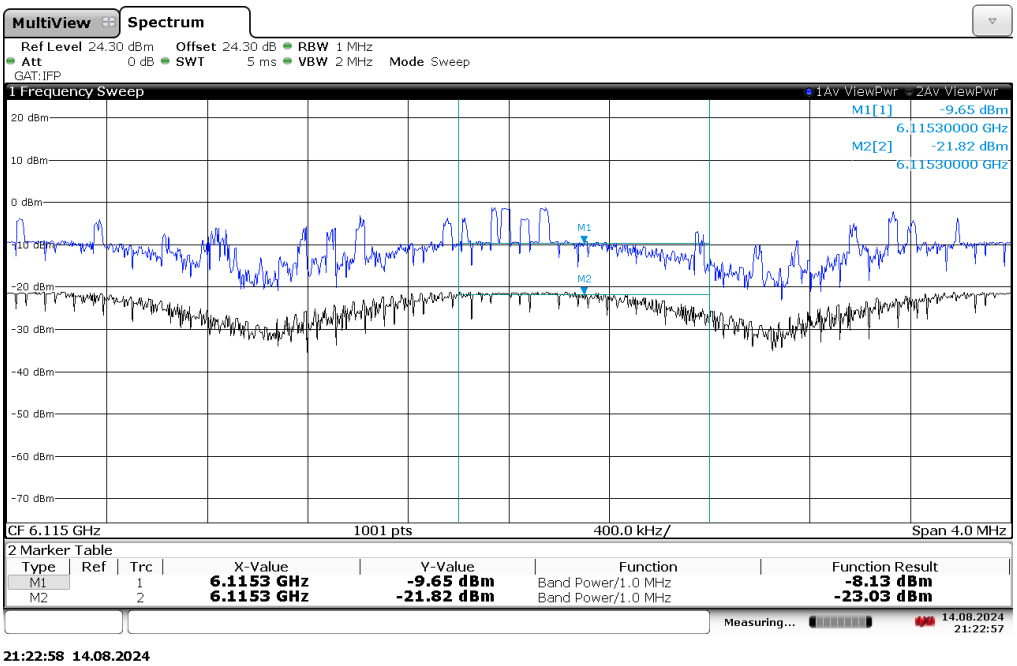
Frequency [MHz]	Measured Power Density [dBm/MHz]	Antenna Gain [dBi]	e.i.r.p Power Density [dBm/MHz]	TPC e.i.r.p Power Density Limit [dBm/MHz]	Verdict
6115	-8.13	-3.50	-11.63	-5.00	PASS
6236	-9.74	-3.50	-13.24	-5.00	PASS
6377	-7.48	-3.90	-11.38	-5.00	PASS

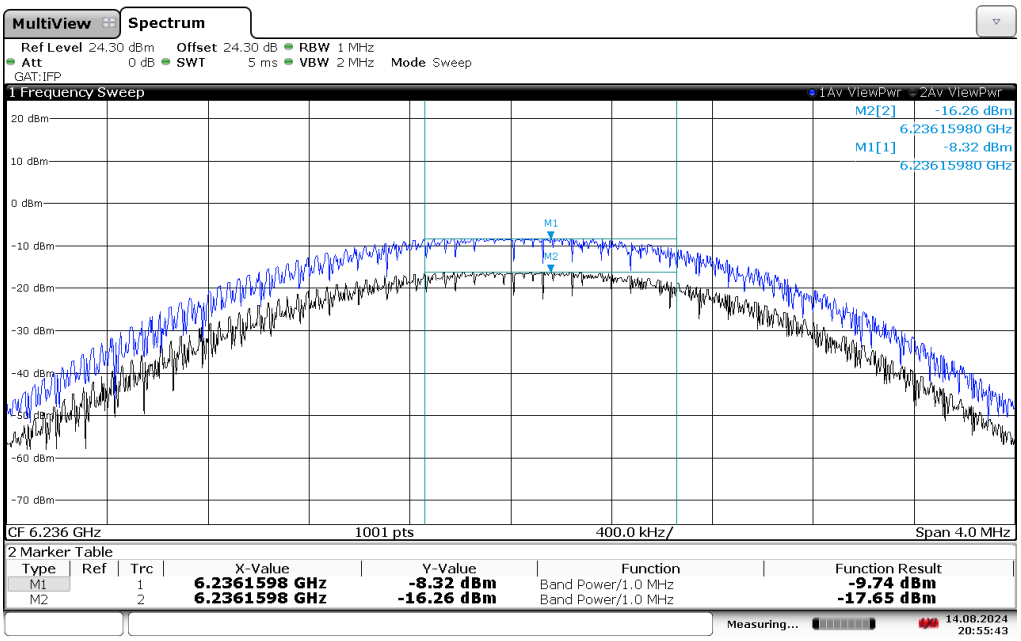
Table 7-8. PSD Measurements (no TPC)

Frequency [MHz]	Measured Power Density [dBm/MHz]	Antenna Gain [dBi]	e.i.r.p Power Density [dBm/MHz]	TPC e.i.r.p Power Density Limit [dBm/MHz]	Verdict
6115	-23.03	-3.50	-26.53	-11.00	PASS
6236	-17.65	-3.50	-21.15	-11.00	PASS
6377	-17.86	-3.90	-21.76	-11.00	PASS

Table 7-9. PSD Measurements (with TPC)

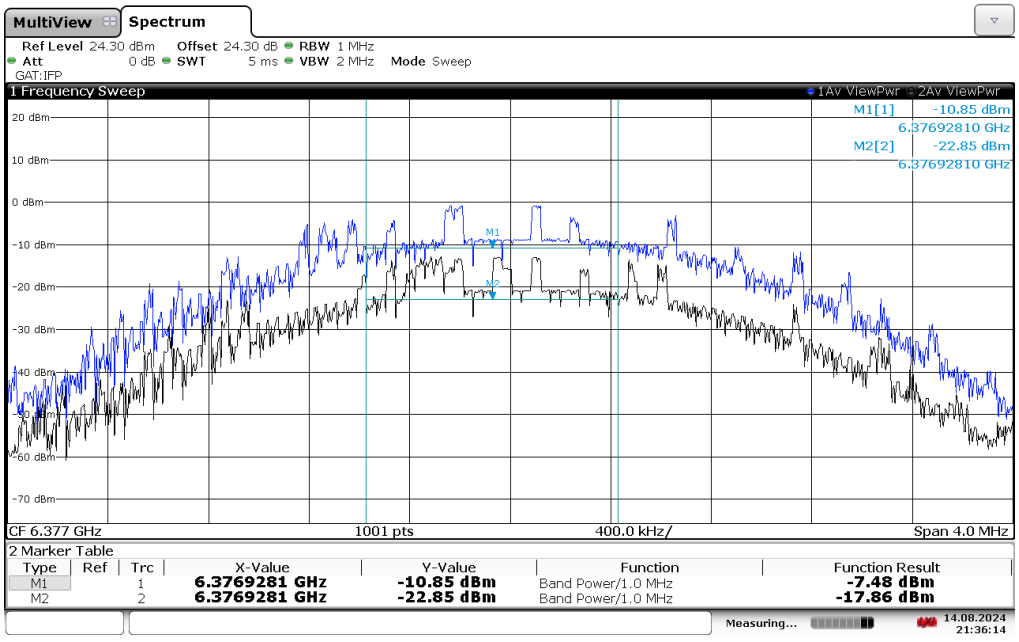


Plot 7-59. Power Spectral Density Plot (NB UNII, 6115MHz)



20:55:44 14.08.2024

Plot 7-60. Power Spectral Density Plot (NB UNII, 6236MHz)



21:36:14 14.08.2024

Plot 7-61. Power Spectral Density Plot (NB UNII, 6377MHz)

7.8 Radiated Spurious Emission – Above 1GHz

§15.407(b) §15.205 §15.209

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2020 and KDB 789033 D02 v02r01, and at the appropriate frequencies. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 7-13 per Section 15.209.

Frequency	Field Strength [µV/m]	Measured Distance [Meters]
Above 960.0 MHz	500	3

Table 7-10. Radiated Limits

Test Procedures Used

ANSI C63.10-2020 – Sections 12.7.7.2, 12.7.6
KDB 789033 D02 v02r01 – Section G

Test Settings

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = power average (RMS)
5. Number of measurement points = 1001 (Number of points must be ≥ 2 x span/RBW)
6. Averaging type = power (RMS)
7. Sweep time = auto couple
8. Trace was averaged over 100 sweeps

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

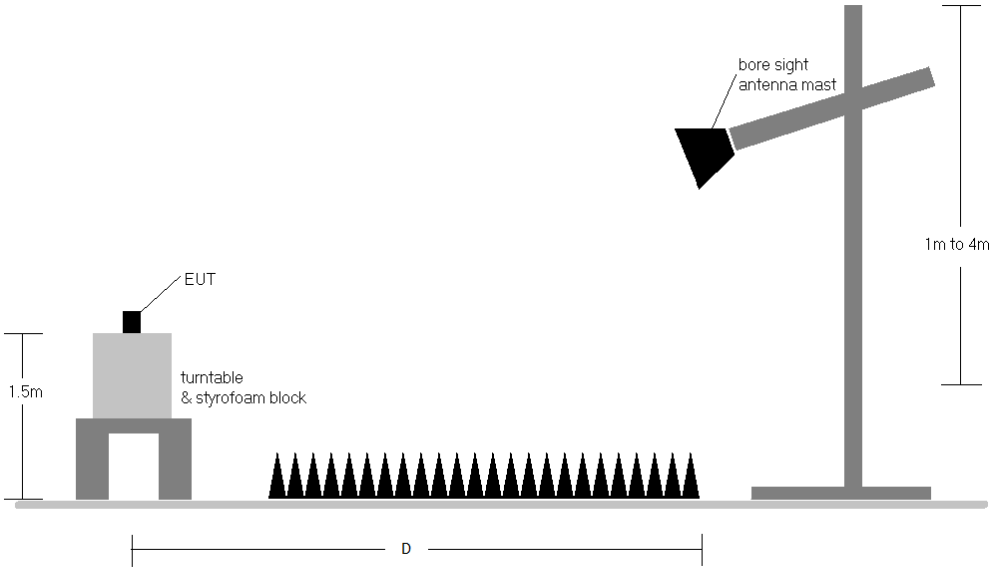


Figure 7-8. Test Instrument & Measurement Setup

Test Notes

1. All emissions that lie in the restricted bands (denoted by a * next to the frequency) specified in §15.205 are below the limit shown in Table 7-10.
2. All spurious emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-10. All spurious emissions that do not lie in a restricted band are subject to a limit of -27dBm/MHz. At a distance of 3 meters, the field strength limit in dBμV/m can be determined by adding a “conversion” factor of 95.2dB to the EIRP limit of -27dBm/MHz to obtain the limit for out of band spurious emissions of 68.2dBμV/m.
3. The antenna is manipulated through typical positions, polarity and length during the tests. The EUT is manipulated through three orthogonal planes.
4. This unit was tested with its standard battery.
5. The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. Above 1 GHz, average and peak measurements were taken using linearly polarized horn antennas.
6. D is the measurement test distance and emissions 1-18GHz were measured at a 3 meters test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.
7. The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Sample Calculations

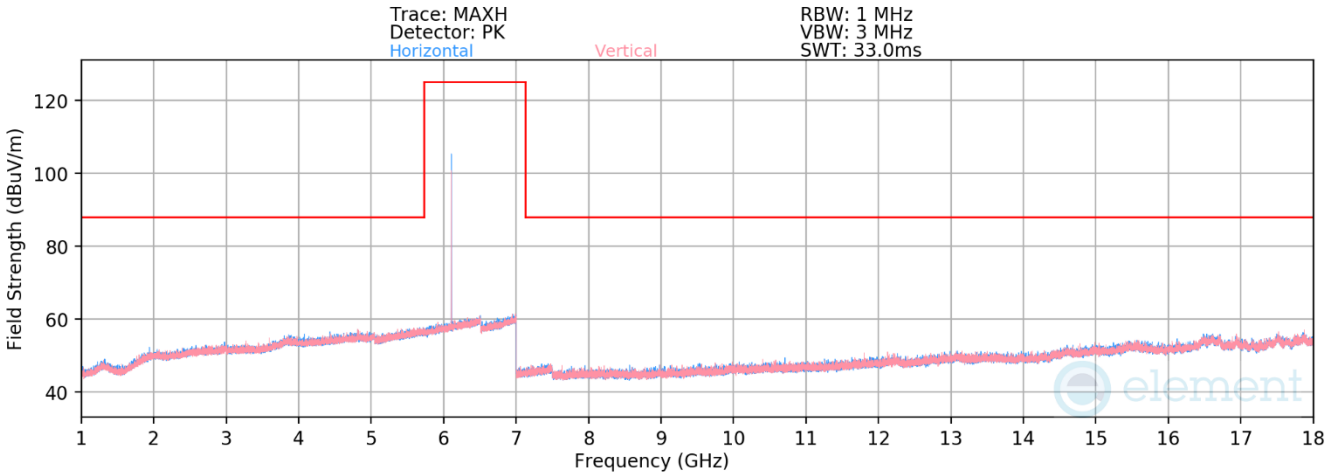
Determining Spurious Emissions Levels

- Field Strength Level $_{[dB\mu V/m]}$ = Analyzer Level $_{[dBm]}$ + 107 + AFCL $_{[dB/m]}$
- AFCL $_{[dB/m]}$ = Antenna Factor $_{[dB/m]}$ + Cable Loss $_{[dB]}$ – Preamplifier Gain $_{[dB]}$
- Margin $_{[dB]}$ = Field Strength Level $_{[dB\mu V/m]}$ – Limit $_{[dB\mu V/m]}$

Radiated Band Edge Measurement Offset

- The amplitude offset shown in the radiated restricted band edge plots in Section 7.8.2 was calculated using the formula:
  Offset (dB) = (Antenna Factor + Cable Loss + Attenuator) – Preamplifier Gain

7.8.1 Radiated Spurious Emission (Above 1GHz)

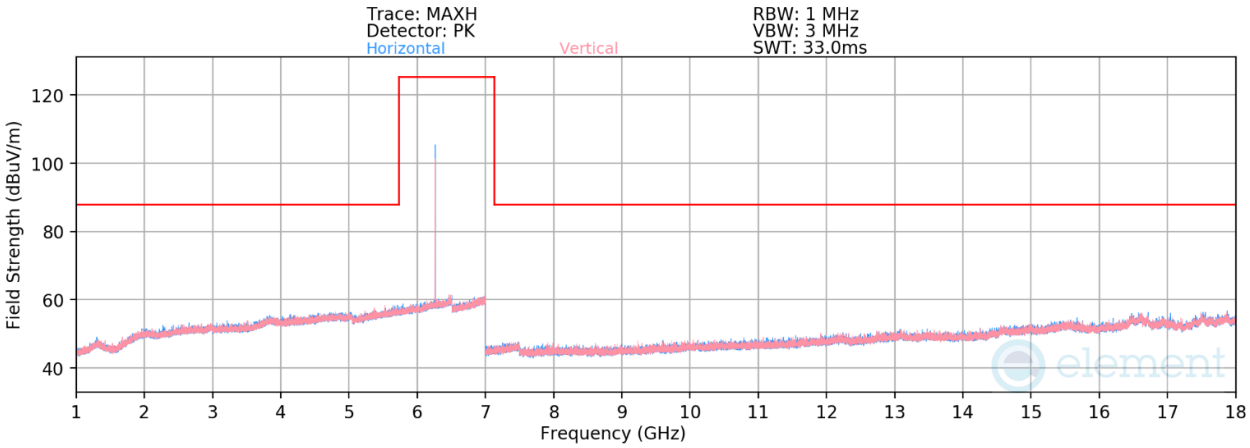


Plot 7-62. Radiated Spurious Emissions 1-18GHz (NB UNII BDR – 6108MHz)

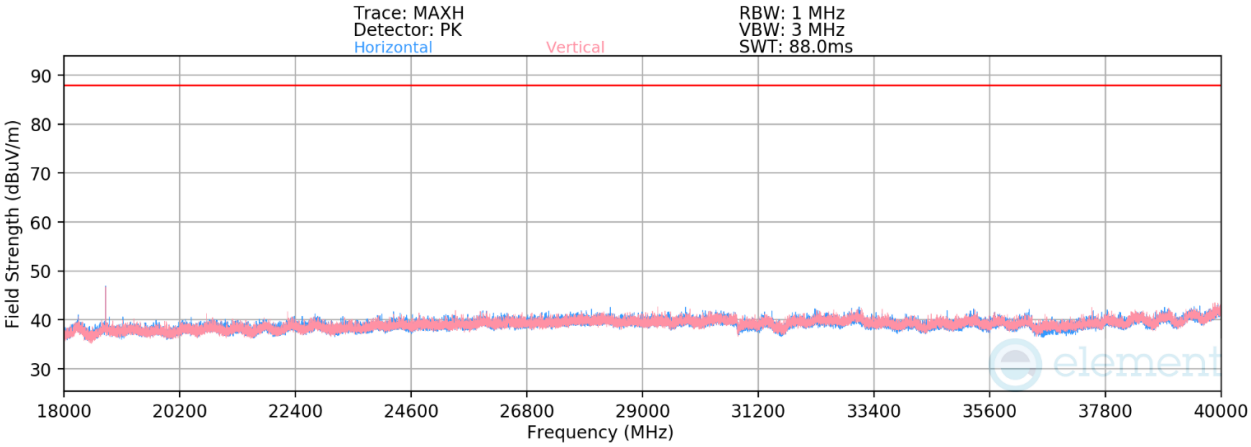
Mode:	NB UNII BDR
Data Rate:	1Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	6108MHz

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	12216.00	Avg	-	-	-	-78.85	10.70	38.85	53.98	-15.13
*	12216.00	Peak	-	-	-	-68.68	10.70	49.02	73.98	-24.96

Table 7-11. Radiated Spurious Emissions Measurements



Plot 7-63. Radiated Spurious Emissions 1-18GHz (NB UNII BDR – 6264MHz)

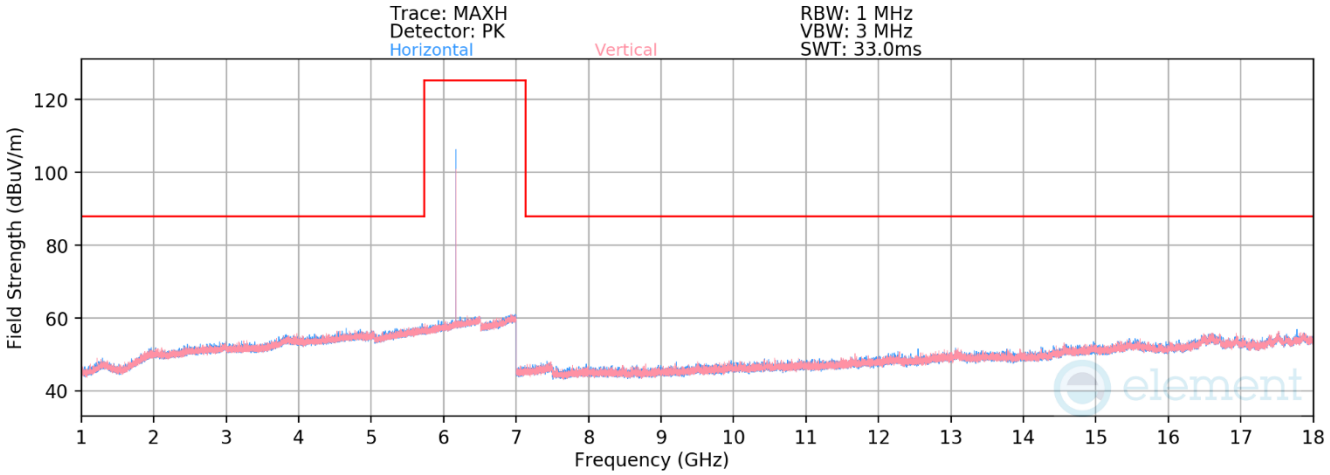


Plot 7-64. Radiated Spurious Emissions 18-40GHz (NB UNII BDR– 6264MHz)

Mode:	NB UNII BDR
Data Rate:	1Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	6264MHz

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	12528.00	Avg	-	-	-	-78.79	10.84	0.00	39.05	53.98	-14.93
*	12528.00	Peak	-	-	-	-68.44	10.84	0.00	49.40	73.98	-24.58
*	18792.00	Avg	V	353	240	-56.19	-6.88	1.18	45.11	53.98	-8.87
*	18792.00	Peak	V	353	240	-49.80	-6.88	0.00	50.32	73.98	-23.66
	25056.00	Avg	-	-	-	-71.96	-4.99	0.00	30.05	68.23	-38.18
	25056.00	Peak	-	-	-	-60.11	-4.99	0.00	41.90	88.23	-46.33
*	31320.00	Avg	V	282	216	-68.61	-1.67	1.18	37.90	53.98	-16.08
*	31320.00	Peak	V	282	216	-59.73	-1.67	0.00	45.60	73.98	-28.38
	37584.00	Avg	-	-	-	-70.10	-6.50	0.00	30.40	68.23	-37.83
	37584.00	Peak	-	-	-	-58.73	-6.50	0.00	41.77	88.23	-46.46

Table 7-12. Radiated Spurious Emissions Measurements

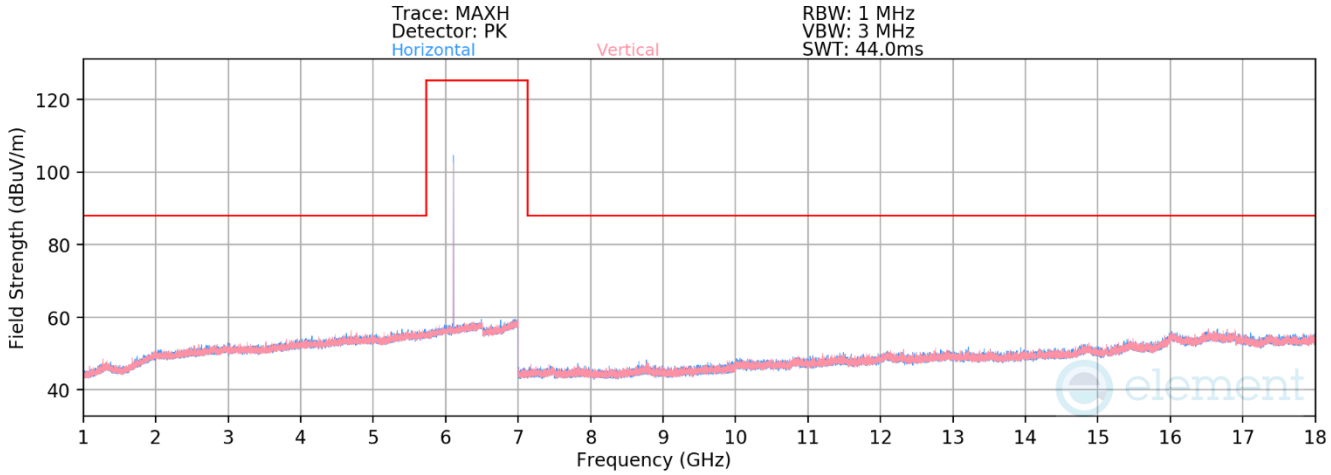


Plot 7-65. Radiated Spurious Emissions 1-18GHz (NB UNII BDR – 6420MHz)

Mode:	NB UNII BDR
Data Rate:	1Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	6420MHz

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
12840.00	Avg	-	-	-	-79.09	11.19	39.10	68.23	-29.13
12840.00	Peak	-	-	-	-67.66	11.19	50.53	88.23	-37.70

Table 7-13. Radiated Spurious Emissions Measurements

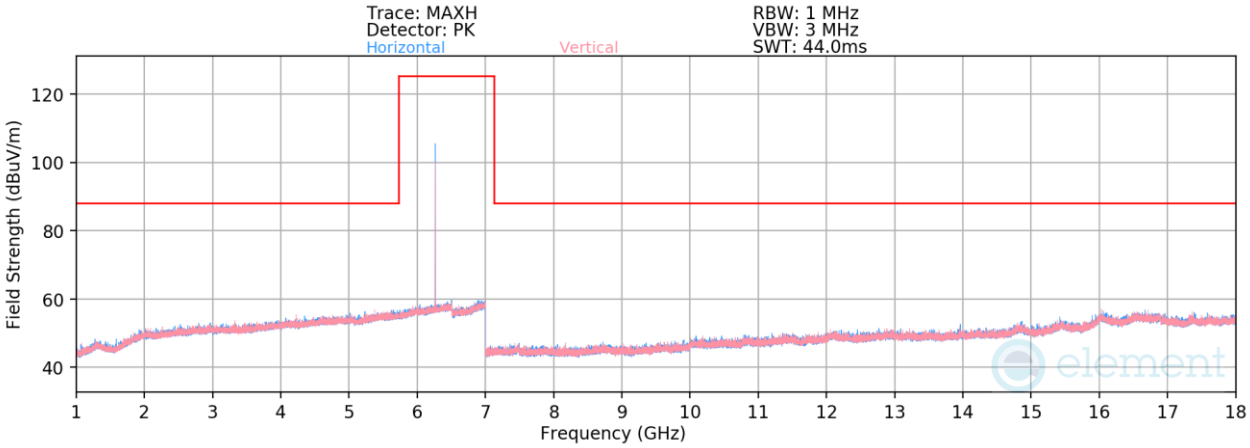


Plot 7-66. Radiated Spurious Emissions 1-18GHz (NB UNII (LE2M) – 6108MHz)

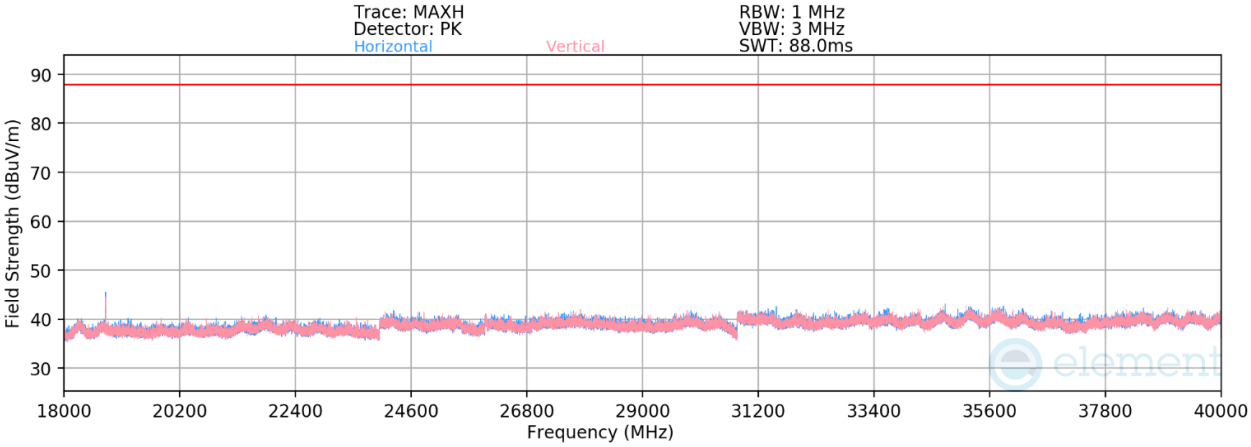
Mode:	NB UNII LE
Data Rate:	2Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	6108MHz

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	12216.00	Avg	-	-	-	-79.40	11.16	38.76	53.98	-15.22
*	12216.00	Peak	-	-	-	-68.60	11.16	49.56	73.98	-24.42

Table 7-14. Radiated Spurious Emissions Measurements



Plot 7-67. Radiated Spurious Emissions 1-18GHz (NB UNII (LE2M) – 6264MHz)

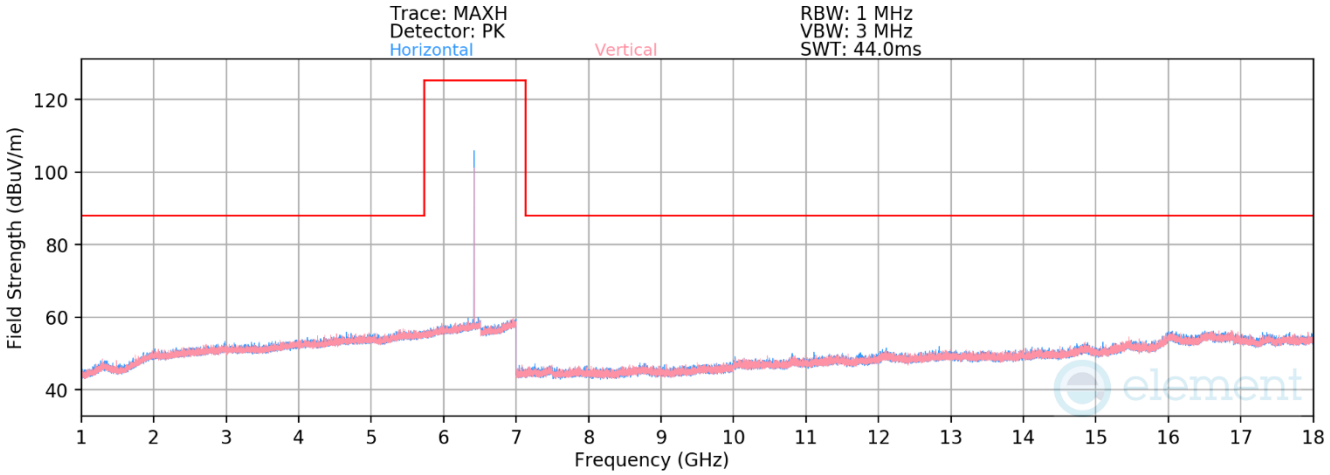


Plot 7-68. Radiated Spurious Emissions Above 18GHz (NB UNII (LE2M) – 6264MHz)

Mode:	NB UNII LE
Data Rate:	2Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	6264MHz

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	12528.00	Avg	-	-	-	-78.95	11.38	0.00	39.43	53.98	-14.55
*	12528.00	Peak	-	-	-	-67.91	11.38	0.00	50.47	73.98	-23.51
*	18792.00	Avg	H	344	43	-59.64	-6.88	0.62	41.11	53.98	-12.87
*	18792.00	Peak	H	344	43	-52.18	-6.88	0.00	47.94	73.98	-26.04
	25056.00	Avg	-	-	-	-72.08	-4.99	0.00	29.93	68.23	-38.30
	25056.00	Peak	-	-	-	-61.02	-4.99	0.00	40.99	88.23	-47.24
*	31320.00	Avg	V	55	107	-67.60	-1.67	0.62	38.36	53.98	-15.62
*	31320.00	Peak	V	55	107	-58.34	-1.67	0.00	46.99	73.98	-26.99
	37584.00	Avg	-	-	-	-71.58	-6.50	0.00	28.91	68.23	-39.32
	37584.00	Peak	-	-	-	-60.29	-6.50	0.00	40.21	88.23	-48.03

Table 7-15. Radiated Spurious Emissions Measurements

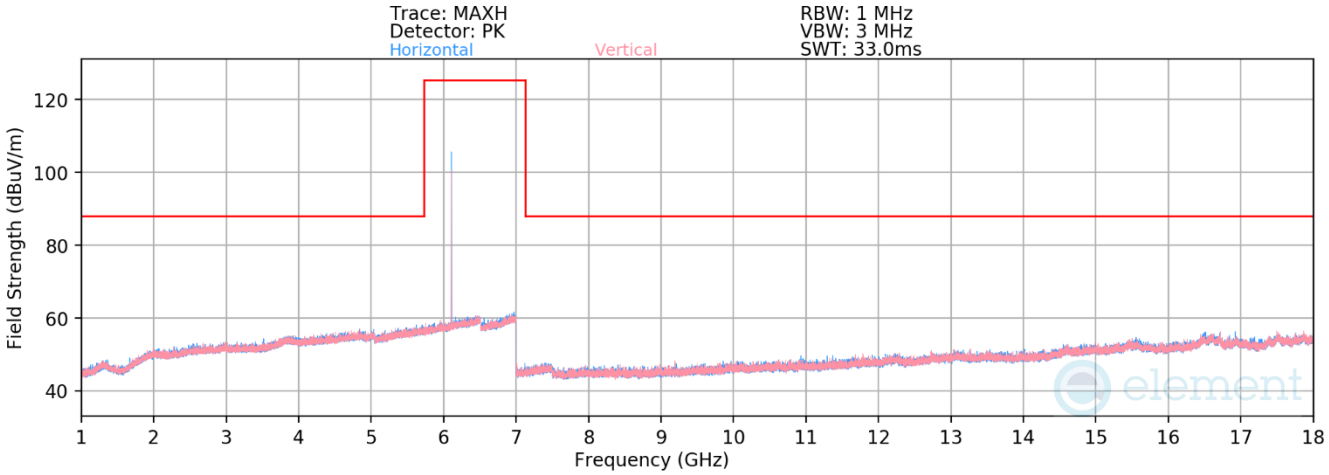


Plot 7-69. Radiated Spurious Emissions 1-18GHz (NB UNII (LE2M) – 6420MHz)

Mode:	NB UNII LE
Data Rate:	2Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	6420MHz

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
12840.00	Avg	H	104	246	-73.81	11.92	0.62	45.73	68.23	-22.50
12840.00	Peak	H	104	246	-65.38	11.92	0.00	53.54	88.23	-34.69

Table 7-16. Radiated Spurious Emissions Measurements

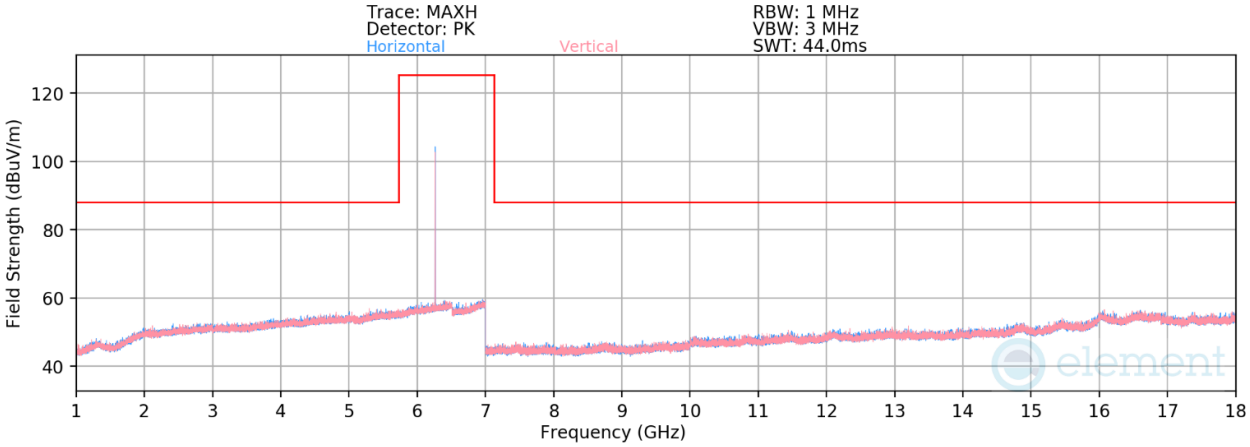


Plot 7-70. Radiated Spurious Emissions 1-18GHz (NB UNII HDR4 – 6108MHz)

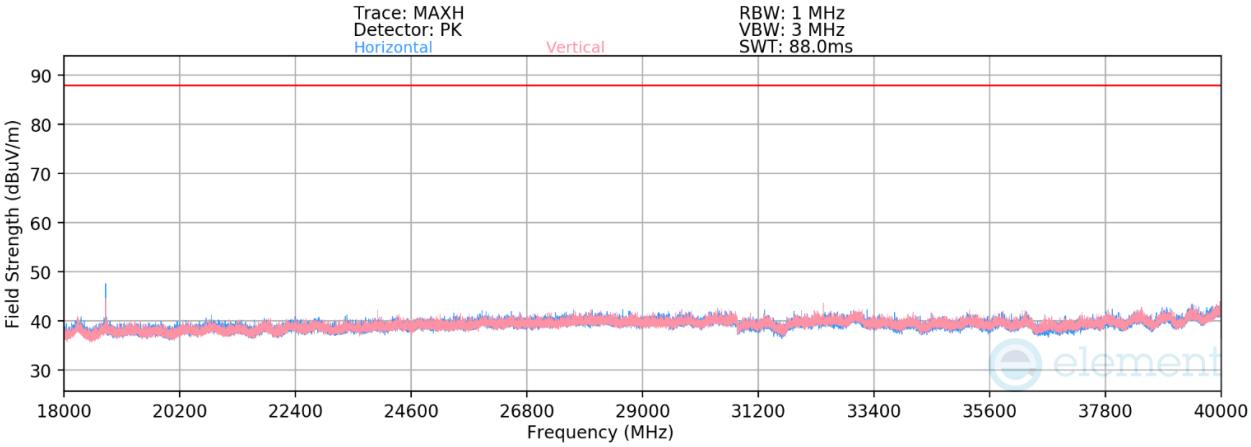
Mode:	NB UNII HDR4
Data Rate:	4Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	6108MHz

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	12216.00	Avg	-	-	-	-82.40	14.85	39.45	53.98	-14.53
*	12216.00	Peak	-	-	-	-71.70	14.85	50.15	73.98	-23.83

Table 7-17. Radiated Spurious Emissions Measurements



Plot 7-71. Radiated Spurious Emissions 1-18GHz (NB UNII HDR4 – 6264MHz)

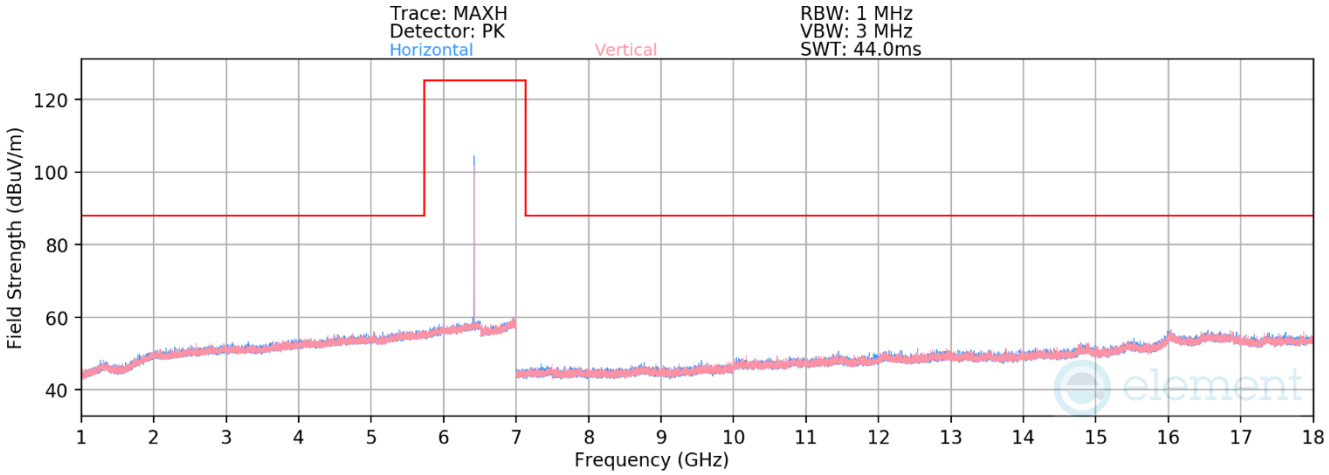


Plot 7-72. Radiated Spurious Emissions Above 18GHz (NB UNII HDR4 – 6264MHz)

Mode:	NB UNII HDR4
Data Rate:	4Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	6264MHz

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	12528.00	Avg	-	-	-	-79.07	11.54	0.00	39.47	53.98	-14.51
*	12528.00	Peak	-	-	-	-68.10	11.54	0.00	50.44	73.98	-23.54
*	18792.00	Avg	V	24	188	-60.61	-7.31	1.09	40.17	53.98	-13.81
*	18792.00	Peak	V	24	188	-50.23	-7.31	0.00	49.46	73.98	-24.52
	25056.00	Avg	-	-	-	-71.84	-4.97	0.00	30.19	68.23	-38.04
	25056.00	Peak	-	-	-	-60.55	-4.97	0.00	41.48	88.23	-46.75
*	31320.00	Avg	V	40	37	-69.70	-2.20	1.09	36.19	53.98	-17.79
*	31320.00	Peak	V	40	37	-58.41	-2.20	0.00	46.39	73.98	-27.59
	37584.00	Avg	-	-	-	-73.46	-3.21	0.00	30.33	68.23	-37.90
	37584.00	Peak	-	-	-	-61.62	-3.21	0.00	42.17	88.23	-46.06

Table 7-18. Radiated Spurious Emissions Measurements

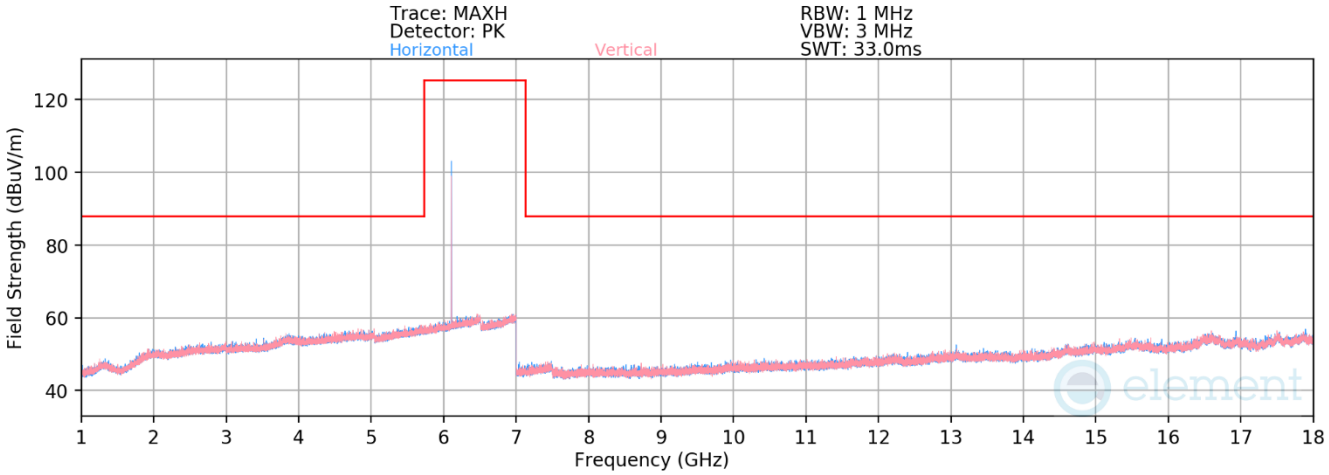


Plot 7-73. Radiated Spurious Emissions 1-18GHz (NB UNII HDR4 – 6420MHz)

Mode:	NB UNII HDR4
Data Rate:	4Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	6420MHz

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
12840.00	Avg	H	104	209	-76.93	11.86	1.09	43.02	68.23	-25.21
12840.00	Peak	H	104	209	-66.76	11.86	0.00	52.10	88.23	-36.13

Table 7-19. Radiated Spurious Emissions Measurements

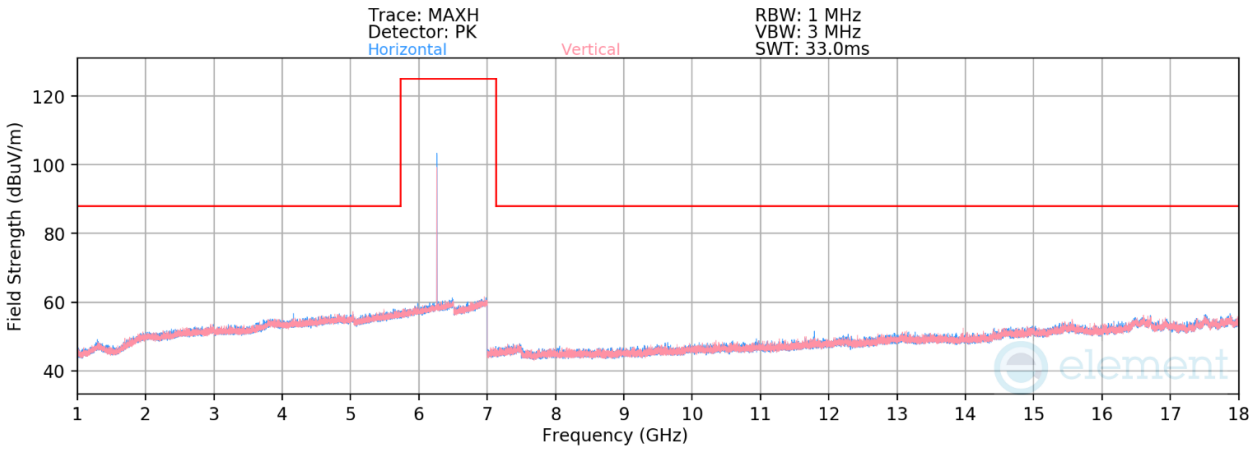


Plot 7-74. Radiated Spurious Emissions 1-18GHz (NB UNII HDRp4 – 6108MHz)

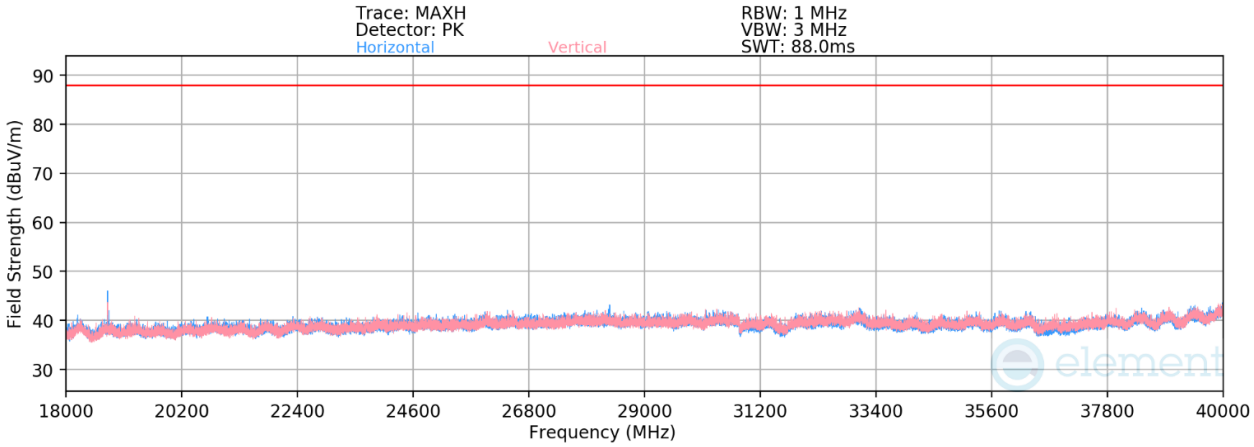
Mode:	NB UNII HDRp4
Data Rate:	4Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	6108MHz

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	12216.00	Avg	-	-	-	-78.70	10.70	39.00	53.98	-14.98
*	12216.00	Peak	-	-	-	-68.42	10.70	49.28	73.98	-24.70

Table 7-20. Radiated Spurious Emissions Measurements



Plot 7-75. Radiated Spurious Emissions 1-18GHz (NB UNII HDRp4 – 6264MHz)

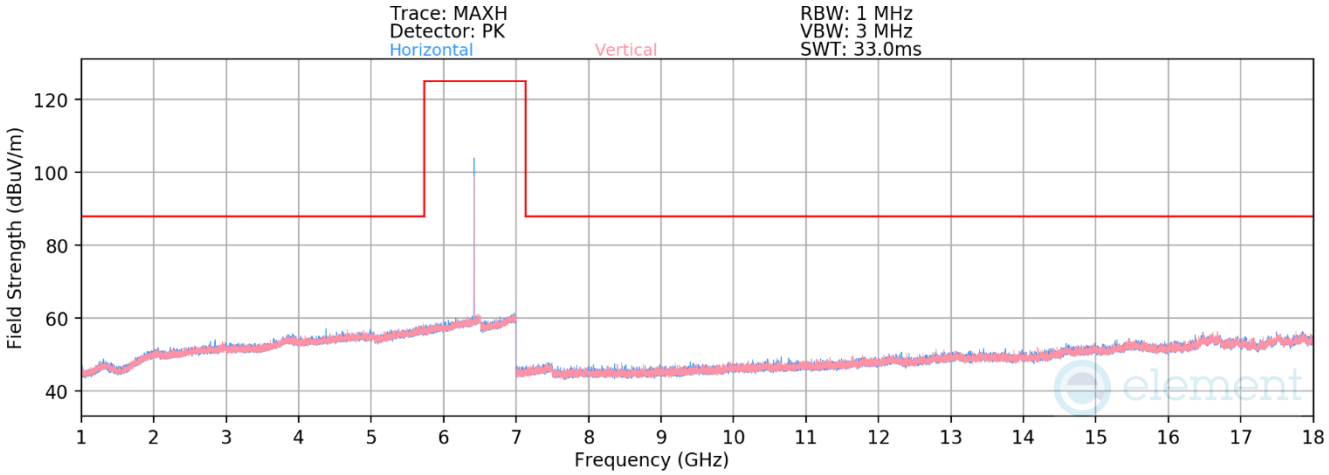


Plot 7-76. Radiated Spurious Emissions Above 18GHz (NB UNII HDRp4 – 6264MHz)

Mode:	NB UNII HDRp4
Data Rate:	4Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	6264MHz

	Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Duty Cycle Correction [dB]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
*	12528.00	Avg	-	-	-	-79.00	10.84	0.00	38.84	53.98	-15.14
*	12528.00	Peak	-	-	-	-68.31	10.84	0.00	49.53	73.98	-24.45
*	18792.00	Avg	V	27	152	-60.29	-6.88	0.60	40.43	53.98	-13.55
*	18792.00	Peak	V	27	152	-52.31	-6.88	0.00	47.81	73.98	-26.17
	25056.00	Avg	-	-	-	-71.53	-4.99	0.00	30.48	68.23	-37.75
	25056.00	Peak	-	-	-	-60.71	-4.99	0.00	41.30	88.23	-46.93
*	31320.00	Avg	V	52	55	-69.51	-1.67	0.60	36.42	53.98	-17.56
*	31320.00	Peak	V	52	55	-59.55	-1.67	0.00	45.78	73.98	-28.20
	37584.00	Avg	-	-	-	-70.28	-6.50	0.00	30.22	68.23	-38.01
	37584.00	Peak	-	-	-	-58.46	-6.50	0.00	42.04	88.23	-46.19

Table 7-21. Radiated Spurious Emissions Measurements



Plot 7-77. Radiated Spurious Emissions 1-18GHz (NB UNII HDRp4 – 6420MHz)

Mode:	NB UNII HDRp4
Data Rate:	4Mbps
Distance of Measurements:	3 Meters
Operating Frequency:	6420MHz

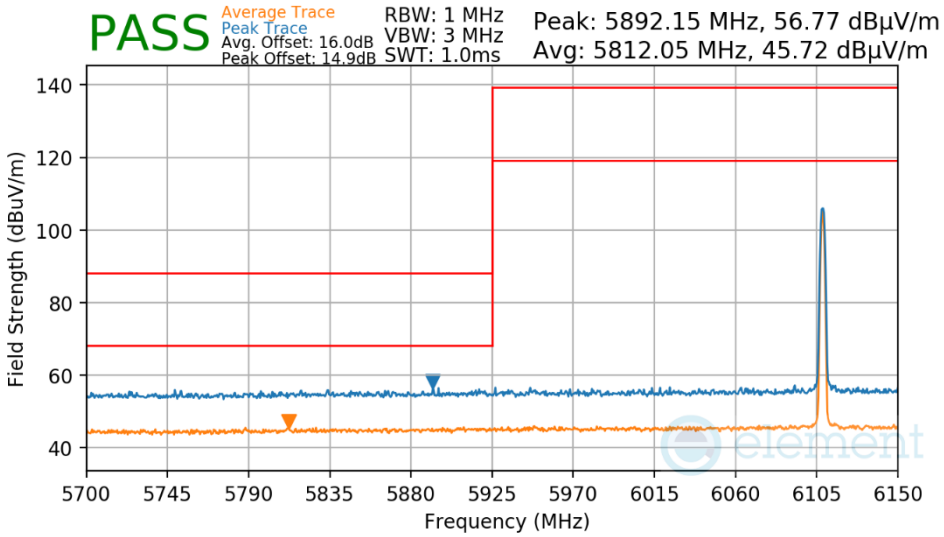
Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
12840.00	Avg	-	-	-	-79.27	11.19	38.92	68.23	-29.31
12840.00	Peak	-	-	-	-68.55	11.19	49.64	88.23	-38.59

Table 7-22. Radiated Spurious Emissions Measurements

7.8.2 Radiated Band Edge Measurements

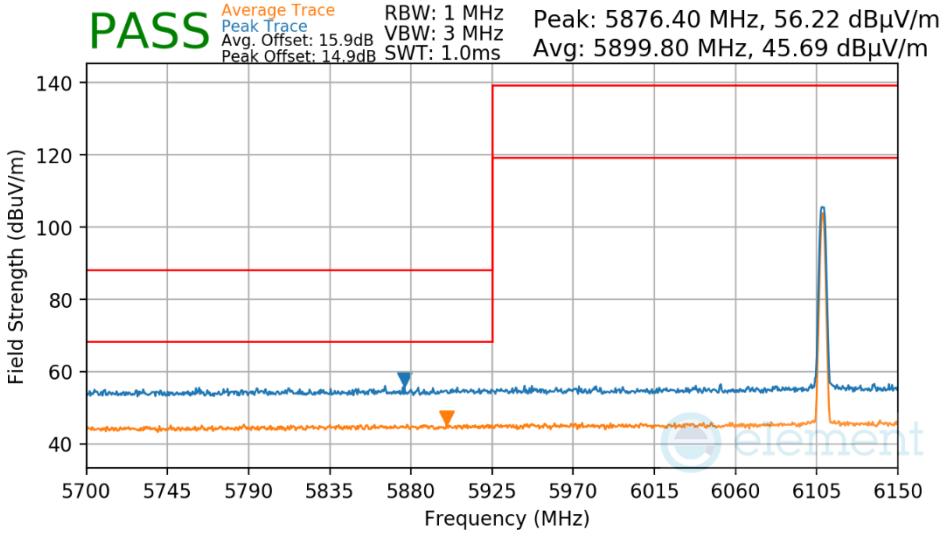
§15.407(b) §15.205 §15.209

Mode:	NB UNII BDR
Measurement Distance:	3 Meters
Operating Frequency:	6108MHz



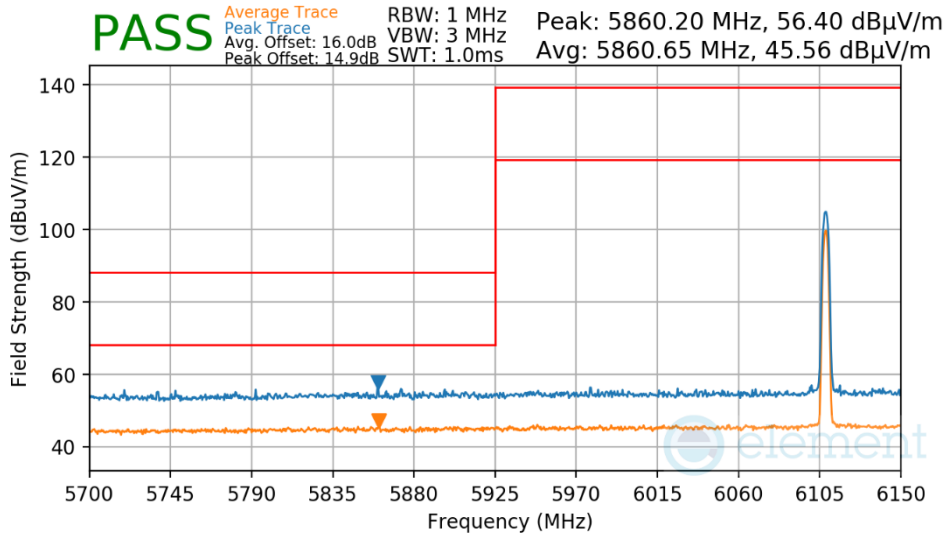
Plot 7-78. Radiated Lower Band Edge Measurement

Mode:	NB UNII LE
Data Rate:	2Mbps
Measurement Distance:	3 Meters
Operating Frequency:	6108MHz



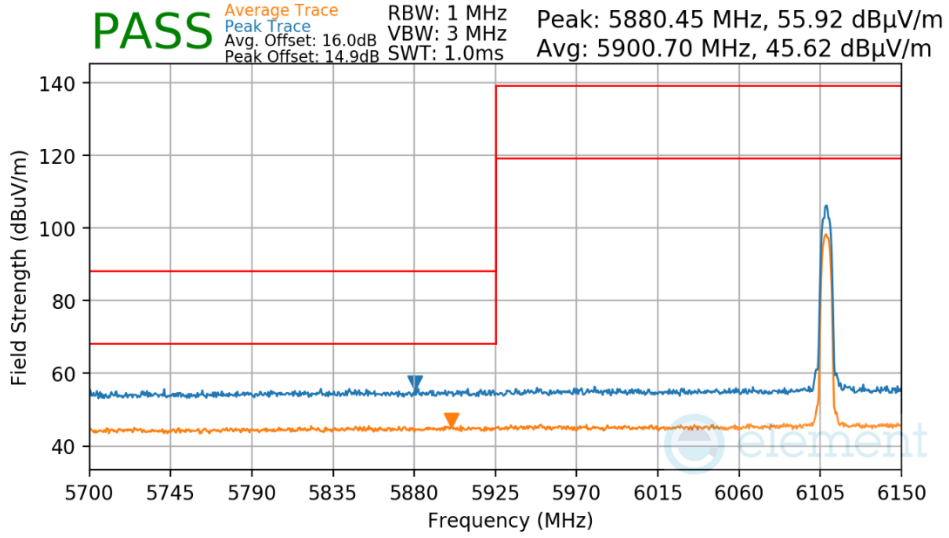
Plot 7-79. Radiated Lower Band Edge Measurement

Mode:	NB UNII HDR4
Measurement Distance:	3 Meters
Operating Frequency:	6108MHz



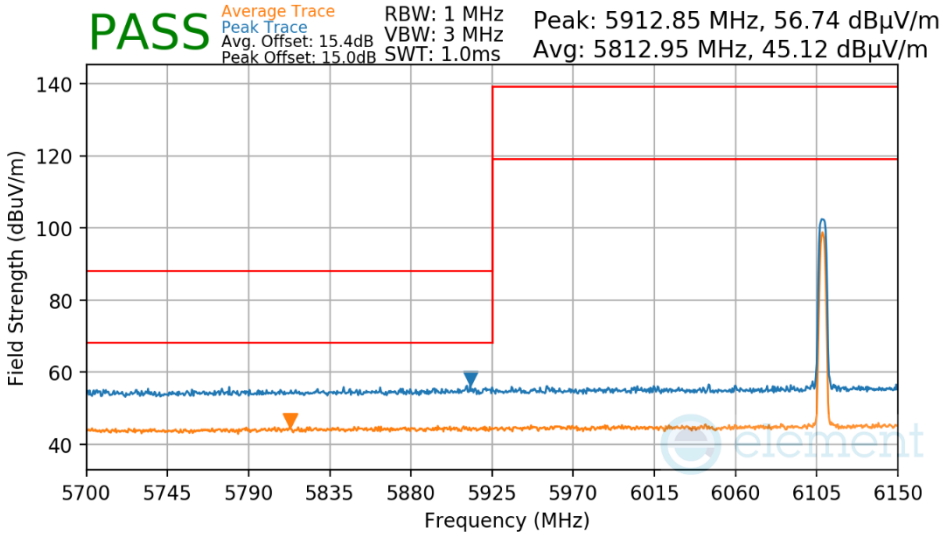
Plot 7-80. Radiated Lower Band Edge Measurement

Mode:	NB UNII HDR8
Measurement Distance:	3 Meters
Operating Frequency:	6108MHz



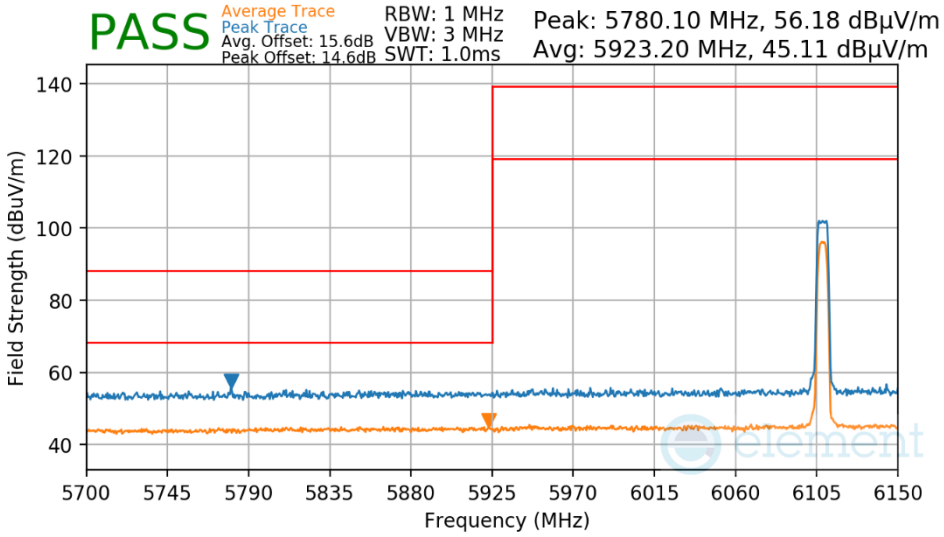
Plot 7-81. Radiated Lower Band Edge Measurement

Mode:	NB UNII HDRp4
Measurement Distance:	3 Meters
Operating Frequency:	6108MHz



Plot 7-82. Radiated Lower Band Edge Measurement

Mode:	NB UNII HDRp8
Measurement Distance:	3 Meters
Operating Frequency:	6108MHz



Plot 7-83. Radiated Lower Band Edge Measurement

7.9 Radiated Spurious Emissions – Below 1GHz

§15.209

Test Overview and Limit

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Table 7-23 per Section 15.209.

Frequency	Field Strength [µV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 7-23. Radiated Limits

Test Procedures Used

ANSI C63.10-2020

Test Settings

Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 120kHz (for emissions from 30MHz – 1GHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 120kHz (for emissions from 30MHz – 1GHz)
3. VBW = 300kHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagrams below.

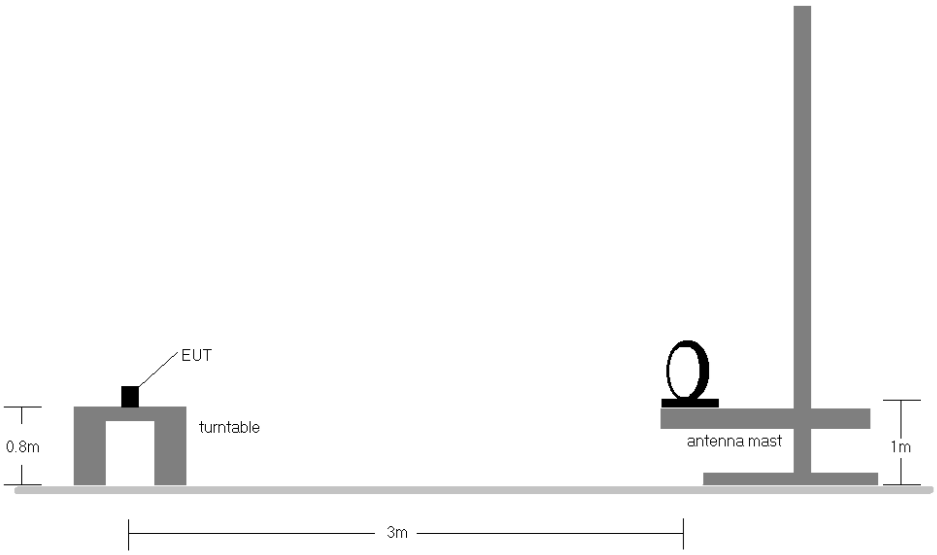


Figure 7-9. Radiated Test Setup < 30MHz

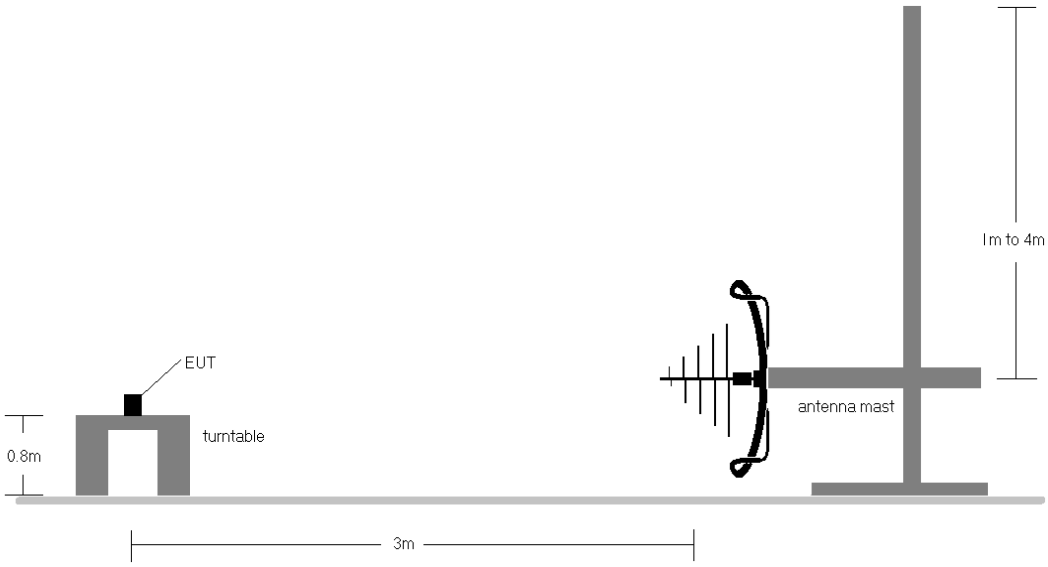


Figure 7-10. Radiated Test Setup < 1GHz

Test Notes

1. All emissions lying in restricted bands specified in §15.205 are below the limit shown in Table 7-23.
2. The broadband receive antenna is manipulated through vertical and horizontal polarizations during the tests. The EUT is manipulated through three orthogonal planes. For below 30MHz the loop antenna was positioned in 3 orthogonal planes (X front, Y side, Z top) to determine the orientation resulting in the worst case emissions.
3. This unit was tested with its standard battery.
4. The spectrum is investigated using a peak detector and final measurements are recorded using CISPR quasi peak detector for emissions within 6dB of the limit.
5. Emissions were measured at a 3 meter test distance.
6. Emissions are investigated while operating on the center channel of the mode, band, and modulation that produced the worst case results during the transmitter spurious emissions testing.
7. No spurious emissions were detected within 20dB of the limit below 30MHz.
8. The results recorded using the broadband antenna is known to correlate with the results obtained by using a tuned dipole with an acceptable degree of accuracy. The VSWR for the measurement antenna was found to be less than 2:1.
9. Both configurations below were investigated, and the worst case has been reported.
    a. EUT charged by charging case and powered by AC/DC adaptor with USB-C cable.
    b. EUT charged by charging case and powered by host PC with USB-C cable.

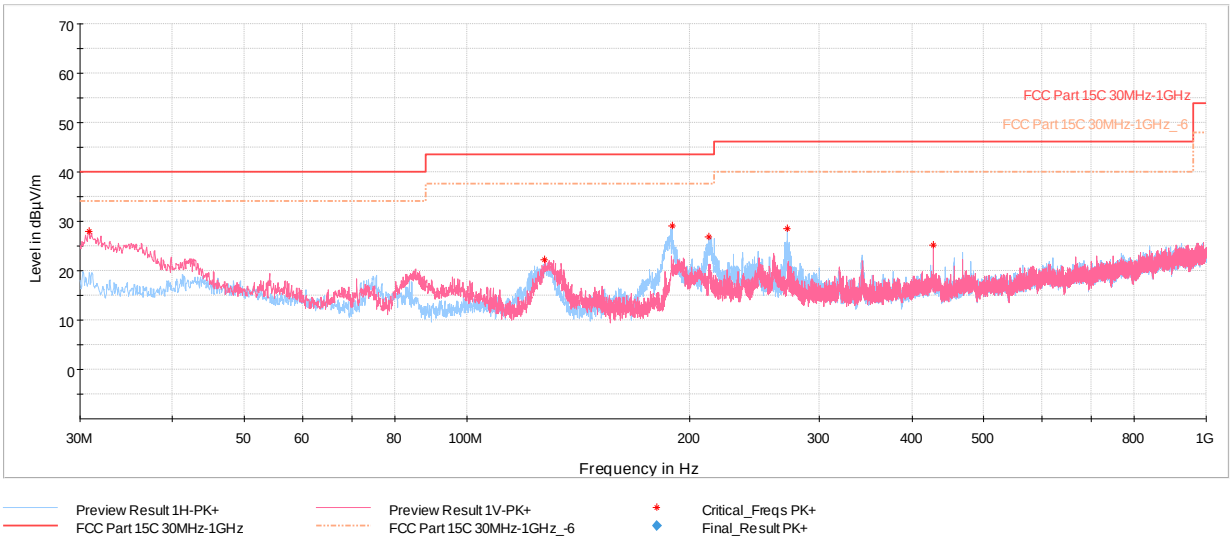
Sample Calculations

Determining Spurious Emissions Levels

- Field Strength Level $_{[dB\mu V/m]}$ = Analyzer Level $_{[dBm]}$ + 107 + AFCL $_{[dB/m]}$
- AFCL $_{[dB/m]}$ = Antenna Factor $_{[dB/m]}$ + Cable Loss $_{[dB]}$ – Preamplifier Gain $_{[dB]}$
- Margin $_{[dB]}$ = Field Strength Level $_{[dB\mu V/m]}$ – Limit $_{[dB\mu V/m]}$

Radiated Spurious Emissions (Below 1GHz)

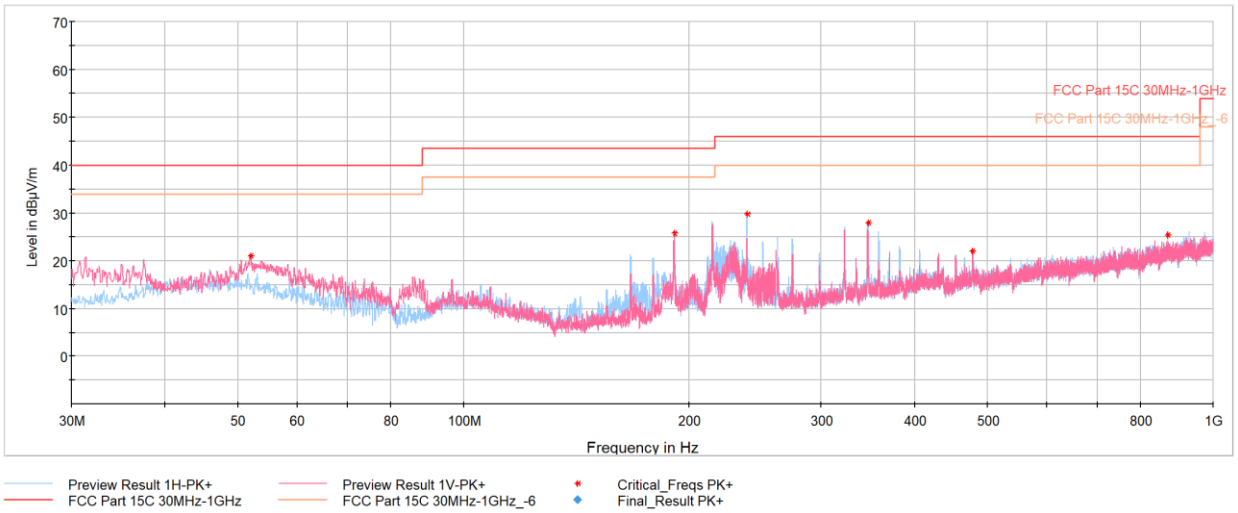
§15.209



Plot 7-84. Radiated Spurious Emissions Below 1GHz (NB UNII BDR – 6264MHz), with host PC with USB-C cable

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
30.82	Max Peak	V	100	134	-62.44	-16.68	27.88	40.00	-12.12
127.58	Max Peak	V	100	94	-64.87	-19.97	22.16	43.52	-21.36
189.71	Max Peak	H	100	194	-59.75	-18.22	29.03	43.52	-14.49
212.60	Max Peak	H	100	242	-62.47	-17.69	26.84	43.52	-16.68
271.53	Max Peak	H	100	170	-62.63	-15.84	28.53	46.02	-17.49
427.85	Max Peak	V	100	58	-70.04	-11.77	25.19	46.02	-20.83

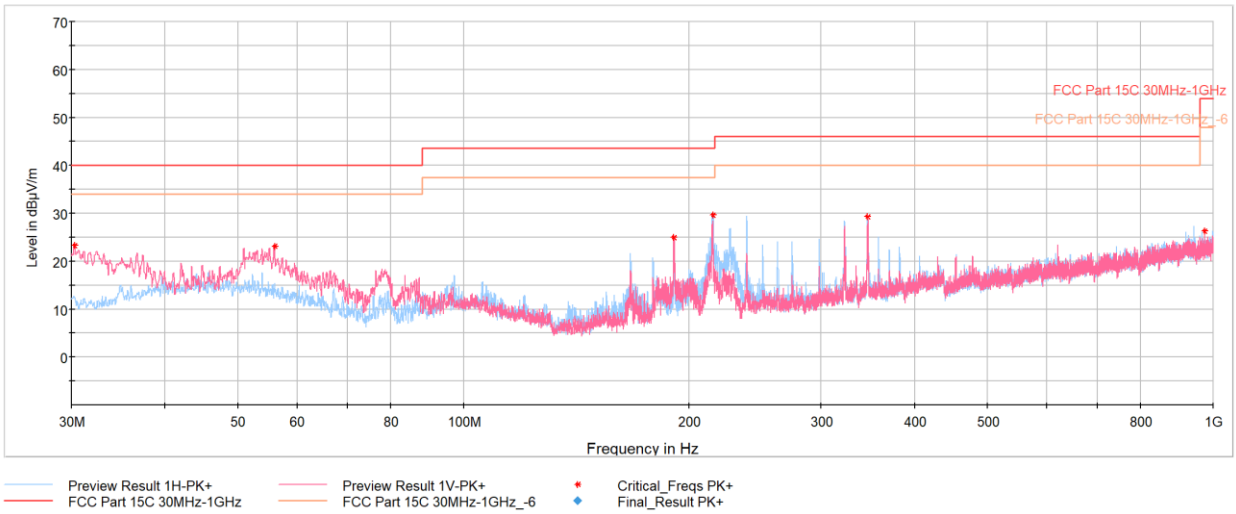
Table 7-24. Radiated Spurious Emissions Below 1GHz (NB UNII BDR – 6264MHz), with host PC with USB-C cable



Plot 7-85. Radiated Spurious Emissions Below 1GHz (NB UNII (LE2M) – 6264MHz), with AC/DC Adapter with USB-C Cable

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
52.02	Max Peak	V	100	276	-72.05	-13.91	21.04	40.00	-18.96
190.97	Max Peak	V	100	90	-63.24	-17.99	25.77	43.52	-17.75
238.79	Max Peak	H	100	151	-60.90	-16.37	29.73	46.02	-16.29
346.17	Max Peak	H	100	54	-65.63	-13.40	27.97	46.02	-18.05
477.56	Max Peak	H	100	0	-74.12	-10.92	21.96	46.02	-24.06
868.27	Max Peak	H	200	116	-77.44	-4.22	25.34	46.02	-20.68

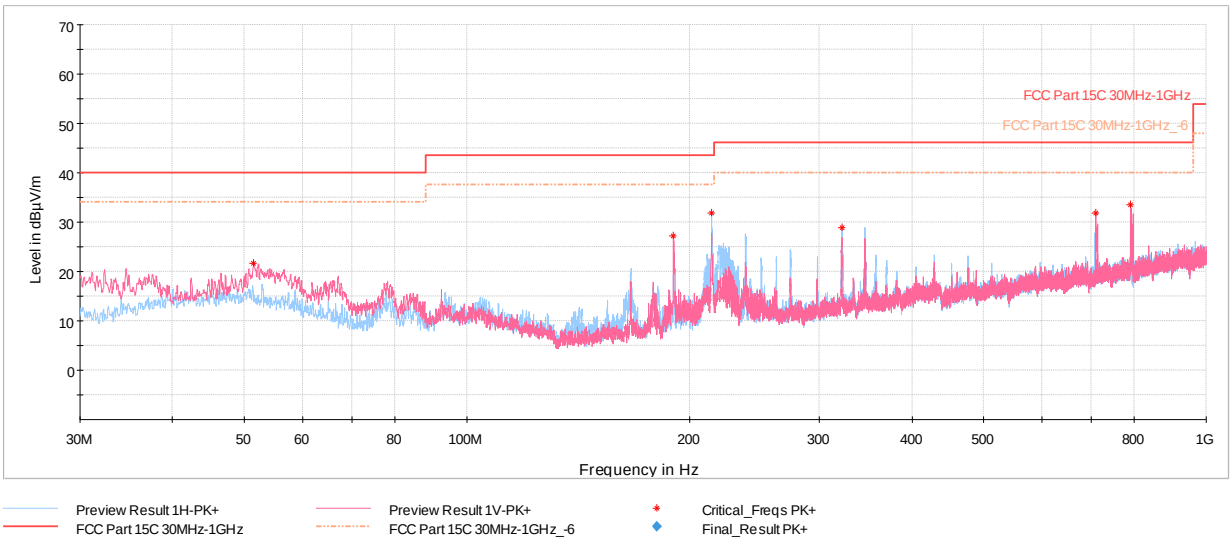
Table 7-25. Radiated Spurious Emissions Below 1GHz (NB UNII (LE2M) – 6264MHz), with AC/DC Adapter with USB-C Cable



Plot 7-86. Radiated Spurious Emissions Below 1GHz (NB UNII HDR4 – 6264MHz), with AC/DC Adapter with USB-C Cable

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
30.29	Max Peak	V	100	326	-67.37	-16.40	23.23	40.00	-16.77
56.00	Max Peak	V	100	6	-69.07	-14.74	23.19	40.00	-16.81
190.78	Max Peak	V	100	69	-63.95	-18.03	25.02	43.52	-18.50
215.03	Max Peak	H	100	339	-59.74	-17.54	29.72	43.52	-13.80
345.88	Max Peak	H	100	137	-64.27	-13.42	29.31	46.02	-16.71
973.47	Max Peak	V	100	345	-77.55	-3.18	26.27	53.98	-27.71

Table 7-26. Radiated Spurious Emissions Below 1GHz (NB UNII HDR4 – 6264MHz), with AC/DC Adapter with USB-C Cable



Plot 7-87. Radiated Spurious Emissions Below 1GHz (NB UNII HDRp4 – 6264MHz), with AC/DC Adapter with USB-C Cable

Frequency [MHz]	Detector	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	Limit [dBµV/m]	Margin [dB]
51.53	Max Peak	V	100	327	-71.45	-13.84	21.71	40.00	-18.29
190.49	Max Peak	V	100	82	-61.66	-18.09	27.25	43.52	-16.27
214.59	Max Peak	H	100	312	-57.62	-17.59	31.79	43.52	-11.73
321.87	Max Peak	H	100	299	-63.67	-14.39	28.94	46.02	-17.08
709.00	Max Peak	V	200	0	-68.06	-7.11	31.83	46.02	-14.19
789.17	Max Peak	V	200	25	-67.58	-5.95	33.47	46.02	-12.55

Table 7-27. Radiated Spurious Emissions Below 1GHz (NB UNII HDRp4 – 6264MHz), with AC/DC Adapter with USB-C Cable

7.10 AC Line Conducted Emissions Measurement

§15.207

Test Overview and Limit

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for AC Line conducted spurious emissions. All data rates and modes were investigated for AC Line conducted spurious emissions.

All conducted emissions must not exceed the limits shown in the table below, per Section 15.207.

Frequency of emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

Table 7-28. Conducted Limits

*Decreases with the logarithm of the frequency.

Test Procedures Used

ANSI C63.10-2020, Section 6.2

Test Settings

Quasi-Peak Measurements

1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

Average Measurements

1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = RMS
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

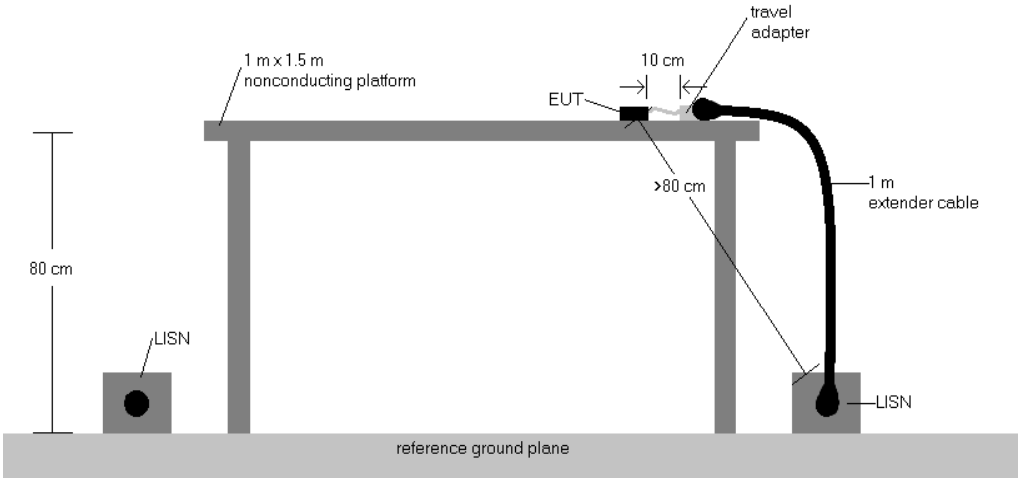
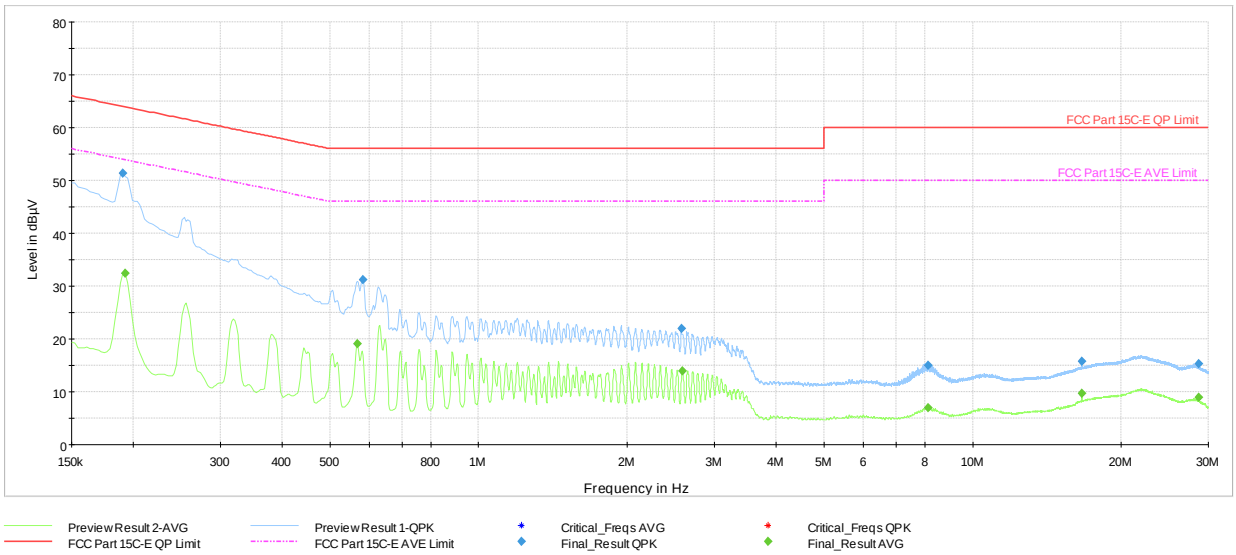


Figure 7-11. Test Instrument & Measurement Setup

Test Notes

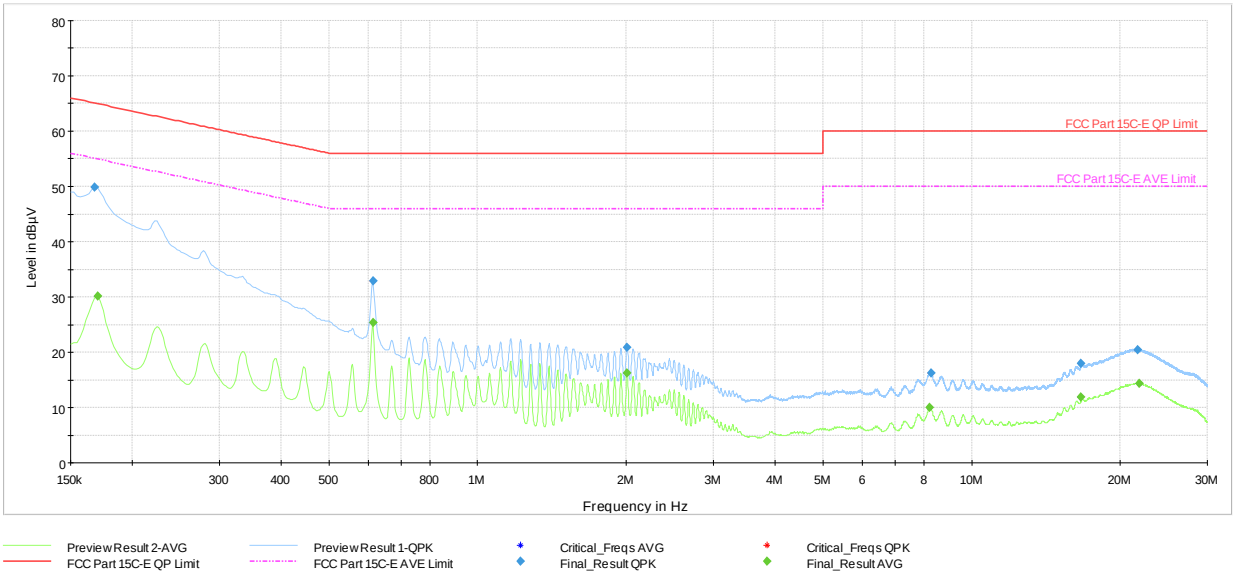
1. All modes of operation were investigated and the worst-case emissions are reported. The emissions found were not affected by the choice of channel used during testing.
2. Both configurations below were investigated, and the worst case has been reported.
    a. EUT charged by charging case and powered by AC/DC adaptor with USB-C cable.
    b. EUT charged by charging case and powered by host PC with USB-C cable.
3. The limit for an intentional radiator from 150kHz to 30MHz are specified in 15.207.
4. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
5. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Correction Factor (dB)
6. Margin (dB) = QP/AV Level (dBμV) - QP/AV Limit (dBμV)
7. Traces shown in plots are made using quasi-peak and average detectors.
8. Deviations to the Specifications: None.



Plot 7-88. AC Line Conducted Plot (NB UNII BDR – 6264MHz) (L1) with host PC with USB-C cable

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.191	FINAL	51.4	—	64.02	-12.63	L1	GND
0.193	FINAL	—	32.45	53.92	-21.47	L1	GND
0.569	FINAL	—	19.15	46.00	-26.85	L1	GND
0.584	FINAL	31.3	—	56.00	-24.73	L1	GND
2.571	FINAL	21.9	—	56.00	-34.06	L1	GND
2.585	FINAL	—	13.90	46.00	-32.10	L1	GND
8.135	FINAL	—	6.97	50.00	-43.03	L1	GND
8.142	FINAL	15.0	—	60.00	-44.96	L1	GND
16.622	FINAL	15.7	—	60.00	-44.27	L1	GND
16.622	FINAL	—	9.71	50.00	-40.29	L1	GND
28.687	FINAL	—	8.87	50.00	-41.13	L1	GND
28.687	FINAL	15.2	—	60.00	-44.76	L1	GND

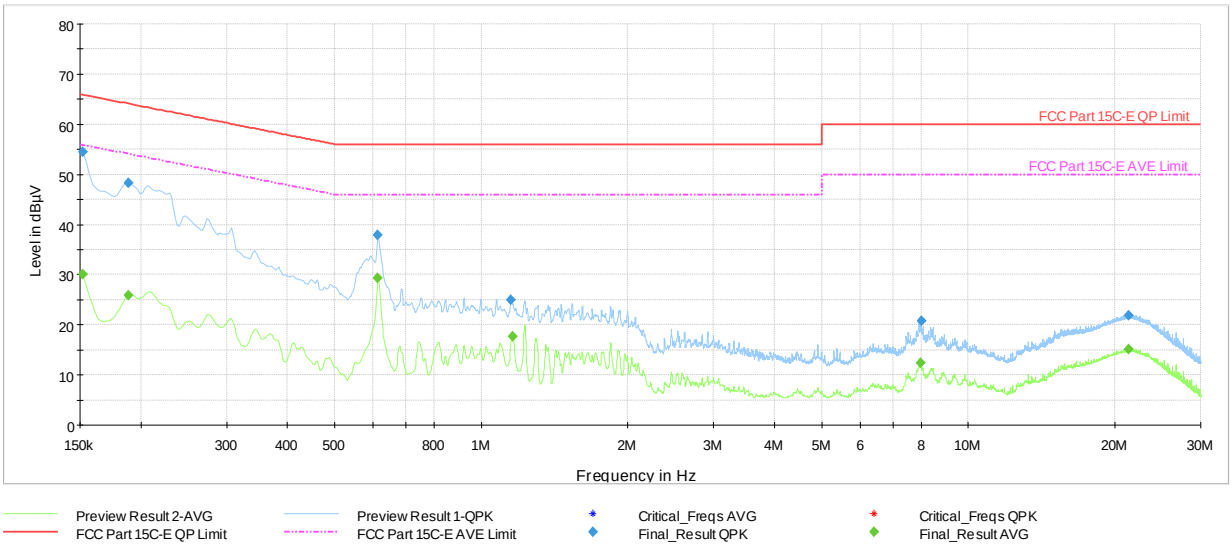
Table 7-29. AC Line Conducted Data (NB UNII BDR – 6264MHz) (L1) with host PC with USB-C cable



Plot 7-89. AC Line Conducted Plot (NB UNII BDR – 6264MHz) (N) with host PC with USB-C cable

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.168	FINAL	49.9	—	65.06	-15.14	N	GND
0.170	FINAL	—	30.20	54.95	-24.75	N	GND
0.614	FINAL	—	25.37	46.00	-20.63	N	GND
0.614	FINAL	32.9	—	56.00	-23.07	N	GND
2.006	FINAL	—	16.22	46.00	-29.78	N	GND
2.006	FINAL	20.9	—	56.00	-35.14	N	GND
8.210	FINAL	—	9.97	50.00	-40.03	N	GND
8.284	FINAL	16.2	—	60.00	-43.80	N	GND
16.625	FINAL	18.0	—	60.00	-42.01	N	GND
16.625	FINAL	—	11.90	50.00	-38.10	N	GND
21.662	FINAL	20.5	—	60.00	-39.51	N	GND
21.849	FINAL	—	14.30	50.00	-35.70	N	GND

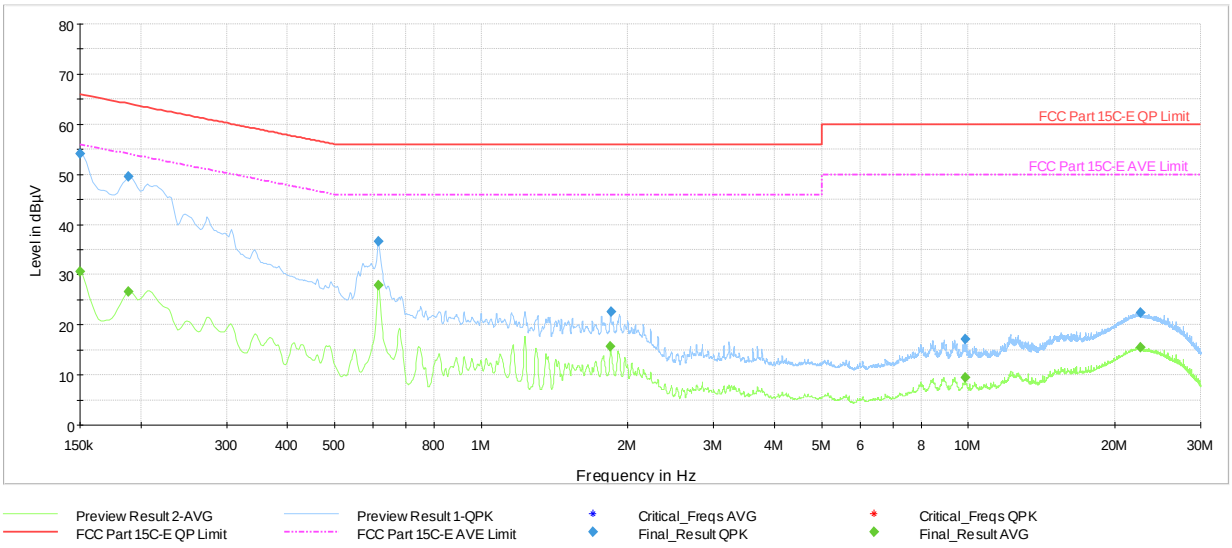
Table 7-30. AC Line Conducted Data (NB UNII BDR – 6264MHz) (N) with host PC with USB-C cable



Plot 7-90. AC Line Conducted Plot (NB UNII (LE2M) – 6264MHz) (L1) with host PC with USB-C cable

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.152	FINAL	—	30.03	55.88	-25.85	L1	GND
0.152	FINAL	54.4	—	65.88	-11.46	L1	GND
0.188	FINAL	—	25.91	54.11	-28.21	L1	GND
0.188	FINAL	48.4	—	64.11	-15.73	L1	GND
0.614	FINAL	—	29.36	46.00	-16.64	L1	GND
0.614	FINAL	37.9	—	56.00	-18.12	L1	GND
1.151	FINAL	25.0	—	56.00	-31.04	L1	GND
1.158	FINAL	—	17.73	46.00	-28.27	L1	GND
7.985	FINAL	—	12.48	50.00	-37.52	L1	GND
8.000	FINAL	20.8	—	60.00	-39.20	L1	GND
21.329	FINAL	—	15.11	50.00	-34.89	L1	GND
21.336	FINAL	21.9	—	60.00	-38.08	L1	GND

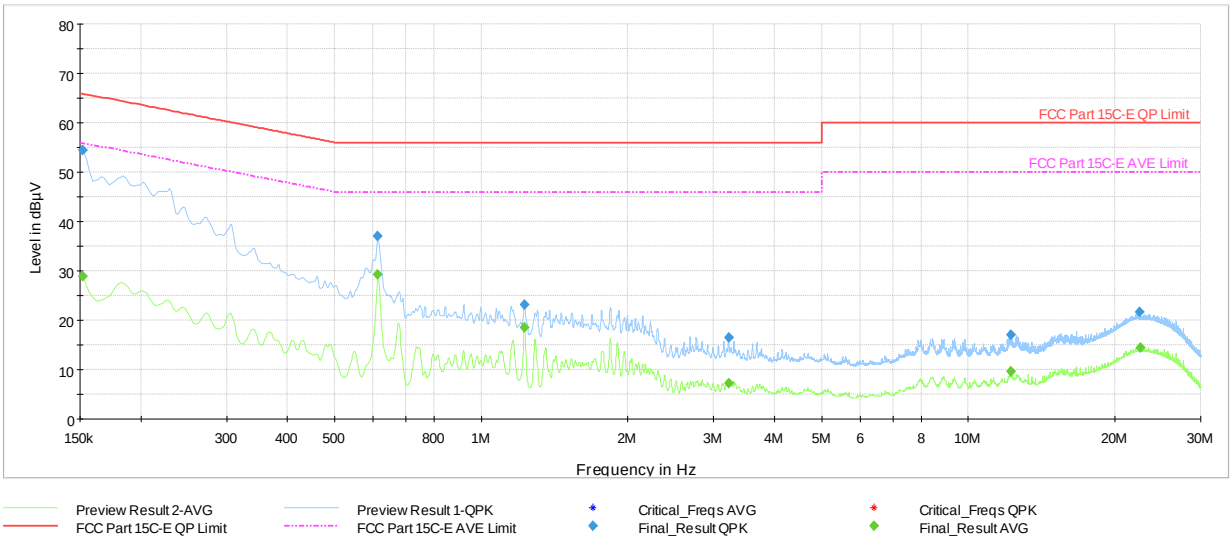
Table 7-31. AC Line Conducted Data (NB UNII (LE2M) – 6264MHz) (L1) with host PC with USB-C cable



Plot 7-91. AC Line Conducted Data (NB UNII (LE2M) – 6264MHz) (N) with host PC with USB-C cable

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.150	FINAL	—	30.67	56.00	-25.33	N	GND
0.150	FINAL	54.1	—	66.00	-11.86	N	GND
0.188	FINAL	—	26.66	54.11	-27.45	N	GND
0.188	FINAL	49.5	—	64.11	-14.61	N	GND
0.616	FINAL	—	27.87	46.00	-18.13	N	GND
0.616	FINAL	36.6	—	56.00	-19.43	N	GND
1.842	FINAL	—	15.69	46.00	-30.31	N	GND
1.844	FINAL	22.6	—	56.00	-33.43	N	GND
9.836	FINAL	17.2	—	60.00	-42.82	N	GND
9.836	FINAL	—	9.47	50.00	-40.53	N	GND
22.522	FINAL	—	15.56	50.00	-34.44	N	GND
22.522	FINAL	22.4	—	60.00	-37.65	N	GND

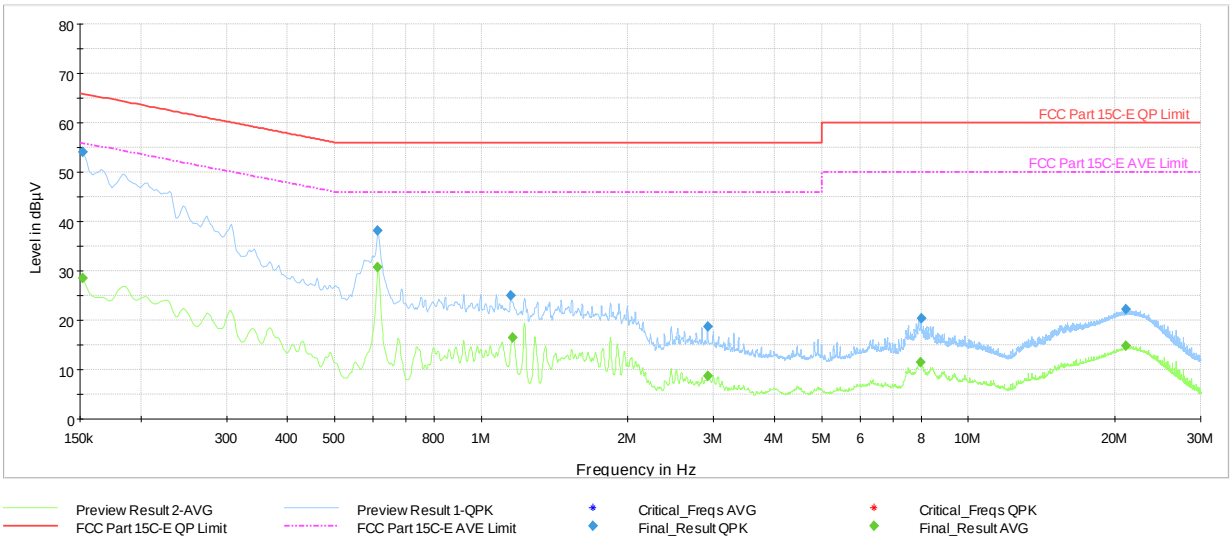
Table 7-32. AC Line Conducted Data (NB UNII (LE2M) – 6264MHz) (N) with host PC with USB-C cable



Plot 7-92. AC Line Conducted Plot (NB UNII HDR4 – 6264MHz) (L1) with host PC with USB-C cable

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.152	FINAL	—	28.94	55.88	-26.93	L1	GND
0.152	FINAL	54.5	—	65.88	-11.36	L1	GND
0.614	FINAL	—	29.23	46.00	-16.77	L1	GND
0.614	FINAL	37.1	—	56.00	-18.91	L1	GND
1.226	FINAL	—	18.54	46.00	-27.46	L1	GND
1.226	FINAL	23.1	—	56.00	-32.90	L1	GND
3.221	FINAL	16.4	—	56.00	-39.56	L1	GND
3.226	FINAL	—	7.22	46.00	-38.78	L1	GND
12.206	FINAL	17.0	—	60.00	-43.00	L1	GND
12.206	FINAL	—	9.65	50.00	-40.35	L1	GND
22.515	FINAL	21.6	—	60.00	-38.38	L1	GND
22.522	FINAL	—	14.54	50.00	-35.46	L1	GND

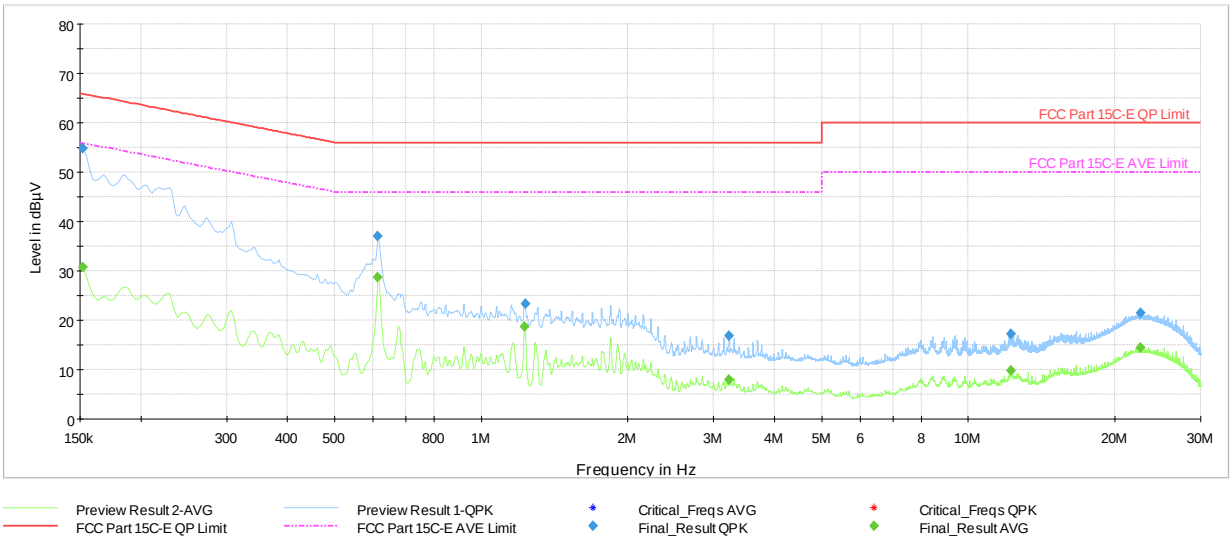
Table 7-33. AC Line Conducted Data (NB UNII HDR4 – 6264MHz) (L1) with host PC with USB-C cable



Plot 7-93. AC Line Conducted Plot (NB UNII HDR4 – 6264MHz) (N) with host PC with USB-C cable

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.152	FINAL	—	28.52	55.88	-27.36	N	GND
0.152	FINAL	54.0	—	65.88	-11.86	N	GND
0.614	FINAL	—	30.76	46.00	-15.24	N	GND
0.614	FINAL	38.1	—	56.00	-17.86	N	GND
1.151	FINAL	25.0	—	56.00	-30.98	N	GND
1.158	FINAL	—	16.53	46.00	-29.47	N	GND
2.918	FINAL	18.6	—	56.00	-37.38	N	GND
2.918	FINAL	—	8.75	46.00	-37.25	N	GND
7.994	FINAL	—	11.41	50.00	-38.59	N	GND
7.996	FINAL	20.3	—	60.00	-39.68	N	GND
21.093	FINAL	—	14.76	50.00	-35.24	N	GND
21.093	FINAL	22.2	—	60.00	-37.82	N	GND

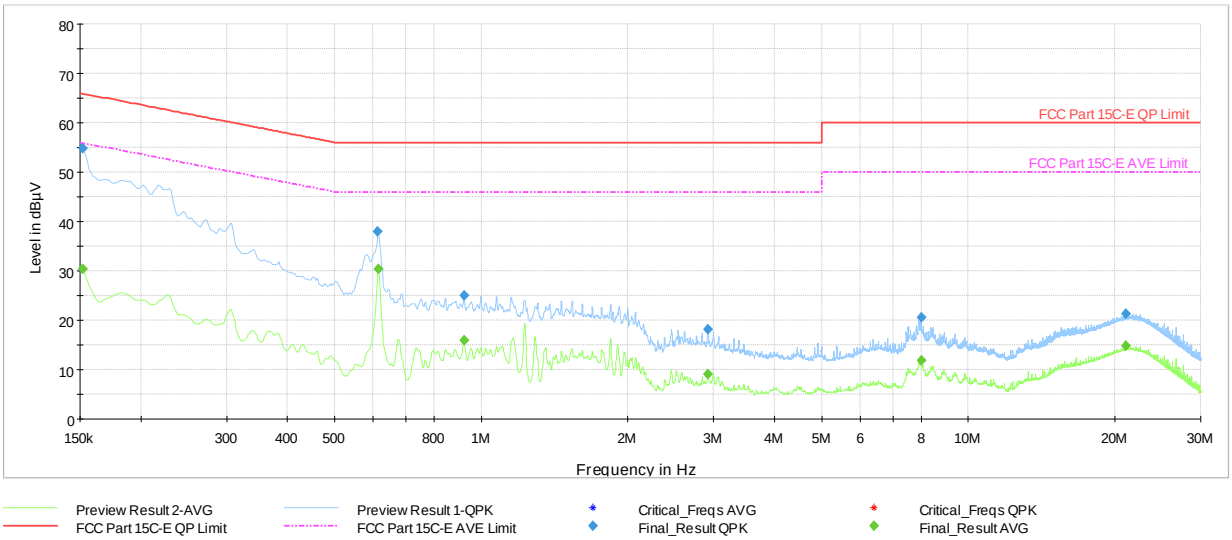
Table 7-34. AC Line Conducted Data (NB UNII HDR4 – 6264MHz) (N) with host PC with USB-C cable



Plot 7-94. AC Line Conducted Plot (NB UNII HDRp4 – 6264MHz) (L1) with host PC with USB-C cable

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.152	FINAL	—	30.75	55.88	-25.12	L1	GND
0.152	FINAL	54.9	—	65.88	-11.03	L1	GND
0.614	FINAL	—	28.65	46.00	-17.35	L1	GND
0.614	FINAL	37.0	—	56.00	-18.99	L1	GND
1.228	FINAL	—	18.70	46.00	-27.30	L1	GND
1.230	FINAL	23.2	—	56.00	-32.76	L1	GND
3.228	FINAL	—	8.00	46.00	-38.00	L1	GND
3.230	FINAL	16.9	—	56.00	-39.06	L1	GND
12.206	FINAL	—	9.85	50.00	-40.15	L1	GND
12.208	FINAL	17.2	—	60.00	-42.81	L1	GND
22.522	FINAL	—	14.46	50.00	-35.54	L1	GND
22.522	FINAL	21.4	—	60.00	-38.59	L1	GND

Table 7-35. AC Line Conducted Data (NB UNII HDRp4 – 6264MHz) (L1) with host PC with USB-C cable



Plot 7-95. AC Line Conducted Plot (NB UNII HDRp4 – 6264MHz) (N) with host PC with USB-C cable

Frequency [MHz]	Process State	QuasiPeak [dBµV]	Average [dBµV]	Limit [dBµV]	Margin [dB]	Line	PE
0.152	FINAL	—	30.42	55.88	-25.46	N	GND
0.152	FINAL	54.8	—	65.88	-11.12	N	GND
0.614	FINAL	38.0	—	56.00	-18.01	N	GND
0.616	FINAL	—	30.44	46.00	-15.56	N	GND
0.922	FINAL	—	15.87	46.00	-30.13	N	GND
0.922	FINAL	25.0	—	56.00	-31.00	N	GND
2.922	FINAL	18.2	—	56.00	-37.83	N	GND
2.922	FINAL	—	9.01	46.00	-36.99	N	GND
8.000	FINAL	20.6	—	60.00	-39.41	N	GND
8.000	FINAL	—	11.79	50.00	-38.21	N	GND
21.093	FINAL	—	14.76	50.00	-35.24	N	GND
21.093	FINAL	21.2	—	60.00	-38.76	N	GND

Table 7-36. AC Line Conducted Data (NB UNII HDRp4 – 6264MHz) (N) with host PC with USB-C Cable

8.0 CONCLUSION

The data collected relate only the item(s) tested and show that the **Apple Wireless Earbud FCC ID: BCG-A3056** is in compliance with Part 15 Subpart E (15.407) of the FCC Rules.