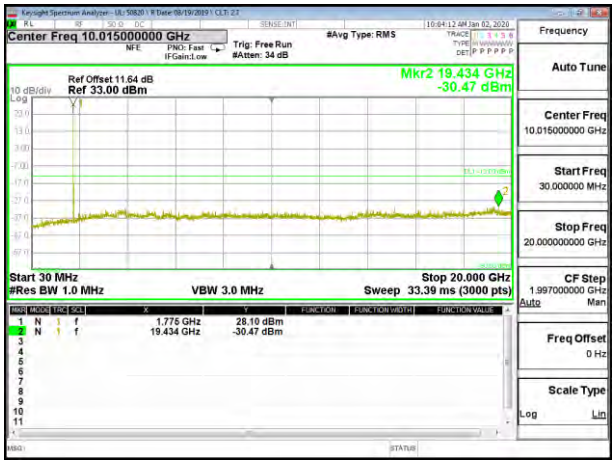
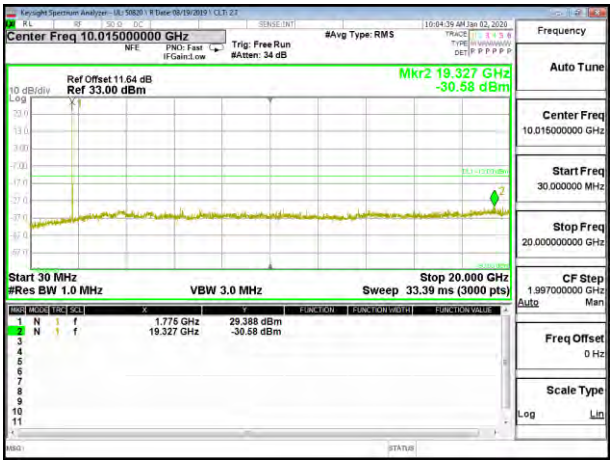


LTE B66 5MHz QPSK High Channel RB1-0



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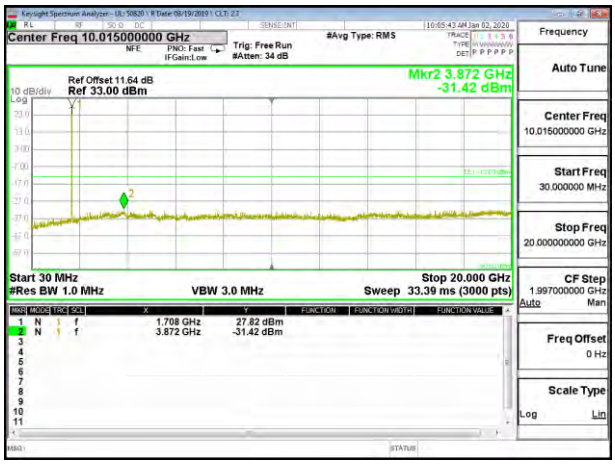

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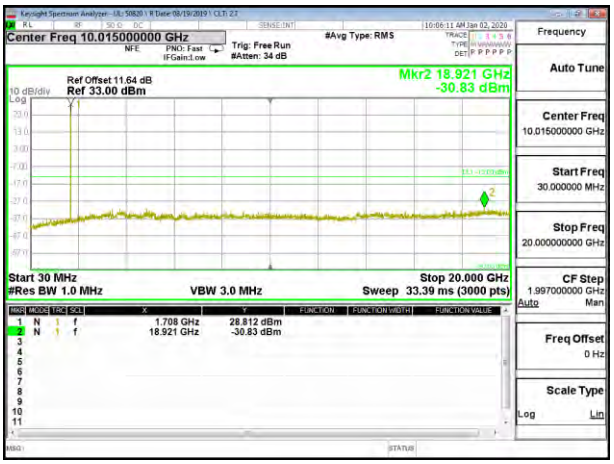

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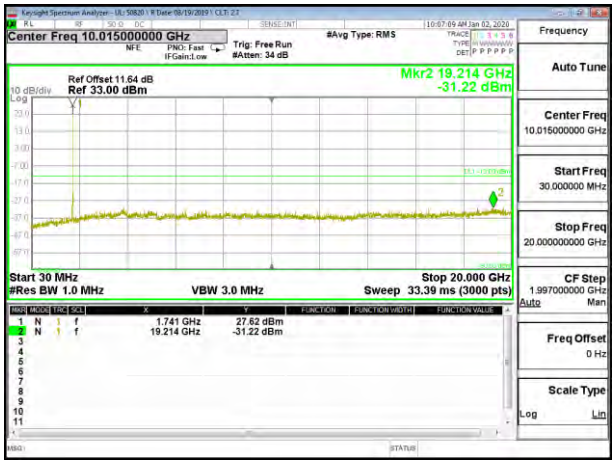

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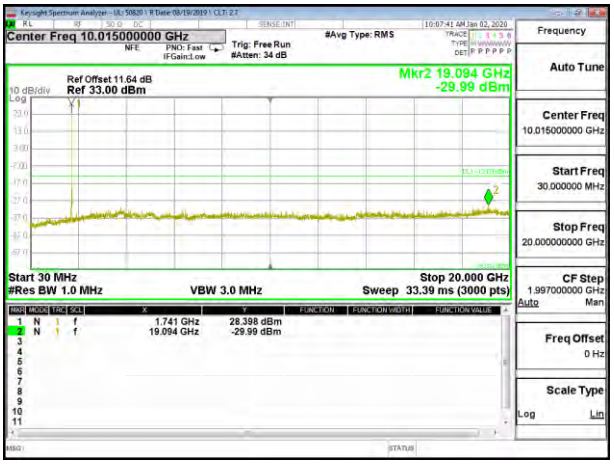

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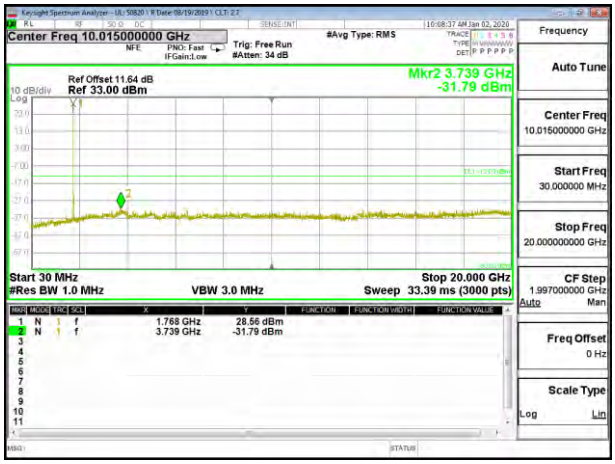

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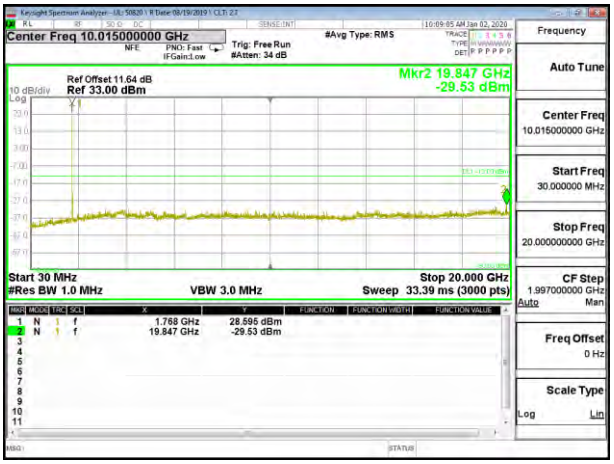

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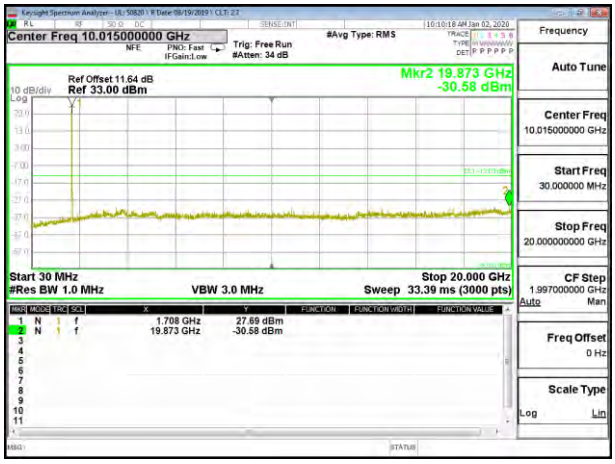

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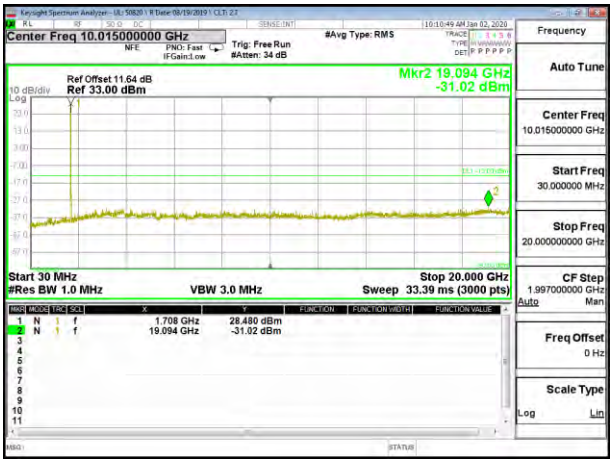

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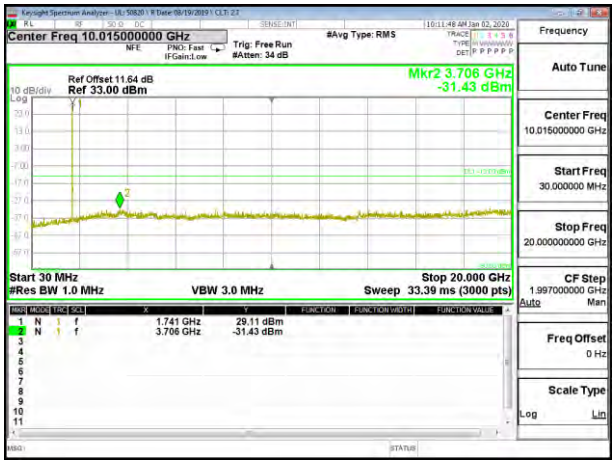

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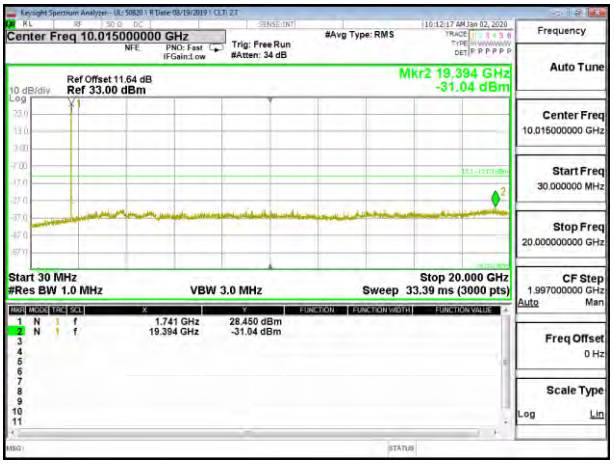

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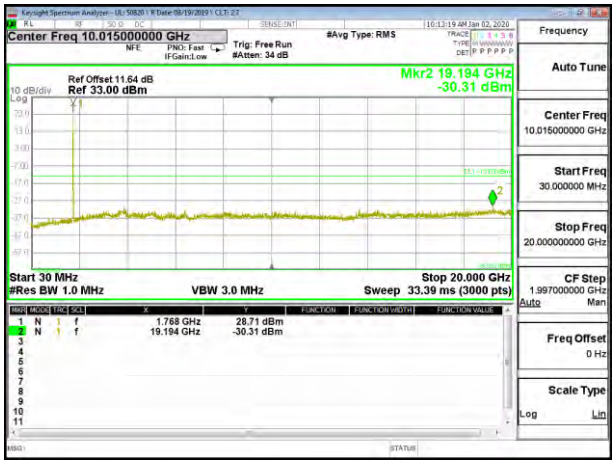

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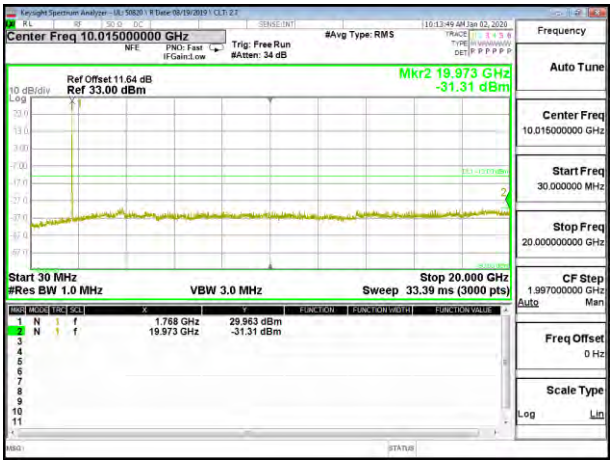

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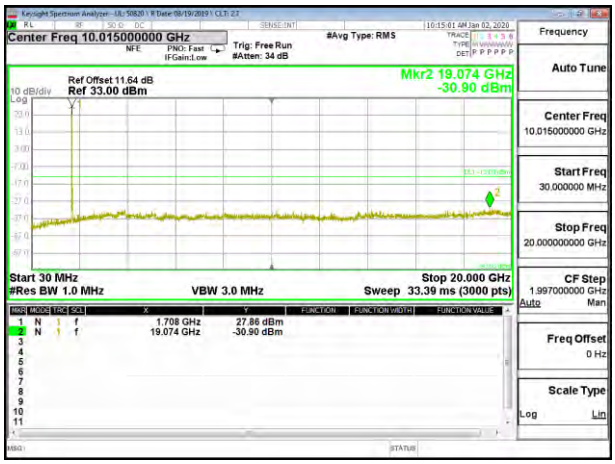
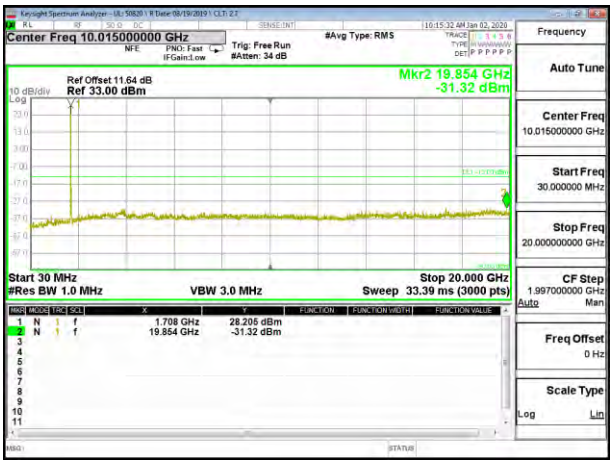


LTE B66 20MHz QPSK Low Channel RB1-0



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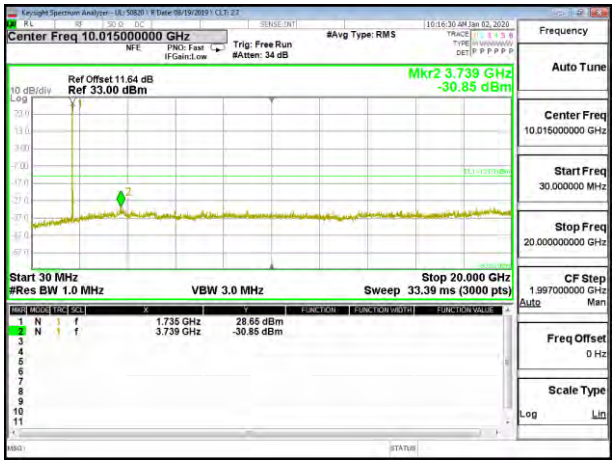

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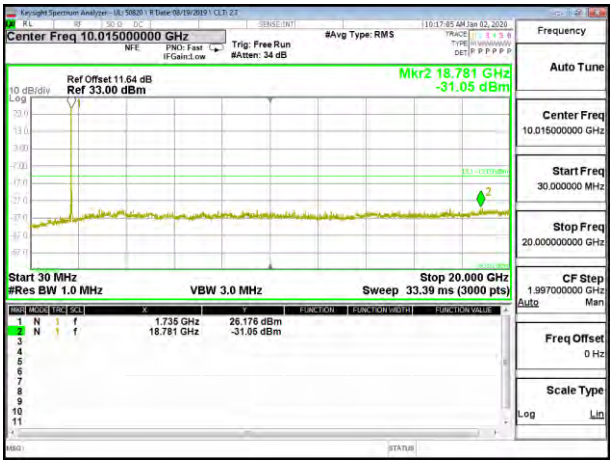
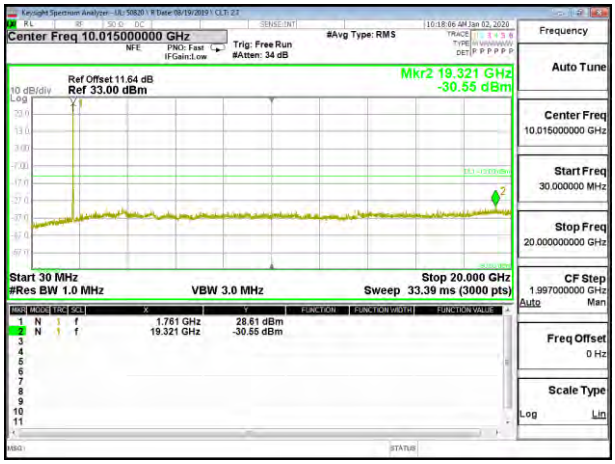
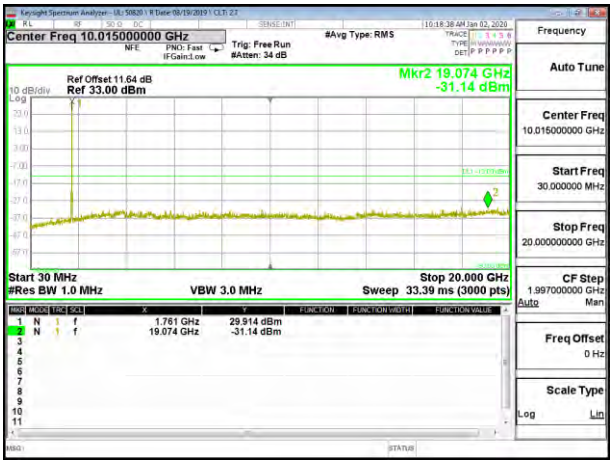


LTE B66 20MHz 16QAM Middle Channel RB1-0



LTE B66 20MHz QPSK High Channel RB1-0

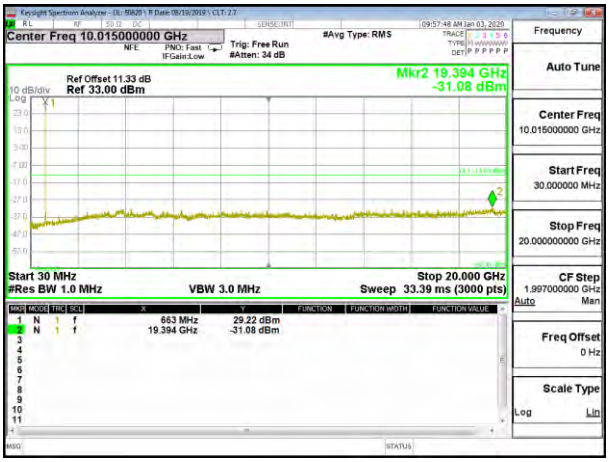


LTE B66 20MHz 16QAM High Channel RB1-0

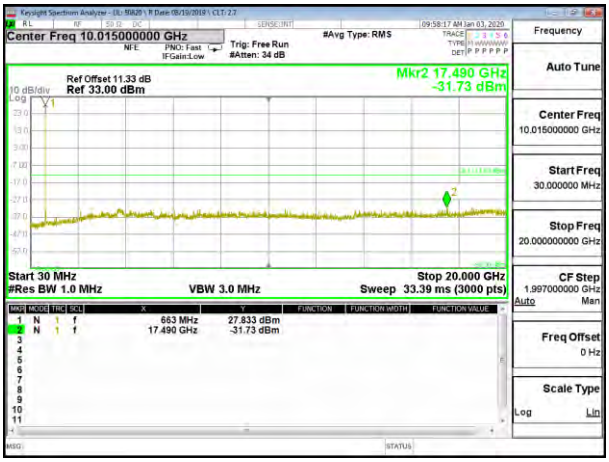
8.3.22. LTE BAND 71

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.



LTE B71 5MHz QPSK Low Channel RB1-0



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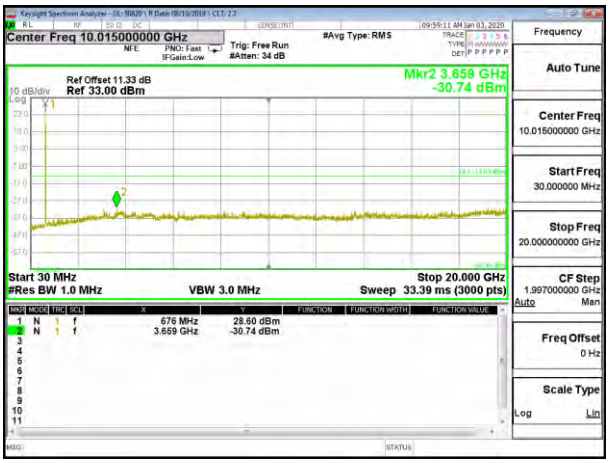
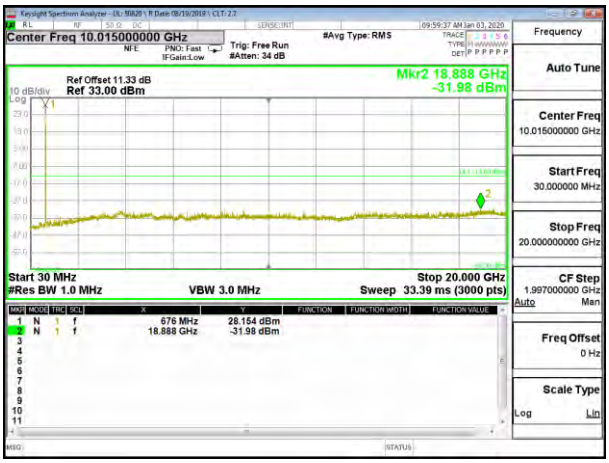


LTE B71 5MHz QPSK Middle Channel RB1-0



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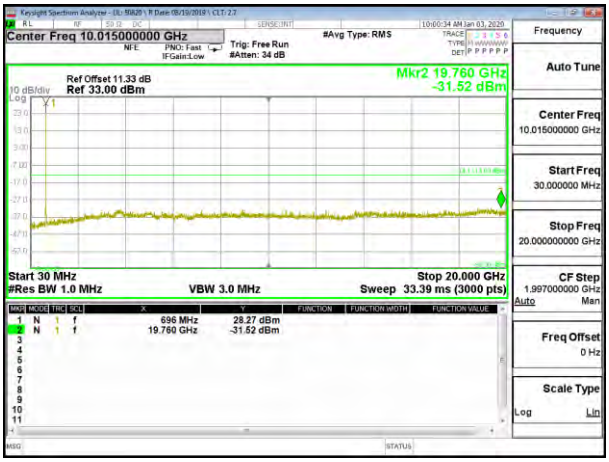

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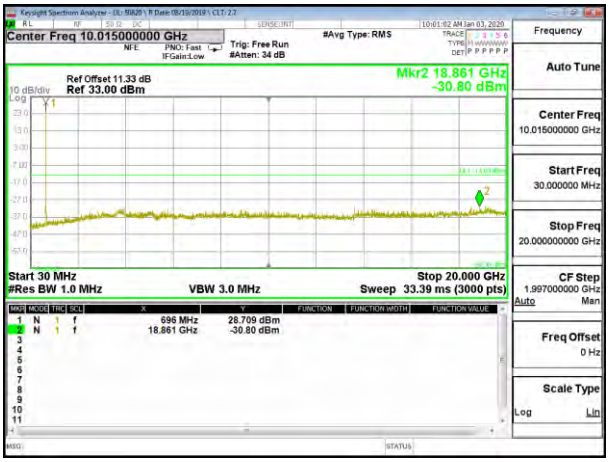

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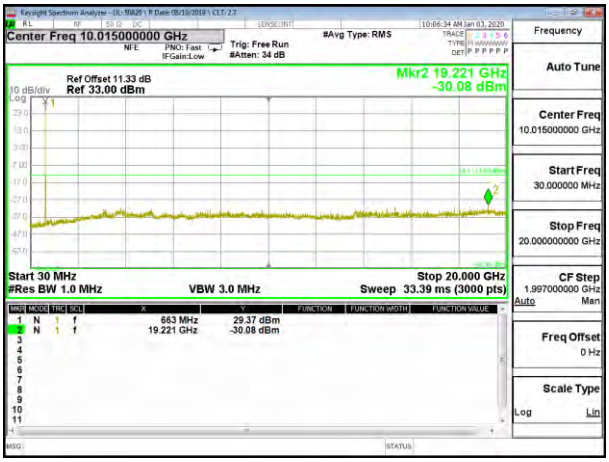
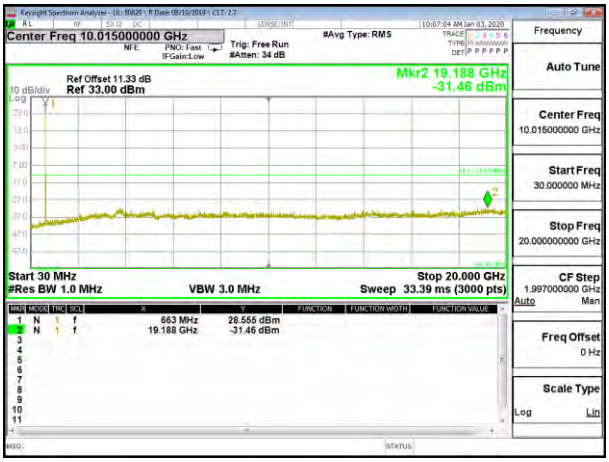


LTE B71 10MHz QPSK Low Channel RB1-0



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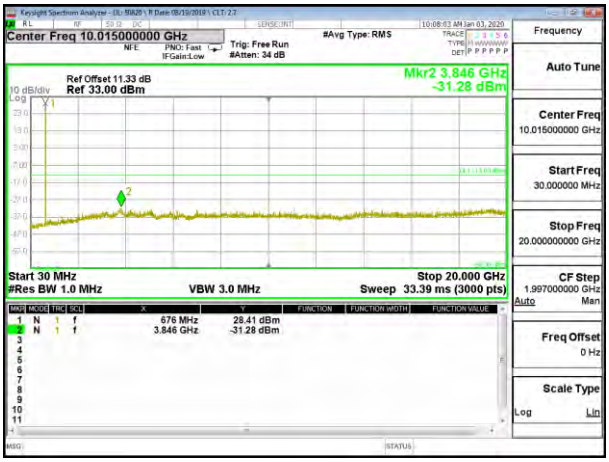

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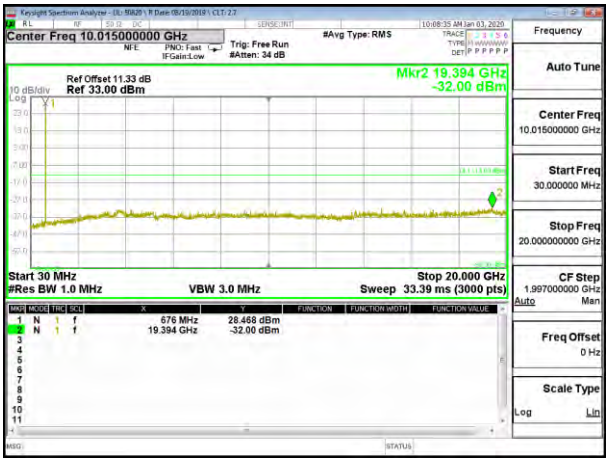

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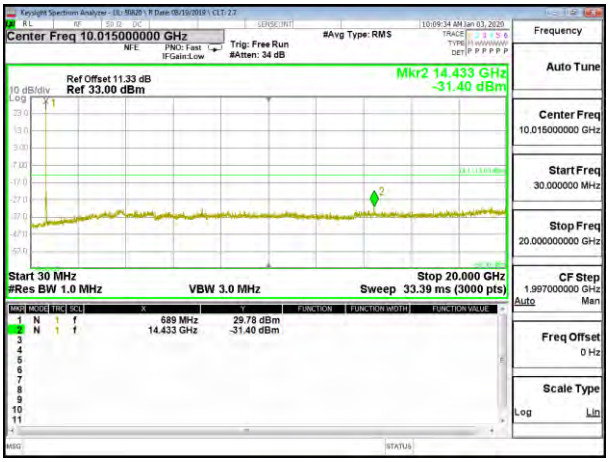
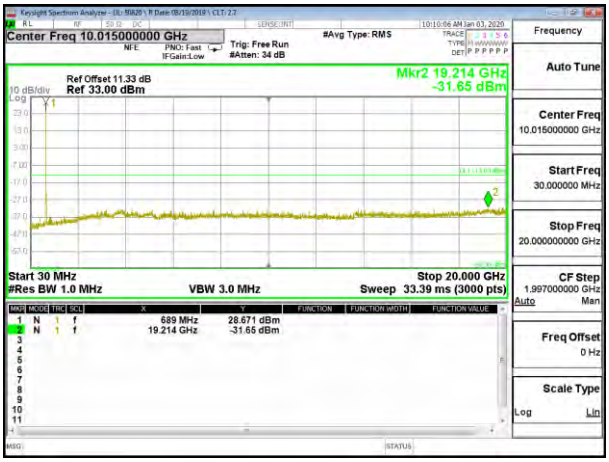


LTE 71 10MHz QPSK High Channel RB1-0



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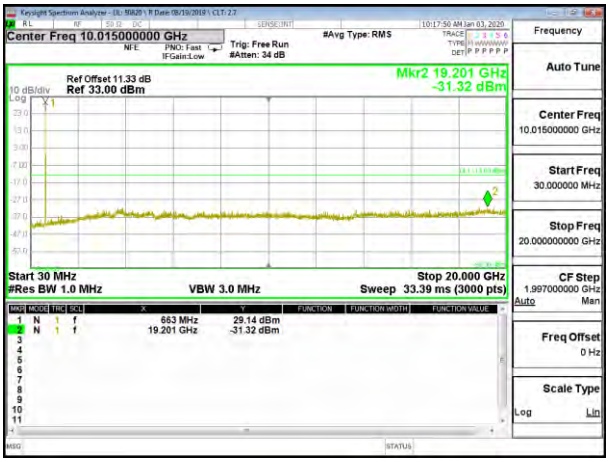

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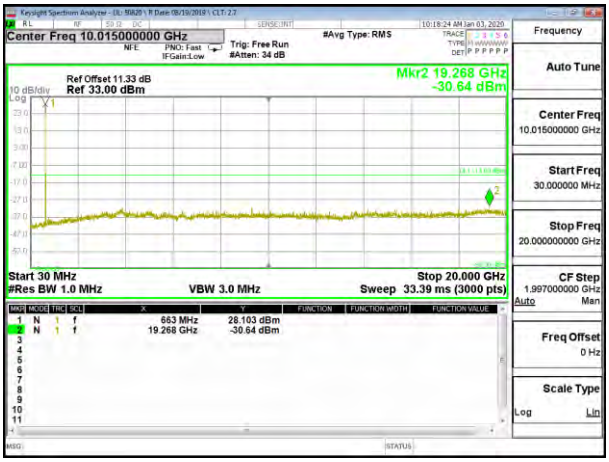

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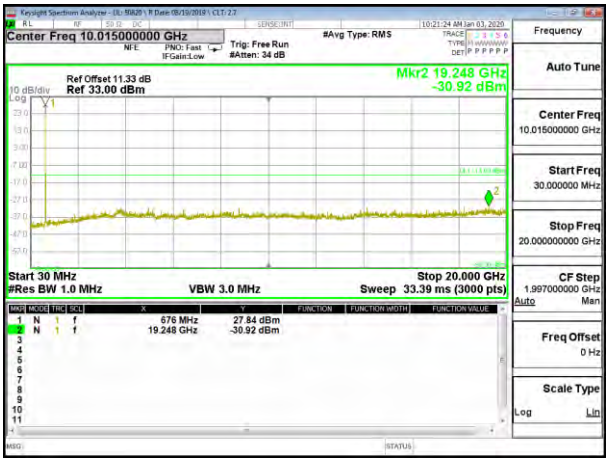

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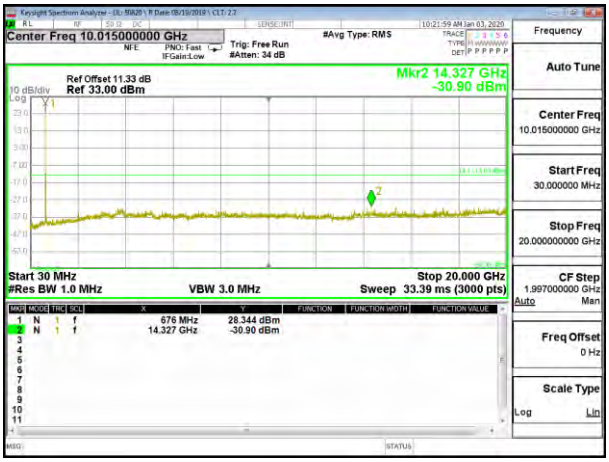

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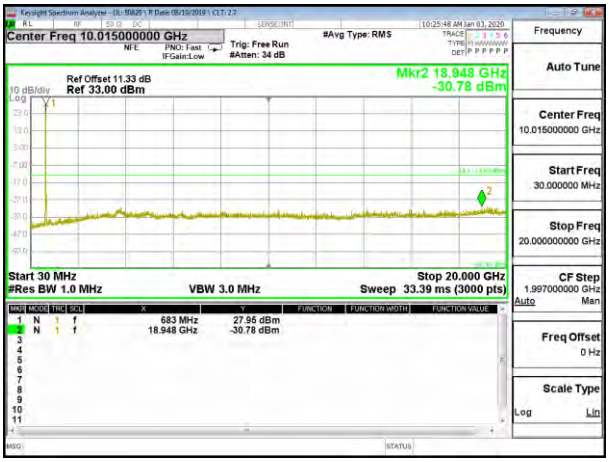
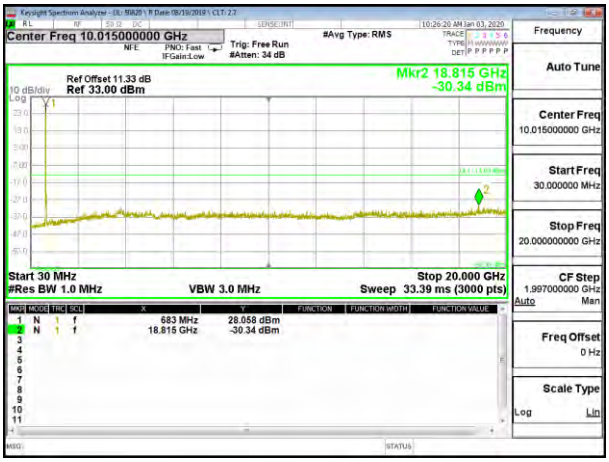
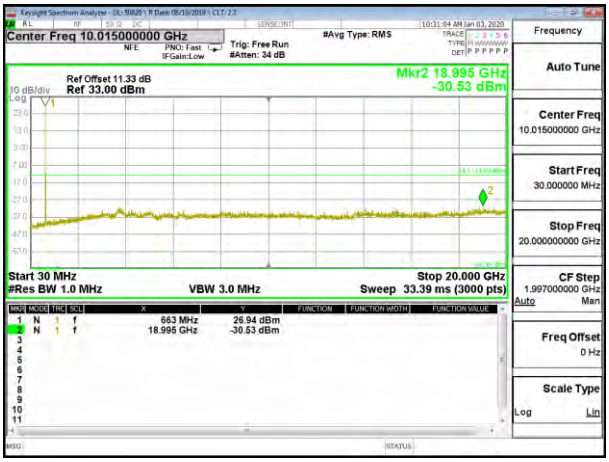


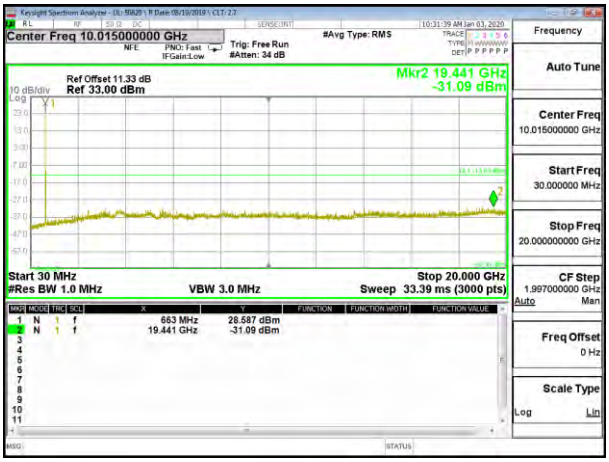
LTE B71 15MHz QPSK High Channel RB1-0



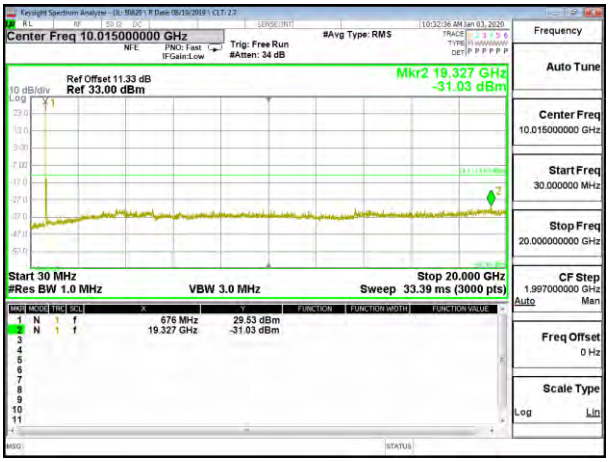
LTE B71 15MHz 16QAM High Channel RB1-0



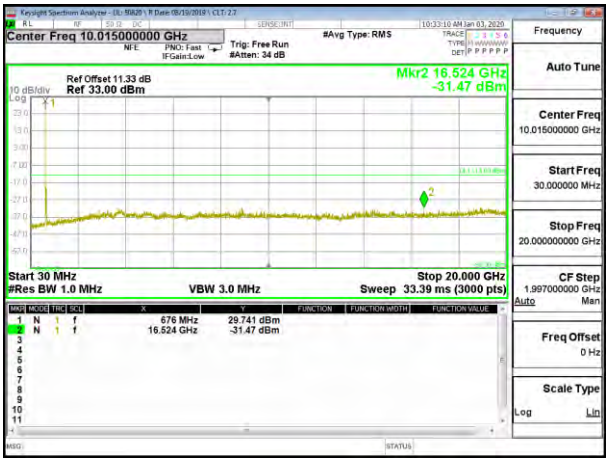
LTE B71 20MHz QPSK Low Channel RB1-0



LTE B71 20MHz 16QAM Low Channel RB1-0



LTE B71 20MHz QPSK Middle Channel RB1-0



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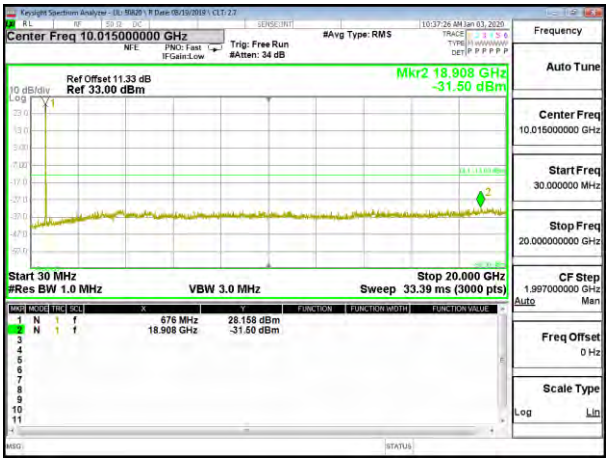
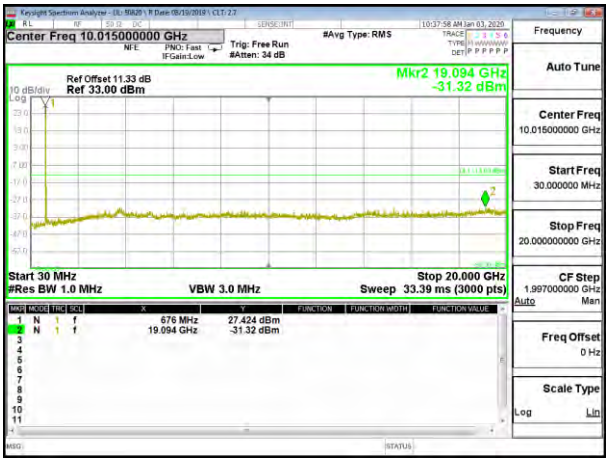


LTE B71 20MHz QPSK High Channel RB1-0



LTE B71 20MHz 16QAM High Channel RB1-0

8.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54, §90.213 and §90.539
ISED: RSS130§4.5, RSS132§5.3; RSS133§6.3, RSS139§6.4, RSS140§4.2, RSS199§4.3.

LIMITS

FCC: §22.355, §90.213
The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

FCC: §90.539
(e) The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 ppm or better when AFC is locked to a base station, and 5 ppm or better when AFC is not locked.

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

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 ±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.

RSS133§6.3
The carrier frequency shall not depart from the reference frequency, in excess of ±2.5 ppm for mobile stations and ±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°C to +50°C
- Voltage = (85% - 115%)

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

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

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

RESULTS

See the following pages.

8.4.1. GSM

Test Engineer ID:	43575 OS	Test Date:	1/2/2020

GPRS 850

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)		824.0308	848.9711		
Extreme (50C)		824.0308	848.9711	-16.2	-0.019
Extreme (40C)		824.0308	848.9711	-12.2	-0.015
Extreme (30C)		824.0308	848.9711	-27.0	-0.032
Extreme (10C)	Normal	824.0308	848.9711	-8.9	-0.011
Extreme (0C)		824.0308	848.9711	-17.1	-0.020
Extreme (-10C)		824.0308	848.9711	-16.4	-0.020
Extreme (-20C)		824.0308	848.9711	-26.9	-0.032
Extreme (-30C)		824.0308	848.9711	-22.6	-0.027
	15%	824.0308	848.9711	-18.4	-0.022
20C	-15%	824.0308	848.9711	-17.6	-0.021
	End Point	824.0308	848.9711	-17.3	-0.021

GPRS 1900

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)		1850.0359	1909.9583		
Extreme (50C)		1850.0359	1909.9582	-25.8	-0.014
Extreme (40C)		1850.0359	1909.9582	-39.5	-0.021
Extreme (30C)		1850.0359	1909.9582	-49.3	-0.026
Extreme (10C)	Normal	1850.0359	1909.9582	-11.9	-0.006
Extreme (0C)		1850.0359	1909.9582	-22.4	-0.012
Extreme (-10C)		1850.0359	1909.9582	-28.5	-0.015
Extreme (-20C)		1850.0359	1909.9582	-11.9	-0.006
Extreme (-30C)		1850.0359	1909.9582	-45.3	-0.024
	15%	1850.0359	1909.9582	-30.9	-0.016
20C	-15%	1850.0359	1909.9582	-36.6	-0.019
	End Point	1850.0359	1909.9582	-32.5	-0.017

8.4.2. CDMA

Test Engineer ID:	43575 OS	Test Date:	1/6/2020

CDMA 1xRTT BC10

Limit		816.35	823.65	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)		816.4917	823.4465		
Extreme (50C)		816.4917	823.4465	4.3	0.01
Extreme (40C)		816.4917	823.4465	4.1	0.00
Extreme (30C)		816.4917	823.4465	4.7	0.01
Extreme (10C)	Normal	816.4917	823.4465	4.5	0.01
Extreme (0C)		816.4917	823.4465	-3.6	0.00
Extreme (-10C)		816.4917	823.4465	-3.9	0.00
Extreme (-20C)		816.4917	823.4465	3.8	0.00
Extreme (-30C)		816.4917	823.4465	-5.8	-0.01
20C	15%	816.4917	823.4465	4.3	0.01
	-15%	816.4917	823.4465	4.1	0.00
	End Point	816.4917	823.4465	4.7	0.01

CDMA 1xRTT BC0

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)		824.0237	848.8463		
Extreme (50C)		824.0237	848.8463	-2.6	0.00
Extreme (40C)		824.0237	848.8463	1.4	0.00
Extreme (30C)		824.0237	848.8463	-2.9	0.00
Extreme (10C)	Normal	824.0237	848.8463	9.9	0.01
Extreme (0C)		824.0237	848.8463	9.6	0.01
Extreme (-10C)		824.0237	848.8463	9.1	0.01
Extreme (-20C)		824.0237	848.8463	-4.7	-0.01
Extreme (-30C)		824.0237	848.8463	-5.9	-0.01
20C	15%	824.0237	848.8463	3.4	0.00
	-15%	824.0237	848.8463	-2.8	0.00
	End Point	824.0237	848.8463	-2.6	0.00

CDMA 1xRTT BC1

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1850.5523	1909.4365		
Extreme (50C)		1850.5523	1909.4365	8.0	0.00
Extreme (40C)		1850.5523	1909.4365	10.6	0.01
Extreme (30C)		1850.5523	1909.4365	8.7	0.00
Extreme (10C)		1850.5523	1909.4365	7.8	0.00
Extreme (0C)		1850.5523	1909.4365	6.8	0.00
Extreme (-10C)		1850.5523	1909.4365	-10.1	-0.01
Extreme (-20C)		1850.5523	1909.4365	-8.8	0.00
Extreme (-30C)		1850.5523	1909.4365	-8.9	0.00
20C	15%	1850.5522	1909.4365	-28.3	-0.02
	-15%	1850.5523	1909.4365	11.0	0.01
	End Point	1850.5522	1909.4365	-28.2	-0.02

8.4.3. WCDMA

Test Engineer ID:	43575 OS	Test Date:	1/2/2020

WCDMA REL 99 BAND 5

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)		824.0868	848.9233		
Extreme (50C)		824.0868	848.9233	-2.1	-0.0026
Extreme (40C)		824.0868	848.9233	-2.3	-0.0027
Extreme (30C)		824.0868	848.9233	2.1	0.0025
Extreme (10C)	Normal	824.0868	848.9233	2.0	0.0024
Extreme (0C)		824.0868	848.9233	-2.7	-0.0032
Extreme (-10C)		824.0868	848.9233	2.7	0.0032
Extreme (-20C)		824.0868	848.9233	2.4	0.0029
Extreme (-30C)		824.0868	848.9233	3.0	0.0036
	15%	824.0868	848.9233	2.0	0.0024
20C	-15%	824.0868	848.9233	2.1	0.0026
	End Point	824.0868	848.9233	1.5	0.0018

WCDMA REL 99 BAND 2

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)		1850.0910	1909.9105		
Extreme (50C)		1850.0910	1909.9105	-3.5	-0.0019
Extreme (40C)		1850.0910	1909.9105	-3.2	-0.0017
Extreme (30C)		1850.0910	1909.9105	-3.2	-0.0017
Extreme (10C)	Normal	1850.0910	1909.9105	-2.6	-0.0014
Extreme (0C)		1850.0910	1909.9105	-2.9	-0.0016
Extreme (-10C)		1850.0910	1909.9105	-3.1	-0.0016
Extreme (-20C)		1850.0910	1909.9105	-3.3	-0.0018
Extreme (-30C)		1850.0910	1909.9105	2.8	0.0015
	15%	1850.0910	1909.9105	-2.5	-0.0013
20C	-15%	1850.0910	1909.9105	3.5	0.0019
	End Point	1850.0910	1909.9105	-1.8	-0.0010

WCDMA REL 99 BAND 4

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1710.1105	1754.9011		
Extreme (50C)		1710.1105	1754.9011	3.4	0.0020
Extreme (40C)		1710.1105	1754.9011	-3.1	-0.0018
Extreme (30C)		1710.1105	1754.9011	-3.0	-0.0017
Extreme (10C)		1710.1105	1754.9011	3.9	0.0023
Extreme (0C)		1710.1105	1754.9011	3.2	0.0019
Extreme (-10C)		1710.1105	1754.9011	-2.9	-0.0017
Extreme (-20C)		1710.1105	1754.9011	-3.3	-0.0019
Extreme (-30C)		1710.1105	1754.9011	-3.7	-0.0021
20C	15%	1710.1105	1754.9011	-3.0	-0.0018
	-15%	1710.1105	1754.9011	-3.6	-0.0021
	End Point	1710.1105	1754.9011	-3.2	-0.0019

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.

Test Engineer ID:	43575 OS	Test Date:	12/27/2019

QPSK, (10MHz BANDWIDTH)

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	824.0013	848.8237		
Extreme (50C)		824.0013	848.8237	2.6	0.003
Extreme (40C)		824.0013	848.8237	2.7	0.003
Extreme (30C)		824.0013	848.8237	3.4	0.004
Extreme (10C)		824.0013	848.8237	2.8	0.003
Extreme (0C)		824.0013	848.8237	3.1	0.004
Extreme (-10C)		824.0013	848.8237	-3.0	-0.004
Extreme (-20C)		824.0013	848.8237	-3.7	-0.004
Extreme (-30C)		824.0013	848.8237	-3.9	-0.005
20C	15%	824.0013	848.8237	-3.3	-0.004
	-15%	824.0013	848.8237	-3.3	-0.004
	End Point	824.0013	848.8237	-3.2	-0.004

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.

Test Engineer ID:	43575 OS	Test Date:	12/27/2019

QPSK, (20MHz BANDWIDTH)

Limit		2500	2570	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2500.9685	2569.0692		
Extreme (50C)		2500.9685	2569.0692	-10.3	-0.004
Extreme (40C)		2500.9685	2569.0692	-10.1	-0.004
Extreme (30C)		2500.9685	2569.0692	-10.6	-0.004
Extreme (10C)		2500.9685	2569.0692	-11.5	-0.005
Extreme (0C)		2500.9685	2569.0692	-11.9	-0.005
Extreme (-10C)		2500.9685	2569.0692	-14.6	-0.006
Extreme (-20C)		2500.9685	2569.0692	-14.9	-0.006
Extreme (-30C)		2500.9685	2569.0692	-12.3	-0.005
20C	15%	2500.9685	2569.0692	-12.4	-0.005
	-15%	2500.9685	2569.0692	-13.3	-0.005
	End Point	2500.9685	2569.0692	-10.5	-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.

Test Engineer ID:	43575 OS	Test Date:	12/27/2019

QPSK, (10MHz BANDWIDTH)

Limit		699	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	699.1260	715.9697		
Extreme (50C)		699.1260	715.9697	2.4	0.003
Extreme (40C)		699.1260	715.9697	2.7	0.004
Extreme (30C)		699.1260	715.9697	2.3	0.003
Extreme (10C)		699.1260	715.9697	3.1	0.004
Extreme (0C)		699.1260	715.9697	-2.3	-0.003
Extreme (-10C)		699.1260	715.9697	2.2	0.003
Extreme (-20C)		699.1260	715.9697	-3.7	-0.005
Extreme (-30C)		699.1260	715.9697	-2.8	-0.004
20C	15%	699.1260	715.9697	3.6	0.005
	-15%	699.1260	715.9697	2.8	0.004
	End Point	699.1260	715.9697	-3.0	-0.004

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.

Test Engineer ID:	43575 OS	Test Date:	12/27/2019

QPSK, (10MHz BANDWIDTH)

Limit		777	787	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	777.1054	786.9728		
Extreme (50C)		777.1054	786.9728	3.2	0.004
Extreme (40C)		777.1054	786.9728	2.4	0.003
Extreme (30C)		777.1054	786.9728	3.3	0.004
Extreme (10C)		777.1054	786.9728	3.0	0.004
Extreme (0C)		777.1054	786.9728	2.9	0.004
Extreme (-10C)		777.1054	786.9728	-2.2	-0.003
Extreme (-20C)		777.1054	786.9728	-2.9	-0.004
Extreme (-30C)		777.1054	786.9728	-2.5	-0.003
20C	15%	777.1054	786.9728	-3.8	-0.005
	-15%	777.1054	786.9728	-2.7	-0.003
	End Point	777.1054	786.9728	3.0	0.004

8.4.8. LTE BAND 14

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.

Test Engineer ID:	43575 OS	Test Date:	1/17/2020

QPSK, (10MHz BANDWIDTH)

Limit		788	798	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	788.1956	797.8200		
Extreme (50C)		788.1956	797.8200	-5.1	-0.006
Extreme (40C)		788.1956	797.8200	-5.1	-0.006
Extreme (30C)		788.1956	797.8200	-8.3	-0.010
Extreme (10C)		788.1956	797.8200	-8.1	-0.010
Extreme (0C)		788.1956	797.8200	-7.6	-0.010
Extreme (-10C)		788.1956	797.8200	-7.2	-0.009
Extreme (-20C)		788.1956	797.8200	8.7	0.011
Extreme (-30C)		788.1956	797.8200	-25.4	-0.032
20C	15%	788.1956	797.8200	17.6	0.022
	-15%	788.1956	797.8200	21.9	0.028
	End Point	788.1956	797.8200	-15.3	-0.019

8.4.9. LTE BAND 25

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 ±2.5 ppm for mobile stations and ±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.

Test Engineer ID:	43575 OS	Test Date:	12/27/2019

QPSK, (20MHz BANDWIDTH)

Limit		1850	1915	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1850.5417	1914.4292		
Extreme (50C)		1850.5417	1914.4292	-3.3	-0.002
Extreme (40C)		1850.5417	1914.4292	-2.5	-0.001
Extreme (30C)		1850.5417	1914.4292	-3.1	-0.002
Extreme (10C)		1850.5417	1914.4292	4.6	0.002
Extreme (0C)		1850.5417	1914.4292	-5.5	-0.003
Extreme (-10C)		1850.5417	1914.4292	-5.2	-0.003
Extreme (-20C)		1850.5417	1914.4292	-6.0	-0.003
Extreme (-30C)		1850.5417	1914.4292	-6.7	-0.004
20C	15%	1850.5417	1914.4292	-6.7	-0.004
	-15%	1850.5417	1914.4292	-6.9	-0.004
	End Point	1850.5417	1914.4292	-4.3	-0.002

8.4.10. LTE BAND 26(FCC PART 90S)

LIMITS

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

Test Engineer ID:	43575 OS	Test Date:	12/27/2019

QPSK, (10MHz BANDWIDTH)

Limit		814	824	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	814.0080	823.9113		
Extreme (50C)		814.0080	823.9113	2.9	0.003
Extreme (40C)		814.0080	823.9113	2.0	0.002
Extreme (30C)		814.0080	823.9113	2.4	0.003
Extreme (10C)		814.0080	823.9113	3.2	0.004
Extreme (0C)		814.0080	823.9113	-2.8	-0.003
Extreme (-10C)		814.0080	823.9113	-2.8	-0.003
Extreme (-20C)		814.0080	823.9113	-3.4	-0.004
Extreme (-30C)		814.0080	823.9113	3.0	0.004
20C	15%	814.0080	823.9113	-2.9	-0.003
	-15%	814.0080	823.9113	3.0	0.004
	End Point	814.0080	823.9113	3.4	0.004

8.4.11. LTE BAND 26(FCC PART 22)

LIMITS

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

Test Engineer ID:	43575 OS	Test Date:	12/27/2019

QPSK, (15MHz BANDWIDTH)

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	824.6231	848.7596		
Extreme (50C)		824.6231	848.7596	3.1	0.004
Extreme (40C)		824.6231	848.7596	2.4	0.003
Extreme (30C)		824.6231	848.7596	3.5	0.004
Extreme (10C)		824.6231	848.7596	2.5	0.003
Extreme (0C)		824.6231	848.7596	-3.8	-0.005
Extreme (-10C)		824.6231	848.7596	-4.1	-0.005
Extreme (-20C)		824.6231	848.7596	-3.5	-0.004
Extreme (-30C)		824.6231	848.7596	-2.8	-0.003
20C	15%	824.6231	848.7596	3.5	0.004
	-15%	824.6231	848.7596	2.9	0.003
	End Point	824.6231	848.7596	3.2	0.004

8.4.12. LTE BAND 30

LIMITS

FCC: §27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.
ISED: RSS195§5.4
The applicant shall ensure frequency stability by showing that the occupied bandwidth is maintained within the range of the operating frequency blocks when testing under the temperature and supply voltage variations specified for the frequency stability measurement in RSS-Gen.

Test Engineer ID:	43575 OS	Test Date:	1/8/2020

QPSK, (10MHz BANDWIDTH)

Limit		2305	2315	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2305.1907	2314.6277		
Extreme (50C)		2305.1907	2314.6277	7.5	0.003
Extreme (40C)		2305.1907	2314.6277	-9.4	-0.004
Extreme (30C)		2305.1907	2314.6277	-9.9	-0.004
Extreme (10C)		2305.1907	2314.6277	-11.0	-0.005
Extreme (0C)		2305.1907	2314.6277	-11.6	-0.005
Extreme (-10C)		2305.1907	2314.6277	-11.8	-0.005
Extreme (-20C)		2305.1907	2314.6277	-14.2	-0.006
Extreme (-30C)		2305.1907	2314.6277	-11.8	-0.005
20C	15%	2305.1907	2314.6277	-11.1	-0.005
	-15%	2305.1907	2314.6277	-13.1	-0.006
	End Point	2305.1907	2314.6277	-9.0	-0.004

8.4.13. LTE BAND 38 (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.

Test Engineer ID:	43575 OS	Test Date:	1/8/2020

QPSK, (20MHz BANDWIDTH)

Limit		2570	2620	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2570.6447	2619.2556		
Extreme (50C)		2570.6447	2619.2556	-18.2	-0.007
Extreme (40C)		2570.6447	2619.2556	-28.7	-0.011
Extreme (30C)		2570.6447	2619.2556	-18.0	-0.007
Extreme (10C)		2570.6447	2619.2556	-25.8	-0.010
Extreme (0C)		2570.6447	2619.2556	-18.5	-0.007
Extreme (-10C)		2570.6447	2619.2556	-21.6	-0.008
Extreme (-20C)		2570.6447	2619.2556	-18.6	-0.007
Extreme (-30C)		2570.6447	2619.2556	-15.8	-0.006
20C	15%	2570.6447	2619.2556	-17.5	-0.007
	-15%	2570.6447	2619.2556	-18.7	-0.007
	End Point	2570.6447	2619.2556	-27.4	-0.011

8.4.14. LTE BAND 41 (FCC) HPUE

LIMITS

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

Test Engineer ID:	43575 OS	Test Date:	1/3/2020

QPSK, (20MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2496.6234	2689.0673		
Extreme (50C)		2496.6234	2689.0673	-5.6	-0.002
Extreme (40C)		2496.6234	2689.0673	4.9	0.002
Extreme (30C)		2496.6234	2689.0673	-5.5	-0.002
Extreme (10C)		2496.6234	2689.0673	-5.5	-0.002
Extreme (0C)		2496.6234	2689.0673	5.4	0.002
Extreme (-10C)		2496.6234	2689.0673	-7.0	-0.003
Extreme (-20C)		2496.6234	2689.0673	-9.0	-0.003
Extreme (-30C)		2496.6234	2689.0673	-8.1	-0.003
20C	15%	2496.6234	2689.0673	-5.1	-0.002
	-15%	2496.6234	2689.0673	5.5	0.002
	End Point	2496.6234	2689.0673	-5.3	-0.002

8.4.15. 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.

Test Engineer ID:	43575 OS	Test Date:	1/3/2020

QPSK, (20MHz BANDWIDTH)

Limit		2500	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2500.9281	2689.6874		
Extreme (50C)		2500.9281	2689.6874	-4.9	-0.002
Extreme (40C)		2500.9281	2689.6874	4.7	0.002
Extreme (30C)		2500.9281	2689.6874	-5.2	-0.002
Extreme (10C)		2500.9281	2689.6874	-7.3	-0.003
Extreme (0C)		2500.9281	2689.6874	-6.0	-0.002
Extreme (-10C)		2500.9281	2689.6874	-8.5	-0.003
Extreme (-20C)		2500.9281	2689.6874	-9.2	-0.004
Extreme (-30C)		2500.9281	2689.6874	-9.1	-0.003
20C	15%	2500.9281	2689.6874	-5.9	-0.002
	-15%	2500.9281	2689.6874	-5.6	-0.002
	End Point	2500.9281	2689.6874	-4.3	-0.002

8.4.16. 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.

Test Engineer ID:	43575 OS	Test Date:	12/27/2019

QPSK, (20MHz BANDWIDTH)

Limit		1710	1780	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1710.6131	1779.5117		
Extreme (50C)		1710.6131	1779.5117	-2.4	-0.001
Extreme (40C)		1710.6131	1779.5117	4.6	0.003
Extreme (30C)		1710.6131	1779.5117	3.7	0.002
Extreme (10C)		1710.6131	1779.5117	4.9	0.003
Extreme (0C)		1710.6131	1779.5117	-3.2	-0.002
Extreme (-10C)		1710.6131	1779.5117	-3.5	-0.002
Extreme (-20C)		1710.6131	1779.5117	-5.1	-0.003
Extreme (-30C)		1710.6131	1779.5117	-5.4	-0.003
20C	15%	1710.6131	1779.5117	-4.2	-0.002
	-15%	1710.6131	1779.5117	3.1	0.002
	End Point	1710.6131	1779.5117	-4.8	-0.003

8.4.17. 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.

Test Engineer ID:	43575 OS	Test Date:	1/6/2020

QPSK, (20MHz BANDWIDTH)

Limit		663	698	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	663.5922	697.3173		
Extreme (50C)		663.5922	697.3173	-3.4	-0.005
Extreme (40C)		663.5922	697.3173	-4.3	-0.006
Extreme (30C)		663.5922	697.3173	-3.1	-0.004
Extreme (10C)		663.5922	697.3173	-3.8	-0.006
Extreme (0C)		663.5922	697.3173	-2.8	-0.004
Extreme (-10C)		663.5922	697.3173	-3.4	-0.005
Extreme (-20C)		663.5922	697.3173	-4.2	-0.006
Extreme (-30C)		663.5922	697.3173	-4.1	-0.006
20C	15%	663.5922	697.3173	2.7	0.004
	-15%	663.5922	697.3173	3.0	0.004
	End Point	663.5922	697.3173	-3.2	-0.005

8.5. PEAK-TO-AVERAGE POWER RATIO

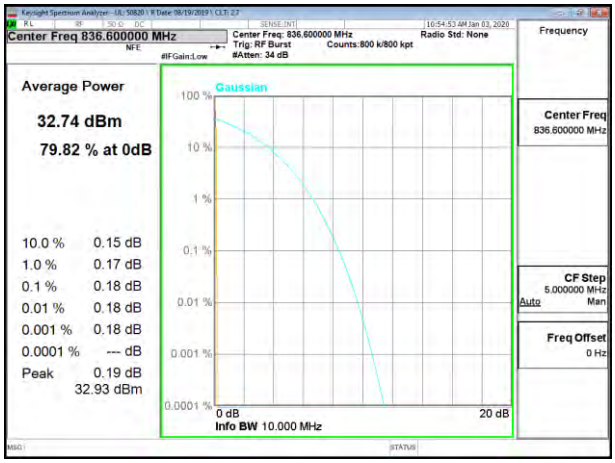
LIMIT

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

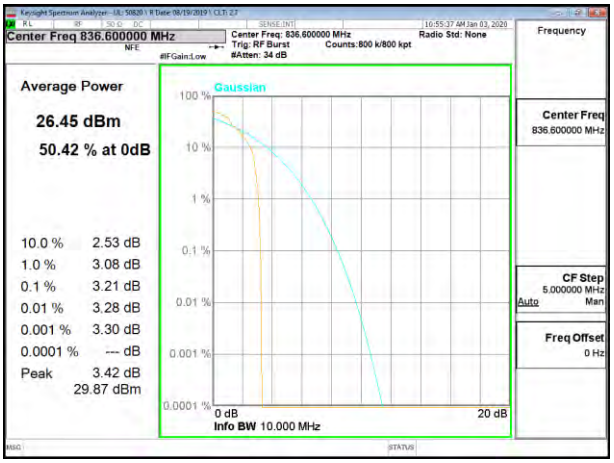
RESULT

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

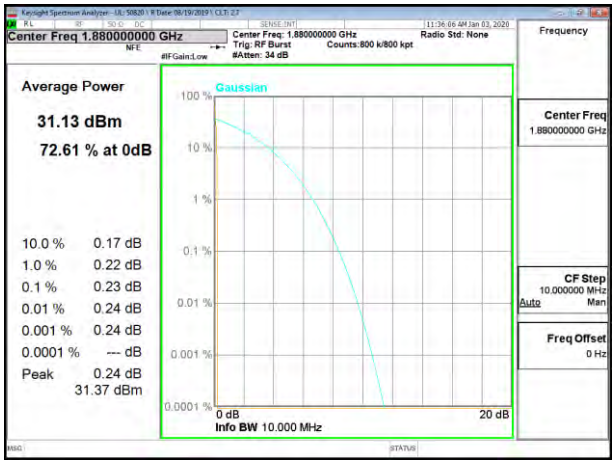
8.5.1. GSM



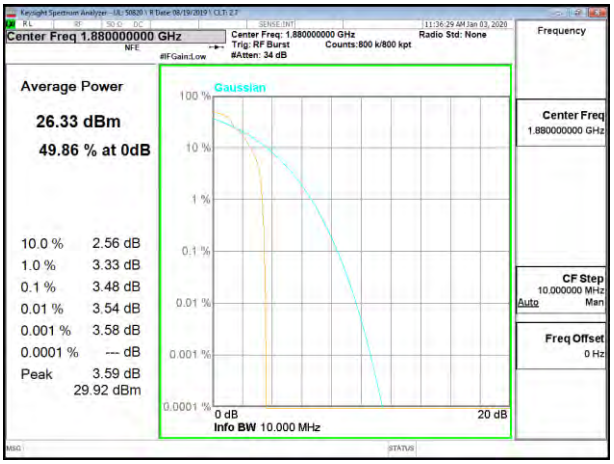
GSM 850 GPRS Middle Channel



GSM 850 EGPRS Middle Channel

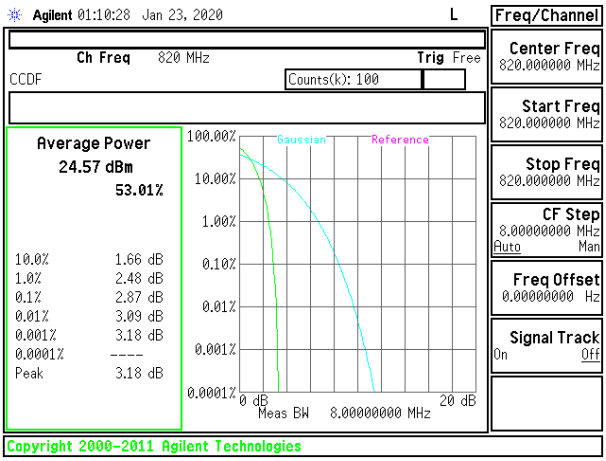


GSM 1900 GPRS Middle Channel

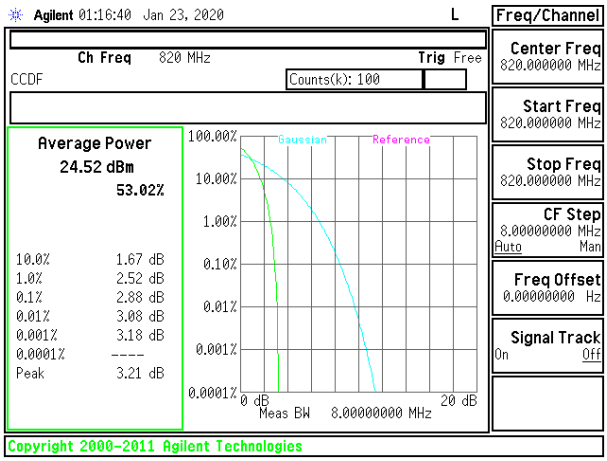


GSM 1900 EGPRS Middle Channel

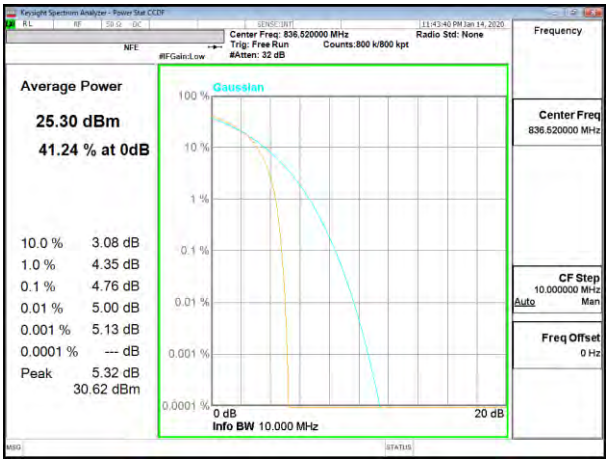
8.5.2. CDMA



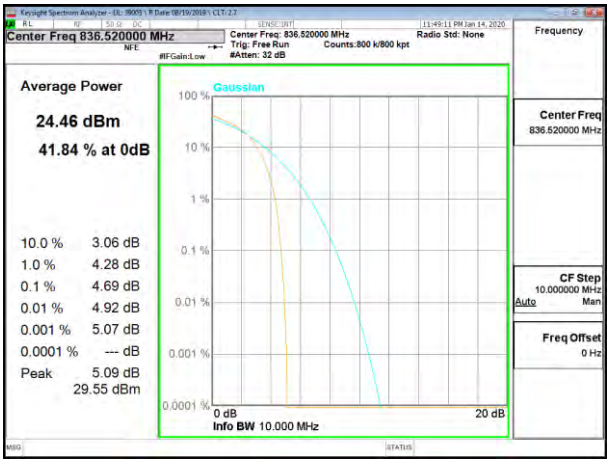
CDMA BC10 1xRTT Middle Channel



CDMA BC10 1xEV-DO Rev A Middle Channel



CDMA BC0 1xRTT Middle Channel



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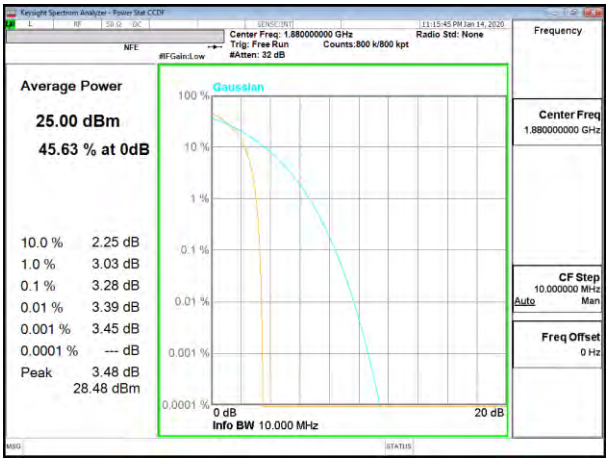
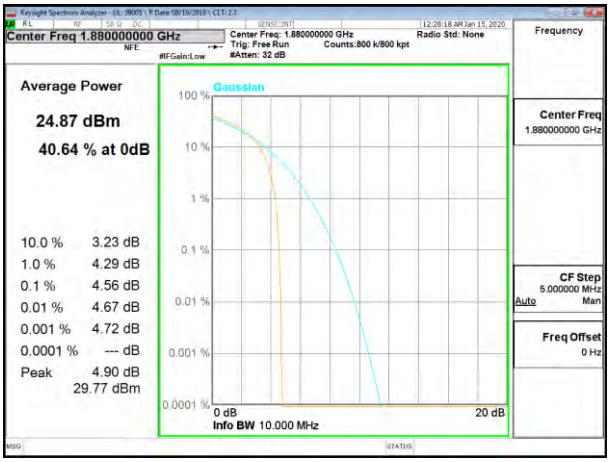
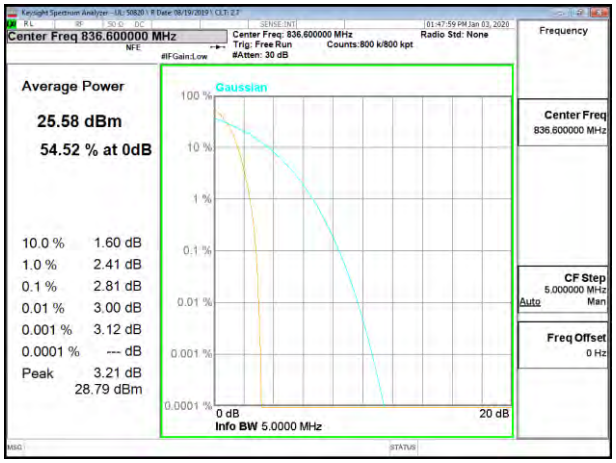


CDMA BC1 1xRTT Middle Channel

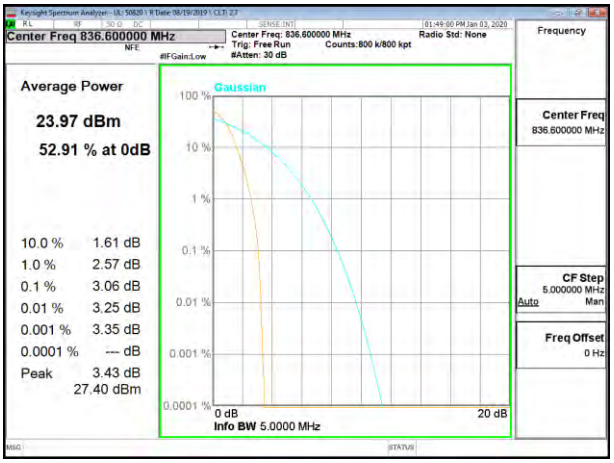


CDMA BC1 1xEV-DO Rev A Middle Channel

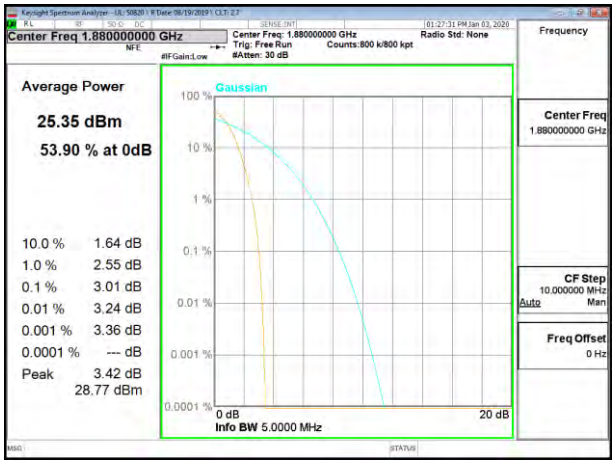
8.5.3. WCDMA



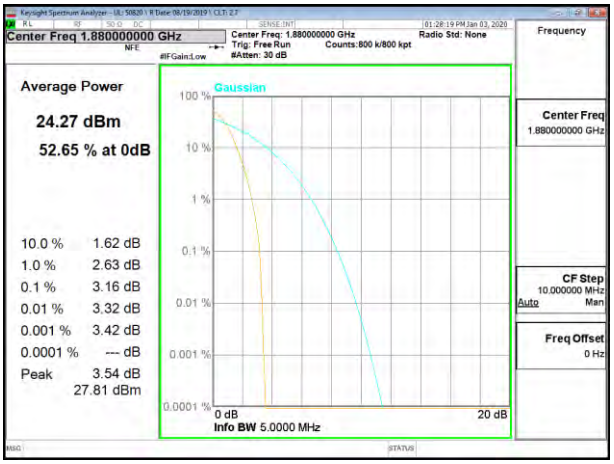
WCDMA Band 5 Rel 99 Middle Channel



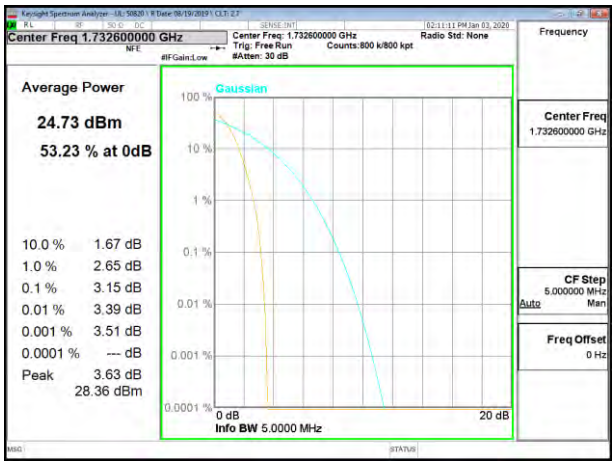
WCDMA Band 5 HSDPA Middle Channel



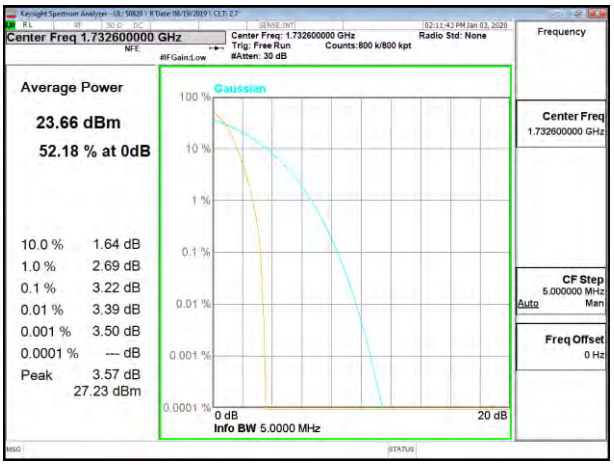
WCDMA Band 2 Rel 99 Middle Channel



WCDMA Band 2 HSDPA Middle Channel

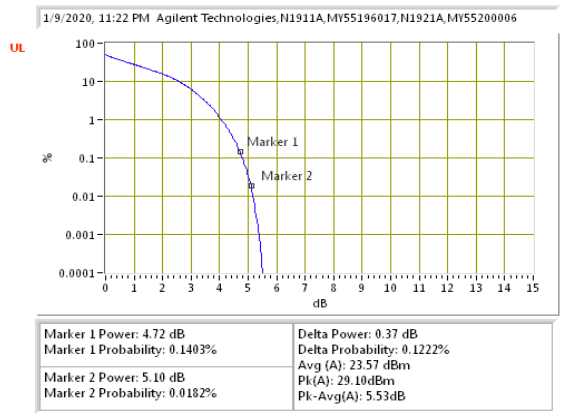


WCDMA Band 4 Rel 99 Middle Channel

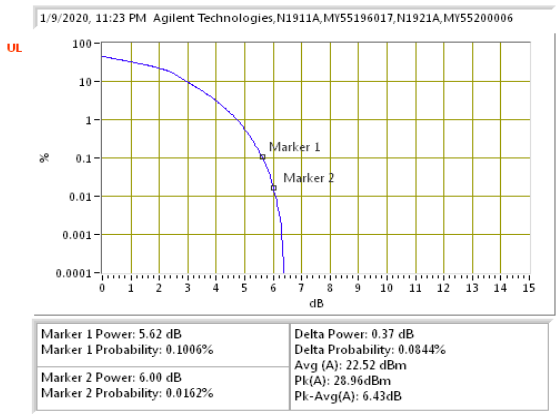


WCDMA Band 4 HSDPA Middle Channel

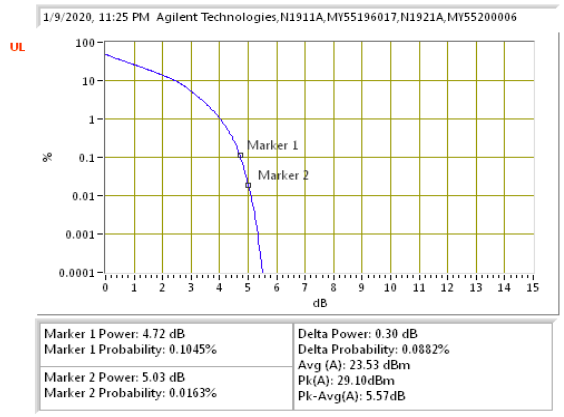
8.5.4. LTE BAND 5



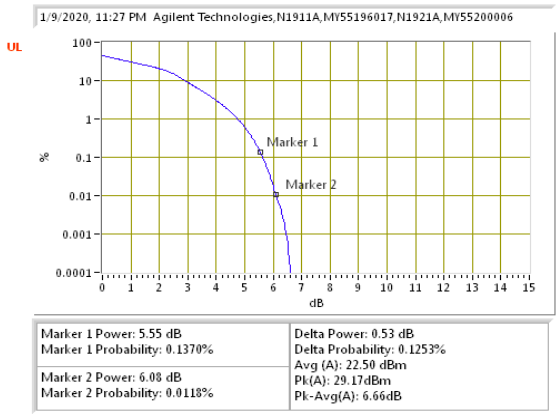
LTE B5 1.4MHz QPSK Middle Channel



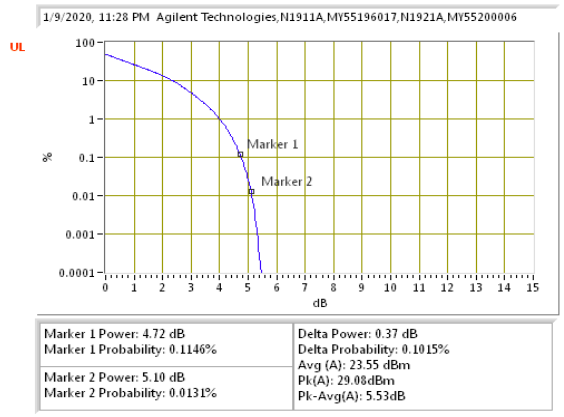
LTE B5 1.4MHz 16QAM Middle Channel



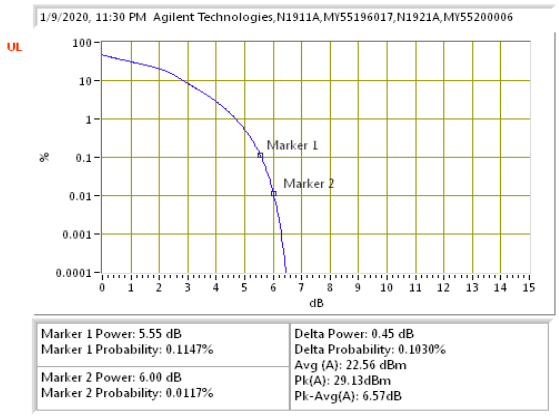
LTE B5 3MHz QPSK Middle Channel



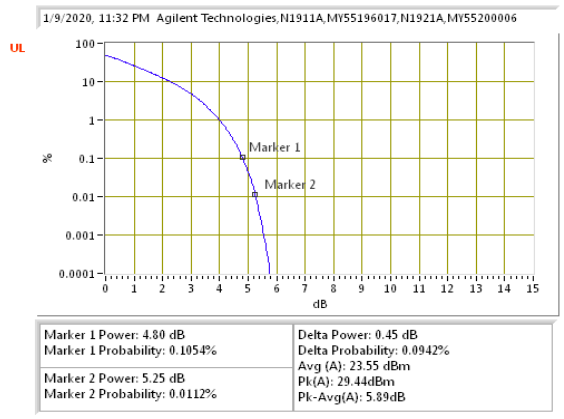
LTE B5 3MHz 16QAM Middle Channel



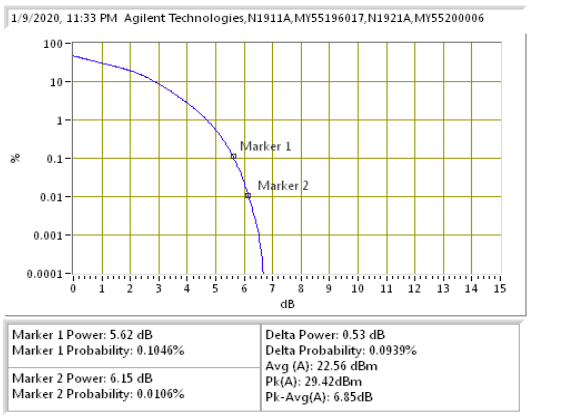
LTE B5 5MHz QPSK Middle Channel



LTE B5 5MHz 16QAM Middle Channel

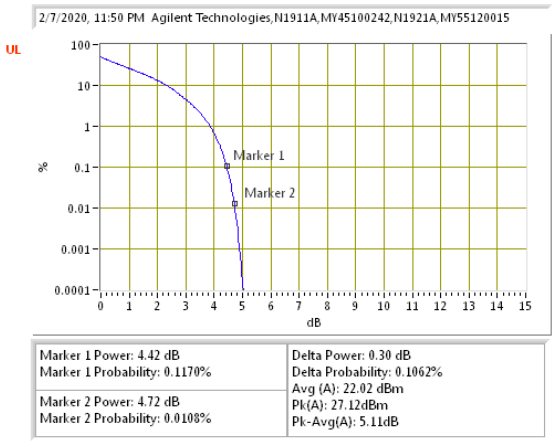


LTE B5 10MHz QPSK Middle Channel

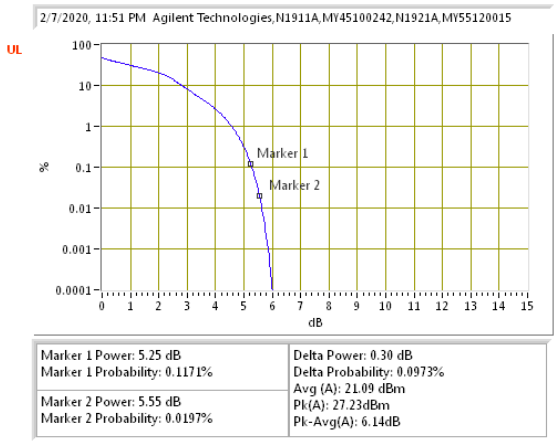


LTE B5 10MHz 16QAM Middle Channel

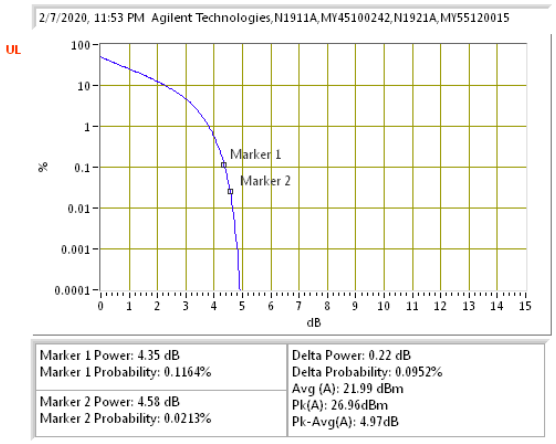
8.5.5. LTE BAND 7



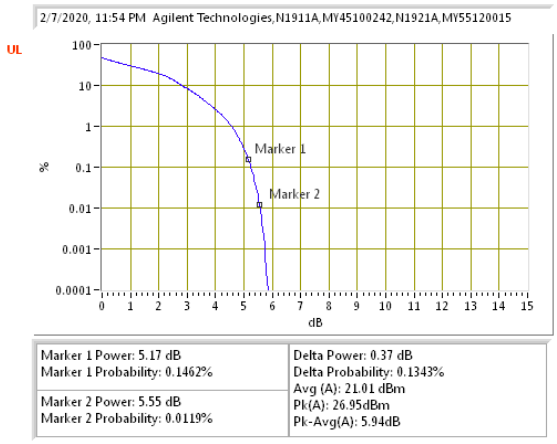
LTE B7 5MHz QPSK Middle Channel



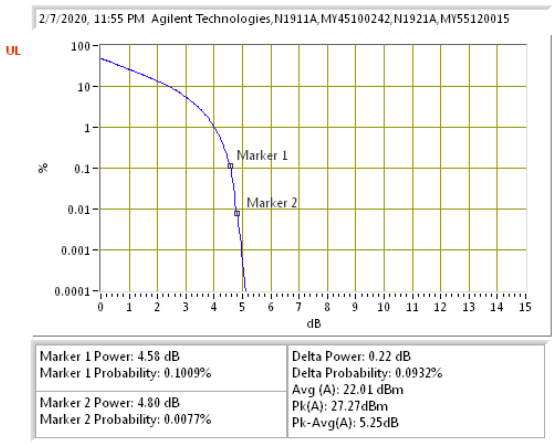
LTE B7 5MHz 16QAM Middle Channel



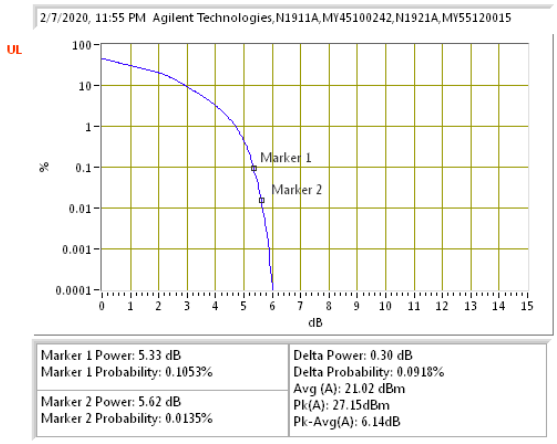
LTE B7 10MHz QPSK Middle Channel



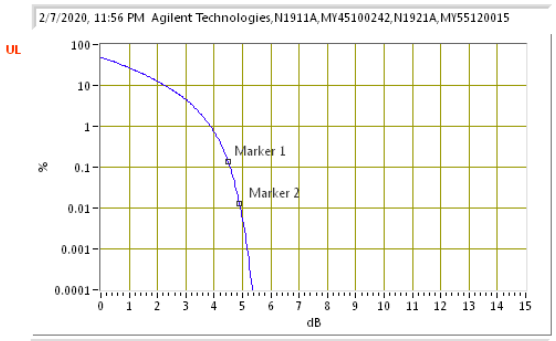
LTE B7 10MHz 16QAM Middle Channel



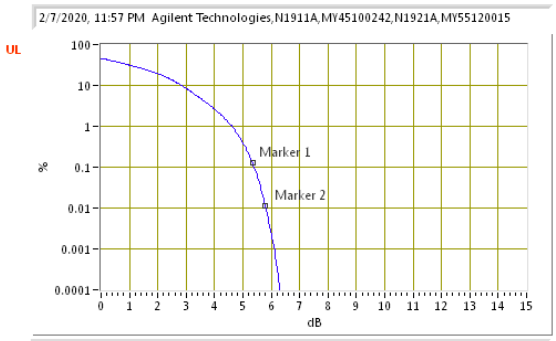
LTE B7 15MHz QPSK Middle Channel



LTE B7 15MHz 16QAM Middle Channel

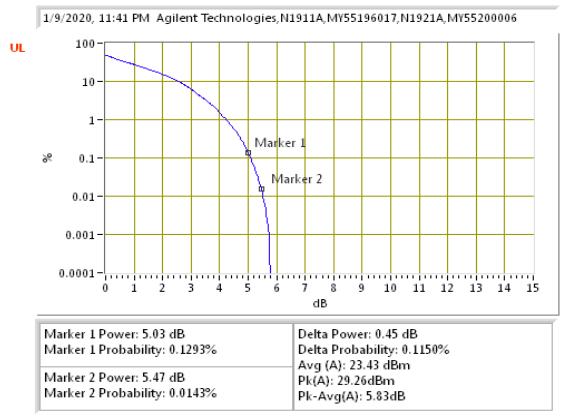


LTE B7 20MHz QPSK Middle Channel

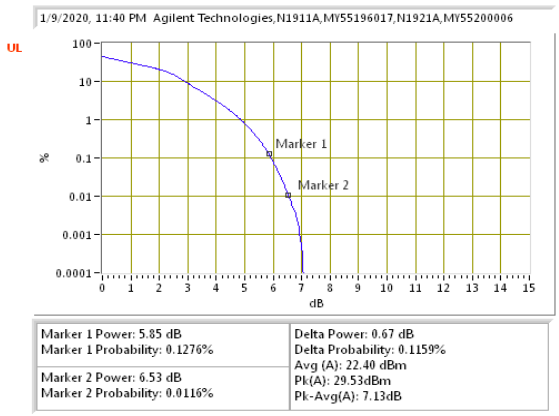


LTE B7 20MHz 16QAM Middle Channel

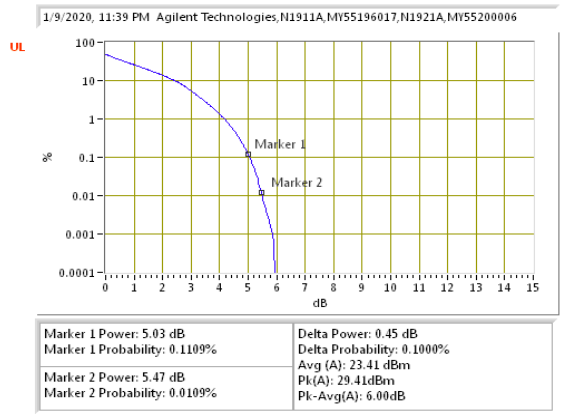
8.5.6. LTE BAND 12



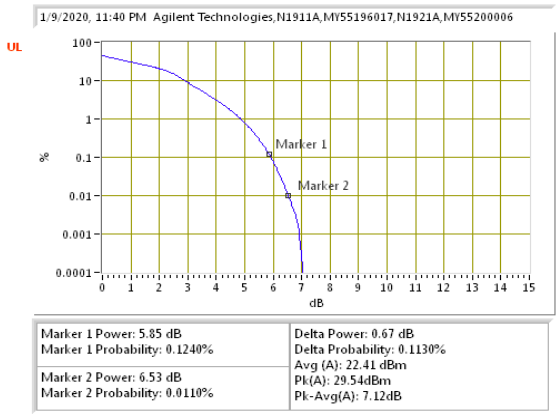
LTE B12 1.4MHz QPSK Middle Channel



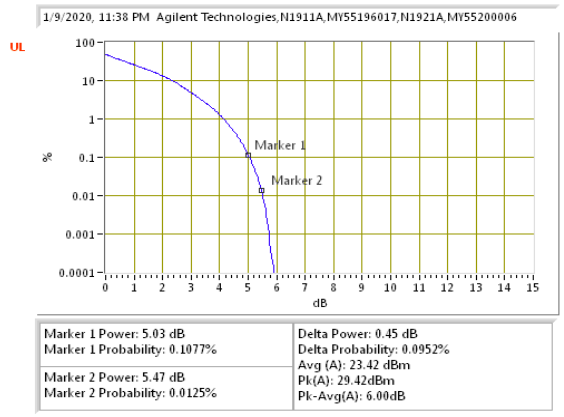
LTE B12 1.4MHz 16QAM Middle Channel



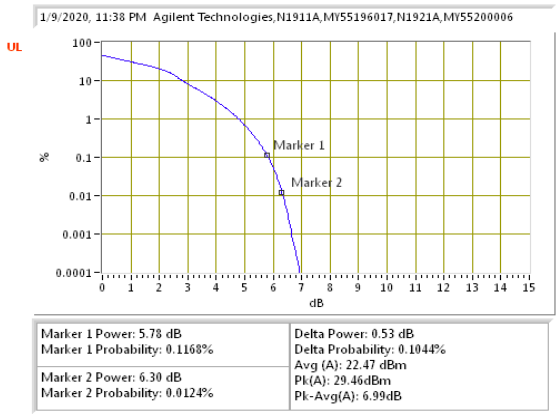
LTE B12 3MHz QPSK Middle Channel



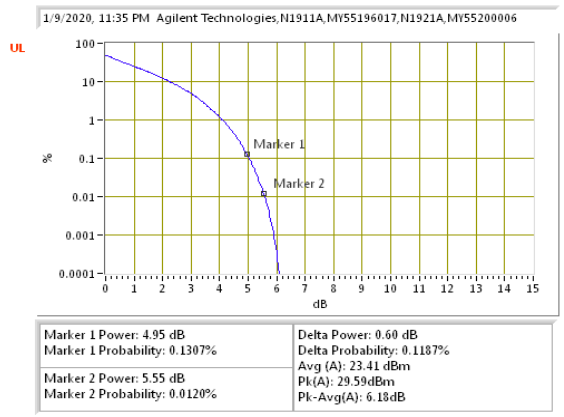
LTE B12 3MHz 16QAM Middle Channel



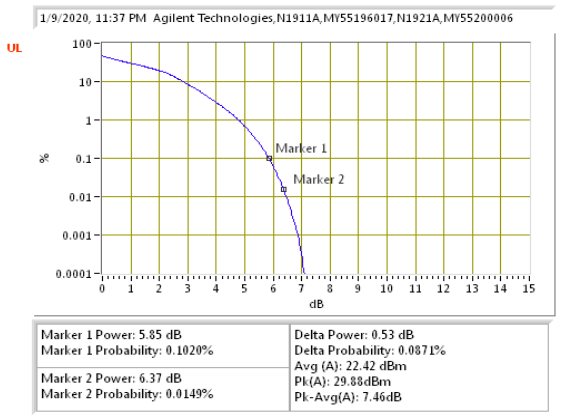
LTE B12 5MHz QPSK Middle Channel



LTE B12 5MHz 16QAM Middle Channel

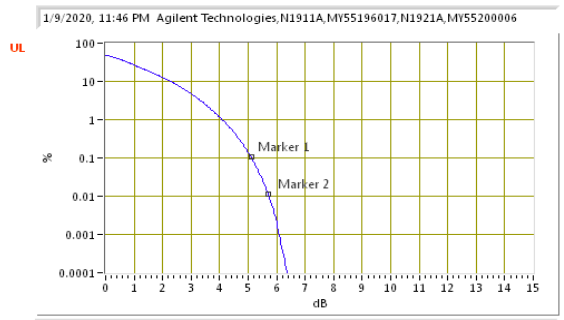


LTE B12 10MHz QPSK Middle Channel

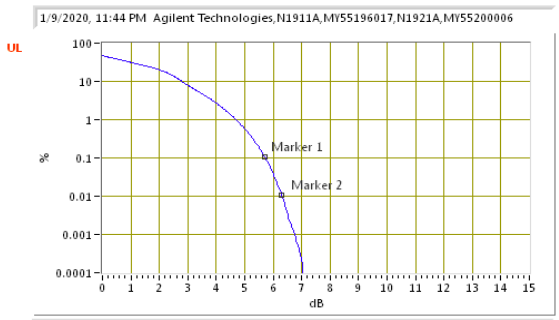


LTE B12 10MHz 16QAM Middle Channel

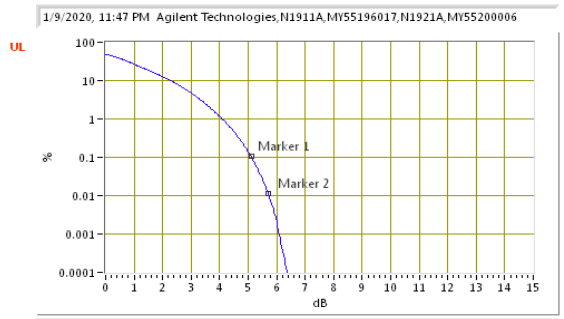
8.5.7. LTE BAND 13



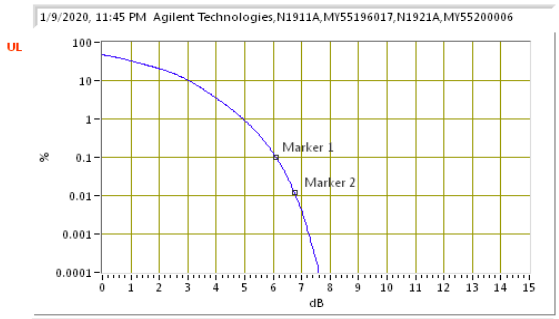
LTE B13 5MHz QPSK Middle Channel



LTE B13 5MHz 16QAM Middle Channel

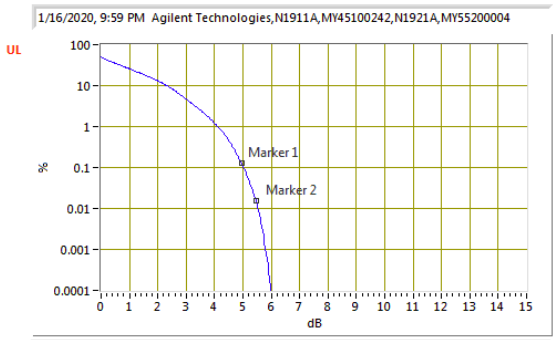


LTE B13 10MHz QPSK Middle Channel



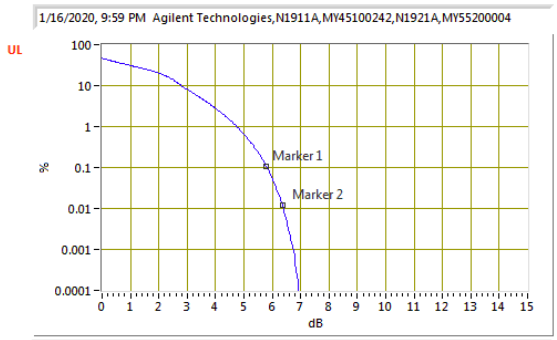
LTE B13 10MHz 16QAM Middle Channel

8.5.8. LTE BAND 14



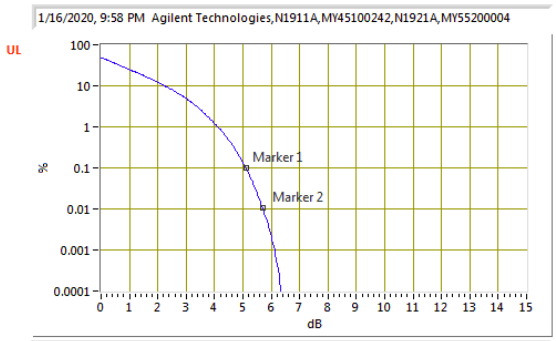
Marker 1 Power: 4.95 dB Marker 1 Probability: 0.1297%	Delta Power: 0.53 dB Delta Probability: 0.1157% Avg (A): 23.39 dBm Pk(A): 29.47dBm Pk-Avg(A): 6.09dB
Marker 2 Power: 5.47 dB Marker 2 Probability: 0.0140%	

LTE B14 5MHz QPSK Middle Channel



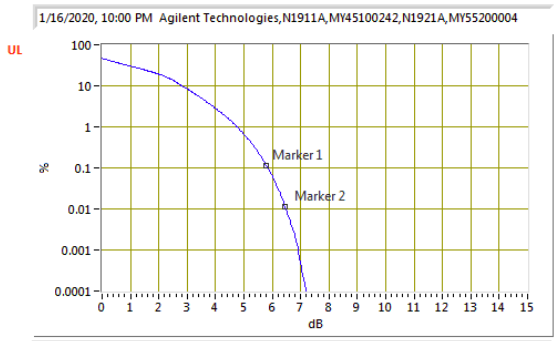
Marker 1 Power: 5.78 dB Marker 1 Probability: 0.1133%	Delta Power: 0.60 dB Delta Probability: 0.1022% Avg (A): 22.39 dBm Pk(A): 29.43dBm Pk-Avg(A): 7.04dB
Marker 2 Power: 6.37 dB Marker 2 Probability: 0.0112%	

LTE B14 5MHz 16QAM Middle Channel



Marker 1 Power: 5.10 dB Marker 1 Probability: 0.1028%	Delta Power: 0.60 dB Delta Probability: 0.0923% Avg (A): 23.37 dBm Pk(A): 29.80dBm Pk-Avg(A): 6.44dB
Marker 2 Power: 5.70 dB Marker 2 Probability: 0.0105%	

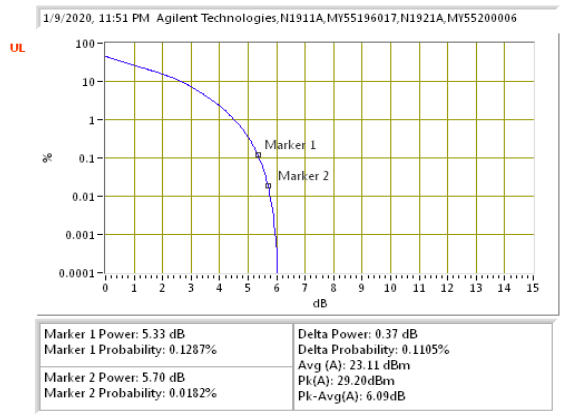
LTE B14 10MHz QPSK Middle Channel



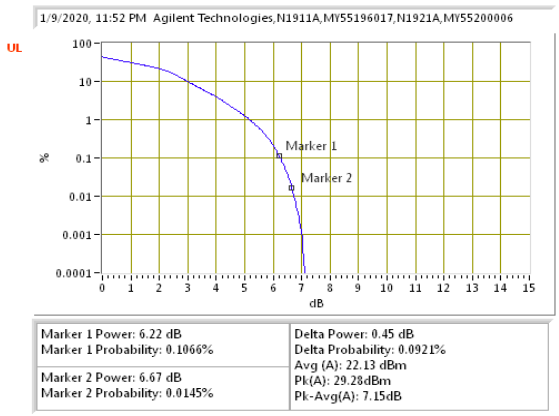
Marker 1 Power: 5.78 dB Marker 1 Probability: 0.1219%	Delta Power: 0.68 dB Delta Probability: 0.1103% Avg (A): 22.35 dBm Pk(A): 29.67dBm Pk-Avg(A): 7.32dB
Marker 2 Power: 6.45 dB Marker 2 Probability: 0.0116%	

LTE B14 10MHz 16QAM Middle Channel

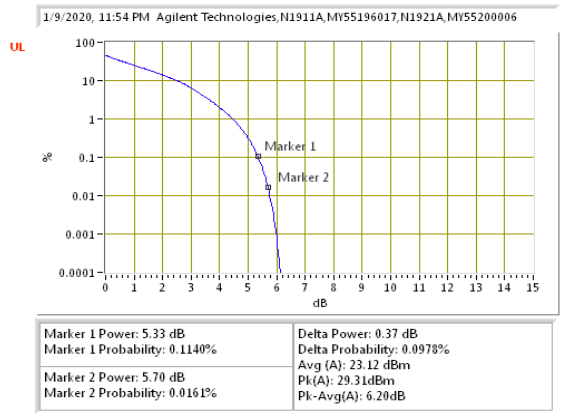
8.5.9. LTE BAND 25



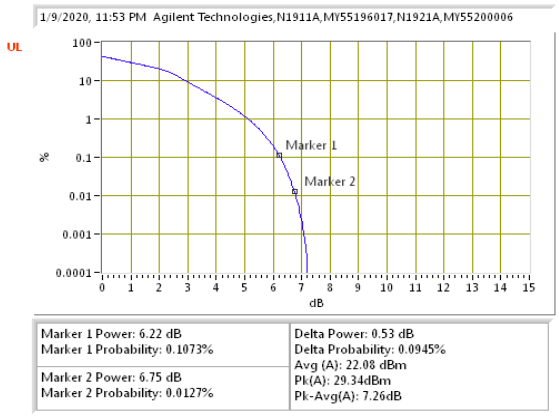
LTE B25 1.4MHz QPSK Middle Channel



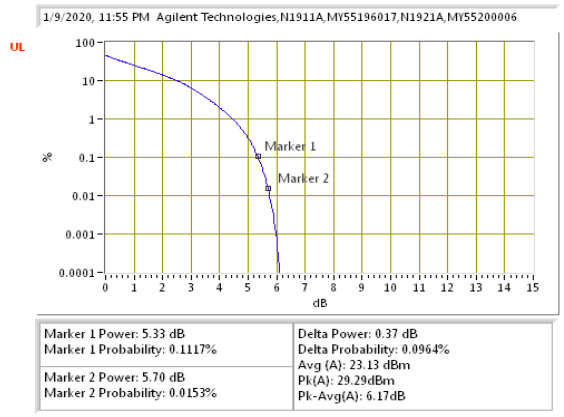
LTE B25 1.4MHz 16QAM Middle Channel



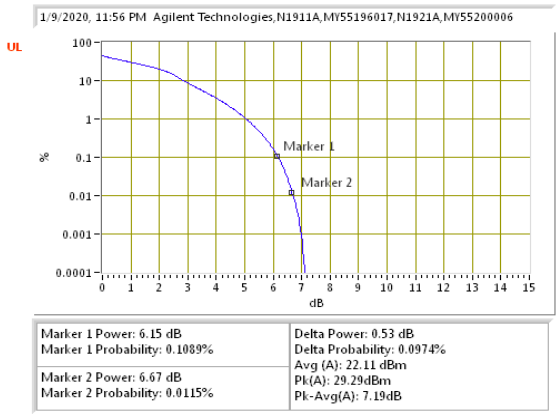
LTE B25 3MHz QPSK Middle Channel



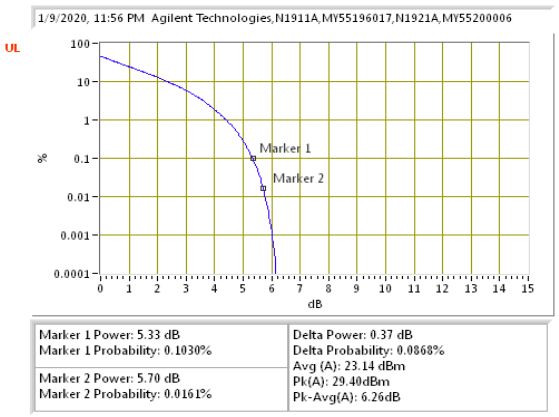
LTE B25 3MHz 16QAM Middle Channel



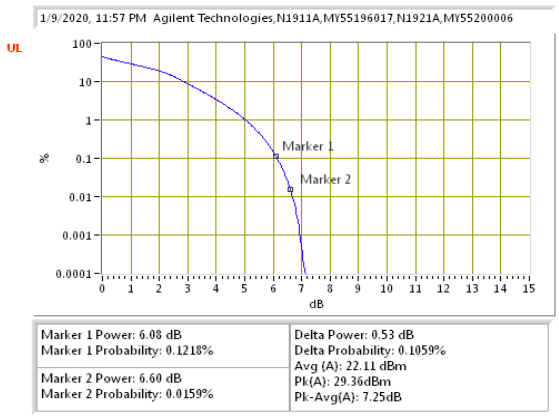
LTE B2 5MHz QPSK Middle Channel



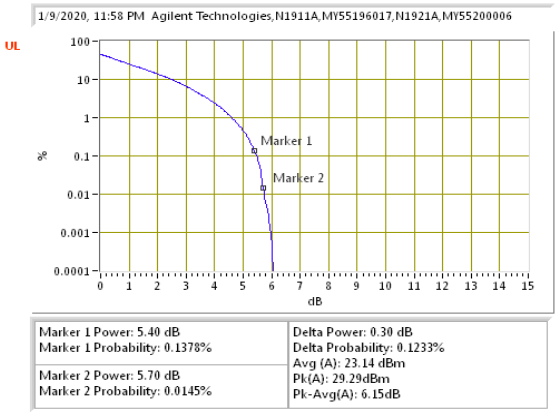
LTE B2 5MHz 16QAM Middle Channel



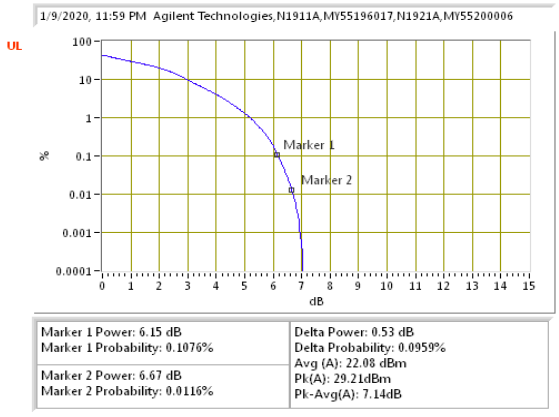
LTE B25 10MHz QPSK Middle Channel



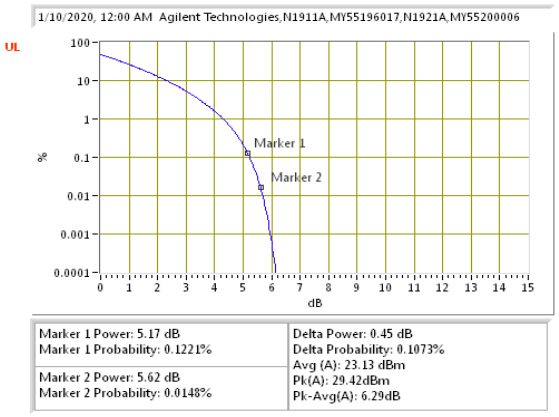
LTE B25 10MHz 16QAM Middle Channel



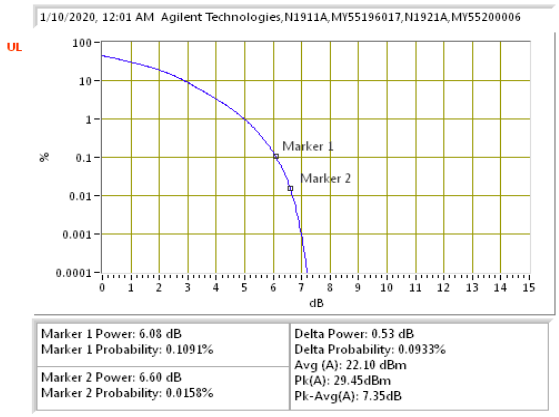
LTE B25 15MHz QPSK Middle Channel



LTE B25 15MHz 16QAM Middle Channel

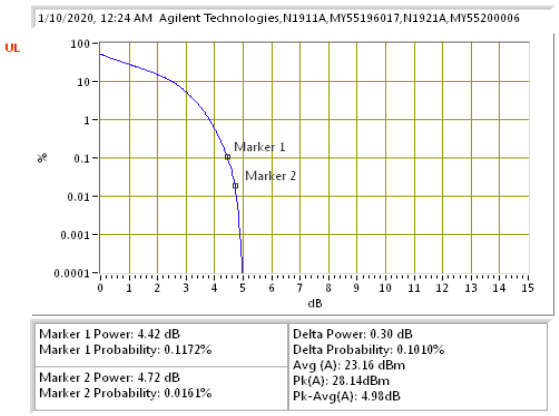


LTE B25 20MHz QPSK Middle Channel

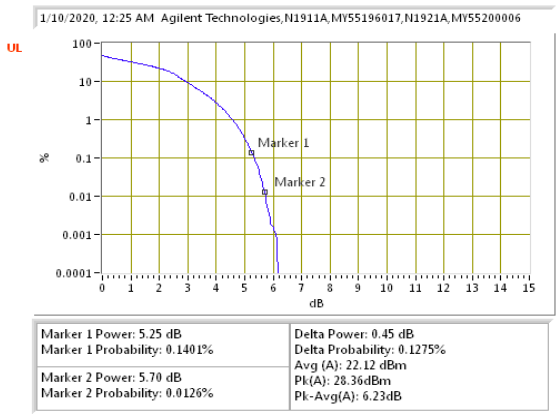


LTE B25 20MHz 16QAM Middle Channel

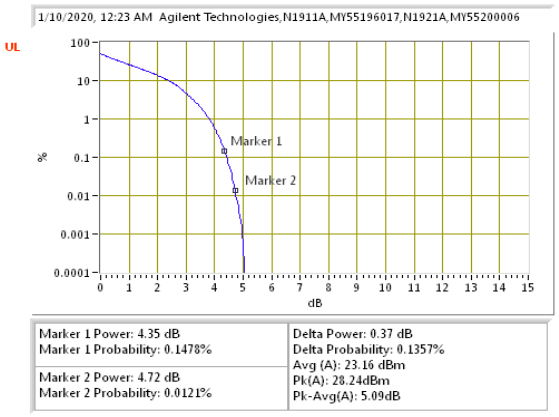
8.5.10. LTE BAND 26 (FCC PART 90S)



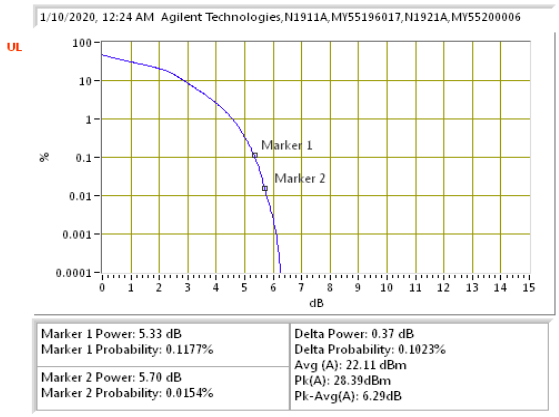
LTE B26 1.4MHz QPSK Middle Channel



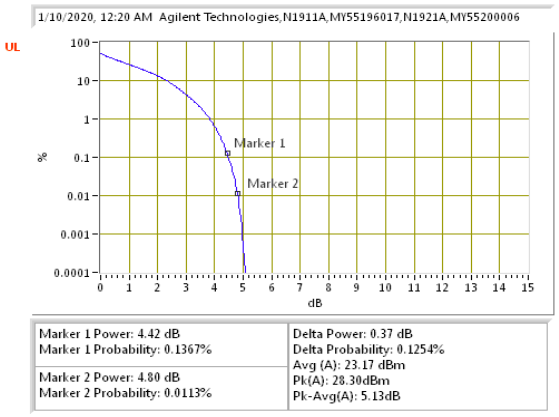
LTE B26 1.4MHz 16QAM Middle Channel



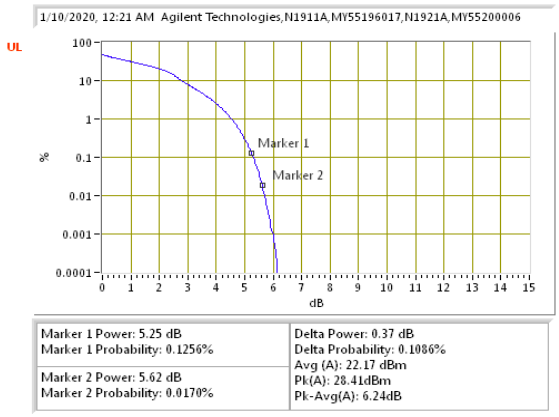
LTE B26 3MHz QPSK Middle Channel



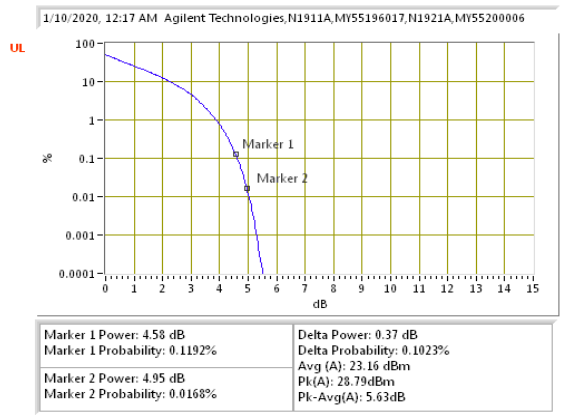
LTE B26 3MHz 16QAM Middle Channel



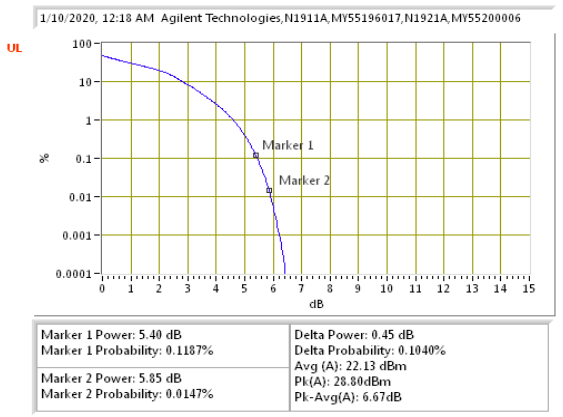
LTE B26 5MHz QPSK Middle Channel



LTE B26 5MHz 16QAM Middle Channel

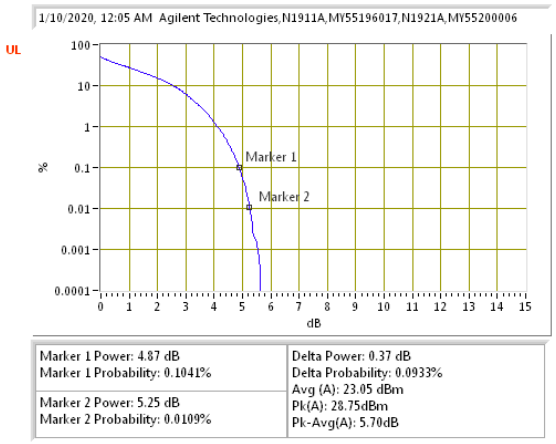


LTE B26 10MHz QPSK Middle Channel

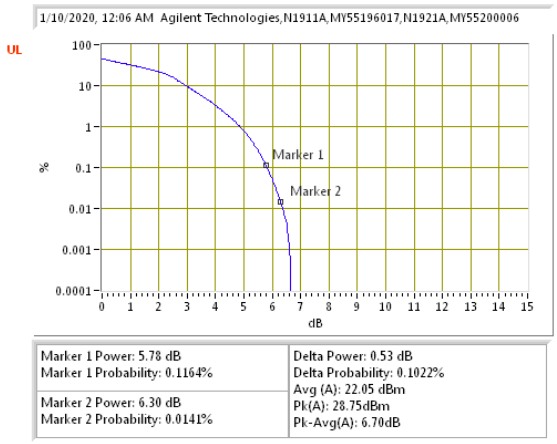


LTE B26 10MHz 16QAM Middle Channel

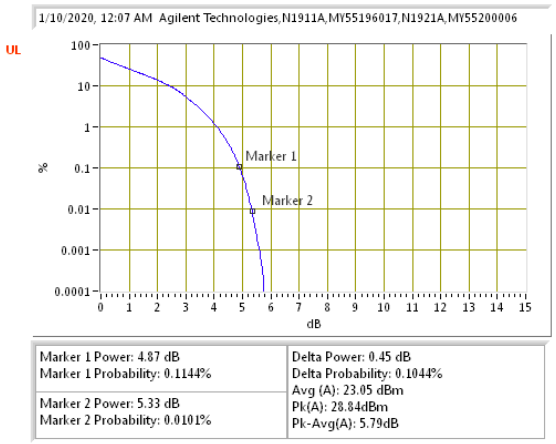
8.5.11. LTE BAND 26 (FCC PART 22)



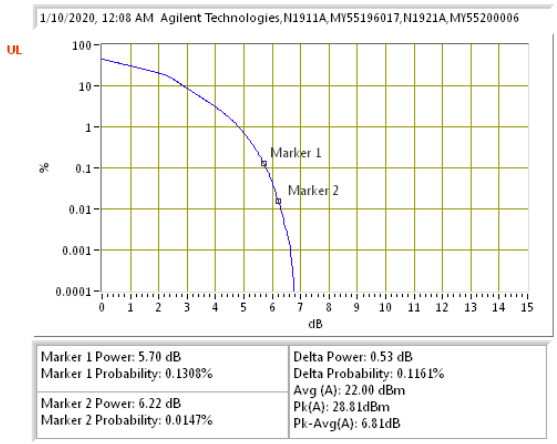
LTE B26 1.4MHz QPSK Middle Channel



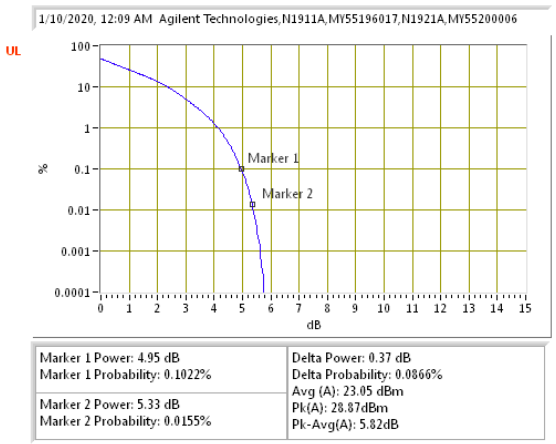
LTE B26 1.4MHz 16QAM Middle Channel



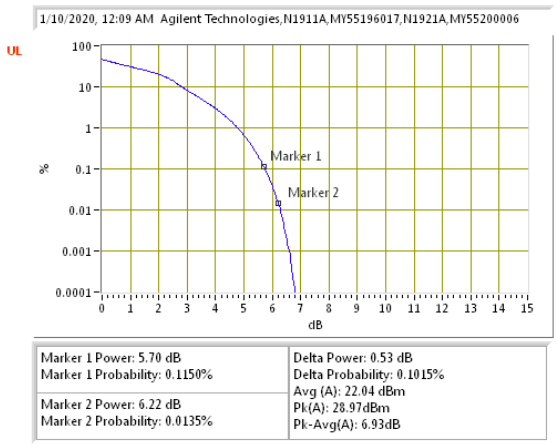
LTE B26 3MHz QPSK Middle Channel



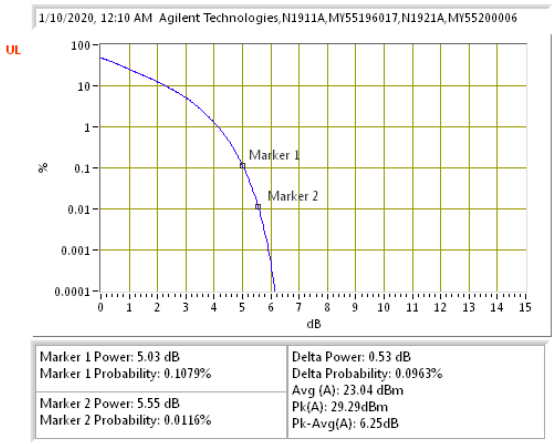
LTE B26 3MHz 16QAM Middle Channel



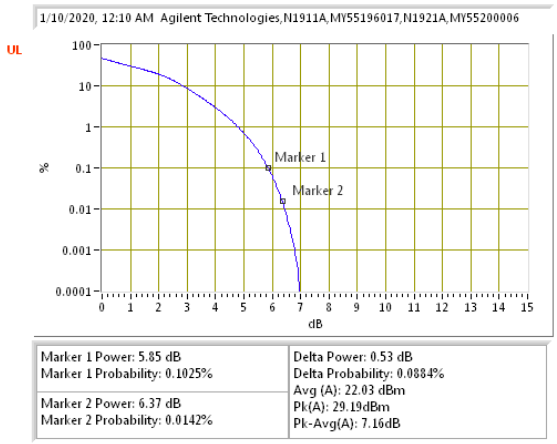
LTE B26 5MHz QPSK Middle Channel



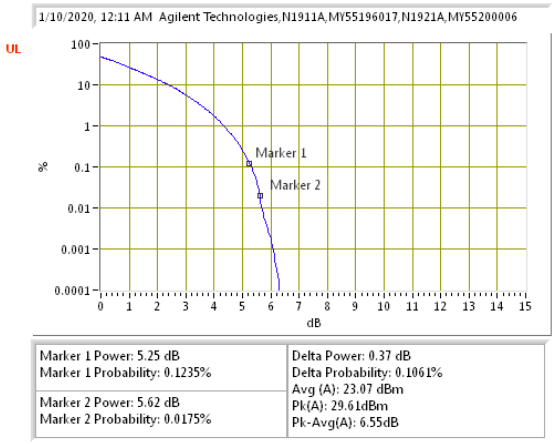
LTE B26 5MHz 16QAM Middle Channel



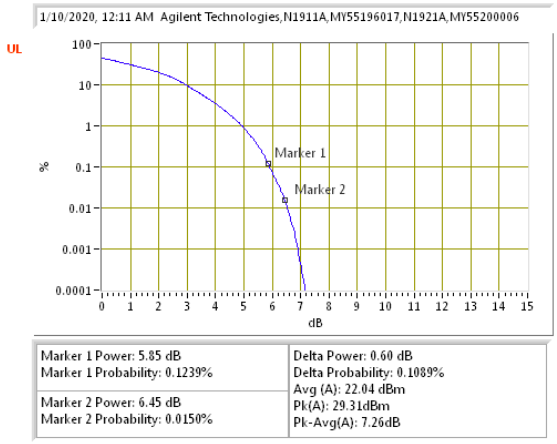
LTE B26 10MHz QPSK Middle Channel



LTE B26 10MHz 16QAM Middle Channel

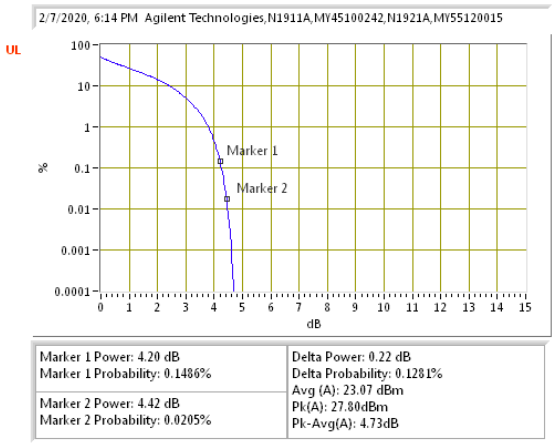


LTE B26 15MHz QPSK Middle Channel

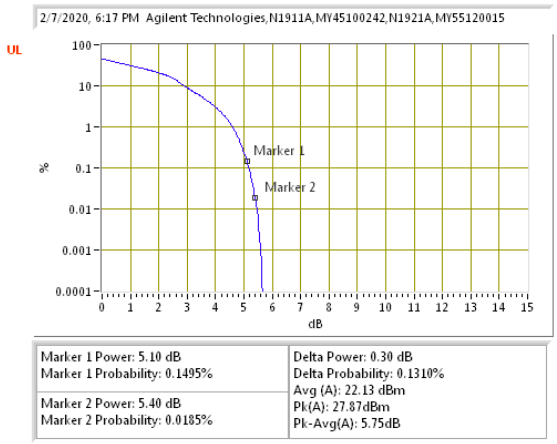


LTE B26 15MHz 16QAM Middle Channel

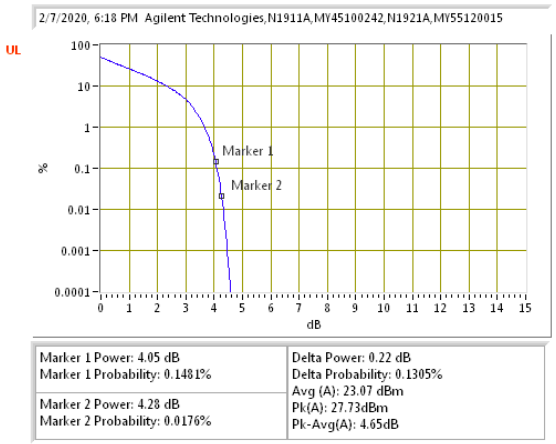
8.5.12. LTE BAND 30



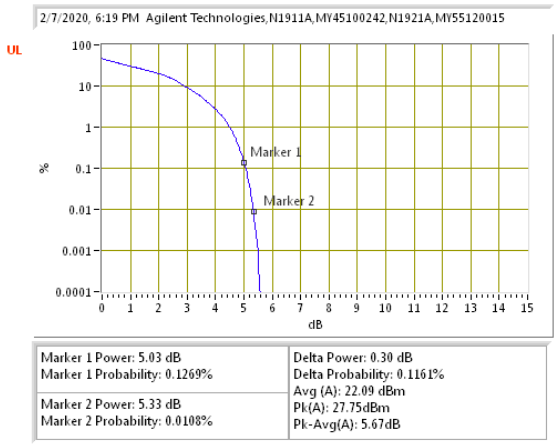
LTE B30 5MHz QPSK Middle Channel



LTE B30 5MHz 16QAM Middle Channel

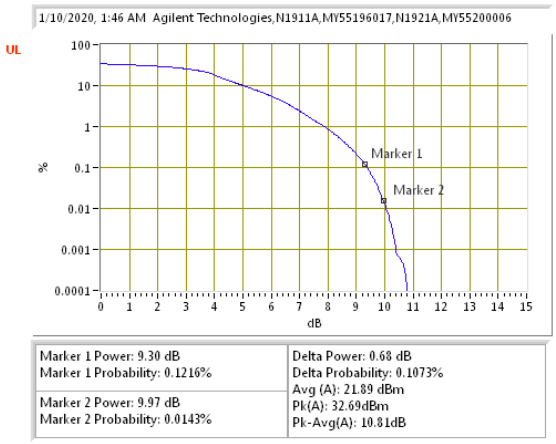


LTE B30 10MHz QPSK Middle Channel

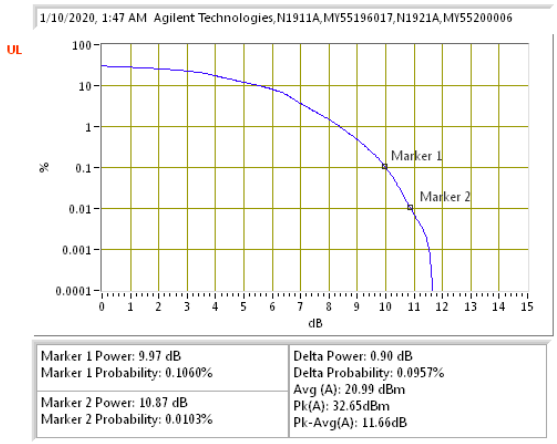


LTE B30 10MHz 16QAM Middle Channel

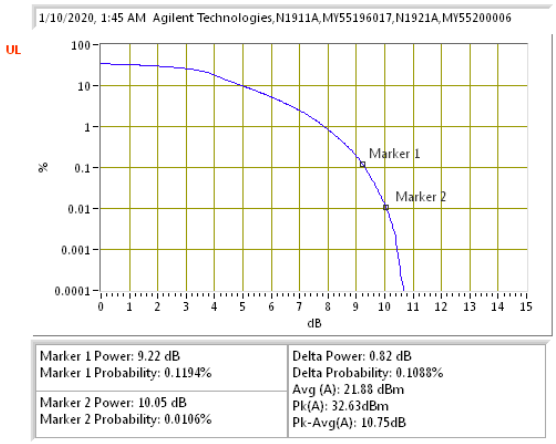
8.5.13. LTE BAND 38 (IC)



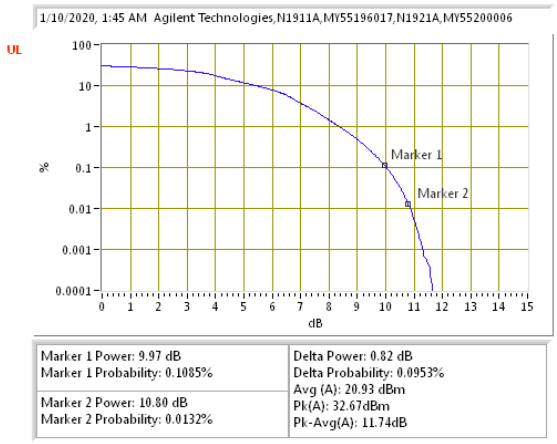
LTE B38 5MHz QPSK Middle Channel



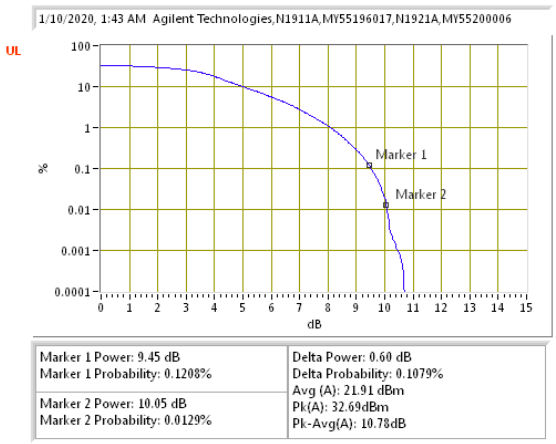
LTE B38 5MHz 16QAM Middle Channel



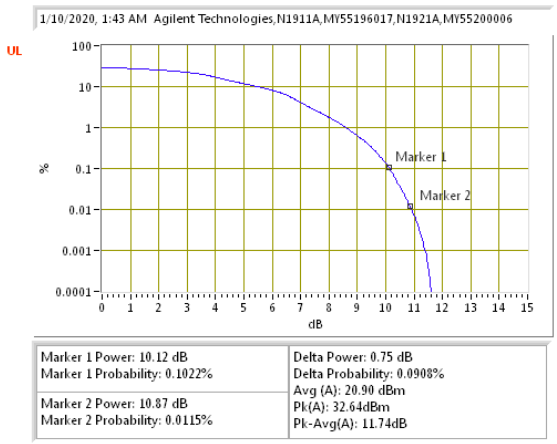
LTE B38 10MHz QPSK Middle Channel



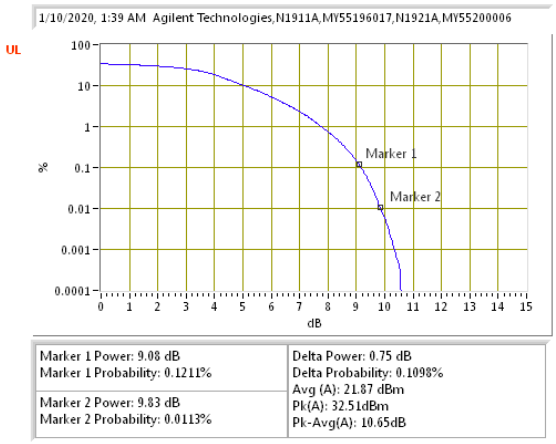
LTE B38 10MHz 16QAM Middle Channel



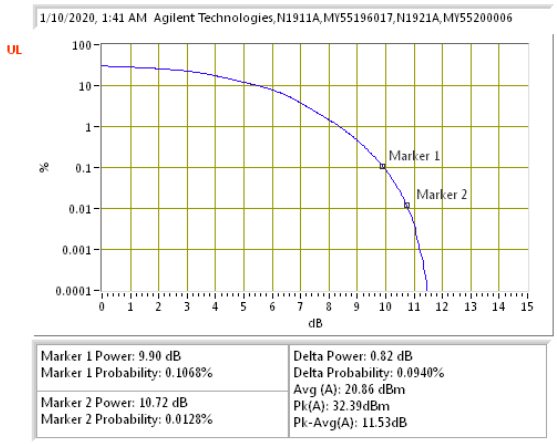
LTE B38 15MHz QPSK Middle Channel



LTE B38 15MHz 16QAM Middle Channel

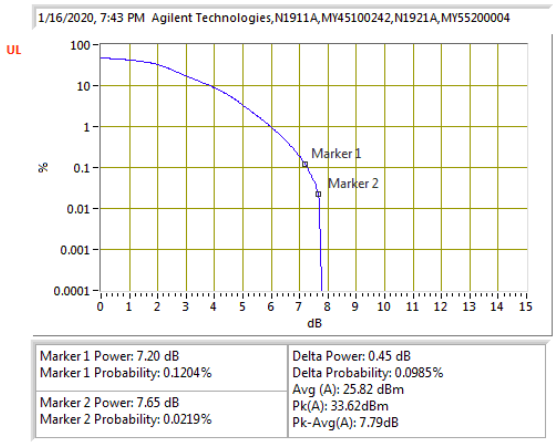


LTE B38 20MHz QPSK Middle Channel

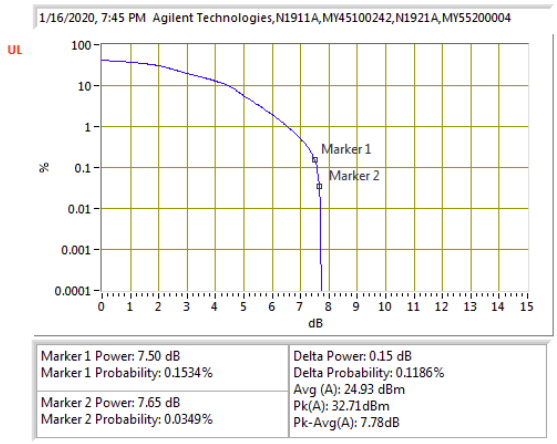


LTE B38 20MHz 16QAM Middle Channel

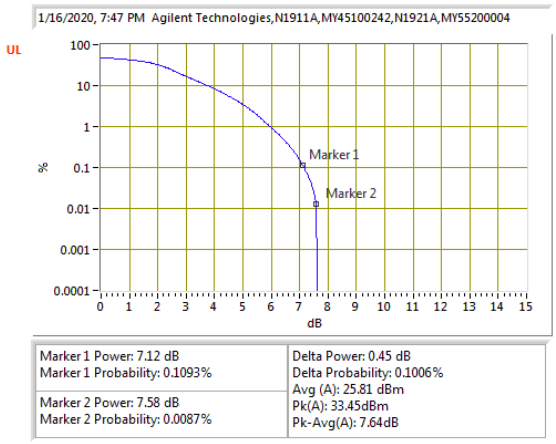
8.5.14. LTE BAND 41 (FCC) HPUE



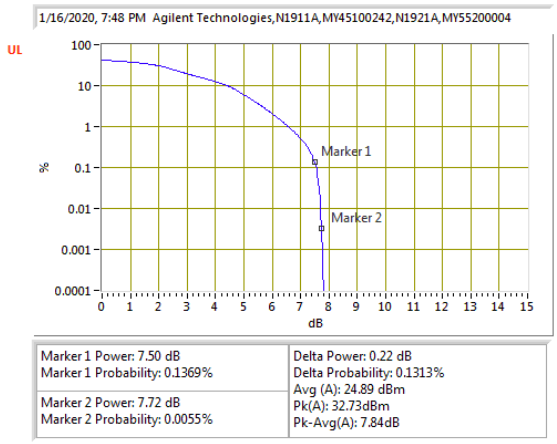
LTE B41 5MHz QPSK Middle Channel



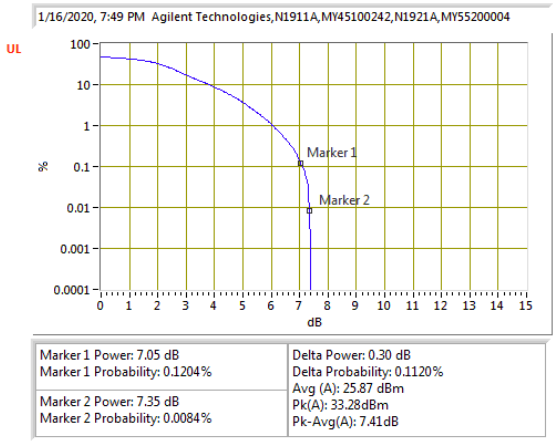
LTE B41 5MHz 16QAM Middle Channel



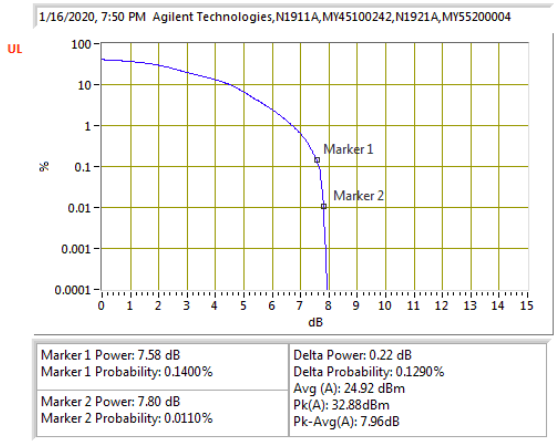
LTE B41 10MHz QPSK Middle Channel



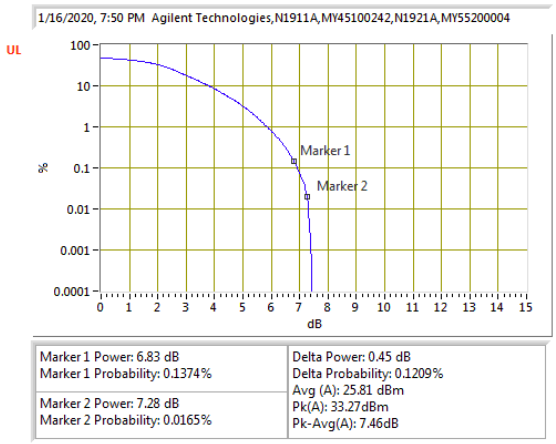
LTE B41 10MHz 16QAM Middle Channel



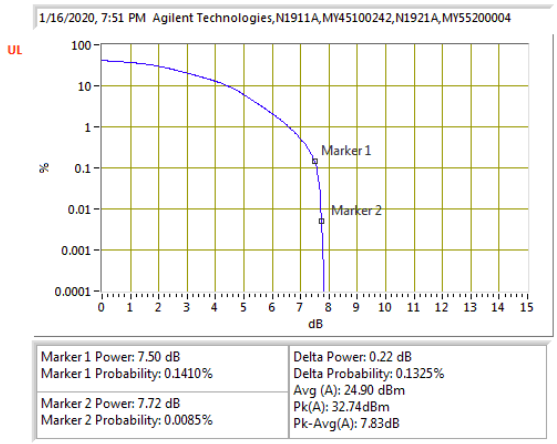
LTE B41 15MHz QPSK Middle Channel



LTE B41 15MHz 16QAM Middle Channel

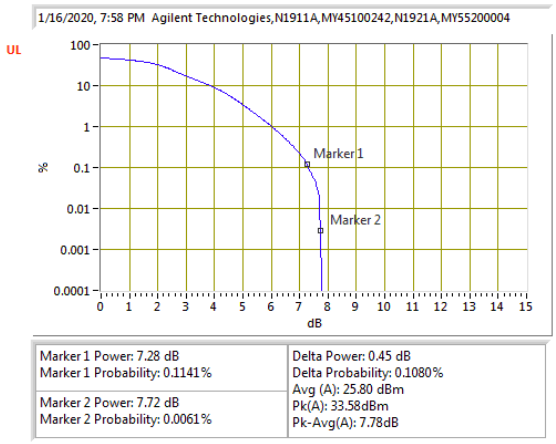


LTE B41 20MHz QPSK Middle Channel

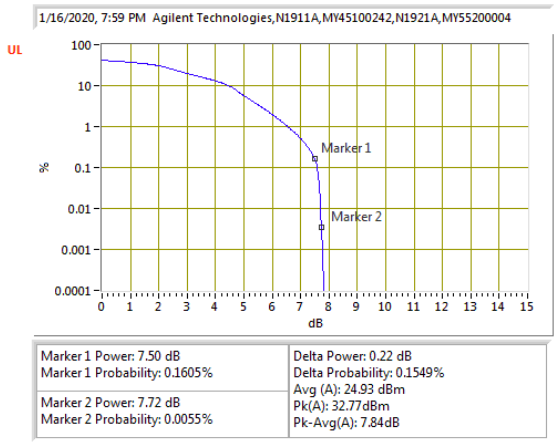


LTE B41 20MHz 16QAM Middle Channel

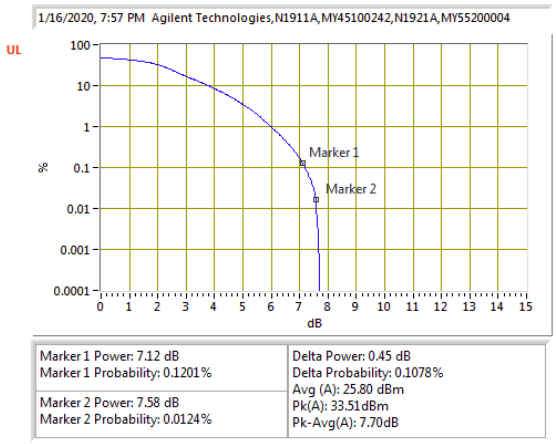
8.5.15. LTE BAND 41 (IC)



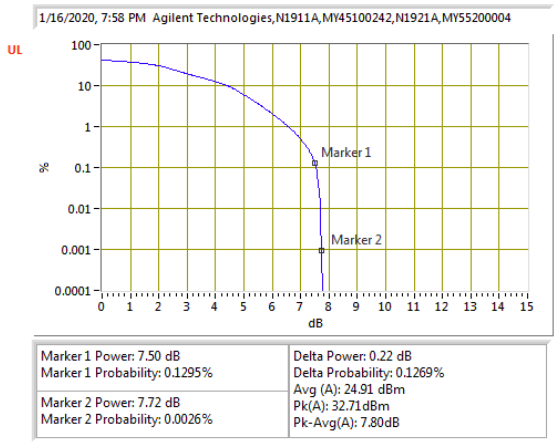
LTE B41 5MHz QPSK Middle Channel



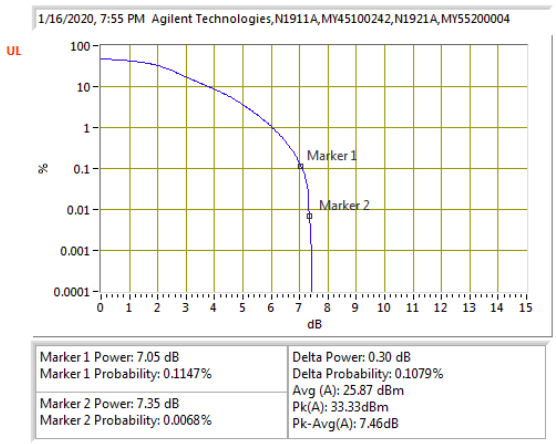
LTE B41 5MHz 16QAM Middle Channel



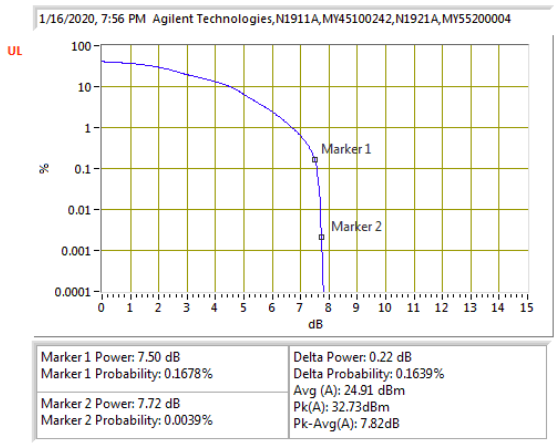
LTE B41 10MHz QPSK Middle Channel



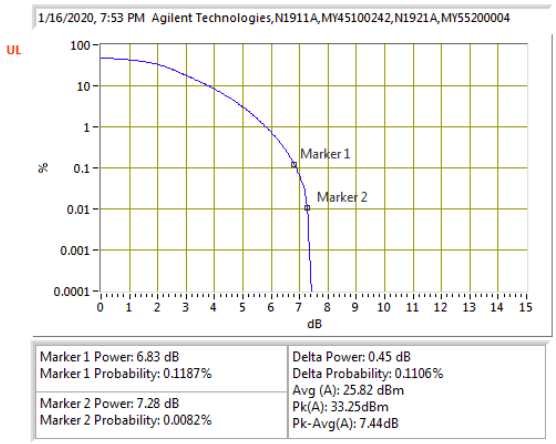
LTE B41 10MHz 16QAM Middle Channel



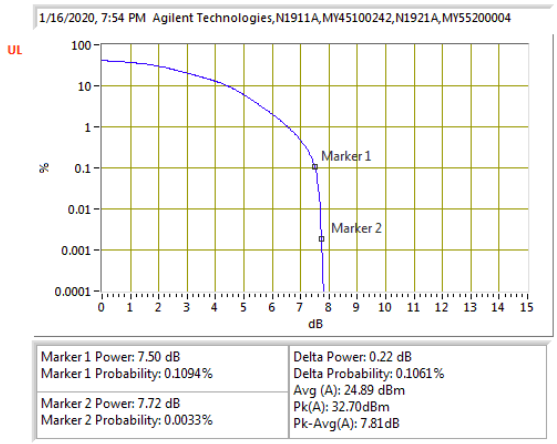
LTE B41 15MHz QPSK Middle Channel



LTE B41 15MHz 16QAM Middle Channel

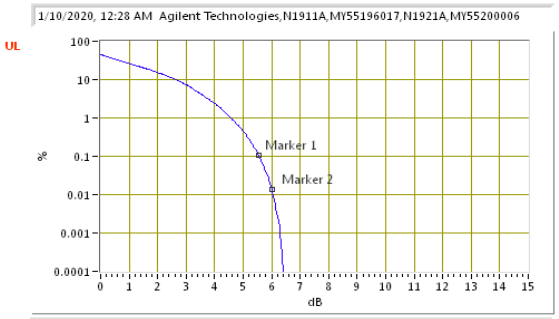


LTE B41 20MHz QPSK Middle Channel

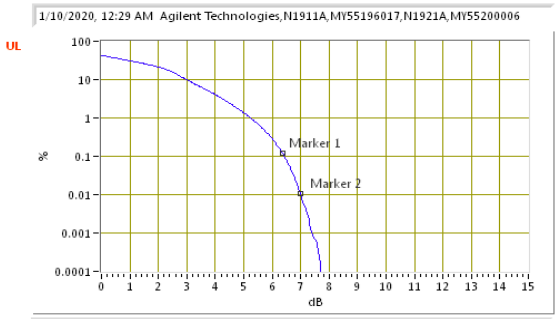


LTE B41 20MHz 16QAM Middle Channel

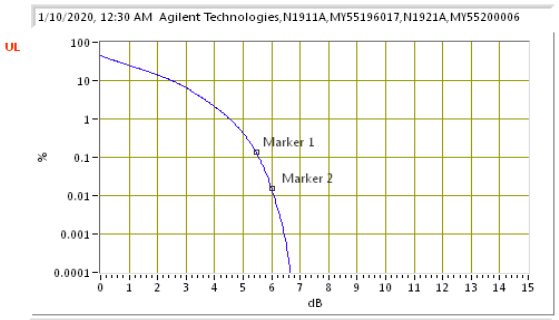
8.5.16. LTE BAND 66



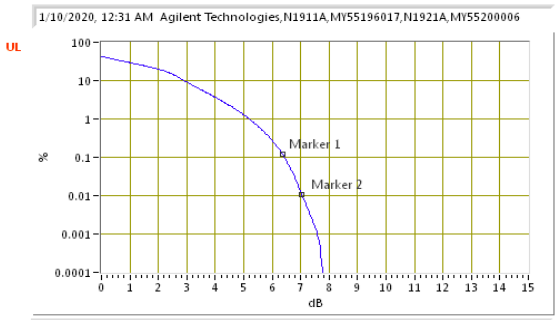
LTE B66 1.4MHz QPSK Middle Channel



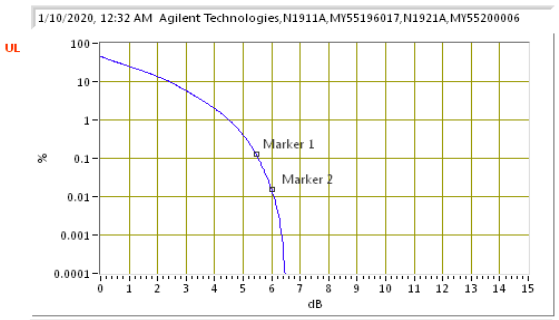
LTE B66 1.4MHz 16QAM Middle Channel



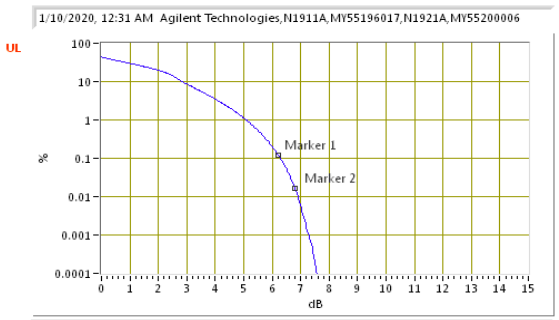
LTE B66 3MHz QPSK Middle Channel



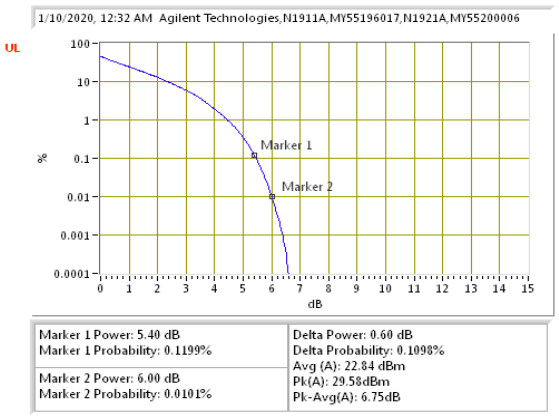
LTE B66 3MHz 16QAM Middle Channel



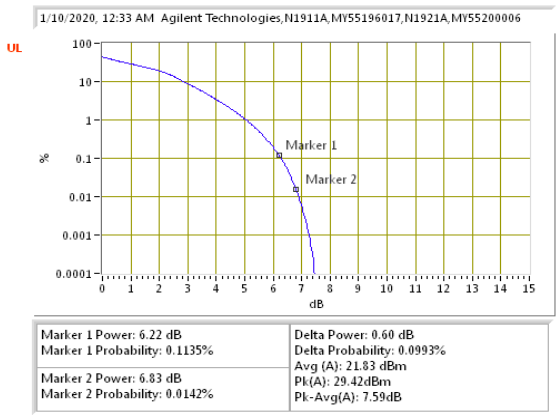
LTE B66 5MHz QPSK Middle Channel



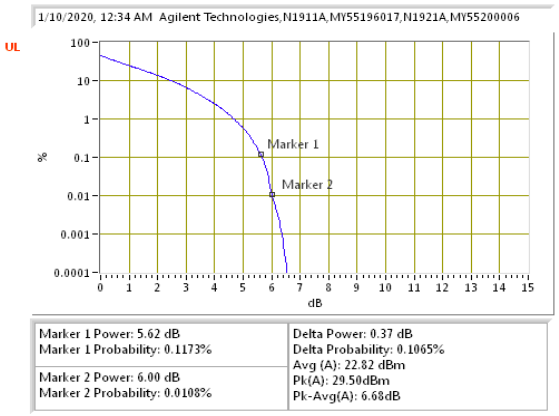
LTE B66 5MHz 16QAM Middle Channel



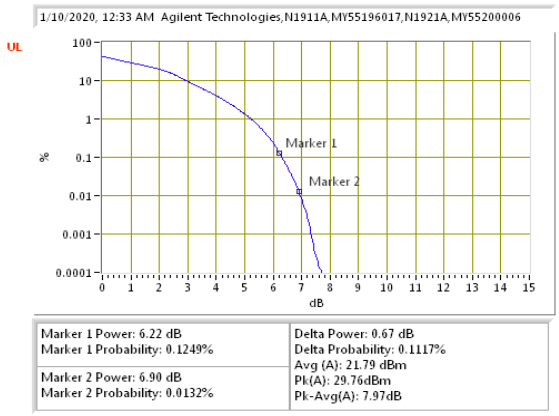
LTE B66 10MHz QPSK Middle Channel



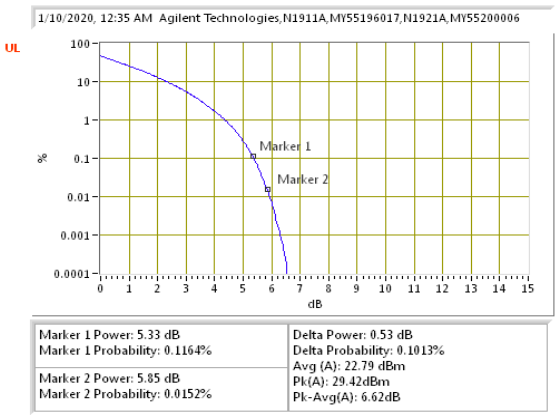
LTE B66 10MHz 16QAM Middle Channel



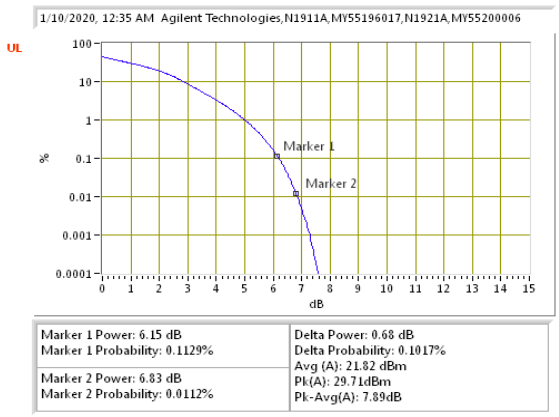
LTE B66 15MHz QPSK Middle Channel



LTE B66 15MHz 16QAM Middle Channel

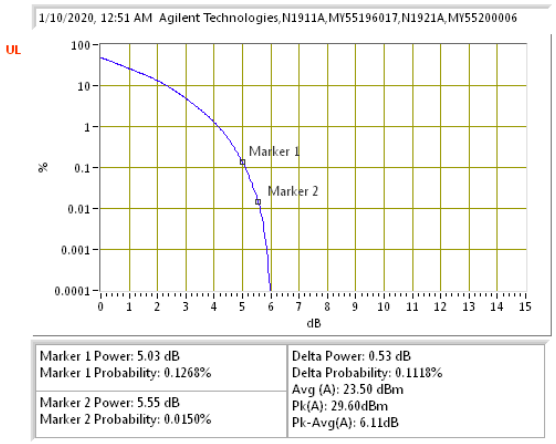


LTE B66 20MHz QPSK Middle Channel

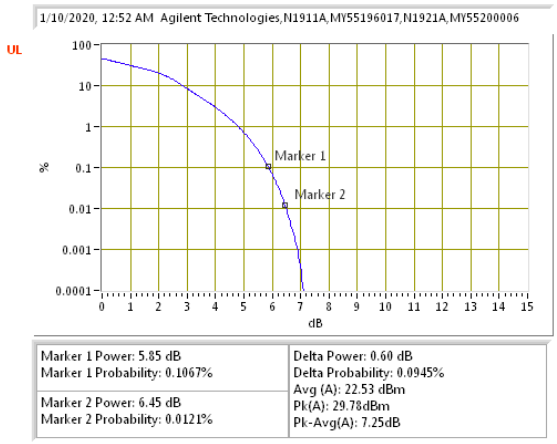


LTE B66 20MHz 16QAM Middle Channel

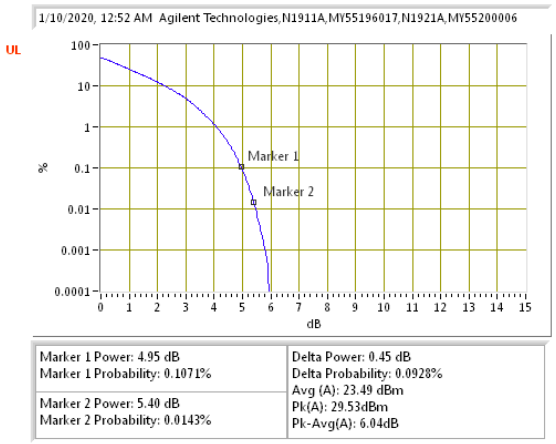
8.5.17. LTE BAND 71



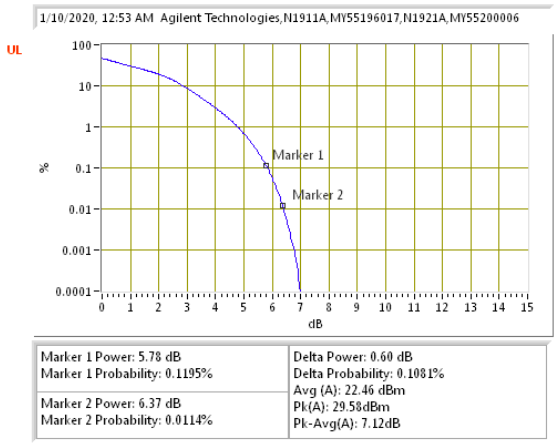
LTE B71 5MHz QPSK Middle Channel



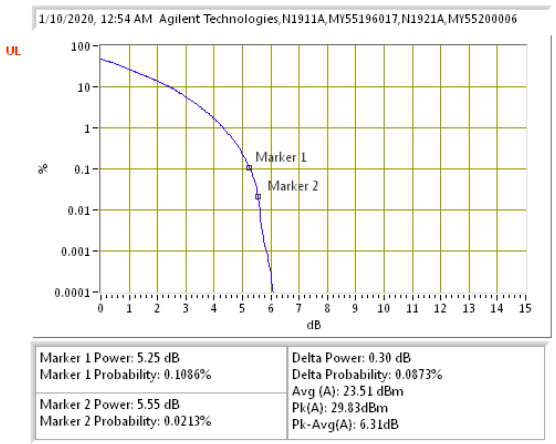
LTE B71 5MHz 16QAM Middle Channel



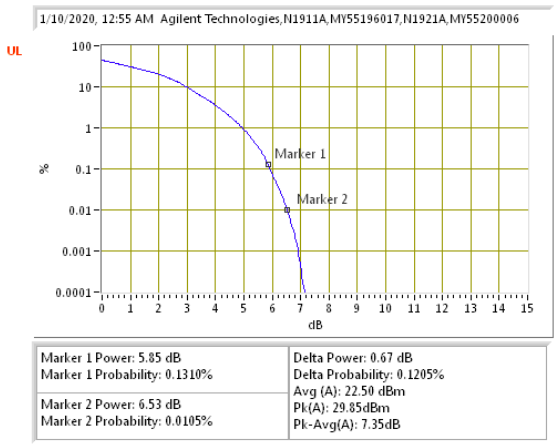
LTE B71 10MHz QPSK Middle Channel



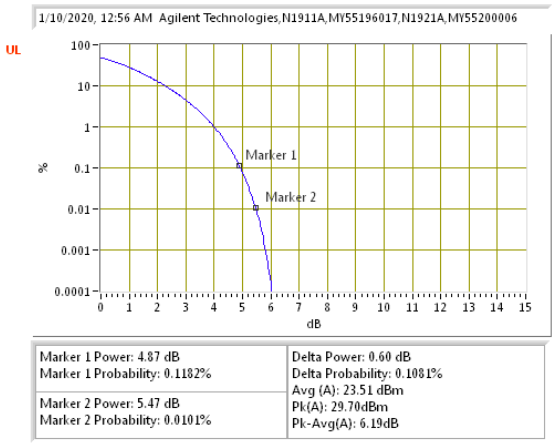
LTE B71 10MHz 16QAM Middle Channel



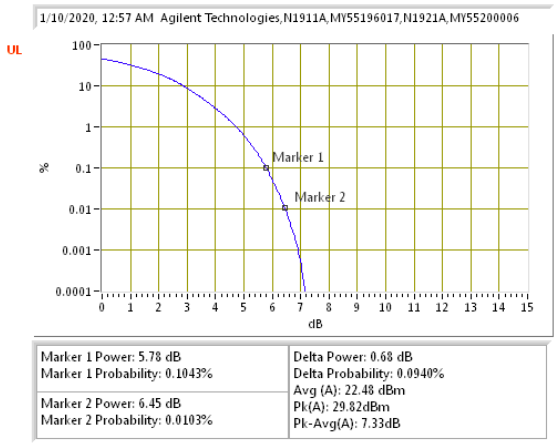
LTE B71 15MHz QPSK Middle Channel



LTE B71 15MHz 16QAM Middle Channel



LTE B71 20MHz QPSK Middle Channel



LTE B71 20MHz 16QAM Middle Channel

9. RADIATED TEST RESULTS

9.1. EFFECTIVE RADIATED POWER ERP/EIRP

RULE PART(S)

FCC: §2.1053, §22.917, §24.238, §27.50 and §90.691
RSS130§4.4, RSS132§5.4; RSS133§6.4, RSS139§6.5, RSS199§4.4, RSS140§4.3

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 ≥ OBW; b) Set VBW ≥ 3 × RBW; c) Set span ≥ 2 x RBW; d) Sweep time = auto couple; e) Detector = peak; f) Ensure that the number of measurement points ≥ 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 ≥ 3 x RBW; d) Set number of points in sweep ≥ 2 × span / RBW; e) Sweep time = auto-couple; f) Detector = RMS (power averaging); g) Use free run trigger If burst duty cycle ≥ 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, WCMDA, and LTE

TEST RESULTS

GSM

Band	Mode	Channel	f(MHz)	ERP/EIRP	
				dBm	W
GSM 850	GPRS	128	824.2	27.02	0.5035
		190	836.6	27.03	0.5047
		251	848.8	27.47	0.5585
	EGPRS	128	824.2	22.32	0.1706
		190	836.6	21.91	0.1552
		251	848.8	22.10	0.1622
GSM 1900	GPRS	512	1850.2	27.19	0.5236
		661	1880.0	25.80	0.3802
		810	1909.8	25.69	0.3707
	EGPRS	512	1850.2	23.43	0.2203
		661	1880.0	22.53	0.1791
		810	1909.8	22.39	0.1734

CDMA

Band	Mode	Channel	f(MHz)	ERP/EIRP	
				dBm	W
BC10	1xRTT	450	817.25	18.00	0.0631
		560	820.00	18.07	0.0641
		670	822.75	18.21	0.0662
	EVDO	450	817.25	18.18	0.0658
		560	820.00	18.06	0.0640
		670	822.75	18.28	0.0673
BC0	1xRTT	1013	824.7	19.82	0.0959
		384	836.52	18.90	0.0776
		777	848.31	19.60	0.0912
	EVDO	1013	824.7	20.00	0.1000
		384	836.52	19.01	0.0796
		777	848.31	19.72	0.0938
BC1	1xRTT	25	1851.25	22.01	0.1589
		600	1880.00	22.79	0.1901
		1175	1908.75	20.77	0.1194
	EVDO	25	1851.25	22.23	0.1671
		600	1880.00	22.67	0.1849
		1175	1908.75	21.03	0.1268

WCDMA

Band	Mode	Channel	f(MHz)	ERP/EIRP	
				dBm	W
Band 5	REL99	4132	826.4	18.68	0.0738
		4183	836.6	18.71	0.0743
		4233	846.6	19.30	0.0851
	HSDPA	4132	826.4	17.21	0.0526
		4183	836.6	17.16	0.0520
		4233	846.6	17.93	0.0621
Band 2	REL99	9262	1852.4	21.48	0.1406
		9400	1880	20.24	0.1057
		9538	1907.6	20.29	0.1069
	HSDPA	9262	1852.4	20.41	0.1099
		9400	1880.0	19.08	0.0809
		9538	1907.6	19.13	0.0818
Band 4	REL99	1312	1712.4	22.37	0.1726
		1413	1732.6	21.27	0.1340
		1513	1752.6	22.32	0.1706
	HSDPA	1312	1712.4	21.17	0.1309
		1413	1732.6	20.14	0.1033
		1513	1752.6	21.18	0.1312

LTE Band 5

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
10	QPSK	1/0	829	19.12	0.0817
		1/0	836.5	18.80	0.0759
		1/0	844	19.44	0.0879
	16QAM	1/0	829	17.88	0.0614
		1/0	836.5	17.68	0.0586
		1/0	844	18.50	0.0708
5	QPSK	1/0	826.5	19.11	0.0815
		1/0	836.5	18.76	0.0752
		1/0	846.5	20.09	0.1021
	16QAM	1/0	826.5	17.79	0.0601
		1/0	836.5	17.60	0.0575
		1/0	846.5	18.97	0.0789
3	QPSK	1/0	825.5	19.20	0.0832
		1/0	836.5	18.85	0.0767
		1/0	847.5	19.70	0.0933
	16QAM	1/0	825.5	18.00	0.0631
		1/0	836.5	17.52	0.0565
		1/0	847.5	18.83	0.0764
1.4	QPSK	1/0	824.7	18.87	0.0771
		1/0	836.5	18.43	0.0697
		1/0	848.3	19.42	0.0875
	16QAM	1/0	824.7	17.62	0.0578
		1/0	836.5	17.21	0.0526
		1/0	848.3	18.33	0.0681

LTE Band 7

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	2510	23.93	0.2472
		1/0	2535	23.23	0.2104
		1/0	2560	22.09	0.1618
	16QAM	1/0	2510	22.80	0.1905
		1/0	2535	22.05	0.1603
		1/0	2560	20.89	0.1227
15	QPSK	1/0	2507.5	23.85	0.2427
		1/0	2535	23.06	0.2023
		1/0	2562.5	22.00	0.1585
	16QAM	1/0	2507.5	22.89	0.1945
		1/0	2535	21.92	0.1556
		1/0	2562.5	20.98	0.1253
10	QPSK	1/0	2505.0	23.27	0.2123
		1/0	2535.0	23.01	0.2000
		1/0	2565.0	21.59	0.1442
	16QAM	1/0	2505.0	22.24	0.1675
		1/0	2535.0	21.94	0.1563
		1/0	2565.0	20.52	0.1127
5	QPSK	1/0	2502.5	23.00	0.1995
		1/0	2535.0	22.87	0.1936
		1/0	2567.5	21.24	0.1330
	16QAM	1/0	2502.5	21.85	0.1531
		1/0	2535.0	21.74	0.1493
		1/0	2567.5	20.15	0.1035

LTE Band 12

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
10	QPSK	1/0	704	19.09	0.0811
		1/0	707.5	18.95	0.0785
		1/0	711	18.96	0.0787
	16QAM	1/0	704	18.12	0.0649
		1/0	707.5	17.63	0.0579
		1/0	711	17.82	0.0605
5	QPSK	1/0	701.5	19.07	0.0807
		1/0	707.5	18.76	0.0752
		1/0	713.5	19.09	0.0811
	16QAM	1/0	701.5	17.81	0.0604
		1/0	707.5	17.46	0.0557
		1/0	713.5	17.85	0.0610
3	QPSK	1/0	700.5	19.00	0.0794
		1/0	707.5	18.42	0.0695
		1/0	714.5	18.69	0.0740
	16QAM	1/0	700.5	17.95	0.0624
		1/0	707.5	17.20	0.0525
		1/0	714.5	17.44	0.0555
1.4	QPSK	1/0	699.7	18.60	0.0724
		1/0	707.5	18.48	0.0705
		1/0	715.3	18.63	0.0729
	16QAM	1/0	699.7	17.46	0.0557
		1/0	707.5	17.52	0.0565
		1/0	715.3	17.50	0.0562

LTE Band 13

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
10	QPSK				
		1/0	782	16.99	0.0500
	16QAM				
		1/0	782	15.78	0.0378
5	QPSK	1/0	779.5	17.02	0.0504
		1/0	782	17.08	0.0511
		1/0	784.5	17.01	0.0502
	16QAM	1/0	779.5	15.55	0.0359
		1/0	782	15.65	0.0367
		1/0	784.5	15.70	0.0372

LTE Band 14

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
10	QPSK				
		1/0	793	17.96	0.0625
	16QAM				
		1/0	793	16.63	0.0460
5	QPSK	1/0	790.5	18.14	0.0652
		1/0	793	18.19	0.0659
		1/0	795.5	18.26	0.0670
	16QAM	1/0	790.5	16.83	0.0482
		1/0	793	16.89	0.0489
		1/0	795.5	16.90	0.0490

LTE Band 25

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	1860	19.52	0.0895
		1/0	1882.5	18.80	0.0759
		1/0	1905	18.48	0.0705
	16QAM	1/0	1860	19.42	0.0875
		1/0	1882.5	18.30	0.0676
		1/0	1905	18.18	0.0658
15	QPSK	1/0	1857.5	20.12	0.1028
		1/0	1882.5	19.00	0.0794
		1/0	1907.5	18.18	0.0658
	16QAM	1/0	1857.5	19.82	0.0959
		1/0	1882.5	18.90	0.0776
		1/0	1907.5	17.88	0.0614
10	QPSK	1/0	1855	20.32	0.1076
		1/0	1882.5	19.00	0.0794
		1/0	1910	19.48	0.0887
	16QAM	1/0	1855	20.02	0.1005
		1/0	1882.5	18.60	0.0724
		1/0	1910	17.98	0.0628
5	QPSK	1/0	1852.5	22.22	0.1667
		1/0	1882.5	20.20	0.1047
		1/0	1912.5	20.18	0.1042
	16QAM	1/0	1852.5	20.82	0.1208
		1/0	1882.5	18.90	0.0776
		1/0	1912.5	18.68	0.0738
3	QPSK	1/0	1851.5	21.92	0.1556
		1/0	1882.5	20.80	0.1202
		1/0	1913.5	20.28	0.1067
	16QAM	1/0	1851.5	20.42	0.1102
		1/0	1882.5	19.20	0.0832
		1/0	1913.5	18.88	0.0773
1.4	QPSK	1/0	1850.7	22.02	0.1592
		1/0	1882.5	20.20	0.1047
		1/0	1914.3	20.88	0.1225
	16QAM	1/0	1850.7	20.92	0.1236
		1/0	1882.5	18.80	0.0759
		1/0	1914.3	19.68	0.0929

LTE Band 26 (FCC PART 90S)

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
15	QPSK				
		1/0	821.5	18.50	0.0708
	16QAM				
		1/0	821.5	17.16	0.0520
10	QPSK				
		1/0	819	17.64	0.0581
	16QAM				
		1/0	819	16.46	0.0443
5	QPSK	1/0	816.5	17.36	0.0545
		1/0	819	17.68	0.0586
		1/0	821.5	18.09	0.0644
	16QAM	1/0	816.5	16.17	0.0414
		1/0	819	16.52	0.0449
		1/0	821.5	16.95	0.0495
3	QPSK	1/0	815.5	17.23	0.0528
		1/0	819	17.42	0.0552
		1/0	822.5	18.05	0.0638
	16QAM	1/0	815.5	16.15	0.0412
		1/0	819	16.15	0.0412
		1/0	822.5	17.14	0.0518
1.4	QPSK	1/0	814.7	16.65	0.0462
		1/0	819	17.09	0.0512
		1/0	823.3	17.96	0.0625
	16QAM	1/0	814.7	15.47	0.0352
		1/0	819	16.14	0.0411
		1/0	823.3	16.72	0.0470

LTE Band 26 (FCC PART 22)

BW (MHz)	Mode	RB/RB Size	f(MHz)	ERP	
				dBm	W
15	QPSK	1/0	831.5	18.66	0.0735
		1/0	836.5	18.15	0.0653
		1/0	841.5	18.71	0.0743
	16QAM	1/0	831.5	17.45	0.0556
		1/0	836.5	16.84	0.0483
		1/0	841.5	17.91	0.0618
10	QPSK	1/0	829.0	18.74	0.0748
		1/0	836.5	18.36	0.0685
		1/0	844.0	18.87	0.0771
	16QAM	1/0	829.0	17.46	0.0557
		1/0	836.5	17.10	0.0513
		1/0	844.0	17.94	0.0622
5	QPSK	1/0	826.5	18.70	0.0741
		1/0	836.5	18.38	0.0689
		1/0	846.5	19.30	0.0851
	16QAM	1/0	826.5	17.54	0.0568
		1/0	836.5	17.28	0.0535
		1/0	846.5	18.04	0.0637
3	QPSK	1/0	825.5	18.50	0.0708
		1/0	836.5	18.17	0.0656
		1/0	847.5	19.17	0.0826
	16QAM	1/0	825.5	17.29	0.0536
		1/0	836.5	17.00	0.0501
		1/0	847.5	18.20	0.0661
1.4	QPSK	1/0	824.7	18.25	0.0668
		1/0	836.5	17.90	0.0617
		1/0	848.3	18.85	0.0767
	16QAM	1/0	824.7	17.15	0.0519
		1/0	836.5	16.80	0.0479
		1/0	848.3	17.81	0.0604

LTE Band 30

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
10	QPSK				
		1/0	2310	20.77	0.1194
	16QAM				
		1/0	2310	19.66	0.0925
5	QPSK	1/0	2307.5	20.23	0.1054
		1/0	2310	20.69	0.1172
		1/0	2312.5	20.72	0.1180
	16QAM	1/0	2307.5	19.15	0.0822
		1/0	2310	19.74	0.0942
		1/0	2312.5	19.76	0.0946

LTE Band 38

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	2580	20.62	0.1153
		1/0	2595	20.40	0.1096
		1/0	2610	18.56	0.0718
	16QAM	1/0	2580	19.52	0.0895
		1/0	2595	19.34	0.0859
		1/0	2610	17.49	0.0561
15	QPSK	1/0	2577.5	20.39	0.1094
		1/0	2595	20.21	0.1050
		1/0	2612.5	18.39	0.0690
	16QAM	1/0	2577.5	19.29	0.0849
		1/0	2595	19.00	0.0794
		1/0	2612.5	17.45	0.0556
10	QPSK	1/0	2575	20.41	0.1099
		1/0	2595	19.97	0.0993
		1/0	2615	18.05	0.0638
	16QAM	1/0	2575	19.35	0.0861
		1/0	2595	18.82	0.0762
		1/0	2615	17.10	0.0513
5	QPSK	1/0	2572.5	20.38	0.1091
		1/0	2595	19.31	0.0853
		1/0	2617.5	17.70	0.0589
	16QAM	1/0	2572.5	19.25	0.0841
		1/0	2595	18.25	0.0668
		1/0	2617.5	16.68	0.0466

LTE Band 41 (FCC) HPUE

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	2506	24.27	0.2673
		1/0	2593	21.99	0.1581
		1/0	2680	15.26	0.0336
	16QAM	1/0	2506	23.42	0.2198
		1/0	2593	20.87	0.1222
		1/0	2680	14.16	0.0261
15	QPSK	1/0	2503.5	24.02	0.2523
		1/0	2593	21.41	0.1384
		1/0	2682.5	13.70	0.0234
	16QAM	1/0	2503.5	22.72	0.1871
		1/0	2593	20.31	0.1074
		1/0	2682.5	13.15	0.0207
10	QPSK	1/0	2501	23.79	0.2393
		1/0	2593	21.23	0.1327
		1/0	2685	14.51	0.0282
	16QAM	1/0	2501	22.62	0.1828
		1/0	2593	20.02	0.1005
		1/0	2685	13.12	0.0205
5	QPSK	1/0	2498.5	23.24	0.2109
		1/0	2593	20.86	0.1219
		1/0	2687.5	13.68	0.0233
	16QAM	1/0	2498.5	21.84	0.1528
		1/0	2593	19.91	0.0979
		1/0	2687.5	12.62	0.0183

LTE Band 41 (IC)

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	2510	24.36	0.2729
		1/0	2595	19.39	0.0869
		1/0	2680	14.60	0.0288
	16QAM	1/0	2510	23.54	0.2259
		1/0	2595	18.43	0.0697
		1/0	2680	13.58	0.0228
15	QPSK	1/0	2507.5	23.92	0.2466
		1/0	2595	19.18	0.0828
		1/0	2682.5	15.73	0.0374
	16QAM	1/0	2507.5	23.05	0.2018
		1/0	2595	18.55	0.0716
		1/0	2682.5	14.91	0.0310
10	QPSK	1/0	2505	23.83	0.2415
		1/0	2595	18.86	0.0769
		1/0	2685	14.39	0.0275
	16QAM	1/0	2505	22.83	0.1919
		1/0	2595	18.07	0.0641
		1/0	2685	13.56	0.0227
5	QPSK	1/0	2592.5	23.22	0.2099
		1/0	2595	17.53	0.0566
		1/0	2687.5	13.56	0.0227
	16QAM	1/0	2592.5	22.14	0.1637
		1/0	2595	16.35	0.0432
		1/0	2687.5	12.42	0.0175

LTE Band 66

BW (MHz)	Mode	RB/RB Size	f(MHz)	EIRP	
				dBm	W
20	QPSK	1/0	1720	18.53	0.0713
		1/0	1745	22.71	0.1866
		1/0	1770	19.51	0.0893
	16QAM	1/0	1720	17.33	0.0541
		1/0	1745	21.31	0.1352
		1/0	1770	20.81	0.1205
15	QPSK	1/0	1717.5	23.33	0.2153
		1/0	1745	19.51	0.0893
		1/0	1772.5	20.91	0.1233
	16QAM	1/0	1717.5	22.13	0.1633
		1/0	1745	18.31	0.0678
		1/0	1772.5	19.61	0.0914
10	QPSK	1/0	1715	19.71	0.0935
		1/0	1745	19.31	0.0853
		1/0	1775	21.31	0.1352
	16QAM	1/0	1715	18.41	0.0693
		1/0	1745	18.21	0.0662
		1/0	1775	19.91	0.0979
5	QPSK	1/0	1712.5	19.01	0.0796
		1/0	1745	19.31	0.0853
		1/0	1777.5	20.61	0.1151
	16QAM	1/0	1712.5	17.71	0.0590
		1/0	1745	17.91	0.0618
		1/0	1777.5	19.31	0.0853
3	QPSK	1/0	1711.5	20.03	0.1007
		1/0	1745	23.11	0.2046
		1/0	1778.5	20.41	0.1099
	16QAM	1/0	1711.5	18.73	0.0746
		1/0	1745	22.11	0.1626
		1/0	1778.5	19.21	0.0834
1.4	QPSK	1/0	1710.7	23.33	0.2153
		1/0	1745	19.81	0.0957
		1/0	1779.3	20.21	0.1050
	16QAM	1/0	1710.7	22.83	0.1919
		1/0	1745	19.32	0.0855
		1/0	1779.3	19.71	0.0935