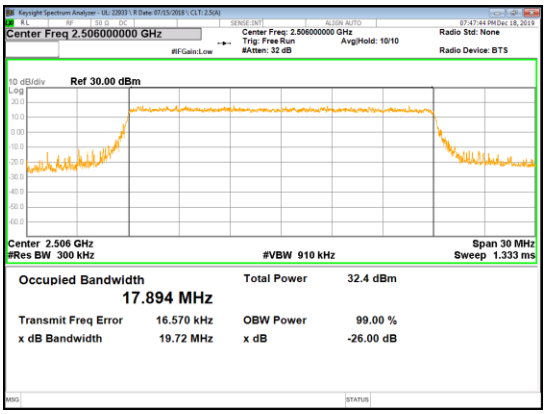
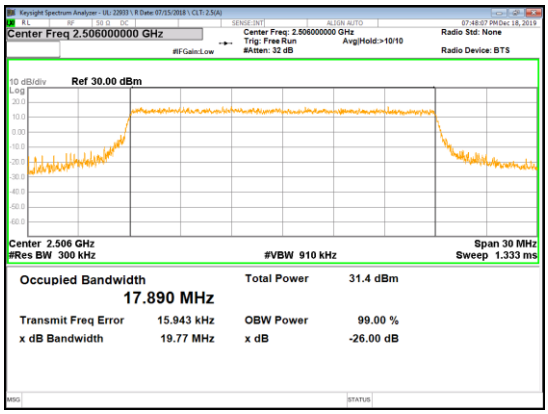
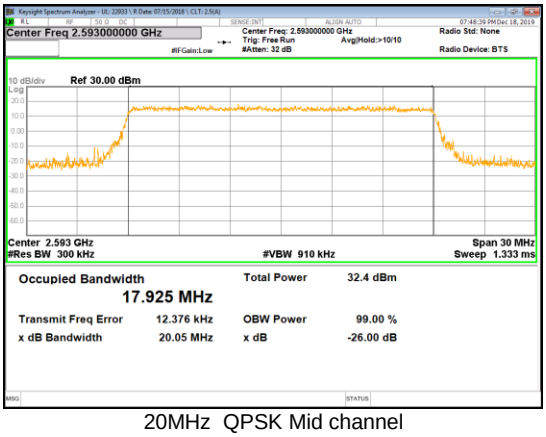
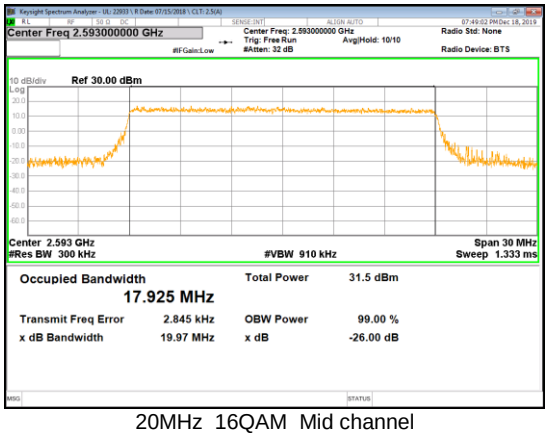
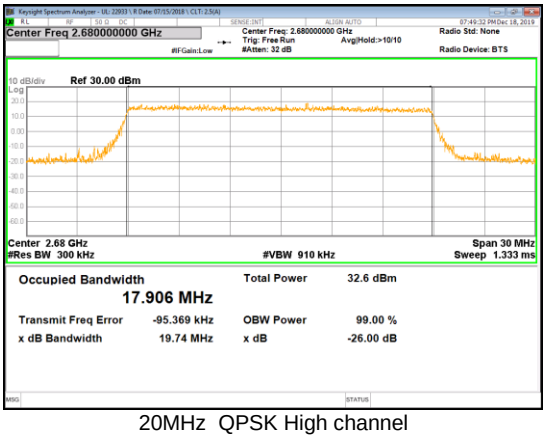
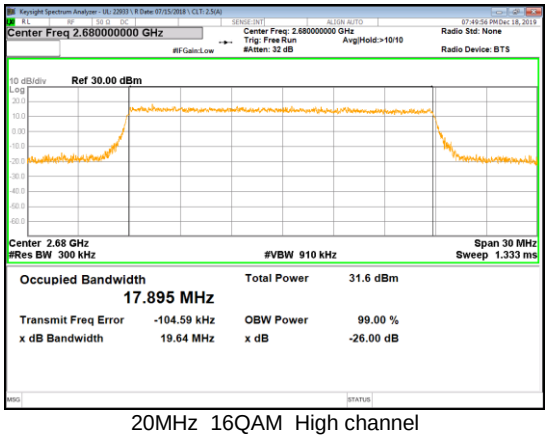
**LTE Band 41(PC2)**

| | | |
|---|---|---|
| Band 41<br><br>20MHz |  <br>20MHz QPSK Low channel |  <br>20MHz 16QAM Low channel |
| |  <br>20MHz QPSK Mid channel |  <br>20MHz 16QAM Mid channel |
| |  <br>20MHz QPSK High channel |  <br>20MHz 16QAM High channel |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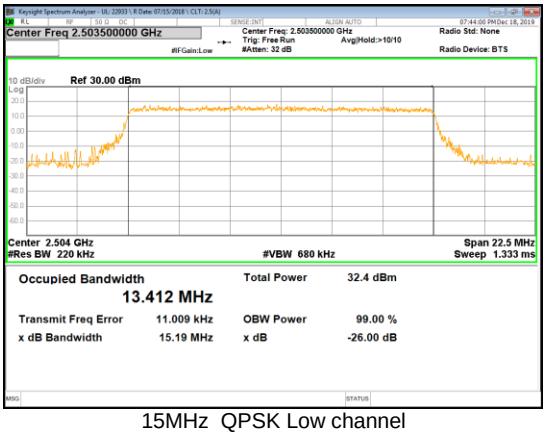
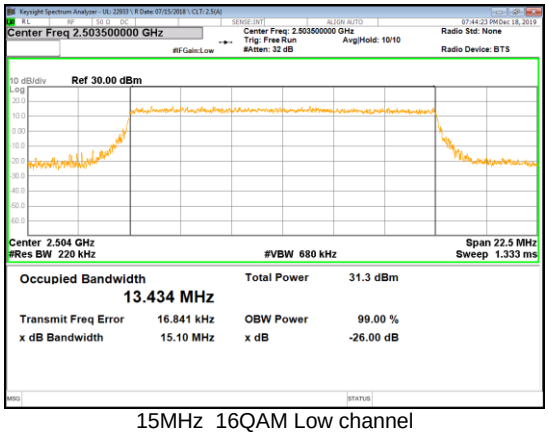
Band 41

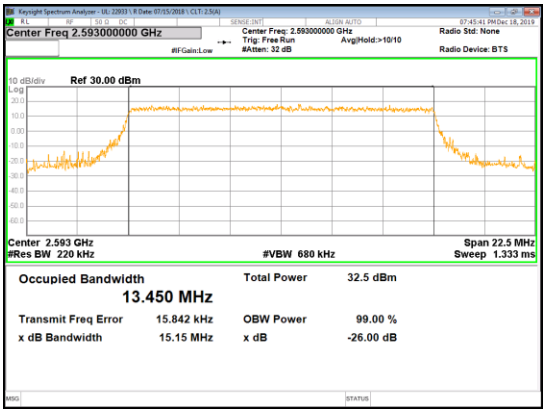
15MHz



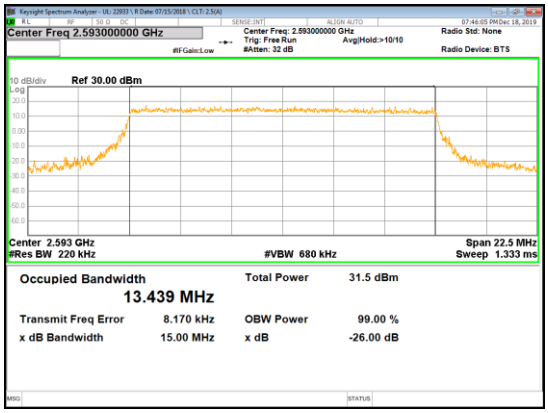

15MHz QPSK Low channel



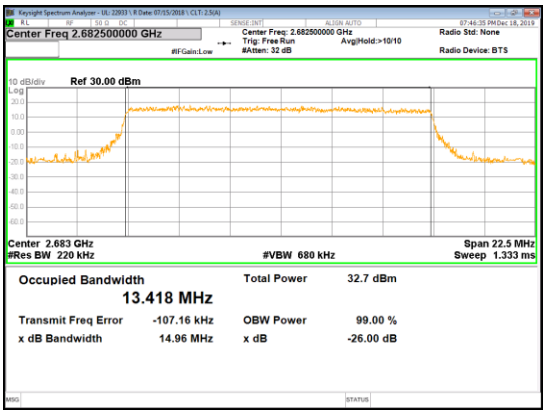

15MHz 16QAM Low channel



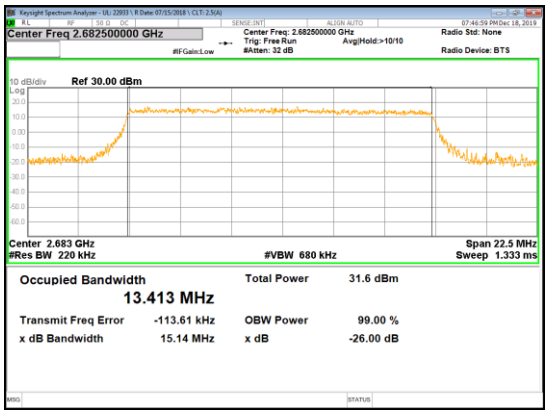

15MHz QPSK Mid channel




15MHz 16QAM Mid channel




15MHz QPSK High channel




15MHz 16QAM High channel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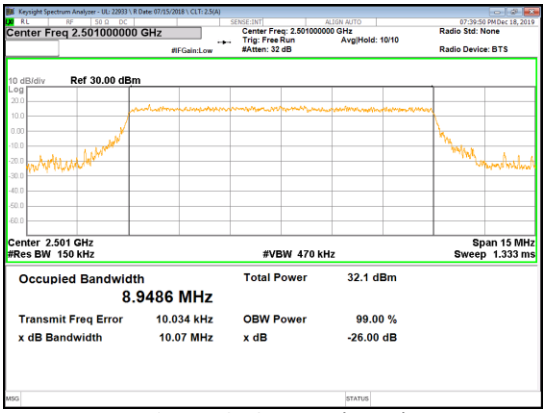
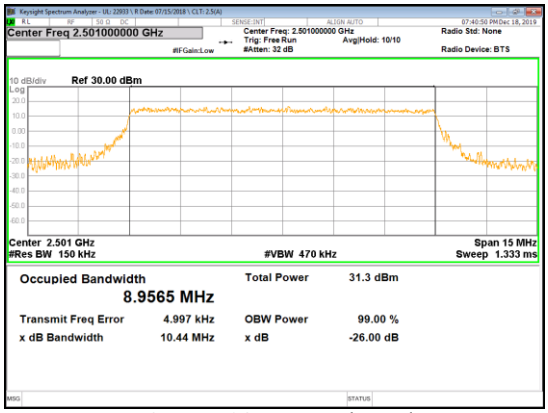
Band 41

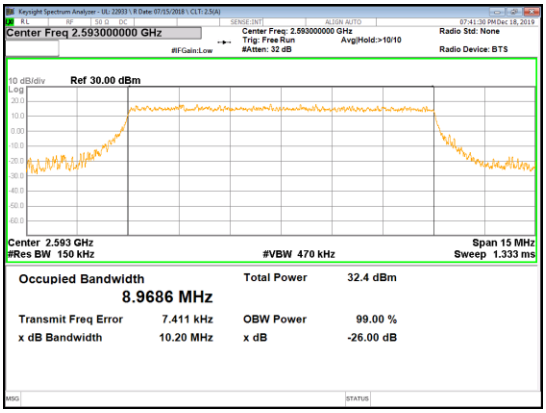
10MHz



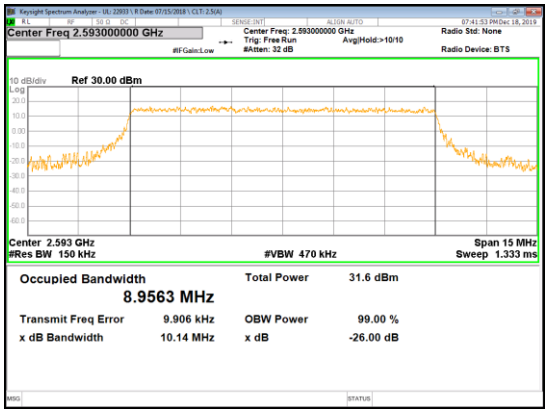

10MHz QPSK Low channel



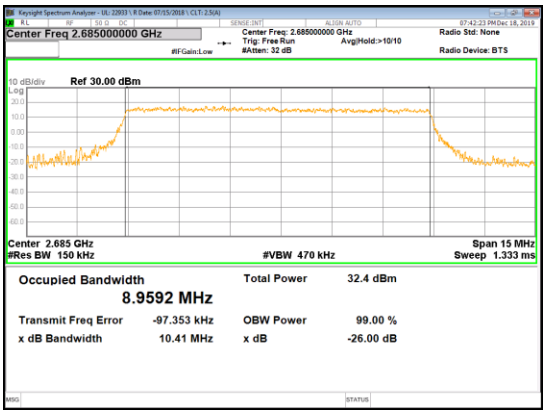

10MHz 16QAM Low channel



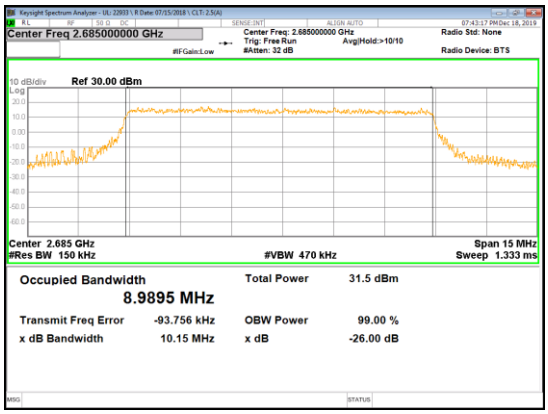

10MHz QPSK Mid channel




10MHz 16QAM Mid channel




10MHz QPSK High channel




10MHz 16QAM High channel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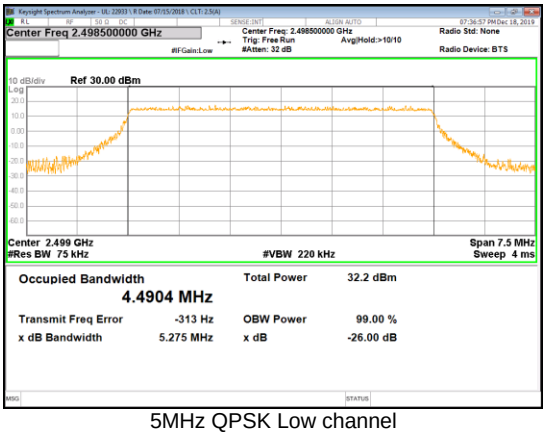
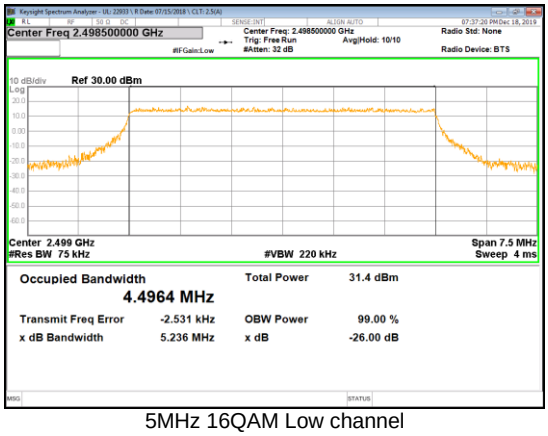
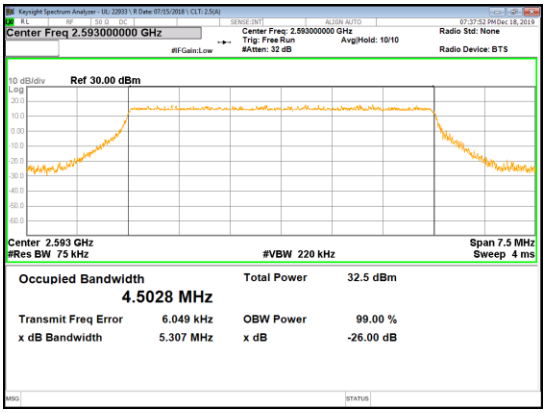
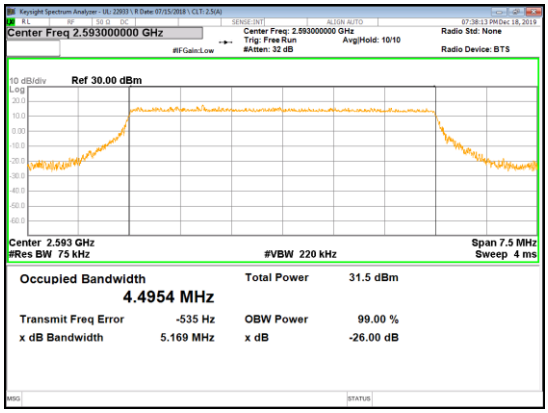
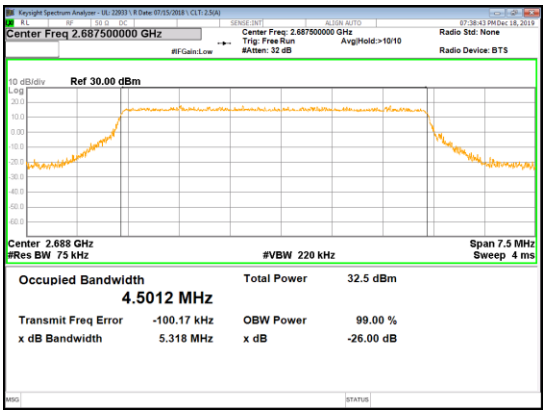
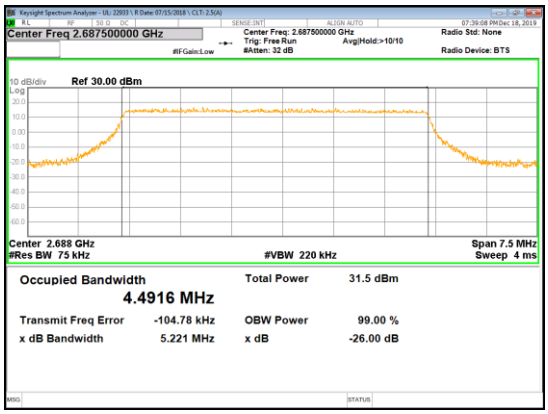
| | | |
|---|---|---|
| Band 41<br>5MHz |  <br>5MHz QPSK Low channel |  <br>5MHz 16QAM Low channel |
| |  <br>5MHz QPSK Mid channel |  <br>5MHz 16QAM Mid channel |
| |  <br>5MHz QPSK High channel |  <br>5MHz 16QAM High channel |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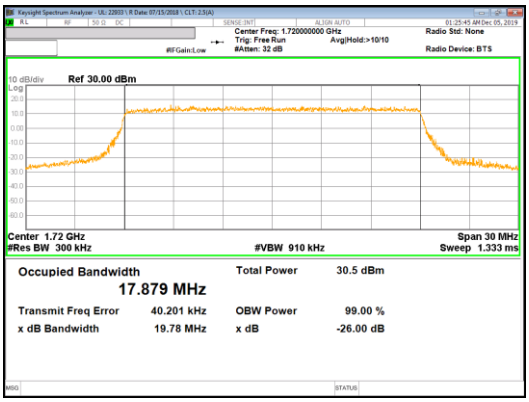
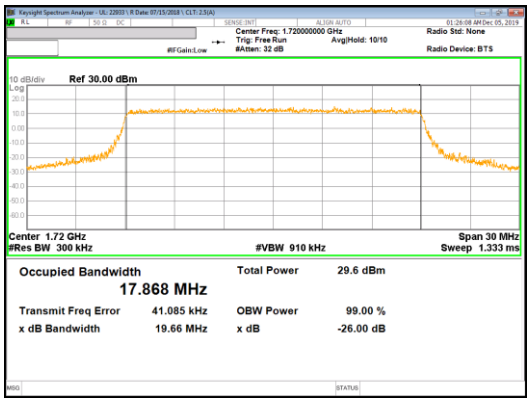
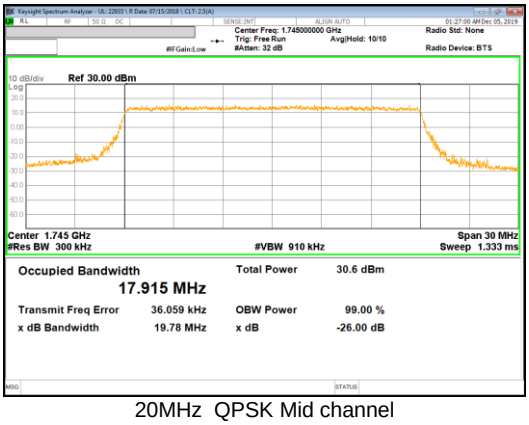
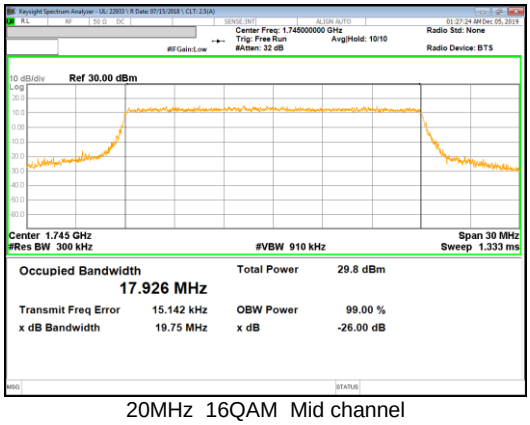
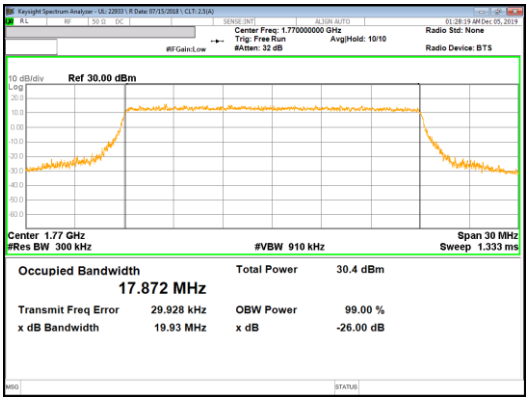
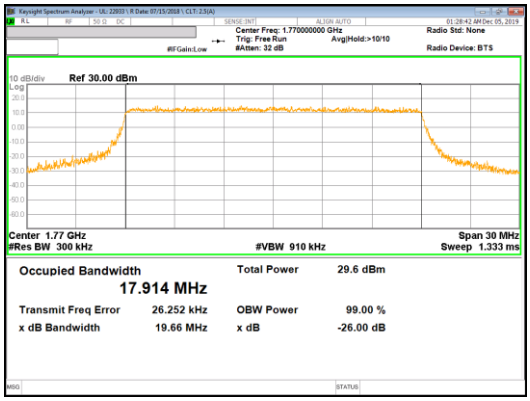
**LTE Band 66**

| | | |
|---|---|---|
| Band 66<br>20MHz |  <br>20MHz QPSK Low channel |  <br>20MHz 16QAM Low channel |
| |  <br>20MHz QPSK Mid channel |  <br>20MHz 16QAM Mid channel |
| |  <br>20MHz QPSK High channel |  <br>20MHz 16QAM High channel |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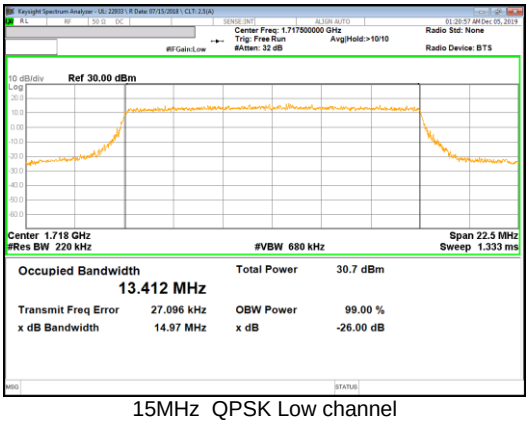
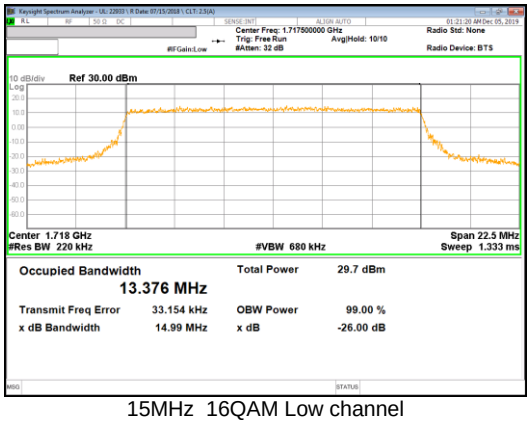
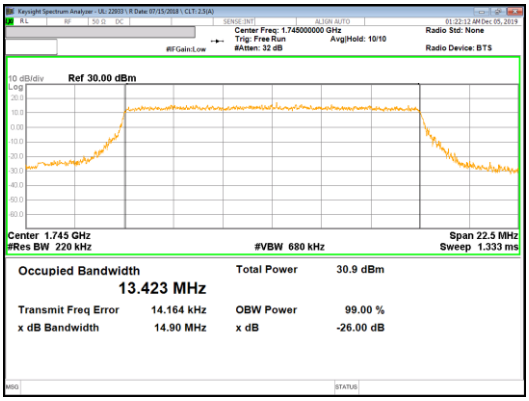
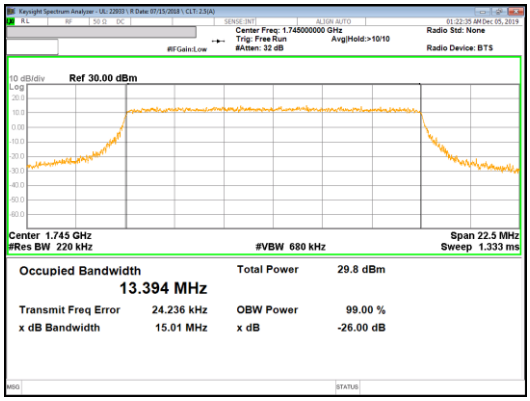
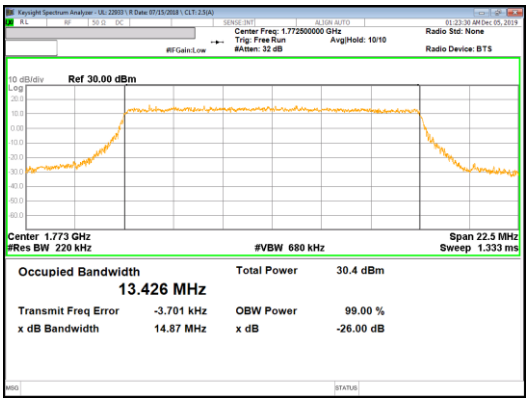
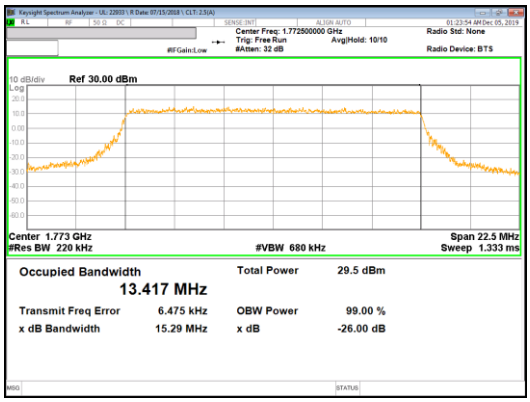
| | | |
|---|---|---|
| Band 66<br><br>15MHz |  <br>15MHz QPSK Low channel |  <br>15MHz 16QAM Low channel |
| |  <br>15MHz QPSK Mid channel |  <br>15MHz 16QAM Mid channel |
| |  <br>15MHz QPSK High channel |  <br>15MHz 16QAM High channel |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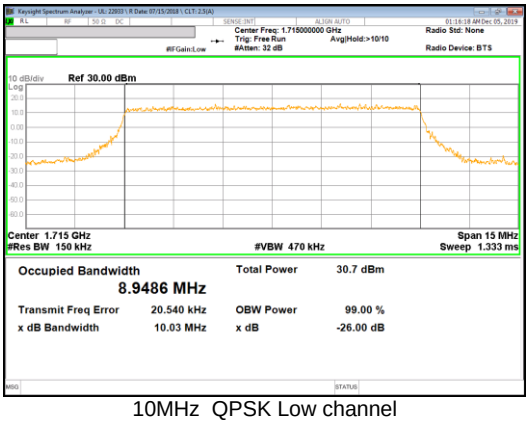
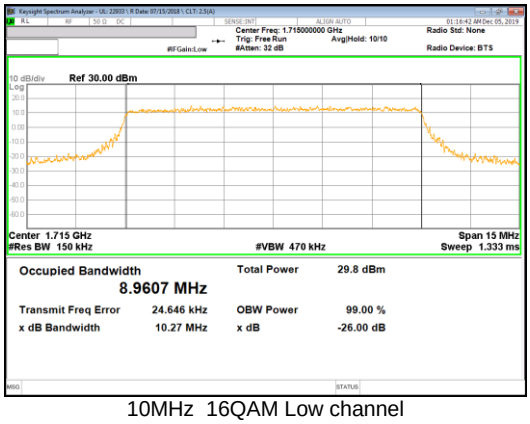
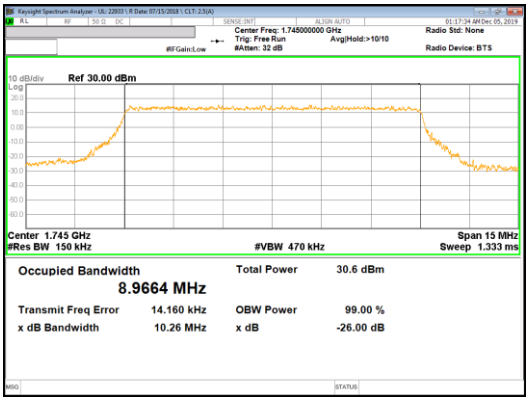
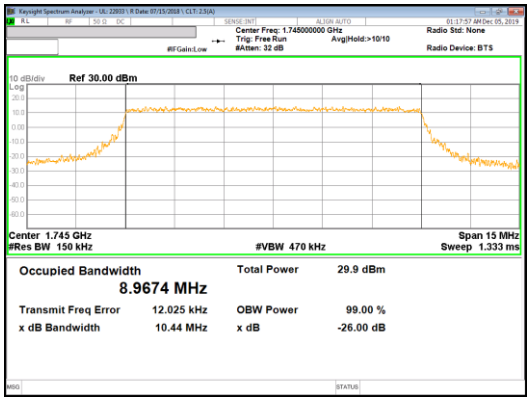
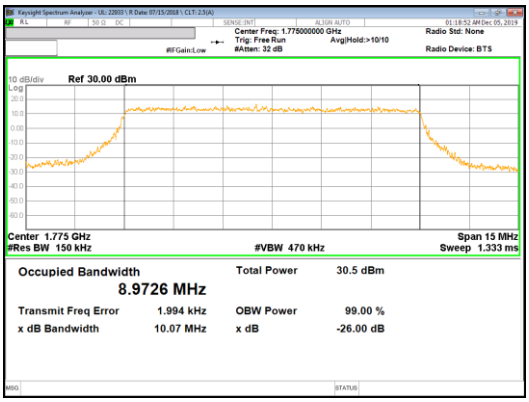
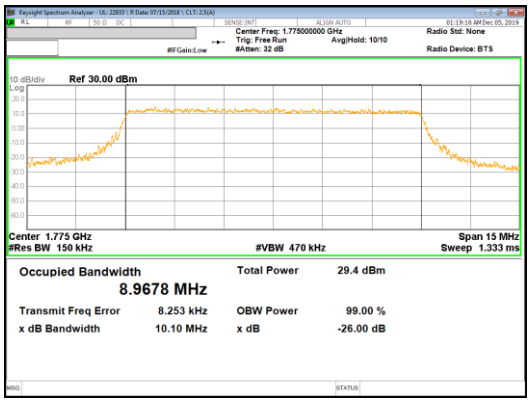
| | | |
|---|---|---|
| Band 66<br><br>10MHz |  <br>10MHz QPSK Low channel |  <br>10MHz 16QAM Low channel |
| |  <br>10MHz QPSK Mid channel |  <br>10MHz 16QAM Mid channel |
| |  <br>10MHz QPSK High channel |  <br>10MHz 16QAM High channel |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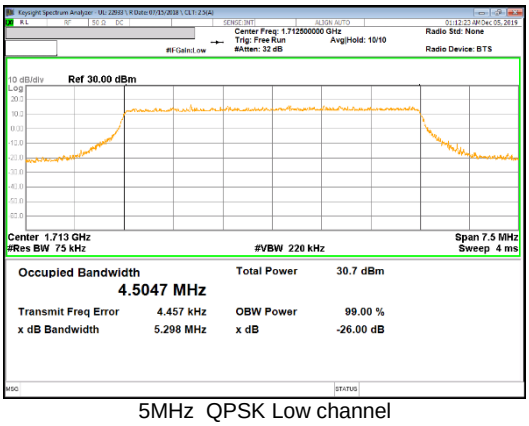
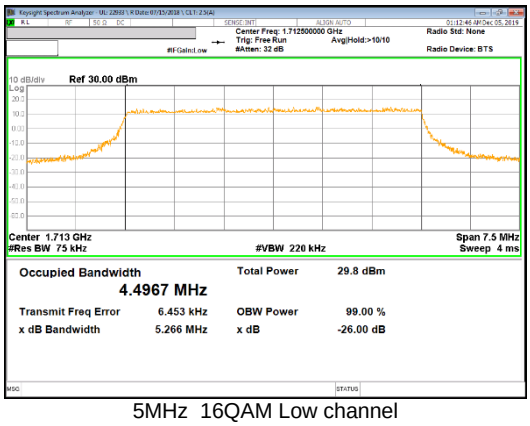
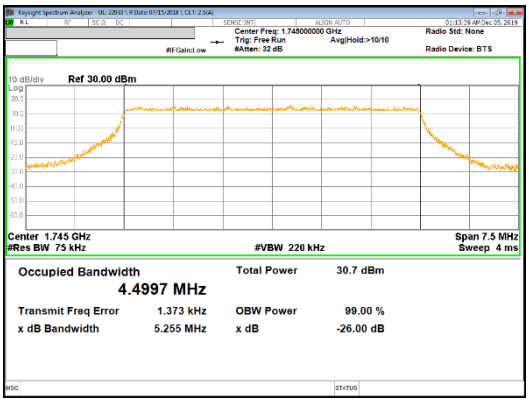
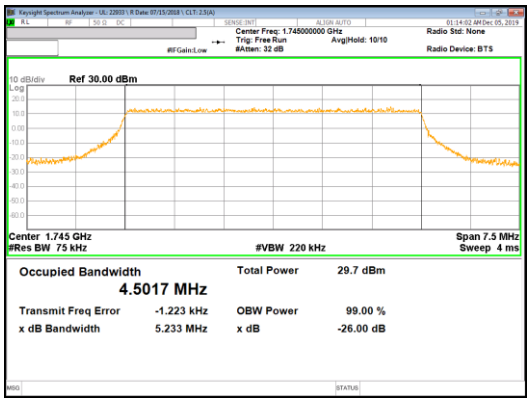
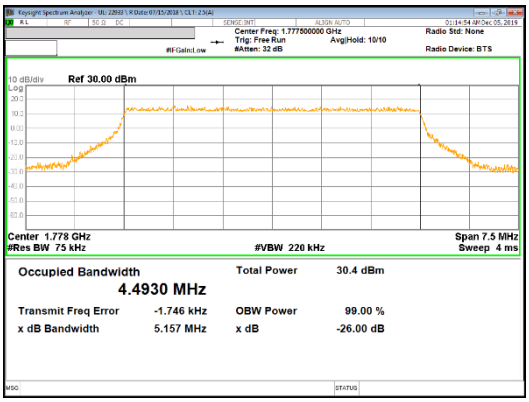
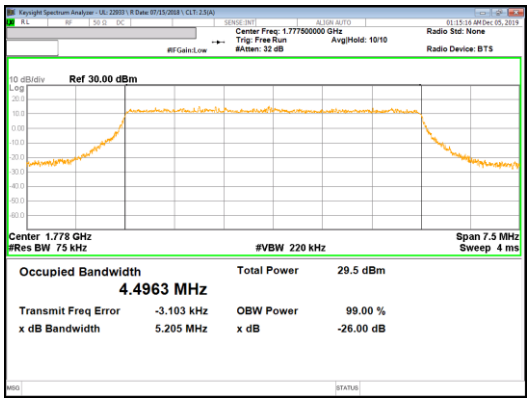
| | | |
|---|---|---|
| Band 66<br><br>5MHz |  <br>5MHz QPSK Low channel |  <br>5MHz 16QAM Low channel |
| |  <br>5MHz QPSK Mid channel |  <br>5MHz 16QAM Mid channel |
| |  <br>5MHz QPSK High channel |  <br>5MHz 16QAM High channel |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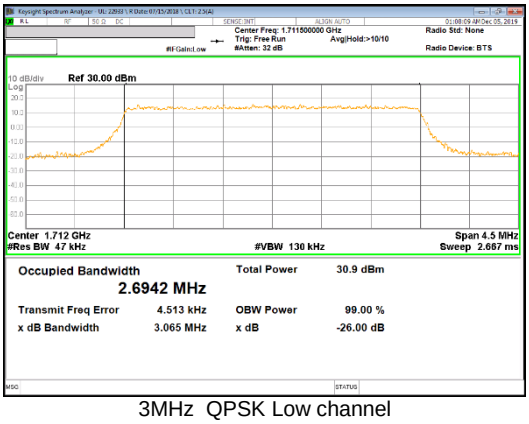
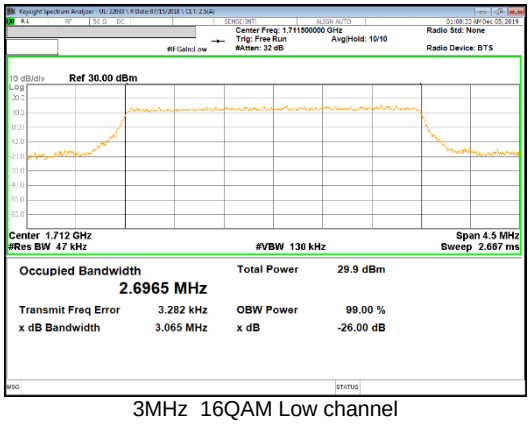
Band 66

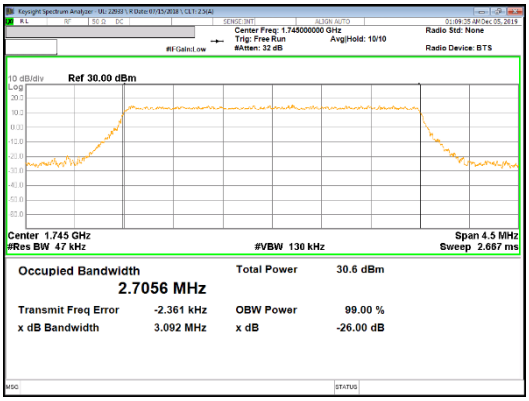
3MHz



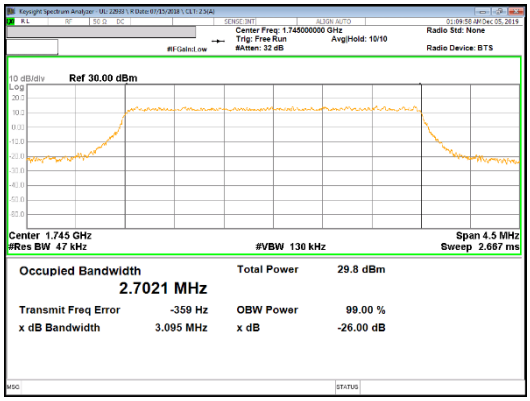

3MHz QPSK Low channel



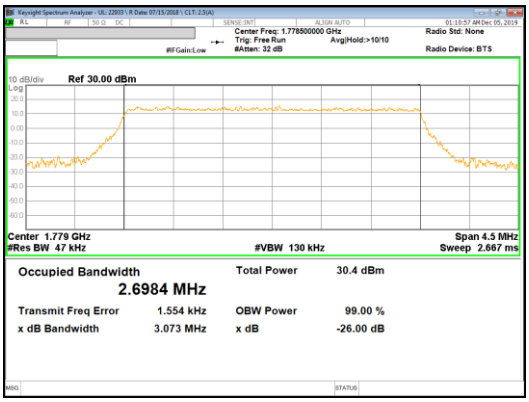

3MHz 16QAM Low channel



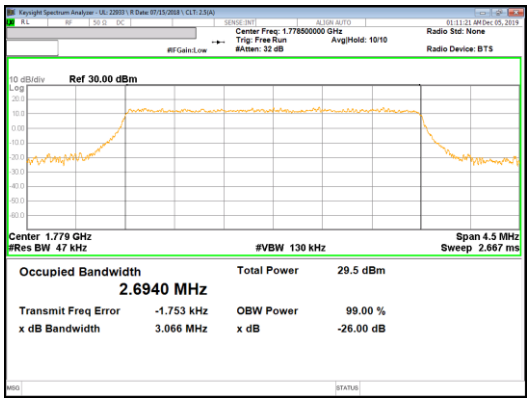

3MHz QPSK Mid channel




3MHz 16QAM Mid channel




3MHz QPSK High channel




3MHz 16QAM High channel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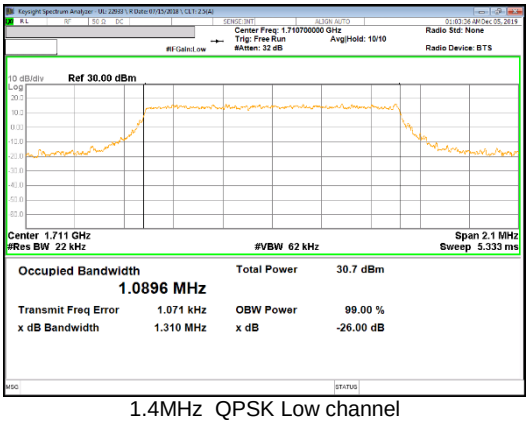
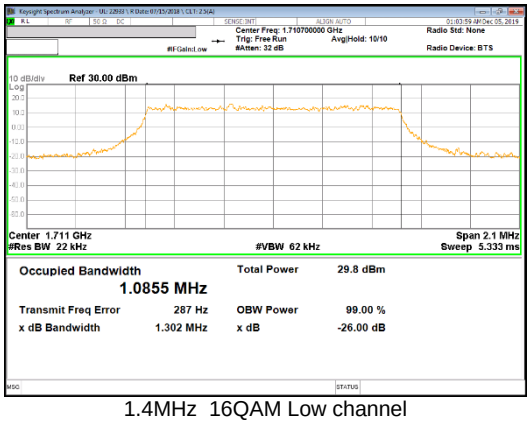
Band 66

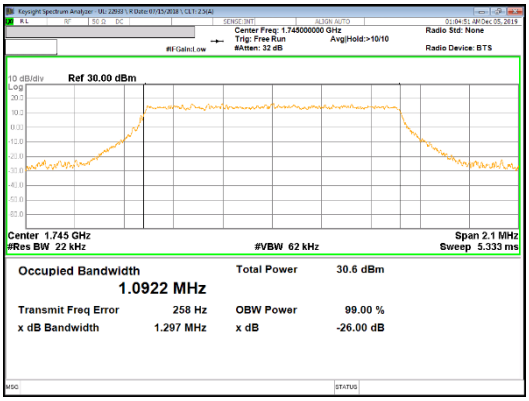
1.4MHz



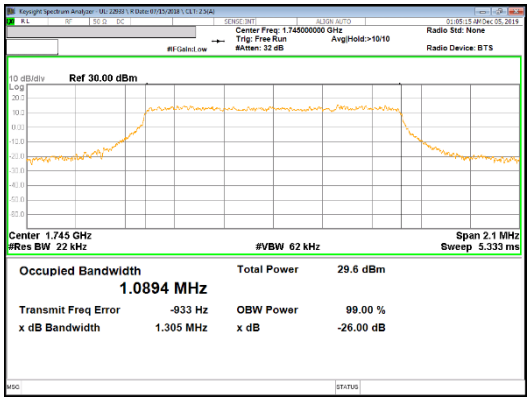

1.4MHz QPSK Low channel



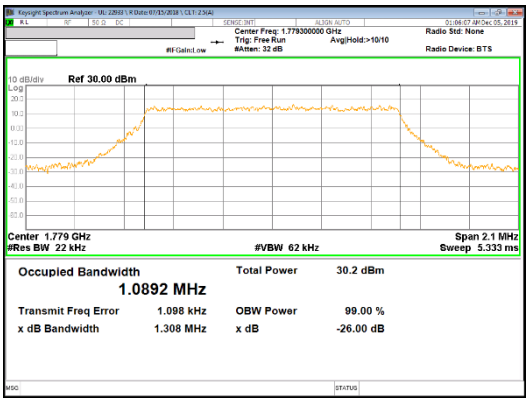

1.4MHz 16QAM Low channel



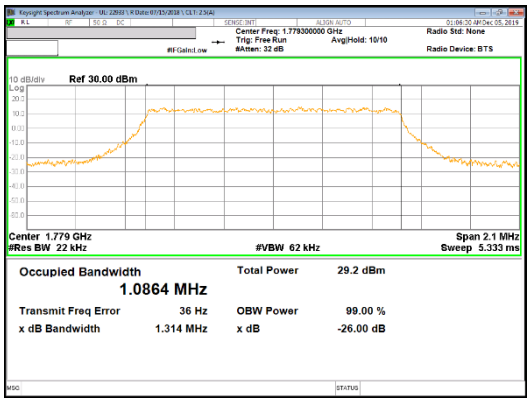

1.4MHz QPSK Mid channel




1.4MHz 16QAM Mid channel




1.4MHz QPSK High channel




1.4MHz 16QAM High channel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**LTE Band 2**

LTE Band 2(Frequency range: 1850-1910 MHz) is covered by LTE Band 25 (Frequency range: 1850-1915 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 4**

LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 5**

LTE Band 5 (Frequency range: 824-849 MHz) is covered by LTE Band 26 (Frequency range: 814-849 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band 17**

LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

**LTE Band41(PC3)**

LTE Band 41(PC3, Frequency range : 2496-2690 MHz) is covered by LTE Band 41(PC2) (Frequency range: 2496-2690 MHz) due to same frequency range, same channel bandwidth and maximum tune-up limit is higher than LTE Band41(PC3).


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## 9.2. BAND EDGE EMISSIONS

**RULE PART(S)**

FCC: §22.359, §22.917, §24.238, §27. 53 and 90.691

**LIMITS**

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

Part 27.53:
(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;

(4) On all frequencies between 763-775 MHz and 793-806 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

(h) The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 $\log_{10}$ (P) dB.

(m) (4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Part 90.691:
(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.


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**TEST PROCEDURE**

Per KDB 971168 D01 Power Meas License Digital Systems v03r01
The transmitter output was connected to a CMW500 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

**GSM**

a) Set the RBW = 1 ~ 5% of OBW(GSM850 – 8.2KHz, GSM1900 – 9.1KHz)

b) Set VBW ≥ 3 × RBW;

c) Set span ≥ 1.5 times the OBW;

d) Sweep time = 1S ;

e) Detector = RMS;

f) Ensure that the number of measurement points ≥ 2*Span/RBW;

g) Trace mode = Average(100);

h) Add duty cycle correction factor (9dB)

**WCDMA/LTE**

a) Set the RBW = 1 ~ 1.5 % of OBW(Typically limited to a minimum RBW of 1% of the OBW)

b) Set VBW ≥ 3 × RBW;

c) Set span ≥ 1.5 times the OBW;

d) Sweep time = Auto;

e) Detector = RMS;

f) Ensure that the number of measurement points ≥ 2*Span/RBW;

g) Trace mode = Average (100);


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**NOTE1:** For frequency range of 763-775 MHz and 793-806 MHz.(LTE Band 13)

a) Set the RBW = 6.2kHz

b) Set VBW ≥ 3 × RBW;

c) Sweep time = 1 second ;

d) Detector = RMS;

e) Ensure that the number of measurement points ≥ 2*Span/RBW;

f) Trace mode = Average;

**NOTE2**

Note that the spurious emissions outside of the channel include narrowband signals. These signals are all below the -13dBm / -25dBm limits. Although the measurement bandwidth is less than the reference bandwidth of 1MHz no addental correction is applied as ANSI C63.26 section 4.2.3 only requires the correction to be applied when the OBW of the emission being measured is wider than the measurement bandwidth (Where the OBW of the signal under measurement is less than the RBW of the measuring instrument, no bandwidth correction or integration will be required.) Plots for low and high channels show the level of the emission measured with the reduced bandwidth and the level of the same emission measured using the integration method over the 1MHz reference bandwidth are very close, indicating the emissions are narrowband.

**RESULTS**

See the following pages.


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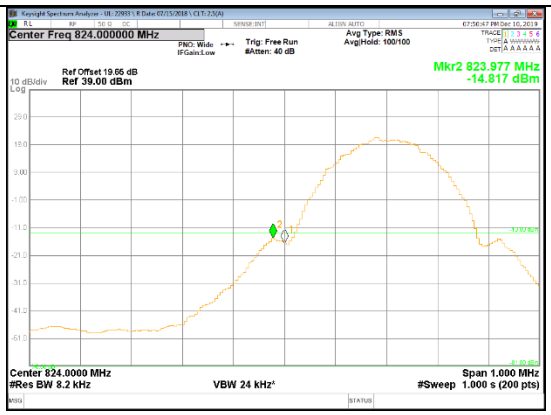
## 9.2.1. BAND EDGE RESULT

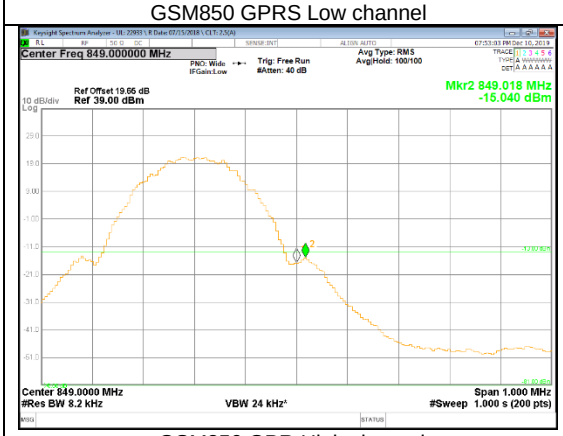
**GSM**

GSM 850

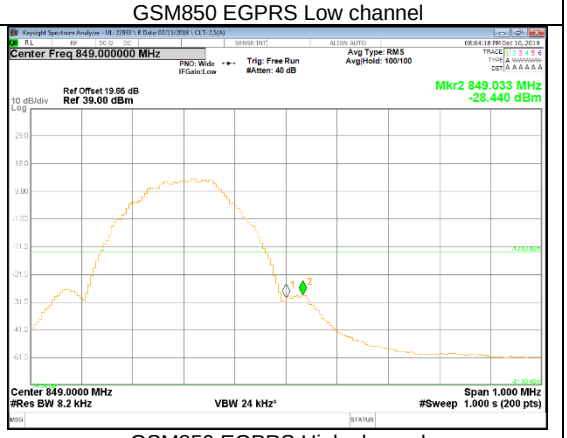



GSM850 GPRS Low channel

GSM850 EGPRS Low channel

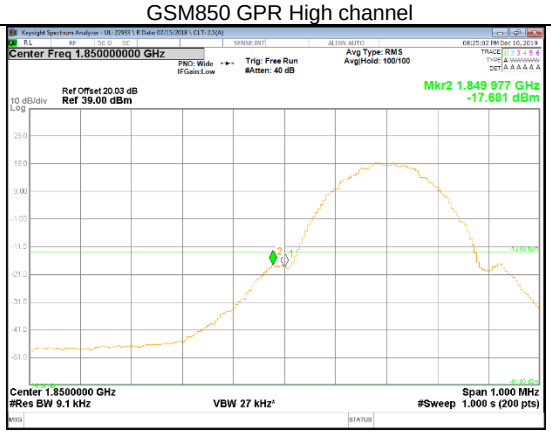



GSM850 GPR High channel

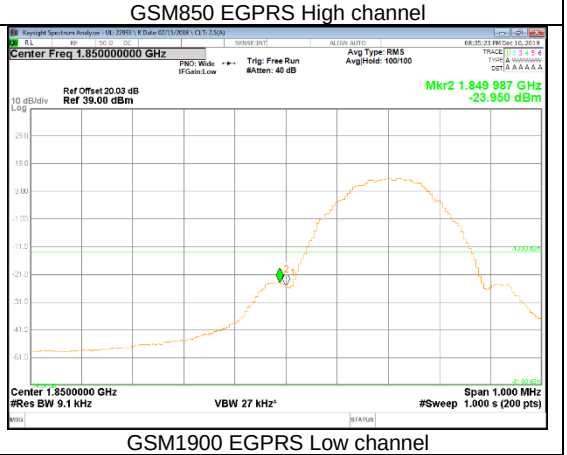



GSM850 EGPRS High channel

GSM 1900




GSM1900 GPRS Low channel




GSM1900 EGPRS Low channel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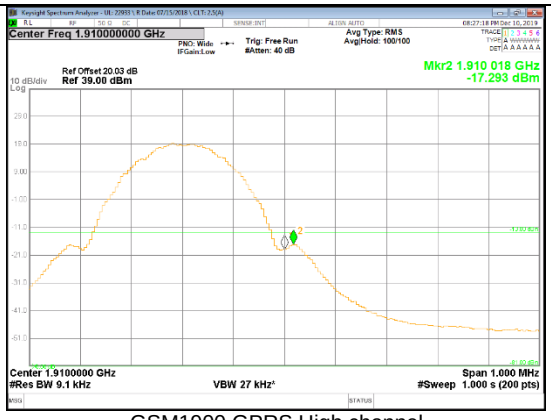
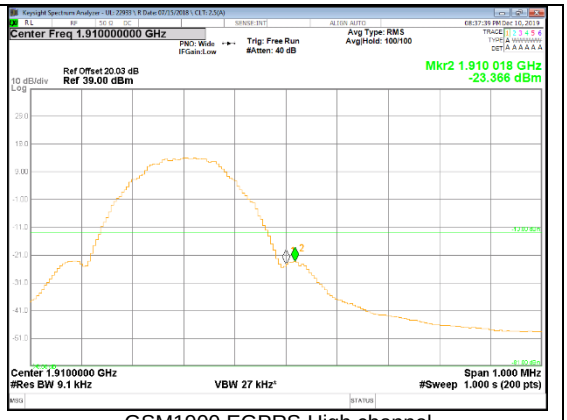


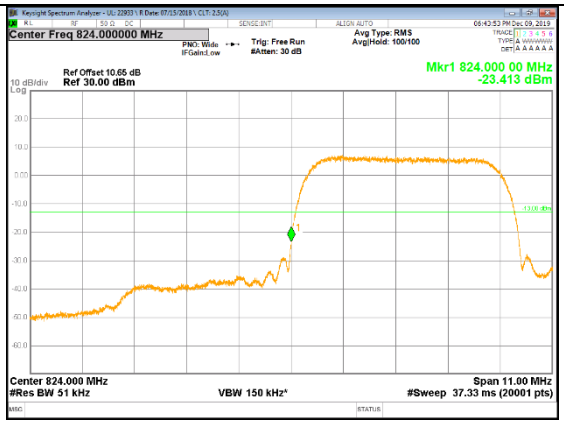

GSM1900 GPRS High channel



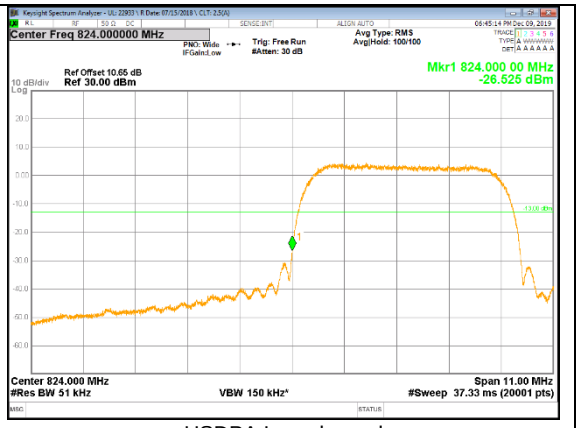

GSM1900 EGPRS High channel

**WCDMA**

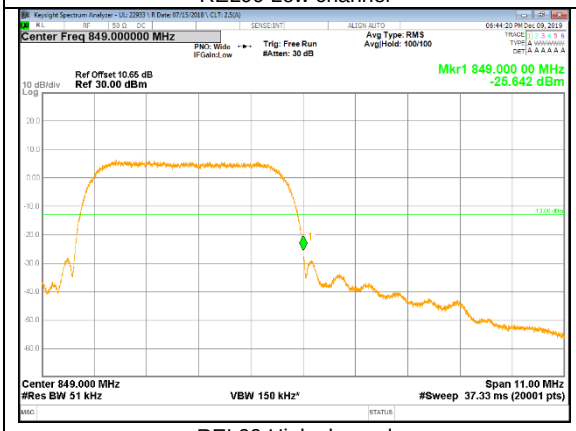
Band 5



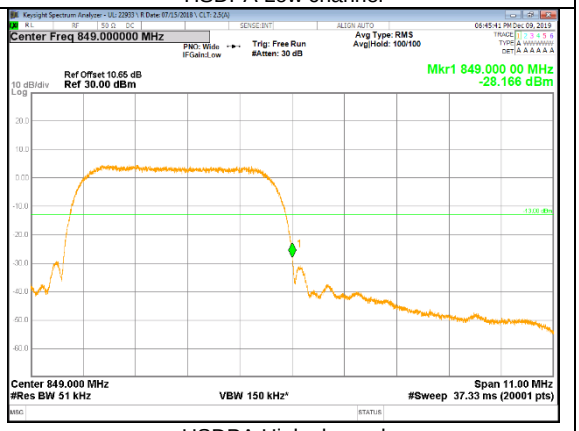

REL99 Low channel




HSDPA Low channel




REL99 High channel




HSDPA High channel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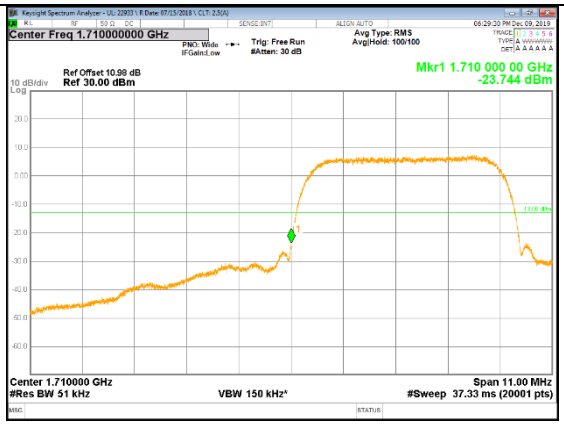
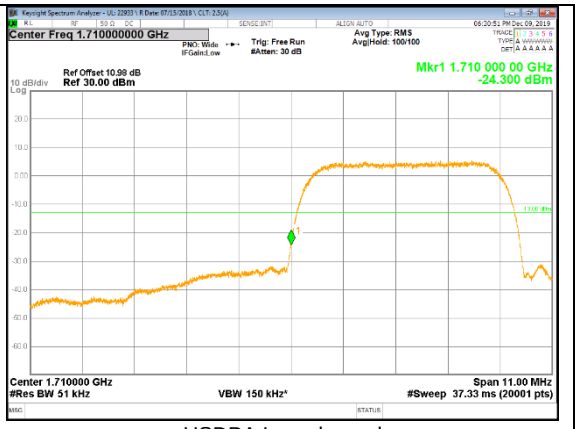
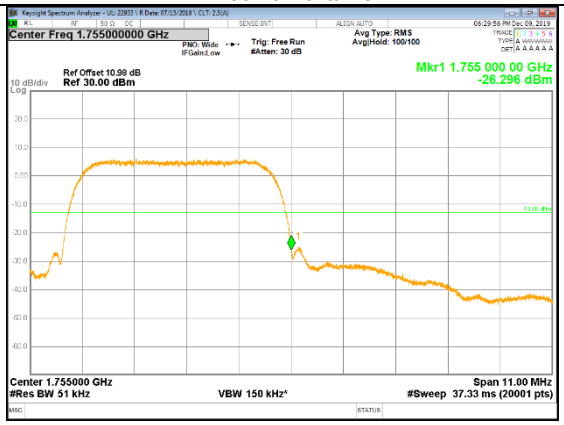
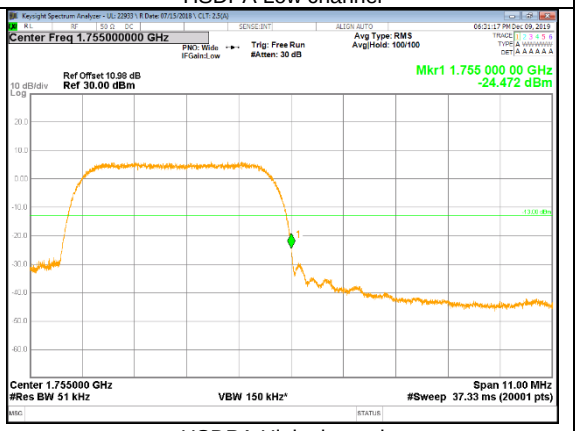
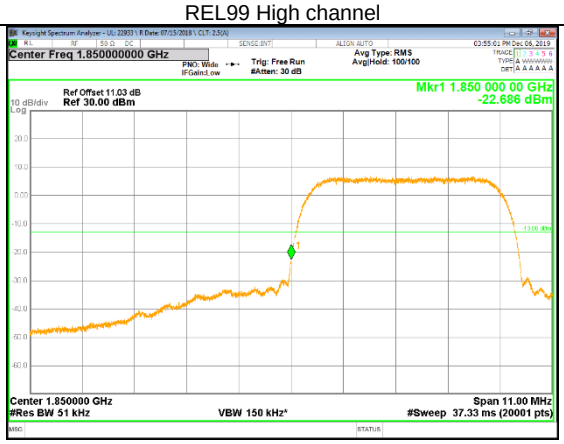
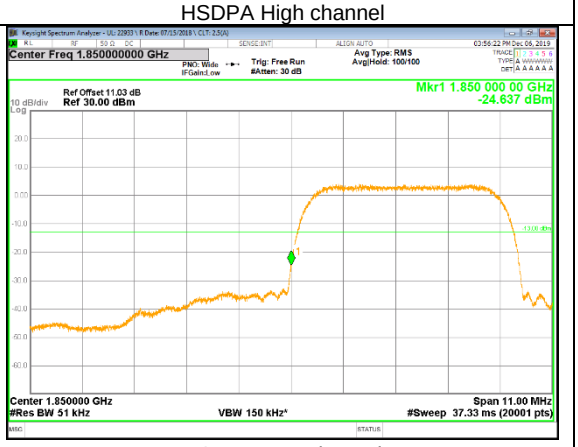
| | | |
|---|---|---|
| Band 4 |  <br>REL99 Low channel |  <br>HSDPA Low channel |
| Band 4 |  <br>REL99 High channel |  <br>HSDPA High channel |
| Band 2 |  <br>REL99 Low channel |  <br>HSDPA Low channel |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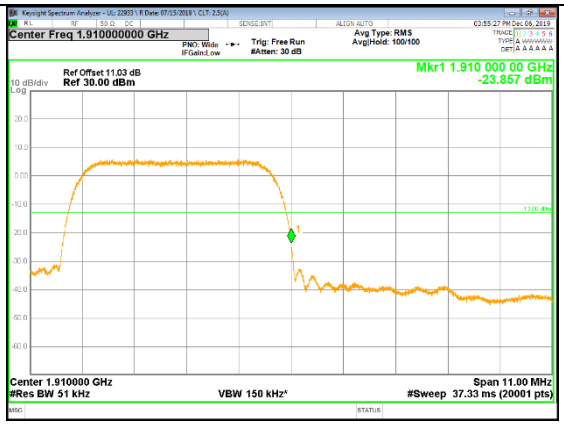
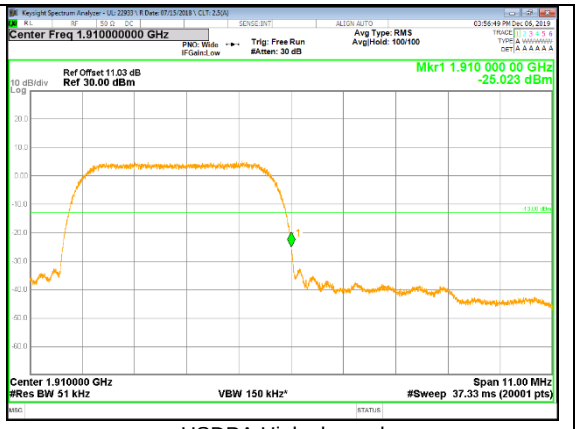



REL99 High channel




HSDPA High channel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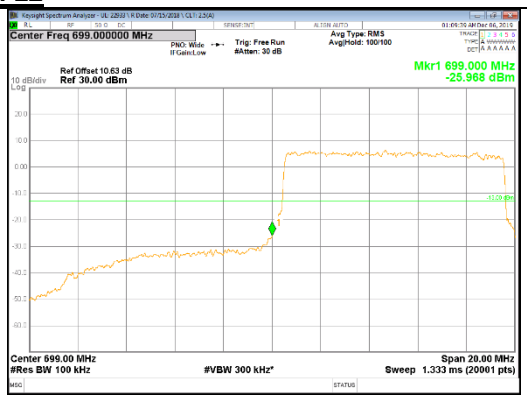
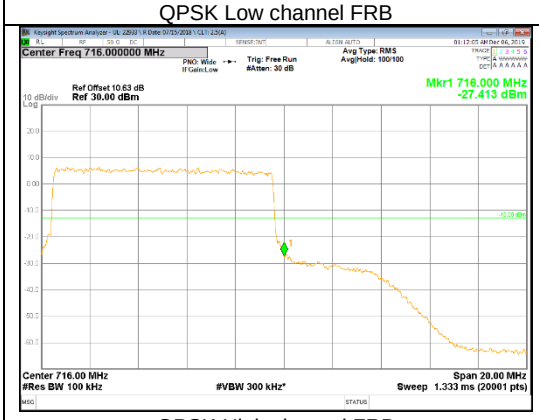
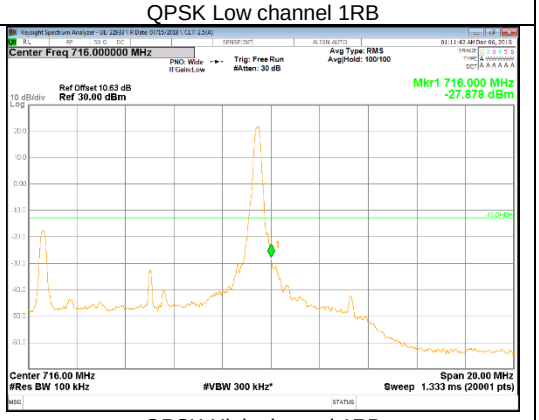
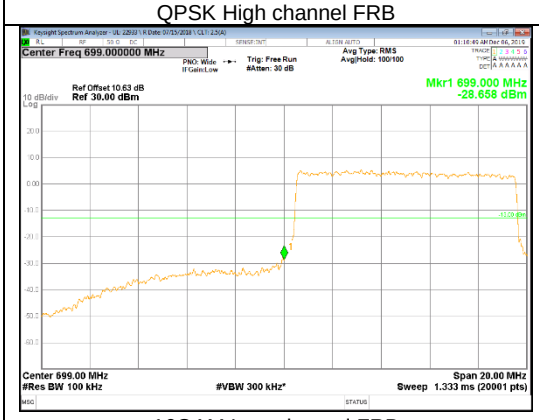
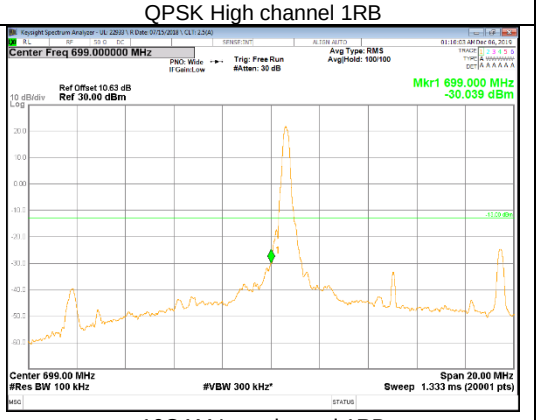
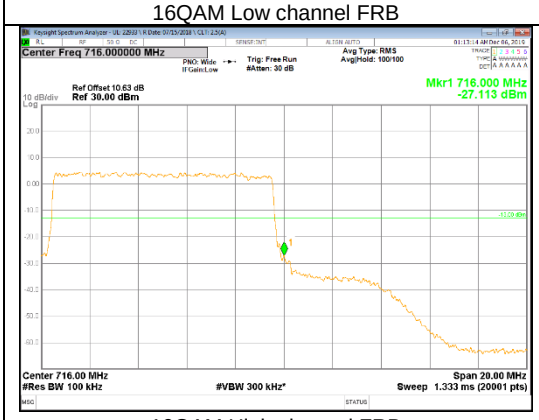
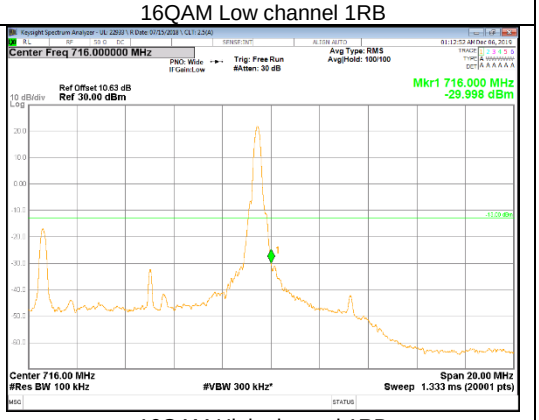
**LTE Band 12**

| | | |
|---|---|---|
| Band 12<br>10MHz |  <br>QPSK Low channel FRB | <br>QPSK Low channel 1RB |
| |  <br>QPSK High channel FRB |  <br>QPSK High channel 1RB |
| |  <br>16QAM Low channel FRB |  <br>16QAM Low channel 1RB |
| |  <br>16QAM High channel FRB |  <br>16QAM High channel 1RB |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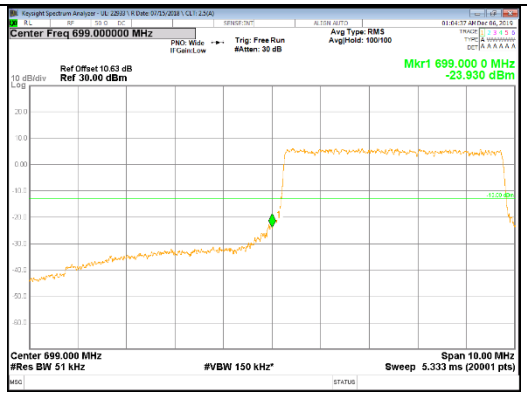
Band 12

5MHz

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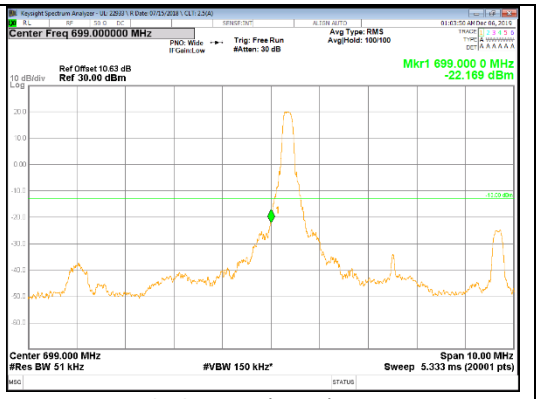


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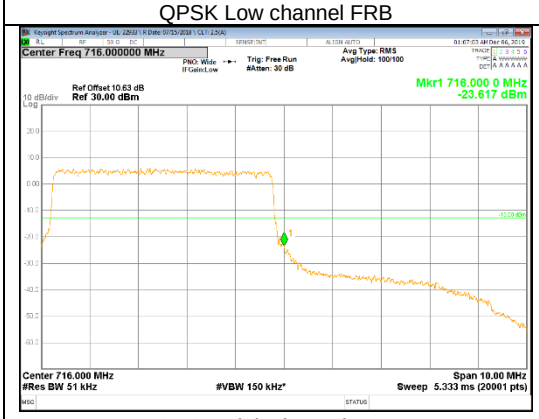


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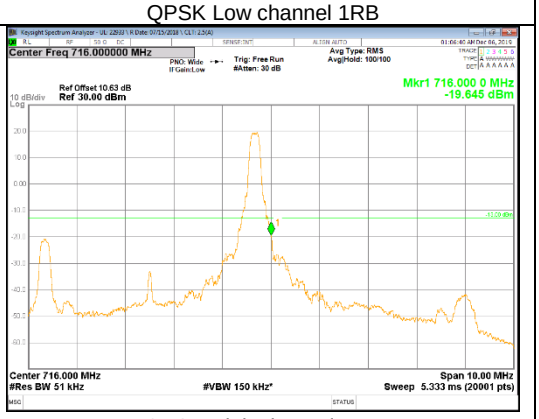


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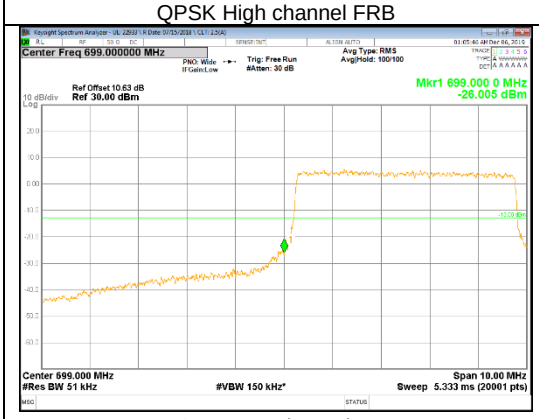


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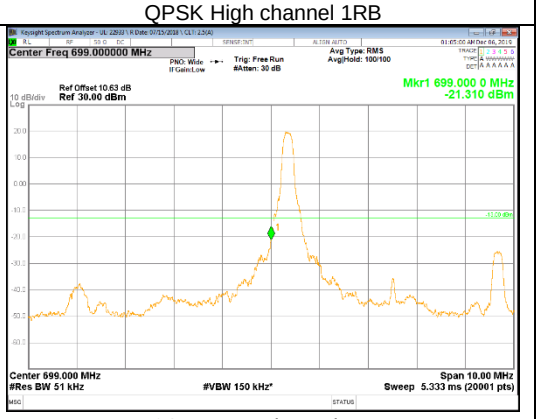


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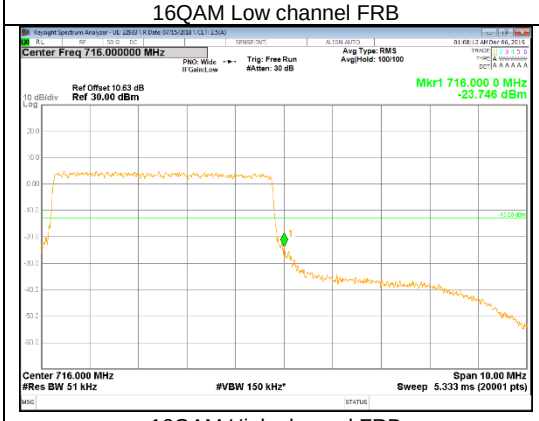


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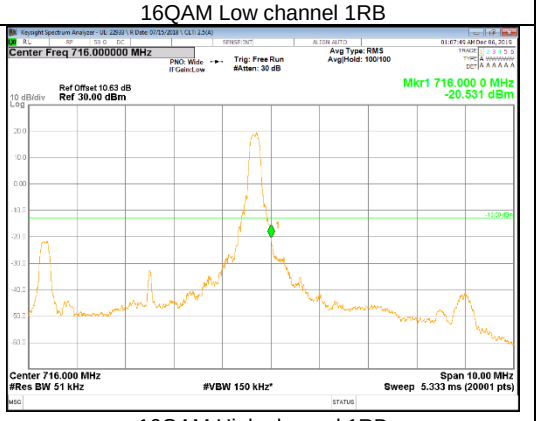


16QAM High channel 1RB


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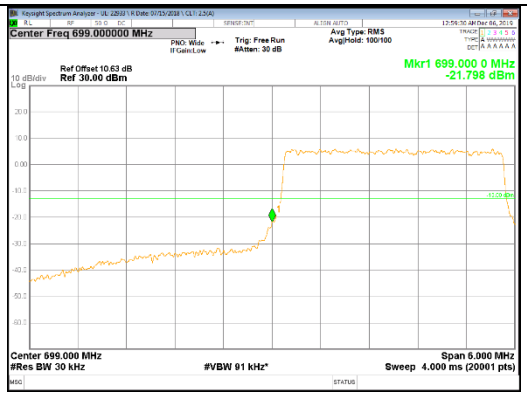
Band 12

3MHz

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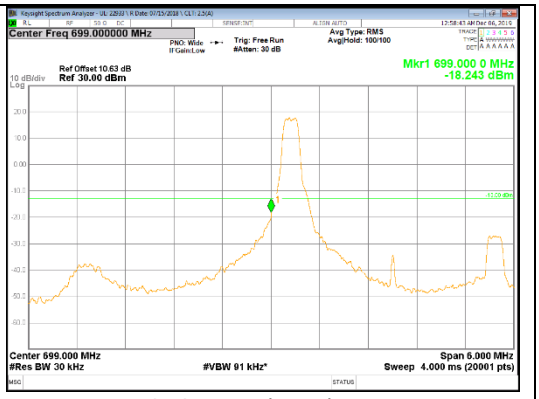


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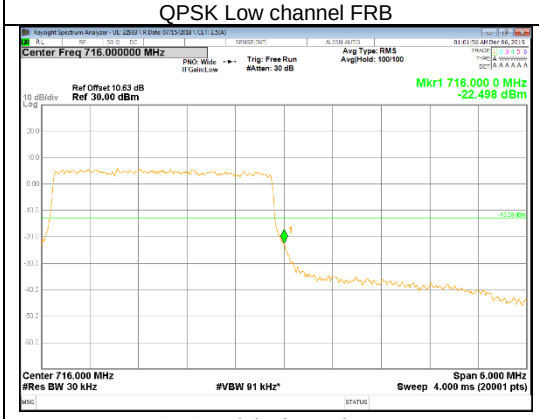


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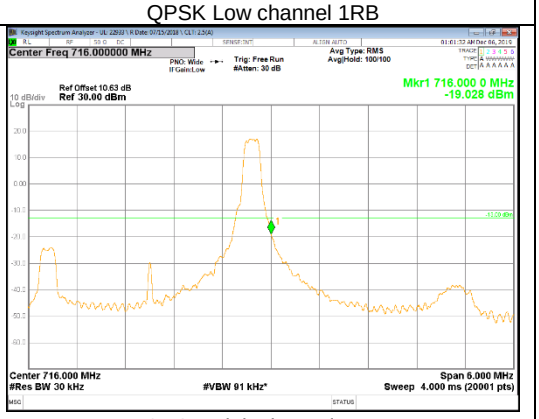


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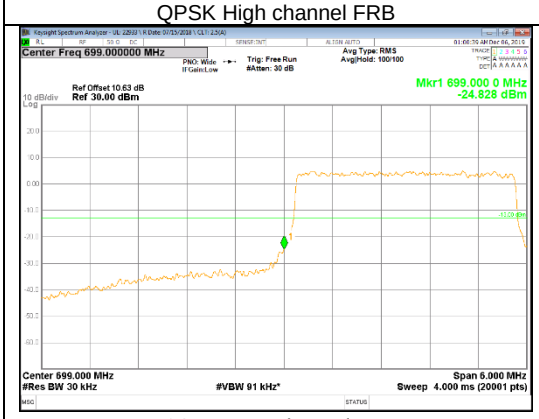


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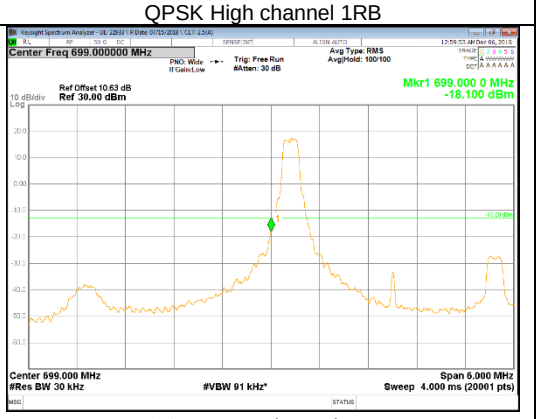


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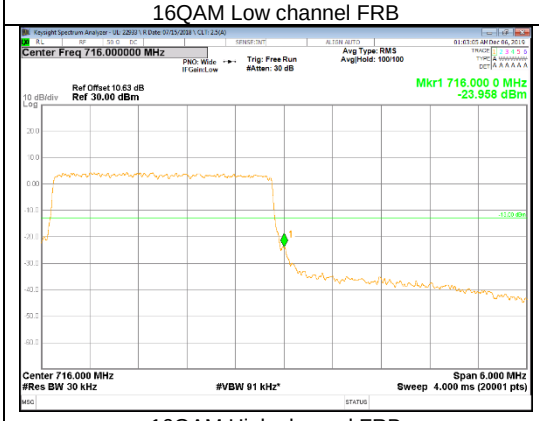


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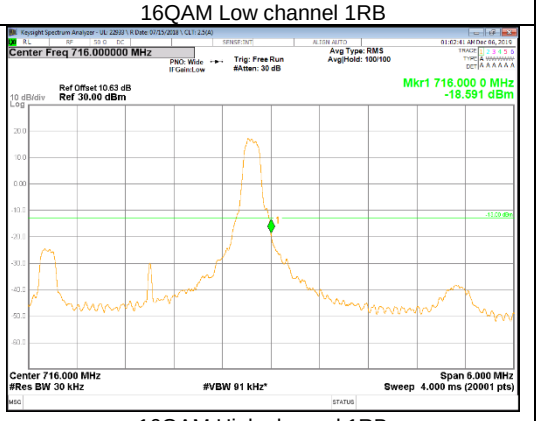


16QAM High channel 1RB



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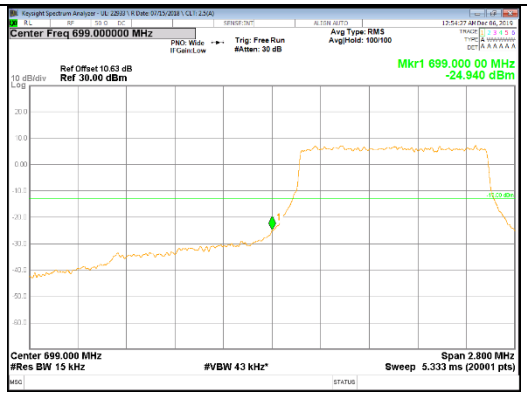
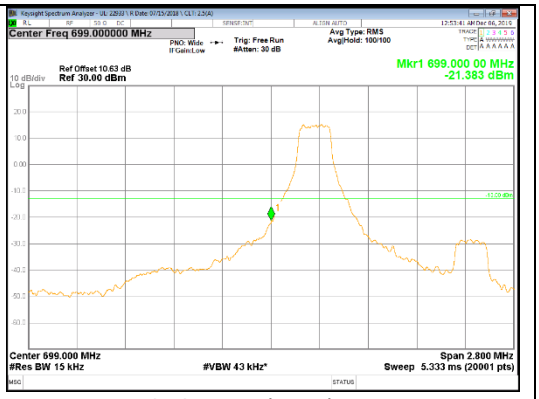
Band 12

1.4MHz




QPSK Low channel FRB

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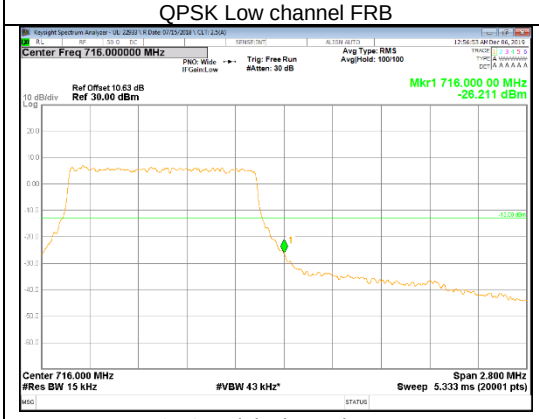


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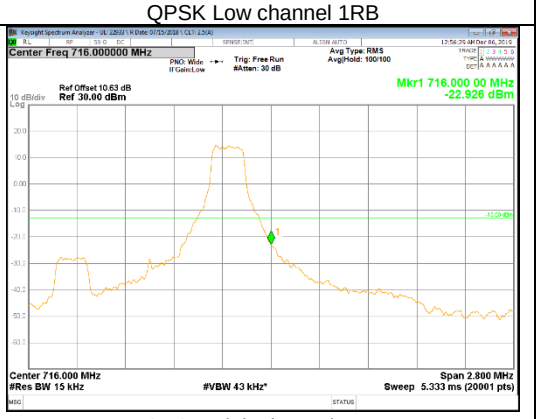


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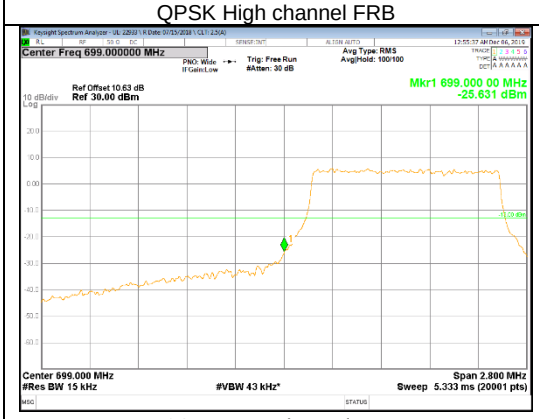


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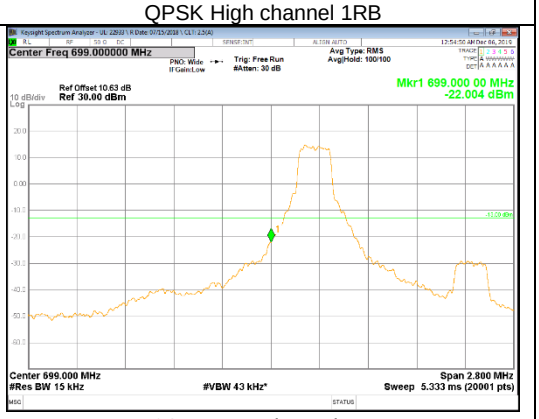


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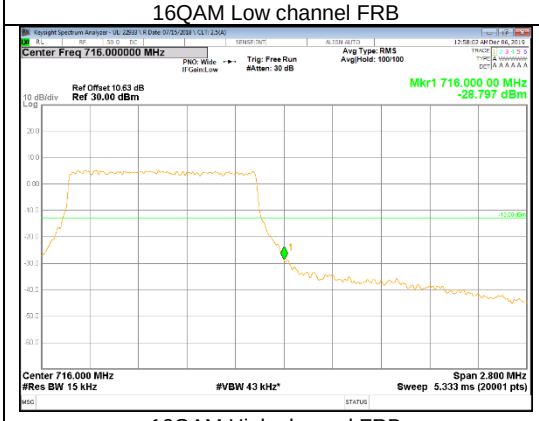
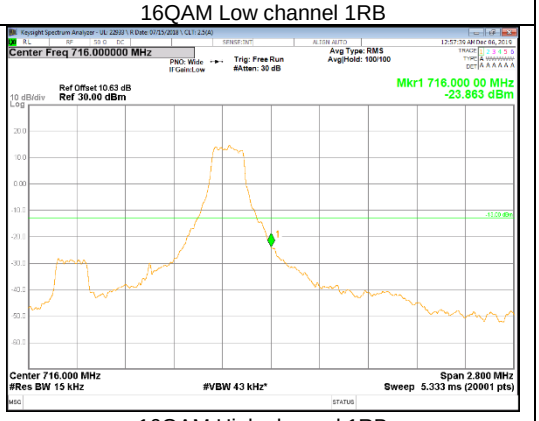



16QAM High channel FRB




16QAM High channel 1RB



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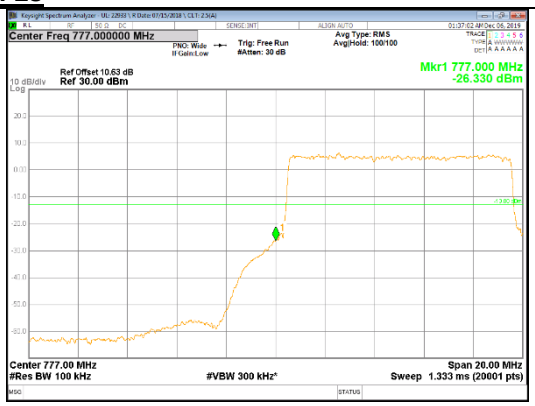
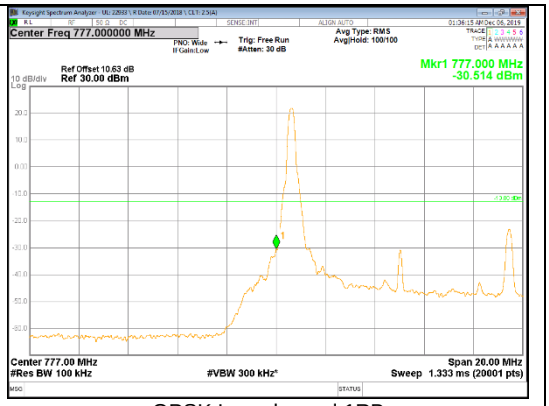
**LTE Band 13**

Band 13

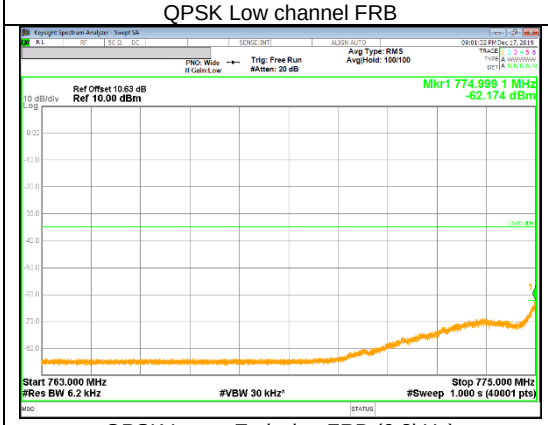
10MHz



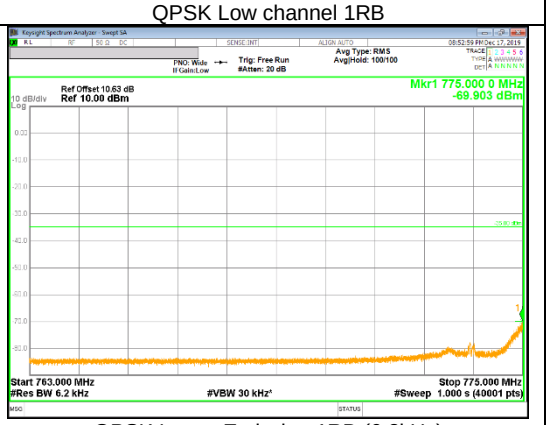

QPSK Low channel FRB



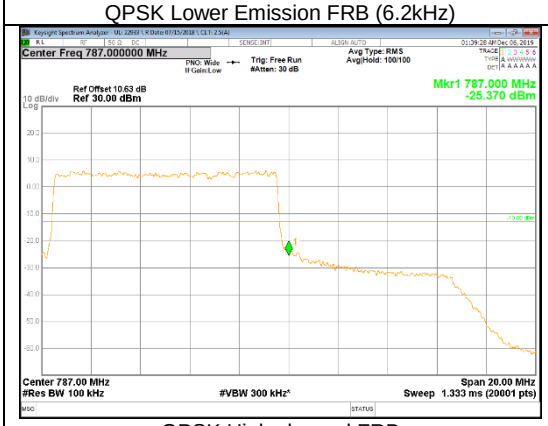

QPSK Low channel 1RB



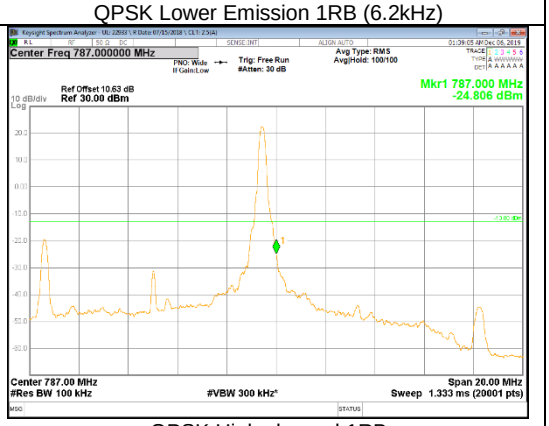

QPSK Lower Emission FRB (6.2kHz)



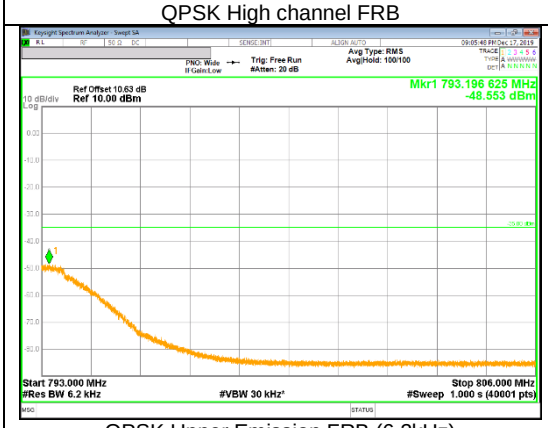

QPSK Lower Emission 1RB (6.2kHz)



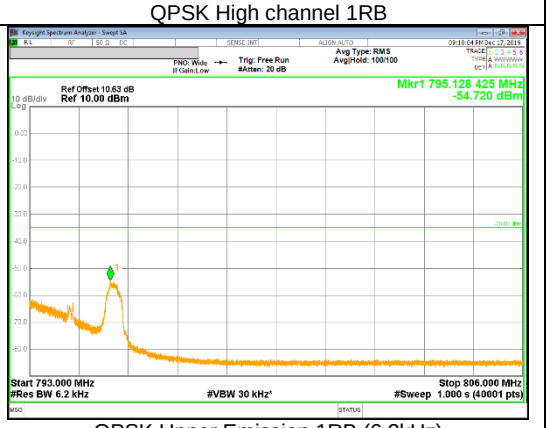

QPSK High channel FRB




QPSK High channel 1RB




QPSK Upper Emission FRB (6.2kHz)




QPSK Upper Emission 1RB (6.2kHz)



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