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

SPECIFICATION:

Emissions outside the frequency band in which the intentional radiator is operating shall be at least 20 dB below the highest level of the desired power.

RESULTS:

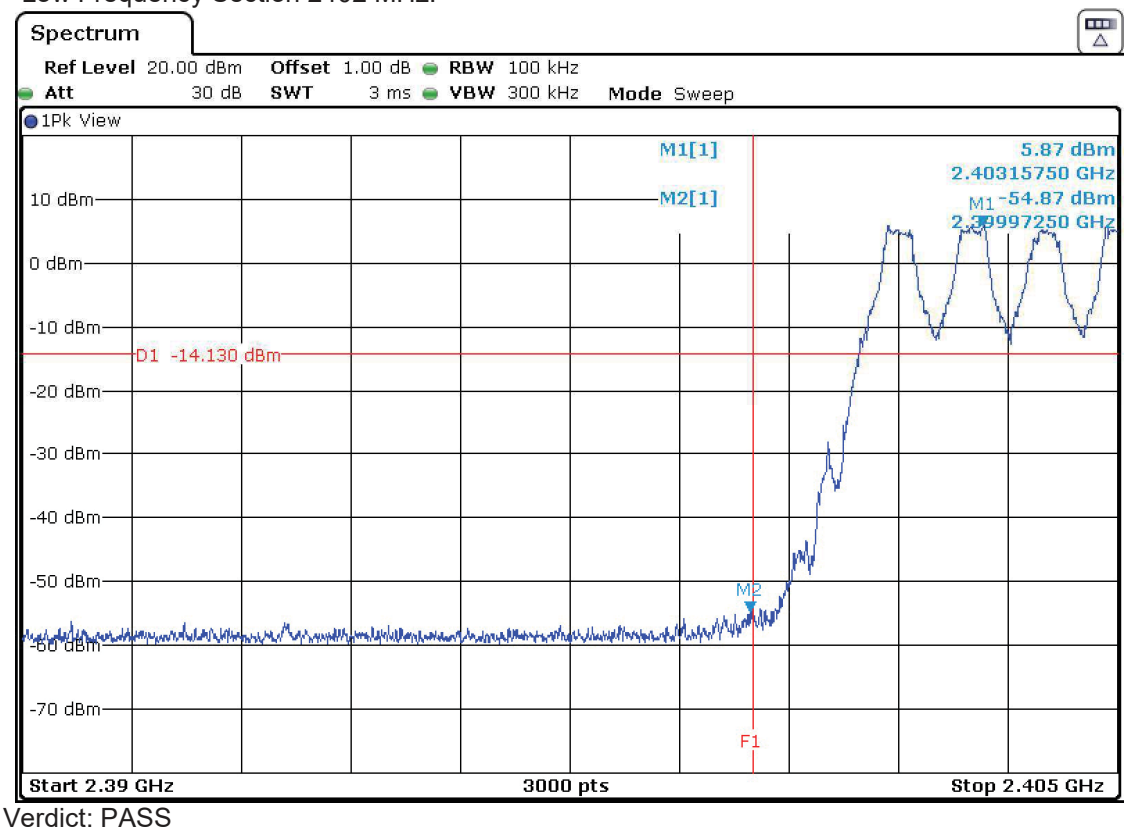
Radiated measurements were used to show compliance with the limits in the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Measurement uncertainty (dB)	<±2.57

- **GFSK – Band-edge emissions compliance**

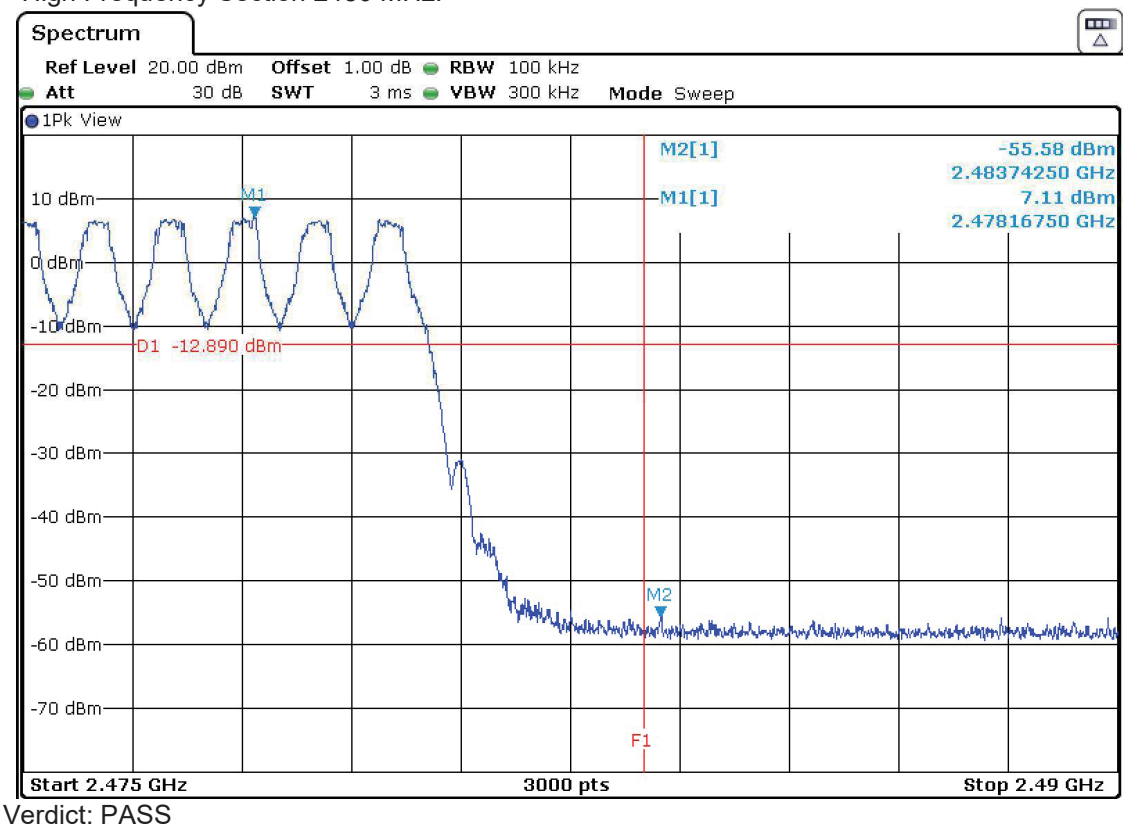
  - ❖ HOPPING ON:

    - Low Frequency Section 2402 MHz:



Verdict: PASS

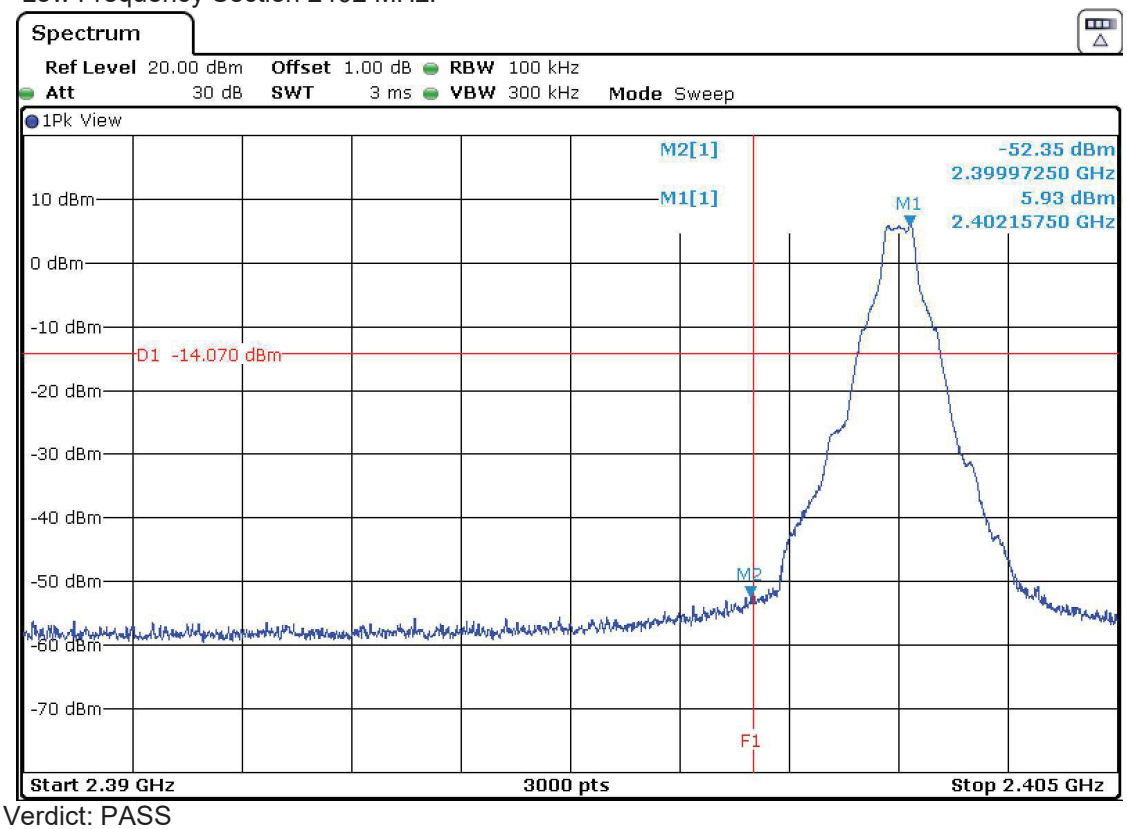
    - High Frequency Section 2480 MHz:



Verdict: PASS

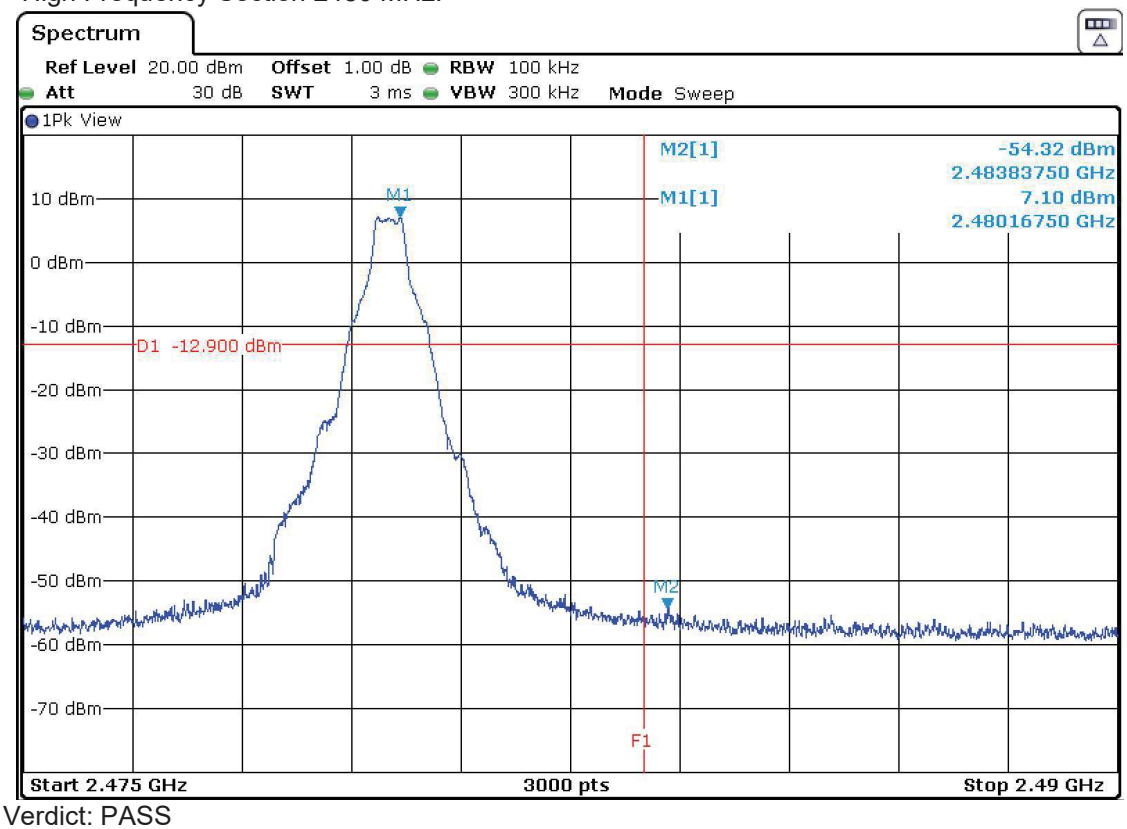
❖ HOPPING OFF:

- Low Frequency Section 2402 MHz:



Verdict: PASS

- High Frequency Section 2480 MHz:

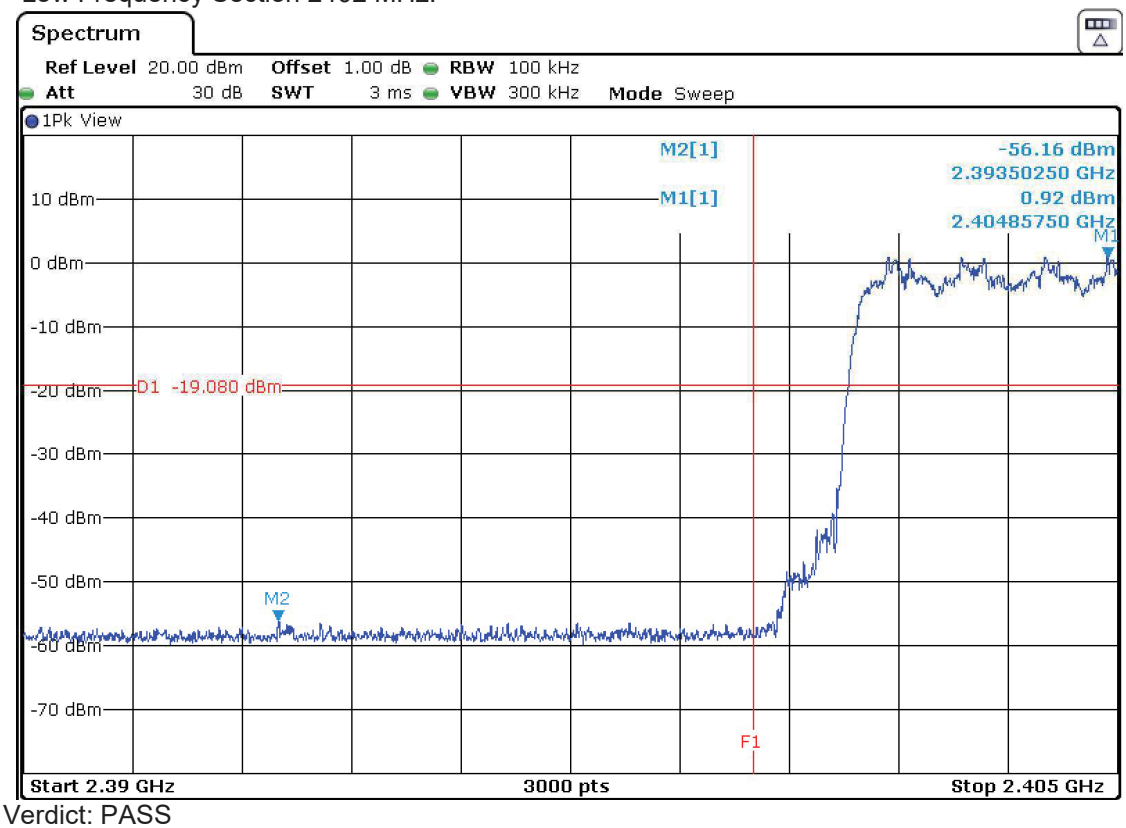


Verdict: PASS

- **Pi/4 DQPSK – Band-edge emissions compliance**

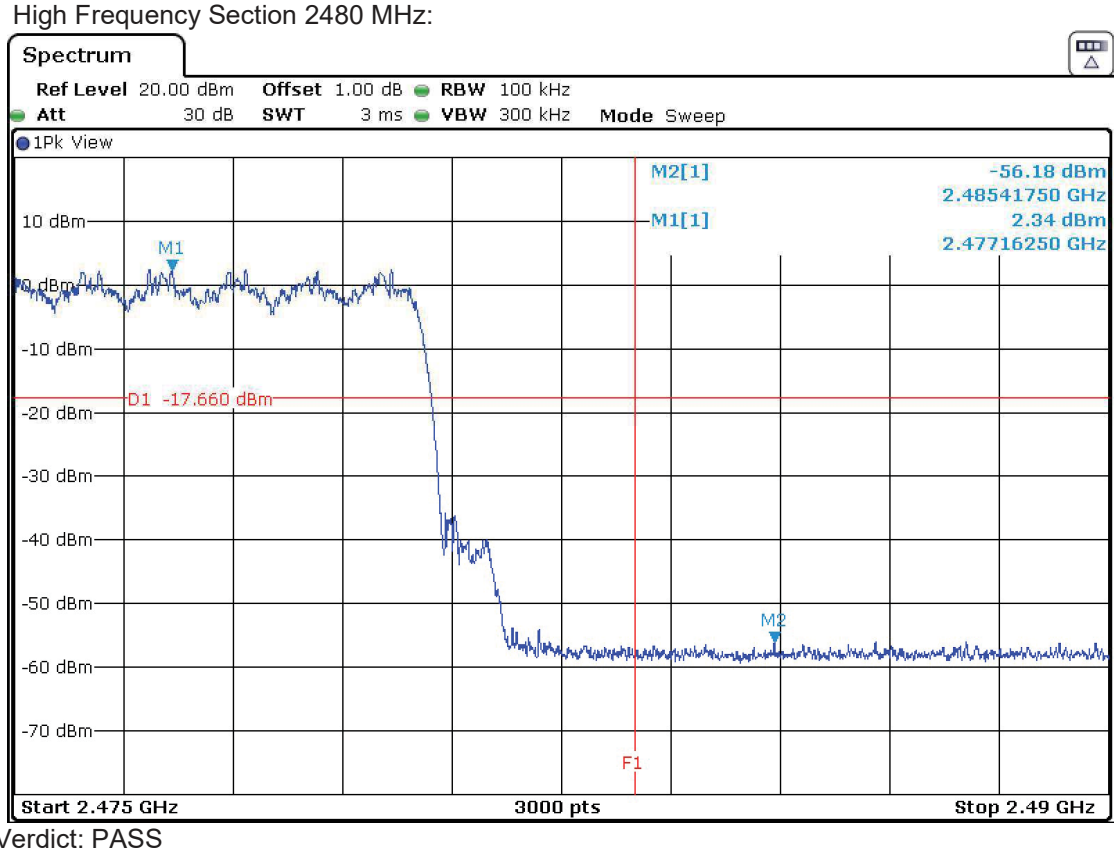
  - ❖ HOPPING ON:

    - Low Frequency Section 2402 MHz:



Verdict: PASS

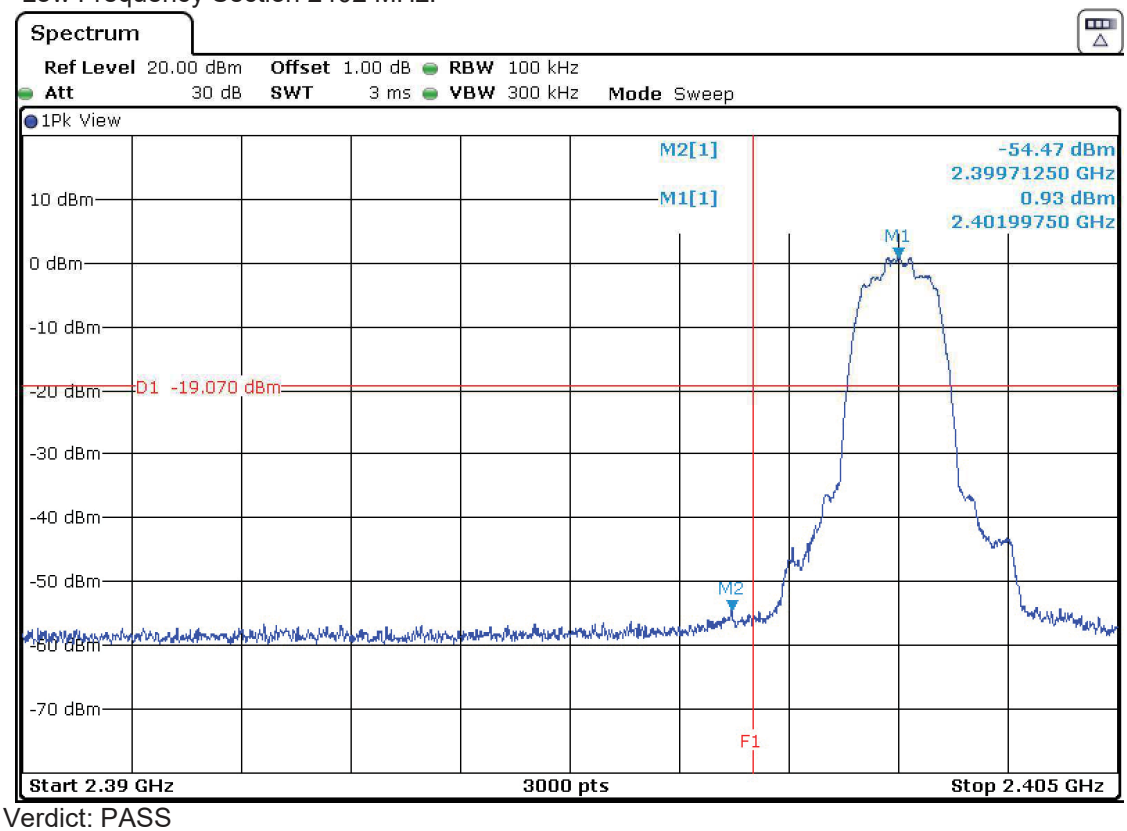
    - High Frequency Section 2480 MHz:



Verdict: PASS

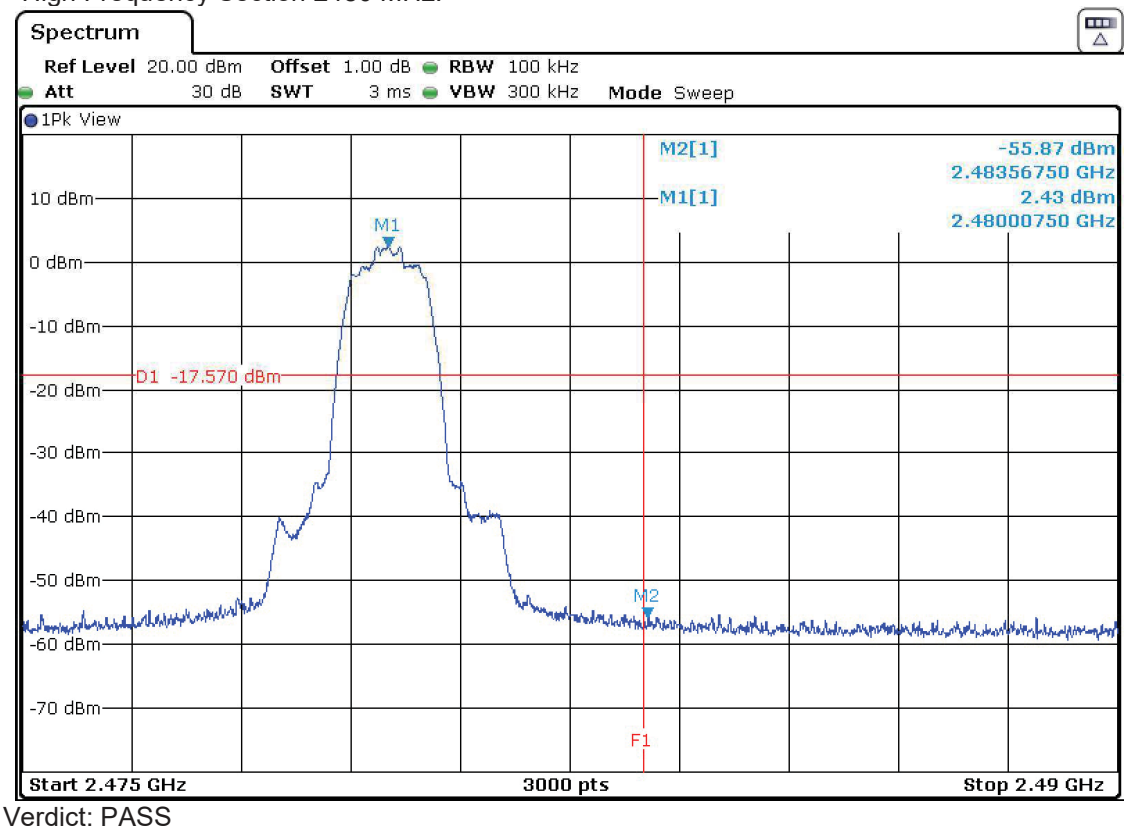
❖ HOPPING OFF:

- Low Frequency Section 2402 MHz:



Verdict: PASS

- High Frequency Section 2480 MHz:

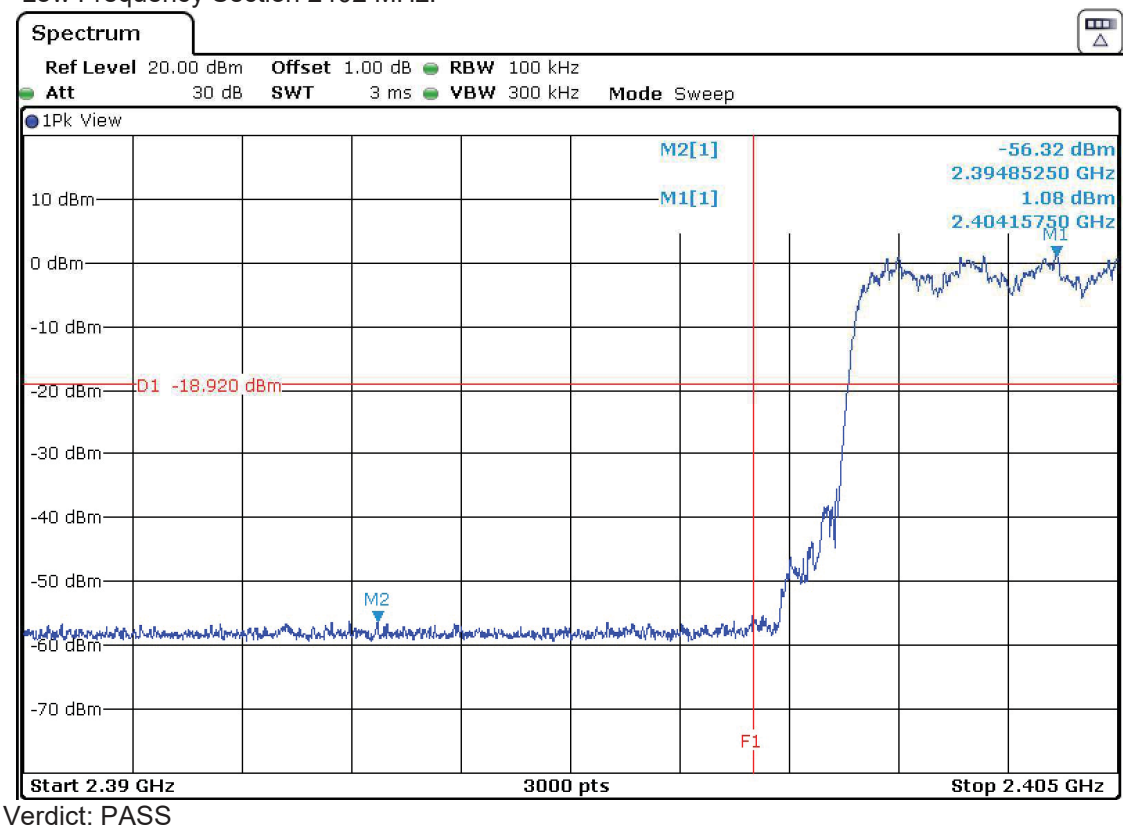


Verdict: PASS

- **8DPSK – Band-edge emissions compliance**

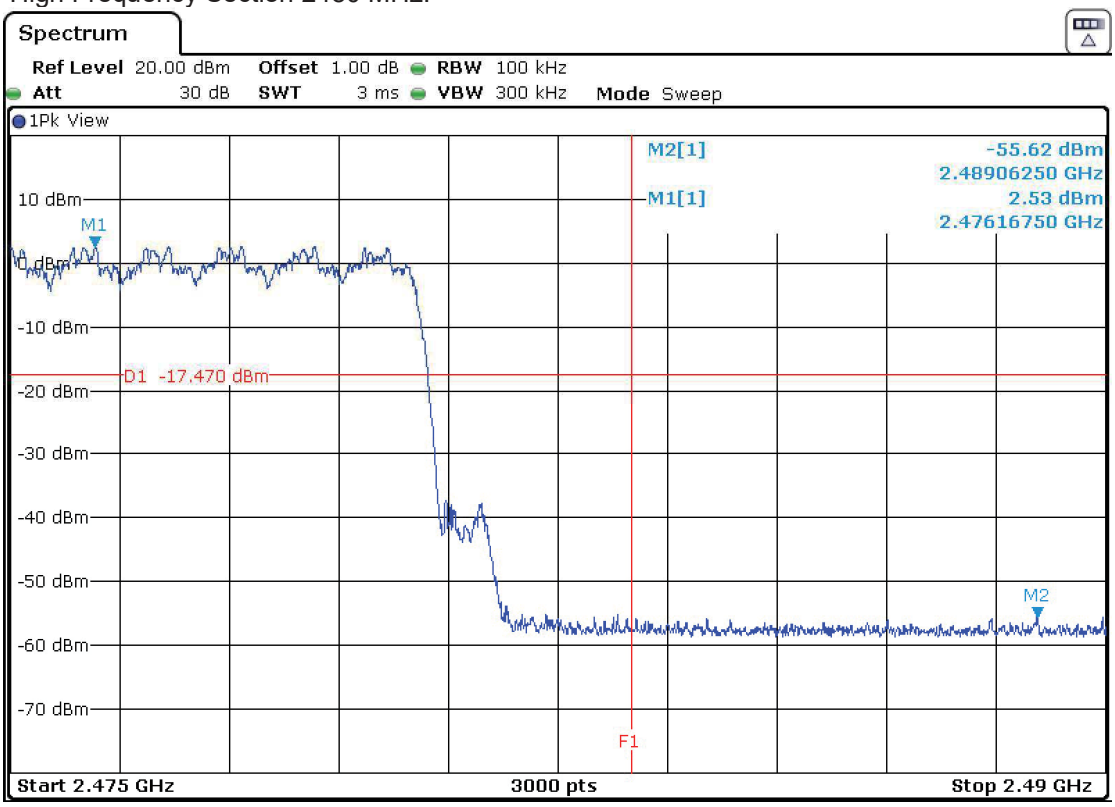
  - ❖ HOPPING ON:

    - Low Frequency Section 2402 MHz:



Verdict: PASS

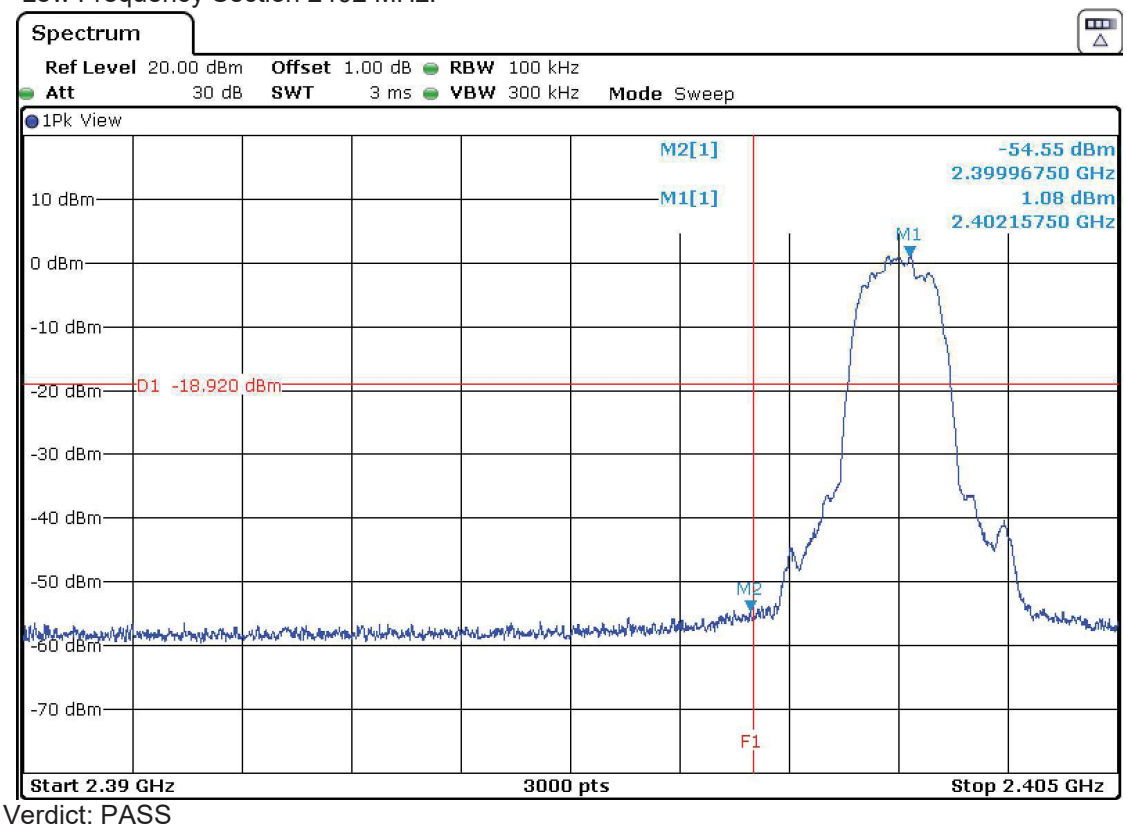
    - High Frequency Section 2480 MHz:



Verdict: PASS

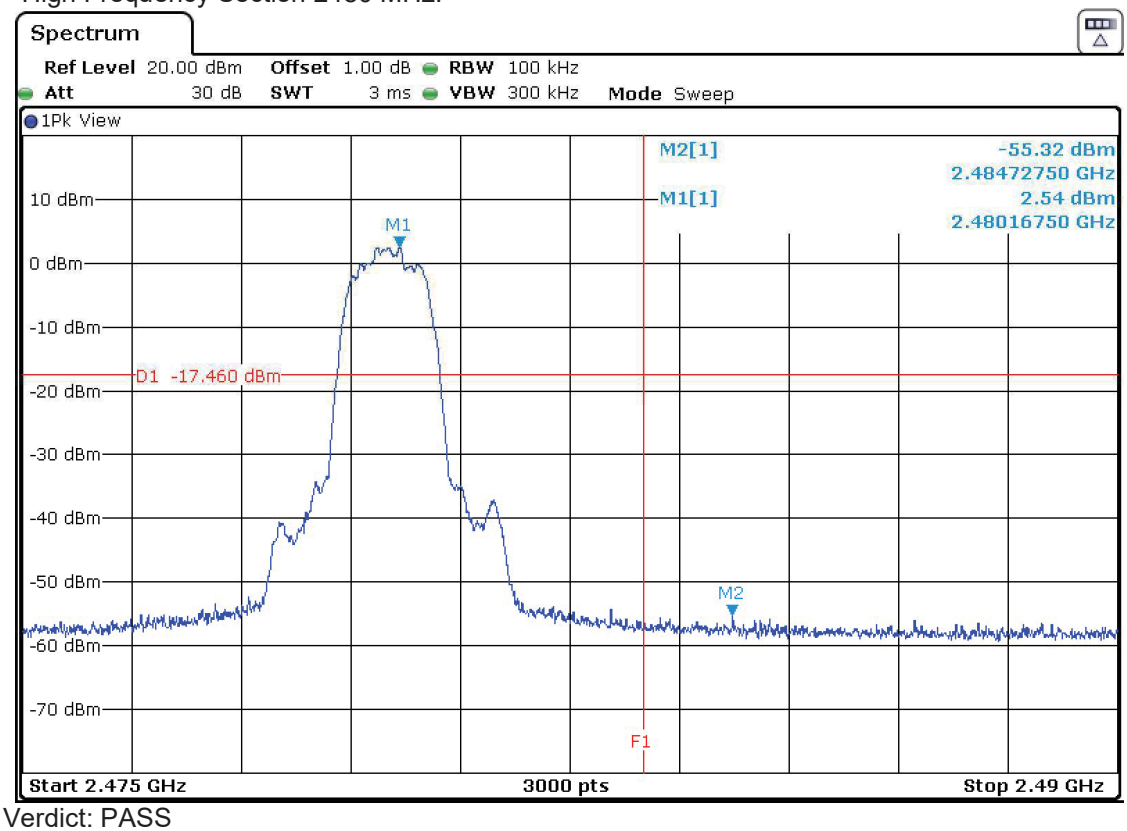
❖ HOPPING OFF:

- Low Frequency Section 2402 MHz:



Verdict: PASS

- High Frequency Section 2480 MHz:



Verdict: PASS

FCC 15.247 (d) / RSS-247 5.5. Emission limitations radiated. (Transmitter)

SPECIFICATION:

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)/RSS-Gen):

Frequency Range (MHz)	Field strength (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 25000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247. Attenuation below the general field strength limits specified in RSS-Gen is not required.

RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

All tests were performed in a semi-anechoic chamber at a distance of 3 m for the frequency range 30 MHz-17 GHz and at distance of 1m for the frequency range 17 GHz-25 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

Frequency range 30 MHz - 1 GHz:

The spurious frequencies detected below 1 GHz do not depend on either the operating channel or the modulation mode selected in the EUT.

Spurious frequencies operating detected at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBµV/m)	Limit (dBµV/m)	Polarization	Detector	Measurement Uncertainty (dB)
499.965	33.69	46	V	Quasi-peak	<± 4.99
749.9825	27.72	46	V	Quasi-peak	<± 4.99

Frequency range 1 - 26 GHz:

The results in the next tables show the maximum measured levels in the 1-26 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Spurious frequencies with peak levels above the average limit (54 dBµV/m at 3 m) are measured with average detector for checking compliance with the average limit.

- **GFSK modulation (DH5)**

  - LOW CHANNEL. No spurious frequencies detected at less than 20 dB below the limit.

  - MIDDLE CHANNEL. No spurious frequencies detected at less than 20 dB below the limit.

  - HIGH CHANNEL. No spurious frequencies detected at less than 20 dB below the limit.

1 GHz- 17 GHz. Measurement Uncertainty (dB): <± 4.98
17 GHz- 26.5 GHz. Measurement Uncertainty (dB): <± 5.08
26.5 GHz- 40 GHz. Measurement Uncertainty (dB): <± 5.33

Verdict: PASS

- **Pi/4-DQPSK modulation (2-DH5)**

  - LOW CHANNEL. No spurious frequencies detected at less than 20 dB below the limit.

  - MIDDLE CHANNEL. No spurious frequencies detected at less than 20 dB below the limit.

  - HIGH CHANNEL. No spurious frequencies detected at less than 20 dB below the limit.

1 GHz- 17 GHz. Measurement Uncertainty (dB): <± 4.98
17 GHz- 26.5 GHz. Measurement Uncertainty (dB): <± 5.08
26.5 GHz- 40 GHz. Measurement Uncertainty (dB): <± 5.33

Verdict: PASS

- **8-DPSK modulation (3DH5)**

  - LOW CHANNEL. No spurious frequencies detected at less than 20 dB below the limit.

  - MIDDLE CHANNEL. No spurious frequencies detected at less than 20 dB below the limit.

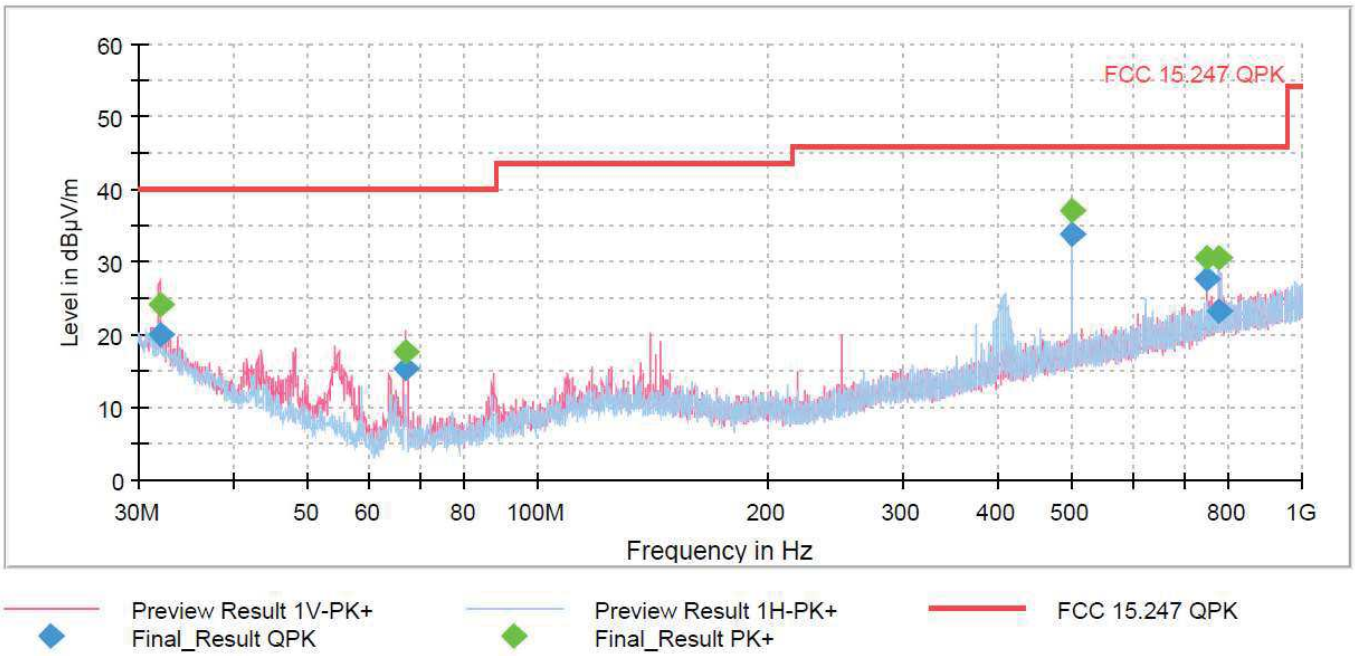
  - HIGH CHANNEL. No spurious frequencies detected at less than 20 dB below the limit.

1 GHz- 17 GHz. Measurement Uncertainty (dB): <± 4.98
17 GHz- 26.5 GHz. Measurement Uncertainty (dB): <± 5.08
26.5 GHz- 40 GHz. Measurement Uncertainty (dB): <± 5.33

Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz:

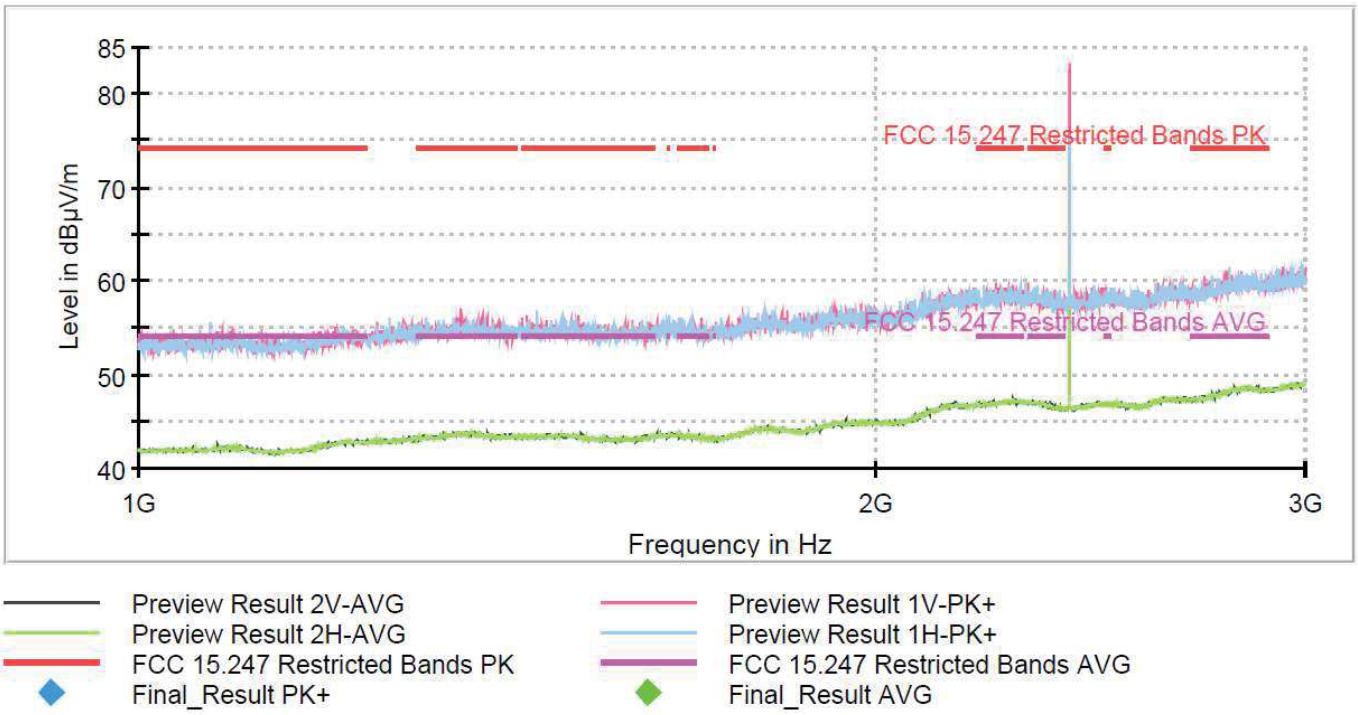
This plot is valid for the Low, Middle and High Channels and all the modulation modes.



FREQUENCY RANGE 1 - 3 GHz:

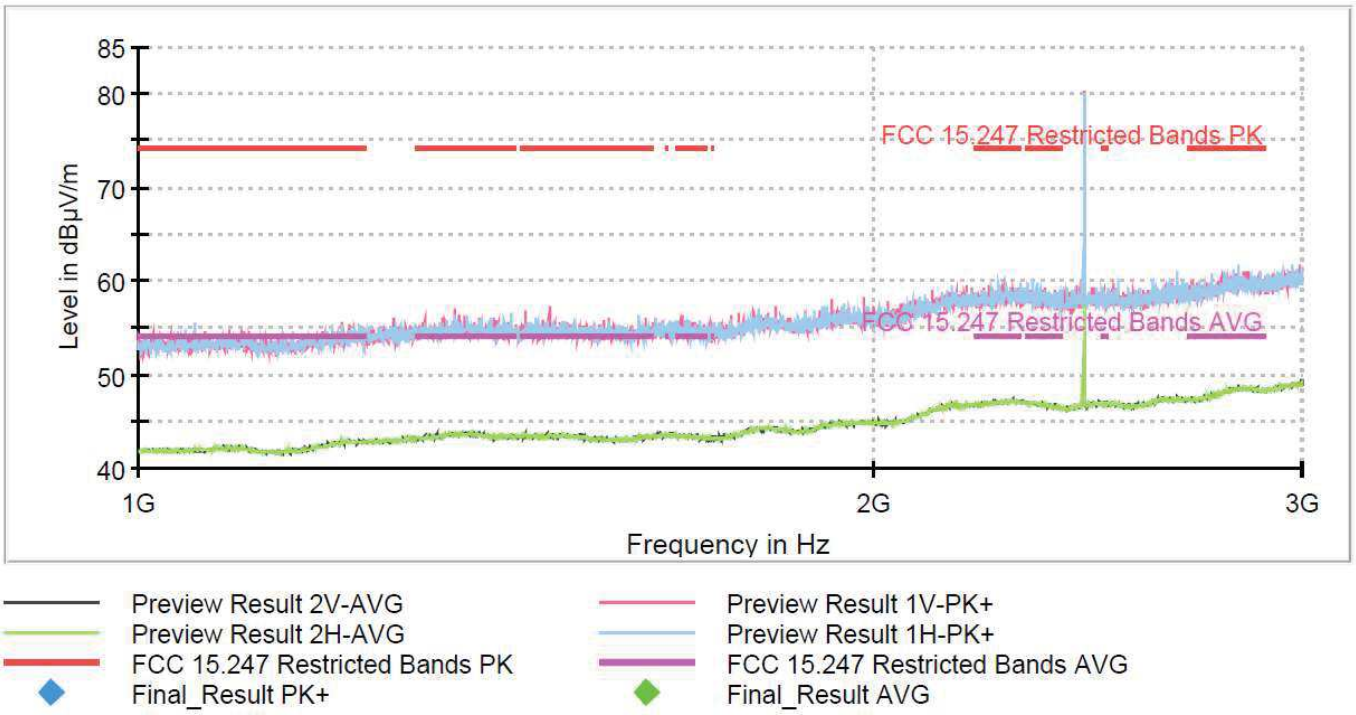
- **GFSK modulation (DH5)**

  - Low Channel:



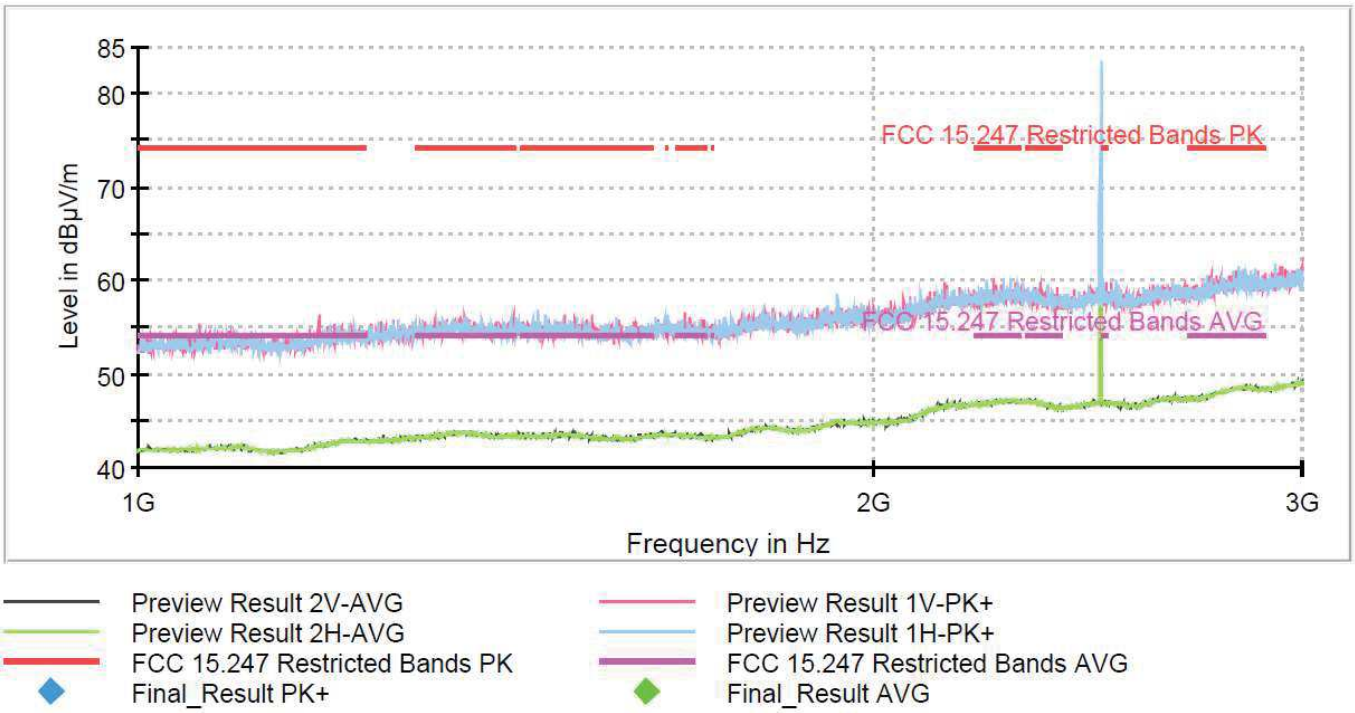
The peak above the limit is the carrier frequency.

  - Middle Channel:



The peak above the limit is the carrier frequency.

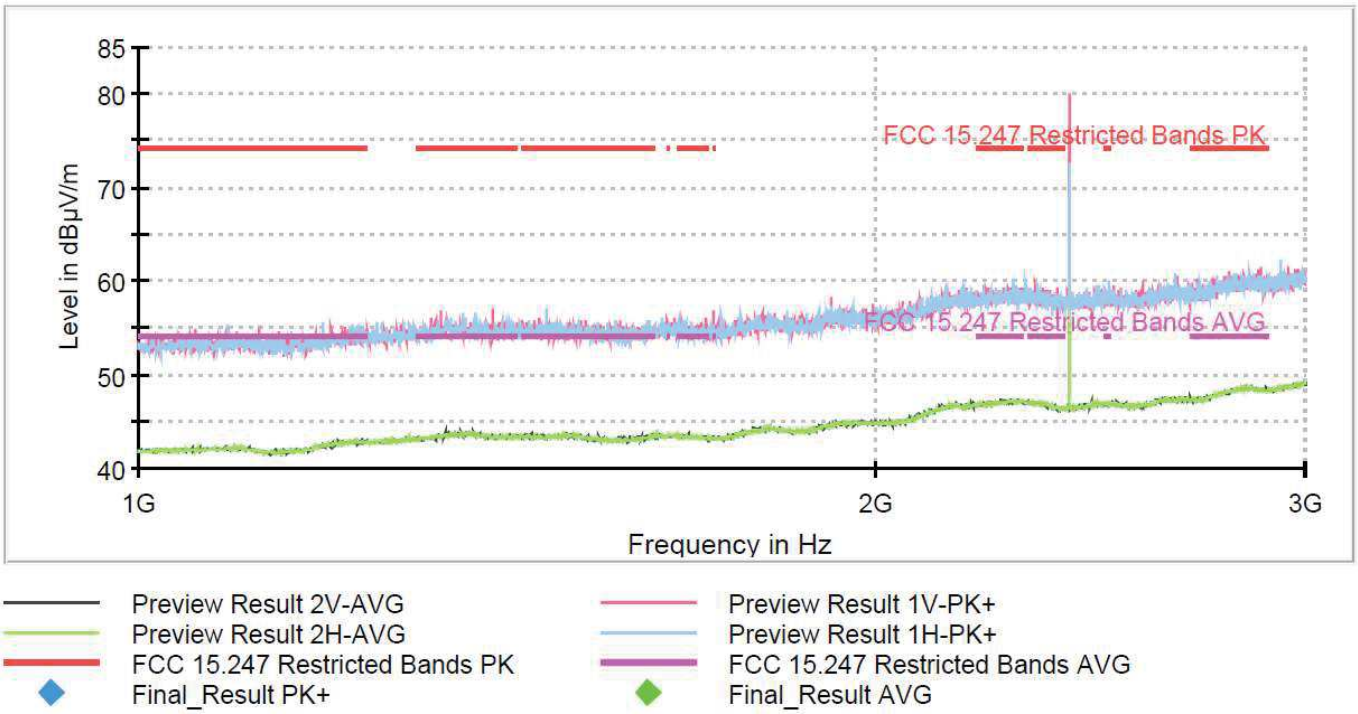
- High Channel:



The peak above the limit is the carrier frequency.

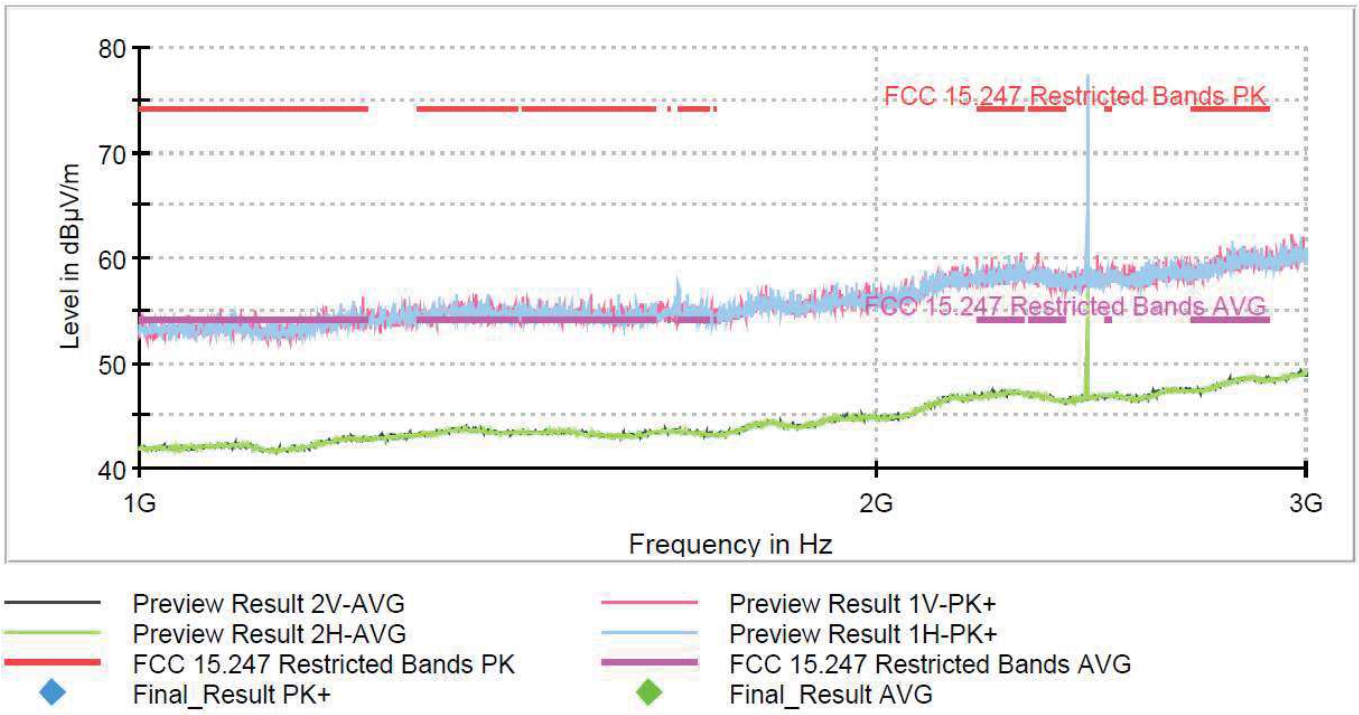
- **Pi/4-DQPSK modulation (2DH5)**

- Low Channel:



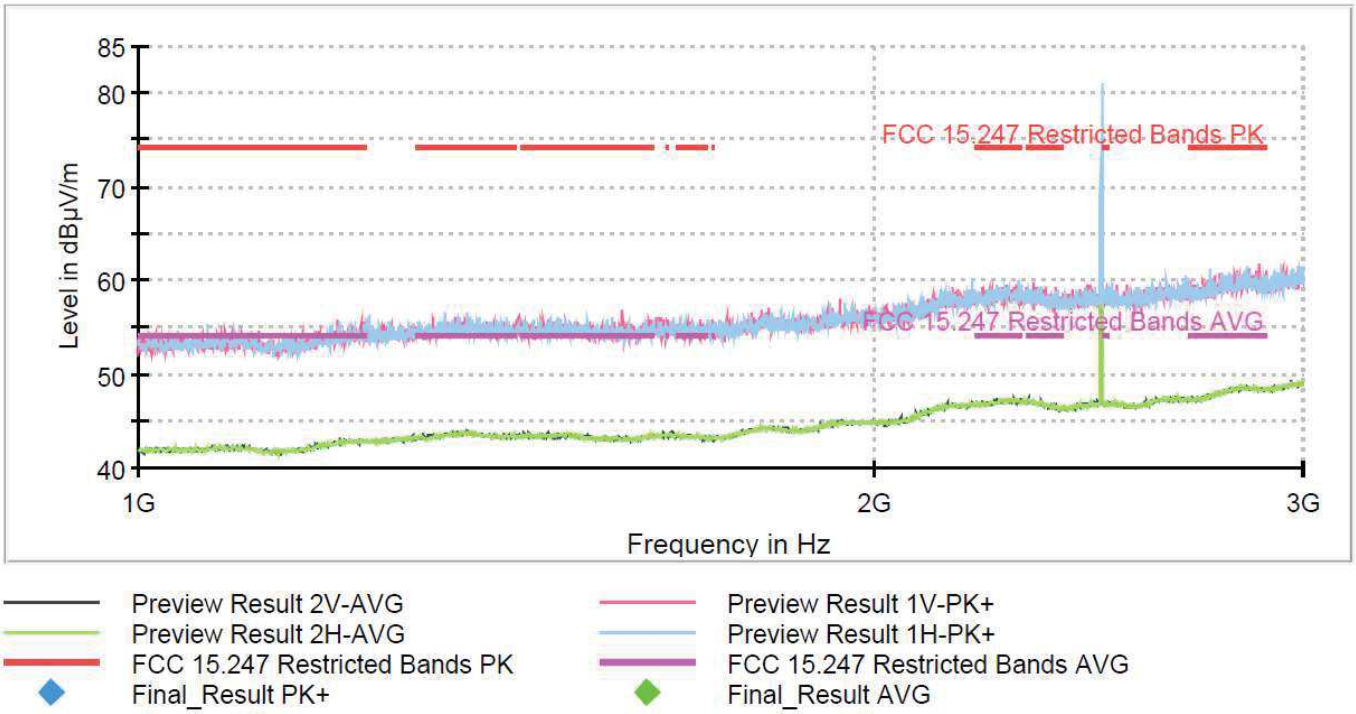
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

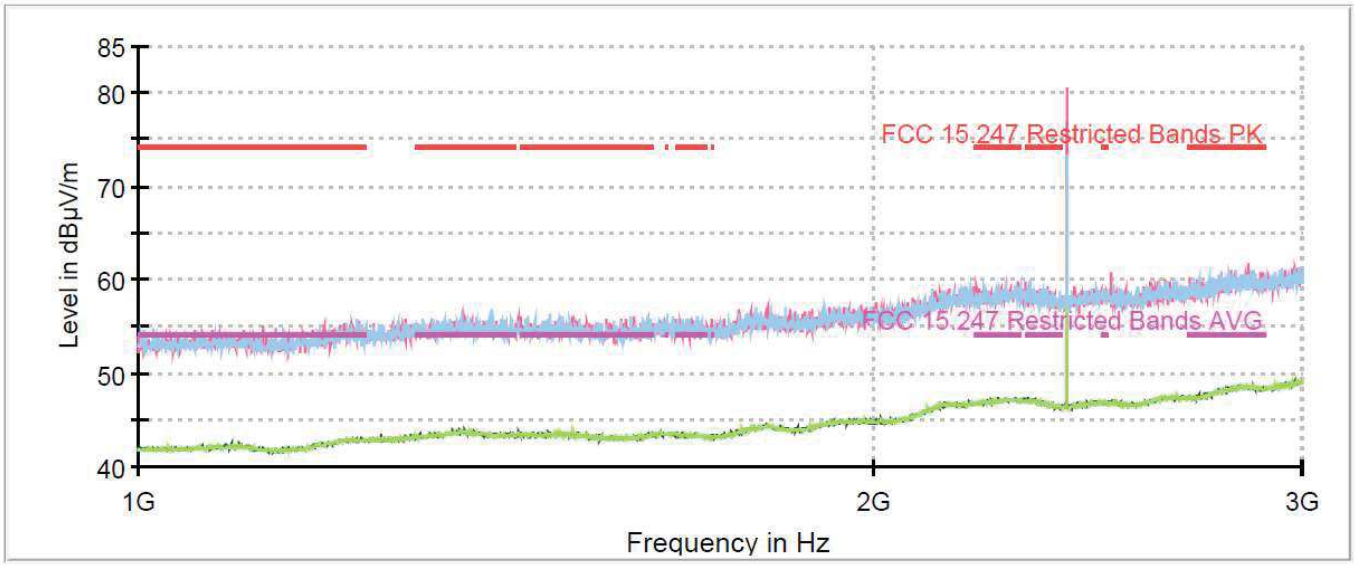
- High Channel:



The peak above the limit is the carrier frequency.

- **8-DPSK modulation (3DH5)**

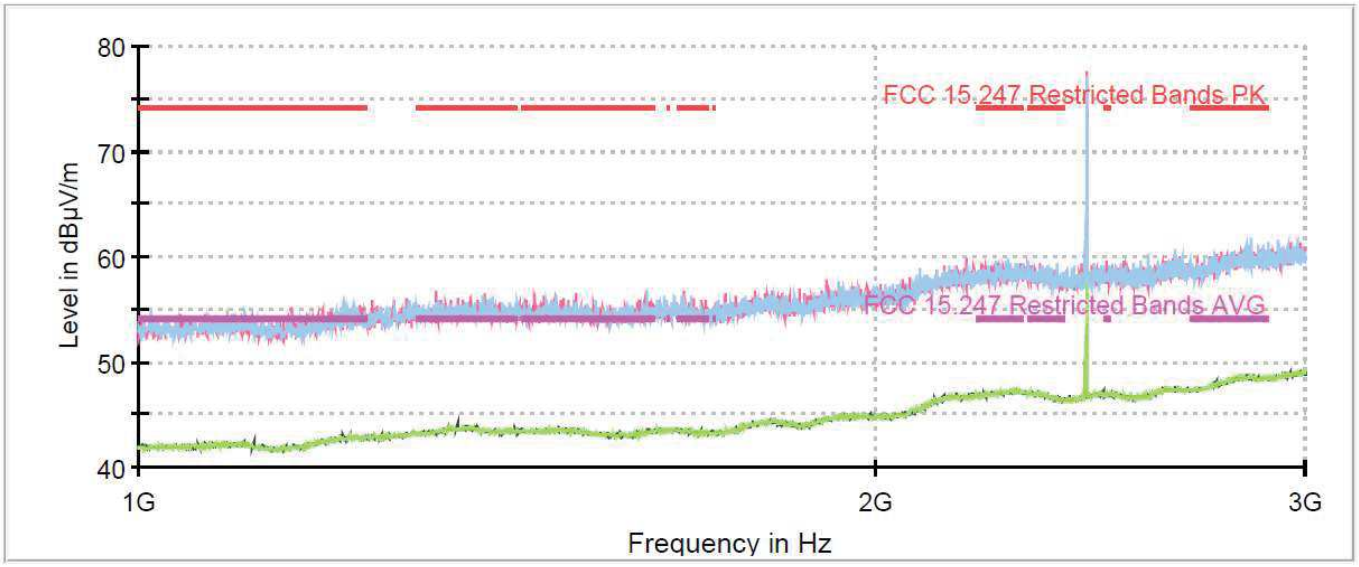
- Low Channel:



Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

The peak above the limit is the carrier frequency.

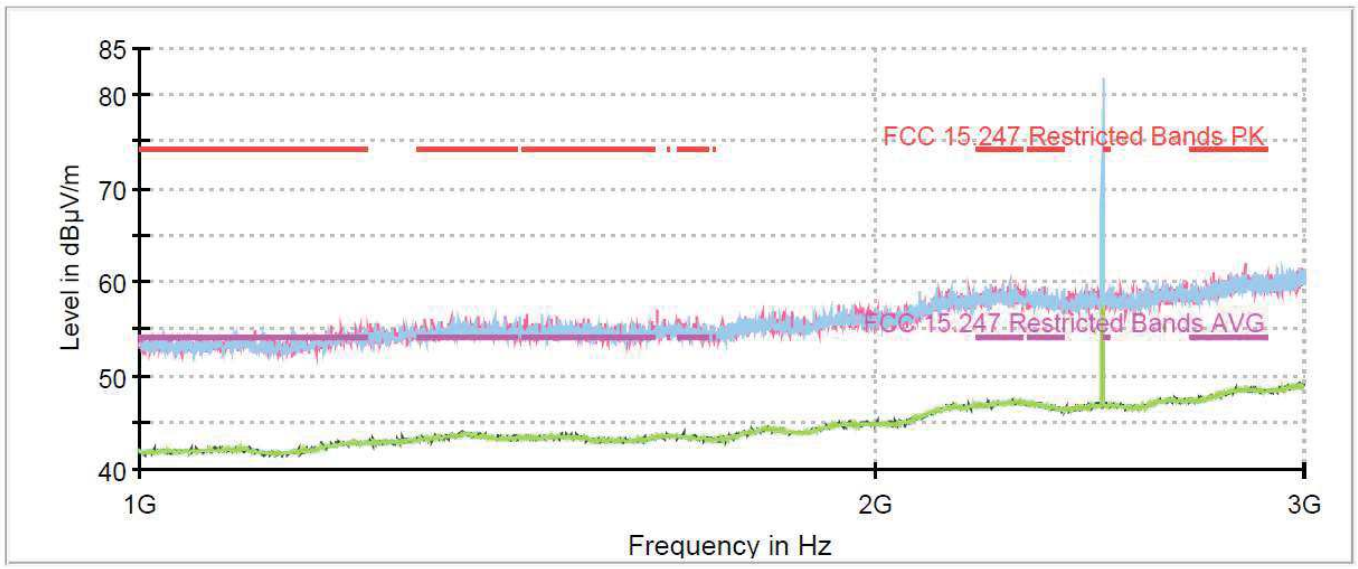
- Middle Channel:



Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

The peak above the limit is the carrier frequency.

- High Channel:



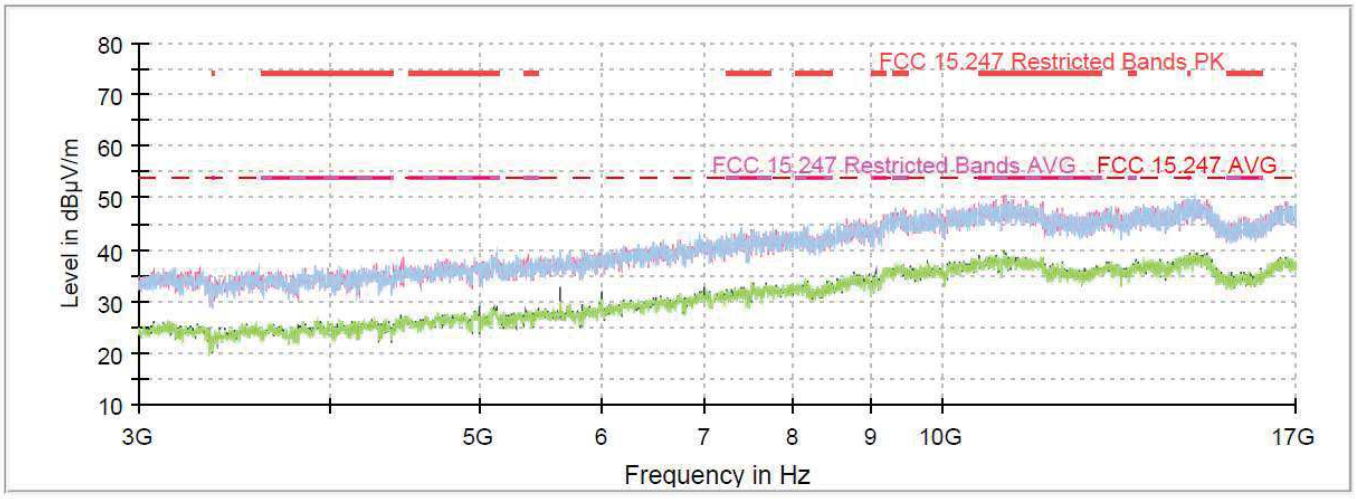
Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz:

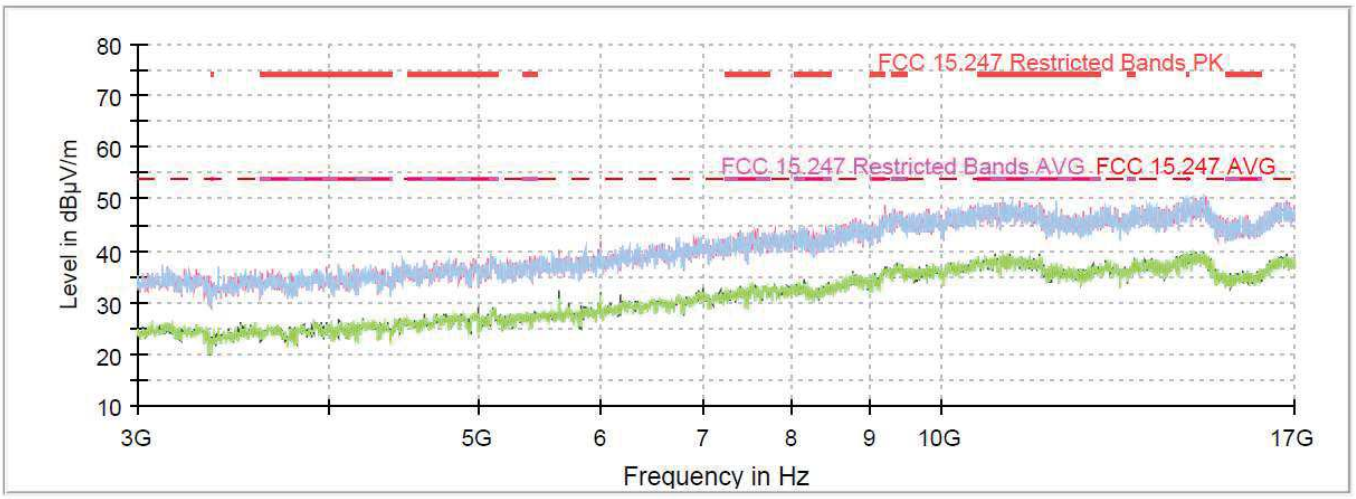
- **GFSK modulation (1DH5)**

- Low Channel:



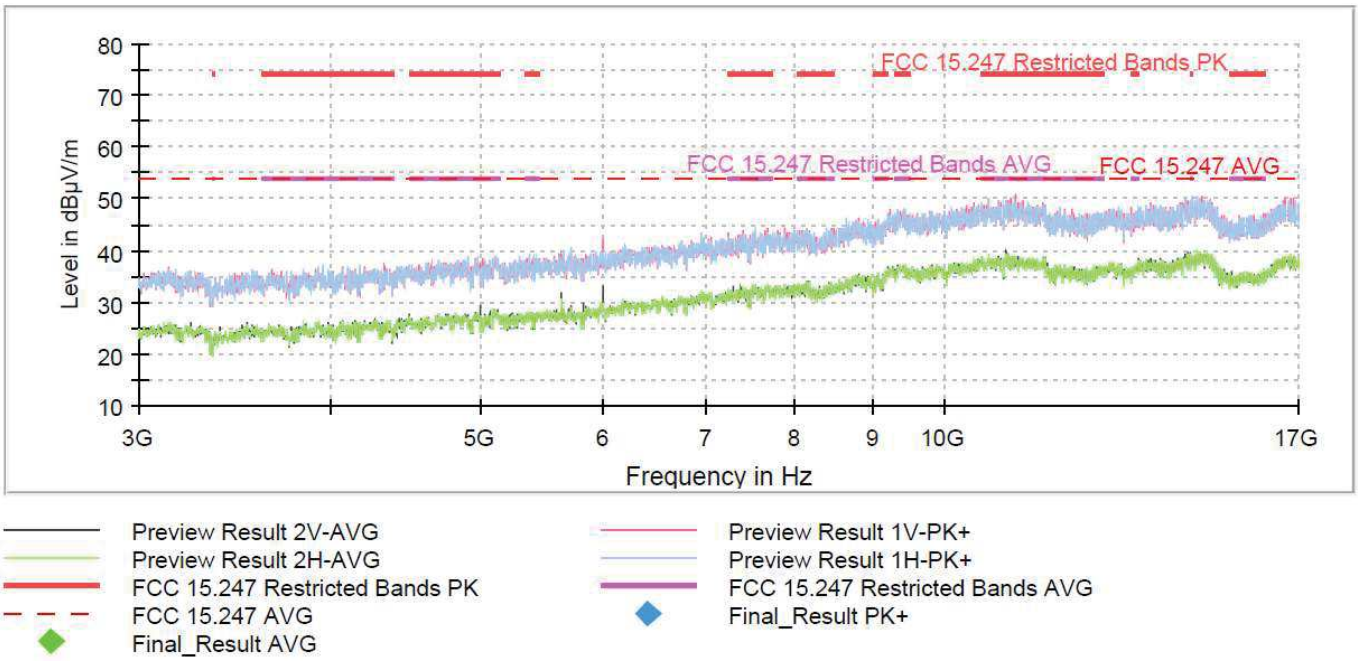
Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 Restricted Bands PK
FCC 15.247 AVG
Final_Result AVG
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result PK+

- Middle Channel:



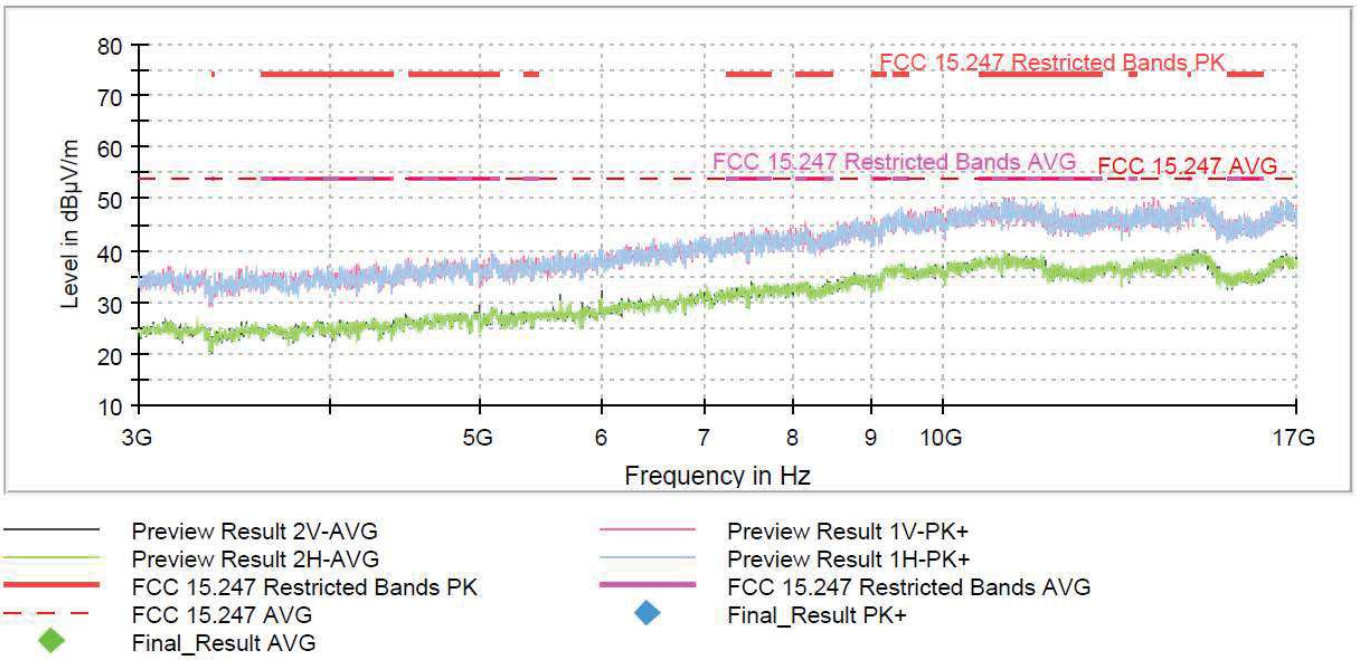
Preview Result 2V-AVG
Preview Result 2H-AVG
FCC 15.247 Restricted Bands PK
FCC 15.247 AVG
Final_Result AVG
Preview Result 1V-PK+
Preview Result 1H-PK+
FCC 15.247 Restricted Bands AVG
Final_Result PK+

- High Channel:

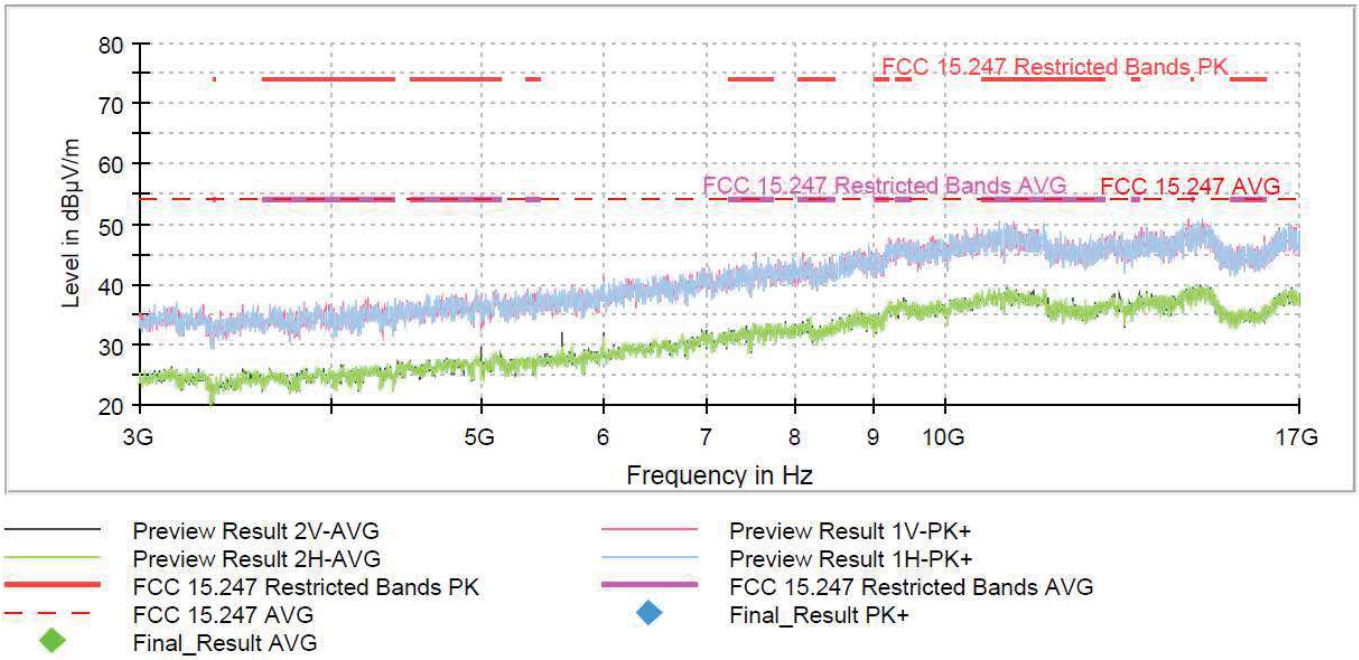


- **Pi/4-DQPSK modulation (2DH5)**

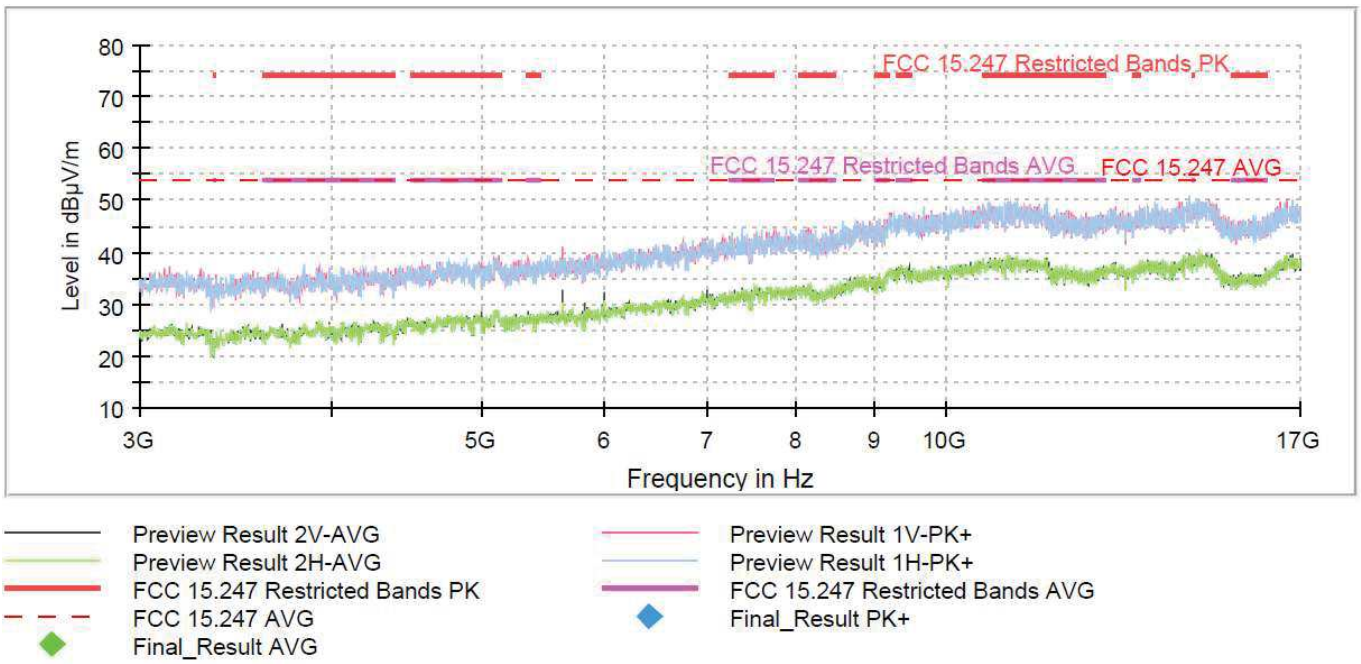
  - Low Channel:



- Middle Channel:

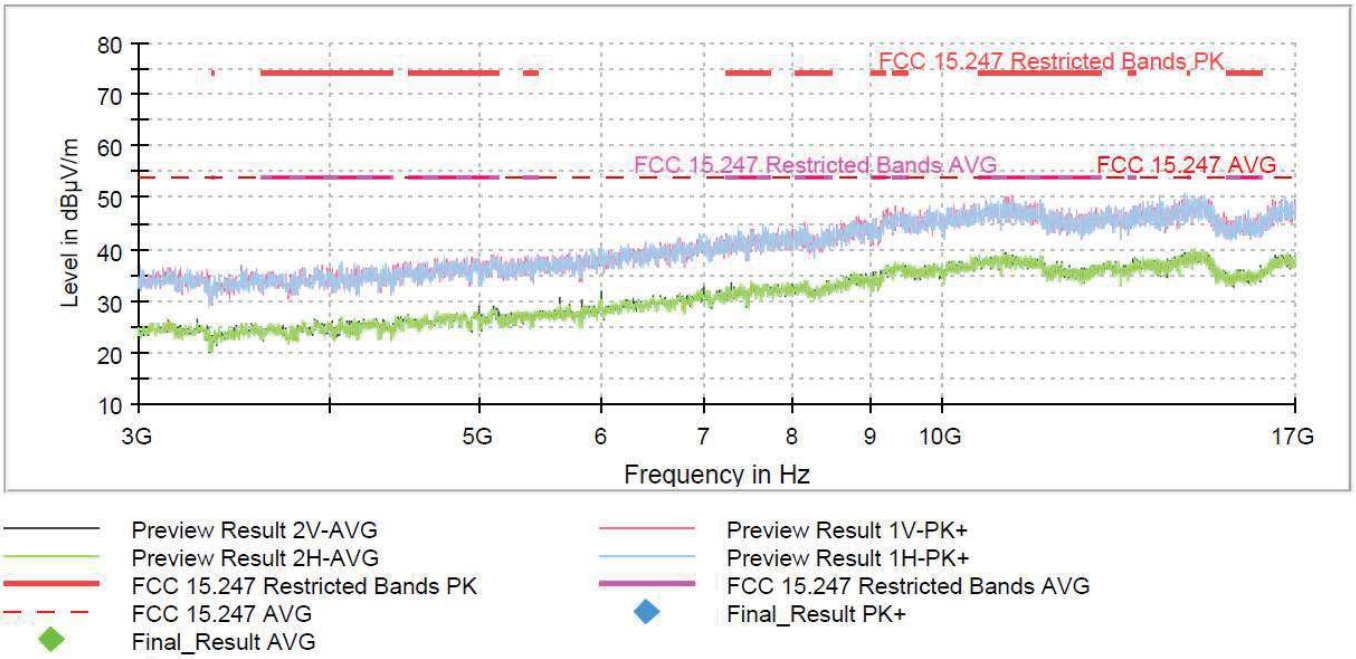


- High Channel:

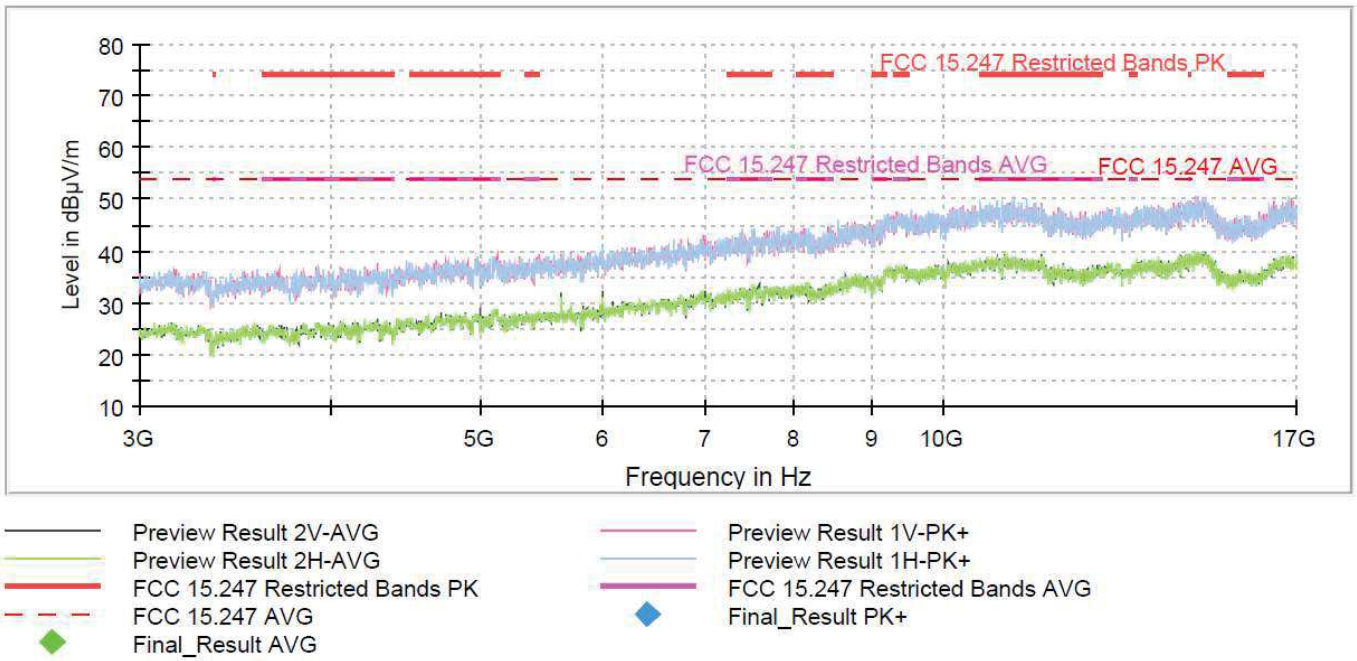


- **8-DPSK modulation (3DH5)**

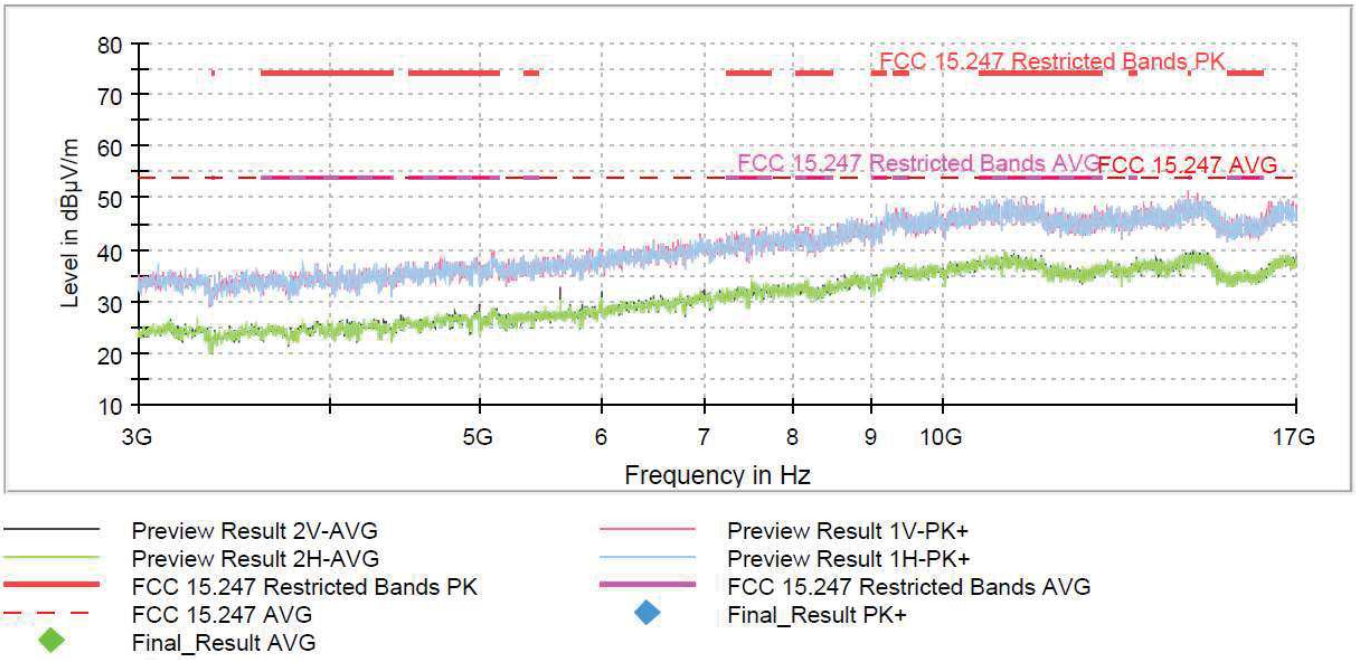
- Low Channel:



- Middle Channel:

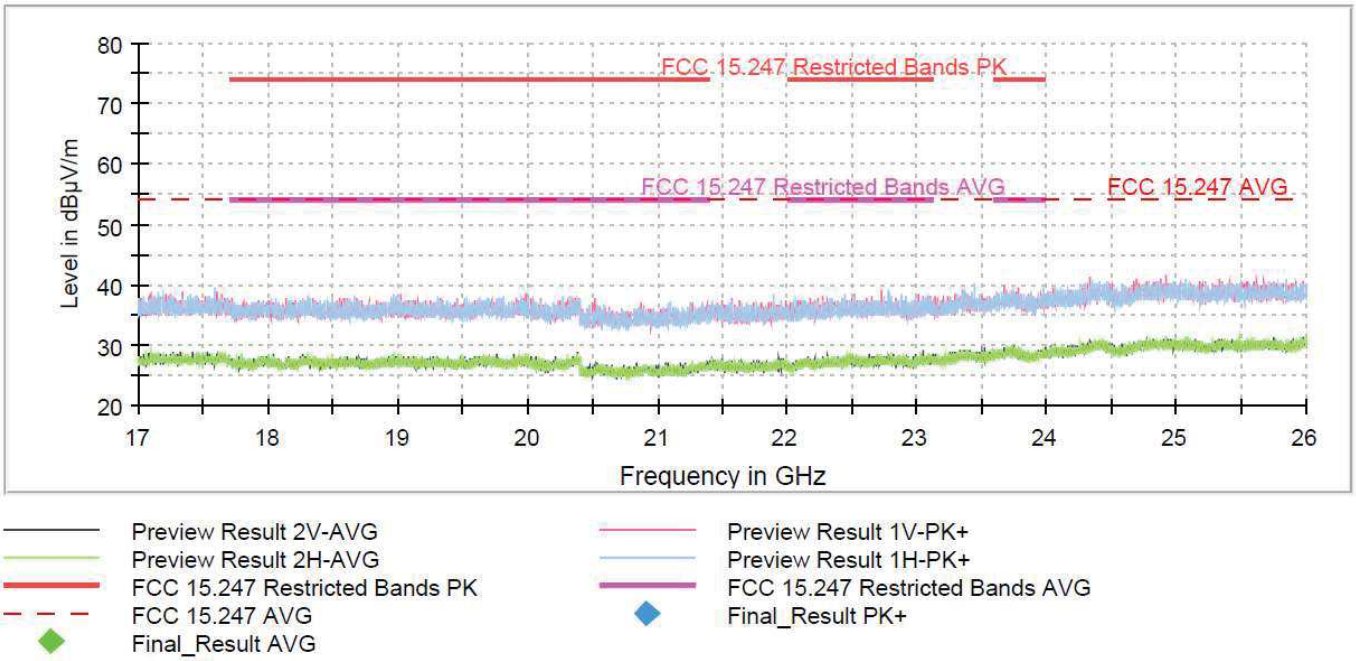


- High Channel:



FREQUENCY RANGE 17 - 26 GHz:

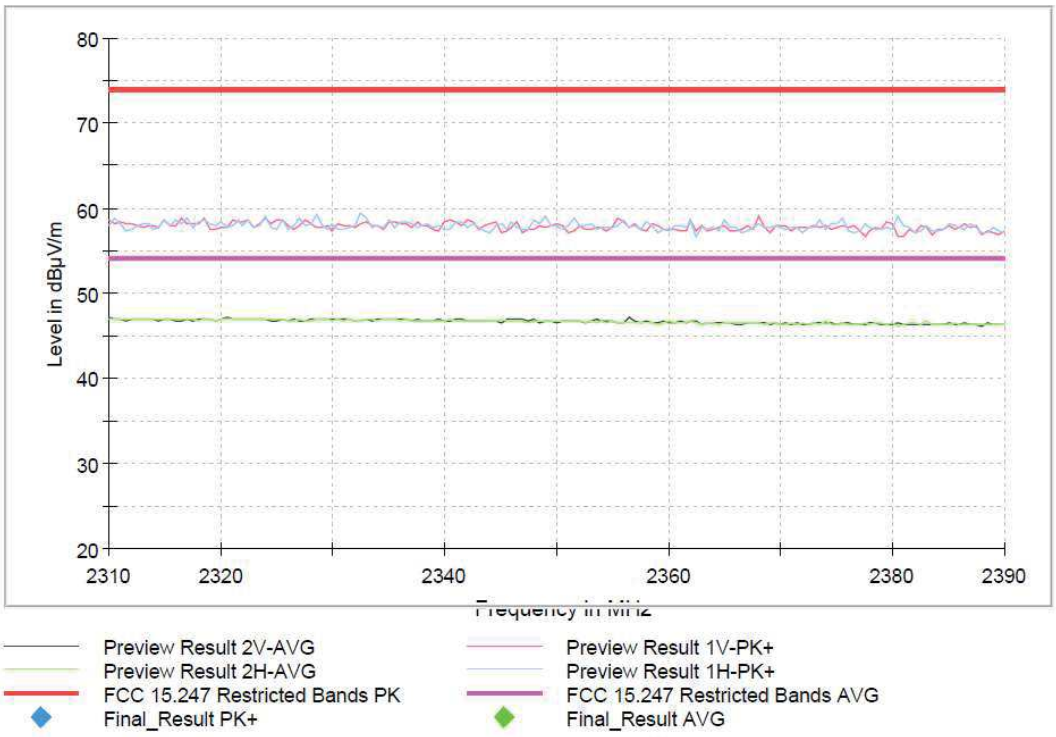
This plot is valid for the Low, Middle and High Channels and all the modulation modes.



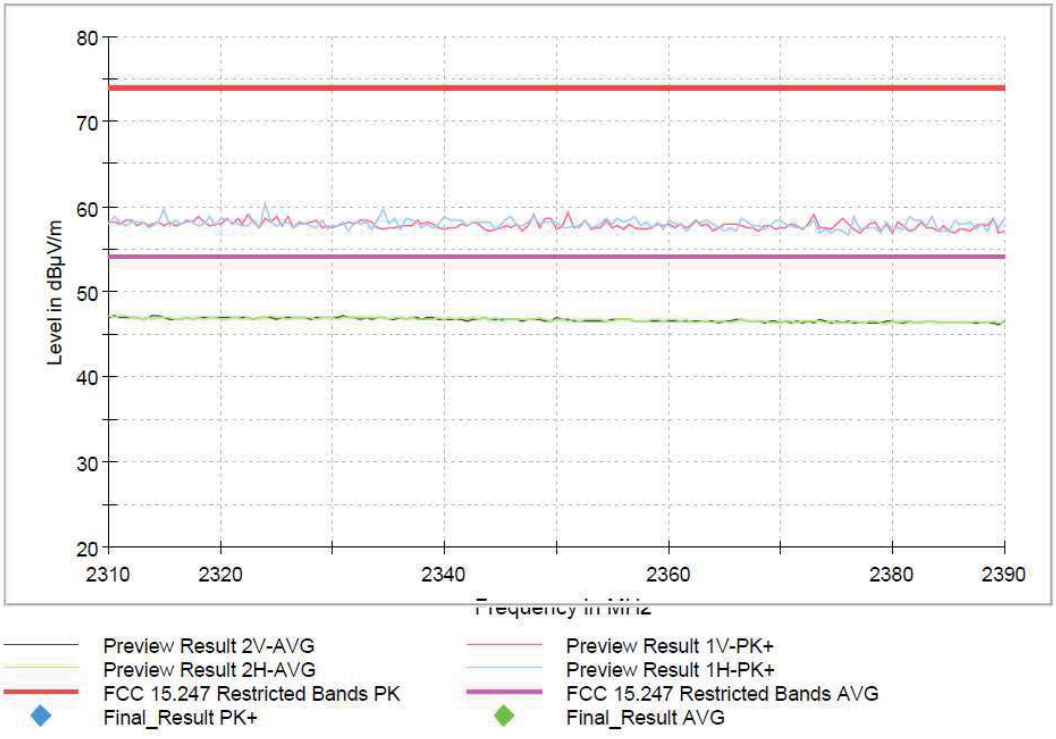
FREQUENCY RANGE 2.31-2.39 GHz:

- **GFSK modulation (1DH5)**

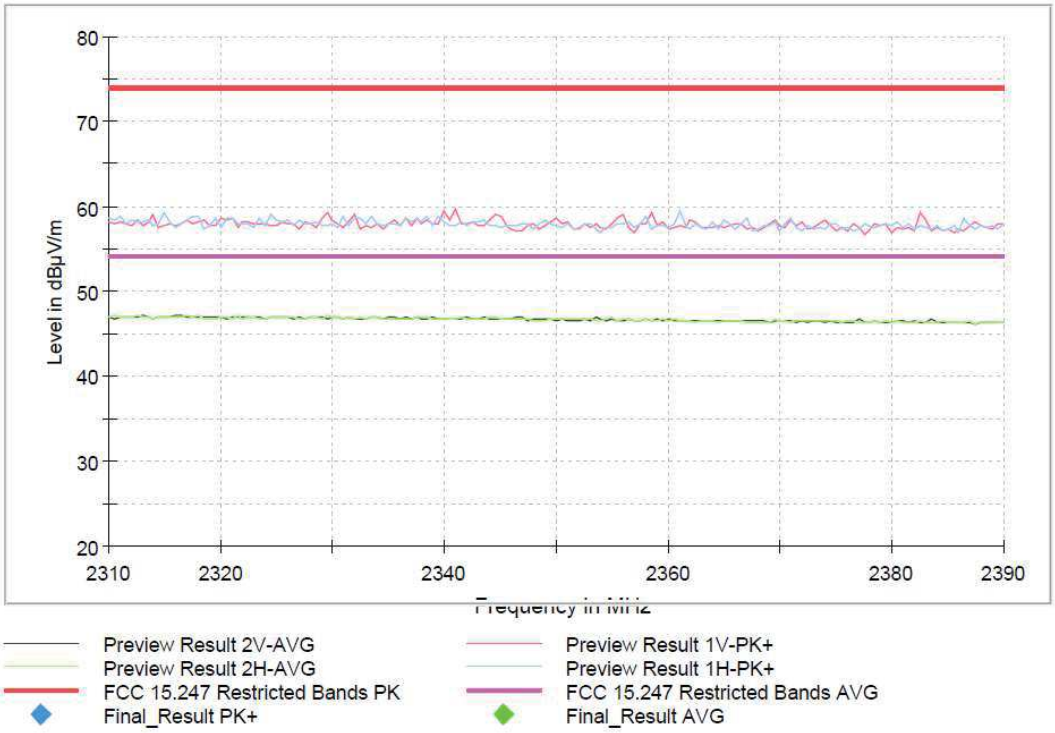
- Low Channel:



- Middle Channel:

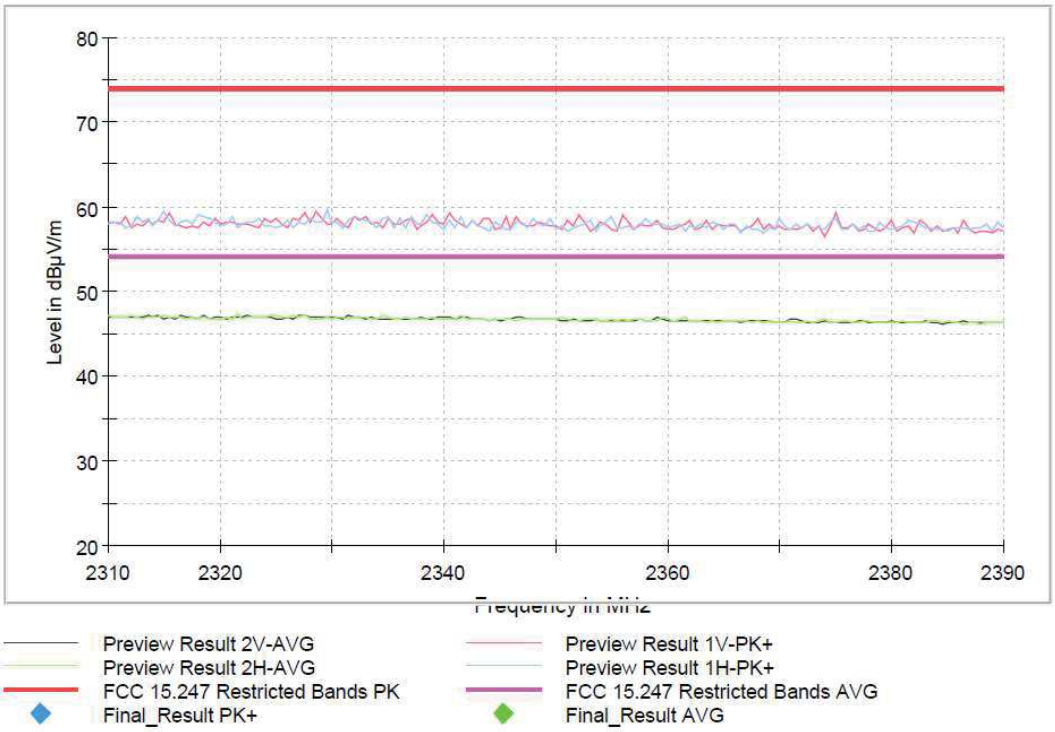


- High Channel:

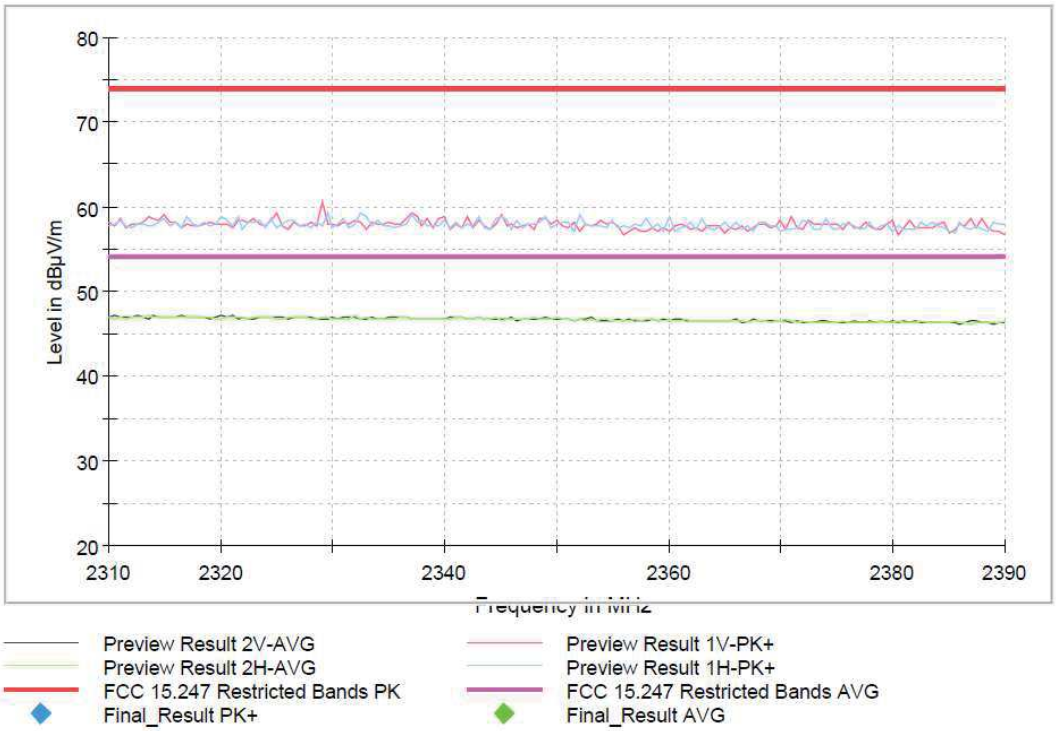


- **Pi/4-DQPSK modulation (2DH5)**

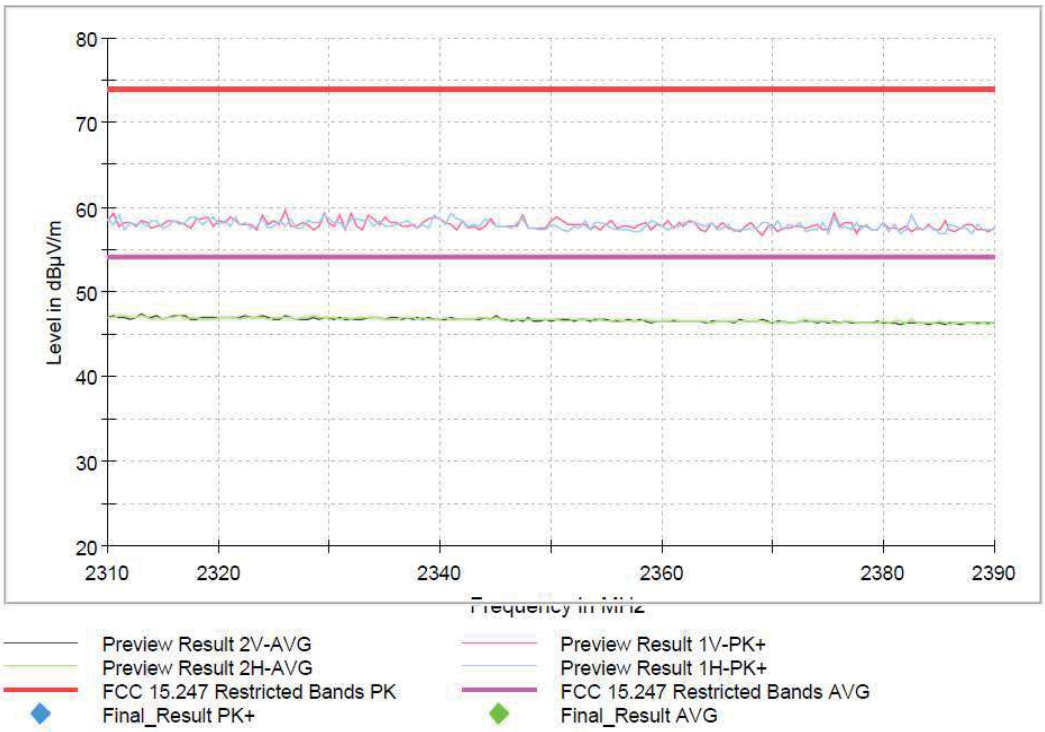
- Low Channel:



- Middle Channel:

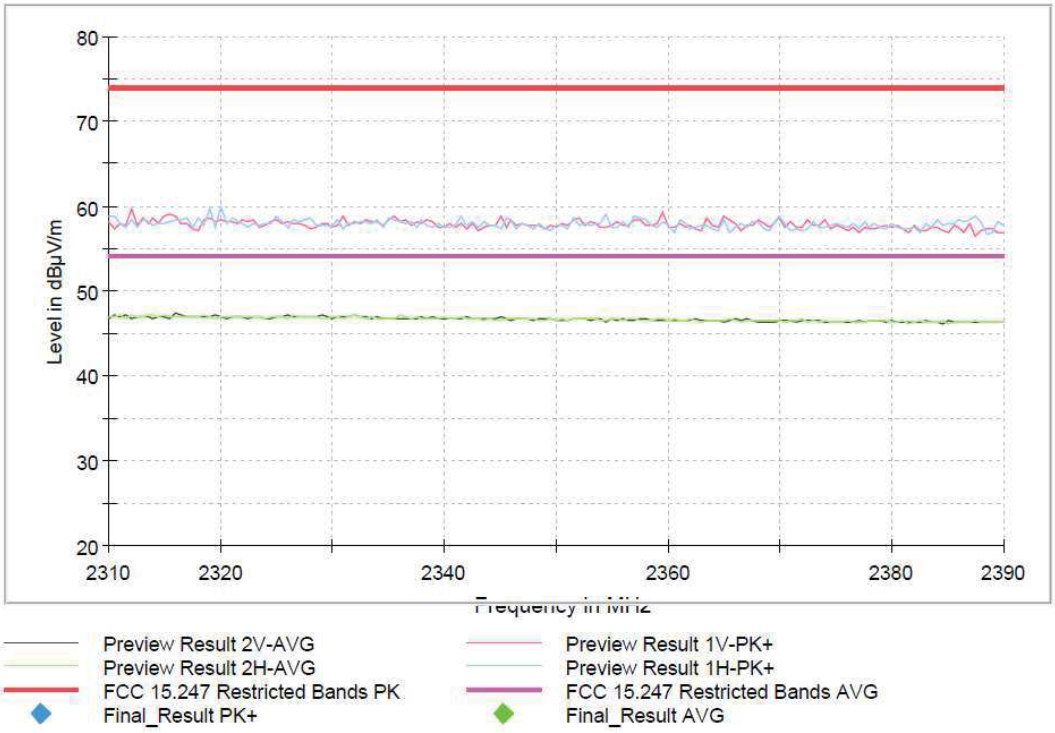


- High Channel:

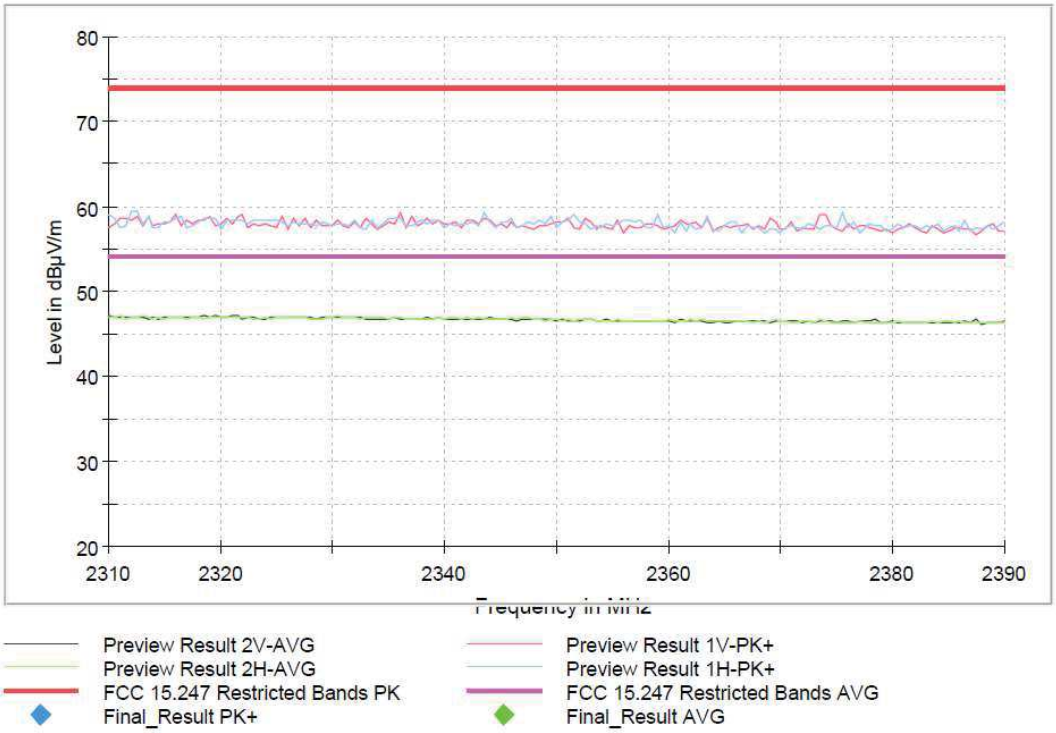


- **8-DPSK modulation (3DH5)**

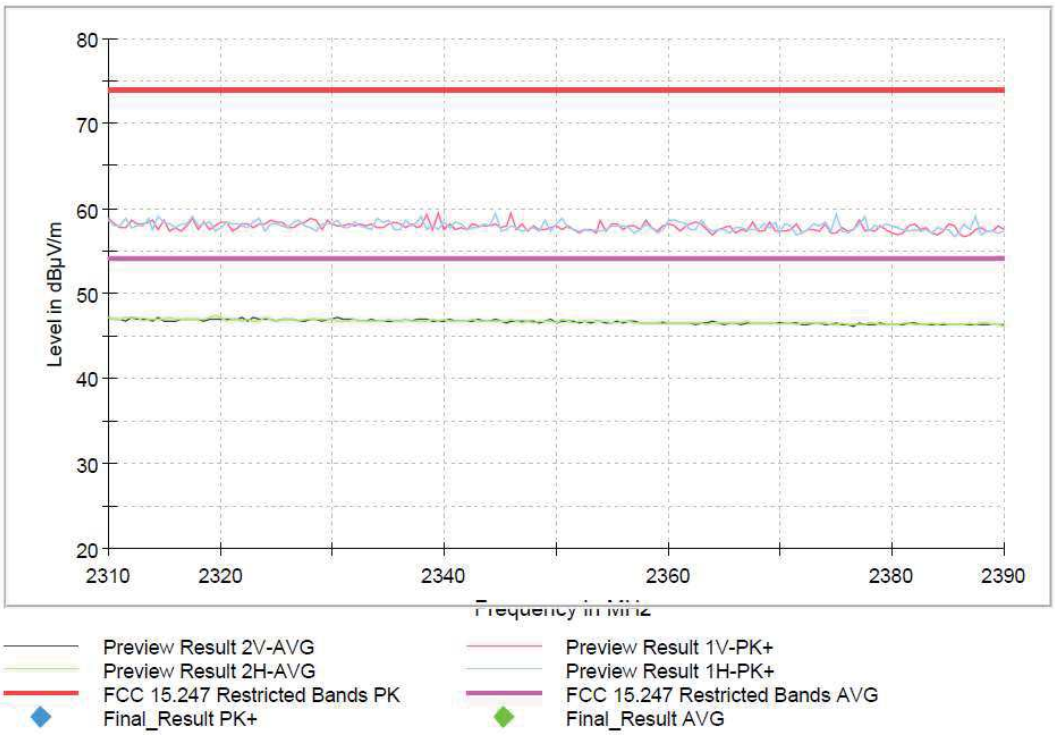
- Low Channel:



- Middle Channel:



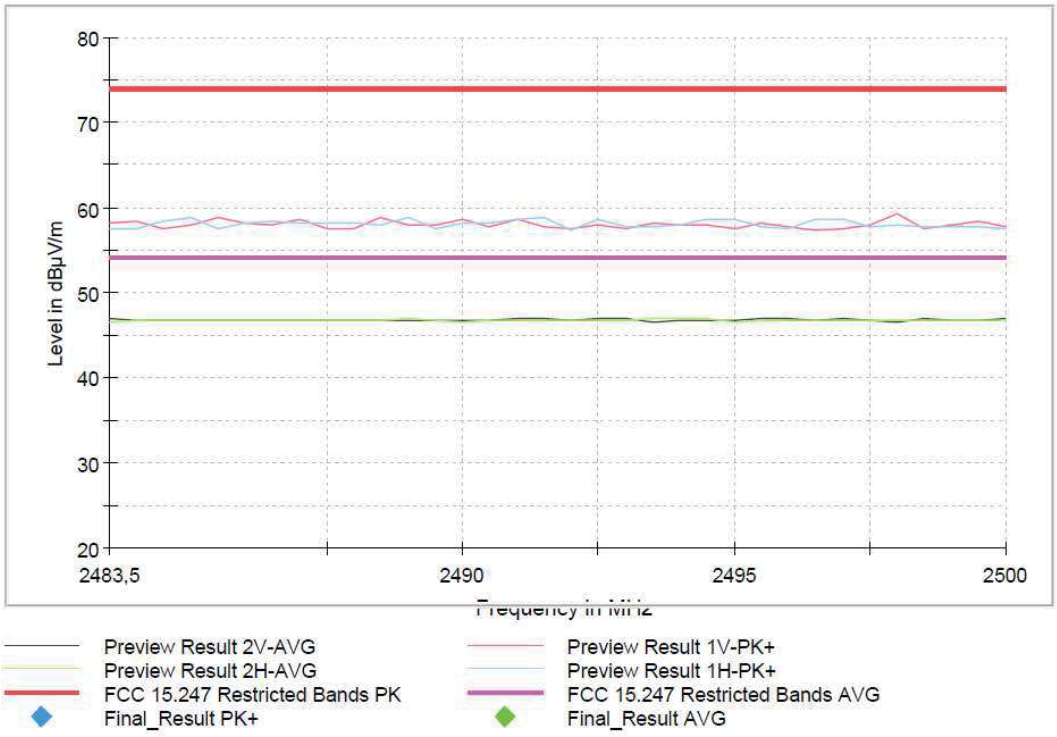
- High Channel:



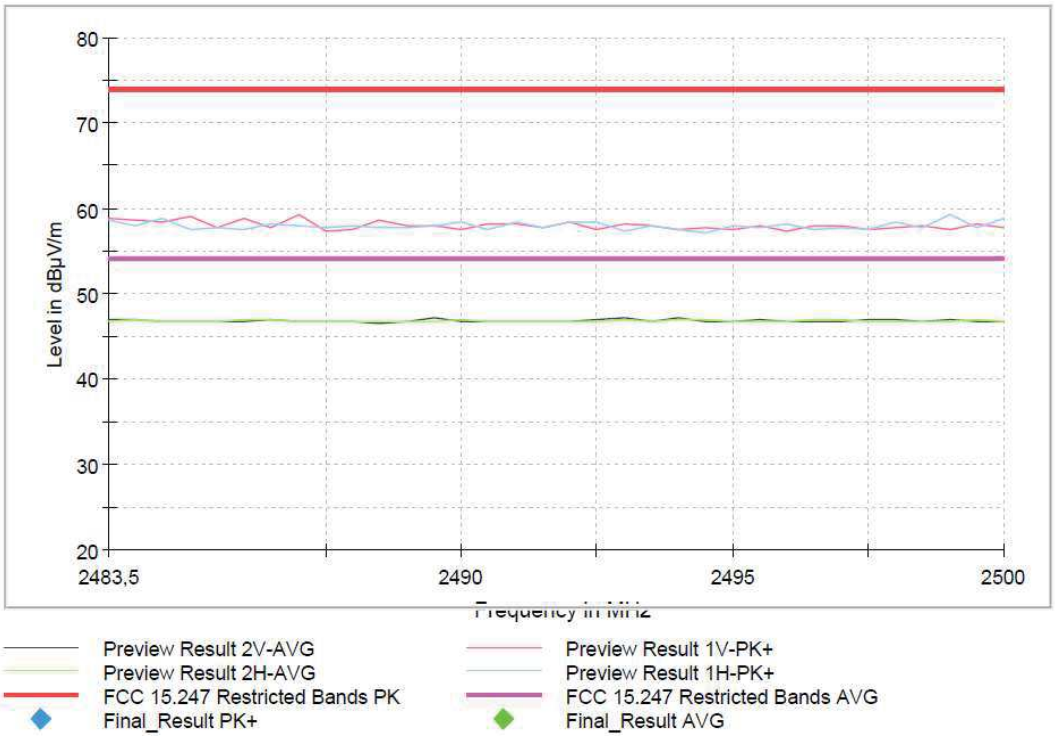
FREQUENCY RANGE 2.4835-2.5 GHz:

- **GFSK modulation (DH5)**

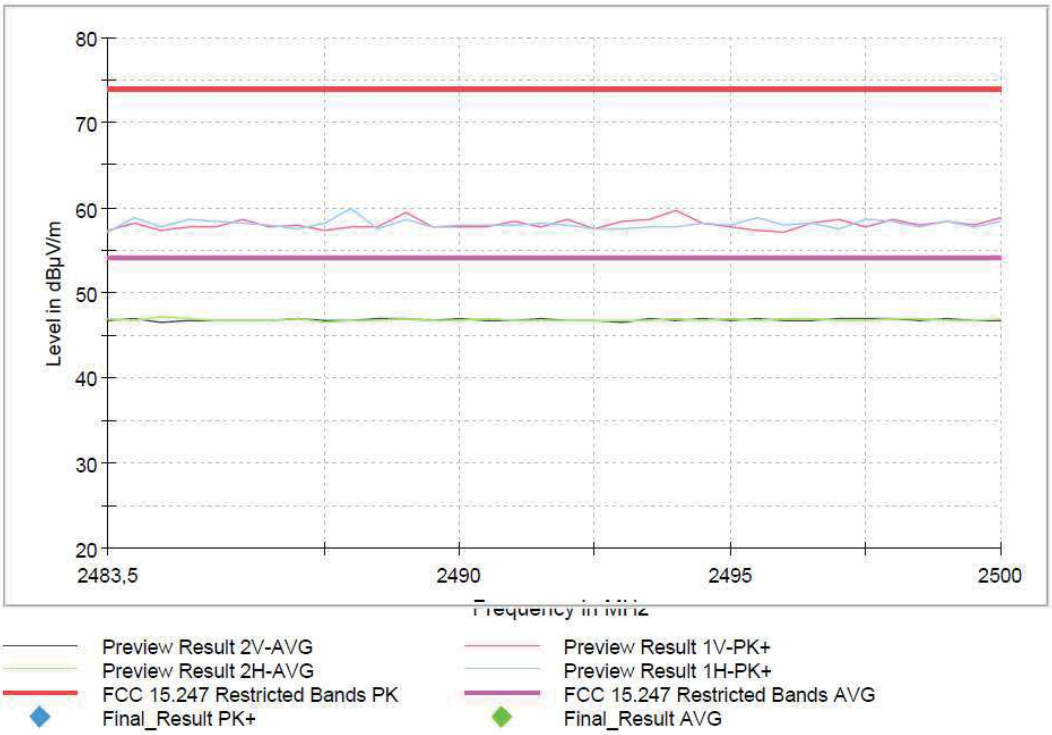
- Low Channel:



- Middle Channel:

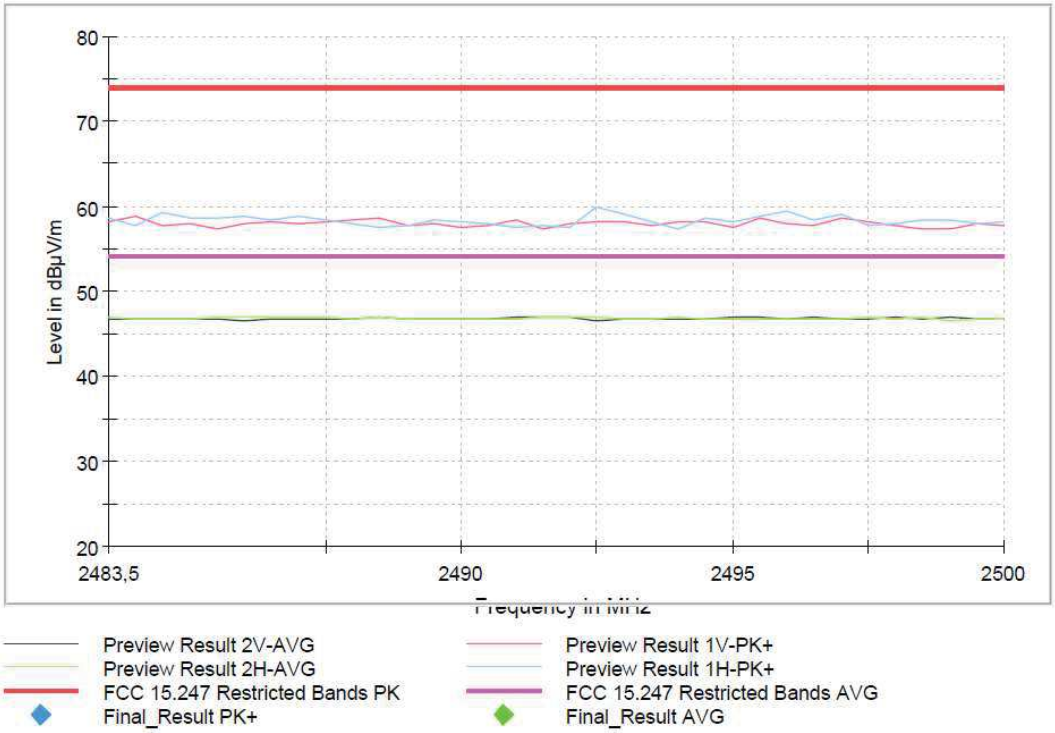


- High Channel:

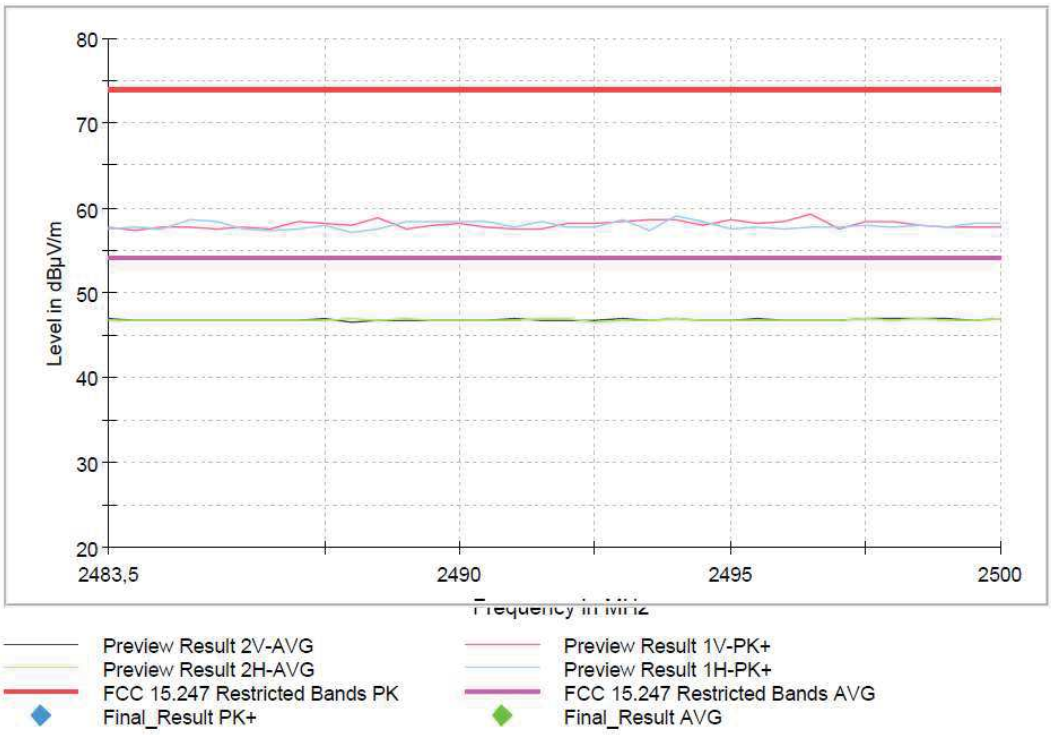


- **Pi/4-DQPSK modulation (2DH5)**

- Low Channel:



- Middle Channel:



- High Channel: