

## 9.2.3. LTE BAND 12 AND 5G NR n12 EMISSION MASK

### LIMITS

FCC: §27.53

(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.

### LTE BAND 12 EMISSION MASK



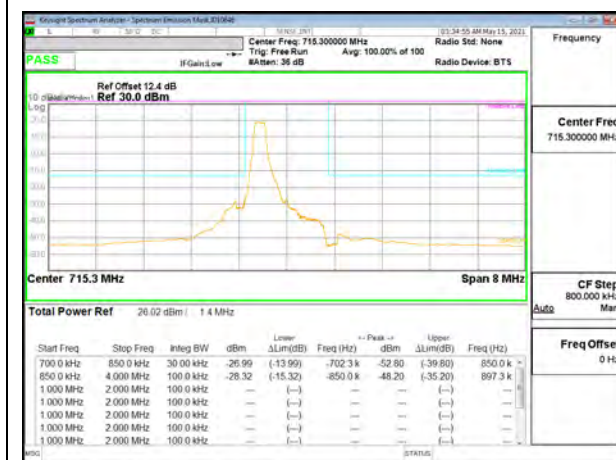




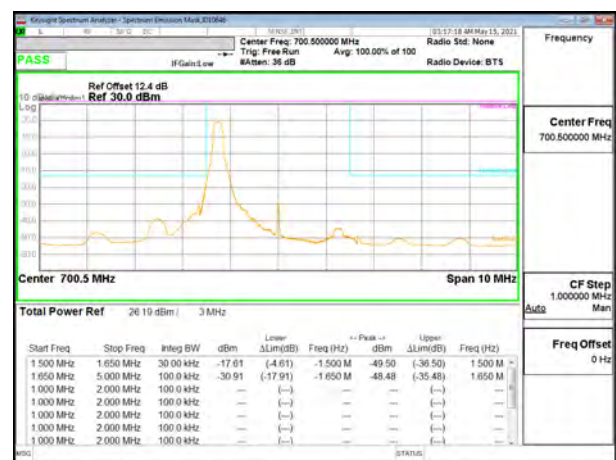
LTE B12 1.4MHz QPSK Low Channel RB6-0



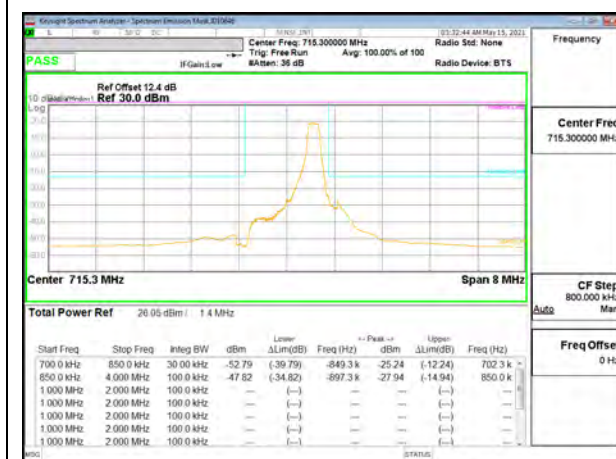
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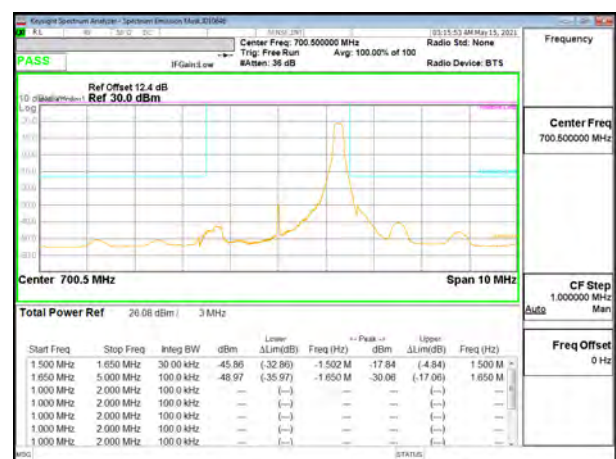
LTE B12 1.4MHz QPSK High Channel RB1-0



LTE B12 3MHz QPSK Low Channel RB1-0



LTE B12 1.4MHz QPSK High Channel RB1-5



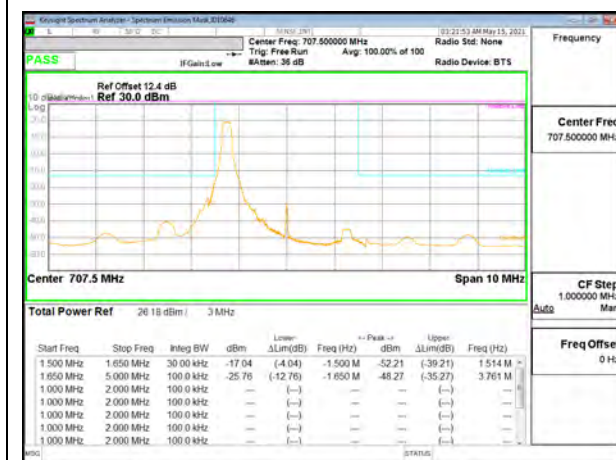
LTE B12 3MHz QPSK Low Channel RB1-14



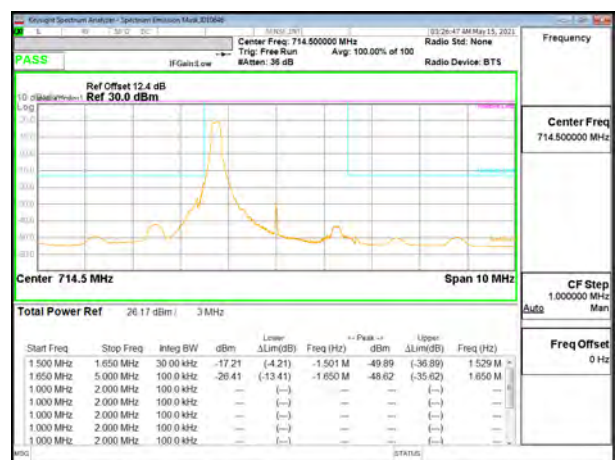
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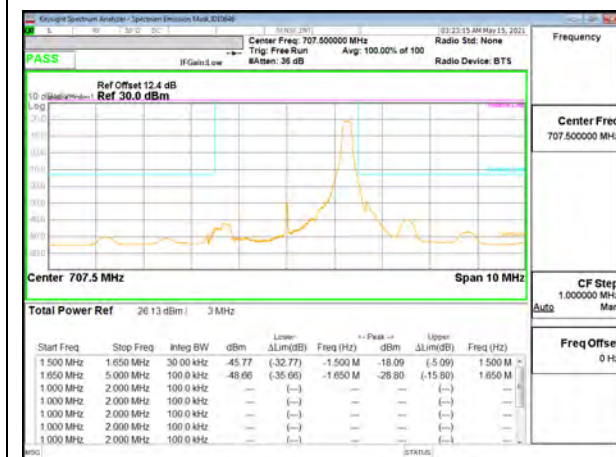
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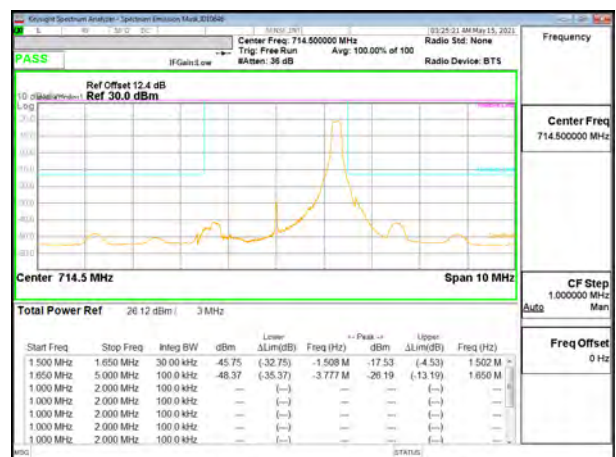
LTE B12 3MHz QPSK Middle Channel RB1-0



LTE B12 3MHz QPSK High Channel RB1-0



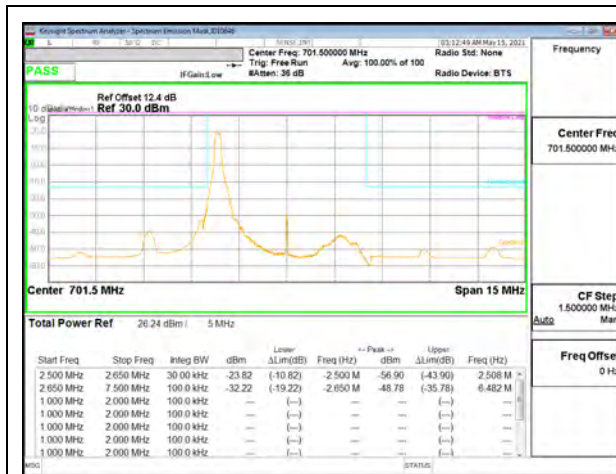
LTE B12 3MHz QPSK Middle Channel RB1-14



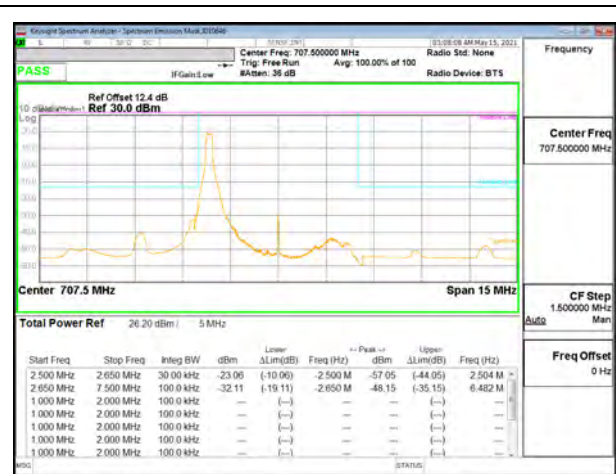
LTE B12 3MHz QPSK High Channel RB1-14



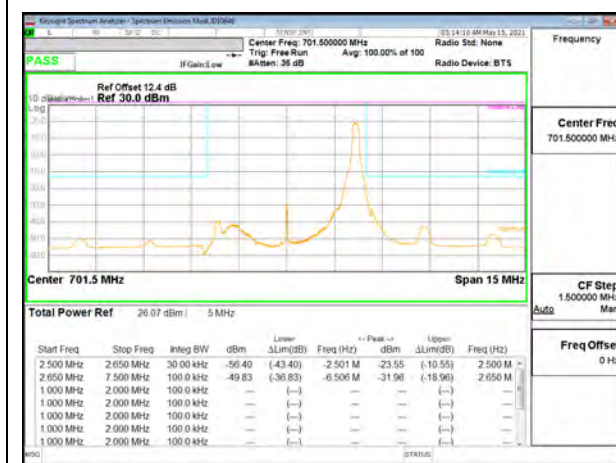




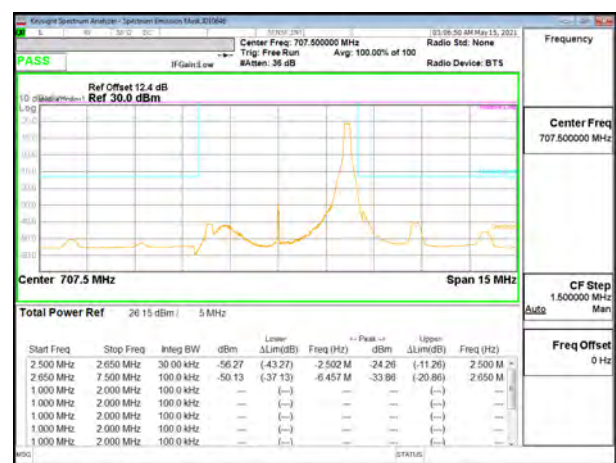
LTE B12 5MHz QPSK Low Channel RB1-0



LTE B12 5MHz QPSK Middle Channel RB1-0



LTE B12 5MHz QPSK Low Channel RB1-24



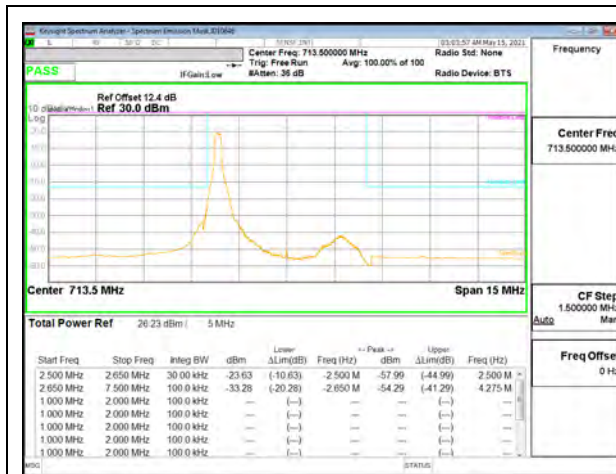
LTE B12 5MHz QPSK Middle Channel RB1-24



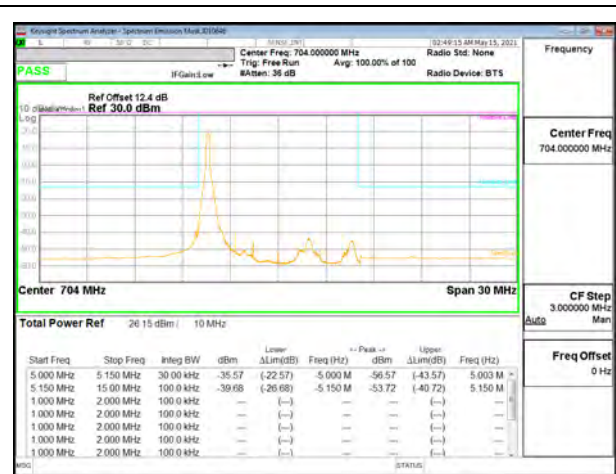
LTE B12 5MHz QPSK Low Channel RB25-0



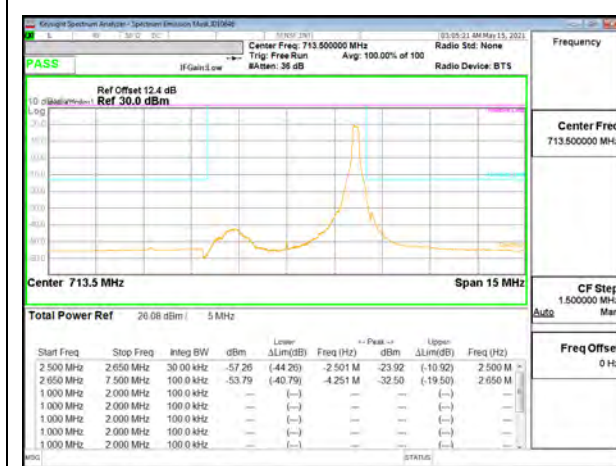
LTE B12 5MHz QPSK Middle Channel RB25-0



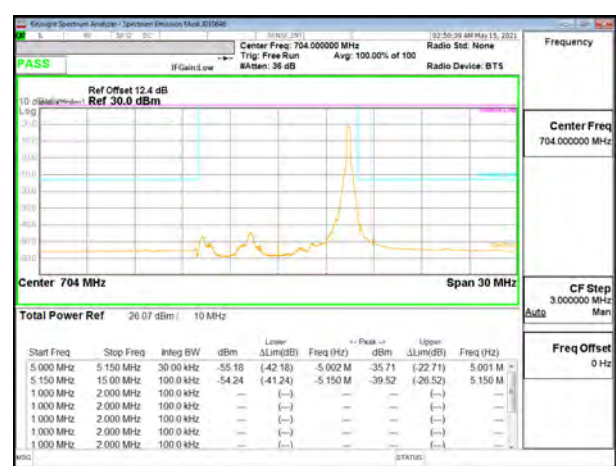
LTE B12 5MHz QPSK High Channel RB1-0



LTE B12 10MHz QPSK Low Channel RB1-0



LTE B12 5MHz QPSK High Channel RB1-24



LTE B12 10MHz QPSK Low Channel RB1-49

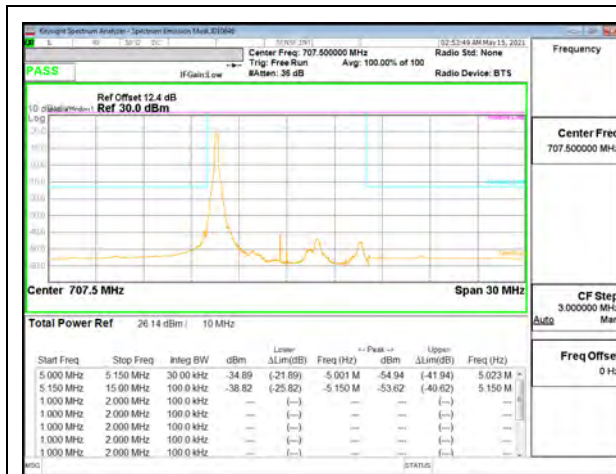


LTE B12 5MHz QPSK High Channel RB25-0

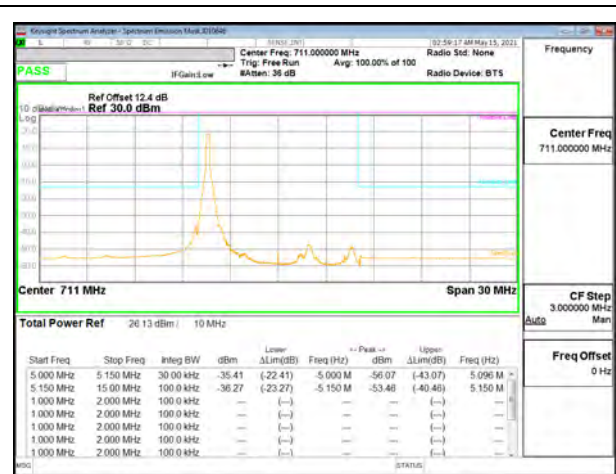


LTE B12 10MHz QPSK Low Channel RB50-0

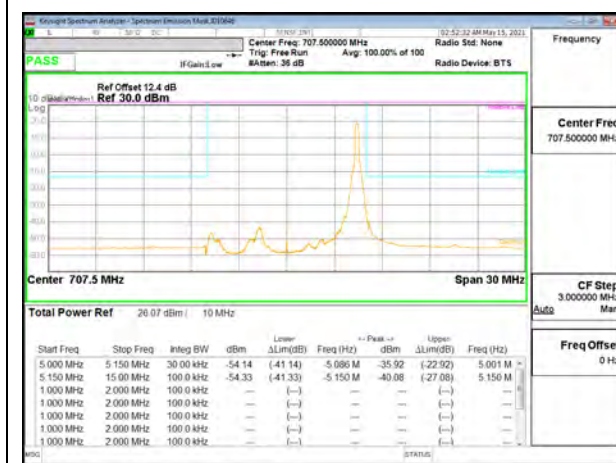




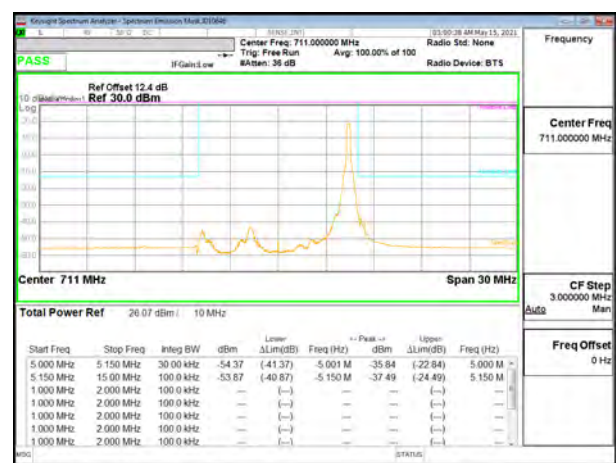
LTE B12 10MHz QPSK Middle Channel RB1-0



LTE B12 10MHz QPSK High Channel RB1-0



LTE B12 10MHz QPSK Middle Channel RB1-49



LTE B12 10MHz QPSK High Channel RB1-49



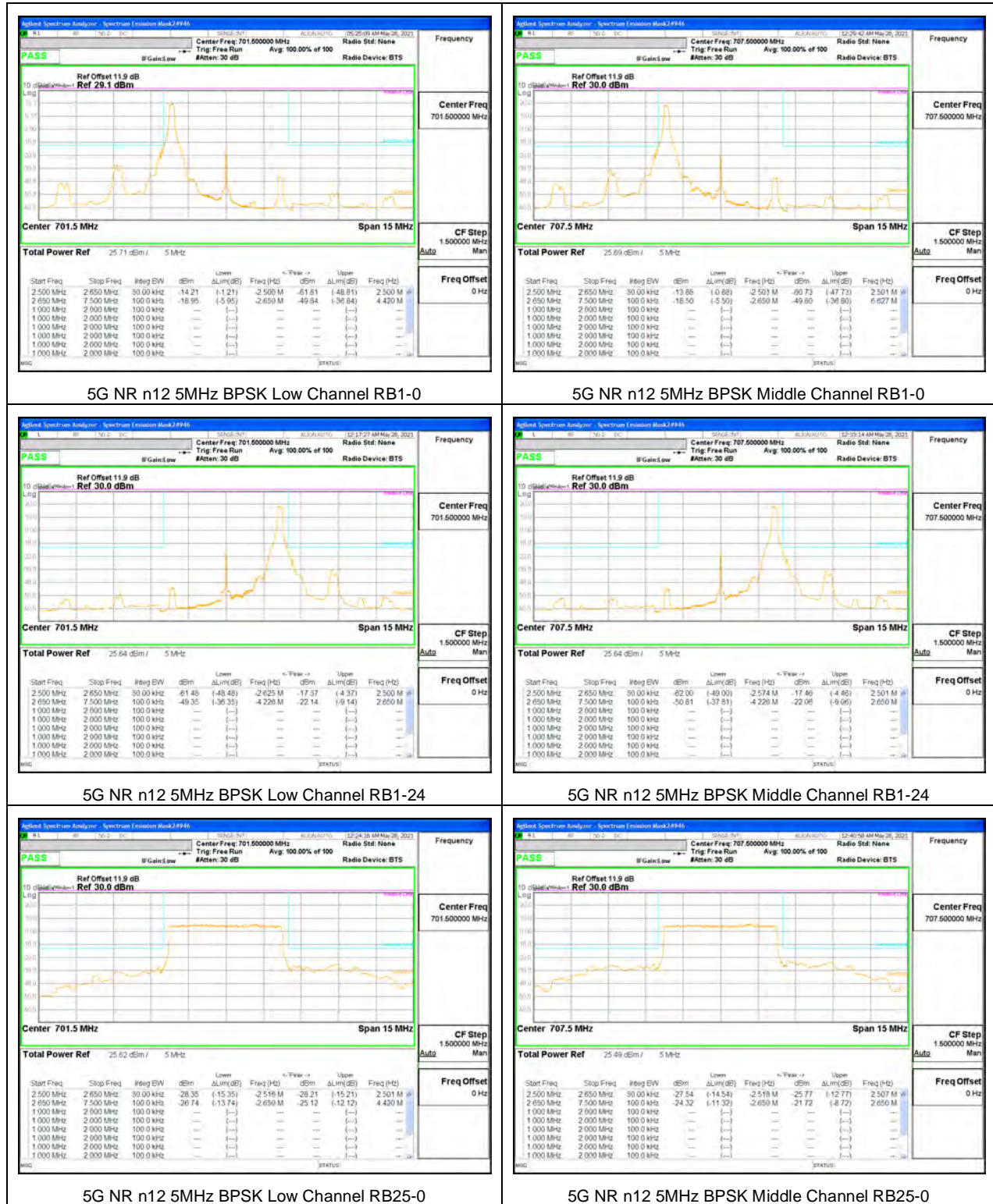
LTE B12 10MHz QPSK Middle Channel RB50-0

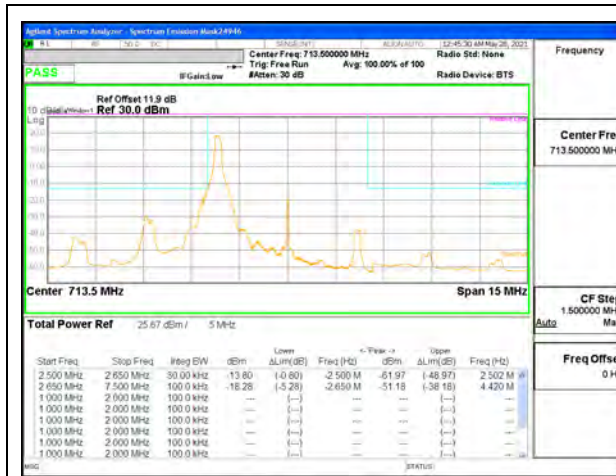


LTE B12 10MHz QPSK High Channel RB50-0

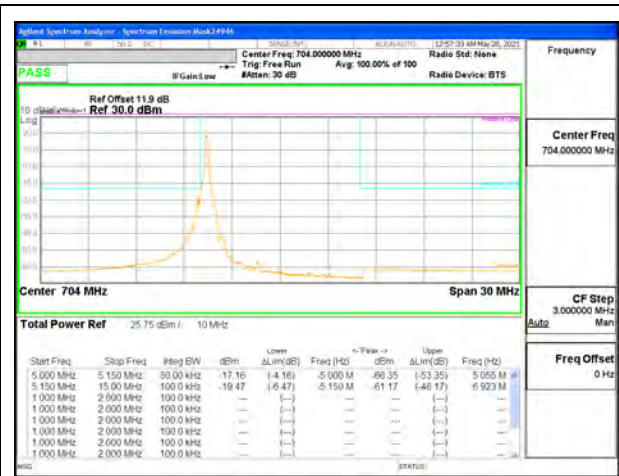


**5G NR n12 EMISSION MASK**

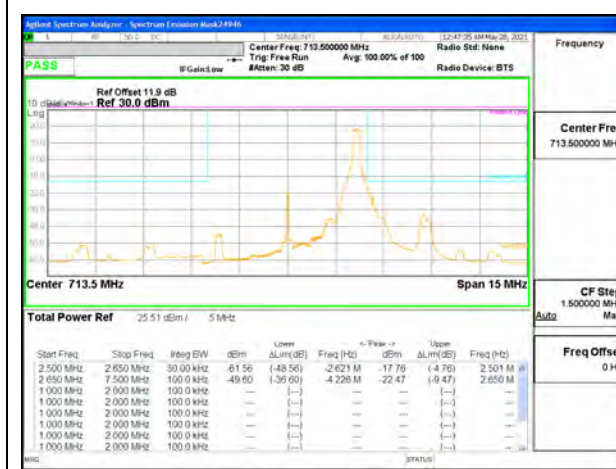




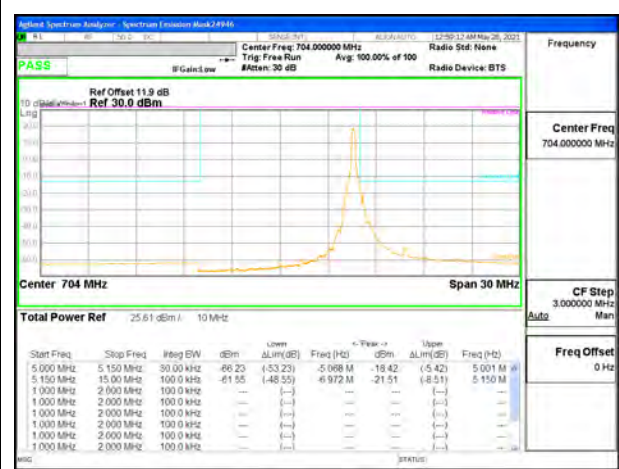
5G NR n12 5MHz BPSK High Channel RB1-0



5G NR n12 10MHz BPSK Low Channel RB1-0



5G NR n12 5MHz BPSK High Channel RB1-24



5G NR n12 10MHz BPSK Low Channel RB1-51

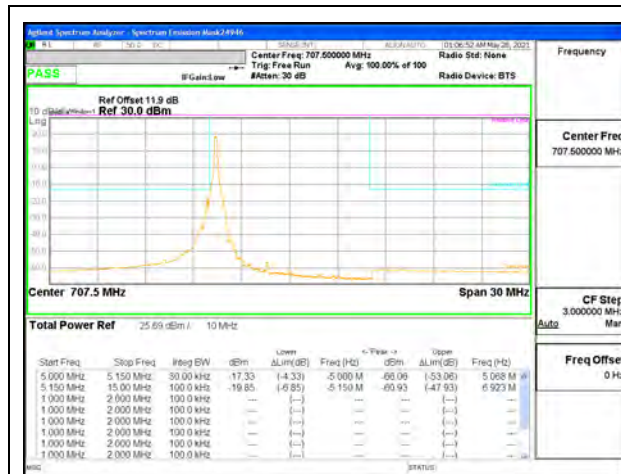


5G NR n12 5MHz BPSK High Channel RB25-0

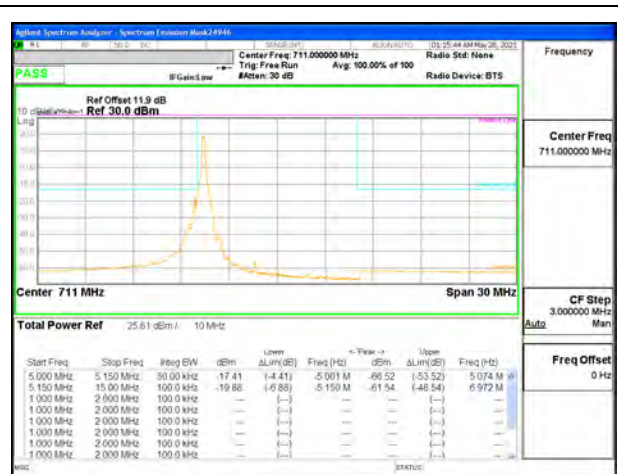


5G NR n12 10MHz BPSK Low Channel RB50-0

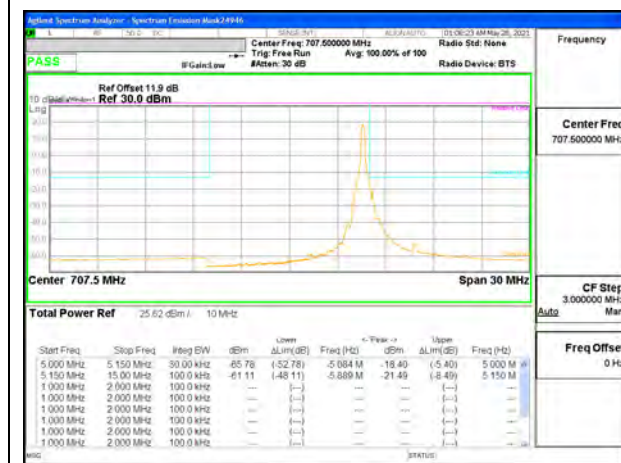




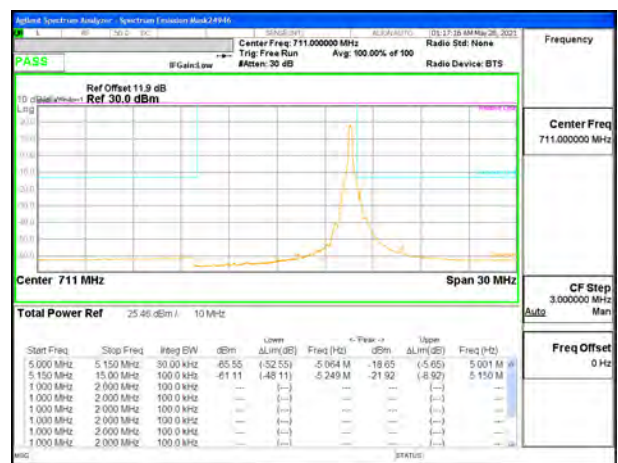
5G NR n12 10MHz BPSK Middle Channel RB1-0



5G NR n12 10MHz BPSK High Channel RB1-0



5G NR n12 10MHz BPSK Middle Channel RB1-51



5G NR n12 10MHz BPSK High Channel RB1-51

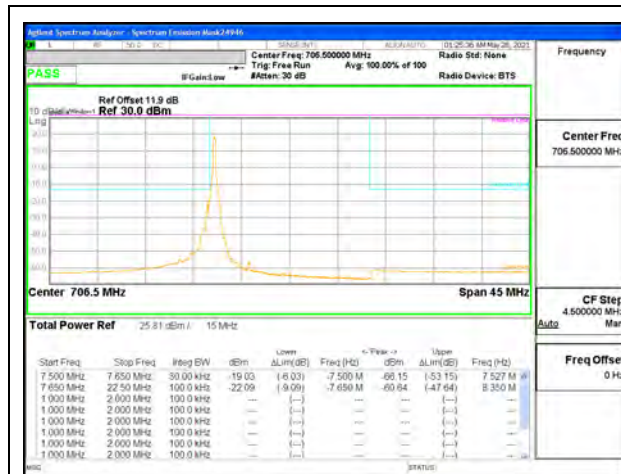


5G NR n12 10MHz BPSK Middle Channel RB50-0

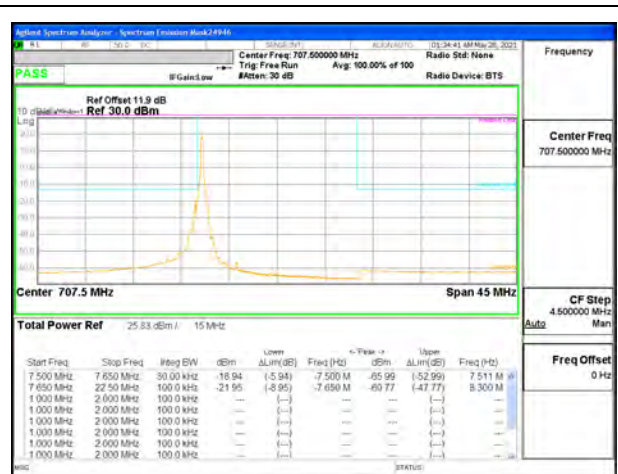


5G NR n12 10MHz BPSK High Channel RB50-0

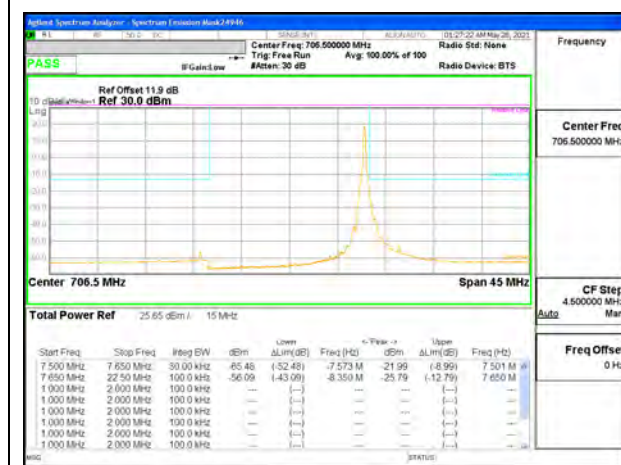




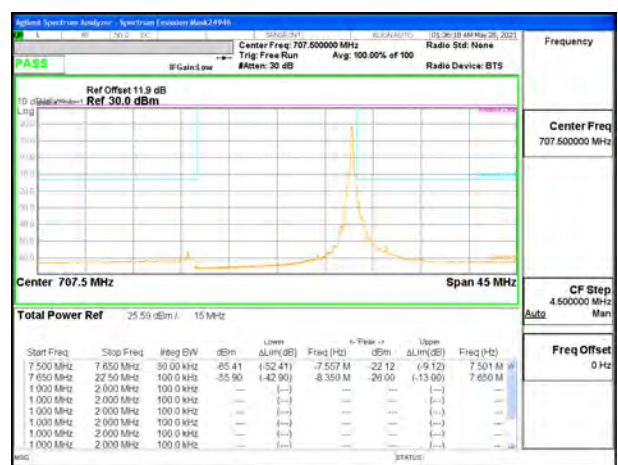
5G NR n12 15MHz BPSK Low Channel RB1-0



5G NR n12 15MHz BPSK Middle Channel RB1-0



5G NR n12 15MHz BPSK Low Channel RB1-78



5G NR n12 15MHz BPSK Middle Channel RB1-78



5G NR n12 15MHz BPSK Low Channel RB75-0



5G NR n12 15MHz BPSK Middle Channel RB75-0



## 9.2.4. LTE BAND 13 EMISSION MASK

### LIMITS

FCC: §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;

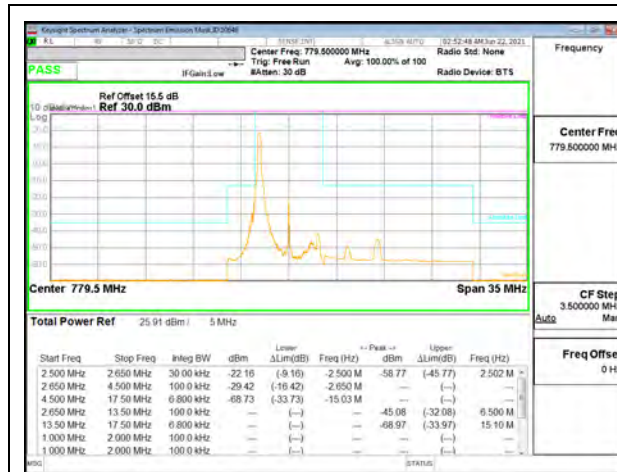
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations;

(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;

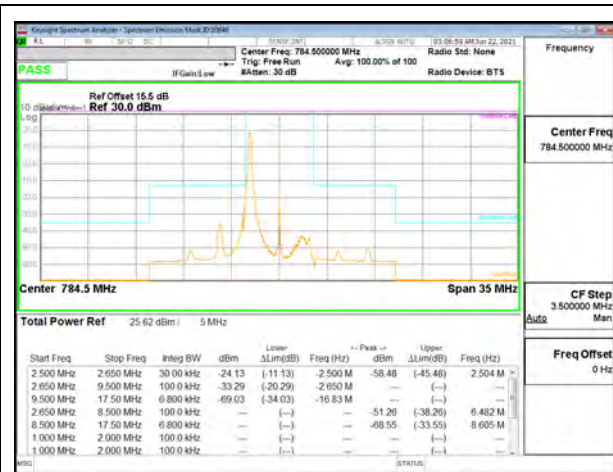
(6) Compliance with the provisions of paragraphs (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(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).

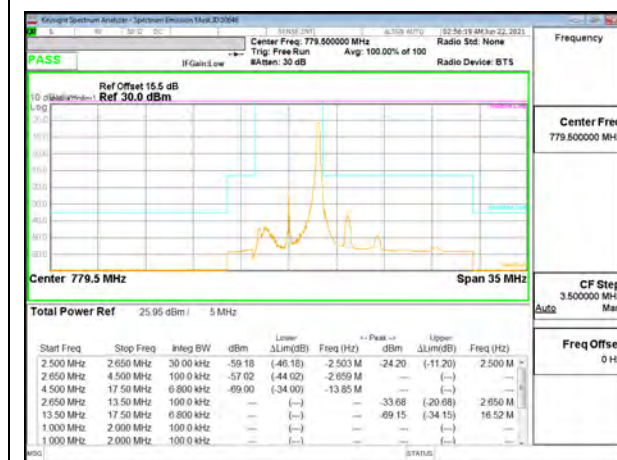




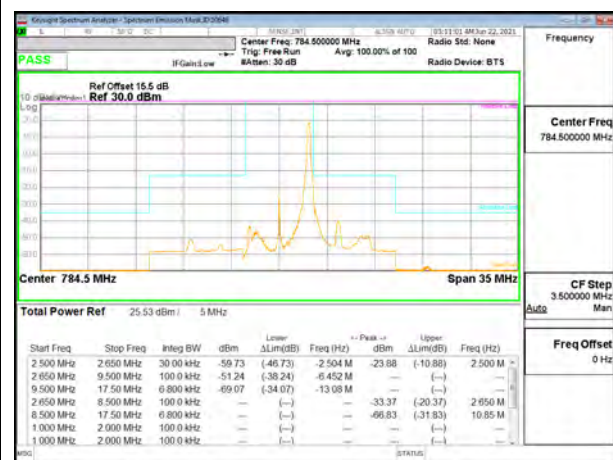
LTE B13 5MHz QPSK Low Channel RB1-0



LTE B13 5MHz QPSK High Channel RB1-0



LTE B13 5MHz QPSK Low Channel RB1-24



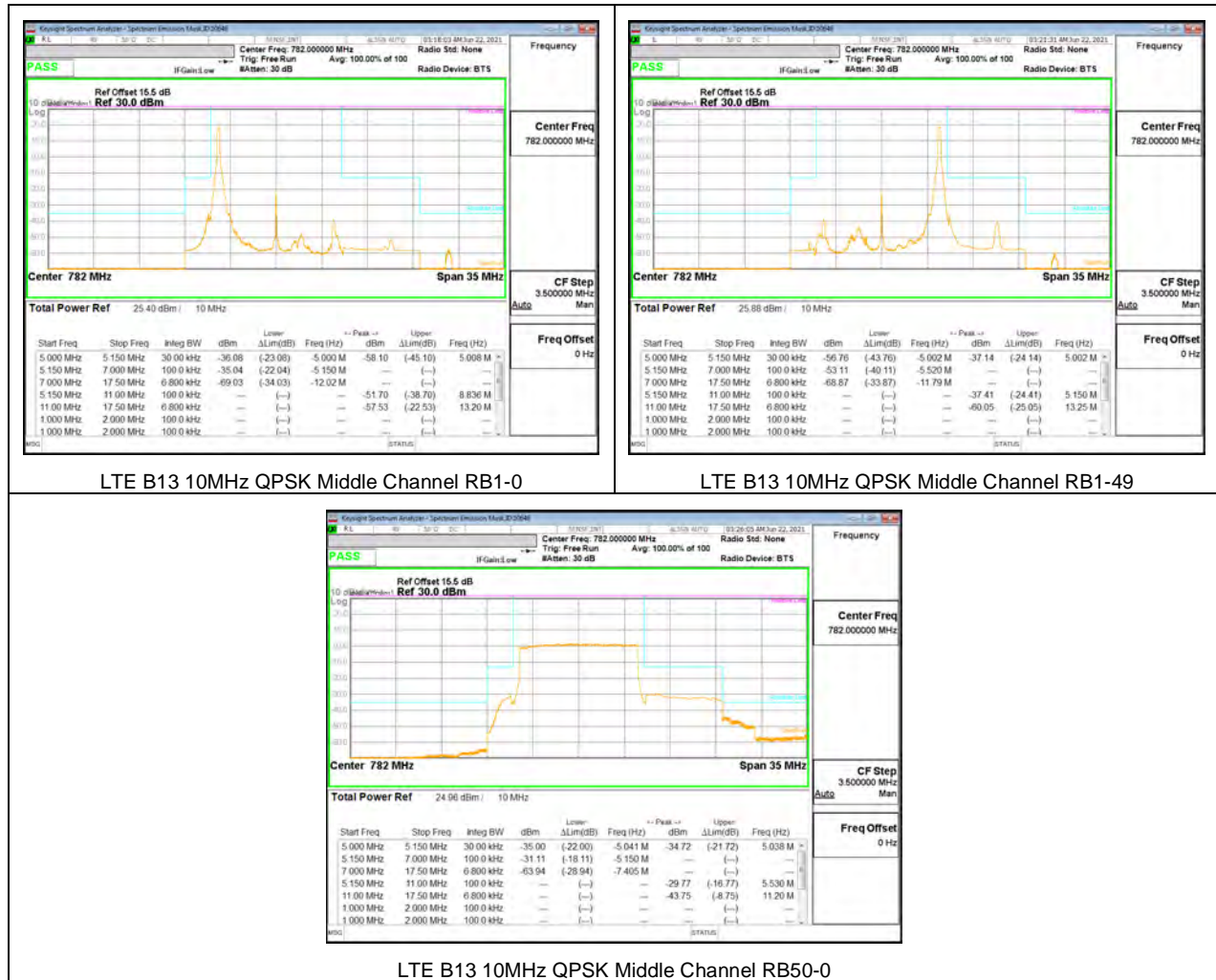
LTE B13 5MHz QPSK High Channel RB1-24



LTE B13 5MHz QPSK Low Channel RB25-0



LTE B13 5MHz QPSK High Channel RB25-0



## 9.2.5. LTE BAND 14 EMISSION MASK

### LIMITS

FCC: §90.543 Emission Limitations.

(e) For operations in the 758-768 MHz and the 788-798 MHz bands, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(2) On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations.

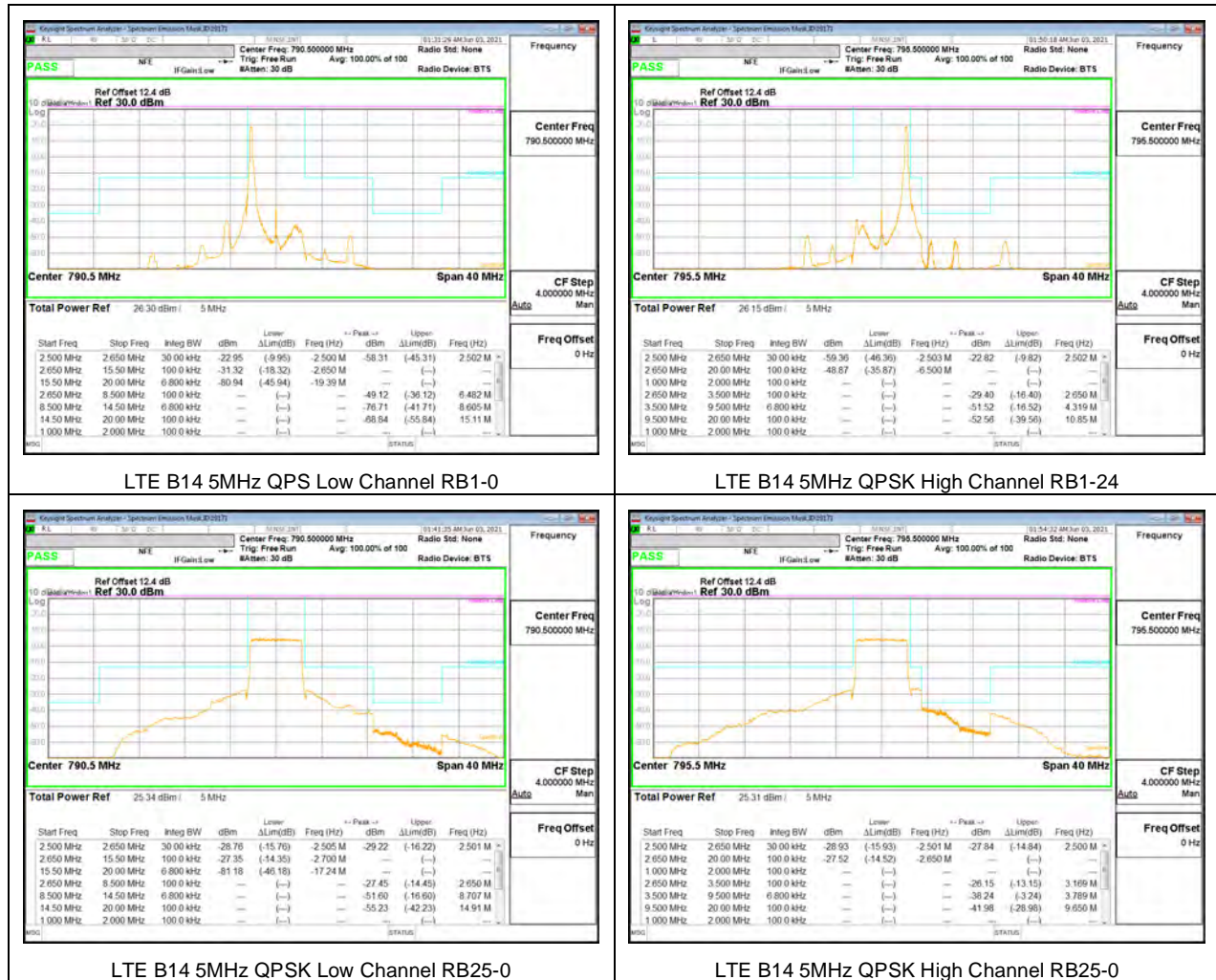
(3) On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least  $43 + 10 \log (P)$  dB.

(4) Compliance with the provisions of paragraphs (e)(1) and (2) 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.

(5) Compliance with the provisions of paragraph (e)(3) 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 30 kHz may be employed.

(f) For operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to  $-70$  dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and  $-80$  dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.







## 9.2.6. LTE BAND 17 EMISSION MASK

### LIMITS

FCC: §27.53

(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.









## 9.2.7. LTE BAND 25 AND 5G NR n25 EMISSION MASK

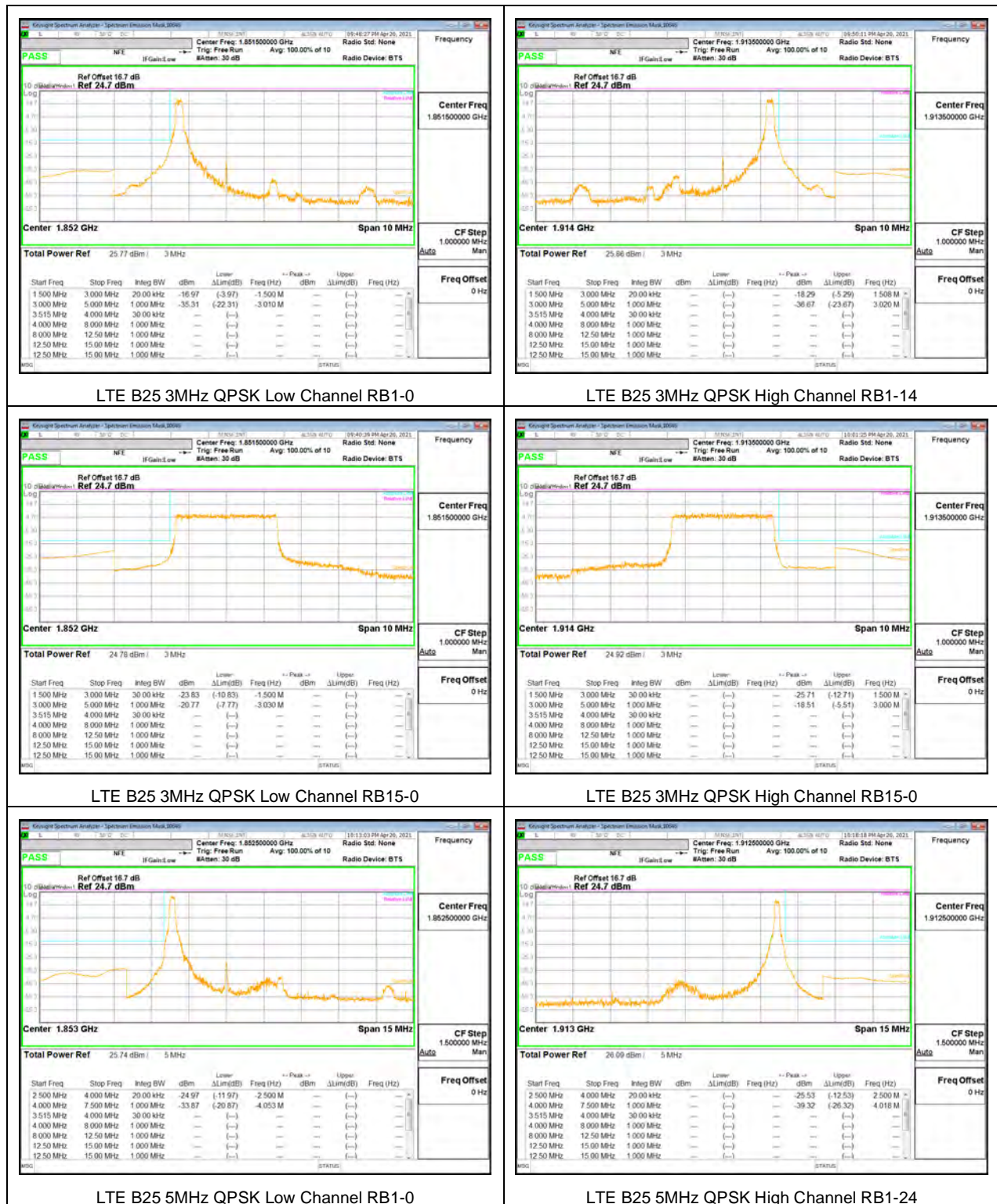
### LIMITS

FCC: §24.238 (a)

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

### LTE BAND 25 EMISSION MASK





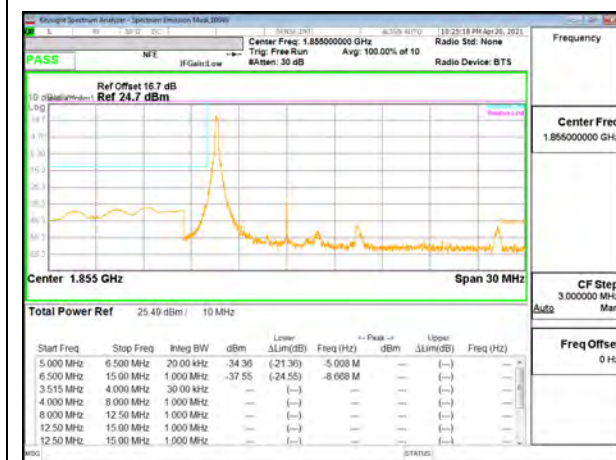




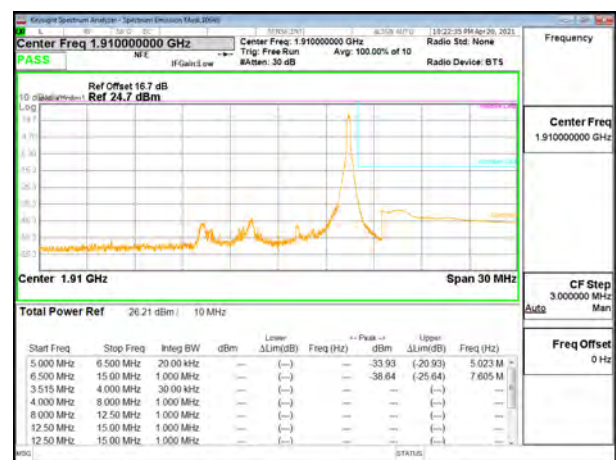
LTE B25 5MHz QPSK Low Channel RB25-0



LTE B25 5MHz QPSK High Channel RB25-0



LTE B25 10MHz QPSK Low Channel RB1-0



LTE B25 10MHz QPSK High Channel RB1-49



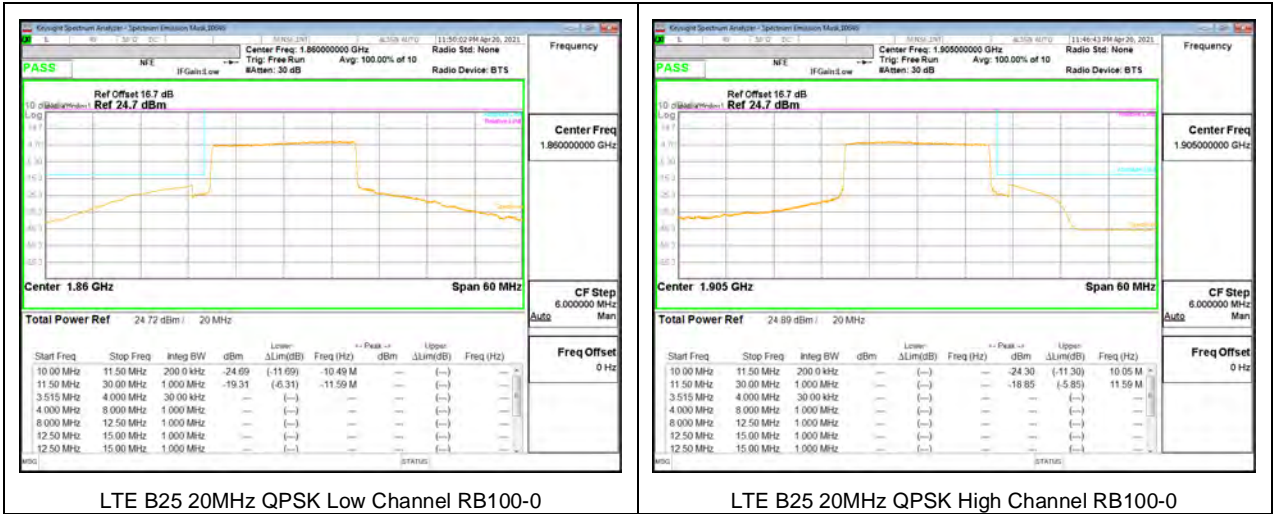
LTE B25 10MHz QPSK Low Channel RB50-0



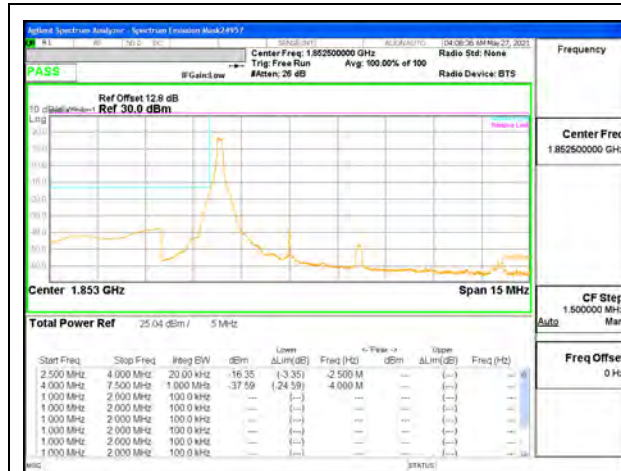
LTE B25 10MHz QPSK High Channel RB50-0



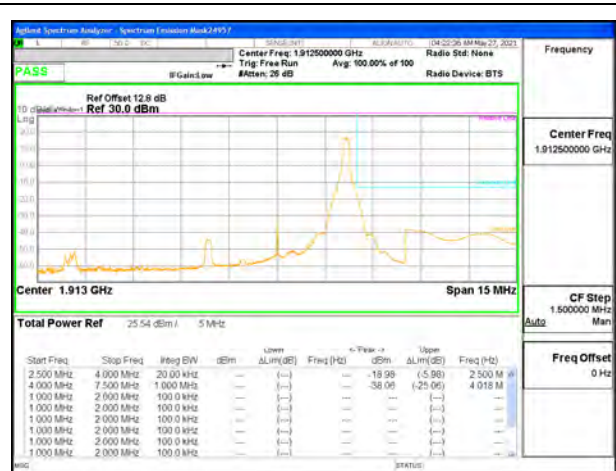




# 5G NR n25 EMISSION MASK



5G NR n25 5MHz BPSK Low Channel RB1-0



5G NR n25 5MHz BPSK High Channel RB1-24



5G NR n25 5MHz BPSK Low Channel RB25-0



5G NR n25 5MHz BPSK High Channel RB25-0

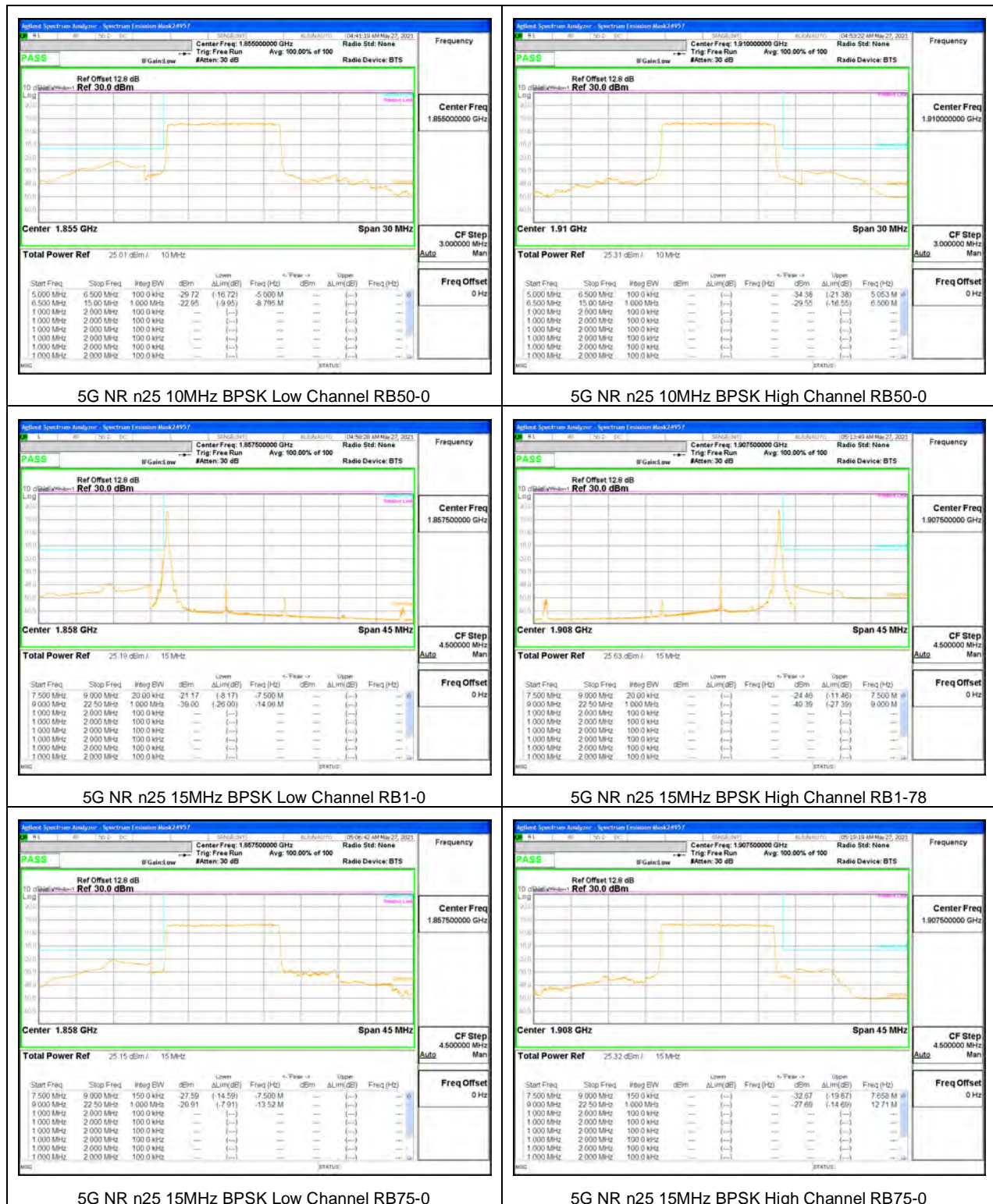


5G NR n25 10MHz BPSK Low Channel RB1-0



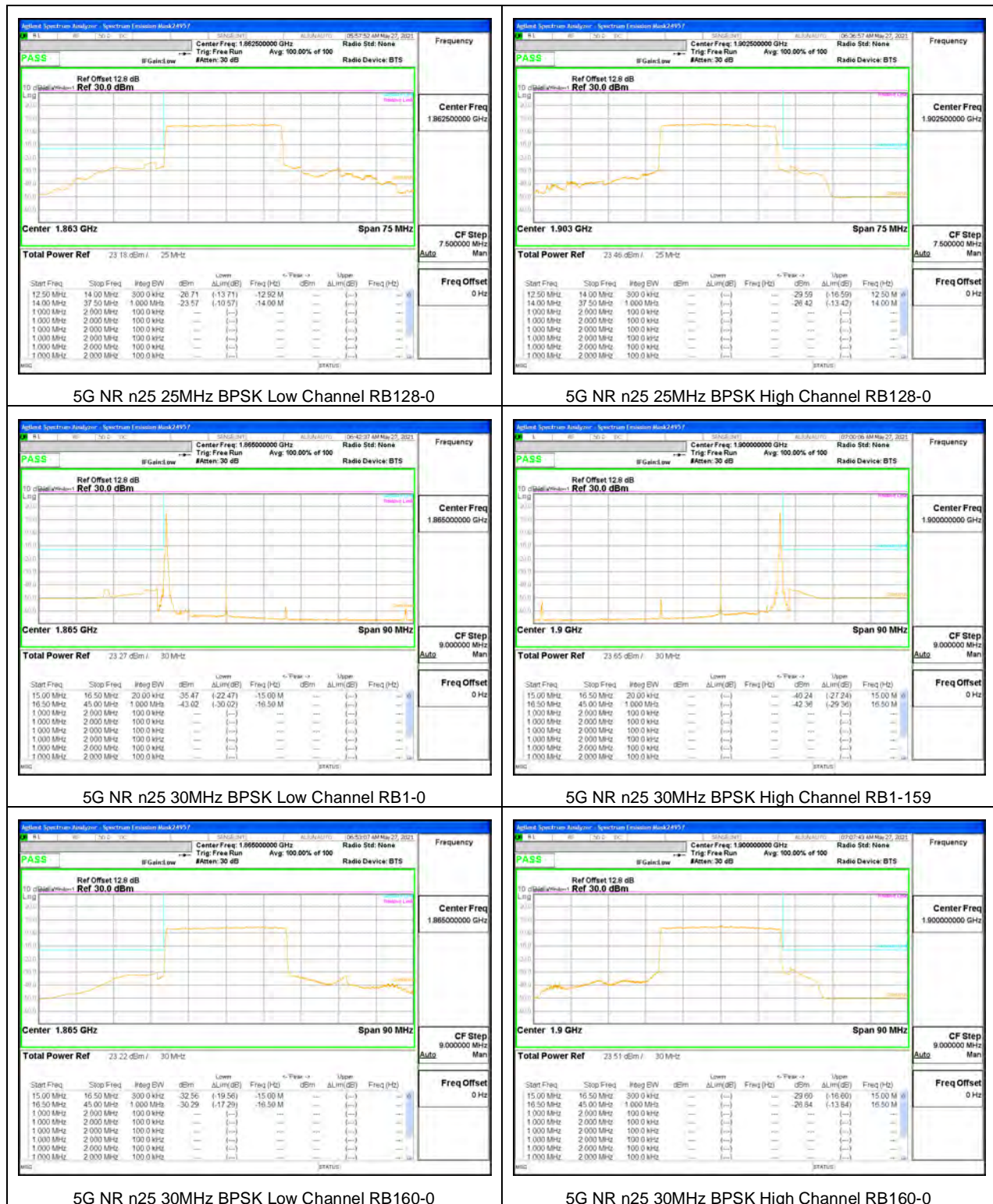
5G NR n25 10MHz BPSK High Channel RB1-51















## 9.2.8. LTE BAND 26 EMISSION MASK (PART 90S)

### LIMITS

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

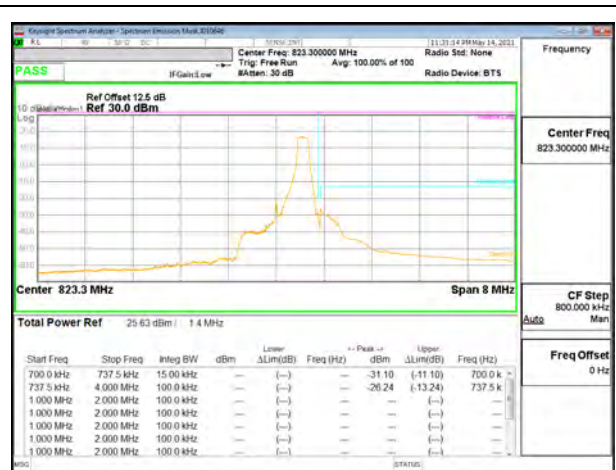
(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

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



LTE B26 1.4MHz QPSK Low Channel RB1-0



LTE B26 1.4MHz QPSK High Channel RB1-5

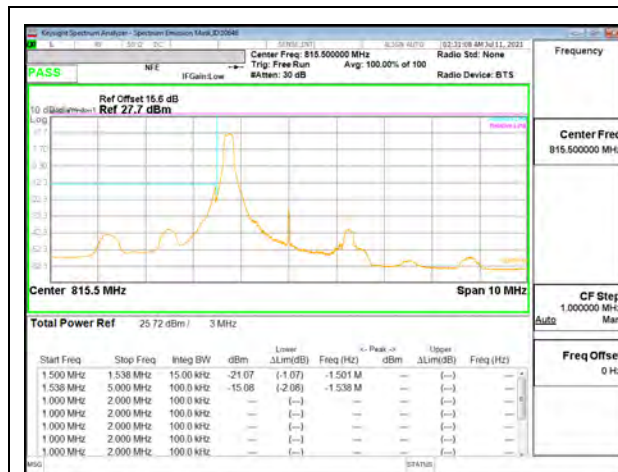


LTE B26 1.4MHz QPSK Low Channel RB6-0

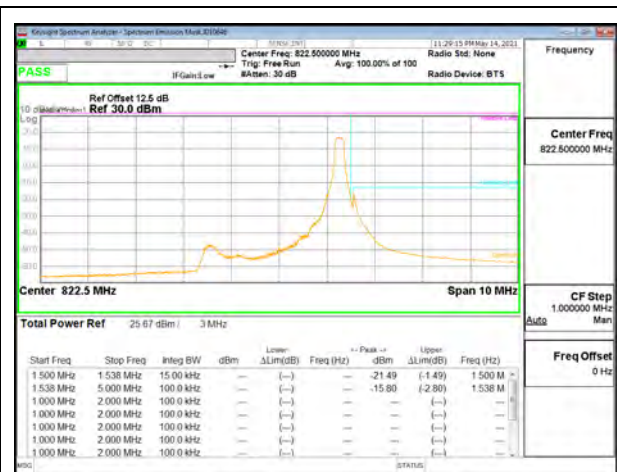


LTE B26 1.4MHz QPSK High Channel RB6-0





LTE B26 3MHz QPSK Low Channel RB1-0



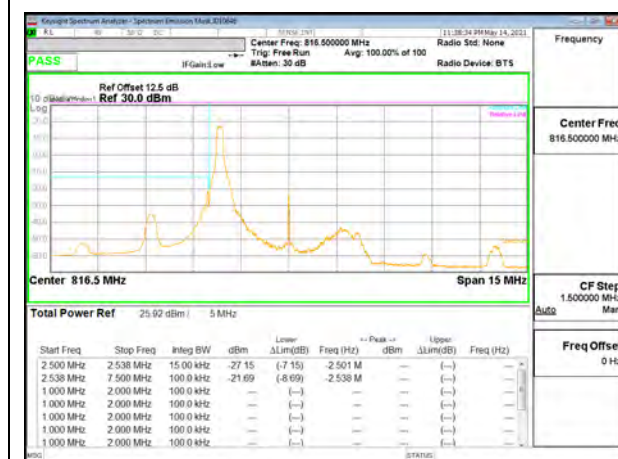
LTE B26 3MHz QPSK High Channel RB1-14



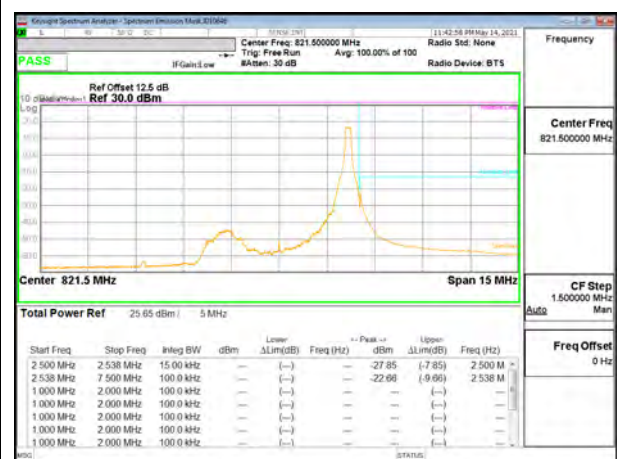
LTE B26 3MHz QPSK Low Channel RB15-0



LTE B26 3MHz QPSK High Channel RB15-0



LTE B26 5MHz QPSK Low Channel RB1-0



LTE B26 5MHz QPSK High Channel RB1-24





## 9.2.9. LTE BAND 26 EMISSION MASK (PART 22)

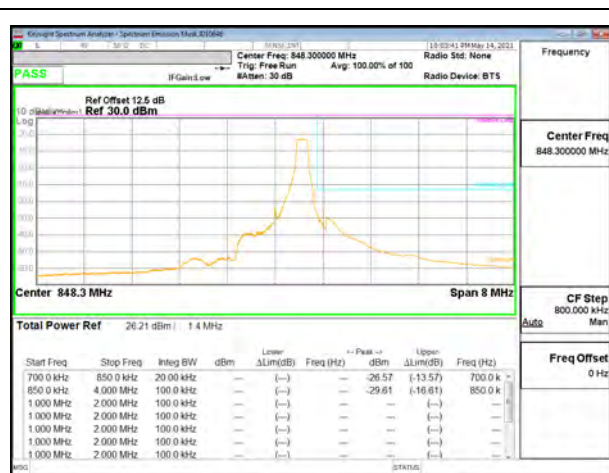
### LIMITS

FCC: §22.917 (a)

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



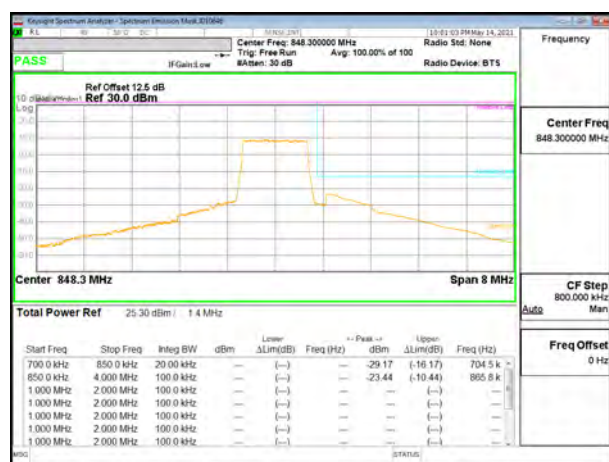
LTE B26 1.4MHz QPSK Low Channel RB1-0



LTE B26 1.4MHz QPSK High Channel RB1-5

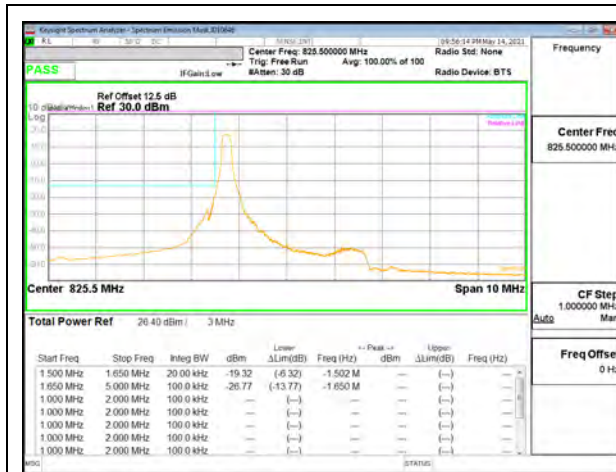


LTE B26 1.4MHz QPSK Low Channel RB6-0

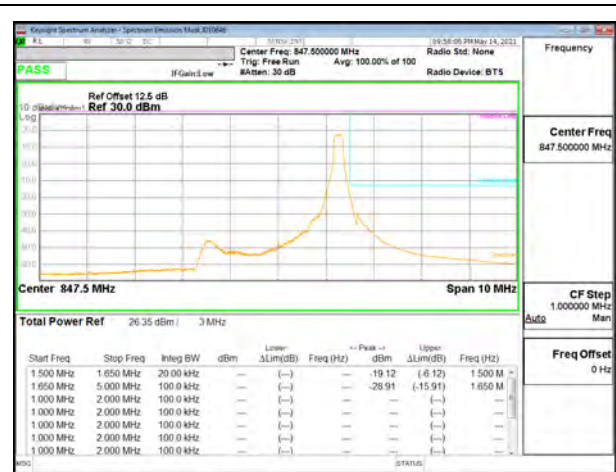


LTE B26 1.4MHz QPSK High Channel RB6-0





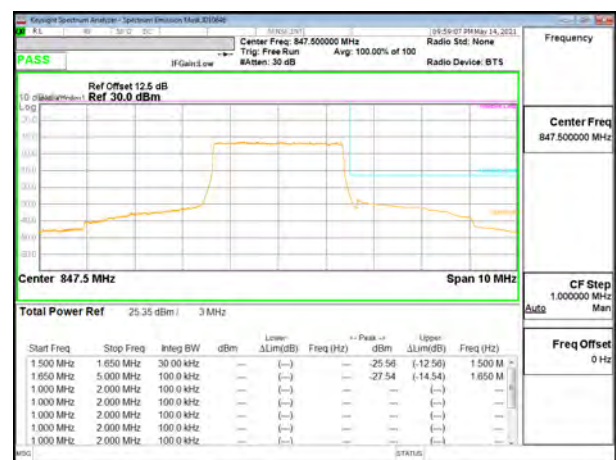
LTE B26 3MHz QPSK Low Channel RB1-0



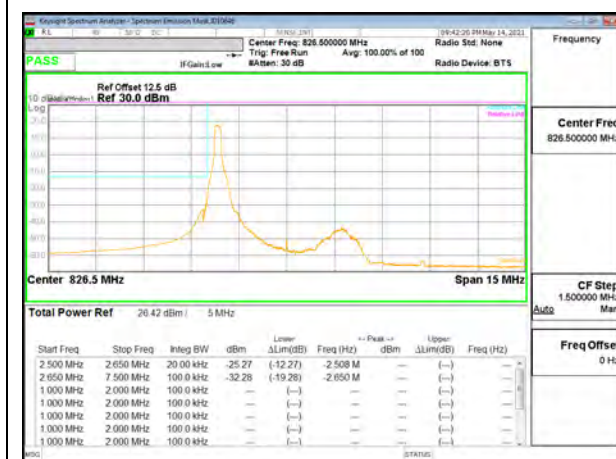
LTE B26 3MHz QPSK High Channel RB1-14



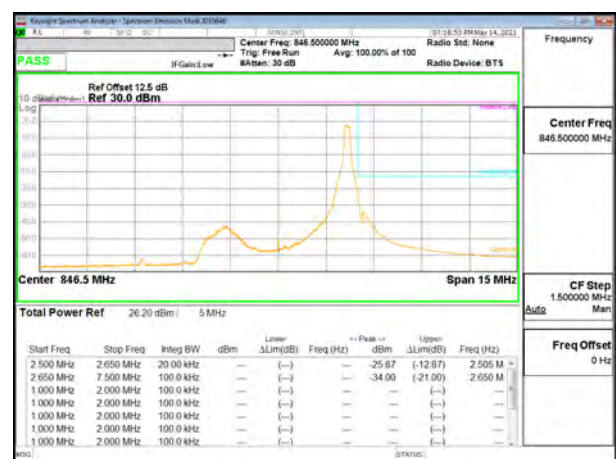
LTE B26 3MHz QPSK Low Channel RB15-0



LTE B26 3MHz QPSK High Channel RB15-0



LTE B26 5MHz QPSK Low Channel RB1-0



LTE B26 5MHz QPSK High Channel RB1-24





## 9.2.10. LTE BAND 30 AND 5G NR n30 EMISSION MASK

### LIMITS

FCC: §27.53

(a) For operations in the 2305-2320 MHz band and the 2345-2360 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power P (with averaging performed only during periods of transmission) within the licensed band(s) of operation, in watts, by the following amounts:

(4) For mobile and portable stations operating in the 2305-2315 MHz and 2350-2360 MHz bands:

(i) By a factor of not less than:  $43 + 10 \log (P)$  dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than  $55 + 10 \log (P)$  dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than  $61 + 10 \log (P)$  dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, AND 5G NR not less than  $67 + 10 \log (P)$  dB on all frequencies between 2328 and 2337 MHz;

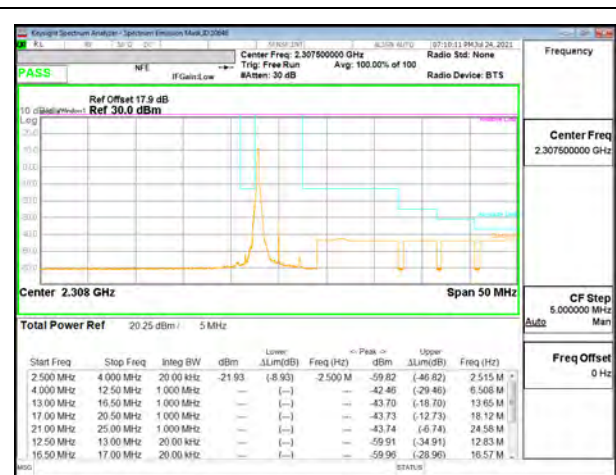
(ii) By a factor of not less than  $43 + 10 \log (P)$  dB on all frequencies between 2300 and 2305 MHz,  $55 + 10 \log (P)$  dB on all frequencies between 2296 and 2300 MHz,  $61 + 10 \log (P)$  dB on all frequencies between 2292 and 2296 MHz,  $67 + 10 \log (P)$  dB on all frequencies between 2288 and 2292 MHz, and  $70 + 10 \log (P)$  dB below 2288 MHz;

(iii) By a factor of not less than  $43 + 10 \log (P)$  dB on all frequencies between 2360 and 2365 MHz, AND 5G NR not less than  $70 + 10 \log (P)$  dB above 2365 MHz.

**LTE BAND 30 EMISSION MASK**



LTE B30 5MHz BPSK Low Channel RB1-0 (Low)



LTE B30 5MHz BPSK Low Channel RB1-0 (High)



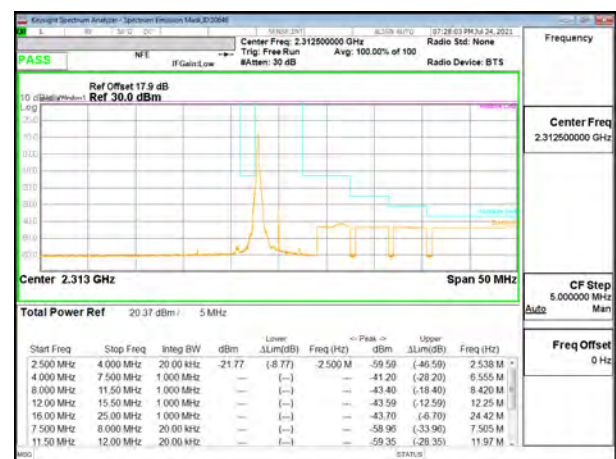
LTE B30 5MHz BPSK Low Channel RB25-0 (Low)



LTE B30 5MHz BPSK Low Channel RB25-0 (High)



LTE B30 5MHz BPSK High Channel RB1-24 (Low)



LTE B30 5MHz BPSK High Channel RB1-24 (High)





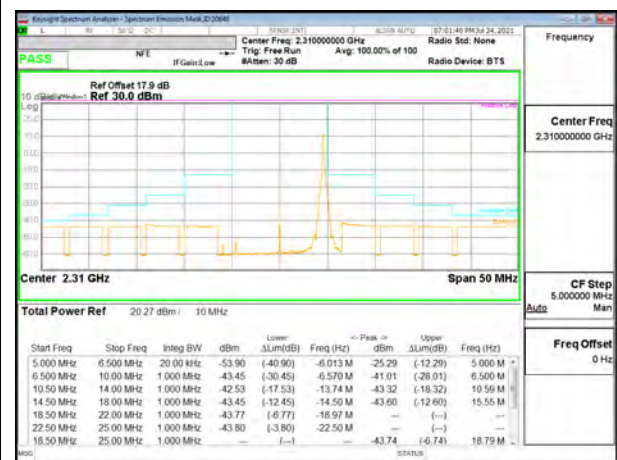
LTE B30 5MHz BPSK High Channel RB25-0 (Low)



LTE B30 5MHz BPSK High Channel RB25-0 (High)



LTE B30 10MHz BPSK Middle Channel RB1-0



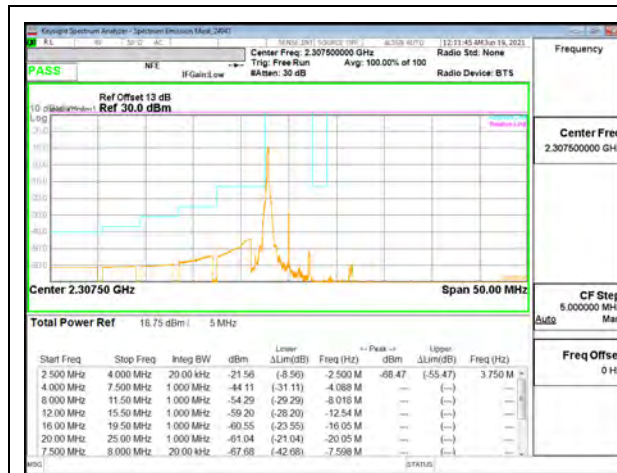
LTE B30 10MHz BPSK Middle Channel RB1-49



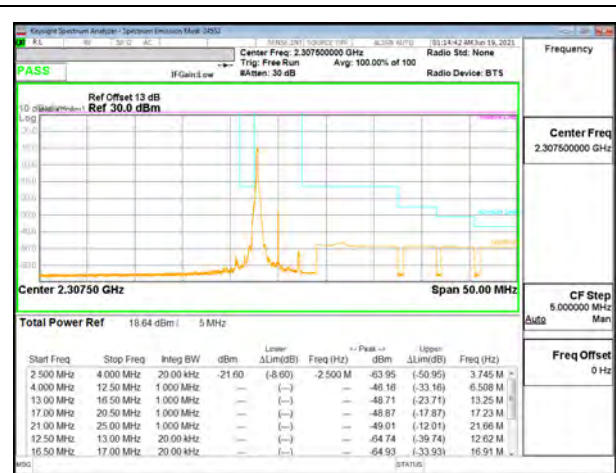
LTE B30 10MHz BPSK Middle Channel RB50-0

Intentionally Blank

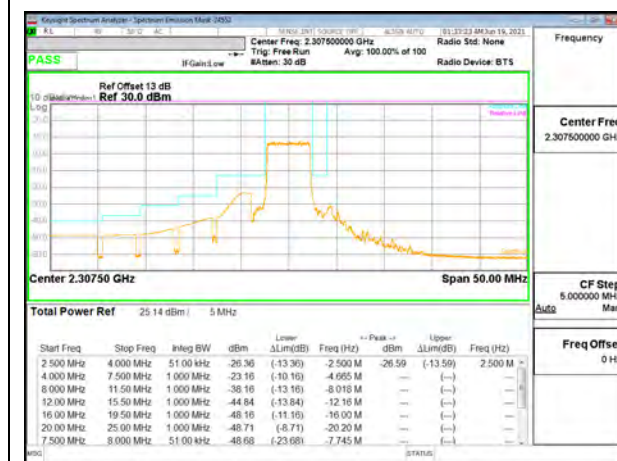
**5G NR n30 EMISSION MASK**



5G NR n30 5MHz BPSK Low Channel RB1-0 (Low)



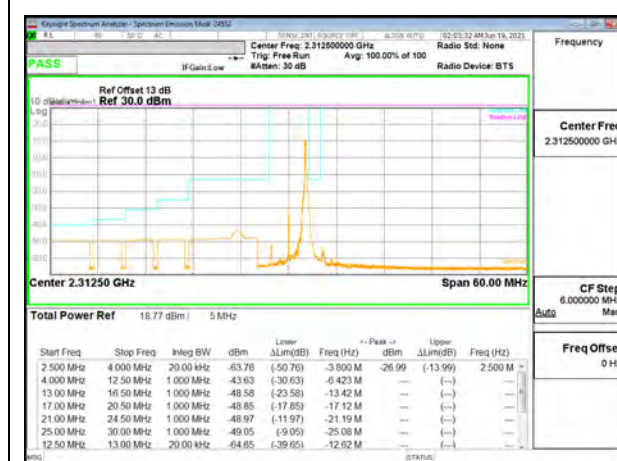
5G NR n30 5MHz BPSK Low Channel RB1-0 (High)



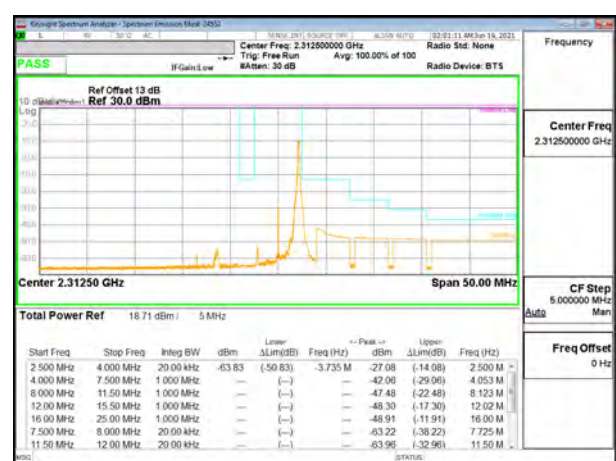
5G NR n30 5MHz BPSK Low Channel RB25-0 (Low)



5G NR n30 5MHz BPSK Low Channel RB25-0 (High)



5G NR n30 5MHz BPSK High Channel RB1-24 (Low)



5G NR n30 5MHz BPSK High Channel RB1-24 (High)







## 9.2.11. LTE BAND 41 AND 5G NR n41 EMISSION MASK

### LIMITS

FCC: §27.53

(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 than  $43 + 10 \log (P)$  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.

# **LTE BAND 41 EMISSION MASK**



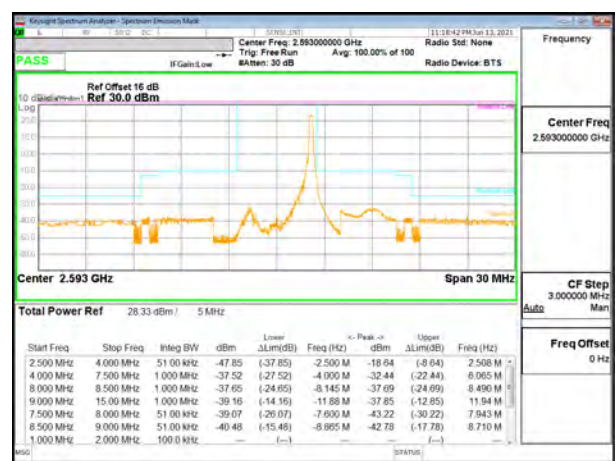
LTE B41 5MHz QPSK Low Channel RB1-0 ID:24875



LTE B41 5MHz QPSK Middle Channel RB1-0 ID:24875



LTE B41 5MHz QPSK Low Channel RB1-24 ID:24875



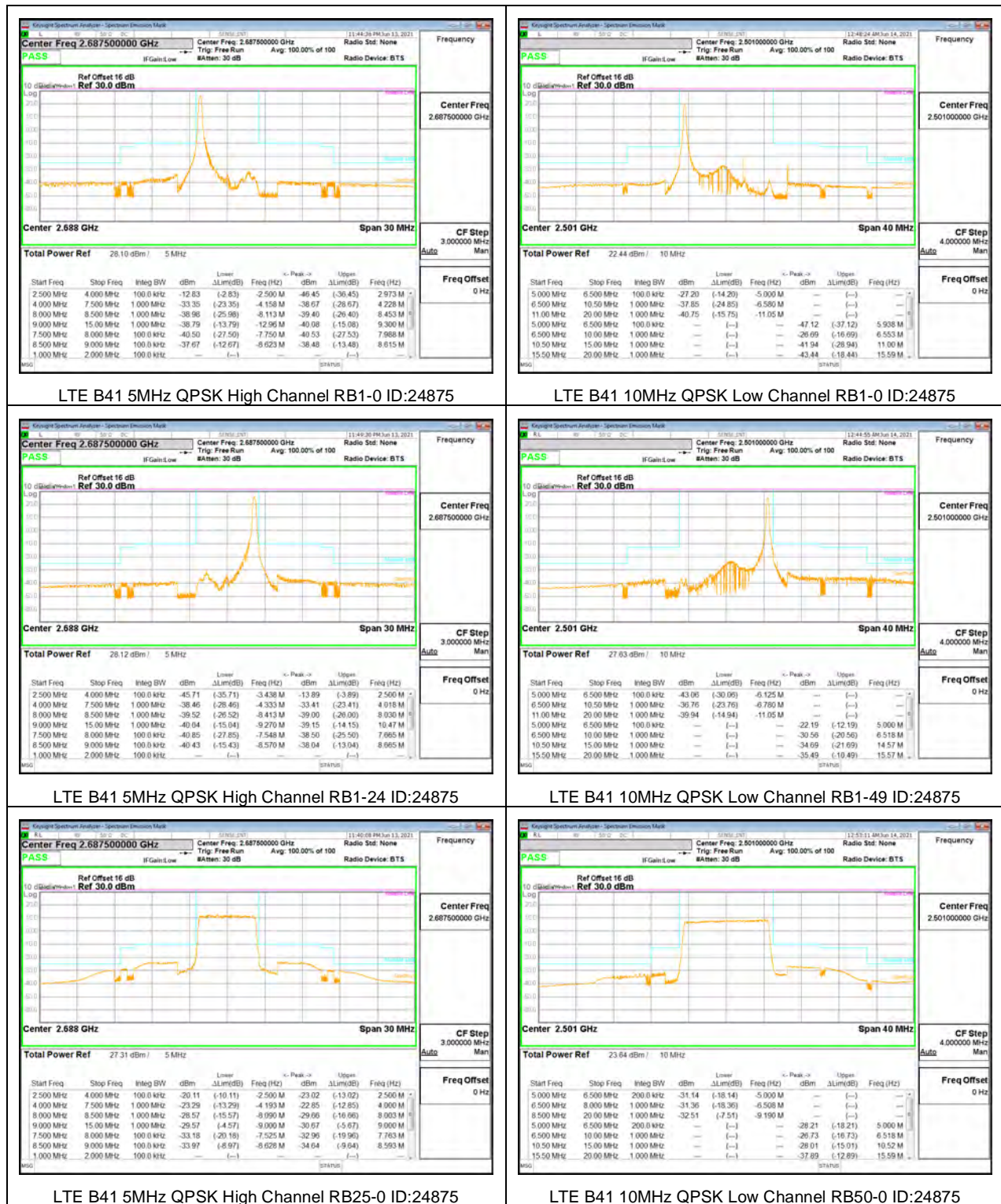
LTE B41 5MHz QPSK Middle Channel RB1-24 ID:24875



LTE B41 5MHz QPSK Low Channel RB25-0 ID:24875

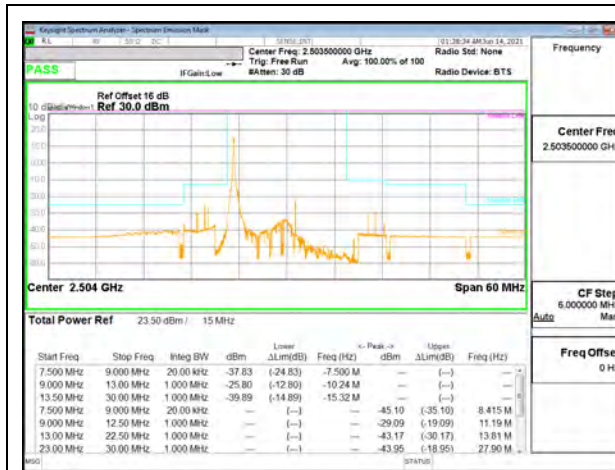


LTE B41 5MHz QPSK Middle Channel RB25-0 ID:24875

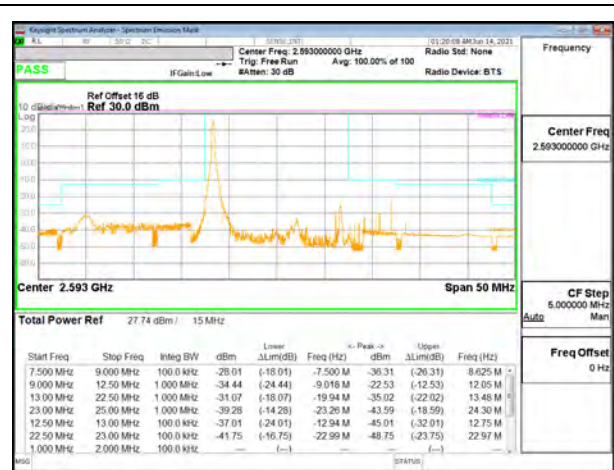








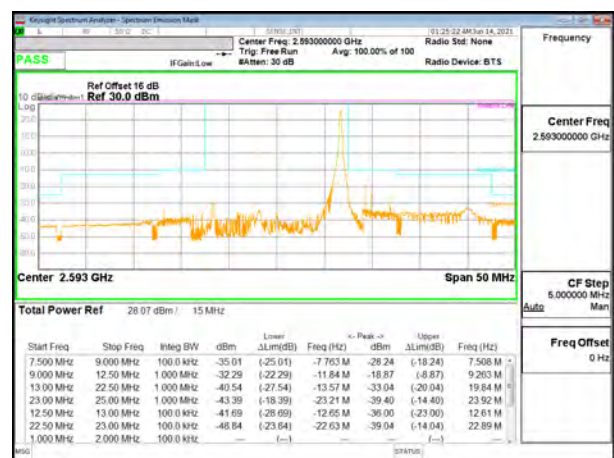
LTE B41 15MHz QPSK Low Channel RB1-0 ID:24875



LTE B41 15MHz QPSK Middle Channel RB1-0 ID:24875



LTE B41 15MHz QPSK Low Channel RB1-74 ID:24875



LTE B41 15MHz QPSK Middle Channel RB1-74 ID:24875

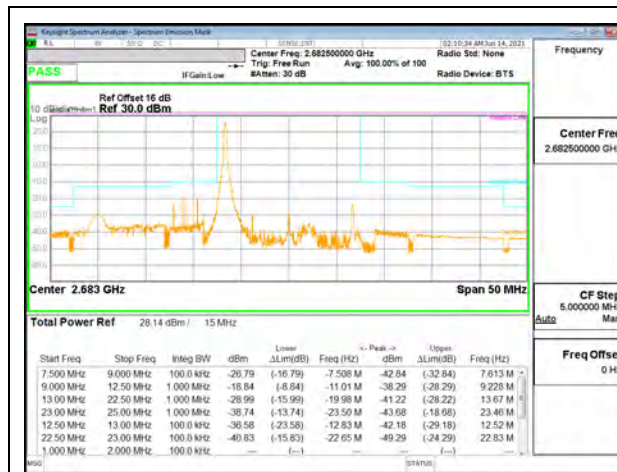


LTE B41 15MHz QPSK Low Channel RB75-0 ID:24875

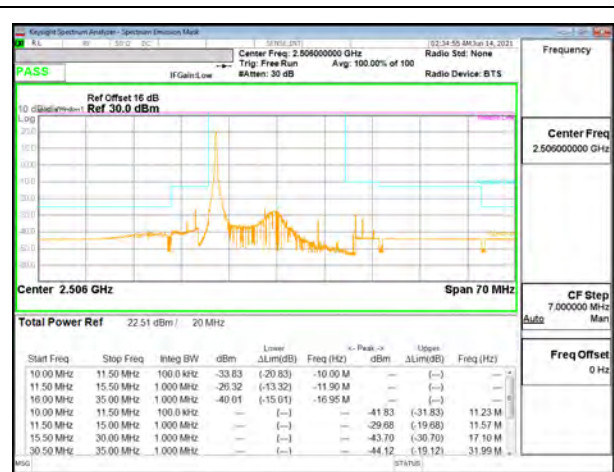


LTE B41 15MHz QPSK Middle Channel RB75-0 ID:24875

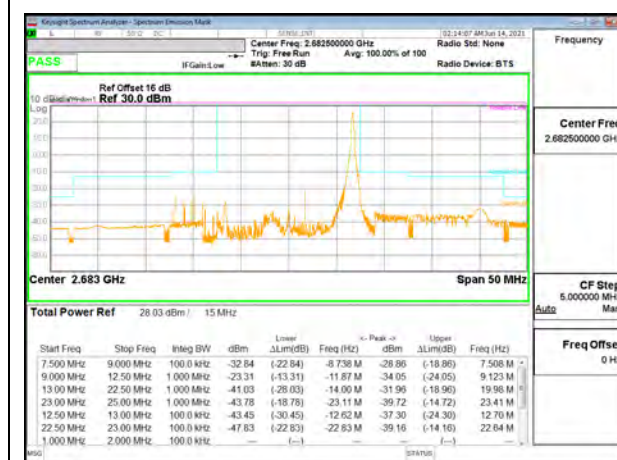




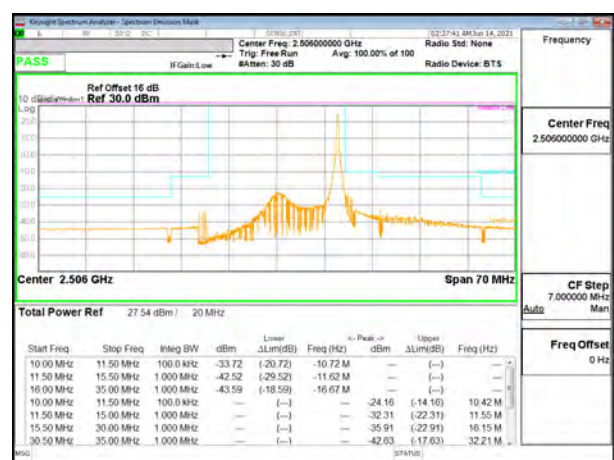
LTE B41 15MHz QPSK High Channel RB1-0 ID:24875



LTE B41 20MHz QPSK Low Channel RB1-0 ID:24875



LTE B41 15MHz QPSK High Channel RB1-74 ID:24875



LTE B41 20MHz QPSK Low Channel RB1-99 ID:24875



LTE B41 15MHz QPSK High Channel RB75-0 ID:24875



LTE B41 20MHz QPSK Low Channel RB100-0 ID:24875





# 5G NR n41 EMISSION MASK













5G NR n41 40MHz BPSK Low Channel RB1-0



5G NR n41 40MHz BPSK Middle Channel RB1-0



5G NR n41 40MHz BPSK Low Channel RB1-105



5G NR n41 40MHz BPSK Middle Channel RB1-105



5G NR n41 40MHz BPSK Low Channel RB100-0



5G NR n41 40MHz BPSK Middle Channel RB100-0