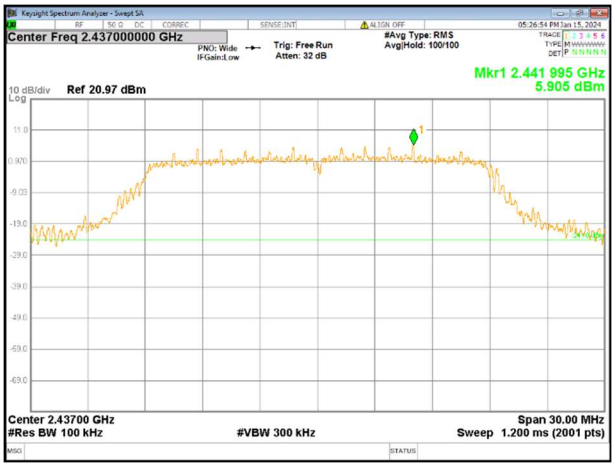
9.5.3. 802.11n HT20 MODE

2TX Antenna 1

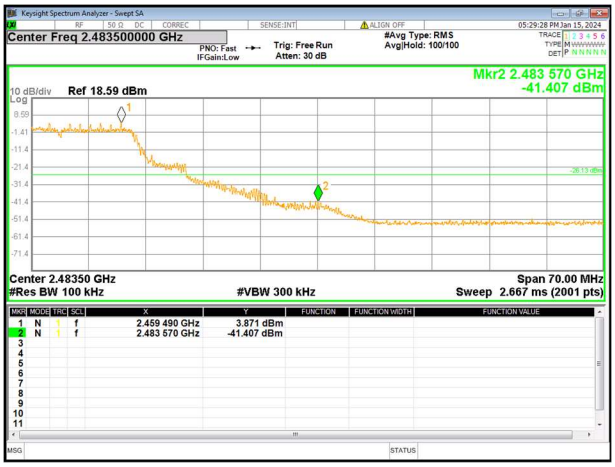
2 Channel Band-edge

Out-Of-Band 2 Channel



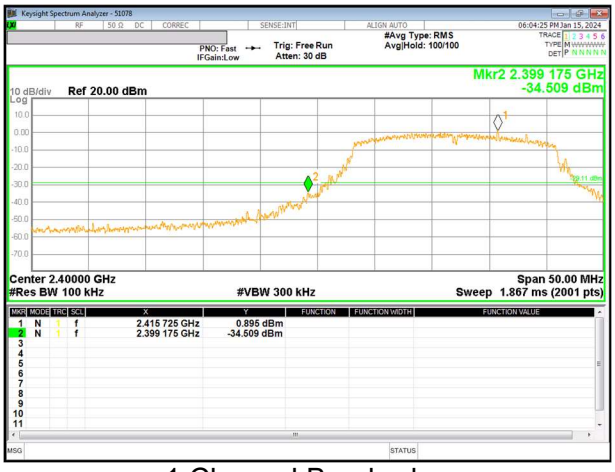
6 Channel Band-edge

Out-Of-Band 6 Channel



9 Channel Band-edge

Out-Of-Band 9 Channel

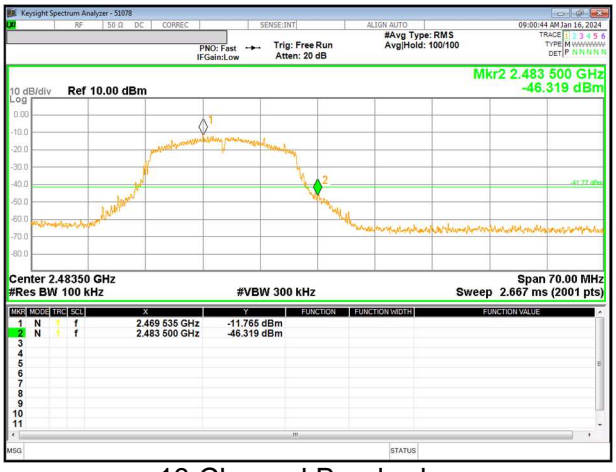


1 Channel Band-edge

10 Channel Band-edge

11 Channel Band-edge

12 Channel Band-edge

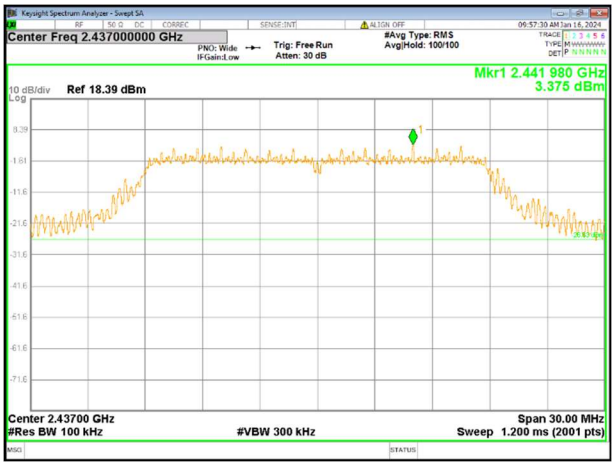


13 Channel Band-edge

2TX Antenna 2

2 Channel Band-edge

Out-Of-Band 2 Channel

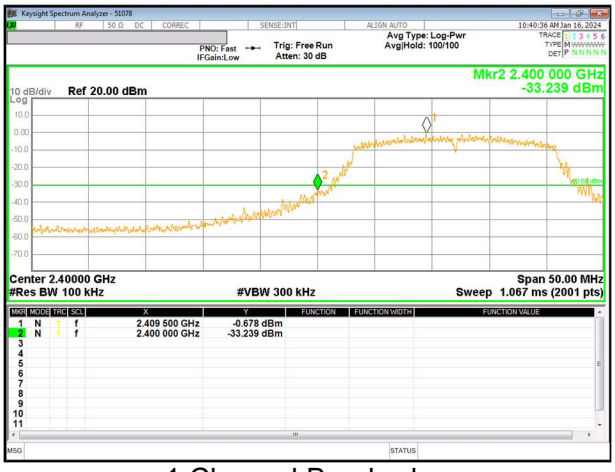


6 Channel Band-edge

Out-Of-Band 6 Channel

9 Channel Band-edge

Out-Of-Band 9 Channel



1 Channel Band-edge

10 Channel Band-edge

11 Channel Band-edge

12 Channel Band-edge

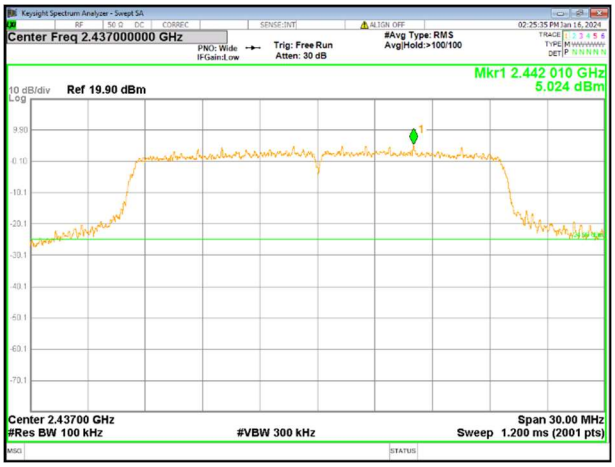
13 Channel Band-edge

9.5.4. 802.11ax HE20(SU) MODE

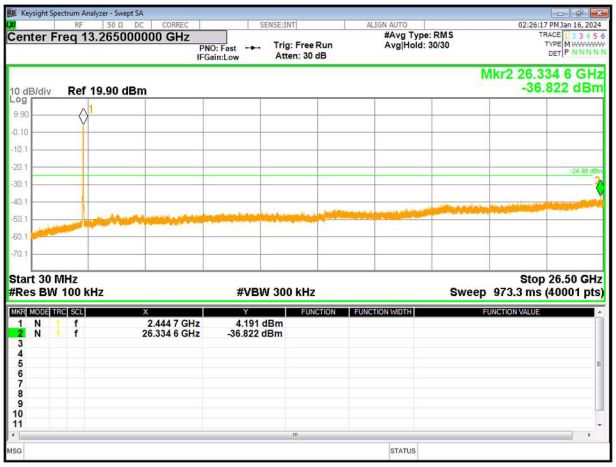
2TX Antenna 1

1 Channel Band-edge

Out-Of-Band 1 Channel



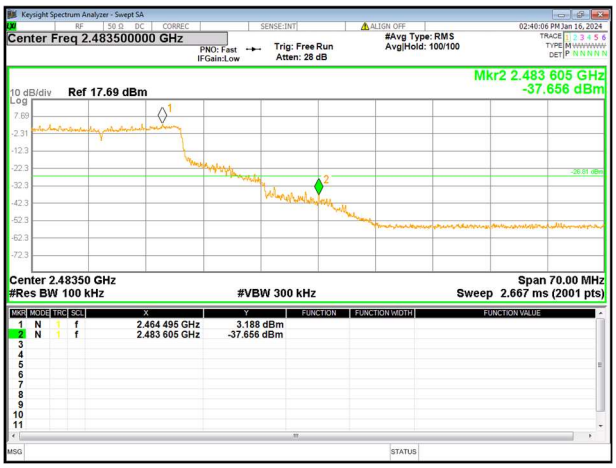
6 Channel Band-edge



Out-Of-Band 6 Channel

9 Channel Band-edge

Out-Of-Band 9 Channel



10 Channel Band-edge

11 Channel Band-edge

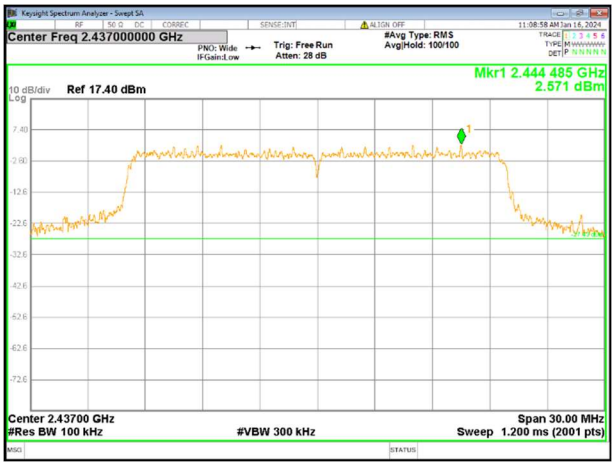
12 Channel Band-edge

13 Channel Band-edge

2TX Antenna 2

1 Channel Band-edge

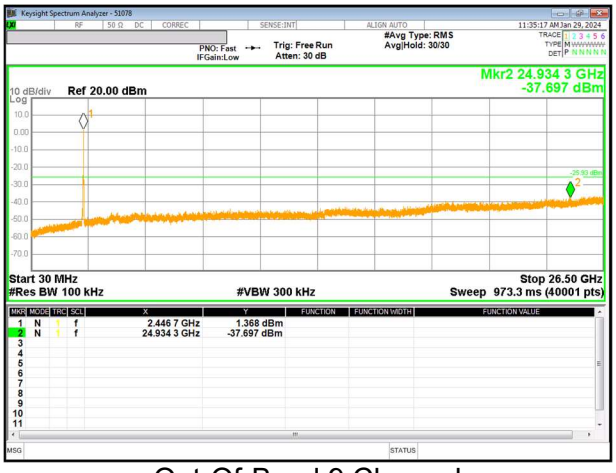
Out-Of-Band 1 Channel



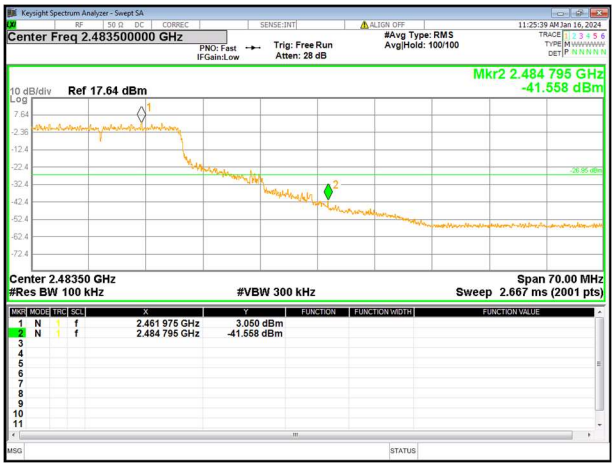
6 Channel Band-edge

Out-Of-Band 6 Channel

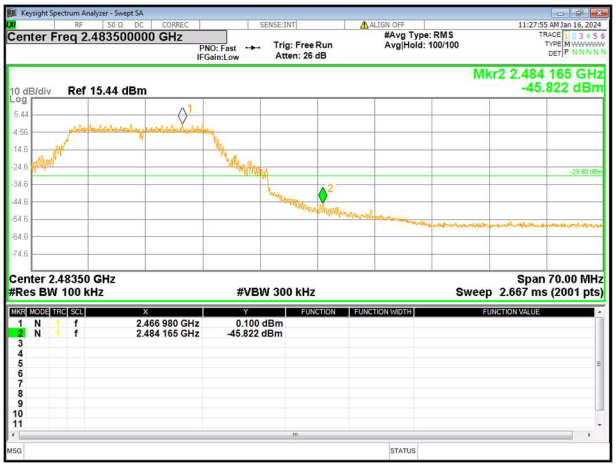
9 Channel Band-edge



Out-Of-Band 9 Channel

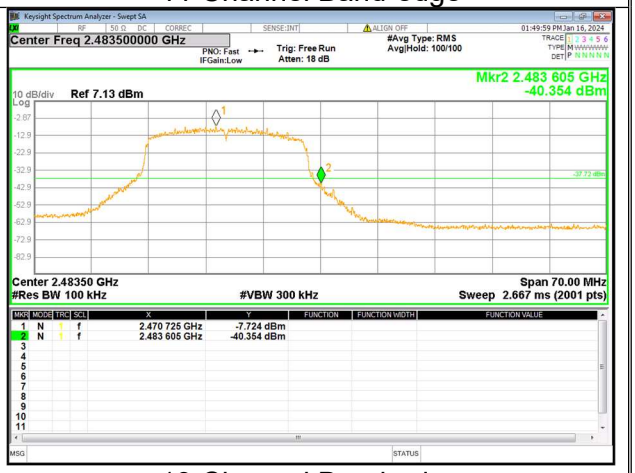


10 Channel Band-edge



11 Channel Band-edge

12 Channel Band-edge



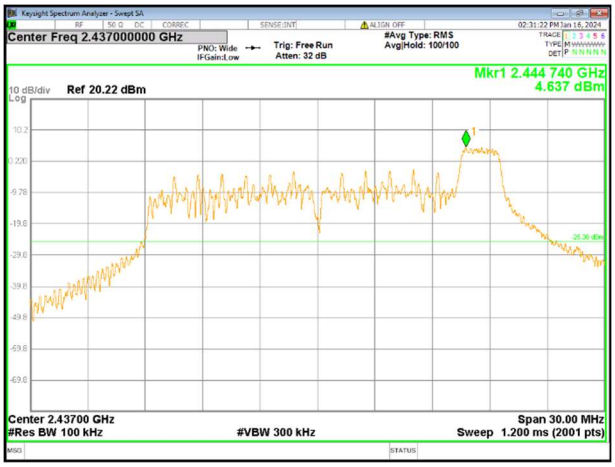
13 Channel Band-edge

9.5.5. 802.11ax HE20(RU) MODE

2TX Antenna 1 MODE

1 Channel Band-edge(0RU)

Out-Of-Band 1 Channel(0RU)

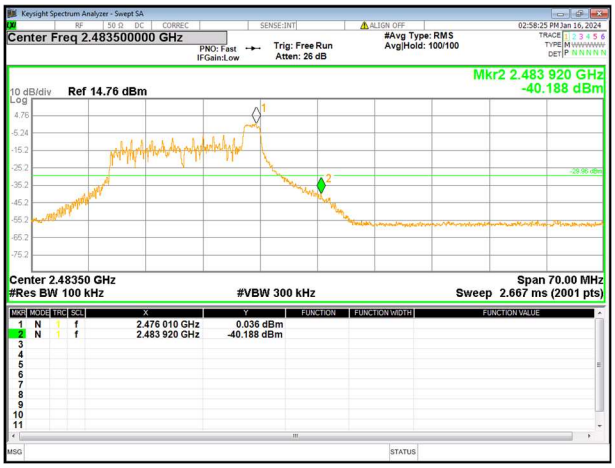


6 Channel Reference level(8RU)

Out-Of-Band 6 Channel(8RU)

11 Channel Band-edge(8RU)

Out-Of-Band 11 Channel(8RU)



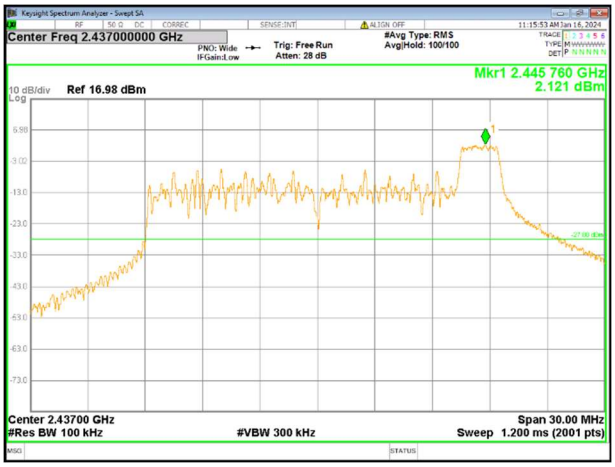
12 Channel Band-edge(8RU)

13 Channel Band-edge(8RU)

2TX Antenna 2 MODE

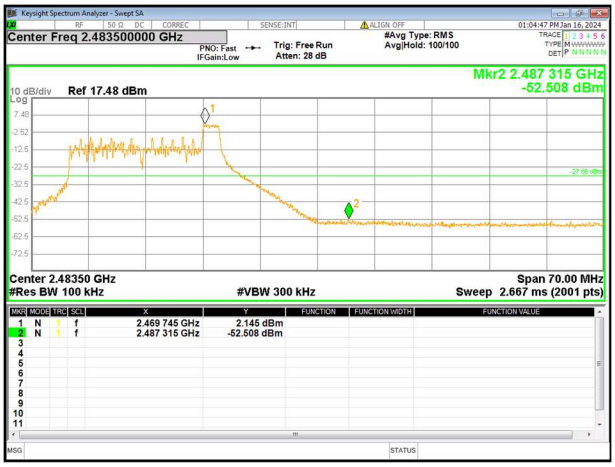
1 Channel Band-edge(0RU)

Out-Of-Band 1 Channel(0RU)



6 Channel Reference level(8RU)

Out-Of-Band 6 Channel(8RU)



11 Channel Band-edge(8RU)

Out-Of-Band 11 Channel(8RU)

12 Channel Band-edge(8RU)

13 Channel Band-edge(8RU)

10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (μV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

FCC Part 15.205 (a) : Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	162.0125 ~	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	167.17	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	167.72 ~ 173.2	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	240 ~ 285	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	322 ~ 335.4	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	399.90 ~ 410	3345.8 ~ 3358		
		608 ~ 614	3600 ~ 4400		
		960 ~ 1240			

▪ FCC Part 15.205(b) : The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1 GHz and 150 cm for above 1 GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements.
(Restriced bandedge, Final detection of spurious harmonic emissions)

Duty cycle factor = 10log (1/x) For this sample:

802.11b MIMO mode = 0 dB (duty cycle > 98%);
802.11g MIMO mode = 0.15 dB (96.54%);
802.11n(HT20) MIMO mode = 0 dB (duty cycle > 98%);
802.11ax(HE20) MIMO SU mode = 0.20 dB (95.51%);
802.11ax(HE20) MIMO 26 Tone mode = 0.10 dB (97.72%);

Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.

The spectrum from 1 GHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

Note : Emission was pre-scanned from 9 kHz to 30 MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

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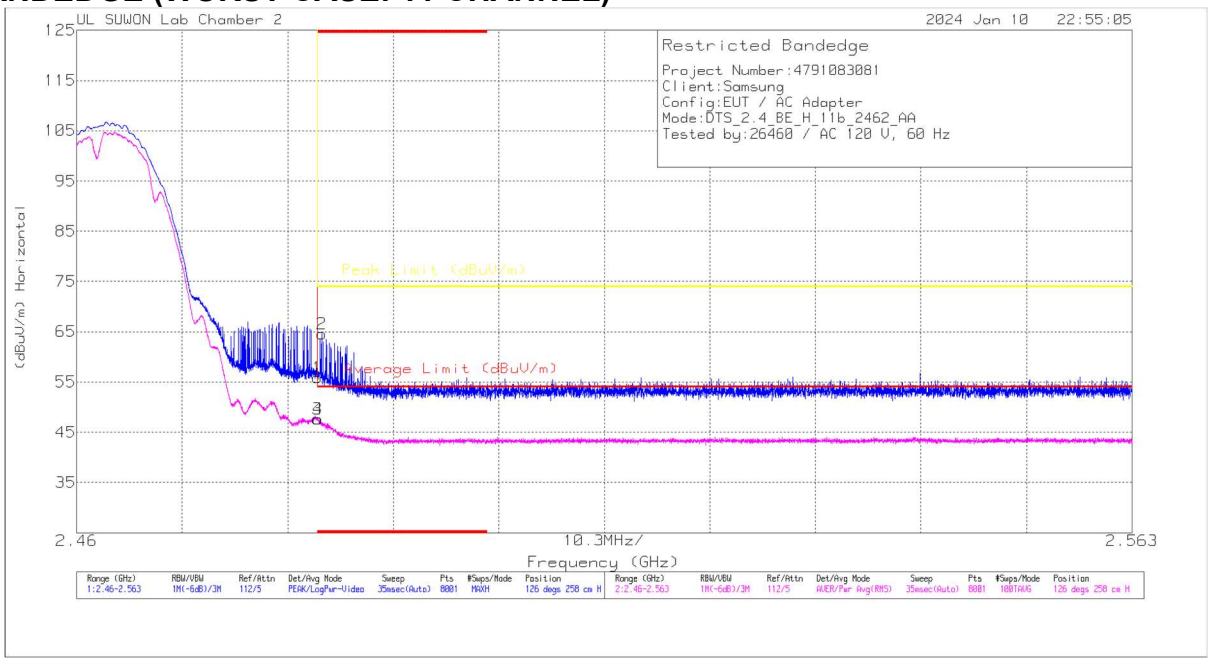
10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

2TX Mode

BANDEDGE (WORST CASE: 11 CHANNEL)



HORIZONTAL RESULT

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	Antenna Correction Factor(dB/m)	Loss(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	43.25	Pk	31.9	-19.3	0	55.85	-	-	74	-18.15	126	258	H
2	* 2.48392	51.95	Pk	31.9	-19.3	0	64.55	-	-	74	-9.45	126	258	H
3	* 2.48351	35.01	RMS	31.9	-19.3	0	47.61	54	-6.39	-	-	126	258	H
4	* 2.48355	35.04	RMS	31.9	-19.3	0	47.64	54	-6.36	-	-	126	258	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
Pk - Peak detector
RMS - RMS detection

BANDEDGE TEST DATA

Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor [dB/m]	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2412	MIMO	* 2.39	41.46	Pk	31.70	-19.60	0.00	53.56	-	-	74.00	-20.44	126	217	H
		* 2.3888	47.63	Pk	31.70	-19.60	0.00	59.73	-	-	74.00	-14.27	126	217	H
		* 2.39	31.54	RMS	31.70	-19.60	0.00	43.64	54.00	-10.36	-	-	126	217	H
		* 2.38966	32.10	RMS	31.70	-19.60	0.00	44.20	54.00	-9.80	-	-	126	217	H
		* 2.39	42.51	Pk	31.70	-19.60	0.00	54.61	-	-	74.00	-19.39	184	308	V
		* 2.38893	44.87	Pk	31.70	-19.60	0.00	56.97	-	-	74.00	-17.03	184	308	V
		* 2.39	31.10	RMS	31.70	-19.60	0.00	43.20	54.00	-10.80	-	-	184	308	V
		* 2.38803	31.49	RMS	31.70	-19.50	0.00	43.69	54.00	-10.31	-	-	184	308	V
2462	MIMO	* 2.48351	43.25	Pk	31.90	-19.30	0.00	55.85	-	-	74.00	-18.15	126	258	H
		* 2.48392	51.95	Pk	31.90	-19.30	0.00	64.55	-	-	74.00	**-9.45**	126	258	H
		* 2.48351	35.01	RMS	31.90	-19.30	0.00	47.61	54.00	-6.39	-	-	126	258	H
		* 2.48355	35.04	RMS	31.90	-19.30	0.00	47.64	54.00	**-6.36**	-	-	126	258	H
		* 2.48351	43.56	Pk	31.90	-19.30	0.00	56.16	-	-	74.00	-17.84	201	371	V
		* 2.48354	51.44	Pk	31.90	-19.30	0.00	64.04	-	-	74.00	-9.96	201	371	V
		* 2.48351	34.59	RMS	31.90	-19.30	0.00	47.19	54.00	-6.81	-	-	201	371	V
		* 2.48369	34.73	RMS	31.90	-19.30	0.00	47.33	54.00	-6.67	-	-	201	371	V
2472	MIMO	* 2.48351	40.61	Pk	31.90	-19.30	0.00	53.21	-	-	74.00	-20.79	125	104	H
		* 2.48495	43.82	Pk	31.90	-19.30	0.00	56.42	-	-	74.00	-17.58	125	104	H
		* 2.48351	30.96	RMS	31.90	-19.30	0.00	43.56	54.00	-10.44	-	-	125	104	H
		2.516	31.61	RMS	31.90	-19.30	0.00	44.21	54.00	-9.79	-	-	125	104	H
		* 2.48351	41.03	Pk	31.90	-19.30	0.00	53.63	-	-	74.00	-20.37	200	366	V
		* 2.48448	45.33	Pk	31.90	-19.30	0.00	57.93	-	-	74.00	-16.07	200	366	V
		* 2.48351	30.98	RMS	31.90	-19.30	0.00	43.58	54.00	-10.42	-	-	200	366	V
		* 2.4837	31.64	RMS	31.90	-19.30	0.00	44.24	54.00	-9.76	-	-	200	366	V

Note1. Pk - Peak detector, RMS - RMS detectior
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

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