

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 ($\mu\text{V}/\text{m}$)	Field strength ($\text{dB}\mu\text{V}/\text{m}$)	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 360° 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.

No spurious frequencies at less than 20 dB below the limit.

Measurement Uncertainty: $<\pm 5.1$ dB

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 dB μ V/m at 3 m) are measured with average detector for checking compliance with the average limit.

- **GFSK modulation (DH5)**

- LOW CHANNEL. Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Emission Level (dB μ V/m)	Duty Cycle Correction (dB)	Corrected Emission Level (dB μ V/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.387333333	57.07	--	57.07	V	Peak	$<\pm 4.11$
	43.57	1.10	44.67		Average	$<\pm 4.11$
4.999500000	42.60	--	42.60	V	Peak	$<\pm 5.13$

- MIDDLE CHANNEL. Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Emission Level (dB μ V/m)	Duty Cycle Correction (dB)	Corrected Emission Level (dB μ V/m)	Polarization	Detector	Measurement Uncertainty (dB)
4	40.79	--	40.79	V	Peak	$<\pm 5.13$
5.0005	42.85	--	42.85	V	Peak	$<\pm 5.13$

- HIGH CHANNEL. Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Emission Level (dB μ V/m)	Duty Cycle Correction (dB)	Corrected Emission Level (dB μ V/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.4855 (*)	56.2	--	56.2	H	Peak	$<\pm 5.13$
	48.87	1.10	49.97		Average	$<\pm 5.13$
5	42.52	--	42.52	V	Peak	$<\pm 5.13$

NOTE: The "delta" technique was used to measure the restricted-band emission between 2483.5 MHz and 2485.5 MHz. When the restricted-band emission is at a frequency greater than 2485.5 MHz, it was measured in the conventional manner.

Verdict: PASS

• **Pi/4-DQPSK modulation (2-DH5)**

- LOW CHANNEL. Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Emission Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Emission Level (dBµV/m)	Polarization	Detector	Measurement Uncertainty (dB)
5	43.98	--	43.98	V	Peak	<± 5.13

- MIDDLE CHANNEL. Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Emission Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Emission Level (dBµV/m)	Polarization	Detector	Measurement Uncertainty (dB)
5.0005	42.31	--	42.31	V	Peak	<± 5.13

- HIGH CHANNEL. Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Emission Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Emission Level (dBµV/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.4855(*)	57.13	--	62.60	H	Peak	<± 5.13
	43.77	1.10	44.87		Average	<± 5.13
5	43.87	--	43.87	V	Peak	<± 5.13

NOTE: The "delta" technique was used to measure the restricted-band emission between 2483.5 MHz and 2485.5 MHz. When the restricted-band emission is at a frequency greater than 2485.5 MHz, it was measured in the conventional manner.

Measurement Uncertainty (dB): 1 GHz ≤ f ≤ 17 GHz: <± 5.13
 17 GHz ≤ f ≤ 26 GHz: <± 5.08

Verdict: PASS

• **8-DPSK modulation (3DH5)**

- LOW CHANNEL. Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Emission Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Emission Level (dBµV/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.387866667	57.13	--	57.13	V	Peak	<± 5.13
	43.69	1.10	44.79		Average	<± 5.13
5	43.71	--	43.71	V	Peak	<± 5.13

- MIDDLE CHANNEL. Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Emission Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Emission Level (dBµV/m)	Polarization	Detector	Measurement Uncertainty (dB)
4	40.79	--	40.79	V	Peak	<± 5.13
5	43.90	--	43.90	V	Peak	<± 5.13

- HIGH CHANNEL. Spurious frequencies at less than 20 dB below the limit:

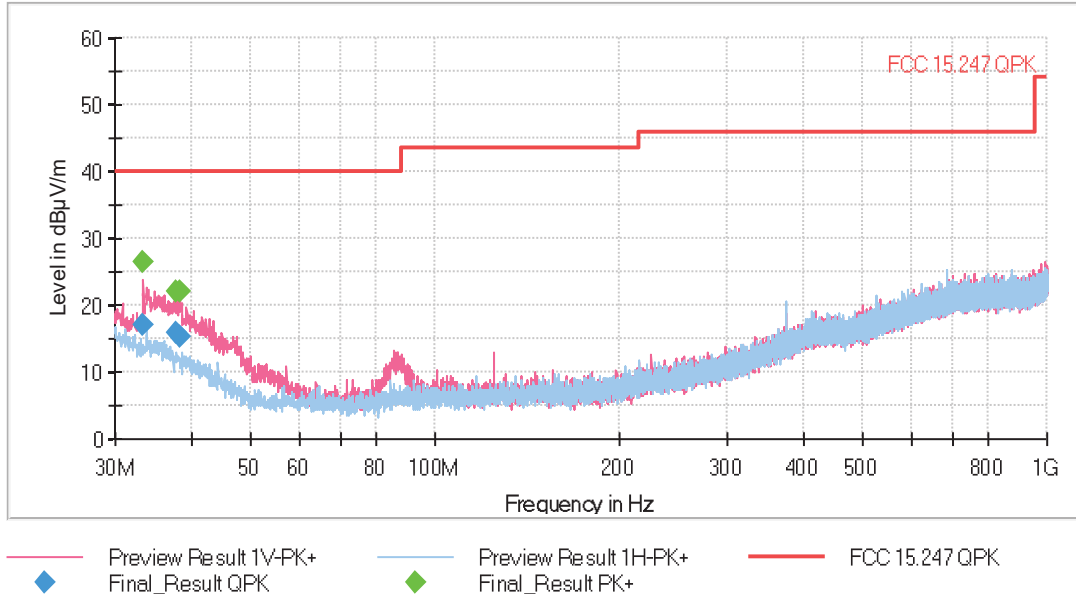
Spurious frequency (GHz)	Emission Level (dBµV/m)	Duty Cycle Correction (dB)	Corrected Emission Level (dBµV/m)	Polarization	Detector	Measurement Uncertainty (dB)
2.4835	62.51	--	62.51	V	Peak	<± 5.13
	52.25	1.10	53.35		Average	<± 5.13
2.483533333	62.17	--	62.17	H	Peak	<± 5.13
	52.22	1.10	53.32		Average	<± 5.13
2.483600000	61.04	--	61.04	V	Peak	<± 5.13
	50.75	1.10	51.85		Average	<± 5.13

Measurement Uncertainty (dB): 1 GHz ≤ f ≤ 17 GHz: <± 5.13
 17 GHz ≤ f ≤ 26 GHz: <± 5.08

Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz:

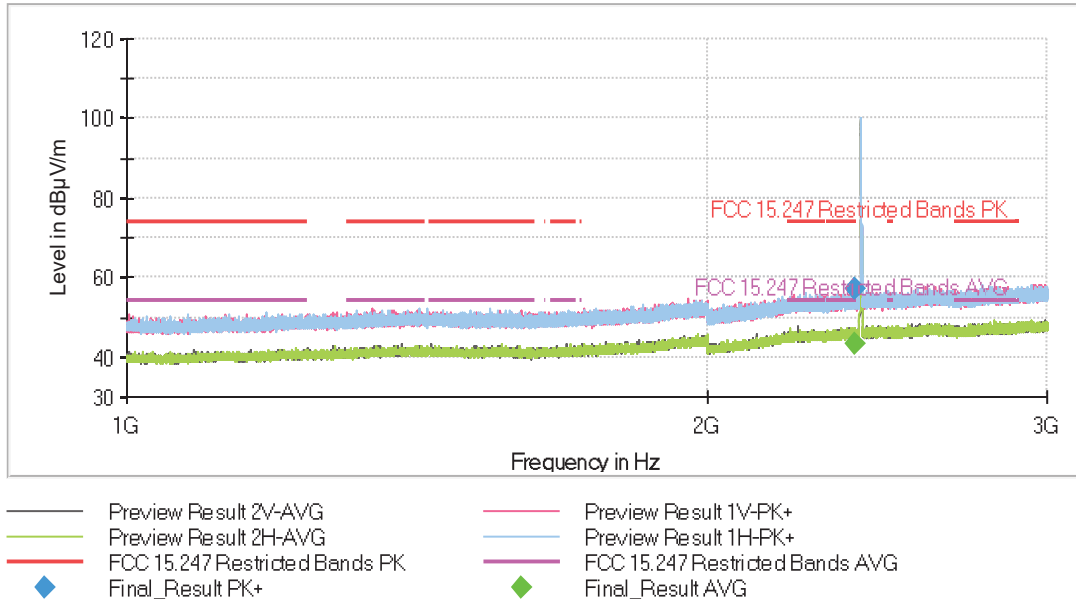
This plot is valid for the Low, Middle and High Channels and all the modulation modes.



FREQUENCY RANGE 1 - 3 GHz:

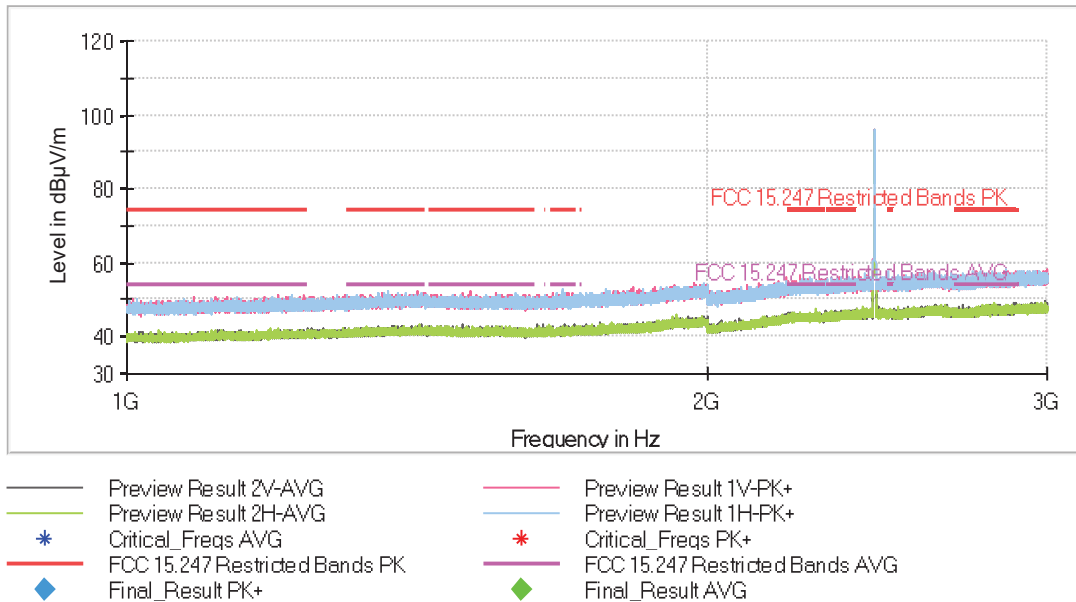
• **GFSK modulation (DH5)**

- Low Channel:



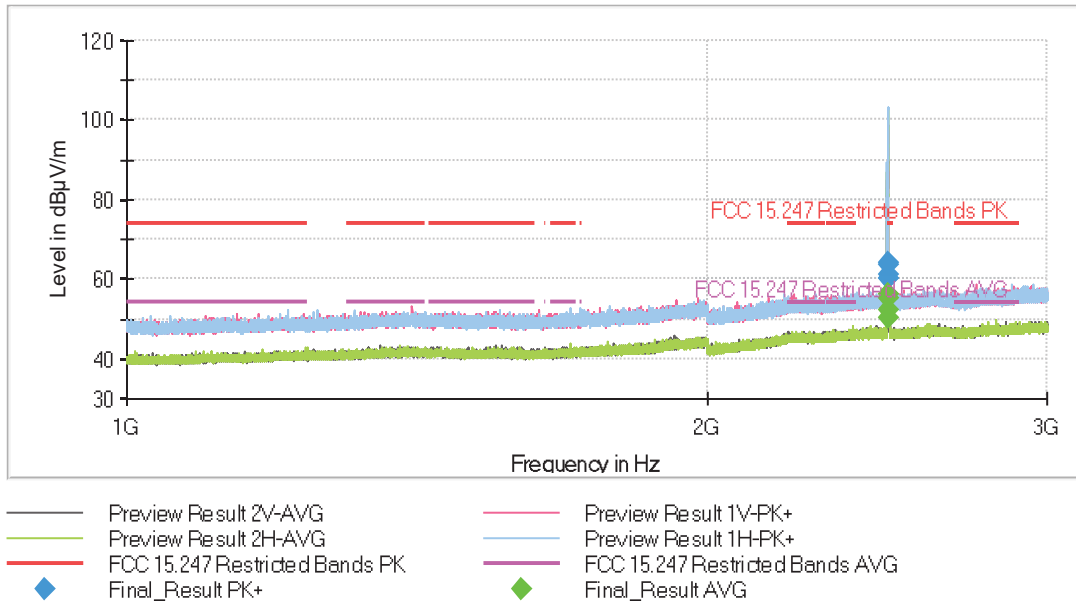
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

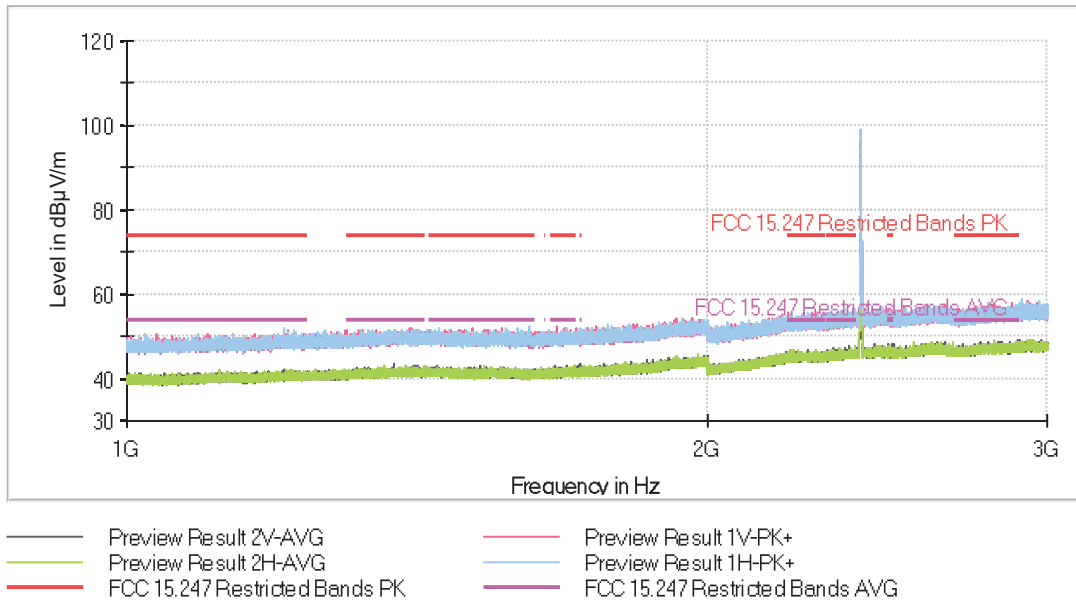
- High Channel:



The peak above the limit is the carrier frequency.

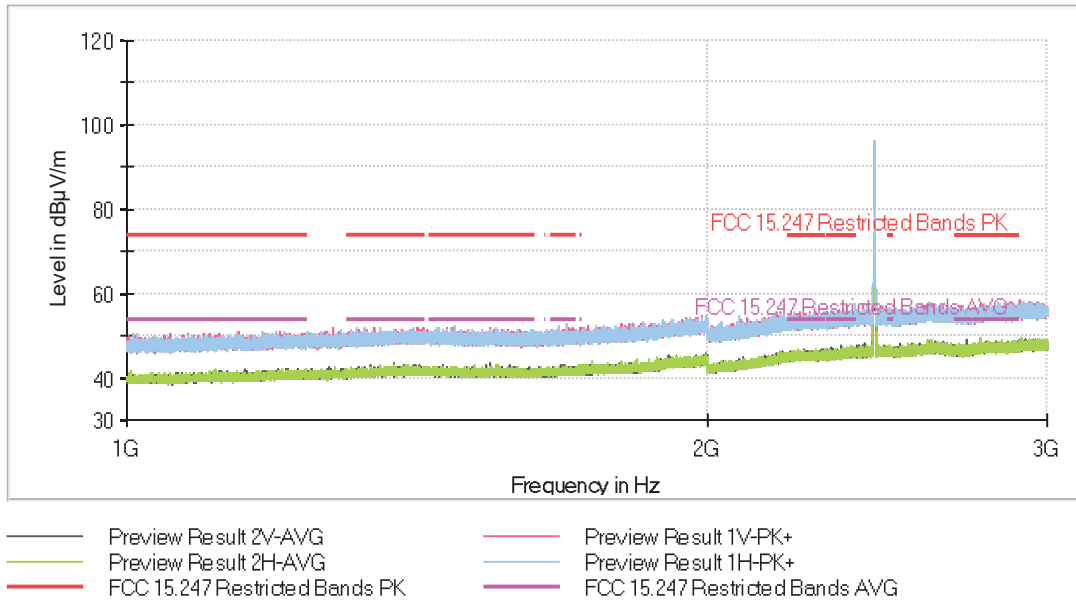
• Pi/4-DQPSK modulation (2DH5)

- Low Channel:



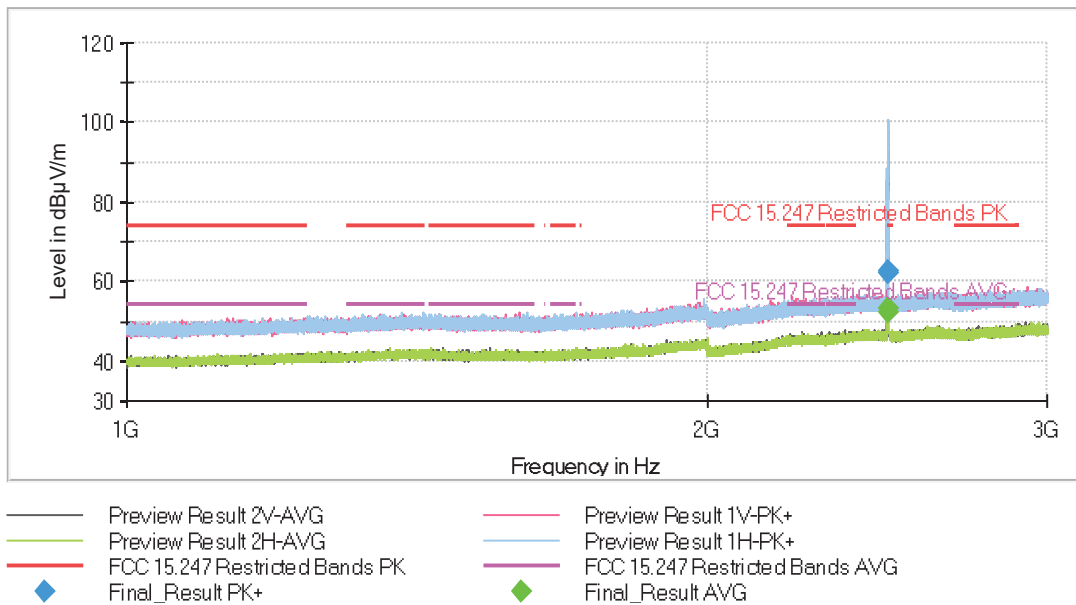
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

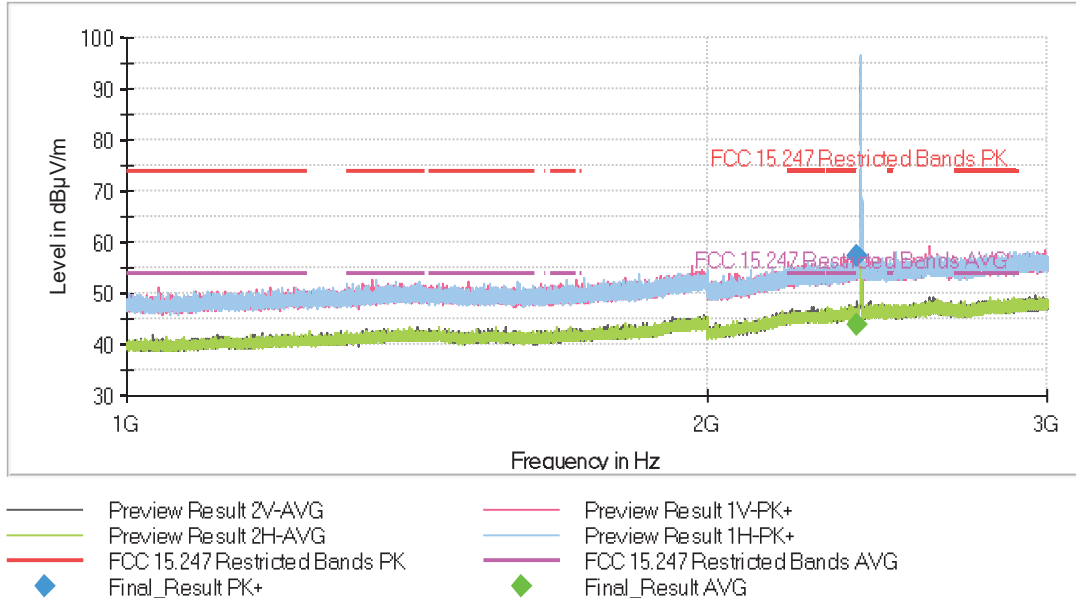
- High Channel:



The peak above the limit is the carrier frequency.

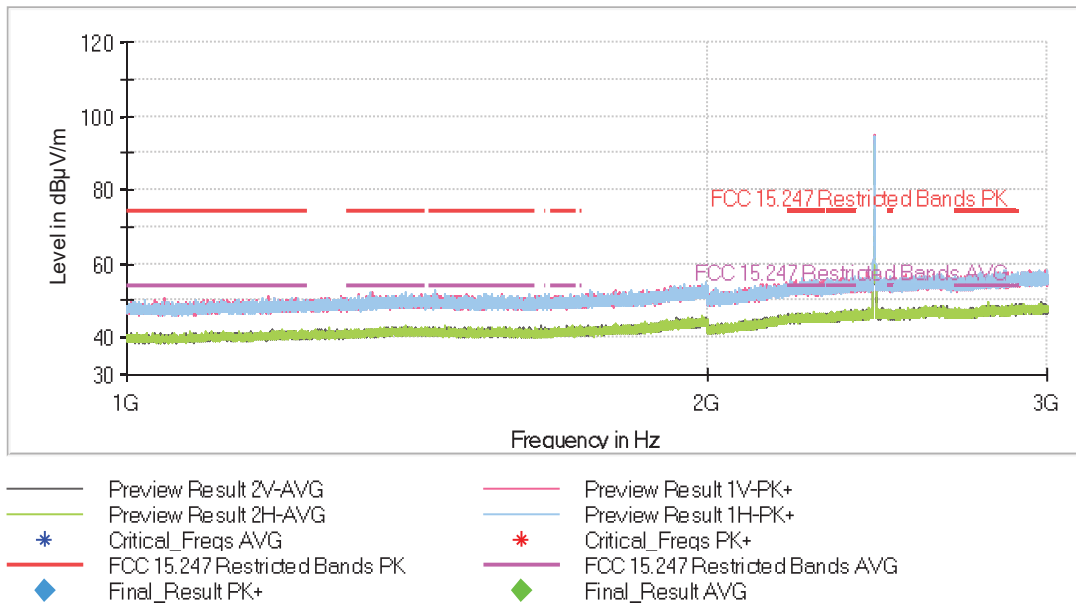
• 8-DPSK modulation (3DH5)

- Low Channel:



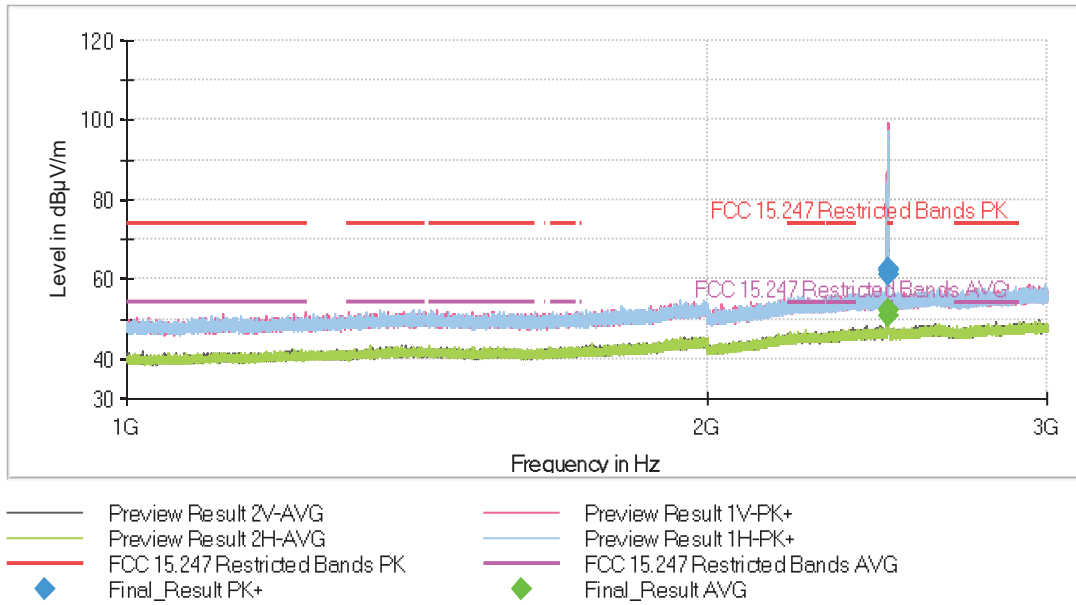
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

- High Channel:



The peak above the limit is the carrier frequency.