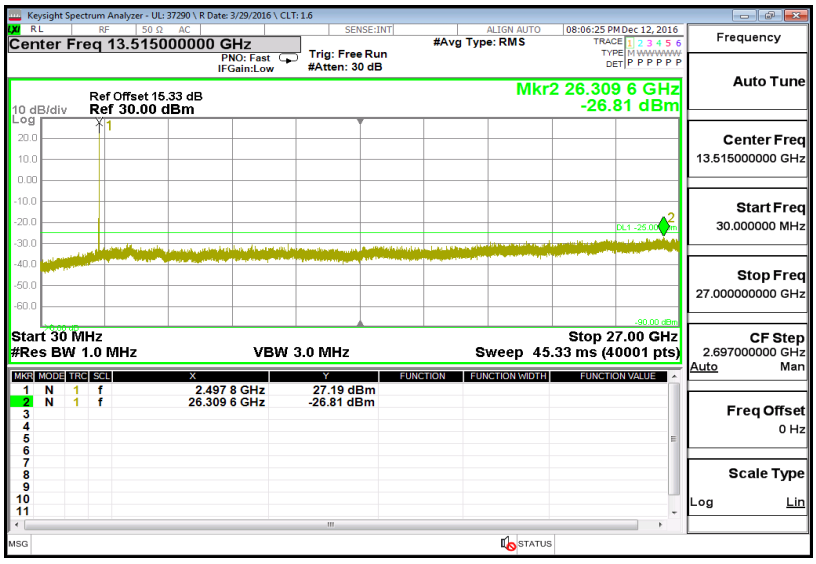
HIGH, RB1-0, 30 TO 27000 MHz



16QAM, (10.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 27000 MHz



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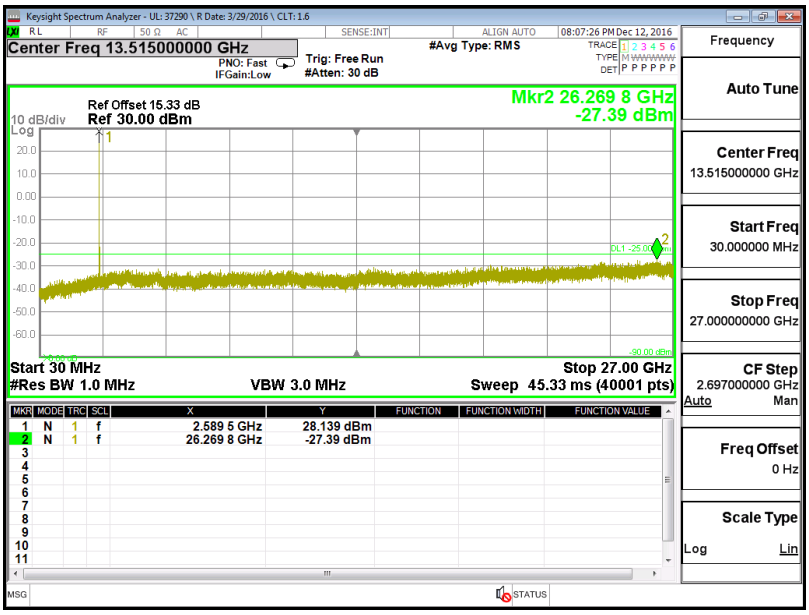
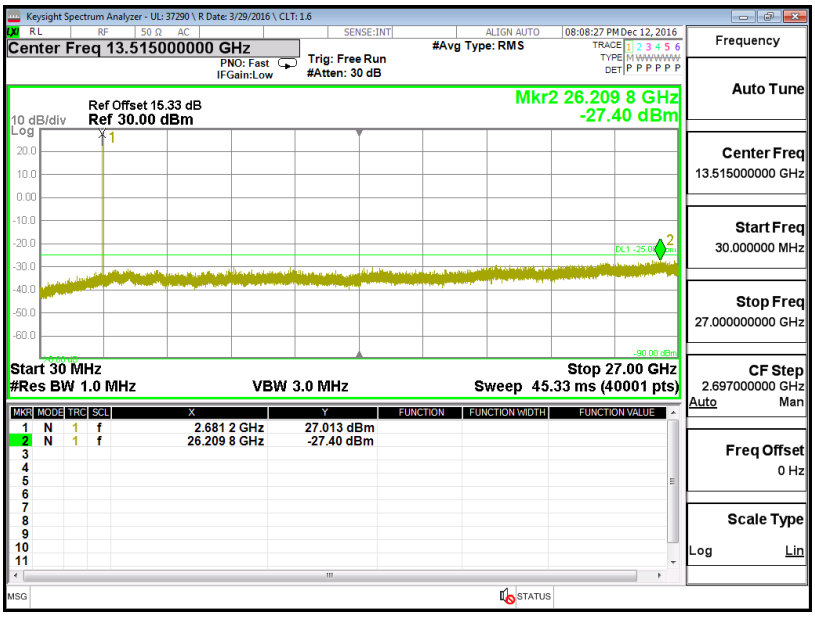
MID, RB1-0, 30 TO 27000 MHz



HIGH, RB1-0, 30 TO 27000 MHz



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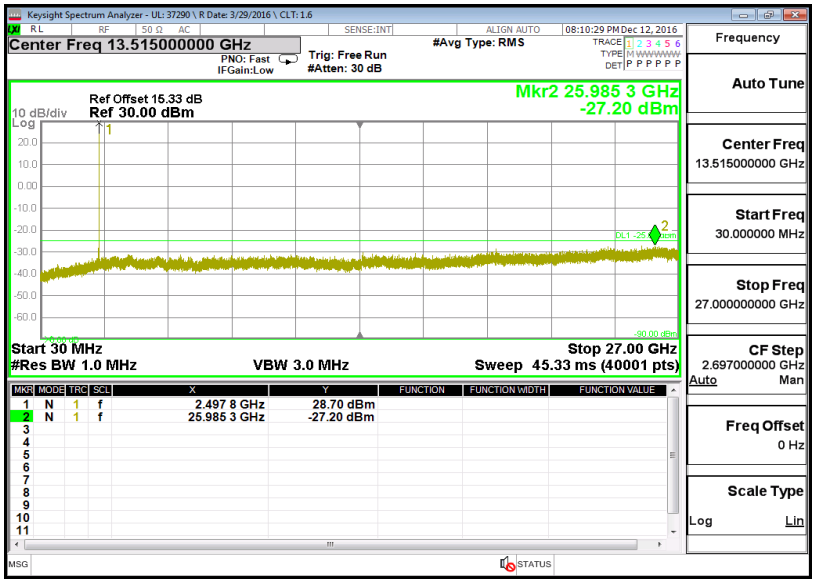
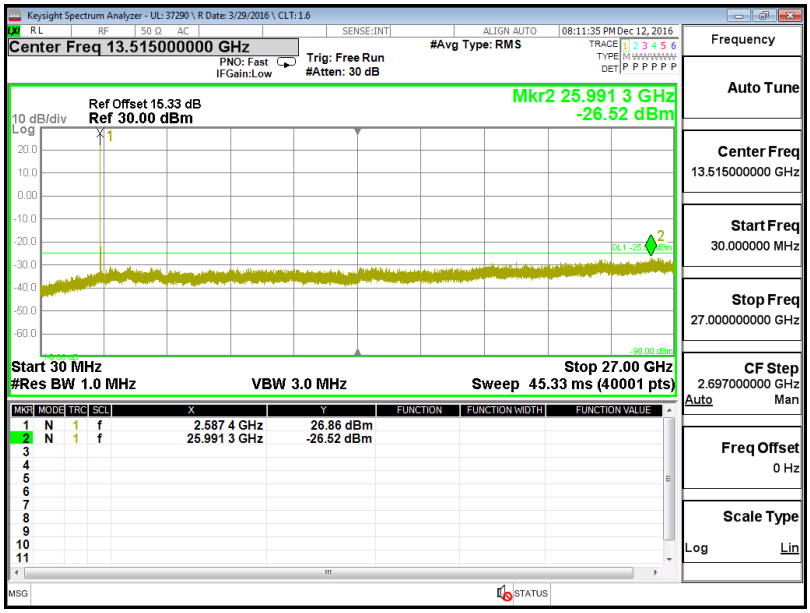
QPSK, (15.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 27000 MHz



MID, RB1-0, 30 TO 27000 MHz



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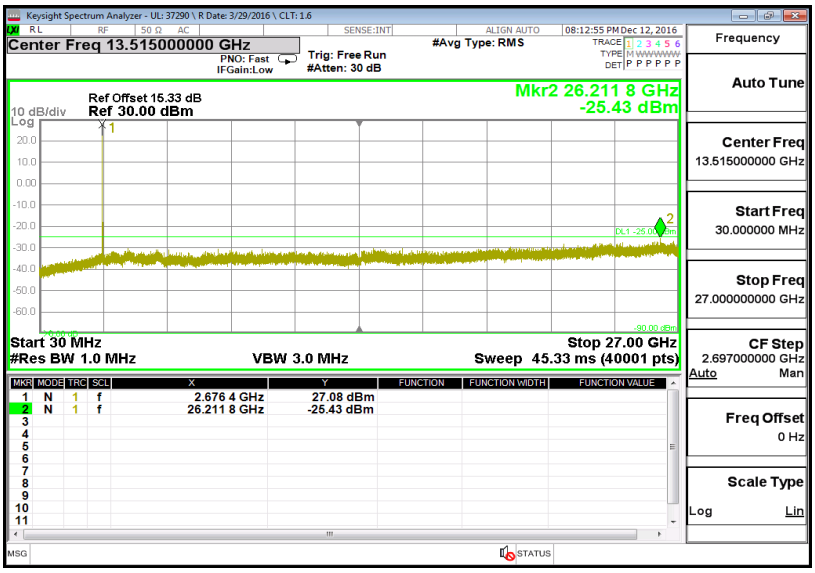
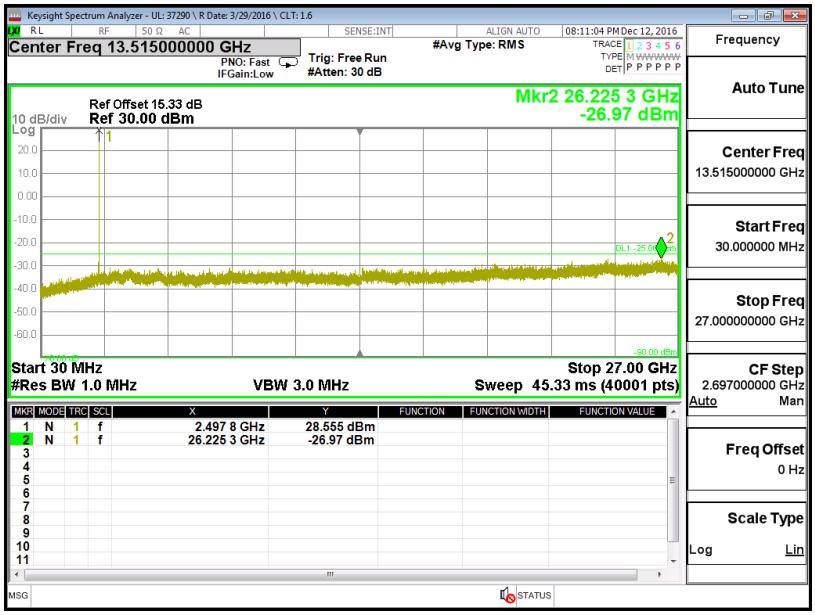
HIGH, RB1-0, 30 TO 27000 MHz



16QAM, (15.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 27000 MHz



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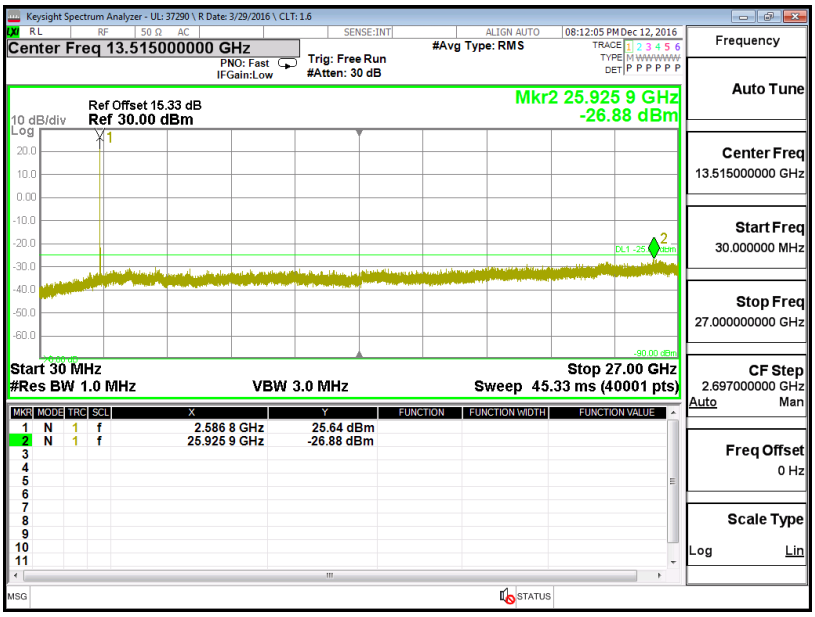
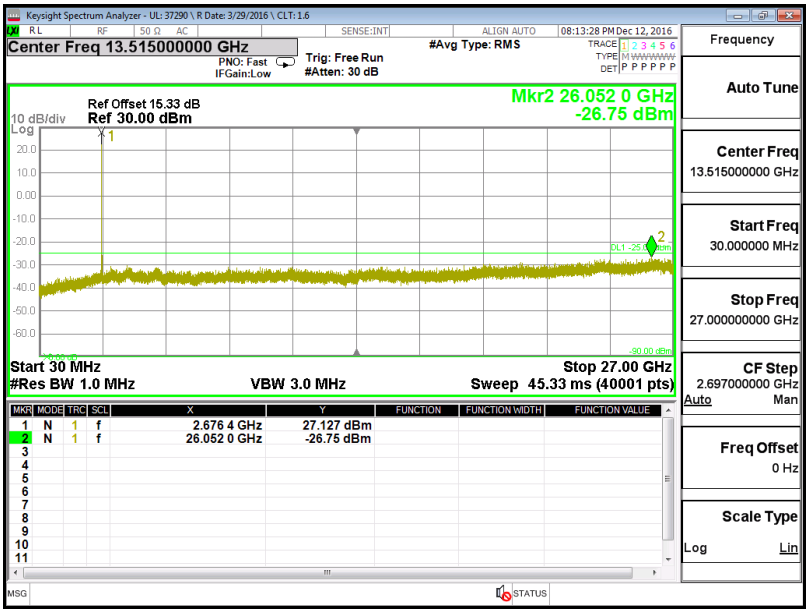
MID, RB1-0, 30 TO 27000 MHz



HIGH, RB1-0, 30 TO 27000 MHz



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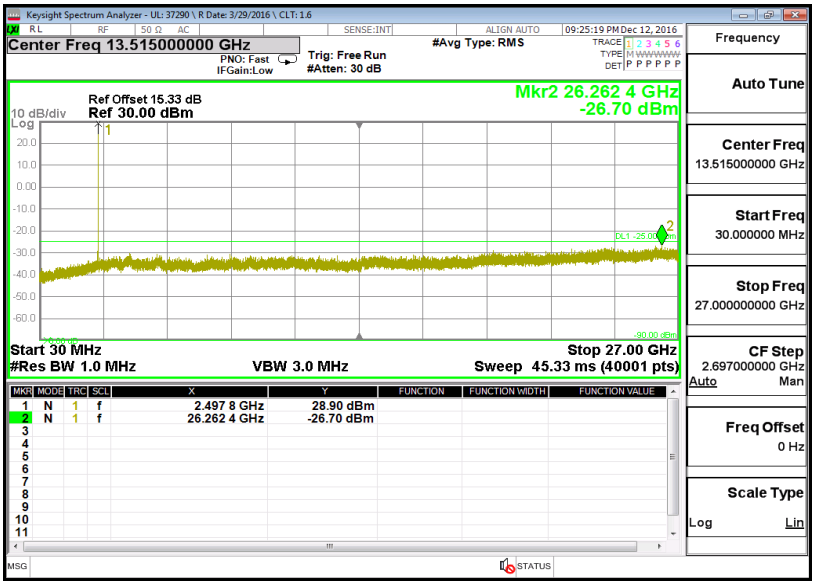
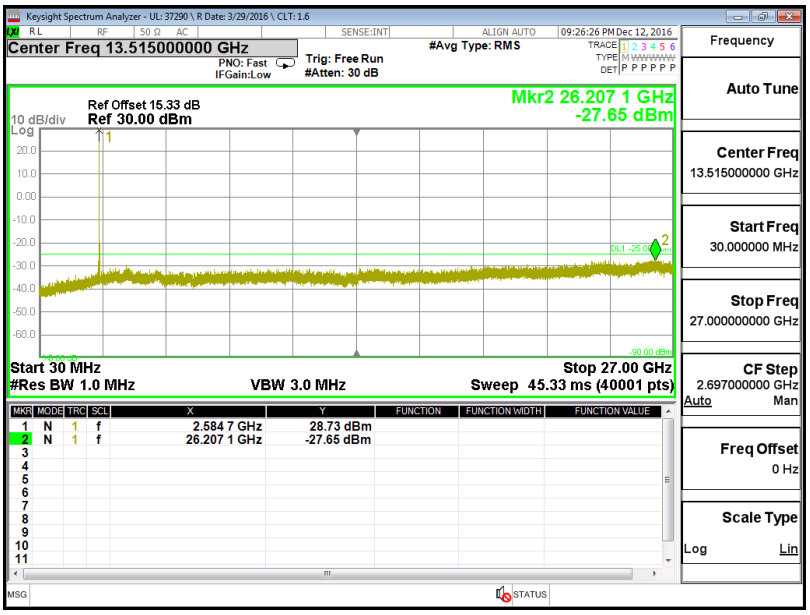
QPSK, (20.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 27000 MHz



MID, RB1-0, 30 TO 27000 MHz



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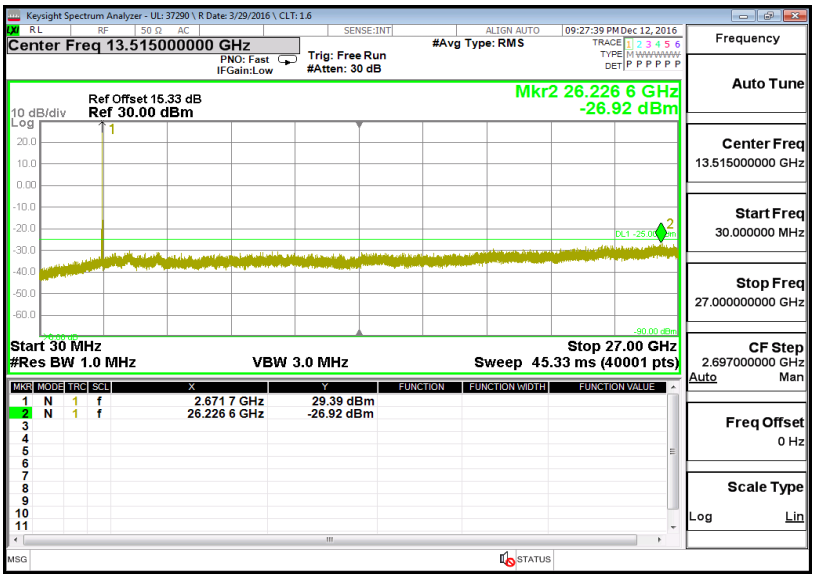
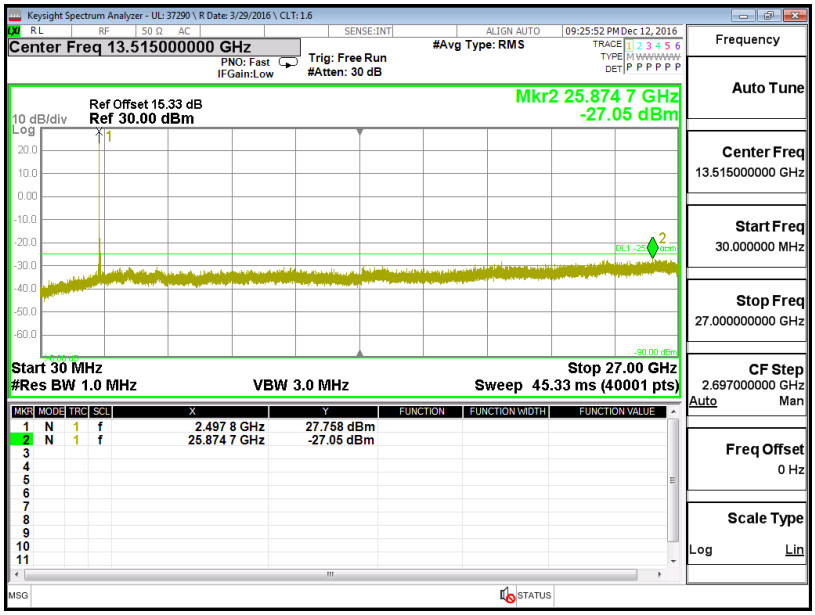
HIGH, RB1-0, 30 TO 27000 MHz



16QAM, (20.0 MHz BAND WIDTH)

LOW, RB1-0, 30 TO 27000 MHz



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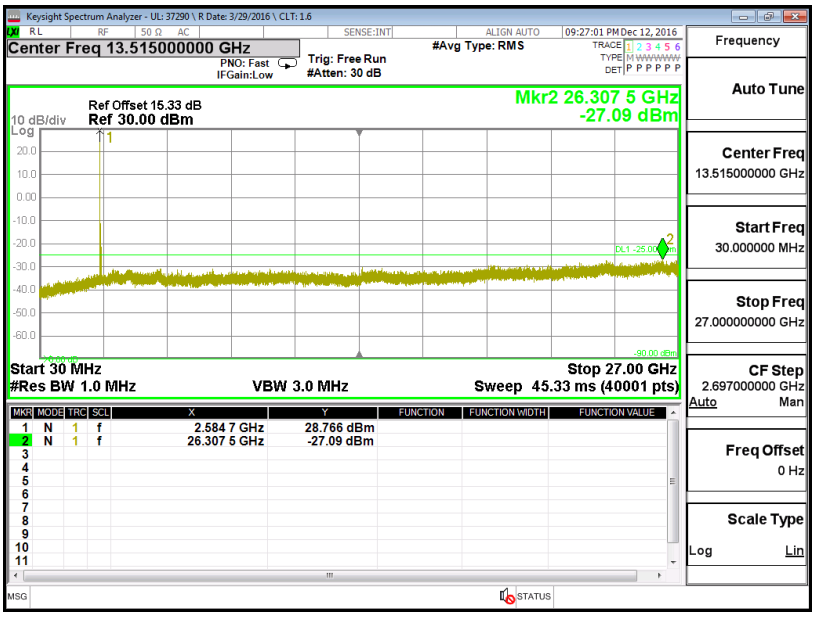
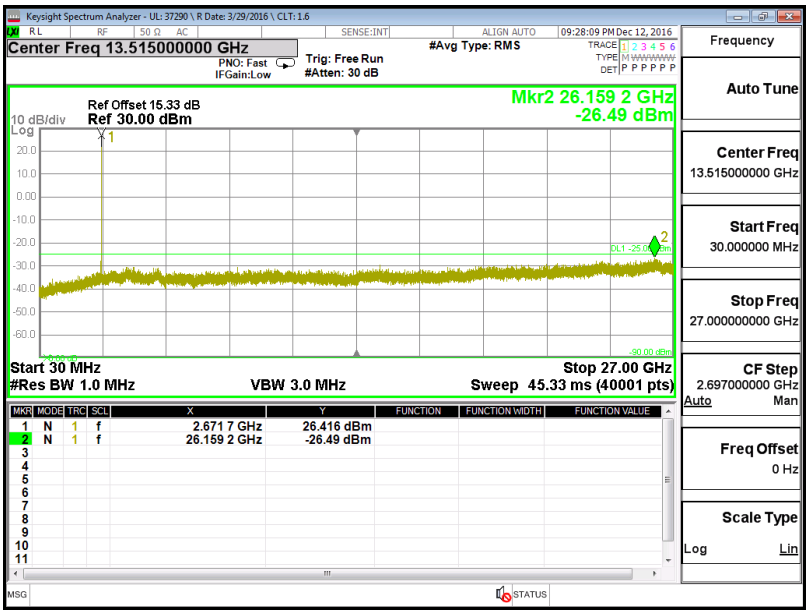
MID, RB1-0, 30 TO 27000 MHz



HIGH, RB1-0, 30 TO 27000 MHz



UL VERIFICATION SERVICES INC.
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
FORM NO: CCSUP4031B
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8.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54 and §90.213

LIMITS

§22.355
The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

§24.235 & §27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

§90.213
The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = −30° to +50°C
- Voltage = (85% - 115%)

  Low voltage, 3.23VDC, Normal, 3.8VDC and High voltage, 4.37VDC.
  End Voltage, 3.2VDC.

Frequency Stability vs Temperature:
The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

Frequency Stability vs Voltage:
The peak frequency error is recorded (worst-case).

MODES TESTED

- LTE Band 2
- LTE Band 4
- LTE Band 5
- LTE Band 7
- LTE Band 12
- LTE Band 13
- LTE Band 17
- LTE Band 25
- LTE Band 26
- LTE Band 27
- LTE Band 30
- LTE Band 41

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RESULTS

See the following pages.

8.4.1. **LTE BAND 2**

ID:	39005	Date:	12/10/16

QPSK, (20MHz BANDWIDTH)

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1851.0706	1908.9628		
Extreme (50C)		1851.0706	1908.9628	7.0	0.004
Extreme (40C)		1851.0706	1908.9628	9.6	0.005
Extreme (30C)		1851.0706	1908.9628	7.0	0.004
Extreme (10C)		1851.0706	1908.9628	6.3	0.003
Extreme (0C)		1851.0706	1908.9628	5.7	0.003
Extreme (-10C)		1851.0706	1908.9628	6.6	0.003
Extreme (-20C)		1851.0706	1908.9628	5.5	0.003
Extreme (-30C)		1851.0706	1908.9628	6.5	0.003
20C	15%	1851.0706	1908.9628	6.9	0.004
	-15%	1851.0706	1908.9628	6.2	0.003
	End Point	1851.0706	1908.9628	5.9	0.003

16QAM, (20MHz BANDWIDTH)

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1851.0496	1908.9291		
Extreme (50C)		1851.0496	1908.9291	8.5	0.005
Extreme (40C)		1851.0496	1908.9291	10.5	0.006
Extreme (30C)		1851.0496	1908.9291	9.3	0.005
Extreme (10C)		1851.0496	1908.9291	6.1	0.003
Extreme (0C)		1851.0496	1908.9291	6.4	0.003
Extreme (-10C)		1851.0496	1908.9291	6.6	0.004
Extreme (-20C)		1851.0496	1908.9291	4.9	0.003
Extreme (-30C)		1851.0496	1908.9291	7.0	0.004
20C	15%	1851.0496	1908.9291	6.9	0.004
	-15%	1851.0496	1908.9291	6.4	0.003
	End Point	1851.0496	1908.9291	5.6	0.003

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8.4.2. **LTE BAND 4**

ID:	39005	Date:	12/10/16

QPSK, (20MHz BANDWIDTH)

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1711.0750	1753.9328		
Extreme (50C)		1711.0750	1753.9328	8.4	0.005
Extreme (40C)		1711.0750	1753.9328	6.5	0.004
Extreme (30C)		1711.0750	1753.9328	6.9	0.004
Extreme (10C)		1711.0750	1753.9328	6.8	0.004
Extreme (0C)		1711.0750	1753.9328	7.6	0.004
Extreme (-10C)		1711.0750	1753.9328	5.7	0.003
Extreme (-20C)		1711.0750	1753.9328	6.9	0.004
Extreme (-30C)		1711.0750	1753.9328	7.0	0.004
20C	15%	1711.0750	1753.9328	5.8	0.003
	-15%	1711.0750	1753.9328	4.4	0.003
	End Point	1711.0750	1753.9328	4.2	0.002

16QAM, (20MHz BANDWIDTH)

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1711.0566	1753.9401		
Extreme (50C)		1711.0566	1753.9401	9.5	0.005
Extreme (40C)		1711.0566	1753.9401	7.7	0.004
Extreme (30C)		1711.0566	1753.9401	6.8	0.004
Extreme (10C)		1711.0566	1753.9401	4.9	0.003
Extreme (0C)		1711.0566	1753.9401	7.8	0.005
Extreme (-10C)		1711.0566	1753.9401	5.2	0.003
Extreme (-20C)		1711.0566	1753.9401	8.5	0.005
Extreme (-30C)		1711.0566	1753.9401	6.3	0.004
20C	15%	1711.0566	1753.9401	5.6	0.003
	-15%	1711.0566	1753.9401	6.3	0.004
	End Point	1711.0566	1753.9401	4.6	0.003

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8.4.3. **LTE BAND 5**

ID:	39005	Date:	12/10/16

QPSK, (10MHz BANDWIDTH)

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.5286	848.4701		
Extreme (50C)		824.5286	848.4701	4.4	0.005
Extreme (40C)		824.5286	848.4701	5.3	0.006
Extreme (30C)		824.5286	848.4701	-3.4	-0.004
Extreme (10C)		824.5286	848.4701	6.1	0.007
Extreme (0C)		824.5286	848.4701	5.0	0.006
Extreme (-10C)		824.5286	848.4701	5.3	0.006
Extreme (-20C)		824.5286	848.4701	5.5	0.007
Extreme (-30C)		824.5286	848.4701	3.4	0.004
20C	15%	824.5286	848.4701	-2.2	-0.003
	-15%	824.5286	848.4701	-3.3	-0.004
	End Point	824.5286	848.4701	-3.2	-0.004

16QAM, (10MHz BANDWIDTH)

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.5238	848.4763		
Extreme (50C)		824.5238	848.4764	4.0	0.005
Extreme (40C)		824.5238	848.4764	7.5	0.009
Extreme (30C)		824.5238	848.4763	2.5	0.003
Extreme (10C)		824.5238	848.4764	5.7	0.007
Extreme (0C)		824.5238	848.4764	8.2	0.010
Extreme (-10C)		824.5238	848.4764	5.3	0.006
Extreme (-20C)		824.5238	848.4763	-2.1	-0.003
Extreme (-30C)		824.5238	848.4764	6.4	0.008
20C	15%	824.5238	848.4763	-2.2	-0.003
	-15%	824.5238	848.4763	3.2	0.004
	End Point	824.5238	848.4763	-5.8	-0.007

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8.4.4. **LTE BAND 7**

ID:	39005	Date:	12/10/16

QPSK, (20MHz BANDWIDTH)

Limit		2500	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2501.0760	2568.9371		
Extreme (50C)		2501.0760	2568.9371	-7.5	-0.003
Extreme (40C)		2501.0760	2568.9371	-8.5	-0.003
Extreme (30C)		2501.0760	2568.9371	-10.0	-0.004
Extreme (10C)		2501.0760	2568.9371	-9.4	-0.004
Extreme (0C)		2501.0760	2568.9371	-8.0	-0.003
Extreme (-10C)		2501.0760	2568.9371	-9.2	-0.004
Extreme (-20C)		2501.0760	2568.9371	-10.2	-0.004
Extreme (-30C)		2501.0760	2568.9371	-7.9	-0.003
20C	15%	2501.0760	2568.9371	-7.4	-0.003
	-15%	2501.0760	2568.9371	-10.1	-0.004
	End Point	2501.0760	2568.9371	-12.2	-0.005

16QAM, (20MHz BANDWIDTH)

Limit		2500	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2501.0861	2568.9344		
Extreme (50C)		2501.0861	2568.9344	-6.5	-0.003
Extreme (40C)		2501.0861	2568.9344	-9.3	-0.004
Extreme (30C)		2501.0861	2568.9344	-9.4	-0.004
Extreme (10C)		2501.0861	2568.9344	-10.2	-0.004
Extreme (0C)		2501.0861	2568.9344	-7.5	-0.003
Extreme (-10C)		2501.0861	2568.9344	-10.1	-0.004
Extreme (-20C)		2501.0861	2568.9344	-12.3	-0.005
Extreme (-30C)		2501.0861	2568.9344	-11.6	-0.005
20C	15%	2501.0861	2568.9344	-10.4	-0.004
	-15%	2501.0861	2568.9344	-10.4	-0.004
	End Point	2501.0861	2568.9344	-13.7	-0.005

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8.4.5. **LTE BAND 12**

ID:	39005	Date:	12/10/16

QPSK, (10MHz BANDWIDTH)

Limit		699	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	699.5338	715.4708		
Extreme (50C)		699.5338	715.4708	2.0	0.00
Extreme (40C)		699.5338	715.4708	2.2	0.00
Extreme (30C)		699.5338	715.4708	2.7	0.00
Extreme (10C)		699.5338	715.4708	-2.5	0.00
Extreme (0C)		699.5338	715.4708	2.4	0.00
Extreme (-10C)		699.5338	715.4708	-3.4	0.00
Extreme (-20C)		699.5338	715.4708	-3.4	0.00
Extreme (-30C)		699.5338	715.4708	-4.1	-0.01
20C	15%	699.5338	715.4708	1.5	0.00
	-15%	699.5338	715.4708	3.2	0.00
	End Point	699.5338	715.4708	-2.1	0.00

16QAM, (10MHz BANDWIDTH)

Limit		699	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	699.5238	715.4650		
Extreme (50C)		699.5238	715.4650	2.1	0.00
Extreme (40C)		699.5238	715.4650	3.3	0.00
Extreme (30C)		699.5238	715.4650	1.5	0.00
Extreme (10C)		699.5238	715.4650	2.6	0.00
Extreme (0C)		699.5238	715.4650	-3.7	-0.01
Extreme (-10C)		699.5238	715.4650	-4.2	-0.01
Extreme (-20C)		699.5238	715.4650	-2.2	0.00
Extreme (-30C)		699.5238	715.4650	-3.1	0.00
20C	15%	699.5238	715.4650	-4.0	-0.01
	-15%	699.5238	715.4650	2.3	0.00
	End Point	699.5238	715.4650	-3.2	0.00

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8.4.6. **LTE BAND 13**

ID:	39005	Date:	12/10/16

QPSK, (10MHz BANDWIDTH)

Limit		777	787	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	777.5307	786.4700		
Extreme (50C)		777.5307	786.4700	3.1	0.004
Extreme (40C)		777.5307	786.4700	2.8	0.004
Extreme (30C)		777.5307	786.4700	2.4	0.003
Extreme (10C)		777.5307	786.4700	2.3	0.003
Extreme (0C)		777.5307	786.4700	3.1	0.004
Extreme (-10C)		777.5307	786.4700	3.4	0.004
Extreme (-20C)		777.5307	786.4700	3.3	0.004
Extreme (-30C)		777.5307	786.4700	3.5	0.004
20C	15%	777.5307	786.4700	2.9	0.004
	-15%	777.5307	786.4700	4.3	0.006
	End Point	777.5307	786.4700	2.5	0.003

16QAM, (10MHz BANDWIDTH)

Limit		777	787	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	777.5362	786.4681		
Extreme (50C)		777.5362	786.4681	3.2	0.004
Extreme (40C)		777.5362	786.4681	2.9	0.004
Extreme (30C)		777.5362	786.4681	2.4	0.003
Extreme (10C)		777.5362	786.4681	2.2	0.003
Extreme (0C)		777.5362	786.4681	2.6	0.003
Extreme (-10C)		777.5362	786.4681	3.5	0.004
Extreme (-20C)		777.5362	786.4681	3.5	0.004
Extreme (-30C)		777.5362	786.4681	3.8	0.005
20C	15%	777.5362	786.4681	2.8	0.004
	-15%	777.5362	786.4681	4.2	0.005
	End Point	777.5362	786.4681	3.0	0.004

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8.4.7. **LTE BAND 17**

ID:	39005	Date:	12/10/16

QPSK, (10MHz BANDWIDTH)

Limit		704	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	704.5311	715.4651		
Extreme (50C)		704.5311	715.4651	2.2	0.003
Extreme (40C)		704.5311	715.4651	2.9	0.004
Extreme (30C)		704.5311	715.4651	2.6	0.004
Extreme (10C)		704.5311	715.4651	3.1	0.004
Extreme (0C)		704.5311	715.4651	2.7	0.004
Extreme (-10C)		704.5311	715.4651	2.1	0.003
Extreme (-20C)		704.5311	715.4651	3.1	0.004
Extreme (-30C)		704.5311	715.4651	-2.6	-0.004
20C	15%	704.5311	715.4651	-2.3	-0.003
	-15%	704.5311	715.4651	3.4	0.005
	End Point	704.5311	715.4651	3.2	0.005

16QAM, (10MHz BANDWIDTH)

Limit		704	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	704.5256	715.4775		
Extreme (50C)		704.5256	715.4775	2.5	0.004
Extreme (40C)		704.5256	715.4775	2.4	0.003
Extreme (30C)		704.5256	715.4775	3.1	0.004
Extreme (10C)		704.5256	715.4775	4.3	0.006
Extreme (0C)		704.5256	715.4775	2.8	0.004
Extreme (-10C)		704.5256	715.4775	2.5	0.003
Extreme (-20C)		704.5256	715.4775	3.6	0.005
Extreme (-30C)		704.5256	715.4775	-3.0	-0.004
20C	15%	704.5256	715.4775	1.5	0.002
	-15%	704.5256	715.4775	-2.2	-0.003
	End Point	704.5256	715.4775	-2.3	-0.003

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8.4.8. **LTE BAND 25**

ID:	39005	Date:	12/10/16

QPSK, (20MHz BANDWIDTH)

Limit		1850	1915	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1851.0089	1913.9206		
Extreme (50C)		1851.0089	1913.9206	7.3	0.004
Extreme (40C)		1851.0089	1913.9206	9.2	0.005
Extreme (30C)		1851.0089	1913.9206	5.3	0.003
Extreme (10C)		1851.0089	1913.9206	5.5	0.003
Extreme (0C)		1851.0089	1913.9206	8.7	0.005
Extreme (-10C)		1851.0089	1913.9206	6.9	0.004
Extreme (-20C)		1851.0089	1913.9206	5.8	0.003
Extreme (-30C)		1851.0089	1913.9206	4.3	0.002
20C	15%	1851.0089	1913.9206	6.3	0.003
	-15%	1851.0089	1913.9206	8.3	0.004
	End Point	1851.0089	1913.9206	4.9	0.003

16QAM, (20MHz BANDWIDTH)

Limit		1850	1915	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1851.0396	1913.9291		
Extreme (50C)		1851.0396	1913.9291	9.2	0.005
Extreme (40C)		1851.0396	1913.9291	7.6	0.004
Extreme (30C)		1851.0396	1913.9291	6.6	0.003
Extreme (10C)		1851.0396	1913.9291	5.8	0.003
Extreme (0C)		1851.0396	1913.9291	8.2	0.004
Extreme (-10C)		1851.0396	1913.9291	6.2	0.003
Extreme (-20C)		1851.0396	1913.9291	5.0	0.003
Extreme (-30C)		1851.0396	1913.9291	3.9	0.002
20C	15%	1851.0396	1913.9291	7.1	0.004
	-15%	1851.0396	1913.9291	6.4	0.003
	End Point	1851.0396	1913.9291	5.6	0.003

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8.4.9. **LTE BAND 26**

ID:	43575	Date:	12/10/16

QPSK, (10MHz BANDWIDTH)

Limit		814	824	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	814.5219	823.4699		
Extreme (50C)		814.5219	823.4699	4.1	0.005
Extreme (40C)		814.5219	823.4699	3.3	0.004
Extreme (30C)		814.5219	823.4699	3.4	0.004
Extreme (10C)		814.5219	823.4699	2.6	0.003
Extreme (0C)		814.5219	823.4699	2.3	0.003
Extreme (-10C)		814.5219	823.4699	2.4	0.003
Extreme (-20C)		814.5219	823.4699	2.1	0.003
Extreme (-30C)		814.5219	823.4699	3.2	0.004
20C	15%	814.5219	823.4699	2.6	0.003
	-15%	814.5219	823.4699	3.2	0.004
	End Point	814.5219	823.4699	2.1	0.003

16QAM, (10MHz BANDWIDTH)

Limit		814	824	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	814.5312	823.4666		
Extreme (50C)		814.5312	823.4666	3.9	0.005
Extreme (40C)		814.5312	823.4666	3.2	0.004
Extreme (30C)		814.5312	823.4666	3.3	0.004
Extreme (10C)		814.5312	823.4666	2.2	0.003
Extreme (0C)		814.5312	823.4666	2.6	0.003
Extreme (-10C)		814.5312	823.4666	2.3	0.003
Extreme (-20C)		814.5312	823.4666	2.5	0.003
Extreme (-30C)		814.5312	823.4666	3.0	0.004
20C	15%	814.5312	823.4666	2.2	0.003
	-15%	814.5312	823.4666	3.0	0.004
	End Point	814.5312	823.4666	2.3	0.003

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8.4.10. LTE BAND 27

ID:	43575	Date:	12/13/16

QPSK, (10MHz BANDWIDTH)

Limit		814	824	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	814.5330	823.4697		
Extreme (50C)		814.5330	823.4697	-3.8	-0.005
Extreme (40C)		814.5330	823.4697	-4.2	-0.005
Extreme (30C)		814.5330	823.4697	-3.8	-0.005
Extreme (10C)		814.5330	823.4697	-3.2	-0.004
Extreme (0C)		814.5330	823.4697	-3.4	-0.004
Extreme (-10C)		814.5330	823.4697	-3.8	-0.005
Extreme (-20C)		814.5330	823.4697	-4.7	-0.006
Extreme (-30C)		814.5330	823.4697	-4.2	-0.005
20C	15%	814.5330	823.4697	-4.6	-0.006
	-15%	814.5330	823.4697	-3.8	-0.005
	End Point	814.5330	823.4697	-3.9	-0.005

16QAM, (10MHz BANDWIDTH)

Limit		814	824	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	814.5354	823.4696		
Extreme (50C)		814.5354	823.4696	-4.2	-0.005
Extreme (40C)		814.5354	823.4696	-4.5	-0.006
Extreme (30C)		814.5354	823.4696	-4.1	-0.005
Extreme (10C)		814.5354	823.4696	-4.3	-0.005
Extreme (0C)		814.5354	823.4696	-3.9	-0.005
Extreme (-10C)		814.5354	823.4696	-3.7	-0.005
Extreme (-20C)		814.5354	823.4696	-3.5	-0.004
Extreme (-30C)		814.5354	823.4696	-4.6	-0.006
20C	15%	814.5354	823.4696	-4.6	-0.006
	-15%	814.5354	823.4696	-4.2	-0.005
	End Point	814.5354	823.4696	-4.7	-0.006

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8.4.11. LTE BAND 30

ID:	43575	Date:	12/13/16

QPSK, (10MHz BANDWIDTH)

Limit		2305	2315	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2305.5353	2314.4581		
Extreme (50C)		2305.5353	2314.4581	-8.7	-0.004
Extreme (40C)		2305.5353	2314.4581	-7.5	-0.003
Extreme (30C)		2305.5353	2314.4581	-7.3	-0.003
Extreme (10C)		2305.5353	2314.4581	-6.8	-0.003
Extreme (0C)		2305.5353	2314.4581	-8.8	-0.004
Extreme (-10C)		2305.5353	2314.4581	-8.7	-0.004
Extreme (-20C)		2305.5353	2314.4581	-7.2	-0.003
Extreme (-30C)		2305.5353	2314.4581	-7.0	-0.003
20C	15%	2305.5353	2314.4581	-8.5	-0.004
	-15%	2305.5353	2314.4581	-6.6	-0.003
	End Point	2305.5353	2314.4581	-6.9	-0.003

16QAM, (10MHz BANDWIDTH)

Limit		2305	2315	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2305.5362	2314.4629		
Extreme (50C)		2305.5361	2314.4629	-8.4	-0.004
Extreme (40C)		2305.5361	2314.4629	-7.4	-0.003
Extreme (30C)		2305.5361	2314.4629	-8.4	-0.004
Extreme (10C)		2305.5362	2314.4629	-6.6	-0.003
Extreme (0C)		2305.5361	2314.4629	-8.5	-0.004
Extreme (-10C)		2305.5361	2314.4629	-8.3	-0.004
Extreme (-20C)		2305.5361	2314.4629	-7.4	-0.003
Extreme (-30C)		2305.5361	2314.4629	-7.8	-0.003
20C	15%	2305.5361	2314.4629	-8.6	-0.004
	-15%	2305.5361	2314.4629	-7.2	-0.003
	End Point	2305.5362	2314.4629	-6.5	-0.003

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8.4.12. LTE BAND 41

ID:	34314	Date:	12/14/16

QPSK, (20MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2496.8800	2688.8843		
Extreme (50C)		2496.8800	2688.8843	-13.0	-0.005
Extreme (40C)		2496.8800	2688.8843	-14.2	-0.005
Extreme (30C)		2496.8800	2688.8843	-12.7	-0.005
Extreme (10C)		2496.8800	2688.8843	-6.9	-0.003
Extreme (0C)		2496.8800	2688.8843	-9.1	-0.004
Extreme (-10C)		2496.8800	2688.8843	-10.9	-0.004
Extreme (-20C)		2496.8800	2688.8843	-13.9	-0.005
Extreme (-30C)		2496.8800	2688.8843	-16.9	-0.007
20C	15%	2496.8800	2688.8843	-12.7	-0.005
	-15%	2496.8800	2688.8843	-10.2	-0.004
	End Point	2496.8800	2688.8843	10.9	0.004

16QAM, (20MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2497.0007	2688.9215		
Extreme (50C)		2497.0007	2688.9215	10.1	0.004
Extreme (40C)		2497.0007	2688.9215	-14.1	-0.005
Extreme (30C)		2497.0007	2688.9215	-11.6	-0.004
Extreme (10C)		2497.0007	2688.9215	-10.4	-0.004
Extreme (0C)		2497.0007	2688.9215	-9.1	-0.004
Extreme (-10C)		2497.0007	2688.9215	-10.4	-0.004
Extreme (-20C)		2497.0007	2688.9215	-14.0	-0.005
Extreme (-30C)		2497.0007	2688.9215	-15.8	-0.006
20C	15%	2497.0007	2688.9215	-13.2	-0.005
	-15%	2497.0007	2688.9215	-9.2	-0.004
	End Point	2497.0007	2688.9215	7.8	0.003

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8.5. PEAK-TO-AVERAGE RATIO

In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB

RESULT

Antenna C was used to measure as the worst case. The results from all CCDF plots are passed with 13dB peak-to-average ratio criteria.

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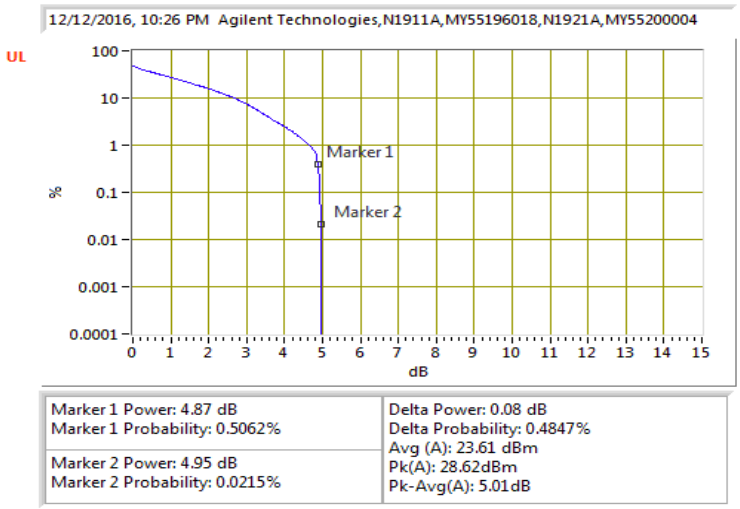
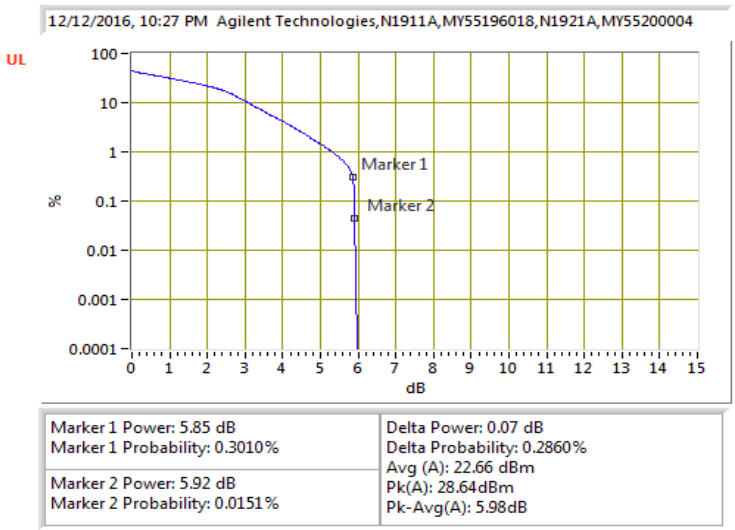
8.5.1. **LTE BAND 2**

QPSK, (1.4 MHz BAND WIDTH)



16QAM, (1.4 MHz BAND WIDTH)



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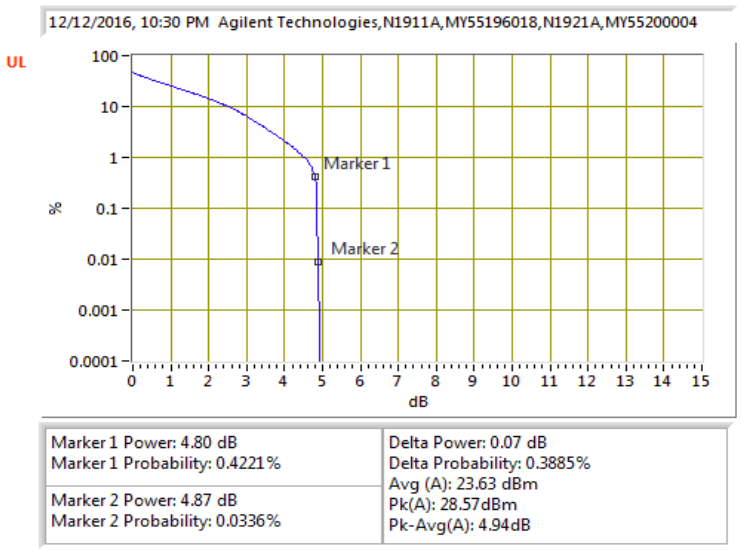
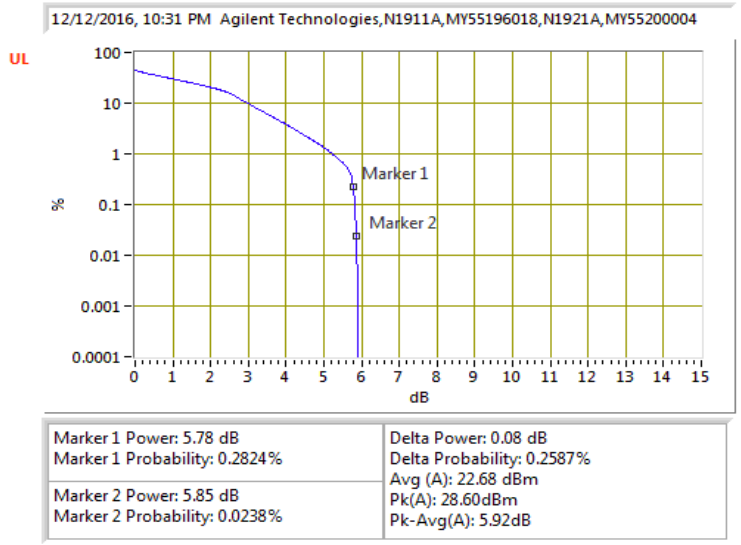
QPSK, (3.0 MHz BAND WIDTH)



16QAM, (3.0 MHz BAND WIDTH)



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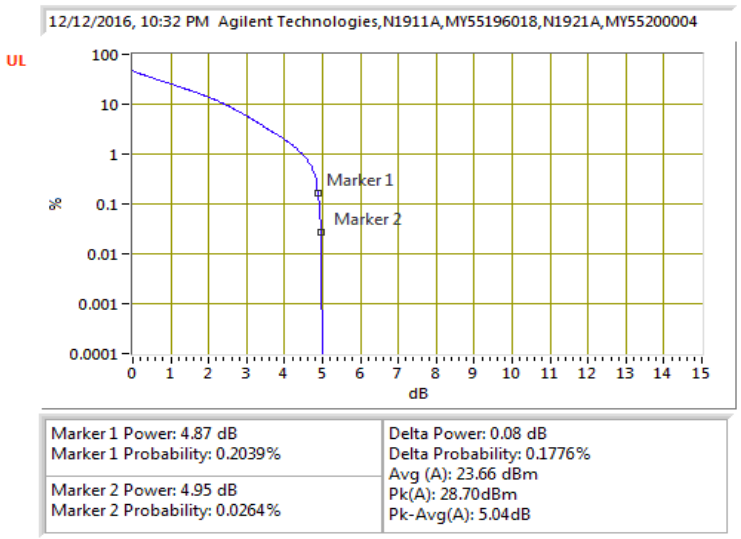
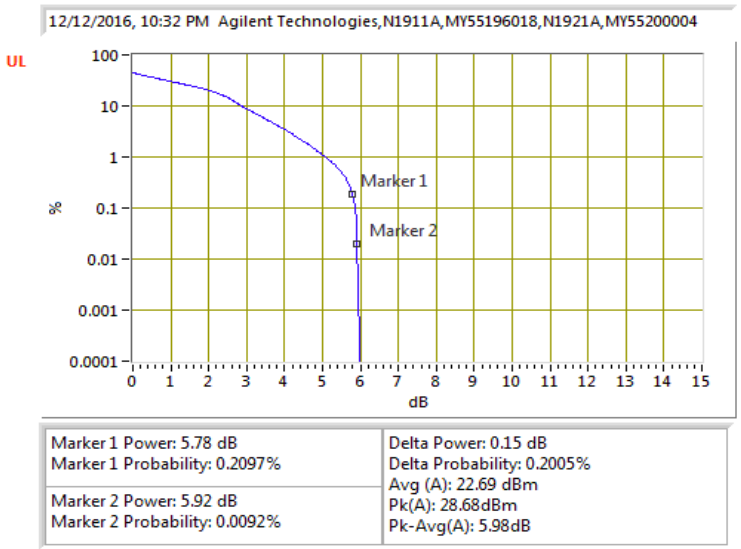
QPSK, (5.0 MHz BAND WIDTH)



16QAM, (5.0 MHz BAND WIDTH)



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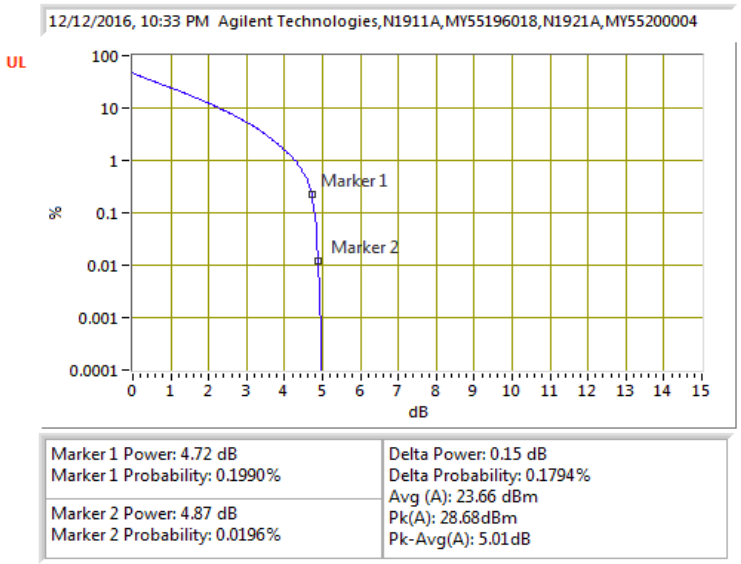
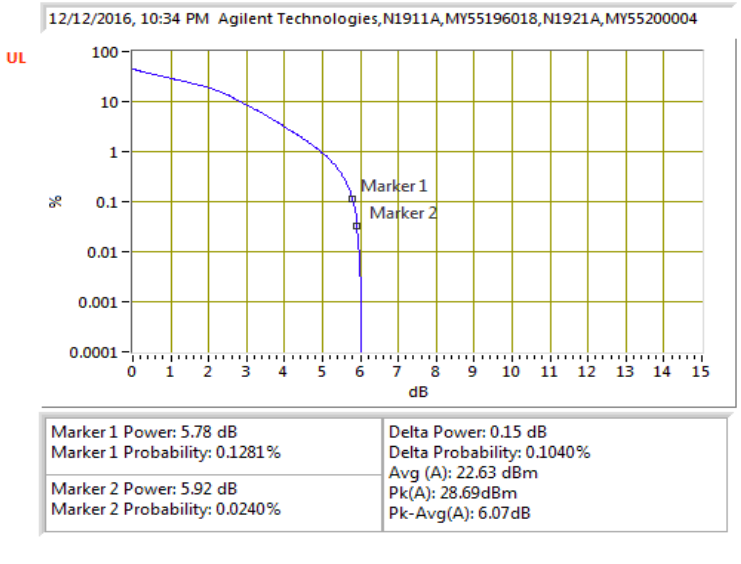
QPSK, (10.0 MHz BAND WIDTH)



16QAM, (10.0 MHz BAND WIDTH)



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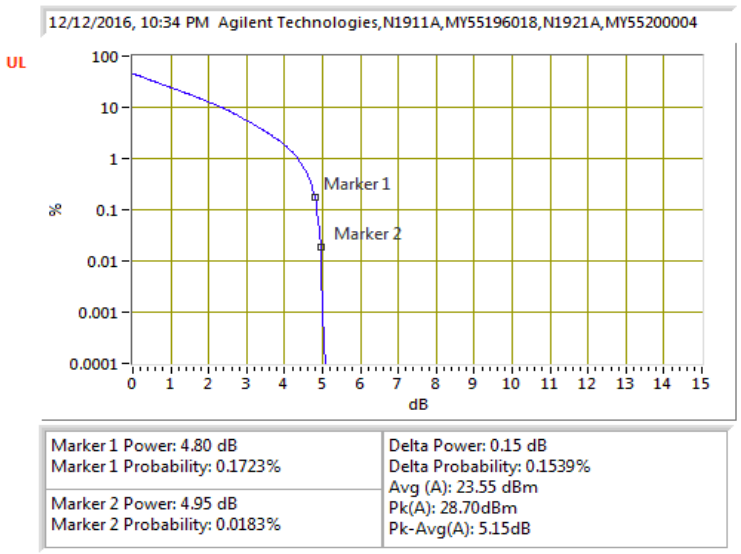
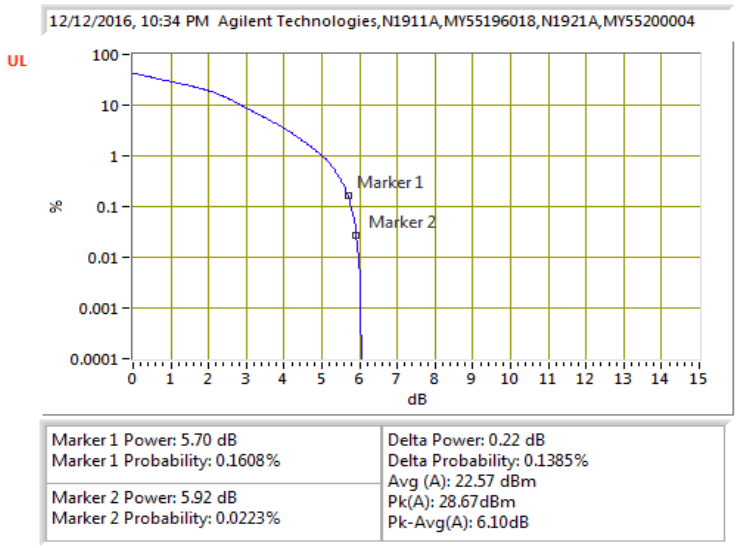
QPSK, (15.0 MHz BAND WIDTH)



16QAM, (15.0 MHz BAND WIDTH)



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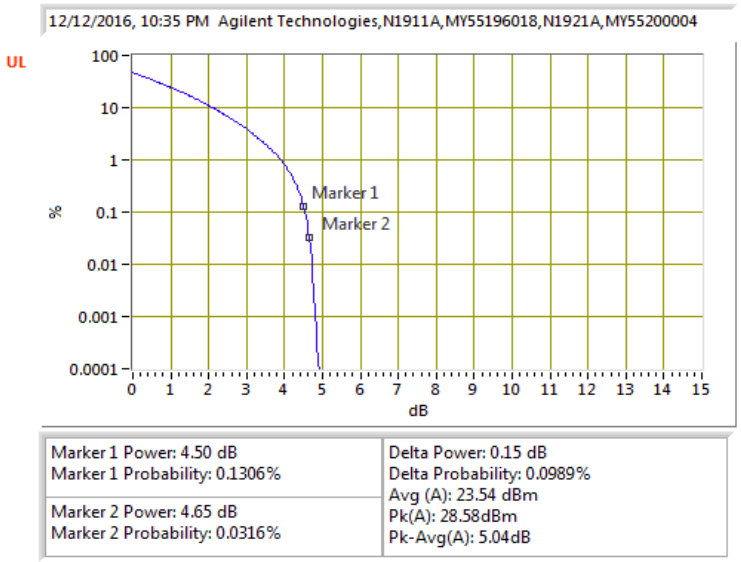
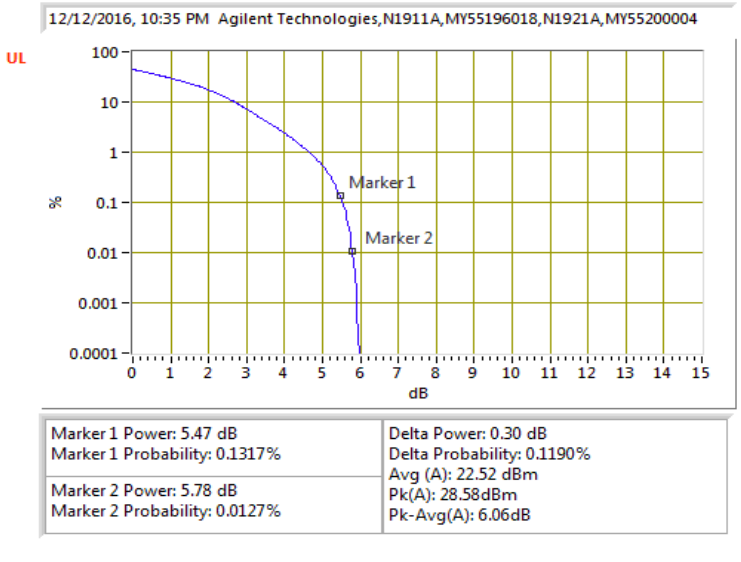
QPSK, (20.0 MHz BAND WIDTH)



16QAM, (20.0 MHz BAND WIDTH)



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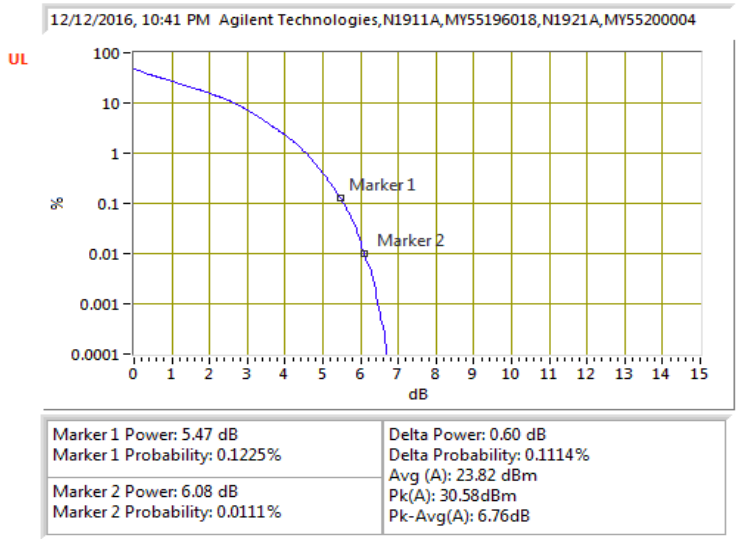
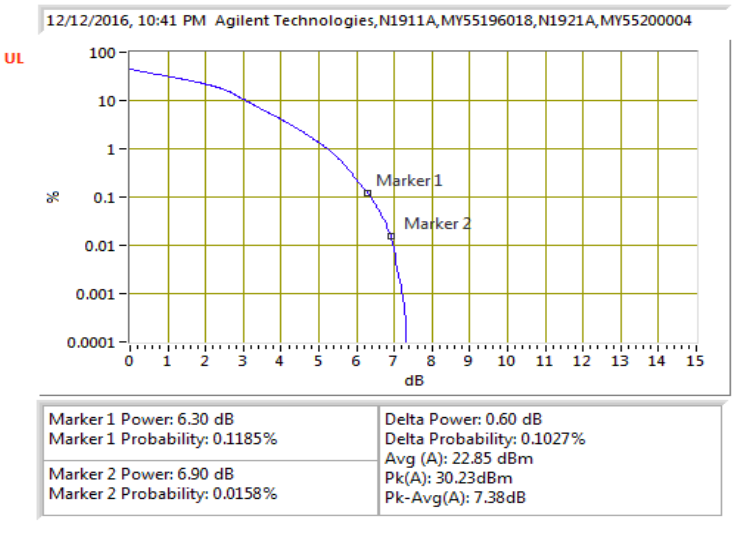
8.5.2. **LTE BAND 4**

QPSK, (1.4 MHz BAND WIDTH)



16QAM, (1.4 MHz BAND WIDTH)



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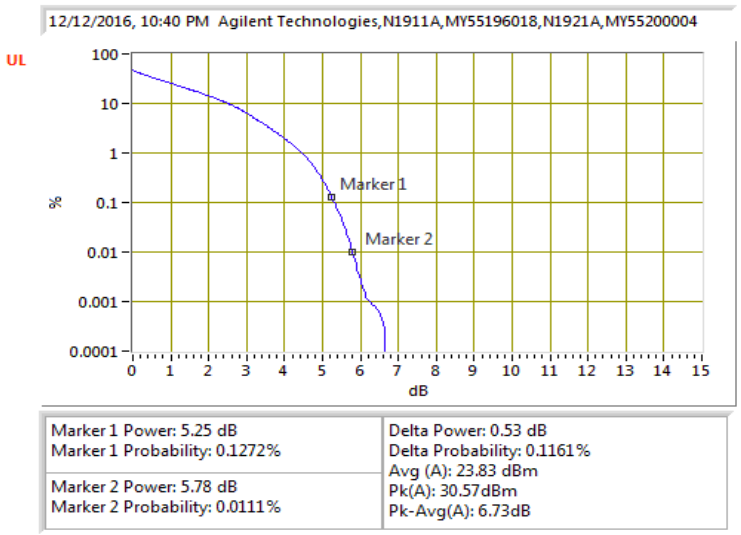
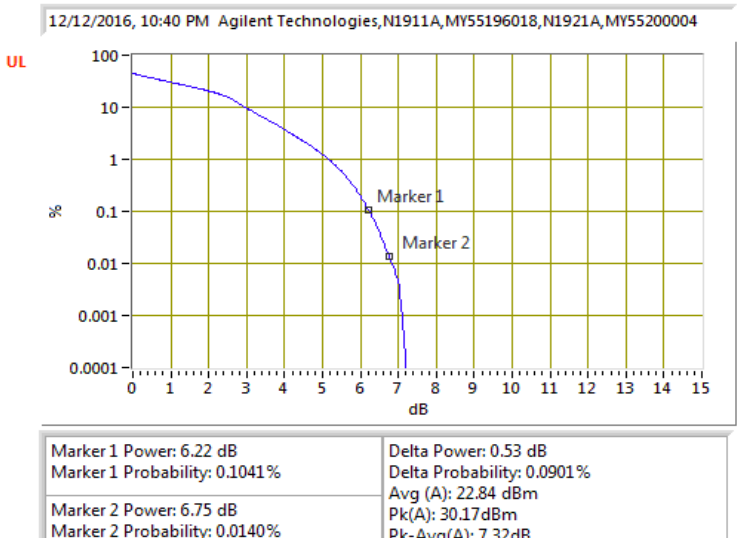
QPSK, (3.0 MHz BAND WIDTH)



16QAM, (3.0 MHz BAND WIDTH)



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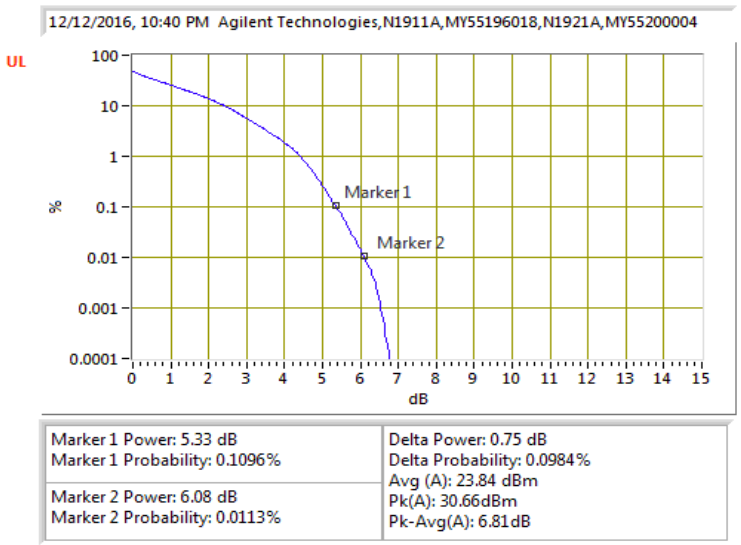
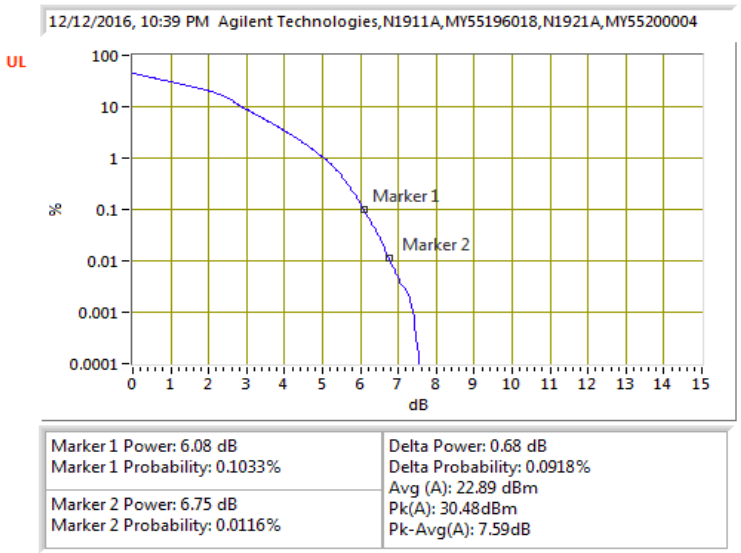
QPSK, (5.0 MHz BAND WIDTH)



16QAM, (5.0 MHz BAND WIDTH)



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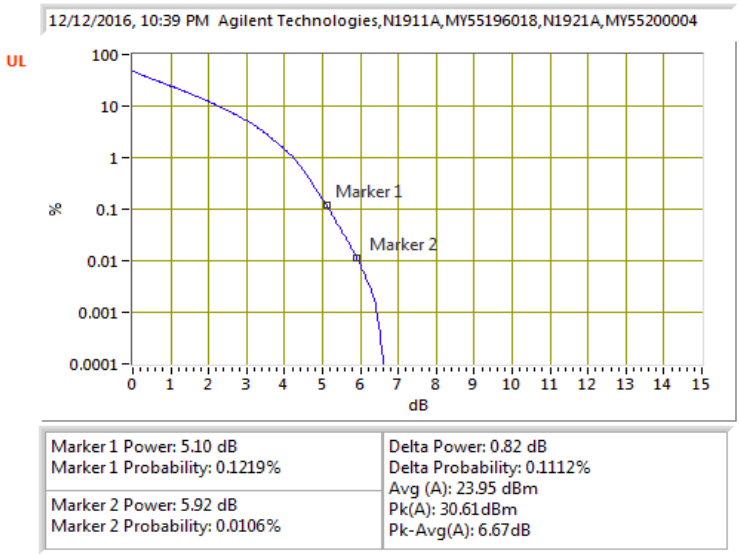
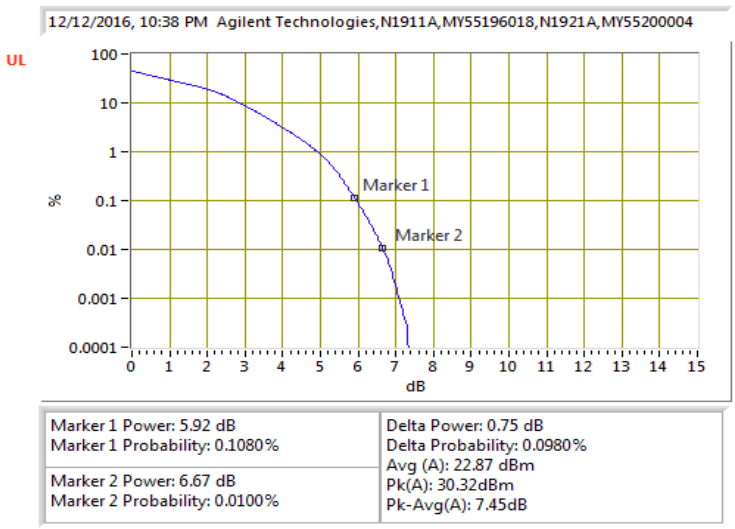
QPSK, (10.0 MHz BAND WIDTH)



16QAM, (10.0 MHz BAND WIDTH)



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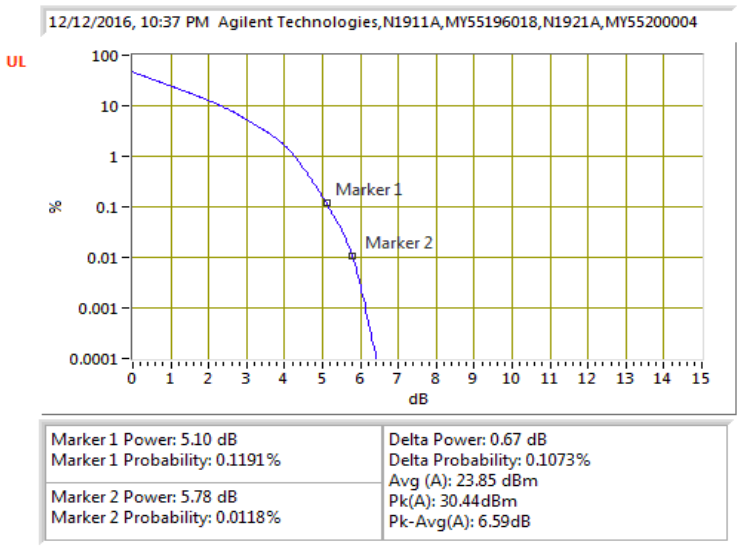
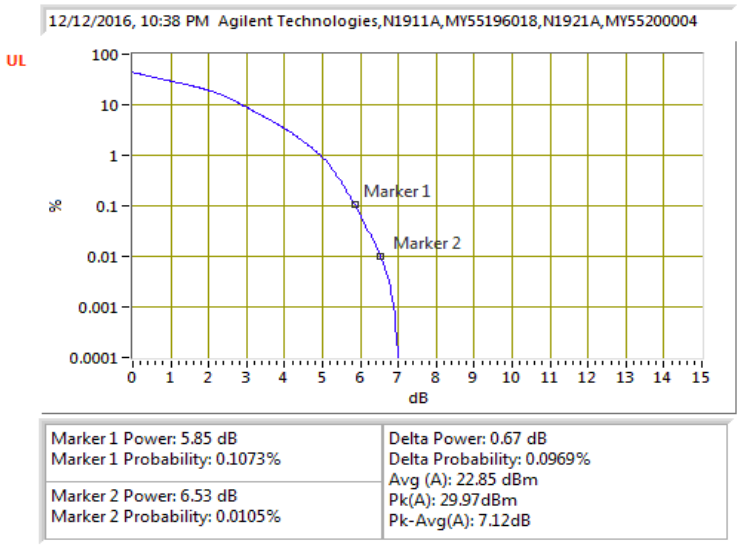
QPSK, (15.0 MHz BAND WIDTH)



16QAM, (15.0 MHz BAND WIDTH)



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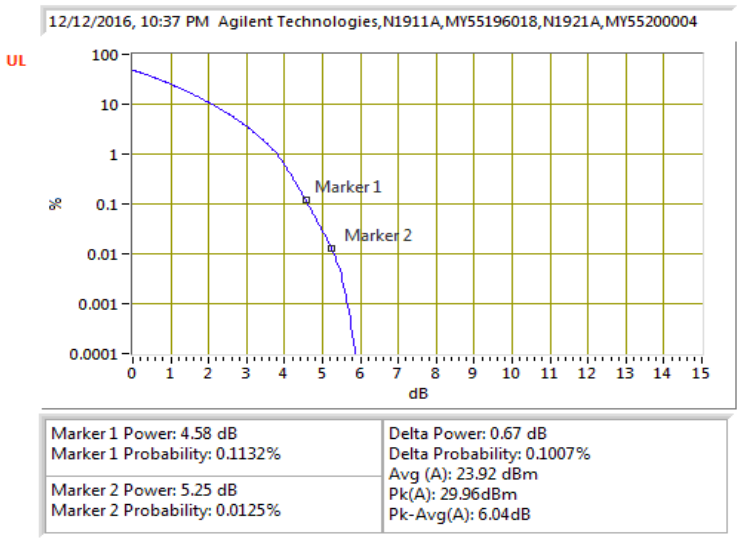
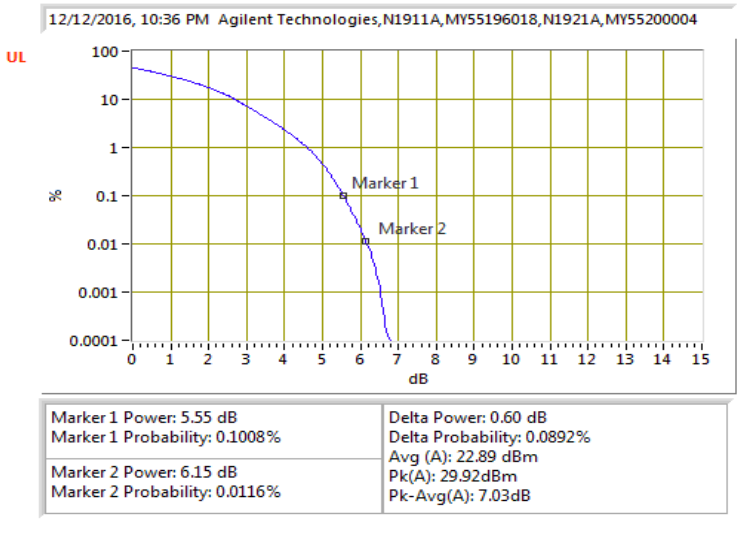
QPSK, (20.0 MHz BAND WIDTH)



16QAM, (20.0 MHz BAND WIDTH)



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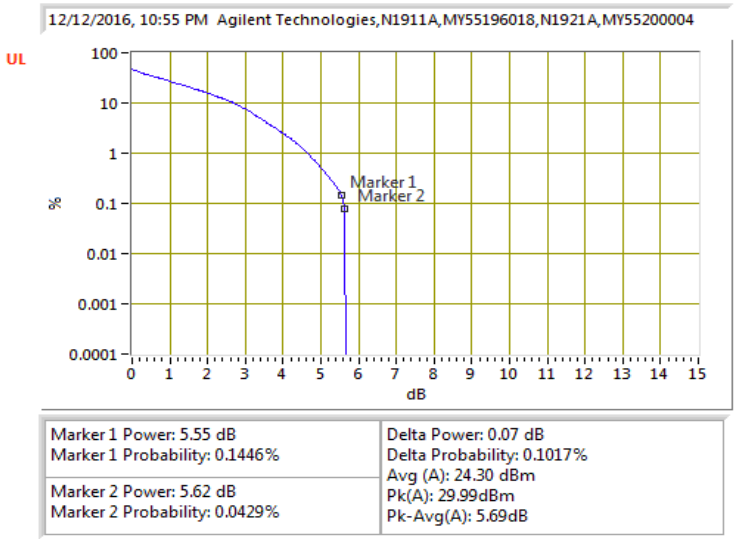
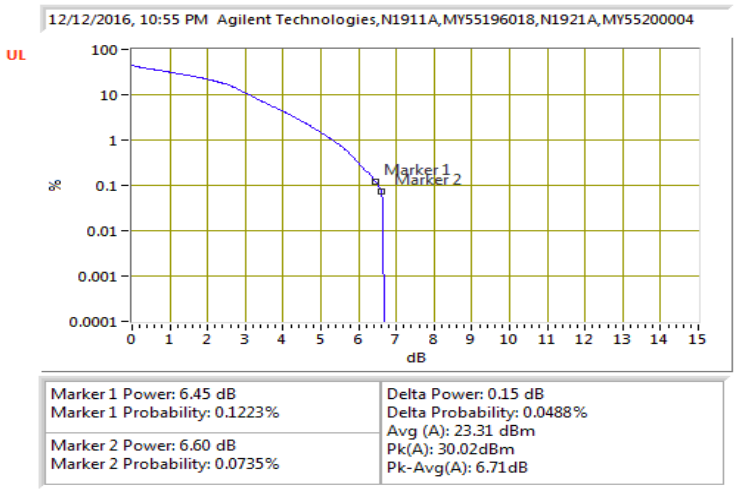
8.5.3. **LTE BAND 5**

QPSK, (1.4 MHz BAND WIDTH)



16QAM, (1.4 MHz BAND WIDTH)



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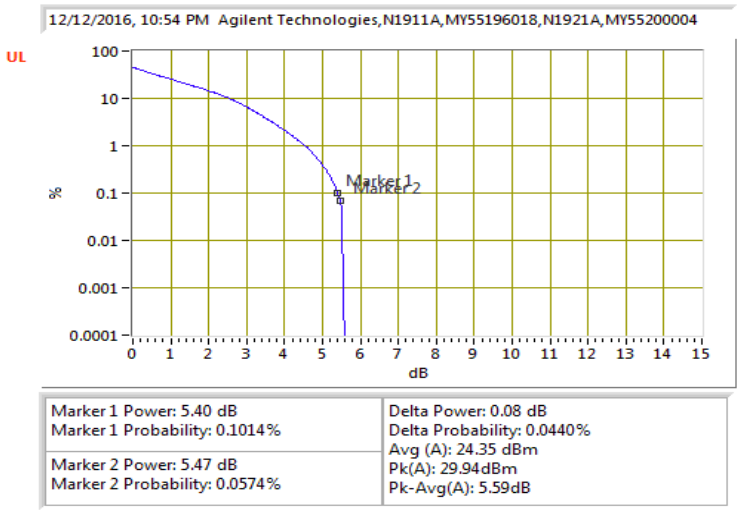
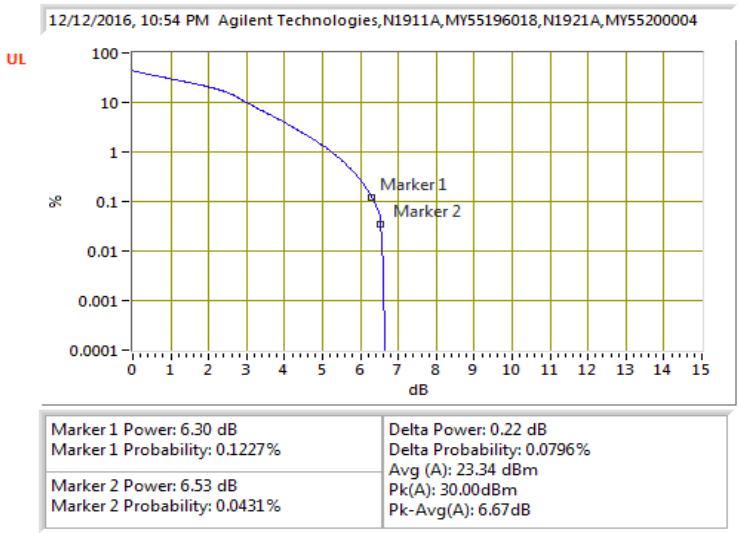
QPSK, (3.0 MHz BAND WIDTH)



16QAM, (3.0 MHz BAND WIDTH)



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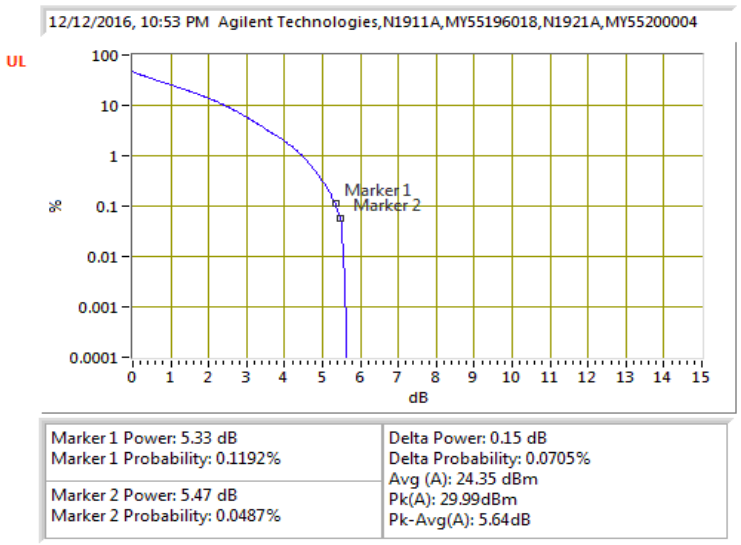
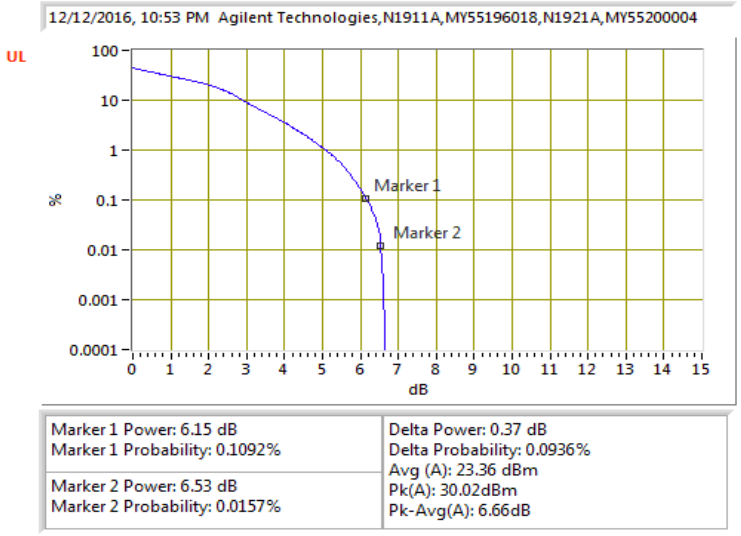
QPSK, (5.0 MHz BAND WIDTH)



16QAM, (5.0 MHz BAND WIDTH)



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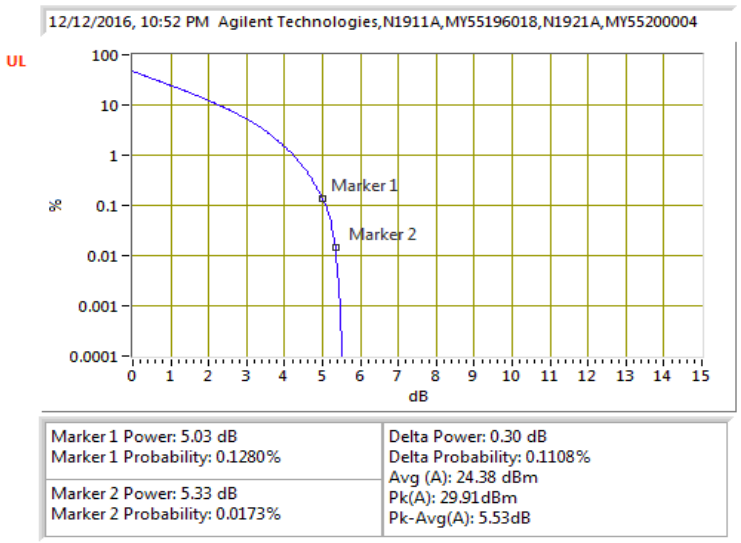
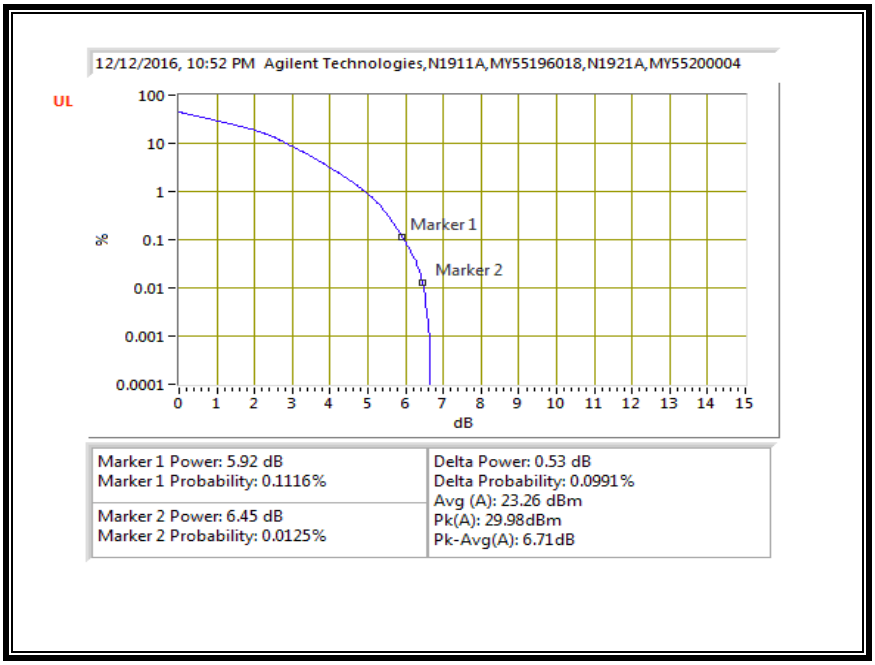
QPSK, (10.0 MHz BAND WIDTH)



16QAM, (10.0 MHz BAND WIDTH)



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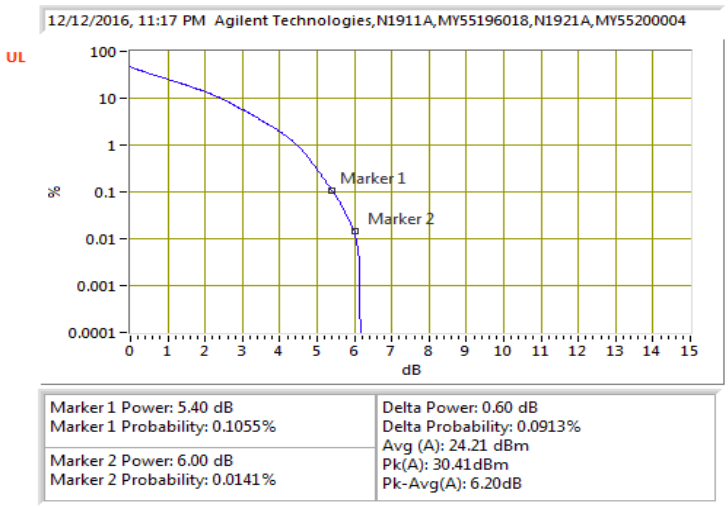
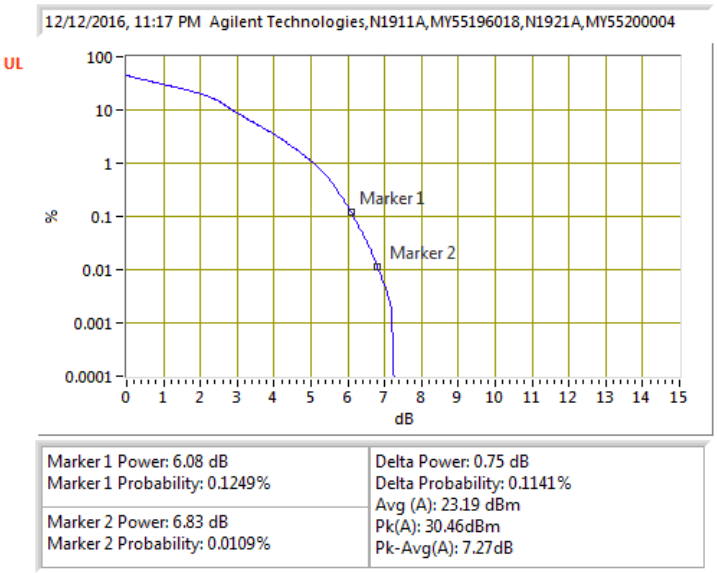
8.5.4. **LTE BAND 7**

QPSK, (5.0 MHz BAND WIDTH)



16QAM, (5.0 MHz BAND WIDTH)



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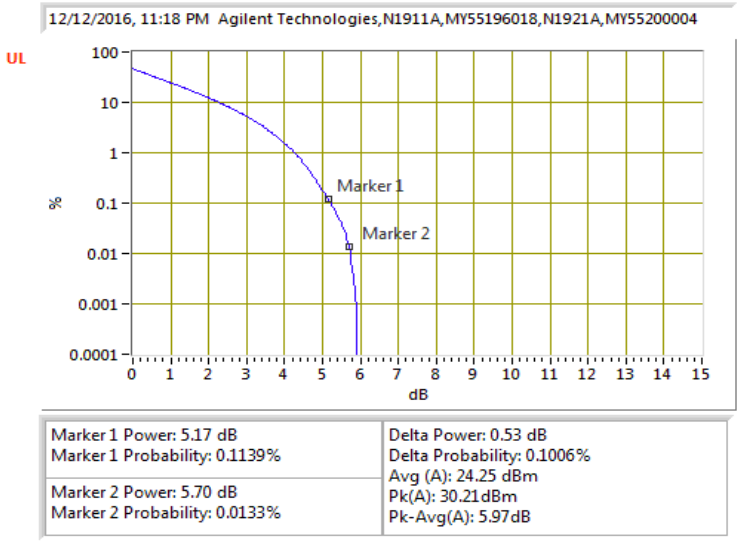
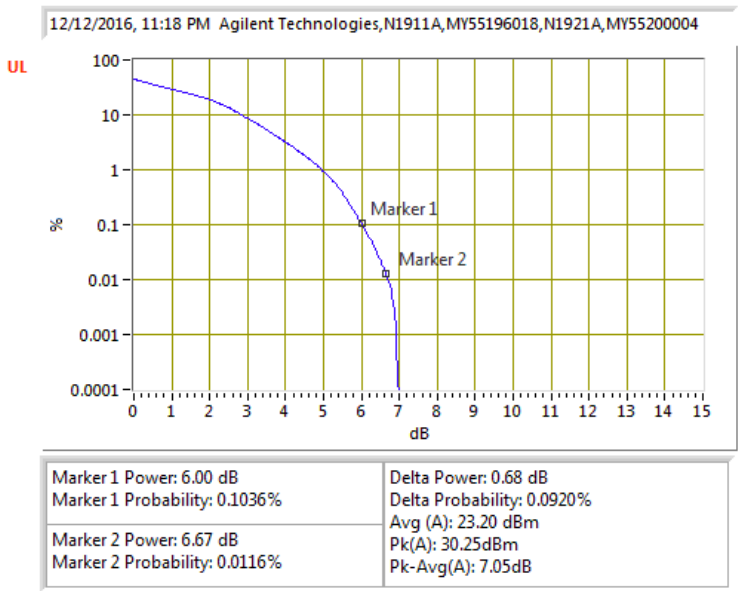
QPSK, (10.0 MHz BAND WIDTH)



16QAM, (10.0 MHz BAND WIDTH)



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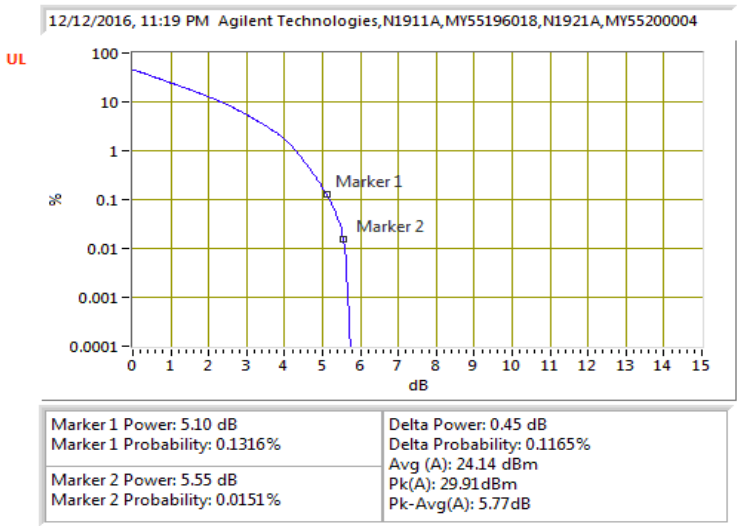
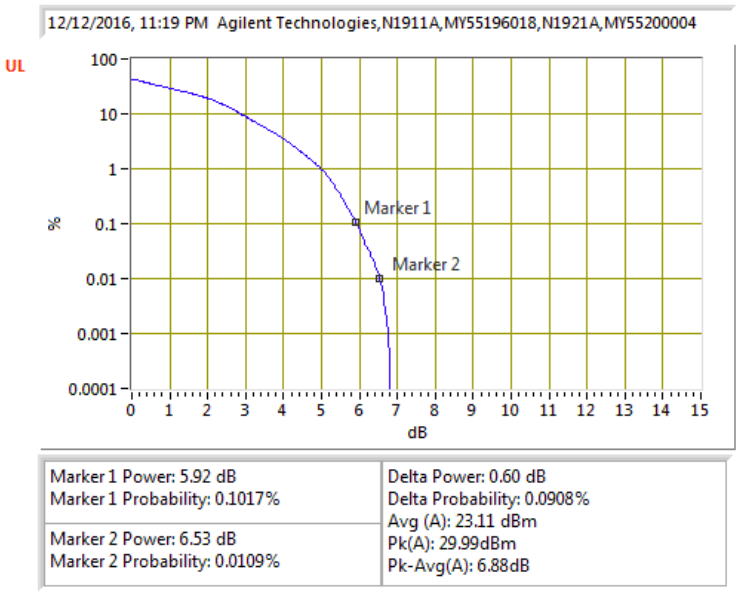
QPSK, (15.0 MHz BAND WIDTH)



16QAM, (15.0 MHz BAND WIDTH)



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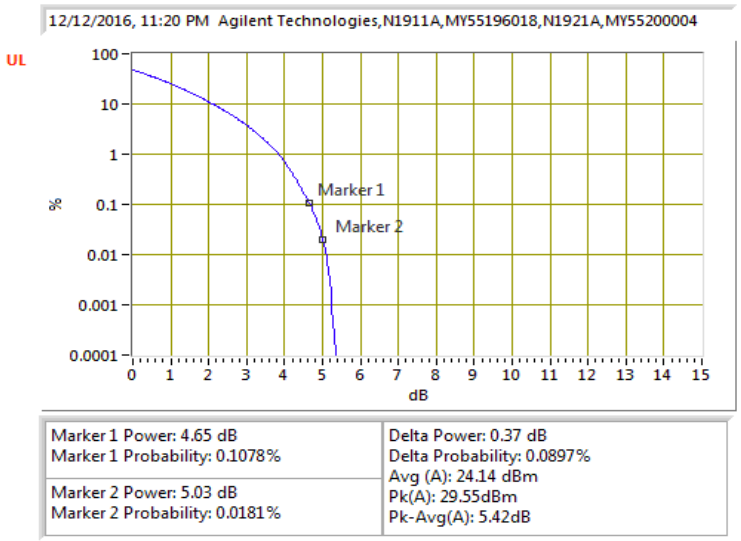
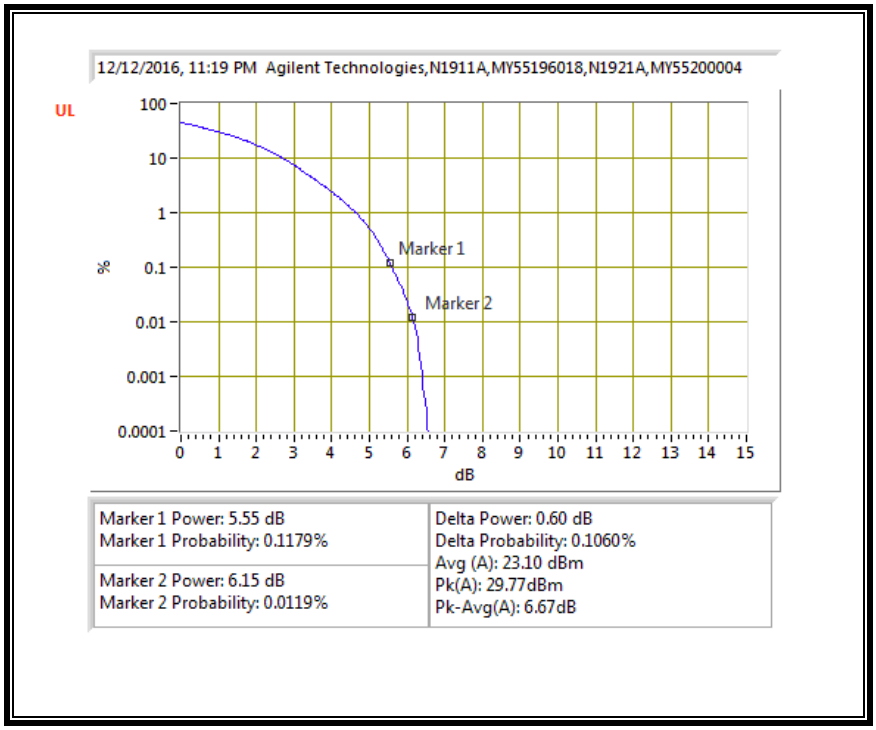
QPSK, (20.0 MHz BAND WIDTH)



16QAM, (20.0 MHz BAND WIDTH)



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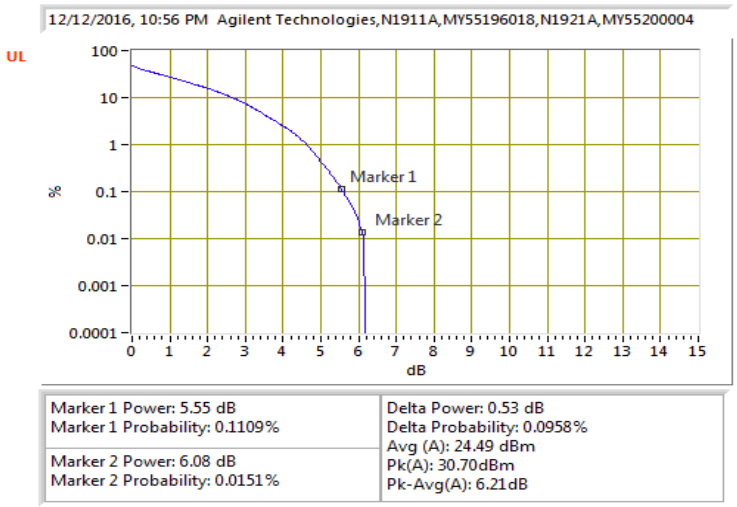
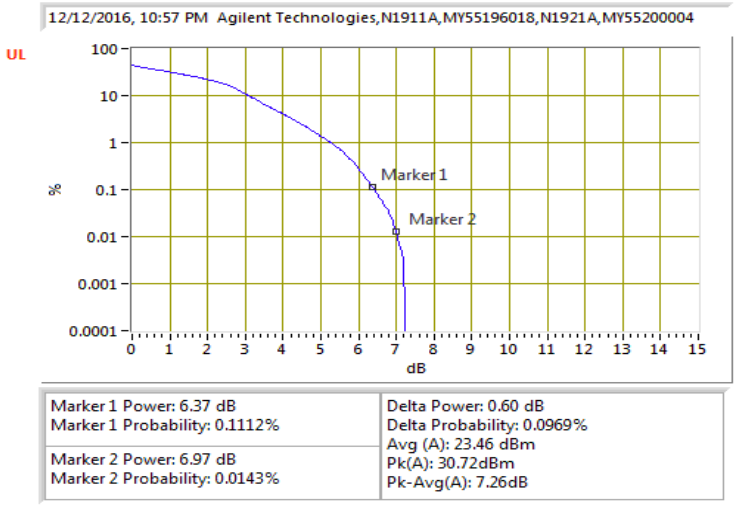
8.5.5. **LTE BAND 12**

QPSK, (1.4 MHz BAND WIDTH)



16QAM, (1.4 MHz BAND WIDTH)



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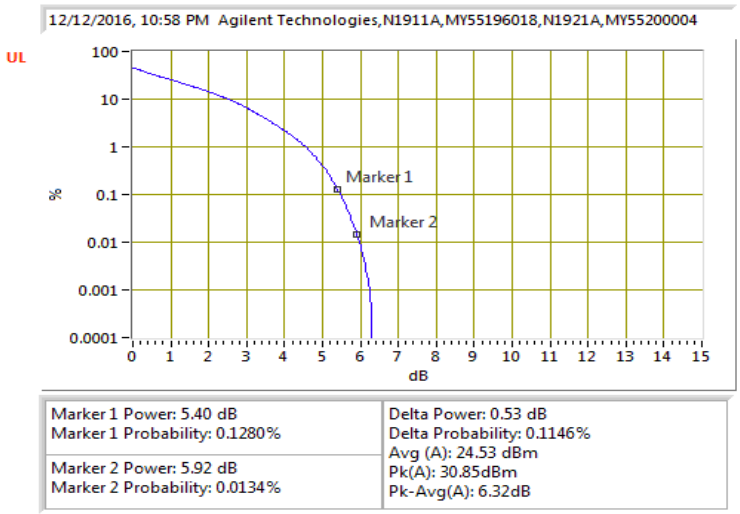
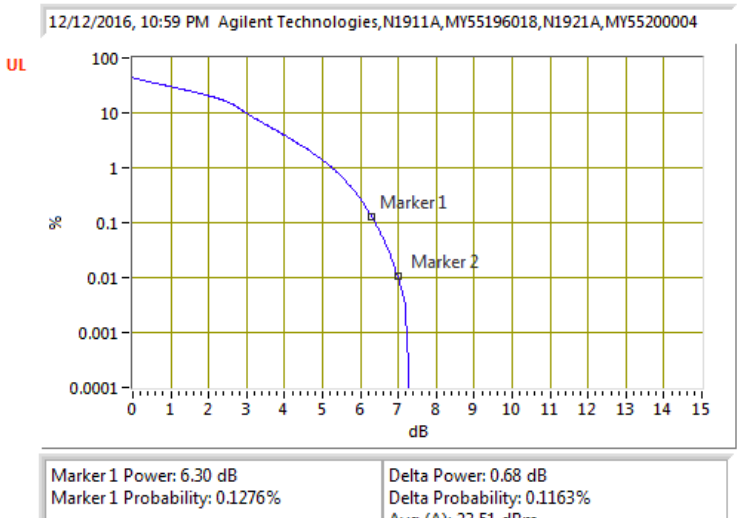
QPSK, (3.0 MHz BAND WIDTH)



16QAM, (3.0 MHz BAND WIDTH)



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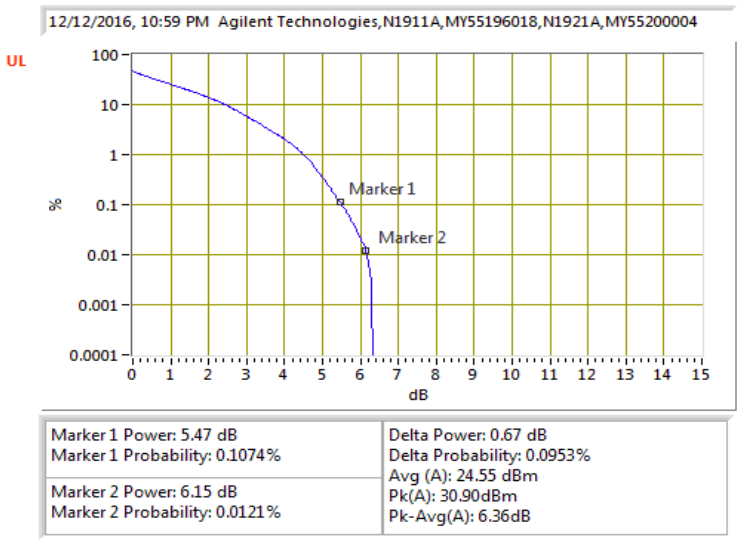
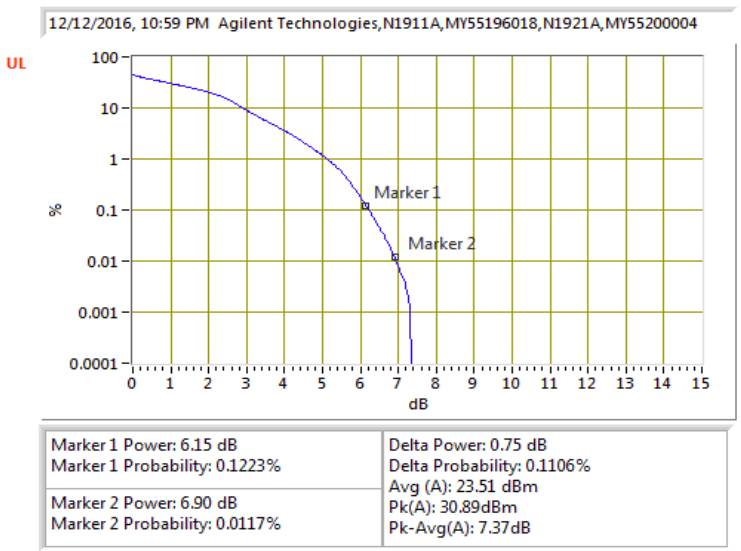
QPSK, (5.0 MHz BAND WIDTH)



16QAM, (5.0 MHz BAND WIDTH)



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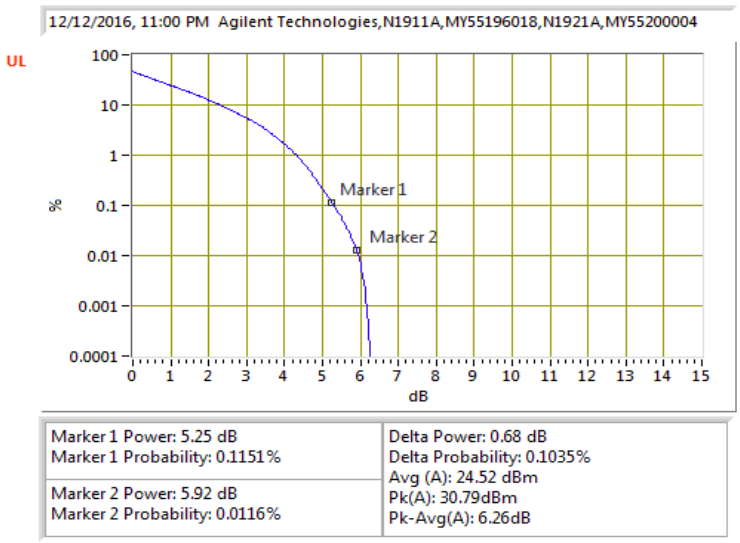
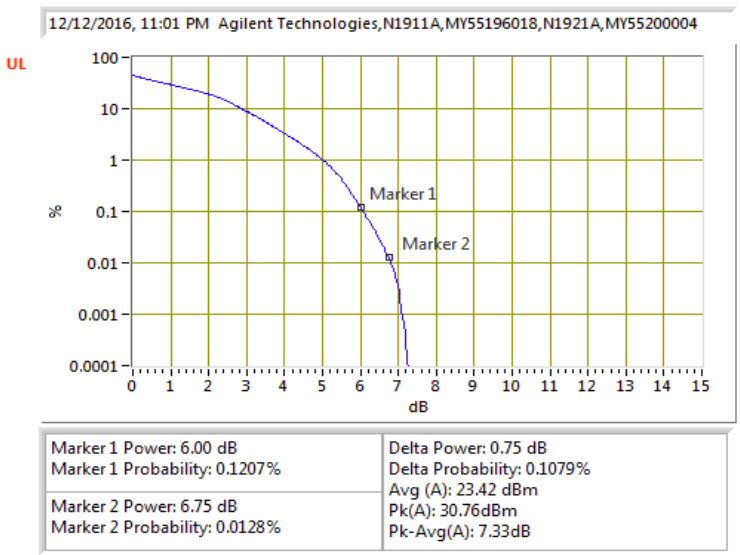
QPSK, (10.0 MHz BAND WIDTH)



16QAM, (10.0 MHz BAND WIDTH)



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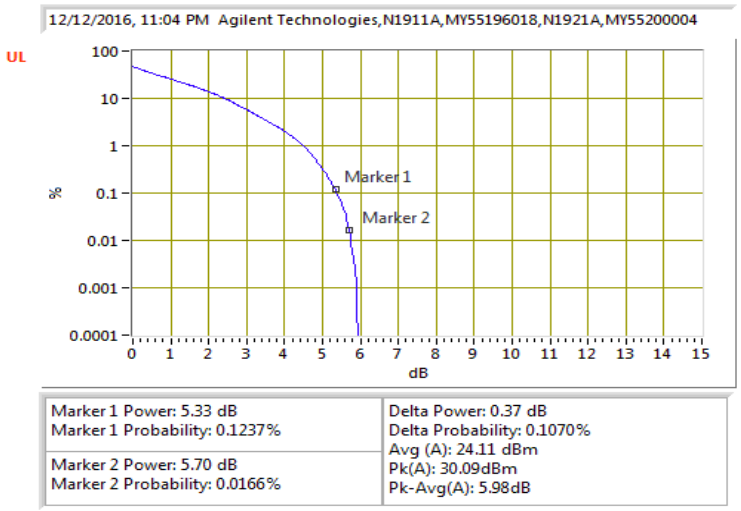
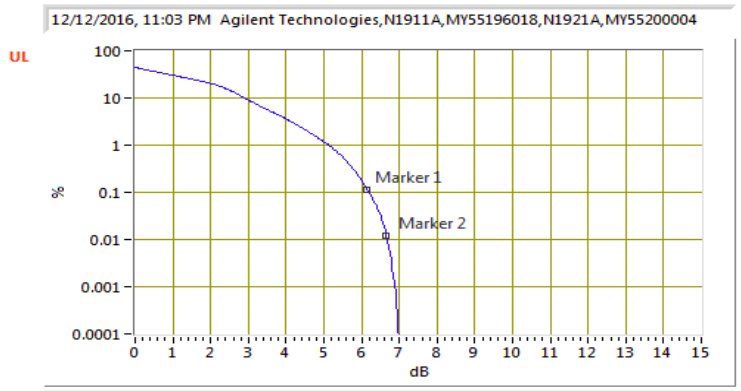
8.5.6. **LTE BAND 13**

QPSK, (5.0 MHz BAND WIDTH)



16QAM, (5.0 MHz BAND WIDTH)



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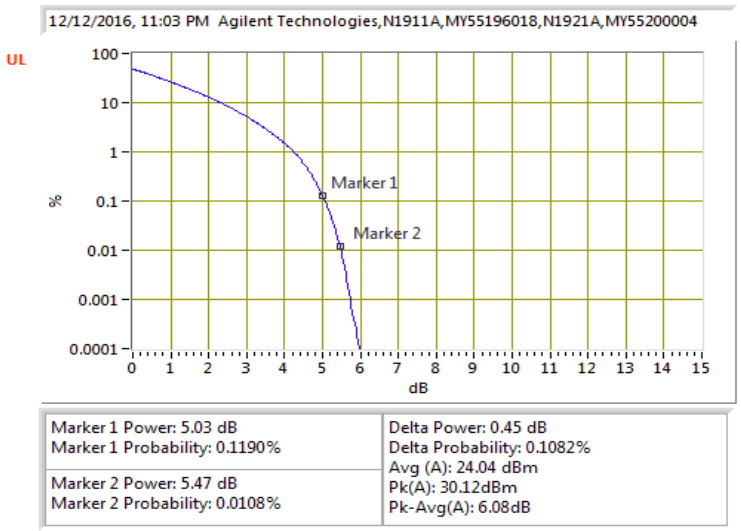
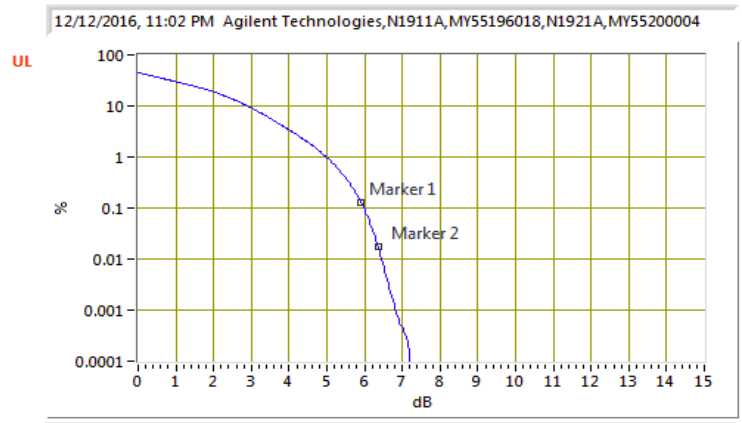
QPSK, (10.0 MHz BAND WIDTH)



16QAM, (10.0 MHz BAND WIDTH)



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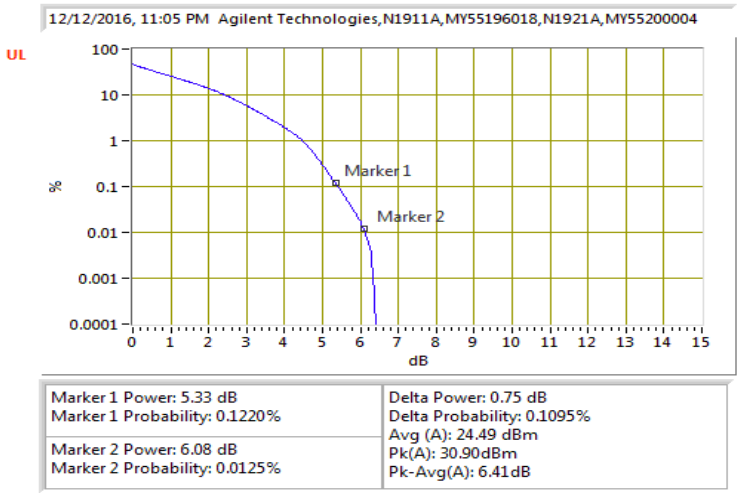
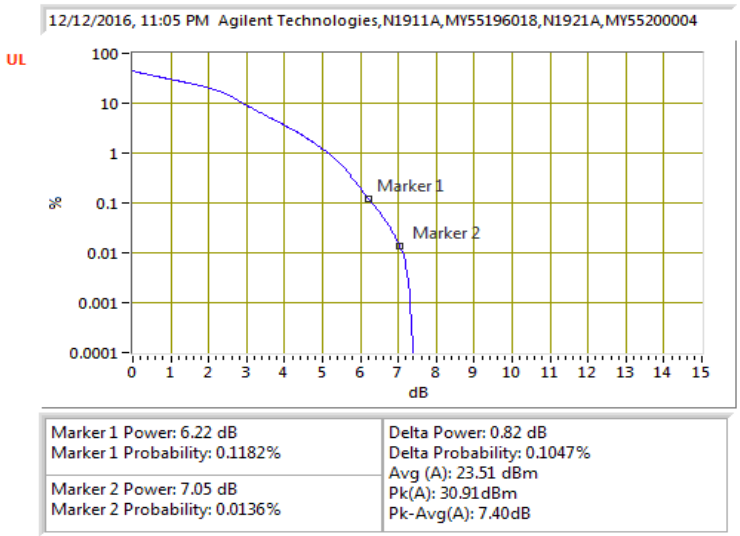
8.5.7. **LTE BAND 17**

QPSK, (5.0 MHz BAND WIDTH)



16QAM, (5.0 MHz BAND WIDTH)



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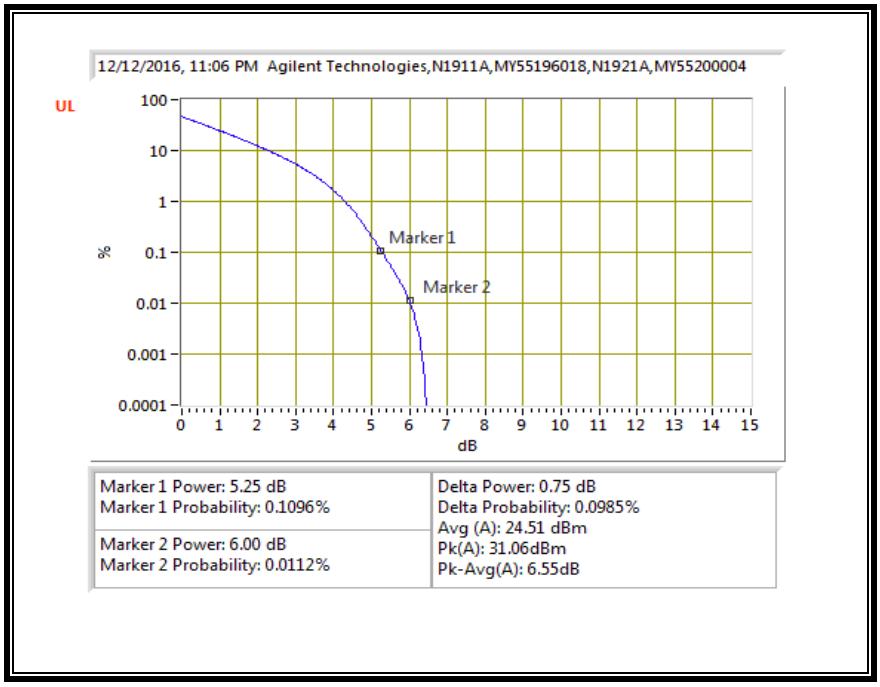
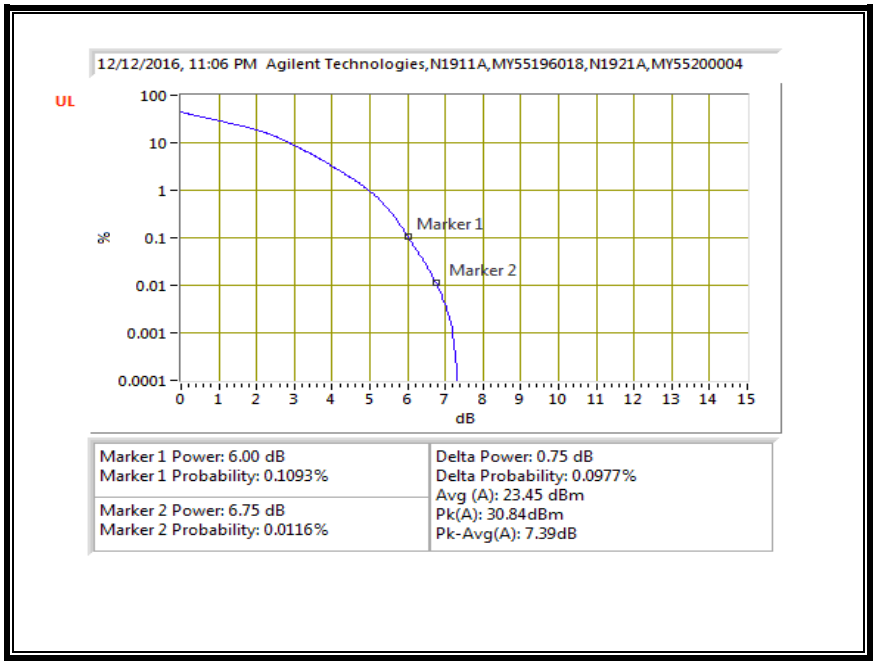
QPSK, (10.0 MHz BAND WIDTH)



16QAM, (10.0 MHz BAND WIDTH)



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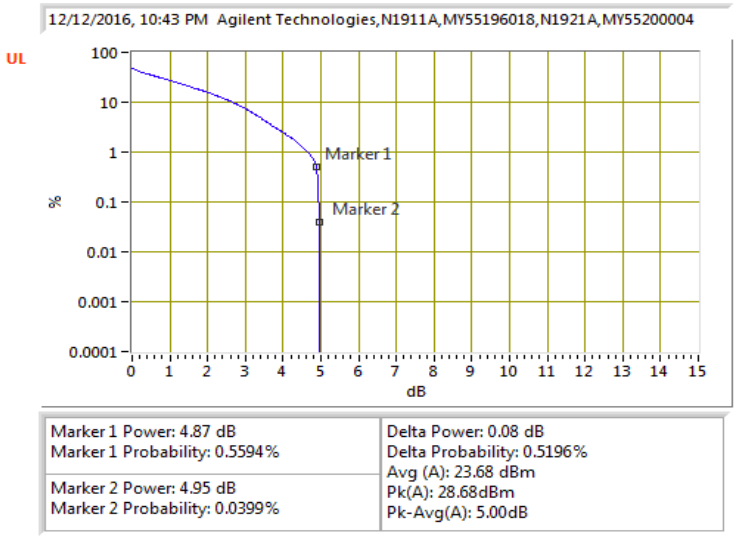
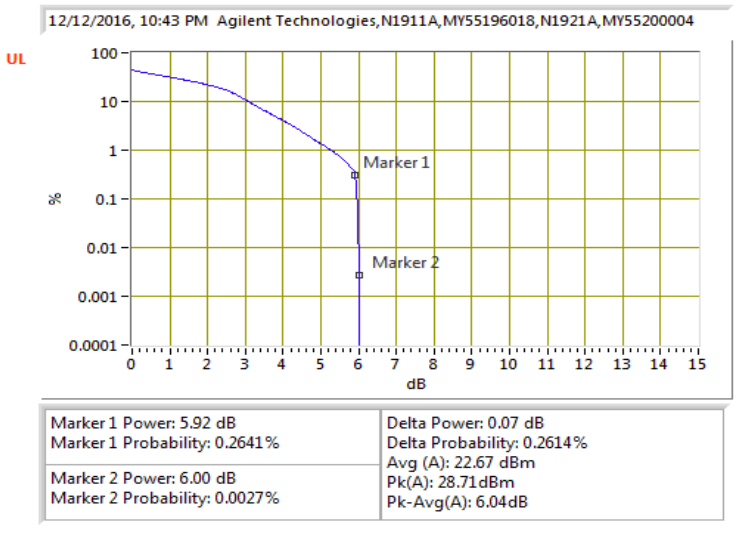
8.5.8. **LTE BAND 25**

QPSK, (1.4 MHz BAND WIDTH)



16QAM, (1.4 MHz BAND WIDTH)



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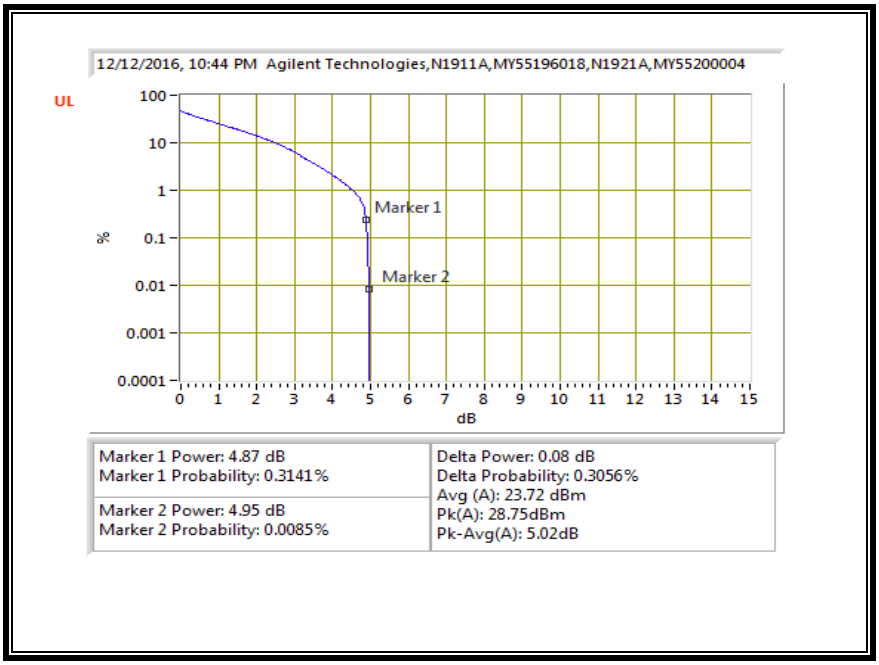
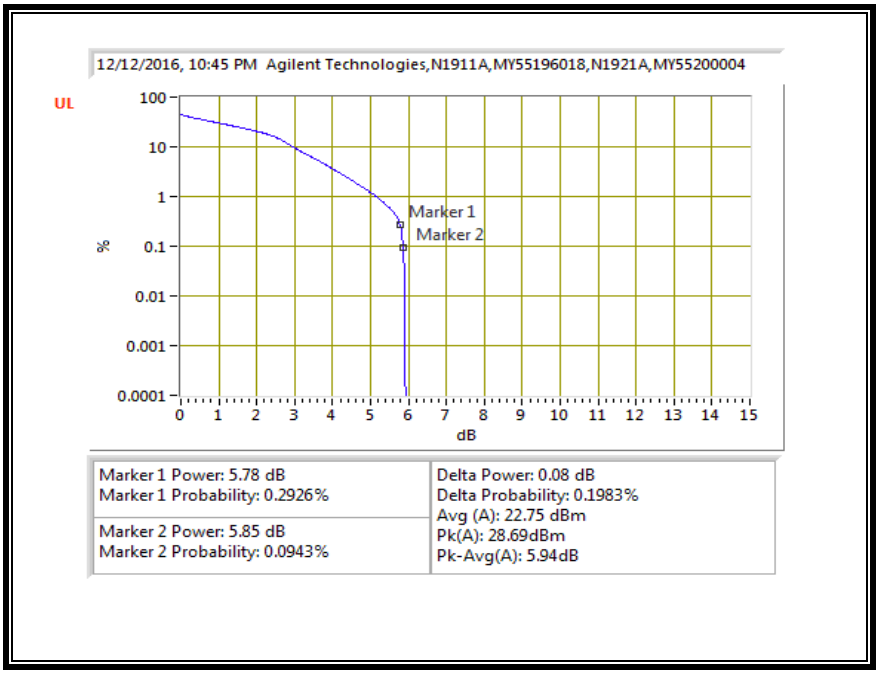
QPSK, (3.0 MHz BAND WIDTH)



16QAM, (3.0 MHz BAND WIDTH)



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