

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

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 1 m for the frequency range 17 GHz-26 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 do not depend neither on the operating channel nor the modulation mode.

Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (MHz)	Emission Level (dBμV/m)	Polarization	Detector	Measurement Uncertainty (dB)
884.764000	31.65	V	Quasi-peak	<± 5.08

Measurement Uncertainty: <± 5.08 dB

- **Mode 802.11 b:**

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.

- LOW CHANNEL. No spurious frequencies at less than 20 dB below the limit.
- MIDDLE CHANNEL. No spurious frequencies at less than 20 dB below the limit.
- HIGH CHANNEL. No spurious frequencies at less than 20 dB below the limit.
- RESTRICTED BAND 2.31-2.39 GHz. LOW CHANNEL. No spurious frequencies at less than 20 dB below the limit.
- RESTRICTED BAND 2.4835-2.5 GHz. HIGH CHANNEL. No spurious frequencies at less than 20 dB below the limit.

Measurement Uncertainty (dB): 1 GHz ≤ f ≤ 17 GHz: <± 5.13
17 GHz < f ≤ 26 GHz: <± 4.82

Verdict: PASS

OFDM modes:

For spurious emissions in the range 30 MHz - 26 GHz (except field strength at the band edges that was performed for all modes) a preliminary scan was performed to determine the worst case mode.

Spurious emissions in the Restricted Bands 2.31-2.39 GHz and 2.4835-2.5 GHz are measured for all modes. The following results and plots are for the worst case OFDM mode.

- **Worst case OFDM mode: 802.11 g.**

- **Mode 802.11 g (OFDM worst case for spurious emissions):**

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.

- LOW CHANNEL. No spurious frequencies at less than 20 dB below the limit
- MIDDLE CHANNEL. No spurious frequencies at less than 20 dB below the limit.
- HIGH CHANNEL. No spurious frequencies at less than 20 dB below the limit.
- RESTRICTED BAND 2.31-2.39 GHz. LOW CHANNEL. No spurious frequencies at less than 20 dB below the limit.
- RESTRICTED BAND 2.4835-2.5 GHz. HIGH CHANNEL. No spurious frequencies at less than 20 dB below the limit.

Measurement Uncertainty (dB): 1 GHz $\leq$ f $\leq$ 17 GHz: $\leq \pm 5.13$
17 GHz $\leq$ f $\leq$ 26 GHz: $\leq \pm 4.82$

Verdict: PASS

- **Mode 802.11 n20:**

The results in the next tables show the maximum measured levels in 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.

- RESTRICTED BAND 2.31-2.39 GHz. LOW CHANNEL. No spurious frequencies at less than 20 dB below the limit.

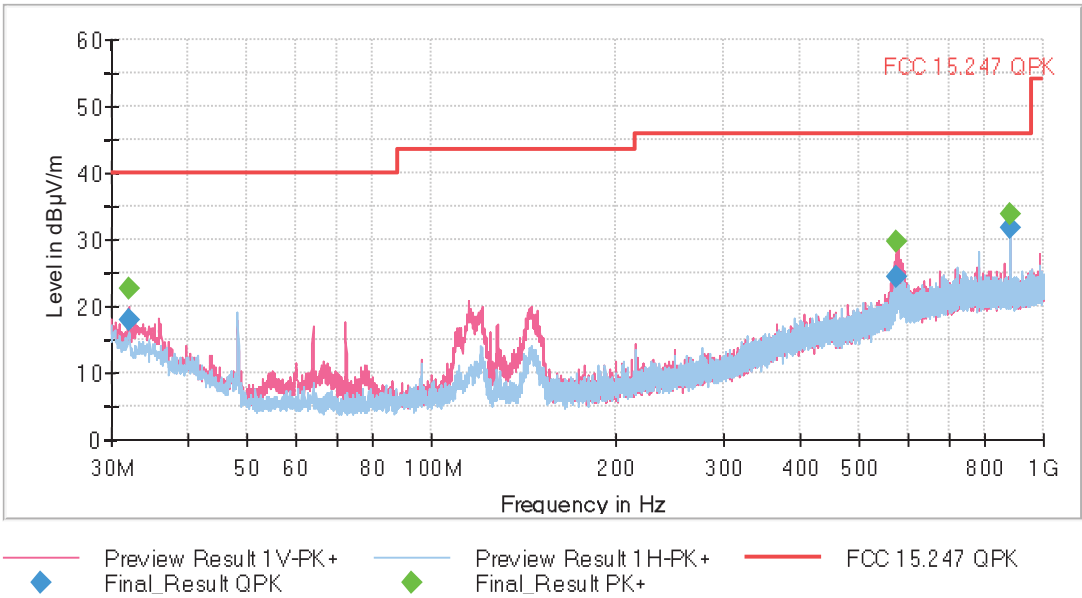
- RESTRICTED BAND 2.4835-2.5 GHz. HIGH CHANNEL. No spurious frequencies at less than 20 dB below the limit.

Measurement Uncertainty (dB): $1 \text{ GHz} \leq f \leq 17 \text{ GHz}$: $\leq \pm 5.13$
 $17 \text{ GHz} < f \leq 26 \text{ GHz}$: $\leq \pm 4.82$

Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz:

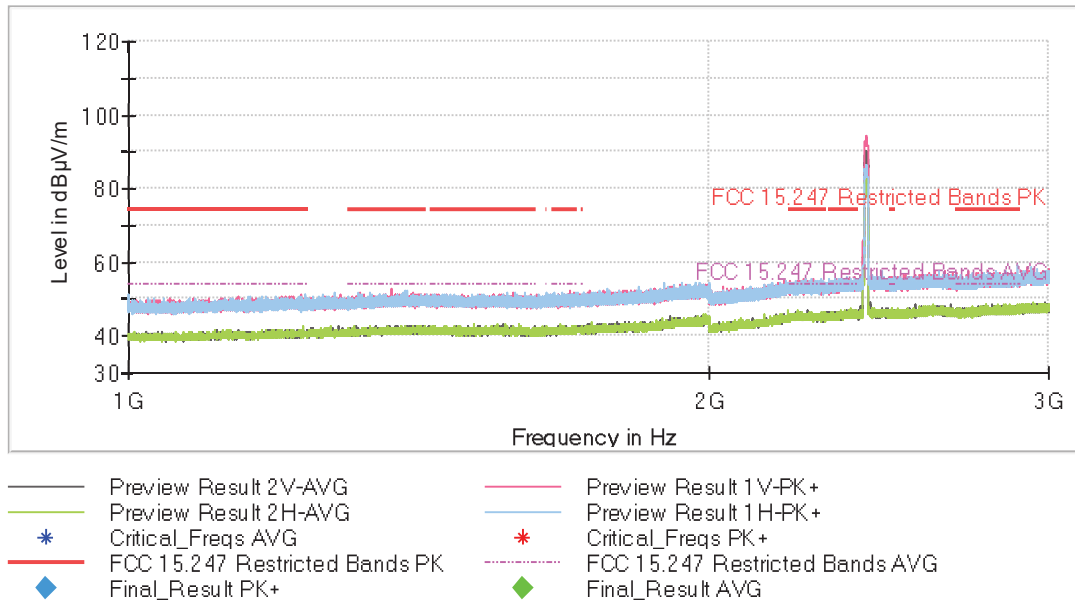
The spurious frequencies detected do not depend neither on the operating channel nor the modulation mode.



• **Mode 802.11 b:**

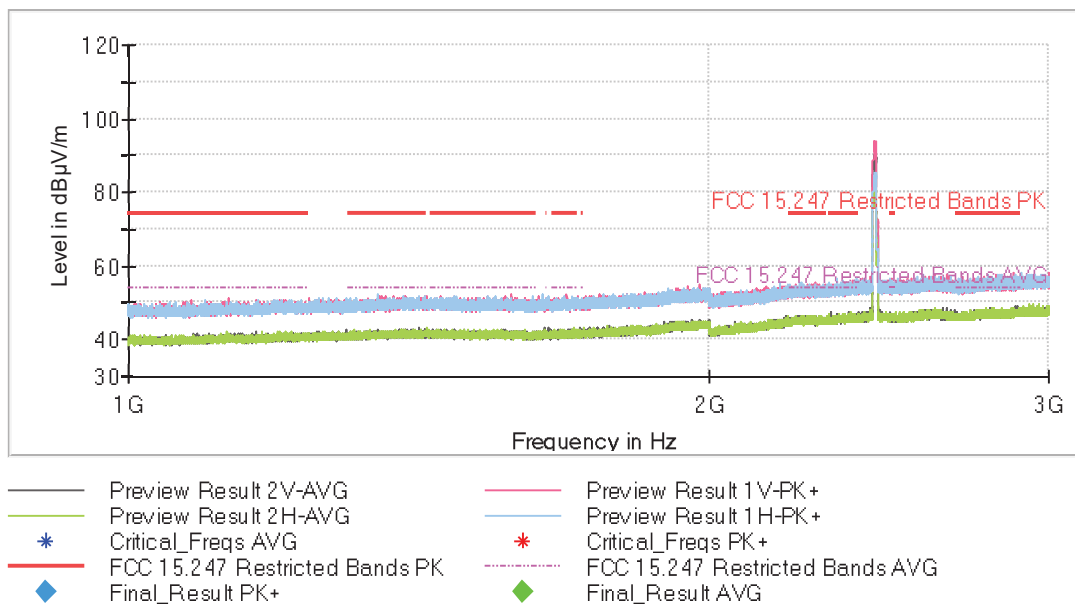
FREQUENCY RANGE 1 - 3 GHz:

- Low Channel:



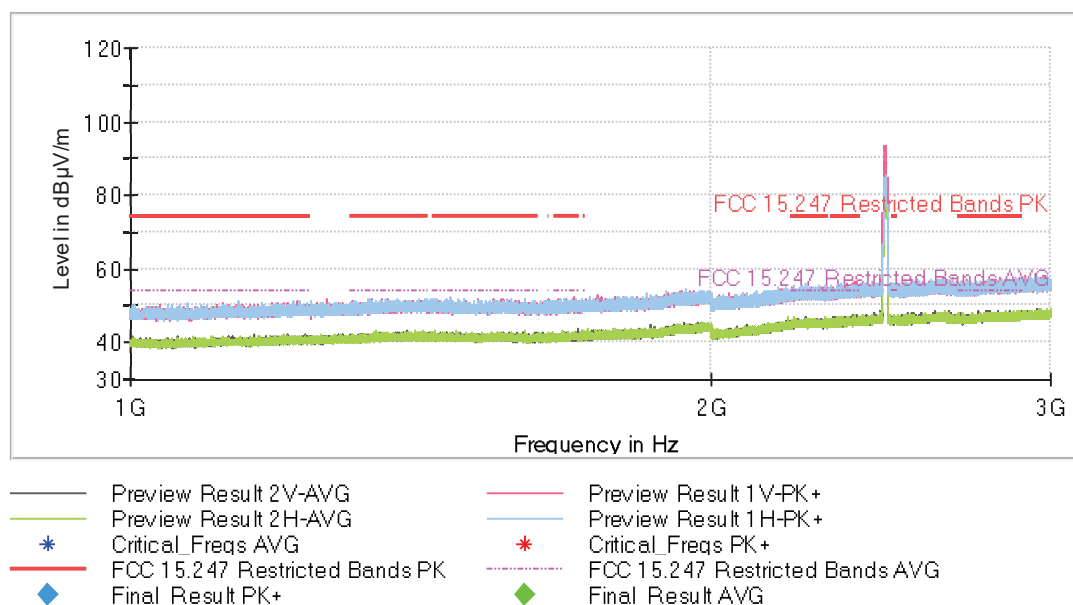
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

- High Channel:



The peak above the limit is the carrier frequency.