

9.2. BAND EDGE AND EMISSION MASK

RULE PART(S)

FCC: §2.1051, §22.917, §24.238, §27.53 and §90.691

LIMITS

FCC: §22.917, §24.238, §27.53 (h), §90.691

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

FCC: §90.691 Emission mask requirements for EA-based systems.

(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 $116 \text{ Log}_{10}(f/6.1)$ decibels or $50 + 10 \text{ Log}_{10}(P)$ 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 $43 + 10 \text{ Log}_{10}(P)$ 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.

FCC: §27.53 (Band 13)

(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 793-805 MHz, by a factor not less than $65 + 10 \log (P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;

(5) Compliance with the provisions of paragraphs (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

(6) Compliance with the provisions of paragraphs (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(f) Emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals. (-70 dBW/MHz = -40 dBm/MHz).

FCC: §27.53 (Band 12, 17)

(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. Compliance with this provision

is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

FCC: §27.53 (Band 7, 41)

(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.

TEST PROCEDURE

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.

For each band edge measurement:

- Set the spectrum analyzer span to include the block edge frequency.
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13 dBm
- Set resolution bandwidth to at least 1% of emission bandwidth.

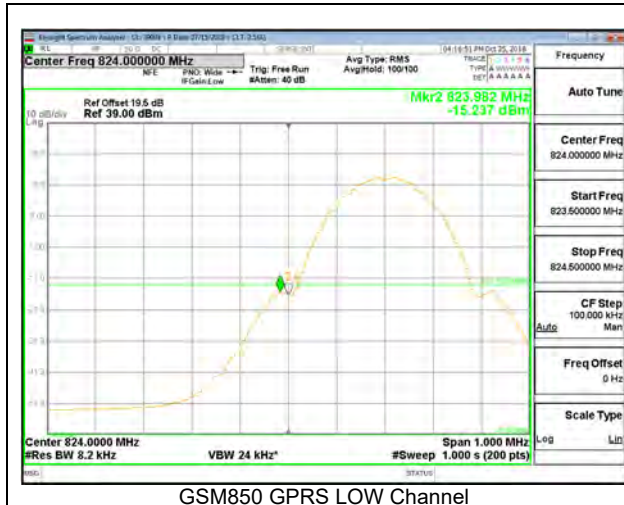
MODES TESTED

- 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

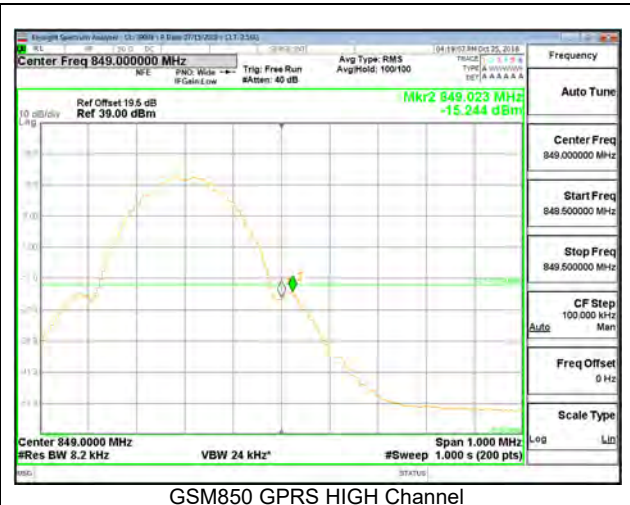
RESULTS

9.2.1. GSM850

GPRS

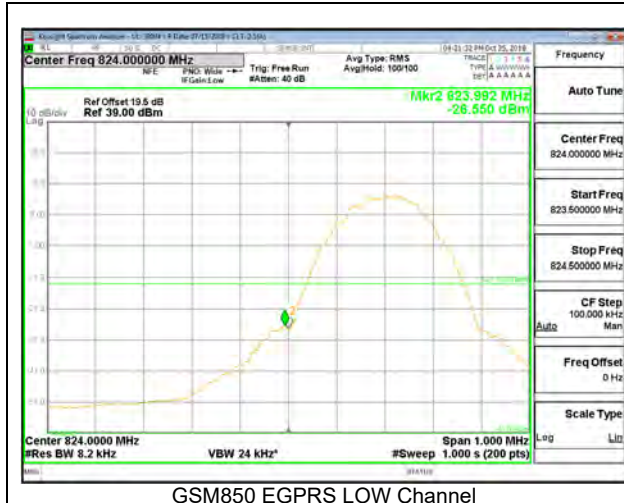


GSM850 GPRS LOW Channel

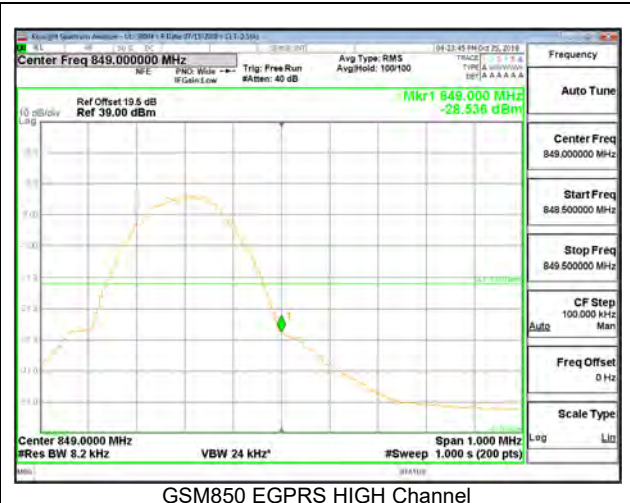


GSM850 GPRS HIGH Channel

EGPRS



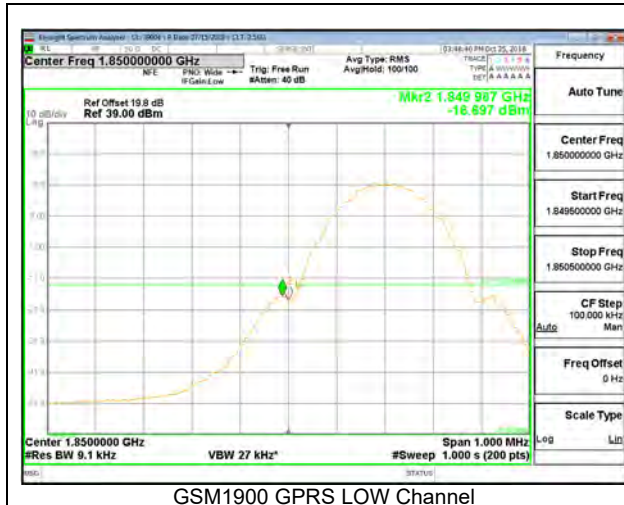
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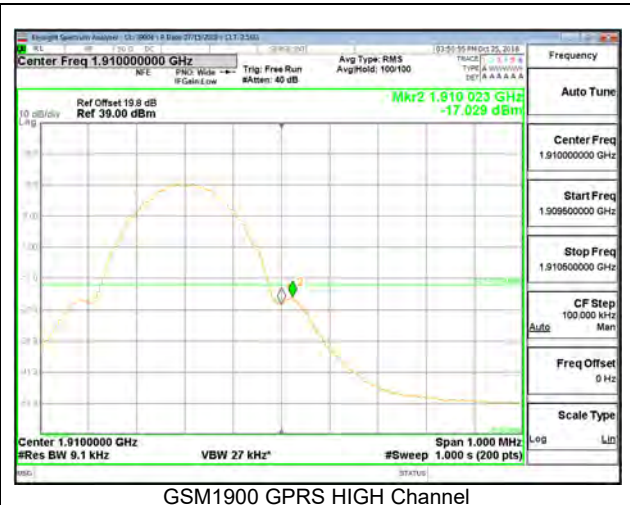
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GPRS

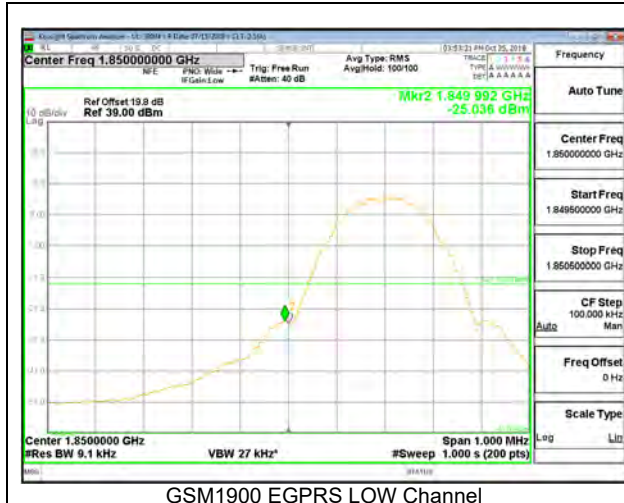


GSM1900 GPRS LOW Channel

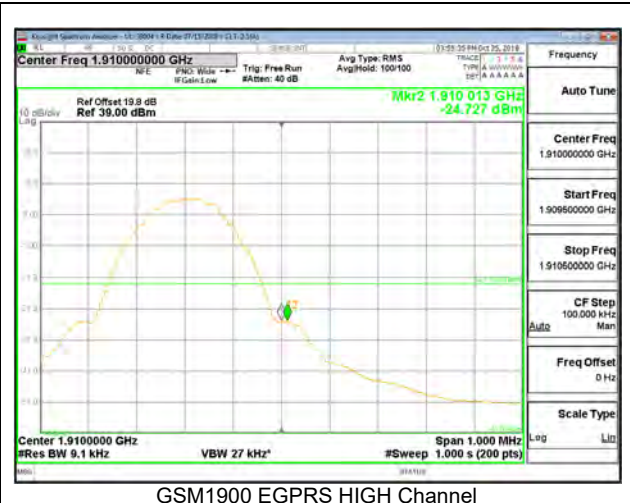


GSM1900 GPRS HIGH Channel

EGPRS



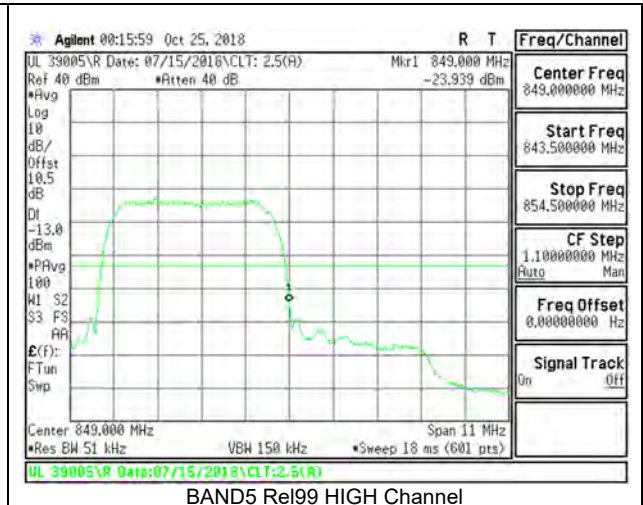
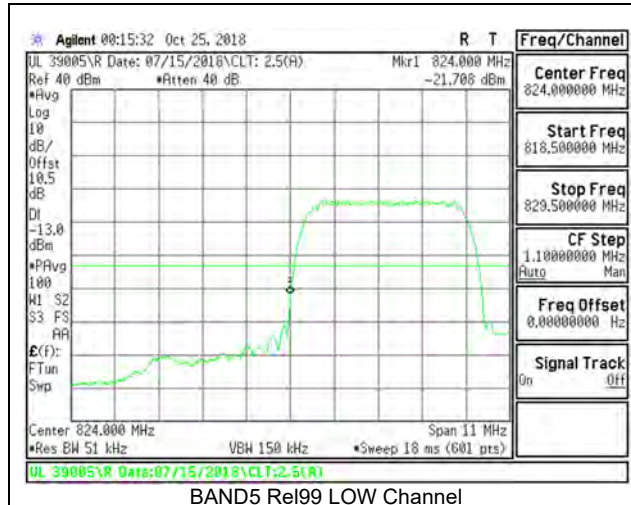
GSM1900 EGPRS LOW Channel



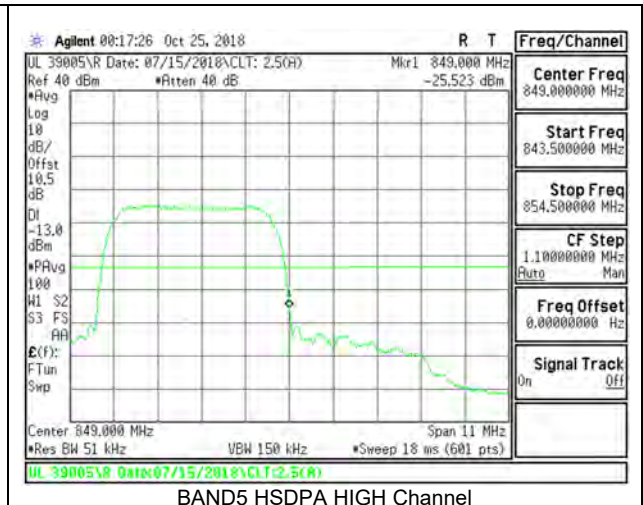
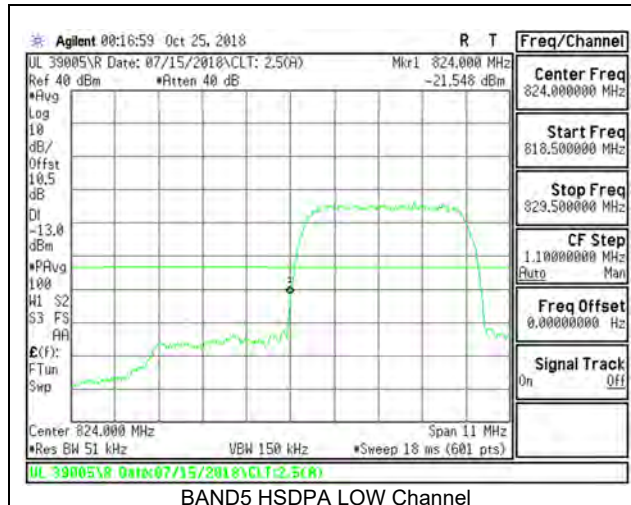
GSM1900 EGPRS HIGH Channel

9.2.3. WCDMA BAND5

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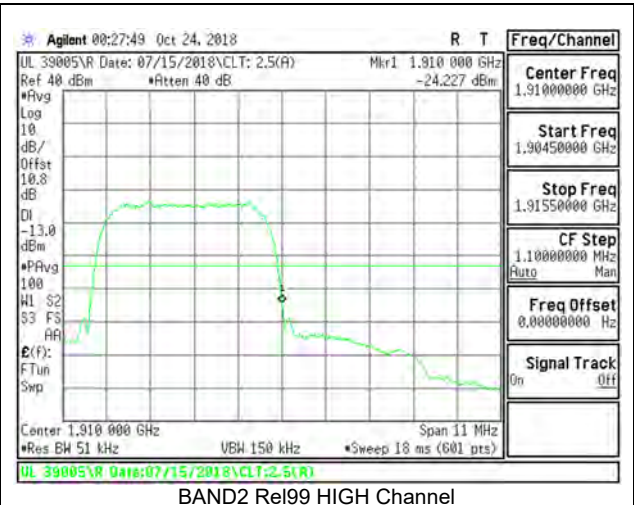
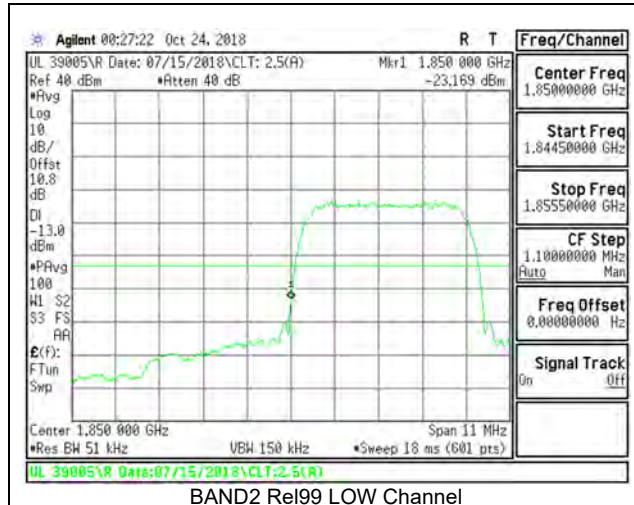


HSDPA

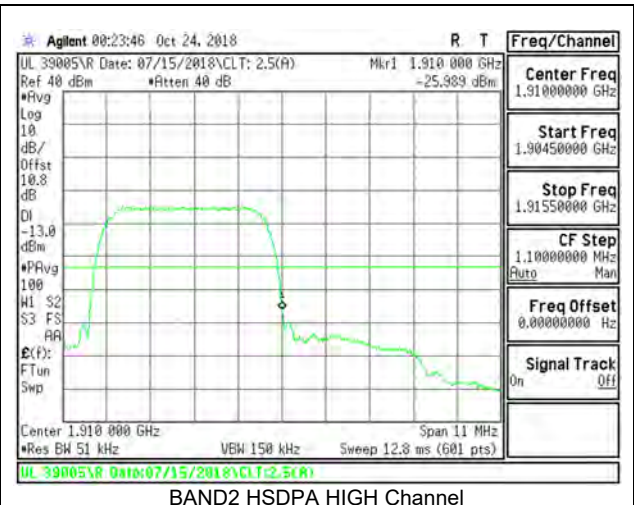
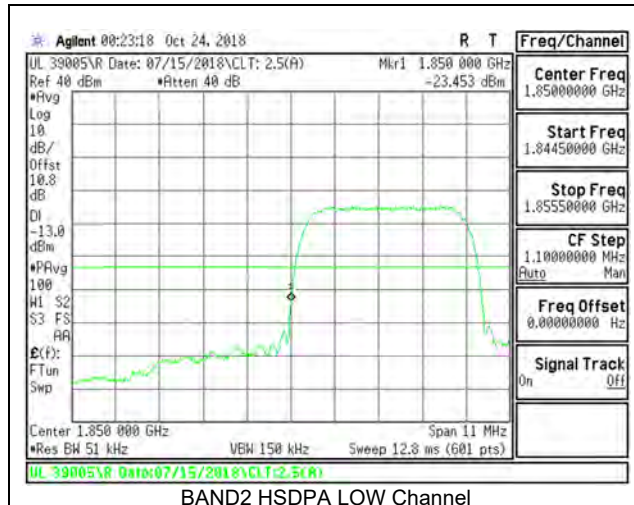


9.2.4. WCDMA BAND2

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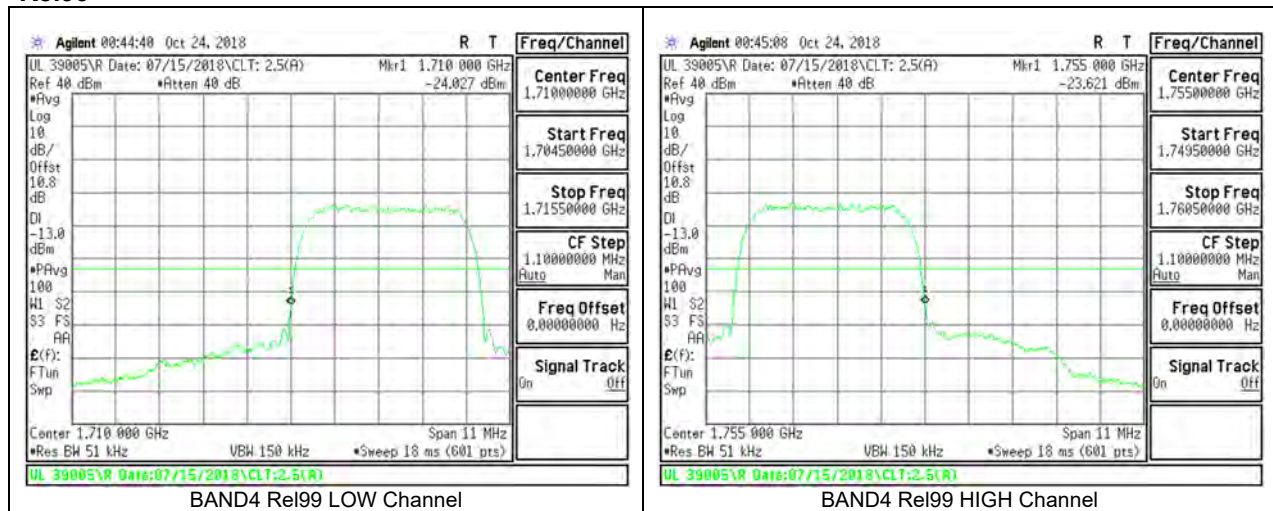


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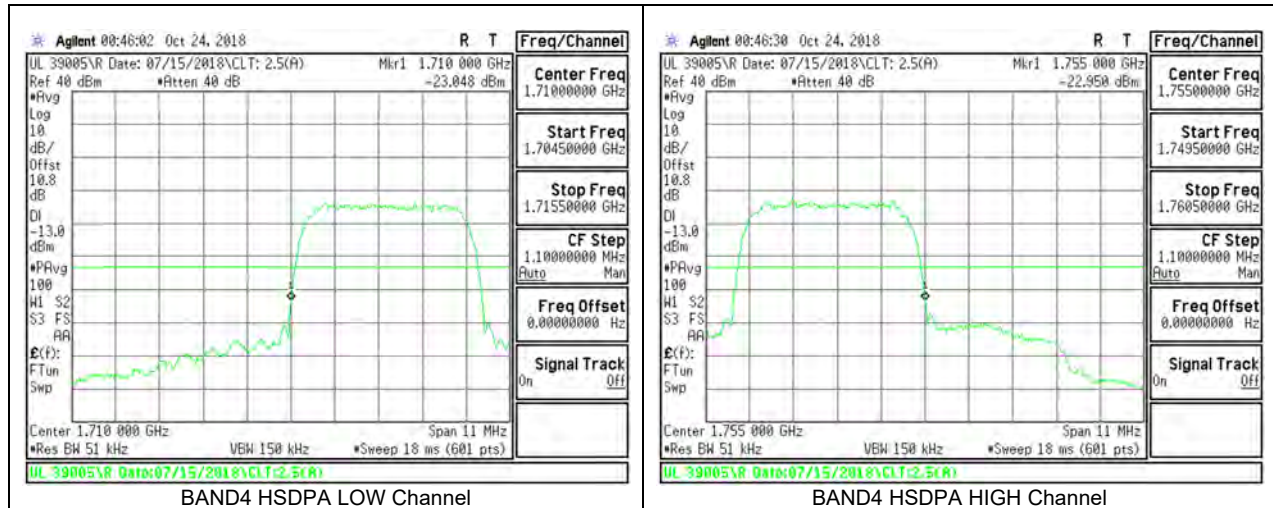


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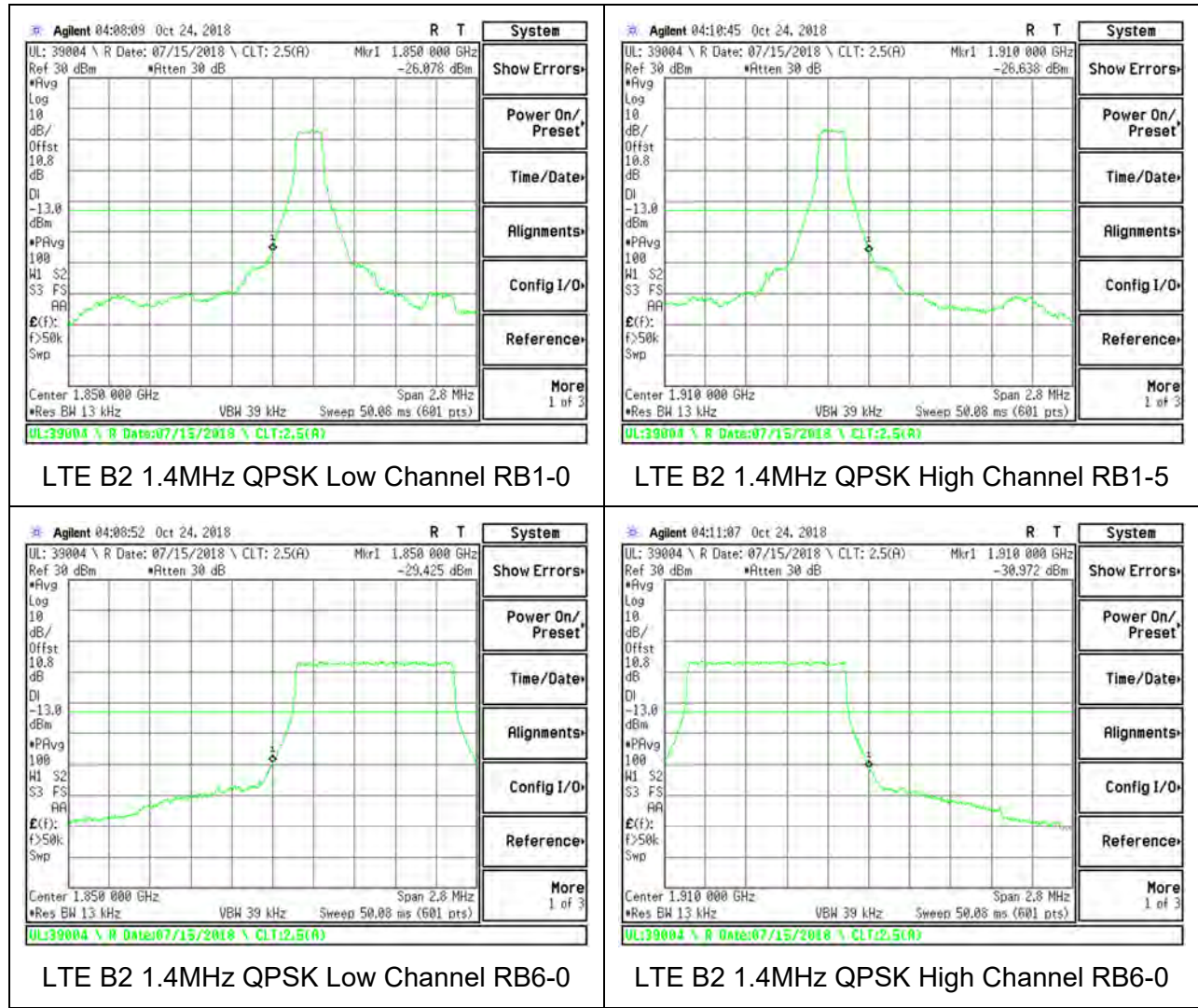
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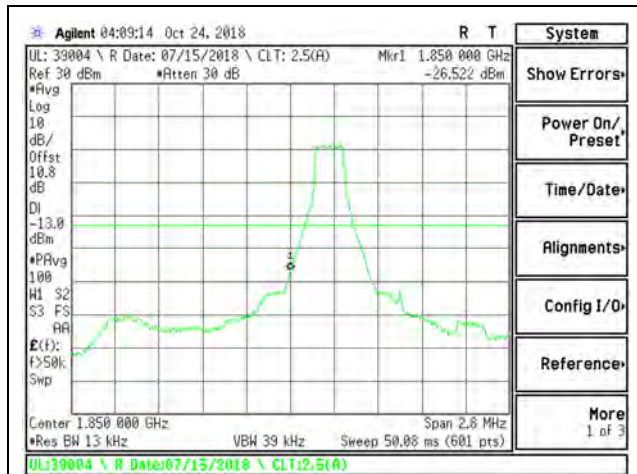


HSDPA

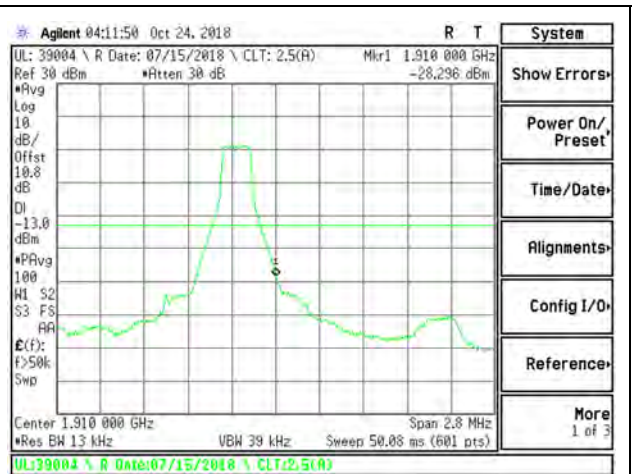


9.2.6. LTE BAND 2 BANDEDGE

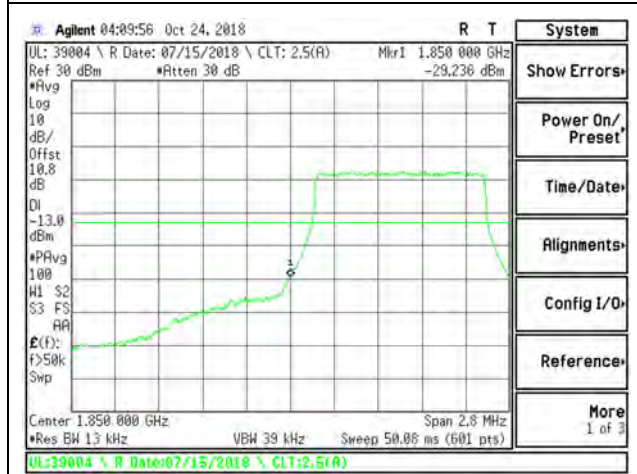




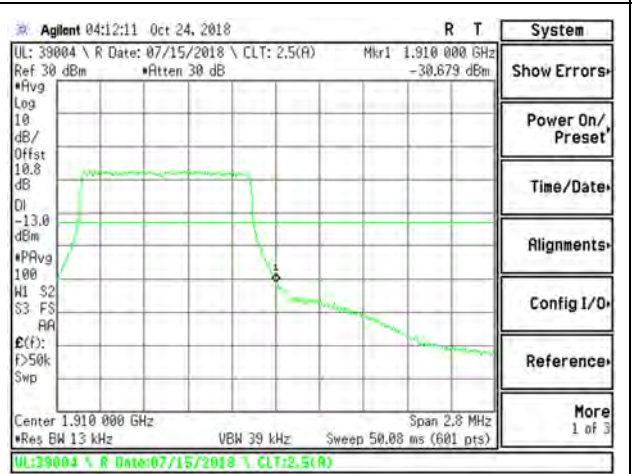
LTE B2 1.4MHz 16QAM Low Channel RB1-0



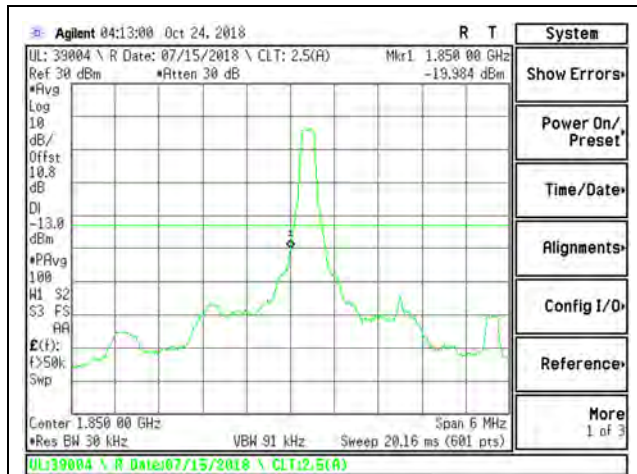
LTE B2 1.4MHz 16QAM High Channel RB1-5



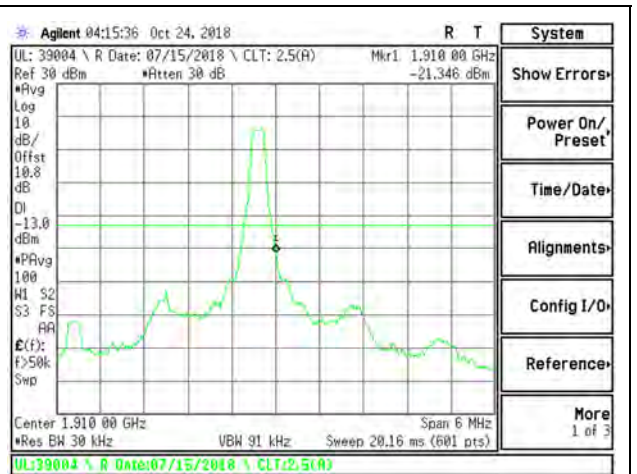
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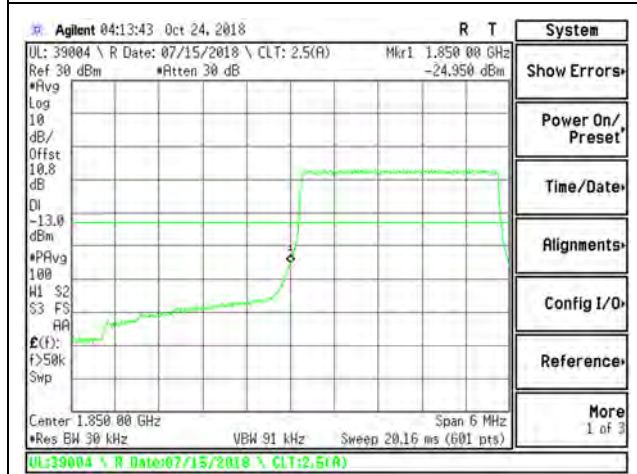
LTE B2 1.4MHz 16QAM High Channel RB6-0



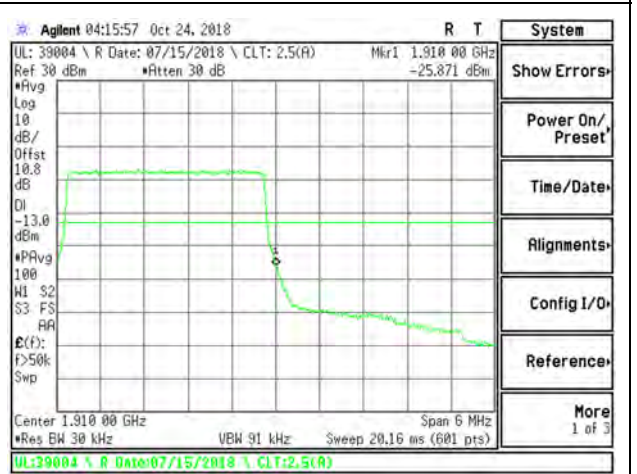
LTE B2 3MHz QPSK Low Channel RB1-0



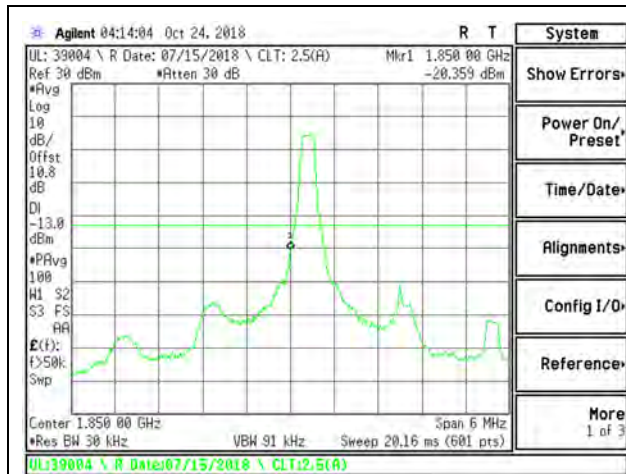
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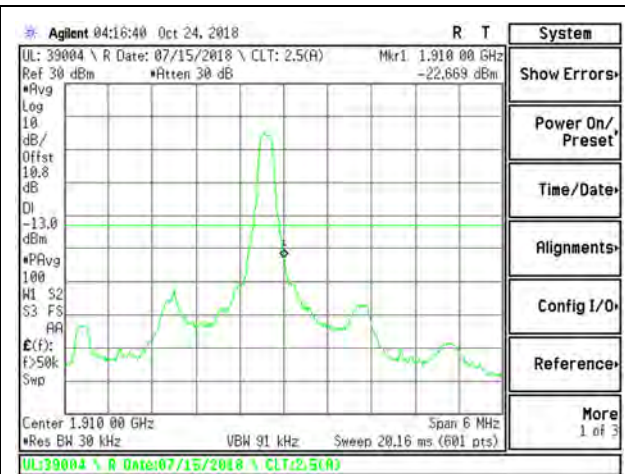
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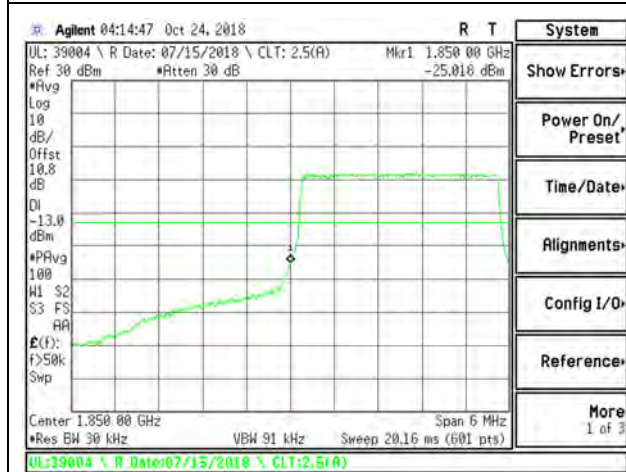
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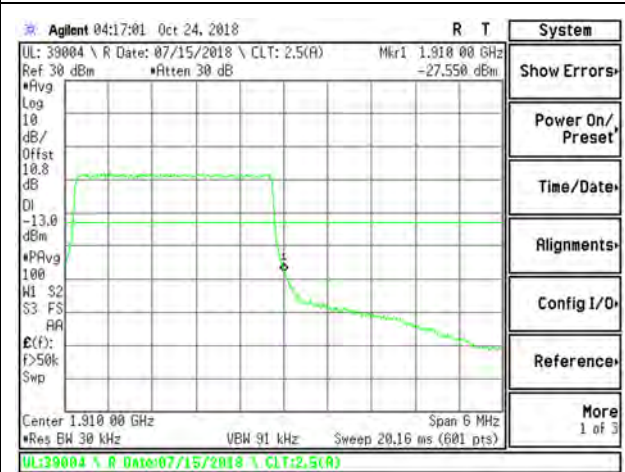
LTE B2 3MHz 16QAM Low Channel RB1-0



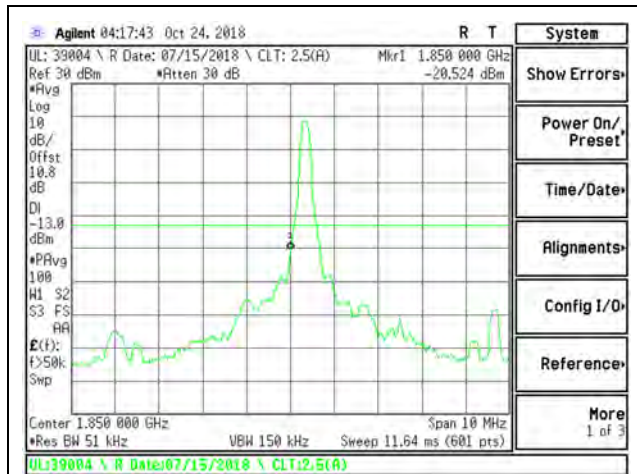
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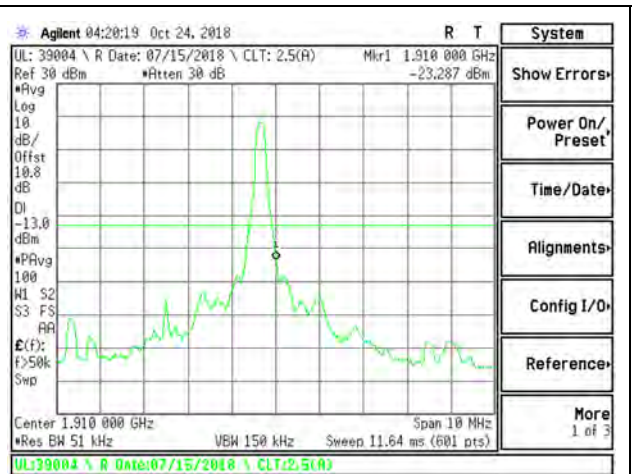
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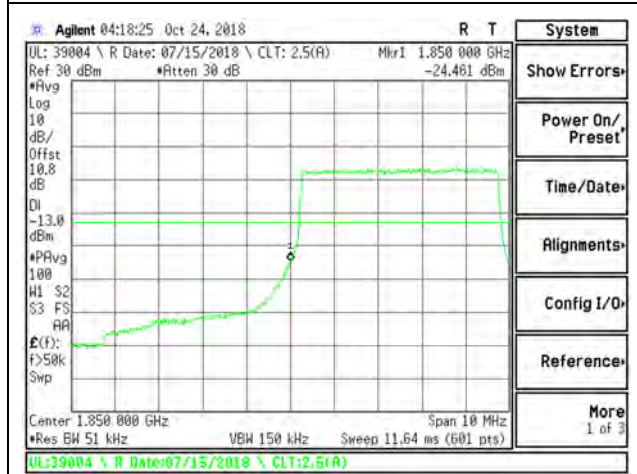
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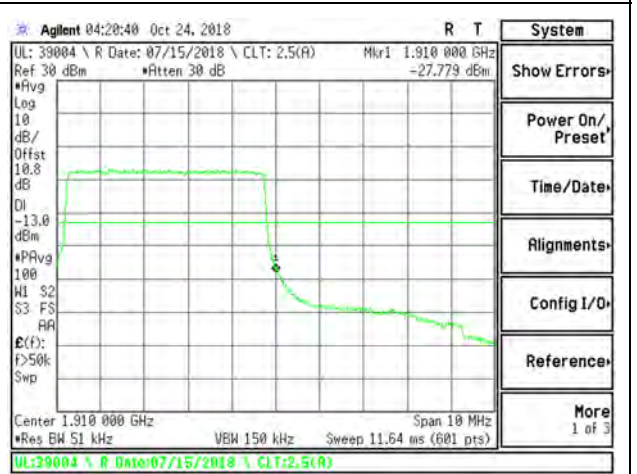
LTE B2 5MHz QPSK Low Channel RB1-0



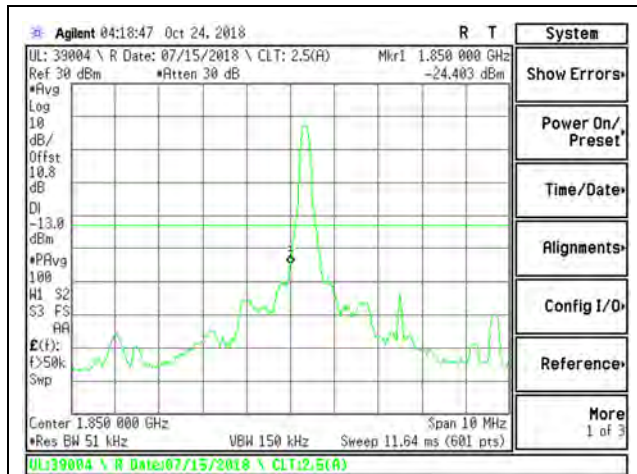
LTE B2 5MHz QPSK High Channel RB1-24



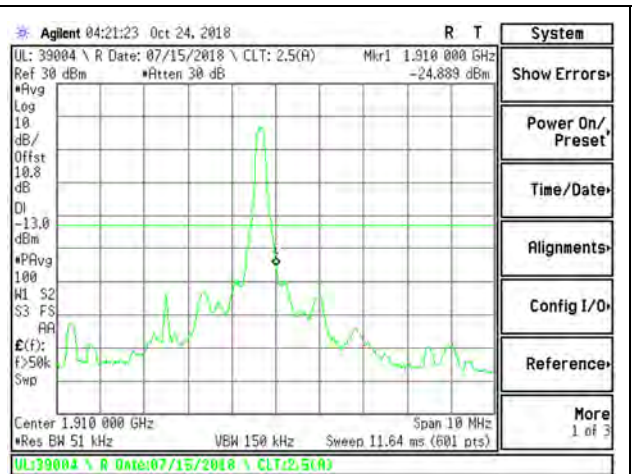
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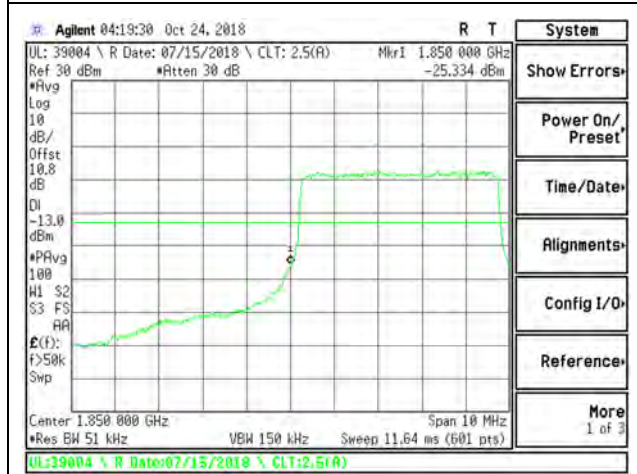
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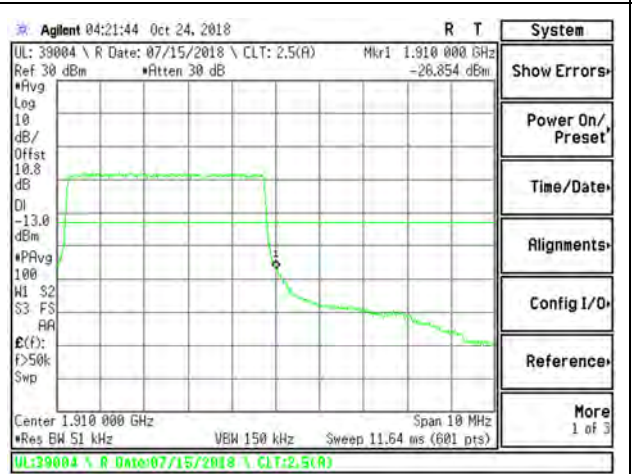
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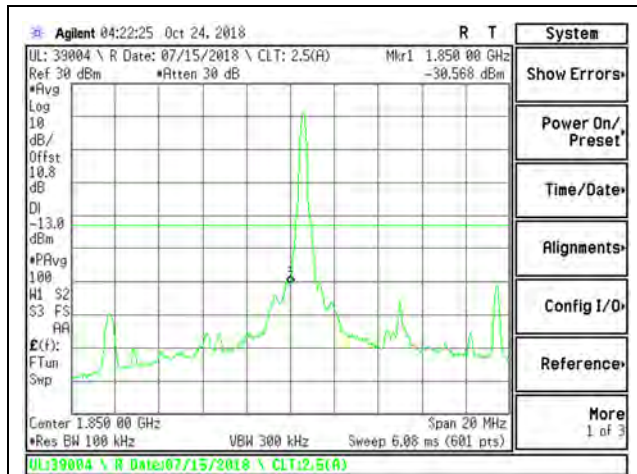
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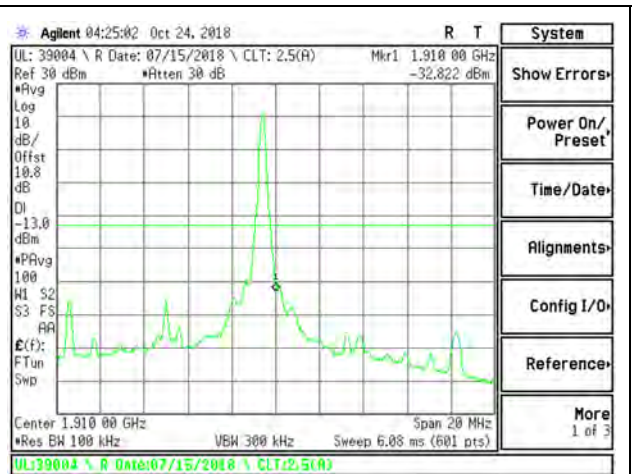
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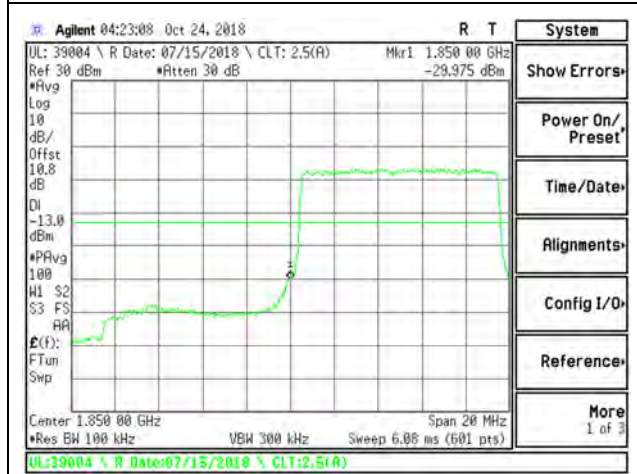
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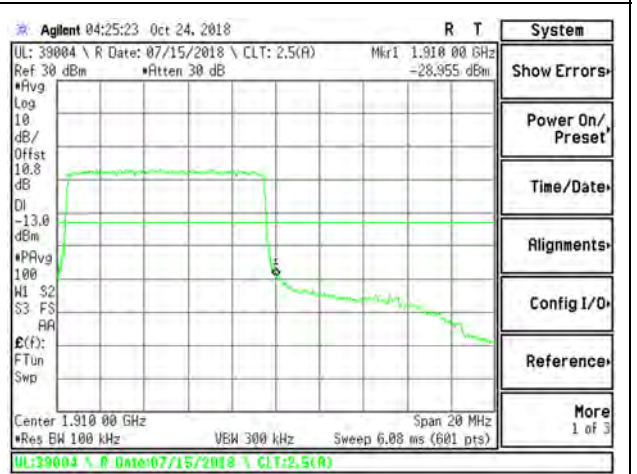
LTE B2 10MHz QPSK Low Channel RB1-0



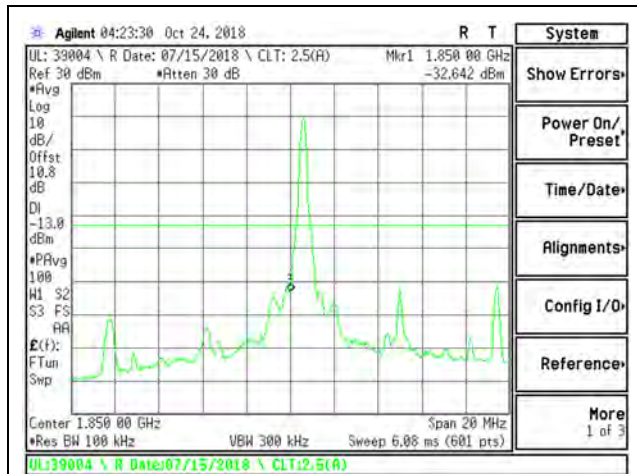
LTE B2 10MHz QPSK High Channel RB1-49



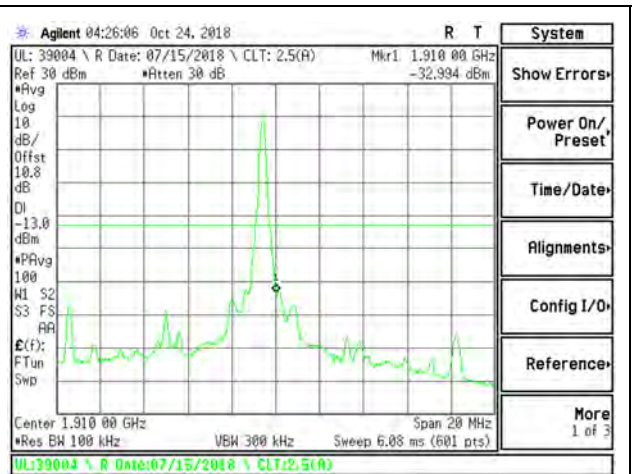
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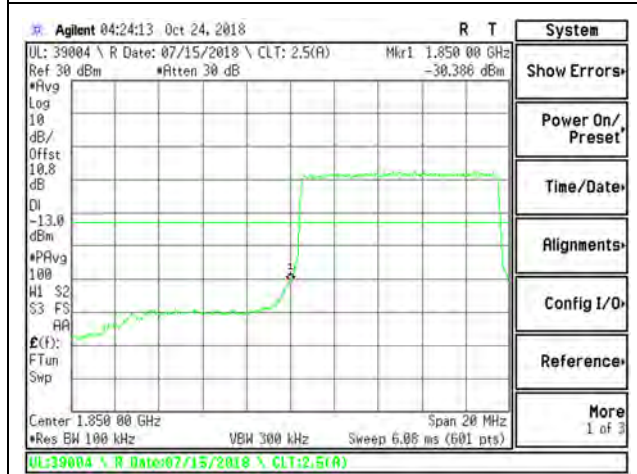
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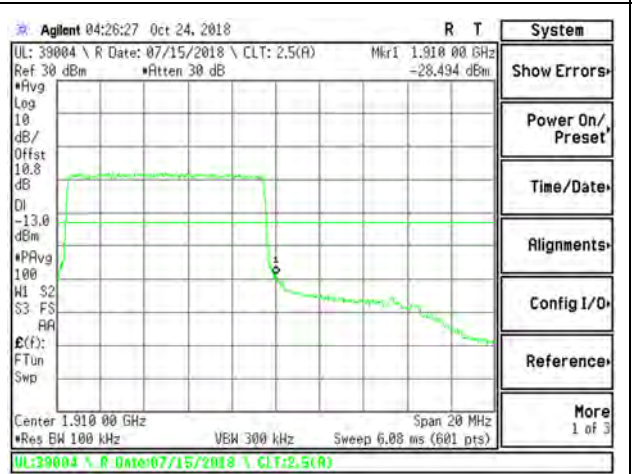
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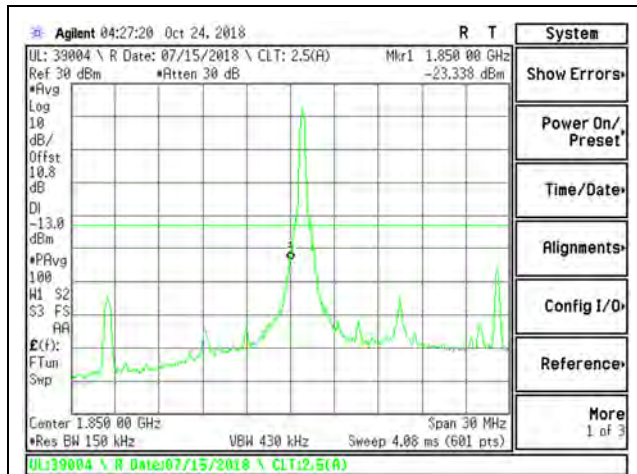
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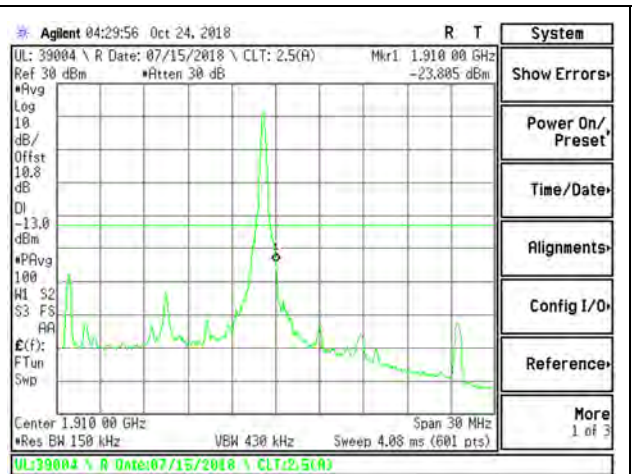
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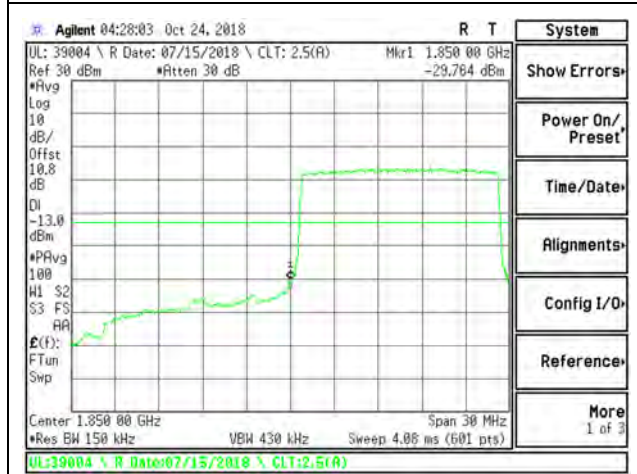
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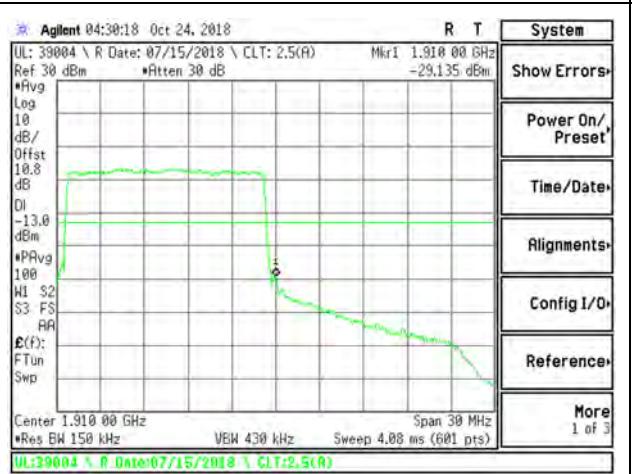
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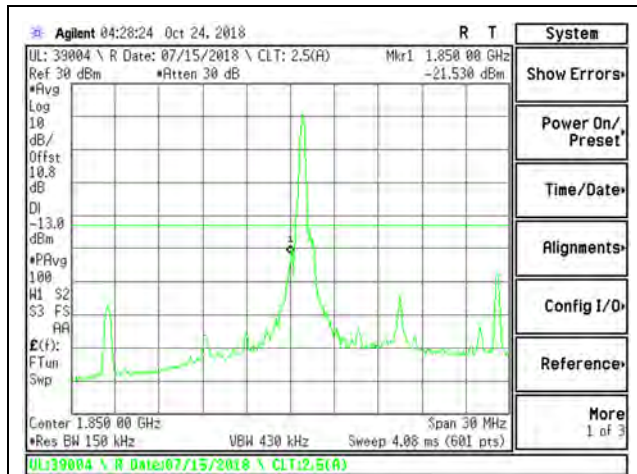
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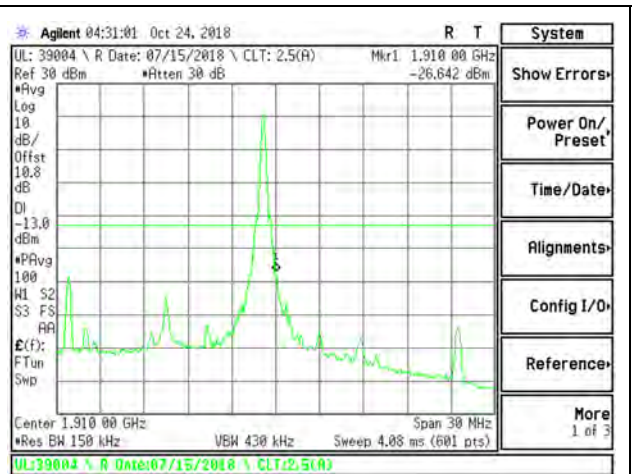
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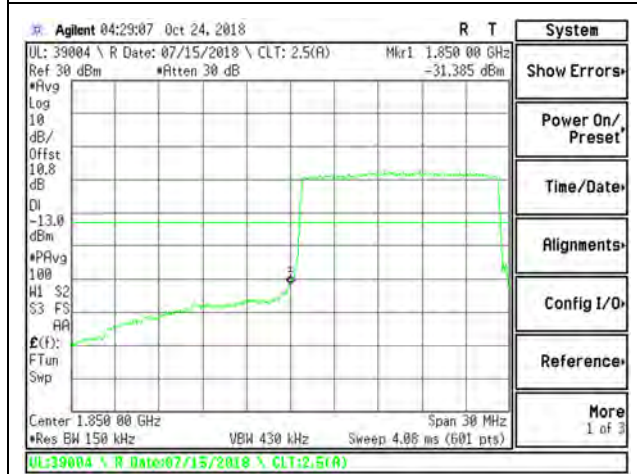
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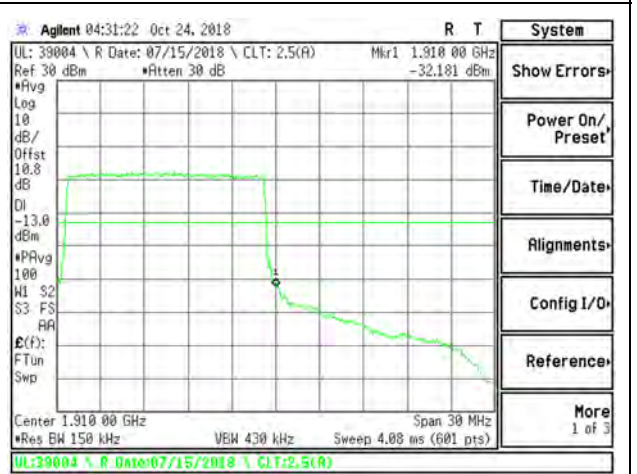
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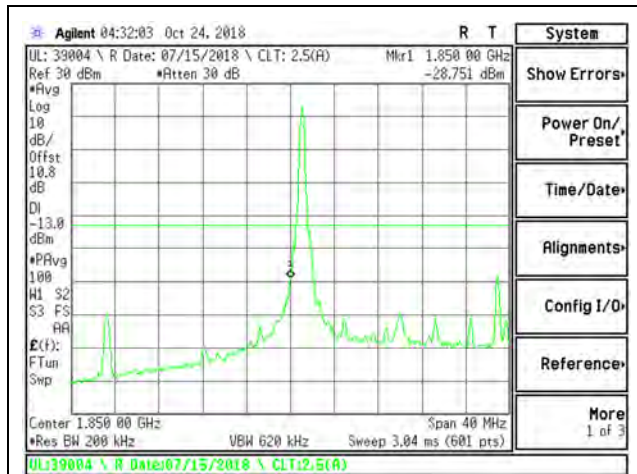
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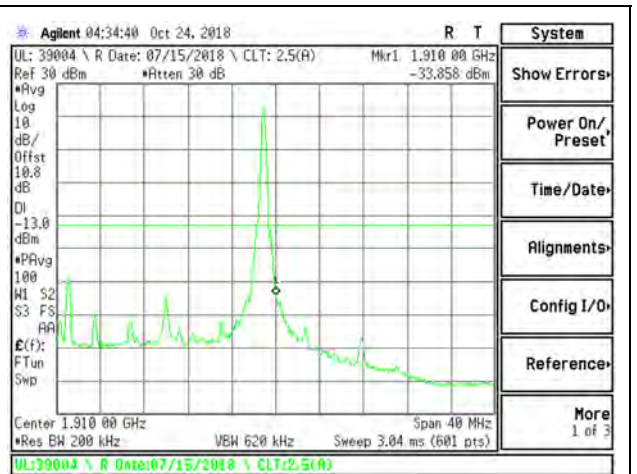
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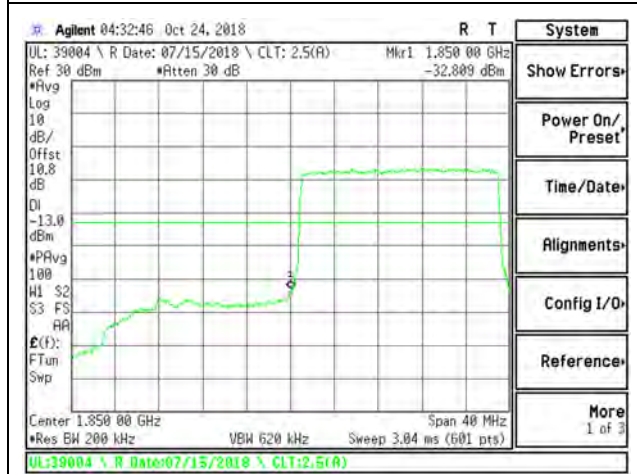
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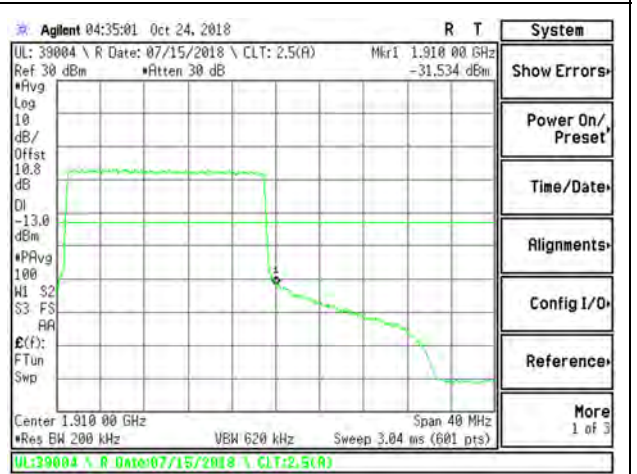
LTE B2 20MHz QPSK Low Channel RB1-0



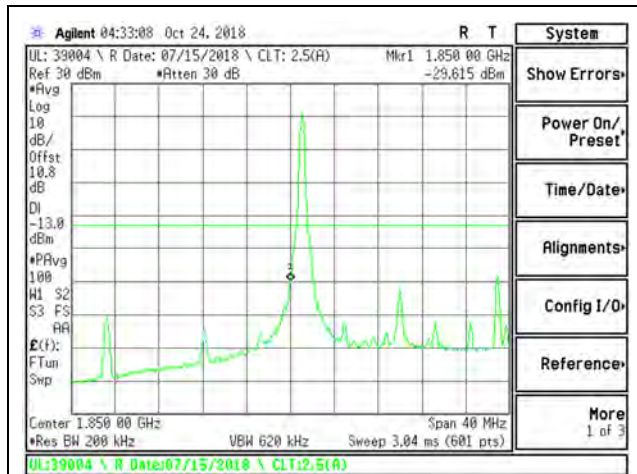
LTE B2 20MHz QPSK High Channel RB1-99



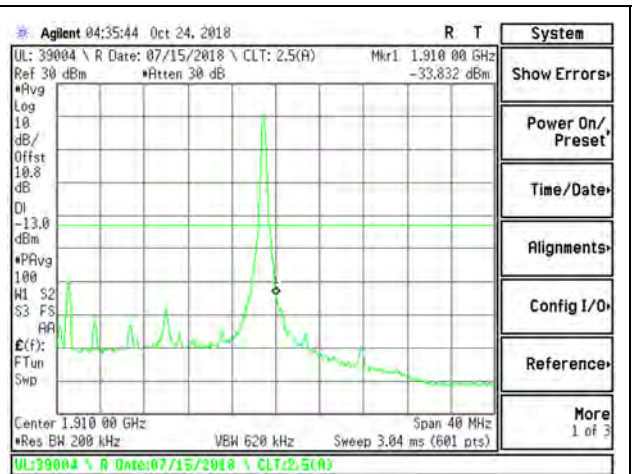
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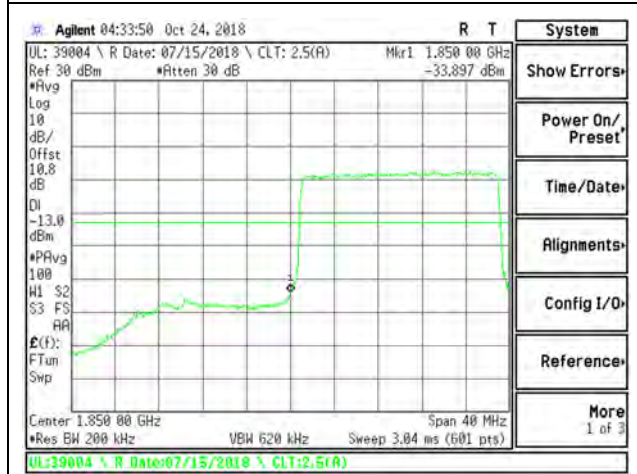
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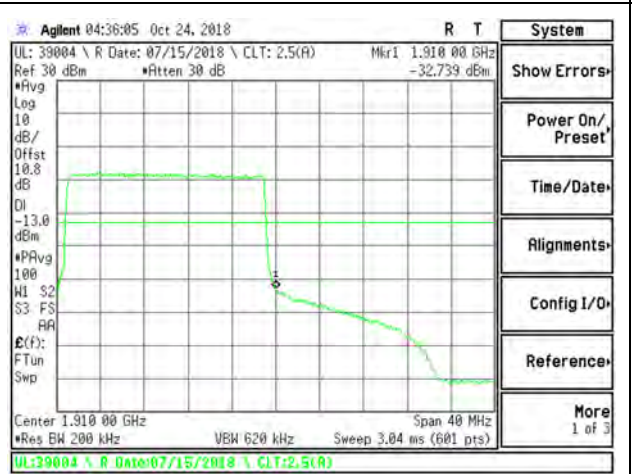
LTE B2 20MHz 16QAM Low Channel RB1-0



LTE B2 20MHz 16QAM High Channel RB1-99

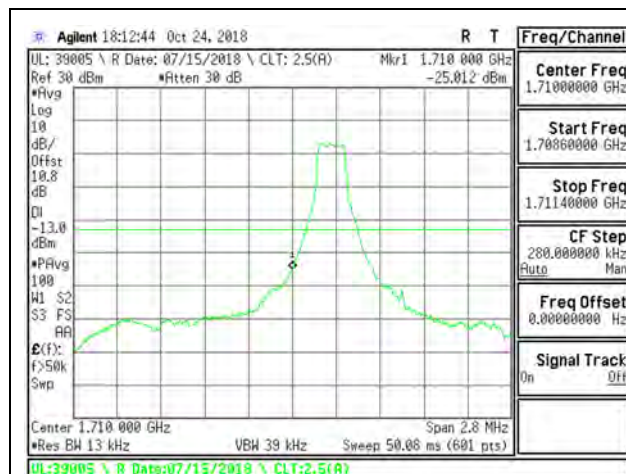


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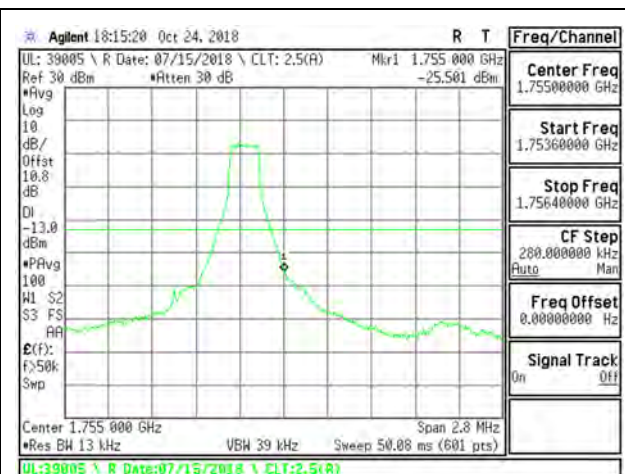


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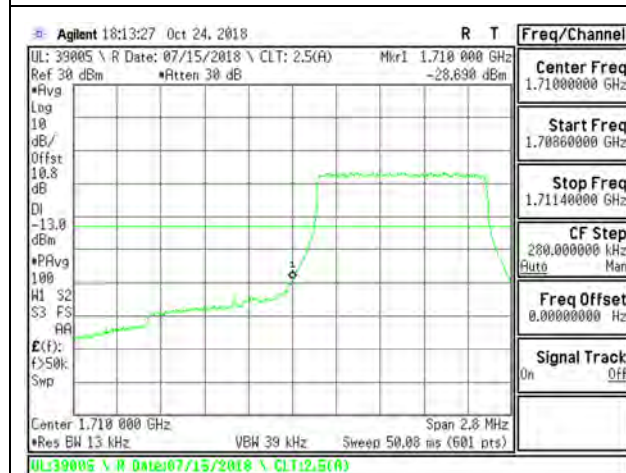
9.2.7. LTE BAND 4 BANDEDGE



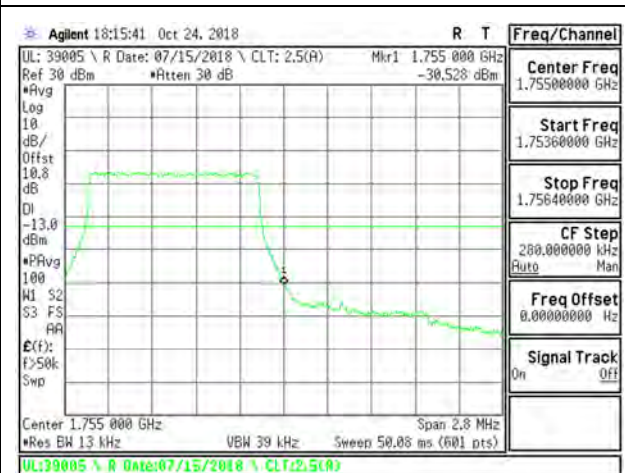
LTE B4 1.4MHz QPSK Low Channel RB1-0



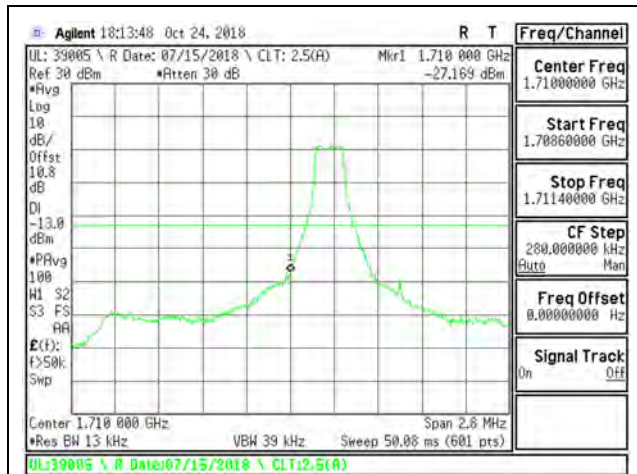
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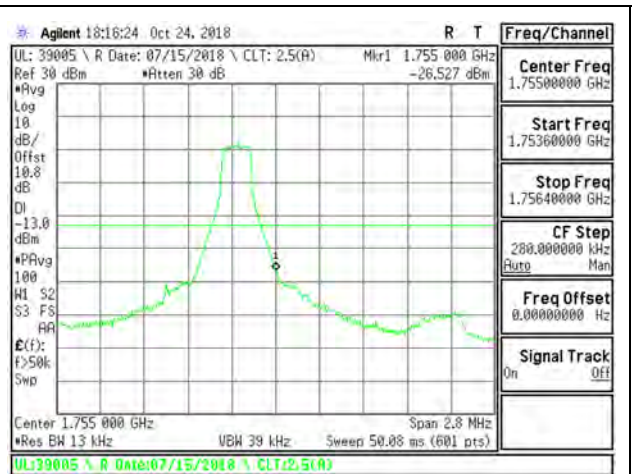
LTE B4 1.4MHz QPSK Low Channel RB6-0



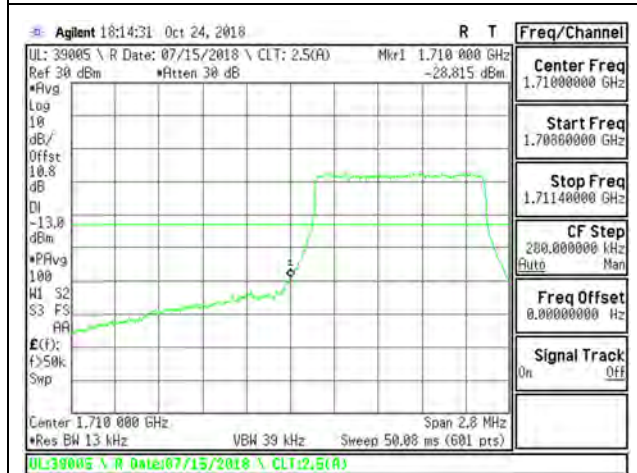
LTE B4 1.4MHz QPSK High Channel RB6-0



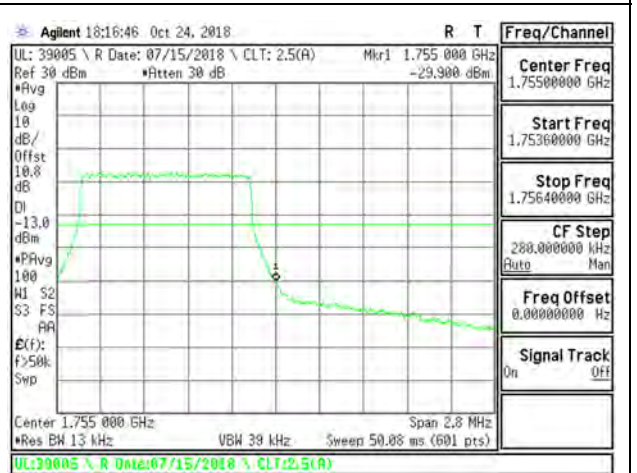
LTE B4 1.4MHz 16QAM Low Channel RB1-0



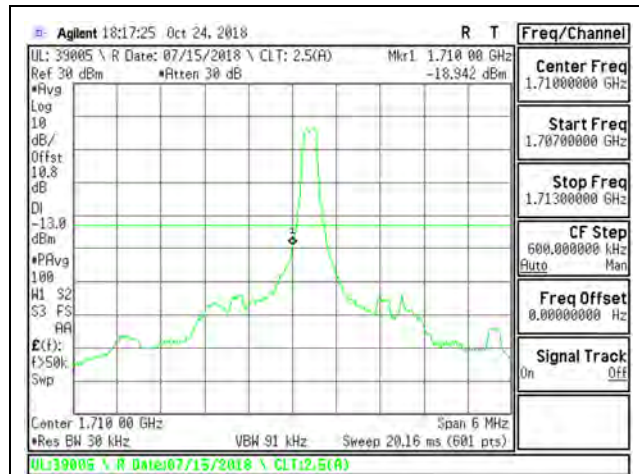
LTE B4 1.4MHz 16QAM High Channel RB1-50



LTE B4 1.4MHz 16QAM Low Channel RB6-0



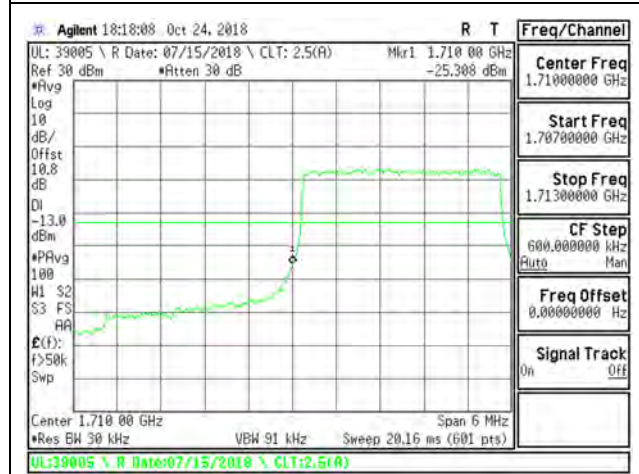
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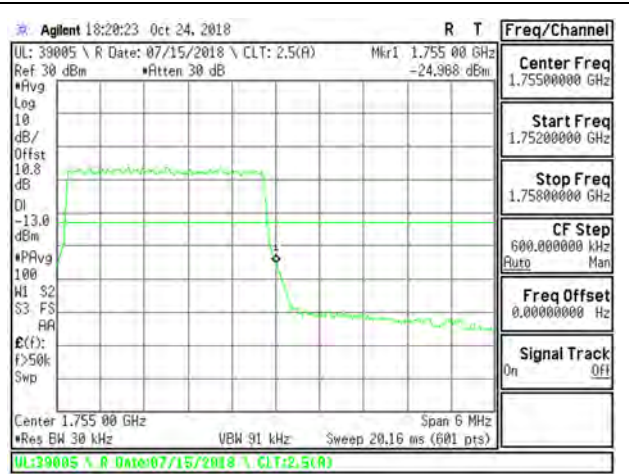
LTE B4 3MHz QPSK Low Channel RB1-0



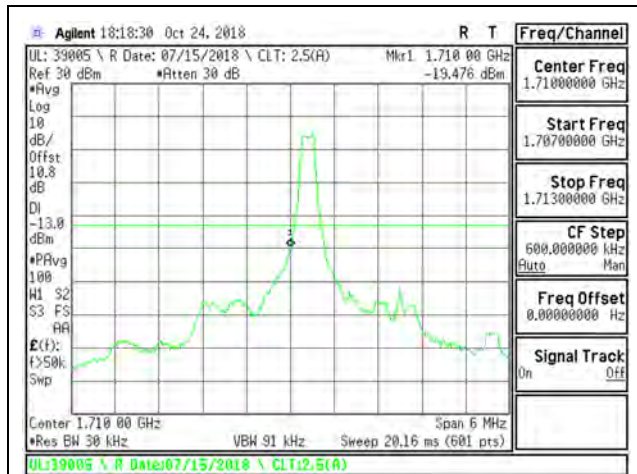
LTE B4 3MHz QPSK High Channel RB1-14



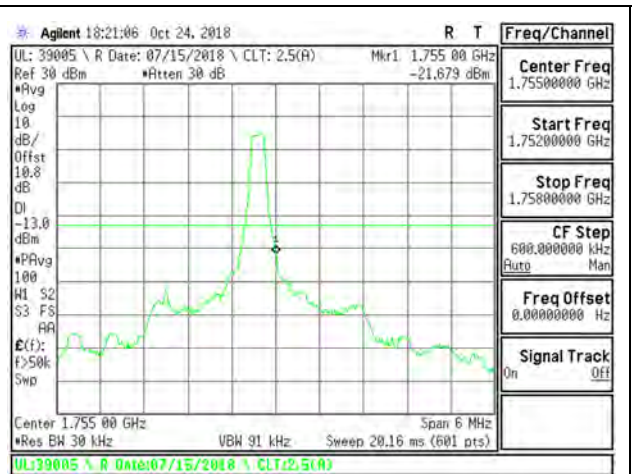
LTE B4 3MHz QPSK Low Channel RB15-0



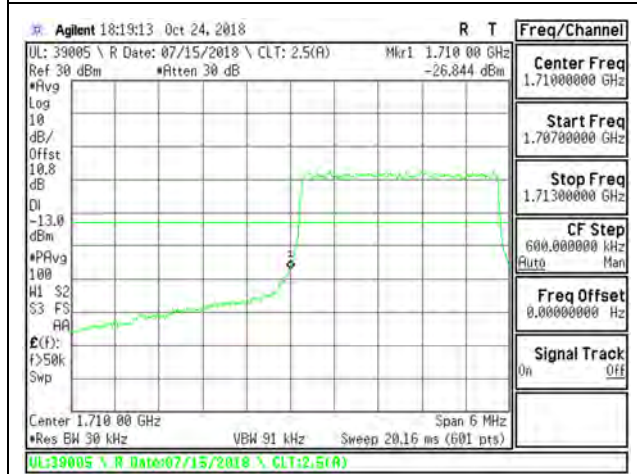
LTE B4 3MHz QPSK High Channel RB15-0



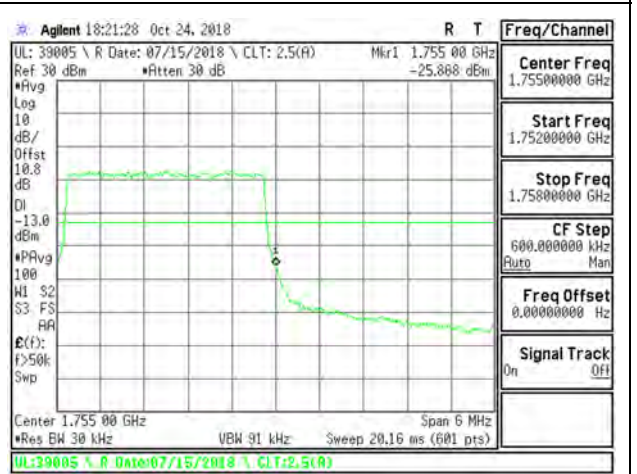
LTE B4 3MHz 16QAM Low Channel RB1-0



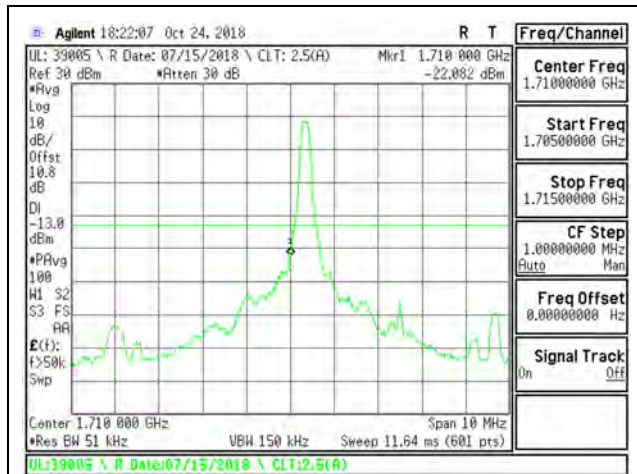
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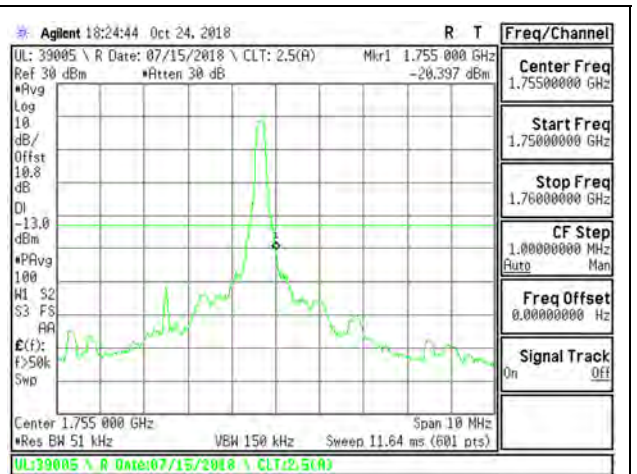
LTE B4 3MHz 16QAM Low Channel RB15-0



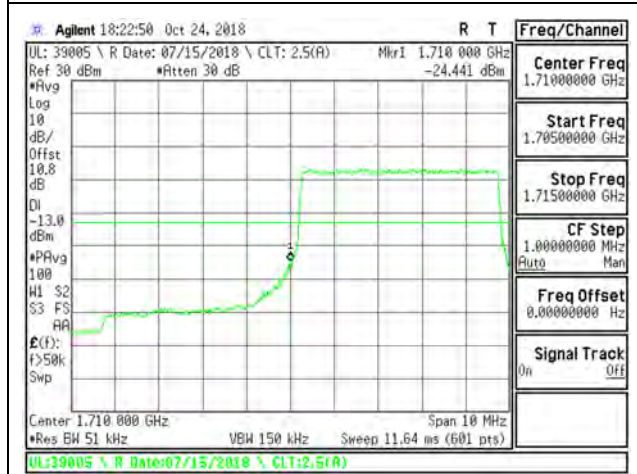
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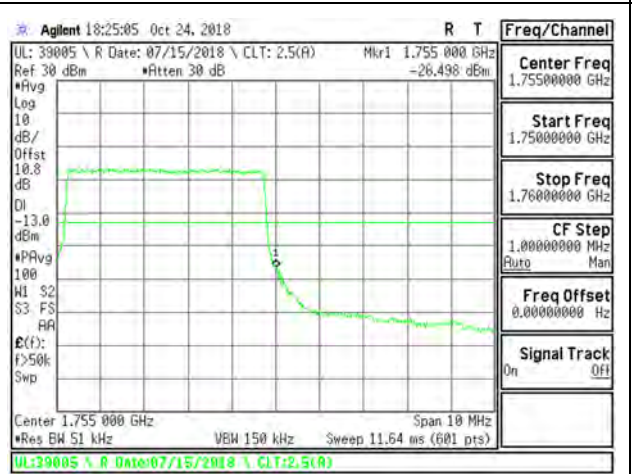
LTE B4 5MHz QPSK Low Channel RB1-0



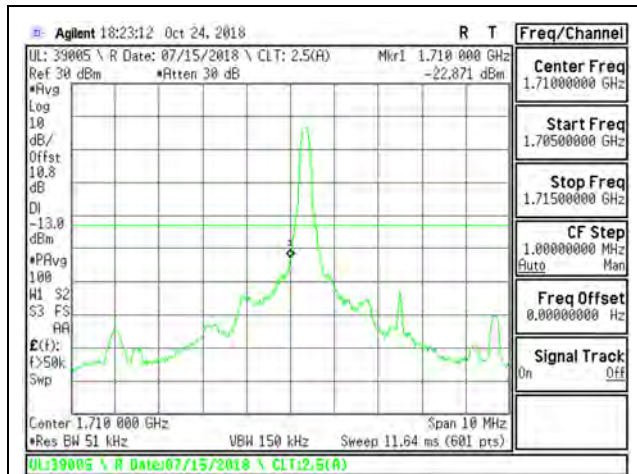
LTE B4 5MHz QPSK High Channel RB1-24



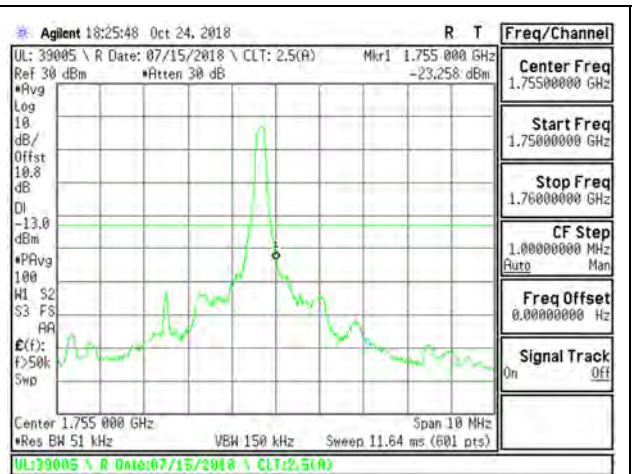
LTE B4 5MHz QPSK Low Channel RB25-0



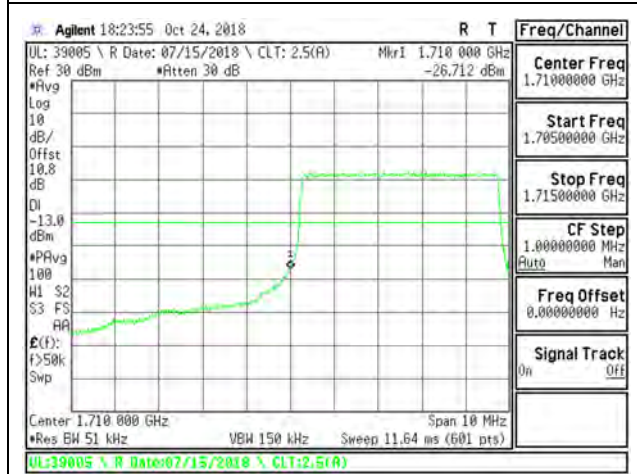
LTE B4 5MHz QPSK High Channel RB25-0



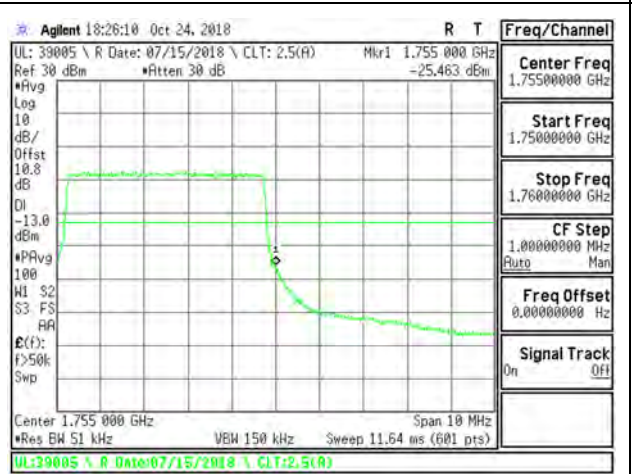
LTE B4 5MHz 16QAM Low Channel RB1-0



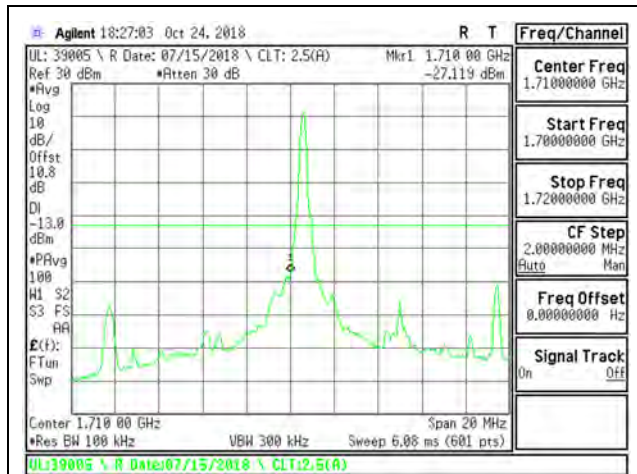
LTE B4 5MHz 16QAM High Channel RB1-24



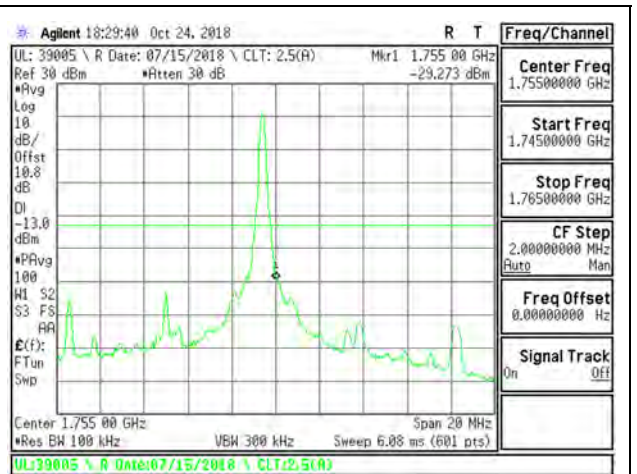
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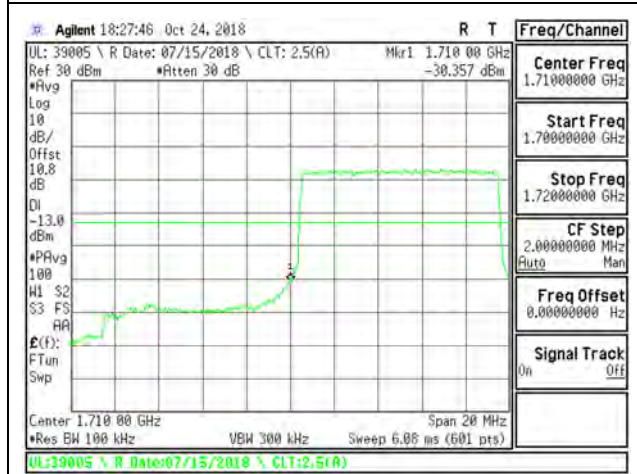
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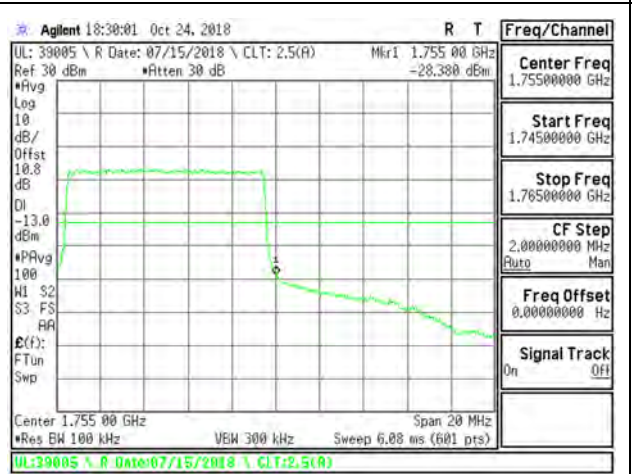
LTE B4 10MHz QPSK Low Channel RB1-0



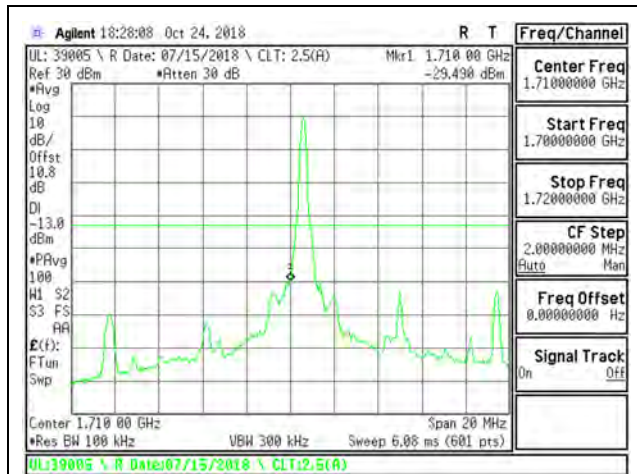
LTE B4 10MHz QPSK High Channel RB1-49



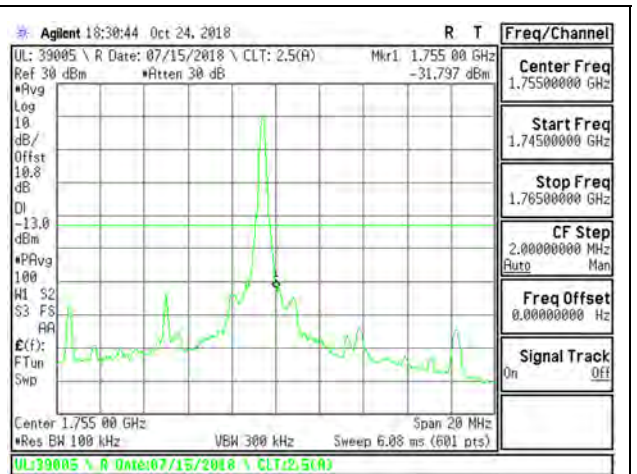
LTE B4 10MHz QPSK Low Channel RB50-0



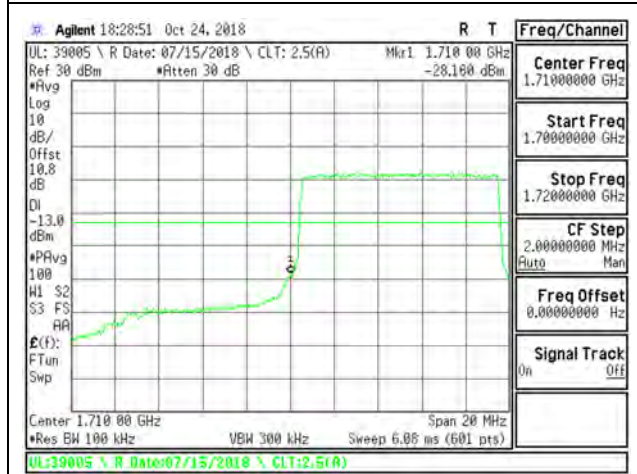
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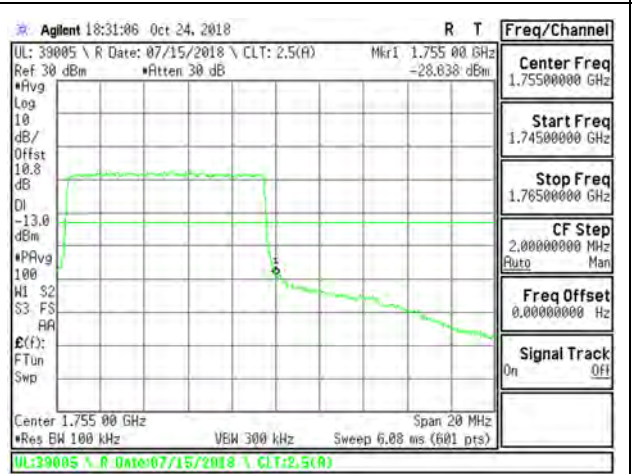
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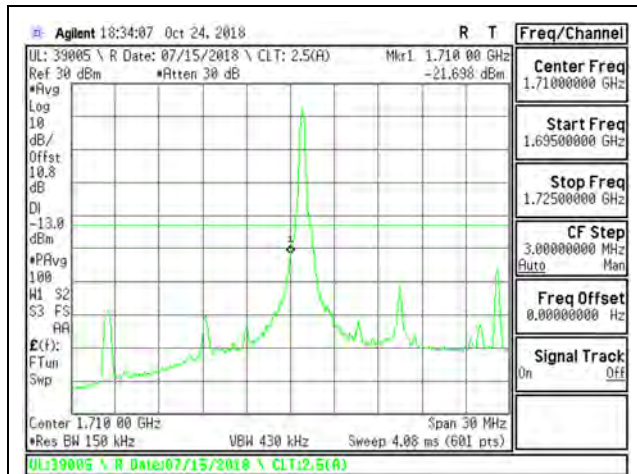
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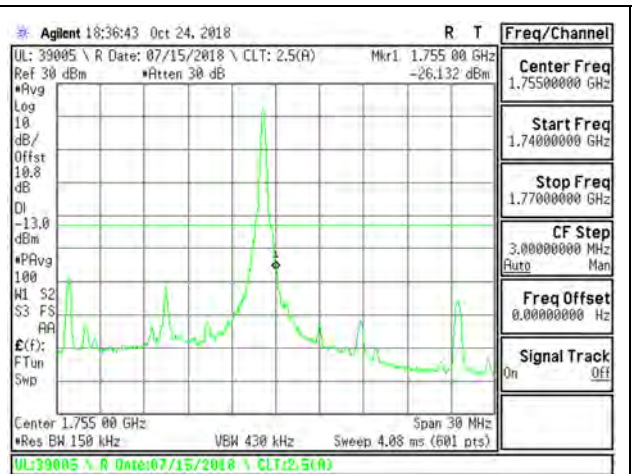
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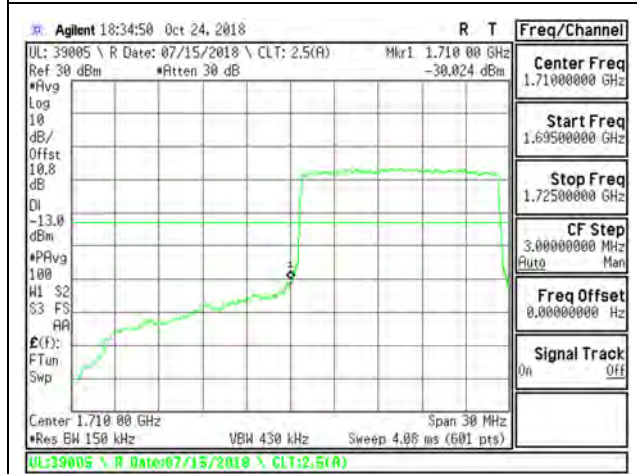
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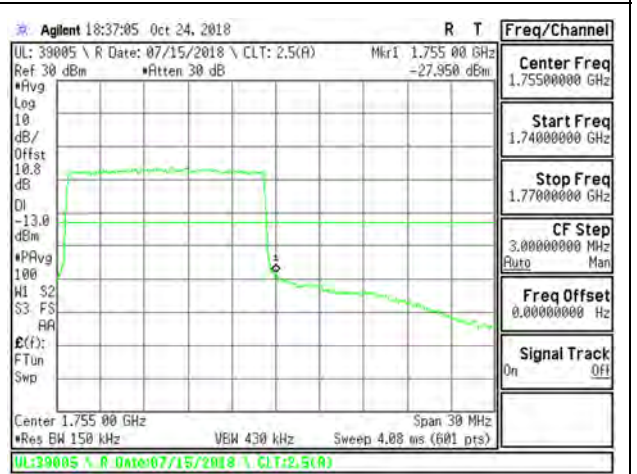
LTE B4 15MHz QPSK Low Channel RB1-0



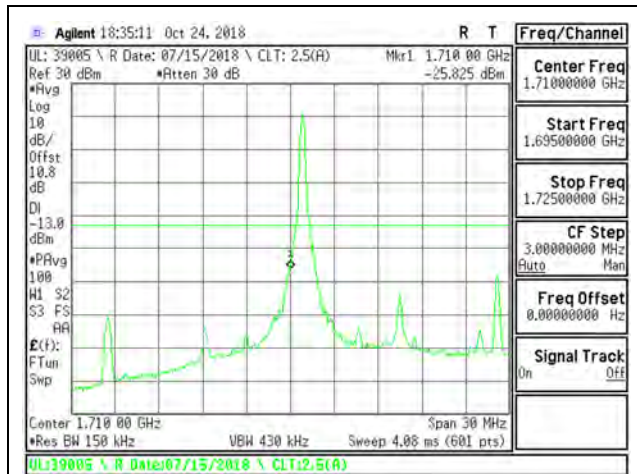
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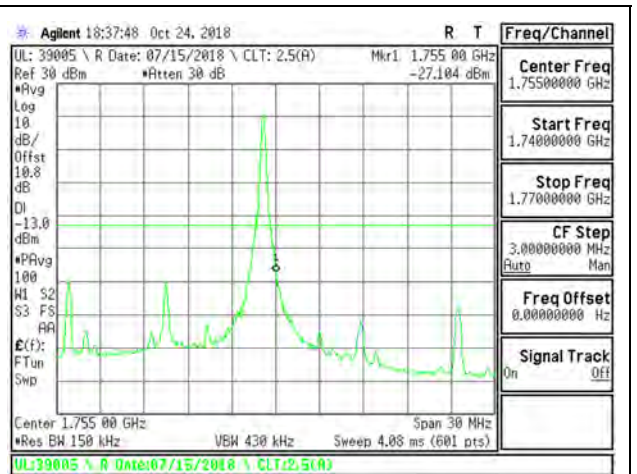
LTE B4 15MHz QPSK Low Channel RB75-0



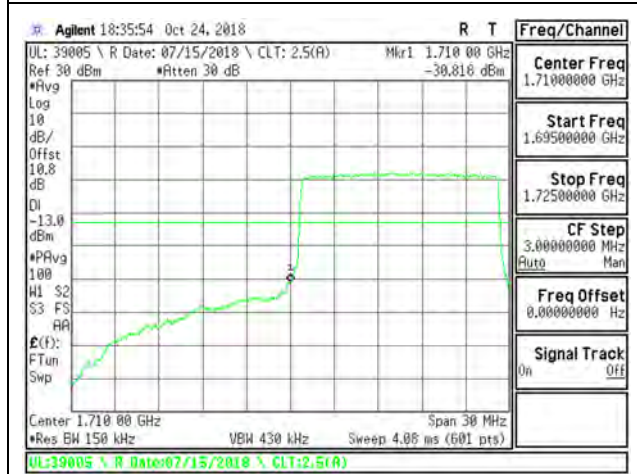
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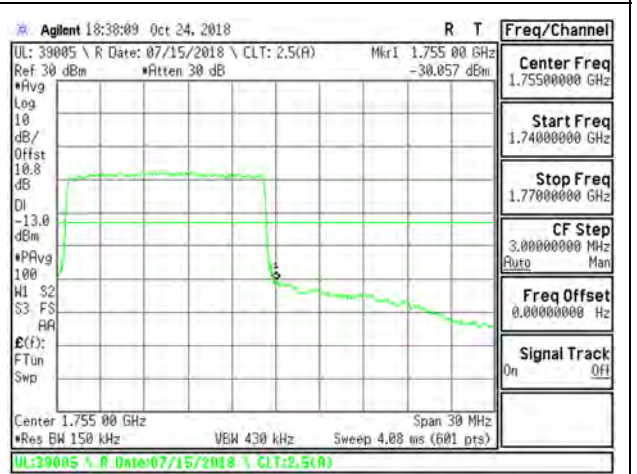
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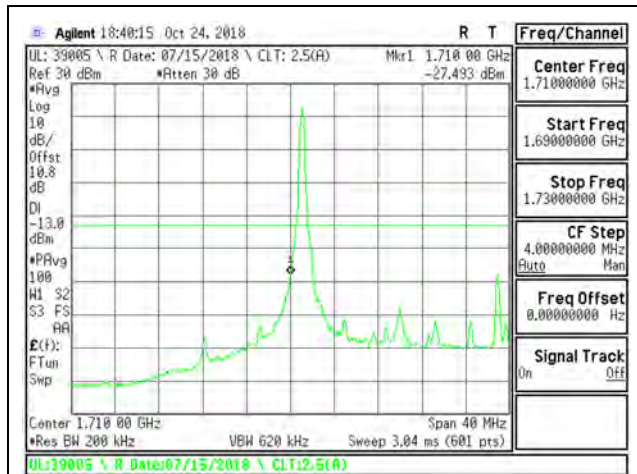
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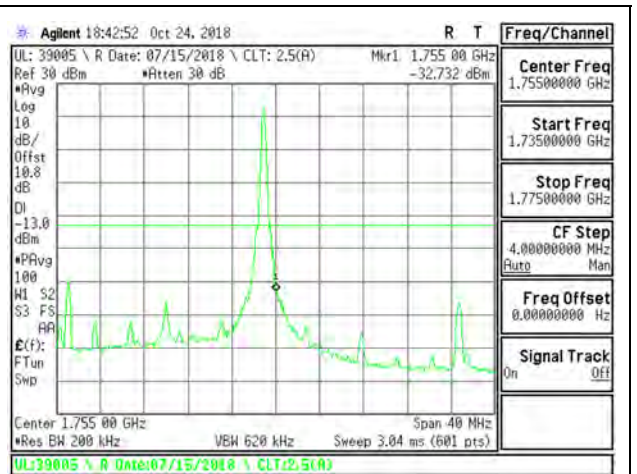
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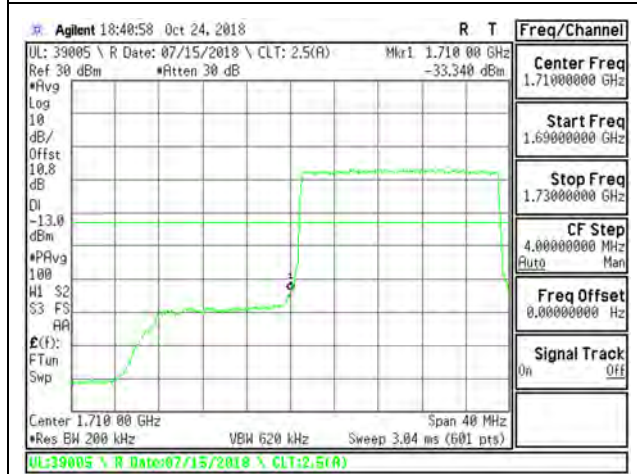
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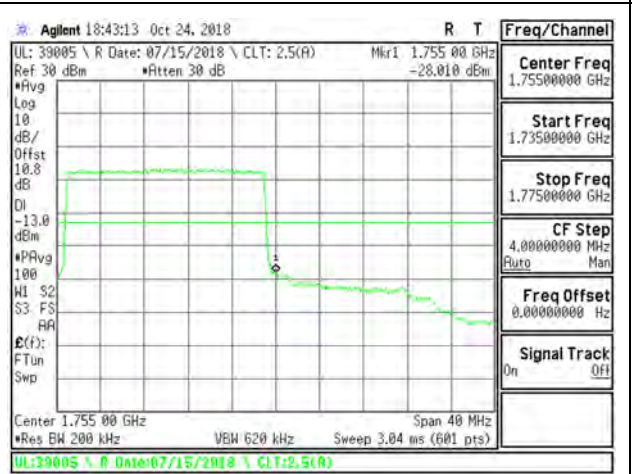
LTE B4 20MHz QPSK Low Channel RB1-0



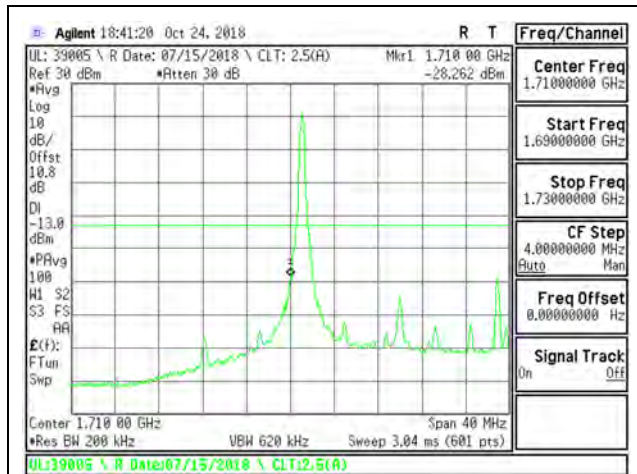
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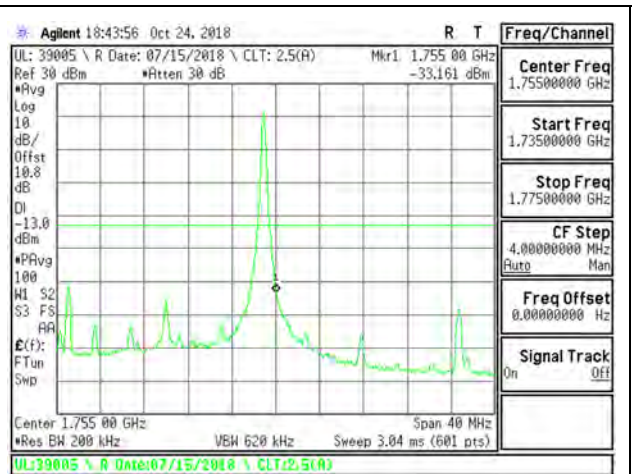
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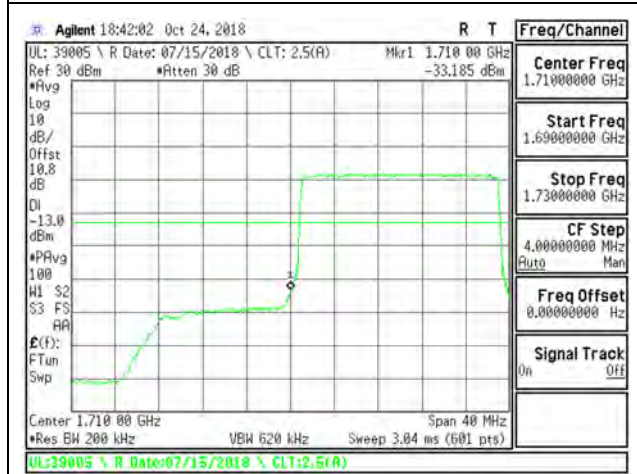
LTE B4 20MHz QPSK High Channel RB100-0



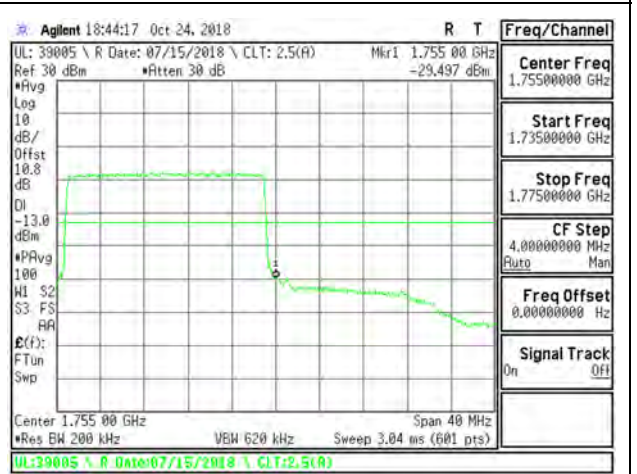
LTE B4 20MHz 16QAM Low Channel RB1-0



LTE B4 20MHz 16QAM High Channel RB1-99

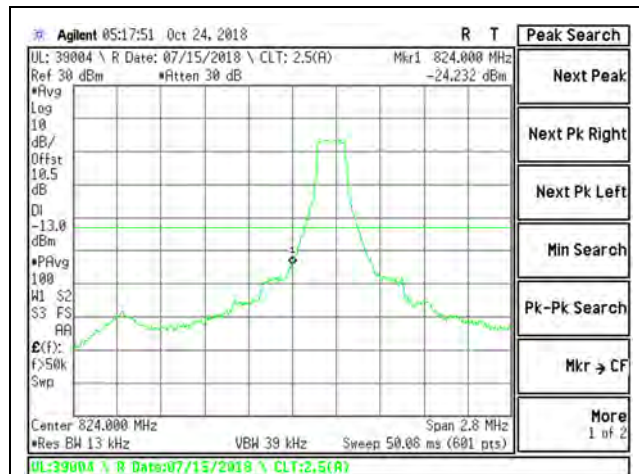


LTE B4 20MHz 16QAM Low Channel RB100-0

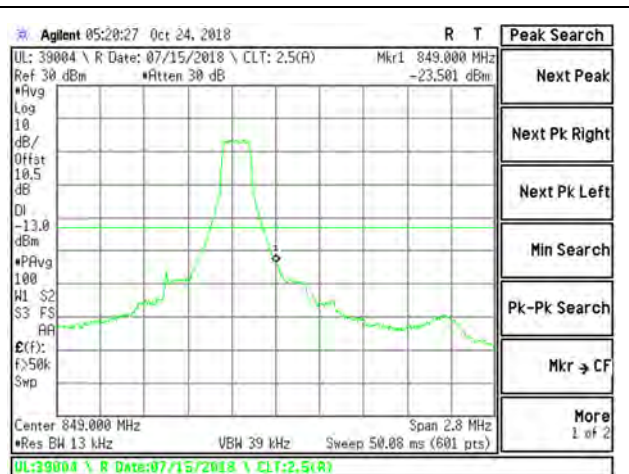


LTE B4 20MHz 16QAM High Channel RB100-0

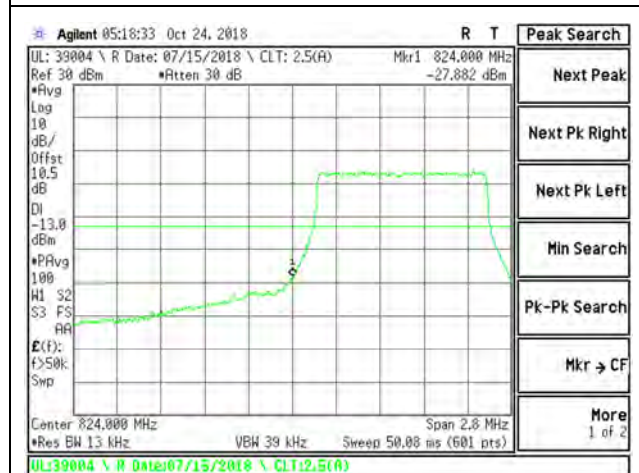
9.2.8. LTE BAND 5 BANDEDGE



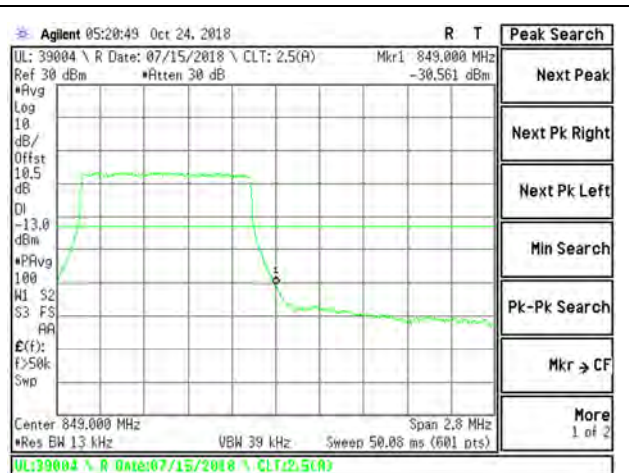
LTE B5 1.4MHz QPSK Low Channel RB1-0



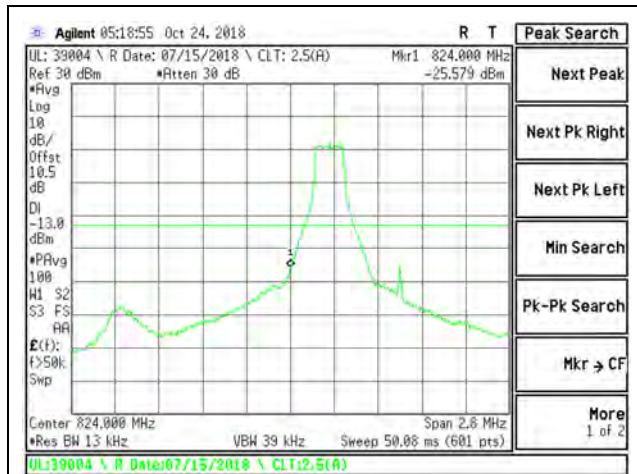
LTE B5 1.4MHz QPSK High Channel RB1-



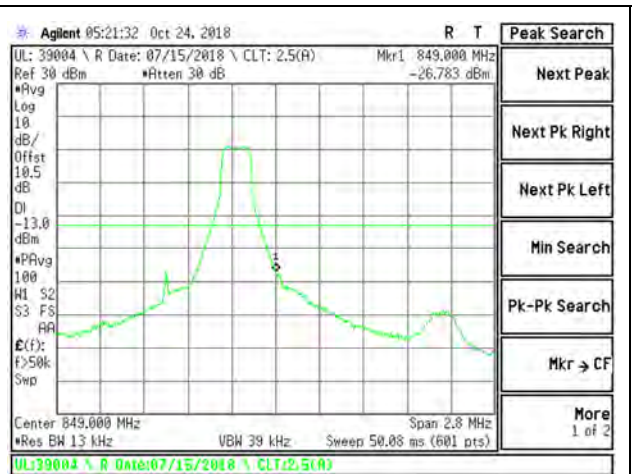
LTE B5 1.4MHz QPSK Low Channel RB6-0



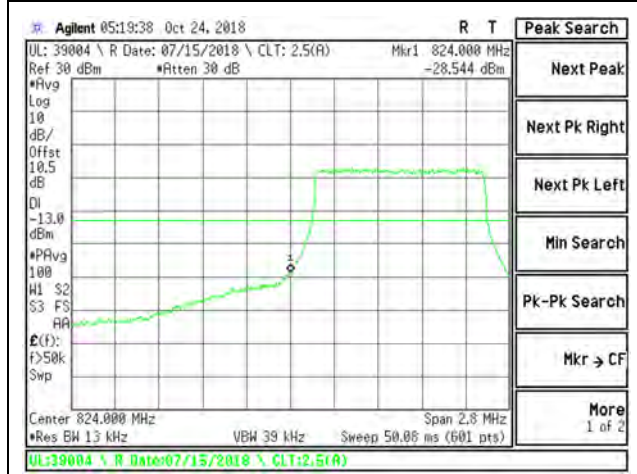
LTE B5 1.4MHz QPSK High Channel RB6-0



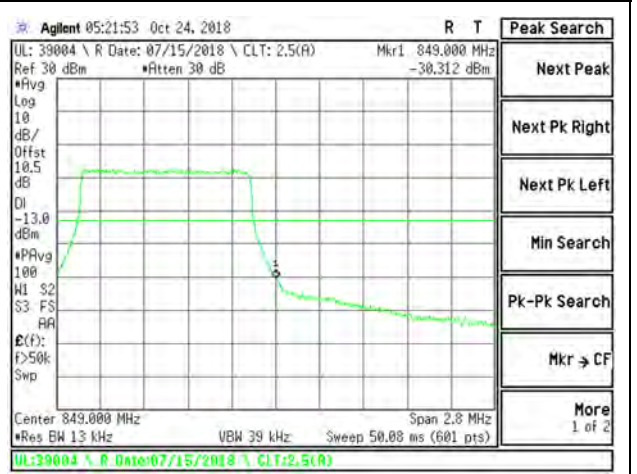
LTE B5 1.4MHz 16QAM Low Channel RB1-0



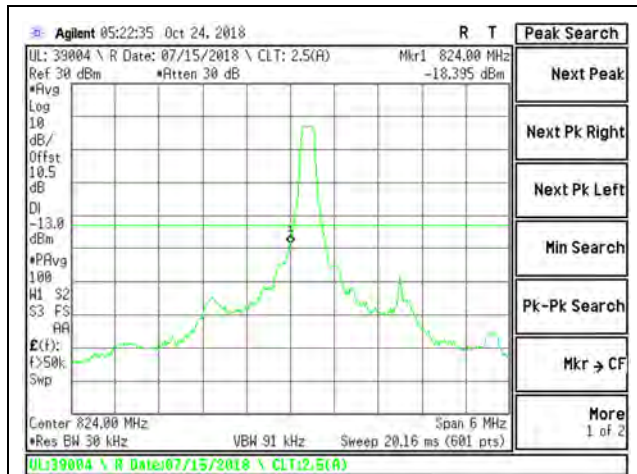
LTE B5 1.4MHz 16QAM High Channel RB1-



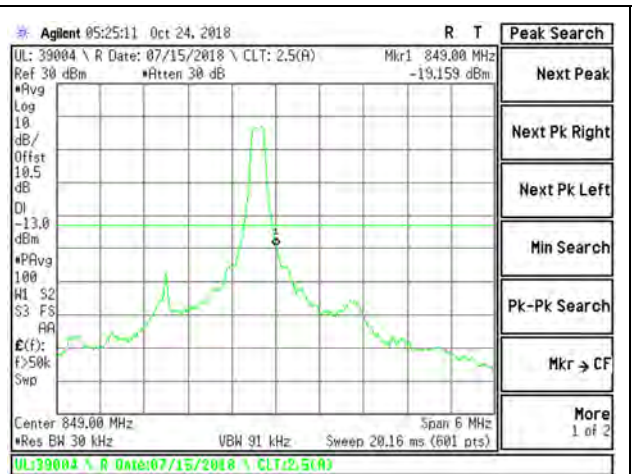
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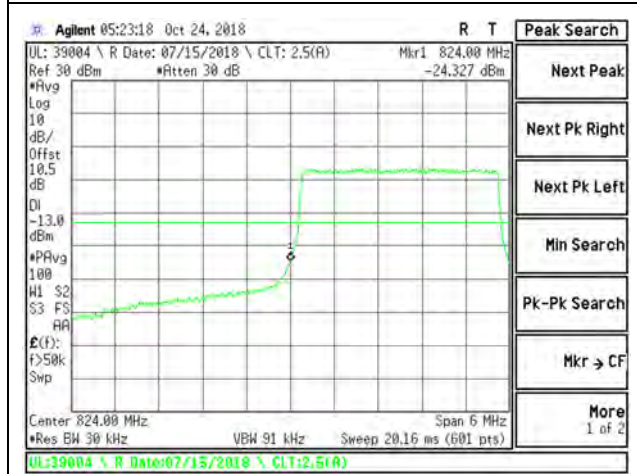
LTE B5 1.4MHz 16QAM High Channel RB6-0



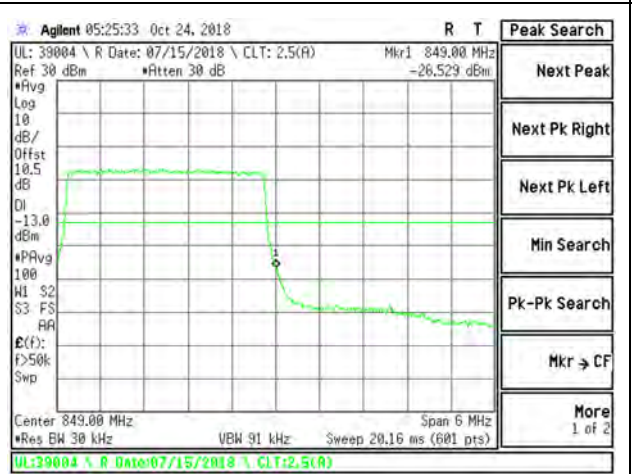
LTE B5 3MHz QPSK Low Channel RB1-0



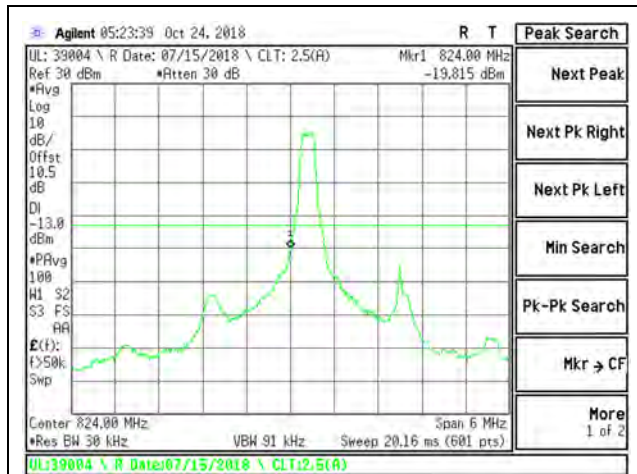
LTE B5 3MHz QPSK High Channel RB1-14



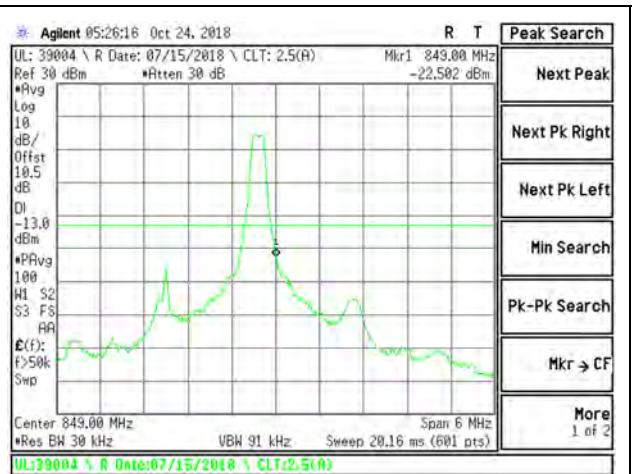
LTE B5 3MHz QPSK Low Channel RB15-0



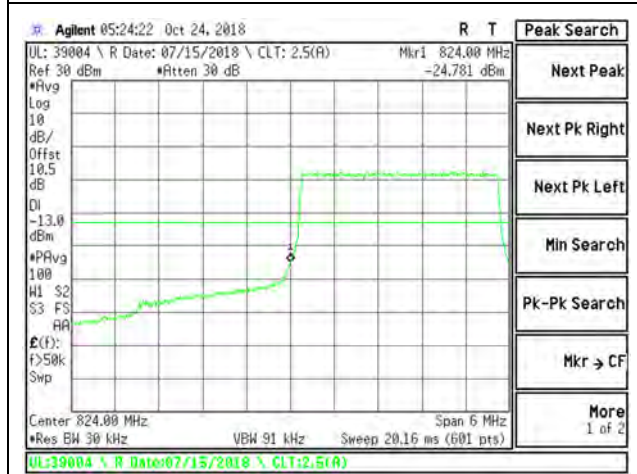
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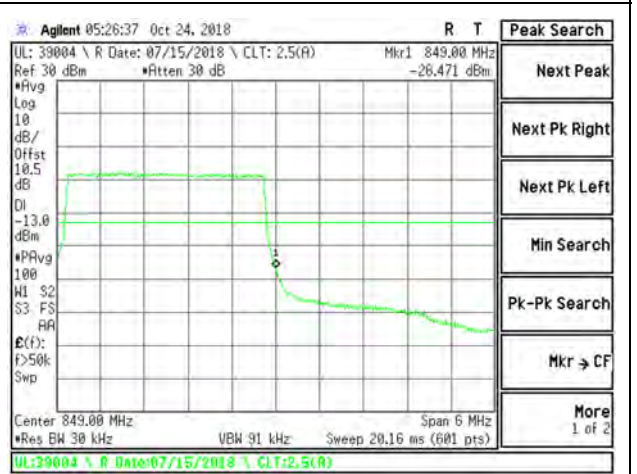
LTE B5 3MHz 16QAM Low Channel RB1-0



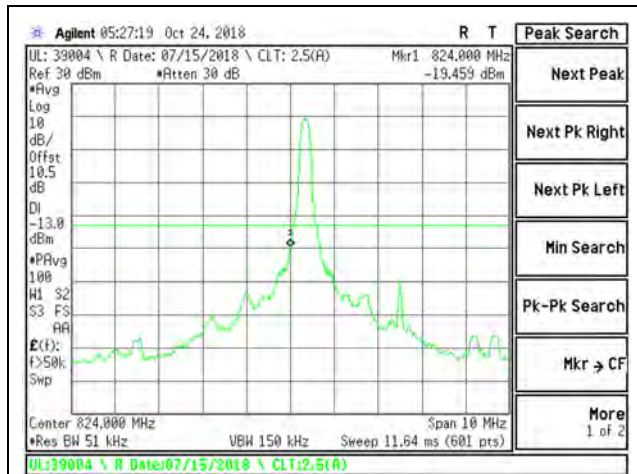
LTE B5 3MHz 16QAM High Channel RB1-14



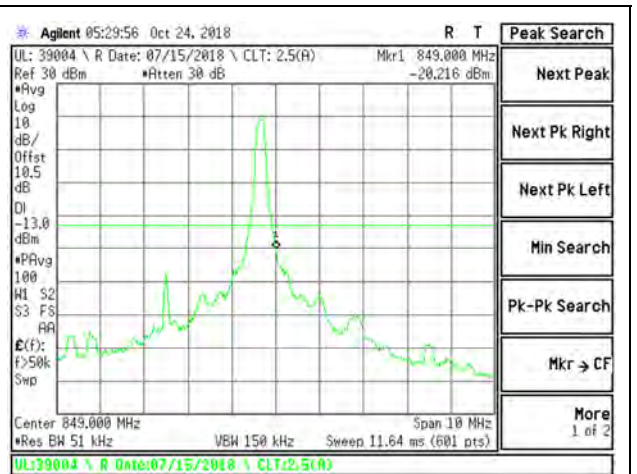
LTE B5 3MHz 16QAM Low Channel RB15-0



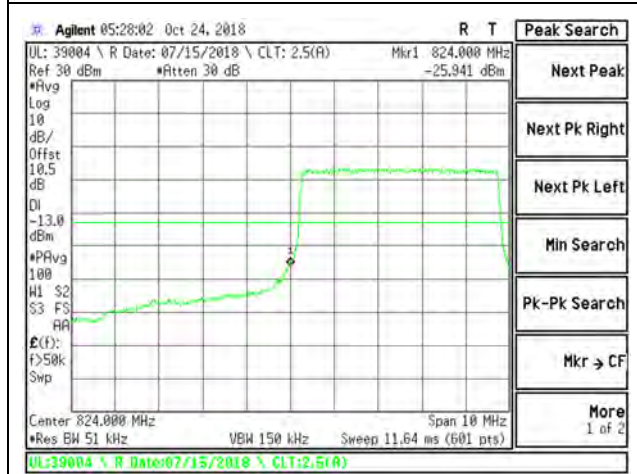
LTE B5 3MHz 16QAM High Channel RB15-0



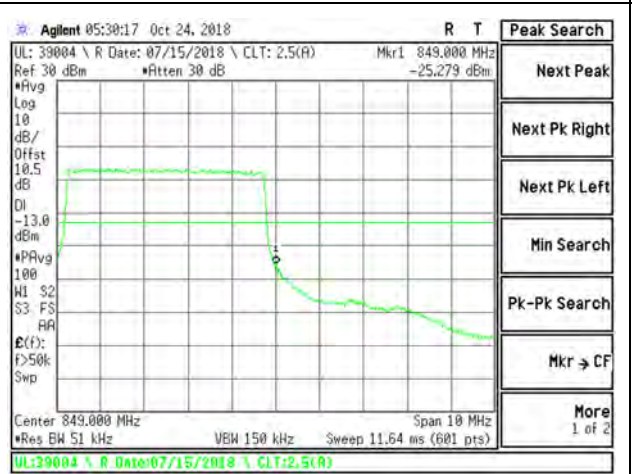
LTE B5 5MHz QPSK Low Channel RB1-0



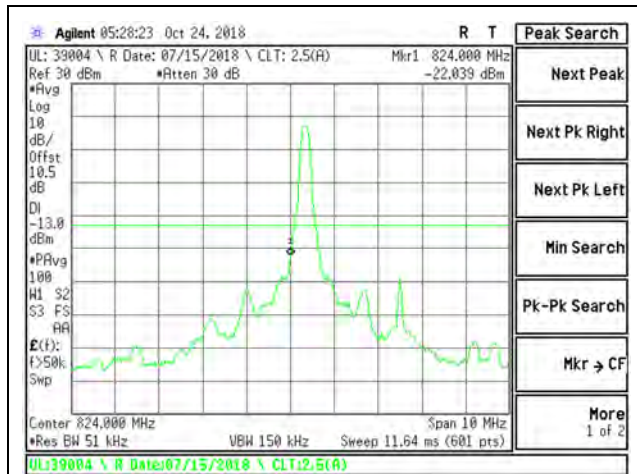
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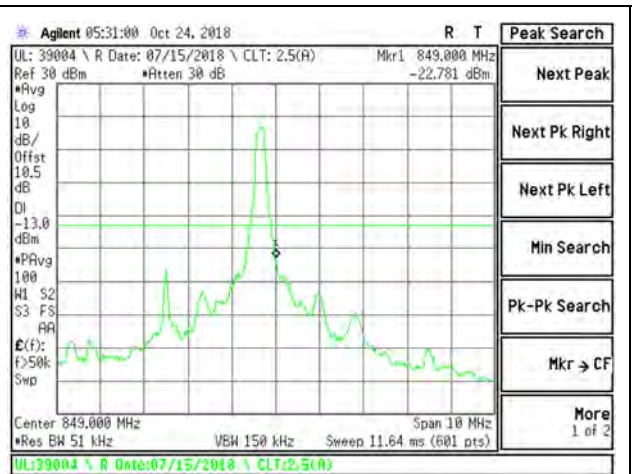
LTE B5 5MHz QPSK Low Channel RB25-0



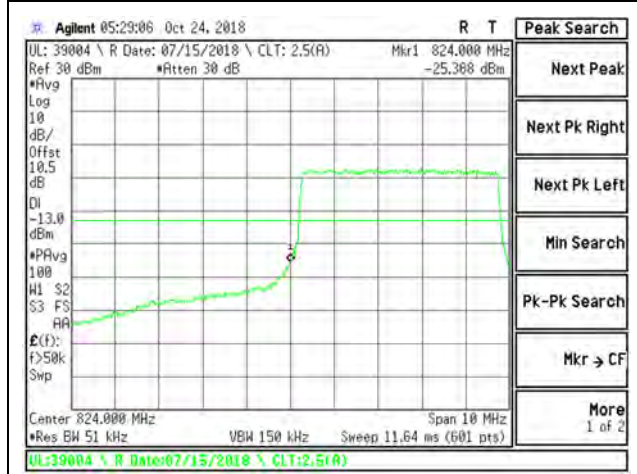
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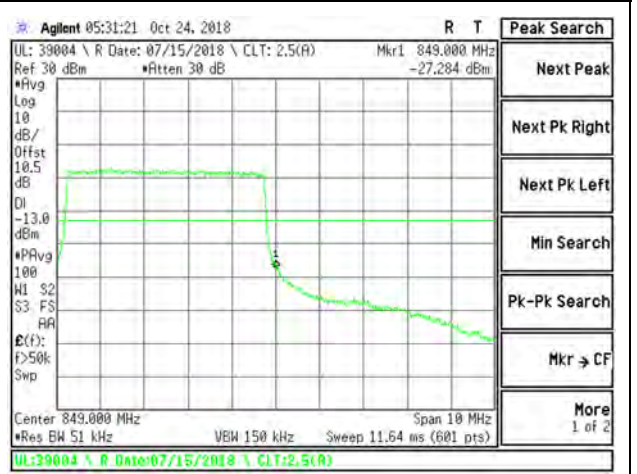
LTE B5 5MHz 16QAM Low Channel RB1-0



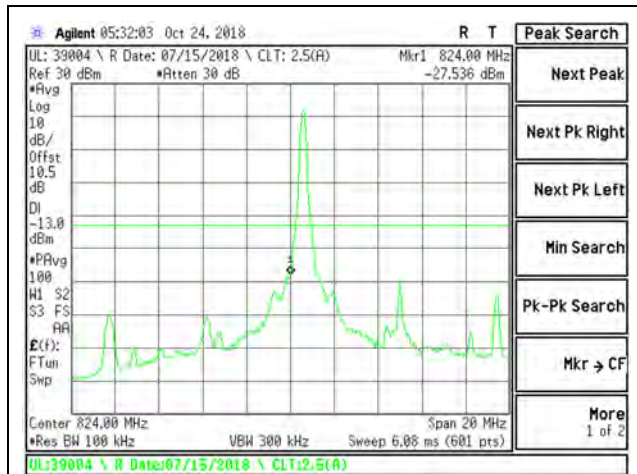
LTE B5 5MHz 16QAM High Channel RB1-24



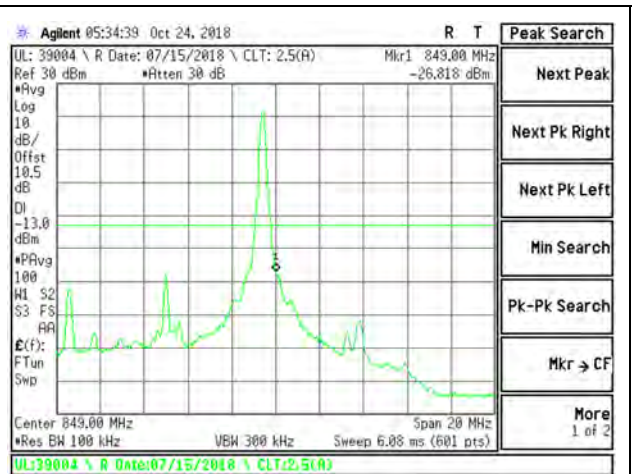
LTE B5 5MHz 16QAM Low Channel RB25-0



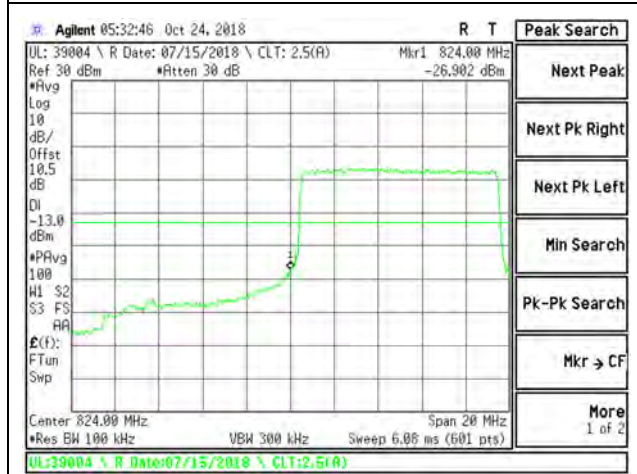
LTE B5 5MHz 16QAM High Channel RB25-0



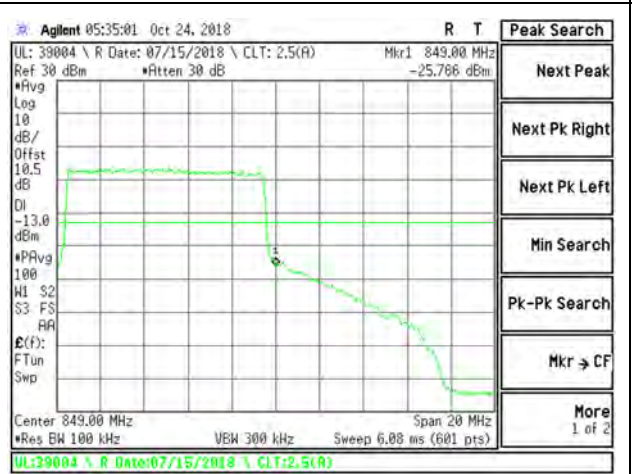
LTE B5 10MHz QPSK Low Channel RB1-0



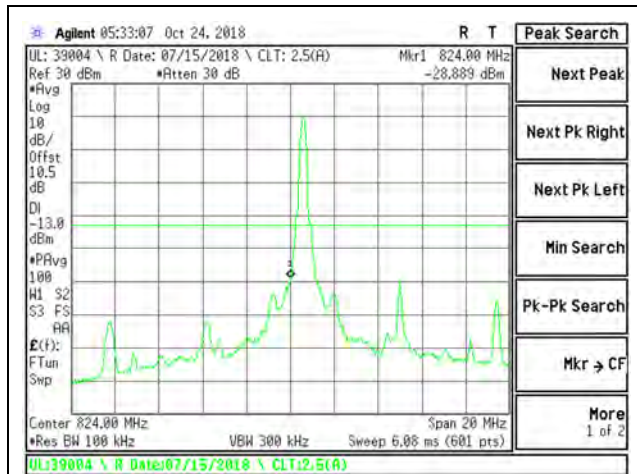
LTE B5 10MHz QPSK High Channel RB1-49



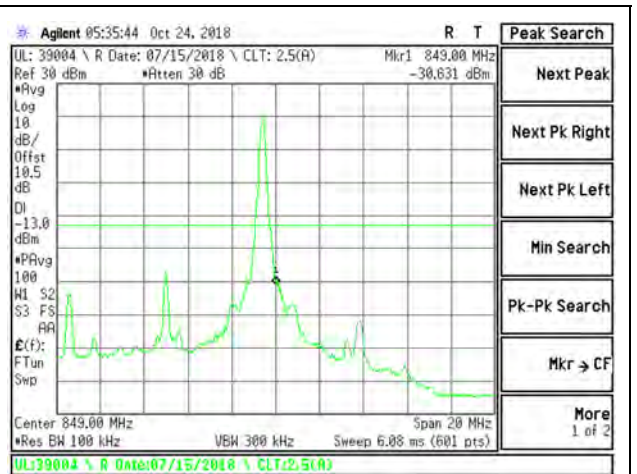
LTE B5 10MHz QPSK Low Channel RB50-0



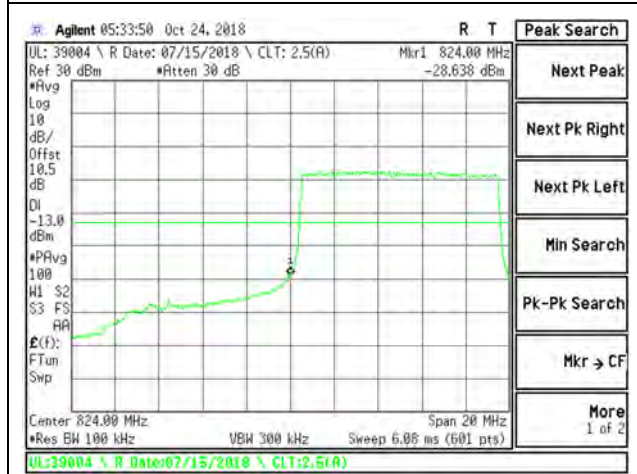
LTE B5 10MHz QPSK High Channel RB50-0



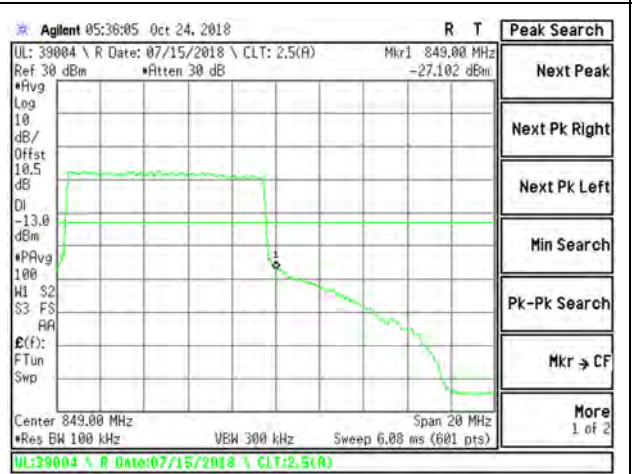
LTE B5 10MHz 16QAM Low Channel RB1-0



LTE B5 10MHz 16QAM High Channel RB1-49

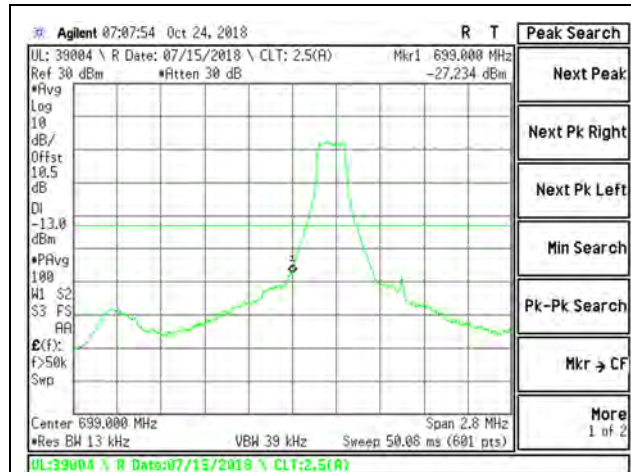


LTE B5 10MHz 16QAM Low Channel RB50-0

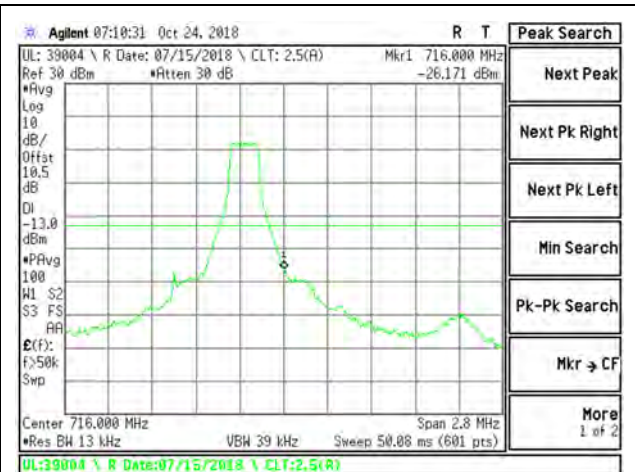


LTE B5 10MHz 16QAM High Channel RB50-0

9.2.9. LTE BAND 12 BANDEDGE



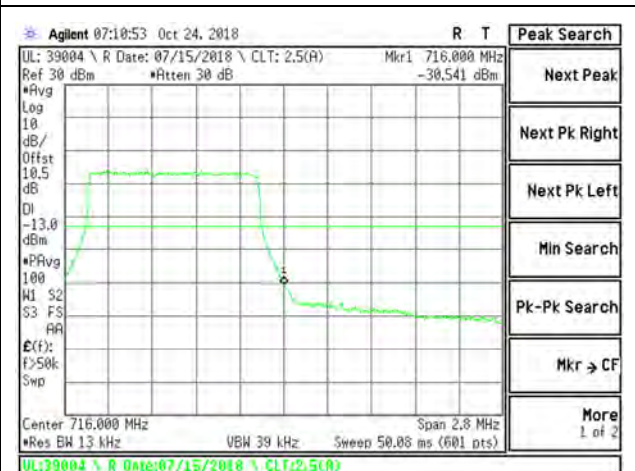
LTE B12 1.4MHz QPSK Low Channel RB1-0



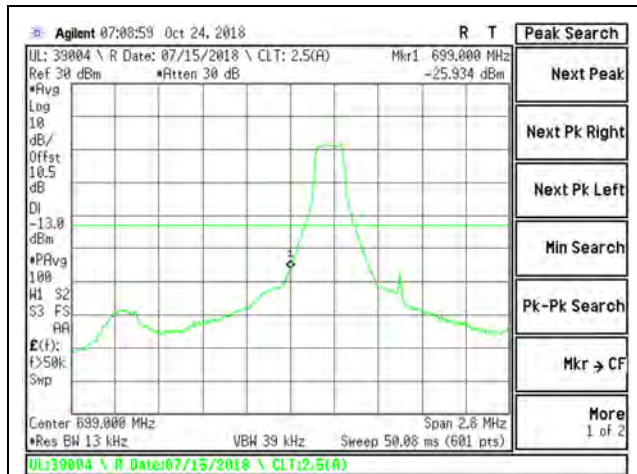
LTE B12 1.4MHz QPSK High Channel RB1-5



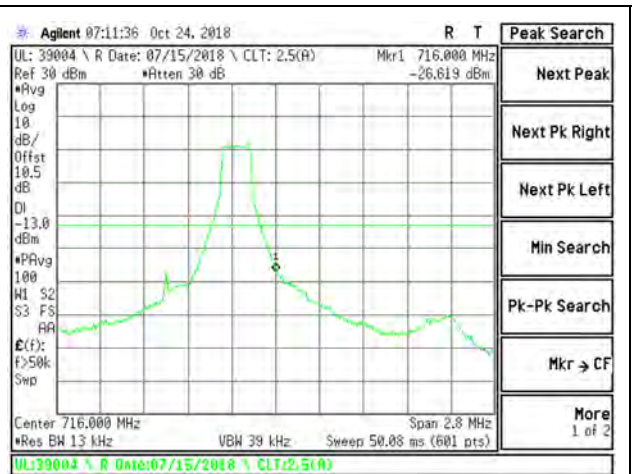
LTE B12 1.4MHz QPSK Low Channel RB6-0



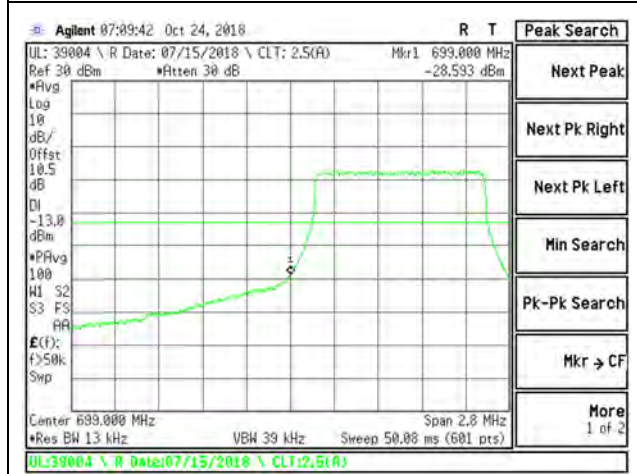
LTE B12 1.4MHz QPSK High Channel RB6-0



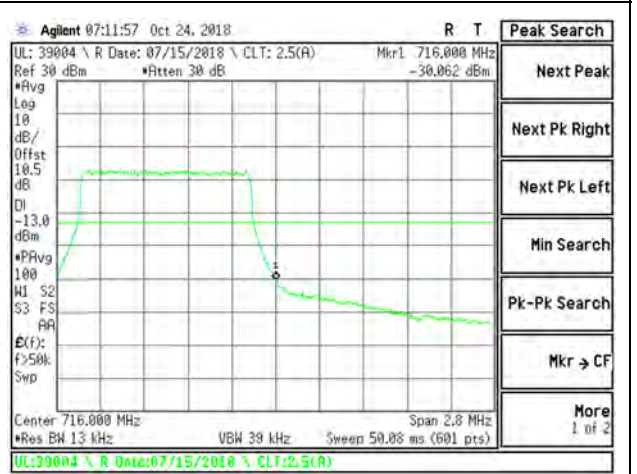
LTE B12 1.4MHz 16QAM Low Channel RB1-0



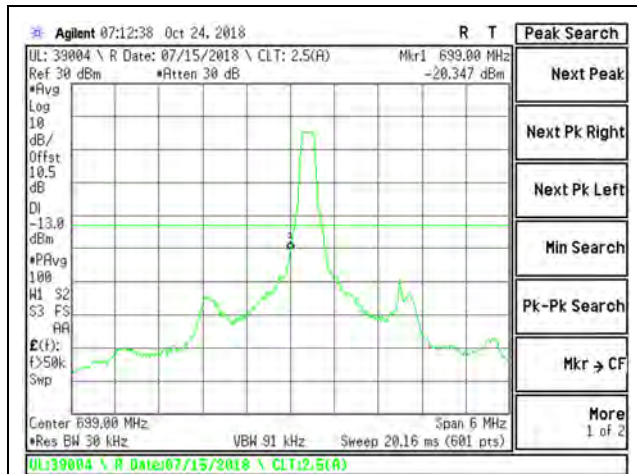
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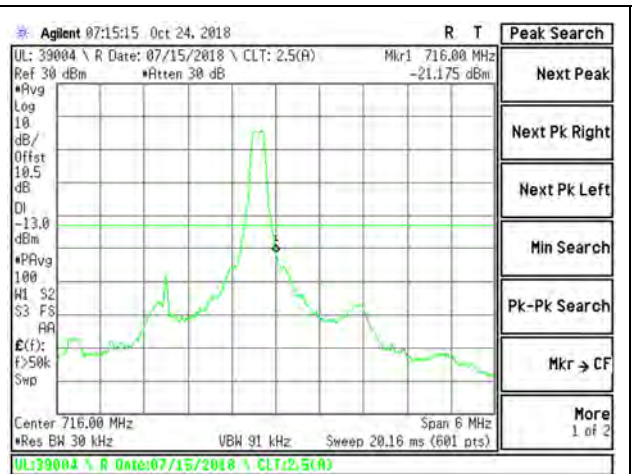
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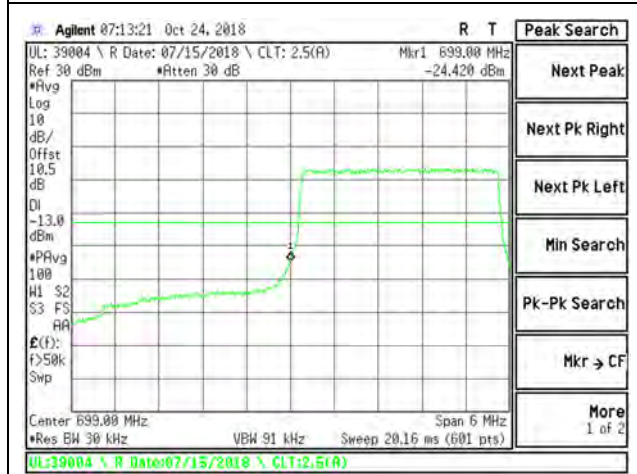
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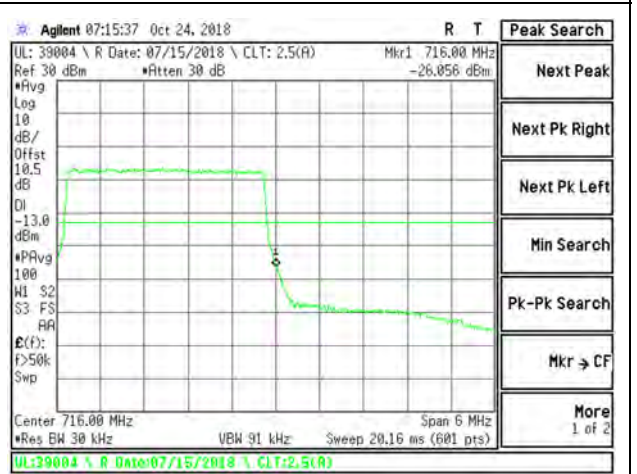
LTE B12 3MHz QPSK Low Channel RB1-0



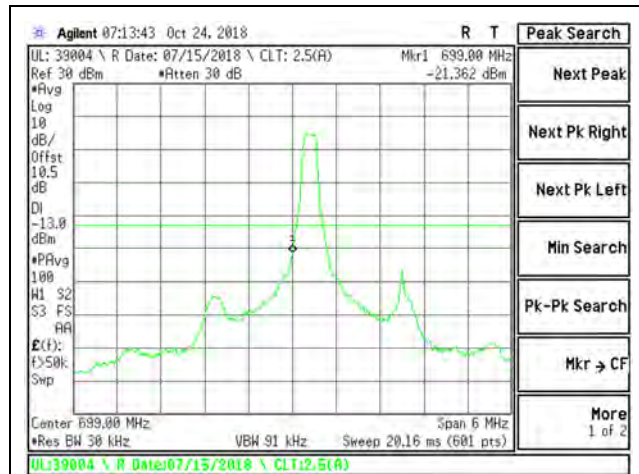
LTE B12 3MHz QPSK High Channel RB1-14



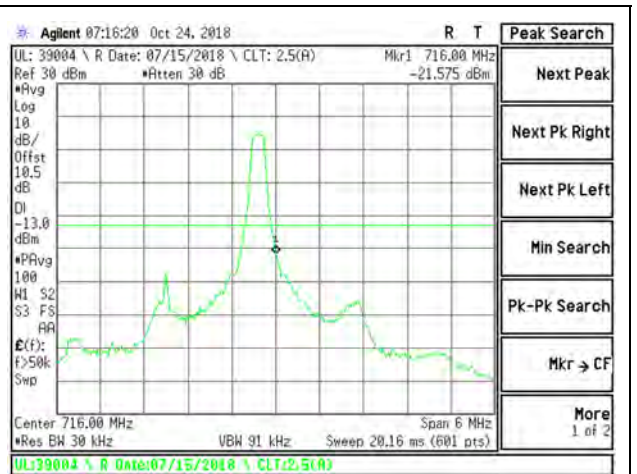
LTE B12 3MHz QPSK Low Channel RB15-0



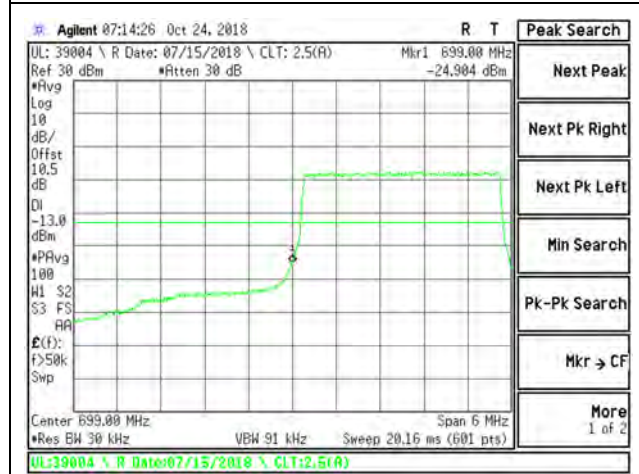
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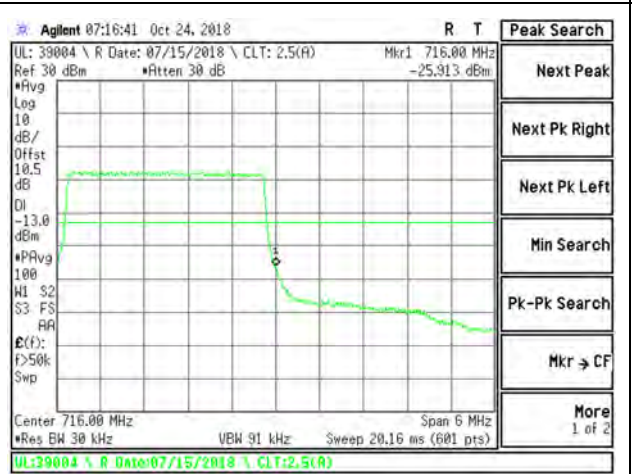
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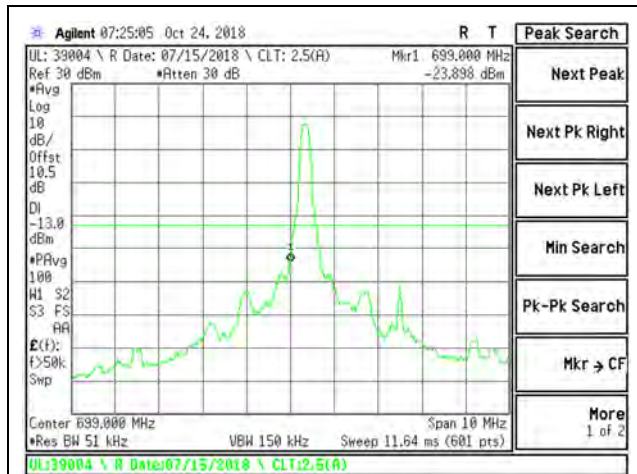
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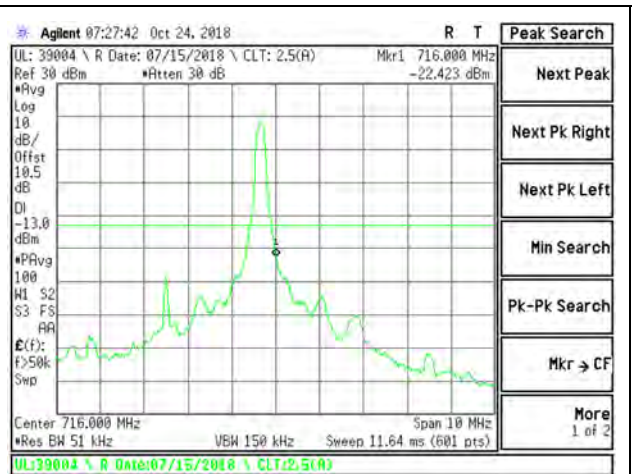
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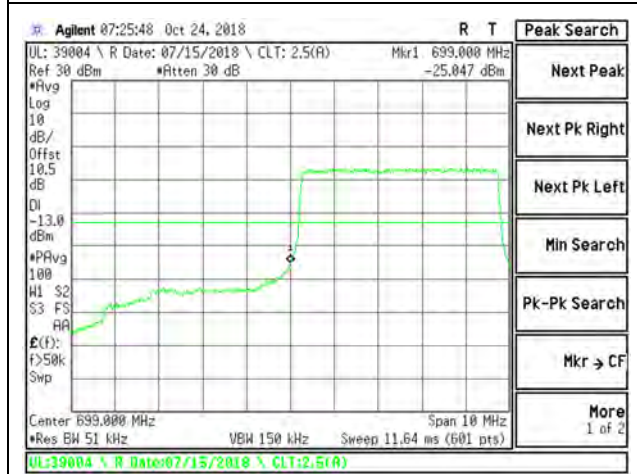
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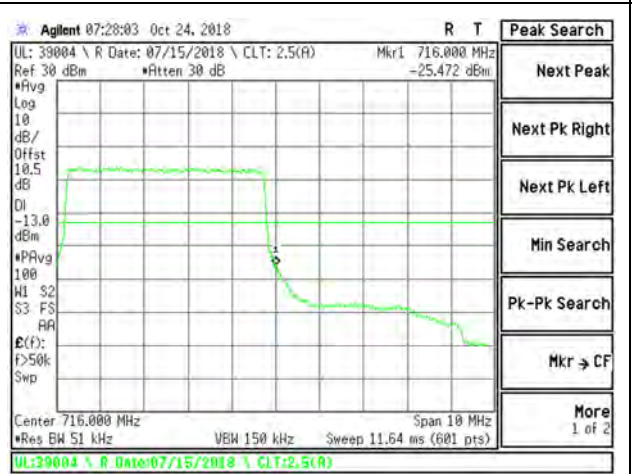
LTE B12 5MHz QPSK Low Channel RB1-0



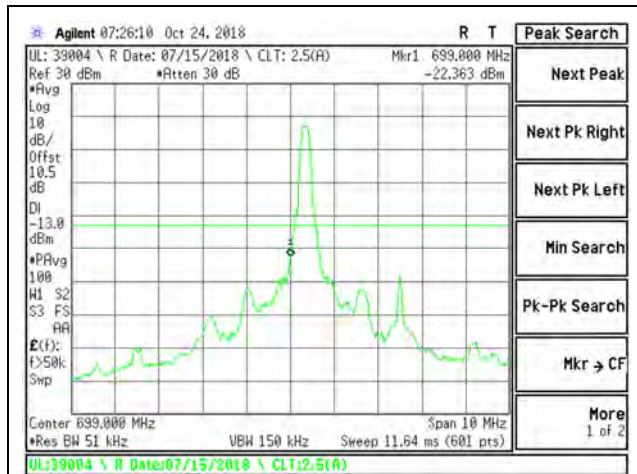
LTE B12 5MHz QPSK High Channel RB1-24



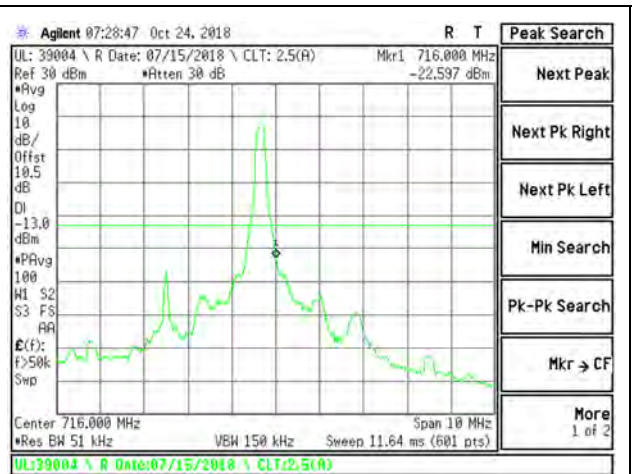
LTE B12 5MHz QPSK Low Channel RB25-0



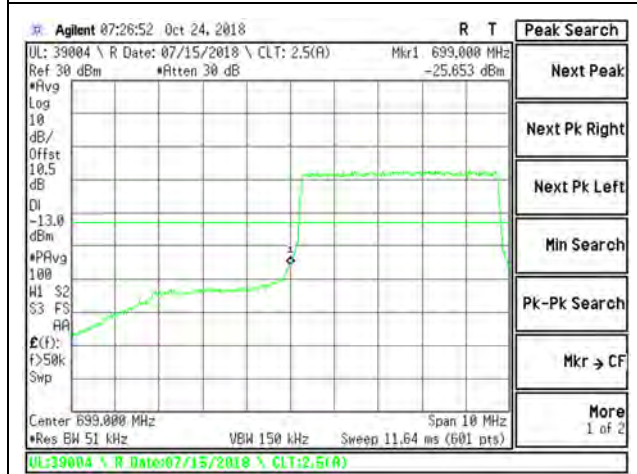
LTE B12 5MHz QPSK High Channel RB25-0



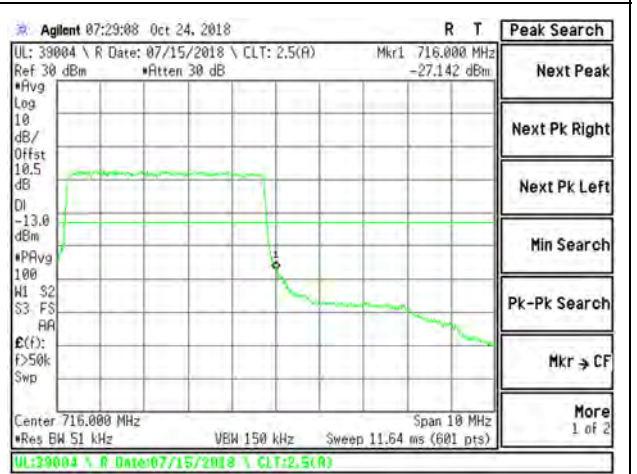
LTE B12 5MHz 16QAM Low Channel RB1-0



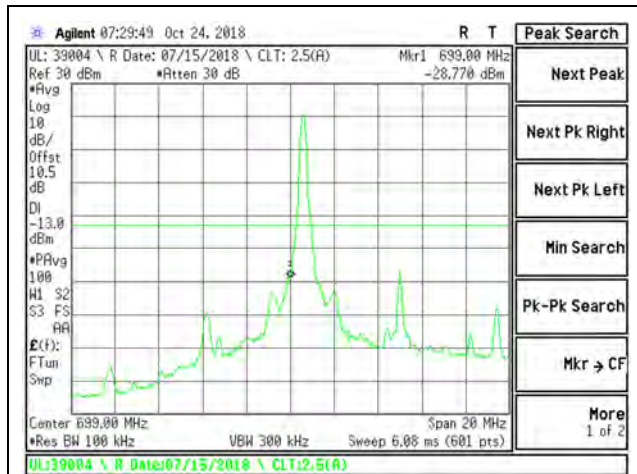
LTE B12 5MHz 16QAM High Channel RB1-24



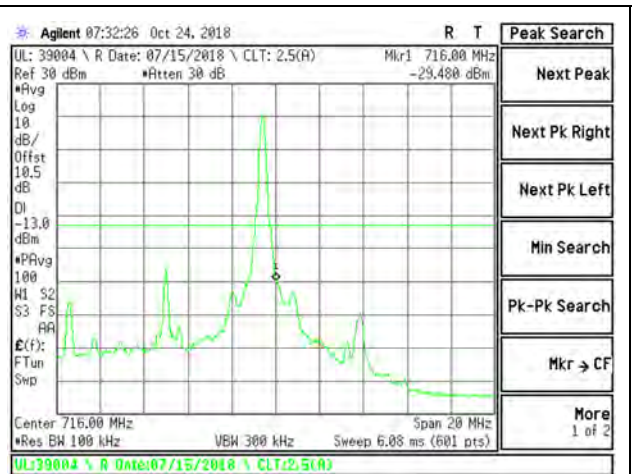
LTE B12 5MHz 16QAM Low Channel RB25-0



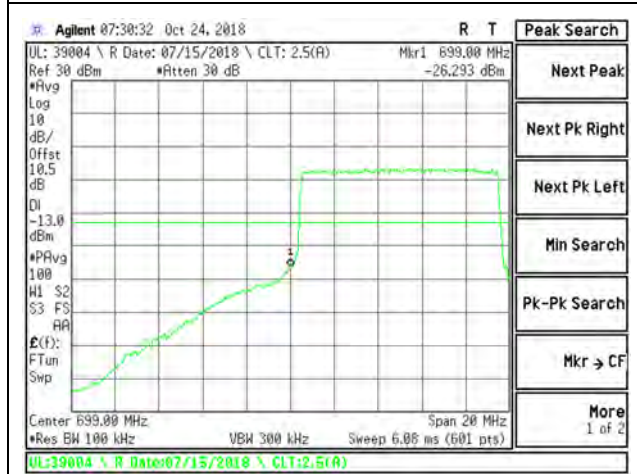
LTE B12 5MHz 16QAM High Channel RB25-0



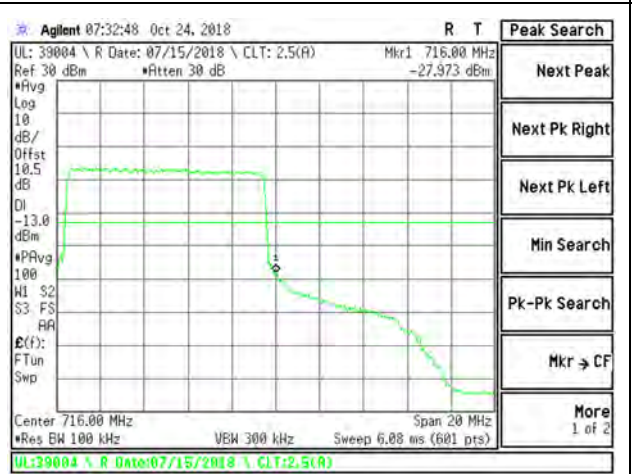
LTE B12 10MHz QPSK Low Channel RB1-0



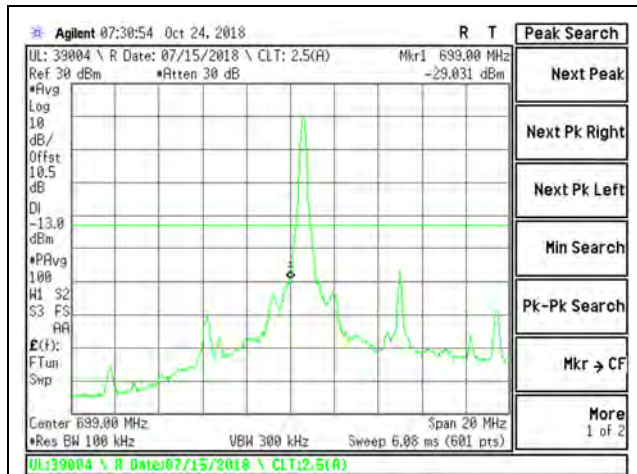
LTE B12 10MHz QPSK High Channel RB1-49



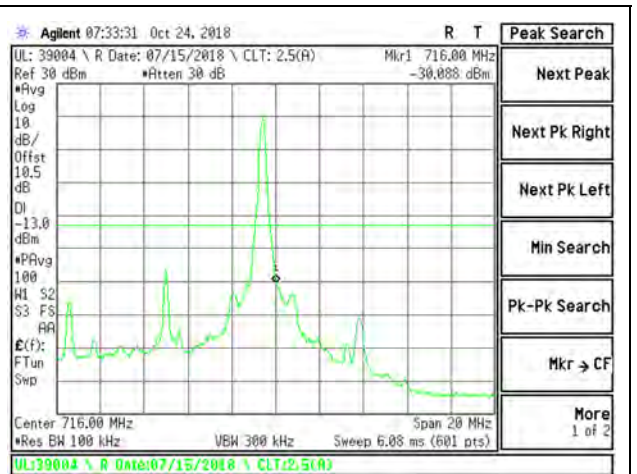
LTE B12 10MHz QPSK Low Channel RB50-0



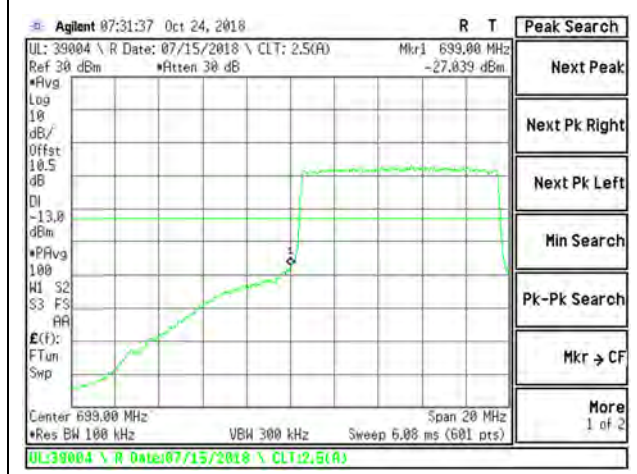
LTE B12 10MHz QPSK High Channel RB50-0



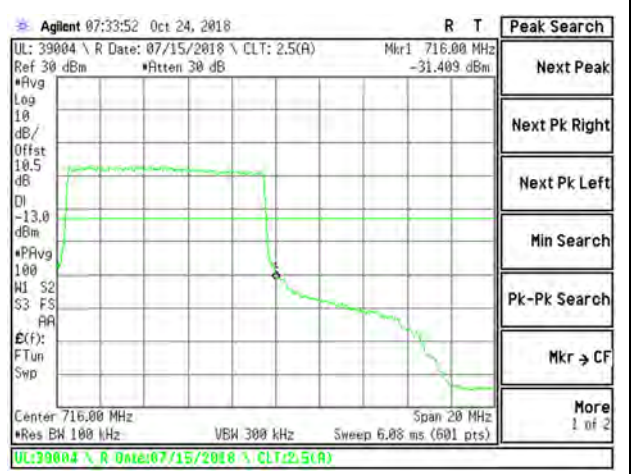
LTE B12 10MHz 16QAM Low Channel RB1-0



LTE B12 10MHz 16QAM High Channel RB1-49

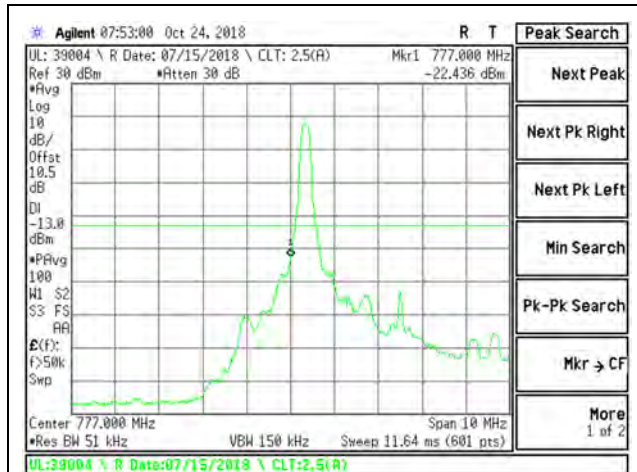


LTE B12 10MHz 16QAM Low Channel RB50-0

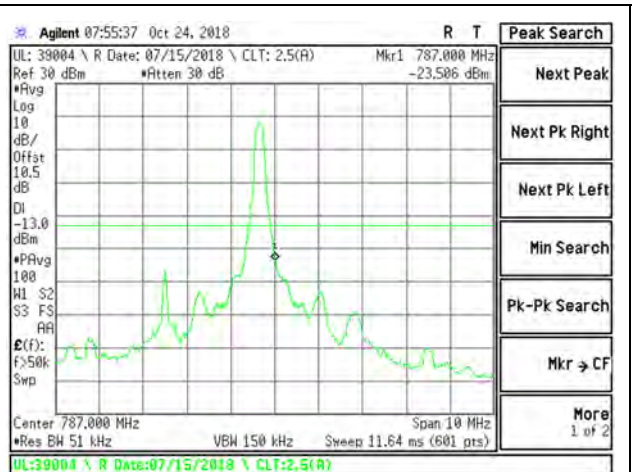


LTE B12 10MHz 16QAM High Channel RB50-0

9.2.10. LTE BAND 13 BANDEDGE



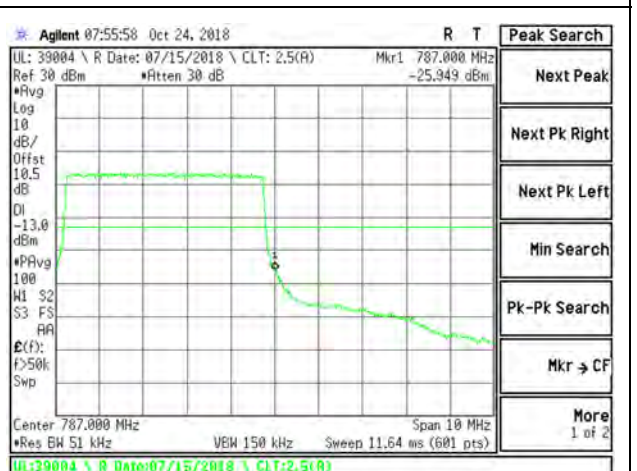
LTE B13 5MHz QPSK Low Channel RB1-0



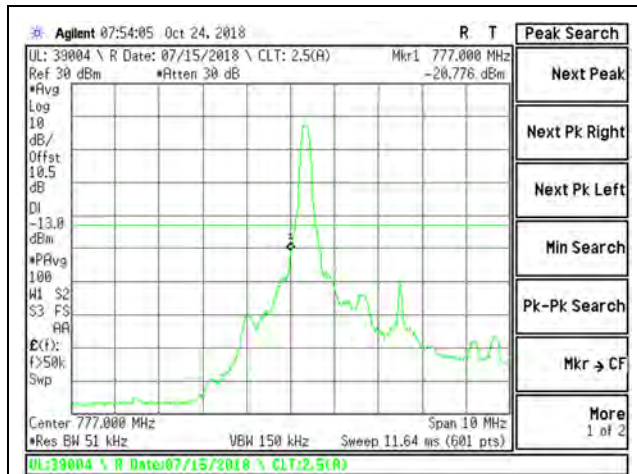
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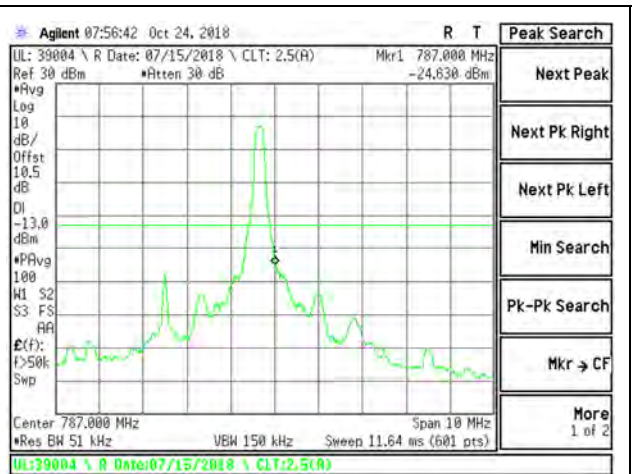
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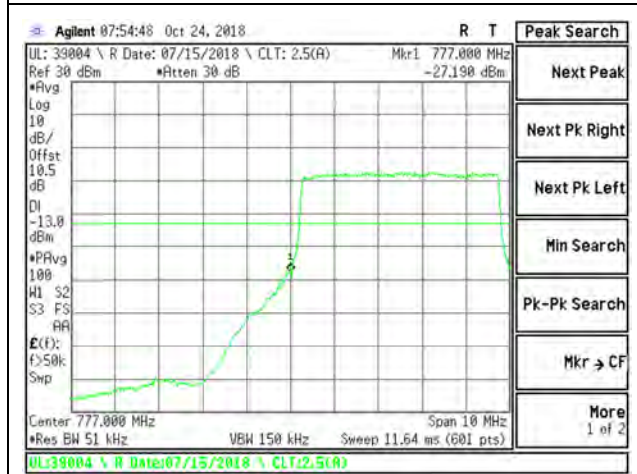
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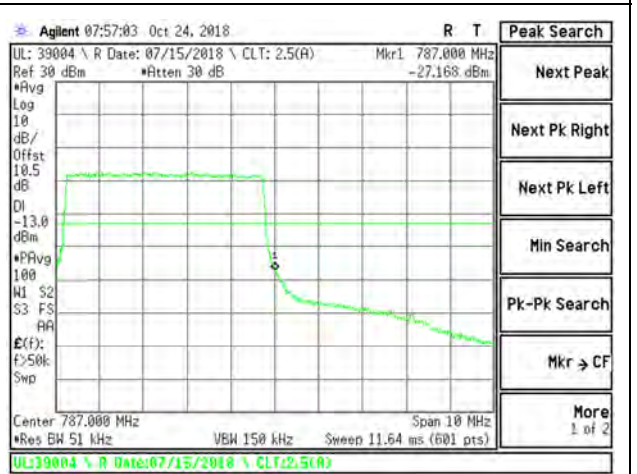
LTE B13 5MHz 16QAM Low Channel RB1-0



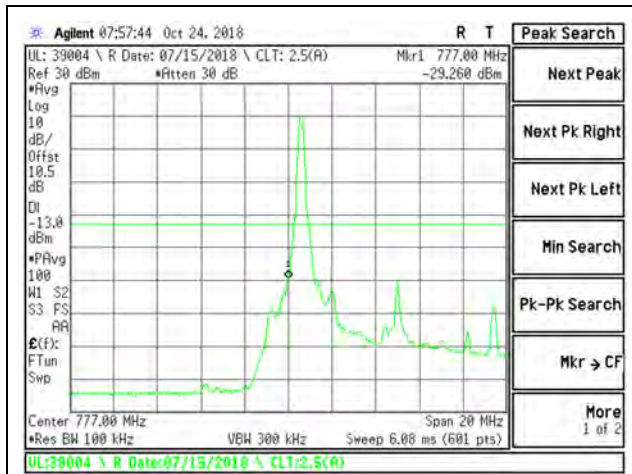
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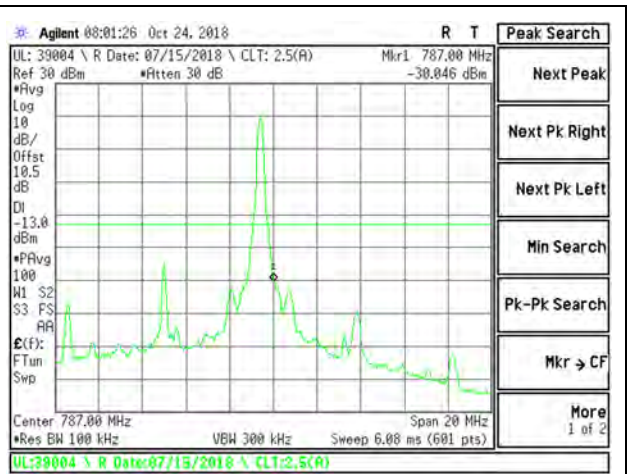
LTE B13 5MHz 16QAM Low Channel RB25-0



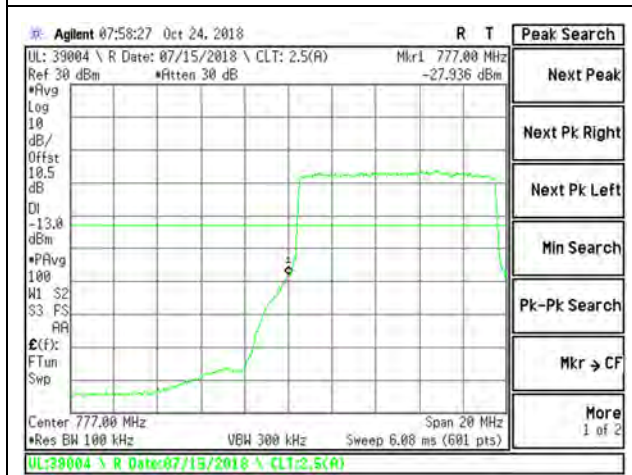
LTE B13 5MHz 16QAM High Channel RB25-0



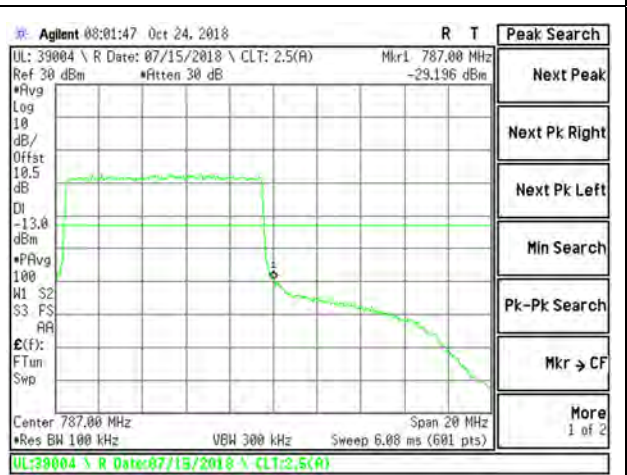
LTE B13 10MHz QPSK Middle Channel RB1-0



LTE B13 10MHz 16QAM Middle Channel RB1-49



LTE B13 10MHz QPSK Middle Channel RB50-0



LTE B13 10MHz 16QAM Middle Channel RB50-0