

ISED CABid: ES1909

Lab. Company Number: 4621A

Test Report No:
73893RRF.001

Partial Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

(*) Identification of item tested	Automatic water filter programmer device. Multiparametric and scalable
(*) Trademark	SKYfilter
(*) Model and /or type reference	810200110 SKYfilter LATCH
Other identification of the product	FCC ID: 2BB2S-SKYFILTER IC: Not provided data
(*) Features	Features: Bluetooth LE HW version: 1 SW version: 10
Applicant	Riegos iberia Regaber, S.A. C/ Garbí, 3 08150, Parets del Vallès, Barcelona, SPAIN
Test method requested, standard	USA FCC Part 15.247 (10-1-21 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (10-1-21 Edition): Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 amendment 2 (February 2021). 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)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager
Date of issue	2023-07-28
Report template No	FDT08_24 (*) "Data provided by the client"

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Acronyms

Acronym ID	Acronym Description
Detector	Detector used
Equipment	Equipment Type
Freq	Frequency
Freq Rng	Frequency Range
MP	Measurement Point
Mod	Modulation
Mode	MIMO Mode
Pol	Polarization
Port	Active Port
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl	Unwanted Emissions Level

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 S.A.U. is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification S.A.U. is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, 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

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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.

The total uncertainty of the measurement system for the radiated emissions of EUT from 30 MHz to 1 GHz is:
Measurement uncertainty $\leq \pm 5,35$ dB with factor ($k = 2$).

The total uncertainty of the measurement system for the radiated emissions of EUT from 1 GHz to 17 GHz is:
Measurement uncertainty $\leq \pm 4,32$ dB with factor ($k = 2$).

The total uncertainty of the measurement system for the radiated emissions of EUT from 17 GHz to 26 GHz is:
Measurement uncertainty $\leq \pm 5,51$ dB with factor ($k = 2$).

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 consists of a Automatic water filter programmer device. Multiparametric and scalable . Automatic water filter programmer for any type of water filter (sand, mesh, ring, hydrocyclone, ...), multiparametric and scalable up to 10 inputs/outputs, (10 solenoids outputs, 1 digital input, 1 relay output or 1 analog input 4-20mA). Programable by user by Bluetooth Low Energy by Android/iOS App Datalogger and alarm management LED indicators for any working process Powered by conventional AA type batteries. Low power consumption.

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 results.

Usage of samples

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial N°	Date of Reception	Application
S/01	73893_2.1	Automatic water filter programmer device	810200110 SKYfilter LATCH	137	2023-06-09	Element Under Test

Notes referenced to samples during the project:

Id	Type
S/01	Sample used for radiated test

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
	[]	AC:	[]	[]	[]	[]	[]
	[X]	DC: 6 to 14 Volts					
Rated Power							
Clock frequencies..... :							
Other parameters							
Software version	10						
Hardware version	1						
Dimensions in cm (W x H x D):	25,2x15,5x6,1						
Mounting position	[]	Table top equipment					
	[X]	Wall/Ceiling mounted equipment					
	[]	Floor standing equipment					
	[]	Hand-held equipment					
	[X]	Other:					
Modules/parts..... :	Module/parts of test item			Type		Manufacturer	
							
Accessories (not part of the test item)	Description			Type		Manufacturer	
	G75-A3P			SOLENOID		BACCARA	
	BLE PROGRAMMER XDS1110			BLE PROGRAMMER		TEXAS INSTRUMENTS	
	CABLE BLE PROGRAMMER			CABLE		GENERIC	
							
Documents as provided by the applicant..... :	Description			File name		Issue date	
	Description of the steps to commissioning the product			Preparación TEST FCC SKYfilter v1.0.docx		07/06/2023	
							

⁽³⁾ Only for Medical Equipment

Identification of the client

Riegos iberia Regaber, S.A.
C/ Garbí, 3
08150, Parets del Vallès, Barcelona, SPAIN

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2023-06-19
Date (finish)	2023-06-20

Document history

Report number	Date	Description
73893RRF.001	2023-07-27	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 %

In the chamber for conducted measurements, 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: Victoria Olmedo Villalba.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
8130	SEMIANECHOIC ABSORBER LINED CHAMBER	P29419	ALBATROSS	N/A
8134	SHIELDED ROOM	P29419	ALBATROSS PROJECTS GMBH	N/A
5862	EMI TEST RECEIVER 9kHz-7GHz	ESR7	ROHDE AND SCHWARZ	2025-02-15
2932	HYBRID BILOG ANTENNA 30MHz-6GHz	JB6	SUNOL SCIENCES CORPORATION	2023-10-29
7763	HORN ANTENNA 1-18GHz	BBHA 9120D	SCHWARZBECK MESS-ELEKTRONIK	2026-01-16
7769	PREAMPLIFIER 30dB 500MHz-18GHz	BBV 9718 C	SCHWARZBECK	2024-02-15
4657	HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK	2026-06-12
8856	PRE-AMPLIFIER G>30dB 17-40GHz	BLMA 1840-4A	BONN ELEKTRONIK	2023-11-02
6158	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2023-10-22
7702	DC POWER SUPPLY 30V/3A 90W	GPS-3030D	GW INSTEK	N/A
7755	DIGITAL MULTIMETER	175	FLUKE	2023-11-10
4848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P

Summary

Bluetooth Low Energy 5.1 (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. Test not required			

Appendix A: Test results. Bluetooth Low Energy 5.1 (2M, 1M)

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<i>RSS-247 5.5 / FCC 15.247 (d) [RSE] Emission limitations radiated (Transmitter)</i>	<i>15</i>

TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal: 12Vdc
Type of Power Supply: External power supply

ANTENNA (*):

Type of Antenna: Integral
Maximum Declared Antenna Gain: +4.5dB

TEST FREQUENCIES (*):

Modulation	Data rates	Low Channel:	Middle Channel	High Channel
BTLE GFSK	1M 1 Mbit/s	2402 MHz	2440 MHz	2480 MHz
BTLE GFSK	2M 2 Mbit/s	2402 MHz	2440 MHz	2480 MHz

During transmitter test the EUT was controlled by a SW tool provided by the client to operate in a continuous transmit mode on the modulation schemes and test channels as required.

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is connected to the TS8997 using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.



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 1.5 m for the frequency range 17 GHz-26 GHz (17 GHz-40 GHz horn antenna).

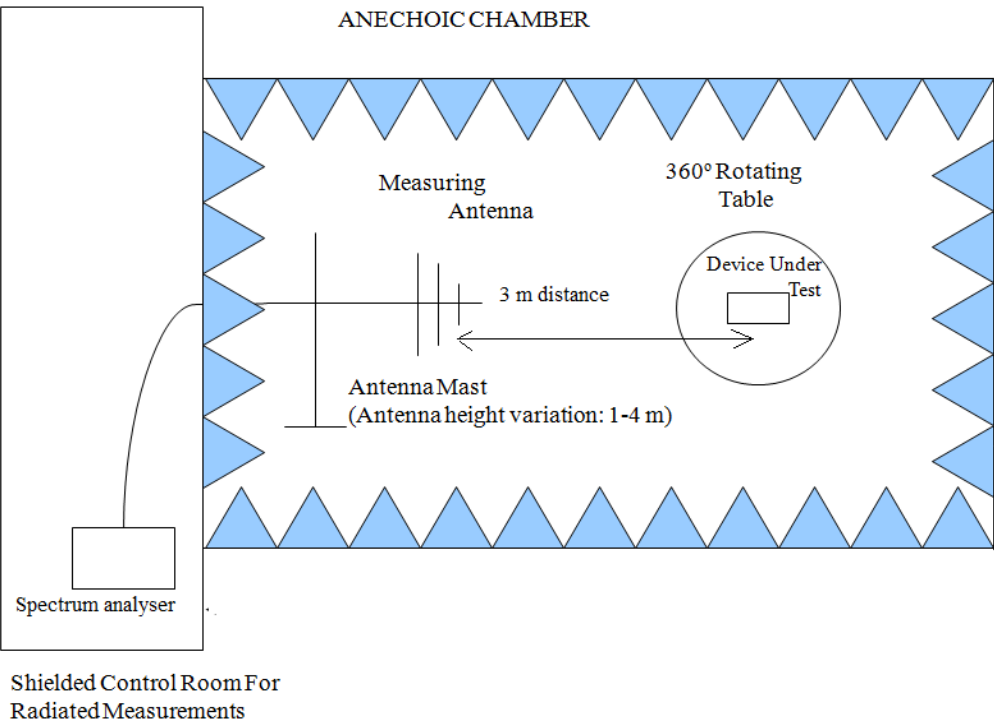
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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.

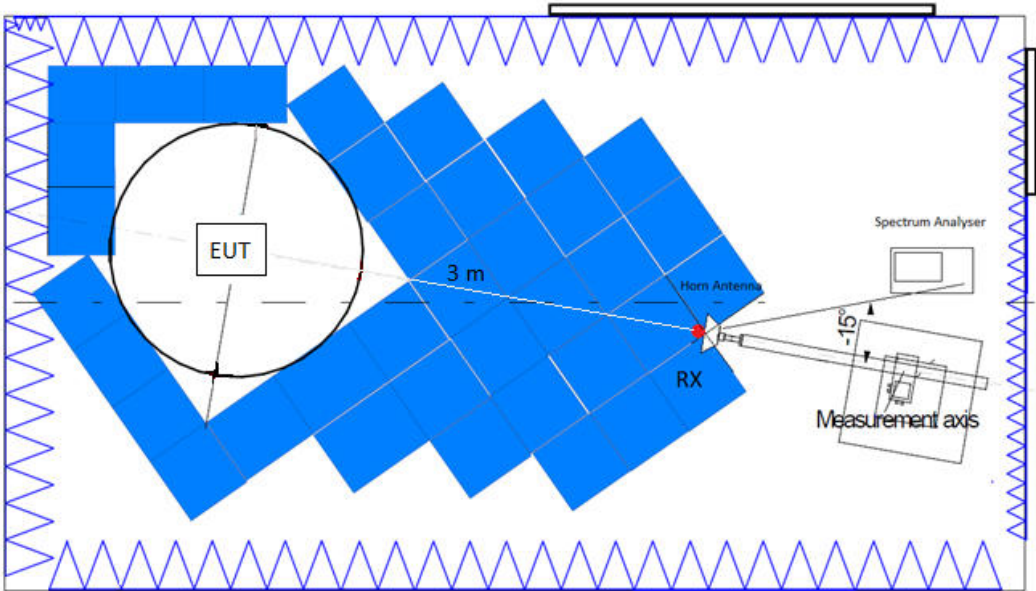
Measurements were made in both horizontal and vertical planes of polarization.

A resolution bandwidth/video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

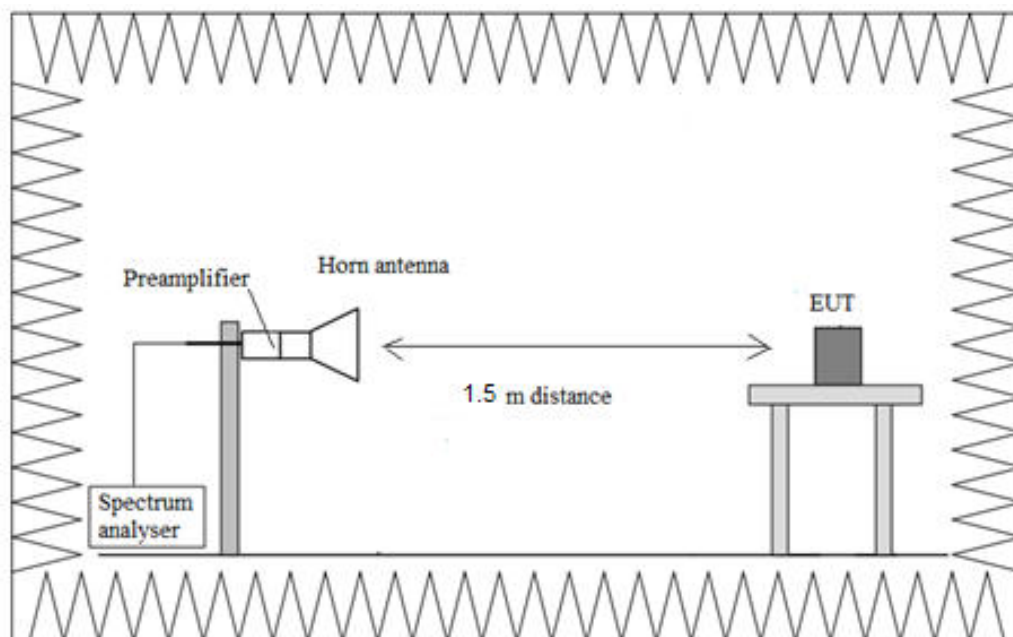
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



TEST CASES DETAILS

RSS-247 5.5 / FCC 15.247 (d) Emission limitations radiated (Transmitter)

Limits

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
Above 960	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

Modulation: BTLE 5.1 (GFSK 1 Mbit/s)

Frequency range 30 MHz – 1 GHz:

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

Frequency range 1 GHz – 26 GHz:

The results below 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 $\text{dB}\mu\text{V/m}$ at 3 m) are measured with average detector for compliance checking with the average limit.

Freq Rng (GHz)	Freq (MHz)	Unwanted Freq (MHz)	Unwanted Lvl (dBμV/m)	Pol	Detector
[3, 17]	2402.00000	4803.500	48.99	V	PK
		7205.000	57.09	H	PK
	2440.00000	4879.500	49.29	V	PK
		7321.000	58.67	H	PK
			52.57	H	AVG
	2480.00000	4959.000	47.35	V	PK
		7439.000	56.75	V	PK
			51.64	V	AVG

Modulation: BTLE 5.1 (GFSK 2 Mbit/s)

Frequency range 30 MHz – 1 GHz:

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

Frequency range 1 GHz – 26 GHz:

The results below 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 compliance checking with the average limit.

Freq Rng (GHz)	Freq (MHz)	Unwanted Freq (MHz)	Unwanted Lvl (dBμV/m)	Pol	Detector
[3, 17]	2402.00000	4803.000	49.64	V	PK
		7204.500	56.53	H	PK
	2440.00000	4878.500	50.64	V	PK
		7318.500	59.61	H	PK
			53.97	H	AVG
	2480.00000	4959.000	47.50	V	PK
		7441.000	56.65	V	PK
			51.19	V	AVG

Verdict

Pass

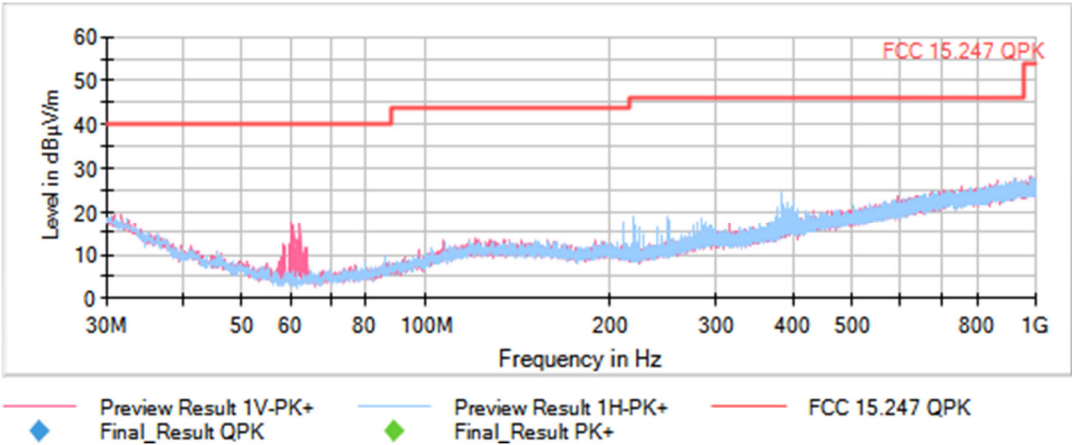
Attachments

Spectrum Analyzer Parameters:

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESR 7] 30 MHz - 1 GHz	48,5 kHz	PK+	100 kHz	1 s	20 dB
Receiver: [FSV 40] 1 GHz - 3 GHz	66,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
Receiver: [FSV 40] 3 GHz - 17 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
Receiver: [FSV 40] 17 GHz - 26 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

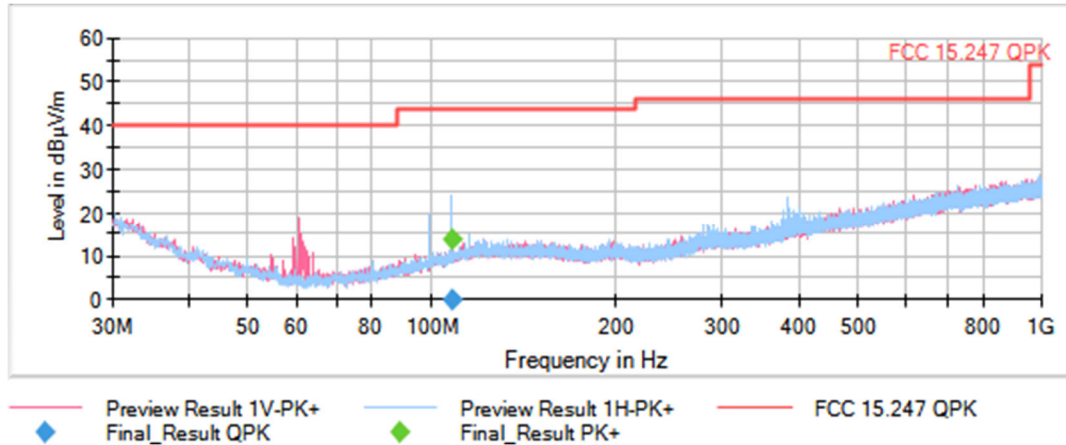
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Modulation = BTLE 5.1 (GFSK 1 Mbit/s) Frequency MHz = 2402.00000
MIMO Mode = SISO Measurement Point = 1
Active Port = 1

Images:



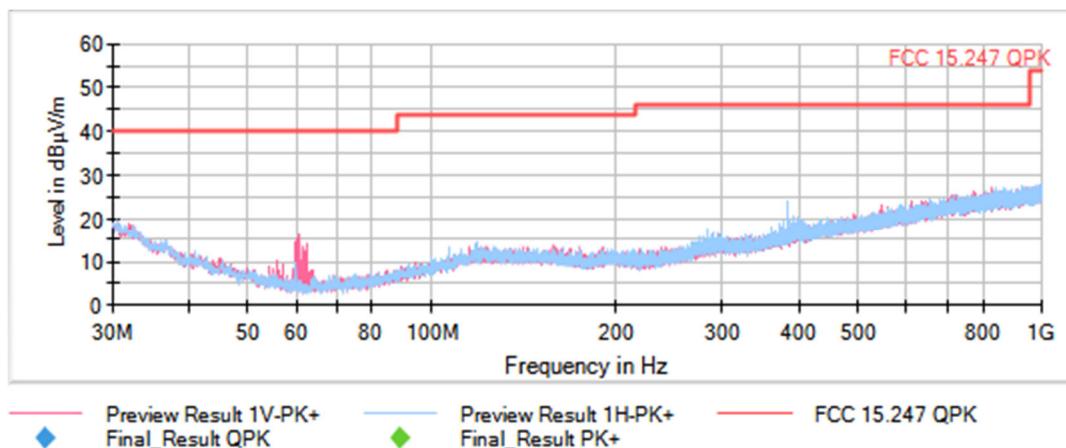
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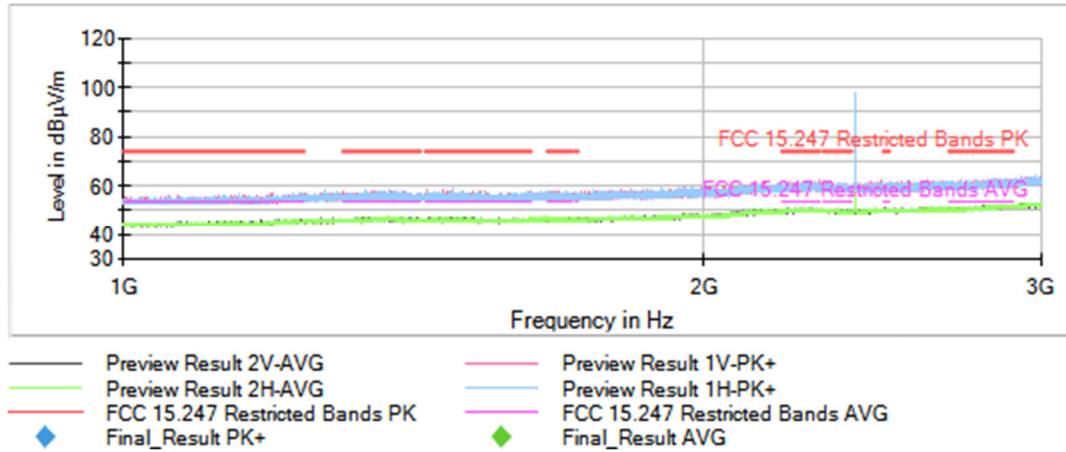
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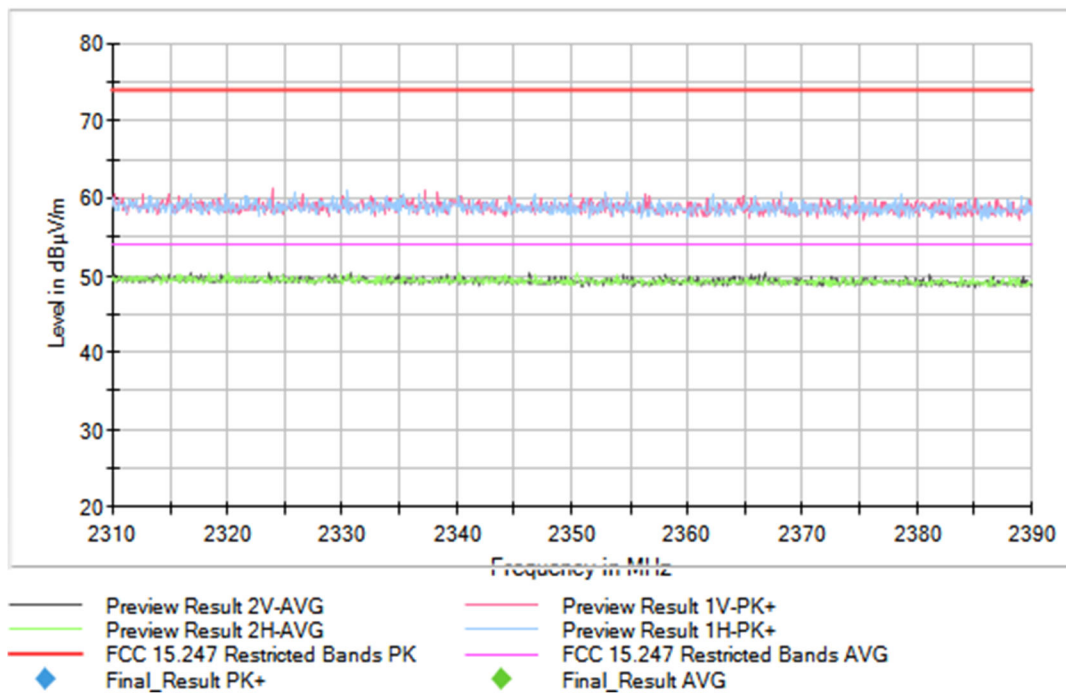


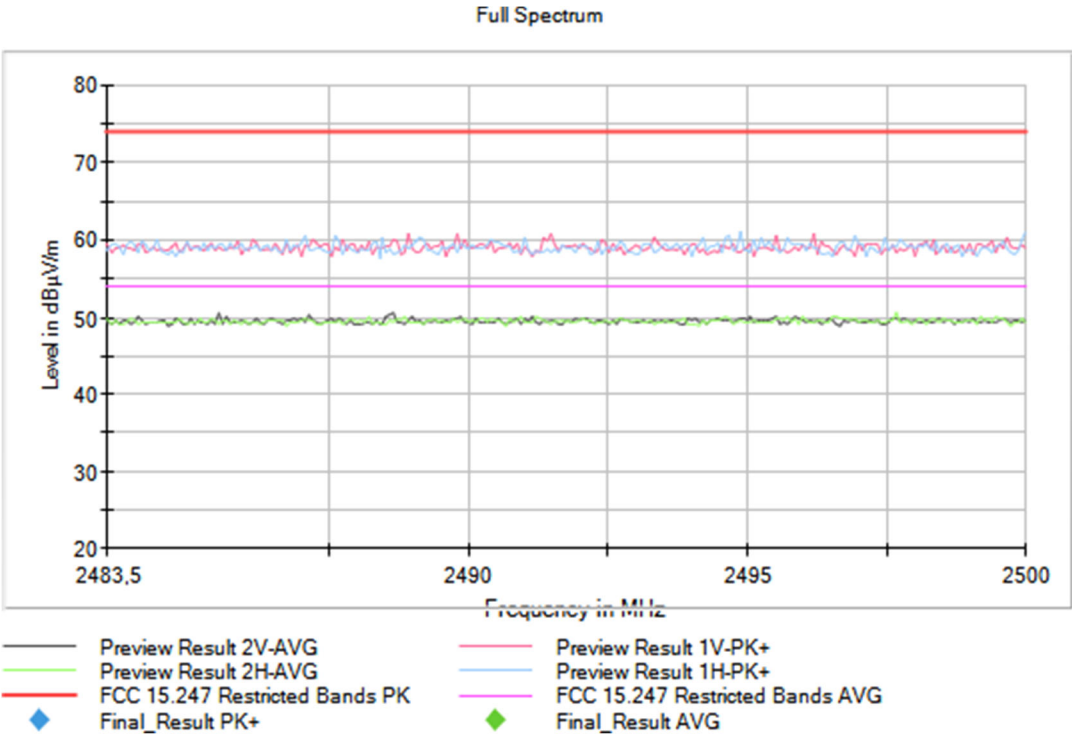
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Active Port = 1

Images:



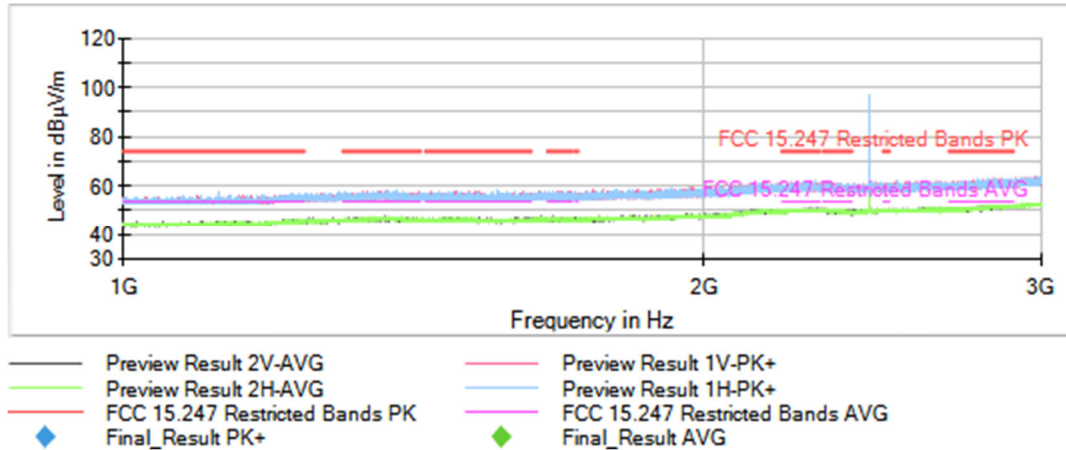
Full Spectrum



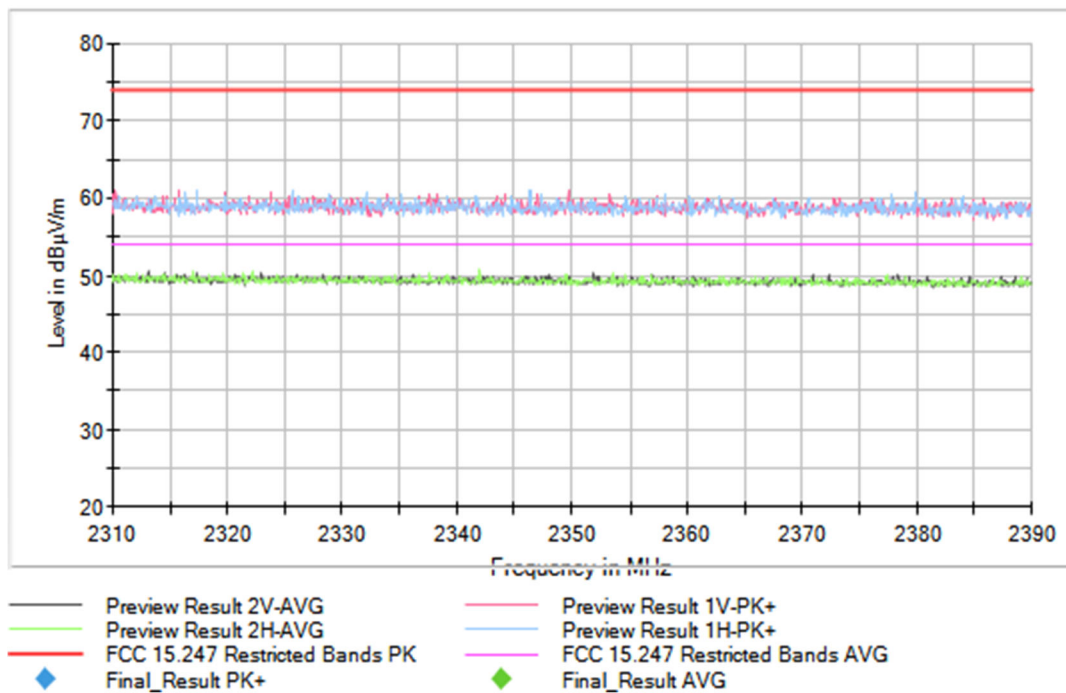


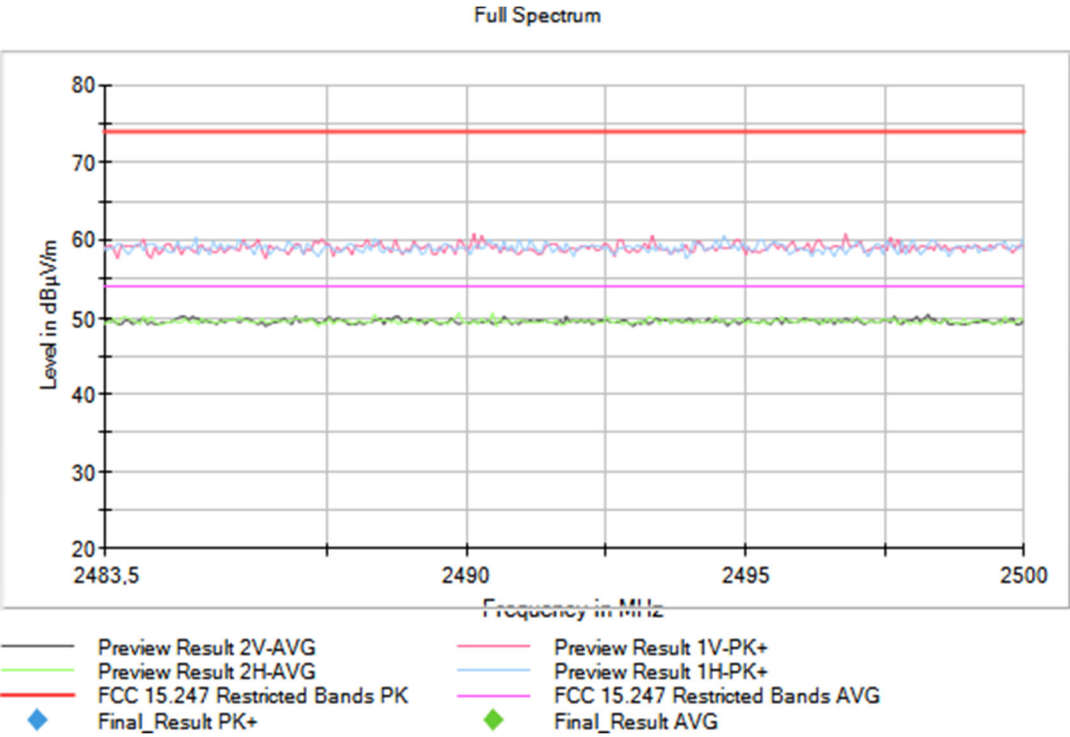
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Active Port = 1

Images:



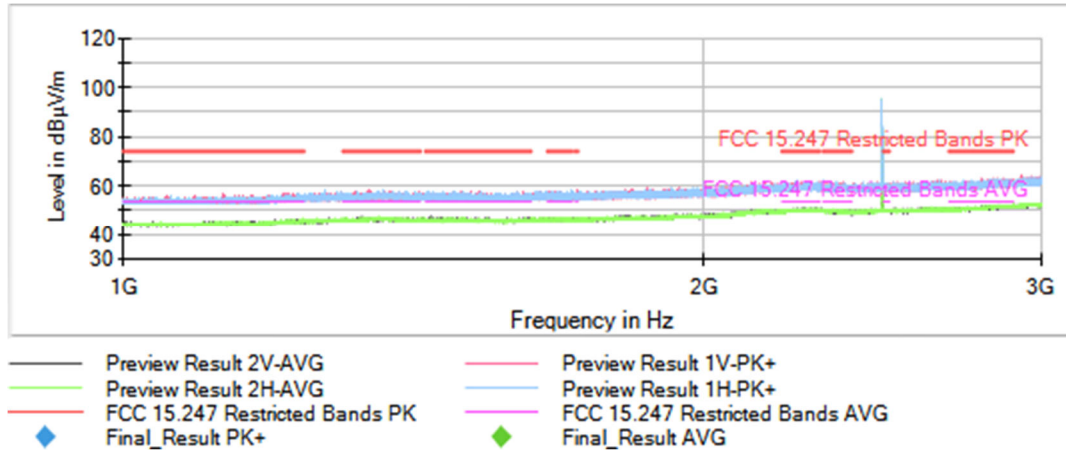
Full Spectrum



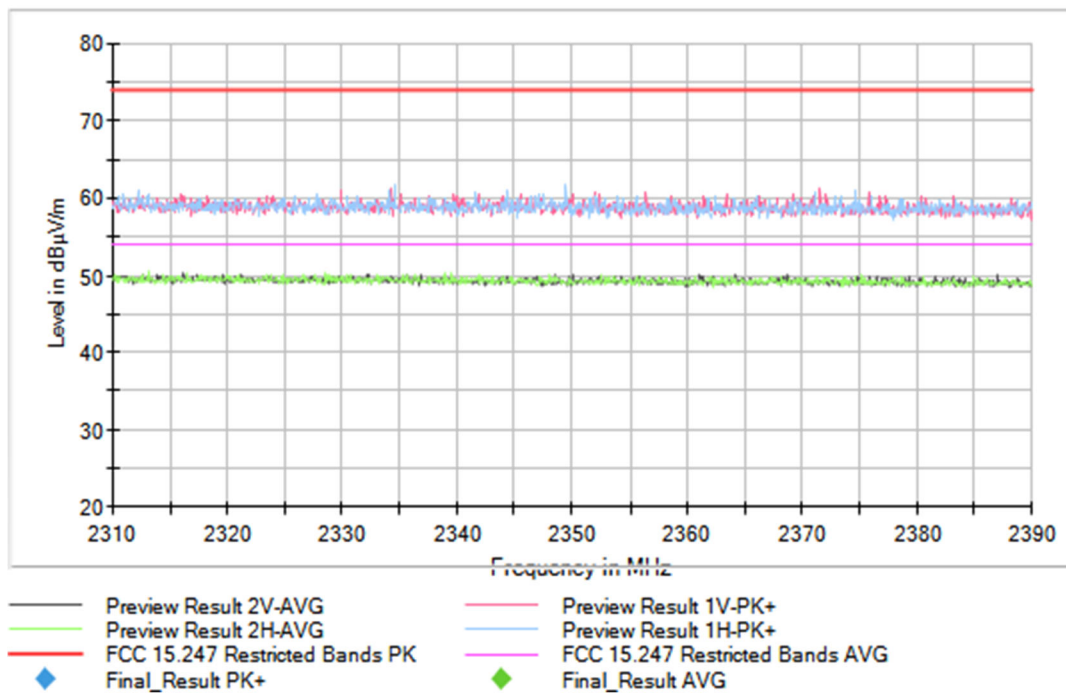


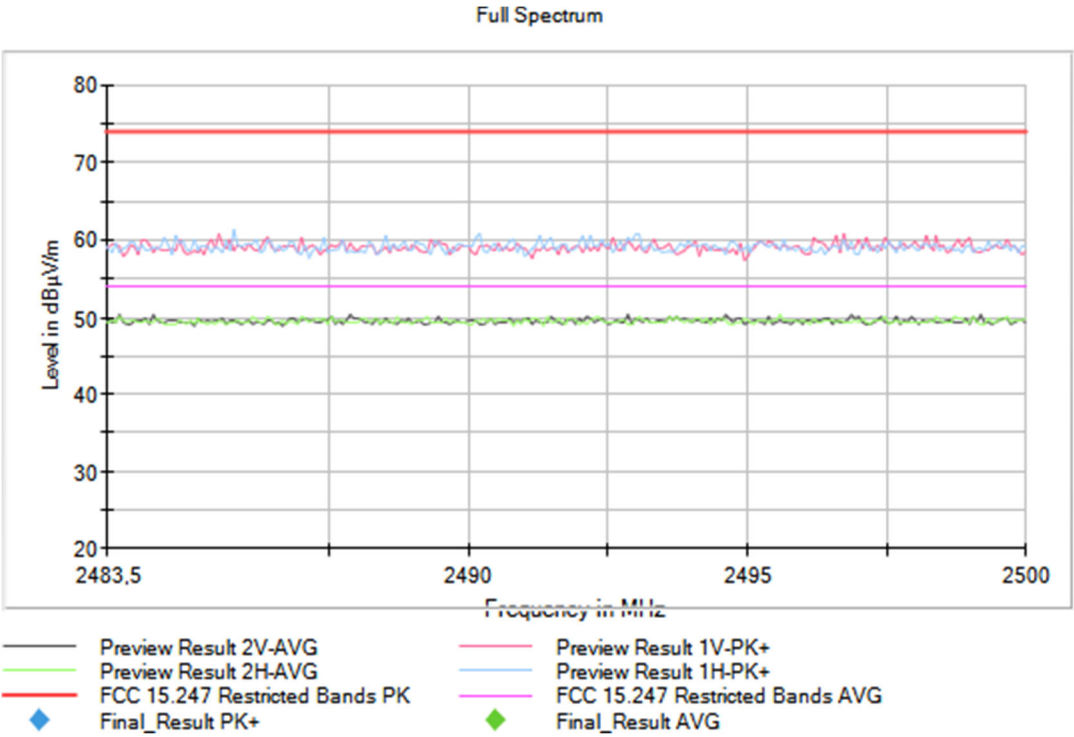
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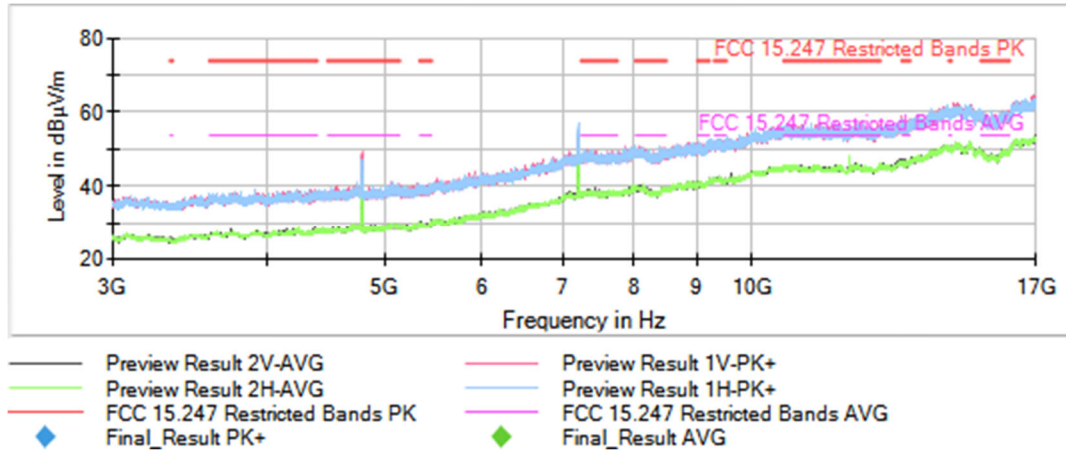
Full Spectrum





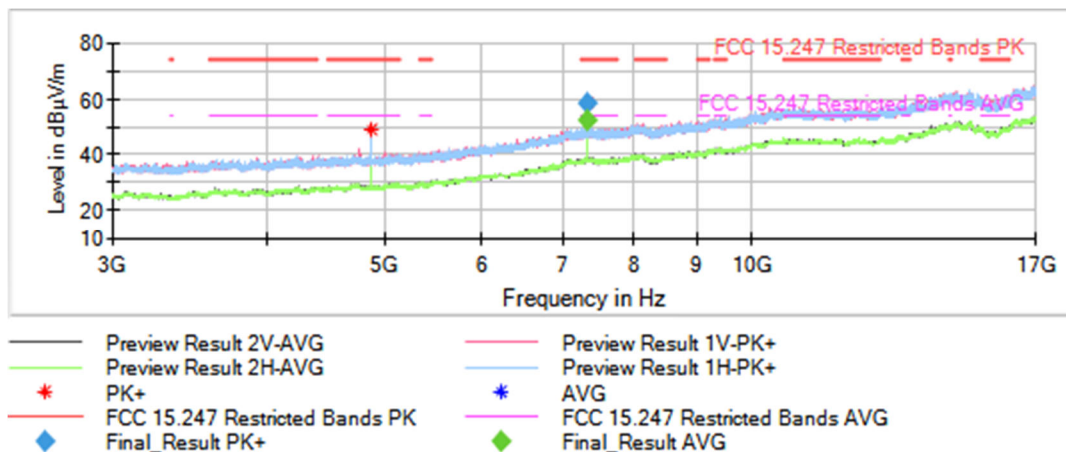
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Images:



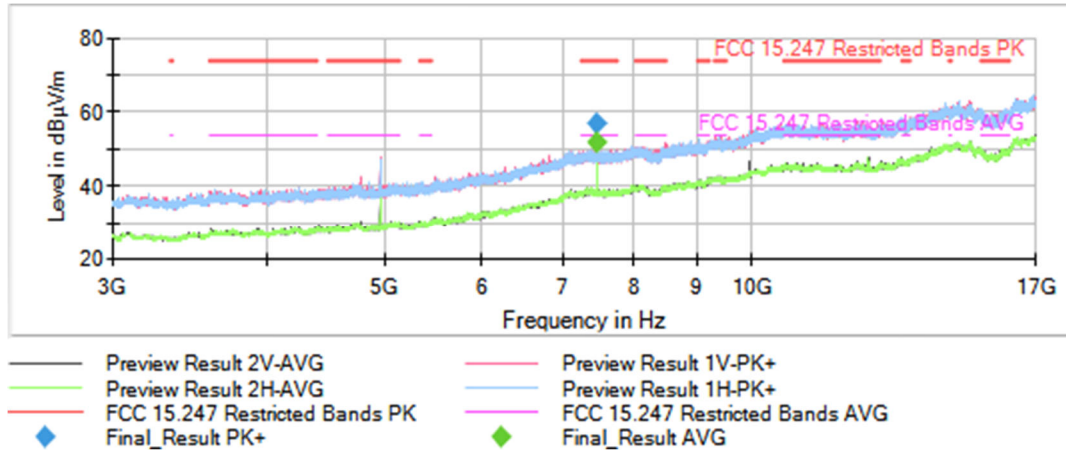
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Images:



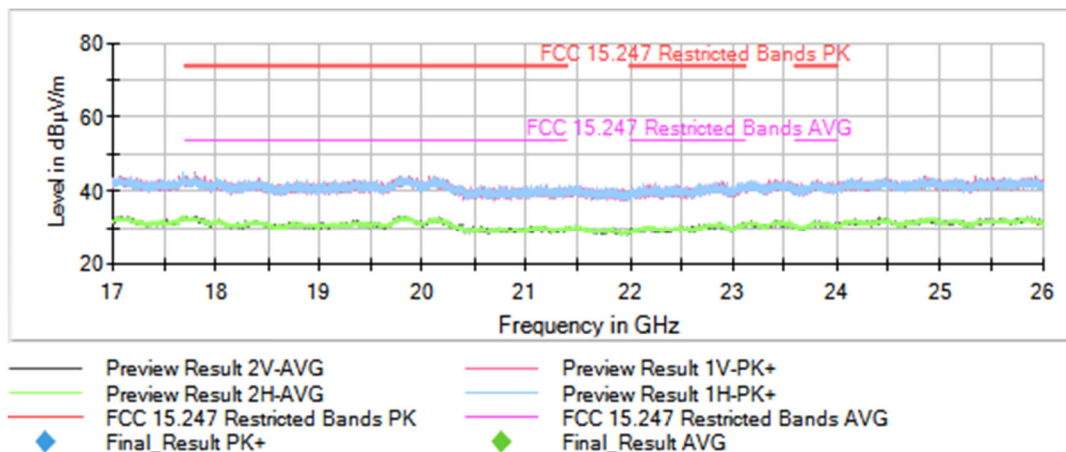
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Active Port = 1

Images:



Frequency Range GHz = [17, 26] Equipment Type = Digital Transmission System (DTS)
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MIMO Mode = SISO Measurement Point = 1
Active Port = 1

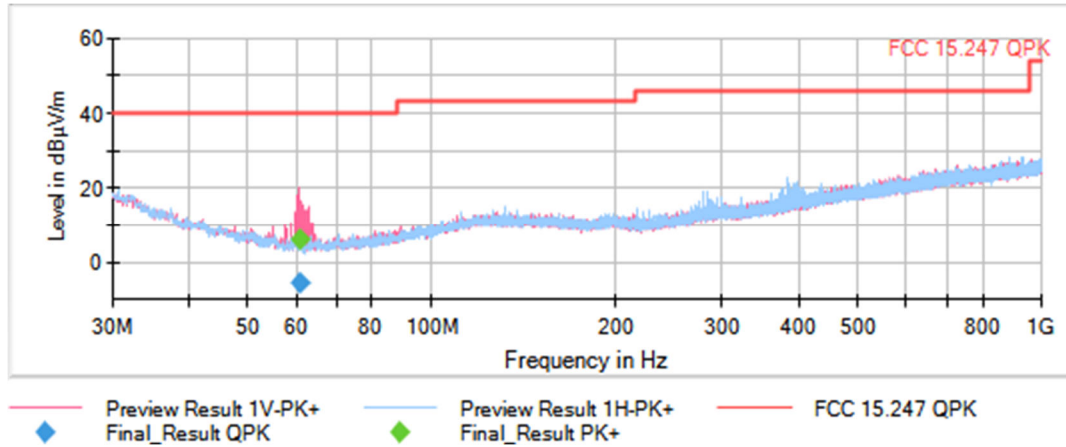
Images:



This plot is valid for all channels

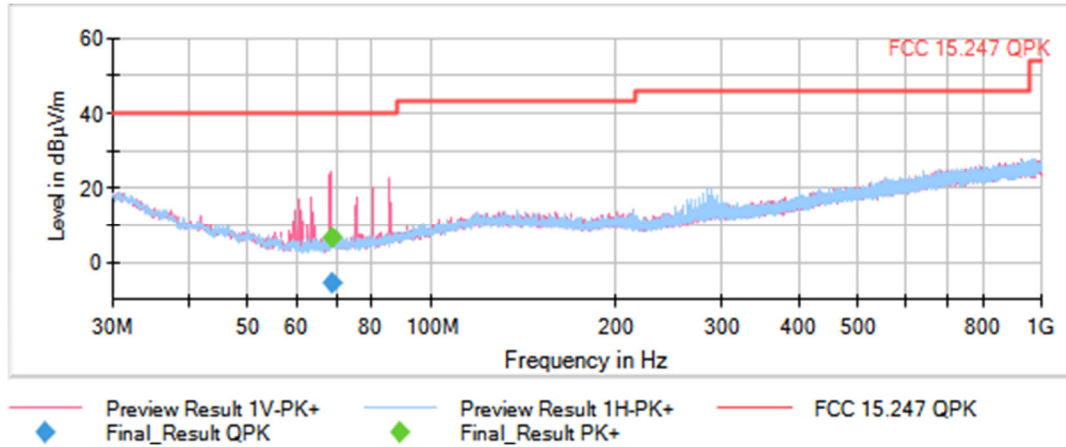
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 Active Port = 1

Images:



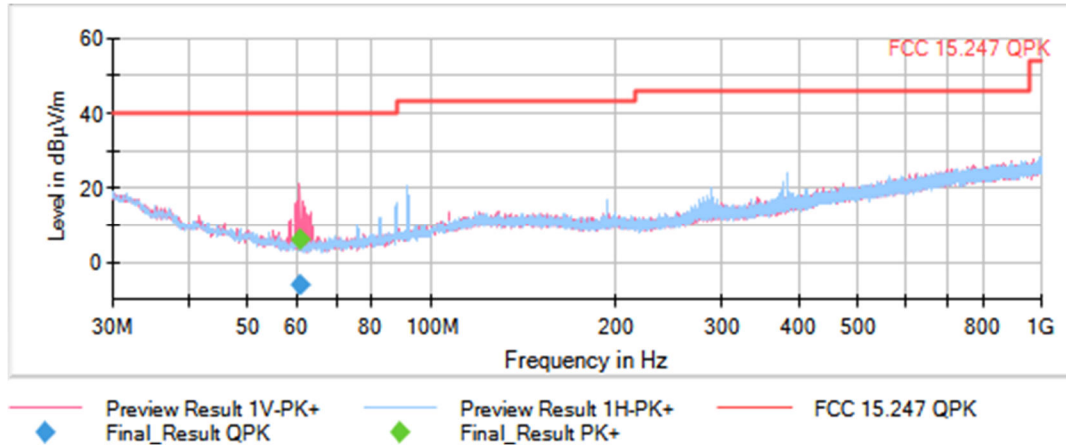
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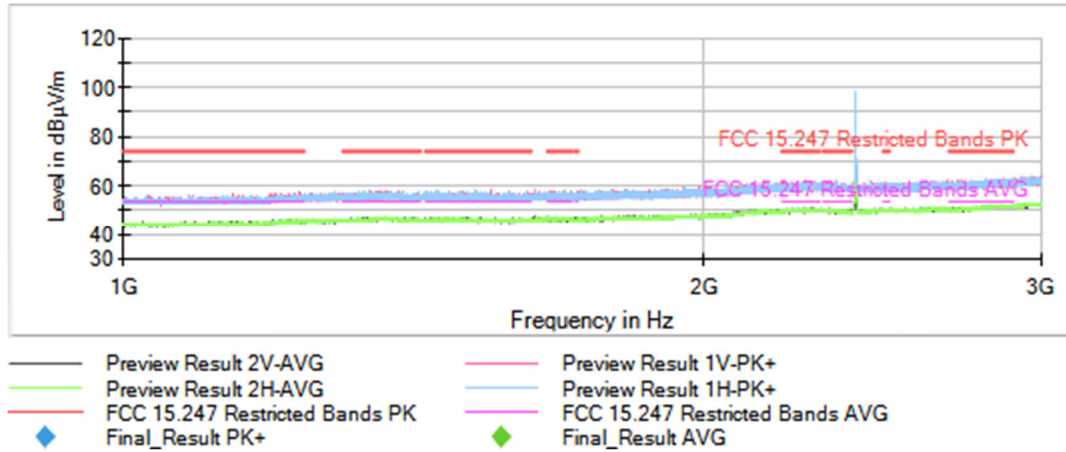
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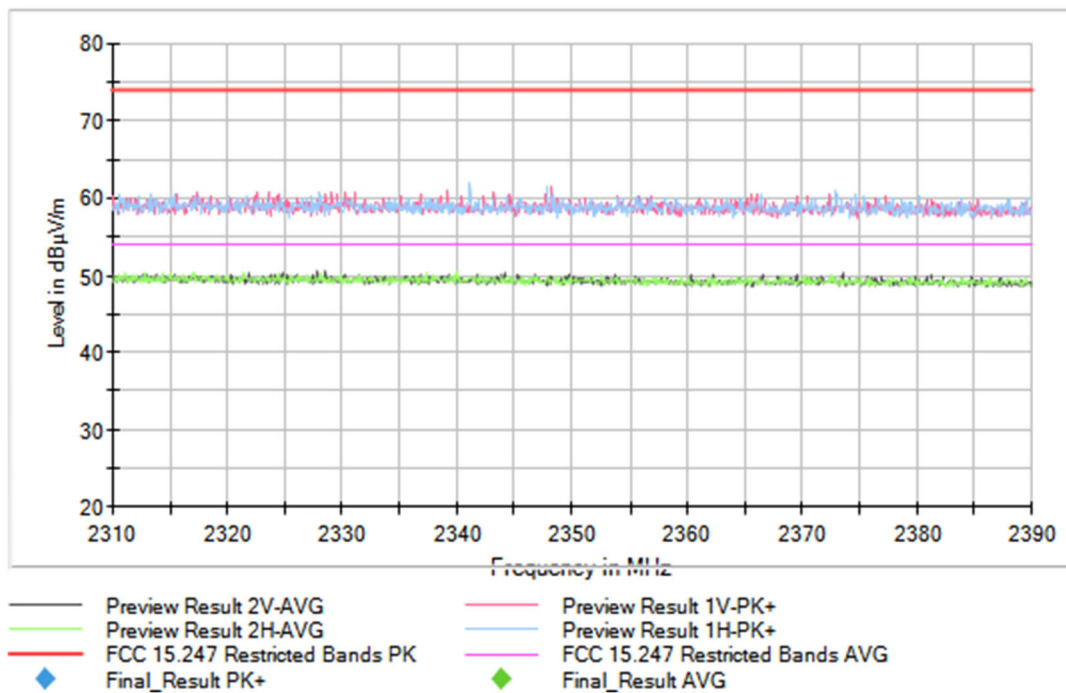


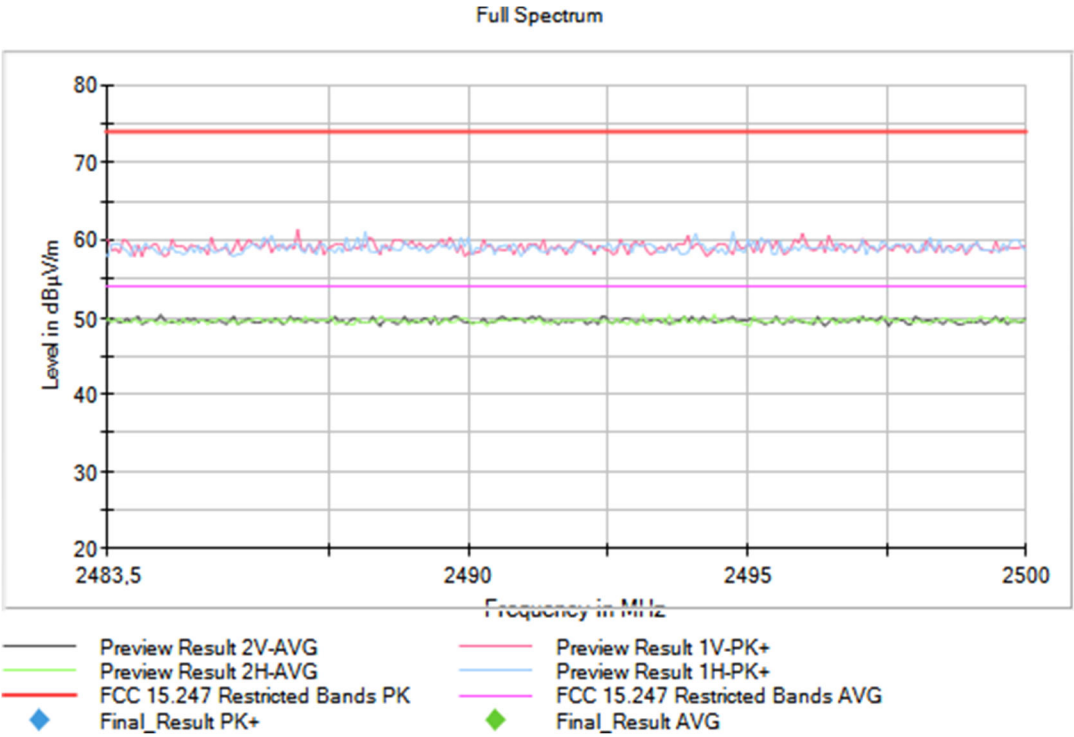
Frequency Range GHz = [1, 3] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE 5.1 (GFSK 2 Mbit/s) Frequency MHz = 2402.00000
MIMO Mode = SISO Measurement Point = 1
Active Port = 1

Images:



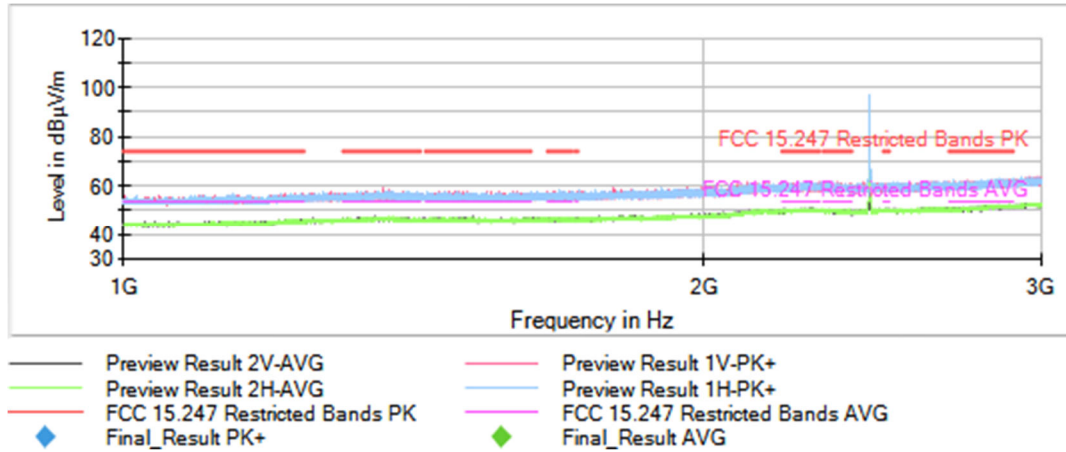
Full Spectrum



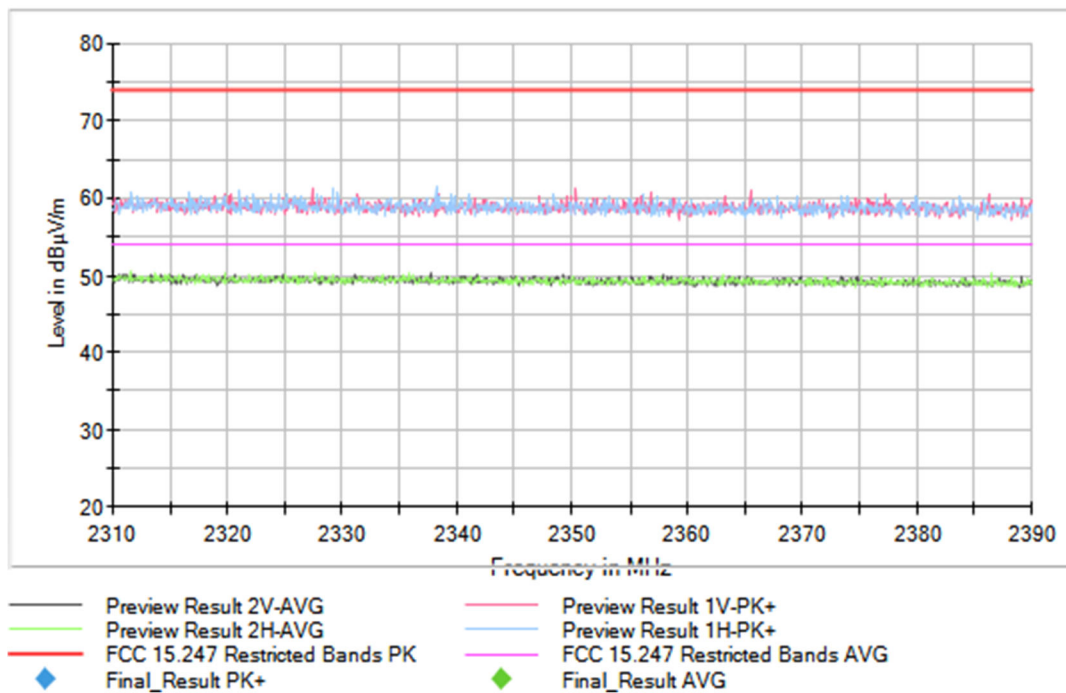


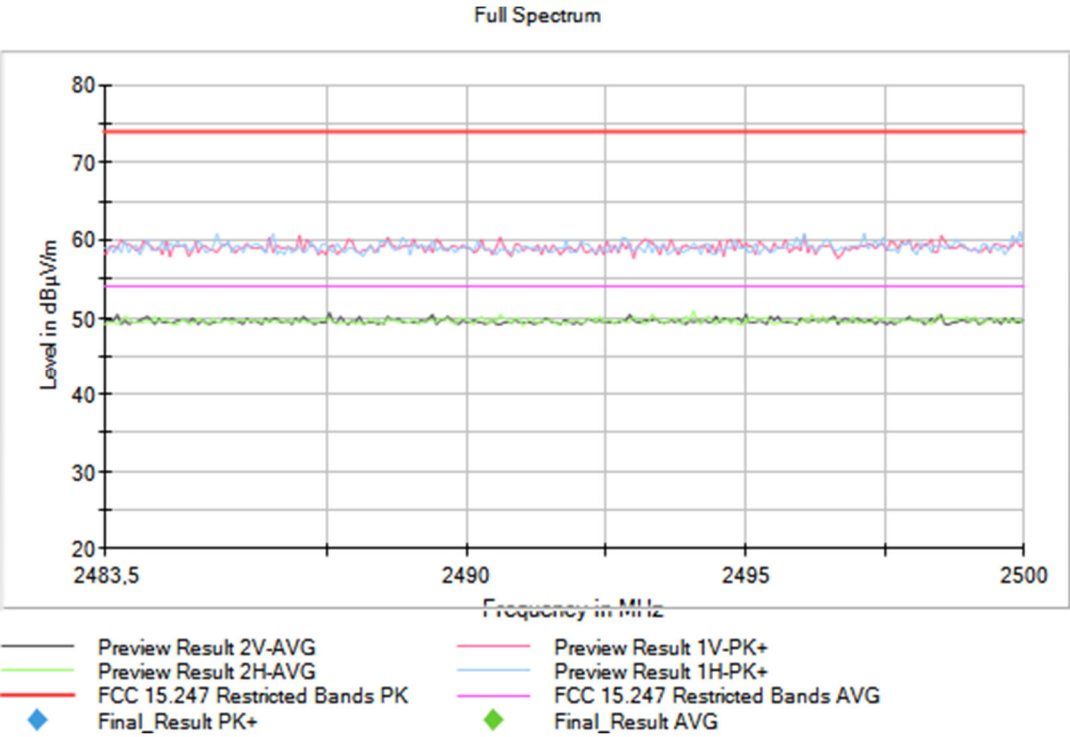
Frequency Range GHz = [1, 3] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE 5.1 (GFSK 2 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Measurement Point = 1
Active Port = 1

Images:



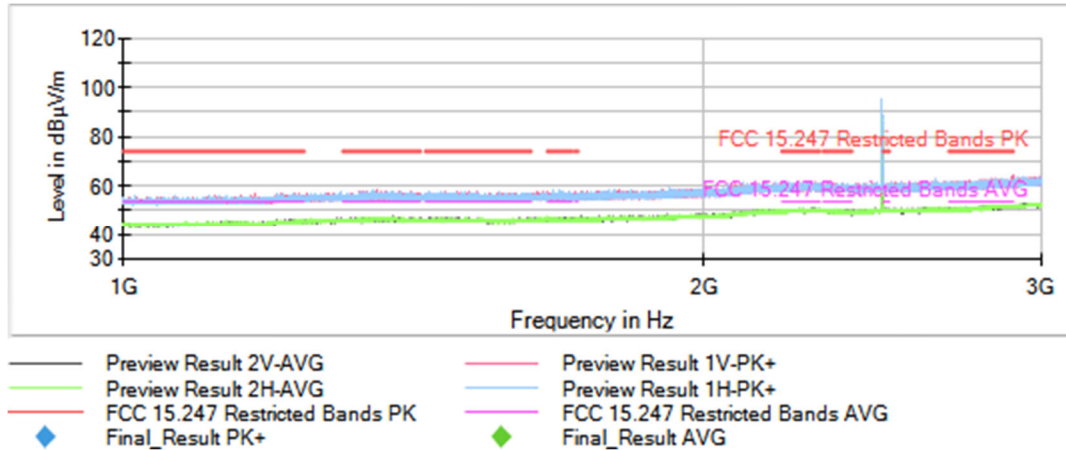
Full Spectrum



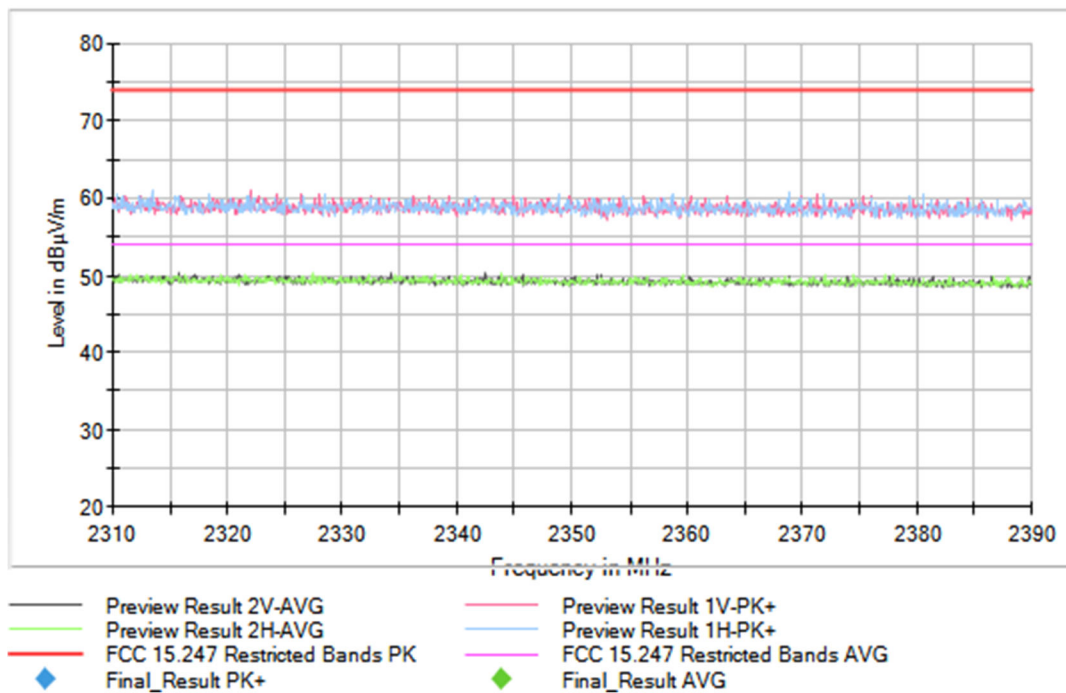


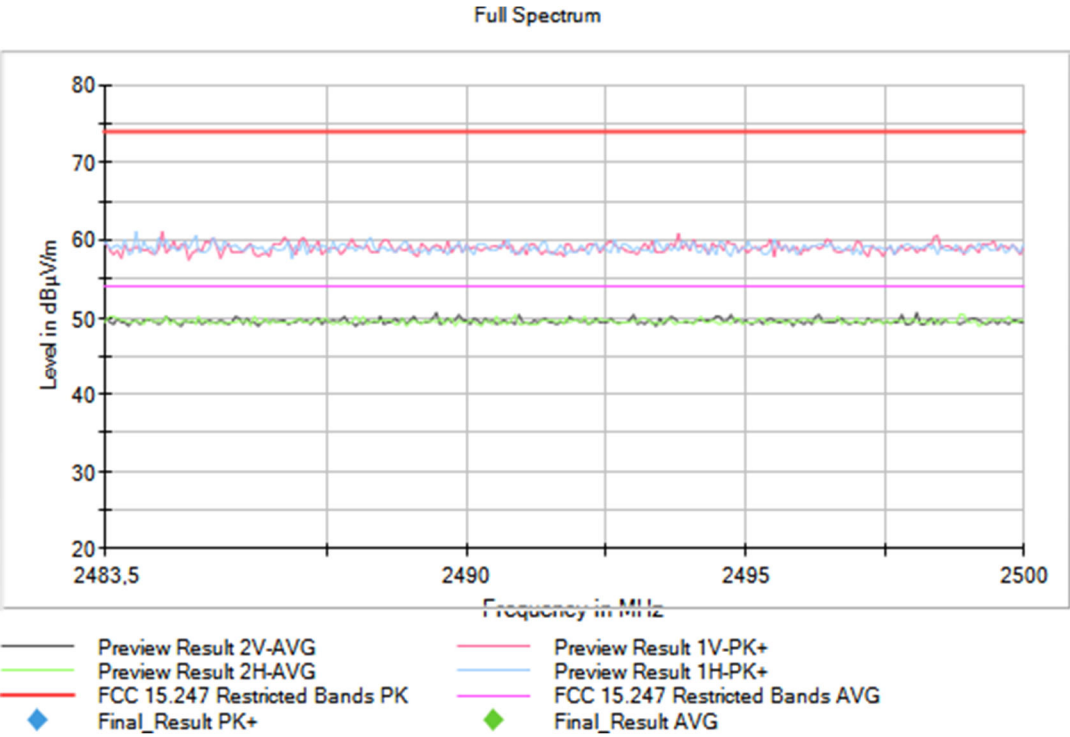
Frequency Range GHz = [1, 3] Equipment Type = Digital Transmission System (DTS)
 Modulation = BTLE 5.1 (GFSK 2 Mbit/s) Frequency MHz = 2480.00000
 MIMO Mode = SISO Measurement Point = 1
 Active Port = 1

Images:



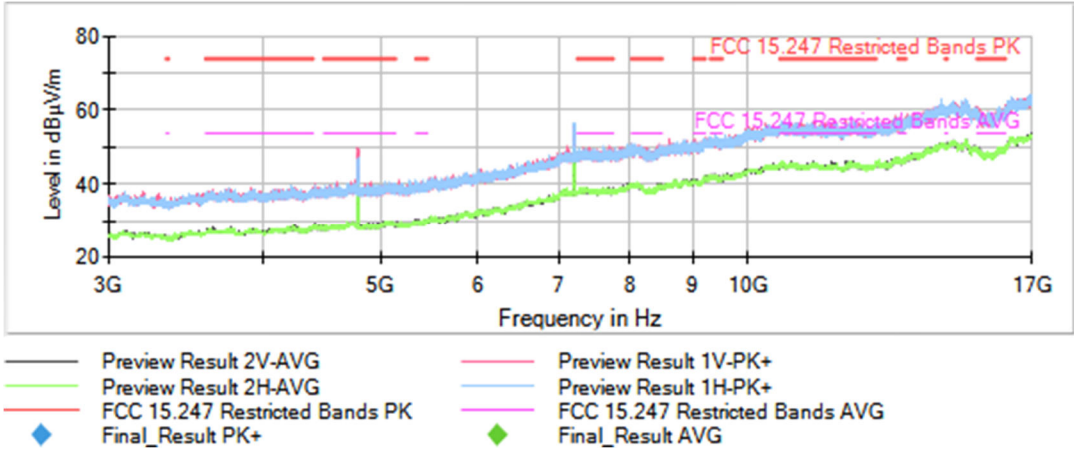
Full Spectrum





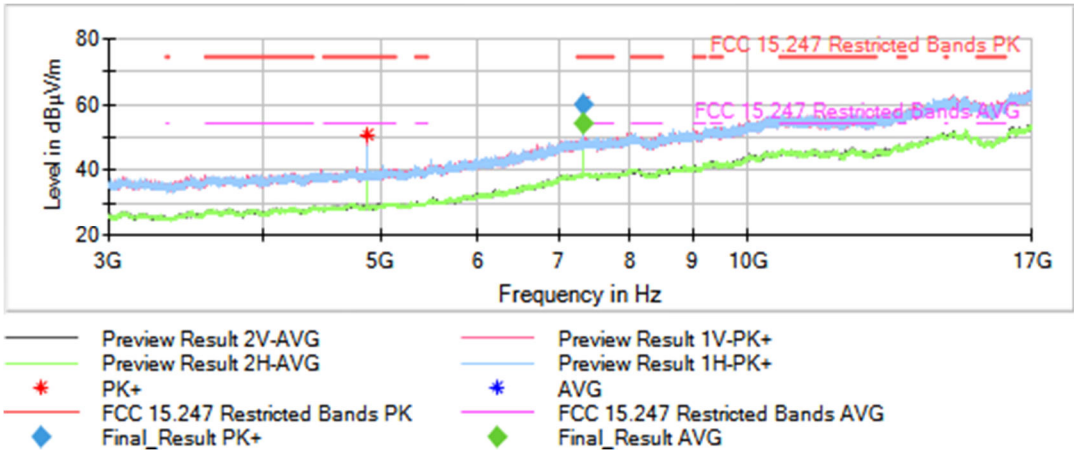
Frequency Range GHz = [3, 17] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE 5.1 (GFSK 2 Mbit/s) Frequency MHz = 2402.00000
MIMO Mode = SISO Measurement Point = 1
Active Port = 1

Images:



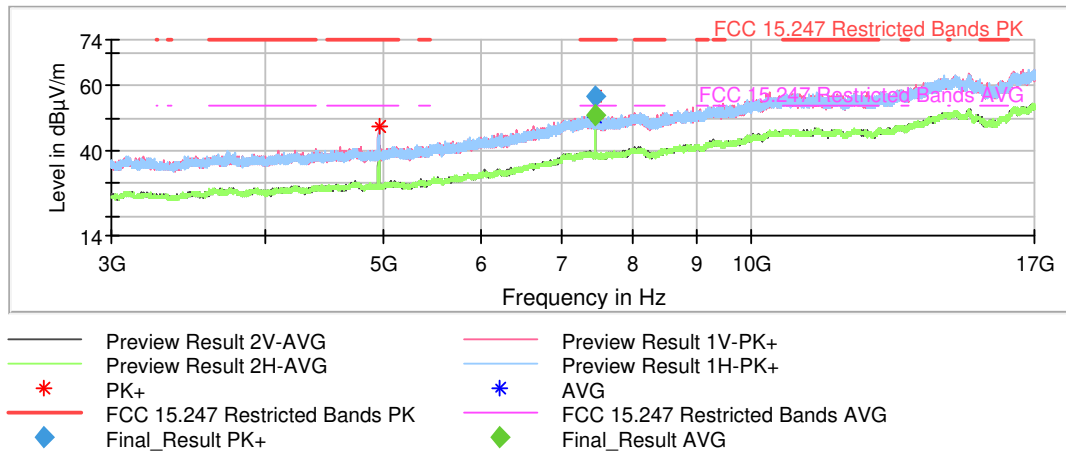
Frequency Range GHz = [3, 17] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE 5.1 (GFSK 2 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Measurement Point = 1
Active Port = 1

Images:



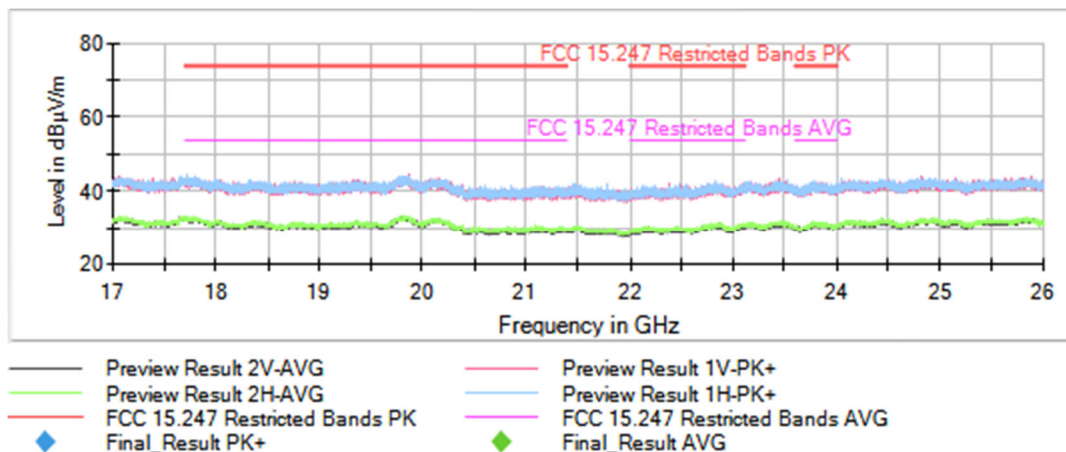
Frequency Range GHz = [3, 17] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE 5.1 (GFSK 2 Mbit/s) Frequency MHz = 2480.00000
MIMO Mode = SISO Measurement Point = 1
Active Port = 1

Images:



Frequency Range GHz = [17, 26] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE 5.1 (GFSK 2 Mbit/s) Measurement Point = 1
MIMO Mode = SISO
Active Port = 1

Images:



This plot is valid for all channels