

ISED CABid: ES1909

Test report No:
NIE: 66554RRF.002

Partial Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

(*) Identification of item tested	WOE46L
(*) Trademark	GN Hearing A/S, GN Audio A/S, ReSound, Beltone, Interton, Audigy, Jabra
(*) Model and /or type reference	WOE46L
Other identification of the product	HW version: PCBA,WOLVERINE, LEFT, V2.B, C6.0 SW version: Dooku2 (M.1.5.6) FCC ID: X26WOE46L IC: 6941C-WOE46L
(*) Features	Audio amplification, Bluetooth 5.0 and 10.667 MHz wireless magnetic induction functionality
Applicant	GN Hearing Lautrupbjerg 7, 2750 Ballerup Denmark
Test method requested, standard	USA FCC Part 15.247 (10-1-19) Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (10-1-19) Edition: Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 (March 2019) Amendment 1. Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules. 558074 D01 Meas Guidance v05r02 dated April 2, 2019. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Approved by (name / position & signature)	Rafael López EMC Consumer & RF Lab. Manager
Date of issue	2021-07-19
Report template No	FDT08_23 (*) "Data provided by the client"

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Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification is a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory, CABid: ES1909, with the appropriate scope of accreditation that covers the performed tests in this report

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample of the model WOE46L is a rechargeable wireless hearing aid.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of result.

Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
66554C/030	Hearing aid (Left)	WOE46L03	2100803161	2021/05/25

Sample S/01 has undergone the test(s): All Radiated tests indicated in Appendixes A.

Test sample description

Ports..... :	Port name and description	Cable				
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾	
	--		☐	☐	☐	
Supplementary information to the ports..... :	--					
Rated power supply	Voltage and Frequency		Reference poles			
			L1	L2	L3	N
	☒	DC: 3.8V				
Rated Power	3.8 V					
Clock frequencies	2.48 GHz and 10.667 MHZ					
Other parameters..... :	--					
Software version	Dooku2 (M.1.5.6)					
Hardware version..... :	PCBA,WOLVERINE,LEFT,V2.B,C6.0					
Dimensions in cm (W x H x D).... :	--					
	☒	Other: Placed behind the ear				
Modules/parts	Module/parts of test item		Type		Manufacturer	
	--					
Accessories (not part of the test item)	Description		Type		Manufacturer	
	Computer		Certified according to IEC 60950-1, IEC 62368-1 or equivalent standard			

Documents as provided by the applicant.....:	Description	File name	Issue date
	Radio test plan	0422600rA_WOE46L_Radio_Test_Plan.docx	2021-03-25

⁽³⁾ Only for Medical Equipment

Identification of the client

GN HEARING A/S

Lautrupbjerg 7, 2750 Ballerup, Denmark

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-06-01
Date (finish)	2021-06-03

Document history

Report number	Date	Description
66554RRF.002	2021-07-19	First release

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C
	Max. = 35 °C
Relative humidity	Min. = 20 %
	Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C
	Max. = 35 °C
Relative humidity	Min. = 20 %
	Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Verónica García, Nicolás Salguero, Javier Miguel Nadales.

Used instrumentation:

Radiated Measurements:

		Last Calibration	Due Calibration
1.	Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N.A.	N.A.
2.	Shielded Room ETS LINDGREN S101	N.A.	N.A.
3.	EMI Test Receiver 9kHz-7GHz ROHDE AND SCHWARZ ESR7	2020/12	2022/12
4.	Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E	2020/04	2023/04
5.	RF Pre-amplifier, 40 dB ,10MHz-6 GHz BONN ELEKTRONIK BLMA 0160-01N	2021/03	2022/03
6.	Signal and Spectrum Analyzer 2Hz-50GHz ROHDE AND SCHWARZ FSW50	2020/07	2022/07
7.	Broadband Horn antenna 1 - 18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120D	2019/11	2022/11
8.	Pre-amplifier, G>40 dB, 1-18 GHz BONN ELEKTRONIK BLMA 0118-1M	2021/06	2022/06
9.	Broadband Horn antenna 18 - 40 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9170	2020/05	2023/05
10.	Pre-amplifier, G>30 dB, 18-40 GHz BONN ELEKTRONIK BLMA 1840-3G	2019/11	2021/11

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured:	N/M

Summary

1. Bluetooth Low Energy 5.0 (2M, 1M).

FCC PART 15 PARAGRAPH/ RSS-247			
Requirement – Test case		Verdict	Remark
FCC 15.247 (a)(2) / RSS-247 5.2. (a)	6 dB Bandwidth	N/M	(1)
FCC 15.247 (b) / RSS-247 5.4. (d)	Maximum output power and antenna gain	N/M	(1)
FCC 15.247 (d) / RSS-247 5.5.	Band-edge emissions compliance (Transmitter)	N/M	(1)
FCC 15.247 (e) / RSS-247 5.2. (b)	Power spectral density	N/M	(1)
FCC 15.247 (d) / RSS-247 5.5.	Emission limitations radiated (Transmitter)	P	
<u>Supplementary information and remarks:</u>			
(1) Only radiated emission test requested.			

Appendix A: Test results. Bluetooth Low Energy 5.0 (2M, 1M)

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TEST CONDITIONS

POWER SUPPLY (V):

Vnominal:	3.8 Vdc
Type of Power Supply:	Battery.
Type of Antenna:	Integral.
Maximum Declared Antenna Gain:	-4.42 dBi

TEST FREQUENCIES:

Low Channel:	2402 MHz
Middle Channel:	2440 MHz
High Channel:	2480 MHz

RADIATED MEASUREMENTS

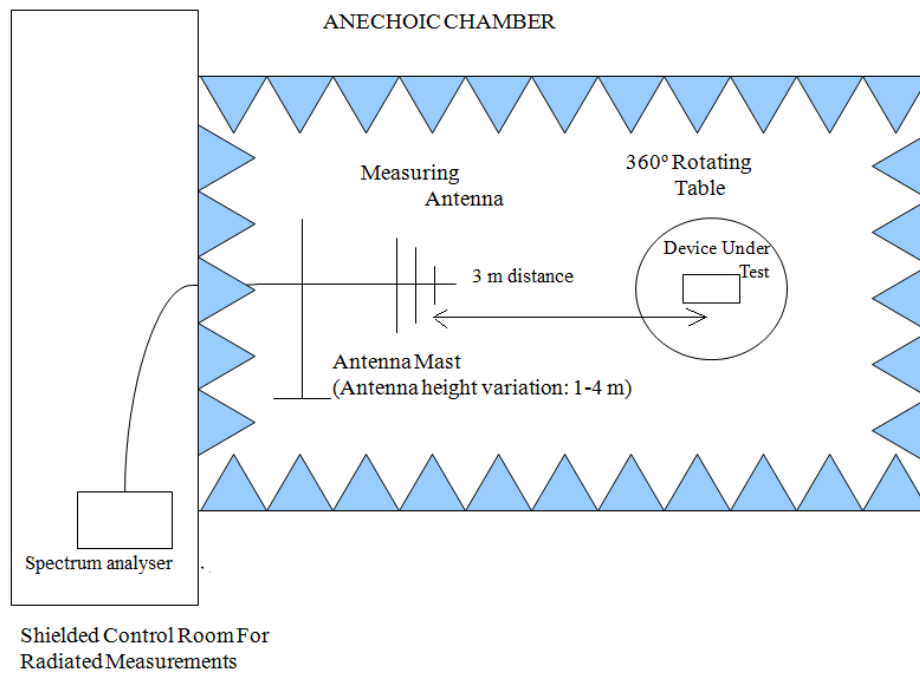
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1m for the frequency range 17 GHz-26 GHz (antenna and 18 GHz-40 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.

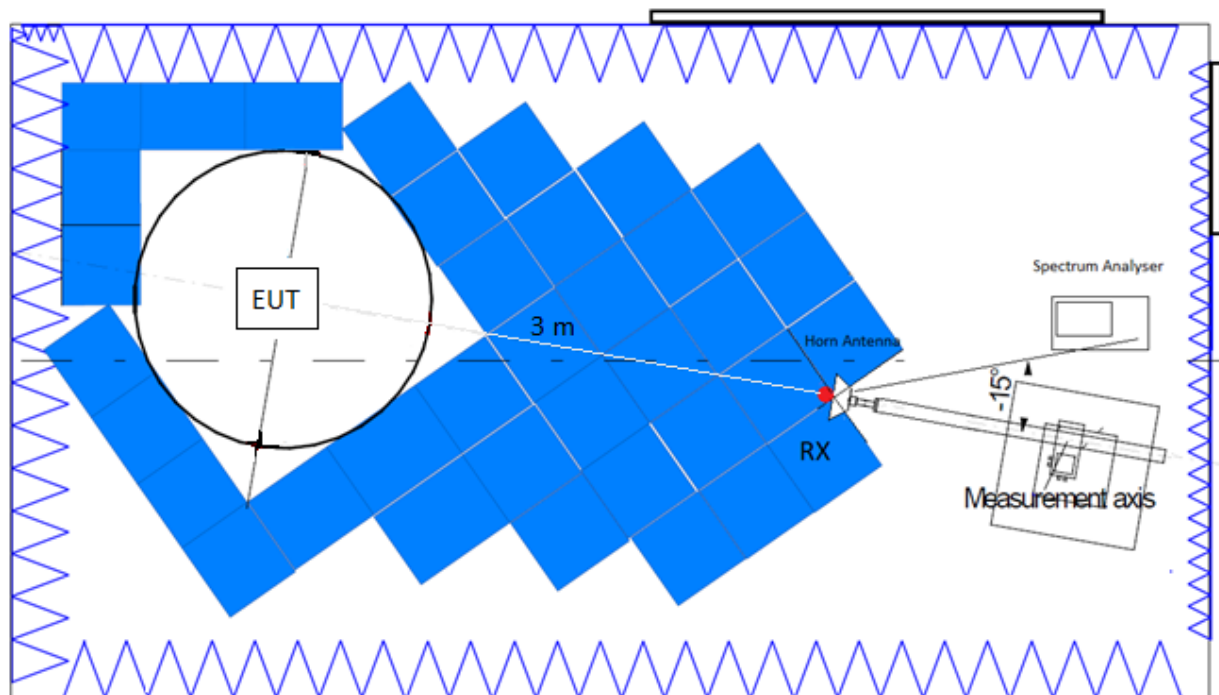
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

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

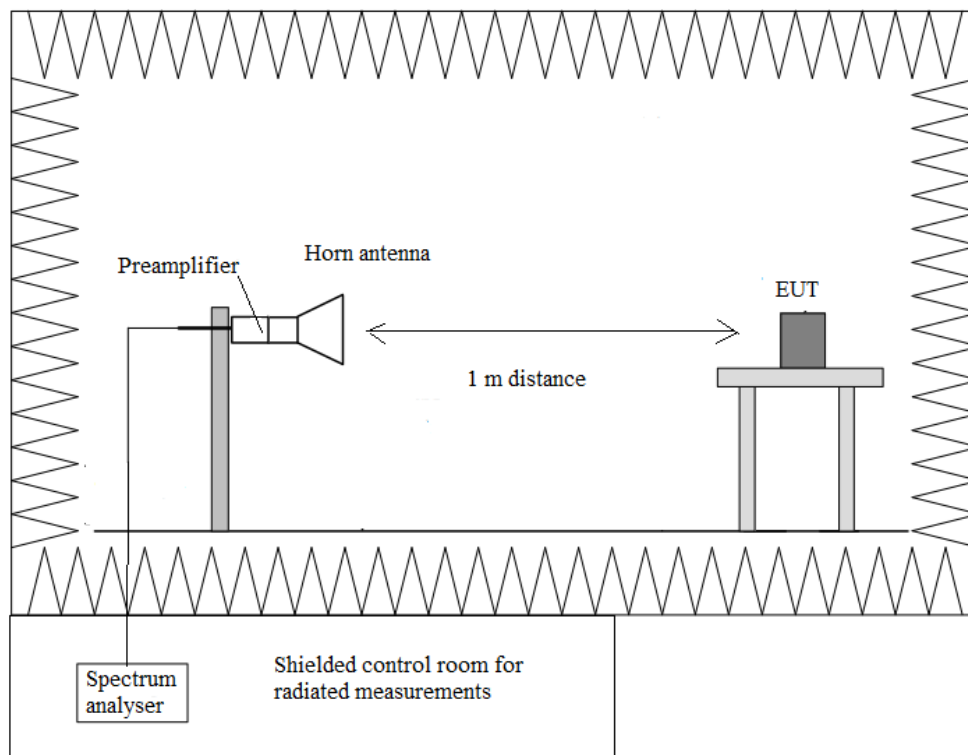
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



FCC 15.247 (d) / RSS-247 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 ($\mu\text{V/m}$)	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 - 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-17 GHz and at distance of 1m 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 detected do not depend neither on the operating channel nor the modulation mode.

No spurious frequencies detected at less than 20 dB below the limit:

Measurement Uncertainty (dB): $<\pm 5.07$

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.

- 2M modulation:**

- LOW CHANNEL. Spurious frequencies detected closest to the limit:

Spurious frequency (GHz)	Emission Level (dBµV/m)	Duty cycle Correction (dB)	Corrected Emission Level (dBµV/m)	Polarization	Detector
2.3426	55.15	---	---	H	Peak
	38.29	11.35	49.64		Average
2.4948	54.12	---	---	H	Peak
	35.26	11.35	46.61		Average
4.8040	44.47	---	---	V	Peak
7.2050	45.69	---	---	H	Peak

- MIDDLE CHANNEL. Spurious frequencies detected closest to the limit:

Spurious frequency (GHz)	Emission Level (dBµV/m)	Duty cycle Correction (dB)	Corrected Emission Level (dBµV/m)	Polarization	Detector
2.3172	55.55	---	---	H	Peak
	37.85	11.35	37.85		Average
2.4869	53.65	---	---	H	Peak
	34.21	11.35	45.56		Average
4.8790	46.35	---	---	V	Peak
9.7580	47.79	---	---	V	Peak

- HIGH CHANNEL. Spurious frequencies detected closest to the limit:

Spurious frequency (GHz)	Emission Level (dBµV/m)	Duty cycle Correction (dB)	Corrected Emission Level (dBµV/m)	Polarization	Detector
2.3399	54.68	---	---	H	Peak
	32.21	11.35	43.56		Average
2.4836	60.17	---	---	V	Peak
	41.52	11.35	52.87		Average
4.9595	47.70	---	---	H	Peak

Measurement uncertainty (dB)

- ≤± 4.00 for f < 1 GHz up to 3 GHz
- ≤± 4.99 for f ≥ 3 GHz up to 17 GHz
- ≤± 5.08 for f ≥ 17 GHz up to 26 GHz

Verdict: PASS

- **1M modulation:**

- LOW CHANNEL. Spurious frequencies detected closest to the limit:

Spurious frequency (GHz)	Emission Level (dBμV/m)	Duty cycle Correction (dB)	Corrected Emission Level (dBμV/m)	Polarization	Detector
2.3173	54.33	---	---	V	Peak
	41.60	11.35	50.30		Average
2.4994	54.14	---	---	H	Peak
	41.40	11.35	50.10		Average
2.8806	55.95	---	---	H	Peak
	43.12	11.35	51.82		Average
4.8040	43.23	---	---	H	Peak
7.2065	46.50	---	---	V	Peak

- MIDDLE CHANNEL. Spurious frequencies detected closest to the limit:

Spurious frequency (GHz)	Emission Level (dBμV/m)	Duty cycle Correction (dB)	Corrected Emission Level (dBμV/m)	Polarization	Detector
2.3233	54.65	---	---	H	Peak
	45.56	11.35	54.26		Average
2.4859	54.32	---	---	H	Peak
	48.25	11.35	56.95		Average
4.8795	46.66	---	---	H	Peak

- HIGH CHANNEL. Spurious frequencies detected closest to the limit:

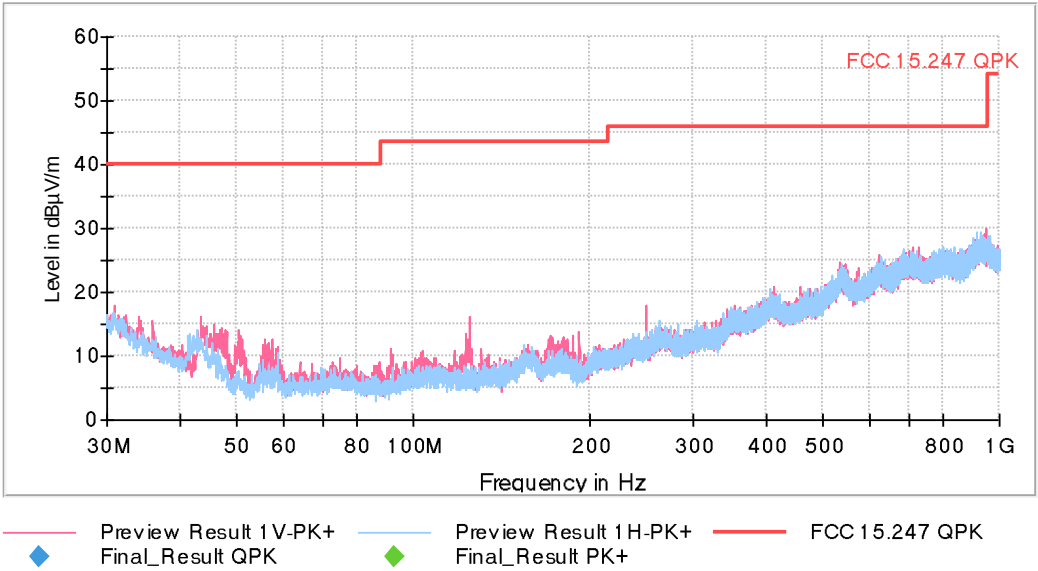
Spurious frequency (GHz)	Emission Level (dBμV/m)	Duty cycle Correction (dB)	Corrected Emission Level (dBμV/m)	Polarization	Detector
2.3222	54.83	---	---	H	Peak
	47.82	11.35	56.52		Average
2.4838	59.06	---	---	V	Peak
	41.53	11.35	41.53		Average
4.9600	47.57	---	---	H	Peak
7.4395	46.62	---	---	V	Peak

Measurement uncertainty (dB) $\leq \pm 4.00$ for $f < 1$ GHz up to 3 GHz
 $\leq \pm 4.99$ for $f \geq 3$ GHz up to 17 GHz
 $\leq \pm 5.08$ for $f \geq 17$ GHz up to 26 GHz

Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz:

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

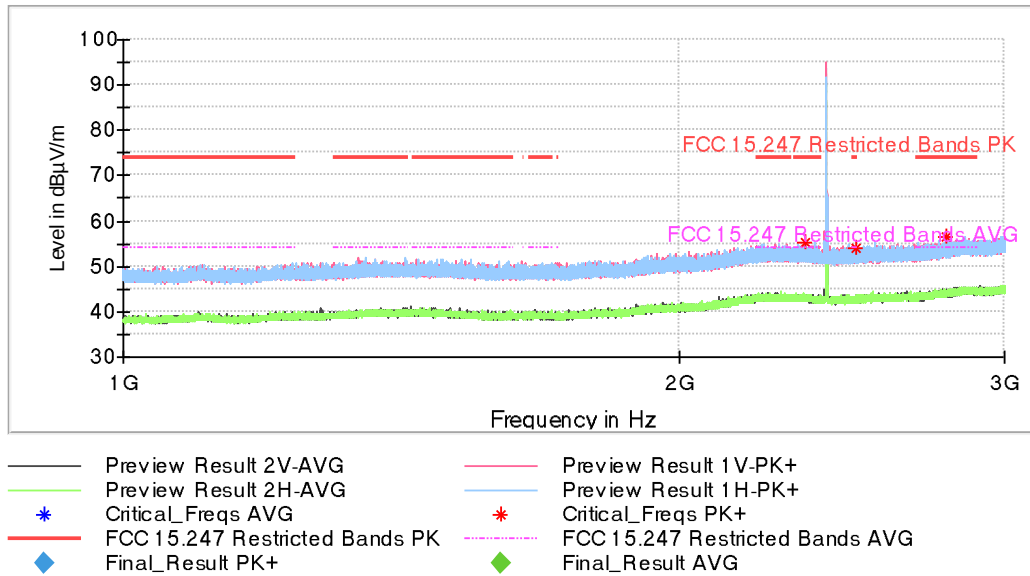


This plot is valid for the Low, Middle and High Channels.

- **2M modulation:**

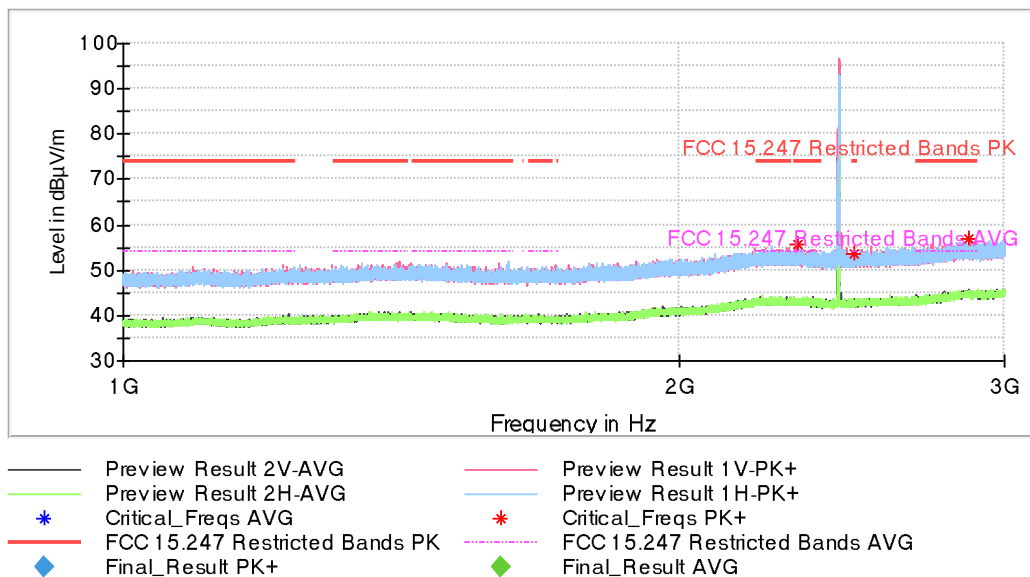
FREQUENCY RANGE 1 - 3 GHz:

- Low Channel:



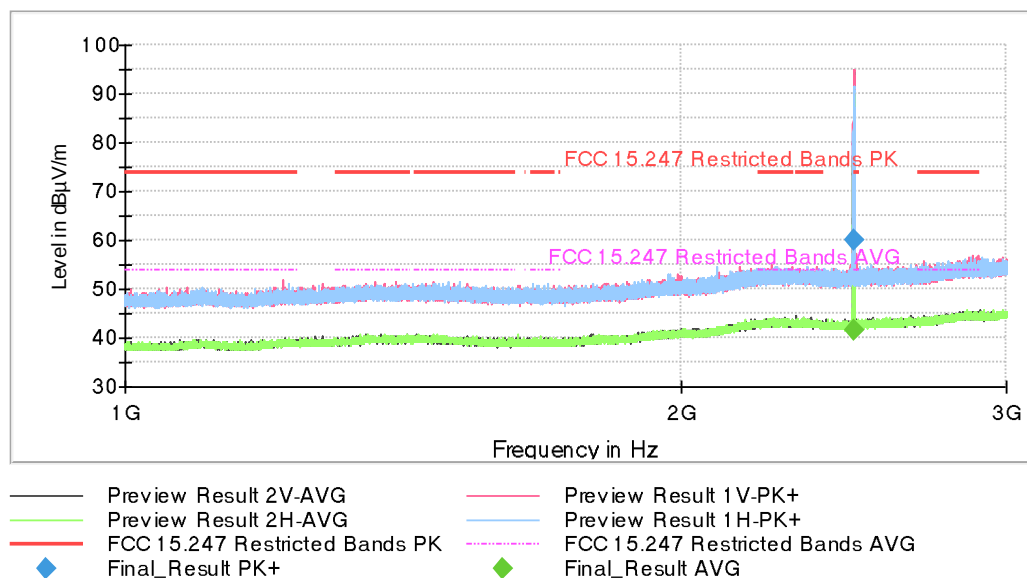
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

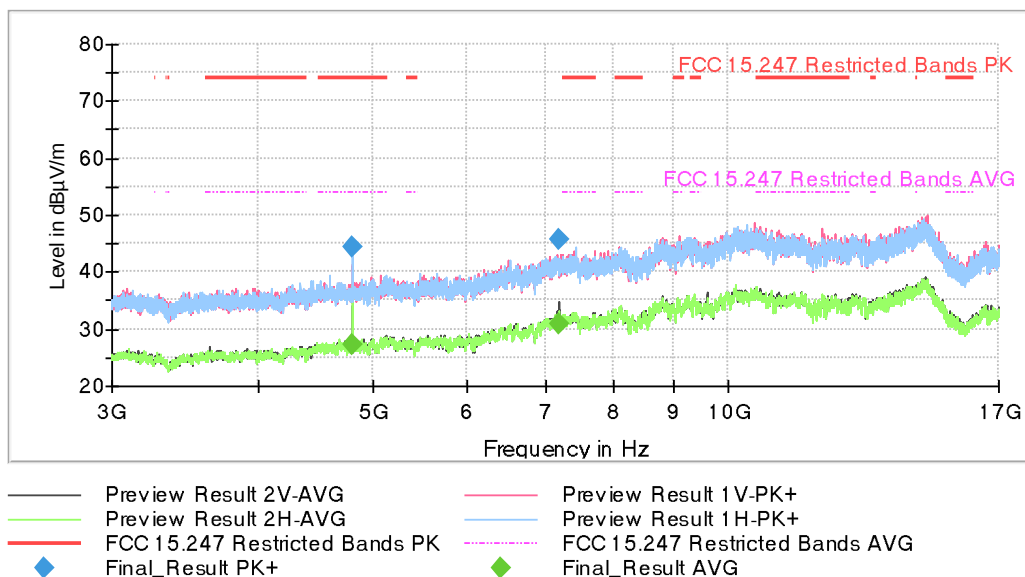
- High Channel:



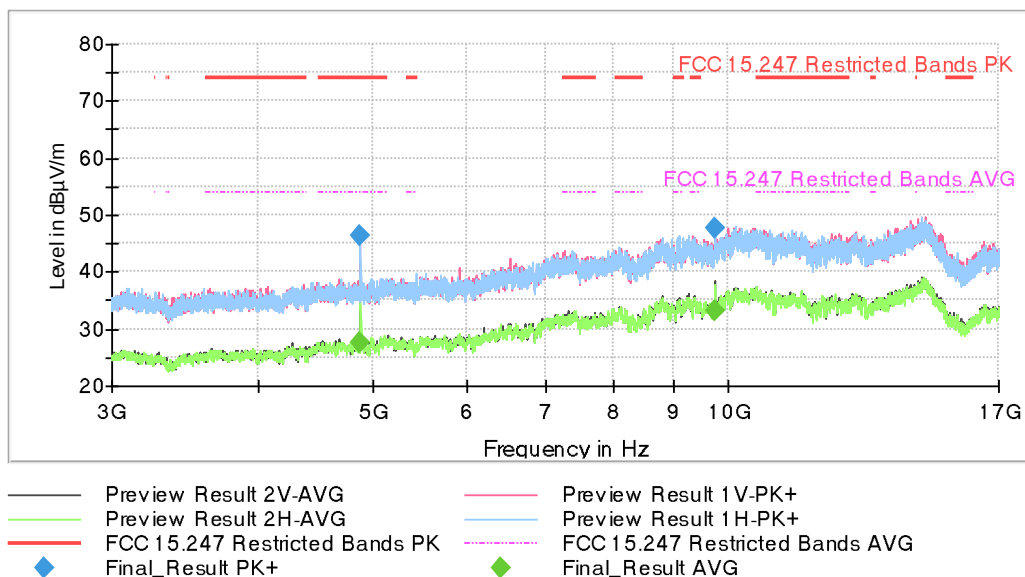
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz:

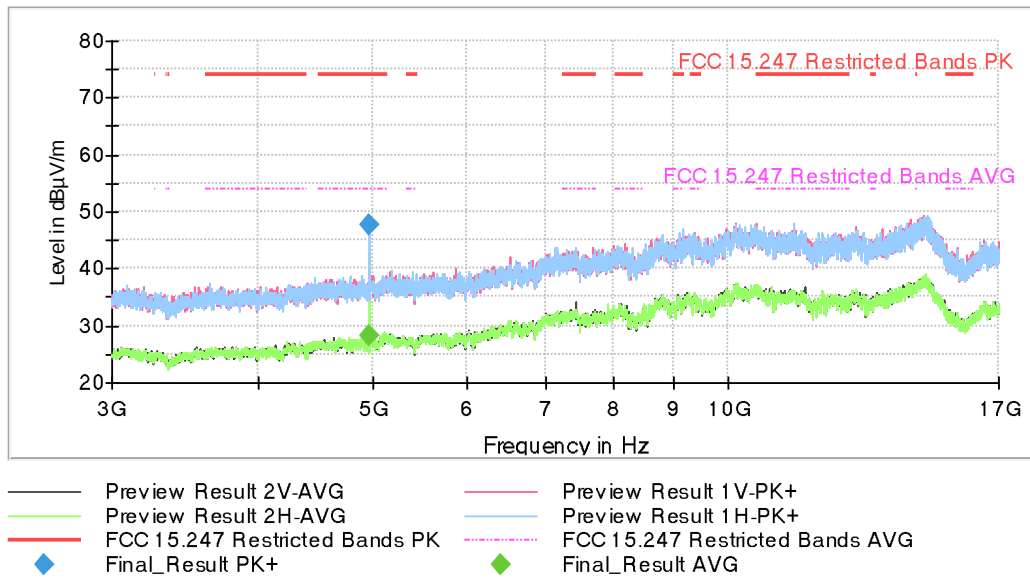
- Low Channel:



- Middle Channel:

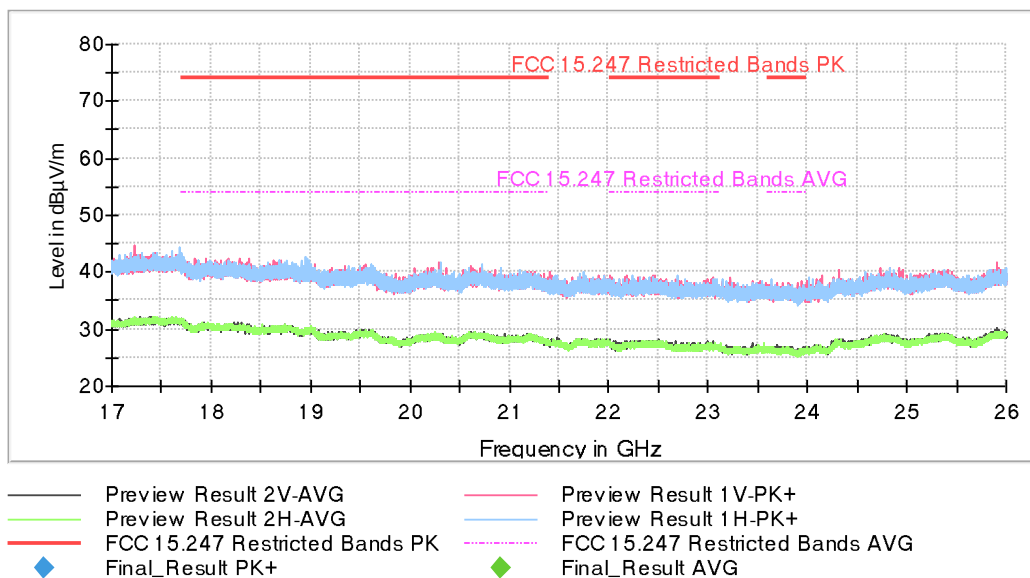


- High Channel:



FREQUENCY RANGE 17 - 26 GHz:

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

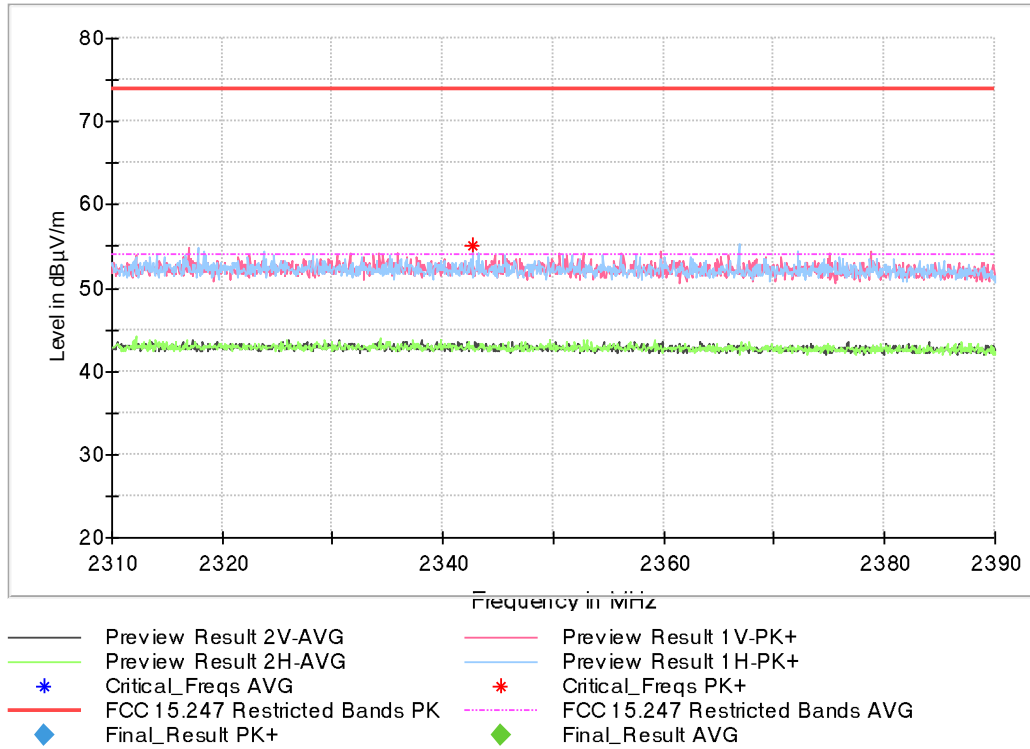


This plot is valid for the Low, Middle and High Channels.

FREQUENCY RANGE 2.31-2.39 GHz:

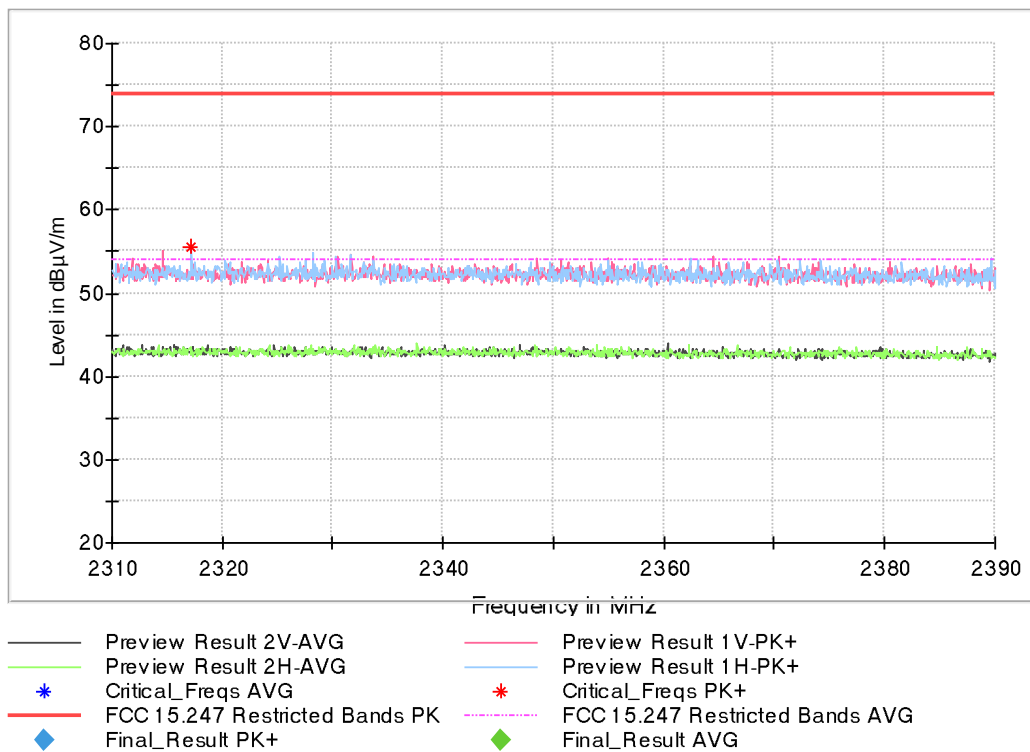
- Low Channel:

Full Spectrum



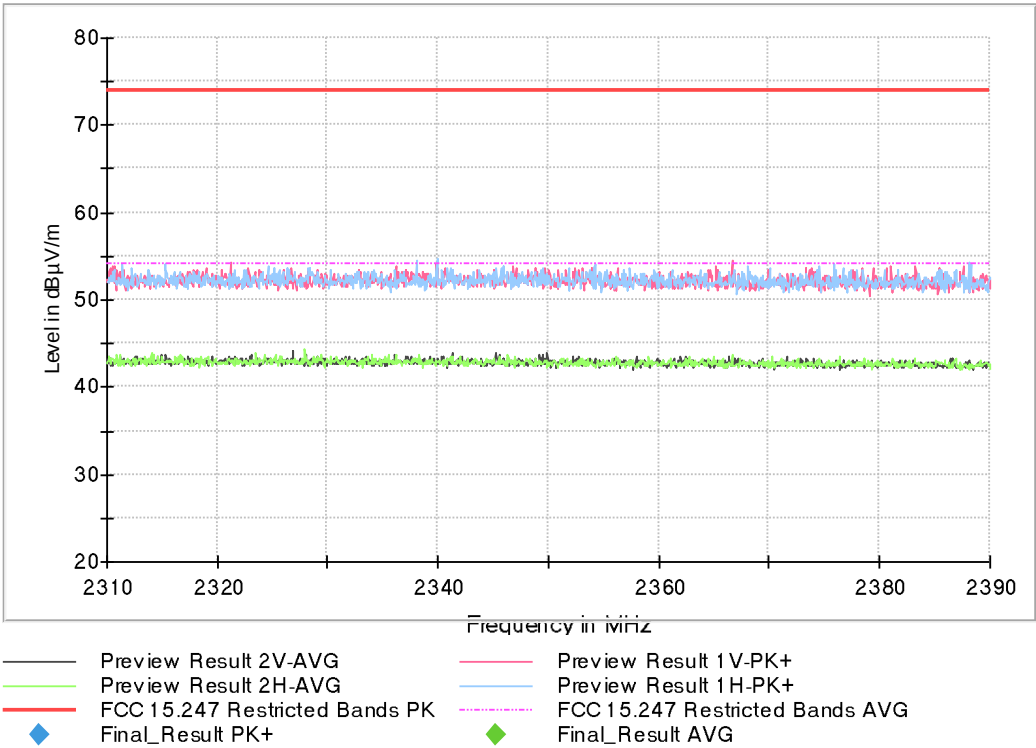
- Middle Channel:

Full Spectrum



- High Channel:

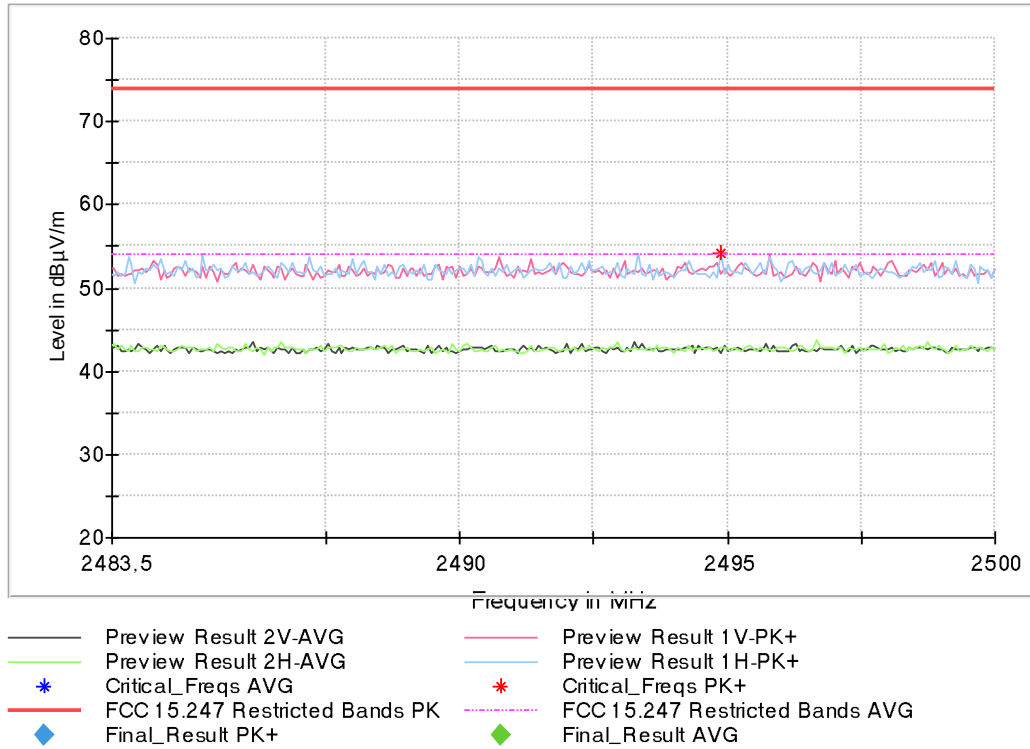
Full Spectrum



FREQUENCY RANGE 2.4835-2.5 GHz:

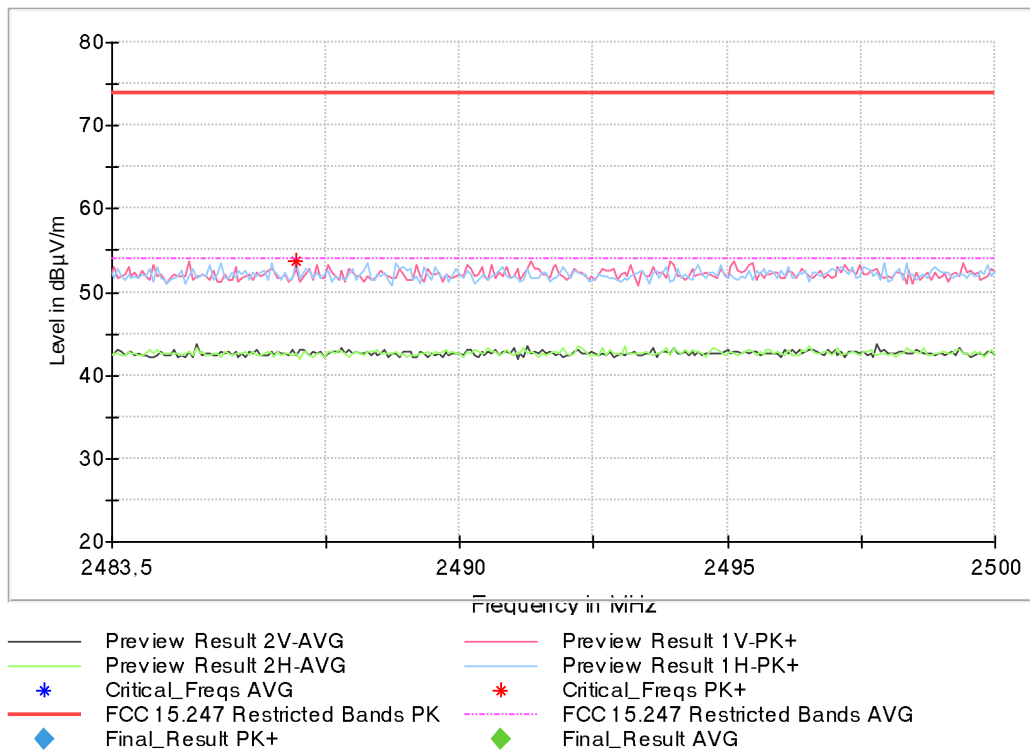
- Low Channel:

Full Spectrum

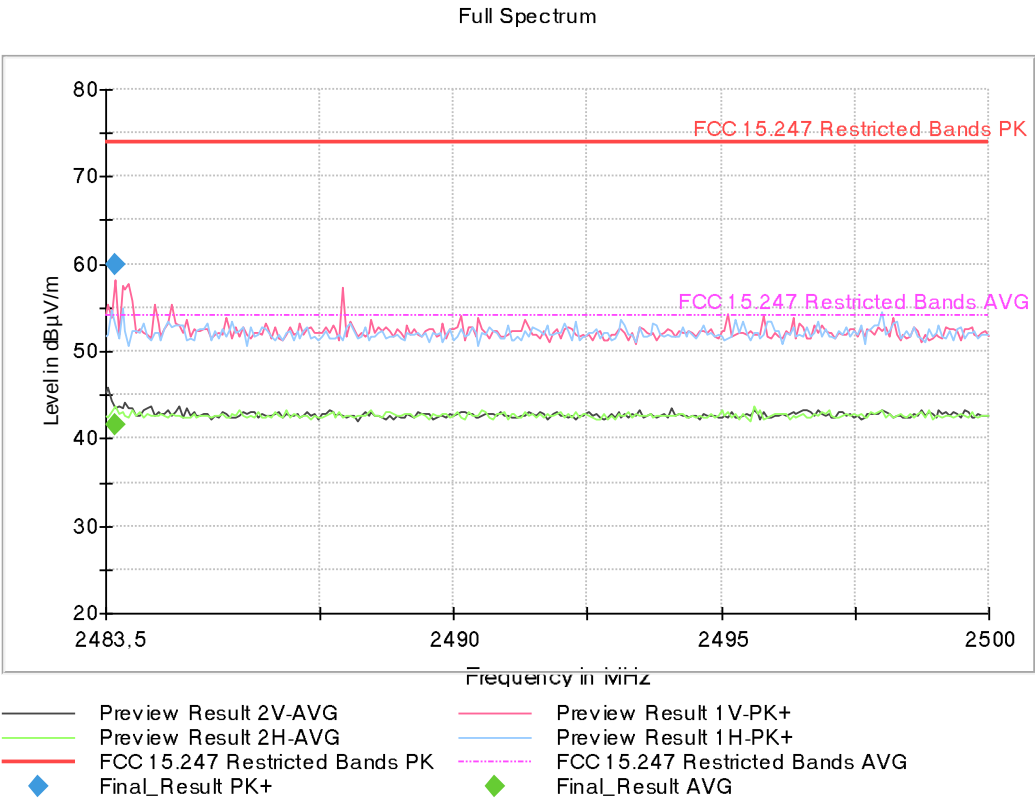


- Middle Channel:

Full Spectrum



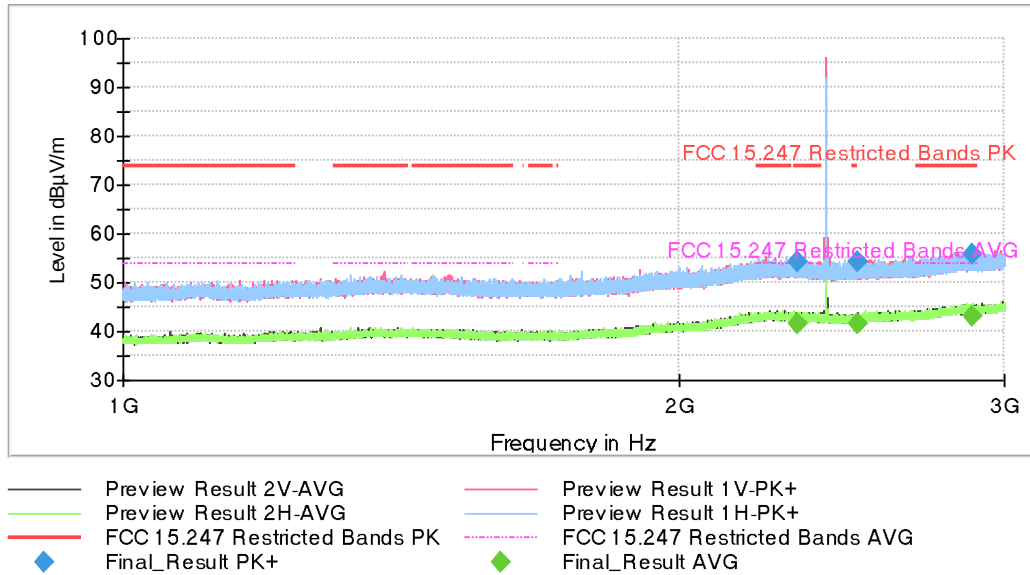
- High Channel:



- **1M modulation:**

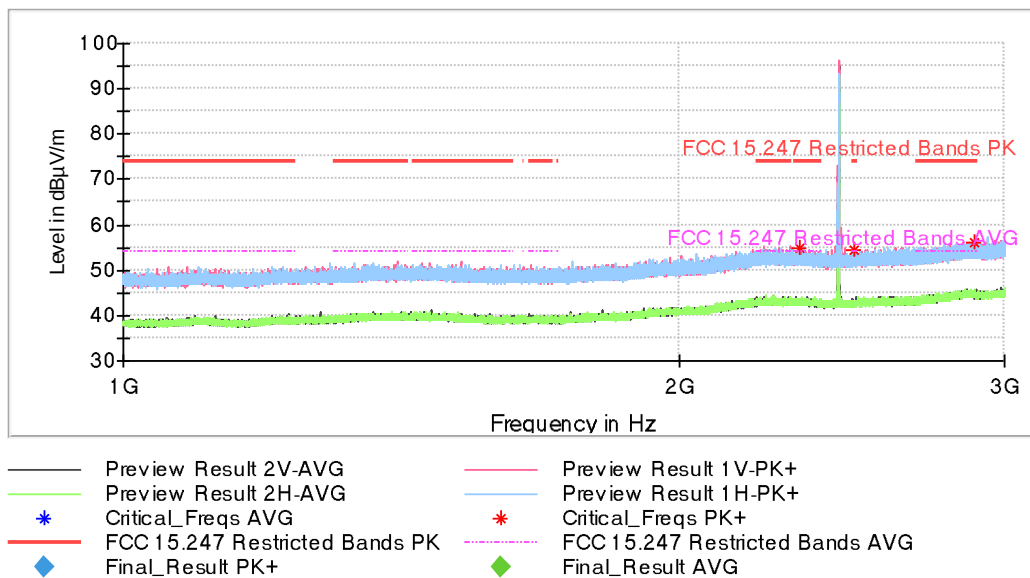
FREQUENCY RANGE 1 - 3 GHz:

- Low Channel:



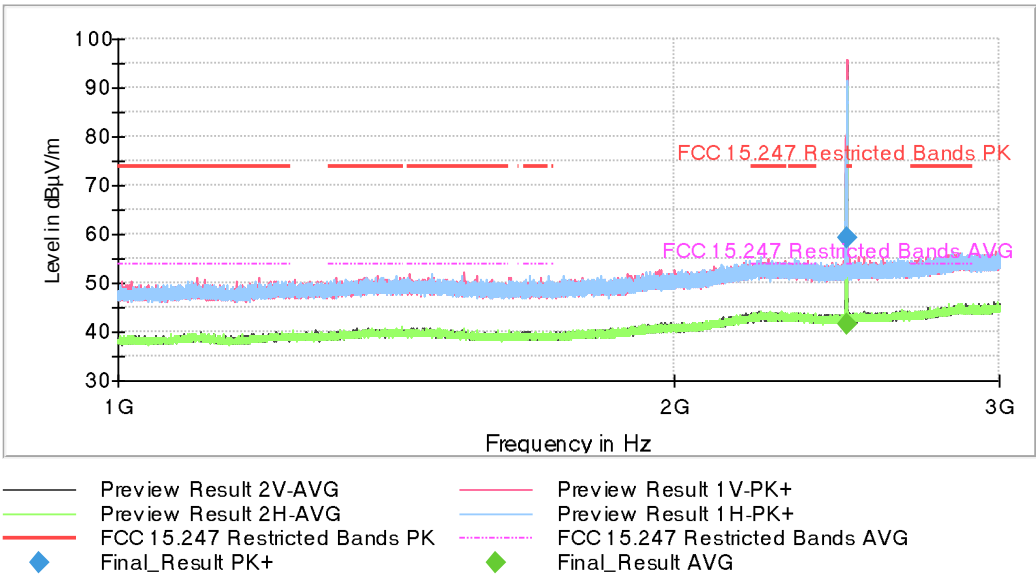
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

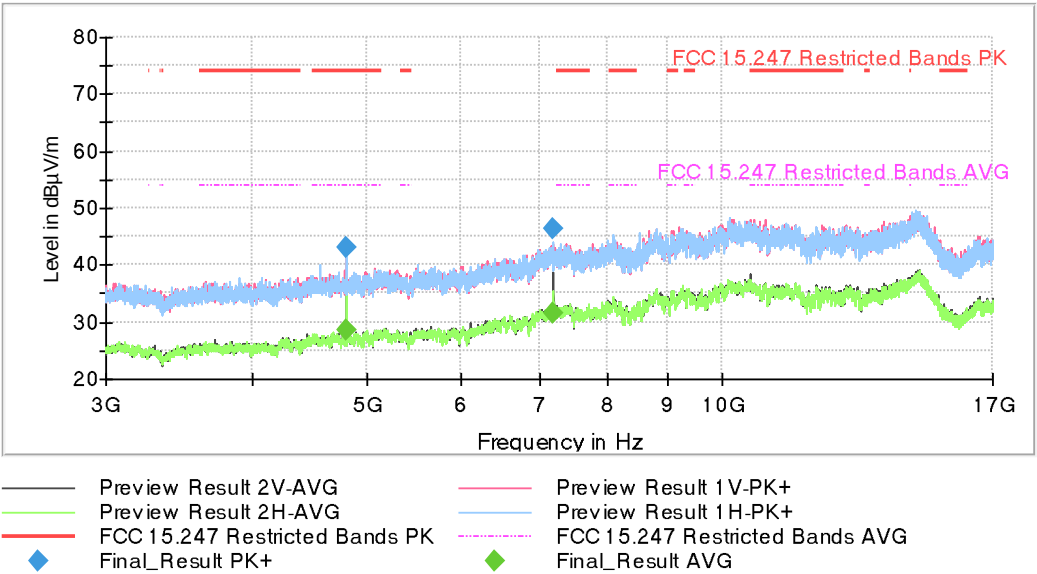
- High Channel:



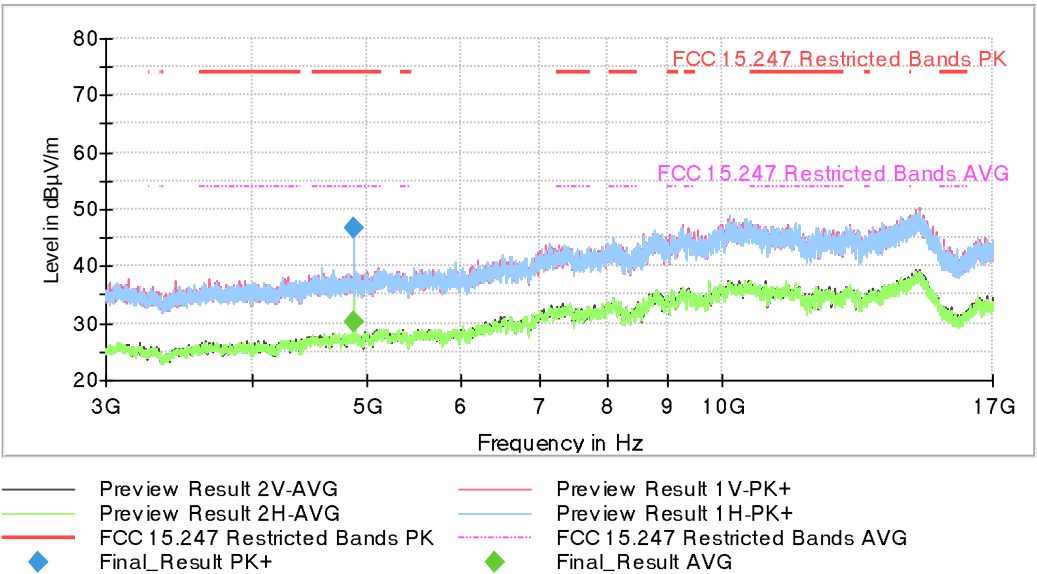
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 3 - 17 GHz:

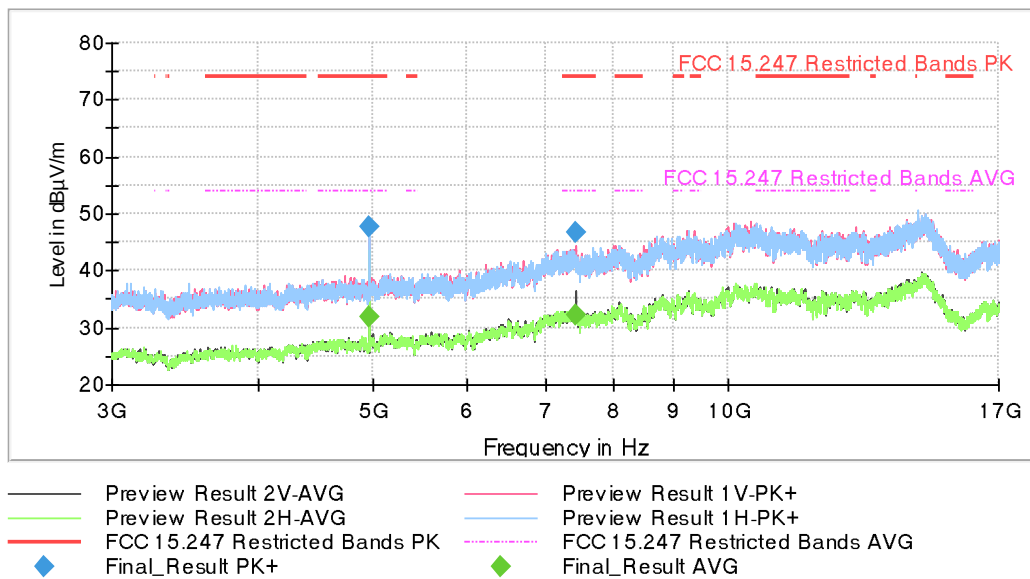
- Low Channel:



- Middle Channel:

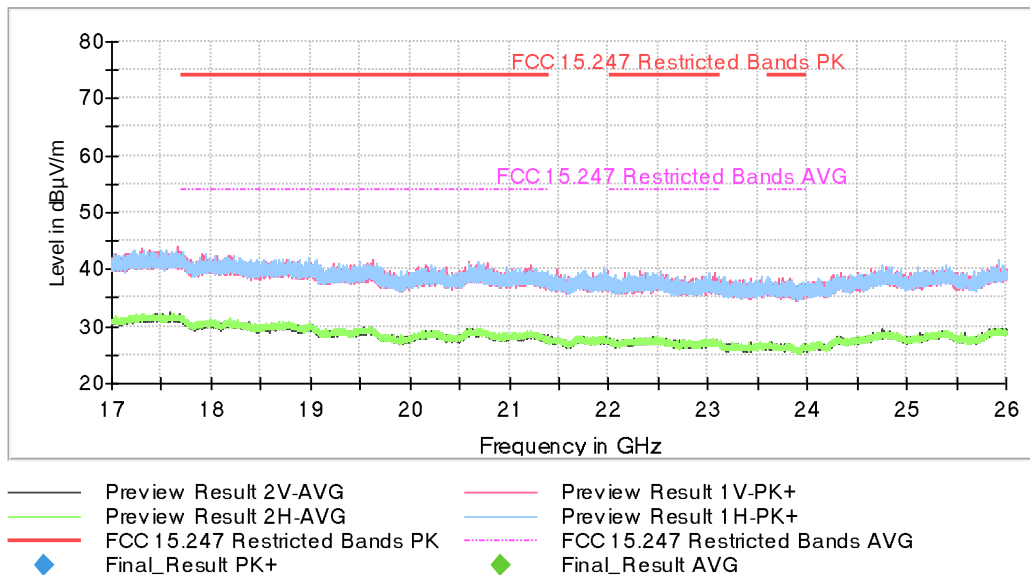


- High Channel:



FREQUENCY RANGE 17 - 26 GHz:

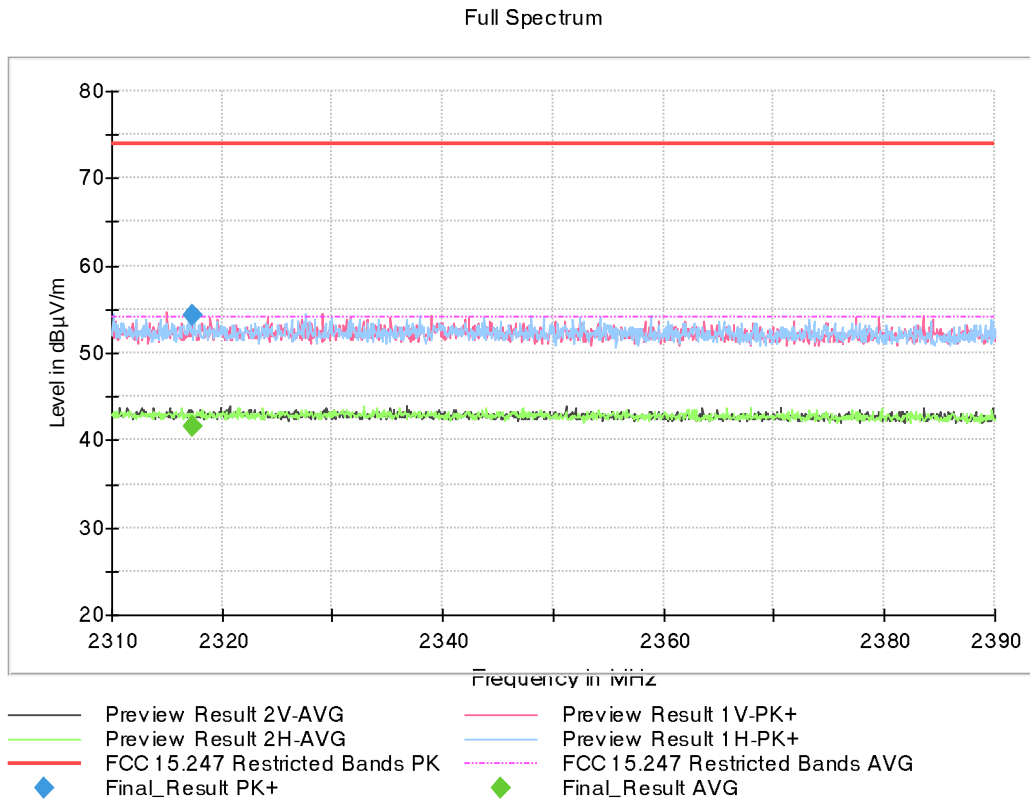
The spurious frequencies detected do not depend on the operating channel.



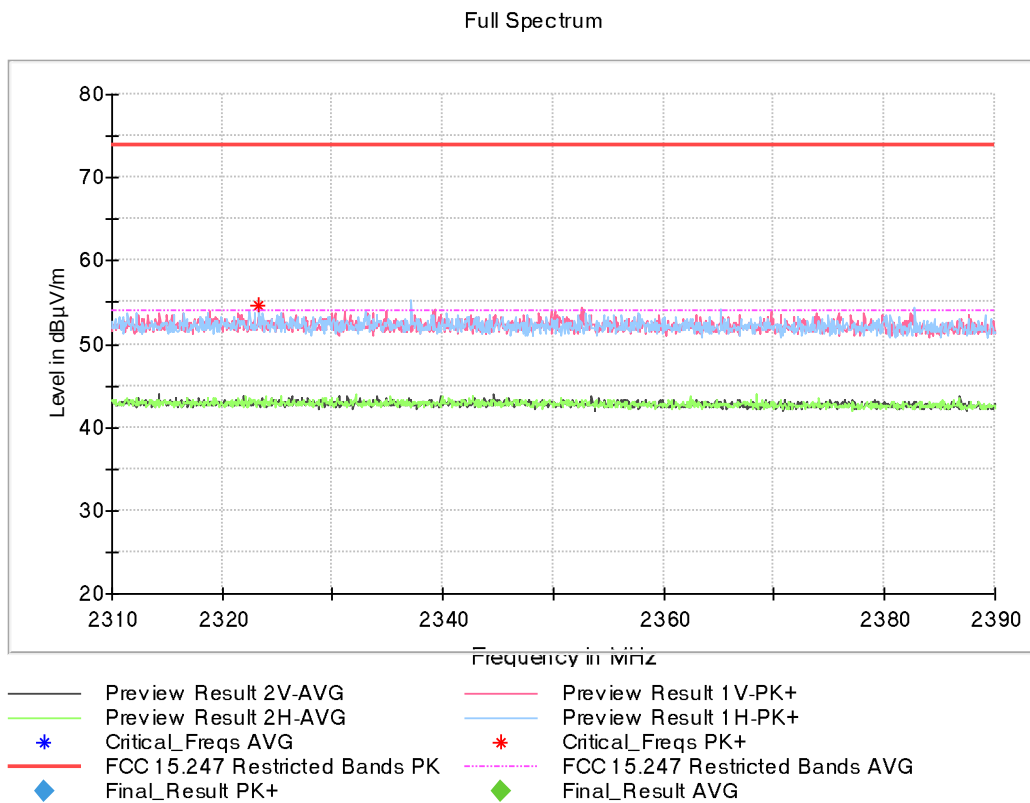
This plot is valid for the Low, Middle and High Channels.

FREQUENCY RANGE 2.31-2.39 GHz:

- Low Channel:

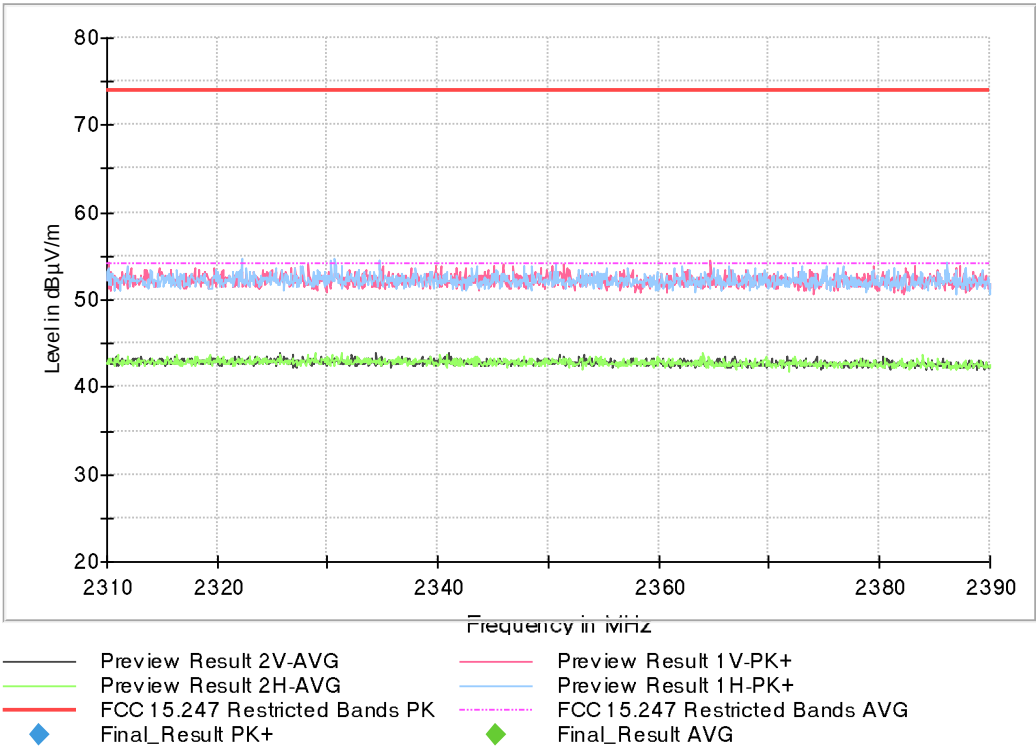


- Middle Channel:



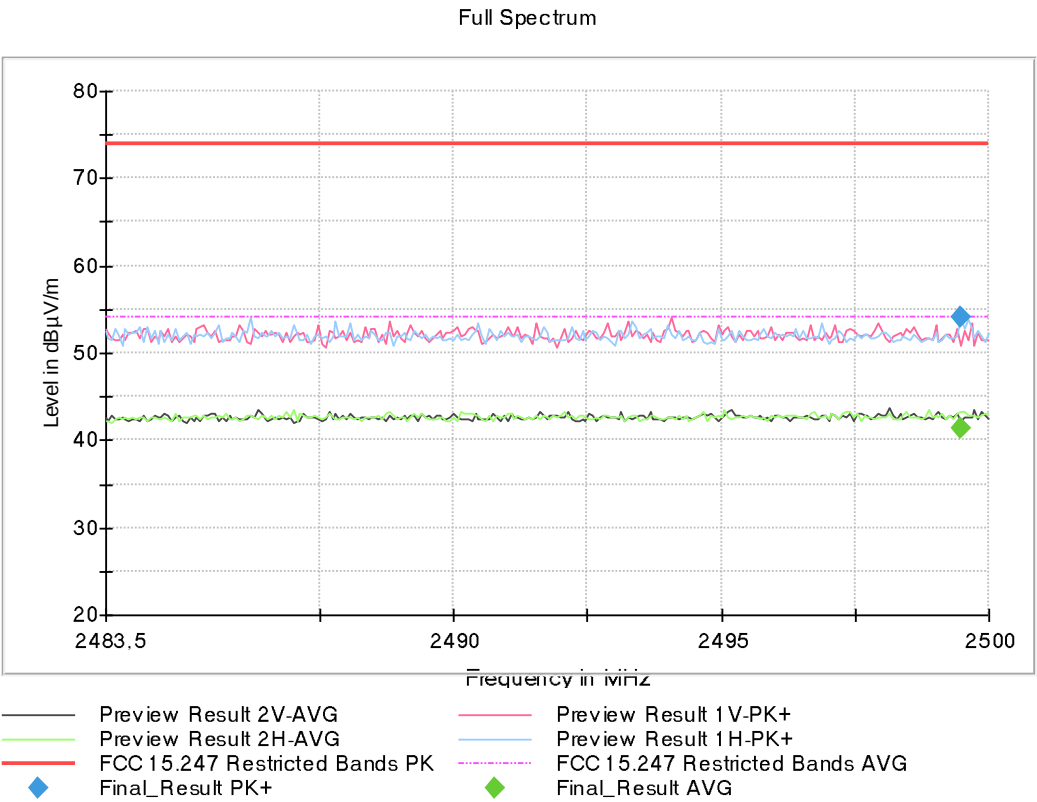
- High Channel:

Full Spectrum

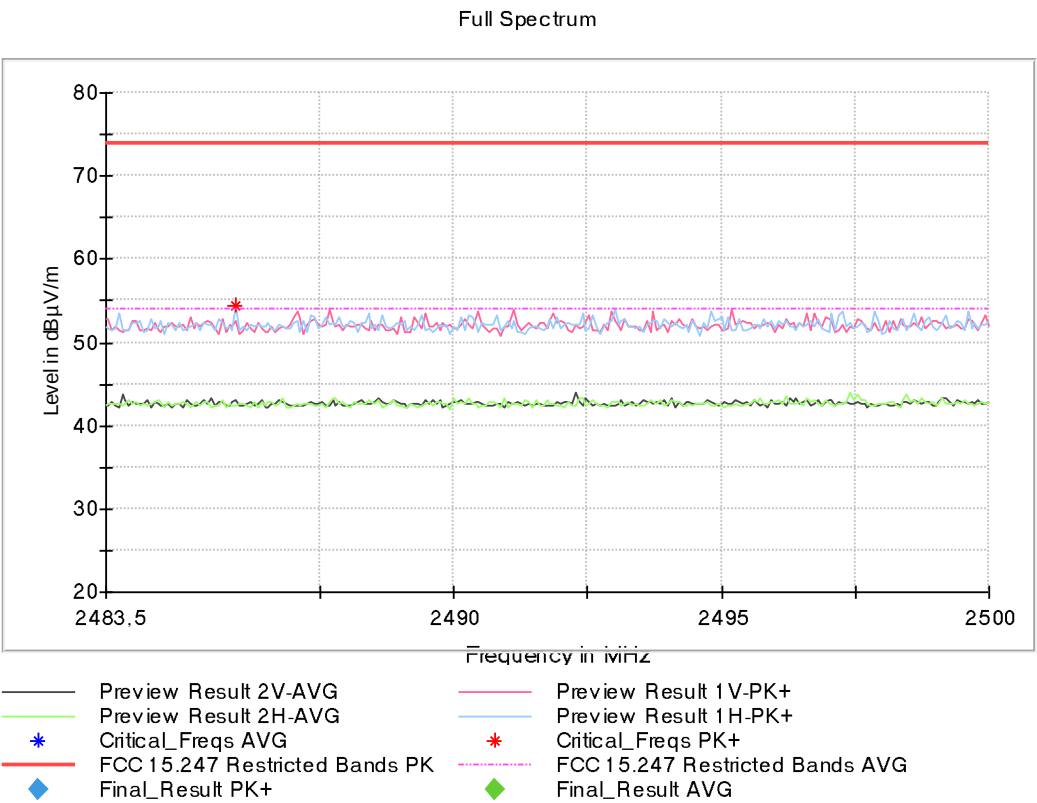


FREQUENCY RANGE 2.4835-2.5 GHz:

- Low Channel:



- Middle Channel:



- High Channel:

