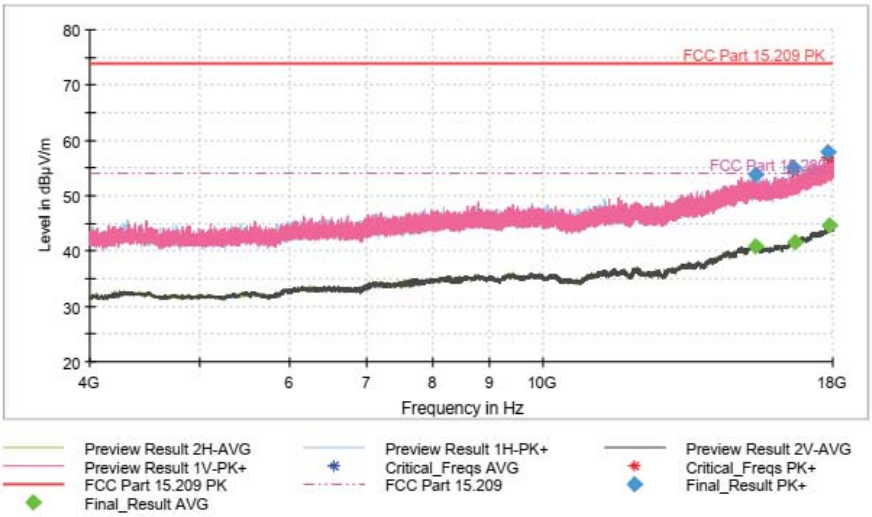
EUT Information

EUT:	Wine climate cabinet
Supply:	Uin 120V/60Hz
Operating mode:	TX 802.11n 2452 MHz mcs7 40 MHz BW

Full Spectrum



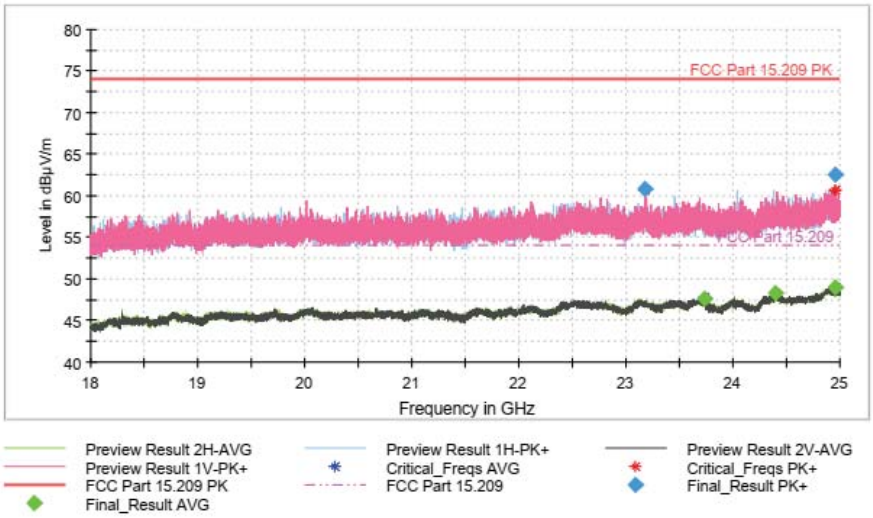
Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
17882.250000	---	44.69	54.00	9.31	150.0	V	0.0
16676.250000	---	41.72	54.00	12.28	150.0	H	0.0
15385.250000	---	40.81	54.00	13.19	150.0	V	0.0
17812.000000	57.82	---	74.00	16.18	150.0	V	0.0
16633.750000	55.13	---	74.00	18.87	150.0	V	0.0
15386.500000	53.70	---	74.00	20.30	150.0	H	0.0

EUT Information

EUT:	Wine climate cabinet
Supply:	Uin 120V/60Hz
Operating mode:	TX 802.11n 2452 MHz mcs7 40 MHz BW

Full Spectrum



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
24952.500000	---	48.92	54.00	5.08	150.0	V	0.0
24399.000000	---	48.28	54.00	5.72	150.0	V	0.0
23733.000000	---	47.63	54.00	6.37	150.0	H	0.0
24952.250000	62.57	---	74.00	11.43	150.0	H	0.0
23174.000000	60.81	---	74.00	13.19	150.0	V	0.0

3.5 47 CFR § 15.247 (a) (2) – 6 dB Emission Bandwidth

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

3.5.1 Test procedure

According ANSI C63.10-2013:

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d) Steps a) through c) might require iteration to adjust within the specified tolerances.
e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “-xx dB down” requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.

f) Set detection mode to peak and trace mode to max hold.

g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyser marker to the highest level of the displayed trace (this is the reference value).

h) Determine the “−xx dB down amplitude” using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyser and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “−xx dB down amplitude” determined in step h). If a marker is below this “−xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “−xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

3.5.2 Test setup

For the test setup refer to chapter 1.4.

3.5.3 Test equipment

For the test setup refer to chapter 1.3.

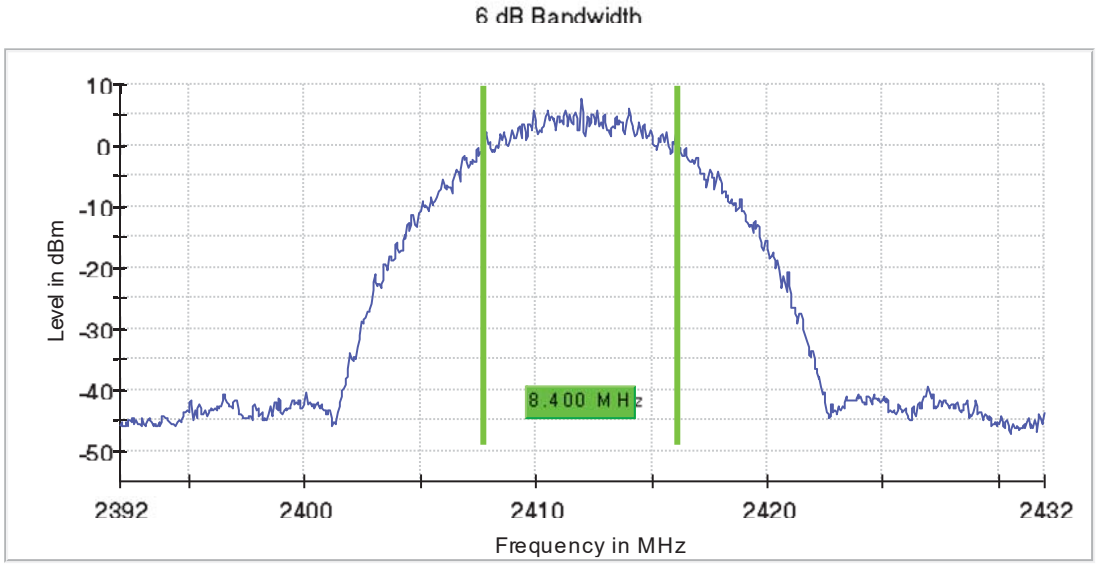
3.5.4 Test results

802.11b:

DUT Frequency (MHz)	Spectrum analyzer RBW (kHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2412.000000	100.000	8.400000	0.500000	---	2407.775000	2416.175000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

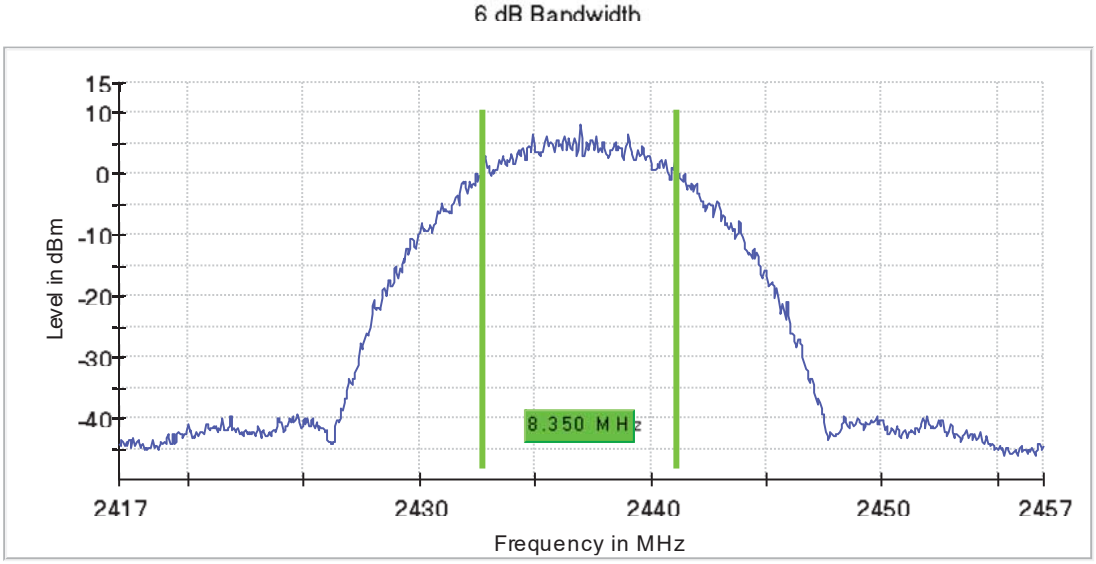
DUT Frequency (MHz)	Max Level (dBm)	Result
2412.000000	7.8	PASS



DUT Frequency (MHz)	Spectrum analyzer RBW (kHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2437.000000	100.000	8.350000	0.500000	---	2432.775000	2441.125000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

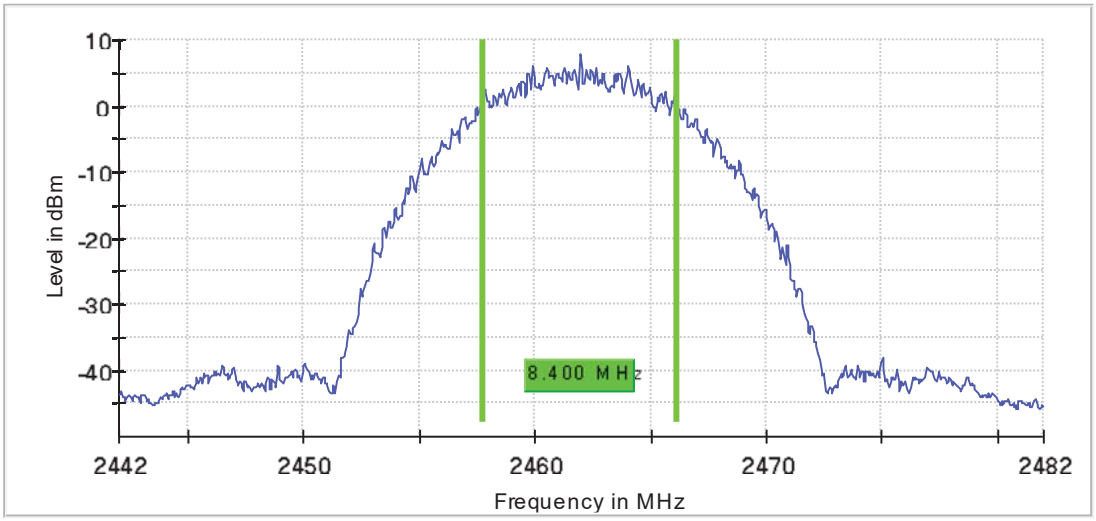
DUT Frequency (MHz)	Max Level (dBm)	Result
2437.000000	8.4	PASS



DUT Frequency (MHz)	Spectrum analyzer RBW (kHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2462.000000	100.000	8.400000	0.500000	---	2457.775000	2466.175000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2462.000000	7.9	PASS

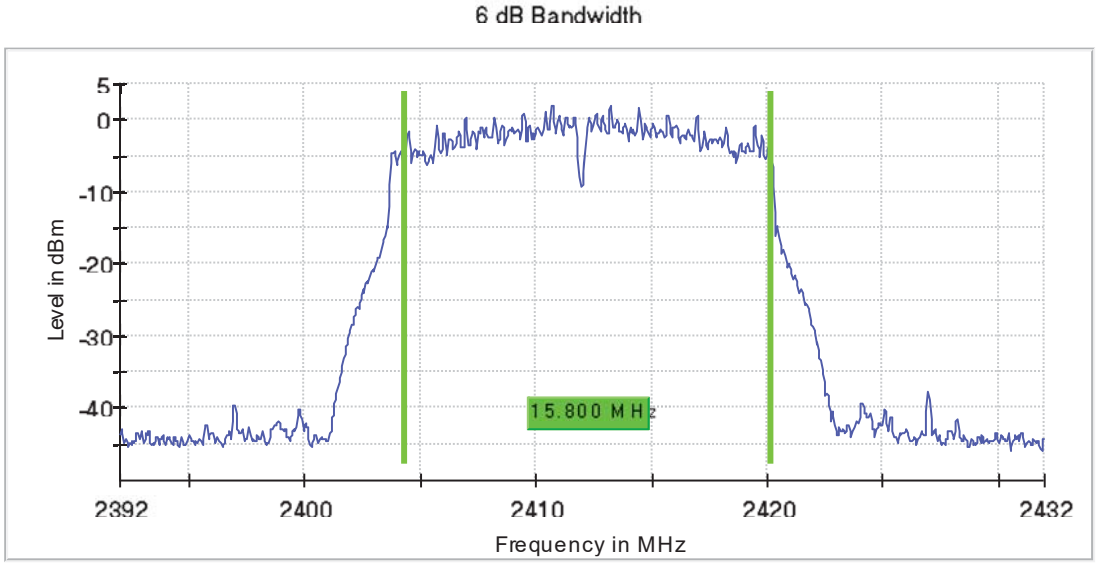


802.11g:

DUT Frequency (MHz)	Spectrum analyzer RBW (kHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2412.000000	100.000	15.800000	0.500000	---	2404.375000	2420.175000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

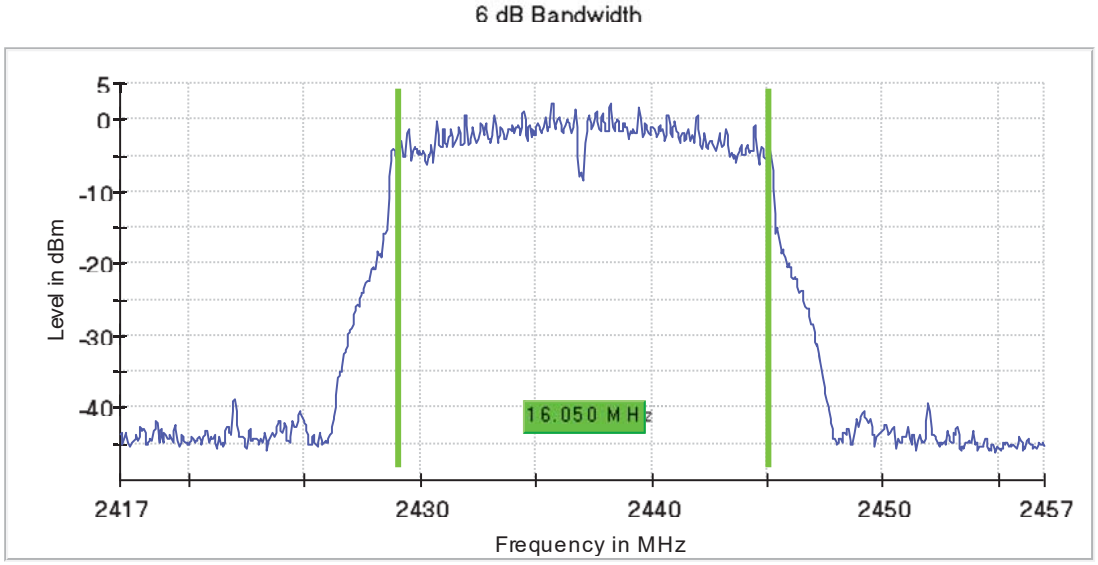
DUT Frequency (MHz)	Max Level (dBm)	Result
2412.000000	2.0	PASS



DUT Frequency (MHz)	Spectrum analyzer RBW (kHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2437.000000	100.000	16.050000	0.500000	---	2429.075000	2445.125000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

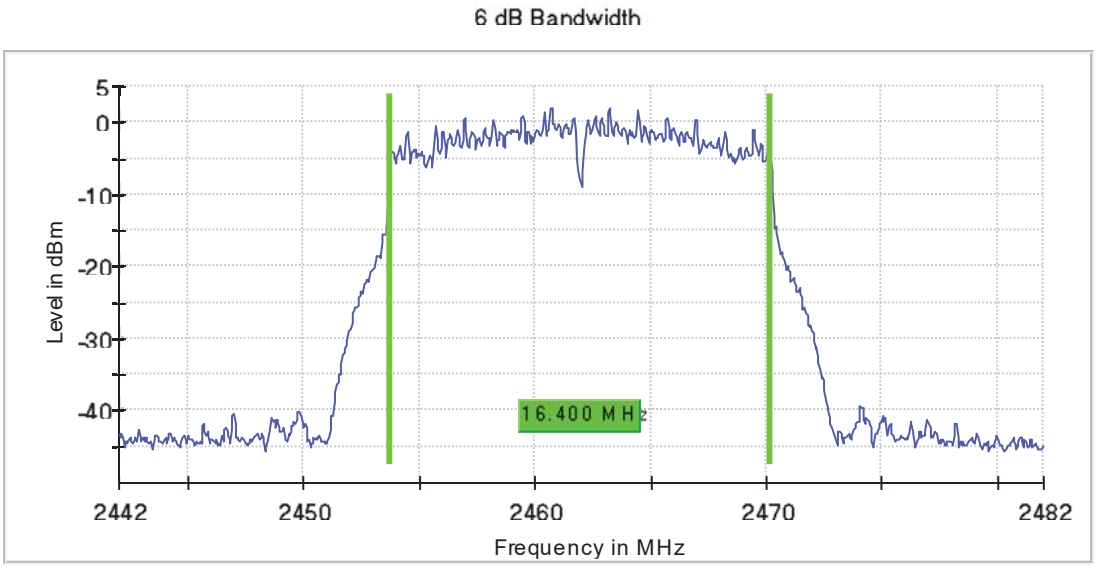
DUT Frequency (MHz)	Max Level (dBm)	Result
2437.000000	2.2	PASS



DUT Frequency (MHz)	Spectrum analyzer RBW (kHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2462.000000	100.000	16.400000	0.500000	---	2453.775000	2470.175000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2462.000000	2.0	PASS

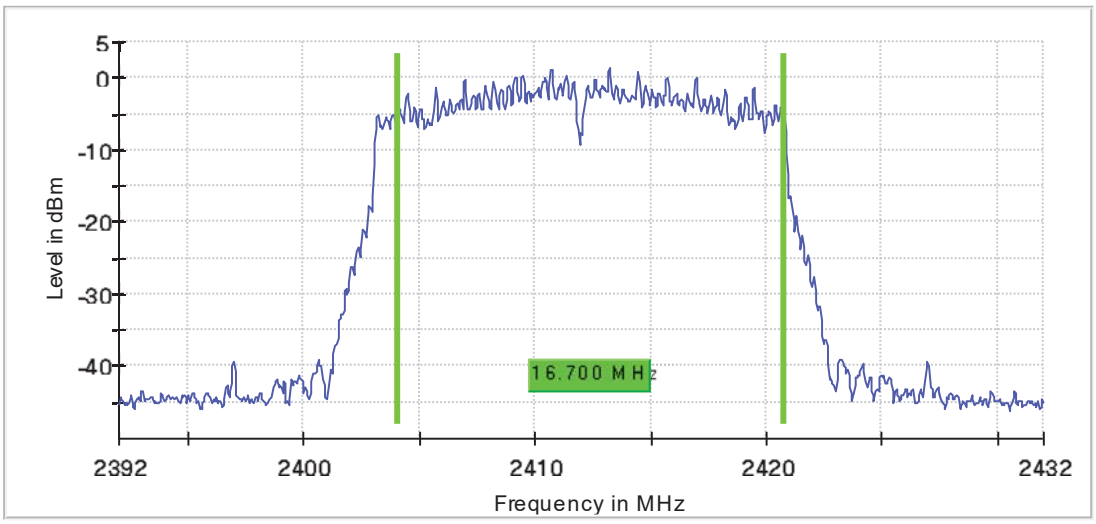


802.11n 20 MHz bandwidth:

DUT Frequency (MHz)	Spectrum analyzer RBW (kHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2412.000000	100.000	16.700000	0.500000	---	2404.075000	2420.775000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

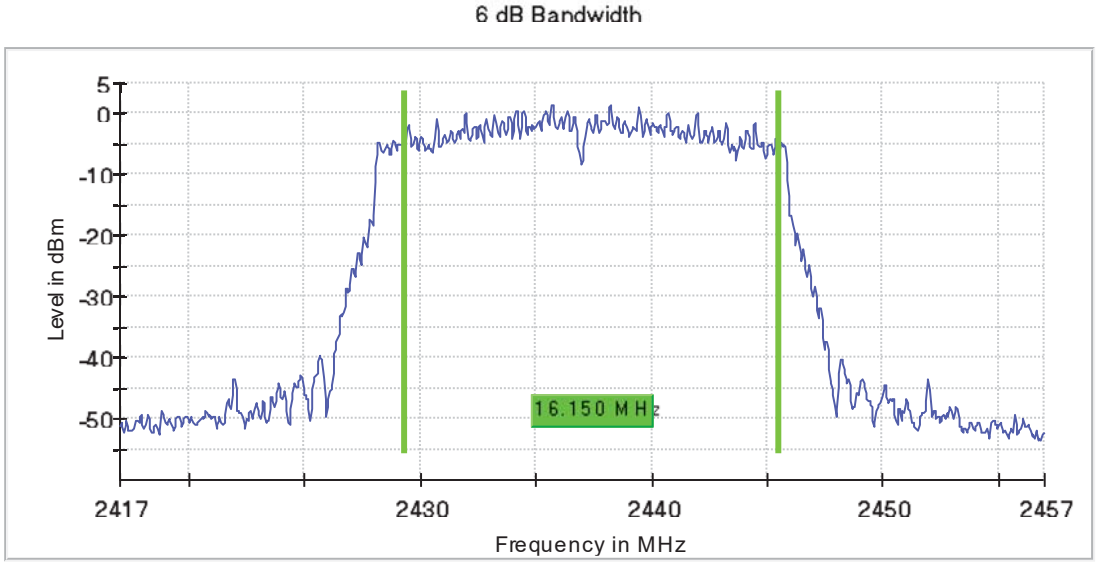
DUT Frequency (MHz)	Max Level (dBm)	Result
2412.000000	1.3	PASS



DUT Frequency (MHz)	Spectrum analyzer RBW (kHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2437.000000	100.000	16.150000	0.500000	---	2429.375000	2445.525000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

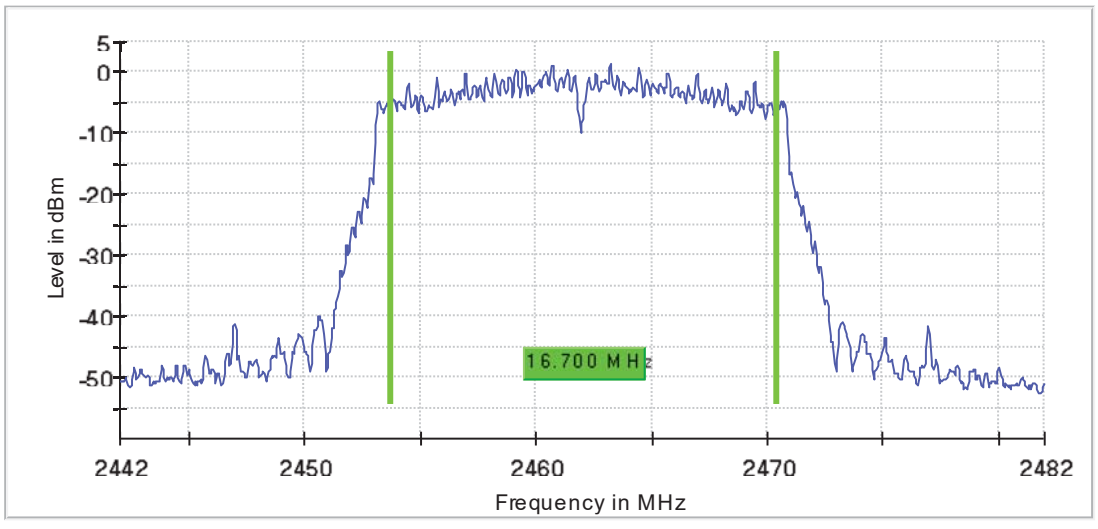
DUT Frequency (MHz)	Max Level (dBm)	Result
2437.000000	1.6	PASS



DUT Frequency (MHz)	Spectrum analyzer RBW (kHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2462.000000	100.000	16.700000	0.500000	---	2453.775000	2470.475000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2462.000000	1.3	PASS

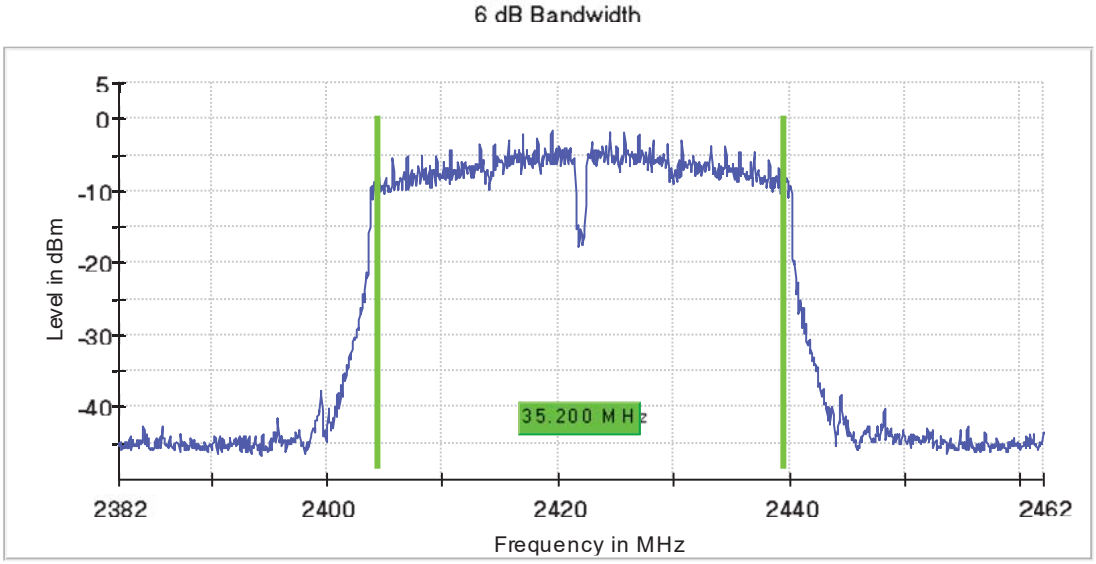


802.11n 40 MHz bandwidth:

DUT Frequency (MHz)	Spectrum analyzer RBW (kHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2422.000000	100.000	35.200000	0.500000	---	2404.375000	2439.575000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

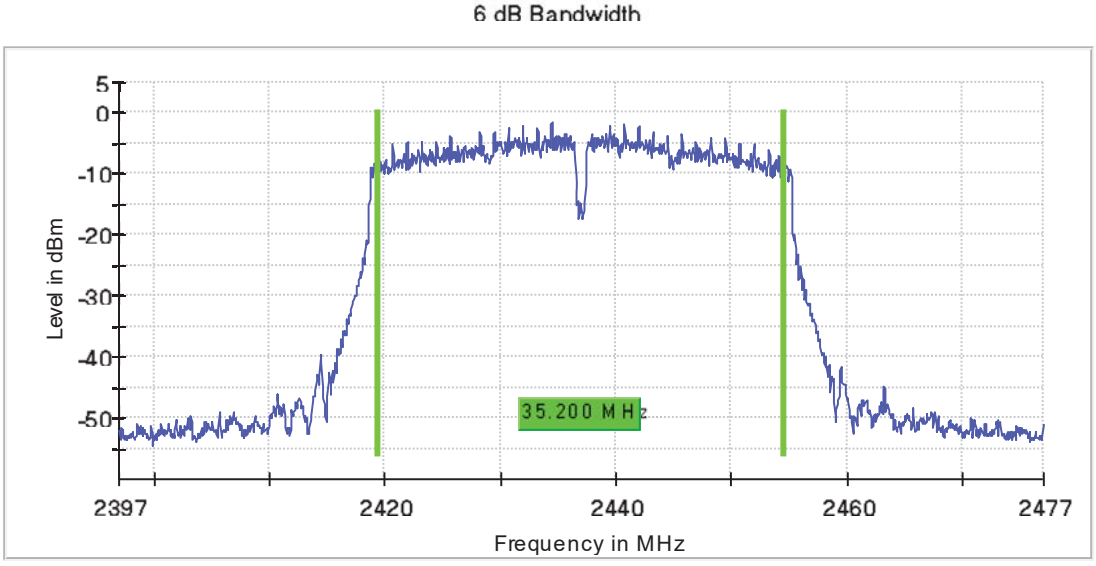
DUT Frequency (MHz)	Max Level (dBm)	Result
2422.000000	-1.7	PASS



DUT Frequency (MHz)	Spectrum analyzer RBW (kHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2437.000000	100.000	35.200000	0.500000	---	2419.375000	2454.575000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

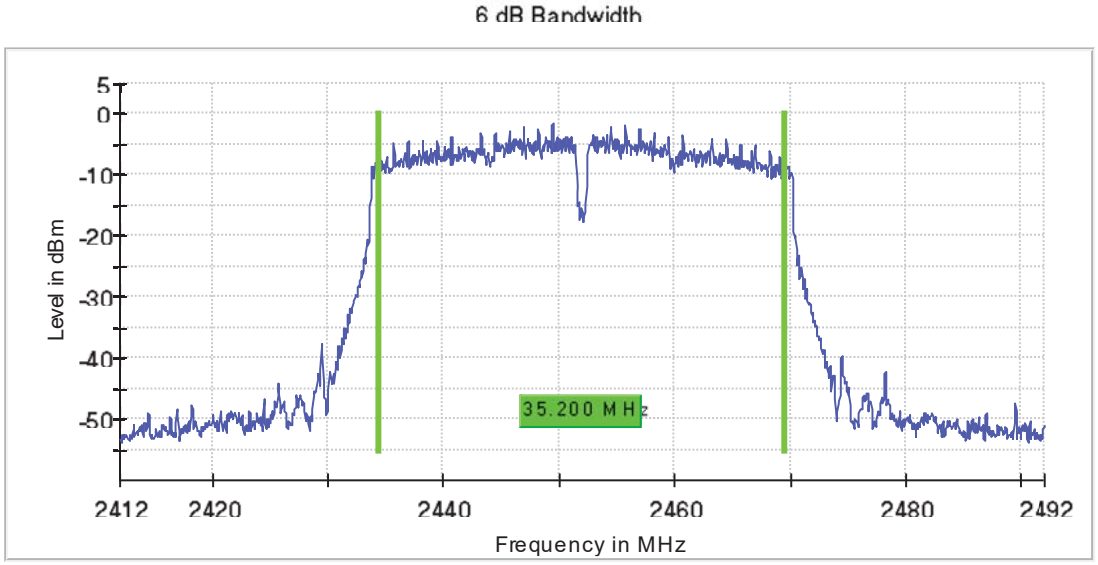
DUT Frequency (MHz)	Max Level (dBm)	Result
2437.000000	-1.5	PASS



DUT Frequency (MHz)	Spectrum analyzer RBW (kHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2452.000000	100.000	35.200000	0.500000	---	2434.375000	2469.575000

(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2452.000000	-1.5	PASS



3.6 47 CFR § 15.247 (b) (3) – Maximum peak output power

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

3.6.1 Test procedure

According ANSI C63.10-2013:

Measurement using an RF average power meter. The procedure for this method is as follows:

a) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:
1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

b) If the transmitter does not transmit continuously, measure the duty cycle *D* of the transmitter output signal as described in 12.2.

c) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.

d) Adjust the measurement in dBm by adding [10 log (1 / *D*)], where *D* is the duty cycle {e.g., [10 log (1 / 0.25)], if the duty cycle is 25%}.

3.6.2 Test setup

For the test setup refer to chapter 1.4.

3.6.3 Test equipment

For the test setup refer to chapter 1.3.

3.6.4 Test results

802.11b:

47 CFR § 15.247 Requirement

DUT Frequency (MHz)	Conducted output power (dBm)	Limit Max (dBm)	Result
2412.000000	15.3	30.0	PASS
2437.000000	15.7	30.0	PASS
2462.000000	15.3	30.0	PASS

RSS 247 Requirement

DUT Frequency (MHz)	Conducted output power (dBm)	Limit Max (dBm)	Equivalent isotropically radiated power (e.i.r.p)	Limit Max (dBm)	Result
2402.000000	15.3	30.0	17.09	36.2	PASS
2440.000000	15.7	30.0	17.49	36.2	PASS
2480.000000	15.3	30.0	17.09	36.2	PASS

802.11g:

47 CFR § 15.247 Requirement

DUT Frequency (MHz)	Conducted output power (dBm)	Limit Max (dBm)	Result
2412.000000	12.8	30.0	PASS
2437.000000	13.0	30.0	PASS
2462.000000	12.8	30.0	PASS

RSS 247 Requirement

DUT Frequency (MHz)	Conducted output power (dBm)	Limit Max (dBm)	Equivalent isotropically radiated power (e.i.r.p)	Limit Max (dBm)	Result
2402.000000	12.8	30.0	14.59	36.2	PASS
2440.000000	13.0	30.0	14.79	36.2	PASS
2480.000000	12.8	30.0	14.59	36.2	PASS

802.11n 20 MHz bandwidth:

47 CFR § 15.247 Requirement

DUT Frequency (MHz)	Conducted output power (dBm)	Limit Max (dBm)	Result
2412.000000	12.1	30.0	PASS
2437.000000	12.4	30.0	PASS
2462.000000	12.2	30.0	PASS

RSS 247 Requirement

DUT Frequency (MHz)	Conducted output power (dBm)	Limit Max (dBm)	Equivalent isotropically radiated power (e.i.r.p)	Limit Max (dBm)	Result
2402.000000	12.1	30.0	13.89	36.2	PASS
2440.000000	12.4	30.0	14.19	36.2	PASS
2480.000000	12.2	30.0	13.99	36.2	PASS

802.11n 40 MHz bandwidth:

47 CFR § 15.247 Requirement

DUT Frequency (MHz)	Conducted output power (dBm)	Limit Max (dBm)	Result
2412.000000	11.8	30.0	PASS
2437.000000	11.8	30.0	PASS
2462.000000	11.8	30.0	PASS

RSS 247 Requirement

DUT Frequency (MHz)	Conducted output power (dBm)	Limit Max (dBm)	Equivalent isotropically radiated power (e.i.r.p)	Limit Max (dBm)	Result
2402.000000	11.8	30.0	13.59	36.2	PASS
2440.000000	11.8	30.0	13.59	36.2	PASS
2480.000000	11.8	30.0	13.59	36.2	PASS

3.7 47 CFR § 15.247 (d) –100 kHz Bandwidth of Frequency Band Edge

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

3.7.1 Test procedure

According ANSI C63.10-2013:
a) Connect the EMI receiver or spectrum analyzer to the EUT using an appropriate RF cable connected to the EUT output. Configure the spectrum analyzer settings as described in step e) (be sure to enter all losses between the unlicensed wireless device output and the spectrum analyzer).

b) Set the EUT to the lowest frequency channel (for the hopping on test, the hopping sequence shall include the lowest frequency channel).

c) Set the EUT to operate at maximum output power and 100% duty cycle, or equivalent “normal mode of operation” as specified in 6.10.3.

d) If using the radiated method, then use the applicable procedure(s) of 6.4, 6.5 6.6, and orient the EUT and measurement antenna positions to produce the highest emission level.

e) Perform the test as follows:
1) Span: Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products that fall outside of the authorized band of operation.
2) Reference level: As required to keep the signal from exceeding the maximum instrument input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
3) Attenuation: Auto (at least 10 dB preferred).
4) Sweep time: Coupled.
5) Resolution bandwidth: 100 kHz.
6) Video bandwidth: 300 kHz.
7) Detector: Peak.
8) Trace: Max hold.

f) Allow the trace to stabilize. For the test with the hopping function turned ON, this can take several minutes to achieve

g) Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge. Enable the marker-delta function, and then use the marker-to-peak function to move the marker to the peak of the in-band emission.

h) Repeat step c) through step e) for every applicable modulation.

i) Set the EUT to the highest frequency channel (for the hopping on test, the hopping sequence shall include the highest frequency channel) and repeat step c) through step d).

j) The band-edge measurement shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

3.7.2 Test setup

For the test setup refer to chapter 1.4.

3.7.3 Test equipment

For the test setup refer to chapter 1.3.

3.7.4 Test results – Conducted measurement of band edges

802.11b:

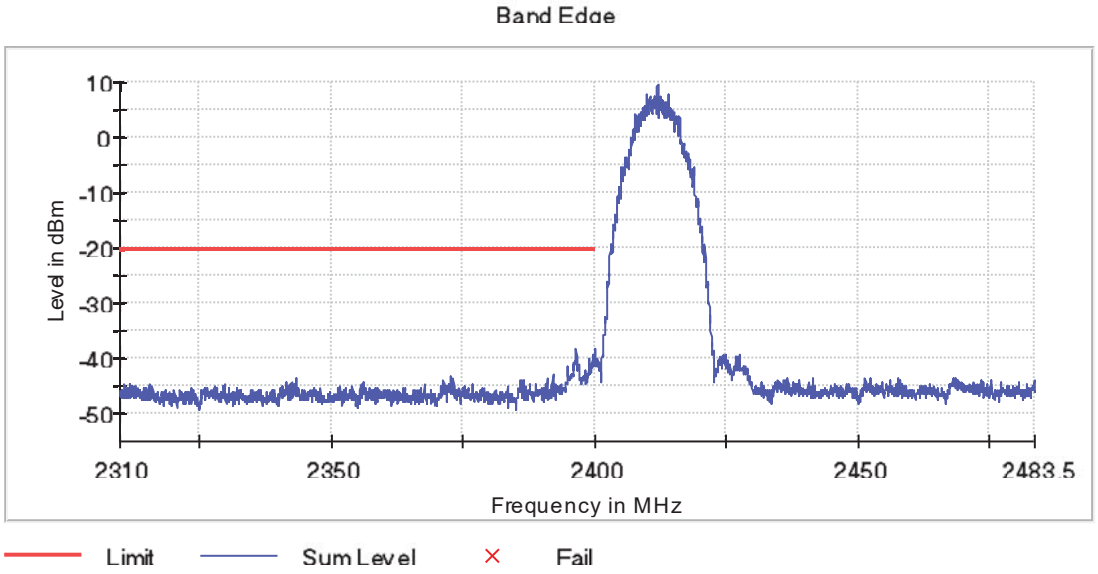
DUT Frequency (MHz)	Result
2412.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2411.975000	9.6

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2396.525000	-38.0	17.6	-20.4	PASS
2396.475000	-38.1	17.6	-20.4	PASS
2399.625000	-39.3	18.8	-20.4	PASS
2399.675000	-39.5	19.1	-20.4	PASS
2396.575000	-39.7	19.3	-20.4	PASS
2396.425000	-39.8	19.3	-20.4	PASS
2399.575000	-39.8	19.4	-20.4	PASS
2398.875000	-40.1	19.7	-20.4	PASS
2396.275000	-40.3	19.8	-20.4	PASS
2399.725000	-40.3	19.9	-20.4	PASS
2398.925000	-40.5	20.0	-20.4	PASS
2399.875000	-40.5	20.1	-20.4	PASS
2399.925000	-40.8	20.3	-20.4	PASS
2396.125000	-40.8	20.3	-20.4	PASS
2396.175000	-40.8	20.3	-20.4	PASS



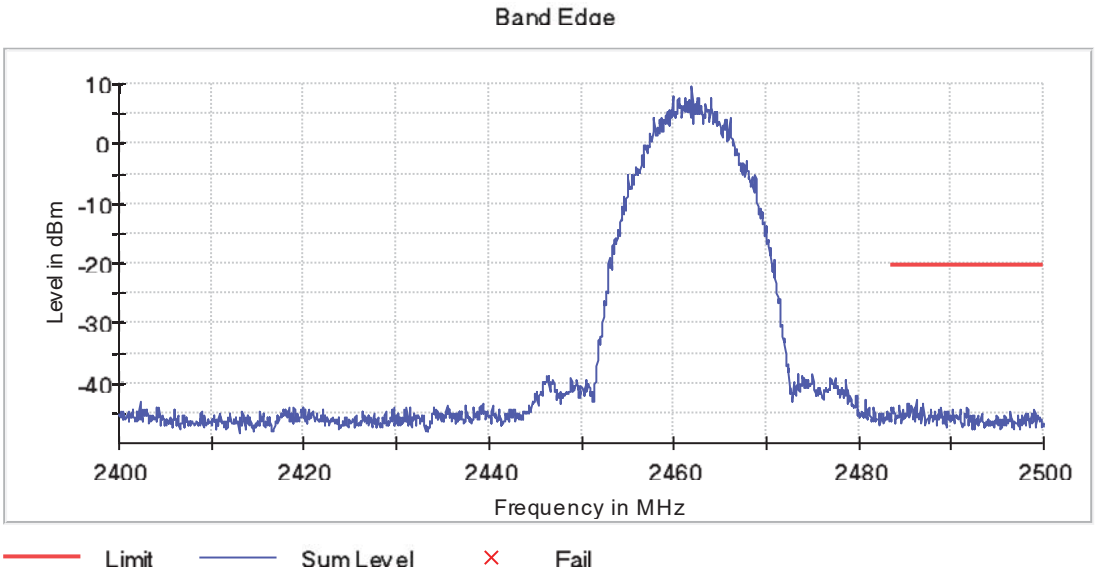
DUT Frequency (MHz)	Result
2462.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2480.025000	-4.9

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2486.225000	-42.7	22.3	-20.4	PASS
2486.275000	-42.9	22.5	-20.4	PASS
2486.975000	-43.4	23.0	-20.4	PASS
2485.325000	-43.4	23.0	-20.4	PASS
2485.375000	-43.5	23.2	-20.4	PASS
2485.725000	-43.7	23.3	-20.4	PASS
2487.025000	-43.8	23.4	-20.4	PASS
2484.425000	-43.9	23.5	-20.4	PASS
2486.675000	-44.0	23.6	-20.4	PASS
2486.625000	-44.1	23.7	-20.4	PASS
2485.275000	-44.1	23.7	-20.4	PASS
2486.025000	-44.1	23.7	-20.4	PASS
2483.525000	-44.2	23.8	-20.4	PASS
2484.375000	-44.2	23.8	-20.4	PASS
2491.675000	-44.2	23.8	-20.4	PASS



802.11g:

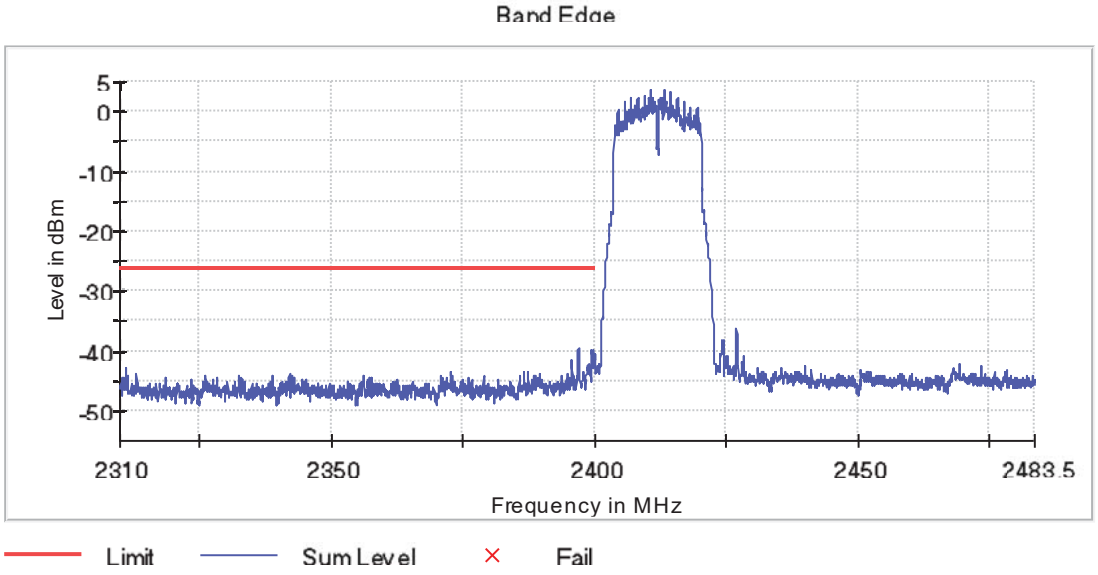
DUT Frequency (MHz)	Result
2412.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2410.675000	3.8

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2396.975000	-39.5	13.3	-26.2	PASS
2396.925000	-39.7	13.5	-26.2	PASS
2399.775000	-39.9	13.6	-26.2	PASS
2399.475000	-39.9	13.6	-26.2	PASS
2399.525000	-40.0	13.8	-26.2	PASS
2399.725000	-40.1	13.8	-26.2	PASS
2397.025000	-40.1	13.8	-26.2	PASS
2399.675000	-40.1	13.9	-26.2	PASS
2399.925000	-40.4	14.1	-26.2	PASS
2399.825000	-40.5	14.2	-26.2	PASS
2399.875000	-40.6	14.3	-26.2	PASS
2399.425000	-41.3	15.1	-26.2	PASS
2395.725000	-41.4	15.2	-26.2	PASS
2399.975000	-41.6	15.4	-26.2	PASS
2395.675000	-41.7	15.4	-26.2	PASS



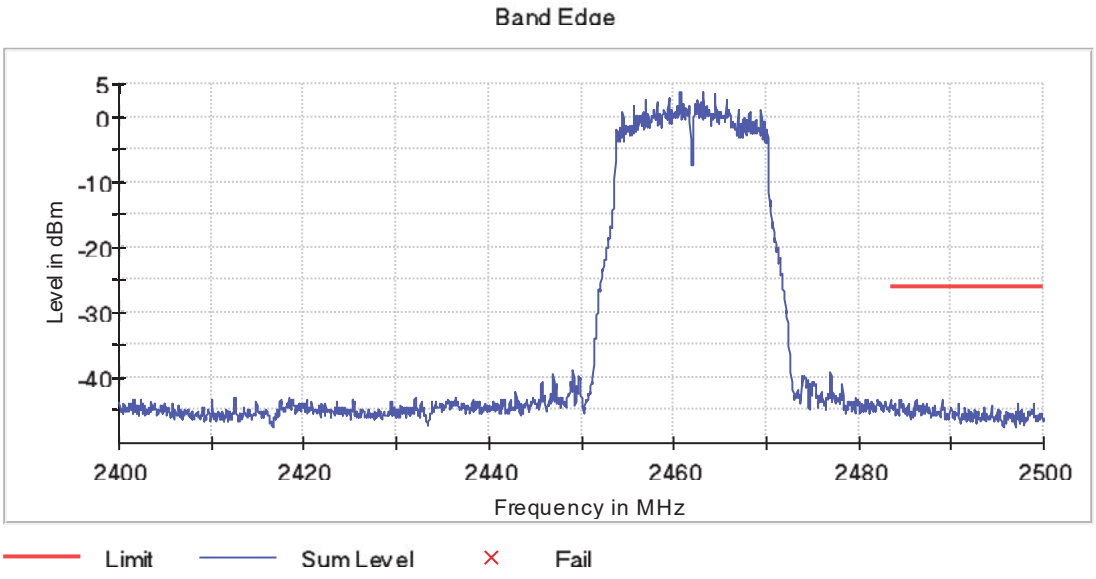
DUT Frequency (MHz)	Result
2462.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2460.675000	3.8

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2488.975000	-43.2	17.0	-26.2	PASS
2484.475000	-43.3	17.1	-26.2	PASS
2489.025000	-43.4	17.2	-26.2	PASS
2484.575000	-43.4	17.2	-26.2	PASS
2486.225000	-43.5	17.3	-26.2	PASS
2484.425000	-43.5	17.3	-26.2	PASS
2484.525000	-43.7	17.5	-26.2	PASS
2486.175000	-43.7	17.5	-26.2	PASS
2498.925000	-43.8	17.6	-26.2	PASS
2484.875000	-43.9	17.6	-26.2	PASS
2497.225000	-43.9	17.6	-26.2	PASS
2485.425000	-43.9	17.7	-26.2	PASS
2484.625000	-43.9	17.7	-26.2	PASS
2485.975000	-43.9	17.7	-26.2	PASS
2486.975000	-43.9	17.7	-26.2	PASS



802.11n 20 MHz bandwidth:

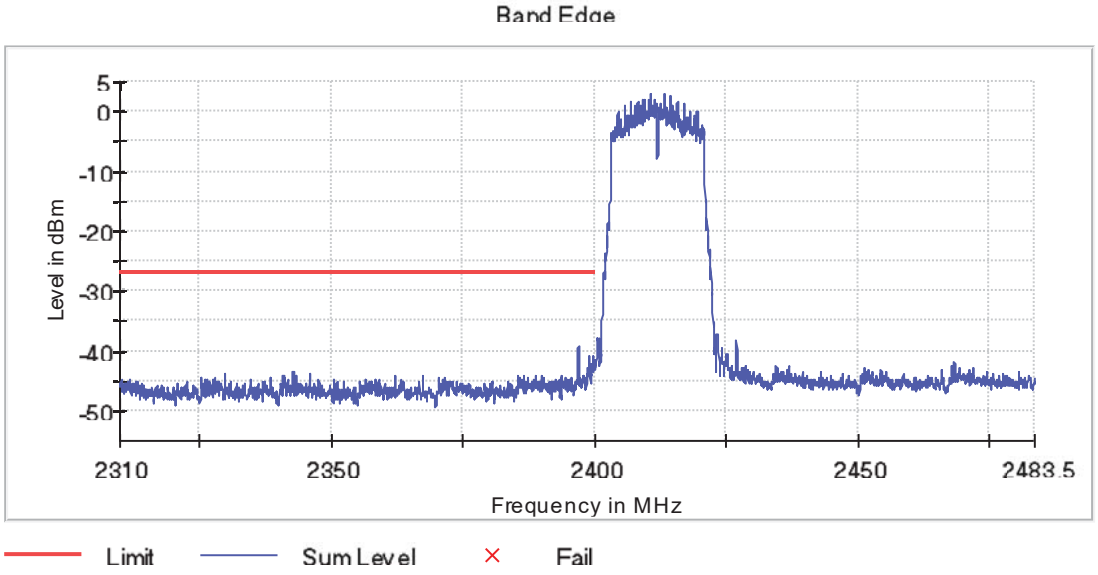
DUT Frequency (MHz)	Result
2412.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2410.675000	3.1

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2396.975000	-39.1	12.2	-26.9	PASS
2396.925000	-39.5	12.6	-26.9	PASS
2397.025000	-40.3	13.4	-26.9	PASS
2399.075000	-40.8	13.9	-26.9	PASS
2399.775000	-40.8	13.9	-26.9	PASS
2399.725000	-41.3	14.4	-26.9	PASS
2399.025000	-41.3	14.5	-26.9	PASS
2399.825000	-41.7	14.8	-26.9	PASS
2399.575000	-41.8	15.0	-26.9	PASS
2399.925000	-42.0	15.1	-26.9	PASS
2399.625000	-42.0	15.2	-26.9	PASS
2398.875000	-42.0	15.2	-26.9	PASS
2399.125000	-42.1	15.2	-26.9	PASS
2399.875000	-42.1	15.2	-26.9	PASS
2399.425000	-42.2	15.3	-26.9	PASS



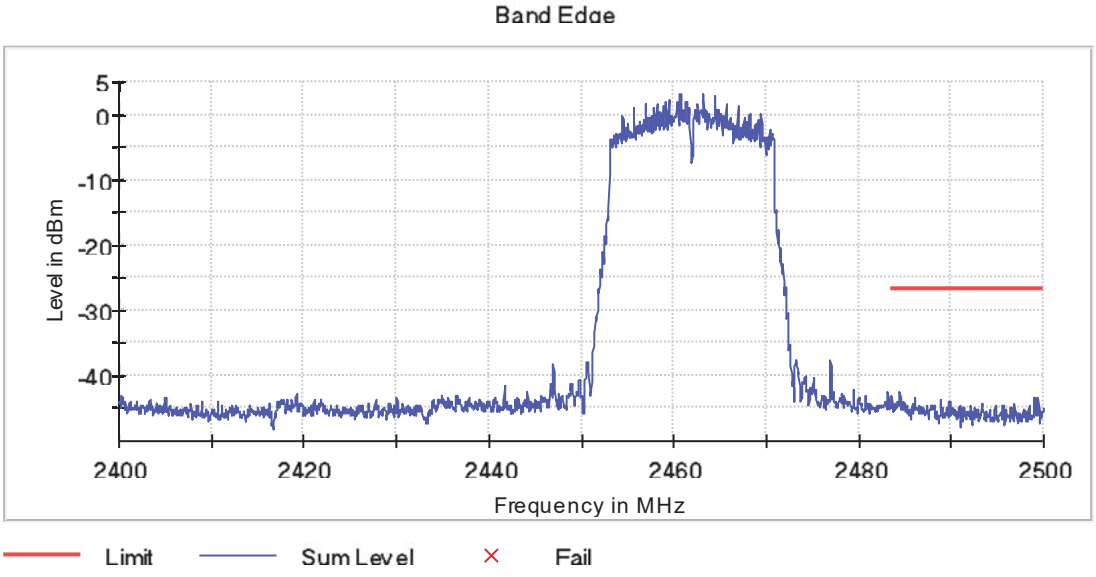
DUT Frequency (MHz)	Result
2462.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2460.675000	3.1

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2484.475000	-42.5	15.6	-26.9	PASS
2484.425000	-42.9	16.0	-26.9	PASS
2483.525000	-43.0	16.2	-26.9	PASS
2483.575000	-43.1	16.2	-26.9	PASS
2499.025000	-43.2	16.3	-26.9	PASS
2499.375000	-43.3	16.4	-26.9	PASS
2484.525000	-43.3	16.4	-26.9	PASS
2499.425000	-43.3	16.5	-26.9	PASS
2499.075000	-43.3	16.5	-26.9	PASS
2486.025000	-43.4	16.5	-26.9	PASS
2486.075000	-43.4	16.5	-26.9	PASS
2488.875000	-43.7	16.8	-26.9	PASS
2488.825000	-43.8	16.9	-26.9	PASS
2489.825000	-43.8	17.0	-26.9	PASS
2489.875000	-43.9	17.0	-26.9	PASS



802.11n 40 MHz bandwidth:

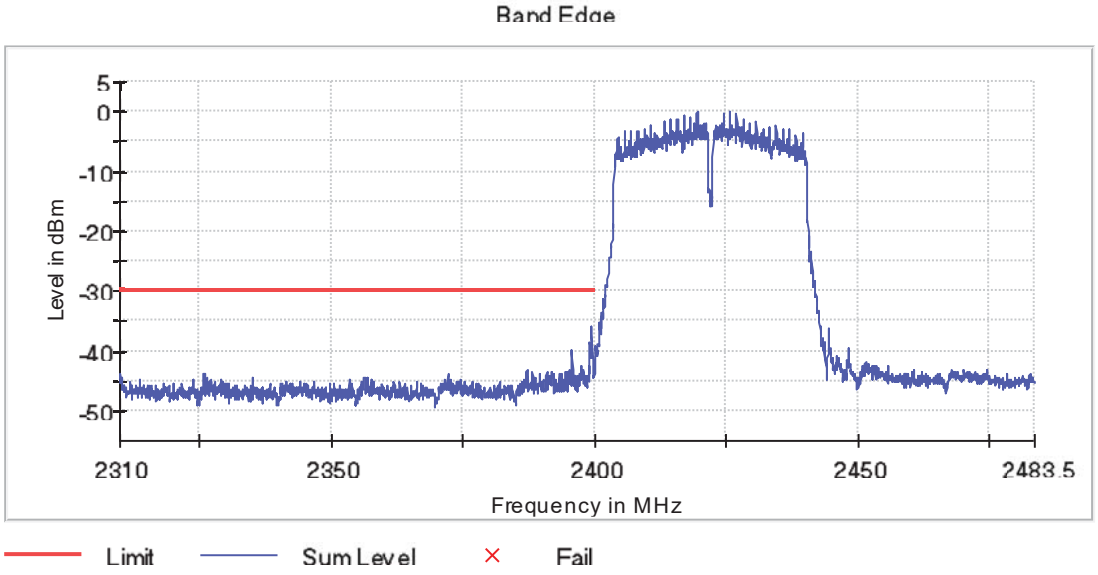
DUT Frequency (MHz)	Result
2422.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2419.475000	0.0

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.475000	-36.0	6.0	-30.0	PASS
2399.425000	-36.2	6.2	-30.0	PASS
2399.525000	-37.2	7.3	-30.0	PASS
2399.175000	-38.5	8.6	-30.0	PASS
2399.125000	-38.8	8.8	-30.0	PASS
2399.375000	-39.2	9.3	-30.0	PASS
2399.225000	-39.8	9.8	-30.0	PASS
2395.725000	-40.0	10.0	-30.0	PASS
2395.775000	-40.4	10.4	-30.0	PASS
2395.675000	-40.5	10.5	-30.0	PASS
2399.325000	-41.0	11.0	-30.0	PASS
2399.275000	-41.2	11.3	-30.0	PASS
2399.075000	-41.5	11.5	-30.0	PASS
2399.575000	-41.6	11.6	-30.0	PASS
2399.675000	-41.8	11.8	-30.0	PASS



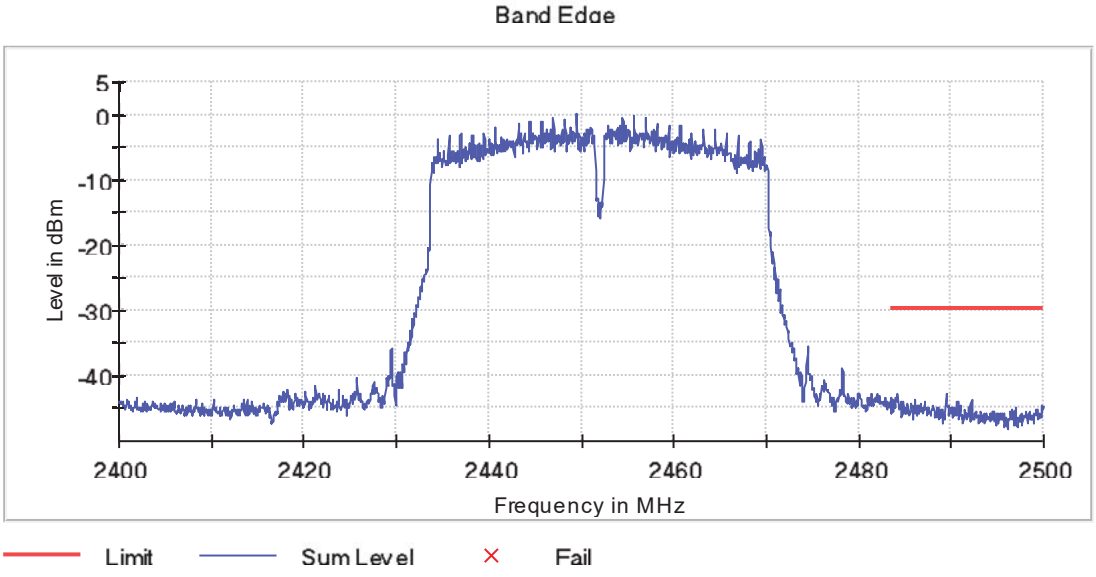
DUT Frequency (MHz)	Result
2452.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2449.475000	0.2

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2484.175000	-42.6	12.8	-29.8	PASS
2489.475000	-42.7	12.9	-29.8	PASS
2484.225000	-42.8	12.9	-29.8	PASS
2489.425000	-43.2	13.3	-29.8	PASS
2484.075000	-43.2	13.4	-29.8	PASS
2484.025000	-43.2	13.4	-29.8	PASS
2489.525000	-43.5	13.7	-29.8	PASS
2483.625000	-43.5	13.7	-29.8	PASS
2486.125000	-43.6	13.7	-29.8	PASS
2486.075000	-43.7	13.8	-29.8	PASS
2492.225000	-43.7	13.8	-29.8	PASS
2490.725000	-43.8	14.0	-29.8	PASS
2484.575000	-43.9	14.1	-29.8	PASS
2490.675000	-44.0	14.2	-29.8	PASS
2487.125000	-44.1	14.2	-29.8	PASS



3.8 47 CFR § 15.247 (e) – Power Spectral Density

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

3.8.1 Test procedure

According ANSI C63.10-2013:

a) Set analyser center frequency to EUT channel center frequency
b) Set the RBW between 3 kHz to 100 kHz
c) Set VBW > 3 x RBW
d) Set the frequency span to 1.5 times the EUT bandwidth
e) Use peak detector and max hold function. Trace to fully stabilize 3 times.
f) If measured value exceeds requirements, then reduce RBW (no less than 3 kHz) and repeat
.

3.8.2 Test setup

For the test setup refer to chapter 1.4.

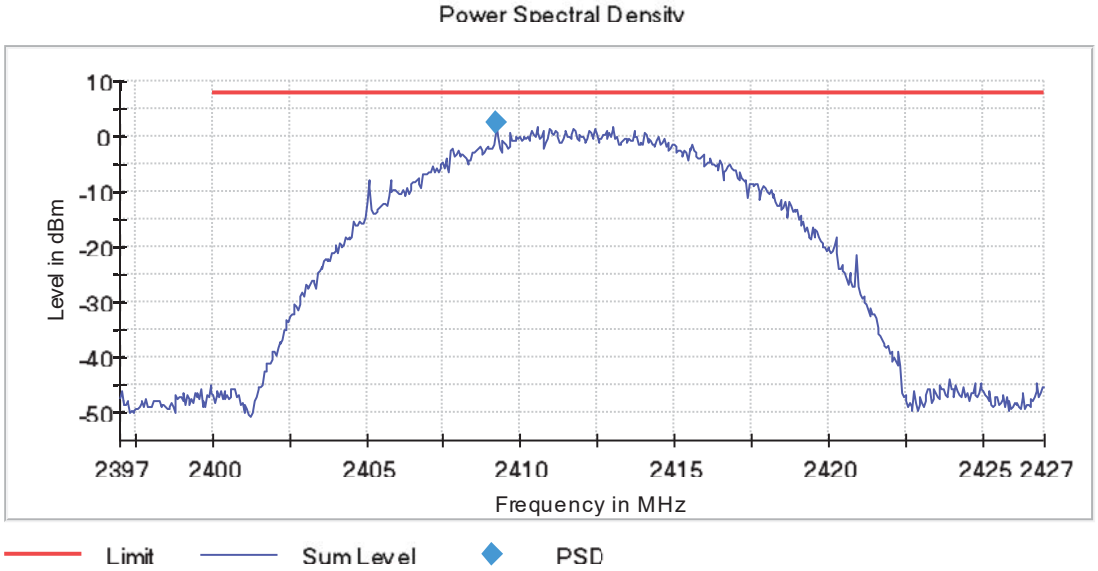
3.8.3 Test equipment

For the test setup refer to chapter 1.3.

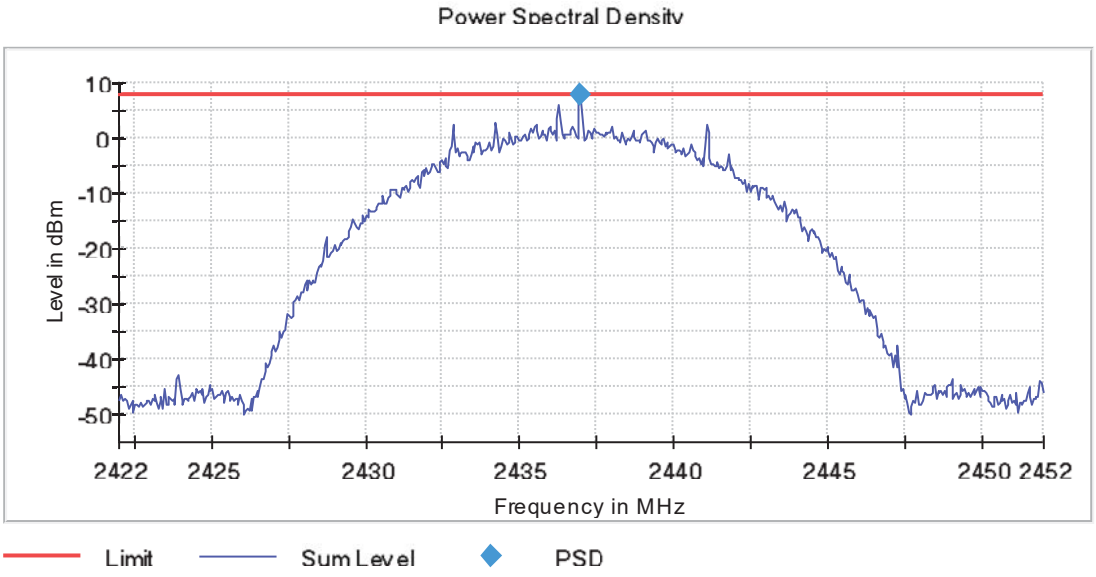
3.8.4 Test results

802.11b:

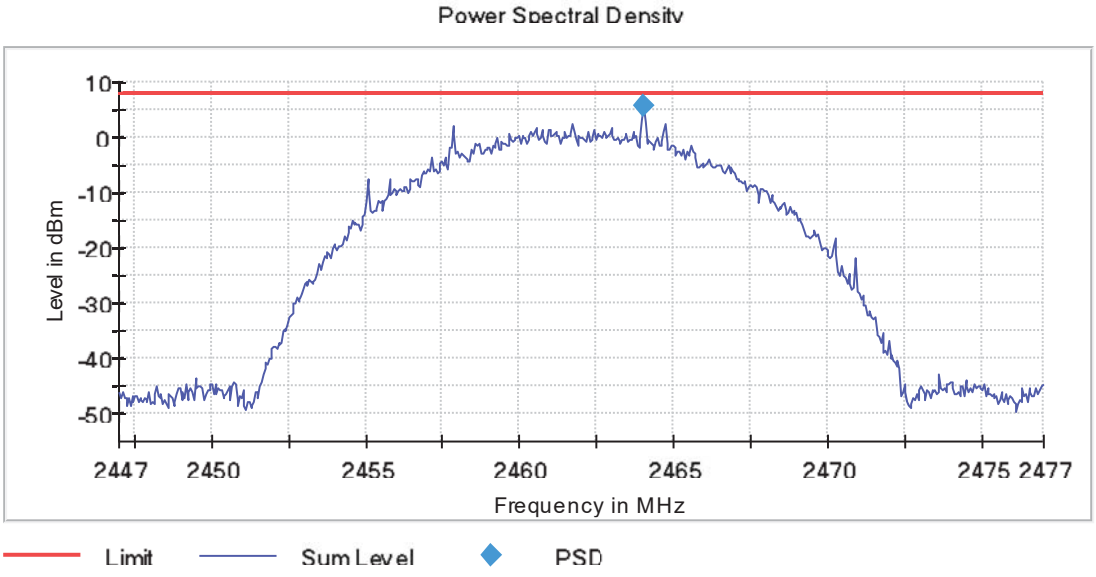
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2409.225000	2.400	8.0	PASS



DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2437.000000	2436.975000	7.916	8.0	PASS

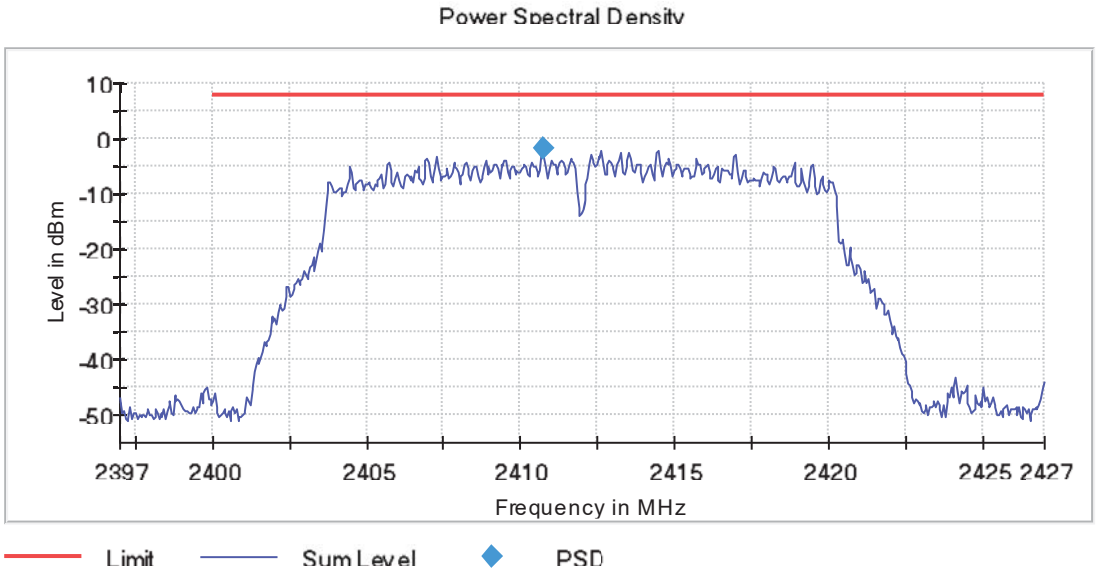


DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2462.000000	2464.025000	5.853	8.0	PASS

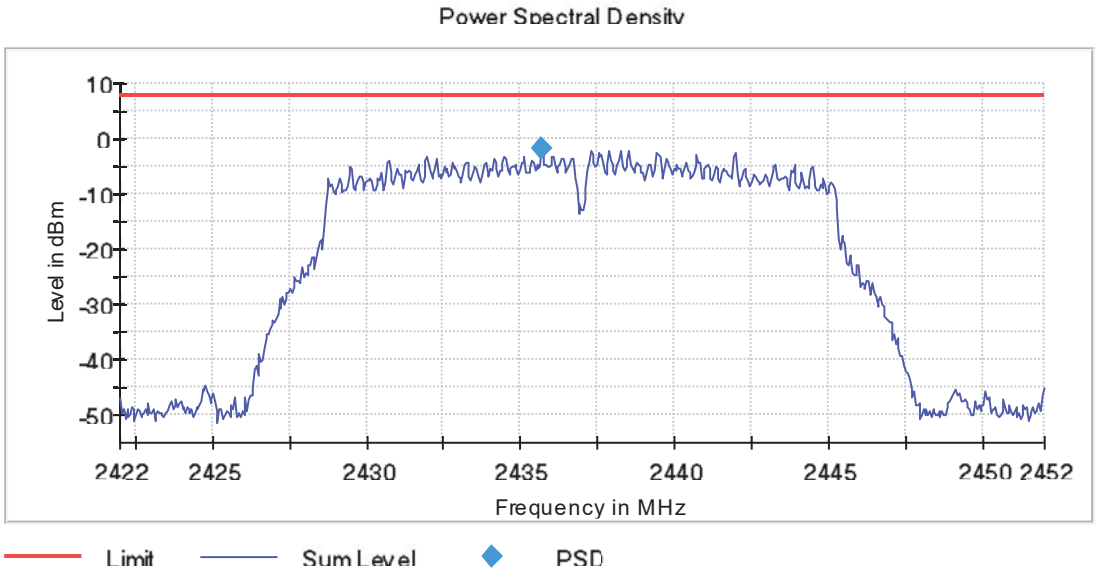


802.11g:

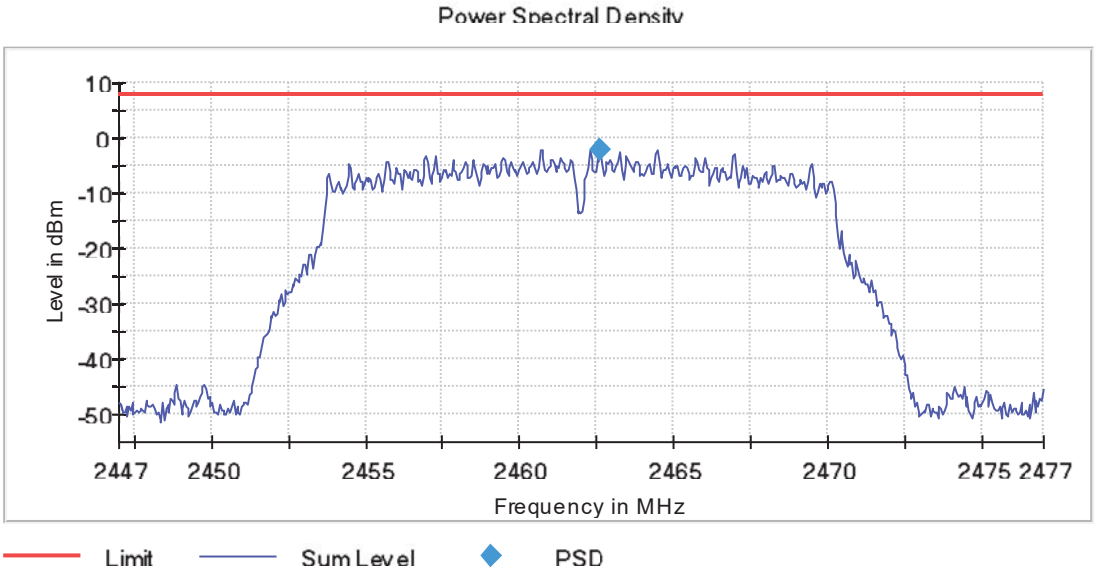
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2410.725000	-1.893	8.0	PASS



DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2437.000000	2435.675000	-1.796	8.0	PASS

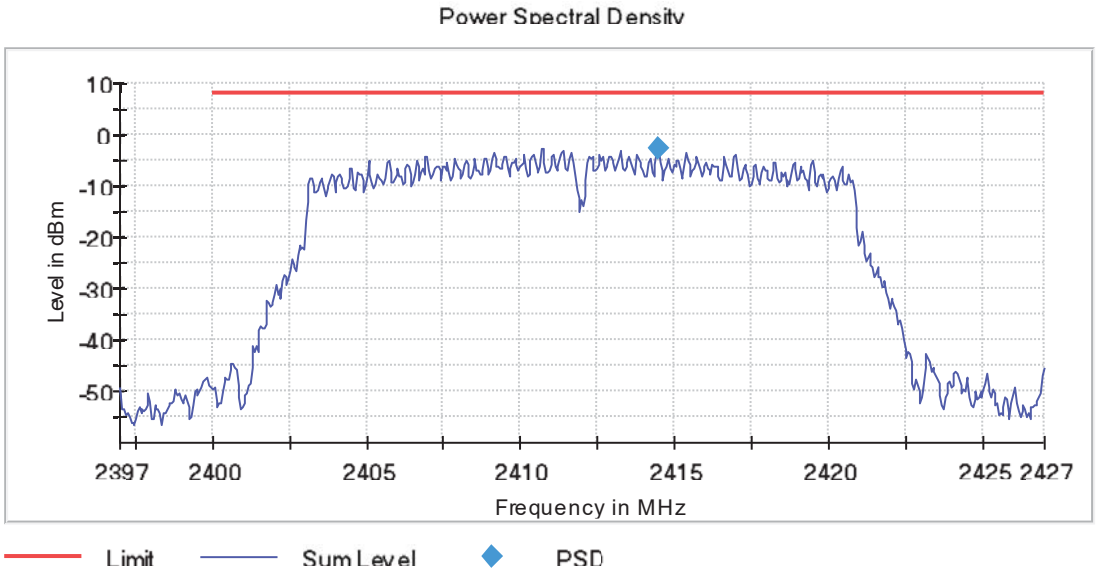


DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2462.000000	2462.625000	-2.128	8.0	PASS

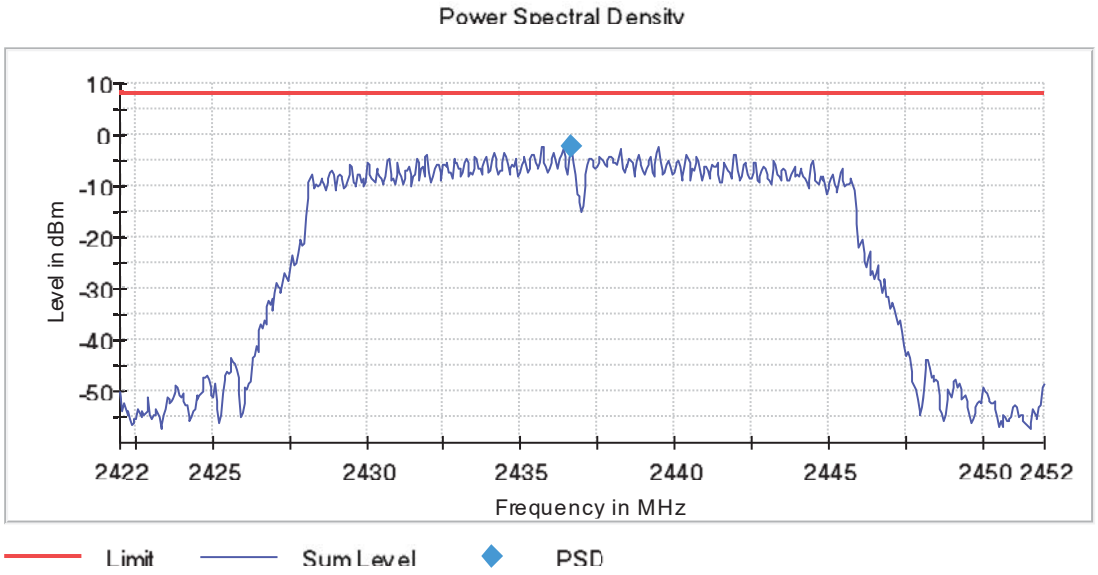


802.11n 20 MHz bandwidth:

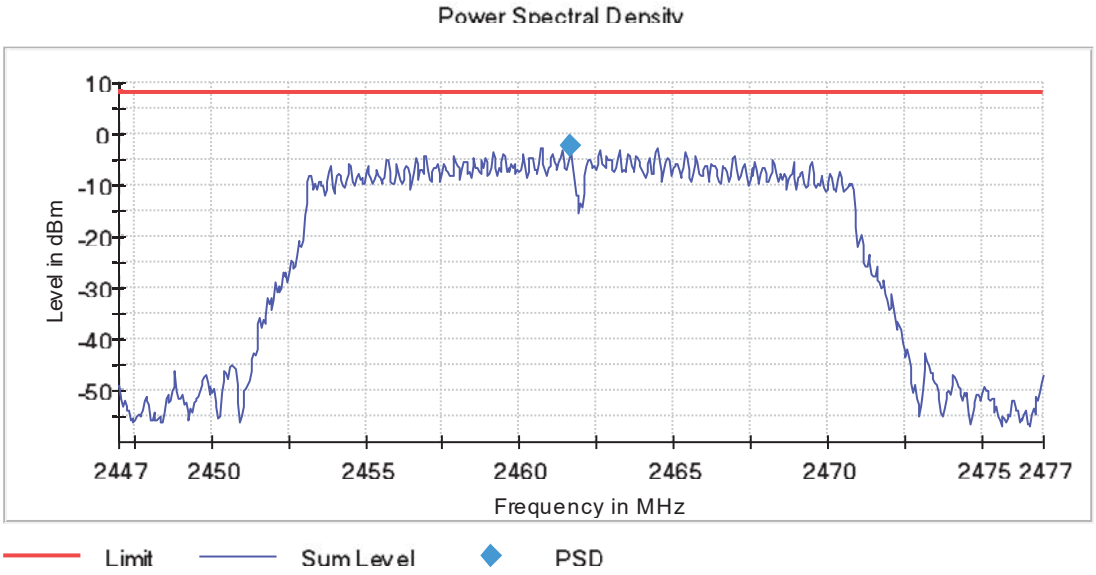
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2412.000000	2414.475000	-2.667	8.0	PASS



DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2437.000000	2436.675000	-2.207	8.0	PASS

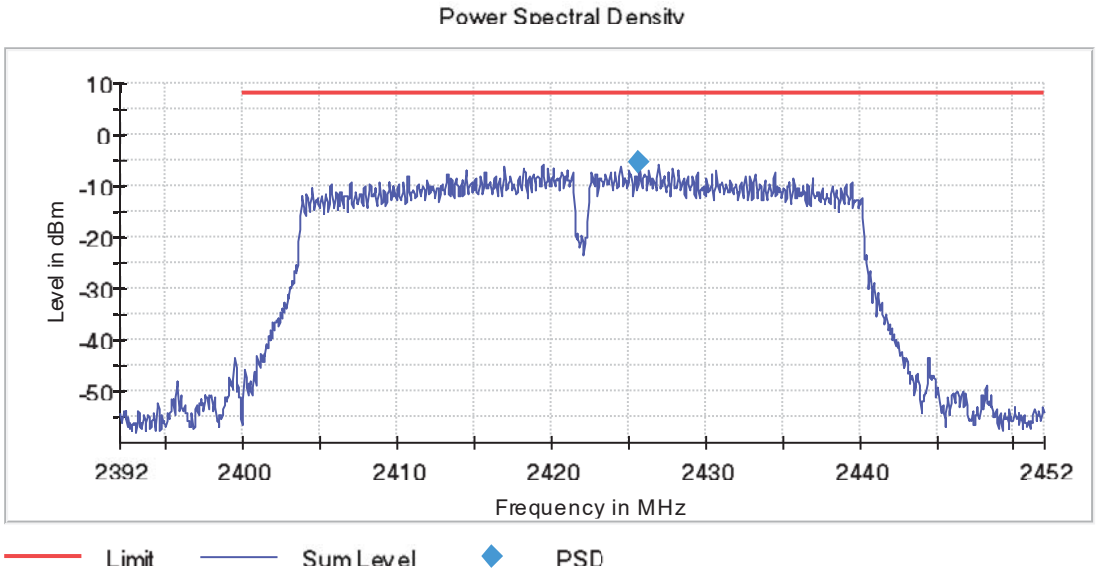


DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2462.000000	2461.675000	-2.453	8.0	PASS

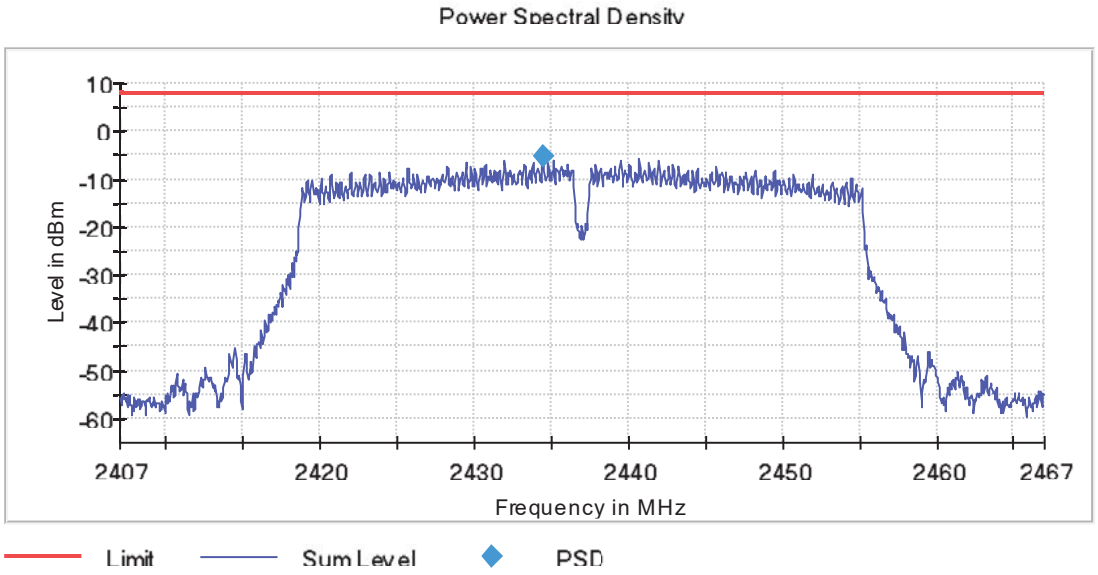


802.11n 40 MHz bandwidth:

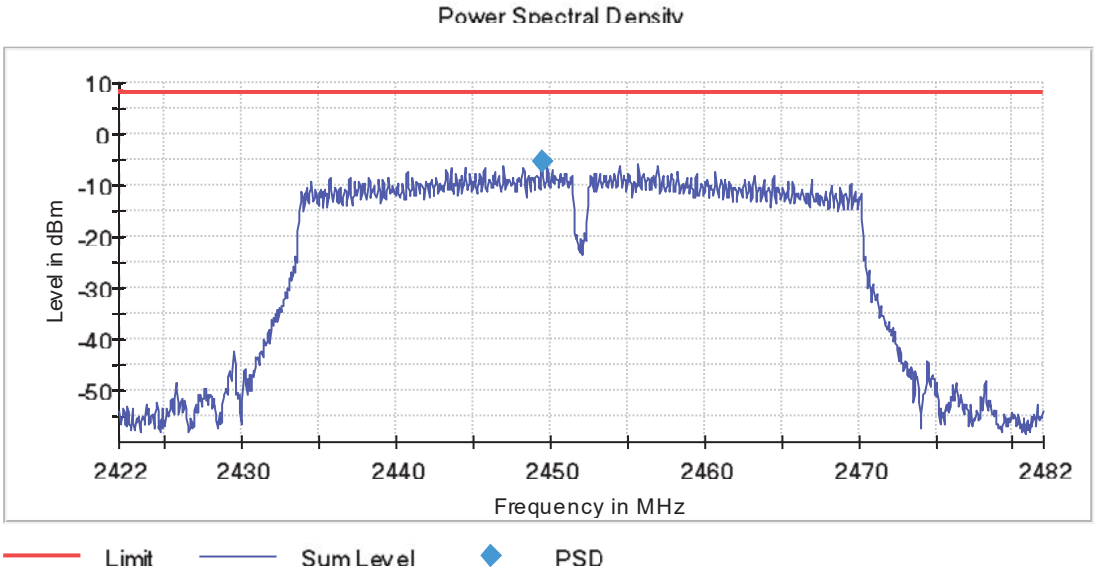
DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2422.000000	2425.725000	-5.532	8.0	PASS



DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2437.000000	2434.475000	-5.331	8.0	PASS



DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2452.000000	2449.475000	-5.531	8.0	PASS



4 Annex I – Additional data

Cross-reference table				
Test	**47 CFR requirements**	**IC requirements**	**Section within the report**	**Conclusion**
Antenna Requirement	§ 15.203	RSS-Gen Issue 5 §6.8	3.1	PASS
AC Line Conducted Emission	§ 15.207 (a)	RSS-Gen Issue 5 §8.8	3.2	PASS
Spurious emission	§ 15.205, § 15.209, § 15.247 (d)	RSS-Gen Issue 5 §8.9* RSS-Gen Issue 5 §8.10* RSS-247 Issue 2 §5.5*	3.3	PASS
6 dB Emission Bandwidth	§ 15.247 (a) (2)	RSS-247 Issue 2 §5.2(a)	3.4	PASS
Maximum peak output power	§ 15.247 (b) (3)	RSS-247 Issue 2 §5.4(d)	3.5	PASS
100 kHz Bandwidth of Frequency Band Edge	§ 15.247 (d)	RSS-247 Issue 2 §5.5	3.6	PASS
Power Spectral Density	§ 15.247 (e)	RSS-247 Issue 2 §5.2(b)	3.7	PASS
*Note: Radiated measurements performed in laboratory recognized by ISED Canada: – CAB identifier: SI0001 – ISED#: 21434				

4.1 Occupied bandwidth (99% emission bandwidth)

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained.

4.1.1 Test procedure

According ANSI C63.10-2013:
a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d) Steps a) through c) might require iteration to adjust within the specified tolerances.
e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “-xx dB down” requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.

f) Set detection mode to peak and trace mode to max hold.

g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyser marker to the highest level of the displayed trace (this is the reference value).

h) Determine the “−xx dB down amplitude” using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyser and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “−xx dB down amplitude” determined in step h). If a marker is below this “−xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “−xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

4.1.2 Test setup
For the test setup refer to chapter 1.4.

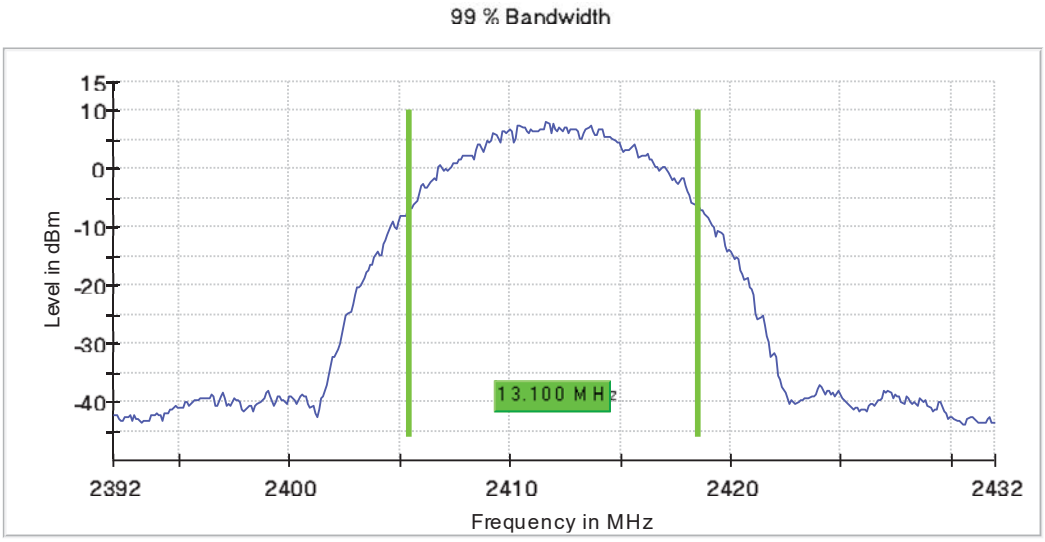
4.1.3 Test equipment
For the test setup refer to chapter 1.3.

802.11b:

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2412.000000	13.100000	---	---	2405.450000	2418.550000

(continuation of the "99 % Bandwidth" table from column 6 ...)

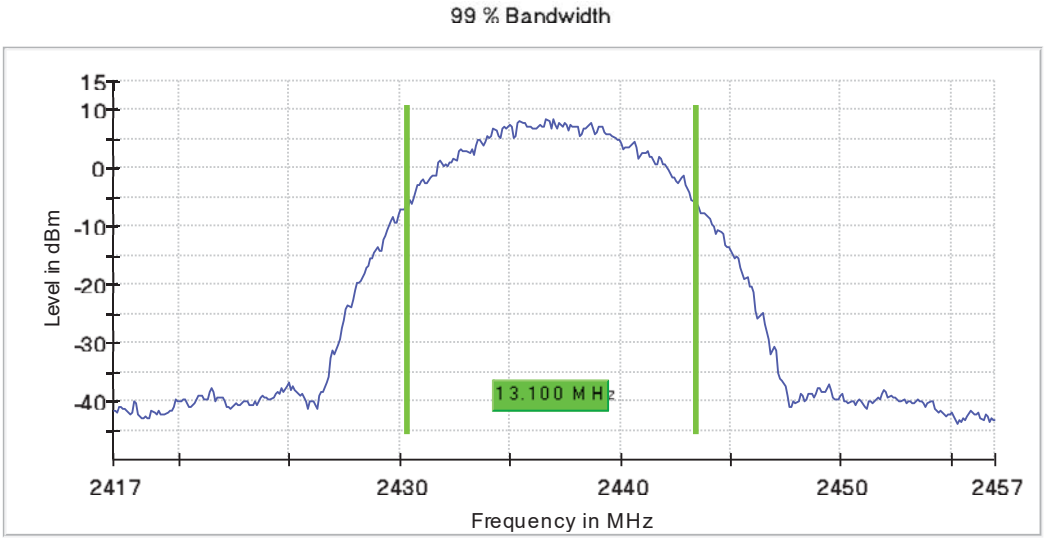
DUT Frequency (MHz)	Result
2412.000000	PASS



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2437.000000	13.100000	---	---	2430.350000	2443.450000

(continuation of the "99 % Bandwidth" table from column 6 ...)

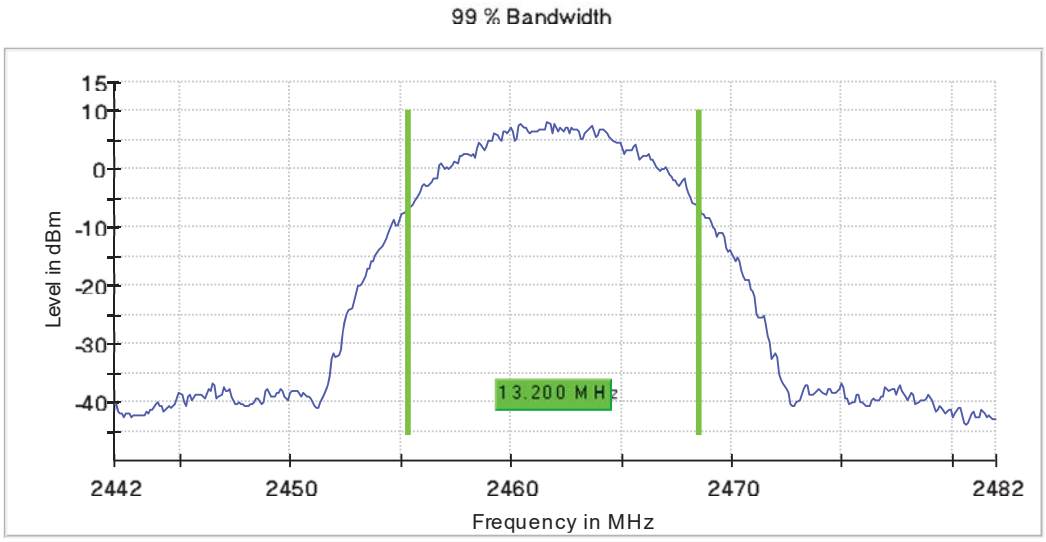
DUT Frequency (MHz)	Result
2437.000000	PASS



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2462.000000	13.200000	---	---	2455.350000	2468.550000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2462.000000	PASS

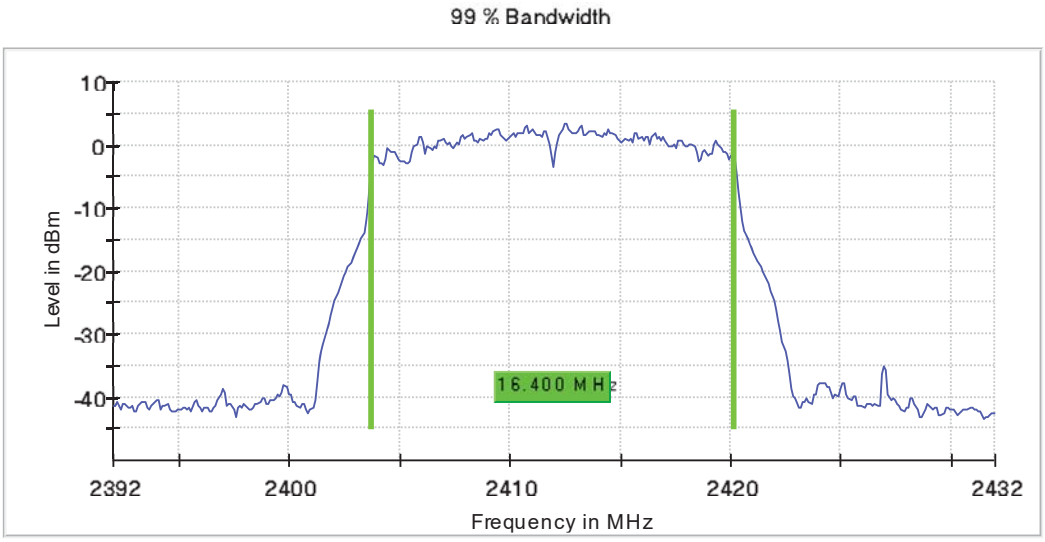


802.11g:

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2412.000000	16.400000	---	2403.750000	2420.150000	2412.000000

(continuation of the "99 % Bandwidth" table from column 6 ...)

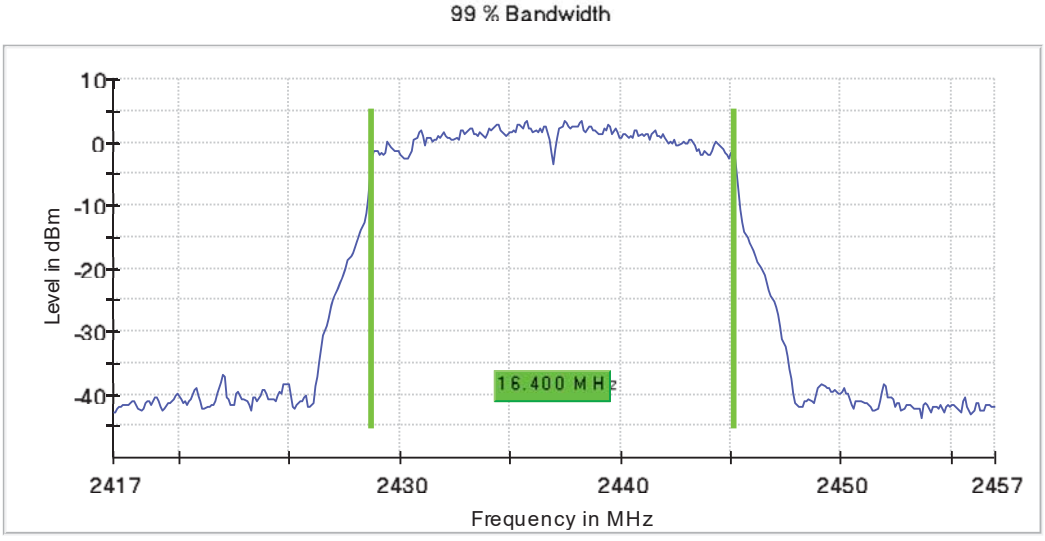
DUT Frequency (MHz)	Result
2412.000000	PASS



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2437.000000	16.400000	---	---	2428.750000	2445.150000

(continuation of the "99 % Bandwidth" table from column 6 ...)

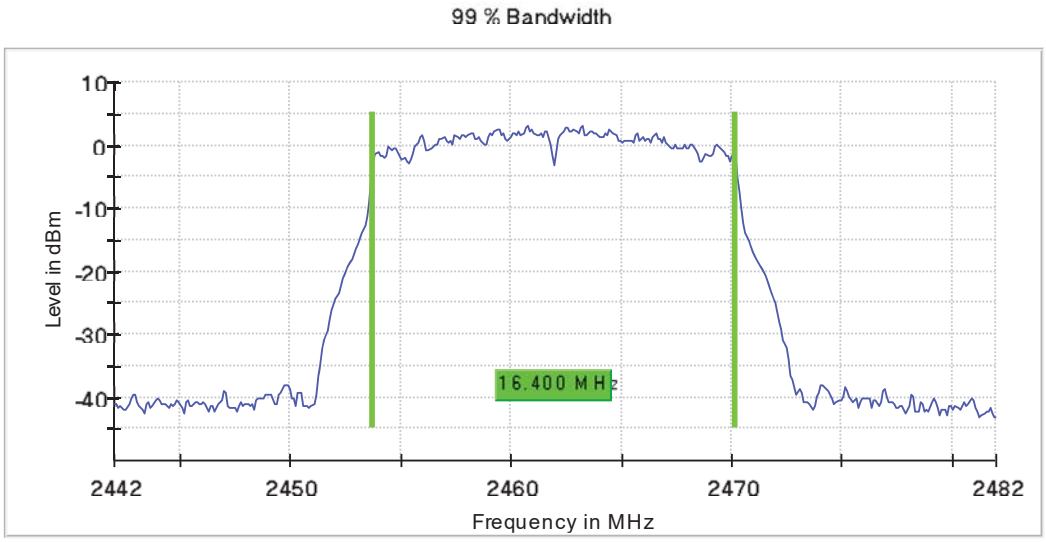
DUT Frequency (MHz)	Result
2437.000000	PASS



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2462.000000	16.400000	---	---	2453.750000	2470.150000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2462.000000	PASS

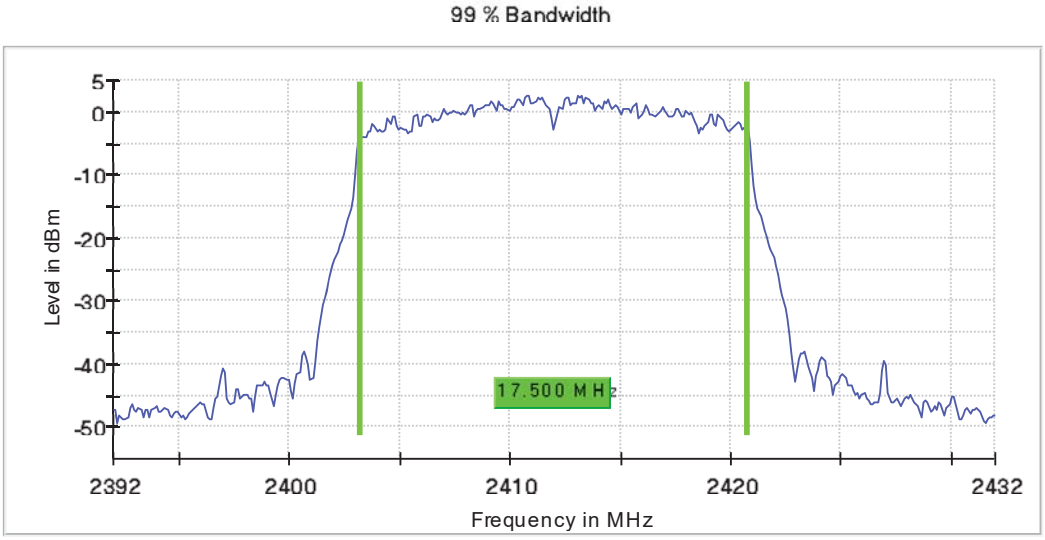


802.11n 20 MHz bandwidth:

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2412.000000	17.500000	---	2403.250000	2420.750000	2412.000000

(continuation of the "99 % Bandwidth" table from column 6 ...)

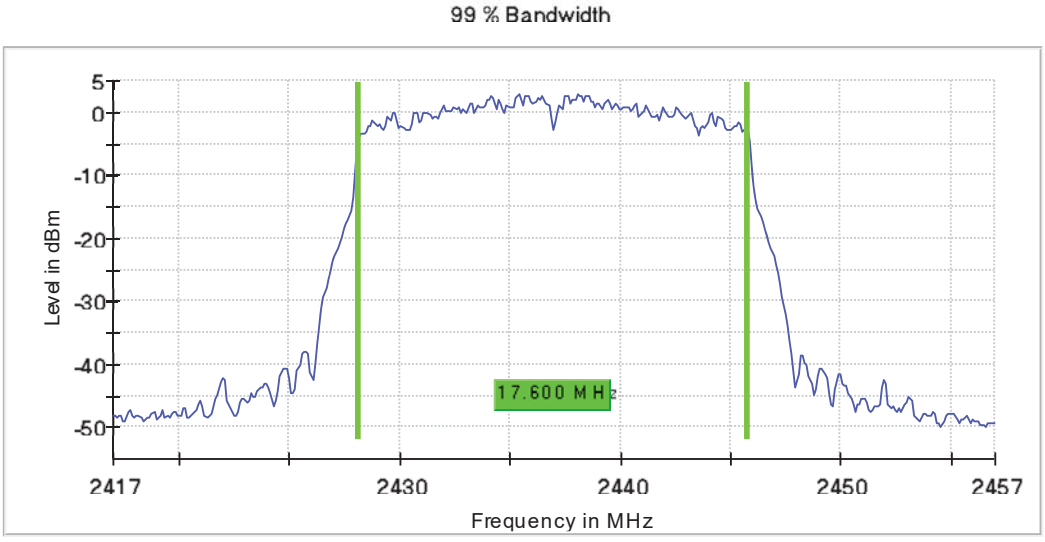
DUT Frequency (MHz)	Result
2412.000000	PASS



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2437.000000	17.600000	---	---	2428.150000	2445.750000

(continuation of the "99 % Bandwidth" table from column 6 ...)

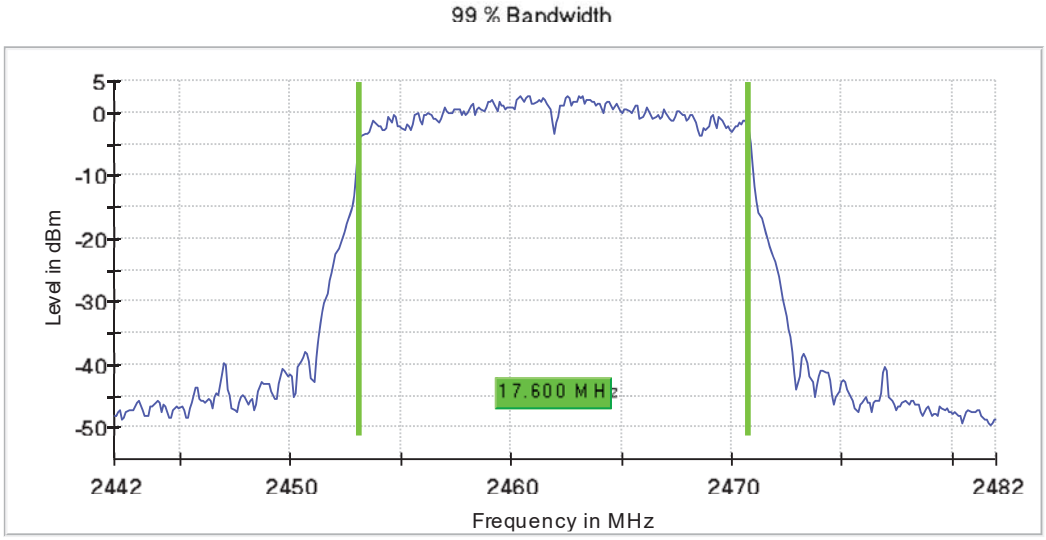
DUT Frequency (MHz)	Result
2437.000000	PASS



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2462.000000	17.600000	---	---	2453.150000	2470.750000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2462.000000	PASS

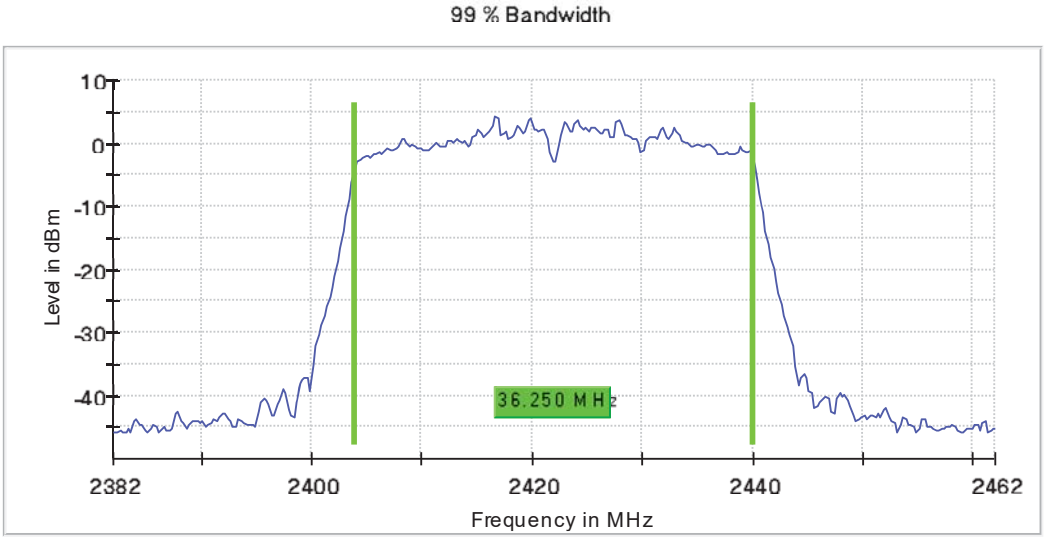


802.11n 40 MHz bandwidth:

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2422.000000	36.250000	---	2403.875000	2440.125000	2422.000000

(continuation of the "99 % Bandwidth" table from column 6 ...)

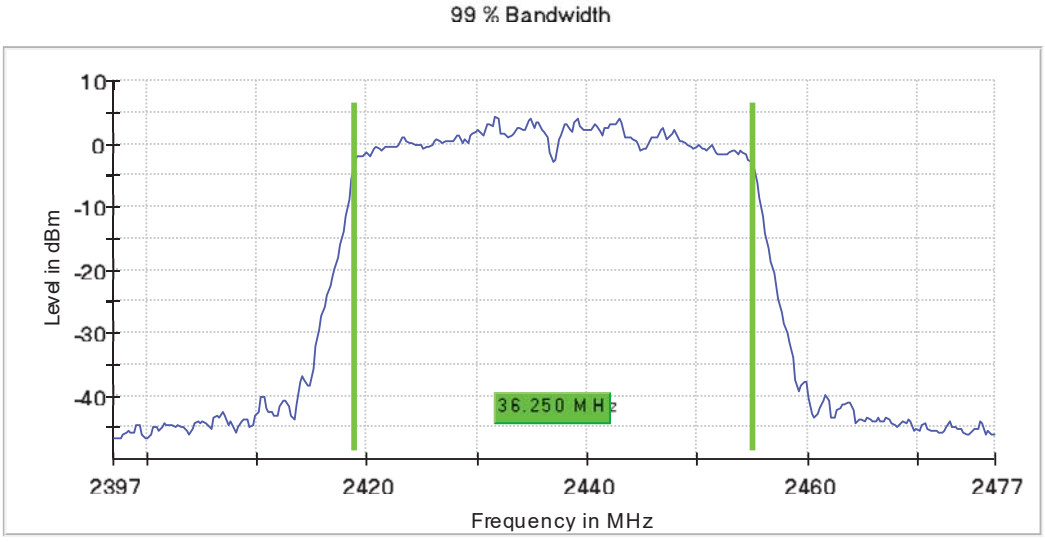
DUT Frequency (MHz)	Result
2422.000000	PASS



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2437.000000	36.250000	---	---	2418.875000	2455.125000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2437.000000	PASS



DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2452.000000	36.250000	---	---	2433.875000	2470.125000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2452.000000	PASS