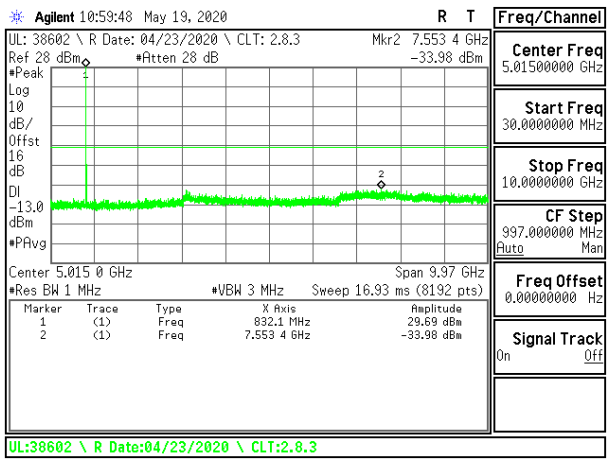
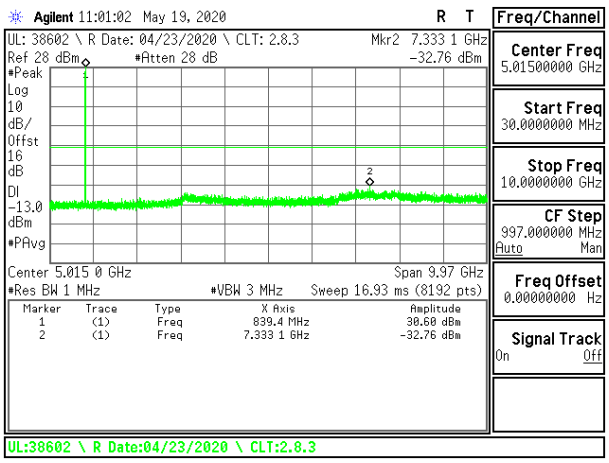


LTE B5 10MHz QPSK Middle Channel RB1-0



LTE B5 10MHz QPSK High Channel RB1-0

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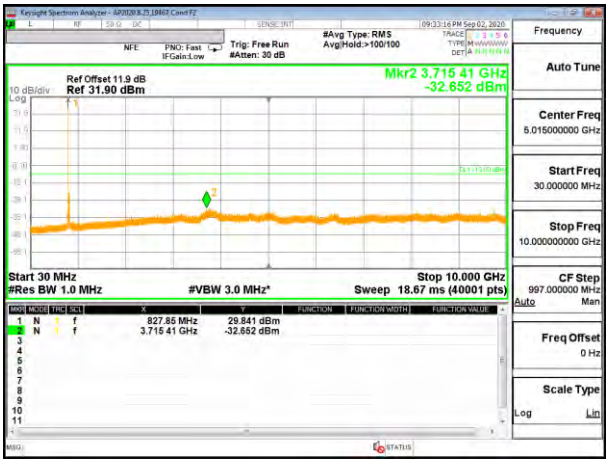
5G NR Band n5

5G NR Band n5 20MHz QPSK Low Channel RB1-1



5G NR Band n5 20MHz QPSK Middle Channel RB1-1

5G NR Band n5 20MHz QPSK High Channel RB1-1

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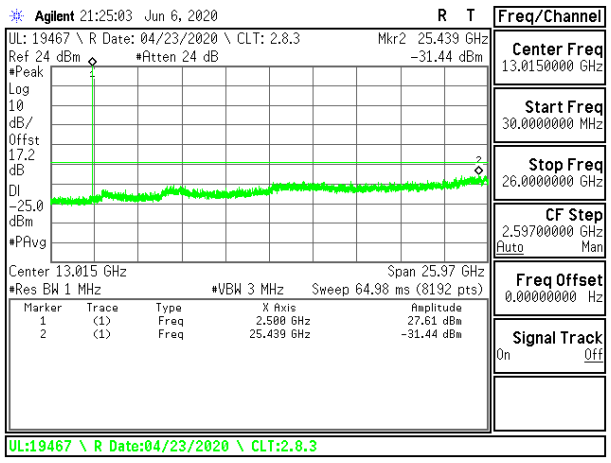
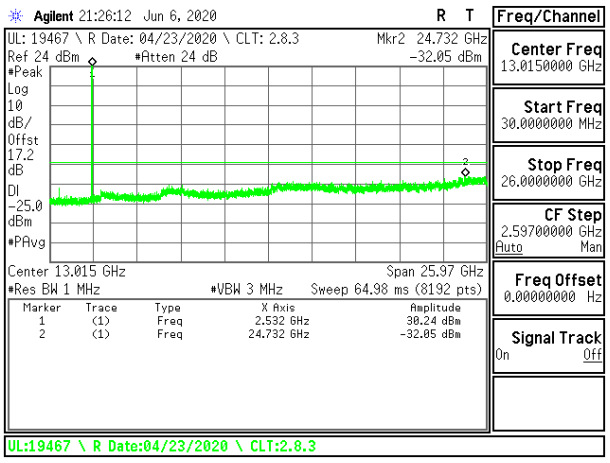
8.3.3. LTE BAND 7

LIMITS

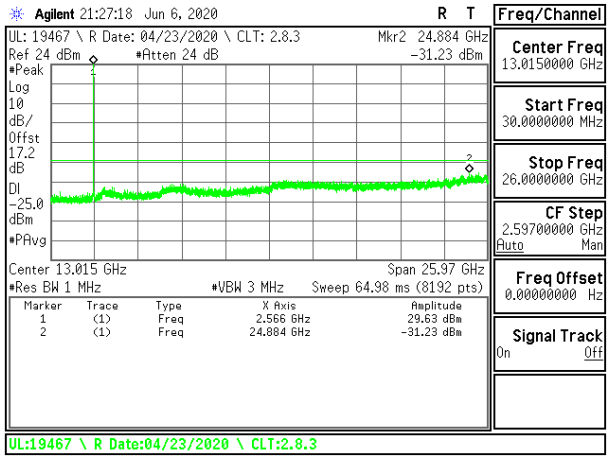
FCC: §27.53 (m)
The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts.



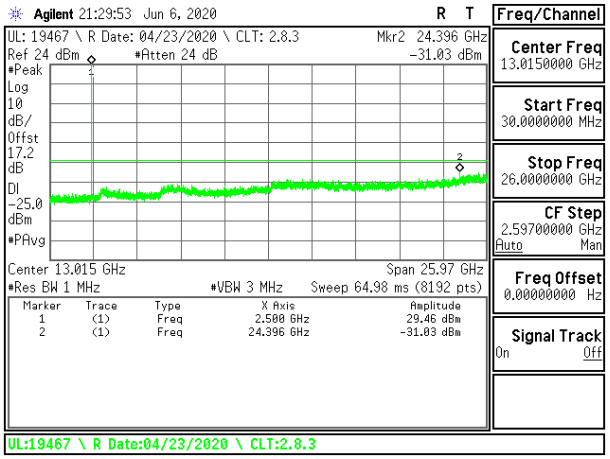
LTE B7 5MHz QPSK Low Channel RB1-0



LTE B7 5MHz QPSK Middle Channel RB1-0



LTE B7 5MHz QPSK High Channel RB1-0



LTE B7 10MHz QPSK Low Channel RB1-0

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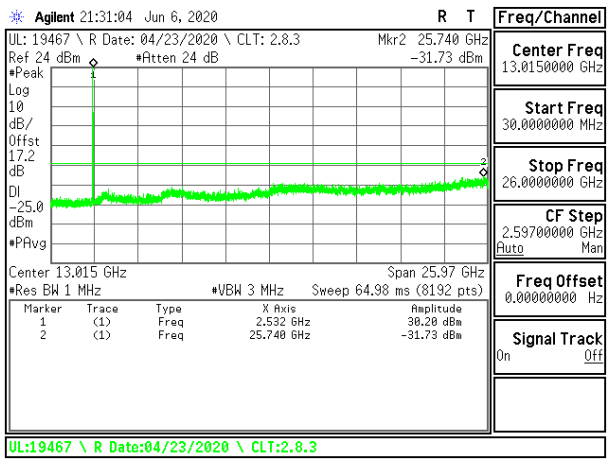
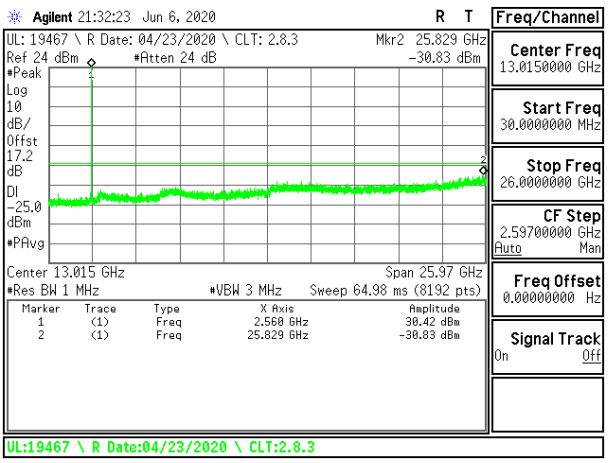
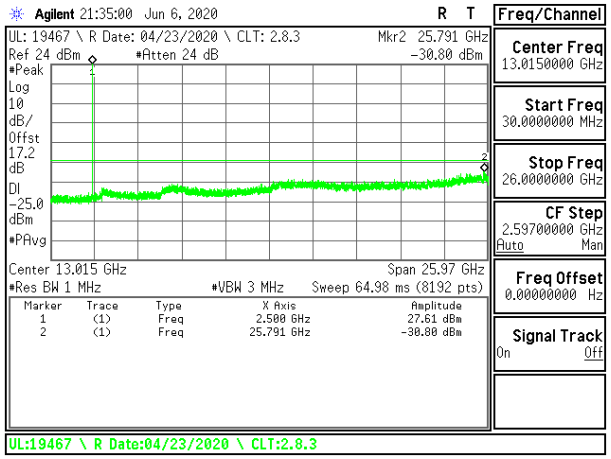


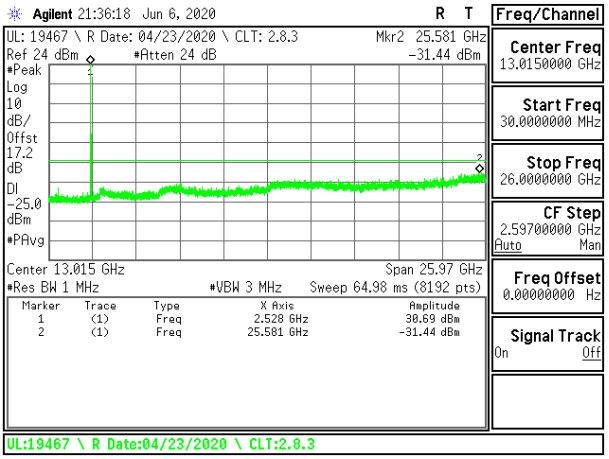
LTE B7 10MHz QPSK Middle Channel RB1-0



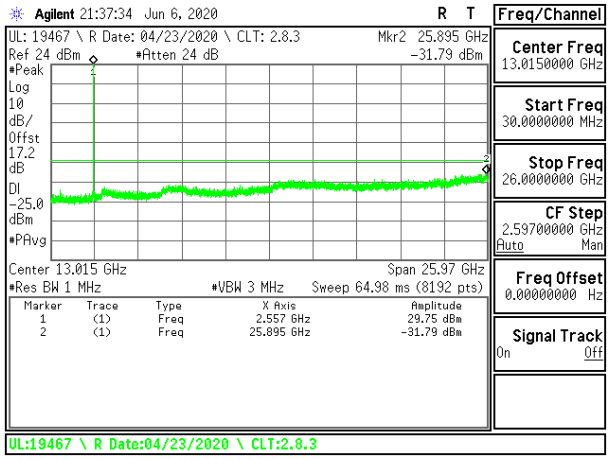
LTE B7 10MHz QPSK High Channel RB1-0



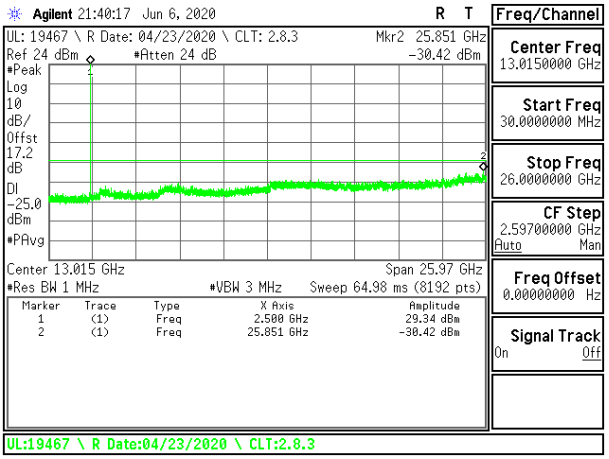
LTE B7 15MHz QPSK Low Channel RB1-0



LTE B7 15MHz QPSK Middle Channel RB1-0



LTE B7 15MHz QPSK High Channel RB1-0



LTE B7 20MHz QPSK Low Channel RB1-0

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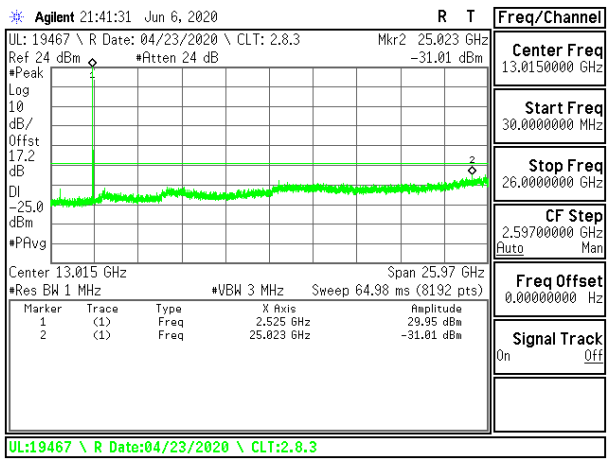
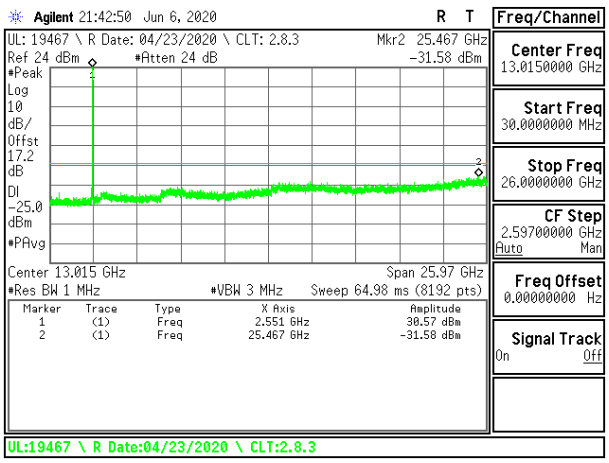


LTE B7 20MHz QPSK Middle Channel RB1-0



LTE B7 20MHz QPSK High Channel RB1-0

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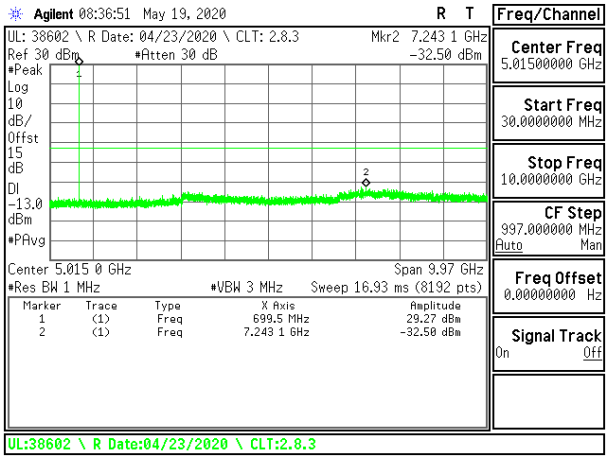
8.3.4. LTE BAND 12 AND 5G NR Band n12

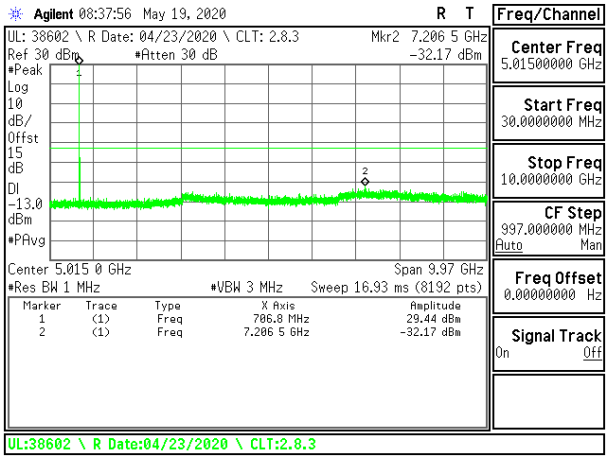
LIMITS

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.

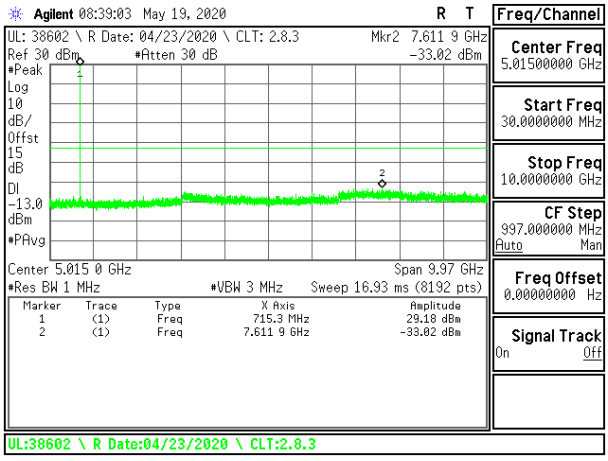
LTE BAND 12



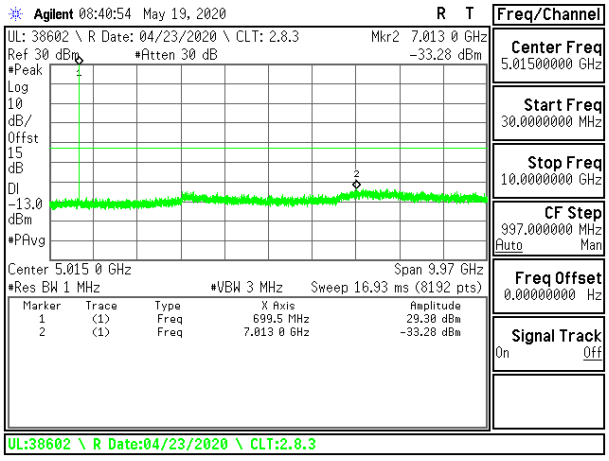
LTE B12 1.4MHz QPSK Low Channel RB1-0



LTE B12 1.4MHz QPSK Middle Channel RB1-0



LTE B12 1.4MHz QPSK High Channel RB1-0



LTE B12 3MHz QPSK Low Channel RB1-0

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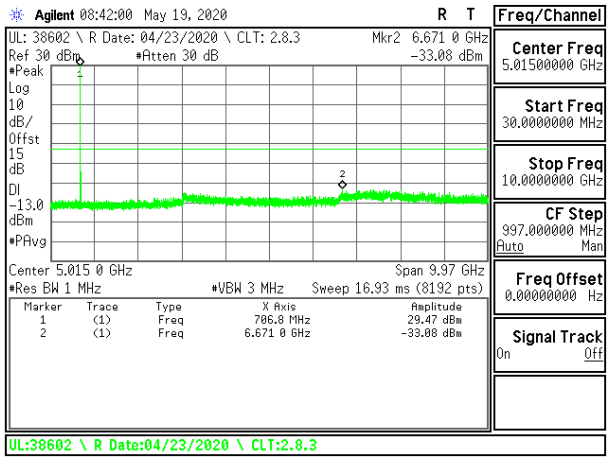
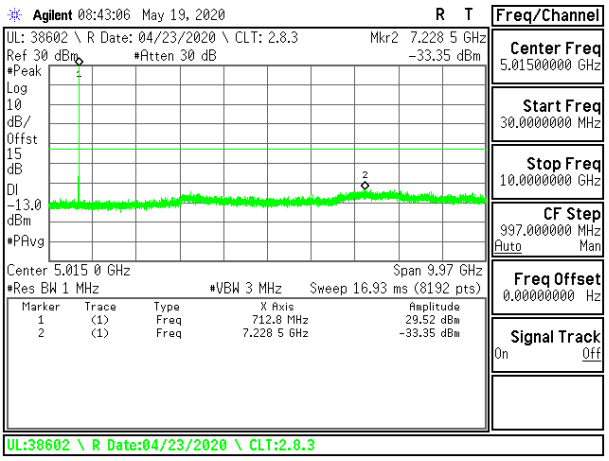
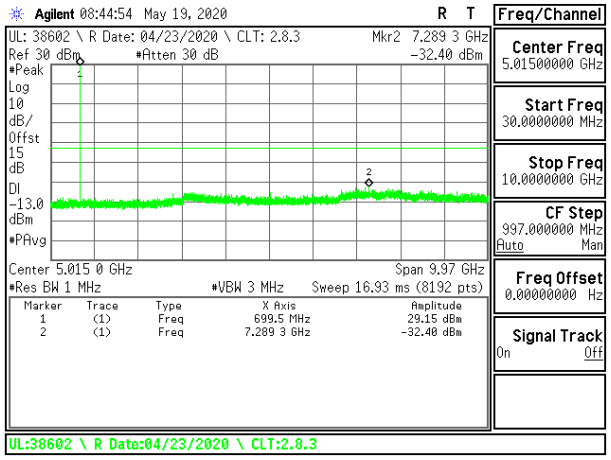


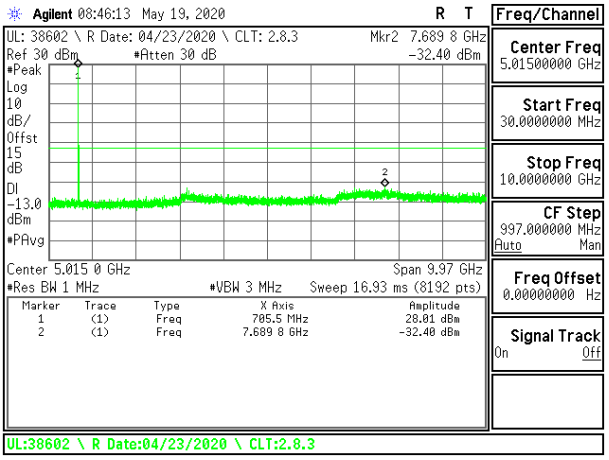
LTE B12 3MHz QPSK Middle Channel RB1-0



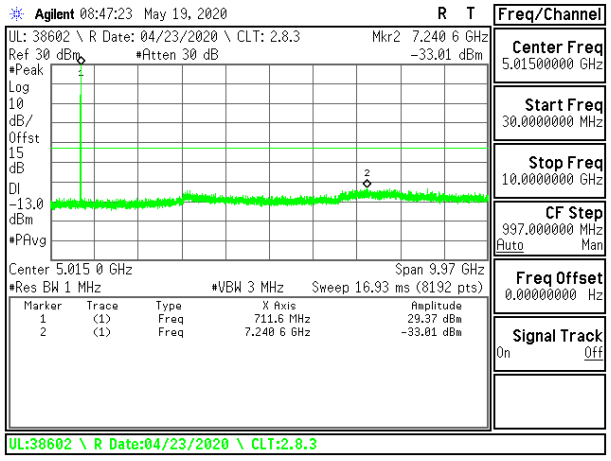
LTE B12 3MHz QPSK High Channel RB1-0



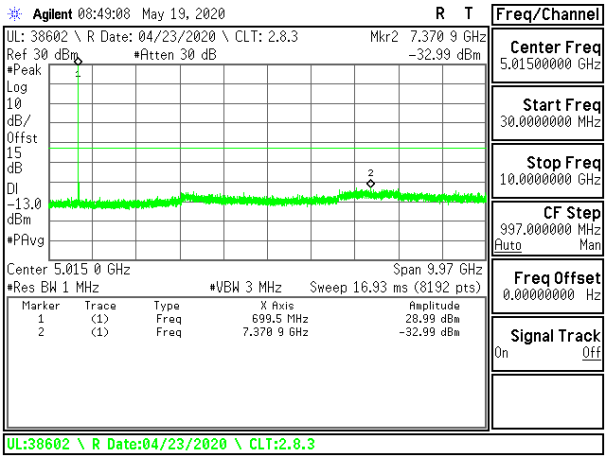
LTE B12 5MHz QPSK Low Channel RB1-0



LTE B12 5MHz QPSK Middle Channel RB1-0



LTE B12 5MHz QPSK High Channel RB1-0



LTE B12 10MHz QPSK Low Channel RB1-0

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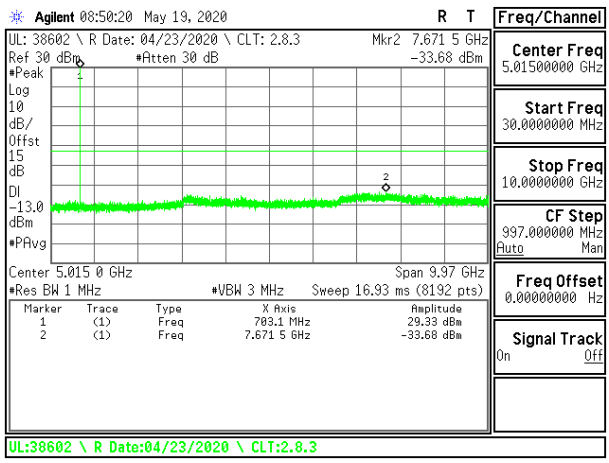
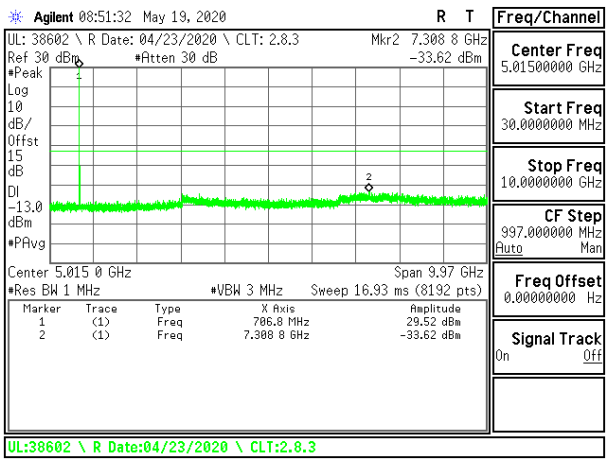


LTE B12 10MHz QPSK Middle Channel RB1-0



LTE B12 10MHz QPSK High Channel RB1-0

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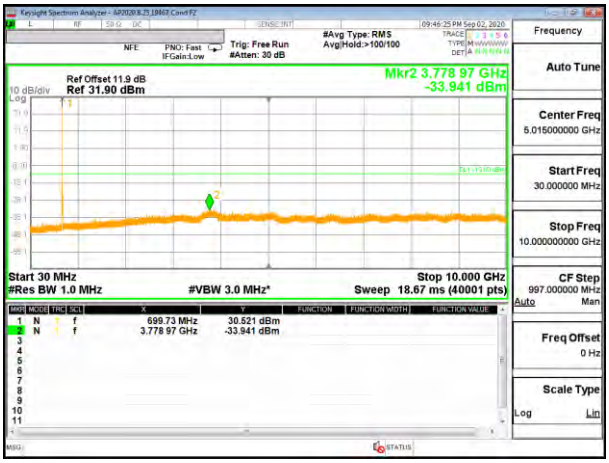
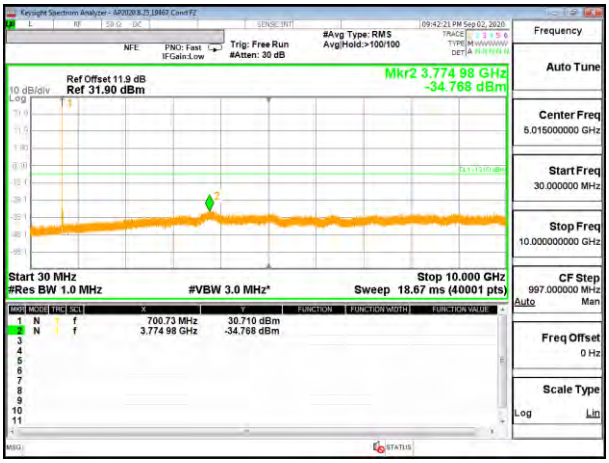
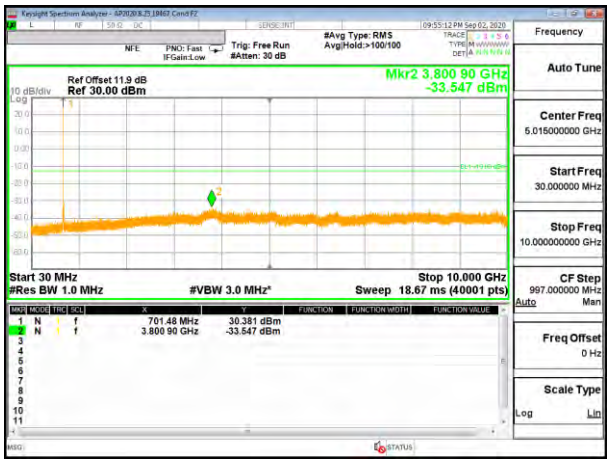
5G NR Band n12



5G NR Band n12 15MHz QPSK Low Channel RB1-1



5G NR Band n12 15MHz QPSK Middle Channel RB1-1



5G NR Band n12 15MHz QPSK High Channel RB1-1

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8.3.5. LTE BAND 13

LIMITS

FCC: §27.53 (c), (f)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts. 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.
Note: Radiated data in section 9.1.6 confirms a compliance for the emissions in GPS 1559-1610 MHz band were wideband emissions therefore the -40dBm/MHz limit was used.

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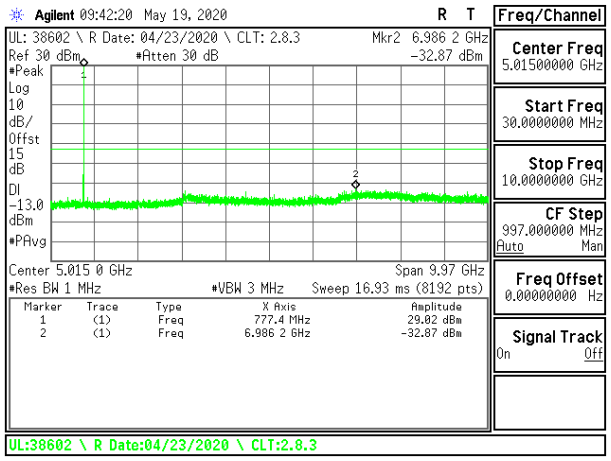
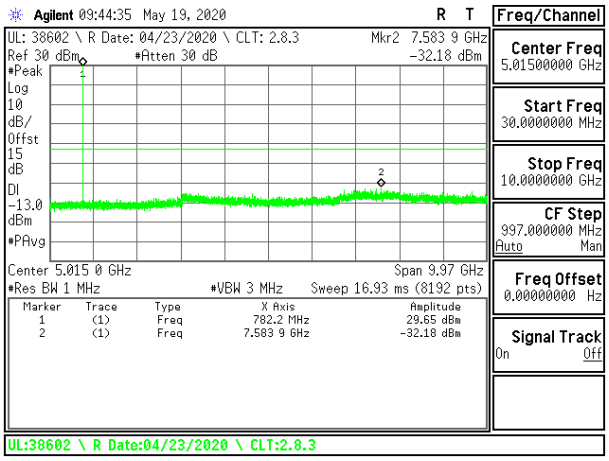
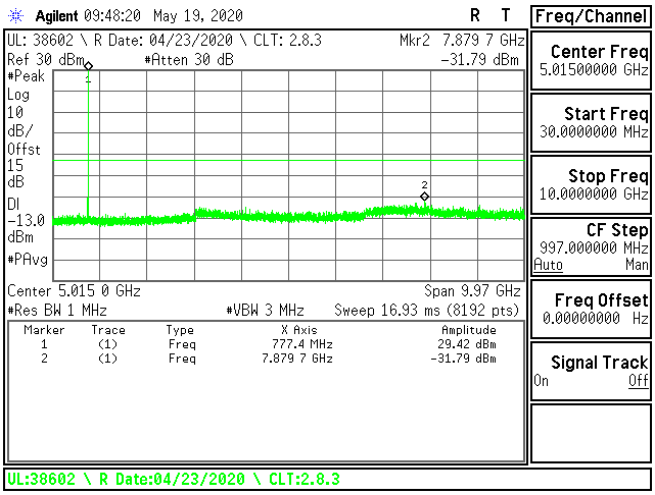


LTE B13 5MHz QPSK Low Channel RB1-0



LTE B13 5MHz QPSK High Channel RB1-0



LTE B13 10MHz QPSK Middle Channel RB1-0

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

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8.3.6. LTE BAND 14

LIMITS

FCC: §90.543 (e), (f)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts. 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.
Note: Radiated data in section 9.1.7 confirms a compliance for the emissions in GPS 1559-1610 MHz band were wideband emissions therefore the -40dBm/MHz limit was used.

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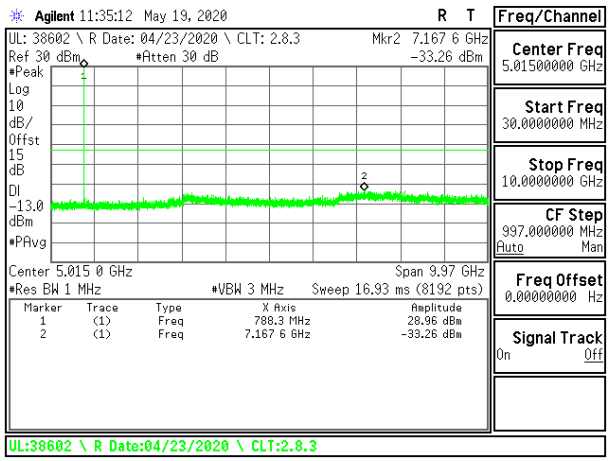
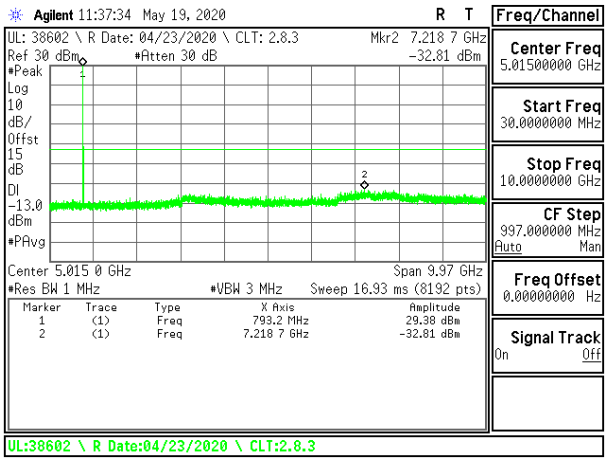
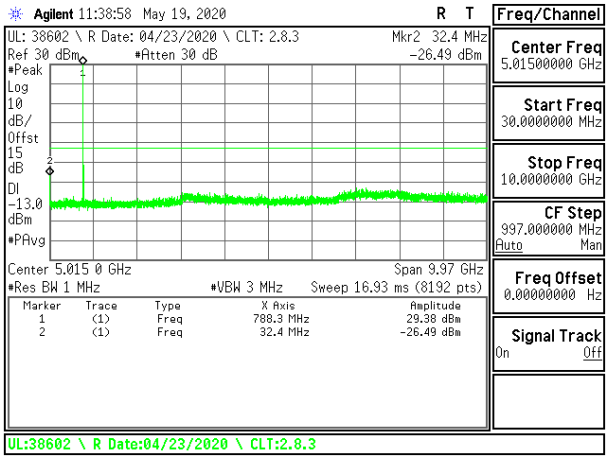


LTE B14 5MHz QPSK Low Channel RB1-0



LTE B14 5MHz QPSK High Channel RB1-0



LTE B14 10MHz QPSK Middle Channel RB1-0

Note: Radiated data in section 9.1.7 confirms a compliance with narrowband limits for GPS1559-1610 MHz band.

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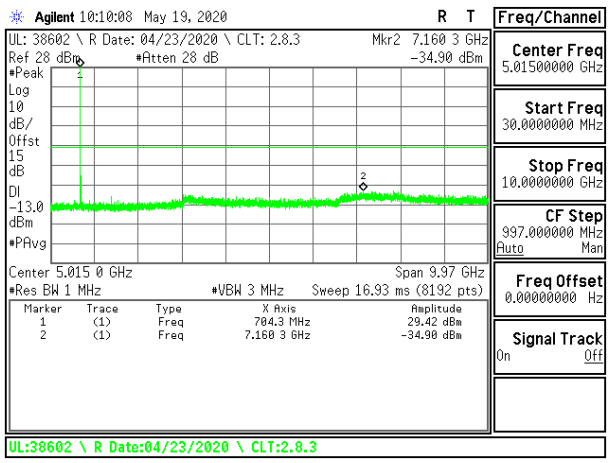
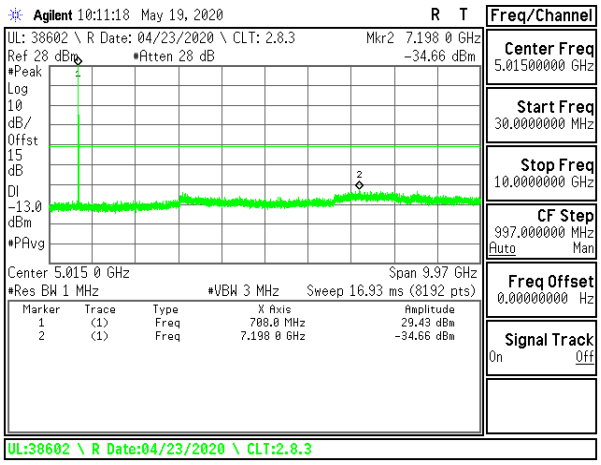
8.3.7. LTE BAND 17

LIMITS

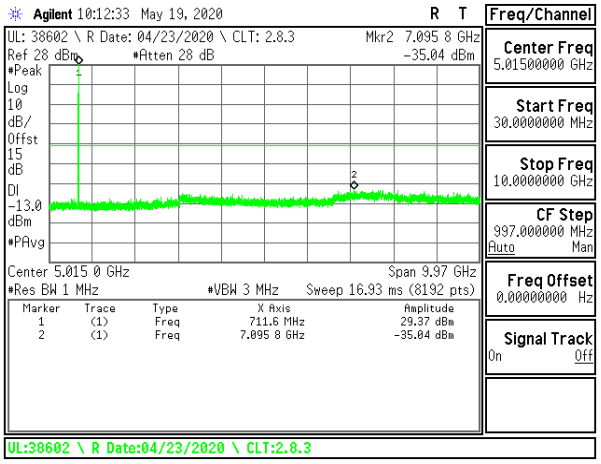
FCC: §27.53 (g)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



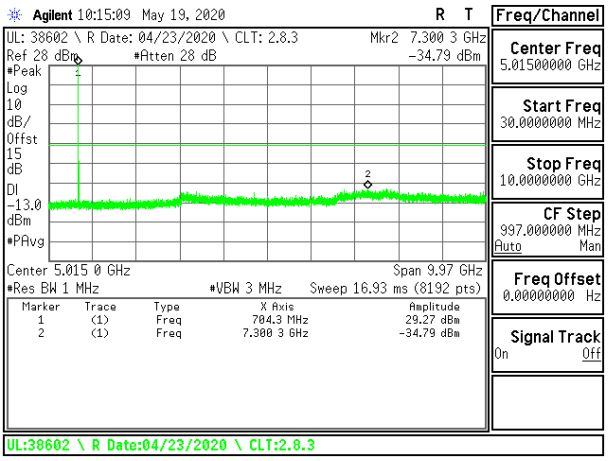
LTE B17 5MHz QPSK Low Channel RB1-0



LTE B17 5MHz QPSK Middle Channel RB1-0



LTE B17 5MHz QPSK High Channel RB1-0



LTE B17 10MHz QPSK Low Channel RB1-0

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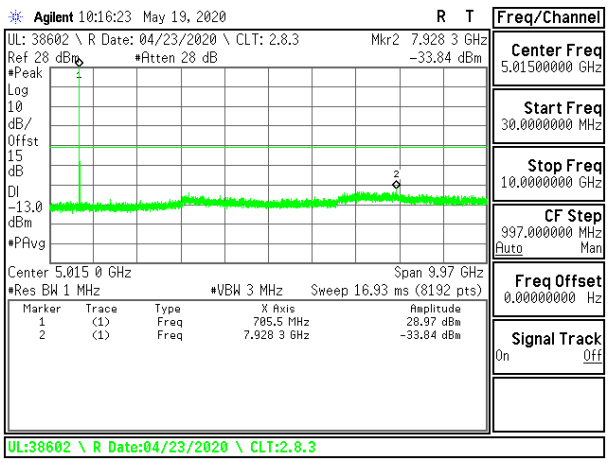
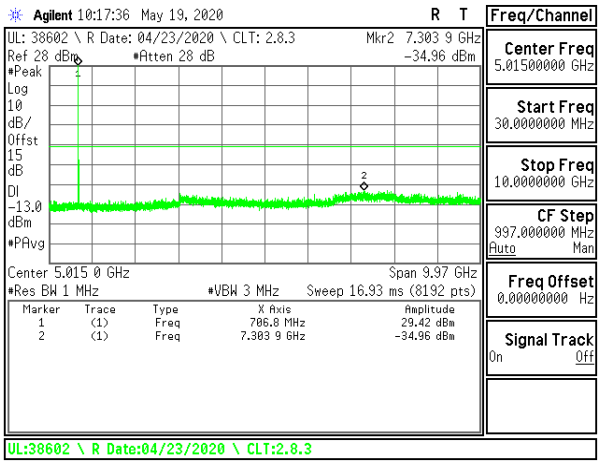


LTE B17 10MHz QPSK Middle Channel RB1-0



LTE B17 10MHz QPSK High Channel RB1-0

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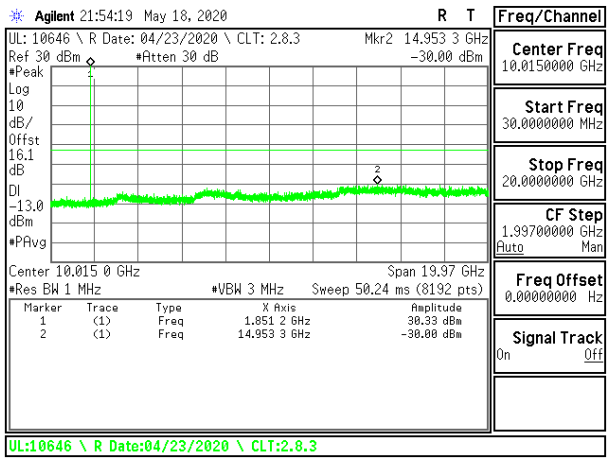
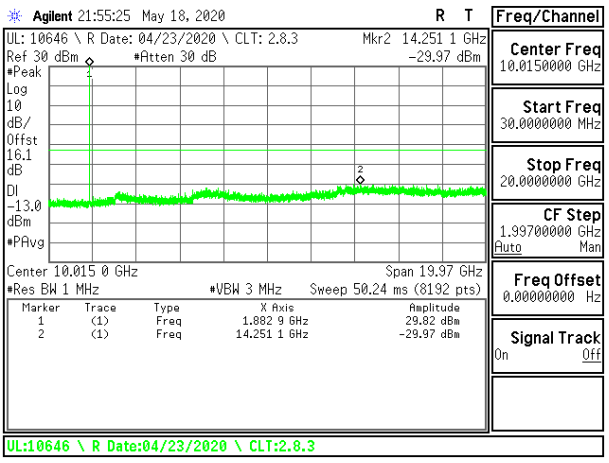
8.3.8. LTE BAND 25

LIMITS

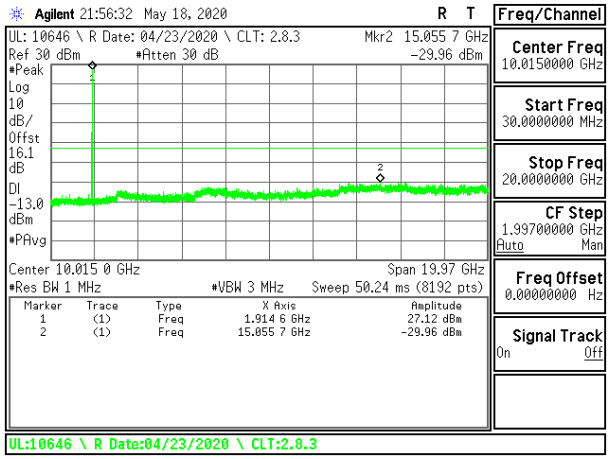
FCC: §24.238
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



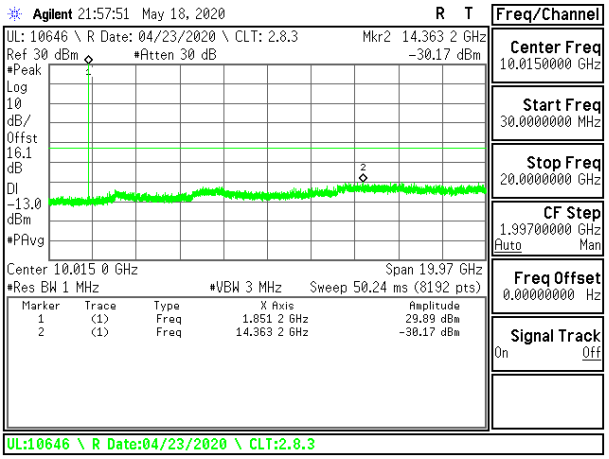
LTE B25 1.4MHz QPSK Low Channel RB1-0



LTE B25 1.4MHz QPSK Middle Channel RB1-0



LTE B25 1.4MHz QPSK High Channel RB1-0



LTE B25 3MHz QPSK Low Channel RB1-0

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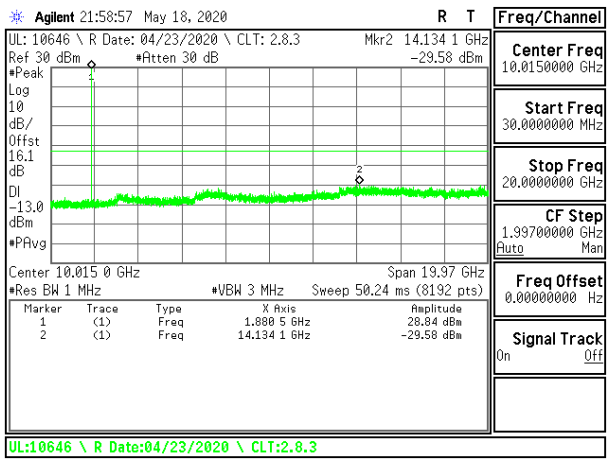
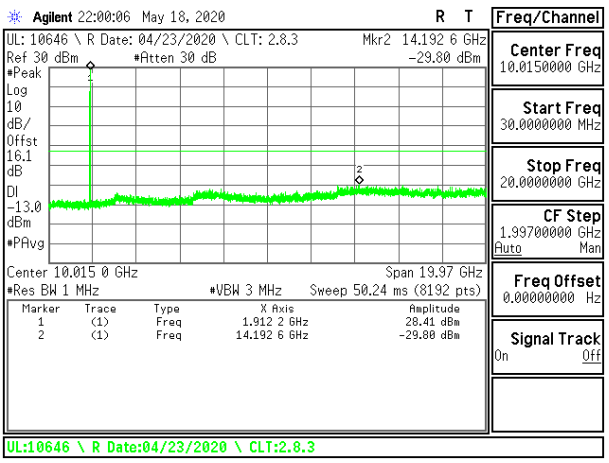
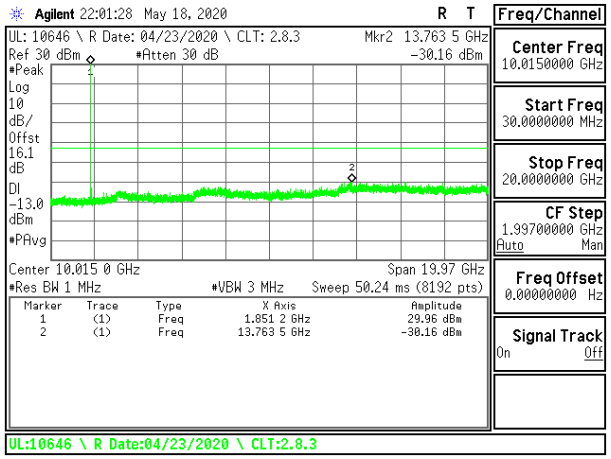


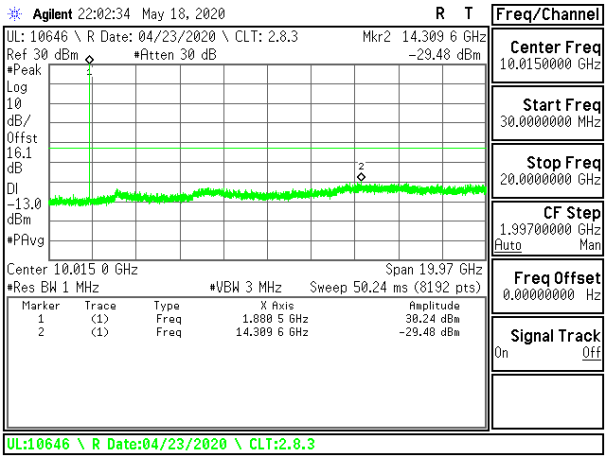
LTE B25 3MHz QPSK Middle Channel RB1-0



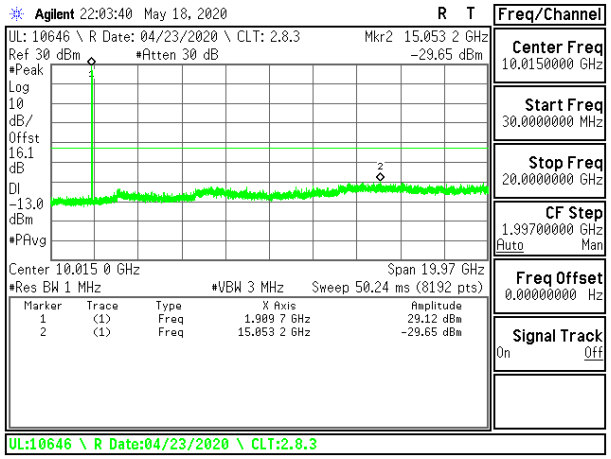
LTE B25 3MHz QPSK High Channel RB1-0



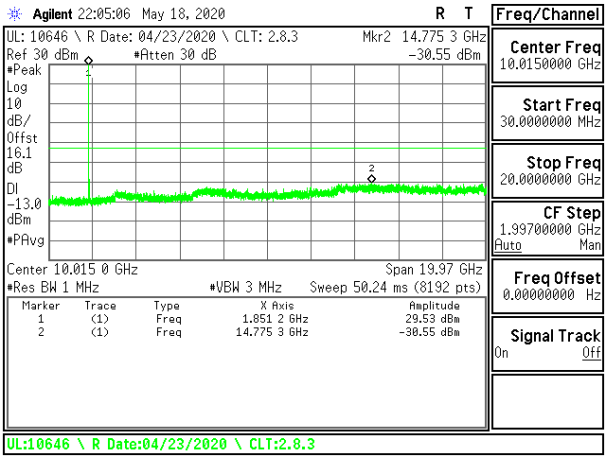
LTE B25 5MHz QPSK Low Channel RB1-0



LTE B25 5MHz QPSK Middle Channel RB1-0



LTE B25 5MHz QPSK High Channel RB1-0



LTE B25 10MHz QPSK Low Channel RB1-0

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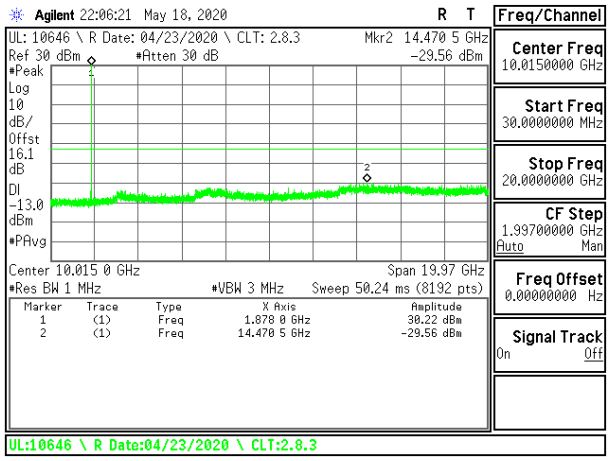
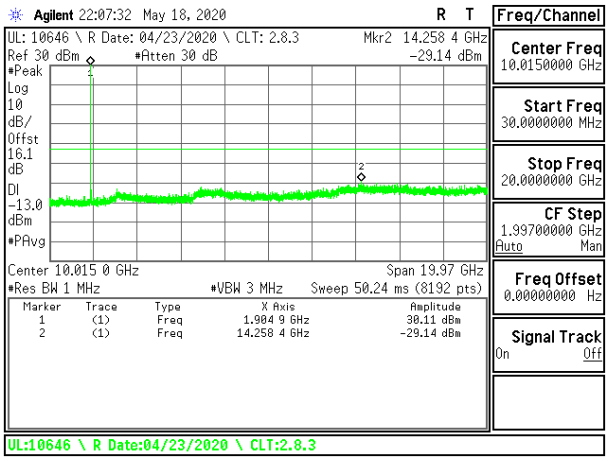
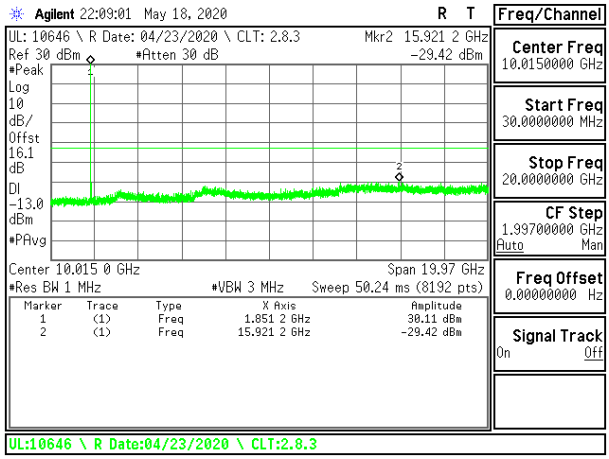


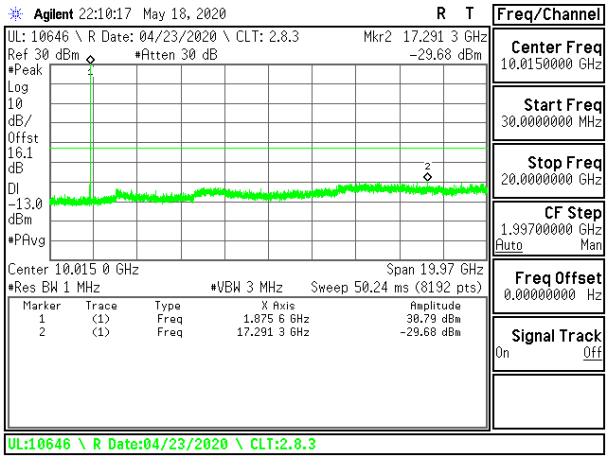
LTE B25 10MHz QPSK Middle Channel RB1-0



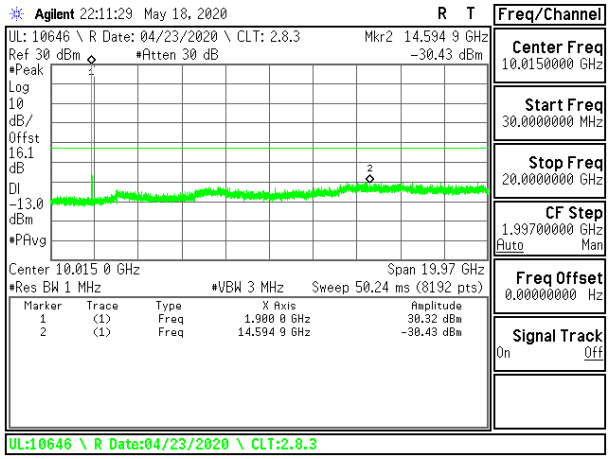
LTE B25 10MHz QPSK High Channel RB1-0



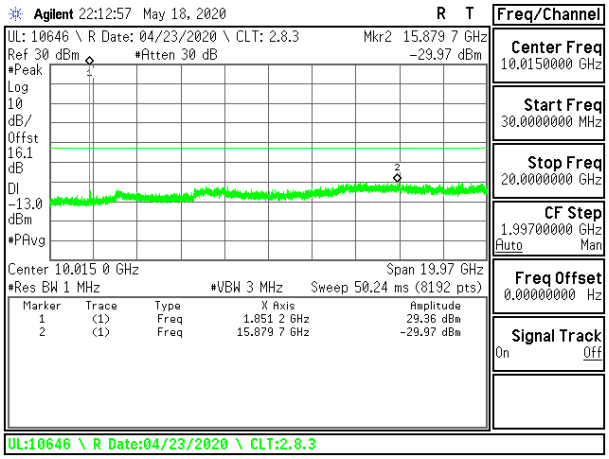
LTE B25 15MHz QPSK Low Channel RB1-0



LTE B25 15MHz QPSK Middle Channel RB1-0



LTE B25 15MHz QPSK High Channel RB1-0



LTE B25 20MHz QPSK Low Channel RB1-0

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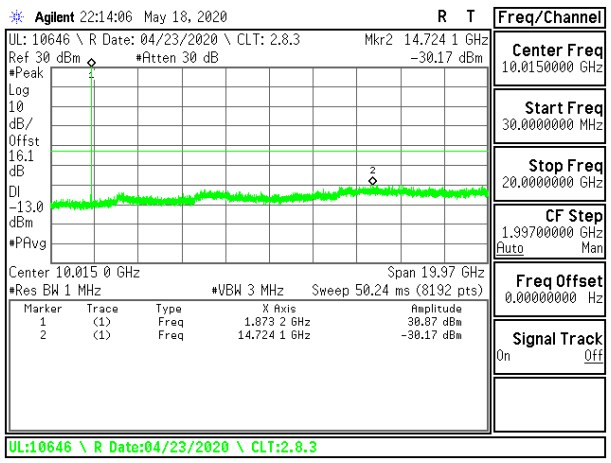
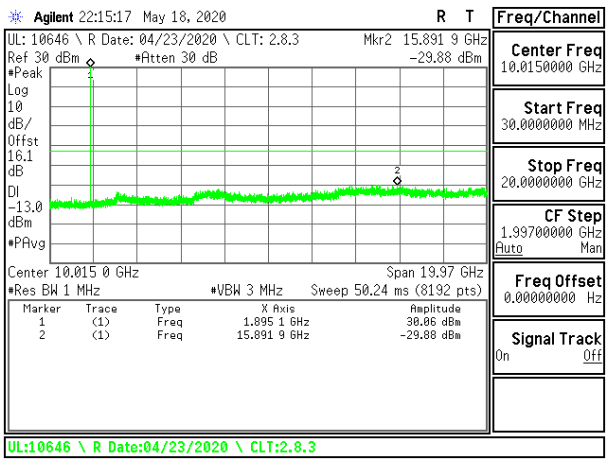


LTE B25 20MHz QPSK Middle Channel RB1-0



LTE B25 20MHz QPSK High Channel RB1-0

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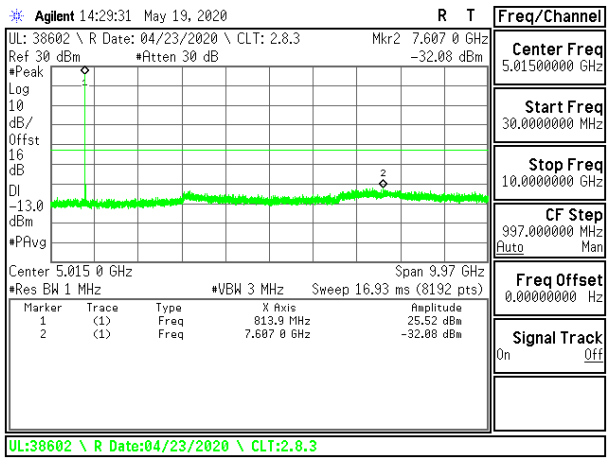
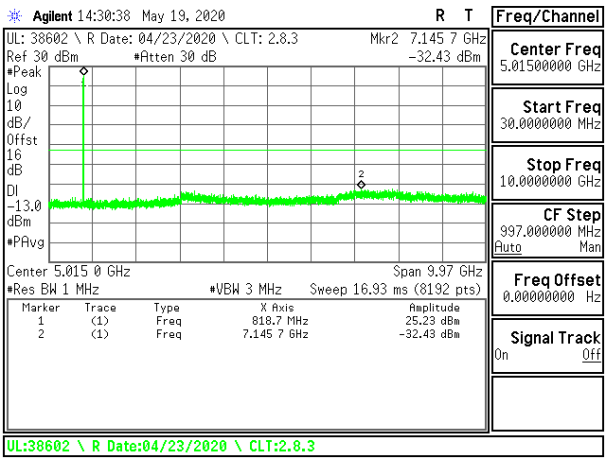
8.3.9. LTE BAND 26 (PART 90S)

LIMITS

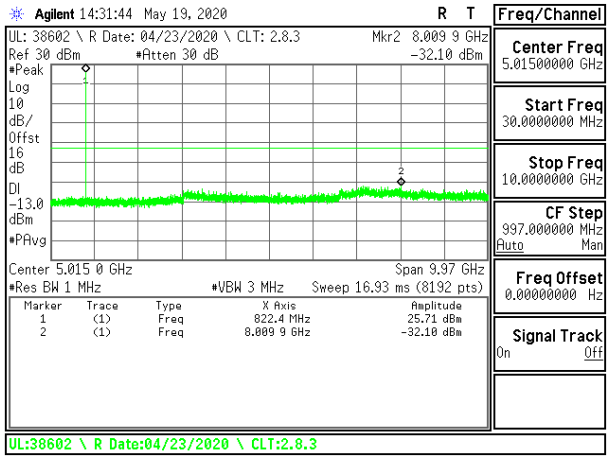
FCC: §90.691
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



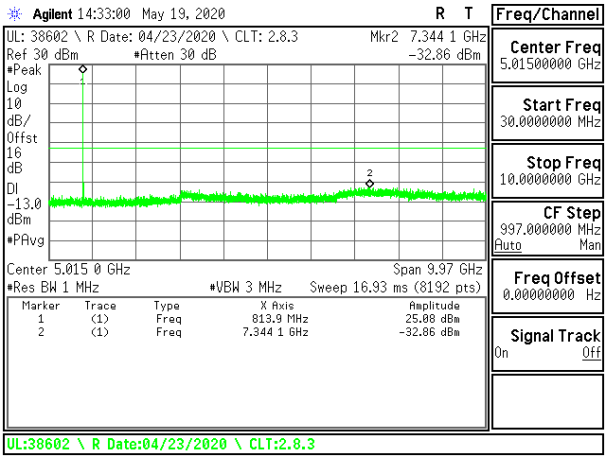
LTE B26 1.4MHz QPSK Low Channel RB1-0



LTE B26 1.4MHz QPSK Middle Channel RB1-0



LTE B26 1.4MHz QPSK High Channel RB1-0



LTE B26 3MHz QPSK Low Channel RB1-0

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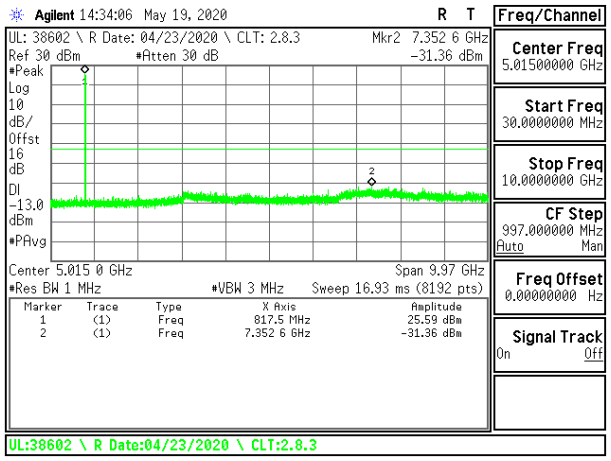
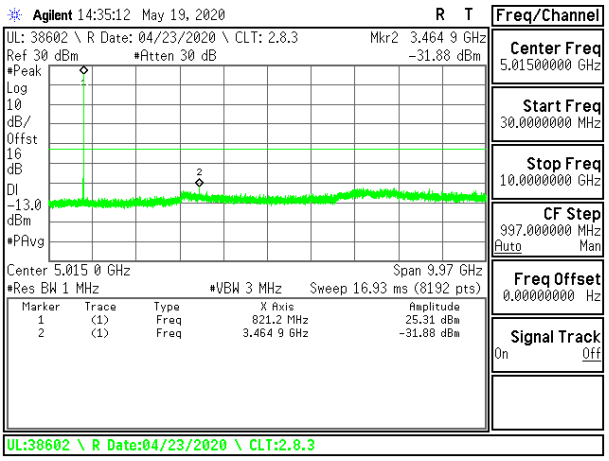
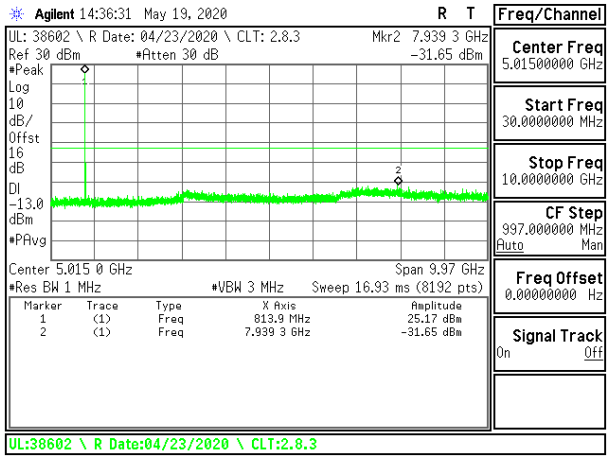


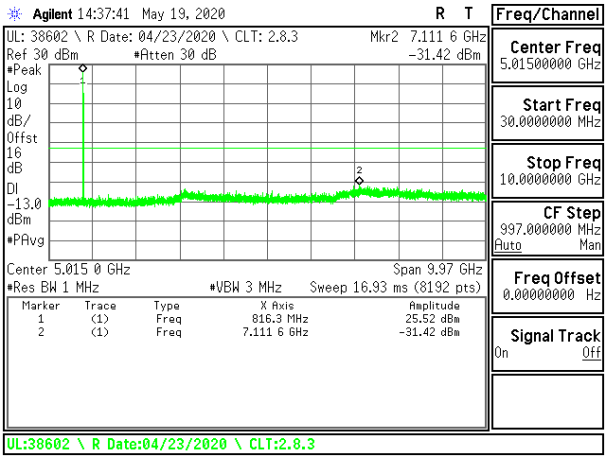
LTE B26 3MHz QPSK Middle Channel RB1-0



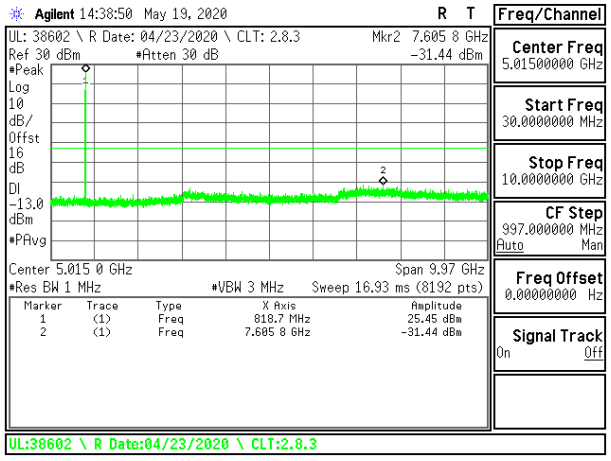
LTE B26 3MHz QPSK High Channel RB1-0



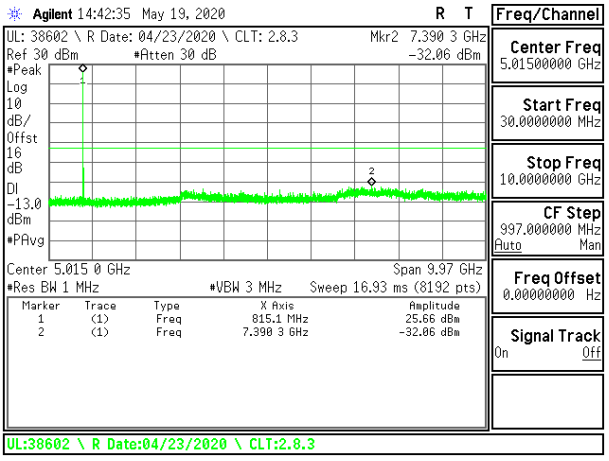
LTE B26 5MHz QPSK Low Channel RB1-0



LTE B26 5MHz QPSK Middle Channel RB1-0



LTE B26 5MHz QPSK High Channel RB1-0



LTE B26 10MHz QPSK Middle Channel RB1-0

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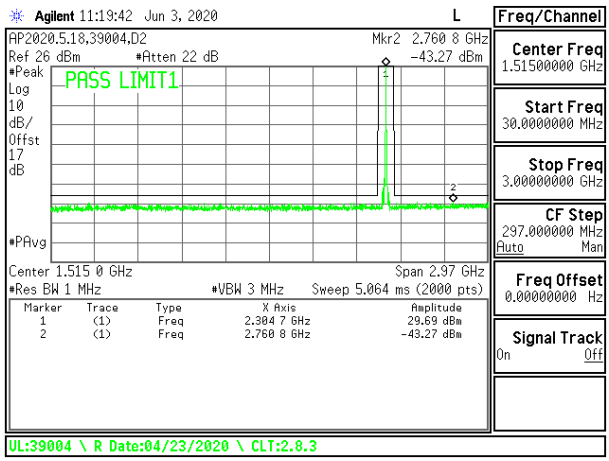
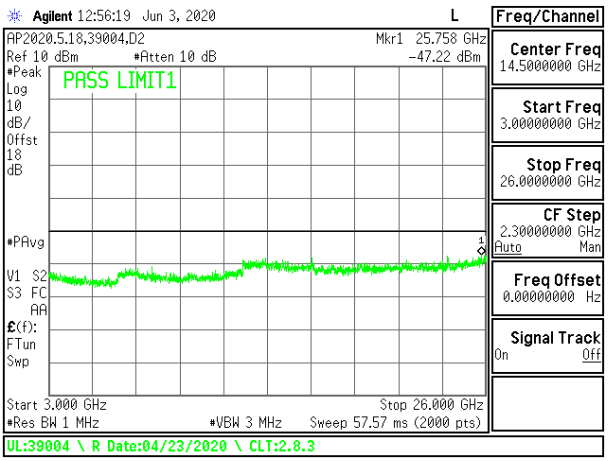
8.3.10. LTE BAND 30

LIMITS

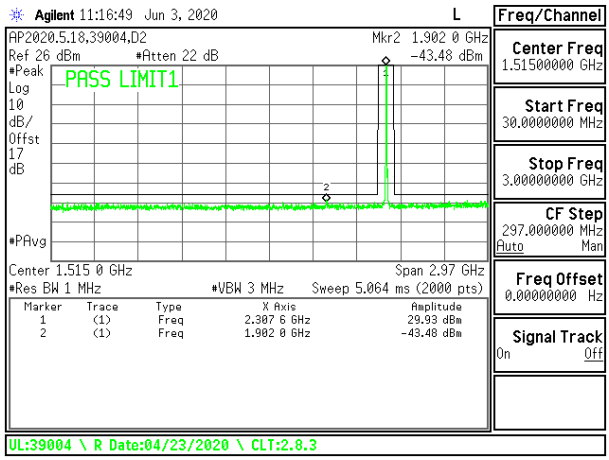
FCC: §27.53 (a)
The minimum permissible attenuation level of any spurious emissions is 70 + 10 log (P) dB where transmitting power (P) in Watts.



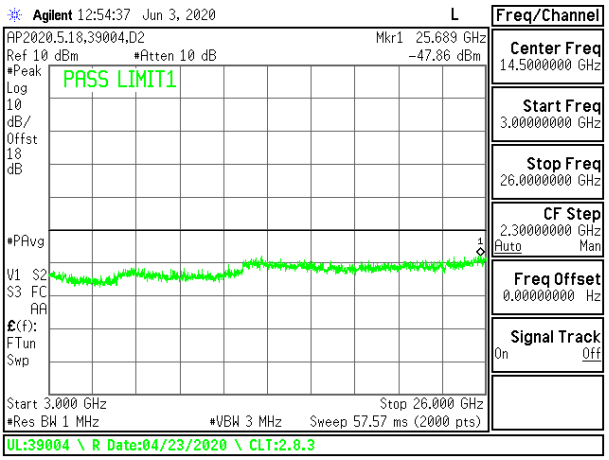
LTE B30 5MHz QPSK Low Channel RB1-0 (30MHz to 3GHz)



LTE B30 5MHz QPSK Low Channel RB1-0 (3G to 26G)



LTE B30 5MHz QPSK Mid Channel RB1-0 (30MHz to 3GHz)



LTE B30 5MHz QPSK Middle Channel RB1-0 (3G to 26G)

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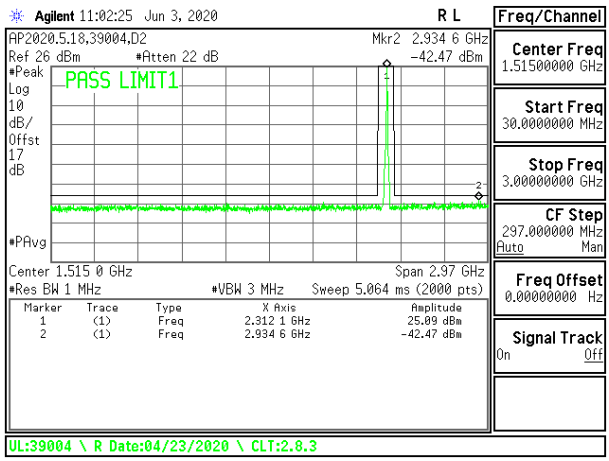
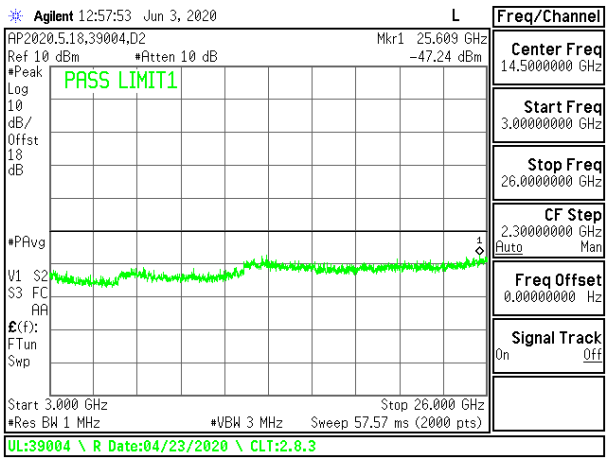
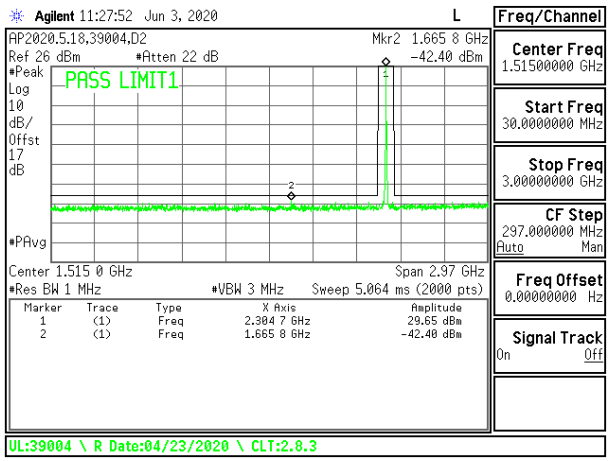


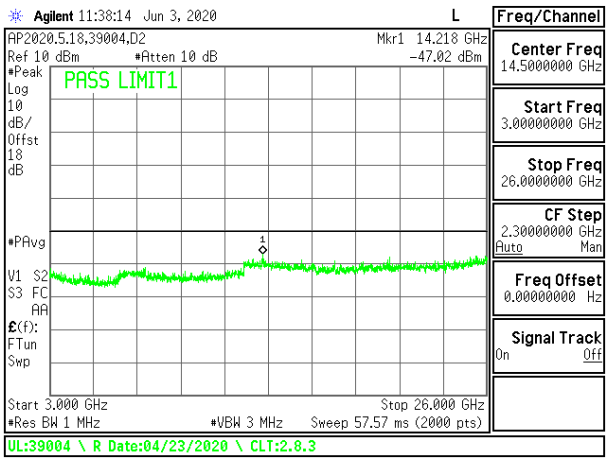
LTE B30 5MHz QPSK High Channel RB1-0 (30MHz to 3GHz)



LTE B30 5MHz QPSK High Channel RB1-0 (3G to 26G)



LTE B30 10MHz QPSK Mid Channel RB1-0 (30MHz to 3GHz)



LTE B30 10MHz QPSK Middle Channel RB1-0 (3G to 26G)

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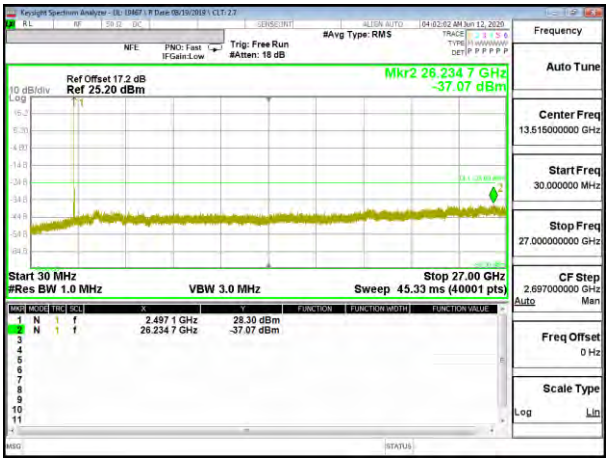
8.3.11. LTE BAND 41 AND 5G NR Band n41

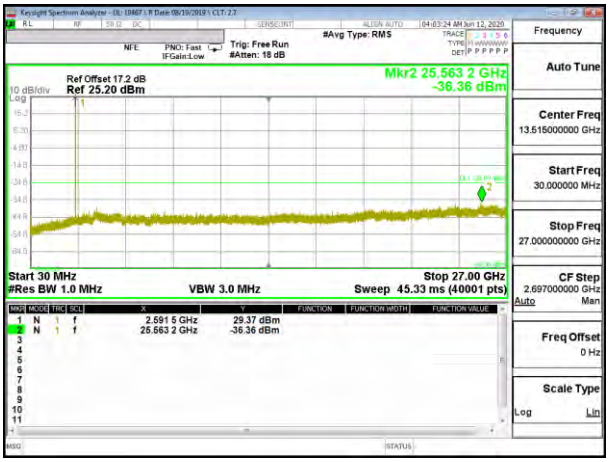
LIMITS

FCC: §27.53 (m)
The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts.

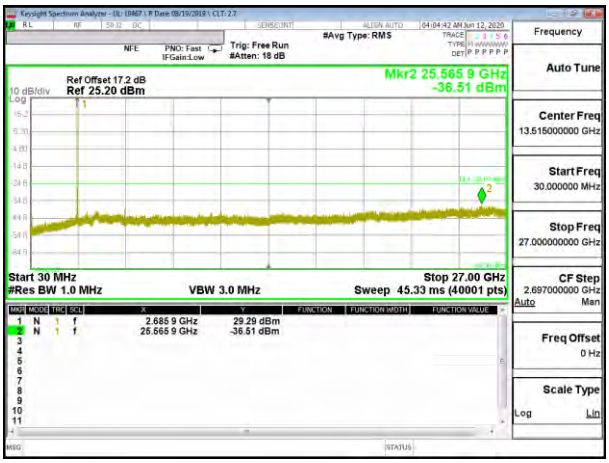
LTE BAND 41



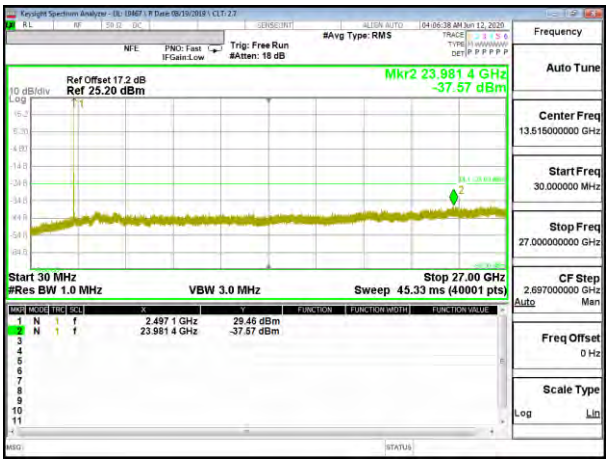
LTE B41 5MHz QPSK Low Channel RB1-0



LTE B41 5MHz QPSK Middle Channel RB1-0



LTE B41 5MHz QPSK High Channel RB1-0



LTE B41 10MHz QPSK Low Channel RB1-0

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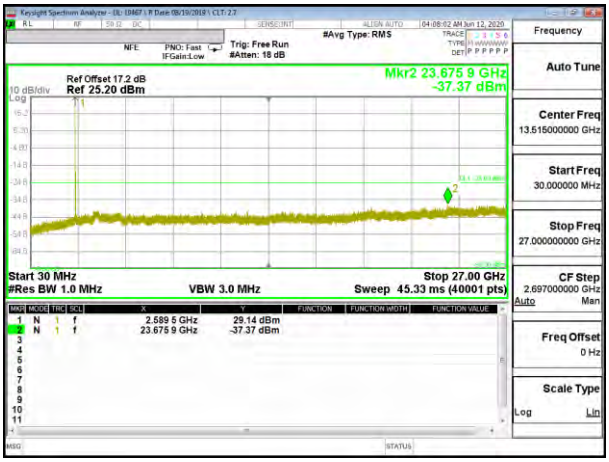
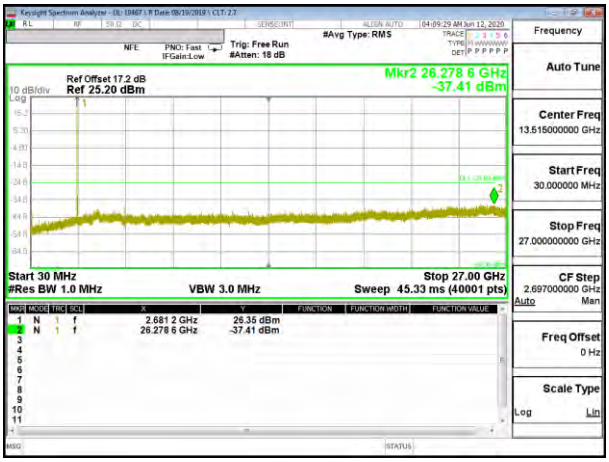
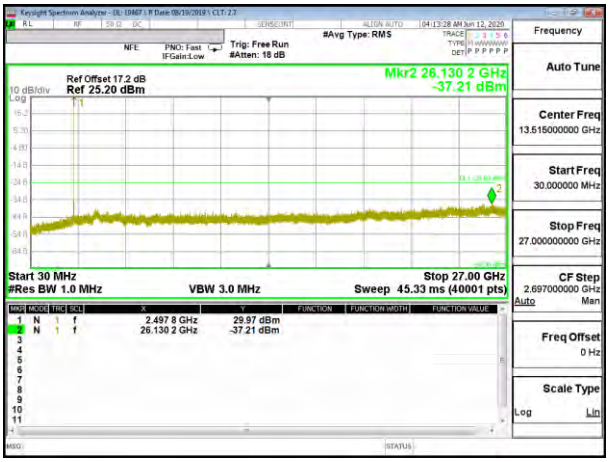


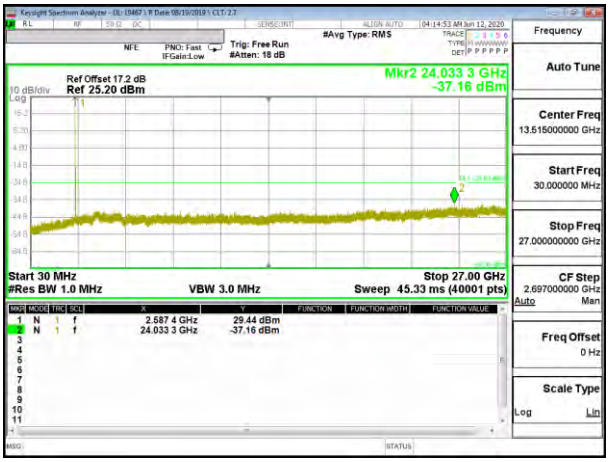
LTE B41 10MHz QPSK Middle Channel RB1-0



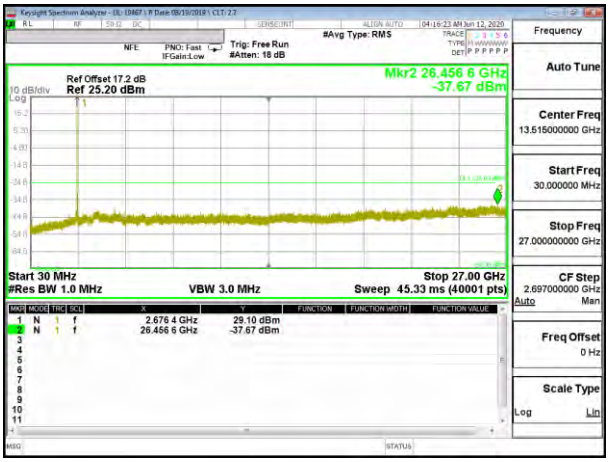
LTE B41 10MHz QPSK High Channel RB1-0



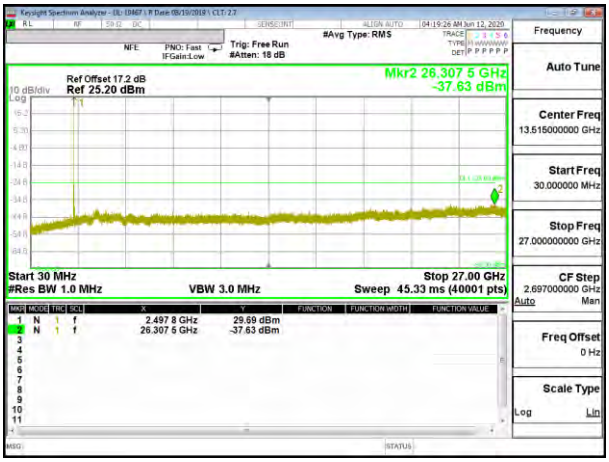
LTE B41 15MHz QPSK Low Channel RB1-0



LTE B41 15MHz QPSK Middle Channel RB1-0



LTE B41 15MHz QPSK High Channel RB1-0



LTE B41 20MHz QPSK Low Channel RB1-0

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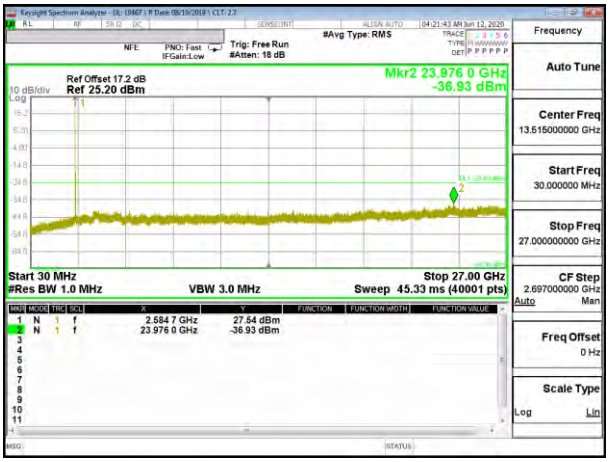
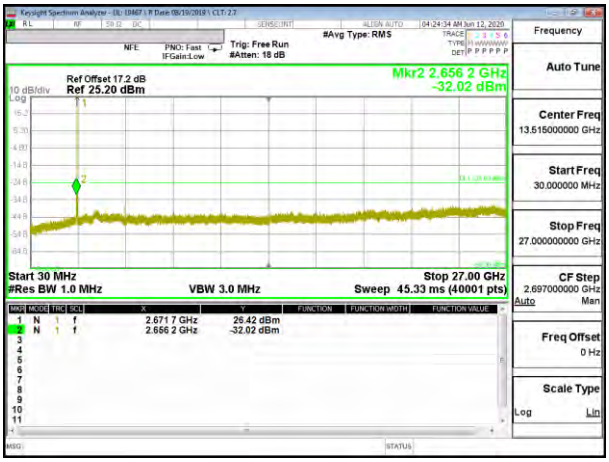


LTE B41 20MHz QPSK Middle Channel RB1-0



LTE B41 20MHz QPSK High Channel RB1-0

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5G NR Band n41

5G NR Band n41 100MHz QPSK Low Channel RB1-1

5G NR Band n41 100MHz QPSK Middle Channel RB1-1

5G NR Band n41 100MHz QPSK High Channel RB1-1

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8.3.12. LTE BAND 48

LIMITS

FCC: §96.41
(e) 3.5 GHz Emissions and Interference Limits—
(2) Additional protection levels. Notwithstanding paragraph (e)(1) of this section, for CBSDs and End User Devices, the conducted power of emissions below 3540 MHz or above 3710 MHz shall not exceed −25 dBm/MHz, and the conducted power of emissions below 3530 MHz or above 3720 MHz shall not exceed −40dBm/MHz.

LTE B48 5MHz QPSK Low Channel RB1-0 (30MHz to 4GHz)

LTE B48 5MHz QPSK Low Channel RB1-0 (4G to 40G)

LTE B48 5MHz QPSK Mid Channel RB1-0 (30MHz to 4GHz)

LTE B48 5MHz QPSK Middle Channel RB1-0 (4G to 40G)

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LTE B48 5MHz QPSK High Channel RB1-0 (30MHz to 4GHz)

LTE B48 5MHz QPSK High Channel RB1-0 (4G to 40G)

LTE B48 10MHz QPSK Low Channel RB1-0 (30MHz to 4GHz)

LTE B48 10MHz QPSK Low Channel RB1-0 (4G to 40G)

LTE B48 10MHz QPSK Mid Channel RB1-0 (30MHz to 4GHz)

LTE B48 10MHz QPSK Middle Channel RB1-0 (4G to 40G)

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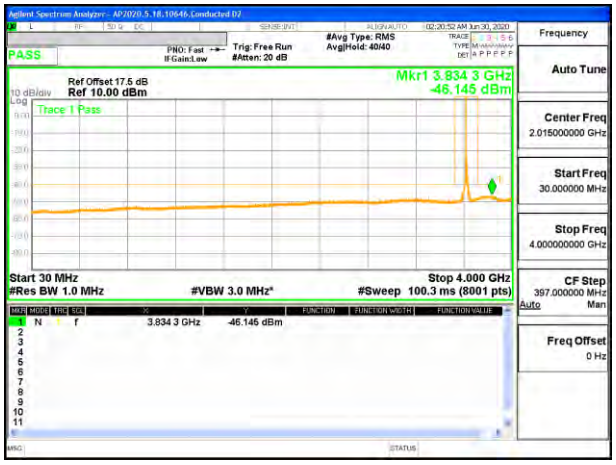
LTE B48 10MHz QPSK High Channel RB1-0 (30MHz to 4GHz)

LTE B48 10MHz QPSK High Channel RB1-0 (4G to 40G)

LTE B48 15MHz QPSK Low Channel RB1-0 (30MHz to 4GHz)

LTE B48 15MHz QPSK Low Channel RB1-0 (4G to 40G)



LTE B48 15MHz QPSK Mid Channel RB1-0 (30MHz to 4GHz)

LTE B48 15MHz QPSK Middle Channel RB1-0 (4G to 40G)

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LTE B48 15MHz QPSK High Channel RB1-0 (30MHz to 4GHz)

LTE B48 15MHz QPSK High Channel RB1-0 (4G to 40G)

LTE B48 20MHz QPSK Low Channel RB1-0 (30MHz to 4GHz)

LTE B48 20MHz QPSK Low Channel RB1-0 (4G to 40G)

LTE B48 20MHz QPSK Mid Channel RB1-0 (30MHz to 4GHz)

LTE B48 20MHz QPSK Middle Channel RB1-0 (4G to 40G)

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LTE B48 20MHz QPSK High Channel RB1-0 (30MHz to 4GHz)

LTE B48 20MHz QPSK High Channel RB1-0 (4G to 40G)

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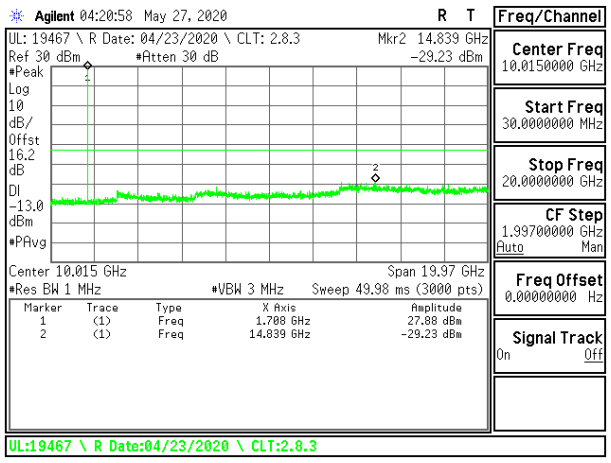
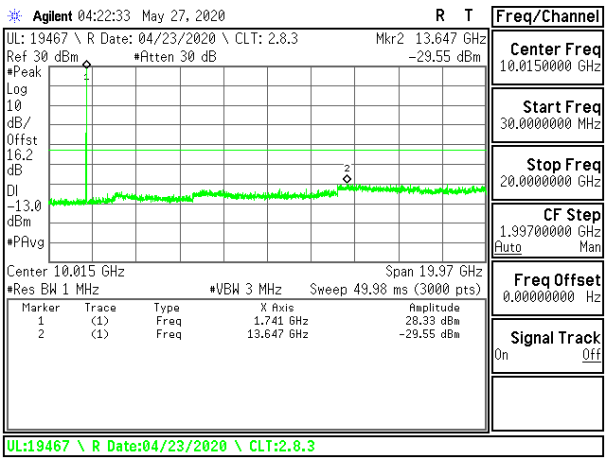
8.3.13. LTE BAND 66

LIMITS

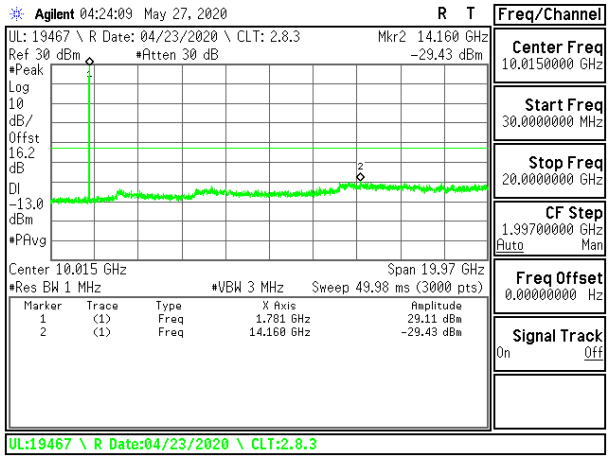
FCC: §27.53 (h)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



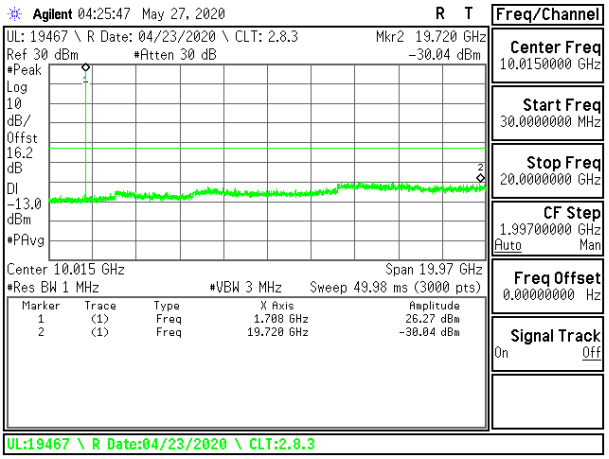
LTE B66 1.4MHz QPSK Low Channel RB1-0



LTE B66 1.4MHz QPSK Middle Channel RB1-0



LTE B66 1.4MHz QPSK High Channel RB1-0



LTE B66 3MHz QPSK Low Channel RB1-0

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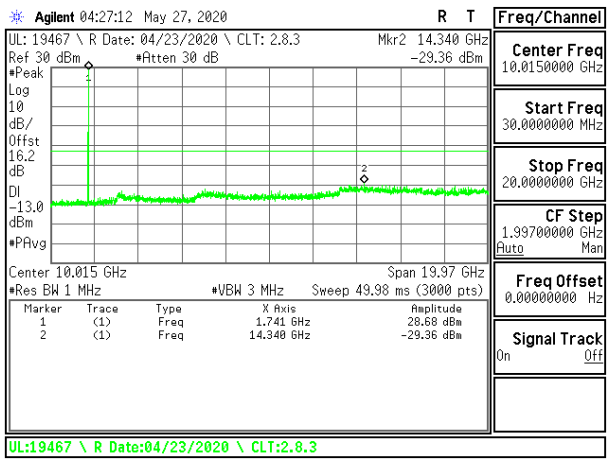
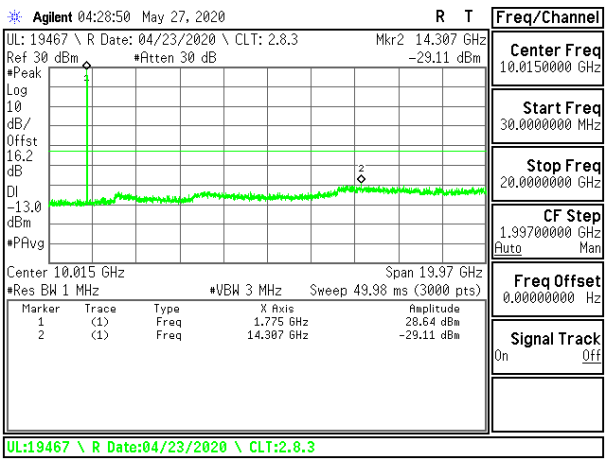
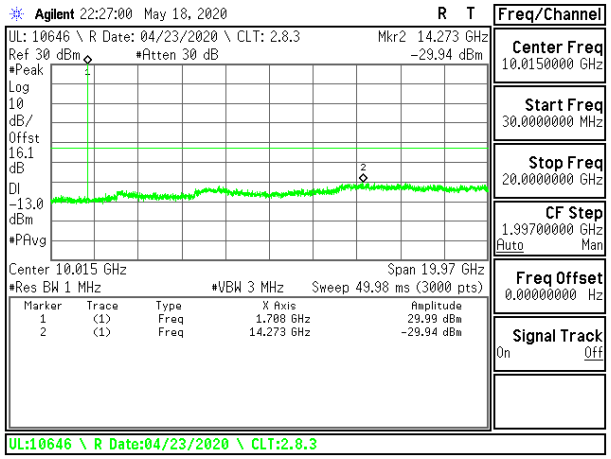


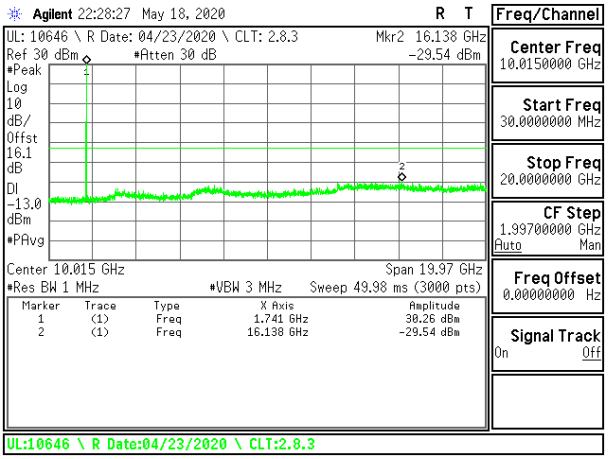
LTE B66 3MHz QPSK Middle Channel RB1-0



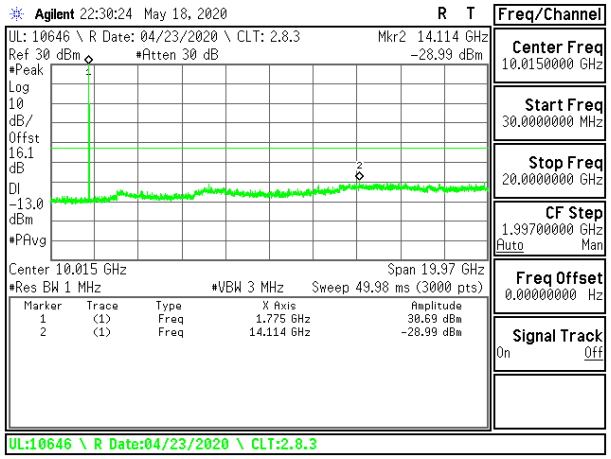
LTE B66 3MHz QPSK High Channel RB1-0



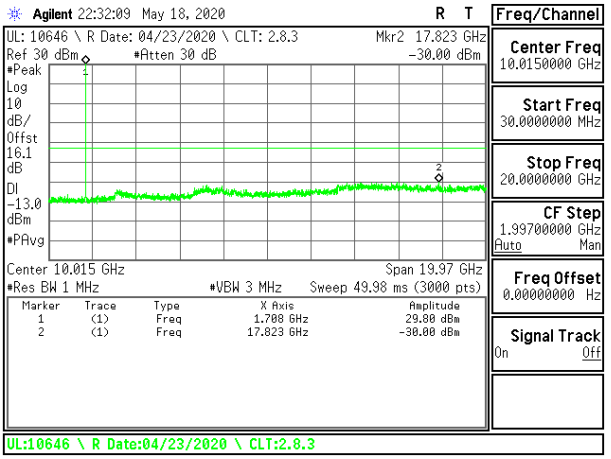
LTE B66 5MHz QPSK Low Channel RB1-0



LTE B66 5MHz QPSK Middle Channel RB1-0



LTE B66 5MHz QPSK High Channel RB1-0



LTE B66 10MHz QPSK Low Channel RB1-0

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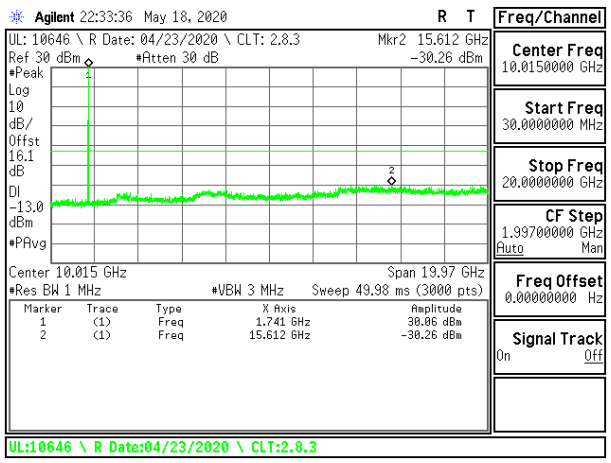
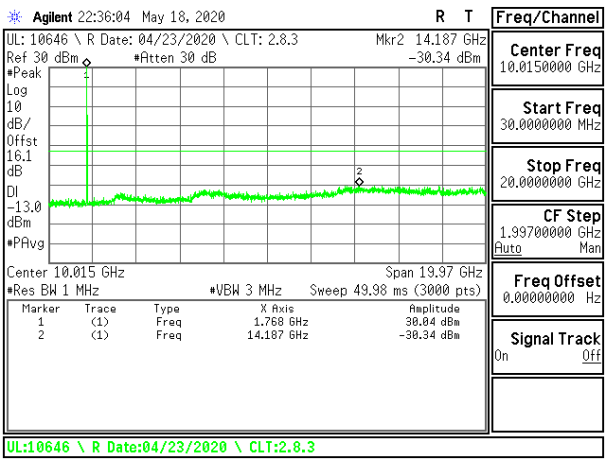
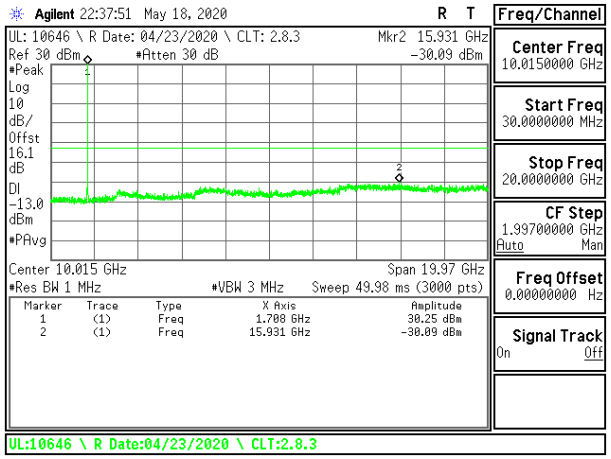


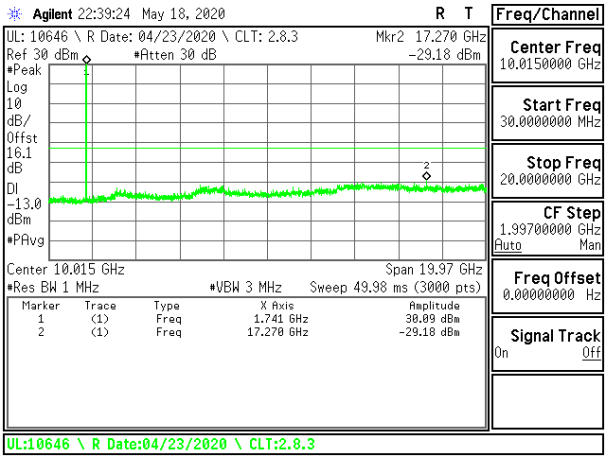
LTE B66 10MHz QPSK Middle Channel RB1-0



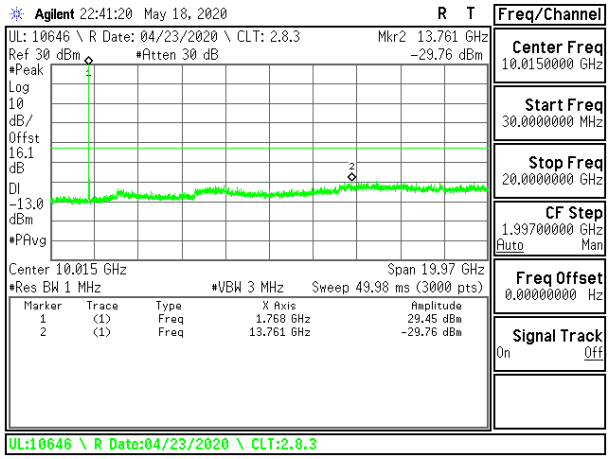
LTE B66 10MHz QPSK High Channel RB1-0



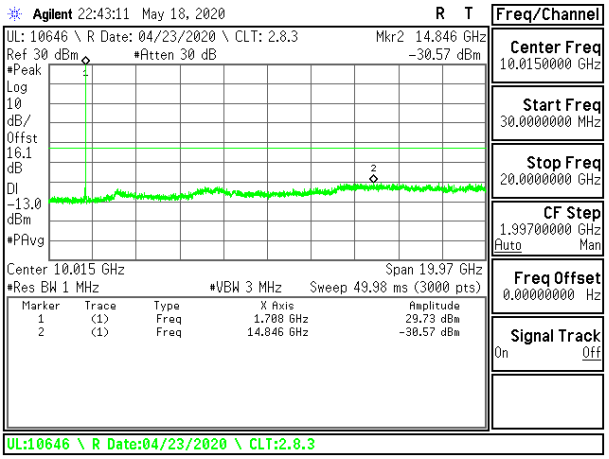
LTE B66 15MHz QPSK Low Channel RB1-0



LTE B66 15MHz QPSK Middle Channel RB1-0



LTE B66 15MHz QPSK High Channel RB1-0



LTE B66 20MHz QPSK Low Channel RB1-0

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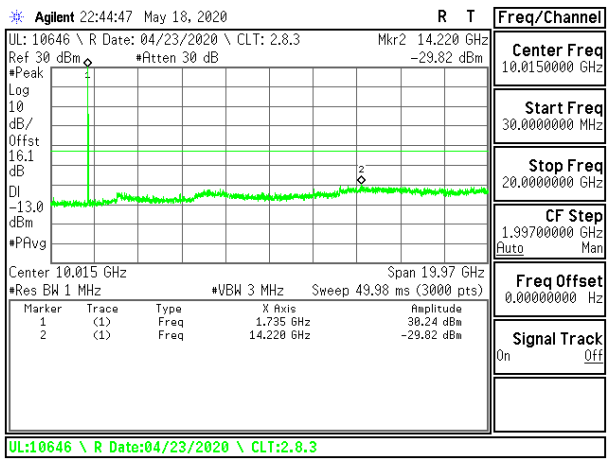
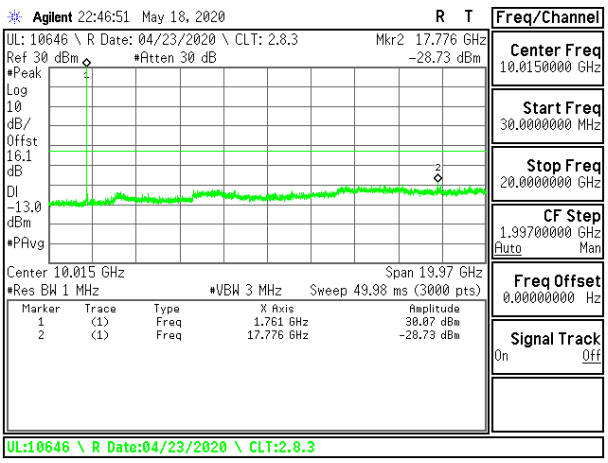


LTE B66 20MHz QPSK Middle Channel RB1-0



LTE B66 20MHz QPSK High Channel RB1-0

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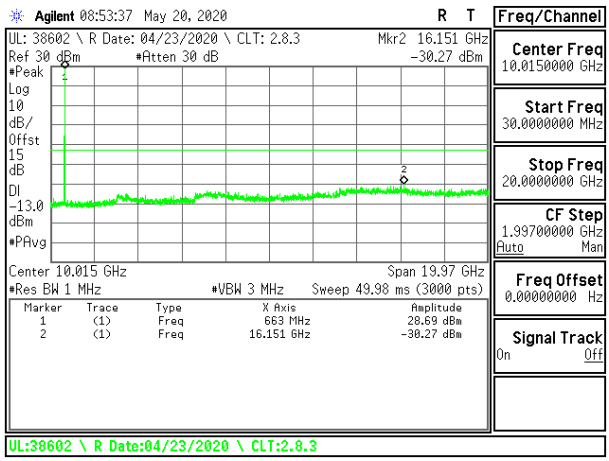
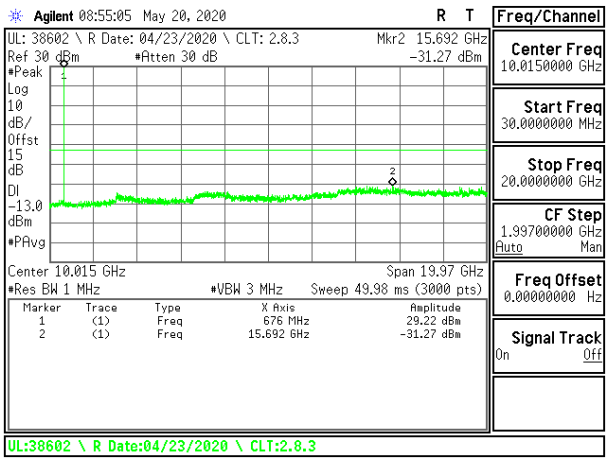
8.3.14. LTE BAND 71

LIMITS

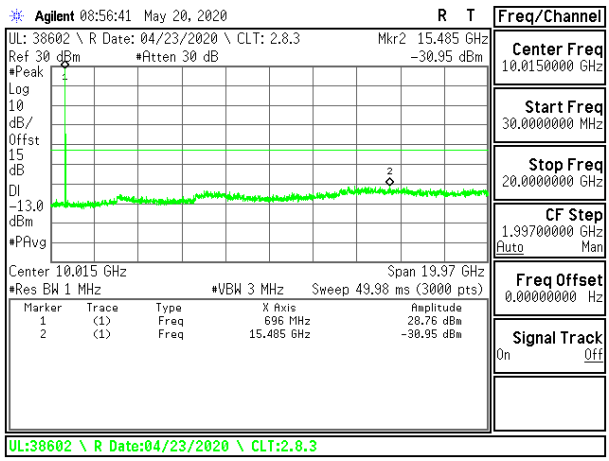
FCC: §27.53 (g)
The minimum permissible attenuation level of any spurious emissions is 43 + 10 log (P) dB where transmitting power (P) in Watts.



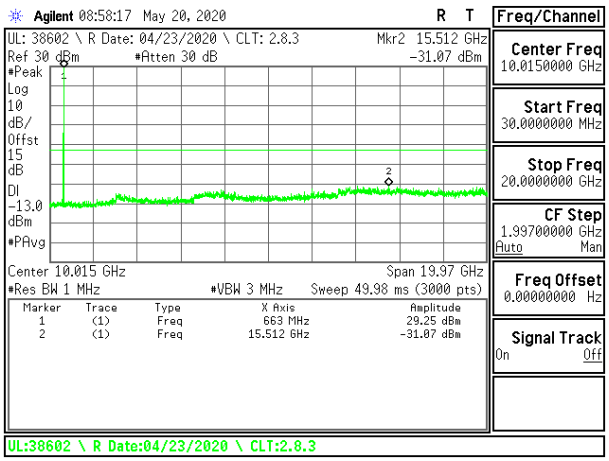
LTE B71 5MHz QPSK Low Channel RB1-0



LTE B71 5MHz QPSK Middle Channel RB1-0



LTE B71 5MHz QPSK High Channel RB1-0



LTE B71 10MHz QPSK Low Channel RB1-0

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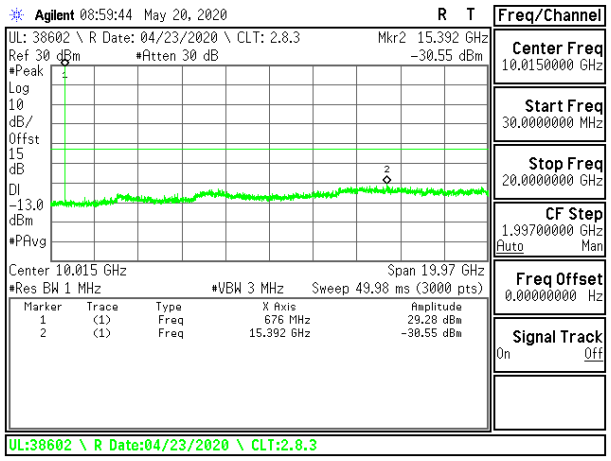
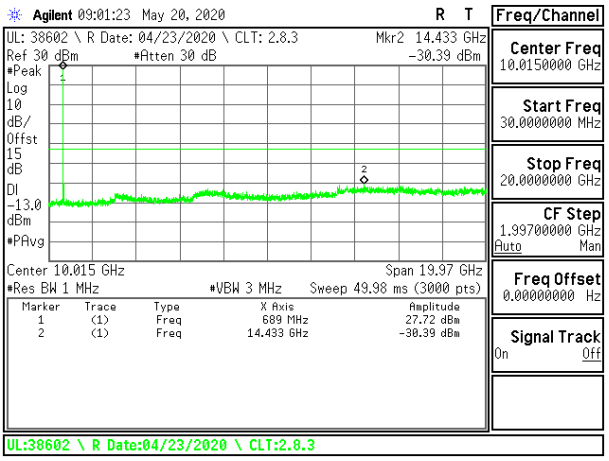
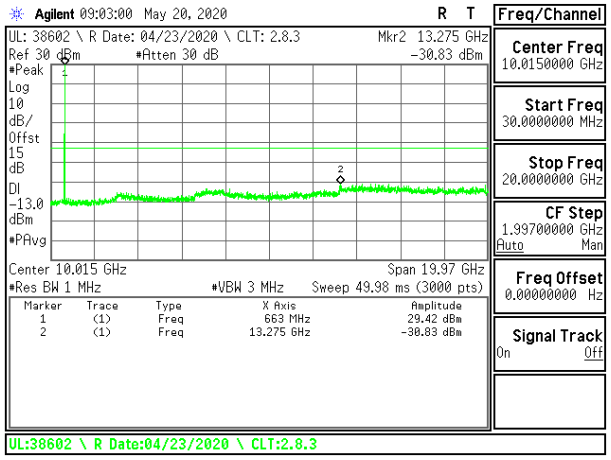


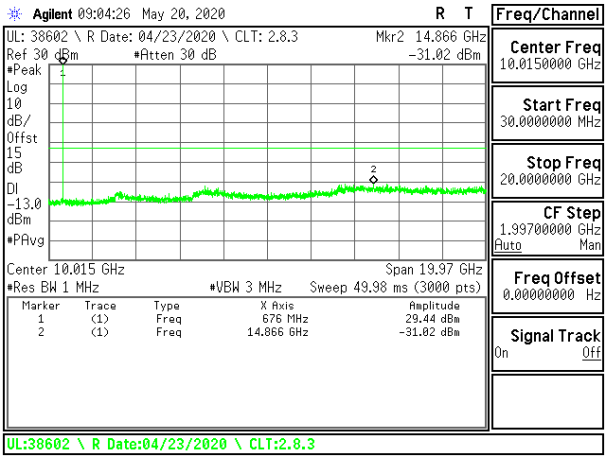
LTE B71 10MHz QPSK Middle Channel RB1-0



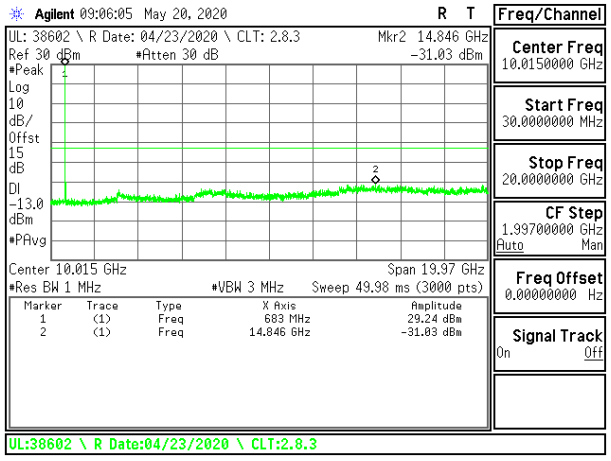
LTE 71 10MHz QPSK High Channel RB1-0



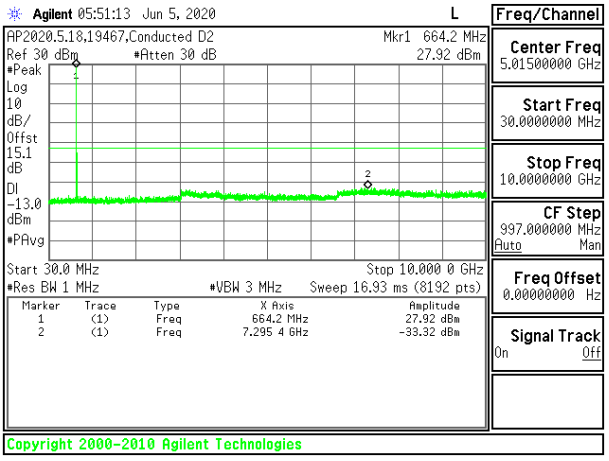
LTE B71 15MHz QPSK Low Channel RB1-0



LTE B71 15MHz QPSK Middle Channel RB1-0



LTE B71 15MHz QPSK High Channel RB1-0



LTE B71 20MHz QPSK Low Channel RB1-0

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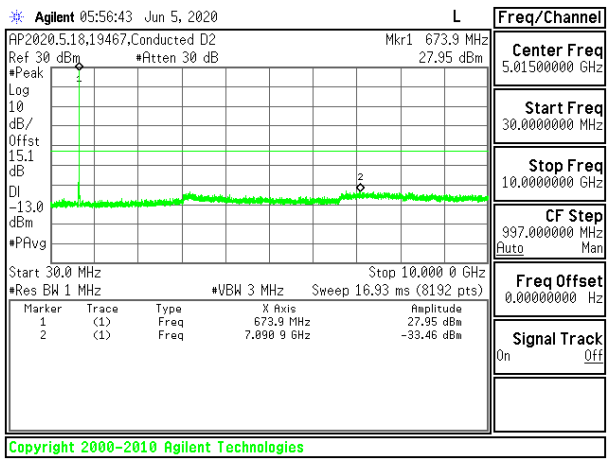
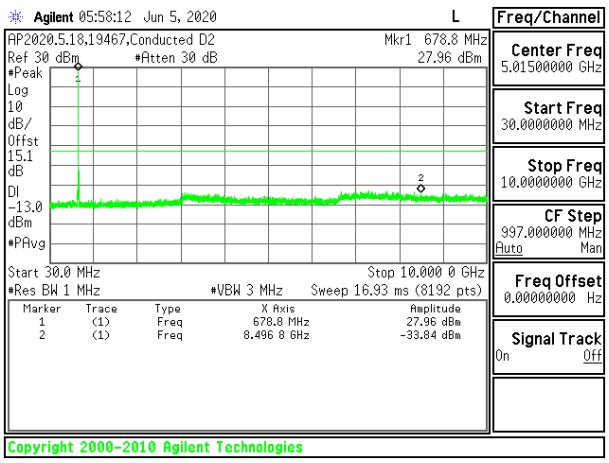


LTE B71 20MHz QPSK Middle Channel RB1-0



LTE B71 20MHz QPSK High Channel RB1-0

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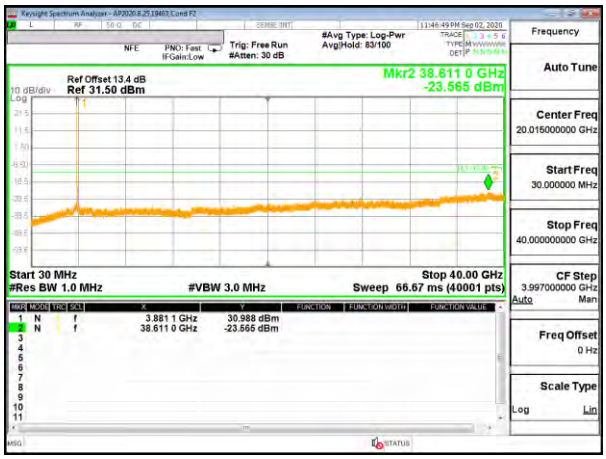
8.3.15. 5G NR Band n77

LIMITS

FCC: §27.53
Emission limits
(I) 3.7 GHz Service. The following emission limits apply to stations transmitting in the 3700-3980 MHz band:
(2) For mobile operations in the 3700-3980 MHz band, the conducted power of any emission outside the licensee's authorized bandwidth shall not exceed −13 dBm/MHz.

5G NR Band n77 100MHz QPSK Low Channel RB1-1

5G NR Band n77 100MHz QPSK Mid Channel RB1-1



5G NR Band n77 100MHz QPSK High Channel RB1-1

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8.4. FREQUENCY STABILITY

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.

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8.4.1. 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.

Test Engineer ID:	19178	Test Date:	6/19/2020

QPSK (20MHz BANDWIDTH)

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	2.8				
Normal (20C)	Normal	1850.9999	1909.0213		
Extreme (50C)		1850.9998	1909.0213	-2.0	-0.001
Extreme (40C)		1850.9998	1909.0213	-1.2	-0.001
Extreme (30C)		1850.9998	1909.0213	-1.9	-0.001
Extreme (10C)		1850.9998	1909.0213	-0.1	0.000
Extreme (0C)		1850.9998	1909.0213	-1.7	-0.001
Extreme (-10C)		1850.9998	1909.0213	-0.7	0.000
Extreme (-20C)		1850.9998	1909.0213	-0.7	0.000
Extreme (-30C)		1850.9998	1909.0213	-0.8	0.000
20C	15%	1850.9998	1909.0213	-1.1	-0.001
	-15%	1850.9998	1909.0213	-1.0	-0.001
	End Point	1850.9998	1909.0213	-0.7	0.000

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8.4.2. LTE BAND 5 AND n5

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:	19178	Test Date:	6/19/2020

LTE BAND 5 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	824.4947	848.5183		
Extreme (50C)		824.4947	848.5183	-2.9	-0.003
Extreme (40C)		824.4947	848.5183	-1.3	-0.002
Extreme (30C)		824.4947	848.5183	-1.5	-0.002
Extreme (10C)		824.4947	848.5183	0.1	0.000
Extreme (0C)		824.4947	848.5183	0.4	0.000
Extreme (-10C)		824.4947	848.5183	-0.4	0.000
Extreme (-20C)		824.4947	848.5183	-1.2	-0.001
Extreme (-30C)		824.4947	848.5183	-0.1	0.000
20C	15%	824.4947	848.5183	-2.4	-0.003
	-15%	824.4947	848.5183	-0.6	-0.001
	End Point	824.4947	848.5183	-0.4	-0.001

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5G NR Band n5 QPSK (20MHz BANDWIDTH)

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	824.4688	847.4390		
Extreme (50C)		824.4688	847.4390	-11.8	-0.014
Extreme (40C)		824.4688	847.4390	-11.8	-0.014
Extreme (30C)		824.4688	847.4390	-10.8	-0.013
Extreme (10C)		824.4688	847.4390	-9.3	-0.011
Extreme (0C)		824.4688	847.4390	11.3	0.014
Extreme (-10C)		824.4688	847.4390	-10.1	-0.012
Extreme (-20C)		824.4688	847.4390	-8.2	-0.010
Extreme (-30C)		824.4688	847.4390	-13.1	-0.016
20C	15%	824.4688	847.4390	-11.5	-0.014
	-15%	824.4688	847.4390	-10.8	-0.013
	End Point	824.4688	847.4390	-10.5	-0.012

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8.4.3. 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.

Test Engineer ID:	19178	Test Date:	6/19/2020

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	2500.9938	2569.0063		
Extreme (50C)		2500.9938	2569.0063	-2.9	-0.001
Extreme (40C)		2500.9938	2569.0063	-2.4	-0.001
Extreme (30C)		2500.9938	2569.0063	-1.5	-0.001
Extreme (10C)		2500.9938	2569.0063	-0.2	0.000
Extreme (0C)		2500.9938	2569.0063	-1.1	0.000
Extreme (-10C)		2500.9938	2569.0063	-0.8	0.000
Extreme (-20C)		2500.9938	2569.0063	-0.8	0.000
Extreme (-30C)		2500.9938	2569.0063	-0.8	0.000
20C	15%	2500.9938	2569.0063	-2.7	-0.001
	-15%	2500.9938	2569.0063	-2.1	-0.001
	End Point	2500.9938	2569.0063	-1.7	-0.001

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8.4.4. LTE BAND 12 AND 5G NR Band n12

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:	19178	Test Date:	6/19/2020

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	699.5072	715.5135		
Extreme (50C)		699.5072	715.5135	-1.0	-0.001
Extreme (40C)		699.5072	715.5135	-1.4	-0.002
Extreme (30C)		699.5072	715.5135	-0.3	0.000
Extreme (10C)		699.5072	715.5135	-0.1	0.000
Extreme (0C)		699.5072	715.5135	0.1	0.000
Extreme (-10C)		699.5072	715.5135	-0.2	0.000
Extreme (-20C)		699.5072	715.5135	-2.2	-0.003
Extreme (-30C)		699.5072	715.5135	-1.4	-0.002
20C	15%	699.5072	715.5135	-2.7	-0.004
	-15%	699.5072	715.5135	-1.2	-0.002
	End Point	699.5072	715.5135	-0.1	0.000

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5G NR Band n12 QPSK (15MHz BANDWIDTH)

Limit		699	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	699.3872	714.8751		
Extreme (50C)		699.3872	714.8751	-13.9	-0.020
Extreme (40C)		699.3872	714.8751	-12.4	-0.017
Extreme (30C)		699.3872	714.8751	-11.9	-0.017
Extreme (10C)		699.3872	714.8751	-11.5	-0.016
Extreme (0C)		699.3872	714.8751	-13.3	-0.019
Extreme (-10C)		699.3872	714.8751	-12.2	-0.017
Extreme (-20C)		699.3872	714.8751	-12.6	-0.018
Extreme (-30C)		699.3872	714.8751	-15.6	-0.022
20C	15%	699.3872	714.8751	-12.4	-0.018
	-15%	699.3872	714.8751	-12.4	-0.017
	End Point	699.3872	714.8751	-12.3	-0.017

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8.4.5. 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.

Test Engineer ID:	19178	Test Date:	6/19/2020

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	777.4995	786.5124		
Extreme (50C)		777.4995	786.5124	-1.0	-0.001
Extreme (40C)		777.4995	786.5124	-0.9	-0.001
Extreme (30C)		777.4995	786.5124	-2.5	-0.003
Extreme (10C)		777.4995	786.5124	0.9	0.001
Extreme (0C)		777.4995	786.5124	-0.3	0.000
Extreme (-10C)		777.4995	786.5124	0.4	0.000
Extreme (-20C)		777.4995	786.5124	-3.0	-0.004
Extreme (-30C)		777.4995	786.5124	1.0	0.001
20C	15%	777.4995	786.5124	-2.7	-0.003
	-15%	777.4995	786.5124	0.2	0.000
	End Point	777.4995	786.5124	-1.3	-0.002

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8.4.6. LTE BAND 14

LIMITS

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.

Test Engineer ID:	19178	Test Date:	6/19/2020

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	788.2415	797.7962		
Extreme (50C)		788.2415	797.7962	-6.2	-0.008
Extreme (40C)		788.2415	797.7962	-4.7	-0.006
Extreme (30C)		788.2415	797.7962	-4.0	-0.005
Extreme (10C)		788.2415	797.7962	-3.6	-0.005
Extreme (0C)		788.2415	797.7962	3.7	0.005
Extreme (-10C)		788.2415	797.7962	-3.5	-0.004
Extreme (-20C)		788.2415	797.7962	-4.4	-0.006
Extreme (-30C)		788.2415	797.7962	-4.5	-0.006
20C	15%	788.2415	797.7962	-3.3	-0.004
	-15%	788.2415	797.7962	4.2	0.005
	End Point	788.2415	797.7962	-4.1	-0.005

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8.4.7. LTE BAND 17

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:	19178	Test Date:	6/19/2020

QPSK (10MHz BANDWIDTH)

Limit		704	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	704.4812	715.5033		
Extreme (50C)		704.4812	715.5033	-3.3	-0.005
Extreme (40C)		704.4812	715.5033	-3.4	-0.005
Extreme (30C)		704.4812	715.5033	-2.4	-0.003
Extreme (10C)		704.4812	715.5033	1.6	0.002
Extreme (0C)		704.4812	715.5033	0.4	0.001
Extreme (-10C)		704.4812	715.5033	-1.1	-0.002
Extreme (-20C)		704.4812	715.5033	2.2	0.003
Extreme (-30C)		704.4812	715.5033	2.9	0.004
20C	15%	704.4812	715.5033	-3.3	-0.005
	-15%	704.4812	715.5033	-3.2	-0.004
	End Point	704.4812	715.5033	-0.2	0.000

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8.4.8. 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.

Test Engineer ID:	19178	Test Date:	6/19/2020

QPSK (20MHz BANDWIDTH)

Limit		1850	1915	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.9882	1914.0058		
Extreme (50C)		1850.9882	1914.0058	-2.8	-0.001
Extreme (40C)		1850.9882	1914.0058	-3.8	-0.002
Extreme (30C)		1850.9882	1914.0058	-2.3	-0.001
Extreme (10C)		1850.9882	1914.0058	-1.6	-0.001
Extreme (0C)		1850.9882	1914.0058	-0.1	0.000
Extreme (-10C)		1850.9882	1914.0058	0.4	0.000
Extreme (-20C)		1850.9882	1914.0058	-0.1	0.000
Extreme (-30C)		1850.9882	1914.0058	-1.3	-0.001
20C	15%	1850.9882	1914.0058	-3.4	-0.002
	-15%	1850.9882	1914.0058	-2.7	-0.001
	End Point	1850.9882	1914.0058	-2.3	-0.001

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8.4.9. LTE BAND 26 (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:	19178	Test Date:	6/19/2020

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	814.5026	823.5232		
Extreme (50C)		814.5026	823.5232	-2.7	-0.003
Extreme (40C)		814.5026	823.5232	-0.2	0.000
Extreme (30C)		814.5026	823.5232	-2.2	-0.003
Extreme (10C)		814.5026	823.5232	-1.0	-0.001
Extreme (0C)		814.5026	823.5232	-0.9	-0.001
Extreme (-10C)		814.5026	823.5232	0.9	0.001
Extreme (-20C)		814.5026	823.5232	2.9	0.003
Extreme (-30C)		814.5026	823.5232	-1.5	-0.002
20C	15%	814.5026	823.5232	0.7	0.001
	-15%	814.5026	823.5232	-0.6	-0.001
	End Point	814.5026	823.5232	-1.7	-0.002

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8.4.10. 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.

Test Engineer ID:	19178	Test Date:	6/19/2020

QPSK (10MHz BANDWIDTH)

Limit		2305	2315	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	2305.4959	2314.5174		
Extreme (50C)		2305.4959	2314.5174	-0.6	0.000
Extreme (40C)		2305.4959	2314.5174	-1.9	-0.001
Extreme (30C)		2305.4959	2314.5174	-1.9	-0.001
Extreme (10C)		2305.4959	2314.5174	-0.9	0.000
Extreme (0C)		2305.4959	2314.5174	0.3	0.000
Extreme (-10C)		2305.4959	2314.5174	0.3	0.000
Extreme (-20C)		2305.4959	2314.5174	2.7	0.001
Extreme (-30C)		2305.4959	2314.5174	-2.7	-0.001
20C	15%	2305.4959	2314.5174	-1.4	-0.001
	-15%	2305.4959	2314.5174	-2.1	-0.001
	End Point	2305.4959	2314.5174	-0.8	0.000

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8.4.11. LTE BAND 41 AND 5G NR Band n41

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:	19178	Test Date:	6/19/2020

LTE BAND 41 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	2496.9029	2689.1068		
Extreme (50C)		2496.9028	2689.1068	-11.3	-0.004
Extreme (40C)		2496.9028	2689.1068	-9.7	-0.004
Extreme (30C)		2496.9029	2689.1068	-5.9	-0.002
Extreme (10C)		2496.9028	2689.1068	-7.3	-0.003
Extreme (0C)		2496.9028	2689.1068	-9.9	-0.004
Extreme (-10C)		2496.9028	2689.1068	-9.9	-0.004
Extreme (-20C)		2496.9028	2689.1068	-11.5	-0.004
Extreme (-30C)		2496.9028	2689.1068	-8.8	-0.003
20C	15%	2496.9028	2689.1068	-12.2	-0.005
	-15%	2496.9028	2689.1068	-9.6	-0.004
	End Point	2496.9028	2689.1068	-10.5	-0.004

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5G NR Band n41 QPSK (100MHz BANDWIDTH)

Limit		2496	2690	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	2497.0086	2687.9440		
Extreme (50C)		2497.0086	2687.9440	-30.8	-0.012
Extreme (40C)		2497.0086	2687.9440	-42.9	-0.017
Extreme (30C)		2497.0086	2687.9440	-33.7	-0.013
Extreme (10C)		2497.0086	2687.9440	-34.7	-0.013
Extreme (0C)		2497.0086	2687.9440	-28.7	-0.011
Extreme (-10C)		2497.0086	2687.9440	-26.3	-0.010
Extreme (-20C)		2497.0086	2687.9440	-32.0	-0.012
Extreme (-30C)		2497.0086	2687.9440	-34.0	-0.013
20C	15%	2497.0086	2687.9440	-30.5	-0.012
	-15%	2497.0086	2687.9440	-40.0	-0.015
	End Point	2497.0086	2687.9440	-27.3	-0.011

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8.4.12. LTE BAND 48

Test Engineer ID:	19178	Test Date:	6/19/2020

QPSK (20MHz BANDWIDTH)

Limit		3550	3700	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	3550.8397	3699.0165		
Extreme (50C)		3550.8397	3699.0165	2.9	0.001
Extreme (40C)		3550.8397	3699.0165	2.2	0.001
Extreme (30C)		3550.8397	3699.0165	1.4	0.000
Extreme (10C)		3550.8397	3699.0165	-1.7	0.000
Extreme (0C)		3550.8397	3699.0165	-3.3	-0.001
Extreme (-10C)		3550.8397	3699.0165	2.5	0.001
Extreme (-20C)		3550.8397	3699.0165	-3.6	-0.001
Extreme (-30C)		3550.8397	3699.0165	1.5	0.000
20C	15%	3550.8397	3699.0165	1.3	0.000
	-15%	3550.8397	3699.0165	-2.8	-0.001
	End Point	3550.8397	3699.0165	-2.8	-0.001

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8.4.13. 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.

Test Engineer ID:	19178	Test Date:	6/19/2020

QPSK (20MHz BANDWIDTH)

Limit		1710	1780	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1710.8861	1779.1371		
Extreme (50C)		1710.8861	1779.1371	-1.0	-0.001
Extreme (40C)		1710.8861	1779.1371	-1.0	-0.001
Extreme (30C)		1710.8861	1779.1371	-1.7	-0.001
Extreme (10C)		1710.8861	1779.1371	-1.5	-0.001
Extreme (0C)		1710.8861	1779.1371	-1.7	-0.001
Extreme (-10C)		1710.8861	1779.1371	1.1	0.001
Extreme (-20C)		1710.8861	1779.1371	-4.5	-0.003
Extreme (-30C)		1710.8861	1779.1371	-4.2	-0.002
20C	15%	1710.8861	1779.1371	-1.3	-0.001
	-15%	1710.8861	1779.1371	-1.9	-0.001
	End Point	1710.8861	1779.1371	-2.2	-0.001

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8.4.14. 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.

Test Engineer ID:	19178	Test Date:	6/19/2020

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	663.9955	697.0181		
Extreme (50C)		663.9955	697.0181	-0.1	0.000
Extreme (40C)		663.9955	697.0181	0.0	0.000
Extreme (30C)		663.9955	697.0181	-0.5	-0.001
Extreme (10C)		663.9955	697.0181	0.2	0.000
Extreme (0C)		663.9955	697.0181	0.4	0.001
Extreme (-10C)		663.9955	697.0181	-0.7	-0.001
Extreme (-20C)		663.9955	697.0181	-0.1	0.000
Extreme (-30C)		663.9955	697.0181	0.0	0.000
20C	15%	663.9955	697.0181	0.3	0.000
	-15%	663.9955	697.0181	-0.4	-0.001
	End Point	663.9955	697.0181	-0.5	-0.001

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8.4.15. 5G NR Band n77

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:	19480	Test Date:	8/4/2020

5G NR Band n77 QPSK (100MHz BANDWIDTH)

Limit		3700	3980	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	3700.9198	3977.9617		
Extreme (50C)		3700.9198	3977.9617	-34.3	-0.009
Extreme (40C)		3700.9198	3977.9617	-49.4	-0.013
Extreme (30C)		3700.9198	3977.9617	-38.2	-0.010
Extreme (10C)		3700.9198	3977.9617	-34.7	-0.009
Extreme (0C)		3700.9198	3977.9617	-26.4	-0.007
Extreme (-10C)		3700.9198	3977.9617	32.2	0.008
Extreme (-20C)		3700.9198	3977.9617	-32.9	-0.009
Extreme (-30C)		3700.9198	3977.9617	-41.0	-0.011
20C	15%	3700.9197	3977.9616	-53.0	-0.014
	-15%	3700.9198	3977.9617	39.2	0.010
	End Point	3700.9198	3977.9617	-33.2	-0.009

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

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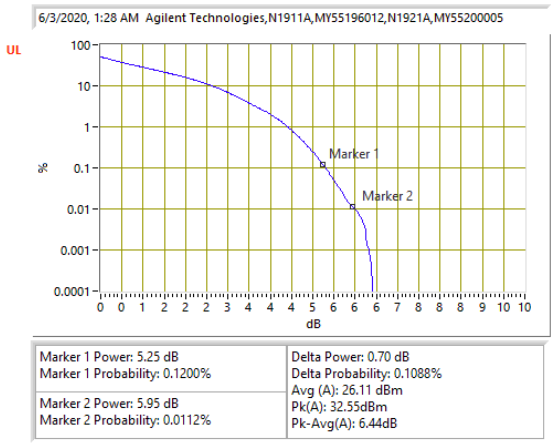
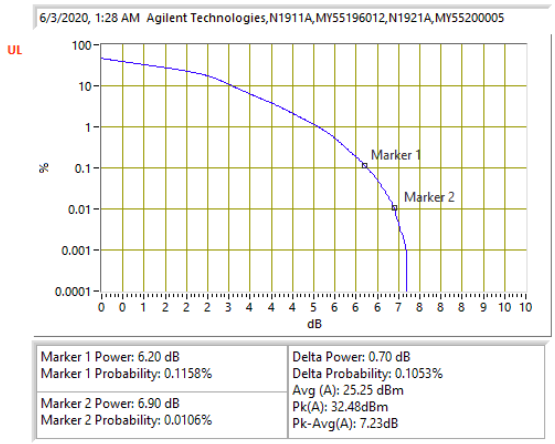
8.1.1. LTE BAND 2

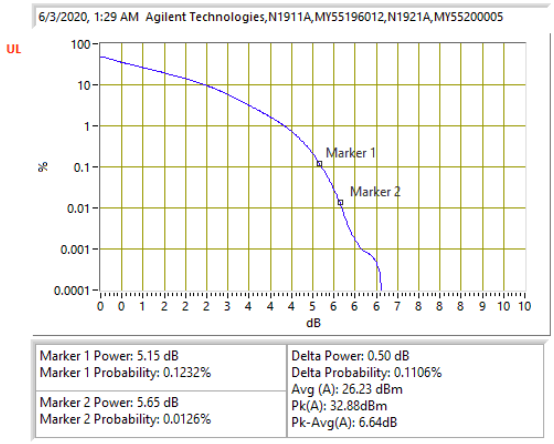
Test Engineer ID:	10646	Test Date:	6/3/2020



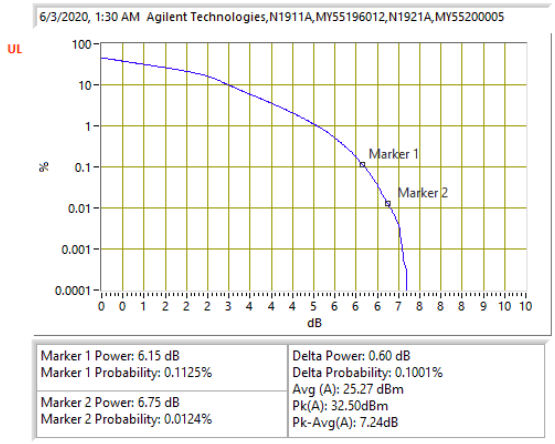
LTE B2 1.4MHz QPSK Middle Channel



LTE B2 1.4MHz 16QAM Middle Channel



LTE B2 3MHz QPSK Middle Channel



LTE B2 3MHz 16QAM Middle Channel

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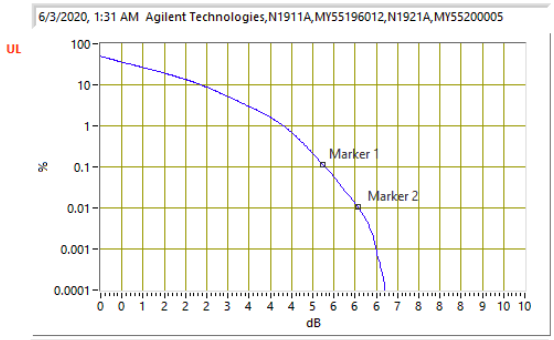
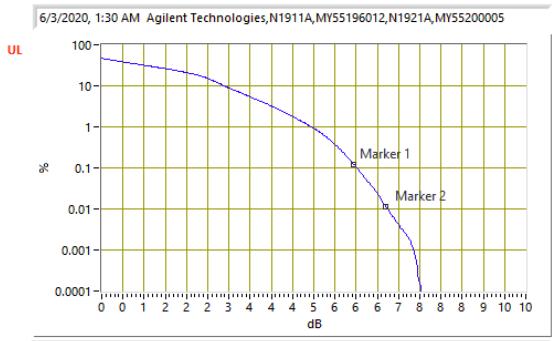


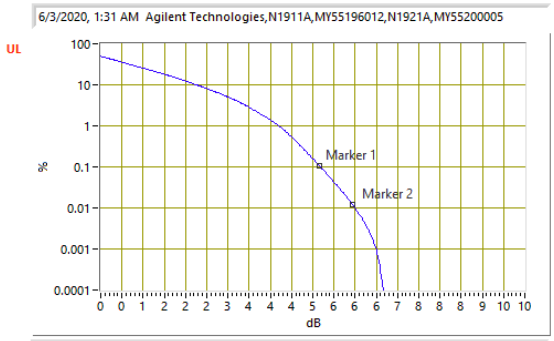
Marker 1 Power: 5.25 dB Marker 1 Probability: 0.1099%	Delta Power: 0.80 dB Delta Probability: 0.0990% Avg (A): 26.21 dBm Pk(A): 33.00dBm Pk-Avg(A): 6.79dB
Marker 2 Power: 6.05 dB Marker 2 Probability: 0.0109%	

LTE B2 5MHz QPSK Middle Channel



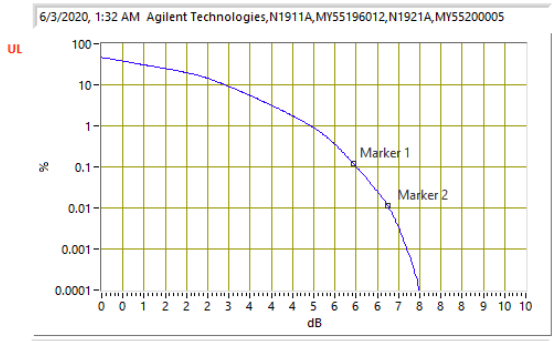
Marker 1 Power: 5.95 dB Marker 1 Probability: 0.1202%	Delta Power: 0.75 dB Delta Probability: 0.1089% Avg (A): 25.23 dBm Pk(A): 32.82dBm Pk-Avg(A): 7.59dB
Marker 2 Power: 6.70 dB Marker 2 Probability: 0.0112%	

LTE B2 5MHz 16QAM Middle Channel



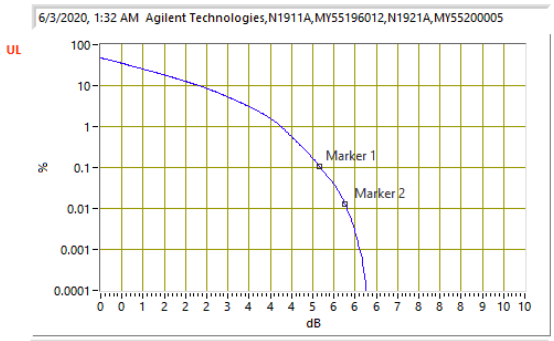
Marker 1 Power: 5.15 dB Marker 1 Probability: 0.1095%	Delta Power: 0.80 dB Delta Probability: 0.0981% Avg (A): 26.12 dBm Pk(A): 32.89dBm Pk-Avg(A): 6.77dB
Marker 2 Power: 5.95 dB Marker 2 Probability: 0.0114%	

LTE B2 10MHz QPSK Middle Channel



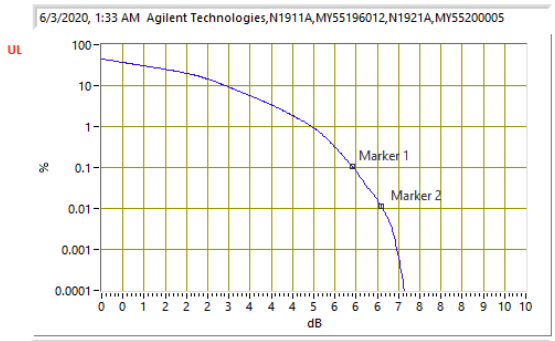
Marker 1 Power: 5.95 dB Marker 1 Probability: 0.1157%	Delta Power: 0.80 dB Delta Probability: 0.1047% Avg (A): 25.11 dBm Pk(A): 32.78dBm Pk-Avg(A): 7.67dB
Marker 2 Power: 6.75 dB Marker 2 Probability: 0.0110%	

LTE B2 10MHz 16QAM Middle Channel



Marker 1 Power: 5.15 dB Marker 1 Probability: 0.1081%	Delta Power: 0.60 dB Delta Probability: 0.0941% Avg (A): 26.23 dBm Pk(A): 32.58dBm Pk-Avg(A): 6.35dB
Marker 2 Power: 5.75 dB Marker 2 Probability: 0.0140%	

LTE B2 15MHz QPSK Middle Channel



Marker 1 Power: 5.90 dB Marker 1 Probability: 0.1090%	Delta Power: 0.70 dB Delta Probability: 0.0980% Avg (A): 25.27 dBm Pk(A): 32.54dBm Pk-Avg(A): 7.26dB
Marker 2 Power: 6.60 dB Marker 2 Probability: 0.0110%	

LTE B2 15MHz 16QAM Middle Channel

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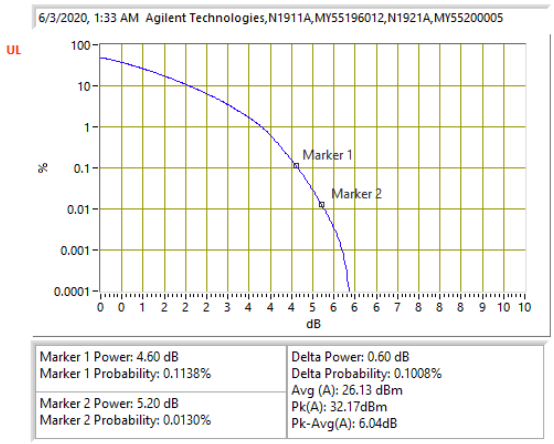
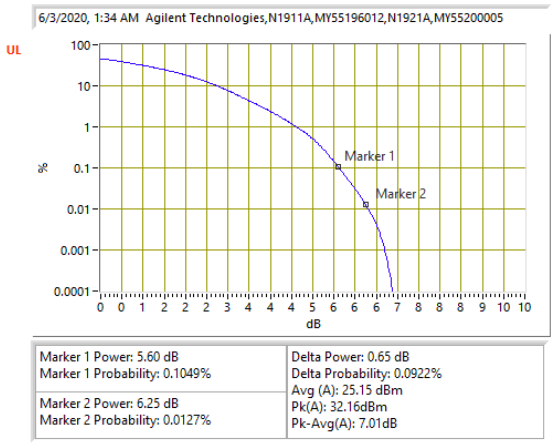


LTE B2 20MHz QPSK Middle Channel



LTE B2 20MHz 16QAM Middle Channel

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8.1.2. LTE BAND 5 AND 5G NR Band n5

LTE BAND 5

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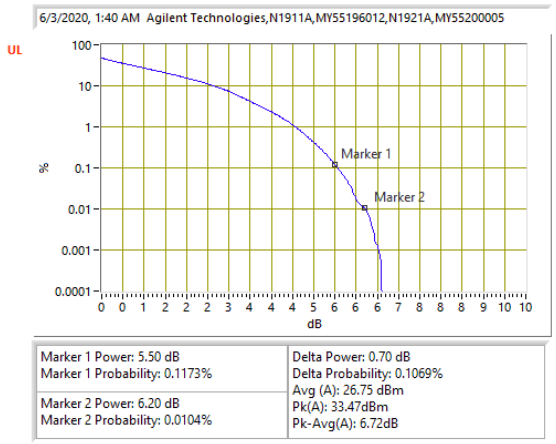
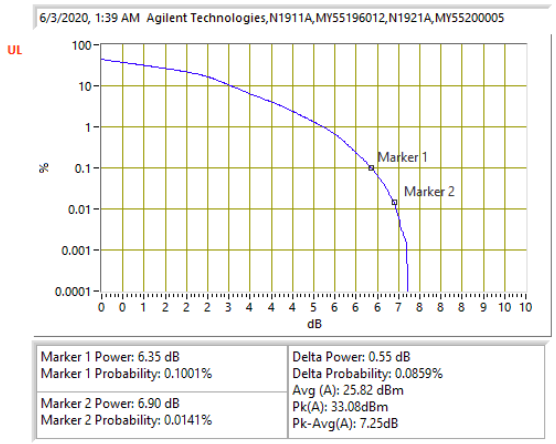
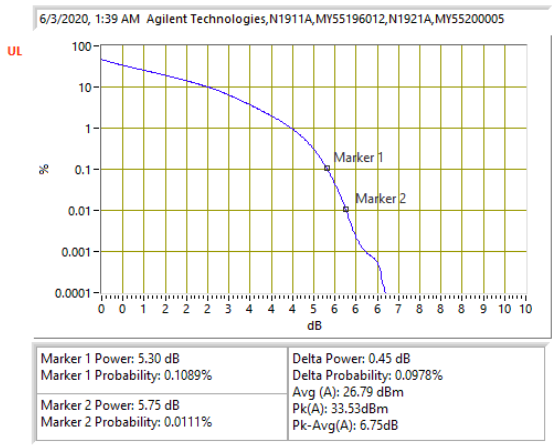


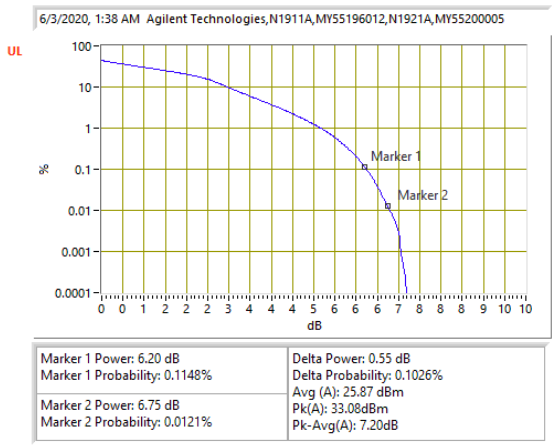
LTE B5 1.4MHz QPSK Middle Channel



LTE B5 1.4MHz 16QAM Middle Channel



LTE B5 3MHz QPSK Middle Channel



LTE B5 3MHz 16QAM Middle Channel

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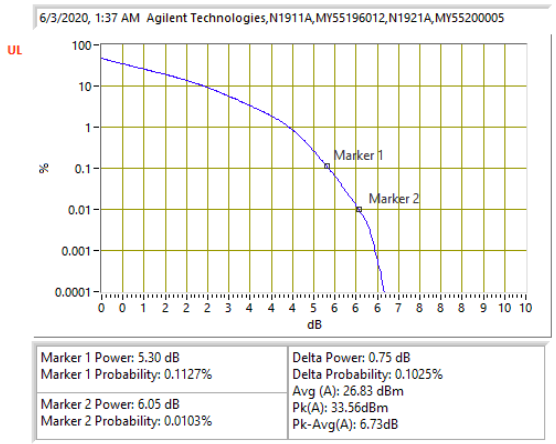
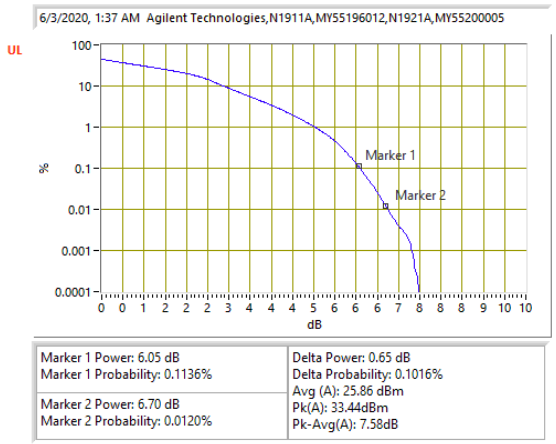
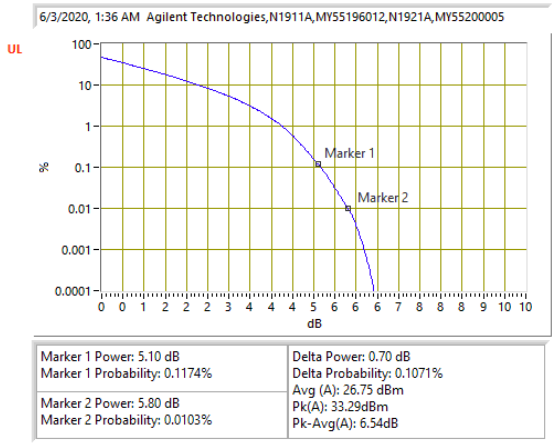


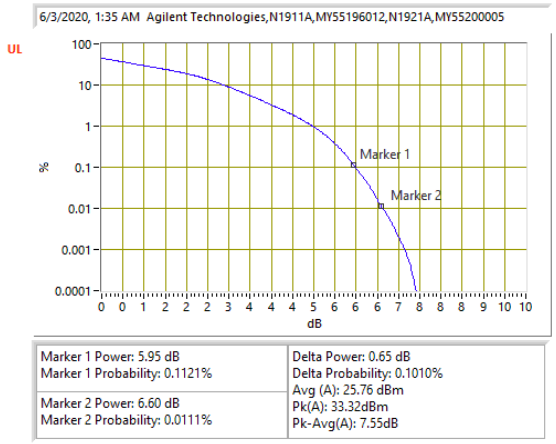
LTE B5 5MHz QPSK Middle Channel



LTE B5 5MHz 16QAM Middle Channel



LTE B5 10MHz QPSK Middle Channel



LTE B5 10MHz 16QAM Middle Channel

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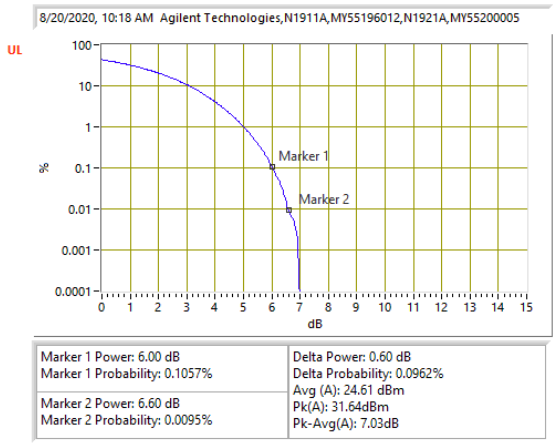
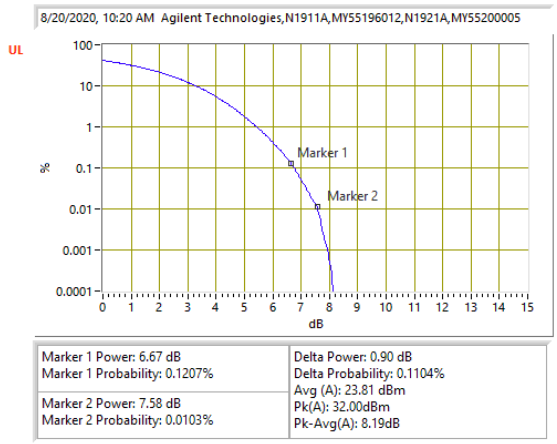
5G NR Band n5

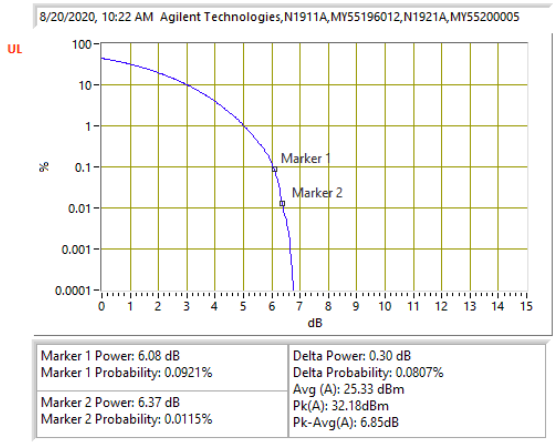
Test Engineer ID:	39004	Test Date:	8/20/2020



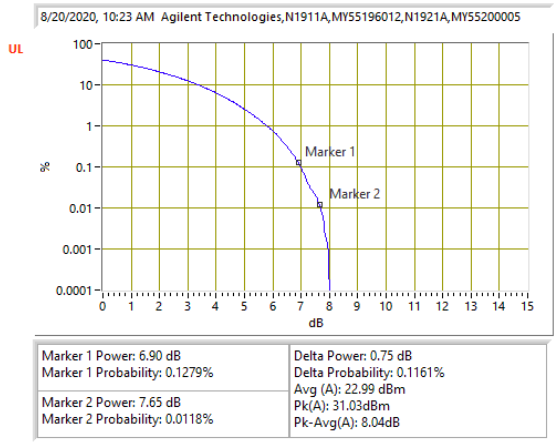
5G NR Band n5 15MHz QPSK Middle Channel



5G NR Band n5 15MHz 16QAM Middle Channel



5G NR Band n5 20MHz QPSK Middle Channel



5G NR Band n5 20MHz 16QAM Middle Channel

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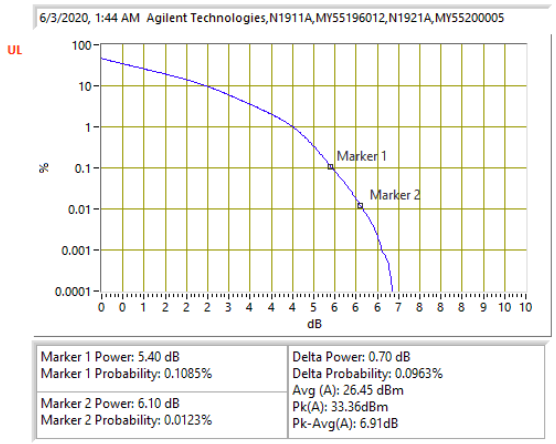
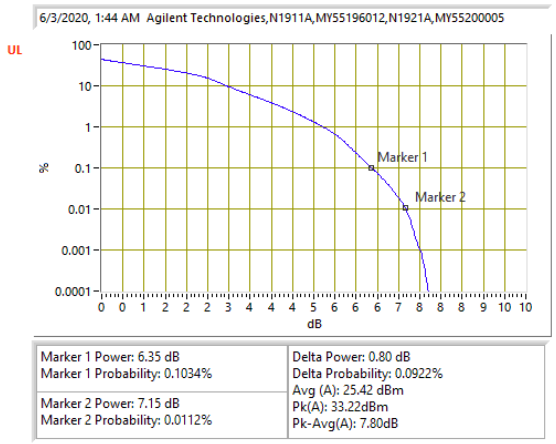
8.1.3. LTE BAND 7

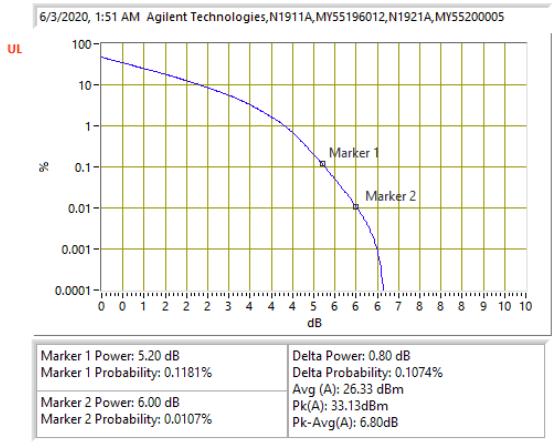
Test Engineer ID:	10646	Test Date:	6/3/2020



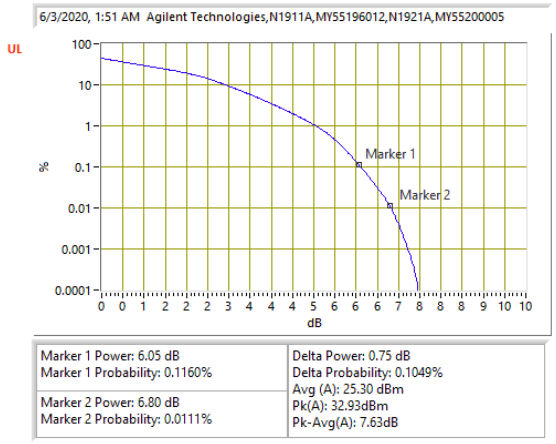
LTE B7 5MHz QPSK Middle Channel



LTE B7 5MHz 16QAM Middle Channel



LTE B7 10MHz QPSK Middle Channel



LTE B7 10MHz 16QAM Middle Channel

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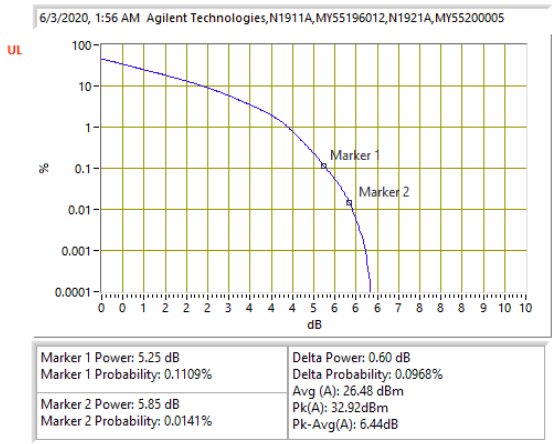
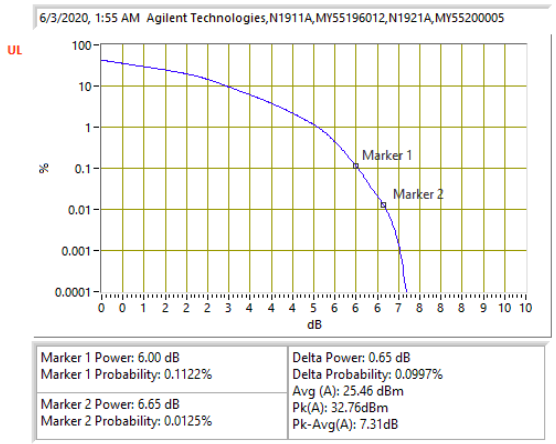
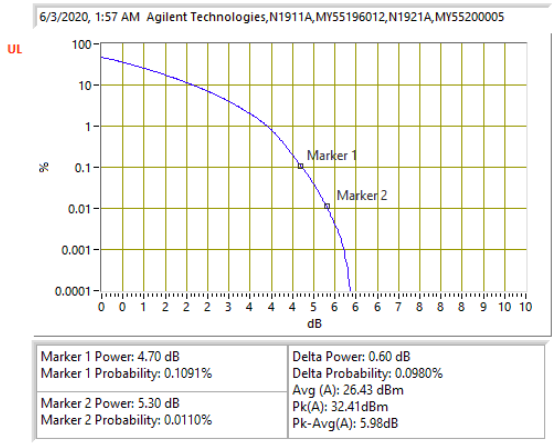


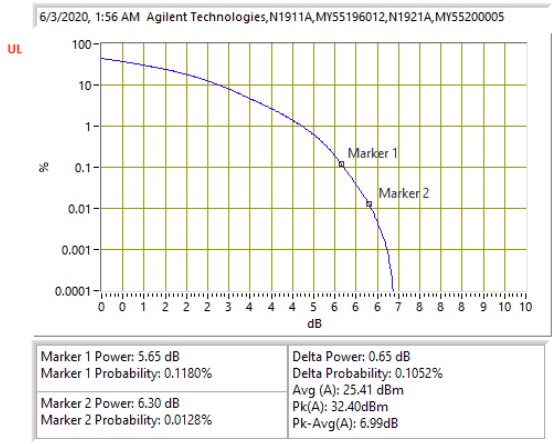
LTE B7 15MHz QPSK Middle Channel



LTE B7 15MHz 16QAM Middle Channel



LTE B7 20MHz QPSK Middle Channel



LTE B7 20MHz 16QAM Middle Channel

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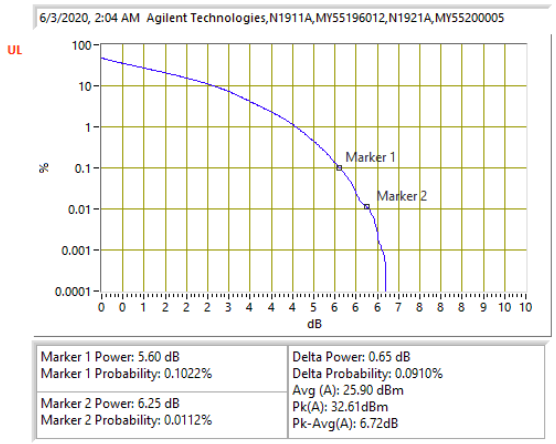
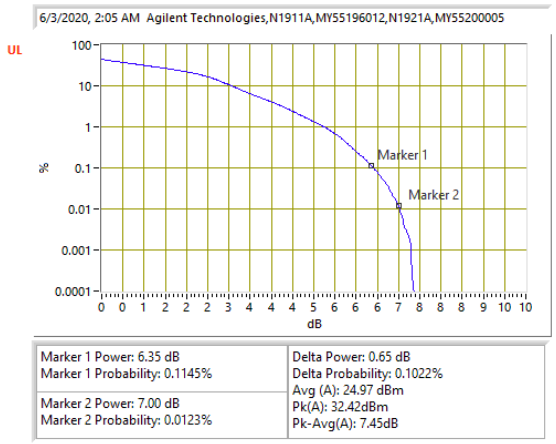
8.1.4. LTE BAND 12 AND 5G NR Band n12

LTE BAND 12

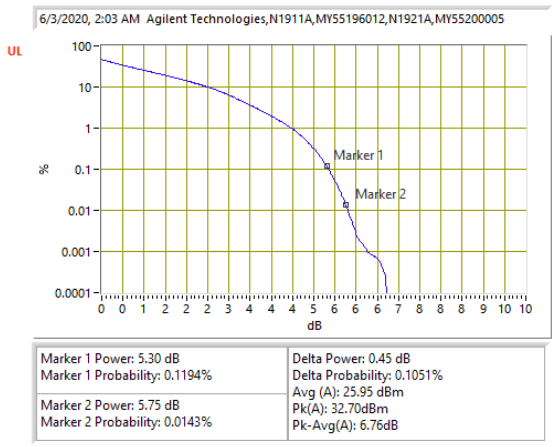
Test Engineer ID:	10646	Test Date:	6/3/2020



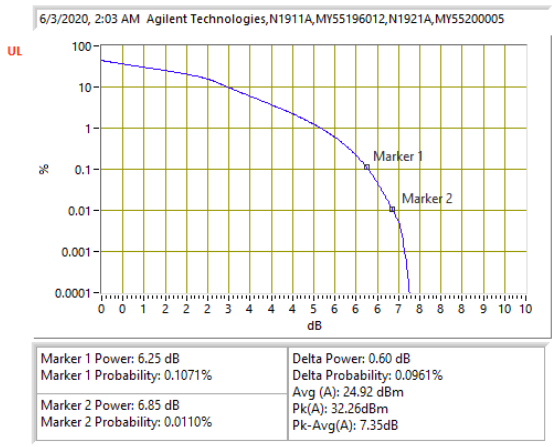
LTE B12 1.4MHz QPSK Middle Channel



LTE B12 1.4MHz 16QAM Middle Channel



LTE B12 3MHz QPSK Middle Channel



LTE B12 3MHz 16QAM Middle Channel

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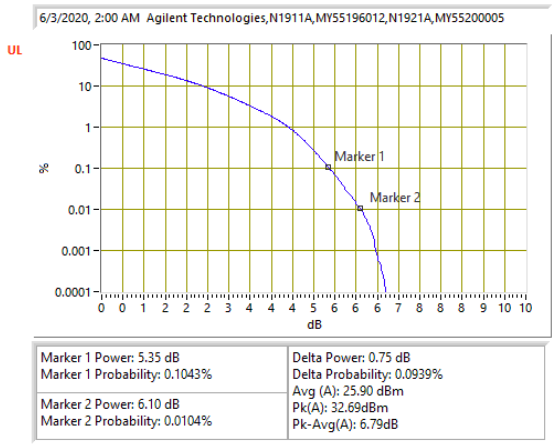
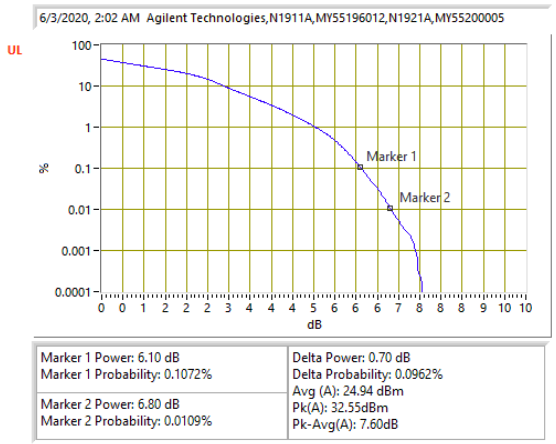
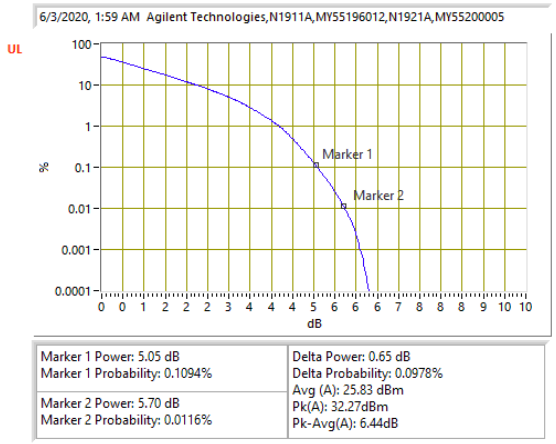


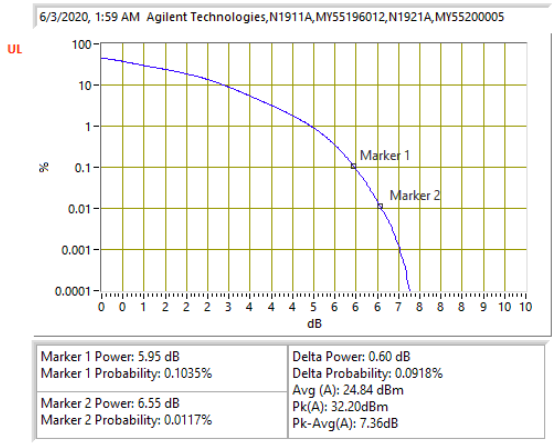
LTE B12 5MHz QPSK Middle Channel



LTE B12 5MHz 16QAM Middle Channel



LTE B12 10MHz QPSK Middle Channel



LTE B12 10MHz 16QAM Middle Channel

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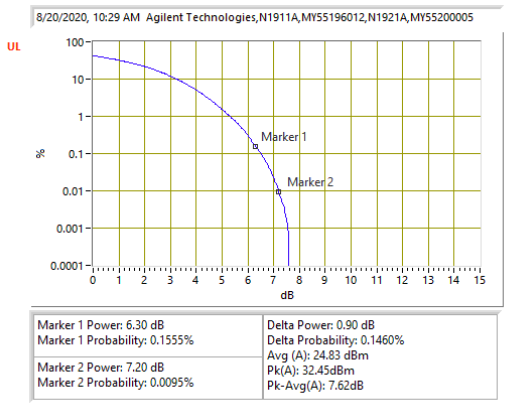
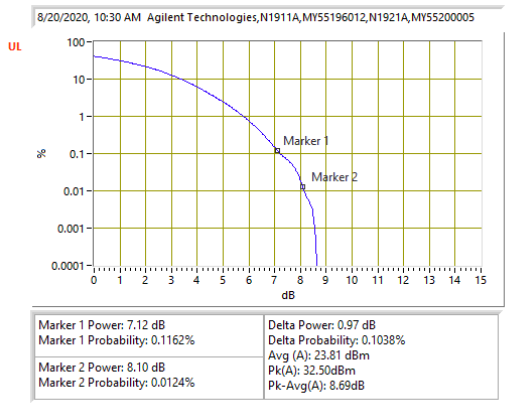
5G NR Band n12

Test Engineer ID:	39004	Test Date:	8/20/2020



5G NR Band n12 15MHz QPSK Middle Channel



5G NR Band n12 15MHz BPSK Middle Channel

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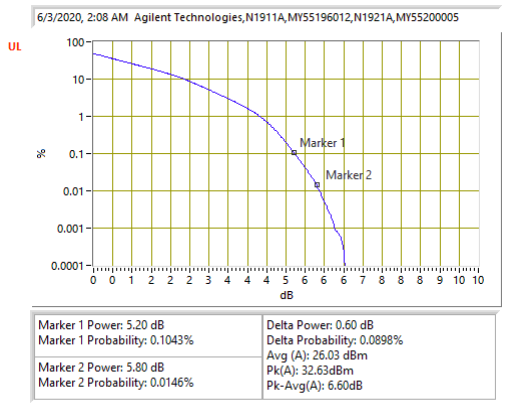
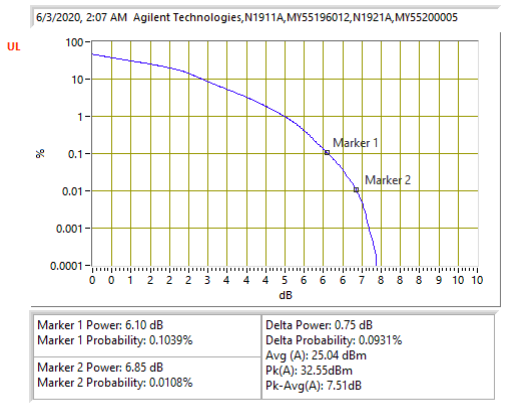
8.1.5. LTE BAND 13

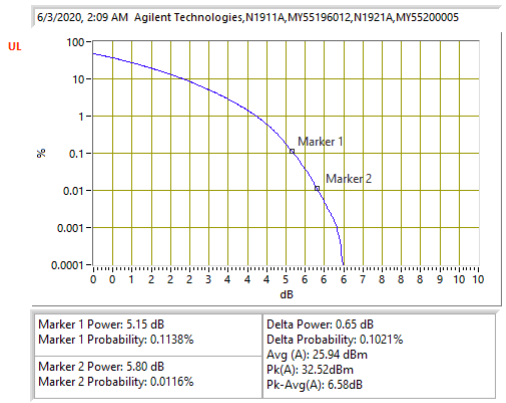
Test Engineer ID:	10646	Test Date:	6/3/2020



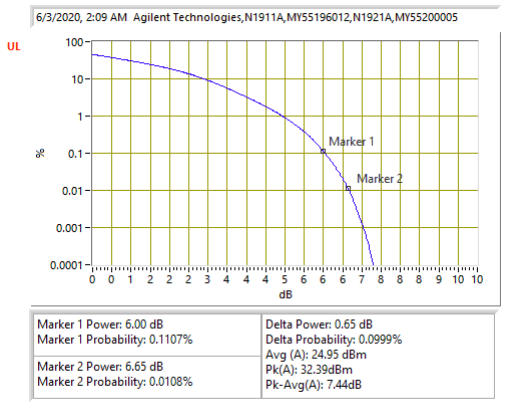
LTE B13 5MHz QPSK Middle Channel



LTE B13 5MHz 16QAM Middle Channel



LTE B13 10MHz QPSK Middle Channel



LTE B13 10MHz 16QAM Middle Channel

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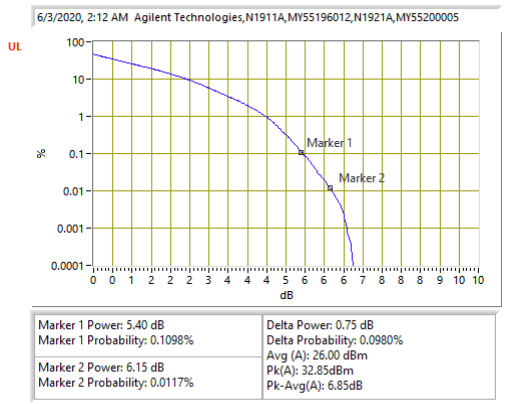
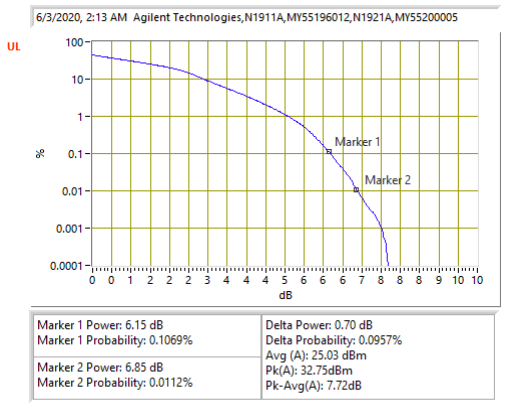
8.1.6. LTE BAND 14

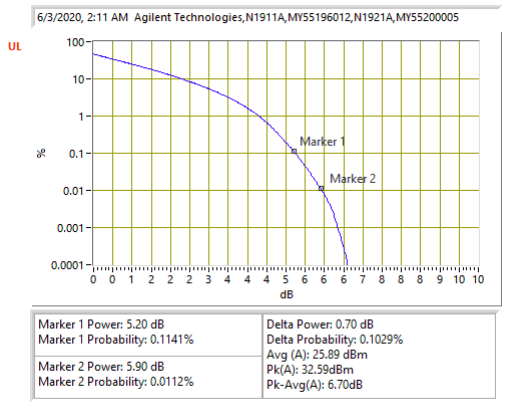
Test Engineer ID:	10646	Test Date:	6/3/2020



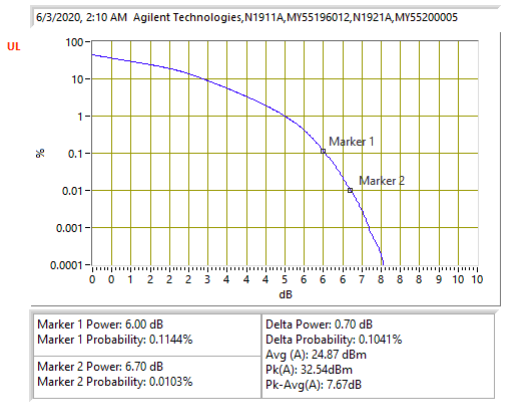
LTE B14 5MHz QPSK Middle Channel



LTE B14 5MHz 16QAM Middle Channel



LTE B14 10MHz QPSK Middle Channel



LTE B14 10MHz 16QAM Middle Channel

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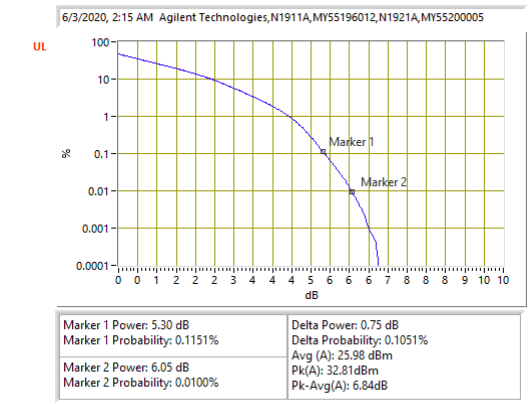
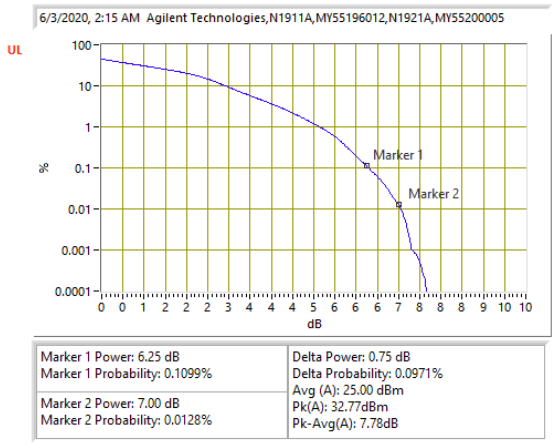
8.1.7. LTE BAND 17

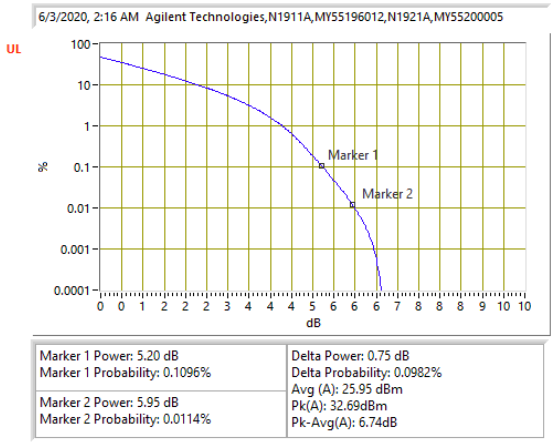
Test Engineer ID:	10646	Test Date:	6/3/2020



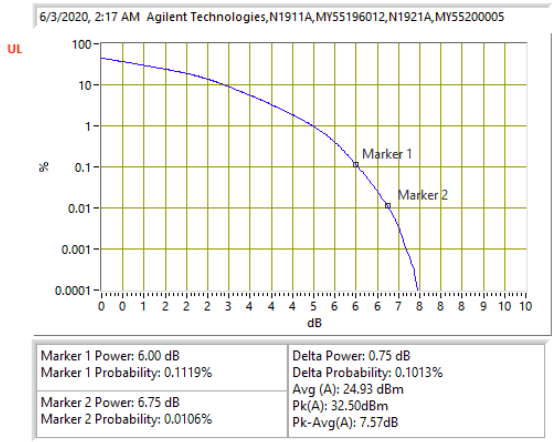
LTE B17 5MHz QPSK Middle Channel



LTE B17 5MHz 16QAM Middle Channel



LTE B17 10MHz QPSK Middle Channel



LTE B17 10MHz 16QAM Middle Channel

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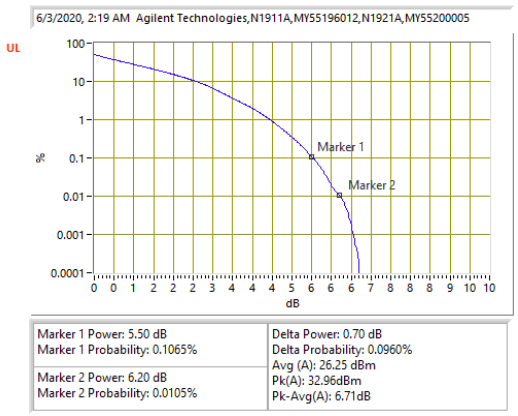
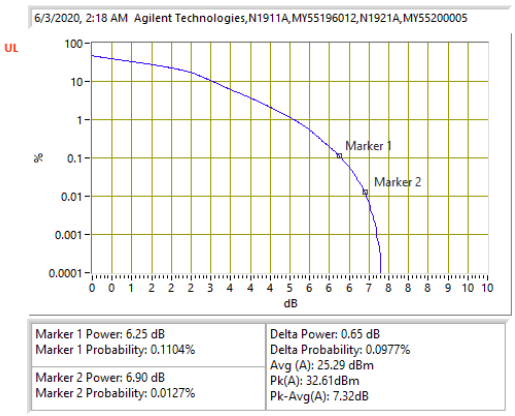
8.1.8. LTE BAND 25

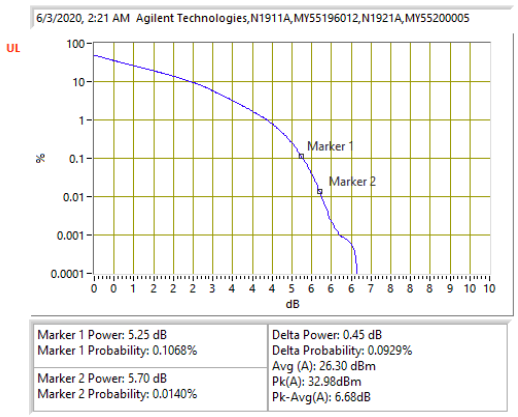
Test Engineer ID:	10646	Test Date:	6/3/2020



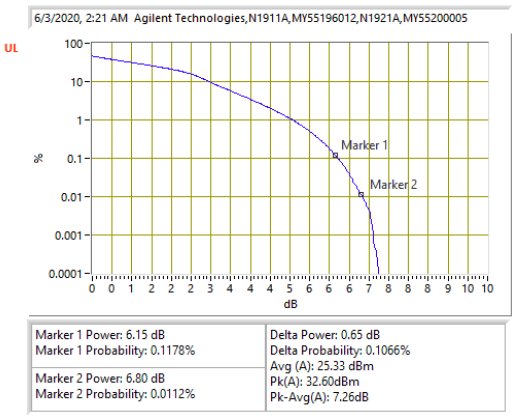
LTE B25 1.4MHz QPSK Middle Channel



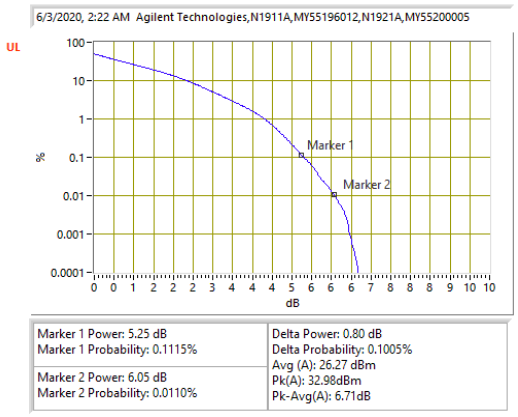
LTE B25 1.4MHz 16QAM Middle Channel



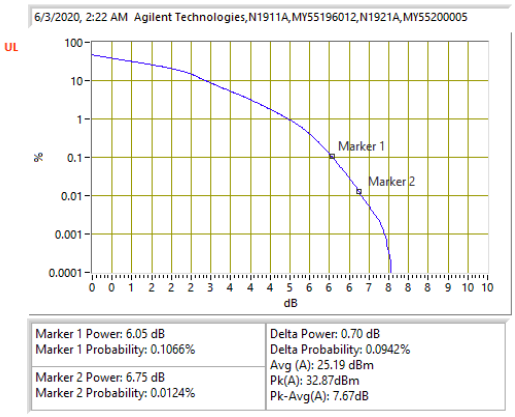
LTE B25 3MHz QPSK Middle Channel



LTE B25 3MHz 16QAM Middle Channel



LTE B2 5MHz QPSK Middle Channel



LTE B2 5MHz 16QAM Middle Channel

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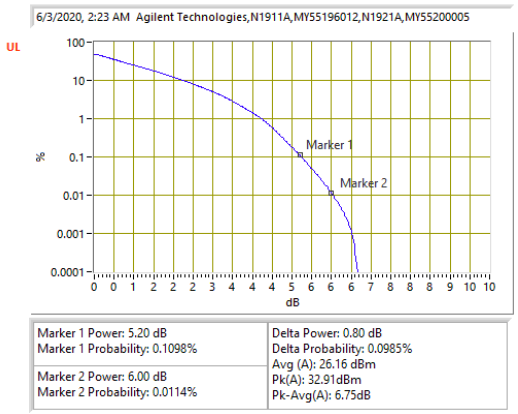
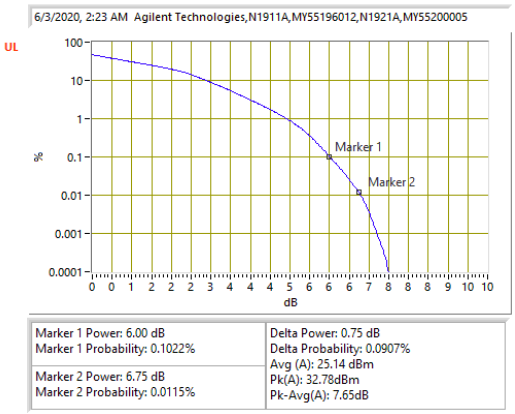
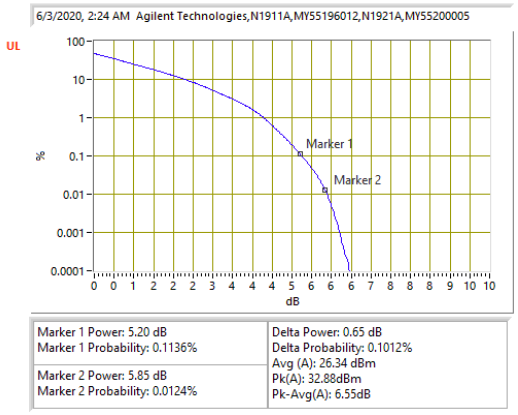


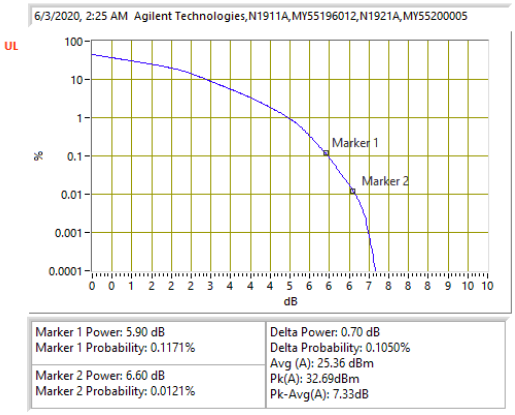
LTE B25 10MHz QPSK Middle Channel



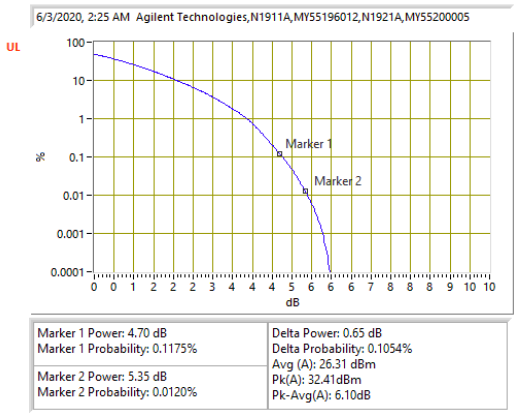
LTE B25 10MHz 16QAM Middle Channel



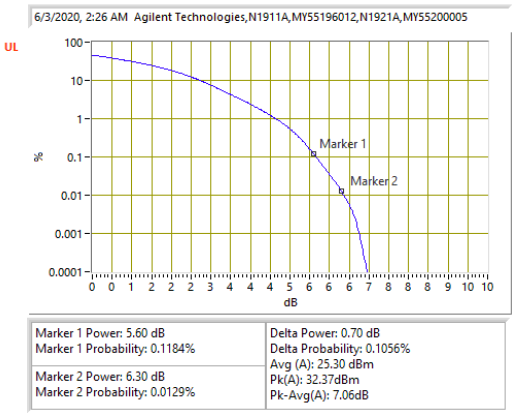
LTE B25 15MHz QPSK Middle Channel



LTE B25 15MHz 16QAM Middle Channel



LTE B25 20MHz QPSK Middle Channel



LTE B25 20MHz 16QAM Middle Channel

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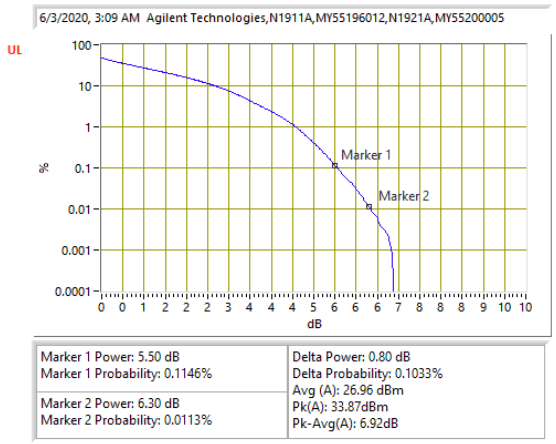
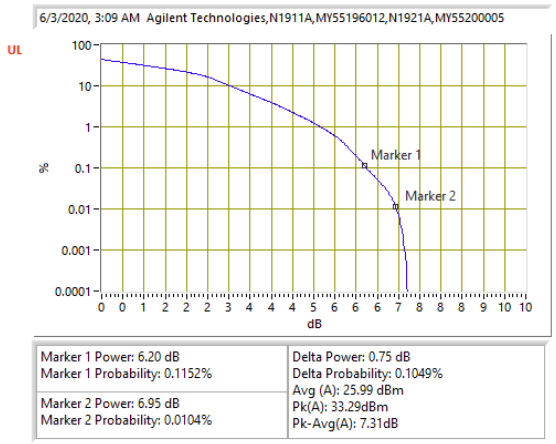
8.1.9. LTE BAND 26 (PART 90S)

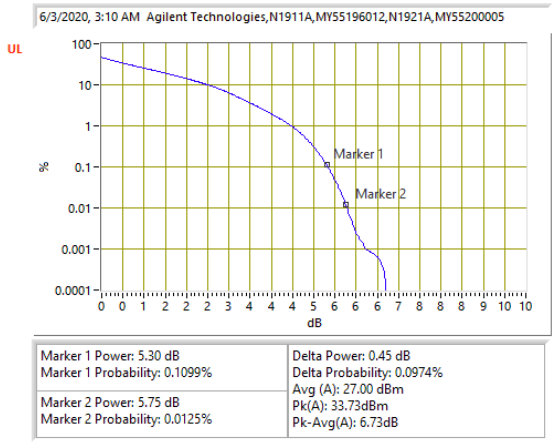
Test Engineer ID:	10646	Test Date:	6/3/2020



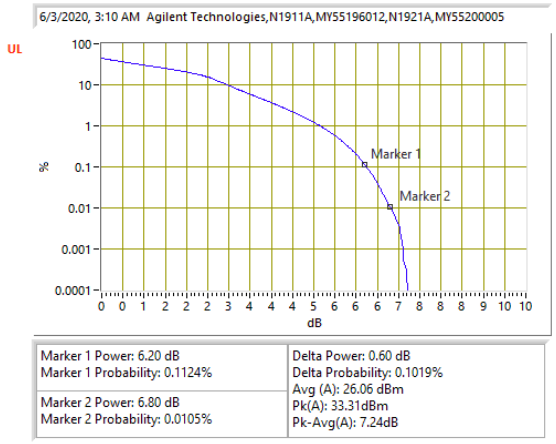
LTE B26 1.4MHz QPSK Middle Channel



LTE B26 1.4MHz 16QAM Middle Channel



LTE B26 3MHz QPSK Middle Channel



LTE B26 3MHz 16QAM Middle Channel

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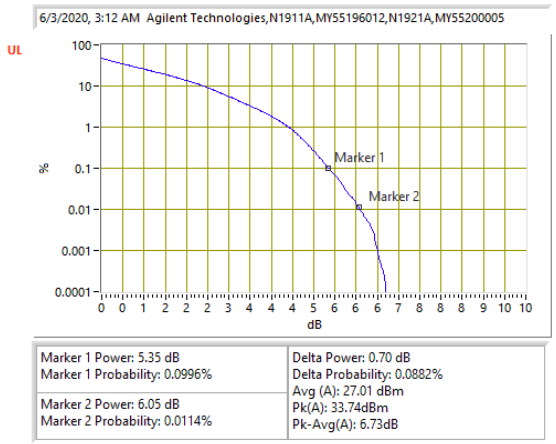
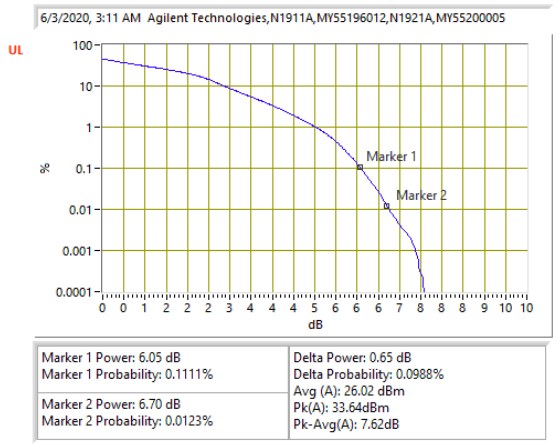
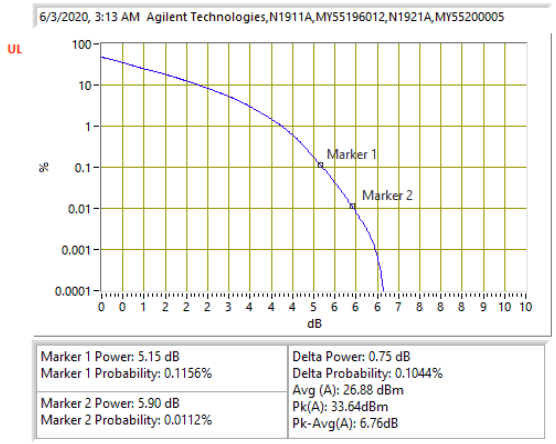


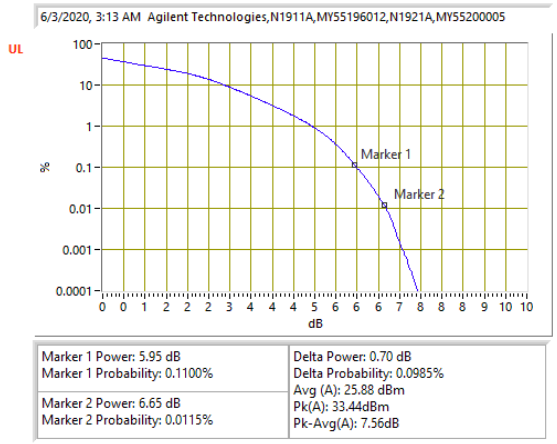
LTE B26 5MHz QPSK Middle Channel



LTE B26 5MHz 16QAM Middle Channel



LTE B26 10MHz QPSK Middle Channel



LTE B26 10MHz 16QAM Middle Channel

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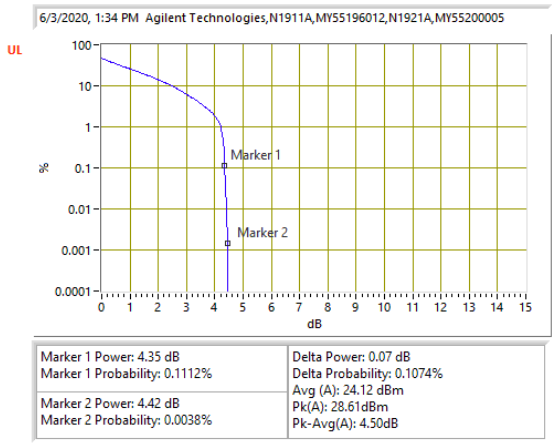
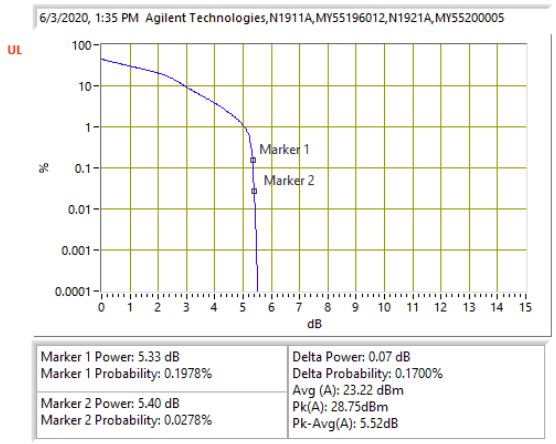
8.1.10. LTE BAND 30

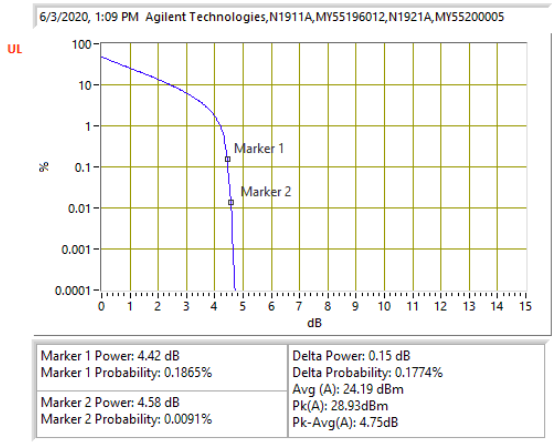
Test Engineer ID:	39004	Test Date:	6/3/2020



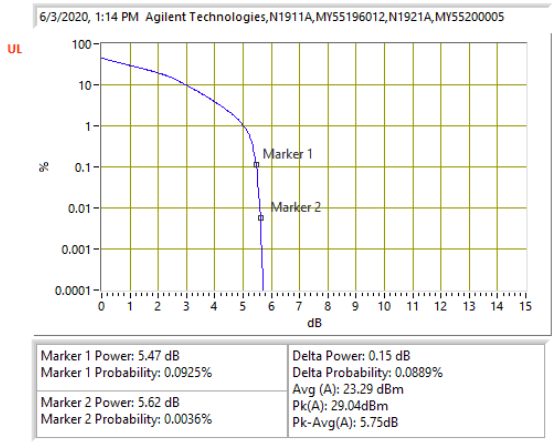
LTE B30 5MHz QPSK Middle Channel



LTE B30 5MHz 16QAM Middle Channel



LTE B30 10MHz QPSK Middle Channel



LTE B30 10MHz 16QAM Middle Channel

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8.1.11. LTE BAND 41 AND 5G NR Band n41

Test Engineer ID:	20769	Test Date:	7/6/2020

Band	Bandwidth (MHz)	Frequency (MHz)	RB Allocation	RB OffSet	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
						Peak	Average	
Band 41	5MHz	2593.0	25	0	QPSK	31.64	18.36	6.29
					16QAM	31.43	17.47	6.97
	10MHz		50	0	QPSK	31.75	18.37	6.39
					16QAM	31.54	17.36	7.19
	15MHz		75	0	QPSK	31.78	18.55	6.24
					16QAM	31.79	17.56	7.24
	20MHz		100	0	QPSK	31.65	18.49	6.17
					16QAM	31.61	17.47	7.15
Band n41	40MHz		100	0	QPSK	31.63	27.03	4.60
					16QAM	31.88	26.17	5.71
	50MHz		128	0	QPSK	31.21	26.59	4.62
					16QAM	31.51	25.95	5.56
	60MHz		162	0	QPSK	31.35	26.54	4.81
					16QAM	31.48	26.13	5.35
	80MHz		216	0	QPSK	30.88	26.48	4.40
					16QAM	31.22	26.17	5.05
	90MHz		240	0	QPSK	30.77	26.79	3.98
					16QAM	31.31	26.46	4.85
	100MHz		270	0	QPSK	30.45	26.69	3.76
					16QAM	31.07	26.19	4.88
Duty Cycle Correction Factor (dB) =			6.99					

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8.1.12. LTE BAND 48

Test Engineer ID:	20769	Test Date:	6/30/2020

Band	Bandwidth (MHz)	Frequency (MHz)	RB Allocation	RB OffSet	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
						Peak	Average	
Band 48	5MHz	3625.0	25	0	QPSK	32.05	21.77	3.29
					16QAM	31.79	20.8	4.00
	10MHz		50	0	QPSK	31.91	21.73	3.19
					16QAM	31.47	20.7	3.78
	15MHz		75	0	QPSK	30.84	21.76	2.09
					16QAM	30.78	20.81	2.98
	20MHz		100	0	QPSK	31.82	21.74	3.09
					16QAM	31.71	20.73	3.99
Duty Cycle Correction Factor (dB) =			6.99					
Peak-to-Average Power Ratio= Peak Reading - Average Reading - Duty Cycle Correction Factor								

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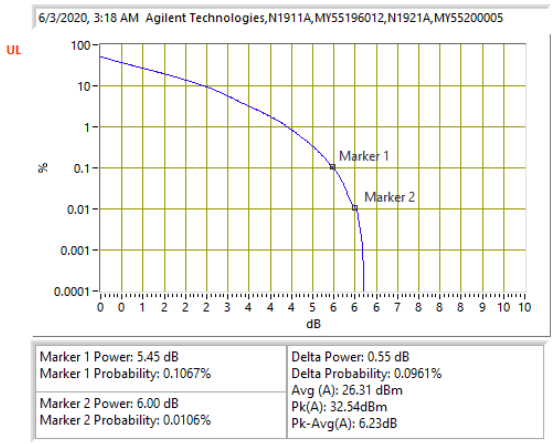
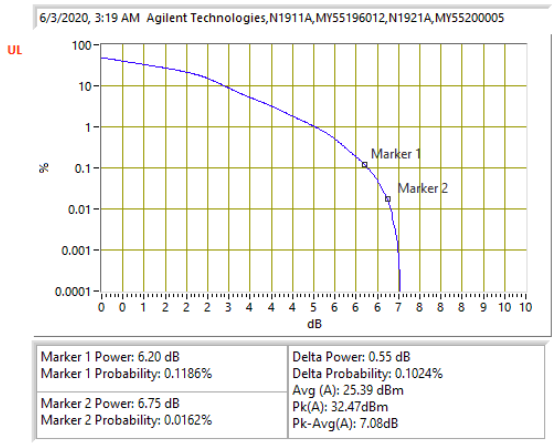
8.1.13. LTE BAND 66

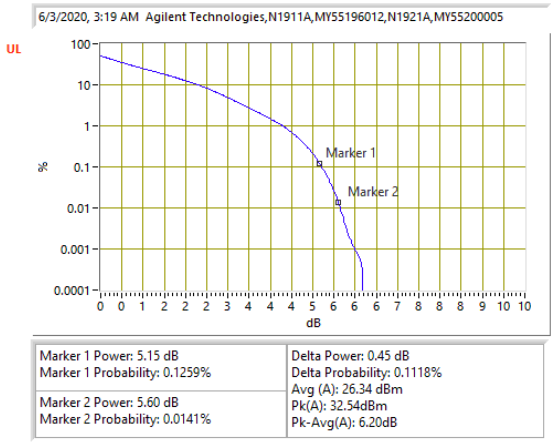
Test Engineer ID:	10646	Test Date:	6/3/2020



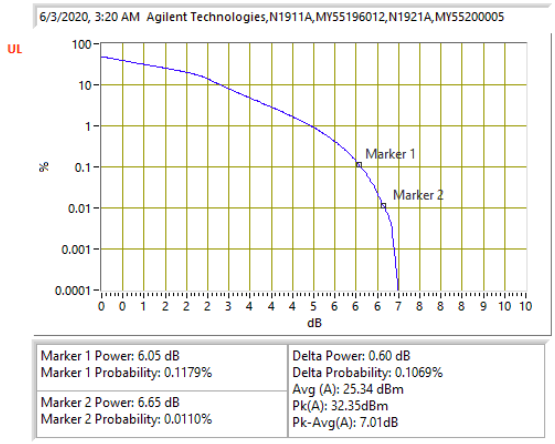
LTE B66 1.4MHz QPSK Middle Channel



LTE B66 1.4MHz 16QAM Middle Channel



LTE B66 3MHz QPSK Middle Channel



LTE B66 3MHz 16QAM Middle Channel

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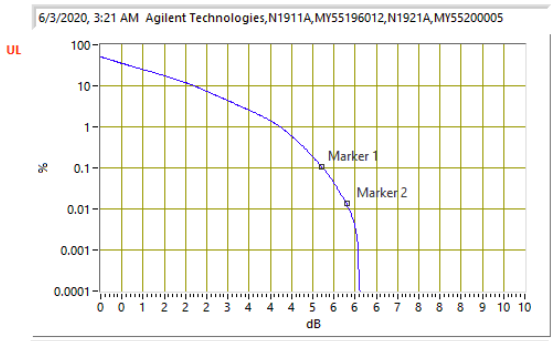
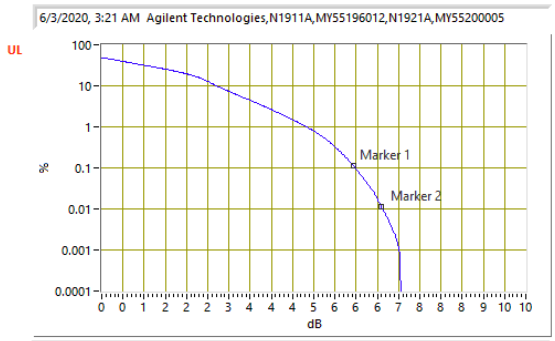


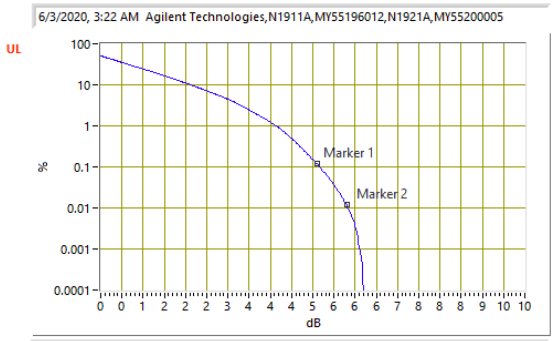
Marker 1 Power: 5.20 dB Marker 1 Probability: 0.1072%	Delta Power: 0.60 dB Delta Probability: 0.0940% Avg (A): 26.36 dBm Pk(A): 32.51dBm Pk-Avg(A): 6.15dB
Marker 2 Power: 5.80 dB Marker 2 Probability: 0.0132%	

LTE B66 5MHz QPSK Middle Channel



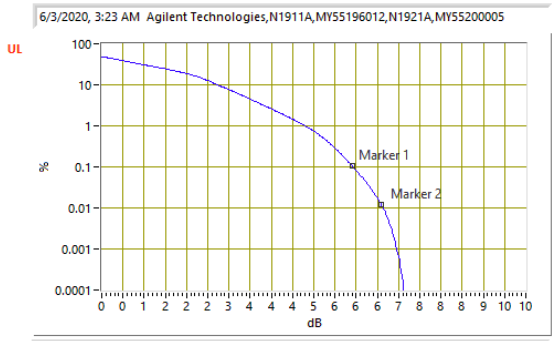
Marker 1 Power: 5.95 dB Marker 1 Probability: 0.1073%	Delta Power: 0.65 dB Delta Probability: 0.0961% Avg (A): 25.39 dBm Pk(A): 32.47dBm Pk-Avg(A): 7.08dB
Marker 2 Power: 6.60 dB Marker 2 Probability: 0.0112%	

LTE B66 5MHz 16QAM Middle Channel



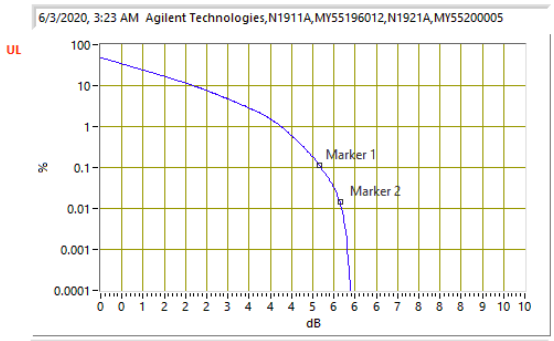
Marker 1 Power: 5.10 dB Marker 1 Probability: 0.1175%	Delta Power: 0.70 dB Delta Probability: 0.1057% Avg (A): 26.23 dBm Pk(A): 32.47dBm Pk-Avg(A): 6.23dB
Marker 2 Power: 5.80 dB Marker 2 Probability: 0.0117%	

LTE B66 10MHz QPSK Middle Channel



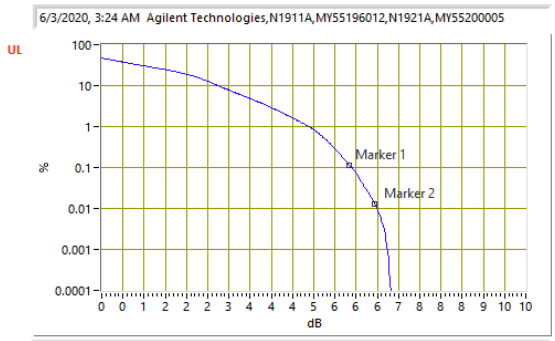
Marker 1 Power: 5.90 dB Marker 1 Probability: 0.1060%	Delta Power: 0.70 dB Delta Probability: 0.0942% Avg (A): 25.26 dBm Pk(A): 32.45dBm Pk-Avg(A): 7.20dB
Marker 2 Power: 6.60 dB Marker 2 Probability: 0.0118%	

LTE B66 10MHz 16QAM Middle Channel



Marker 1 Power: 5.15 dB Marker 1 Probability: 0.1142%	Delta Power: 0.50 dB Delta Probability: 0.1010% Avg (A): 26.31 dBm Pk(A): 32.26dBm Pk-Avg(A): 5.95dB
Marker 2 Power: 5.65 dB Marker 2 Probability: 0.0131%	

LTE B66 15MHz QPSK Middle Channel



Marker 1 Power: 5.85 dB Marker 1 Probability: 0.1119%	Delta Power: 0.60 dB Delta Probability: 0.0994% Avg (A): 25.40 dBm Pk(A): 32.26dBm Pk-Avg(A): 6.86dB
Marker 2 Power: 6.45 dB Marker 2 Probability: 0.0126%	

LTE B66 15MHz 16QAM Middle Channel

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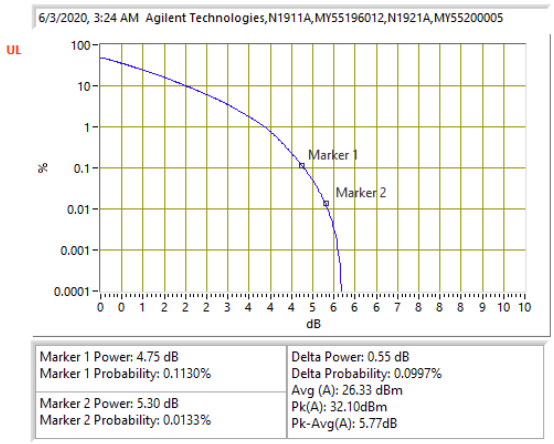
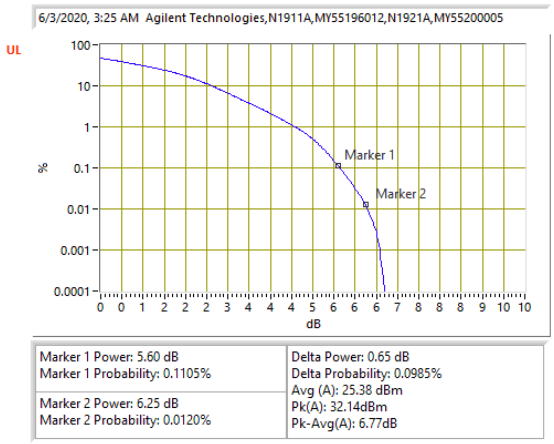


LTE B66 20MHz QPSK Middle Channel



LTE B66 20MHz 16QAM Middle Channel

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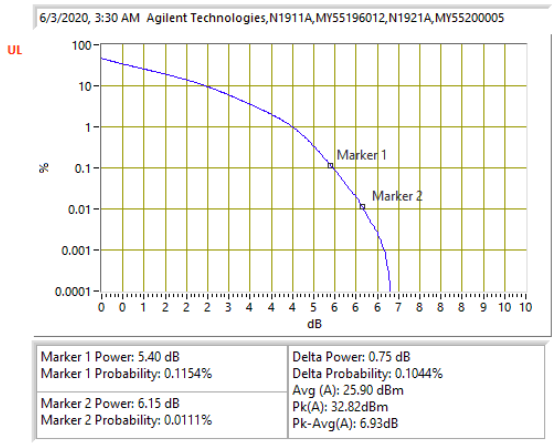
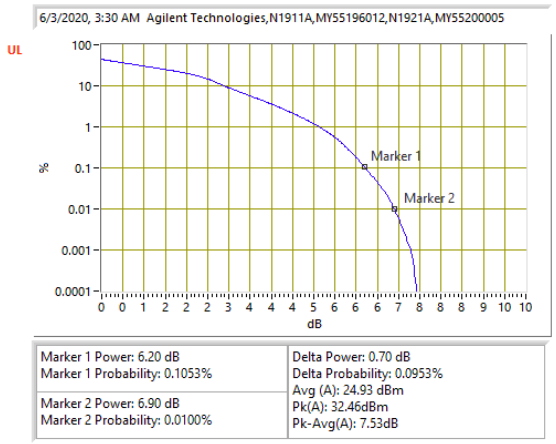
8.1.14. LTE BAND 71

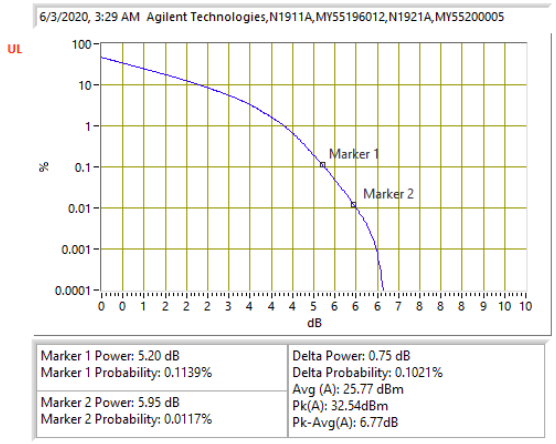
Test Engineer ID:	10646	Test Date:	6/3/2020



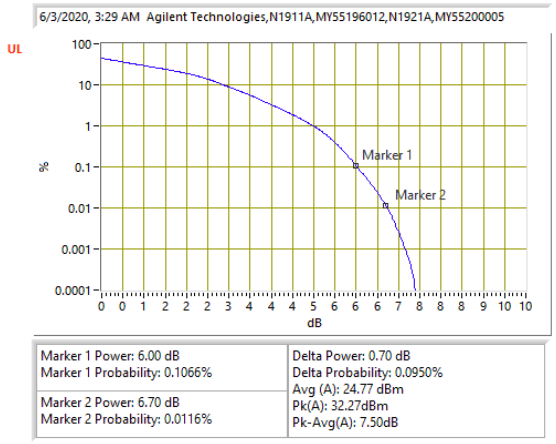
LTE B71 5MHz QPSK Middle Channel



LTE B71 5MHz 16QAM Middle Channel



LTE B71 10MHz QPSK Middle Channel



LTE B71 10MHz 16QAM Middle Channel

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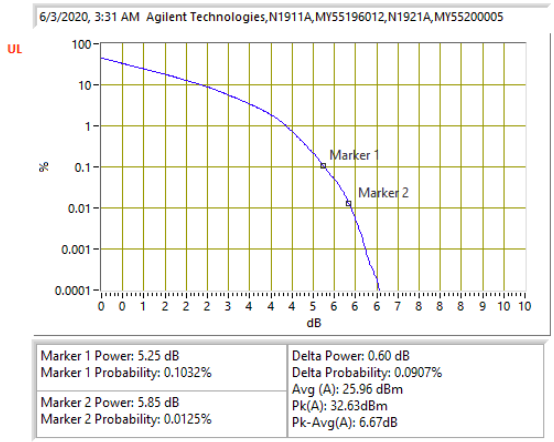
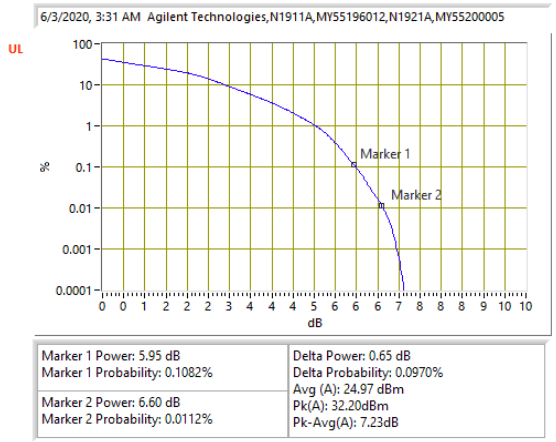
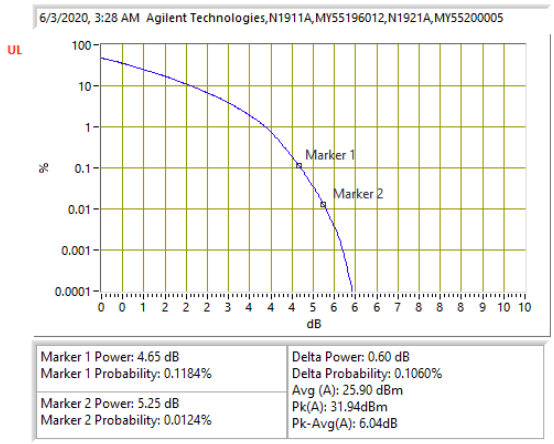


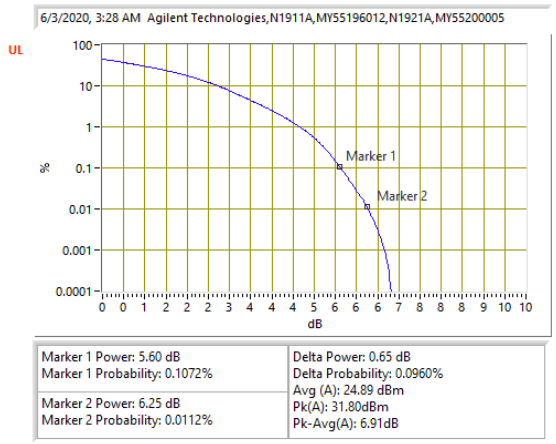
LTE B71 15MHz QPSK Middle Channel



LTE B71 15MHz 16QAM Middle Channel



LTE B71 20MHz QPSK Middle Channel



LTE B71 20MHz 16QAM Middle Channel

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8.1.15. 5G NR Band n77

Test Engineer ID:	20769	Test Date:	8/20/2020

Band	Bandwidth (MHz)	Frequency (MHz)	RB Allocation	RB OffSet	Modulation	Conducted Power (dBm)		Peak-to-Average Power Ratio (dB)
						Peak	Average	
Band n77	20MHz	3840.0	100	0	QPSK	31.31	26.34	4.97
					16QAM	31.94	25.14	6.80
	40MHz		100	0	QPSK	31.38	25.8	5.58
					16QAM	31.68	25.01	6.67
	50MHz		128	0	QPSK	30.75	26.03	4.72
					16QAM	31.32	25.07	6.25
	60MHz		162	0	QPSK	29.06	24.55	4.51
					16QAM	29.96	23.49	6.47
	80MHz		216	0	QPSK	28.92	24.34	4.58
					16QAM	29.14	23.27	5.87
	90MHz		240	0	QPSK	28.81	24.4	4.41
					16QAM	29.06	23.11	5.95
	100MHz		270	0	QPSK	28.18	24.55	3.63
					16QAM	28.82	23.49	5.33

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9. RADIATED TEST RESULTS

Radiated measurement using the Field Strength Method

Using the test configuration shown in Figure 6 below, We measure the radiated emissions directly from the EUT and convert the measured field strength or received power to ERP or EIRP, as required, for comparison to the applicable limits. As stated in 5.5.1 of ANSI C63.26-2015, the field strength measurement method using a test site validated to the requirements of ANSI C63.4 is an alternative to the substitution measurement method.

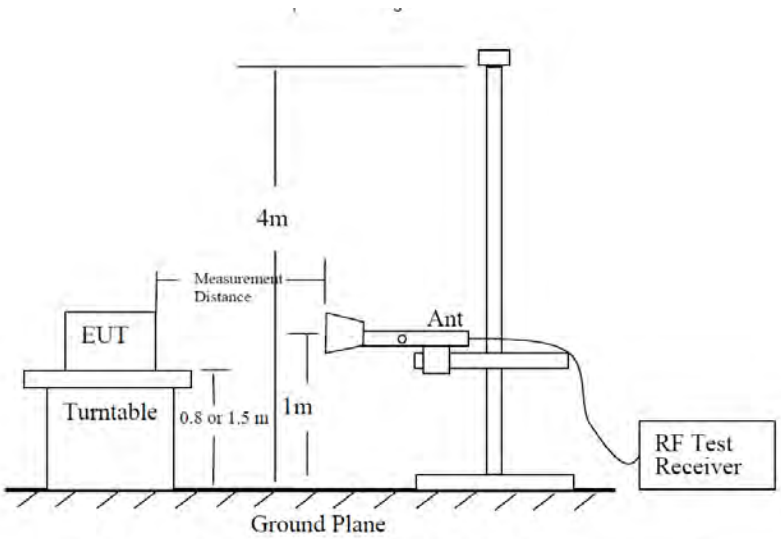

Figure 6 —Test site-up for radiated ERP and/or EIRP measurements

Radiated Power Measurement Calculation According to ANSI C63.26-2015

a) E (dBμV/m) = Measured amplitude level (dBμV) + Cable Loss (dB) + Antenna Factor (dB/m).

b) E (dBμV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m).

c) E (dBμV/m) = EIRP (dBm) − 20log(D) + 104.8; where D is the measurement distance (in the far field region) in m.

d) EIRP (dBm) = E (dBμV/m) + 20log(D) − 104.8; where D is the measurement distance (in the far field region) in m.

So, from d)

The measuring distance is usually at 3m, then 20*Log(3)=9.5424

Then, EIRP (dBm) = E (dBμV/m) + 9.5424 − 104.8 = E (dBμV/m) – 95.2576

Note that: we do confidence check to our chambers every day to see if any degradation from expected/normal reading reference data. Also we do ambient check to all our chambers every month.

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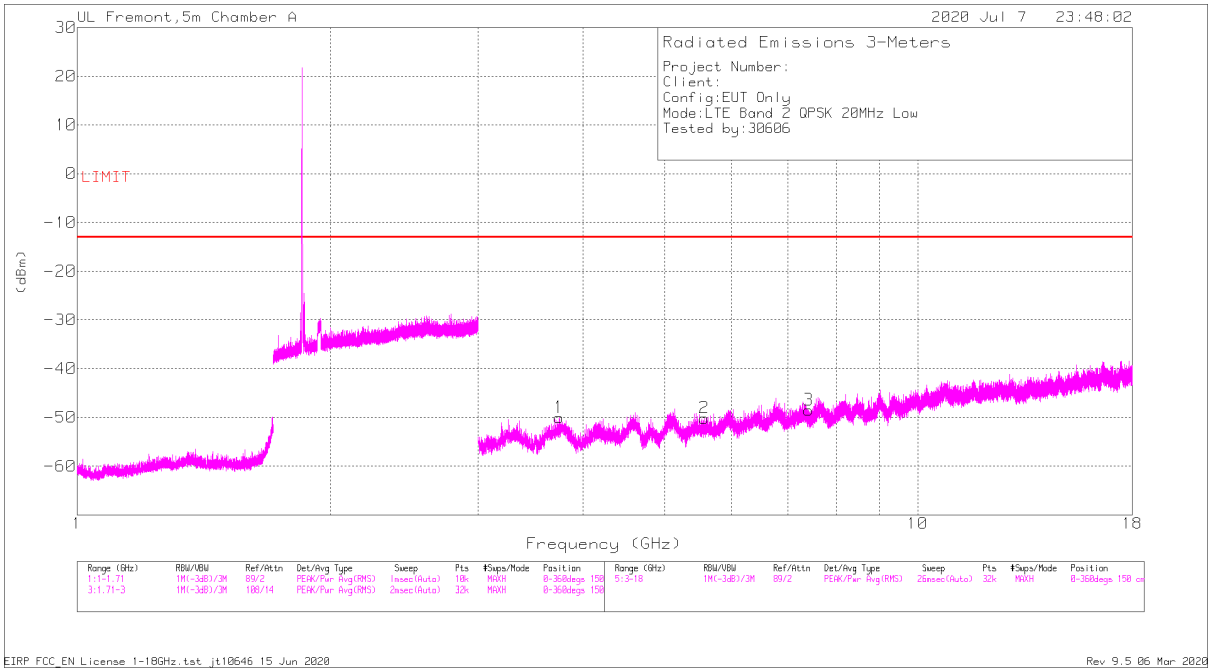
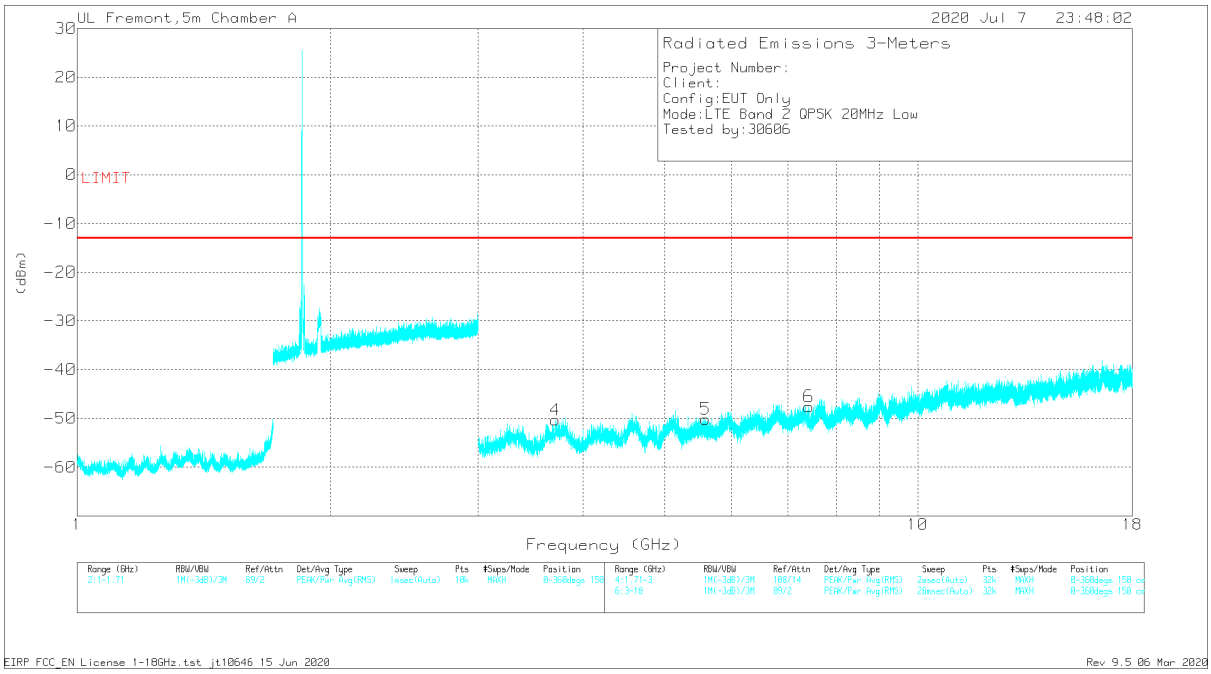
9.1. Example Plot



Horizontal Polarity



Vertical Polarity

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Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T962 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
4	3.70547	38.97	Pk	33.3	-27.4	-95.2	-50.33	-13	-37.33	V
1	3.74531	38.89	Pk	33.4	-27.1	-95.2	-50.01	-13	-37.01	H
2	5.57156	36.58	Pk	34.9	-26.4	-95.2	-50.12	-13	-37.12	H
5	5.59453	36.56	Pk	34.9	-26.4	-95.2	-50.14	-13	-37.14	V
3	7.41797	34.41	Pk	35.8	-23.5	-95.2	-48.49	-13	-35.49	H
6	7.42125	35.41	Pk	35.8	-23.6	-95.2	-47.59	-13	-34.59	V

Pk - Peak detector

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T962 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	EIRP CF	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
3.7051	39.89	Pk	33.3	-27.4	-95.2	-49.41	-13	-36.41	V
3.74759	40.2	Pk	33.5	-27	-95.2	-48.5	-13	-35.5	H
5.5675	38.18	Pk	34.9	-26.5	-95.2	-48.62	-13	-35.62	H
5.59136	37.87	Pk	34.9	-26.4	-95.2	-48.83	-13	-35.83	V
7.41778	36.17	Pk	35.8	-23.5	-95.2	-46.73	-13	-33.73	H
7.42259	36.06	Pk	35.7	-23.6	-95.2	-47.04	-13	-34.04	V

Pk - Peak detector

EIRP FCC_EN License 1-18GHz.tst jt10646 15 Jun 2020

Rev 9.5 07 Jul 2020

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9.2. FIELD STRENGTH OF SPURIOUS RADIATION, ANT1

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.

All tests below 1GHz were done with a Resolution Bandwidth of 100kHz, and a Video Bandwidth of 300kHz.

RESULTS

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9.2.1. 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.

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QPSK LTE BAND 2 (20.0MHZ BANDWIDTH)

Project #:	13259315
Date:	7/8/2020
Test Engineer:	30606
Configuration:	EUT Only
Mode	LTE Band 2 QPSK 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T348 (dB/m)	Amp/Cbl (dB)	EIRP	Corrected Reading (dBm)	Harmonics limit	Margin (dB)	Polarity
Low Channel, 1860MHz									
3.7051	39.89	Pk	33.3	-27.4	-95.2	-49.41	-13	-36.41	V
3.74759	40.2	Pk	33.5	-27	-95.2	-48.5	-13	-35.5	H
5.5675	38.18	Pk	34.9	-26.5	-95.2	-48.62	-13	-35.62	H
5.59136	37.87	Pk	34.9	-26.4	-95.2	-48.83	-13	-35.83	V
7.41778	36.17	Pk	35.8	-23.5	-95.2	-46.73	-13	-33.73	H
7.42259	36.06	Pk	35.7	-23.6	-95.2	-47.04	-13	-34.04	V
Mid Channel, 1880MHz									
3.75053	40.23	Pk	33.5	-27	-95.2	-48.47	-13	-35.47	H
3.7733	40.52	Pk	33.6	-27.1	-95.2	-48.18	-13	-35.18	V
5.62023	38.24	Pk	34.8	-26.4	-95.2	-48.56	-13	-35.56	V
5.66745	38.62	Pk	34.8	-26.5	-95.2	-48.28	-13	-35.28	H
7.52603	36.63	Pk	35.7	-23.2	-95.2	-46.07	-13	-33.07	H
7.53907	36.44	Pk	35.7	-22.8	-95.2	-45.86	-13	-32.86	V
High Channel, 1900MHz									
3.80134	39.63	Pk	33.7	-27.5	-95.2	-49.37	-13	-36.37	V
3.81058	30.98	Av	33.7	-27.6	-95.2	-58.12	-13	-45.12	H
5.67743	37.8	Pk	34.8	-26.6	-95.2	-49.2	-13	-36.2	H
5.68322	38	Pk	34.8	-26.7	-95.2	-49.1	-13	-36.1	V
7.61157	35.67	Pk	35.8	-21.3	-95.2	-45.03	-13	-32.03	V
7.61504	35.34	Pk	35.7	-21.3	-95.2	-45.46	-13	-32.46	H

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9.2.2. LTE BAND 5 AND 5G NR Band n5

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.

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QPSK LTE BAND 5 (10.0MHZ BANDWIDTH)

Project #:	13259315
Date:	4/14/2020
Test Engineer:	50822
Configuration:	EUT Only
Mode:	LTE Band 5 QPSK 10MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T348 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	Margin (dB)	Polarity
Low Channel, 829MHz									
1.65605	41.47	Pk	28.7	-32.8	-95.2	-57.83	-13	-44.83	H
1.65866	41.63	Pk	28.8	-32.8	-95.2	-57.57	-13	-44.57	V
2.48597	41.11	Pk	32.6	-32	-95.2	-53.49	-13	-40.49	V
2.48937	41.31	Pk	32.6	-31.9	-95.2	-53.19	-13	-40.19	H
3.31542	40.2	Pk	32.8	-30.6	-95.2	-52.8	-13	-39.8	H
3.31676	40.03	Pk	32.8	-30.6	-95.2	-52.97	-13	-39.97	V
Mid Channel, 836.5MHz									
1.67261	41.81	Pk	28.9	-32.8	-95.2	-57.29	-13	-44.29	V
1.6741	42.33	Pk	28.9	-32.8	-95.2	-56.77	-13	-43.77	H
2.50819	41.11	Pk	32.7	-31.8	-95.2	-53.19	-13	-40.19	V
2.51081	41.28	Pk	32.6	-31.8	-95.2	-53.12	-13	-40.12	H
3.34532	40.39	Pk	32.8	-30.8	-95.2	-52.81	-13	-39.81	H
3.34752	39.68	Pk	32.8	-30.7	-95.2	-53.42	-13	-40.42	V
High Channel, 844MHz									
1.68786	41.98	Pk	28.9	-32.7	-95.2	-57.02	-13	-44.02	H
1.68825	41.79	Pk	28.9	-32.7	-95.2	-57.21	-13	-44.21	V
2.53444	41.7	Pk	32.6	-31.7	-95.2	-52.6	-13	-39.6	H
2.53446	40.28	Pk	32.6	-31.7	-95.2	-54.02	-13	-41.02	V
3.37422	40.1	Pk	32.8	-30.7	-95.2	-53	-13	-40	V
3.377	40.47	Pk	32.8	-30.7	-95.2	-52.63	-13	-39.63	H

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QPSK 5G NR Band n5 (20.0MHZ BANDWIDTH)

Project #:	13259315
Date:	7/10/2020
Test Engineer:	19479
Configuration:	EUT Only
Mode	5G NR Band n5 QPSK 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T348 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	Margin (dB)	Polarity
Low Channel, 834MHz									
1.66215	38.49	Pk	29	-32.3	-95.2	-59.21	-13	-46.21	V
1.67079	41.29	Pk	29	-32.2	-95.2	-56.41	-13	-43.41	H
2.4952	41.78	Pk	33.5	-31.3	-95.2	-50.62	-13	-37.62	H
2.49591	40.88	Pk	33.5	-31.3	-95.2	-51.52	-13	-38.52	V
3.35102	40.92	Pk	33	-30.1	-95.2	-50.78	-13	-37.78	V
3.35299	40.26	Pk	33	-30.1	-95.2	-51.44	-13	-38.44	H
Mid Channel, 836.5MHz									
1.67178	42.16	Pk	29	-32.2	-95.2	-55.54	-13	-42.54	H
1.67943	42.29	Pk	28.9	-32.2	-95.2	-55.51	-13	-42.51	V
2.5056	40.63	Pk	33.5	-31.4	-95.2	-51.77	-13	-38.77	V
2.51059	41.1	Pk	33.5	-31.4	-95.2	-51.3	-13	-38.3	H
3.34568	40.33	Pk	33	-30.1	-95.2	-51.37	-13	-38.37	V
3.35008	41.04	Pk	33	-30.1	-95.2	-50.66	-13	-37.66	H
High Channel, 839MHz									
1.68194	41.52	Pk	28.9	-32.2	-95.2	-56.28	-13	-43.28	V
1.68194	37.32	Pk	28.9	-32.2	-95.2	-60.48	-13	-47.48	V
1.6838	41.97	Pk	29	-32.2	-95.2	-55.73	-13	-42.73	H
2.51649	40.88	Pk	33.5	-31.4	-95.2	-51.42	-13	-38.42	H
2.51924	40.98	Pk	33.5	-31.3	-95.2	-51.22	-13	-38.22	V
3.35395	40.24	Pk	33	-30.1	-95.2	-51.46	-13	-38.46	V

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9.2.3. 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.

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QPSK LTE BAND 7 (20.0MHZ BANDWIDTH)

Project #:	13259315
Date:	4/10/2020
Test Engineer:	10641
Configuration:	EUT Only
Mode	LTE Band 7 QPSK 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T348 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	Margin (dB)	Polarity
Low Channel, 2510MHz									
5.01996	39.57	Pk	34.3	-28.9	-95.2	-50.23	-25	-25.23	V
5.02152	39.16	Pk	34.3	-28.9	-95.2	-50.64	-25	-25.64	H
7.52898	35.62	Pk	35.8	-24.5	-95.2	-48.28	-25	-23.28	V
7.53108	35.76	Pk	35.8	-24.6	-95.2	-48.24	-25	-23.24	H
10.04155	33.87	Pk	37.1	-22.2	-95.2	-46.43	-25	-21.43	V
10.04185	34.89	Pk	37.1	-22.1	-95.2	-45.31	-25	-20.31	H
Mid Channel, 2535MHz									
5.06339	39.04	Pk	34.4	-28.7	-95.2	-50.46	-25	-25.46	V
5.06349	38.27	Pk	34.4	-28.7	-95.2	-51.23	-25	-26.23	H
7.60469	35.93	Pk	35.8	-24.6	-95.2	-48.07	-25	-23.07	V
7.60705	36.85	Pk	35.8	-24.5	-95.2	-47.05	-25	-22.05	H
10.1411	35.33	Pk	37.2	-22	-95.2	-44.67	-25	-19.67	V
10.14117	35.24	Pk	37.2	-22	-95.2	-44.76	-25	-19.76	H
High Channel, 2560MHz									
5.13854	37.42	Pk	34.6	-26.2	-95.2	-48.58	-25	-23.58	H
5.14144	37.83	Pk	34.5	-26.2	-95.2	-48.27	-25	-23.27	V
7.65308	41.92	Pk	35.8	-22.4	-95.2	-39.58	-25	-14.58	H
7.65972	35.29	Pk	35.8	-22.3	-95.2	-46.11	-25	-21.11	V
10.22392	34.82	Pk	37.5	-20	-95.2	-41.98	-25	-16.98	H
10.23893	34.73	Pk	37.6	-20.1	-95.2	-42.17	-25	-17.17	V

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9.2.4. LTE BAND 12 AND 5G NR Band n12

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.

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QPSK LTE BAND 12 (10.0MHZ BANDWIDTH)

Project #:	13259315
Date:	4/16/2020
Test Engineer:	10641
Configuration:	EUT Only
Mode	LTE Band 12 QPSK 10MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T348 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	Margin (dB)	Polarity
Low Channel, 704MHz									
1.40732	41.91	Pk	28.8	-33.1	-95.2	-57.59	-13	-44.59	H
1.40889	41.74	Pk	28.7	-33.1	-95.2	-57.86	-13	-44.86	V
2.11032	41.78	Pk	31.7	-32.2	-95.2	-53.92	-13	-40.92	H
2.11247	42.5	Pk	31.7	-32.2	-95.2	-53.2	-13	-40.2	V
2.81597	40.33	Pk	32.5	-31.2	-95.2	-53.57	-13	-40.57	H
2.81665	40.29	Pk	32.5	-31.3	-95.2	-53.71	-13	-40.71	V
Mid Channel, 707.5MHz									
1.41746	41.98	Pk	28.6	-33	-95.2	-57.62	-13	-44.62	H
1.4176	42.3	Pk	28.6	-33	-95.2	-57.3	-13	-44.3	V
2.10923	50.78	Pk	31.7	-32.2	-95.2	-44.92	-13	-31.92	V
2.1093	52.93	Pk	31.7	-32.2	-95.2	-42.77	-13	-29.77	H
2.83054	40.77	Pk	32.4	-31.2	-95.2	-53.23	-13	-40.23	V
2.83154	40.57	Pk	32.4	-31.2	-95.2	-53.43	-13	-40.43	H
High Channel, 711MHz									
1.42072	42.51	Pk	28.6	-33	-95.2	-57.09	-13	-44.09	H
1.42123	42.85	Pk	28.6	-33	-95.2	-56.75	-13	-43.75	V
2.11964	53.97	Pk	31.7	-32.2	-95.2	-41.73	-13	-28.73	H
2.11988	48.55	Pk	31.7	-32.2	-95.2	-47.15	-13	-34.15	V
2.84323	40.5	Pk	32.4	-31.1	-95.2	-53.4	-13	-40.4	V
2.84555	40.76	Pk	32.4	-31.1	-95.2	-53.14	-13	-40.14	H

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QPSK 5G NR Band n12 (15.0MHZ BANDWIDTH)

Project #:	13259315
Date:	7/29/2020
Test Engineer:	50820
Configuration:	EUT Only
Mode	5G NR Band n12 QPSK 15MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T348 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	Margin (dB)	Polarity
Low Channel, 706.5MHz									
1.41126	41.27	Pk	29.1	-32.7	-95.2	-56.63	-13	-43.63	V
1.4141	42.43	Pk	29.1	-32.7	-95.2	-55.47	-13	-42.47	H
2.0997	44.67	Pk	31.9	-31.8	-95.2	-49.93	-13	-36.93	H
2.09989	42.11	Pk	31.8	-31.8	-95.2	-52.59	-13	-39.59	V
2.82412	39.54	Pk	32.6	-30.7	-95.2	-53.06	-13	-40.06	H
2.8278	39.38	Pk	32.5	-30.6	-95.2	-53.22	-13	-40.22	V
Mid Channel, 707.5MHz									
1.41331	42.7	Pk	29.1	-32.7	-95.2	-55.2	-13	-42.2	H
1.41449	41.96	Pk	29.1	-32.7	-95.2	-55.94	-13	-42.94	V
2.12138	40.73	Pk	31.6	-31.7	-95.2	-54.07	-13	-41.07	H
2.1233	41.01	Pk	31.6	-31.7	-95.2	-53.79	-13	-40.79	V
2.82864	39.77	Pk	32.5	-30.6	-95.2	-52.83	-13	-39.83	H
2.83178	39.73	Pk	32.6	-30.6	-95.2	-52.77	-13	-39.77	V
High Channel, 708.5MHz									
1.41893	42.23	Pk	29.1	-32.6	-95.2	-55.57	-13	-42.57	V
1.1664	42.74	Pk	28.1	-33.2	-95.2	-57.56	-13	-44.56	H
2.12363	41.41	Pk	31.6	-31.7	-95.2	-53.39	-13	-40.39	H
2.12561	41.08	Pk	31.6	-31.6	-95.2	-53.62	-13	-40.62	V
2.8325	40.16	Pk	32.5	-30.6	-95.2	-52.44	-13	-39.44	V
2.83278	40.23	Pk	32.5	-30.6	-95.2	-52.37	-13	-39.37	H

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9.2.5. 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.

QPSK LTE BAND 13 (10.0MHZ BANDWIDTH)

Project #:	13259315
Date:	4/16/2020
Test Engineer:	10641
Configuration:	EUT Only
Mode	LTE Band 13 QPSK 10MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T348 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	Margin (dB)	Polarity
Mid Channel, 782MHz									
1.56331	42.38	Pk	28	-33	-95.2	-57.82	-40	-17.82	V
1.56492	42.09	Pk	28	-33	-95.2	-58.11	-40	-18.11	H
2.34539	41.38	Pk	31.9	-31.9	-95.2	-53.82	-13	-40.82	H
2.34667	41.19	Pk	31.9	-31.9	-95.2	-54.01	-13	-41.01	V
3.12683	41.02	Pk	33.1	-31	-95.2	-52.08	-13	-39.08	H
3.13025	40.46	Pk	33.1	-31	-95.2	-52.64	-13	-39.64	V

*** Emissions in the GPS band were wideband emissions therefore the -40dBm/MHz limit was used.**

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9.2.6. LTE BAND 14

LIMITS

FCC: §90.543 Emission Limitations. (Band 14)
(e) For operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

(f) For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics 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. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation

QPSK LTE BAND 14 (10.0MHZ BANDWIDTH)

Project #:	13259315
Date:	4/22/2020
Test Engineer:	20792
Configuration:	EUT Only
Mode	LTE Band 14 QPSK 10MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T348 (dB/m)	Amp/Cbl (dB)	Amp/Cbl (dB)	Corrected Reading (dBm)	Harmonics limit	Margin (dB)	Polarity
Mid Channel, 793MHz									
1.58477	42.73	Pk	28.1	-32.9	-95.2	-57.27	-40	-17.27	V
1.58647	42.22	Pk	28.1	-32.9	-95.2	-57.78	-40	-17.78	H
2.3782	41.33	Pk	32.2	-31.8	-95.2	-53.47	-13	-40.47	V
2.37849	42.85	Pk	32.2	-31.8	-95.2	-51.95	-13	-38.95	H
3.17094	40.81	Pk	32.9	-30.9	-95.2	-52.39	-13	-39.39	H
3.17276	40.76	Pk	32.9	-30.9	-95.2	-52.44	-13	-39.44	V

*** Emissions in the GPS band were wideband emissions therefore the -40dBm/MHz limit was used.**

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9.2.7. LTE BAND 17

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.

QPSK LTE BAND 17 (10.0MHZ BANDWIDTH)

Project #:	13259315
Date:	4/16/2020
Test Engineer:	10641
Configuration:	EUT Only
Mode	LTE Band 17 QPSK 10MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T348 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	Margin (dB)	Polarity
Mid Channel, 710MHz									
1.41987	43.08	Pk	28.6	-33	-95.2	-56.52	-13	-43.52	H
1.42229	42.41	Pk	28.6	-33	-95.2	-57.19	-13	-44.19	V
2.13053	41.14	Pk	31.7	-32.2	-95.2	-54.56	-13	-41.56	H
2.1315	41.22	Pk	31.7	-32.1	-95.2	-54.38	-13	-41.38	V
2.83939	40.52	Pk	32.4	-31.1	-95.2	-53.38	-13	-40.38	H
2.84111	40.86	Pk	32.4	-31.1	-95.2	-53.04	-13	-40.04	V

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9.2.8. LTE BAND 25

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.

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QPSK LTE BAND 25 (20.0MHZ BANDWIDTH)

Project #:	13259315
Date:	4/15/2020
Test Engineer:	10641
Configuration:	EUT Only
Mode	LTE Band 25 QPSK 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T348 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	PK Margin (dB)	Polarity
Low Channel, 1860MHz									
3.7207	40.83	Pk	33.3	-29.9	-95.2	-50.97	-13	-37.97	H
3.72115	33.23	Pk	33.3	-29.9	-95.2	-58.57	-13	-45.57	V
5.57804	38.66	Pk	34.9	-28	-95.2	-49.64	-13	-36.64	V
5.582	38.47	Pk	34.9	-28	-95.2	-49.83	-13	-36.83	H
7.44006	36.25	Pk	35.8	-24.9	-95.2	-48.05	-13	-35.05	H
7.44138	35.43	Pk	35.7	-24.8	-95.2	-48.87	-13	-35.87	V
Mid Channel, 1882.5MHz									
3.76256	40.44	Pk	33.6	-30.1	-95.2	-51.26	-13	-38.26	V
3.76456	40.24	Pk	33.6	-30.1	-95.2	-51.46	-13	-38.46	H
5.64559	38.84	Pk	34.9	-28	-95.2	-49.46	-13	-36.46	V
5.6458	38.19	Pk	34.9	-28	-95.2	-50.11	-13	-37.11	H
7.52947	36.02	Pk	35.8	-24.5	-95.2	-47.88	-13	-34.88	V
7.53025	35.71	Pk	35.8	-24.5	-95.2	-48.19	-13	-35.19	H
High Channel, 1905MHz									
3.80932	40.5	Pk	33.7	-30.2	-95.2	-51.2	-13	-38.2	H
3.81135	40.88	Pk	33.7	-30.2	-95.2	-50.82	-13	-37.82	V
5.71312	39.07	Pk	34.9	-28.2	-95.2	-49.43	-13	-36.43	H
5.71671	39.22	Pk	35	-28.2	-95.2	-49.18	-13	-36.18	V
7.61724	36.48	Pk	35.7	-24.3	-95.2	-47.32	-13	-34.32	V
7.62176	35.93	Pk	35.8	-24.2	-95.2	-47.67	-13	-34.67	H

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9.2.9. LTE BAND 26 (PART 90S)

LIMITS

FCC: §90.691
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.

QPSK LTE BAND 26 (10.0MHZ BANDWIDTH)

Project #:	13259315
Date:	4/14/2020
Test Engineer:	10641
Configuration:	EUT Only
Mode	LTE Band 26 QPSK 10MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T348 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	Margin (dB)	Polarity
Mid Channel, 819MHz									
1.63768	41.59	Pk	28.5	-32.8	-95.2	-57.91	-13	-44.91	V
1.63781	41.69	Pk	28.5	-32.8	-95.2	-57.81	-13	-44.81	H
2.4564	42.5	Pk	32.5	-31.9	-95.2	-52.1	-13	-39.1	V
2.45688	43.63	Pk	32.5	-31.9	-95.2	-50.97	-13	-37.97	H
3.27545	40.52	Pk	32.9	-30.8	-95.2	-52.58	-13	-39.58	V
3.27698	40.21	Pk	32.9	-30.8	-95.2	-52.89	-13	-39.89	H

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9.2.10. LTE BAND 30

LIMITS

FCC: §27.53 (a)
For mobile and portable stations operating in the 2305-2315 MHz: by a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

QPSK LTE BAND 30 (10.0MHZ BANDWIDTH)

Project #:	13259315
Date:	5/22/2020
Test Engineer:	20792
Configuration:	EUT Only
Mode	LTE Band 30 QPSK 10MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	Margin (dB)	Polarity
Mid Channel, 2310MHz									
4.8567	38.81	Pk	34.2	-29.4	-95.2	-51.59	-40	-11.59	V
4.86618	39.29	Pk	34.1	-29.3	-95.2	-51.11	-40	-11.11	H
6.87778	35.7	Pk	35.9	-25.1	-95.2	-48.7	-40	-8.7	V
6.93215	35.61	Pk	36	-25.5	-95.2	-49.09	-40	-9.09	H
8.51191	35.29	Pk	36	-23.6	-95.2	-47.51	-40	-7.51	H
9.4512	34.52	Pk	36.5	-22.4	-95.2	-46.58	-40	-6.58	V

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9.2.11. LTE BAND 41 and 5G NR Band n41

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.

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QPSK LTE BAND 41 (20.0MHZ BANDWIDTH)

Project #:	13259315
Date:	4/15/2020
Test Engineer:	10641
Configuration:	EUT Only
Mode	LTE Band 41 QPSK 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T348 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	PK Margin (dB)	Polarity
Low Channel, 2506MHz									
5.01061	38.87	Pk	34.3	-29.1	-95.2	-51.13	-25	-26.13	H
5.0112	38.81	Pk	34.3	-29.1	-95.2	-51.19	-25	-26.19	V
7.51729	35.72	Pk	35.7	-24.4	-95.2	-48.18	-25	-23.18	V
7.51761	37.95	Pk	35.7	-24.4	-95.2	-45.95	-25	-20.95	H
10.0225	34.23	Pk	37.1	-22	-95.2	-45.87	-25	-20.87	V
10.02369	34.09	Pk	37.1	-22	-95.2	-46.01	-25	-21.01	H
Mid Channel, 2593MHz									
5.18537	38.49	Pk	34.6	-28.5	-95.2	-50.61	-25	-25.61	H
5.18773	38.6	Pk	34.6	-28.5	-95.2	-50.5	-25	-25.5	V
7.77771	35.51	Pk	35.9	-24.4	-95.2	-48.19	-25	-23.19	V
7.78011	36.2	Pk	35.8	-24.4	-95.2	-47.6	-25	-22.6	H
10.37125	33.65	Pk	37.4	-21.3	-95.2	-45.45	-25	-20.45	H
10.37246	33.42	Pk	37.4	-21.3	-95.2	-45.68	-25	-20.68	V
High Channel, 2680MHz									
5.36017	38.51	Pk	35	-28.8	-95.2	-50.49	-25	-25.49	H
5.36152	38.72	Pk	35	-28.8	-95.2	-50.28	-25	-25.28	V
8.04063	36.14	Pk	35.8	-23.8	-95.2	-47.06	-25	-22.06	H
8.04099	36.31	Pk	35.8	-23.8	-95.2	-46.89	-25	-21.89	V
10.71904	35.6	Pk	37.9	-21.4	-95.2	-43.1	-25	-18.1	V
10.72111	34.94	Pk	37.9	-21.4	-95.2	-43.76	-25	-18.76	H

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QPSK 5G NR Band n41 (100.0MHZ BANDWIDTH)

Project #:	13259315
Date:	7/17/2020
Test Engineer:	19169
Configuration:	EUT Only
Mode	5G NR Band n41 QPSK 100MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T348 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	PK Margin (dB)	Polarity
Low Channel, 2546MHz									
4.99013	39.14	Pk	34.1	-28.4	-95.2	-50.36	-25	-25.36	H
4.99239	39.39	Pk	34.1	-28.4	-95.2	-50.11	-25	-25.11	V
7.48763	37.3	Pk	36	-23.8	-95.2	-45.7	-25	-20.7	V
7.4893	36.58	Pk	36	-23.8	-95.2	-46.42	-25	-21.42	H
9.98269	35.11	Pk	37.2	-20.9	-95.2	-43.79	-25	-18.79	V
9.9828	35.42	Pk	37.2	-20.9	-95.2	-43.48	-25	-18.48	H
Mid Channel, 2593MHz									
5.18578	39.48	Pk	34.6	-27.7	-95.2	-48.82	-25	-23.82	H
5.18799	38.85	Pk	34.6	-27.7	-95.2	-49.45	-25	-24.45	V
7.77832	36.2	Pk	35.9	-23.4	-95.2	-46.5	-25	-21.5	V
7.78083	36.18	Pk	35.9	-23.4	-95.2	-46.52	-25	-21.52	H
10.37314	34.74	Pk	37.7	-20.2	-95.2	-42.96	-25	-17.96	V
10.3735	34.68	Pk	37.7	-20.2	-95.2	-43.02	-25	-18.02	H
High Channel, 2640MHz									
5.37908	38.69	Pk	34.8	-27.8	-95.2	-49.51	-25	-24.51	V
5.37948	38.48	Pk	34.8	-27.8	-95.2	-49.72	-25	-24.72	H
8.06832	36.26	Pk	36.2	-23.2	-95.2	-45.94	-25	-20.94	H
8.06964	36.06	Pk	36.2	-23.2	-95.2	-46.14	-25	-21.14	V
10.7604	35.6	Pk	37.8	-20.2	-95.2	-42	-25	-17	V
10.76075	35.77	Pk	37.8	-20.2	-95.2	-41.83	-25	-16.83	H

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9.2.12. 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.

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QPSK LTE BAND 66 (20.0MHZ BANDWIDTH)

Project #:	13179115
Date:	5/15/2020
Test Engineer:	10641
Configuration:	EUT Only
Mode	LTE Band 66 QPSK 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	PK Margin (dB)	Polarity
Low Channel, 1720MHz									
3.4387	39.83	Pk	32.8	-30.4	-95.2	-52.97	-13	-39.97	H
3.44112	39.79	Pk	32.8	-30.4	-95.2	-53.01	-13	-40.01	V
5.16076	38.1	Pk	34.5	-28.6	-95.2	-51.2	-13	-38.2	H
5.16181	38.98	Pk	34.5	-28.6	-95.2	-50.32	-13	-37.32	V
6.87942	36.87	Pk	35.9	-25.1	-95.2	-47.53	-13	-34.53	H
6.88071	36.18	Pk	35.9	-25.1	-95.2	-48.22	-13	-35.22	V
Mid Channel, 1745MHz									
3.49015	-67.05	Pk	33.1	-30.1	12	-52.05	-13	-39.05	86
3.49086	-66.83	Pk	33.1	-30.1	11.7	-52.13	-13	-39.13	187
5.2346	-68.92	Pk	34.7	-28.9	11.4	-51.72	-13	-38.72	196
5.23565	-68.6	Pk	34.7	-28.9	11.3	-51.5	-13	-38.5	136
6.97862	-70.03	Pk	36	-25.5	10	-49.53	-13	-36.53	161
6.98145	-70.94	Pk	36	-25.5	10.6	-49.84	-13	-36.84	256
High Channel, 1770MHz									
3.54013	-66.96	Pk	33.2	-30.4	11.4	-52.76	-13	-39.76	228
3.54192	-66.81	Pk	33.1	-30.4	11.2	-52.91	-13	-39.91	99
5.30772	-68.2	Pk	35	-28.9	10.8	-51.3	-13	-38.3	112
5.30988	-67.69	Pk	35	-28.9	10.8	-50.79	-13	-37.79	238
7.07899	-70.41	Pk	36	-25.2	10.7	-48.91	-13	-35.91	203
7.07959	-71.2	Pk	36	-25.2	10.8	-49.6	-13	-36.6	223

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9.2.13. 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.

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QPSK LTE BAND 71 (20.0MHZ BANDWIDTH)

Project #:	13179115
Date:	5/16/2020
Test Engineer:	10641
Configuration:	EUT Only
Mode	LTE Band 71 QPSK 20MHz
Chamber #:	Chamber A

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T862 (dB/m)	Amp/Cbl (dB)	EIRP CF	Corrected Reading (dBm)	Harmonics limit	PK Margin (dB)	Polarity
Low Channel, 673.0MHz									
1.3449	41.23	Pk	29.3	-33.2	-95.2	-57.87	-13	-44.87	H
1.34493	41.67	Pk	29.3	-33.2	-95.2	-57.43	-13	-44.43	V
2.01809	41.24	Pk	31.6	-32.4	-95.2	-54.76	-13	-41.76	H
2.02011	41.26	Pk	31.6	-32.4	-95.2	-54.74	-13	-41.74	V
2.69206	41.2	Pk	32.4	-31.6	-95.2	-53.2	-13	-40.2	V
2.69333	41.25	Pk	32.4	-31.6	-95.2	-53.15	-13	-40.15	H
Mid Channel, 680.5MHz									
1.36076	-65.18	Pk	29.5	-33.1	10.9	-57.88	-13	-44.88	99
1.36216	-64.96	Pk	29.6	-33.1	10.2	-58.26	-13	-45.26	145
2.03979	-65.89	Pk	31.6	-32.3	11.5	-55.09	-13	-42.09	147
2.04016	-65.59	Pk	31.6	-32.3	11.5	-54.79	-13	-41.79	201
2.72214	-66.05	Pk	32.4	-31.5	11.2	-53.95	-13	-40.95	234
2.72365	-66.65	Pk	32.4	-31.4	11.2	-54.45	-13	-41.45	216
High Channel, 688.0MHz									
1.37474	-64.41	Pk	29.3	-33.2	10.6	-57.71	-13	-44.71	296
1.37515	-65.29	Pk	29.3	-33.2	9.9	-59.29	-13	-46.29	197
2.16382	-65.08	Pk	31.5	-31.9	11.7	-53.78	-13	-40.78	184
2.16425	-66.49	Pk	31.5	-31.9	10.9	-55.99	-13	-42.99	258
2.75164	-66.16	Pk	32.4	-31.4	11.8	-53.36	-13	-40.36	212
2.75168	-66.04	Pk	32.4	-31.4	12.6	-52.44	-13	-39.44	188

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9.3. FIELD STRENGTH OF SPURIOUS RADIATION, ANT2

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

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9.3.1. 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.

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