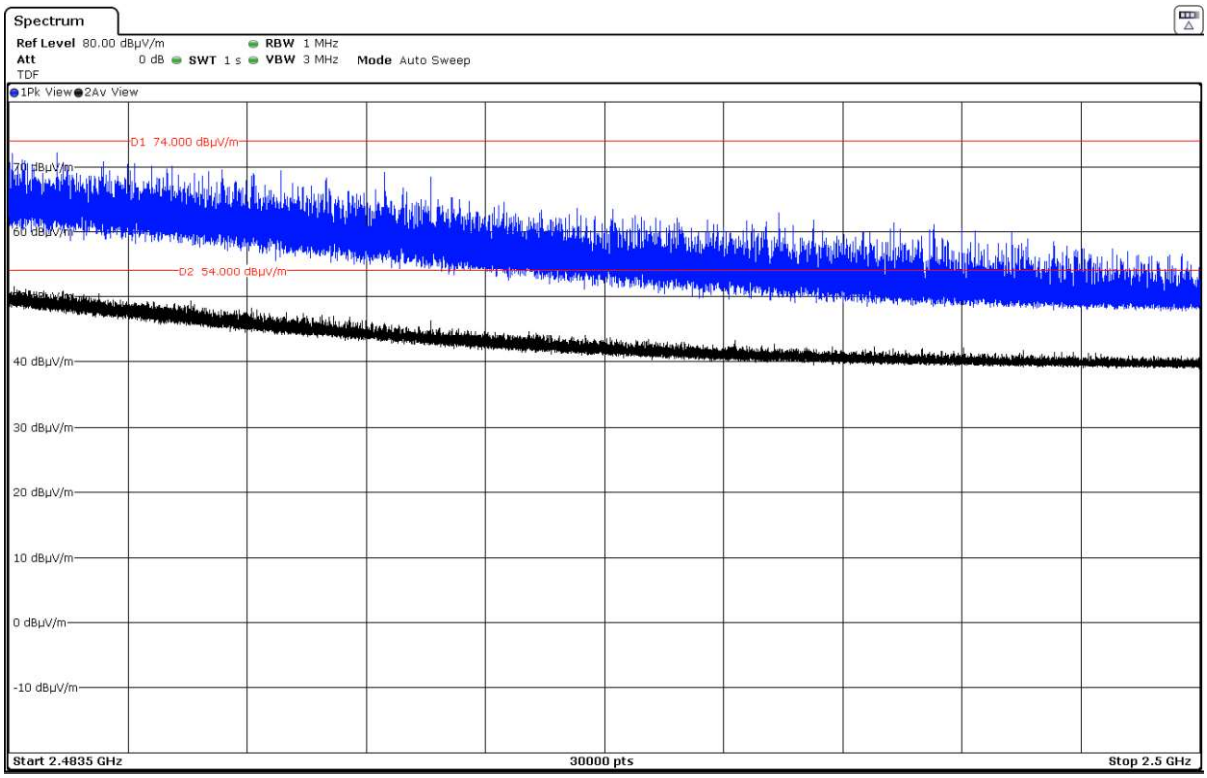
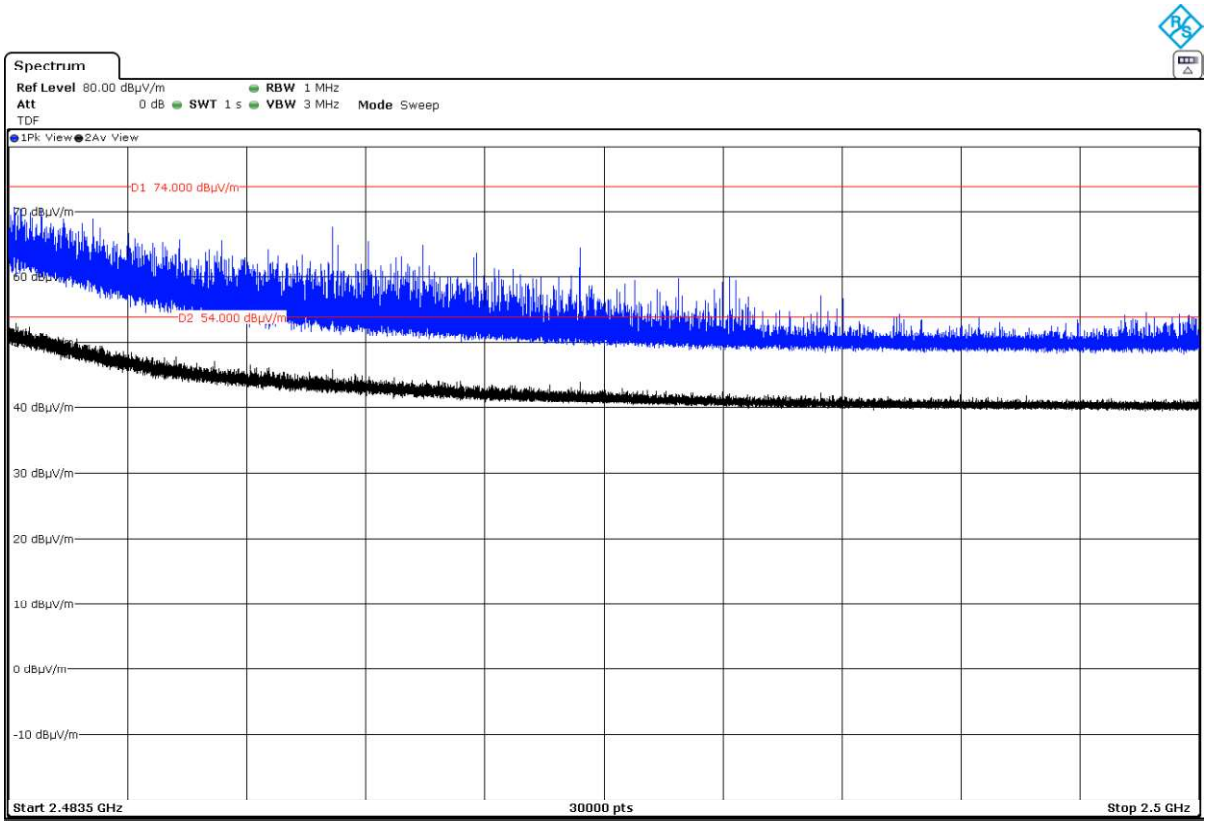
- CH 10:



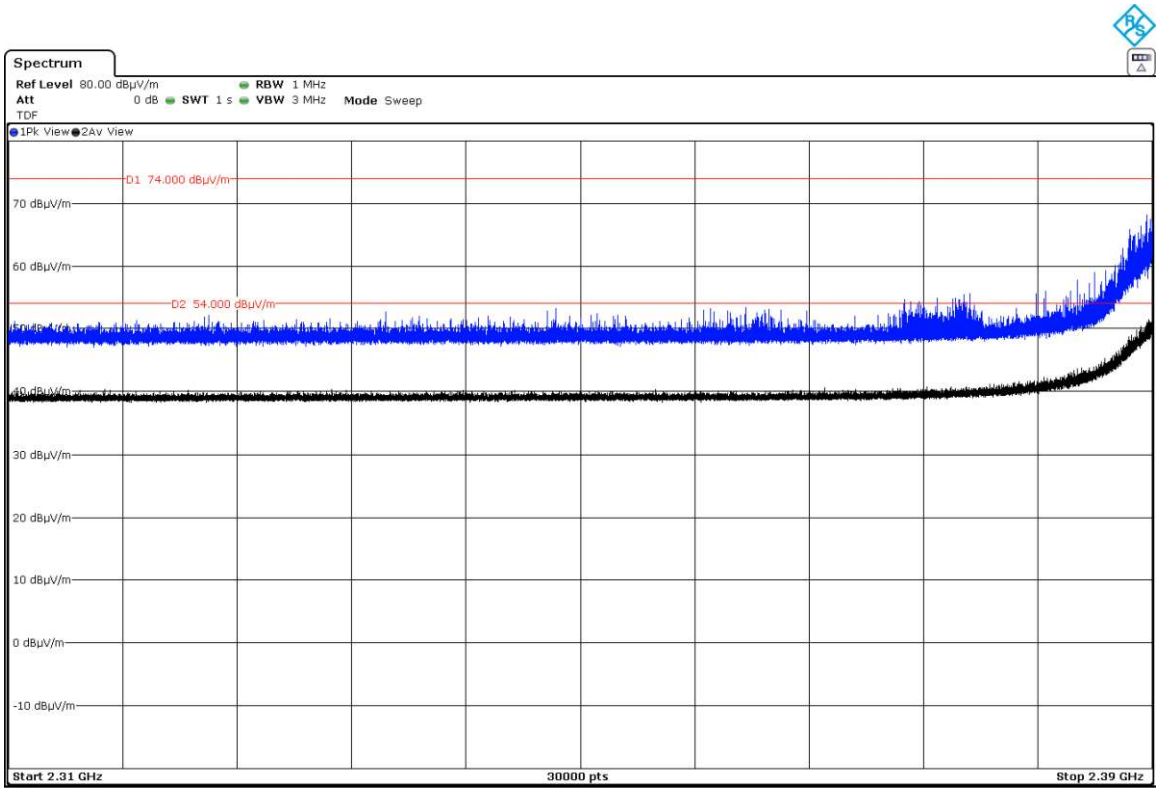
- High Channel. CH 11:



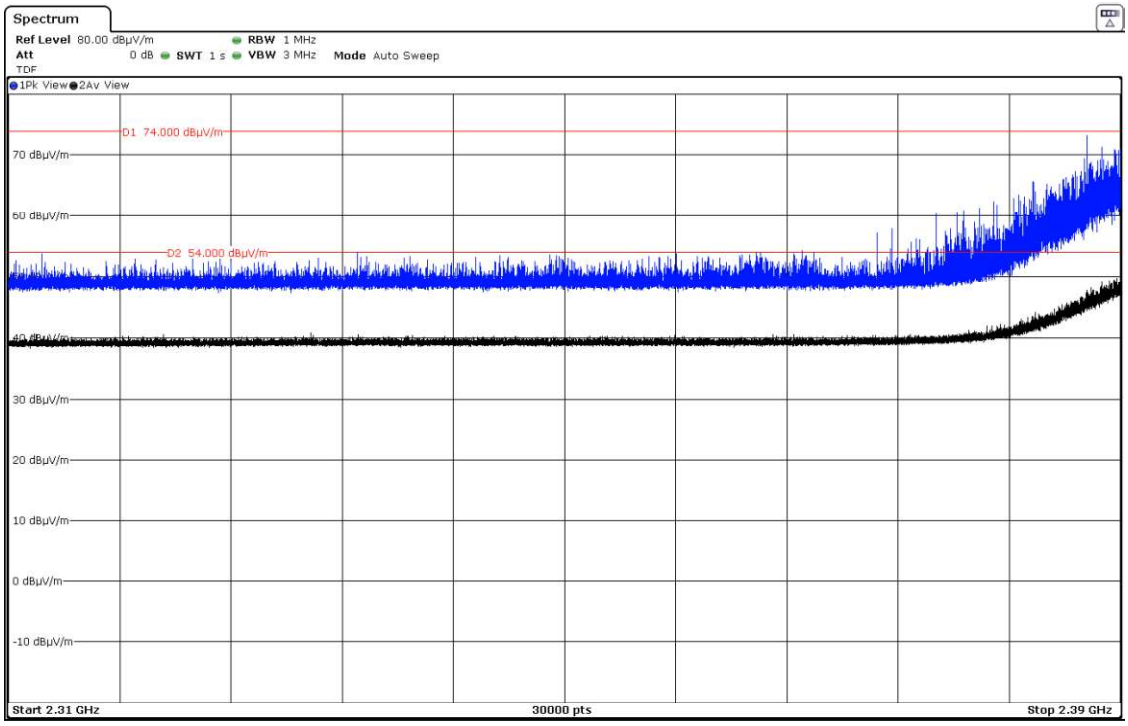
- **Mode 802.11 n20**

FREQUENCY RANGE 2.31-2.39 GHz (Restricted Band 1):

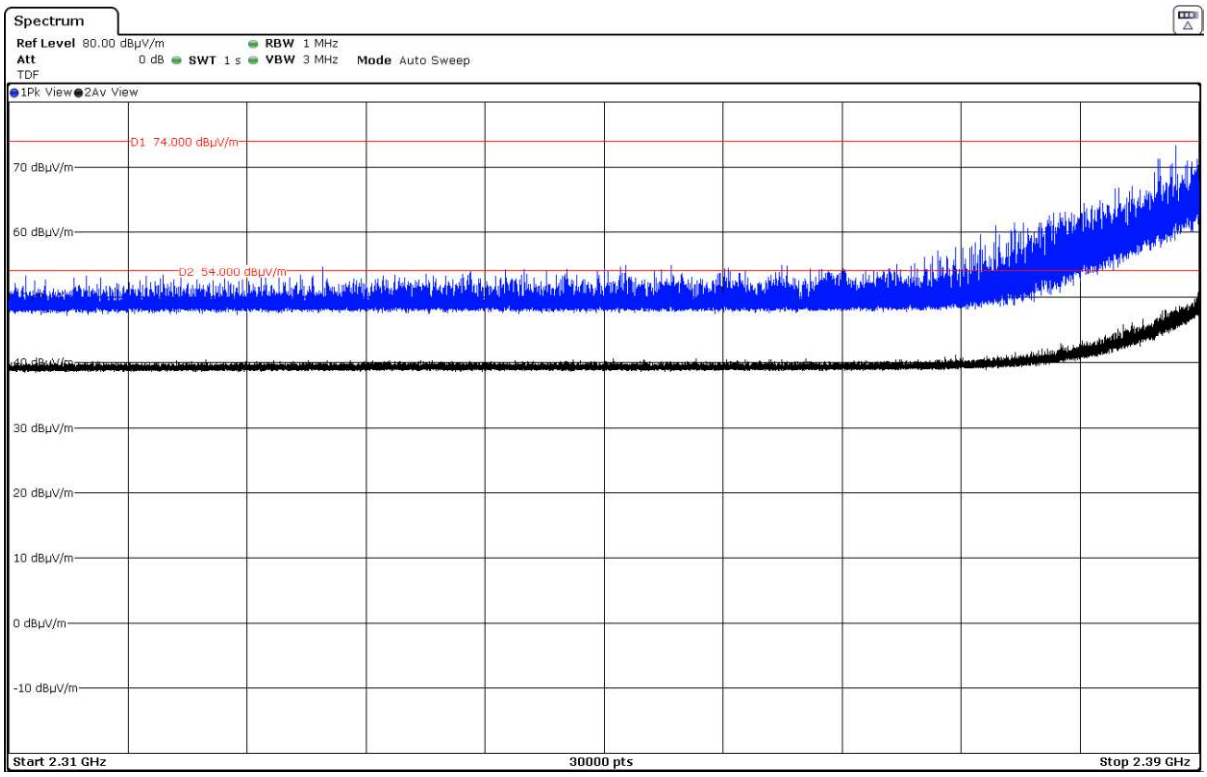
- Low Channel. CH 1:



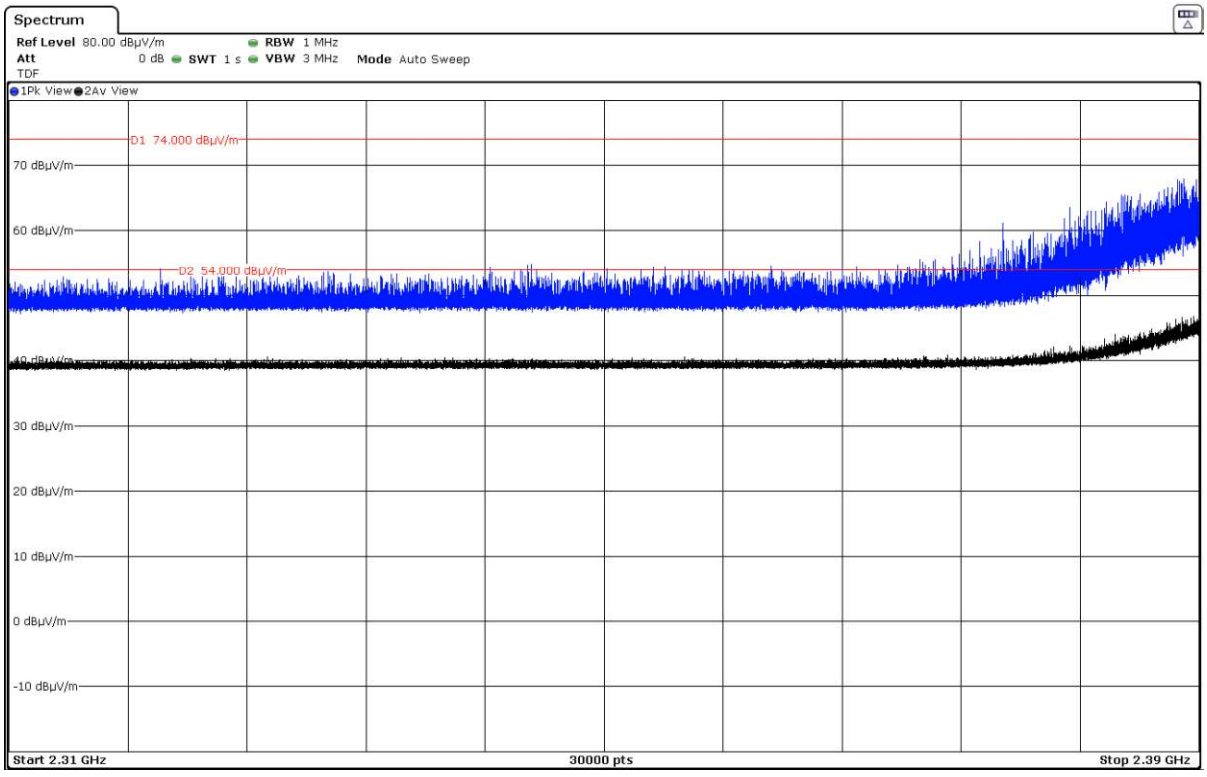
- CH 2:



- CH 3:

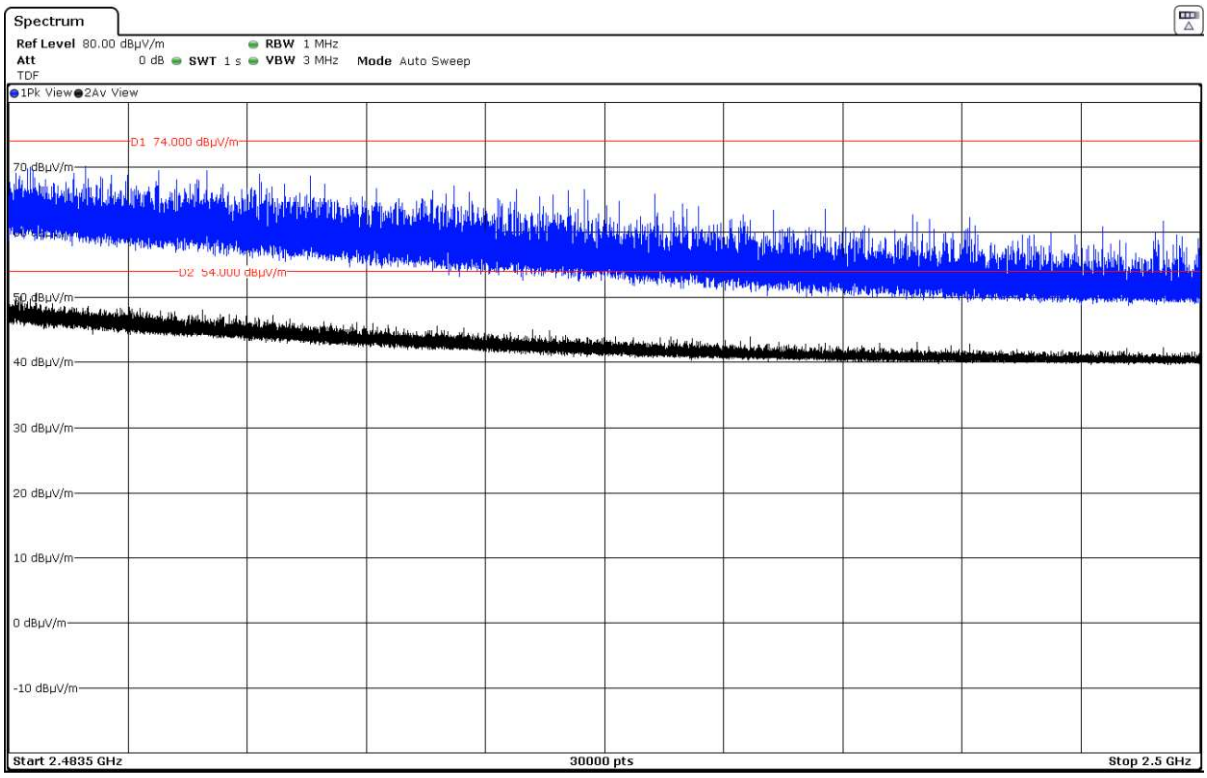

Spectrum
Ref Level 80.00 dBµV/m
RBW 1 MHz
Att 0 dB SWT 1 s VBW 3 MHz Mode Auto Sweep
TDF
1Pk View 2Av View
D1 74.000 dBµV/m
70 dBµV/m
60 dBµV/m
D2 54.000 dBµV/m
40 dBµV/m
30 dBµV/m
20 dBµV/m
10 dBµV/m
0 dBµV/m
-10 dBµV/m
Start 2.31 GHz
30000 pts
Stop 2.39 GHz

- CH 4:

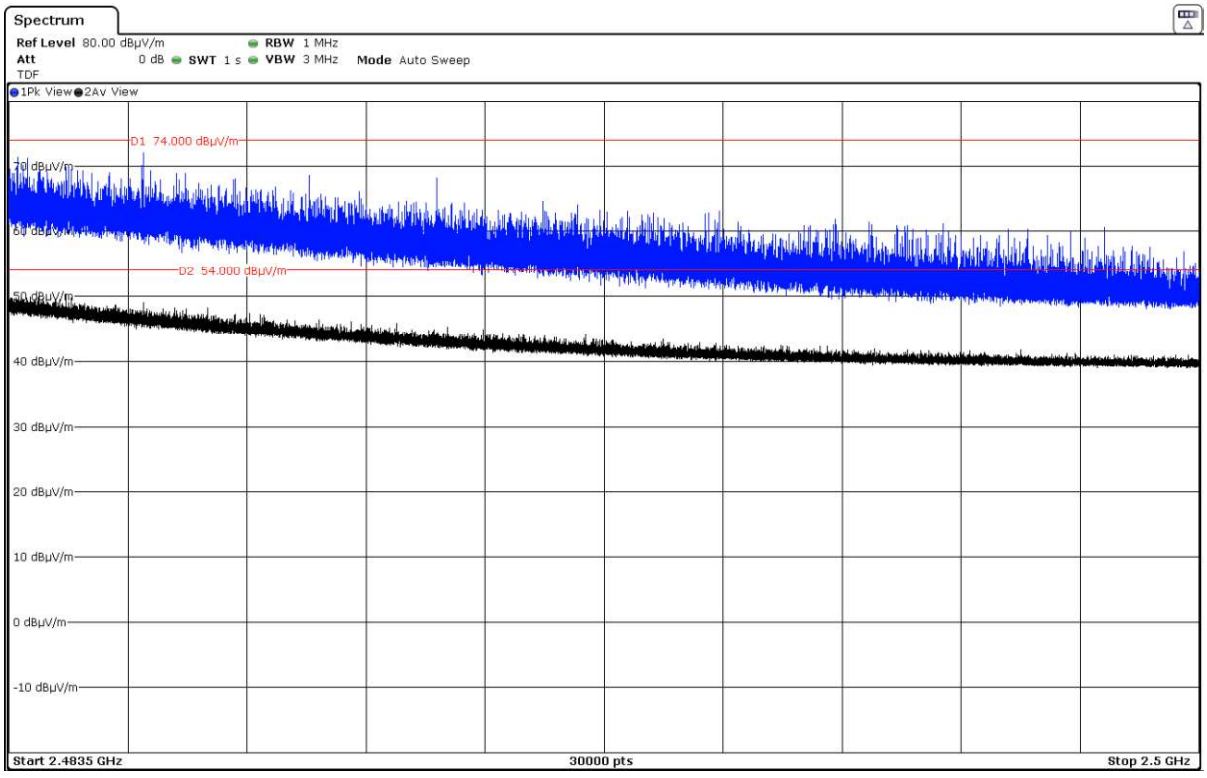

Spectrum
Ref Level 80.00 dBµV/m
RBW 1 MHz
Att 0 dB SWT 1 s VBW 3 MHz Mode Auto Sweep
TDF
1Pk View 2Av View
D1 74.000 dBµV/m
70 dBµV/m
60 dBµV/m
D2 54.000 dBµV/m
40 dBµV/m
30 dBµV/m
20 dBµV/m
10 dBµV/m
0 dBµV/m
-10 dBµV/m
Start 2.31 GHz
30000 pts
Stop 2.39 GHz

FREQUENCY RANGE 2.4835-2.5 GHz (Restricted Band 2):

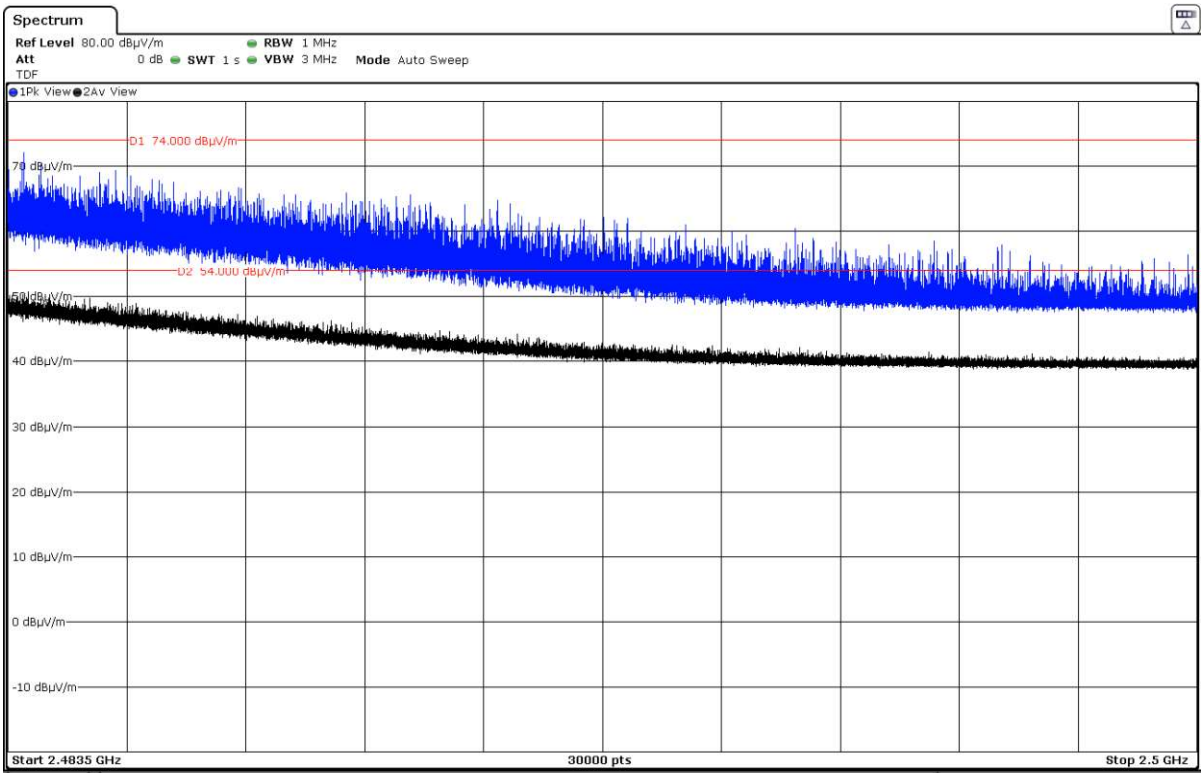
- CH 8:



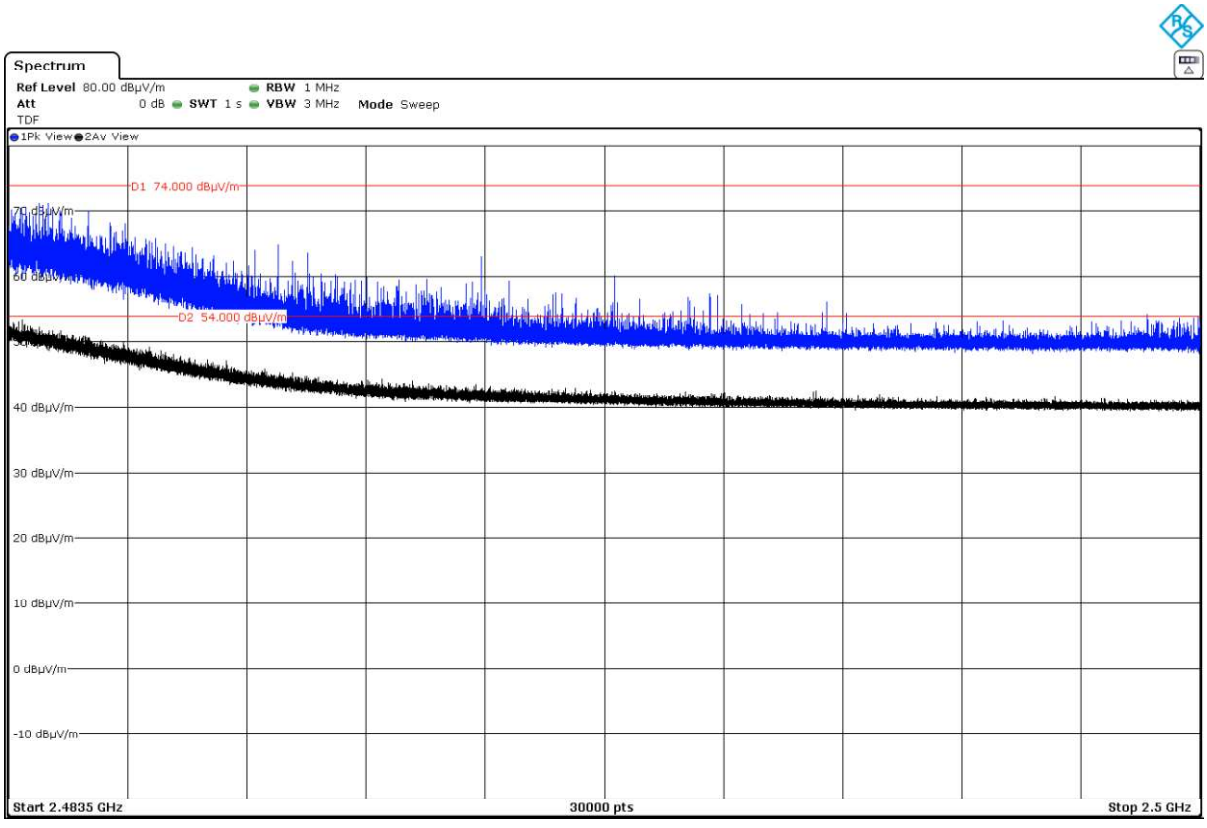
- CH 9:



- CH 10:



- High Channel. CH 11:



Appendix B: Test results. RF interface 2.

INDEX

TEST CONDITIONS

POWER SUPPLY (V):

V nonimal:	3.3 Vdc
Type of power supply:	DC voltage.
Type of Antenna:	External dipole.
Declared Antenna Gain:	2.14 dBi

TEST FREQUENCIES:

Low Channel:	2412 MHz
Middle Channel:	2437 MHz
High Channel:	2462 MHz

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is connected to the spectrum analyser using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss

RADIATED MEASUREMENTS

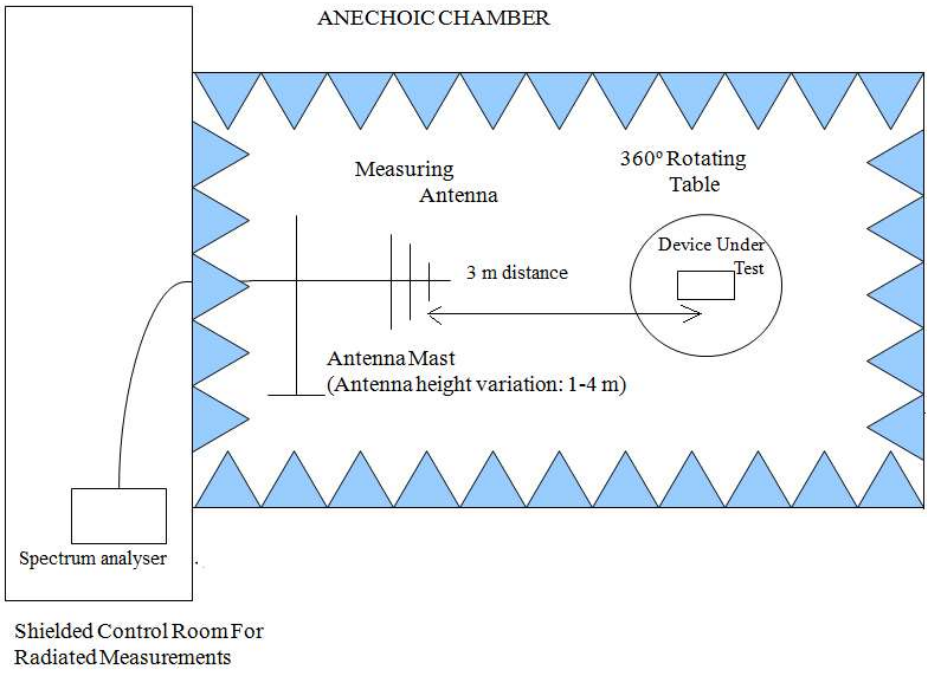
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz) is situated at a distance of 3 m and at a distance of 1m for the frequency range 1 GHz-26 GHz (1 GHz-18 GHz Double ridge horn antenna and 18 GHz-40 GHz horn antenna).

For radiated emissions in the range 1 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

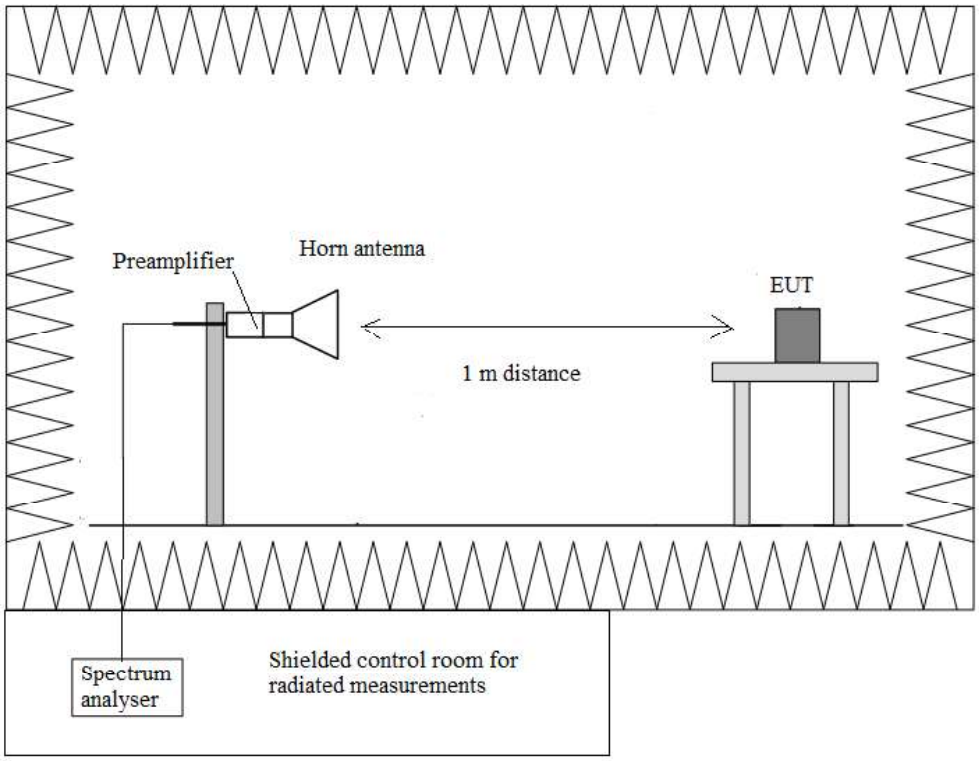
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup f > 1 GHz:



Occupied Bandwidth

RESULTS:

- **Mode 802.11 b**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
99% bandwidth (MHz)	12.75	13.08	12.81
Measurement uncertainty (kHz)	<± 28.03		

- **Mode 802.11 g**

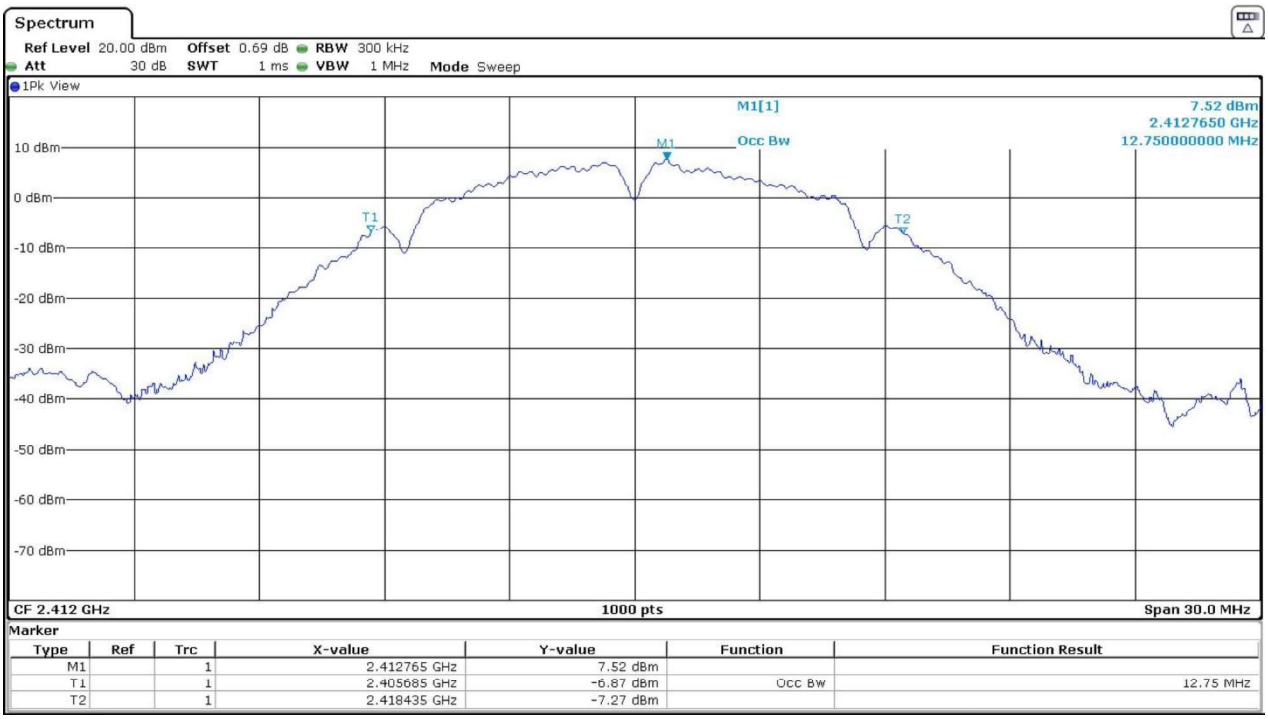
	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
99% bandwidth (MHz)	16.65	22.60	16.65
Measurement uncertainty (kHz)	<± 28.03		

- **Mode 802.11 n20**

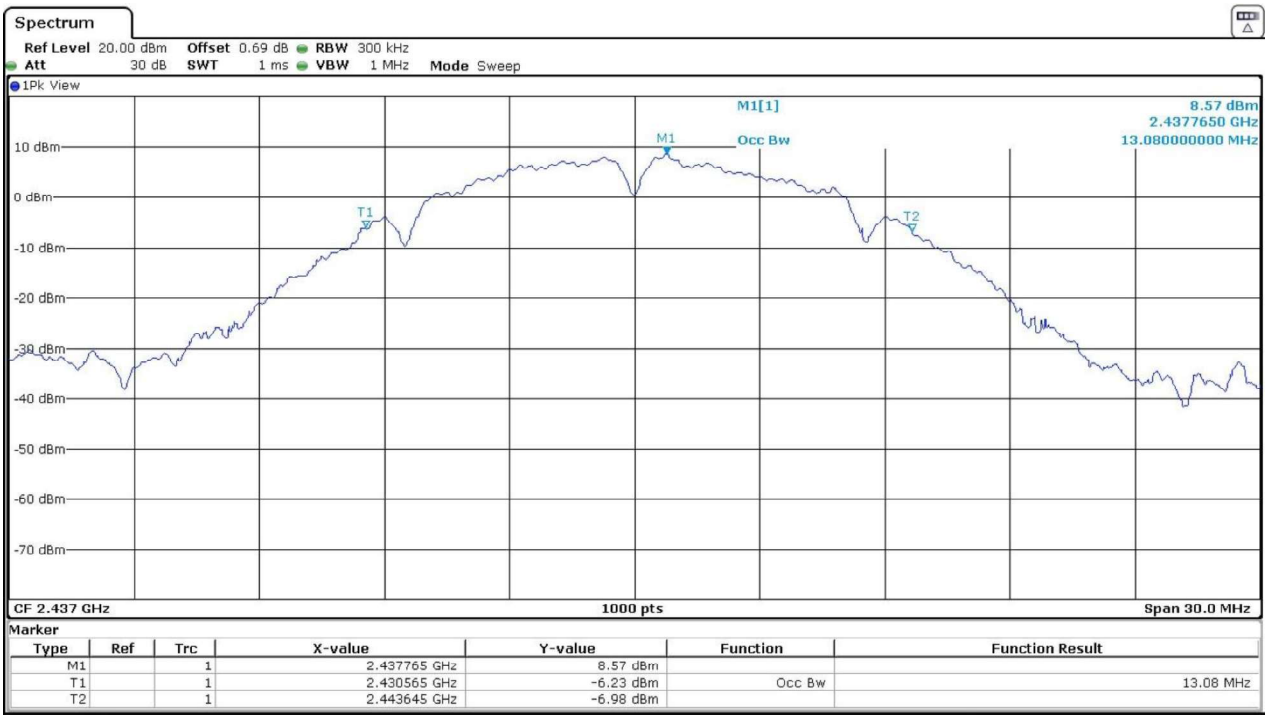
	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
99% bandwidth (MHz)	17.60	23.10	17.60
Measurement uncertainty (kHz)	<± 28.03		

- **Mode 802.11 b – Occupied Bandwidth**

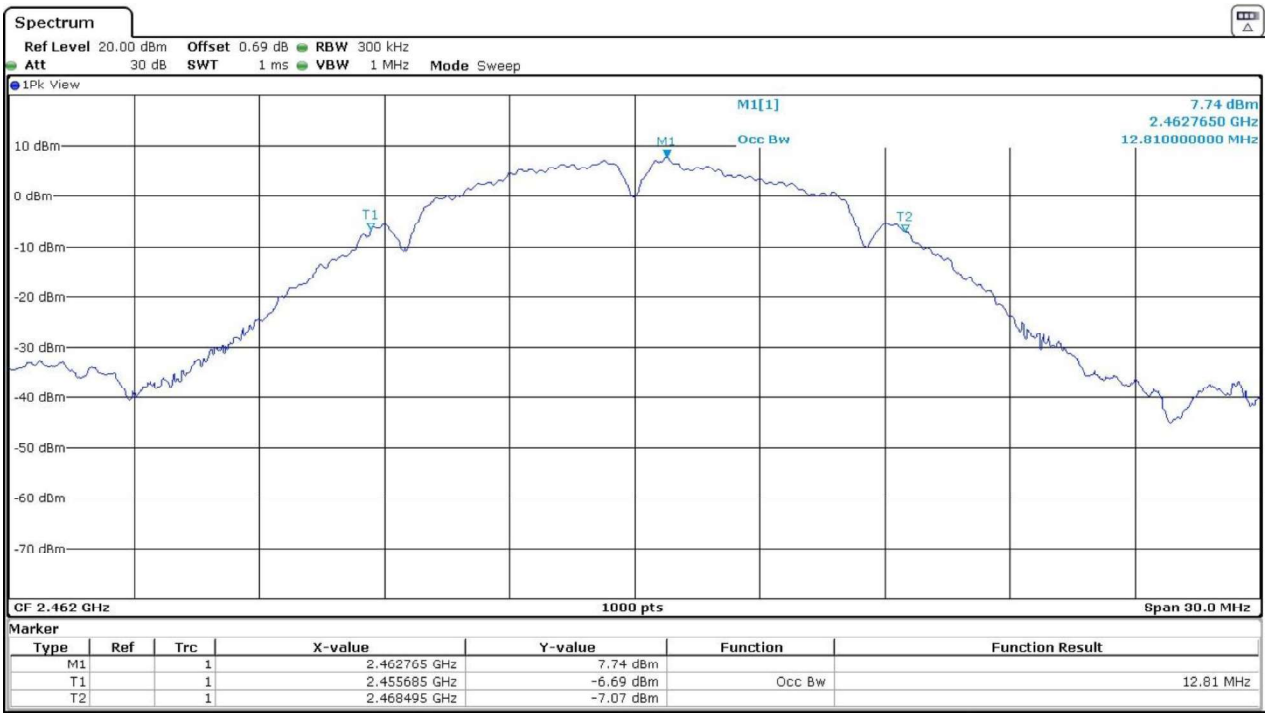
- Low Channel:



- Middle Channel:

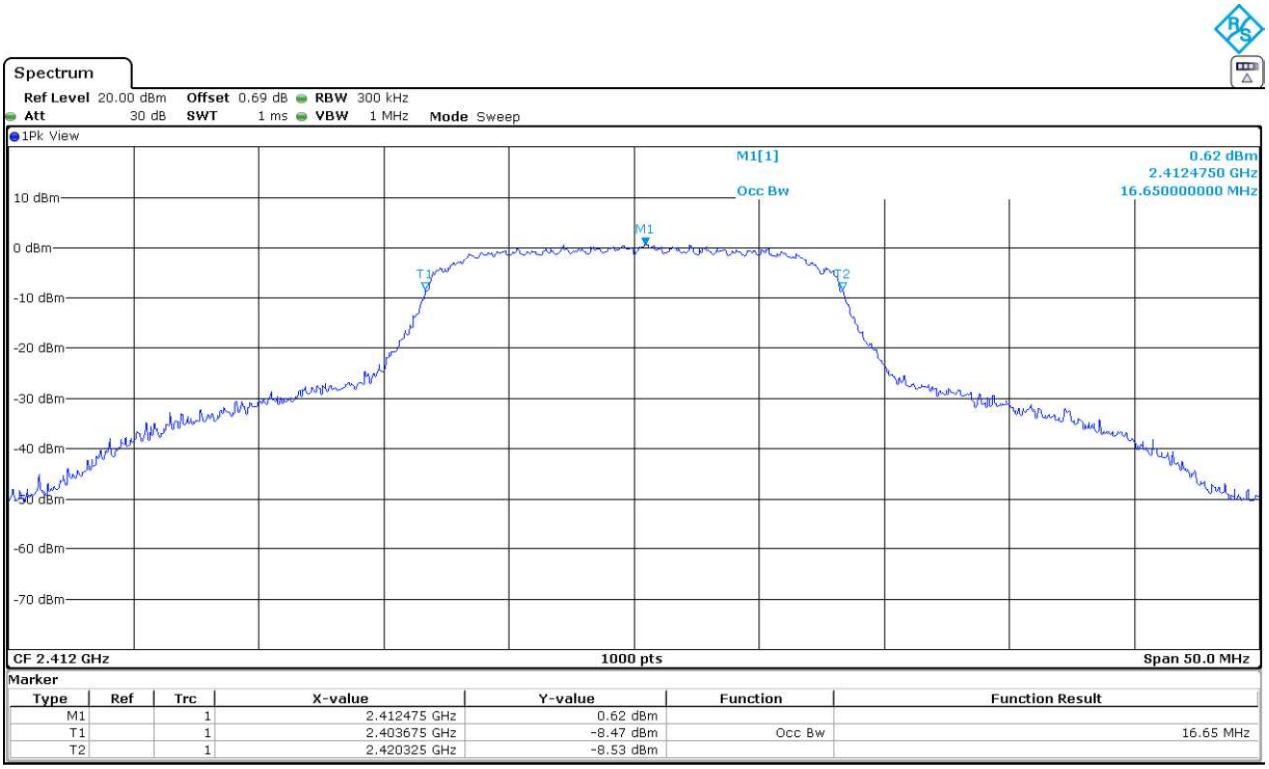


- High Channel:

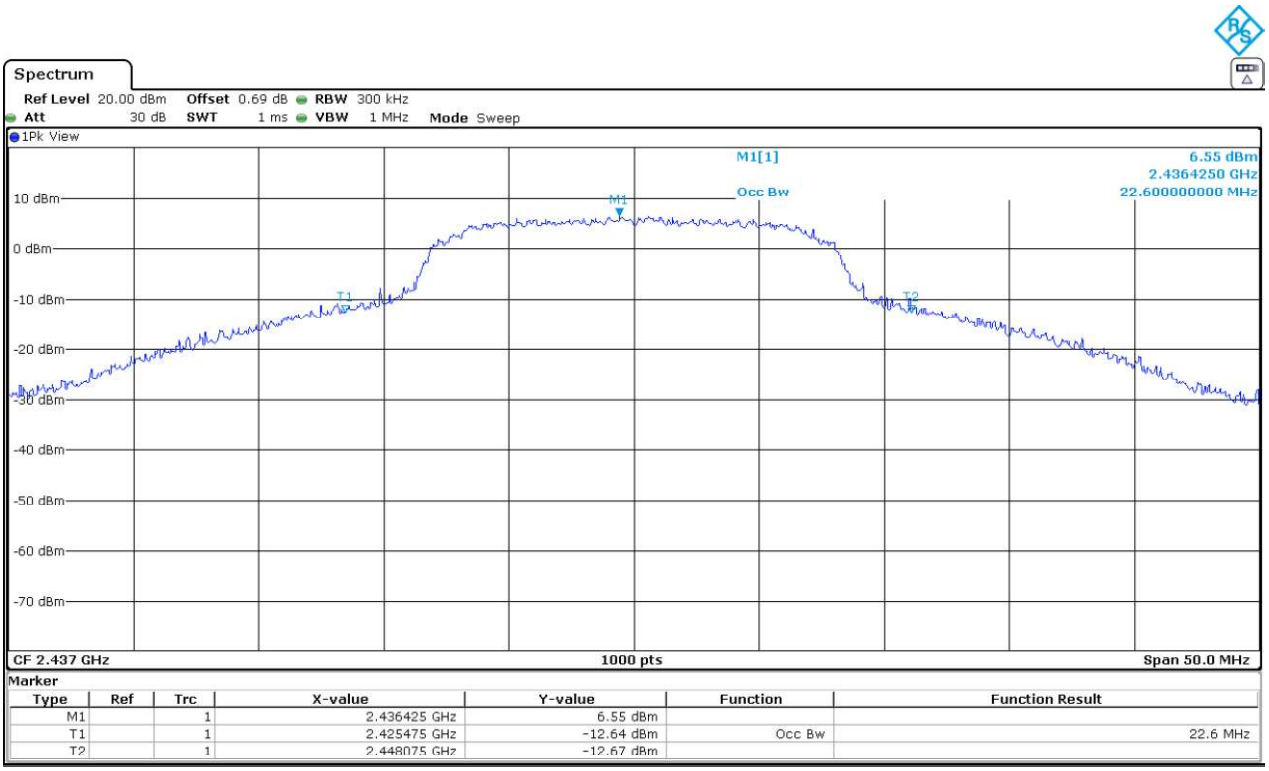


- **Mode 802.11 g – Occupied Bandwidth**

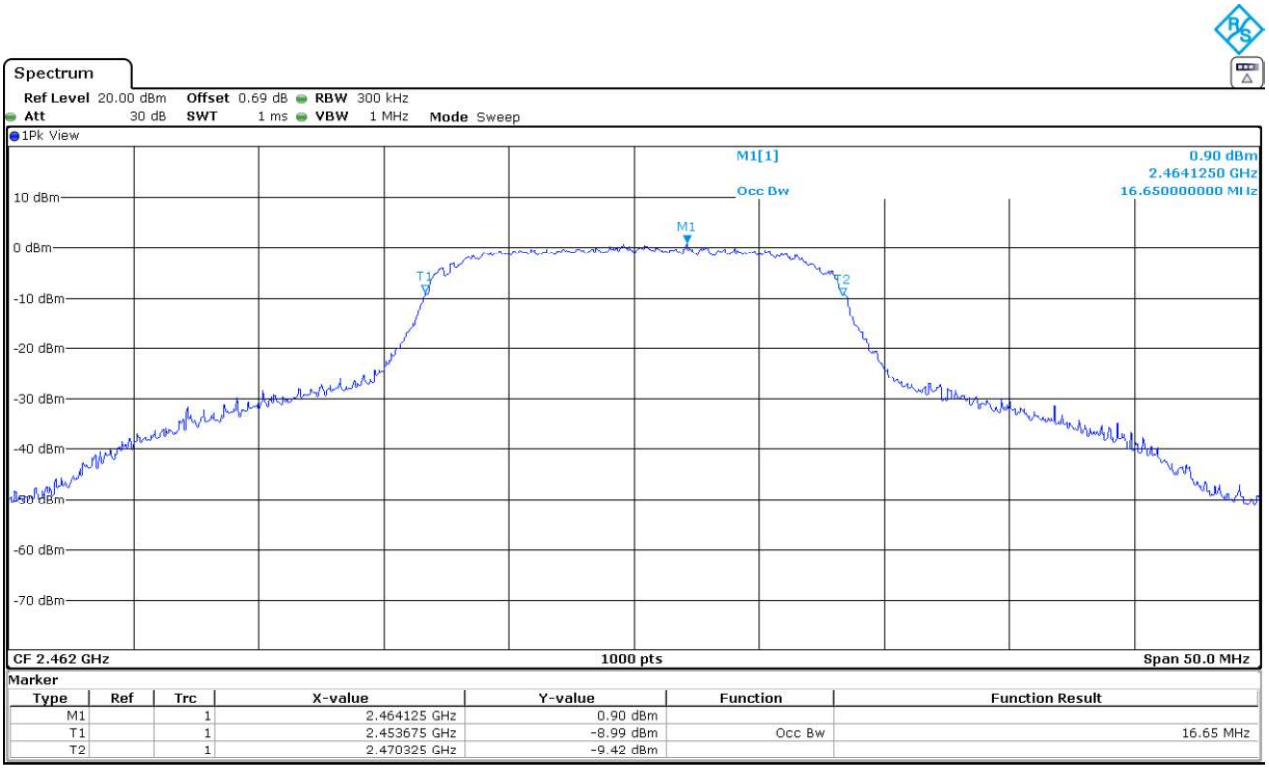
- Low Channel:



- Middle Channel:

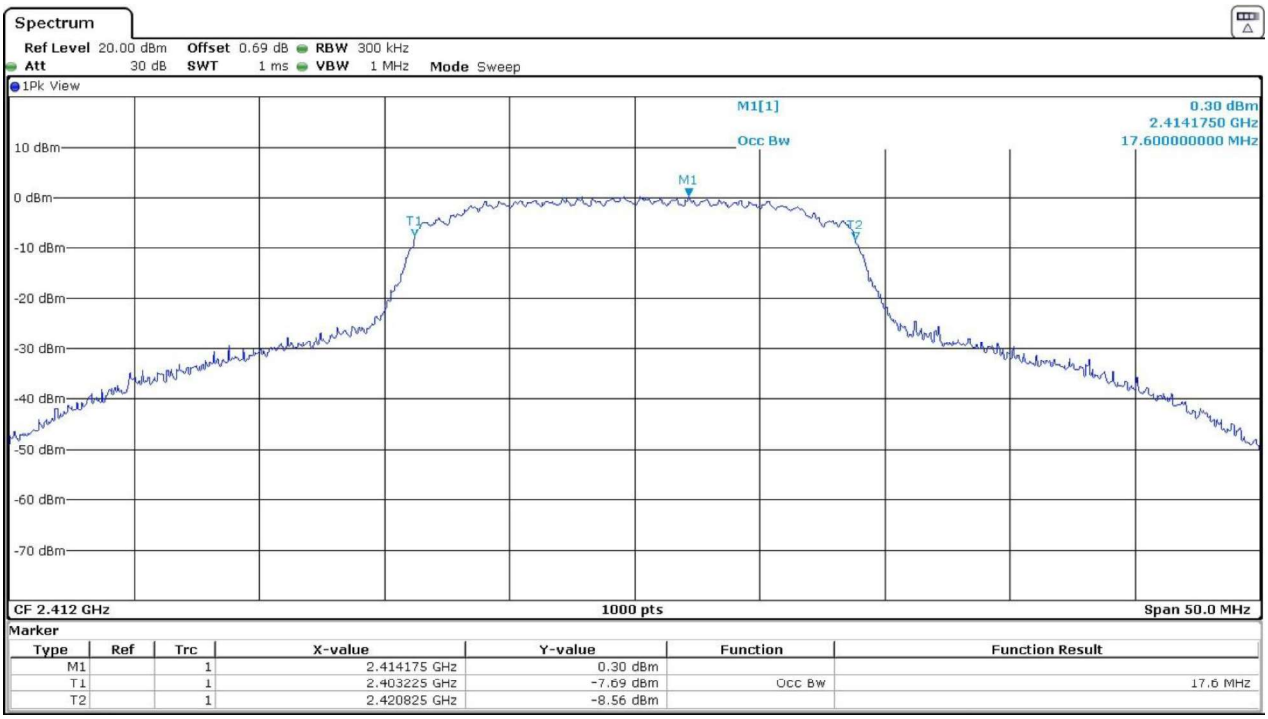


- High Channel:

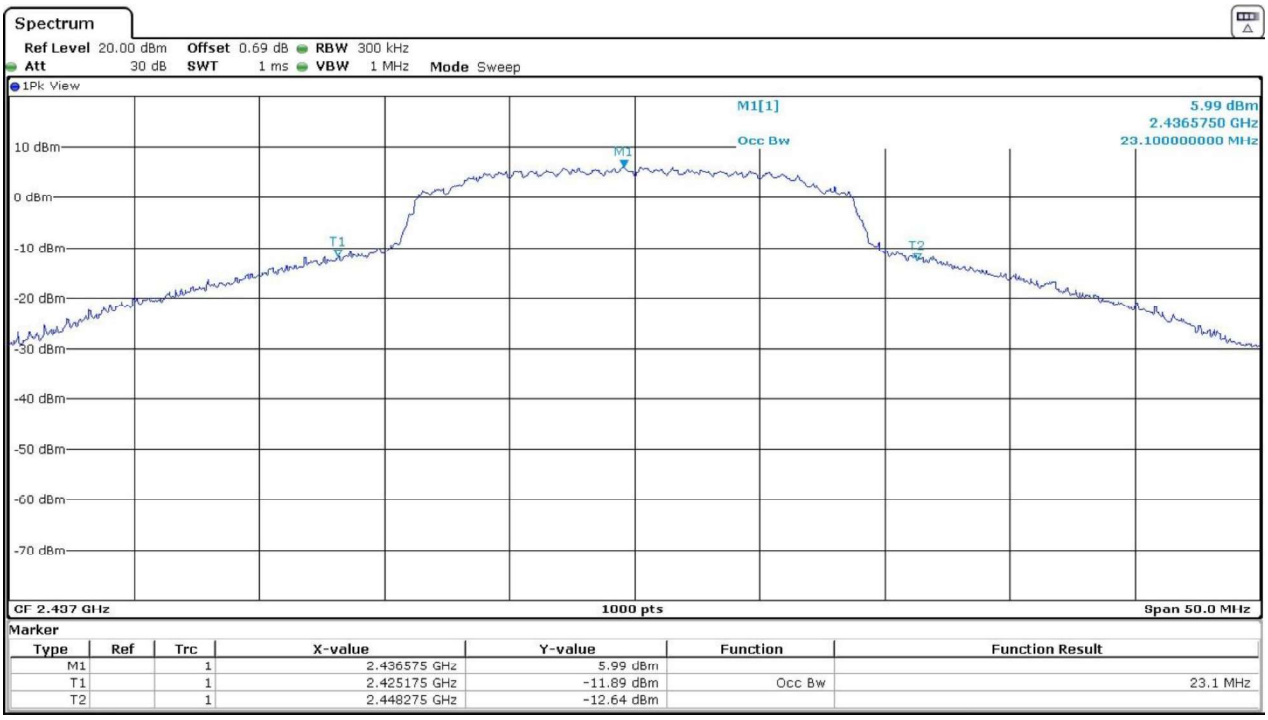


- **Mode 802.11 n20 – Occupied Bandwidth**

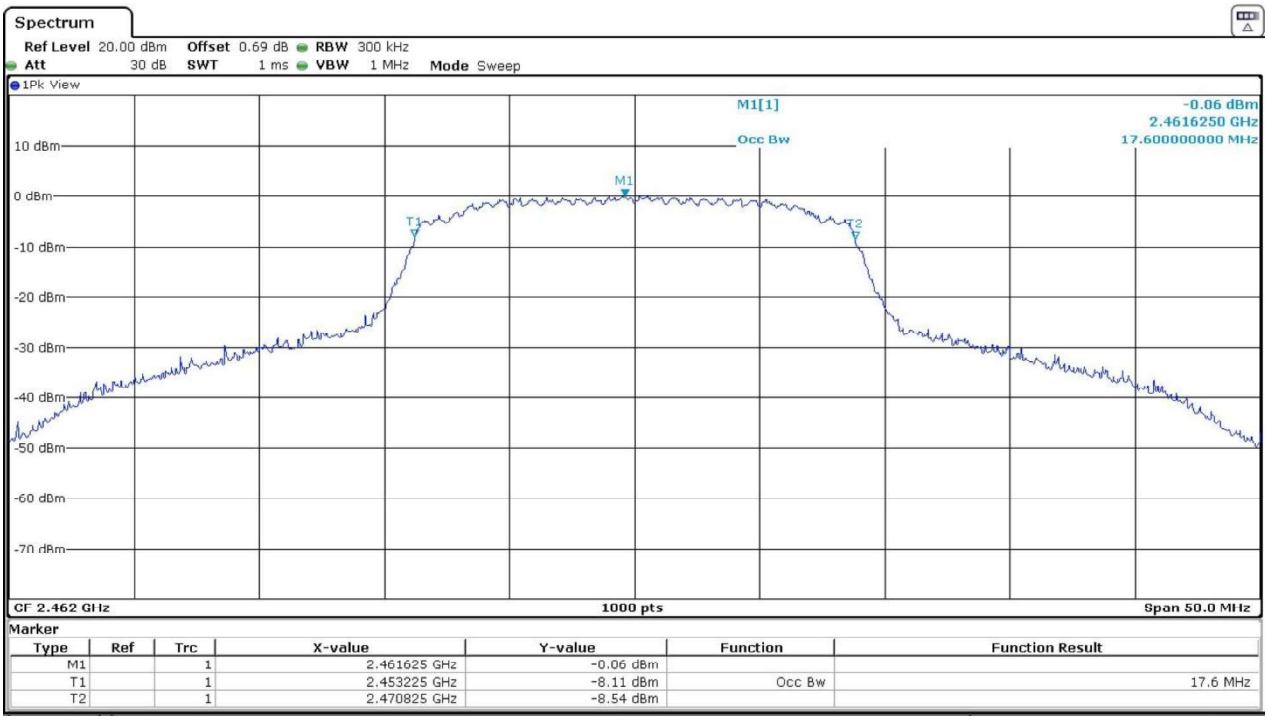
- Low Channel:



- Middle Channel:



- High Channel:



FCC Section 15.247 Subclause (a) (2) / RSS-247 Clause 5.2 (a) 6 dB Bandwidth.

SPECIFICATION:

The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS:

- **Mode 802.11 b**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
6 dB Spectrum bandwidth (MHz)	7.843	7.992	7.816
Measurement uncertainty (kHz)	<±11.01		

- **Mode 802.11 g**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
6 dB Spectrum bandwidth (MHz)	15.116	15.133	15.132
Measurement uncertainty (kHz)	<±11.01		

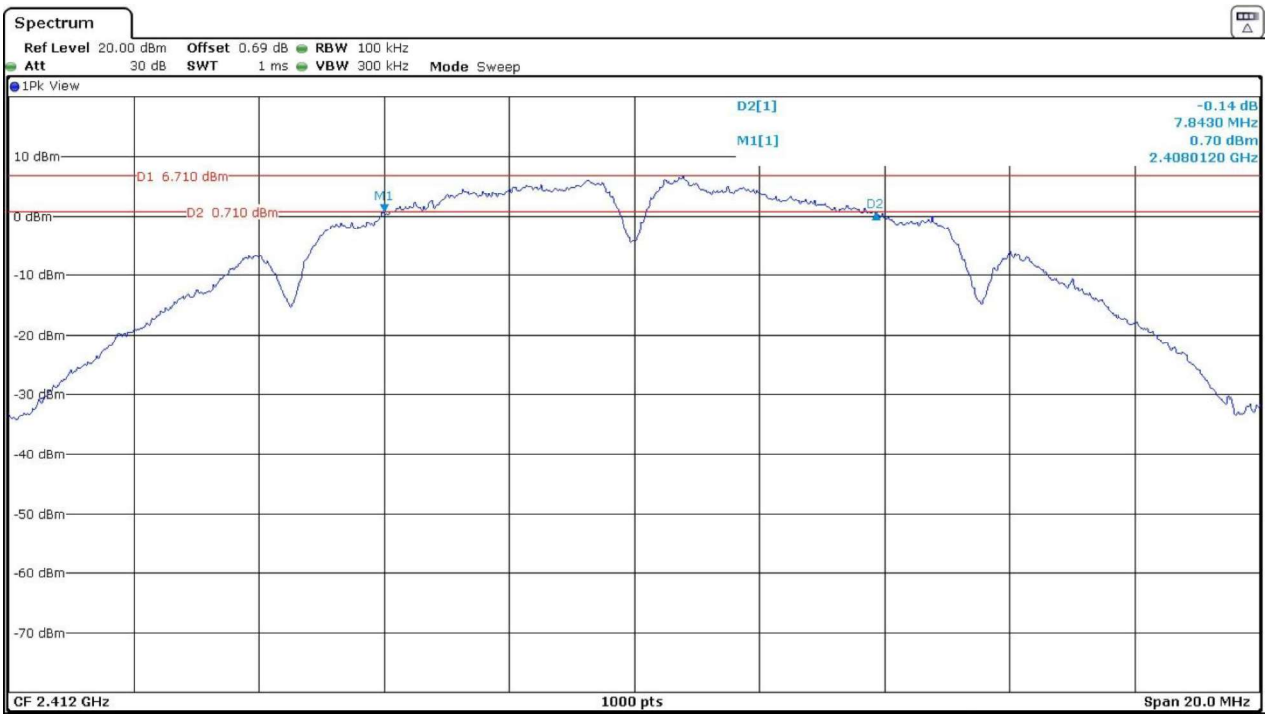
- **Mode 802.11 n20**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
6 dB Spectrum bandwidth (MHz)	15.128	16.559	15.133
Measurement uncertainty (kHz)	<±11.01		

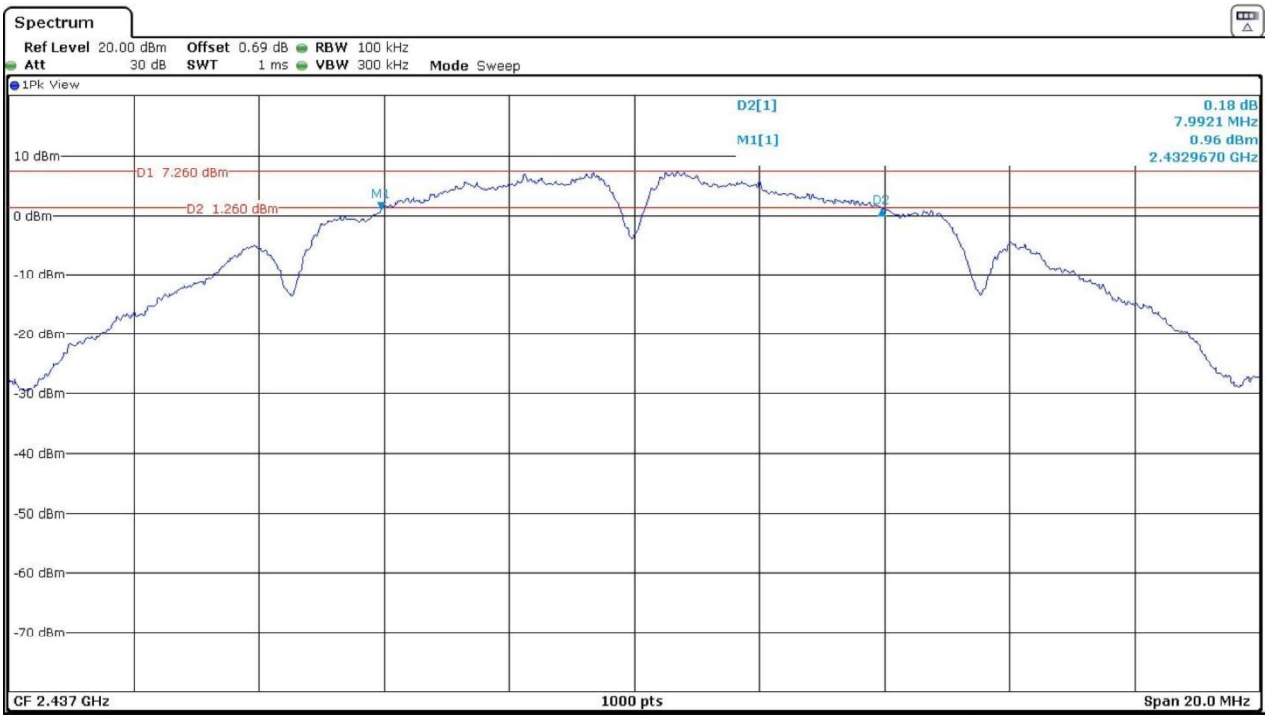
Verdict: PASS

- **Mode 802.11 b – 6 dB Bandwidth**

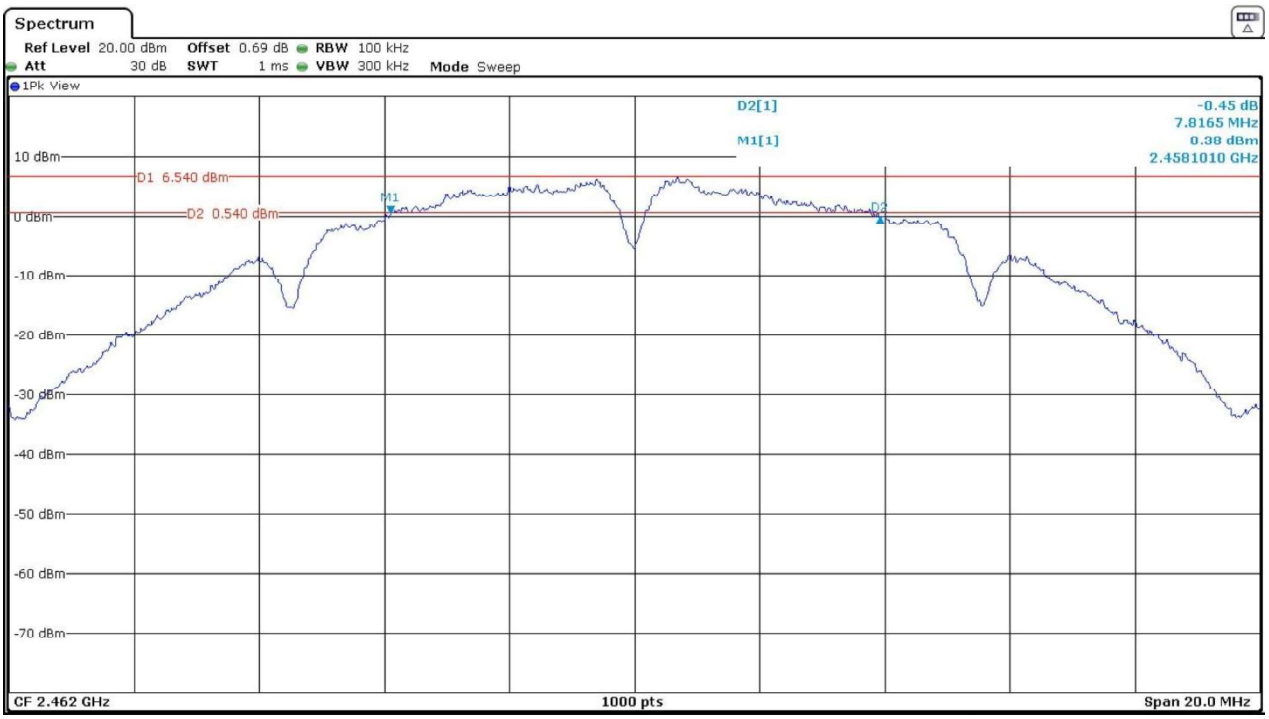
- Low Channel:



- Middle Channel:

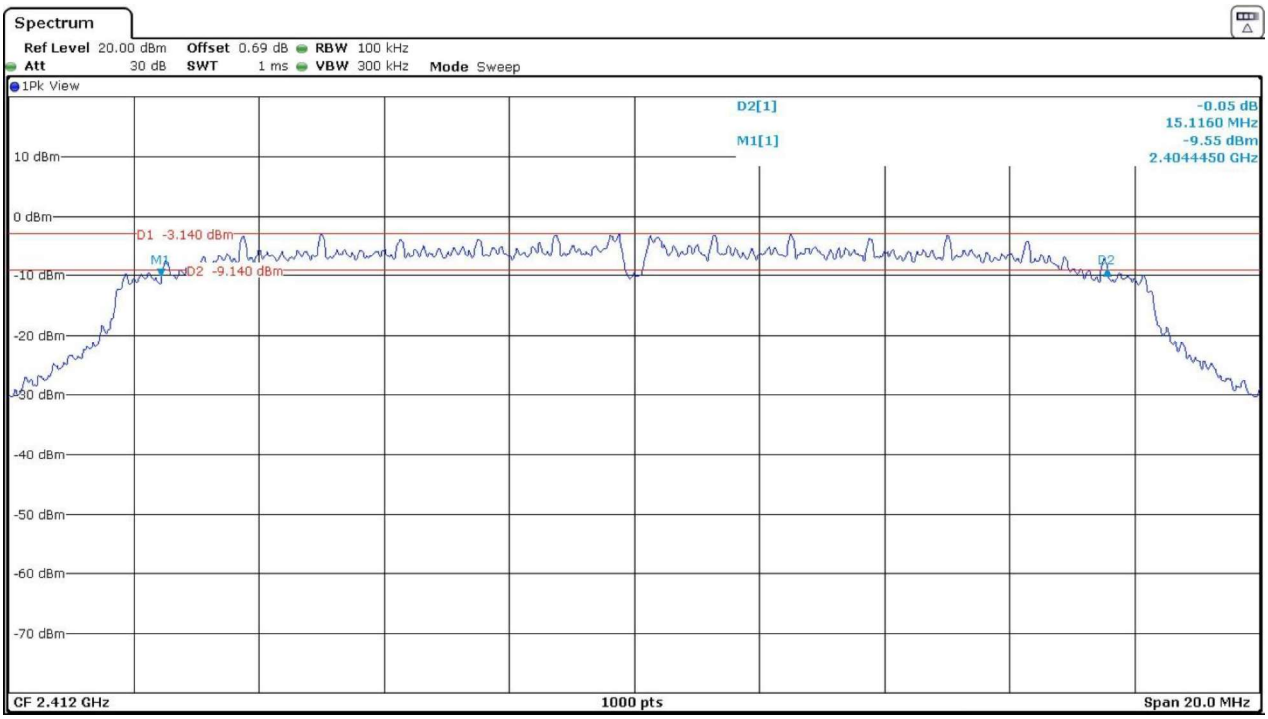


- High Channel:

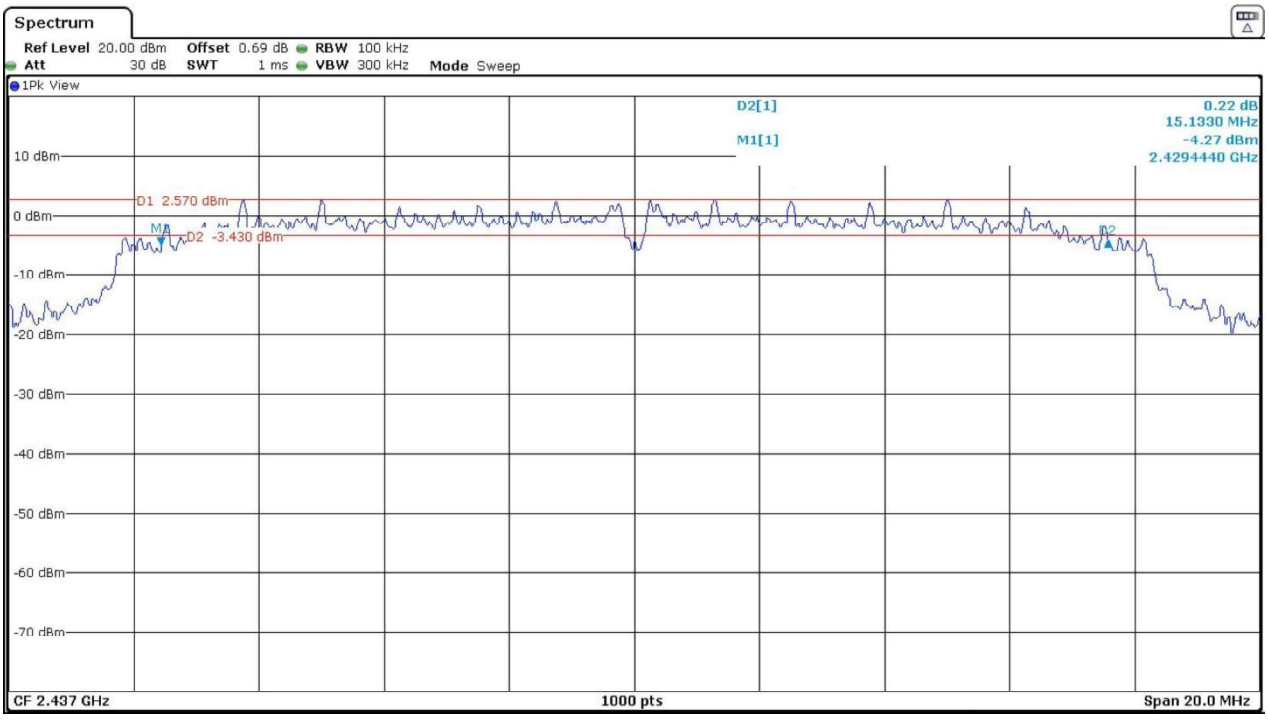


- **Mode 802.11 g – 6 dB Bandwidth**

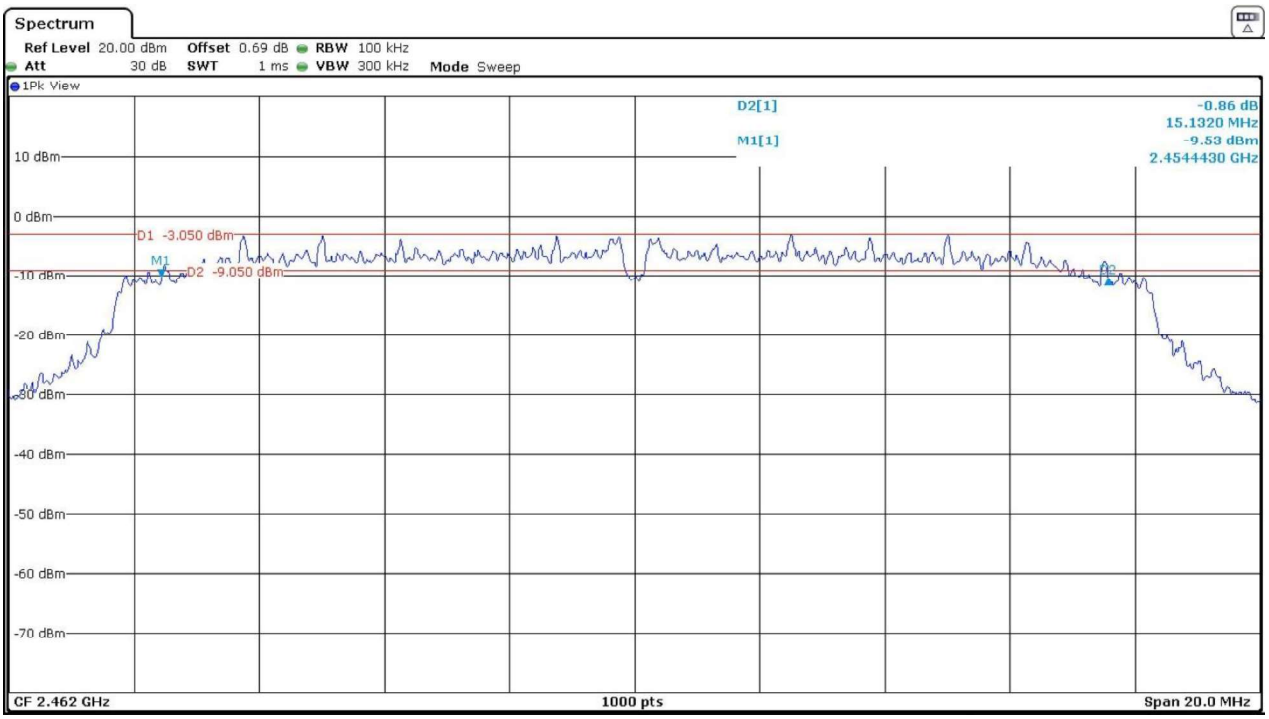
- Low Channel:



- Middle Channel:

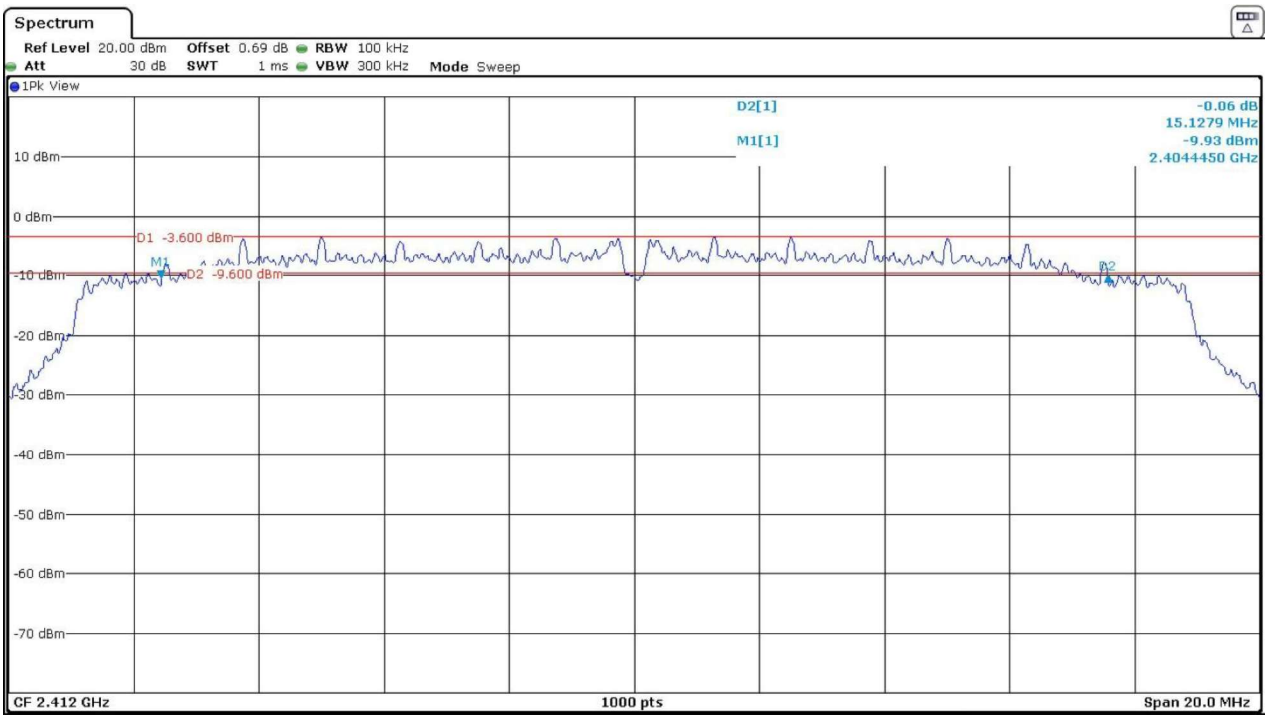


- High Channel:

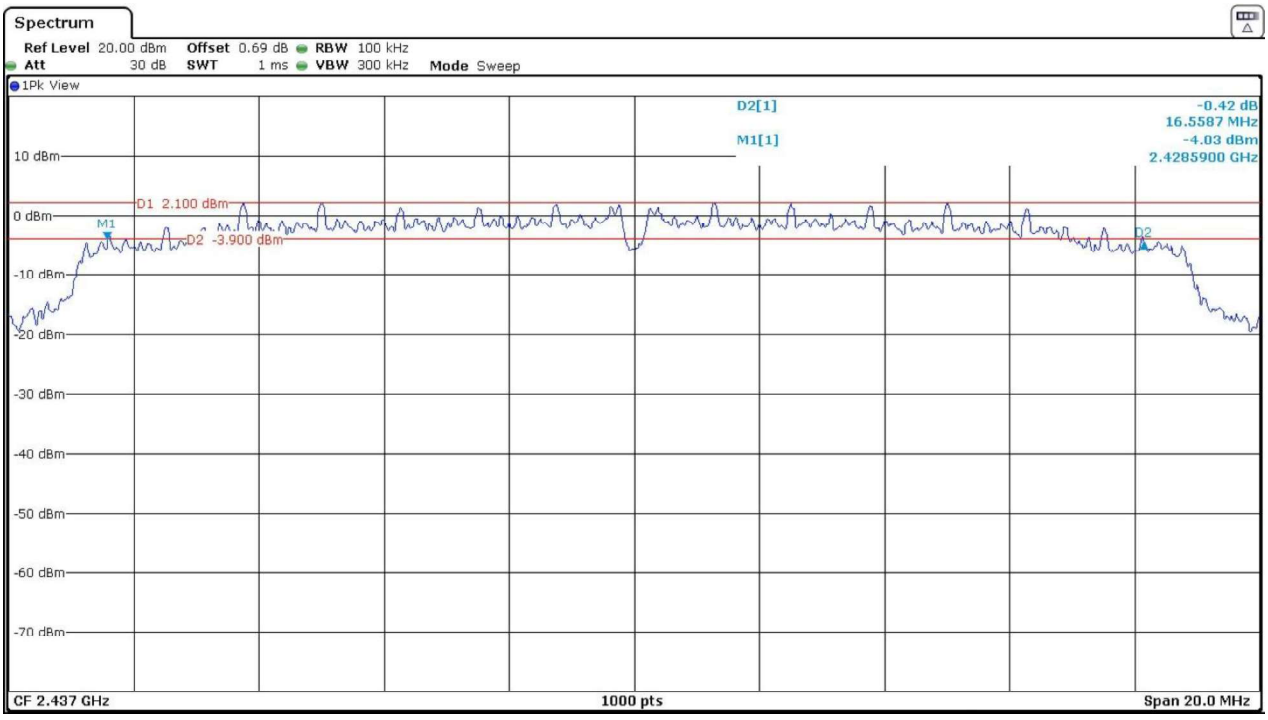


- **Mode 802.11 n20 – 6 dB Bandwidth**

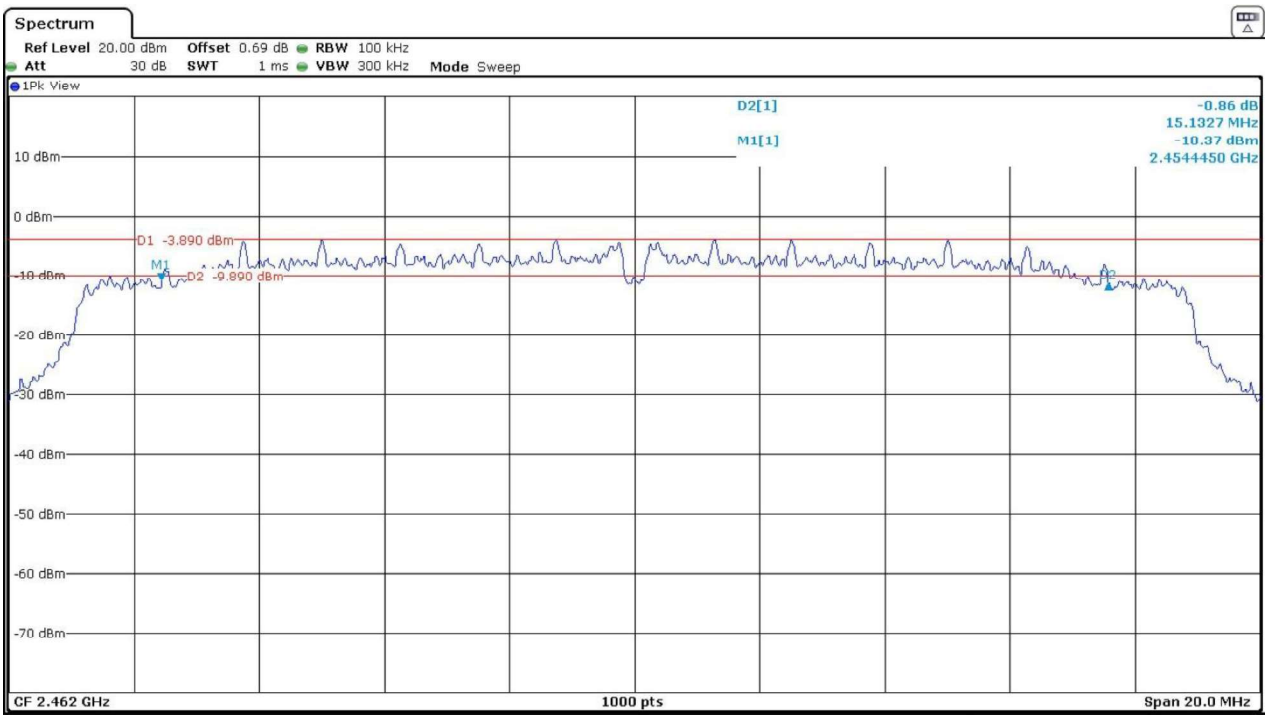
- Low Channel:



- Middle Channel:



- High Channel:



FCC Section 15.247 Subclause (b) / RSS-247 Clause 5.4 (d) Maximum output power and antenna gain

SPECIFICATION:

For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).
The e.i.r.p. shall not exceed 4 W (36 dBm) (Canada).

RESULTS:

For all modes, the maximum conducted output power was measured using the method according to point 11.9.1.3 “PKPM1 Peak power meter method” of ANSI C.63.10-2013.

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

Maximum declared antenna gain: 2.14 dBi.

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

- **Mode 802.11 b**

Peak Conducted Output Power	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
Maximum Conducted Power (dBm)	16.71	17.70	16.85
Maximum EIRP Power (dBm)	18.85	19.84	18.99
Measurement uncertainty (dB)	<±0.33		

- **Mode 802.11 g**

Peak Conducted Output Power	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
Maximum Conducted Power (dBm)	14.16	18.46	13.86
Maximum EIRP Power (dBm)	16.30	20.60	16.00
Measurement uncertainty (dB)	<±0.33		

- **Mode 802.11 n20**

Peak Conducted Output Power	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
Maximum Conducted Power (dBm)	13.71	18.41	13.51
Maximum EIRP Power (dBm)	15.85	20.55	15.65
Measurement uncertainty (dB)	<±0.33		

Verdict: PASS

FCC Section 15.247 Subclause (d) / RSS-247 Clause 5.5. Emission limitations conducted (Transmitter)

SPECIFICATION:

In any 100 kHz bandwidths outside the frequency band in which the 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

RESULTS:

- **Mode 802.11 b**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
Reference Level Measurement (dBm)	6.49	7.17	6.62
Measurement uncertainty (dB)	<±1.56		

No spurious peaks were found at less than 20 dB below the limit.

- **Mode 802.11 g**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
Reference Level Measurement (dBm)	-3.19	2.82	-3.26
Measurement uncertainty (dB)	<±1.56		

No spurious peaks were found at less than 20 dB below the limit.

- **Mode 802.11 n20**

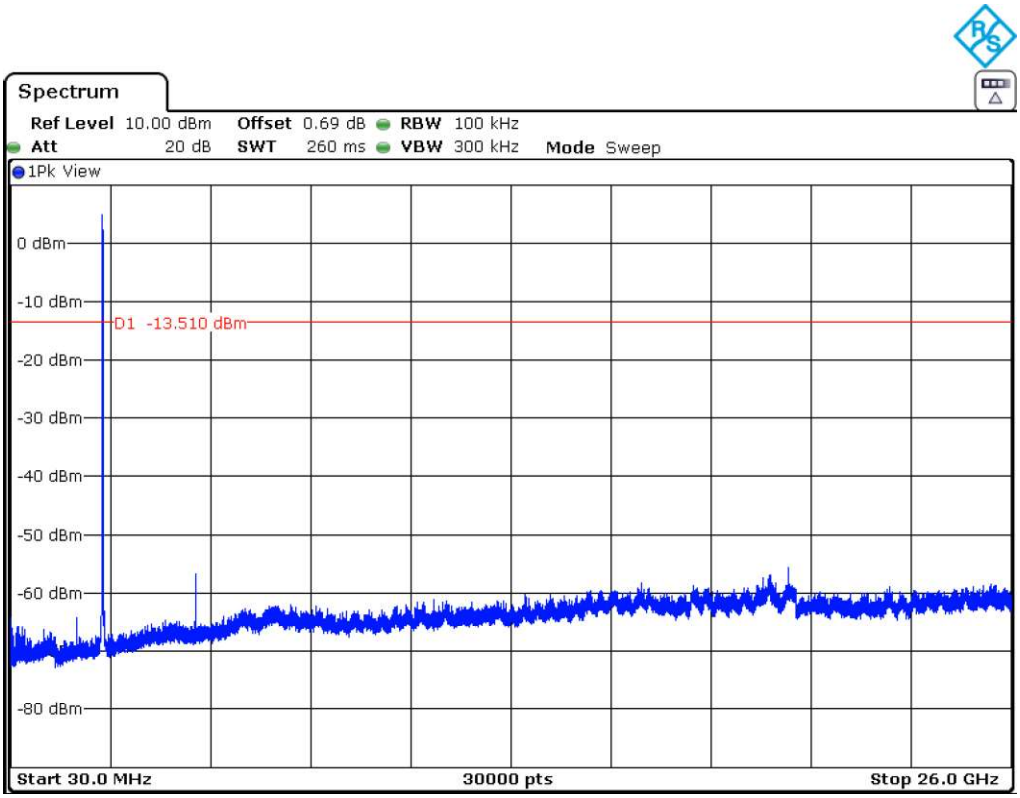
	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
Reference Level Measurement (dBm)	-3.58	2.34	-3.87
Measurement uncertainty (dB)	<±1.56		

No spurious peaks were found at less than 20 dB below the limit.

Verdict: PASS

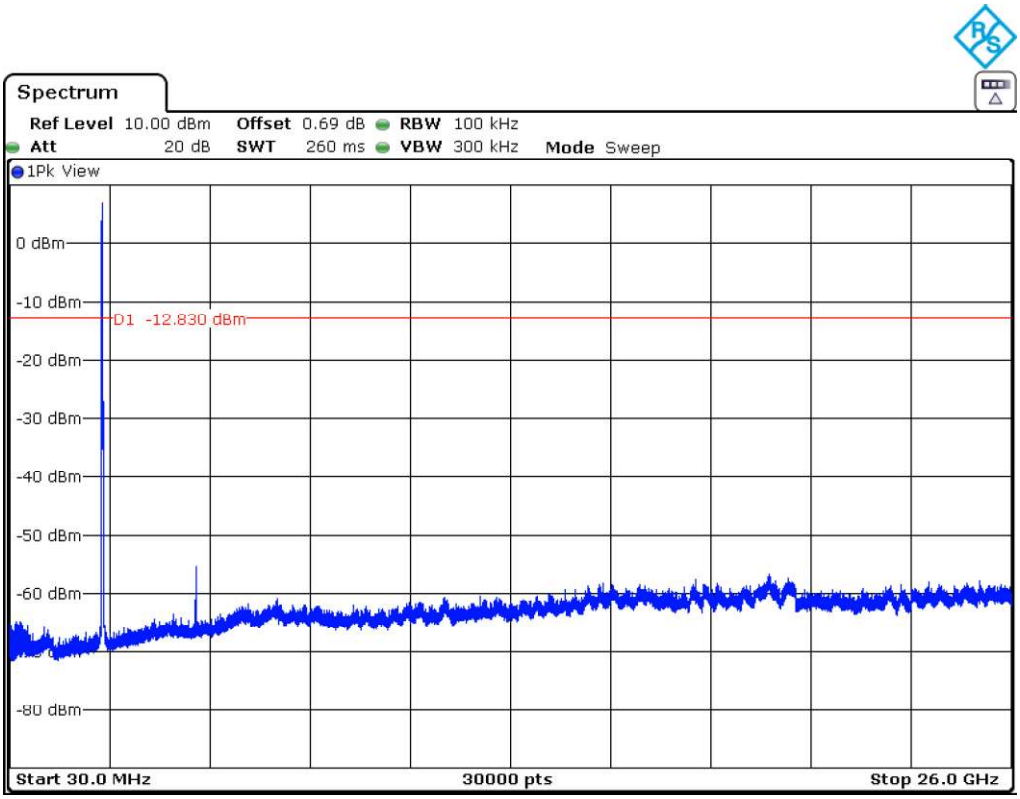
- **Mode 802.11 b – Emission limitations conducted**

- Low Channel:



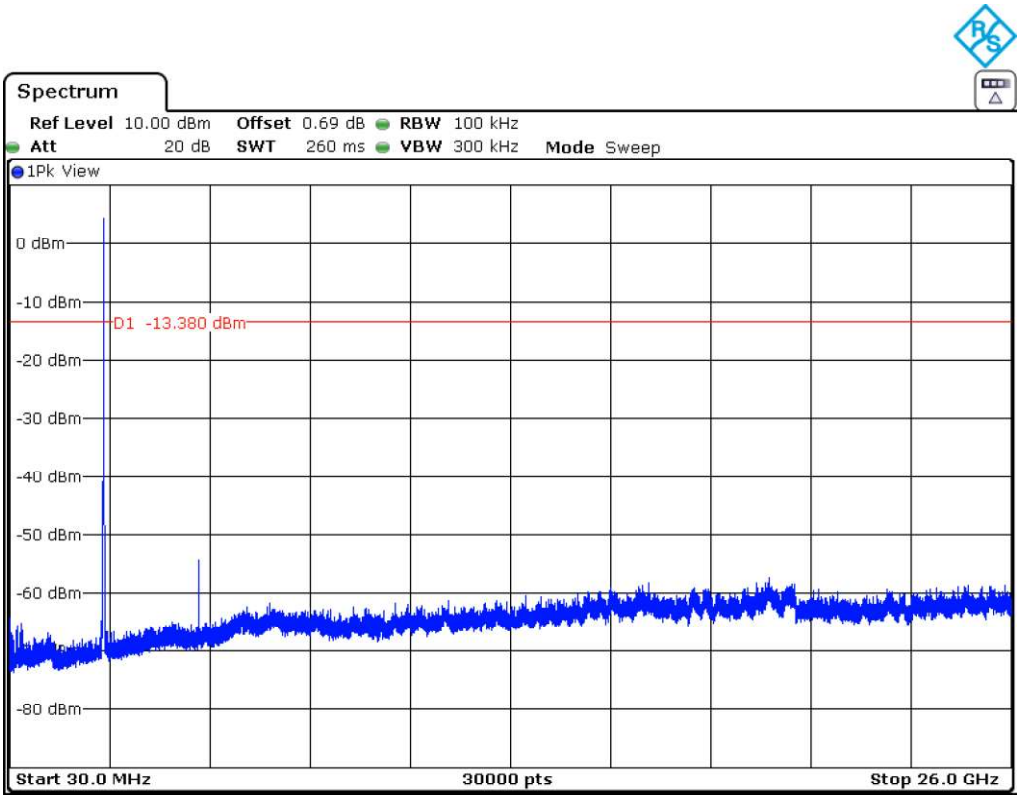
The peak shown in the plot above the limit is the carrier frequency.

- Middle Channel:



The peak shown in the plot above the limit is the carrier frequency.

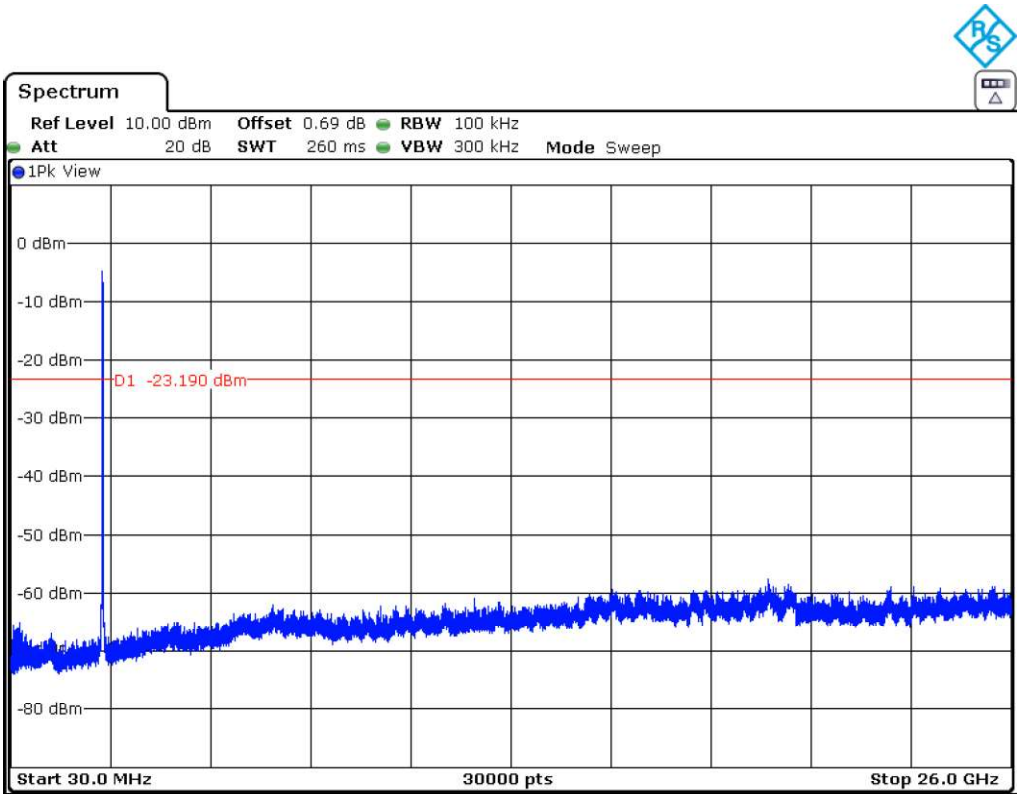
- High Channel:



The peak shown in the plot above the limit is the carrier frequency.

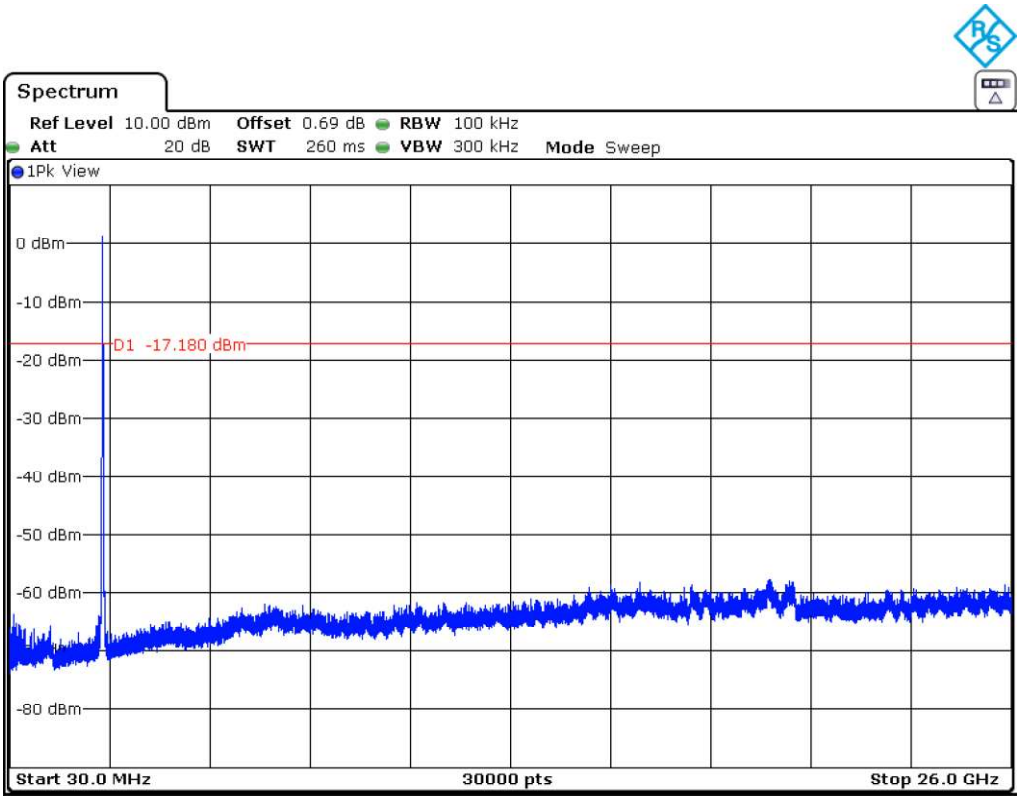
- **Mode 802.11 g – Emission limitations conducted**

- Low Channel:



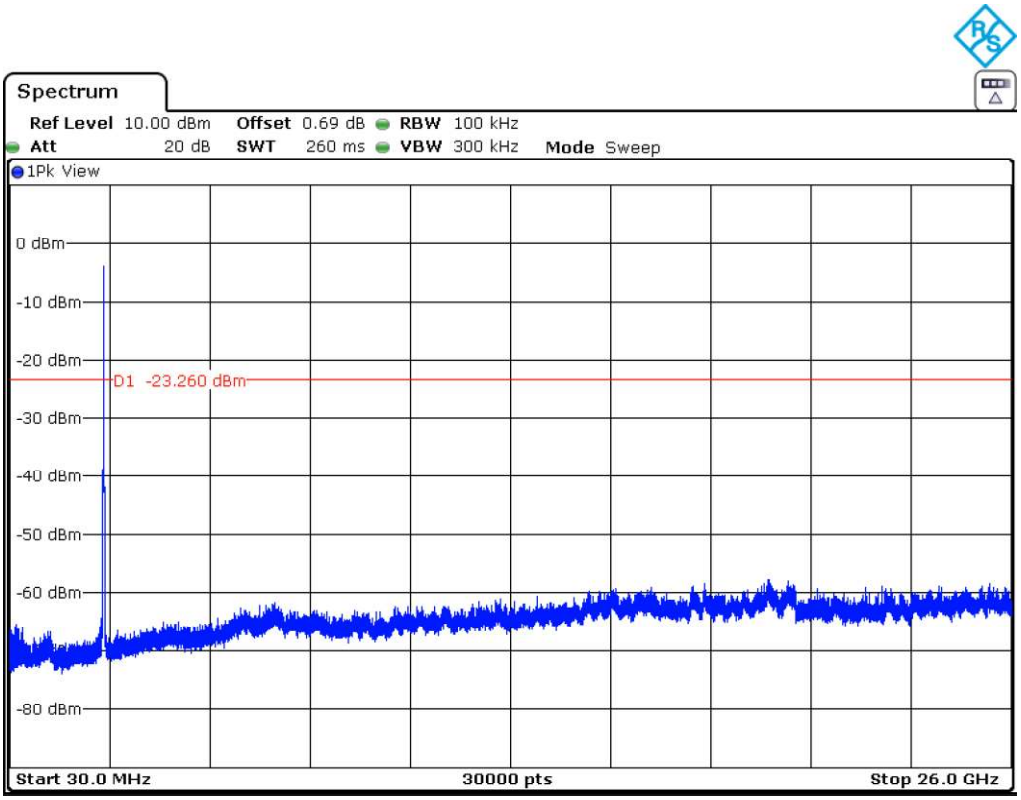
The peak shown in the plot above the limit is the carrier frequency.

- Middle Channel:



The peak shown in the plot above the limit is the carrier frequency.

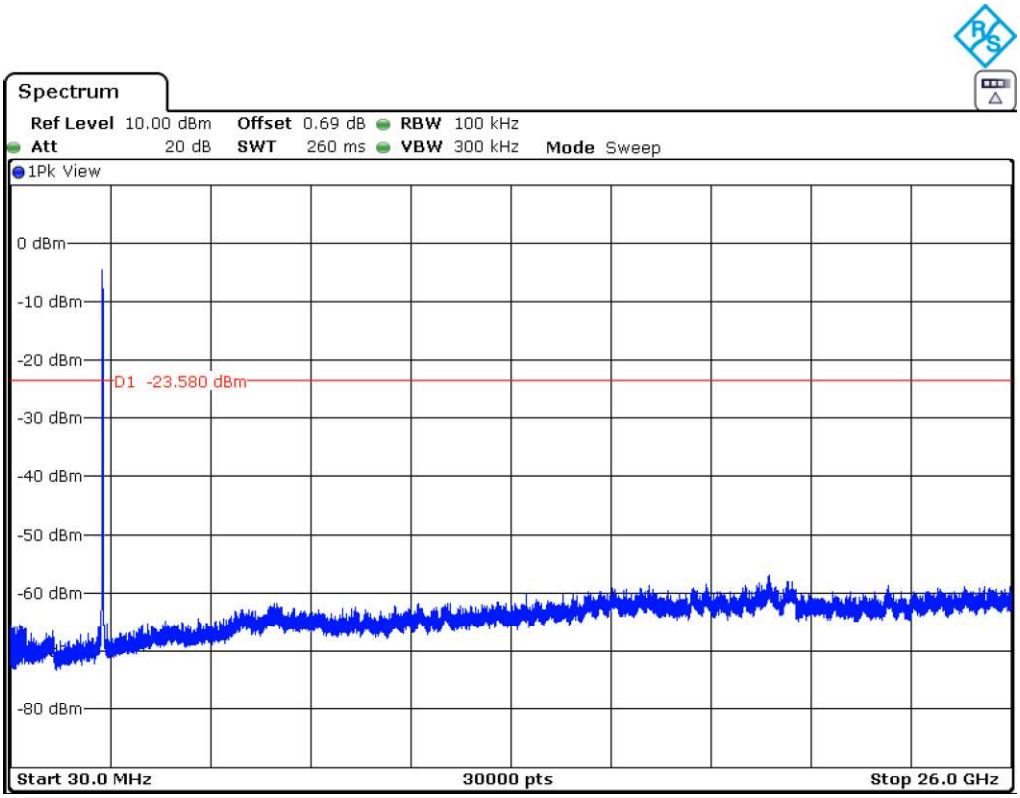
- High Channel:



The peak shown in the plot above the limit is the carrier frequency.

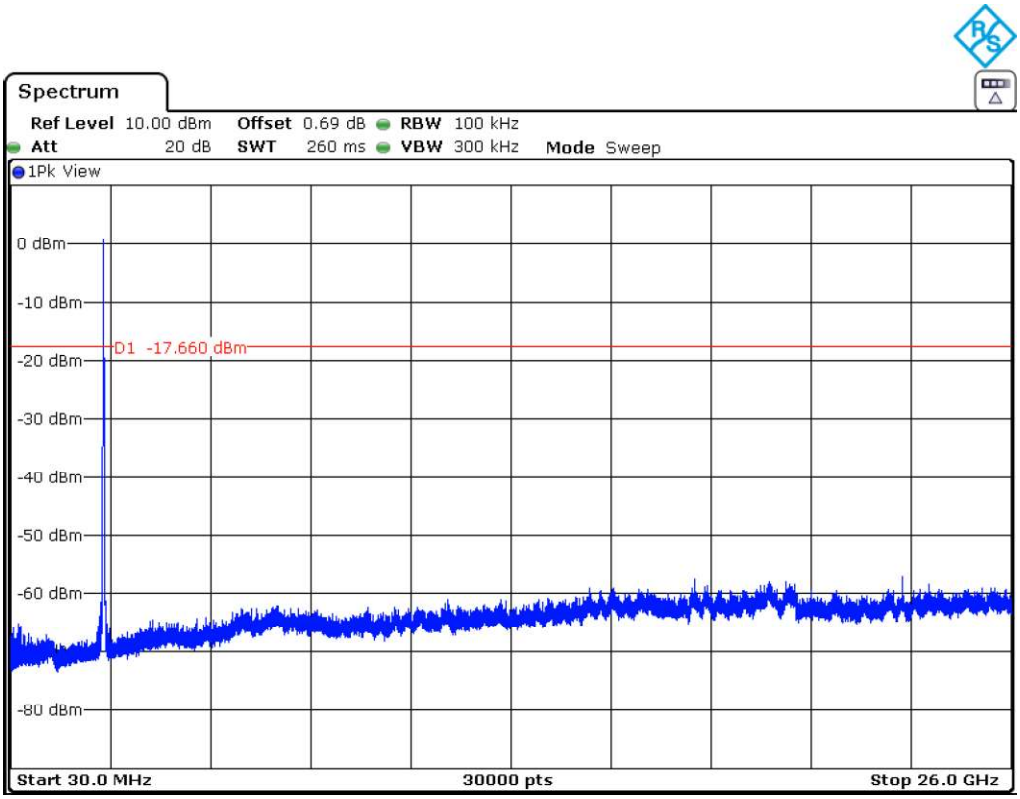
- **Mode 802.11 n20 – Emission limitations conducted**

- Low Channel:



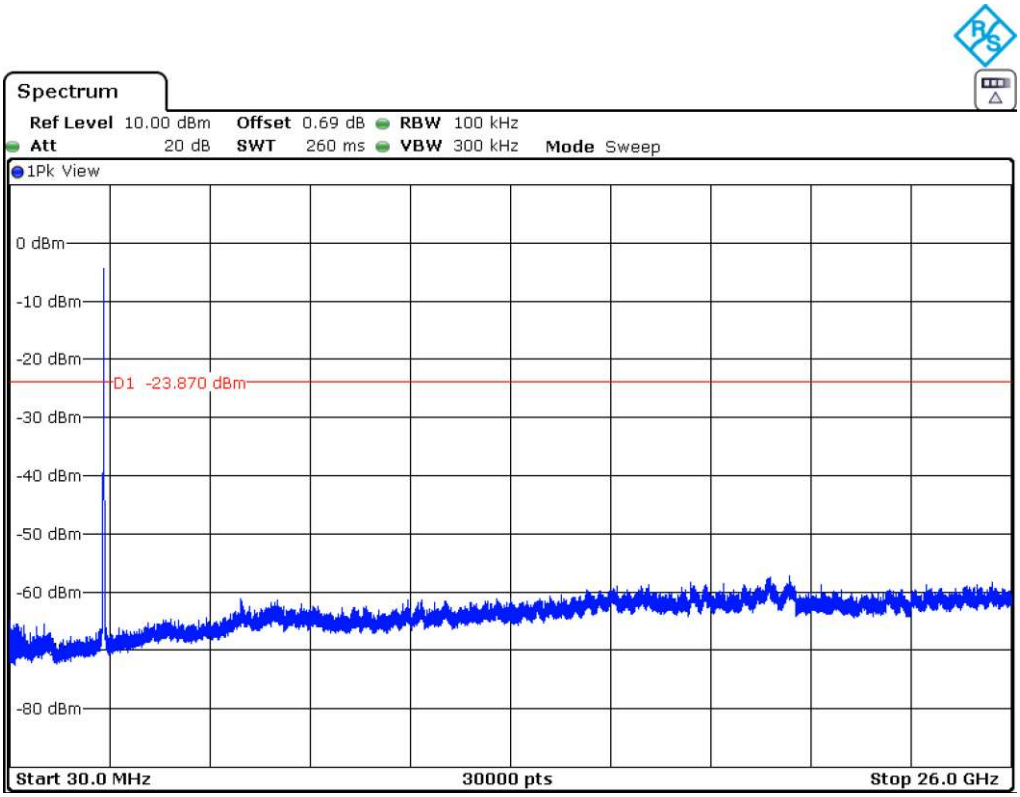
The peak shown in the plot above the limit is the carrier frequency.

- Middle Channel:



The peak shown in the plot above the limit is the carrier frequency.

- High Channel:



The peak shown in the plot above the limit is the carrier frequency.

FCC Section 15.247 Subclause (d) / RSS-247 Clause 5.5. Band-edge emissions compliance (Transmitter)

SPECIFICATION:

In any 100 kHz bandwidths outside the frequency band in which the 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

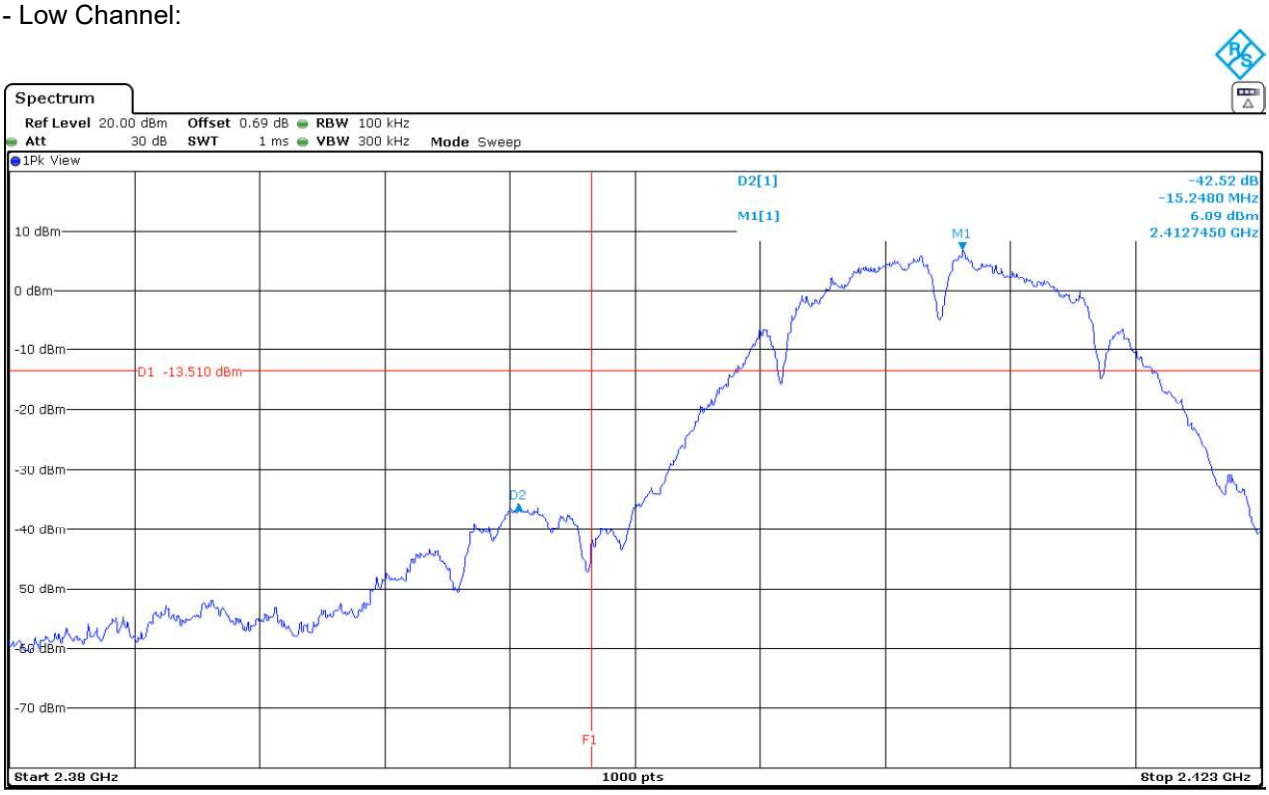
RESULTS:

Radiated measurements were used to show compliance with the limits in the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Measurement uncertainty (dB)	<±1.56

- **Mode 802.11 b – Band-edge emissions compliance**

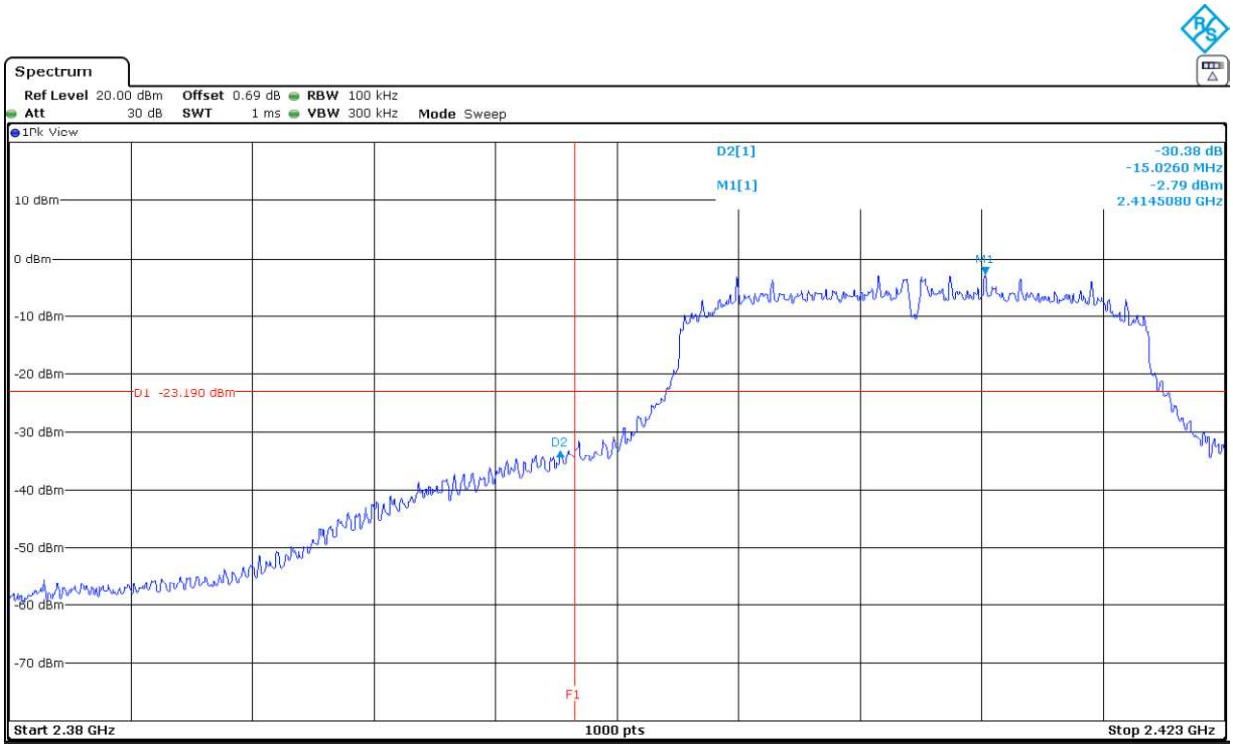
- Low Channel:



Verdict: PASS

- **Mode 802.11 g – Band-edge emissions compliance**

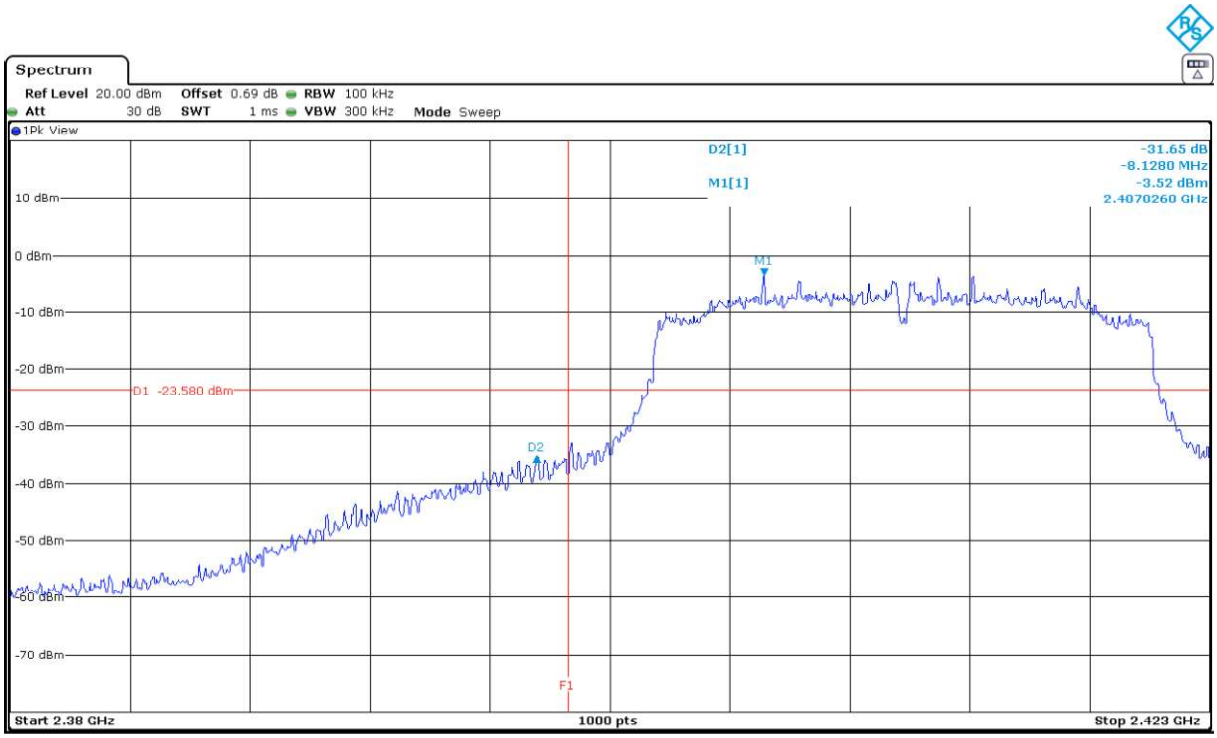
- Low Channel:



Verdict: PASS

- **Mode 802.11 n20 – Band-edge emissions compliance**

- Low Channel:



Verdict: PASS

FCC Section 15.247 Subclause (e) / RSS-247 5.2. (b) Power spectral density

SPECIFICATION:

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.

RESULTS:

The maximum power spectral density level in the fundamental emission was measured using the method according to point 11.10.2." Method PKPSD (Peak PSD)" of ANSI C.63.10-2013.

- **Mode 802.11 b**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
Power Spectral Density (dBm)	6.49	7.17	6.62
Measurement uncertainty (dB)	<±1.56		

- **Mode 802.11 g**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
Power Spectral Density (dBm)	-3.19	2.82	-3.26
Measurement uncertainty (dB)	<±1.56		

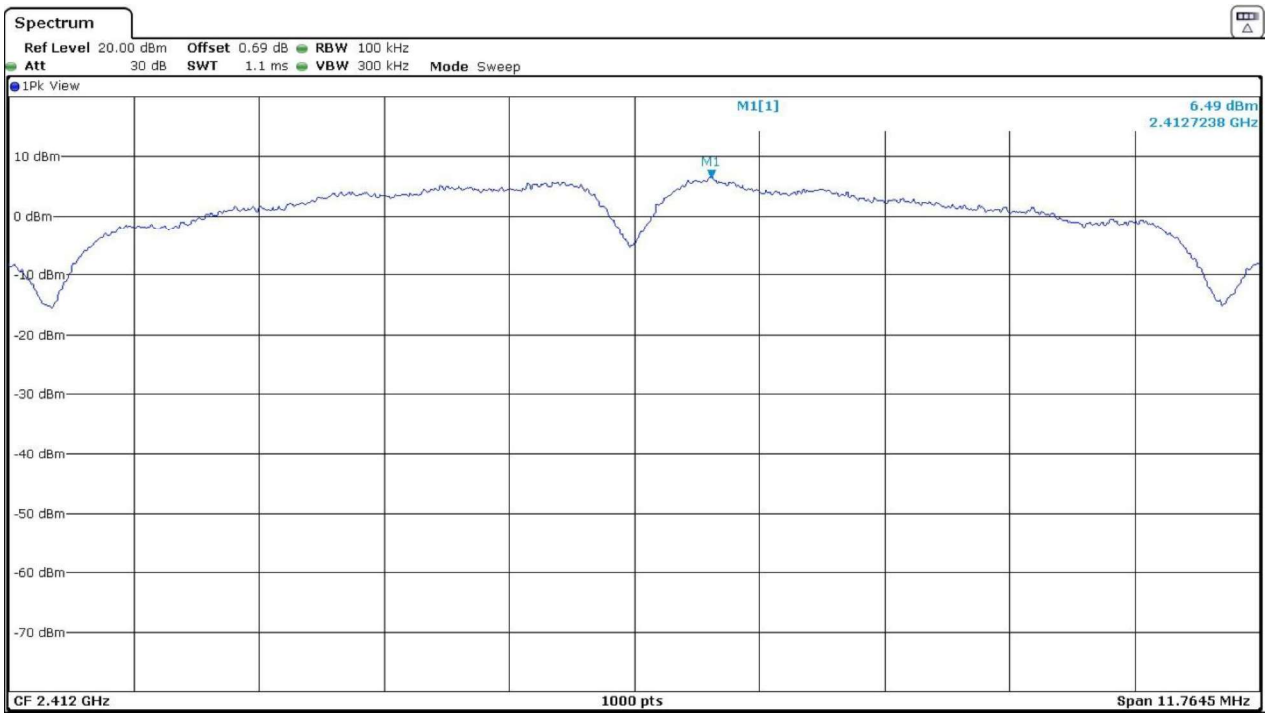
- **Mode 802.11 n20**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
Power Spectral Density (dBm)	-3.58	2.34	-3.87
Measurement uncertainty (dB)	<±1.56		

Verdict: PASS

- **Mode 802.11 b – Power Spectral Density**

- Low Channel:



- Middle Channel: