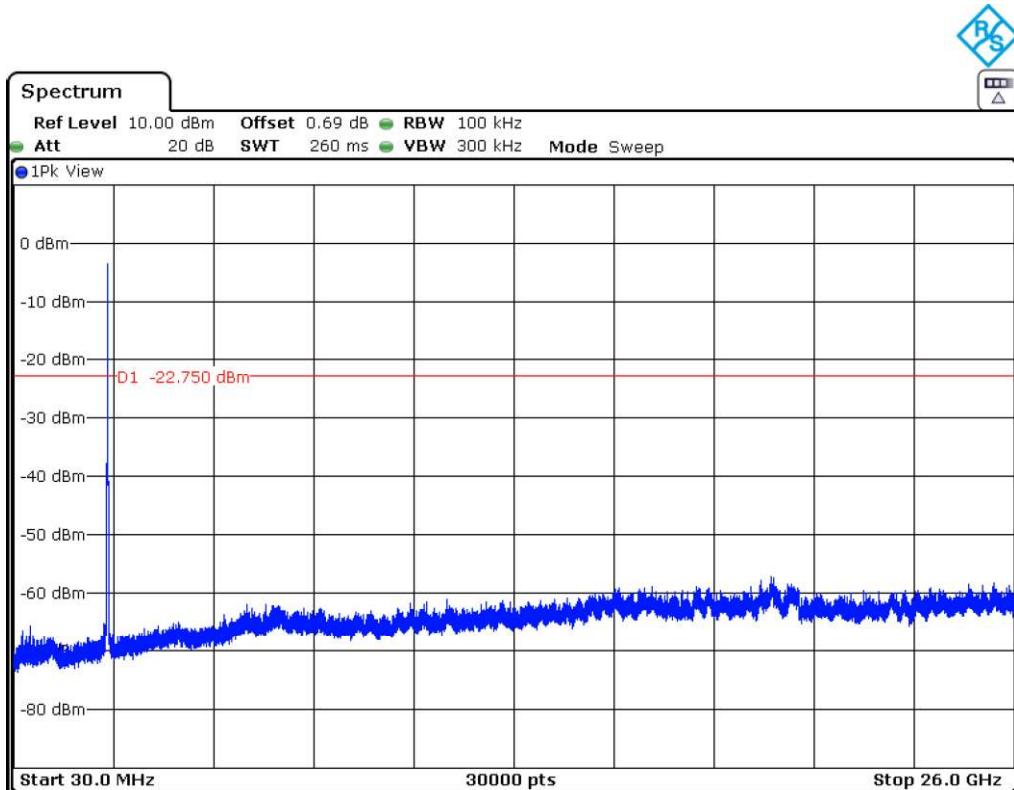


- High Channel:



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.

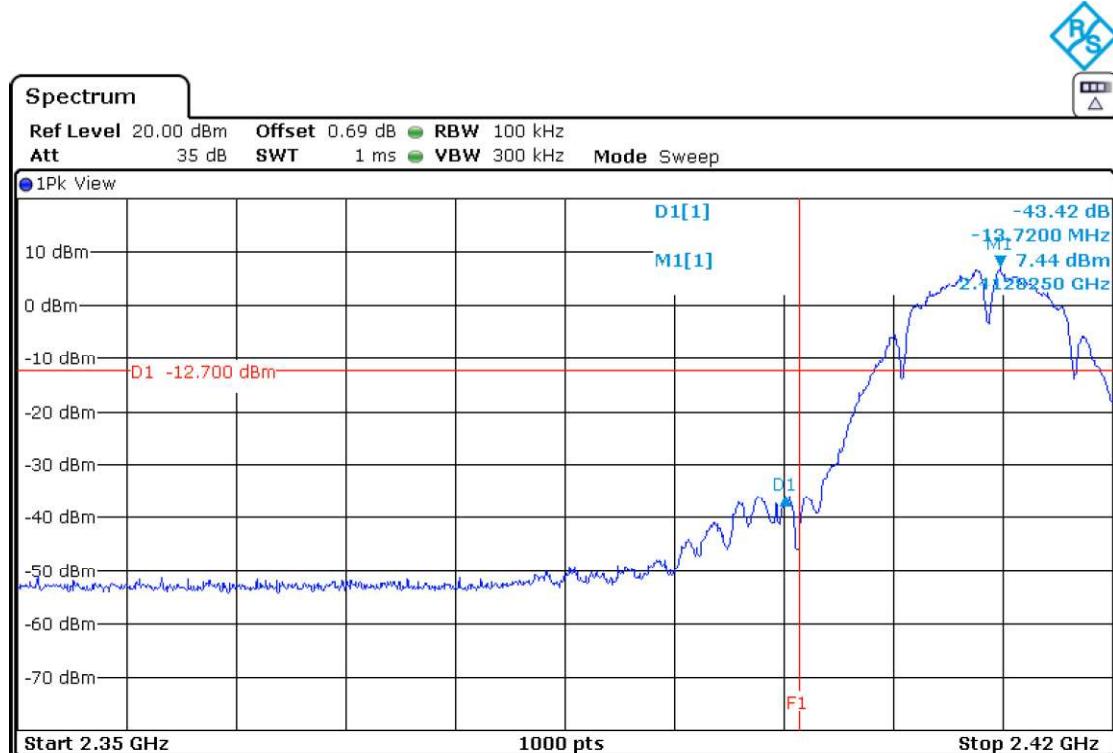
RESULTS:

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

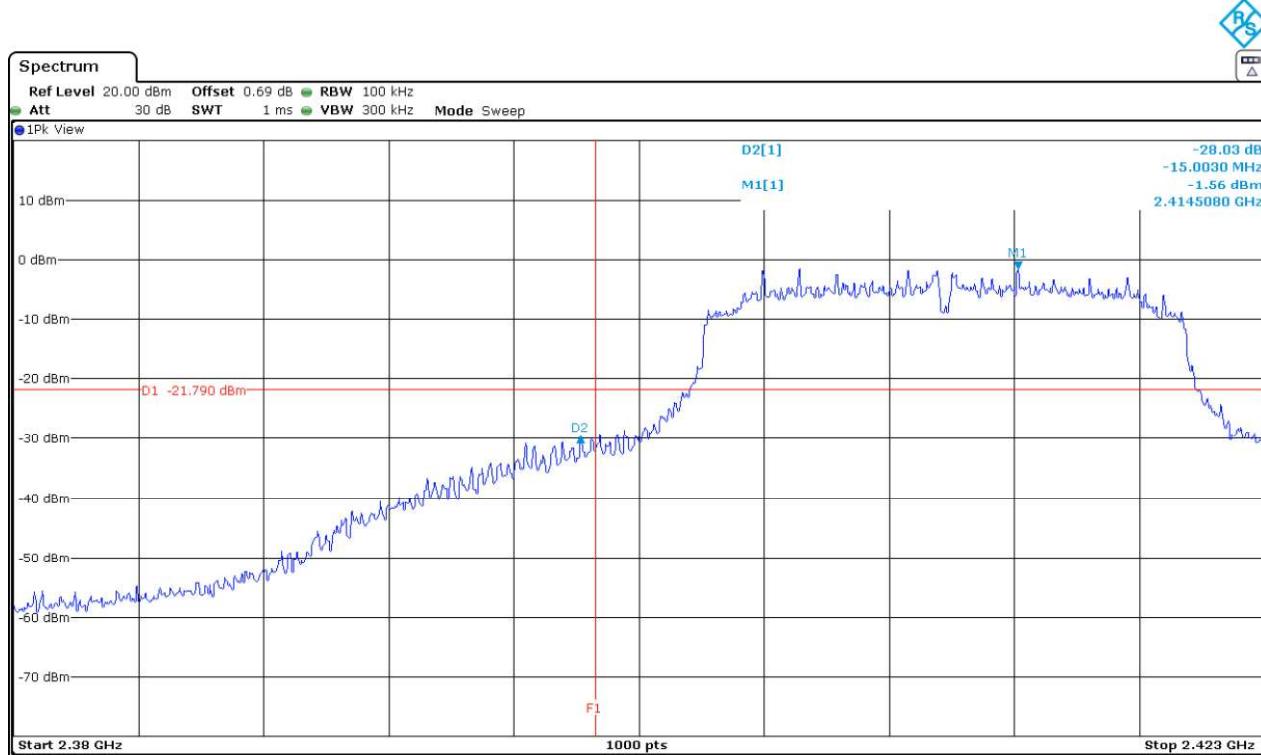
- Low Channel:



Verdict: PASS

- Mode 802.11 g – Band-edge emissions compliance

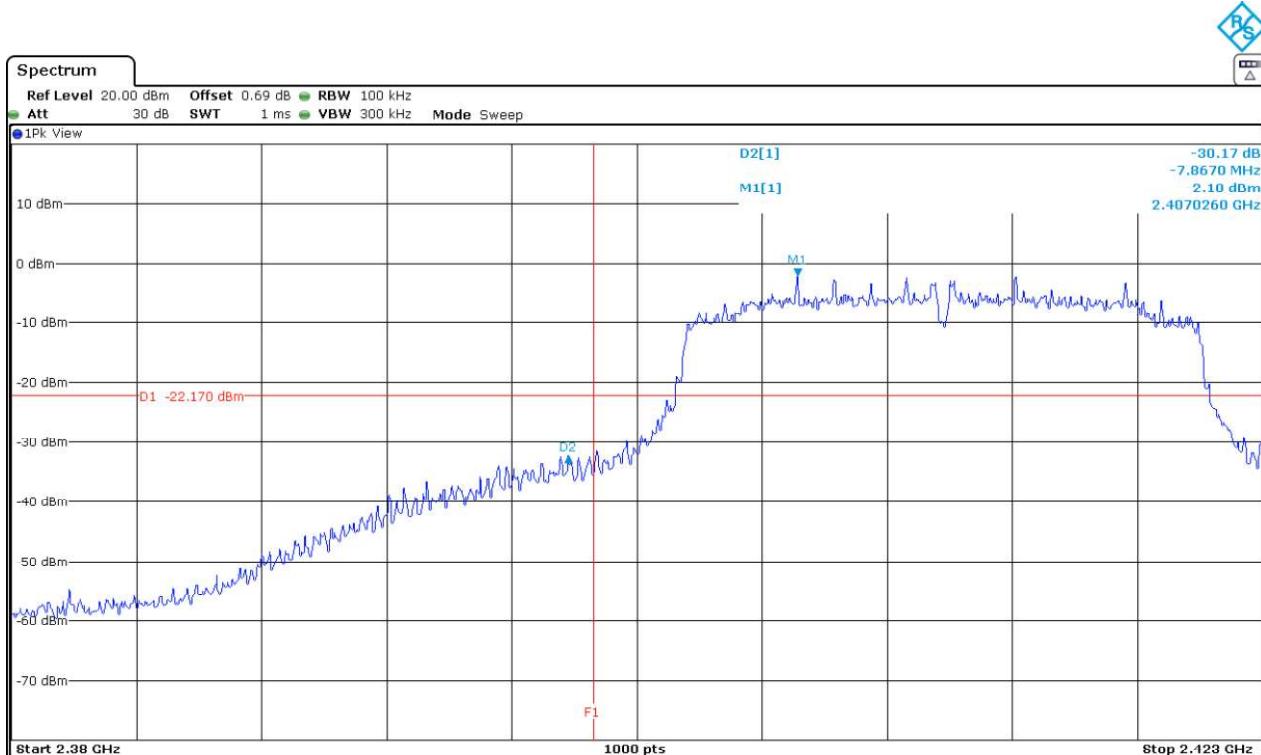
- Low Channel:



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)	6.74	7.74	6.44
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)	-1.79	3.82	-1.81
Measurement uncertainty (dB)	<±1.56		

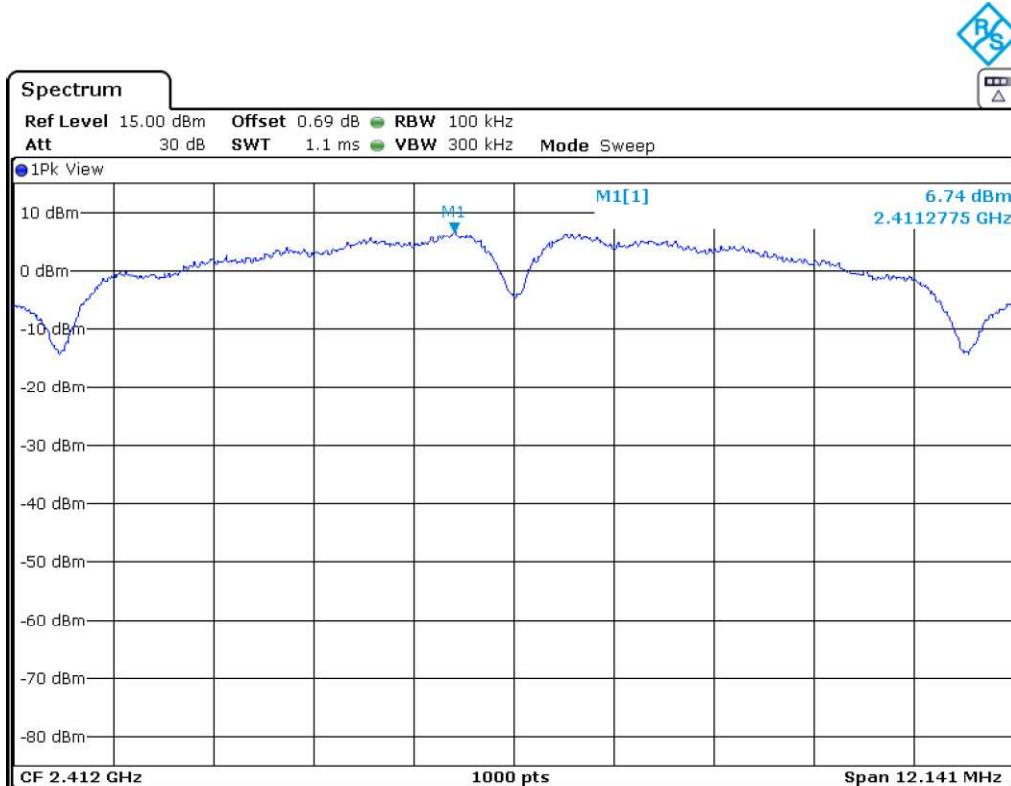
- **Mode 802.11 n20**

	Low Channel 2412 MHz	Middle Channel 2437 MHz	High Channel 2462 MHz
Power Spectral Density (dBm)	-2.17	3.61	-2.75
Measurement uncertainty (dB)	<±0.56		

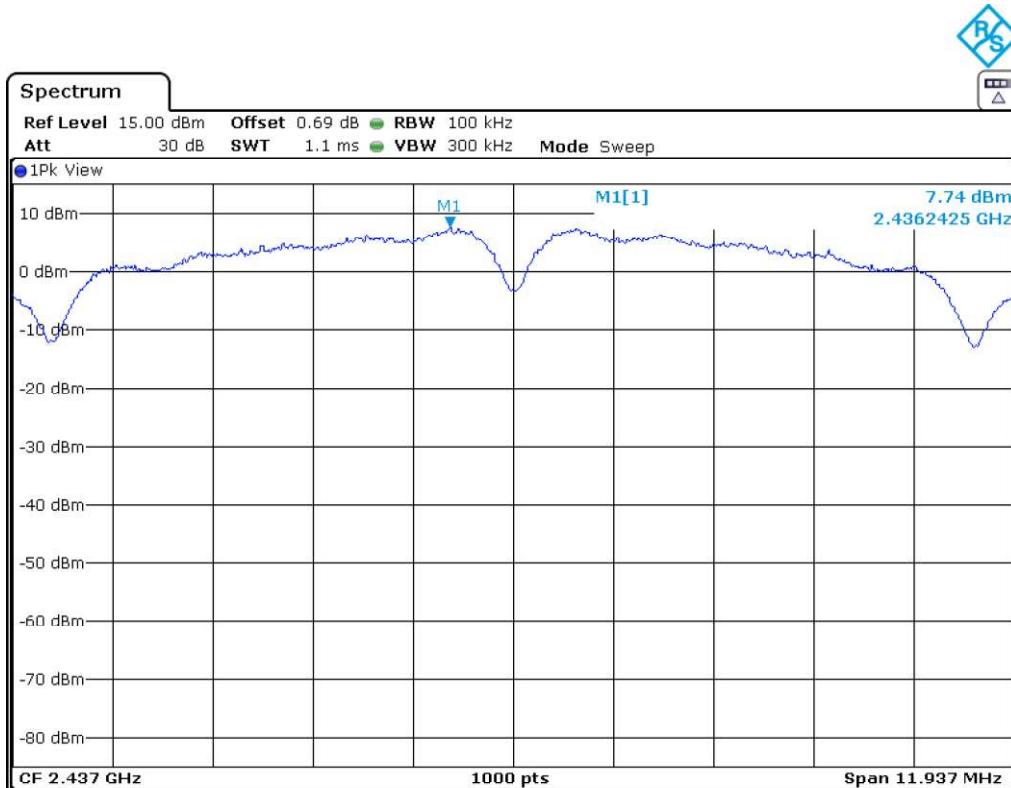
Verdict: PASS

- Mode 802.11 b – Power Spectral Density

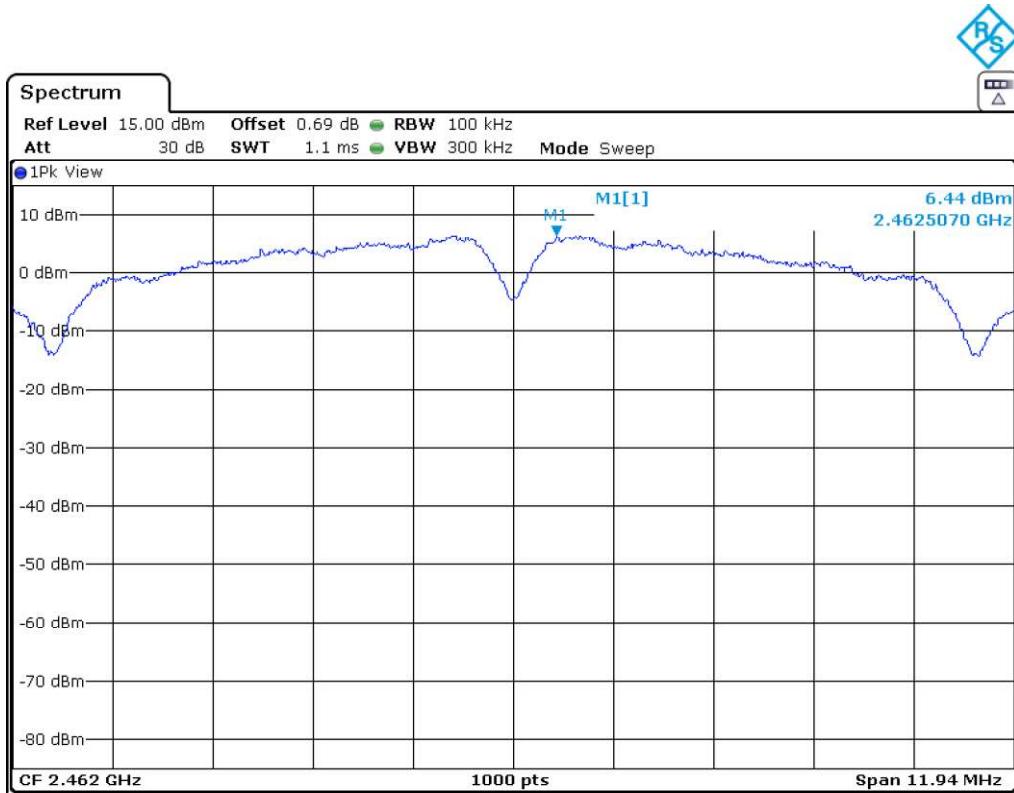
- Low Channel:



- Middle Channel:

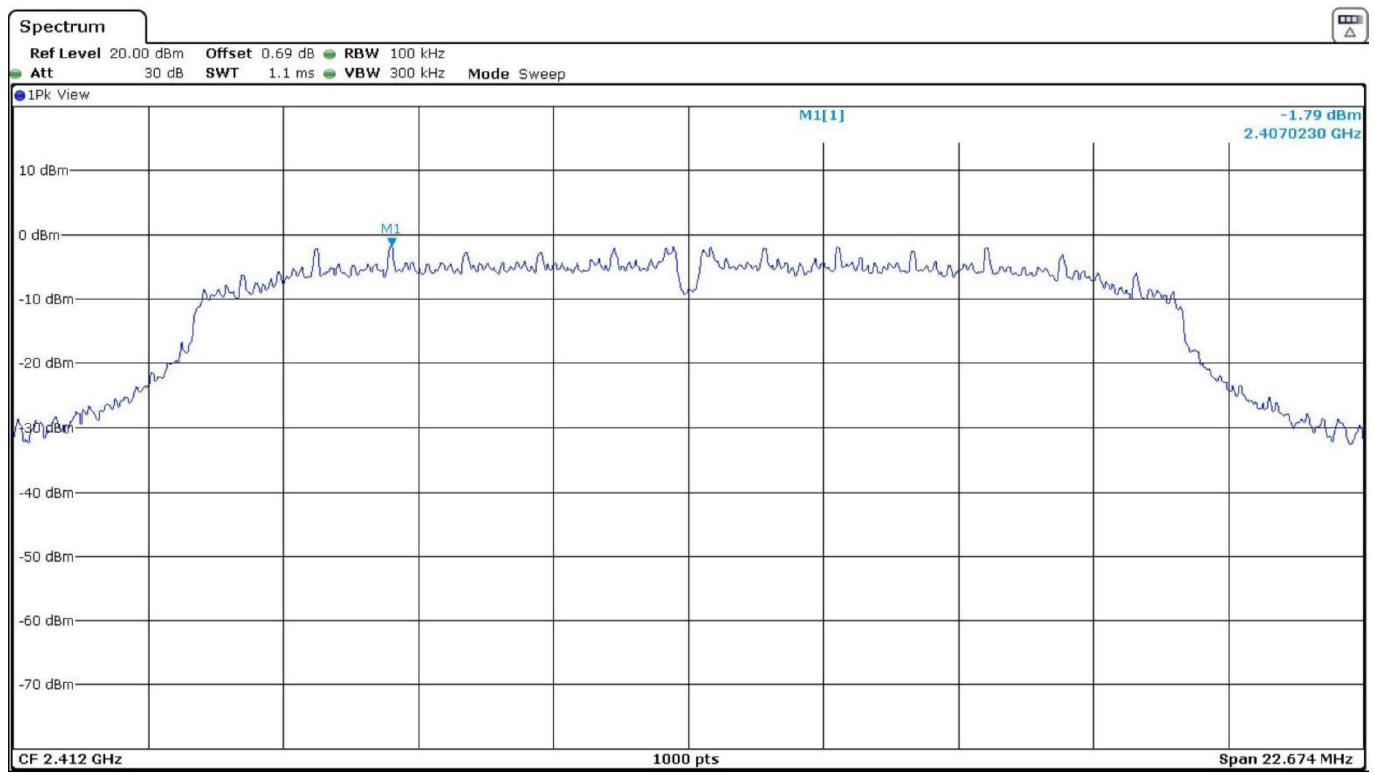


- High Channel:

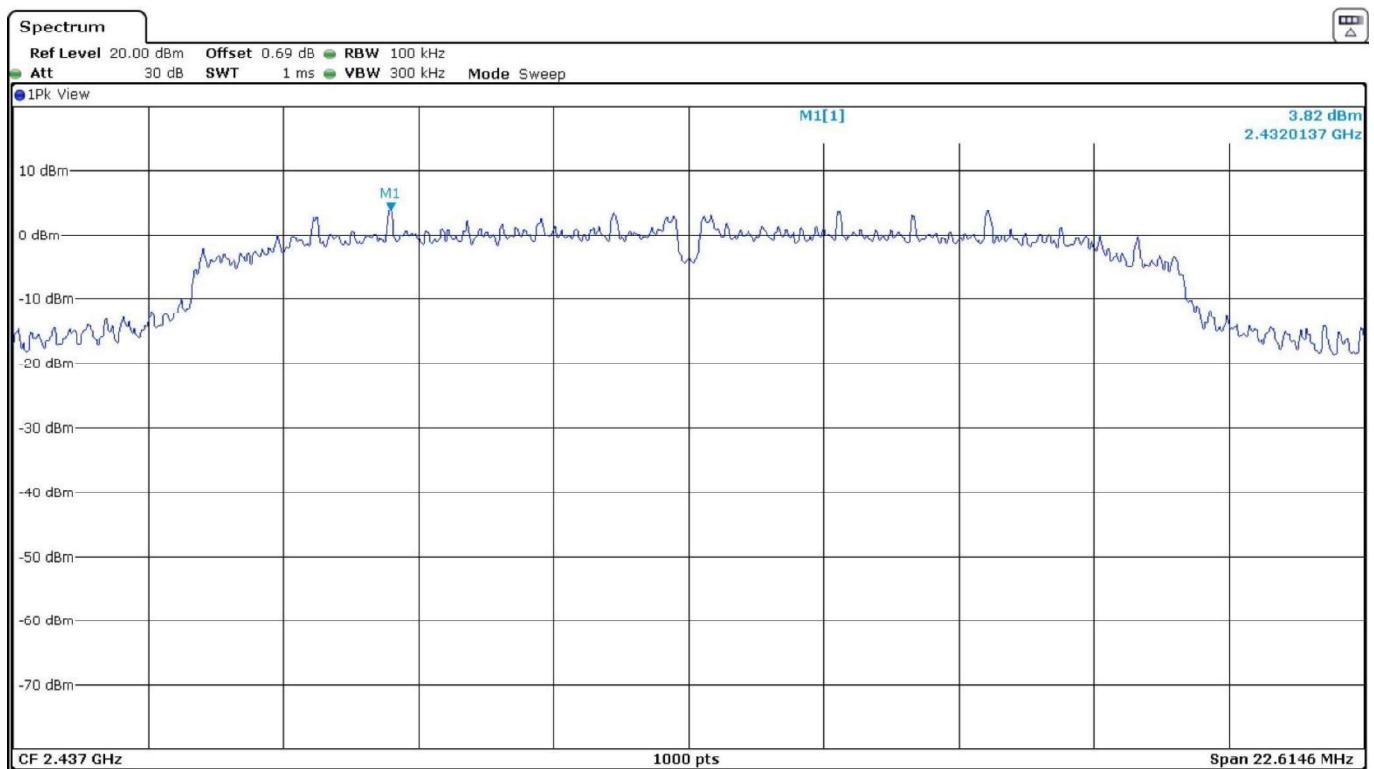


- Mode 802.11 g – Power Spectral Density

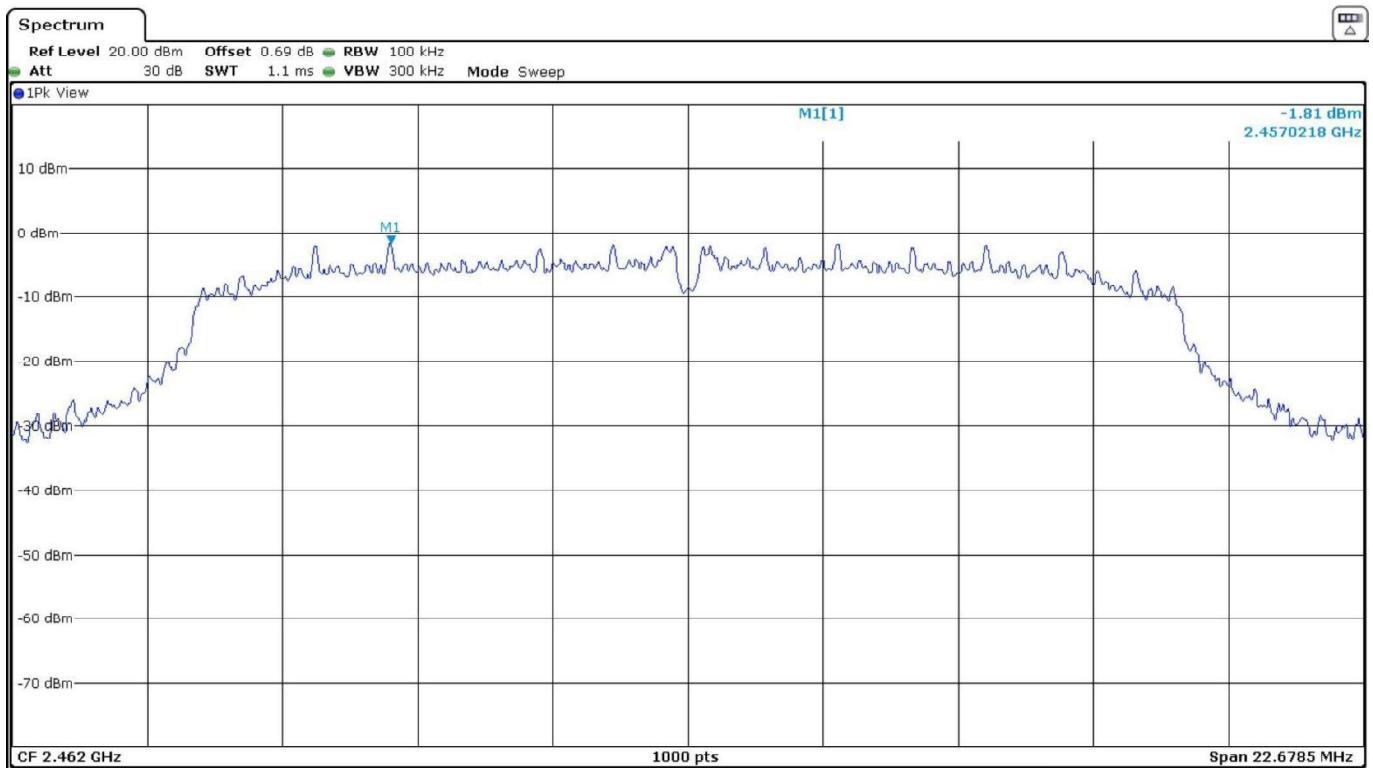
- Low Channel:



- Middle Channel:

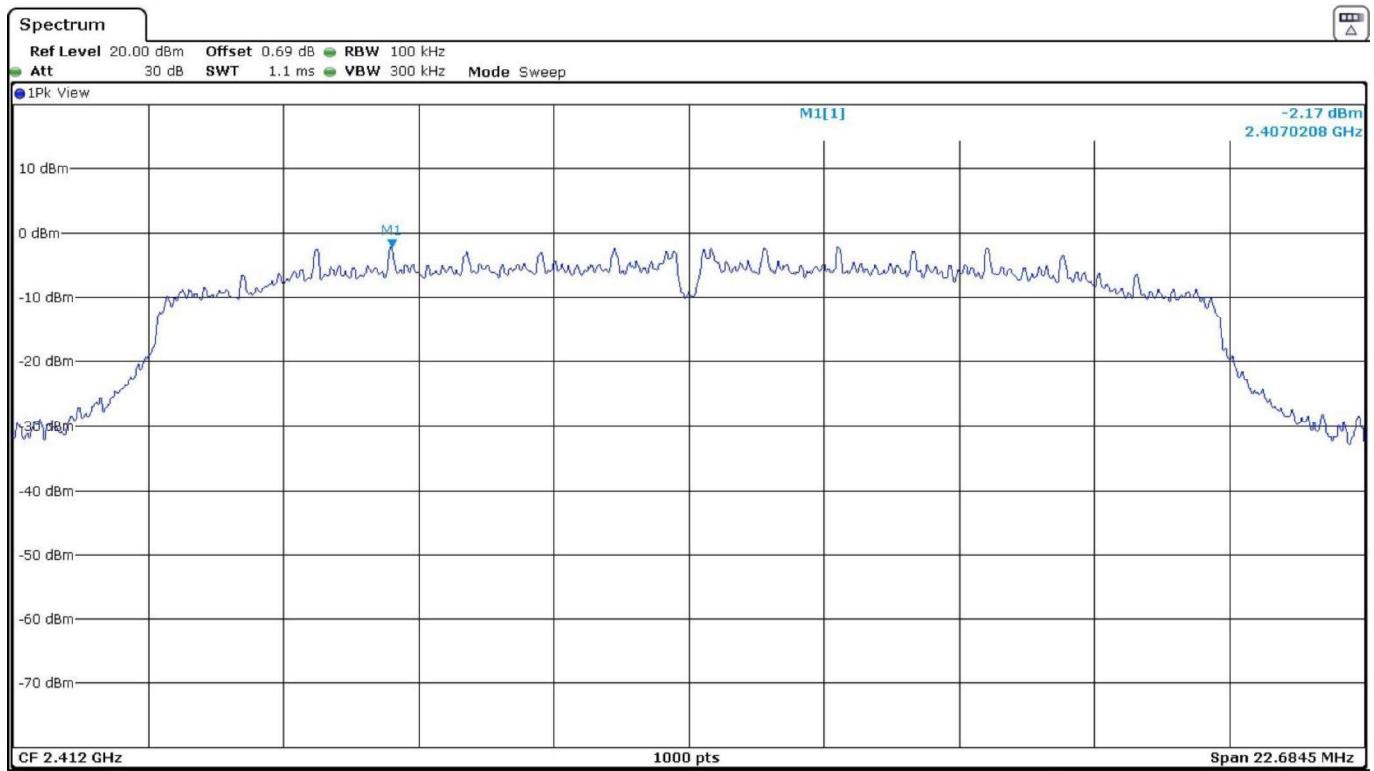


- High Channel:

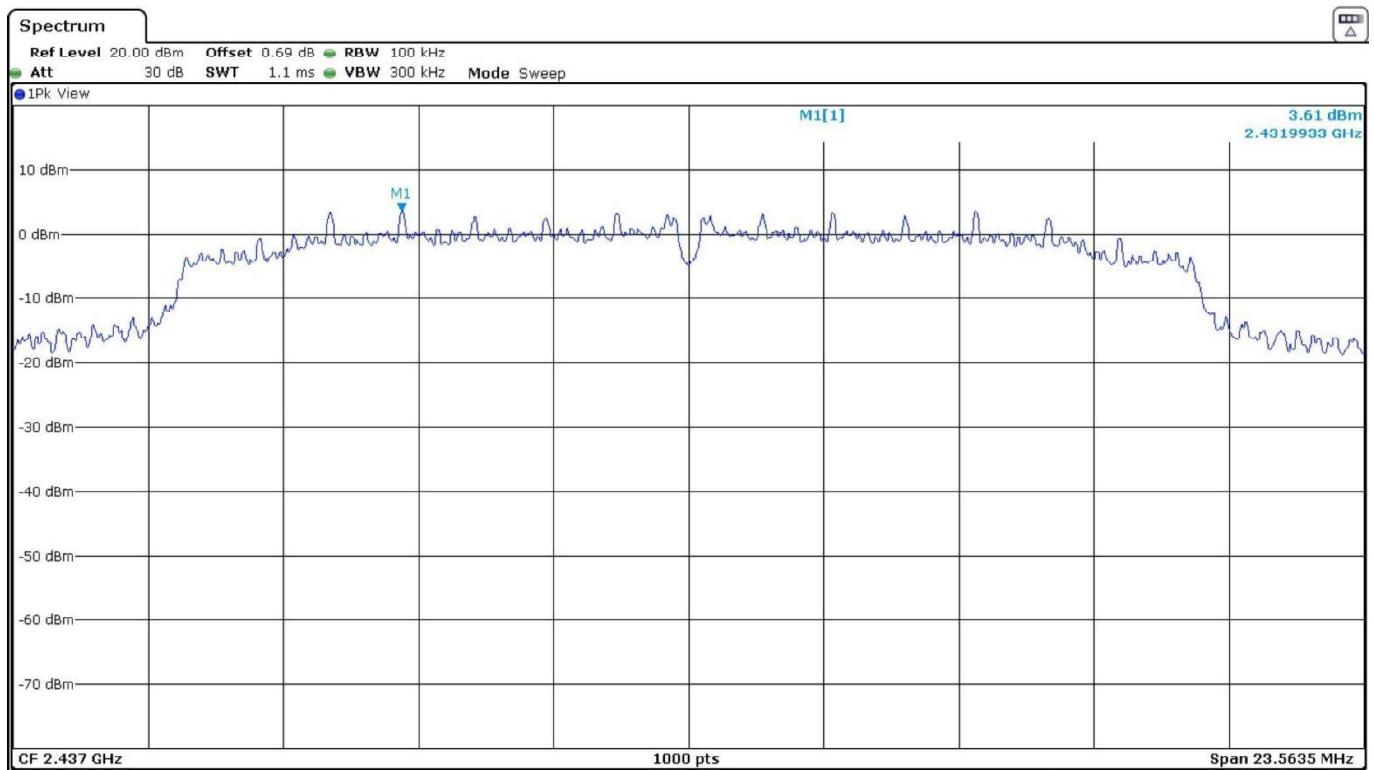


- Mode 802.11 n20 – Power Spectral Density

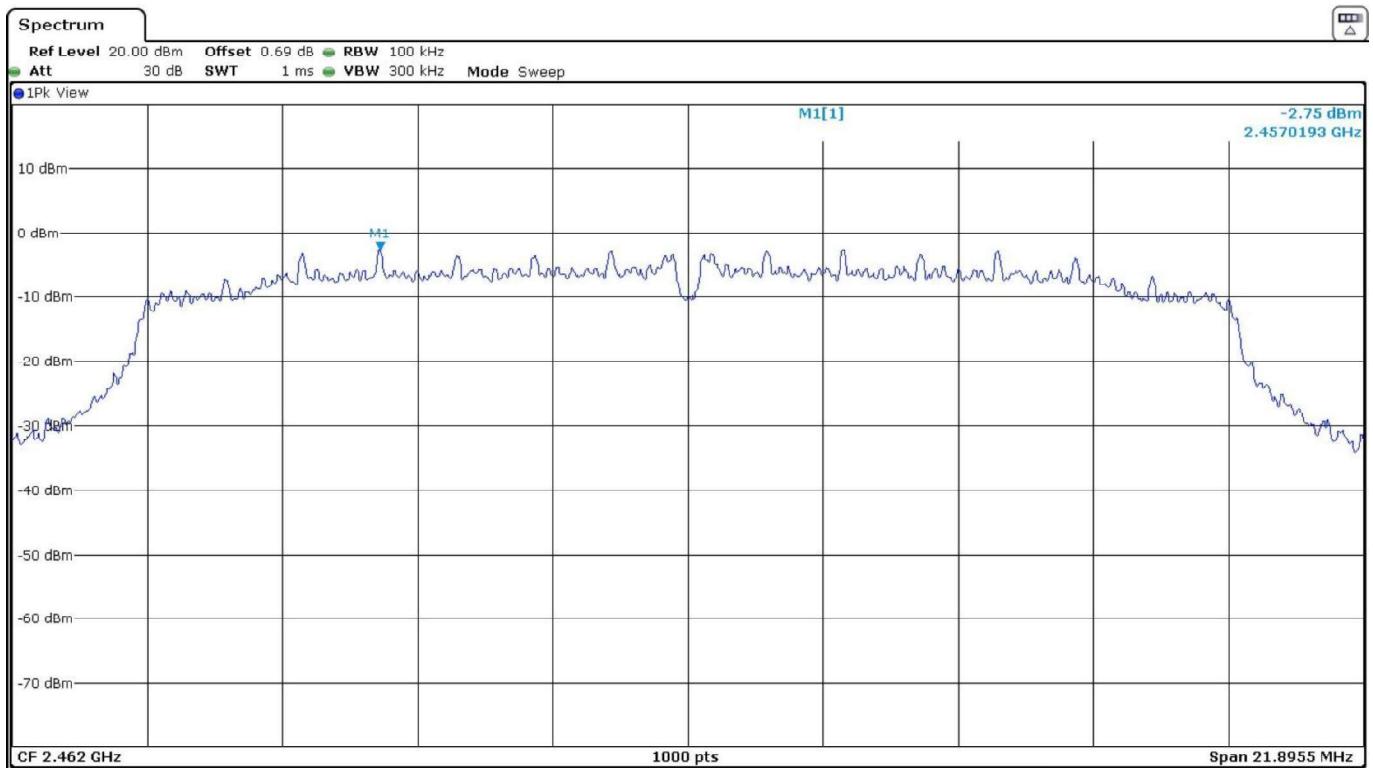
- Low Channel:



- Middle Channel:



- High Channel:



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

SPECIFICATION:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)/RSS-Gen):

Frequency Range (MHz)	Field strength (μ V/m)	Field strength (dB μ 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 - 10000	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-1000 MHz and at distance of 1m for the frequency range 1 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.

The field strength at the restricted bands and band edges was evaluated for each mode on the lowest and highest channels at the rated power for the channel under test. Where the power at the edge channels was lower than the power at the center channels additional measurements were made at the adjacent channels.

• Mode 802.11 b

Frequency range 30 MHz - 1 GHz:

The spurious frequencies do not depend on the operating channel.

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

Frequency range 1 - 26 GHz:

The results in the next tables show the maximum measured levels in the 1-25 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Spurious signals 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.

- LOW CHANNEL. Spurious frequencies closest to the limit:

Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
4.82387	Peak	40.19	H	<± 3.70
7.27570	Peak	43.68	V	<± 3.70
9.64773	Peak	45.8	H	<± 3.70

- MIDDLE CHANNEL. Spurious frequencies closest to the limit:

Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
4.87408	Peak	38.87	H	<± 3.70
7.31192	Peak	44.35	H	<± 3.70
9.74788	Peak	46.28	V	<± 3.70

- HIGH CHANNEL. Spurious frequencies closest to the limit:

Spurious frequency (MHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
9.84796	Peak	46.96	V	<± 3.70

- RESTRICTED BAND 1 (2.31 - 2.39 GHz). Spurious frequencies closest to the limit:

Channel	Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
CH 1	2.38970	Peak	55.76	H	<±3.70
		Average	47.59		<±3.70
CH 2	2.38808	Peak	54.12	H	<±3.70
		Average	46.00		<±3.70
CH 3	2.38709	Peak	52.71	H	<±3.70
CH 4	2.38790	Peak	52.93	H	<±3.70

- RESTRICTED BAND 2 (2.4835 - 2.5 GHz). Spurious frequencies closest to the limit:

Channel	Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
CH 8	2.48446	Peak	54.21	H	<±3.70
		Average	45.53		<±3.70
CH 9	2.48894	Peak	54.61	H	<±3.70
		Average	45.60		<±3.70
CH 10	2.48627	Peak	55.81	H	<±3.70
		Average	47.10		<±3.70
CH 11	2.483501	Peak	58.11	H	<±3.70
		Average	52.33		<±3.70

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. Herein the results for the worst case mode: 802.11g.

Spurious emissions in the Restricted Band 1 and Restricted Band 2 are measured for all modes.

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

Frequency range 30 MHz - 1 GHz:

The spurious frequencies do not depend on the operating channel.

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

Frequency range 1 - 26 GHz:

The results in the next tables show the maximum measured levels in the 1-25 GHz range including the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Spurious signals 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.

- LOW CHANNEL. Spurious frequencies closest to the limit:

Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
9.64792	Peak	47.23	V	<± 3.70

- MIDDLE CHANNEL. Spurious frequencies closest to the limit:

Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
4.87062	Peak	39.08	H	<± 3.70
9.74821	Peak	46.65	V	<± 3.70

- HIGH CHANNEL.

No spurious frequencies were found at less than 20 dB of the limit.

- RESTRICTED BAND 1 (2.31 - 2.39 GHz). Spurious frequencies closest to the limit:

Channel	Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
CH 1	2.38876	Peak	68.80	H	<±3.70
		Average	51.64		<±3.70
CH 2	2.38980	Peak	73.56	H	<±3.70
		Average	50.31		<±3.70
CH 3	2.38983	Peak	71.46	H	<±3.70
		Average	49.82		<±3.70
CH 4	2.38960	Peak	70.21	H	<±3.70
		Average	48.79		<±3.70

- RESTRICTED BAND 2 (2.4835 - 2.5 GHz). Spurious frequencies closest to the limit:

Channel	Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
CH 8	2.48427	Peak	70.31	H	<±3.70
		Average	51.08		<±3.70
CH 9	2.48404	Peak	69.15	H	<±3.70
		Average	48.55		<±3.70
CH 10	2.48484	Peak	72.15	H	<±3.70
		Average	51.50		<±3.70
CH 11	2.48357	Peak	70.70	H	<±3.70
		Average	53.07		<±3.70

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 signals 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.

- RESTRICTED BAND 1 (2.31 - 2.39 GHz). Spurious frequencies closest to the limit:

Channel	Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
CH 1	2.38963	Peak	68.27	H	<±3.70
		Average	51.46		<±3.70
CH 2	2.38758	Peak	73.29	H	<±3.70
		Average	49.80		<±3.70
CH 3	2.38841	Peak	73.24	H	<±3.70
		Average	50.79		<±3.70
CH 4	2.38895	Peak	67.95	H	<±3.70
		Average	46.84		<±3.70

- RESTRICTED BAND 2 (2.4835 - 2.5 GHz). Spurious frequencies closest to the limit:

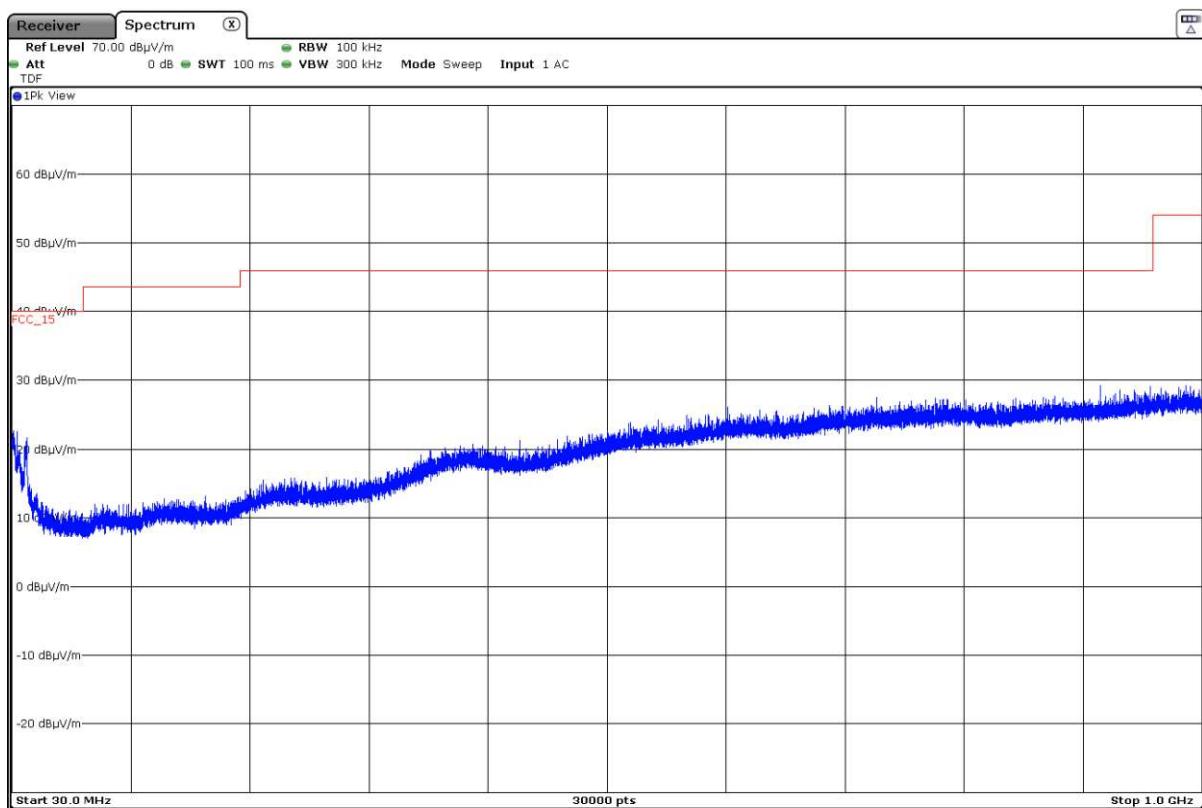
Channel	Spurious frequency (GHz)	Detector	Emission Level (dB μ V/m)	Polarization	Measurement Uncertainty (dB)
CH 8	2.48456	Peak	70.12	H	<±3.70
		Average	50.63		<±3.70
CH 9	2.484357	Peak	72.07	H	<±3.70
		Average	50.13		<±3.70
CH 10	2.483916	Peak	72.05	H	<±3.70
		Average	50.67		<±3.70
CH 11	2.48393	Peak	71.12	H	<±3.70
		Average	53.41		<±3.70

Verdict: PASS

- **Mode 802.11 b**

FREQUENCY RANGE 30 MHz - 1 GHz:

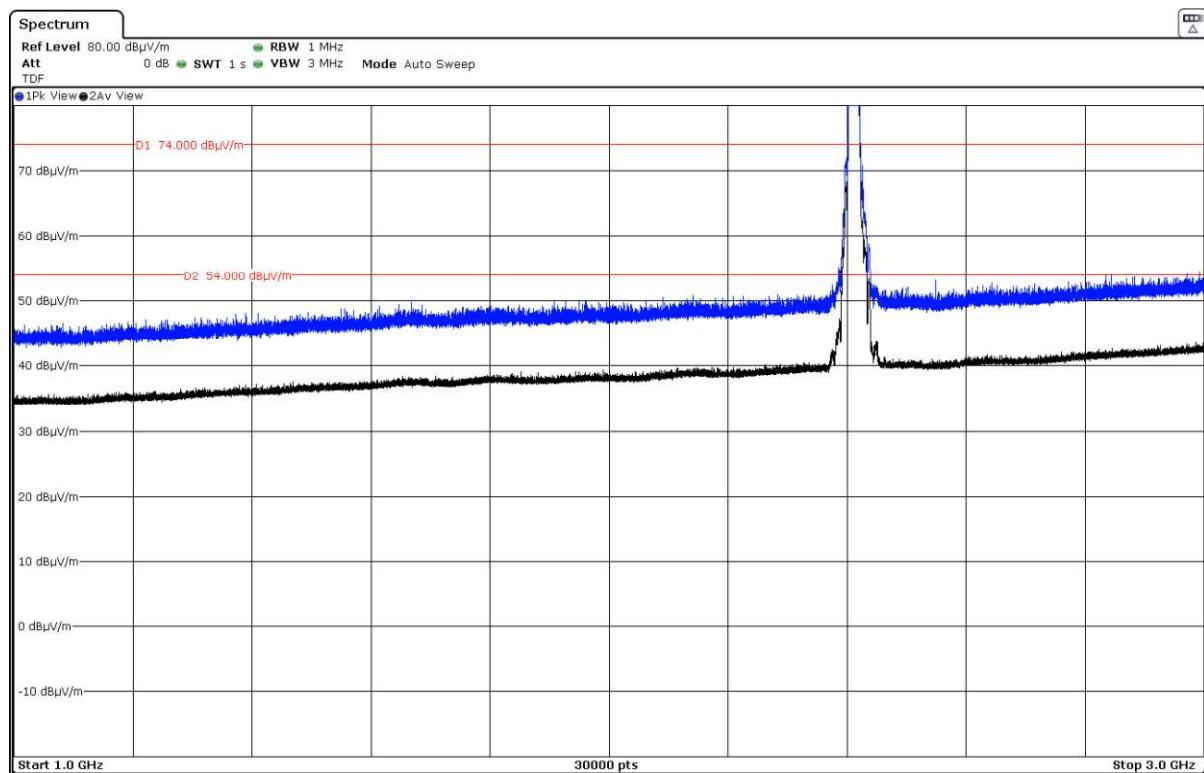
The spurious signals detected do not depend on the operating channel.



Note: This plot is valid for all three channels.

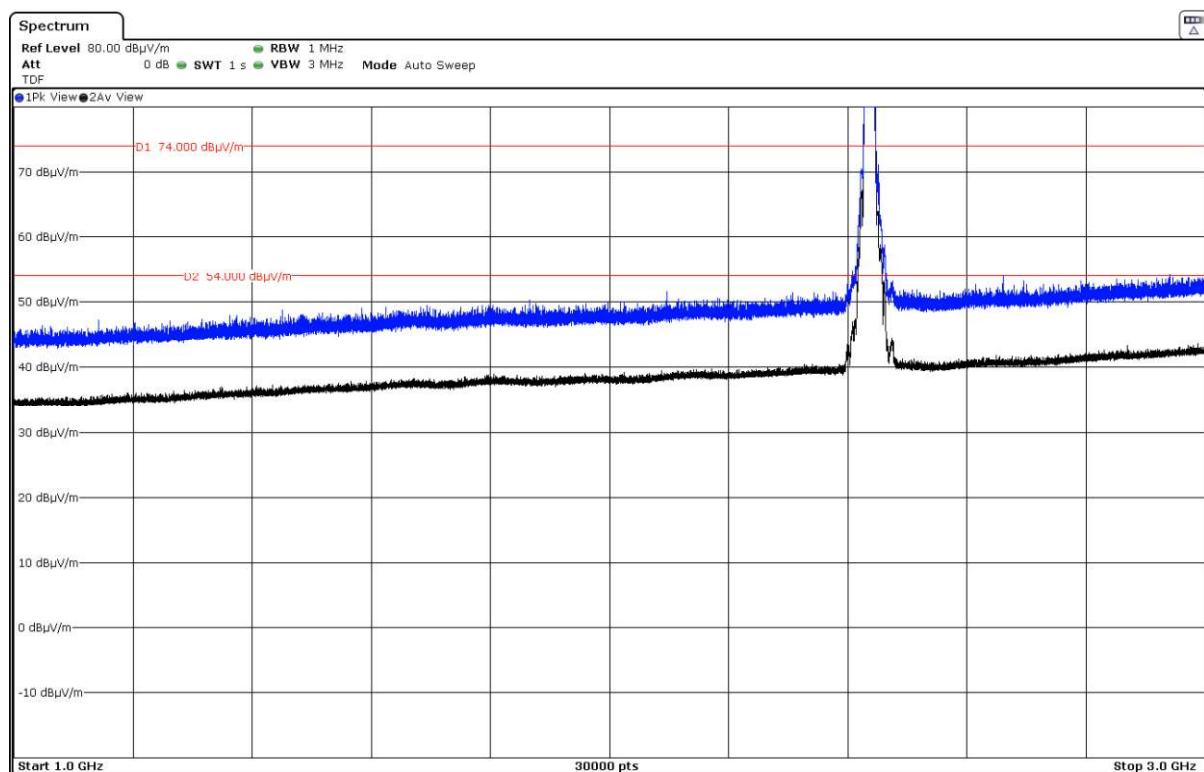
FREQUENCY RANGE 1 - 3 GHz:

- Low Channel:



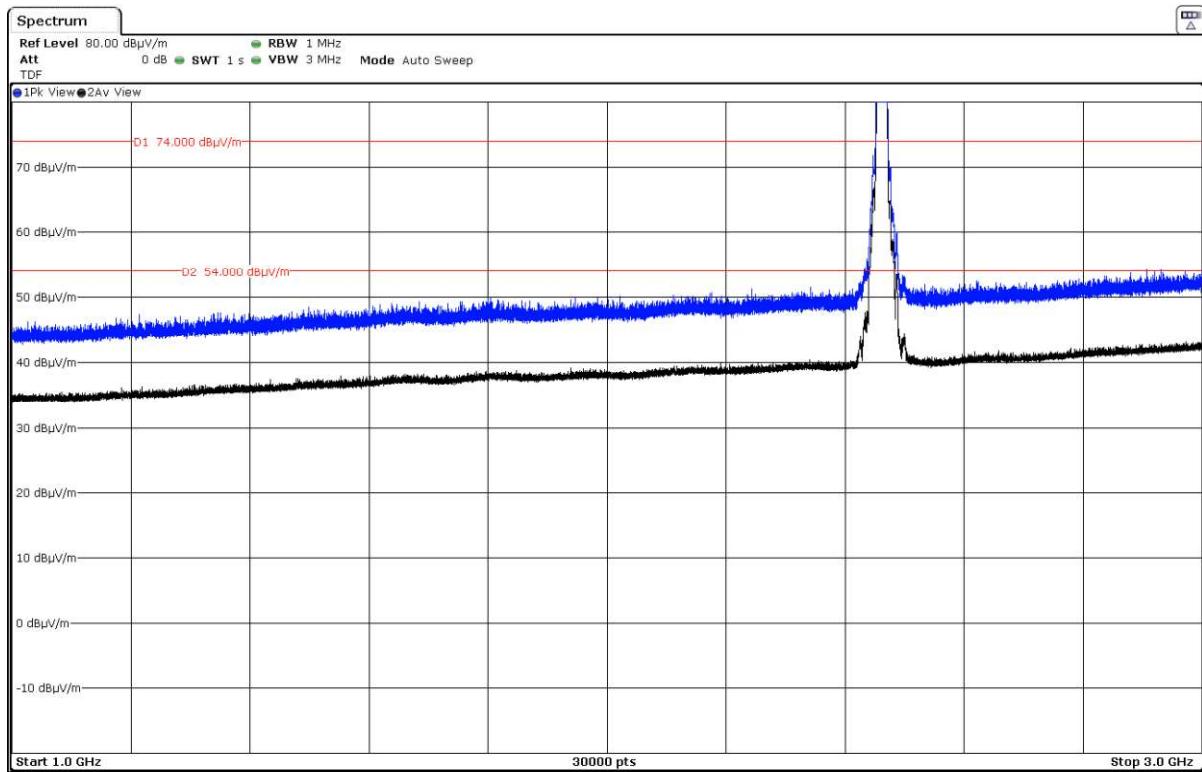
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

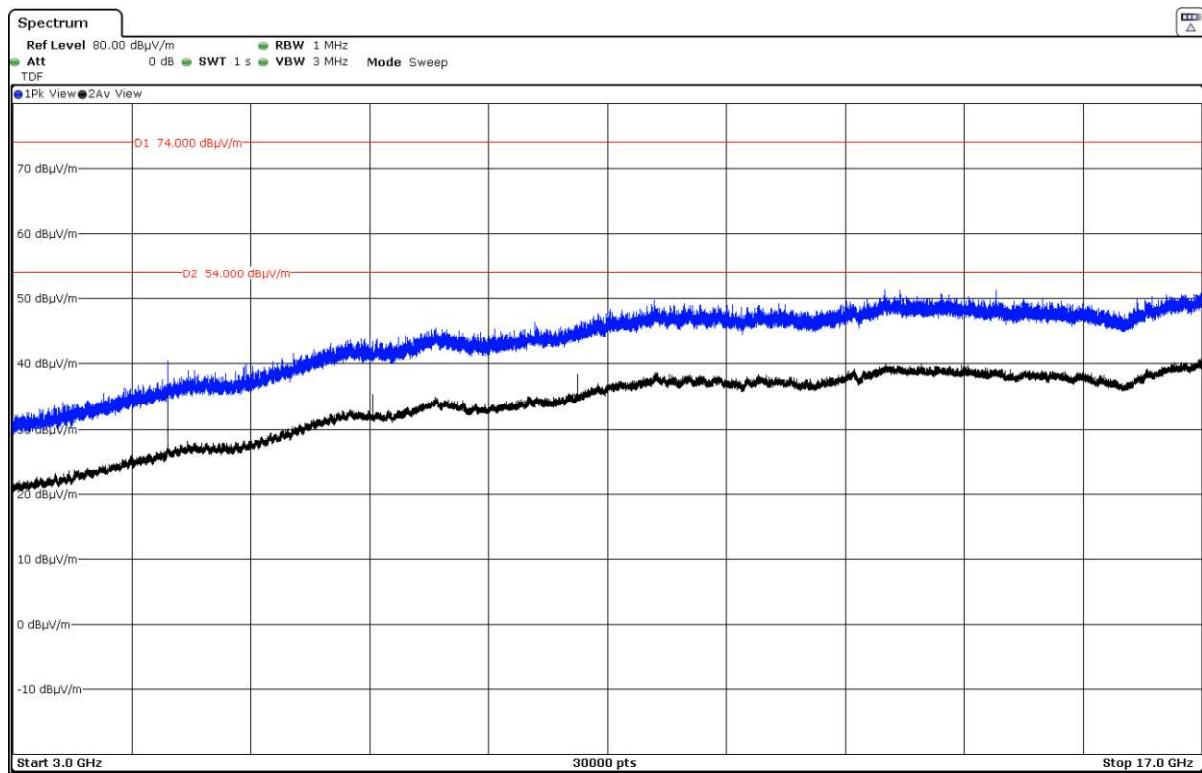
- High Channel:



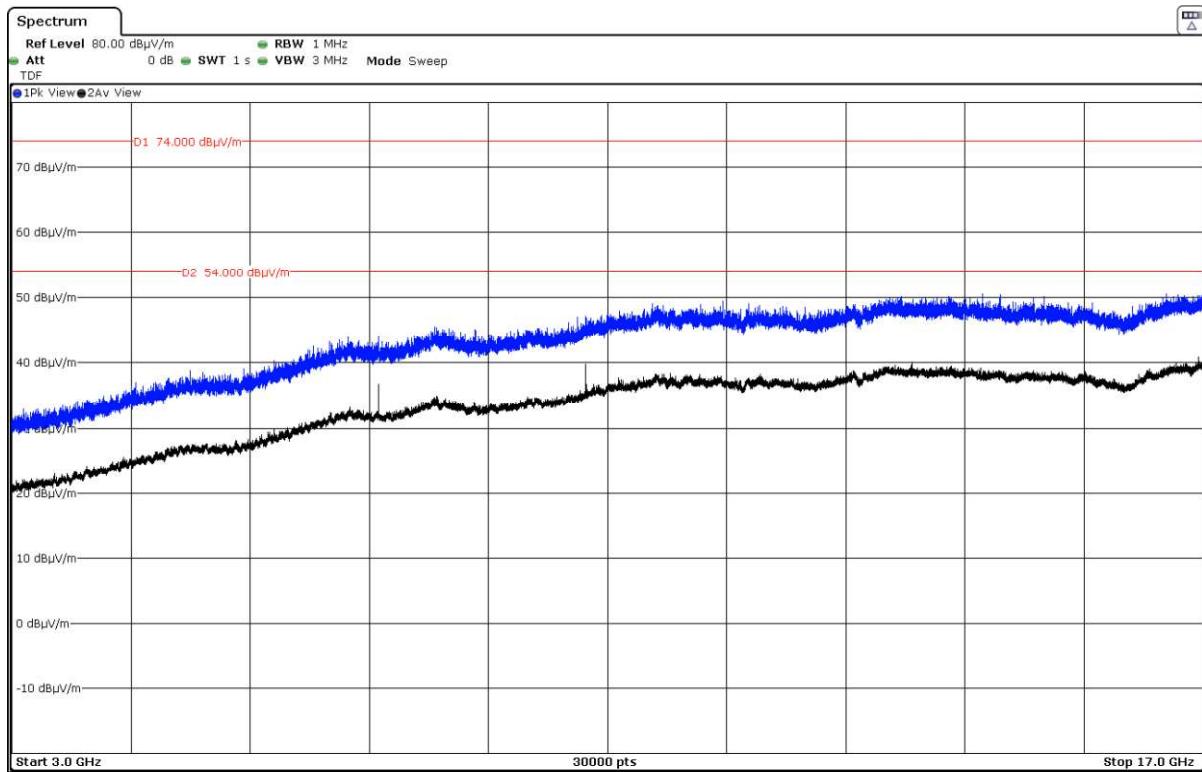
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz:

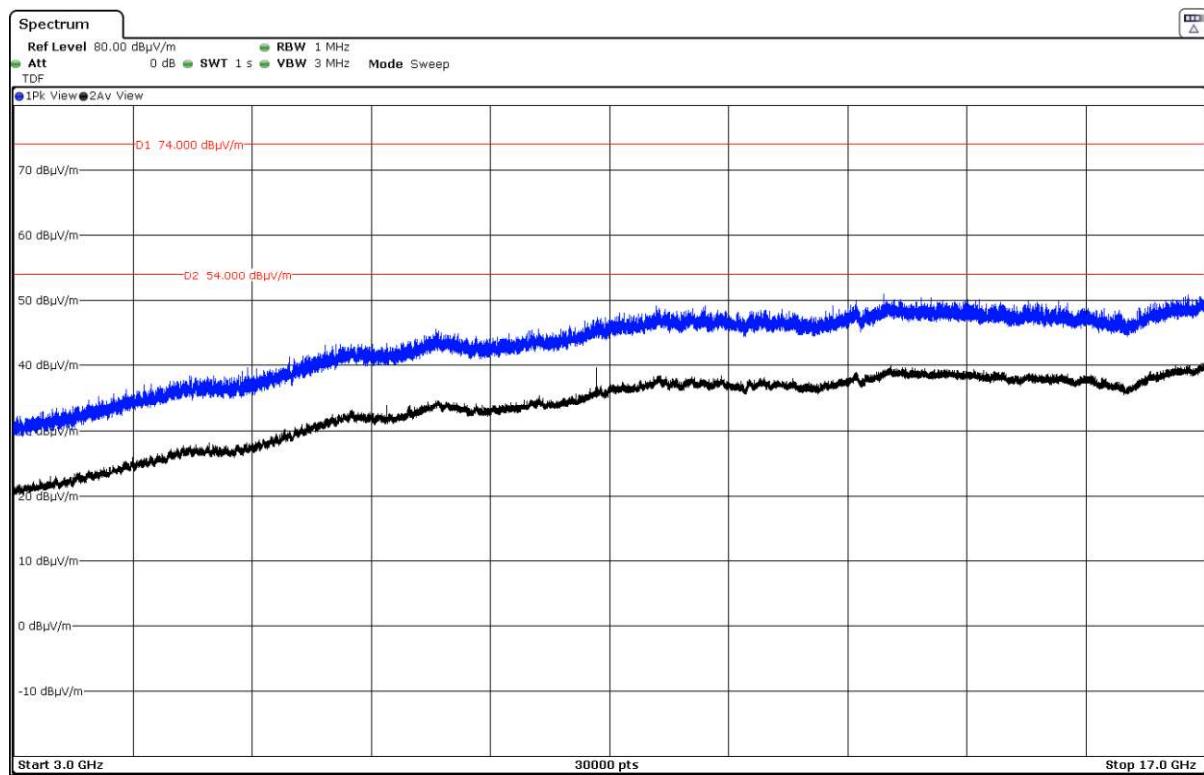
- Low Channel:



- Middle Channel:

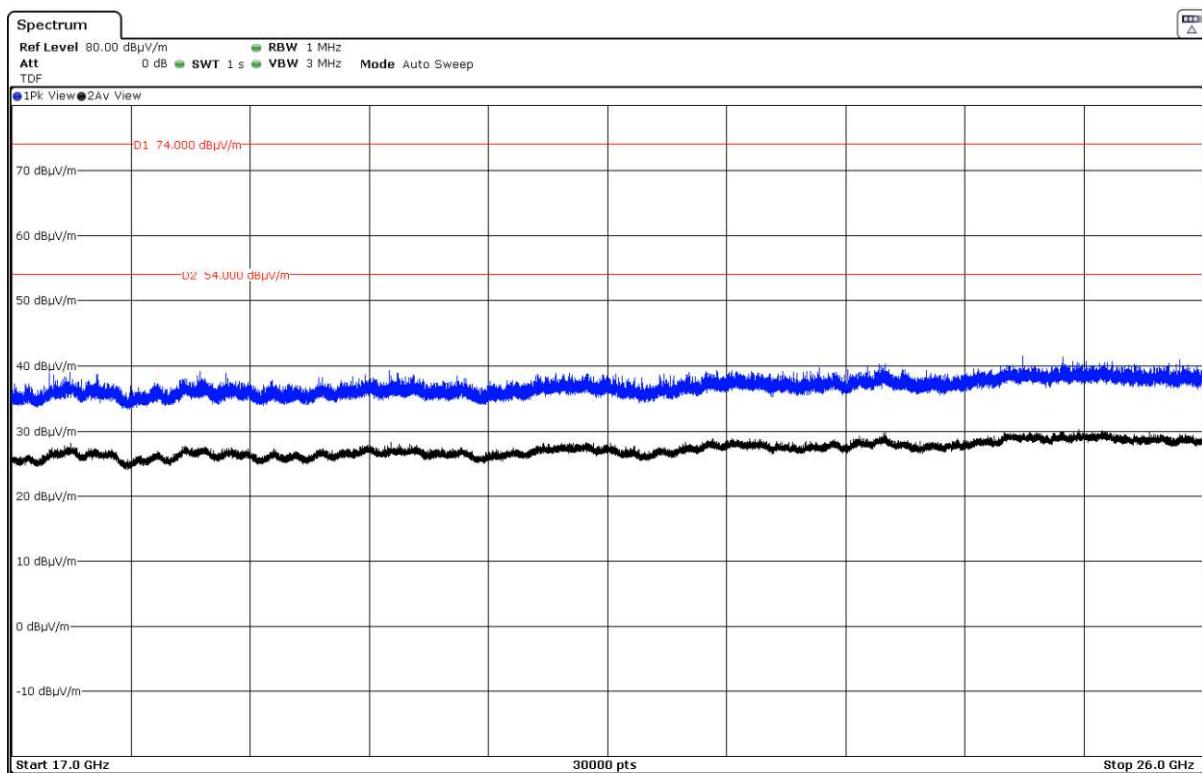


- High Channel:



FREQUENCY RANGE 17 - 26 GHz:

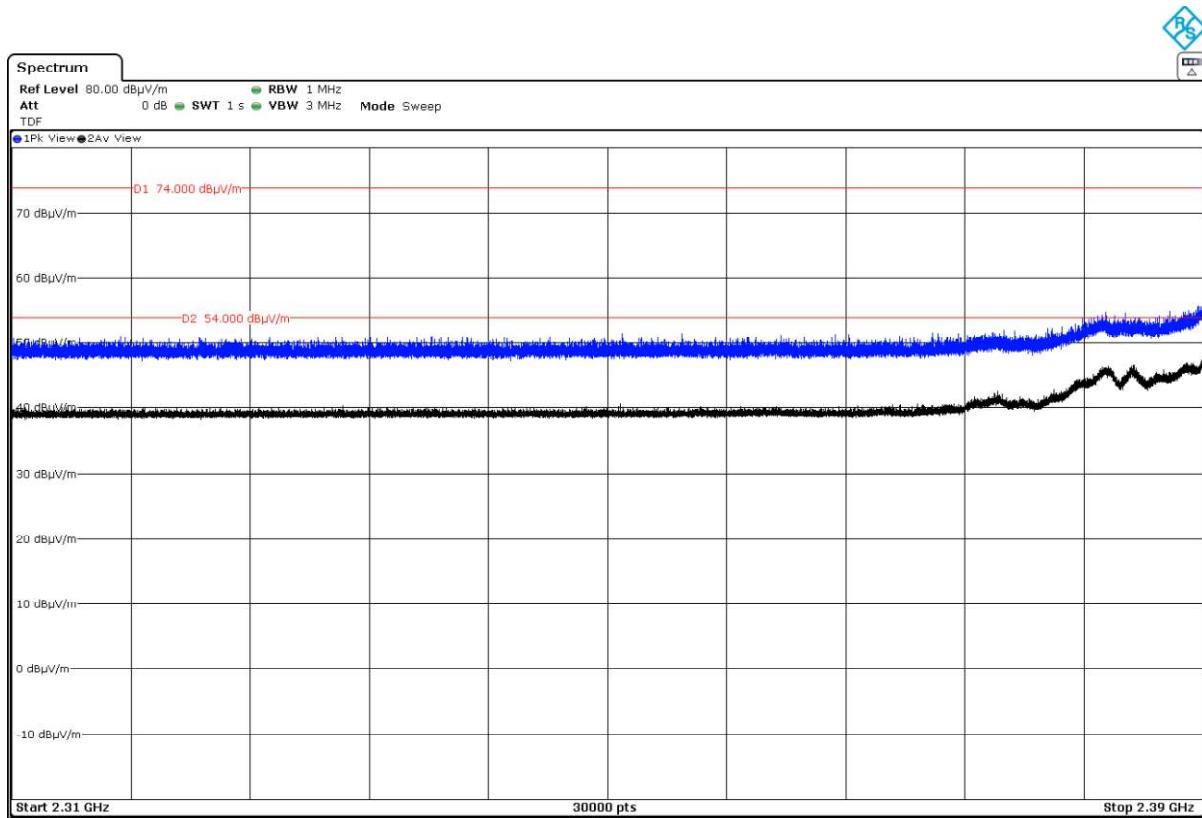
The spurious signals detected do not depend on the operating channel.



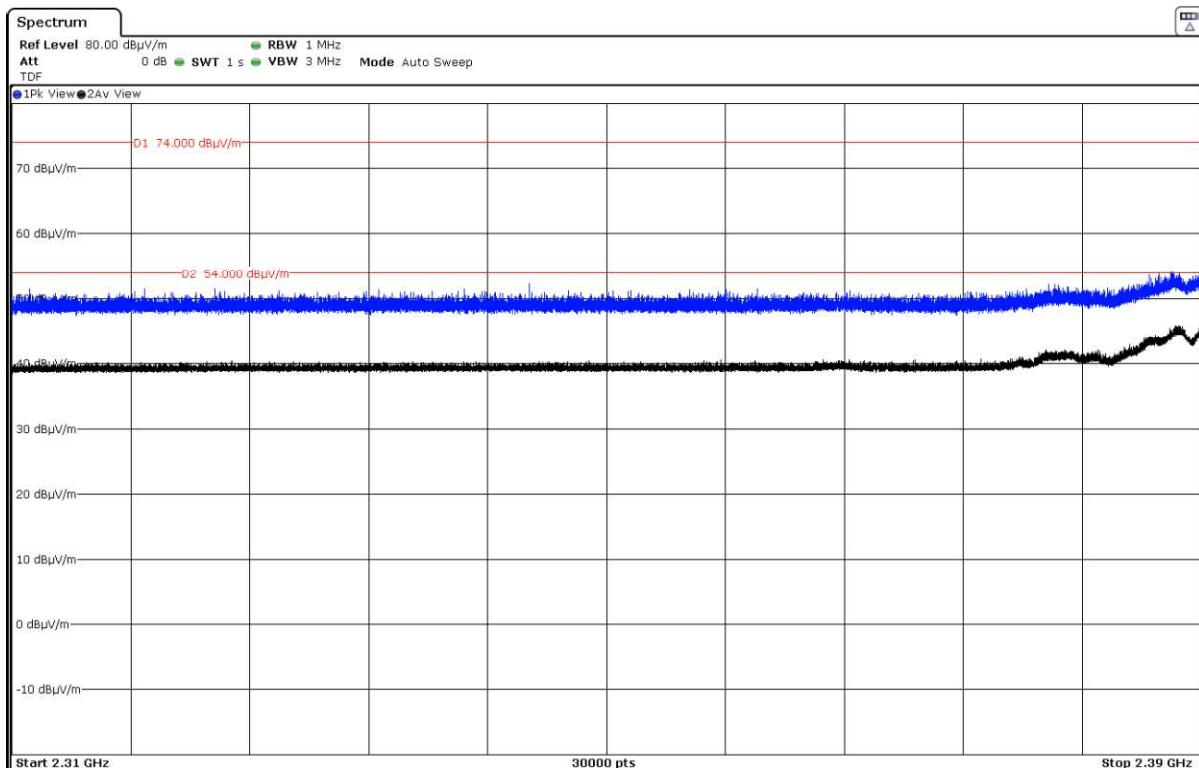
Note: This plot is valid for all three channels.

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

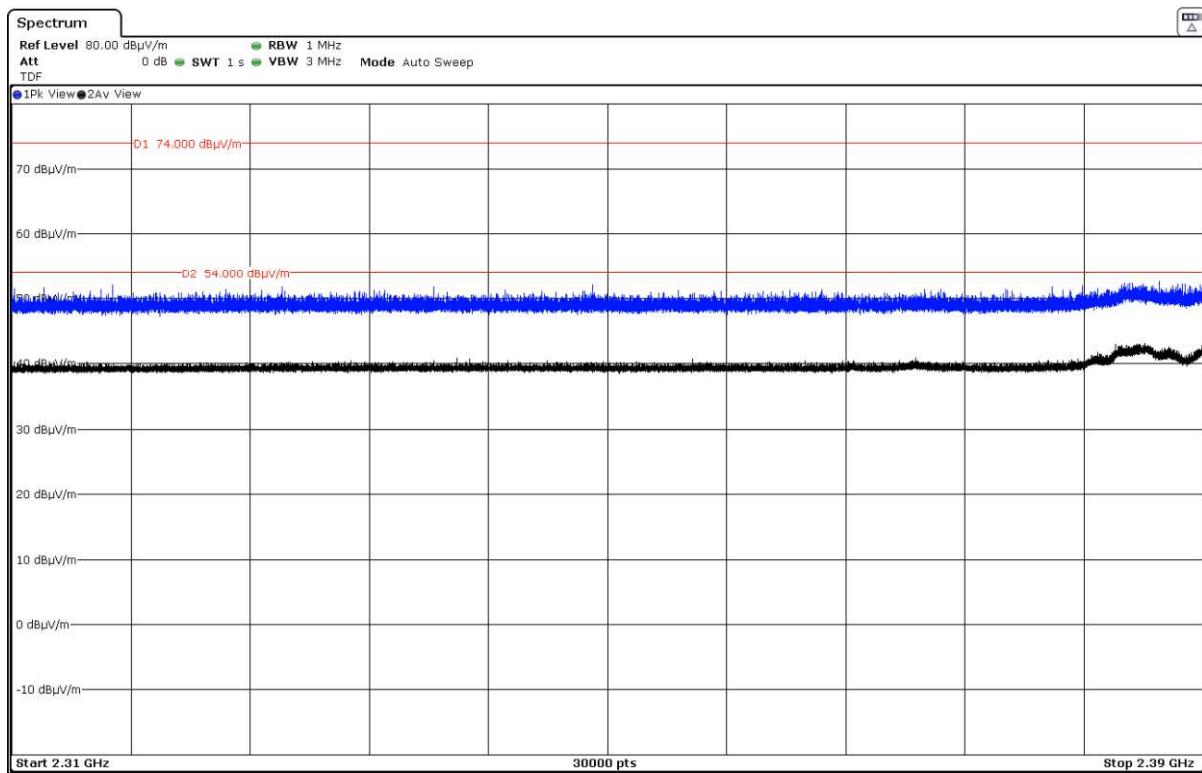
- Low Channel. CH 1:



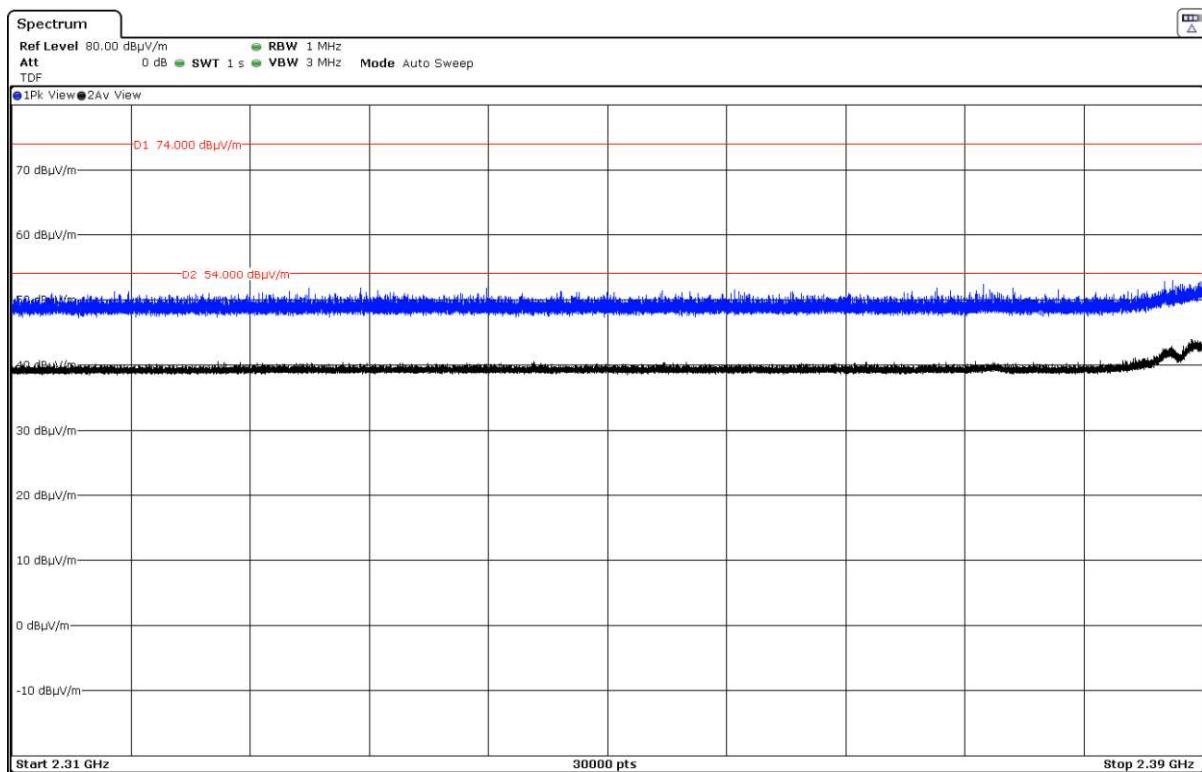
- CH 2:



- CH 3:

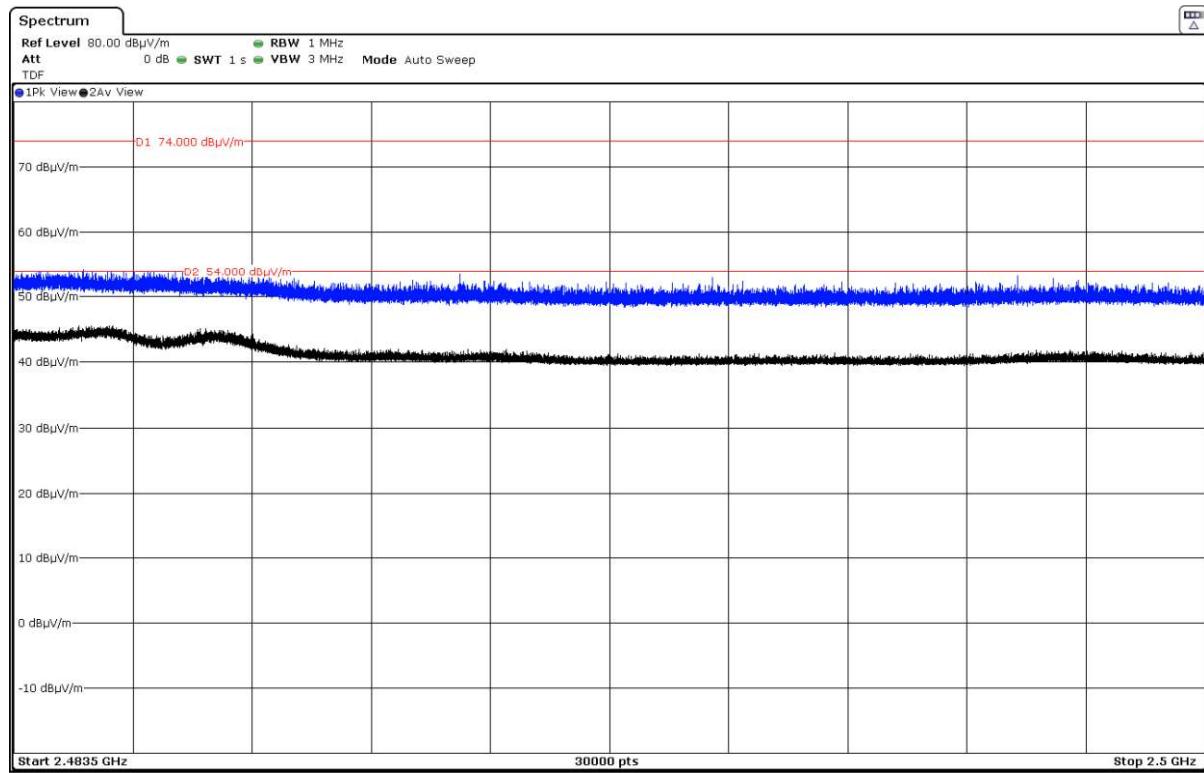


- CH 4:

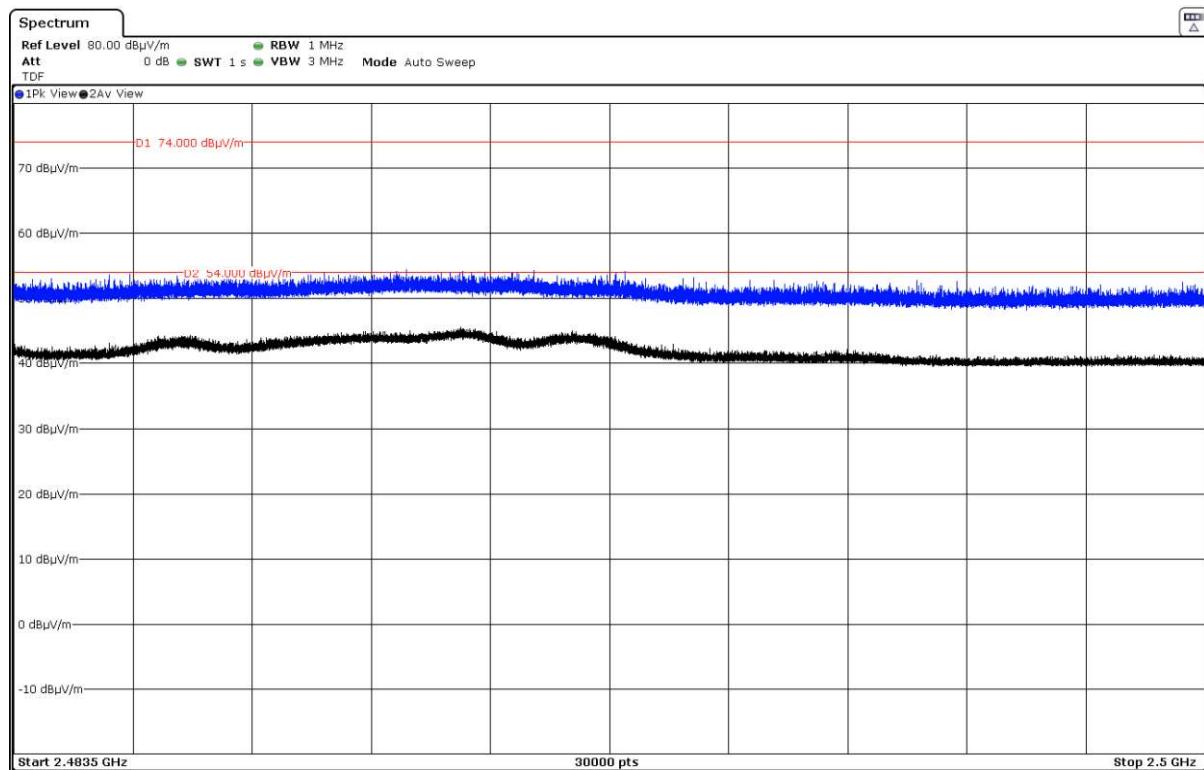


FREQUENCY RANGE 2.4835-2.5 GHz (Restricted Band 2):

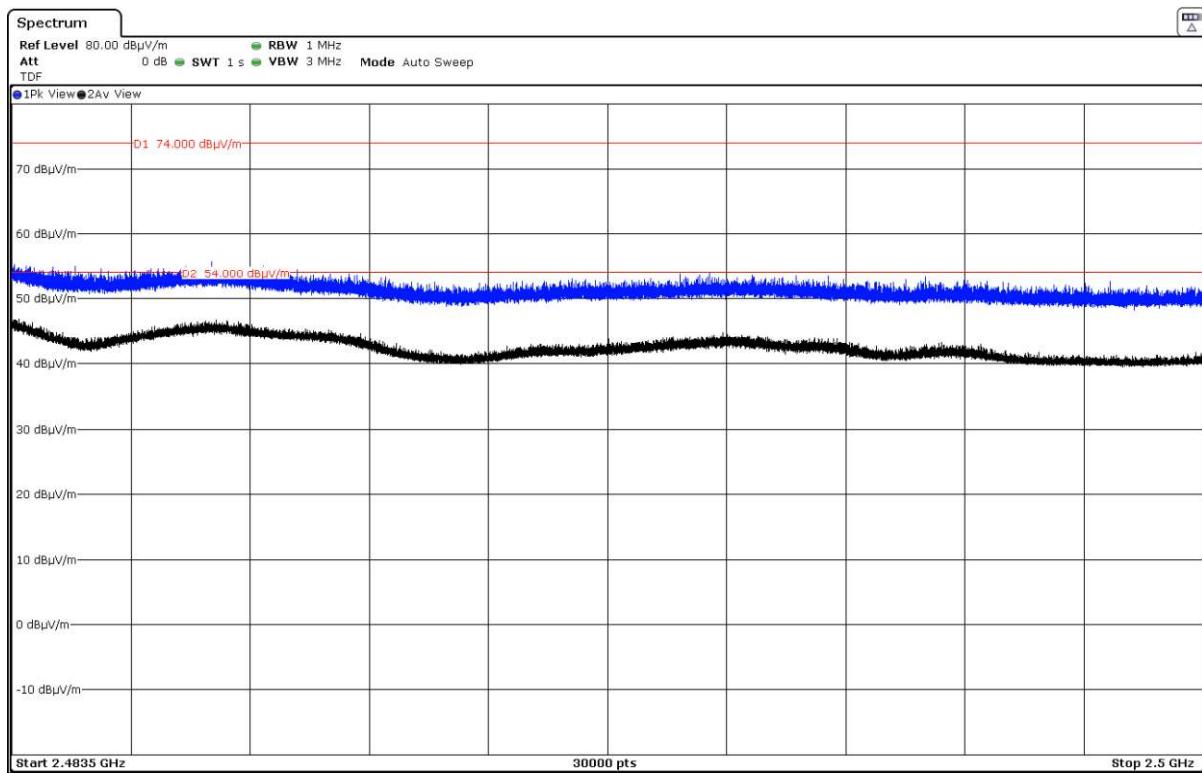
- CH 8:



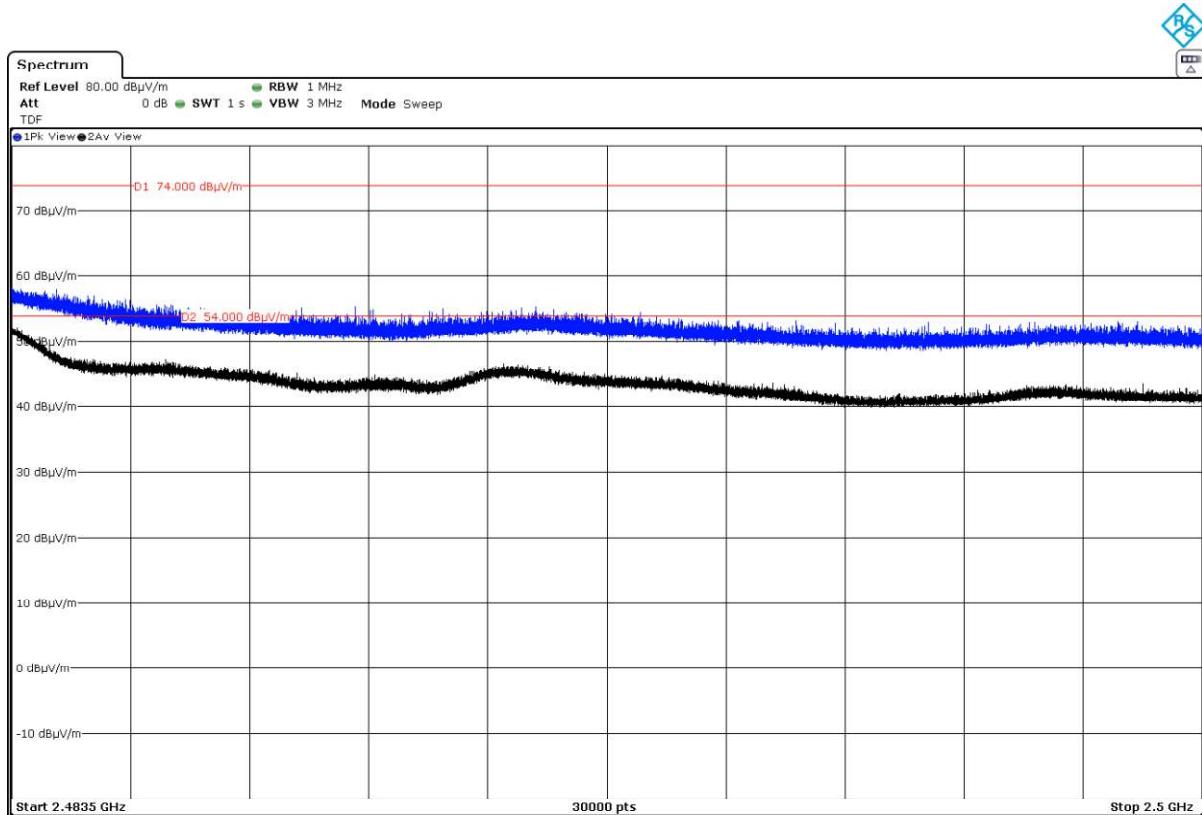
- CH 9:



- CH 10:



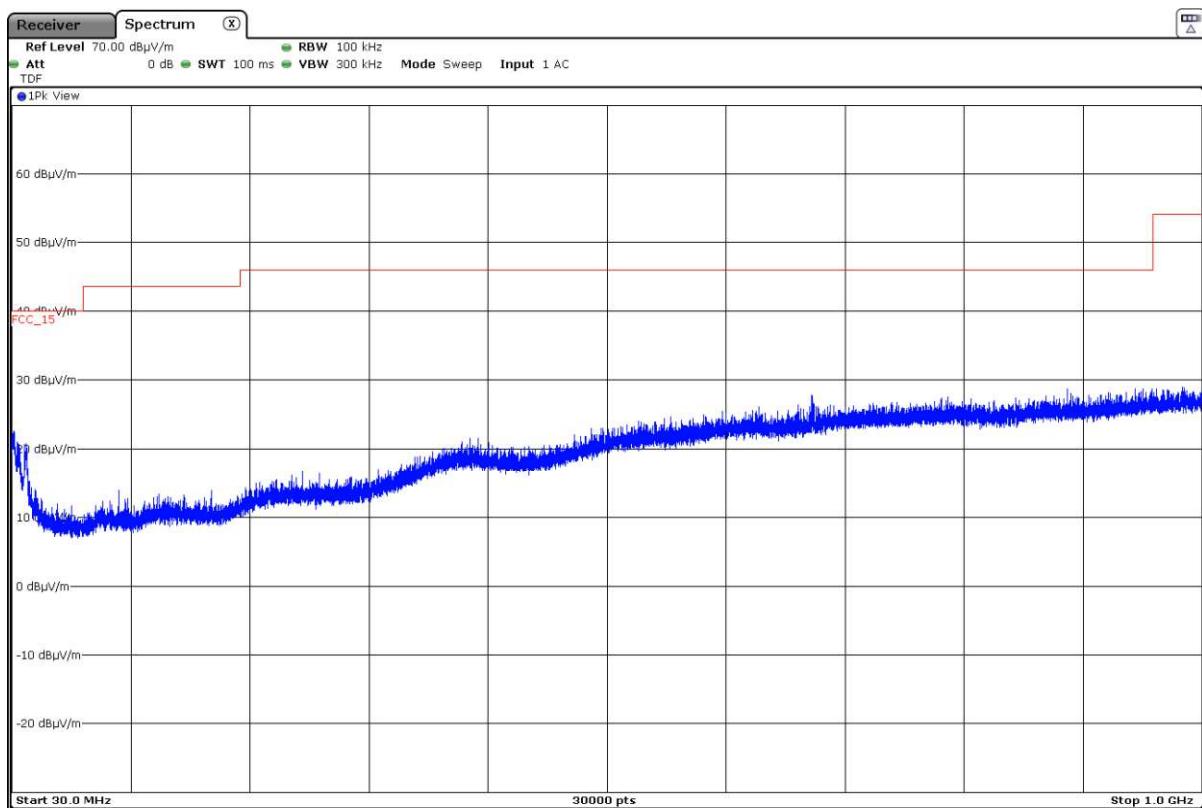
- High Channel. CH 11:



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

FREQUENCY RANGE 30 MHz - 1 GHz:

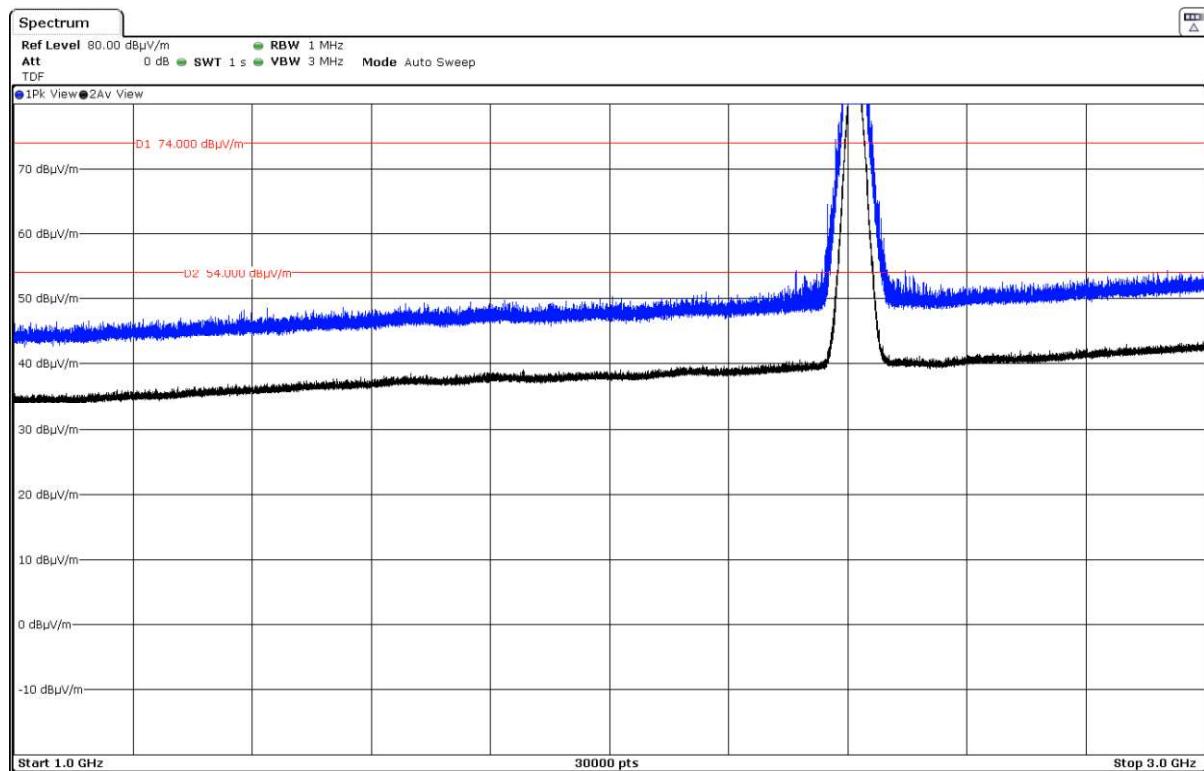
The spurious signals detected do not depend on the operating channel.



Note: This plot is valid for all three channels.

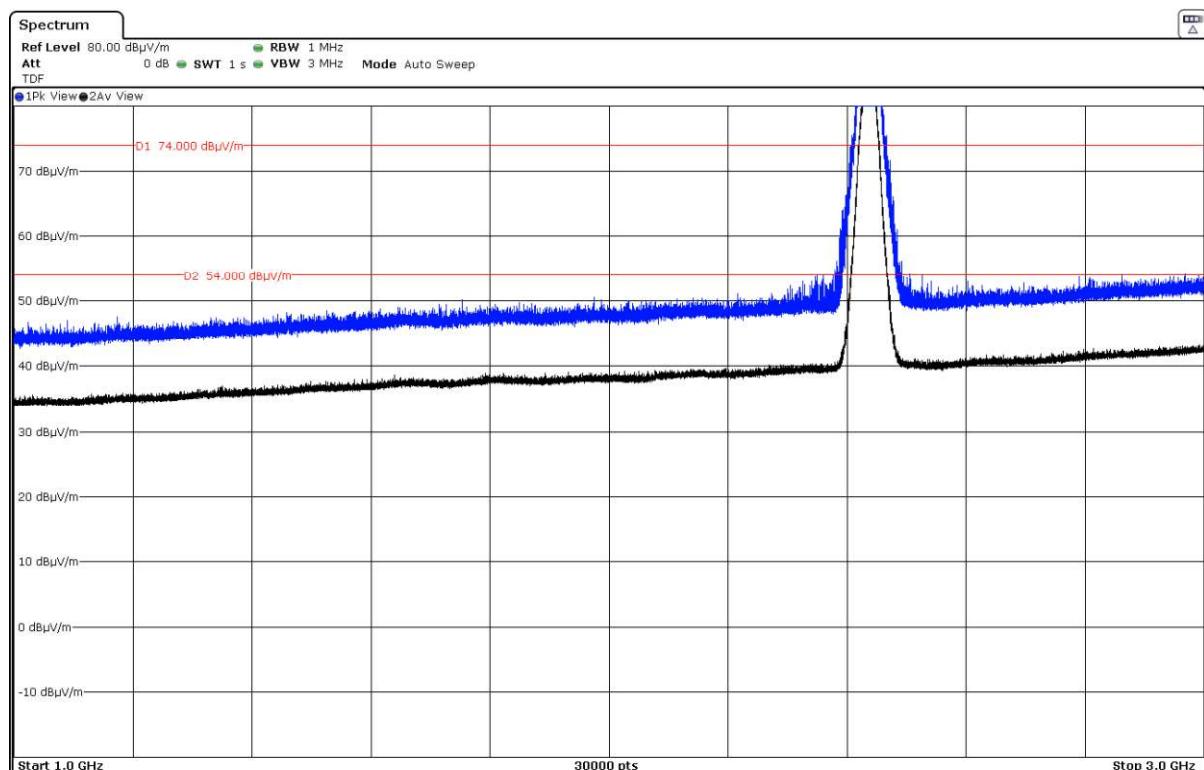
FREQUENCY RANGE 1 - 3 GHz:

- Low Channel:



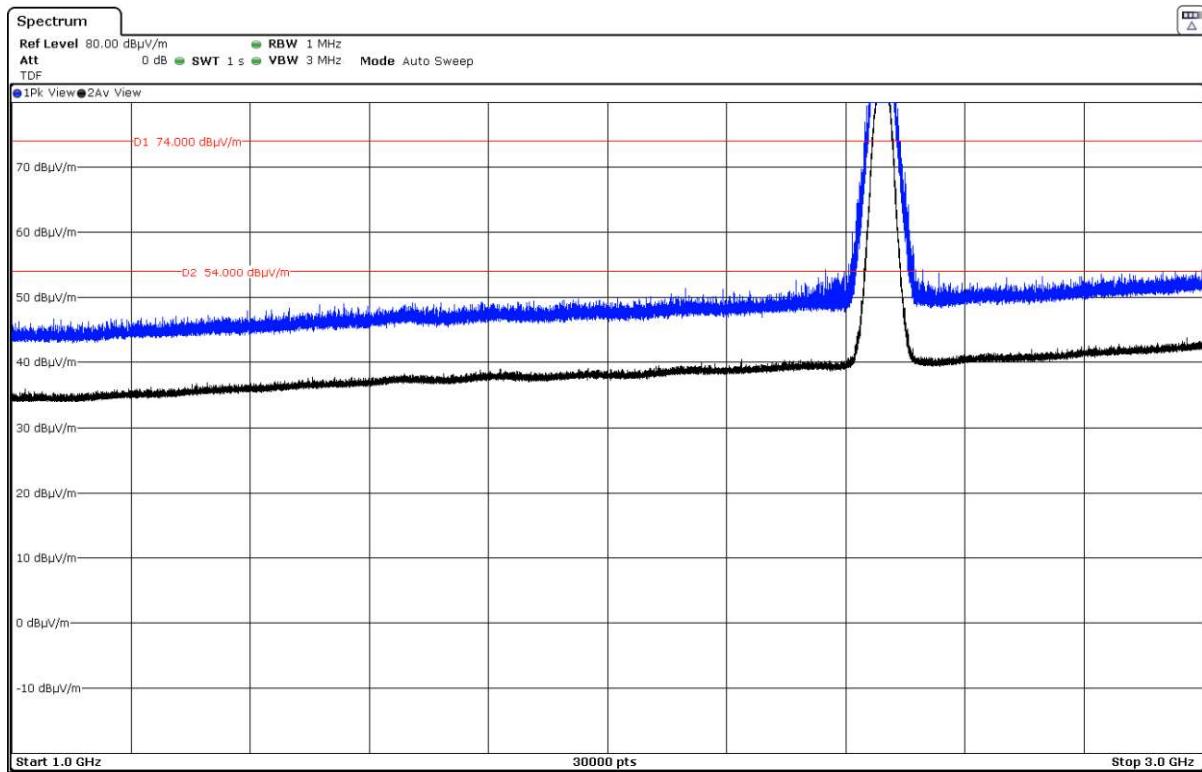
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

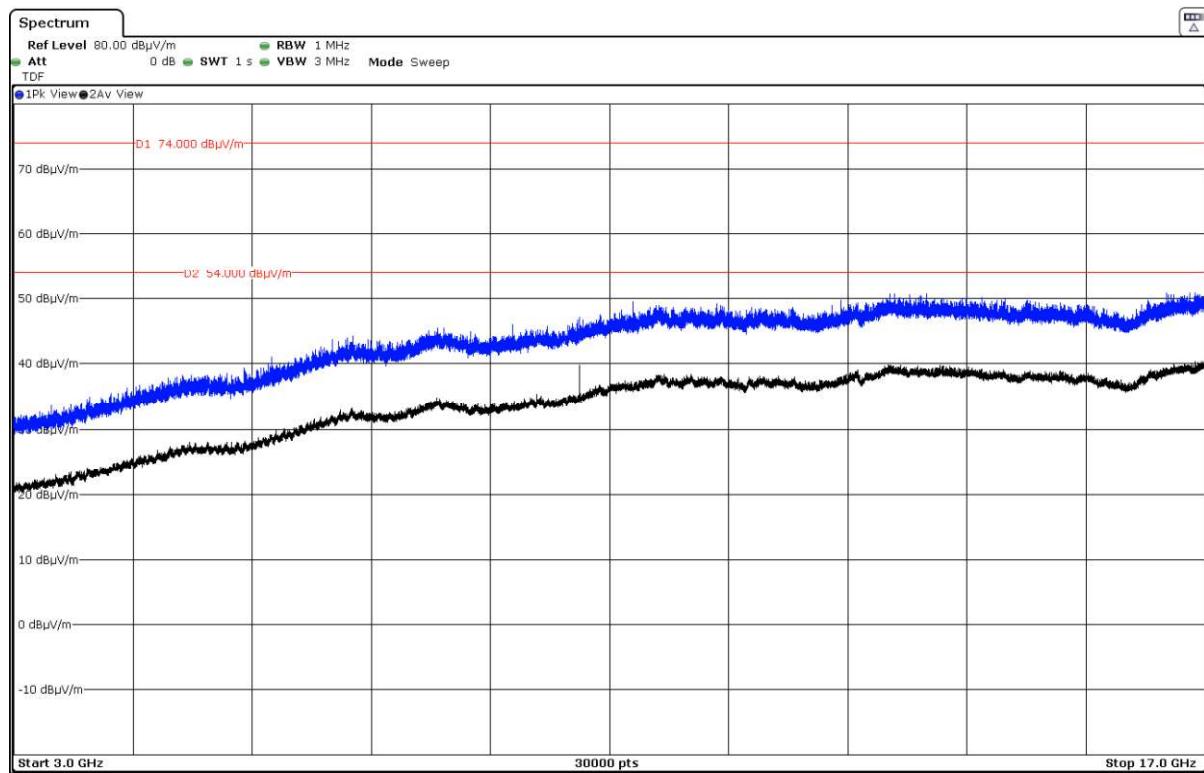
- High Channel:



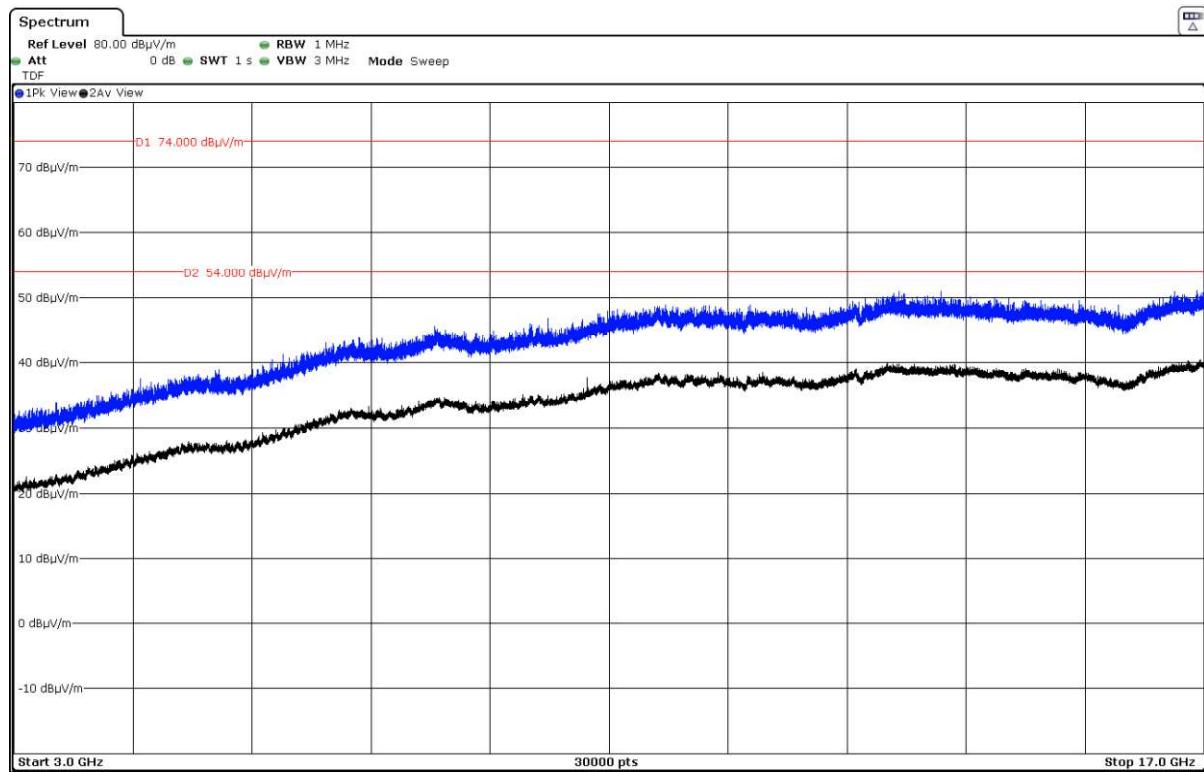
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz:

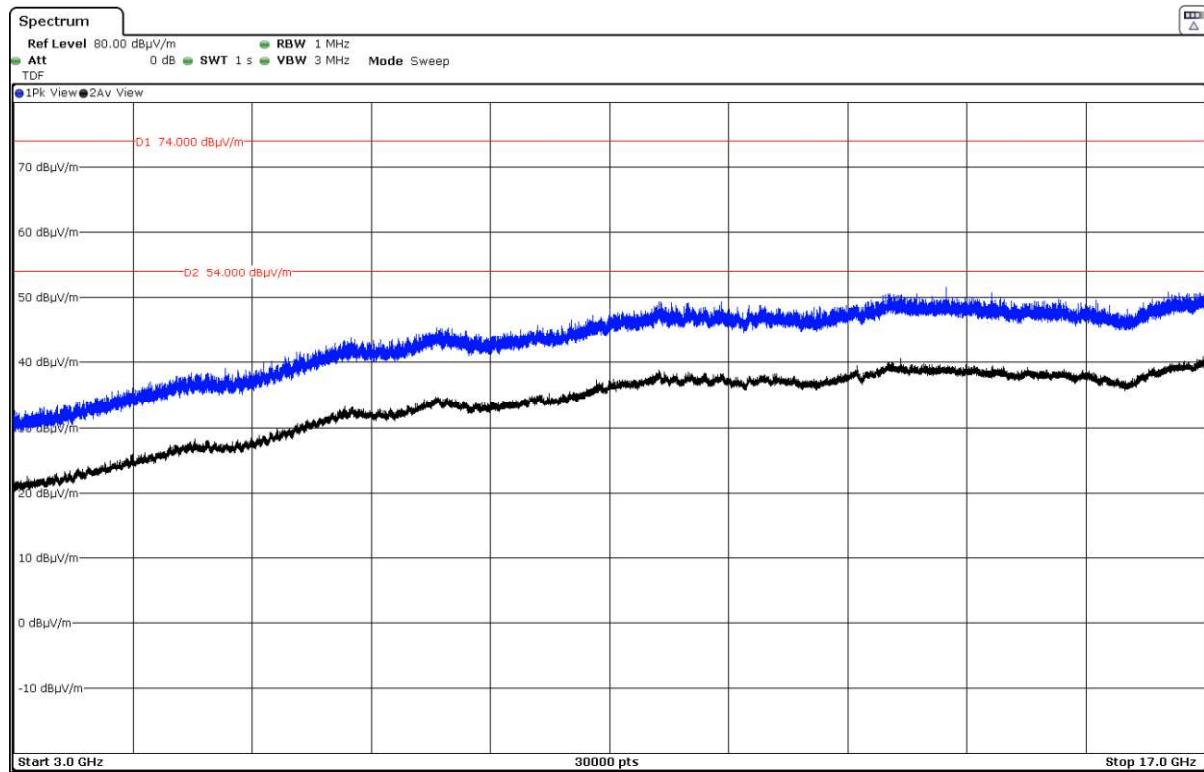
- Low Channel:



- Middle Channel:

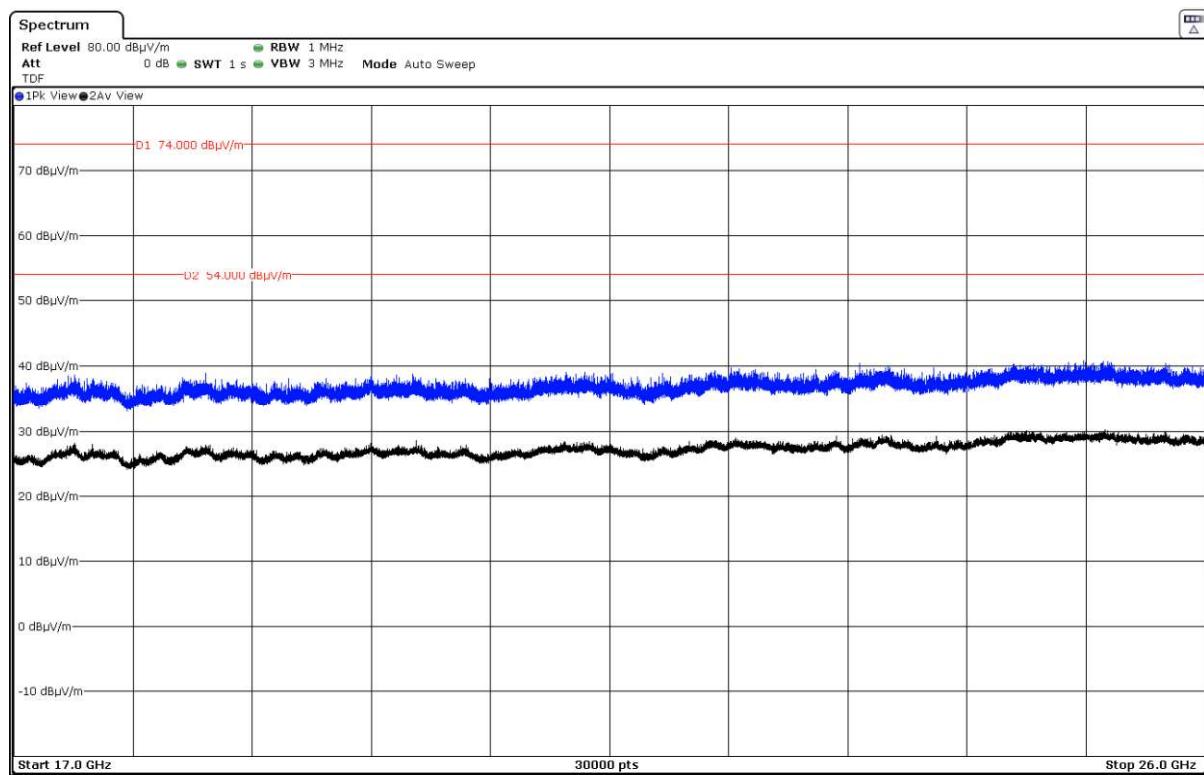


- High Channel:



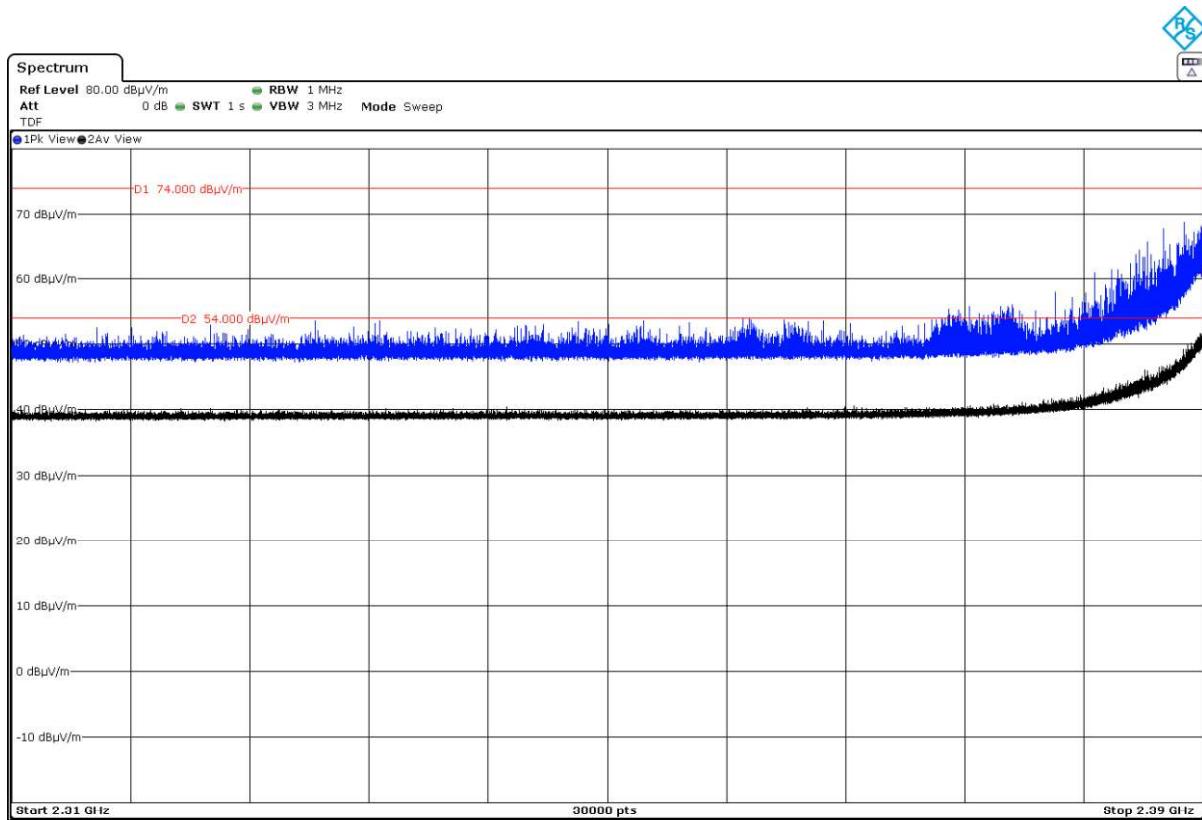
FREQUENCY RANGE 17 - 26 GHz:

The spurious signals detected do not depend on the operating channel.

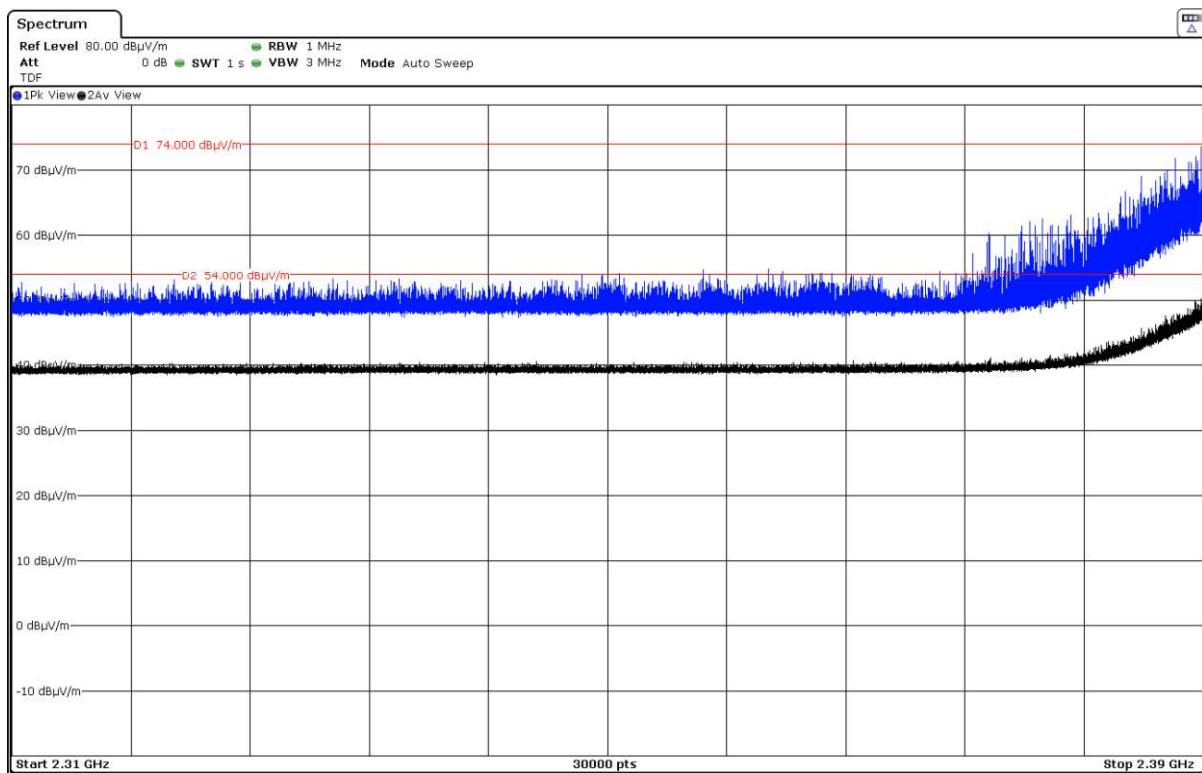


FREQUENCY RANGE 2.31-2.39 GHz (Restricted Band 1):

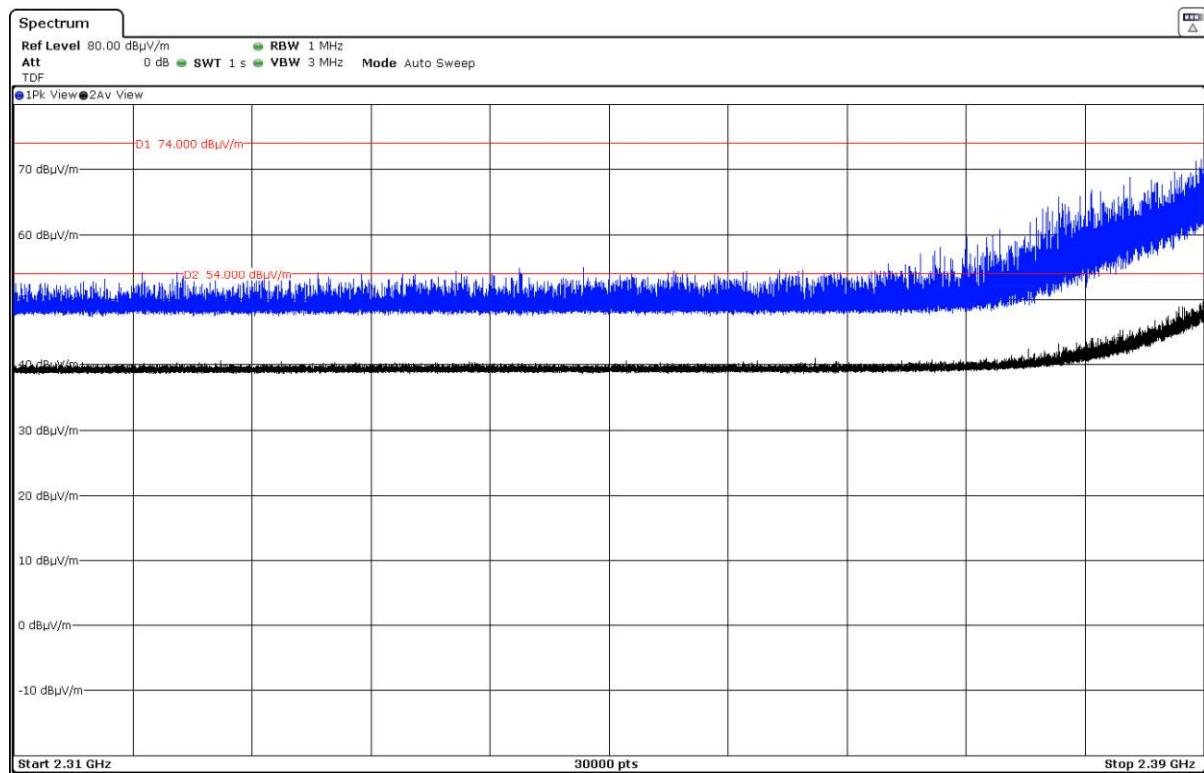
- Low Channel. CH 1:



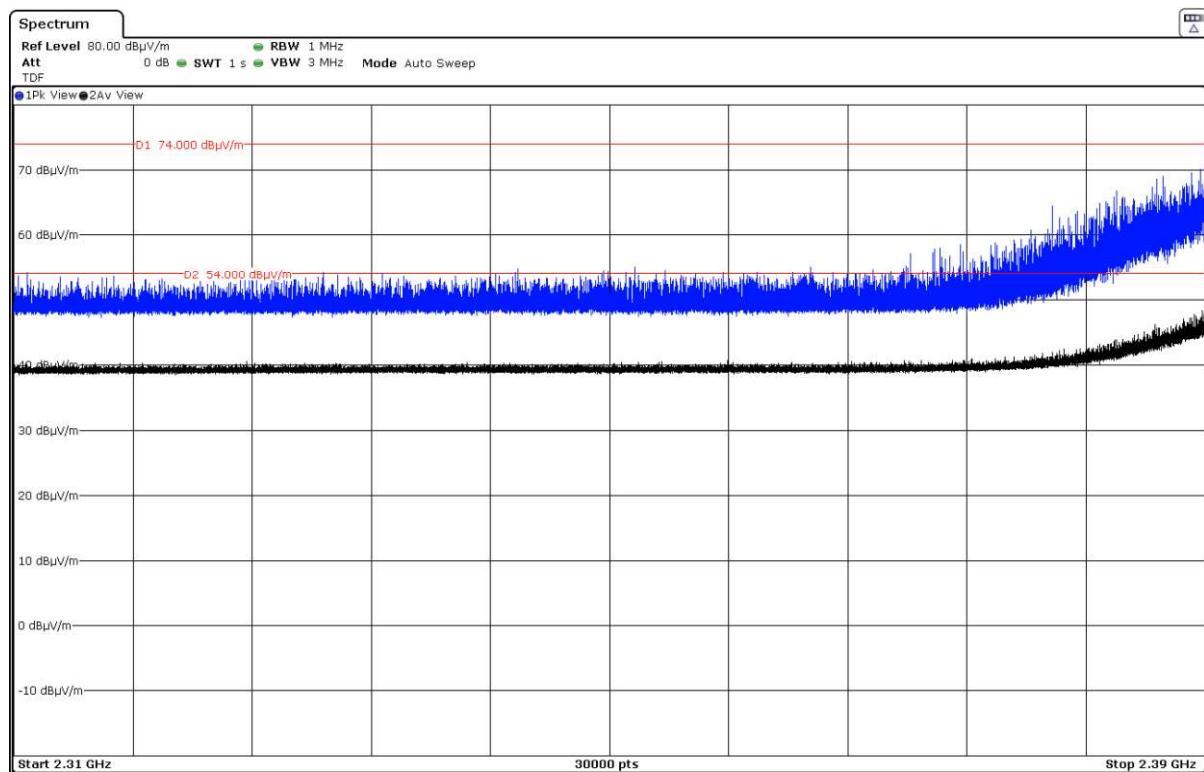
- CH 2:



- CH 3:

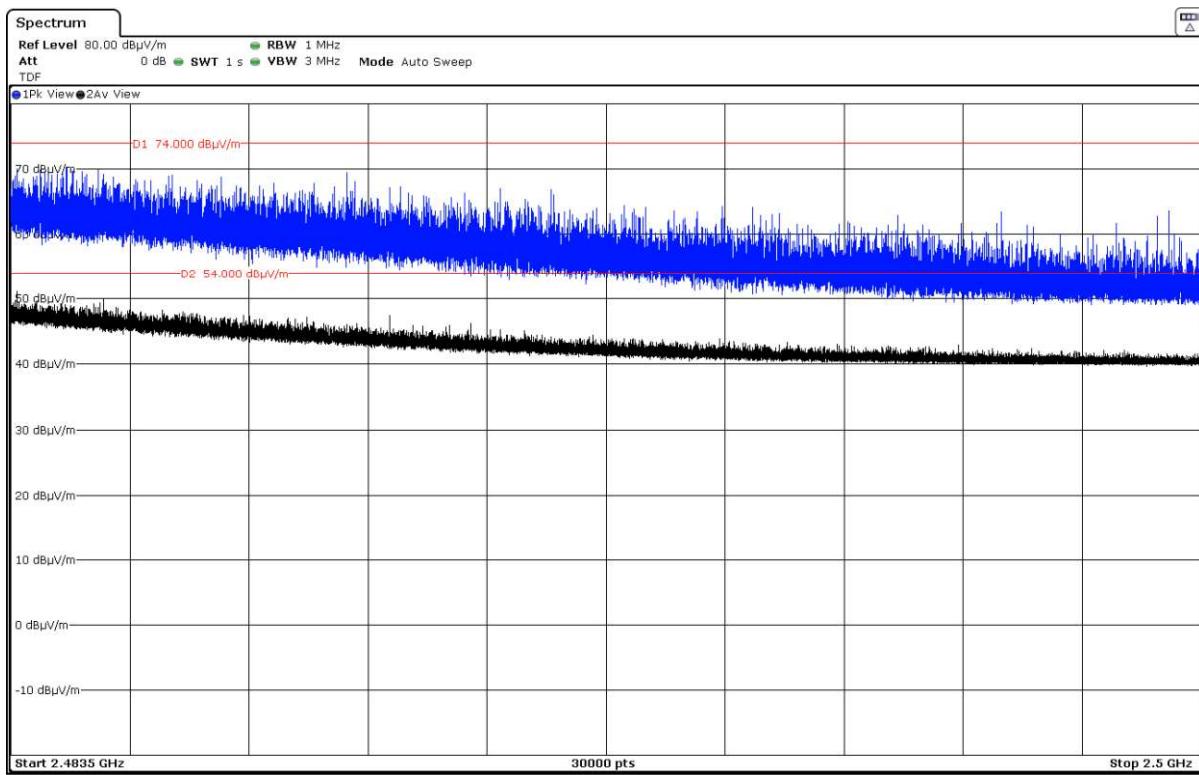


- CH 4:



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

- CH 8:



- CH 9:

