DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29 507 456

ENSAYOS Nº 51/LE147

Test report No:
NIE: 63185RRF.007

Partial Test Report

USA FCC Part 15.247, 15.209
CANADA RSS-247, RSS-Gen

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz.
Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.
General Requirements and Information for the Certification of Radio Apparatus.

(*) Identification of item tested	Headunit with radio and Bluetooth
(*) Trademark	Panasonic
(*) Model and /or type reference	MIB3E_MQB_BT
(*) Other identification of the product	HW version: X01 SW version: X464 PN: 654.035.867.A FCC ID: WUQ-MIB3HBT IC: 216R-MIB3HBT
(*) Features	Bluetooth, FM, AM, USB
Applicant	PANASONIC AUTOMOTIVE SYSTEMS EUROPE GMBH Robert Bosch Str. 27-29 – 63225 Langen - Germany
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 Amendment 1 (March 2019). 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 Martín EMC Consumer & RF Lab. Manager RAFAEL LÓPEZ MARTÍN 2020.11.20 12:49:25 +01'00'
Date of issue	2020-11-20
Report template No	FDT08_22 (*) "Data provided by the client"

Index

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 with appropriate scope of accreditation that include testing performed in this test 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.

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 MIB3E_MQB_BT is an automotive head unit to be installed in cars with the following features: Bluetooth, FM, AM, USB.

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 Nº	Description	Model	Serial Nº	Date of reception
63185/005	Headunit with radio and Bluetooth	MIB3E_MQB_BT	PM6-00129.04.20413F0184	2020/05/20
51929B/119	RF Harness	--	--	2018/12/10

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

Test sample description

<table>
<tr><td rowspan="8">Ports…… :</td><td rowspan="2">Port name and description</td><td colspan="4">Cable</td></tr>
<tr><td>Specified max length [m]</td><td>Attached during test</td><td>Shielded</td><td>Coupled to patient(3)</td></tr>
<tr><td></td><td></td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td></td><td></td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td></td><td></td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td></td><td></td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td></td><td></td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td></td><td></td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td>Supplementary information to the ports…… :</td><td colspan="5"></td></tr>
<tr><td rowspan="5">Rated power supply .....:</td><td colspan="2" rowspan="2">Voltage and Frequency</td><td colspan="4">Reference poles</td></tr>
<tr><td>L1</td><td>L2</td><td>L3</td><td>N</td><td>PE</td></tr>
<tr><td>☐</td><td>AC:</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td>☐</td><td>AC:</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td>☒</td><td colspan="5">DC: 12 V</td></tr>
<tr><td></td><td>☐</td><td colspan="5">DC:</td></tr>
<tr><td>Rated Power .....:</td><td colspan="5"></td></tr>
<tr><td>Clock frequencies.....:</td><td colspan="5"></td></tr>
<tr><td>Other parameters .....:</td><td colspan="5"></td></tr>
</table>

Software version .....:	X464			
Hardware version .....:	X01			
Dimensions in cm (W x H x D) ....:				
Mounting position .....:	☐	Table top equipment		
	☐	Wall/Ceiling mounted equipment		
	☐	Floor standing equipment		
	☐	Hand-held equipment		
	☐	Other:		
Modules/parts.....:	Module/parts of test item		Type	Manufacturer
Accessories (not part of the test item) .....:	Description		Type	Manufacturer
Documents as provided by the applicant.....:	Description		File name	Issue date

(3) Only for Medical Equipment

Identification of the client

PANASONIC AUTOMOTIVE SYSTEMS EUROPE GMBH

Robert Bosch Str. 27-29 – 63225 Langen - Germany

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2020-05-28
Date (finish)	2020-06-02

Document history

Report number	Date	Description
63185RRF.007	2020-11-20	First release

Environmental conditions

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

The tests have been performed by the technical personnel: Daniel López, Jaime Barranquero, Antonio Manuel Sánchez and Victoria Olmedo.

Used instrumentation:

Radiated Measurements:

		Last Calibration	Due Calibration
1.	Semianechoic Absorber Lined Chamber ALBATROSS P29419	2020/01	2023/01
2.	Ultralog Antenna 30MHz-6GHz, ROHDE AND SCHWARZ HL562E_UPG	2019/10	2022/10
3.	EMI Test Receiver 2Hz-44GHz, ROHDE AND SCHWARZ ESW44	2019/10	2021/10
4.	Horn Antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D	2019/11	2022/11
5.	Preamplifier 30dB 500MHz-18GHz, SCHWARZBECK BBV 9718 C	2020/01	2021/01
6.	HORN ANTENNA 18-40GHz BBHA 9170 SCHWARZBECK	2017/12	2020/12
7.	PRE-AMPLIFIER G>30dB 18-40GHz BONN ELEKTRONIK	2019/11	2021/11
8.	DC Power Supply 30V/3A 90W, GW INSTEK GPS-3030D	N.A.	N.A.

Testing verdicts

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

Summary

1. Bluetooth EDR

FCC PART 15 PARAGRAPH / RSS-247 Requirement – Test case		Verdict	Remark
FCC 15.247 (a)(1) / RSS-247 5.1. (b)	20 dB Bandwidth and Carrier frequency separation	N/M	
FCC 15.247 (a)(1)(iii) / RSS-247 5.1. (d)	Number of hopping channels	N/M	
FCC 15.247 (a)(1)(iii) / RSS-247 5.1. (d)	Time of occupancy (Dwell Time)	N/M	
FCC 15.247 (b) / RSS-247 5.4. (b)	Maximum peak output power and antenna gain	N/M	
FCC 15.247 (d) / RSS-247 5.5.	Band-edge emissions compliance (Transmitter)	N/M	
FCC 15.247 (d) / RSS-247 5.5.	Emission limitations radiated (Transmitter)	P	(1)
Supplementary information and remarks: (1) Only test requested.			

Appendix A: Test results. Bluetooth EDR (GFSK, Pi/4-DQPSK, 8DPSK)

INDEX

TEST CONDITIONS

POWER SUPPLY (V):

V nonimal:	12 Vdc.
Type of Power Supply:	External DC (Car Battery).

ANTENNA:

Type of Antenna:	Integral.
Maximum Declared Antenna Gain:	+1.3 dBi

TEST FREQUENCIES:

Low Channel:	2402 MHz
Middle Channel:	2441 MHz
High Channel:	2480 MHz

RADIATED MEASUREMENTS:

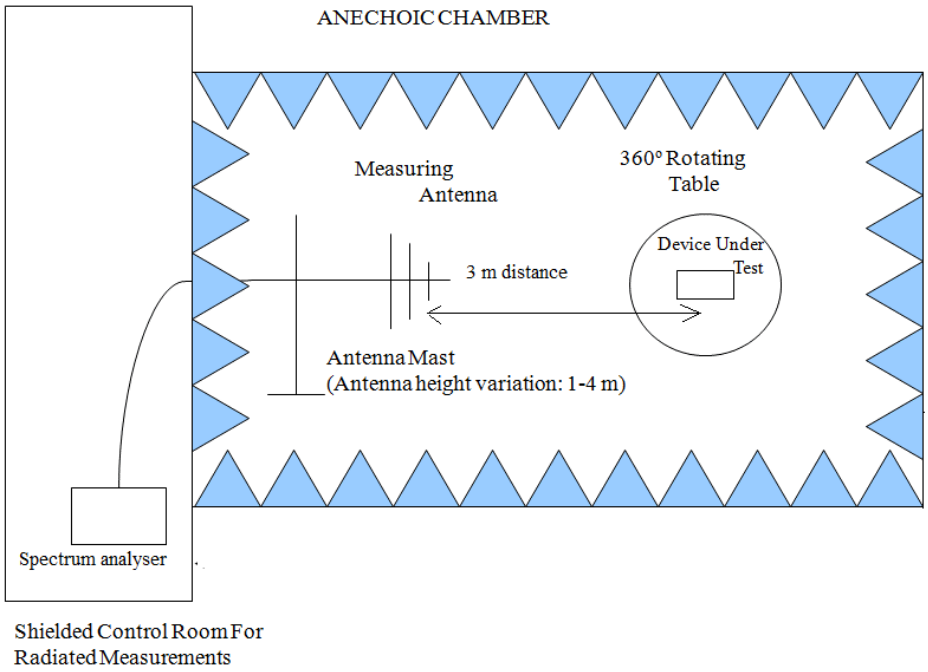
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1 GHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1m for the frequency range 17 GHz-26 GHz (17 GHz-26 GHz horn antenna).

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.

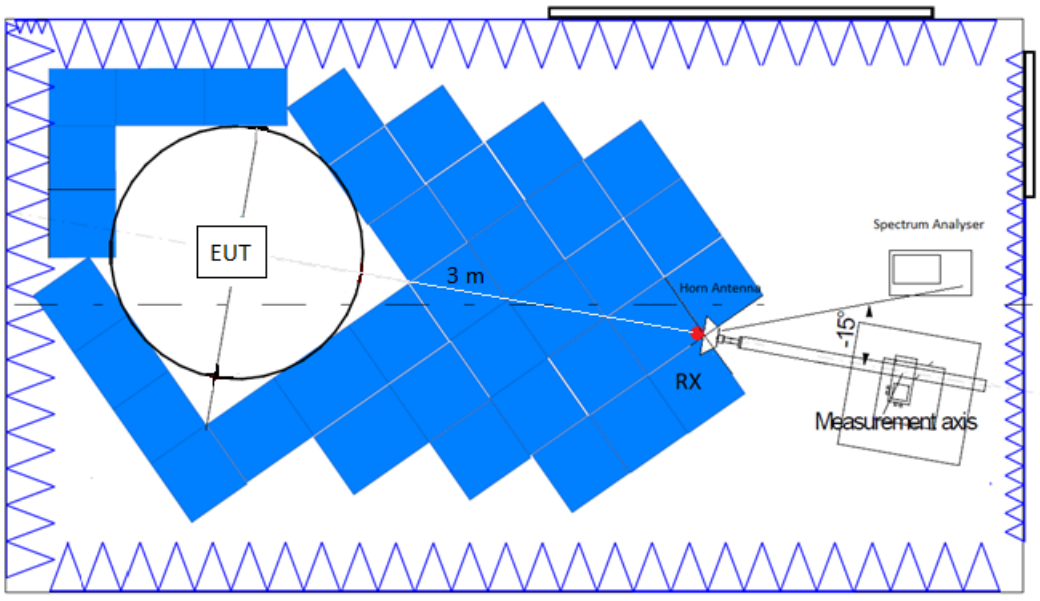
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find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

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

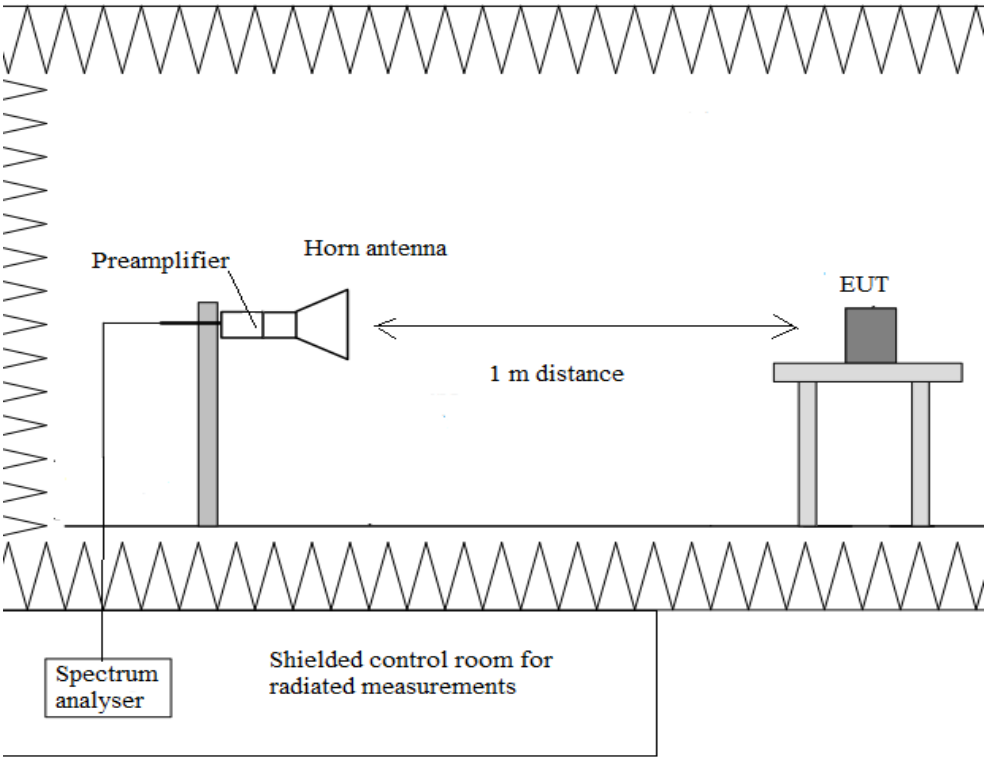
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz 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 §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-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 on neither the operating channel or the modulation mode.

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

Spurious Frequency (MHz)	Emission Level (dBµV/m)	Limit (dBµV/m)	Polarization	Detector	Measurement Uncertainty (dB)
243.4	31.62	46	V	Quasi peak	<± 5.1
362.225	31.67	46	H	Quasi peak	<± 5.1
792.18	36.21	46	H	Quasi peak	<± 5.1
800.18	37.64	46	H	Quasi peak	<± 5.1

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.
  - RESTRICTED BANDS: No spurious frequencies detected.

Measurement Uncertainty (dB): 1 GHz- 17 GHz <± 4.6
17 GHz- 26 GHz <± 4.89

Verdict: PASS

- **Pi/4-DQPSK (2DH5):**
  - 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.
  - RESTRICTED BANDS: No spurious frequencies detected.

Measurement Uncertainty (dB): 1 GHz- 17 GHz <± 4.6
17 GHz- 26 GHz <± 4.89

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.

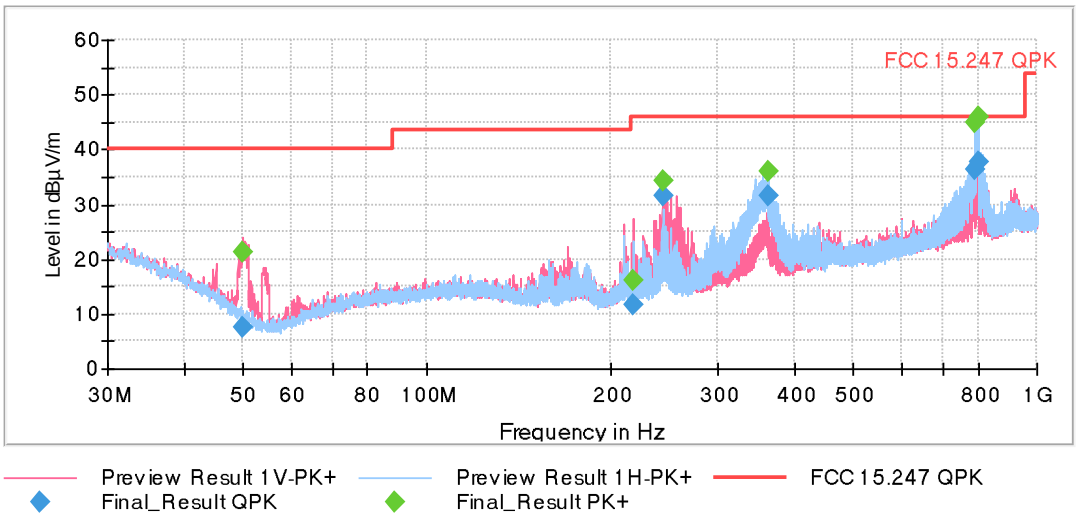
  - RESTRICTED BANDS: No spurious frequencies detected.

Measurement Uncertainty (dB): 1 GHz- 17 GHz <± 4.6
17 GHz- 26 GHz <± 4.89

Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz:

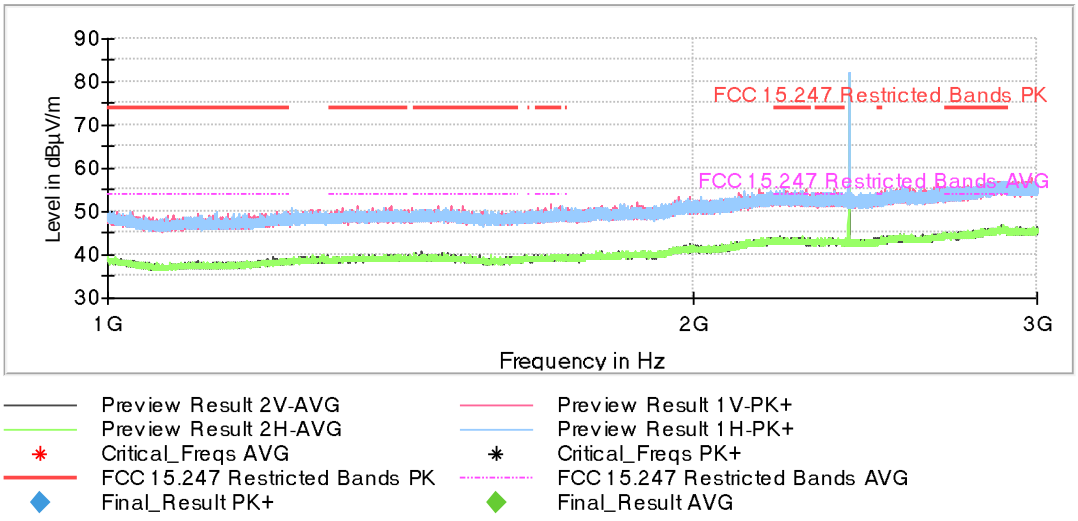
This plot is valid for the Low, Middle and High Channels and all the modulation modes.



FREQUENCY RANGE 1 - 3 GHz:

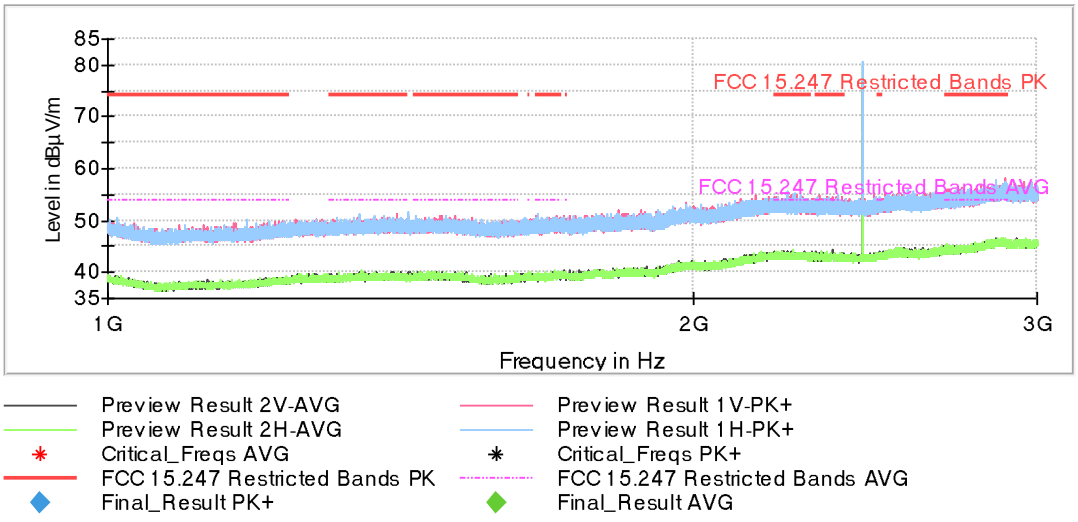
- **GFSK modulation (DH5)**

  - Low Channel:



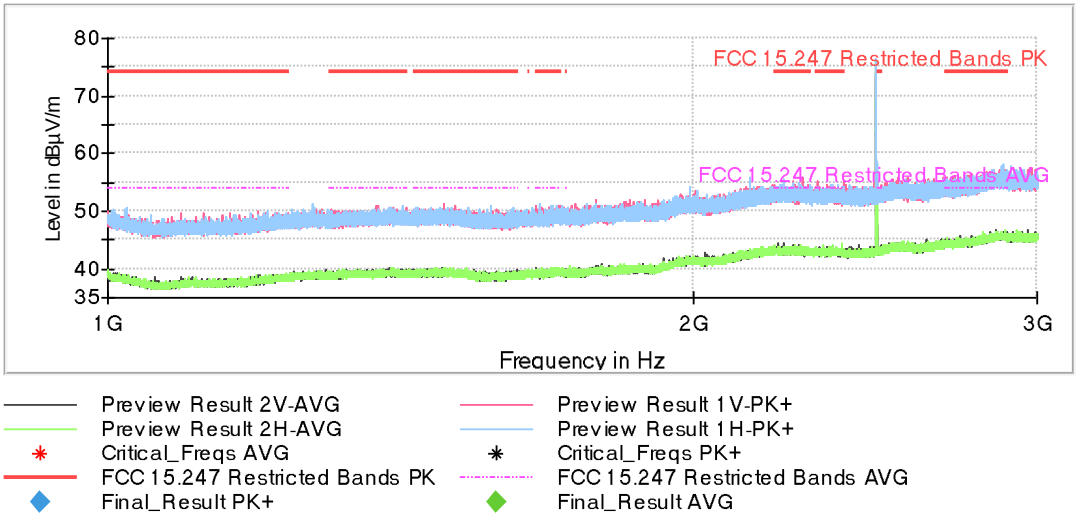
The peak above the limit is the carrier frequency.

  - Middle Channel:



The peak above the limit is the carrier frequency.

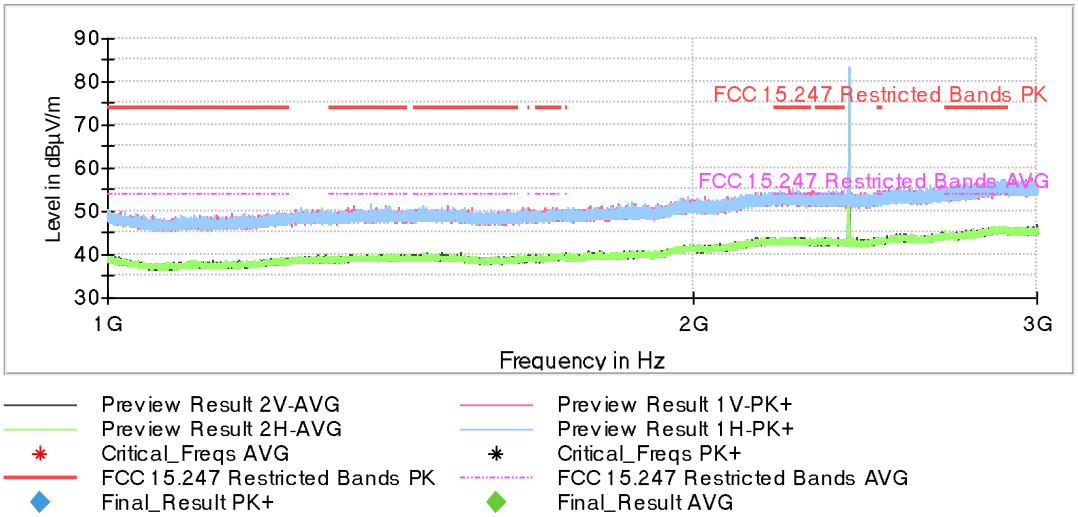
- High Channel:



The peak above the limit is the carrier frequency.

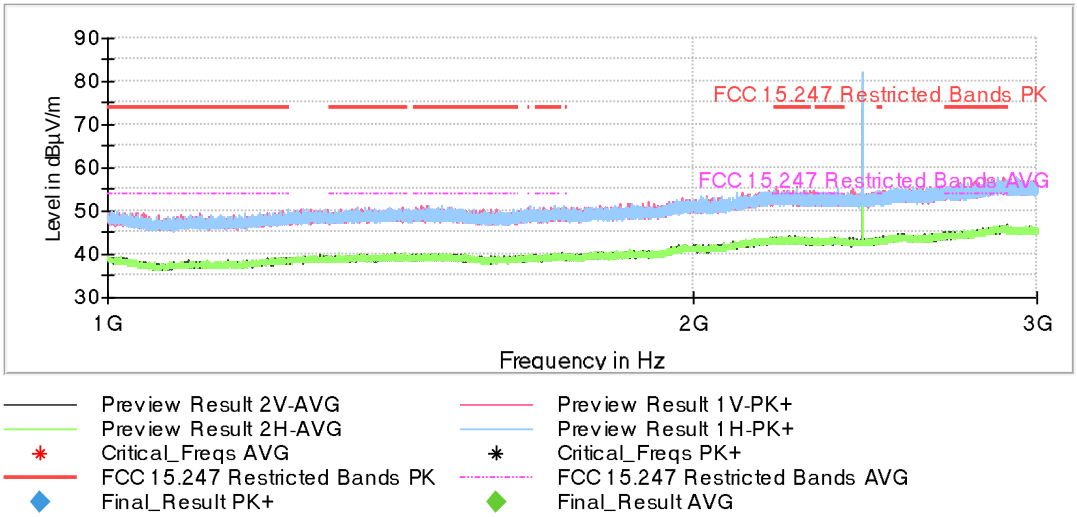
- **Pi/4-DQPSK modulation (2DH5):**

- Low Channel:



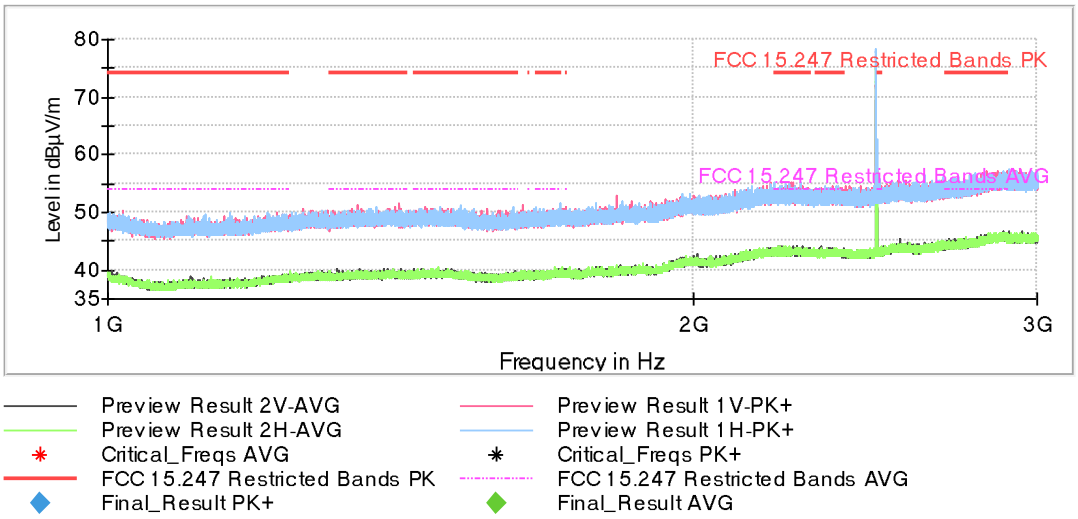
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

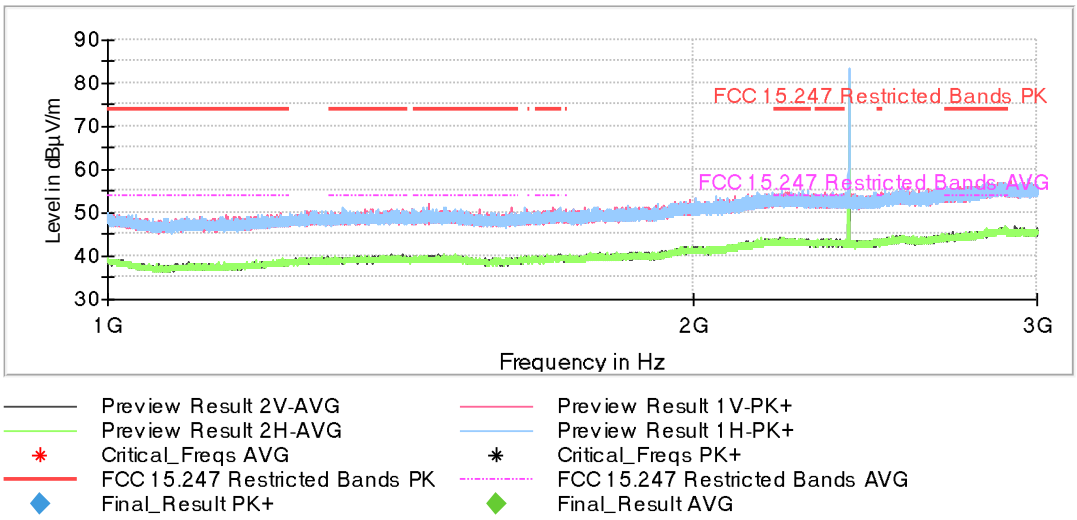
- High Channel:



The peak above the limit is the carrier frequency.

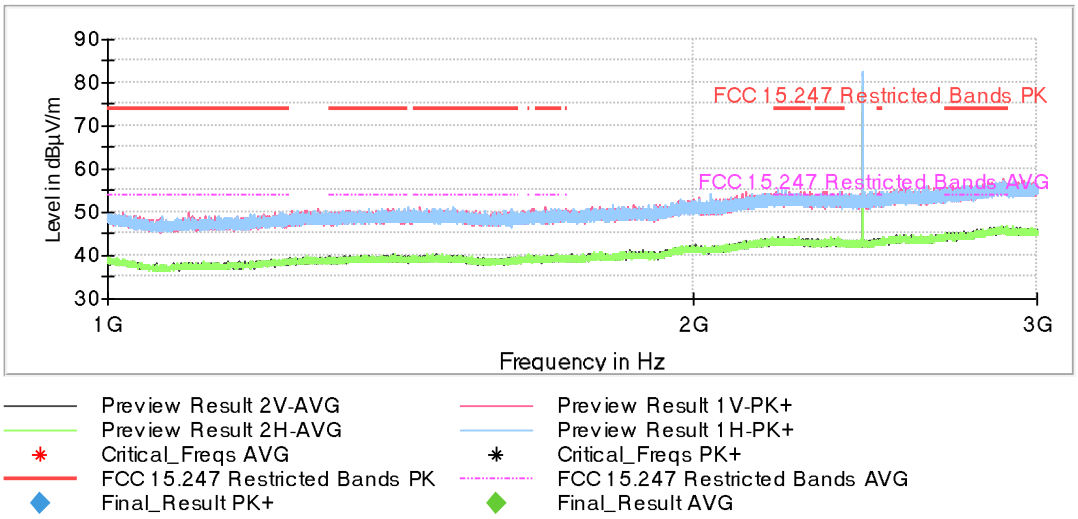
- **8-DPSK modulation (3DH5):**

  - Low Channel:



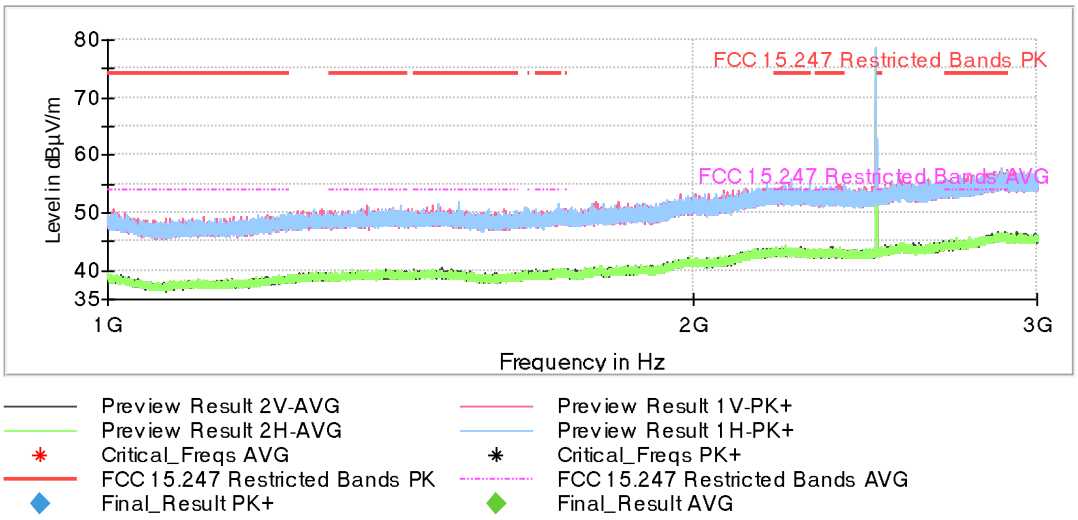
The peak above the limit is the carrier frequency.

  - Middle Channel:



The peak above the limit is the carrier frequency.

- High Channel:

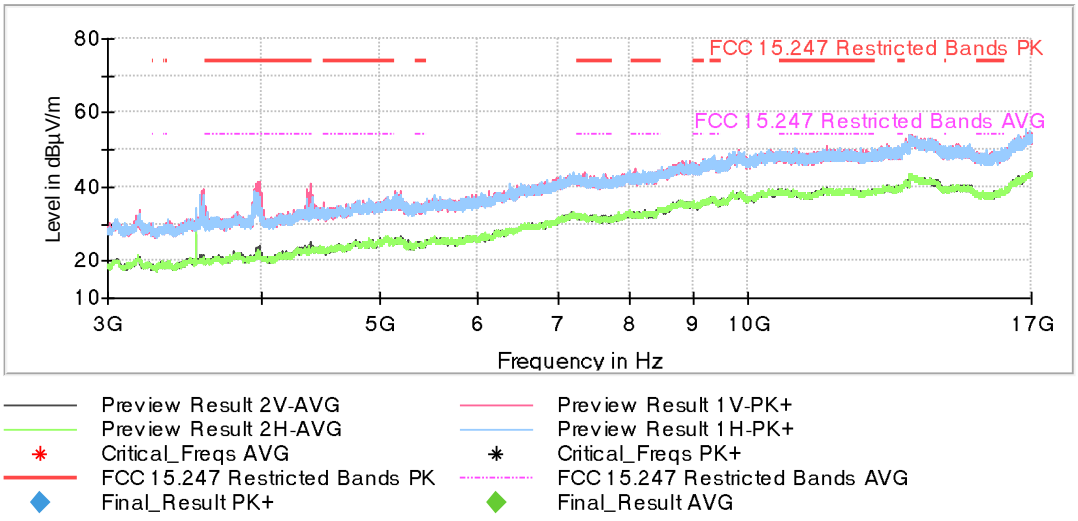


The peak above the limit is the carrier frequency.

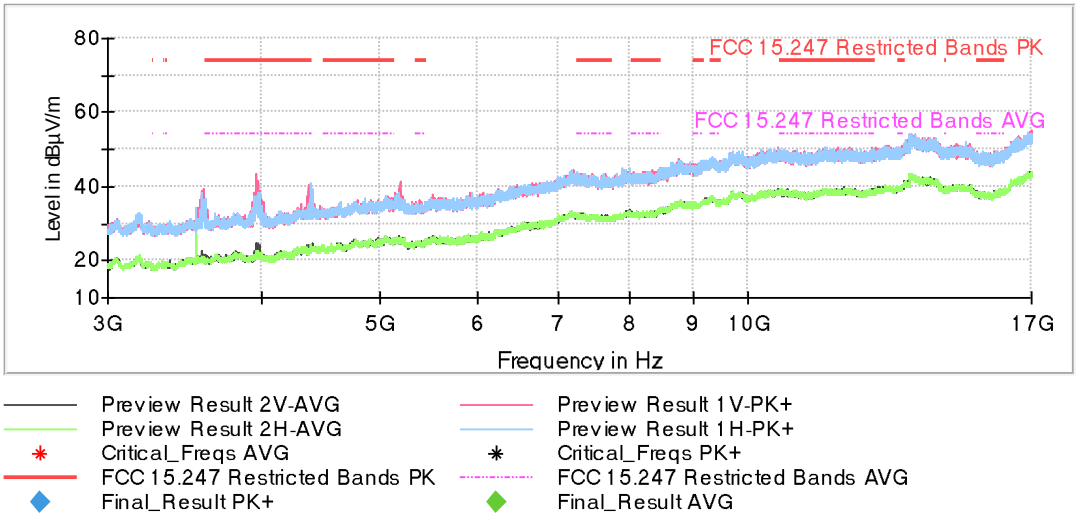
FREQUENCY RANGE 3 - 17 GHz:

- **GFSK modulation (DH5)**

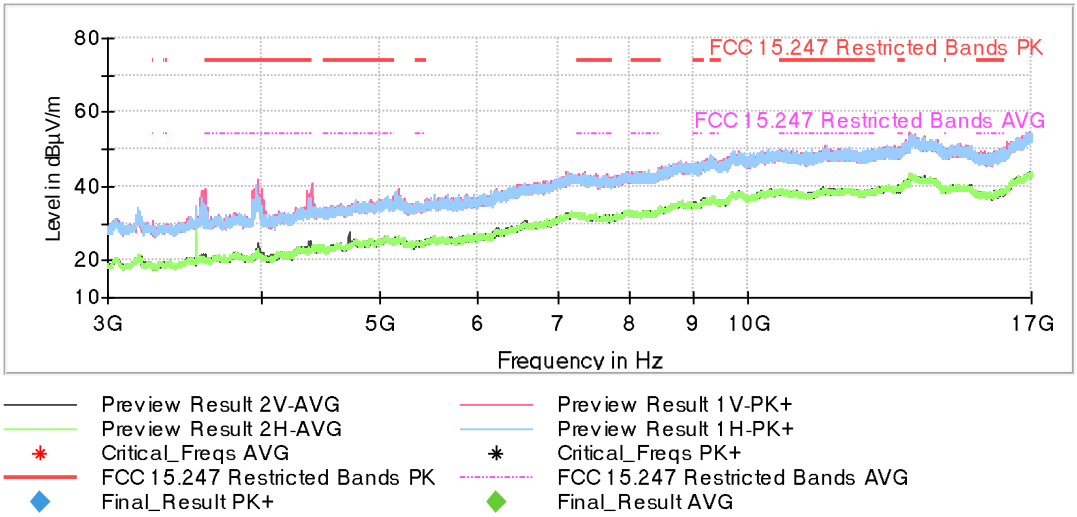
- Low Channel:



- Middle Channel:

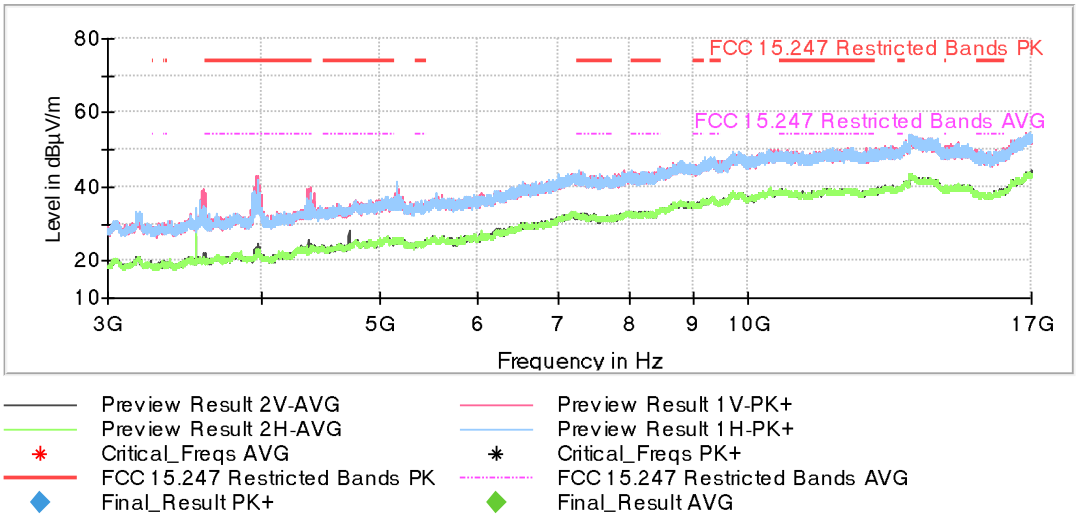


- High Channel:

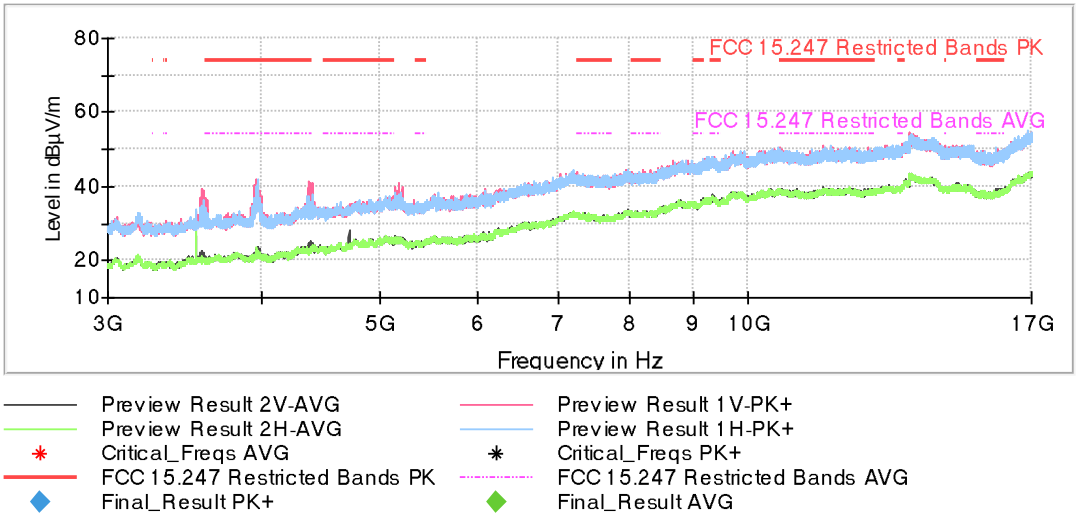


- **Pi/4-DQPSK modulation (2DH5):**

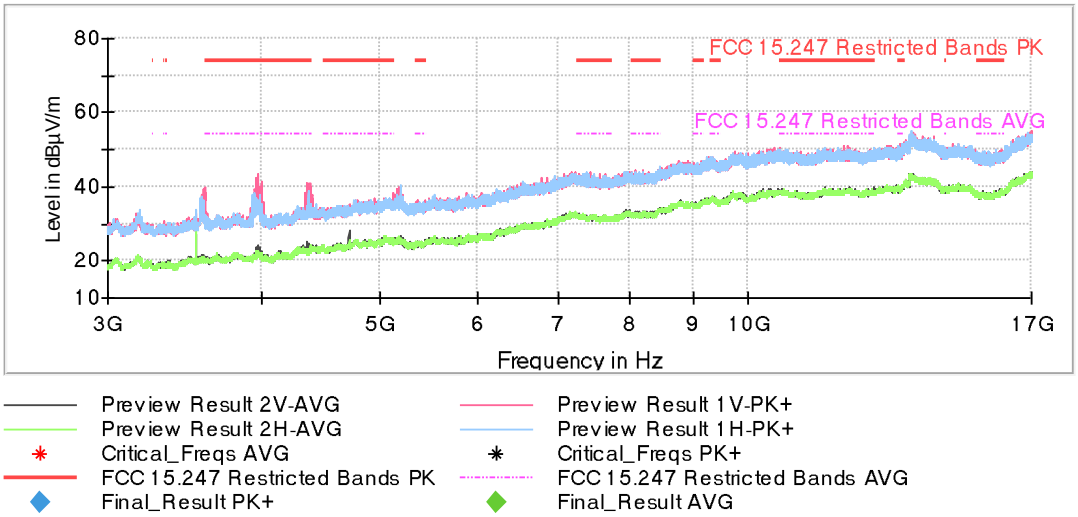
- Low Channel:



- Middle Channel:

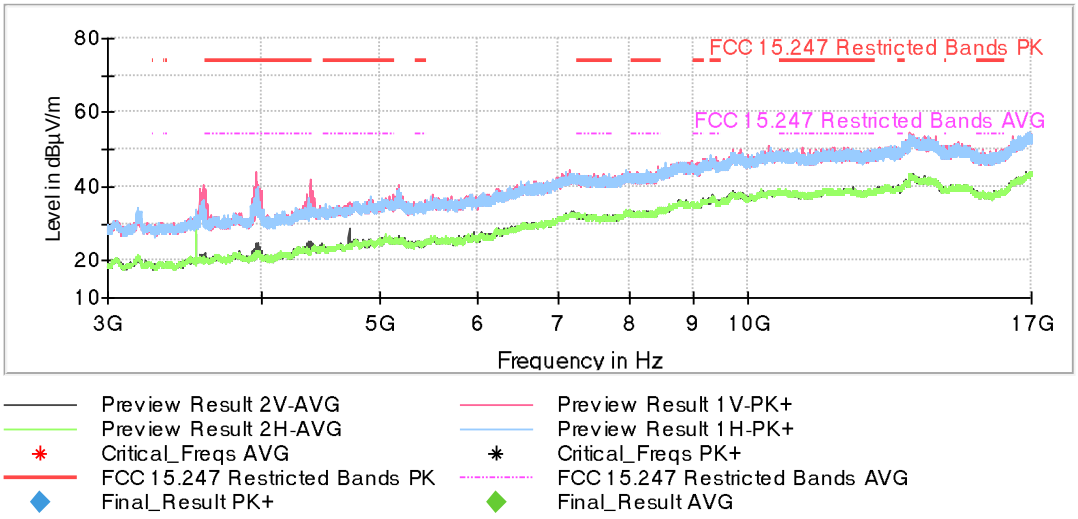


- High Channel:

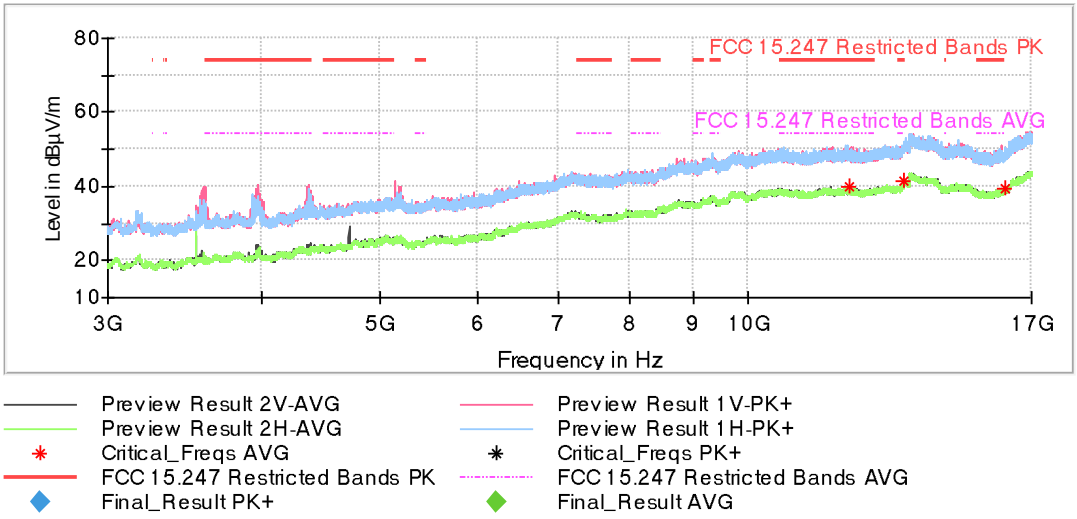


- **8-DPSK modulation (3DH5):**

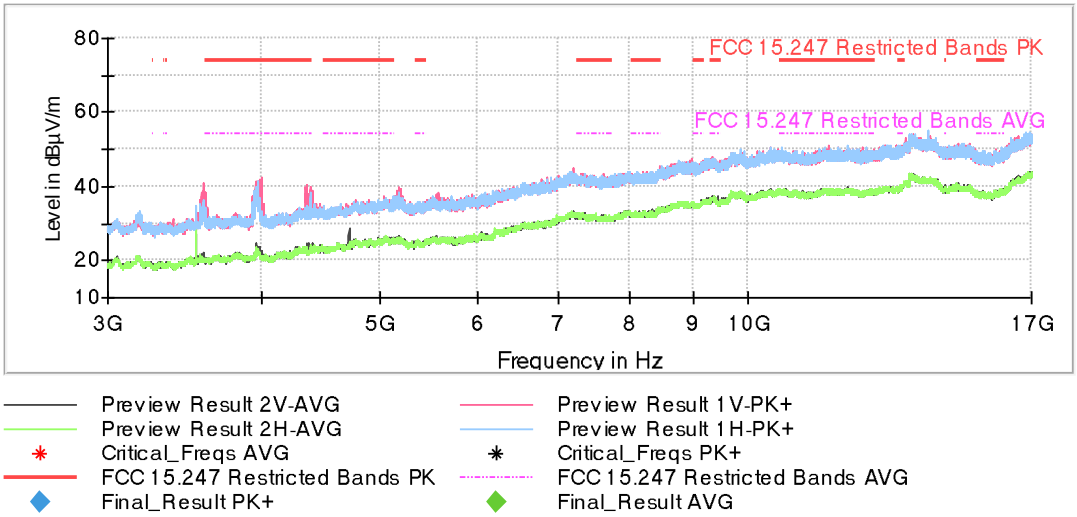
  - Low Channel:



  - Middle Channel:

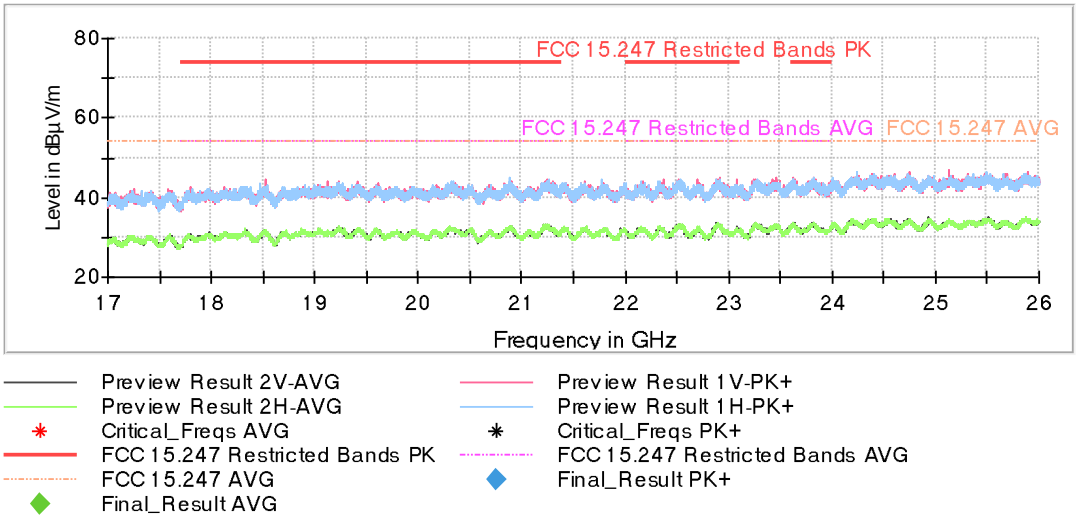


- High Channel:



FREQUENCY RANGE 17 - 26 GHz:

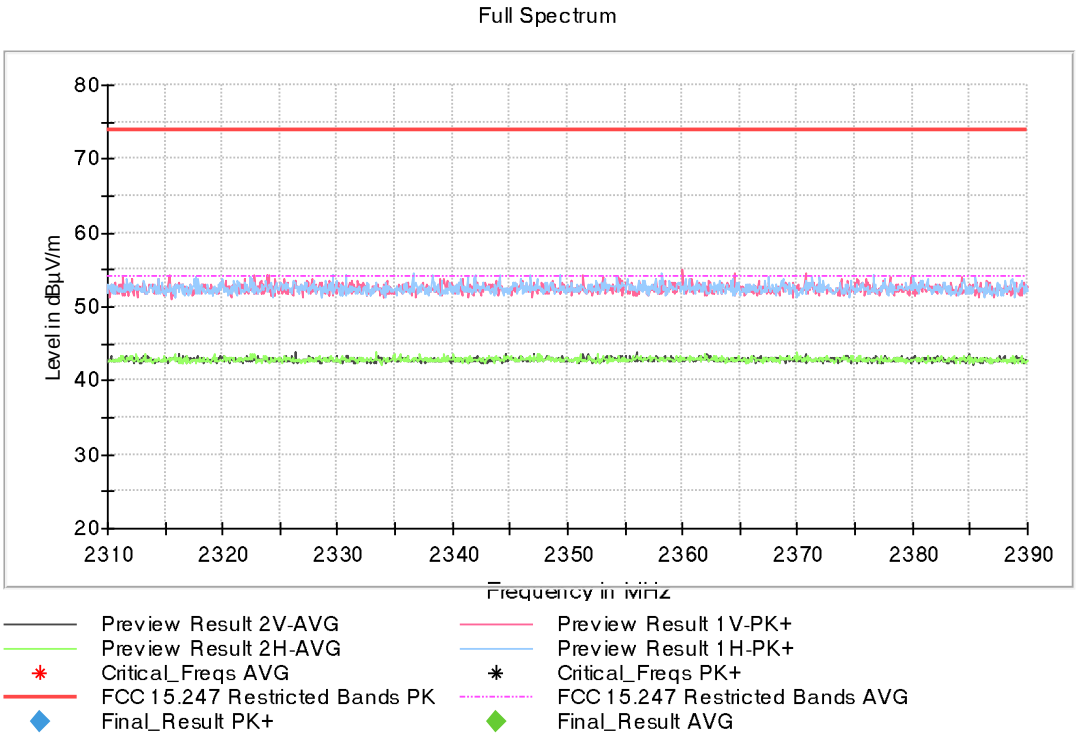
This plot is valid for the Low, Middle and High Channels and all the modulation modes.



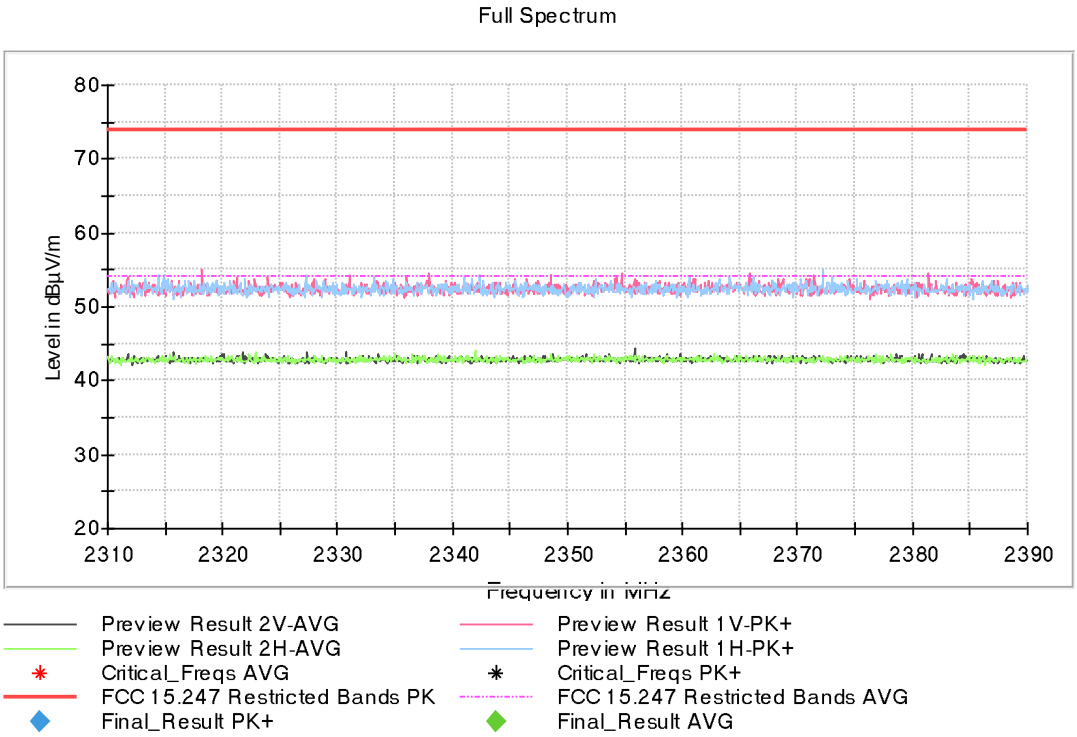
RESTRICTED BAND 2.31-2.39 GHz:

- **GFSK modulation (DH5):**

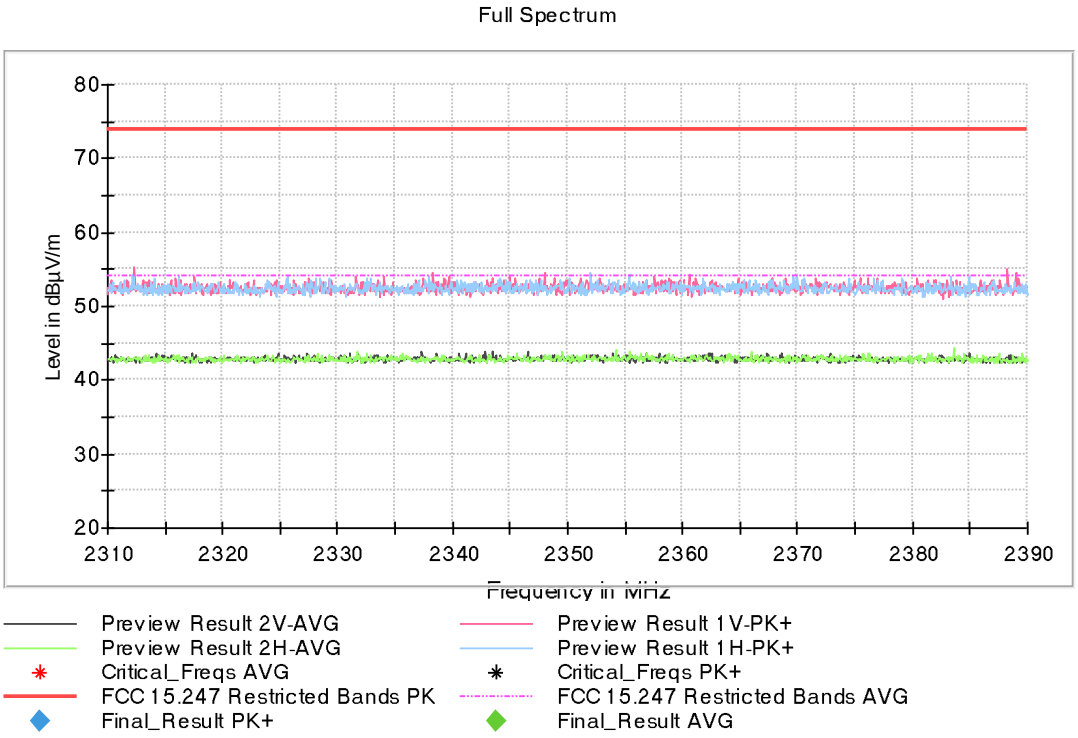
- Low Channel:



- Middle Channel:

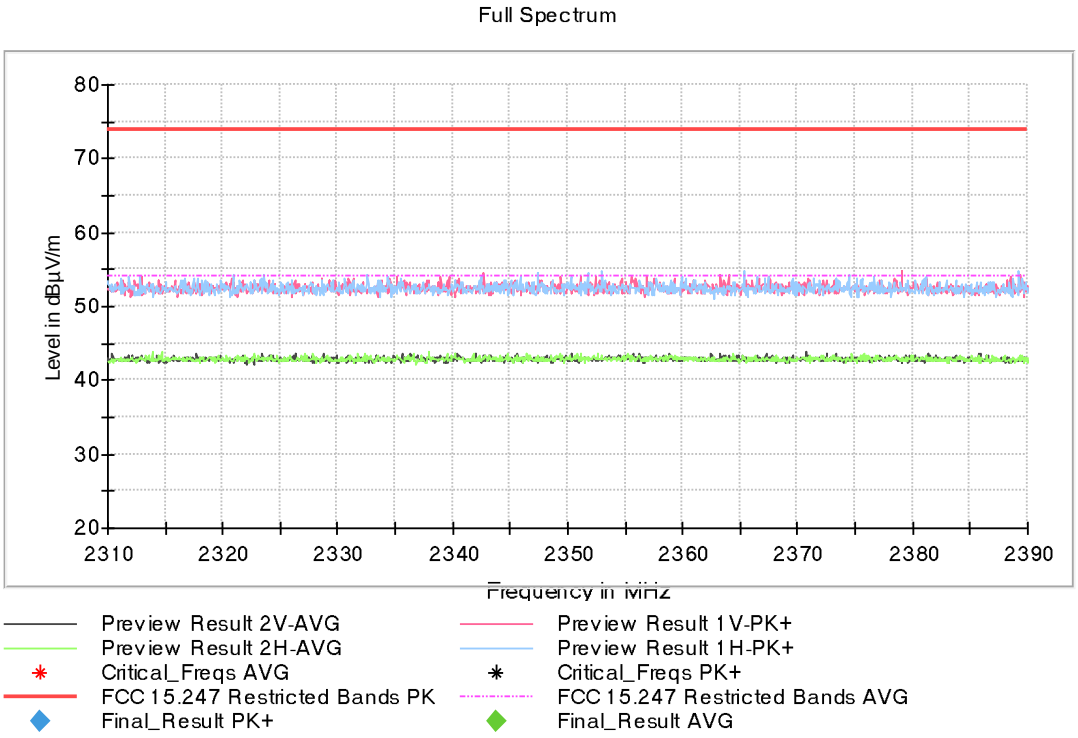


- High Channel:

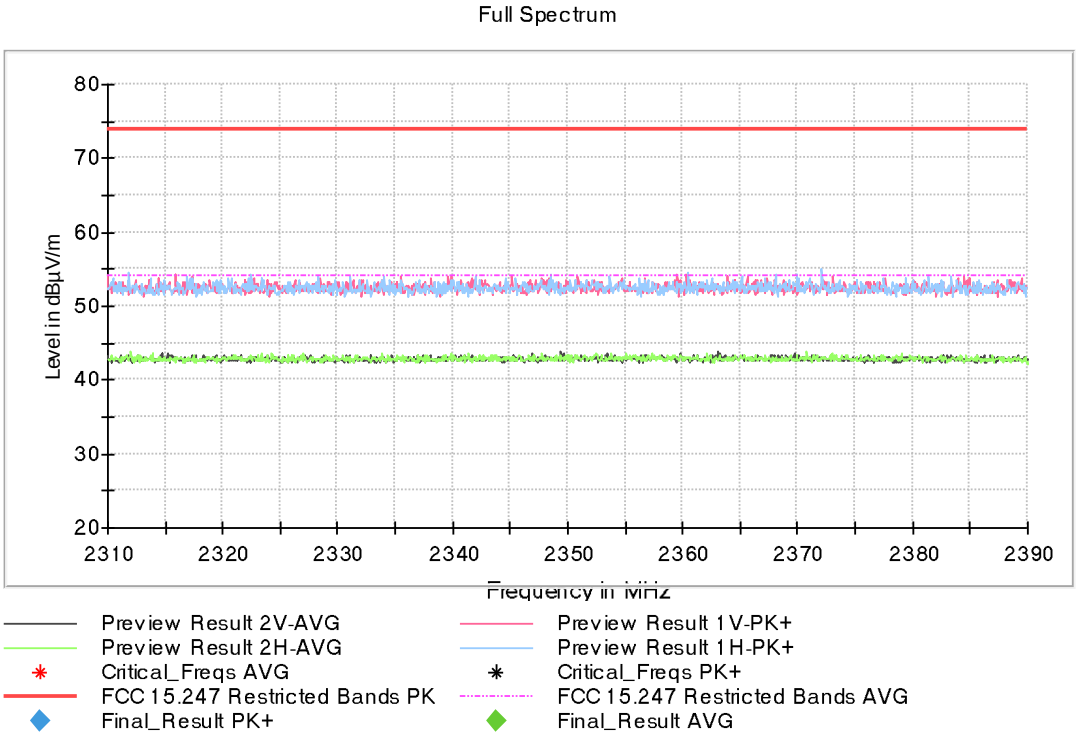


- **Pi/4-DQPSK modulation (2DH5):**

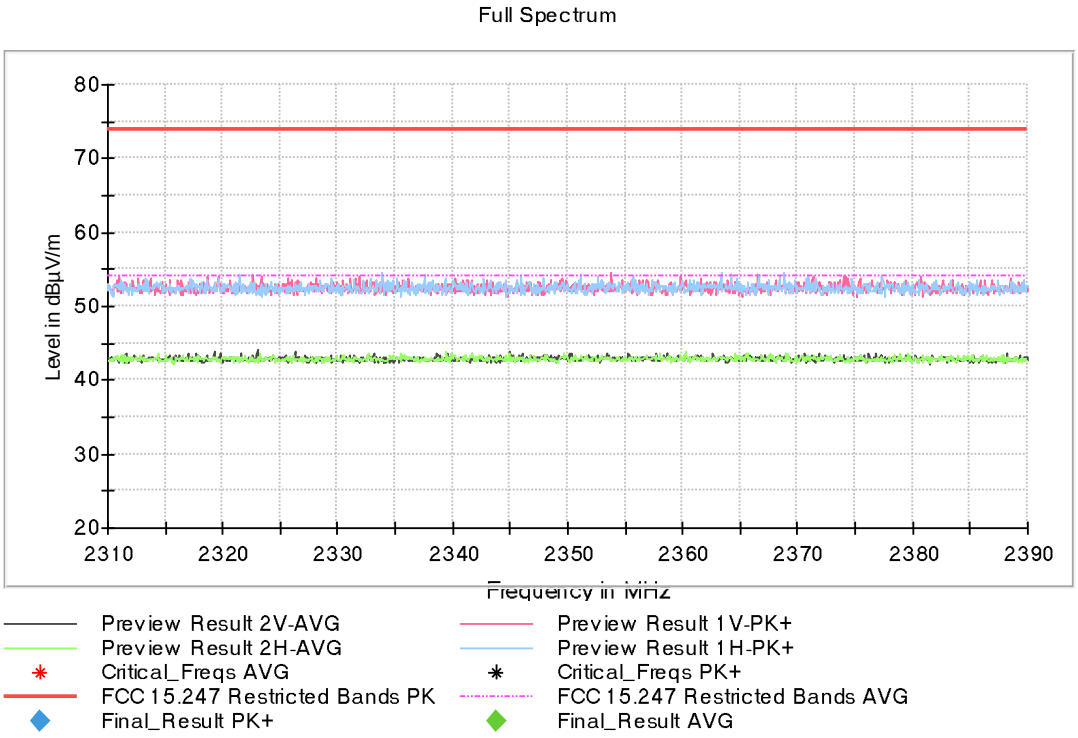
  - Low Channel:



  - Middle Channel:

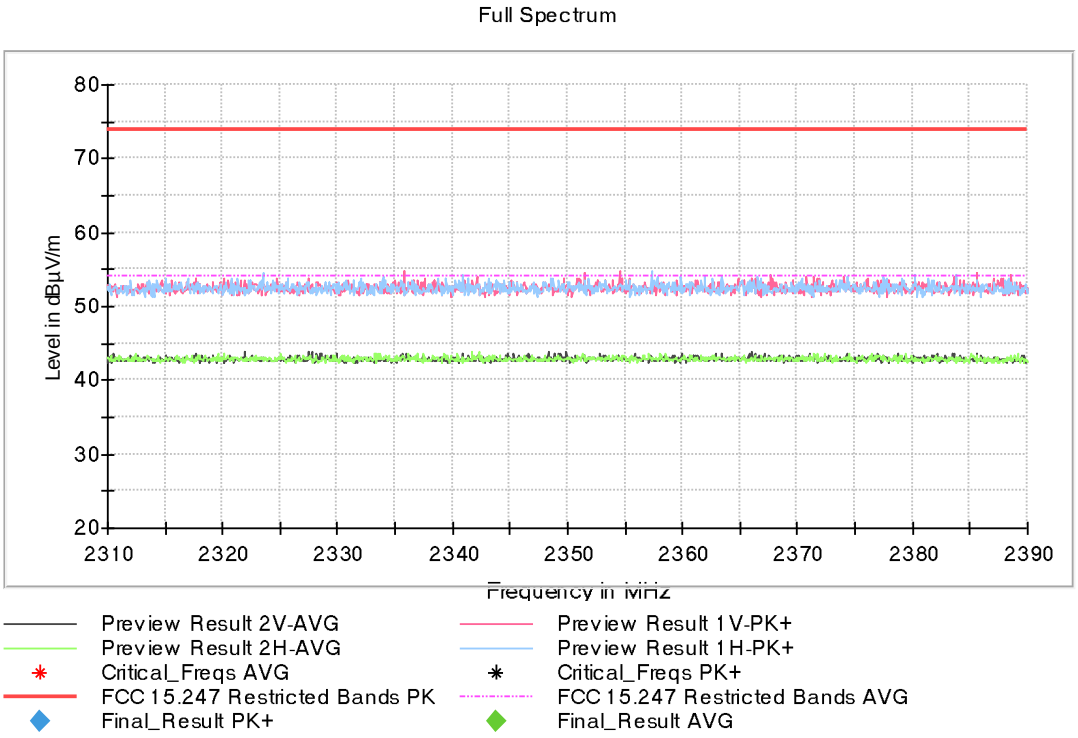


- High Channel:

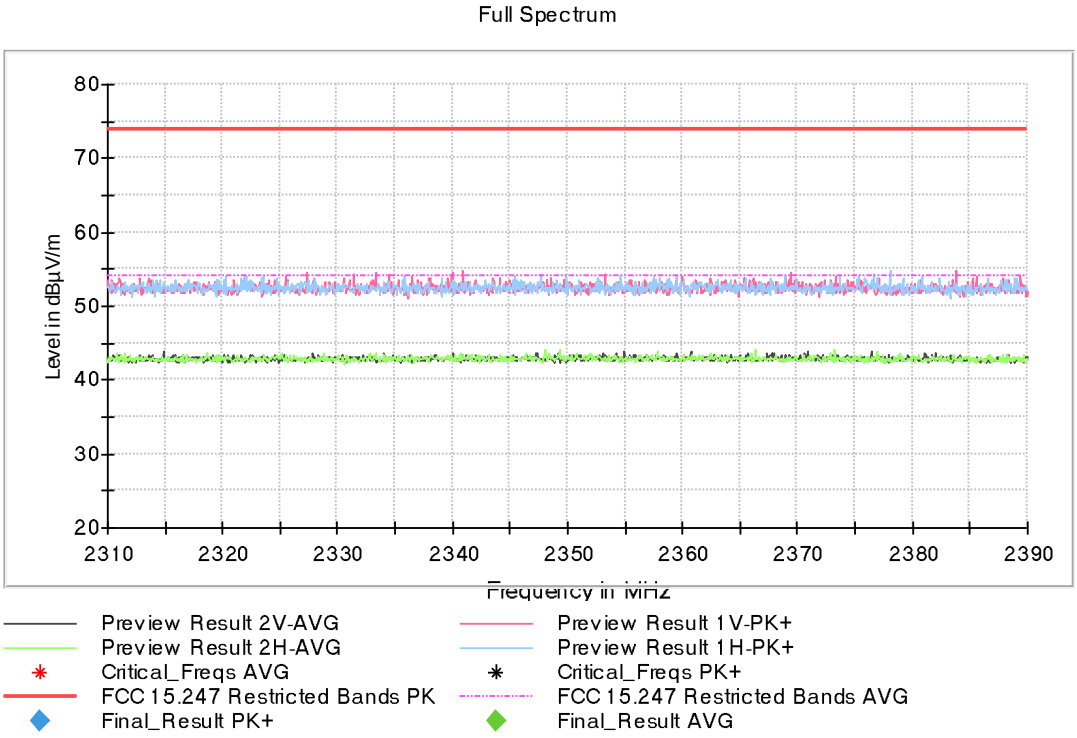


- **8-DPSK modulation (3DH5):**

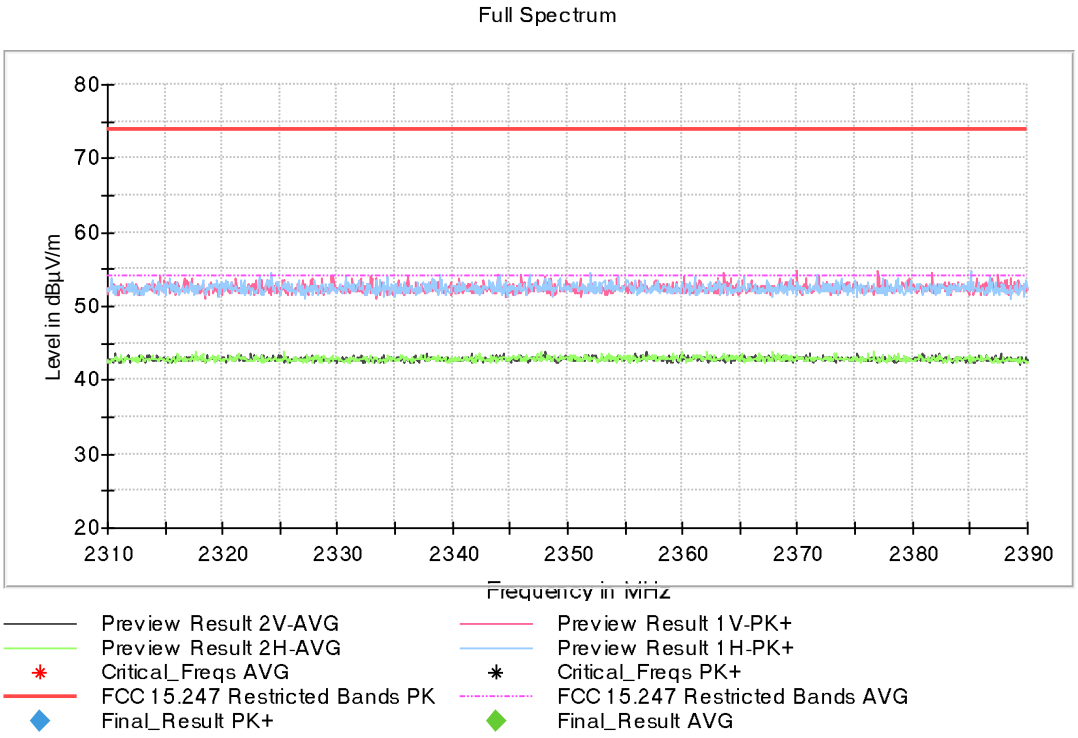
  - Low Channel:



  - Middle Channel:



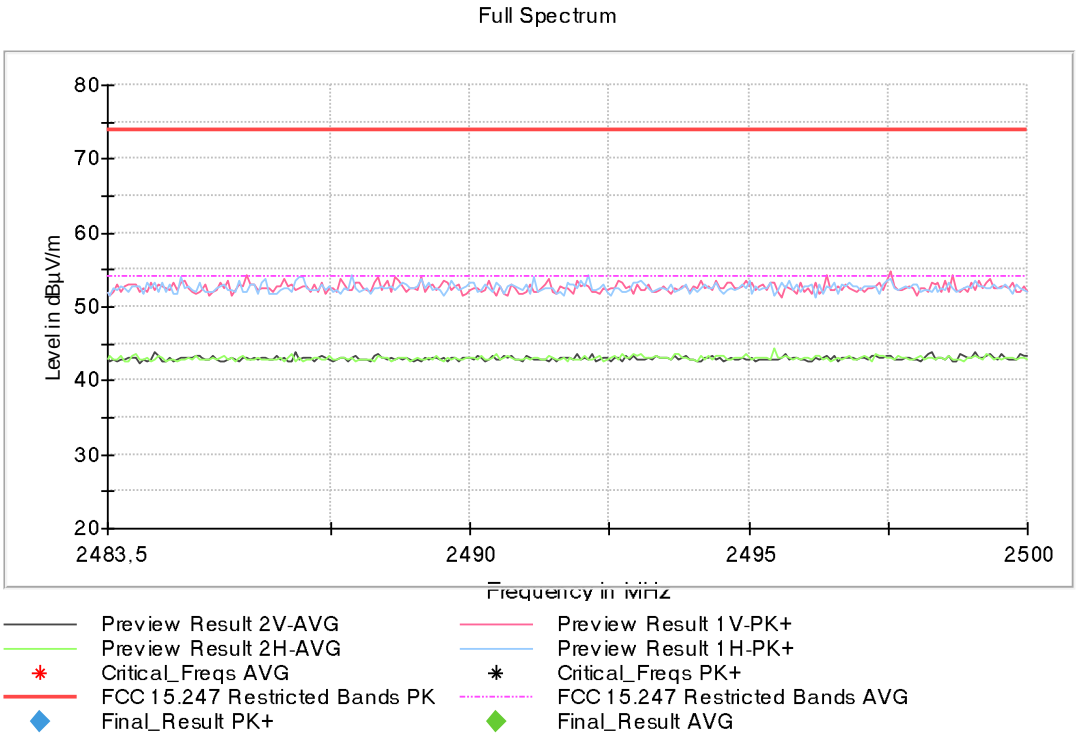
- High Channel:



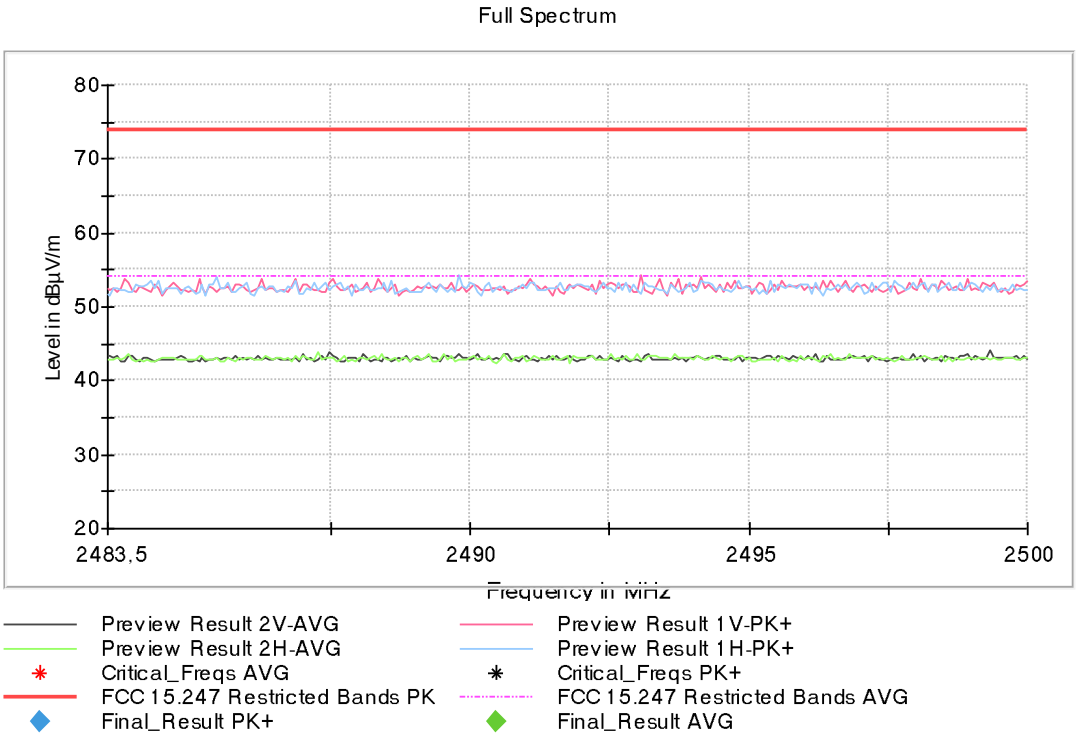
RESTRICTED BAND 2.4835-2.5 GHz:

- **GFSK modulation (DH5):**

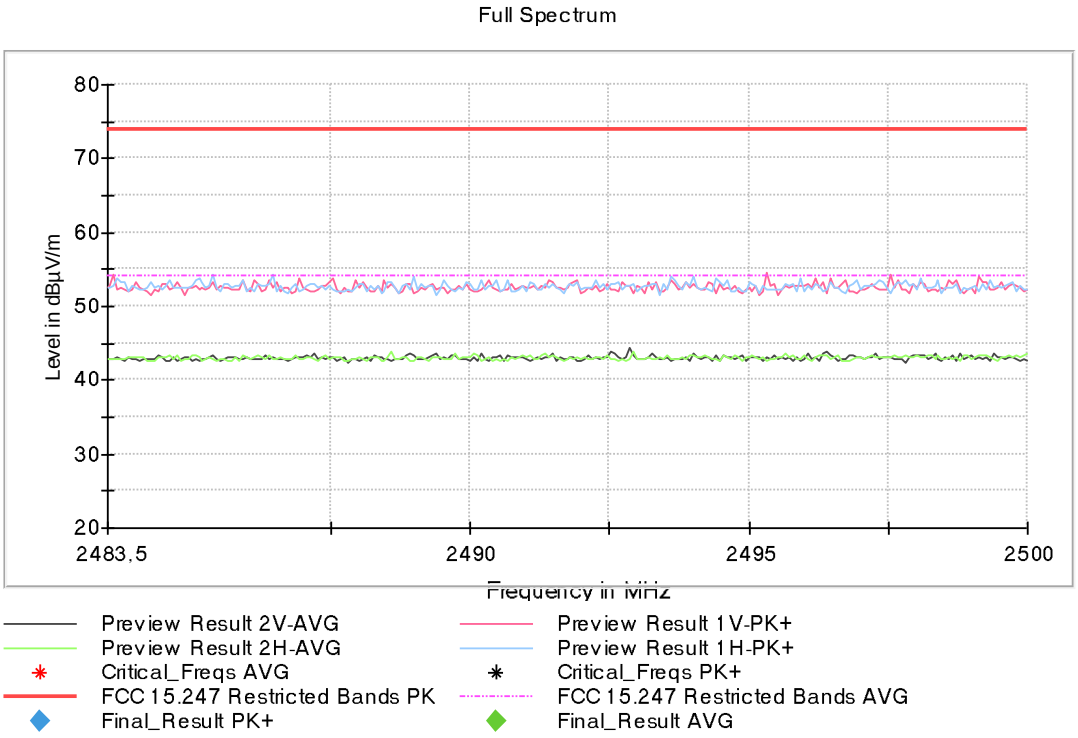
- Low Channel:



- Middle Channel:

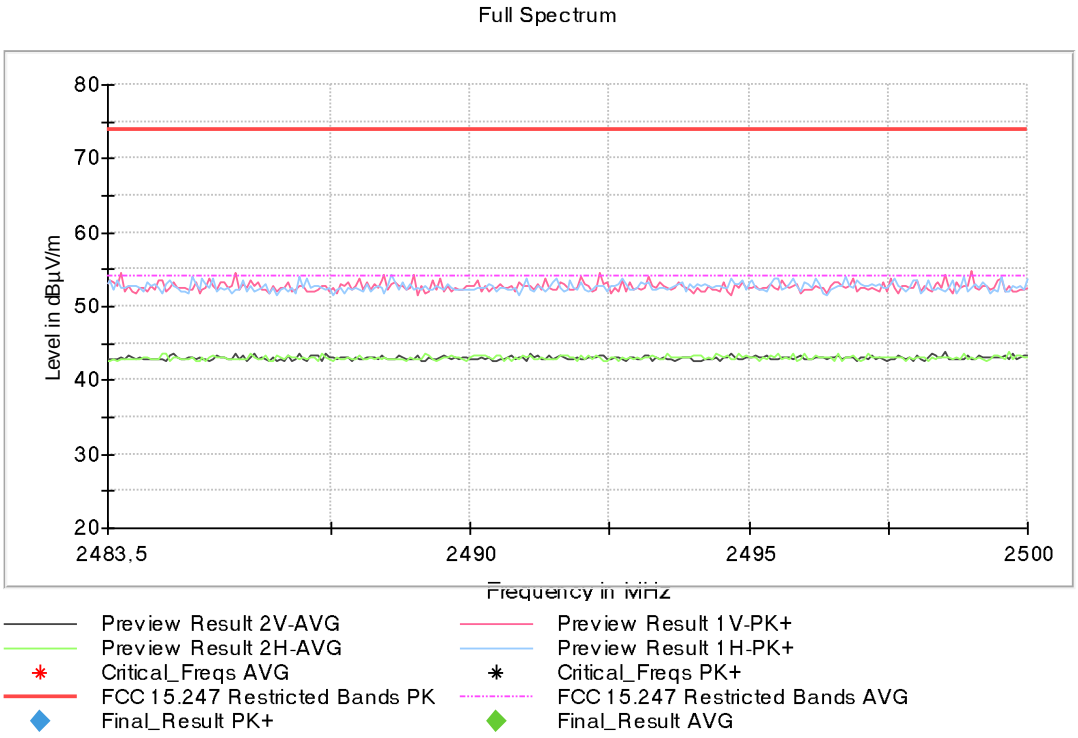


- High Channel:

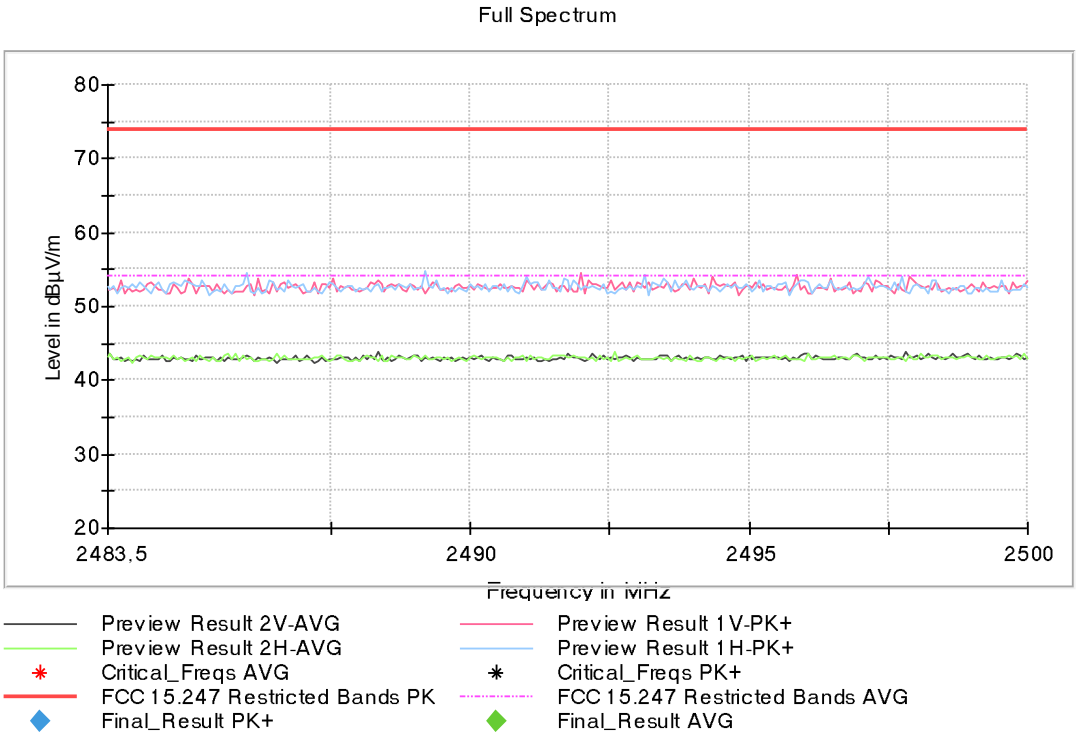


- **Pi/4-DQPSK modulation (2DH5):**

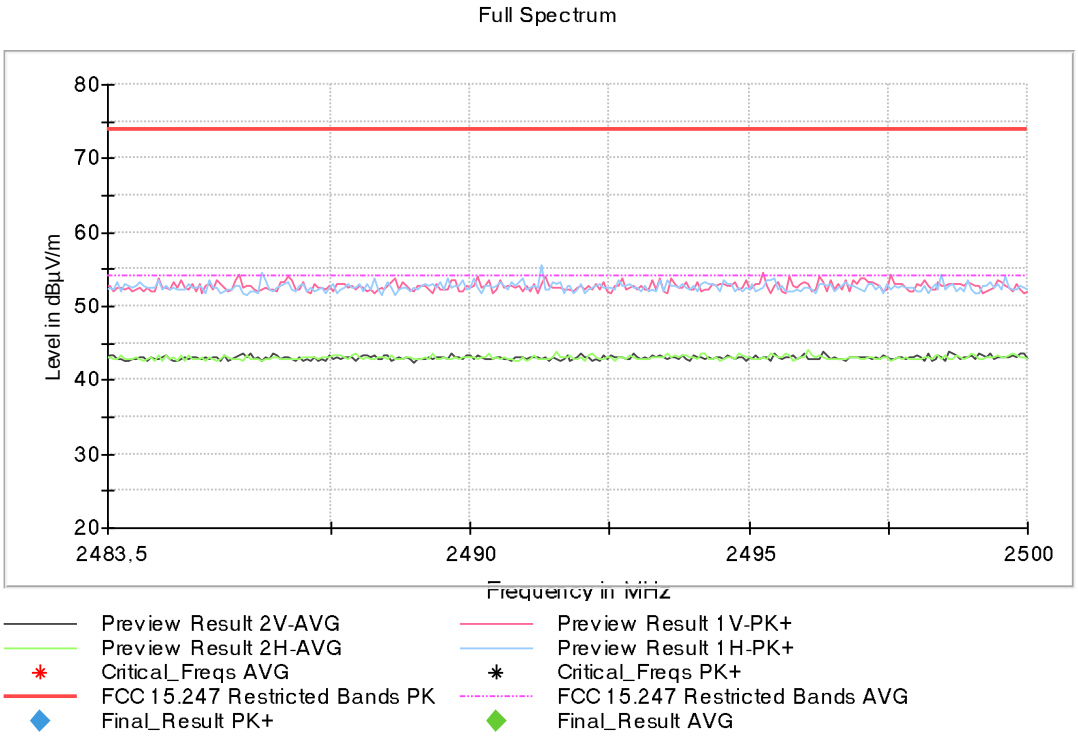
  - Low Channel:



  - Middle Channel:

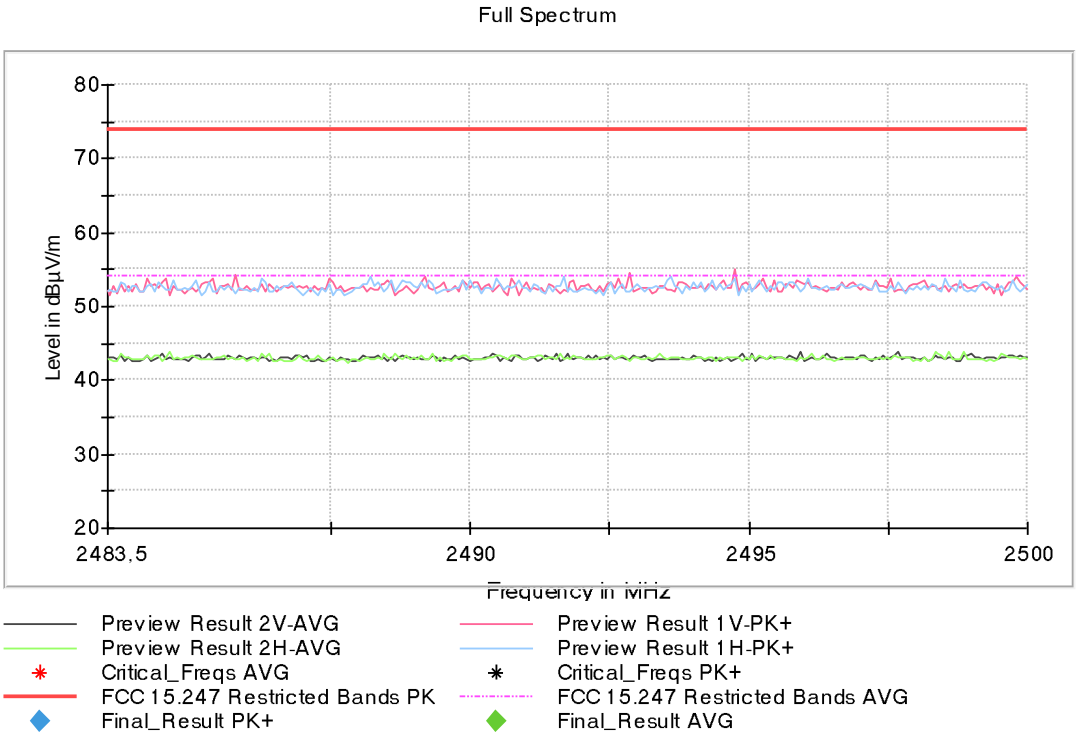


- High Channel:

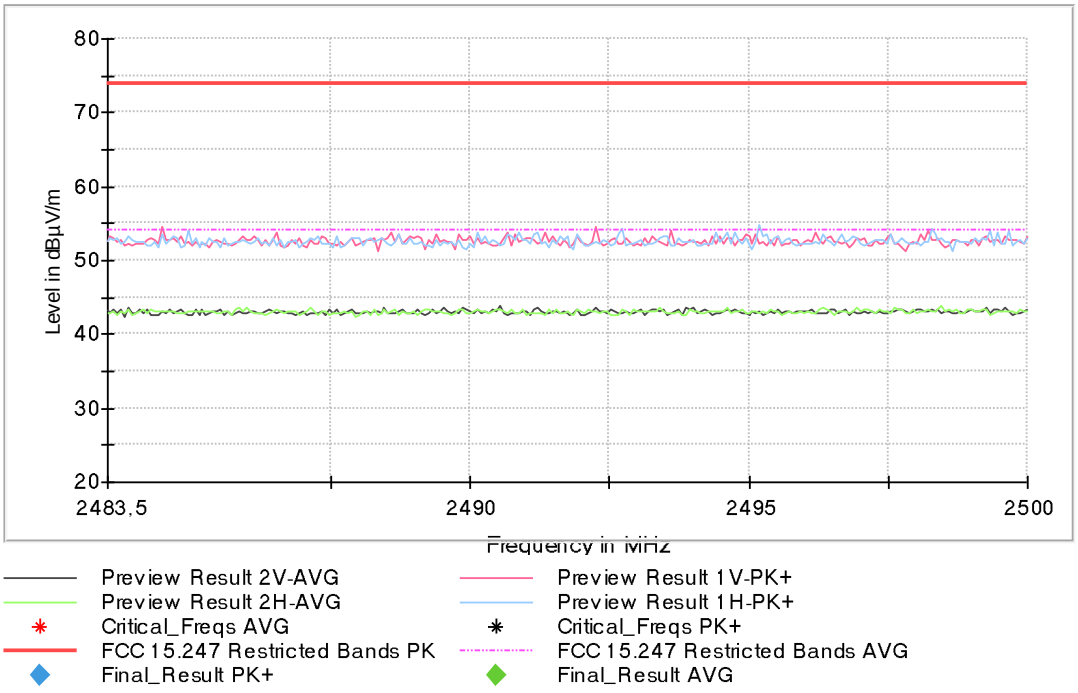


- **8-DPSK modulation (3DH5):**

  - Low Channel:



  - Middle Channel:



- High Channel: