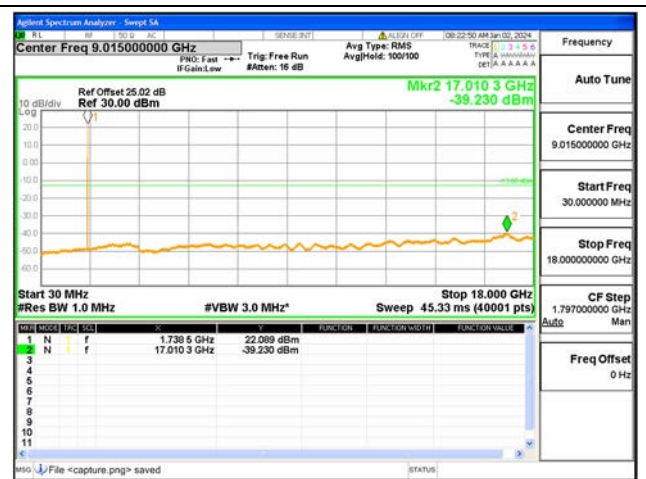


B66 / 15MHz / Low CH / QPSK



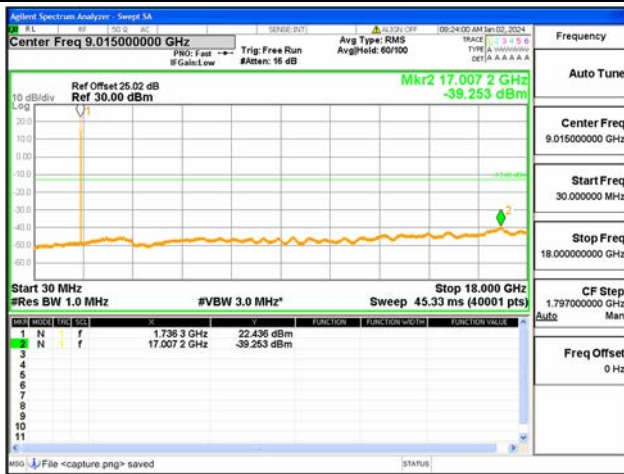
B66 / 15MHz / Mid CH / QPSK



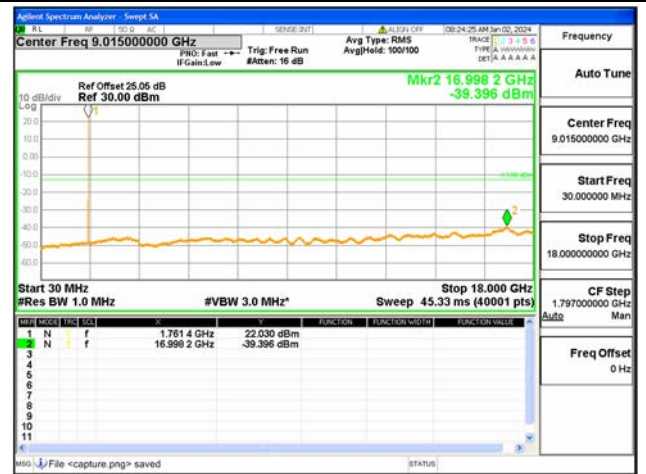
B66 / 15MHz / High CH / QPSK



B66 / 20MHz / Low CH / QPSK



B66 / 20MHz / Mid CH / QPSK



B66 / 20MHz / High CH / QPSK



## 2.6. Band Edge

### 2.6.1. Requirement

#### Band 2

According to FCC section 24.238(a), for operations in the 1850–1910MHz bands, 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 in a 1MHz bandwidth. However, in the 1 MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

#### Band 4, 66

According to FCC section 27.53(h), for operations in the 1710–1755MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10}(P)$  dB a 1MHz bandwidth. However, in the 1 MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

#### Band 5

According to FCC section 22.917(a), for operations in the 824–849MHz bands, 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 in a 100kHz bandwidth. However, in the 1 MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

#### Band 7

According to FCC section 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.

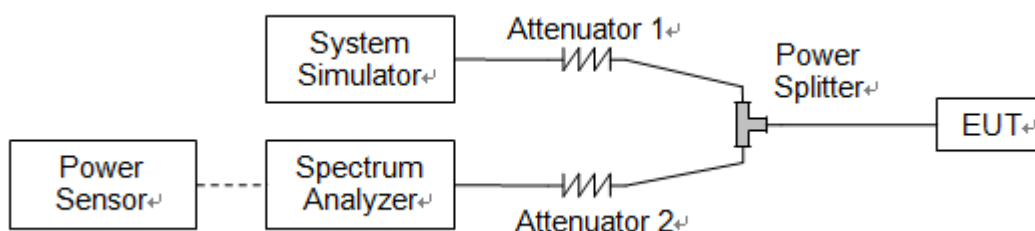
**Band 12**

According to FCC section 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.

**Band 13**

According to FCC section 27.53(c)(2), 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 in a 100kHz bandwidth. 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.

**2.6.2. Test Description**



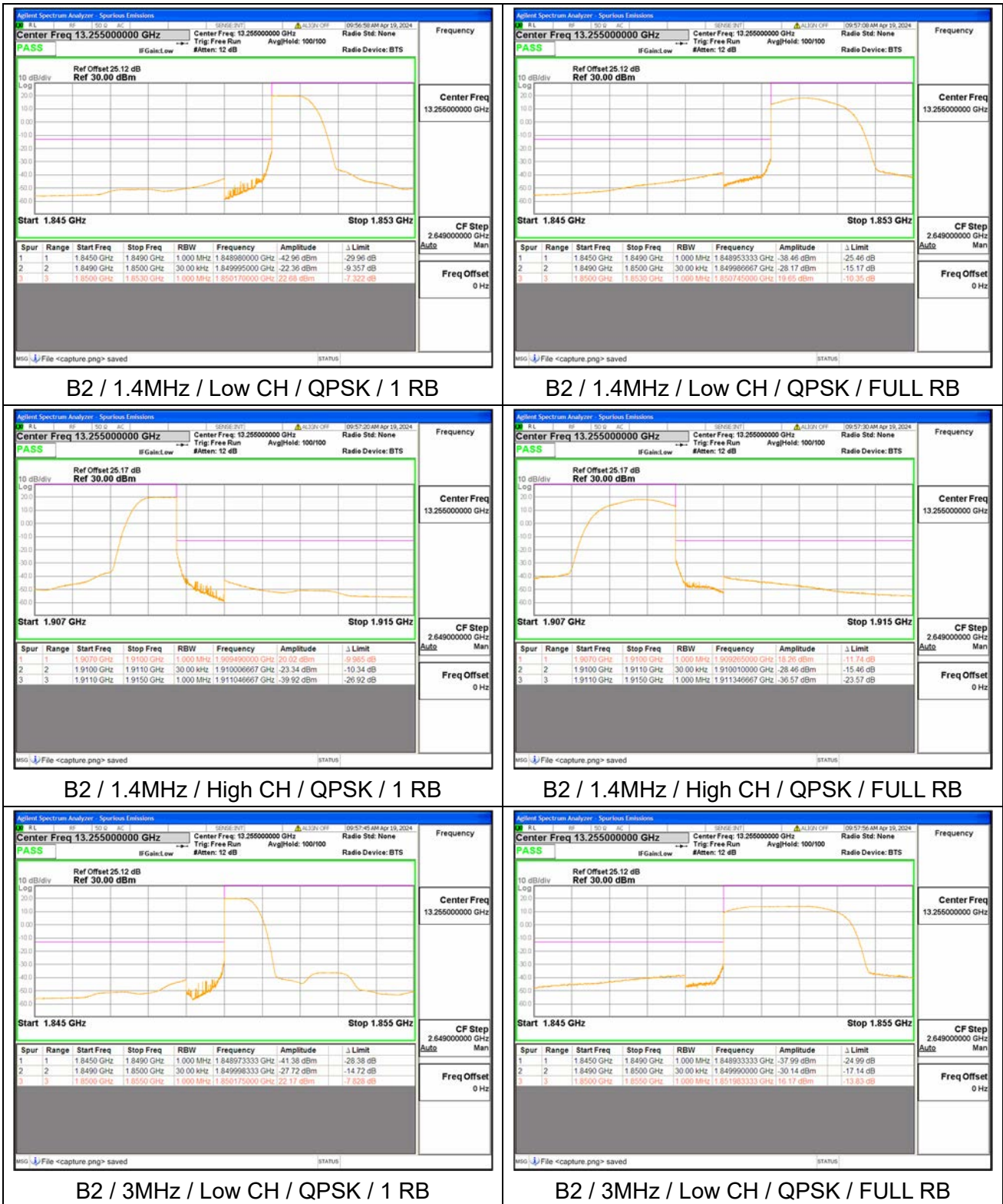
The EUT is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power. A call is established between the EUT and the SS.

**2.6.3. Test Procedure**

KDB 971168 D01v03 Section 6.0 and ANSI/TIA-603-E-2016.



2.6.4. Test Result



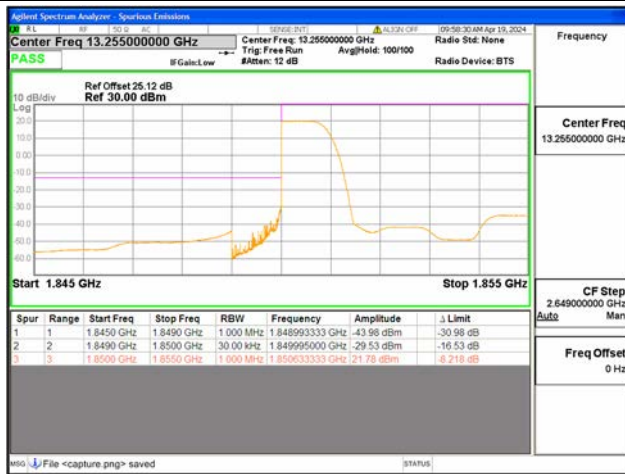




B2 / 3MHz / High CH / QPSK / 1 RB



B2 / 3MHz / High CH / QPSK / FULL RB



B2 / 5MHz / Low CH / QPSK / 1 RB



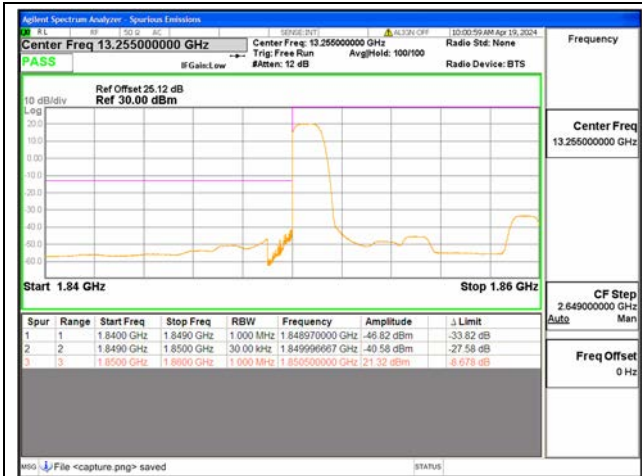
B2 / 5MHz / Low CH / QPSK / FULL RB



B2 / 5MHz / High CH / QPSK / 1 RB



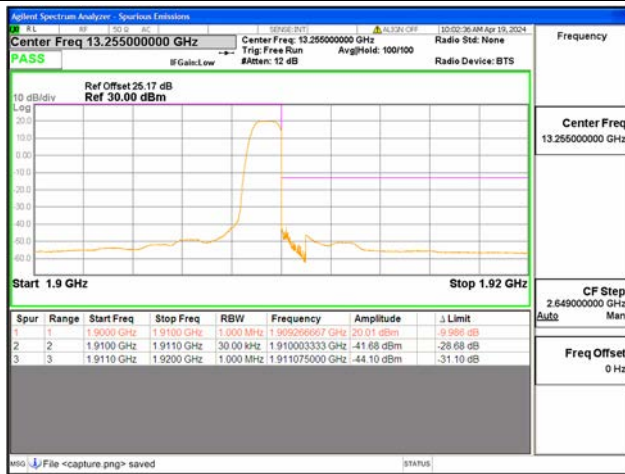
B2 / 5MHz / High CH / QPSK / FULL RB



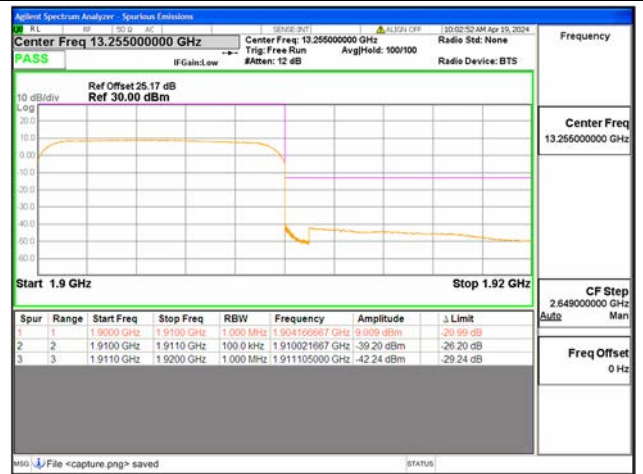
B2 / 10MHz / Low CH / QPSK / 1 RB



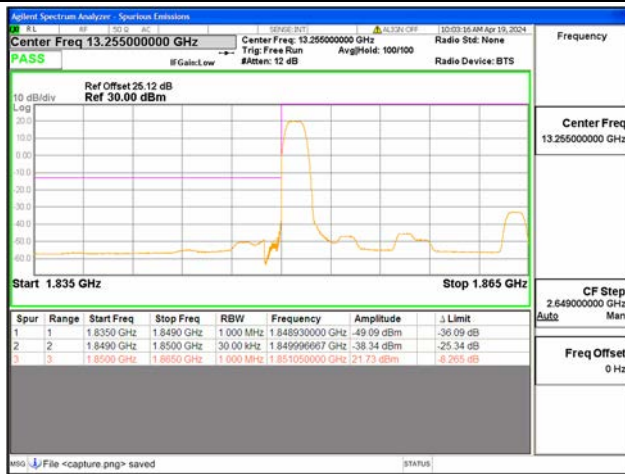
B2 / 10MHz / Low CH / QPSK / FULL RB



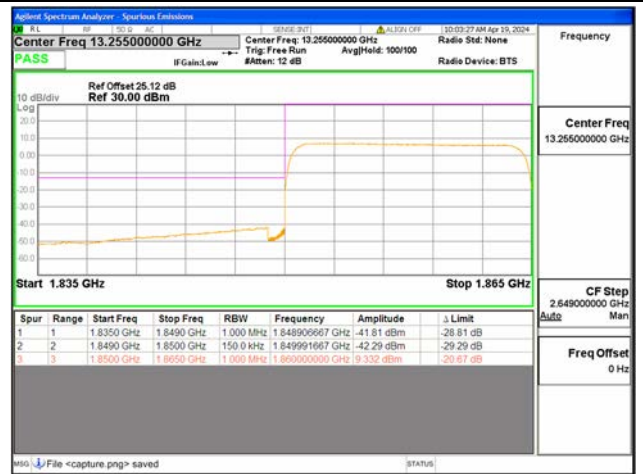
B2 / 10MHz / High CH / QPSK / 1 RB



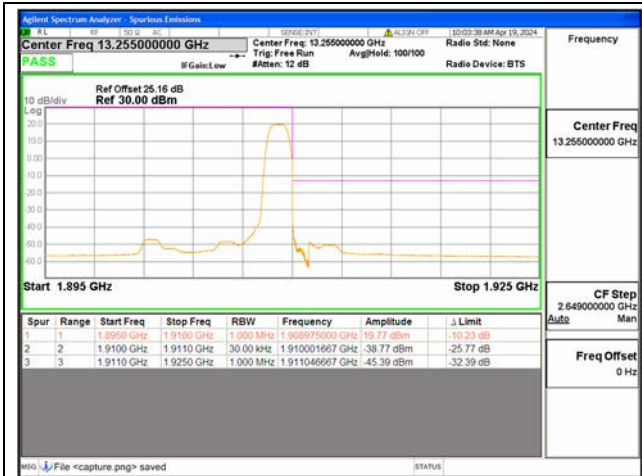
B2 / 10MHz / High CH / QPSK / FULL RB



B2 / 15MHz / Low CH / QPSK / 1 RB



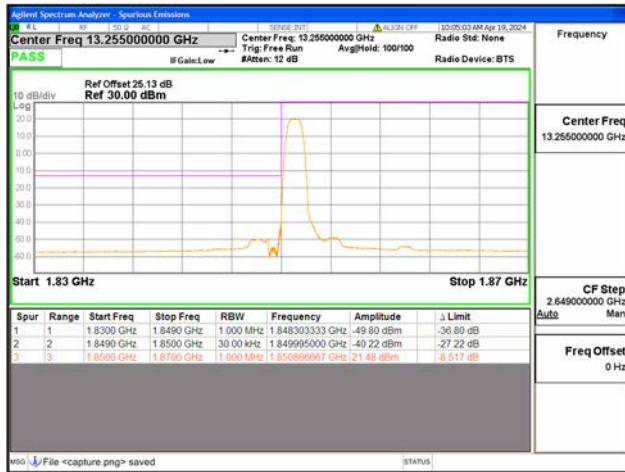
B2 / 15MHz / Low CH / QPSK / FULL RB



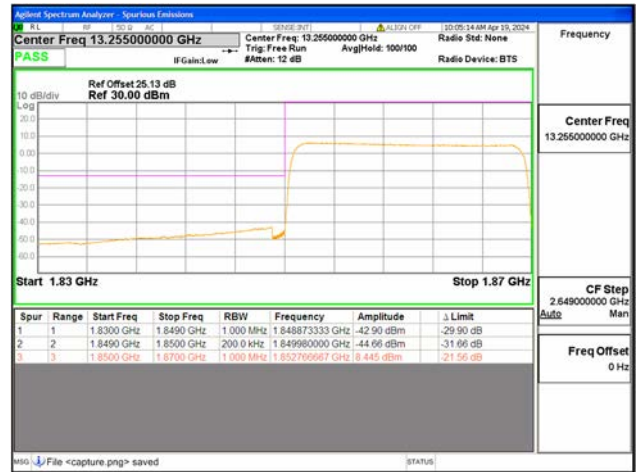
B2 / 15MHz / High CH / QPSK / 1 RB



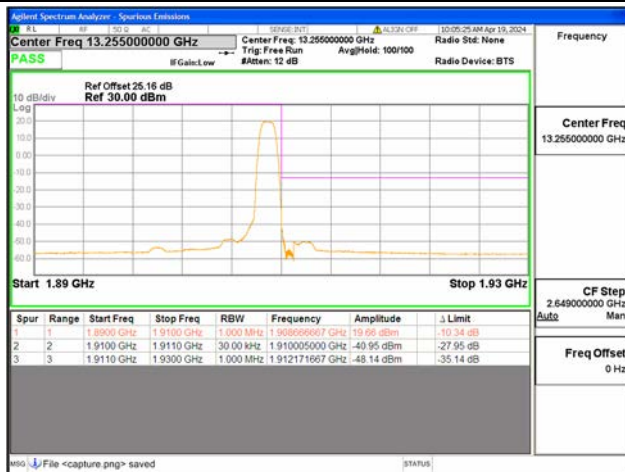
B2 / 15MHz / High CH / QPSK / FULL RB



B2 / 20MHz / Low CH / QPSK / 1 RB



B2 / 20MHz / Low CH / QPSK / FULL RB



B2 / 20MHz / High CH / QPSK / 1 RB

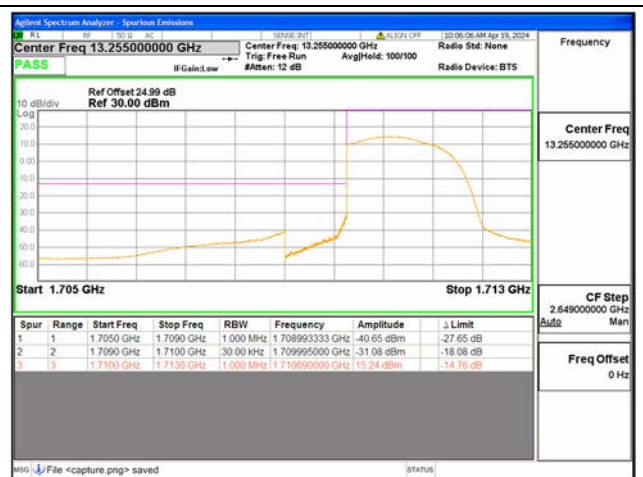


B2 / 20MHz / High CH / QPSK / FULL RB





B4 / 1.4MHz / Low CH / QPSK / 1 RB



B4 / 1.4MHz / Low CH / QPSK / FULL RB



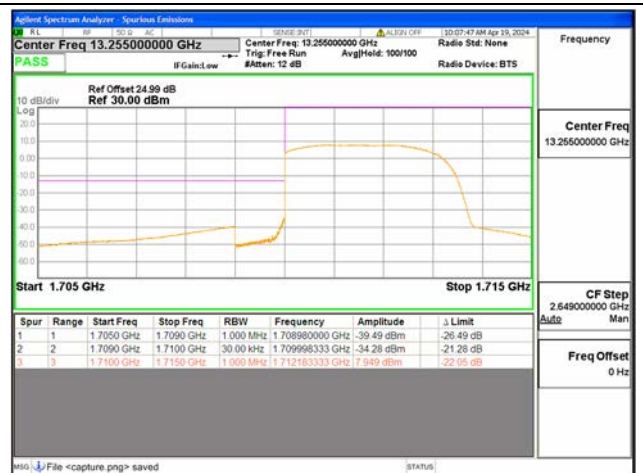
B4 / 1.4MHz / High CH / QPSK / 1 RB



B4 / 1.4MHz / High CH / QPSK / FULL RB



B4 / 3MHz / Low CH / QPSK / 1 RB



B4 / 3MHz / Low CH / QPSK / FULL RB

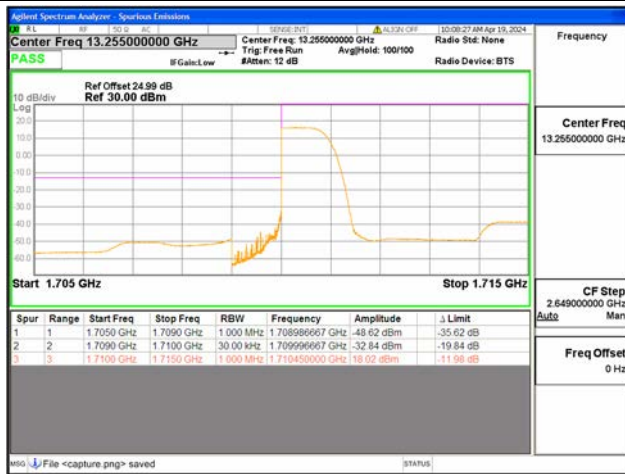




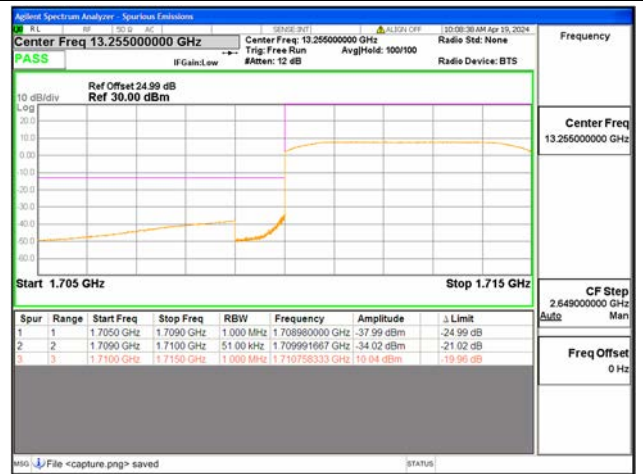
B4 / 3MHz / High CH / QPSK / 1 RB



B4 / 3MHz / High CH / QPSK / FULL RB



B4 / 5MHz / Low CH / QPSK / 1 RB



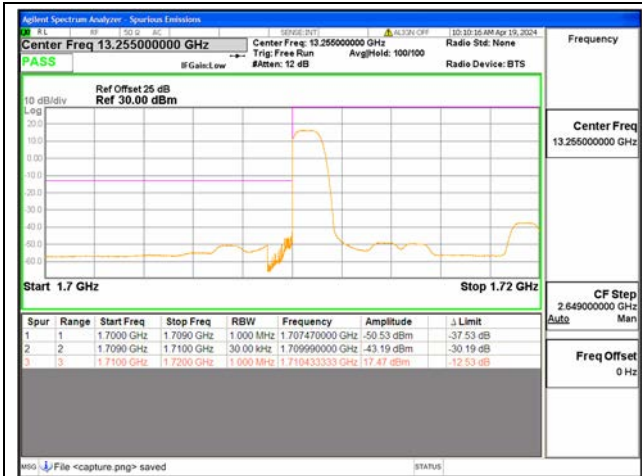
B4 / 5MHz / Low CH / QPSK / FULL RB



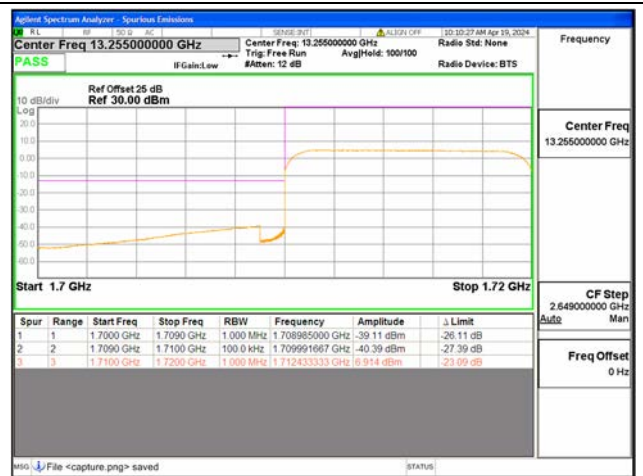
B4 / 5MHz / High CH / QPSK / 1 RB



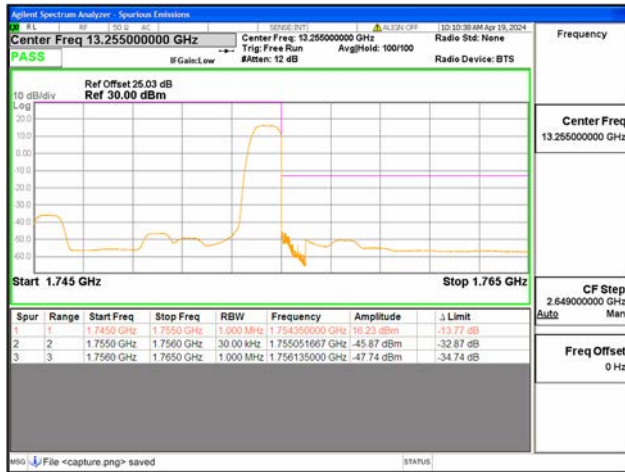
B4 / 5MHz / High CH / QPSK / FULL RB



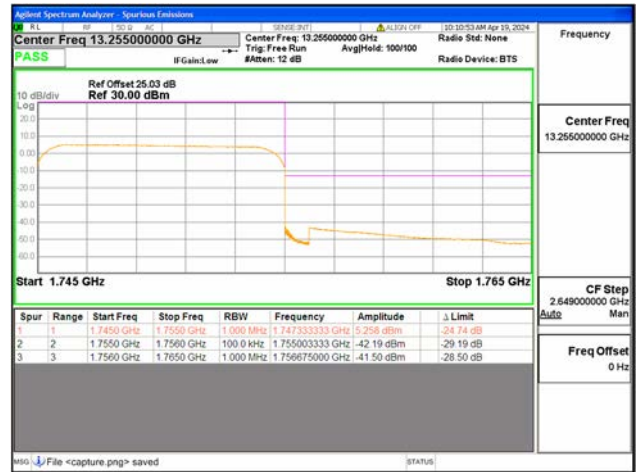
B4 / 10MHz / Low CH / QPSK / 1 RB



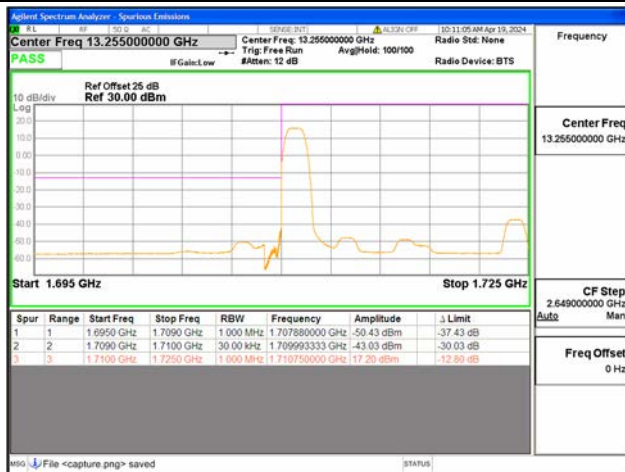
B4 / 10MHz / Low CH / QPSK / FULL RB



B4 / 10MHz / High CH / QPSK / 1 RB



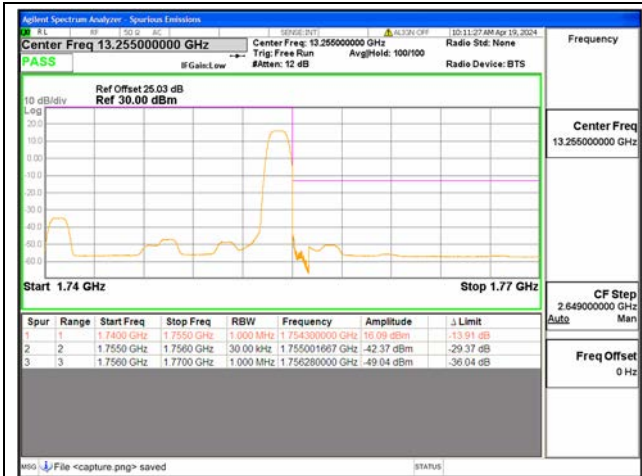
B4 / 10MHz / High CH / QPSK / FULL RB



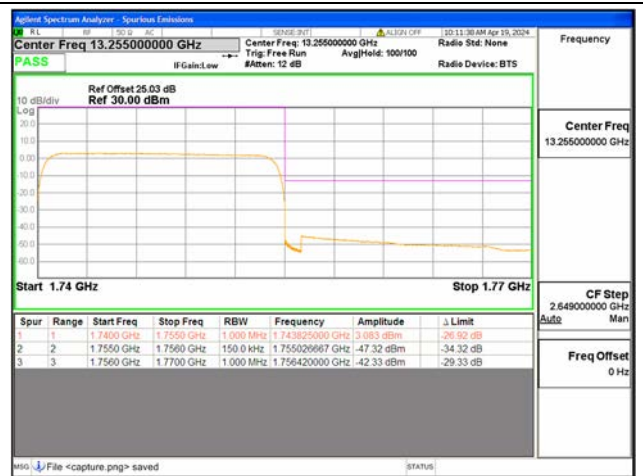
B4 / 15MHz / Low CH / QPSK / 1 RB



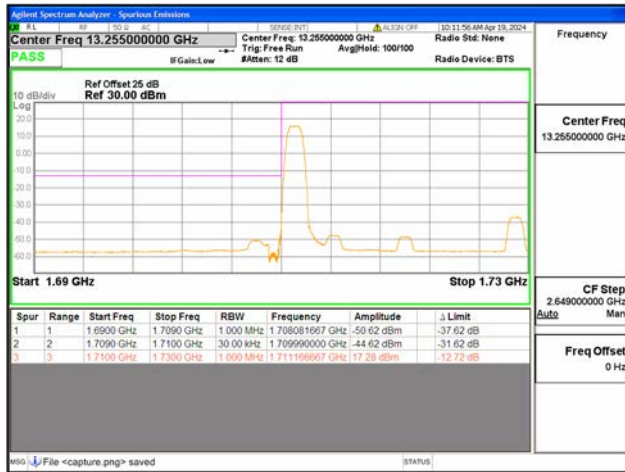
B4 / 15MHz / Low CH / QPSK / FULL RB



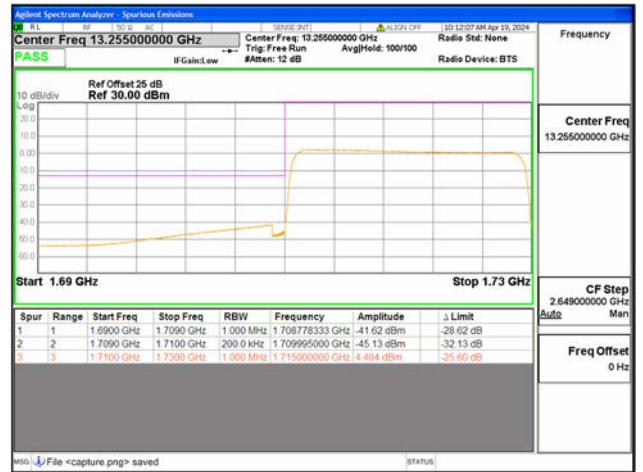
B4 / 15MHz / High CH / QPSK / 1 RB



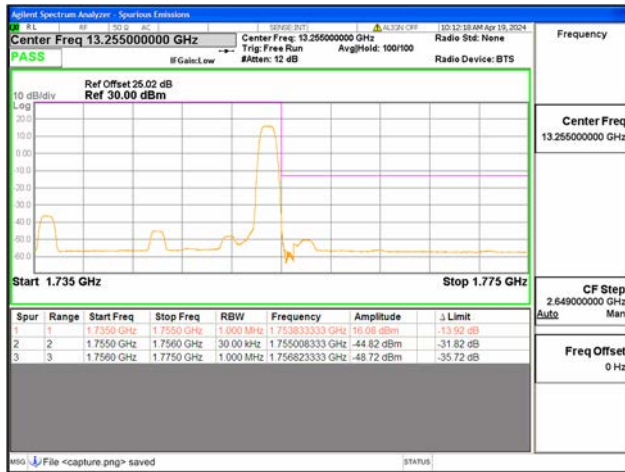
B4 / 15MHz / High CH / QPSK / FULL RB



B4 / 20MHz / Low CH / QPSK / 1 RB



B4 / 20MHz / Low CH / QPSK / FULL RB

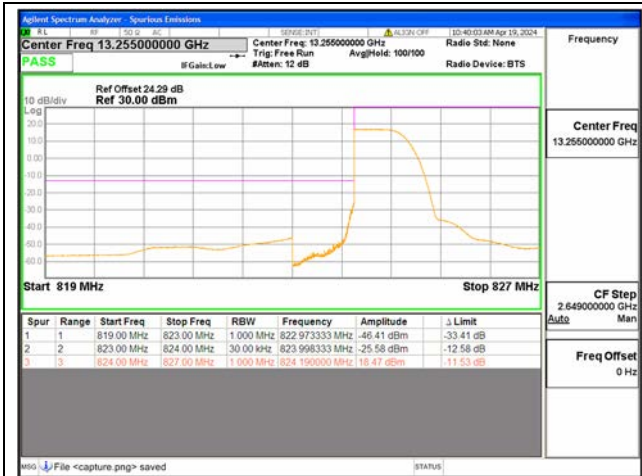


B4 / 20MHz / High CH / QPSK / 1 RB



B4 / 20MHz / High CH / QPSK / FULL RB

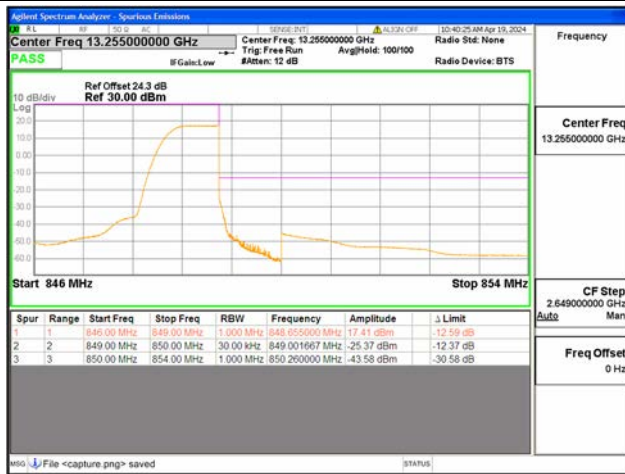




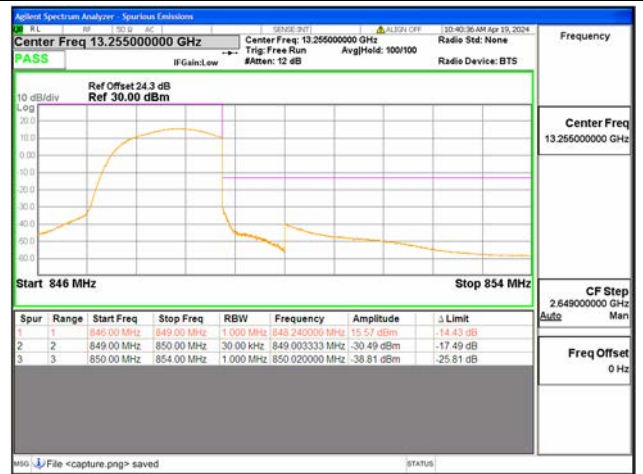
B5 / 1.4MHz / Low CH / QPSK / 1 RB



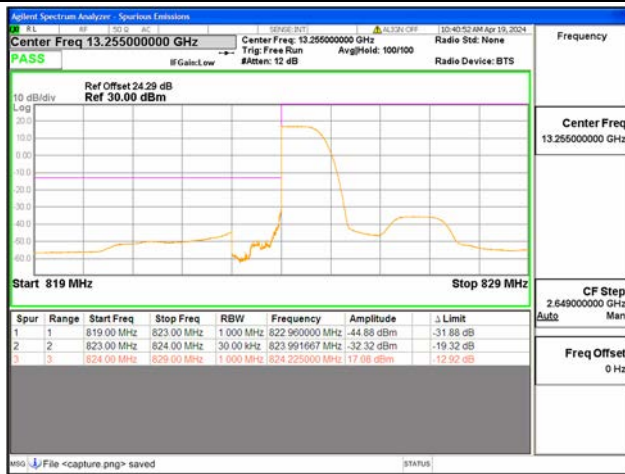
B5 / 1.4MHz / Low CH / QPSK / FULL RB



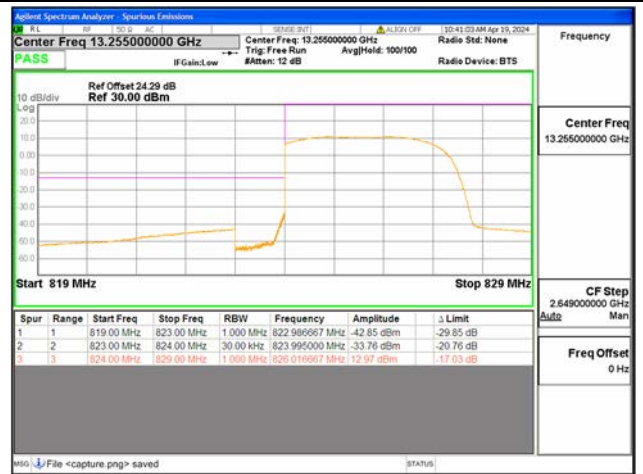
B5 / 1.4MHz / High CH / QPSK / 1 RB



B5 / 1.4MHz / High CH / QPSK / FULL RB



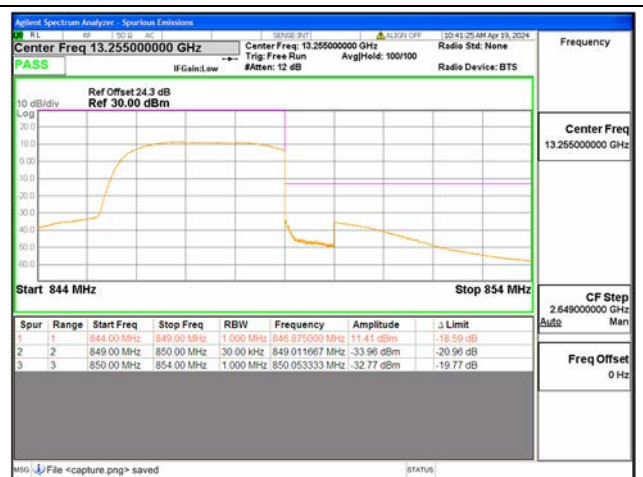
B5 / 3MHz / Low CH / QPSK / 1 RB



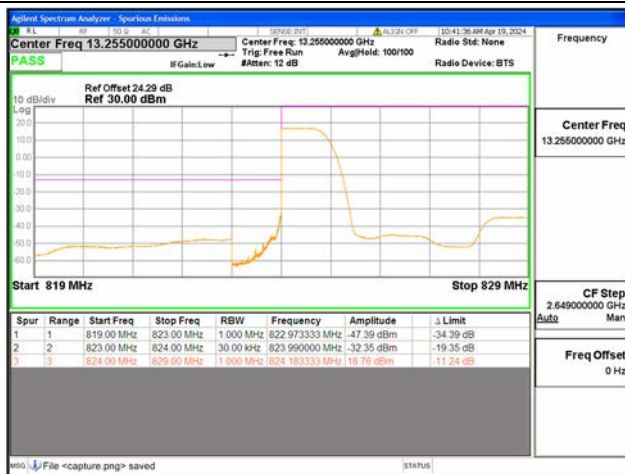
B5 / 3MHz / Low CH / QPSK / FULL RB



B5 / 3MHz / High CH / QPSK / 1 RB



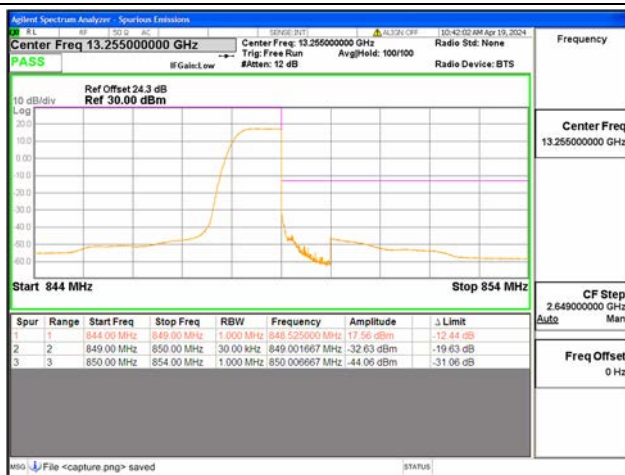
B5 / 3MHz / High CH / QPSK / FULL RB



B5 / 5MHz / Low CH / QPSK / 1 RB



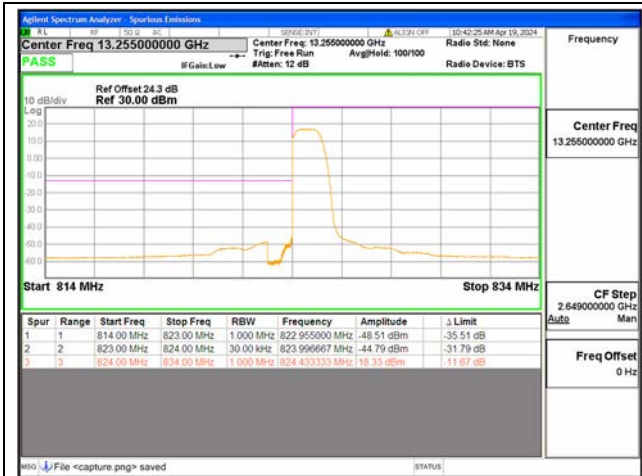
B5 / 5MHz / Low CH / QPSK / FULL RB



B5 / 5MHz / High CH / QPSK / 1 RB



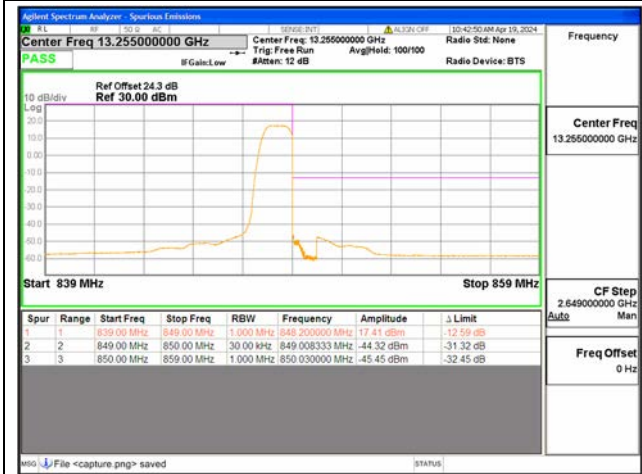
B5 / 5MHz / High CH / QPSK / FULL RB



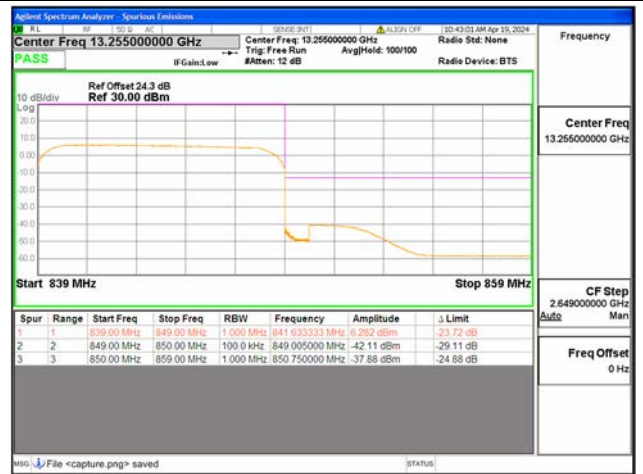
B5 / 10MHz / Low CH / QPSK / 1 RB



B5 / 10MHz / Low CH / QPSK / FULL RB



B5 / 10MHz / High CH / QPSK / 1 RB



B5 / 10MHz / High CH / QPSK / FULL RB

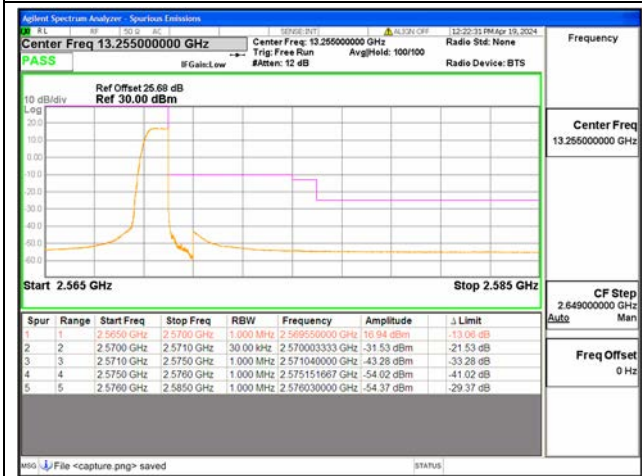




B7 / 5MHz / Low CH / QPSK / 1 RB



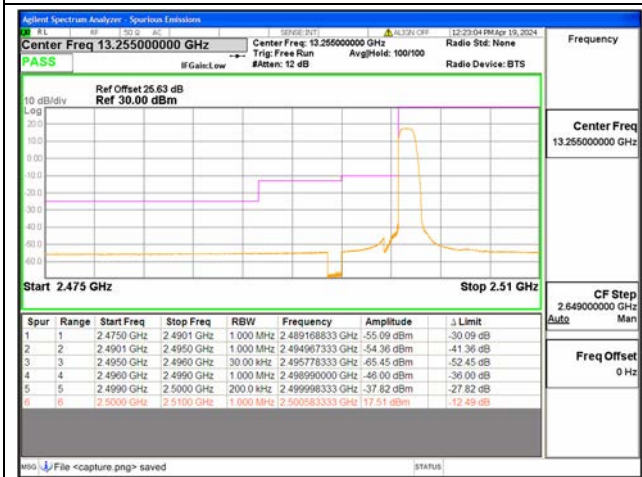
B7 / 5MHz / Low CH / QPSK / FULL RB



B7 / 5MHz / High CH / QPSK / 1 RB



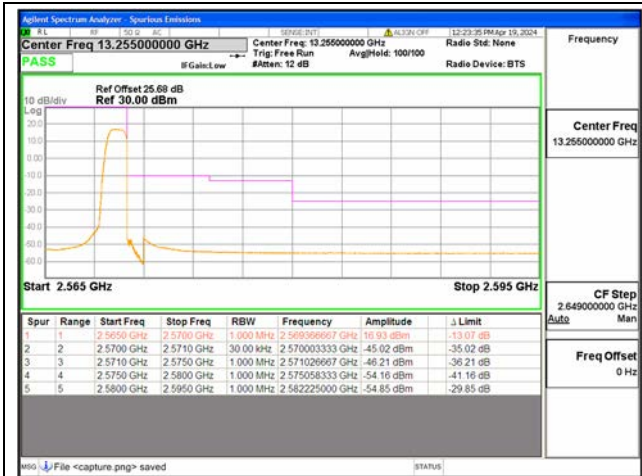
B7 / 5MHz / High CH / QPSK / FULL RB



B7 / 10MHz / Low CH / QPSK / 1 RB



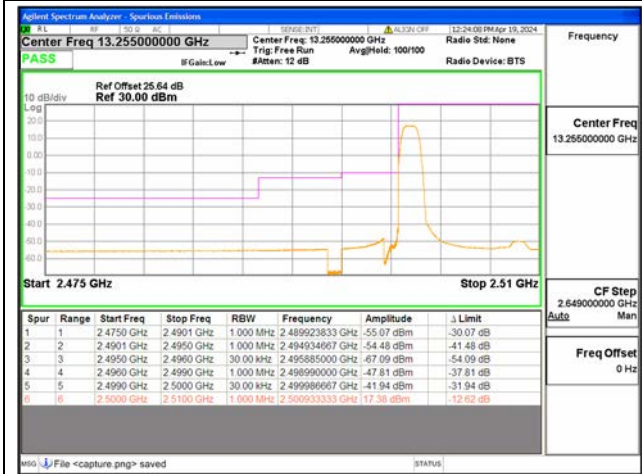
B7 / 10MHz / Low CH / QPSK / FULL RB



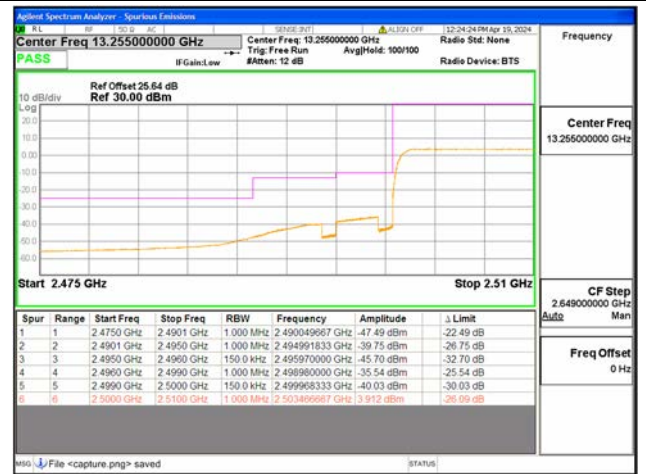
B7 / 10MHz / High CH / QPSK / 1 RB



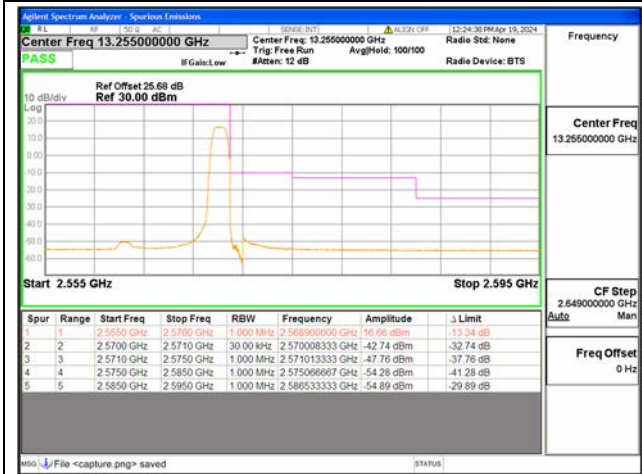
B7 / 10MHz / High CH / QPSK / FULL RB



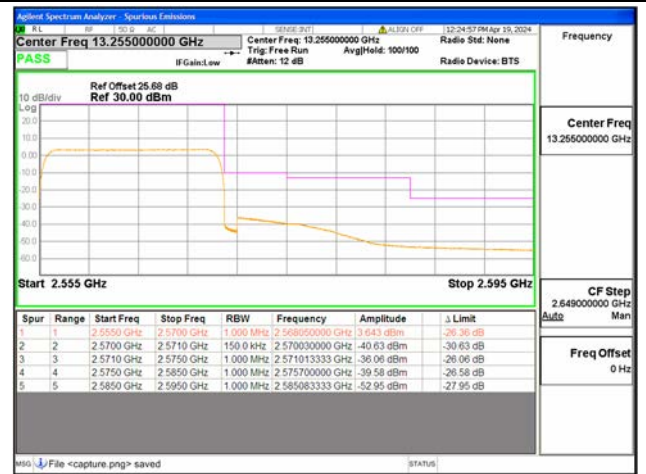
B7 / 15MHz / Low CH / QPSK / 1 RB



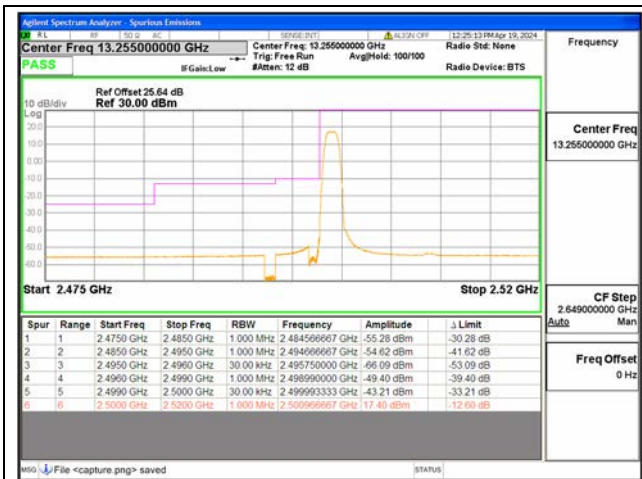
B7 / 15MHz / Low CH / QPSK / FULL RB



B7 / 15MHz / High CH / QPSK / 1 RB



B7 / 15MHz / High CH / QPSK / FULL RB



B7 / 20MHz / Low CH / QPSK / 1 RB



B7 / 20MHz / Low CH / QPSK / FULL RB

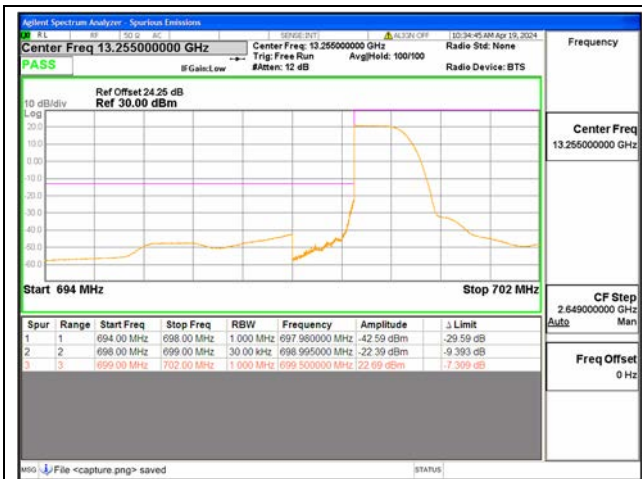


B7 / 20MHz / High CH / QPSK / 1 RB



B7 / 20MHz / High CH / QPSK / FULL RB

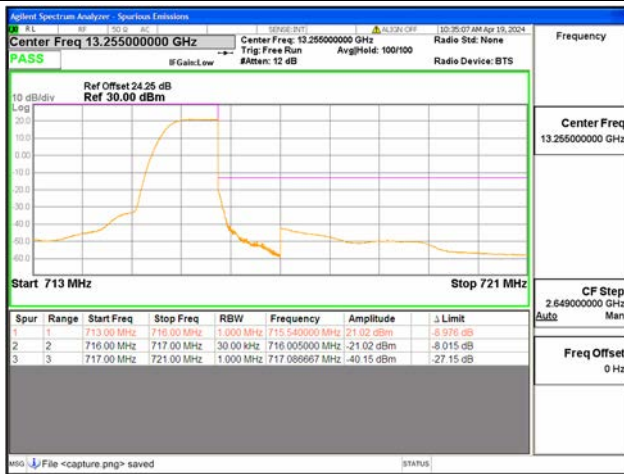




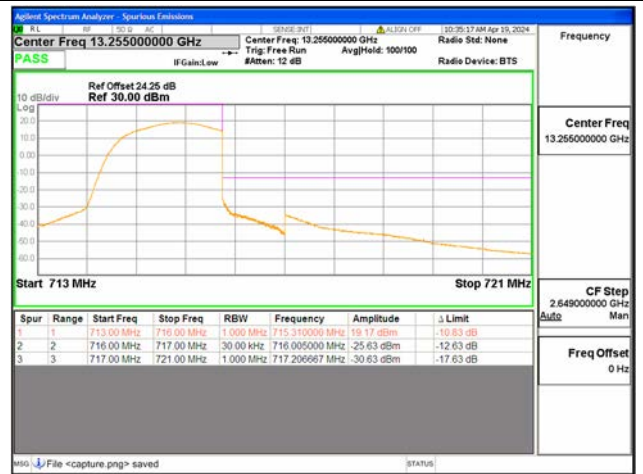
B12 / 1.4MHz / Low CH / QPSK / 1 RB



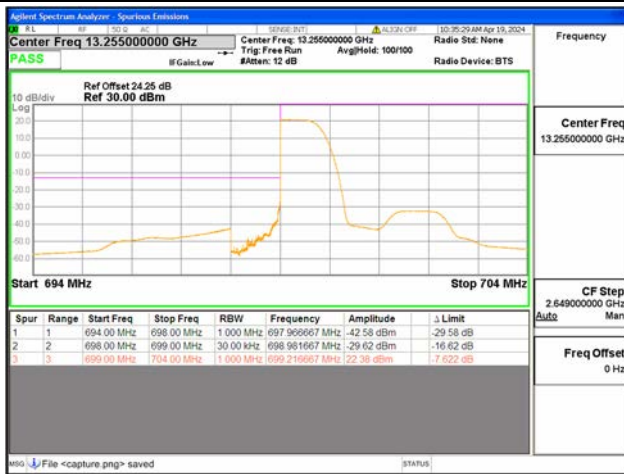
B12 / 1.4MHz / Low CH / QPSK / FULL RB



B12 / 1.4MHz / High CH / QPSK / 1 RB



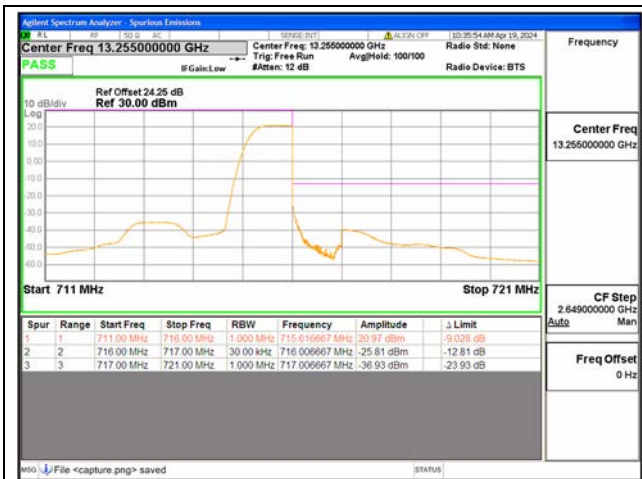
B12 / 1.4MHz / High CH / QPSK / FULL RB



B12 / 3MHz / Low CH / QPSK / 1 RB



B12 / 3MHz / Low CH / QPSK / FULL RB



B12 / 3MHz / High CH / QPSK / 1 RB



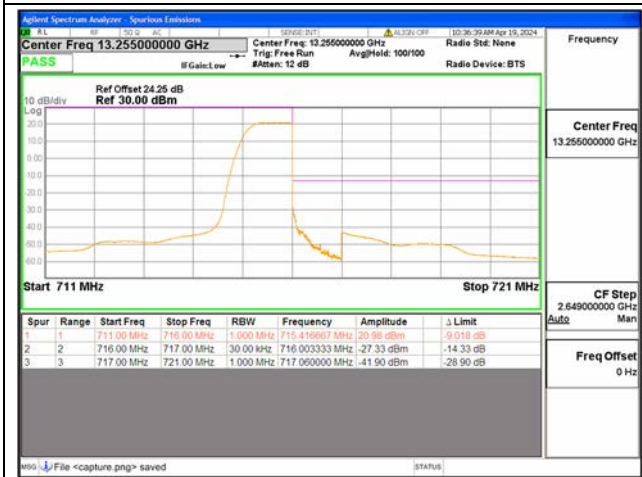
B12 / 3MHz / High CH / QPSK / FULL RB



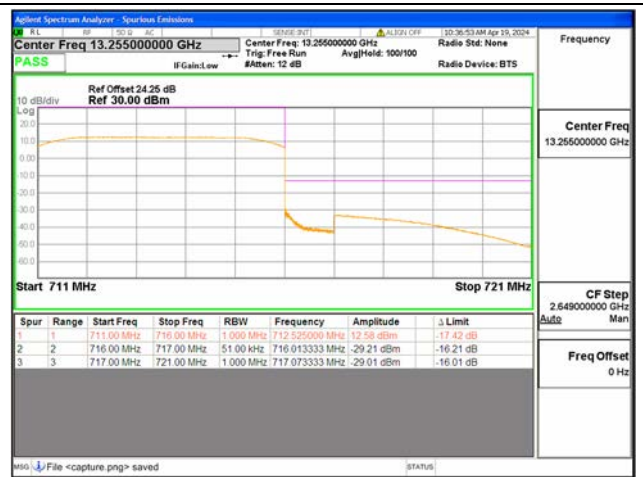
B12 / 5MHz / Low CH / QPSK / 1 RB



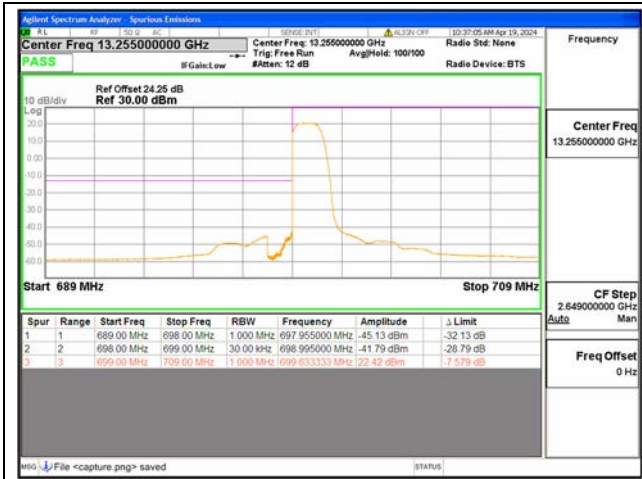
B12 / 5MHz / Low CH / QPSK / FULL RB



B12 / 5MHz / High CH / QPSK / 1 RB



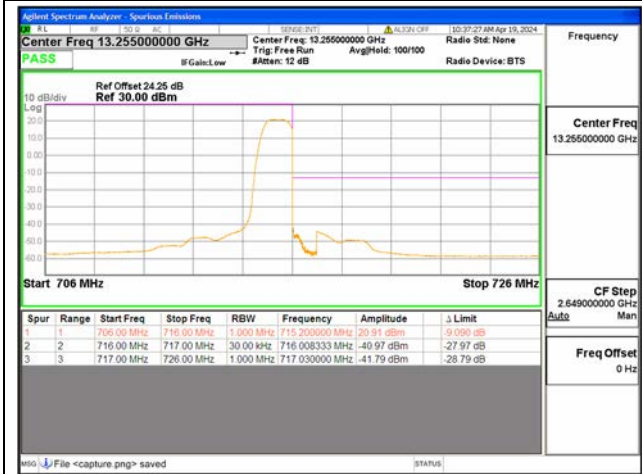
B12 / 5MHz / High CH / QPSK / FULL RB



B12 / 10MHz / Low CH / QPSK / 1 RB



B12 / 10MHz / Low CH / QPSK / FULL RB

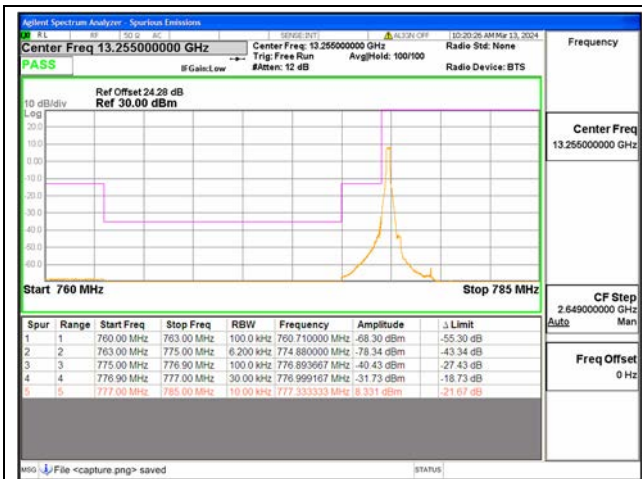


B12 / 10MHz / High CH / QPSK / 1 RB



B12 / 10MHz / High CH / QPSK / FULL RB





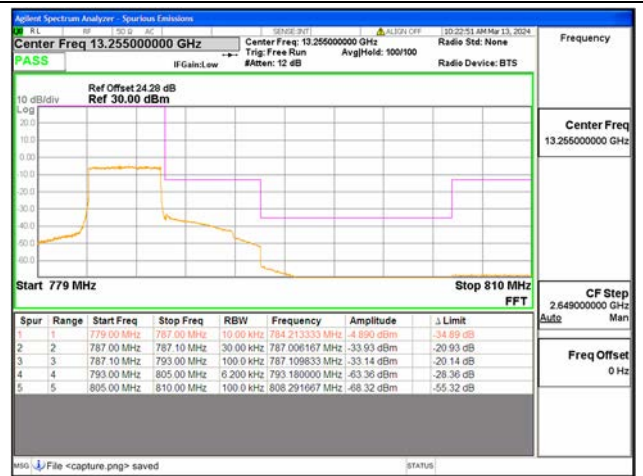
B13 / 5MHz / Low CH / QPSK / 1 RB



B13 / 5MHz / Low CH / QPSK / FULL RB



B13 / 5MHz / High CH / QPSK / 1 RB



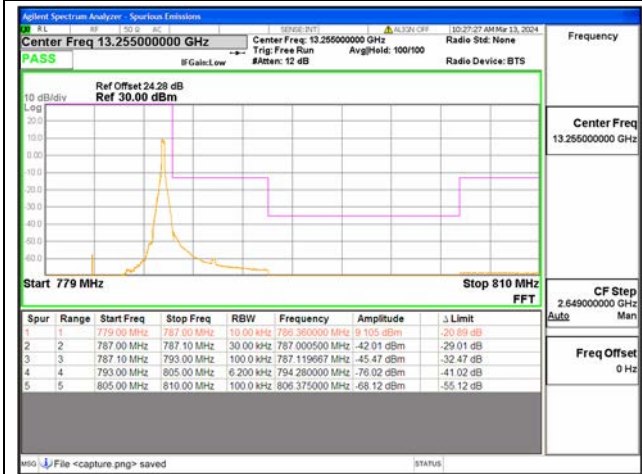
B13 / 5MHz / High CH / QPSK / FULL RB



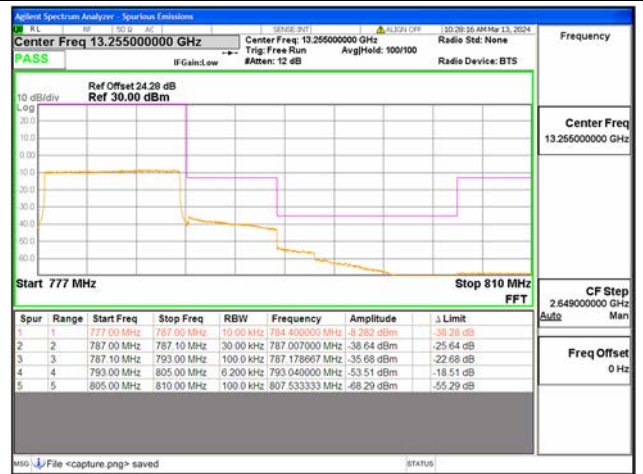
B13 / 10MHz / Low CH / QPSK / 1 RB



B13 / 10MHz / Low CH / QPSK / FULL RB



B13 / 10MHz / High CH / QPSK / 1 RB



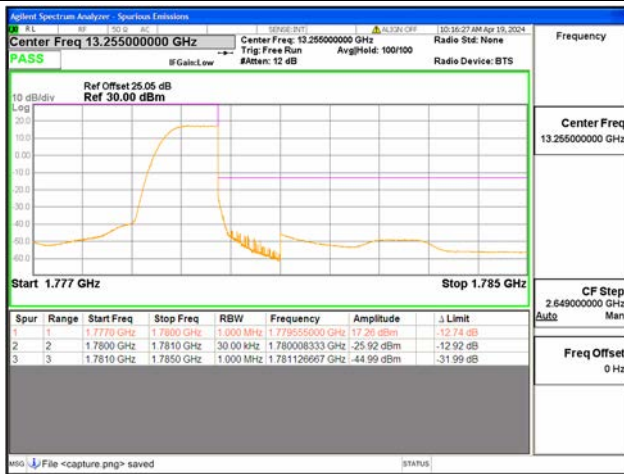
B13 / 10MHz / High CH / QPSK / FULL RB



B66 / 1.4MHz / Low CH / QPSK / 1 RB



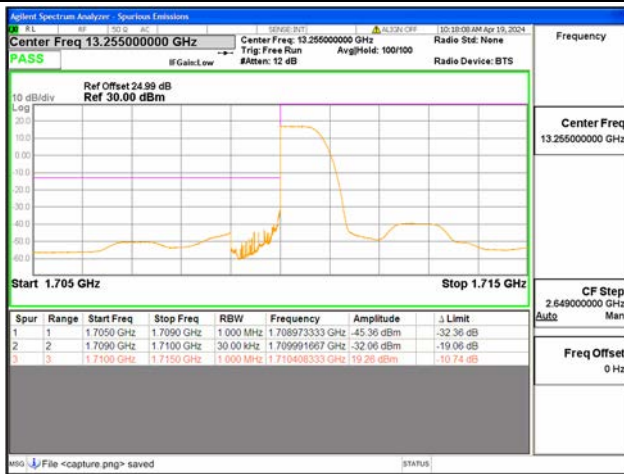
B66 / 1.4MHz / Low CH / QPSK / FULL RB



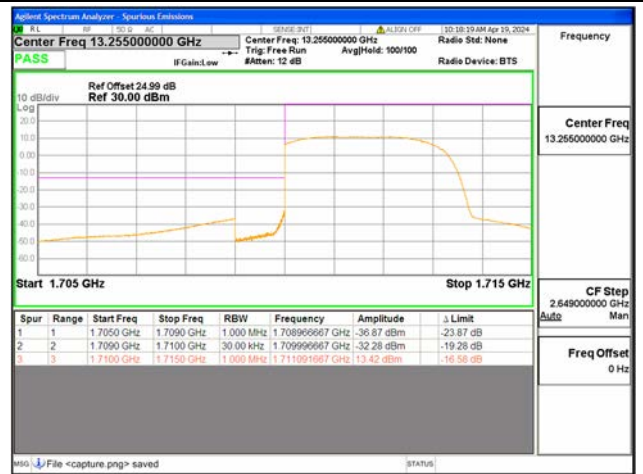
B66 / 1.4MHz / High CH / QPSK / 1 RB



B66 / 1.4MHz / High CH / QPSK / FULL RB



B66 / 3MHz / Low CH / QPSK / 1 RB



B66 / 3MHz / Low CH / QPSK / FULL RB

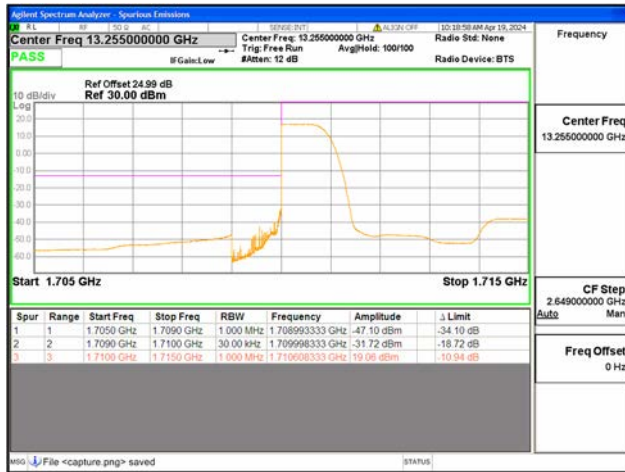




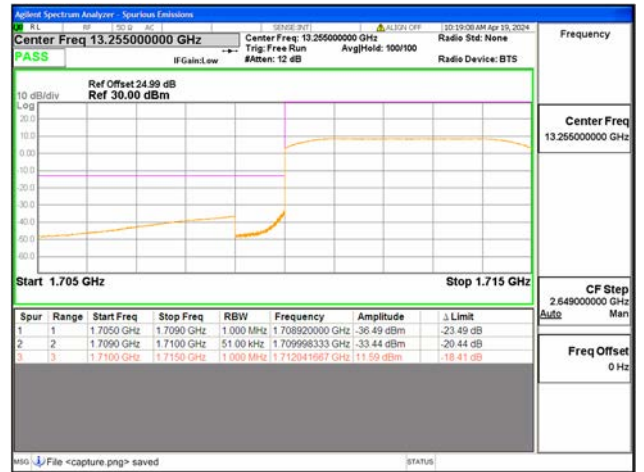
B66 / 3MHz / High CH / QPSK / 1 RB



B66 / 3MHz / High CH / QPSK / FULL RB



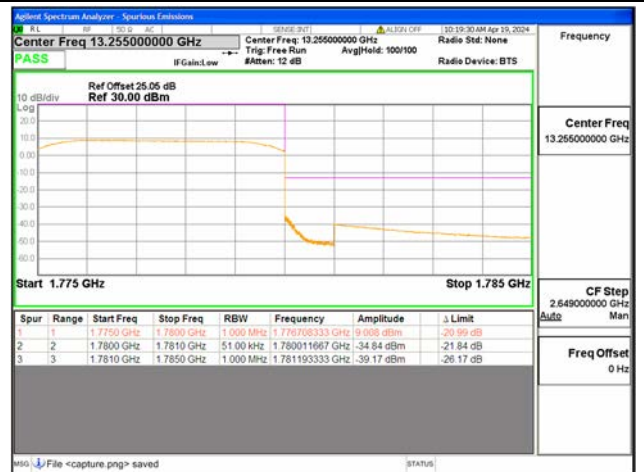
B66 / 5MHz / Low CH / QPSK / 1 RB



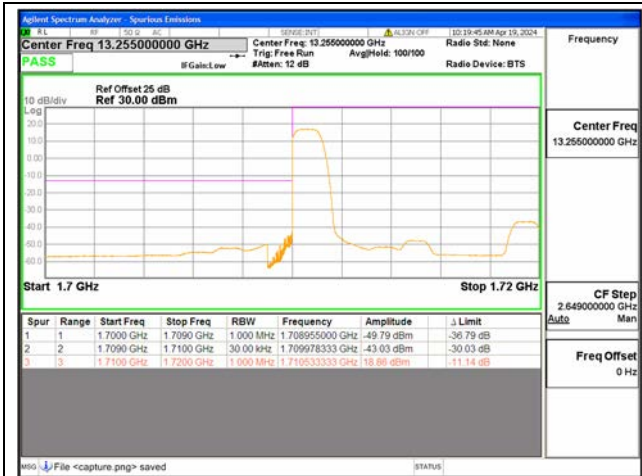
B66 / 5MHz / Low CH / QPSK / FULL RB



B66 / 5MHz / High CH / QPSK / 1 RB



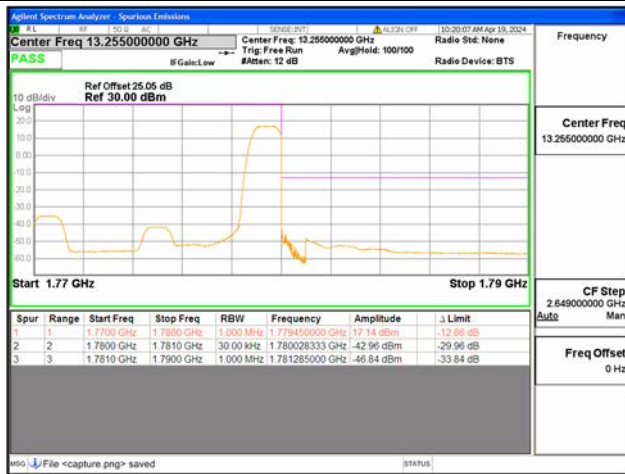
B66 / 5MHz / High CH / QPSK / FULL RB



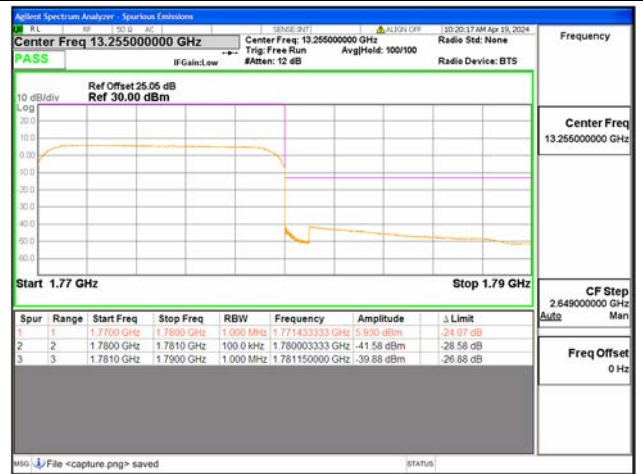
B66 / 10MHz / Low CH / QPSK / 1 RB



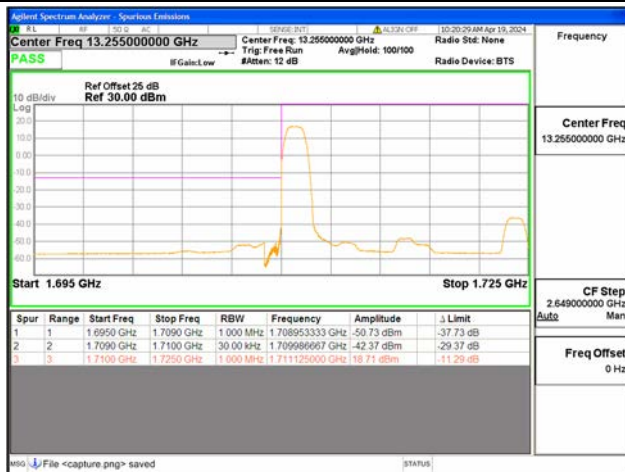
B66 / 10MHz / Low CH / QPSK / FULL RB



B66 / 10MHz / High CH / QPSK / 1 RB



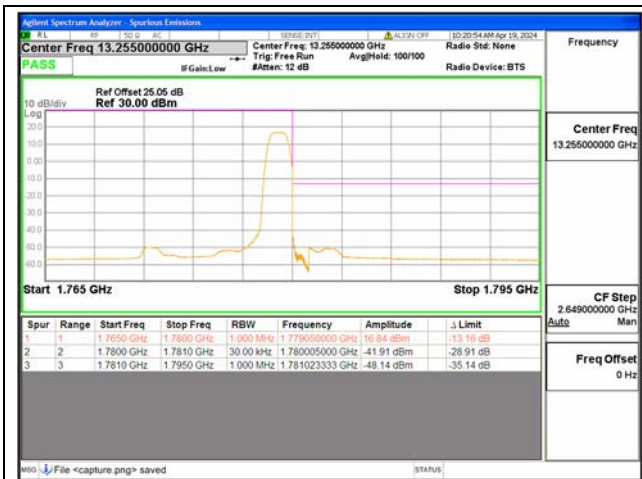
B66 / 10MHz / High CH / QPSK / FULL RB



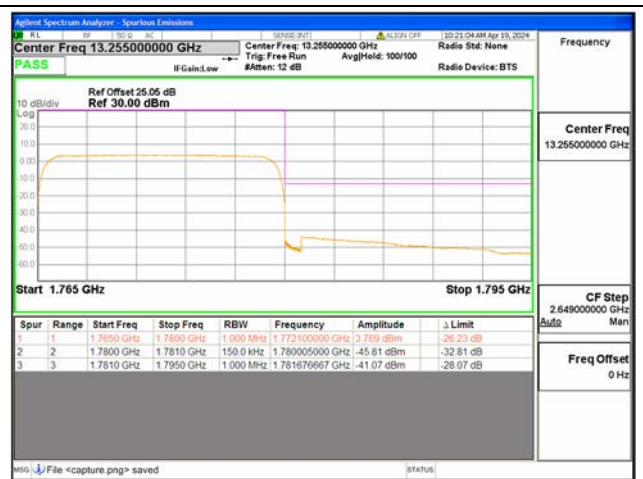
B66 / 15MHz / Low CH / QPSK / 1 RB



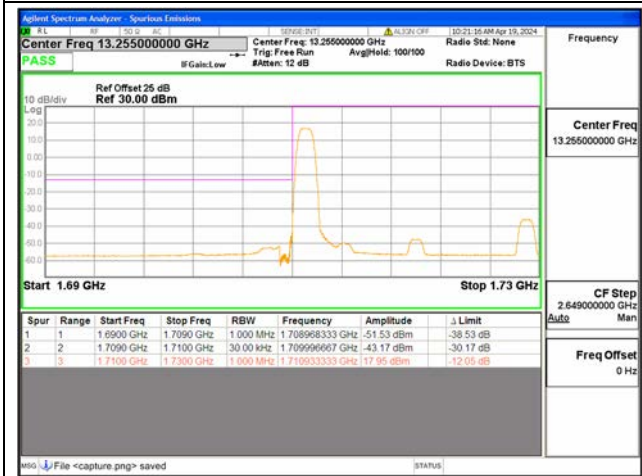
B66 / 15MHz / Low CH / QPSK / FULL RB



B66 / 15MHz / High CH / QPSK / 1 RB



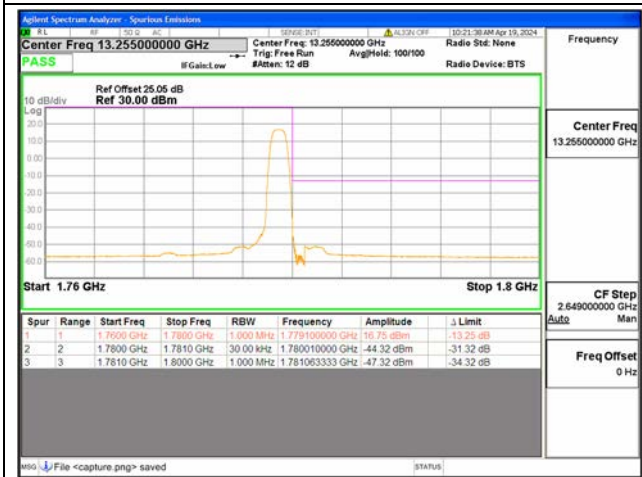
B66 / 15MHz / High CH / QPSK / FULL RB



B66 / 20MHz / Low CH / QPSK / 1 RB



B66 / 20MHz / Low CH / QPSK / FULL RB



B66 / 20MHz / High CH / QPSK / 1 RB



B66 / 20MHz / High CH / QPSK / FULL RB



## 2.7. Radiated Spurious Emissions

### 2.7.1. Requirement

According to FCC section 2.1051, 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. This calculated to be -13dBm.

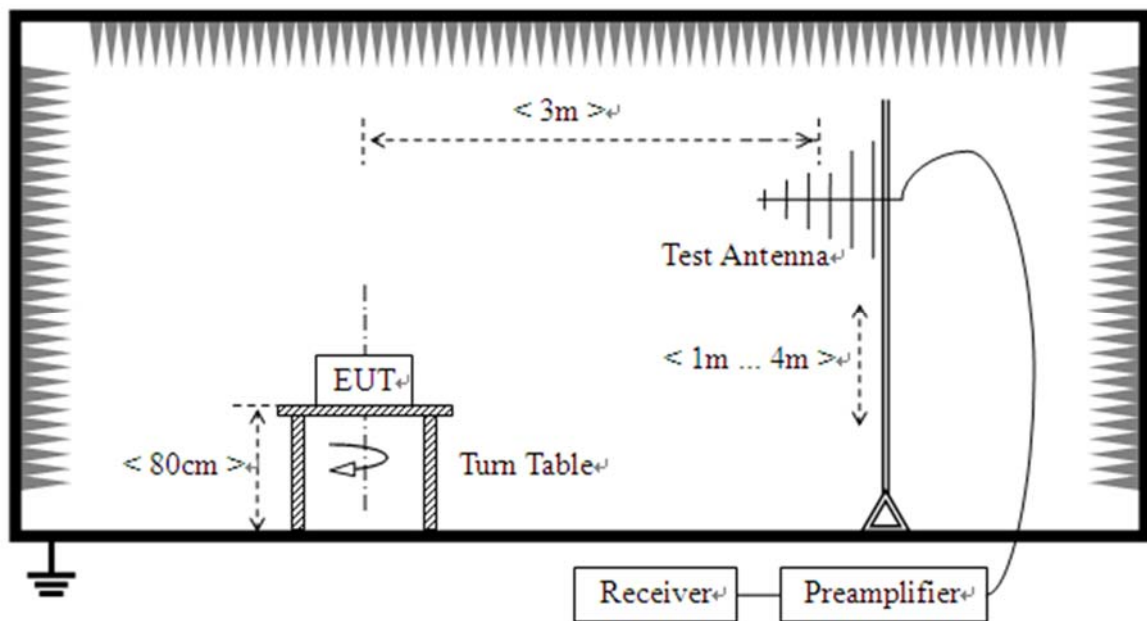
Additional requirement for LTE Band 7

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  $55 + 10 \log(P)$  dB. This calculated to be -25dBm.

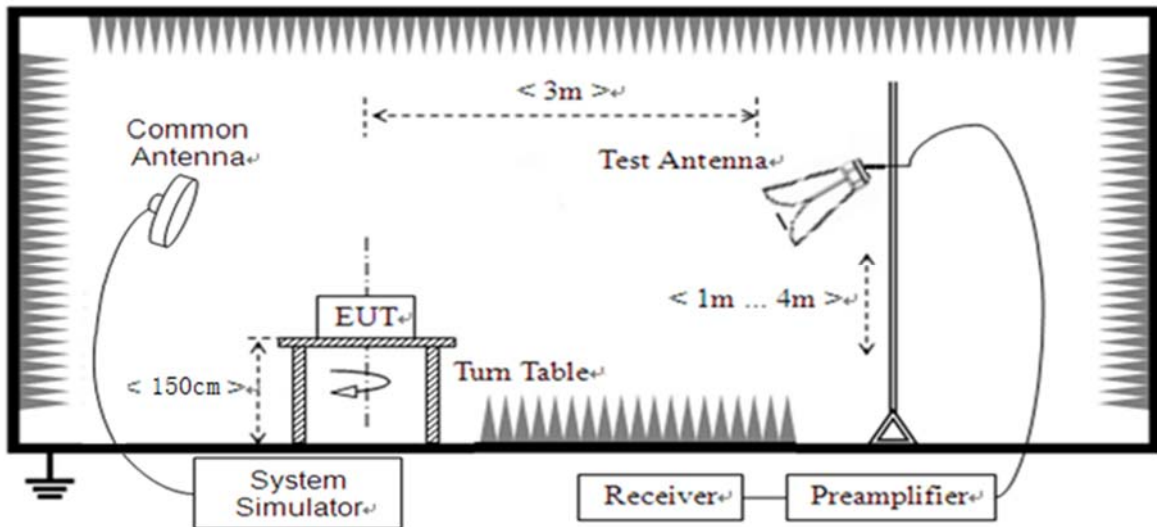
Additional requirement for Band 13

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to  $-70$  dBW/MHz equivalent isotropically radiated power (E.I.R.P.) for wideband signals, and  $-80$  dBW E.I.R.P. for discrete emissions of less than 700 Hz bandwidth. This calculated to be -40dBm.

### 2.7.2. Test Description



(For the test frequency from 30MHz to1GHz)



(For the test frequency above 1GHz)

The EUT is located in a 3m Full-Anechoic Chamber, the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading. A call is established between the EUT and the SS via a Common Antenna. The EUT is commanded by the SS to operate at the maximum and minimum output power, and only the test result of the maximum output power was recorded.

In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground and the Turn Table is actuated to turn from 0° to 360° to determine the maximum value of the radiated power. The emission levels at both horizontal and vertical polarizations should be tested. The Filters consists of Notch Filters and High Pass Filter.

**Note:** When doing measurements above 1GHz, the EUT has been within the 3dB cone width of the horn antenna during horizontal antenna.

### 2.7.3. Test Procedure

KDB 971168 D01v03 Section 5.8 and ANSI/TIA-603-E-2016.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements.

For measurements above 1GHz (exclude 1559-1610 MHz) the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements.



#### 2.7.4. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested to verify the out of band emissions.

The substitution corrections are obtained as described below:

$$A_{\text{SUBST}} = P_{\text{SUBST\_TX}} - P_{\text{SUBST\_RX}} - L_{\text{SUBST\_CABLES}} + G_{\text{SUBST\_TX\_ANT}}$$

$$A_{\text{TOT}} = L_{\text{CABLES}} + A_{\text{SUBST}}$$

Where  $A_{\text{SUBST}}$  is the final substitution correction including receive antenna gain.

$P_{\text{SUBST\_TX}}$  is signal generator level,

$P_{\text{SUBST\_RX}}$  is receiver level,

$L_{\text{SUBST\_CABLES}}$  is cable losses including TX cable,

$G_{\text{SUBST\_TX\_ANT}}$  is substitution antenna gain.

$A_{\text{TOT}}$  is total correction factor including cable loss and substitution correction

During the test, the data of  $A_{\text{TOT}}$  was added in the test spectrum analyze, so spectrum analyze reading is the final values which contain the data of  $A_{\text{TOT}}$ .

**Note1:** The power of the EUT transmitting frequency should be ignored.

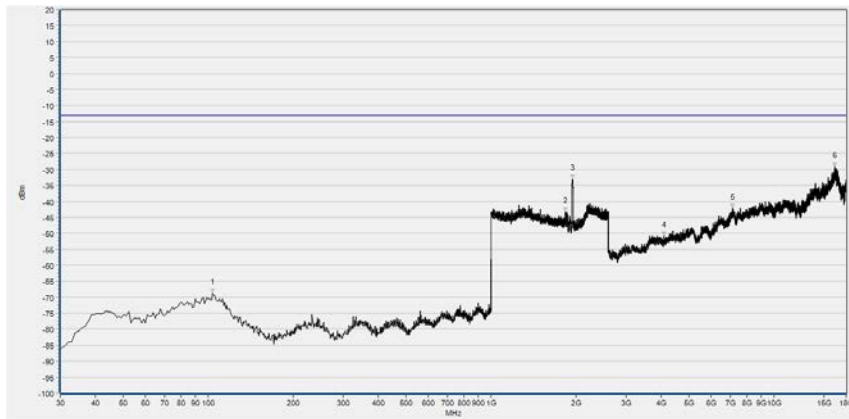
**Note2:** All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

**Note3:** All bandwidth and modulation were considered and evaluated respectively by performing full test for each band, only the worst cases (Max Bandwidth and QPSK mode) were recorded in this test report.

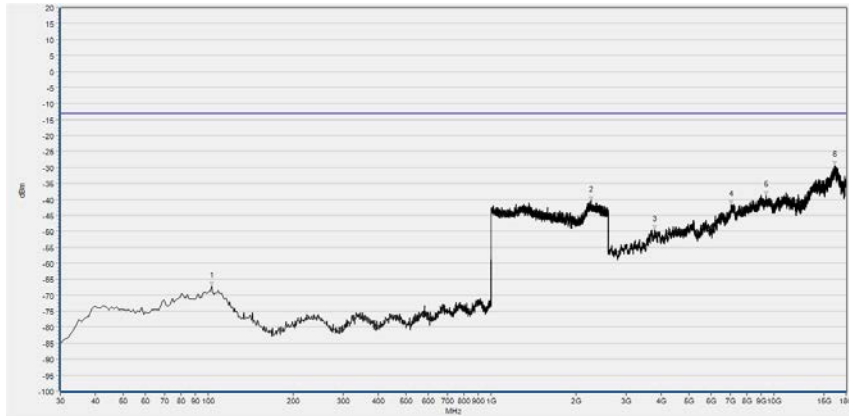
**Note4:** N/A means the frequency is the basic frequency or the base station frequency, they are no need to verdict.



LTE Band 2, 20MHz BW, Low Channel, QPSK

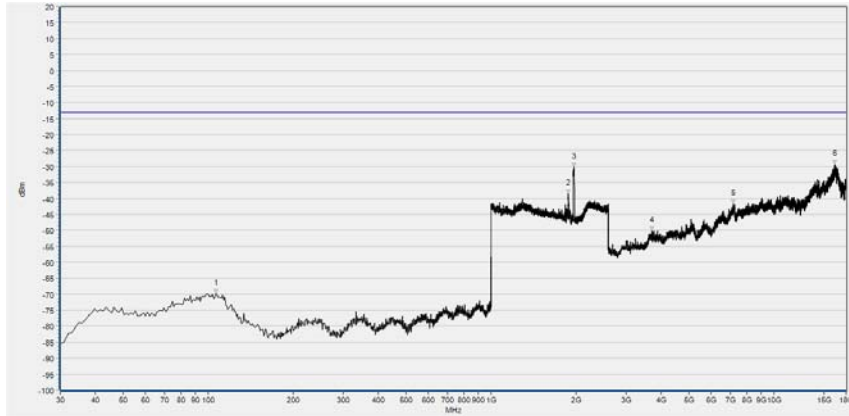


No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	103.720	-68.76	-13.00	Horizontal	PASS
2	1830.412	-43.28	-13.00	Horizontal	N/A
3	1937.975	-32.95	-13.00	Horizontal	N/A
4	4078.669	-50.94	-13.00	Horizontal	PASS
5	7122.822	-42.21	-13.00	Horizontal	PASS
6	16381.306	-29.12	-13.00	Horizontal	PASS

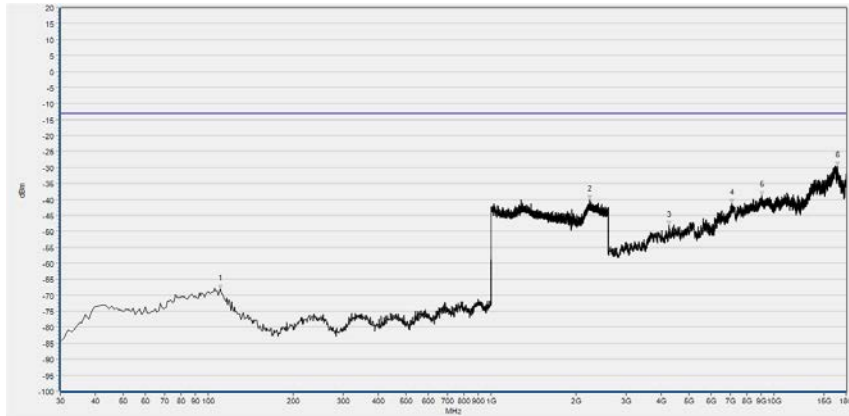


No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	102.750	-67.04	-13.00	Vertical	PASS
2	2260.664	-40.29	-13.00	Vertical	PASS
3	3793.017	-49.39	-13.00	Vertical	PASS
4	7078.014	-41.75	-13.00	Vertical	PASS
5	9382.833	-38.86	-13.00	Vertical	PASS
6	16420.513	-29.37	-13.00	Vertical	PASS

LTE Band 2, 20MHz BW, Mid Channel, QPSK

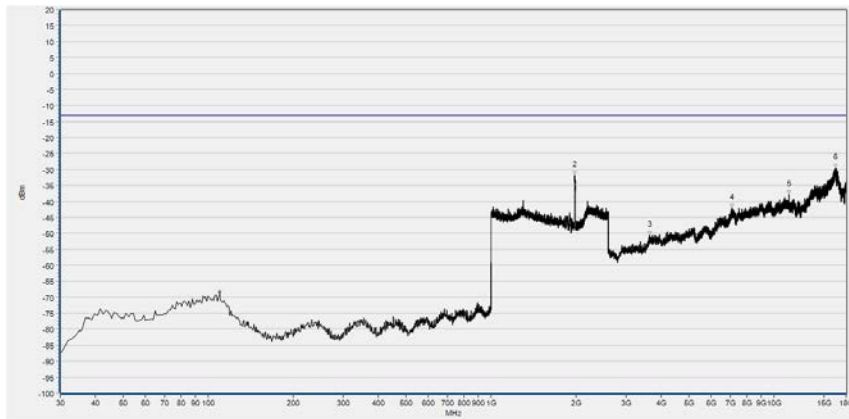


No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	106.630	-69.92	-13.00	Horizontal	PASS
2	1877.151	-38.52	-13.00	Horizontal	N/A
3	1966.787	-30.37	-13.00	Horizontal	N/A
4	3706.201	-50.22	-13.00	Horizontal	PASS
5	7184.434	-41.59	-13.00	Horizontal	PASS
6	16434.515	-29.29	-13.00	Horizontal	PASS

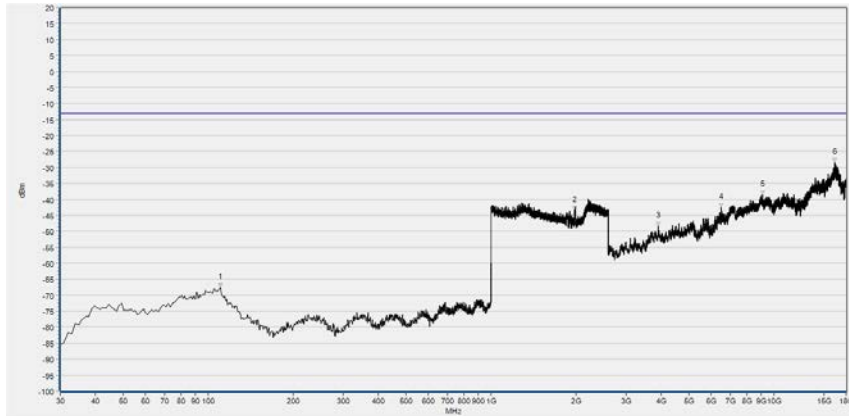


No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	110.510	-68.10	-13.00	Vertical	PASS
2	2227.371	-40.12	-13.00	Vertical	PASS
3	4257.901	-48.24	-13.00	Vertical	PASS
4	7108.820	-41.23	-13.00	Vertical	PASS
5	9077.578	-38.84	-13.00	Vertical	PASS
6	16820.986	-29.67	-13.00	Vertical	PASS

LTE Band 2, 20MHz BW, High Channel, QPSK



No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	109.540	-69.25	-13.00	Horizontal	PASS
2	1978.311	-31.92	-13.00	Horizontal	N/A
3	3644.590	-50.62	-13.00	Horizontal	PASS
4	7086.416	-42.05	-13.00	Horizontal	PASS
5	11329.187	-37.92	-13.00	Horizontal	PASS
6	16515.730	-29.71	-13.00	Horizontal	PASS



No.	Fre.(MHz)	PK (dBm)	Limit (dBm)	Antenna	Verdict
1	110.510	-67.68	-13.00	Vertical	PASS
2	1974.470	-43.46	-13.00	Vertical	N/A
3	3907.838	-48.34	-13.00	Vertical	PASS
4	6523.513	-42.53	-13.00	Vertical	PASS
5	9141.989	-38.62	-13.00	Vertical	PASS
6	16434.515	-28.41	-13.00	Vertical	PASS