

ISED CABid: ES1909

Test Report No:

NIE: 60287RRF.001

Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

(*) Identification of item tested	Bluetooth Low Energy Cryptocurrency Hardware Wallet
(*) Trademark	Ledger
(*) Model and /or type reference	NanoX
Other identification of the product	HW version: 2.0.1 SW version: 2.0.0 FCC ID: 2ASAL1407 IC: 24697-1407
(*) Features	Bluetooth LE
Manufacturer	Ledger SAS 1 rue du Mail 75002 Paris, France
Test method requested, standard	USA FCC Part 15.247 (10-1-20 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (10-1-20 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.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López Martín EMC Consumer & RF Lab. Manager
Date of issue	2021-11-22
Report template No	FDT08_23 (*) "Data provided by the client"



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DEKRA Testing and Certification is a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this 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.

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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:

Identification of item tested	Bluetooth Low Energy Cryptocurrency Hardware Wallet
Trademark (Brand name)	Ledger
Model name	NanoX
Detailed description of product:	Cryptocurrency Hardware Wallet with BLE connectivity and USB communication, with embedded LiPo Battery

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.

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

Control N°	Description	Model	Serial N°	Date of reception
60287/003	Cryptocurrency Hardware Wallet	NanoX	---	2021/07/27

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

- Sample S/02 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
60287/001	Cryptocurrency Hardware Wallet	NanoX	---	2021/07/27

Sample S/02 has undergone the following test(s): All CONDUCTED tests indicated in Appendix A.

Test sample description

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾		
	USB Type C (5V)	2	[]	[]	[]		
			[]	[]	[]		
			[]	[]	[]		
			[]	[]	[]		
			[]	[]	[]		
Supplementary information to the ports..... :							
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	[]	AC:	[]	[]	[]	[]	[]
	[]	AC:	[]	[]	[]	[]	[]
	[X]	DC: USB Type C (5V)					
[X]	DC: Lithium-Ion Polymer Battery 3.7V (Included in product packaging)						
Rated Power	350 mW with USB Power supply, 111mW with battery only						
Clock frequencies.....	32MHz and 32.768kHz clocks						
Other parameters							
Software version	2.0.0						
Hardware version	2.0.1						
Dimensions in cm (W x H x D)	18.5x71.95x11.55mm						
Mounting position	[]	Table top equipment					
	[]	Wall/Ceiling mounted equipment					
	[]	Floor standing equipment					
	[X]	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

Ledger SAS

1 rue du Mail 75002 Paris, France

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-09-27
Date (finish)	2021-10-04

Document history

Report number	Date	Description
60287RRF.001	2021-11-22	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: Javier Miguel Nadales Lisbona, José Manuel Jiménez González, Miguel Angel Torres Camara and Nicolás Salguero Camarena.

Used instrumentation:

Conducted Measurements

	Last Calibration	Due Calibration
1. Shielded Room ETS LINDGREN S101	N/A	N/A
2. Signal and Spectrum Analyzer 10 Hz - 40 GHz ROHDE AND SCHWARZ FSV40	2021/02	2023/02
3. Open Switch Unit up to 7.5GHz ROHDE AND SCHWARZ OSP-B157W8 PLUS	2021/08	2023/08
4. Open Switch Unit up to 40 GHz ROHDE AND SCHWARZ OSP-B157Wx	2019/10	2021/10

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. Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E	2020/04	2023/04
4. Preamplifier G>40dB 10MHz-6GHz, BONN ELEKTRONIK, BLNA 0160-01N	2021/03	2022/03
5. EMI Test Receiver, 9kHz-7GHz, ROHDE AND SCHWARZ ESR7	2020/12	2022/12
6. Horn Antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D	2019/11	2022/11
7. RF Preamplifier, G>40 dB ,1-18 GHz BONN ELEKTRONIK BLMA 0118-1M	2021/06	2022/06
8. Horn Antenna 18-40 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9170	2020/05	2023/05
9. RF Preamplifier, G>30 dB ,18-40 GHz BONN ELEKTRONIK BLMA 1840-3G	2019/11	2021/11
10. Spectrum Analyzer ROHDE AND SCHWARZ FSW50	2020/07	2022/07

Testing verdicts

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

Summary

Bluetooth Low Energy 5.0 (2M, 1M)

Requirement – Test case	FCC PART 15 PARAGRAPH / RSS-247	Verdict	Remark
RSS-247 5.2 (a) / FCC 15.247 (a) (2) 6 dB Bandwidth		Pass	
RSS-247 5.4 (d) / FCC 15.247 (b) (3) Maximum Peak Conducted output power		Pass	
RSS-247 5.5 / FCC 15.247 (d) Band-edge emissions compliance (Transmitter)		Pass	
RSS-247 5.5 / FCC 15.247 (d) Emission limitations radiated (Transmitter)		Pass	
99dBw Occupied Channel Bandwidth 99%		Pass	
<u>Supplementary information and remarks:</u> None			

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

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RSS-247 5.5 / FCC 15.247 (d) Emission limitations radiated (Transmitter)	33
Occupied Channel Bandwidth 99%	51

TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal:	5Vdc
Type of Power Supply:	USB Type C

ANTENNA (*):

Type of Antenna:	Ceramic
Maximum Declared Antenna Gain:	1.3dBi

TEST FREQUENCIES (*):

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

Tests were performance using different test modes with a software provided by the customer. Power setting used to be in compliance with the limits of the standard was 7 (-14.10dBm)

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 m for the frequency range 17 GHz-26 GHz (antenna and 18 GHz-40 GHz horn antenna).

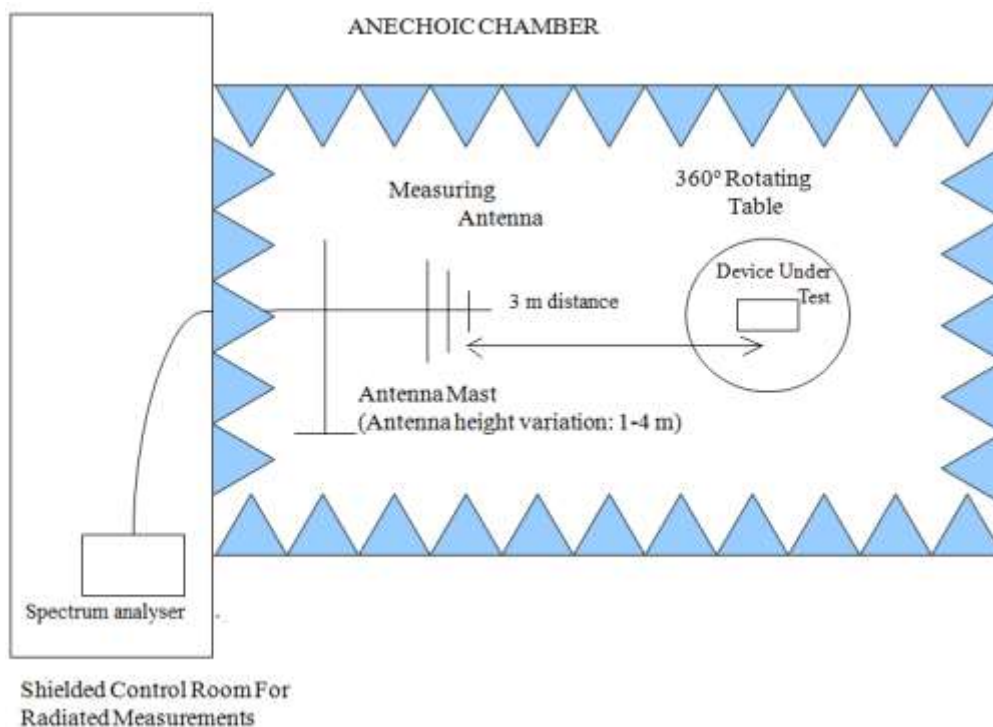
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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.

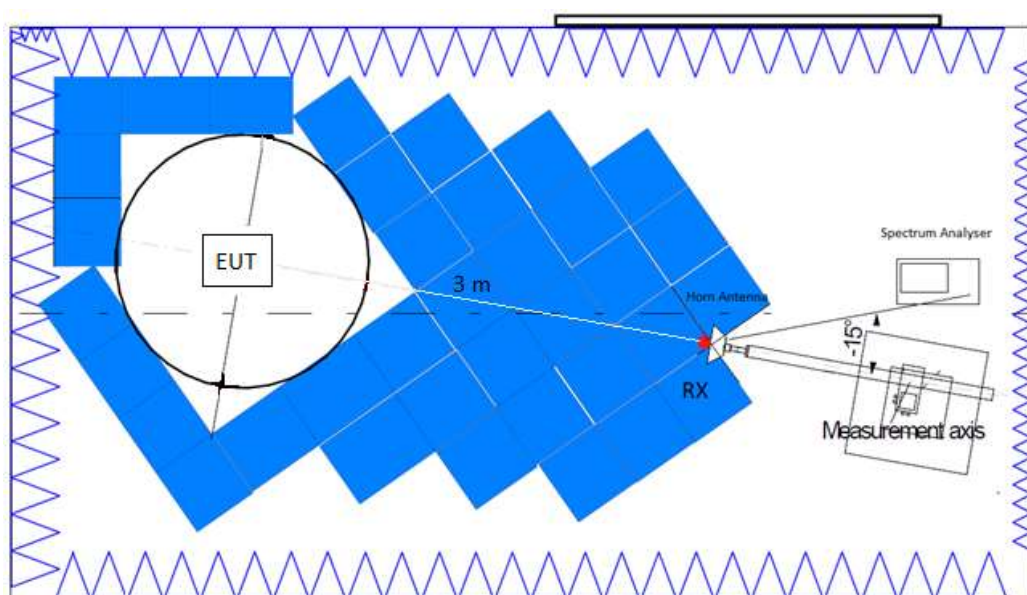
Measurements were made in both horizontal and vertical planes of polarization.

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.

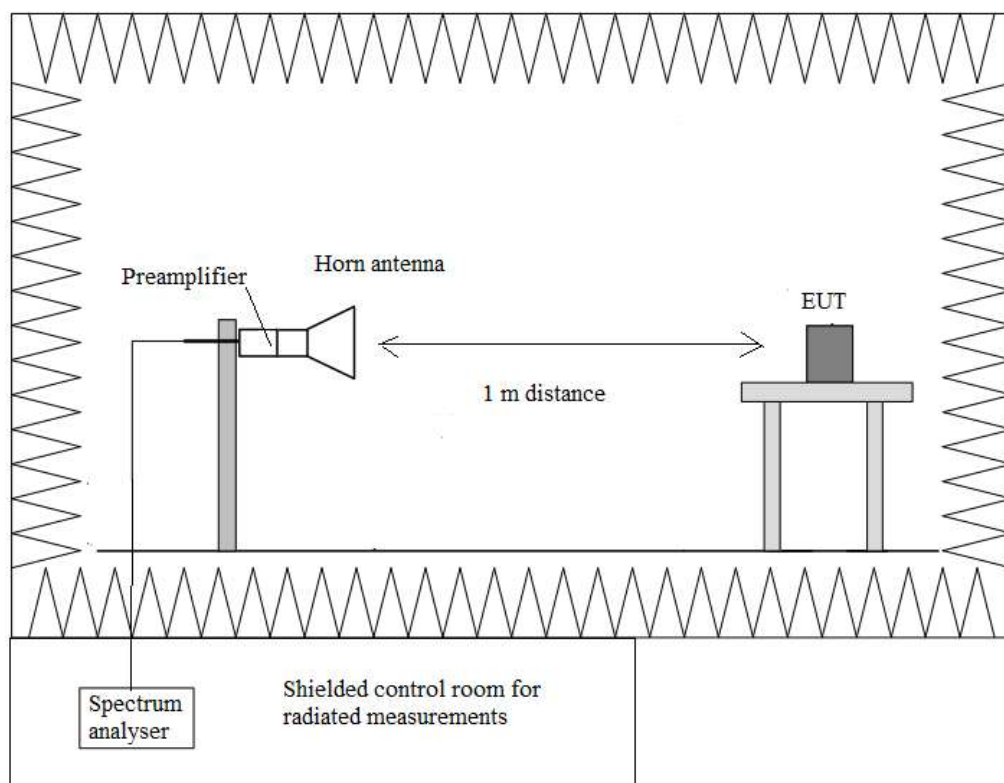
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



TEST CASES DETAILS

FCC 47 CFR Part 15.247 / RSS-247

RSS-247 5.2 (a) / FCC 15.247 (a) (2) 6 dB Bandwidth

Limits

The minimum 6 dB bandwidth shall be at least 500 kHz.

Results

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

Operation Band (MHz)	Equipment	Freq (MHz)	# of Tx Chains	# of Ch	20dBw (MHz)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00	1	1	0.673268
		2440.00			0.673268
		2480.00			0.693070

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

Operation Band (MHz)	Equipment	Freq (MHz)	# of Tx Chains	# of Ch	20dBw (MHz)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00	1	1	1.188118
		2440.00			1.188118
		2480.00			1.188118

Verdict

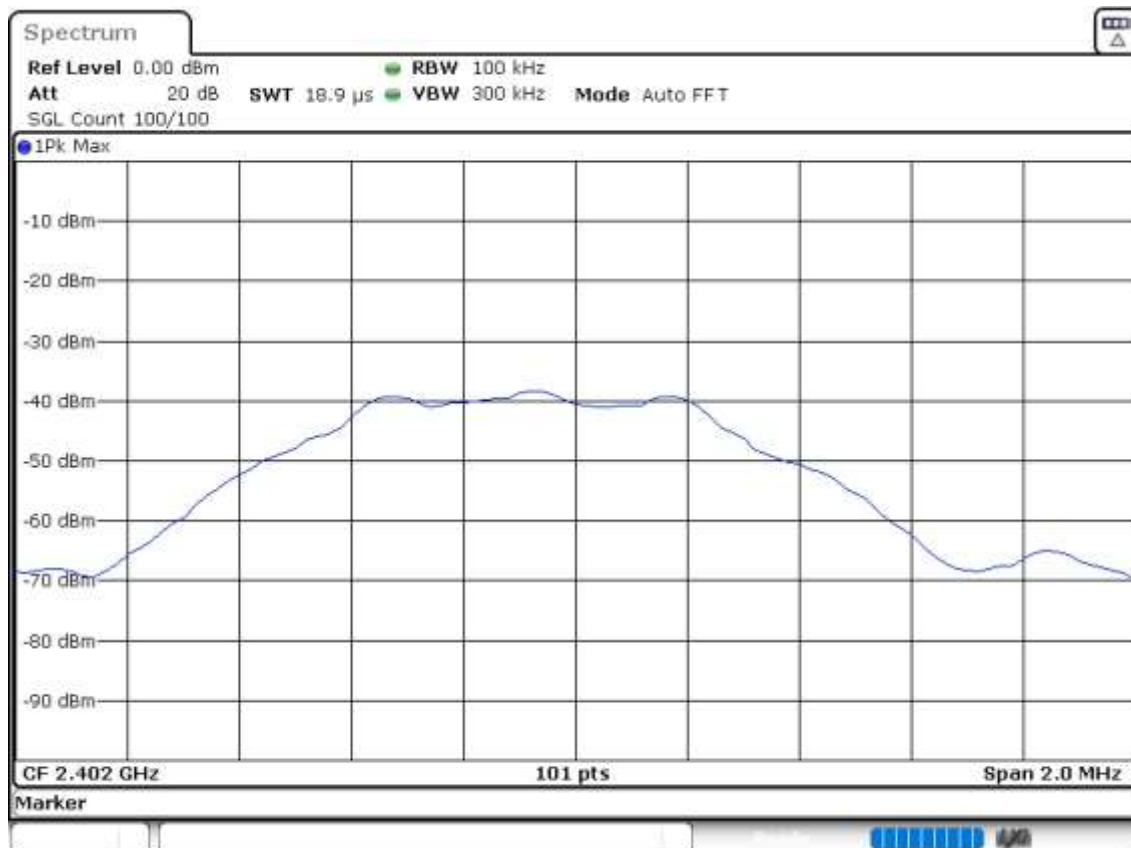
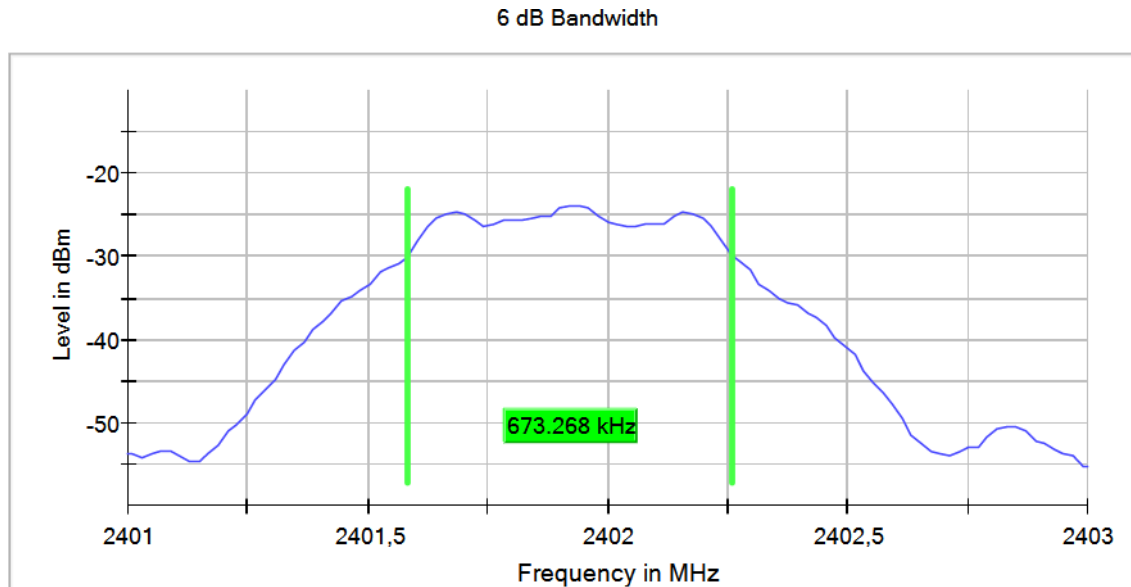
Pass

Uncertainty 1.40%

Attachments

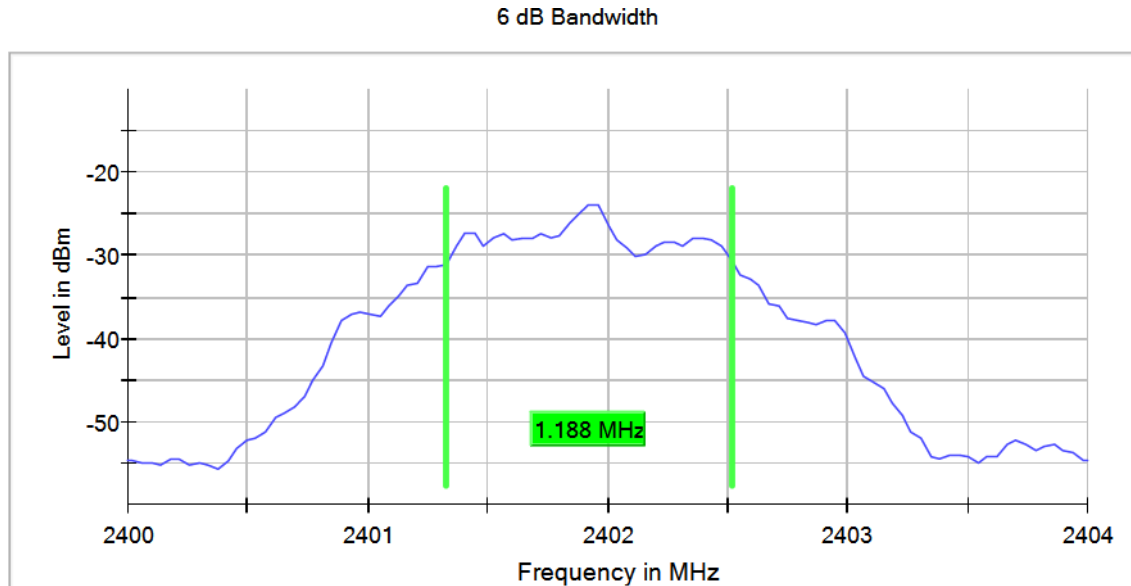
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2402.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



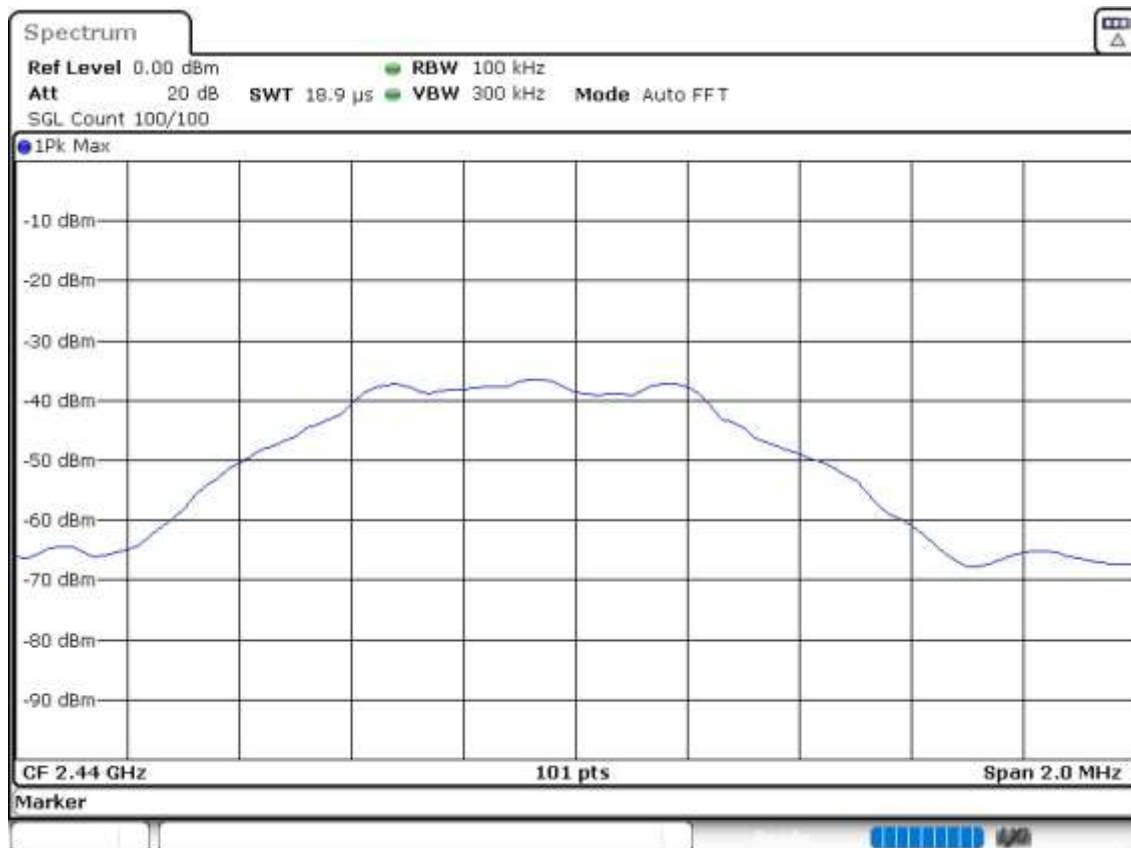
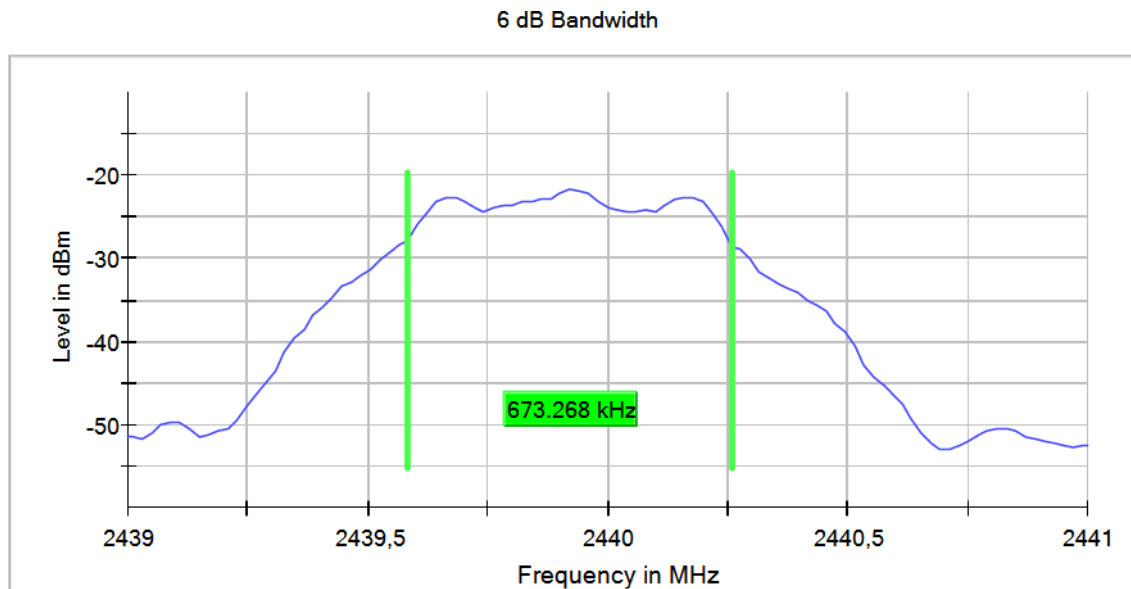
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2402.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



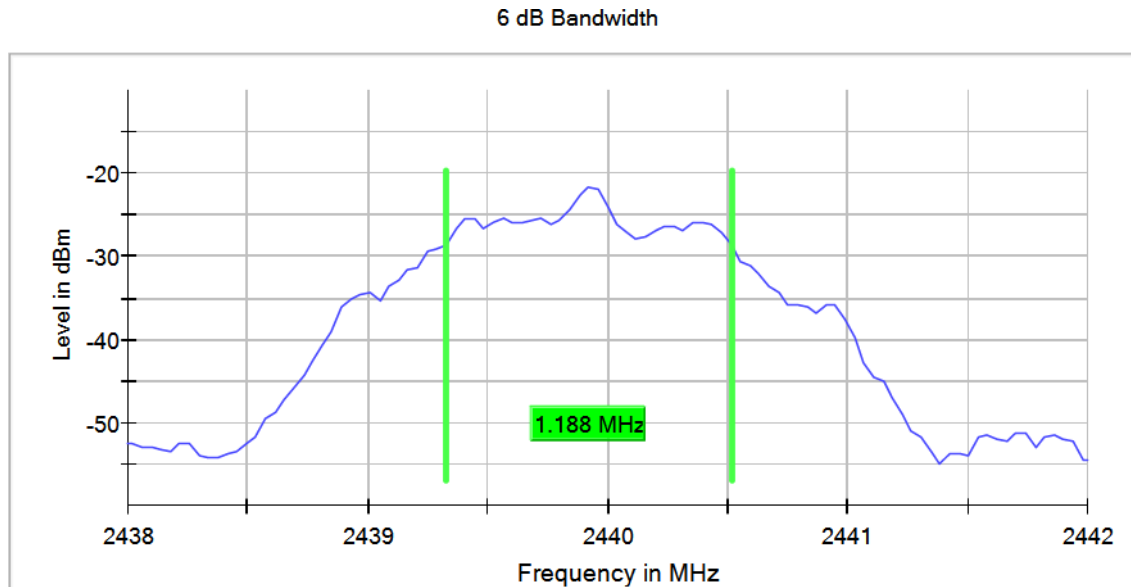
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2440.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



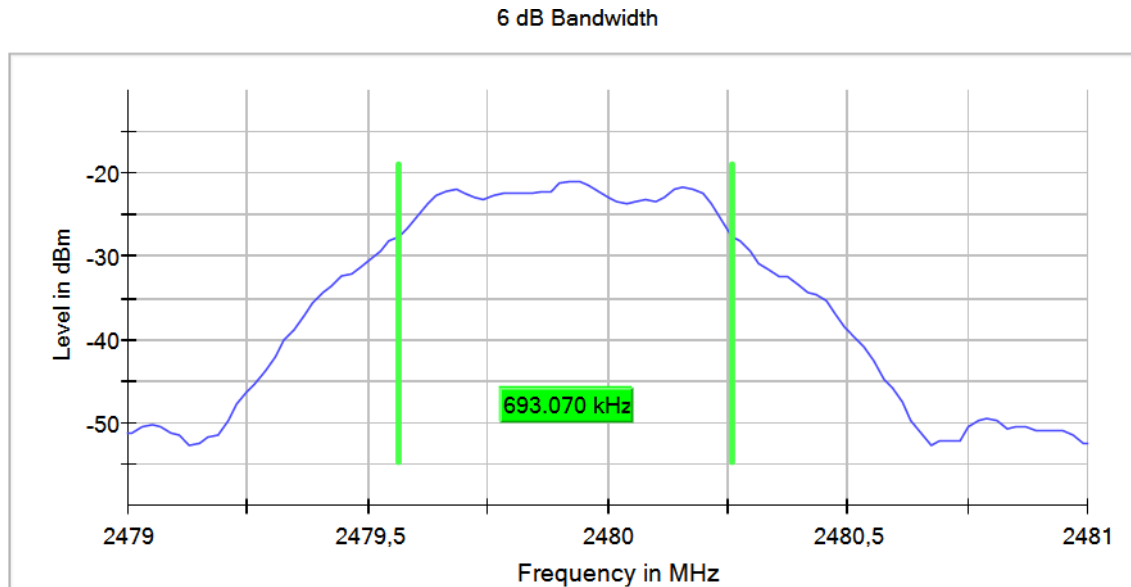
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2440.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



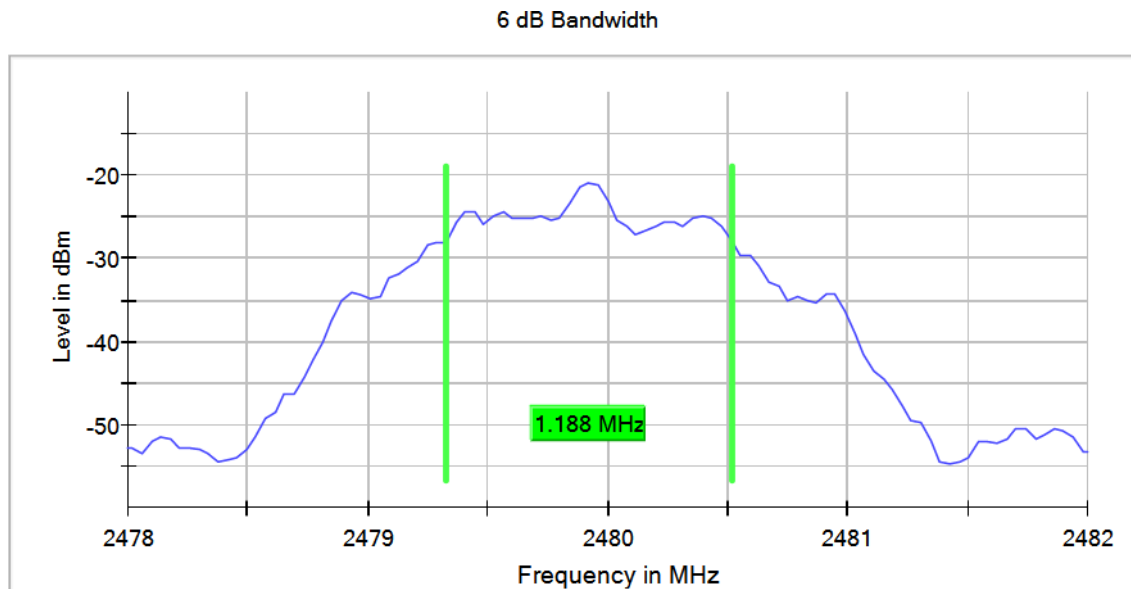
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



RSS-247 5.4 (d) / FCC 15.247 (b) (3) Maximum Peak Conducted output power

Limits

For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).

The e.i.r.p. shall not exceed 4 W (36 dBm) (Canada).

Results

The maximum peak conducted output power level in the fundamental emission was measured using the method according to point 11.9.1.1 "RBW $\geq$ DTS bandwidth" of ANSI C.63.10-2013.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

Maximum Declared Antenna Gain: 1.3 dBi

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

Operation Band (MHz)	Equipment	Freq (MHz)	Max Conducted Power (dBm)	Max E.I.R.P (dBm)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00	-21.9	-20.6
[2400, 2483.5]	Digital Transmission System (DTS)	2440.00	-19.7	-18.4
[2400, 2483.5]	Digital Transmission System (DTS)	2480.00	-19.0	-17.7

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

Operation Band (MHz)	Equipment	Freq (MHz)	Max Conducted Power (dBm)	Max E.I.R.P (dBm)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00	-21.6	-20.3
[2400, 2483.5]	Digital Transmission System (DTS)	2440.00	-19.9	-18.6
[2400, 2483.5]	Digital Transmission System (DTS)	2480.00	-19.4	-18.1

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

Verdict

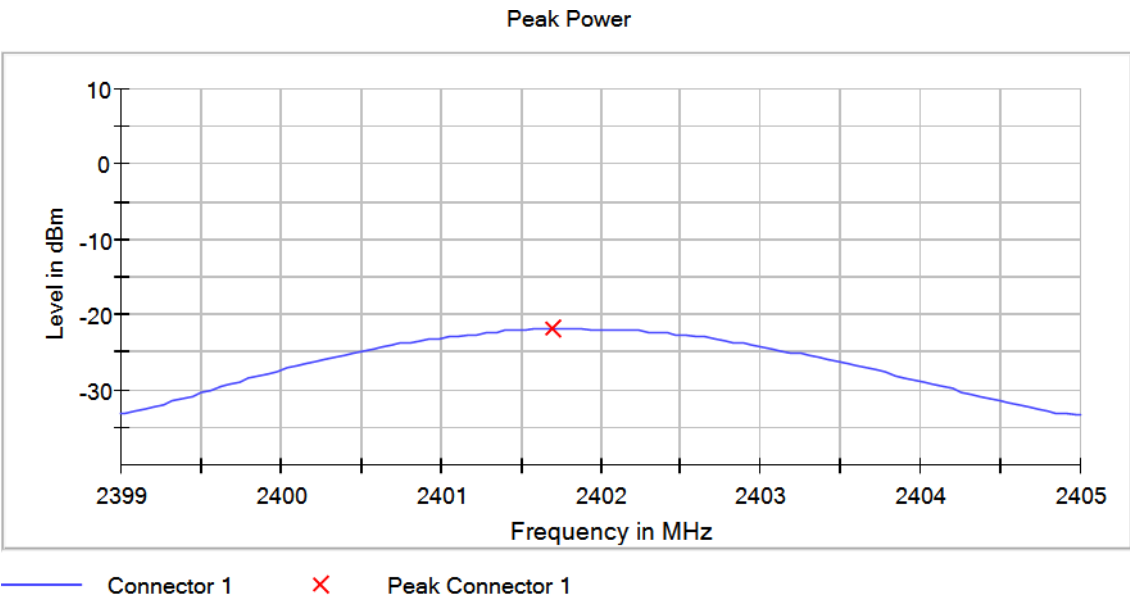
Pass

Uncertainty 0.99dB

Attachments

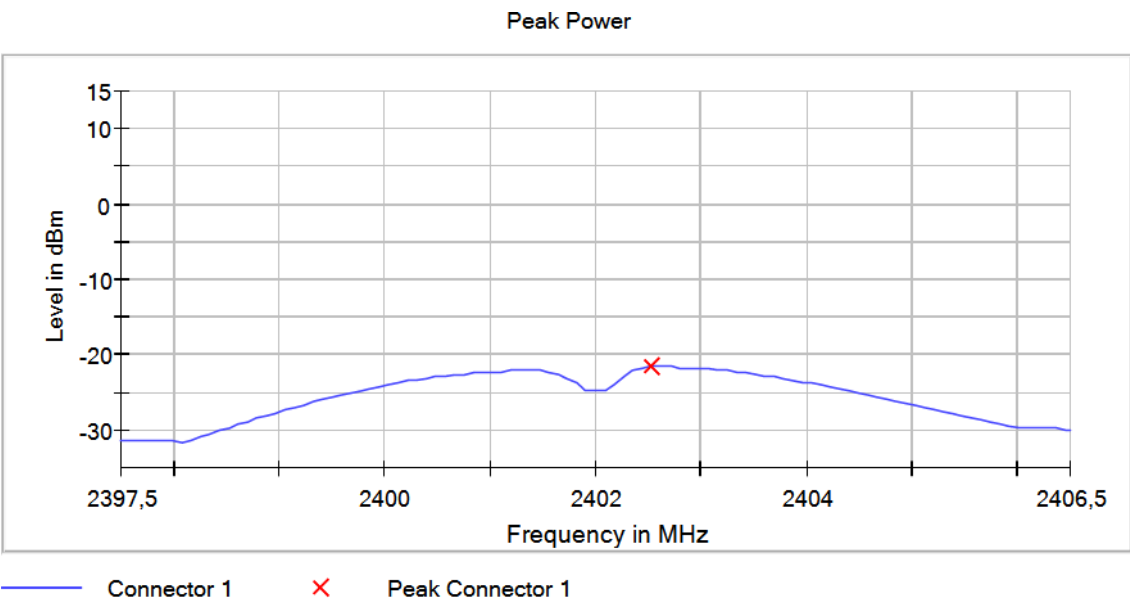
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Images:



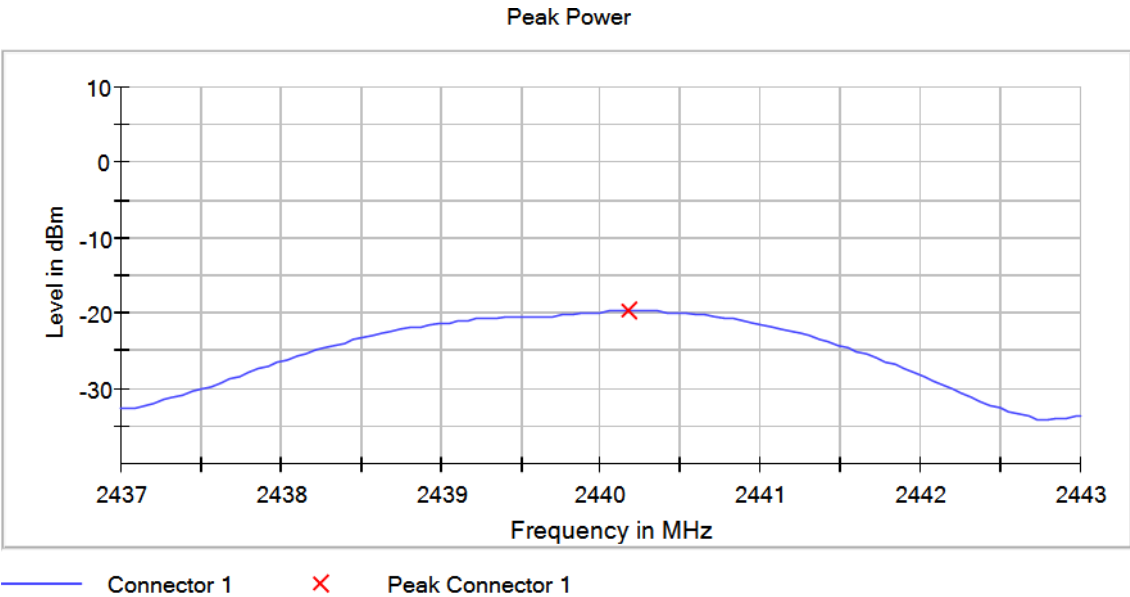
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Images:



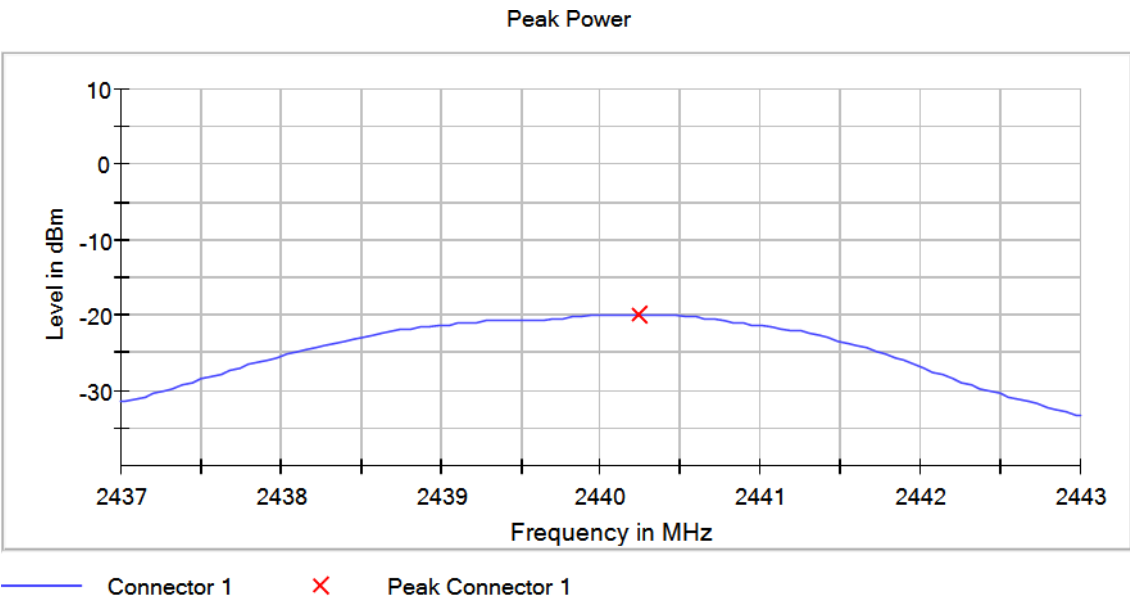
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2440.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



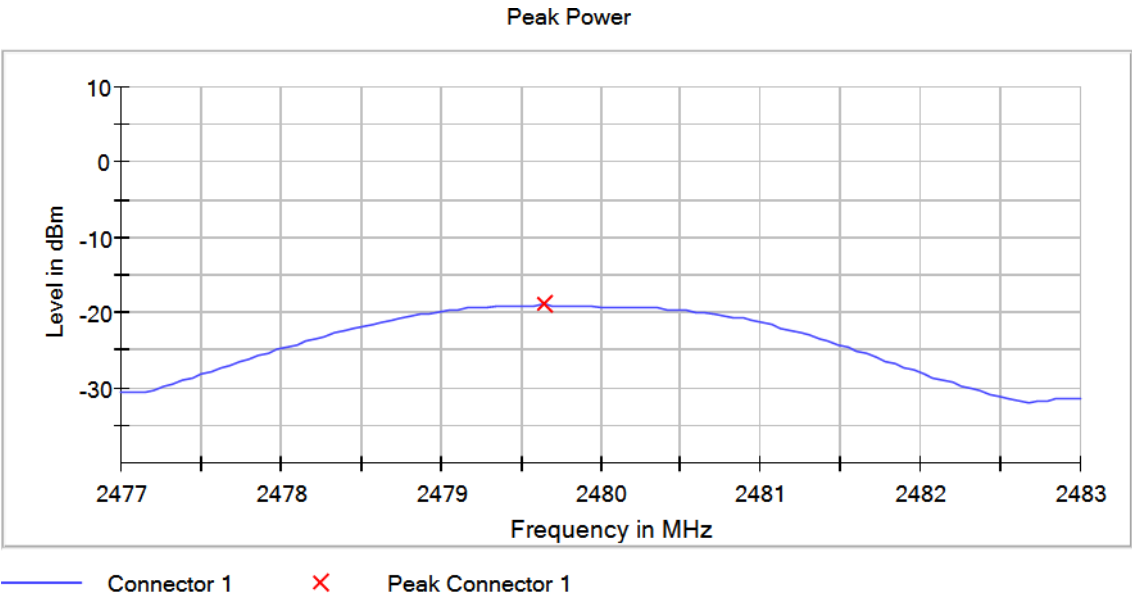
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2440.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



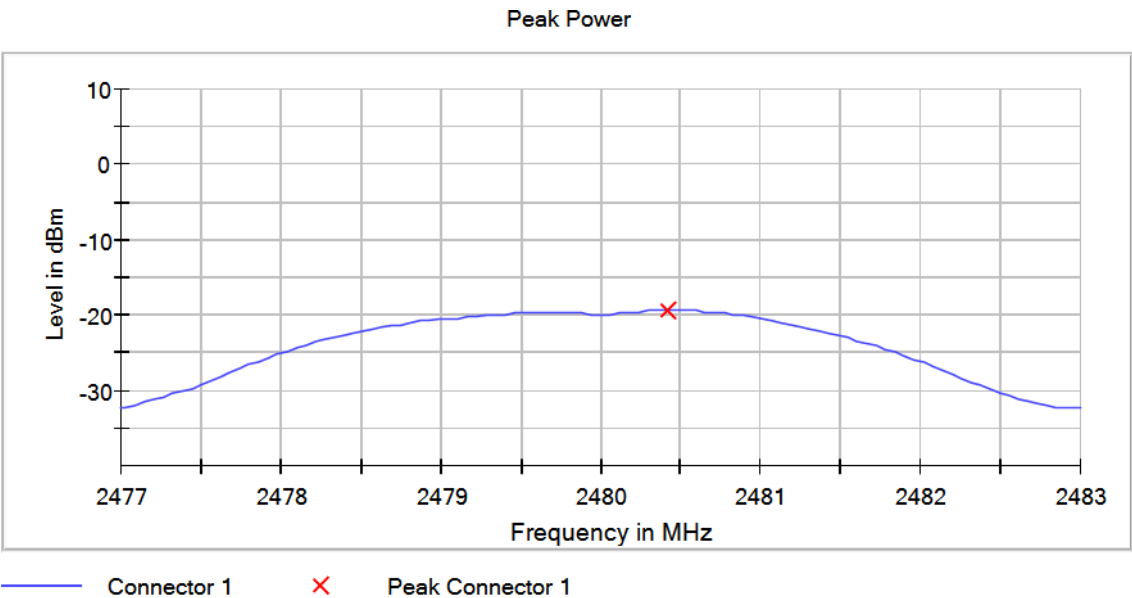
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



RSS-247 5.2 (b) / FCC 15.247 (e) Power Spectral Density

Limits

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.

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

Operation Band (MHz)	Equipment	Freq (MHz)	Power Spectral Density (dBm)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00	-29.55
[2400, 2483.5]	Digital Transmission System (DTS)	2440.00	-27.64
[2400, 2483.5]	Digital Transmission System (DTS)	2480.00	-26.27

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

Operation Band (MHz)	Equipment	Freq (MHz)	Power Spectral Density (dBm)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00	-29.18
[2400, 2483.5]	Digital Transmission System (DTS)	2440.00	-27.08
[2400, 2483.5]	Digital Transmission System (DTS)	2480.00	-26.18

Verdict

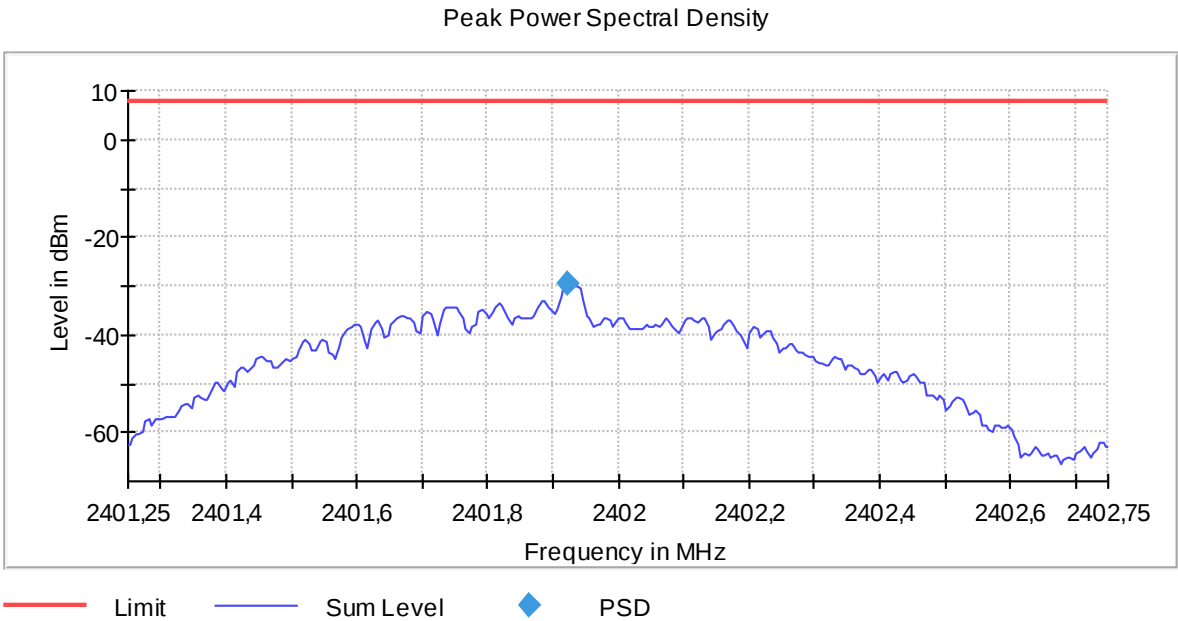
Pass

Uncertainty 0.99dB

Attachments

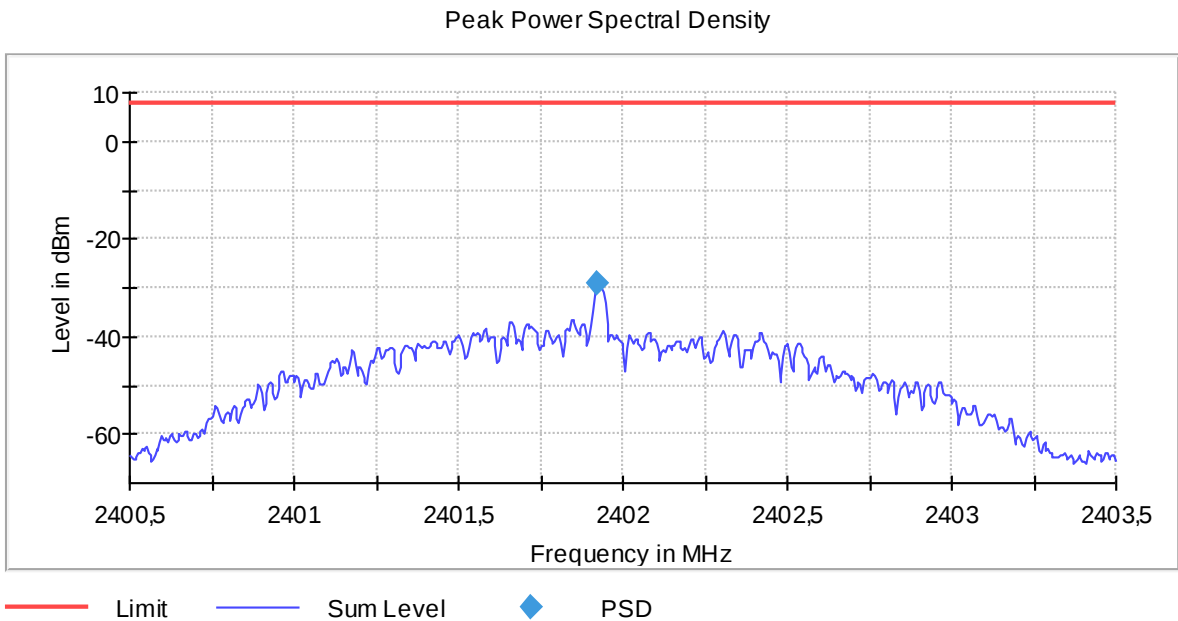
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Images:



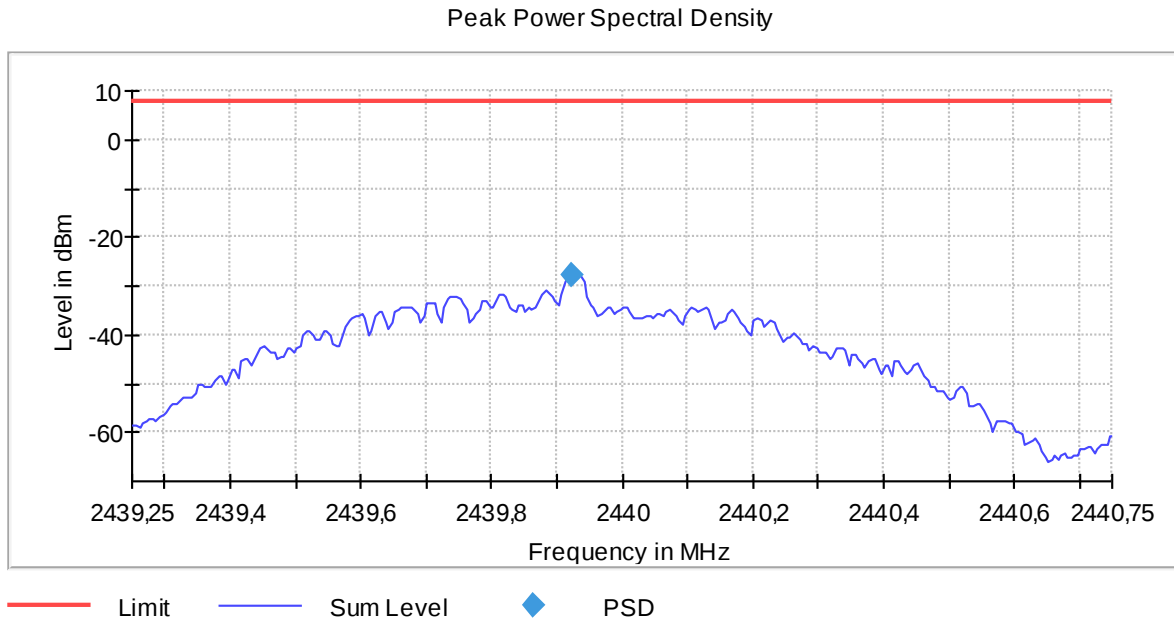
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Images:



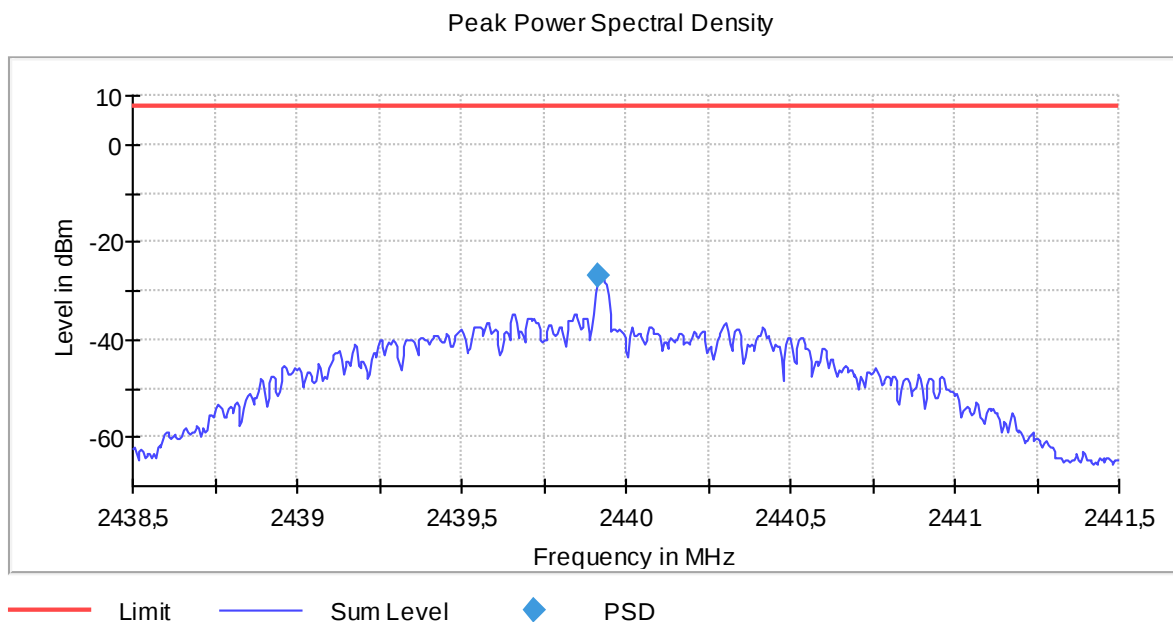
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2440.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



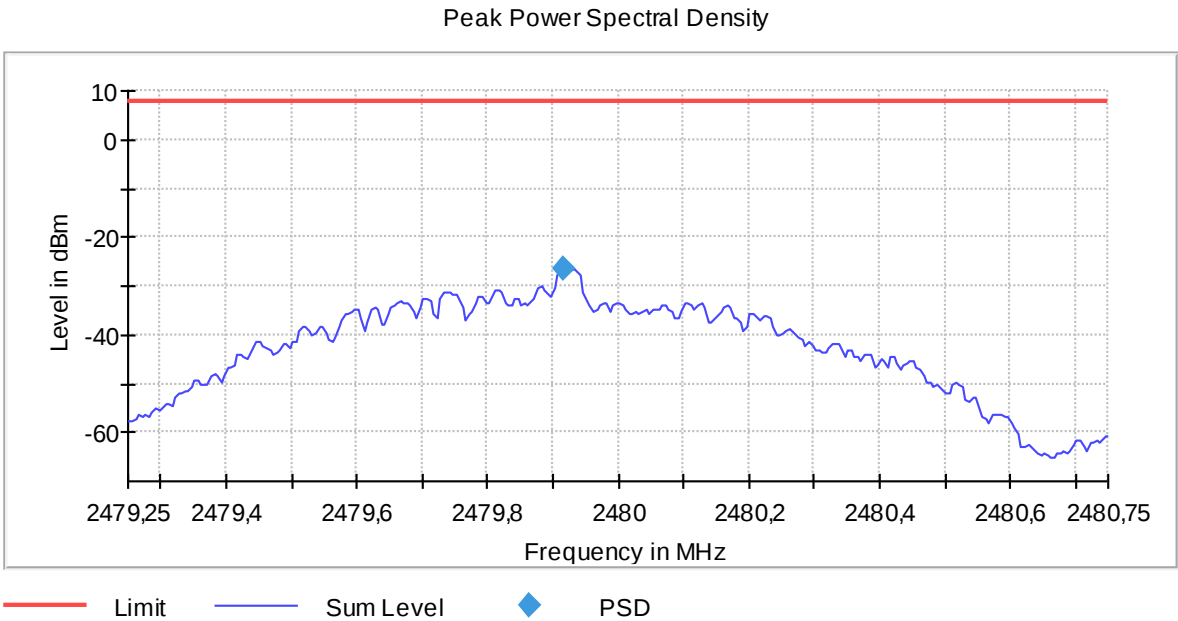
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2440.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



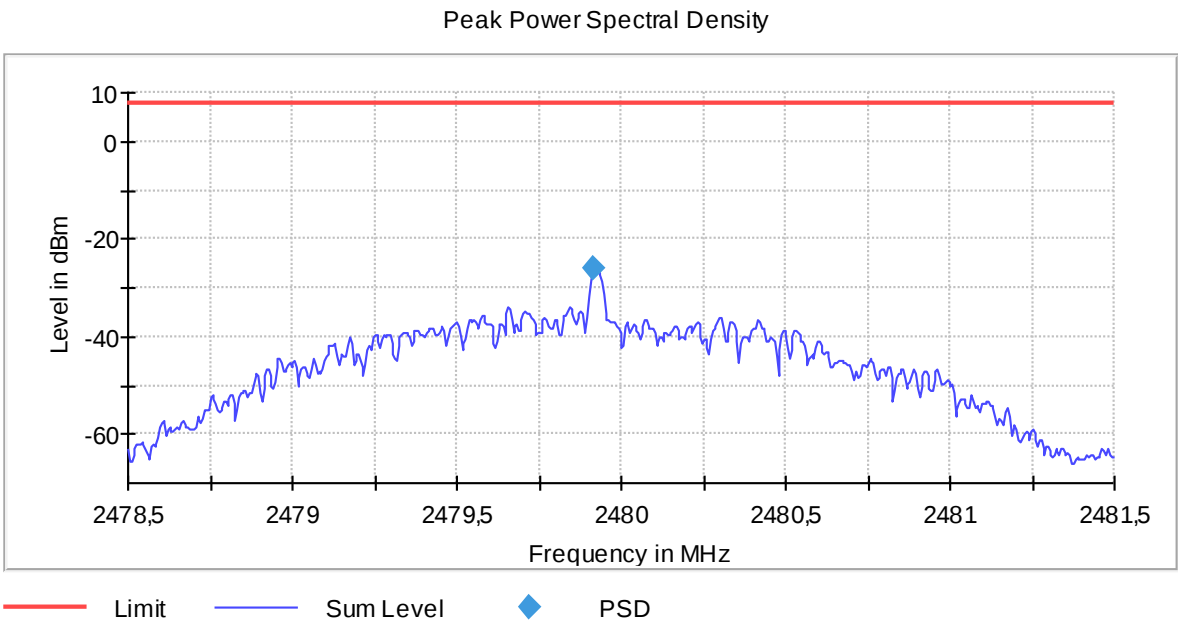
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



RSS-247 5.5 / FCC 15.247 (d) Band-edge emissions compliance (Transmitter)

Limits

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

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

Verdict

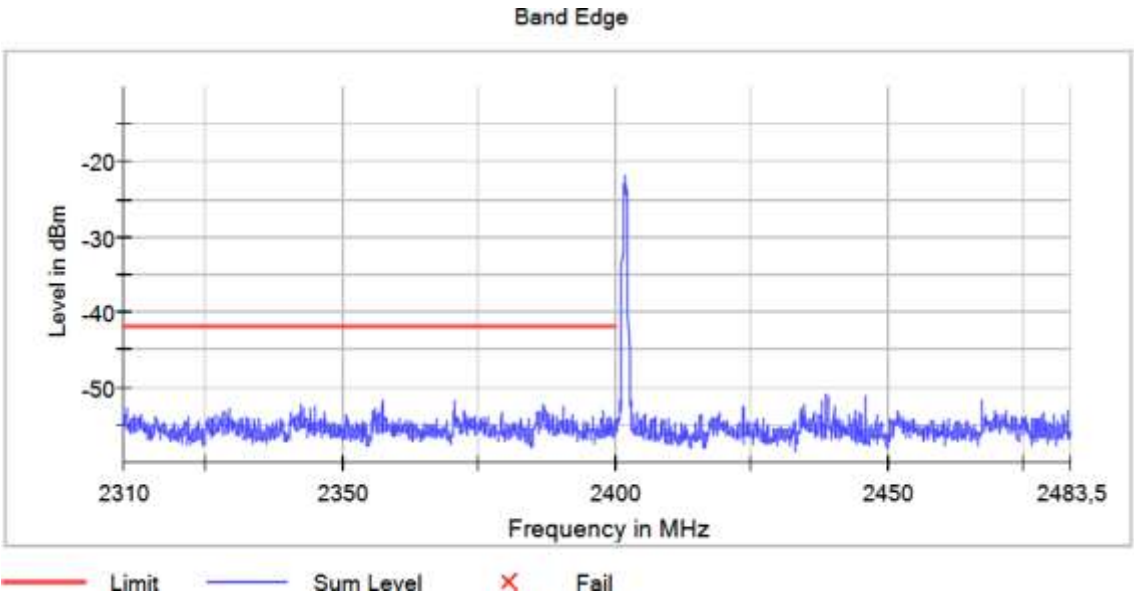
Pass

Uncertainty 0.89dB

Attachments

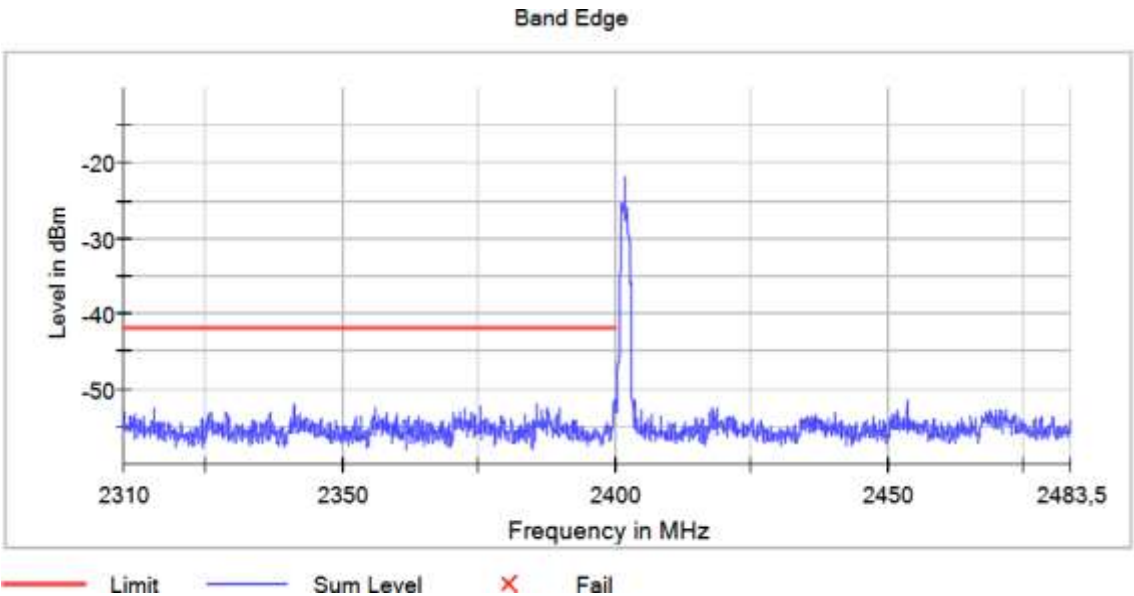
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2402.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1, Measurement Point = 1

Images:



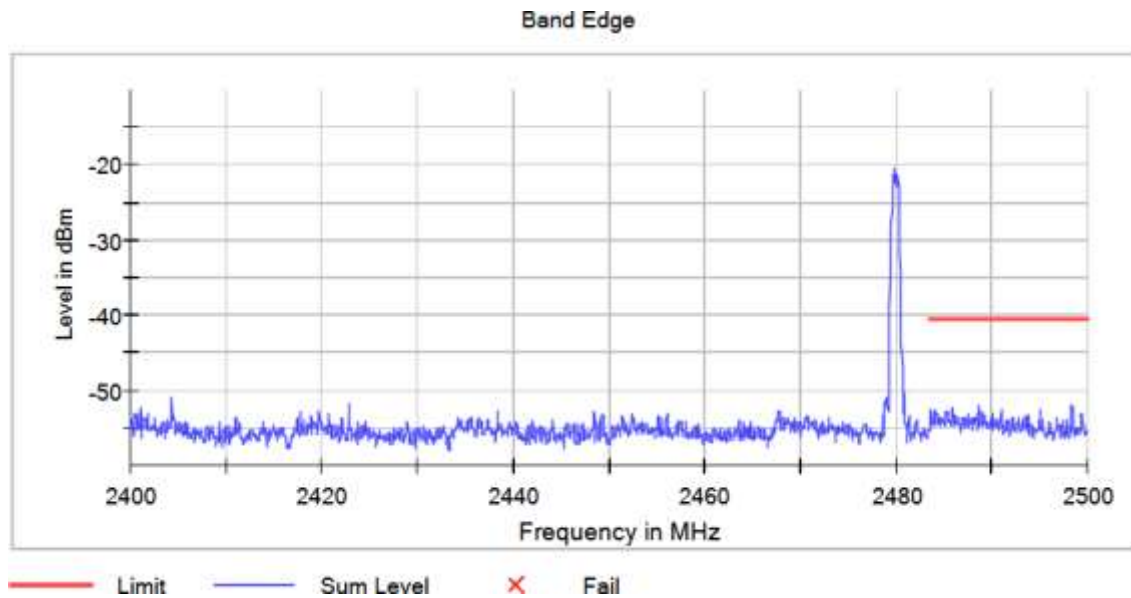
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2402.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1, Measurement Point = 1

Images:



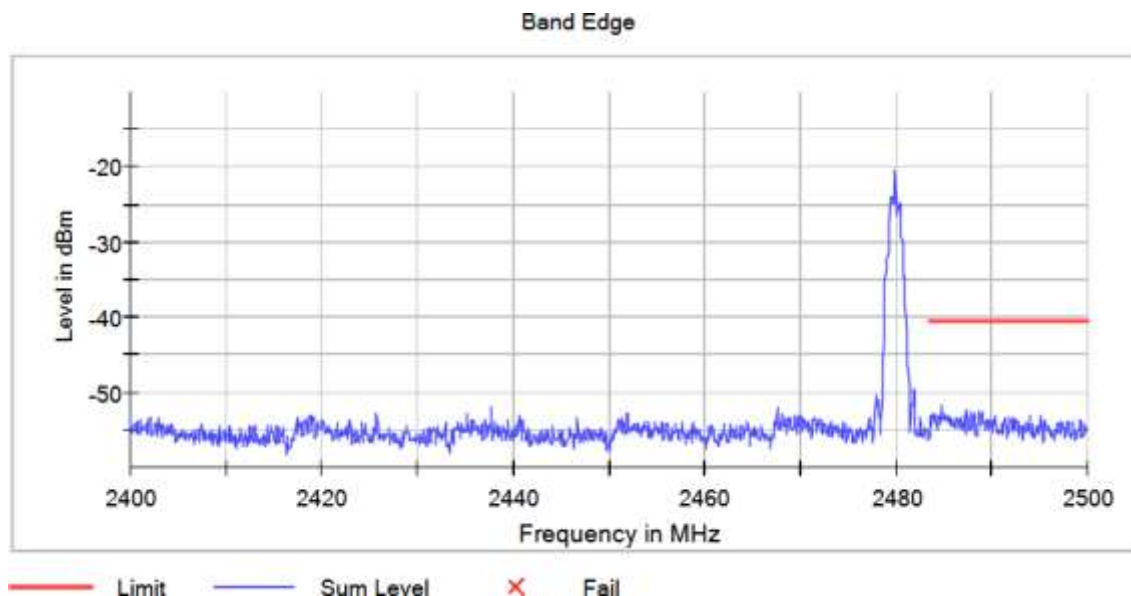
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1, Measurement Point = 1

Images:



Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1, Measurement Point = 1

Images:



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
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 3m for the frequency range 30 MHz-17 GHz and a distance of 1m for 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

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

The spurious emissions below 1 GHz do not depend on the operating channel selected in the EUT.

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

Spurious frequency (MHz)	Emission Level (dBμV/m)	Polarization	Detector
42.513000	25.51	V	Quasi-Peak
203.727000	25.57	V	Quasi-Peak

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

The spurious emissions below 1 GHz do not depend on the operating channel selected in the EUT.

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

Spurious frequency (MHz)	Emission Level (dBμV/m)	Polarization	Detector
42.561500	27.06	V	Quasi-Peak
203.678500	27.66	V	Quasi-Peak

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.

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

- 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.

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

- 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.

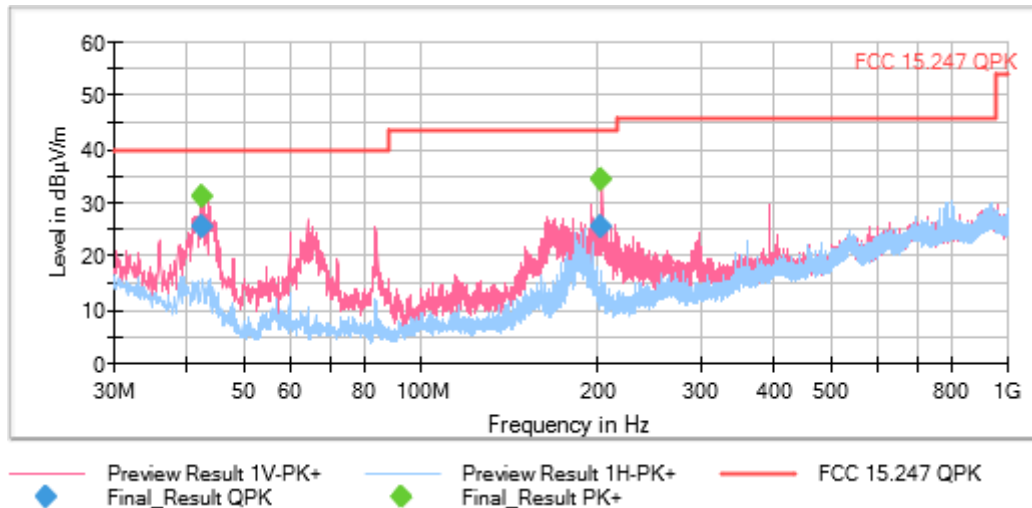
Verdict Pass

Measurement Uncertainty (dB) 30MHz to 1GHz <±4.99
1GHz to 17GHz <±4.98
17GHz to 26GHz <±5.08
26GHz to 40GHz <±5.13

Attachments

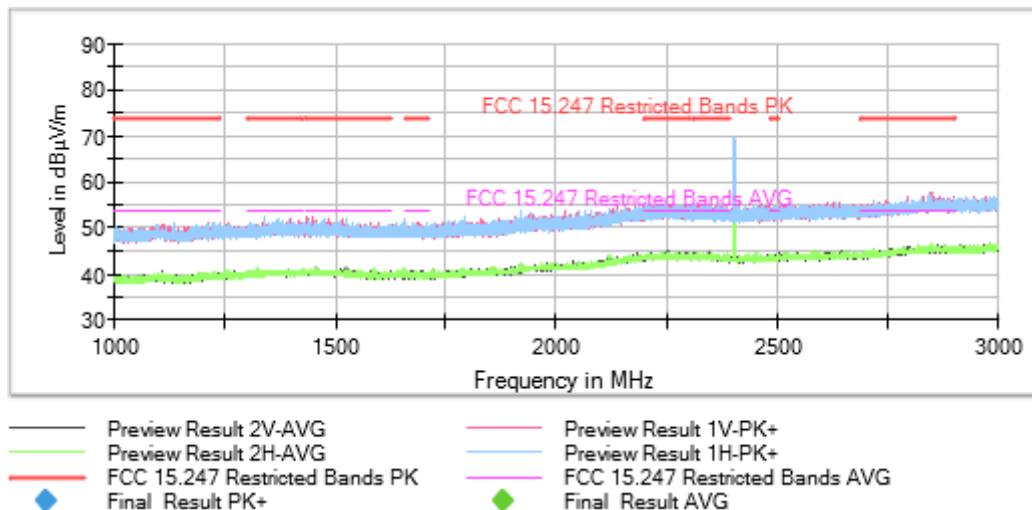
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [0.03, 1], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = QP, Measurement Point = 1

Images:

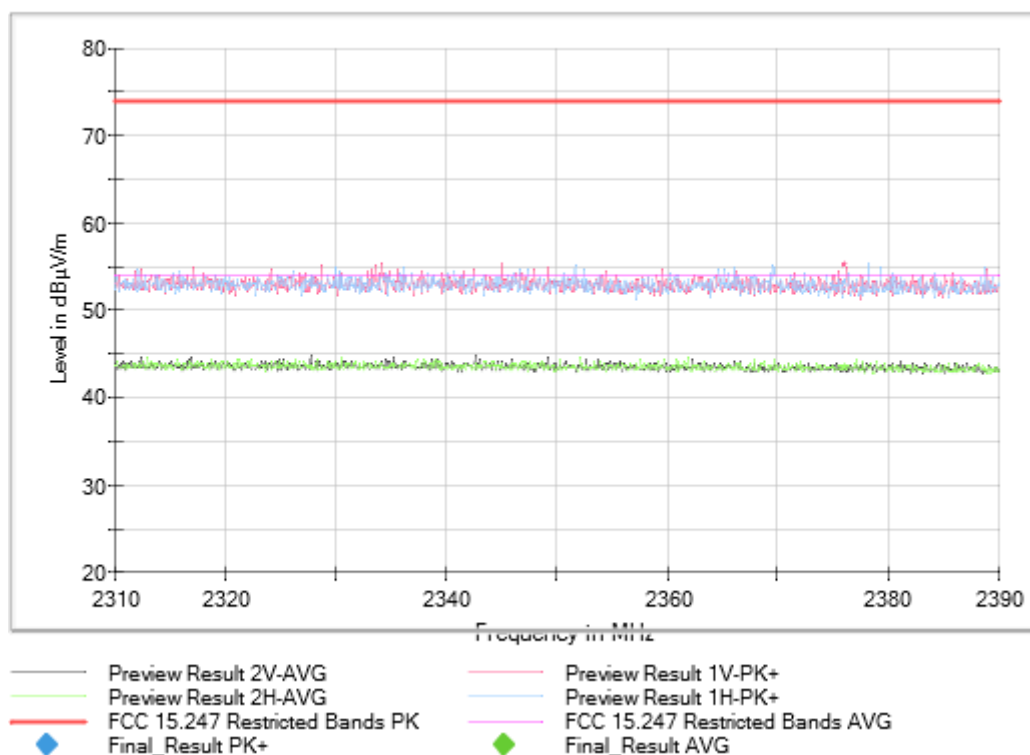


Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2402.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 3], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

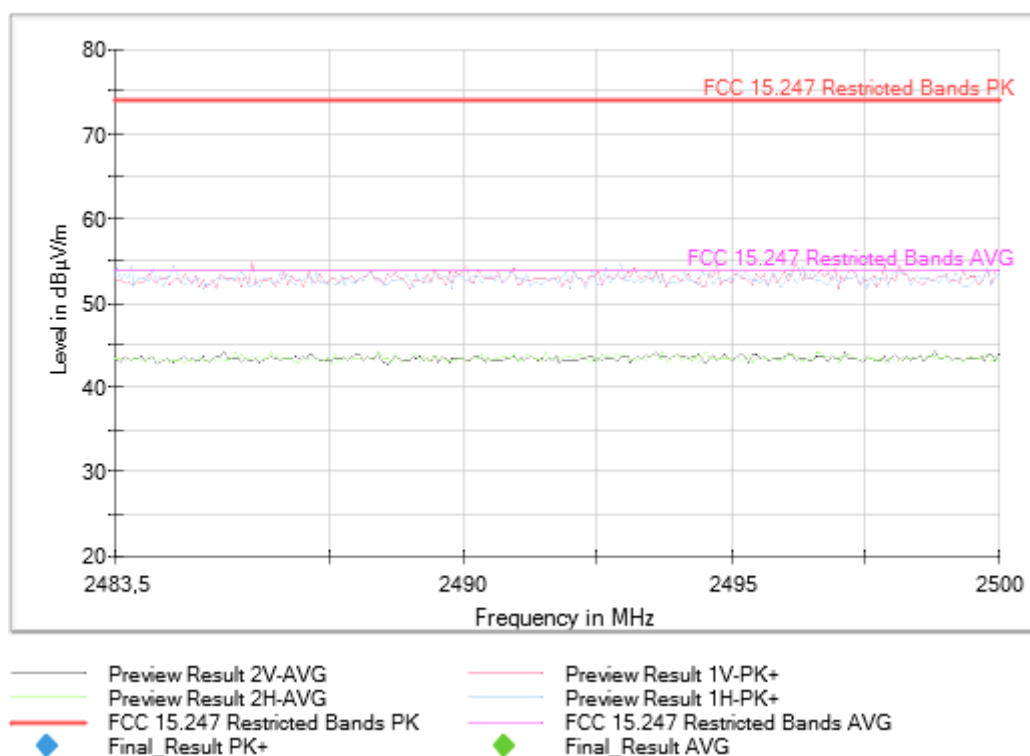
Images:



Full Spectrum

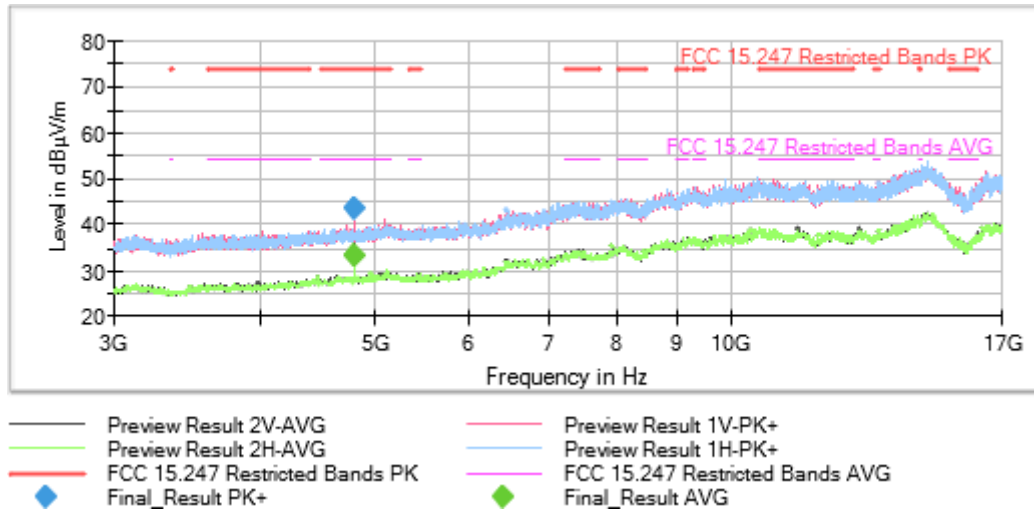


Full Spectrum



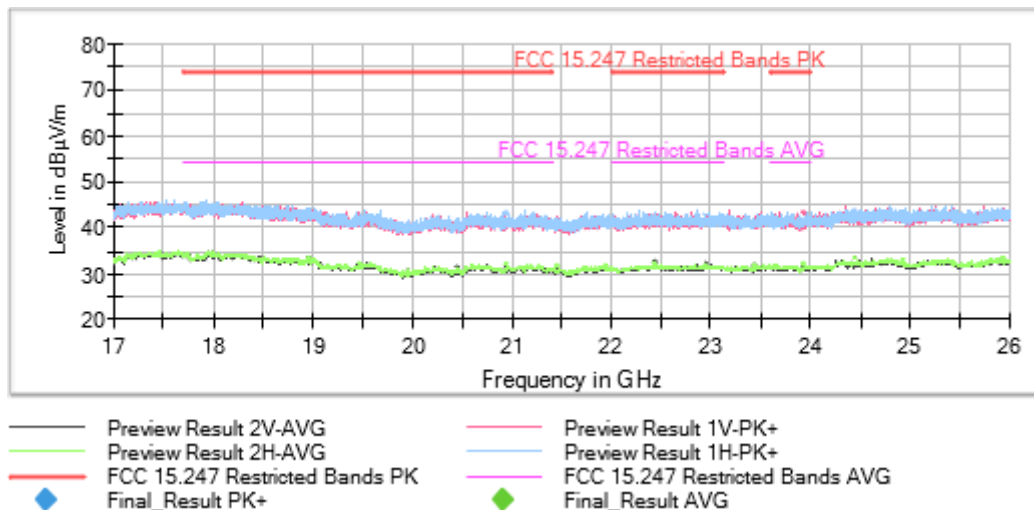
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2402.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [3, 17], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

Images:



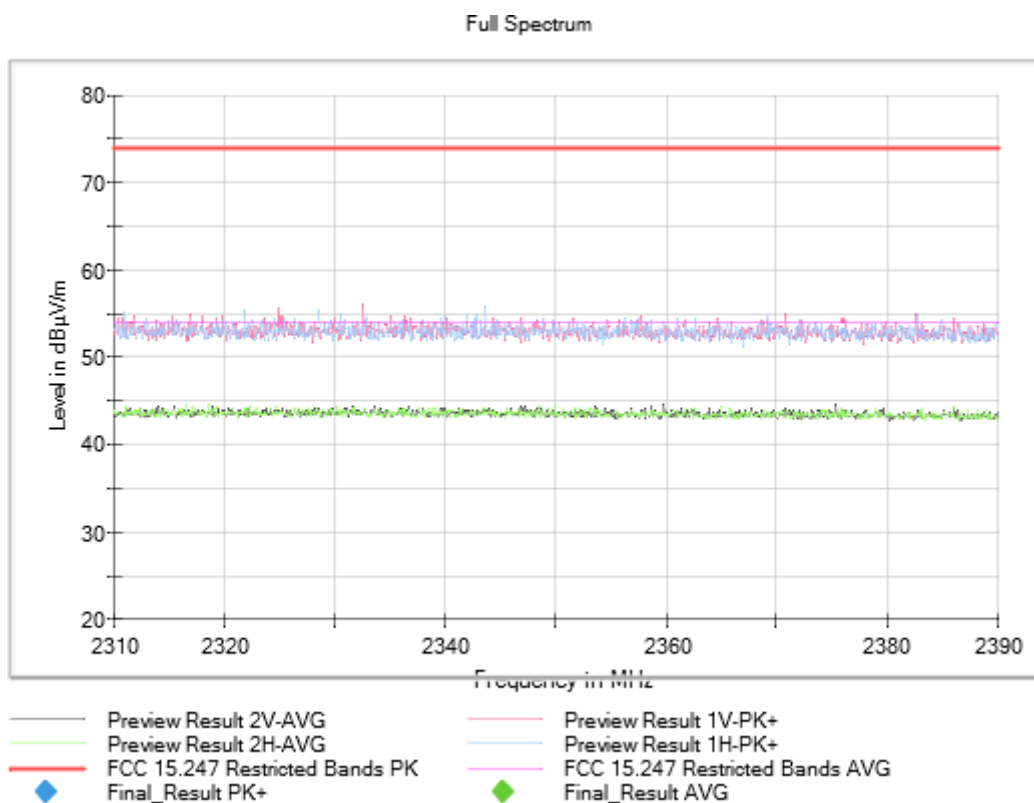
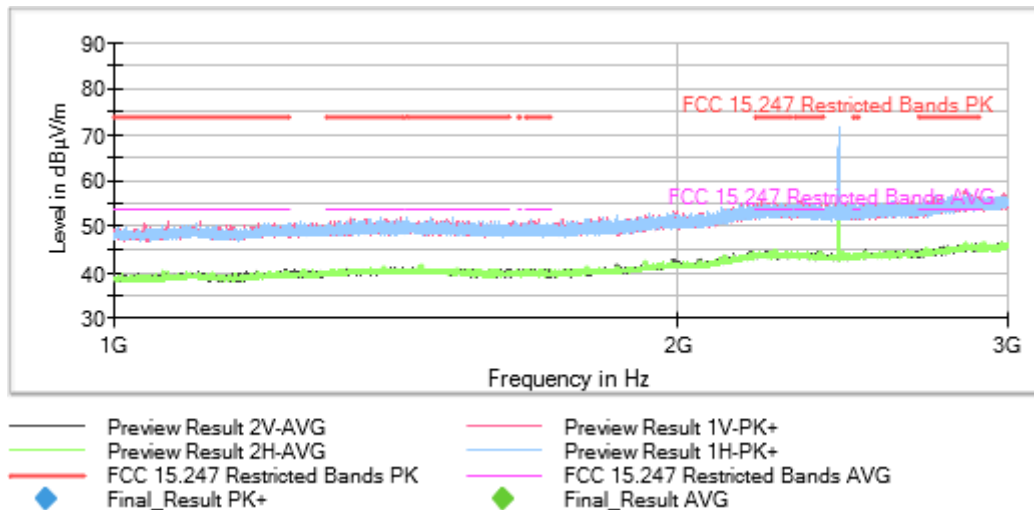
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2402.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [17, 26], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

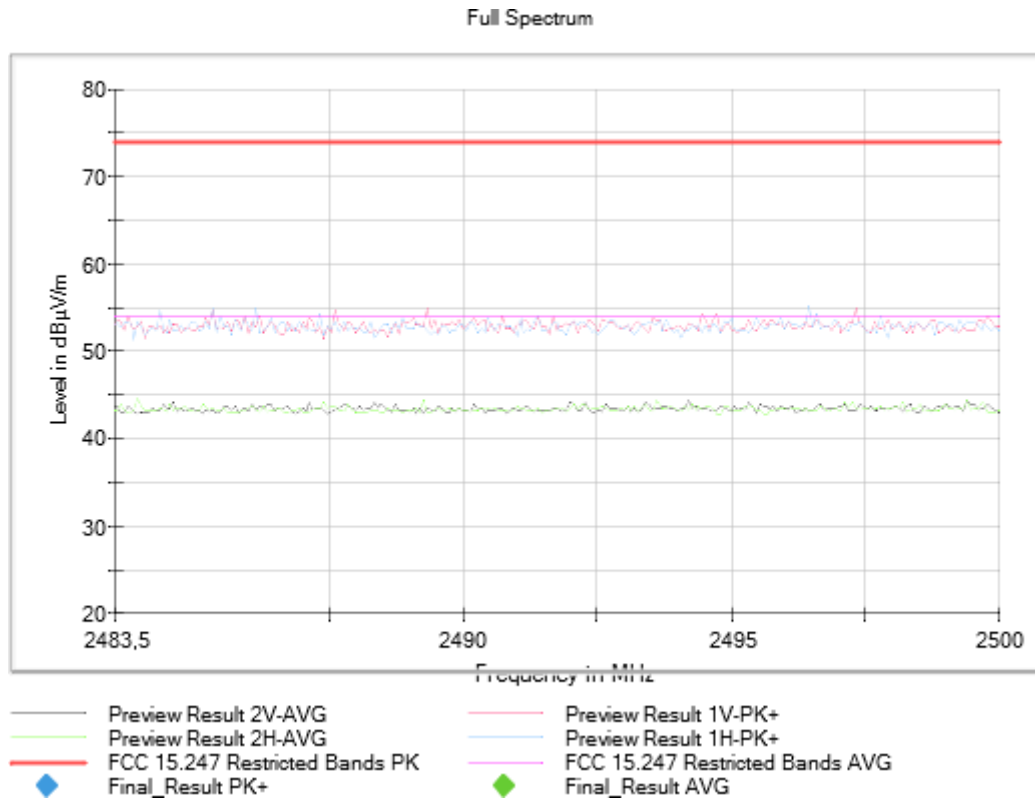
Images:



Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2440.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 3], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

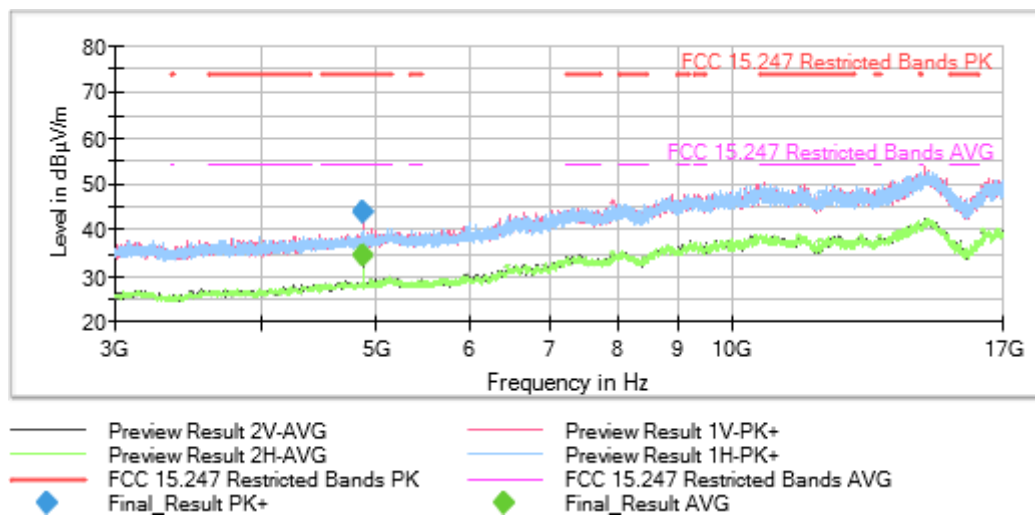
Images:





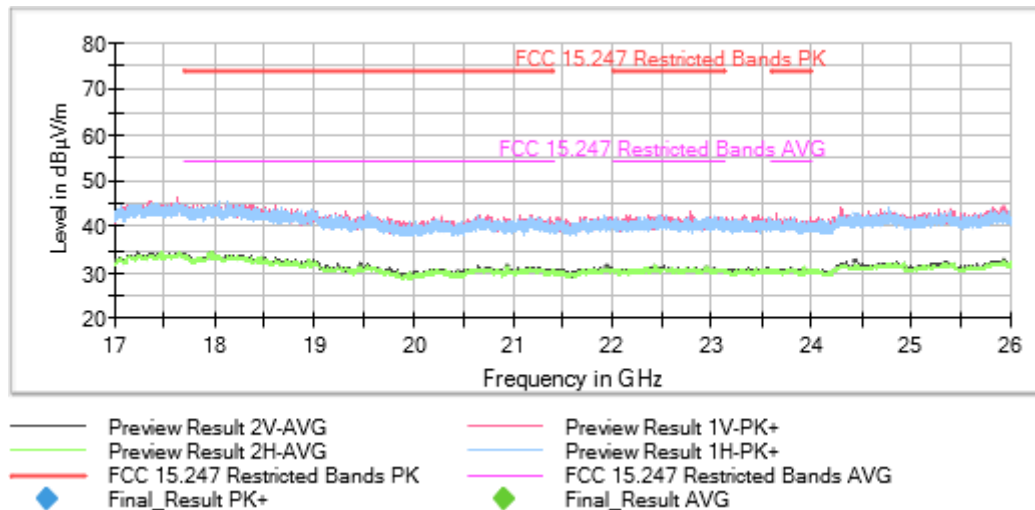
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2440.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [3, 17], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

Images:



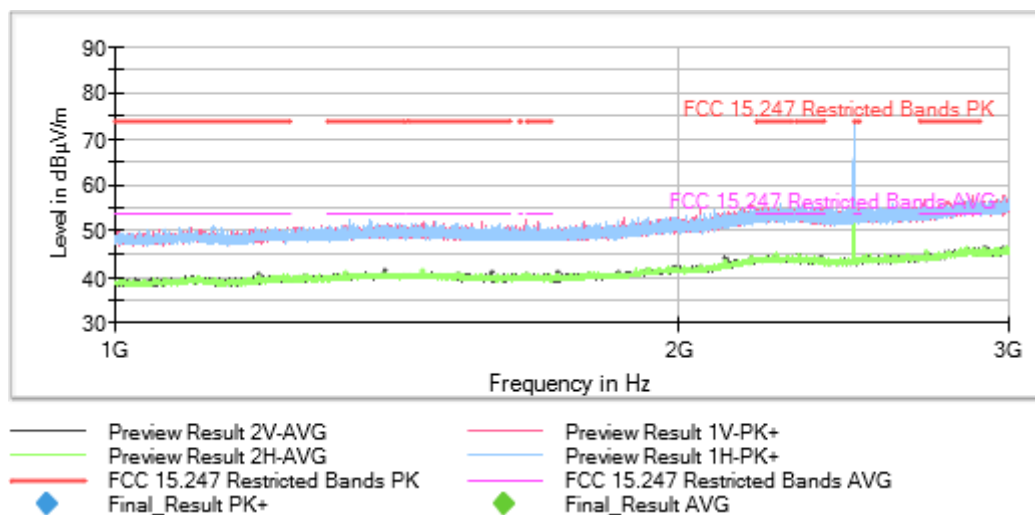
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Images:

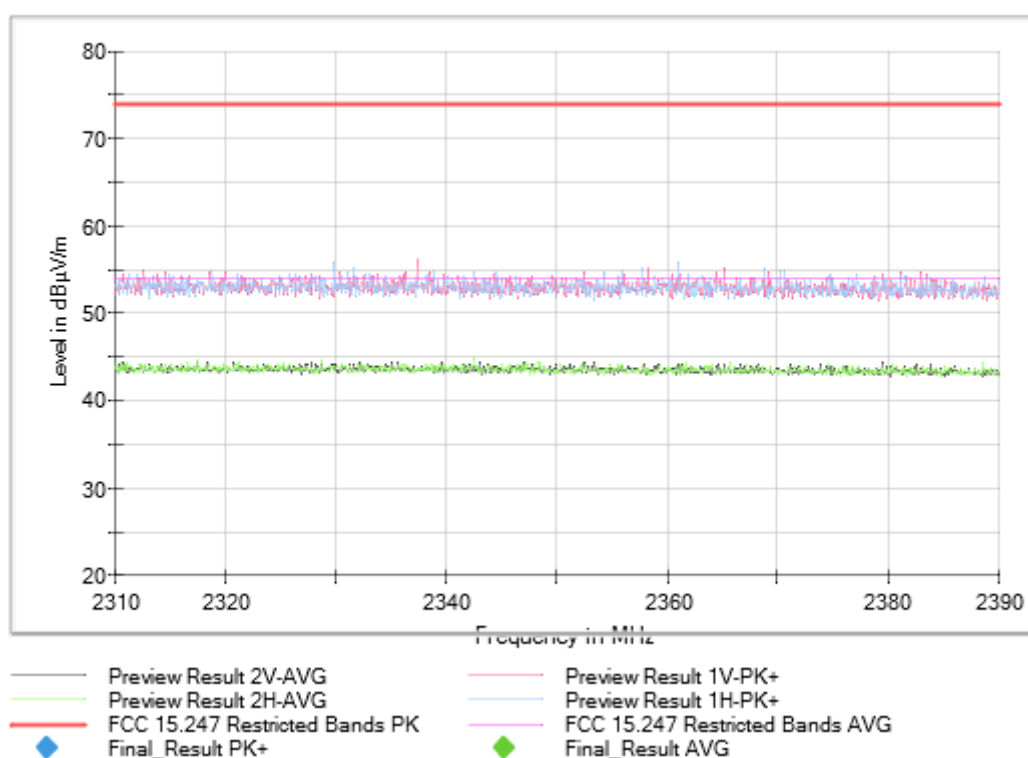


Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 3], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

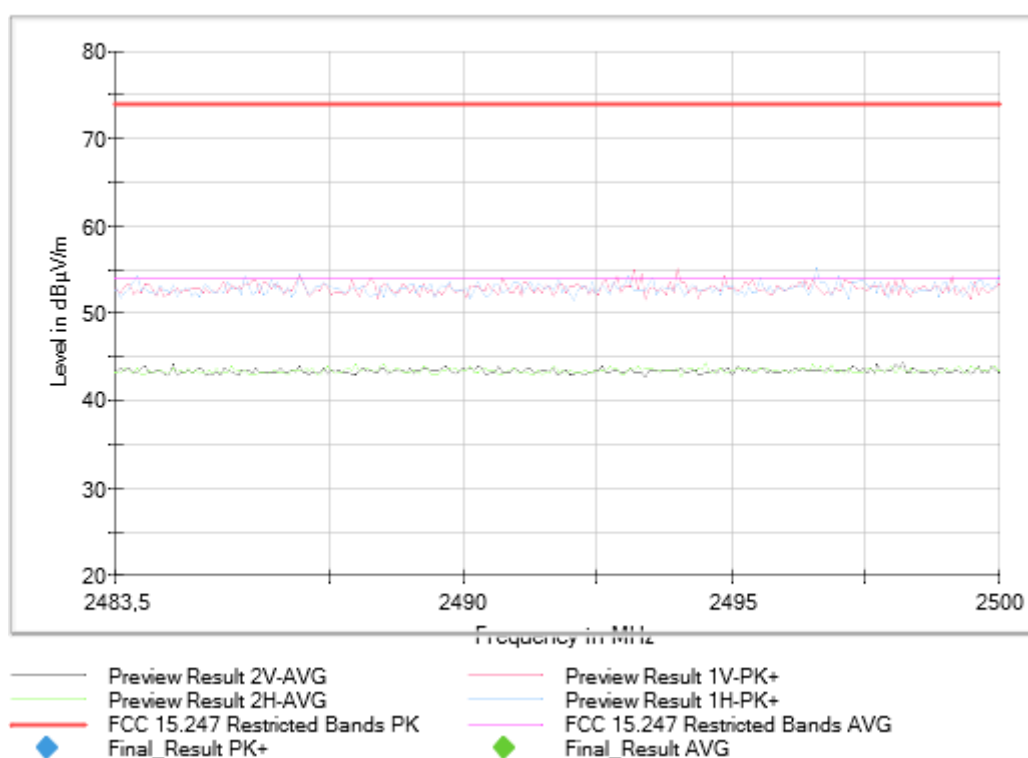
Images:



Full Spectrum

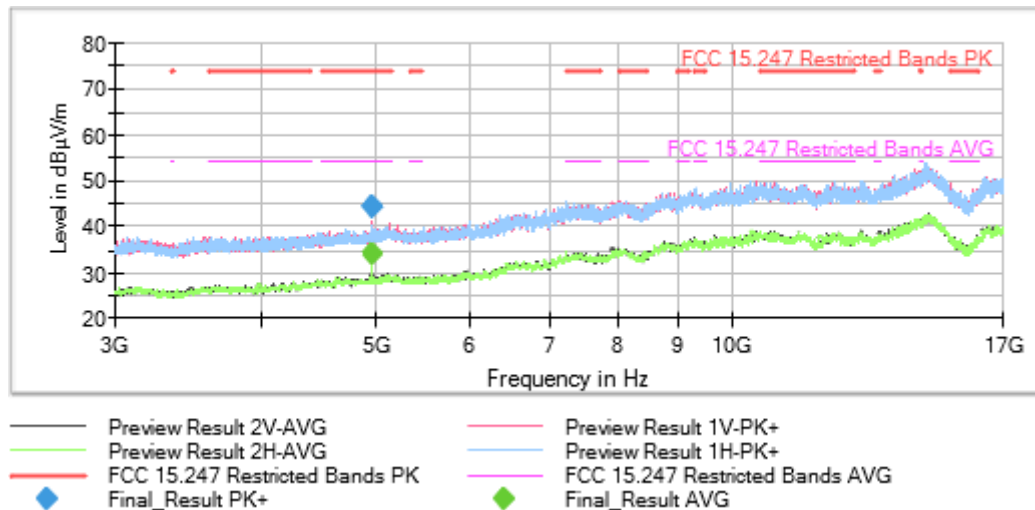


Full Spectrum



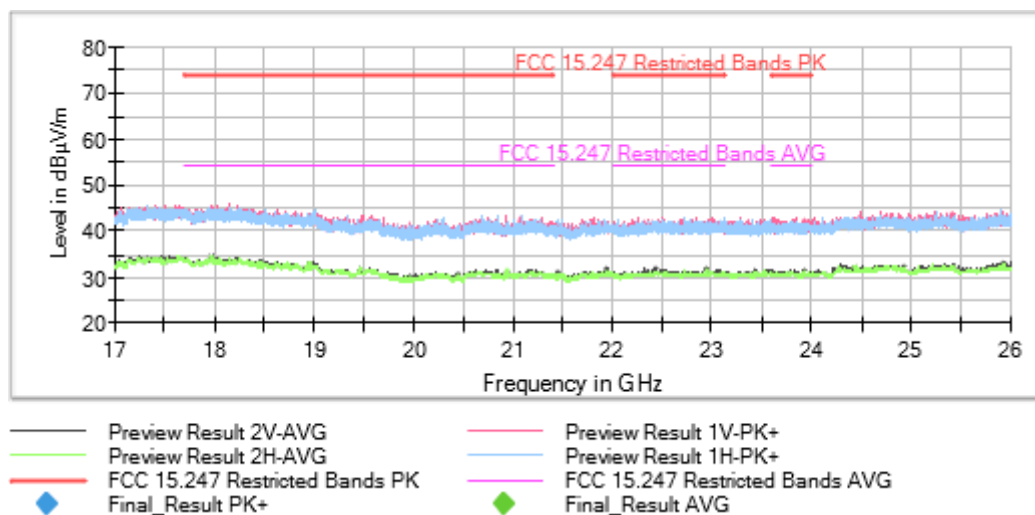
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [3, 17], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

Images:



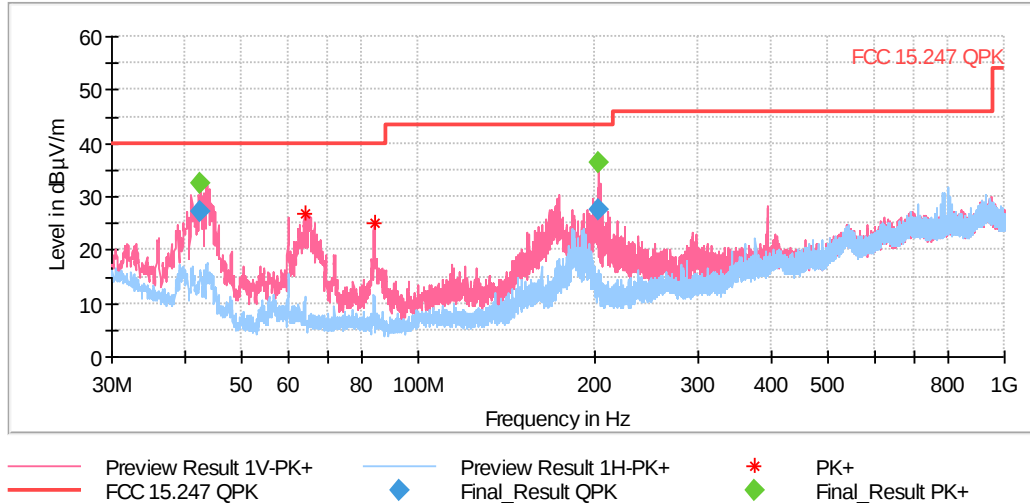
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [17, 26], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

Images:



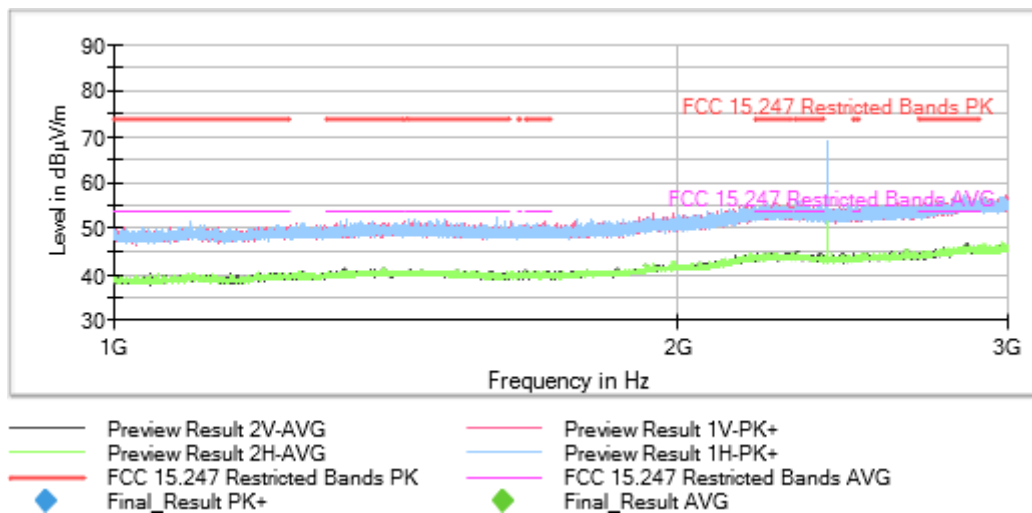
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [0.03, 1], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = QP, Measurement Point = 1

Images:

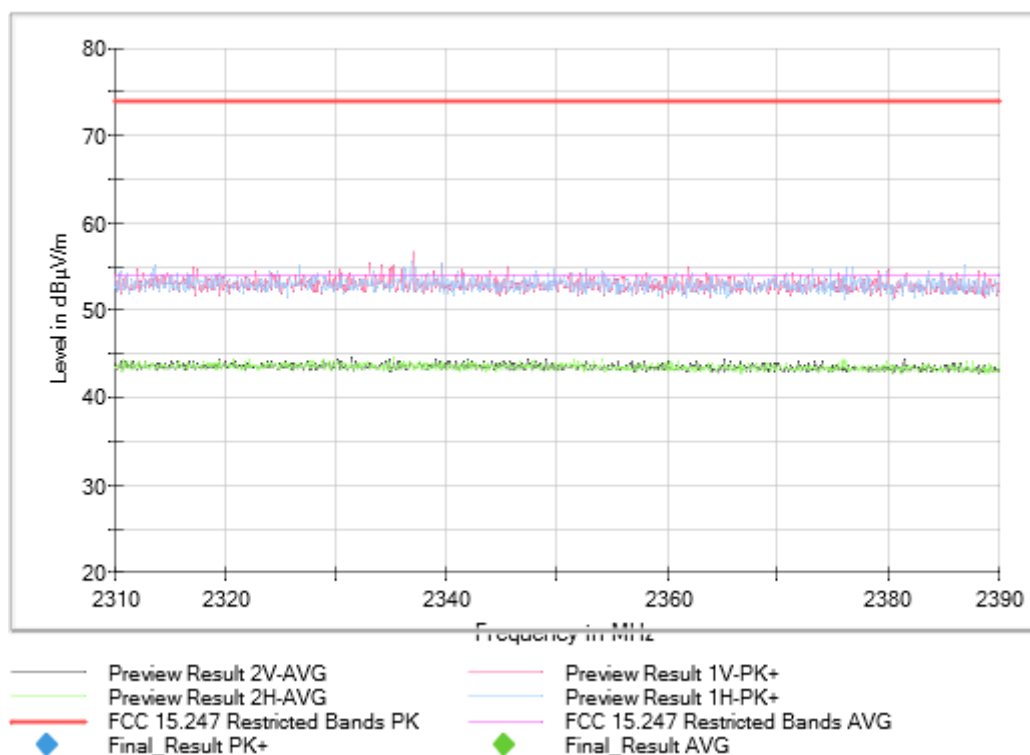


Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2402.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 3], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

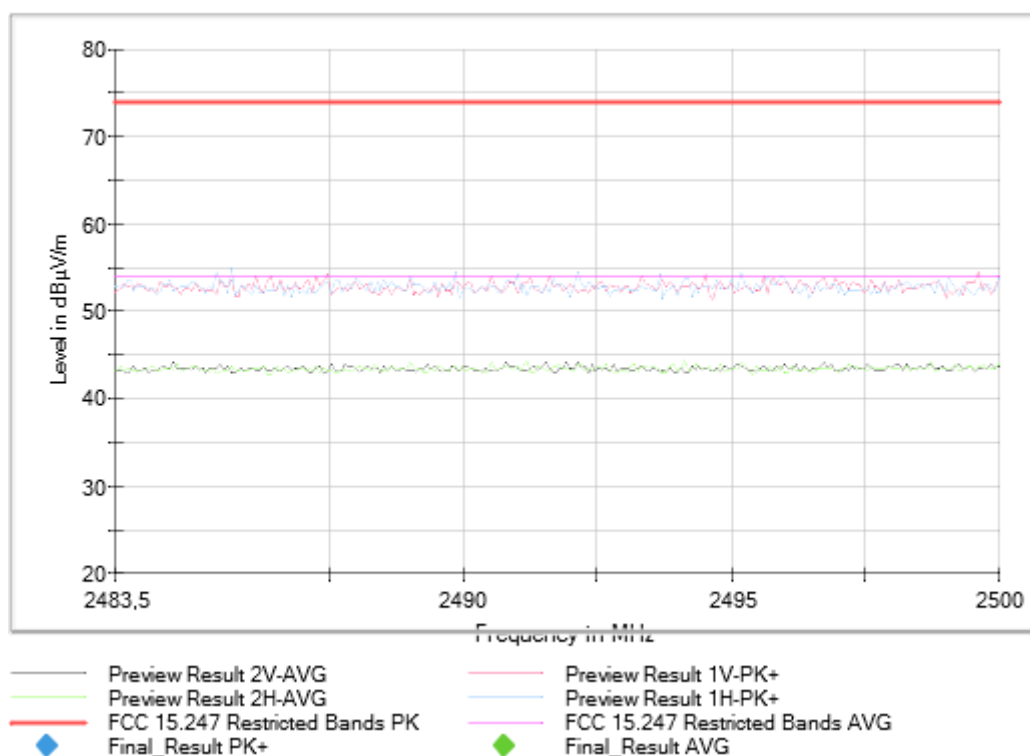
Images:



Full Spectrum

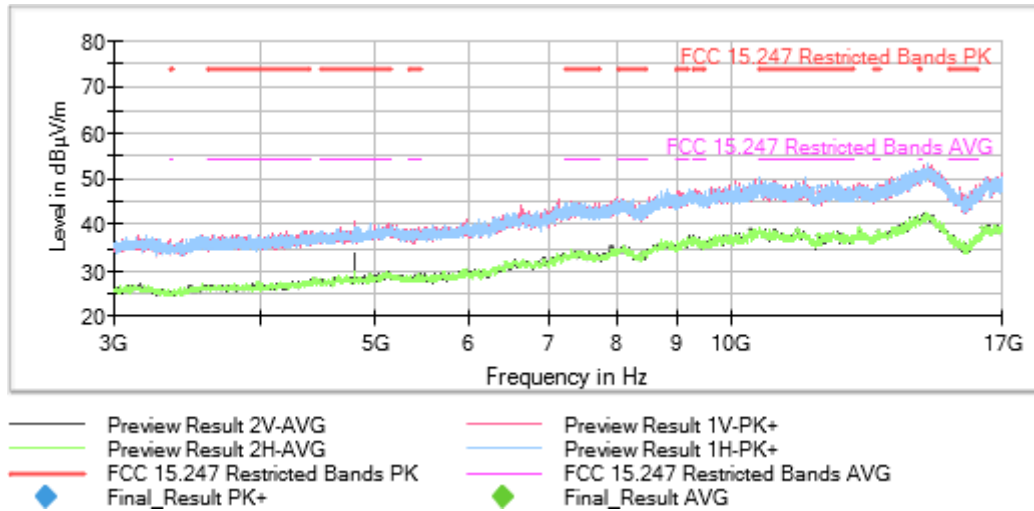


Full Spectrum



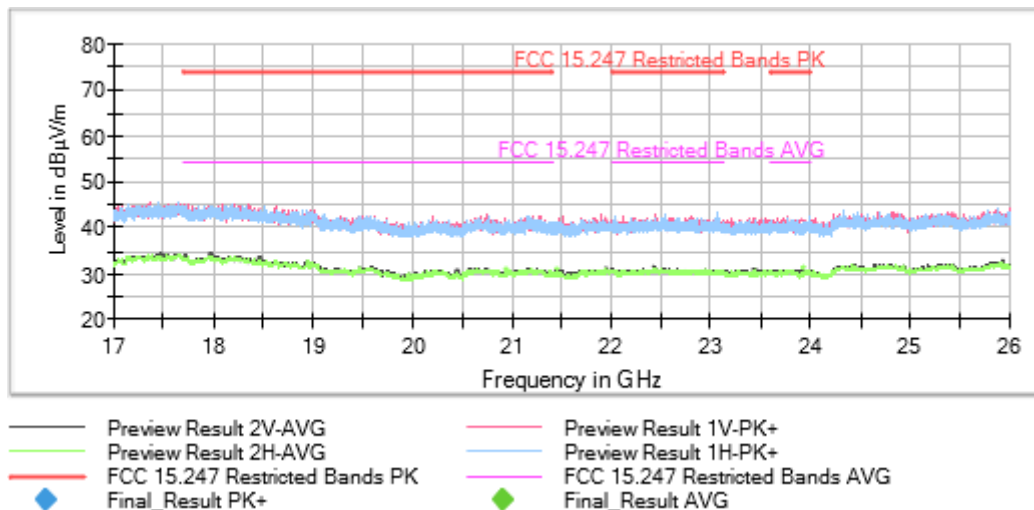
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Images:



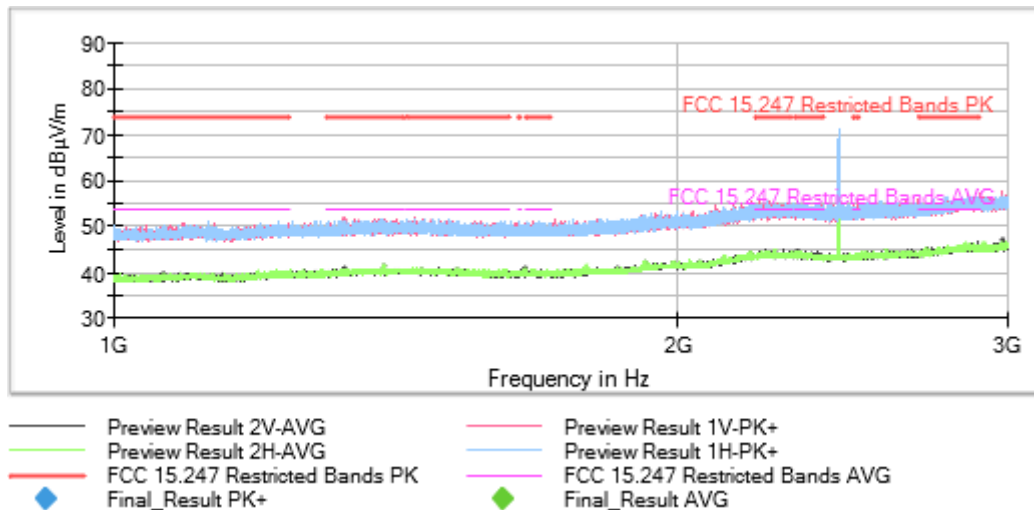
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Images:

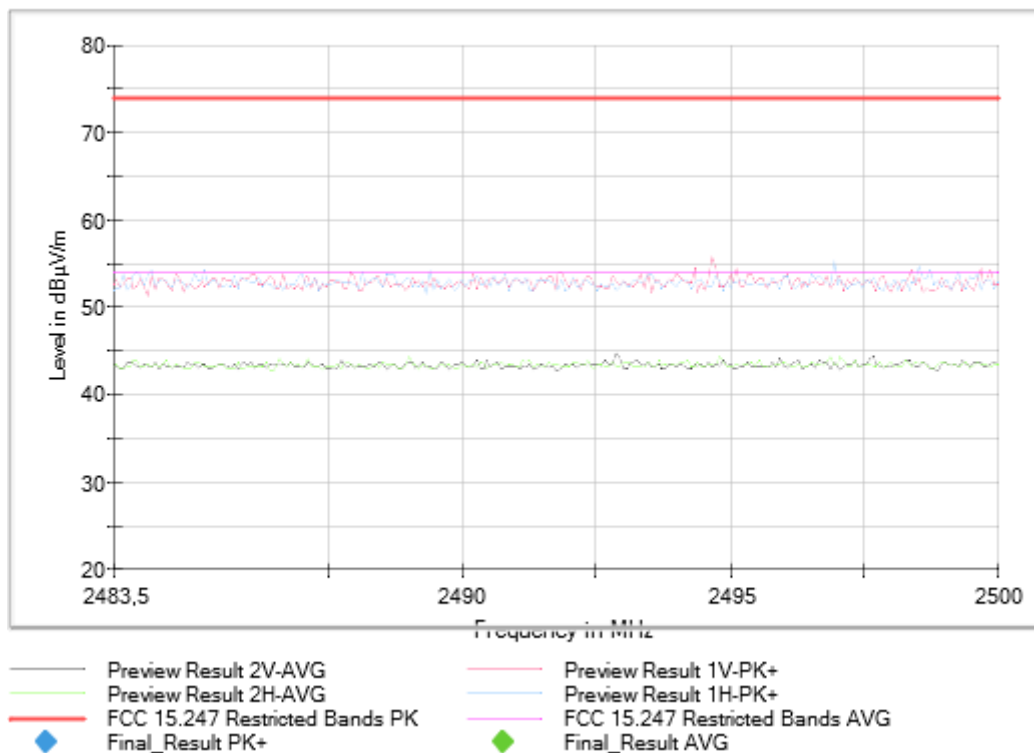


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Images:



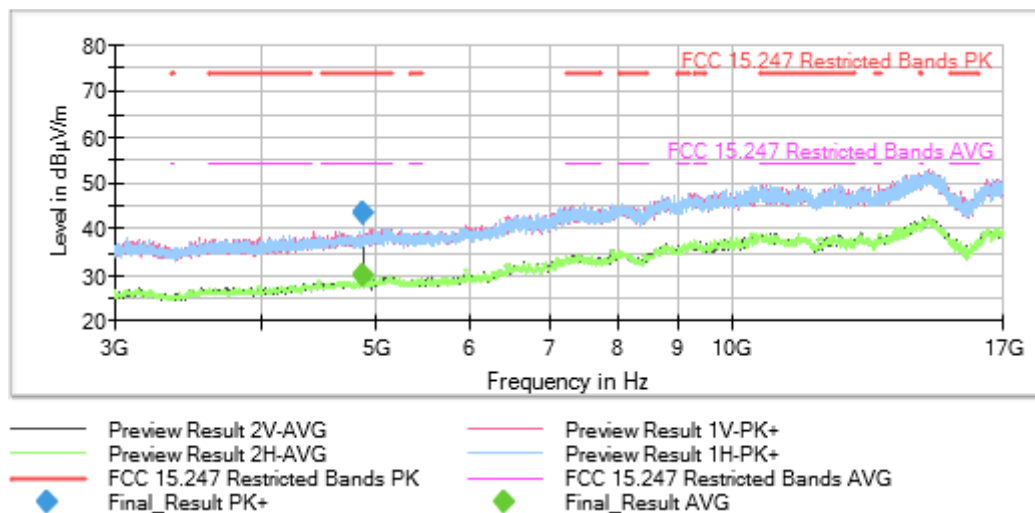
Full Spectrum





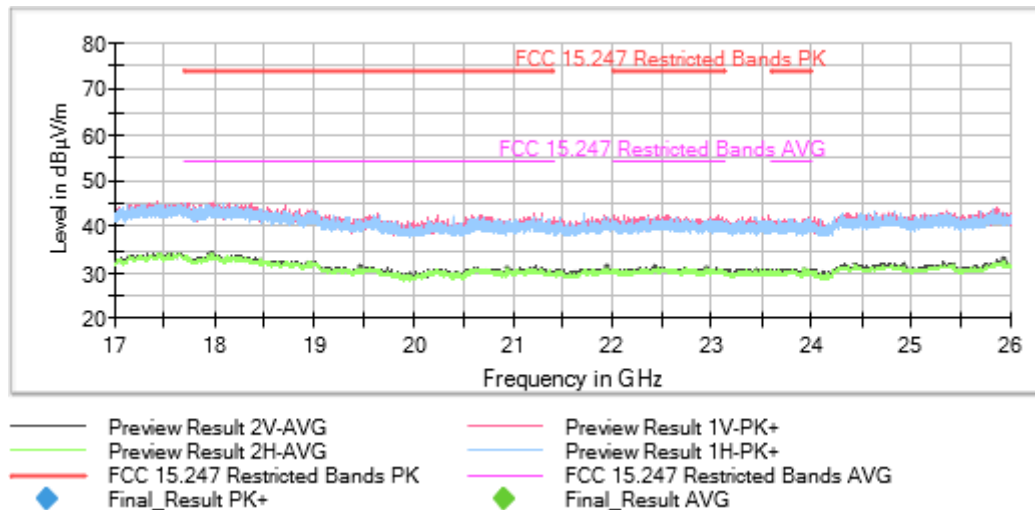
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2440.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [3, 17], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

Images:



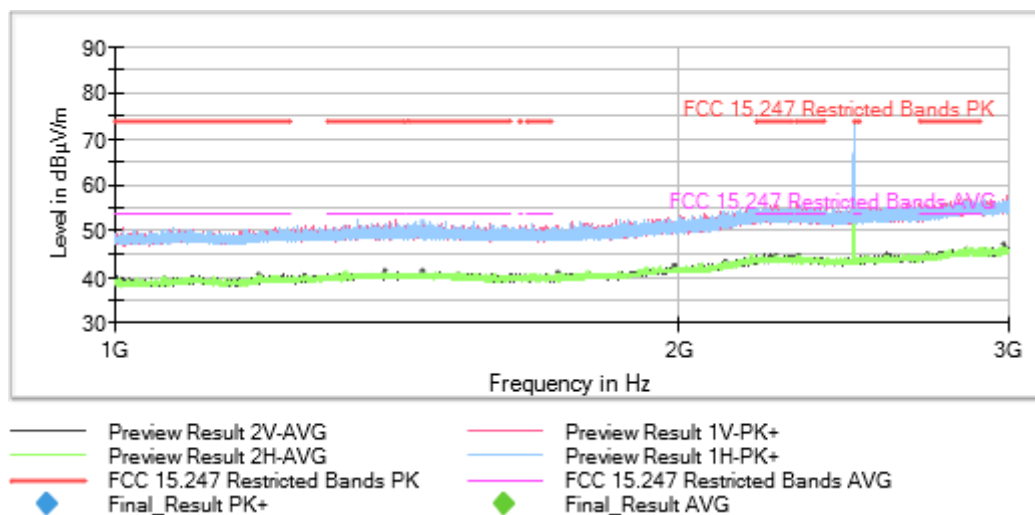
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2440.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [17, 26], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

Images:

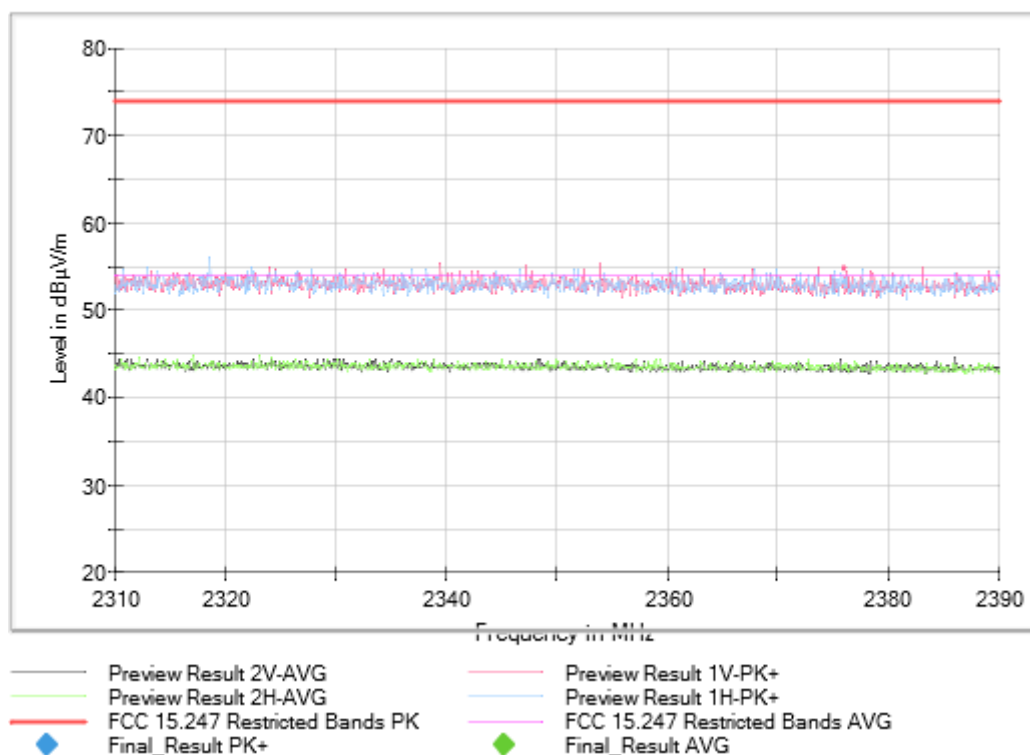


Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 3], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

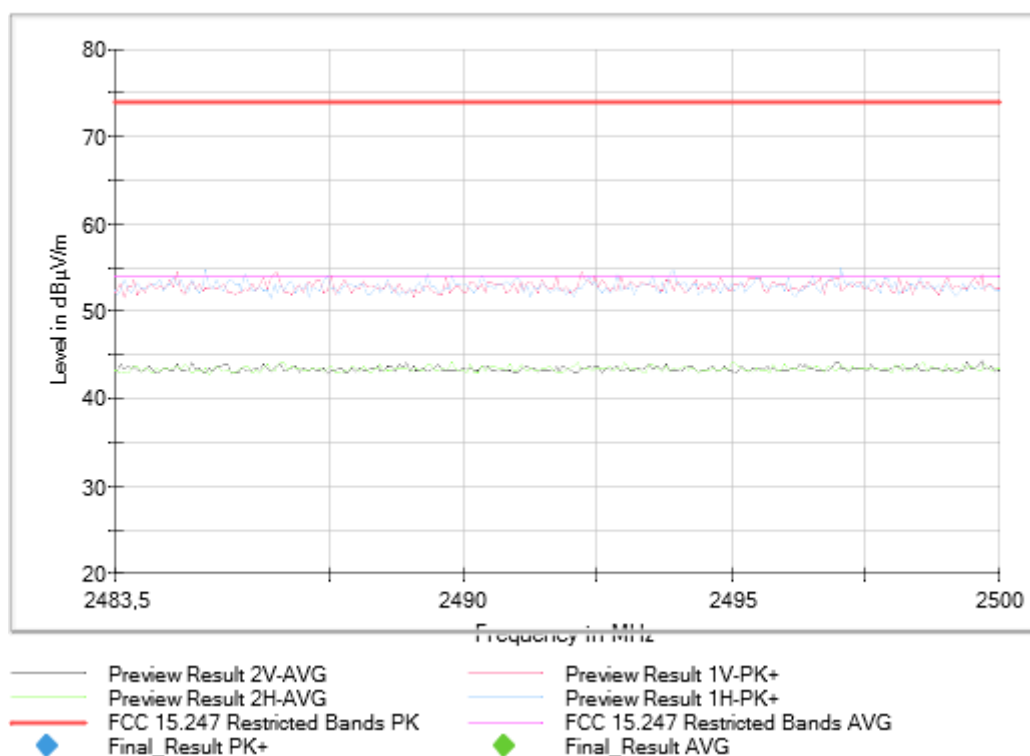
Images:



Full Spectrum

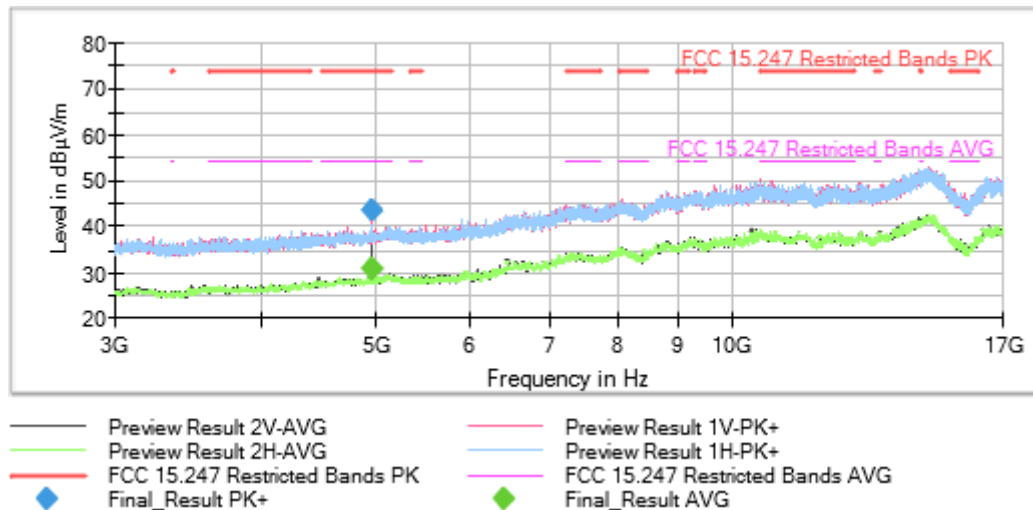


Full Spectrum



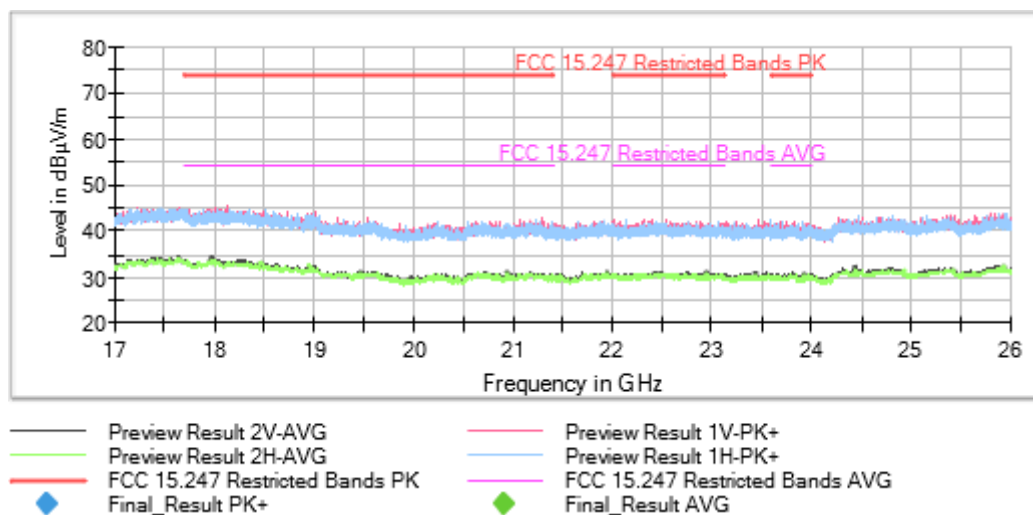
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [3, 17], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

Images:



Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [17, 26], Number of Transmission Chains = 1, Available Number of Channels = 1, Detector used = AVG, Measurement Point = 1

Images:



Occupied Channel Bandwidth 99%

Limits

No Limit has been set to this test case

Results

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

Operation Band (MHz)	Equipment	Freq (MHz)	Occ Ch BW (MHz)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00	1.035000
[2400, 2483.5]	Digital Transmission System (DTS)	2440.00	1.030000
[2400, 2483.5]	Digital Transmission System (DTS)	2480.00	1.015000

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

Operation Band (MHz)	Equipment	Freq (MHz)	Occ Ch BW (MHz)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00	2.090000
[2400, 2483.5]	Digital Transmission System (DTS)	2440.00	2.090000
[2400, 2483.5]	Digital Transmission System (DTS)	2480.00	2.060000

Verdict

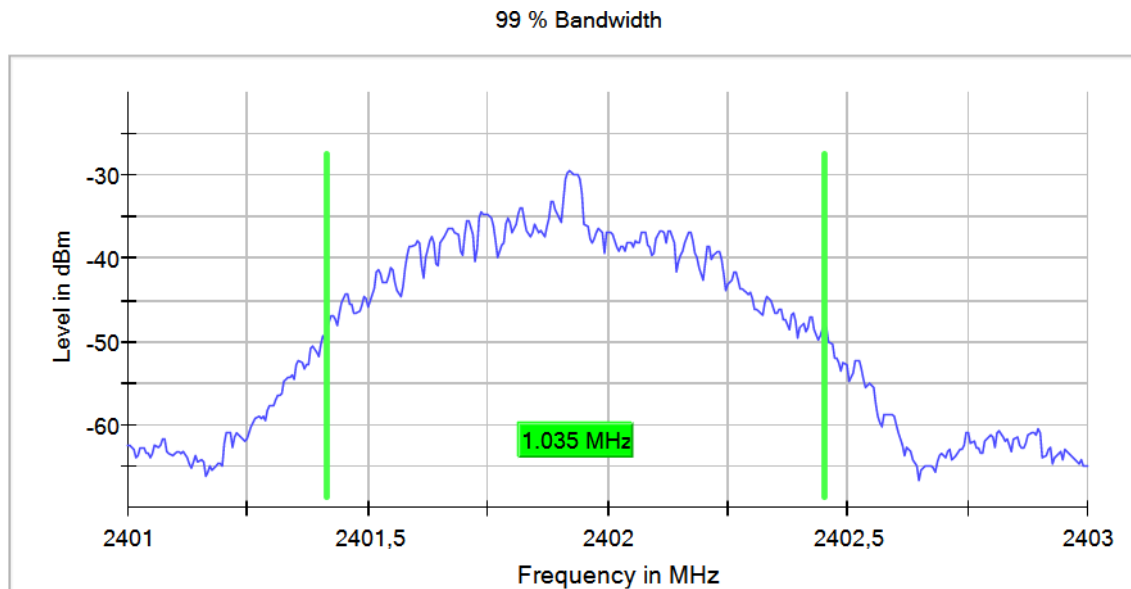
Pass

Uncertainty 1.40%

Attachments

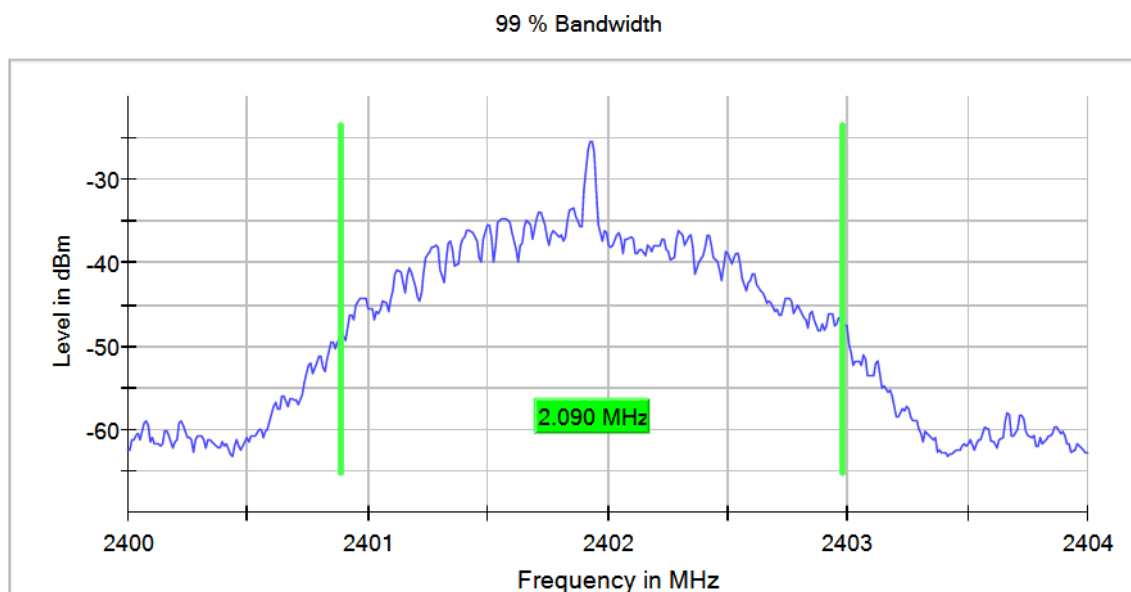
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2402.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



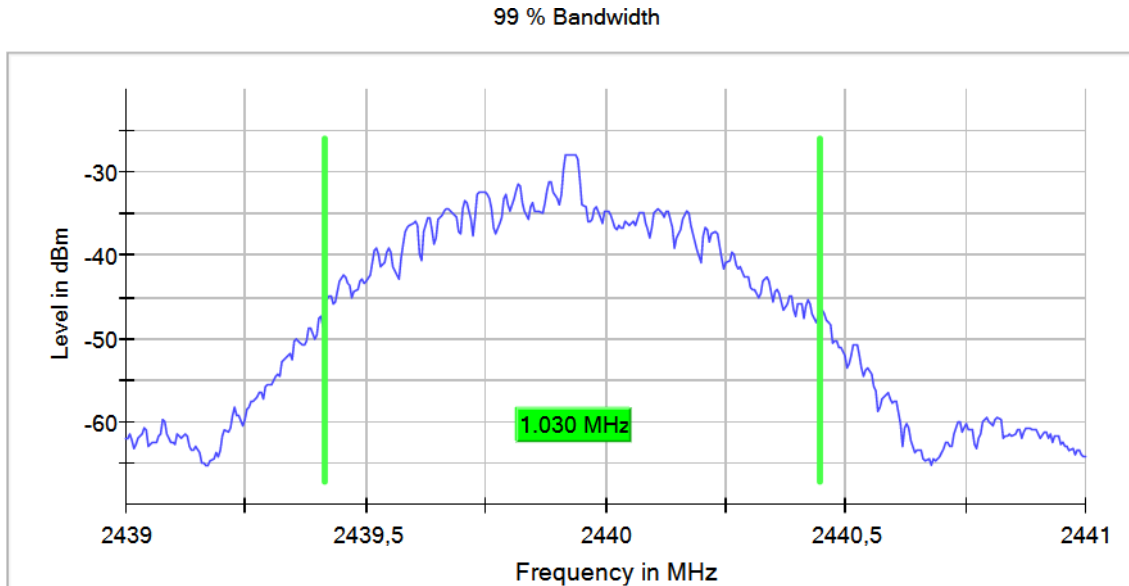
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2402.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



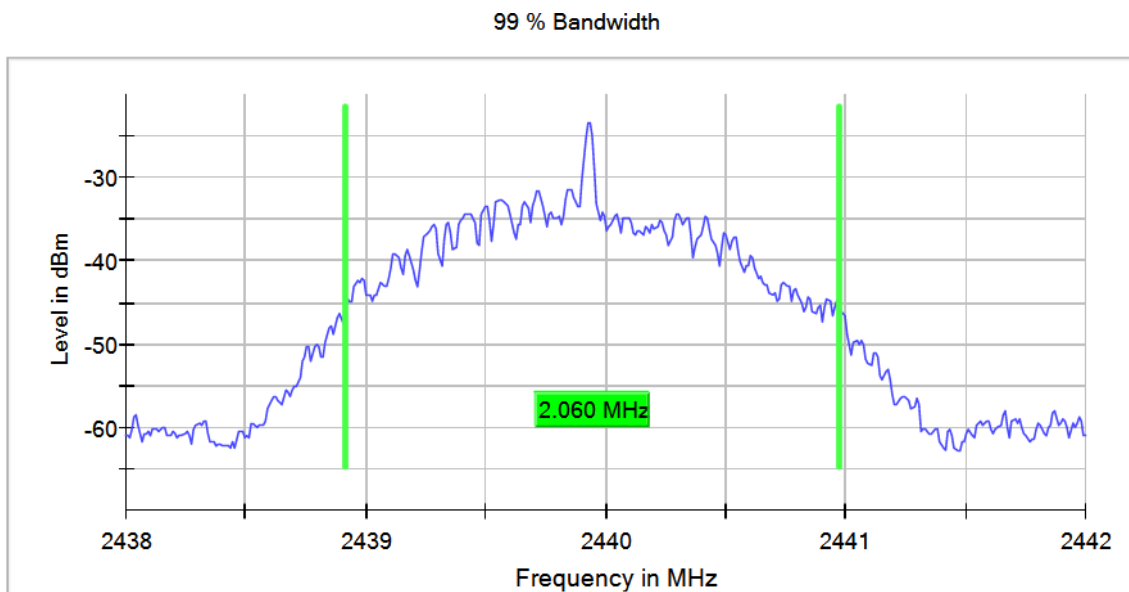
Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2440.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



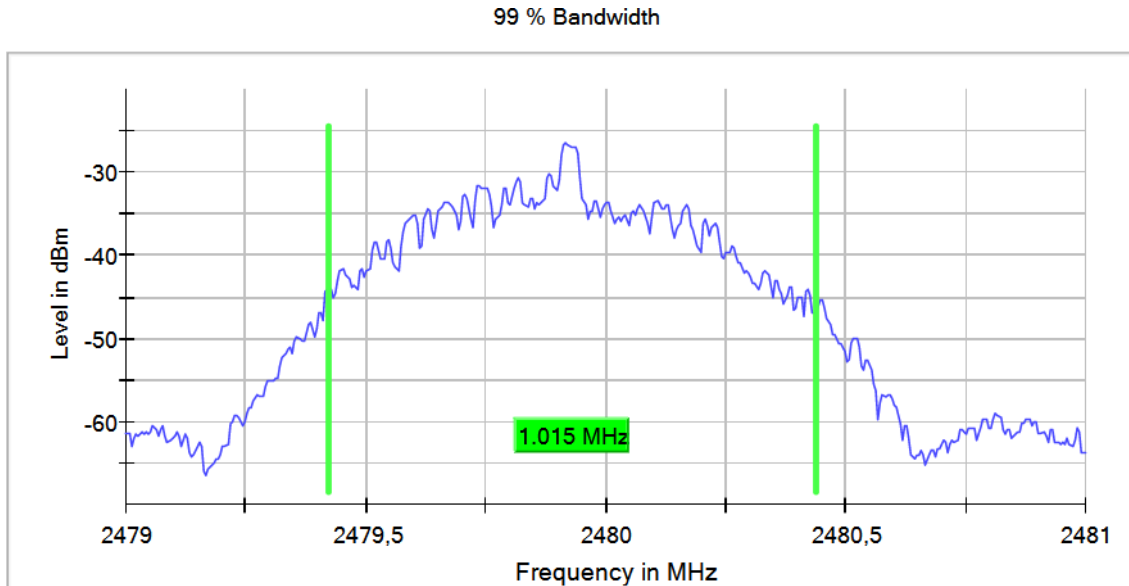
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Images:



Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:



Operation Band MHz = [2400, 2483.5], Equipment Type = Digital Transmission System (DTS), Frequency MHz = 2480.00, Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Number of Transmission Chains = 1, Available Number of Channels = 1

Images:

