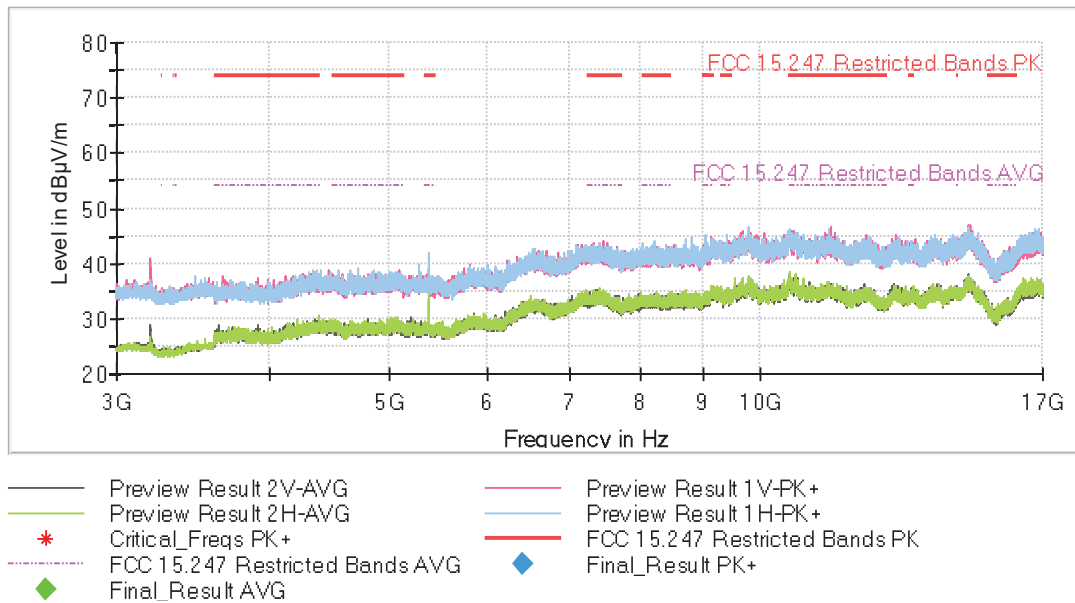
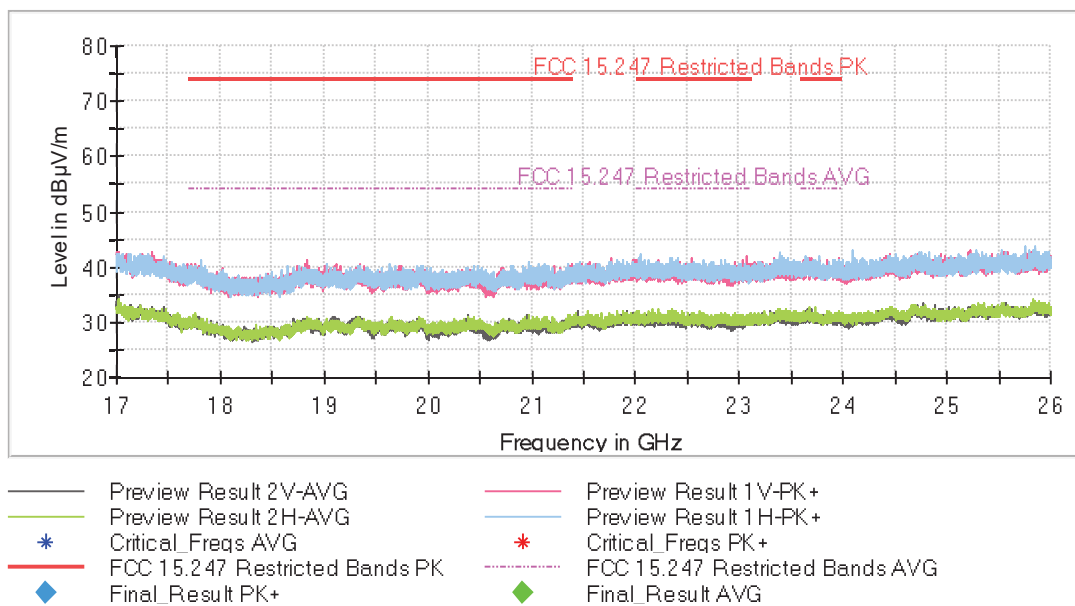


- High Channel:



FREQUENCY RANGE 17 - 26 GHz:

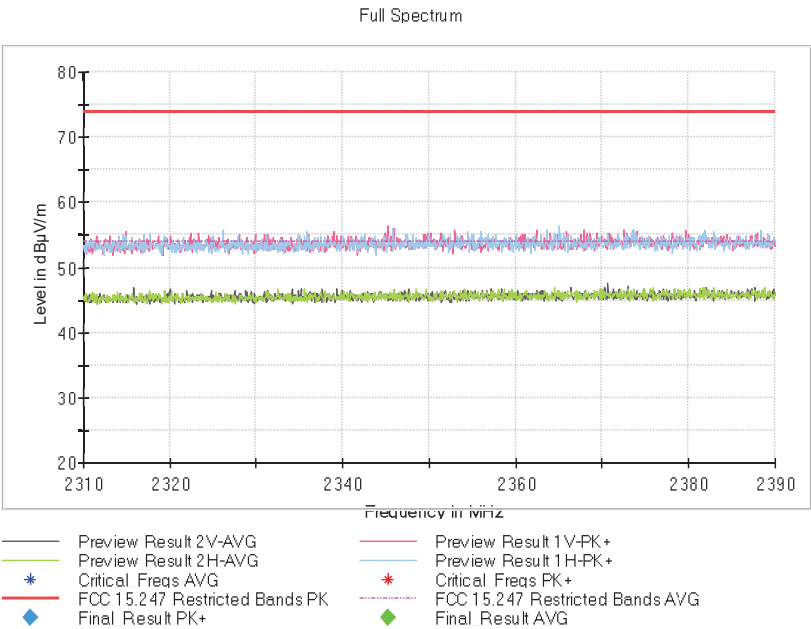
This plot is valid for the Low, Middle and High Channels and all the modulation modes.



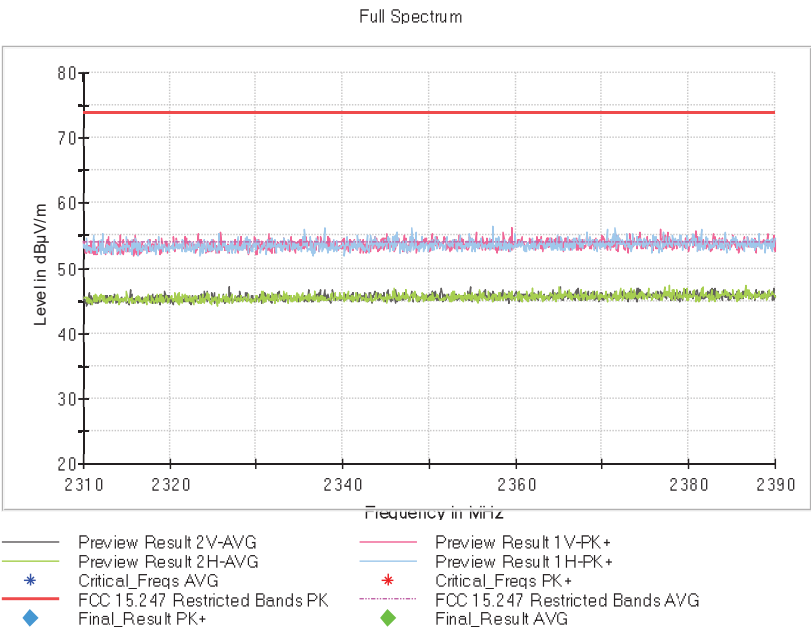
FREQUENCY RANGE 2.31-2.39 GHz:

GFSK modulation (DH5)

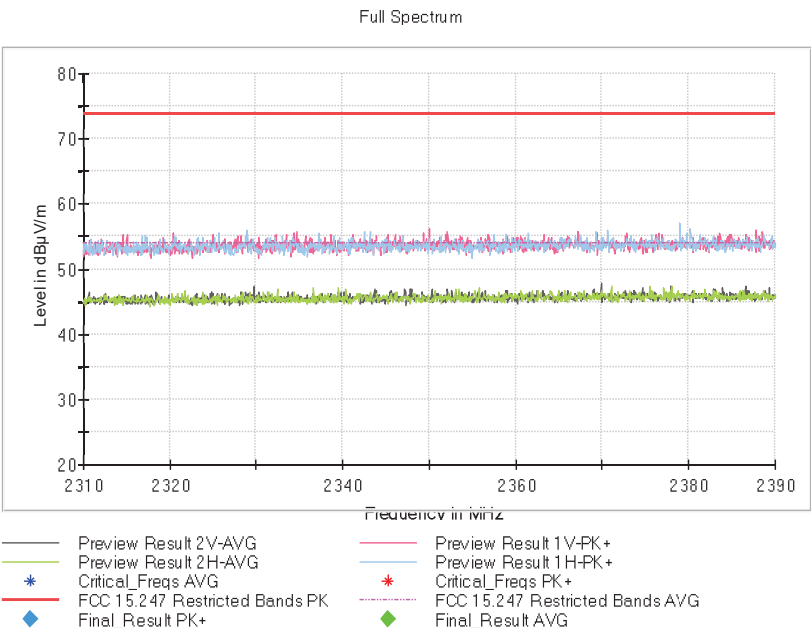
- Low Channel:



- Middle Channel:

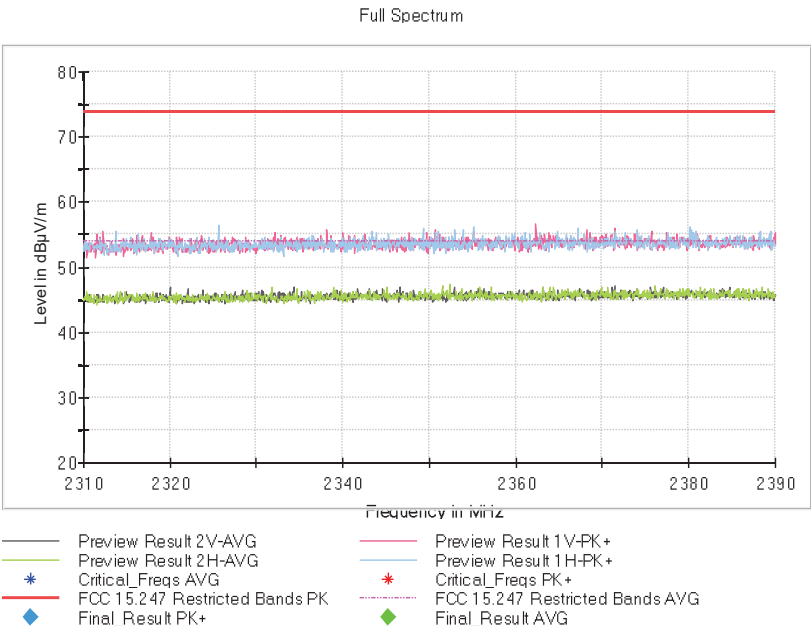


- High Channel:



• Pi/4-DQPSK modulation (2DH5)

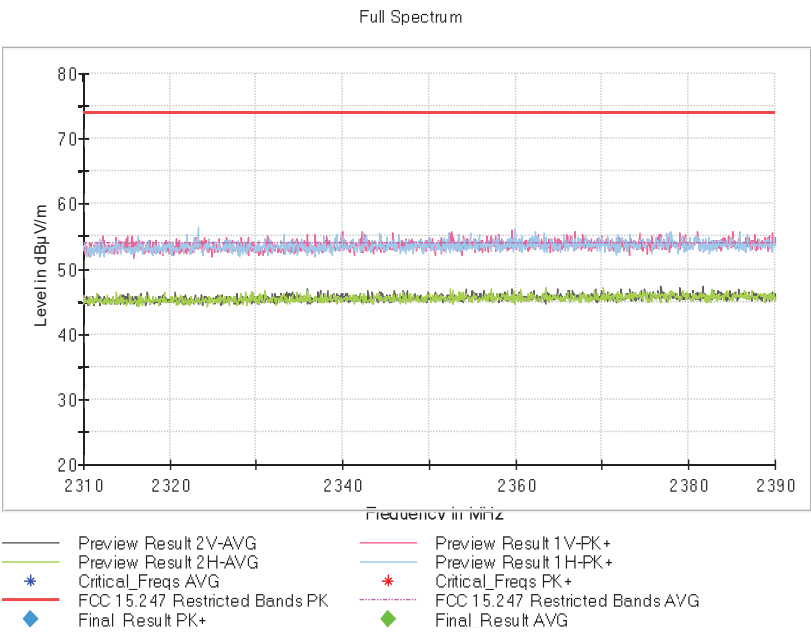
- Low Channel:



- Middle Channel:

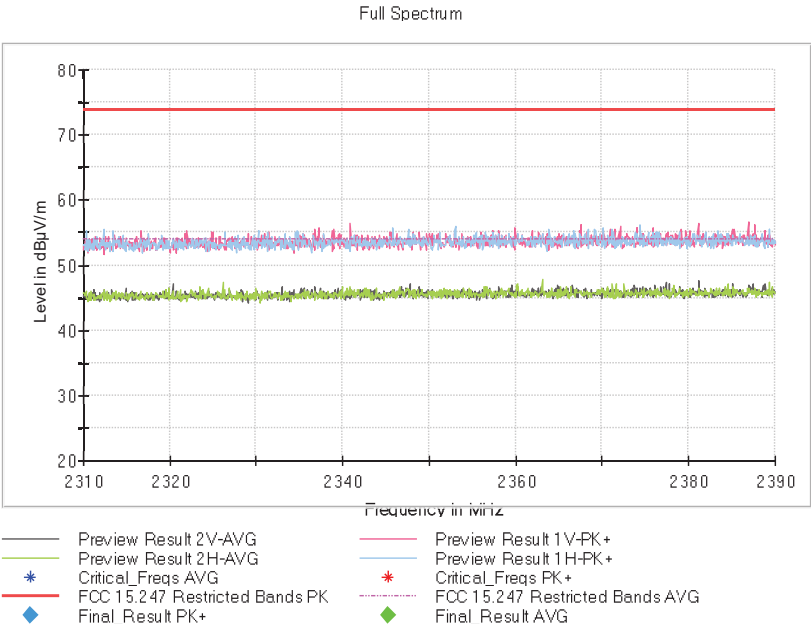


- High Channel:

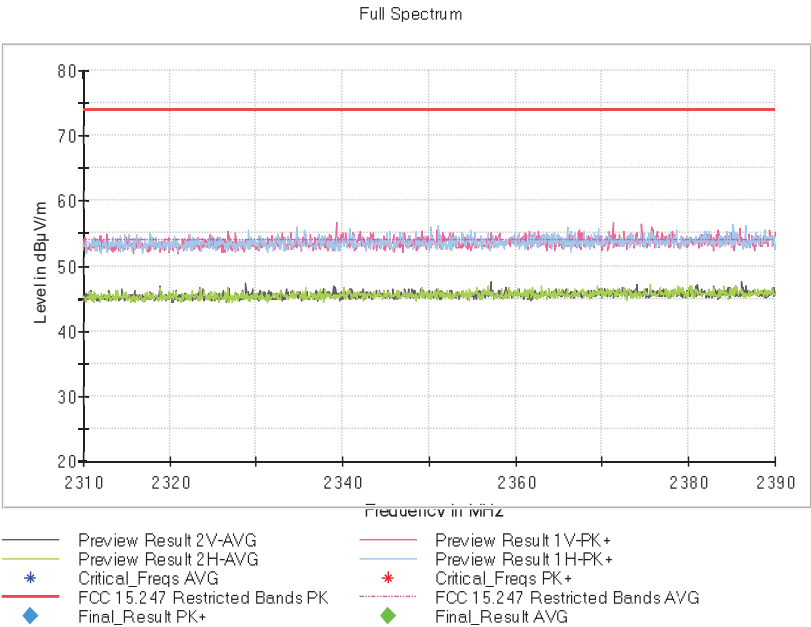


8-DPSK modulation (3DH5)

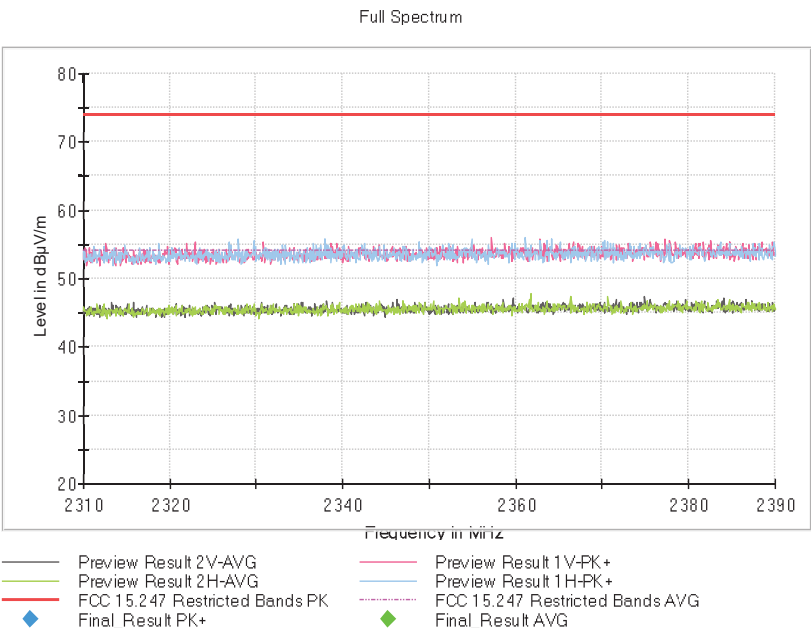
- Low Channel:



- Middle Channel:



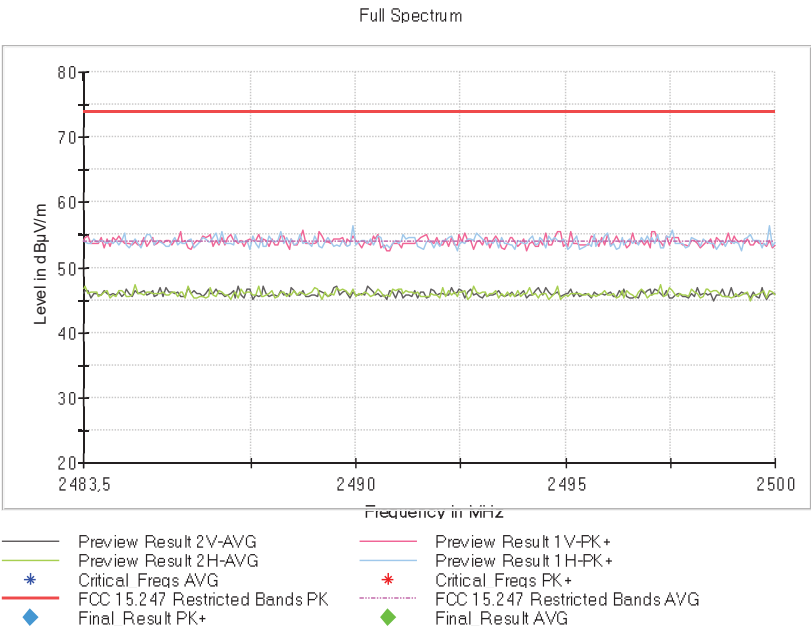
- High Channel:



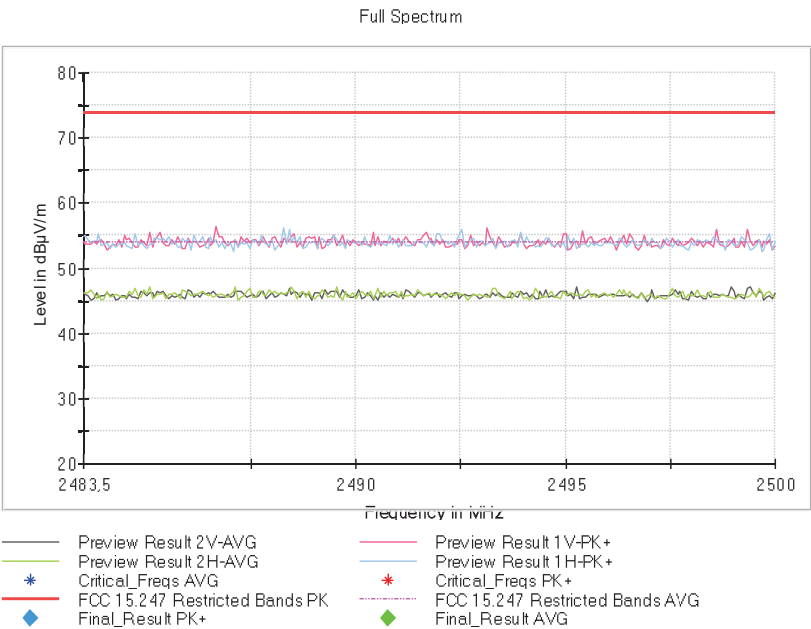
FREQUENCY RANGE 2.4835-2.5 GHz:

GFSK modulation (DH5)

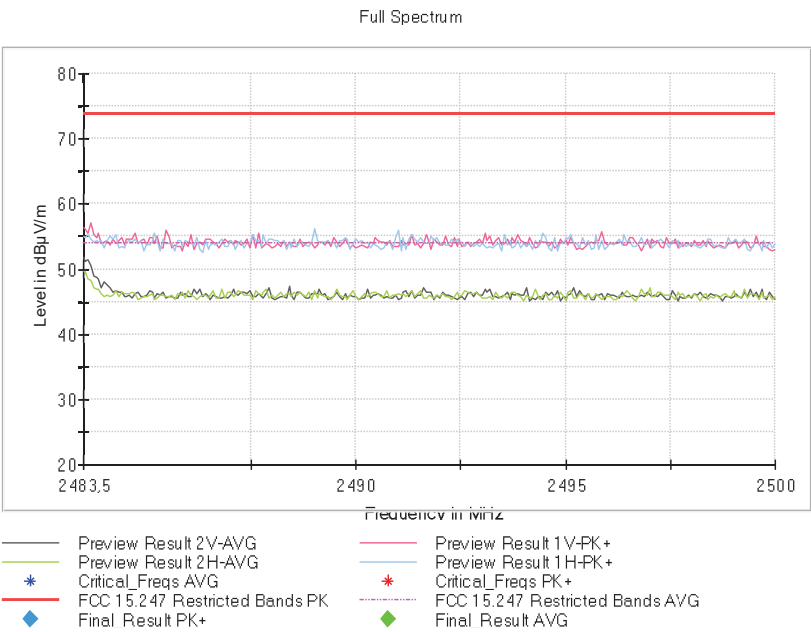
- Low Channel:



- Middle Channel:



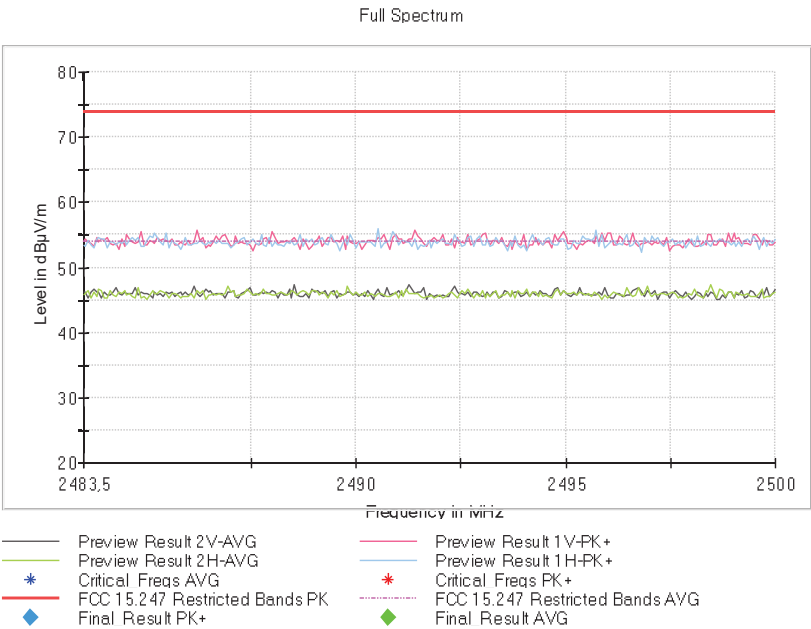
- High Channel:



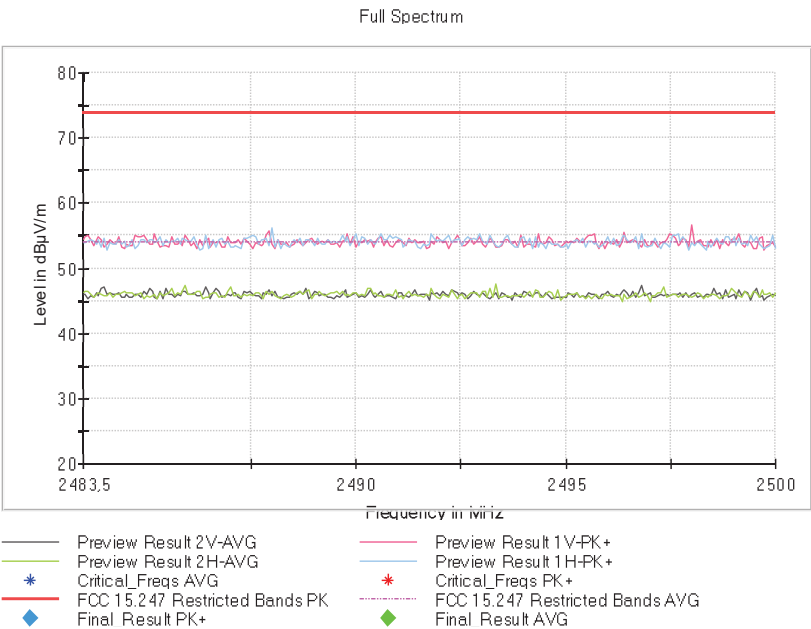
FREQUENCY RANGE 2.4835-2.5 GHz:

• Pi/4-DQPSK modulation (2DH5)

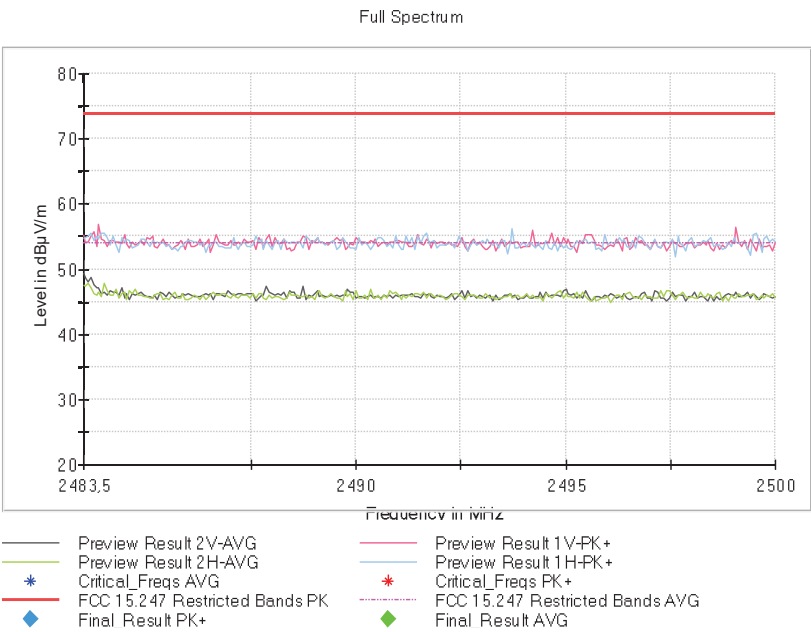
- Low Channel:



- Middle Channel:



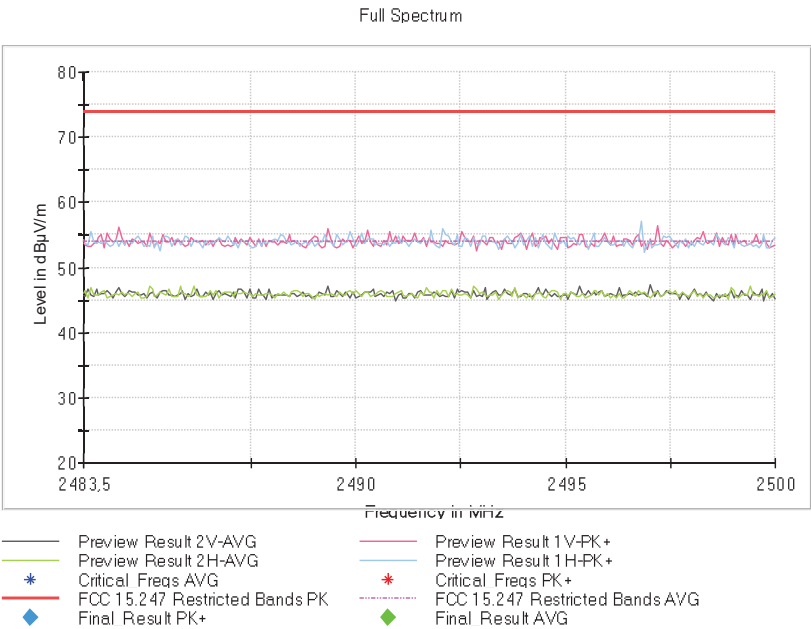
- High Channel:



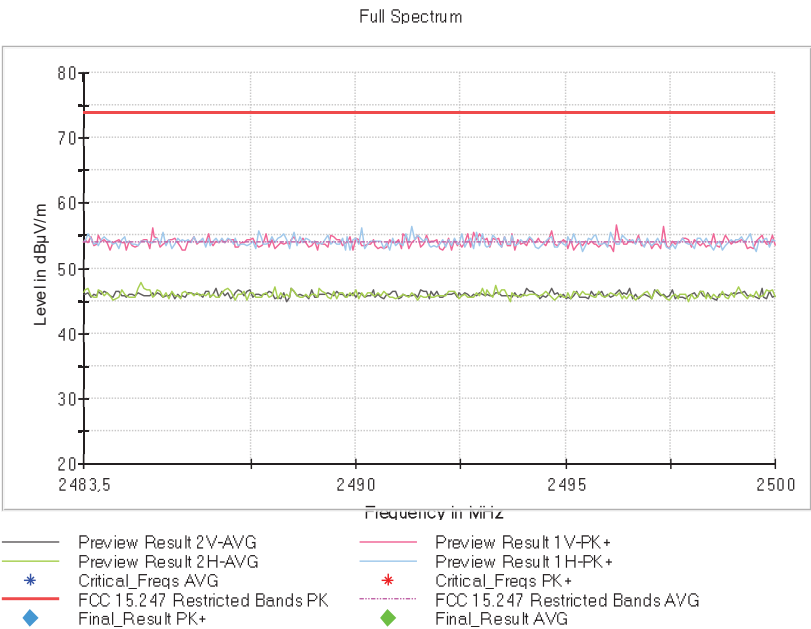
FREQUENCY RANGE 2.4835-2.5 GHz:

- 8-DPSK modulation (3DH5)

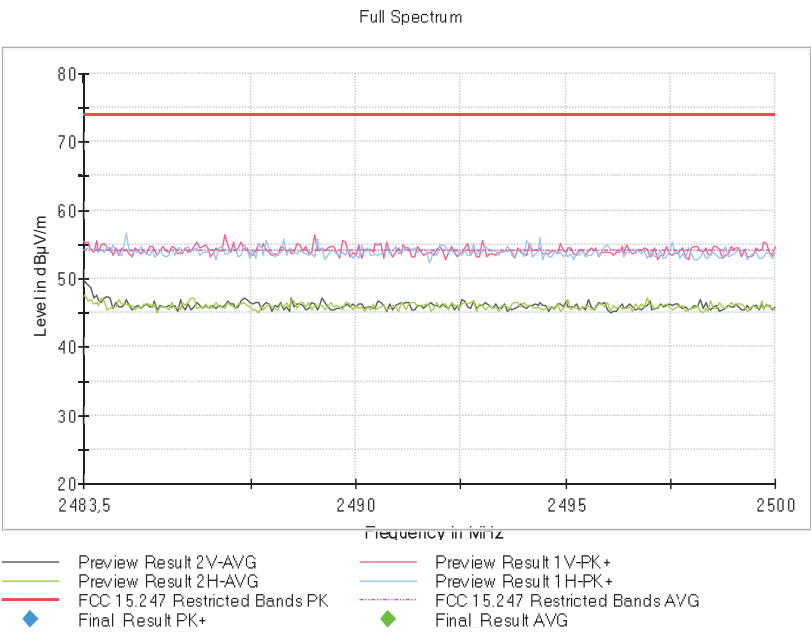
- Low Channel:



- Middle Channel:



- High Channel:



Appendix B: Test results. 802.11 bgn20 1x1

TEST CONDITIONS	41
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FCC 15.35 (c) / RSS-Gen 6.10. Transmitter Duty Cycle	51
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FCC 15.247 (d) / RSS-247 5.5. Emission limitations radiated (Transmitter).....	60

TEST CONDITIONS

POWER SUPPLY (V):

V nominal:	12 Vdc.
Type of Power Supply:	DC External (Car Battery).

ANTENNA:

Type of Antenna:	External.
Maximum Declared Antenna Gain:	+2.2 dBi (antenna gain plus antenna cable loss).

TEST FREQUENCIES FOR 802.11 bgn20:

Low Channel (1):	2412 MHz
Middle Channel (6):	2437 MHz
High Channel (11):	2462 MHz

The sample was used to configure the EUT to continuously transmit at a specified output power in all channels with different modes and modulation schemes.

The field strength at the band edges was evaluated for each mode for the channel under test.

During transmitter test the EUT was being controlled by the SW tool to operate in a continuous transmit mode on the test channel as required and in each of the different modulation modes.

The EUT has four separate antennas which correspond to one port of the equipment.

The data rates of 1 Mbps for 802.11 b, 6.5 Mbps for 802.11 g, MCS0 for 802.11 n20, were selected based on preliminary testing that identified those rates corresponding to the worst cases for output power and band edge levels at restricted bands.

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.



The DC supply voltage is applied using an external calibrated power supply with a multimeter.

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) and 1 GHz-18 GHz Double ridge horn antenna is situated at a distance of 3 m and a distance of 1 m for the frequency range 17 GHz-26 GHz (18 GHz-40 GHz horn antenna).

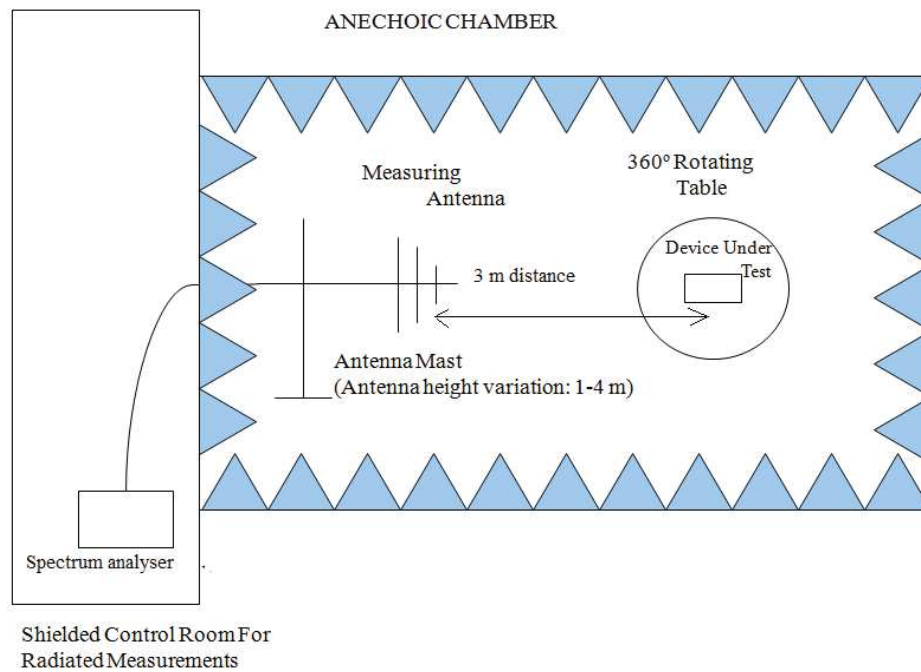
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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 360° and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

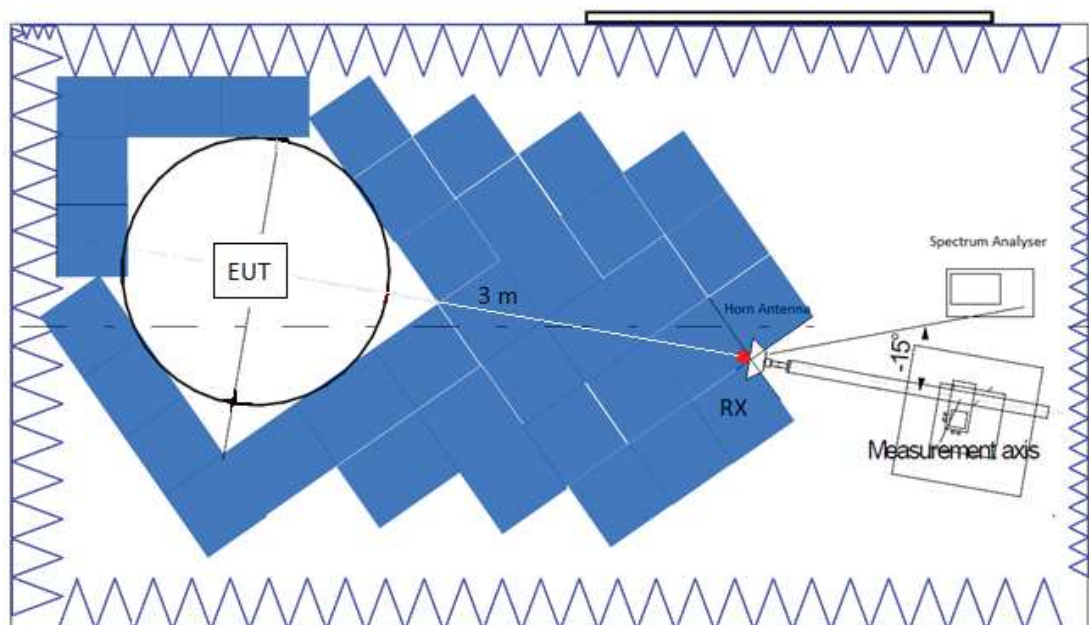
Measurements were made in both horizontal and vertical planes of polarization.

A resolution bandwidth / video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

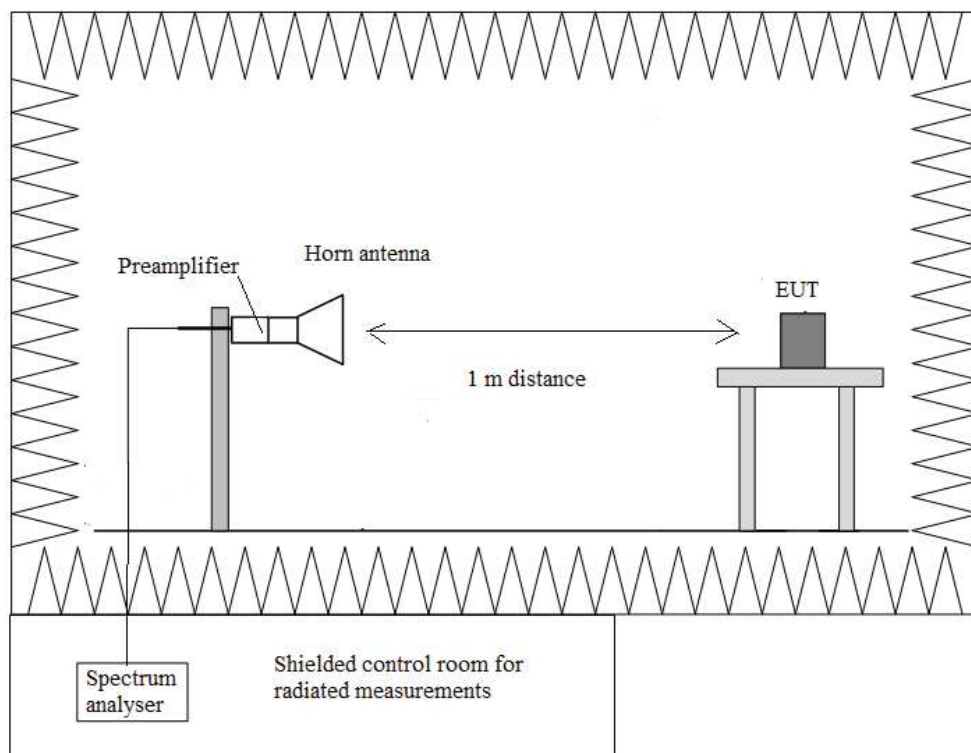
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



Occupied Bandwidth

RESULTS:

- **Mode 802.11 b:**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
99% Bandwidth (MHz)	11.12	11.25	11.14
Measurement uncertainty (kHz)	<± 2.34		

- **Mode 802.11 g:**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
99% Bandwidth (MHz)	16.83	16.86	16.85
Measurement uncertainty (kHz)	<± 2.34		

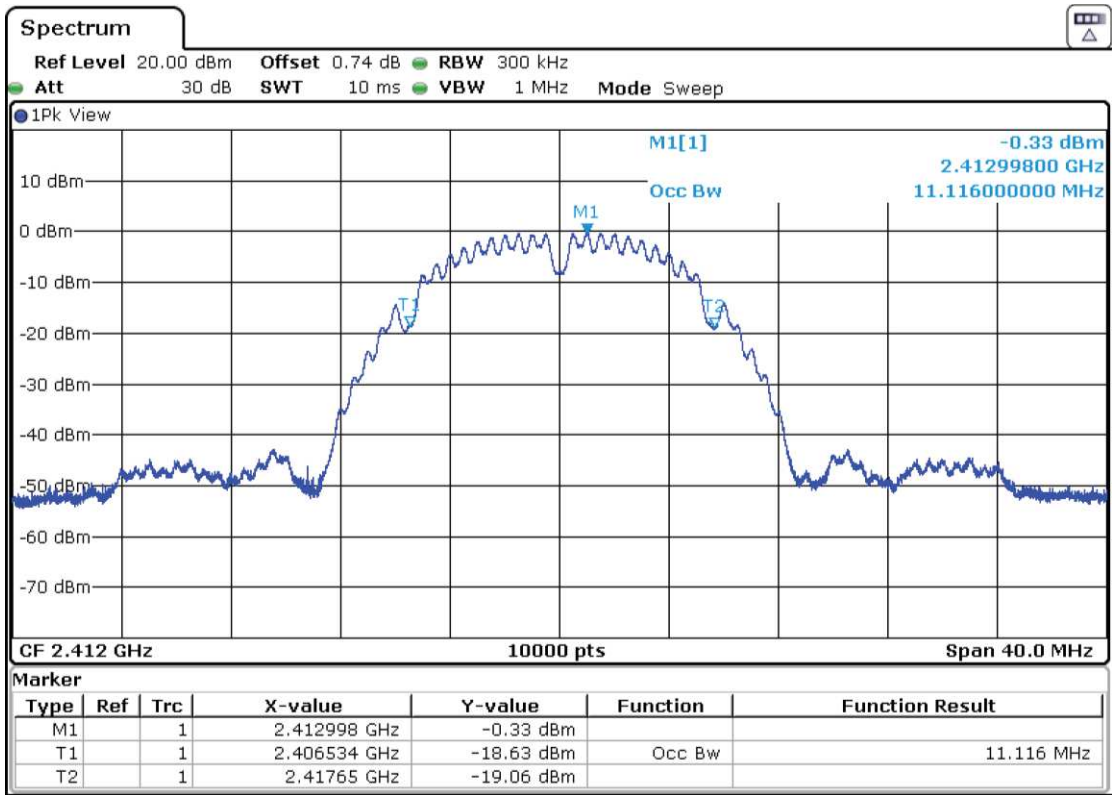
- **Mode 802.11 n20:**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
99% Bandwidth (MHz)	17.95	17.96	17.97
Measurement uncertainty (kHz)	<± 2.34		

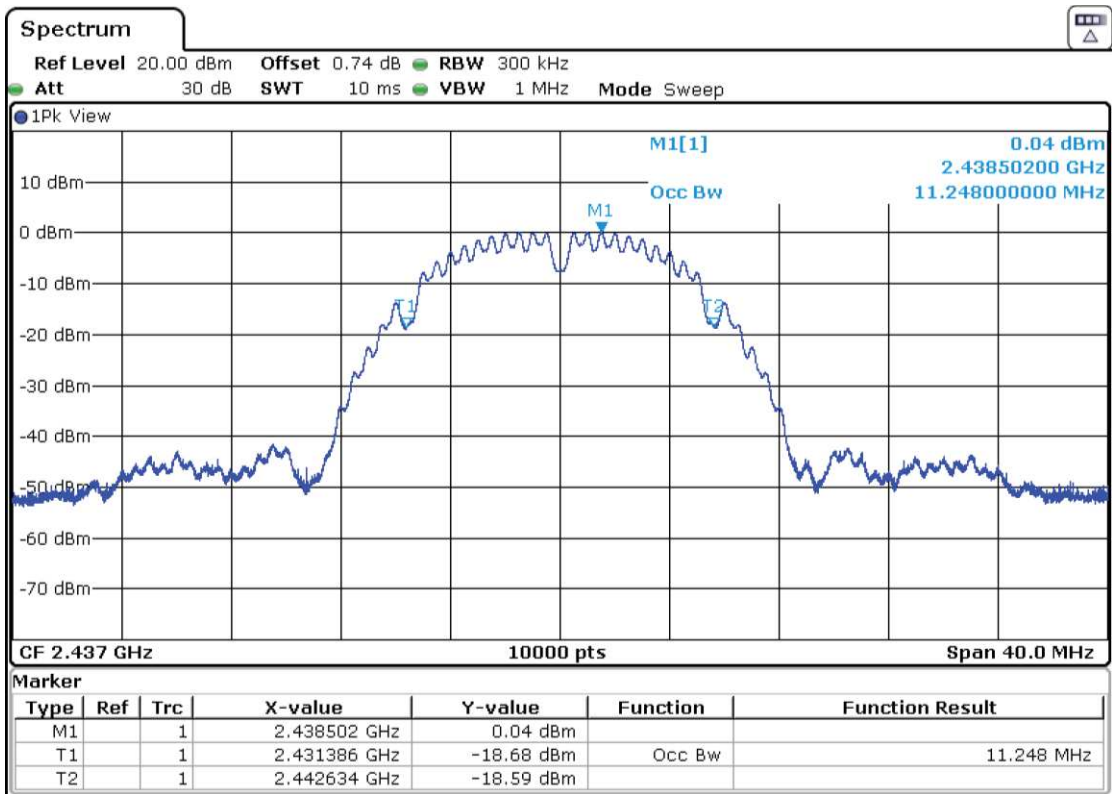
Verdict: PASS

• Mode 802.11 b – Occupied Bandwidth:

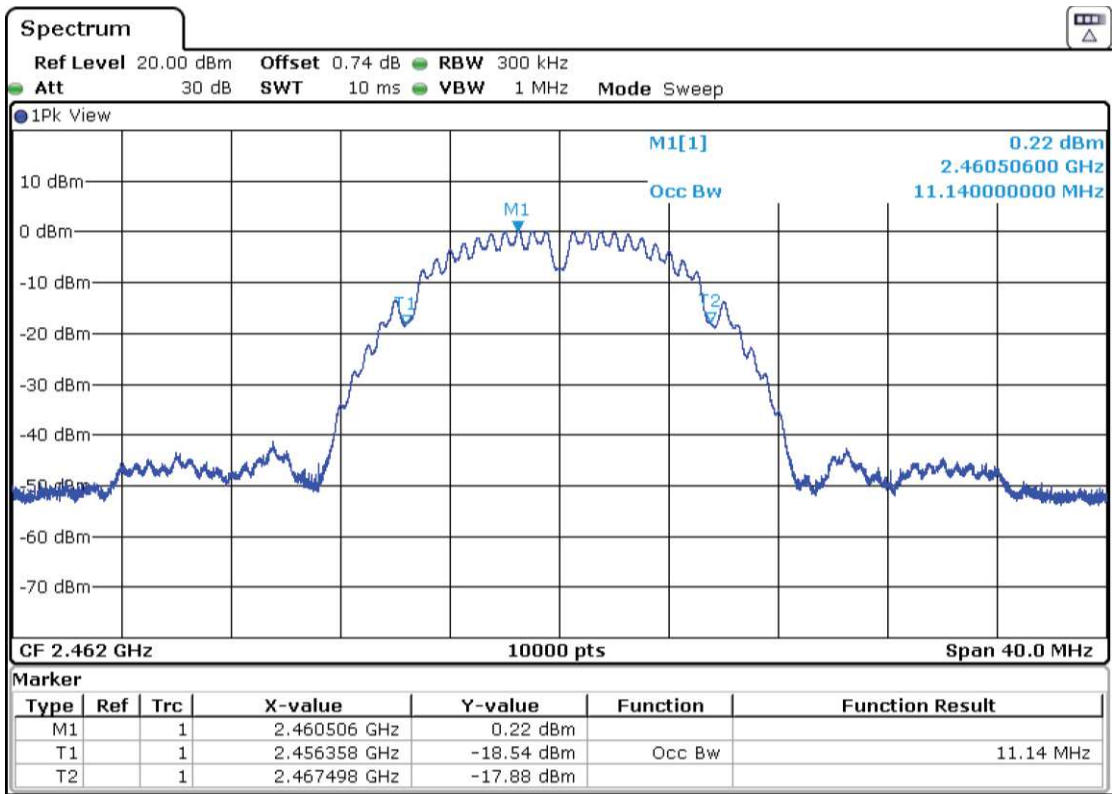
- Low Channel:



- Middle Channel:

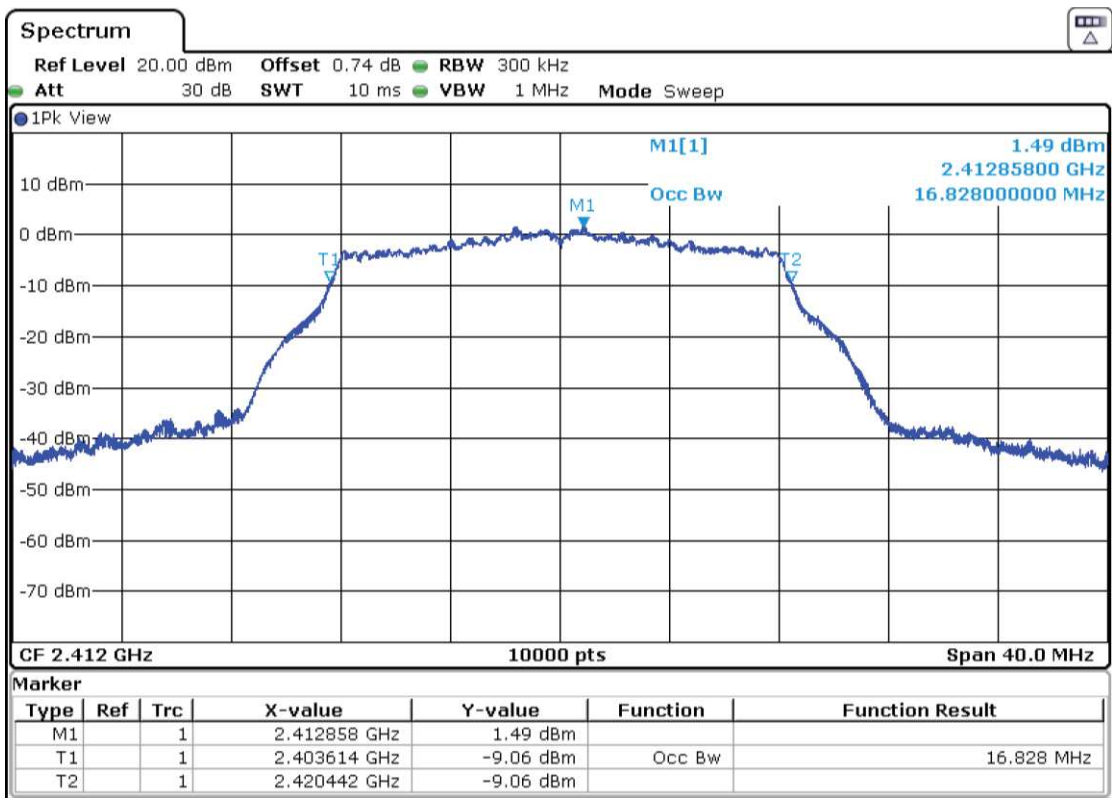


- High Channel:

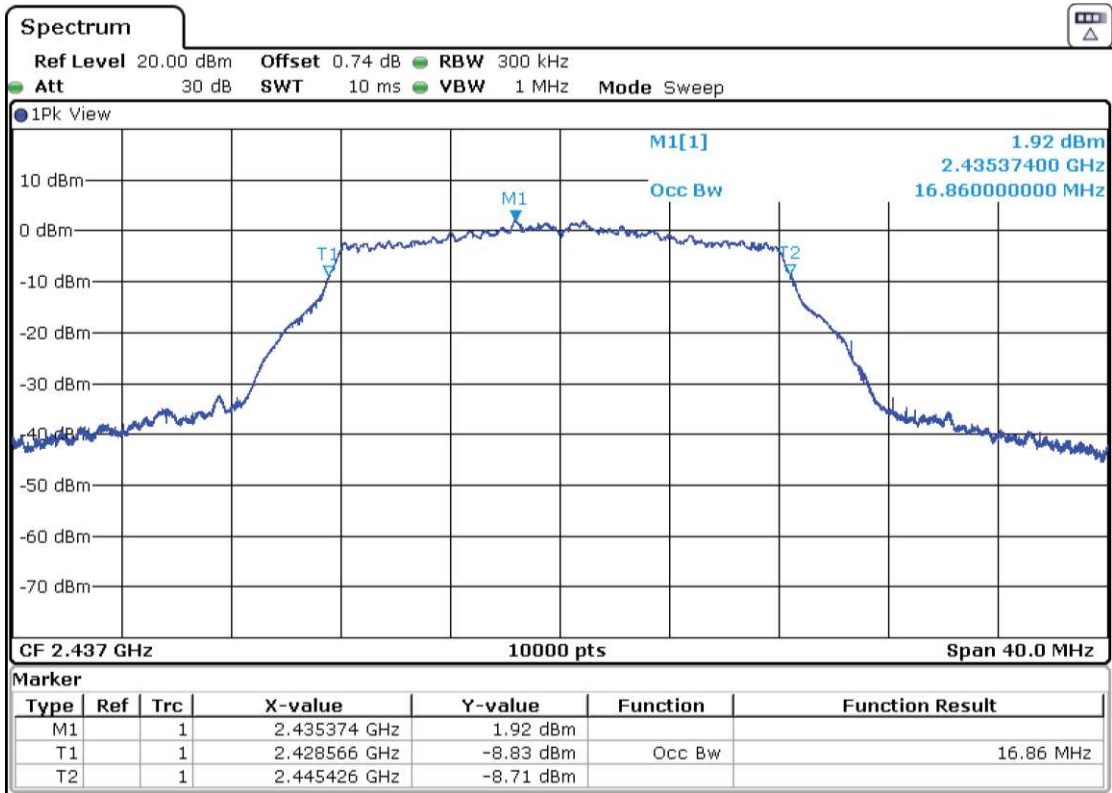


- Mode 802.11 g – Occupied Bandwidth:

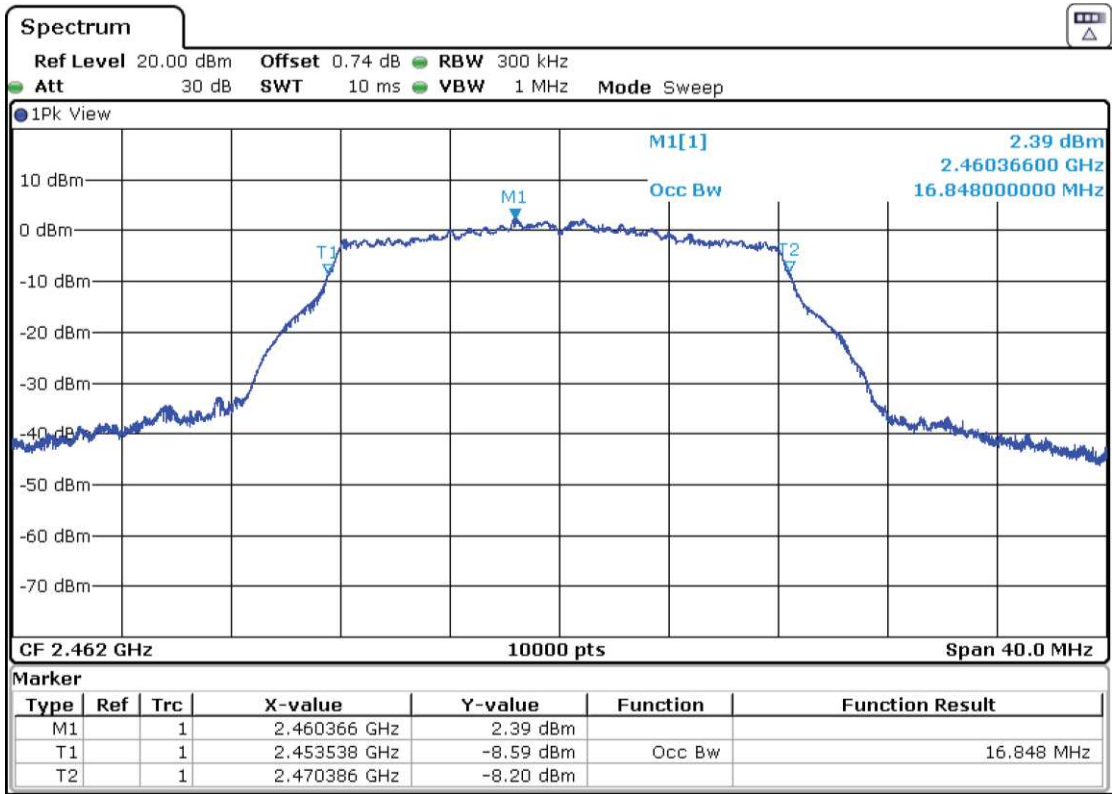
- Low Channel:



- Middle Channel:

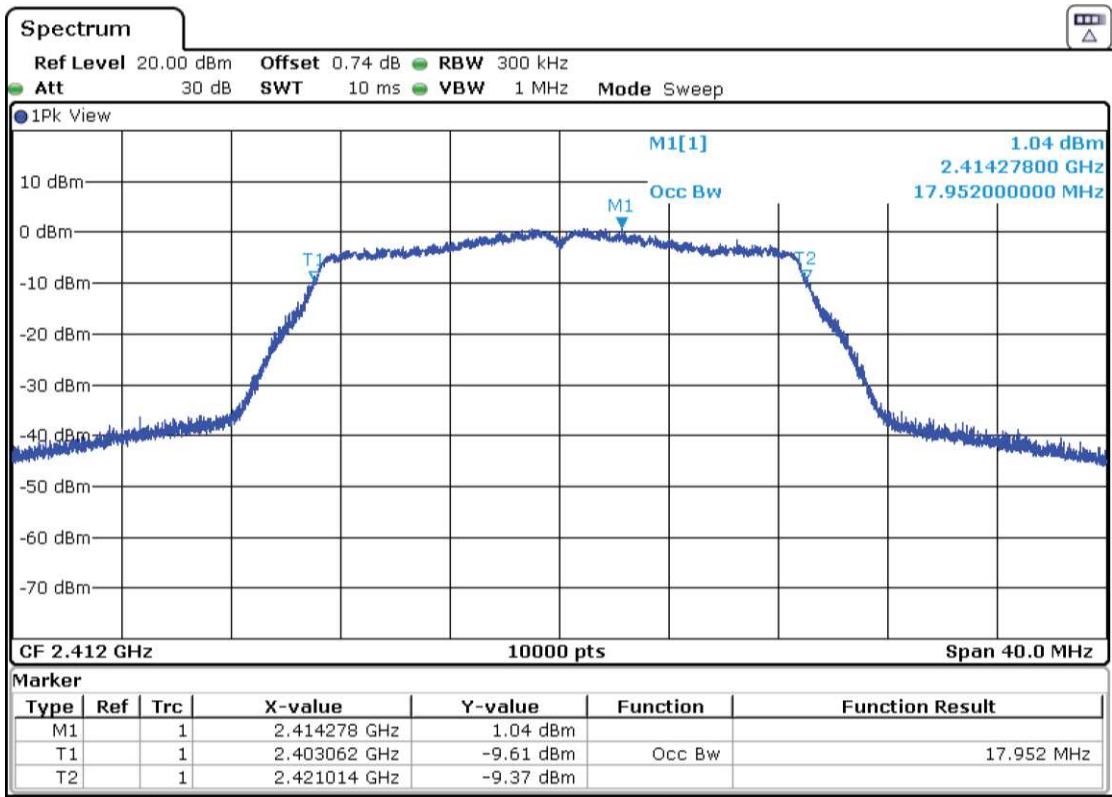


- High Channel:

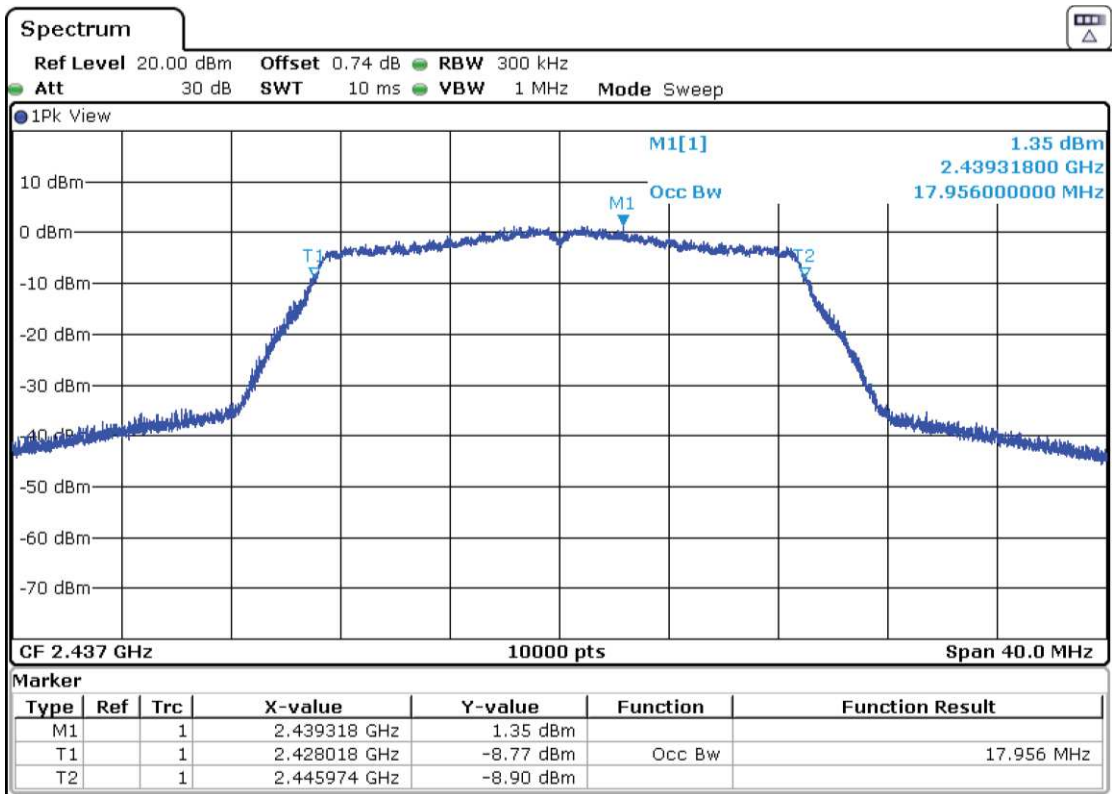


• Mode 802.11 n20 – Occupied Bandwidth:

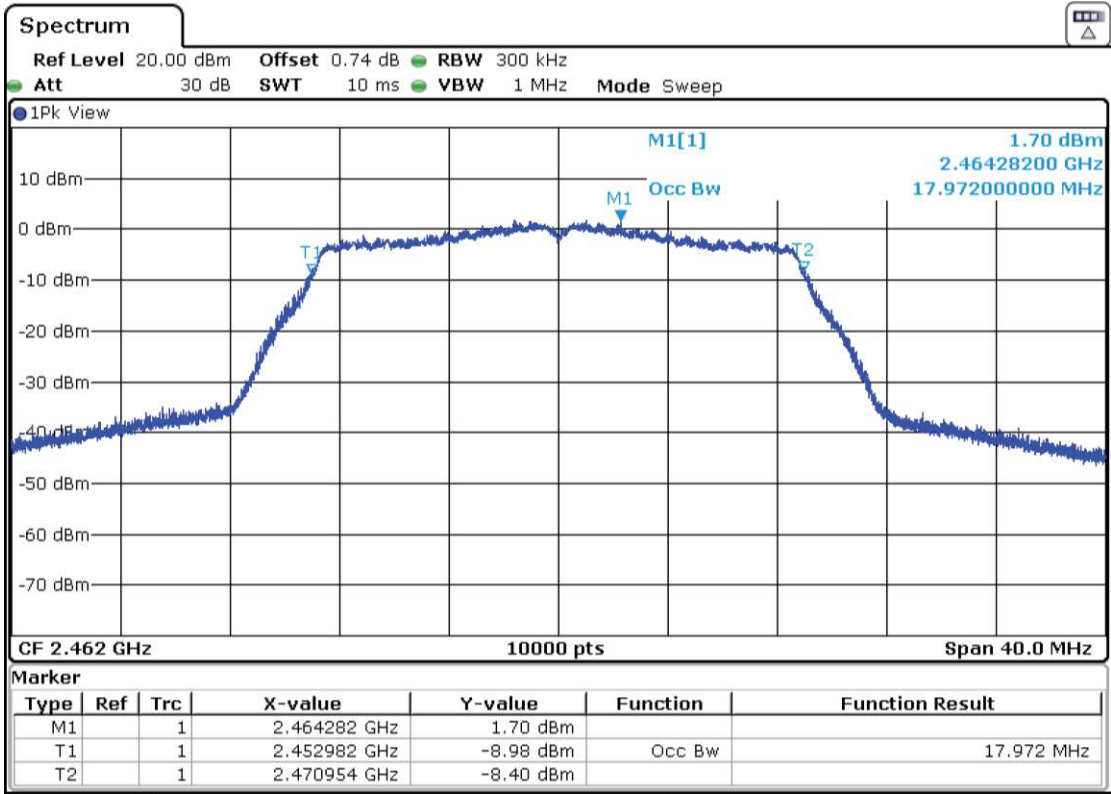
- Low Channel:



- Middle Channel:



- High Channel:



FCC 15.35 (c) / RSS-Gen 6.10. Transmitter Duty Cycle

SPECIFICATION:

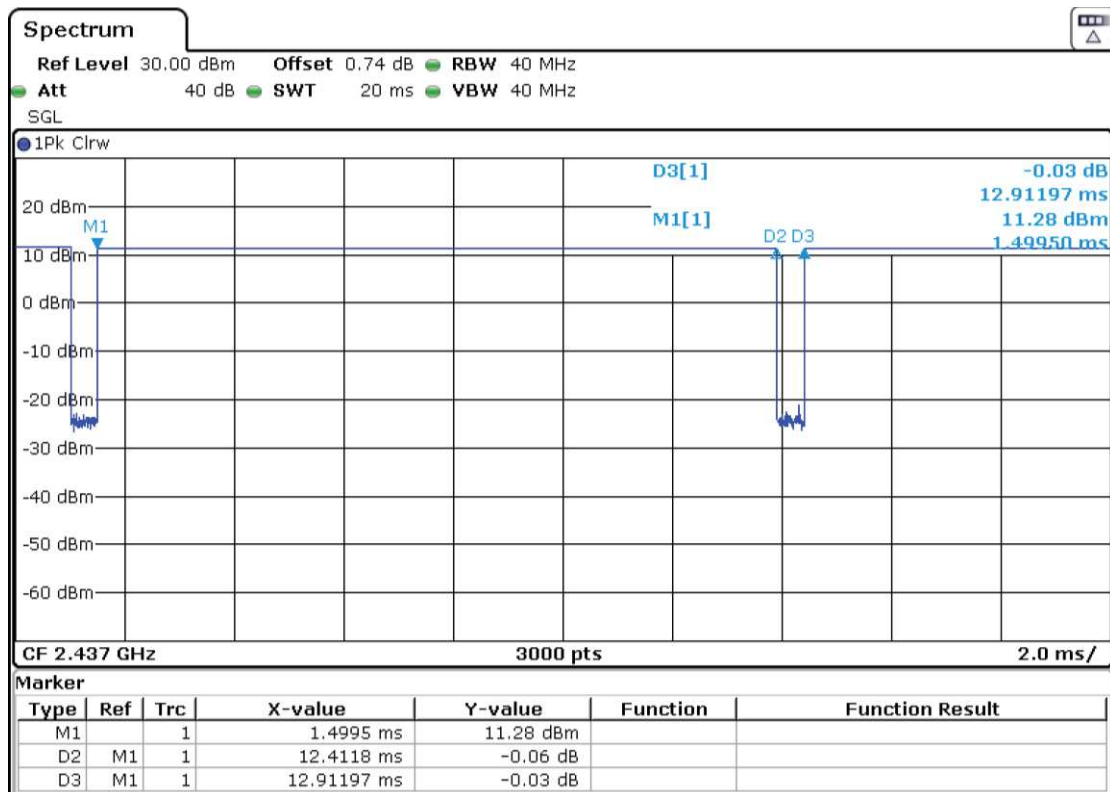
When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

RESULTS:

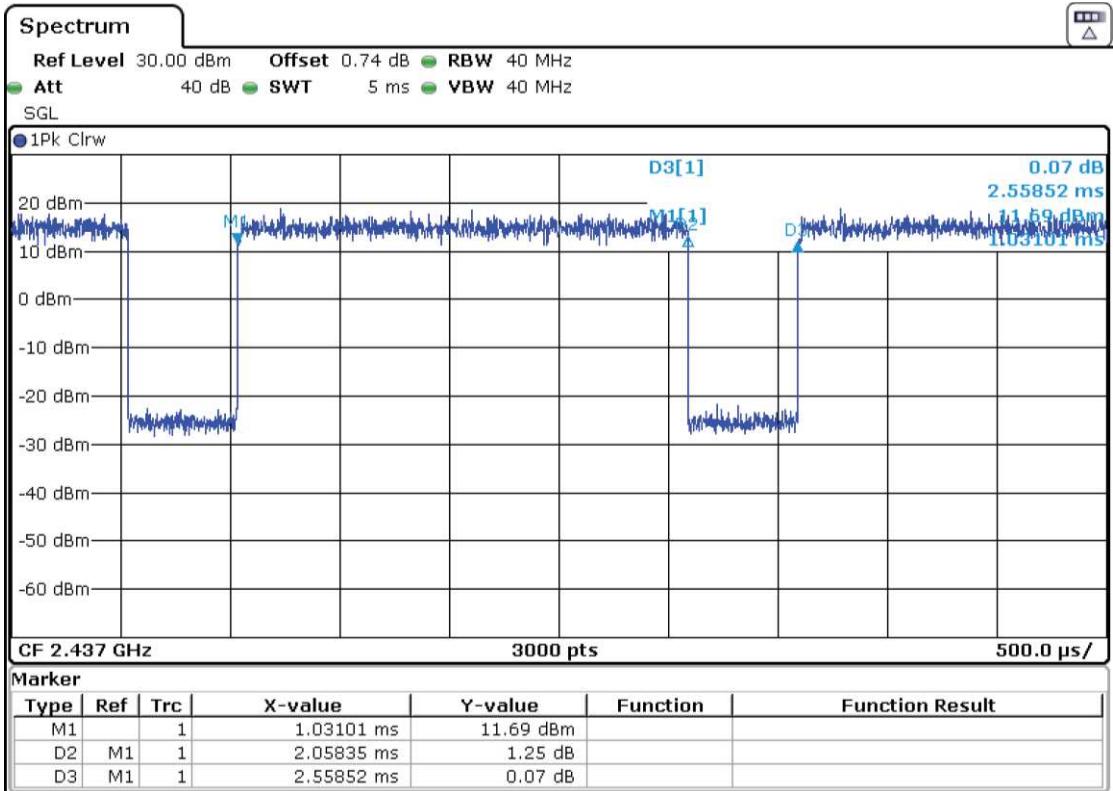
The results below are for data rates with a duty cycle less than 98%. The results for all rest of modes having a value > 98%.

Technique	Mode	Pulse Duration (ms)	Period (ms)	Duty Cycle Correction (dB)
SISO	802.11 b	12.4118	12.91197	0.171577395
SISO	802.11 g	2.05835	2.55852	0.944695925
SISO	802.11 n20	1.9133	2.41514	1.011592393

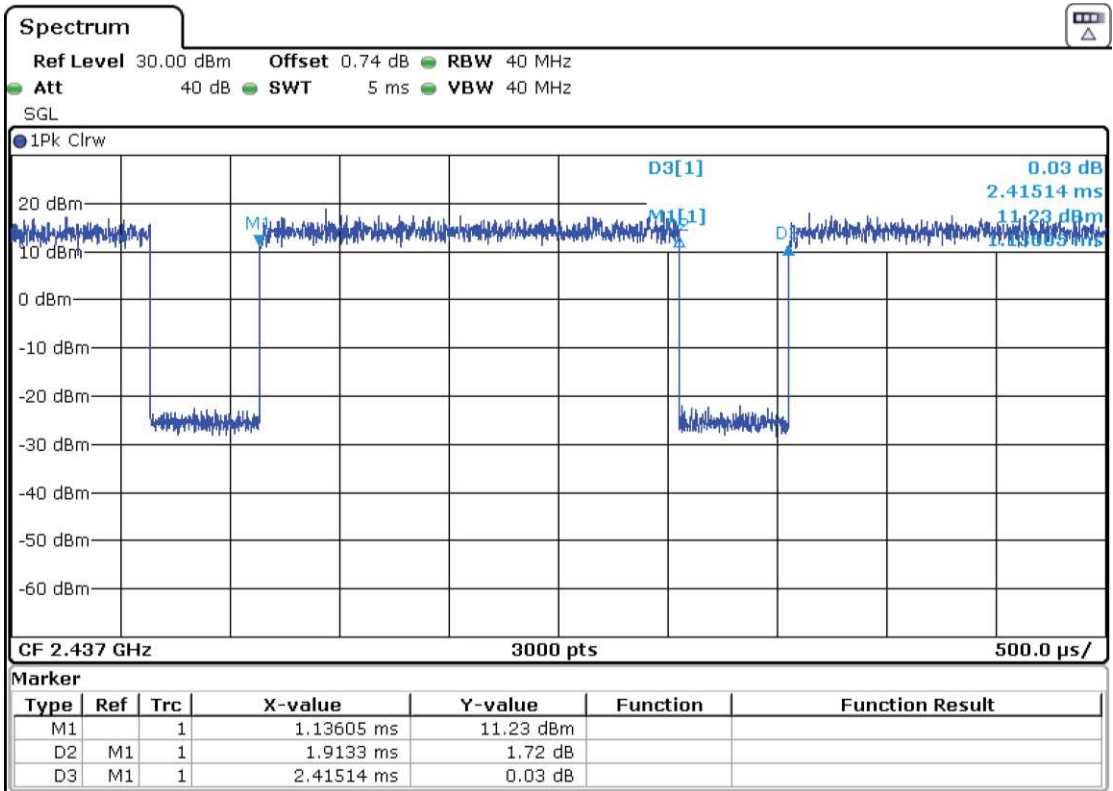
- Mode 802.11 b:



• Mode 802.11 g:



• Mode 802.11 n20:



FCC 15.247 (b) / RSS-247 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:

Maximum Declared Antenna Gain: +2.2 dBi

For modes b, g, n20, the maximum conducted output power was measured using the method according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Meas Guidance v05r02 and ANSI C63.10-2013 11.9.2.2.4.

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

- **Mode 802.11 b:**

	Low Channel	Middle Channel	High Channel
Maximum Average Conducted Power (dBm)	7.62	7.98	8.34
Maximum EIRP Power (dBm)	9.82	10.18	10.54
Maximum EIRP Power with Duty Cycle Correction (dBm)	9.99	10.35	10.71
Measurement uncertainty (dB)	<±2.57		

- **Mode 802.11 g:**

	Low Channel	Middle Channel	High Channel
Maximum Average Conducted Power (dBm)	7.46	7.89	8.18
Maximum EIRP Power (dBm)	9.66	10.09	10.38
Maximum EIRP Power with Duty Cycle Correction (dBm)	10.60	11.03	11.32
Measurement uncertainty (dB)	<±2.57		

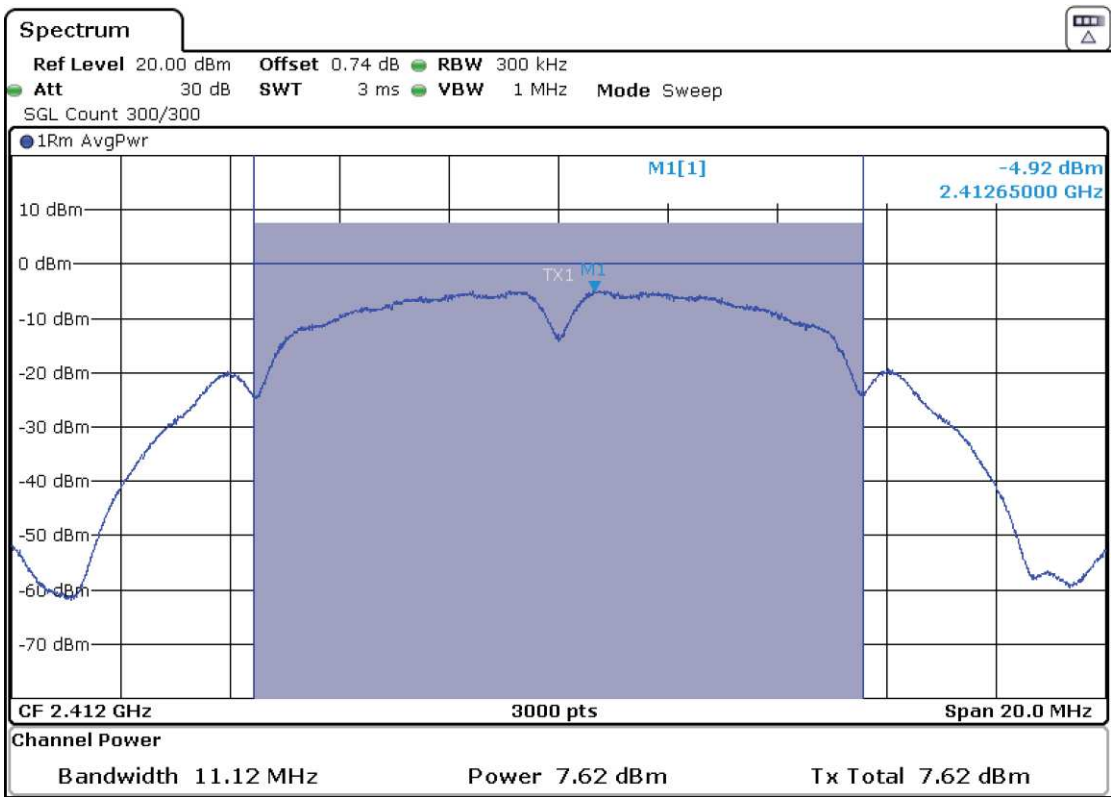
- **Mode 802.11 n20:**

	Low Channel	Middle Channel	High Channel
Maximum Average Conducted Power (dBm)	6.56	6.98	7.37
Maximum EIRP Power (dBm)	8.76	9.18	9.57
Maximum EIRP Power with Duty Cycle Correction (dBm)	9.77	10.19	10.58
Measurement uncertainty (dB)	<±2.57		

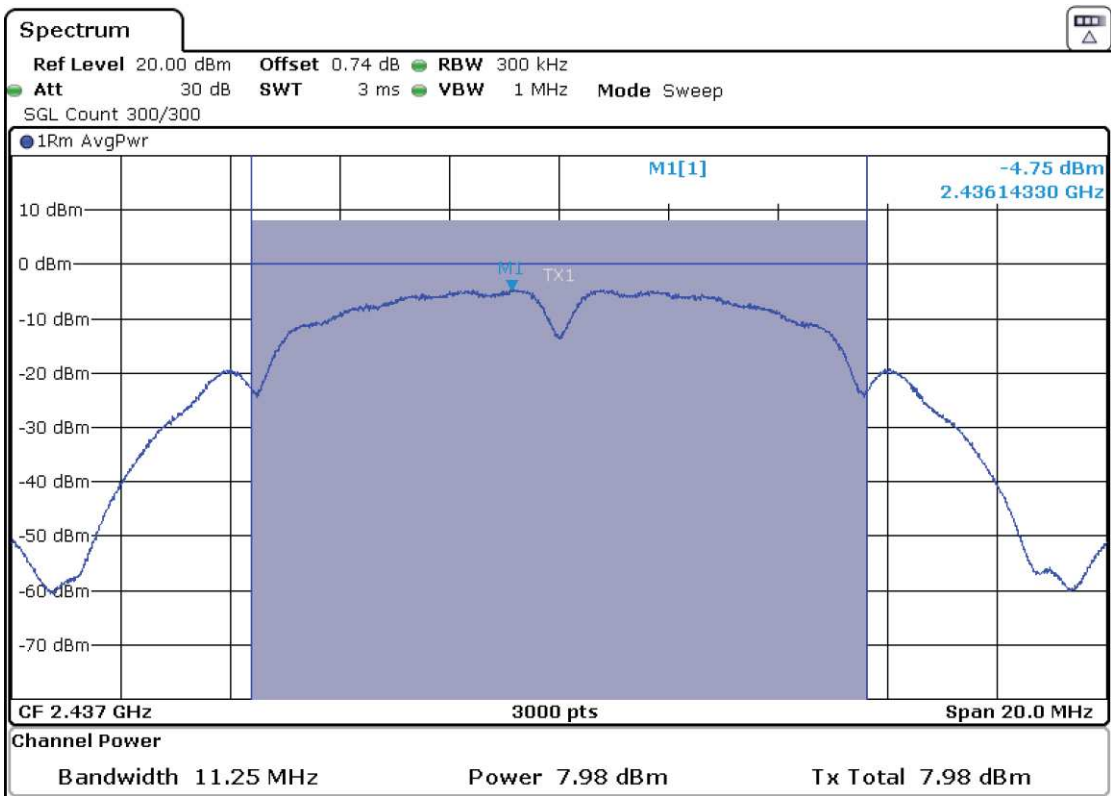
Verdict: PASS

• Mode 802.11 b:

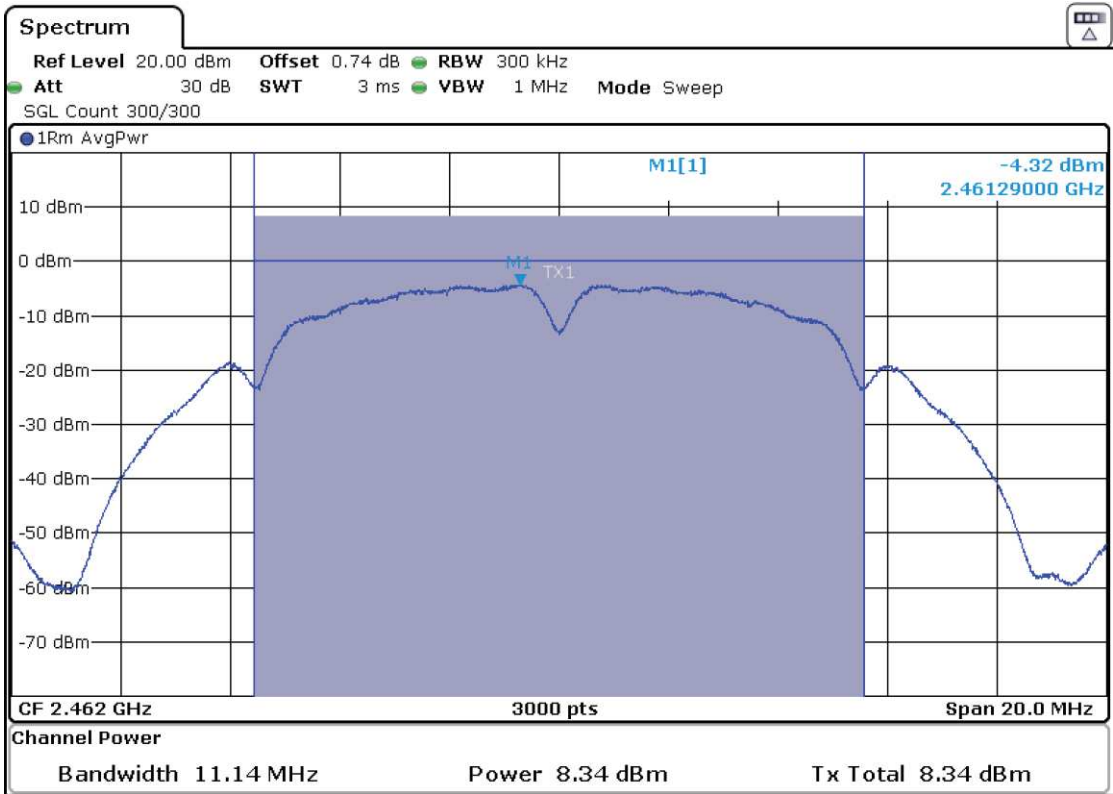
- Low Channel:



- Middle Channel:

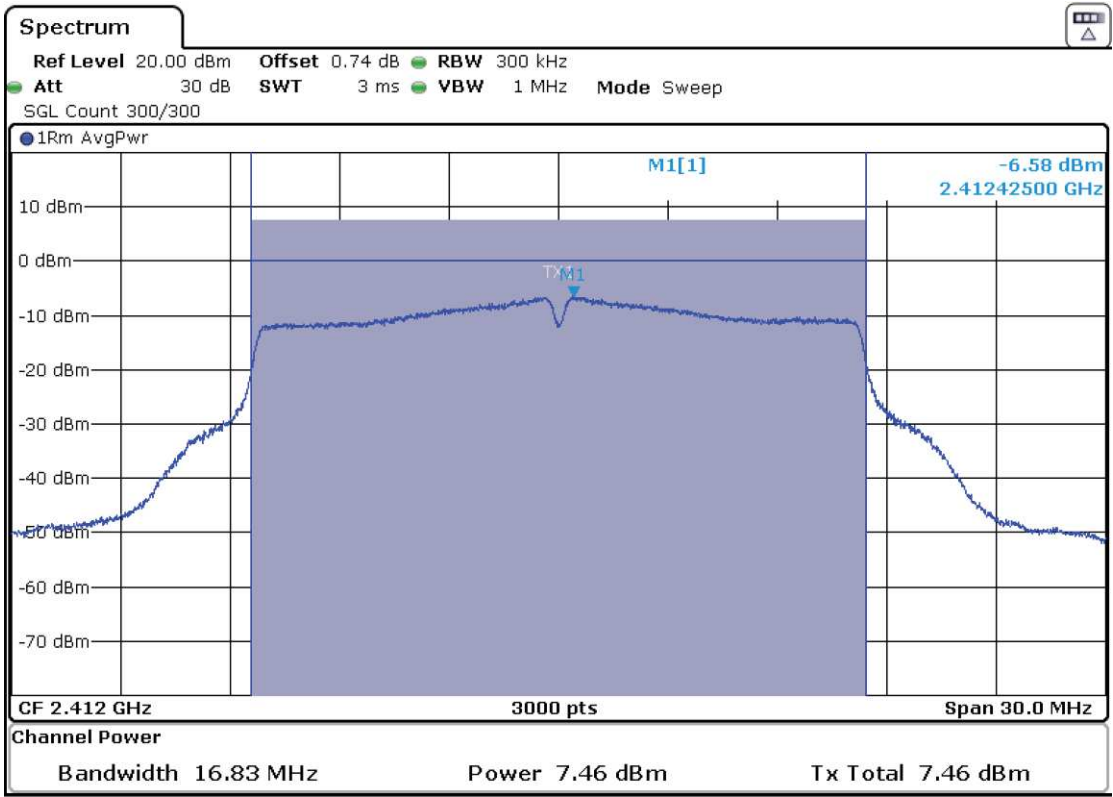


- High Channel:

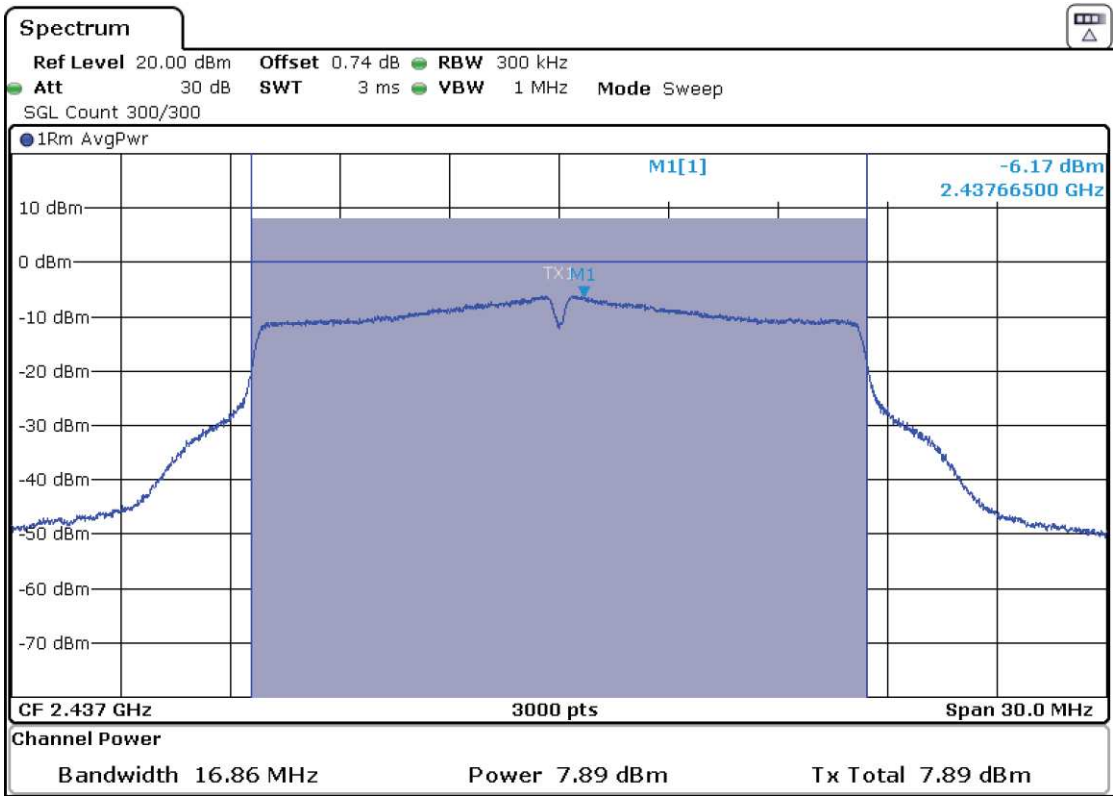


- **Mode 802.11 g:**

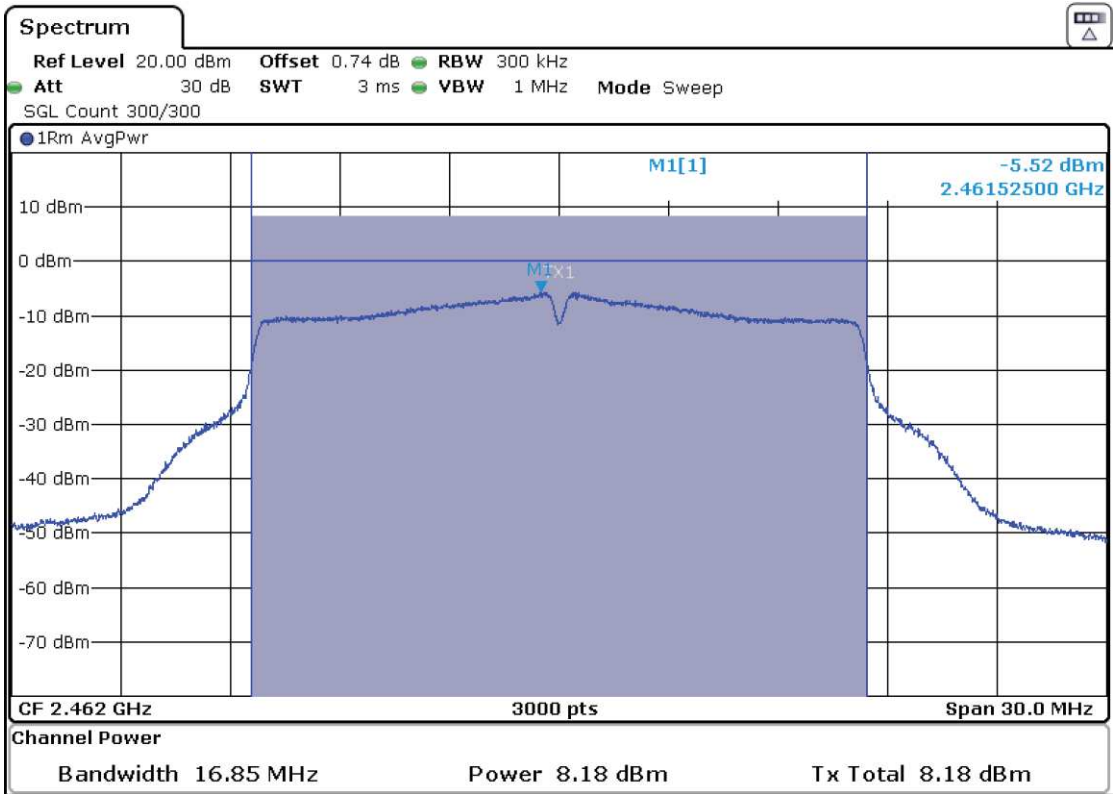
- Low Channel:



- Middle Channel:

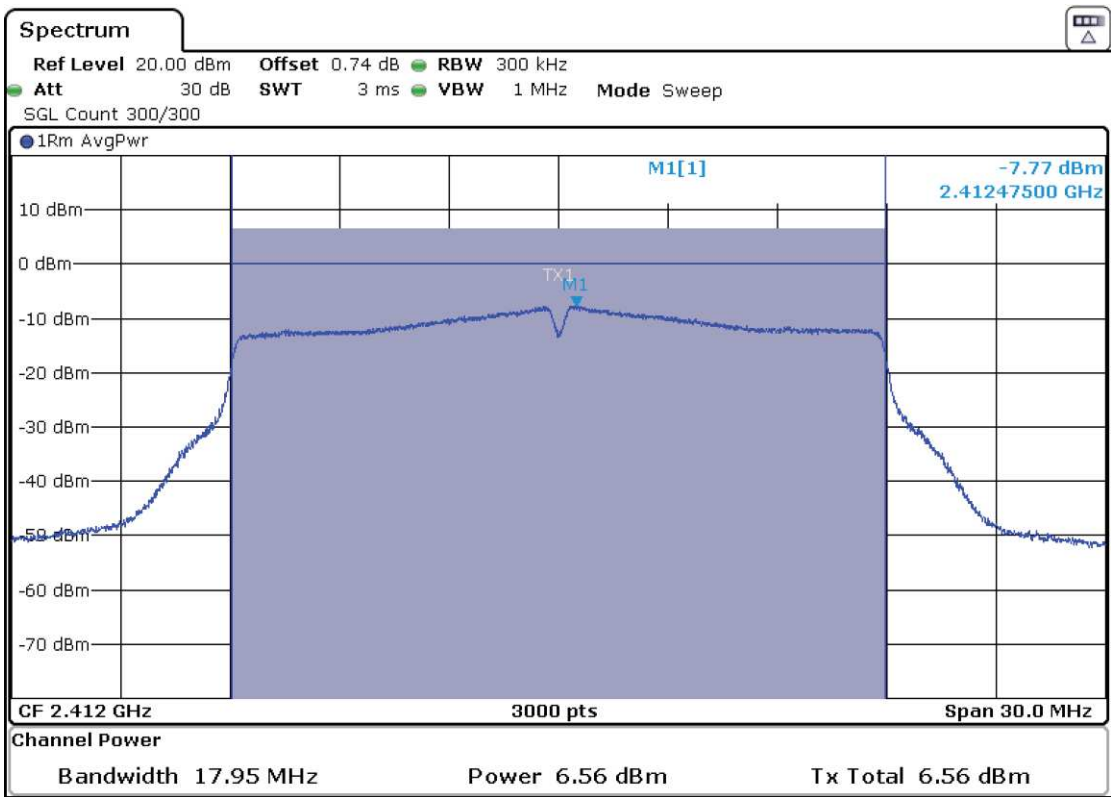


- High Channel:

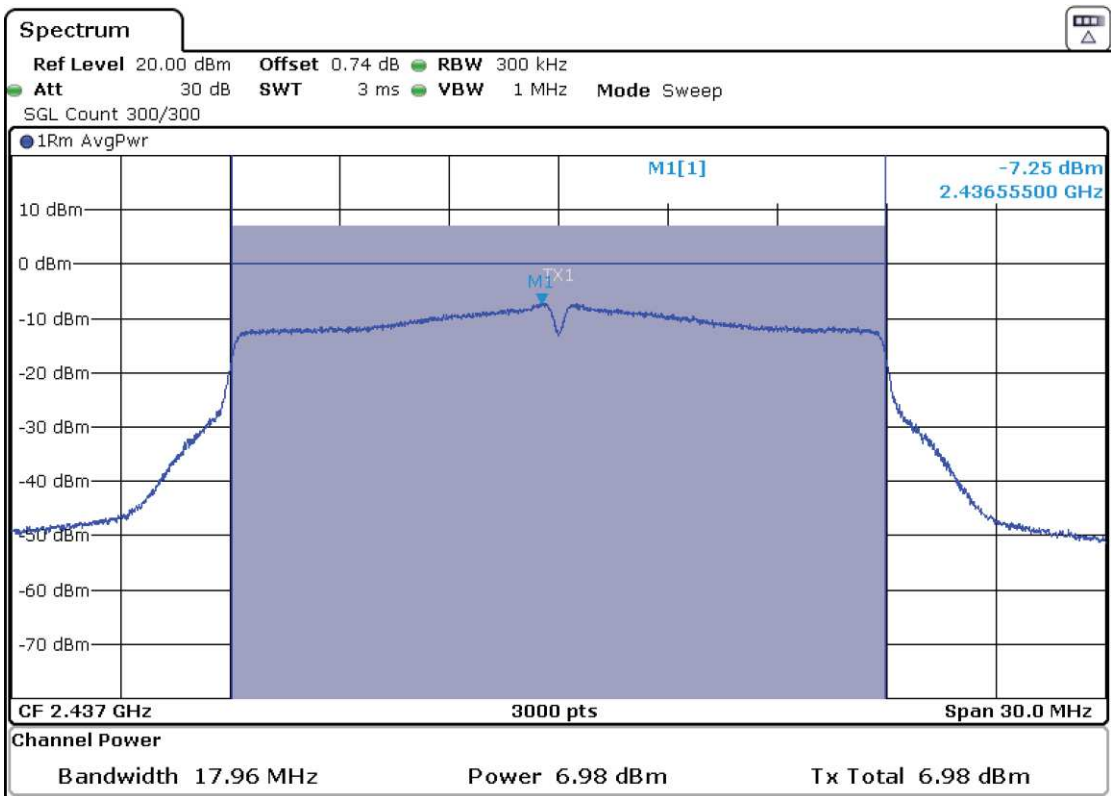


• Mode 802.11 n20:

- Low Channel:



- Middle Channel:



- High Channel:

