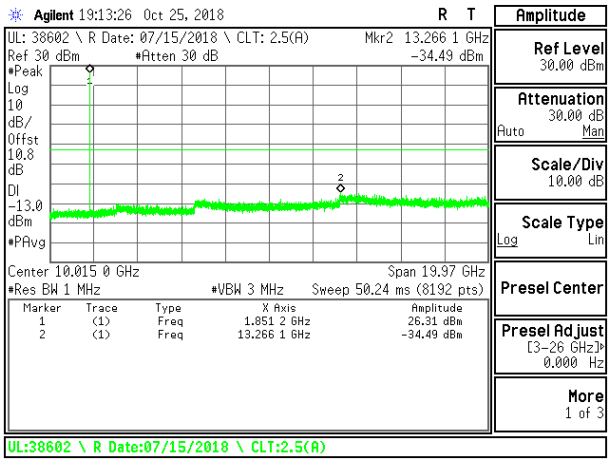
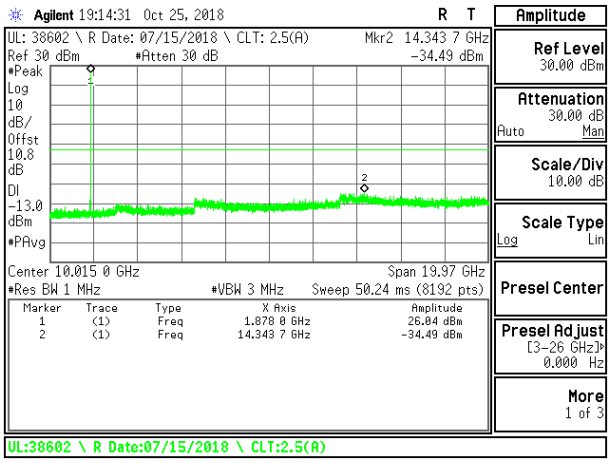


LTE B2 5MHz QPSK Low Channel RB1-0



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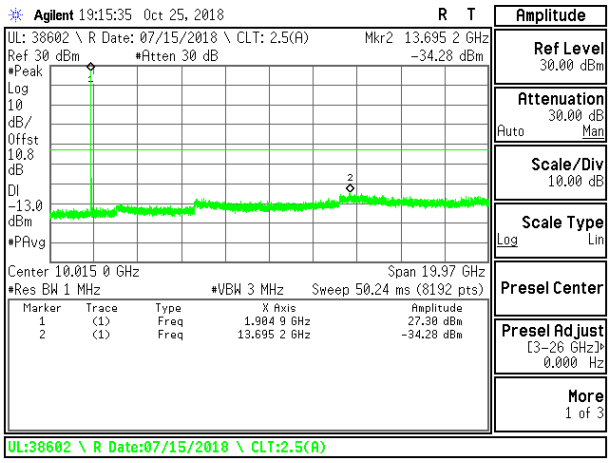

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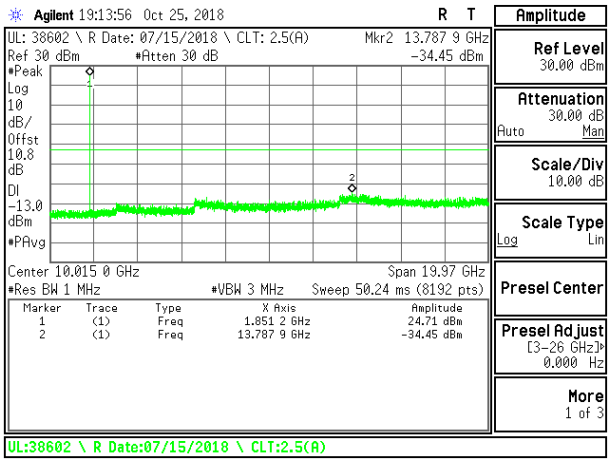
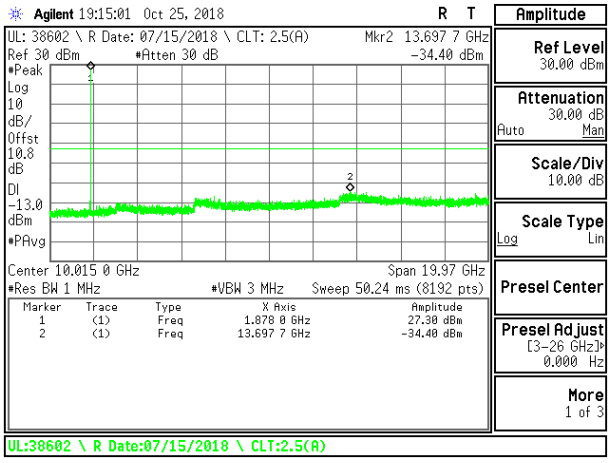
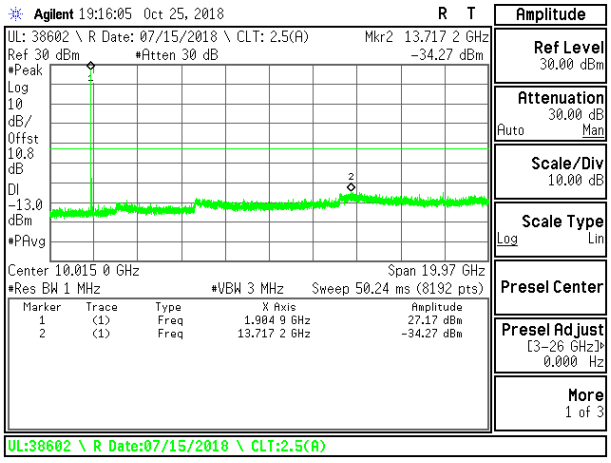


LTE B2 5MHz 16QAM Low Channel RB1-0



LTE B2 5MHz 16QAM Mid Channel RB1-0



LTE B2 5MHz 16QAM High Channel RB1-0

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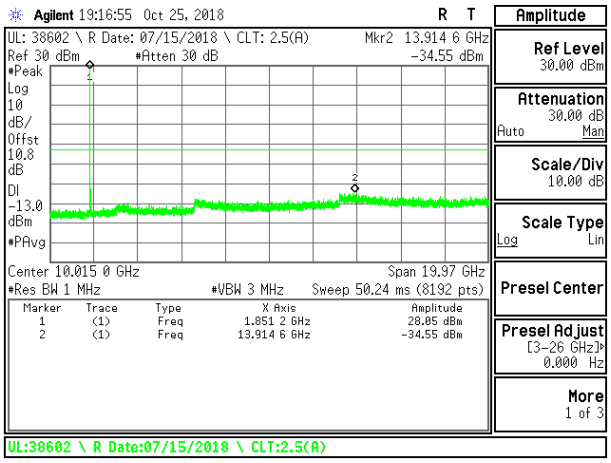
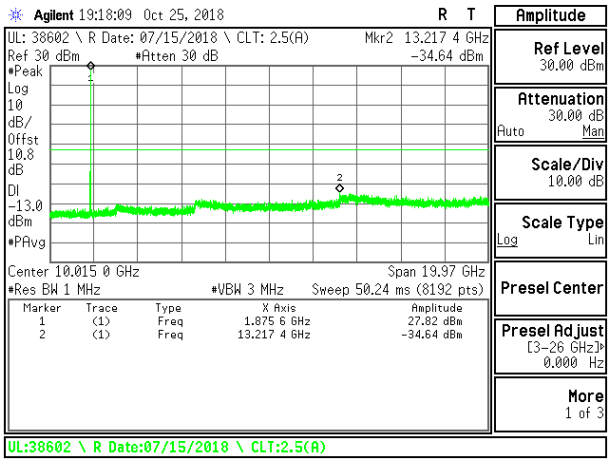


LTE B2 10MHz QPSK Low Channel RB1-0



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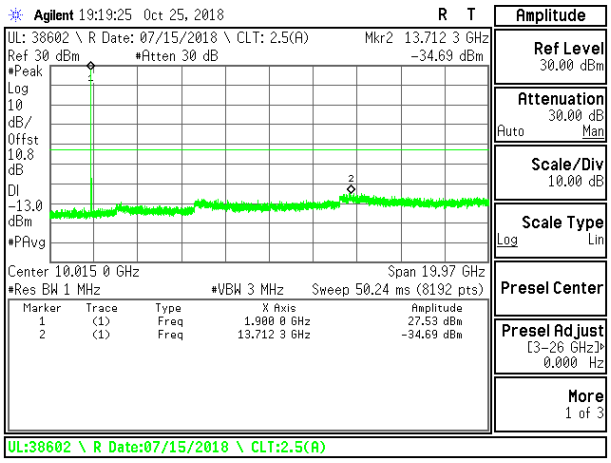

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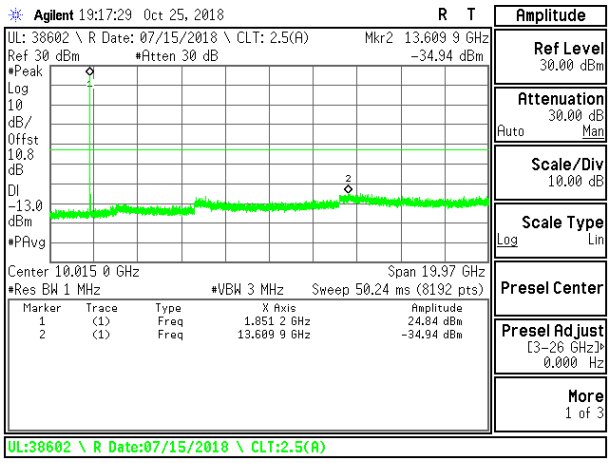

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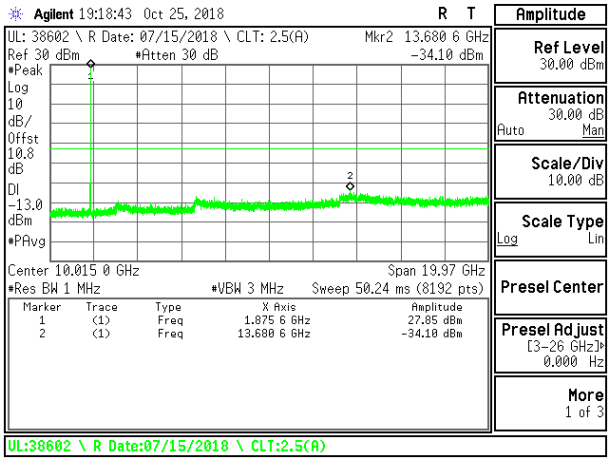
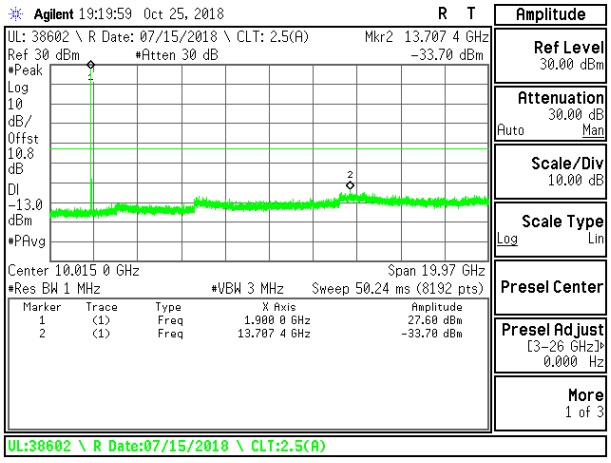


LTE B2 10MHz 16QAM Mid Channel RB1-0



LTE B2 10MHz 16QAM High Channel RB1-0

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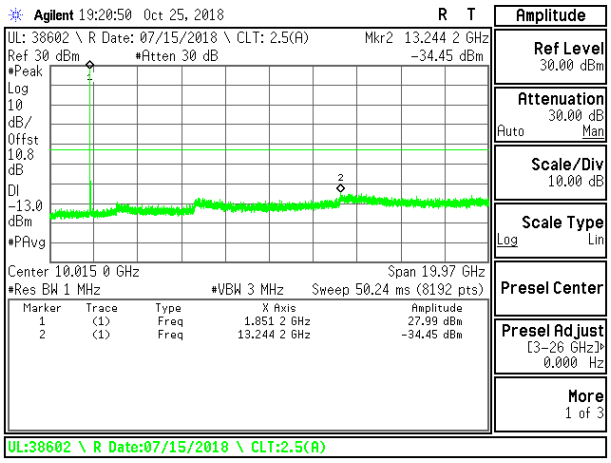
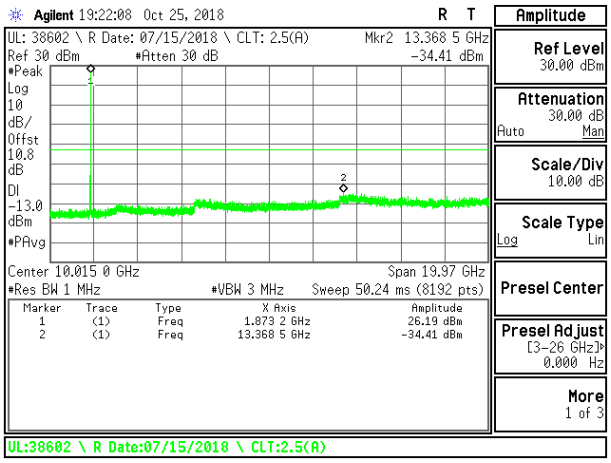
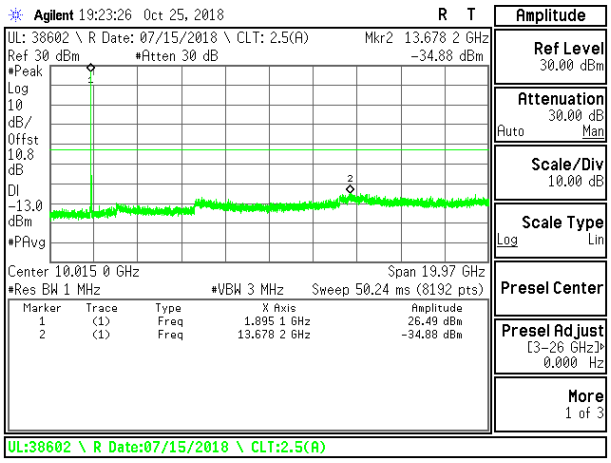


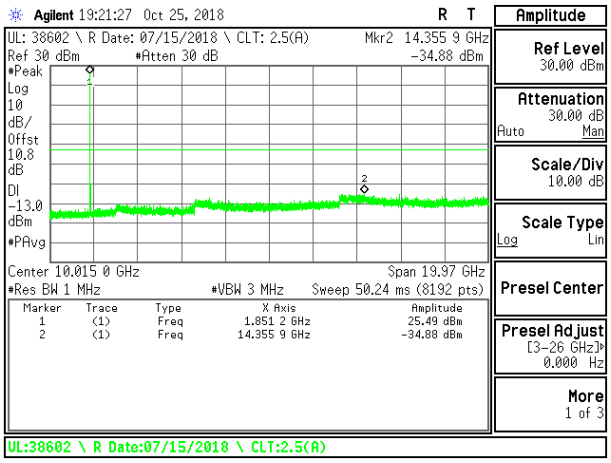
LTE B2 15MHz QPSK Low Channel RB1-0



LTE B2 15MHz QPSK Mid Channel RB1-0



LTE B2 15MHz QPSK High Channel RB1-0



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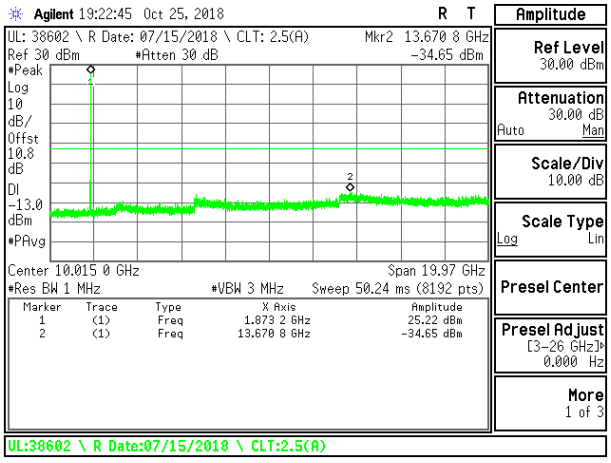
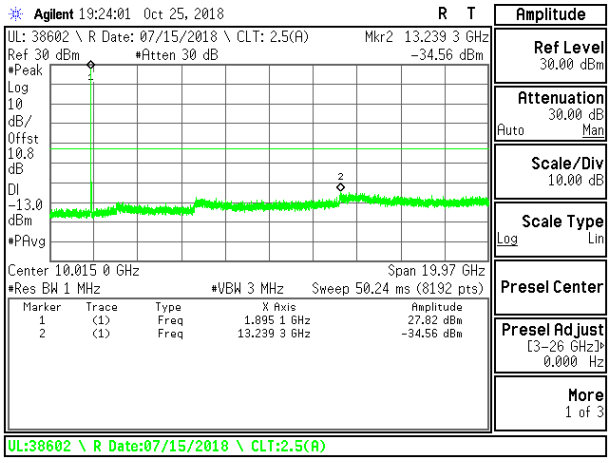


LTE B2 15MHz 16QAM Mid Channel RB1-0



LTE B2 15MHz 16QAM High Channel RB1-0

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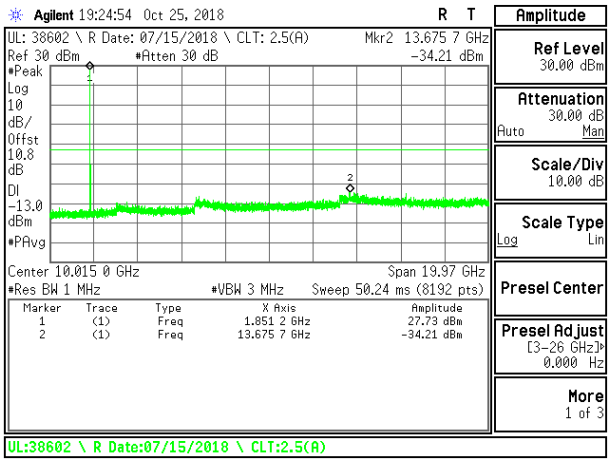
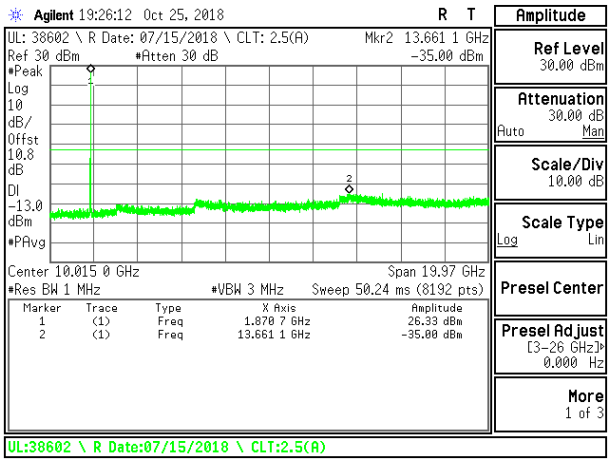


LTE B2 20MHz QPSK Low Channel RB1-0



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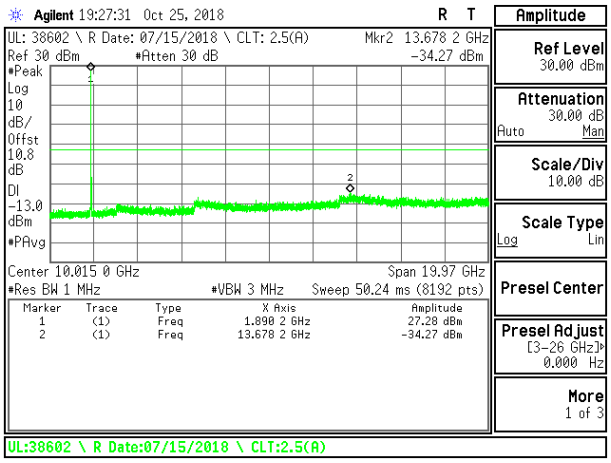

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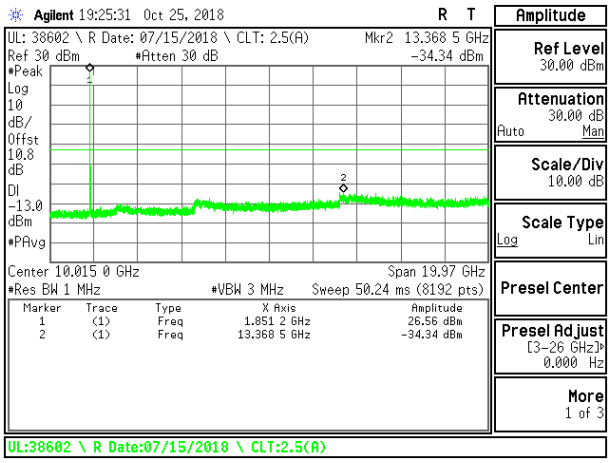

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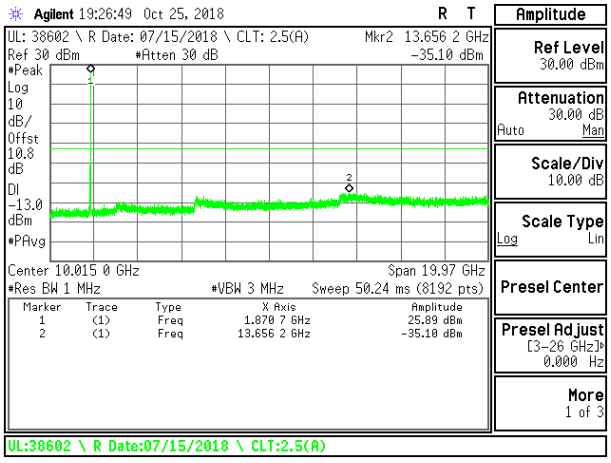
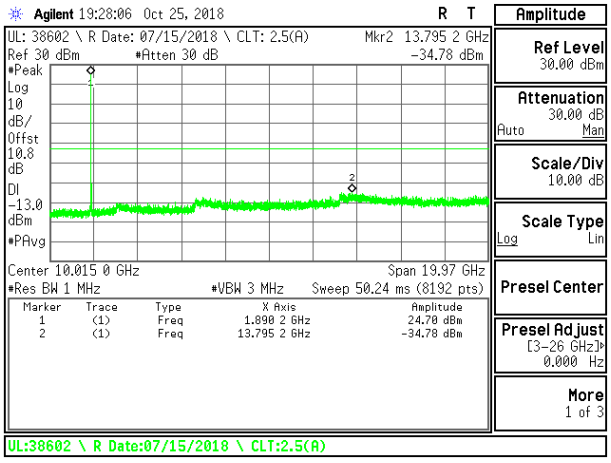


LTE B2 20MHz 16QAM Mid Channel RB1-0



LTE B2 20MHz 16QAM High Channel RB1-0

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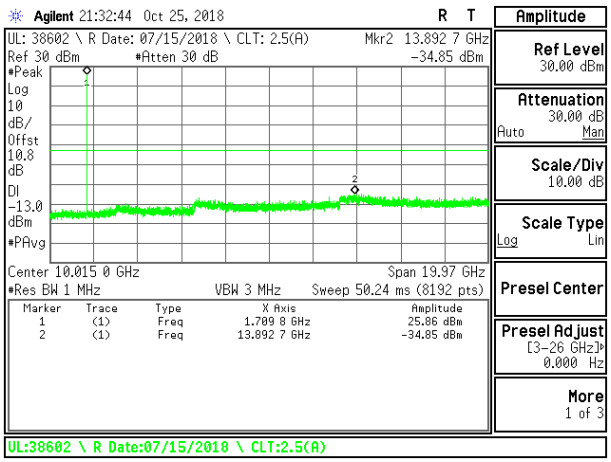
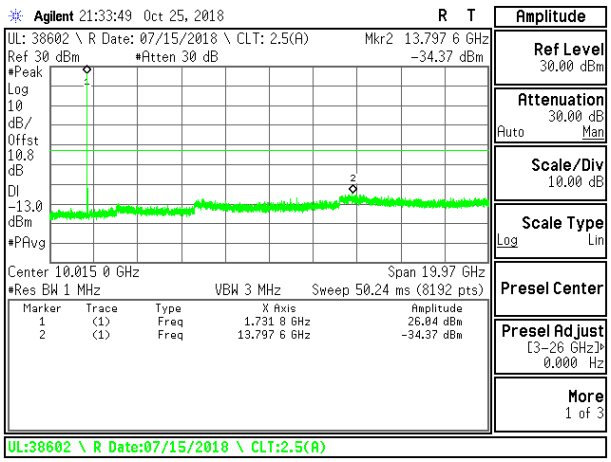
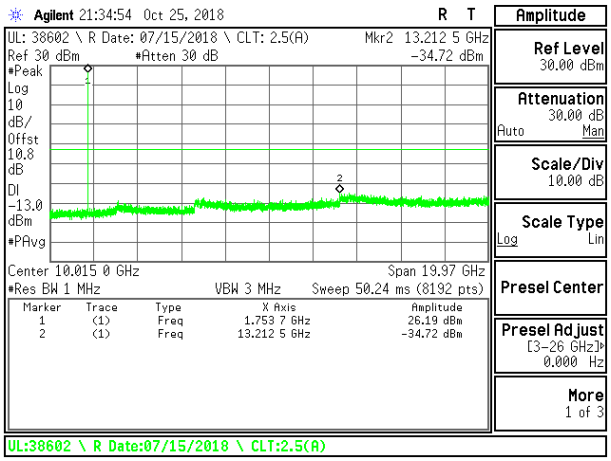
9.3.7. **LTE BAND 4**



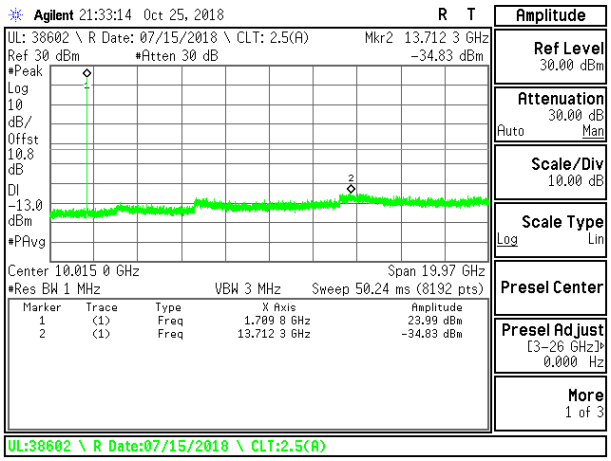
LTE B4 1.4MHz QPSK Low Channel RB1-0



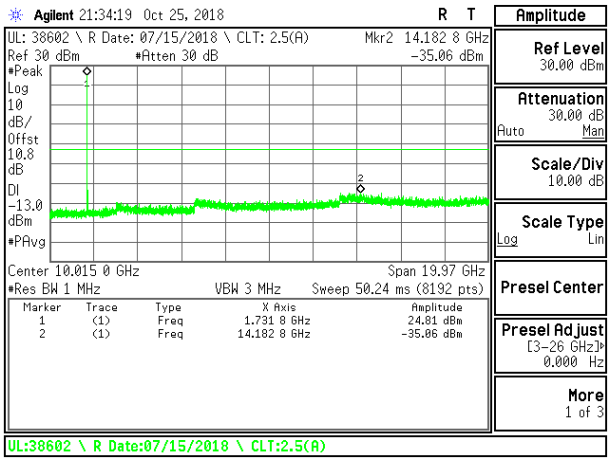
LTE B4 1.4MHz QPSK Mid Channel RB1-0



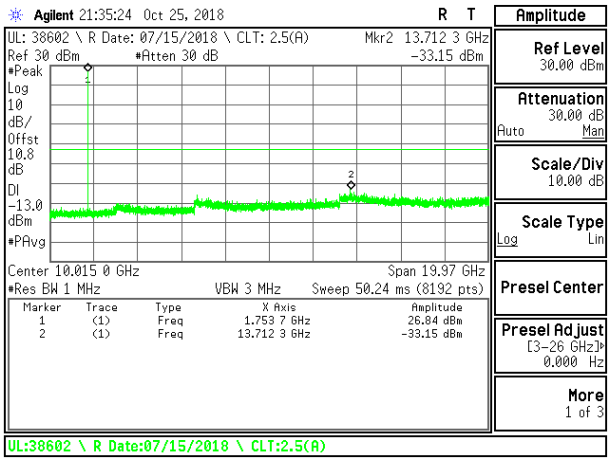
LTE B4 1.4MHz QPSK High Channel RB1-0



LTE B4 1.4MHz 16QAM Low Channel RB1-0



LTE B4 1.4MHz 16QAM Mid Channel RB1-0



LTE B4 1.4MHz 16QAM High Channel RB1-0

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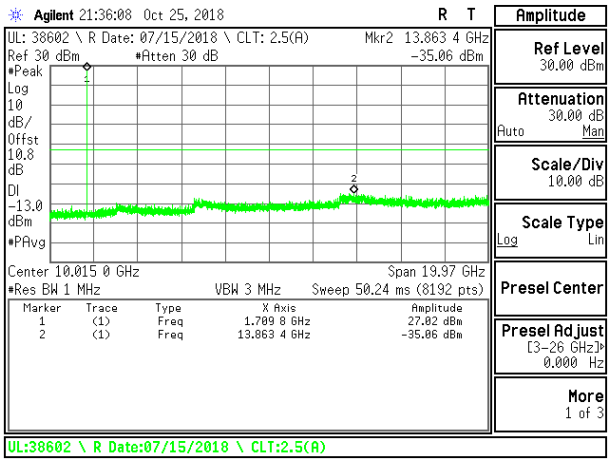
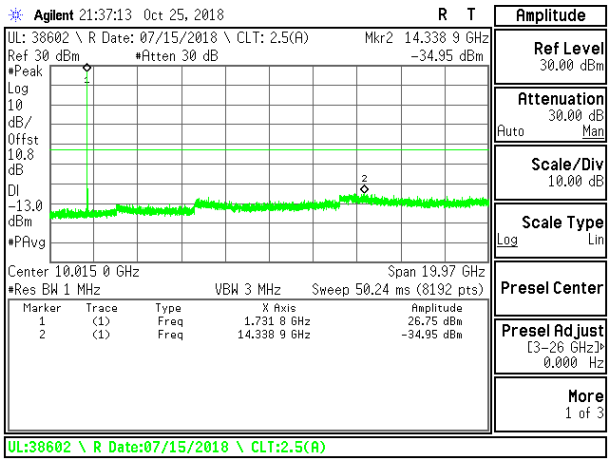
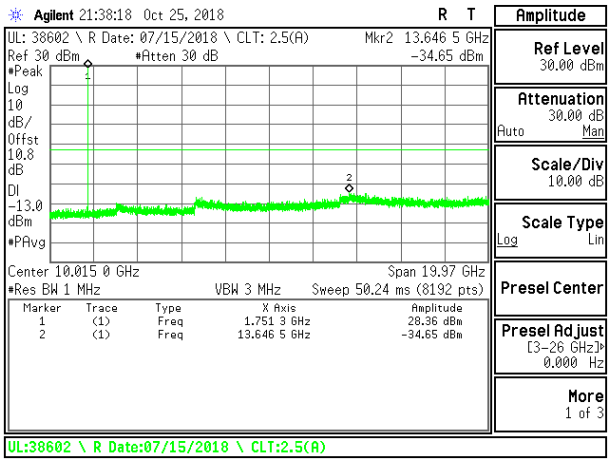


LTE B4 3MHz QPSK Low Channel RB1-0



LTE B4 3MHz QPSK Mid Channel RB1-0



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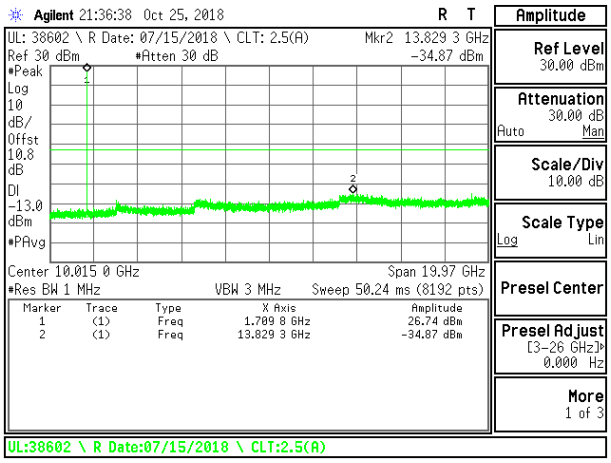
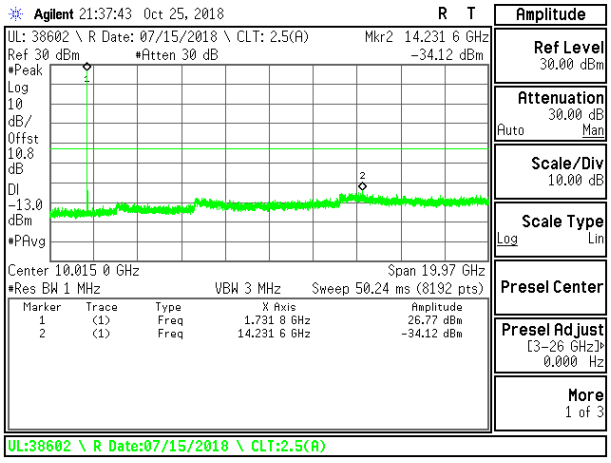
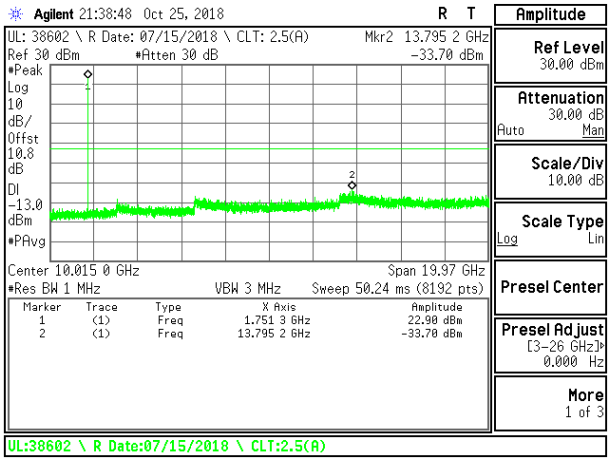


LTE B4 3MHz 16QAM Low Channel RB1-0



LTE B4 3MHz 16QAM Mid Channel RB1-0



LTE B4 3MHz 16QAM High Channel RB1-0

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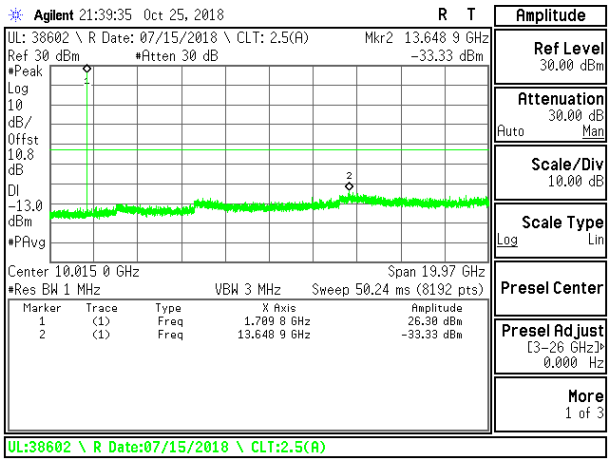
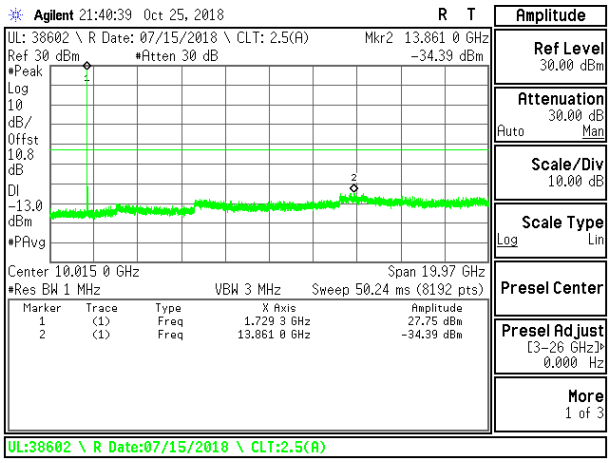
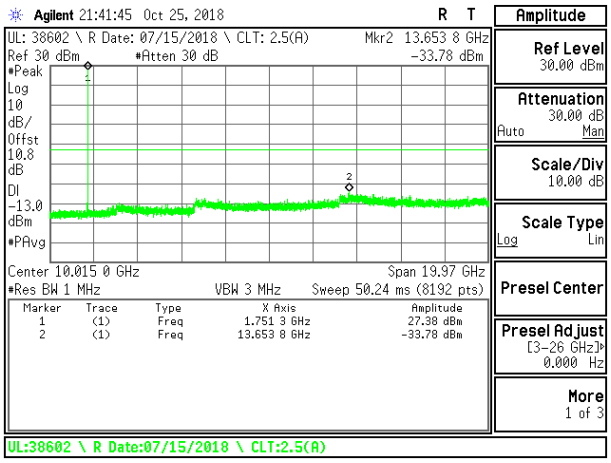


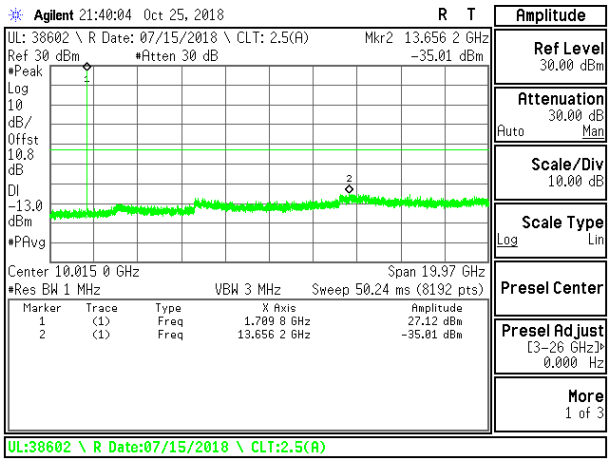
LTE B4 5MHz QPSK Low Channel RB1-0



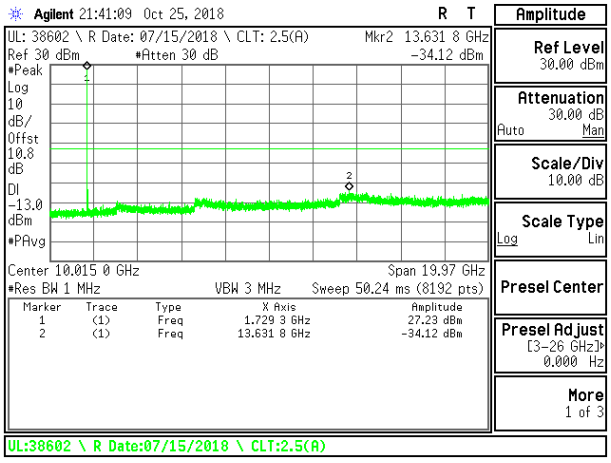
LTE B4 5MHz QPSK Mid Channel RB1-0



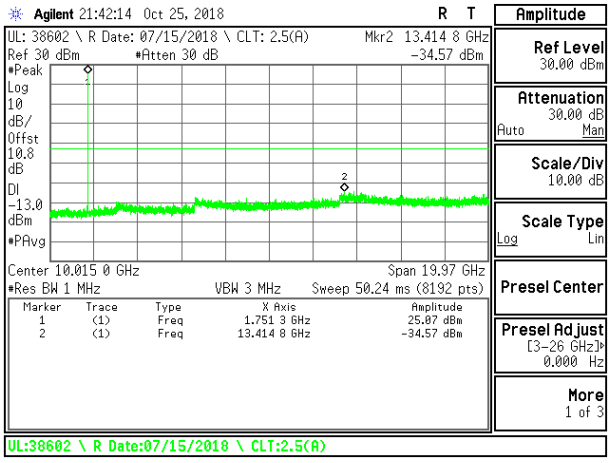
LTE B4 5MHz QPSK High Channel RB1-0



LTE B4 5MHz 16QAM Low Channel RB1-0



LTE B4 5MHz 16QAM Mid Channel RB1-0



LTE B4 5MHz 16QAM High Channel RB1-0

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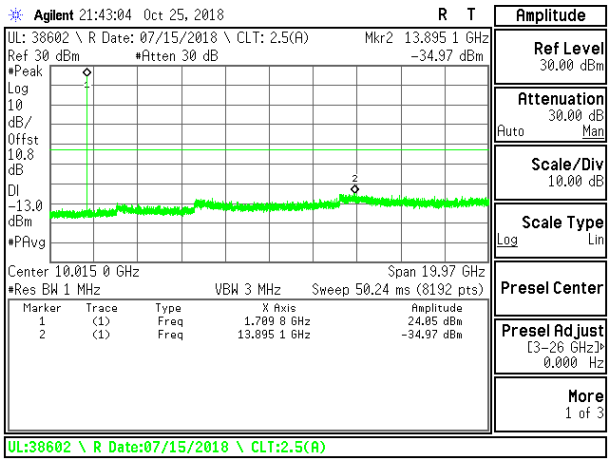
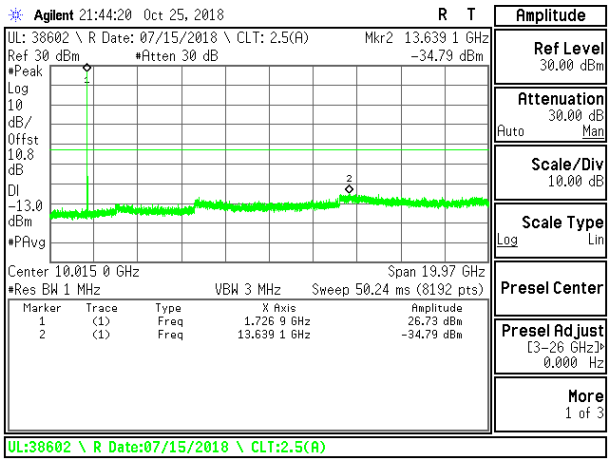
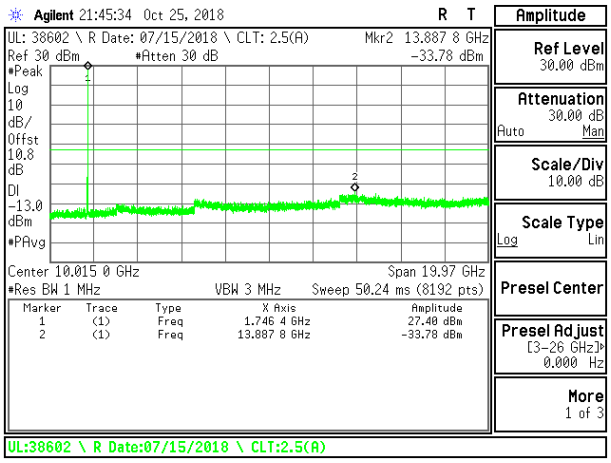


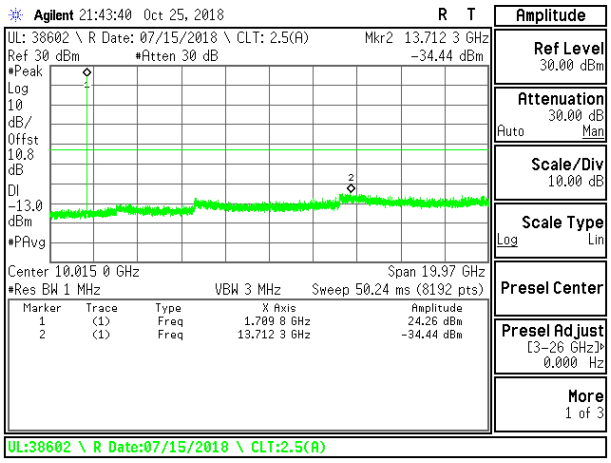
LTE B4 10MHz QPSK Low Channel RB1-0



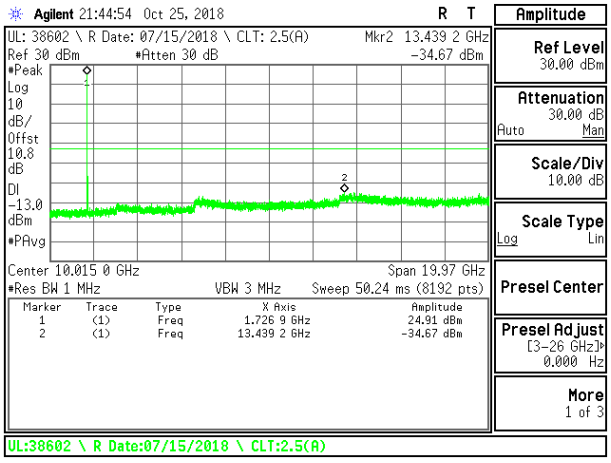
LTE B4 10MHz QPSK Mid Channel RB1-0



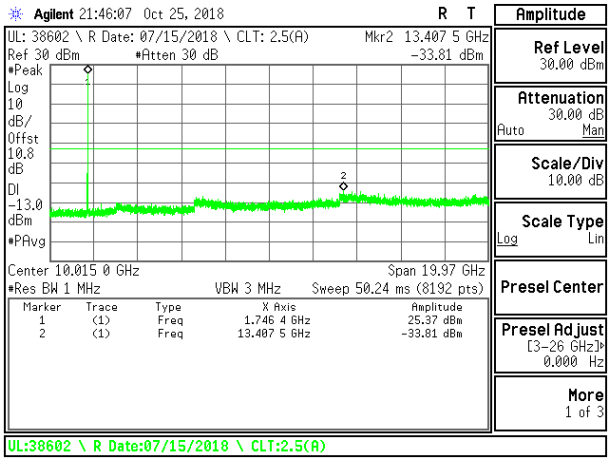
LTE B4 10MHz QPSK High Channel RB1-0



LTE B4 10MHz 16QAM Low Channel RB1-0



LTE B4 10MHz 16QAM Mid Channel RB1-0



LTE B4 10MHz 16QAM High Channel RB1-0

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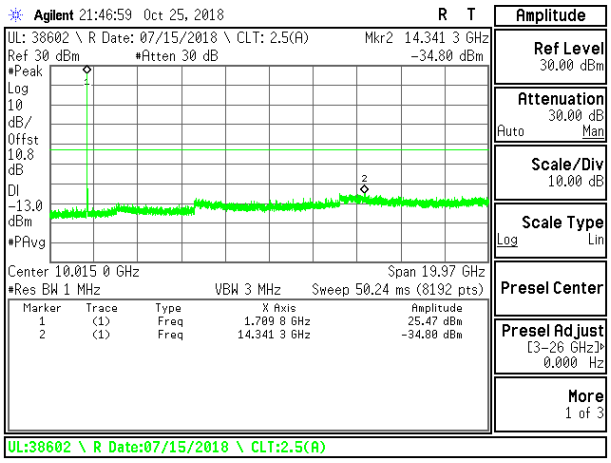
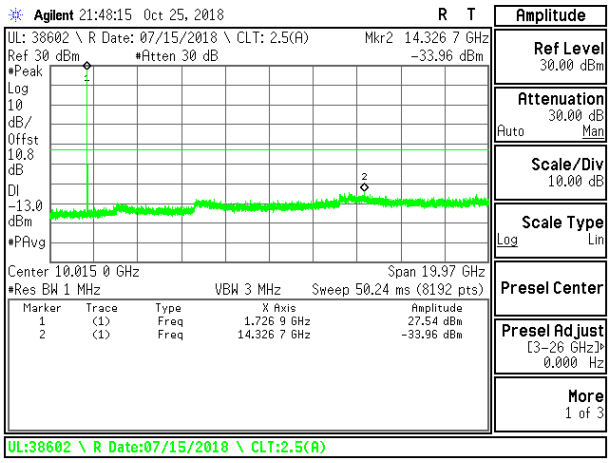
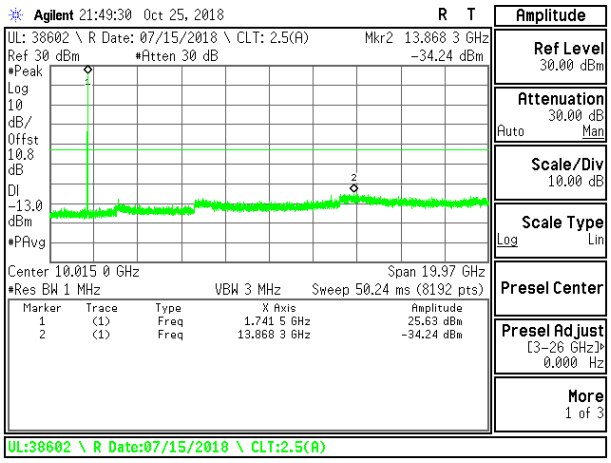


LTE B4 15MHz QPSK Low Channel RB1-0



LTE B4 15MHz QPSK Mid Channel RB1-0



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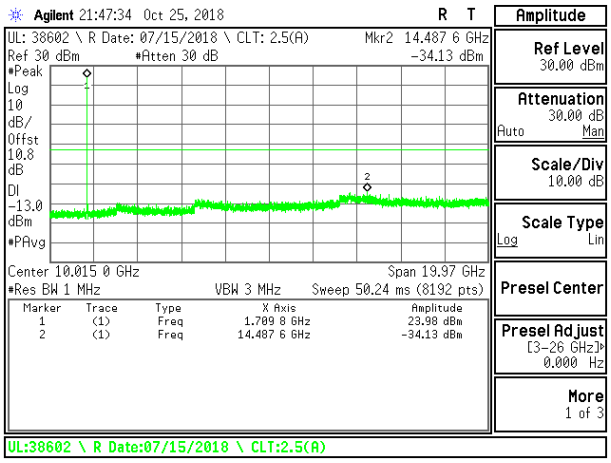
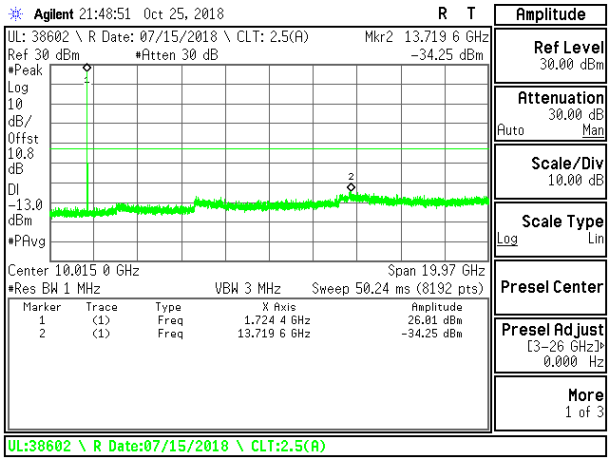
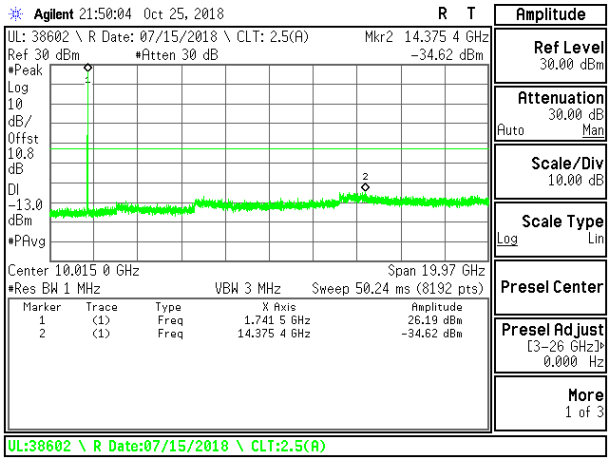


LTE B4 15MHz 16QAM Low Channel RB1-0



LTE B4 15MHz 16QAM Mid Channel RB1-0



LTE B4 15MHz 16QAM High Channel RB1-0

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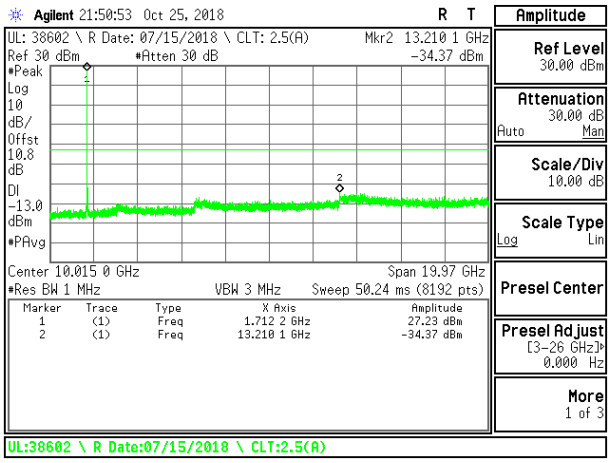
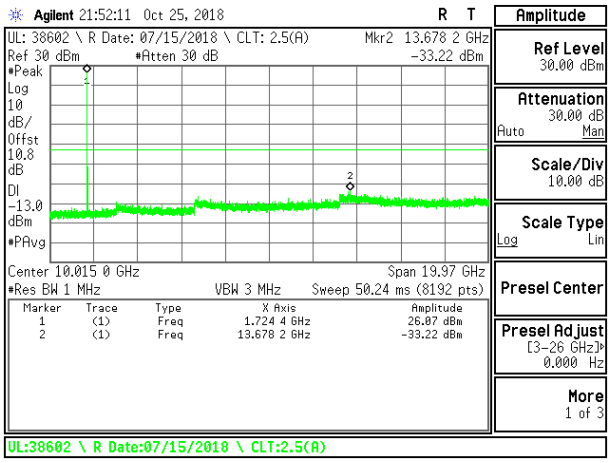


LTE B4 20MHz QPSK Low Channel RB1-0



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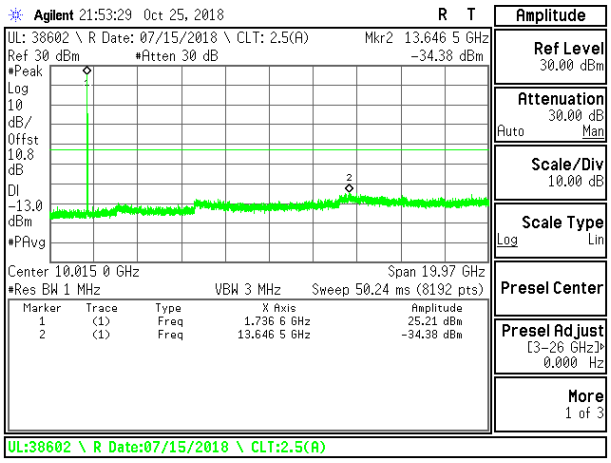

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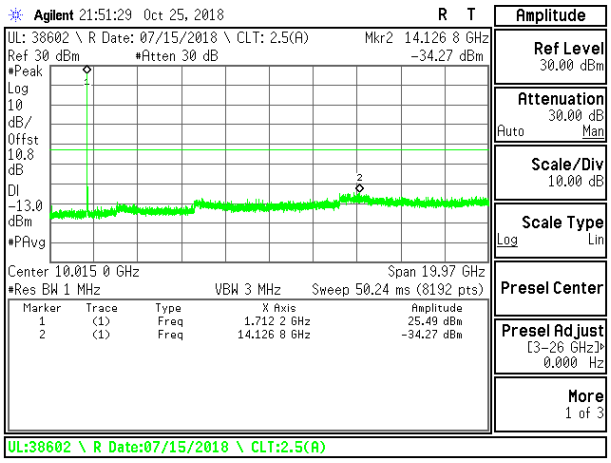
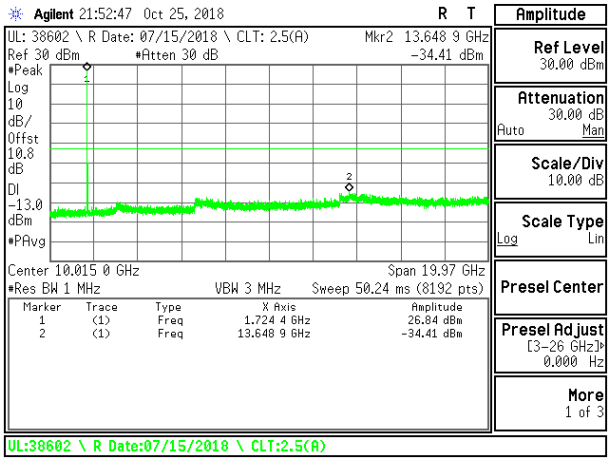
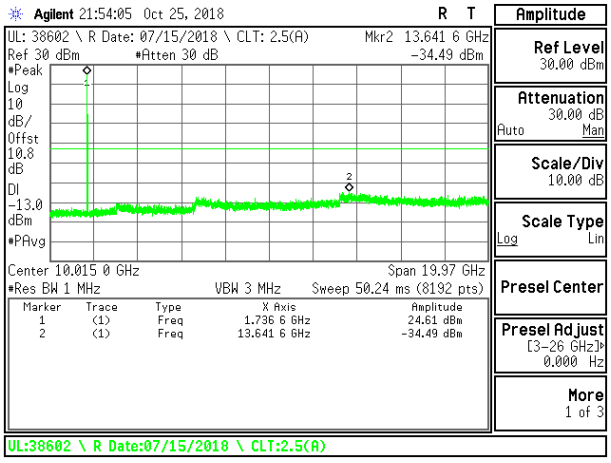


LTE B4 20MHz 16QAM Low Channel RB1-0



LTE B4 20MHz 16QAM Mid Channel RB1-0



LTE B4 20MHz 16QAM High Channel RB1-0

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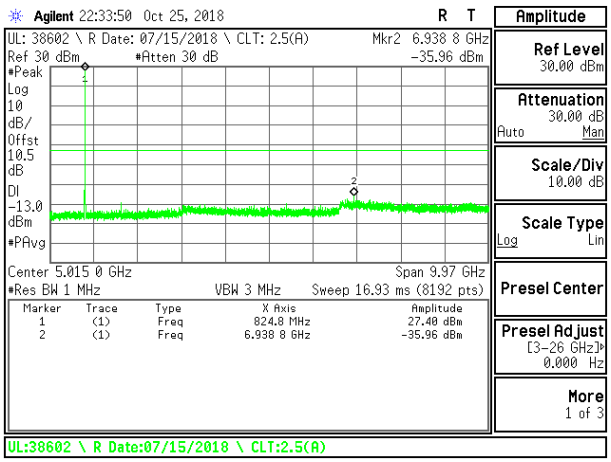
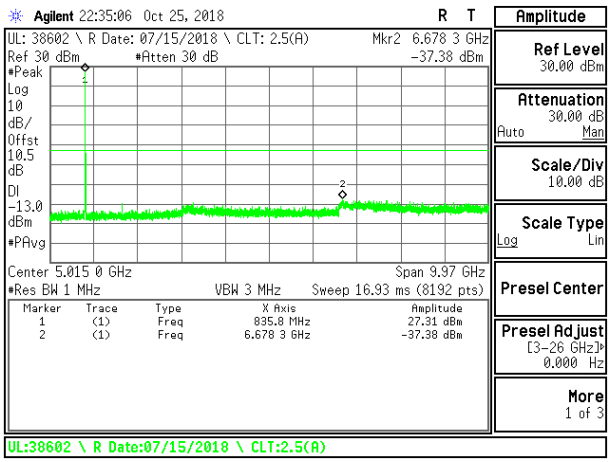
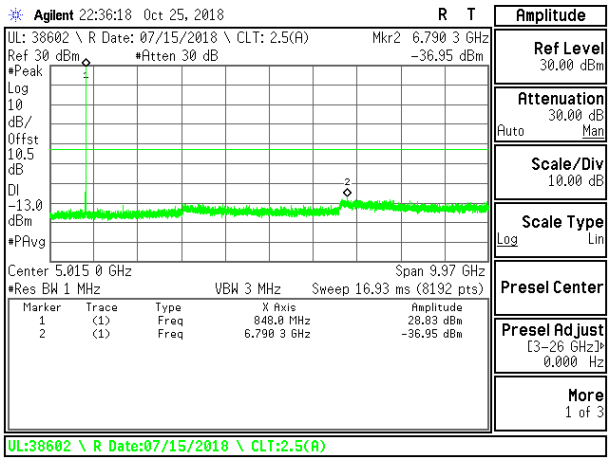
9.3.8. **LTE BAND 5**



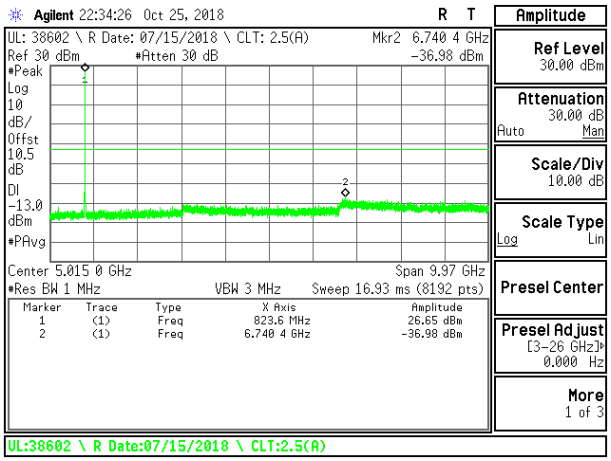
LTE B5 1.4MHz QPSK Low Channel RB1-0



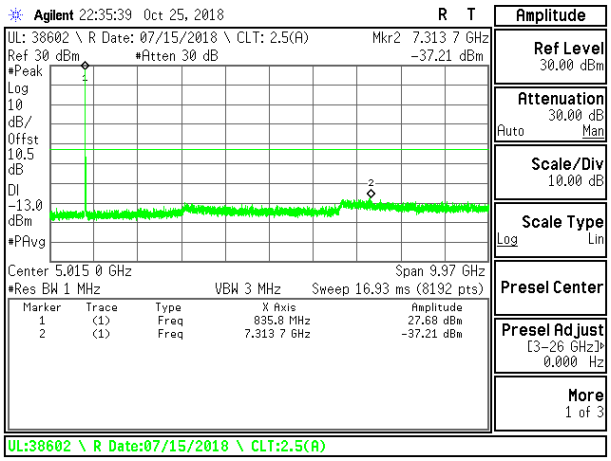
LTE B5 1.4MHz QPSK Mid Channel RB1-0



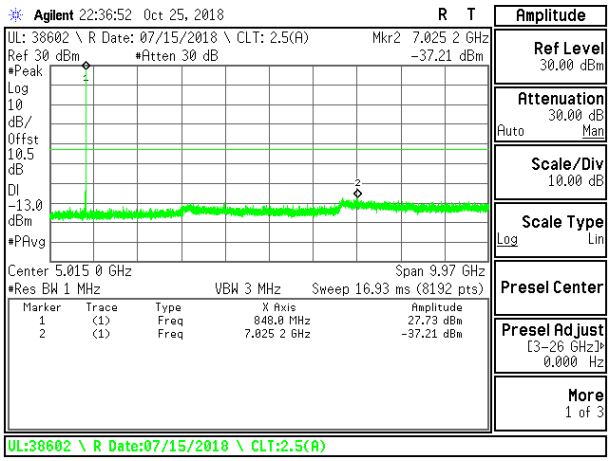
LTE B5 1.4MHz QPSK High Channel RB1-0



LTE B5 1.4MHz 16QAM Low Channel RB1-0



LTE B5 1.4MHz 16QAM Mid Channel RB1-0



LTE B5 1.4MHz 16QAM High Channel RB1-0

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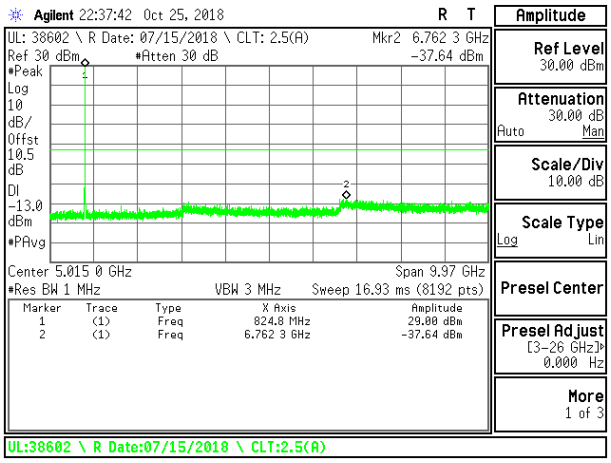
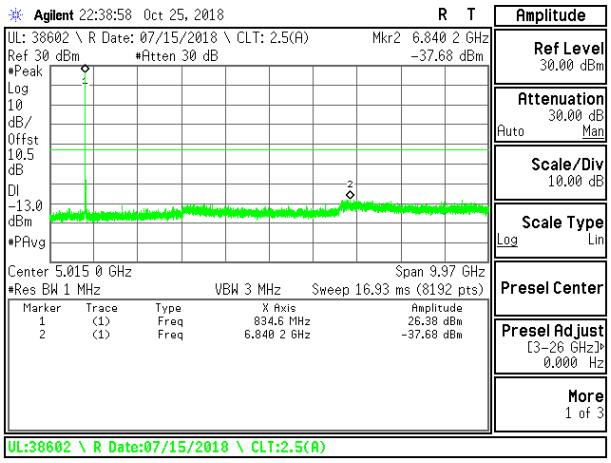
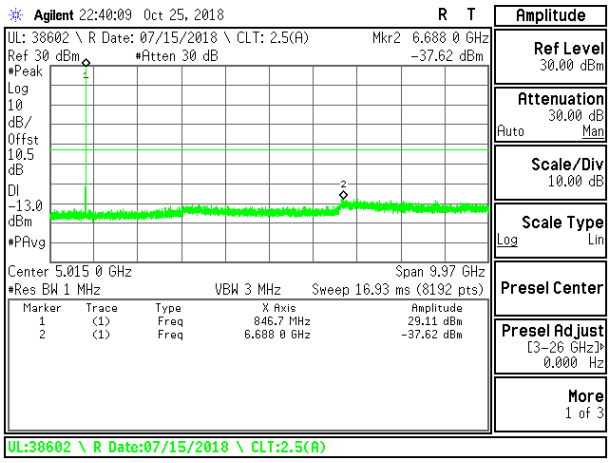


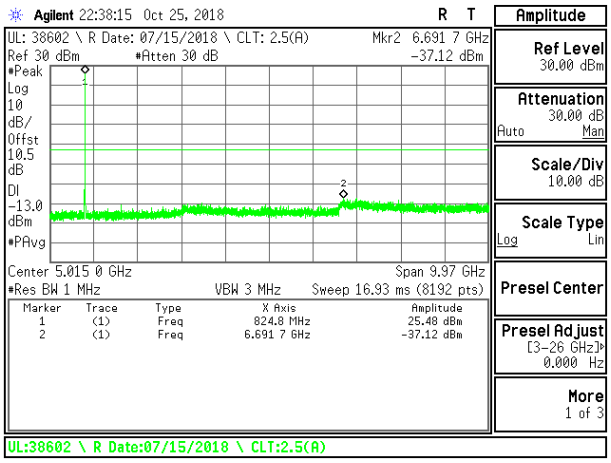
LTE B5 3MHz QPSK Low Channel RB1-0



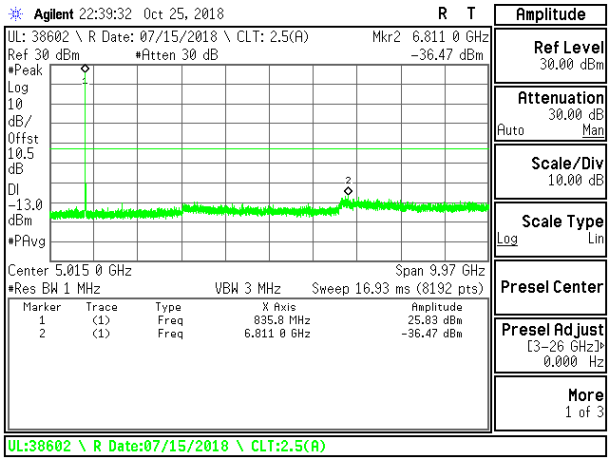
LTE B5 3MHz QPSK Mid Channel RB1-0



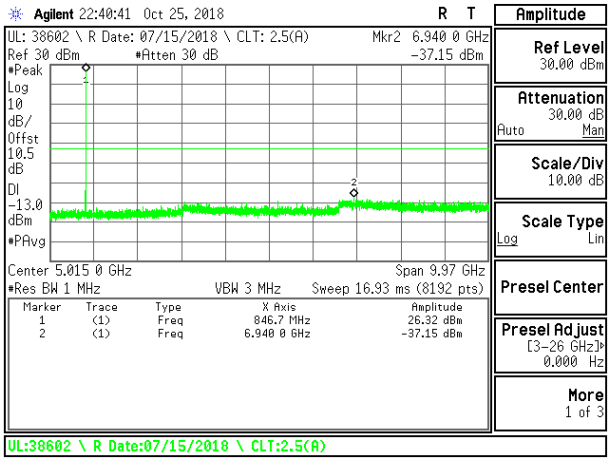
LTE B5 3MHz QPSK High Channel RB1-0



LTE B5 3MHz 16QAM Low Channel RB1-0



LTE B5 3MHz 16QAM Mid Channel RB1-0



LTE B5 3MHz 16QAM High Channel RB1-0

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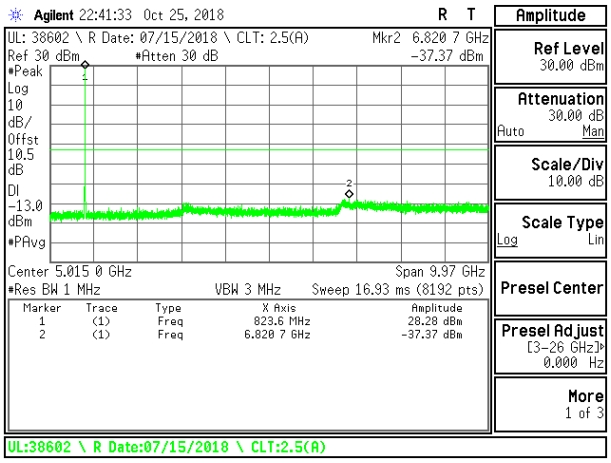
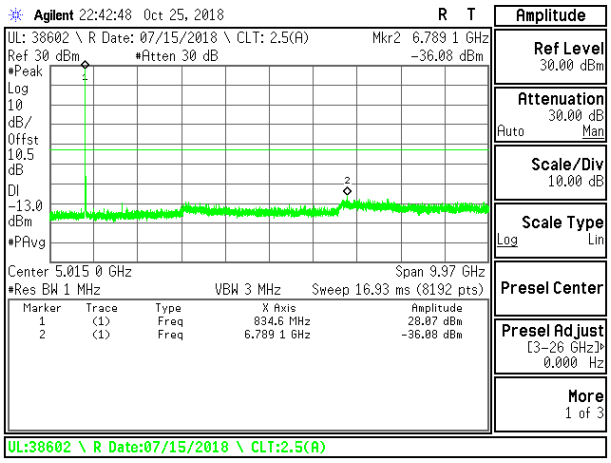
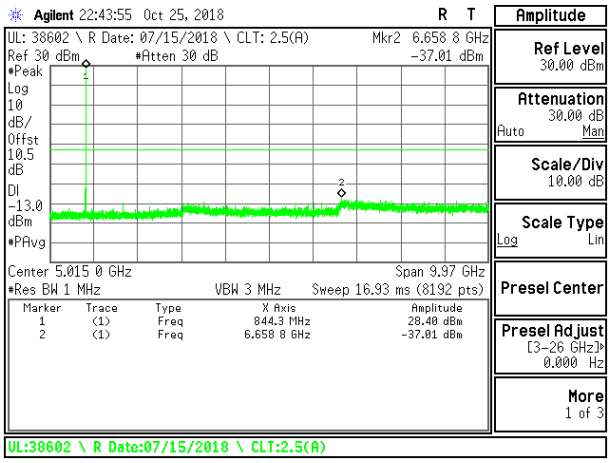


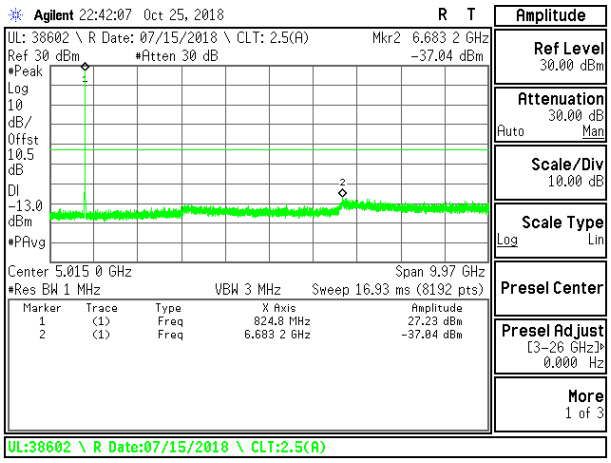
LTE B5 5MHz QPSK Low Channel RB1-0



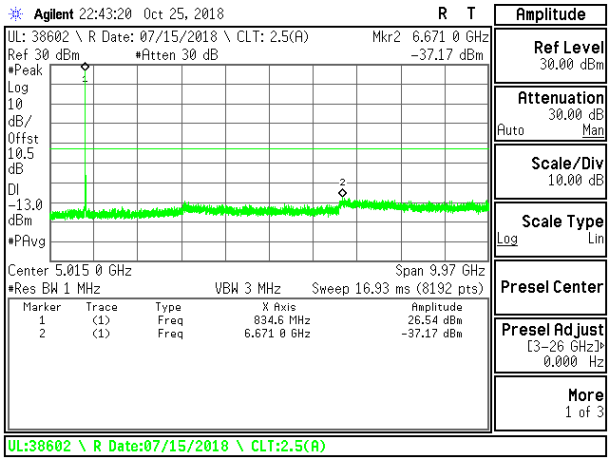
LTE B5 5MHz QPSK Mid Channel RB1-0



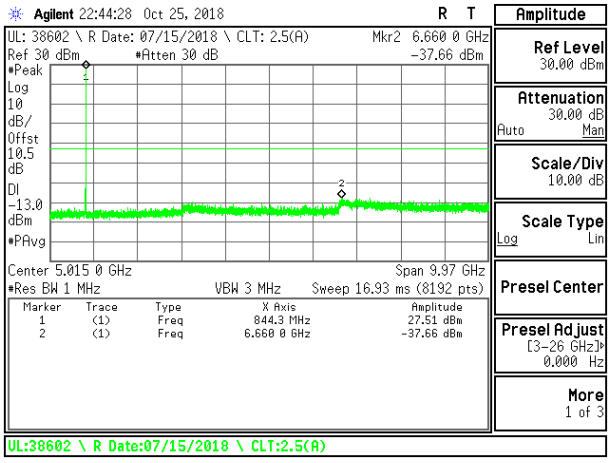
LTE B5 5MHz QPSK High Channel RB1-0



LTE B5 5MHz 16QAM Low Channel RB1-0



LTE B5 5MHz 16QAM Mid Channel RB1-0



LTE B5 5MHz 16QAM High Channel RB1-0

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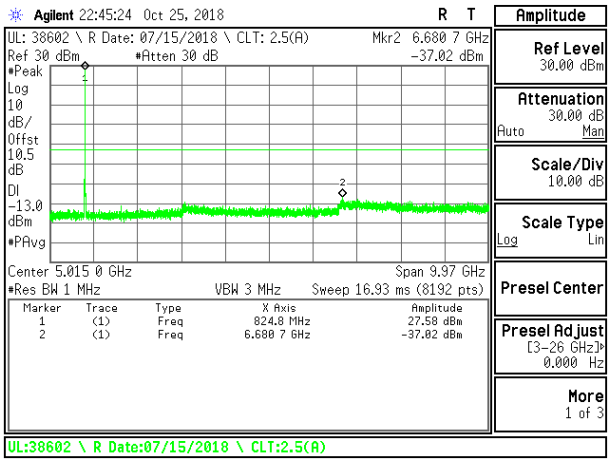
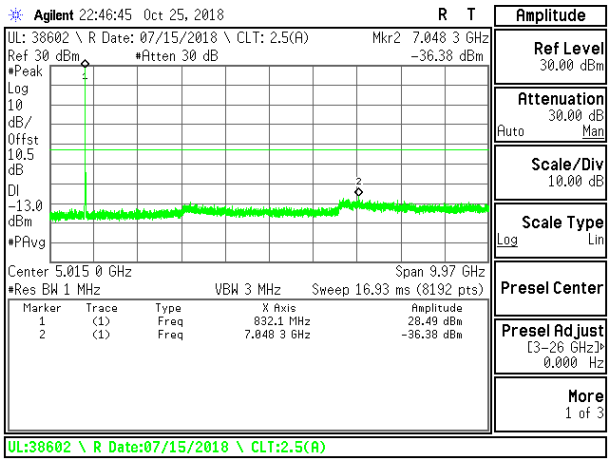


LTE B5 10MHz QPSK Low Channel RB1-0



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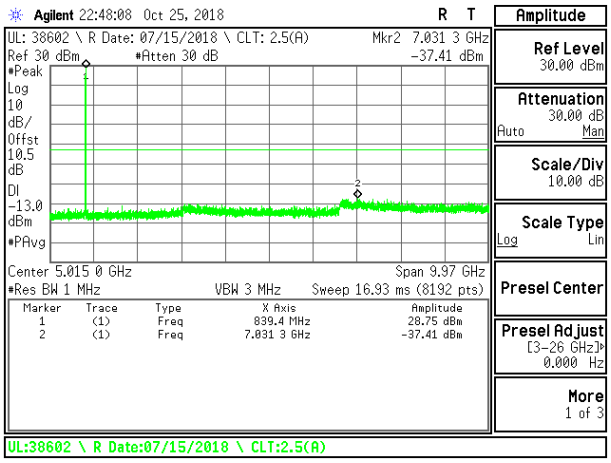
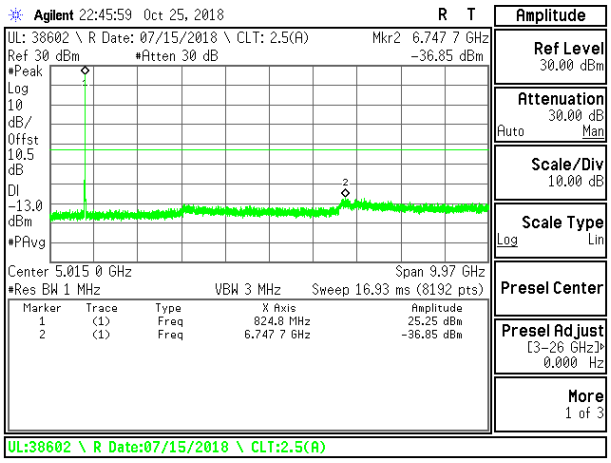
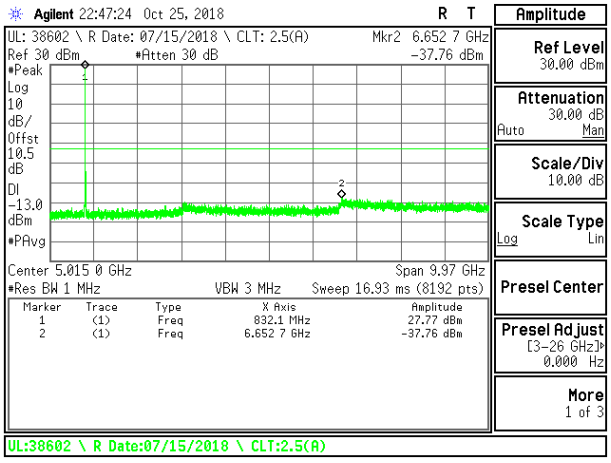


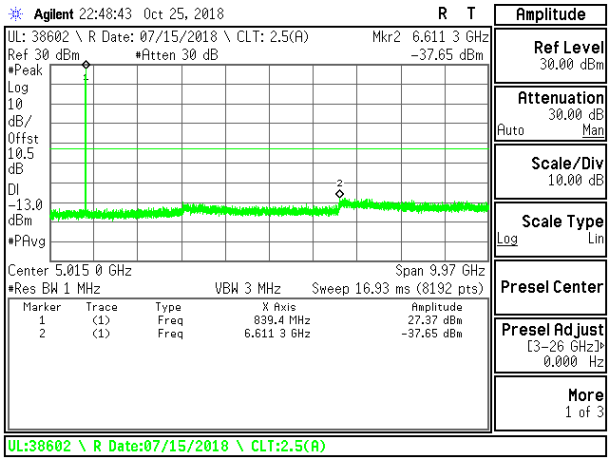
LTE B5 10MHz QPSK High Channel RB1-0



LTE B5 10MHz 16QAM Low Channel RB1-0



LTE B5 10MHz 16QAM Mid Channel RB1-0



LTE B5 10MHz 16QAM High Channel RB1-0

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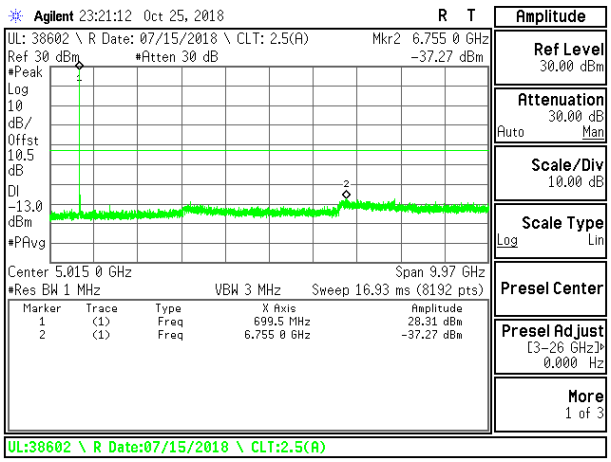
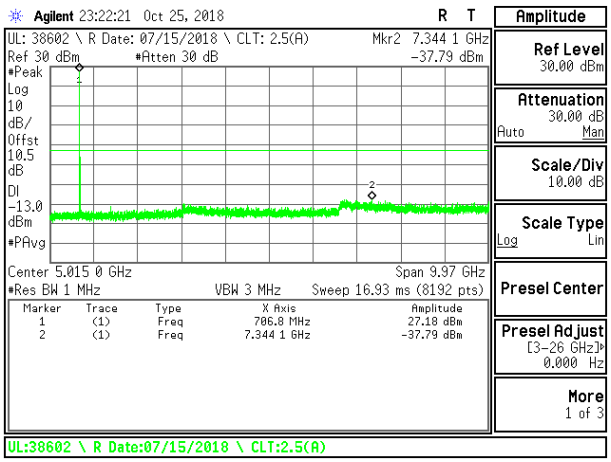
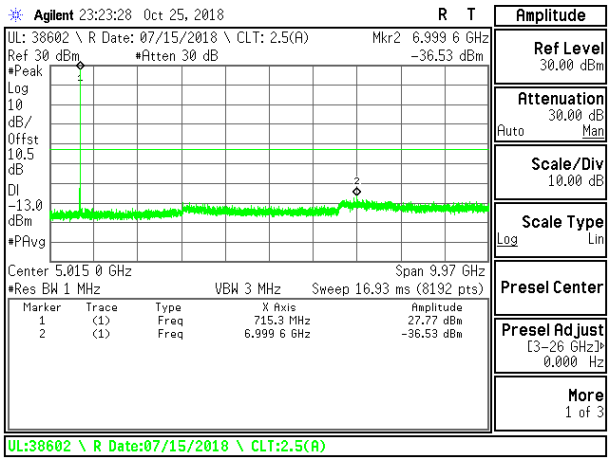
9.3.9. **LTE BAND 12**



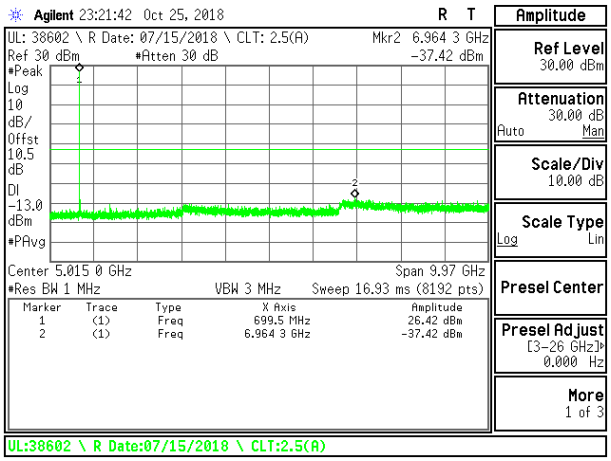
LTE B12 1.4MHz QPSK Low Channel RB1-0



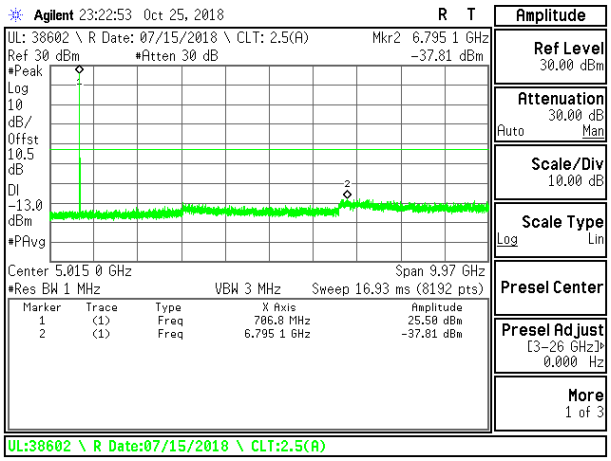
LTE B12 1.4MHz QPSK Mid Channel RB1-0



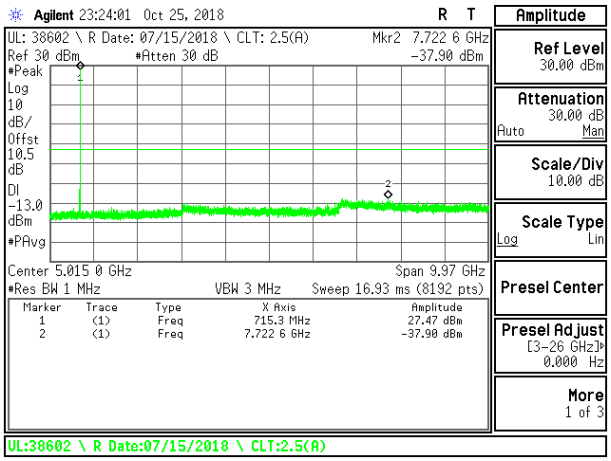
LTE B12 1.4MHz QPSK High Channel RB1-0



LTE B12 1.4MHz 16QAM Low Channel RB1-0



LTE B12 1.4MHz 16QAM Mid Channel RB1-0



LTE B12 1.4MHz 16QAM High Channel RB1-0

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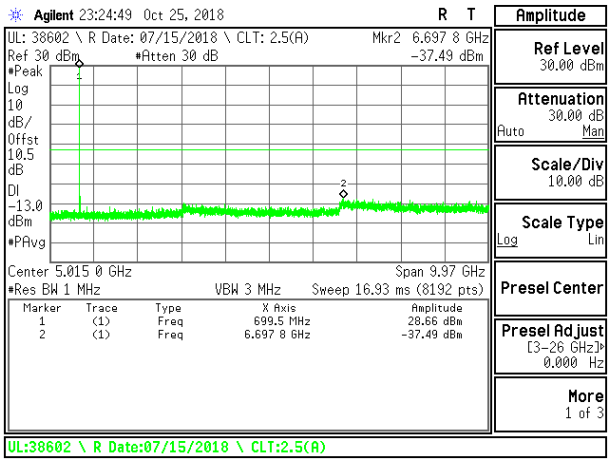
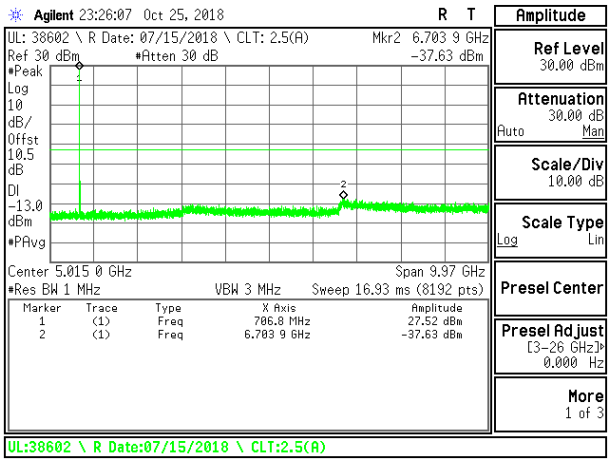
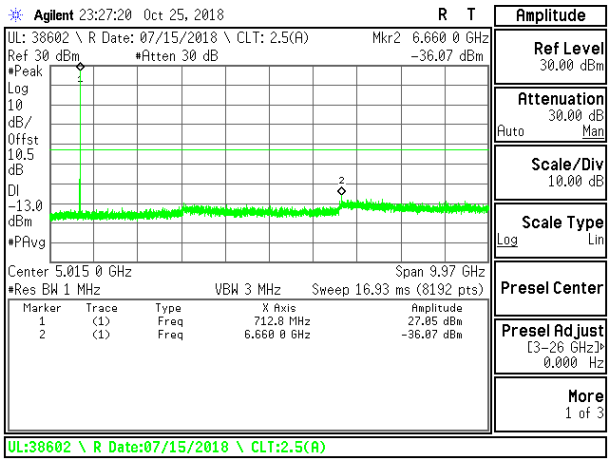


LTE B12 3MHz QPSK Low Channel RB1-0



LTE B12 3MHz QPSK Mid Channel RB1-0



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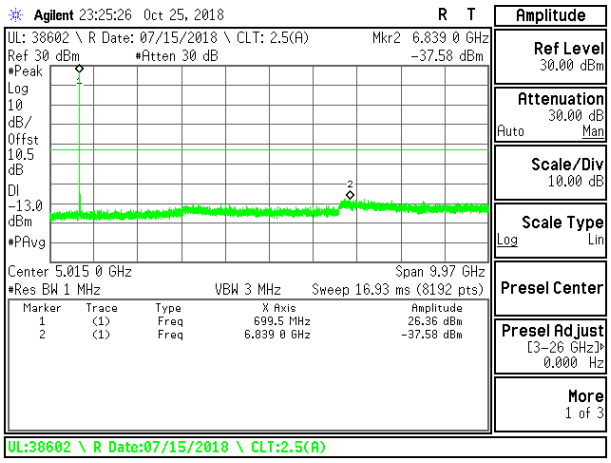
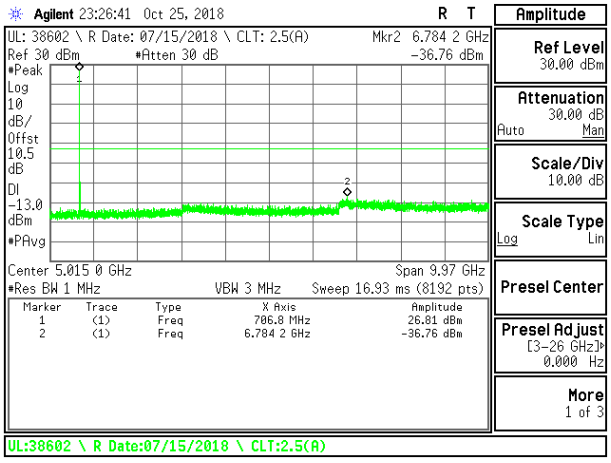
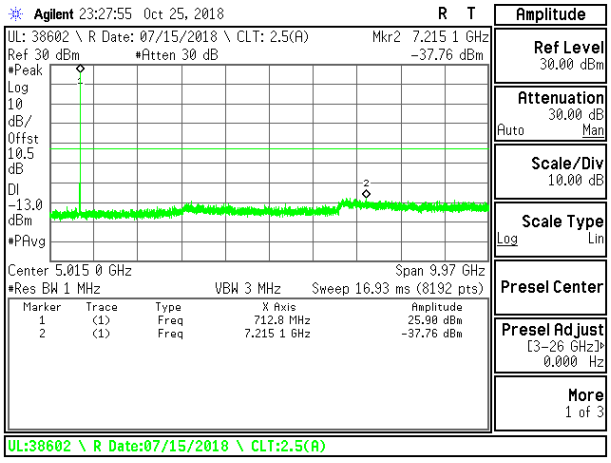


LTE B12 3MHz 16QAM Low Channel RB1-0



LTE B12 3MHz 16QAM Mid Channel RB1-0



LTE B12 3MHz 16QAM High Channel RB1-0

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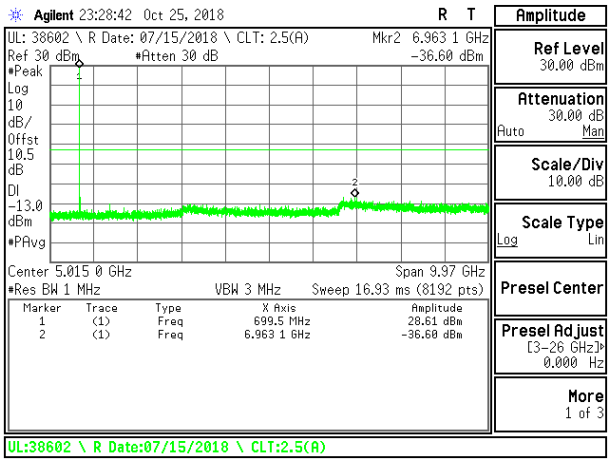
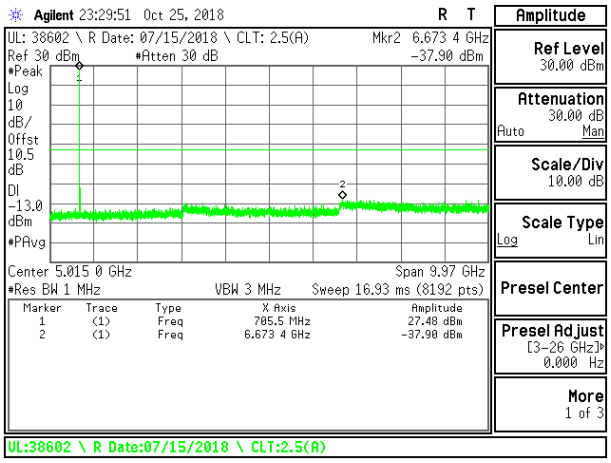
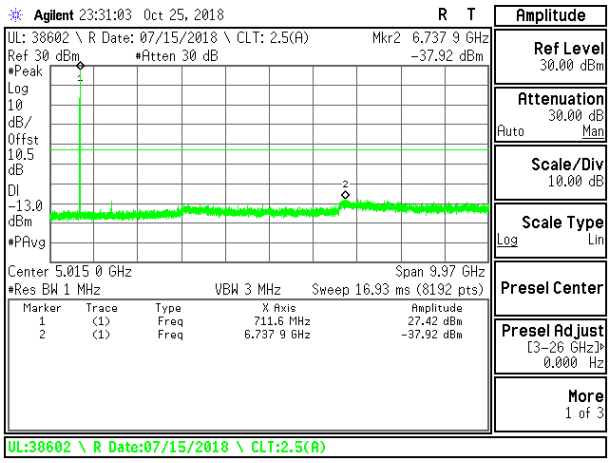


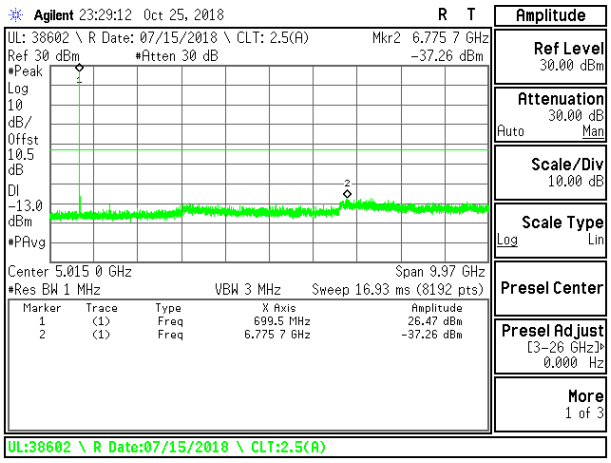
LTE B12 5MHz QPSK Low Channel RB1-0



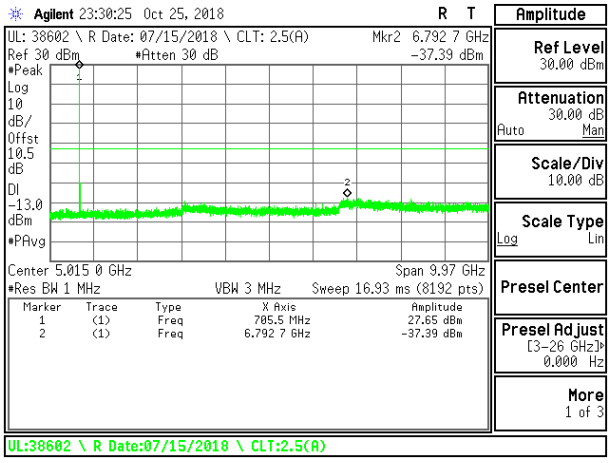
LTE B12 5MHz QPSK Mid Channel RB1-0



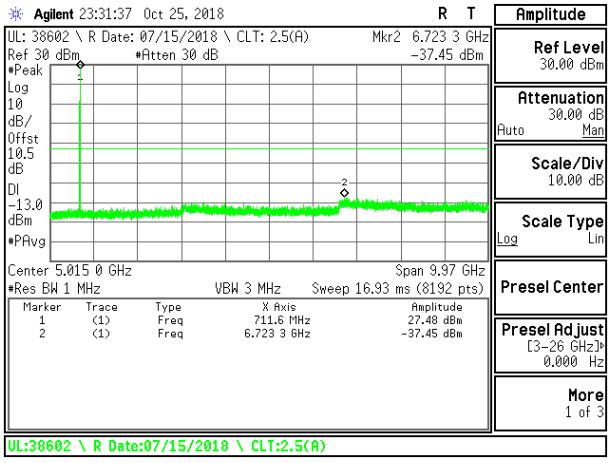
LTE B12 5MHz QPSK High Channel RB1-0



LTE B12 5MHz 16QAM Low Channel RB1-0



LTE B12 5MHz 16QAM Mid Channel RB1-0



LTE B12 5MHz 16QAM High Channel RB1-0

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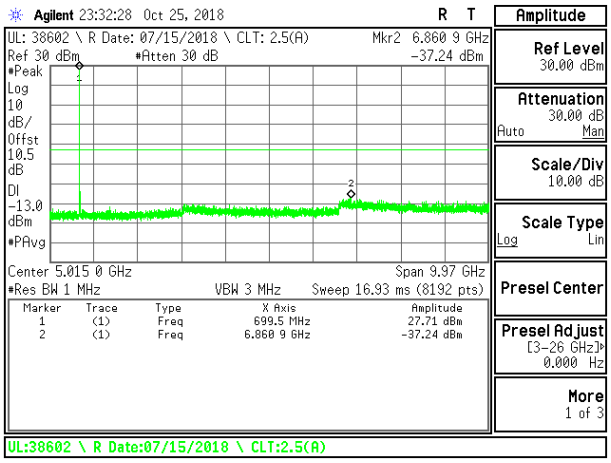
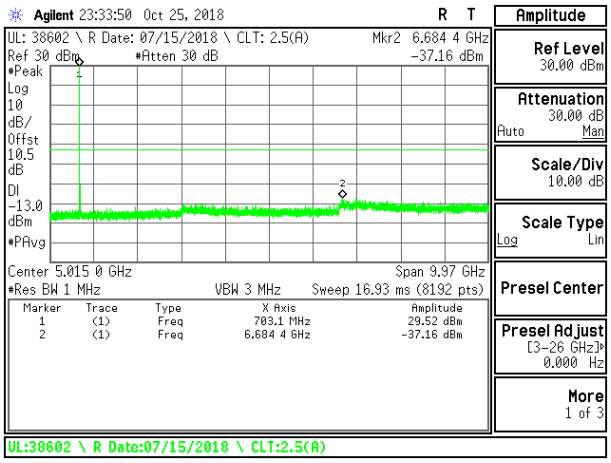
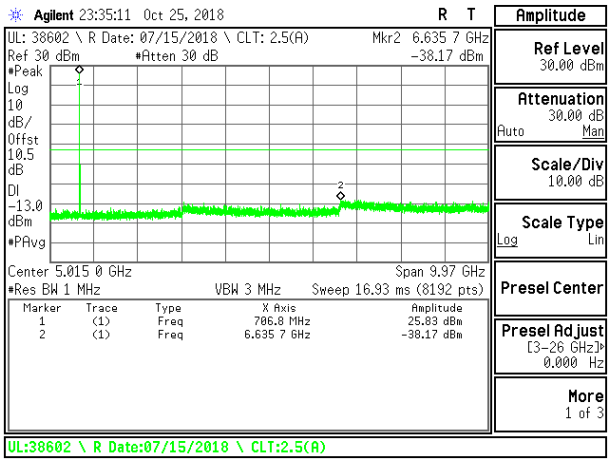


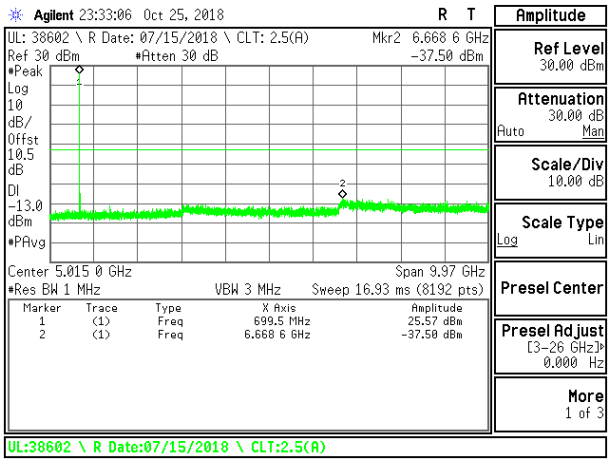
LTE B12 10MHz QPSK Low Channel RB1-0



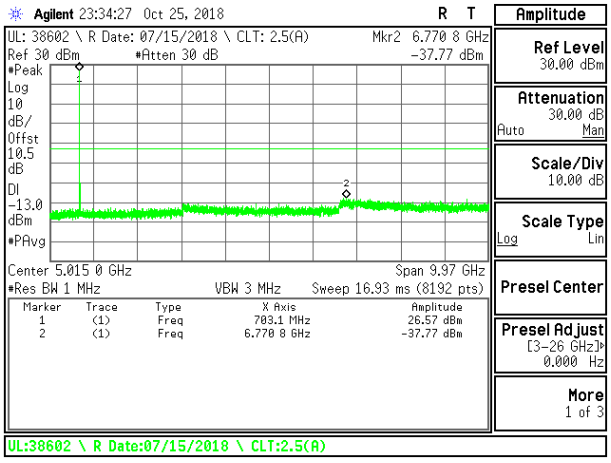
LTE B12 10MHz QPSK Mid Channel RB1-0



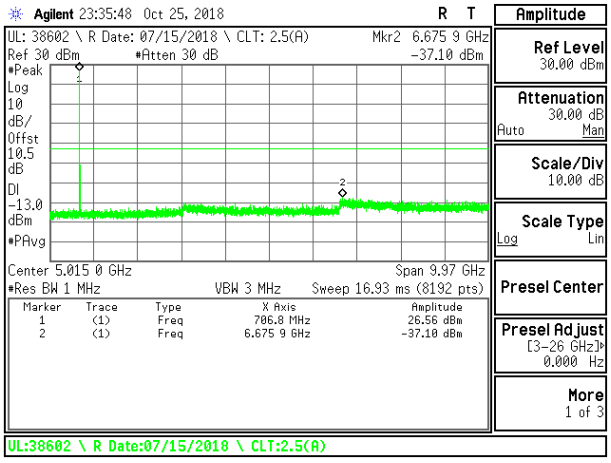
LTE B12 10MHz QPSK High Channel RB1-0



LTE B12 10MHz 16QAM Low Channel RB1-0



LTE B12 10MHz 16QAM Mid Channel RB1-0



LTE B12 10MHz 16QAM High Channel RB1-0

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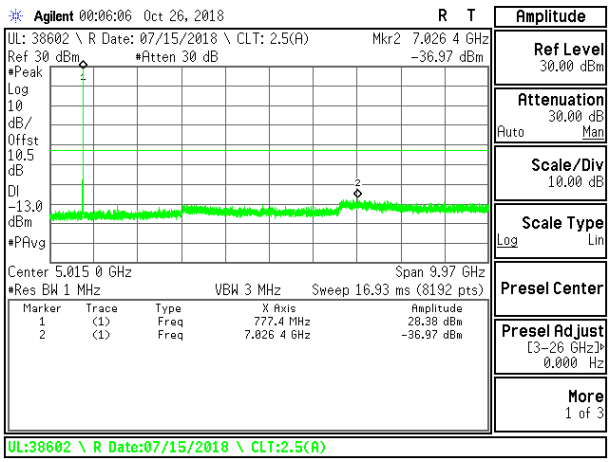
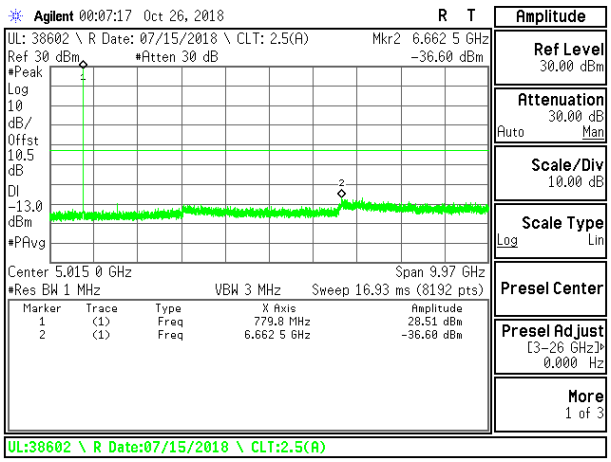
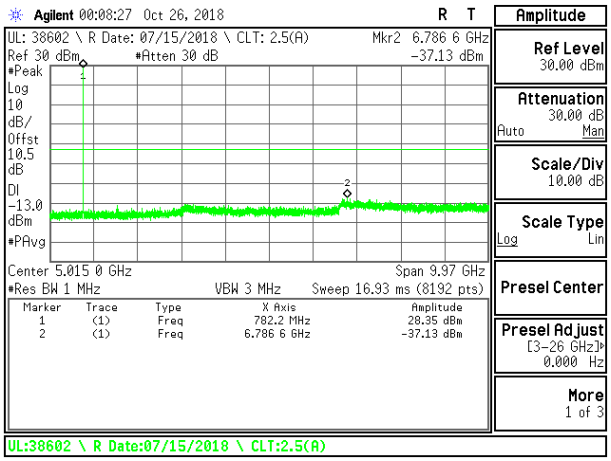
9.3.10. **LTE BAND 13**



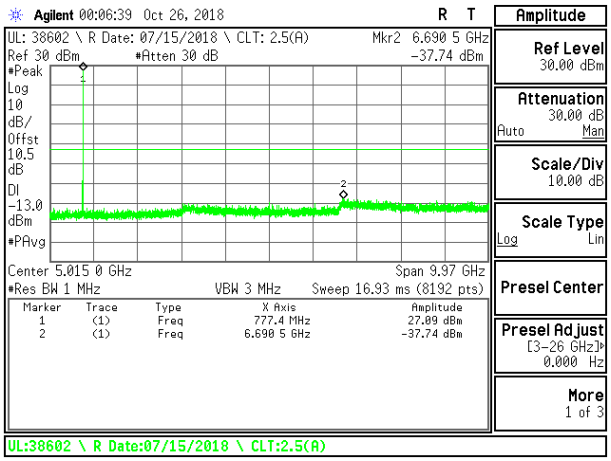
LTE B13 5MHz QPSK Low Channel RB1-0



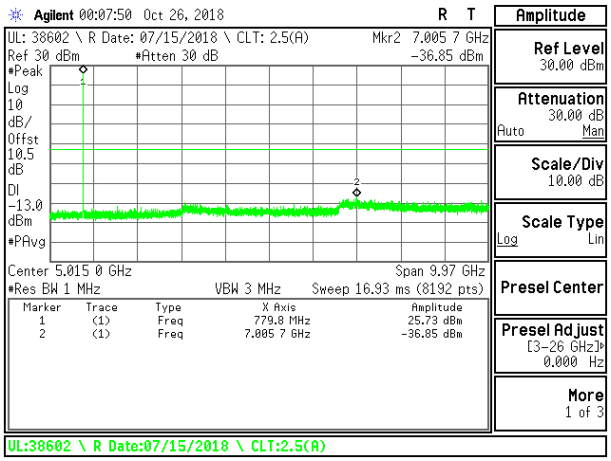
LTE B13 5MHz QPSK Mid Channel RB1-0



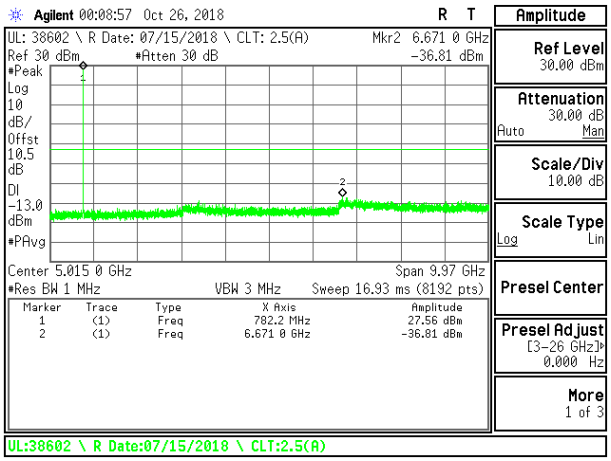
LTE B13 5MHz QPSK High Channel RB1-0



LTE B13 5MHz 16QAM Low Channel RB1-0



LTE B13 5MHz 16QAM Mid Channel RB1-0



LTE B13 5MHz 16QAM High Channel RB1-0

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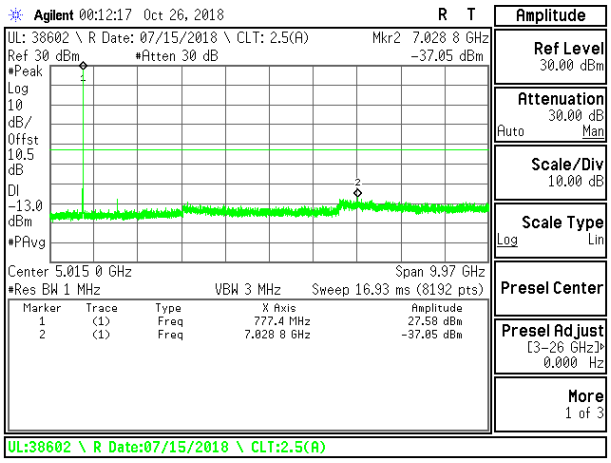
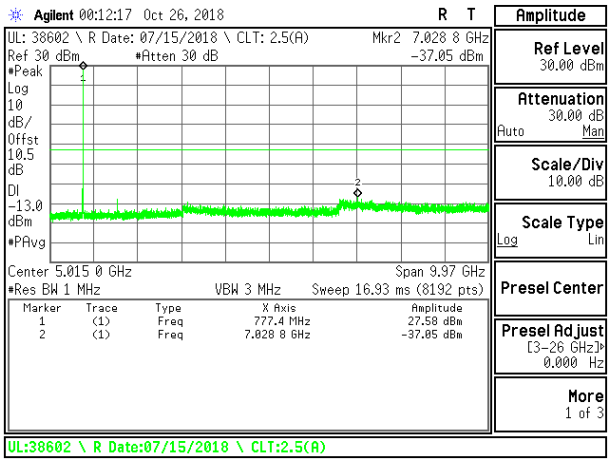
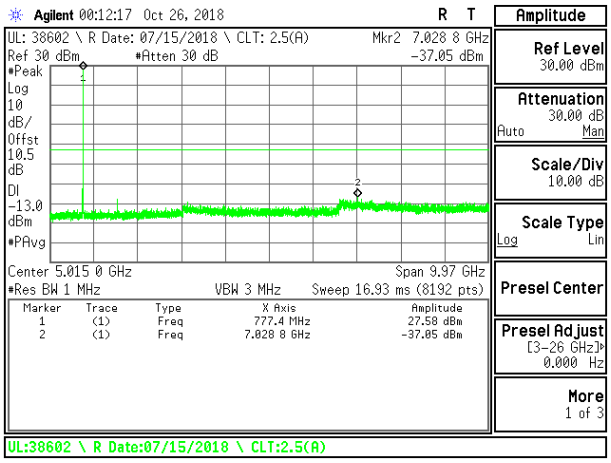


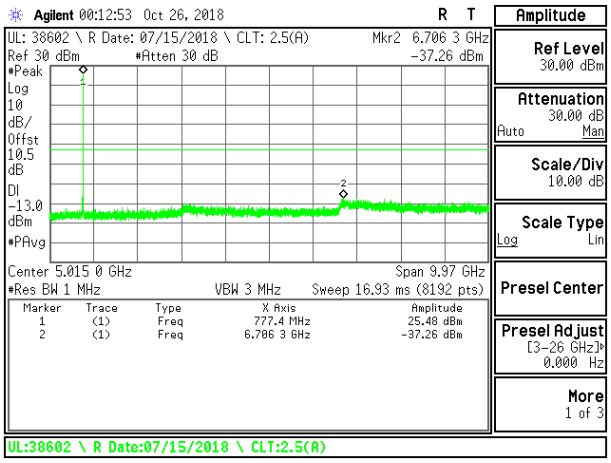
LTE B13 10MHz QPSK Low Channel RB1-0



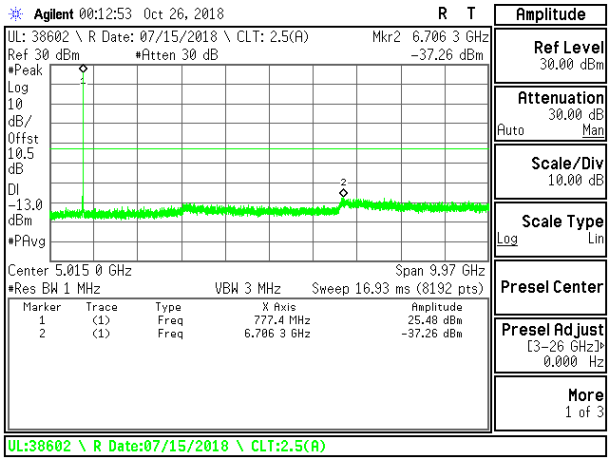
LTE B13 10MHz QPSK Mid Channel RB1-0



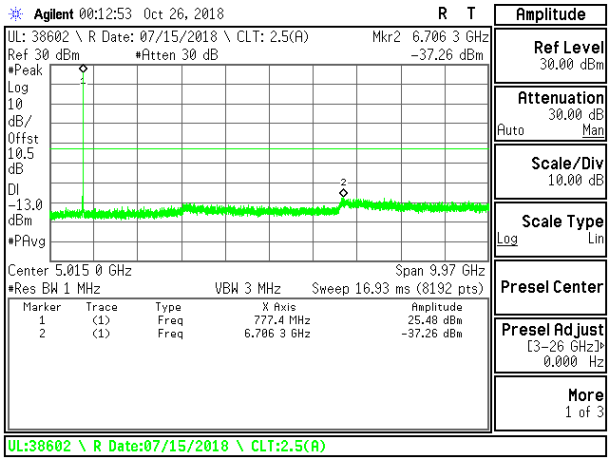
LTE B13 10MHz QPSK High Channel RB1-0



LTE B13 10MHz 16QAM Low Channel RB1-0



LTE B13 10MHz 16QAM Mid Channel RB1-0



LTE B13 10MHz 16QAM High Channel RB1-0

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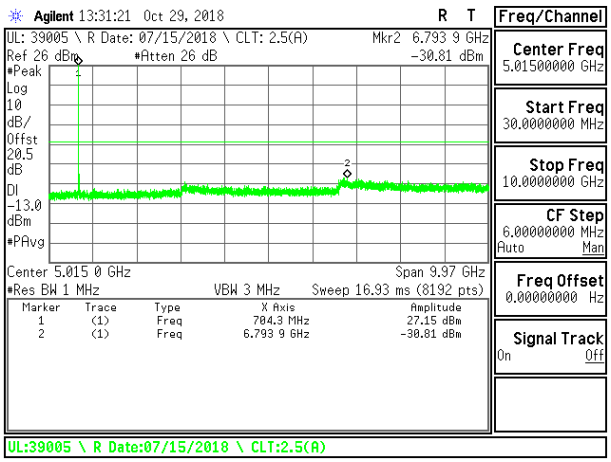
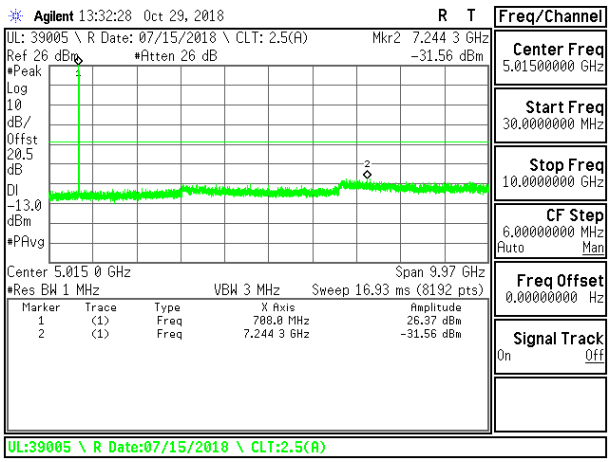
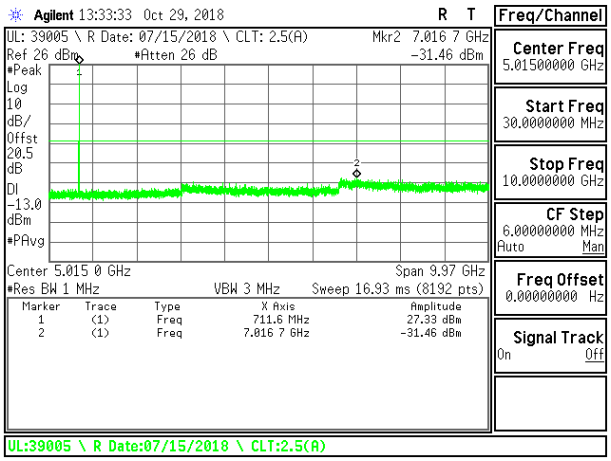
9.3.11. **LTE BAND 17**



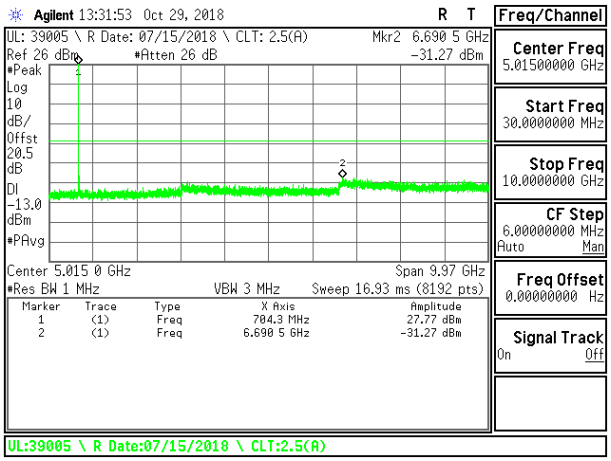
LTE B17 5MHz QPSK Low Channel RB1-0



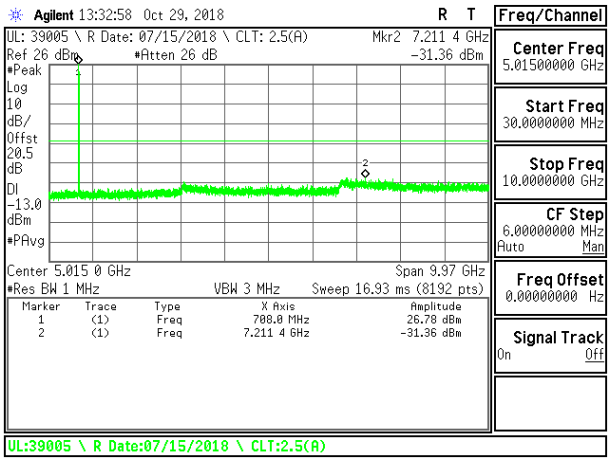
LTE B17 5MHz QPSK Mid Channel RB1-0



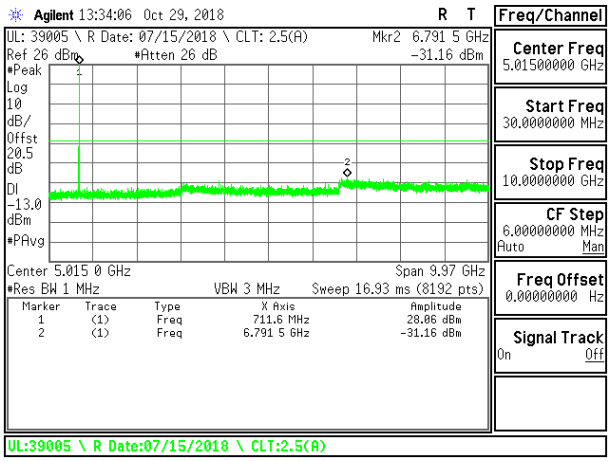
LTE B17 5MHz QPSK High Channel RB1-0



LTE B17 5MHz 16QAM Low Channel RB1-0



LTE B17 5MHz 16QAM Mid Channel RB1-0



LTE B17 5MHz 16QAM High Channel RB1-0

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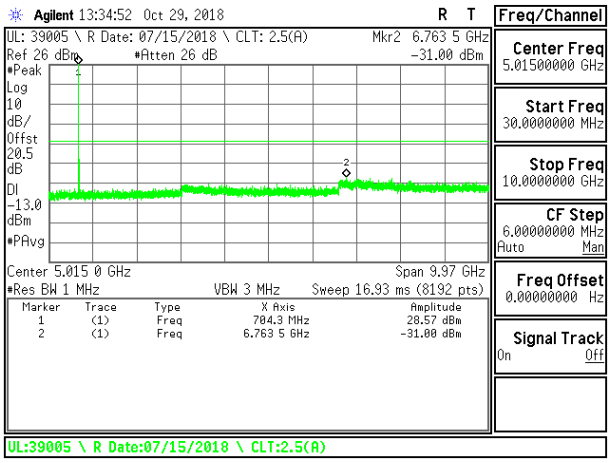
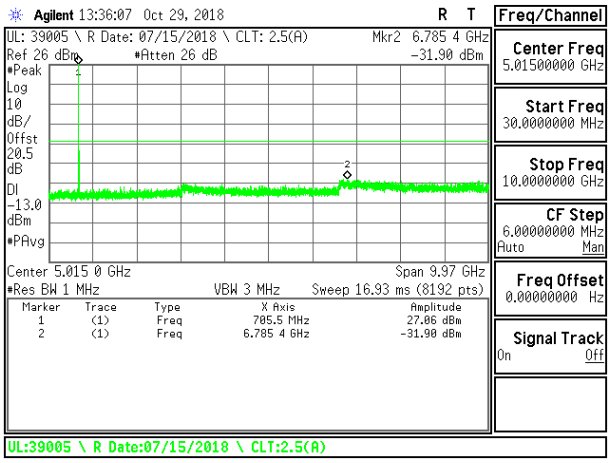
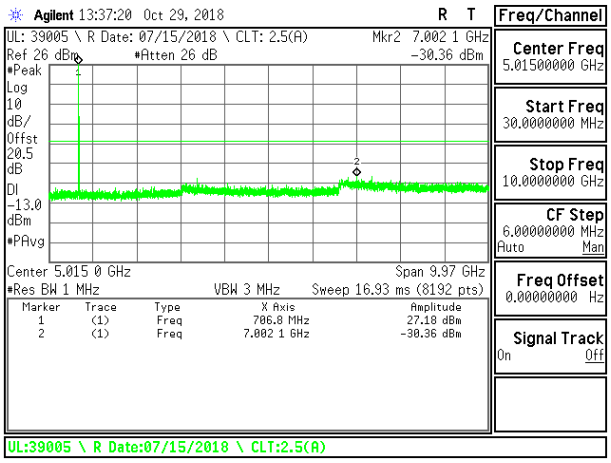


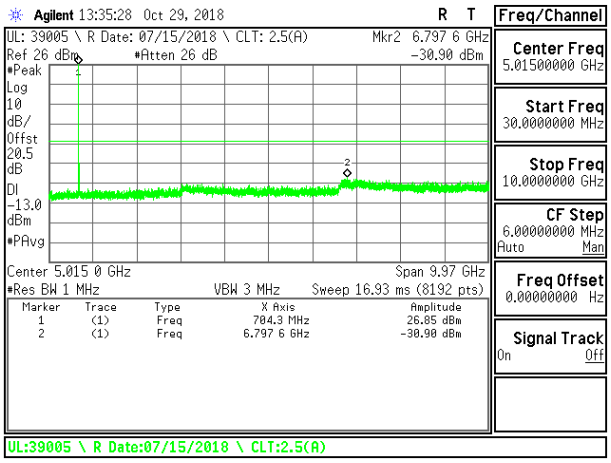
LTE B17 10MHz QPSK Low Channel RB1-0



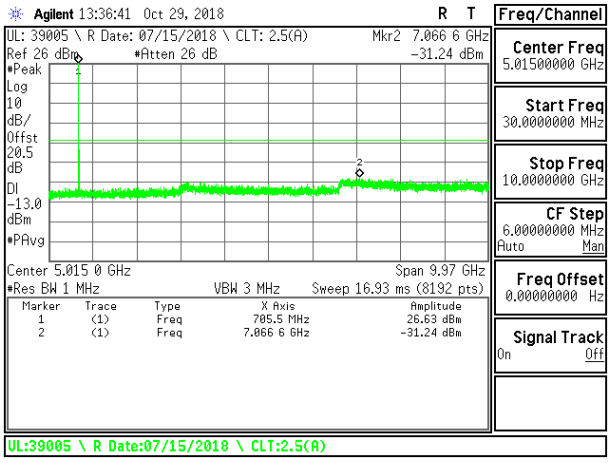
LTE B17 10MHz QPSK Mid Channel RB1-0



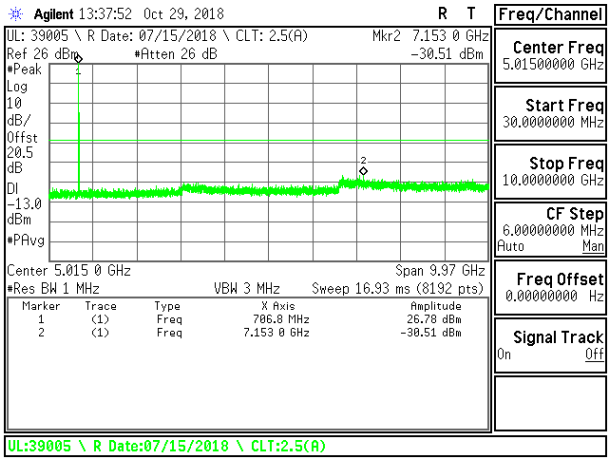
LTE B17 10MHz QPSK High Channel RB1-0



LTE B17 10MHz 16QAM Low Channel RB1-0



LTE B17 10MHz 16QAM Mid Channel RB1-0



LTE B17 10MHz 16QAM High Channel RB1-0

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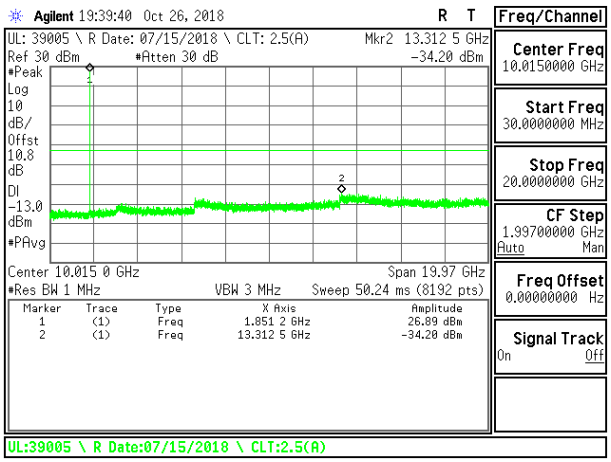
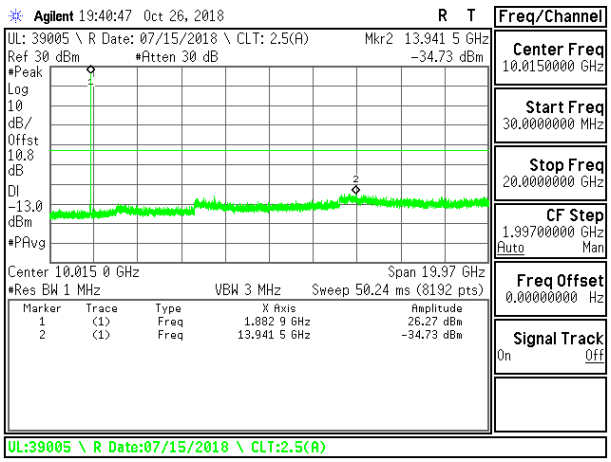
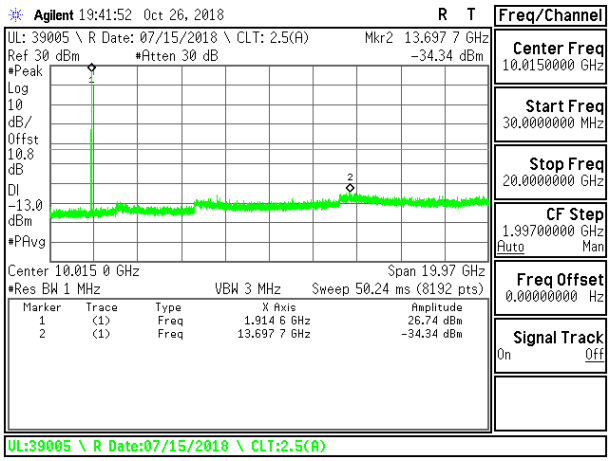
9.3.12. **LTE BAND 25**



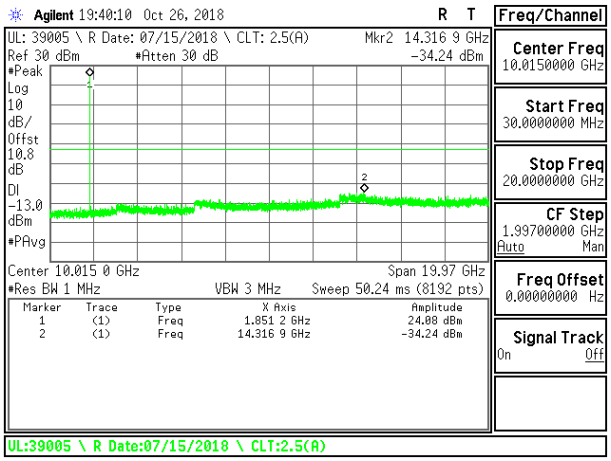
LTE B25 1.4MHz QPSK Low Channel RB1-0



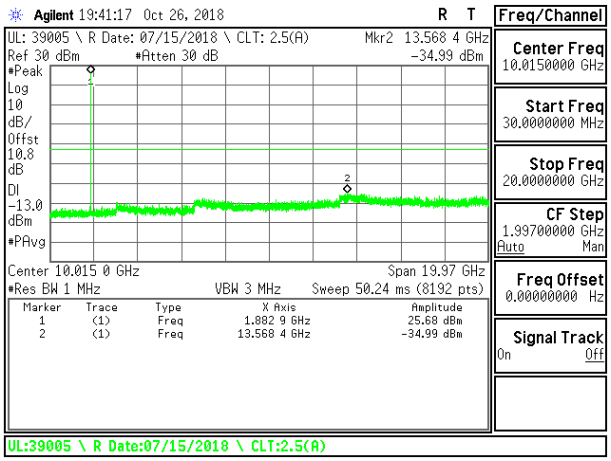
LTE B25 1.4MHz QPSK Mid Channel RB1-0



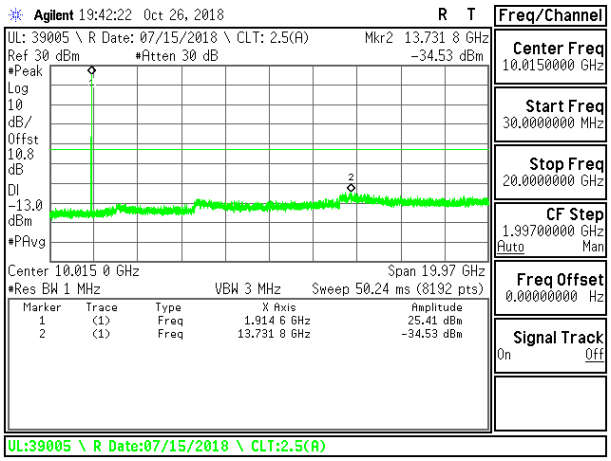
LTE B25 1.4MHz QPSK High Channel RB1-0



LTE B25 1.4MHz 16QAM Low Channel RB1-0



LTE B25 1.4MHz 16QAM Mid Channel RB1-0



LTE B25 1.4MHz 16QAM High Channel RB1-0

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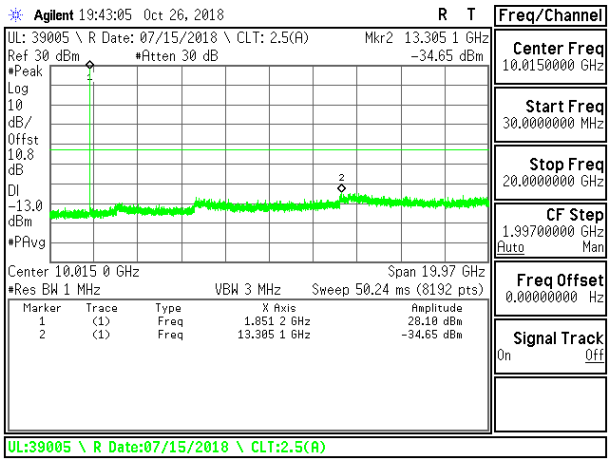
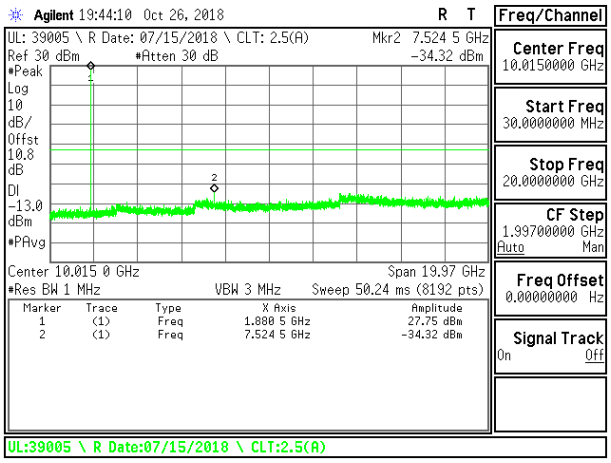
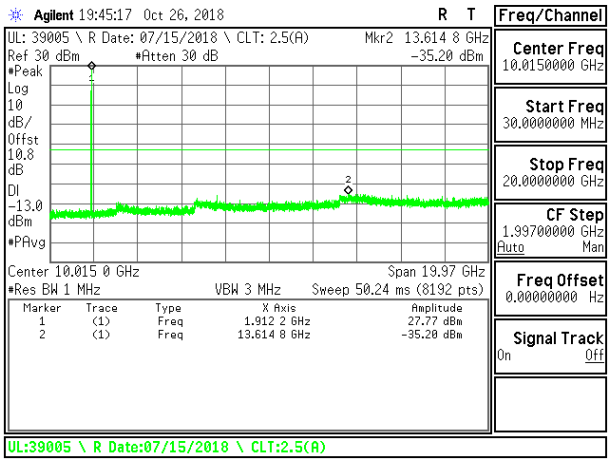


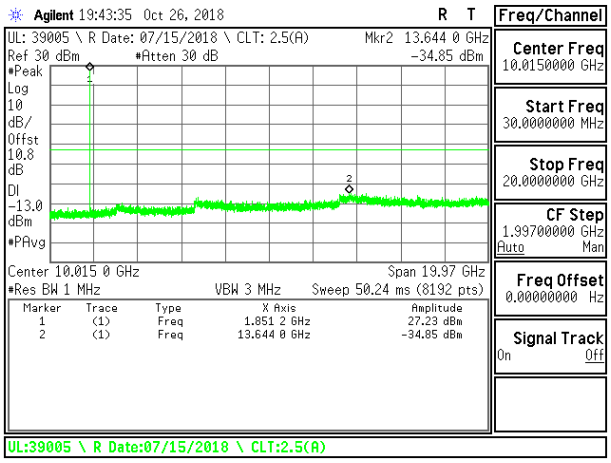
LTE B25 3MHz QPSK Low Channel RB1-0



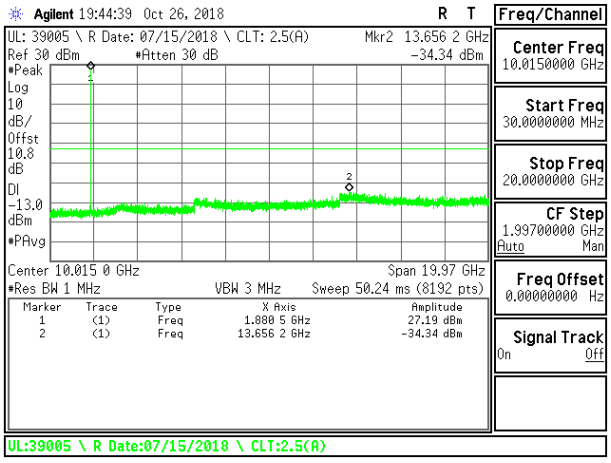
LTE B25 3MHz QPSK Mid Channel RB1-0



LTE B25 3MHz QPSK High Channel RB1-0



LTE B25 3MHz 16QAM Low Channel RB1-0



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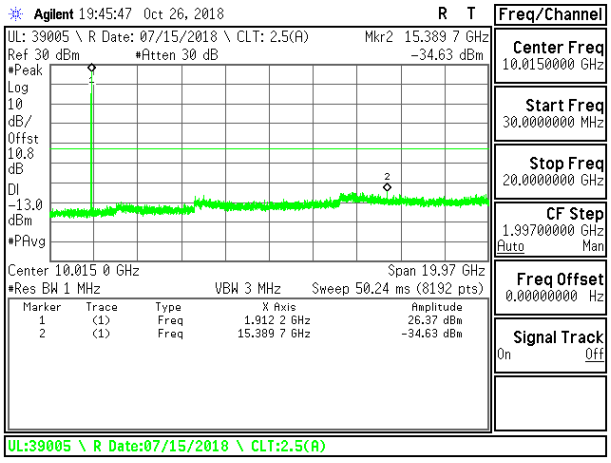

LTE B25 3MHz 16QAM High Channel RB1-0

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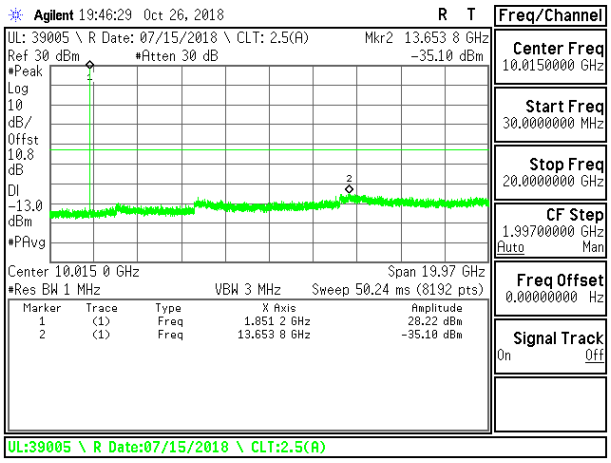
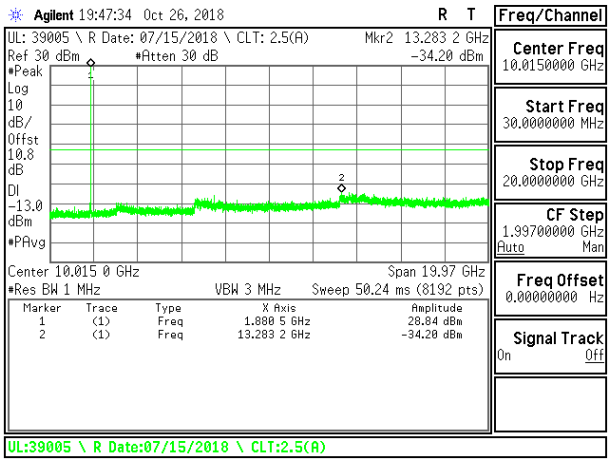
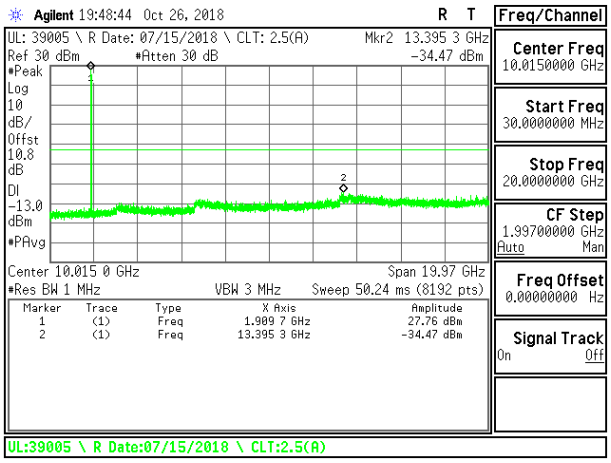


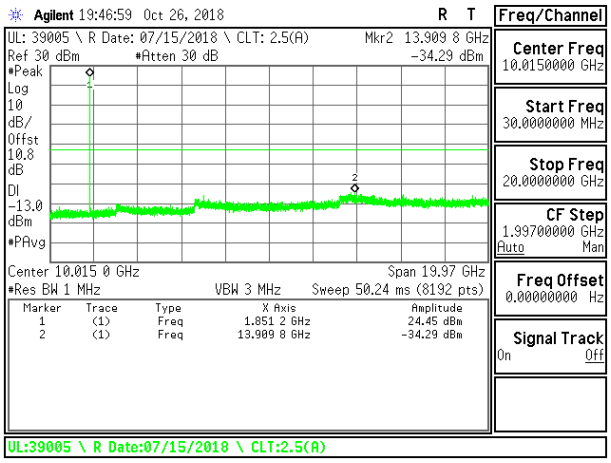
LTE B25 5MHz QPSK Low Channel RB1-0



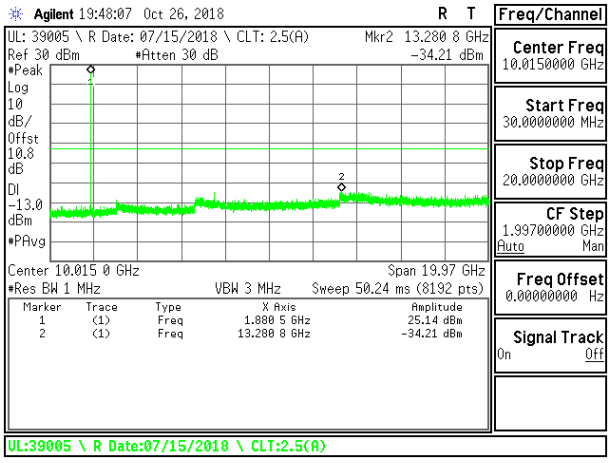
LTE B25 5MHz QPSK Mid Channel RB1-0



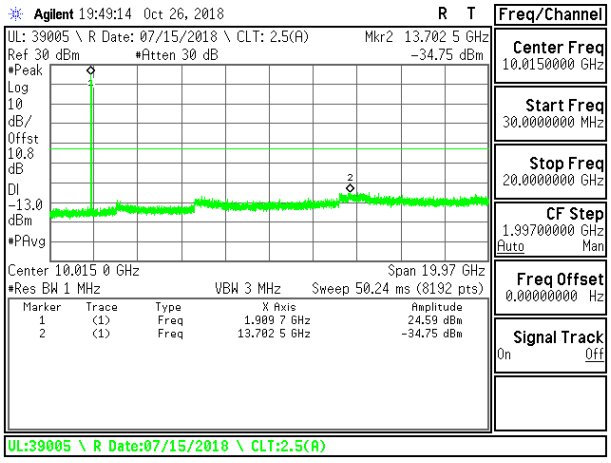
LTE B25 5MHz QPSK High Channel RB1-0



LTE B25 5MHz 16QAM Low Channel RB1-0



LTE B25 5MHz 16QAM Mid Channel RB1-0



LTE B25 5MHz 16QAM High Channel RB1-0

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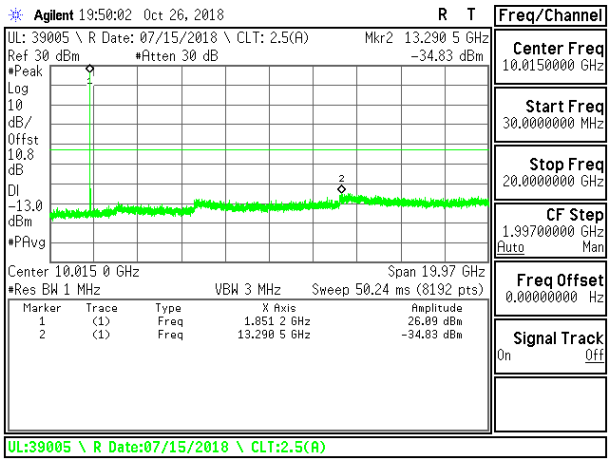
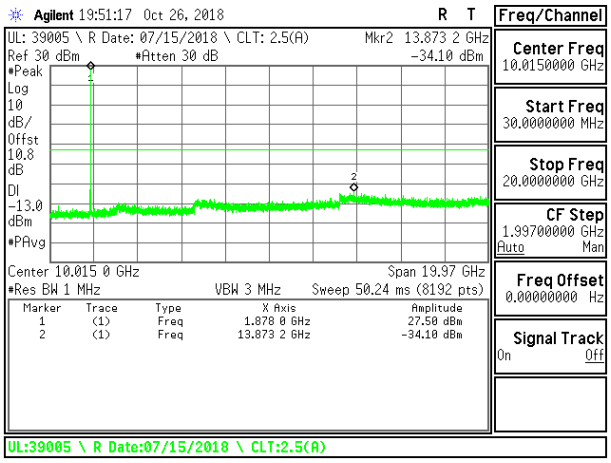


LTE B25 10MHz QPSK Low Channel RB1-0



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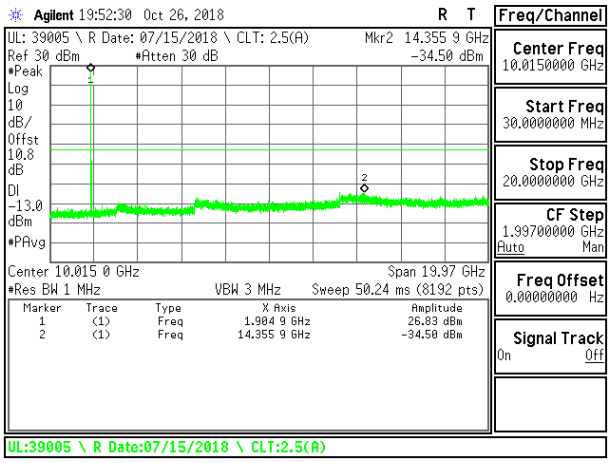
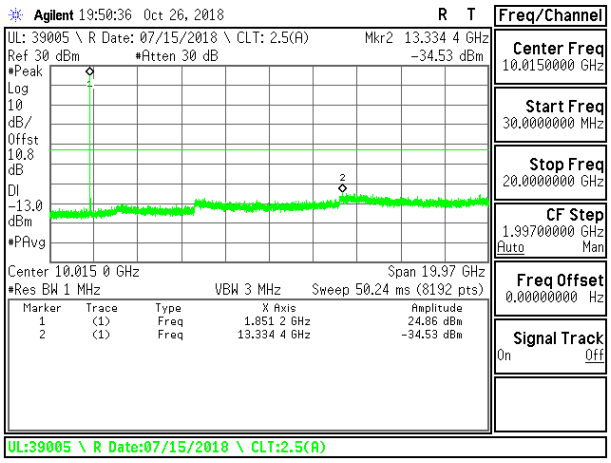
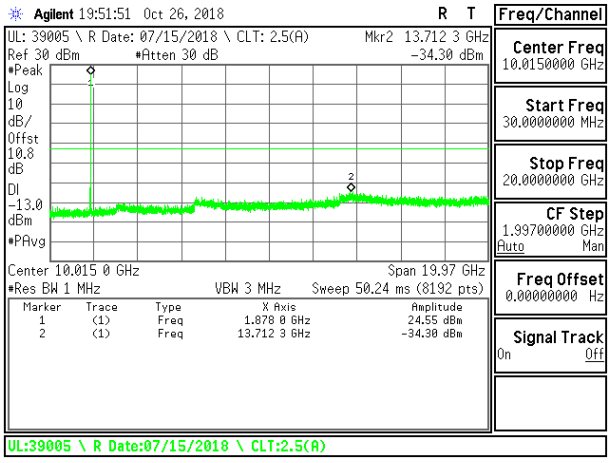


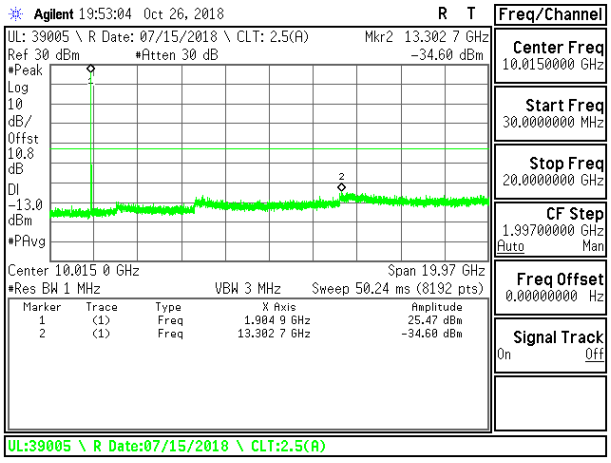
LTE B25 10MHz QPSK High Channel RB1-0



LTE B25 10MHz 16QAM Low Channel RB1-0



LTE B25 10MHz 16QAM Mid Channel RB1-0



LTE B25 10MHz 16QAM High Channel RB1-0

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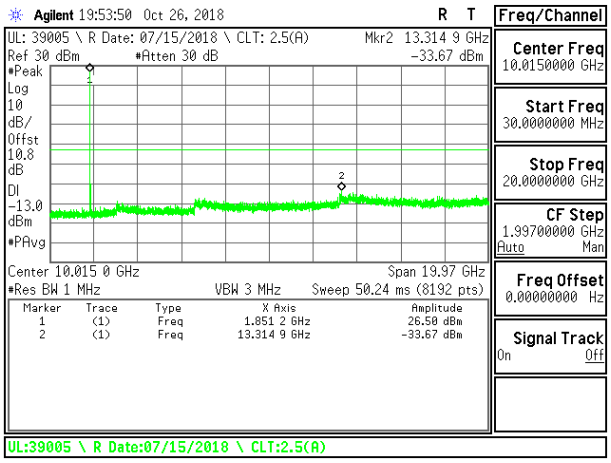
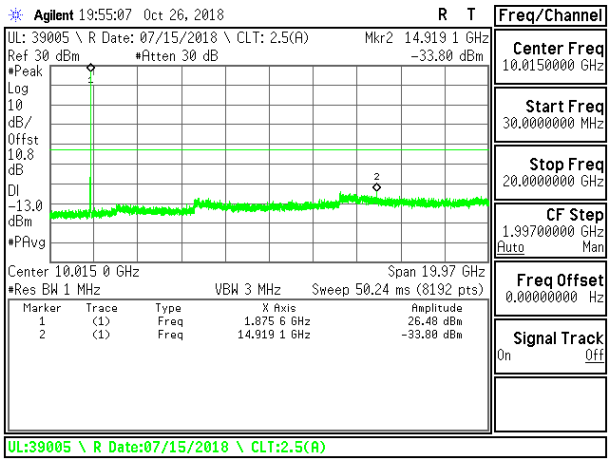


LTE B25 15MHz QPSK Low Channel RB1-0



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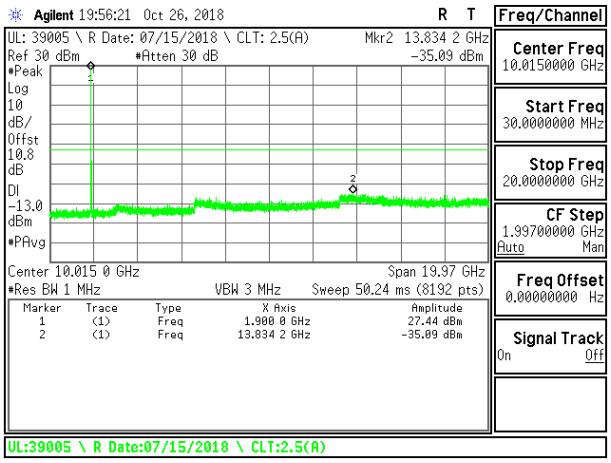
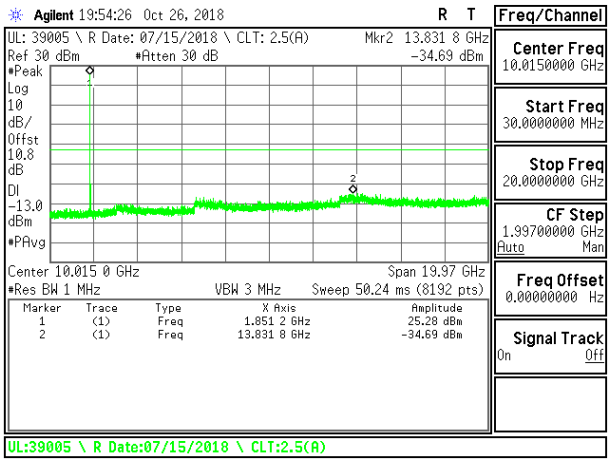
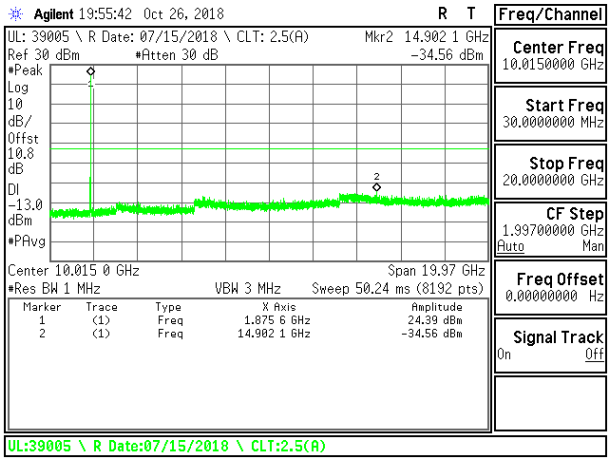


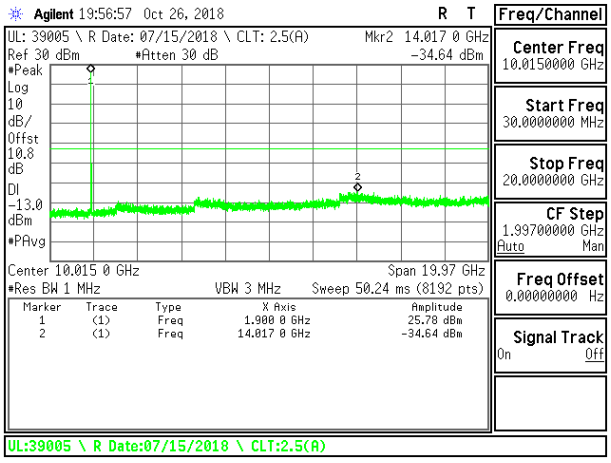
LTE B25 15MHz QPSK High Channel RB1-0



LTE B25 15MHz 16QAM Low Channel RB1-0



LTE B25 15MHz 16QAM Mid Channel RB1-0



LTE B25 15MHz 16QAM High Channel RB1-0

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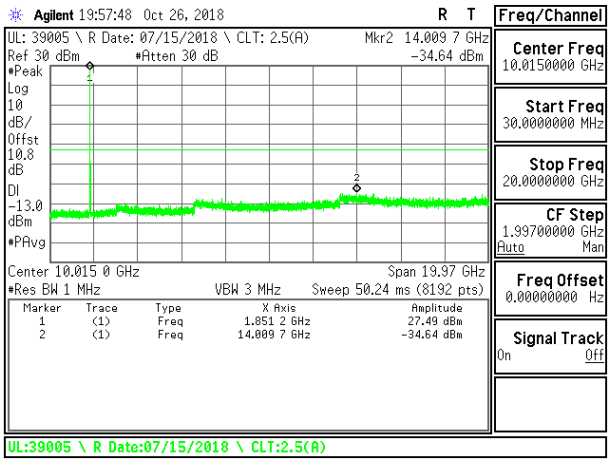
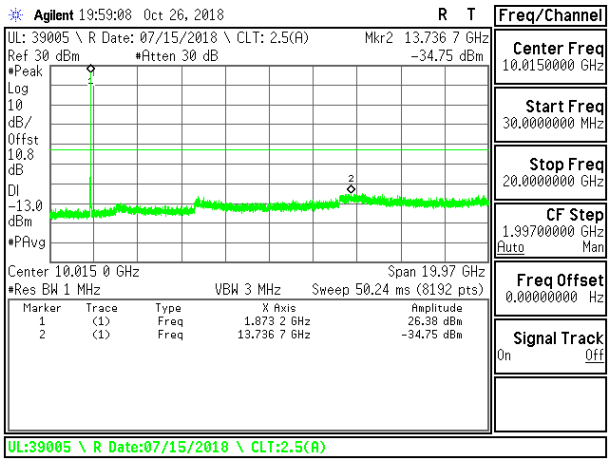


LTE B25 20MHz QPSK Low Channel RB1-0



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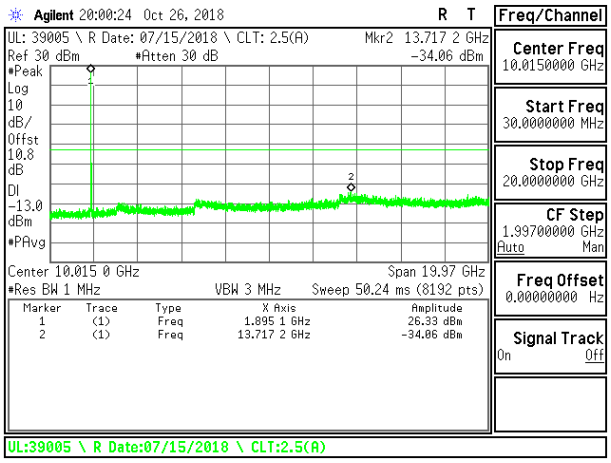

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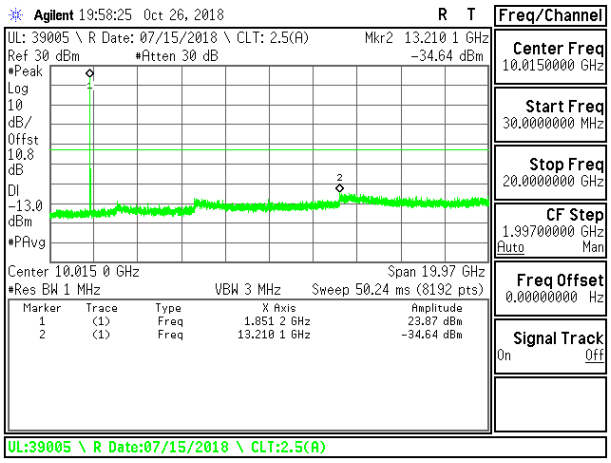

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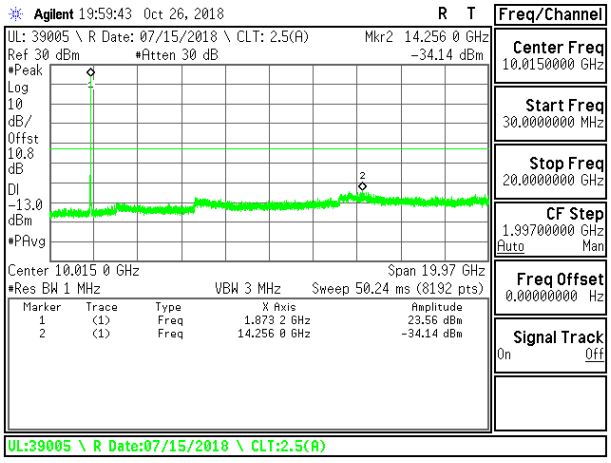
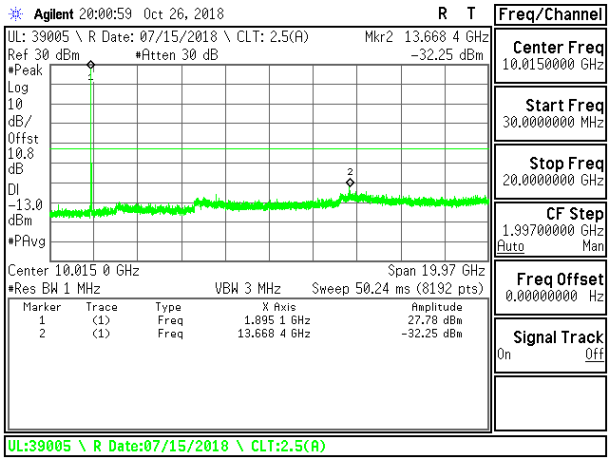


LTE B25 20MHz 16QAM Mid Channel RB1-0



LTE B25 20MHz 16QAM High Channel RB1-0

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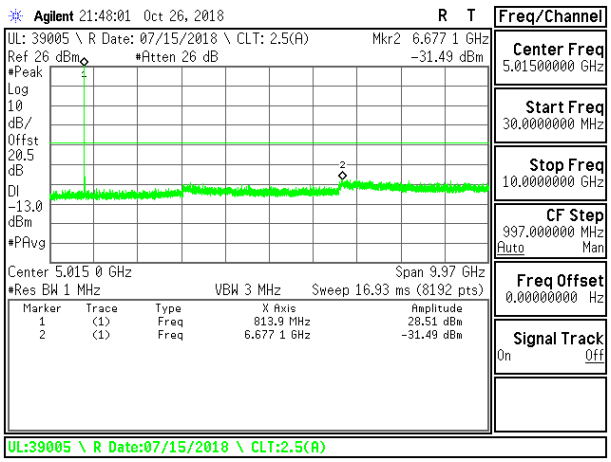
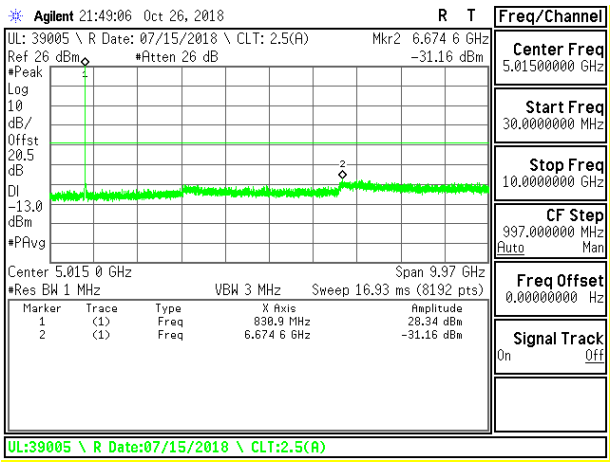
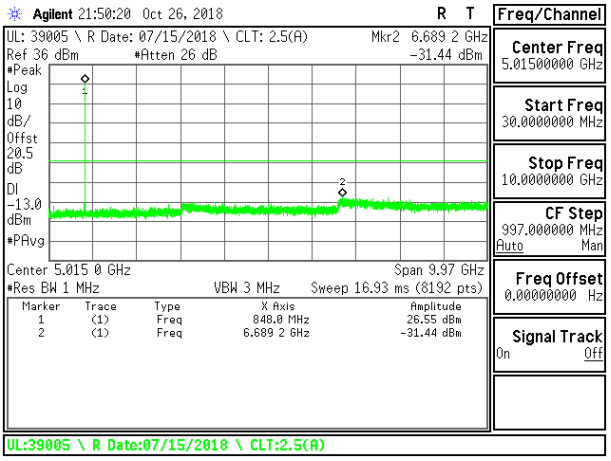
9.3.13. **LTE BAND 26**



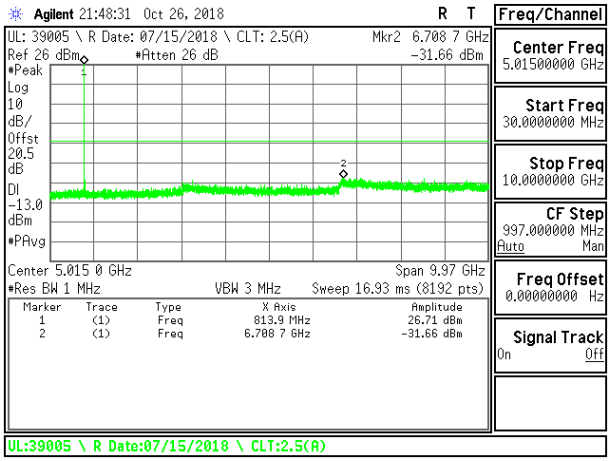
LTE B26 1.4MHz QPSK Low Channel RB1-0



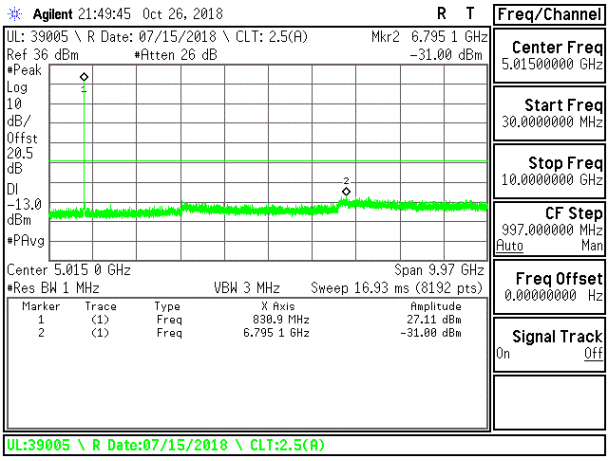
LTE B26 1.4MHz QPSK Mid Channel RB1-0



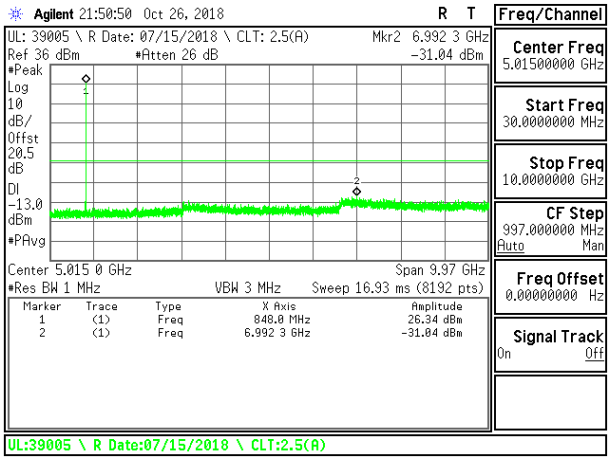
LTE B26 1.4MHz QPSK High Channel RB1-0



LTE B26 1.4MHz 16QAM Low Channel RB1-0



LTE B26 1.4MHz 16QAM Mid Channel RB1-0



LTE B26 1.4MHz 16QAM High Channel RB1-0

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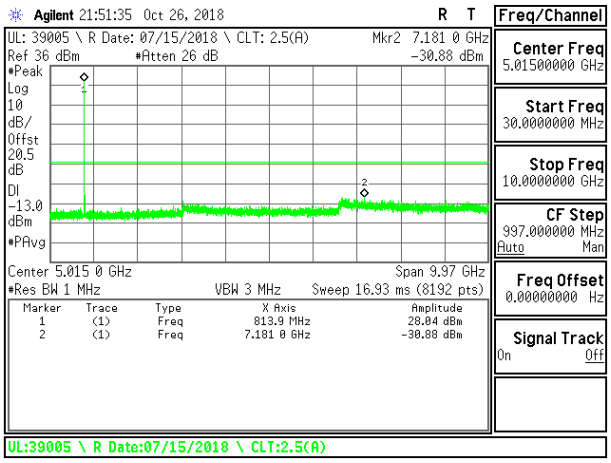
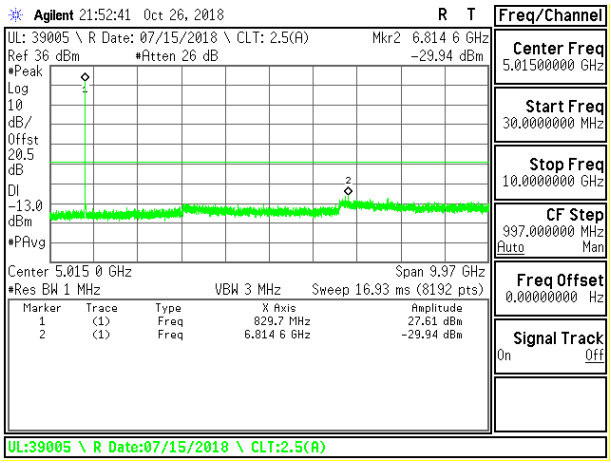
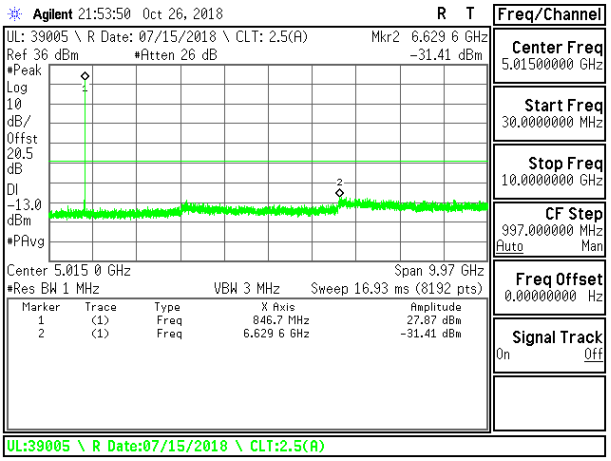


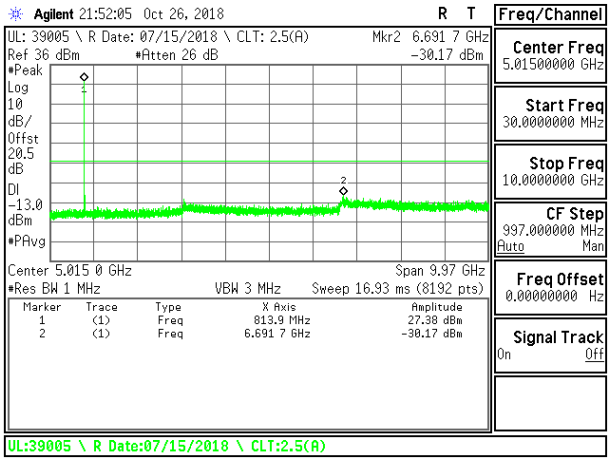
LTE B26 3MHz QPSK Low Channel RB1-0



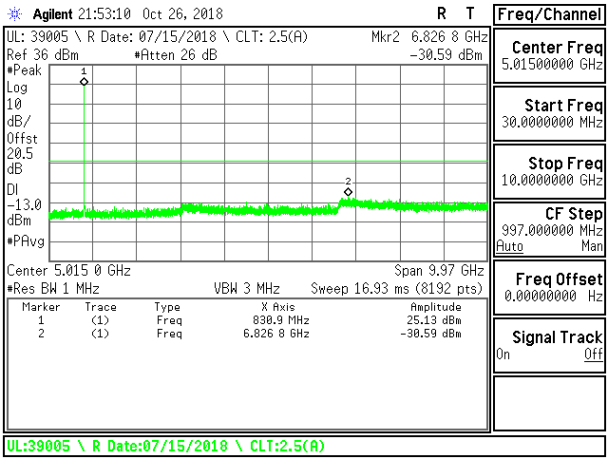
LTE B26 3MHz QPSK Mid Channel RB1-0



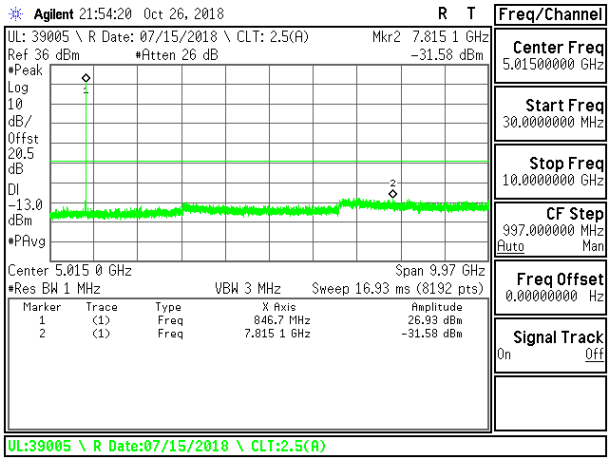
LTE B26 3MHz QPSK High Channel RB1-0



LTE B26 3MHz 16QAM Low Channel RB1-0



LTE B26 3MHz 16QAM Mid Channel RB1-0



LTE B26 3MHz 16QAM High Channel RB1-0

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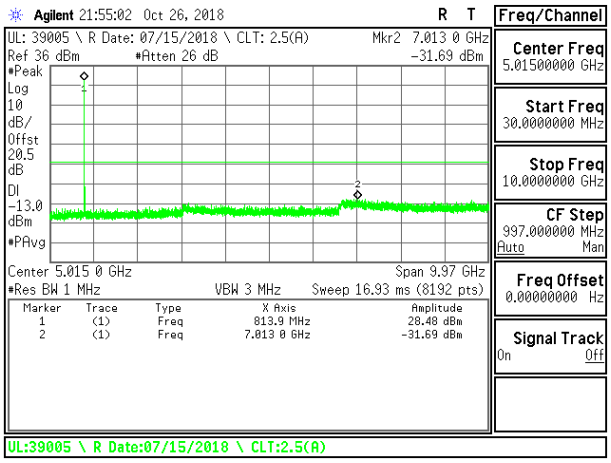
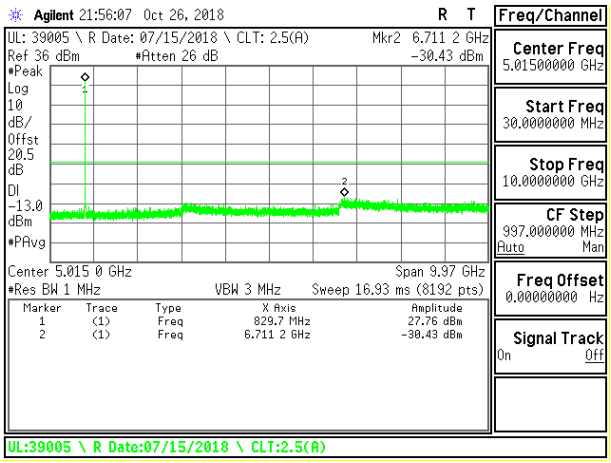
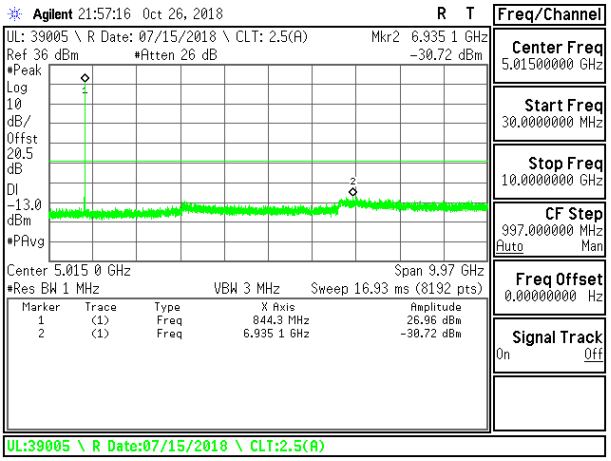


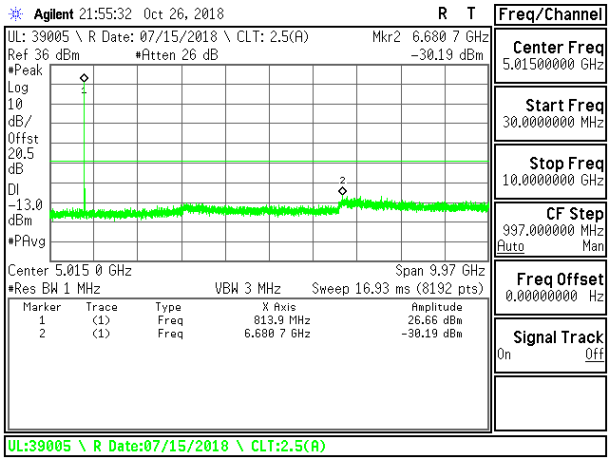
LTE B26 5MHz QPSK Low Channel RB1-0



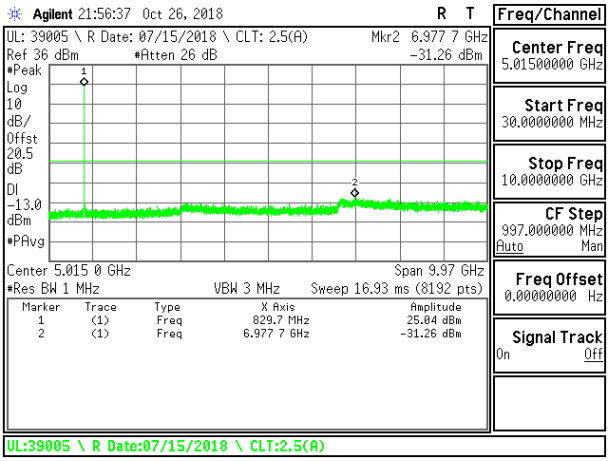
LTE B26 5MHz QPSK Mid Channel RB1-0



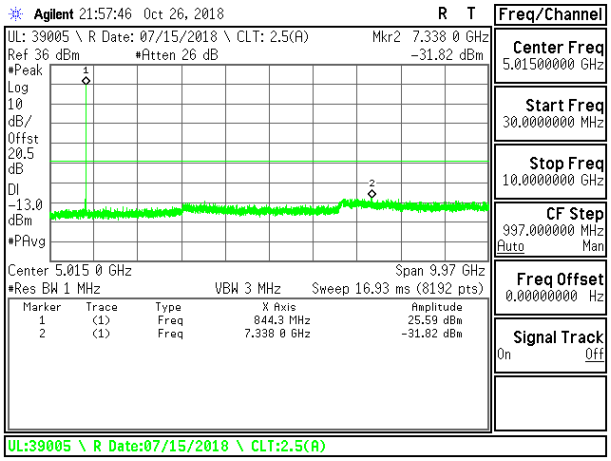
LTE B26 5MHz QPSK High Channel RB1-0



LTE B26 5MHz 16QAM Low Channel RB1-0



LTE B26 5MHz 16QAM Mid Channel RB1-0



LTE B26 5MHz 16QAM High Channel RB1-0

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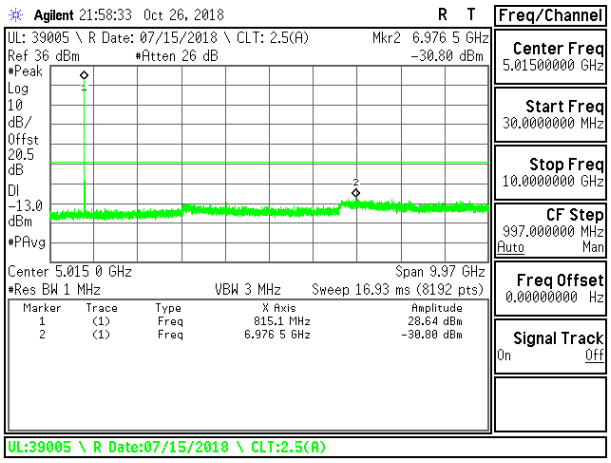
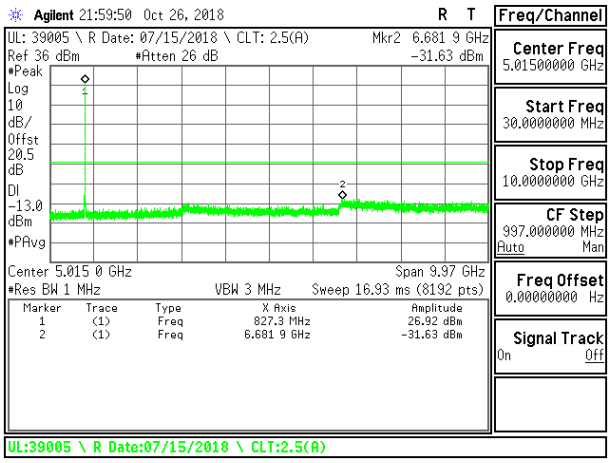
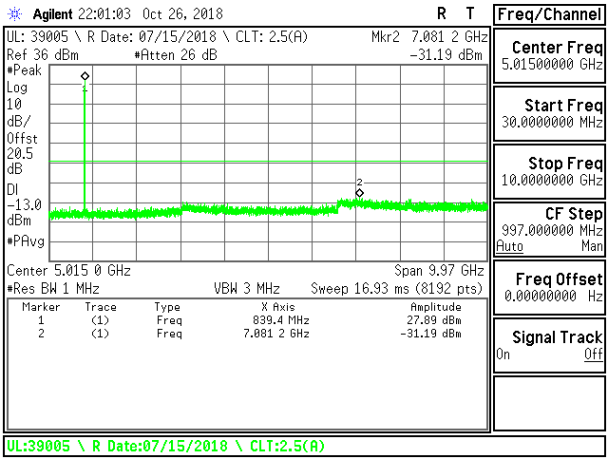


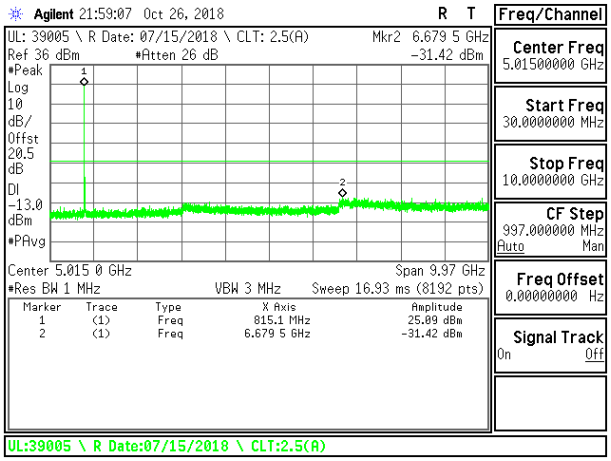
LTE B26 10MHz QPSK Low Channel RB1-0



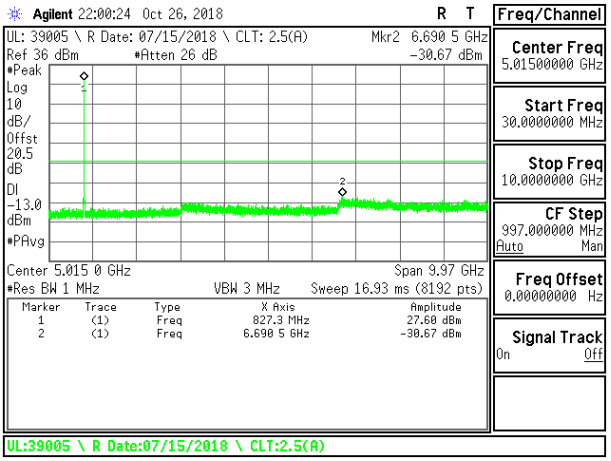
LTE B26 10MHz QPSK Mid Channel RB1-0



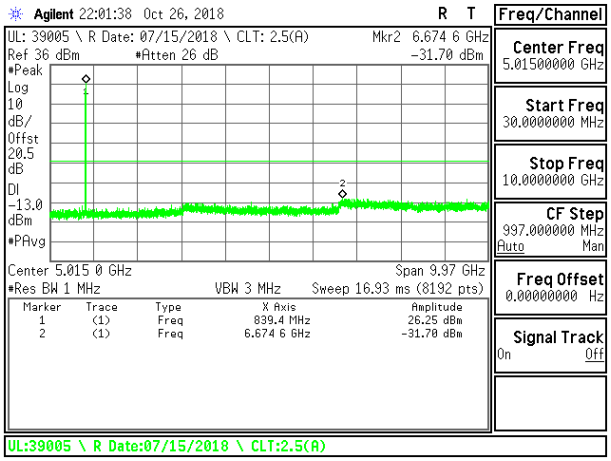
LTE B26 10MHz QPSK High Channel RB1-0



LTE B26 10MHz 16QAM Low Channel RB1-0



LTE B26 10MHz 16QAM Mid Channel RB1-0



LTE B26 10MHz 16QAM High Channel RB1-0

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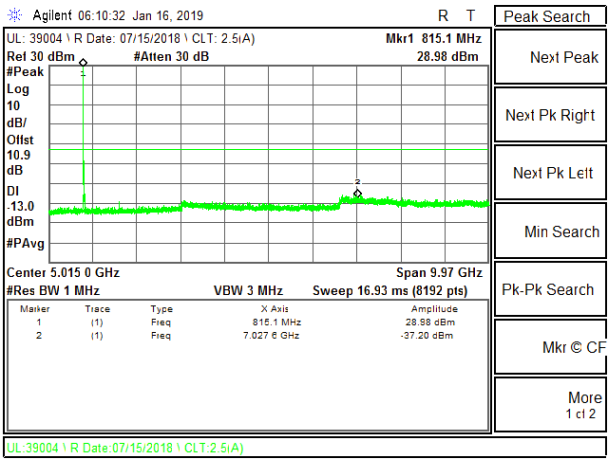
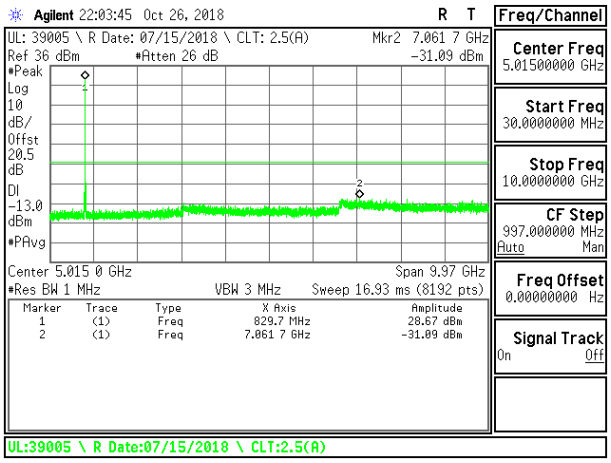
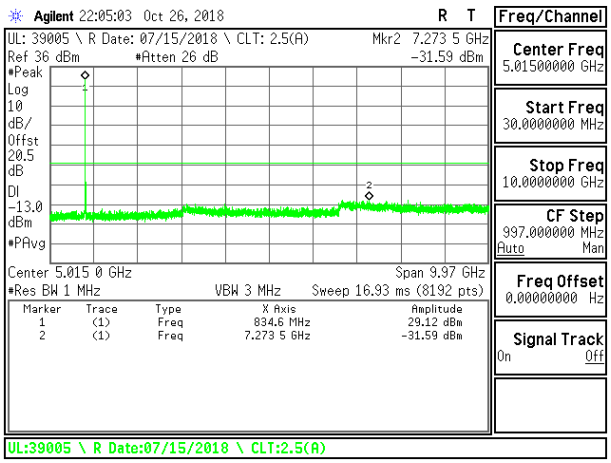


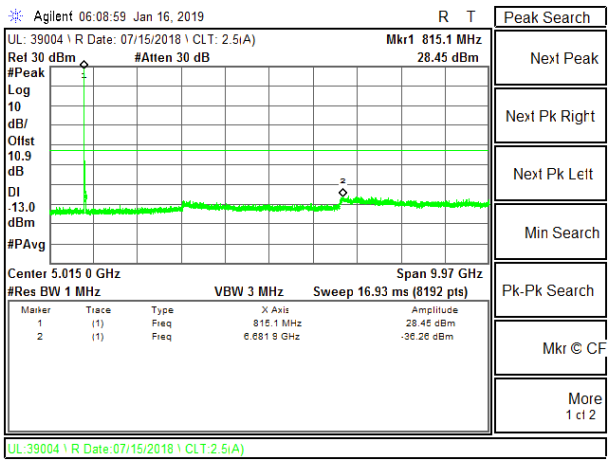
LTE B26 15MHz QPSK Low Channel RB1-0



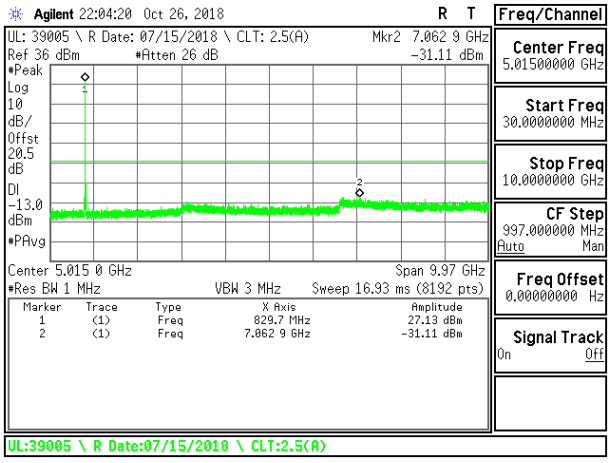
LTE B26 15MHz QPSK Mid Channel RB1-0



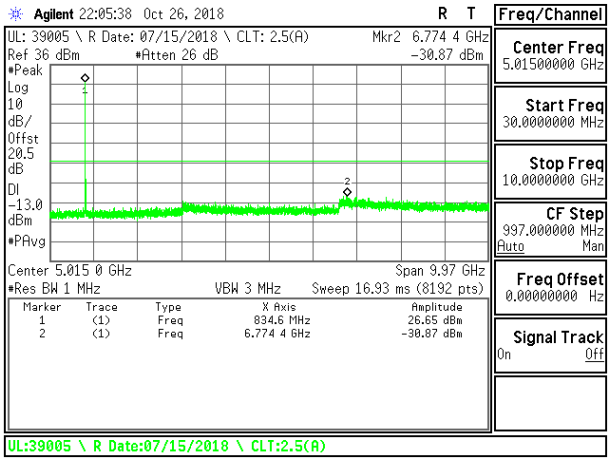
LTE B26 15MHz QPSK High Channel RB1-0



LTE B26 15MHz 16QAM Low Channel RB1-0



LTE B26 15MHz 16QAM Mid Channel RB1-0



LTE B26 15MHz 16QAM High Channel RB1-0

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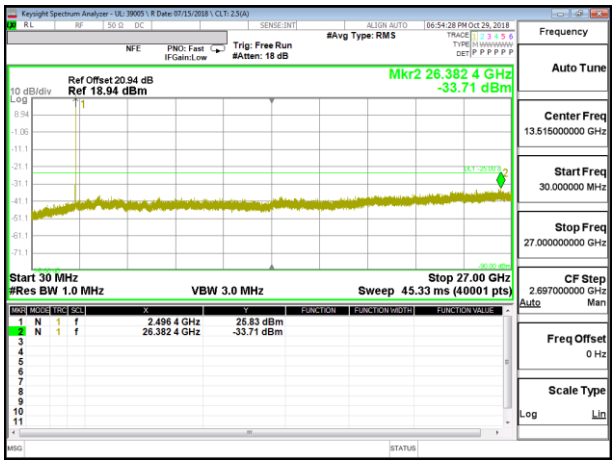
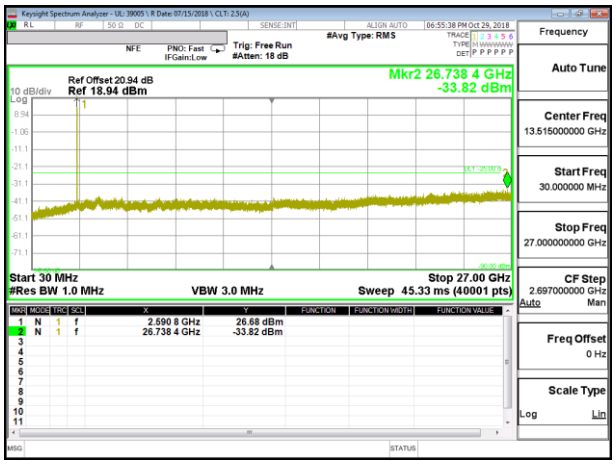
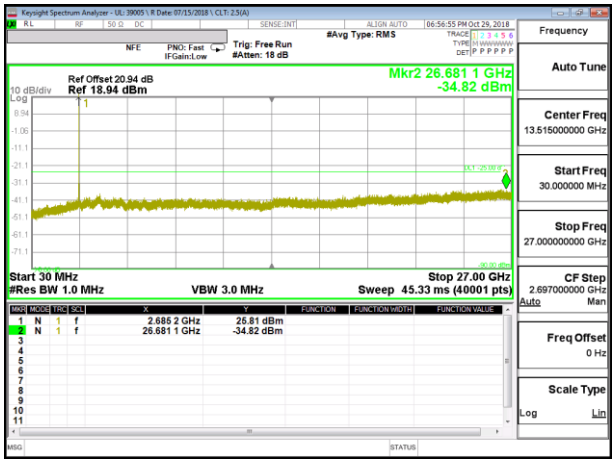
9.3.14. **LTE BAND 41**



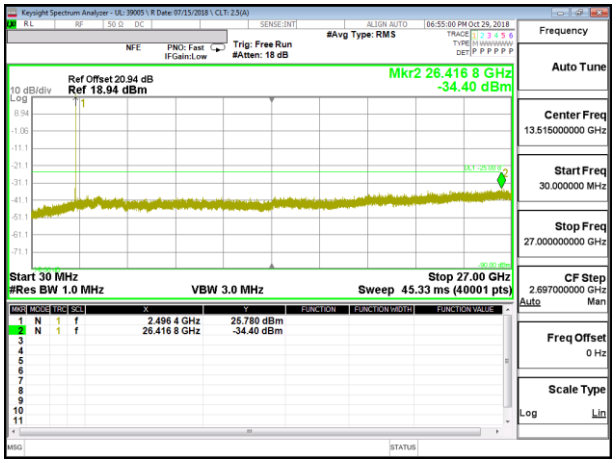
LTE B41 5MHz QPSK Low Channel RB1-0



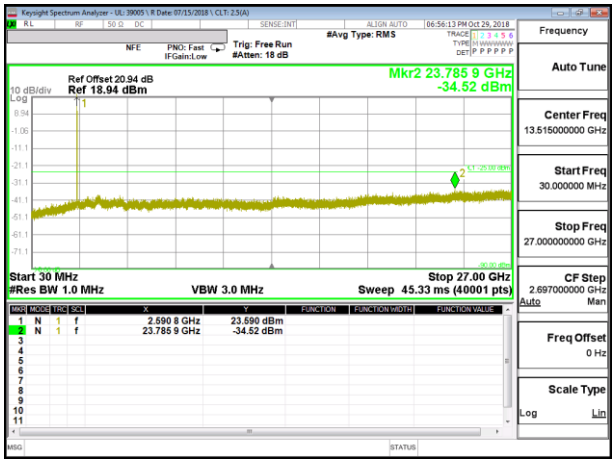
LTE B41 5MHz QPSK Mid Channel RB1-0



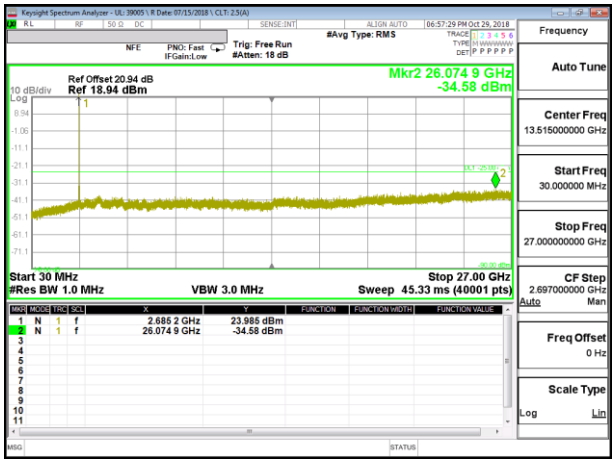
LTE B41 5MHz QPSK High Channel RB1-0



LTE B41 5MHz 16QAM Low Channel RB1-0



LTE B41 5MHz 16QAM Mid Channel RB1-0



LTE B41 5MHz 16QAM High Channel RB1-0

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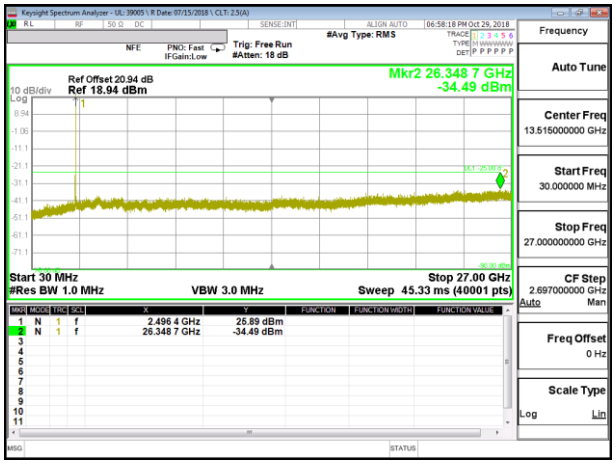
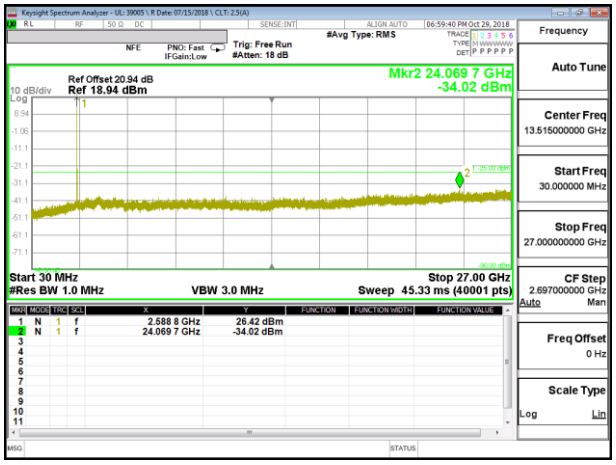
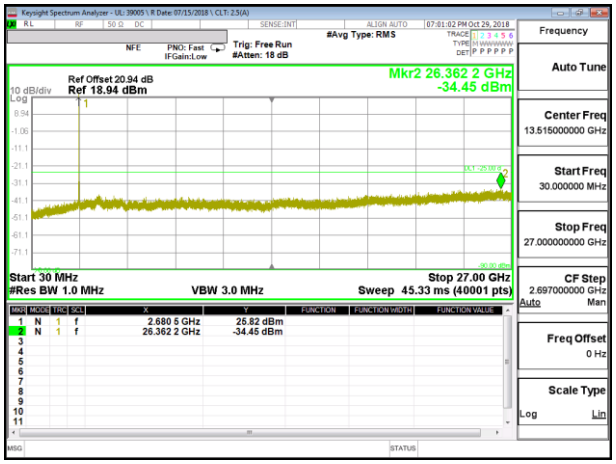


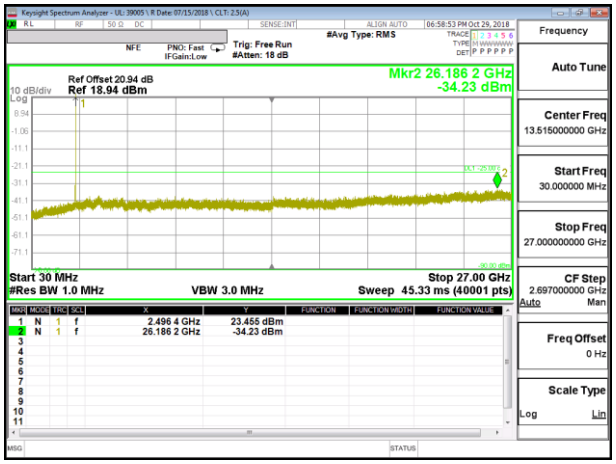
LTE B41 10MHz QPSK Low Channel RB1-0



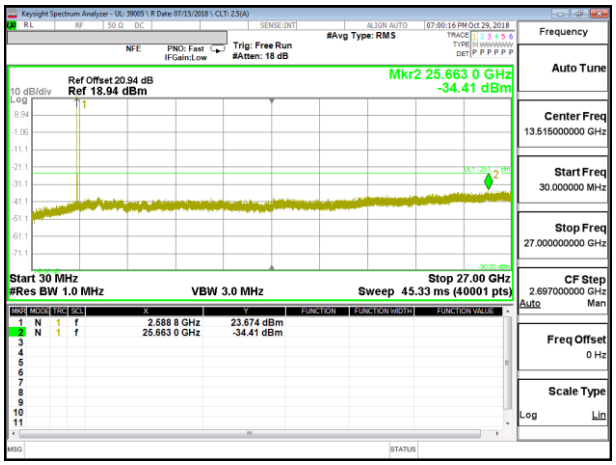
LTE B41 10MHz QPSK Mid Channel RB1-0



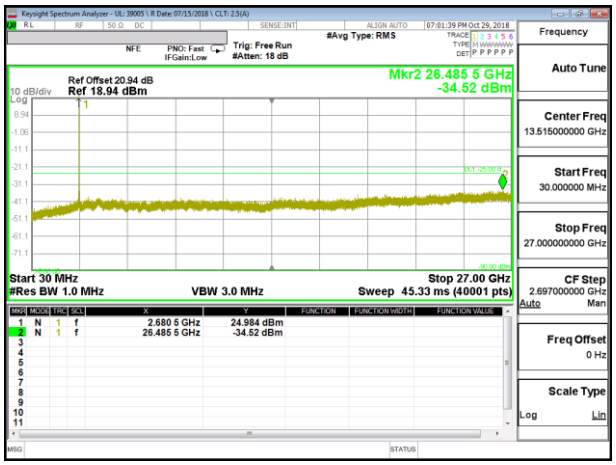
LTE B41 10MHz QPSK High Channel RB1-0



LTE B41 10MHz 16QAM Low Channel RB1-0



LTE B41 10MHz 16QAM Mid Channel RB1-0



LTE B41 10MHz 16QAM High Channel RB1-0

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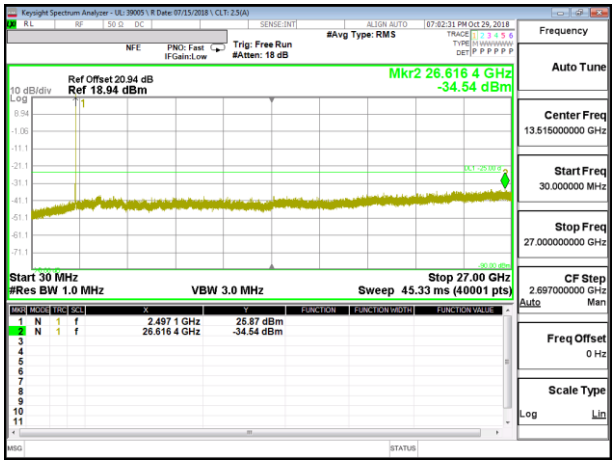
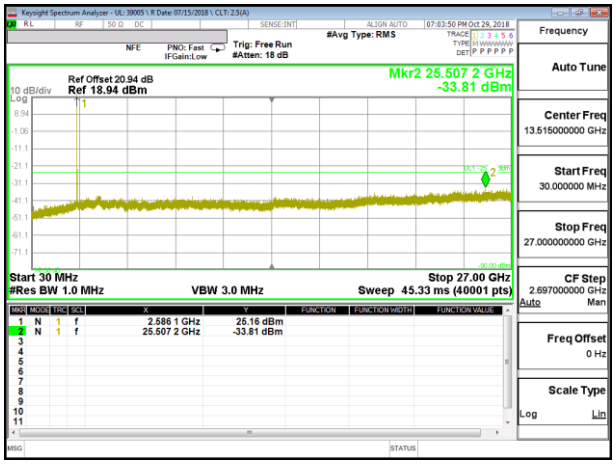
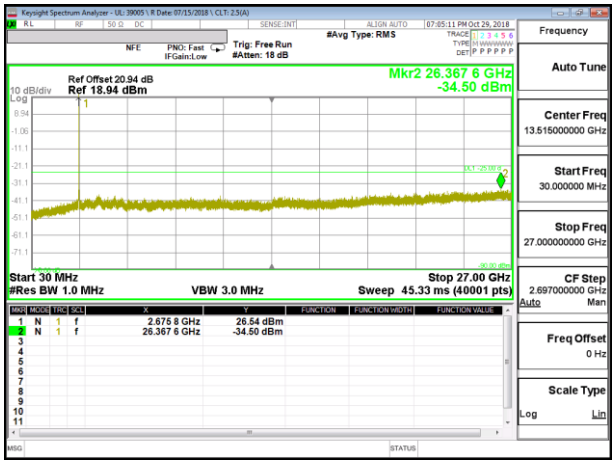


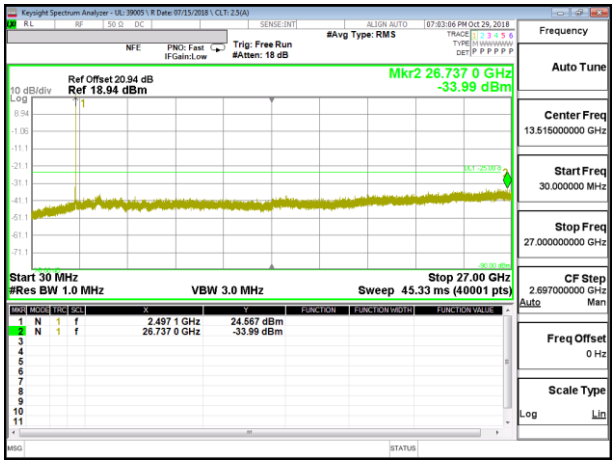
LTE B41 15MHz QPSK Low Channel RB1-0



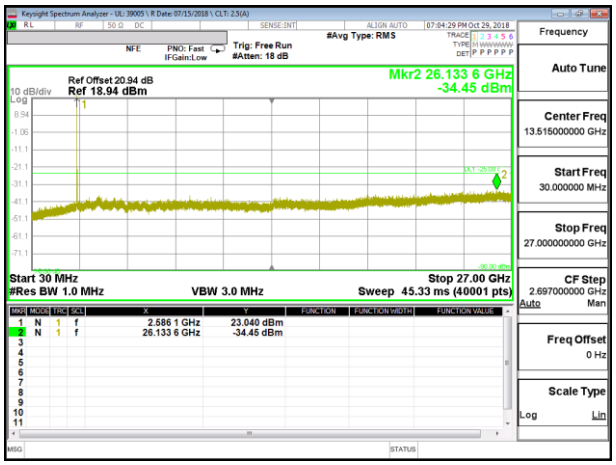
LTE B41 15MHz QPSK Mid Channel RB1-0



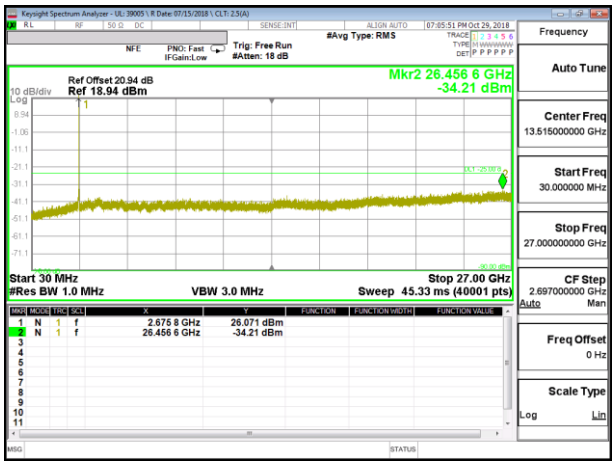
LTE B41 15MHz QPSK High Channel RB1-0



LTE B41 15MHz 16QAM Low Channel RB1-0



LTE B41 15MHz 16QAM Mid Channel RB1-0



LTE B41 15MHz 16QAM High Channel RB1-0

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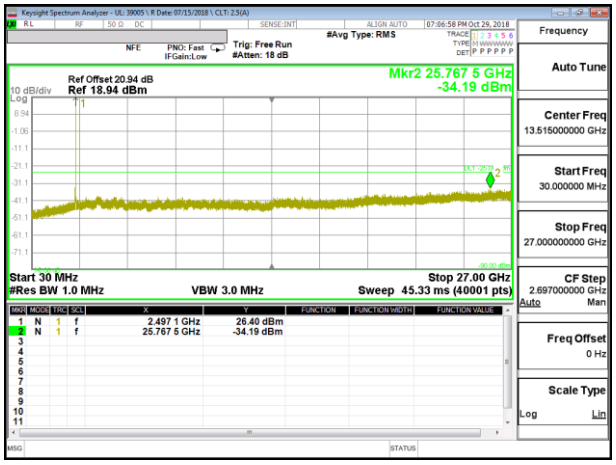
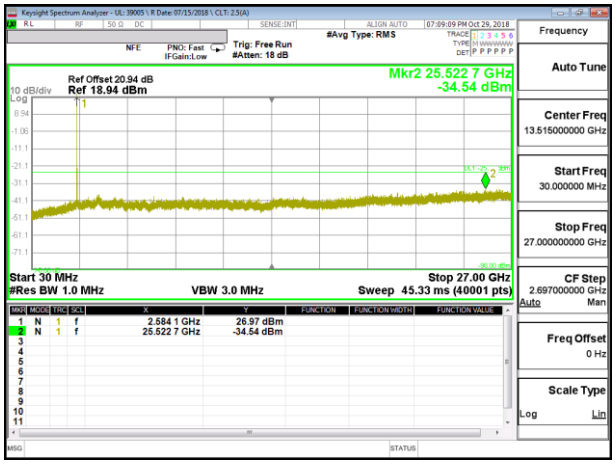
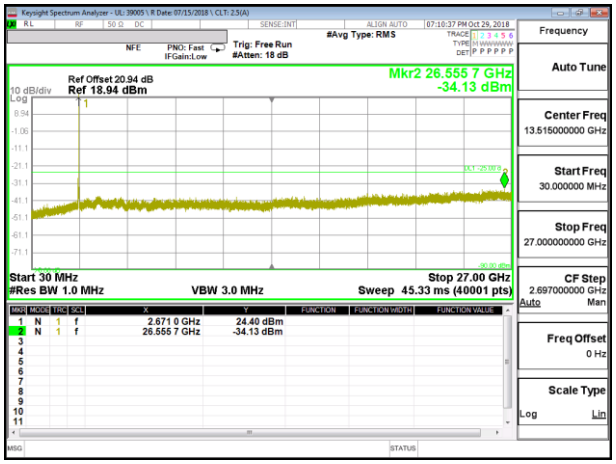


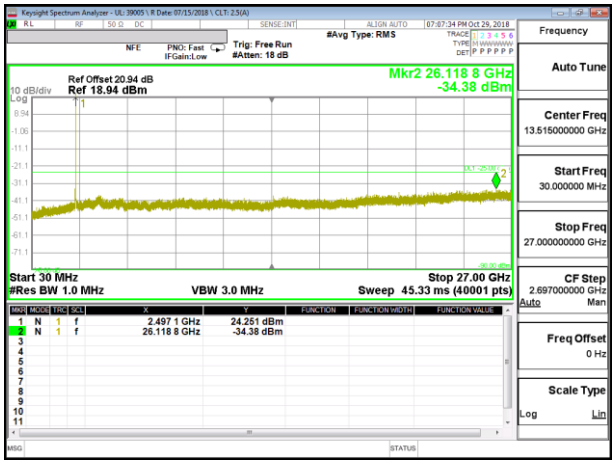
LTE B41 20MHz QPSK Low Channel RB1-0



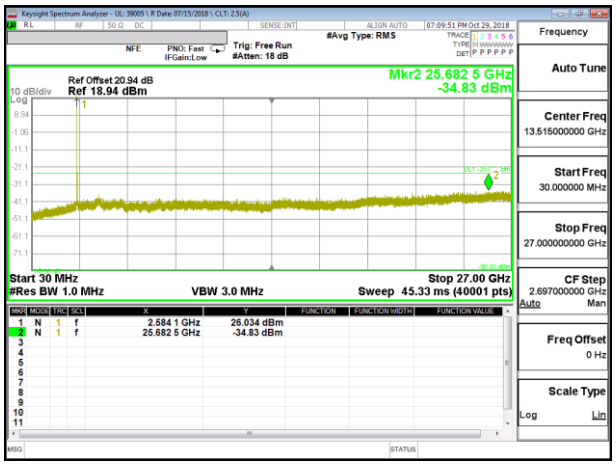
LTE B41 20MHz QPSK Mid Channel RB1-0



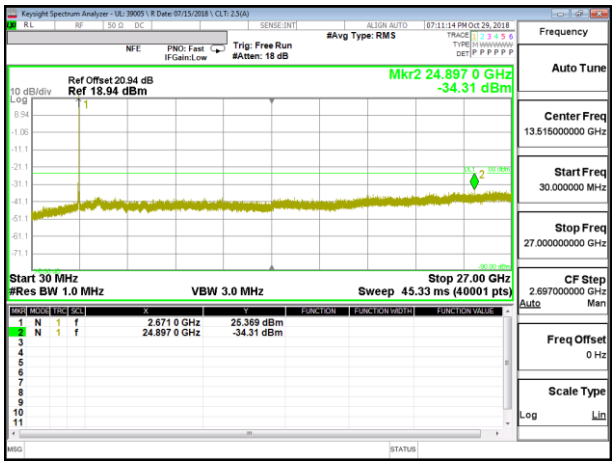
LTE B41 20MHz QPSK High Channel RB1-0



LTE B41 20MHz 16QAM Low Channel RB1-0



LTE B41 20MHz 16QAM Mid Channel RB1-0



LTE B41 20MHz 16QAM High Channel RB1-0

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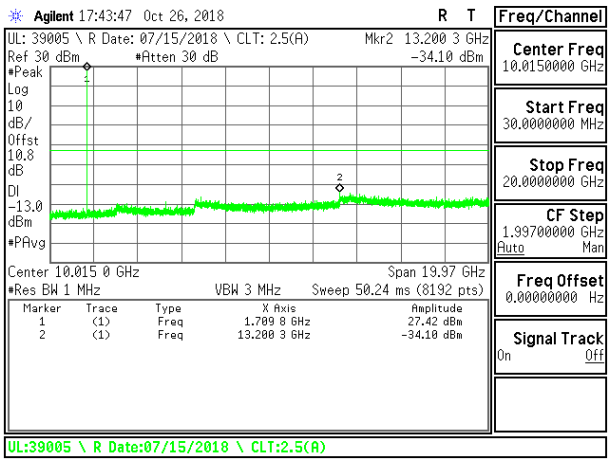
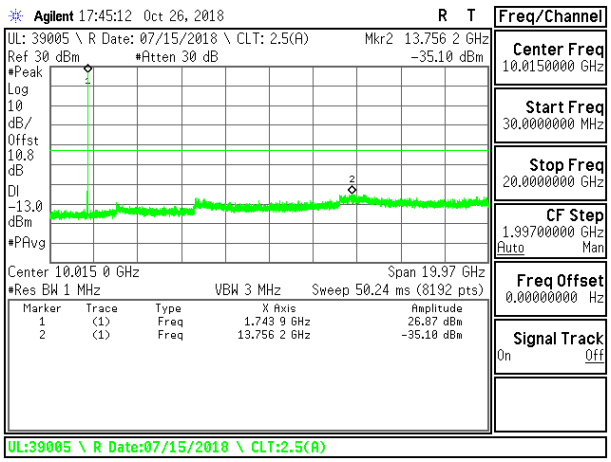
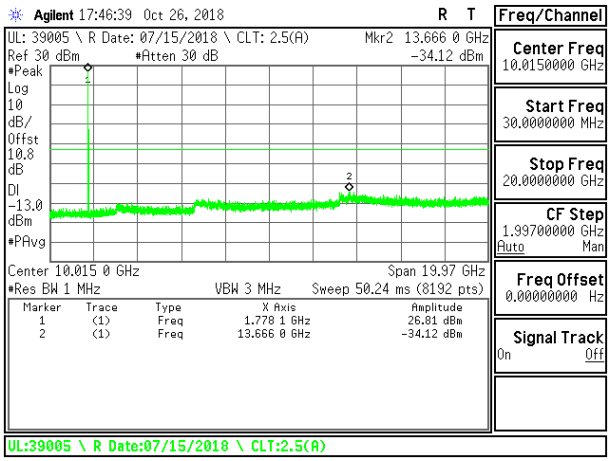
9.3.15. **LTE BAND 66**



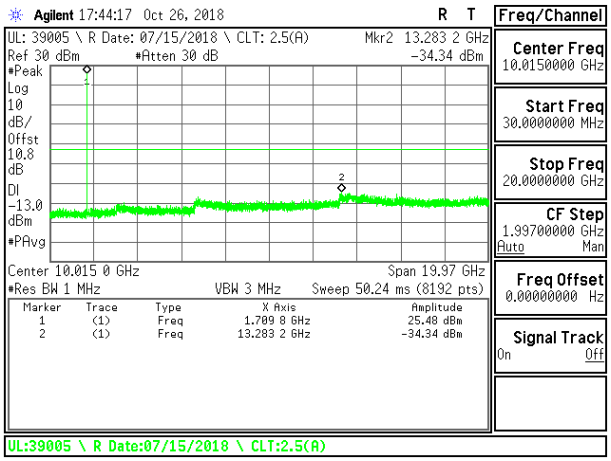
LTE B66 1.4MHz QPSK Low Channel RB1-0



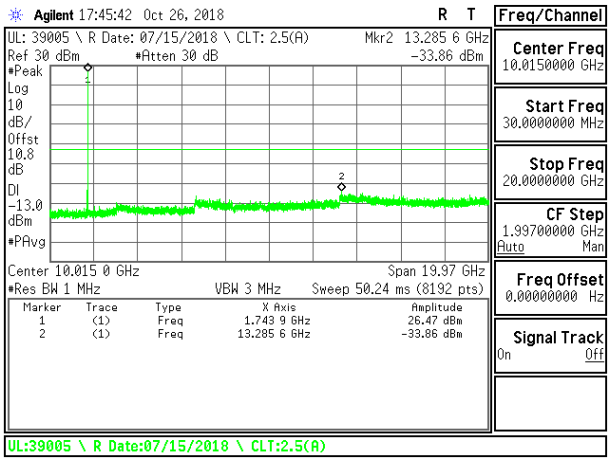
LTE B66 1.4MHz QPSK Mid Channel RB1-0



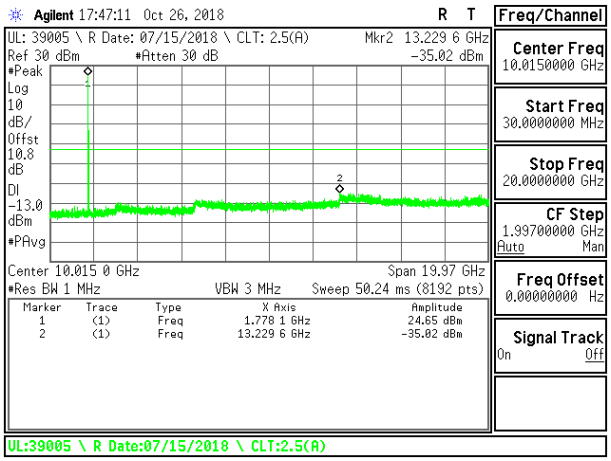
LTE B66 1.4MHz QPSK High Channel RB1-0



LTE B66 1.4MHz 16QAM Low Channel RB1-0



LTE B66 1.4MHz 16QAM Mid Channel RB1-0



LTE B66 1.4MHz 16QAM High Channel RB1-0

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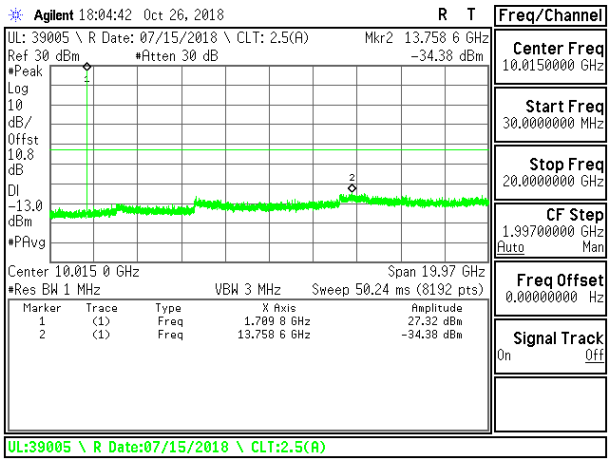
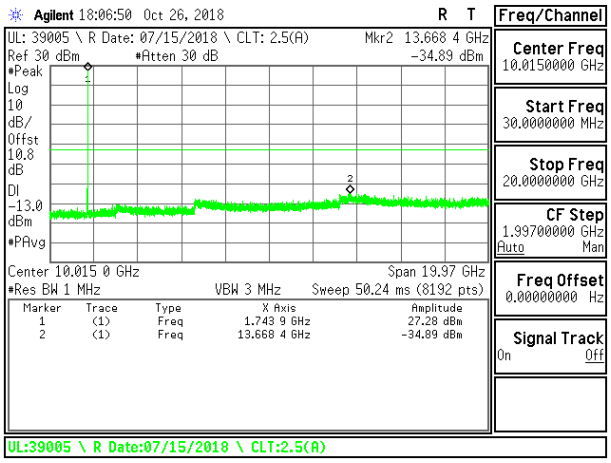
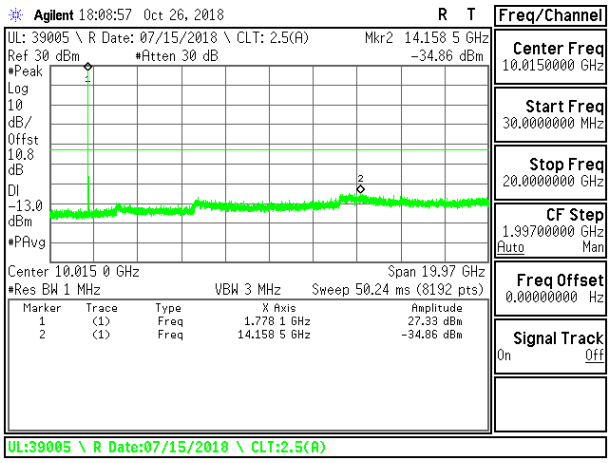


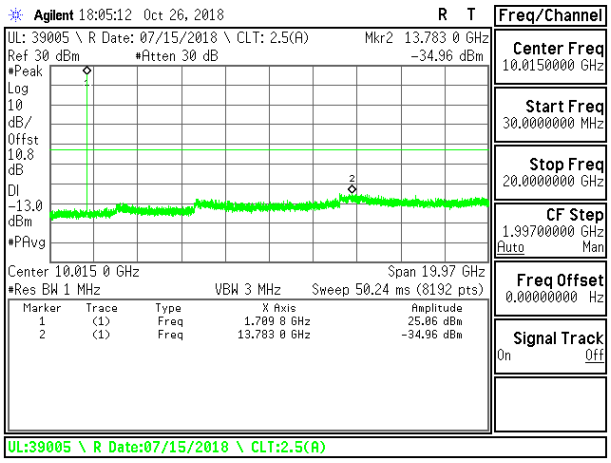
LTE B66 3MHz QPSK Low Channel RB1-0



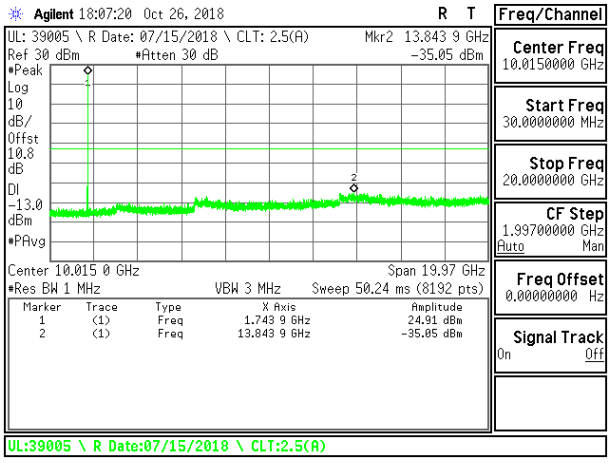
LTE B66 3MHz QPSK Mid Channel RB1-0



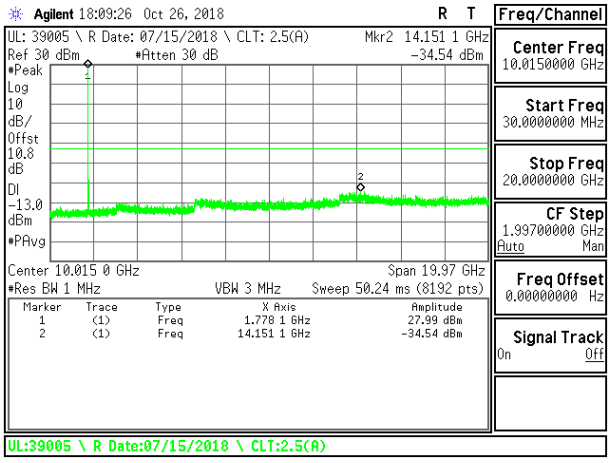
LTE B66 3MHz QPSK High Channel RB1-0



LTE B66 3MHz 16QAM Low Channel RB1-0



LTE B66 3MHz 16QAM Mid Channel RB1-0



LTE B66 3MHz 16QAM High Channel RB1-0

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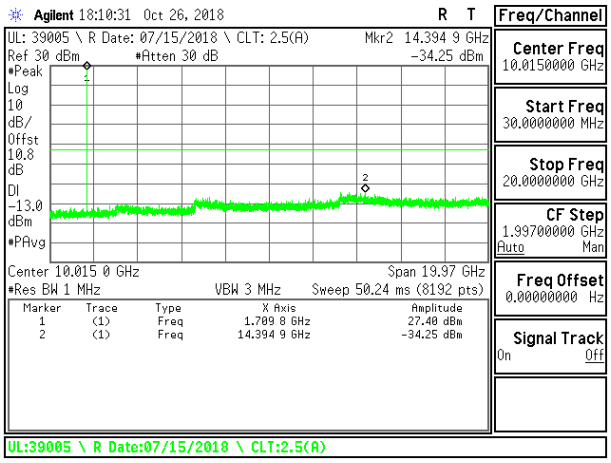
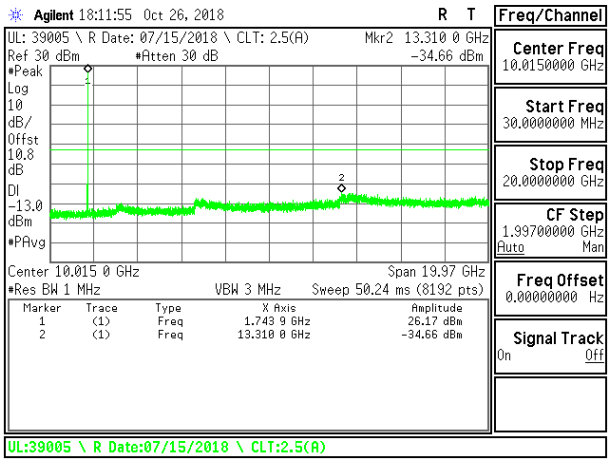
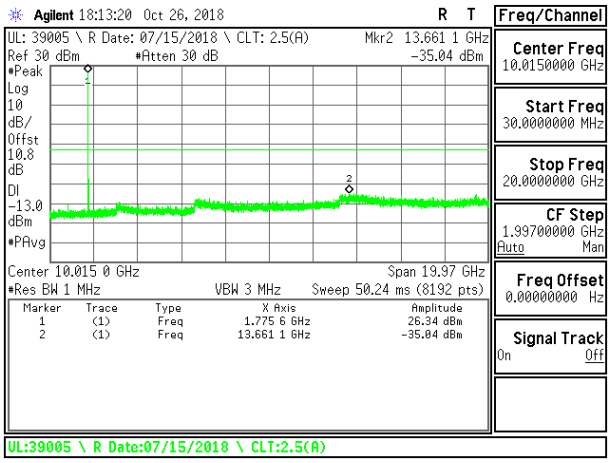


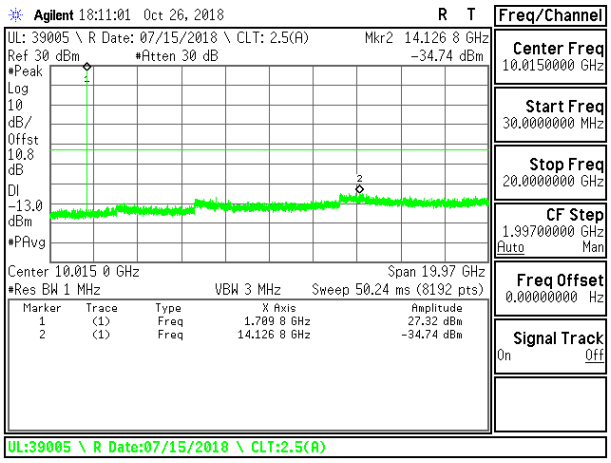
LTE B66 5MHz QPSK Low Channel RB1-0



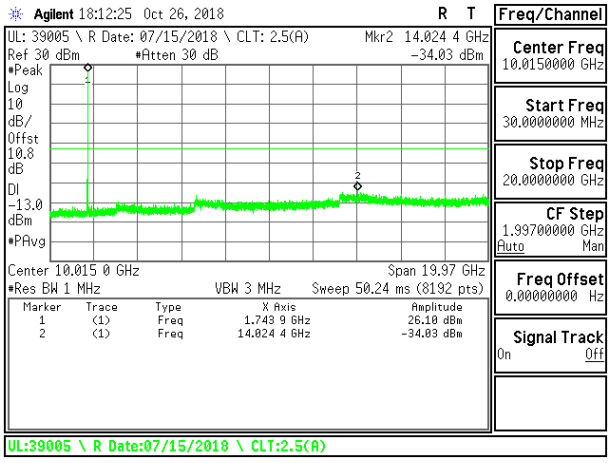
LTE B66 5MHz QPSK Mid Channel RB1-0



LTE B66 5MHz QPSK High Channel RB1-0



LTE B66 5MHz 16QAM Low Channel RB1-0



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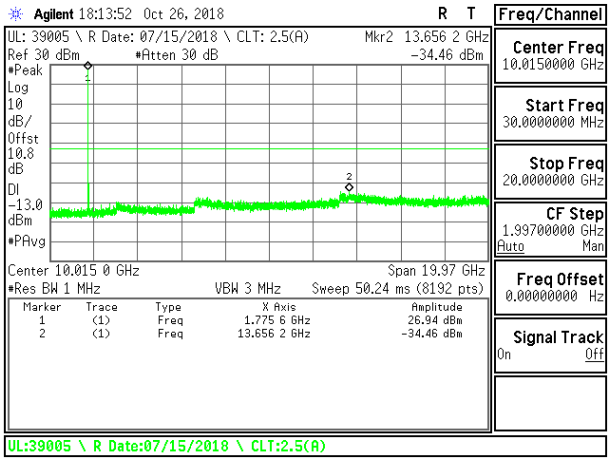

LTE B66 5MHz 16QAM High Channel RB1-0

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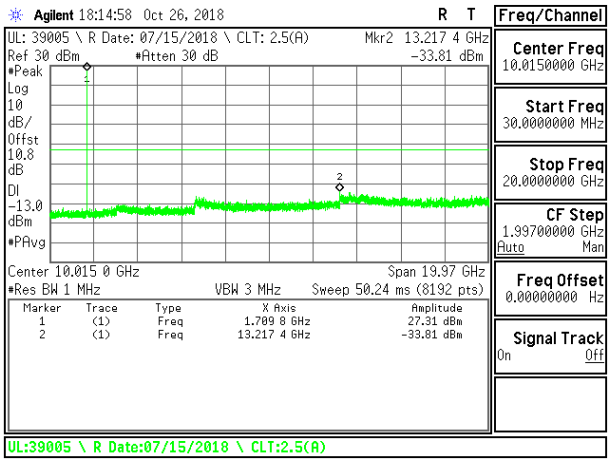
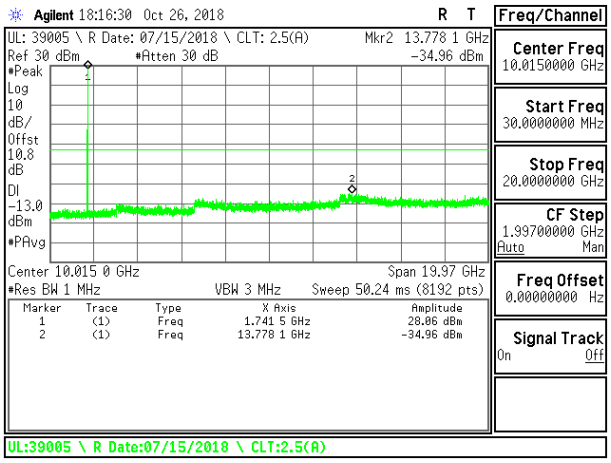


LTE B66 10MHz QPSK Low Channel RB1-0



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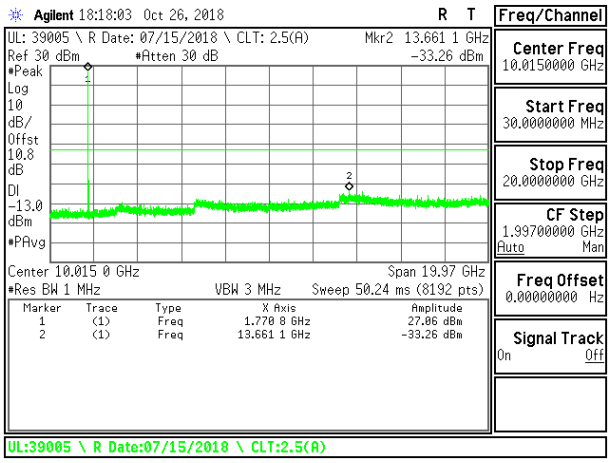
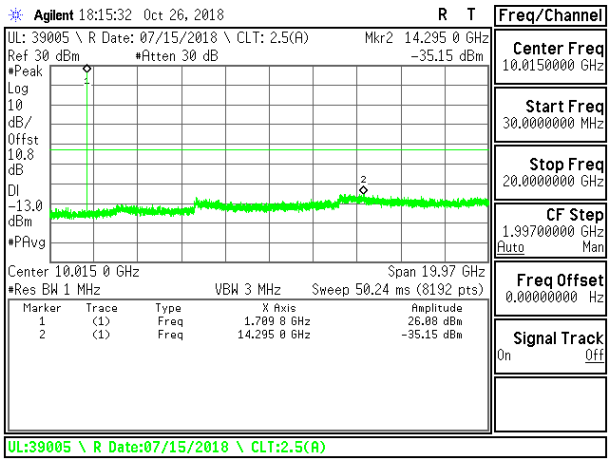
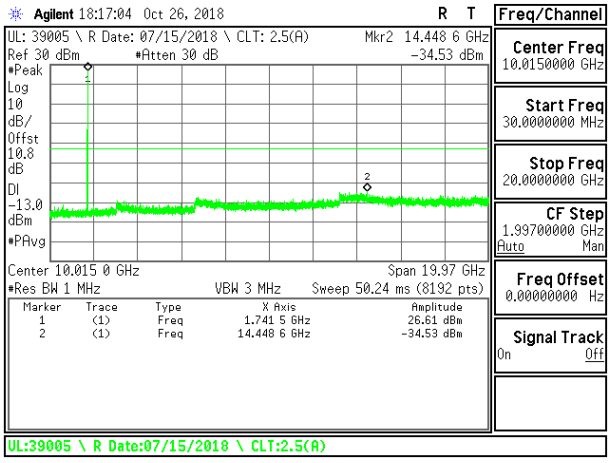


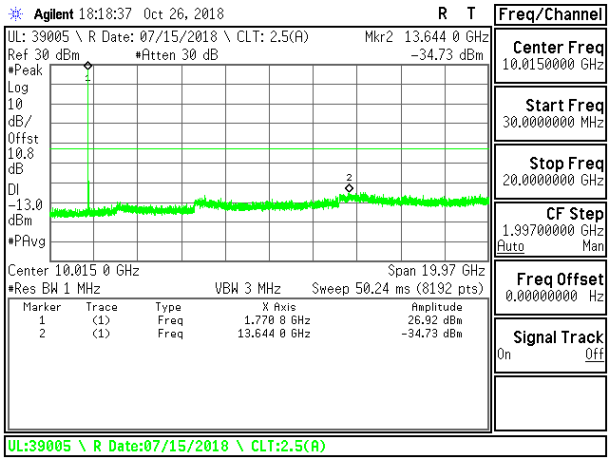
LTE B66 10MHz QPSK High Channel RB1-0



LTE B66 10MHz 16QAM Low Channel RB1-0



LTE B66 10MHz 16QAM Mid Channel RB1-0



LTE B66 10MHz 16QAM High Channel RB1-0

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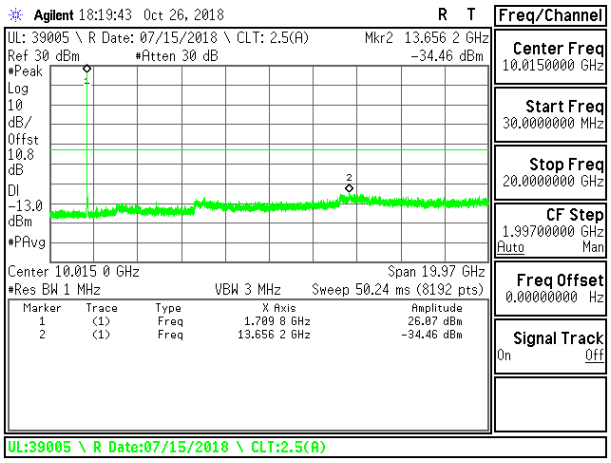
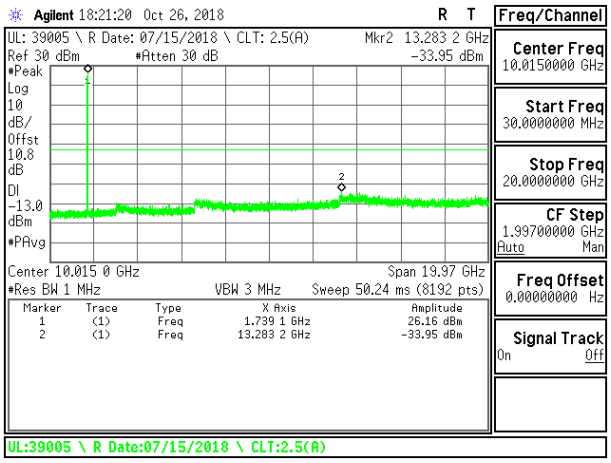
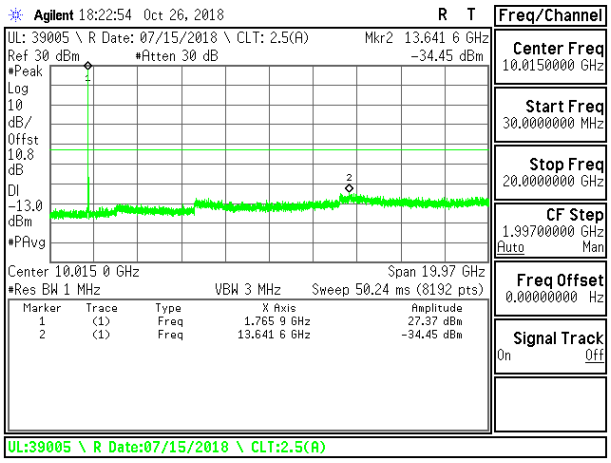


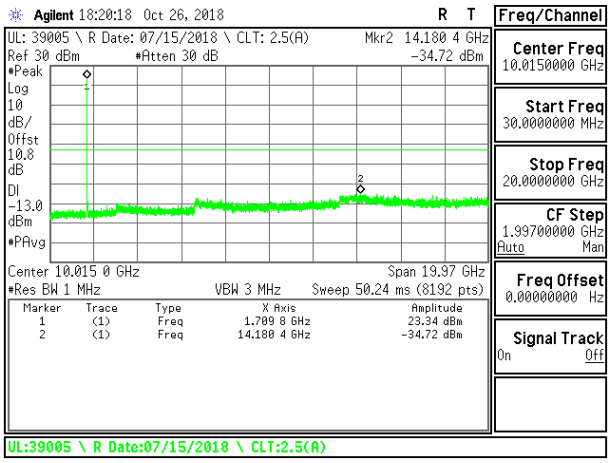
LTE B66 15MHz QPSK Low Channel RB1-0



LTE B66 15MHz QPSK Mid Channel RB1-0



LTE B66 15MHz QPSK High Channel RB1-0



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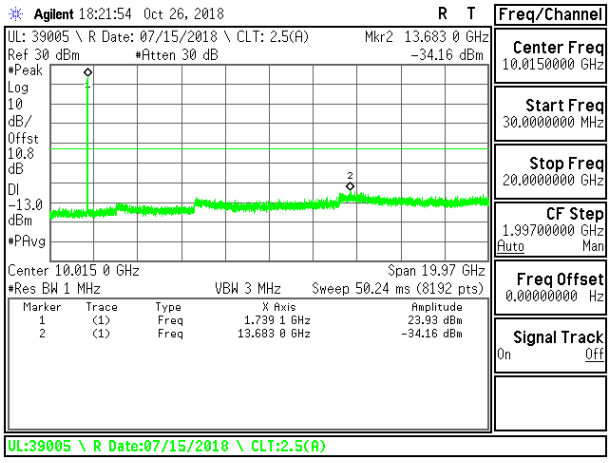
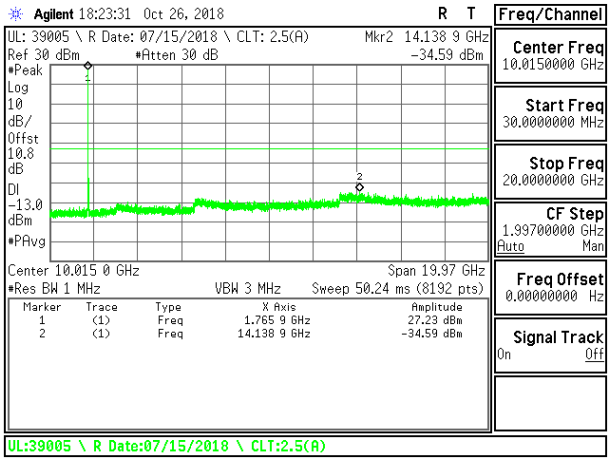


LTE B66 15MHz 16QAM Mid Channel RB1-0



LTE B66 15MHz 16QAM High Channel RB1-0

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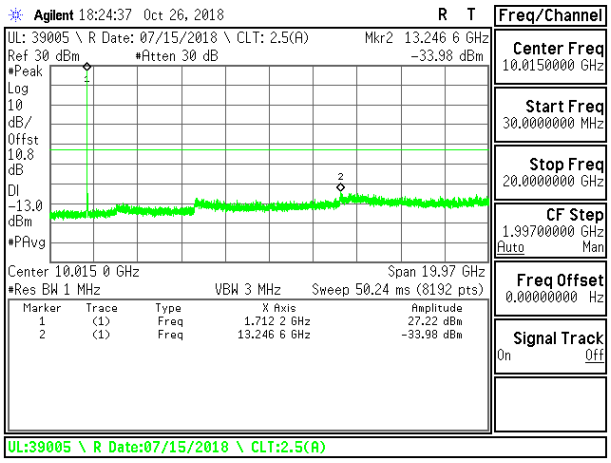
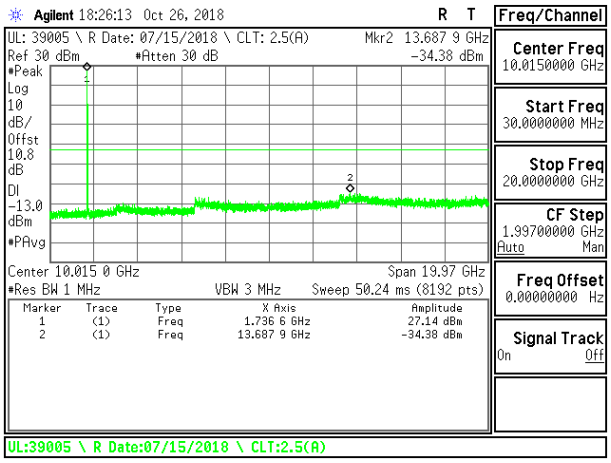
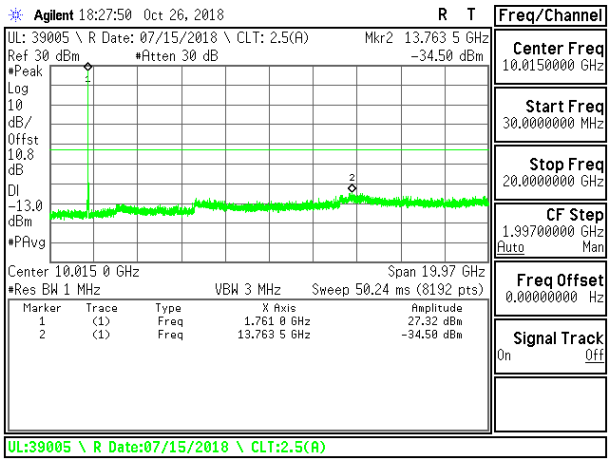


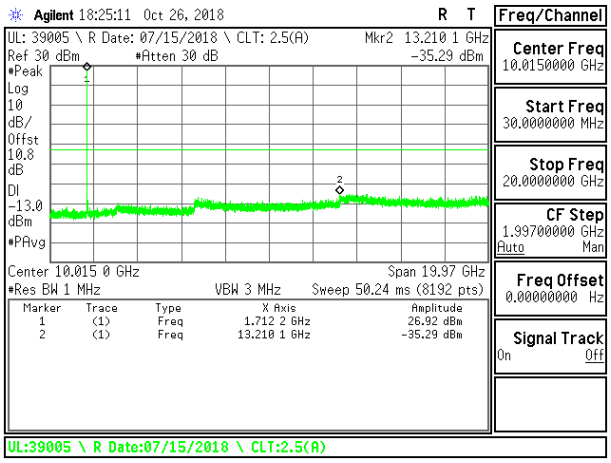
LTE B66 20MHz QPSK Low Channel RB1-0



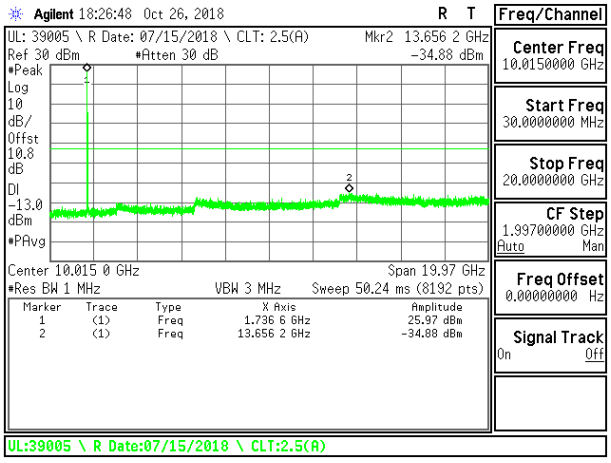
LTE B66 20MHz QPSK Mid Channel RB1-0



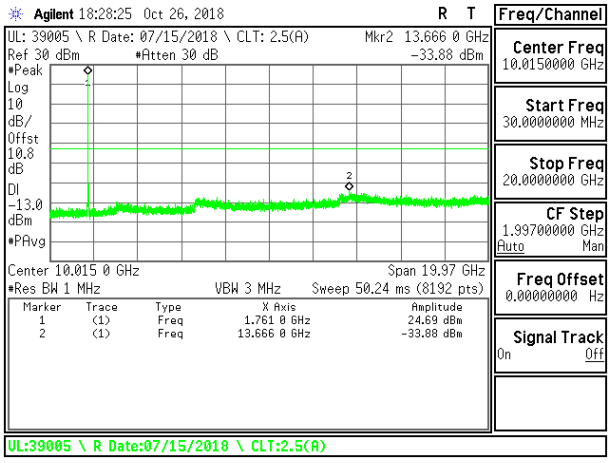
LTE B66 20MHz QPSK High Channel RB1-0



LTE B66 20MHz 16QAM Low Channel RB1-0



LTE B66 20MHz 16QAM Mid Channel RB1-0



LTE B66 20MHz 16QAM High Channel RB1-0

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9.4. FREQUENCY STABILITY

RULE PART(S)

FCC: §2.1055, §22.355, §24.235, §27.54 and §90.213

LIMITS

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

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

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = −30°C to +50°C
- Voltage = (85% - 115%)

  Low voltage, 3.3VDC, Normal, 3.85VDC and High voltage, 4.43VDC.
  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).

MODES TESTED

- GSM 850
- GSM 1900
- WCDMA Band 5
- WCDMA Band 2
- WCDMA Band 4
- LTE Band 2
- LTE Band 4
- LTE Band 5
- LTE Band 12
- LTE Band 13
- LTE Band 17
- LTE Band 25
- LTE Band 26
- LTE Band 41
- LTE Band 66

RESULTS

See the following pages.

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9.4.1. GSM

ID:	43575	Date:	11/16/18

GPRS 850MHz

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.0393	848.9640		
Extreme (50C)		824.0393	848.9640	-5.8	-0.007
Extreme (40C)		824.0393	848.9640	-4.7	-0.006
Extreme (30C)		824.0393	848.9640	-14.0	-0.017
Extreme (10C)		824.0393	848.9640	-9.8	-0.012
Extreme (0C)		824.0393	848.9640	-12.3	-0.015
Extreme (-10C)		824.0393	848.9640	-23.5	-0.028
Extreme (-20C)		824.0393	848.9640	-32.3	-0.039
Extreme (-30C)		824.0393	848.9640	-27.7	-0.033
20C	15%	824.0393	848.9640	-17.8	-0.021
	-15%	824.0393	848.9640	-18.8	-0.022
	End Point	824.0393	848.9640	-13.1	-0.016

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GPRS 1900MHz

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1850.0539	1909.9480		
Extreme (50C)		1850.0539	1909.9480	9.6	0.005
Extreme (40C)		1850.0539	1909.9480	19.8	0.011
Extreme (30C)		1850.0539	1909.9480	-25.5	-0.014
Extreme (10C)		1850.0539	1909.9480	17.2	0.009
Extreme (0C)		1850.0539	1909.9480	10.4	0.006
Extreme (-10C)		1850.0539	1909.9480	-42.3	-0.022
Extreme (-20C)		1850.0539	1909.9480	-38.8	-0.021
Extreme (-30C)		1850.0539	1909.9480	-41.9	-0.022
20C	15%	1850.0539	1909.9480	31.5	0.017
	-15%	1850.0539	1909.9480	-12.2	-0.006
	End Point	1850.0539	1909.9480	-16.9	-0.009

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9.4.2. WCDMA

ID:	43575	Date:	11/16/18

UMTS REL99 BAND 5

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	824.0983	848.7060		
Extreme (50C)		824.0983	848.7060	3.5	0.0042
Extreme (40C)		824.0983	848.7060	2.0	0.0024
Extreme (30C)		824.0983	848.7060	2.3	0.0027
Extreme (10C)		824.0983	848.7060	2.7	0.0032
Extreme (0C)		824.0983	848.7060	2.1	0.0025
Extreme (-10C)		824.0983	848.7060	-1.7	-0.0020
Extreme (-20C)		824.0983	848.7060	2.1	0.0025
Extreme (-30C)		824.0983	848.7060	2.1	0.0025
20C	15%	824.0983	848.7060	-1.7	-0.0021
	-15%	824.0983	848.7060	2.0	0.0024
	End Point	824.0983	848.7060	1.3	0.0015

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UMTS REL99 BAND 2

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1850.1032	1909.3072		
Extreme (50C)		1850.1032	1909.3072	8.2	0.0044
Extreme (40C)		1850.1032	1909.3072	3.3	0.0018
Extreme (30C)		1850.1032	1909.3072	3.9	0.0020
Extreme (10C)		1850.1032	1909.3072	3.5	0.0019
Extreme (0C)		1850.1032	1909.3072	2.7	0.0014
Extreme (-10C)		1850.1032	1909.3072	2.5	0.0013
Extreme (-20C)		1850.1032	1909.3072	3.2	0.0017
Extreme (-30C)		1850.1032	1909.3072	3.5	0.0019
20C	15%	1850.1032	1909.3072	-3.2	-0.0017
	-15%	1850.1032	1909.3072	-2.2	-0.0012
	End Point	1850.1032	1909.3072	-4.2	-0.0022

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UMTS REL99 BAND 4

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	1710.1068	1754.9005		
Extreme (50C)		1710.1068	1754.9005	9.4	0.0054
Extreme (40C)		1710.1068	1754.9005	7.6	0.0044
Extreme (30C)		1710.1068	1754.9005	3.7	0.0021
Extreme (10C)		1710.1068	1754.9005	3.8	0.0022
Extreme (0C)		1710.1068	1754.9005	4.1	0.0024
Extreme (-10C)		1710.1068	1754.9005	3.8	0.0022
Extreme (-20C)		1710.1068	1754.9005	5.0	0.0029
Extreme (-30C)		1710.1068	1754.9005	3.3	0.0019
20C	15%	1710.1068	1754.9005	-2.6	-0.0015
	-15%	1710.1068	1754.9005	-3.5	-0.0020
	End Point	1710.1068	1754.9005	-3.5	-0.0020

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9.4.3. LTE BAND 2

ID:	10649	Date:	11/12/18

QPSK, (20MHz BANDWIDTH)

Limit		1850	1910	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1850.8520	1909.1670		
Extreme (50C)		1850.8520	1909.1670	-8.3	-0.004
Extreme (40C)		1850.8520	1909.1670	-8.3	-0.004
Extreme (30C)		1850.8520	1909.1670	-7.4	-0.004
Extreme (10C)		1850.8520	1909.1670	-7.5	-0.004
Extreme (0C)		1850.8520	1909.1670	-8.2	-0.004
Extreme (-10C)		1850.8520	1909.1670	-8.7	-0.005
Extreme (-20C)		1850.8520	1909.1670	-9.9	-0.005
Extreme (-30C)		1850.8520	1909.1670	-5.2	-0.003
20C	15%	1850.8520	1909.1670	-6.5	-0.003
	-15%	1850.8520	1909.1670	6.0	0.003
	End Point	1850.8520	1909.1670	5.9	0.003

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9.4.4. LTE BAND 4

ID:	10649	Date:	11/12/18

QPSK, (20MHz BANDWIDTH)

Limit		1710	1755	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1710.8390	1754.1610		
Extreme (50C)		1710.8390	1754.1610	-7.6	-0.004
Extreme (40C)		1710.8390	1754.1610	-6.9	-0.004
Extreme (30C)		1710.8390	1754.1610	-7.4	-0.004
Extreme (10C)		1710.8390	1754.1610	-7.5	-0.004
Extreme (0C)		1710.8390	1754.1610	-7.6	-0.004
Extreme (-10C)		1710.8390	1754.1610	-9.7	-0.006
Extreme (-20C)		1710.8390	1754.1610	-7.6	-0.004
Extreme (-30C)		1710.8390	1754.1610	5.1	0.003
20C	15%	1710.8390	1754.1610	4.1	0.002
	-15%	1710.8390	1754.1610	6.0	0.003
	End Point	1710.8390	1754.1610	6.2	0.004

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9.4.5. LTE BAND 5

ID:	10649	Date:	11/12/18

QPSK, (10MHz BANDWIDTH)

Limit		824	849	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	824.3162	848.6880		
Extreme (50C)		824.3162	848.6880	-5.1	-0.006
Extreme (40C)		824.3162	848.6880	-5.1	-0.006
Extreme (30C)		824.3162	848.6880	3.8	0.005
Extreme (10C)		824.3162	848.6880	-6.1	-0.007
Extreme (0C)		824.3162	848.6880	-4.7	-0.006
Extreme (-10C)		824.3162	848.6880	-4.2	-0.005
Extreme (-20C)		824.3162	848.6880	-7.0	-0.008
Extreme (-30C)		824.3162	848.6880	4.7	0.006
20C	15%	824.3162	848.6880	4.0	0.005
	-15%	824.3162	848.6880	4.6	0.005
	End Point	824.3162	848.6880	4.1	0.005

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9.4.6. LTE BAND 12

ID:	10649	Date:	11/12/18

QPSK, (10MHz BANDWIDTH)

Limit		699	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	699.3113	715.6887		
Extreme (50C)		699.3113	715.6887	-4.7	-0.01
Extreme (40C)		699.3113	715.6887	-4.6	-0.01
Extreme (30C)		699.3113	715.6887	5.0	0.01
Extreme (10C)		699.3113	715.6887	5.2	0.01
Extreme (0C)		699.3113	715.6887	-3.9	-0.01
Extreme (-10C)		699.3113	715.6887	-4.0	-0.01
Extreme (-20C)		699.3113	715.6887	4.9	0.01
Extreme (-30C)		699.3113	715.6887	5.7	0.01
20C	15%	699.3113	715.6887	8.0	0.01
	-15%	699.3113	715.6887	6.8	0.01
	End Point	699.3113	715.6887	6.5	0.01

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9.4.7. LTE BAND 13

ID:	10649	Date:	11/12/18

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	777.0397	786.9670		
Extreme (50C)		777.0397	786.9670	-4.6	-0.006
Extreme (40C)		777.0397	786.9670	4.7	0.006
Extreme (30C)		777.0397	786.9670	4.7	0.006
Extreme (10C)		777.0397	786.9670	-4.3	-0.005
Extreme (0C)		777.0397	786.9670	-4.6	-0.006
Extreme (-10C)		777.0397	786.9670	-4.5	-0.006
Extreme (-20C)		777.0397	786.9670	-5.1	-0.007
Extreme (-30C)		777.0397	786.9670	4.6	0.006
20C	15%	777.0397	786.9670	4.4	0.006
	-15%	777.0397	786.9670	4.4	0.006
	End Point	777.0397	786.9670	3.7	0.005

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9.4.8. LTE BAND 17

ID:	10649	Date:	11/12/18

QPSK, (10MHz BANDWIDTH)

Limit		704	716	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm	F high @ -13dBm		
Temperature	Voltage	(MHz)	(MHz)		
Normal (20C)	Normal	704.3064	715.6862		
Extreme (50C)		704.3064	715.6862	-5.6	-0.008
Extreme (40C)		704.3064	715.6862	6.3	0.009
Extreme (30C)		704.3064	715.6862	4.8	0.007
Extreme (10C)		704.3064	715.6862	4.0	0.006
Extreme (0C)		704.3064	715.6862	-3.9	-0.005
Extreme (-10C)		704.3064	715.6862	4.6	0.006
Extreme (-20C)		704.3064	715.6862	4.8	0.007
Extreme (-30C)		704.3064	715.6862	4.0	0.006
20C	15%	704.3064	715.6862	4.9	0.007
	-15%	704.3064	715.6862	5.3	0.007
	End Point	704.3064	715.6862	5.0	0.007

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9.4.9. LTE BAND 25

ID:	43575	Date:	11/16/18

QPSK, (20MHz BANDWIDTH)

Limit		1850	1915	Delta (Hz)	Frequency Stability (ppm)
Condition		F low @ -13dBm (MHz)	F high @ -13dBm (MHz)		
Temperature	Voltage				
Normal (20C)	Normal	1850.8390	1914.1610		
Extreme (50C)		1850.8390	1914.1610	5.4	0.003
Extreme (40C)		1850.8390	1914.1610	5.3	0.003
Extreme (30C)		1850.8390	1914.1610	6.2	0.003
Extreme (10C)		1850.8390	1914.1610	4.3	0.002
Extreme (0C)		1850.8390	1914.1610	4.7	0.003
Extreme (-10C)		1850.8390	1914.1610	6.8	0.004
Extreme (-20C)		1850.8390	1914.1610	-5.3	-0.003
Extreme (-30C)		1850.8390	1914.1610	-7.5	-0.004
20C	15%	1850.8390	1914.1610	6.0	0.003
	-15%	1850.8390	1914.1610	5.3	0.003
	End Point	1850.8390	1914.1610	-7.5	-0.004

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9.4.10. **LTE BAND 26(FCC PART 90S)**

ID:	10649	**Date:**	11/12/18

QPSK, (10MHz BANDWIDTH)

Limit		**814**	**824**	**Delta (Hz)**	**Frequency Stability (ppm)**
Condition		**F low @ -13dBm (MHz)**	**F high @ -13dBm (MHz)**		
Temperature	**Voltage**				
Normal (20C)	Normal	814.0238	823.9725		
Extreme (50C)		814.0238	823.9725	4.6	0.006
Extreme (40C)		814.0238	823.9725	-4.4	-0.005
Extreme (30C)		814.0238	823.9725	-4.4	-0.005
Extreme (10C)		814.0238	823.9725	-4.0	-0.005
Extreme (0C)		814.0238	823.9725	4.8	0.006
Extreme (-10C)		814.0238	823.9725	-4.9	-0.006
Extreme (-20C)		814.0238	823.9725	-4.8	-0.006
Extreme (-30C)		814.0238	823.9725	4.2	0.005
20C	15%	814.0238	823.9725	4.3	0.005
	-15%	814.0238	823.9725	4.3	0.005
	End Point	814.0238	823.9725	4.3	0.005

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9.4.11. **LTE BAND 26(FCC PART 22)**

ID:	10649	**Date:**	11/12/18

QPSK, (15MHz BANDWIDTH)

Limit		**824**	**849**	**Delta (Hz)**	**Frequency Stability (ppm)**
Condition		**F low @ -13dBm (MHz)**	**F high @ -13dBm (MHz)**		
Temperature	**Voltage**				
Normal (20C)	Normal	824.5550	848.4270		
Extreme (50C)		824.5550	848.4270	-4.3	-0.005
Extreme (40C)		824.5550	848.4270	-4.7	-0.006
Extreme (30C)		824.5550	848.4270	-3.4	-0.004
Extreme (10C)		824.5550	848.4270	2.6	0.003
Extreme (0C)		824.5550	848.4270	-4.0	-0.005
Extreme (-10C)		824.5550	848.4270	3.9	0.005
Extreme (-20C)		824.5550	848.4270	-3.6	-0.004
Extreme (-30C)		824.5550	848.4270	-4.7	-0.006
20C	15%	824.5550	848.4270	4.3	0.005
	-15%	824.5550	848.4270	4.5	0.005
	End Point	824.5550	848.4270	5.1	0.006

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9.4.12. **LTE BAND 41**

ID:	10649	**Date:**	11/12/18

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	2496.9060	2689.1140		
Extreme (50C)		2496.9060	2689.1140	-13.2	-0.005
Extreme (40C)		2496.9060	2689.1140	-12.6	-0.005
Extreme (30C)		2496.9060	2689.1140	-10.5	-0.004
Extreme (10C)		2496.9060	2689.1140	-11.1	-0.004
Extreme (0C)		2496.9060	2689.1140	-12.5	-0.005
Extreme (-10C)		2496.9060	2689.1140	-14.3	-0.006
Extreme (-20C)		2496.9060	2689.1140	-14.4	-0.006
Extreme (-30C)		2496.9060	2689.1140	-15.7	-0.006
20C	15%	2496.9060	2689.1140	6.5	0.002
	-15%	2496.9060	2689.1140	8.3	0.003
	End Point	2496.9060	2689.1140	8.7	0.003

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9.4.13. **LTE BAND 66**

ID:	10649	**Date:**	11/12/18

QPSK, (20MHz BANDWIDTH)

Limit		**1710**	**1780**	**Delta (Hz)**	**Frequency Stability (ppm)**
Condition		**F low @ -13dBm**	**F high @ -13dBm**		
Temperature	**Voltage**	**(MHz)**	**(MHz)**		
Normal (20C)	Normal	1710.8450	1779.1670		
Extreme (50C)		1710.8450	1779.1670	-6.1	-0.004
Extreme (40C)		1710.8450	1779.1670	-8.1	-0.005
Extreme (30C)		1710.8450	1779.1670	-5.8	-0.003
Extreme (10C)		1710.8450	1779.1670	-4.5	-0.003
Extreme (0C)		1710.8450	1779.1670	-6.9	-0.004
Extreme (-10C)		1710.8450	1779.1670	-8.2	-0.005
Extreme (-20C)		1710.8450	1779.1670	-8.4	-0.005
Extreme (-30C)		1710.8450	1779.1670	9.6	0.006
20C	15%	1710.8450	1779.1670	5.5	0.003
	-15%	1710.8450	1779.1670	5.5	0.003
	End Point	1710.8450	1779.1670	5.0	0.003

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9.5. PEAK TO AVERAGE RATIO

LIMITS

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

LAT 1 antenna was used to measure as the worst case. The results from all CCDF plots are passed with 13dB peak-to-average power ratio criteria.

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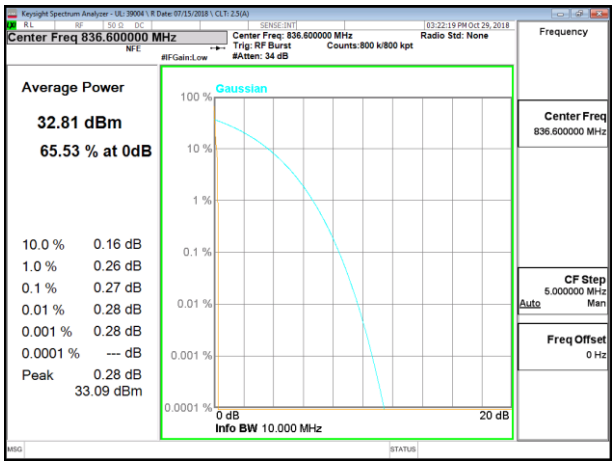
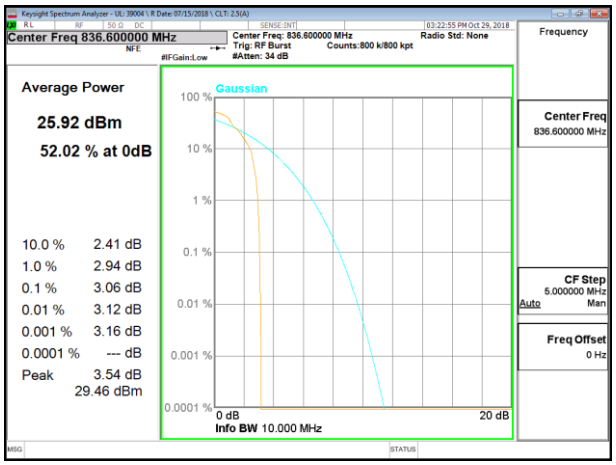
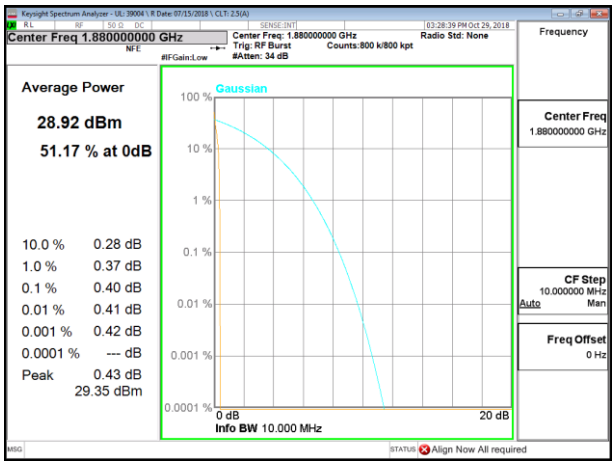
9.5.1. **GSM**



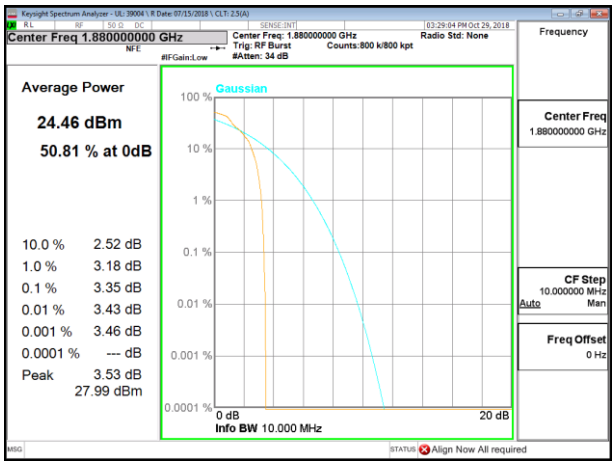
GSM 850MHz GPRS MID Channel



GSM 850MHz EGPRS MID Channel



GSM 1900MHz GPRS MID Channel



GSM 1900MHz EGPRS MID Channel

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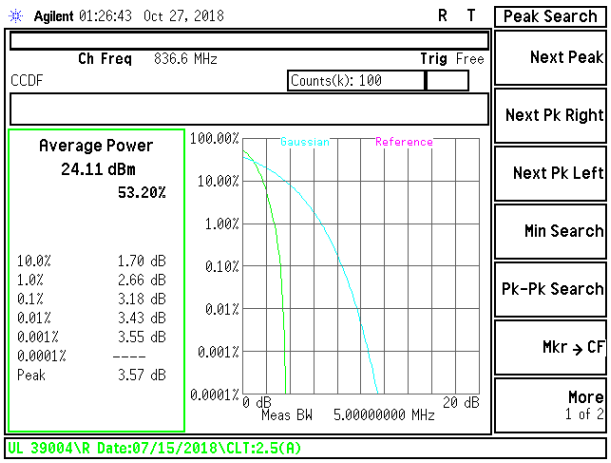
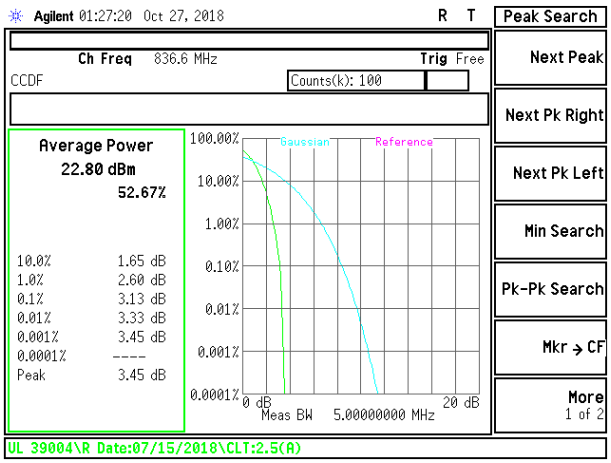
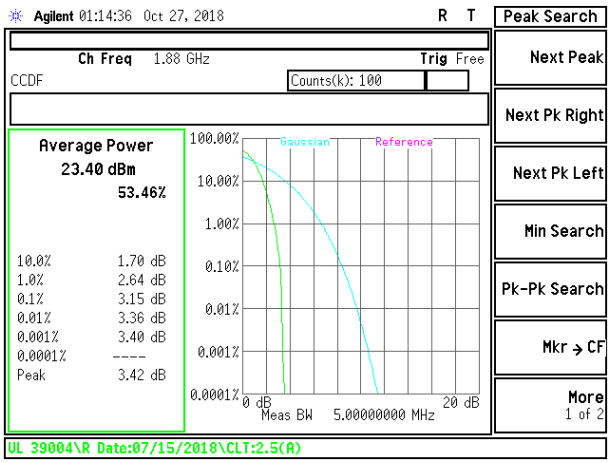
9.5.2. **WCDMA**



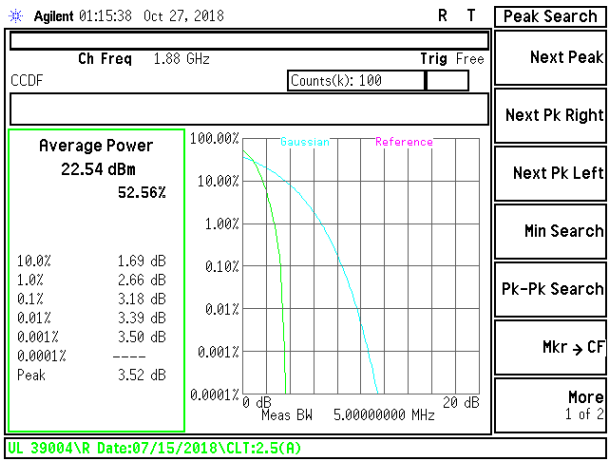
WCDMA BAND5 Rel99 MID Channel



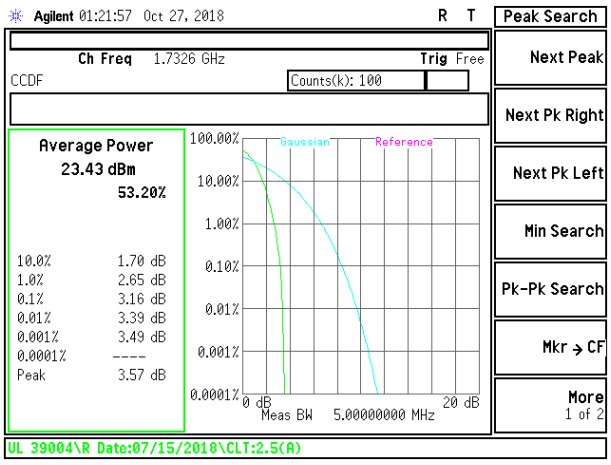
WCDMA BAND5 HSDPA MID Channel



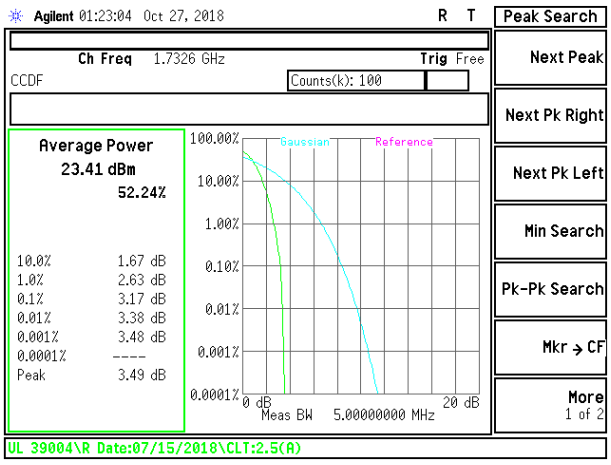
WCDMA BAND2 Rel99 MID Channel



WCDMA BAND2 HSDPA MID Channel



WCDMA BAND4 Rel99 MID Channel



WCDMA BAND4 HSDPA MID Channel

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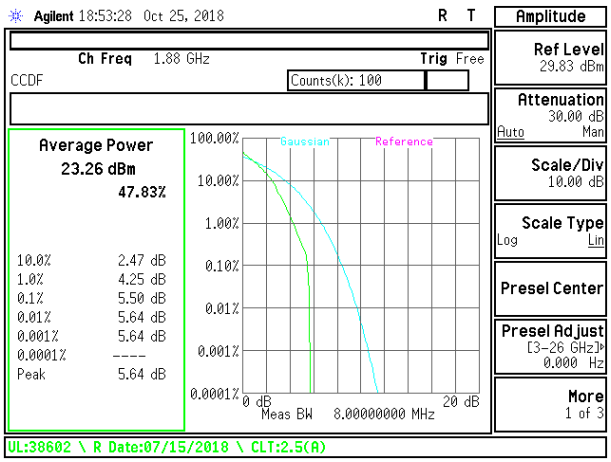
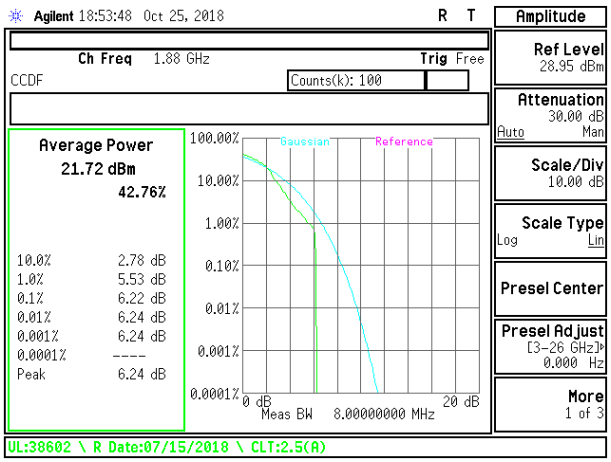
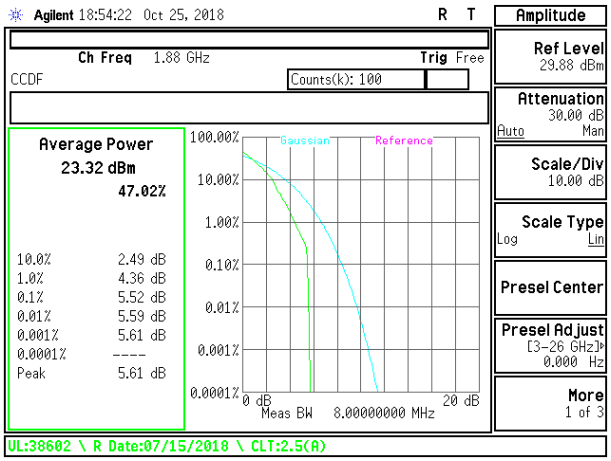
9.5.3. **LTE BAND 2**



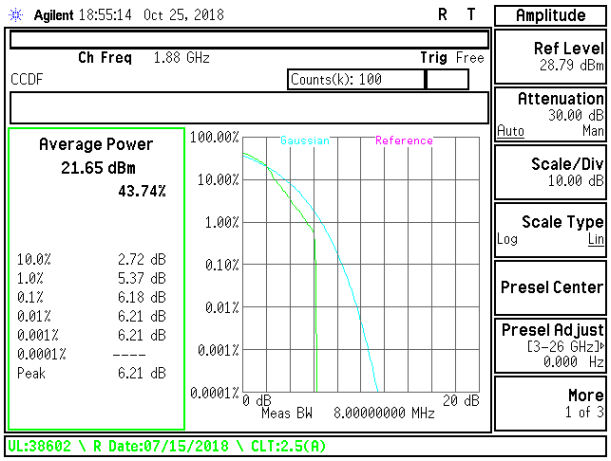
LTE B2 1.4MHz QPSK Mid Channel



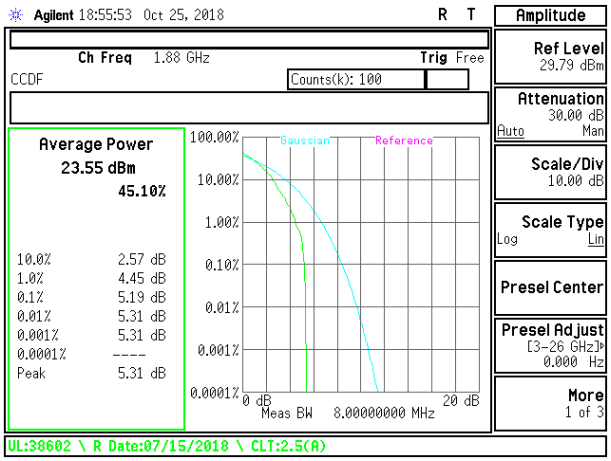
LTE B2 1.4MHz 16QAM Mid Channel



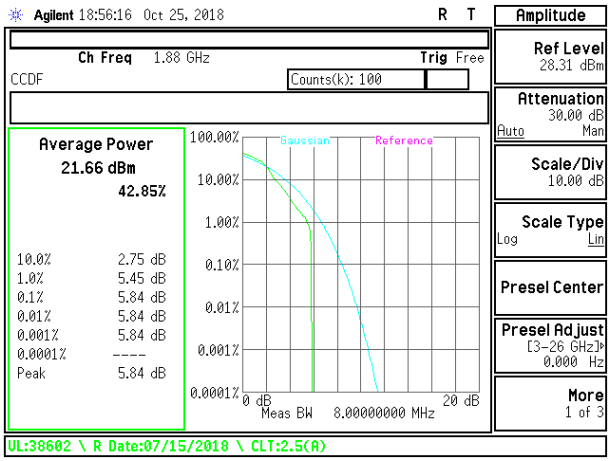
LTE B2 3MHz QPSK Mid Channel



LTE B2 3MHz 16QAM Mid Channel



LTE B2 5MHz QPSK Mid Channel



LTE B2 5MHz 16QAM Mid Channel

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