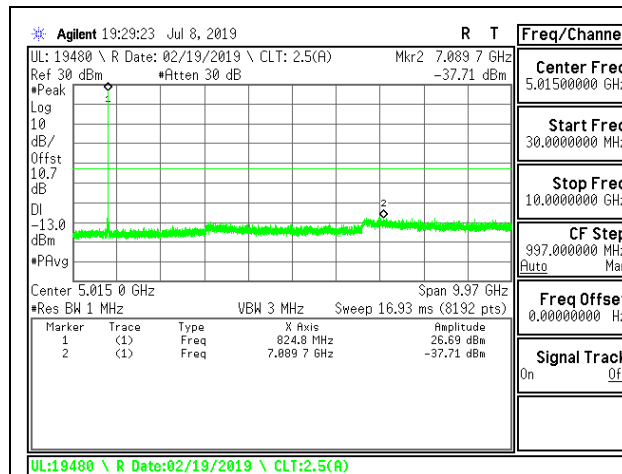
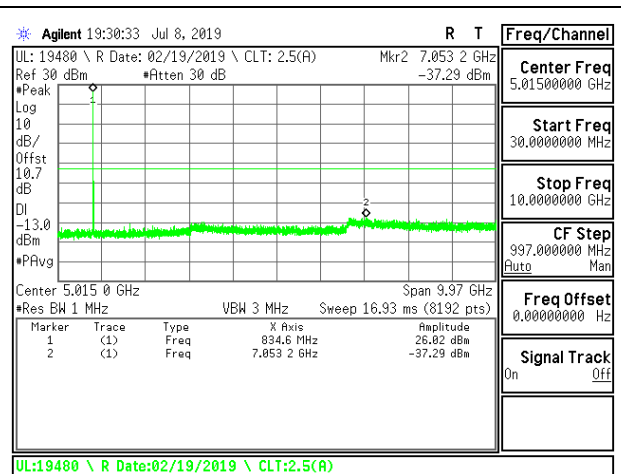
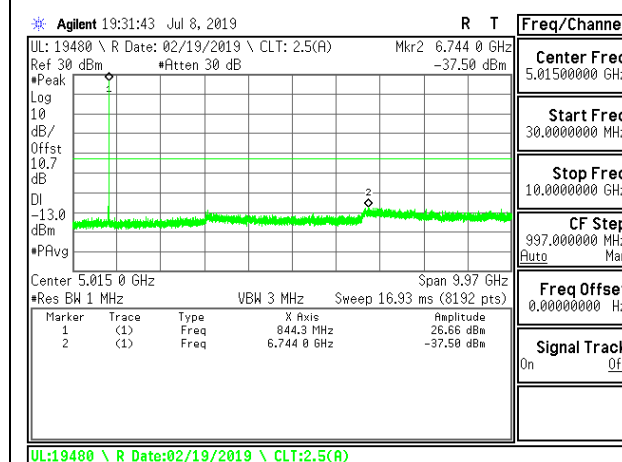




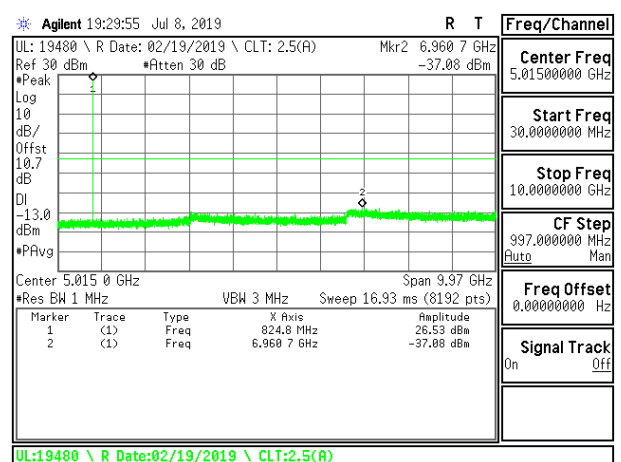
LTE B5 5MHz QPSK Low Channel RB1-0



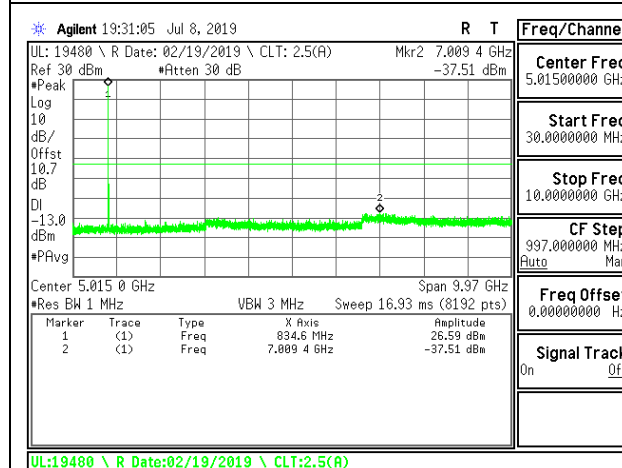
LTE B5 5MHz QPSK Middle Channel RB1-0



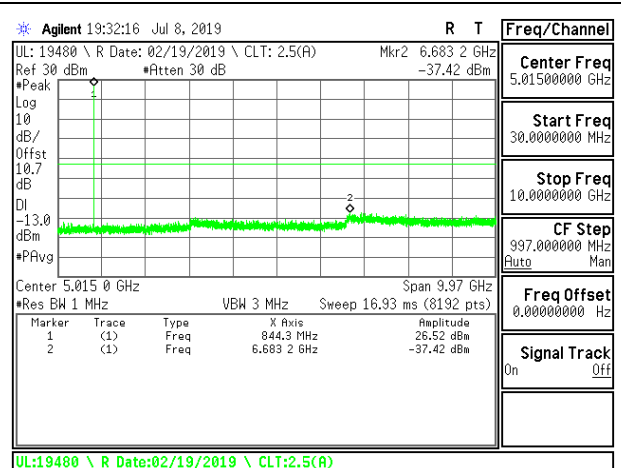
LTE B5 5MHz QPSK High Channel RB1-0



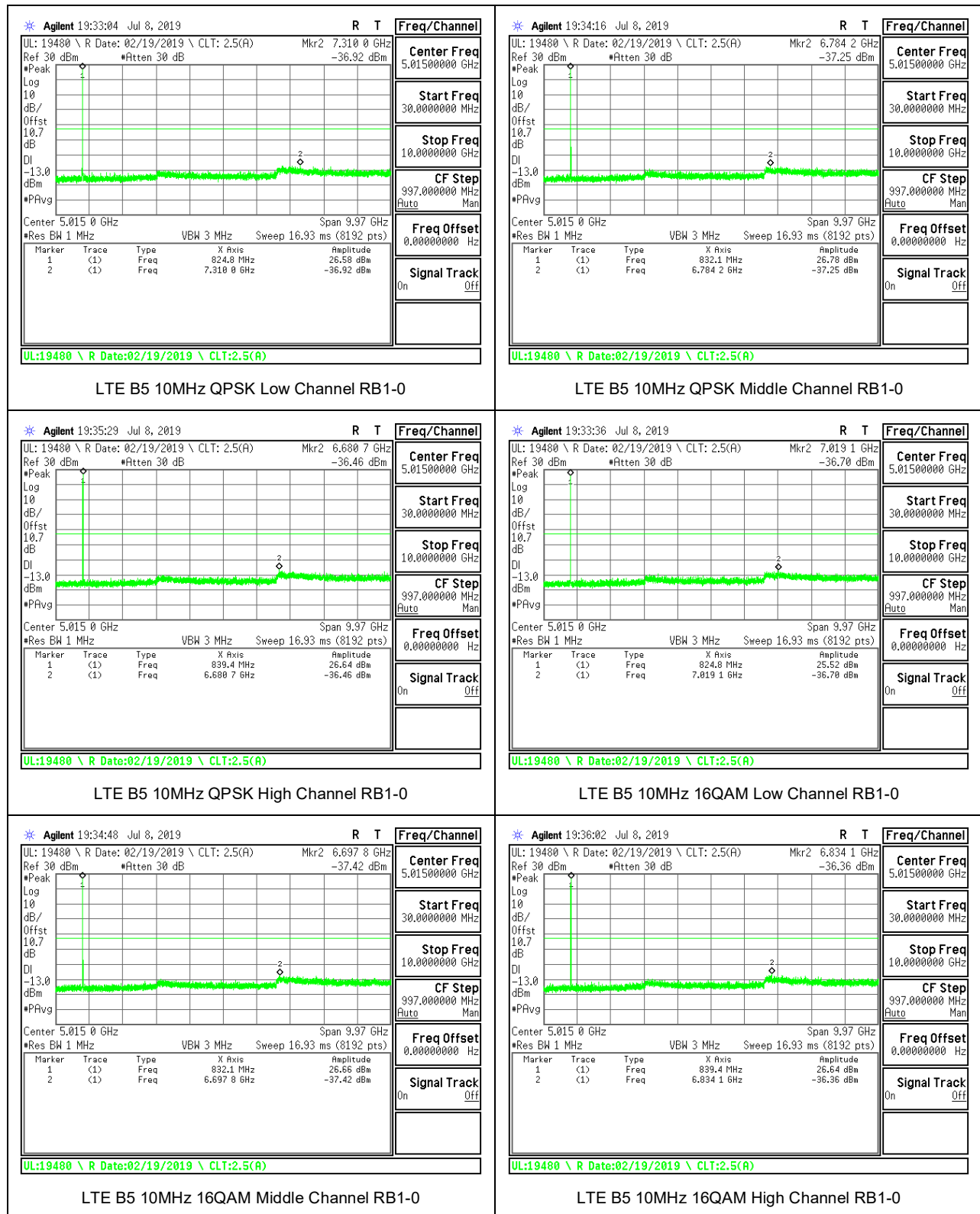
LTE B5 5MHz 16QAM Low Channel RB1-0



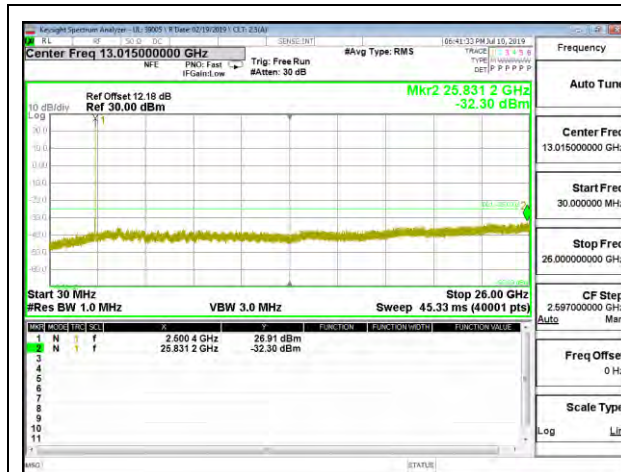
LTE B5 5MHz 16QAM Middle Channel RB1-0



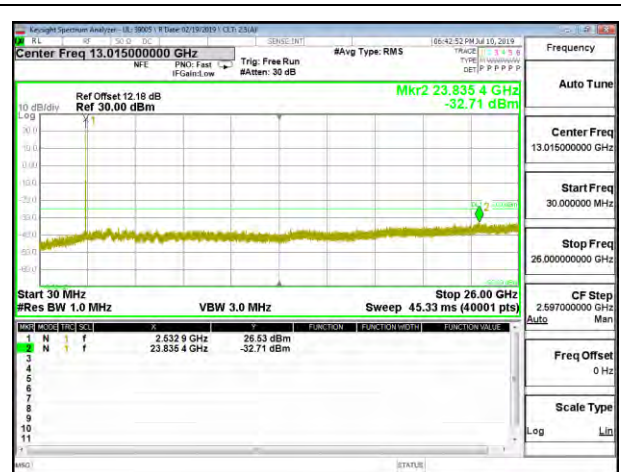
LTE B5 5MHz 16QAM High Channel RB1-0



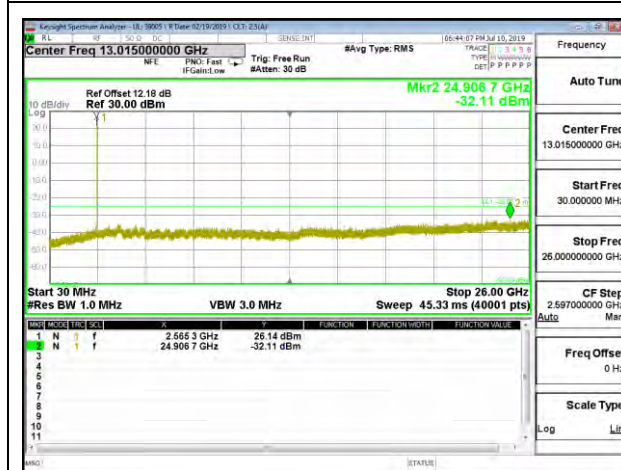
8.3.4. LTE BAND 7



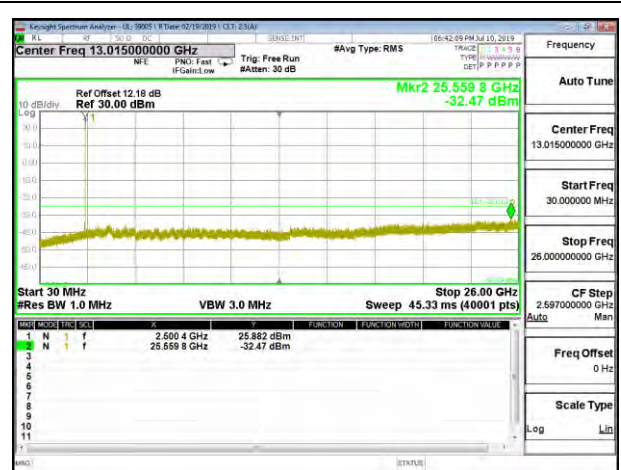
LTE B7 5MHz QPSK Low Channel RB1-0



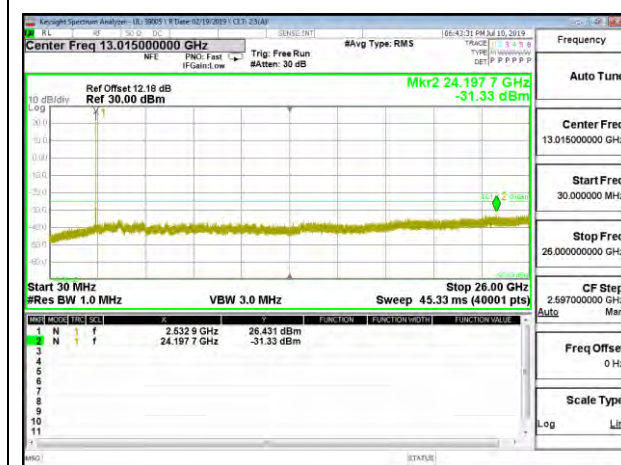
LTE B7 5MHz QPSK Middle Channel RB1-0



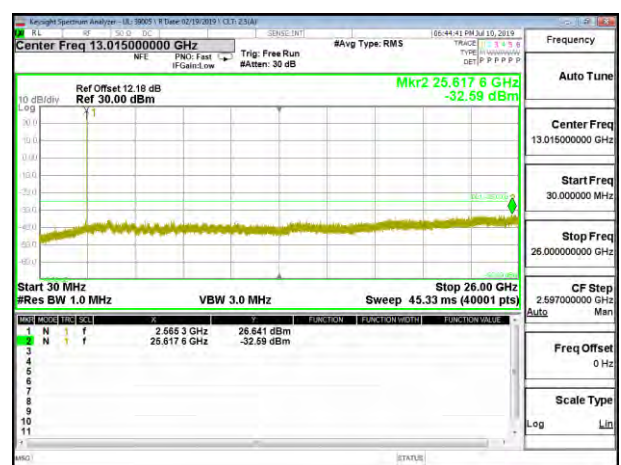
LTE B7 5MHz QPSK High Channel RB1-0



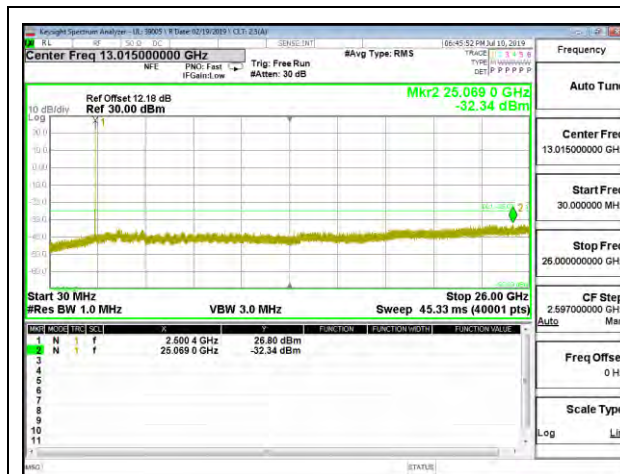
LTE B7 5MHz 16QAM Low Channel RB1-0



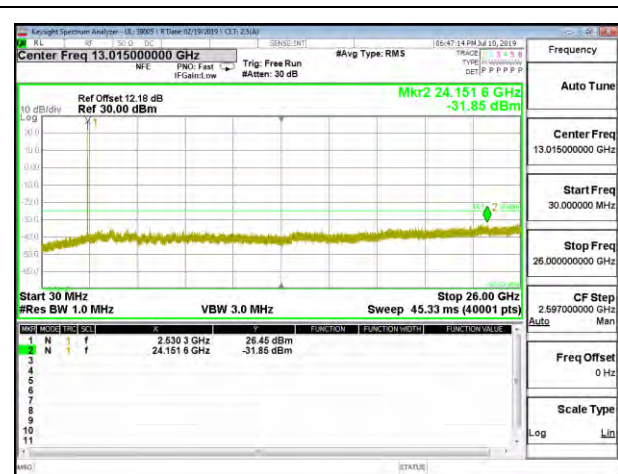
LTE B7 5MHz 16QAM Middle Channel RB1-0



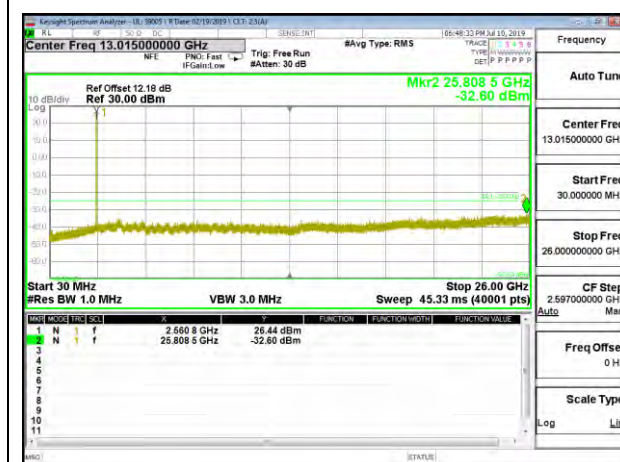
LTE B7 5MHz 16QAM High Channel RB1-0



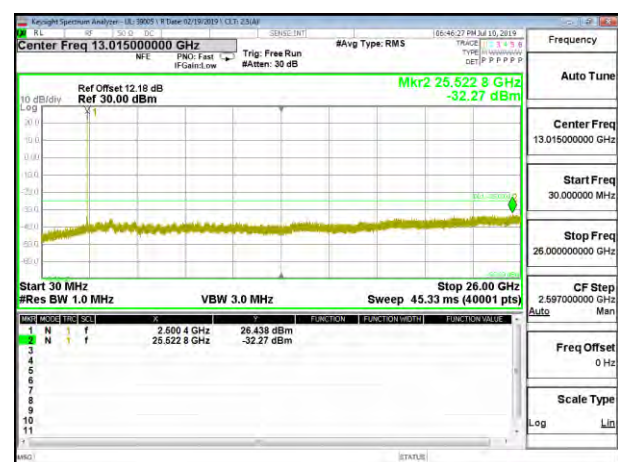
LTE B7 10MHz QPSK Low Channel RB1-0



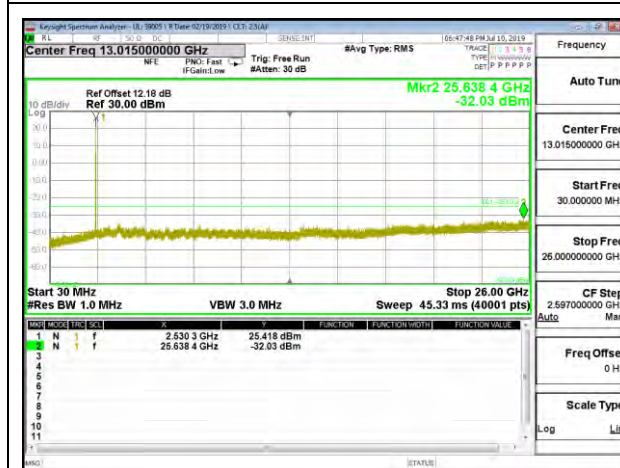
LTE B7 10MHz QPSK Middle Channel RB1-0



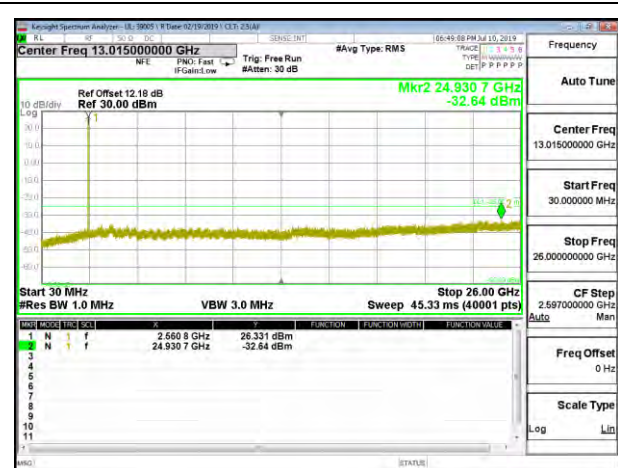
LTE B7 10MHz QPSK High Channel RB1-0



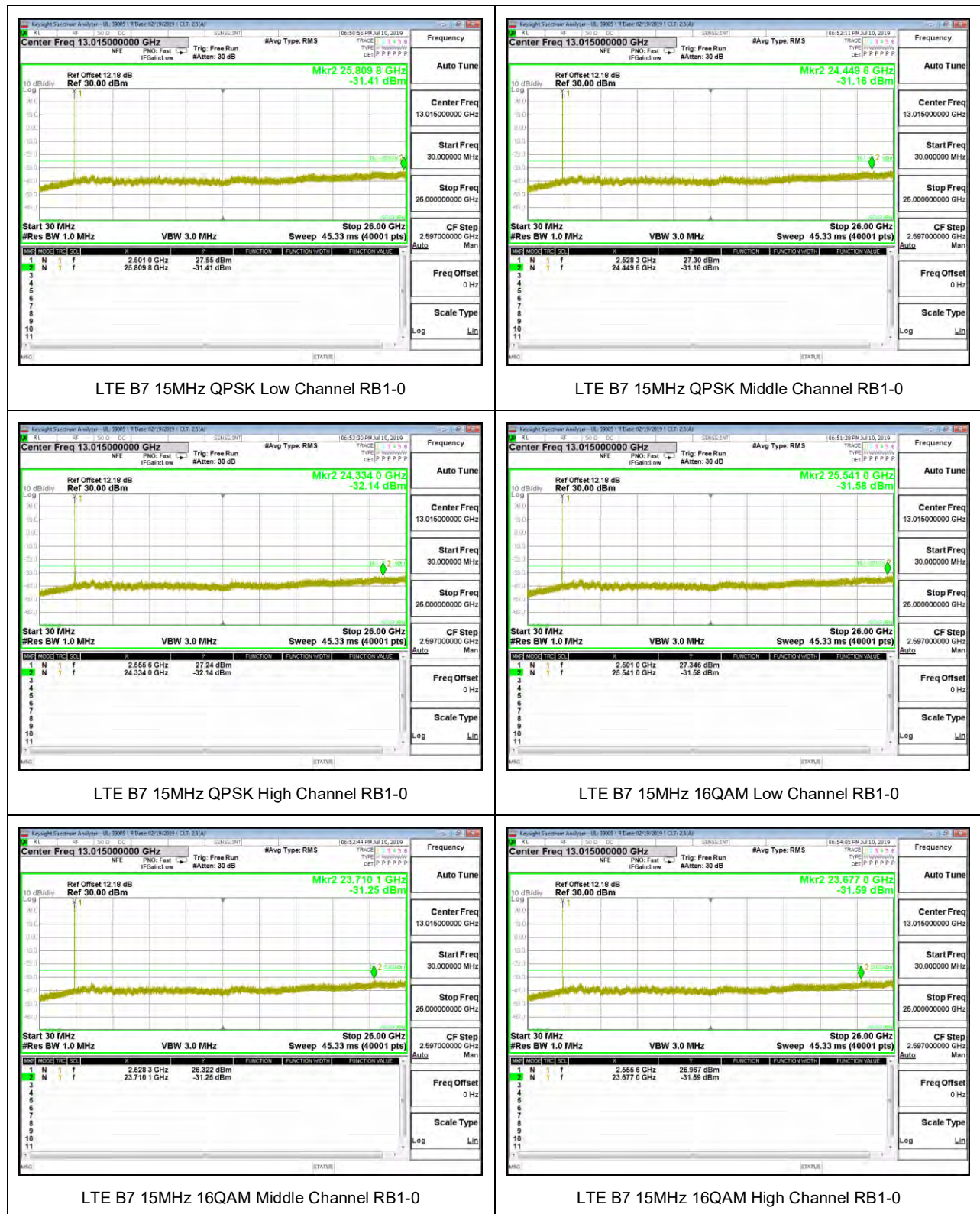
LTE B7 10MHz 16QAM Low Channel RB1-0

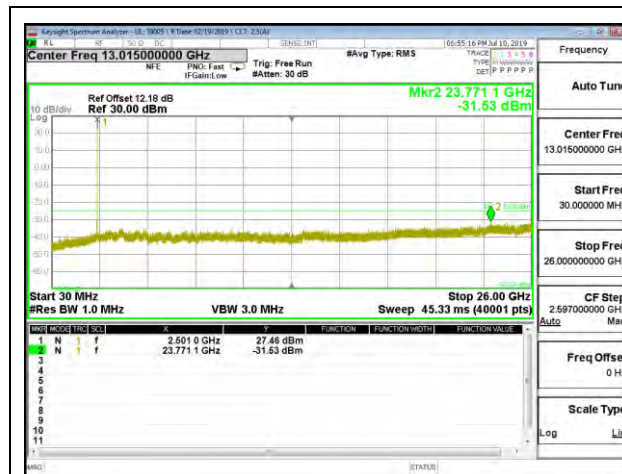


LTE B7 10MHz 16QAM Middle Channel RB1-0

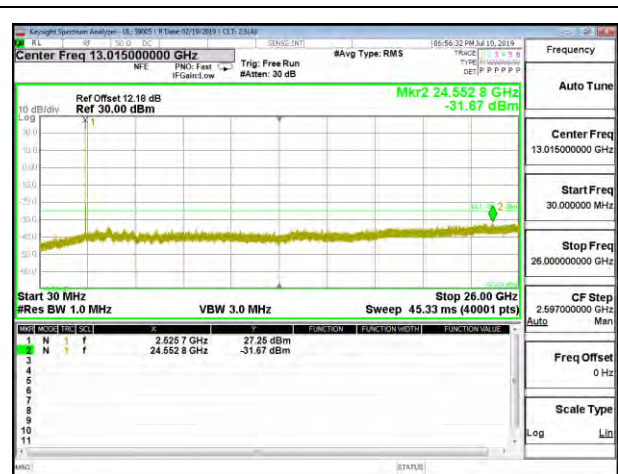


LTE B7 10MHz 16QAM High Channel RB1-0

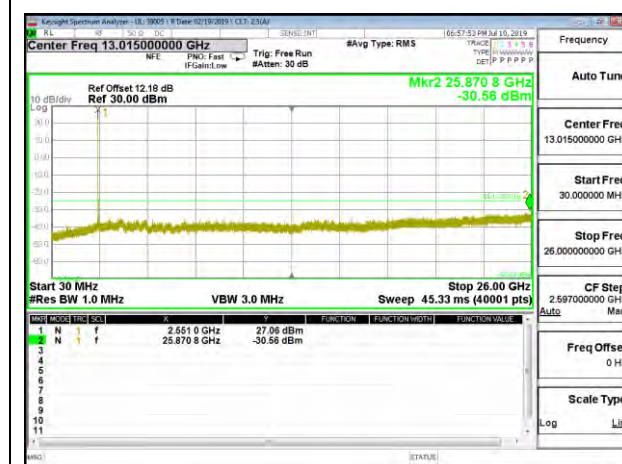




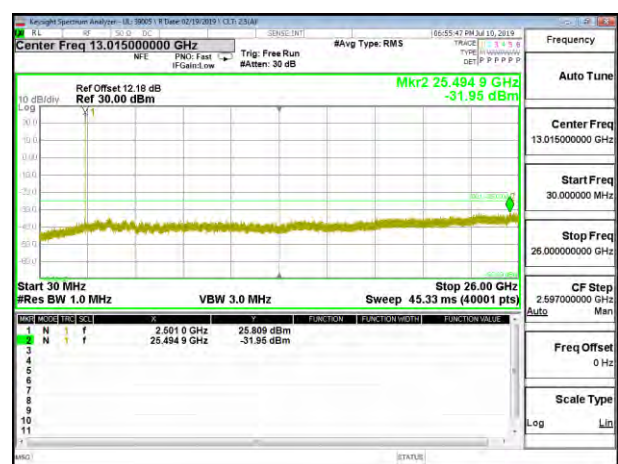
LTE B7 20MHz QPSK Low Channel RB1-0



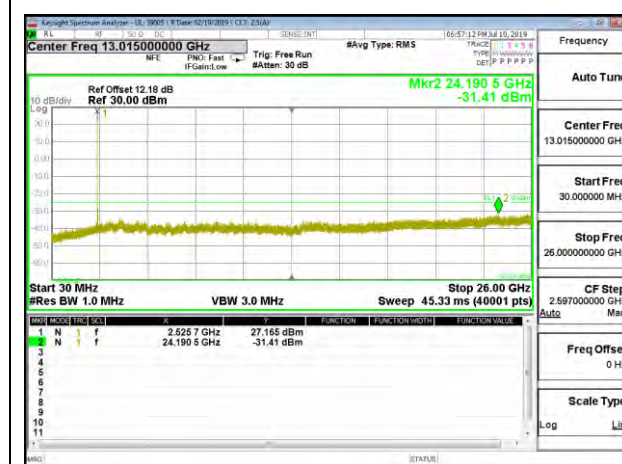
LTE B7 20MHz QPSK Middle Channel RB1-0



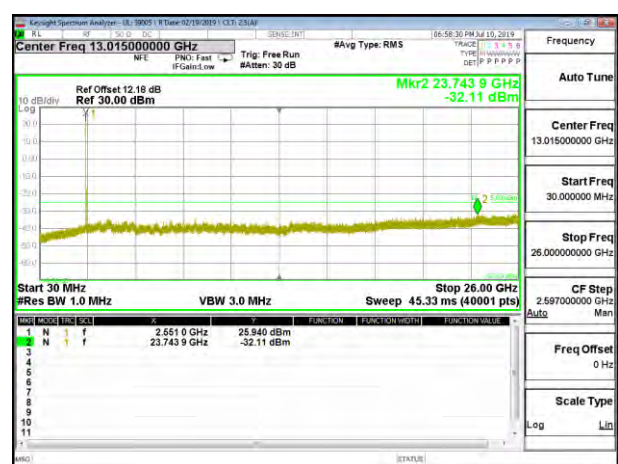
LTE B7 20MHz QPSK High Channel RB1-0



LTE B7 20MHz 16QAM Low Channel RB1-0

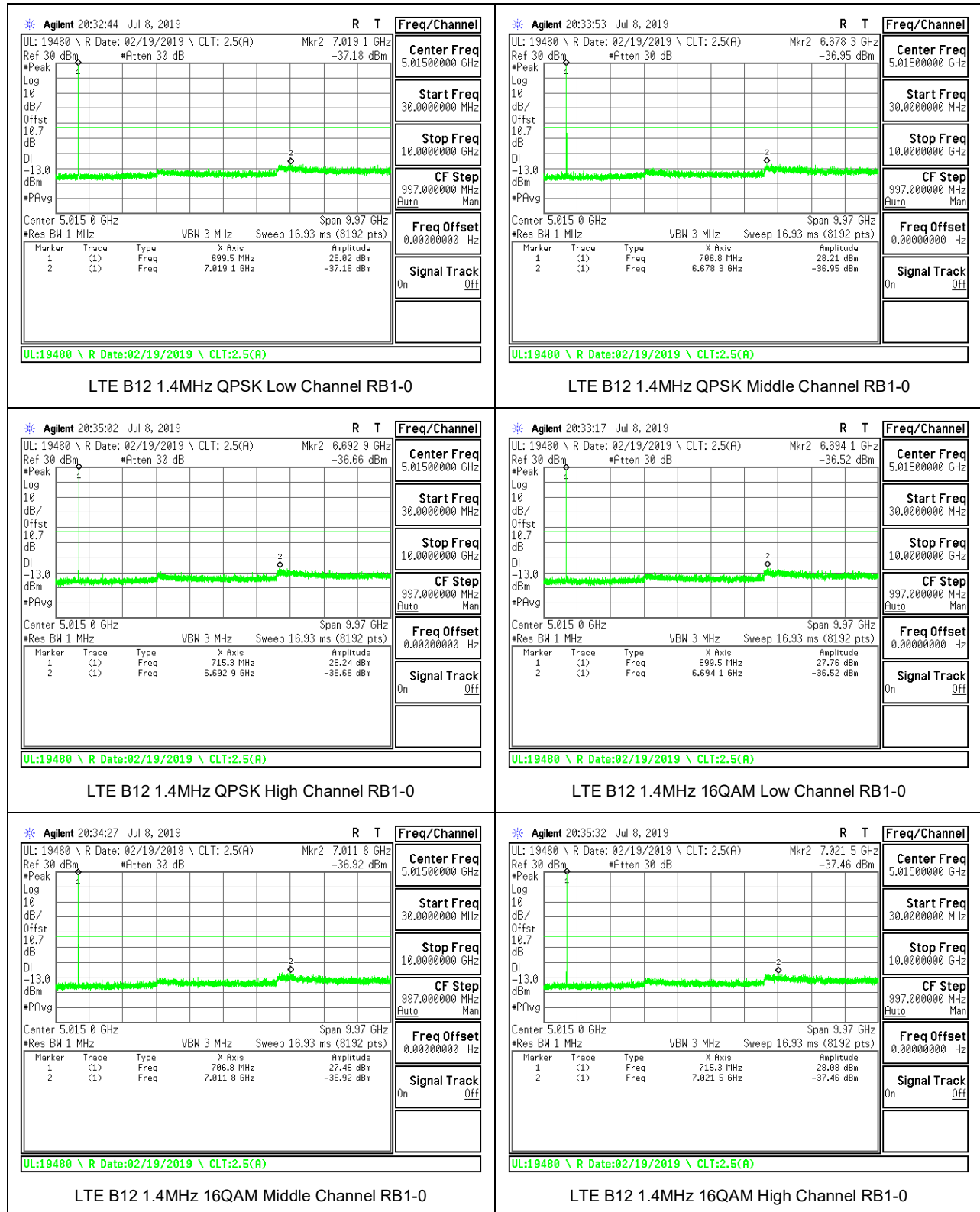


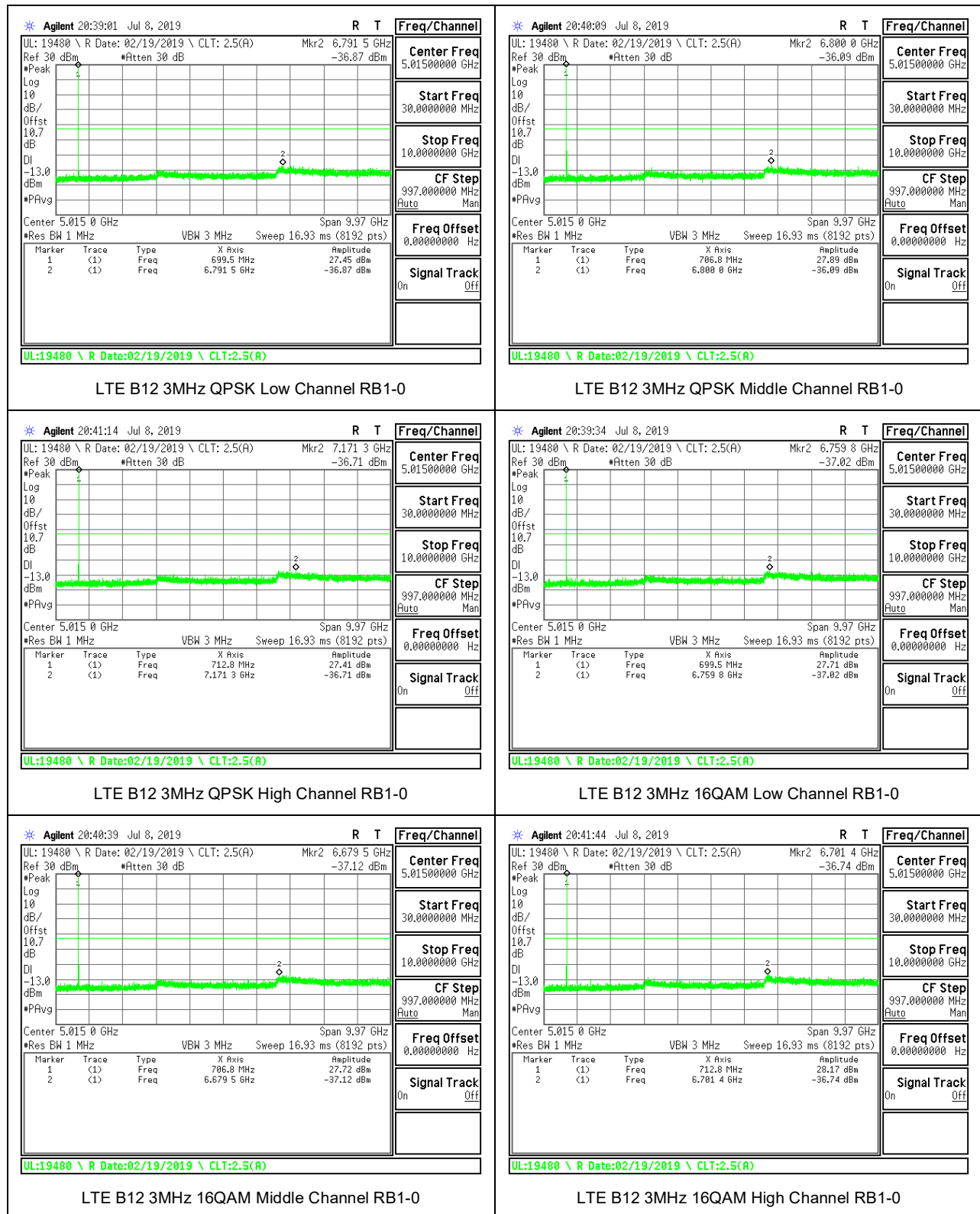
LTE B7 20MHz 16QAM Middle Channel RB1-0

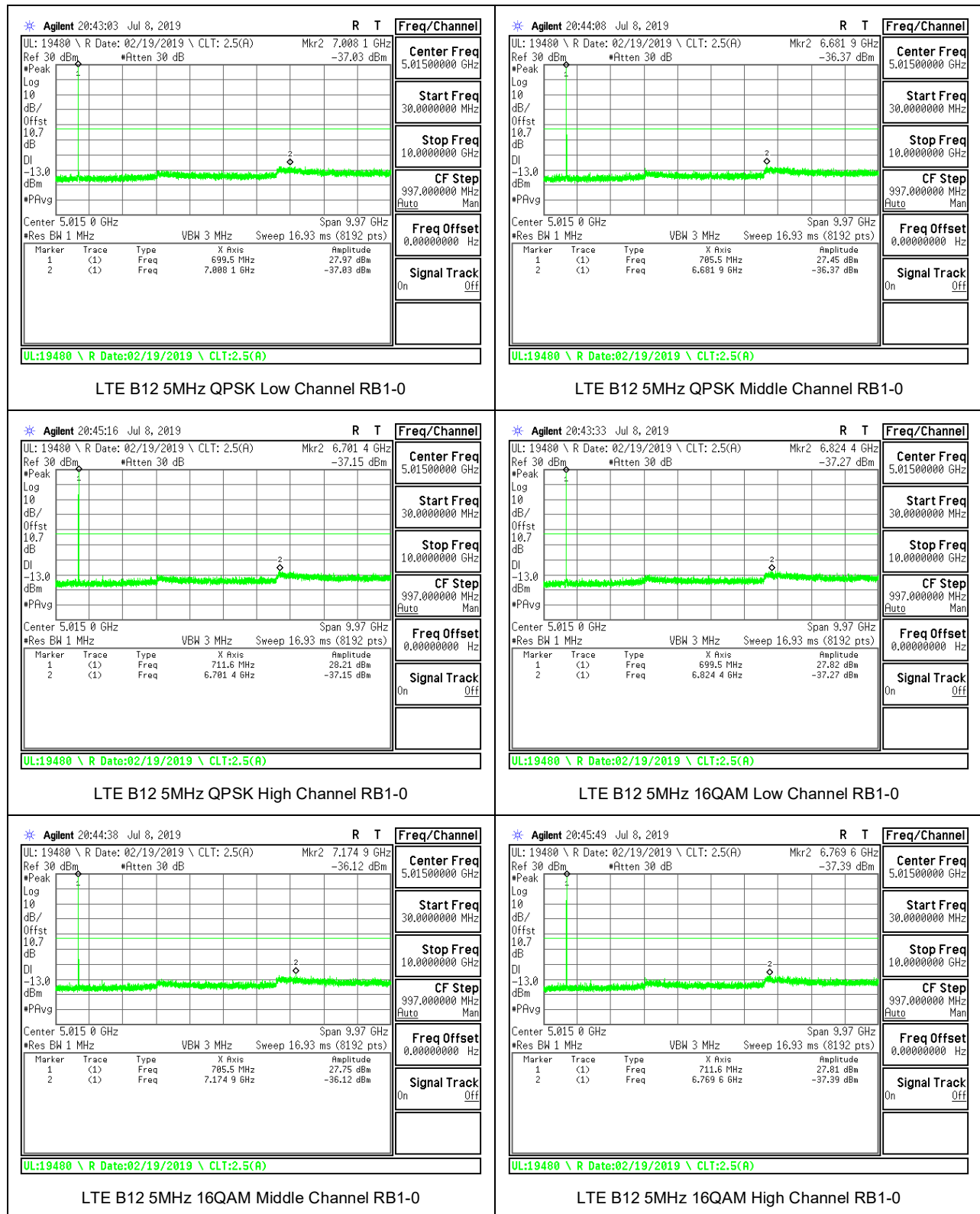


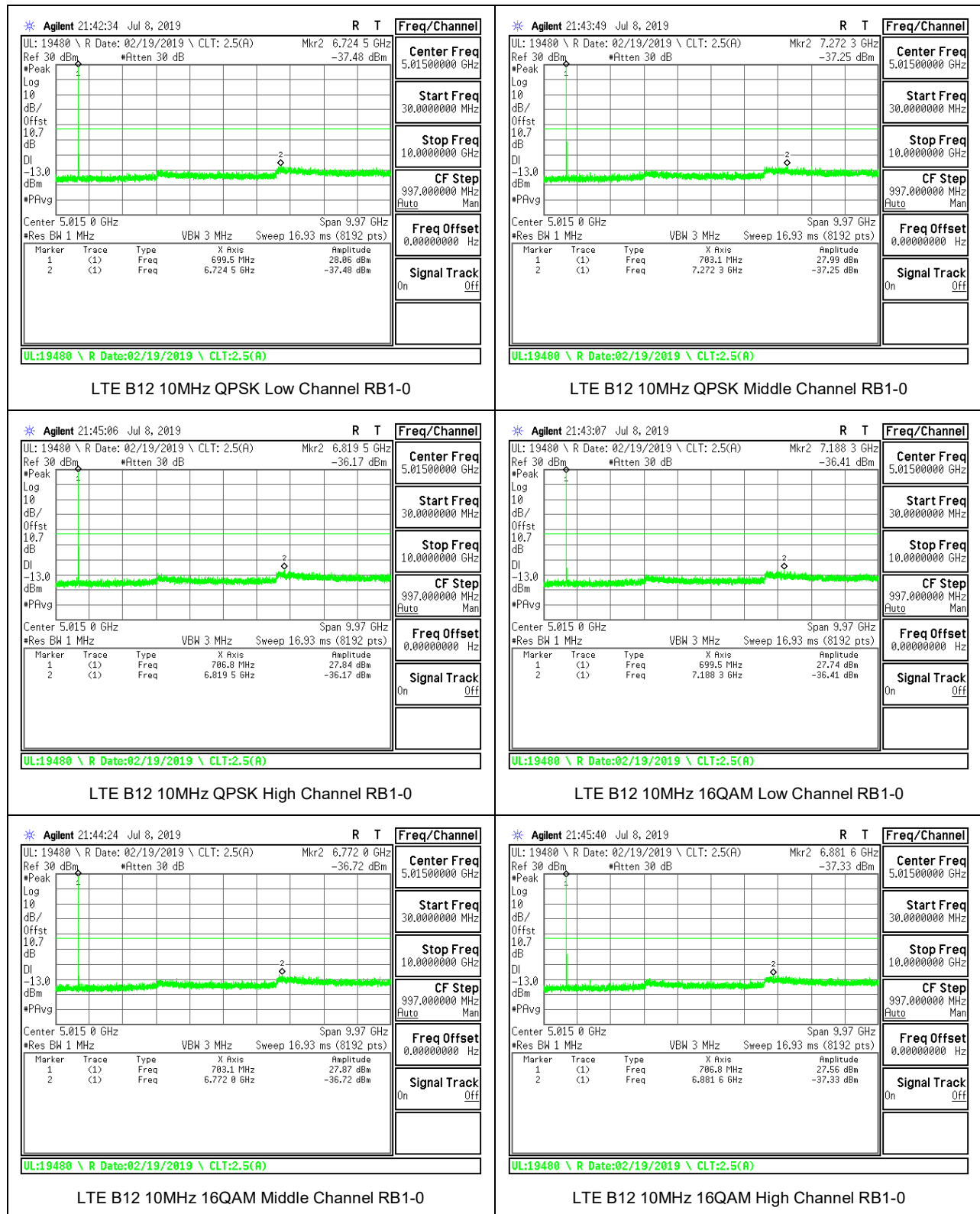
LTE B7 20MHz 16QAM High Channel RB1-0

8.3.5. LTE BAND 12

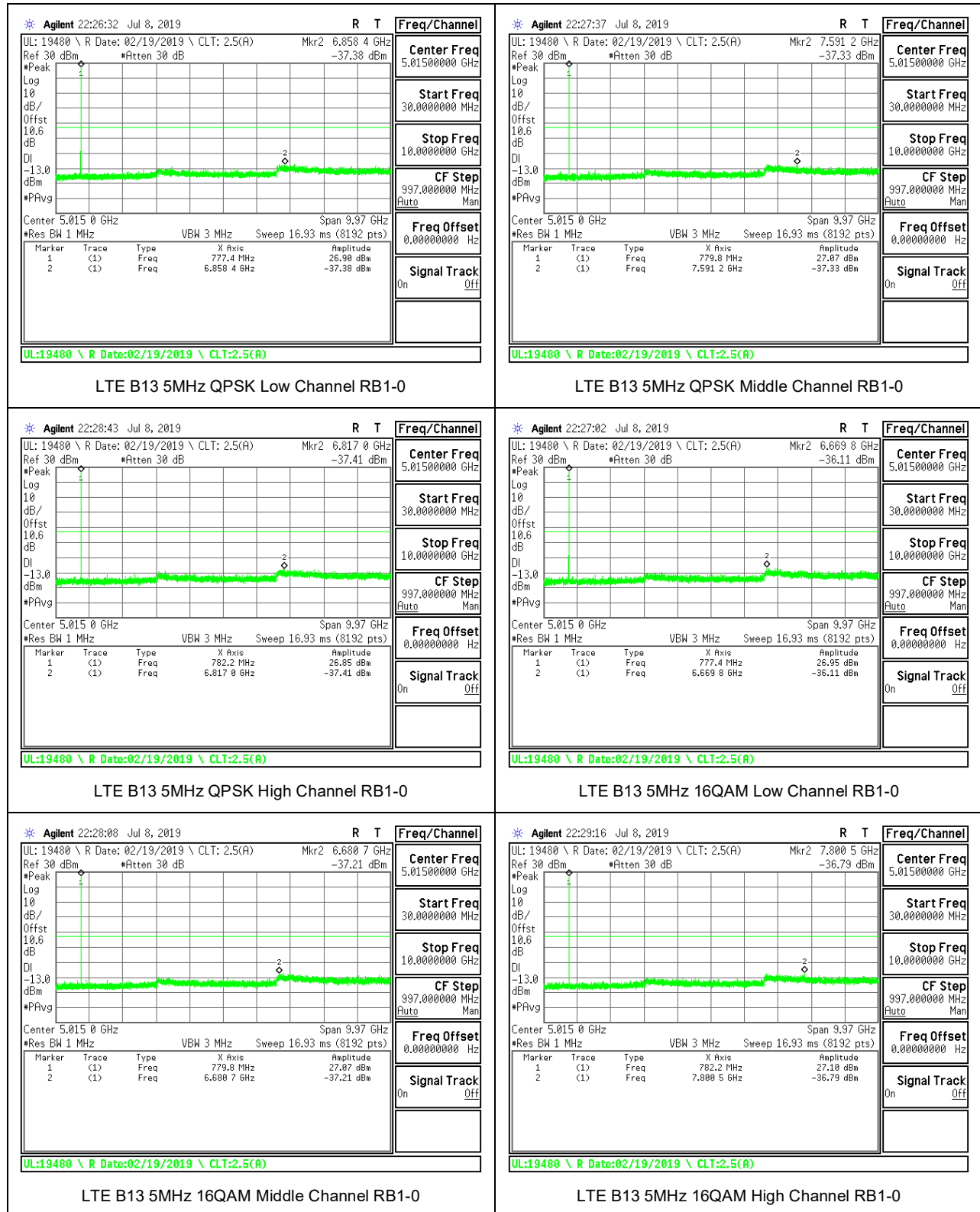


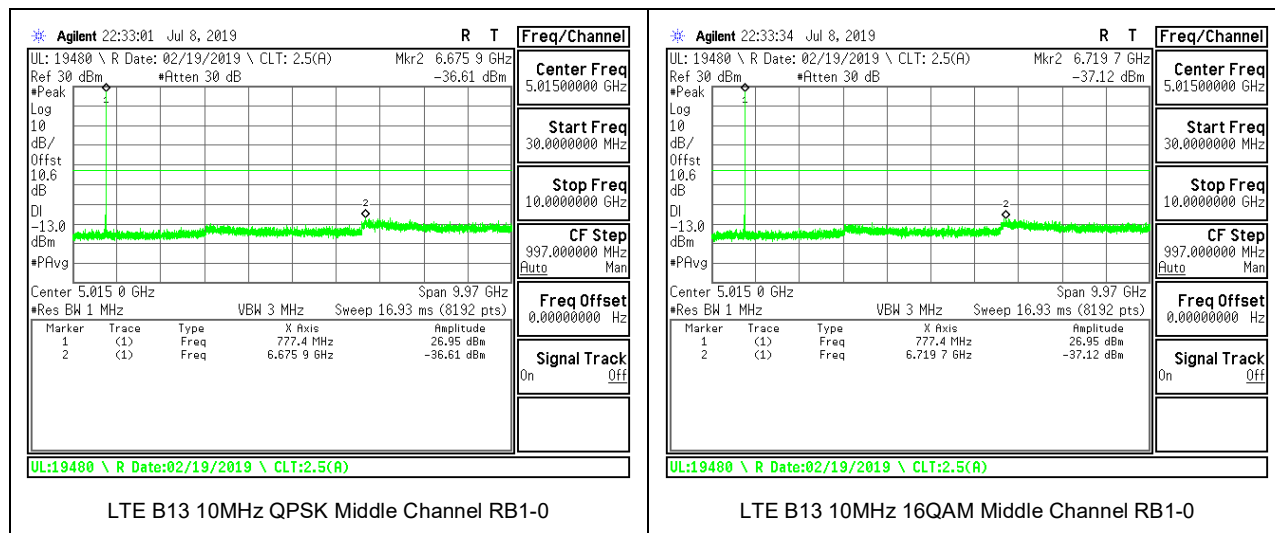






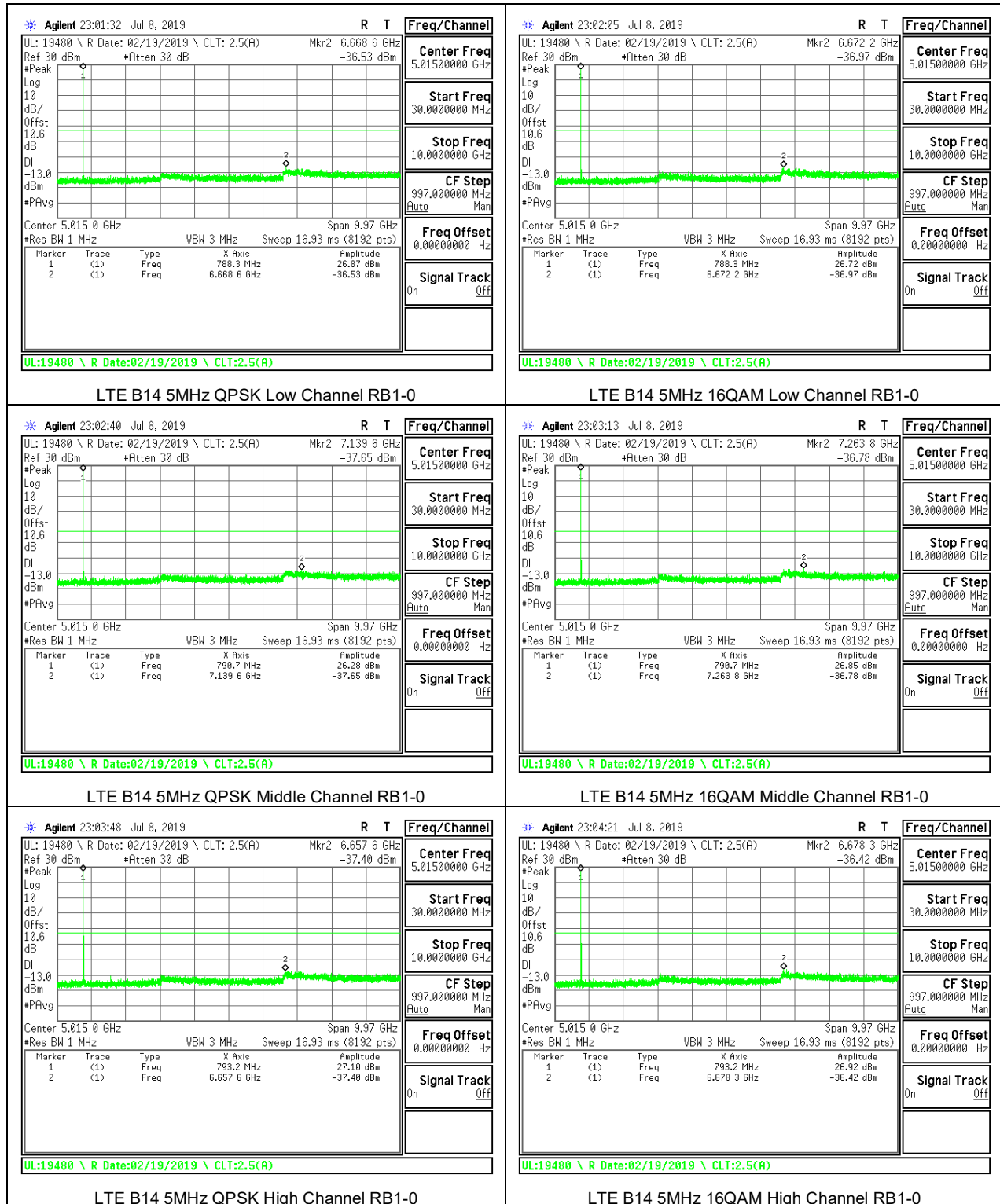
8.3.6. LTE BAND 13

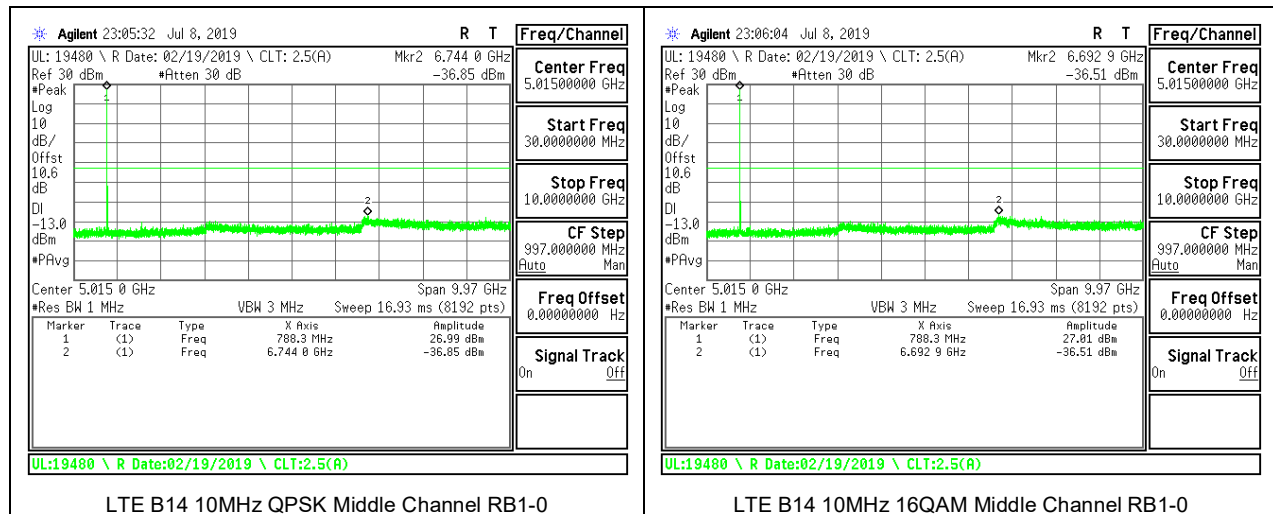




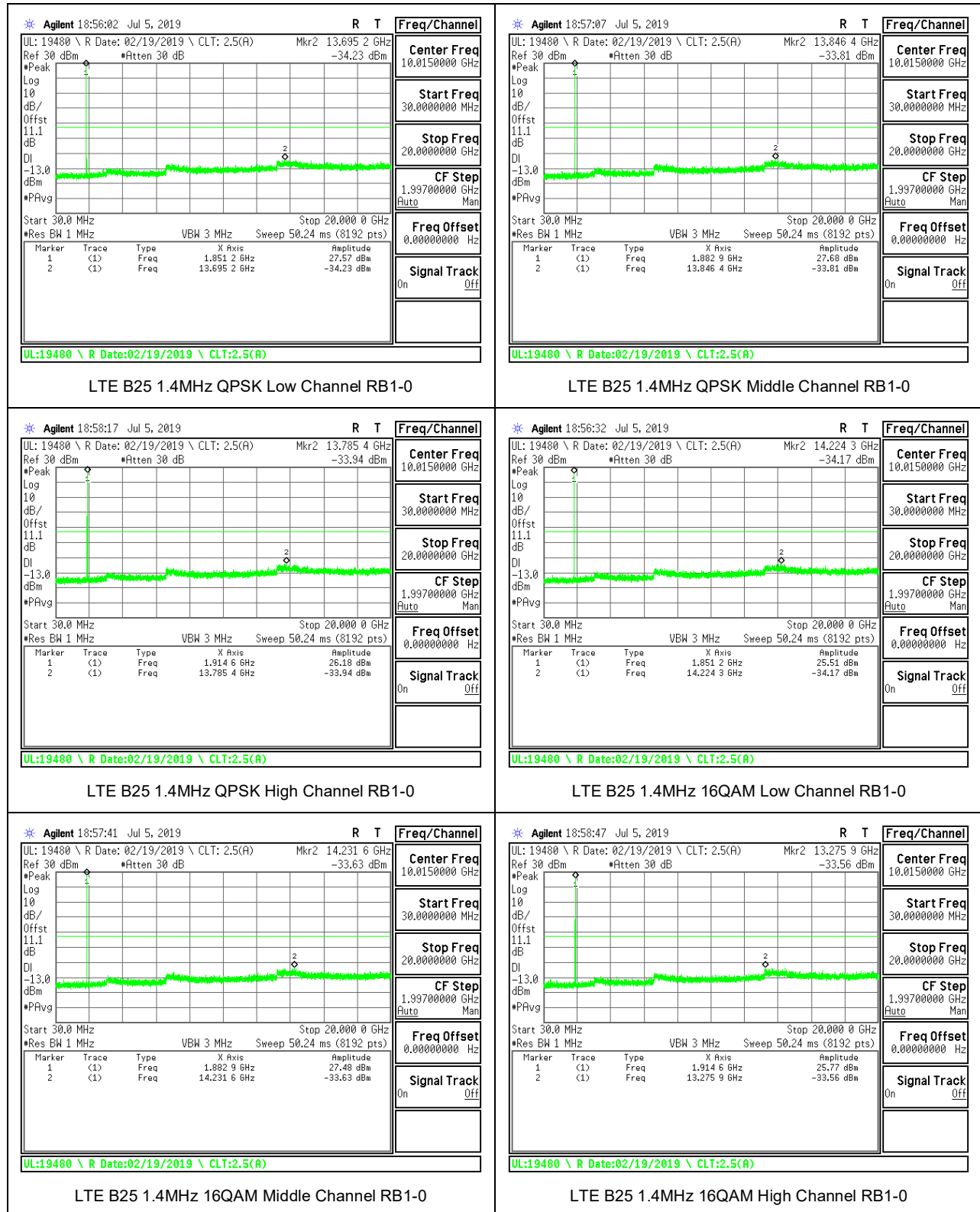
Note: Radiated data in section 9.1.6 confirms a compliance with narrowband limits for GPS1559-1610 MHz band.

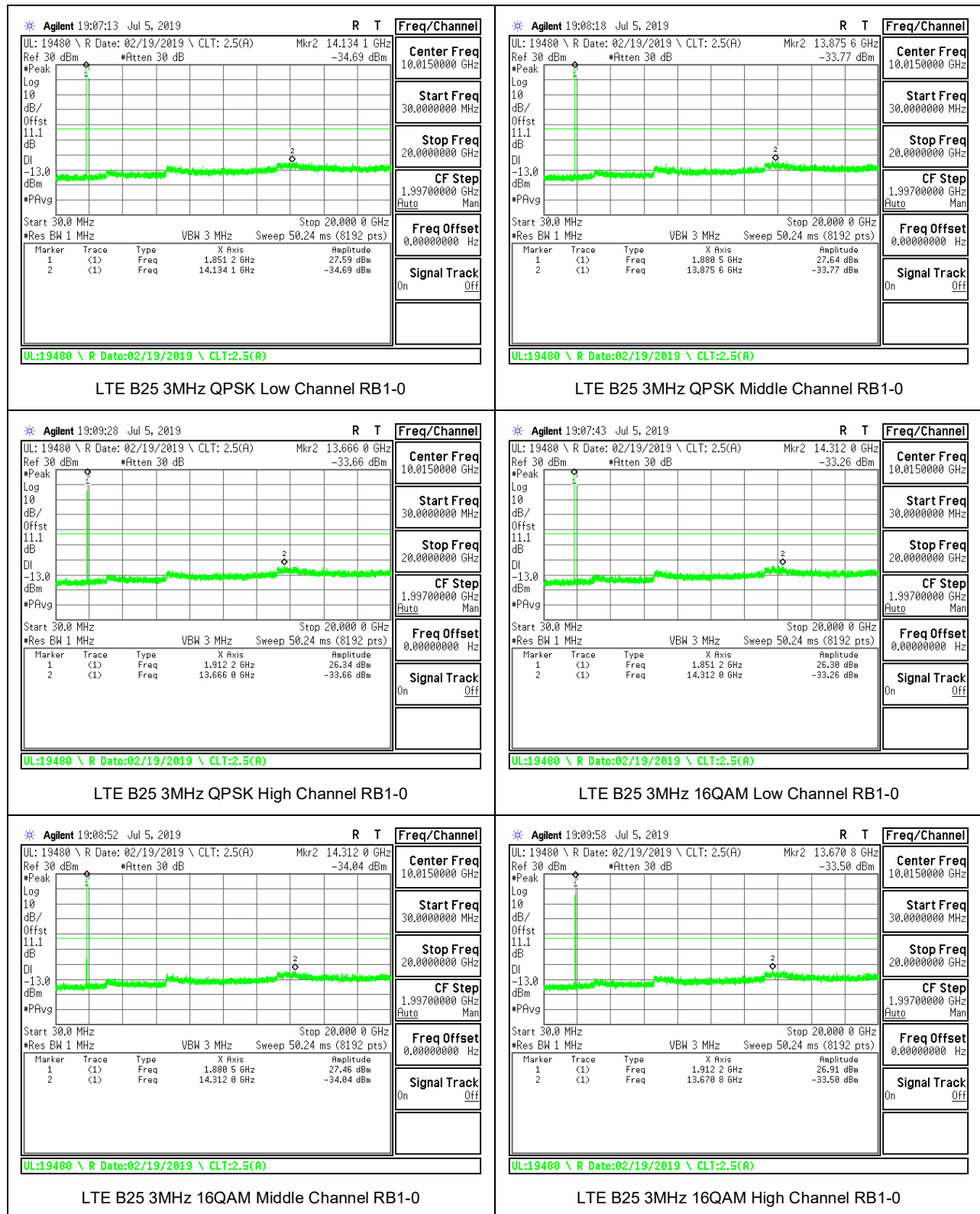
8.3.7. LTE BAND 14

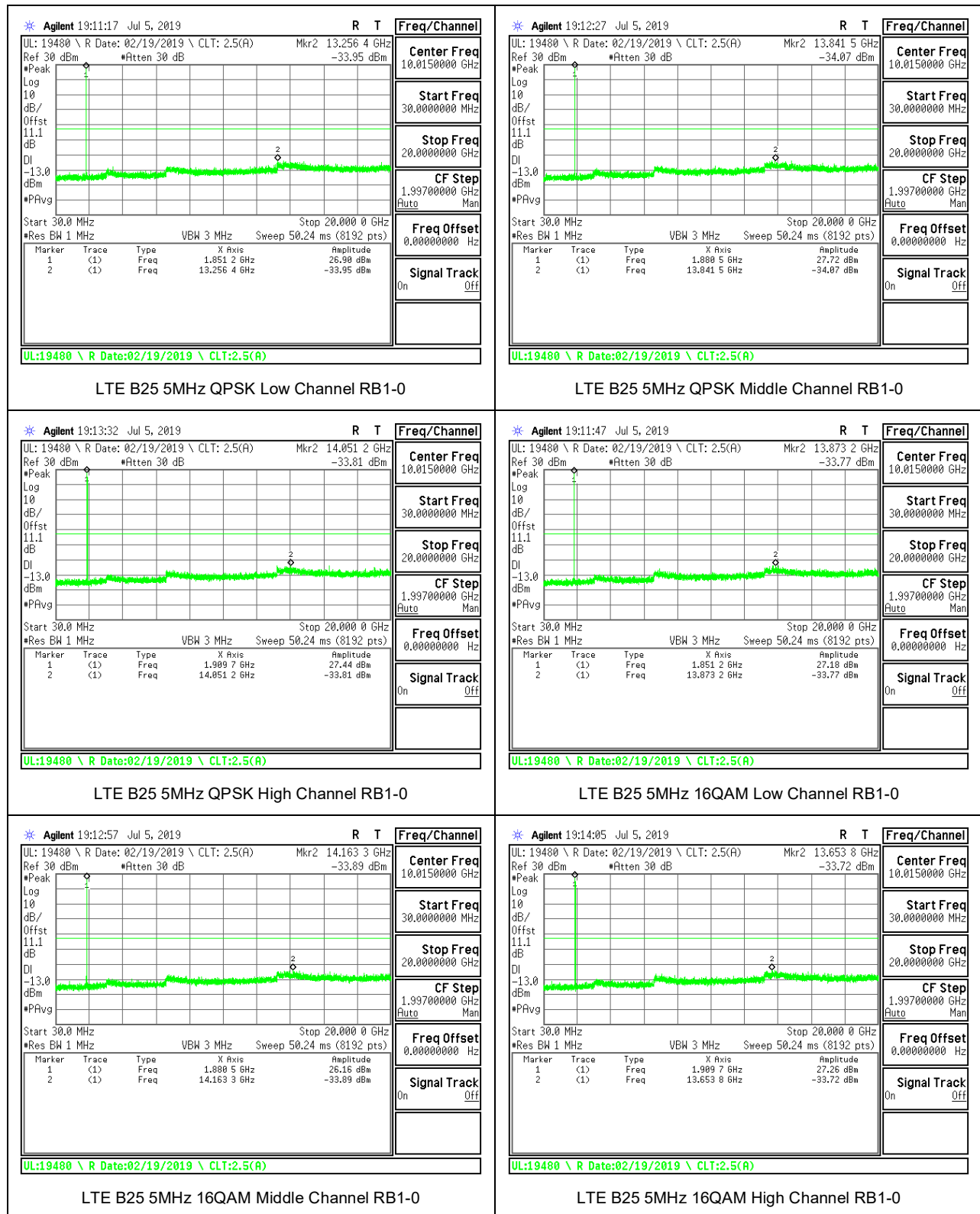


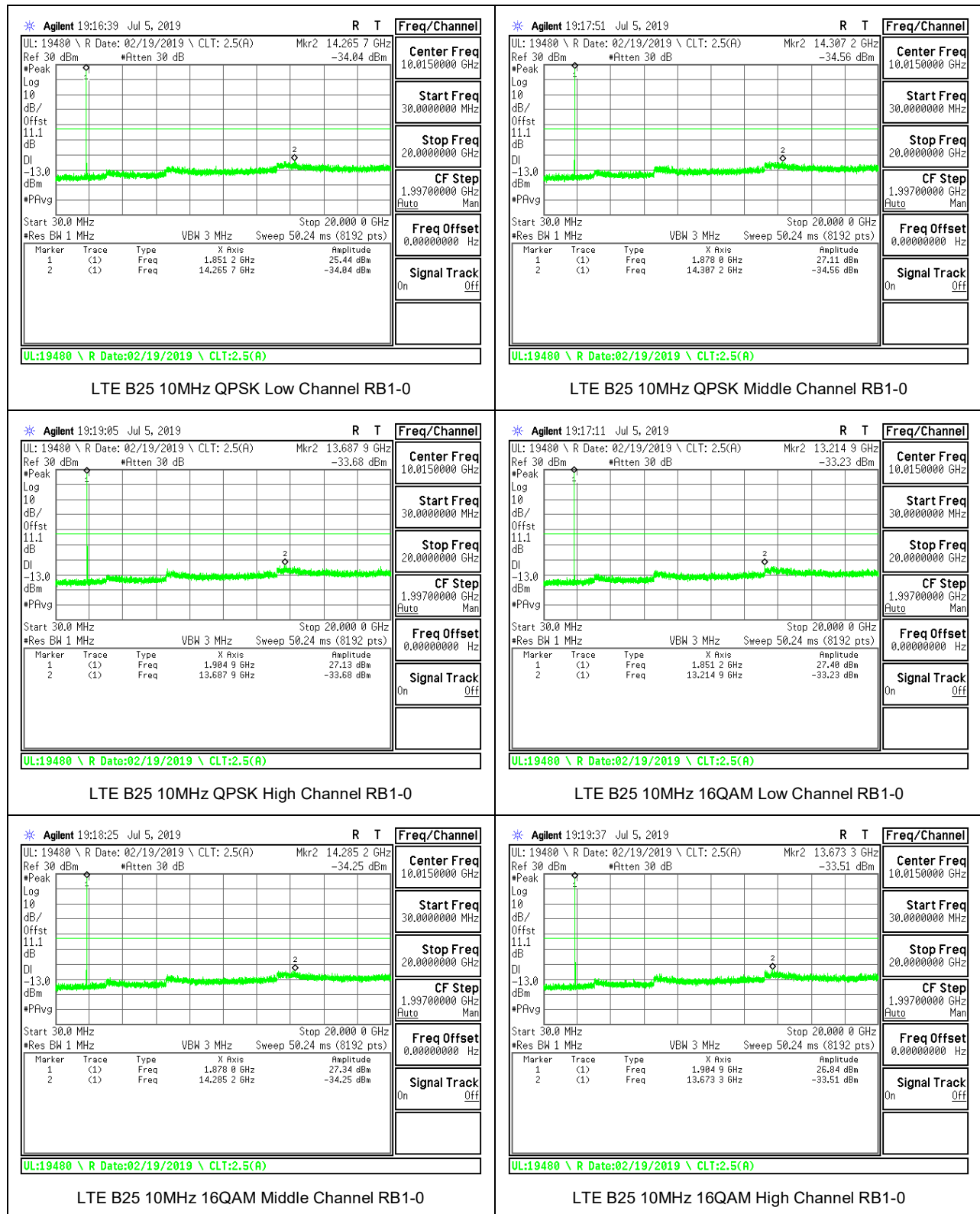


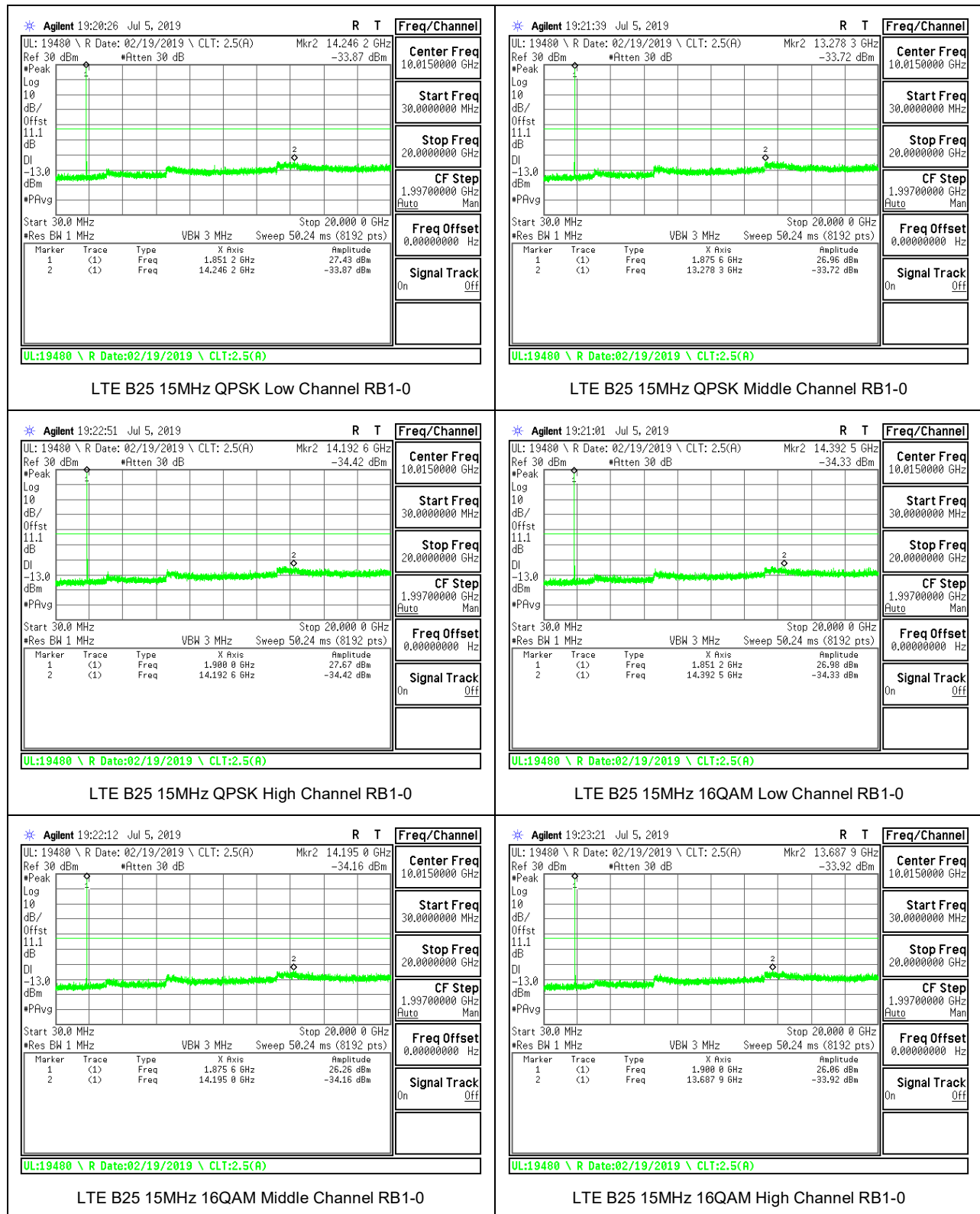
8.3.8. LTE BAND 25

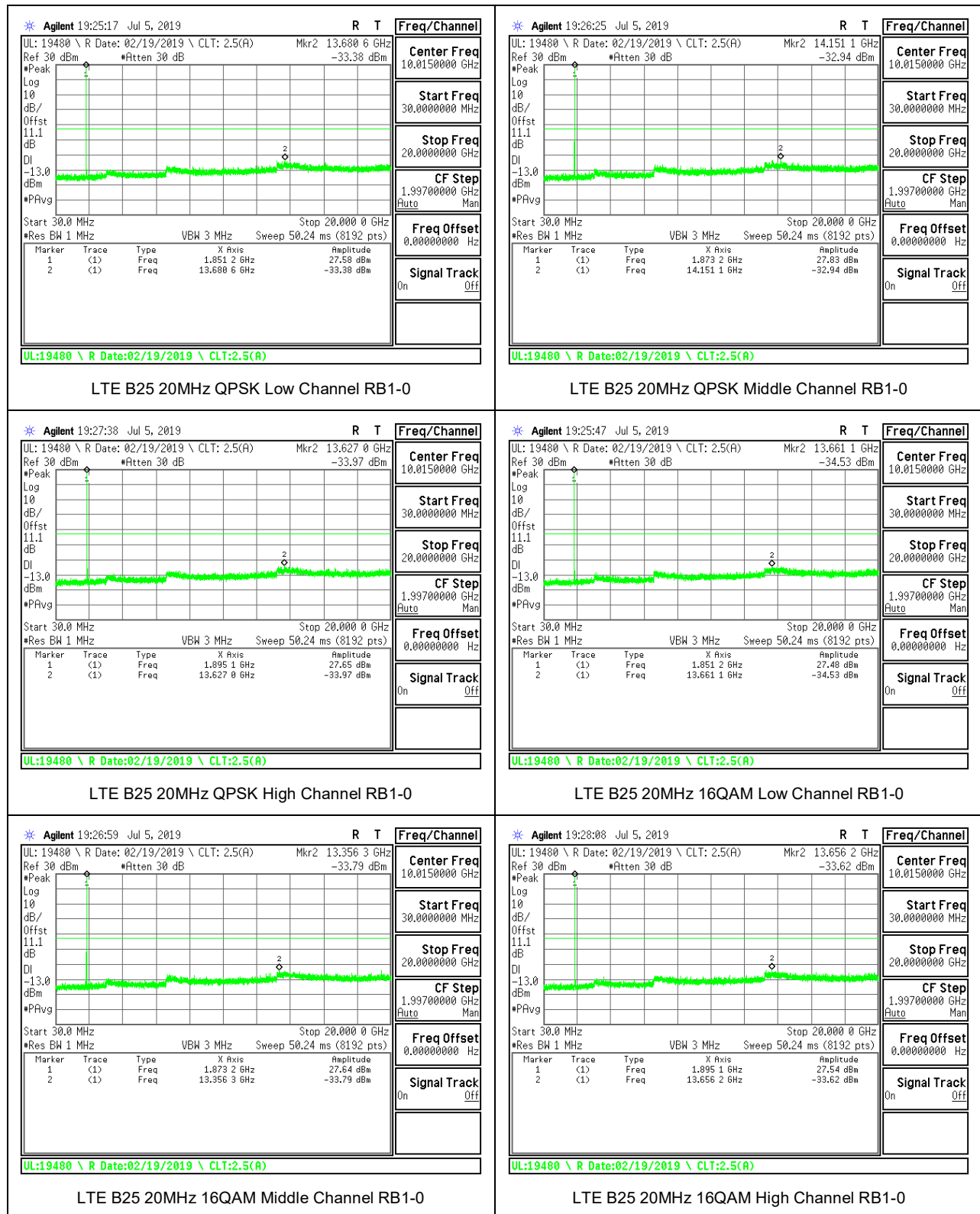




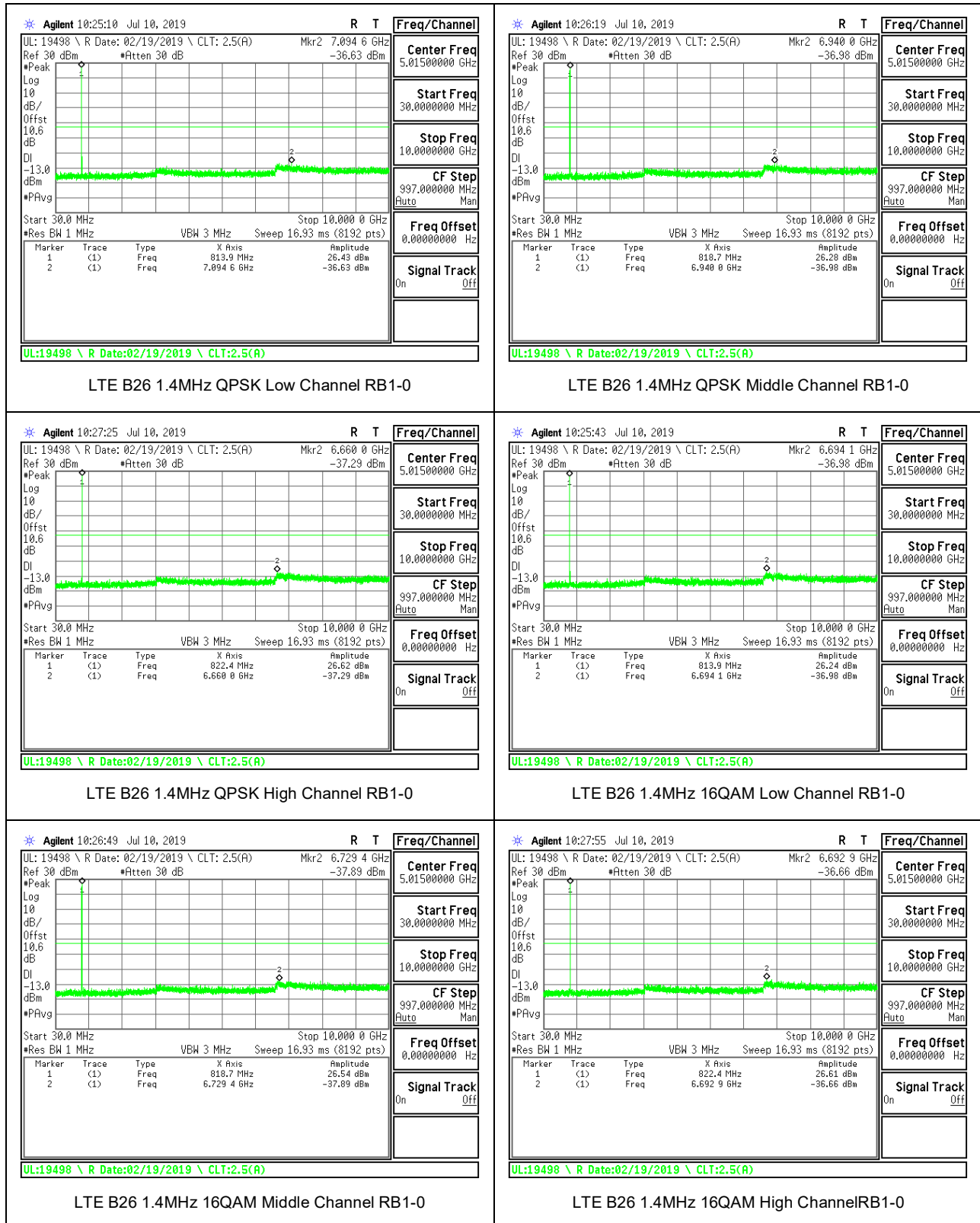


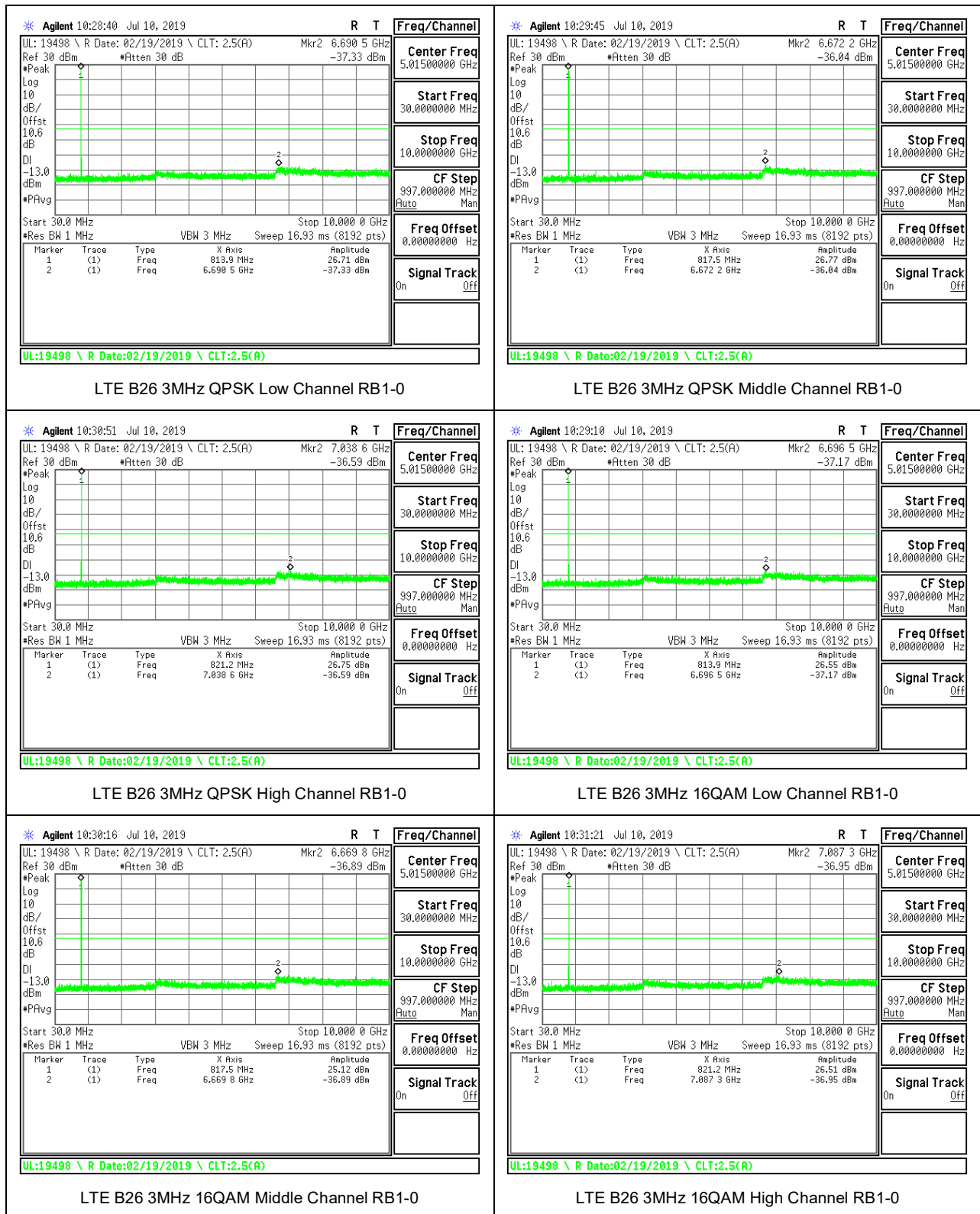


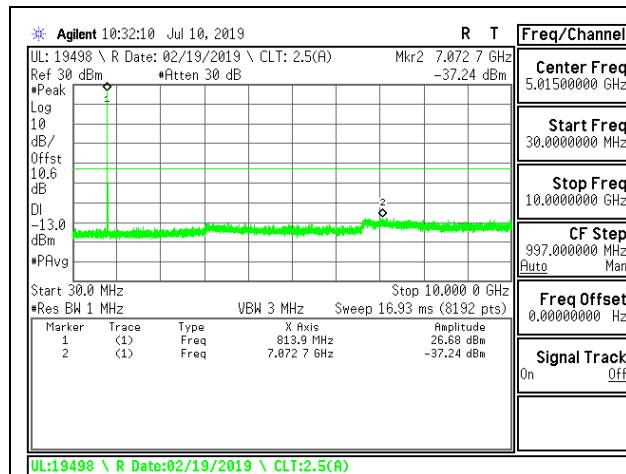




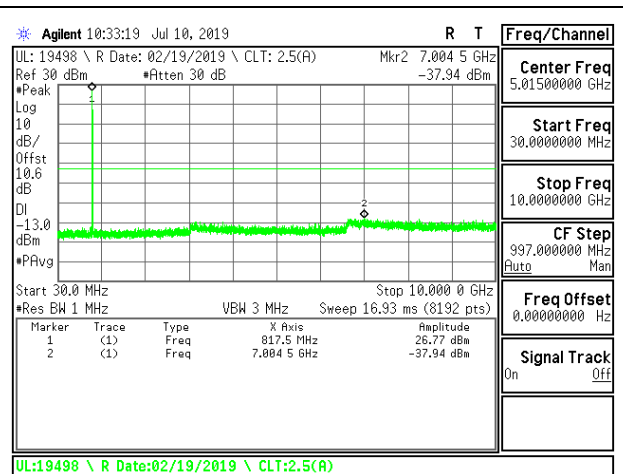
8.3.9. LTE BAND 26 (FCC PART 90S)



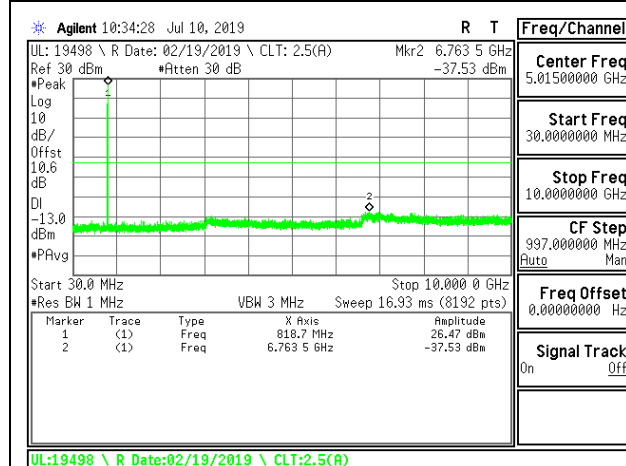




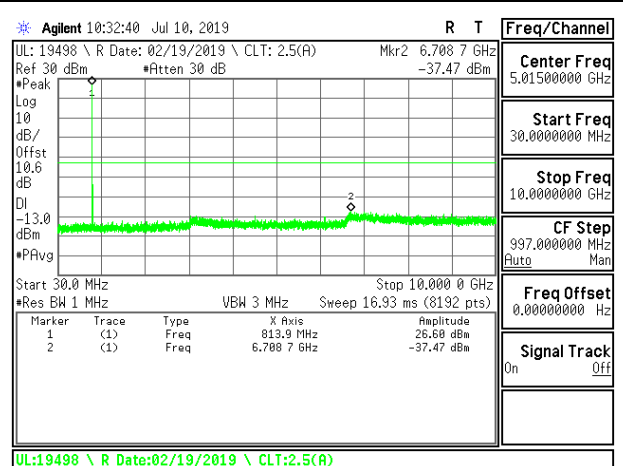
LTE B26 5MHz QPSK Low Channel RB1-0



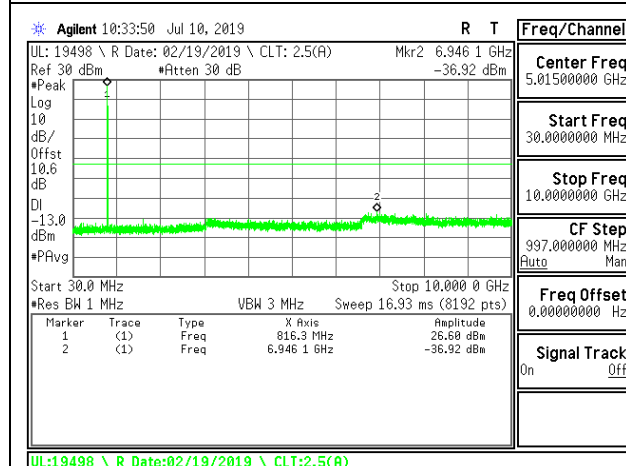
LTE B26 5MHz QPSK Middle Channel RB1-0



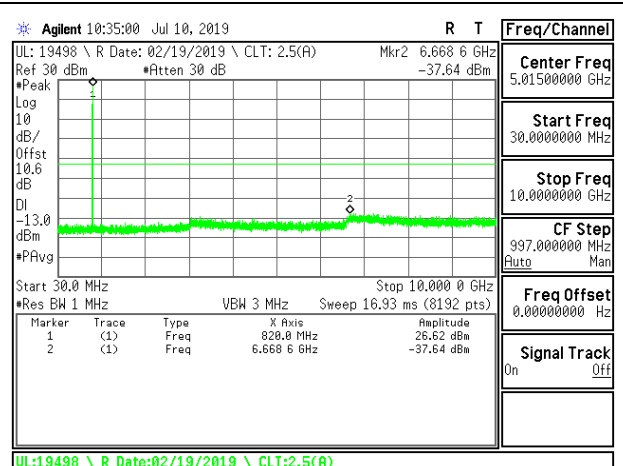
LTE B26 5MHz QPSK High Channel RB1-0



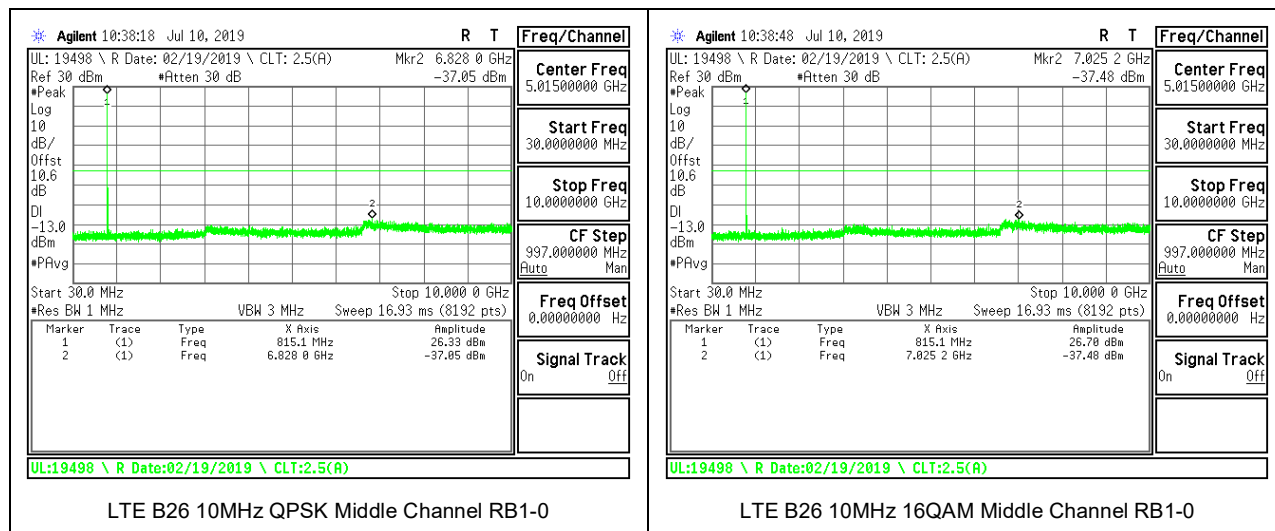
LTE B26 5MHz 16QAM Low Channel RB1-0



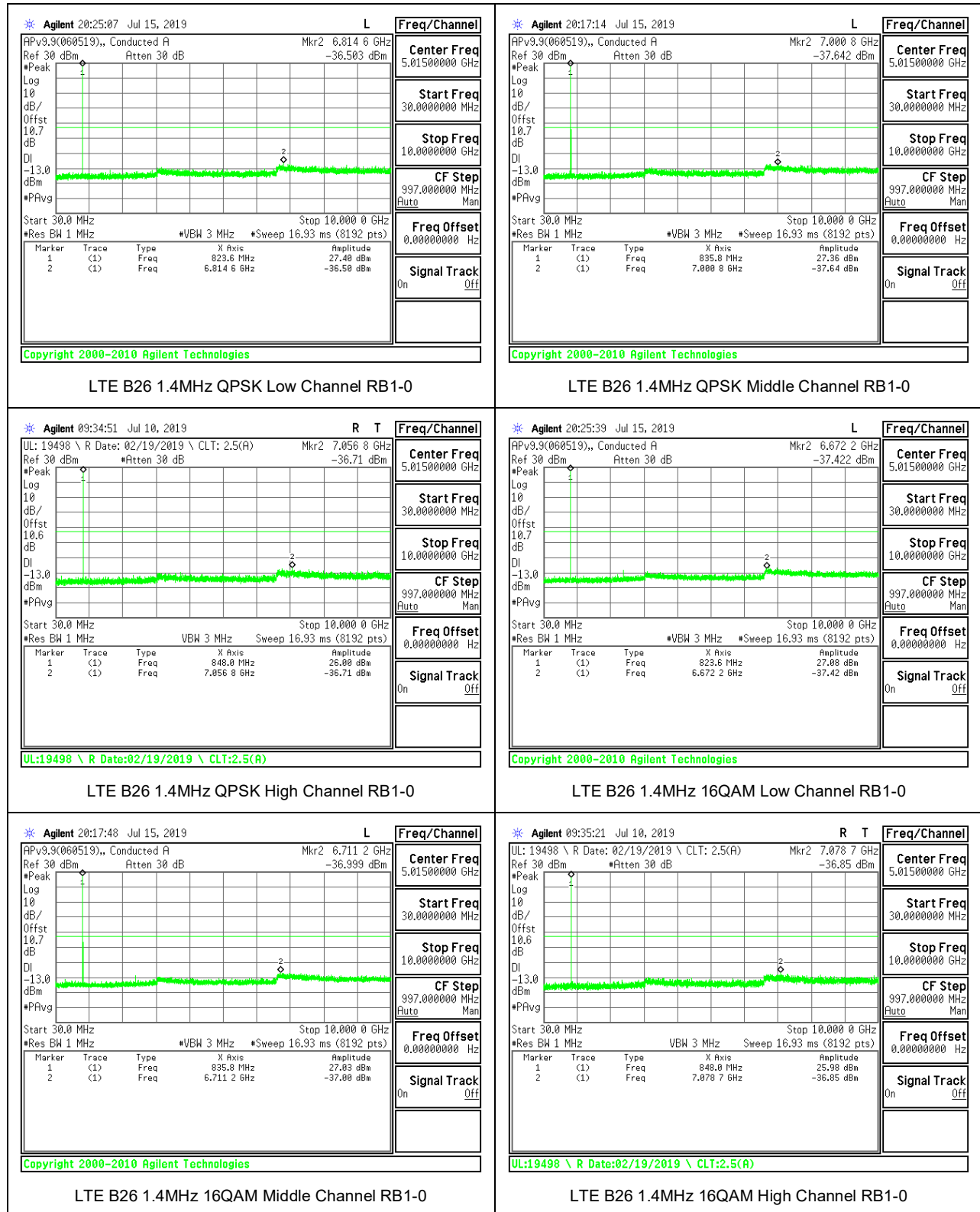
LTE B26 5MHz 16QAM Middle Channel RB1-0

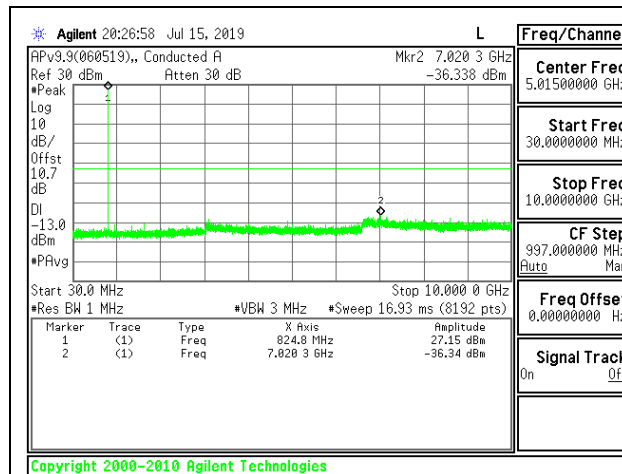


LTE B26 5MHz 16QAM High Channel RB1-0

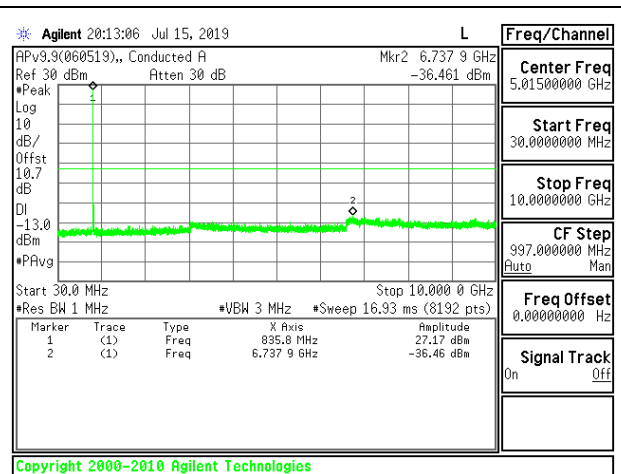


8.3.10. LTE BAND 26 (FCC PART 22)

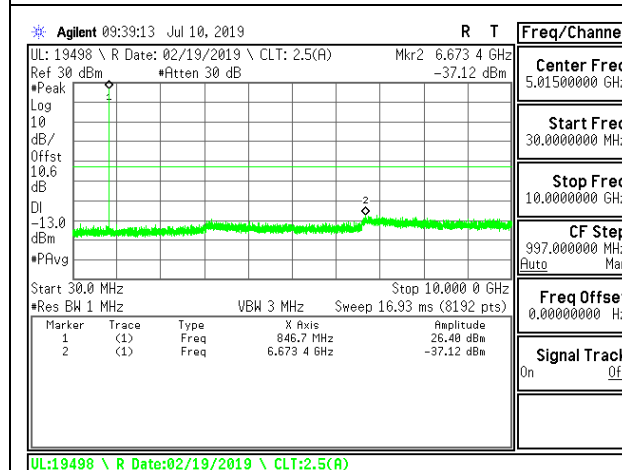




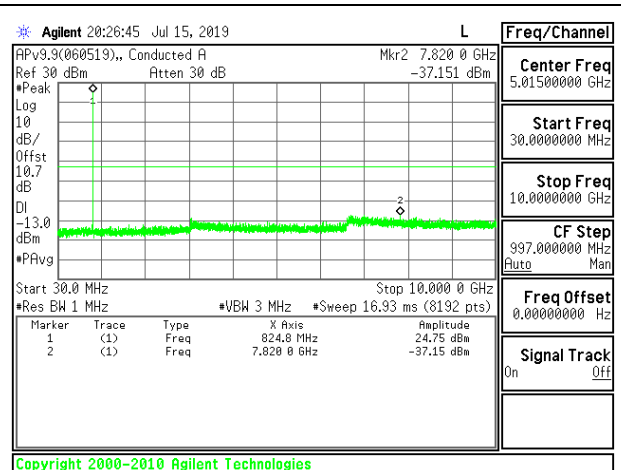
LTE B26 3MHz QPSK Low Channel RB1-0



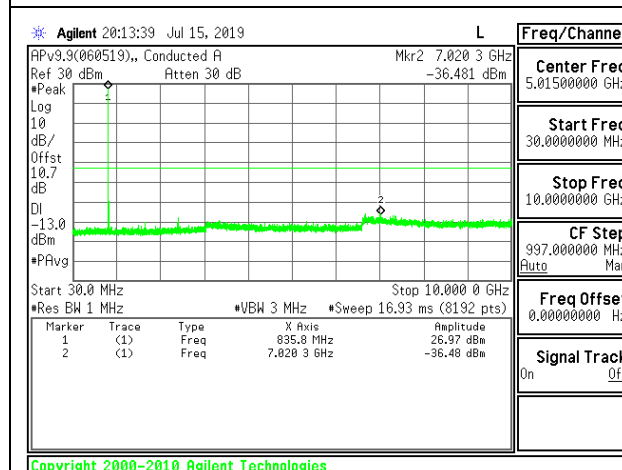
LTE B26 3MHz QPSK Middle Channel RB1-0



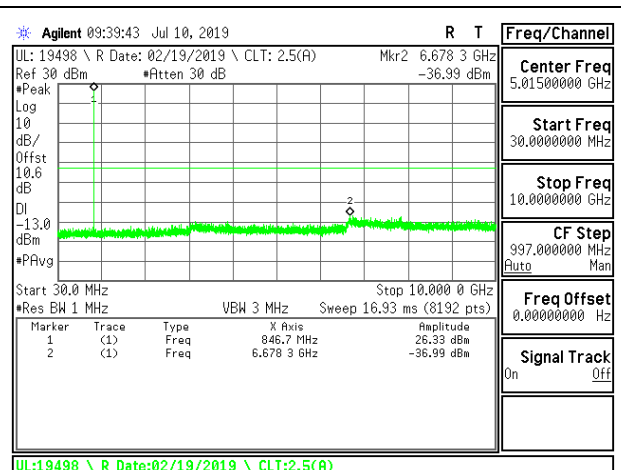
LTE B26 3MHz QPSK High Channel RB1-0



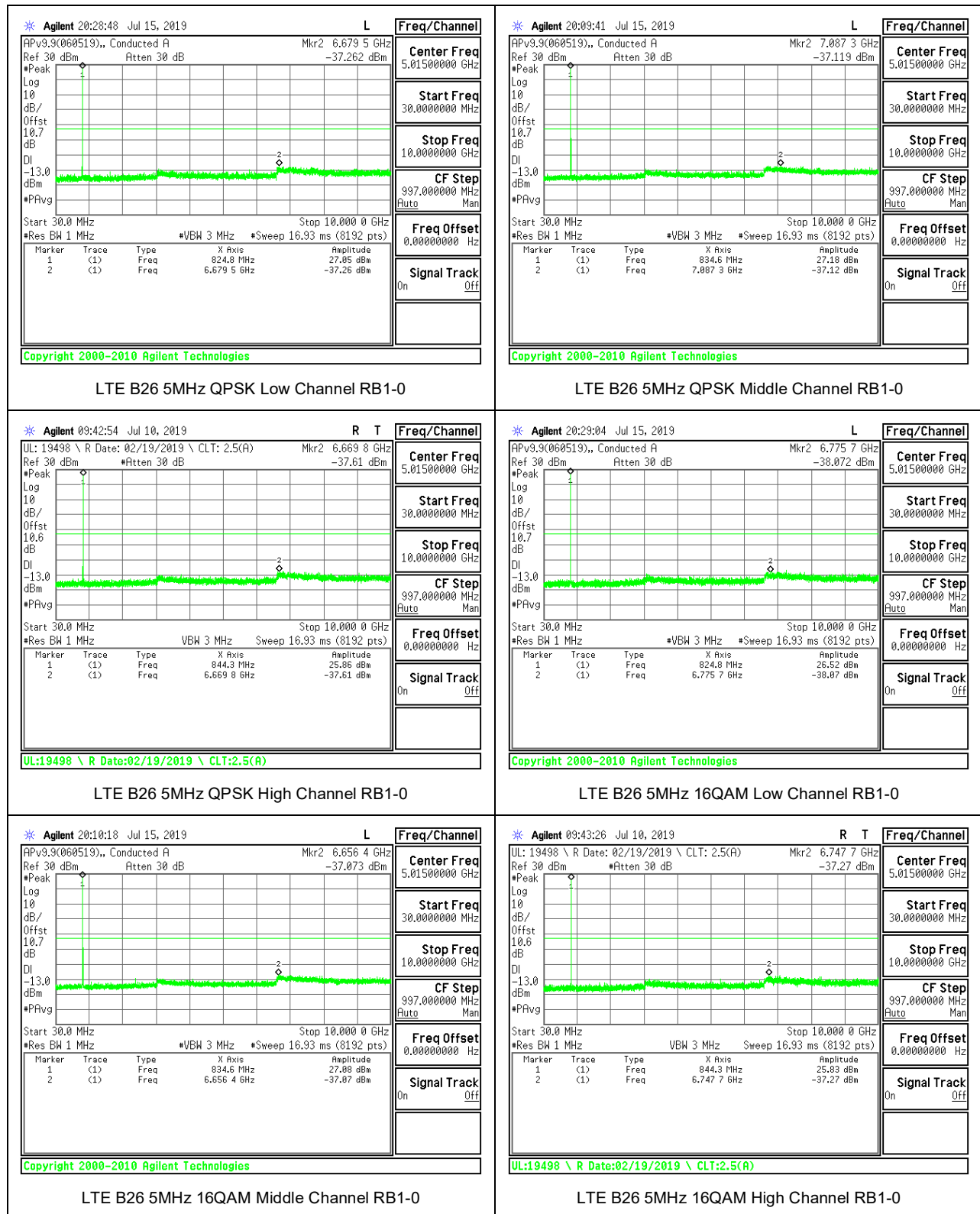
LTE B26 3MHz 16QAM Low Channel RB1-0

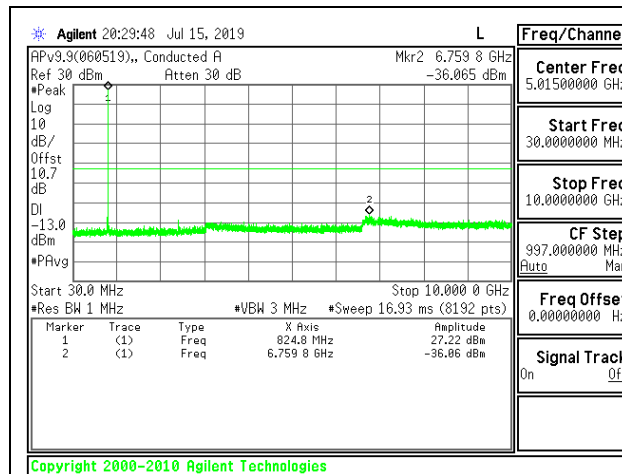


LTE B26 3MHz 16QAM Middle Channel RB1-0

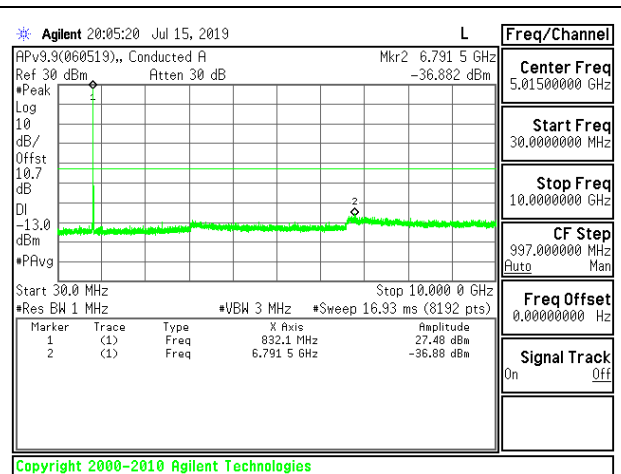


LTE B26 3MHz 16QAM High Channel RB1-0

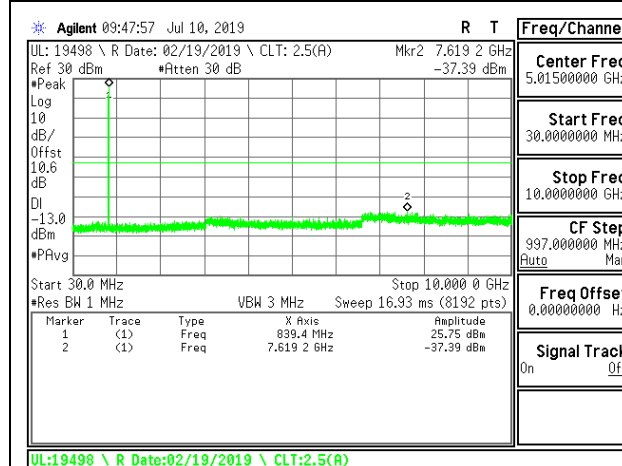




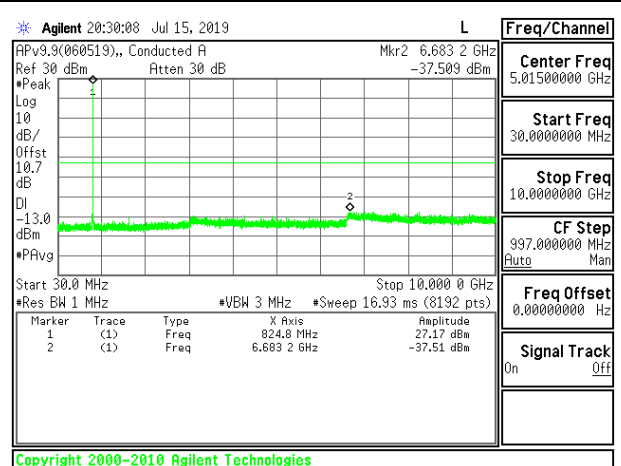
LTE B26 10MHz QPSK Low Channel RB1-0



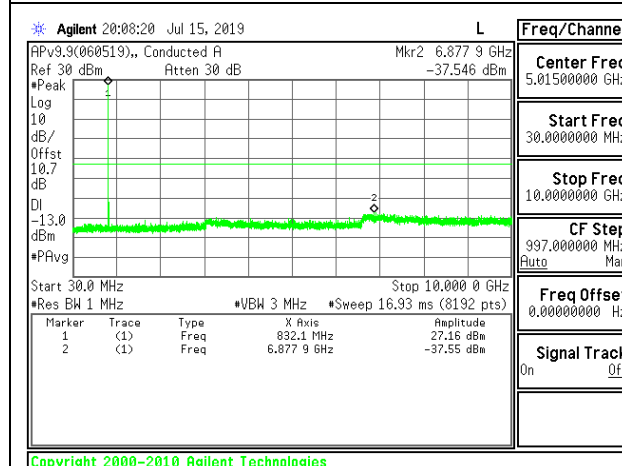
LTE B26 10MHz QPSK Middle Channel RB1-0



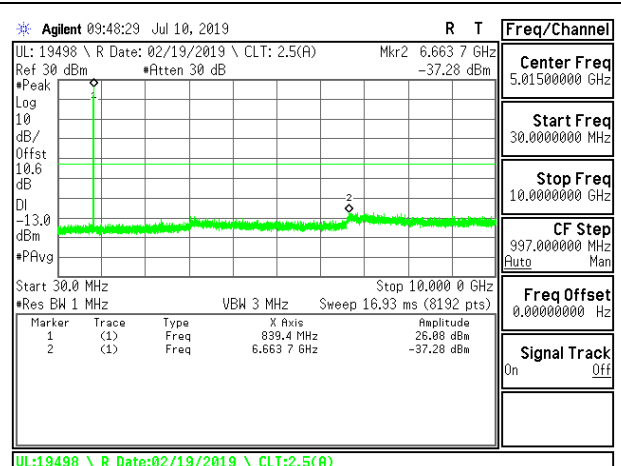
LTE B26 10MHz QPSK High Channel RB1-0



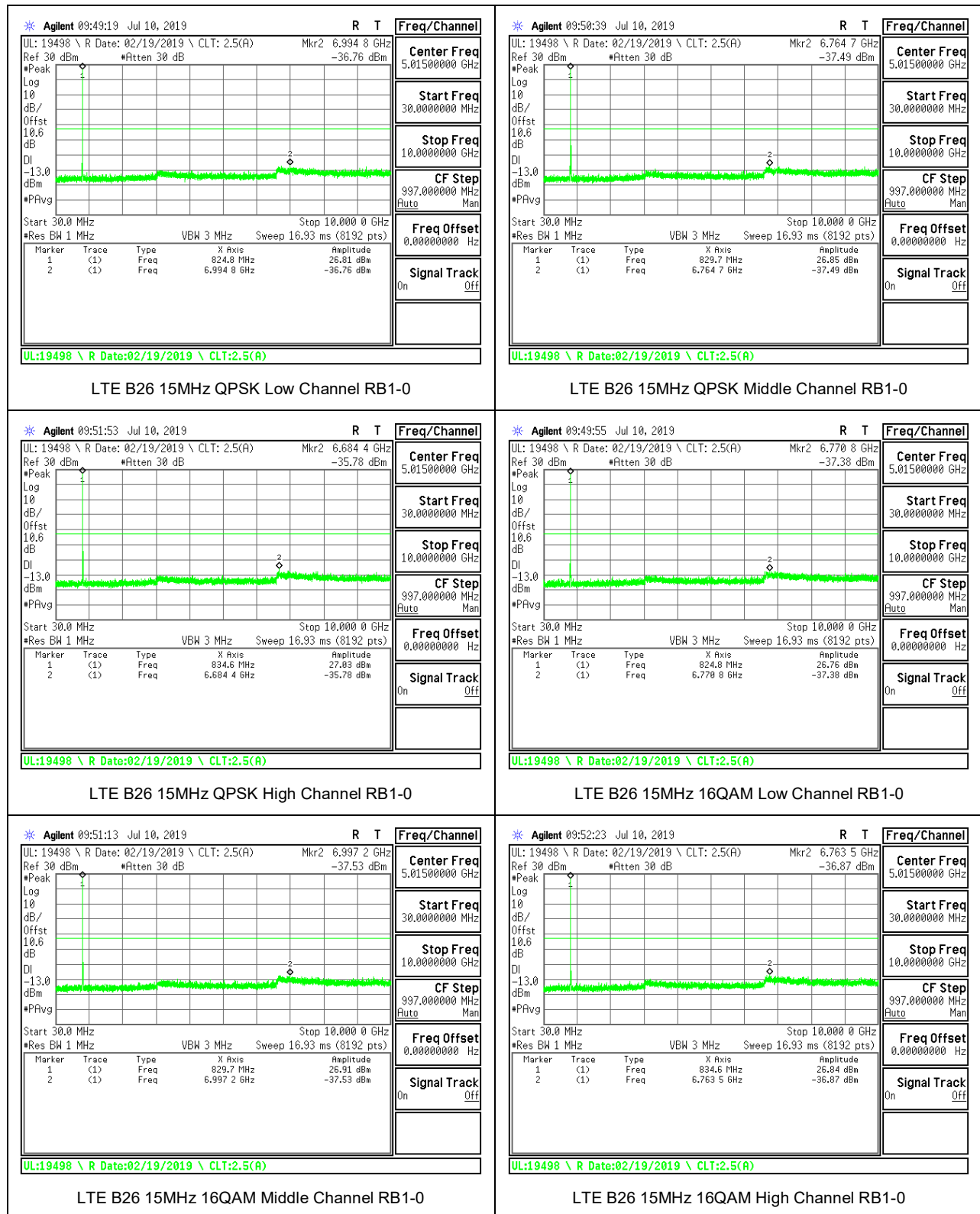
LTE B26 10MHz 16QAM Low Channel RB1-0



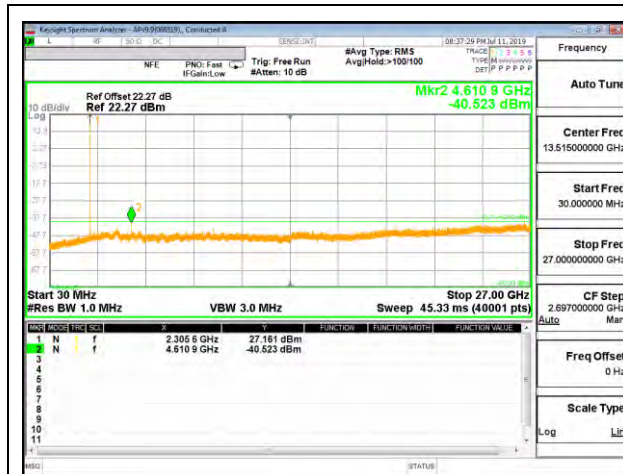
LTE B26 10MHz 16QAM Middle Channel RB1-0



LTE B26 10MHz 16QAM High Channel RB1-0



8.3.11. LTE BAND 30



LTE B30 5MHz QPSK Low Channel RB1-0



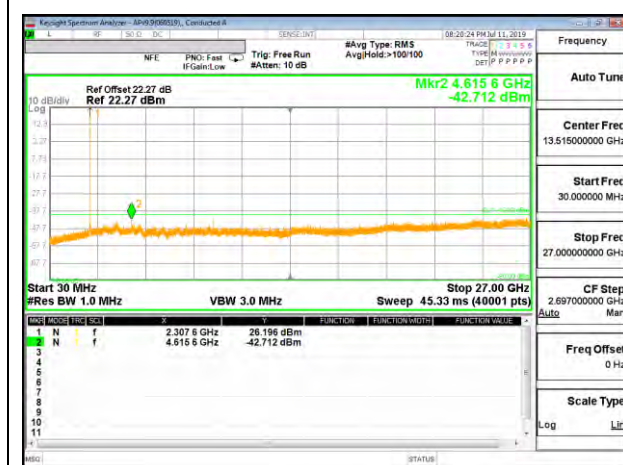
LTE B30 5MHz QPSK Middle Channel RB1-0



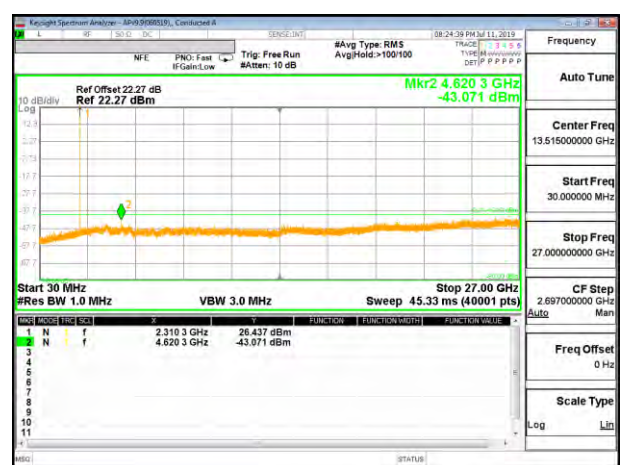
LTE B30 5MHz QPSK High Channel RB1-0



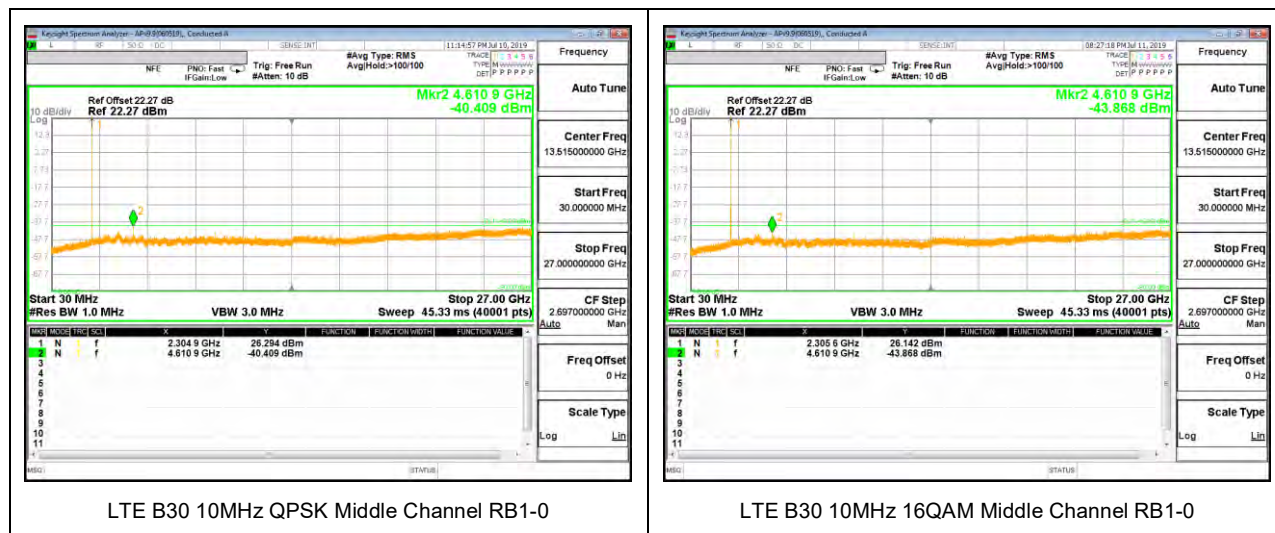
LTE B30 5MHz 16QAM Low Channel RB1-0



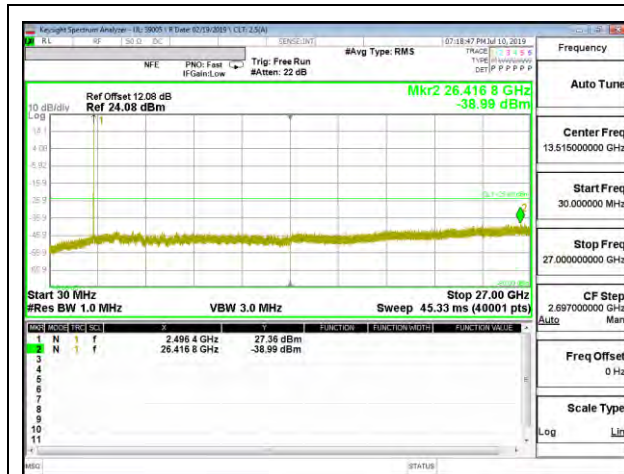
LTE B30 5MHz 16QAM Middle Channel RB1-0



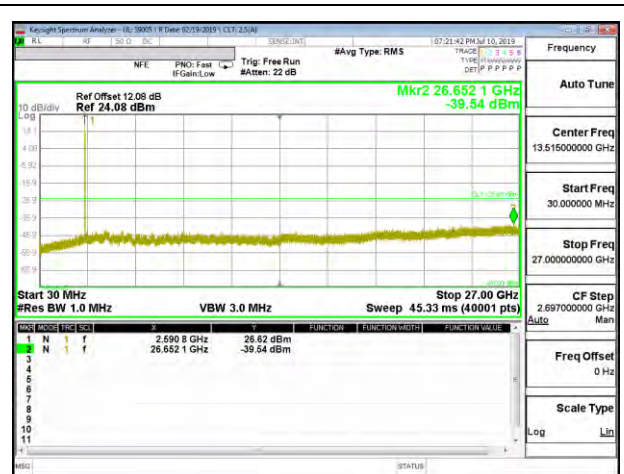
LTE B30 5MHz 16QAM High Channel RB1-0



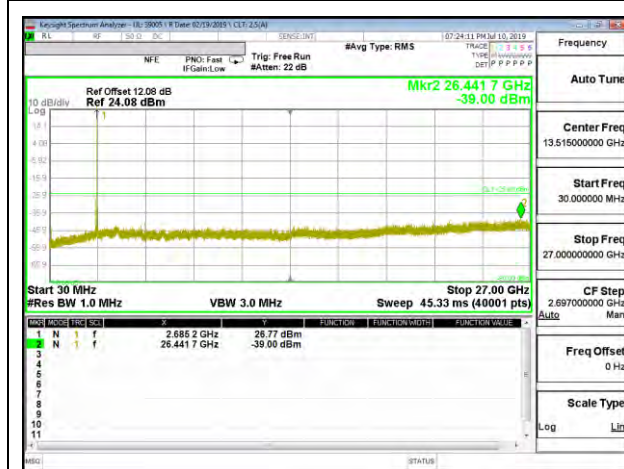
8.3.12. LTE BAND 41



LTE B41 5MHz QPSK Low Channel RB1-0



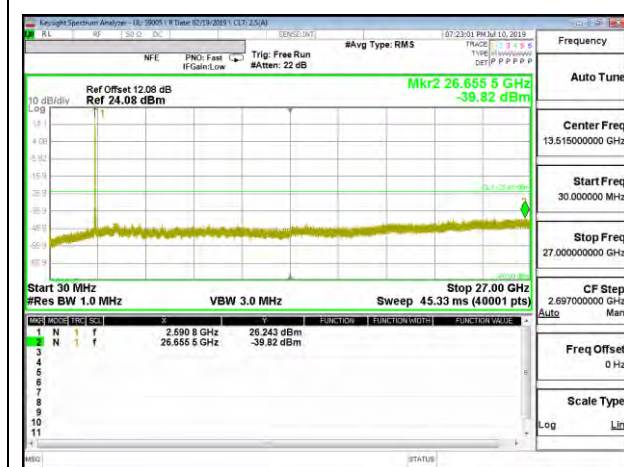
LTE B41 5MHz QPSK Middle Channel RB1-0



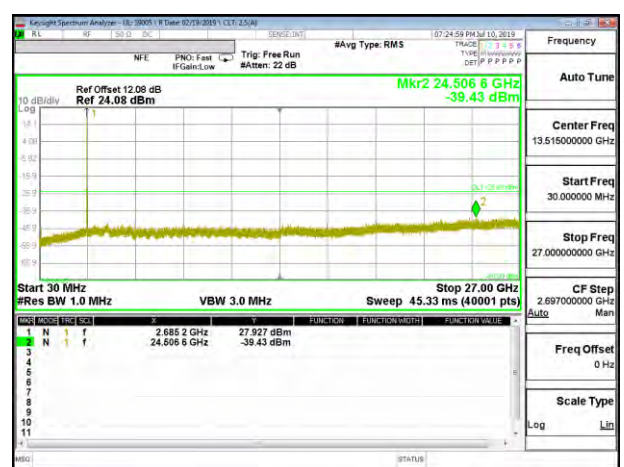
LTE B41 5MHz QPSK High Channel RB1-0



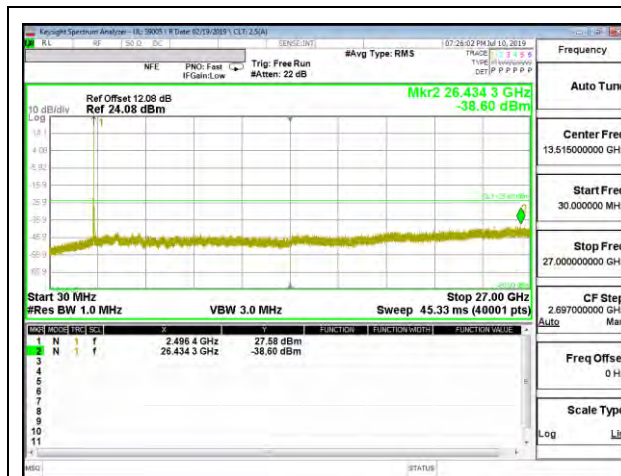
LTE B41 5MHz 16QAM Low Channel RB1-0



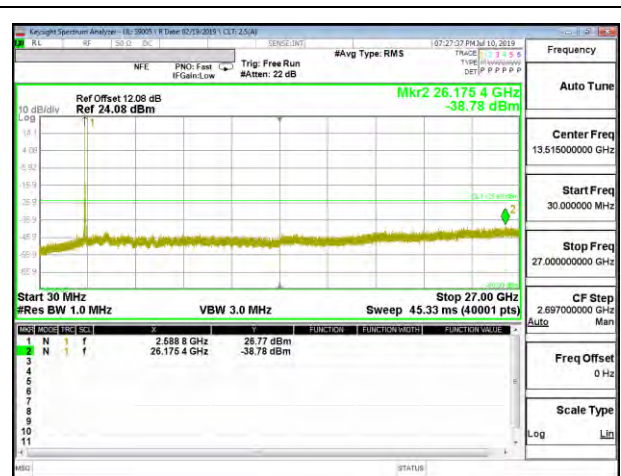
LTE B41 5MHz 16QAM Middle Channel RB1-0



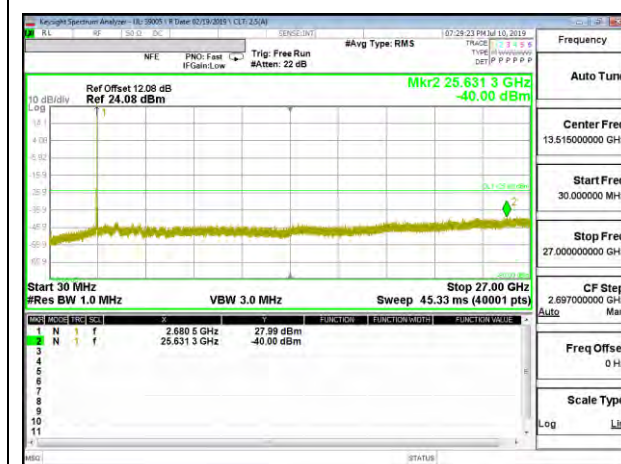
LTE B41 5MHz 16QAM High Channel RB1-0



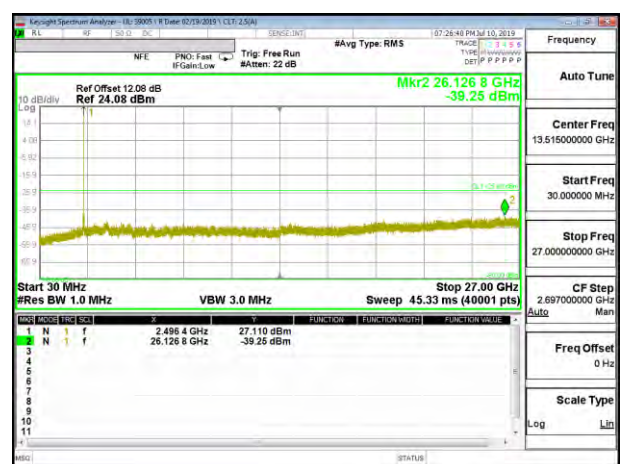
LTE B41 10MHz QPSK Low Channel RB1-0



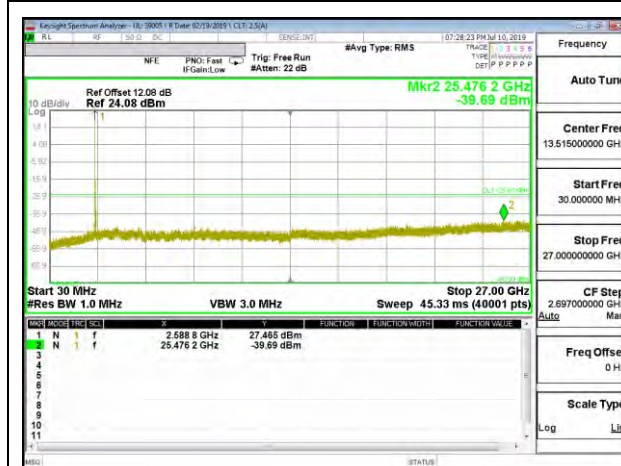
LTE B41 10MHz QPSK Middle Channel RB1-0



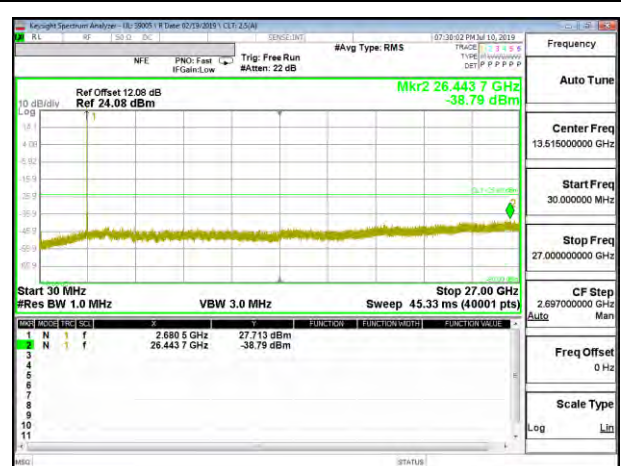
LTE B41 10MHz QPSK High Channel RB1-0



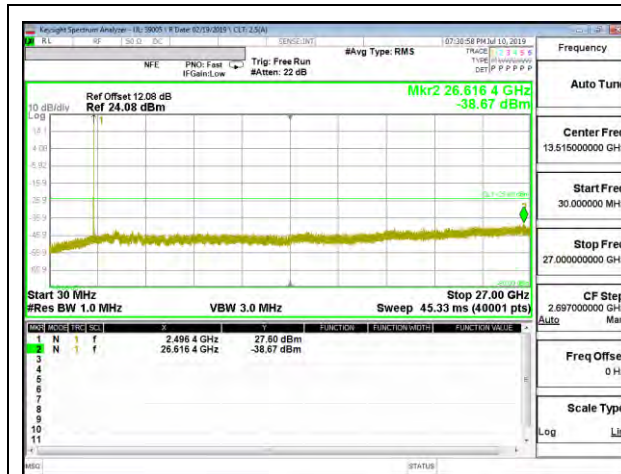
LTE B41 10MHz 16QAM Low Channel RB1-0



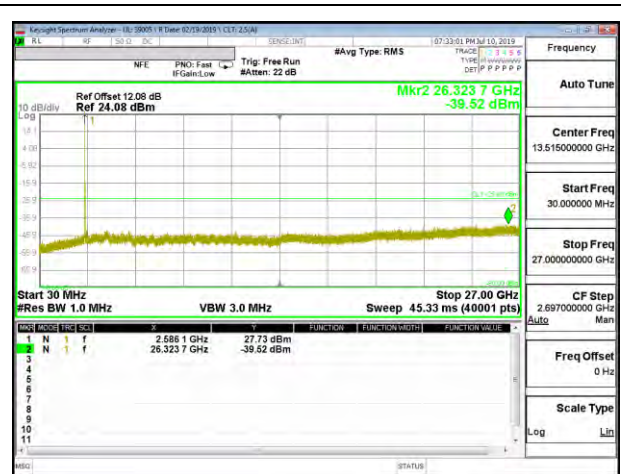
LTE B41 10MHz 16QAM Middle Channel RB1-0



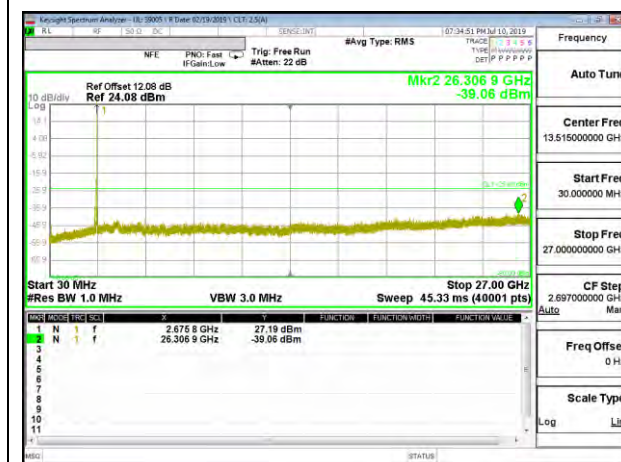
LTE B41 10MHz 16QAM High Channel RB1-0



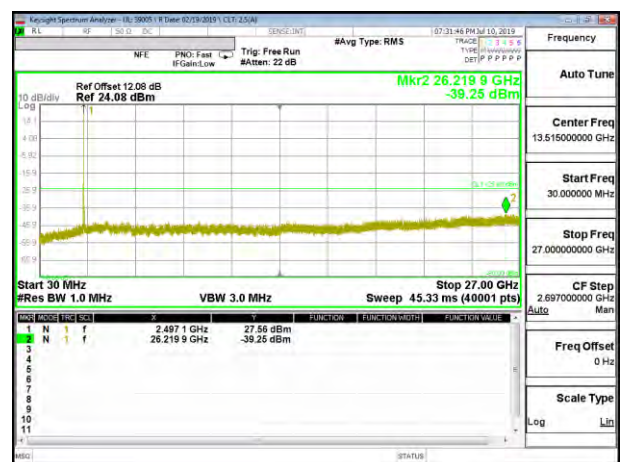
LTE B41 15MHz QPSK Low Channel RB1-0



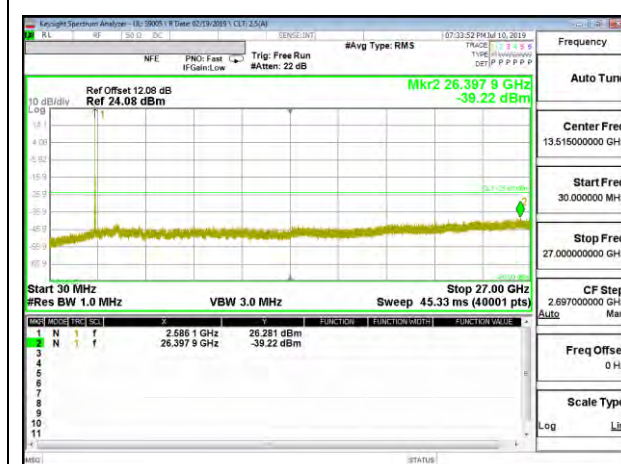
LTE B41 15MHz QPSK Middle Channel RB1-0



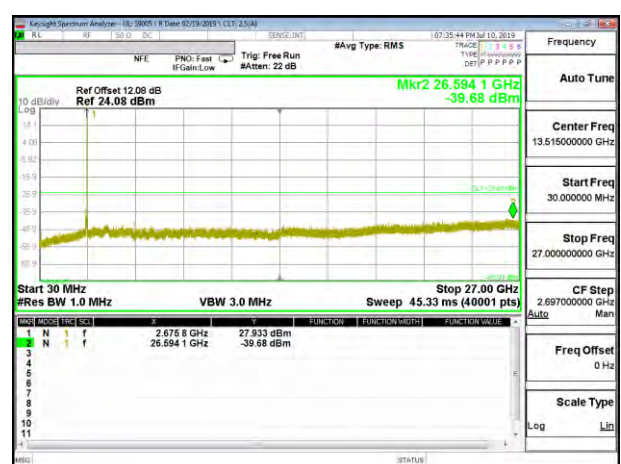
LTE B41 15MHz QPSK High Channel RB1-0



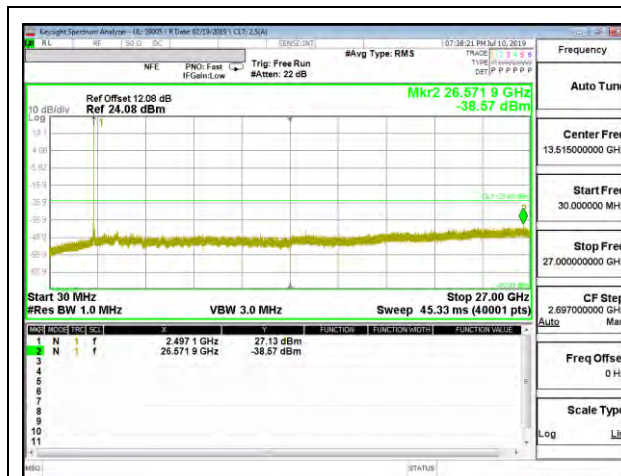
LTE B41 15MHz 16QAM Low Channel RB1-0



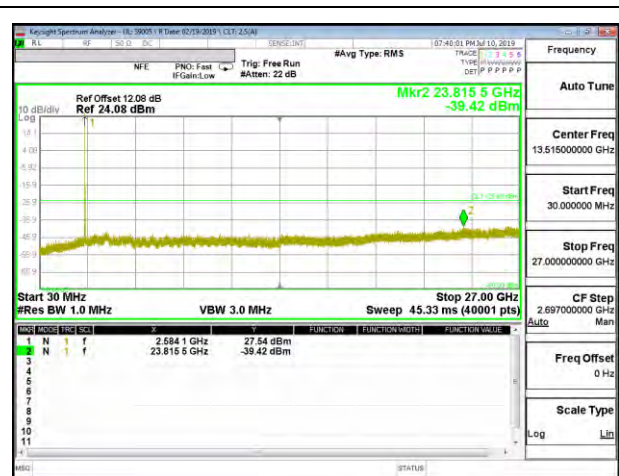
LTE B41 15MHz 16QAM Middle Channel RB1-0



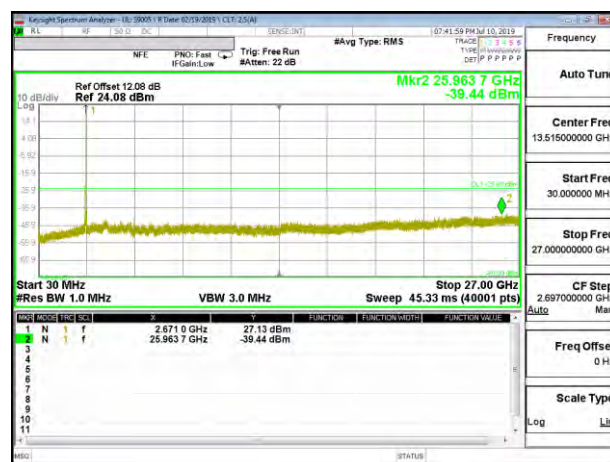
LTE B41 15MHz 16QAM High Channel RB1-0



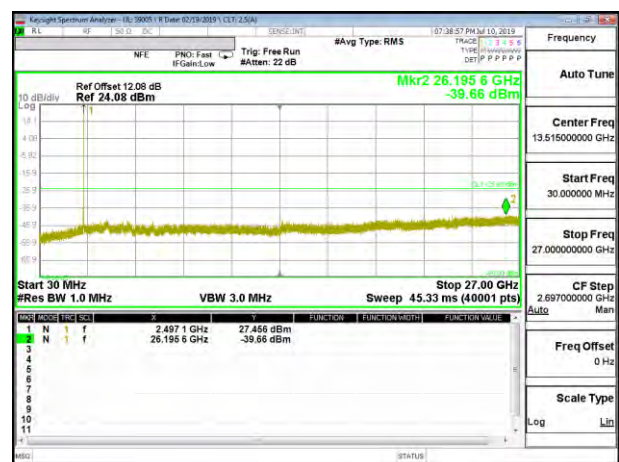
LTE B41 20MHz QPSK Low Channel RB1-0



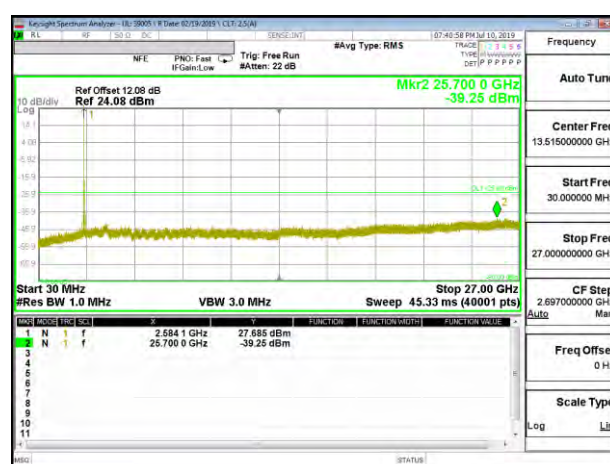
LTE B41 20MHz QPSK Middle Channel RB1-0



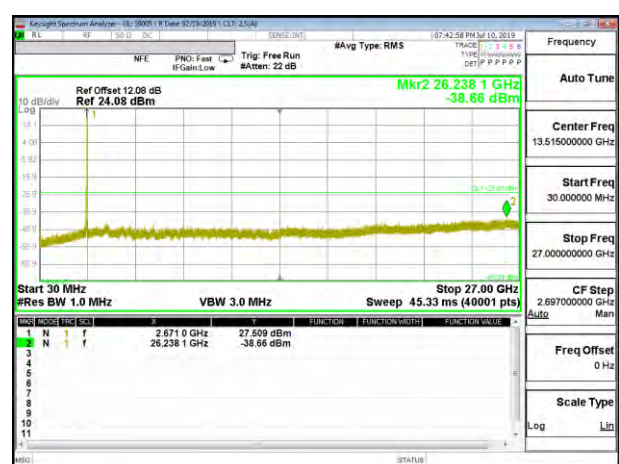
LTE B41 20MHz QPSK High Channel RB1-0



LTE B41 20MHz 16QAM Low Channel RB1-0

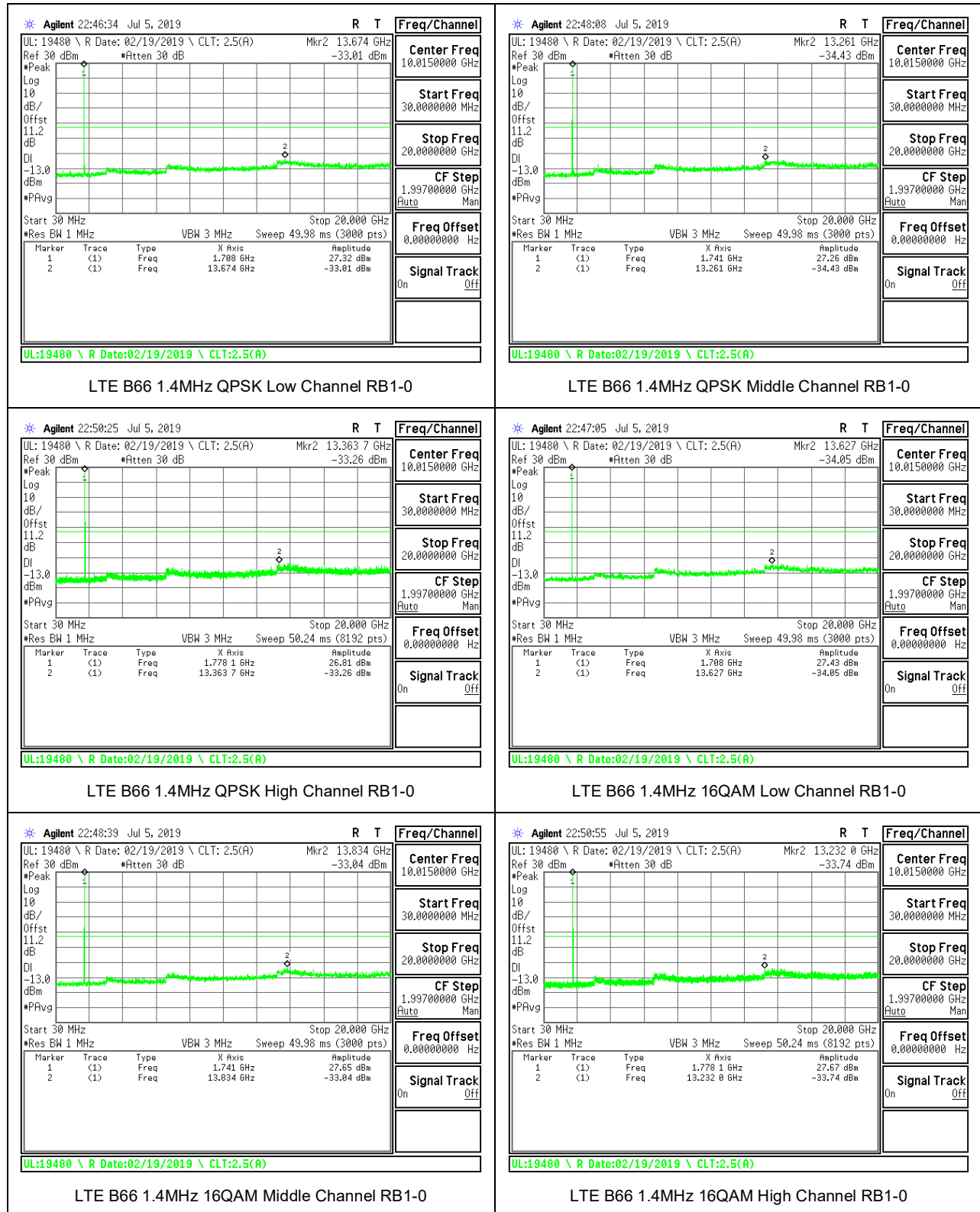


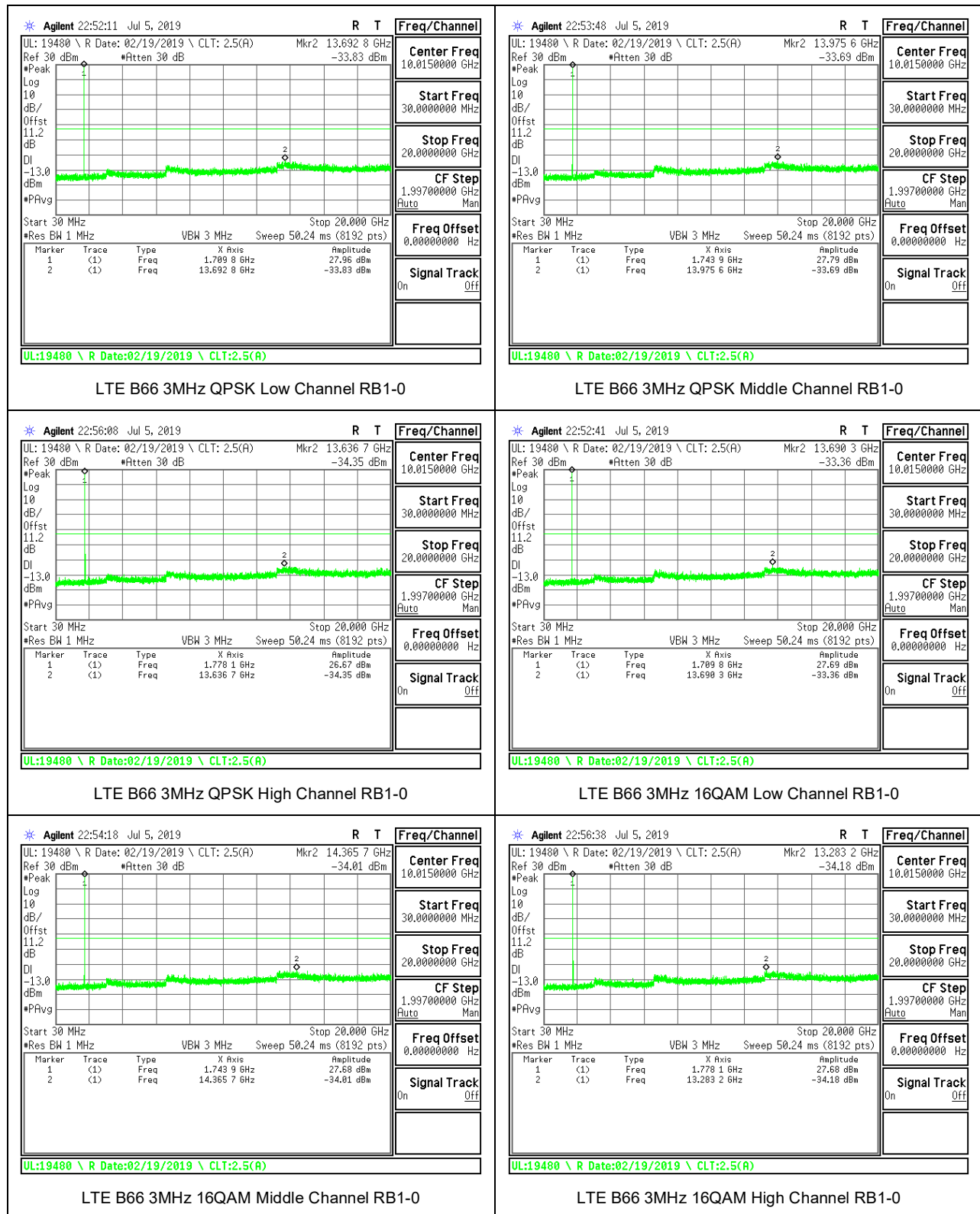
LTE B41 20MHz 16QAM Middle Channel RB1-0

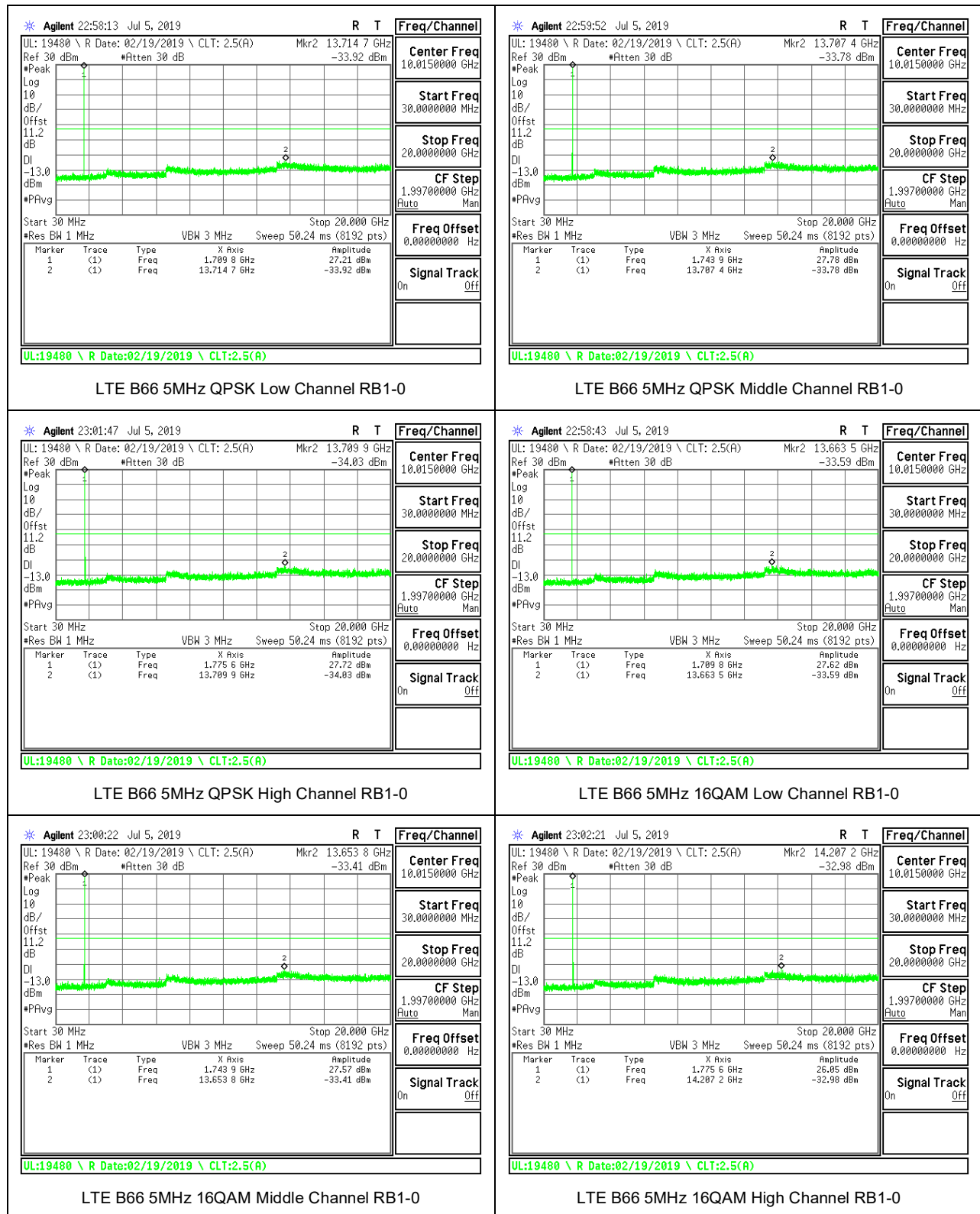


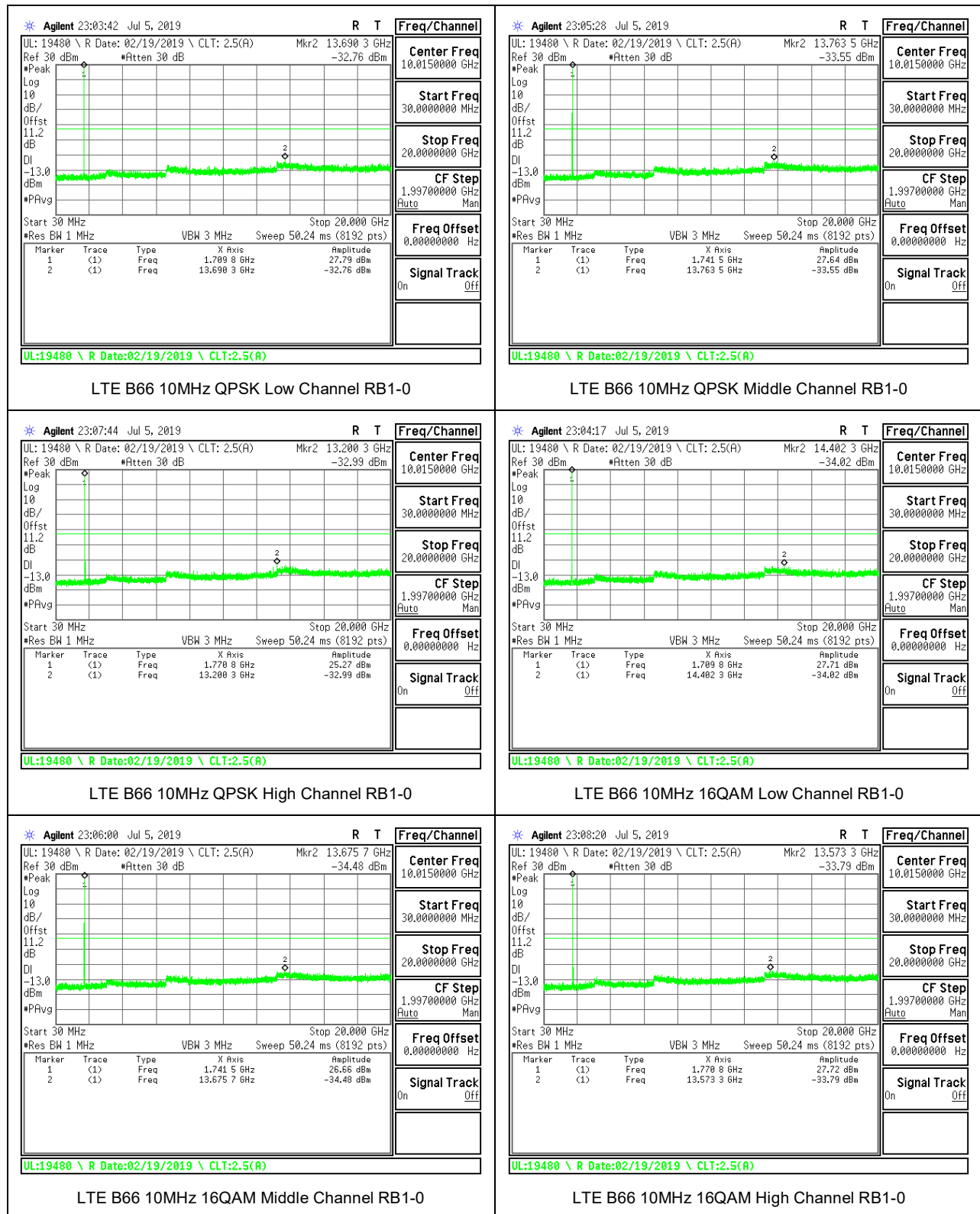
LTE B41 20MHz 16QAM High Channel RB1-0

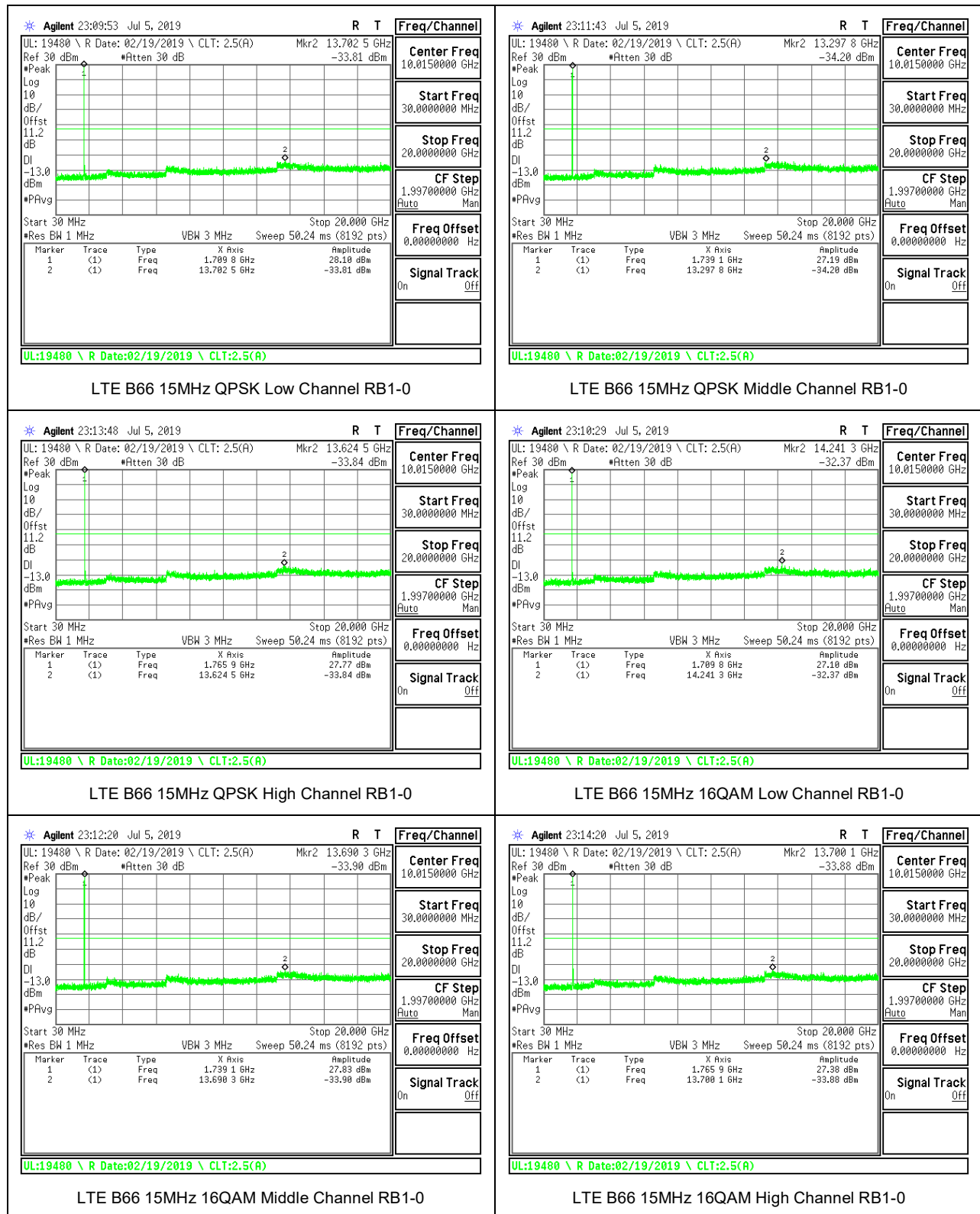
8.3.13. LTE BAND 66

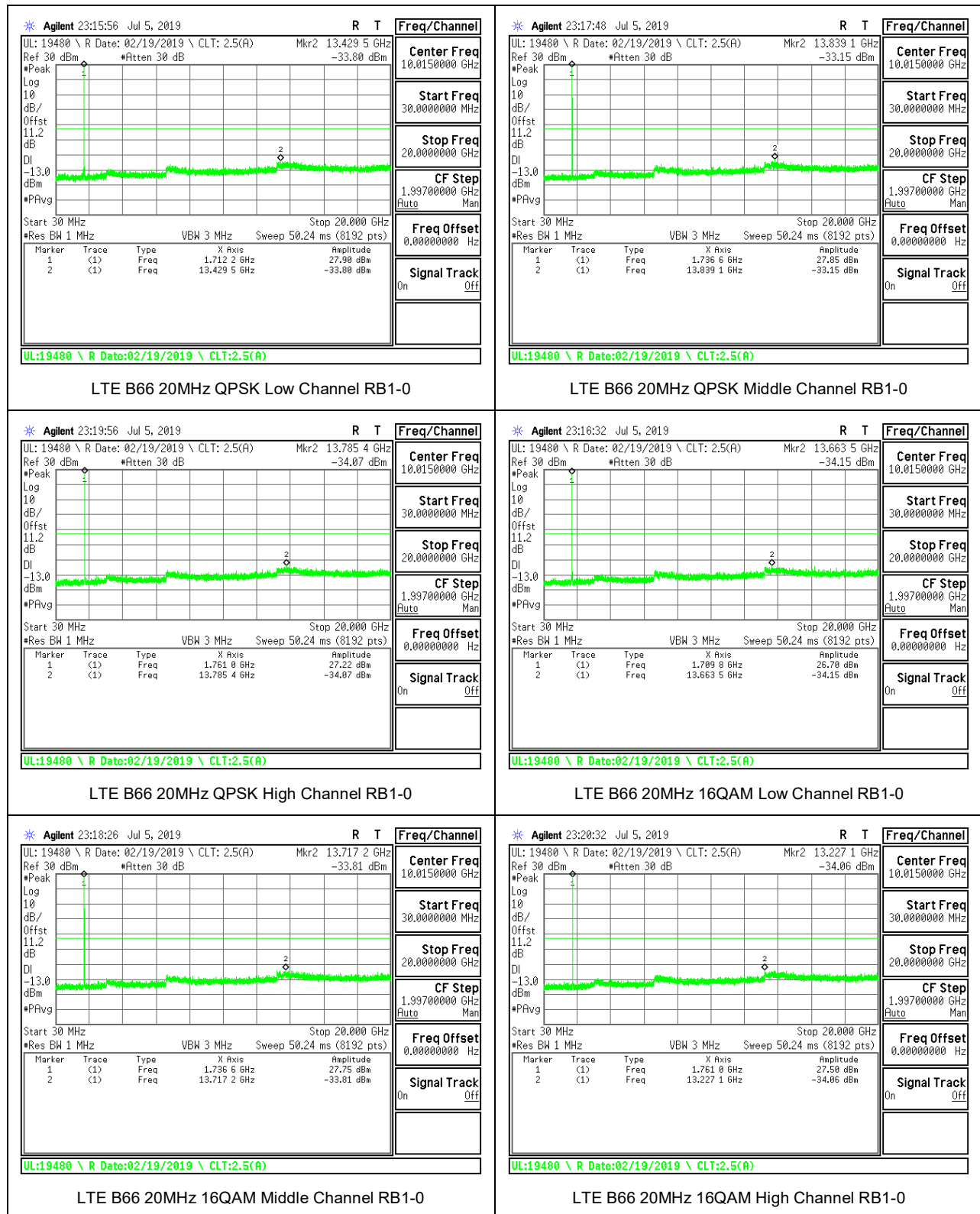












8.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §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, 6.4VDC, Normal, 7.6VDC and High voltage, 8.7VDC.
End Voltage, 5.1VDC.

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 4
- LTE Band 5
- LTE Band 7
- LTE Band 12
- LTE Band 13
- LTE Band 14
- LTE Band 25
- LTE Band 26
- LTE Band 30
- LTE Band 41
- LTE Band 66

RESULTS

EUT shuts down at temperature -30°C and $+50^{\circ}\text{C}$, and no frequency error is reported at these two temperatures.

8.4.1. LTE BAND 2

ID:	19498 ER	Date:	7/11/19
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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	1850.5840	1909.4650		
Extreme (40C)		1850.5840	1909.4650	-4.5	-0.002
Extreme (30C)		1850.5840	1909.4650	-2.6	-0.001
Extreme (10C)		1850.5840	1909.4650	6.3	0.003
Extreme (0C)		1850.5840	1909.4650	2.7	0.001
Extreme (-10C)		1850.5840	1909.4650	-5.1	-0.003
Extreme (-20C)		1850.5840	1909.4650	-0.7	0.000
20C	15%	1850.5840	1909.4650	-11.0	-0.006
	-15%	1850.5840	1909.4650	-11.3	-0.006
	End Point Voltage	1850.5840	1909.4650	10.6	0.006

8.4.2. LTE BAND 4

ID:	19498 ER	Date:	7/11/19
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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	1710.5280	1754.3680		
Extreme (40C)		1710.5280	1754.3680	-4.2	-0.002
Extreme (30C)		1710.5280	1754.3680	-5.1	-0.003
Extreme (10C)		1710.5280	1754.3680	-4.4	-0.003
Extreme (0C)		1710.5280	1754.3680	-5.2	-0.003
Extreme (-10C)		1710.5280	1754.3680	-3.7	-0.002
Extreme (-20C)		1710.5280	1754.3680	-1.1	-0.001
20C	15%	1710.5280	1754.3680	-11.0	-0.006
	-15%	1710.5280	1754.3680	-10.4	-0.006
	End Point Voltage	1710.5280	1754.3680	-12.0	-0.007

8.4.3. LTE BAND 5

ID:	19498 ER	Date:	7/11/19
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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	824.0640	848.9040		
Extreme (40C)		824.0640	848.9040	1.2	0.001
Extreme (30C)		824.0640	848.9040	-1.1	-0.001
Extreme (10C)		824.0640	848.9040	-0.7	-0.001
Extreme (0C)		824.0640	848.9040	-0.4	0.000
Extreme (-10C)		824.0640	848.9040	-0.3	0.000
Extreme (-20C)		824.0640	848.9040	-0.6	-0.001
20C	15%	824.0640	848.9040	5.5	0.007
	-15%	824.0640	848.9040	-6.6	-0.008
	End Point Voltage	824.0640	848.9040	-5.6	-0.007

8.4.4. LTE BAND 7

ID:	19498 ER	Date:	7/11/19
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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	2500.7280	2569.5040		
Extreme (40C)		2500.7280	2569.5040	-14.0	-0.006
Extreme (30C)		2500.7280	2569.5040	4.2	0.002
Extreme (10C)		2500.7280	2569.5040	-2.7	-0.001
Extreme (0C)		2500.7280	2569.5040	-3.5	-0.001
Extreme (-10C)		2500.7280	2569.5040	4.1	0.002
Extreme (-20C)		2500.7280	2569.5040	2.2	0.001
20C	15%	2500.7280	2569.5040	11.3	0.004
	-15%	2500.7280	2569.5040	-6.0	-0.002
	End Point Voltage	2500.7280	2569.5040	-11.3	-0.004

8.4.5. LTE BAND 12

ID:	19498 ER	Date:	7/11/19
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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	699.0840	715.8640		
Extreme (40C)		699.0840	715.8640	-3.8	-0.005
Extreme (30C)		699.0840	715.8640	1.8	0.003
Extreme (10C)		699.0840	715.8640	0.5	0.001
Extreme (0C)		699.0840	715.8640	3.8	0.005
Extreme (-10C)		699.0840	715.8640	3.3	0.005
Extreme (-20C)		699.0840	715.8640	2.7	0.004
20C	15%	699.0840	715.8640	4.7	0.007
	-15%	699.0840	715.8640	6.0	0.008
	End Point Voltage	699.0840	715.8640	5.0	0.007

8.4.6. LTE BAND 13

ID:	19498 ER	Date:	7/11/19
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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	777.1280	786.8760		
Extreme (40C)		777.1280	786.8760	2.3	0.003
Extreme (30C)		777.1280	786.8760	2.3	0.003
Extreme (10C)		777.1280	786.8760	-1.1	-0.001
Extreme (0C)		777.1280	786.8760	2.9	0.004
Extreme (-10C)		777.1280	786.8760	2.2	0.003
Extreme (-20C)		777.1280	786.8760	-1.8	-0.002
20C	15%	777.1280	786.8760	3.5	0.004
	-15%	777.1280	786.8760	6.3	0.008
	End Point Voltage	777.1280	786.8760	4.0	0.005

8.4.7. LTE BAND 14

ID:	19498 ER	Date:	7/11/19
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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	788.0800	797.8720		
Extreme (40C)		788.0800	797.8720	0.7	0.001
Extreme (30C)		788.0800	797.8720	0.8	0.001
Extreme (10C)		788.0800	797.8720	0.7	0.001
Extreme (0C)		788.0800	797.8720	0.9	0.001
Extreme (-10C)		788.0800	797.8720	1.7	0.002
Extreme (-20C)		788.0800	797.8720	1.1	0.001
20C	15%	788.0800	797.8720	-3.7	-0.005
	-15%	788.0800	797.8720	3.7	0.005
	End Point Voltage	788.0800	797.8720	5.1	0.006

8.4.8. LTE BAND 25

ID:	19498 ER	Date:	7/11/19
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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	1850.5520	1914.3120		
Extreme (40C)		1850.5520	1914.3120	-5.7	-0.003
Extreme (30C)		1850.5520	1914.3120	-5.6	-0.003
Extreme (10C)		1850.5520	1914.3120	-7.7	-0.004
Extreme (0C)		1850.5520	1914.3120	-6.2	-0.003
Extreme (-10C)		1850.5520	1914.3120	-5.0	-0.003
Extreme (-20C)		1850.5520	1914.3120	3.5	0.002
20C	15%	1850.5520	1914.3120	-12.0	-0.006
	-15%	1850.5520	1914.3120	-10.0	-0.005
	End Point	1850.5520	1914.3120	6.0	0.003

8.4.9. LTE BAND 26(FCC PART 90S)

ID:	19498 ER	Date:	7/11/19
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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	814.1360	823.8760		
Extreme (40C)		814.1360	823.8760	-4.0	-0.005
Extreme (30C)		814.1360	823.8760	-4.0	-0.005
Extreme (10C)		814.1360	823.8760	-4.6	-0.006
Extreme (0C)		814.1360	823.8760	-1.9	-0.002
Extreme (-10C)		814.1360	823.8760	-1.2	-0.001
Extreme (-20C)		814.1360	823.8760	-3.1	-0.004
20C	15%	814.1360	823.8760	5.6	0.007
	-15%	814.1360	823.8760	-8.8	-0.011
	End Point Voltage	814.1360	823.8760	-9.6	-0.012

8.4.10. LTE BAND 26(FCC PART 22)

ID:	19498 ER	Date:	7/11/19
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QPSK, (15MHz BANDWIDTH)

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.4080	848.6340		
Extreme (40C)		824.4080	848.6340	-2.8	-0.003
Extreme (30C)		824.4080	848.6340	-0.6	-0.001
Extreme (10C)		824.4080	848.6340	-3.2	-0.004
Extreme (0C)		824.4080	848.6340	2.2	0.003
Extreme (-10C)		824.4080	848.6340	-1.2	-0.001
Extreme (-20C)		824.4080	848.6340	0.8	0.001
20C	15%	824.4080	848.6340	-5.5	-0.007
	-15%	824.4080	848.6340	-6.3	-0.007
	End Point Voltage	824.4080	848.6340	4.4	0.005

8.4.11. LTE BAND 30

ID:	19498 ER	Date:	7/11/19
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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	2305.1480	2314.8240		
Extreme (40C)		2305.1480	2314.8240	-10.6	-0.005
Extreme (30C)		2305.1480	2314.8240	-3.6	-0.002
Extreme (10C)		2305.1480	2314.8240	-3.9	-0.002
Extreme (0C)		2305.1480	2314.8240	7.1	0.003
Extreme (-10C)		2305.1480	2314.8240	-2.5	-0.001
Extreme (-20C)		2305.1480	2314.8240	-2.2	-0.001
20C	15%	2305.1480	2314.8240	-12.2	-0.005
	-15%	2305.1480	2314.8240	-14.0	-0.006
	End Point Voltage	2305.1480	2314.8240	-13.3	-0.006

8.4.12. LTE BAND 41

ID:	19498 ER	Date:	8/29/19
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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	2496.6480	2689.2240		
Extreme (40C)		2496.6480	2689.2240	6.2	0.002
Extreme (30C)		2496.6480	2689.2240	1.8	0.001
Extreme (10C)		2496.6480	2689.2240	2.7	0.001
Extreme (0C)		2496.6480	2689.2240	-0.7	0.000
Extreme (-10C)		2496.6480	2689.2240	4.6	0.002
Extreme (-20C)		2496.6480	2689.2240	3.4	0.001
20C	15%	2496.6480	2689.2240	-15.2	-0.006
	-15%	2496.6480	2689.2240	-14.8	-0.006
	End Point Voltage	2496.6480	2689.2240	-15.0	-0.006

8.4.13. LTE BAND 66

ID:	19498 ER	Date:	8/29/19
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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	1710.5760	1779.4800		
Extreme (40C)		1710.5760	1779.4800	-5.2	-0.003
Extreme (30C)		1710.5760	1779.4800	-3.4	-0.002
Extreme (10C)		1710.5760	1779.4800	-1.7	-0.001
Extreme (0C)		1710.5760	1779.4800	4.7	0.003
Extreme (-10C)		1710.5760	1779.4800	3.6	0.002
Extreme (-20C)		1710.5760	1779.4800	-1.3	-0.001
20C	15%	1710.5760	1779.4800	-10.1	-0.006
	-15%	1710.5760	1779.4800	-4.1	-0.002
	End Point Voltage	1710.5760	1779.4800	-7.9	-0.005

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 4
- LTE Band 5
- LTE Band 7
- LTE Band 12
- LTE Band 13
- LTE Band 14
- LTE Band 25
- LTE Band 26
- LTE Band 30
- LTE Band 41
- LTE Band 66

RESULT

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:	19498 ER	Date:	7/8/19
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