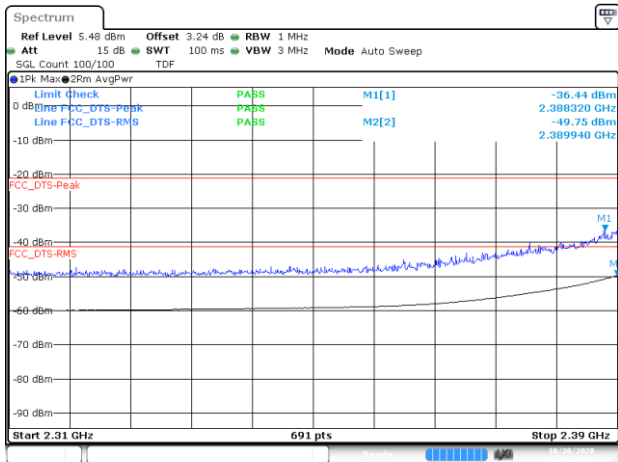
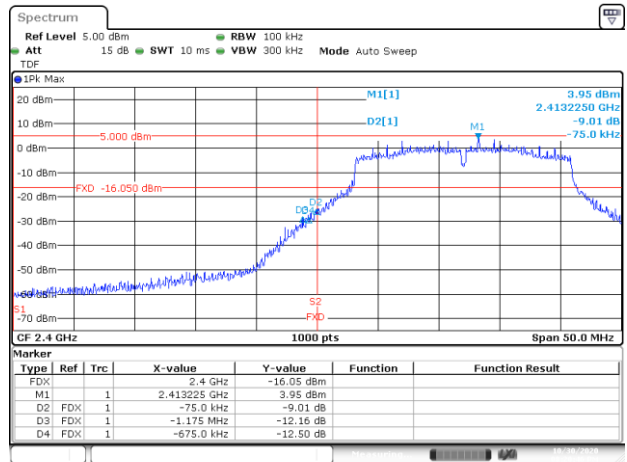


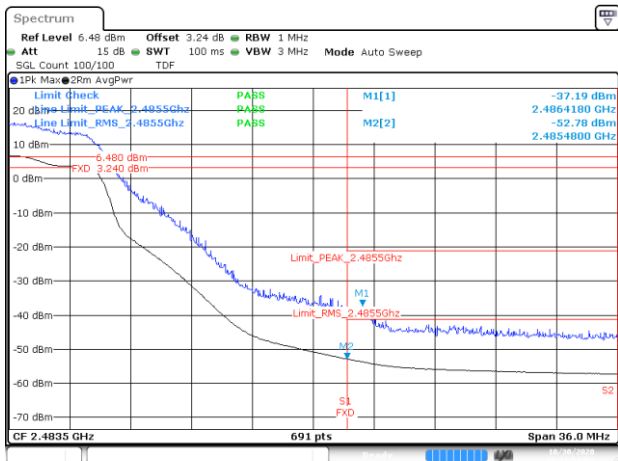
MIMO-B



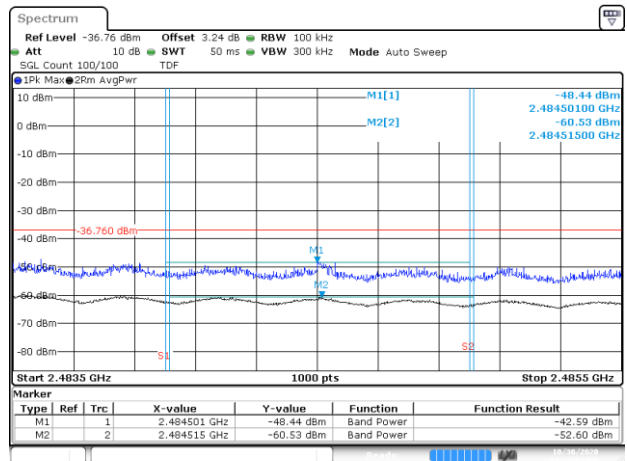
BE-R-LOW, MIMO-B, 802.11n20-HT8, Ch1



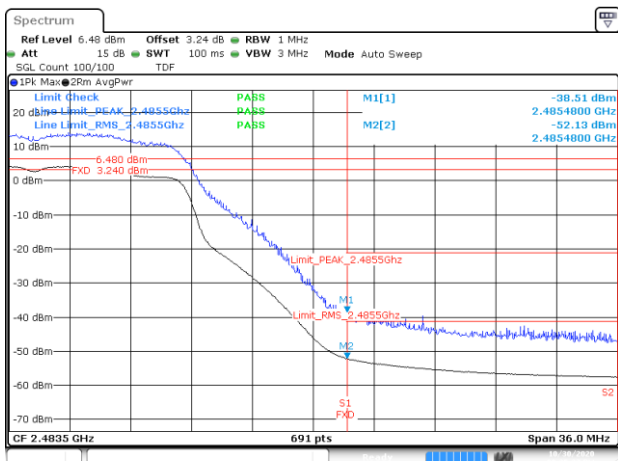
BE-NR, MIMO-B, 802.11n20-HT8 Ch1



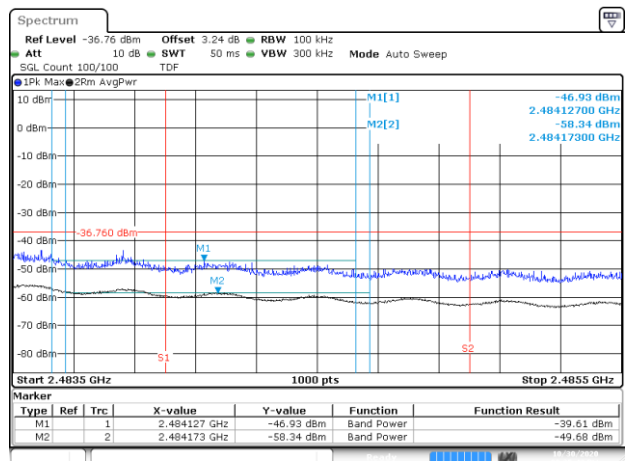
BE-R-HIGH, MIMO-B, 802.11n20-HT8, Ch11



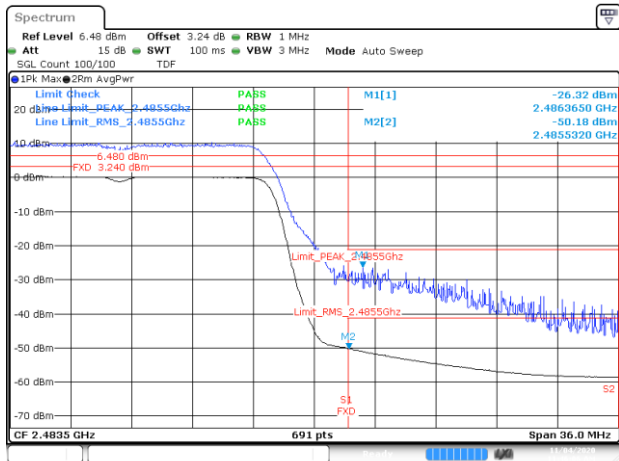
BE-R-HIGH-2MHz, MIMO-B, 802.11n20-HT8, Ch11



BE-R-HIGH, MIMO-B, 802.11n20-HT8, Ch12

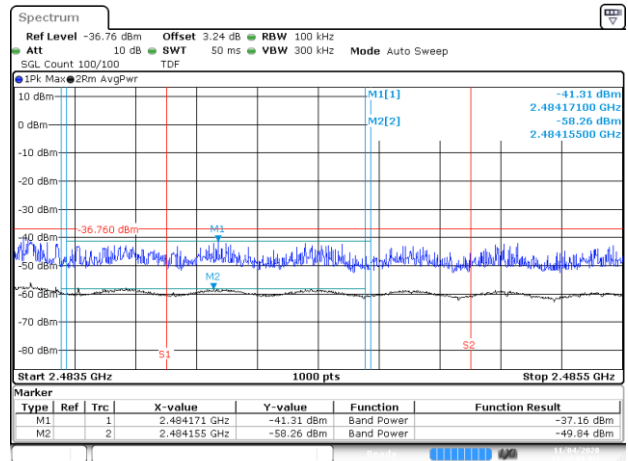


BE-R-HIGH-2MHz, MIMO-B, 802.11n20-HT8, Ch12



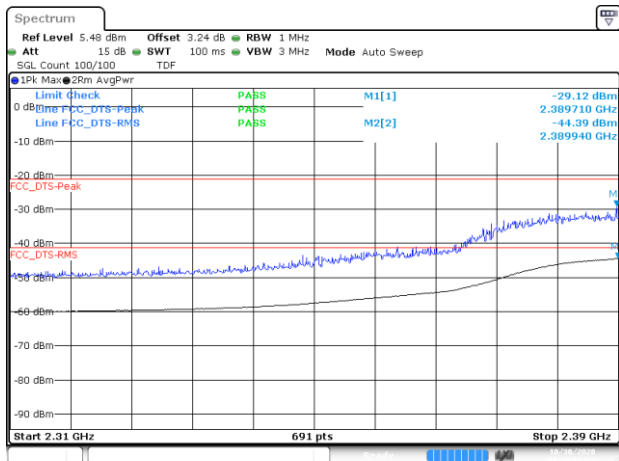
Date: 4 NOV 2020 11:48:03

BE-R-HIGH, MIMO-B, 802.11n20-HT8, Ch13

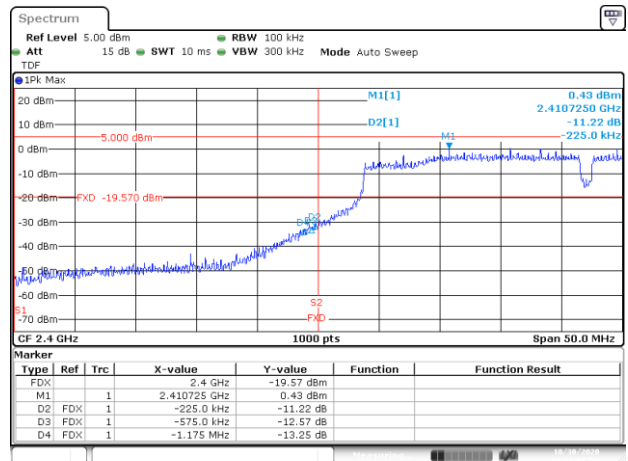


Date: 4 NOV 2020 11:47:09

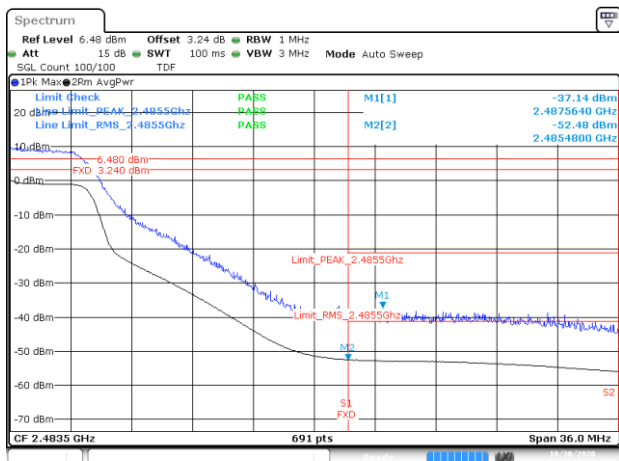
BE-R-HIGH-2MHz, MIMO-B, 802.11n20-HT8, Ch13



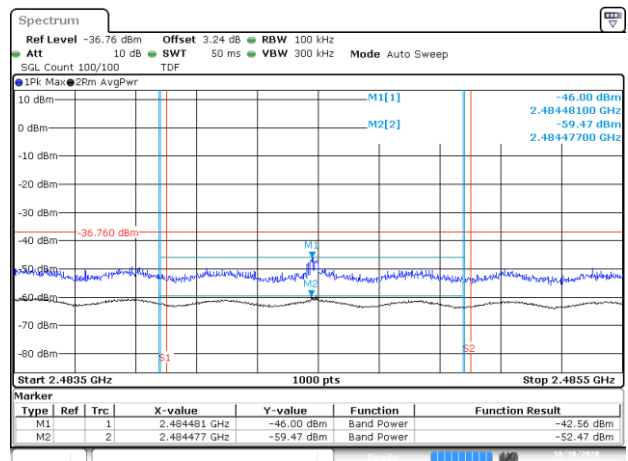
BE-R-LOW, MIMO-B, 802.11n40-HT8, Ch3



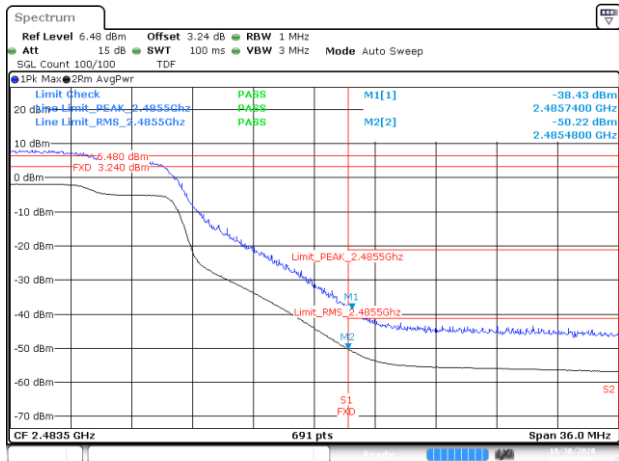
BE-NR, MIMO-B, 802.11n40-HT8, Ch3



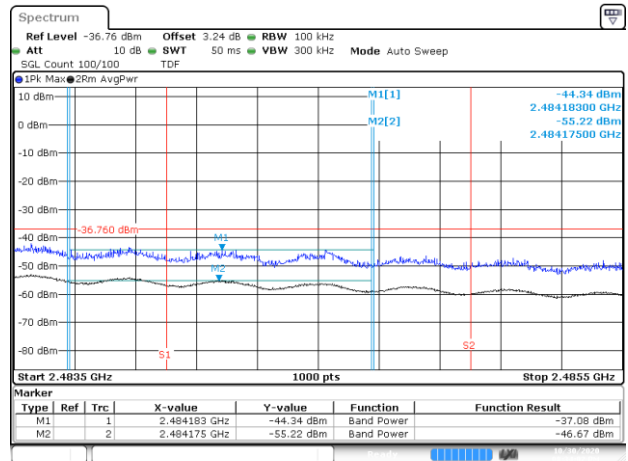
BE-R-HIGH, MIMO-B, 802.11n40-HT8, Ch9



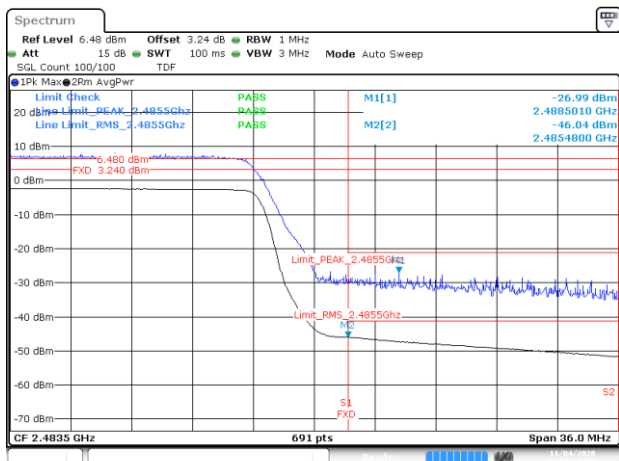
BE-R-HIGH-2MHz, MIMO-B, 802.11n40-HT8, Ch9



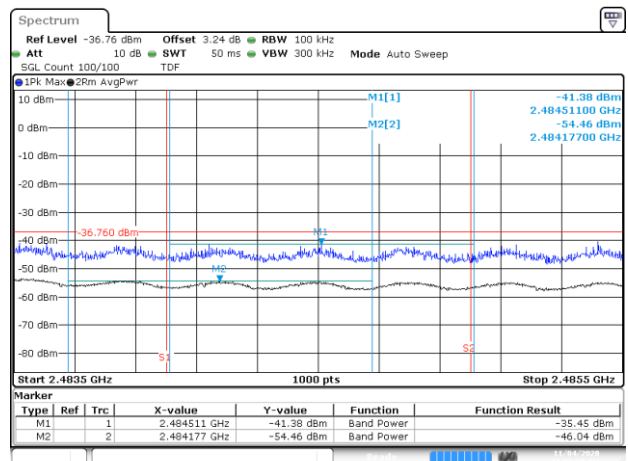
BE-R-HIGH, MIMO-B, 802.11n40-HT8, Ch10



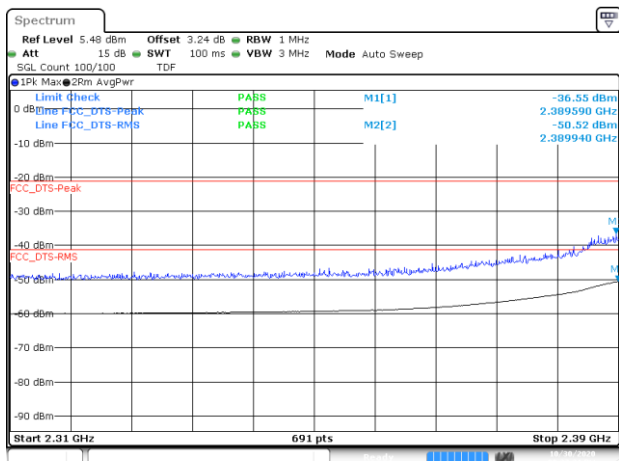
BE-R-HIGH-2MHz, MIMO-B, 802.11n40-HT8, Ch10



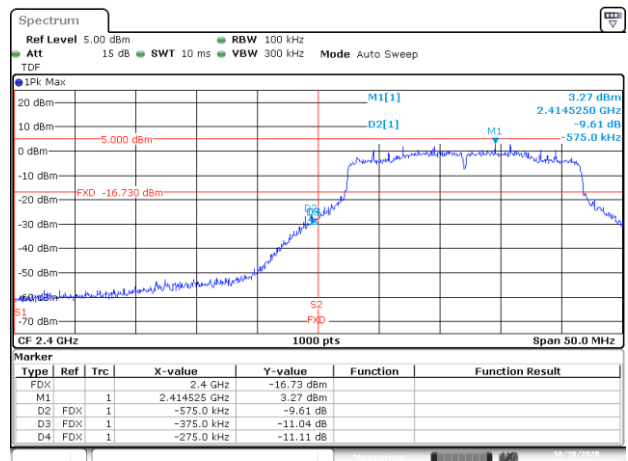
BE-R-HIGH, MIMO-B, 802.11n40-HT8, Ch11



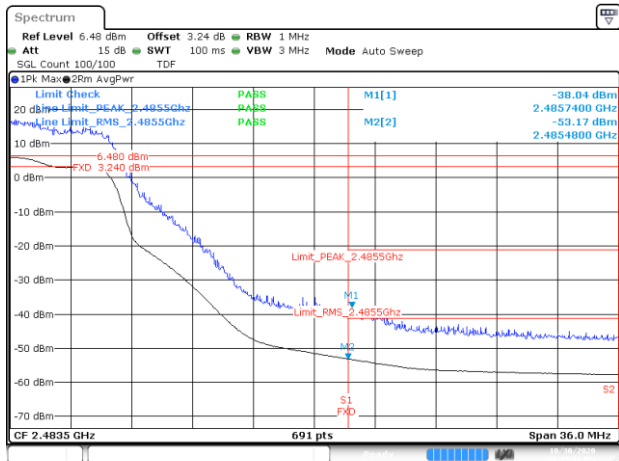
BE-R-HIGH-2MHz, MIMO-B, 802.11n40-HT8, Ch11



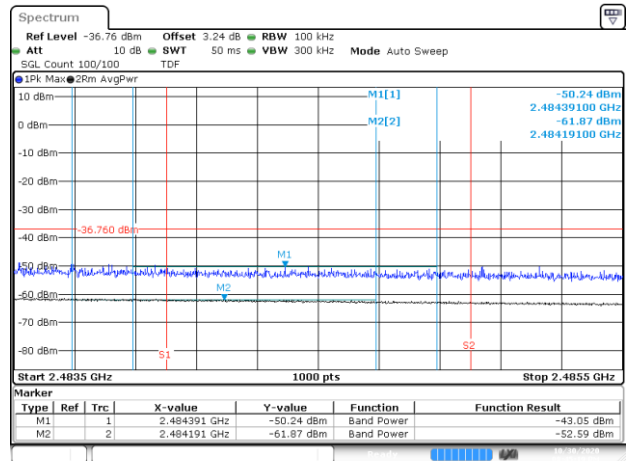
BE-R-LOW, MIMO-B, 802.11ax20-HE0, Ch1



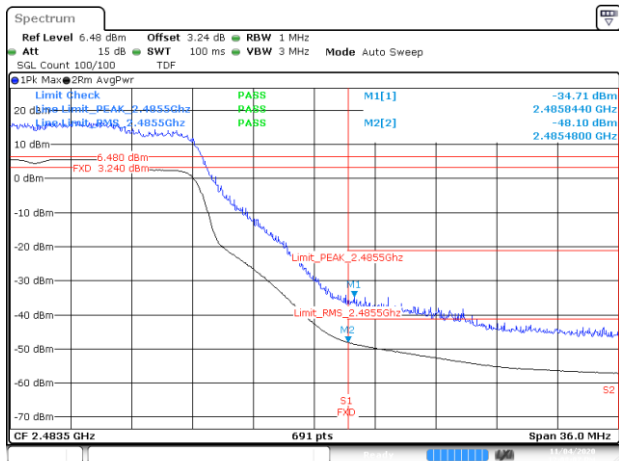
BE-NR, MIMO-B, 802.11ax20-HE0, Ch1



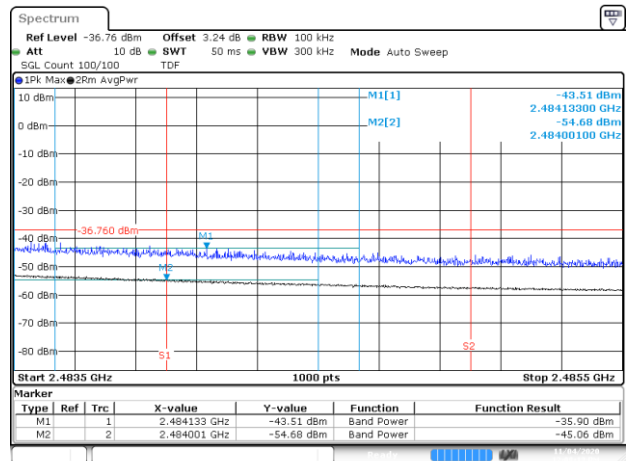
BE-R-HIGH, MIMO-B, 802.11ax20-HE0, Ch11



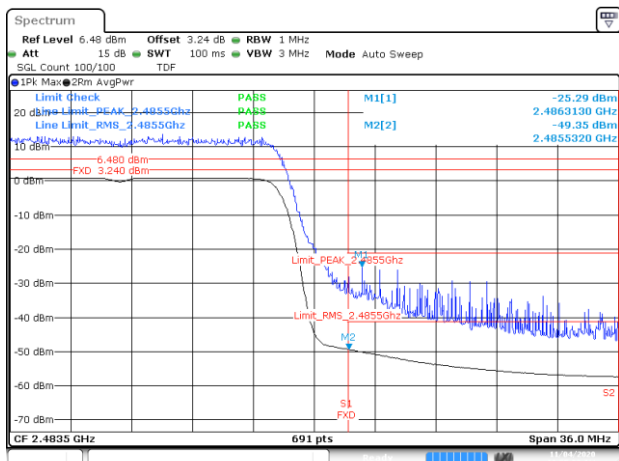
BE-R-HIGH-2MHz, MIMO-B, 802.11ax20-HE0, Ch11



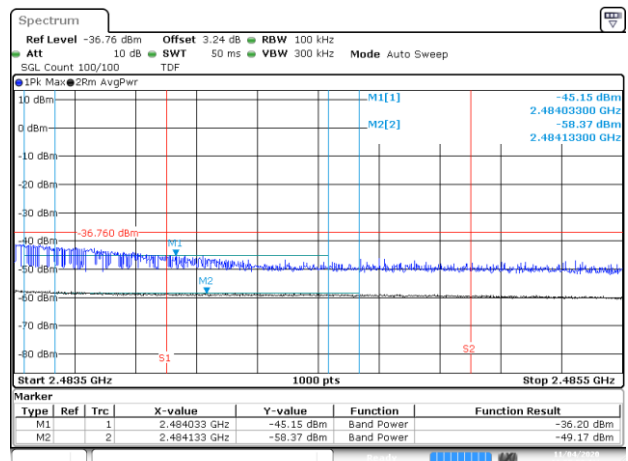
BE-R-HIGH, MIMO-B, 802.11ax20-HE0, Ch12



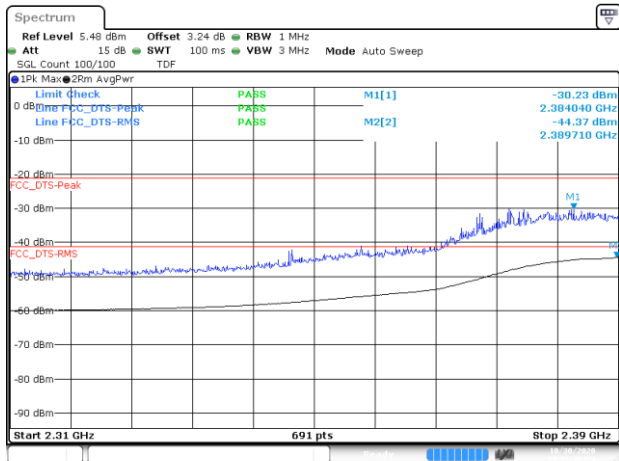
BE-R-HIGH-2MHz, MIMO-B, 802.11ax20-HE0, Ch12



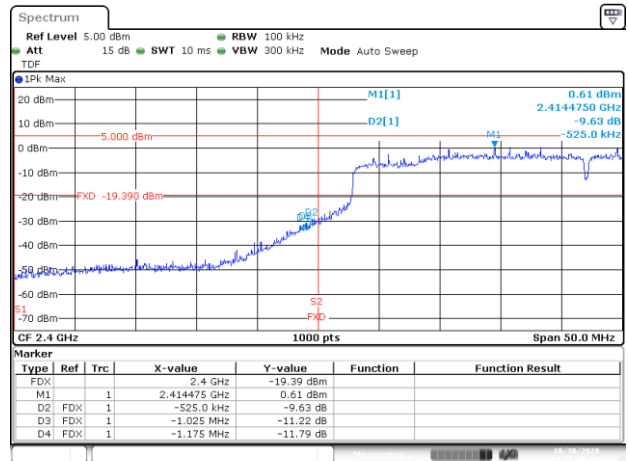
BE-R-HIGH, MIMO-B, 802.11ax20-HE0, Ch13



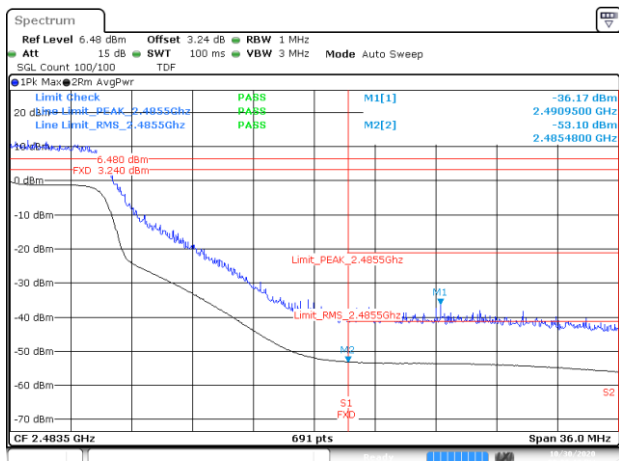
BE-R-HIGH-2MHz, MIMO-B, 802.11ax20-HE0, Ch13



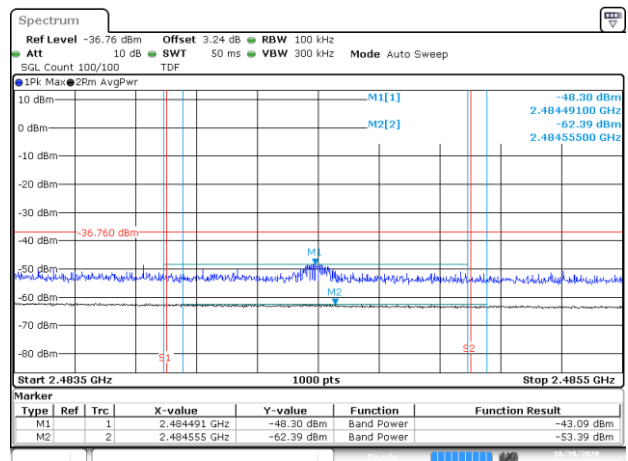
BE-R-LOW, MIMO-B, 802.11ax40-HE0, Ch3



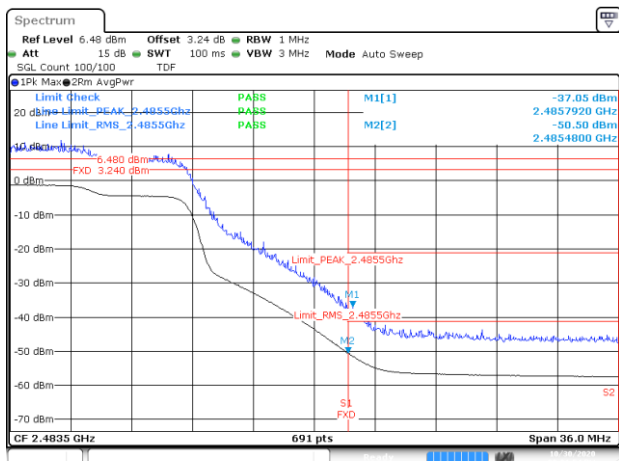
BE-NR, MIMO-B, 802.11ax40-HE0, Ch3



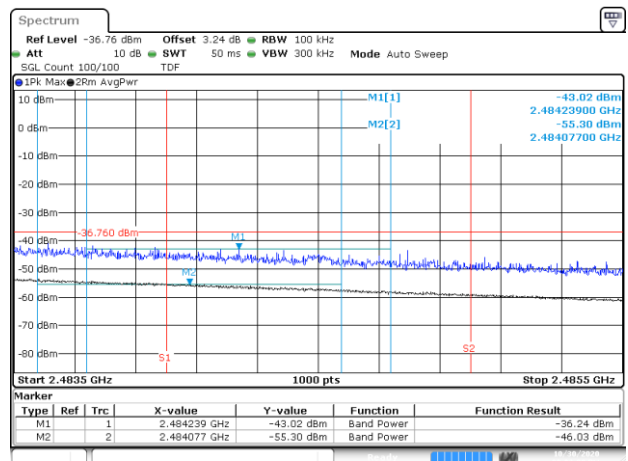
BE-R-HIGH, MIMO-B, 802.11ax40-HE0, Ch9



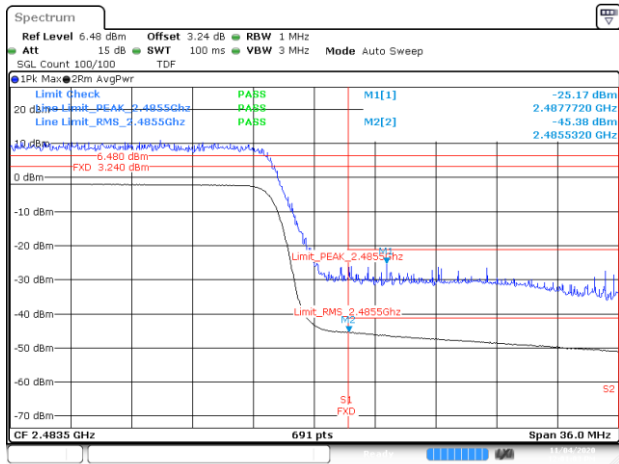
BE-R-HIGH-2MHz, MIMO-B, 802.11ax40-HE0, Ch9



BE-R-HIGH, MIMO-B, 802.11ax40-HE0, Ch10

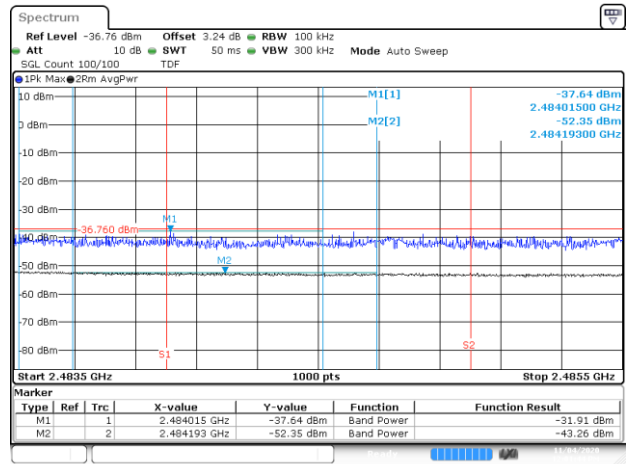


BE-R-HIGH-2MHz, MIMO-B, 802.11ax40-HE0, Ch10



Date: 4 NOV 2020 12:01:03

BE-R-HIGH, MIMO-B, 802.11ax40-HE0, Ch11



Date: 4 NOV 2020 12:01:44

BE-R-HIGH-2MHz, MIMO-B, 802.11ax40-HE0, Ch11

B.4 Test Results BLE

B.4.1 6dB & 99% Bandwidth

Test limits

FCC part	RSS part	Limits
15.247 (a) (2)	RSS-247 Clause 5.2 (a)	Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test procedure

The conducted setup shown in section *Test & System Description* was used to measure the 6dB & 99% Bandwidth. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

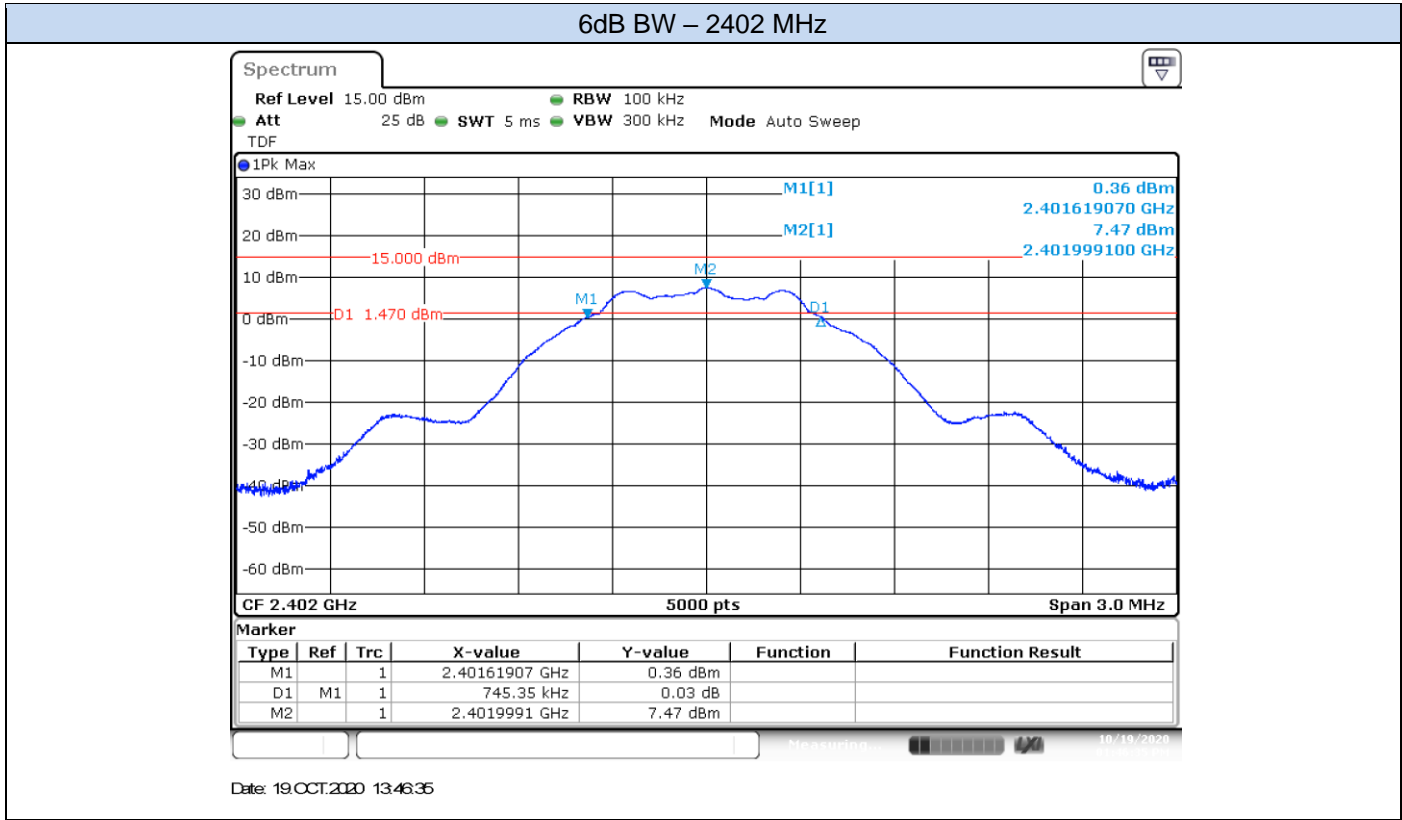
Results tables

Mode	Frequency [MHz]	6dB BW [MHz]	99% BW [MHz]
BLE	2402	0.745	1.16
	2440	0.670	1.46
	2480	0.676	1.15

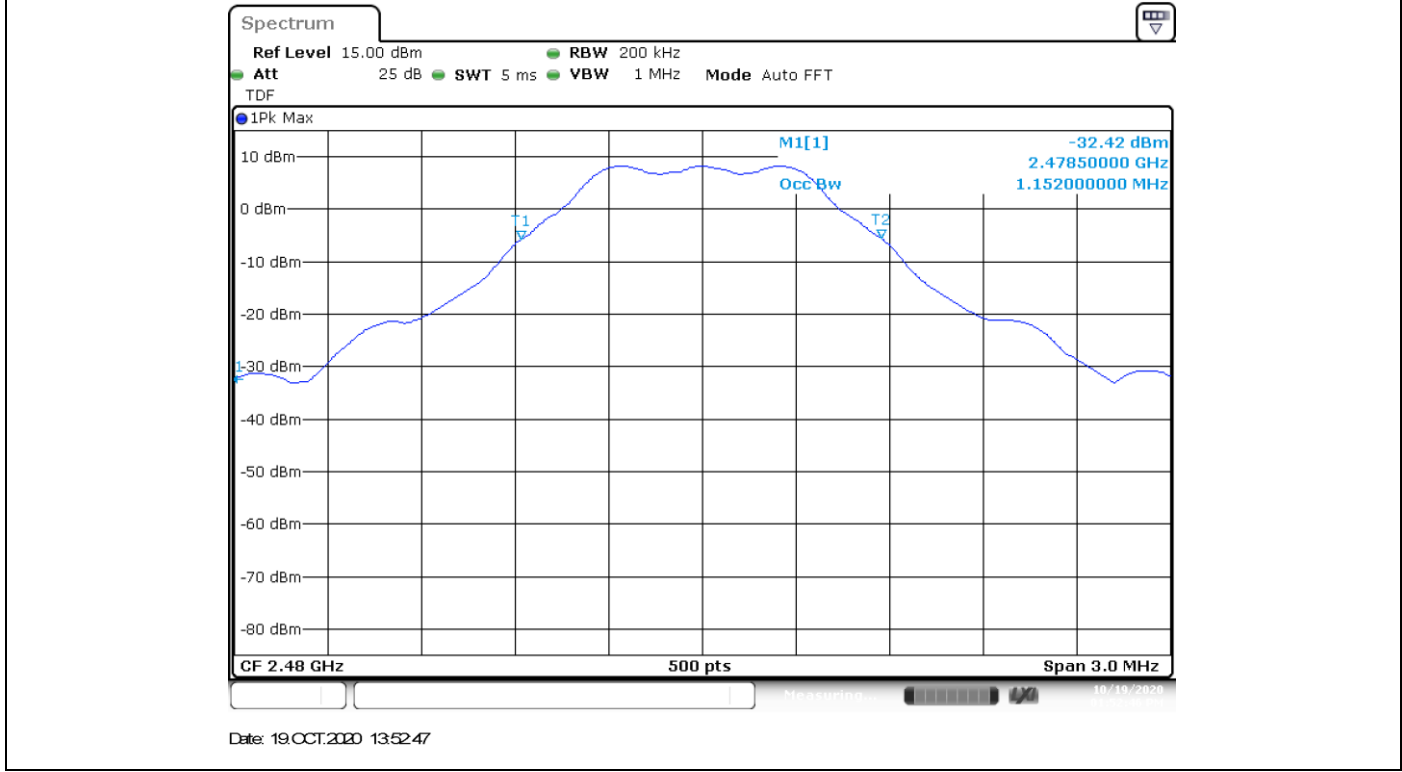
Max Value

Results screenshot

BLE



99% BW – 2480 MHz



B.4.2 Maximum Output Power and antenna gain

Test limits

	Limits
<p>FCC Part 15.247 (b) (3)</p>	<p>(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:</p> <p>(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level.</p> <p>(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.</p>
<p>RSS-247 Clause 5.4 (d)</p>	<p>For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).</p> <p>As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode</p>

Test procedure:

The Maximum peak conducted output power was measured using the $RBW \geq DTS \text{ bandwidth}$ method defined in paragraph 11.9.1.1 of ANSI C63.10-2013.

The Maximum conducted average output power was measured using the channel integration method according to Method AVGSA-2, defined in paragraph 11.9.2.2.4 of ANSI C63.10-2013.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

The conducted setup shown in section *Test & System Description* was used to measure the maximum conducted output power. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

Results tables

Mode	Meas. Duty Cycle [%]	Frequency [MHz]	Peak Power [dBm]		Peak Output Power [mW]
			Measured Conducted Output Power	EIRP	
BLE	55.70	2402	7.63	10.87	5.79
		2440	8.11	11.35	6.47
		2480	8.23	11.47	6.65

Max Value

Min Value

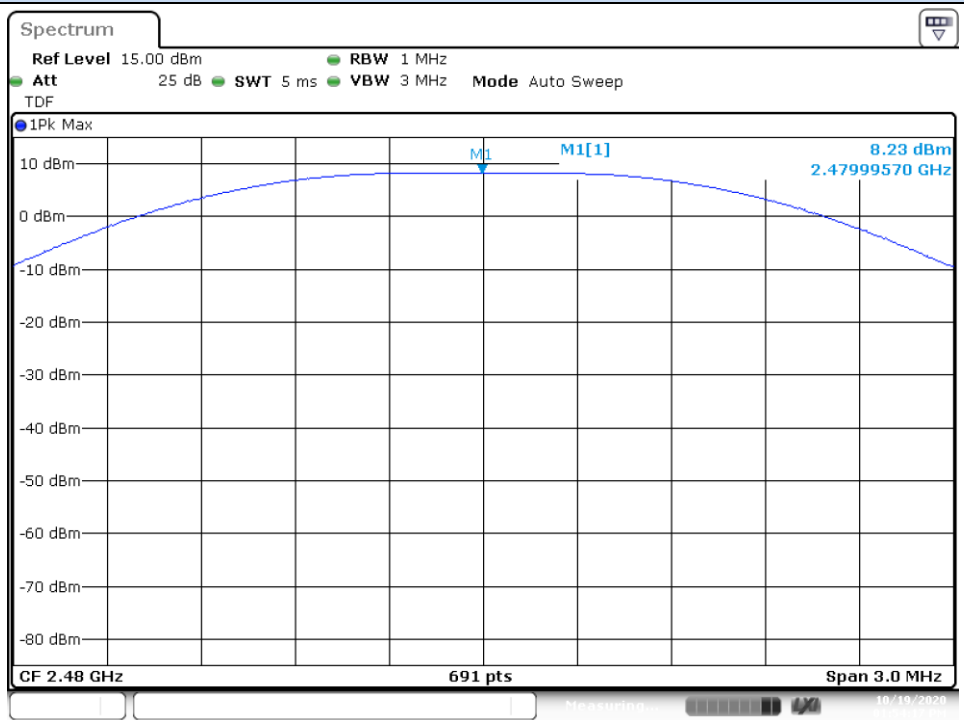
Mode	Meas. Duty Cycle [%]	Frequency [MHz]	Average Output Power* [dBm]			Average Output Power [mW]
			Maximum Conducted Output Power	Maximum Conducted Output Power Duty cycle Compensated	EIRP	
BLE	55.70	2402	5.48	8.02	11.26	6.34
		2440	5.98	8.52	11.76	7.11
		2480	6.11	8.65	11.89	7.33

* Output Power RMS values are shown for indicative purpose only

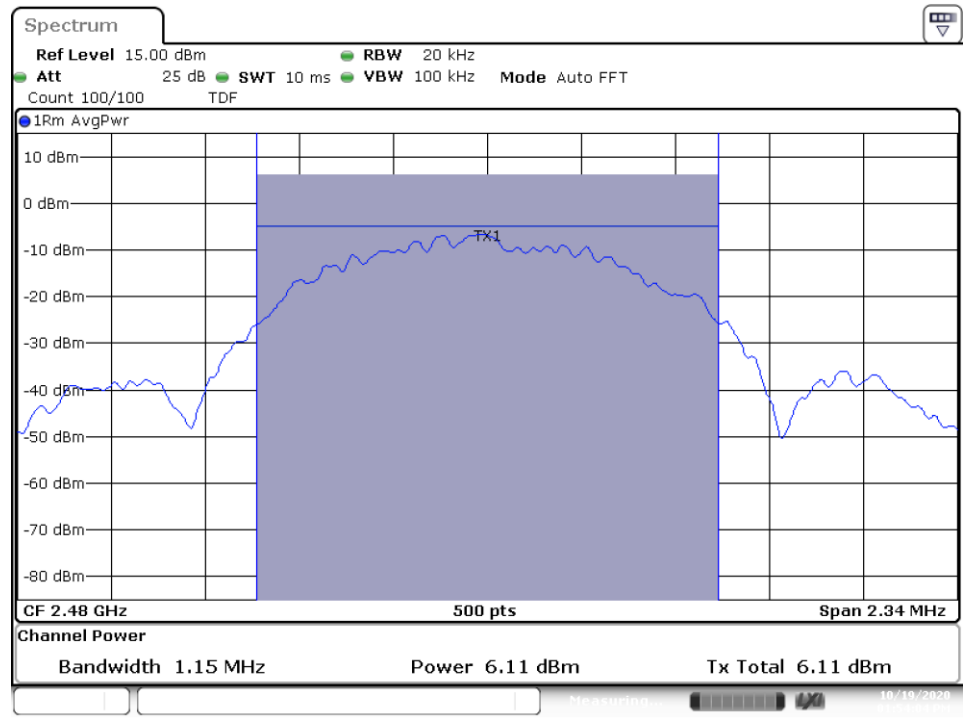
Results screenshot

BLE

Max Power Peak – 2480 MHz



Max Power RMS – 2480 MHz



B.4.3 Power Spectral Density

Test limits

FCC part	RSS part	Limits
15.247 (e)	RSS-247 Clause 5.2 (b)	For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test procedure

The maximum peak power spectral density level of the fundamental emission was measured using the method PKPSD, defined in paragraph 11.10.2 of ANSI C63.10-2013.

The conducted setup shown in section *Test & System Description* was used to measure the power spectral density. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

Results tables

Mode	CH	Frequency [MHz]	PSD Peak [dBm/3kHz]
BLE	0	2402	-7.45
	19	2440	-7.24
	39	2480	-7.28

B.4.4 Out-of-band emission (Conducted)

Test Limits

FCC part	RSS part	Limits																				
15.247 (d)	RSS-247 Clause 5.5	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.																				
15.209	RSS-Gen A1 Clause 8.9	<p>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):</p> <table border="1"> <thead> <tr> <th>Freq Range (MHz)</th> <th>Field Strength (μV/m)</th> <th>Field Strength (dBμV/m)</th> <th>Meas. Distance (m)</th> </tr> </thead> <tbody> <tr> <td>30-88</td> <td>100</td> <td>40</td> <td>3</td> </tr> <tr> <td>88-216</td> <td>150</td> <td>43.5</td> <td>3</td> </tr> <tr> <td>216-960</td> <td>200</td> <td>46</td> <td>3</td> </tr> <tr> <td>Above 960</td> <td>500</td> <td>54</td> <td>3</td> </tr> </tbody> </table> <p>The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</p>	Freq Range (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Meas. Distance (m)	30-88	100	40	3	88-216	150	43.5	3	216-960	200	46	3	Above 960	500	54	3
Freq Range (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Meas. Distance (m)																			
30-88	100	40	3																			
88-216	150	43.5	3																			
216-960	200	46	3																			
Above 960	500	54	3																			

Test procedure

In case of band edge measurements falling in restricted bands, the declared Antenna Gain is also compensated in the graph.

For band edge measurements falling in restricted bands, the following limits in dBm were applied for the average detector after the conversion from the limits detailed above in dBμV/m, according to FCC 47 CFR part 15 - Subpart C – §15.209(a). The limits in dBm for peak detector are 20dB above the indicated values in the table.

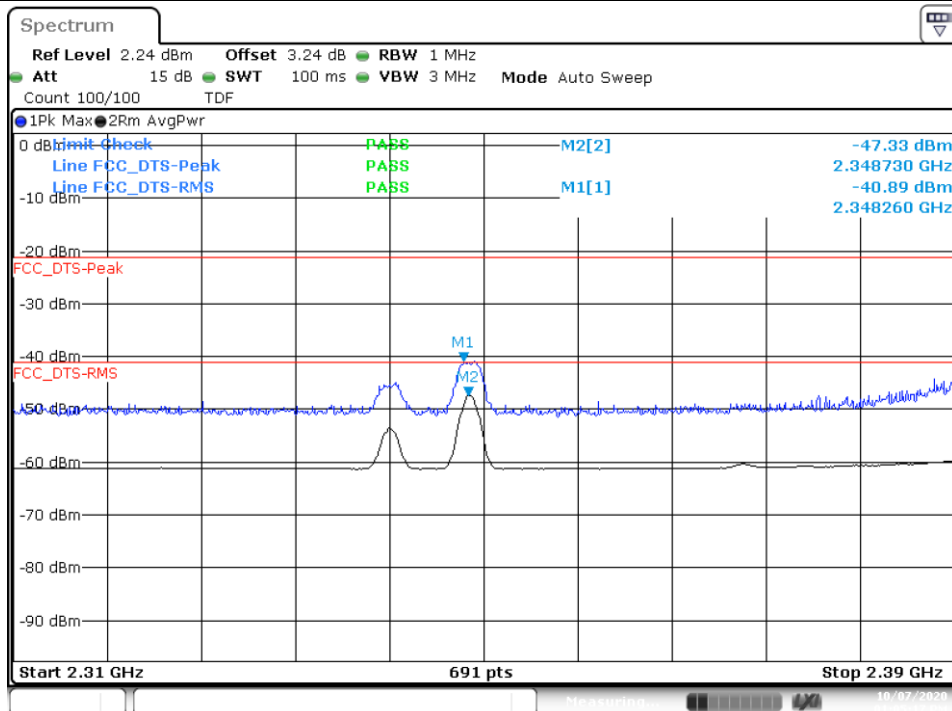
§15.209(a)			Converted values	
Freq Range (MHz)	Distance (m)	Field strength (microvolts/meter)	Field strength (dB microvolts/meter)	Power (dBm)
Above 960	3	500	54.0	-41.2

The conducted setup shown in section *Test & System Description* was used to measure the out-of-band emissions. The antenna terminal of the EUT is connected to the spectrum through an attenuator, and the spectrum analyzer reading is compensated to include the RF path loss.

Note: For the compliance of the out-of-band Measurements, PSD_{Peak} were measured with 100kHz RBW and values are shown just as a reference in section B.4.3.

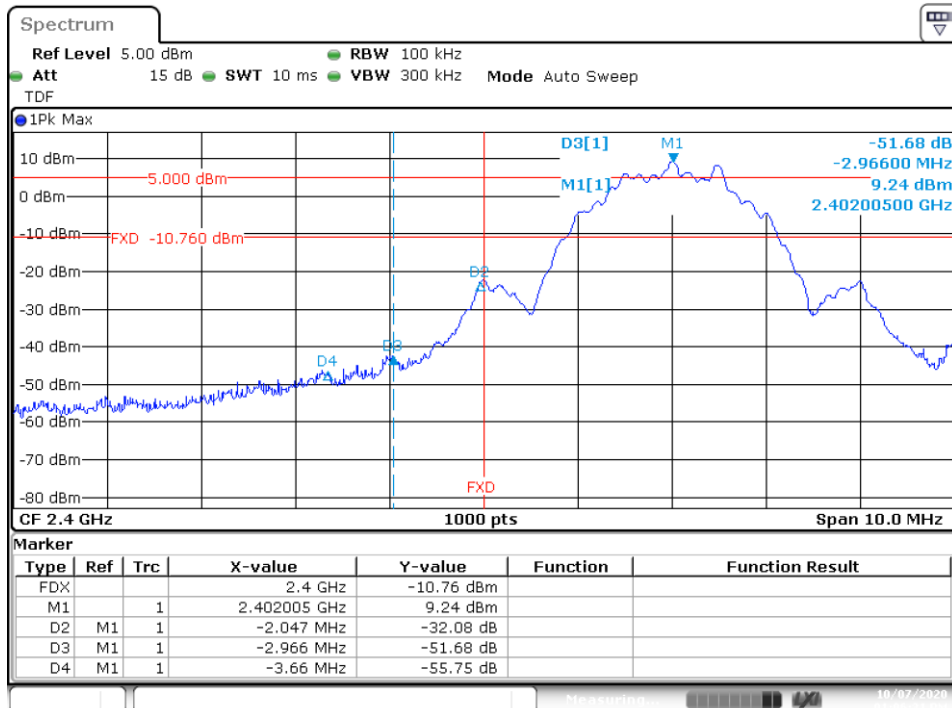
BLE

BE Low (Restricted) – 2402 MHz

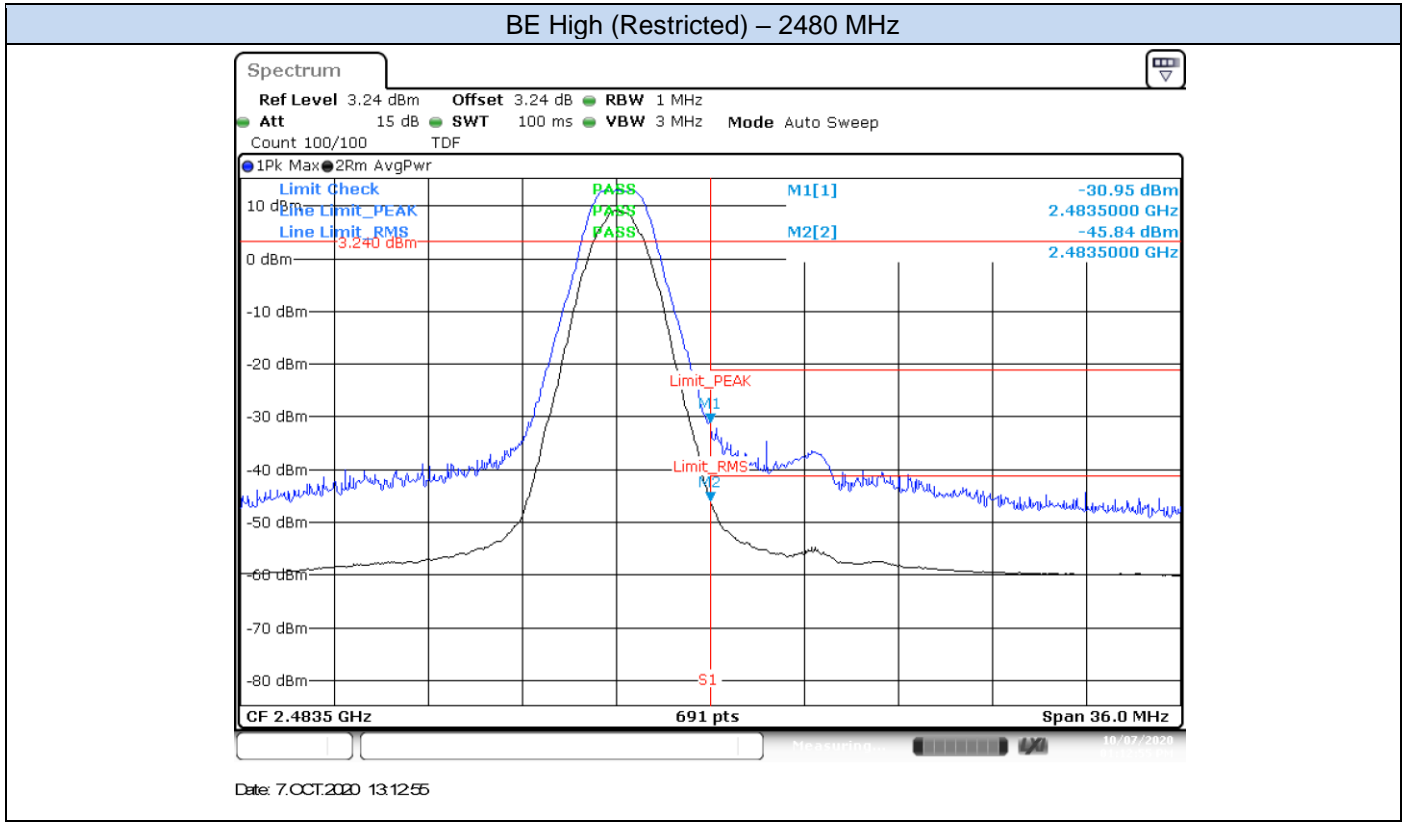


Date: 7.OCT.2020 13:05:18

BE Low (Non Restricted) – 2402 MHz



Date: 7.OCT.2020 13:05:32



B.4.5 Radiated spurious emission

Standards references

FCC part	RSS part	Limits																					
<p>15.247 (d) 15.209</p>	<p>RSS-247 Clause 5.5 RSS-Gen A1 Clause 8.9</p>	<p>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):</p>																					
		<table border="1"> <thead> <tr> <th data-bbox="630 472 794 535">Freq Range (MHz)</th> <th data-bbox="831 472 986 535">Field Strength (μV/m)</th> <th data-bbox="1023 472 1177 535">Field Strength (dBμV/m)</th> <th data-bbox="1214 472 1417 535">Meas. Distance (m)</th> </tr> </thead> <tbody> <tr> <td data-bbox="630 542 794 573">30-88</td> <td data-bbox="831 542 986 573">100</td> <td data-bbox="1023 542 1177 573">40</td> <td data-bbox="1214 542 1417 573">3</td> </tr> <tr> <td data-bbox="630 580 794 611">88-216</td> <td data-bbox="831 580 986 611">150</td> <td data-bbox="1023 580 1177 611">43.5</td> <td data-bbox="1214 580 1417 611">3</td> </tr> <tr> <td data-bbox="630 618 794 649">216-960</td> <td data-bbox="831 618 986 649">200</td> <td data-bbox="1023 618 1177 649">46</td> <td data-bbox="1214 618 1417 649">3</td> </tr> <tr> <td data-bbox="630 656 794 687">Above 960</td> <td data-bbox="831 656 986 687">500</td> <td data-bbox="1023 656 1177 687">54</td> <td data-bbox="1214 656 1417 687">3</td> </tr> </tbody> </table>	Freq Range (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Meas. Distance (m)	30-88	100	40	3	88-216	150	43.5	3	216-960	200	46	3	Above 960	500	54	3	
Freq Range (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Meas. Distance (m)																				
30-88	100	40	3																				
88-216	150	43.5	3																				
216-960	200	46	3																				
Above 960	500	54	3																				
<p>The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</p>																							

Test procedure

The radiated setups shown in section *Test & System Description* were used to measure the radiated spurious emissions. were used to measure the radiated spurious emissions.
 Depending of the frequency range and bands being tested, different antennas and filters were used.
 The final measurement is done by varying the antenna height from 1 to 4 meters, the EUT azimuth over 360° and for both Vertical and Horizontal polarizations.
 The radiated spurious emissions were measured on the lowest, middle and highest channels.

Test Results**Radiated Spurious - 30 MHz – 1 GHz**

Frequency	Quasi-Peak	Limit	Margin	Polarization
MHz	dB μ V/m	dB μ V/m	dB	---
74.5	36.5	40.0	3.5	V

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

1 GHz – 26.5 GHz, BLE**Radiated Spurious – 2402 MHz**

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dB μ V/m	dB μ V/m	dB μ V/m	dB	---
3381.0	62.1	---	68.2	6.1	V
17476.0	53.4	---	68.2	14.8	V
22000.0	47.3	---	68.2	20.9	V

Radiated Spurious – 2440 MHz

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dB μ V/m	dB μ V/m	dB μ V/m	dB	---
3391.0	61.7	---	68.2	6.5	H
17487.5	53.8	---	68.2	14.4	H
22000.0	47.5	---	68.2	20.7	V

Radiated Spurious – 2480 MHz

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dB μ V/m	dB μ V/m	dB μ V/m	dB	---
3373.5	61.8	---	68.2	6.4	H
17493.5	53.2	---	68.2	14.9	H
22000.0	48.1	---	68.2	20.1	V