

8.4.5 Test data: U-NII-2A band: 5250-5350 MHz, continued

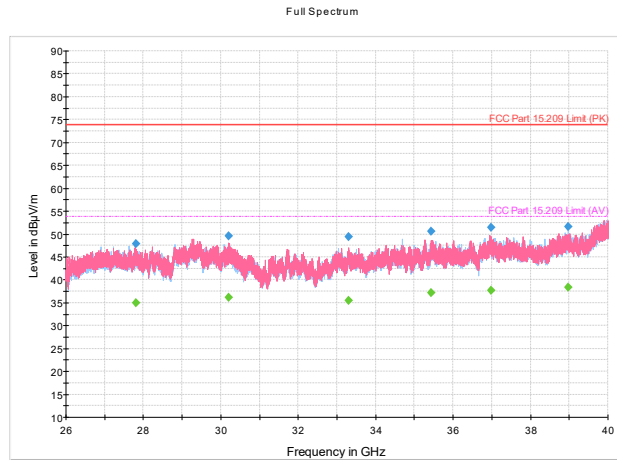


Figure 8.4-21: Radiated emissions, 26-40 GHz, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)

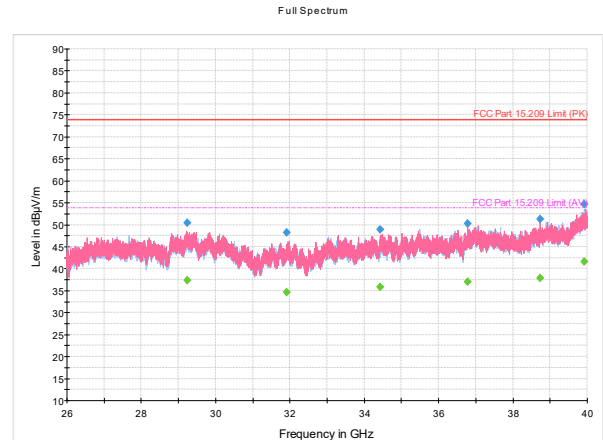


Figure 8.4-22: Radiated emissions, 26-40 GHz, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
27804.350000	47.82	---	73.90	26.08	5000.0	1000.000	132.0	V	179.0	9.6
27804.350000	---	34.93	53.90	18.97	5000.0	1000.000	132.0	V	179.0	9.6
30193.975000	---	36.15	53.90	17.75	5000.0	1000.000	148.0	V	215.0	11.8
30193.975000	49.64	---	73.90	24.26	5000.0	1000.000	148.0	V	215.0	11.8
33302.100000	49.36	---	73.90	24.54	5000.0	1000.000	197.0	V	82.0	12.4
33302.100000	---	35.55	53.90	18.35	5000.0	1000.000	197.0	V	82.0	12.4
35433.175000	---	37.12	53.90	16.78	5000.0	1000.000	154.0	V	50.0	14.1
35433.175000	50.52	---	73.90	23.38	5000.0	1000.000	154.0	V	50.0	14.1
36982.600000	51.36	---	73.90	22.54	5000.0	1000.000	158.0	H	316.0	15.9
36982.600000	---	37.72	53.90	16.18	5000.0	1000.000	158.0	H	316.0	15.9
38975.175000	51.58	---	73.90	22.32	5000.0	1000.000	179.0	H	11.0	17.7
38975.175000	---	38.43	53.90	15.47	5000.0	1000.000	179.0	H	11.0	17.7

Table 8.4-23: Radiated emissions results, 26-40 GHz, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
29231.200000	---	37.28	53.90	16.62	5000.0	1000.000	168.0	V	0.0	13.4
29231.200000	50.43	---	73.90	23.47	5000.0	1000.000	168.0	V	0.0	13.4
31922.500000	48.14	---	73.90	25.76	5000.0	1000.000	107.0	H	294.0	12.4
31922.500000	---	34.62	53.90	19.28	5000.0	1000.000	107.0	H	294.0	12.4
34425.600000	48.97	---	73.90	24.93	5000.0	1000.000	195.0	V	42.0	13.8
34425.600000	---	35.86	53.90	18.04	5000.0	1000.000	195.0	V	42.0	13.8
36780.750000	---	37.00	53.90	16.90	5000.0	1000.000	185.0	V	98.0	15.8
36780.750000	50.31	---	73.90	23.59	5000.0	1000.000	185.0	V	98.0	15.8
38735.150000	51.22	---	73.90	22.68	5000.0	1000.000	194.0	V	78.0	17.3
38735.150000	---	37.87	53.90	16.03	5000.0	1000.000	194.0	V	78.0	17.3
39915.750000	54.69	---	73.90	19.21	5000.0	1000.000	179.0	H	8.0	21.9
39915.750000	---	41.66	53.90	12.24	5000.0	1000.000	179.0	H	8.0	21.9

Table 8.4-24: Radiated emissions results, 26-40 GHz, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)

Notes: ¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
² Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.4.5 Test data: U-NII-2C band: 5470-5725 MHz, continued

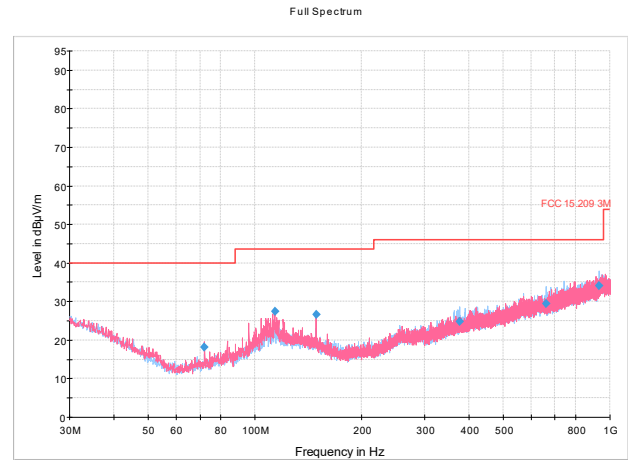
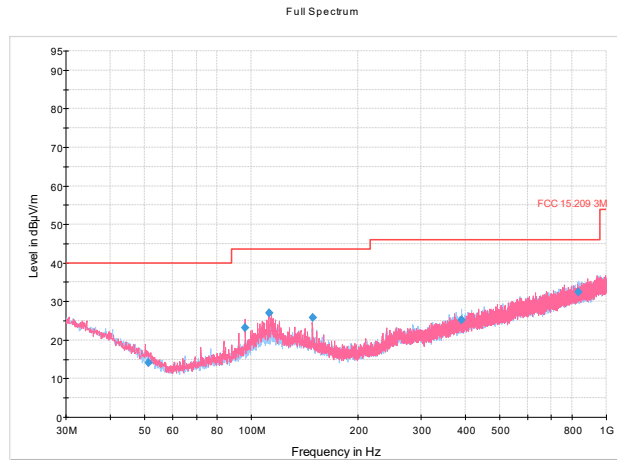


Figure 8.4-23: Radiated emissions, 0.030-1 GHz, 802.11n, MCSS, U-NII-2C band, low channel: 5500 MHz (CH100)

Figure 8.4-24: Radiated emissions, 0.030-1 GHz, 802.11n, MCS5, U-NII-2C band, high channel: 5720 MHz (CH144)

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
51.136000	14.20	40.00	25.80	5000.0	120.000	100.0	V	329.0	15.5
96.000000	23.20	43.50	20.30	5000.0	120.000	321.0	V	358.0	17.2
112.045000	26.98	43.50	16.52	5000.0	120.000	371.0	V	333.0	19.0
148.517000	25.78	43.50	17.72	5000.0	120.000	100.0	V	0.0	19.4
390.007000	25.19	46.00	20.81	5000.0	120.000	237.0	H	126.0	24.9
835.147000	32.52	46.00	13.48	5000.0	120.000	251.0	H	203.0	32.7

Table 8.4-25: Radiated emissions results, 0.030-1 GHz, 802.11n, MCSS, U-NII-2C band, low channel: 5500 MHz (CH100)

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
71.984000	18.16	40.00	21.84	5000.0	120.000	361.0	V	0.0	14.1
113.614000	27.34	43.50	16.16	5000.0	120.000	397.0	V	214.0	19.2
148.494000	26.61	43.50	16.89	5000.0	120.000	100.0	V	182.0	19.4
377.186000	24.72	46.00	21.28	5000.0	120.000	100.0	H	84.0	24.4
660.135000	29.46	46.00	16.54	5000.0	120.000	205.0	H	260.0	29.9
932.003000	34.00	46.00	12.00	5000.0	120.000	388.0	H	57.0	34.2

Table 8.4-26: Radiated emissions results, 0.030-1 GHz, 802.11n, MCS5, U-NII-2C band, high channel: 5720 MHz (CH144)

Notes: ¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
² Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.4.5 Test data: U-NII-2C band: 5470-5725 MHz, continued

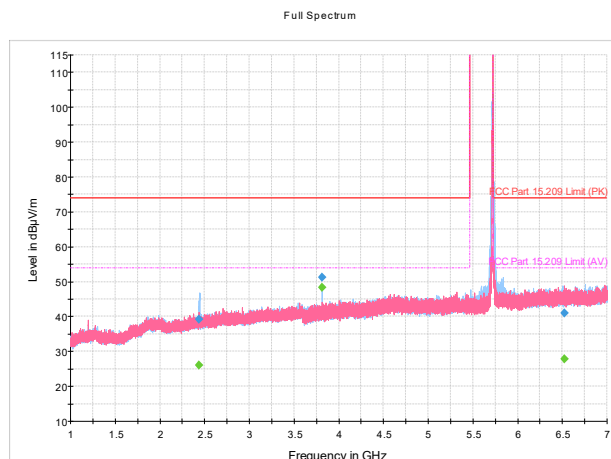
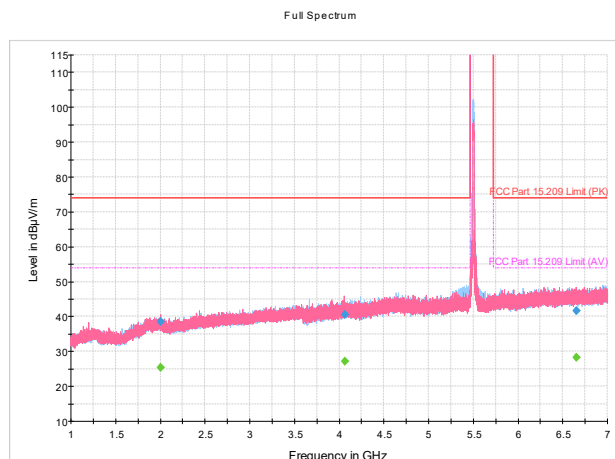


Figure 8.4-25: Radiated emissions, 1-7 GHz, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

Figure 8.4-26: Radiated emissions, 1-7 GHz, 802.11n, MCS, U-NII-2C band, high channel: 5720 MHz (CH144)

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2005.800000	---	25.29	53.90	28.61	5000.0	1000.000	129.0	V	0.0	-10.8
2005.800000	38.62	---	73.90	35.28	5000.0	1000.000	129.0	V	0.0	-10.8
4061.200000	---	27.25	53.90	26.65	5000.0	1000.000	323.0	V	354.0	-3.5
4061.200000	40.47	---	73.90	33.43	5000.0	1000.000	323.0	V	354.0	-3.5
6649.400000	41.65	---	73.90	32.25	5000.0	1000.000	276.0	H	310.0	0.7
6649.400000	---	28.30	53.90	25.60	5000.0	1000.000	276.0	H	310.0	0.7

Table 8.4-27: Radiated emissions results, 1-7 GHz, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2441.400000	---	26.04	53.90	27.86	5000.0	1000.000	126.0	H	216.0	-9.8
2441.400000	39.31	---	73.90	34.59	5000.0	1000.000	126.0	H	216.0	-9.8
3813.400000	---	48.29	53.90	5.61	5000.0	1000.000	144.0	H	297.0	-4.6
3813.400000	51.33	---	73.90	22.57	5000.0	1000.000	144.0	H	297.0	-4.6
6524.000000	40.88	---	73.90	33.02	5000.0	1000.000	397.0	V	195.0	0.4
6524.000000	---	27.86	53.90	26.04	5000.0	1000.000	397.0	V	195.0	0.4

Table 8.4-28: Radiated emissions results, 1-7 GHz, 802.11n, MCS, U-NII-2C band, high channel: 5720 MHz (CH144)

Notes:

¹Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)

²Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

³Only three points were taken because the complete range 1-18 GHz was separated in two ranges: 1-7 GHz (three points) and 7-18 GHz (three points).

8.4.5 Test data: U-NII-2C band: 5470-5725 MHz, continued

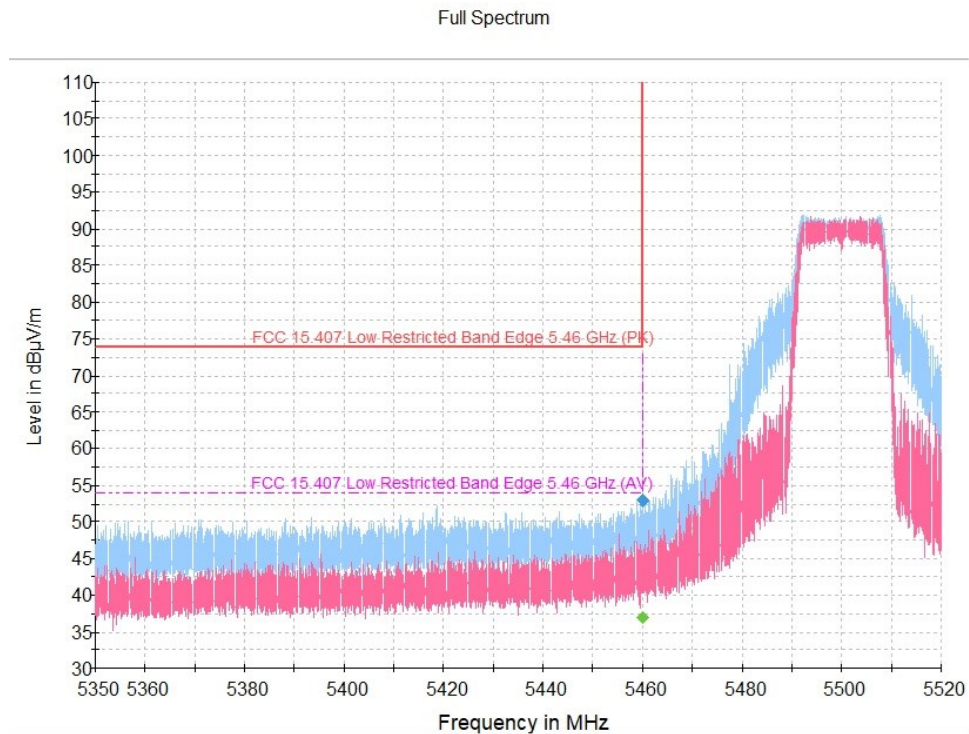


Figure 8.4-27: Radiated emissions, restricted band edge, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
5460.000000	52.89	---	73.90	21.01	5000.0	1000.000	104.0	H	308.0	-2.3
5460.000000	---	36.94	53.90	16.96	5000.0	1000.000	104.0	H	308.0	-2.3

Table 8.4-29: Radiated emissions, restricted band edge, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

Notes:
¹Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
²Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.4.5 Test data: U-NII-2C band: 5470-5725 MHz, continued

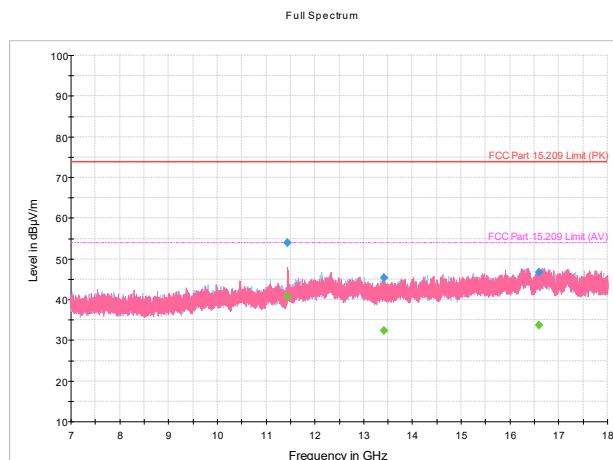
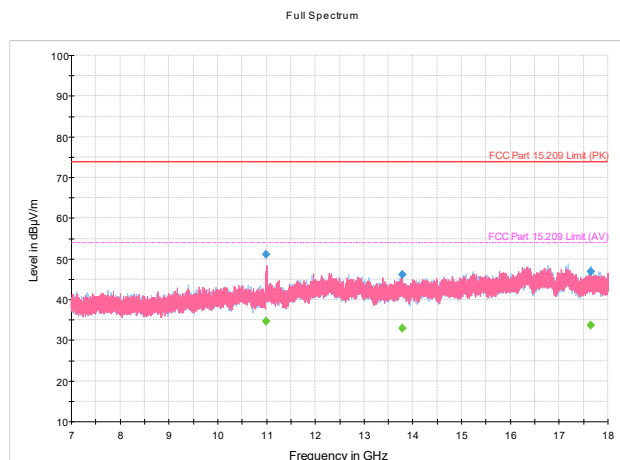


Figure 8.4-28: Radiated emissions, 7-18 GHz, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

Figure 8.4-29: Radiated emissions, 7-18 GHz, 802.11n, MCS, U-NII-2C band, high channel: 5720 MHz (CH144)

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
10995.333333	---	34.74	53.90	19.16	5000.0	1000.000	238.0	V	96.0	4.0
10995.333333	51.03	---	73.90	22.87	5000.0	1000.000	238.0	V	96.0	4.0
13783.633333	46.13	---	73.90	27.77	5000.0	1000.000	111.0	V	300.0	10.0
13783.633333	---	32.93	53.90	20.97	5000.0	1000.000	111.0	V	300.0	10.0
17646.933333	---	33.73	53.90	20.17	5000.0	1000.000	224.0	H	0.0	13.7
17646.933333	46.84	---	73.90	27.06	5000.0	1000.000	224.0	H	0.0	13.7

Table 8.4-30: Radiated emissions results, 7-18 GHz, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
11443.400000	---	40.70	53.90	13.20	5000.0	1000.000	221.0	V	135.0	3.9
11443.400000	53.89	---	73.90	20.01	5000.0	1000.000	221.0	V	135.0	3.9
13414.966667	---	32.43	53.90	21.47	5000.0	1000.000	226.0	V	274.0	8.8
13414.966667	45.42	---	73.90	28.48	5000.0	1000.000	226.0	V	274.0	8.8
16591.166667	46.61	---	73.90	27.29	5000.0	1000.000	190.0	H	350.0	12.8
16591.166667	---	33.71	53.90	20.19	5000.0	1000.000	190.0	H	350.0	12.8

Table 8.4-31: Radiated emissions results, 7-18 GHz, 802.11n, MCS, U-NII-2C band, high channel: 5720 MHz (CH144)

Notes:

¹Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)

²Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

³Only three points were taken because the complete range 1-18 GHz was separated in two ranges: 1-7 GHz (three points) and 7-18 GHz (three points).

⁴A highpass filter was used for avoiding the saturation in the power amplifier.

8.4.5 Test data: U-NII-2C band: 5470-5725 MHz, continued

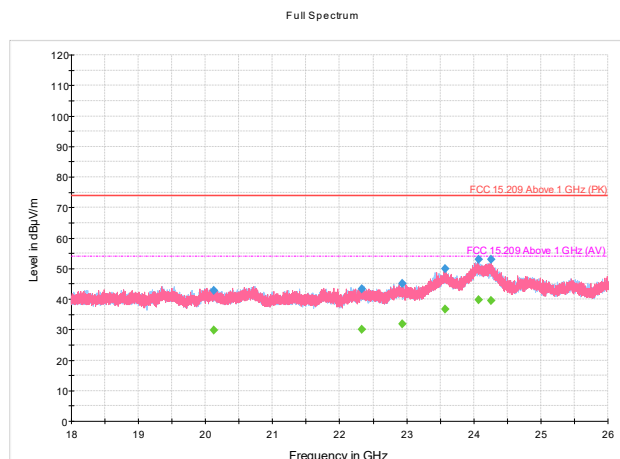


Figure 8.4-30: Radiated emissions, 18-26 GHz, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

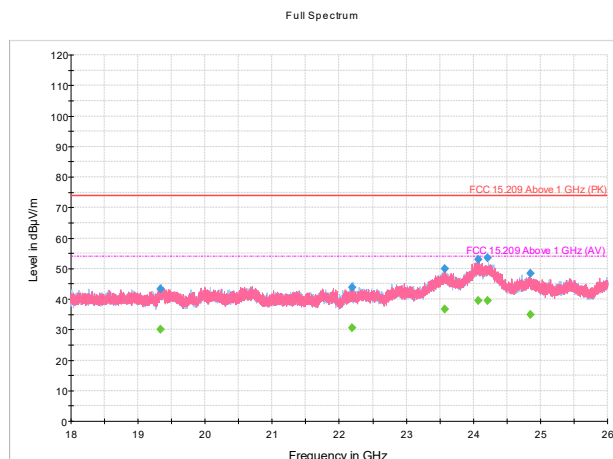


Figure 8.4-31: Radiated emissions, 18-26 GHz, 802.11n, MCS, U-NII-2C band, high channel: 5720 MHz (CH144)

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
20122.100000	42.92	---	73.90	30.98	5000.0	1000.000	291.0	H	210.0	18.8
20122.100000	---	29.91	53.90	23.99	5000.0	1000.000	291.0	H	210.0	18.8
22334.600000	43.43	---	73.90	30.47	5000.0	1000.000	358.0	H	323.0	19.5
22334.600000	---	30.15	53.90	23.75	5000.0	1000.000	358.0	H	323.0	19.5
22929.100000	45.10	---	73.90	28.80	5000.0	1000.000	130.0	V	226.0	21.1
22929.100000	---	31.92	53.90	21.98	5000.0	1000.000	130.0	V	226.0	21.1
23570.100000	---	36.62	53.90	17.28	5000.0	1000.000	400.0	V	196.0	25.9
23570.100000	49.99	---	73.90	23.91	5000.0	1000.000	400.0	V	196.0	25.9
24074.200000	---	39.72	53.90	14.18	5000.0	1000.000	400.0	V	0.0	29.7
24074.200000	52.89	---	73.90	21.01	5000.0	1000.000	400.0	V	0.0	29.7
24257.000000	52.99	---	73.90	20.91	5000.0	1000.000	141.0	V	237.0	29.0
24257.000000	---	39.54	53.90	14.36	5000.0	1000.000	141.0	V	237.0	29.0

Table 8.4-32: Radiated emissions results, 18-26 GHz, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19338.300000	---	29.98	53.90	23.92	5000.0	1000.000	289.0	H	358.0	18.5
19338.300000	43.20	---	73.90	30.70	5000.0	1000.000	289.0	H	358.0	18.5
22194.900000	43.88	---	73.90	30.02	5000.0	1000.000	400.0	H	239.0	19.9
22194.900000	---	30.59	53.90	23.31	5000.0	1000.000	400.0	H	239.0	19.9
23575.400000	49.94	---	73.90	23.96	5000.0	1000.000	400.0	V	108.0	26.0
23575.400000	---	36.77	53.90	17.13	5000.0	1000.000	400.0	V	108.0	26.0
24073.900000	---	39.55	53.90	14.35	5000.0	1000.000	387.0	V	201.0	29.7
24073.900000	53.02	---	73.90	20.88	5000.0	1000.000	387.0	V	201.0	29.7
24217.600000	---	39.55	53.90	14.35	5000.0	1000.000	151.0	H	310.0	29.1
24217.600000	53.62	---	73.90	20.28	5000.0	1000.000	151.0	H	310.0	29.1
24855.700000	---	34.93	53.90	18.97	5000.0	1000.000	308.0	H	320.0	24.7
24855.700000	48.39	---	73.90	25.51	5000.0	1000.000	308.0	H	320.0	24.7

Table 8.4-33: Radiated emissions results, 18-26 GHz, 802.11n, MCS, U-NII-2C band, high channel: 5720 MHz (CH144)

Notes: ¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
² Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.4.5 Test data: U-NII-2C band: 5470-5725 MHz, continued

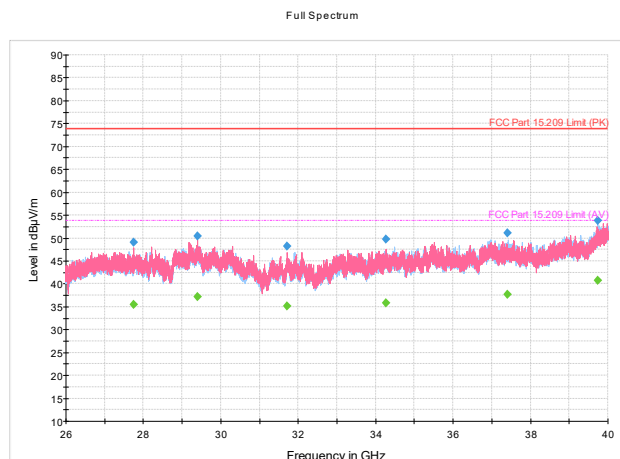


Figure 8.4-32: Radiated emissions, 26-40 GHz, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

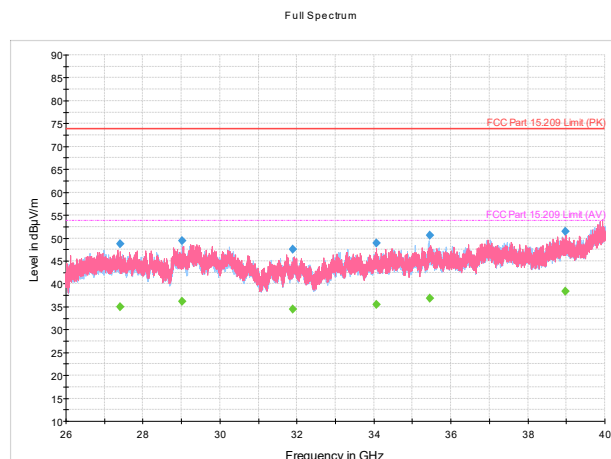


Figure 8.4-33: Radiated emissions, 26-40 GHz, 802.11n, MCS, U-NII-2C band, high channel: 5720 MHz (CH144)

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
27749.475000	---	35.49	53.90	18.41	5000.0	1000.000	188.0	V	11.0	9.6
27749.475000	49.11	---	73.90	24.79	5000.0	1000.000	188.0	V	11.0	9.6
29405.300000	---	37.20	53.90	16.70	5000.0	1000.000	125.0	V	277.0	12.9
29405.300000	50.36	---	73.90	23.54	5000.0	1000.000	125.0	V	277.0	12.9
31711.500000	---	35.10	53.90	18.80	5000.0	1000.000	197.0	V	11.0	11.9
31711.500000	48.18	---	73.90	25.72	5000.0	1000.000	197.0	V	11.0	11.9
34261.400000	49.69	---	73.90	24.21	5000.0	1000.000	165.0	V	145.0	13.6
34261.400000	---	35.76	53.90	18.14	5000.0	1000.000	165.0	V	145.0	13.6
37414.225000	---	37.64	53.90	16.26	5000.0	1000.000	161.0	H	6.0	15.9
37414.225000	51.03	---	73.90	22.87	5000.0	1000.000	161.0	H	6.0	15.9
39736.750000	53.86	---	73.90	20.04	5000.0	1000.000	152.0	H	178.0	20.3
39736.750000	---	40.77	53.90	13.13	5000.0	1000.000	152.0	H	178.0	20.3

Table 8.4-34: Radiated emissions results, 26-40 GHz, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
27411.750000	---	35.04	53.90	18.86	5000.0	1000.000	161.0	V	269.0	9.3
27411.750000	48.74	---	73.90	25.16	5000.0	1000.000	161.0	V	269.0	9.3
29013.600000	---	36.14	53.90	17.76	5000.0	1000.000	107.0	H	46.0	12.6
29013.600000	49.42	---	73.90	24.48	5000.0	1000.000	107.0	H	46.0	12.6
31897.000000	47.53	---	73.90	26.37	5000.0	1000.000	116.0	H	321.0	12.4
31897.000000	---	34.39	53.90	19.51	5000.0	1000.000	116.0	H	321.0	12.4
34061.650000	48.88	---	73.90	25.02	5000.0	1000.000	185.0	V	260.0	13.0
34061.650000	---	35.47	53.90	18.43	5000.0	1000.000	185.0	V	260.0	13.0
35444.800000	50.62	---	73.90	23.28	5000.0	1000.000	158.0	H	18.0	14.2
35444.800000	---	36.86	53.90	17.04	5000.0	1000.000	158.0	H	18.0	14.2
38970.050000	51.37	---	73.90	22.53	5000.0	1000.000	154.0	V	11.0	17.7
38970.050000	---	38.36	53.90	15.54	5000.0	1000.000	154.0	V	11.0	17.7

Table 8.4-35: Radiated emissions results, 26-40 GHz, 802.11n, MCS, U-NII-2C band, high channel: 5720 MHz (CH144)

Notes: ¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
² Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.4.5 Test data: U-NII-3 band: 5725-5850 MHz, continued

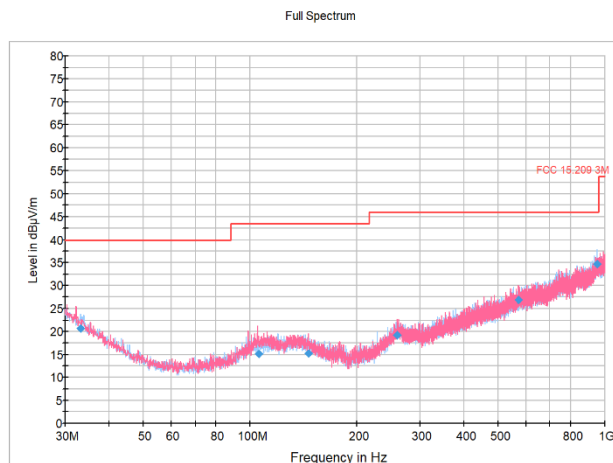
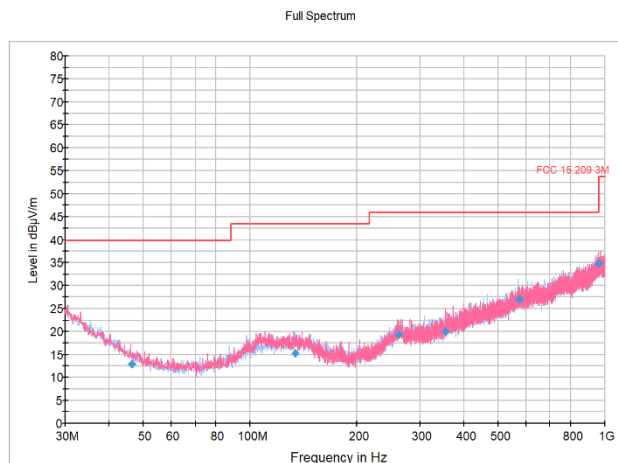


Figure 8.4-34: Radiated emissions, 0.030-1 GHz, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

Figure 8.4-35: Radiated emissions, 0.030-1 GHz, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
46.442000	12.87	40.00	27.13	5000.0	120.000	199.0	V	260.0	15.9
134.159000	15.37	43.50	28.13	5000.0	120.000	102.0	H	148.0	18.4
261.645000	19.28	46.00	26.72	5000.0	120.000	383.0	V	0.0	21.7
355.466000	20.10	46.00	25.90	5000.0	120.000	368.0	V	67.0	22.4
572.291000	26.94	46.00	19.06	5000.0	120.000	329.0	H	-1.0	28.8
958.561000	34.75	46.00	11.25	5000.0	120.000	261.0	H	44.0	35.4

Table 8.4-36: Radiated emissions results, 0.030-1 GHz, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
33.221000	20.80	40.00	19.20	5000.0	120.000	260.0	H	339.0	23.1
105.395000	15.13	43.50	28.37	5000.0	120.000	225.0	V	0.0	17.6
145.849000	15.25	43.50	28.25	5000.0	120.000	361.0	V	274.0	18.3
259.373000	19.12	46.00	26.88	5000.0	120.000	207.0	V	126.0	21.4
571.833000	26.90	46.00	19.10	5000.0	120.000	269.0	V	116.0	28.7
952.427000	34.59	46.00	11.41	5000.0	120.000	339.0	H	139.0	35.3

Table 8.4-37: Radiated emissions results, 0.030-1 GHz, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

Notes: ¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
² Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.4.5 Test data: U-NII-3 band: 5725-5850 MHz, continued

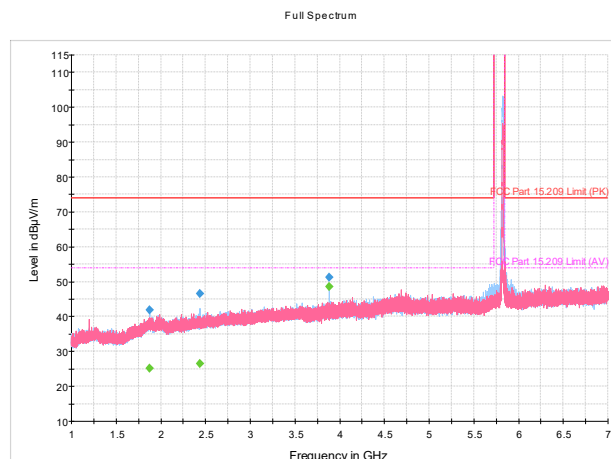
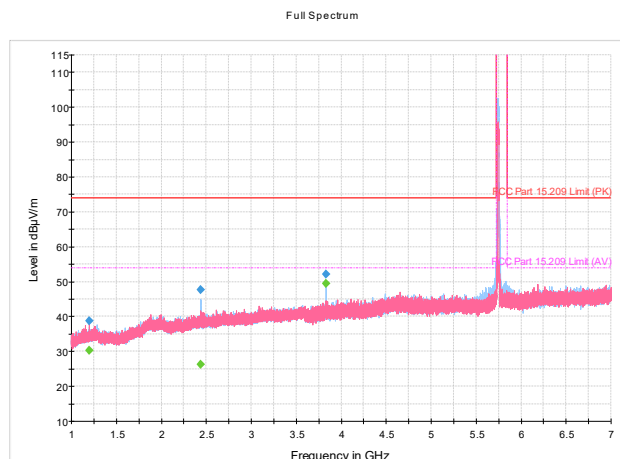


Figure 8.4-36: Radiated emissions, 1-7 GHz, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

Figure 8.4-37: Radiated emissions, 1-7 GHz, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1199.800000	38.67	---	73.90	35.23	5000.0	1000.000	181.0	V	133.0	-13.8
1199.800000	---	30.30	53.90	23.60	5000.0	1000.000	181.0	V	133.0	-13.8
2437.800000	---	26.34	53.90	27.56	5000.0	1000.000	163.0	H	157.0	-9.8
2437.800000	47.57	---	73.90	26.33	5000.0	1000.000	163.0	H	157.0	-9.8
3830.000000	---	49.53	53.90	4.37	5000.0	1000.000	155.0	H	309.0	-4.5
3830.000000	52.04	---	73.90	21.86	5000.0	1000.000	155.0	H	309.0	-4.5

Table 8.4-38: Radiated emissions results, 1-7 GHz, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1870.600000	---	25.13	53.90	28.77	5000.0	1000.000	204.0	H	84.0	-10.9
1870.600000	41.97	---	73.90	31.93	5000.0	1000.000	204.0	H	84.0	-10.9
2438.000000	---	26.55	53.90	27.35	5000.0	1000.000	167.0	H	47.0	-9.8
2438.000000	46.54	---	73.90	27.36	5000.0	1000.000	167.0	H	47.0	-9.8
3883.400000	51.19	---	73.90	22.71	5000.0	1000.000	141.0	H	310.0	-4.3
3883.400000	---	48.67	53.90	5.23	5000.0	1000.000	141.0	H	310.0	-4.3

Table 8.4-39: Radiated emissions results, 1-7 GHz, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

Notes:

¹Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)

²Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

³Only three points were taken because the complete range 1-18 GHz was separated in two ranges: 1-7 GHz (three points) and 7-18 GHz (three points).

8.4.5 Test data: U-NII-3 band: 5725-5850 MHz, continued

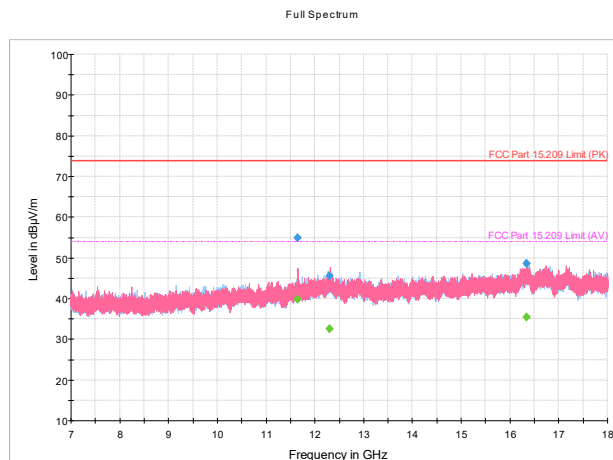
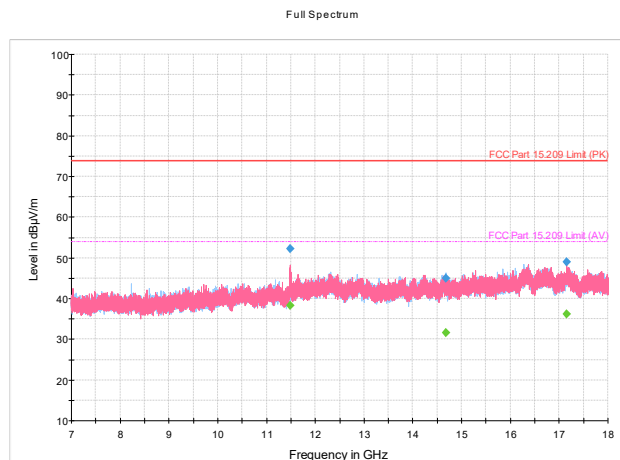


Figure 8.4-38: Radiated emissions, 7-18 GHz, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

Figure 8.4-39: Radiated emissions, 7-18 GHz, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
11487.000000	52.26	---	73.90	21.64	5000.0	1000.000	224.0	V	109.0	3.9
11487.000000	---	38.37	53.90	15.53	5000.0	1000.000	224.0	V	109.0	3.9
14672.166667	---	31.52	53.90	22.38	5000.0	1000.000	260.0	H	122.0	9.3
14672.166667	44.99	---	73.90	28.91	5000.0	1000.000	260.0	H	122.0	9.3
17150.700000	---	36.09	53.90	17.81	5000.0	1000.000	119.0	V	350.0	14.3
17150.700000	49.04	---	73.90	24.86	5000.0	1000.000	119.0	V	350.0	14.3

Table 8.4-40: Radiated emissions results, 7-18 GHz, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
11650.100000	---	39.88	53.90	14.02	5000.0	1000.000	213.0	V	108.0	5.0
11650.100000	54.81	---	73.90	19.09	5000.0	1000.000	213.0	V	108.0	5.0
12301.000000	45.59	---	73.90	28.31	5000.0	1000.000	211.0	V	70.0	7.1
12301.000000	---	32.55	53.90	21.35	5000.0	1000.000	211.0	V	70.0	7.1
16340.933333	---	35.35	53.90	18.55	5000.0	1000.000	400.0	H	344.0	13.2
16340.933333	48.60	---	73.90	25.30	5000.0	1000.000	400.0	H	344.0	13.2

Table 8.4-41: Radiated emissions results, 7-18 GHz, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

Notes:

¹Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)

²Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

³Only three points were taken because the complete range 1-18 GHz was separated in two ranges: 1-7 GHz (three points) and 7-18 GHz (three points).

⁴A highpass filter was used for avoiding the saturation in the power amplifier.

8.4.5 Test data: U-NII-3 band: 5725-5850 MHz, continued

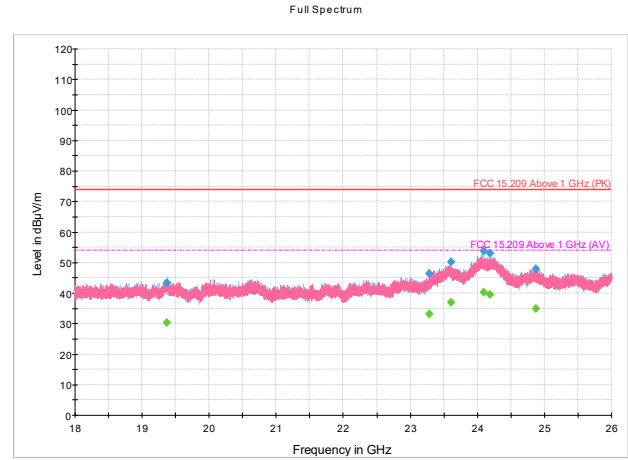
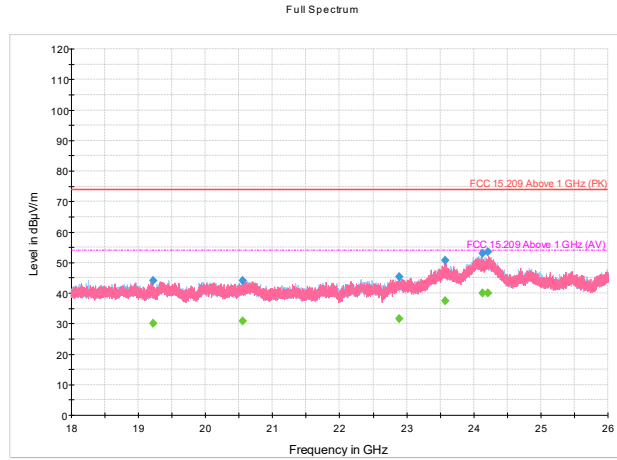


Figure 8.4-40: Radiated emissions, 18-26 GHz, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

Figure 8.4-41: Radiated emissions, 18-26 GHz, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19222.100000	44.09	---	73.90	29.81	5000.0	1000.000	309.0	H	183.0	18.1
19222.100000	---	30.07	53.90	23.83	5000.0	1000.000	309.0	H	183.0	18.1
20549.100000	44.12	---	73.90	29.78	5000.0	1000.000	400.0	H	284.0	18.9
20549.100000	---	30.90	53.90	23.00	5000.0	1000.000	400.0	H	284.0	18.9
22889.000000	---	31.69	53.90	22.21	5000.0	1000.000	400.0	V	0.0	21.2
22889.000000	45.42	---	73.90	28.48	5000.0	1000.000	400.0	V	0.0	21.2
23572.000000	50.63	---	73.90	23.27	5000.0	1000.000	233.0	V	358.0	25.9
23572.000000	---	37.45	53.90	16.45	5000.0	1000.000	233.0	V	358.0	25.9
24127.500000	---	40.07	53.90	13.83	5000.0	1000.000	144.0	V	135.0	29.5
24127.500000	52.95	---	73.90	20.95	5000.0	1000.000	144.0	V	135.0	29.5
24217.100000	53.55	---	73.90	20.35	5000.0	1000.000	400.0	V	148.0	29.1
24217.100000	---	40.00	53.90	13.90	5000.0	1000.000	400.0	V	148.0	29.1

Table 8.4-42: Radiated emissions results, 18-26 GHz, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
19373.800000	---	30.27	53.90	23.63	5000.0	1000.000	203.0	H	356.0	18.4
19373.800000	43.27	---	73.90	30.63	5000.0	1000.000	203.0	H	356.0	18.4
23285.900000	46.34	---	73.90	27.56	5000.0	1000.000	400.0	V	286.0	22.9
23285.900000	---	33.12	53.90	20.78	5000.0	1000.000	400.0	V	286.0	22.9
23605.400000	---	36.95	53.90	16.95	5000.0	1000.000	400.0	H	0.0	25.8
23605.400000	50.08	---	73.90	23.82	5000.0	1000.000	400.0	H	0.0	25.8
24092.300000	---	40.20	53.90	13.70	5000.0	1000.000	400.0	H	252.0	29.6
24092.300000	53.70	---	73.90	20.20	5000.0	1000.000	400.0	H	252.0	29.6
24184.100000	52.99	---	73.90	20.91	5000.0	1000.000	256.0	H	0.0	29.2
24184.100000	---	39.53	53.90	14.37	5000.0	1000.000	256.0	H	0.0	29.2
24877.400000	---	34.81	53.90	19.09	5000.0	1000.000	109.0	V	210.0	24.7
24877.400000	47.89	---	73.90	26.01	5000.0	1000.000	109.0	V	210.0	24.7

Table 8.4-43: Radiated emissions results, 18-26 GHz, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

Notes: ¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
² Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.4.5 Test data: U-NII-3 band: 5725-5850 MHz, continued

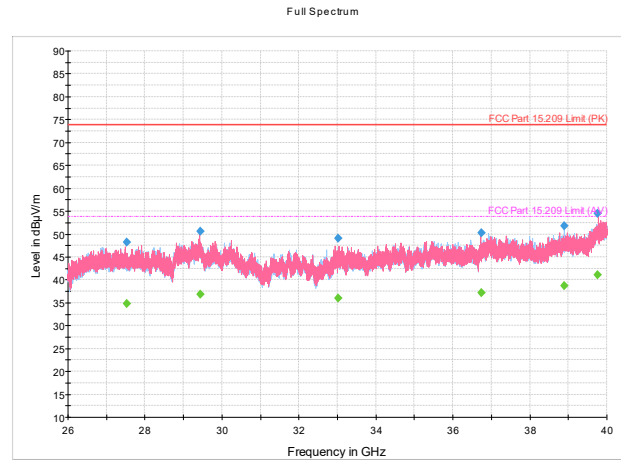
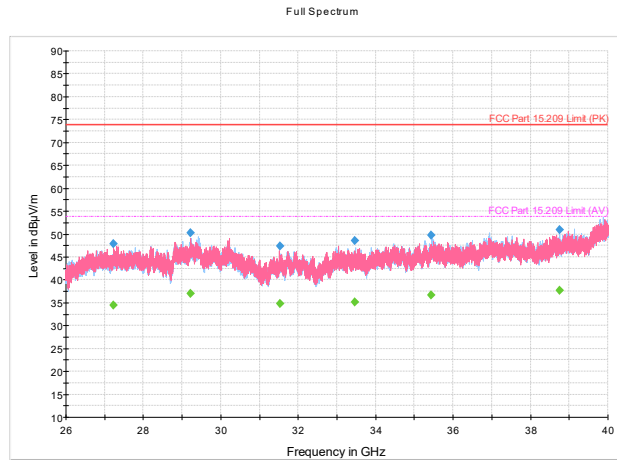


Figure 8.4-42: Radiated emissions, 26-40 GHz, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

Figure 8.4-43: Radiated emissions, 26-40 GHz, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

Two spectral plots in different color are showed in the above figure: red plot and blue plot, where the red one corresponds to vertical polarization scan and the blue one corresponds to horizontal polarization scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
27221.675000	---	34.44	53.90	19.46	5000.0	1000.000	194.0	V	67.0	9.1
27221.675000	47.84	---	73.90	26.06	5000.0	1000.000	194.0	V	67.0	9.1
29218.875000	---	37.09	53.90	16.81	5000.0	1000.000	174.0	V	0.0	13.3
29218.875000	50.33	---	73.90	23.57	5000.0	1000.000	174.0	V	0.0	13.3
31523.650000	---	34.79	53.90	19.11	5000.0	1000.000	145.0	V	170.0	11.6
31523.650000	47.44	---	73.90	26.46	5000.0	1000.000	145.0	V	170.0	11.6
33466.375000	---	35.14	53.90	18.76	5000.0	1000.000	185.0	H	55.0	12.1
33466.375000	48.60	---	73.90	25.30	5000.0	1000.000	185.0	H	55.0	12.1
35439.500000	---	36.71	53.90	17.19	5000.0	1000.000	161.0	H	152.0	14.2
35439.500000	49.82	---	73.90	24.08	5000.0	1000.000	161.0	H	152.0	14.2
38752.725000	---	37.67	53.90	16.23	5000.0	1000.000	110.0	H	48.0	17.3
38752.725000	50.88	---	73.90	23.02	5000.0	1000.000	110.0	H	48.0	17.3

Table 8.44-44: Radiated emissions results, 26-40 GHz, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
27532.750000	---	34.82	53.90	19.08	5000.0	1000.000	132.0	H	276.0	9.4
27532.750000	48.30	---	73.90	25.60	5000.0	1000.000	132.0	H	276.0	9.4
29442.075000	50.60	---	73.90	23.30	5000.0	1000.000	175.0	V	5.0	12.7
29442.075000	---	36.83	53.90	17.07	5000.0	1000.000	175.0	V	5.0	12.7
33028.475000	48.99	---	73.90	24.91	5000.0	1000.000	179.0	H	54.0	13.0
33028.475000	---	36.01	53.90	17.89	5000.0	1000.000	179.0	H	54.0	13.0
36733.775000	---	37.19	53.90	16.71	5000.0	1000.000	129.0	V	82.0	15.7
36733.775000	50.25	---	73.90	23.65	5000.0	1000.000	129.0	V	82.0	15.7
38891.350000	---	38.71	53.90	15.19	5000.0	1000.000	148.0	H	11.0	17.6
38891.350000	51.77	---	73.90	22.13	5000.0	1000.000	148.0	H	11.0	17.6
39765.300000	---	41.09	53.90	12.81	5000.0	1000.000	110.0	V	0.0	20.6
39765.300000	54.56	---	73.90	19.34	5000.0	1000.000	110.0	V	0.0	20.6

Table 8.44-45: Radiated emissions results, 26-40 GHz, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

Notes: ¹ Field strength (dBµV/m) = receiver/spectrum analyzer value (dBµV) + correction factor (dB)
² Correction factors = antenna factor ACF (dB) + cable loss (dB) – pre-amp (dB)

8.5 FCC 15.407(b) Undesirable emission limits

8.5.1 Definition and limits

Title 47 → Chapter I → Subchapter A → Part 15 → Subpart C → §15.407(b)

KDB 789033 D02 (2)

- (d) Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:
- (1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
 - (2) For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
 - (3) For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
 - (4) For transmitters operating in the 5.725-5.85 GHz band:
 - (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
 - (ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in § 15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.
 - (5) For transmitters operating within the 5.925-7.125 GHz band: Any emissions outside of the 5.925-7.125 GHz band must not exceed an e.i.r.p. of -27 dBm/MHz.
 - (6) For transmitters operating within the 5.925-7.125 GHz bands: Power spectral density must be suppressed by 20 dB at 1 MHz outside of channel edge, by 28 dB at one channel bandwidth from the channel center, and by 40 dB at one- and one-half times the channel bandwidth away from channel center. At frequencies between one megahertz outside an unlicensed device's channel edge and one channel bandwidth from the center of the channel, the limits must be linearly interpolated between 20 dB and 28 dB suppression, and at frequencies between one and one- and one-half times an unlicensed device's channel bandwidth, the limits must be linearly interpolated between 28 dB and 40 dB suppression. Emissions removed from the channel center by more than one- and one-half times the channel bandwidth must be suppressed by at least 40 dB.
 - (7) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
 - (8) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in § 15.207.
 - (9) The provisions of § 15.205 apply to intentional radiators operating under this section.
 - (10) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency band edges as the design of the equipment permits.

8.5.2 Test summary

Verdict	Pass		
Test date	July 6, 2022; July 7, 2022	Temperature	24 °C; 25 °C
Test engineer	Martha Espinoza, Wireless Test Engineer	Air pressure	1002 mbar; 1005 mbar
Test location	Wireless Bench	Relative humidity	48 %; 51%

8.5.3 Notes

Testing was performed in Tx mode and the EUT transmitting on a fixed channel. Low, Middle, and High channel were tested using worst case modulation for each band. Only one bandwidth was declared by manufacturer.

U-NII-1 band: 5150-5250 MHz → IEEE 802.11n MCS1 (worst case)

U-NII-2A band: 5250-5350 MHz → IEEE 802.11n MCS7 (worst case)

U-NII-2C band: 5470-5725 MHz → IEEE 802.11n MCS5 (worst case)

U-NII-3 band: 5725-5850 MHz → IEEE 802.11n MCS0 (worst case)

The spectrum was searched from 100 kHz to 40 GHz (10th harmonic of the highest transmit frequency but not more than 40 GHz).

For conducted measurements, the loss of the connected cable was input into the spectrum analyzer as an offset.

8.5.4 Setup details

Receiver settings for radiated measurements within restricted bands above 1 GHz:

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	Average and peak (final measurements)
Trace mode	Max Hold
Measurement time	5 s (final measurements)

8.5.5 Test data: U-NII-1 band: 5150-5250 MHz

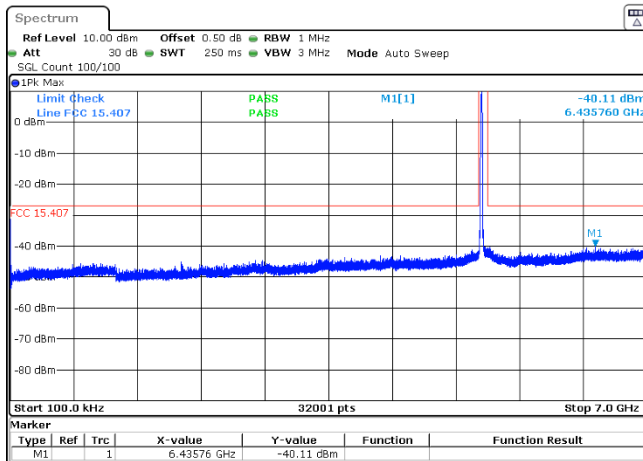


Figure 8.5-1: Radiated emissions, 0.0001 -7 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)

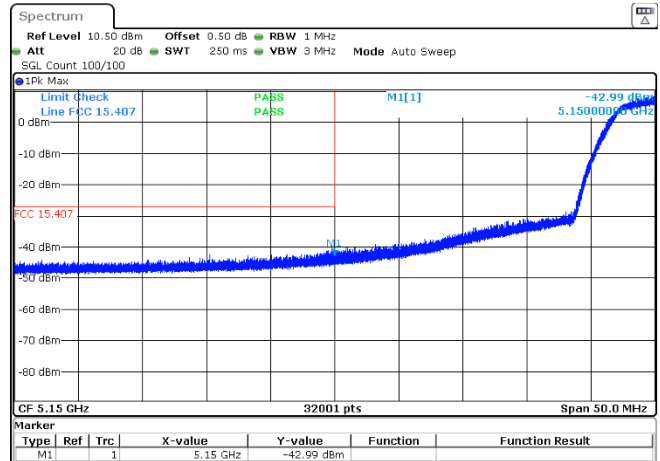


Figure 8.5-2: Low band edge, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)

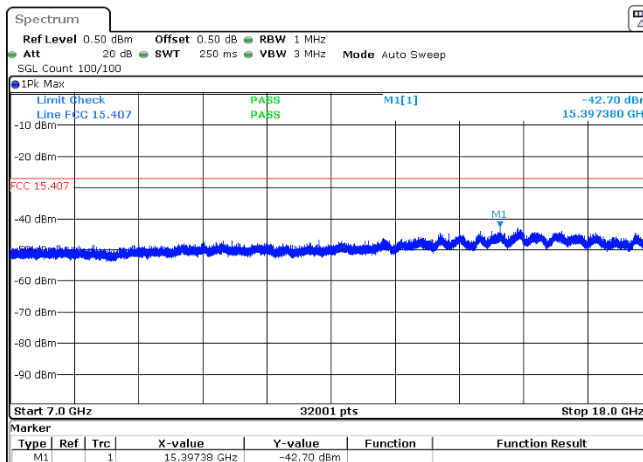


Figure 8.5-3: Radiated emissions, 7 -18 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)

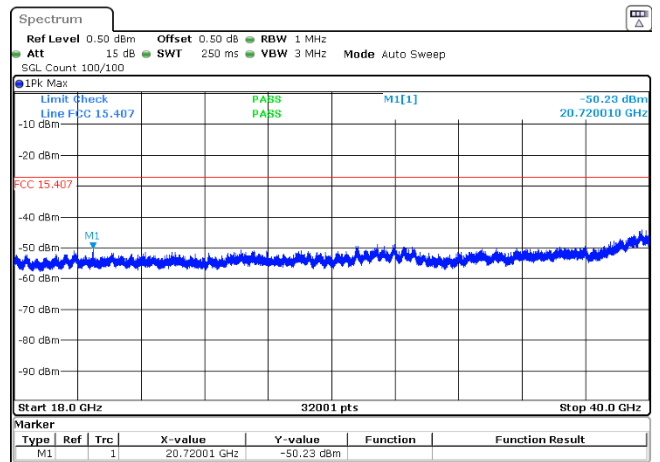


Figure 8.5-4: Radiated emissions, 18 -40 GHz, 802.11n, MCS1, U-NII-1 band, low channel: 5180 MHz (CH36)

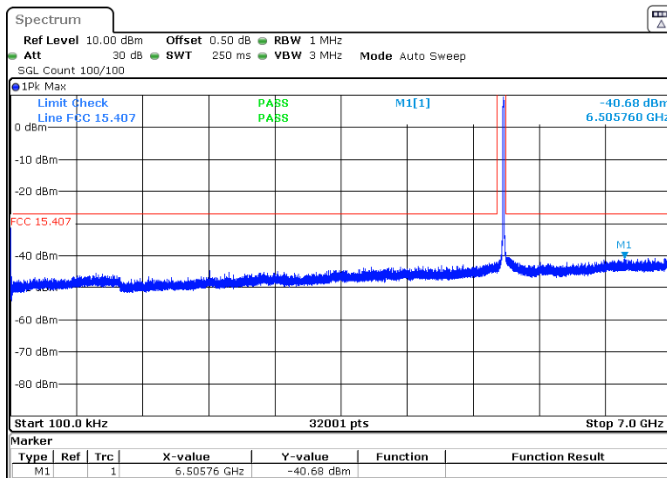


Figure 8.5-5: Radiated emissions, 0.0001 -7 GHz, 802.11n, MCS1, U-NII-1 band, middle channel: 5220 MHz (CH44)

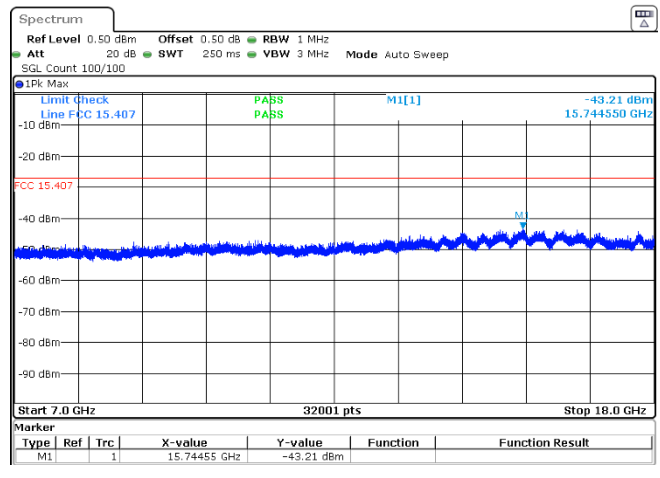


Figure 8.5-6: Radiated emissions, 7 -18 GHz, 802.11n, MCS1, U-NII-1 band, middle channel: 5220 MHz (CH44)

8.5.5 Test data: U-NII-1 band: 5150-5250 MHz, continued

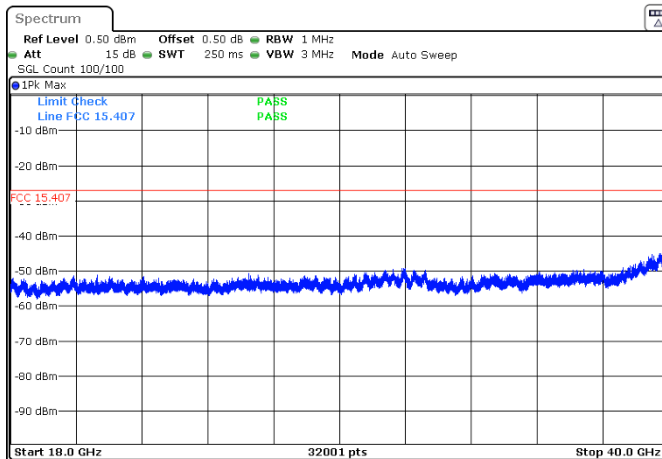


Figure 8.5-7: Radiated emissions, 18 -40 GHz, 802.11n, MCS1, U-NII-1 band, middle channel: 5220 MHz (CH44)

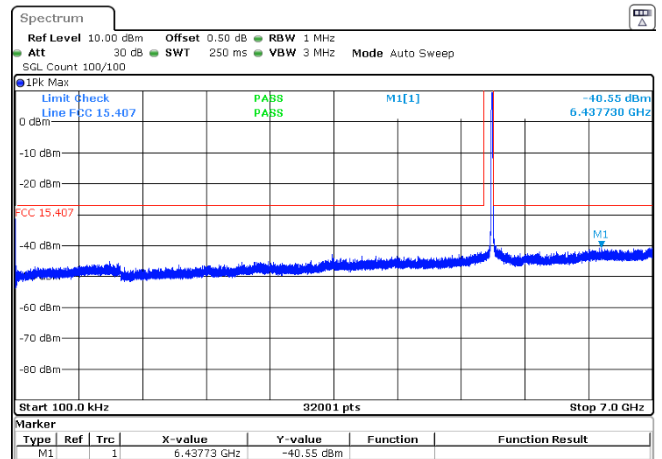


Figure 8.5-8: Radiated emissions, 0.0001 -7 GHz, 802.11n, MCS1, U-NII-1 band, high channel: 5240 MHz (CH48)

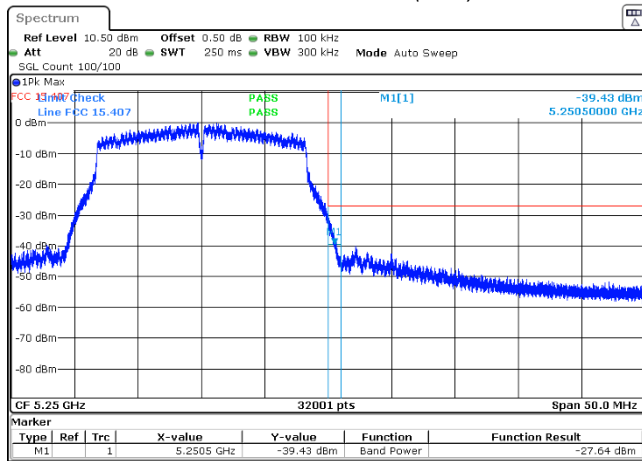


Figure 8.5-9: High band edge, 802.11n, MCS1, U-NII-1 band, high channel: 5240 MHz (CH48)

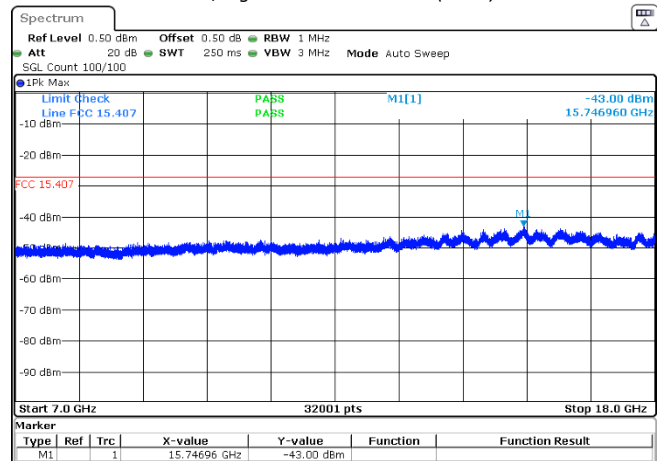


Figure 8.5-10: Radiated emissions, 7 -18 GHz, 802.11n, MCS1, U-NII-1 band, high channel: 5240 MHz (CH48)

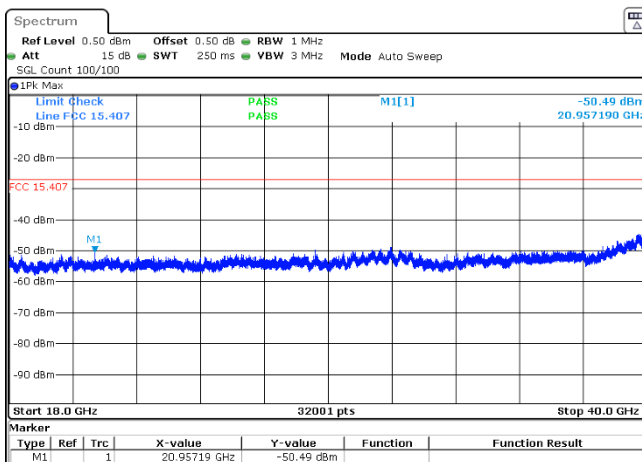


Figure 8.5-11: Radiated emissions, 18 -40 GHz, 802.11n, MCS1, U-NII-1 band, high channel: 5240 MHz (CH48)

Figure 8.5.9 was measured at 100 kHz of RBW but integrated over 1 MHz at the edge of the band according to clause FCC 15.407 (b)(8), complying with the emission limit require limit at band edge (-27 dBm/MHz).

8.5.5 Test data: U-NII-2A band: 5250-5350 MHz, continued

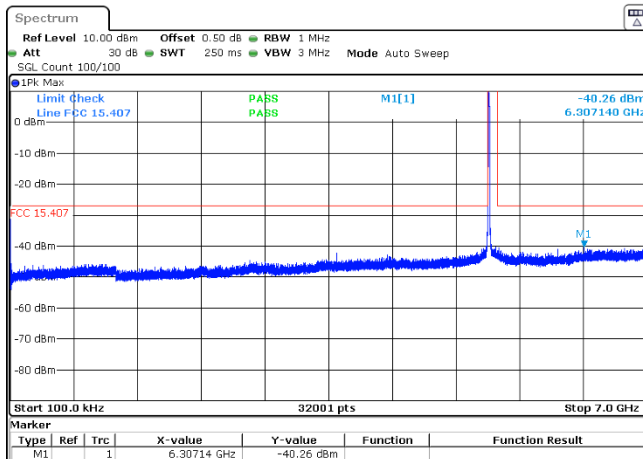


Figure 8.5-12: Radiated emissions, 0.0001 -7 GHz, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)

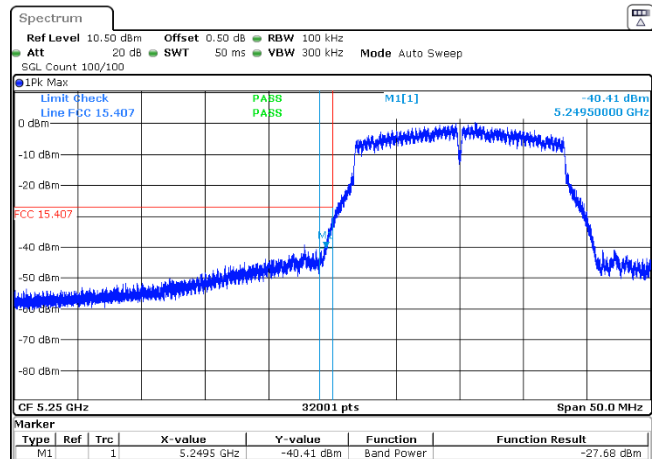


Figure 8.5-13: Low band edge, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)

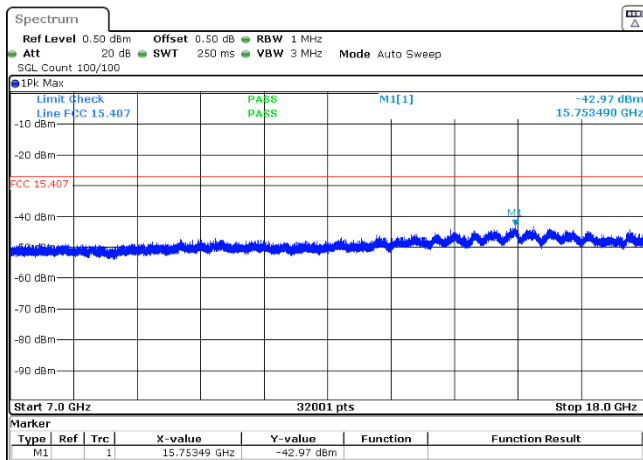


Figure 8.5-14: Radiated emissions, 7 -18 GHz, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)

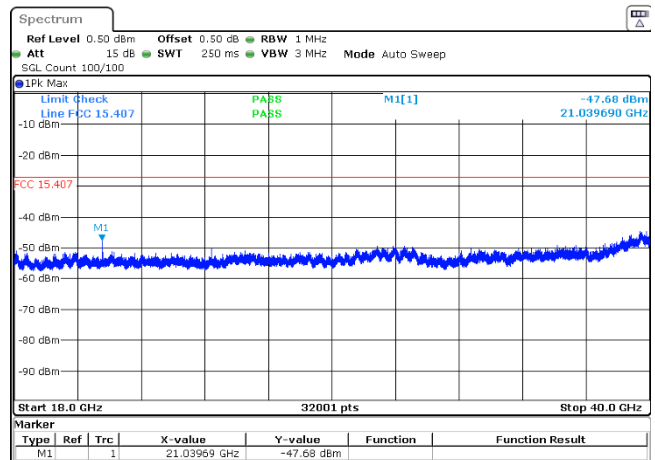


Figure 8.5-15: Radiated emissions, 18 -40 GHz, 802.11n, MCS7, U-NII-2A band, low channel: 5260 MHz (CH52)

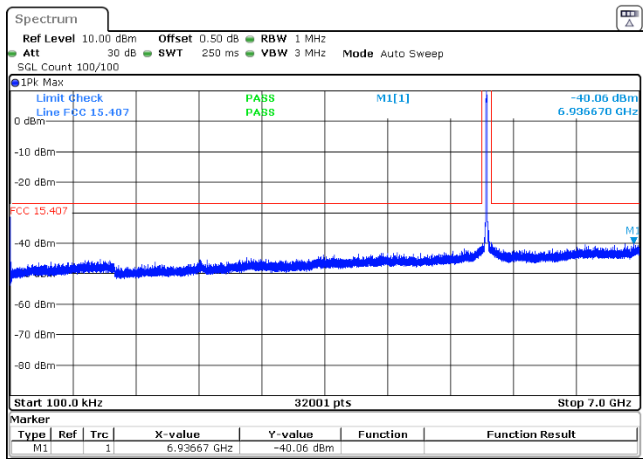


Figure 8.5-16: Radiated emissions, 0.0001 -7 GHz, 802.11n, MCS7, U-NII-2A band, middle channel: 5300 MHz (CH60)

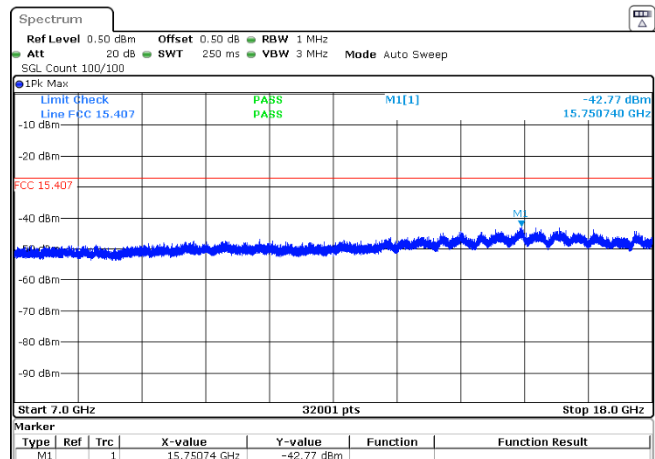


Figure 8.5-17: Radiated emissions, 7 -18 GHz, 802.11n, MCS7, U-NII-2A band, middle channel: 5300 MHz (CH60)

8.5.5 Test data: U-NII-2A band: 5250-5350 MHz, continued

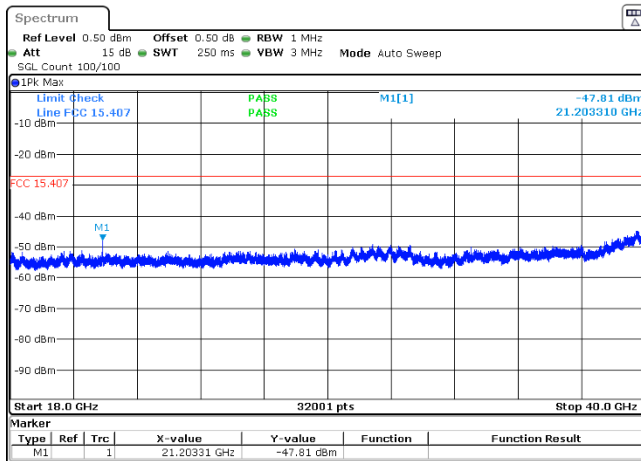


Figure 8.5-18: Radiated emissions, 18 -40 GHz, 802.11n, MCS7, U-NII-2A band, middle channel: 5300 MHz (CH60)

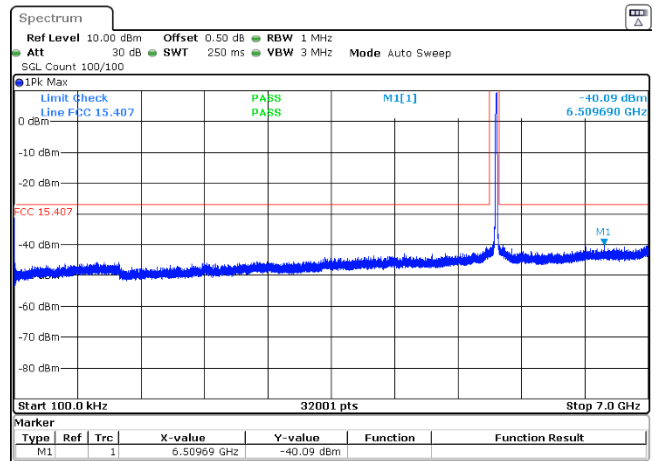


Figure 8.5-19: Radiated emissions, 0.0001 -7 GHz, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)

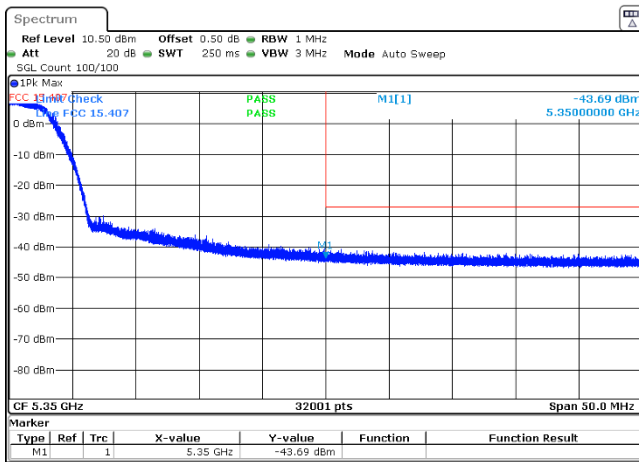


Figure 8.5-20: High band edge, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)

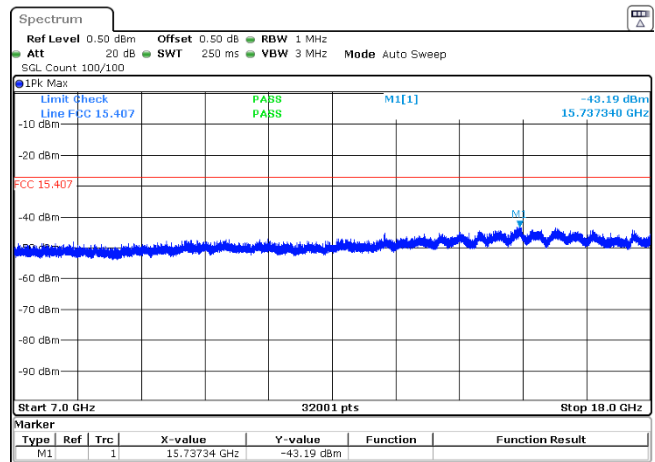


Figure 8.5-21: Radiated emissions, 7 -18 GHz, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)

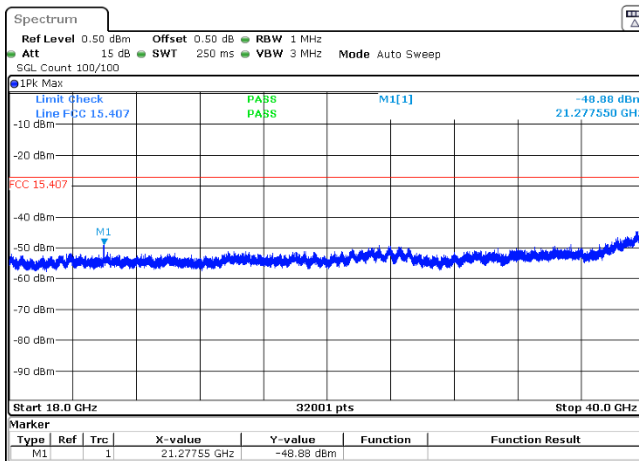


Figure 8.5-22: Radiated emissions, 18 -40 GHz, 802.11n, MCS7, U-NII-2A band, high channel: 5320 MHz (CH64)

Figure 8.5.13 was measured at 100 kHz of RBW but integrated over 1 MHz at the edge of the band according to clause FCC 15.407 (b)(8), complying with the emission limit require limit at band edge (-27 dBm/MHz).

8.5.5 Test data: U-NII-2C band: 5470-5725 MHz, continued

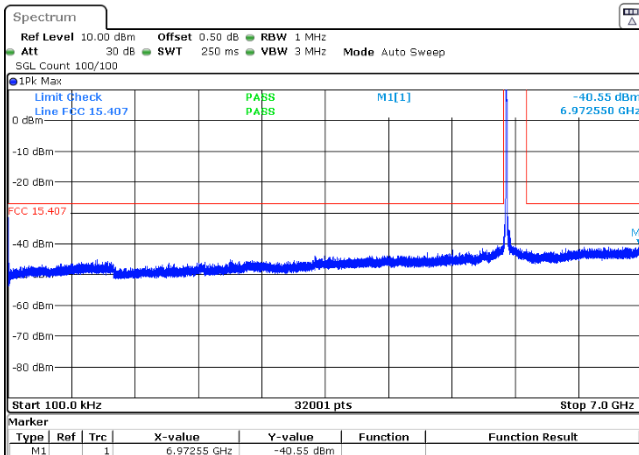


Figure 8.5-23: Radiated emissions, 0.0001 -7 GHz, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

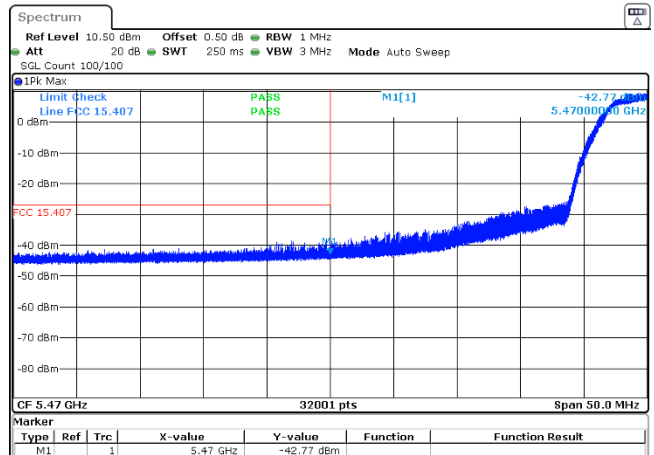


Figure 8.5-24: Low band edge, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

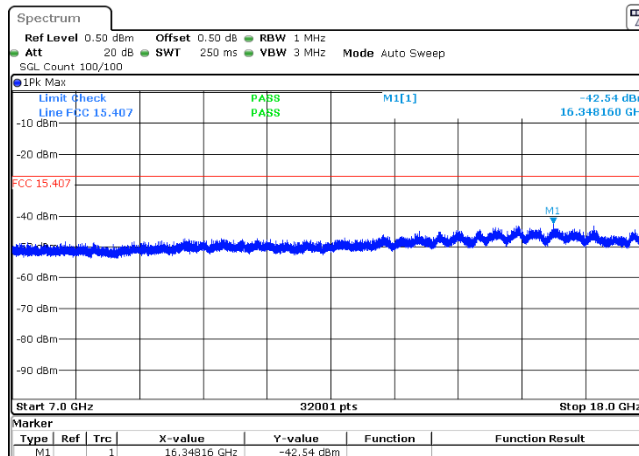


Figure 8.5-25: Radiated emissions, 7 -18 GHz, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

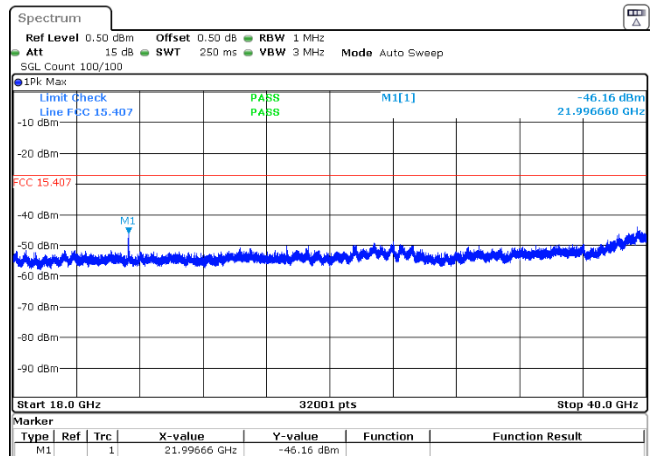


Figure 8.5-26: Radiated emissions, 18 -40 GHz, 802.11n, MCS5, U-NII-2C band, low channel: 5500 MHz (CH100)

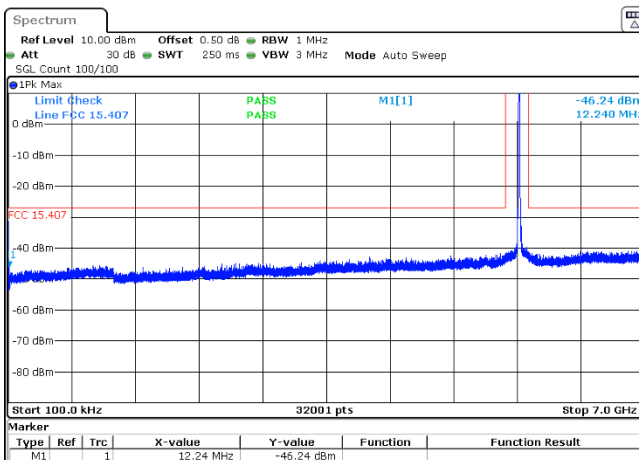


Figure 8.5-27: Radiated emissions, 0.0001 -7 GHz, 802.11n, MCS5, U-NII-2C band, middle channel: 5620 MHz (CH124)

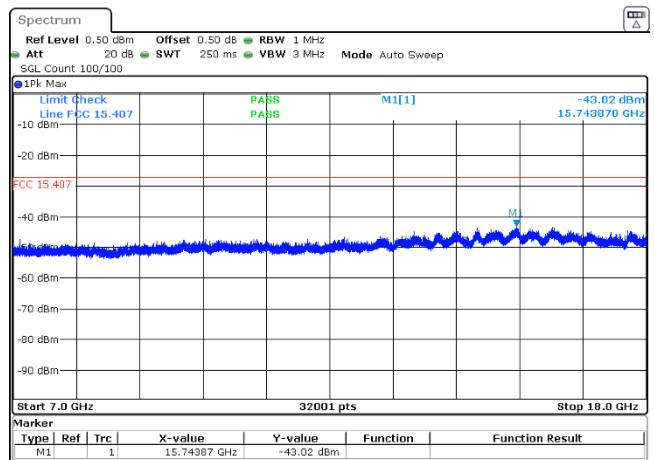


Figure 8.5-28: Radiated emissions, 7 -18 GHz, 802.11n, MCS5, U-NII-2C band, middle channel: 5620 MHz (CH124)

8.5.5 Test data: U-NII-2C band: 5470-5725 MHz, continued

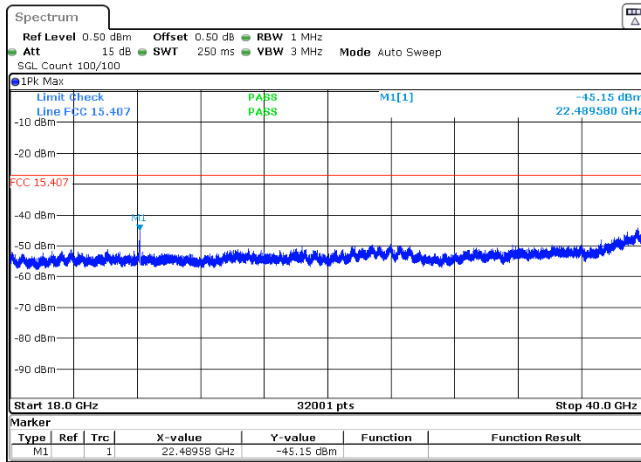


Figure 8.5-29: Radiated emissions, 18 -40 GHz, 802.11n, MCS5, U-NII-2C band, middle channel: 5620 MHz (CH124)

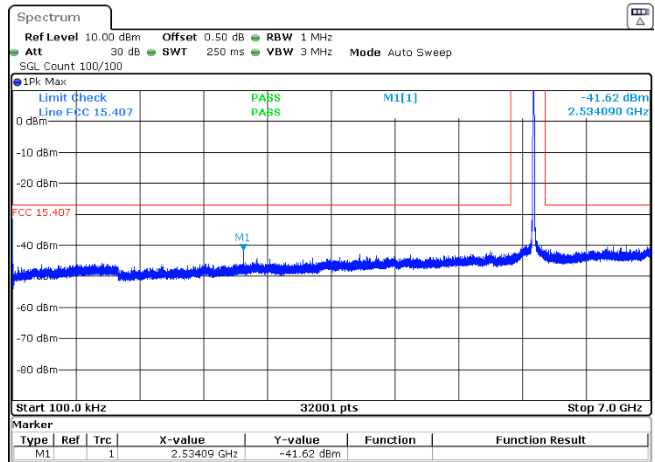


Figure 8.5-30: Radiated emissions, 0.0001 -7 GHz, 802.11n, MCS5, U-NII-2C band, high channel: 5720 MHz (CH144)

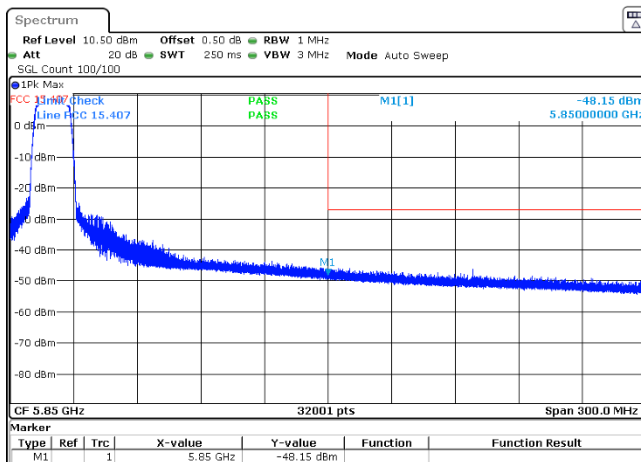


Figure 8.5-31: High band edge, 802.11n, MCS5, U-NII-2C band, high channel: 5720 MHz (CH144)

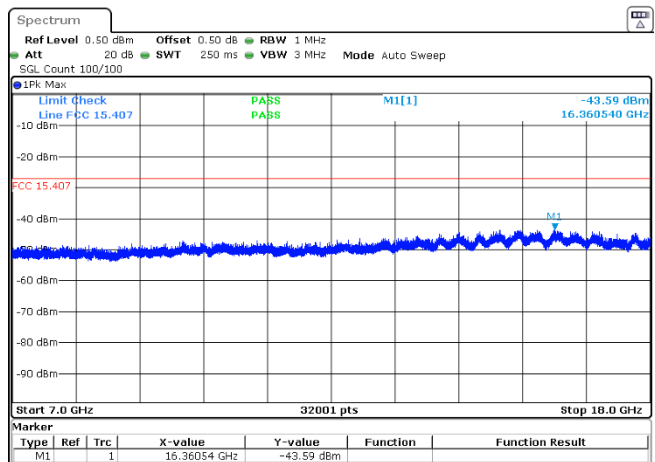


Figure 8.5-32: Radiated emissions, 7 -18 GHz, 802.11n, MCS5, U-NII-2C band, high channel: 5720 MHz (CH144)

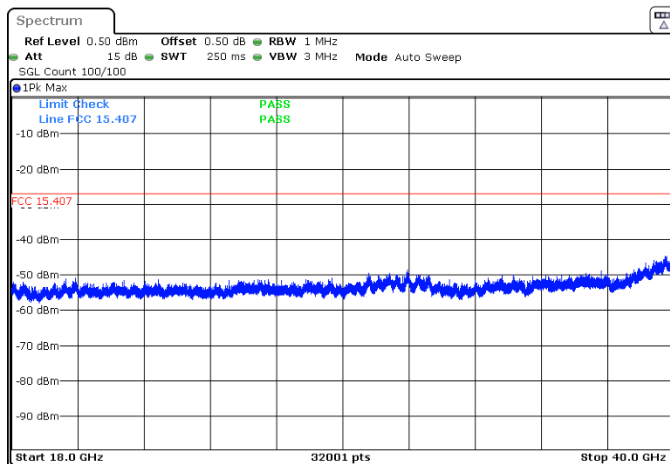


Figure 8.5-33: Radiated emissions, 18 -40 GHz, 802.11n, MCS5, U-NII-2C band, high channel: 5720 MHz (CH144)

Figure 8.5.30 and 8.3.31 show the limit line with a highest frequency band (at 5850 MHz) due channel 144 is a “straddle channel” which means it is distributed over the U-NII-2C and U-NII-3 bands. The band edges are considered to be 5470 MHz and 5850 MHz according to KDB 789033 D02 (B)(b)(iii).

8.5.5 Test data: U-NII-3 band: 5725-5850 MHz, continued

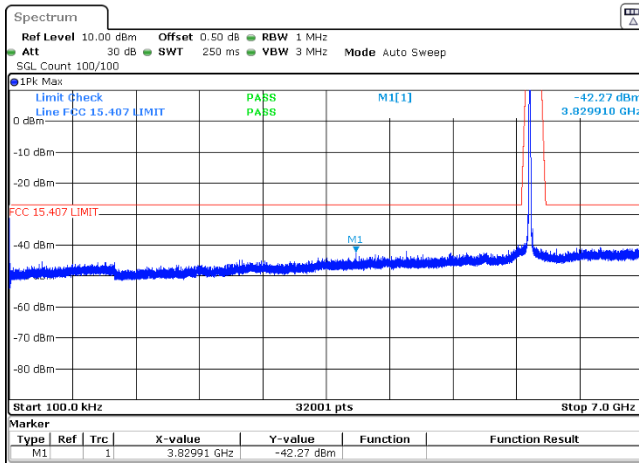


Figure 8.5-34: Radiated emissions, 0.0001 - 7 GHz, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

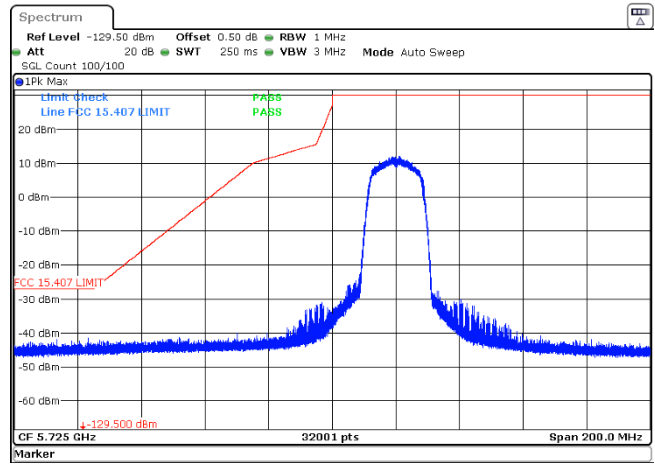


Figure 8.5-35: Low band edge, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

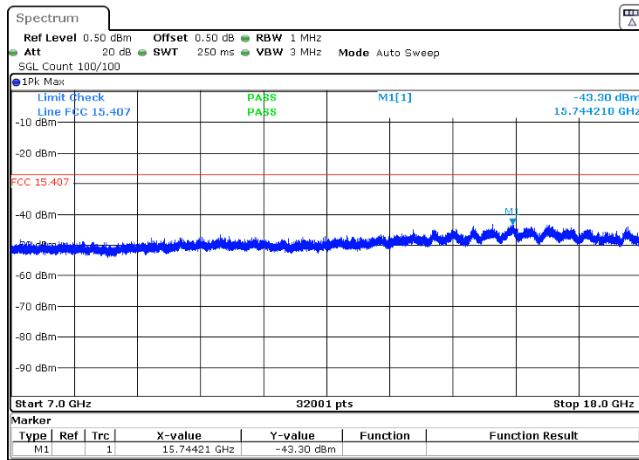


Figure 8.5-36: Radiated emissions, 7 - 18 GHz, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

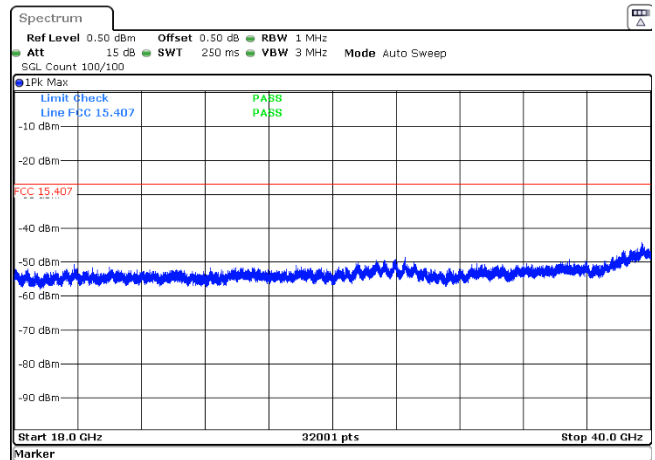


Figure 8.5-37: Radiated emissions, 18 - 40 GHz, 802.11n, MCS0, U-NII-3 band, low channel: 5745 MHz (CH149)

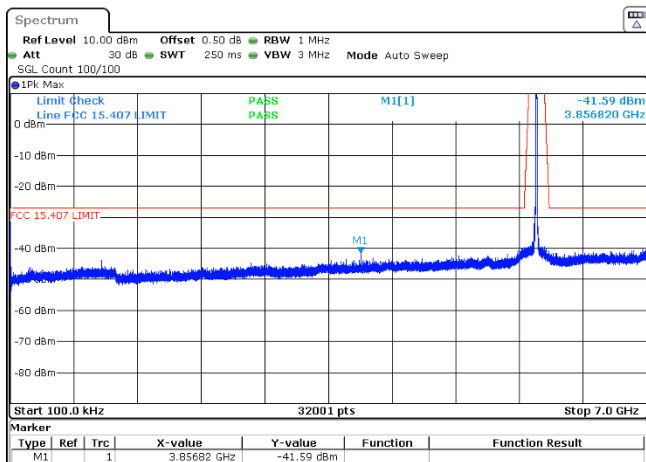


Figure 8.5-38: Radiated emissions, 0.0001 - 7 GHz, 802.11n, MCS0, U-NII-3 band, middle channel: 5785 MHz (CH157)

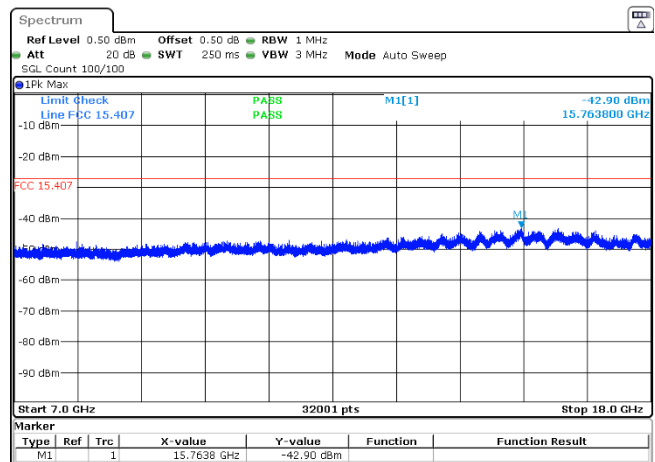


Figure 8.5-39: Radiated emissions, 7 - 18 GHz, 802.11n, MCS0, U-NII-3 band, middle channel: 5785 MHz (CH157)

8.5.5 Test data: U-NII-3 band: 5725-5850 MHz, continued

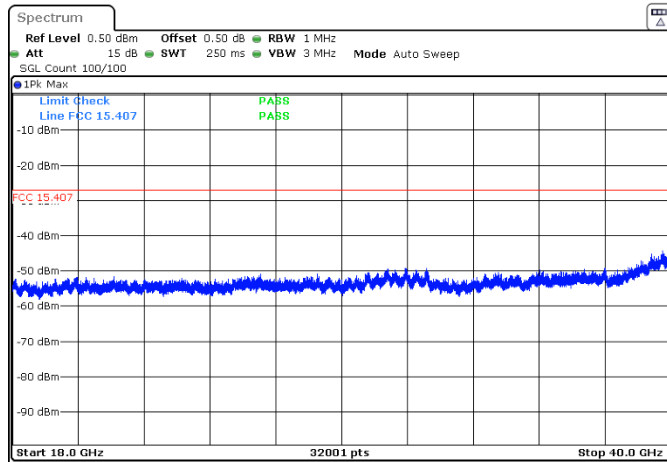


Figure 8.5-40: Radiated emissions, 18 -40 GHz, 802.11n, MCS0, U-NII-3 band, middle channel: 5785 MHz (CH157)

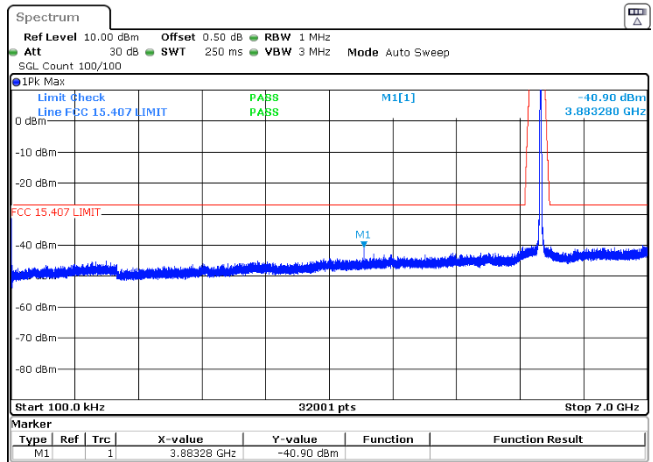


Figure 8.5-41: Radiated emissions, 0.0001 -7 GHz, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

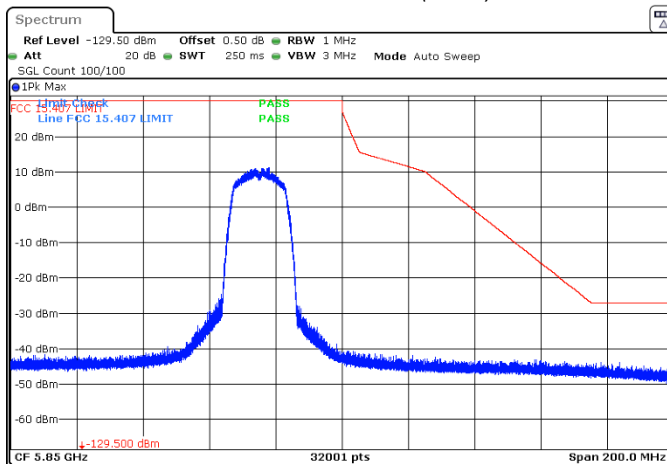


Figure 8.5-42: High band edge, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

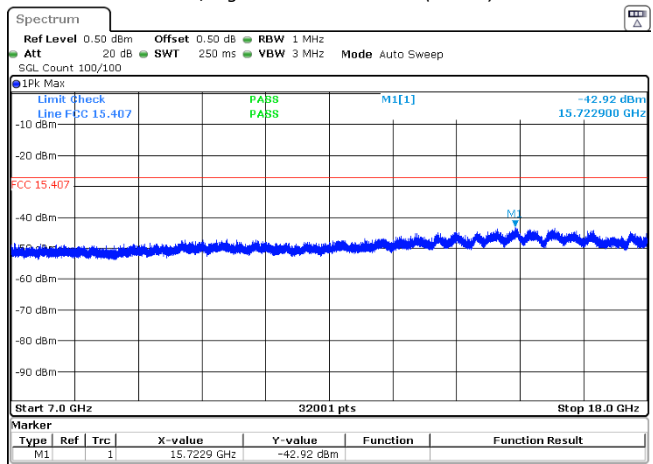


Figure 8.5-43: Radiated emissions, 7 -18 GHz, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

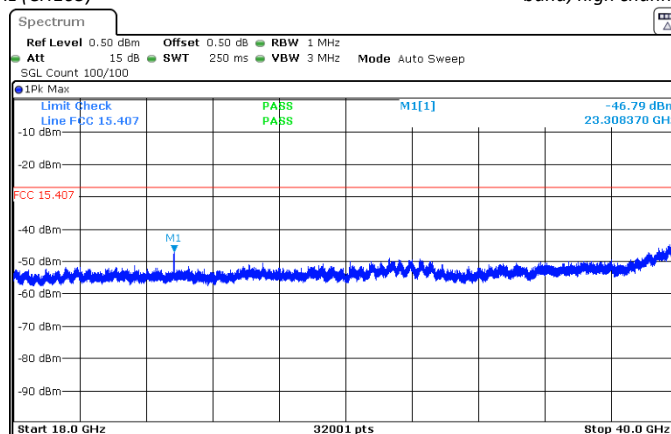


Figure 8.5-44: Radiated emissions, 18 -40 GHz, 802.11n, MCS0, U-NII-3 band, high channel: 5825 MHz (CH165)

8.6 FCC 15.407(a) and RSS-247 Power Spectral Density

8.6.1 Definition and limits

Title 47 → Chapter I → Subchapter A → Part 15 → Subpart C → §15.407(a)

KDB 789033 D02 (F)

For the band 5.15-5.25 GHz.

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.895 GHz:

For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

8.6.2 Test summary

Verdict	Pass		
Test date	July 5, 2022	Temperature	21 °C
Test engineer	Martha Espinoza, Wireless Test Engineer	Air pressure	1003 mbar
Test location	Wireless bench	Relative humidity	51 %

8.6.3 Notes

Testing was performed in Tx mode and the EUT transmitting on a fixed channel. Low, Middle, and High channel were tested using worst case modulation for each band. Only one bandwidth was declared by manufacturer.

U-NII-1 band: 5150-5250 MHz → IEEE 802.11n MCS1 (worst case)

U-NII-2A band: 5250-5350 MHz → IEEE 802.11n MCS7 (worst case)

U-NII-2C band: 5470-5725 MHz → IEEE 802.11n MCS5 (worst case)

U-NII-3 band: 5725-5850 MHz → IEEE 802.11n MCS0 (worst case)

For conducted measurements, the loss of the connected cable was input into the spectrum analyzer as an offset.

8.6.4 Setup details

Receiver settings

Resolution bandwidth	1 MHz (5150-5725 MHz band); 500 kHz (5725 MHz-5850 MHz band)
Video bandwidth	≥ 3 x RBW
Span	Emission Bandwidth
Detector mode	RMS
Trace mode	Average

8.6.5 Test data

Channel	Frequency	PSD	Limit	Margin
CH 36 IEEE 802.11n MCS1	5180 MHz	0.53 dBm	11 dBm/1 MHz	10.47 dB
CH 44 IEEE 802.11n MCS1	5220 MHz	0.71 dBm	11 dBm/1 MHz	10.29 dB
CH 48 IEEE 802.11n MCS1	5240 MHz	2.80 dBm	11 dBm/1 MHz	8.20 dB
CH 52 IEEE 802.11n MCS7	5260 MHz	1.36 dBm	11 dBm/1 MHz	9.64 dB
CH 60 IEEE 802.11n MCS7	5300 MHz	0.95 dBm	11 dBm/1 MHz	10.05 dB
CH 64 IEEE 802.11n MCS7	5320 MHz	1.13 dBm	11 dBm/1 MHz	9.87 dB
CH 100 IEEE 802.11n MCS5	5500 MHz	2.24 dBm	11 dBm/1 MHz	8.06 dB
CH 124 IEEE 802.11n MCS5	5620 MHz	2.94 dBm	11 dBm/1 MHz	8.78 dB
CH 144 IEEE 802.11n MCS5	5720 MHz	2.22 dBm	11 dBm/1 MHz	8.78 dB
CH 149 IEEE 802.11n MCS0	5745 MHz	-0.36 dBm	30 dBm/500 kHz	30.36 dB
CH 157 IEEE 802.11n MCS0	5785 MHz	-0.29 dBm	30 dBm/500 kHz	30.29 dB
CH 165 IEEE 802.11n MCS0	5825 MHz	-1.43 dBm	30 dBm/500 kHz	31.43 dB

Table 8.6-1: Power Spectral Density.

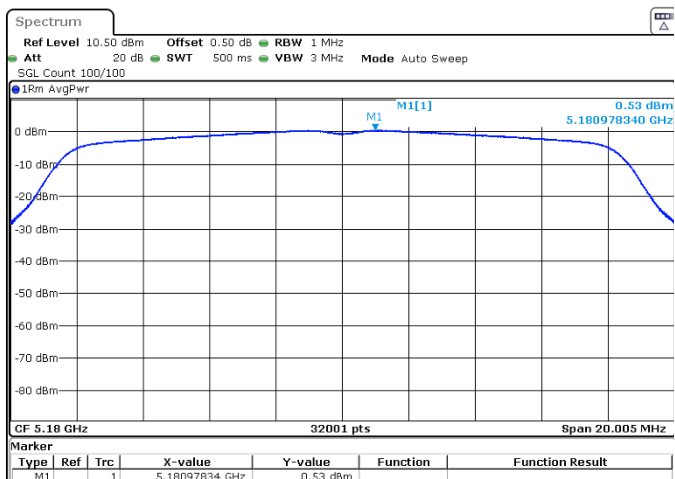


Figure 8.6-1: PSD, IEEE 802.11n MCS1, Channel 36: 5180 MHz

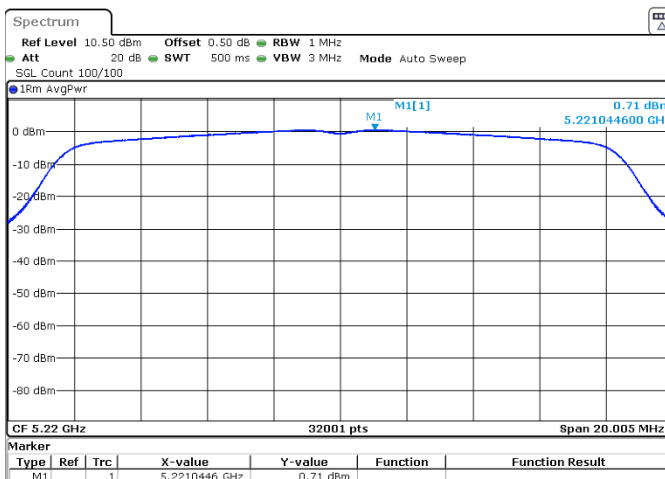


Figure 8.6-2: PSD, IEEE 802.11n MCS1, Channel 44: 5220 MHz

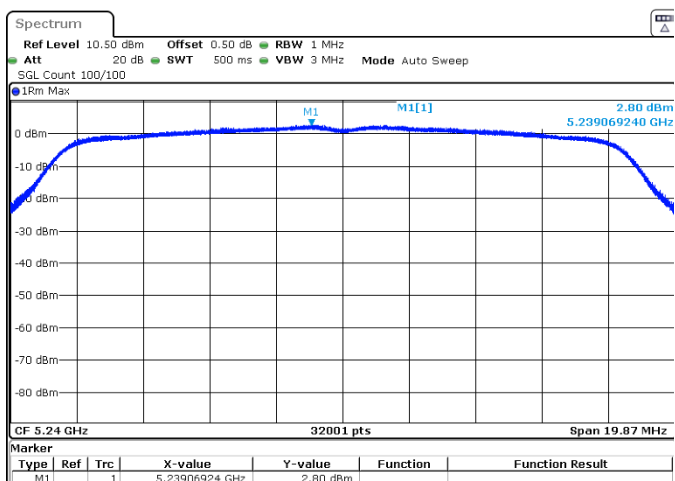


Figure 8.6-3: PSD, IEEE 802.11n MCS1, Channel 48: 5240 MHz

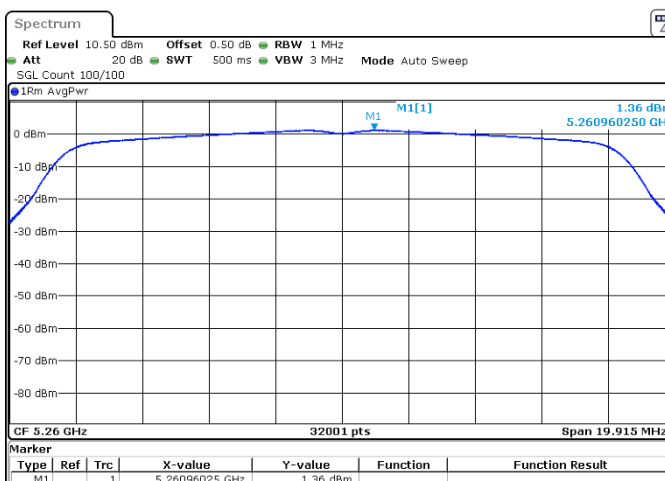


Figure 8.6-4: PSD, IEEE 802.11n MCS7, Channel 52: 5260 MHz

8.6.5 Test data, continued

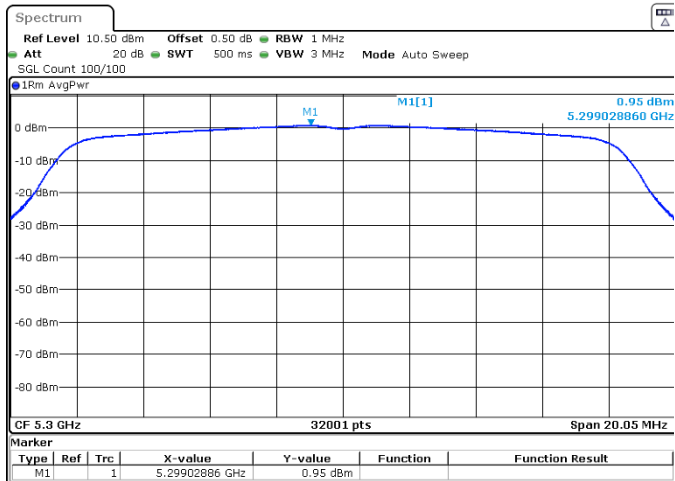


Figure 8.6-5: PSD, IEEE 802.11n MCS7, Channel 60: 5300 MHz

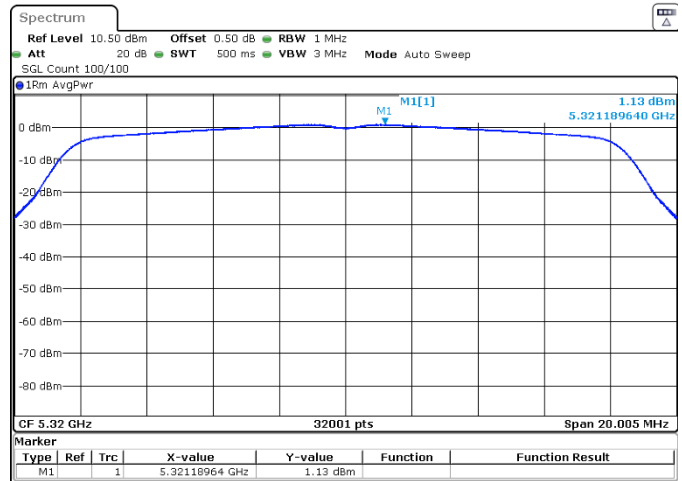


Figure 8.6-6: PSD, IEEE 802.11n MCS7, Channel 64: 5320 MHz

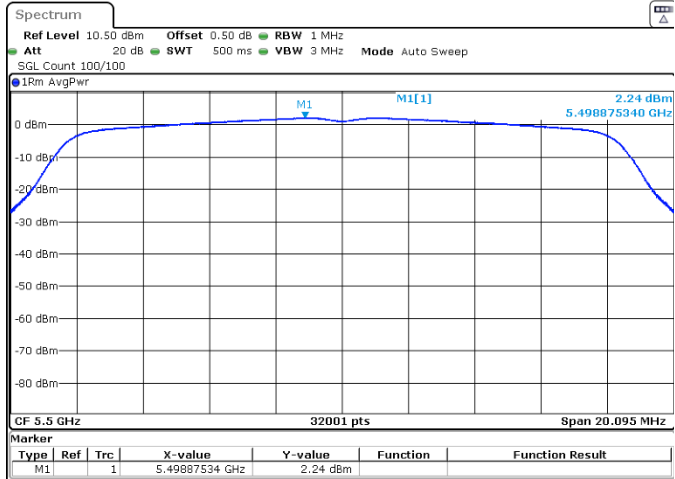


Figure 8.6-7: PSD, IEEE 802.11n MCS5, Channel 100: 5500 MHz

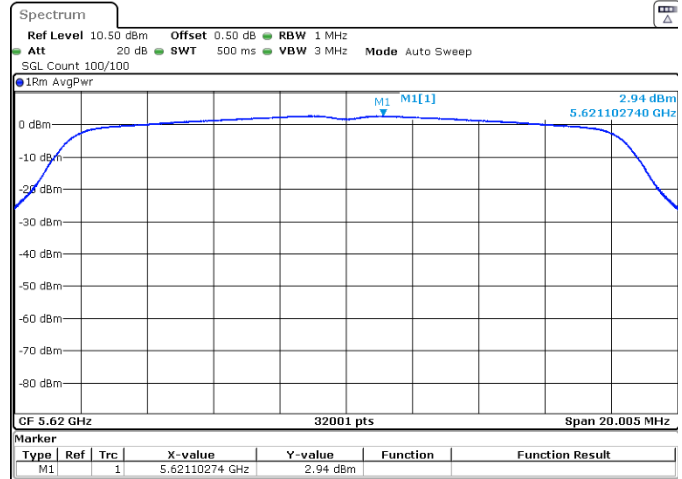


Figure 8.6-8: PSD, IEEE 802.11n MCS5, Channel 124: 5620 MHz

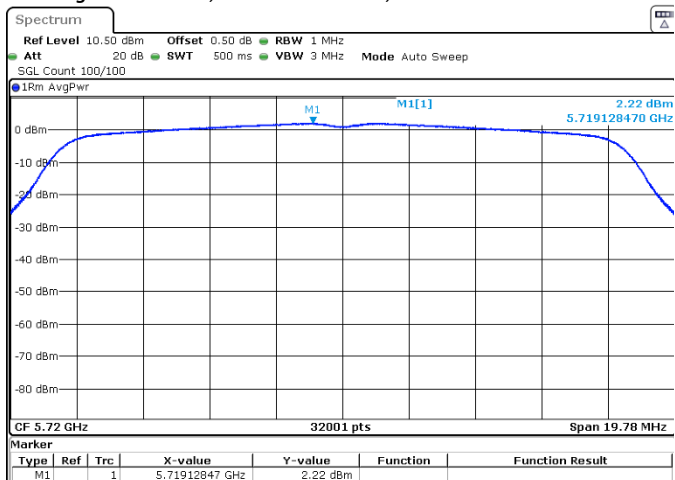


Figure 8.6-9: PSD, IEEE 802.11n MCS0, Channel 144: 5720 MHz

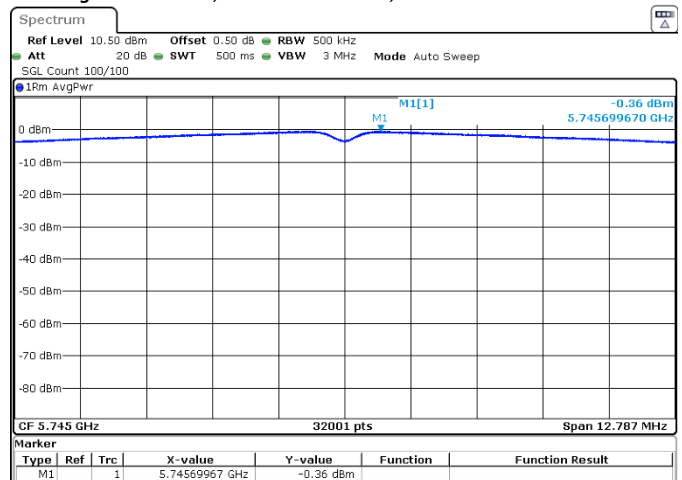


Figure 8.6-10: PSD, IEEE 802.11n MCS0, Channel 149: 5745 MHz

8.6.5 Test data, continued

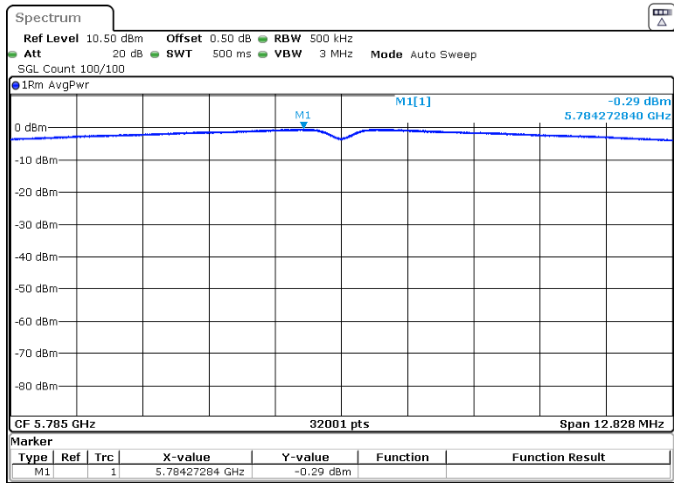


Figure 8.6-11: PSD, IEEE 802.11n MCS0, Channel 157: 5785 MHz

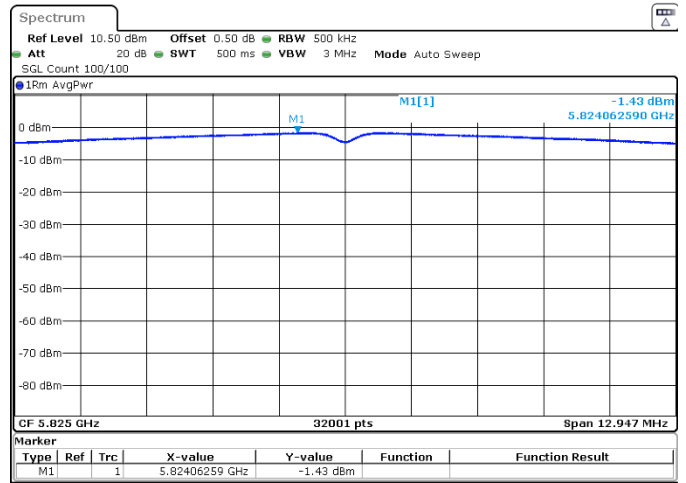


Figure 8.6-12: PSD, IEEE 802.11n MCS0, Channel 165: 5825 MHz

8.7 FCC 15.407(g) and RSS-247 Frequency Stability

8.7.1 Definition and limits

Title 47 → Chapter I → Subchapter A → Part 15 → Subpart C → §15.407(g)

KDB 789033 D02 (3)

Section 15.407(g) specifies that U-NII devices are required to ensure frequency stability. It is required that the emissions are maintained within the band of operation under all conditions of normal operation as specified in the user's manual. The grantee is responsible for ensuring that the EUT meets Section 15.407(g) requirements; however, the applications for equipment certification are not required to include test reports with explicit demonstration of compliance.

8.7.2 Test summary

Verdict	Pass		
Test date	July 18, 2022	Temperature	21 °C
Test engineer	Martha Espinoza, Wireless Test Engineer	Air pressure	1005 mbar
Test location	Wireless bench	Relative humidity	59 %

8.7.3 Notes

Testing was performed in Tx mode and the EUT transmitting on a fixed channel. Low, Middle, and High channel were tested using worst case modulation for each band. Only one bandwidth was declared by manufacturer.

U-NII-1 band: 5150-5250 MHz → IEEE 802.11n MCS1 (worst case)

U-NII-2A band: 5250-5350 MHz → IEEE 802.11n MCS7 (worst case)

U-NII-2C band: 5470-5725 MHz → IEEE 802.11n MCS5 (worst case)

U-NII-3 band: 5725-5850 MHz → IEEE 802.11n MCS0 (worst case)

Extreme temperature and extreme voltage declared by manufacturer: -35C to +85C, 2.97V to 3.63V.

8.7.4 Setup details

Receiver settings

Resolution bandwidth	1% to 5% of the OBW
Video bandwidth	≥ 3 x RBW
Span	1.5 time to 5.0 times the OBW
Detector mode	Peak
Trace mode	Max Hold

8.7.5 Test data

Channel	Center Frequency	Low Frequency	High Frequency	Center frequency calculated	ppm
36	5180	5171.7682	5188.2717	5180.020	-3.85
44	5220	5211.7682	5228.2717	5220.020	-3.82
48	5240	5231.7682	5248.2717	5240.020	-3.81
149	5745	5736.7283	5753.2318	5744.980	3.47
157	5785	5776.7283	5793.2318	5784.980	3.45
165	5825	5816.7283	5833.2717	5825.000	0.00
52	5260	5251.7283	5268.2717	5260.000	0.00
60	5300	5291.7682	5308.2717	5300.020	-3.76
64	5320	5311.7682	5328.2717	5320.020	-3.75
100	5500	5491.7682	5508.2717	5500.020	-3.63
124	5620	5611.7682	5628.2717	5620.020	-3.55
144	5720	5711.7283	5728.2318	5719.980	3.49

Table 8.7-1: Frequency stability at +20C and 3.3V, nominal values.

8.7.5 Test data, continued

Channel	Center Frequency	Low Frequency	High Frequency	Center frequency calculated	ppm
36	5180	5171.8082	5188.3516	5180.080	-15.42
44	5220	5211.6484	5228.1918	5219.920	15.31
48	5240	5231.7283	5248.3117	5240.020	-3.82
149	5745	5736.6883	5753.2318	5744.960	6.95
157	5785	5776.7283	5793.1918	5784.960	6.91
165	5825	5816.6883	5833.3117	5825.000	0.00
52	5260	5251.8082	5268.3516	5260.080	-15.19
60	5300	5291.6484	5308.2318	5299.940	11.30
64	5320	5311.7682	5328.3117	5320.040	-7.51
100	5500	5491.6883	5508.2318	5499.960	7.26
124	5620	5611.8082	5628.3117	5620.060	-10.67
144	5720	5711.6883	5728.2318	5719.960	6.98

Table 8.7-2: Frequency stability at +20C and 2.97V, 10% reduced from nominal value.

Channel	Center Frequency	Low Frequency	High Frequency	Center frequency calculated	ppm
36	5180	5171.7482	5188.3516	5180.050	-9.63
44	5220	5211.6484	5228.1918	5219.920	15.31
48	5240	5231.6883	5248.2717	5239.980	3.82
149	5745	5736.6484	5753.2318	5744.940	10.43
157	5785	5776.7283	5793.1918	5784.960	6.91
165	5825	5816.6484	5833.2717	5824.960	6.86
52	5260	5251.8082	5268.3516	5260.080	-15.19
60	5300	5291.6084	5308.2318	5299.920	15.08
64	5320	5311.7283	5328.3117	5320.020	-3.76
100	5500	5491.6484	5508.2318	5499.940	10.89
124	5620	5611.7682	5628.3117	5620.040	-7.11
144	5720	5711.6883	5728.1918	5719.940	10.48

Table 8.7-3: Frequency stability at +20C and 3.63V, 10% added from nominal value.

Channel	Center Frequency	Low Frequency	High Frequency	Center frequency calculated	ppm
36	5180	5171.8032	5188.316	5180.060	-11.51
44	5220	5211.6484	5228.1918	5219.920	15.31
48	5240	5231.7283	5248.2717	5240.000	0.00
149	5745	5736.6883	5753.2717	5744.980	3.48
157	5785	5776.7682	5793.2318	5785.000	0.00
165	5825	5816.7283	5833.2717	5825.000	0.00
52	5260	5251.8482	5268.3516	5260.100	-18.99
60	5300	5291.6484	5308.2318	5299.940	11.30
64	5320	5311.7682	5328.317	5320.043	-8.01
100	5500	5491.7682	5508.2318	5500.000	0.00
124	5620	5611.8082	5628.3516	5620.080	-14.22
144	5720	5711.283	5728.2318	5719.757	42.41

Table 8.7-4: Frequency stability at -35C and 3.3V, minimum temperature.

Channel	Center Frequency	Low Frequency	High Frequency	Center frequency calculated	ppm
36	5180	5171.8881	5188.4316	5180.160	-30.86
44	5220	5211.7682	5228.3117	5220.040	-7.65
48	5240	5231.8482	5248.3916	5240.120	-22.88
149	5745	5736.8082	5753.3916	5745.100	-17.39
157	5785	5776.8082	5793.3516	5785.080	-13.81
165	5825	5816.8482	5833.4316	5825.140	-24.02
52	5260	5251.8881	5268.3916	5260.140	-26.59
60	5300	5291.7682	5308.3516	5300.060	-11.30
64	5320	5311.8881	5328.4316	5320.160	-30.05
100	5500	5491.7682	5508.3516	5500.060	-10.89
124	5620	5611.8881	5628.4316	5620.160	-28.44
144	5720	5711.7682	5728.3516	5720.060	-10.47

Table 8.7-5: Frequency stability at +85C and 3.3V, maximum temperature.