

ISED CABid: ES1909

Test Report No:
 NIE: 70982RRF.002

Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

(*) Identification of item tested	OCS Lock
(*) Trademark	Ojmar
(*) Model and /or type reference	OCS SMART
Other identification of the product	HW version: 5.3 SW version: 3.0.0 FCC ID: 2ANY7OJM005
(*) Features	Bluetooth low energy
Manufacturer	OJMAR S.A. Pol. Indus. de Lerun s/n 20870 Elgoibar (Gipuzkoa)
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	2022-06-07
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
Operation Band	Operation Band
Pol	Polarization
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl	Unwanted Emissions Level

Competences and guarantees

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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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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.

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

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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 OCS Lock. Electronic lock powered by battery which is used to close lockers..

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	70982B_11.1	Intelligent locking systems	OCS	--	2022/03/28	Auxiliary Element
S/01	70982B_13.1	Sample Holder	--	--	2022/03/28	Auxiliary Element
S/01	70982B_15.1	Keyboard	OCS	18	2022/04/04	Element Under Test

Notes referenced to samples during the project:

Id	Type
S/01	Radiated

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	PE
	[]	AC:	[]	[]	[]	[]	[]
	[]	AC:	[]	[]	[]	[]	[]
	[]	DC:					
[]	DC:						
Rated Power	Battery						
Clock frequencies.....	32 MHz						
Other parameters						
Software version						
Hardware version						
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

OJMAR S.A.
Pol. Indus. de Lerun s/n 20870 Elgoibar (Gipuzkoa)

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2022-05-04
Date (finish)	2022-05-08

Document history

Report number	Date	Description
70982RRF.002	2022-05-09	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: Alejandro Belgrano González, Miguel Manuel López Guzmán, Miriam Godoy Carrasco and Rafael Fernandez Martin.

Used instrumentation:

Equipment	Model	Manufacturer	Next Calibration
SEMIANECHOIC ABSORBER LINED CHAMBER	FACT 3 200 STP	ETS LINDGREN	N/A
SEMIANECHOIC ABSORBER LINED CHAMBER IV	FACT 3 200 STP	ETS LINDGREN	N/A
EMI TEST RECEIVER 9kHz-7GHz	ESR7	ROHDE AND SCHWARZ	2022-12-12
HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2022-11-18
PRE-AMPLIFIER G>30dB 17-40GHz	BLMA 1840-4A	BONN ELEKTRONIK	2022-09-08
HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK MESS-ELEKTRONIK	2023-05-05
HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2023-04-30
HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2023-10-29
PRE-AMPLIFIER G>40dB 1-18 GHz	BLMA 0118-1M	BONN ELEKTRONIK	2022-06-07
PRE-AMPLIFIER G>40dB 10MHz-6GHz	BLNA 0160-01N	BONN ELEKTRONIK	2023-03-17
SIGNAL AND SPECTRUM ANALYZER 2Hz-50GHz	FSW50	ROHDE AND SCHWARZ	2022-07-06

Testing verdicts

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

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. Test not requested			

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

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

TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal: 6,0V DC V
Type of Power Supply: Battery

ANTENNA (*):

Type of Antenna: Internal
Maximum Declared Antenna Gain: 1.95 dBi

TEST FREQUENCIES (*):

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

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).

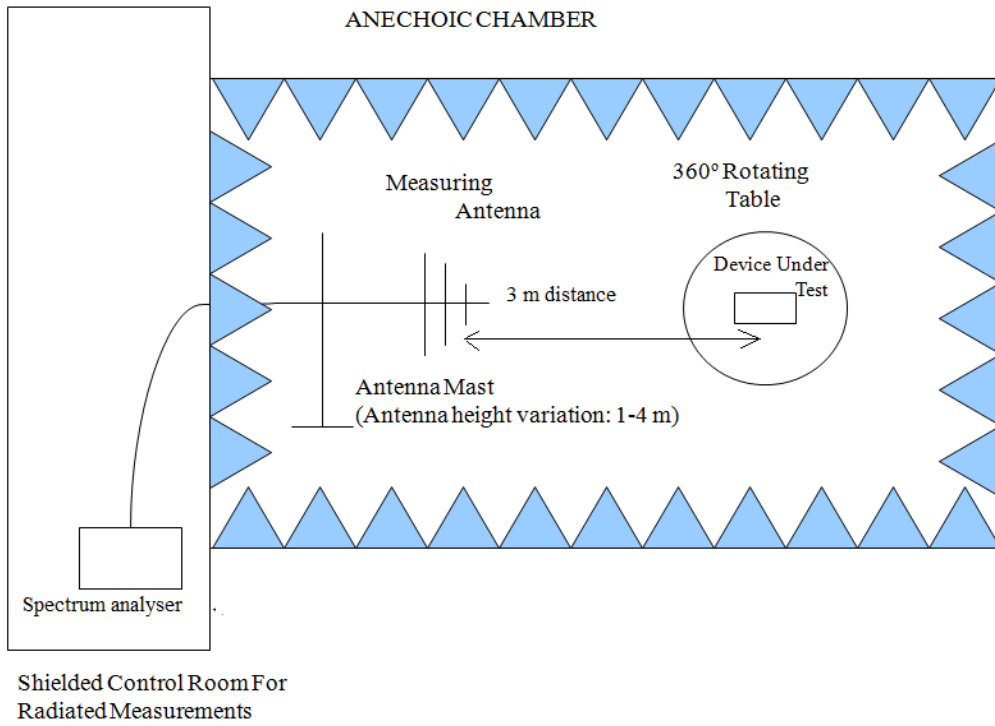
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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.

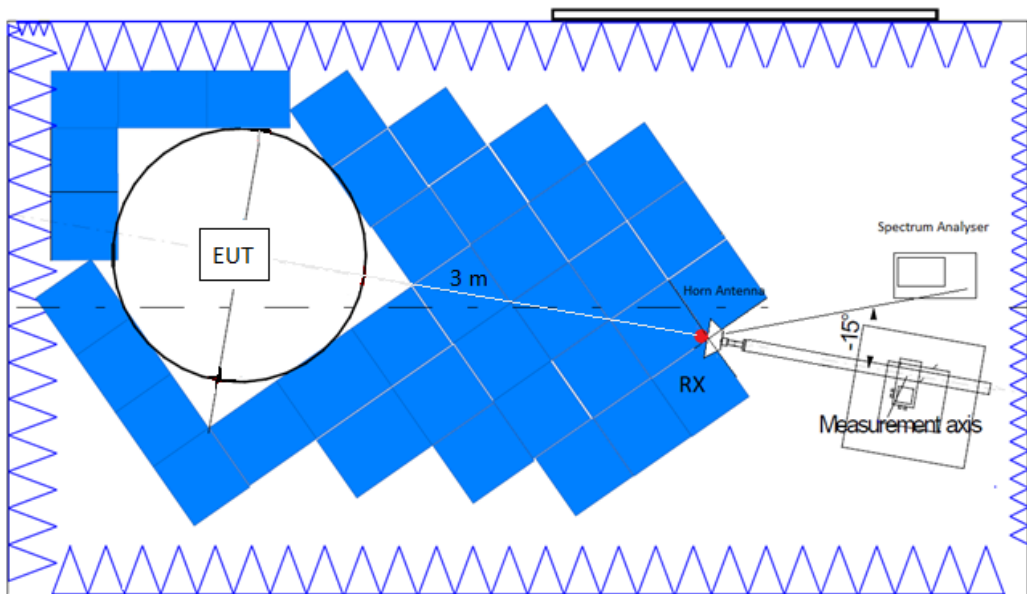
Measurements were made in both horizontal and vertical planes of polarization.

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.

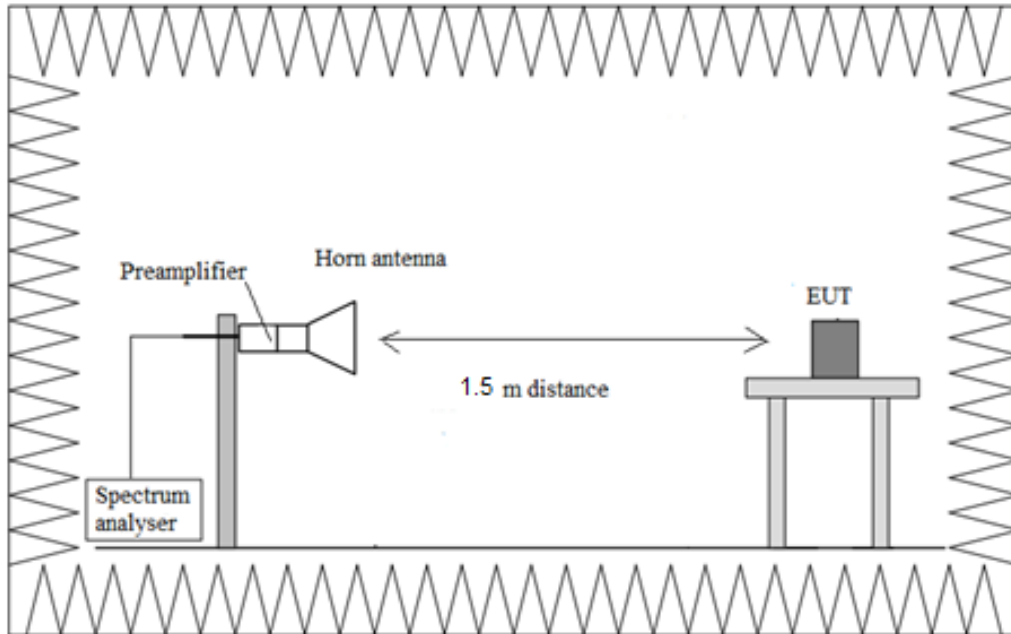
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



TEST CASES DETAILS

FCC 47 CFR Part 15.247 / RSS-247

RSS-247 5.5 / FCC 15.247 (d) [RSE] 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 ($\mu\text{V}/\text{m}$)	Field strength ($\text{dB}\mu\text{V}/\text{m}$)	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.

Operation Band: [2400, 2483.5]

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

Results

Freq (MHz)	Equipment	Freq Rng (GHz)	Unwanted Freq (MHz)	Unwanted Lvl ($\text{dB}\mu\text{V}/\text{m}$)	Pol	Detector
2480.00000	Digital Transmission System (DTS)	[3, 17]	4961.181	53.91	H	AVG
			4961.181	57.66	H	PK
			4961.181	57.71	H	PK
			4961.181	50.49	H	AVG

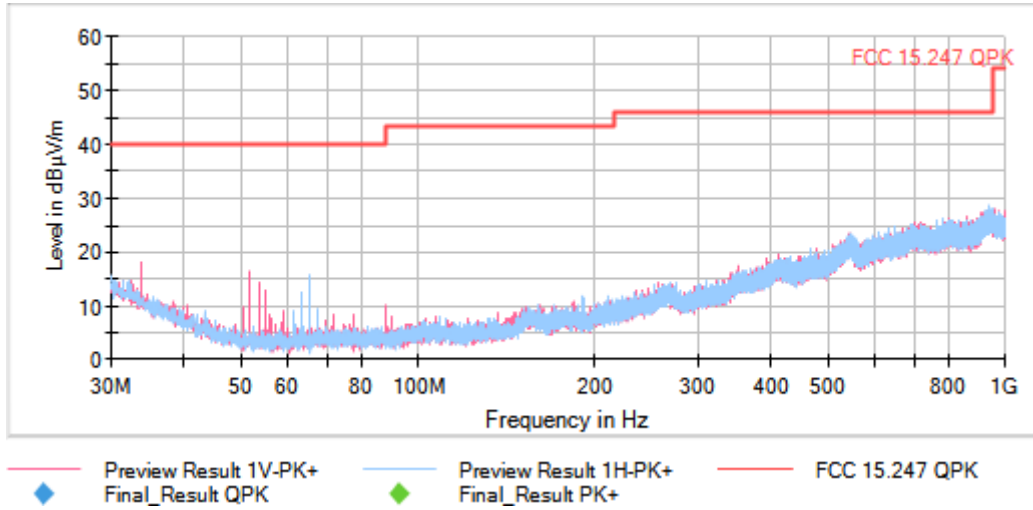
Verdict

Pass

Attachments

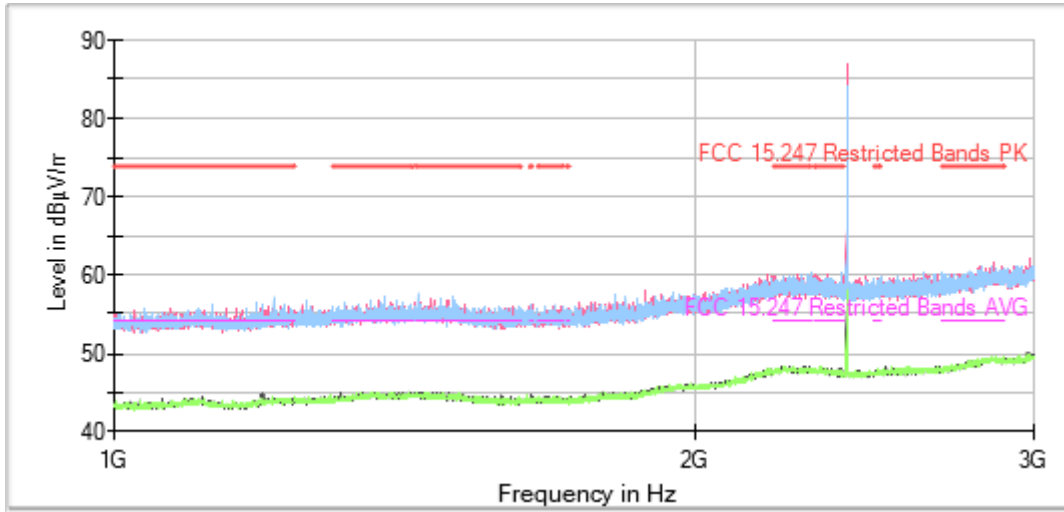
Operation Band MHz = [2400, 2483.5], Frequency MHz = The spurious frequencies detected do not depend neither on the operating channel, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [0.03, 1], Measurement Point = 1

Images:

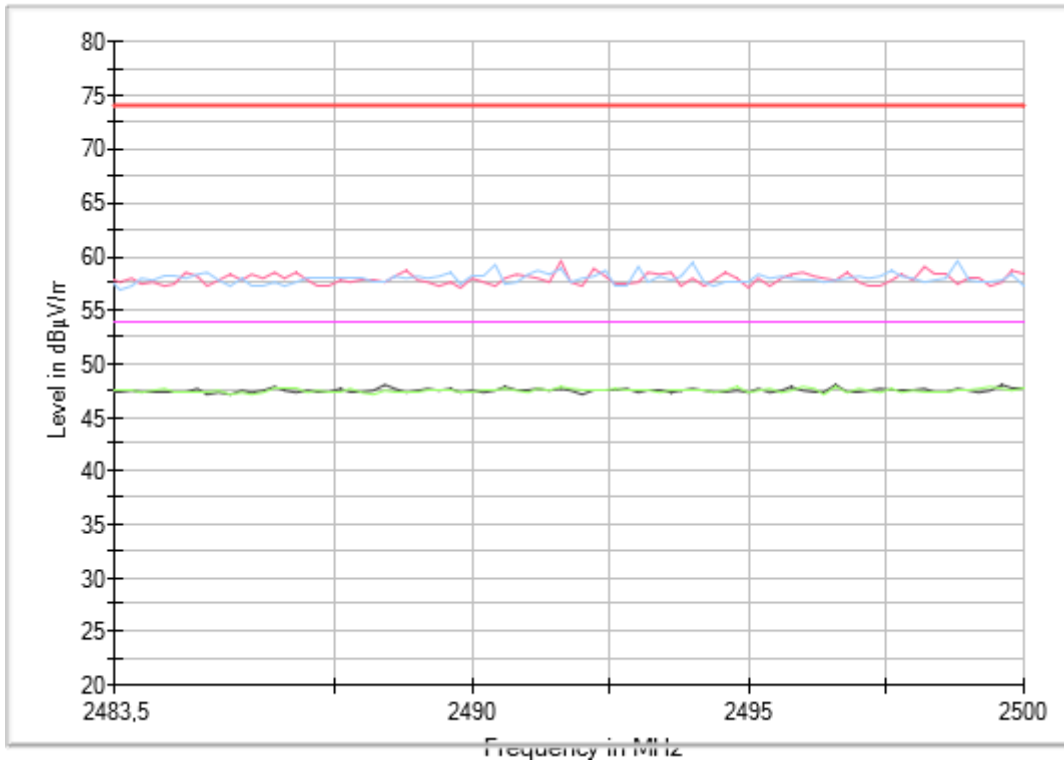


Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 3], Measurement Point = 1

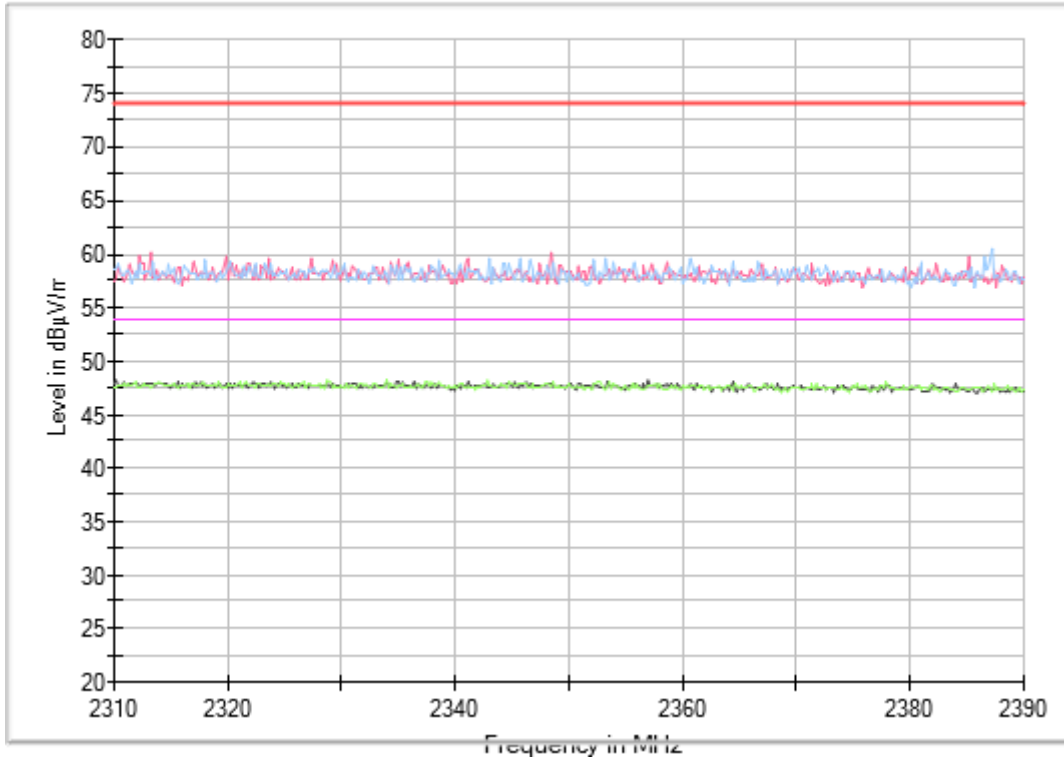
Images:



Full Spectrum

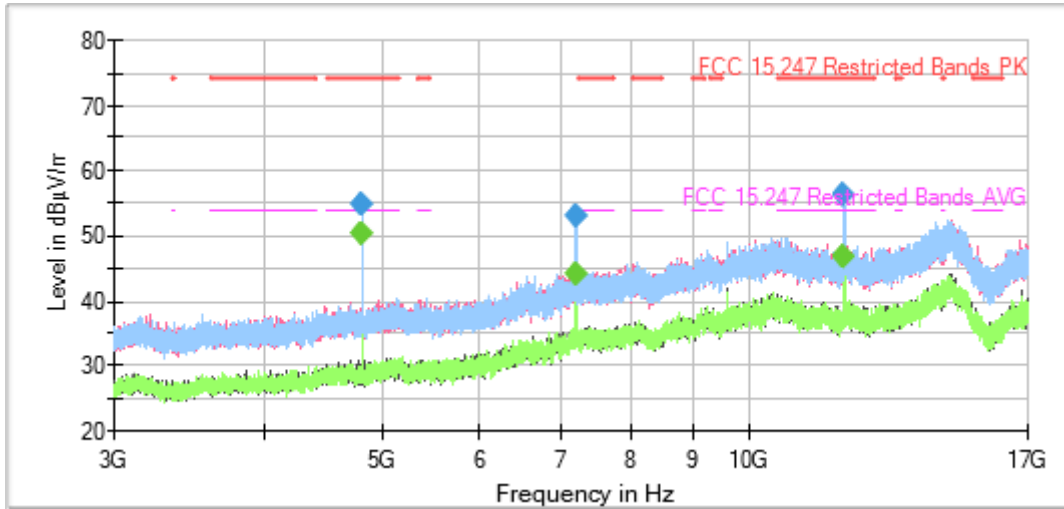


Full Spectrum



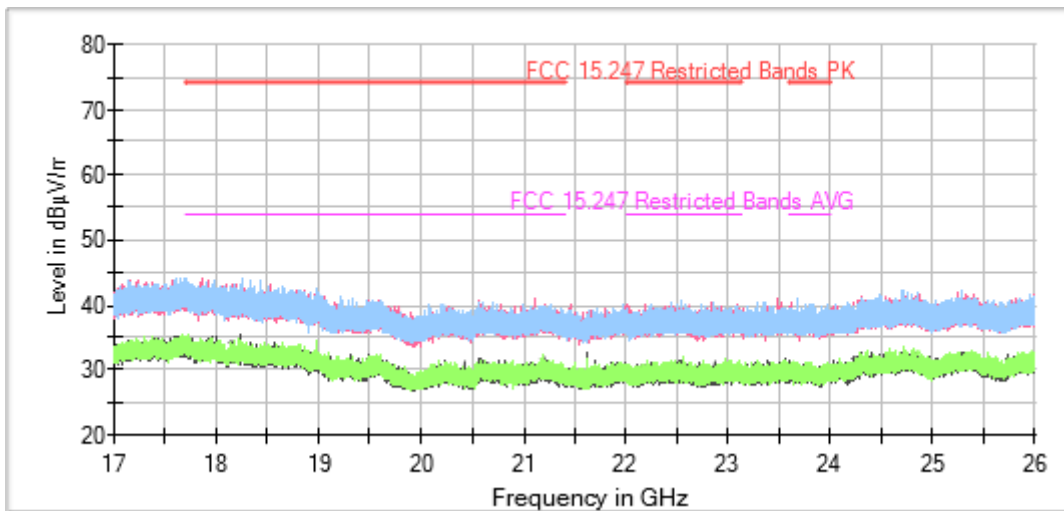
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Images:



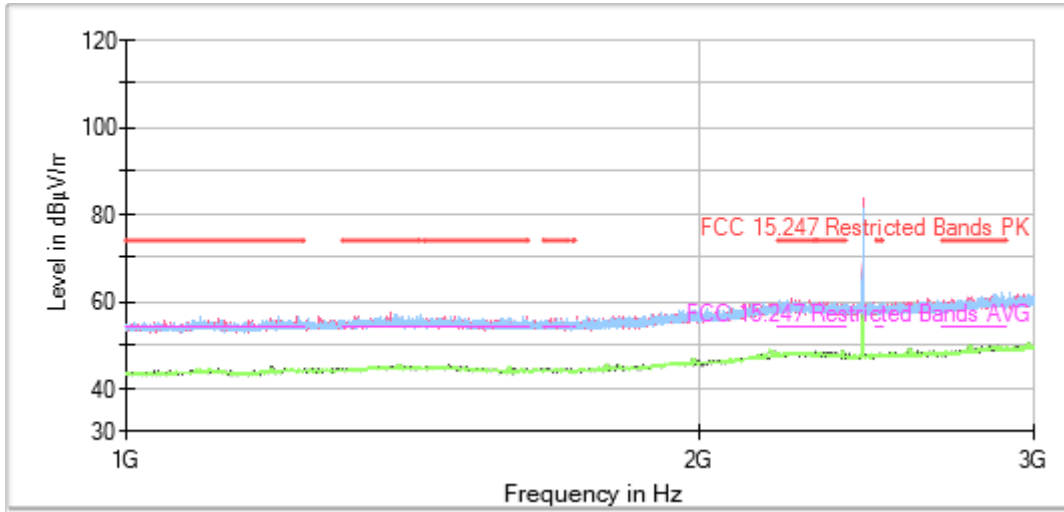
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Images:

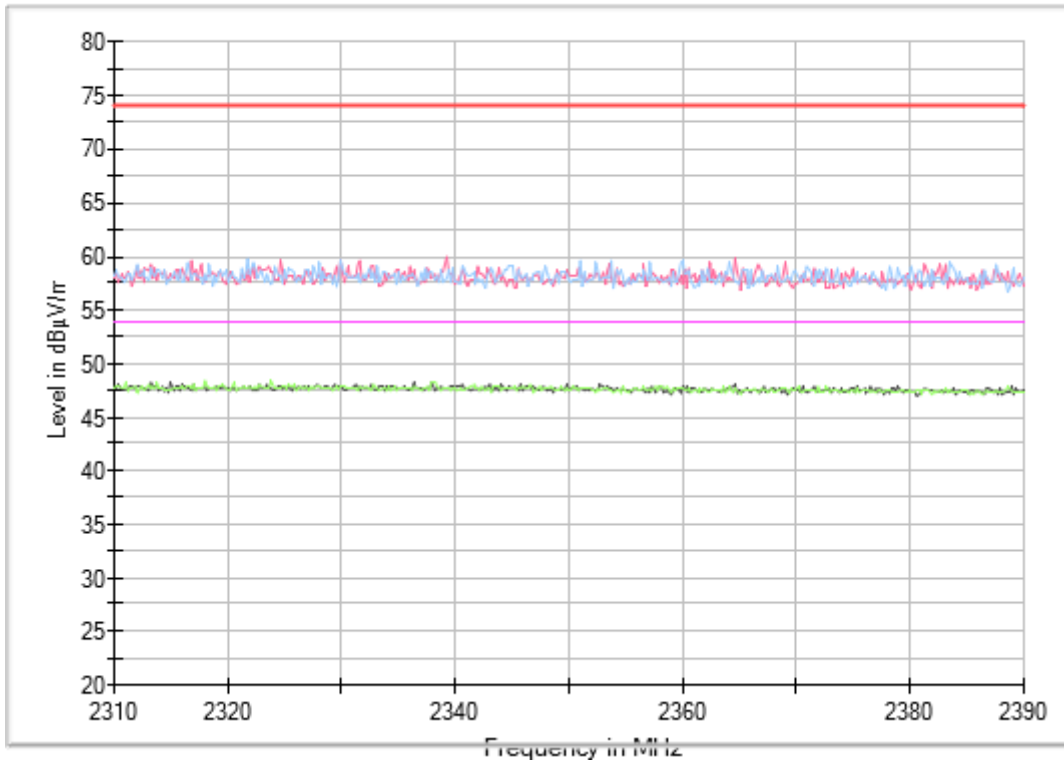


Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 3], Measurement Point = 1

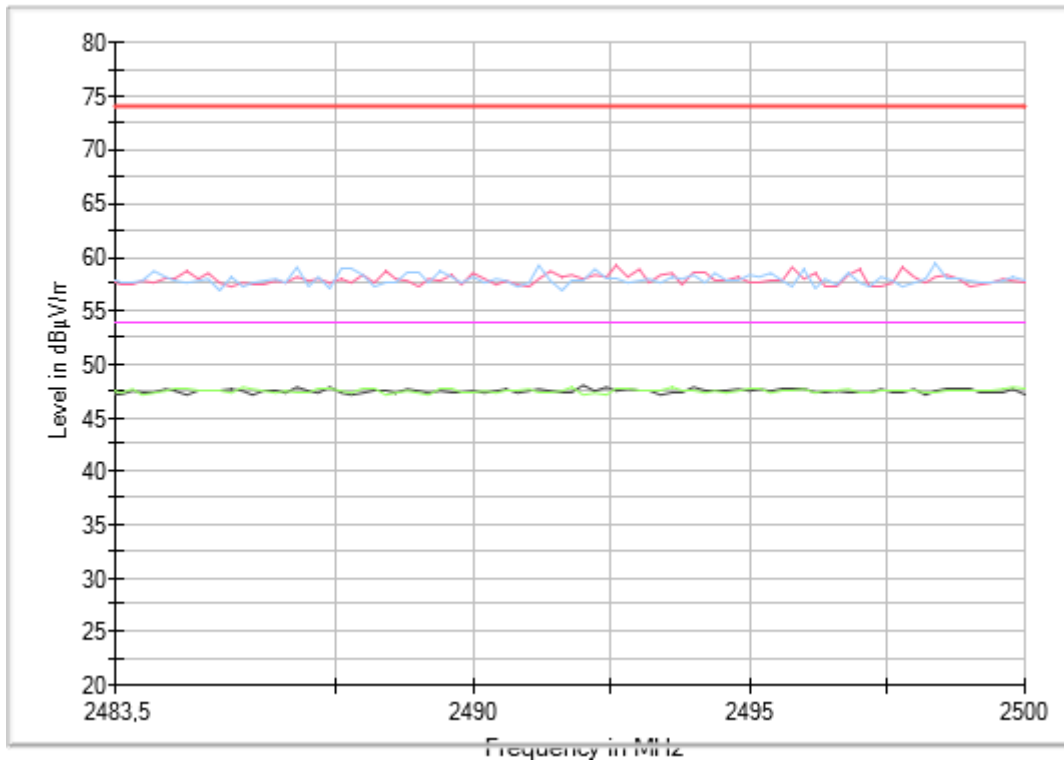
Images:



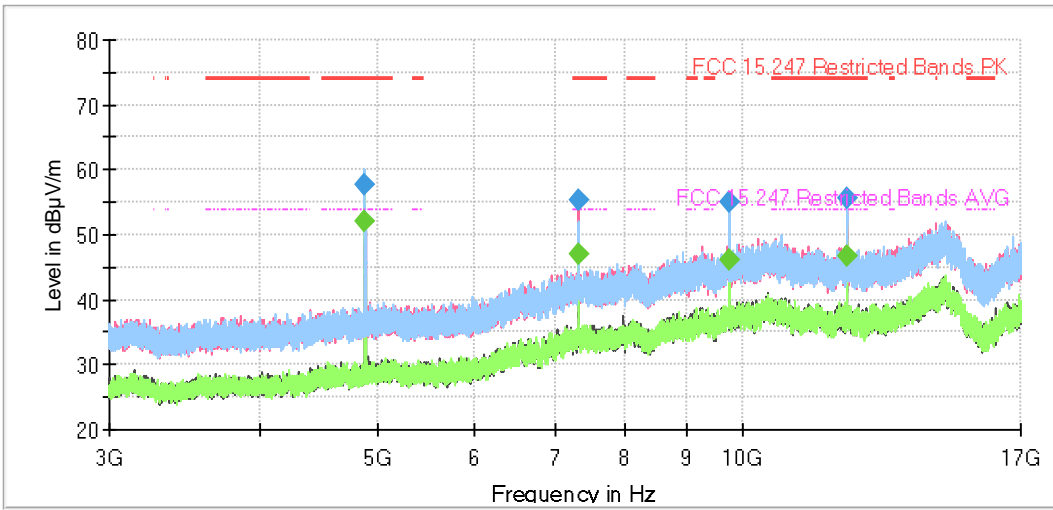
Full Spectrum



Full Spectrum

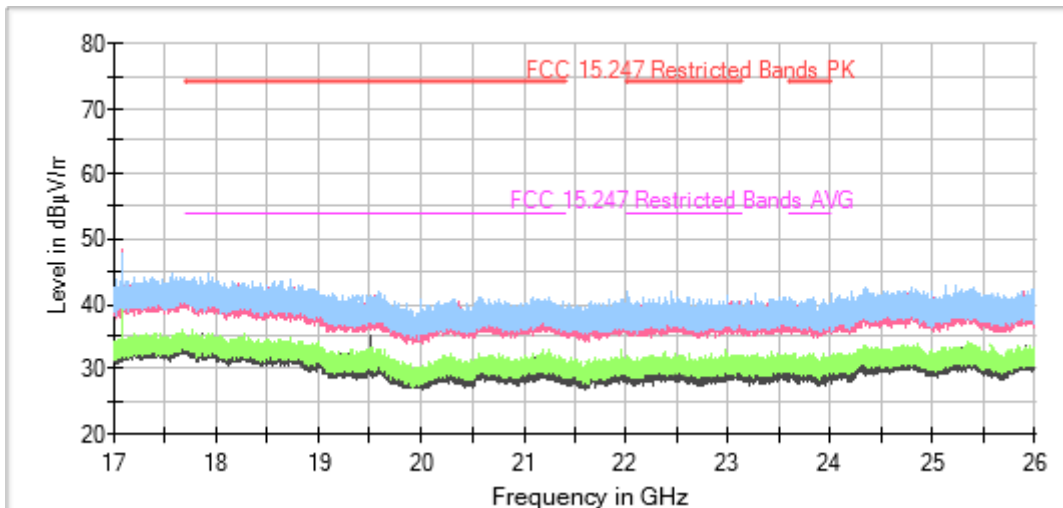


Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [3, 17], Measurement Point = 1

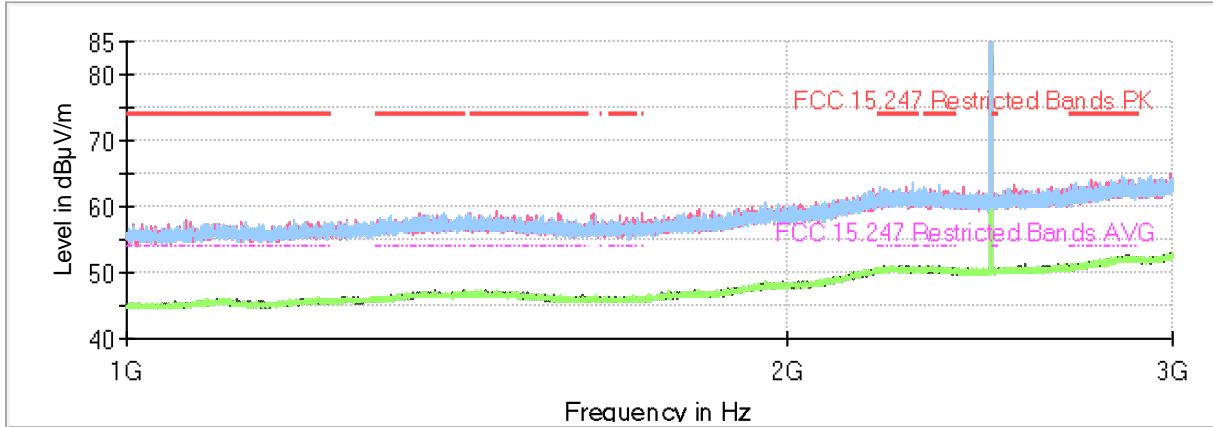


Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [17, 26], Measurement Point = 1

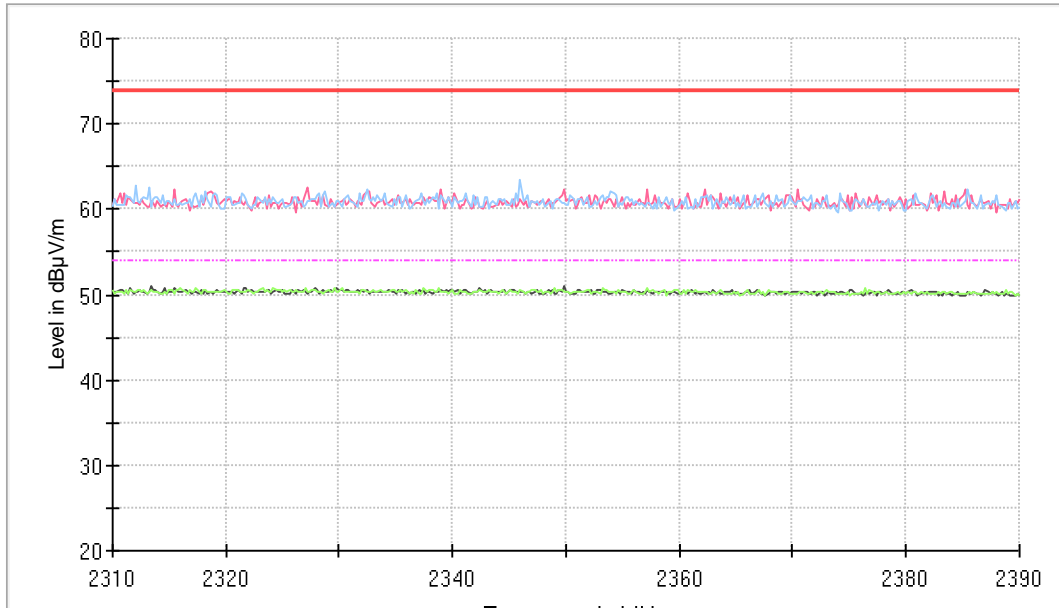
Images:



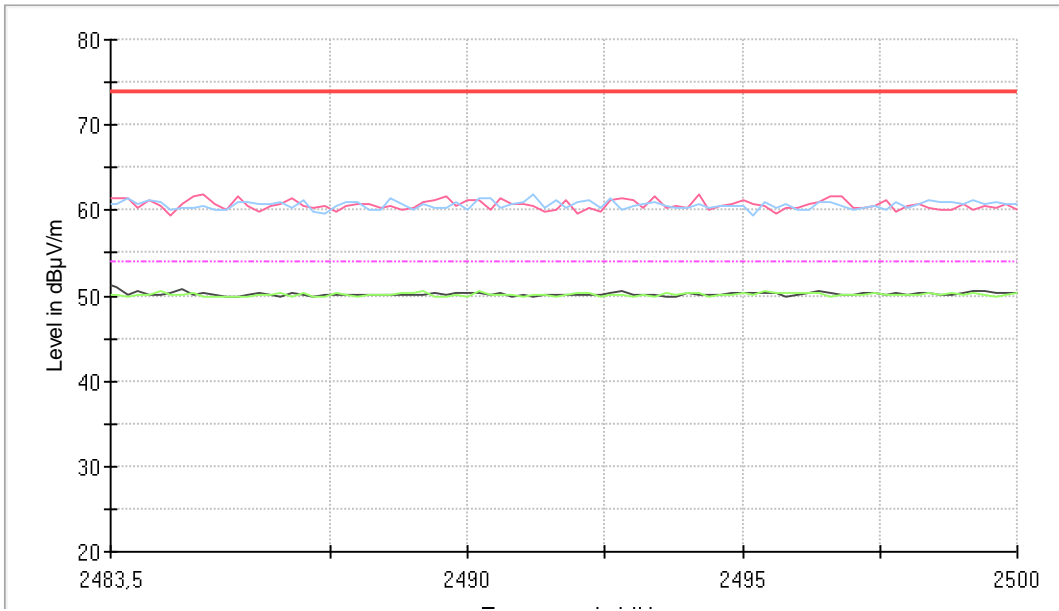
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 3], Number of Transmission Chains = 1, Available Number of Channels = 1, Measurement Point = 1



Full Spectrum

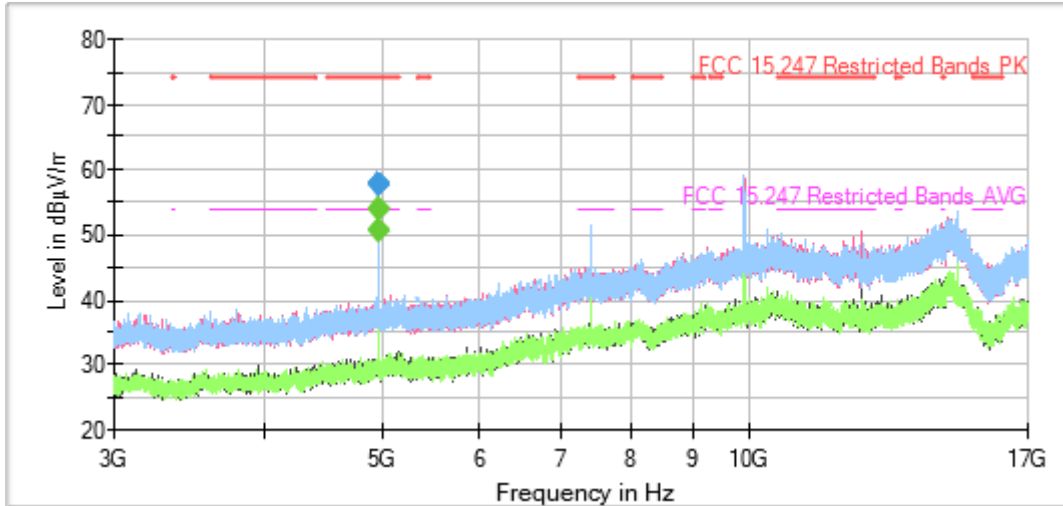


Full Spectrum



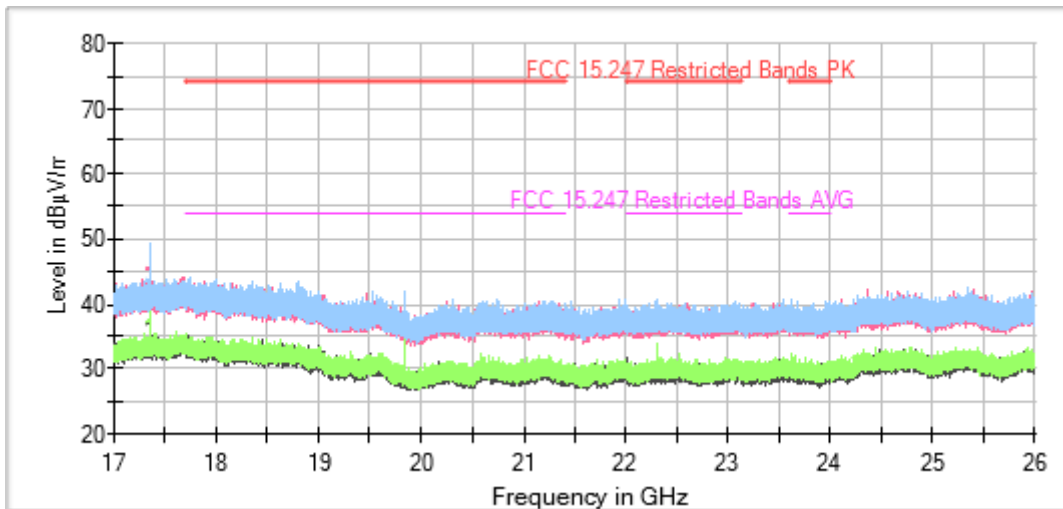
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [3, 17], Number of Transmission Chains = 1, Available Number of Channels = 1, Measurement Point = 1

Images:



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [17, 26], Measurement Point = 1

Images:



Operation Band: [2400, 2483.5]

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

Results

Freq (MHz)	Equipment	Freq Rng (GHz)	Unwanted Freq (MHz)	Unwanted Lvl (dB μ V/m)	Pol	Detector
2402.00000	Digital Transmission System (DTS)	[3, 17]	4804.530	55.60	H	PK
			4804.530	53.03	H	AVG
2440.00000			4879.930	51.17	H	AVG
			4880.580	53.98	H	PK

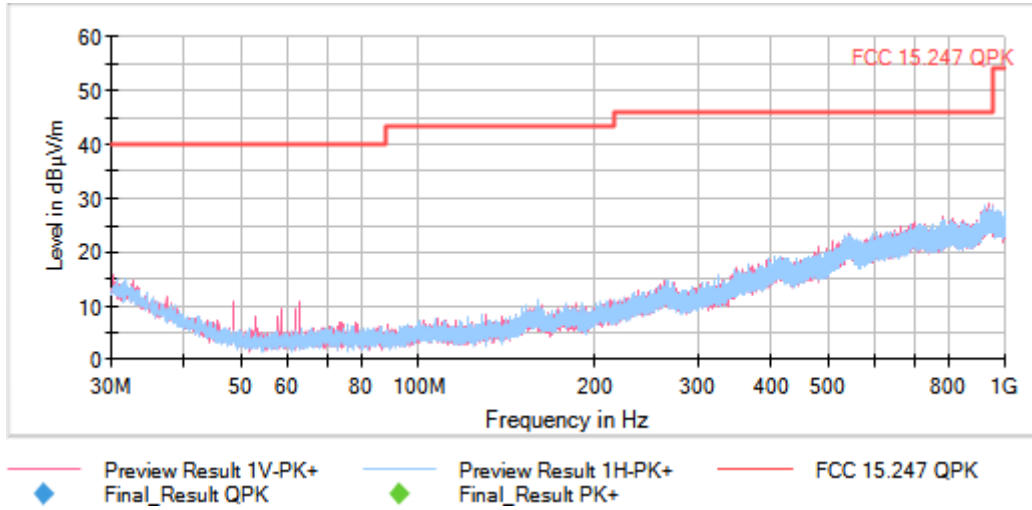
Verdict

Pass

Attachments

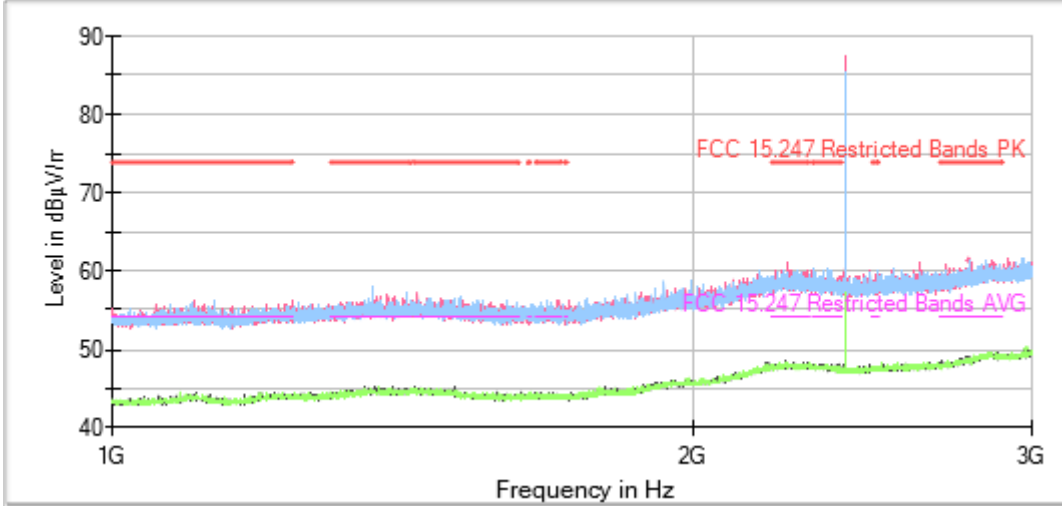
Operation Band MHz = [2400, 2483.5], Frequency MHz = The spurious frequencies detected do not depend neither on the operating channel, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [0.03, 1], Measurement Point = 1

Images:

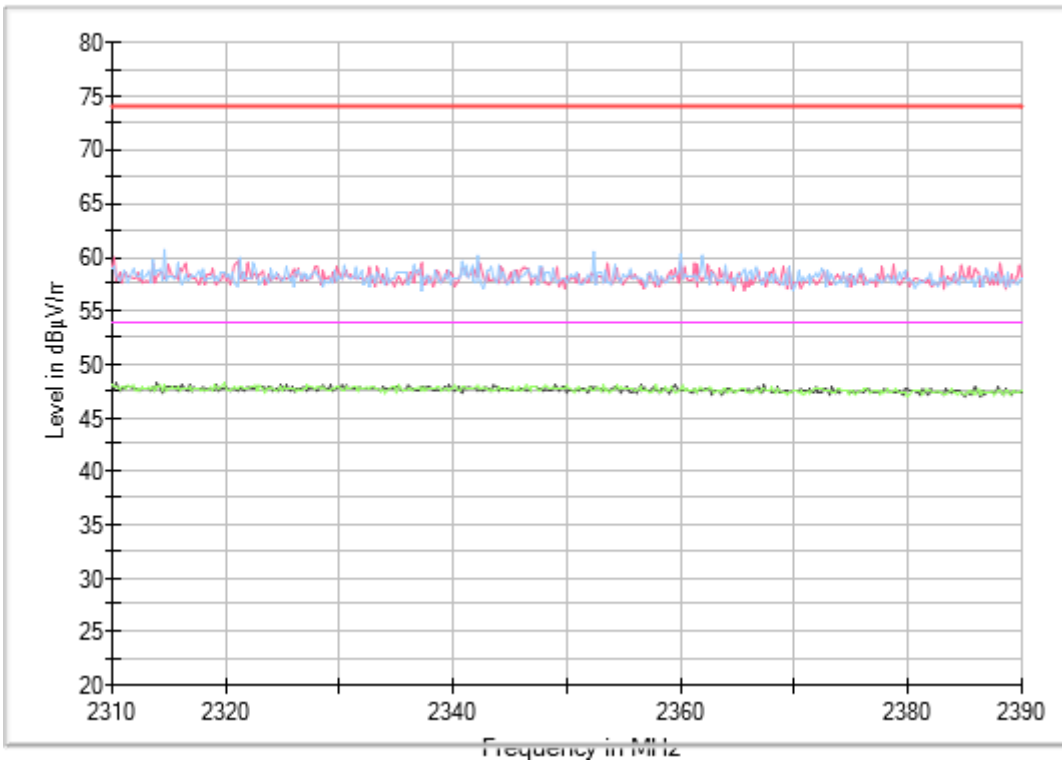


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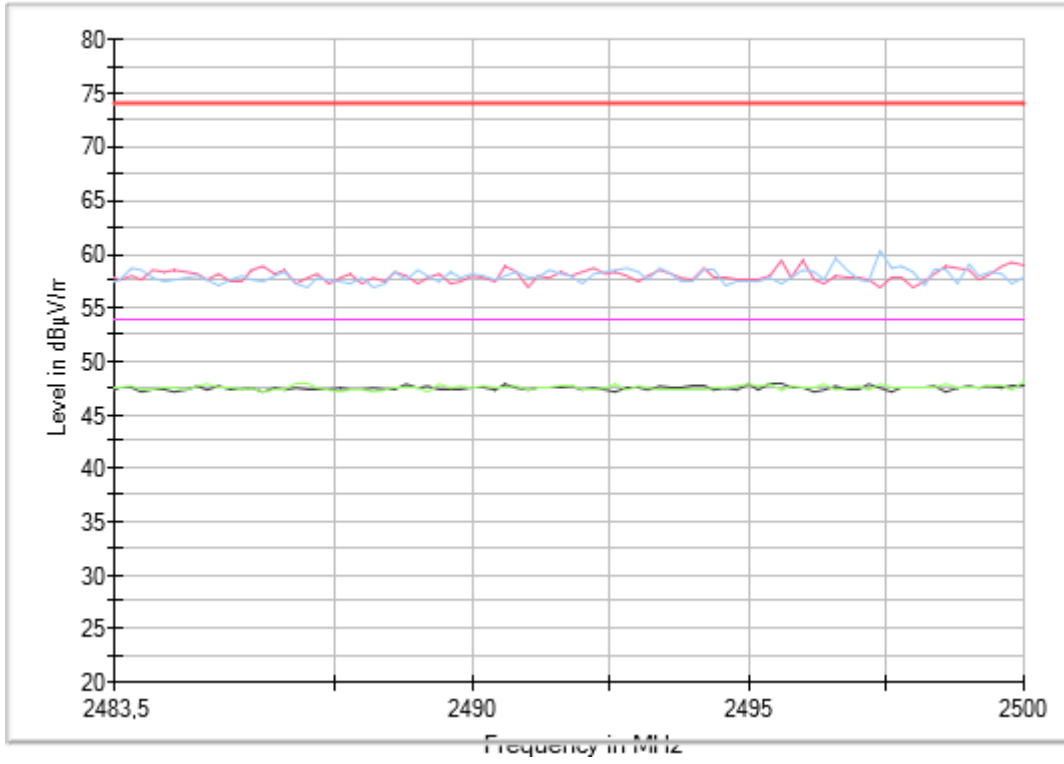
Images:



Full Spectrum

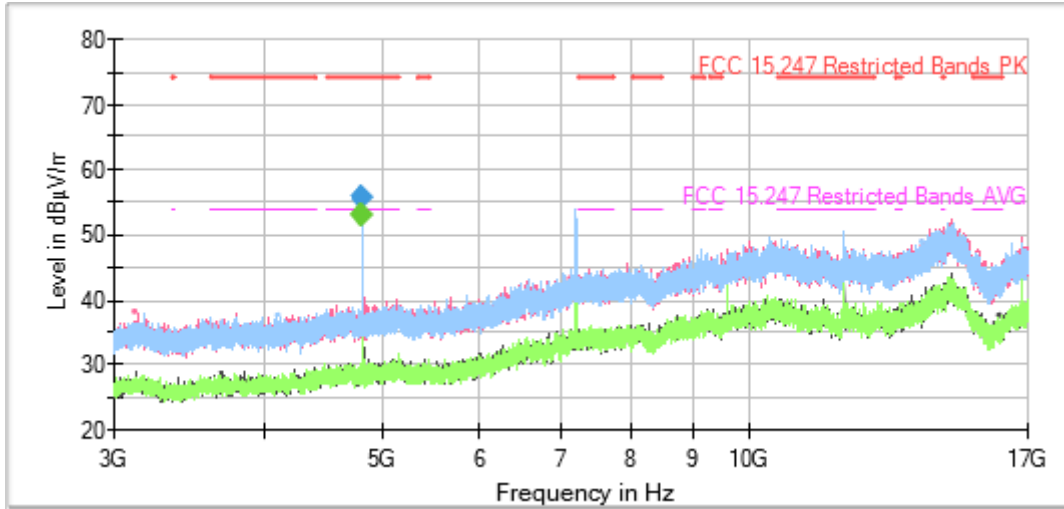


Full Spectrum



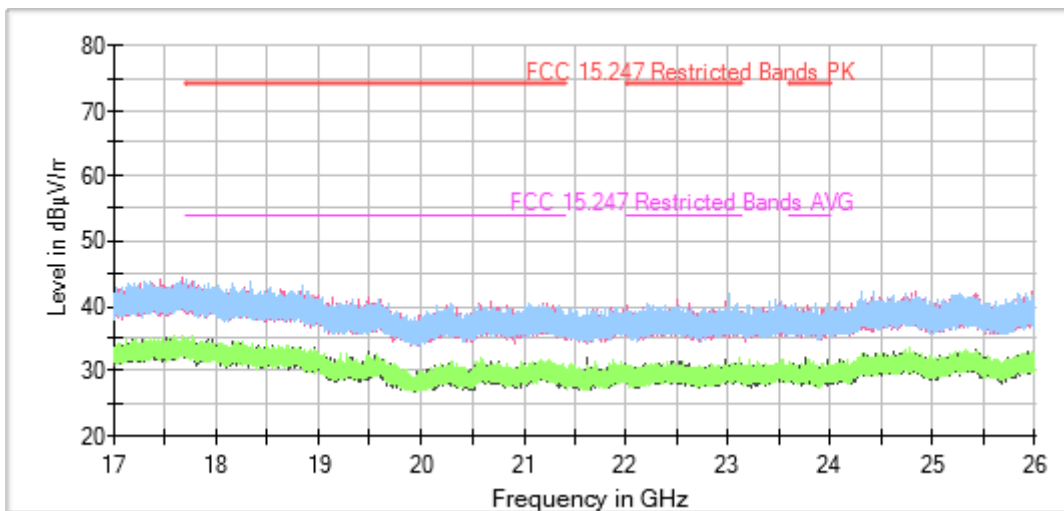
Operation Band MHz = [2400, 2483.5], Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [3, 17], Measurement Point = 1

Images:



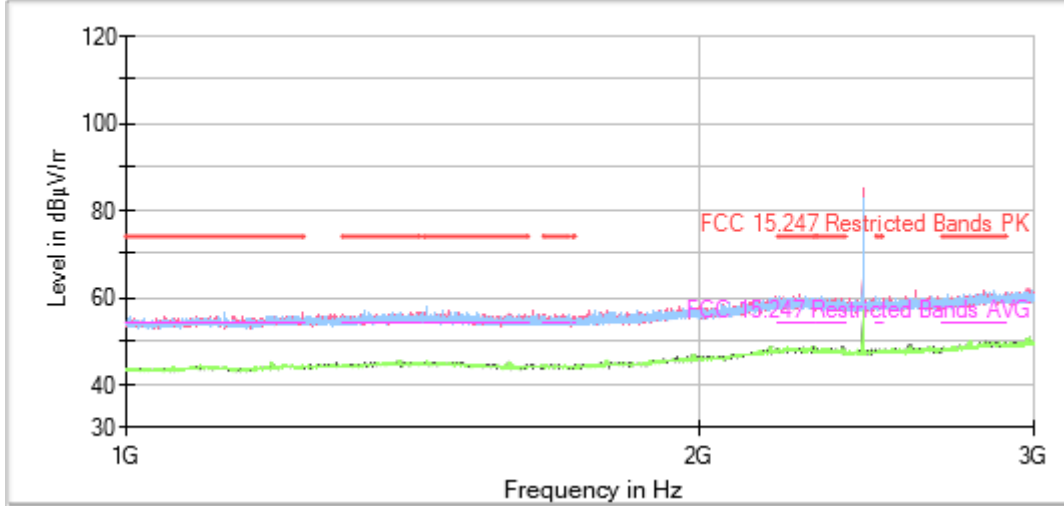
Operation Band MHz = [2400, 2483.5], Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [17, 26], Measurement Point = 1

Images:

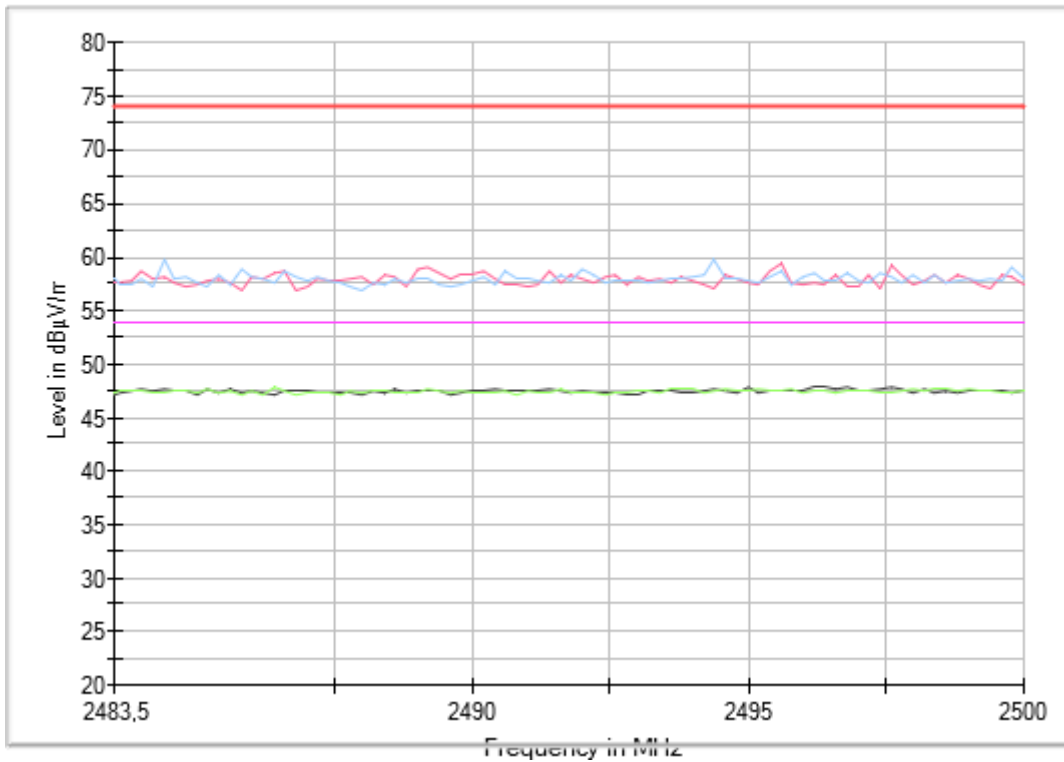


Operation Band MHz = [2400, 2483.5], Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 3], Measurement Point = 1

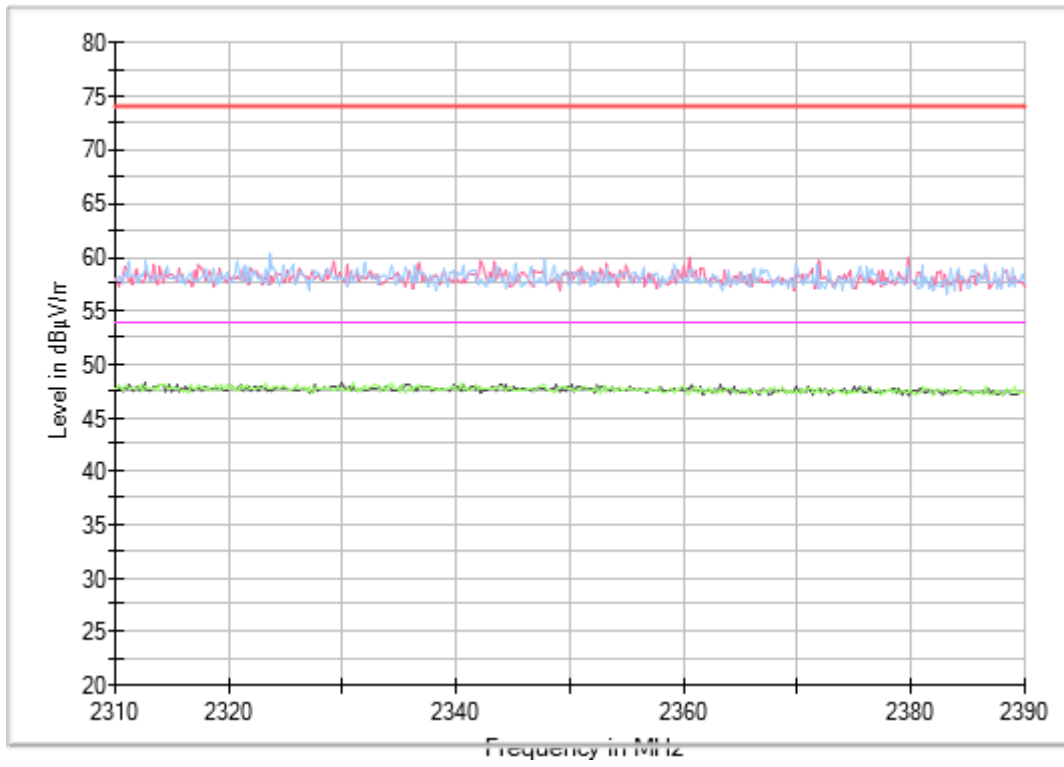
Images:



Full Spectrum

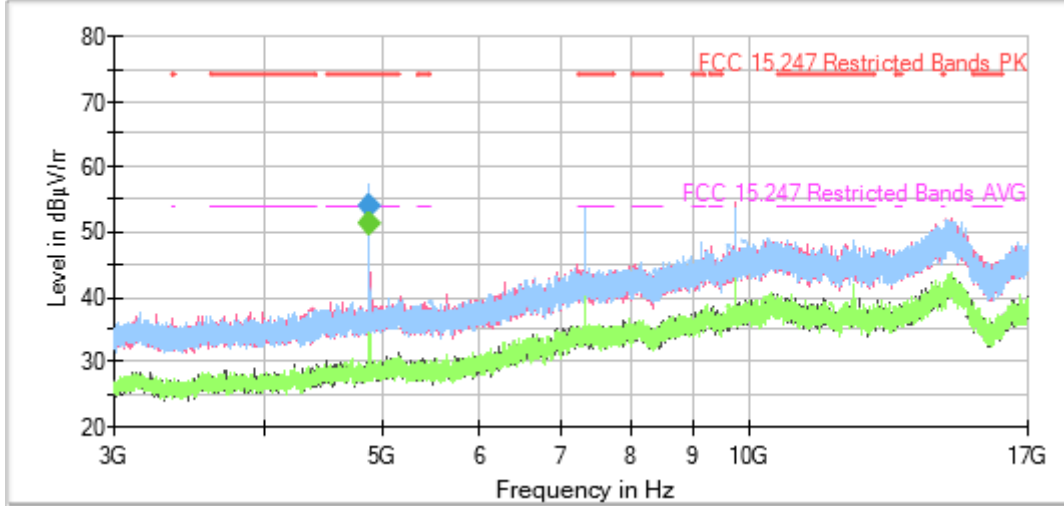


Full Spectrum



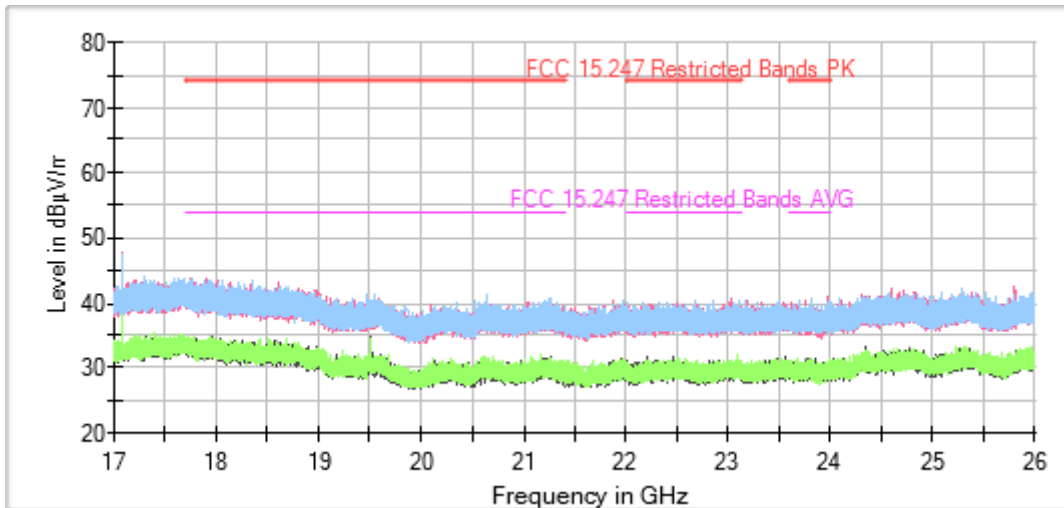
Operation Band MHz = [2400, 2483.5], Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [3, 17], Measurement Point = 1

Images:



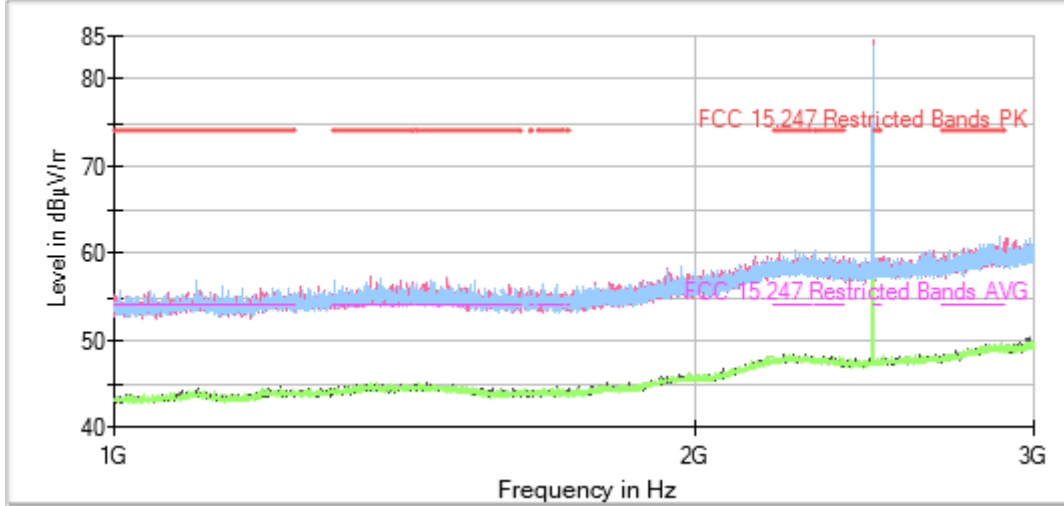
Operation Band MHz = [2400, 2483.5], Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [17, 26], Measurement Point = 1

Images:

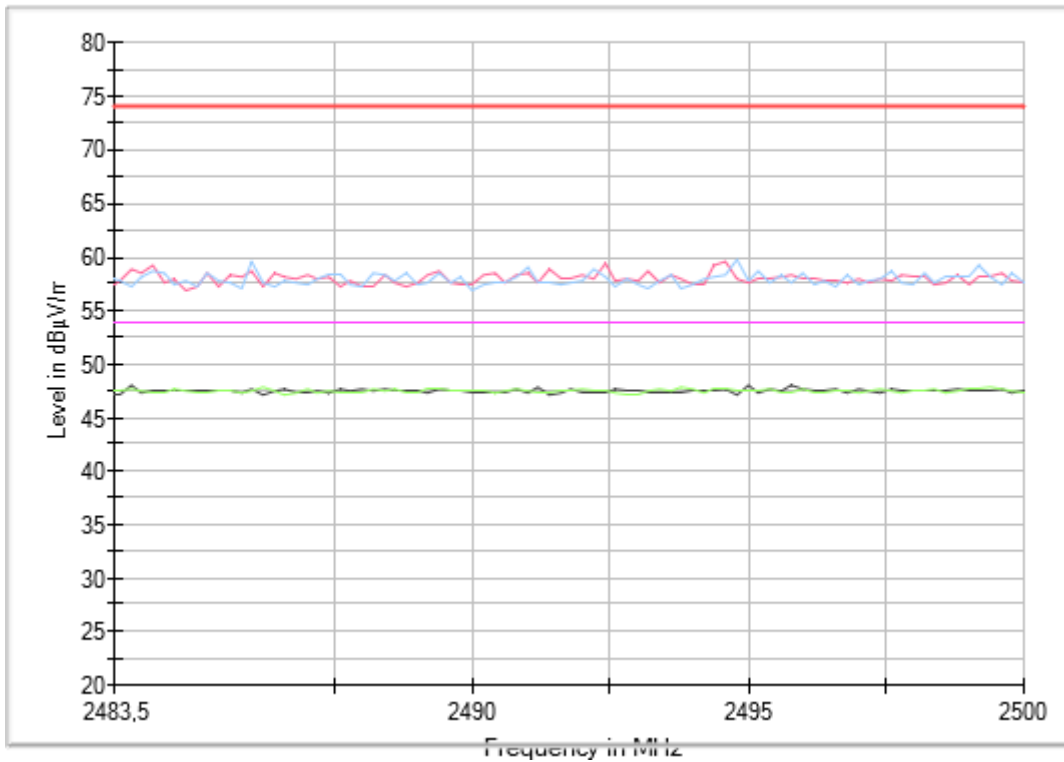


Operation Band MHz = [2400, 2483.5], Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 3], Measurement Point = 1

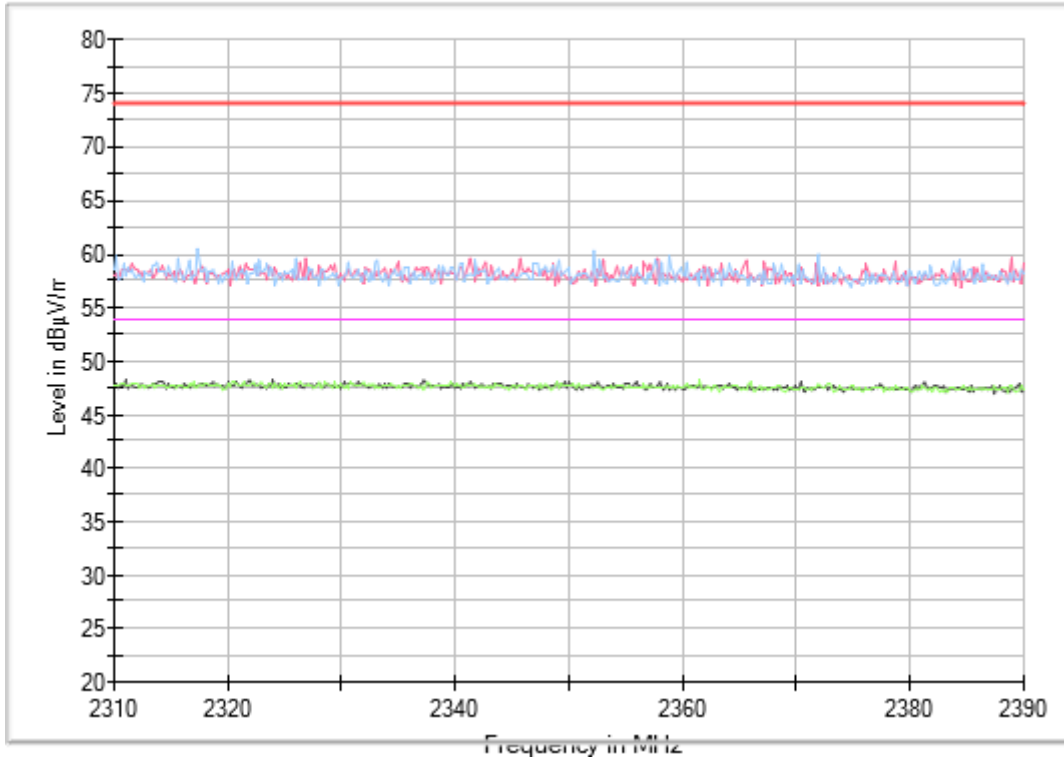
Images:



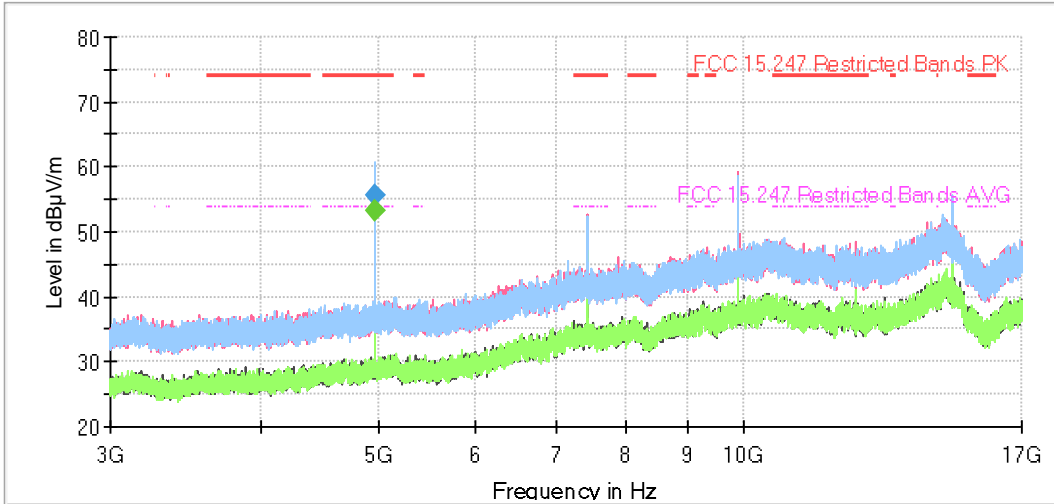
Full Spectrum



Full Spectrum



Operation Band MHz = [2400, 2483.5], Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [3, 17], Measurement Point = 1



Operation Band MHz = [2400, 2483.5], Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [17, 26], Measurement Point = 1

