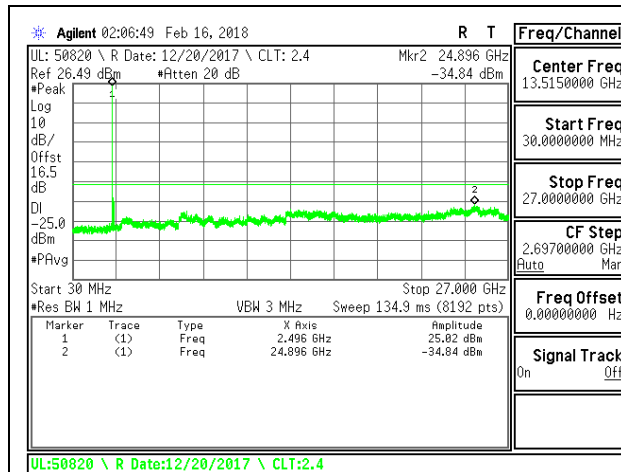
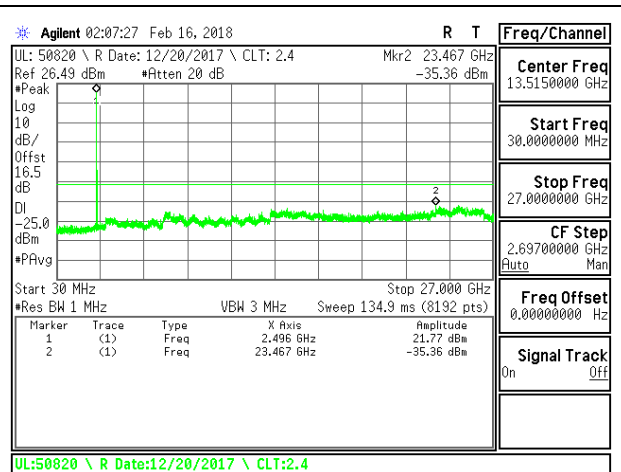
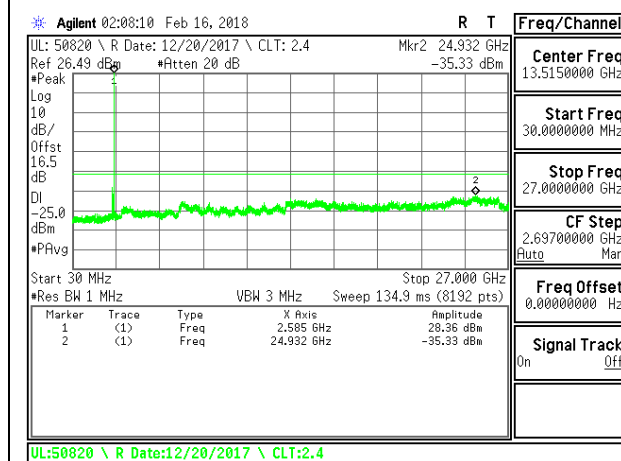




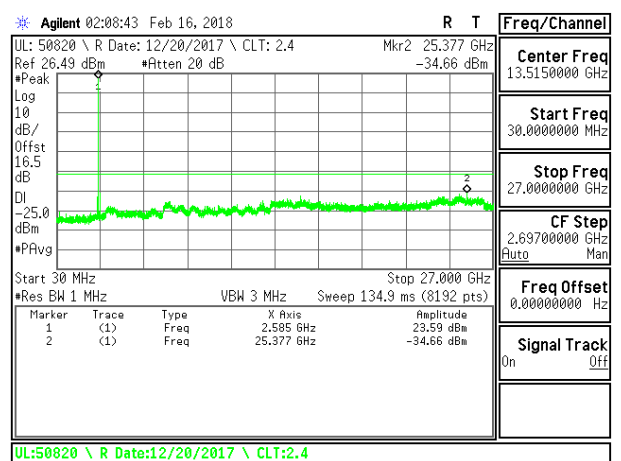
LTE B41 15MHz QPSK Low Channel RB1-0



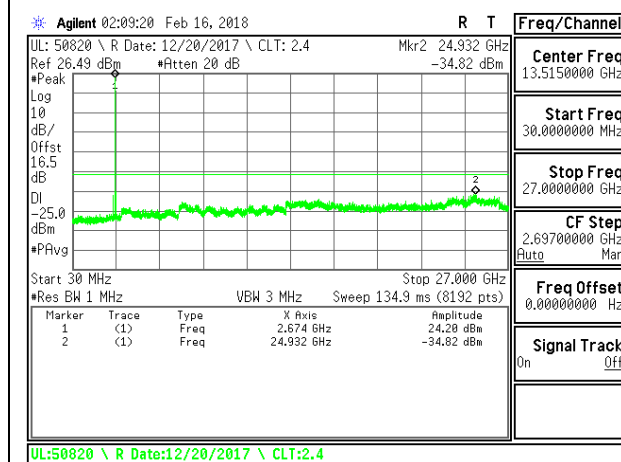
LTE B41 15MHz 16QAM Low Channel RB1-0



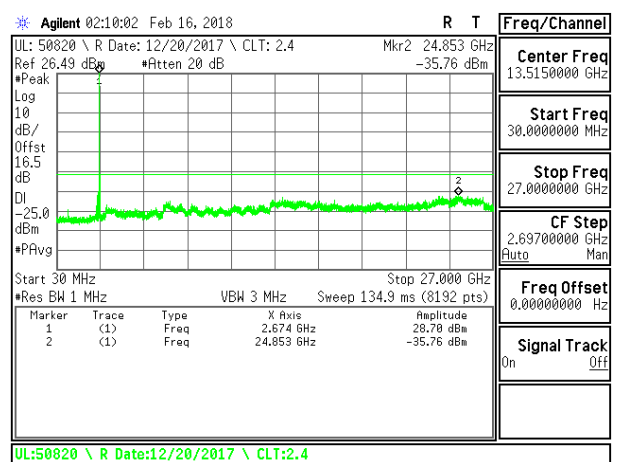
LTE B41 15MHz QPSK Middle Channel RB1-0



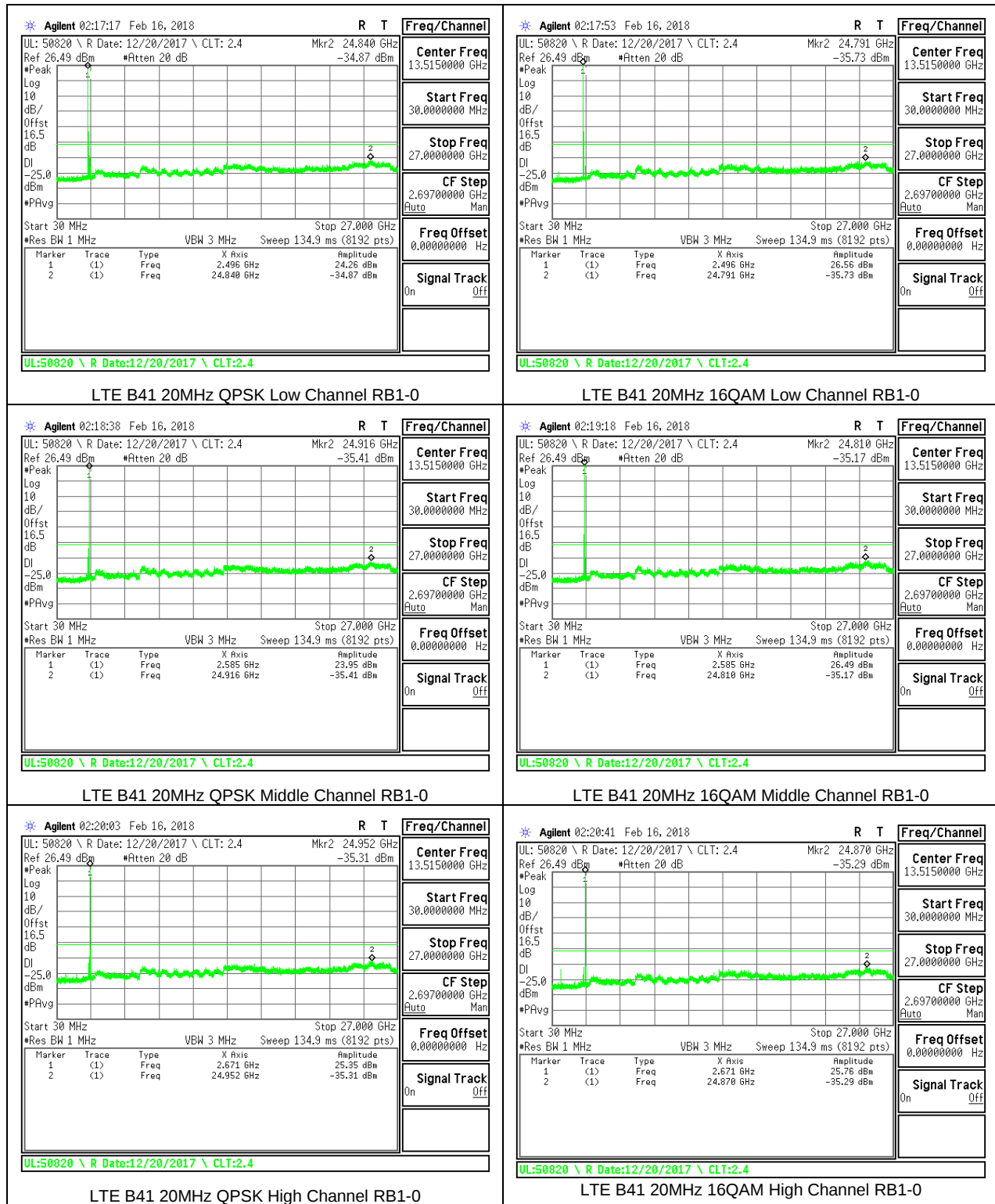
LTE B41 15MHz 16QAM Middle Channel RB1-0



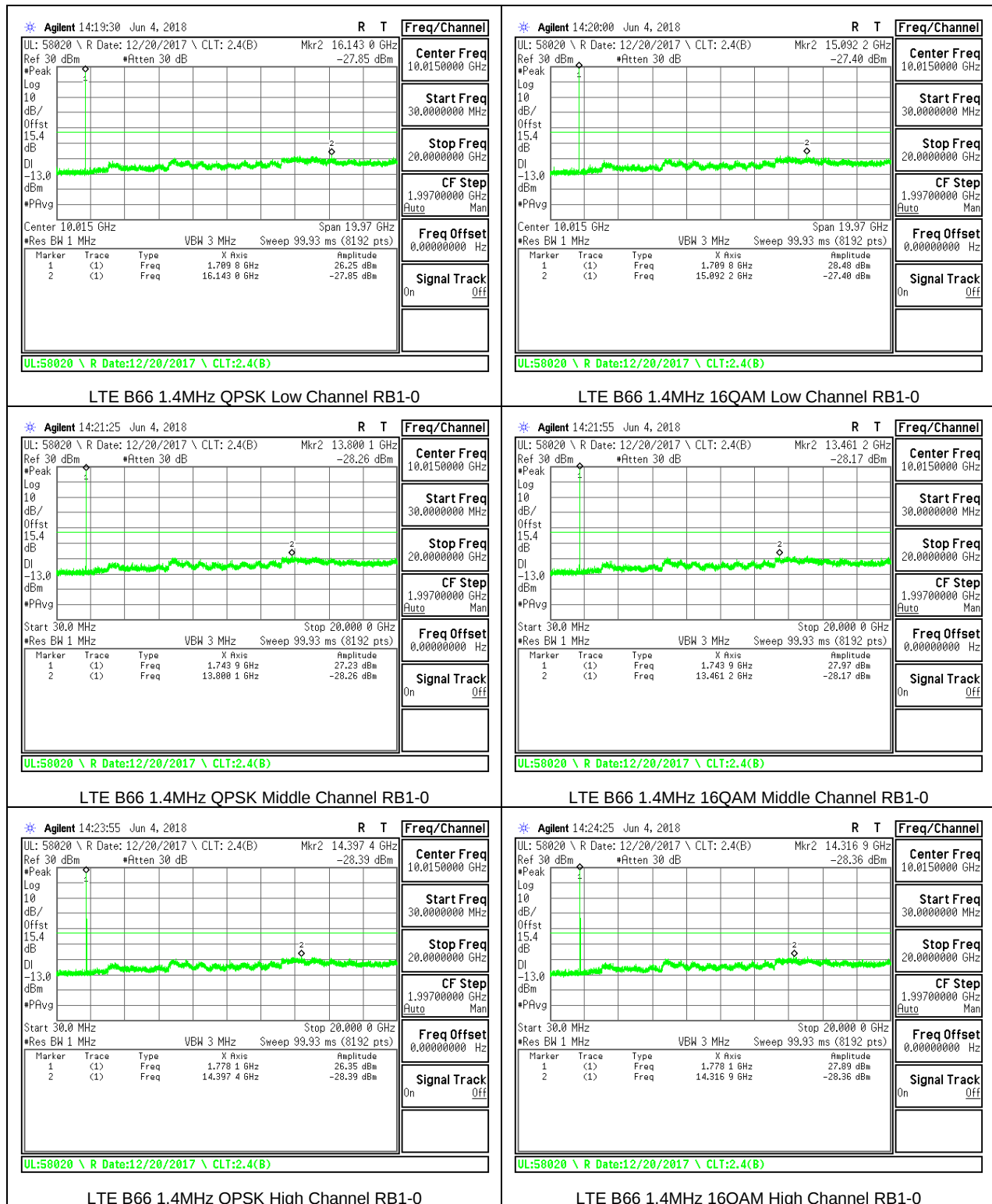
LTE B41 15MHz QPSK High Channel RB1-0

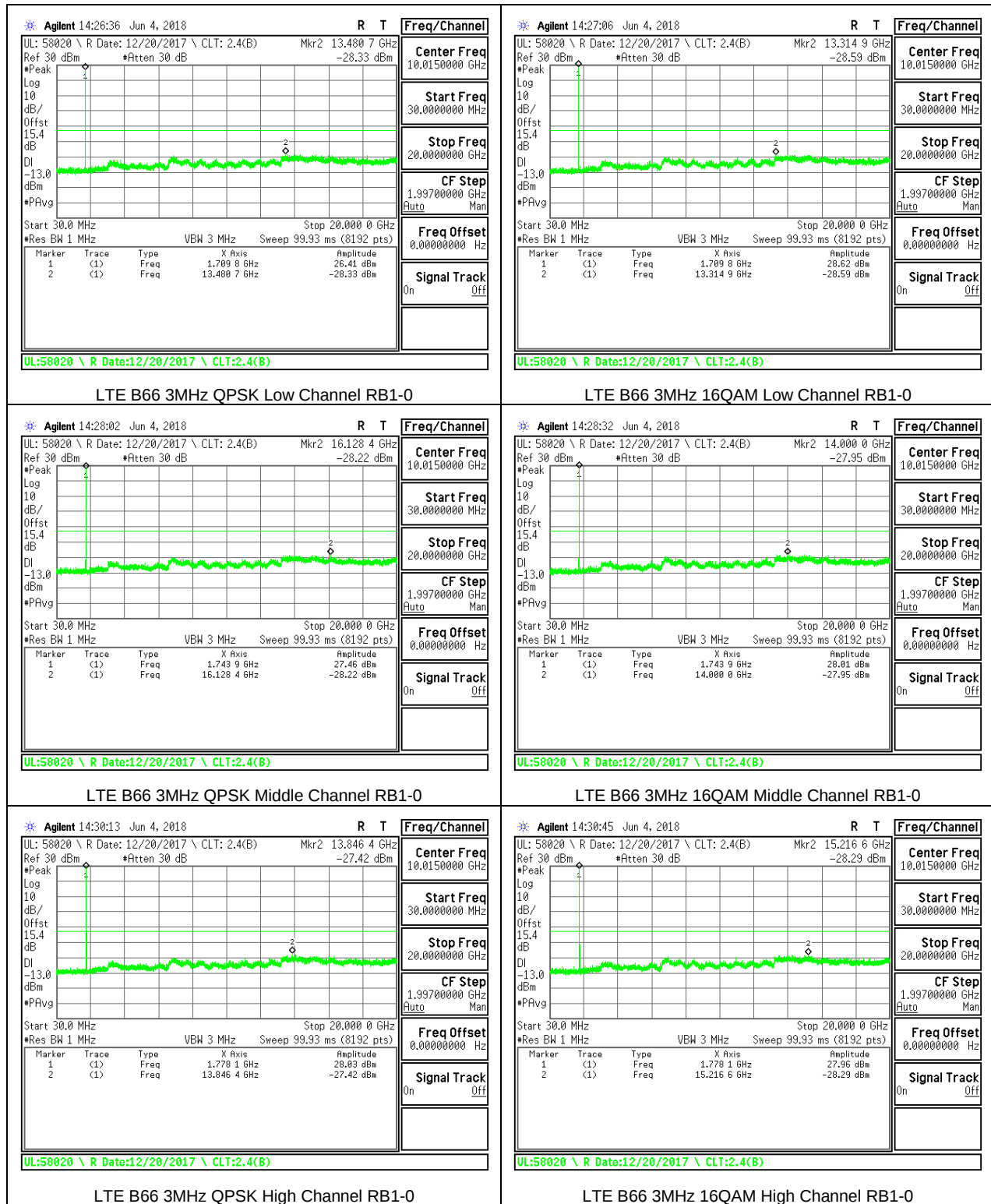


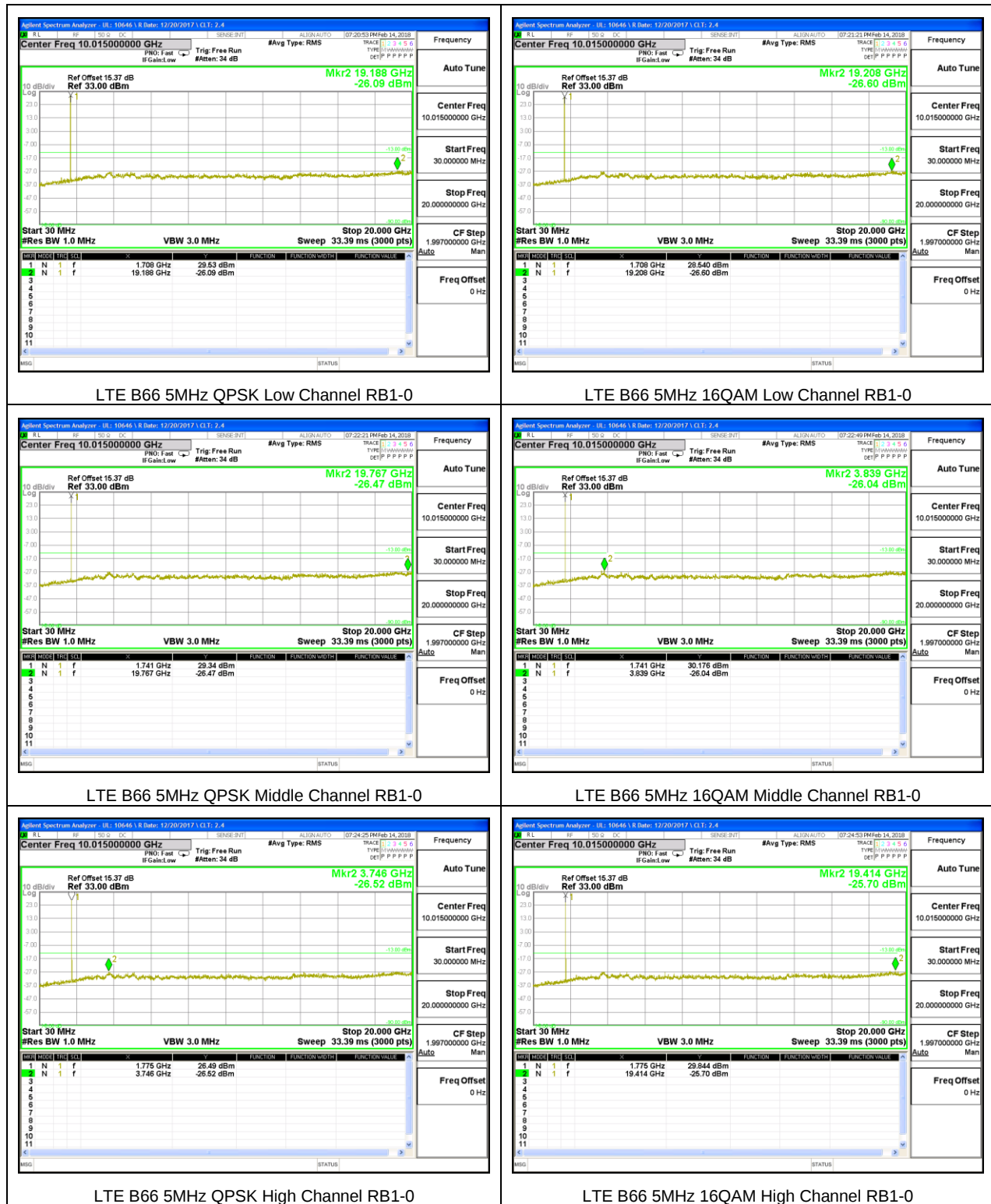
LTE B41 15MHz 16QAM High Channel RB1-0

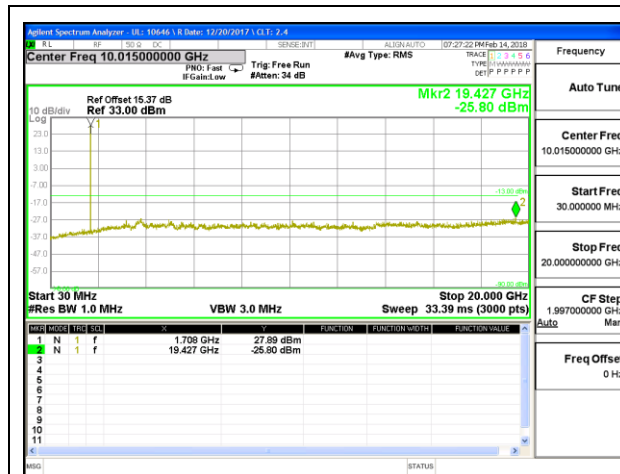


8.3.12. LTE BAND 66

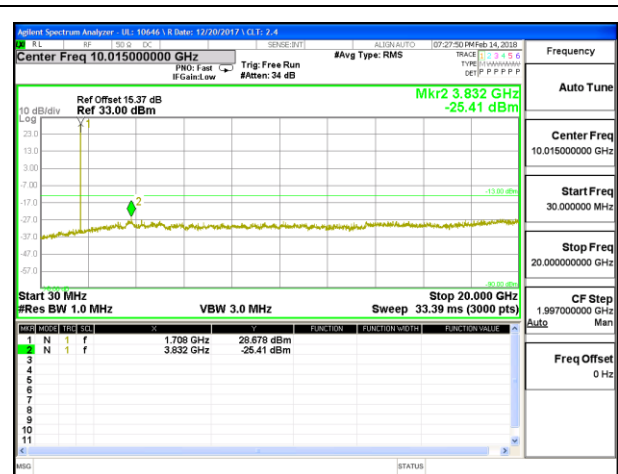




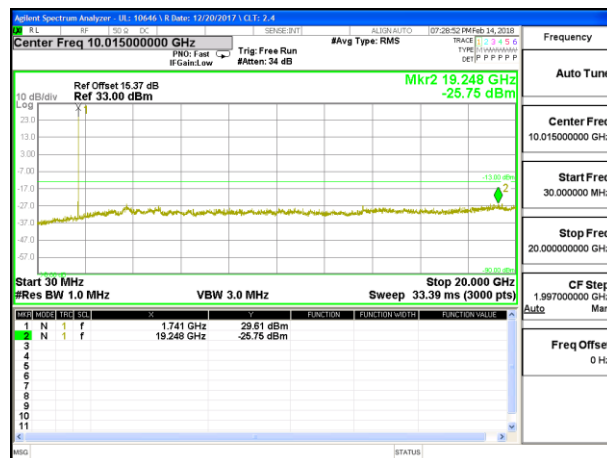




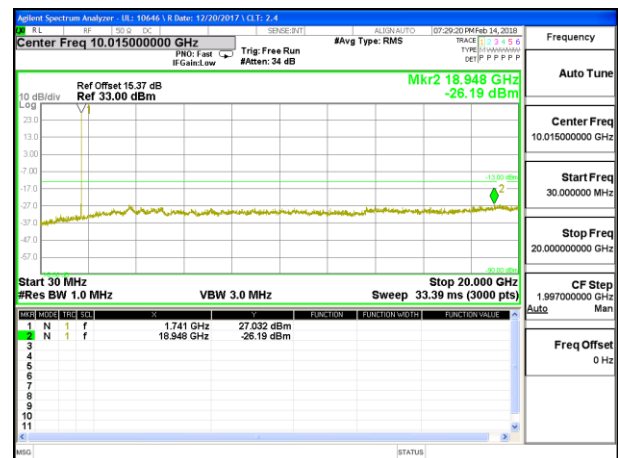
LTE B66 10MHz QPSK Low Channel RB1-0



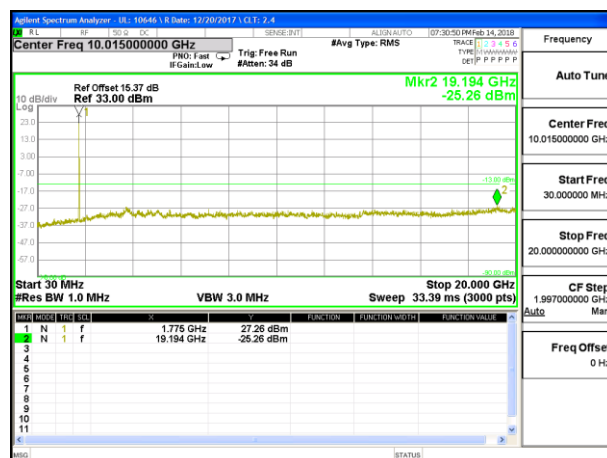
LTE B66 10MHz 16QAM Low Channel RB1-0



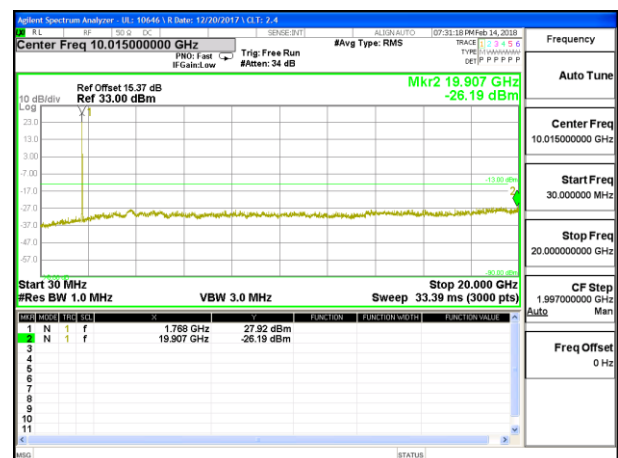
LTE B66 10MHz QPSK Middle Channel RB1-0



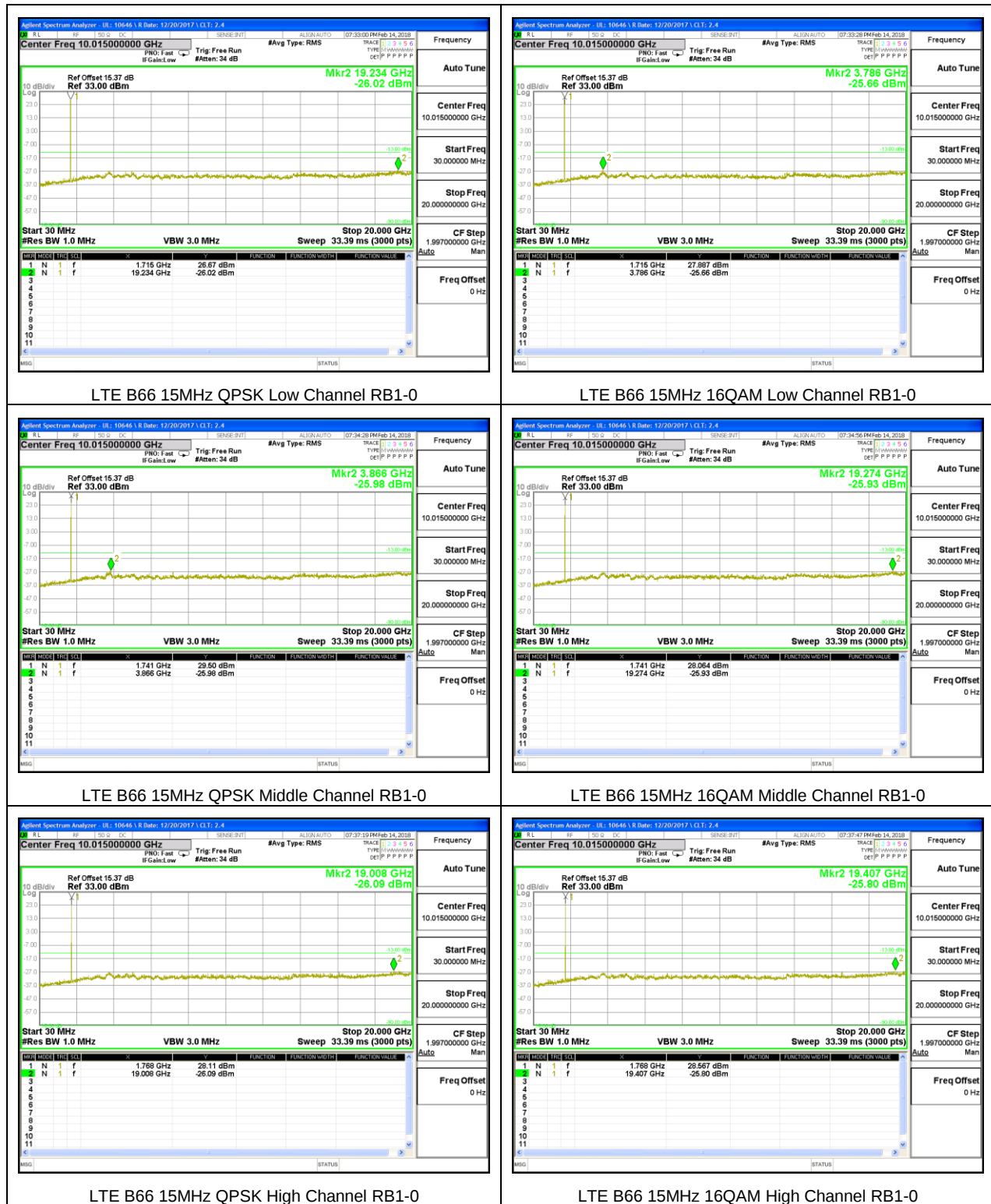
LTE B66 10MHz 16QAM Middle Channel RB1-0

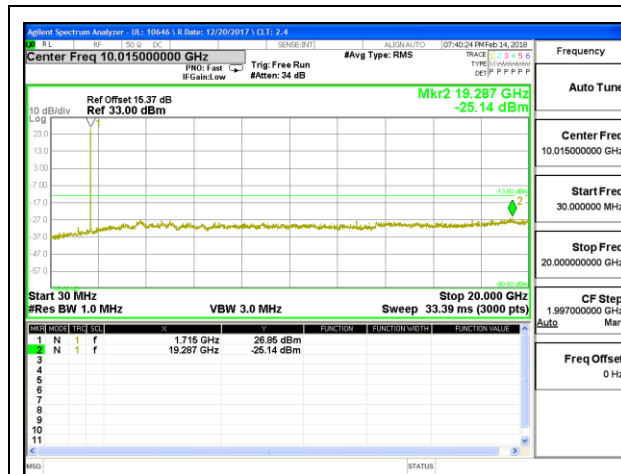


LTE B66 10MHz QPSK High Channel RB1-0

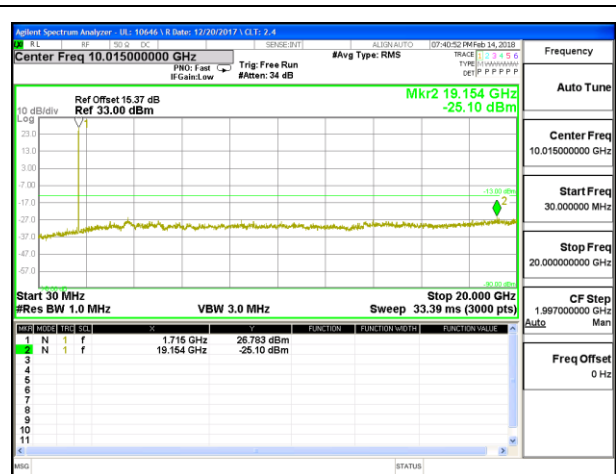


LTE B66 10MHz 16QAM High Channel RB1-0

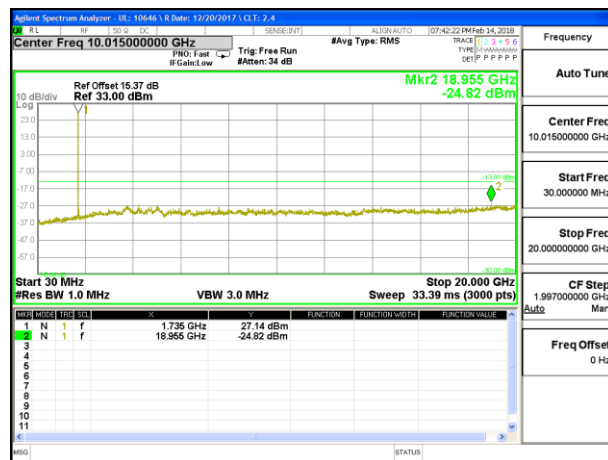




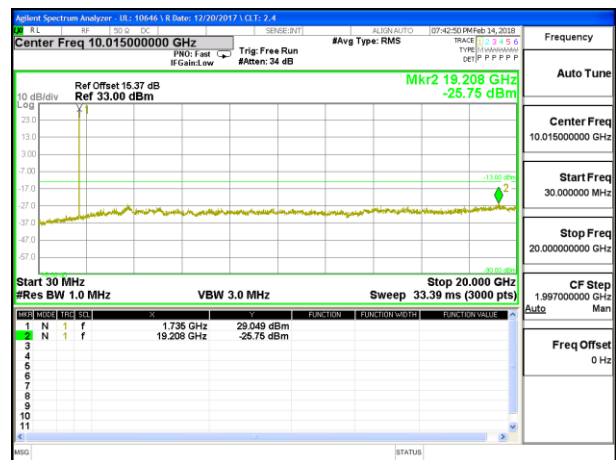
LTE B66 20MHz QPSK Low Channel RB1-0



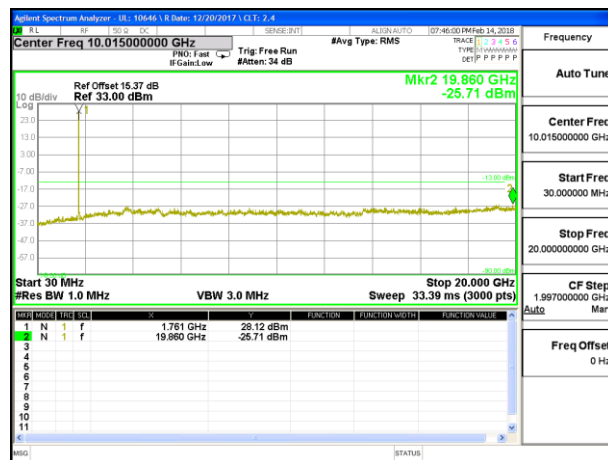
LTE B66 20MHz 16QAM Low Channel RB1-0



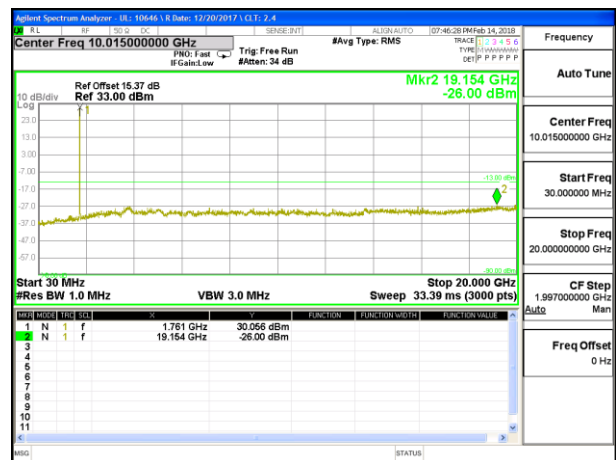
LTE B66 20MHz QPSK Middle Channel RB1-0



LTE B66 20MHz 16QAM Middle Channel RB1-0



LTE B66 20MHz QPSK High Channel RB1-0



LTE B66 20MHz 16QAM High Channel RB1-0

8.4. FREQUENCY STABILITY

RULE PART(S)

§2.1055, §22.355, §24.235, §27.54, §90.213 and §90.539

LIMITS

FCC: §22.355, §90.213

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

FCC: §90.539

(e) The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 ppm or better when AFC is locked to a base station, and 5 ppm or better when AFC is not locked.

FCC: §24.235 & §27.54

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

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = -30°C to $+50^{\circ}\text{C}$
- 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 placed inside a temperature chamber. The temperature is set to 20°C 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 $+50^{\circ}\text{C}$ is reached.

Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

MODES TESTED

- LTE Band 2
- LTE Band 5
- LTE Band 7
- LTE Band 12
- LTE Band 13
- LTE Band 14
- LTE Band 17
- LTE Band 25
- LTE Band 26
- LTE Band 30
- LTE Band 41
- LTE Band 66

RESULTS

See the following pages.

8.4.1. LTE BAND 2

ID:	44410 / 50893	Date:	3/12/18
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QPSK, (20MHz BANDWIDTH)

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1851.0113	1908.9952		
Extreme (50C)		1851.0113	1908.9952	14.4	0.008
Extreme (40C)		1851.0113	1908.9952	15.1	0.008
Extreme (30C)		1851.0113	1908.9952	15.2	0.008
Extreme (10C)		1851.0113	1908.9952	15.6	0.008
Extreme (0C)		1851.0112	1908.9952	-14.0	-0.007
Extreme (-10C)		1851.0112	1908.9952	-12.1	-0.006
Extreme (-20C)		1851.0112	1908.9952	-32.8	-0.017
Extreme (-30C)		1851.0112	1908.9952	-43.3	-0.023
20C	15%	1851.0113	1908.9952	15.6	0.008
	-15%	1851.0113	1908.9952	17.3	0.009
	End Point	1851.0112	1908.9952	-16.1	-0.009

8.4.2. LTE BAND 5

ID:	44410 / 50893	Date:	3/12/18
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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	824.2326	848.4996		
Extreme (50C)		824.2326	848.4996	9.7	0.012
Extreme (40C)		824.2326	848.4996	8.2	0.010
Extreme (30C)		824.2325	848.4996	-28.1	-0.034
Extreme (10C)		824.2326	848.4996	10.7	0.013
Extreme (0C)		824.2325	848.4995	-61.5	-0.074
Extreme (-10C)		824.2325	848.4996	-24.0	-0.029
Extreme (-20C)		824.2326	848.4997	63.7	0.076
Extreme (-30C)		824.2326	848.4997	63.2	0.076
20C	15%	824.2326	848.4996	27.1	0.032
	-15%	824.2326	848.4996	30.8	0.037
	End Point	824.2326	848.4996	23.7	0.028

8.4.3. LTE BAND 7

ID:	44410 / 50893	Date:	3/12/18
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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	2500.2058	2569.1608		
Extreme (50C)		2500.2057	2569.1608	-57.5	-0.023
Extreme (40C)		2500.2057	2569.1607	-65.7	-0.026
Extreme (30C)		2500.2057	2569.1608	-57.9	-0.023
Extreme (10C)		2500.2057	2569.1608	-47.7	-0.019
Extreme (0C)		2500.2058	2569.1609	51.0	0.020
Extreme (-10C)		2500.2057	2569.1607	-105.3	-0.042
Extreme (-20C)		2500.2056	2569.1607	-132.9	-0.052
Extreme (-30C)		2500.2057	2569.1607	-77.1	-0.030
20C	15%	2500.2058	2569.1609	55.9	0.022
	-15%	2500.2058	2569.1609	54.8	0.022
	End Point	2500.2058	2569.1609	67.3	0.027

8.4.4. LTE BAND 12

ID:	44410 / 50893	Date:	3/12/18
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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	699.3320	715.6306		
Extreme (50C)		699.3320	715.6306	15.4	0.022
Extreme (40C)		699.3320	715.6306	15.3	0.022
Extreme (30C)		699.3320	715.6306	16.6	0.023
Extreme (10C)		699.3320	715.6306	14.6	0.021
Extreme (0C)		699.3320	715.6306	23.8	0.034
Extreme (-10C)		699.3320	715.6306	18.8	0.027
Extreme (-20C)		699.3320	715.6306	15.3	0.022
Extreme (-30C)		699.3320	715.6306	14.3	0.020
20C	15%	699.3320	715.6306	22.9	0.032
	-15%	699.3320	715.6306	20.3	0.029
	End Point	699.3320	715.6306	21.1	0.030

8.4.5. LTE BAND 13

ID:	44410 / 50893	Date:	3/12/18
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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	777.1121	786.8886		
Extreme (50C)		777.1121	786.8887	22.0	0.028
Extreme (40C)		777.1121	786.8887	24.2	0.031
Extreme (30C)		777.1121	786.8887	23.3	0.030
Extreme (10C)		777.1121	786.8887	19.1	0.024
Extreme (0C)		777.1121	786.8887	24.4	0.031
Extreme (-10C)		777.1121	786.8887	46.9	0.060
Extreme (-20C)		777.1121	786.8887	52.0	0.067
Extreme (-30C)		777.1122	786.8887	74.5	0.095
20C	15%	777.1121	786.8887	25.9	0.033
	-15%	777.1121	786.8887	30.4	0.039
	End Point	777.1121	786.8887	27.8	0.036

8.4.6. LTE BAND 14

ID:	44410 / 50893	Date:	3/12/18
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QPSK, (10MHz BANDWIDTH)

Limit		788	798	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	788.3352	797.6663		
Extreme (50C)		788.3352	797.6663	-20.2	-0.025
Extreme (40C)		788.3352	797.6664	21.3	0.027
Extreme (30C)		788.3352	797.6664	9.9	0.013
Extreme (10C)		788.3352	797.6663	-53.8	-0.068
Extreme (0C)		788.3352	797.6663	-28.7	-0.036
Extreme (-10C)		788.3352	797.6664	9.9	0.013
Extreme (-20C)		788.3352	797.6664	12.2	0.015
Extreme (-30C)		788.3352	797.6664	15.5	0.020
20C	15%	788.3352	797.6664	33.4	0.042
	-15%	788.3352	797.6664	42.7	0.054
	End Point	788.3353	797.6664	47.9	0.060

8.4.7. LTE BAND 17

ID:	10646	Date:	5/30/18
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QPSK, (10MHz BANDWIDTH)

Limit		704	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	704.3240	715.6690		
Extreme (50C)		704.3240	715.6691	15.4	0.022
Extreme (40C)		704.3240	715.6691	15.3	0.021
Extreme (30C)		704.3240	715.6691	16.6	0.023
Extreme (10C)		704.3240	715.6691	14.6	0.021
Extreme (0C)		704.3240	715.6691	23.8	0.034
Extreme (-10C)		704.3240	715.6691	18.8	0.026
Extreme (-20C)		704.3240	715.6691	15.3	0.022
Extreme (-30C)		704.3240	715.6691	14.3	0.020
20C	15%	704.3240	715.6691	22.9	0.032
	-15%	704.3240	715.6691	20.3	0.029
	End Point	704.3240	715.6691	21.1	0.030

8.4.8. LTE BAND 25

ID:	10646	Date:	5/30/18
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QPSK, (20MHz BANDWIDTH)

Limit		1850	1915	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.8196	1914.1317		
Extreme (50C)		1850.8197	1914.1318	14.4	0.008
Extreme (40C)		1850.8197	1914.1318	15.1	0.008
Extreme (30C)		1850.8197	1914.1318	15.2	0.008
Extreme (10C)		1850.8197	1914.1318	15.6	0.008
Extreme (0C)		1850.8196	1914.1317	-14.0	-0.007
Extreme (-10C)		1850.8196	1914.1317	-12.1	-0.006
Extreme (-20C)		1850.8196	1914.1317	-32.8	-0.017
Extreme (-30C)		1850.8196	1914.1317	-43.3	-0.023
20C	15%	1850.8197	1914.1318	15.6	0.008
	-15%	1850.8197	1914.1318	17.3	0.009
	End Point	1850.8196	1914.1317	-16.1	-0.009

8.4.9. LTE BAND 26 (FCC PART 90S)

ID:	10646	Date:	6/21/18
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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	814.3193	823.6911		
Extreme (50C)		814.3193	823.6911	7.8	0.010
Extreme (40C)		814.3193	823.6911	8.4	0.010
Extreme (30C)		814.3193	823.6911	9.4	0.012
Extreme (10C)		814.3193	823.6911	8.5	0.010
Extreme (0C)		814.3193	823.6911	9.8	0.012
Extreme (-10C)		814.3193	823.6911	10.1	0.012
Extreme (-20C)		814.3193	823.6911	10.5	0.013
Extreme (-30C)		814.3193	823.6911	8.2	0.010
20C	15%	814.3193	823.6911	7.3	0.009
	-15%	814.3193	823.6911	7.1	0.009
	End Point	814.3193	823.6911	7.0	0.009

8.4.10. LTE BAND 30

ID:	44410 / 50893	Date:	3/12/18
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QPSK, (10MHz BANDWIDTH)

Limit		2305	2315	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2305.3439	2314.6491		
Extreme (50C)		2305.3440	2314.6492	87.0	0.038
Extreme (40C)		2305.3440	2314.6492	81.2	0.035
Extreme (30C)		2305.3440	2314.6492	82.2	0.036
Extreme (10C)		2305.3440	2314.6492	73.8	0.032
Extreme (0C)		2305.3440	2314.6492	83.8	0.036
Extreme (-10C)		2305.3438	2314.6491	-59.9	-0.026
Extreme (-20C)		2305.3439	2314.6492	53.2	0.023
Extreme (-30C)		2305.3439	2314.6492	48.7	0.021
20C	15%	2305.3440	2314.6492	77.4	0.034
	-15%	2305.3440	2314.6492	78.2	0.034
	End Point	2305.3440	2314.6492	81.1	0.035

8.4.11. LTE BAND 41

ID:	50893	Date:	3/12/18
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QPSK, (20MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2496.9075	2689.0947		
Extreme (50C)		2496.9074	2689.0946	-42.6	-0.016
Extreme (40C)		2496.9075	2689.0946	-41.5	-0.016
Extreme (30C)		2496.9074	2689.0946	-61.5	-0.024
Extreme (10C)		2496.9075	2689.0946	-29.0	-0.011
Extreme (0C)		2496.9075	2689.0946	-28.4	-0.011
Extreme (-10C)		2496.9075	2689.0946	-30.7	-0.012
Extreme (-20C)		2496.9075	2689.0946	-28.1	-0.011
Extreme (-30C)		2496.9075	2689.0947	-26.7	-0.010
20C	15%	2496.9074	2689.0946	-65.8	-0.025
	-15%	2496.9076	2689.0948	109.9	0.042
	End Point	2496.9075	2689.0946	-38.2	-0.015

8.4.12. LTE BAND 66

ID:	44410	Date:	3/12/18
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QPSK, (20MHz BANDWIDTH)

Limit		1710	1780	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1710.8368	1779.1458		
Extreme (50C)		1710.8368	1779.1458	15.0	0.009
Extreme (40C)		1710.8369	1779.1458	15.9	0.009
Extreme (30C)		1710.8369	1779.1458	16.0	0.009
Extreme (10C)		1710.8369	1779.1458	17.0	0.010
Extreme (0C)		1710.8368	1779.1458	13.4	0.008
Extreme (-10C)		1710.8368	1779.1457	-55.5	-0.032
Extreme (-20C)		1710.8367	1779.1456	-137.3	-0.079
Extreme (-30C)		1710.8367	1779.1456	-123.0	-0.070
20C	15%	1710.8369	1779.1458	16.8	0.010
	-15%	1710.8369	1779.1458	16.2	0.009
	End Point	1710.8369	1779.1458	16.5	0.009

8.5. PEAK-TO-AVERAGE POWER RATIO

LIMIT

In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

MODES TESTED

- LTE Band 2
- LTE Band 5
- LTE Band 7
- LTE Band 12
- LTE Band 13
- LTE Band 14
- LTE Band 17
- LTE Band 25
- LTE Band 26
- LTE Band 30
- LTE Band 41
- LTE Band 66

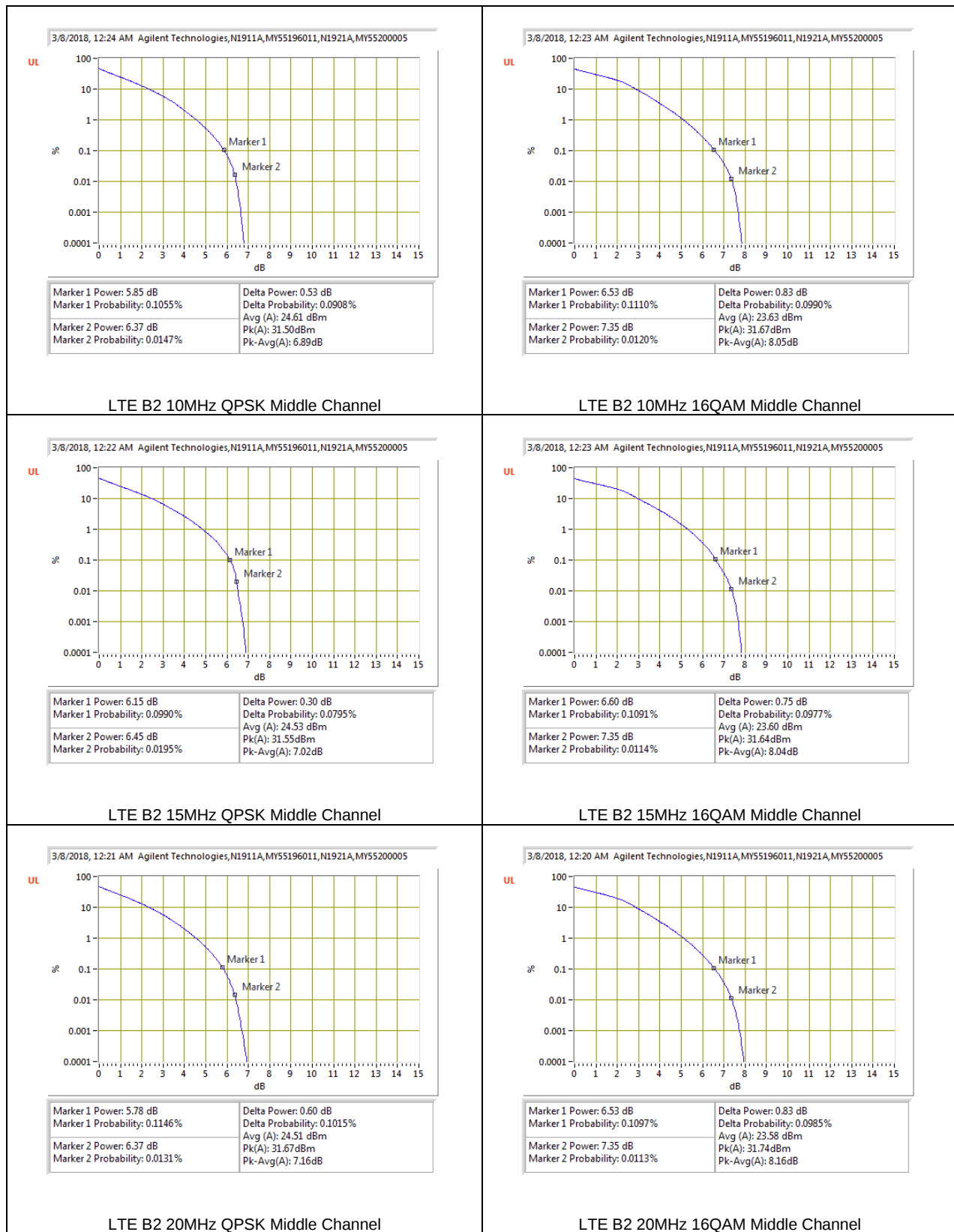
RESULT

Ant 1 was used to measure as the worst case; full resource block (FRB) for each bandwidth was used to measure as the worst case. The results from all CCDF measurements are passed with 13dB peak-to-average power ratio criteria.

ID:	39004	Date:	3/18/18
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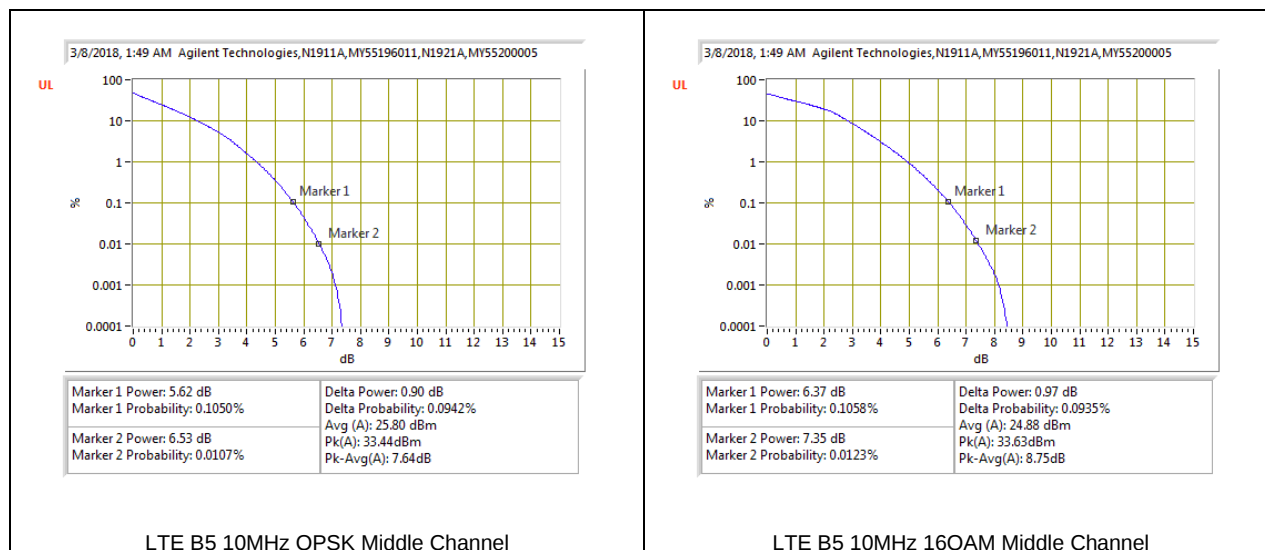
8.5.1. LTE BAND 2





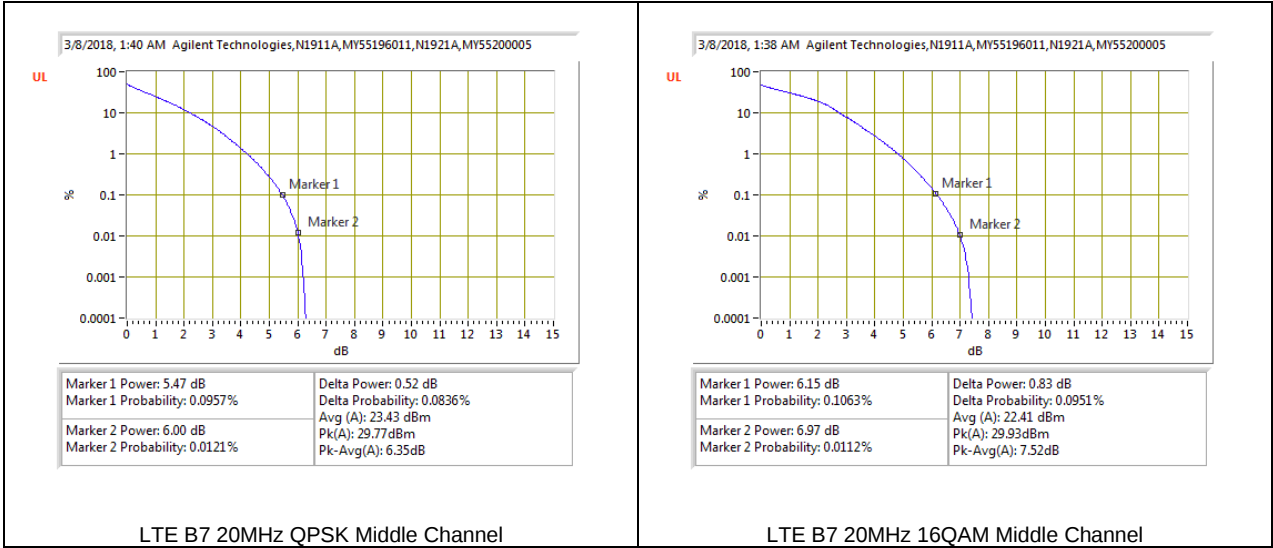
8.5.2. LTE BAND 5





8.5.3. LTE BAND 7





8.5.4. LTE BAND 12



