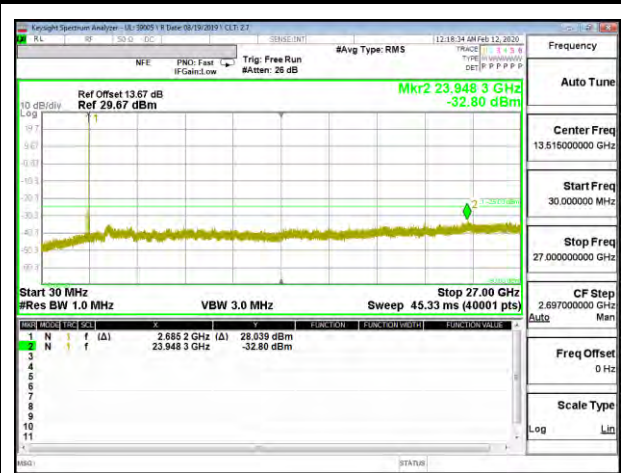
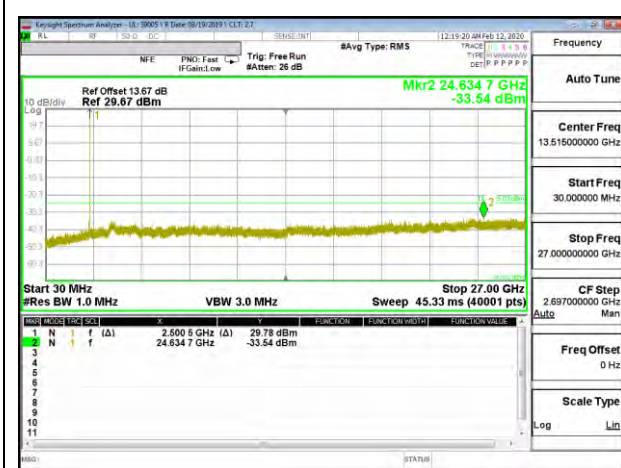


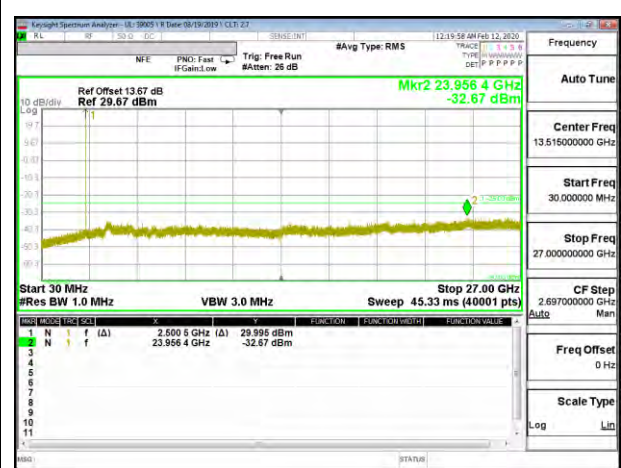
LTE B41 5MHz QPSK High Channel RB1-0



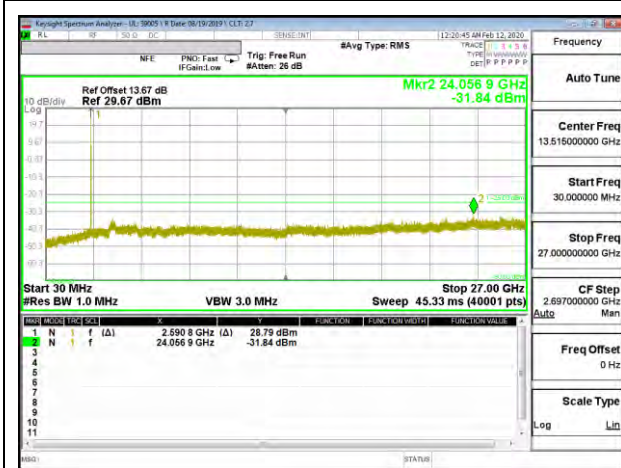
LTE B41 5MHz 16QAM High Channel RB1-0



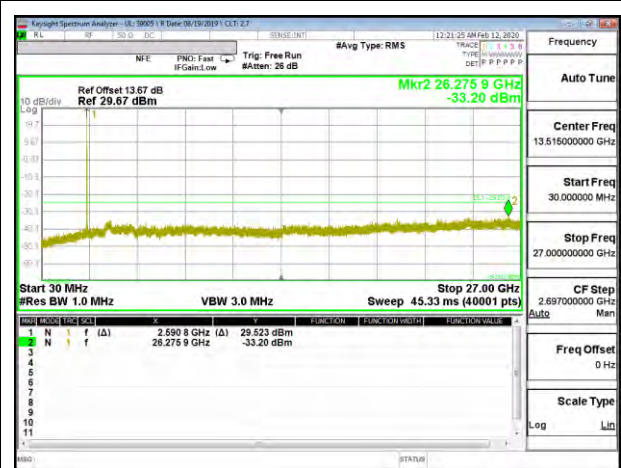
LTE B41 10MHz QPSK Low Channel RB1-0



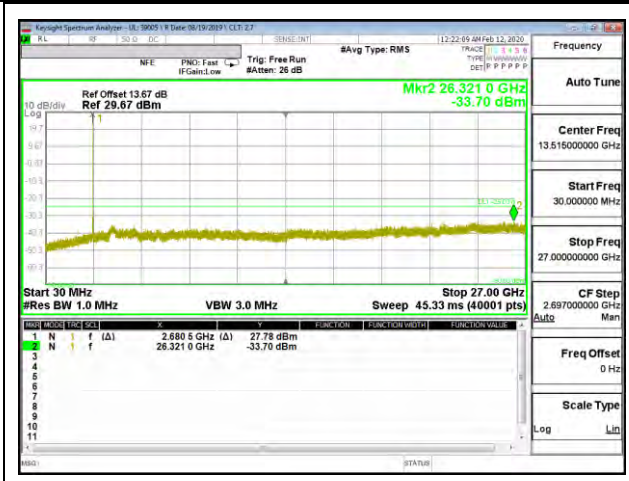
LTE B41 10MHz 16QAM Low Channel RB1-0



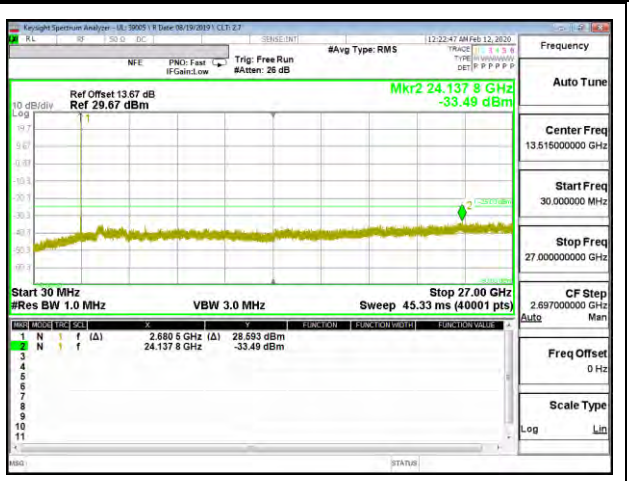
LTE B41 10MHz QPSK Middle Channel RB1-0



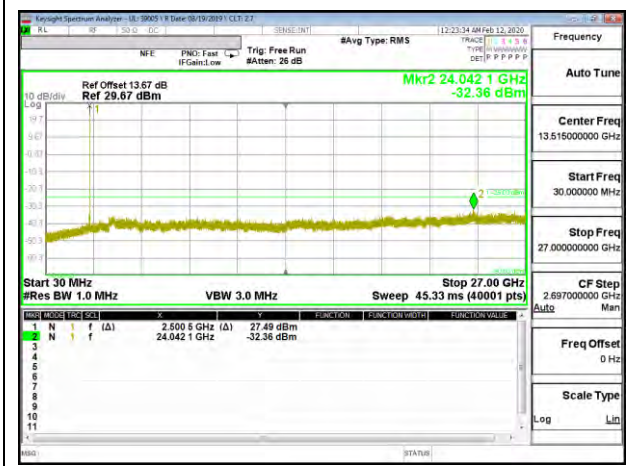
LTE B41 10MHz 16QAM Middle Channel RB1-0



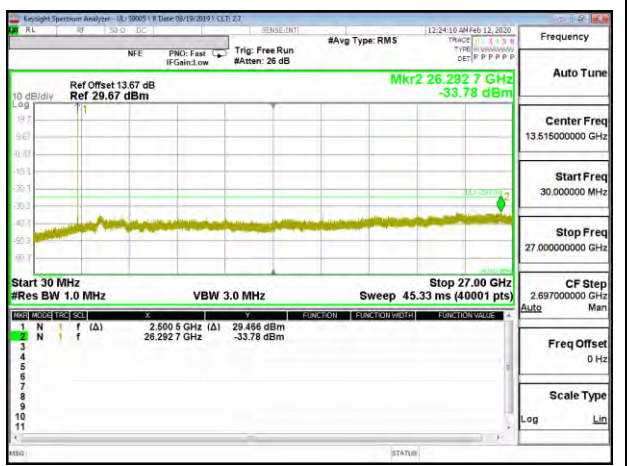
LTE B41 10MHz QPSK High Channel RB1-0



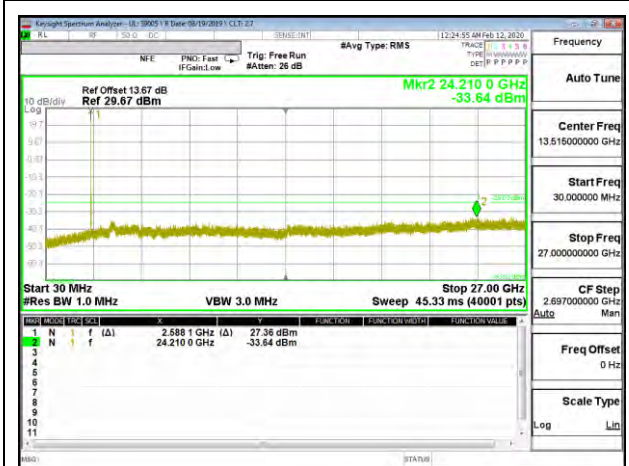
LTE B41 10MHz 16QAM High Channel RB1-0



LTE B41 15MHz QPSK Low Channel RB1-0



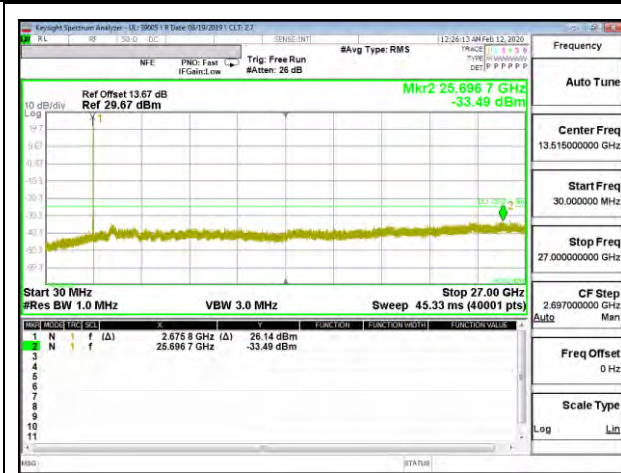
LTE B41 15MHz 16QAM Low Channel RB1-0



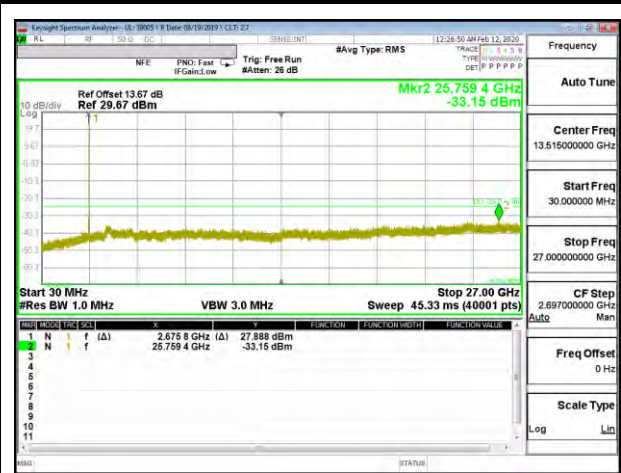
LTE B41 15MHz QPSK Middle Channel RB1-0



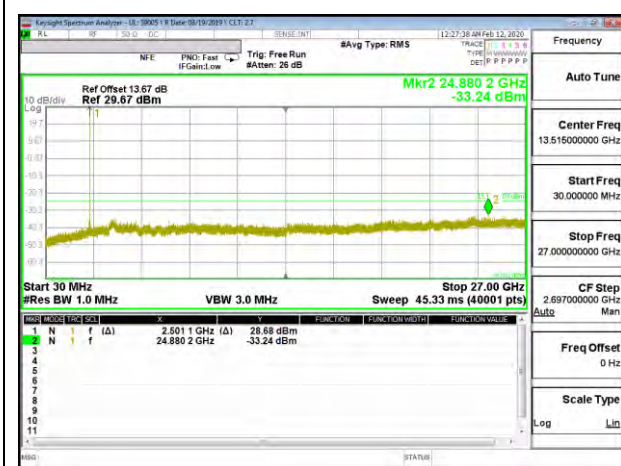
LTE B41 15MHz 16QAM Middle Channel RB1-0



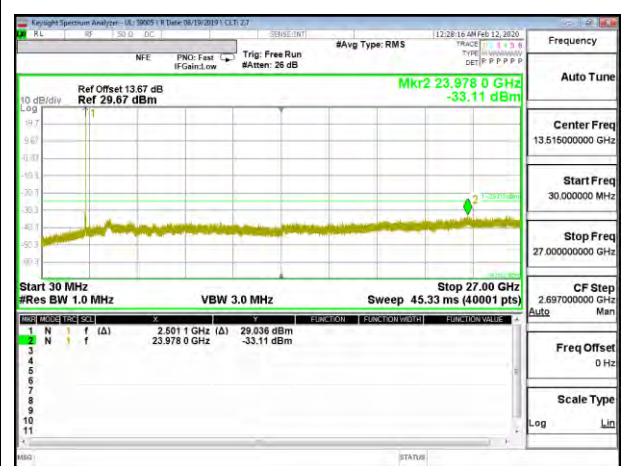
LTE B41 15MHz QPSK High Channel RB1-0



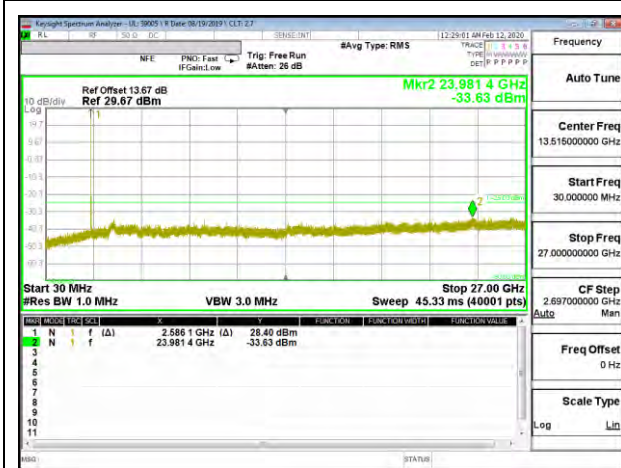
LTE B41 15MHz 16QAM High Channel RB1-0



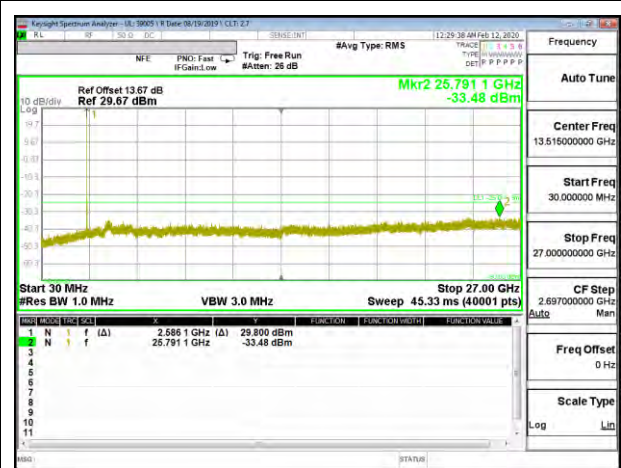
LTE B41 20MHz QPSK Low Channel RB1-0



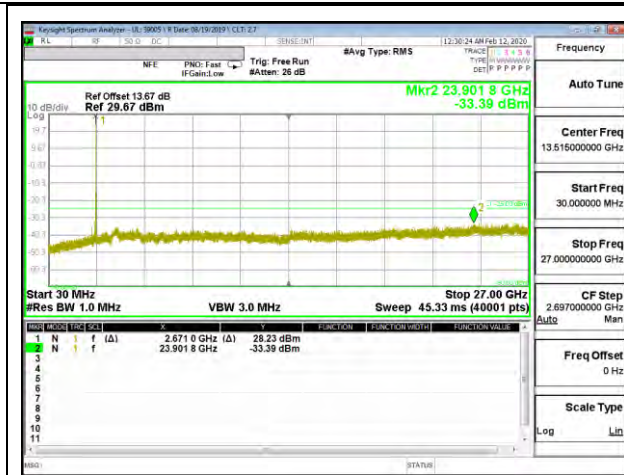
LTE B41 20MHz 16QAM Low Channel RB1-0



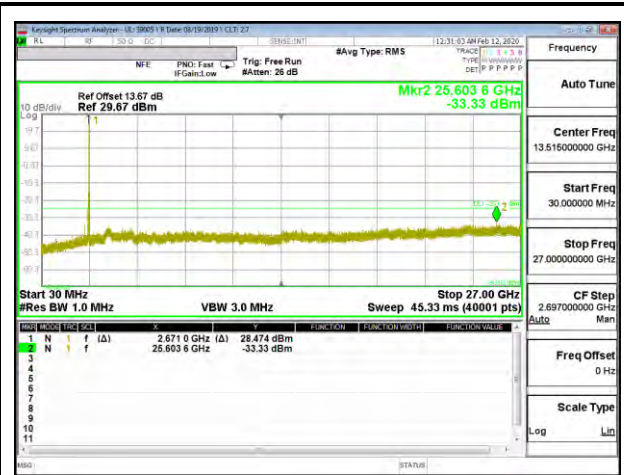
LTE B41 20MHz QPSK Middle Channel RB1-0



LTE B41 20MHz 16QAM Middle Channel RB1-0



LTE B41 20MHz QPSK High Channel RB1-0



LTE B41 20MHz 16QAM High Channel RB1-0

**8.3.13. LTE BAND 66**

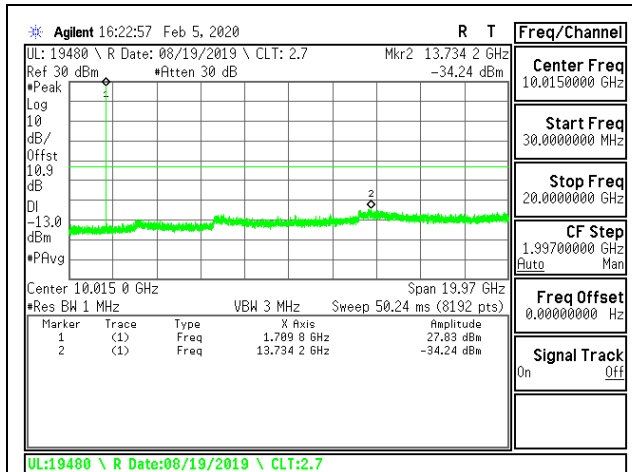
**LIMITS**

FCC: §27.53 (h)

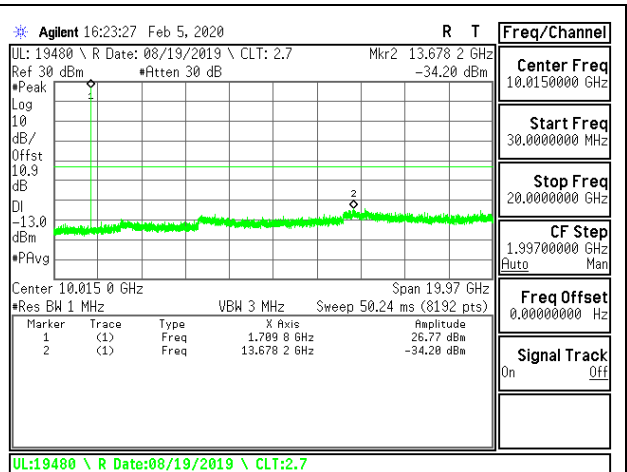
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

ISED: RSS139§6.6

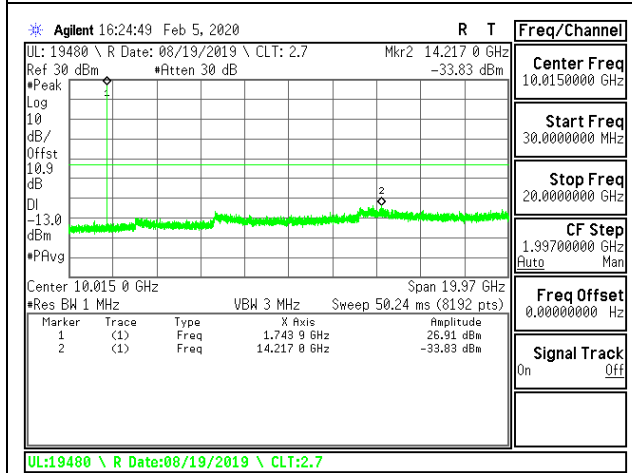
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



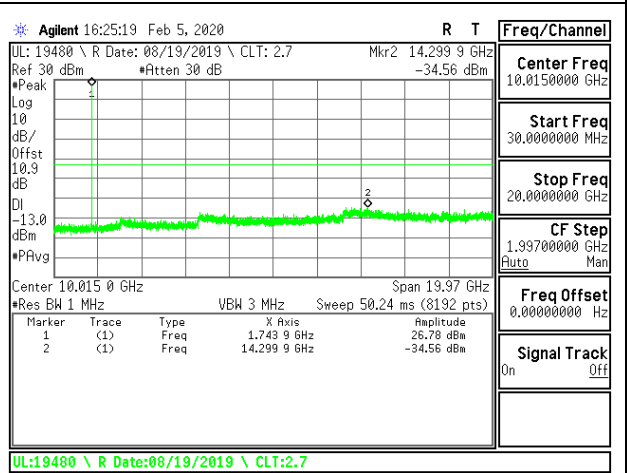
LTE B66 1.4MHz QPSK Low Channel RB1-0



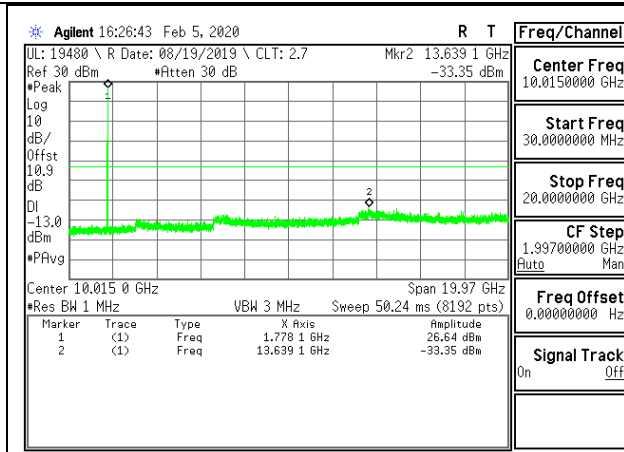
LTE B66 1.4MHz 16QAM Low Channel RB1-0



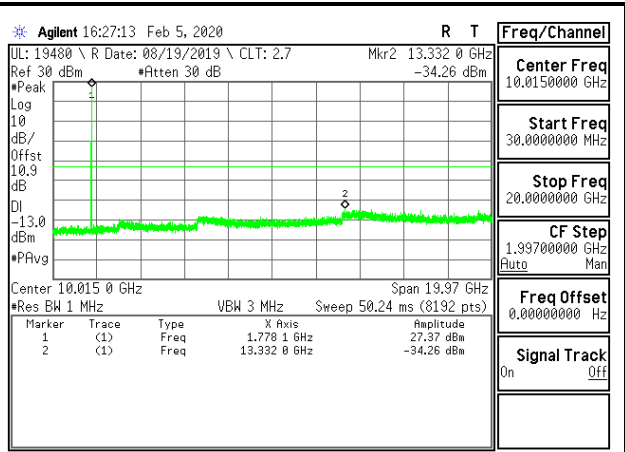
LTE B66 1.4MHz QPSK Middle Channel RB1-0



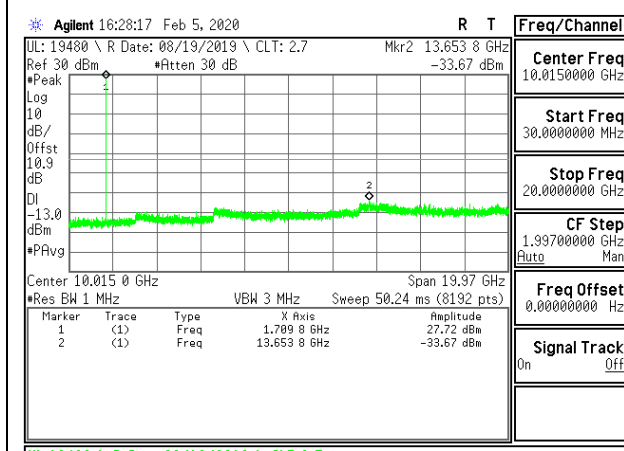
LTE B66 1.4MHz 16QAM Middle Channel RB1-0



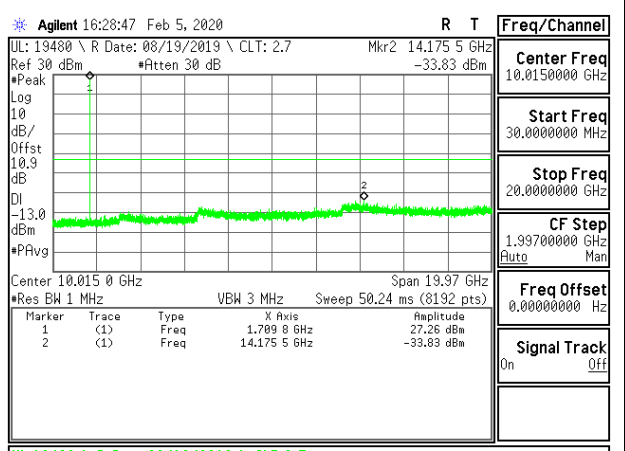
LTE B66 1.4MHz QPSK High Channel RB1-0



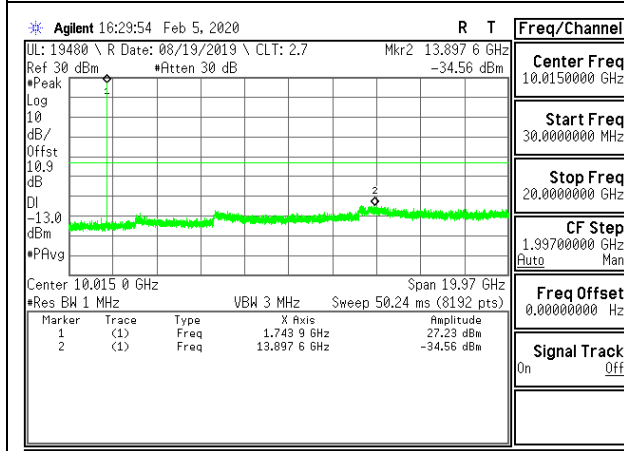
LTE B66 1.4MHz 16QAM High Channel RB1-0



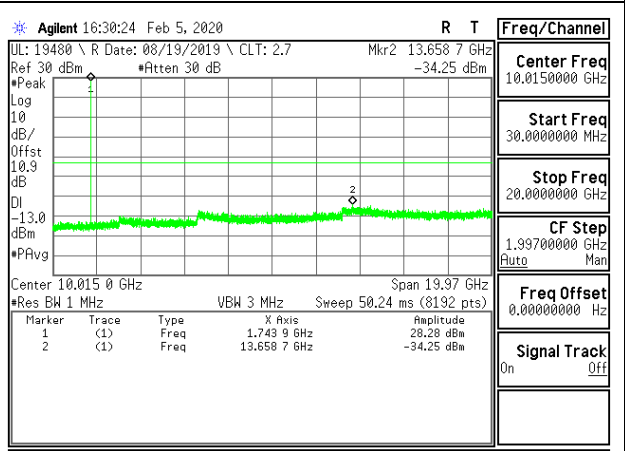
LTE B66 3MHz QPSK Low Channel RB1-0



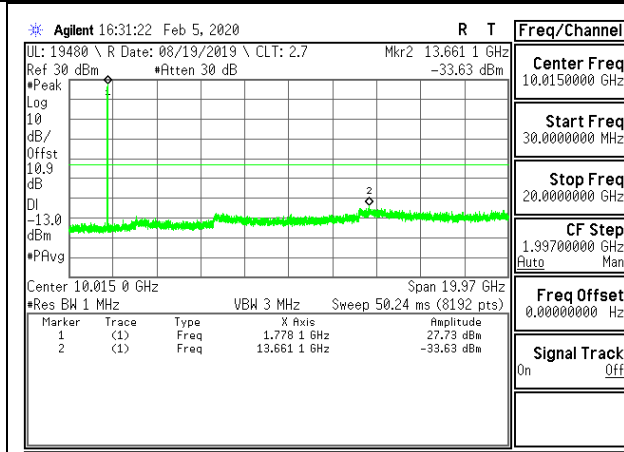
LTE B66 3MHz 16QAM Low Channel RB1-0



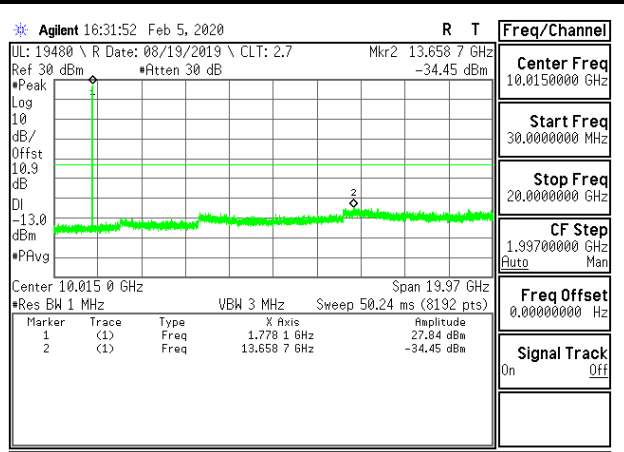
LTE B66 3MHz QPSK Middle Channel RB1-0



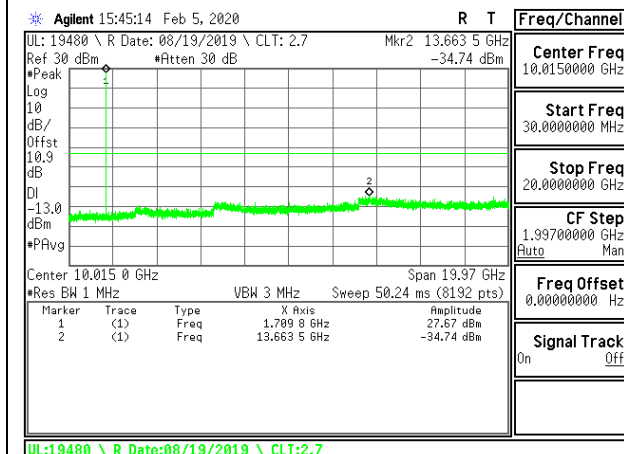
LTE B66 3MHz 16QAM Middle Channel RB1-0



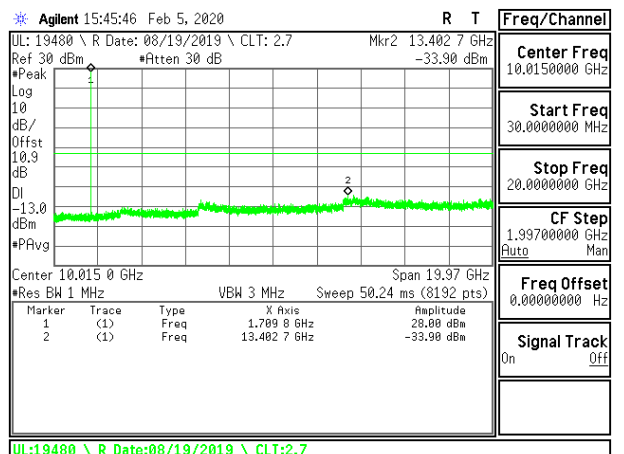
LTE B66 3MHz QPSK High Channel RB1-0



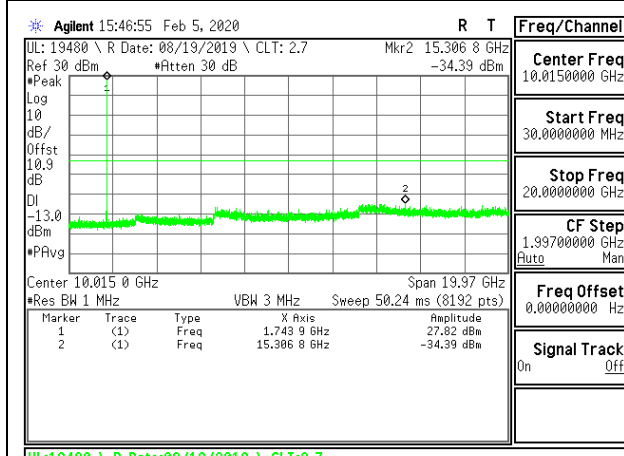
LTE B66 3MHz 16QAM High Channel RB1-0



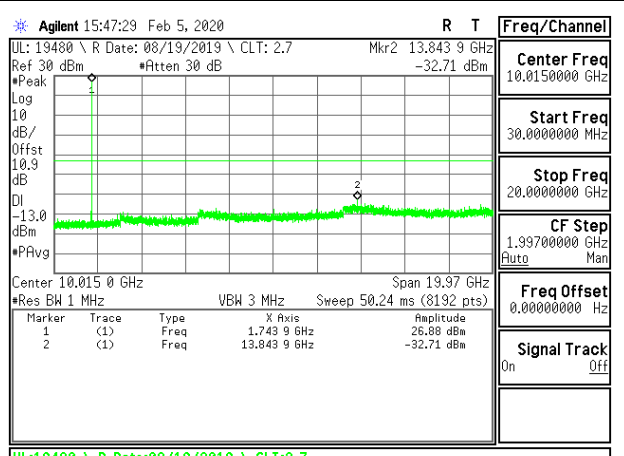
LTE B66 5MHz QPSK Low Channel RB1-0



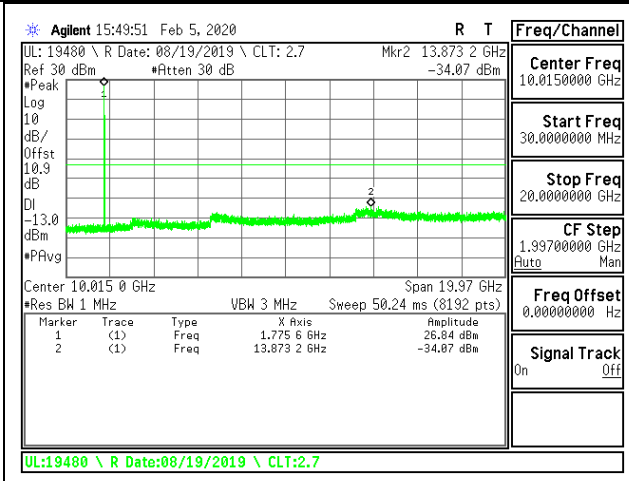
LTE B66 5MHz 16QAM Low Channel RB1-0



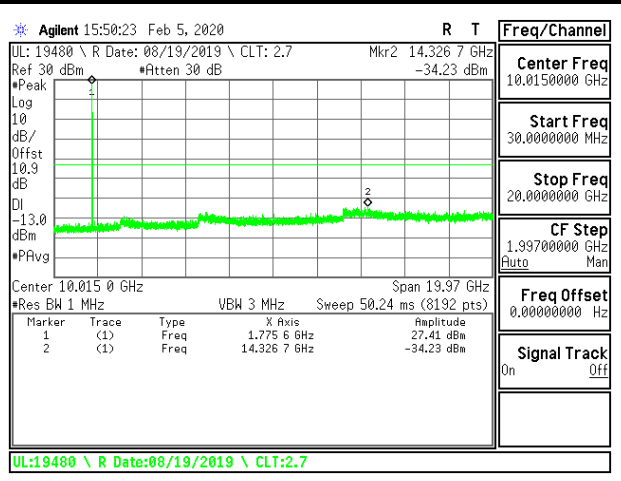
LTE B66 5MHz QPSK Middle Channel RB1-0



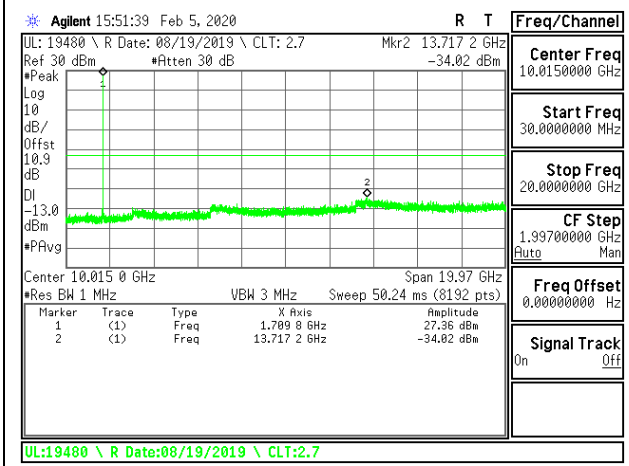
LTE B66 5MHz 16QAM Middle Channel RB1-0



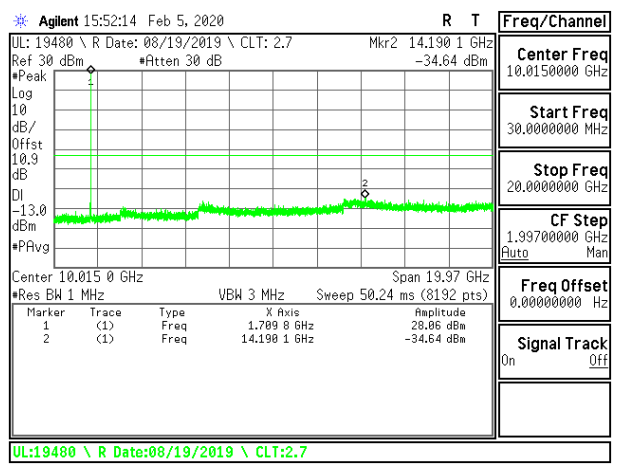
LTE B66 5MHz QPSK High Channel RB1-0



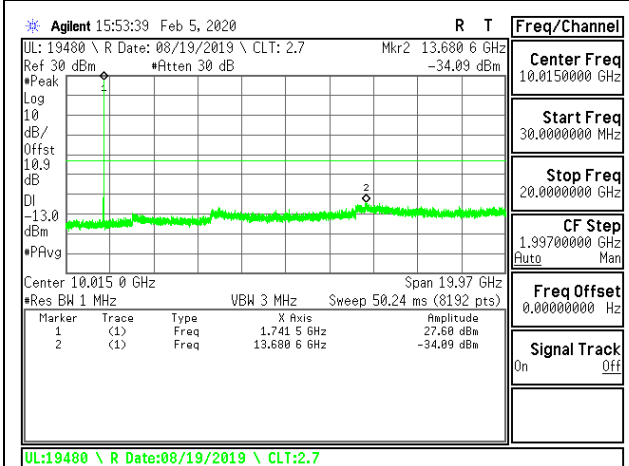
LTE B66 5MHz 16QAM High Channel RB1-0



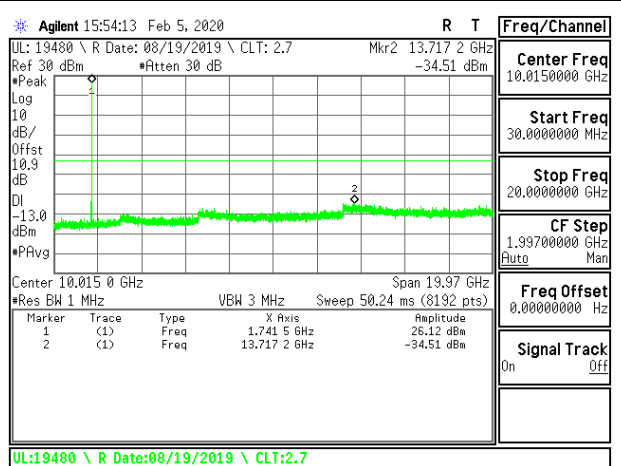
LTE B66 10MHz QPSK Low Channel RB1-0



LTE B66 10MHz 16QAM Low Channel RB1-0

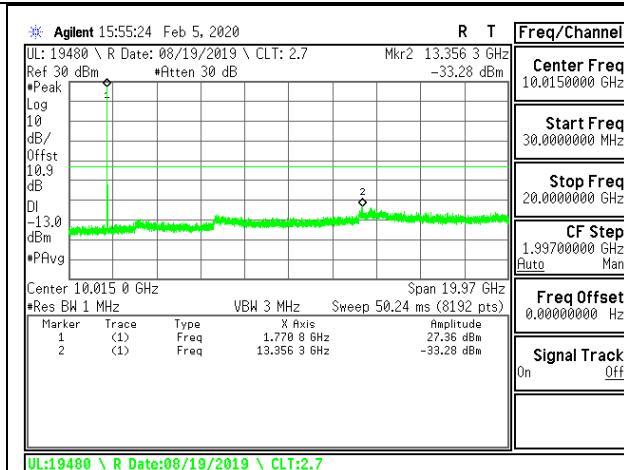


LTE B66 10MHz QPSK Middle Channel RB1-0

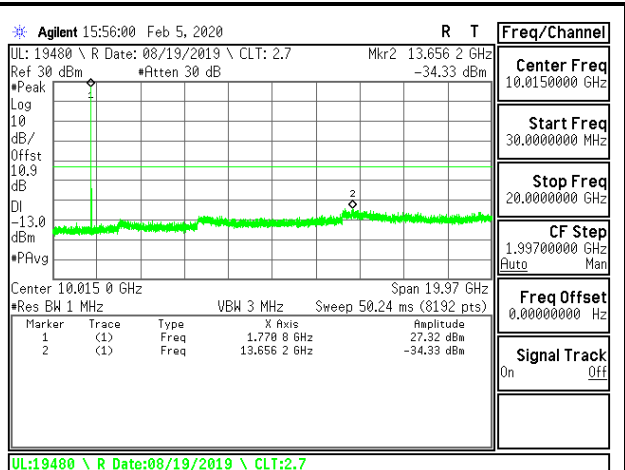


LTE B66 10MHz 16QAM Middle Channel RB1-0

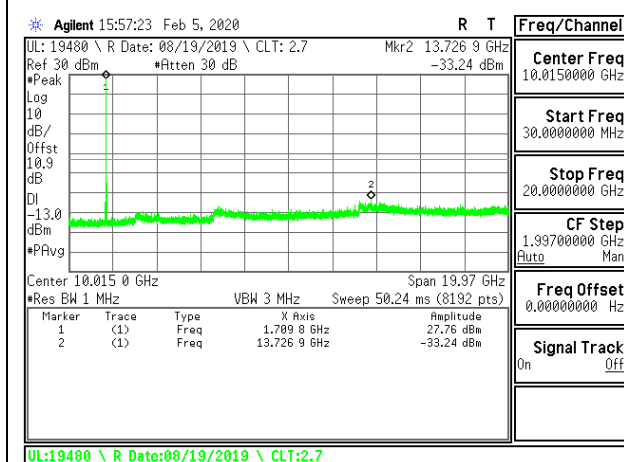




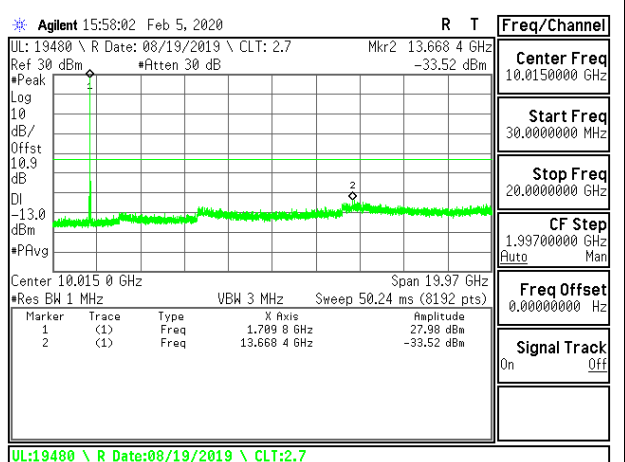
LTE B66 10MHz QPSK High Channel RB1-0



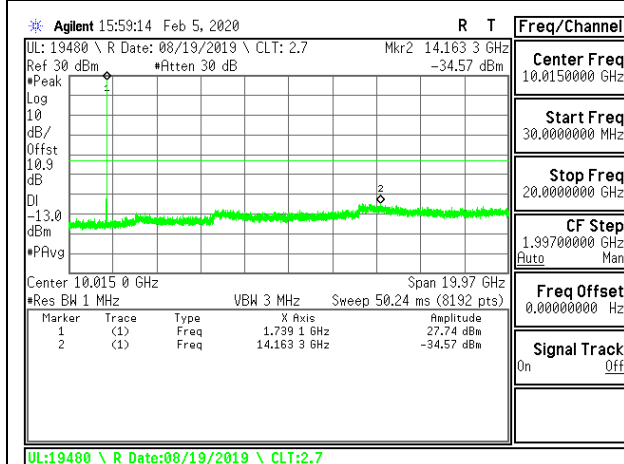
LTE B66 10MHz 16QAM High Channel RB1-0



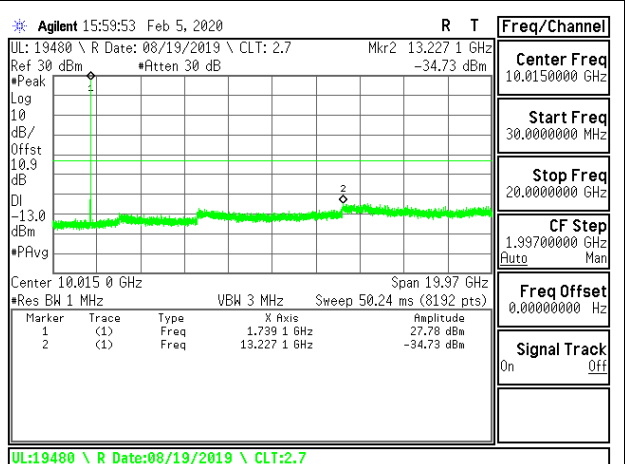
LTE B66 15MHz QPSK Low Channel RB1-0



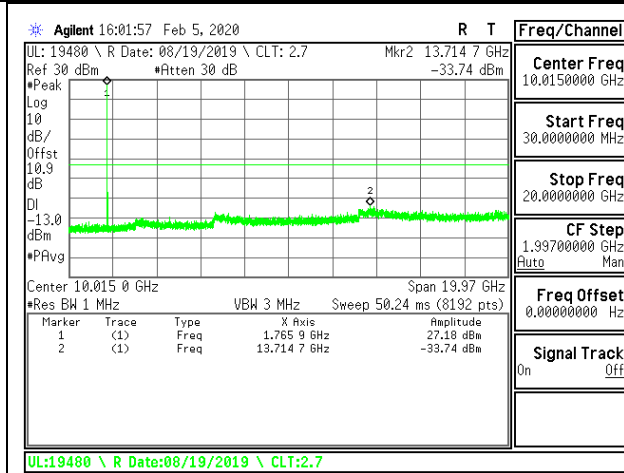
LTE B66 15MHz 16QAM Low Channel RB1-0



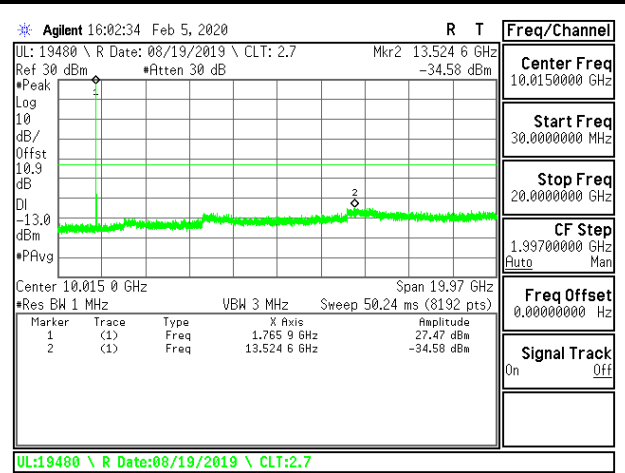
LTE B66 15MHz QPSK Middle Channel RB1-0



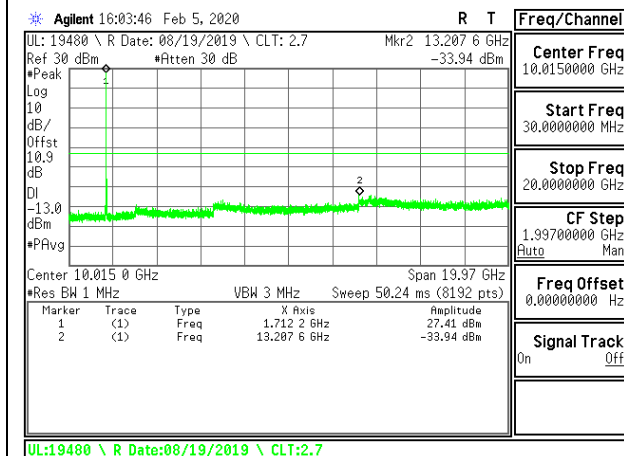
LTE B66 15MHz 16QAM Middle Channel RB1-0



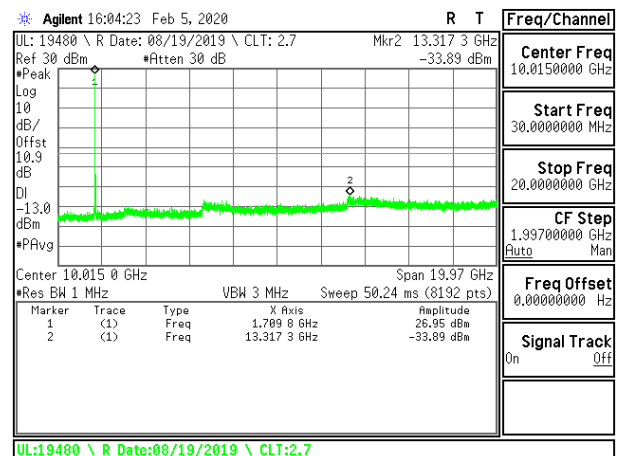
LTE B66 15MHz QPSK High Channel RB1-0



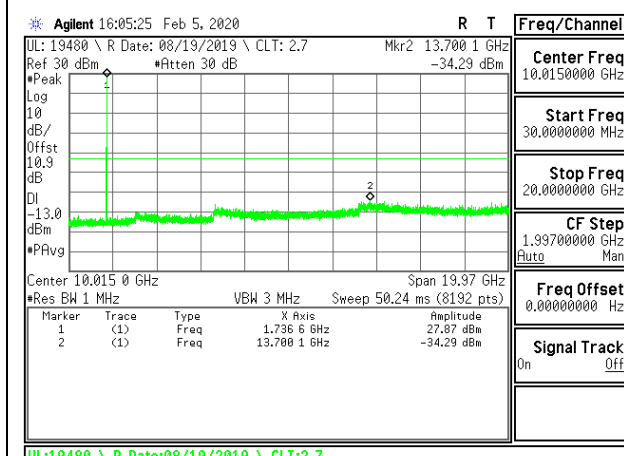
LTE B66 15MHz 16QAM High Channel RB1-0



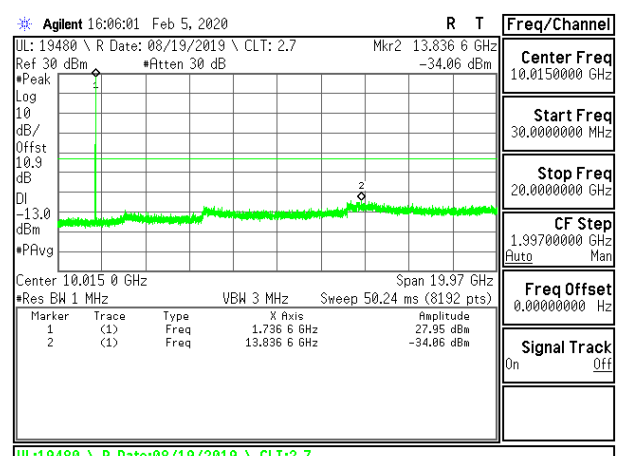
LTE B66 20MHz QPSK Low Channel RB1-0



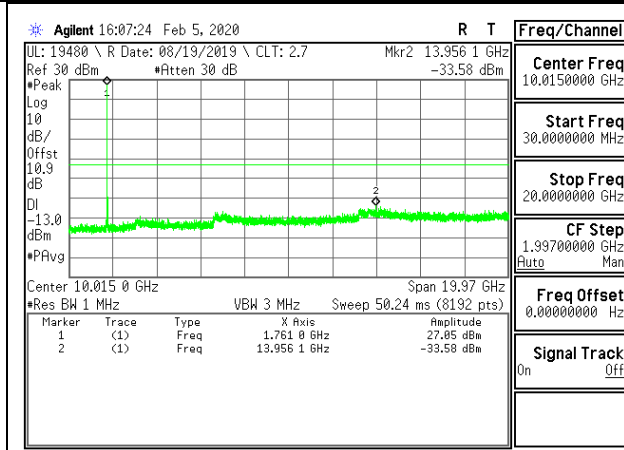
LTE B66 20MHz 16QAM Low Channel RB1-0



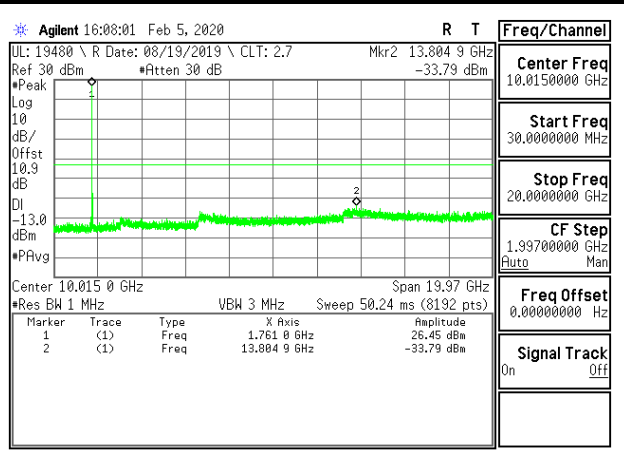
LTE B66 20MHz QPSK Middle Channel RB1-0



LTE B66 20MHz 16QAM Middle Channel RB1-0



LTE B66 20MHz QPSK High Channel RB1-0



LTE B66 20MHz 16QAM High Channel RB1-0

**8.3.14. LTE BAND 71**

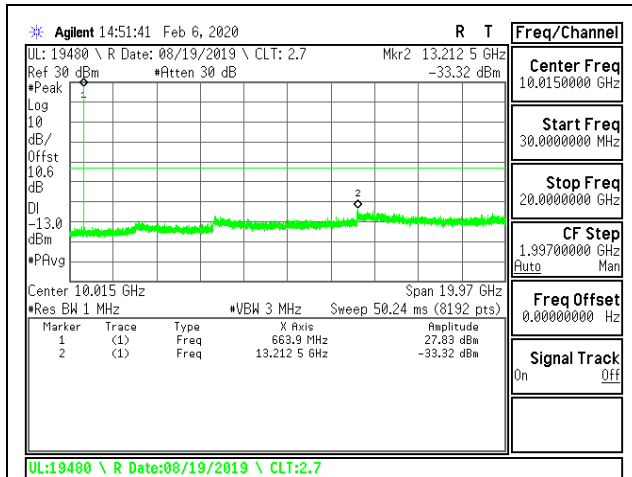
**LIMITS**

FCC: §27.53 (g)

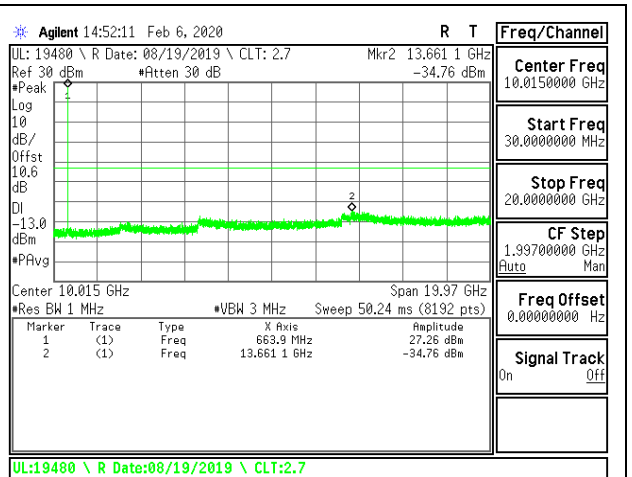
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.

ISED: RSS130§4.7

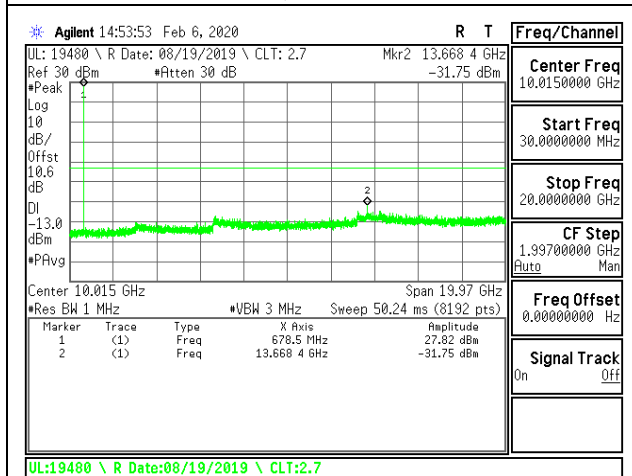
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



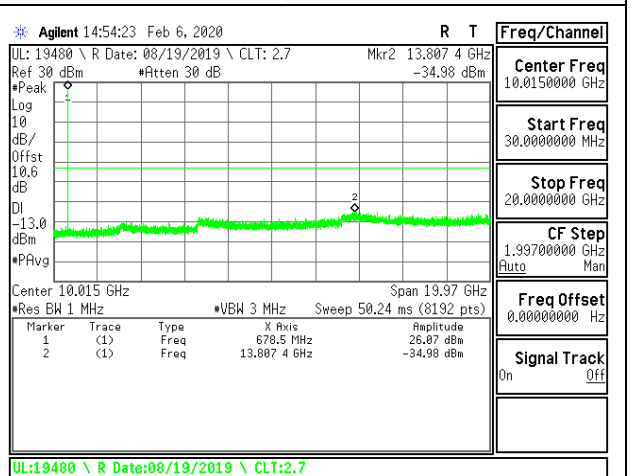
LTE B71 5MHz QPSK Low Channel RB1-0



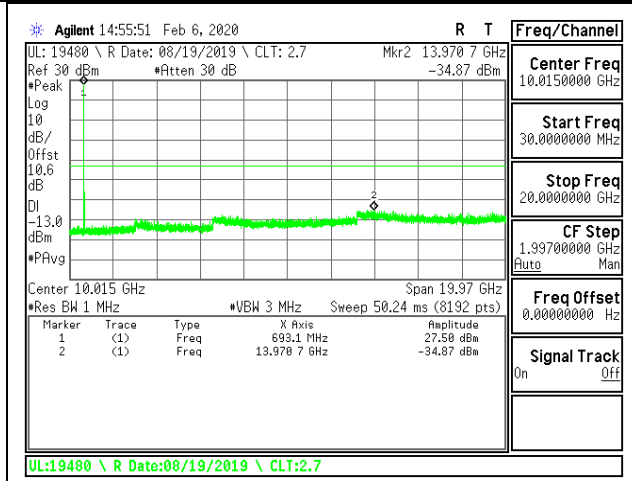
LTE B71 5MHz 16QAM Low Channel RB1-0



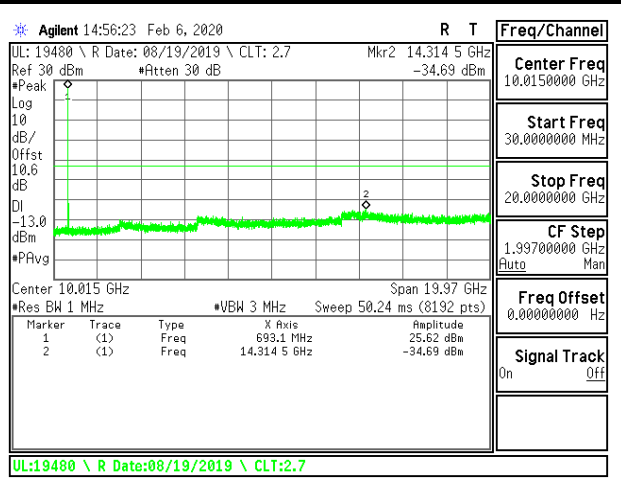
LTE B71 5MHz QPSK Middle Channel RB1-0



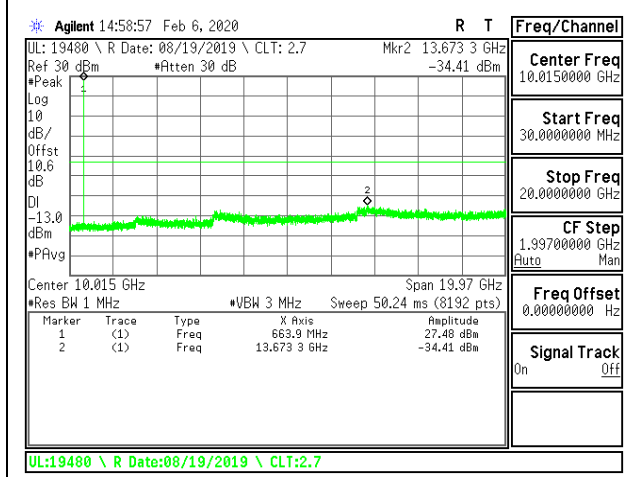
LTE B71 5MHz 16QAM Middle Channel RB1-0



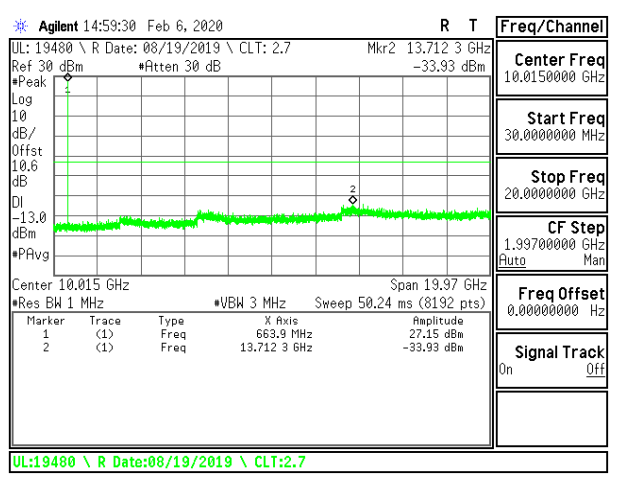
LTE B71 5MHz QPSK High Channel RB1-0



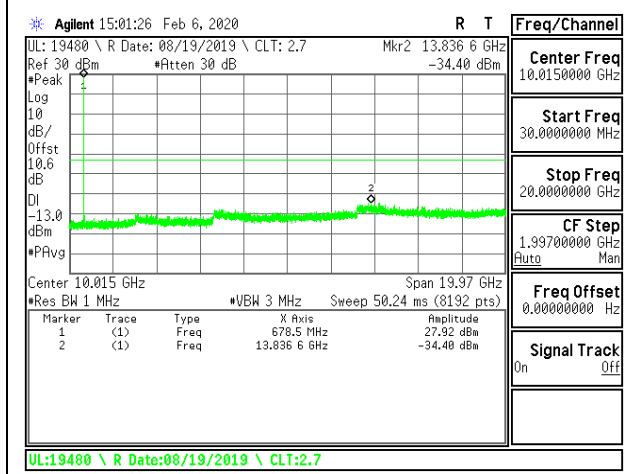
LTE B71 5MHz 16QAM High Channel RB1-0



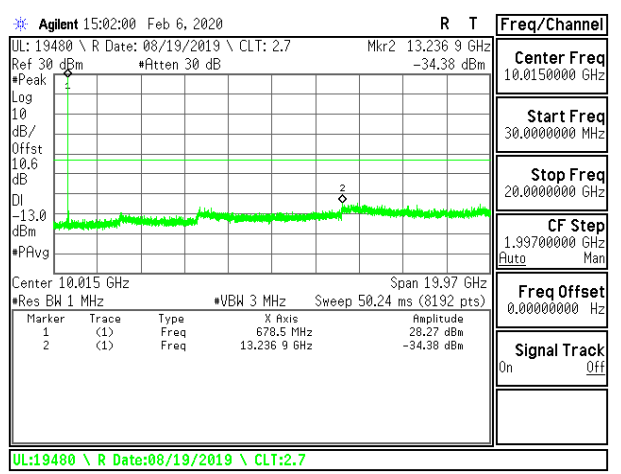
LTE B71 10MHz QPSK Low Channel RB1-0



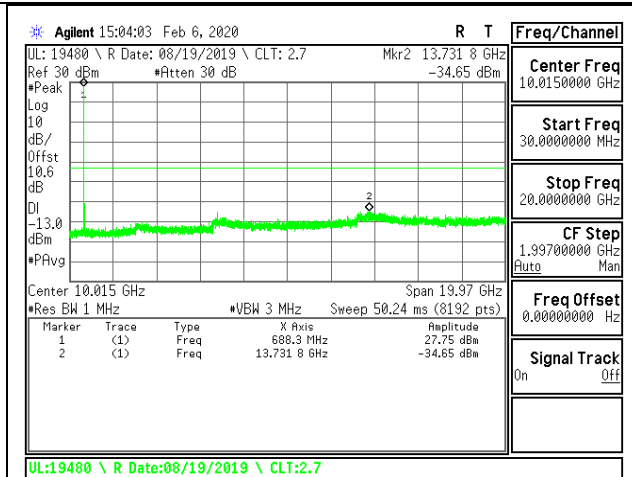
LTE B71 10MHz 16QAM Low Channel RB1-0



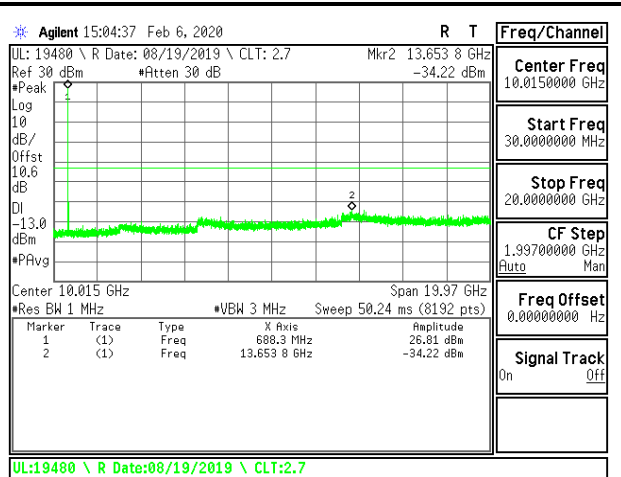
LTE B71 10MHz QPSK Middle Channel RB1-0



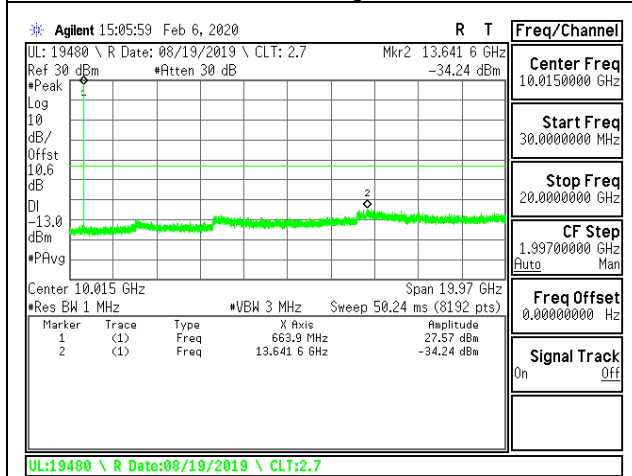
LTE B71 10MHz 16QAM Middle Channel RB1-0



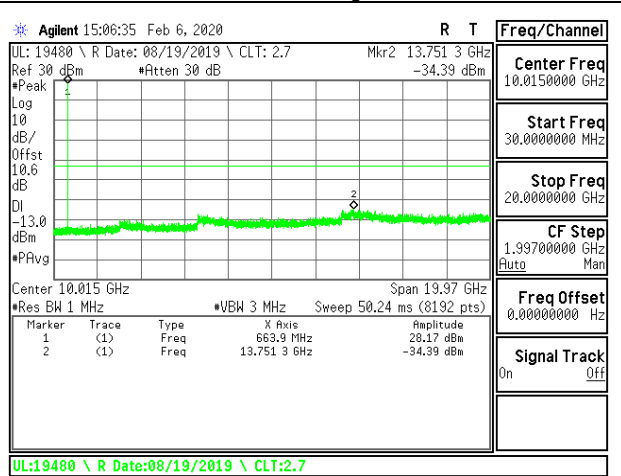
LTE 71 10MHz QPSK High Channel RB1-0



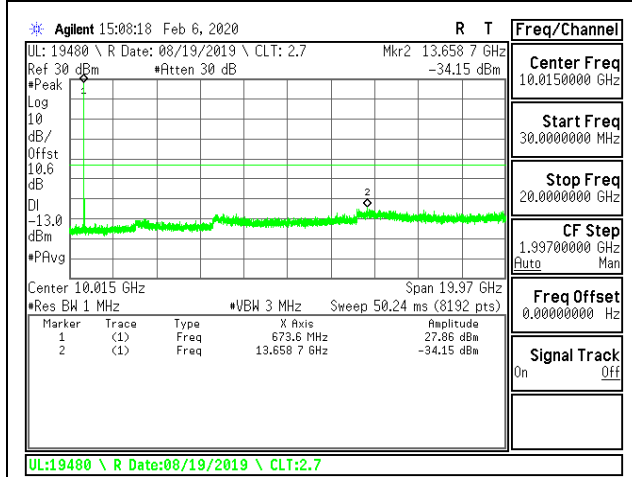
LTE B71 10MHz 16QAM High Channel RB1-0



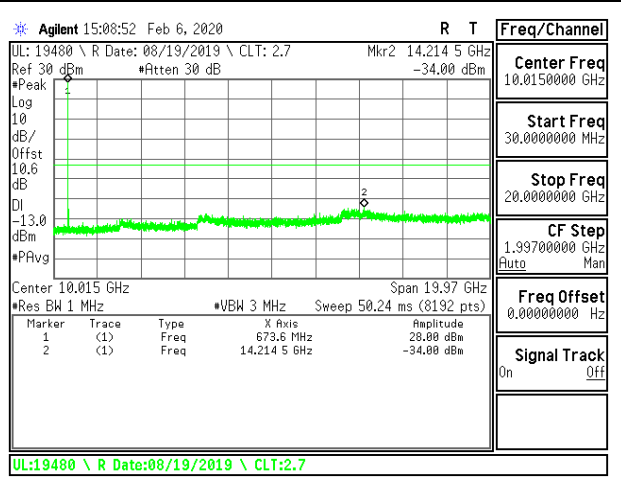
LTE B71 15MHz QPSK Low Channel RB1-0



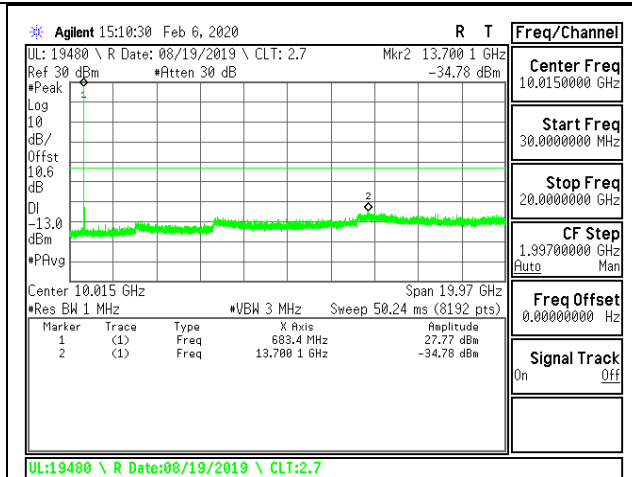
LTE B71 15MHz 16QAM Low Channel RB1-0



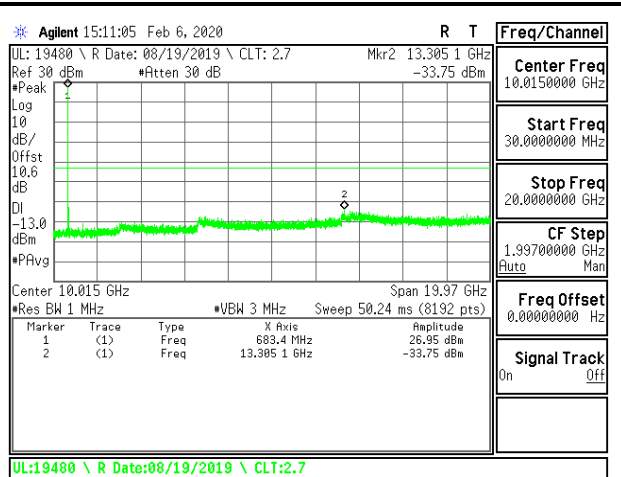
LTE B71 15MHz QPSK Middle Channel RB1-0



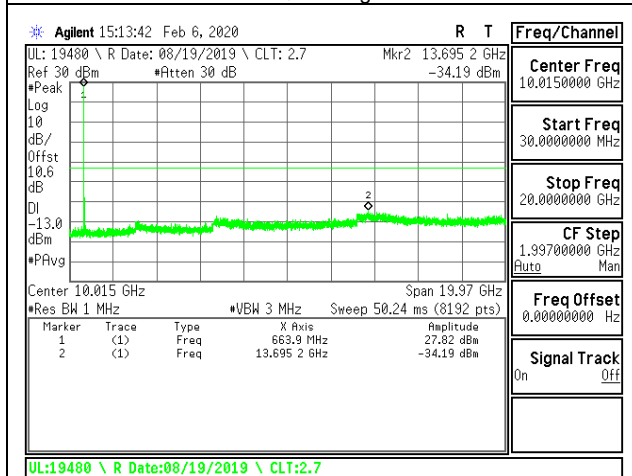
LTE B71 15MHz 16QAM Middle Channel RB1-0



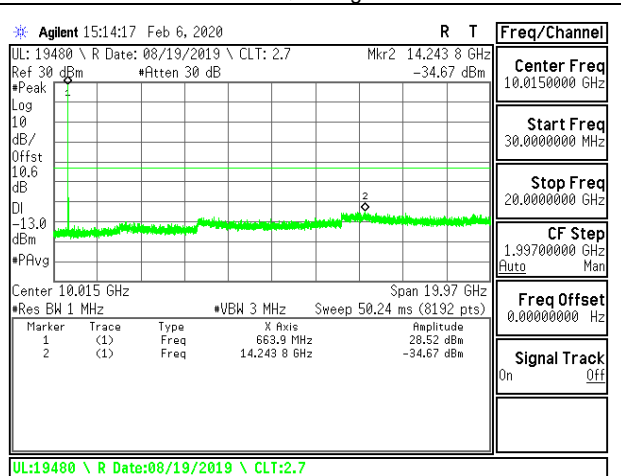
LTE B71 15MHz QPSK High Channel RB1-0



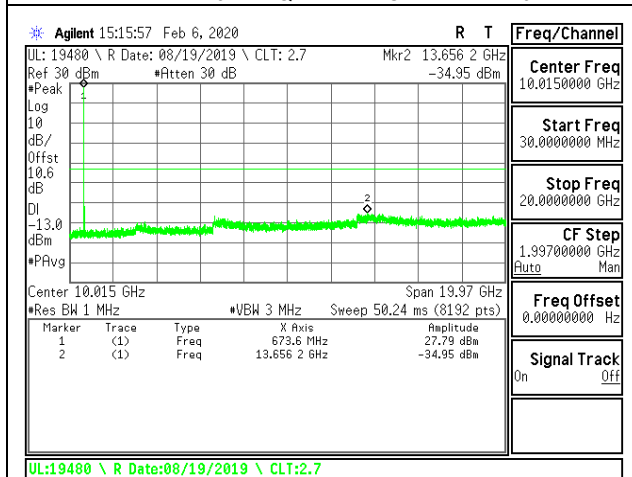
LTE B71 15MHz 16QAM High Channel RB1-0



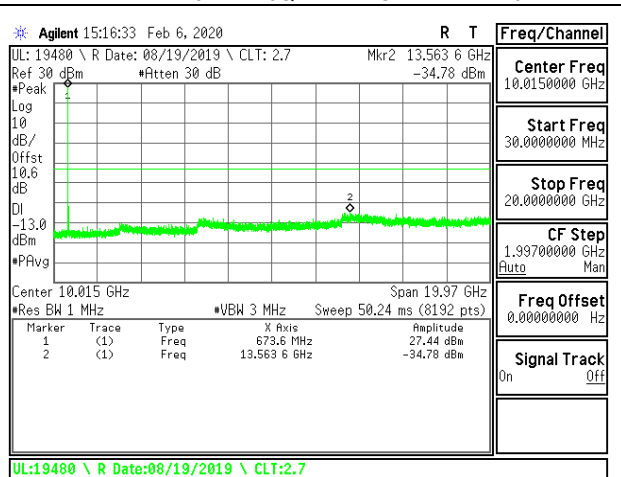
LTE B71 20MHz QPSK Low Channel RB1-0



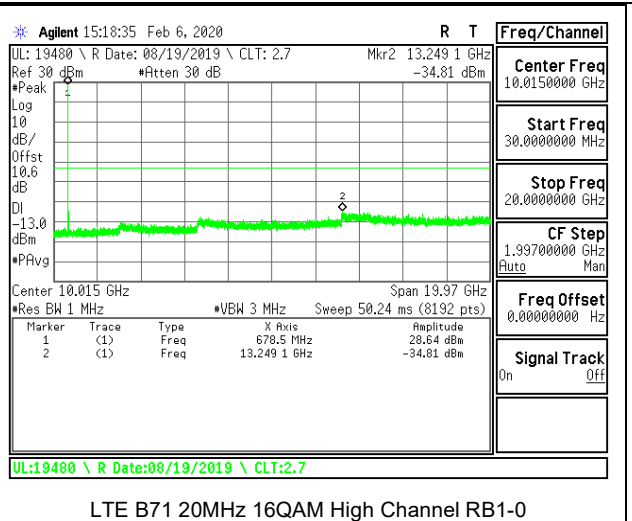
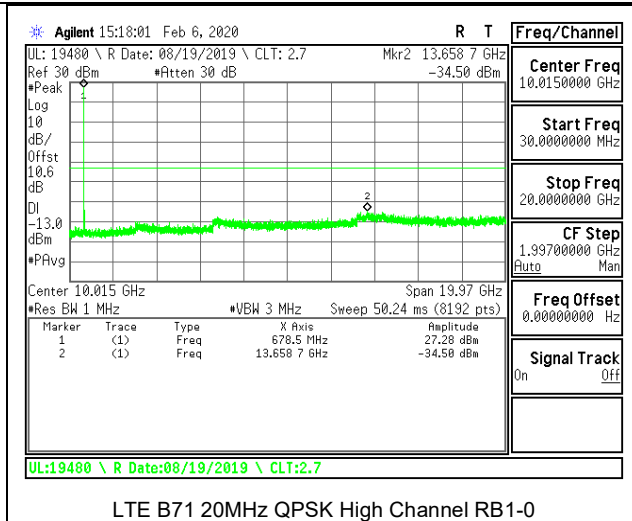
LTE B71 20MHz 16QAM Low Channel RB1-0



LTE B71 20MHz QPSK Middle Channel RB1-0



LTE B71 20MHz 16QAM Middle Channel RB1-0





## 8.4. FREQUENCY STABILITY

### RULE PART(S)

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

ISED: RSS130§4.5, RSS132§5.3; RSS133§6.3, RSS139§6.4, RSS199§4.3.

### LIMITS

FCC: §22.355

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

FCC: §24.235 & §27.54

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

RSS130§4.5

For equipment that is capable of transmitting numerous channels simultaneously for different applications (e.g. LTE and narrowband – Internet of Things (IoT)), the occupied bandwidth shall be the bandwidth representing the sum of the occupied bandwidths of these channels.

The frequency stability shall be sufficient to ensure that the occupied bandwidth remains within each frequency block range when tested at the temperature and supply voltage variations specified in RSS-Gen.

RSS132§5.3

The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  SRSP for mobile stations and  $\pm 1.5$  ppm for base stations.

In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the occupied bandwidth stays within each of the sub-bands (see Section 5.1) when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS133§6.3

The carrier frequency shall not depart from the reference frequency, in excess of  $\pm 2.5$  ppm for mobile stations and  $\pm 1.0$  ppm for base stations.

In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS139§6.4, RSS140§4.2

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

RSS199§4.3

Transmitter Frequency Stability

- a. The transmitter frequency stability limit shall be determined as follows:

The frequency offset shall be measured according to the procedure described in RSS-Gen and recorded;

- b. Using a resolution bandwidth equal to that permitted within the 1 MHz band immediately outside the channel edge, as found in clause 4.6, reference points will be selected at the unwanted emission levels which comply with the attenuation specified in 4.6, for the type of device under test, on the emission mask of the lowest and highest channels, and the frequency at these points shall be recorded as fL and fH respectively.

The applicant shall ensure frequency stability by showing that fL minus the frequency offset and fH plus the frequency offset shall be within the frequency range that the equipment is designed to operate.

### TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. =  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$

- Voltage = (85% - 115%)

Low voltage, 3.23VDC, Normal, 3.8VDC and High voltage, 4.37VDC.  
End Voltage, 2.8VDC.

**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°C is reached.

**Frequency Stability vs Voltage:**

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

**RESULTS**

See the following pages.

**8.4.1. GSM**

**LIMITS**

FCC §22.355

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

FCC §24.235

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

FCC §27.54

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

<b>Test Engineer ID:</b>	43575	<b>Test Date:</b>	2/20/2020
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**GPRS 850**

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.0183	848.9815		
Extreme (50C)		824.0183	848.9815	20.0	0.024
Extreme (40C)		824.0183	848.9815	18.3	0.022
Extreme (30C)		824.0183	848.9815	33.0	0.039
Extreme (10C)		824.0183	848.9815	23.0	0.027
Extreme (0C)		824.0183	848.9815	21.5	0.026
Extreme (-10C)		824.0183	848.9815	20.9	0.025
Extreme (-20C)		824.0183	848.9815	13.0	0.015
Extreme (-30C)		824.0183	848.9815	15.2	0.018
20C	15%	824.0183	848.9815	24.1	0.029
	-15%	824.0183	848.9815	21.3	0.025
	End Point	824.0183	848.9815	24.9	0.030

**GPRS 1900**

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1850.0237	1909.9734		
Extreme (50C)		1850.0237	1909.9734	5.6	0.003
Extreme (40C)		1850.0237	1909.9734	15.4	0.008
Extreme (30C)		1850.0237	1909.9734	23.6	0.013
Extreme (10C)		1850.0237	1909.9734	32.7	0.017
Extreme (0C)		1850.0237	1909.9734	31.1	0.017
Extreme (-10C)		1850.0237	1909.9734	25.3	0.013
Extreme (-20C)		1850.0237	1909.9734	25.3	0.013
Extreme (-30C)		1850.0237	1909.9734	18.0	0.010
20C	15%	1850.0237	1909.9734	28.9	0.015
	-15%	1850.0237	1909.9734	27.4	0.015
	End Point	1850.0237	1909.9734	26.8	0.014

**8.4.2. WCDMA**

**LIMITS**

FCC §22.355

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

FCC §24.235

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

FCC §27.54

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

<b>Test Engineer ID:</b>	43575	<b>Test Date:</b>	2/20/2020
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**WCDMA REL 99 BAND 5**

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.1103	848.8950		
Extreme (50C)		824.1103	848.8950	-2.8	-0.0033
Extreme (40C)		824.1103	848.8950	2.0	0.0024
Extreme (30C)		824.1103	848.8950	-21.4	-0.0256
Extreme (10C)		824.1103	848.8950	-6.9	-0.0083
Extreme (0C)		824.1103	848.8950	-4.4	-0.0052
Extreme (-10C)		824.1103	848.8950	-13.7	-0.0163
Extreme (-20C)		824.1103	848.8950	8.8	0.0105
Extreme (-30C)		824.1103	848.8950	9.1	0.0108
20C		15%	824.1103	848.8950	-10.0
	-15%	824.1103	848.8950	-9.1	-0.0109
	End Point	824.1103	848.8950	-8.1	-0.0097

**WCDMA REL 99 BAND 2**

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1850.1161	1909.8745		
Extreme (50C)		1850.1161	1909.8745	19.3	0.0103
Extreme (40C)		1850.1161	1909.8745	18.8	0.0100
Extreme (30C)		1850.1161	1909.8745	17.7	0.0094
Extreme (10C)		1850.1161	1909.8745	16.5	0.0088
Extreme (0C)		1850.1161	1909.8745	18.0	0.0096
Extreme (-10C)		1850.1161	1909.8745	20.0	0.0106
Extreme (-20C)		1850.1161	1909.8745	19.6	0.0104
Extreme (-30C)		1850.1161	1909.8745	17.9	0.0095
20C	15%	1850.1161	1909.8745	17.2	0.0092
	-15%	1850.1161	1909.8745	17.0	0.0090
	End Point	1850.1161	1909.8745	17.3	0.0092

**WCDMA REL 99 BAND 4**

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1710.1049	1754.8943		
Extreme (50C)		1710.1049	1754.8943	22.1	0.0128
Extreme (40C)		1710.1049	1754.8943	20.7	0.0119
Extreme (30C)		1710.1049	1754.8943	15.9	0.0092
Extreme (10C)		1710.1049	1754.8943	18.3	0.0106
Extreme (0C)		1710.1049	1754.8943	17.5	0.0101
Extreme (-10C)		1710.1049	1754.8943	16.6	0.0096
Extreme (-20C)		1710.1049	1754.8943	18.4	0.0106
Extreme (-30C)		1710.1049	1754.8943	19.0	0.0110
20C	15%	1710.1049	1754.8943	14.7	0.0085
	-15%	1710.1049	1754.8943	14.9	0.0086
	End Point	1710.1049	1754.8943	13.8	0.0080

**8.4.3. LTE BAND 2**

**LIMITS**

FCC: §24.235

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

ISED: RSS133§6.3

The carrier frequency shall not depart from the reference frequency, in excess of  $\pm 2.5$  ppm for mobile stations and  $\pm 1.0$  ppm for base stations.

In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

<b>Test Engineer ID:</b>	50820	<b>Test Date:</b>	2/21/2020
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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	1851.0132	1909.0011		
Extreme (50C)		1851.0132	1909.0011	13.8	0.007
Extreme (40C)		1851.0132	1909.0011	14.1	0.008
Extreme (30C)		1851.0132	1909.0011	12.5	0.007
Extreme (10C)		1851.0132	1909.0011	13.4	0.007
Extreme (0C)		1851.0132	1909.0011	12.5	0.007
Extreme (-10C)		1851.0132	1909.0011	13.4	0.007
Extreme (-20C)		1851.0132	1909.0011	11.9	0.006
Extreme (-30C)		1851.0132	1909.0011	12.6	0.007
20C	15%	1851.0132	1909.0011	11.0	0.006
	-15%	1851.0132	1909.0011	12.0	0.006
	End Point	1851.0132	1909.0011	14.5	0.008



**8.4.4. LTE BAND 5**

**LIMITS**

FCC: §22.355

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

ISED: RSS132§5.3

The carrier frequency shall not depart from the reference frequency in excess of ±2.5 SRSP for mobile stations and ±1.5 ppm for base stations.

In lieu of meeting the above stability values, the test report may show that the frequency stability is sufficient to ensure that the occupied bandwidth stays within each of the sub-bands (see Section 5.1) when tested to the temperature and supply voltage variations specified in RSS-Gen.

<b>Test Engineer ID:</b>	39005	<b>Test Date:</b>	2/21/2020
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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	824.4628	848.5296		
Extreme (50C)		824.4628	848.5296	-8.4	-0.010
Extreme (40C)		824.4628	848.5296	-8.3	-0.010
Extreme (30C)		824.4628	848.5296	-8.3	-0.010
Extreme (10C)		824.4628	848.5296	-9.2	-0.011
Extreme (0C)		824.4628	848.5296	-7.1	-0.009
Extreme (-10C)		824.4628	848.5296	-6.4	-0.008
Extreme (-20C)		824.4628	848.5296	-6.1	-0.007
Extreme (-30C)		824.4628	848.5296	-5.9	-0.007
20C		15%	824.4628	848.5296	-4.6
	-15%	824.4628	848.5296	-8.3	-0.010
	End Point	824.4628	848.5296	-6.8	-0.008

**8.4.5. LTE BAND 7**

**LIMITS**

FCC: §27.54

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

ISED: RSS199§4.3

Transmitter Frequency Stability

- a. The transmitter frequency stability limit shall be determined as follows:

The frequency offset shall be measured according to the procedure described in RSS-Gen and recorded;

- b. Using a resolution bandwidth equal to that permitted within the 1 MHz band immediately outside the channel edge, as found in clause 4.6, reference points will be selected at the unwanted emission levels which comply with the attenuation specified in 4.6, for the type of device under test, on the emission mask of the lowest and highest channels, and the frequency at these points shall be recorded as fL and fH respectively.

The applicant shall ensure frequency stability by showing that fL minus the frequency offset and fH plus the frequency offset shall be within the frequency range that the equipment is designed to operate.

<b>Test Engineer ID:</b>	39005	<b>Test Date:</b>	2/21/2020
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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	2501.0141	2568.9954		
Extreme (50C)		2501.0141	2568.9954	10.6	0.004
Extreme (40C)		2501.0141	2568.9954	10.4	0.004
Extreme (30C)		2501.0141	2568.9954	9.5	0.004
Extreme (10C)		2501.0141	2568.9954	9.0	0.004
Extreme (0C)		2501.0141	2568.9954	11.2	0.004
Extreme (-10C)		2501.0141	2568.9954	10.9	0.004
Extreme (-20C)		2501.0141	2568.9954	11.5	0.005
Extreme (-30C)		2501.0141	2568.9954	12.3	0.005
20C	15%	2501.0141	2568.9954	10.6	0.004
	-15%	2501.0141	2568.9954	11.6	0.005
	End Point	2501.0141	2568.9954	11.3	0.004

**8.4.6. LTE BAND 12**

**LIMITS**

FCC: §27.54

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

ISED: RSS130§4.5

For equipment that is capable of transmitting numerous channels simultaneously for different applications (e.g. LTE and narrowband – Internet of Things (IoT)), the occupied bandwidth shall be the bandwidth representing the sum of the occupied bandwidths of these channels.

The frequency stability shall be sufficient to ensure that the occupied bandwidth remains within each frequency block range when tested at the temperature and supply voltage variations specified in RSS-Gen.

<b>Test Engineer ID:</b>	50820	<b>Test Date:</b>	2/21/2020
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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	699.4999	715.5205		
Extreme (50C)		699.4999	715.5205	-7.5	-0.011
Extreme (40C)		699.4999	715.5205	-6.8	-0.010
Extreme (30C)		699.4999	715.5205	-5.5	-0.008
Extreme (10C)		699.4999	715.5205	-6.1	-0.009
Extreme (0C)		699.4999	715.5205	-8.2	-0.012
Extreme (-10C)		699.4999	715.5205	-5.8	-0.008
Extreme (-20C)		699.4999	715.5205	-5.0	-0.007
Extreme (-30C)		699.4999	715.5205	-6.6	-0.009
20C	15%	699.4999	715.5205	-5.8	-0.008
	-15%	699.4999	715.5205	-7.3	-0.010
	End Point	699.4999	715.5205	-5.5	-0.008

**8.4.7. LTE BAND 13**

**LIMITS**

FCC: §27.54

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

ISED: RSS130§4.5

For equipment that is capable of transmitting numerous channels simultaneously for different applications (e.g. LTE and narrowband – Internet of Things (IoT)), the occupied bandwidth shall be the bandwidth representing the sum of the occupied bandwidths of these channels.

The frequency stability shall be sufficient to ensure that the occupied bandwidth remains within each frequency block range when tested at the temperature and supply voltage variations specified in RSS-Gen.

<b>Test Engineer ID:</b>	39005	<b>Test Date:</b>	2/21/2020
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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	777.4945	786.5080		
Extreme (50C)		777.4945	786.5080	-5.2	-0.007
Extreme (40C)		777.4945	786.5080	-5.2	-0.007
Extreme (30C)		777.4945	786.5080	-4.3	-0.005
Extreme (10C)		777.4945	786.5080	-5.0	-0.006
Extreme (0C)		777.4945	786.5080	-5.7	-0.007
Extreme (-10C)		777.4945	786.5080	-6.0	-0.008
Extreme (-20C)		777.4945	786.5080	-4.4	-0.006
Extreme (-30C)		777.4945	786.5080	-5.0	-0.006
20C	15%	777.4945	786.5080	-6.7	-0.009
	-15%	777.4945	786.5080	-5.8	-0.007
	End Point	777.4945	786.5080	-6.5	-0.008

**8.4.8. LTE BAND 41 (FCC)**

**LIMITS**

FCC: §27.54

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

<b>Test Engineer ID:</b>	39005	<b>Test Date:</b>	2/21/2020
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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	2496.9451	2689.0546		
Extreme (50C)		2496.9451	2689.0546	11.2	0.004
Extreme (40C)		2496.9451	2689.0546	10.2	0.004
Extreme (30C)		2496.9451	2689.0546	10.1	0.004
Extreme (10C)		2496.9451	2689.0546	9.9	0.004
Extreme (0C)		2496.9451	2689.0546	13.3	0.005
Extreme (-10C)		2496.9451	2689.0546	13.6	0.005
Extreme (-20C)		2496.9451	2689.0546	13.0	0.005
Extreme (-30C)		2496.9451	2689.0546	14.2	0.005
20C	15%	2496.9451	2689.0546	12.5	0.005
	-15%	2496.9451	2689.0546	13.1	0.005
	End Point	2496.9451	2689.0546	10.6	0.004

**8.4.9. LTE BAND 41 (IC)**

**LIMITS**

ISED: RSS199§4.3

Transmitter Frequency Stability

a. The transmitter frequency stability limit shall be determined as follows:

The frequency offset shall be measured according to the procedure described in RSS-Gen and recorded;

b. Using a resolution bandwidth equal to that permitted within the 1 MHz band immediately outside the channel edge, as found in clause 4.6, reference points will be selected at the unwanted emission levels which comply with the attenuation specified in 4.6, for the type of device under test, on the emission mask of the lowest and highest channels, and the frequency at these points shall be recorded as fL and fH respectively.

The applicant shall ensure frequency stability by showing that fL minus the frequency offset and fH plus the frequency offset shall be within the frequency range that the equipment is designed to operate.

<b>Test Engineer ID:</b>	50820	<b>Test Date:</b>	2/21/2020
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**QPSK, (20MHz BANDWIDTH)**

Limit		2500	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2500.9535	2689.0534		
Extreme (50C)		2500.9535	2689.0534	11.0	0.004
Extreme (40C)		2500.9535	2689.0534	10.3	0.004
Extreme (30C)		2500.9535	2689.0534	10.2	0.004
Extreme (10C)		2500.9535	2689.0534	10.3	0.004
Extreme (0C)		2500.9535	2689.0534	14.2	0.005
Extreme (-10C)		2500.9535	2689.0534	13.8	0.005
Extreme (-20C)		2500.9535	2689.0534	12.9	0.005
Extreme (-30C)		2500.9535	2689.0534	13.6	0.005
20C	15%	2500.9535	2689.0534	11.0	0.004
	-15%	2500.9535	2689.0534	10.6	0.004
	End Point	2500.9535	2689.0534	10.8	0.004

**8.4.10. LTE BAND 66**

**LIMITS**

FCC: §27.54

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

ISED: RSS139§6.4

The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

<b>Test Engineer ID:</b>	39005	<b>Test Date:</b>	2/21/2020
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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	1711.0007	1779.0128		
Extreme (50C)		1711.0007	1779.0128	9.5	0.005
Extreme (40C)		1711.0007	1779.0128	9.0	0.005
Extreme (30C)		1711.0007	1779.0128	8.0	0.005
Extreme (10C)		1711.0007	1779.0128	10.0	0.006
Extreme (0C)		1711.0007	1779.0128	8.9	0.005
Extreme (-10C)		1711.0007	1779.0128	8.9	0.005
Extreme (-20C)		1711.0007	1779.0128	9.8	0.006
Extreme (-30C)		1711.0007	1779.0128	9.7	0.006
20C	15%	1711.0007	1779.0128	8.6	0.005
	-15%	1711.0007	1779.0128	9.0	0.005
	End Point	1711.0007	1779.0128	7.9	0.005

**8.4.11. LTE BAND 71**

**LIMITS**

FCC: §27.54

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

ISED: RSS130§4.5

For equipment that is capable of transmitting numerous channels simultaneously for different applications (e.g. LTE and narrowband – Internet of Things (IoT)), the occupied bandwidth shall be the bandwidth representing the sum of the occupied bandwidths of these channels.

The frequency stability shall be sufficient to ensure that the occupied bandwidth remains within each frequency block range when tested at the temperature and supply voltage variations specified in RSS-Gen.

<b>Test Engineer ID:</b>	50820	<b>Test Date:</b>	2/21/2020
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**QPSK, (20MHz BANDWIDTH)**

Limit		663	698	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	664.0027	697.0603		
Extreme (50C)		664.0027	697.0603	4.0	0.006
Extreme (40C)		664.0027	697.0603	6.0	0.009
Extreme (30C)		664.0027	697.0603	4.8	0.007
Extreme (10C)		664.0027	697.0603	7.0	0.010
Extreme (0C)		664.0027	697.0603	3.5	0.005
Extreme (-10C)		664.0027	697.0603	3.9	0.006
Extreme (-20C)		664.0027	697.0603	5.7	0.008
Extreme (-30C)		664.0027	697.0603	4.5	0.007
20C	15%	664.0027	697.0603	6.3	0.009
	-15%	664.0027	697.0603	5.3	0.008
	End Point	664.0027	697.0603	8.6	0.013



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## 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.

### RESULT

The results from all CCDF measurements are passed with 13dB peak-to-average power ratio criteria.

**8.5.1. GSM**



GSM 850 GPRS Middle Channel



GSM 850 EGPRS Middle Channel

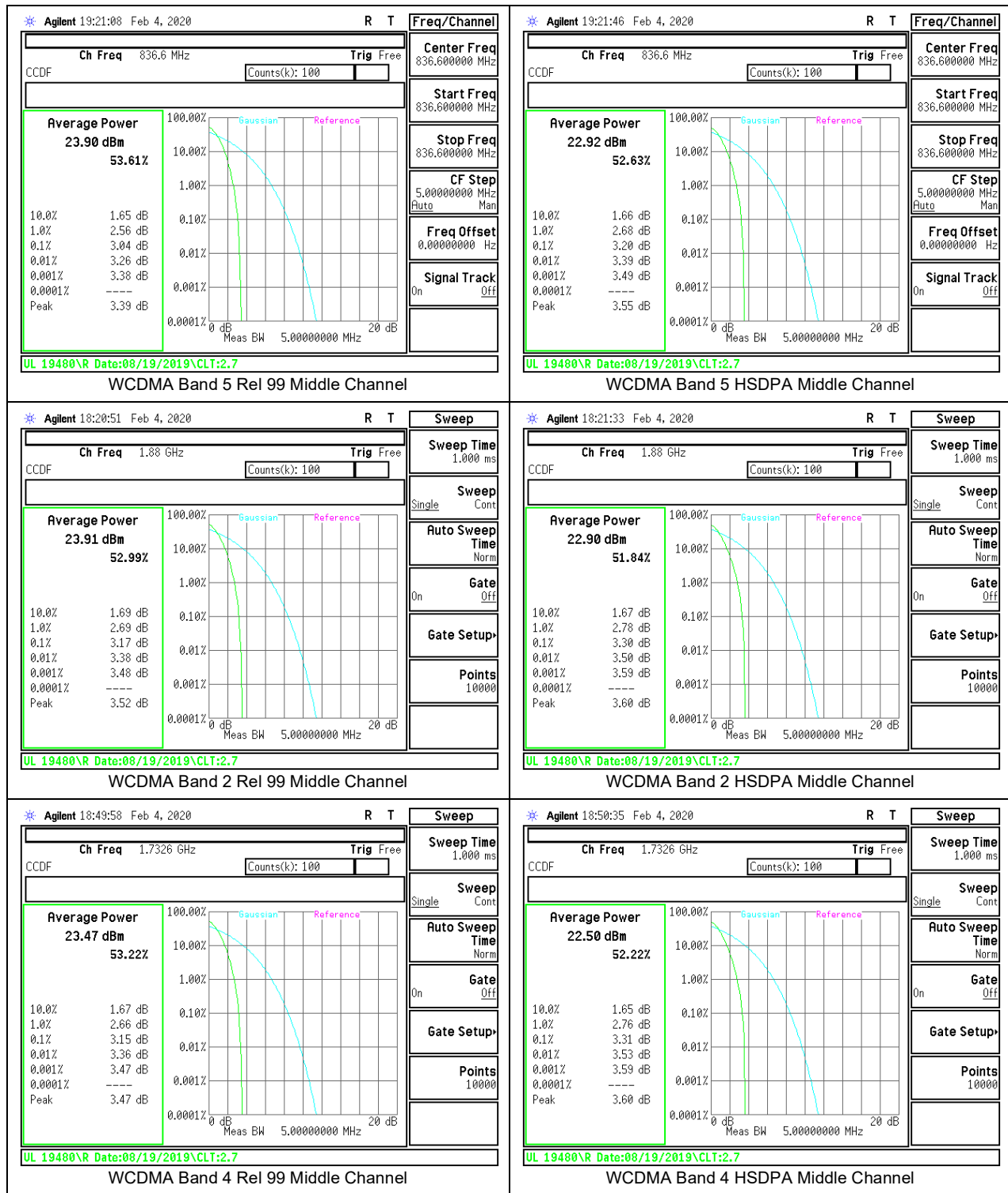


GSM 1900 GPRS Middle Channel

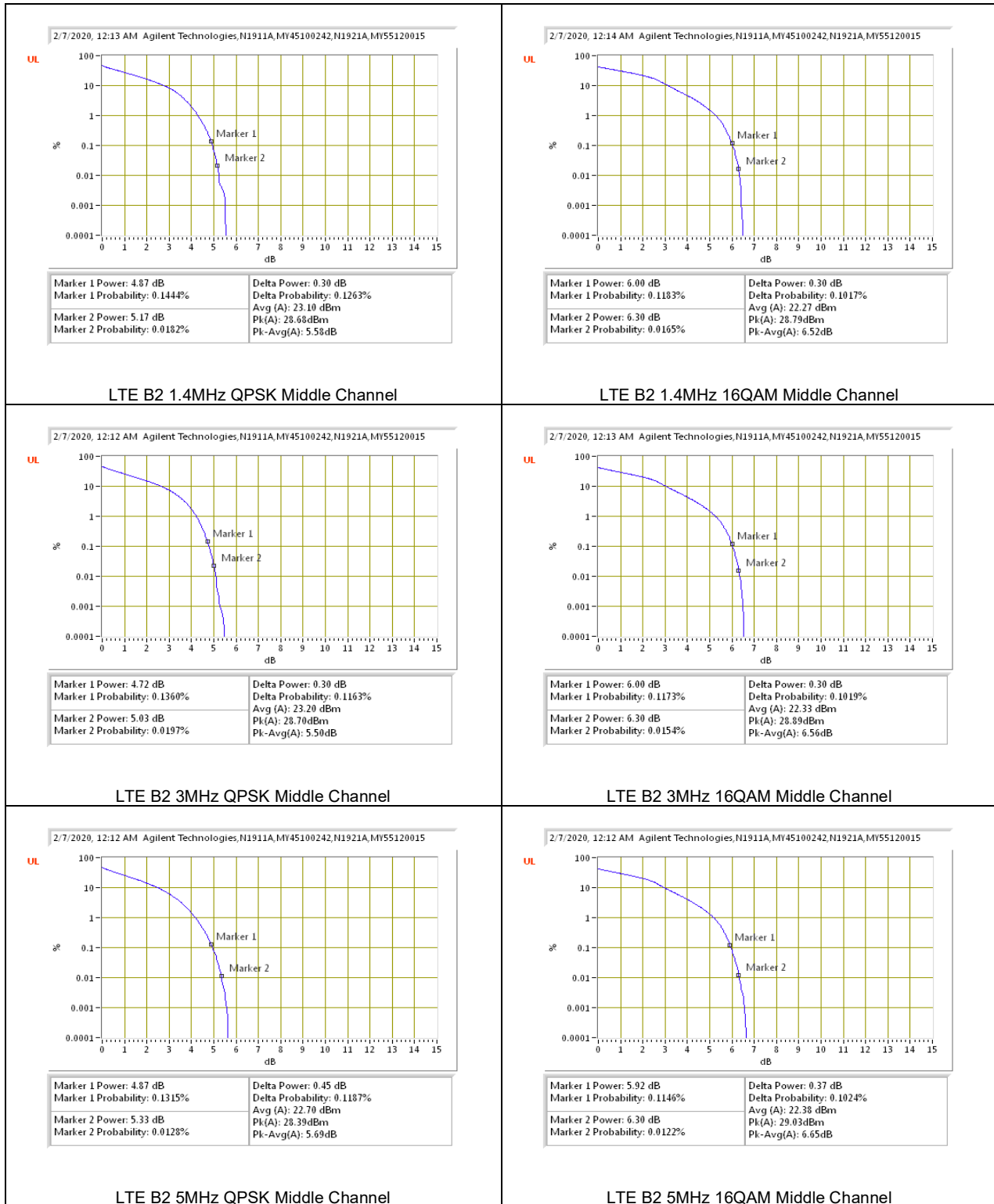


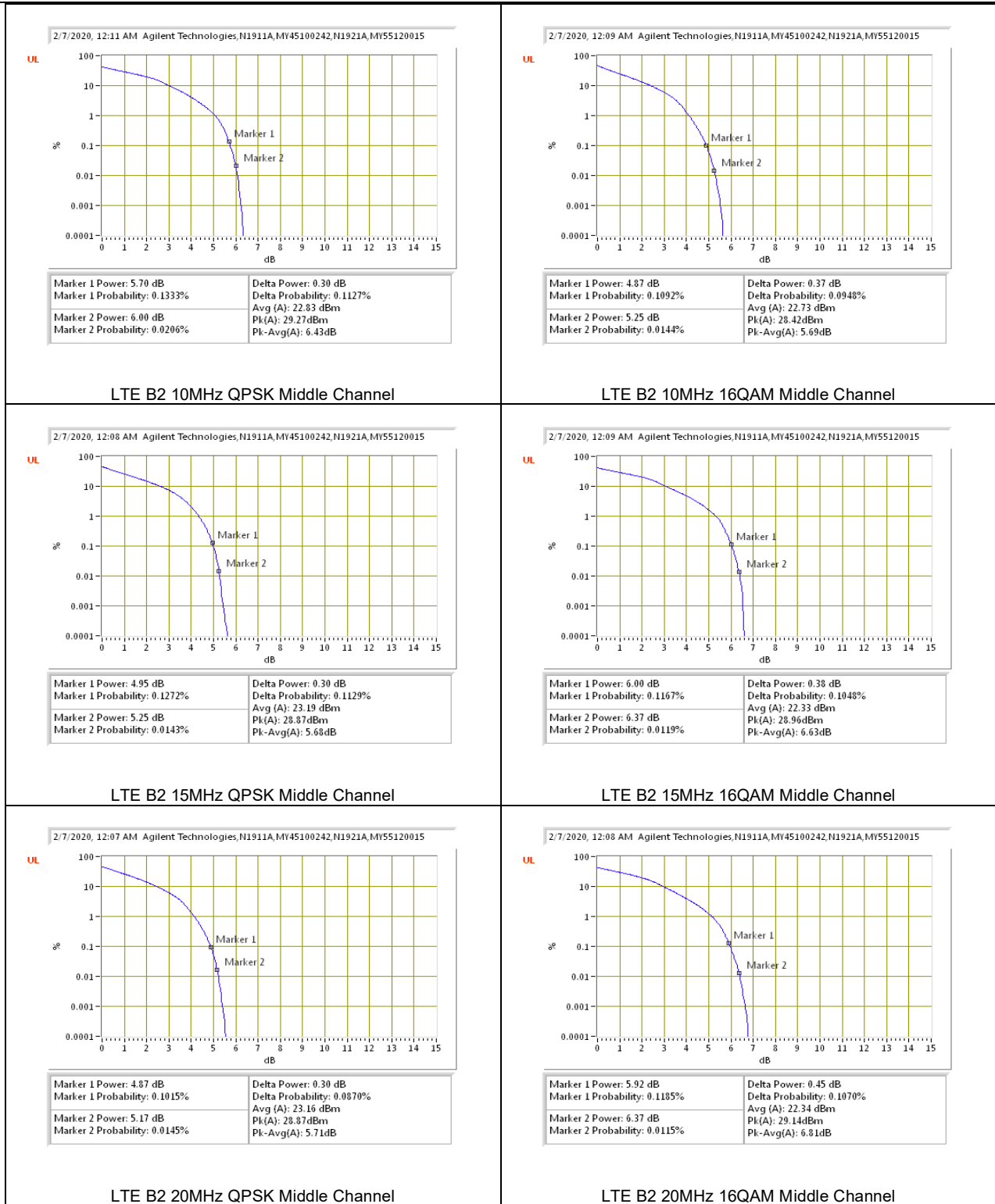
GSM 1900 EGPRS Middle Channel

8.5.2. WCDMA

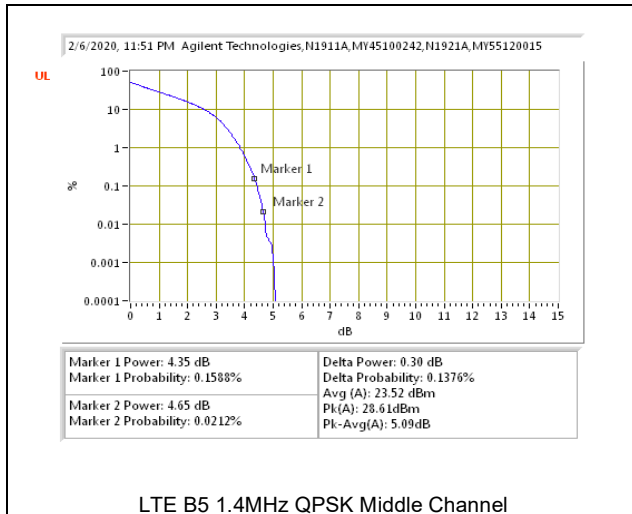


**8.5.3. LTE BAND 2**

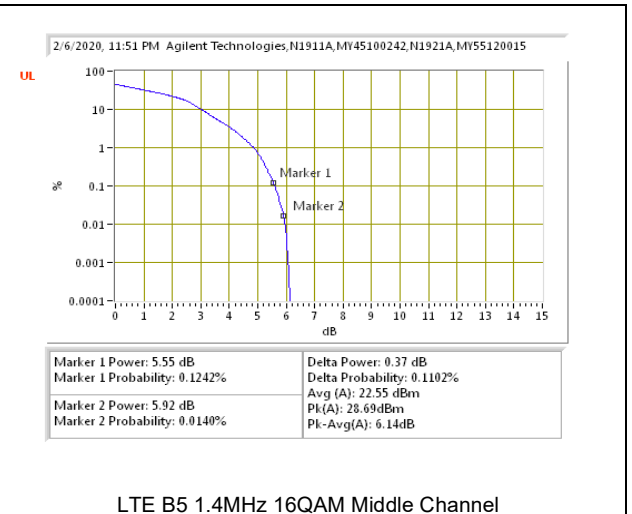




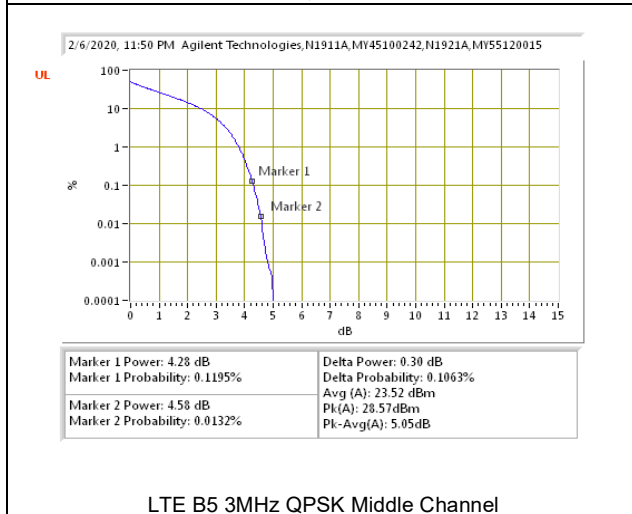
**8.5.4. LTE BAND 5**



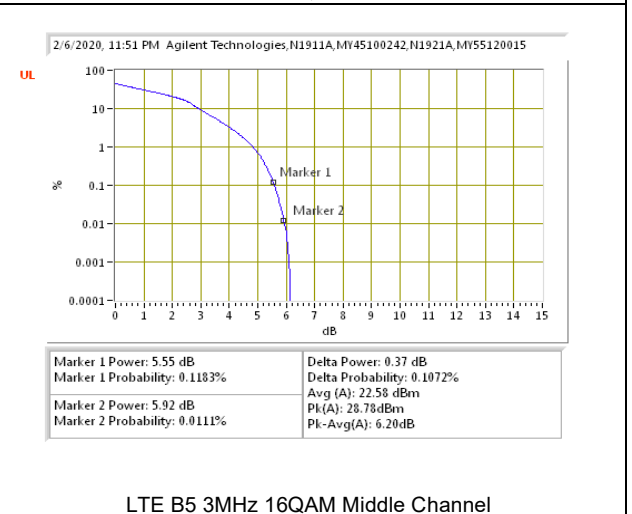
LTE B5 1.4MHz QPSK Middle Channel



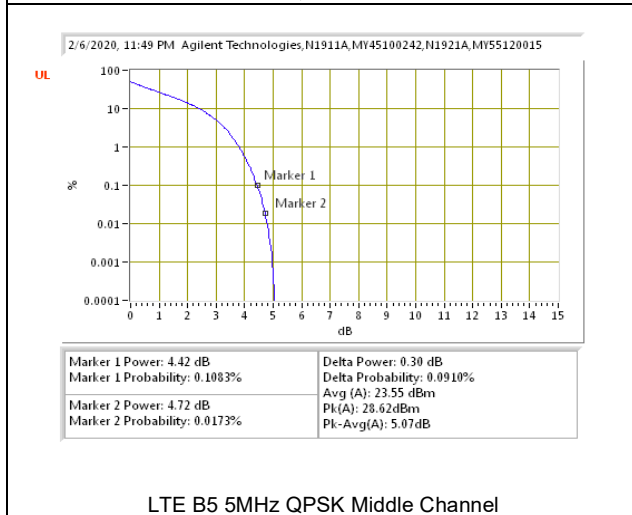
LTE B5 1.4MHz 16QAM Middle Channel



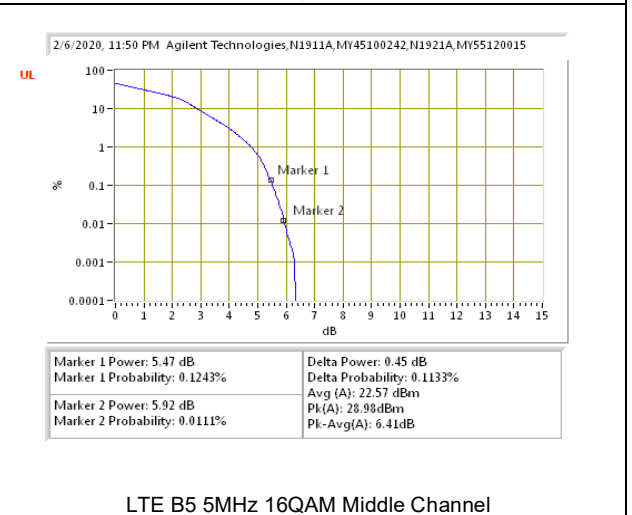
LTE B5 3MHz QPSK Middle Channel



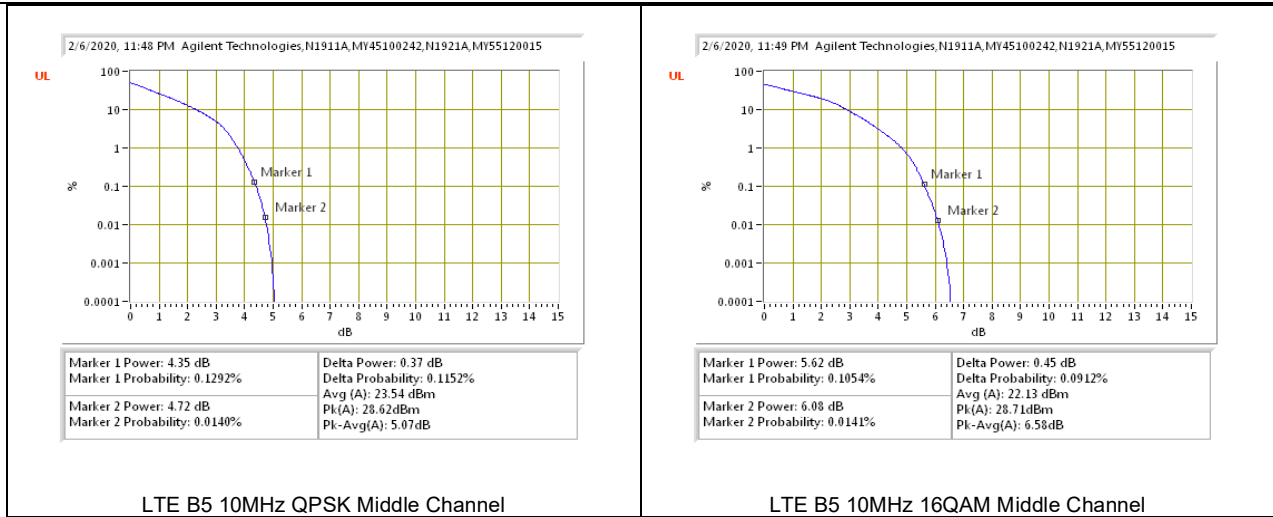
LTE B5 3MHz 16QAM Middle Channel



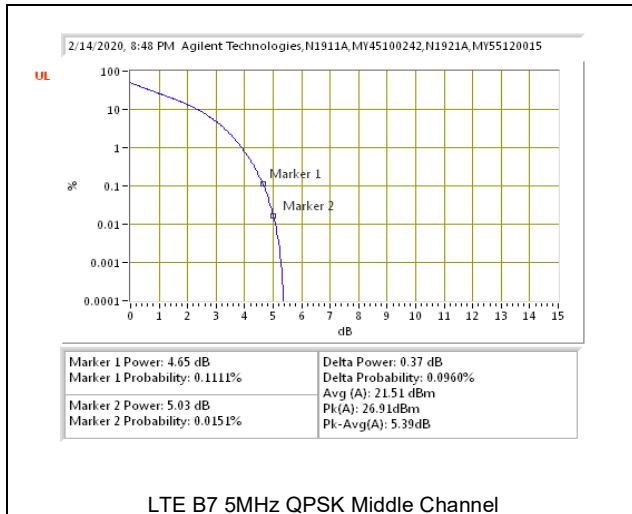
LTE B5 5MHz QPSK Middle Channel



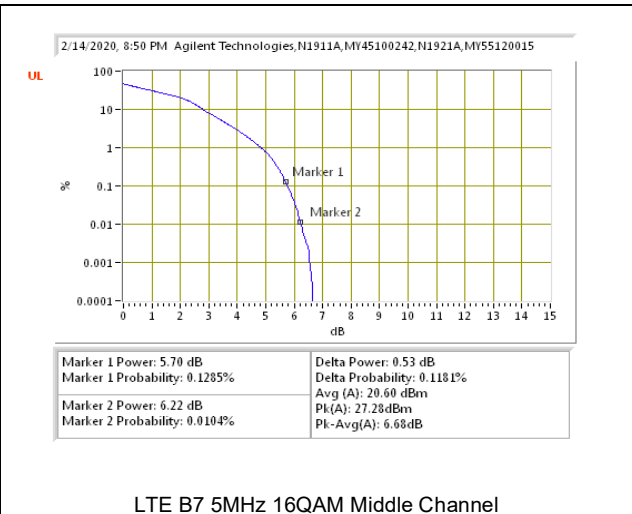
LTE B5 5MHz 16QAM Middle Channel



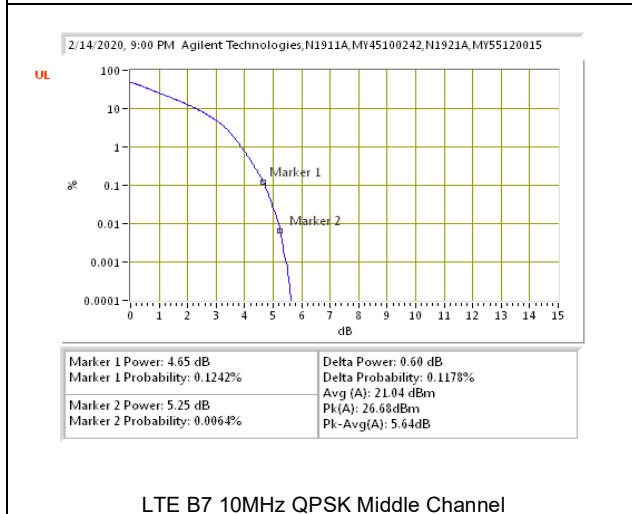
**8.5.5. LTE BAND 7**



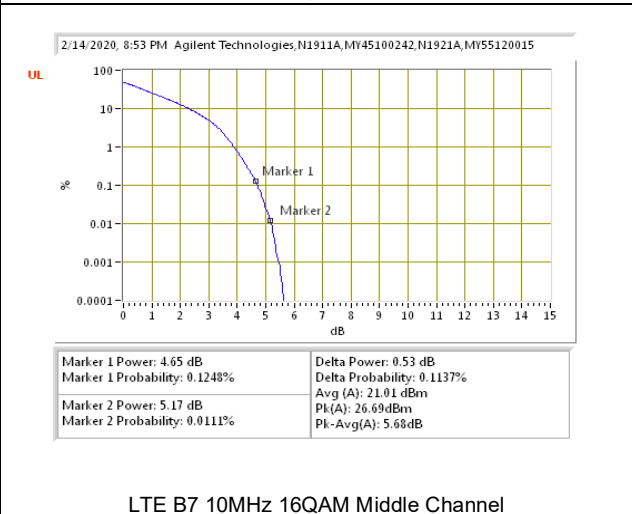
LTE B7 5MHz QPSK Middle Channel



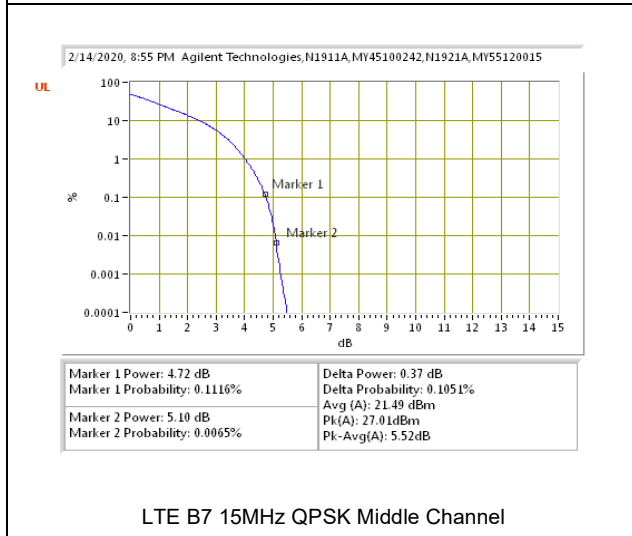
LTE B7 5MHz 16QAM Middle Channel



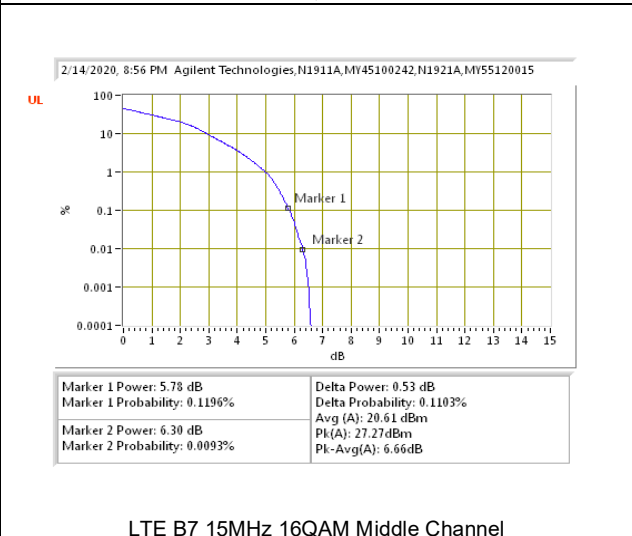
LTE B7 10MHz QPSK Middle Channel



LTE B7 10MHz 16QAM Middle Channel

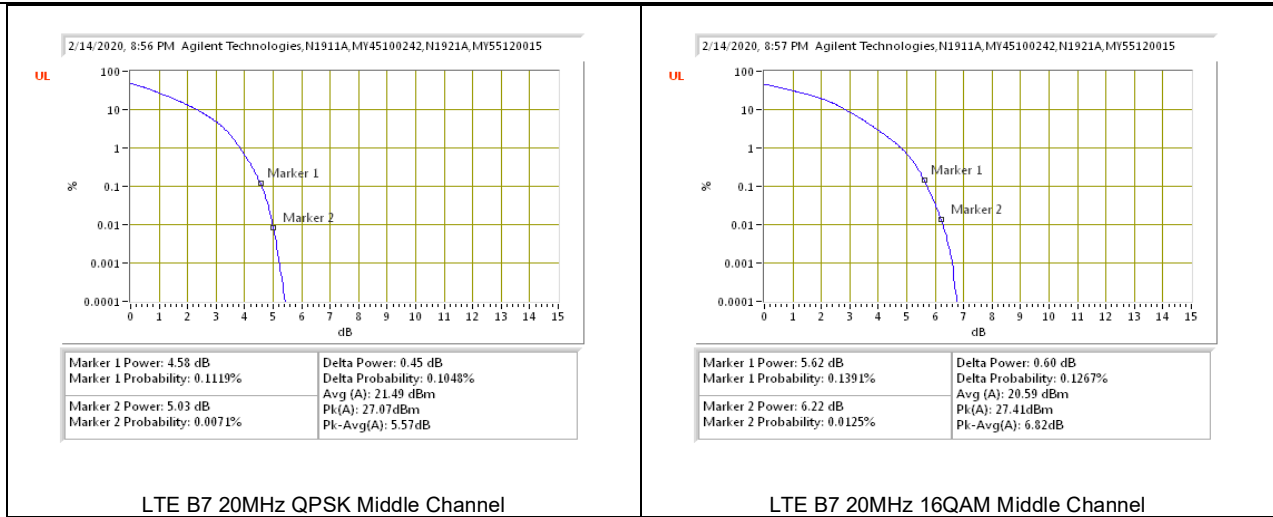


LTE B7 15MHz QPSK Middle Channel

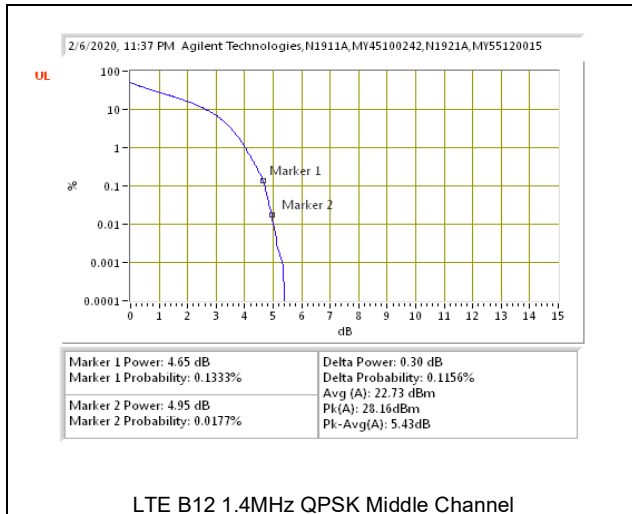


LTE B7 15MHz 16QAM Middle Channel

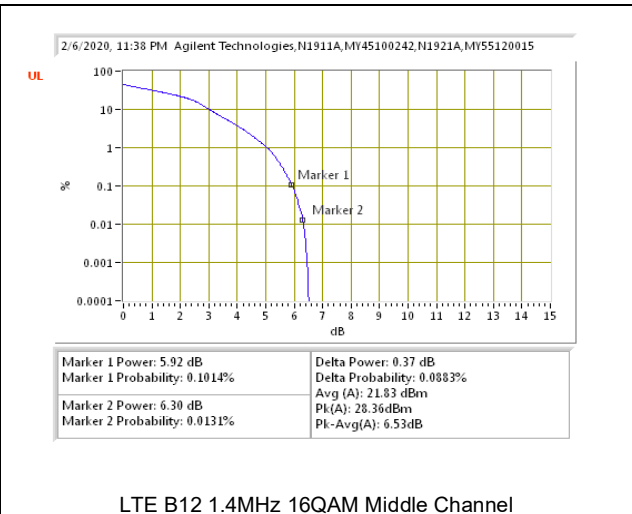




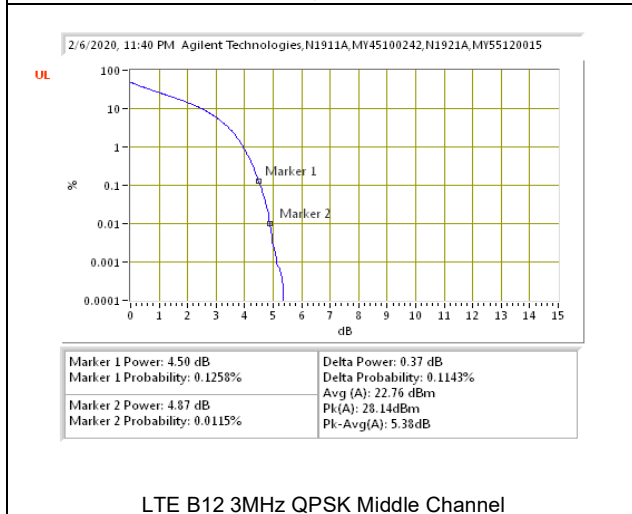
**8.5.6. LTE BAND 12**



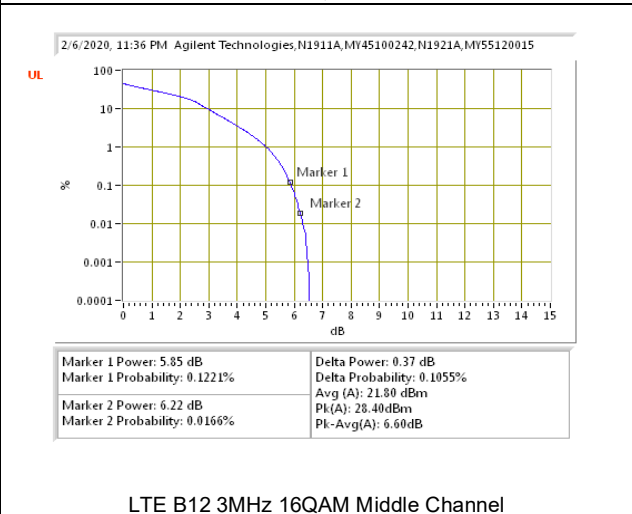
LTE B12 1.4MHz QPSK Middle Channel



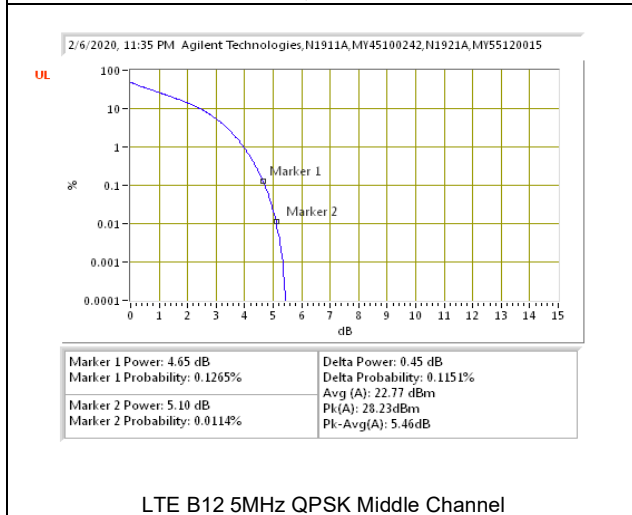
LTE B12 1.4MHz 16QAM Middle Channel



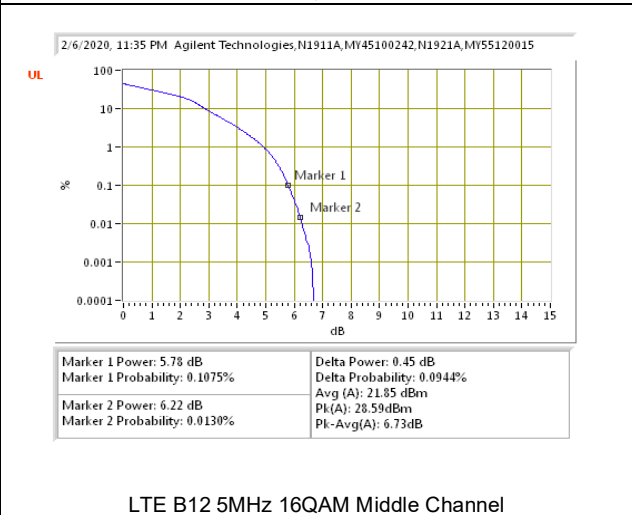
LTE B12 3MHz QPSK Middle Channel



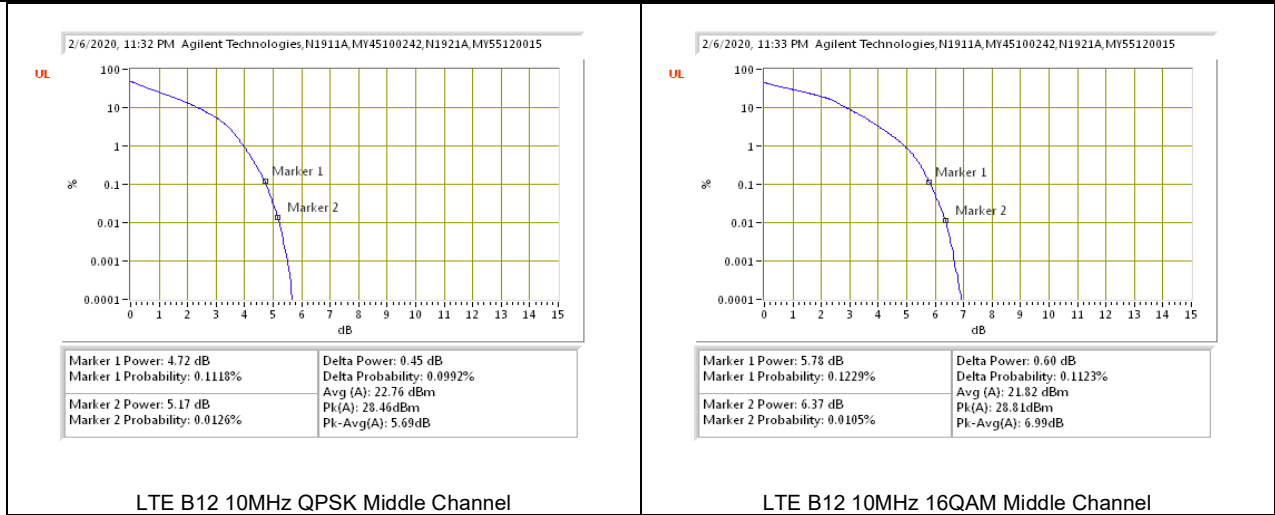
LTE B12 3MHz 16QAM Middle Channel



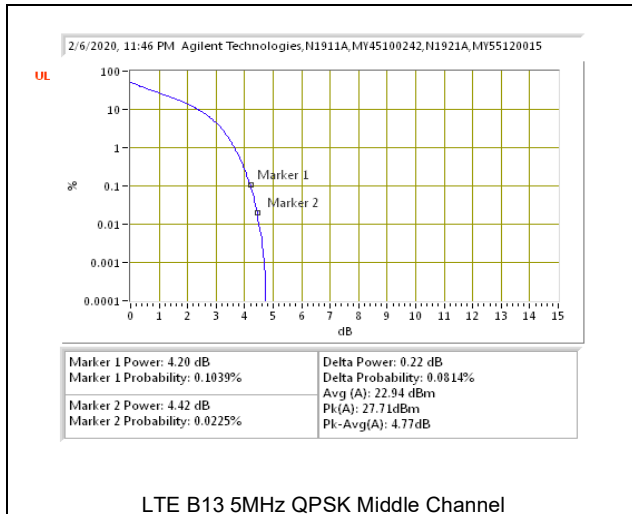
LTE B12 5MHz QPSK Middle Channel



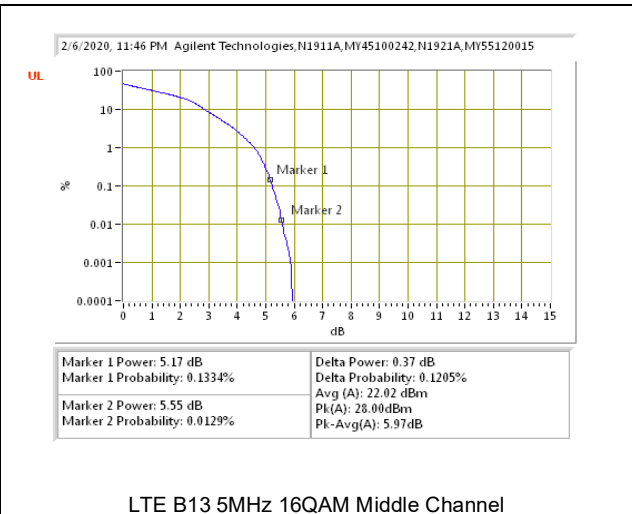
LTE B12 5MHz 16QAM Middle Channel



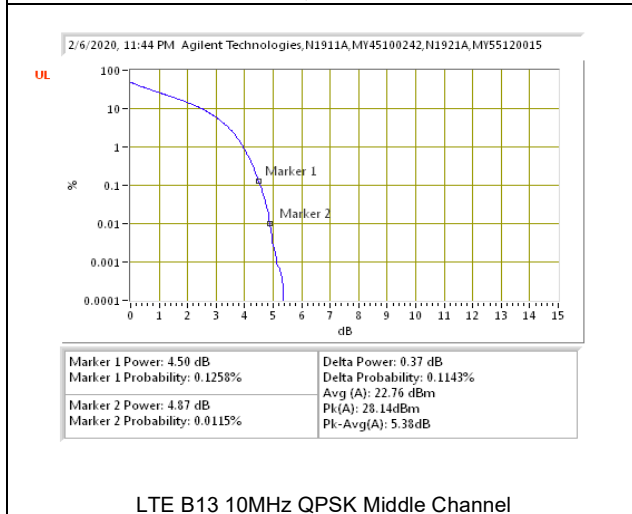
**8.5.7. LTE BAND 13**



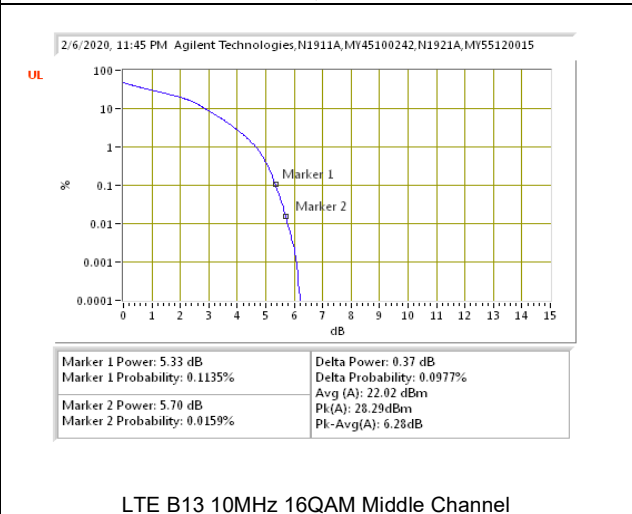
LTE B13 5MHz QPSK Middle Channel



LTE B13 5MHz 16QAM Middle Channel

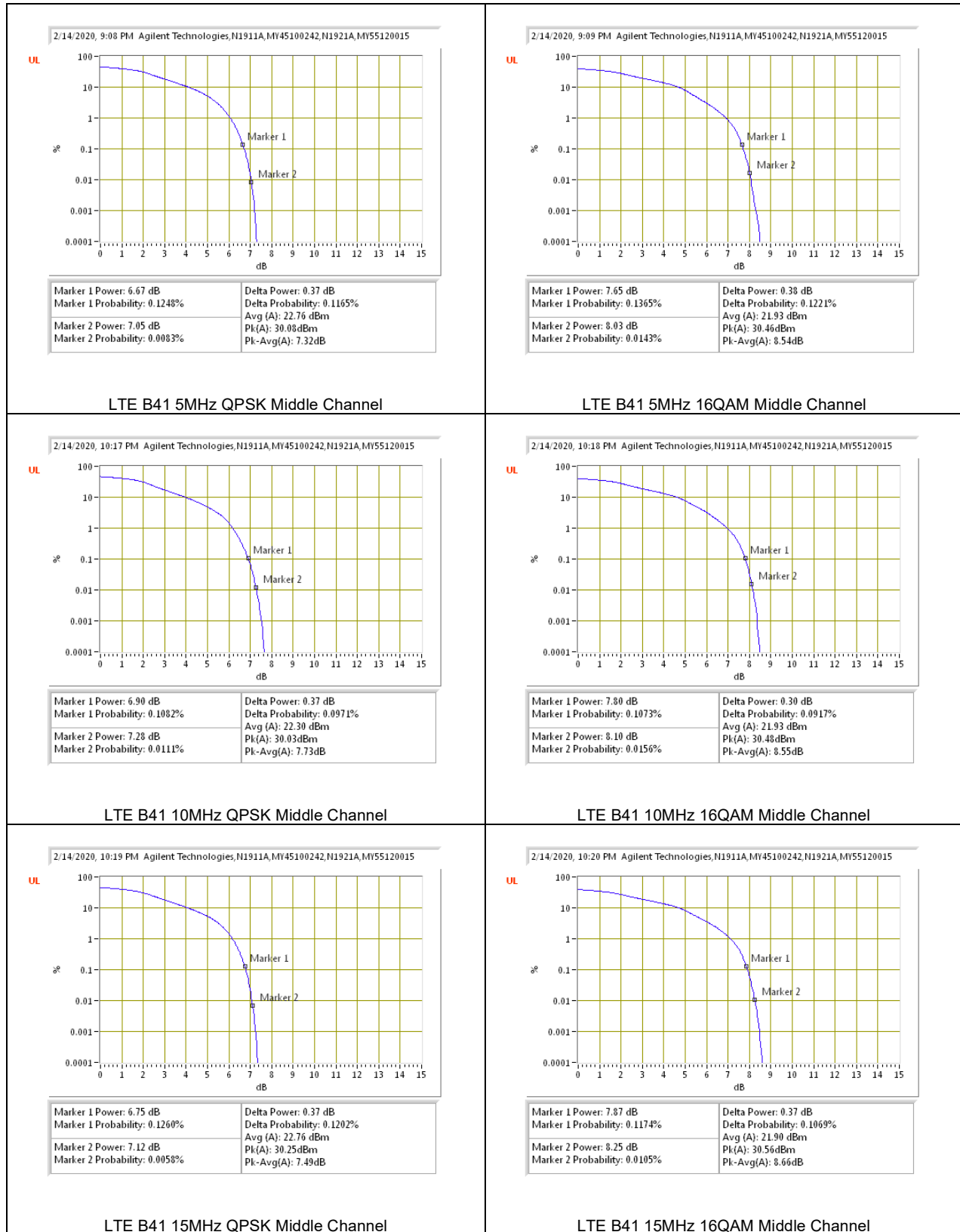


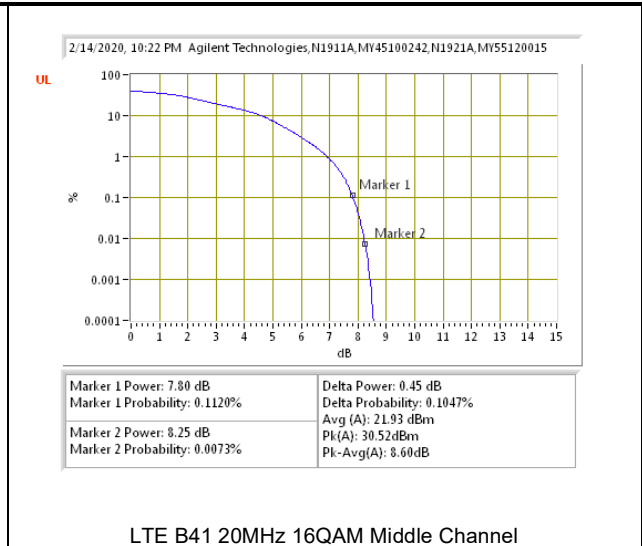
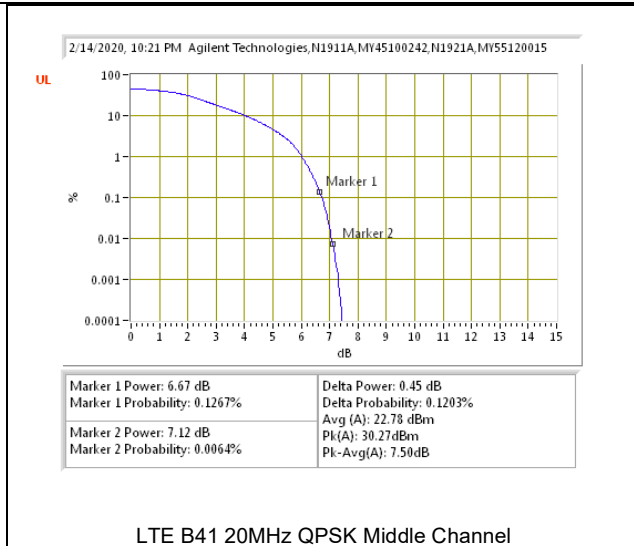
LTE B13 10MHz QPSK Middle Channel



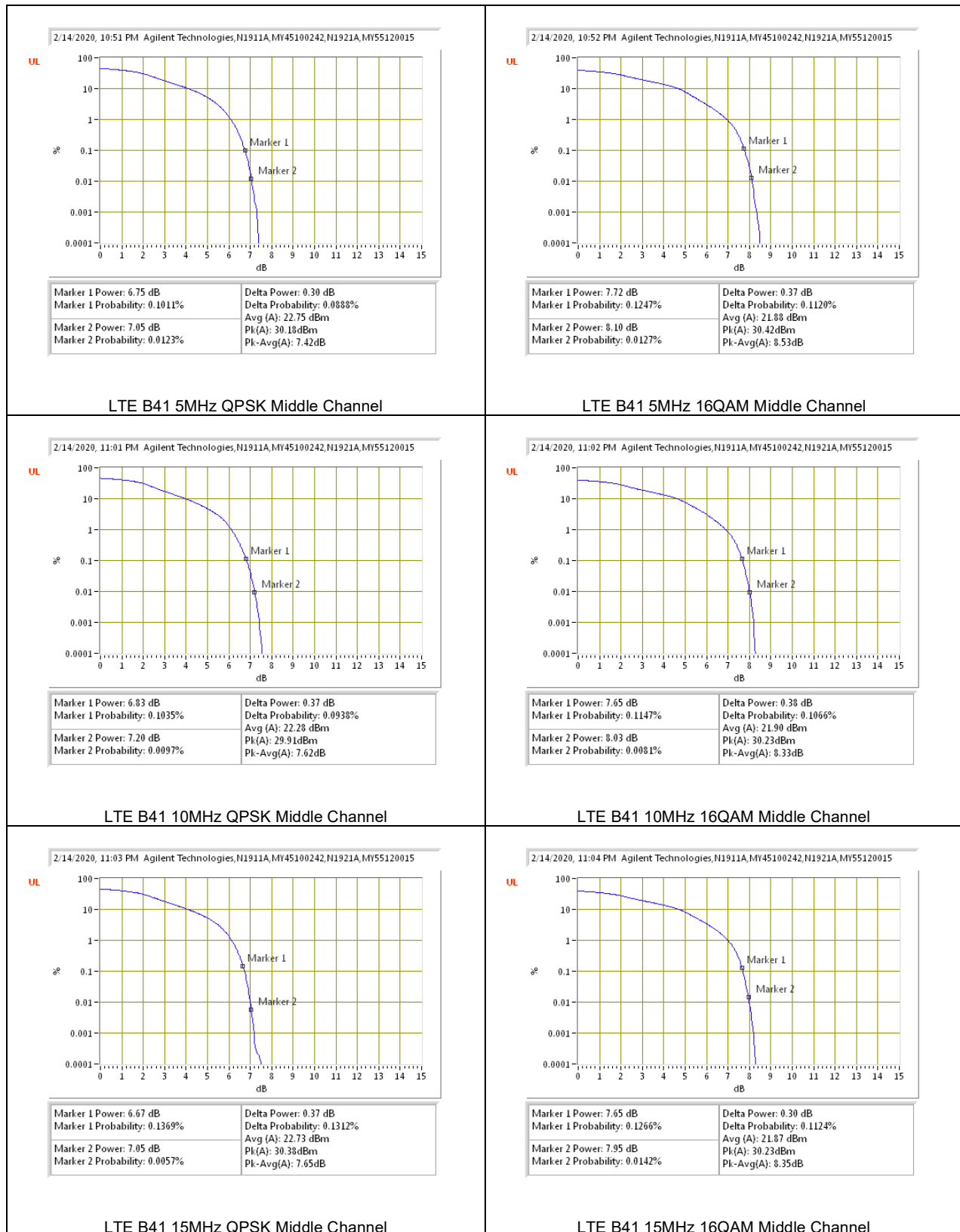
LTE B13 10MHz 16QAM Middle Channel

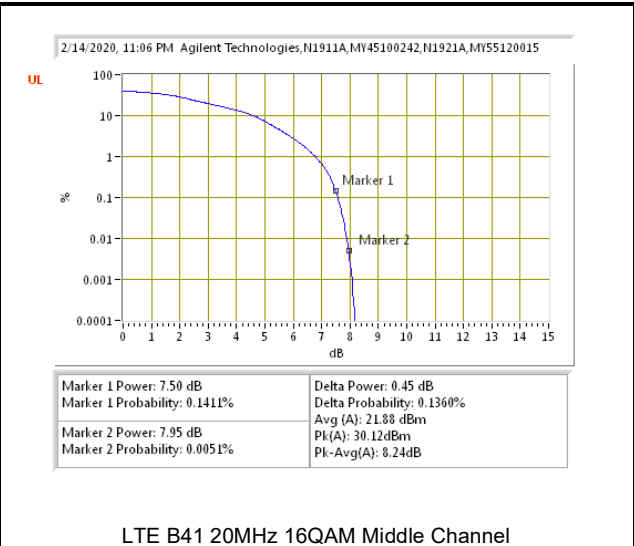
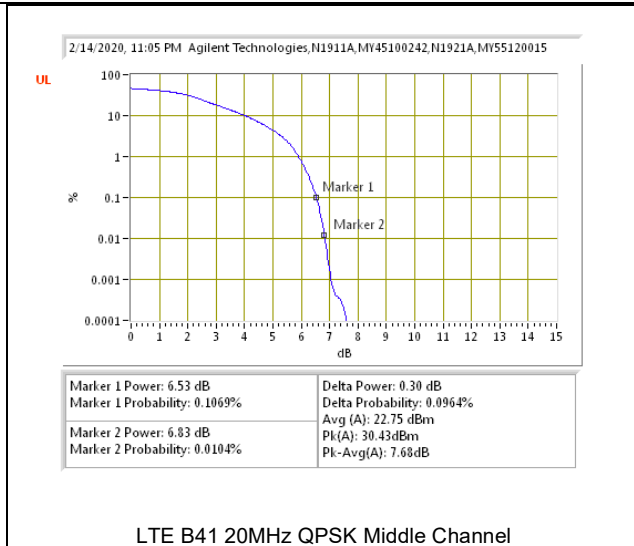
**8.5.8. LTE BAND 41 (FCC)**





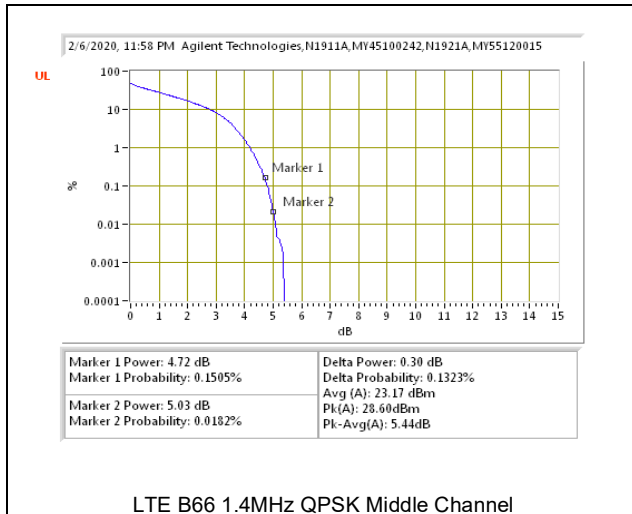
**8.5.9. LTE BAND 41 (IC)**



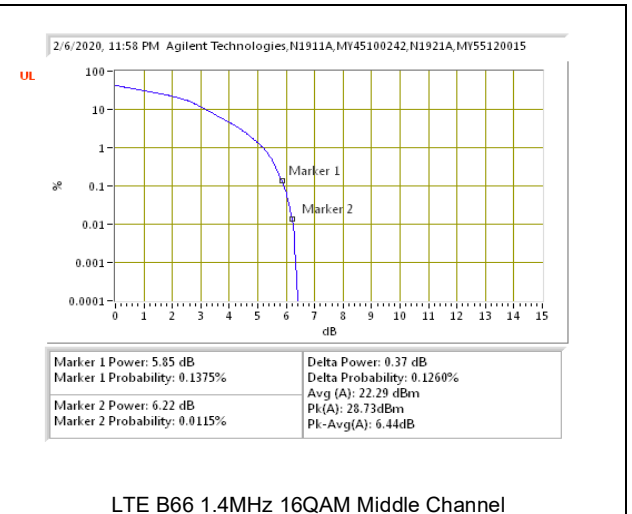




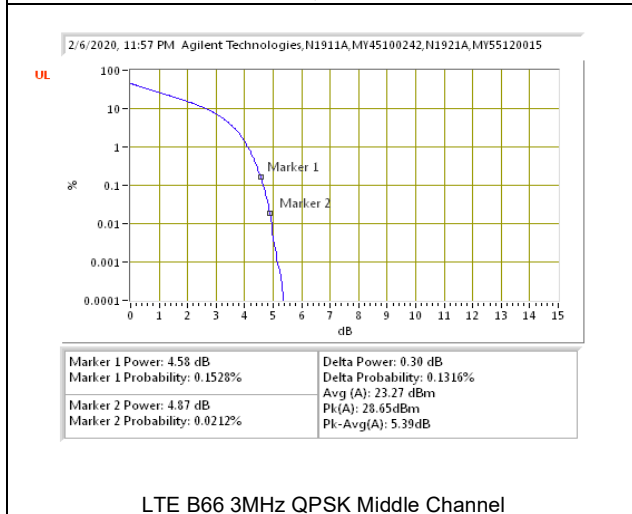
**8.5.10. LTE BAND 66**



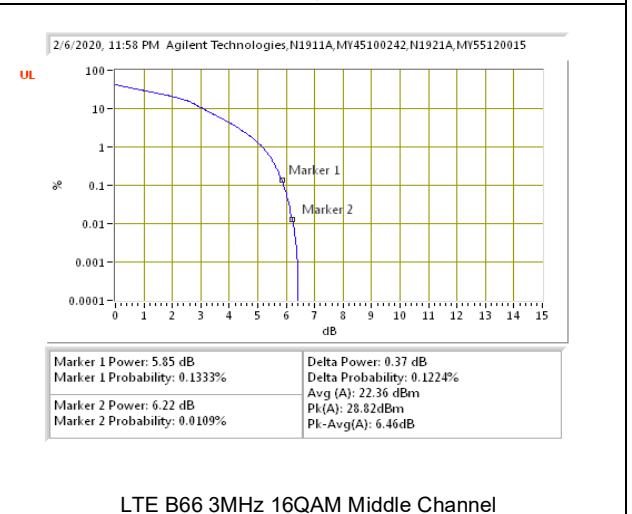
LTE B66 1.4MHz QPSK Middle Channel



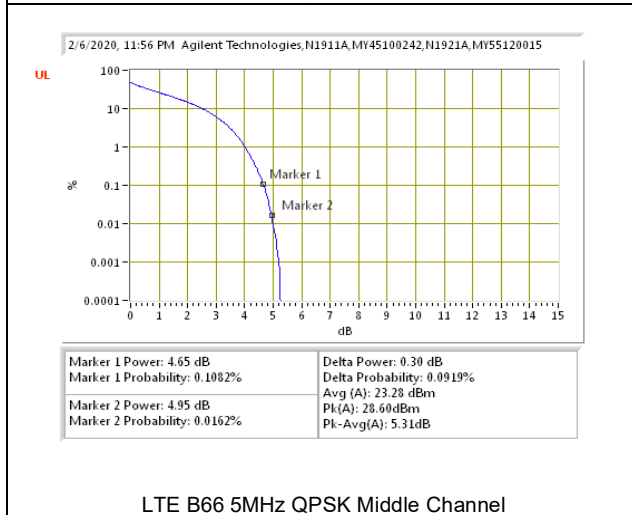
LTE B66 1.4MHz 16QAM Middle Channel



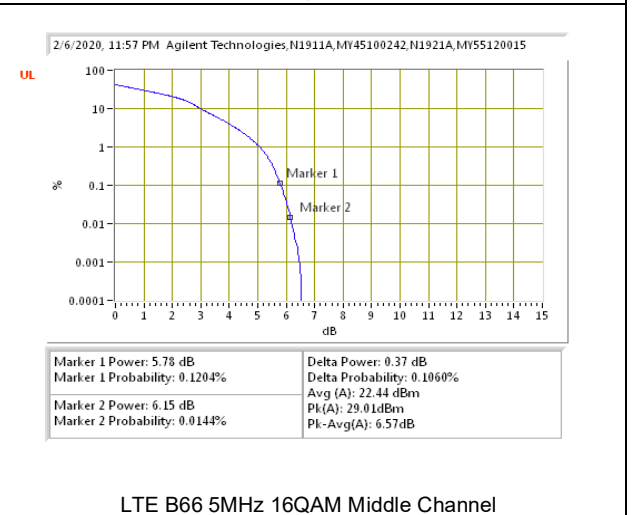
LTE B66 3MHz QPSK Middle Channel



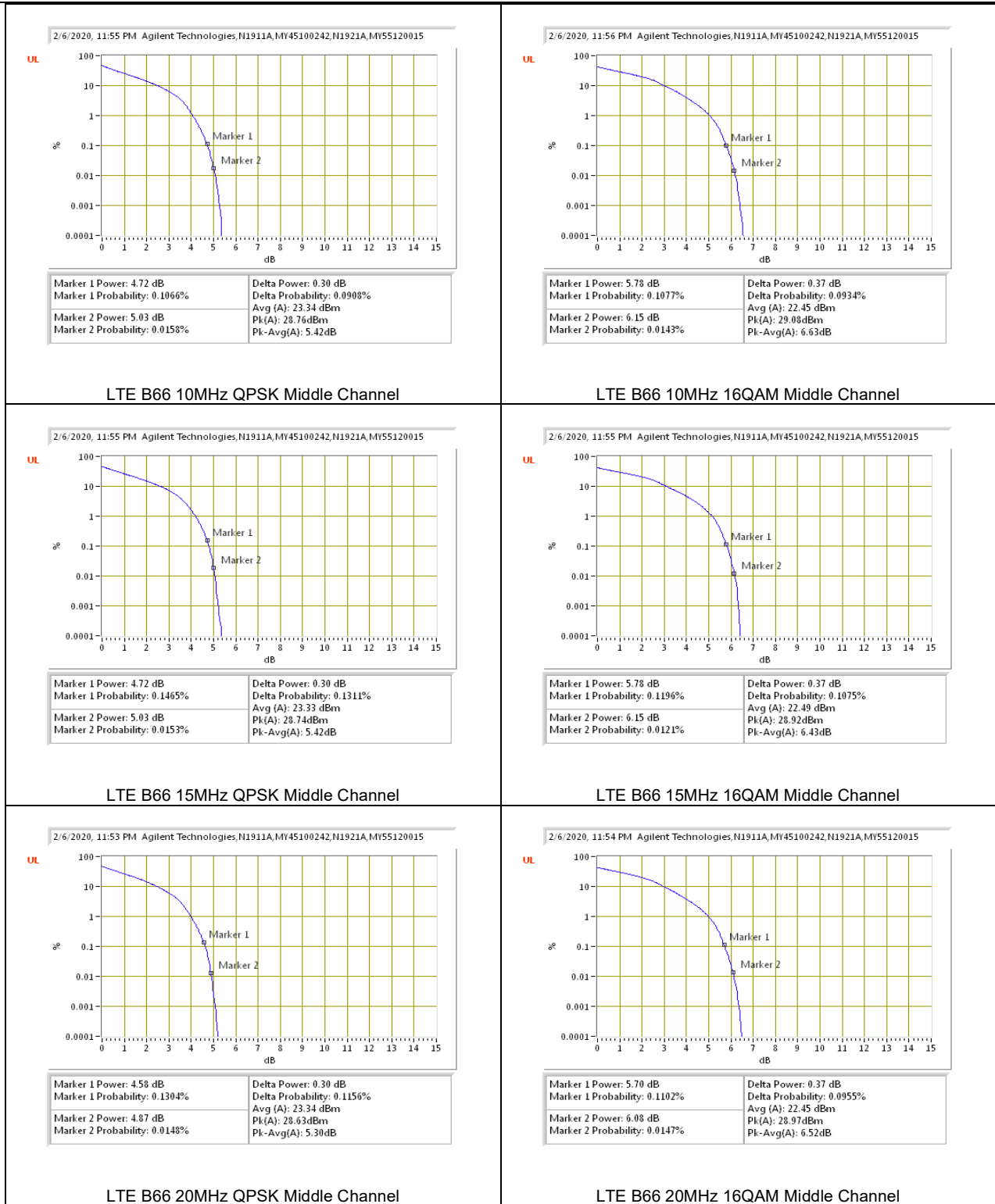
LTE B66 3MHz 16QAM Middle Channel



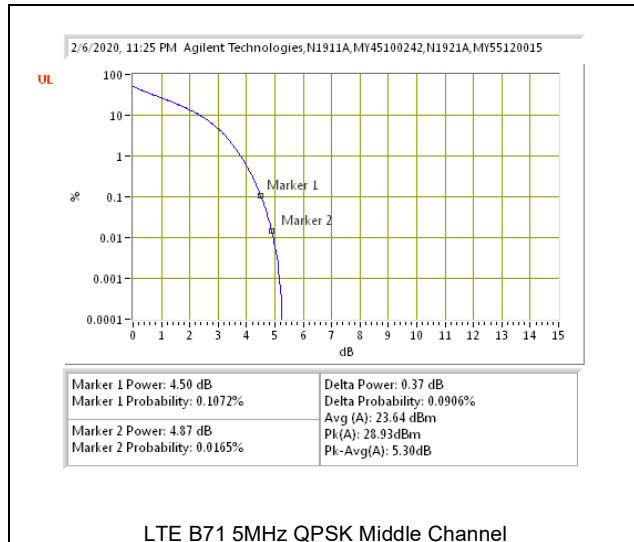
LTE B66 5MHz QPSK Middle Channel



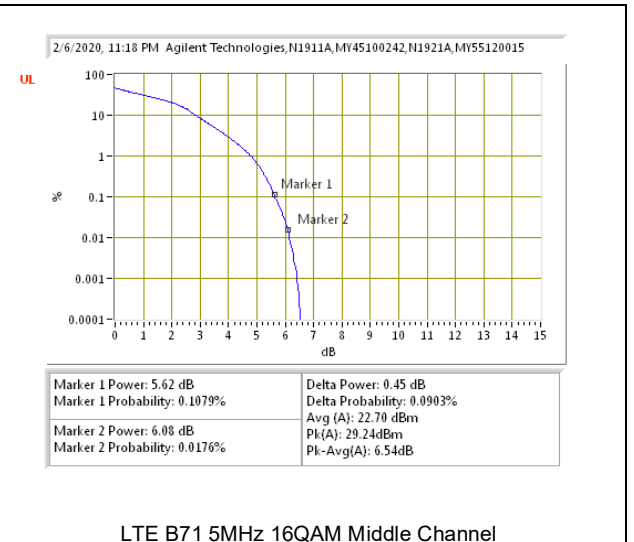
LTE B66 5MHz 16QAM Middle Channel



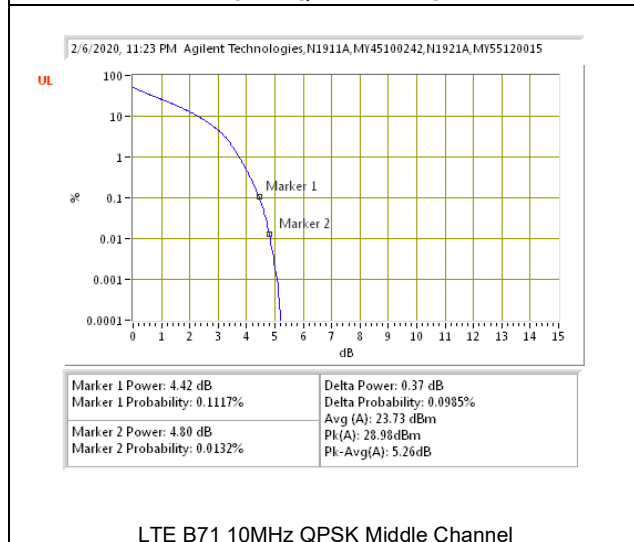
**8.5.11. LTE BAND 71**



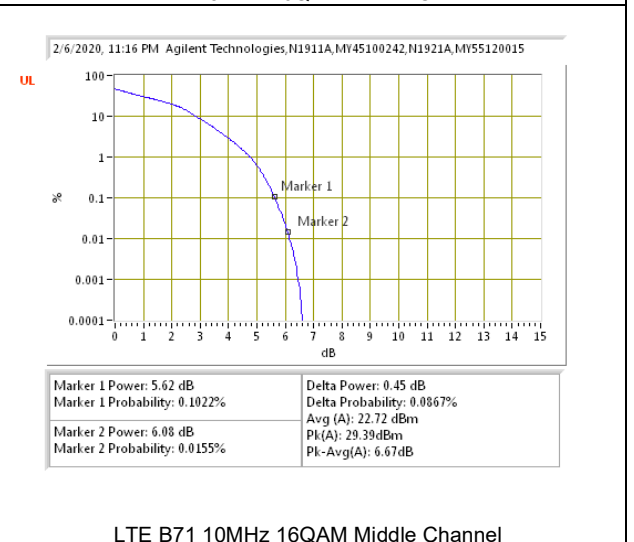
LTE B71 5MHz QPSK Middle Channel



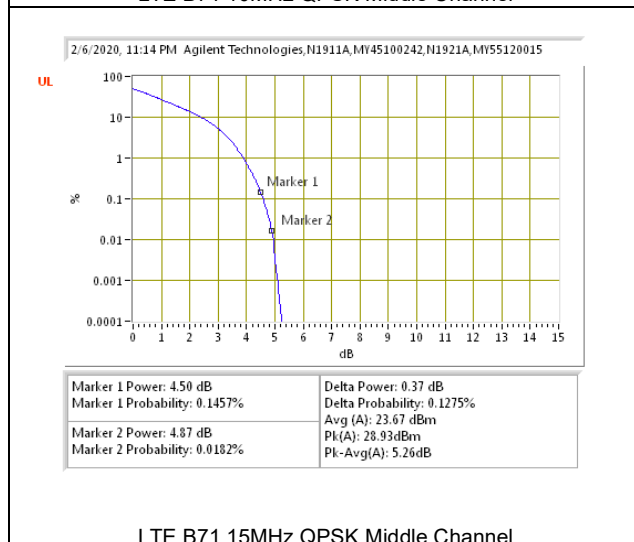
LTE B71 5MHz 16QAM Middle Channel



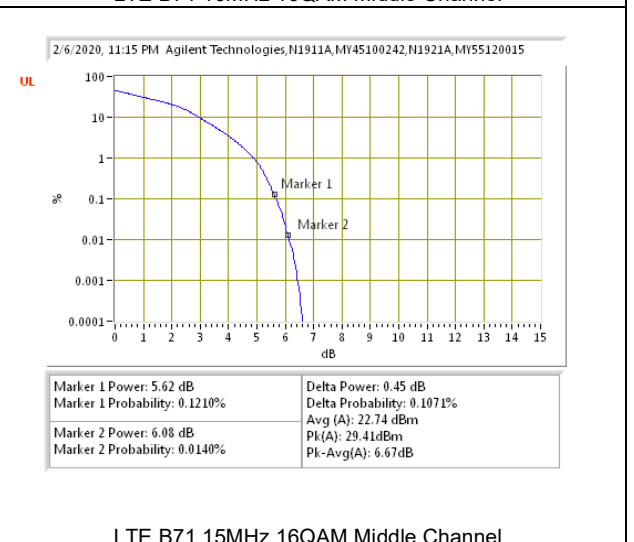
LTE B71 10MHz QPSK Middle Channel



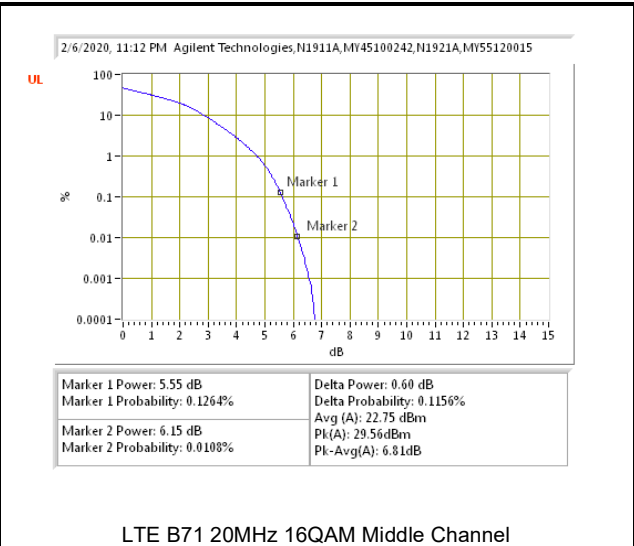
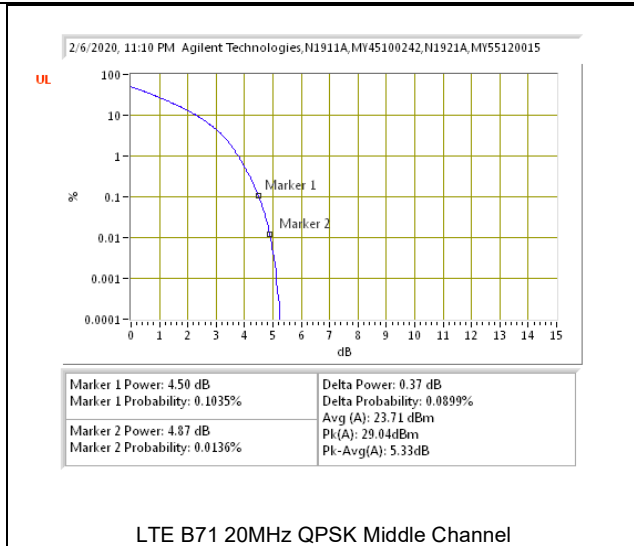
LTE B71 10MHz 16QAM Middle Channel



LTE B71 15MHz QPSK Middle Channel



LTE B71 15MHz 16QAM Middle Channel



## 9. RADIATED TEST RESULTS

### 9.1. EFFECTIVE RADIATED POWER ERP/EIRP

#### RULE PART(S)

FCC: §2.1053, §22.917, §24.238, and §27.50  
RSS130§4.4, RSS132§5.4, RSS133§6.4, RSS139§6.5, RSS199§4.4

#### LIMITS

- 22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.  
24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.  
27.50(c) - (10) Portable stations (hand-held devices) are limited to 3 watts ERP; (LTE B12)  
27.50(d) - (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.(Band 66)

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

#### TEST PROCEDURE

ANSI / TIA / EIA 603-E (2016), Clause 2.2.17; PSA setting reference to 971168 D01 v03r01

For peak power measurement with a PSA:

- a) Set the RBW  $\geq$  OBW; b) Set VBW  $\geq 3 \times$  RBW; c) Set span  $\geq 2 \times$  RBW; d) Sweep time = auto couple; e) Detector = peak; f) Ensure that the number of measurement points  $\geq$  span/RBW; g) Trace mode = max hold;

For average power measurement with a PSA:

- a) Set span to at least 1.5 times the OBW; b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz; c) Set VBW  $\geq 3 \times$  RBW; d) Set number of points in sweep  $\geq 2 \times$  span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle  $\geq 98$ ; h) Use trigger to capture bursts If burst duty cycle  $< 98$ ; i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode. j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function.

#### MODES TESTED

GSM, WCDMA, and LTE

#### TEST RESULTS

**GSM**

Band	Mode	Channel	f(MHz)	ERP/EIRP	
				dBm	W
GSM 850	GPRS	128	824.2	29.64	0.9204
		190	836.6	28.96	0.7870
		251	848.8	29.14	0.8204
	EGPRS	128	824.2	22.50	0.1778
		190	836.6	21.35	0.1365
		251	848.8	22.18	0.1652
GSM 1900	GPRS	512	1850.2	29.42	0.8750
		661	1880.0	29.80	0.9550
		810	1909.8	29.70	0.9333
	EGPRS	512	1850.2	24.14	0.2594
		661	1880.0	24.88	0.3076
		810	1909.8	24.48	0.2805

**WCDMA**

Band	Mode	Channel	f(MHz)	ERP/EIRP	
				dBm	W
Band 5	REL99	4132	826.4	19.04	0.0802
		4183	836.6	18.81	0.0760
		4233	846.6	18.61	0.0726
	HSDPA	4132	826.4	18.03	0.0635
		4183	836.6	17.76	0.0597
		4233	846.6	17.65	0.0582
Band 2	REL99	9262	1852.4	21.43	0.1390
		9400	1880	21.93	0.1560
		9538	1907.6	20.55	0.1135
	HSDPA	9262	1852.4	20.48	0.1117
		9400	1880.0	20.91	0.1233
		9538	1907.6	19.57	0.0906
Band 4	REL99	1312	1712.4	21.12	0.1294
		1413	1732.6	21.45	0.1396
		1513	1752.6	22.27	0.1687
	HSDPA	1312	1712.4	20.38	0.1091
		1413	1732.6	20.59	0.1146
		1513	1752.6	21.20	0.1318

**LTE Band 2**

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	1860	22.82	0.1914
		1/0	1880	23.21	0.2094
		1/0	1900	22.70	0.1862
	16QAM	1/0	1860	22.00	0.1585
		1/0	1880	22.57	0.1807
		1/0	1900	22.24	0.1675
15	QPSK	1/0	1857.5	22.24	0.1675
		1/0	1880	22.74	0.1879
		1/0	1902.5	23.31	0.2143
	16QAM	1/0	1857.5	21.36	0.1368
		1/0	1880	22.13	0.1633
		1/0	1902.5	22.63	0.1832
10	QPSK	1/0	1855	21.23	0.1327
		1/0	1880	22.77	0.1892
		1/0	1905	22.88	0.1941
	16QAM	1/0	1855	20.40	0.1096
		1/0	1880	21.94	0.1563
		1/0	1905	22.12	0.1629
5	QPSK	1/0	1852.5	21.86	0.1535
		1/0	1880	22.78	0.1897
		1/0	1907.5	22.89	0.1945
	16QAM	1/0	1852.5	21.32	0.1355
		1/0	1880	21.96	0.1570
		1/0	1907.5	22.05	0.1603
3	QPSK	1/0	1851.5	22.08	0.1614
		1/0	1880	22.94	0.1968
		1/0	1908.5	22.77	0.1892
	16QAM	1/0	1851.5	21.25	0.1334
		1/0	1880	22.18	0.1652
		1/0	1908.5	21.90	0.1549
1.4	QPSK	1/0	1850.7	21.71	0.1483
		1/0	1880	22.56	0.1803
		1/0	1909.3	22.69	0.1858
	16QAM	1/0	1850.7	20.95	0.1245
		1/0	1880	21.84	0.1528
		1/0	1909.3	21.85	0.1531

**LTE Band 5**

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
10	QPSK	1/0	829	20.58	0.1143
		1/0	836.5	20.54	0.1132
		1/0	844	19.91	0.0979
	16QAM	1/0	829	20.21	0.1050
		1/0	836.5	20.17	0.1040
		1/0	844	19.47	0.0885
5	QPSK	1/0	826.5	20.34	0.1081
		1/0	836.5	20.40	0.1096
		1/0	846.5	19.65	0.0923
	16QAM	1/0	826.5	20.02	0.1005
		1/0	836.5	20.18	0.1042
		1/0	846.5	19.35	0.0861
3	QPSK	1/0	825.5	20.42	0.1102
		1/0	836.5	20.29	0.1069
		1/0	847.5	19.44	0.0879
	16QAM	1/0	825.5	19.98	0.0995
		1/0	836.5	19.96	0.0991
		1/0	847.5	19.06	0.0805
1.4	QPSK	1/0	824.7	20.18	0.1042
		1/0	836.5	19.96	0.0991
		1/0	848.3	19.04	0.0802
	16QAM	1/0	824.7	19.76	0.0946
		1/0	836.5	19.55	0.0902
		1/0	848.3	18.66	0.0735



**LTE Band 7**

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	2510	21.31	0.1352
		1/0	2535	21.60	0.1445
		1/0	2560	21.37	0.1371
	16QAM	1/0	2510	20.54	0.1132
		1/0	2535	20.97	0.1250
		1/0	2560	20.70	0.1175
15	QPSK	1/0	2507.5	21.23	0.1327
		1/0	2535	21.66	0.1466
		1/0	2562.5	21.32	0.1355
	16QAM	1/0	2507.5	20.51	0.1125
		1/0	2535	20.82	0.1208
		1/0	2562.5	20.56	0.1138
10	QPSK	1/0	2505.0	20.92	0.1236
		1/0	2535.0	21.77	0.1503
		1/0	2565.0	21.34	0.1361
	16QAM	1/0	2505.0	20.06	0.1014
		1/0	2535.0	20.97	0.1250
		1/0	2565.0	20.58	0.1143
5	QPSK	1/0	2502.5	21.04	0.1271
		1/0	2535.0	22.07	0.1611
		1/0	2567.5	21.15	0.1303
	16QAM	1/0	2502.5	20.22	0.1052
		1/0	2535.0	21.35	0.1365
		1/0	2567.5	20.29	0.1069

**LTE Band 12**

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
10	QPSK	1/0	704	19.92	0.0982
		1/0	707.5	19.80	0.0955
		1/0	711	20.02	0.1005
	16QAM	1/0	704	19.09	0.0811
		1/0	707.5	18.99	0.0793
		1/0	711	19.10	0.0813
5	QPSK	1/0	701.5	19.83	0.0962
		1/0	707.5	19.89	0.0975
		1/0	713.5	20.16	0.1038
	16QAM	1/0	701.5	19.01	0.0796
		1/0	707.5	19.03	0.0800
		1/0	713.5	19.42	0.0875
3	QPSK	1/0	700.5	19.64	0.0920
		1/0	707.5	19.94	0.0986
		1/0	714.5	19.93	0.0984
	16QAM	1/0	700.5	18.80	0.0759
		1/0	707.5	19.09	0.0811
		1/0	714.5	19.13	0.0818
1.4	QPSK	1/0	699.7	19.72	0.0938
		1/0	707.5	19.45	0.0881
		1/0	715.3	19.69	0.0931
	16QAM	1/0	699.7	18.80	0.0759
		1/0	707.5	18.56	0.0718
		1/0	715.3	18.84	0.0766

**LTE Band 13**

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
10	QPSK	1/0	782	20.71	0.1178
	16QAM	1/0	782	19.86	0.0968
5	QPSK	1/0	779.5	20.50	0.1122
		1/0	782	20.65	0.1161
		1/0	784.5	20.38	0.1091
	16QAM	1/0	779.5	19.73	0.0940
		1/0	782	19.75	0.0944
		1/0	784.5	19.52	0.0895

**LTE Band 41 (FCC)**

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	2506	22.25	0.1679
		1/0	2593	22.65	0.1841
		1/0	2680	20.96	0.1247
	16QAM	1/0	2506	21.58	0.1439
		1/0	2593	21.98	0.1578
		1/0	2680	20.12	0.1028
15	QPSK	1/0	2503.5	21.36	0.1368
		1/0	2593	21.86	0.1535
		1/0	2682.5	21.19	0.1315
	16QAM	1/0	2503.5	20.67	0.1167
		1/0	2593	20.94	0.1242
		1/0	2682.5	20.33	0.1079
10	QPSK	1/0	2501	21.15	0.1303
		1/0	2593	22.06	0.1607
		1/0	2685	21.43	0.1390
	16QAM	1/0	2501	20.14	0.1033
		1/0	2593	21.02	0.1265
		1/0	2685	20.28	0.1067
5	QPSK	1/0	2498.5	20.90	0.1230
		1/0	2593	21.94	0.1563
		1/0	2687.5	21.55	0.1429
	16QAM	1/0	2498.5	20.02	0.1005
		1/0	2593	20.87	0.1222
		1/0	2687.5	20.44	0.1107

**LTE Band 41 (IC)**

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	2510	22.41	0.1742
		1/0	2595	22.74	0.1879
		1/0	2680	20.96	0.1247
	16QAM	1/0	2510	21.58	0.1439
		1/0	2595	21.83	0.1524
		1/0	2680	20.12	0.1028
15	QPSK	1/0	2507.5	21.70	0.1479
		1/0	2595	21.47	0.1403
		1/0	2682.5	21.19	0.1315
	16QAM	1/0	2507.5	20.73	0.1183
		1/0	2595	20.64	0.1159
		1/0	2682.5	20.33	0.1079
10	QPSK	1/0	2505	21.72	0.1486
		1/0	2595	21.88	0.1542
		1/0	2685	21.43	0.1390
	16QAM	1/0	2505	20.56	0.1138
		1/0	2595	20.98	0.1253
		1/0	2685	20.28	0.1067
5	QPSK	1/0	2592.5	21.62	0.1452
		1/0	2595	21.96	0.1570
		1/0	2687.5	21.55	0.1429
	16QAM	1/0	2592.5	20.59	0.1146
		1/0	2595	20.70	0.1175
		1/0	2687.5	20.44	0.1107

**LTE Band 66**

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	1720	23.11	0.2046
		1/0	1745	22.55	0.1799
		1/0	1770	22.28	0.1690
	16QAM	1/0	1720	21.93	0.1560
		1/0	1745	21.85	0.1531
		1/0	1770	21.21	0.1321
15	QPSK	1/0	1717.5	23.07	0.2028
		1/0	1745	22.78	0.1897
		1/0	1772.5	22.20	0.1660
	16QAM	1/0	1717.5	21.95	0.1567
		1/0	1745	22.06	0.1607
		1/0	1772.5	21.01	0.1262
10	QPSK	1/0	1715	23.06	0.2023
		1/0	1745	23.05	0.2018
		1/0	1775	22.48	0.1770
	16QAM	1/0	1715	21.94	0.1563
		1/0	1745	22.19	0.1656
		1/0	1775	21.33	0.1358
5	QPSK	1/0	1712.5	23.06	0.2023
		1/0	1745	23.48	0.2228
		1/0	1777.5	22.38	0.1730
	16QAM	1/0	1712.5	22.19	0.1656
		1/0	1745	22.61	0.1824
		1/0	1777.5	21.48	0.1406
3	QPSK	1/0	1711.5	23.00	0.1995
		1/0	1745	23.52	0.2249
		1/0	1778.5	22.10	0.1622
	16QAM	1/0	1711.5	21.95	0.1567
		1/0	1745	22.59	0.1816
		1/0	1778.5	21.20	0.1318
1.4	QPSK	1/0	1710.7	22.91	0.1954
		1/0	1745	23.25	0.2113
		1/0	1779.3	21.79	0.1510
	16QAM	1/0	1710.7	21.97	0.1574
		1/0	1745	22.30	0.1698
		1/0	1779.3	20.89	0.1227

**LTE Band 71**

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
20	QPSK	1/0	673	19.22	0.0836
		1/0	680.5	19.55	0.0902
		1/0	688	19.77	0.0948
	16QAM	1/0	673	18.64	0.0731
		1/0	680.5	18.80	0.0759
		1/0	688	18.94	0.0783
15	QPSK	1/0	670.5	18.81	0.0760
		1/0	680.5	19.47	0.0885
		1/0	690.5	19.74	0.0942
	16QAM	1/0	670.5	18.21	0.0662
		1/0	680.5	18.59	0.0723
		1/0	690.5	18.91	0.0778
10	QPSK	1/0	668	18.70	0.0741
		1/0	680.5	19.31	0.0853
		1/0	693	19.81	0.0957
	16QAM	1/0	668	18.09	0.0644
		1/0	680.5	18.43	0.0697
		1/0	693	18.96	0.0787
5	QPSK	1/0	665.5	18.76	0.0752
		1/0	680.5	19.15	0.0822
		1/0	695.5	19.44	0.0879
	16QAM	1/0	665.5	18.16	0.0655
		1/0	680.5	18.30	0.0676
		1/0	695.5	18.63	0.0729

**9.1.1. GSM**

GPRS 850										EGPRS 850																																																																																																																																																																																													
<p align="center"><b>UL Verification Services, Inc.</b> High Frequency Substitution Measurement</p> <p>Company: Samsung                      Project #: 13211873                      Date: 2/11/2020                      Test Engineer: 19480 BS                      Configuration: EUT Only                      Location: Chamber K                      Mode: GPRS 850 MHz Fundamentals</p> <p><b>Test Equipment:</b>                      Receiving: Hybrid PRE0181574, and Chamber K SMA Cables                      Substitution: Dipole T416, Chamber K Passthrough Cables</p> <table border="1"> <thead> <tr> <th>f MHz</th> <th>SG reading (dBm)</th> <th>Ant. Pol. (H/V)</th> <th>Cable Loss (dB)</th> <th>Antenna Gain (dBd)</th> <th>ERP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>824.20</td><td>25.91</td><td>V</td><td>4.1</td><td>0.5</td><td>22.36</td><td>38.5</td><td>-16.1</td><td></td></tr> <tr><td>824.20</td><td>33.39</td><td>H</td><td>4.1</td><td>0.3</td><td>29.64</td><td>38.5</td><td>-8.9</td><td></td></tr> <tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>836.60</td><td>25.73</td><td>V</td><td>4.1</td><td>0.5</td><td>22.15</td><td>38.5</td><td>-16.3</td><td></td></tr> <tr><td>836.60</td><td>32.74</td><td>H</td><td>4.1</td><td>0.3</td><td>28.96</td><td>38.5</td><td>-9.5</td><td></td></tr> <tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>848.80</td><td>25.08</td><td>V</td><td>4.1</td><td>0.5</td><td>21.48</td><td>38.5</td><td>-17.0</td><td></td></tr> <tr><td>848.80</td><td>32.94</td><td>H</td><td>4.1</td><td>0.3</td><td>29.14</td><td>38.5</td><td>-9.4</td><td></td></tr> </tbody> </table>										f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch									824.20	25.91	V	4.1	0.5	22.36	38.5	-16.1		824.20	33.39	H	4.1	0.3	29.64	38.5	-8.9		Mid Ch									836.60	25.73	V	4.1	0.5	22.15	38.5	-16.3		836.60	32.74	H	4.1	0.3	28.96	38.5	-9.5		High Ch									848.80	25.08	V	4.1	0.5	21.48	38.5	-17.0		848.80	32.94	H	4.1	0.3	29.14	38.5	-9.4		<p align="center"><b>UL Verification Services, Inc.</b> High Frequency Substitution Measurement</p> <p>Company: Samsung                      Project #: 13211873                      Date: 2/11/2020                      Test Engineer: 19480 BS                      Configuration: EUT Only                      Location: Chamber K                      Mode: EGPRS 850 MHz Fundamentals</p> <p><b>Test Equipment:</b>                      Receiving: Hybrid PRE0181574, and Chamber K SMA Cables                      Substitution: Dipole T416, Chamber K Passthrough Cables</p> <table border="1"> <thead> <tr> <th>f MHz</th> <th>SG reading (dBm)</th> <th>Ant. Pol. (H/V)</th> <th>Cable Loss (dB)</th> <th>Antenna Gain (dBd)</th> <th>ERP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>824.20</td><td>18.71</td><td>V</td><td>4.1</td><td>0.5</td><td>15.16</td><td>38.5</td><td>-23.3</td><td></td></tr> <tr><td>824.20</td><td>26.25</td><td>H</td><td>4.1</td><td>0.3</td><td>22.50</td><td>38.5</td><td>-16.0</td><td></td></tr> <tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>836.60</td><td>17.93</td><td>V</td><td>4.1</td><td>0.5</td><td>14.35</td><td>38.5</td><td>-24.1</td><td></td></tr> <tr><td>836.60</td><td>25.13</td><td>H</td><td>4.1</td><td>0.3</td><td>21.35</td><td>38.5</td><td>-17.1</td><td></td></tr> <tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>848.80</td><td>18.05</td><td>V</td><td>4.1</td><td>0.5</td><td>14.45</td><td>38.5</td><td>-24.0</td><td></td></tr> <tr><td>848.80</td><td>25.98</td><td>H</td><td>4.1</td><td>0.3</td><td>22.18</td><td>38.5</td><td>-16.3</td><td></td></tr> </tbody> </table>										f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch									824.20	18.71	V	4.1	0.5	15.16	38.5	-23.3		824.20	26.25	H	4.1	0.3	22.50	38.5	-16.0		Mid Ch									836.60	17.93	V	4.1	0.5	14.35	38.5	-24.1		836.60	25.13	H	4.1	0.3	21.35	38.5	-17.1		High Ch									848.80	18.05	V	4.1	0.5	14.45	38.5	-24.0		848.80	25.98	H	4.1	0.3	22.18	38.5	-16.3	
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9.1.3. LTE Band 2

20MHz QPSK										20MHz 16QAM																																																																																																																																																																																													
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9.1.4. LTE Band 5

10MHz QPSK										10MHz 16QAM																																																																																																																																																											
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847.50	22.86	H	4.1	0.3	19.06	38.5	-19.4																																																																																																																																																														
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9.1.5. LTE Band 7

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9.1.6. LTE Band 12

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715.30	11.79	V	3.8	1.2	9.20	34.8	-25.6																																																																																																																																																																																																																				
715.30	21.39	H	3.8	1.2	18.84	34.8	-16.0																																																																																																																																																																																																																				

**9.1.7. LTE Band 13**

10MHz QPSK										10MHz 16QAM									
UL Verification Services, Inc. High Frequency Substitution Measurement Company: Samsung Project #: 13211873 Date: 2/10/2020 Test Engineer: 19480 BS Configuration: EUT Only Location: Chamber K Mode: LTE_QPSK Band 13 Fundamentals, 10MHz Bandwidth Test Equipment: Receiving: Hybrid PRE0181574, and Chamber K SMA Cables Substitution: Dipole T416, Chamber K Passthrough Cables										UL Verification Services, Inc. High Frequency Substitution Measurement Company: Samsung Project #: 13211873 Date: 2/10/2020 Test Engineer: 19480 BS Configuration: EUT Only Location: Chamber K Mode: LTE_16QAM Band 13 Fundamentals, 10MHz Bandwidth Test Equipment: Receiving: Hybrid PRE0181574, and Chamber K SMA Cables Substitution: Dipole T416, Chamber K Passthrough Cables									
f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Delta	Notes		f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Delta	Notes	
Mid Ch										Mid Ch									
782.00	16.11	V	4.0	0.7	12.90	34.8	-19.9			782.00	15.22	V	4.0	0.7	12.01	34.8	-22.8		
782.00	24.15	H	4.0	0.5	20.71	34.8	-14.1			782.00	23.30	H	4.0	0.5	19.86	34.8	-14.9		
5MHz QPSK										5MHz 16QAM									
UL Verification Services, Inc. High Frequency Substitution Measurement Company: Samsung Project #: 13211873 Date: 2/10/2020 Test Engineer: 19480 BS Configuration: EUT Only Location: Chamber K Mode: LTE_QPSK Band 13 Fundamentals, 5MHz Bandwidth Test Equipment: Receiving: Hybrid PRE0181574, and Chamber K SMA Cables Substitution: Dipole T416, Chamber K Passthrough Cables										UL Verification Services, Inc. High Frequency Substitution Measurement Company: Samsung Project #: 13211873 Date: 2/10/2020 Test Engineer: 19480 BS Configuration: EUT Only Location: Chamber K Mode: LTE_16QAM Band 13 Fundamentals, 5MHz Bandwidth Test Equipment: Receiving: Hybrid PRE0181574, and Chamber K SMA Cables Substitution: Dipole T416, Chamber K Passthrough Cables									
f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Delta	Notes		f	SG reading	Ant. Pol.	Cable Loss	Antenna Gain	ERP	Limit	Delta	Notes	
Low Ch										Low Ch									
779.50	16.12	V	4.0	0.8	12.93	34.8	-21.8			779.50	15.35	V	4.0	0.8	12.16	34.8	-22.6		
779.50	23.90	H	4.0	0.5	20.50	34.8	-14.3			779.50	23.13	H	4.0	0.5	19.73	34.8	-15.0		
Mid Ch										Mid Ch									
782.00	16.05	V	4.0	0.7	12.84	34.8	-21.9			782.00	15.19	V	4.0	0.7	11.98	34.8	-22.8		
782.00	24.09	H	4.0	0.5	20.65	34.8	-14.1			782.00	23.19	H	4.0	0.5	19.75	34.8	-15.0		
High Ch										High Ch									
784.50	15.73	V	4.0	0.7	12.49	34.8	-22.3			784.50	14.86	V	4.0	0.7	11.62	34.8	-23.2		
784.50	23.86	H	4.0	0.5	20.38	34.8	-14.4			784.50	23.00	H	4.0	0.5	19.52	34.8	-15.2		

9.1.8. LTE Band 41 (FCC)

20MHz QPSK										20MHz 16QAM																																																																																																																																																																																													
<p align="center"><b>UL Verification Services, Inc.</b> High Frequency Substitution Measurement</p> <p><b>Company:</b> Samsung  <b>Project #:</b> 13211873  <b>Date:</b> 2/14/2020  <b>Test Engineer:</b> 19480 BS  <b>Configuration:</b> EUT Only  <b>Location:</b> Chamber K  <b>Mode:</b> LTE_QPSK Band 41(FCC) Fundamentals, 20MHz Bandwidth</p> <p><b>Test Equipment:</b>                      Receiving: Horn T344, and Chamber K SMA Cables                      Substitution: T120, Chamber K Passthrough Cables</p> <table border="1"> <thead> <tr> <th>f MHz</th> <th>SG reading (dBm)</th> <th>Ant. Pol. (H/V)</th> <th>Cable Loss (dB)</th> <th>Antenna Gain (dBi)</th> <th>EIRP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2506.00</td><td>20.50</td><td>V</td><td>7.3</td><td>5.7</td><td>18.38</td><td>33.0</td><td>-14.0</td><td></td></tr> <tr><td>2506.00</td><td>23.77</td><td>H</td><td>7.3</td><td>5.7</td><td>22.25</td><td>33.0</td><td>-10.7</td><td></td></tr> <tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2593.00</td><td>19.22</td><td>V</td><td>7.3</td><td>5.8</td><td>17.76</td><td>33.0</td><td>-15.2</td><td></td></tr> <tr><td>2593.00</td><td>24.11</td><td>H</td><td>7.3</td><td>5.8</td><td>22.65</td><td>33.0</td><td>-10.4</td><td></td></tr> <tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2680.00</td><td>18.57</td><td>V</td><td>7.7</td><td>6.0</td><td>16.88</td><td>33.0</td><td>-16.1</td><td></td></tr> <tr><td>2680.00</td><td>22.65</td><td>H</td><td>7.7</td><td>6.0</td><td>20.96</td><td>33.0</td><td>-12.0</td><td></td></tr> </tbody> </table>										f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch									2506.00	20.50	V	7.3	5.7	18.38	33.0	-14.0		2506.00	23.77	H	7.3	5.7	22.25	33.0	-10.7		Mid Ch									2593.00	19.22	V	7.3	5.8	17.76	33.0	-15.2		2593.00	24.11	H	7.3	5.8	22.65	33.0	-10.4		High Ch									2680.00	18.57	V	7.7	6.0	16.88	33.0	-16.1		2680.00	22.65	H	7.7	6.0	20.96	33.0	-12.0		<p align="center"><b>UL Verification Services, Inc.</b> High Frequency Substitution Measurement</p> <p><b>Company:</b> Samsung  <b>Project #:</b> 13211873  <b>Date:</b> 2/14/2020  <b>Test Engineer:</b> 19480 BS  <b>Configuration:</b> EUT Only  <b>Location:</b> Chamber K  <b>Mode:</b> LTE_16QAM Band 41(FCC) Fundamentals, 20MHz Bandwidth</p> <p><b>Test Equipment:</b>                      Receiving: Horn T344, and Chamber K SMA Cables                      Substitution: T120, Chamber K Passthrough Cables</p> <table border="1"> <thead> <tr> <th>f MHz</th> <th>SG reading (dBm)</th> <th>Ant. Pol. (H/V)</th> <th>Cable Loss (dB)</th> <th>Antenna Gain (dBi)</th> <th>EIRP (dBm)</th> <th>Limit (dBm)</th> <th>Delta (dB)</th> <th>Notes</th> </tr> </thead> <tbody> <tr><td>Low Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2506.00</td><td>19.54</td><td>V</td><td>7.3</td><td>5.7</td><td>18.02</td><td>33.0</td><td>-15.0</td><td></td></tr> <tr><td>2506.00</td><td>23.10</td><td>H</td><td>7.3</td><td>5.7</td><td>21.58</td><td>33.0</td><td>-11.4</td><td></td></tr> <tr><td>Mid Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2593.00</td><td>18.42</td><td>V</td><td>7.3</td><td>5.8</td><td>16.96</td><td>33.0</td><td>-16.0</td><td></td></tr> <tr><td>2593.00</td><td>23.44</td><td>H</td><td>7.3</td><td>5.8</td><td>21.38</td><td>33.0</td><td>-11.0</td><td></td></tr> <tr><td>High Ch</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2680.00</td><td>17.78</td><td>V</td><td>7.7</td><td>6.0</td><td>16.09</td><td>33.0</td><td>-16.9</td><td></td></tr> <tr><td>2680.00</td><td>21.81</td><td>H</td><td>7.7</td><td>6.0</td><td>20.12</td><td>33.0</td><td>-12.9</td><td></td></tr> </tbody> </table>										f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	Low Ch									2506.00	19.54	V	7.3	5.7	18.02	33.0	-15.0		2506.00	23.10	H	7.3	5.7	21.58	33.0	-11.4		Mid Ch									2593.00	18.42	V	7.3	5.8	16.96	33.0	-16.0		2593.00	23.44	H	7.3	5.8	21.38	33.0	-11.0		High Ch									2680.00	17.78	V	7.7	6.0	16.09	33.0	-16.9		2680.00	21.81	H	7.7	6.0	20.12	33.0	-12.9	
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**9.1.9. LTE Band 41 (IC)**

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9.1.10. LTE Band 66

20MHz QPSK										20MHz 16QAM																																																																																																																																																																																																																	
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## 9.2. FIELD STRENGTH OF SPURIOUS RADIATION

### RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.53

ISED: RSS130§4.7, RSS132§5.5; RSS133§6.5, RSS139§6.6, RSS199§4.5.

### LIMITS

FCC: §22.917(a), §24.238(a), §27.53 (g), (h)

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

FCC: §27.53 (Band 13)

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

(f) Emissions in the band 1559-1610 MHz shall be limited to  $-70$  dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and  $-80$  dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

FCC: §27.53 (m) (Band 7, 41)

At least  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

RSS130§4.7

#### 4.7.1 General unwanted emissions limits

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least  $43 + 10 \log_{10} p$  (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

#### 4.7.2 Additional unwanted emissions limits

In addition to the limit outlined in [section 4.7.1](#) above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

- (a) the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
  - i.  $76 + 10 \log_{10} p$  (watts), dB, for base and fixed equipment and
  - ii.  $65 + 10 \log_{10} p$  (watts), dB, for mobile and portable equipment
- (b) the e.i.r.p. in the band 1559-1610 MHz shall not exceed  $-70$  dBW/MHz for wideband signal and  $-80$  dBW for discrete emission with bandwidth less than 700 Hz.

RSS132§5.5

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

- (iii) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P ( dBW) by at least  $43 + 10 \log_{10} p$  (watts).
- (iv) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

RSS133§6.5

Equipment shall comply with the limits in (i) and (ii) below.

- (iii) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts).
- (iv) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least  $43 + 10 \log_{10} p$  (watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

RSS139§6.6

- (iii) (i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, Footnote 2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.
- (iv) (ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

RSS199§4.5

Equipment shall comply with the following unwanted emission limits:

- a. for base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least  $43 + 10 \log_{10} p$
- b. for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:
  - i.  $40 + 10 \log_{10} p$  from the channel edges to 5 MHz away
  - ii.  $43 + 10 \log_{10} p$  between 5 MHz and X MHz from the channel edges, and
  - iii.  $55 + 10 \log_{10} p$  at X MHz and beyond from the channel edges

In addition, the attenuation shall not be less than  $43 + 10 \log_{10} p$  on all frequencies between 2490.5 MHz and 2496 MHz, and  $55 + 10 \log_{10} p$  at or below 2490.5 MHz.

In (a) and (b), **p** is the transmitter power measured in watts and **X** is 6 MHz or the equipment occupied bandwidth, whichever is greater.

**TEST PROCEDURE**

KDB 971168 D01 v03r01/D02 v02/r01

All tests above 1GHz were done with a Resolution Bandwidth of 1MHz, and a Video Bandwidth of 3MHz.

**RESULTS**

No spurious emissions were detected above system noise floor from 18-26GHz.

**9.2.1. GSM 850**

**GPRS MODE**

Company:	Samsung
Project #:	13211873
Date:	2/4/2020
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode:	GPRS 850
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
824.2 MHz												
1	1.63431	-66.8	Pk	28.4	-34.7	11.4	-61.7	-13	-48.7	0-360	149	H
2	2.47209	-66.53	Pk	32.3	-34.4	11	-57.63	-13	-44.63	0-360	149	H
3	3.28809	-68.07	Pk	32.8	-32.4	10.9	-56.77	-13	-43.77	0-360	149	H
4	1.6375	-66.73	Pk	28.5	-34.7	11.8	-61.13	-13	-48.13	0-360	149	V
5	2.48431	-65.36	Pk	32.5	-34.4	10.2	-57.06	-13	-44.06	0-360	149	V
6	3.29766	-67.94	Pk	32.8	-32.2	10.8	-56.54	-13	-43.54	0-360	149	V
836.6 MHz												
1	1.72197	-65.54	Pk	29.5	-34.6	11.7	-58.94	-13	-45.94	0-360	149	H
2	2.51459	-65.61	Pk	32.4	-34.3	10.3	-57.21	-13	-44.21	0-360	149	H
3	3.3715	-67.53	Pk	32.9	-32.2	10.8	-56.03	-13	-43.03	0-360	149	H
4	1.69222	-66.32	Pk	29	-34.7	12	-60.02	-13	-47.02	0-360	149	V
5	2.50397	-66.35	Pk	32.4	-34.3	11.2	-57.05	-13	-44.05	0-360	149	V
6	3.37256	-68.37	Pk	32.9	-32.2	11.1	-56.57	-13	-43.57	0-360	149	V
848.8 MHz												
1	1.72356	-66.75	Pk	29.4	-34.6	11.9	-60.05	-13	-47.05	0-360	149	H
2	2.56931	-66.11	Pk	32.4	-34.2	10.8	-57.11	-13	-44.11	0-360	149	H
3	3.40125	-68.49	Pk	32.9	-32.3	10.8	-57.09	-13	-44.09	0-360	149	H
4	1.7055	-66.26	Pk	29.3	-34.7	12	-59.66	-13	-46.66	0-360	149	V
5	2.53505	-64.97	Pk	32.4	-34.3	10.6	-56.27	-13	-43.27	0-360	149	V
6	3.39488	-67.75	Pk	32.9	-32.3	11.2	-55.95	-13	-42.95	0-360	149	V

**EGPRS MODE**

Company:	Samsung
Project #:	13211873
Date:	2/4/2020
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode:	EGPRS 850
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
824.2 MHz												
1	1.63272	-66.63	Pk	28.5	-34.7	11.4	-61.43	-13	-48.43	0-360	149	H
2	2.47316	-65.58	Pk	32.3	-34.4	10.9	-56.78	-13	-43.78	0-360	149	H
3	3.27481	-67.21	Pk	32.8	-32.6	10.7	-56.31	-13	-43.31	0-360	149	H
4	1.63591	-67.41	Pk	28.4	-34.7	12	-61.71	-13	-48.71	0-360	149	V
5	2.47475	-65.74	Pk	32.4	-34.4	11	-56.74	-13	-43.74	0-360	149	V
6	3.30244	-67.97	Pk	32.8	-32.3	11.1	-56.37	-13	-43.37	0-360	149	V
836.6 MHz												
1	1.68903	-65.67	Pk	29	-34.6	10.7	-60.57	-13	-47.57	0-360	149	H
2	2.52097	-65.59	Pk	32.4	-34.4	10.5	-57.09	-13	-44.09	0-360	149	H
3	3.34441	-68	Pk	32.9	-32.3	10.6	-56.8	-13	-43.8	0-360	149	H
4	1.68	-66.19	Pk	28.8	-34.7	11.2	-60.89	-13	-47.89	0-360	149	V
5	2.51194	-66.61	Pk	32.4	-34.3	11.4	-57.11	-13	-44.11	0-360	149	V
6	3.33325	-66.67	Pk	32.9	-32.4	11	-55.17	-13	-42.17	0-360	149	V
848.8 MHz												
1	1.71294	-65.5	Pk	29.3	-34.6	11.3	-59.5	-13	-46.5	0-360	149	H
2	2.56825	-66.39	Pk	32.4	-34.3	10.7	-57.59	-13	-44.59	0-360	149	H
3	3.37522	-68.09	Pk	32.9	-32.2	10.9	-56.49	-13	-43.49	0-360	149	H
4	1.69116	-65.22	Pk	29	-34.7	11.9	-59.02	-13	-46.02	0-360	149	V
5	2.53531	-65.68	Pk	32.4	-34.3	10.6	-56.98	-13	-43.98	0-360	149	V
6	3.40497	-68.14	Pk	33	-32.3	11.1	-56.34	-13	-43.34	0-360	149	V

**9.2.2. GSM 1900**

**GPRS MODE**

Company:	Samsung
Project #:	13211873
Date:	2/4/2020
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode:	GPRS 1900
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1850.2 MHz												
1	3.78641	-68.74	Pk	33.3	-31.3	10.8	-55.94	-13	-42.94	0-360	150	H
2	5.46569	-70.56	Pk	34.4	-28.7	11.1	-53.76	-13	-40.76	0-360	150	H
3	7.46	-72.75	Pk	35.6	-25.7	10.5	-52.35	-13	-39.35	0-360	150	H
4	3.65944	-68.29	Pk	32.9	-31.5	11.3	-55.59	-13	-42.59	0-360	150	H
5	5.56716	-71.14	Pk	34.6	-28.5	10.9	-54.14	-13	-41.14	0-360	150	H
6	7.47381	-72.56	Pk	35.7	-25.7	10.5	-52.06	-13	-39.06	0-360	150	H
1880 MHz												
1	3.82838	-68.06	Pk	33.4	-31	10.4	-55.26	-13	-42.26	0-360	149	H
2	5.73078	-71.34	Pk	34.9	-27.9	10.4	-53.94	-13	-40.94	0-360	149	H
3	7.48975	-72.32	Pk	35.7	-25.7	10.4	-51.92	-13	-38.92	0-360	149	H
4	3.77472	-68.33	Pk	33.3	-31.3	10.6	-55.73	-13	-42.73	0-360	149	V
5	5.6155	-70.8	Pk	34.8	-28.4	10.8	-53.6	-13	-40.6	0-360	149	V
6	7.60291	-71.9	Pk	35.7	-25.5	10.5	-51.2	-13	-38.2	0-360	149	V
1909.8 MHz												
1	3.79013	-68.33	Pk	33.3	-31.3	10.8	-55.53	-13	-42.53	0-360	149	H
2	5.845	-70.95	Pk	35.1	-27.8	10.6	-53.05	-13	-40.05	0-360	149	H
3	7.78778	-73.31	Pk	35.8	-25	10.5	-52.01	-13	-39.01	0-360	149	H
4	3.79384	-68.02	Pk	33.4	-31.3	10.5	-55.42	-13	-42.42	0-360	149	V
5	5.65322	-70.41	Pk	34.7	-28.2	10.5	-53.41	-13	-40.41	0-360	149	V
6	7.71872	-72.19	Pk	35.9	-25.3	10.5	-51.09	-13	-38.09	0-360	149	V



**EGPRS MODE**

Company:	Samsung
Project #:	13211873
Date:	2/4/2020
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode:	EGPRS 1900
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1850.2 MHz												
1	3.79331	-67.93	Pk	33.4	-31.3	10.7	-55.13	-13	-42.13	0-360	149	H
2	5.50394	-70.57	Pk	34.6	-28.7	10.9	-53.77	-13	-40.77	0-360	149	H
3	7.31709	-72.39	Pk	35.6	-25.8	10.3	-52.29	-13	-39.29	0-360	149	H
4	3.73434	-67.27	Pk	33.1	-31.4	10.6	-54.97	-13	-41.97	0-360	149	V
5	5.51031	-70.28	Pk	34.6	-28.6	11.2	-53.08	-13	-40.08	0-360	149	V
6	7.56784	-73.24	Pk	35.7	-25.4	10.7	-52.24	-13	-39.24	0-360	149	V
1880 MHz												
1	3.669	-68.28	Pk	32.9	-31.4	11	-55.78	-13	-42.78	0-360	149	H
2	5.56503	-70.3	Pk	34.6	-28.6	10.6	-53.7	-13	-40.7	0-360	149	H
3	7.61513	-72.72	Pk	35.7	-25.5	10.4	-52.12	-13	-39.12	0-360	149	H
4	3.79066	-68.36	Pk	33.3	-31.3	10.5	-55.86	-13	-42.86	0-360	149	V
5	5.62294	-70.7	Pk	34.8	-28.4	10.7	-53.6	-13	-40.6	0-360	149	V
6	7.49772	-73.05	Pk	35.6	-25.7	10.8	-52.35	-13	-39.35	0-360	149	V
1909.8 MHz												
1	3.77844	-68.38	Pk	33.3	-31.4	10.8	-55.68	-13	-42.68	0-360	149	H
2	5.83916	-70.95	Pk	35	-27.8	10.4	-53.35	-13	-40.35	0-360	149	H
3	7.68897	-72.83	Pk	35.8	-25.4	10.4	-52.03	-13	-39.03	0-360	149	H
4	3.85334	-68.46	Pk	33.4	-30.9	10.8	-55.16	-13	-42.16	0-360	149	V
5	5.66863	-70.29	Pk	34.8	-28.2	10.7	-52.99	-13	-39.99	0-360	149	V
6	7.60078	-72.9	Pk	35.7	-25.5	10.6	-52.1	-13	-39.1	0-360	149	V

**9.2.3. WCDMA BAND 5**

**REL 99 MODE**

Company:	Samsung
Project #:	13211873
Date:	2/4/2020
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode:	REL 99 Band 5
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
826.4 MHz												
1	1.65078	-61.39	Pk	28.6	-34.7	10.1	-57.39	-13	-44.39	0-360	149	H
2	2.479	-65.64	Pk	32.4	-34.4	10.5	-57.14	-13	-44.14	0-360	149	H
3	3.32263	-67.88	Pk	32.8	-32.3	10.9	-56.48	-13	-43.48	0-360	149	H
4	1.65025	-55.68	Pk	28.6	-34.7	10.9	-50.88	-13	-37.88	0-360	149	V
5	2.46784	-66.09	Pk	32.4	-34.4	11.1	-56.99	-13	-43.99	0-360	149	V
6	3.30509	-68.25	Pk	32.8	-32.3	11.3	-56.45	-13	-43.45	0-360	149	V
836.6 MHz												
1	1.6715	-63.97	Pk	28.8	-34.7	9.9	-59.97	-13	-46.97	0-360	149	H
2	2.50663	-65.88	Pk	32.4	-34.3	10	-57.78	-13	-44.78	0-360	149	H
3	3.36884	-67.33	Pk	32.9	-32.2	10.8	-55.83	-13	-42.83	0-360	149	H
4	1.6715	-57.46	Pk	28.8	-34.7	11.3	-52.06	-13	-39.06	0-360	149	V
5	2.50928	-66.74	Pk	32.3	-34.3	11.5	-57.24	-13	-44.24	0-360	149	V
6	3.346	-68.02	Pk	32.9	-32.3	10.8	-56.62	-13	-43.62	0-360	149	V
846.6 MHz												
1	1.69116	-65.05	Pk	29	-34.7	11	-59.75	-13	-46.75	0-360	149	H
2	2.55922	-66.64	Pk	32.5	-34.3	10.5	-57.94	-13	-44.94	0-360	149	H
3	3.38531	-68.14	Pk	33	-32.2	11	-56.34	-13	-43.34	0-360	149	H
4	1.69009	-60.58	Pk	29	-34.7	11.9	-54.38	-13	-41.38	0-360	149	V
5	2.53053	-66.83	Pk	32.4	-34.3	10.8	-57.93	-13	-44.93	0-360	149	V
6	3.38531	-67.02	Pk	33	-32.2	11.1	-55.12	-13	-42.12	0-360	149	V

**HSDPA MODE**

Company:	Samsung
Project #:	13211873
Date:	2/4/2020
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode:	HSDPA Band 5
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
826.4 MHz												
1	1.65078	-62.14	Pk	28.6	-34.7	10.1	-58.14	-13	-45.14	0-360	149	H
2	2.47634	-66.19	Pk	32.4	-34.4	10.8	-57.39	-13	-44.39	0-360	149	H
3	3.31466	-67.29	Pk	32.8	-32.3	10.9	-55.89	-13	-42.89	0-360	149	H
4	1.65025	-56.47	Pk	28.6	-34.7	10.9	-51.67	-13	-38.67	0-360	149	V
5	2.47528	-66.58	Pk	32.4	-34.4	10.9	-57.68	-13	-44.68	0-360	149	V
6	3.30616	-67.81	Pk	32.8	-32.3	11.3	-56.01	-13	-43.01	0-360	149	V
836.6 MHz												
1	1.66991	-65.17	Pk	28.7	-34.6	10	-61.07	-13	-48.07	0-360	149	H
2	2.50291	-65.68	Pk	32.4	-34.2	10	-57.48	-13	-44.48	0-360	149	H
3	3.34334	-67.01	Pk	32.9	-32.3	10.6	-55.81	-13	-42.81	0-360	149	H
4	1.67097	-59.32	Pk	28.8	-34.7	11.3	-53.92	-13	-40.92	0-360	149	V
5	2.51406	-66.26	Pk	32.4	-34.3	11.3	-56.86	-13	-43.86	0-360	149	V
6	3.34866	-67.84	Pk	32.9	-32.3	10.7	-56.54	-13	-43.54	0-360	149	V
846.6 MHz												
1	1.69381	-66.78	Pk	29	-34.7	11.4	-61.08	-13	-48.08	0-360	149	H
2	2.54169	-65.44	Pk	32.4	-34.3	9.9	-57.44	-13	-44.44	0-360	149	H
3	3.36247	-67.95	Pk	32.9	-32.2	10.8	-56.45	-13	-43.45	0-360	149	H
4	1.69116	-63.81	Pk	29	-34.7	11.9	-57.61	-13	-44.61	0-360	149	V
5	2.54381	-66.64	Pk	32.4	-34.3	10.7	-57.84	-13	-44.84	0-360	149	V
6	3.37788	-68.36	Pk	32.9	-32.2	11.2	-56.46	-13	-43.46	0-360	149	V

**9.2.4. WCDMA BAND 2**

**REL 99 MODE**

Company:	Samsung
Project #:	13211873
Date:	2/4/2020
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode:	REL 99 Band 2
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1852.4 MHz												
1	3.669	-68.14	Pk	32.9	-31.4	11	-55.64	-13	-42.64	0-360	148	H
2	5.50713	-71.32	Pk	34.6	-28.6	11	-54.32	-13	-41.32	0-360	148	H
3	7.49241	-72.44	Pk	35.7	-25.7	10.4	-52.04	-13	-39.04	0-360	148	H
4	3.68813	-68.03	Pk	32.9	-31.4	11.2	-55.33	-13	-42.33	0-360	148	V
5	5.57991	-70.51	Pk	34.7	-28.3	10.5	-53.61	-13	-40.61	0-360	148	V
6	7.37766	-73.17	Pk	35.6	-25.7	10.7	-52.57	-13	-39.57	0-360	148	V
1880 MHz												
1	3.78853	-67.54	Pk	33.3	-31.3	10.8	-54.74	-13	-41.74	0-360	149	H
2	5.57088	-70.4	Pk	34.6	-28.5	10.5	-53.8	-13	-40.8	0-360	149	H
3	7.5025	-71.6	Pk	35.5	-25.6	10.6	-51.1	-13	-38.1	0-360	149	H
4	3.77844	-69.72	Pk	33.3	-31.4	10.5	-57.32	-13	-44.32	0-360	149	V
5	5.6155	-72.2	Pk	34.8	-28.4	10.8	-55	-13	-42	0-360	149	V
6	7.55509	-72.98	Pk	35.7	-25.5	10.5	-52.28	-13	-39.28	0-360	149	V
1907.6 MHz												
1	3.8135	-67.14	Pk	33.4	-31.3	10.2	-54.84	-13	-41.84	0-360	149	H
2	5.72281	-71.07	Pk	34.9	-27.9	10.3	-53.77	-13	-40.77	0-360	149	H
3	7.60822	-72.77	Pk	35.8	-25.5	10.4	-52.07	-13	-39.07	0-360	149	H
4	3.79491	-68.42	Pk	33.4	-31.3	10.5	-55.82	-13	-42.82	0-360	149	V
5	5.69253	-70.87	Pk	34.8	-28	10.5	-53.57	-13	-40.57	0-360	149	V
6	7.63691	-72.96	Pk	35.8	-25.5	10.6	-52.06	-13	-39.06	0-360	149	V

**HSDPA MODE**

Company:	Samsung
Project #:	13211873
Date:	2/4/2020
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode:	HSDPA Band 2
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1852.4 MHz												
1	3.65731	-68.39	Pk	32.9	-31.4	11	-55.89	-13	-42.89	0-360	149	H
2	5.5815	-70.61	Pk	34.7	-28.3	10.1	-54.11	-13	-41.11	0-360	149	H
3	7.45203	-72.58	Pk	35.6	-25.7	10.6	-52.08	-13	-39.08	0-360	149	H
4	3.68334	-69.1	Pk	32.9	-31.4	11.1	-56.5	-13	-43.5	0-360	149	V
5	5.56503	-69.92	Pk	34.6	-28.6	10.9	-53.02	-13	-40.02	0-360	149	V
6	7.45416	-73.78	Pk	35.7	-25.7	10.8	-52.98	-13	-39.98	0-360	149	V
1880 MHz												
1	3.79119	-68.03	Pk	33.3	-31.3	10.8	-55.23	-13	-42.23	0-360	149	H
2	5.62453	-69.96	Pk	34.8	-28.4	10.5	-53.06	-13	-40.06	0-360	149	H
3	7.47434	-72.58	Pk	35.7	-25.6	10.4	-52.08	-13	-39.08	0-360	149	H
4	3.77419	-68.8	Pk	33.3	-31.3	10.6	-56.2	-13	-43.2	0-360	149	V
5	5.61072	-71.03	Pk	34.8	-28.4	10.8	-53.83	-13	-40.83	0-360	149	V
6	7.53066	-73.55	Pk	35.7	-25.5	10.6	-52.75	-13	-39.75	0-360	149	V
1907.6 MHz												
1	3.85866	-67.97	Pk	33.4	-31	10.3	-55.27	-13	-42.27	0-360	149	H
2	5.67766	-71.22	Pk	34.8	-28.2	10.2	-54.42	-13	-41.42	0-360	149	H
3	7.71553	-72.99	Pk	35.8	-25.3	10.3	-52.19	-13	-39.19	0-360	149	H
4	3.83581	-69.17	Pk	33.4	-31.2	10.7	-56.27	-13	-43.27	0-360	149	V
5	5.74088	-71.49	Pk	34.9	-28.1	10.6	-54.09	-13	-41.09	0-360	149	V
6	7.61778	-72.35	Pk	35.7	-25.5	10.5	-51.65	-13	-38.65	0-360	149	V

**9.2.5. WCDMA BAND 4**

**REL 99 MODE**

Company:	Samsung
Project #:	13211873
Date:	2/4/2020
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode:	REL 99 Band 4
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cpl (dB)	Amp/Cpl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1712.4 MHz												
1	3.46447	-67.66	Pk	33.1	-32.3	11	-55.86	-13	-42.86	0-360	149	H
2	5.16606	-70.24	Pk	34.2	-29.1	10.6	-54.54	-13	-41.54	0-360	149	H
3	6.84109	-72.2	Pk	35.8	-26.1	10.3	-52.2	-13	-39.2	0-360	149	H
4	3.41984	-68.19	Pk	33	-32.2	11.2	-56.19	-13	-43.19	0-360	149	V
5	5.11931	-69.97	Pk	34.3	-29.4	10.5	-54.57	-13	-41.57	0-360	149	V
6	6.80178	-72.04	Pk	35.7	-26.3	10.4	-52.24	-13	-39.24	0-360	149	V
1732.6 MHz												
1	3.46606	-66.81	Pk	33.1	-32.2	11	-54.91	-13	-41.91	0-360	149	H
2	5.22291	-69.79	Pk	34.3	-29	10.8	-53.69	-13	-40.69	0-360	149	H
3	6.90431	-72.23	Pk	35.6	-26.2	10.2	-52.63	-13	-39.63	0-360	149	H
4	3.45544	-67.69	Pk	33.1	-32.2	11.2	-55.59	-13	-42.59	0-360	149	V
5	5.22875	-70.63	Pk	34.3	-29	10.8	-54.53	-13	-41.53	0-360	149	V
6	6.96328	-71.68	Pk	35.7	-26.2	10.3	-51.88	-13	-38.88	0-360	149	V
1752.6 MHz												
1	3.45491	-68.23	Pk	33.1	-32.2	11.2	-56.13	-13	-43.13	0-360	149	H
2	5.23034	-69.92	Pk	34.3	-28.9	10.5	-54.02	-13	-41.02	0-360	149	H
3	6.94894	-72.01	Pk	35.8	-26.2	10.1	-52.31	-13	-39.31	0-360	149	H
4	3.49475	-66.62	Pk	33	-32.1	11	-54.72	-13	-41.72	0-360	149	V
5	5.27763	-71.09	Pk	34.4	-28.8	11.3	-54.19	-13	-41.19	0-360	149	V
6	7.035	-72.7	Pk	35.7	-26	10.6	-52.4	-13	-39.4	0-360	149	V

**HSDPA MODE**

Company:	Samsung
Project #:	13211873
Date:	2/4/2020
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode:	HSDPA Band 4
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1712.4 MHz												
1	3.44269	-68.02	Pk	33.1	-32.2	10.8	-56.32	-13	-43.32	0-360	149	H
2	5.10763	-70.08	Pk	34.2	-29.4	10.6	-54.68	-13	-41.68	0-360	149	H
3	6.76247	-71.84	Pk	35.8	-26.5	10.4	-52.14	-13	-39.14	0-360	149	H
4	3.43206	-67.47	Pk	33.1	-32.2	11.1	-55.47	-13	-42.47	0-360	149	V
5	5.15969	-70.45	Pk	34.2	-29.1	10.7	-54.65	-13	-41.65	0-360	149	V
6	6.82622	-73.69	Pk	35.8	-26.1	10.6	-53.39	-13	-40.39	0-360	149	V
1732.6 MHz												
1	3.50431	-67.92	Pk	33.1	-32.1	11.1	-55.82	-13	-42.82	0-360	149	H
2	5.16341	-69.58	Pk	34.2	-29.1	10.6	-53.88	-13	-40.88	0-360	149	H
3	6.86713	-72.44	Pk	35.7	-26.1	10.6	-52.24	-13	-39.24	0-360	149	H
4	3.44588	-67.8	Pk	33.1	-32.2	11.2	-55.7	-13	-42.7	0-360	149	V
5	5.22981	-69.1	Pk	34.3	-29	10.7	-53.1	-13	-40.1	0-360	149	V
6	6.96116	-72.39	Pk	35.7	-26.2	10.3	-52.59	-13	-39.59	0-360	149	V
1752.6 MHz												
1	3.50538	-67.29	Pk	33.1	-32.1	11	-55.29	-13	-42.29	0-360	152	H
2	5.20803	-70.73	Pk	34.2	-29	10.9	-54.63	-13	-41.63	0-360	152	H
3	7.10592	-72.4	Pk	35.7	-26	10.4	-52.3	-13	-39.3	0-360	152	H
4	3.49103	-67.78	Pk	33	-32.1	11	-55.88	-13	-42.88	0-360	152	V
5	5.28188	-70.59	Pk	34.3	-28.8	11.2	-53.89	-13	-40.89	0-360	152	V
6	7.06209	-72.49	Pk	35.7	-25.9	10.5	-52.19	-13	-39.19	0-360	152	V

**9.2.6. LTE BAND 2**

**LIMITS**

FCC: §24.238(a)

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

RSS133§6.5

Equipment shall comply with the limits in (i) and (ii) below.

- (i) In the 1.0 MHz bands immediately outside and adjacent to the equipment's operating frequency block, the emission power per any 1% of the emission bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts).
- (ii) After the first 1.0 MHz, the emission power in any 1 MHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least 43 + 10 log10p(watts). If the measurement is performed using 1% of the emission bandwidth, power integration over 1.0 MHz is required.

**QPSK LTE BAND 2 (20.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/10/20
Test Engineer:	20756
Configuration:	EUT + Support Equipment
Mode	LTE 5 QPSK 20MHz
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1860 MHz												
1	3.66103	-68.07	Pk	32.9	-31.5	10.9	-55.77	-13	-42.77	0-360	149	H
2	5.51191	-70.03	Pk	34.6	-28.6	10.9	-53.13	-13	-40.13	0-360	149	H
3	7.49984	-73.14	Pk	35.5	-25.7	10.5	-52.84	-13	-39.84	0-360	149	H
4	3.68813	-69.05	Pk	32.9	-31.4	11.2	-56.35	-13	-43.35	0-360	149	V
5	5.55972	-70.15	Pk	34.6	-28.6	11	-53.15	-13	-40.15	0-360	149	V
6	7.35853	-73.57	Pk	35.6	-25.8	10.5	-53.27	-13	-40.27	0-360	149	V
1880 MHz												
1	3.70194	-67.98	Pk	33	-31.4	10.7	-55.68	-13	-42.68	0-360	149	H
2	5.56503	-71.21	Pk	34.6	-28.6	10.6	-54.61	-13	-41.61	0-360	149	H
3	7.53172	-72.38	Pk	35.7	-25.5	10.2	-51.98	-13	-38.98	0-360	149	H
4	3.75772	-68.78	Pk	33.2	-31.4	10.7	-56.28	-13	-43.28	0-360	149	V
5	5.5985	-71.21	Pk	34.7	-28.4	10.5	-54.41	-13	-41.41	0-360	149	V
6	7.46956	-72.9	Pk	35.6	-25.7	10.7	-52.3	-13	-39.3	0-360	149	V
1900 MHz												
1	3.78163	-68.55	Pk	33.4	-31.4	10.8	-55.75	-13	-42.75	0-360	149	H
2	5.66331	-71.17	Pk	34.8	-28.2	10.6	-53.97	-13	-40.97	0-360	149	H
3	7.48709	-72.33	Pk	35.6	-25.7	10.5	-51.93	-13	-38.93	0-360	149	H
4	3.78163	-67.76	Pk	33.4	-31.4	10.5	-55.26	-13	-42.26	0-360	149	V
5	5.71113	-70.94	Pk	34.8	-27.9	10.3	-53.74	-13	-40.74	0-360	149	V
6	7.60716	-72.5	Pk	35.8	-25.5	10.5	-51.7	-13	-38.7	0-360	149	V



**16QAM LTE BAND 2 (20.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/10/20
Test Engineer:	20756
Configuration:	EUT + Support Equipment
Mode	LTE 5 16QAM 20MHz
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1860 MHz												
1	3.686	-69.07	Pk	32.9	-31.4	11.2	-56.37	-13	-43.37	0-360	149	H
2	5.55813	-70.9	Pk	34.6	-28.5	10.9	-53.9	-13	-40.9	0-360	149	H
3	7.40741	-72.65	Pk	35.6	-25.6	10.4	-52.25	-13	-39.25	0-360	149	H
4	3.686	-67.86	Pk	32.9	-31.4	11.1	-55.26	-13	-42.26	0-360	149	V
5	5.54538	-70.6	Pk	34.5	-28.5	10.9	-53.7	-13	-40.7	0-360	149	V
6	7.41059	-73.36	Pk	35.6	-25.6	10.6	-52.76	-13	-39.76	0-360	149	V
1880 MHz												
1	3.79119	-67	Pk	33.3	-31.3	10.8	-54.2	-13	-41.2	0-360	149	H
2	5.66225	-71.07	Pk	34.8	-28.2	10.5	-53.97	-13	-40.97	0-360	149	H
3	7.45309	-73.26	Pk	35.6	-25.7	10.6	-52.76	-13	-39.76	0-360	149	H
4	3.74869	-69.32	Pk	33.2	-31.4	10.7	-56.82	-13	-43.82	0-360	149	V
5	5.58522	-71.12	Pk	34.7	-28.3	10.4	-54.32	-13	-41.32	0-360	149	V
6	7.53384	-72.82	Pk	35.7	-25.5	10.6	-52.02	-13	-39.02	0-360	149	V
1900 MHz												
1	3.78216	-65.6	Pk	33.4	-31.4	10.8	-52.8	-13	-39.8	0-360	149	H
2	5.61444	-70.68	Pk	34.8	-28.4	10.5	-53.78	-13	-40.78	0-360	149	H
3	7.54181	-72.68	Pk	35.6	-25.5	10.2	-52.38	-13	-39.38	0-360	149	H
4	3.78163	-68.25	Pk	33.4	-31.4	10.5	-55.75	-13	-42.75	0-360	149	V
5	5.63781	-70.74	Pk	34.7	-28.3	10.6	-53.74	-13	-40.74	0-360	149	V
6	7.60184	-72.39	Pk	35.7	-25.5	10.6	-51.59	-13	-38.59	0-360	149	V

**9.2.7. LTE BAND 5**

**LIMITS**

FCC: §22.917(a)

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

RSS132§5.5

Mobile and base station equipment shall comply with the limits in (i) and (ii) below.

- (i) In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated (in dB) below the transmitter output power P ( dBW) by at least 43 + 10 log10p (watts).
- (ii) After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any100 kHz bandwidth shall be attenuated (in dB) below the transmitter output power P (dBW) by at least43 + 10 log10 p (watts). If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

**QPSK LTE BAND 5 (10.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/05/20
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode	LTE 5 QPSK 10MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
829 MHz												
1	1.65769	-56.65	Pk	28.6	-35.8	12.3	-51.55	-13	-38.55	0-360	149	H
2	2.48697	-64.49	Pk	32.3	-35.4	11.6	-55.99	-13	-42.99	0-360	149	H
3	3.28969	-66.36	Pk	32.9	-34.5	12.1	-55.86	-13	-42.86	0-360	149	H
4	1.65663	-63.84	Pk	28.6	-35.8	11.3	-59.74	-13	-46.74	0-360	149	V
5	2.49016	-65.66	Pk	32.3	-35.4	10.9	-57.86	-13	-44.86	0-360	149	V
6	3.32263	-65.7	Pk	32.8	-34.5	11.6	-55.8	-13	-42.8	0-360	149	V
836.5 MHz												
1	1.67309	-58.74	Pk	28.7	-35.8	12.1	-53.74	-13	-40.74	0-360	149	H
2	2.50928	-64.06	Pk	32.4	-35.5	12.1	-55.06	-13	-42.06	0-360	149	H
3	3.35397	-66.6	Pk	32.8	-34.4	11.9	-56.3	-13	-43.3	0-360	149	H
4	1.67309	-57.43	Pk	28.7	-35.8	11.8	-52.73	-13	-39.73	0-360	149	V
5	2.50875	-64.15	Pk	32.4	-35.4	11.7	-55.45	-13	-42.45	0-360	149	V
6	3.33909	-66.98	Pk	32.8	-34.5	11.9	-56.78	-13	-43.78	0-360	149	V
844 MHz												
1	1.68744	-61.86	Pk	28.7	-35.8	11.6	-57.36	-13	-44.36	0-360	149	H
2	2.53159	-63.06	Pk	32.3	-35.4	12.4	-53.76	-13	-40.76	0-360	149	H
3	3.36513	-66	Pk	32.8	-34.5	11.6	-56.1	-13	-43.1	0-360	149	H
4	1.68744	-59.57	Pk	28.7	-35.8	12.1	-54.57	-13	-41.57	0-360	149	V
5	2.53691	-65.46	Pk	32.3	-35.4	11.5	-57.06	-13	-44.06	0-360	149	V
6	3.36513	-66.09	Pk	32.8	-34.5	11.7	-56.09	-13	-43.09	0-360	149	V

**16QAM LTE BAND 5 (10.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/05/20
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode	LTE 5 16QAM 10MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
829 MHz												
1	1.65769	-57.44	Pk	28.6	-35.8	12.3	-52.34	-13	-39.34	0-360	149	H
2	2.47794	-64.66	Pk	32.3	-35.5	11.7	-56.16	-13	-43.16	0-360	149	H
3	3.32581	-65.67	Pk	32.8	-34.5	11.7	-55.67	-13	-42.67	0-360	149	H
4	1.65769	-61.57	Pk	28.6	-35.8	11.3	-57.47	-13	-44.47	0-360	149	V
5	2.48644	-63.05	Pk	32.3	-35.5	11	-55.25	-13	-42.25	0-360	149	V
6	3.31838	-66	Pk	32.8	-34.5	11.4	-56.3	-13	-43.3	0-360	149	V
836.5 MHz												
1	1.67256	-57.58	Pk	28.7	-35.8	12.2	-52.48	-13	-39.48	0-360	149	H
2	2.50928	-60.17	Pk	32.4	-35.5	12.1	-51.17	-13	-38.17	0-360	149	H
3	3.33644	-65.98	Pk	32.8	-34.5	11.6	-56.08	-13	-43.08	0-360	149	H
4	1.67256	-59.96	Pk	28.7	-35.8	11.8	-55.26	-13	-42.26	0-360	149	V
5	2.50928	-61.97	Pk	32.4	-35.5	11.7	-53.37	-13	-40.37	0-360	149	V
6	3.33856	-66.11	Pk	32.8	-34.5	11.9	-55.91	-13	-42.91	0-360	149	V
844 MHz												
1	1.68744	-59.79	Pk	28.7	-35.8	11.6	-55.29	-13	-42.29	0-360	149	H
2	2.53213	-61.95	Pk	32.3	-35.4	12.4	-52.65	-13	-39.65	0-360	149	H
3	3.36406	-66.03	Pk	32.8	-34.5	11.6	-56.13	-13	-43.13	0-360	149	H
4	1.68744	-58.3	Pk	28.7	-35.8	12.1	-53.3	-13	-40.3	0-360	149	V
5	2.52575	-65	Pk	32.4	-35.4	11.9	-56.1	-13	-43.1	0-360	149	V
6	3.35981	-65.61	Pk	32.8	-34.4	11.7	-55.51	-13	-42.51	0-360	149	V

**9.2.8. LTE BAND 7**

**LIMITS**

FCC: §27.53 (m)

At least 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

RSS199§4.5

Equipment shall comply with the following unwanted emission limits:

- a. for base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least 43 + 10 log<sub>10</sub> p
- b. for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:
  - i. 40 + 10 log<sub>10</sub> p from the channel edges to 5 MHz away
  - ii. 43 + 10 log<sub>10</sub> p between 5 MHz and X MHz from the channel edges, and
  - iii. 55 + 10 log<sub>10</sub> p at X MHz and beyond from the channel edges

In addition, the attenuation shall not be less than 43 + 10 log<sub>10</sub> p on all frequencies between 2490.5 MHz and 2496 MHz, and 55 + 10 log<sub>10</sub> p at or below 2490.5 MHz.

In (a) and (b), p is the transmitter power measured in watts and X is 6 MHz or the equipment occupied bandwidth, whichever is greater.

**QPSK LTE BAND 7 (20.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/06/20
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode	LTE 7 QPSK 20MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2510 MHz												
1	4.98544	-68.47	Pk	34.1	-31.2	12	-53.57	-25	-28.57	0-360	149	H
2	7.53013	-67.91	Pk	35.7	-27.9	11.8	-48.31	-25	-23.31	0-360	149	H
3	10.00522	-72.41	Pk	37	-25.1	12.4	-48.11	-25	-23.11	0-360	149	H
4	5.01997	-67.44	Pk	34.2	-31.3	11.5	-53.04	-25	-28.04	0-360	149	V
5	7.53013	-68.53	Pk	35.7	-27.9	11.8	-48.93	-25	-23.93	0-360	149	V
6	10.03975	-69.46	Pk	37.1	-25.1	12.1	-45.36	-25	-20.36	0-360	149	V
2535 MHz												
1	5.06938	-68.16	Pk	34.2	-31.2	11.9	-53.26	-25	-28.26	0-360	149	H
2	7.60503	-68.72	Pk	35.7	-27.7	12.2	-48.52	-25	-23.52	0-360	149	H
3	10.03869	-73.18	Pk	37.1	-25.1	12.3	-48.88	-25	-23.88	0-360	149	H
4	5.05556	-68.18	Pk	34.2	-31.1	12	-53.08	-25	-28.08	0-360	149	V
5	7.60503	-69.19	Pk	35.7	-27.7	11.9	-49.29	-25	-24.29	0-360	149	V
6	10.13963	-72.29	Pk	37.2	-25.4	12.3	-48.19	-25	-23.19	0-360	149	V
2560 MHz												
1	5.11931	-66.95	Pk	34.3	-31	12.1	-51.55	-25	-26.55	0-360	149	H
2	7.67994	-66.3	Pk	35.7	-27.6	12.3	-45.9	-25	-20.9	0-360	149	H
3	10.18319	-72.89	Pk	37.2	-25.1	12.6	-48.19	-25	-23.19	0-360	149	H
4	5.09434	-68.53	Pk	34.2	-31.1	12	-53.43	-25	-28.43	0-360	149	V
5	7.67941	-67.55	Pk	35.7	-27.6	12.3	-47.15	-25	-22.15	0-360	149	V
6	10.2395	-70.18	Pk	37.3	-25.1	12.1	-45.88	-25	-20.88	0-360	149	V

**16QAM LTE BAND 7 (20.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/06/20
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode	LTE 7 16QAM 20MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2510 MHz												
1	5.01997	-67.57	Pk	34.2	-31.3	11.7	-52.97	-25	-27.97	0-360	149	H
2	7.53013	-67.36	Pk	35.7	-27.9	11.8	-47.76	-25	-22.76	0-360	149	H
3	9.95316	-72.59	Pk	37	-25.3	12.7	-48.19	-25	-23.19	0-360	149	H
4	5.01944	-67.89	Pk	34.2	-31.3	11.5	-53.49	-25	-28.49	0-360	149	V
5	7.52959	-67.73	Pk	35.7	-27.9	11.8	-48.13	-25	-23.13	0-360	149	V
6	10.03975	-71.4	Pk	37.1	-25.1	12.1	-47.3	-25	-22.3	0-360	149	V
2535 MHz												
1	5.05131	-67.84	Pk	34.2	-31.1	12	-52.74	-25	-27.74	0-360	149	H
2	7.60503	-69.01	Pk	35.7	-27.7	12.2	-48.81	-25	-23.81	0-360	149	H
3	10.11625	-72.83	Pk	37.2	-25.4	12.3	-48.73	-25	-23.73	0-360	149	H
4	5.09434	-69.5	Pk	34.2	-31.1	12	-54.4	-25	-29.4	0-360	149	V
5	7.60503	-69.38	Pk	35.7	-27.7	11.9	-49.48	-25	-24.48	0-360	149	V
6	10.17575	-71.99	Pk	37.2	-25.2	12.3	-47.69	-25	-22.69	0-360	149	V
2560 MHz												
1	5.11984	-67.09	Pk	34.3	-31.1	12.1	-51.79	-25	-26.79	0-360	149	H
2	7.67941	-67.2	Pk	35.7	-27.6	12.3	-46.8	-25	-21.8	0-360	149	H
3	10.30272	-73.33	Pk	37.4	-25.3	12.3	-48.93	-25	-23.93	0-360	149	H
4	5.10869	-66.83	Pk	34.2	-31	12.3	-51.33	-25	-26.33	0-360	149	V
5	7.67994	-66.98	Pk	35.7	-27.6	12.3	-46.58	-25	-21.58	0-360	149	V
6	10.24003	-69.8	Pk	37.3	-25.1	12.1	-45.5	-25	-20.5	0-360	149	V

**9.2.9. LTE BAND 12**

**LIMITS**

FCC: §27.53 (g)

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

RSS130§4.7

**4.7.1 General unwanted emissions limits**

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log<sub>10</sub> p (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

**4.7.2 Additional unwanted emissions limits**

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

- a. the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
  - iii. 76 + 10 log<sub>10</sub> p (watts), dB, for base and fixed equipment and
  - iv. 65 + 10 log<sub>10</sub> p (watts), dB, for mobile and portable equipment
- b. the e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.

**QPSK LTE BAND 12 (10.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/10/20
Test Engineer:	20756
Configuration:	EUT + Support Equipment
Mode	LTE 12 QPSK 10MHz
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
704 MHz												
1	1.3995	-65.61	PK	28.9	-34.7	10.6	-60.81	-13	-47.81	0-360	149	H
2	2.09863	-56.68	PK	31.4	-34.5	10.2	-49.58	-13	-36.58	0-360	149	H
3	2.80625	-66.61	PK	32.4	-33.9	10.4	-57.71	-13	-44.71	0-360	149	H
4	1.41331	-67.25	PK	28.7	-34.7	12	-61.25	-13	-48.25	0-360	149	V
5	2.09863	-64.58	PK	31.4	-34.5	11.4	-56.28	-13	-43.28	0-360	149	V
6	2.81103	-66.53	PK	32.4	-33.9	10.9	-57.13	-13	-44.13	0-360	149	V
707.5 MHz												
1	1.40641	-65.51	PK	28.8	-34.6	10.8	-60.51	-13	-47.51	0-360	149	H
2	2.10925	-55.65	PK	31.3	-34.5	10	-48.85	-13	-35.85	0-360	149	H
3	2.87584	-66.85	PK	32.4	-33.8	11.2	-57.05	-13	-44.05	0-360	149	H
4	1.41544	-67.28	PK	28.7	-34.6	12.1	-61.08	-13	-48.08	0-360	149	V
5	2.10872	-61.21	PK	31.3	-34.5	10.7	-53.71	-13	-40.71	0-360	149	V
6	2.87797	-66.4	PK	32.4	-33.8	11	-56.8	-13	-43.8	0-360	149	V
711 MHz												
1	1.43084	-66.11	PK	28.6	-34.7	10.7	-61.51	-13	-48.51	0-360	149	H
2	2.11934	-56.09	PK	31.3	-34.5	10.3	-48.99	-13	-35.99	0-360	149	H
3	2.83441	-66.4	PK	32.3	-33.9	10.9	-57.1	-13	-44.1	0-360	149	H
4	1.41384	-66.53	PK	28.7	-34.6	12	-60.43	-13	-47.43	0-360	149	V
5	2.11934	-62.77	PK	31.3	-34.5	11	-54.97	-13	-41.97	0-360	149	V
6	* 2.853	-67.35	PK	32.3	-33.9	11.4	-57.55	-13	-44.55	0-360	149	V

**16QAM LTE BAND 12 (10.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/10/20
Test Engineer:	20756
Configuration:	EUT + Support Equipment
Mode	LTE 12 16QAM 10MHz
Chamber #:	Chamber K

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
704 MHz												
1	* 1.39897	-65.25	Pk	28.9	-34.7	10.6	-60.45	-13	-47.45	0-360	149	H
2	2.09863	-56.91	Pk	31.4	-34.5	10.2	-49.81	-13	-36.81	0-360	149	H
3	* 2.81369	-65.85	Pk	32.3	-33.9	10.6	-56.85	-13	-43.85	0-360	149	H
4	* 1.41225	-66.74	Pk	28.8	-34.7	11.9	-60.74	-13	-47.74	0-360	149	V
5	2.09809	-61.61	Pk	31.4	-34.5	11.5	-53.21	-13	-40.21	0-360	149	V
6	* 2.80891	-65.97	Pk	32.4	-33.9	10.9	-56.57	-13	-43.57	0-360	149	V
707.5 MHz												
1	* 1.40588	-66.25	Pk	28.8	-34.6	10.8	-61.25	-13	-48.25	0-360	149	H
2	2.10925	-56.57	Pk	31.3	-34.5	10	-49.77	-13	-36.77	0-360	149	H
3	* 2.84875	-66.76	Pk	32.3	-33.9	11.2	-57.16	-13	-44.16	0-360	149	H
4	* 1.41278	-66.72	Pk	28.7	-34.7	11.9	-60.82	-13	-47.82	0-360	149	V
5	2.10872	-61.44	Pk	31.3	-34.5	10.7	-53.94	-13	-40.94	0-360	149	V
6	* 2.83228	-65.78	Pk	32.3	-33.9	11.2	-56.18	-13	-43.18	0-360	149	V
711 MHz												
1	* 1.41384	-65.92	Pk	28.7	-34.6	11	-60.82	-13	-47.82	0-360	149	H
2	2.11934	-54.3	Pk	31.3	-34.5	10.3	-47.2	-13	-34.2	0-360	149	H
3	* 2.87	-66.73	Pk	32.4	-33.8	11.2	-56.93	-13	-43.93	0-360	149	H
4	* 1.41278	-66.16	Pk	28.7	-34.7	11.9	-60.26	-13	-47.26	0-360	149	V
5	2.11934	-63.4	Pk	31.3	-34.5	11	-55.6	-13	-42.6	0-360	149	V
6	* 2.85938	-66.08	Pk	32.3	-33.8	11.2	-56.38	-13	-43.38	0-360	149	V

**9.2.10. LTE BAND 13**

**LIMITS**

FCC: §27.53

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

(f) Emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

RSS130§4.7

**4.7.1 General unwanted emissions limits**

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least  $43 + 10 \log_{10} p$  (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

**4.7.2 Additional unwanted emissions limits**

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

- a. the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
  - i.  $76 + 10 \log_{10} p$  (watts), dB, for base and fixed equipment and
  - ii.  $65 + 10 \log_{10} p$  (watts), dB, for mobile and portable equipment
- b. the e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.

**QPSK LTE BAND 13 (10.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/05/20
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode	LTE 13 QPSK 10MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
782MHz												
1	1.56313	-63.9	Pk	28	-35.9	11.1	-60.7	-40	-20.7	0-360	149	H
2	2.34566	-60.83	PK	31.6	-35.6	13.1	-51.73	-13	-38.73	0-360	149	H
3	3.10906	-64.97	PK	33	-34.8	11.6	-55.17	-13	-42.17	0-360	149	H
4	1.57322	-65.14	PK	28	-35.8	12.1	-60.84	-40	-20.84	0-360	149	V
5	2.34566	-62.05	PK	31.6	-35.6	12.1	-53.95	-13	-40.95	0-360	149	V
6	3.1165	-65.68	PK	33.1	-34.8	11.6	-55.78	-13	-42.78	0-360	149	V



**16QAM LTE BAND 13 (10.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/05/20
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode	LTE 13 16QAM 10MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
782MHz												
1	1.56366	-63.56	Pk	28	-35.9	11.1	-60.36	-40	-20.36	0-360	149	H
2	2.34566	-63.28	Pk	31.6	-35.6	13.1	-54.18	-13	-41.18	0-360	149	H
3	3.14359	-65.96	Pk	32.9	-34.7	11.6	-56.16	-13	-43.16	0-360	149	H
4	1.54984	-65.66	Pk	28.1	-35.9	12.7	-60.76	-40	-20.76	0-360	149	V
5	2.34566	-62.08	Pk	31.6	-35.6	12.1	-53.98	-13	-40.98	0-360	149	V
6	3.12978	-66.14	Pk	33.1	-34.8	11.3	-56.54	-13	-43.54	0-360	149	V

**9.2.12. LTE BAND 41 (FCC)**

**LIMITS**

FCC: §27.53 (m)

At least 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section.

**QPSK LTE BAND 41 (20.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/17/20
Test Engineer:	20756
Configuration:	EUT + Support Equipment
Mode	LTE 41 QPSK 20MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2506 MHz												
1	4.99394	-67.89	Pk	34.1	-31.2	12.3	-52.69	-25	-27.69	0-360	149	H
2	7.49134	-68.28	Pk	35.7	-27.9	12	-48.48	-25	-23.48	0-360	149	H
3	10.00256	-72.72	Pk	37	-25.2	12.3	-48.62	-25	-23.62	0-360	149	H
4	4.99394	-67.07	Pk	34.1	-31.2	11.7	-52.47	-25	-27.47	0-360	149	V
5	7.49134	-69.29	Pk	35.7	-27.9	11.8	-49.69	-25	-24.69	0-360	149	V
6	10.00734	-71.54	Pk	37	-25.1	12.2	-47.44	-25	-22.44	0-360	149	V
2593 MHz												
1	5.21494	-68.45	Pk	34.3	-31	12.3	-52.85	-25	-27.85	0-360	149	H
2	7.75219	-69.73	Pk	35.8	-27.6	12.2	-49.33	-25	-24.33	0-360	149	H
3	10.41216	-72.24	Pk	37.6	-25.3	12.3	-47.64	-25	-22.64	0-360	149	H
4	5.17297	-68.73	Pk	34.2	-31	12.2	-53.33	-25	-28.33	0-360	149	V
5	7.75219	-69.83	Pk	35.8	-27.6	12	-49.63	-25	-24.63	0-360	149	V
6	10.33619	-72.04	Pk	37.4	-25.4	12.2	-47.84	-25	-22.84	0-360	149	V
2680 MHz												
1	5.3435	-68.71	Pk	34.4	-31	12.3	-53.01	-25	-28.01	0-360	149	H
2	8.01356	-65.16	Pk	35.7	-27.4	12	-44.86	-25	-19.86	0-360	149	H
3	10.71072	-73.01	Pk	37.9	-24.9	12.5	-47.51	-25	-22.51	0-360	149	H
4	5.34191	-69.67	Pk	34.5	-31	12.2	-53.97	-25	-28.97	0-360	149	V
5	8.01303	-59.99	Pk	35.7	-27.4	11.9	-39.79	-25	-14.79	0-360	149	V
6	10.68469	-72.35	Pk	37.9	-24.7	12.4	-46.75	-25	-21.75	0-360	149	V

**16QAM LTE BAND 41 (20.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/17/20
Test Engineer:	20756
Configuration:	EUT + Support Equipment
Mode	LTE 41 16QAM 20MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2506 MHz												
1	5.00297	-68.54	Pk	34.1	-31.3	12.1	-53.64	-25	-28.64	0-360	149	H
2	7.49134	-68.92	Pk	35.7	-27.9	12	-49.12	-25	-24.12	0-360	149	H
3	10.04294	-73.37	Pk	37.2	-25.1	12.3	-48.97	-25	-23.97	0-360	149	H
4	4.99288	-68.34	Pk	34.1	-31.2	11.7	-53.74	-25	-28.74	0-360	149	V
5	7.49134	-68.28	Pk	35.7	-27.9	11.8	-48.68	-25	-23.68	0-360	149	V
6	9.98769	-71.55	Pk	37	-25.3	12	-47.85	-25	-22.85	0-360	149	V
2593 MHz												
1	5.16766	-68.21	Pk	34.3	-31	12.2	-52.71	-25	-27.71	0-360	149	H
2	7.75166	-66.68	Pk	35.8	-27.6	12.2	-46.28	-25	-21.28	0-360	149	H
3	10.37444	-72.55	Pk	37.5	-25.3	12.3	-48.05	-25	-23.05	0-360	149	H
4	5.16075	-69.42	Pk	34.3	-31	12	-54.12	-25	-29.12	0-360	149	V
5	7.75219	-68.76	Pk	35.8	-27.6	12	-48.56	-25	-23.56	0-360	149	V
6	10.33619	-70.7	Pk	37.4	-25.4	12.2	-46.5	-25	-21.5	0-360	149	V
2680 MHz												
1	5.34191	-66.52	Pk	34.5	-31	12.3	-50.72	-25	-25.72	0-360	149	H
2	8.01303	-59.88	Pk	35.7	-27.4	12	-39.58	-25	-14.58	0-360	149	H
3	10.61669	-72.89	Pk	37.8	-24.9	12.4	-47.59	-25	-22.59	0-360	149	H
4	5.34775	-68.03	Pk	34.5	-30.9	12.2	-52.23	-25	-27.23	0-360	149	V
5	8.01303	-56.25	Pk	35.7	-27.4	11.9	-36.05	-25	-11.05	0-360	149	V
6	10.68469	-71.41	Pk	37.9	-24.7	12.4	-45.81	-25	-20.81	0-360	149	V

**9.2.13. LTE BAND 41 (IC)**

**LIMITS**

RSS199§4.5

Equipment shall comply with the following unwanted emission limits:

- a. for base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least  $43 + 10 \log_{10} p$
- b. for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:
  - i.  $40 + 10 \log_{10} p$  from the channel edges to 5 MHz away
  - ii.  $43 + 10 \log_{10} p$  between 5 MHz and X MHz from the channel edges, and
  - iii.  $55 + 10 \log_{10} p$  at X MHz and beyond from the channel edges

In addition, the attenuation shall not be less than  $43 + 10 \log_{10} p$  on all frequencies between 2490.5 MHz and 2496 MHz, and  $55 + 10 \log_{10} p$  at or below 2490.5 MHz.

In (a) and (b), p is the transmitter power measured in watts and X is 6 MHz or the equipment occupied bandwidth, whichever is greater.

**QPSK LTE BAND 41 (20.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/21/20
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode	LTE 41 QPSK 20MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2510 MHz												
1	5.04281	-68.37	PK	34.2	-31.1	12.2	-53.07	-25	-28.07	0-360	149	H
2	7.53013	-66.83	PK	35.7	-27.9	11.8	-47.23	-25	-22.23	0-360	149	H
3	10.04028	-72.16	PK	37.1	-25.1	12.3	-47.86	-25	-22.86	0-360	149	H
4	5.01997	-65.9	PK	34.2	-31.3	11.5	-51.5	-25	-26.5	0-360	149	V
5	7.52959	-68.25	PK	35.7	-27.9	11.8	-48.65	-25	-23.65	0-360	149	V
6	10.03922	-71.99	PK	37.1	-25.1	12.1	-47.89	-25	-22.89	0-360	149	V
2595 MHz												
1	5.22397	-68.72	PK	34.3	-30.9	12.4	-52.92	-25	-27.92	0-360	149	H
2	7.78459	-63.99	PK	35.8	-27.5	12.1	-43.59	-25	-18.59	0-360	149	H
3	10.37975	-73.46	PK	37.6	-25.3	12.4	-48.76	-25	-23.76	0-360	149	H
4	5.17403	-69.19	PK	34.2	-31	12.2	-53.79	-25	-28.79	0-360	149	V
5	7.78459	-61.89	PK	35.8	-27.5	11.9	-41.69	-25	-16.69	0-360	149	V
6	10.37975	-70.9	PK	37.6	-25.3	12.3	-46.3	-25	-21.3	0-360	149	V
2680 MHz												
1	5.3435	-68.71	PK	34.4	-31	12.3	-53.01	-25	-28.01	0-360	149	H
2	8.01356	-65.16	PK	35.7	-27.4	12	-44.86	-25	-19.86	0-360	149	H
3	10.71072	-73.01	PK	37.9	-24.9	12.5	-47.51	-25	-22.51	0-360	149	H
4	5.34191	-69.67	PK	34.5	-31	12.2	-53.97	-25	-28.97	0-360	149	V
5	8.01303	-59.99	PK	35.7	-27.4	11.9	-39.79	-25	-14.79	0-360	149	V
6	10.68469	-72.35	PK	37.9	-24.7	12.4	-46.75	-25	-21.75	0-360	149	V

**16QAM LTE BAND 41 (20.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/21/20
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode	LTE 41 16QAM 20MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2510 MHz												
1	5.07044	-68.52	Pk	34.2	-31.2	11.8	-53.72	-25	-28.72	0-360	149	H
2	7.52959	-65.79	Pk	35.7	-27.9	11.9	-46.09	-25	-21.09	0-360	149	H
3	10.02541	-73.01	Pk	37.1	-25	12.5	-48.41	-25	-23.41	0-360	149	H
4	5.01997	-67.83	Pk	34.2	-31.3	11.5	-53.43	-25	-28.43	0-360	149	V
5	7.53013	-67.04	Pk	35.7	-27.9	11.8	-47.44	-25	-22.44	0-360	149	V
6	10.04028	-70.59	Pk	37.1	-25.1	12	-46.59	-25	-21.59	0-360	149	V
2595 MHz												
1	5.16659	-68.99	Pk	34.3	-31	12.2	-53.49	-25	-28.49	0-360	149	H
2	7.78459	-65.21	Pk	35.8	-27.5	12.1	-44.81	-25	-19.81	0-360	149	H
3	10.31813	-72.34	Pk	37.4	-25.3	12.6	-47.64	-25	-22.64	0-360	149	H
4	5.16925	-68.89	Pk	34.3	-31	12.1	-53.49	-25	-28.49	0-360	149	V
5	7.78513	-65.04	Pk	35.8	-27.5	11.9	-44.84	-25	-19.84	0-360	149	V
6	10.37975	-68.35	Pk	37.6	-25.3	12.3	-43.75	-25	-18.75	0-360	149	V
2680 MHz												
1	5.34191	-66.52	Pk	34.5	-31	12.3	-50.72	-25	-25.72	0-360	149	H
2	8.01303	-59.88	Pk	35.7	-27.4	12	-39.58	-25	-14.58	0-360	149	H
3	10.61669	-72.89	Pk	37.8	-24.9	12.4	-47.59	-25	-22.59	0-360	149	H
4	5.34775	-68.03	Pk	34.5	-30.9	12.2	-52.23	-25	-27.23	0-360	149	V
5	8.01303	-56.25	Pk	35.7	-27.4	11.9	-36.05	-25	-11.05	0-360	149	V
6	10.68469	-71.41	Pk	37.9	-24.7	12.4	-45.81	-25	-20.81	0-360	149	V

**9.2.14. LTE BAND 66**

**LIMITS**

FCC: §27.53 (h)

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

RSS139§6.6

- (i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, Footnote 2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log 10 p (watts) dB.
- (ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log 10 p (watts) dB.

**QPSK LTE BAND 66 (20.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/14/20
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode	LTE 66 QPSK 20MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1720 MHz												
1	3.44003	-62.55	Pk	32.6	-34.3	12	-52.25	-13	-39.25	0-360	149	H
2	5.22291	-69.35	Pk	34.3	-30.9	12.4	-53.55	-13	-40.55	0-360	149	H
3	6.79859	-70.93	Pk	35.6	-28.1	12.4	-51.03	-13	-38.03	0-360	149	H
4	3.44003	-65.98	Pk	32.6	-34.3	11.9	-55.78	-13	-42.78	0-360	149	V
5	5.19263	-68.83	Pk	34.2	-31.1	11.8	-53.93	-13	-40.93	0-360	149	V
6	6.87722	-71.08	Pk	35.7	-28.2	12	-51.58	-13	-38.58	0-360	149	V
1745 MHz												
1	3.47191	-67.44	Pk	33.1	-32.2	11	-55.54	-13	-42.54	0-360	149	H
2	5.22291	-70.23	Pk	34.3	-29	10.8	-54.13	-13	-41.13	0-360	149	H
3	6.85597	-72.65	Pk	35.8	-26.1	10.4	-52.55	-13	-39.55	0-360	149	H
4	3.50378	-67.03	Pk	33.1	-32.1	10.8	-55.23	-13	-42.23	0-360	149	V
5	5.17138	-70.38	Pk	34.2	-29.1	10.6	-54.68	-13	-41.68	0-360	149	V
6	6.93672	-72.8	Pk	35.8	-26.2	10.6	-52.6	-13	-39.6	0-360	149	V
7	12.15253	-70.87	Pk	39	-19.9	10	-41.77	-13	-28.77	0-360	149	V
1770 MHz												
1	3.52184	-66.27	Pk	33	-32.1	10.6	-54.77	-13	-41.77	0-360	149	H
2	5.34616	-70.43	Pk	34.4	-28.8	10.9	-53.93	-13	-40.93	0-360	149	H
3	7.08228	-72.49	Pk	35.7	-26	10.1	-52.69	-13	-39.69	0-360	149	H
4	3.50591	-67.57	Pk	33.1	-32.1	10.7	-55.87	-13	-42.87	0-360	149	V
5	5.27922	-71.36	Pk	34.4	-28.8	11.3	-54.46	-13	-41.46	0-360	149	V
6	7.04509	-73.35	Pk	35.8	-26	10.4	-53.15	-13	-40.15	0-360	149	V
7	12.32784	-72.31	Pk	39	-20.1	9.9	-43.51	-13	-30.51	0-360	149	V

**16QAM LTE BAND 66 (20.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/14/20
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode	LTE 66 16QAM 20MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1720 MHz												
1	3.44003	-63.47	Pk	32.6	-34.3	12	-53.17	-13	-40.17	0-360	149	H
2	5.23194	-69.45	Pk	34.3	-30.8	12.4	-53.55	-13	-40.55	0-360	149	H
3	6.86925	-71.69	Pk	35.5	-28.1	12.4	-51.89	-13	-38.89	0-360	149	H
4	3.44694	-64.99	Pk	32.6	-34.3	12	-54.69	-13	-41.69	0-360	149	V
5	5.12675	-69.01	Pk	34.3	-31.2	12	-53.91	-13	-40.91	0-360	149	V
6	6.86659	-71.17	Pk	35.6	-28.1	12.3	-51.37	-13	-38.37	0-360	149	V
1745 MHz												
1	3.47191	-67.51	Pk	33.1	-32.2	11	-55.61	-13	-42.61	0-360	149	H
2	5.21706	-70.88	Pk	34.2	-29.1	11	-54.78	-13	-41.78	0-360	149	H
3	6.84906	-73.28	Pk	35.7	-26.1	10.5	-53.18	-13	-40.18	0-360	149	H
4	3.43684	-67.03	Pk	33.1	-32.3	11	-55.23	-13	-42.23	0-360	149	V
5	5.15969	-70.02	Pk	34.2	-29.1	10.7	-54.22	-13	-41.22	0-360	149	V
6	6.85066	-72.83	Pk	35.7	-26.1	10.4	-52.83	-13	-39.83	0-360	149	V
7	12.15253	-69.71	Pk	39	-19.9	10	-40.61	-13	-27.61	0-360	149	V
1770 MHz												
1	3.52184	-66.38	Pk	33	-32.1	10.6	-54.88	-13	-41.88	0-360	149	H
2	5.20909	-70.35	Pk	34.2	-29.1	10.9	-54.35	-13	-41.35	0-360	149	H
3	7.13009	-73.2	Pk	35.6	-25.9	10.2	-53.3	-13	-40.3	0-360	149	H
4	3.55956	-67.79	Pk	33.2	-32	10.1	-56.49	-13	-43.49	0-360	149	V
5	5.34775	-71.02	Pk	34.4	-28.8	11	-54.42	-13	-41.42	0-360	149	V
6	7.00578	-72.94	Pk	35.8	-26.1	10.6	-52.64	-13	-39.64	0-360	149	V
7	12.32731	-69.6	Pk	39	-20.1	9.9	-40.8	-13	-27.8	0-360	149	V

**9.2.15. LTE BAND 71**

**LIMITS**

FCC: §27.53 (g)

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

RSS130§4.7

**4.7.1 General unwanted emissions limits**

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least  $43 + 10 \log_{10} p$  (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

**4.7.2 Additional unwanted emissions limits**

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

- a. the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
  - i.  $76 + 10 \log_{10} p$  (watts), dB, for base and fixed equipment and
  - ii.  $65 + 10 \log_{10} p$  (watts), dB, for mobile and portable equipment
- b. the e.i.r.p. in the band 1559-1610 MHz shall not exceed -70 dBW/MHz for wideband signal and -80 dBW for discrete emission with bandwidth less than 700 Hz.

**QPSK LTE BAND 71 (20.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/10/20
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode	LTE 71 QPSK 20MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cpl (dB)	Amp/Cpl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
673 MHz												
1	1.36975	-64.98	PK	29.4	-35.9	11	-60.48	-13	-47.48	0-360	149	H
2	2.04338	-64.44	PK	30.9	-35.6	11.6	-57.54	-13	-44.54	0-360	149	H
3	2.6915	-65.35	PK	32.3	-35.2	11.5	-56.75	-13	-43.75	0-360	149	H
4	1.34531	-65.39	PK	29	-35.8	11.1	-61.09	-13	-48.09	0-360	149	V
5	2.01841	-65.77	PK	30.9	-35.6	11.8	-58.67	-13	-45.67	0-360	149	V
6	2.68353	-66	PK	32.3	-35.2	11.8	-57.1	-13	-44.1	0-360	149	V
680.5 MHz												
1	1.36072	-62.01	PK	29.3	-35.9	11.2	-57.41	-13	-44.41	0-360	149	H
2	2.04178	-62.7	PK	30.9	-35.7	11.5	-56	-13	-43	0-360	149	H
3	2.72231	-65.86	PK	32.2	-35.2	11.2	-57.66	-13	-44.66	0-360	149	H
4	1.36444	-65.34	PK	29.4	-35.8	10.8	-60.94	-13	-47.94	0-360	149	V
5	2.04975	-65.98	PK	30.9	-35.7	10.7	-60.08	-13	-47.08	0-360	149	V
6	2.73294	-65.95	PK	32.2	-35.2	11.4	-57.55	-13	-44.55	0-360	149	V
688 MHz												
1	1.39313	-65.64	PK	28.8	-35.8	12.4	-60.24	-13	-47.24	0-360	149	H
2	2.06356	-61.07	PK	31	-35.6	11.2	-54.47	-13	-41.47	0-360	149	H
3	2.76056	-65.43	PK	32.1	-35.2	12.3	-56.23	-13	-43.23	0-360	149	H
4	1.36816	-64.44	PK	29.4	-35.8	10.8	-60.04	-13	-47.04	0-360	149	V
5	2.06356	-62.66	PK	31	-35.6	10.8	-56.46	-13	-43.46	0-360	149	V
6	2.7425	-65.7	PK	32.2	-35.2	11.7	-57	-13	-44	0-360	149	V



**16QAM LTE BAND 71 (20.0MHZ BANDWIDTH)**

Company:	Samsung
Project #:	13211873
Date:	2/10/20
Test Engineer:	43575
Configuration:	EUT + Support Equipment
Mode	LTE 71 16QAM 20MHz
Chamber #:	Chamber J

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	WWAN Harmonics Limit	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
673 MHz												
1	1.34053	-64.99	Pk	29	-35.9	11.6	-60.29	-13	-47.29	0-360	149	H
2	2.01894	-64.61	Pk	30.9	-35.7	11.2	-58.21	-13	-45.21	0-360	149	H
3	2.71488	-65.06	Pk	32.2	-35.2	11.2	-56.86	-13	-43.86	0-360	149	H
4	1.34584	-65.15	Pk	29	-35.8	11.1	-60.85	-13	-47.85	0-360	149	V
5	2.01894	-65.55	Pk	30.9	-35.7	11.8	-58.55	-13	-45.55	0-360	149	V
6	2.69177	-65.46	Pk	32.3	-35.2	11.9	-56.46	-13	-43.46	0-360	149	V
680.5 MHz												
1	1.36019	-63.66	Pk	29.3	-35.9	11.3	-58.96	-13	-45.96	0-360	149	H
2	2.04072	-63.98	Pk	30.9	-35.7	11.4	-57.38	-13	-44.38	0-360	149	H
3	2.73081	-66.01	Pk	32.2	-35.2	11.4	-57.61	-13	-44.61	0-360	149	H
4	1.36391	-66.11	Pk	29.4	-35.8	10.8	-61.71	-13	-48.71	0-360	149	V
5	2.04125	-64.57	Pk	30.9	-35.7	10.9	-58.47	-13	-45.47	0-360	149	V
6	2.72178	-66.09	Pk	32.2	-35.2	11.3	-57.79	-13	-44.79	0-360	149	V
688 MHz												
1	1.35009	-65.29	Pk	29.2	-35.9	11.5	-60.49	-13	-47.49	0-360	149	H
2	2.06356	-59.69	Pk	31	-35.6	11.2	-53.09	-13	-40.09	0-360	149	H
3	2.74409	-64.37	Pk	32.1	-35.2	11.8	-55.67	-13	-42.67	0-360	149	H
4	1.36231	-64.81	Pk	29.3	-35.9	10.9	-60.51	-13	-47.51	0-360	149	V
5	2.06409	-63.19	Pk	31	-35.6	10.8	-56.99	-13	-43.99	0-360	149	V
6	2.73931	-64.64	Pk	32.2	-35.2	11.7	-55.94	-13	-42.94	0-360	149	V