

ISED CABid: ES1909

Lab. Company Number: 4621A

Test Report No:

83665RRF.002

Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

(*) Identification of item tested	Receiver-In-The-Canal Hearing Aid (air-conduction, wireless)
(*) Trademark	Phonak
(*) Model and /or type reference	Audéo E90-Sphere
(*) Derived model not tested	See Data provided by the client section
Other identification of the product	FCC ID: KWC-ERF IC: 2262A-ERF
(*) Features	Bluetooth, Bluetooth LE, DM, Flora HW version: 050-1141-P6 SW version: 067-1612
(*) Manufacturer	See Data provided by the client section
Test method requested, standard	USA FCC Part 15.247 (10-1-23 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (10-1-23 Edition): Radiated emission limits; general requirements. CANADA RSS-247 Issue 4 (July 2025). 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 C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager 
Date of issue	2026-02-23
Report template No	FDT08_27 (*) "Data provided by the client"

Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456)

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Acronyms

Acronym ID	Acronym Description
Avg COT	Average Channel Occupancy Time
Detector	Detector used
Ebw	Emission Bandwidth
Equipment	Equipment Type
Freq	Frequency
Freq Rng	Frequency Range
Inband Peak Lvl	Inband Peak Level
Lvl	Level
MP	Measurement Point
Mod	Modulation
NHp	Number of Hopping channels
Occ Ch BW	Occupied Channel Bandwidth
Operation Band	Operation Band
PSD	Power Spectral Density
Peak Power	Maximum Peak Conducted Output Power
Pol	Polarization
Port	Active Port
RU	Resource Unit
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.

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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 ($k = 2$).

The total uncertainty of the measurement system for the conducted testing of EUT is:

RF Peak Output Power: Measurement uncertainty $\leq \pm 0,80$ dB

RF Average Output Power: Measurement uncertainty $\leq \pm 0,99$ dB

Power Spectral Density: Measurement uncertainty $\leq \pm 0,99$ dB

6dB Bandwidth: Measurement uncertainty $\leq \pm 2,84$ %

Occupied Channel Bandwidth: Measurement uncertainty $\leq \pm 1,17$ %

Conducted Band-edge spurious emissions: Measurement uncertainty $\leq \pm 1,76$ dB

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", "Manufacturer", "Derived model not tested").
2. The sample consists of a Phonak Audéo E90-Sphere. Hearing aids.
3. Derived model not tested. These models have been declared by the supplier of the sample as being the same as the model under test. The derived model not tested document provided by the supplier is included.



ID: PDL-26681
Version: 5

Declaration of equivalence DoE Louis Hls

To whom it may concern

Stäfa (Switzerland), January 2026 / Regulatory Affairs

Product Equality Declaration

We, Sonova AG, hereby declare under our own responsibility that the products listed below as "Products with equivalent Hardware and Software" are in all relevant parts and hardware and software construction identical to the corresponding product identified as "Products with basis Hardware and Software".

The following standards and/or technical regulations and corresponding test reports fully apply accordingly:

Standards
Hearing aid standards:
ACOUSTIC: IEC (International Electroacoustic Commission) 60118-0 and NSH 7.0 (including Annex A)
EMC (Electromagnetic Compatibility): IEC 60118-13; EMC immunity: ANSI (American National Standards Institute) C63.19
Degrees of protection provided by enclosures (IP Code): IEC 60529
SW: IEC/EN 62304:2006 + A1:2015; UNE EN 62304:2007 + Cor:2009 + A1:2016
Europe: HEALTH & SAFETY: IEC/EN 60601-1; IEC/EN 60601-1-6; IEC/EN 60601-1-11; IEC/EN 60601-2-66; IEC/EN 62133-2; UN 38.3 Test 7; IEC/EN 62479; EMC: IEC/EN 60601-1-2; EN ETSI 301 489-1, -17 ; SPECTRUM: EN 300 328
RF USA: 47 CFR Part 15 (B); Part 15 (C):15.249, 15.209; Part 2: 2.1093; 2.1091
RF Canada: RSS-Gen, ICES-003, RSS-210, RSS-102
RF Japan: ARIB T66, Ordinance regulating Radio Equipment (2005-08) Ar12 item 19
Bluetooth SIG: RF.TS.p33, RF-PHY.TS.p20

The only difference between the listed equivalent and corresponding basis products is the brand name, model's name, a separate set of audiological features per performance level and new corresponding fitting software due to marketing purposes. Please refer to the Product Equality Assessment (PDL-26195, PDL-26023 and PDL-24477).

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Products with basis Hardware and Software (tested representative model)	Products with equivalent Hardware and Software
Phonak Audéo E90-Sphere (with S/M/P/UP/MAV receivers) HW version: 050-1141-xx FW version: 087-1612 SW version: Target 12 or higher	Phonak Audéo E70-Sphere (with S/M/P/UP/MAV receivers) HW version: 050-1142-xx FW version: 087-1613 SW version: Target 12 or higher Phonak Audéo E50-Sphere (with S/M/P/UP/MAV receivers) HW version: 050-1143-xx FW version: 087-1614 SW version: Target 12 or higher Phonak Audéo E30-Sphere (with S/M/P/UP/MAV receivers) HW version: 050-1211-XX FW version: 087-1621 SW version: Target 12 or higher Phonak Audéo E-Sphere Trial (with S/M/P/UP/MAV receivers) HW version: 050-1147-xx FW version: 087-1612, 087-1613, 087-1614, 087-1621 SW version: Target 12 or higher Phonak Audéo E-Sphere Demo (with S/M/P/UP/MAV receivers) HW version: 050-1213-P6 FW version: 087-1612 SW version: Target 12 or higher ampli-mini E 5 6P RITE-R AI PH (with S/M/P/UP/MAV receivers) HW version: 050-1141-xx67 FW version: 087-1612 SW version: Target 12 or higher ampli-mini E 4 6P RITE-R AI PH (with S/M/P/UP/MAV receivers) HW version: 050-1142-xx67 FW version: 087-1613 SW version: Target 12 or higher ampli-mini E 3 6P RITE-R AI PH (with S/M/P/UP/MAV receivers) HW version: 050-1143-xx67 FW version: 087-1614 SW version: Target 12 or higher ampli-mini E D 6P RITE-R AI PH (with S/M/P/UP/MAV receivers) HW version: 050-1147-P667 FW version: 087-1612, 087-1613, 087-1614, 087-1621 SW version: Target 12 or higher MEMINI E 5 6P R-R AI PH (with S/M/P/UP/MAV receivers) HW version: 050-1141-xxB1 FW version: 087-1612 SW version: Target 12 or higher MEMINI E 4 6P R-R AI PH (with S/M/P/UP/MAV receivers) HW version: 050-1142-xxB1 FW version: 087-1613 SW version: Target 12 or higher MEMINI E 3 6P R-R AI PH (with S/M/P/UP/MAV receivers) HW version: 050-1143-xxB1 FW version: 087-1614 SW version: Target 12 or higher

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	MEMINI E D 6P R-R AI PH (with S/M/P/UP/MAV receivers) HW version: 050-1147-P6B1 FW version: 067-1612, 067-1613, 067-1614, 067-1621 SW version: Target 12 or higher Phonak Audéo E90-R (with S/M/P/UP/MAV receivers) HW version: 050-1134-xx FW version: 067-1615 SW version: Target 12 or higher Phonak Audéo E70-R (with S/M/P/UP/MAV receivers) HW version: 050-1135-xx FW version: 067-1616 SW version: Target 12 or higher Phonak Audéo E50-R (with S/M/P/UP/MAV receivers) HW version: 050-1136-xx FW version: 067-1617 SW version: Target 12 or higher Phonak Audéo E30-R (with S/M/P/UP/MAV receivers) HW version: 050-1137-xx FW version: 067-1618 SW version: Target 12 or higher Phonak Audéo E-R Trial (with S/M/P/UP/MAV receivers) HW version: 050-1145-xx FW version: 067-1615, 067-1616, 067-1617, 067-1618 SW version: Target 12 or higher Phonak Audéo E-R Demo (with S/M/P/UP/MAV receivers) HW version: 050-1214-P6 FW version: 067-1615 SW version: Target 12 or higher Phonak CROS E-R (with CROS tube/CROS tip)¹ HW version: 050-1144-xx FW version: 067-1619 SW version: Target 12 or higher Phonak CROS E-R Demo (with CROS tube/CROS tip)¹ HW version: 050-1215-P6 FW version: 067-1619 SW version: Target 12 or higher ampli-mini E 5 6P R-R PH (with S/M/P/UP/MAV receivers) HW version: 050-1134-xx67 FW version: 067-1615 SW version: Target 12 or higher ampli-mini E 4 6P R-R PH (with S/M/P/UP/MAV receivers) HW version: 050-1135-xx67 FW version: 067-1616 SW version: Target 12 or higher ampli-mini E 3 6P R-R PH (with S/M/P/UP/MAV receivers) HW version: 050-1136-xx67 FW version: 067-1617 SW version: Target 12 or higher
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	ampli-mini E 2 6P R-R PH (with S/M/P/UP/MAV receivers) HW version: 050-1137-xx67 FW version: 067-1618 SW version: Target 12 or higher ampli-mini E D 6P R-R PH (with S/M/P/UP/MAV receivers) HW version: 050-1145-P667 FW version: 067-1615, 067-1616, 067-1617, 067-1618 SW version: Target 12 or higher MEMINI E 5 6P R-R PH (with S/M/P/UP/MAV receivers) HW version: 050-1134-xxB1 FW version: 067-1615 SW version: Target 12 or higher MEMINI E 4 6P R-R PH (with S/M/P/UP/MAV receivers) HW version: 050-1135-xxB1 FW version: 067-1616 SW version: Target 12 or higher MEMINI E 3 6P R-R PH (with S/M/P/UP/MAV receivers) HW version: 050-1136-xxB1 FW version: 067-1617 SW version: Target 12 or higher MEMINI E 2 6P R-R PH (with S/M/P/UP/MAV receivers) HW version: 050-1137-xxB1 FW version: 067-1618 SW version: Target 12 or higher MEMINI E D 6P R-R PH (with S/M/P/UP/MAV receivers) HW version: 050-1145-P6B1 FW version: 067-1615, 067-1616, 067-1617, 067-1618 SW version: Target 12 or higher
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where xx – means colour identification

¹Acoustic standards are not applicable to CROS

Place and date

Staefa, 22 January 2026

Staefa, 22 January 2026

Aleksandra Enns-Bray

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Regulatory affairs manager

Head of Regulatory Affairs

Document is signed and dated electronically with SmartSolve

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Document Detail

22-Jan-2026

1

Type:	PDL	Status:	CURRENT
Document No.:	PDL-26681	Effective Date:	22-Jan-2026
Rev.:	5		
Title:	Declaration of equivalence DoE Louis Hls		
Process:	Regulatory Affairs		
Owner:	11AENNSBRAY Aleksandra Enns-Bray		

Attributes

Attribute Type	Value	Description
Affected Site	1100	Stafa (CH)
Project	Louis RIC Development	
Project Phase	Design Output	

Approvals

Level	Actor	Job Title	Sign-off Date	Sign-off By
1	Nataya Jaiman	Regulatory Affairs and Quality Coordinator	22-Jan-2026	11NJAIMAN
2	David Sooprayen	Head of Regulatory Affairs	22-Jan-2026	22DSOOPRAYEN
2	Aleksandra Enns-Bray	Regulatory Affairs and Vigilance Manager	22-Jan-2026	11AENNSBRAY

Revision Notes

Access Activity	Note	Accessed By	Accessed Date
Remark	(1) replaced development names with marketing names, (2) added Demo models for Phonak brand, (3) removed lowest performance level for private labels.	11AENNSBRAY	22-Jan-2026

4. The customer indicates that their product is manufactured in more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided.

ID	Role	Site details
1	Legal Manufacturer (as Brand) and Manufacturing site	Sonova AG CH-MF-000015958 Laubisrütistrasse 28 8712 Stäfa / SWITZERLAND Phone: +41 58 928 01 01 / Fax: +41 58 928 20 11
2	Manufacturing site	Sonova Hearing (Suzhou) Co., Ltd No.78 Qi Ming Road, Comprehensive Bonded Zone, Suzhou Industrial Park, Jiangsu province, P.R. China
3	Manufacturing site	Sonova Operation Center Vietnam Co. Ltd. No. 29A VSIP Street 8, Vietnam Singapore Industrial Park Thuan An Town, Binh Duong Province, Vietnam
4	Manufacturing site	Sonova North American Operations Center S.A. DE C.V. Avenida Riba, 775 Parque Industrial Condesa Mexicali B.C. México C.P 21395

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. The laboratory is not responsible for such information and it is not covered by accreditation.

Usage of samples

A radiated measurement was performed in the range of 30MHz to 1GHz to determine the worst case between S, M, P, UP and MAV receivers. The frequency responses of the five receivers are very similar, with the UP receiver level slightly above the other receivers. The maximum emission occurred with a UP receiver.

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial N°	Date of Reception	Application
S/01	83665C_31.1	Hearing Aid "Receiver UP"	Audéo E90- Sphere	2547H08AL	2025-12-23	Element Under Test
S/02	83665C_2.1	SetUp Module Conducted	Audéo E90- Sphere	WP19H02JJ	2025-12-16	Element Under Test

Notes referenced to samples during the project:

Id	Type
S/01	Radiated
S/02	Conducted

Test sample description

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded			
	RF port	0.2	[X]	[X]			
			[]	[]			
			[]	[]			
			[]	[]			
			[]	[]			
Supplementary information to the ports..... :							
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	[]	AC:	[]	[]	[]	[]	[]
	[]	AC:	[]	[]	[]	[]	[]
	[X]	DC: min./ max. voltage: 3.0/4.2 V					
[]	DC:						
Rated Power							
Clock frequencies..... :							
Other parameters							
Software version	067-1612						
Hardware version	050-1141-P6						
Dimensions in cm (W x H x D)							
Mounting position	[]	Table top equipment					
	[]	Wall/Ceiling mounted equipment					
	[]	Floor standing equipment					
	[]	Hand-held equipment					
	[X]	Other: Hearing Instrument					
Modules/parts..... :	Module/parts of test item		Type	Manufacturer			

	Hearing instrument		Sonova Ag
	Balun PCB		Sonova Ag
	Programming PCB		Sonova Ag
	UFL cable		Taoglas Limited
Accessories (not part of the test item)	Description	Type	Manufacturer
			
			
			
			
			
			
Documents as provided by the applicant.....	Description	File name	Issue date
	Document that describes the conducted module setup	Antenna and Conducted Module Datasheet.pdf	
			
			
			

Identification of the client

Sonova AG
Laubisrütistrasse 28, 8712 Stäfa, Switzerland

Testing period and place

Test Location	DEKRA TESTING AND CERTIFICATION S.A.U. C/ Margarita Salas Boulevard, 26 - Parque Tecnológico de Andalucía; 29590 Campanillas (Málaga) (Location D)
Date (start)	2026-01-08
Date (finish)	2026-01-22

Document history

Report number	Date	Description
83665RRF.002	2026-02-23	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: Karla Castilla Alcalde, Rubén Mora Fernandez and Victoria Olmedo Villalba.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
10304	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2026-10-01
07040	EXTENSION FOR OPEN SWITCH UNIT UP TO 40GHz	OSP-B157Wx	ROHDE AND SCHWARZ	2027-08-26
04612	HORN ANTENNA 1-18GHz	BBHA 9120D	SCHWARZBECK MESS- ELEKTRONIK	2027-10-15
06495	HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK	2027-07-11
09968	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2026-09-22
07862	PRE-AMPLIFIER G>30dB 18-40GHz	BLMA 1840-3G	BONN ELEKTRONIK	2026-07-09
07769	PREAMPLIFIER 30dB 500MHz-18GHz	BBV 9718 C	SCHWARZBECK	2026-03-17
07039	Rohde&Schwarz	OSP-B157W8	ROHDE AND SCHWARZ	2027-08-14
08130	SEMIANECHOIC ABSORBER LINED CHAMBER	P29419	ALBATROSS	--
08661	SHIELDED ROOM	-	SIEPEL	--
08134	SHIELDED ROOM	P29419	ALBATROSS PROJECTS GMBH	--
07794	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2027-06-10
04848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	--
07552	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2026-04-23
07549	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2026-04-23
07550	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2026-04-23
07798	WMS32	WMS32	ROHDE AND SCHWARZ	--
07702	DC POWER SUPPLY 30V/3A 90W	GPS-3030D	GW INSTEK	--
07755	DIGITAL MULTIMETER	175	FLUKE	2026-11-25

Testing verdicts

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

Summary

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

FCC PART 15 PARAGRAPH/ RSS-247		
Requirement – Test case	Verdict	Remark
FCC 15.247 (a)(2) / RSS-247 6.3.1. (a) 6 dB Bandwidth	P	--
FCC 15.247 (b) / RSS-247 6.3.2. Maximum output power and antenna gain	P	--
FCC 15.247 (d) / RSS-247 6.6 Band-edge emissions compliance (Transmitter)	P	--
FCC 15.247 (e) / RSS-247 6.3.1. (b) Power spectral density	P	--
FCC 15.247 (d) / RSS-247 6.6. Emission limitations radiated (Transmitter)	P	--
<u>Supplementary information and remarks:</u> None		

Appendix B: Flora (2M).

FCC PART 15 PARAGRAPH/ RSS-247		
Requirement – Test case	Verdict	Remark
FCC 15.247 (a)(2) / RSS-247 6.3.1. (a) 6 dB Bandwidth	P	--
FCC 15.247 (b) / RSS-247 6.3.2. Maximum output power and antenna gain	P	--
FCC 15.247 (d) / RSS-247 6.6 Band-edge emissions compliance (Transmitter)	P	--
FCC 15.247 (e) / RSS-247 6.3.1. (b) Power spectral density	P	--
FCC 15.247 (d) / RSS-247 6.6. Emission limitations radiated (Transmitter)	P	--
<u>Supplementary information and remarks:</u> None		

Appendix C: DM (2M).

FCC PART 15 PARAGRAPH/ RSS-247		
Requirement – Test case	Verdict	Remark
FCC 15.247 (a)(2) / RSS-247 6.3.1. (a) 6 dB Bandwidth	P	--
FCC 15.247 (b) / RSS-247 6.3.2. Maximum output power and antenna gain	P	--
FCC 15.247 (d) / RSS-247 6.6 Band-edge emissions compliance (Transmitter)	P	--
FCC 15.247 (e) / RSS-247 6.3.1. (b) Power spectral density	P	--
FCC 15.247 (d) / RSS-247 6.6. Emission limitations radiated (Transmitter)	P	--
<u>Supplementary information and remarks:</u> None		

Appendix D: Bluetooth Classic.

FCC PART 15 PARAGRAPH/ RSS-247		
Requirement – Test case	Verdict	Remark
FCC 15.247 (a)(2) / RSS-247 6.3.1. (a) 6 dB Bandwidth	P	--
FCC 15.247 (b) / RSS-247 6.3.2. Maximum output power and antenna gain	P	--
FCC 15.247 (d) / RSS-247 6.6 Band-edge emissions compliance (Transmitter)	P	--
FCC 15.247 (e) / RSS-247 6.3.1. (b) Power spectral density	P	--
FCC 15.247 (d) / RSS-247 6.6. Emission limitations radiated (Transmitter)	P	--
<u>Supplementary information and remarks:</u> None		

Appendix A: Test results. Bluetooth Low Energy 5.2 (1M, 2M)

TEST CONDITIONS	21
SAMPLE CALCULATION	24
TEST CASES DETAILS	25
<i>99dBw Occupied Channel Bandwidth 99%</i>	25
<i>RSS-247 6.3.1 (a) / FCC 15.247 (a) (2) [6dBw] 6 dB Bandwidth</i>	33
<i>RSS-247 6.3.1. (b) / FCC 15.247 (e) [PSD] Power Spectral Density</i>	41
<i>RSS-247 6.3.2 / FCC 15.247 (b) [Pkc] Maximum Peak Conducted Output Power</i>	49
<i>RSS-247 6.6 / FCC 15.247 (d) [Bndedge] Band-edge emissions compliance (Transmitter)</i>	58
<i>RSS-247 6.6 / FCC 15.247 (d) [RSE] Emission limitations radiated (Transmitter)</i>	70

TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal: 3.7 Vdc
Type of Power Supply: Internal rechargeable battery

ANTENNA (*):

Type of Antenna: Integral Antenna
Maximum Declared Antenna Gain: -10.5 dBi

TEST FREQUENCIES (*):

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



For measurements that do not include the Spectrum Analyzer Parameters table, a screenshot of the analyzer with the raw results obtained is included, where the parameters can be consulted.

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).

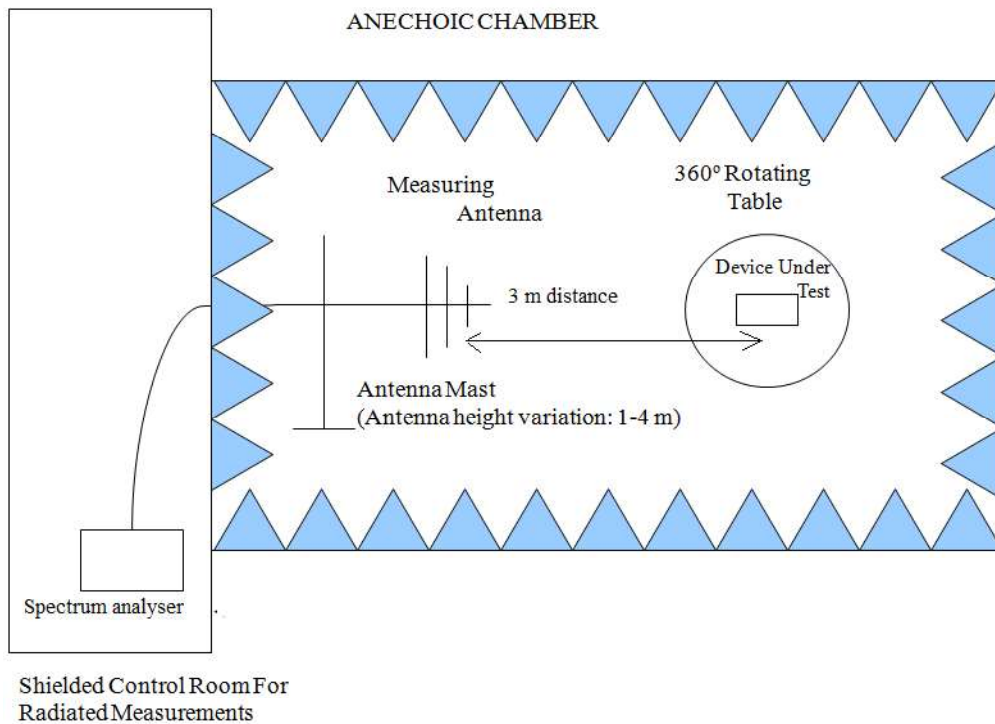
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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.

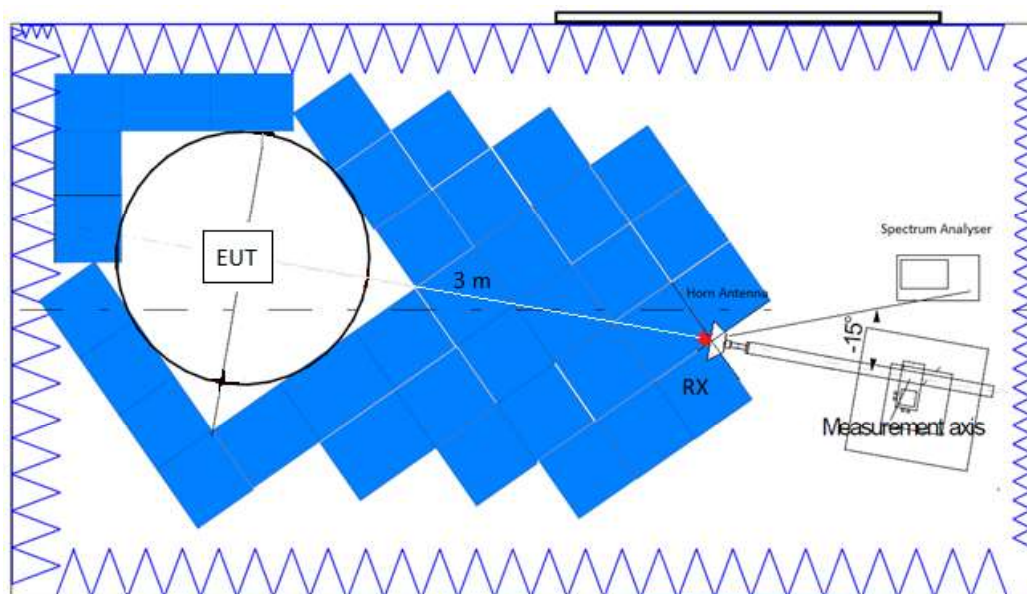
Measurements were made in both horizontal and vertical planes of polarization.

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.

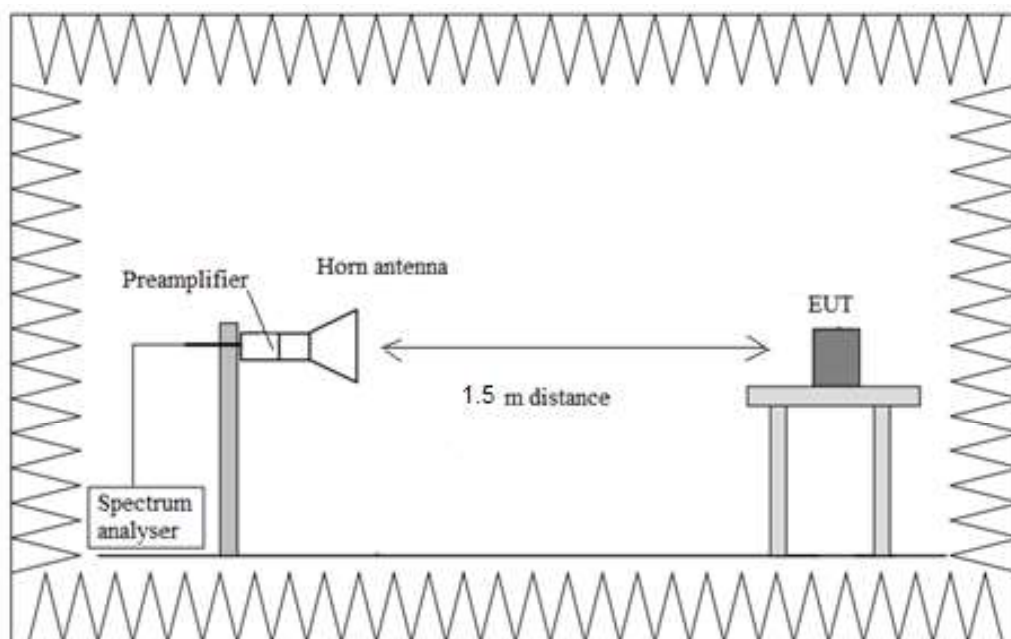
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



SAMPLE CALCULATION

For radiated measurements:

Values measures by the test receiver / analyzer are converted to field strength, in dBuV/m, at the regulatory distance using the following calculation:

$$\text{Unwanted Lvl (dBuV/m)} = \text{Raw Rec (dBuV)} + \text{Preamp (dB)} + \text{Trd Corre. (dB/m)} + \text{SigPath (dB)}$$

Where,

Raw Rec (dBuV): Measured voltage in the receiver / spectrum analyzer in dBuV

Preamp (dB): Path loses due to preamplifier

Trd Corr. (dB/m): Antenna factor in dB/m

SigPath (dB) = Cable loss (dB) – External Gain amplifier (dB) – Distance factor (dB)

Cable loss (dB): Cable loss

External Gain amplifier (dB): Gain from external amplifier (when used)

Distance factor (dB): Distance factor in dB. When measurement distance is different to limit distance

The field strength, calculated by this way is compared with the regulatory limit.

TEST CASES DETAILS

99dBw Occupied Channel Bandwidth 99%

Limits

RSS-Gen 6.7 / FCC 2.1049 - Occupied Channel Bandwidth 99%

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained.

Modulation: BTLE 5.2 (GFSK 1 Mbit/s)

Results

Operation Band (MHz)	Equipment	Freq (MHz)	Port	Occ Ch BW (MHz)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00000	1	1.025
		2440.00000		1.025
		2480.00000		1.025

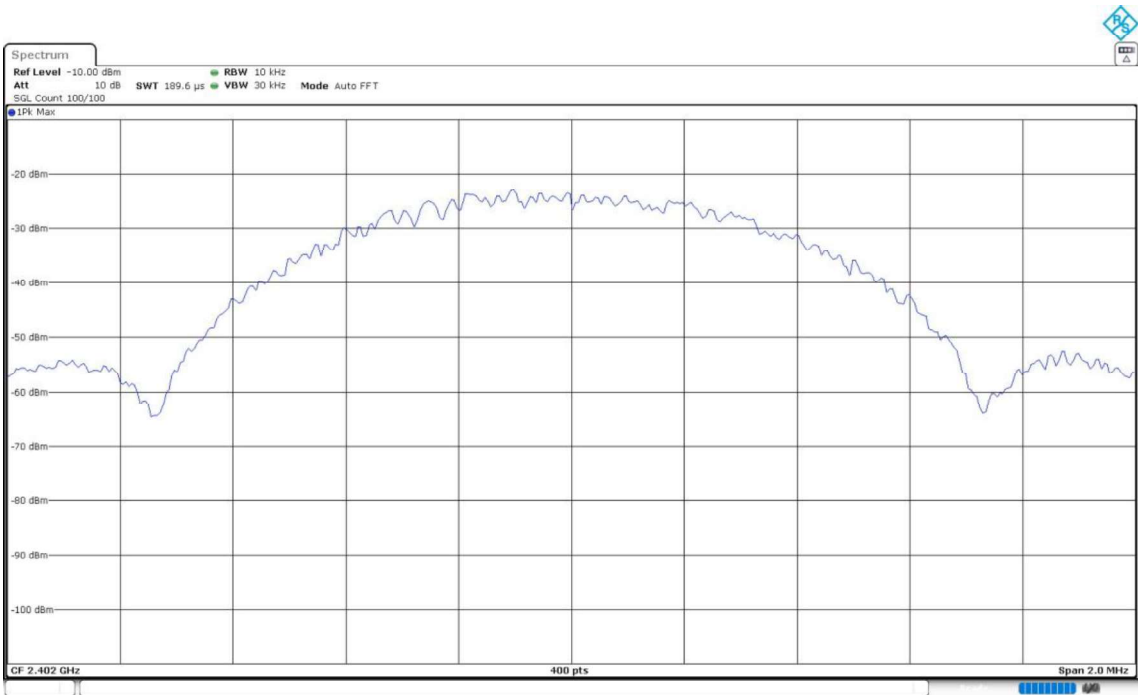
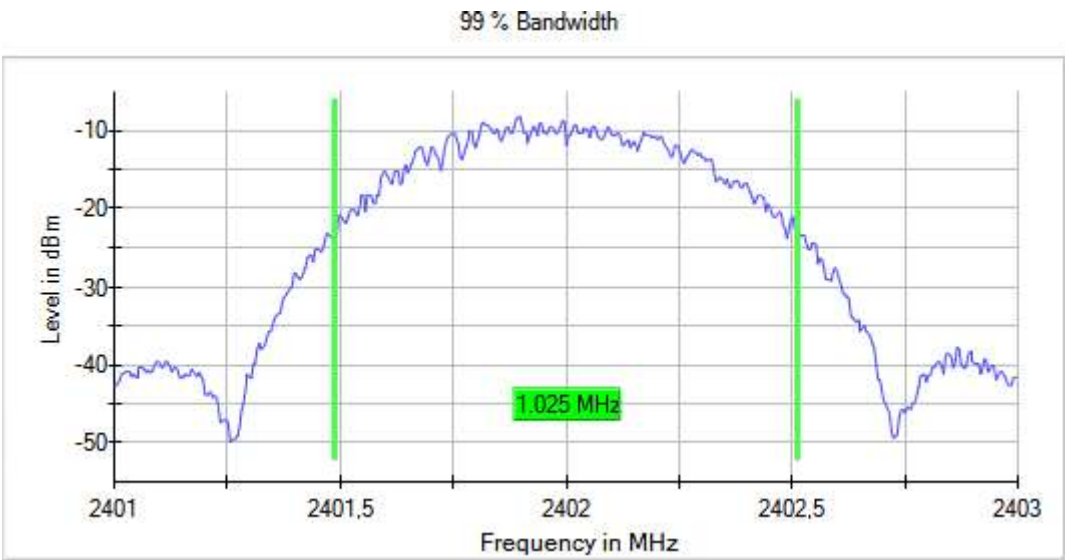
Verdict

Pass

Attachments

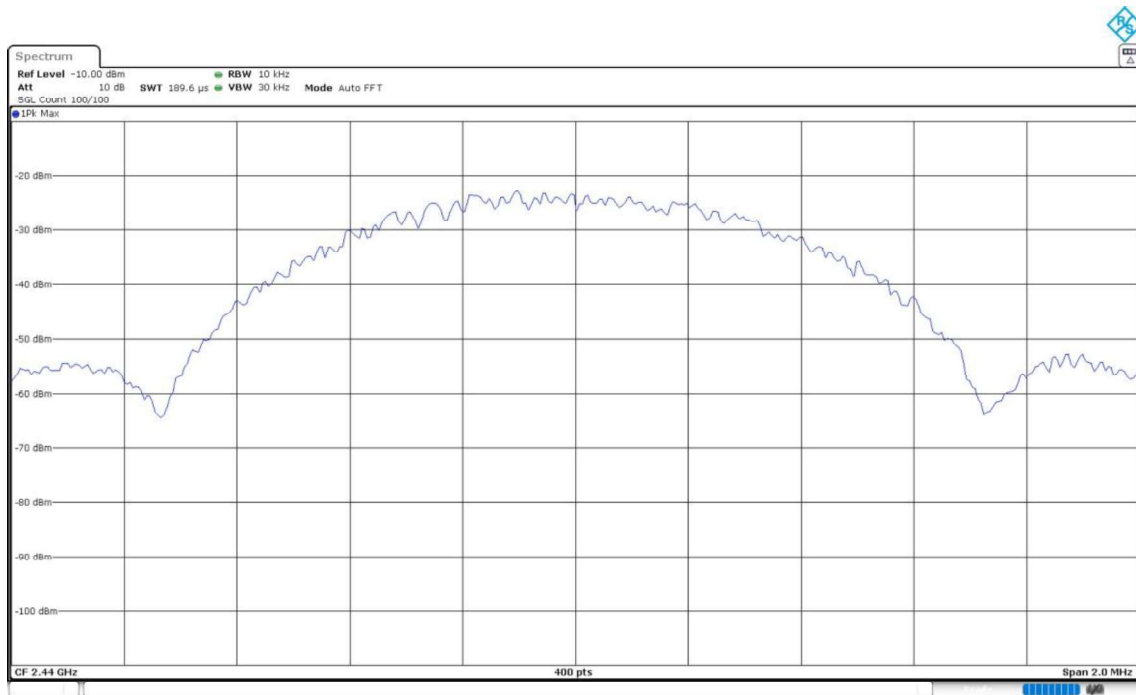
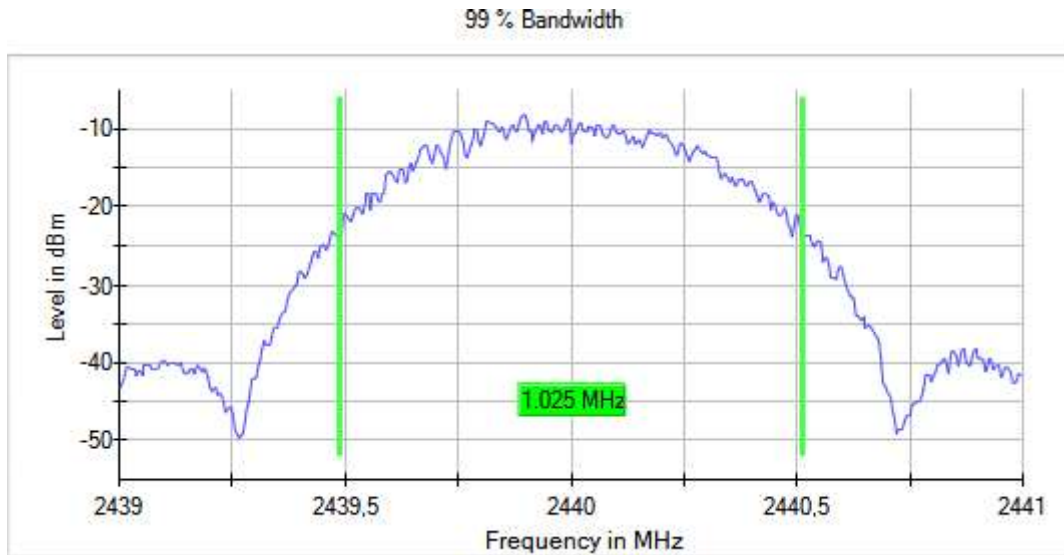
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2402.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



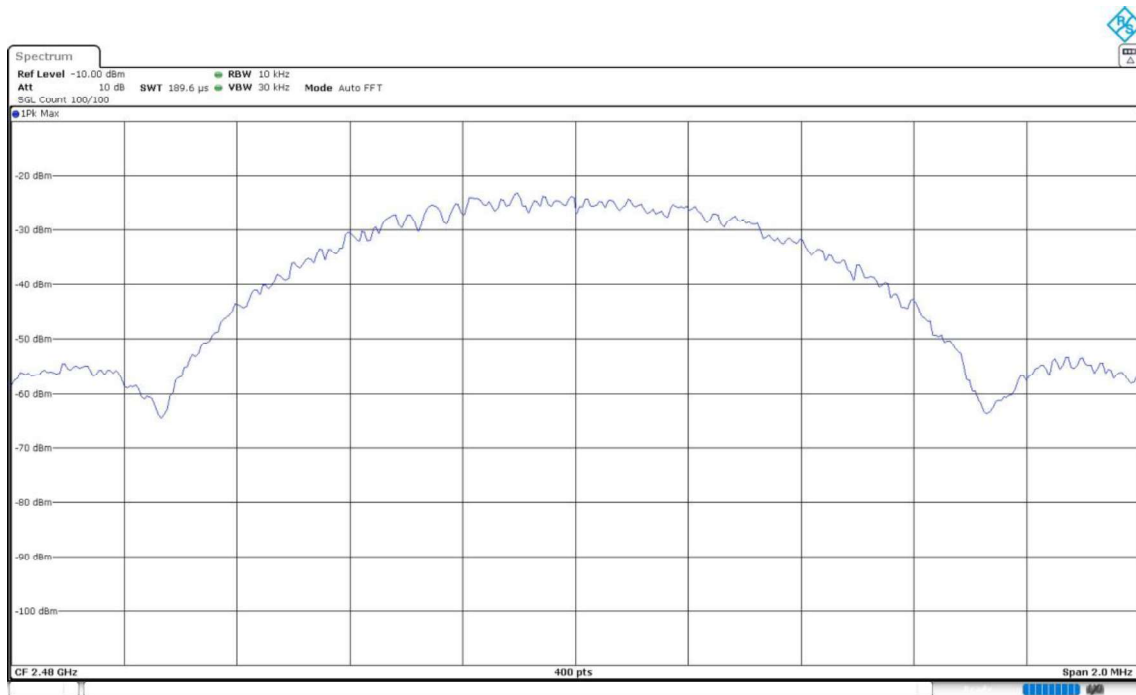
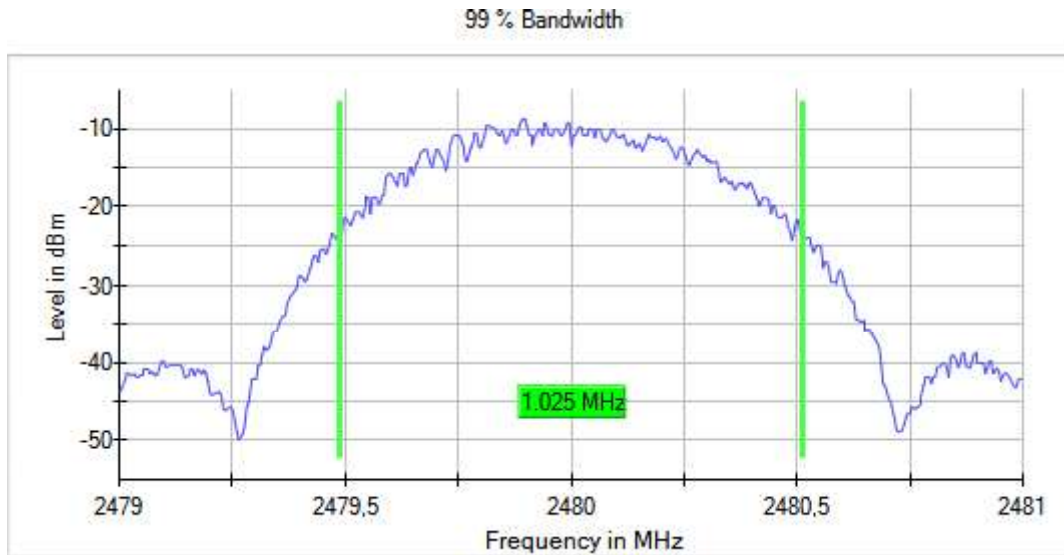
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
 Frequency MHz = 2440.00000 Active Port = 1
 Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
 Frequency MHz = 2480.00000 Active Port = 1
 Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Modulation: BTLE 5.2 (GFSK 2 Mbit/s)

Results

Operation Band (MHz)	Equipment	Freq (MHz)	Port	Occ Ch BW (MHz)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00000	1	2.050
		2440.00000		2.050
		2480.00000		2.050

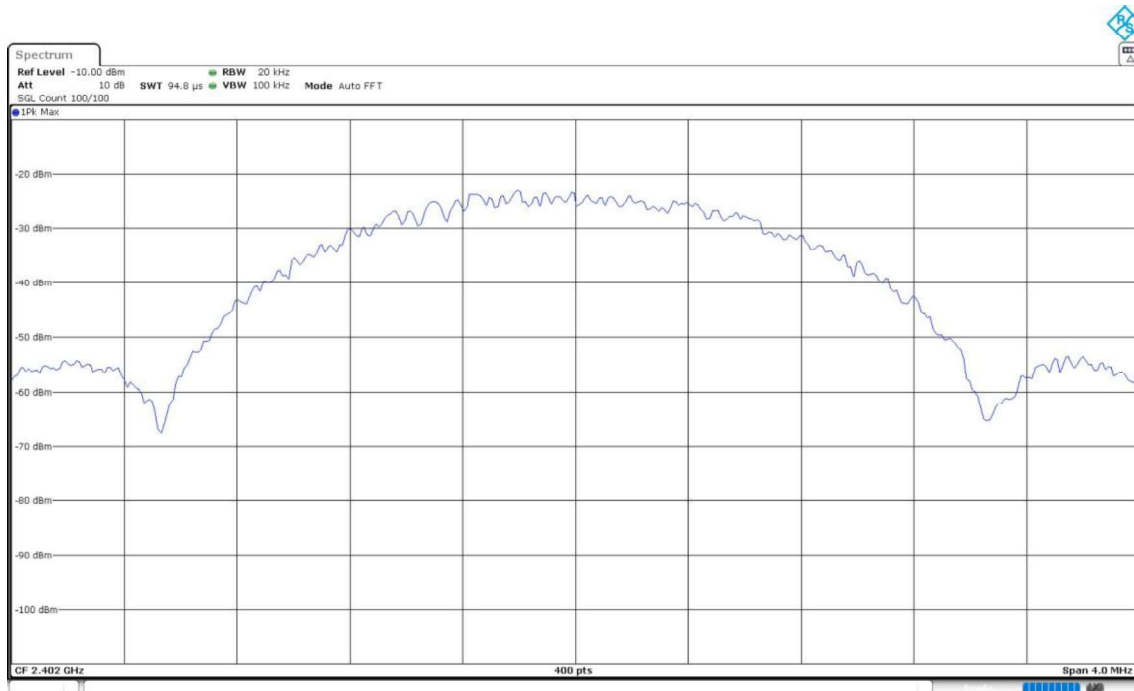
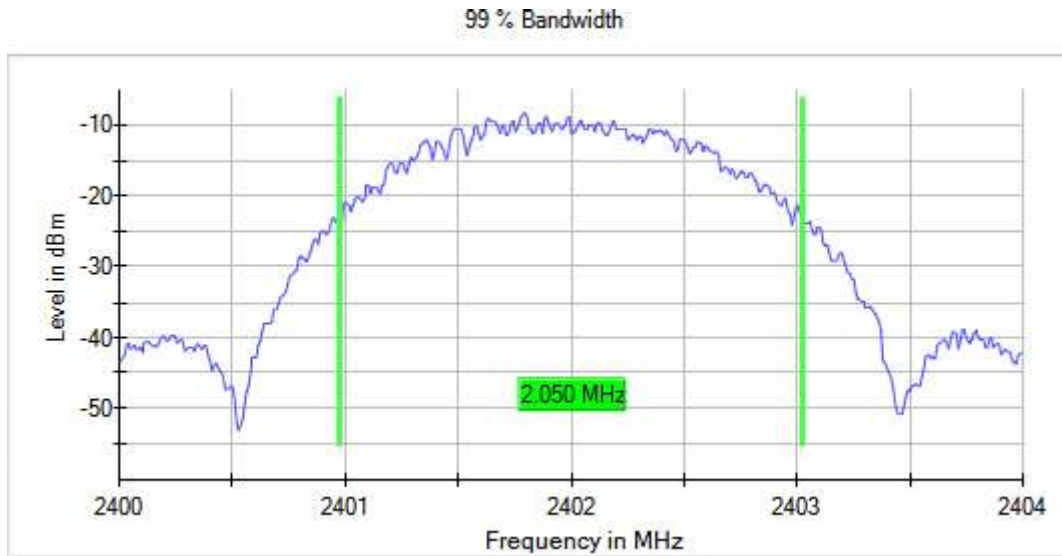
Verdict

Pass

Attachments

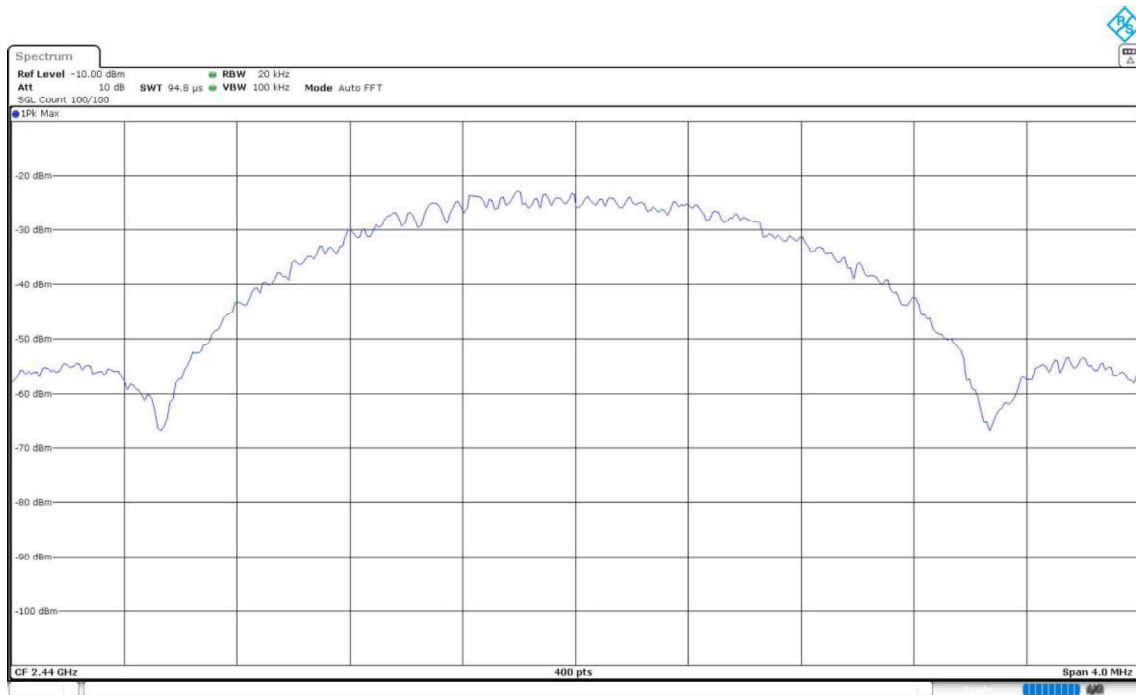
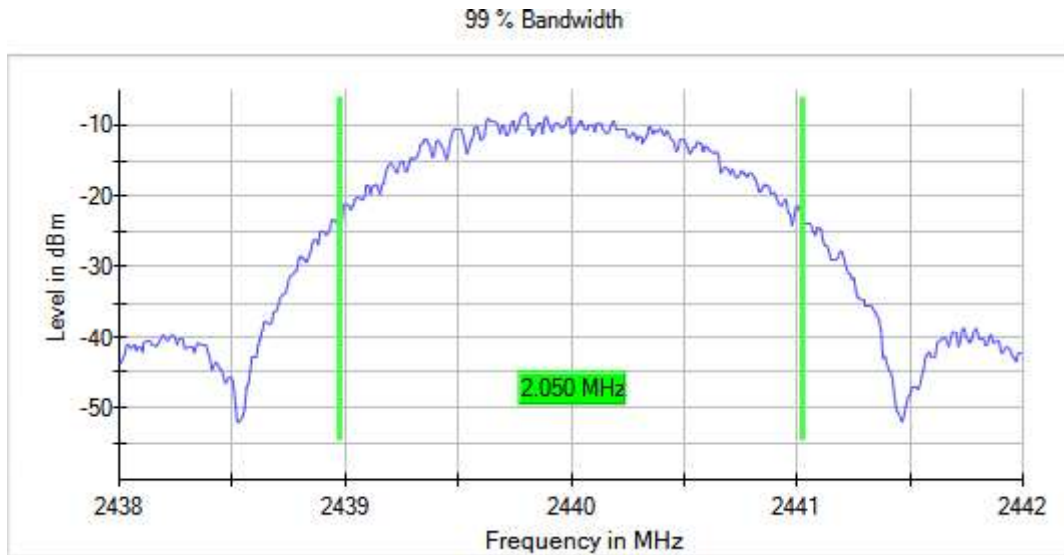
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
 Frequency MHz = 2402.00000 Active Port = 1
 Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



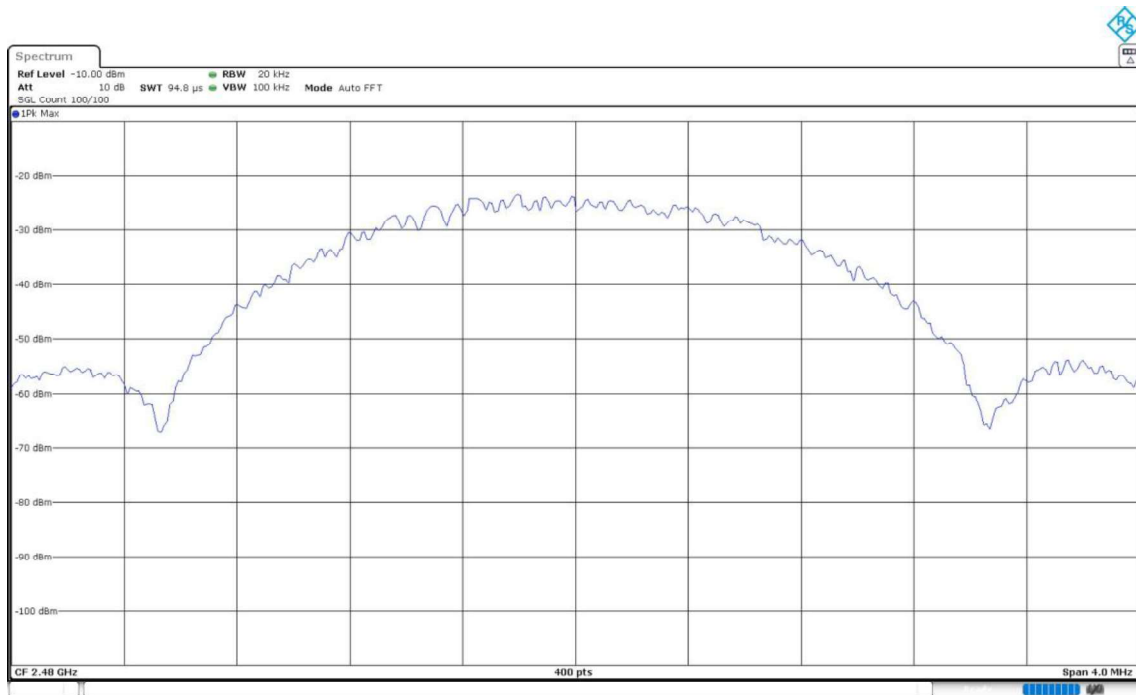
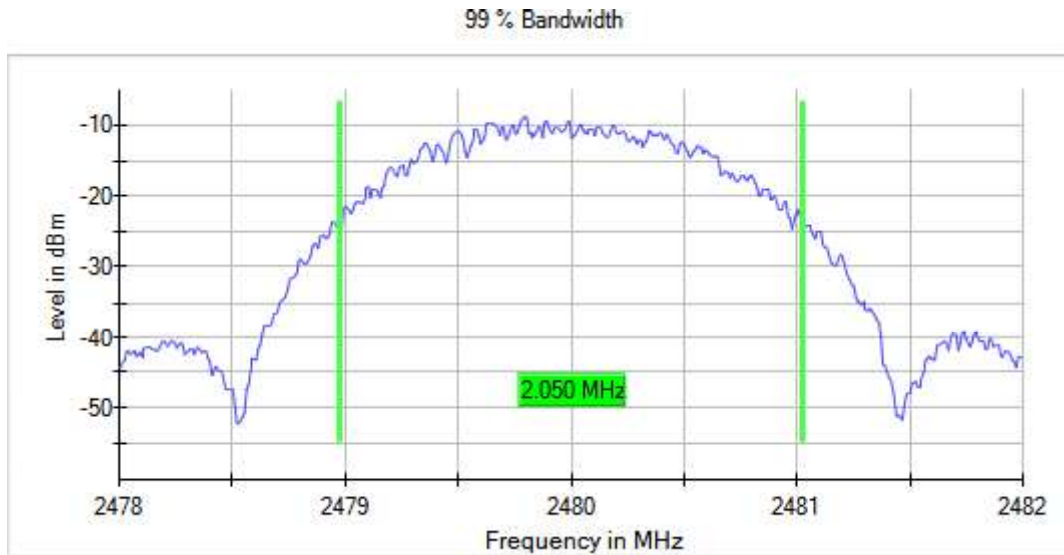
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
 Frequency MHz = 2440.00000 Active Port = 1
 Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
 Frequency MHz = 2480.00000 Active Port = 1
 Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



RSS-247 6.3.1 (a) / FCC 15.247 (a) (2) [6dBw] 6 dB Bandwidth

Limits

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Modulation: BTLE 5.2 (GFSK 1 Mbit/s)

Results

Operation Band (MHz)	Equipment	Freq (MHz)	Port	Ebw (MHz)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00000	1	0.733
		2440.00000		0.733
		2480.00000		0.733

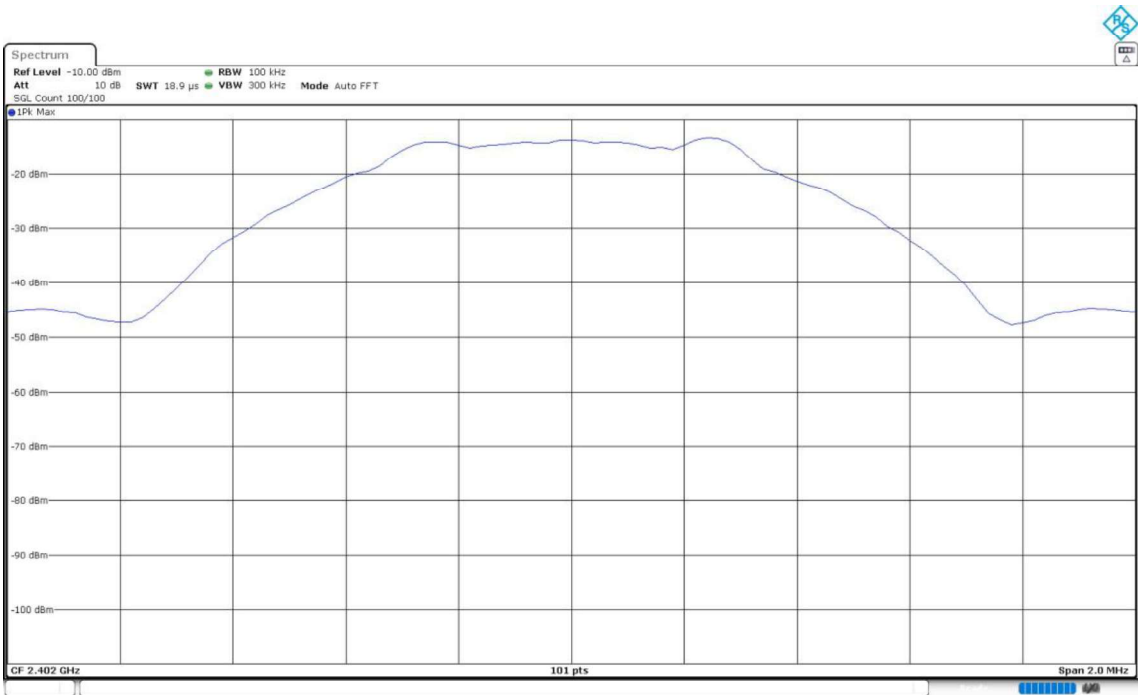
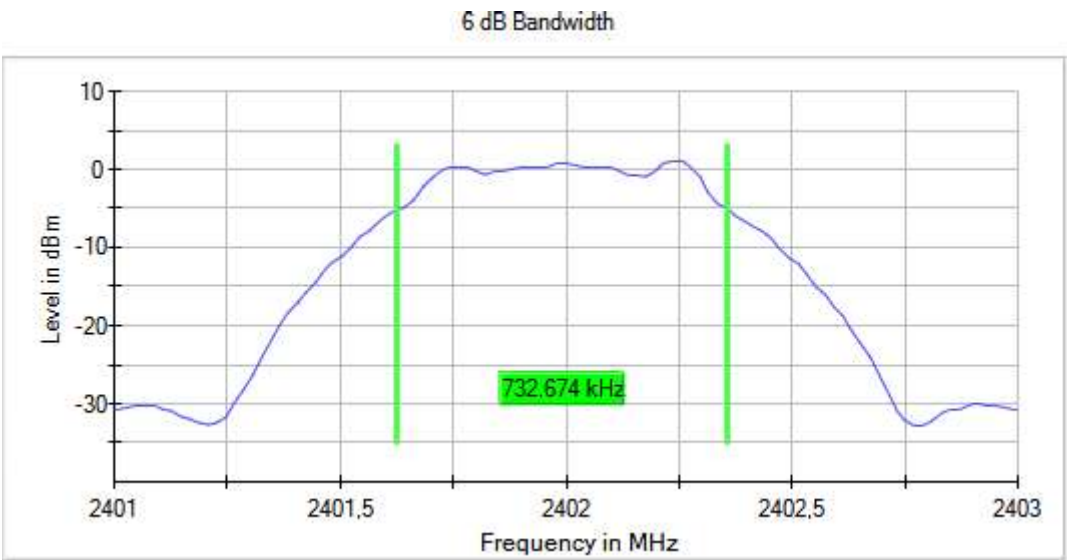
Verdict

Pass

Attachments

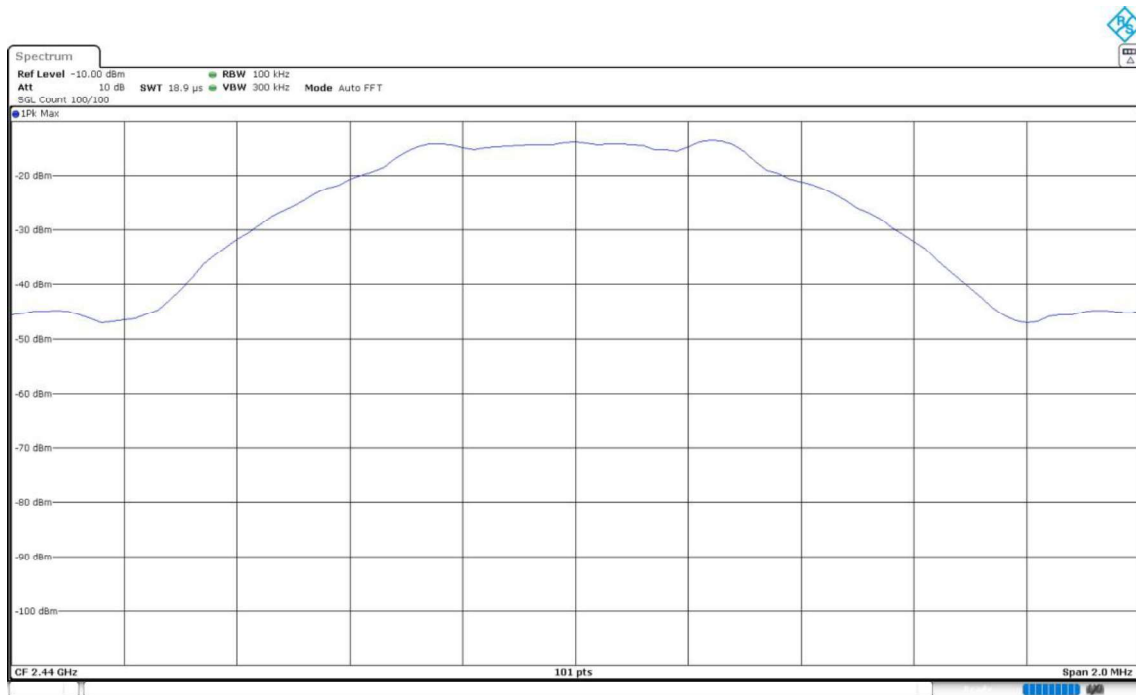
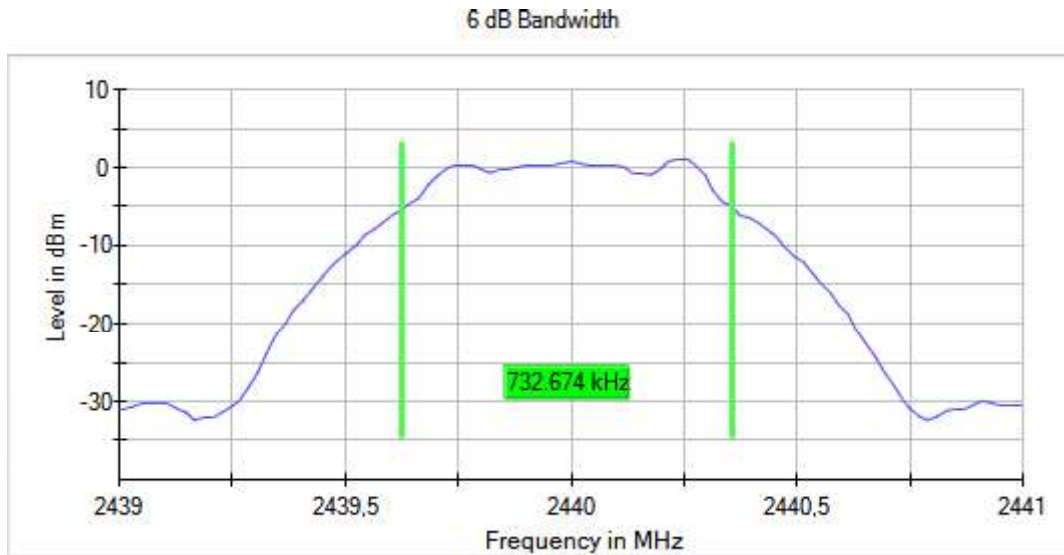
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2402.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



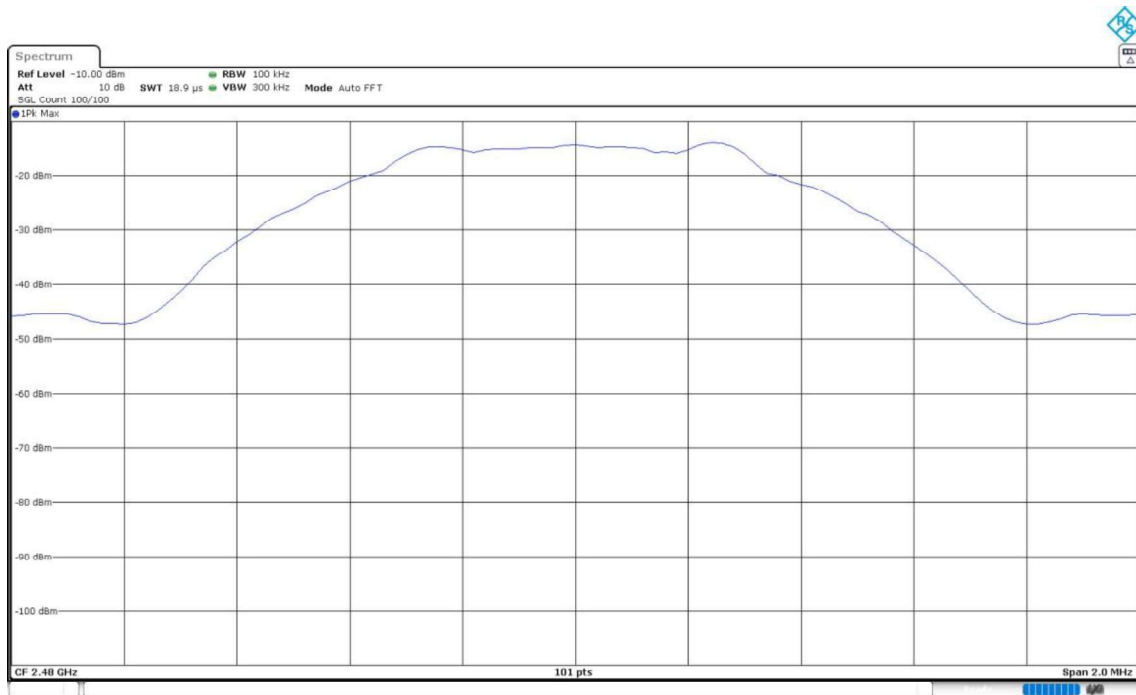
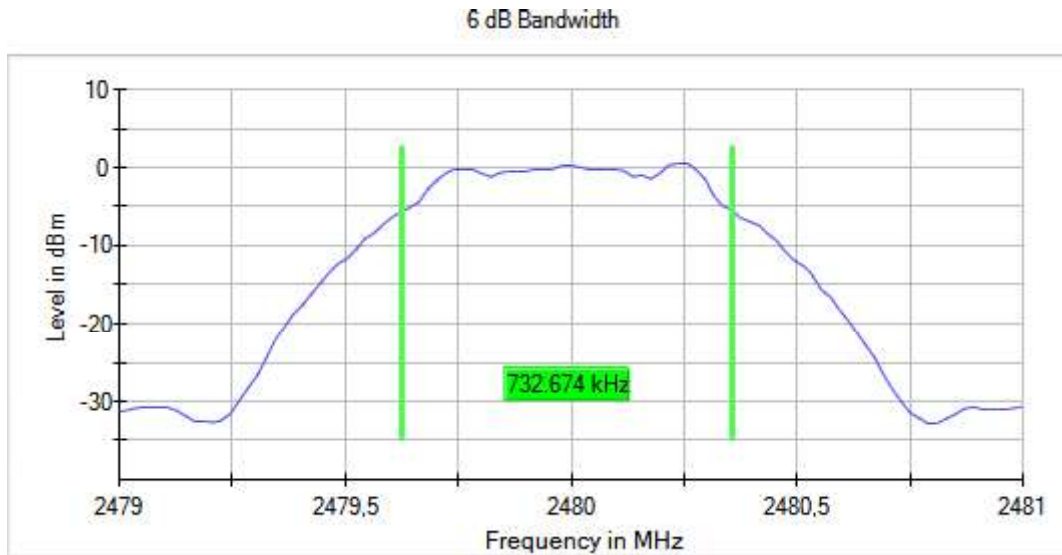
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
 Frequency MHz = 2440.00000 Active Port = 1
 Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
 Frequency MHz = 2480.00000 Active Port = 1
 Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Modulation: BTLE 5.2 (GFSK 2 Mbit/s)

Results

Operation Band (MHz)	Equipment	Freq (MHz)	Port	Ebw (MHz)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00000	1	1.426
		2440.00000		1.426
		2480.00000		1.426

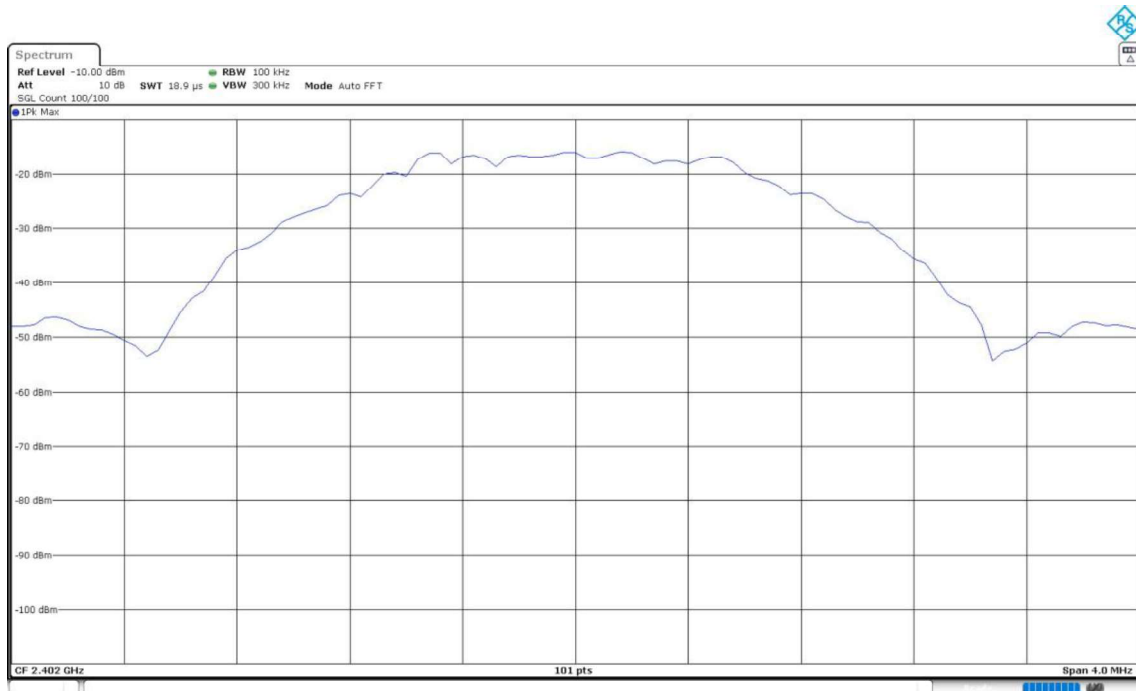
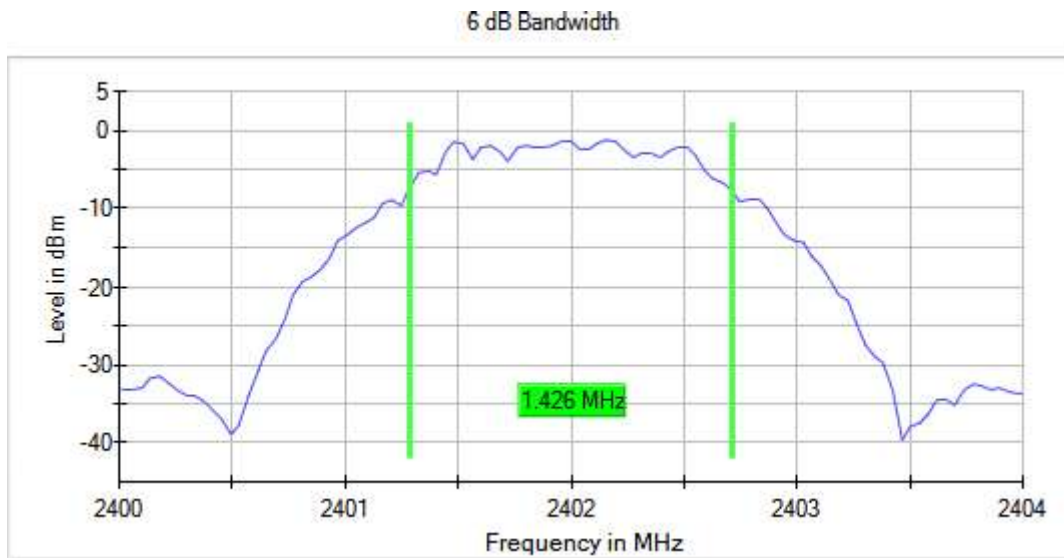
Verdict

Pass

Attachments

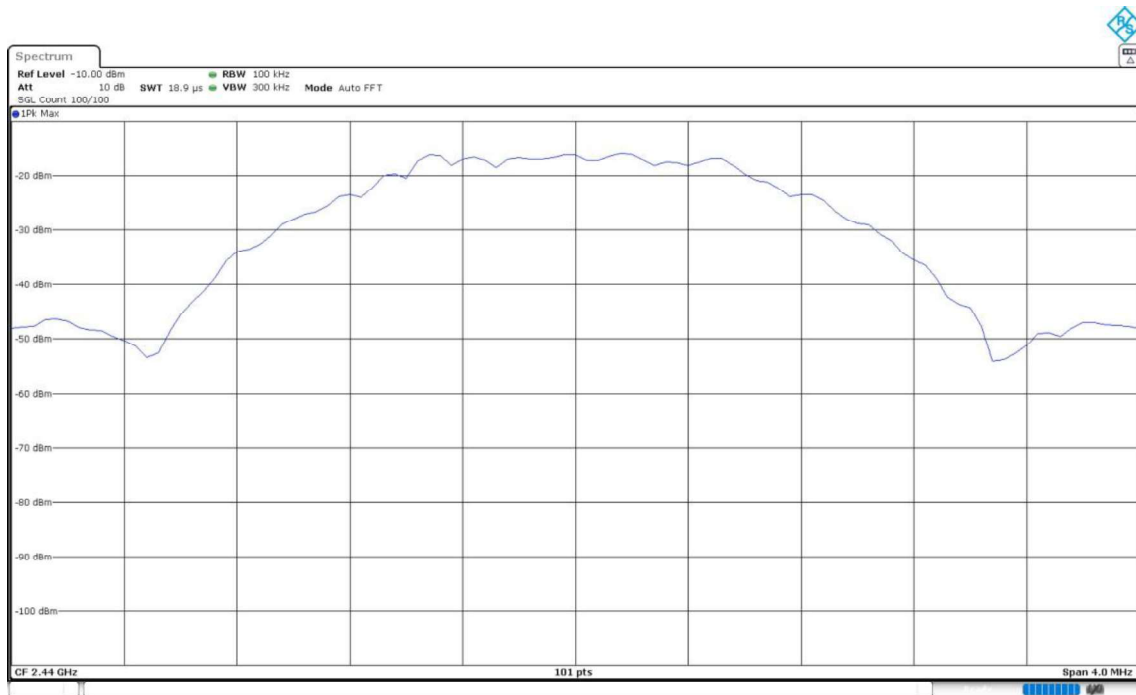
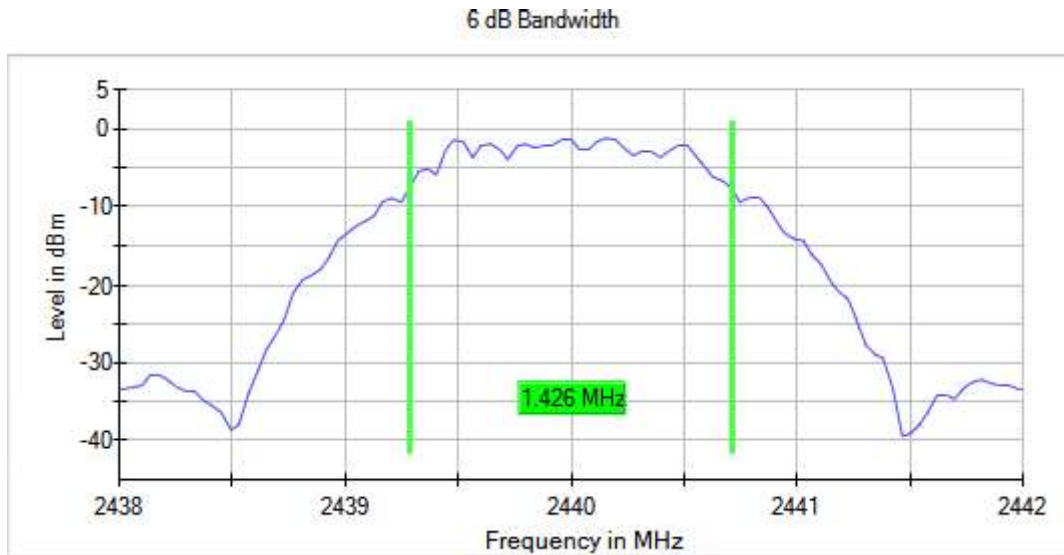
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
 Frequency MHz = 2402.00000 Active Port = 1
 Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



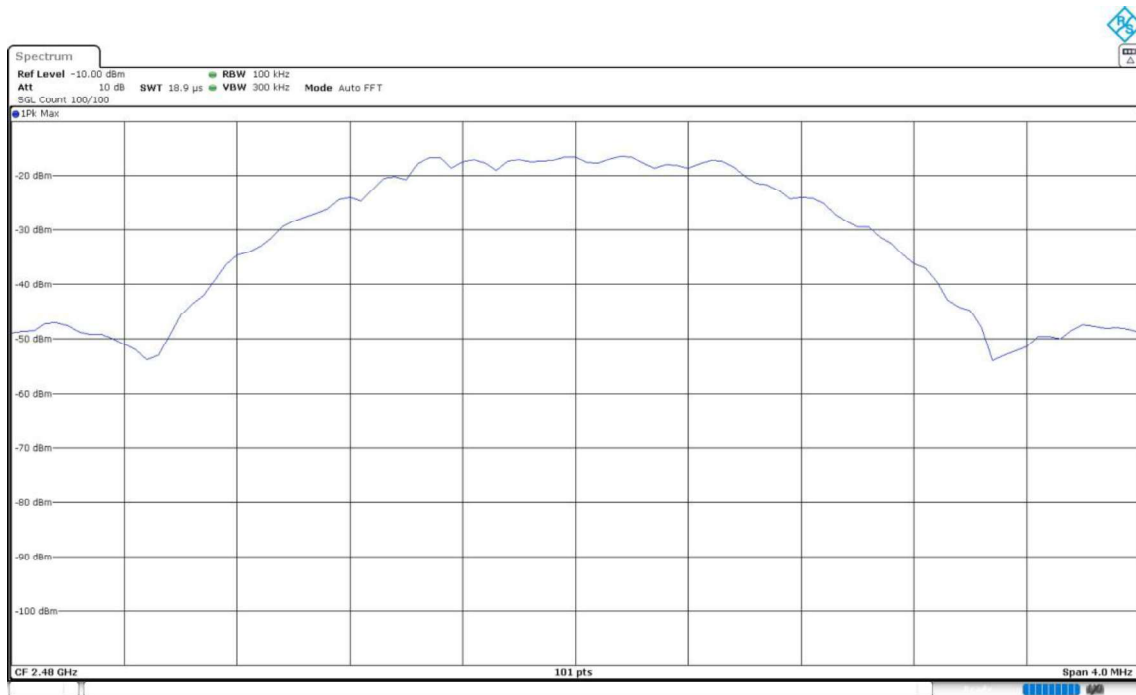
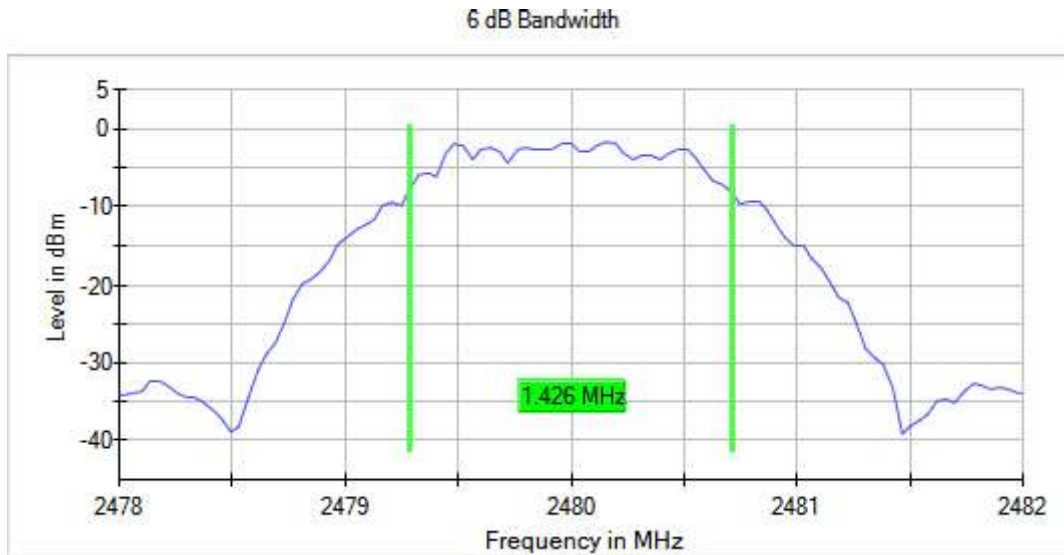
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
 Frequency MHz = 2440.00000 Active Port = 1
 Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2480.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



RSS-247 6.3.1. (b) / FCC 15.247 (e) [PSD] 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.

Modulation: BTLE 5.2 (GFSK 1 Mbit/s)

Results

Operation Band (MHz)	Equipment	Freq (MHz)	Port	PSD (dBm)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00000	1	-8.21
		2440.00000		-8.19
		2480.00000		-8.64

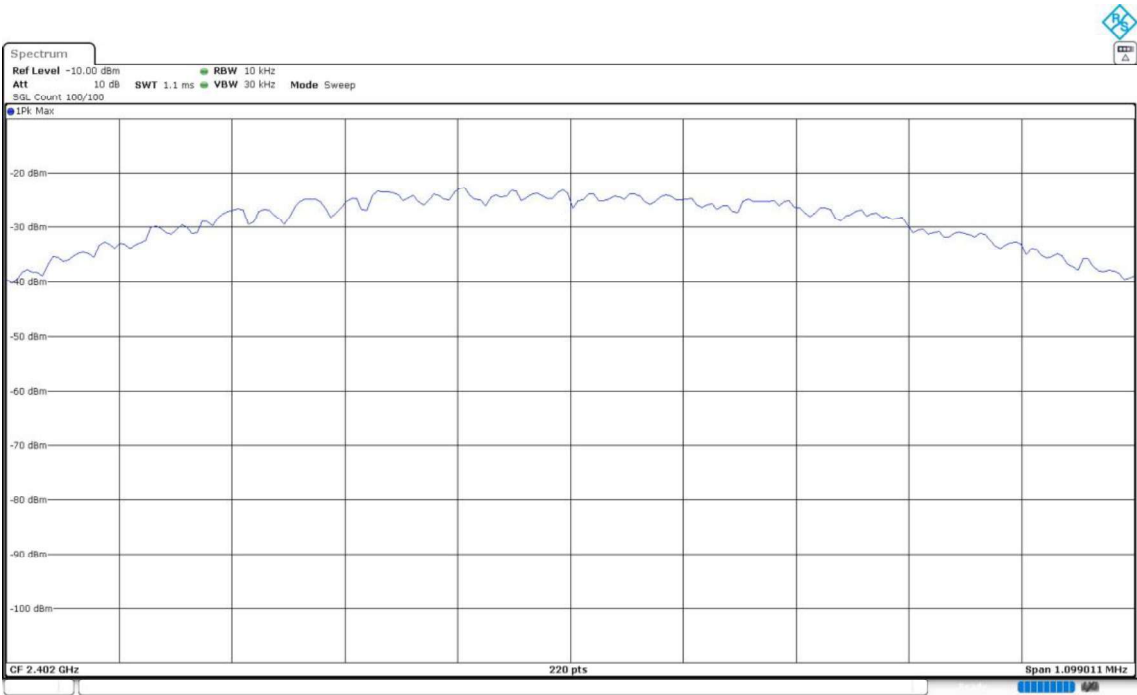
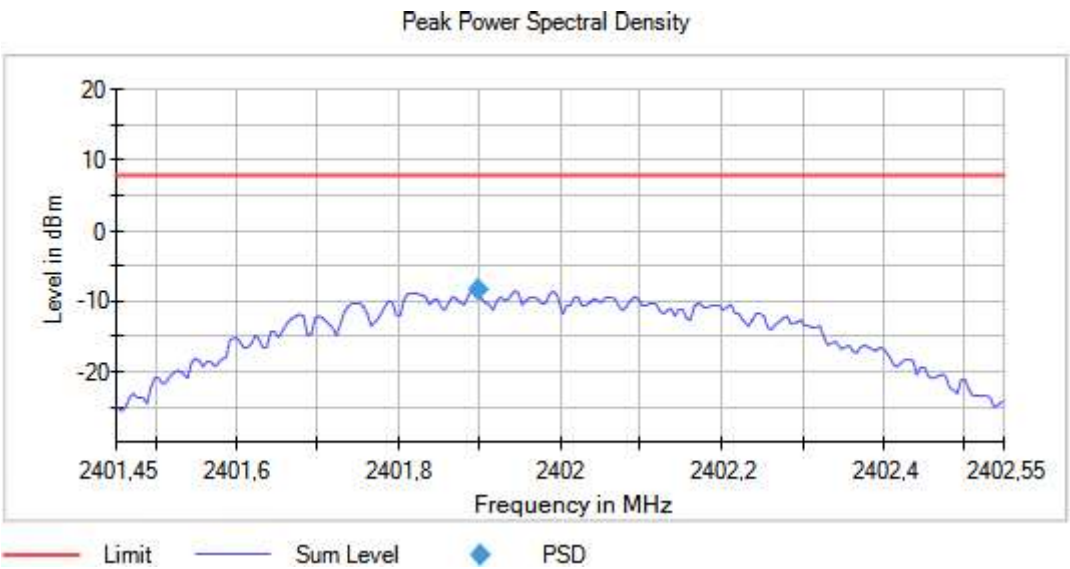
Verdict

Pass

Attachments

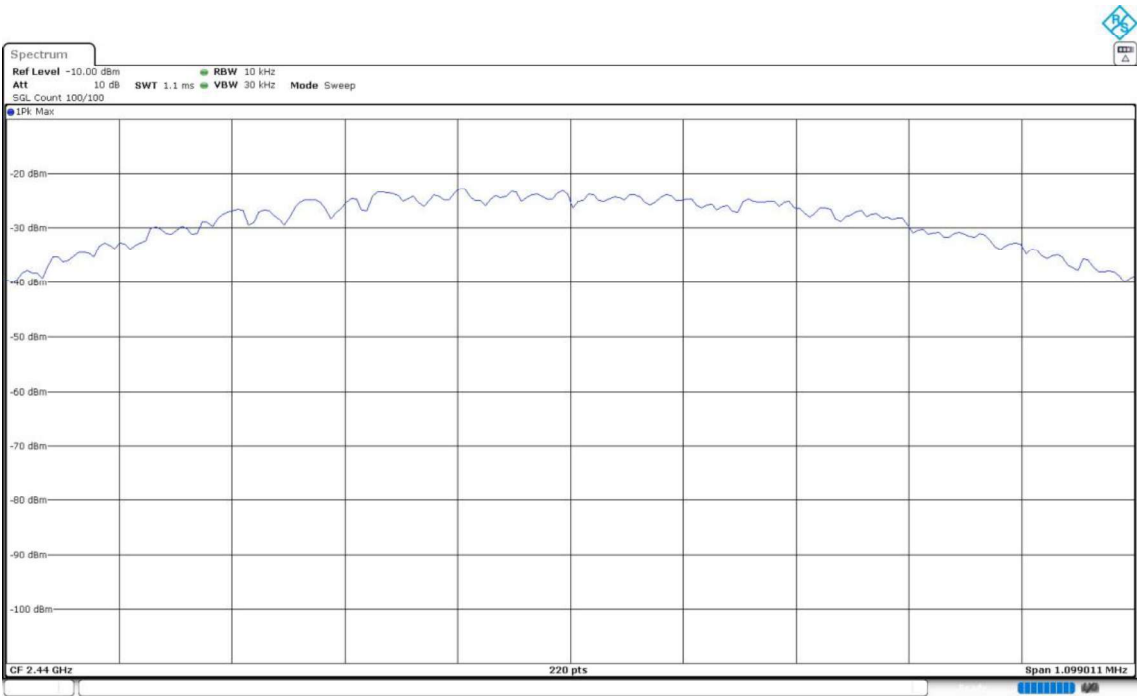
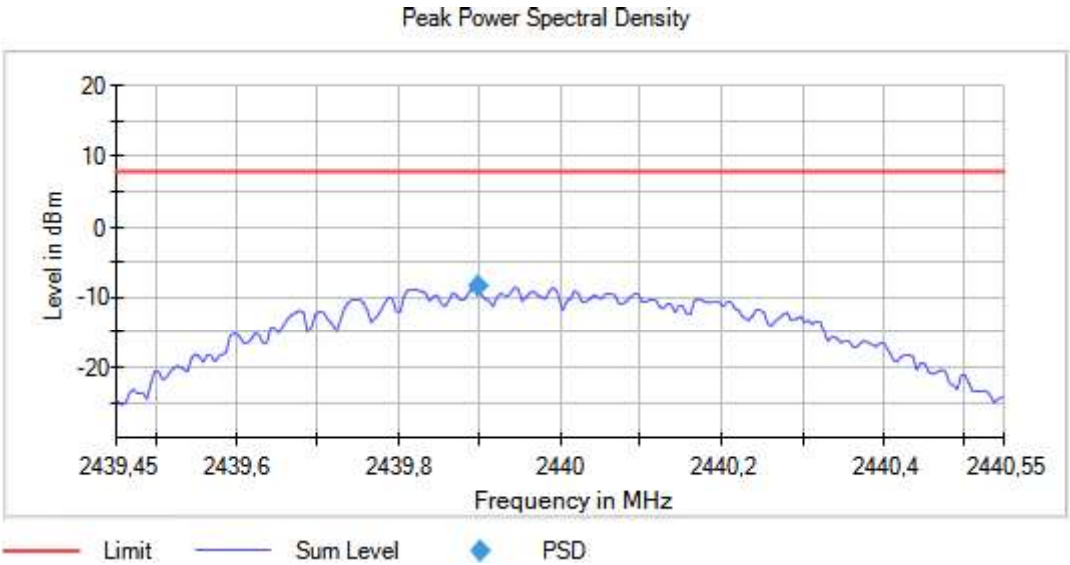
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2402.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



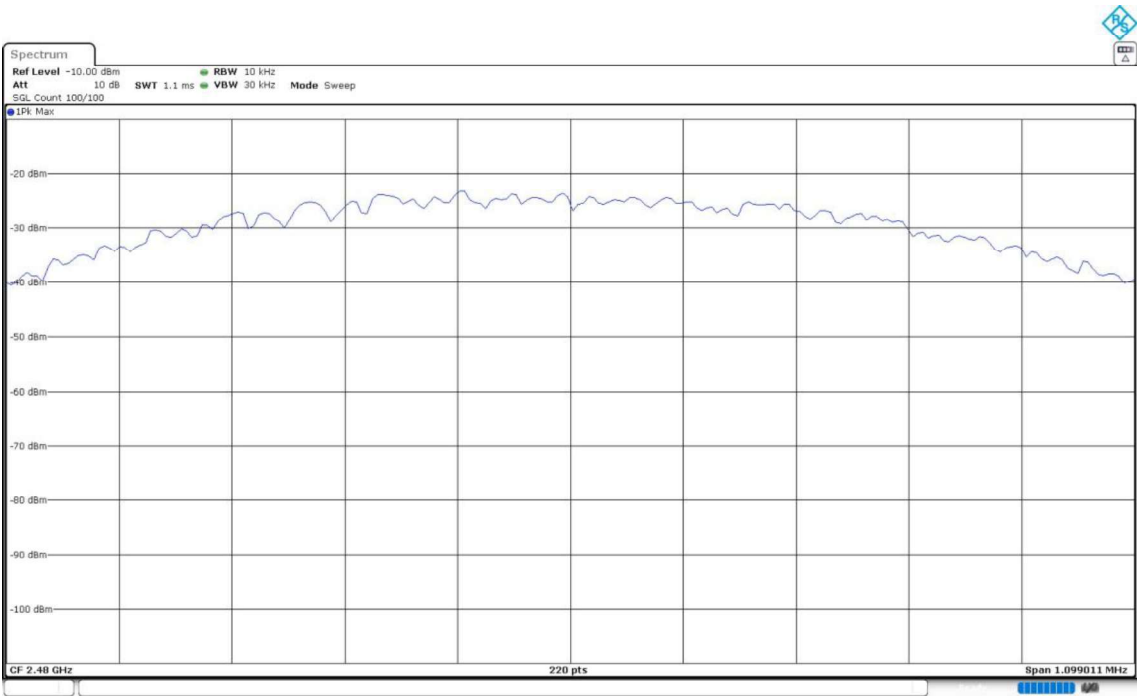
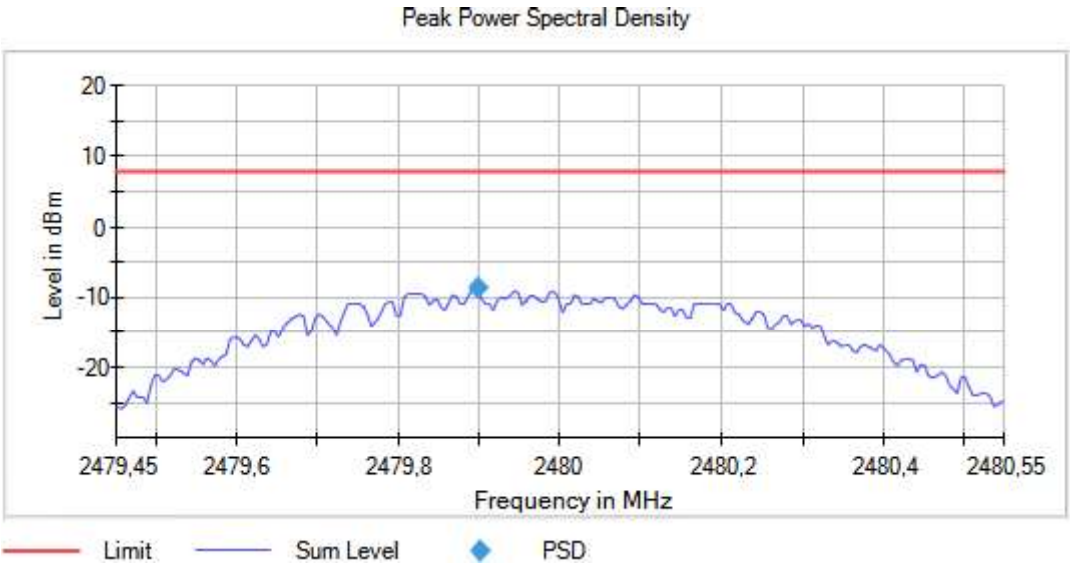
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2440.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2480.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Modulation: BTLE 5.2 (GFSK 2 Mbit/s)

Results

Operation Band (MHz)	Equipment	Freq (MHz)	Port	PSD (dBm)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00000	1	-12.09
		2440.00000		-12.04
		2480.00000		-12.55

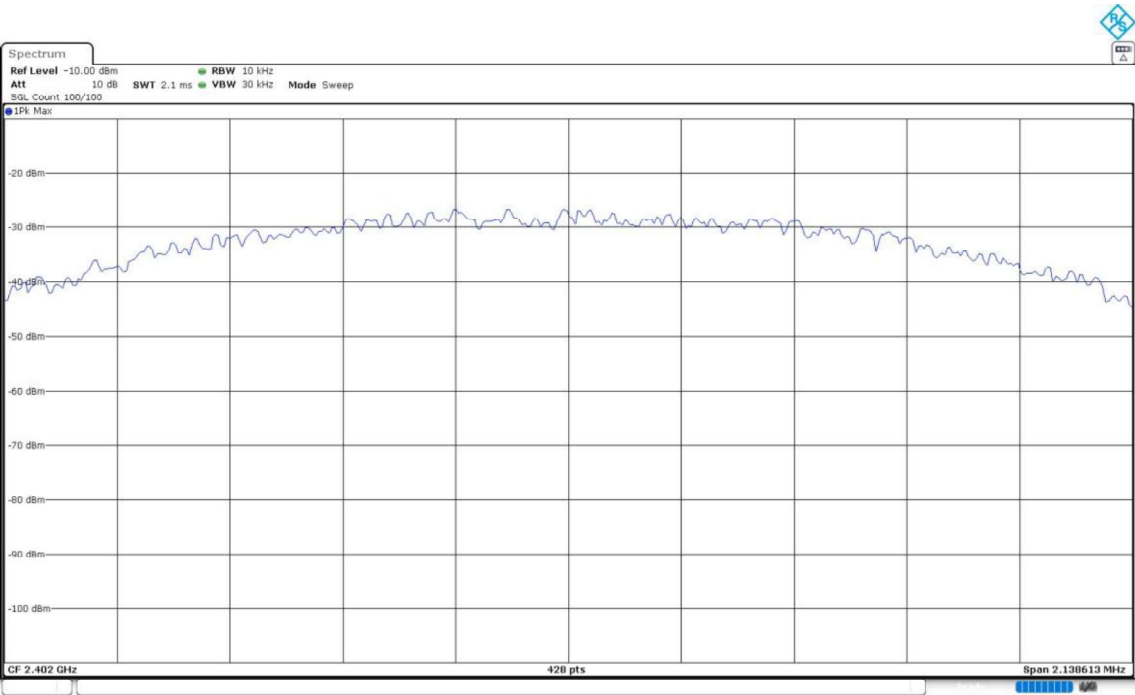
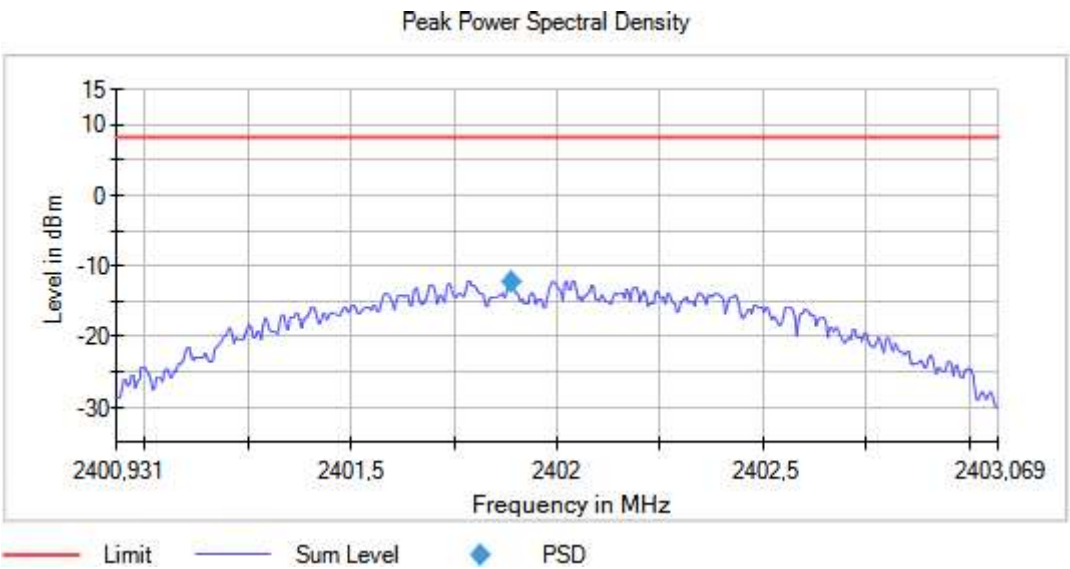
Verdict

Pass

Attachments

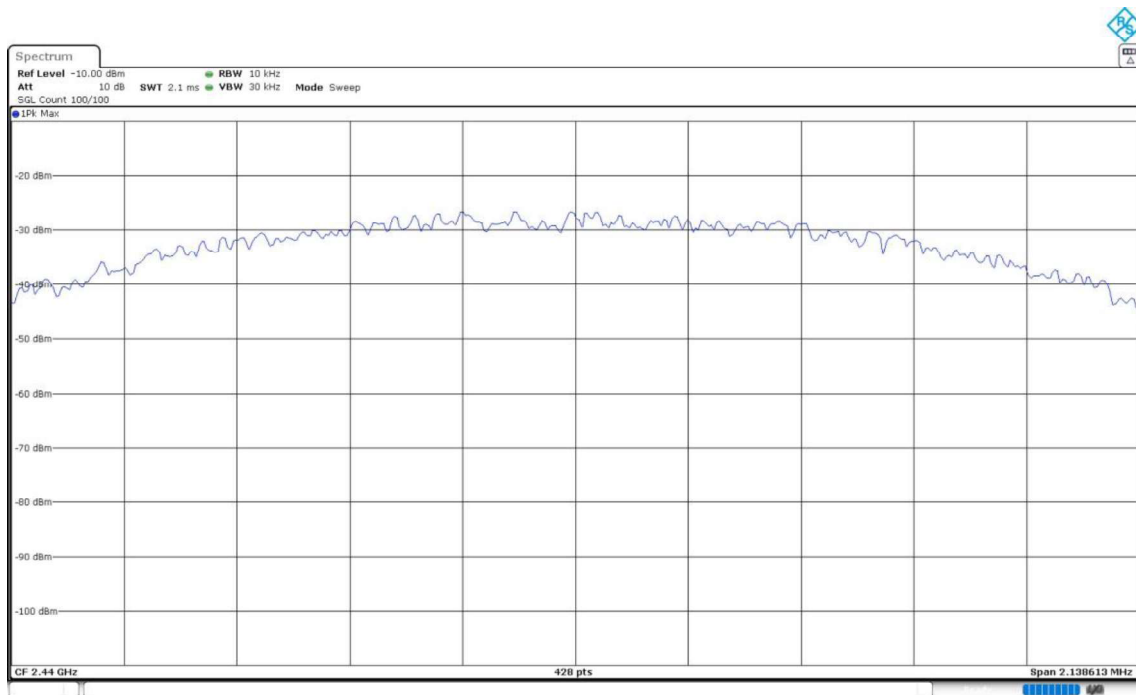
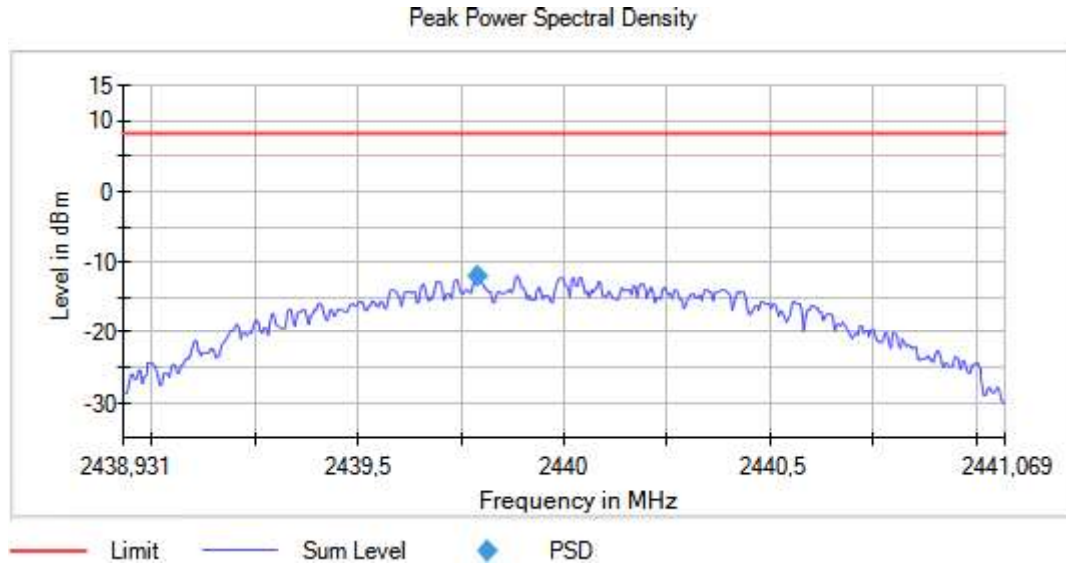
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2402.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



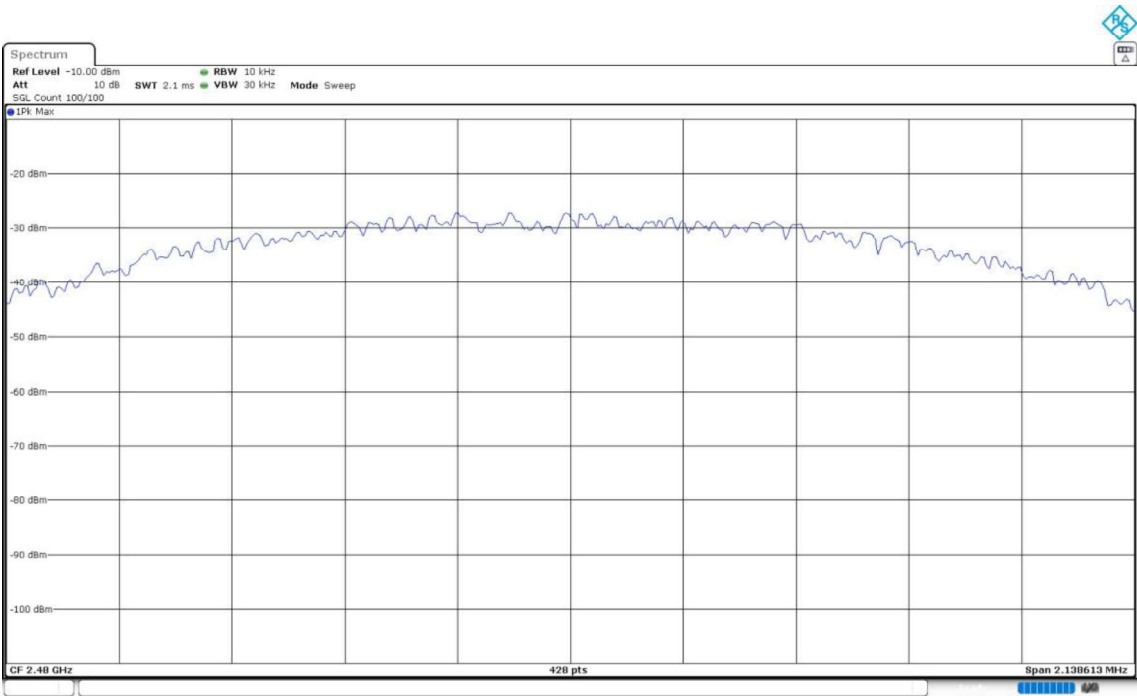
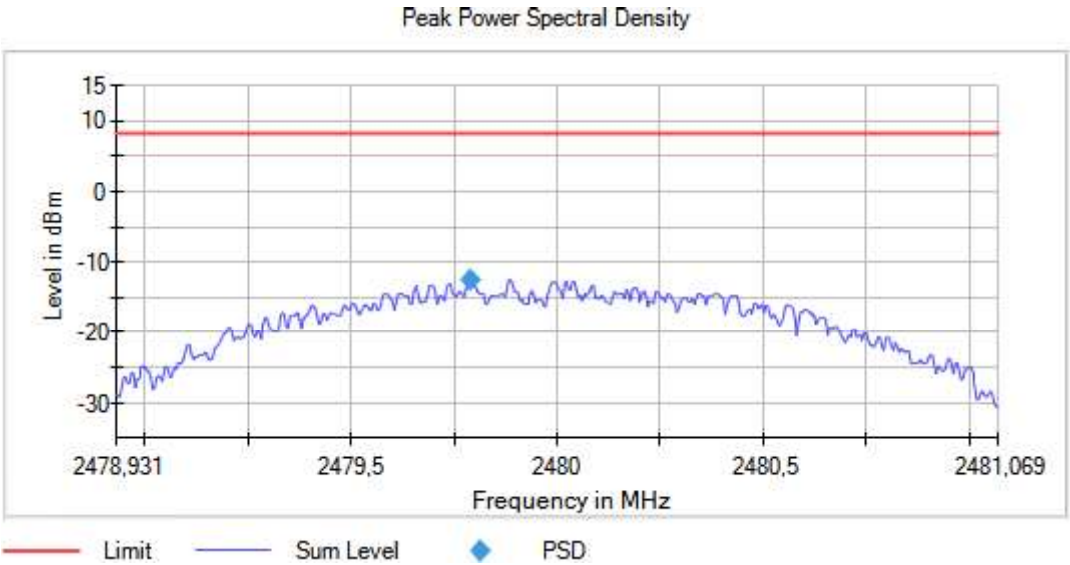
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2440.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2480.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



RSS-247 6.3.2 / FCC 15.247 (b) [Pkcp] Maximum Peak Conducted Output Power

Limits

FCC 15.247 (b) (3)

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

RSS 5.4 (d)

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

Modulation: BTLE 5.2 (GFSK 1 Mbit/s)

Results

Operation Band (MHz)	Equipment	Freq (MHz)	Port	Peak Power (dBm)	E.I.R.P. (dBm)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00000	1	1.8580	-8.642
		2440.00000		1.8290	-8.671
		2480.00000		1.3220	-9.178

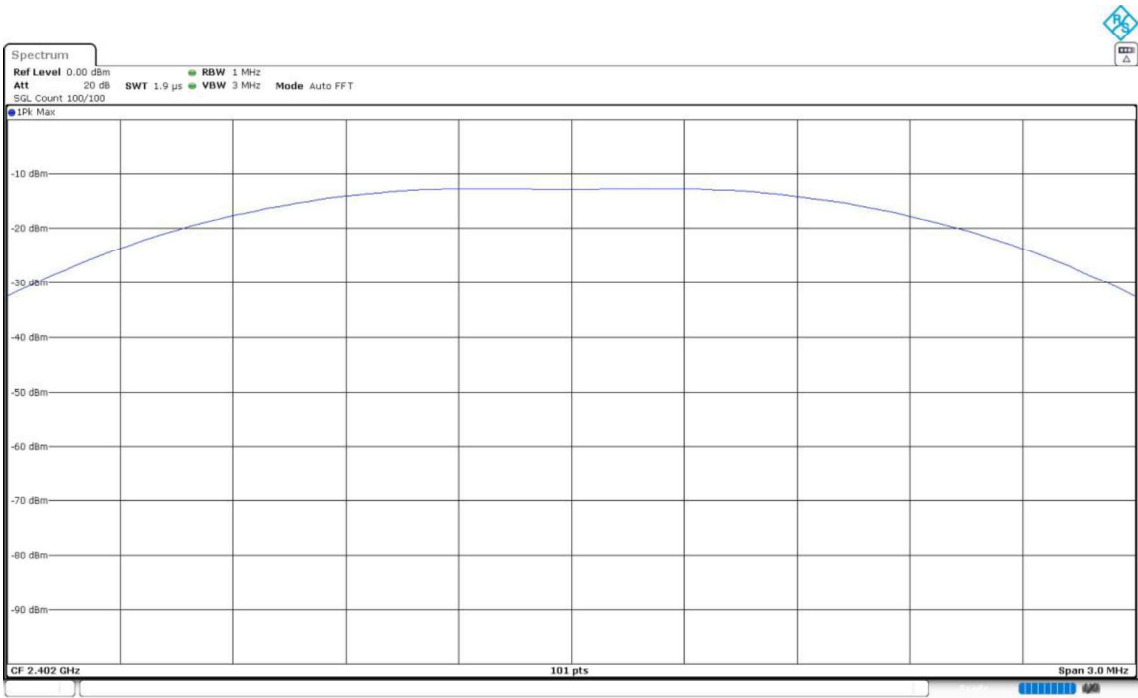
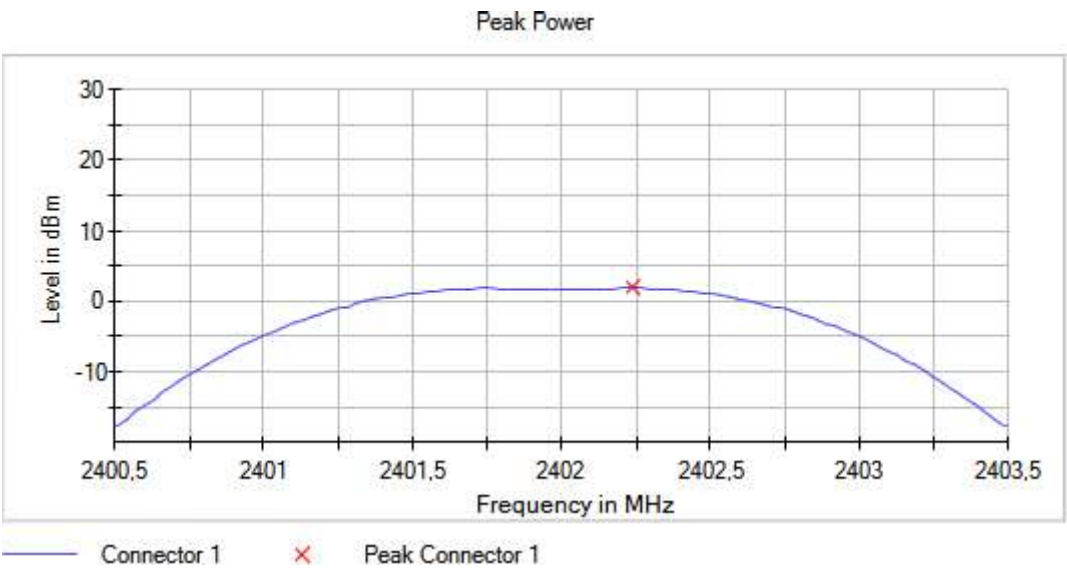
Verdict

Pass

Attachments

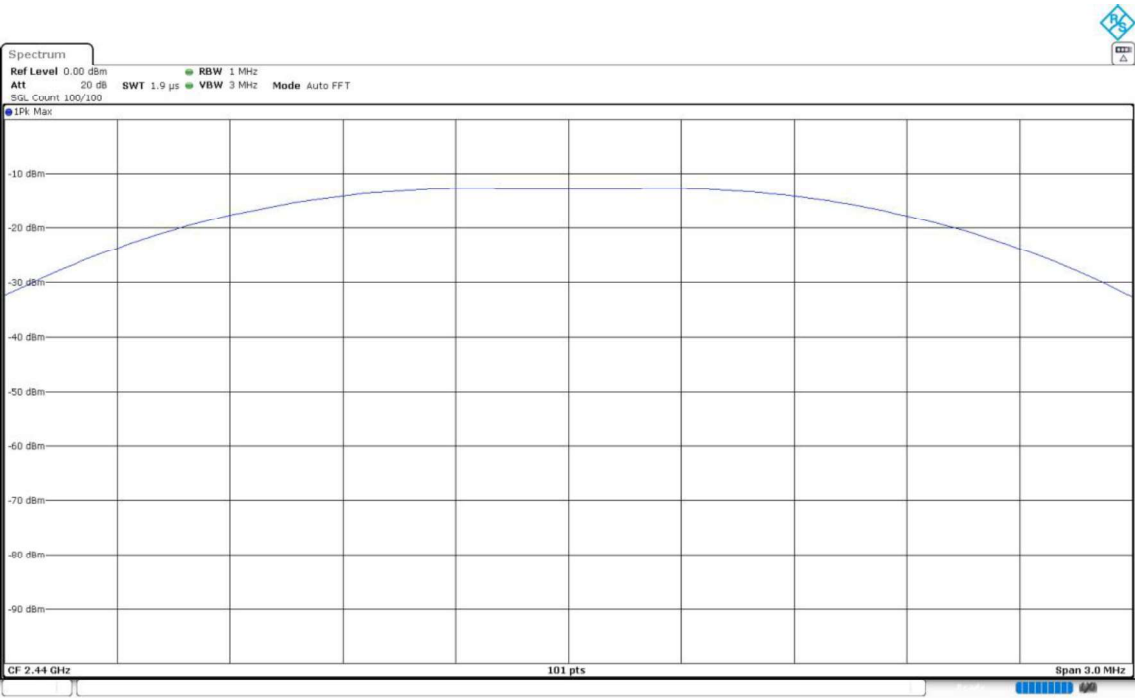
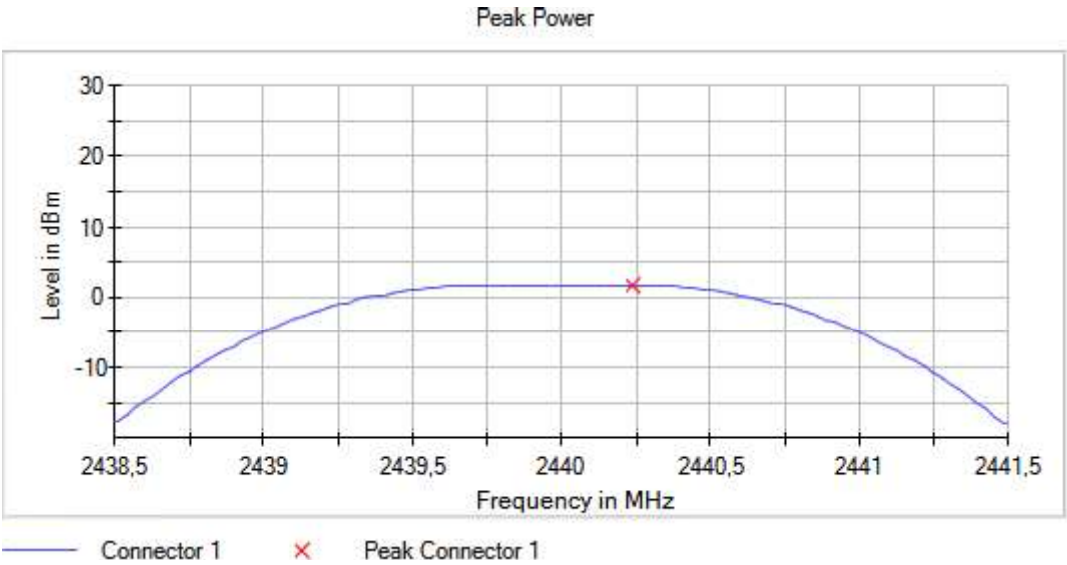
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2402.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



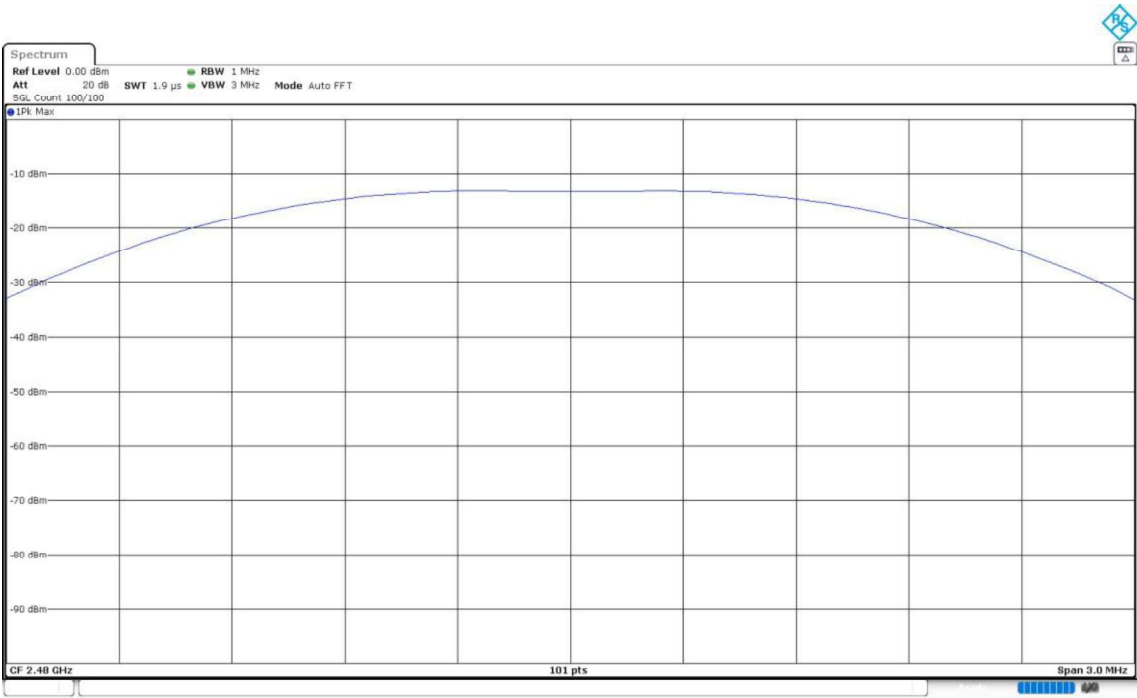
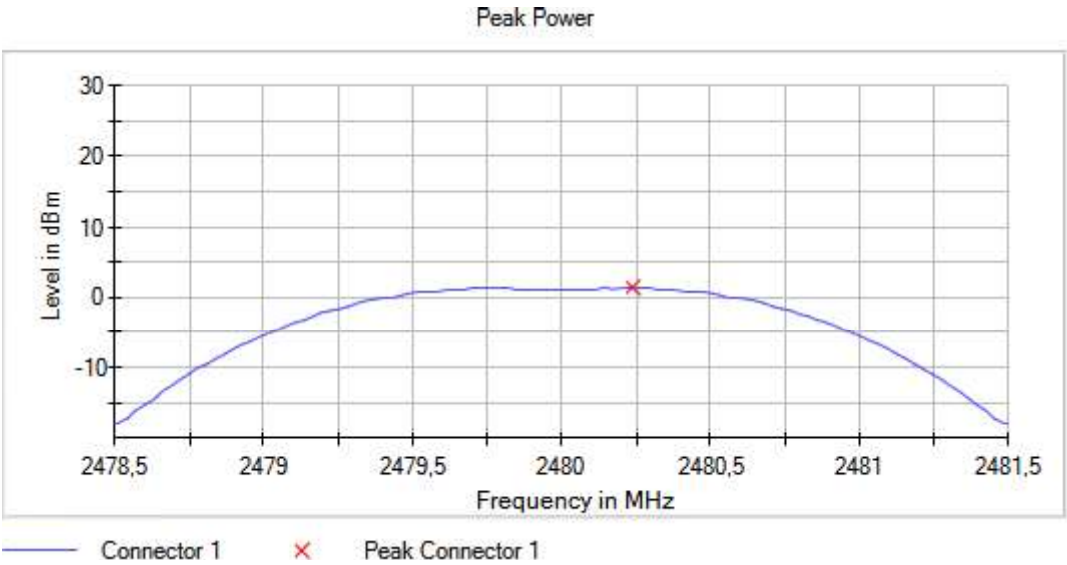
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2440.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2480.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Modulation: BTLE 5.2 (GFSK 2 Mbit/s)

Results

Operation Band (MHz)	Equipment	Freq (MHz)	Port	Peak Power (dBm)	E.I.R.P. (dBm)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00000	1	1.7880	-8.712
		2440.00000		1.7780	-8.712
		2480.00000		1.2510	-9.249

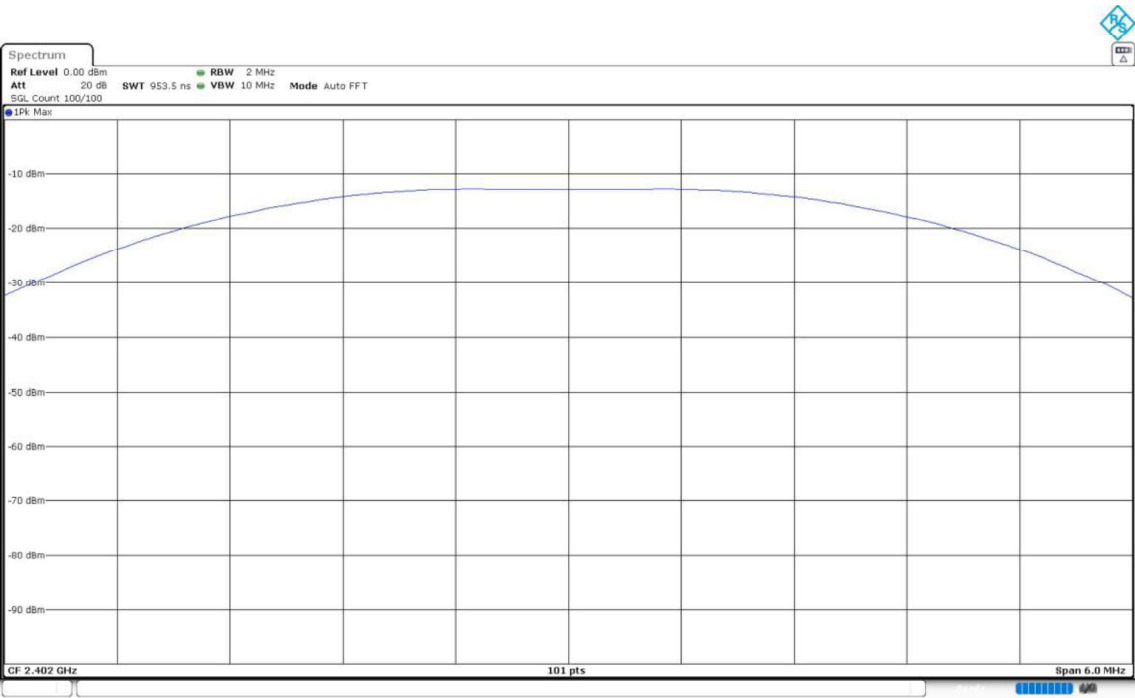
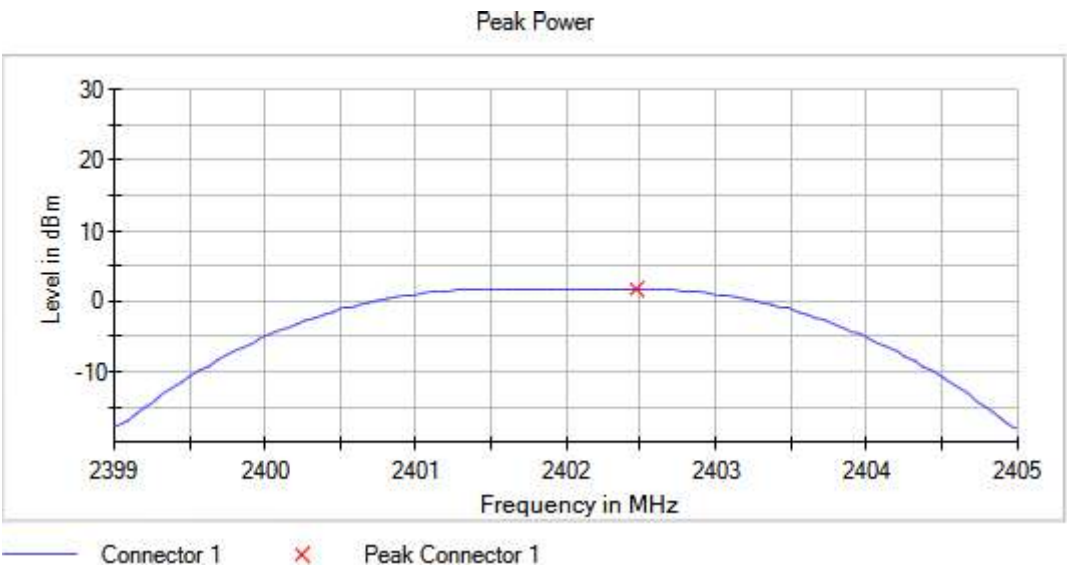
Verdict

Pass

Attachments

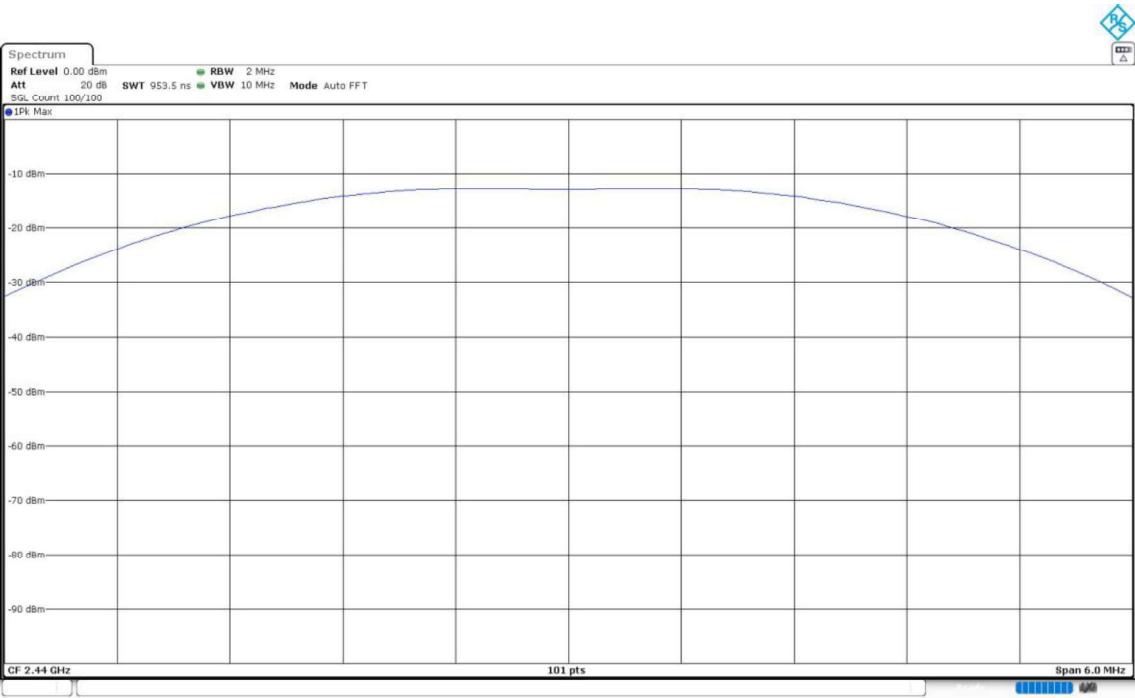
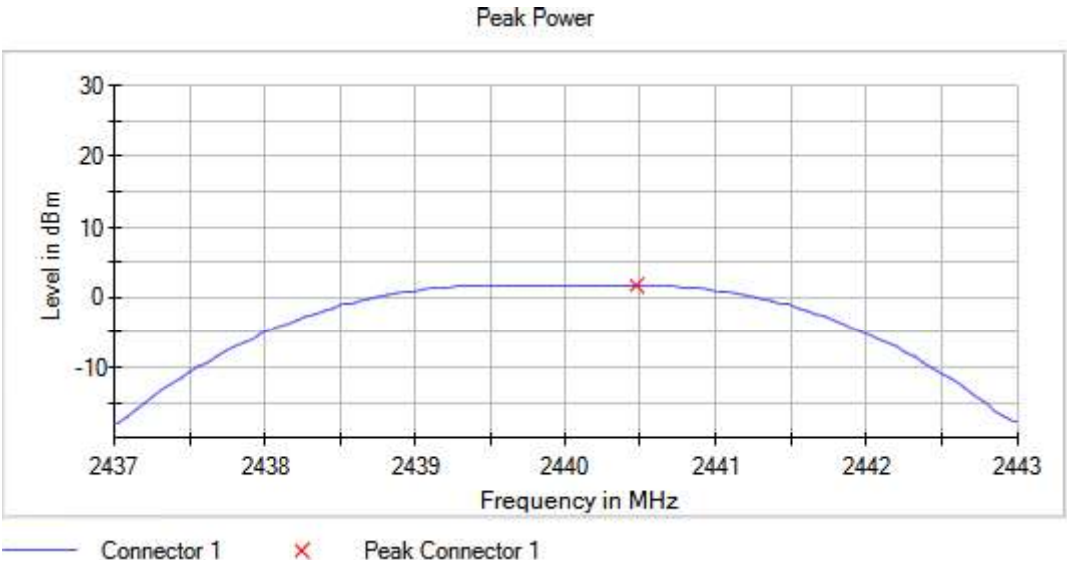
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2402.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



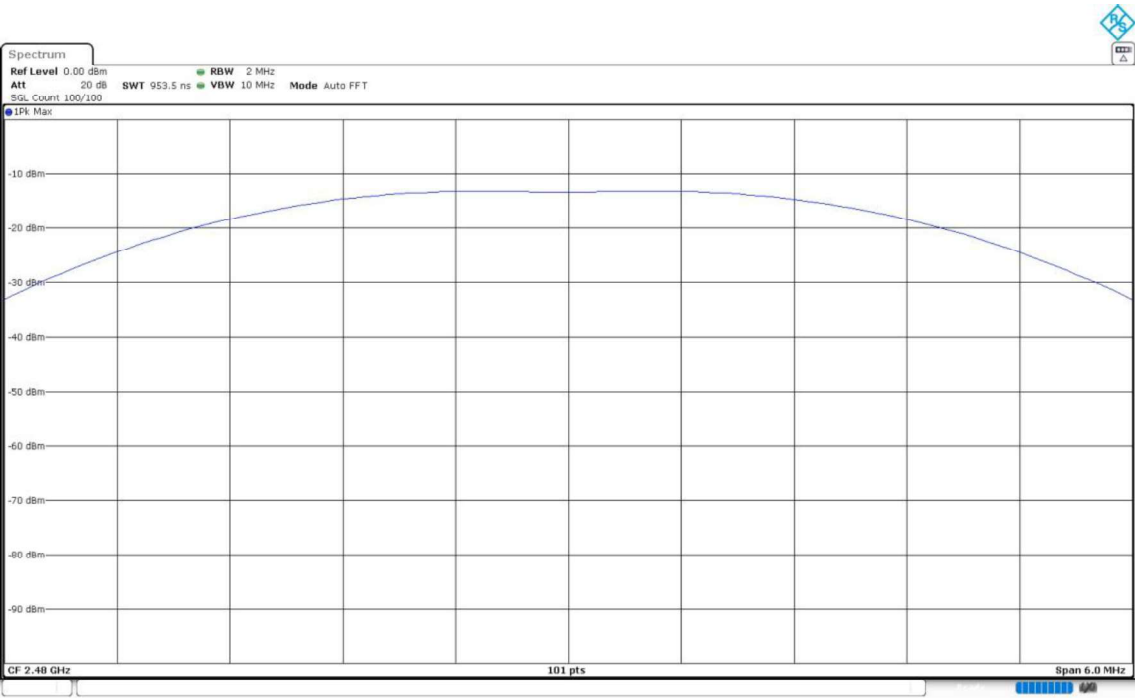
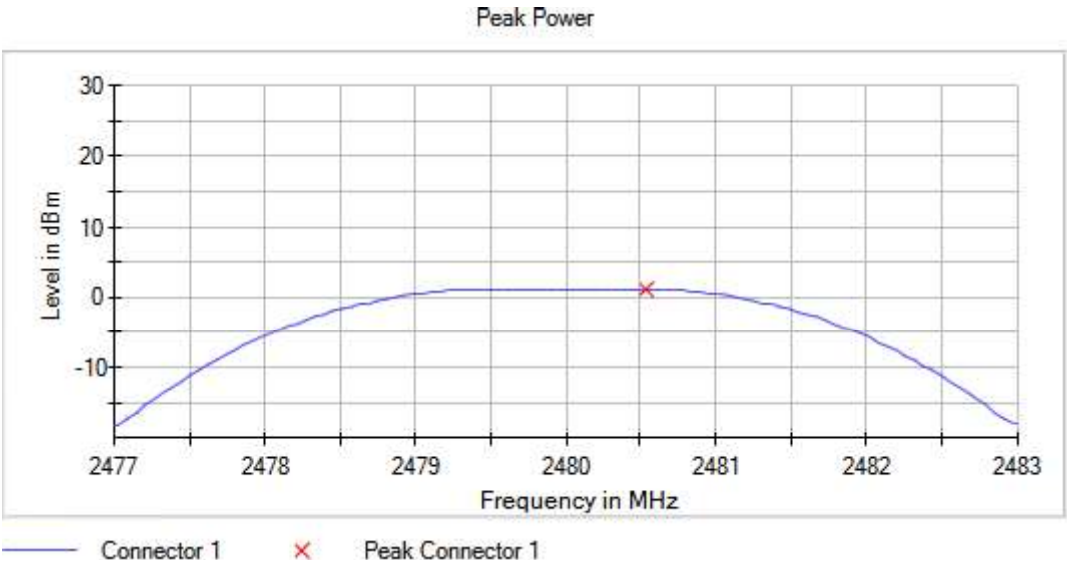
Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2440.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2480.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



RSS-247 6.6 / FCC 15.247 (d) [Bndedge] 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.

Modulation: BTLE 5.2 (GFSK 1 Mbit/s)

Results

Operation Band (MHz)	Equipment	Freq (MHz)	Port	Inband Peak Lvl (dBm)	Freq (MHz)	Lvl (dBm)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00000	1	-7.850	2400.000000	-69.0
				-7.850	2399.875000	-69.5
				-7.850	2399.975000	-70.0
				-7.850	2399.925000	-70.3
				-7.850	2399.775000	-70.4
				-7.850	2398.975000	-70.5
				-7.850	2399.725000	-70.6
				-7.850	2399.025000	-70.7
				-7.850	2399.825000	-70.8
				-7.850	2398.525000	-71.6
				-7.850	2398.575000	-71.9
				-7.850	2399.575000	-72.0
				-7.850	2399.625000	-72.1
				-7.850	2373.775000	-72.1
				-7.850	2399.525000	-72.2
		2480.00000		-8.340	2484.725000	-71.0
				-8.340	2484.775000	-71.1
				-8.340	2483.675000	-71.1
				-8.340	2483.525000	-71.2
				-8.340	2483.625000	-71.3
				-8.340	2485.225000	-71.7
				-8.340	2483.725000	-71.8
				-8.340	2485.375000	-71.9
				-8.340	2484.525000	-72.0
				-8.340	2484.075000	-72.1
				-8.340	2483.775000	-72.1
				-8.340	2484.125000	-72.1
				-8.340	2485.175000	-72.1

Operation Band (MHz)	Equipment	Freq (MHz)	Port	Inband Peak Lvl (dBm)	Freq (MHz)	Lvl (dBm)
				-8.340	2483.575000	-72.2
				-8.340	2485.325000	-72.2

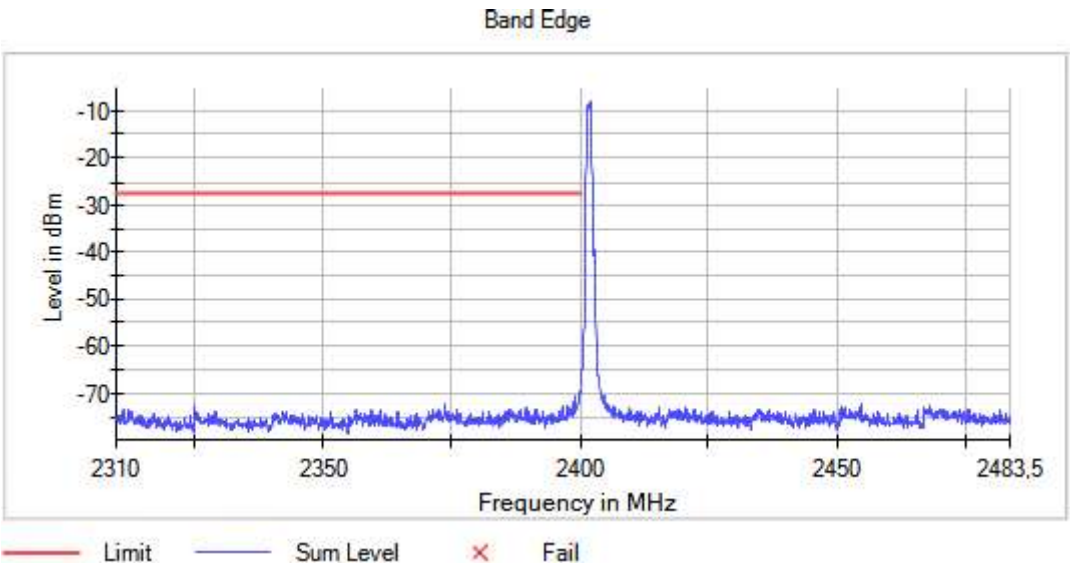
Verdict

Pass

Attachments

Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2402.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Tables:

Spectrum Analyzer Parameters 1

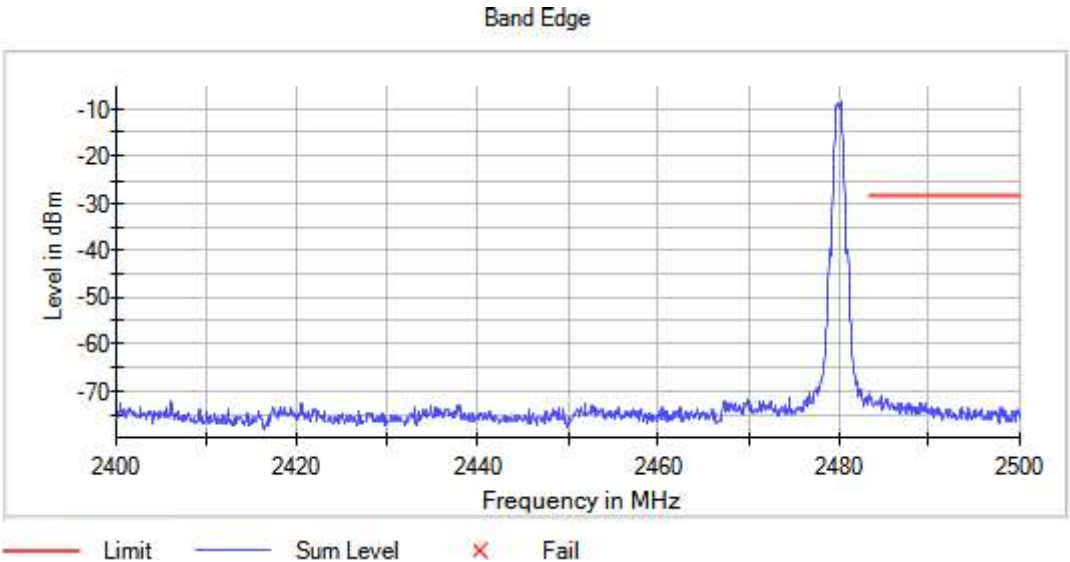
Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
SweepTime	113.672 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Spectrum Analyzer Parameters 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	5 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.14 dB	0.50 dB

Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2480.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Tables:

Spectrum Analyzer Parameters 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
Sweeptime	113.672 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Spectrum Analyzer Parameters 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	5 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.14 dB	0.50 dB

Modulation: BTLE 5.2 (GFSK 2 Mbit/s)

Results

Operation Band (MHz)	Equipment	Freq (MHz)	Port	Inband Peak Lvl (dBm)	Freq (MHz)	Lvl (dBm)
[2400, 2483.5]	Digital Transmission System (DTS)	2402.00000	1	-10.255	2400.000000	-42.5
				-10.255	2399.975000	-42.5
				-10.255	2399.925000	-44.1
				-10.255	2399.875000	-44.9
				-10.255	2399.825000	-47.0
				-10.255	2399.775000	-48.6
				-10.255	2399.725000	-50.9
				-10.255	2399.675000	-54.4
				-10.255	2399.625000	-55.1
				-10.255	2399.575000	-56.0
				-10.255	2399.525000	-56.9
				-10.255	2399.475000	-57.8
				-10.255	2399.425000	-60.7
				-10.255	2399.375000	-62.3
				-10.255	2399.325000	-62.6
		2480.00000		-10.675	2483.525000	-69.0
				-10.675	2483.725000	-70.1
				-10.675	2483.675000	-70.2
				-10.675	2483.575000	-70.8
				-10.675	2483.775000	-70.9
				-10.675	2484.025000	-71.2
				-10.675	2483.975000	-71.4
				-10.675	2484.175000	-71.7
				-10.675	2485.225000	-71.7
				-10.675	2483.625000	-71.7
				-10.675	2485.175000	-71.8
				-10.675	2484.125000	-71.8
				-10.675	2484.075000	-71.9
				-10.675	2484.575000	-72.2
				-10.675	2486.925000	-72.2

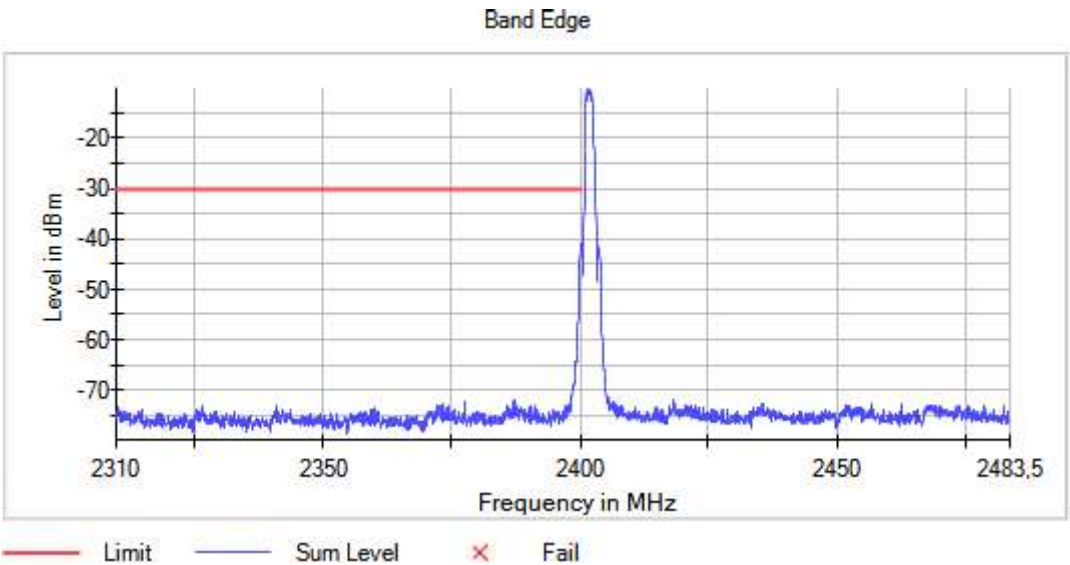
Verdict

Pass

Attachments

Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2402.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



Tables:

Spectrum Analyzer Parameters 1

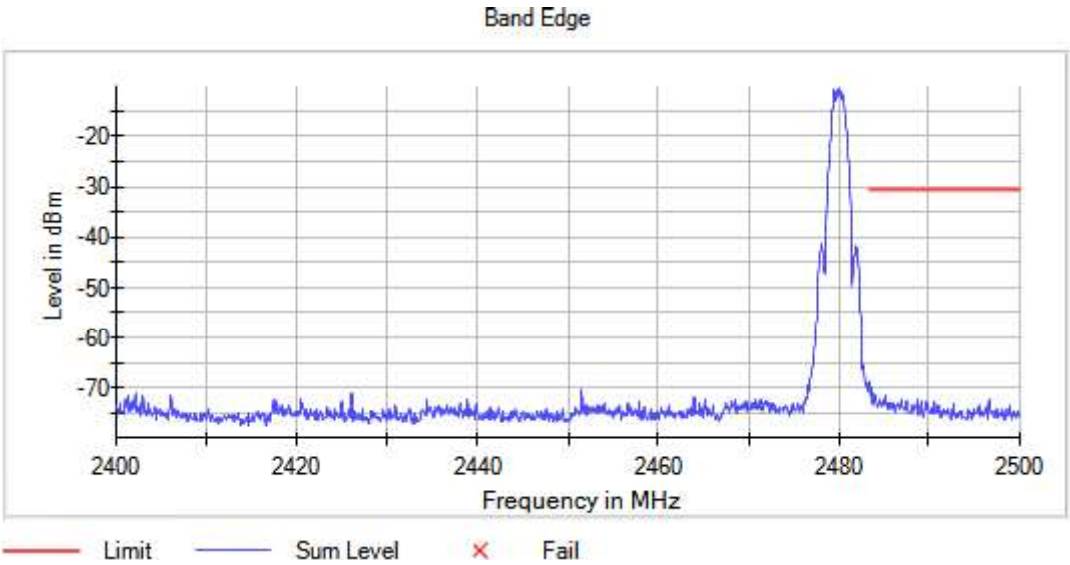
Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
SweepTime	113.672 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Spectrum Analyzer Parameters 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	7 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.25 dB	0.50 dB

Operation Band MHz = [2400, 2483.5] Equipment Type = Digital Transmission System (DTS)
Frequency MHz = 2480.00000 Active Port = 1
Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



Tables:

Spectrum Analyzer Parameters 1

Setting	Instrument Value	Target Value
Start Frequency	2.31000 GHz	2.31000 GHz
Stop Frequency	2.40000 GHz	2.40000 GHz
Span	90.000 MHz	90.000 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1800	~ 1800
SweepTime	113.672 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamplifier	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

Spectrum Analyzer Parameters 2

Setting	Instrument Value	Target Value
Start Frequency	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	1670	~ 1670
SweepTime	94.727 µs	AUTO
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	AUTO
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	FFT	AUTO
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	7 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.25 dB	0.50 dB

RSS-247 6.6 / 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 ($\mu\text{V/m}$)	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.

Frequency range tested for Radiated emissions:

Start frequency: no radiofrequency signal generated in the device found below 10th sub-harmonic, no further investigation required.

Stop frequency: it has been performed the radiated spurious emissions until 10th harmonic.

Modulation: BTLE 5.2 (GFSK 1 Mbit/s)

Results

- Frequency range [30MHz - 1GHz]
The spurious frequencies do not depend on modulation and channel operation.
No spurious frequencies detected at less than 20 dB below the limit.
- Frequency range [1 - 17GHz]
No spurious frequencies detected at less than 20 dB below the limit.
- Frequency range [17 - 26GHz]
The spurious frequencies do not depend on modulation and channel operation.
No spurious frequencies detected at less than 20 dB below the limit.

Verdict

Pass

Attachments

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [0.03, 1]

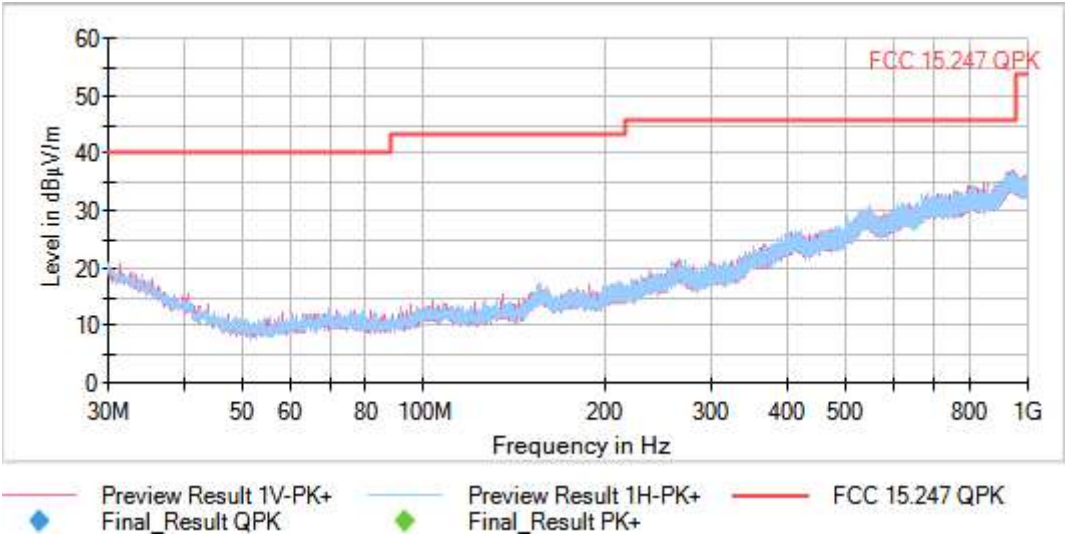
Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 2402.00000

Active Port = 1

Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



This plot is valid for all channels and modulations

Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	30 MHz - 1 GHz	48,5 kHz	PK+	100 kHz	1 s	30 dB

Operation Band MHz = [2400, 2483.5]

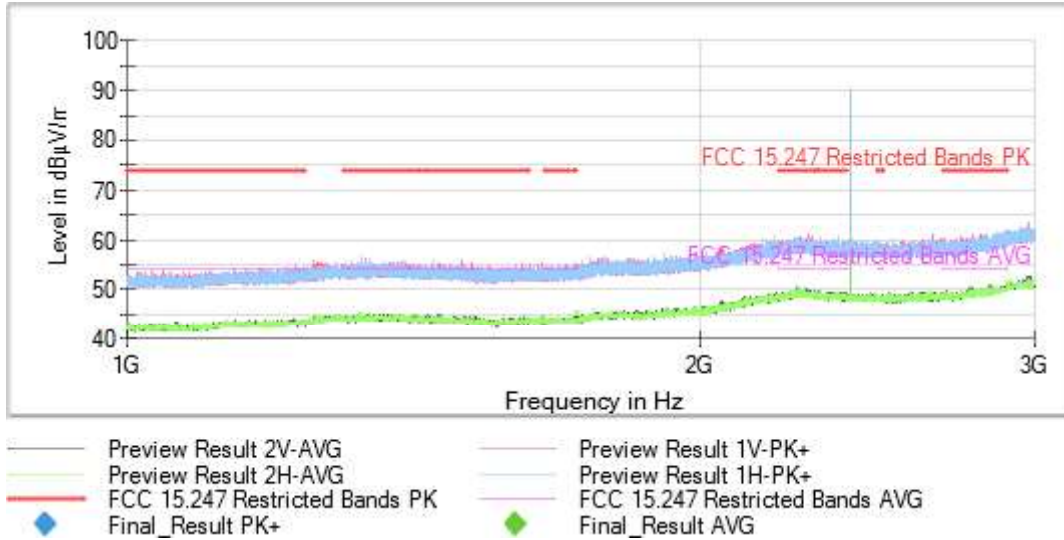
Frequency Range GHz = [1, 3]

Equipment Type = Digital Transmission System (DTS) Frequency MHz = 2402.00000

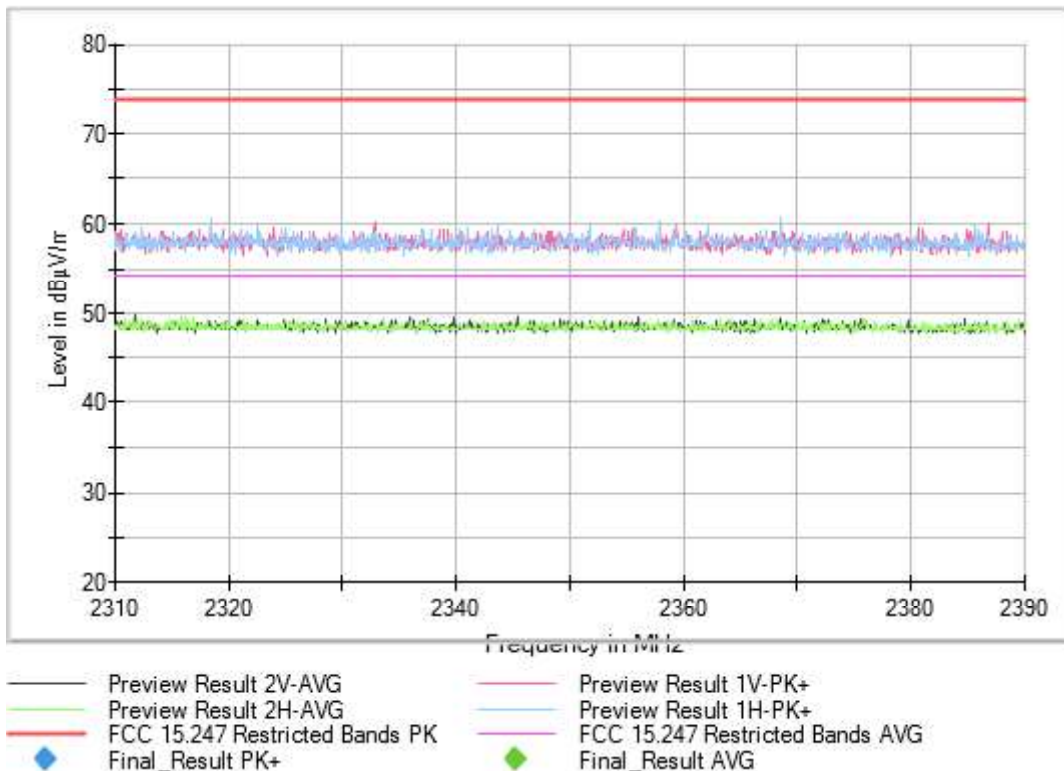
Active Port = 1

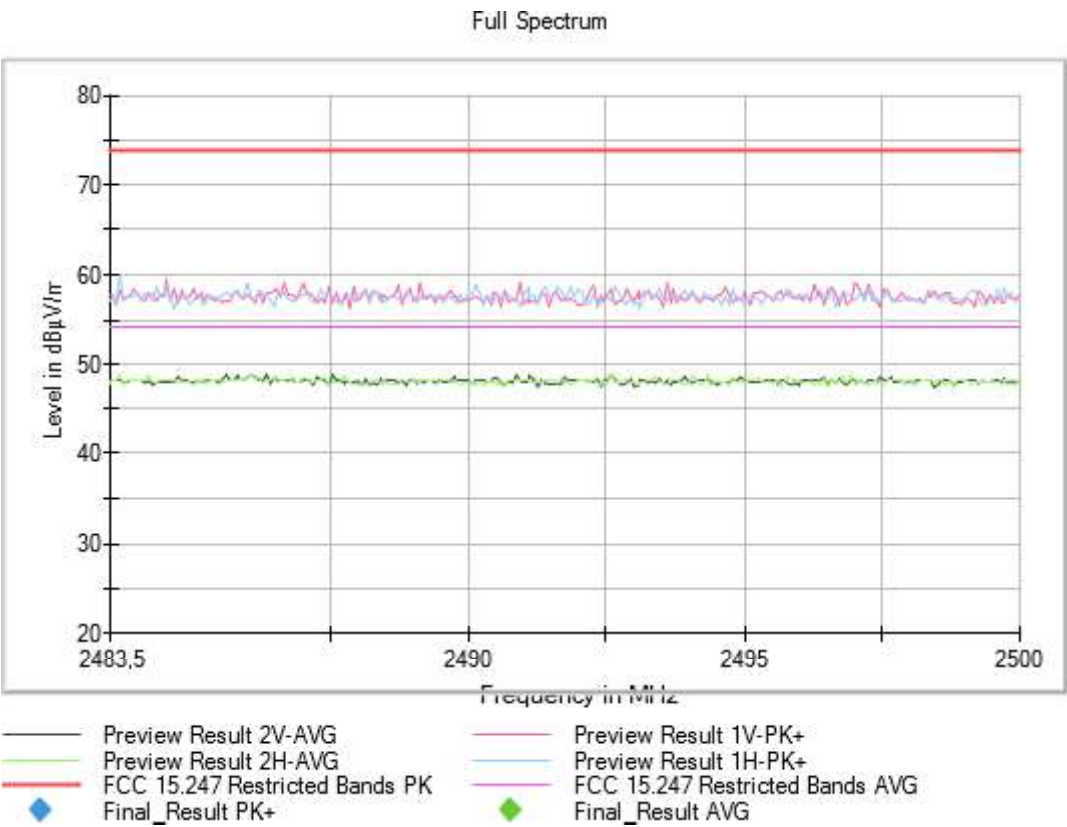
Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	66,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

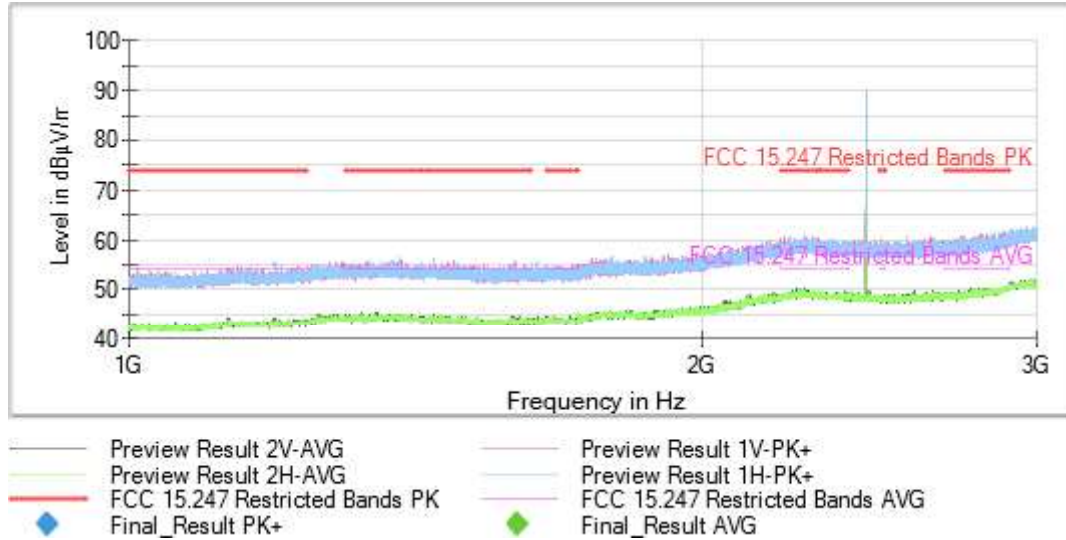
Frequency Range GHz = [1, 3]

Equipment Type = Digital Transmission System (DTS) Frequency MHz = 2440.00000

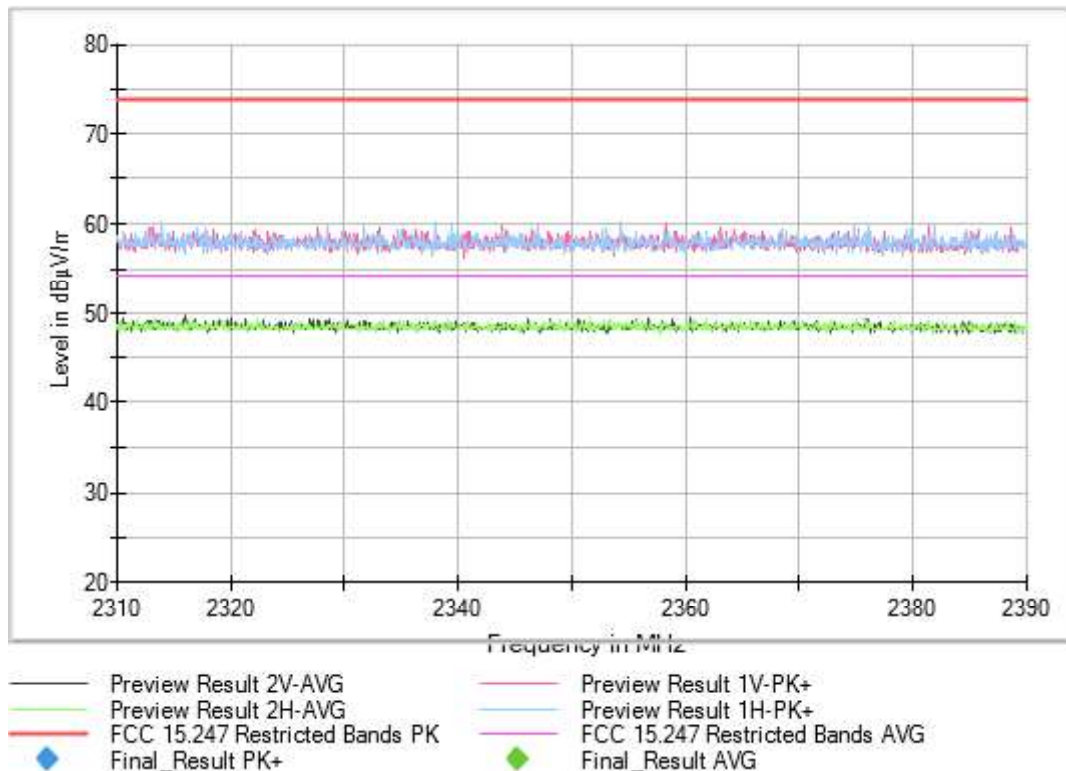
Active Port = 1

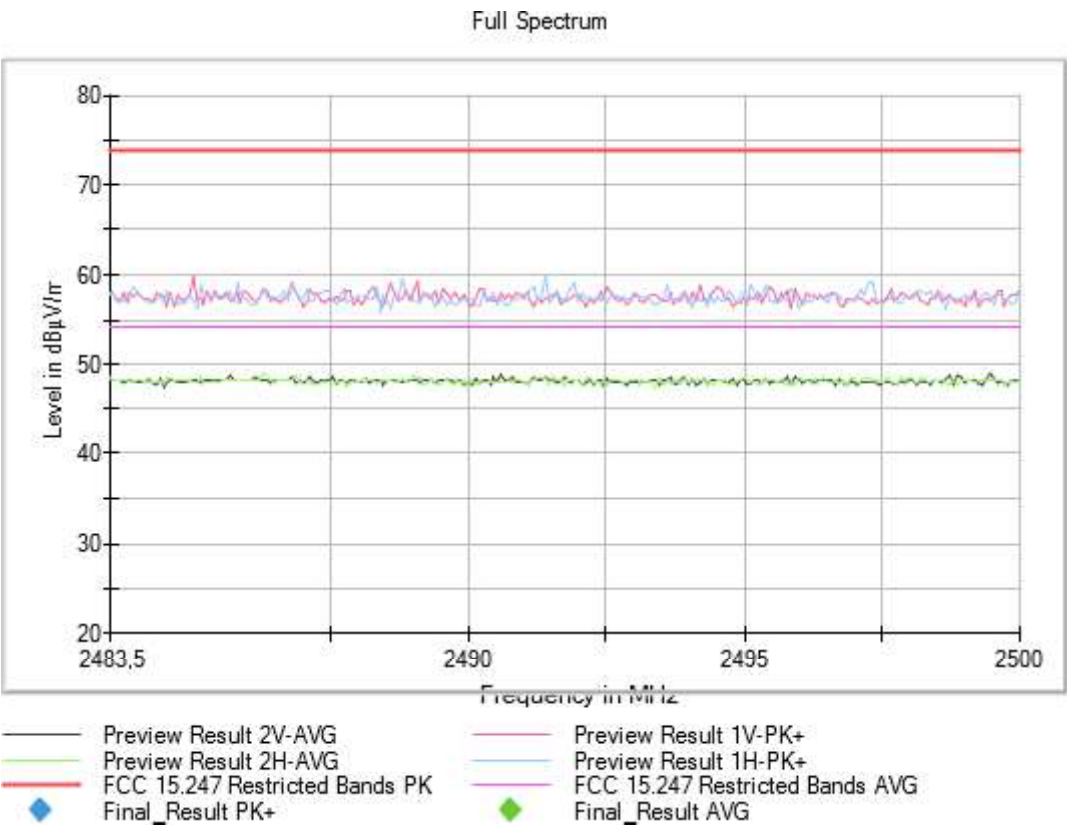
Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	66,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

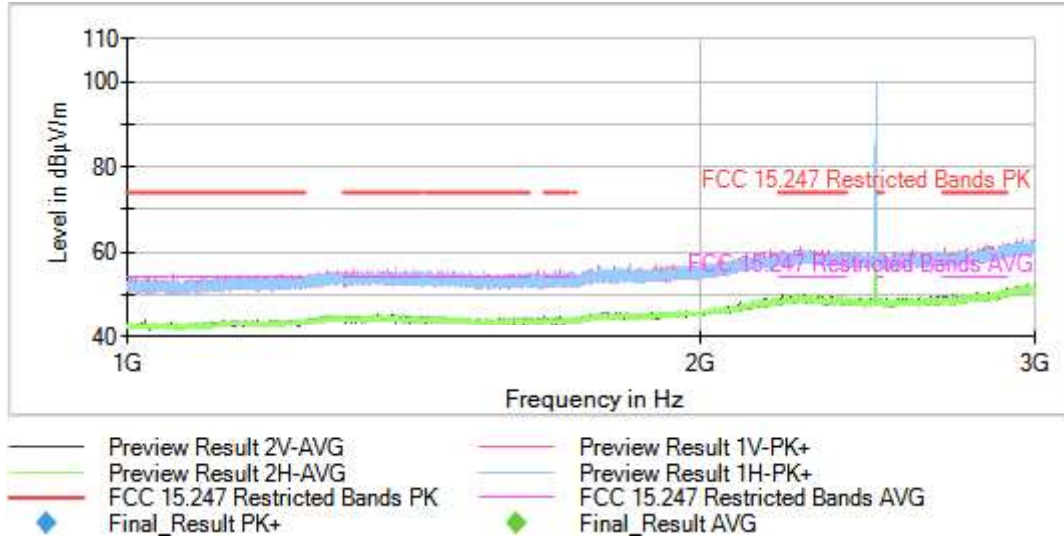
Frequency Range GHz = [1, 3]

Equipment Type = Digital Transmission System (DTS) Frequency MHz = 2480.00000

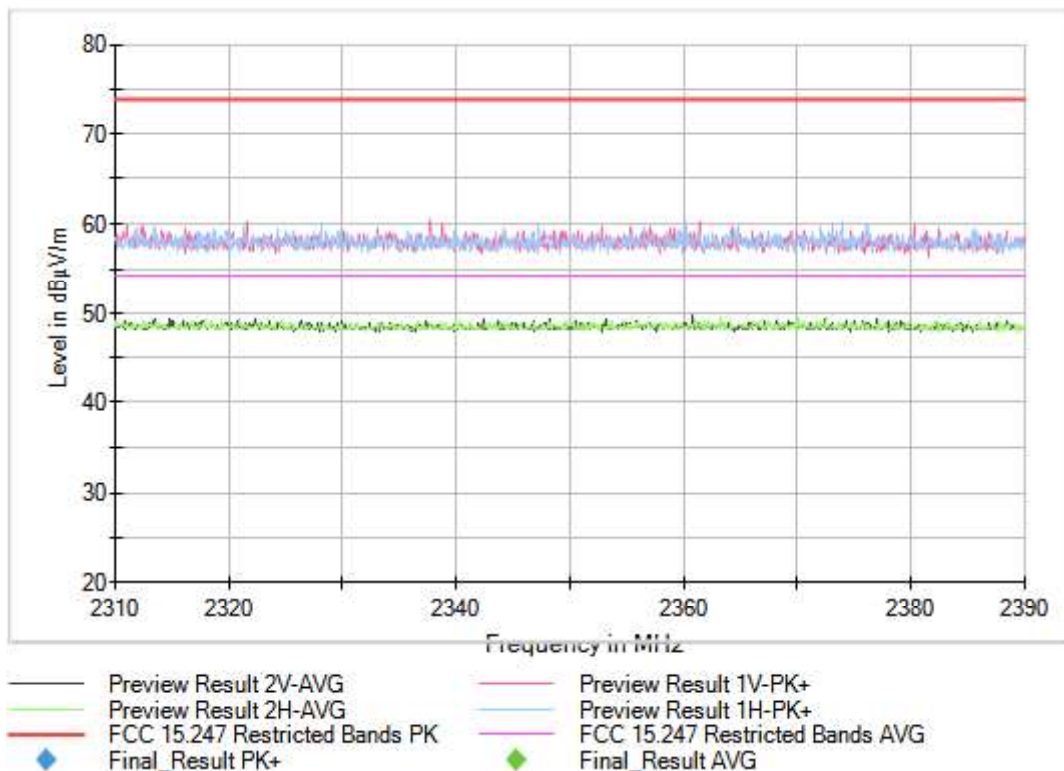
Active Port = 1

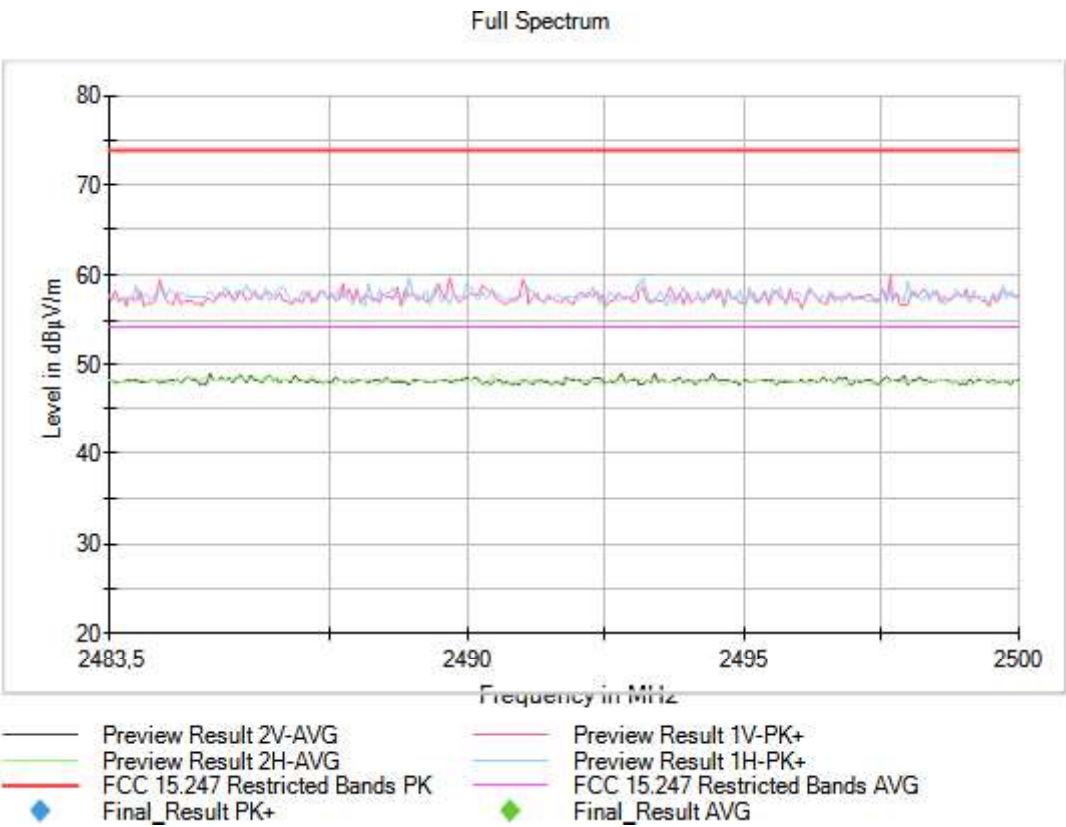
Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	66,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Equipment Type = Digital Transmission System (DTS)

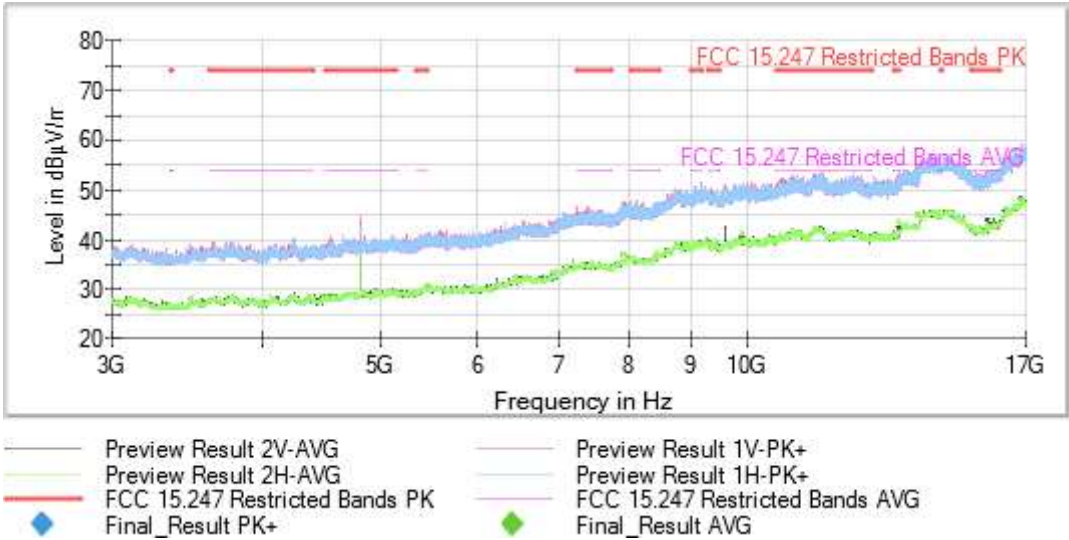
Active Port = 1

Frequency Range GHz = [3, 17]

Frequency MHz = 2402.00000

Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Equipment Type = Digital Transmission System (DTS)

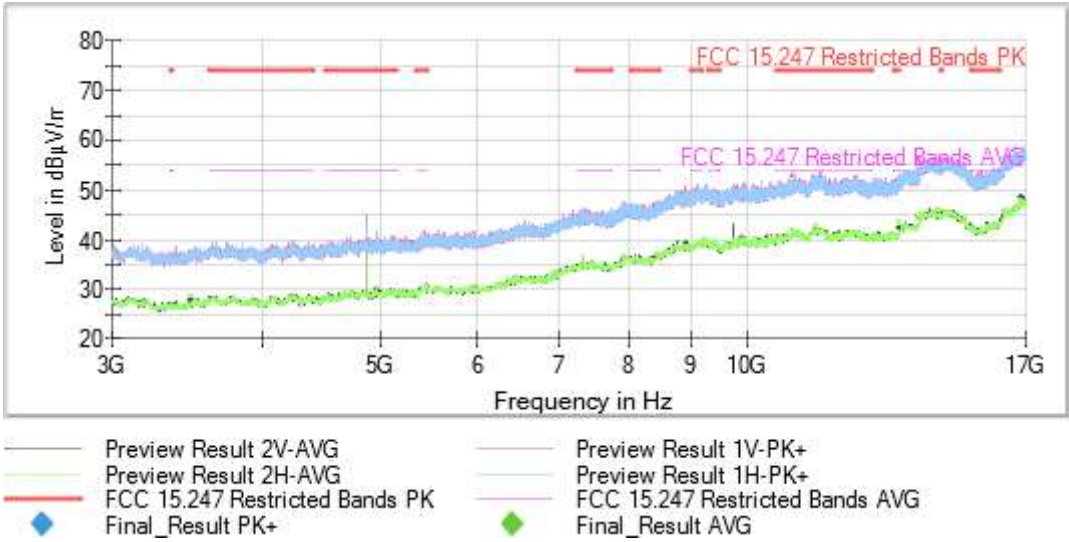
Active Port = 1

Frequency Range GHz = [3, 17]

Frequency MHz = 2440.00000

Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Equipment Type = Digital Transmission System (DTS)

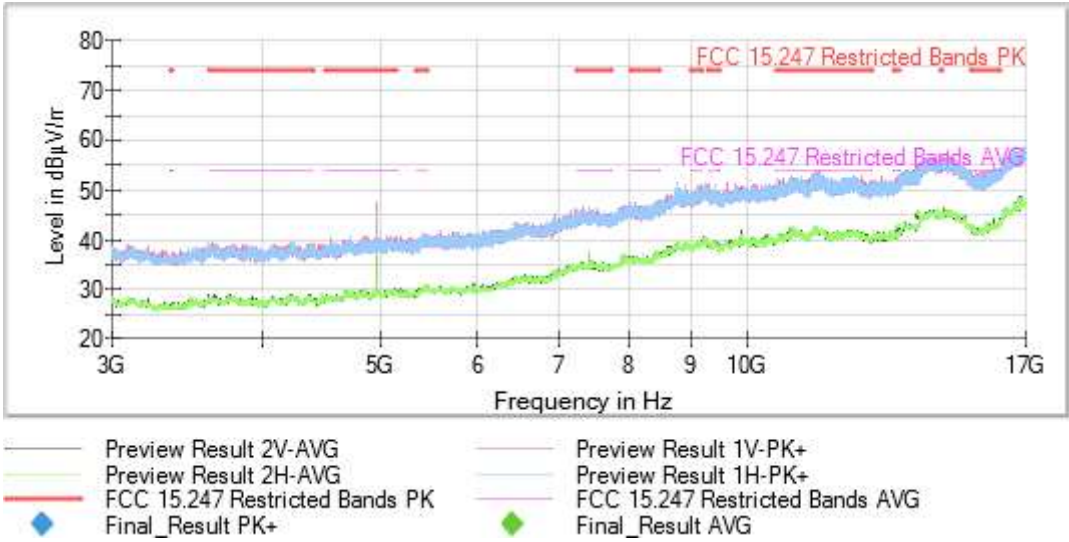
Active Port = 1

Frequency Range GHz = [3, 17]

Frequency MHz = 2480.00000

Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [17, 26]

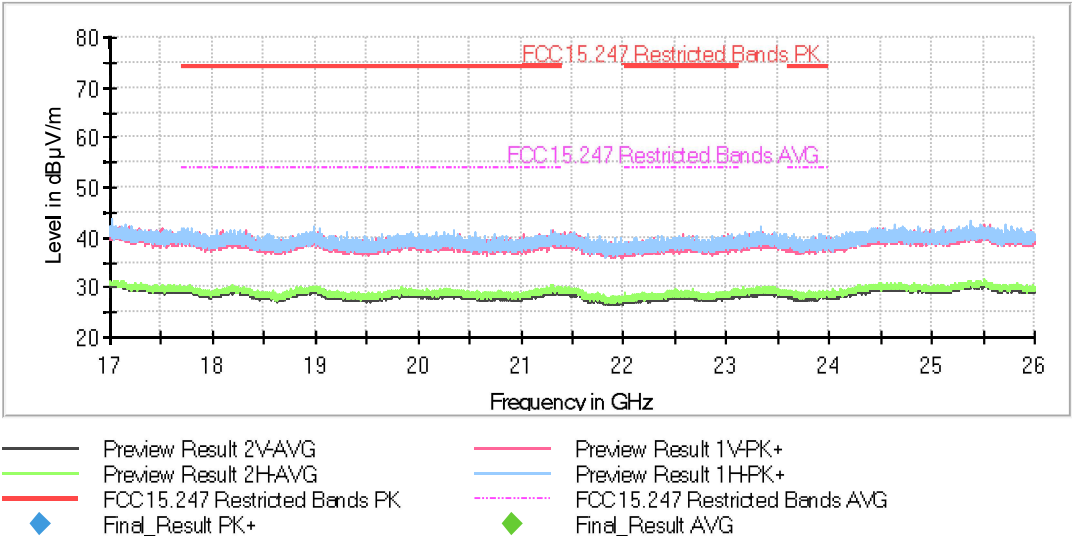
Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 2480.00000

Active Port = 1

Modulation = BTLE 5.2 (GFSK 1 Mbit/s)

Images:



This plot is valid for all channels and modulations

Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	17 GHz - 26 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Modulation: BTLE 5.2 (GFSK 2 Mbit/s)

Results

- Frequency range [30MHz - 1GHz]
The spurious frequencies do not depend on modulation and channel operation.
No spurious frequencies detected at less than 20 dB below the limit.
- Frequency range [1 - 17GHz]
No spurious frequencies detected at less than 20 dB below the limit.
- Frequency range [17 - 26GHz]
The spurious frequencies do not depend on modulation and channel operation.
No spurious frequencies detected at less than 20 dB below the limit.

Verdict

Pass

Attachments

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [0.03, 1]

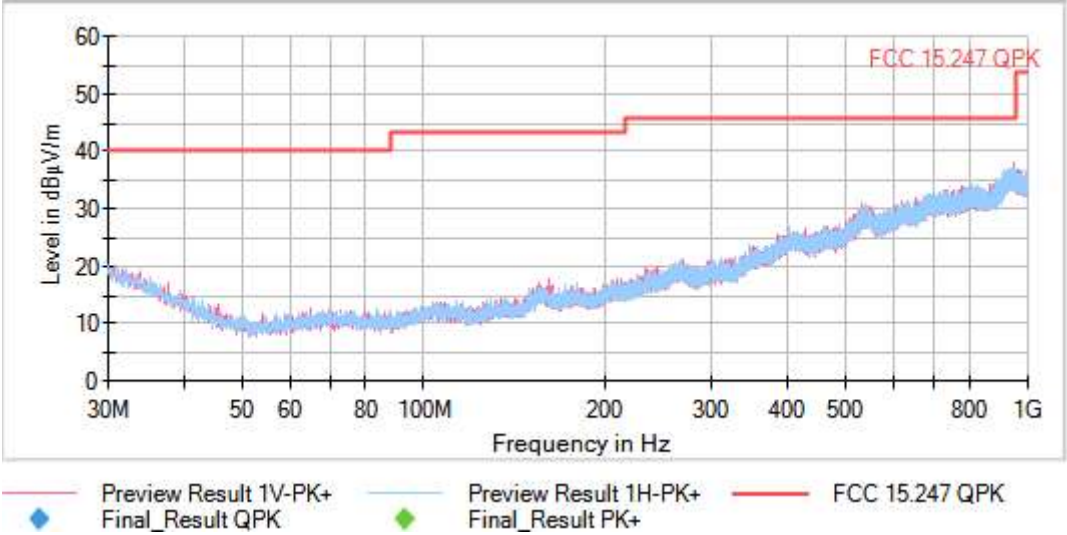
Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 2480.00000

Active Port = 1

Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



This plot is valid for all channels and modulations

Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	30 MHz - 1 GHz	48,5 kHz	PK+	100 kHz	1 s	30 dB

Operation Band MHz = [2400, 2483.5]

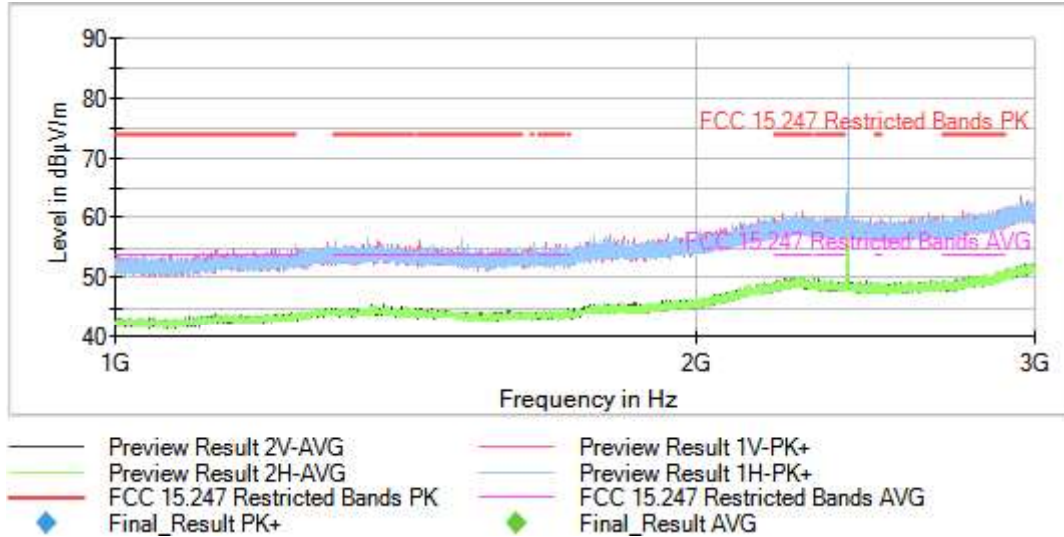
Frequency Range GHz = [1, 3]

Equipment Type = Digital Transmission System (DTS) Frequency MHz = 2402.00000

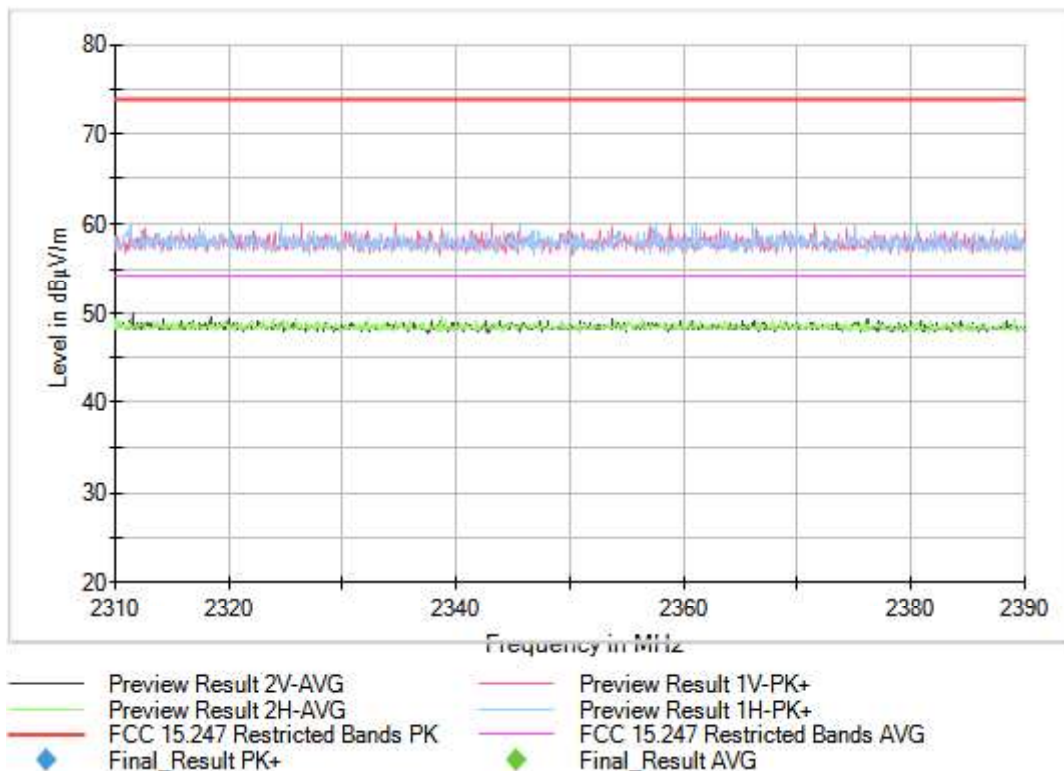
Active Port = 1

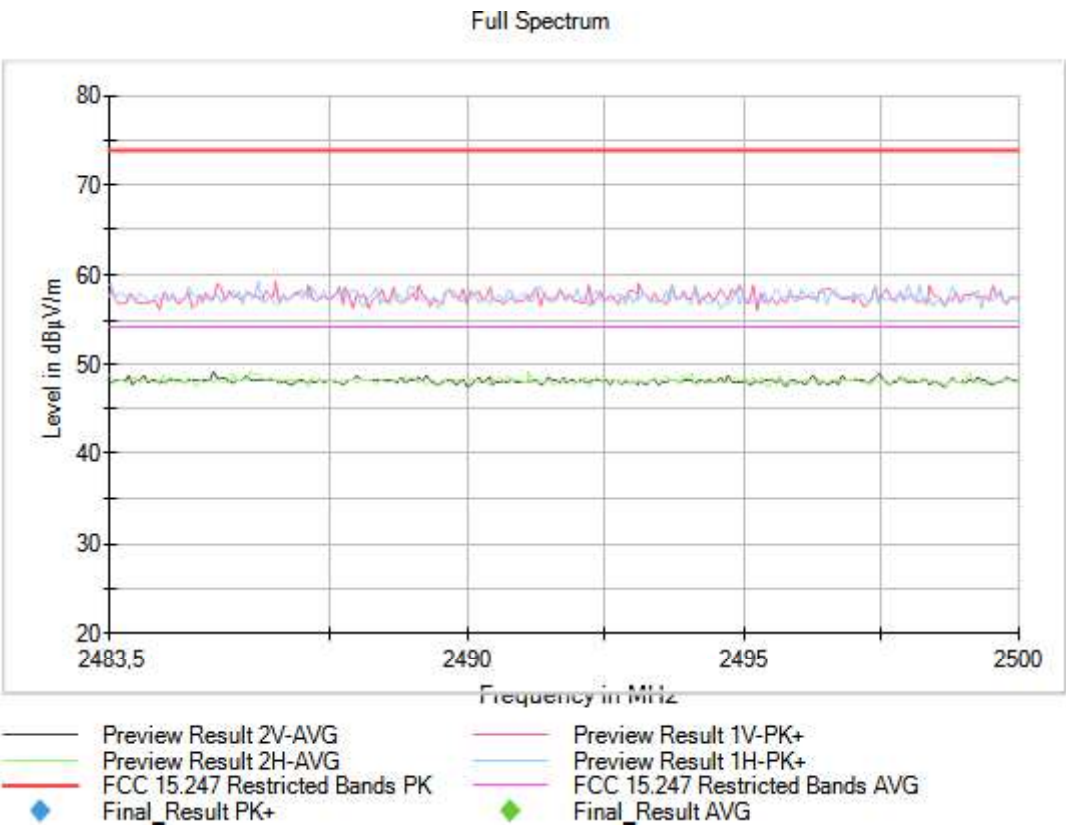
Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	66,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

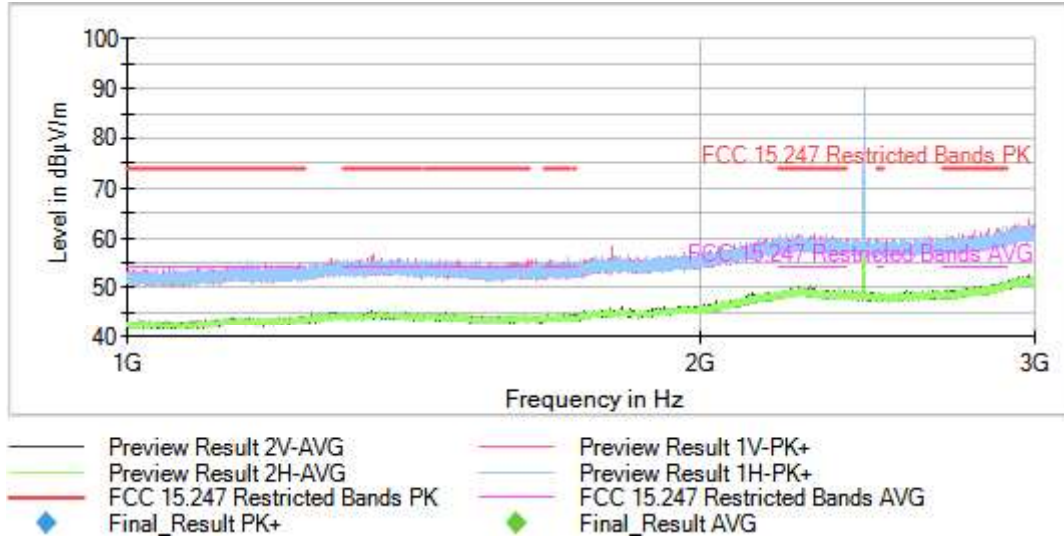
Frequency Range GHz = [1, 3]

Equipment Type = Digital Transmission System (DTS) Frequency MHz = 2440.00000

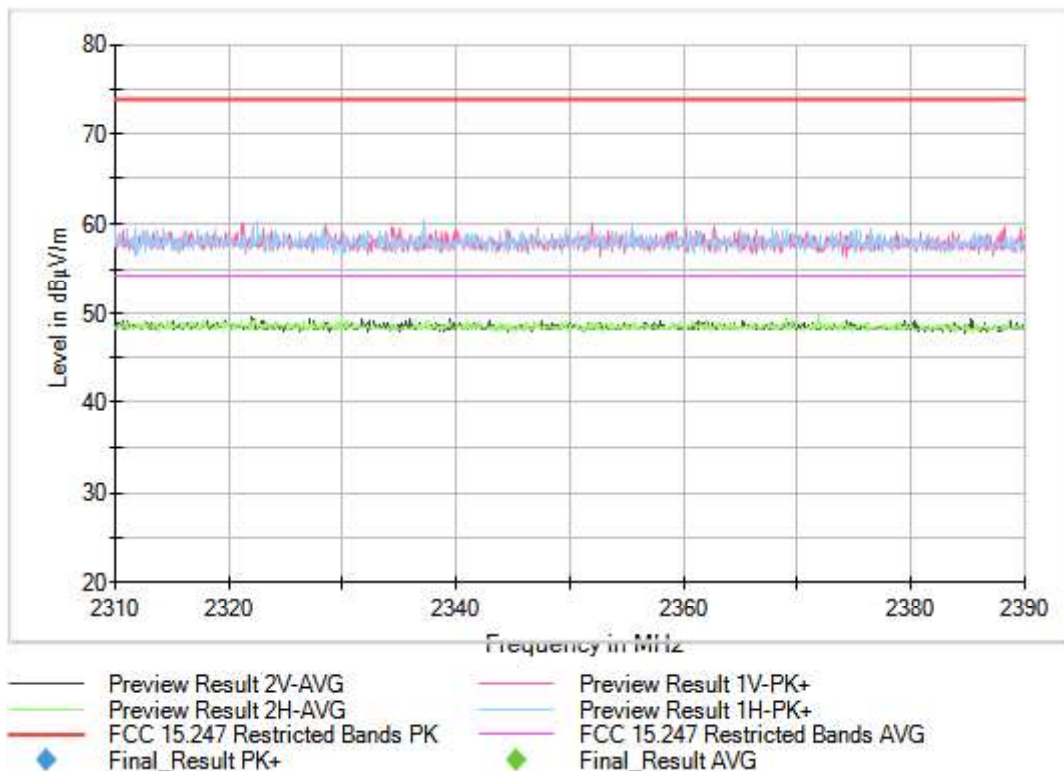
Active Port = 1

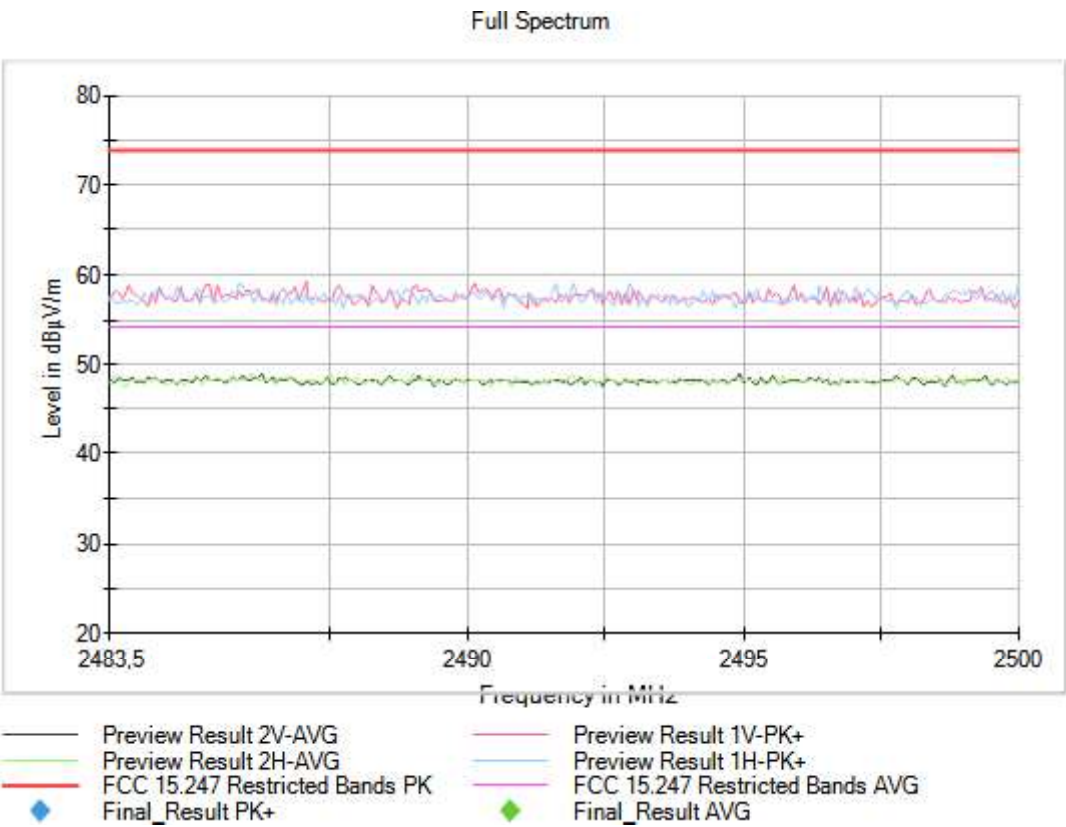
Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	66,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

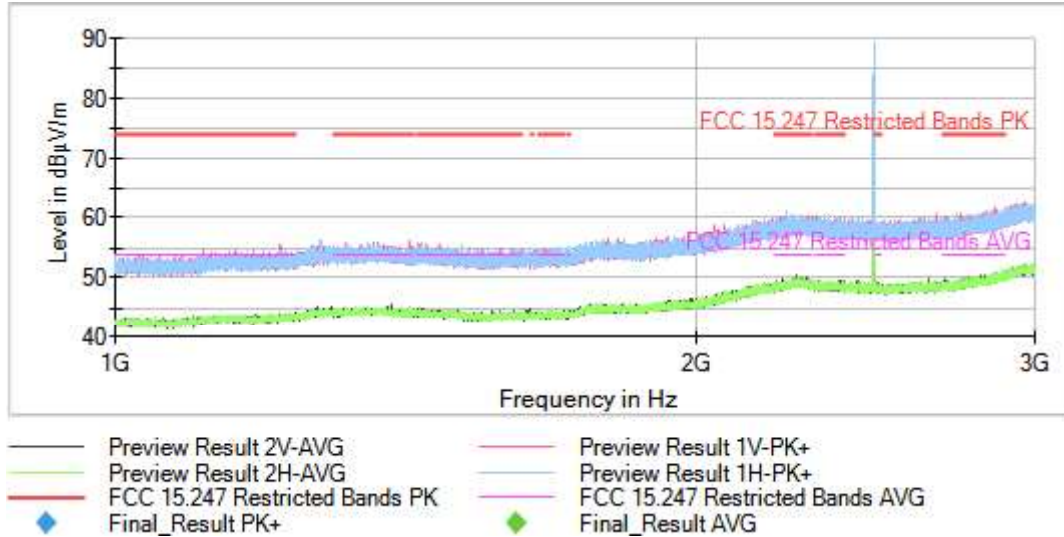
Frequency Range GHz = [1, 3]

Equipment Type = Digital Transmission System (DTS) Frequency MHz = 2480.00000

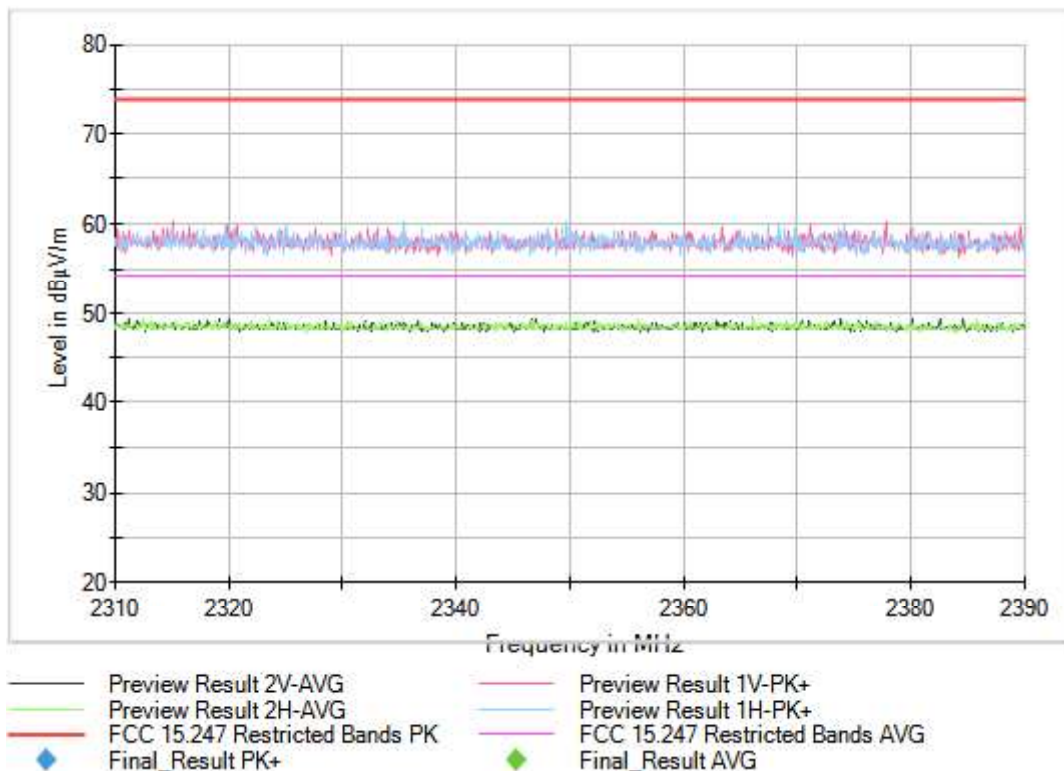
Active Port = 1

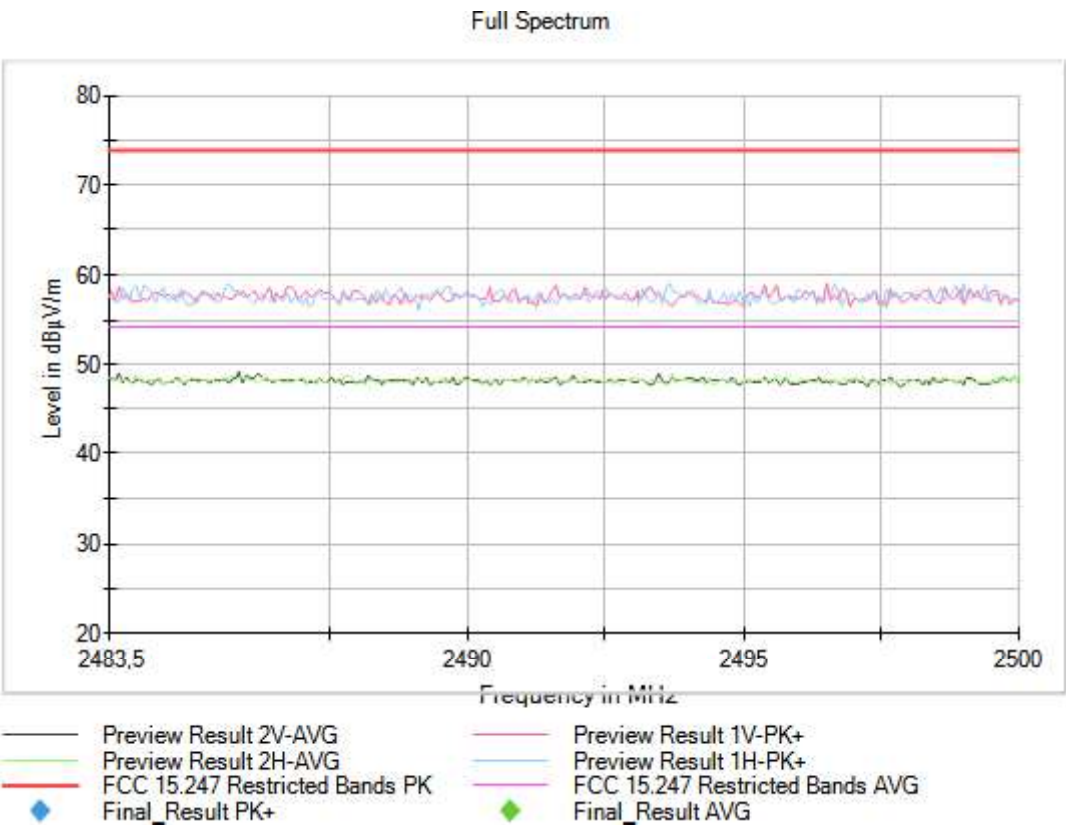
Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



Full Spectrum





Tables:
Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	1 GHz - 3 GHz	66,667 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Equipment Type = Digital Transmission System (DTS)

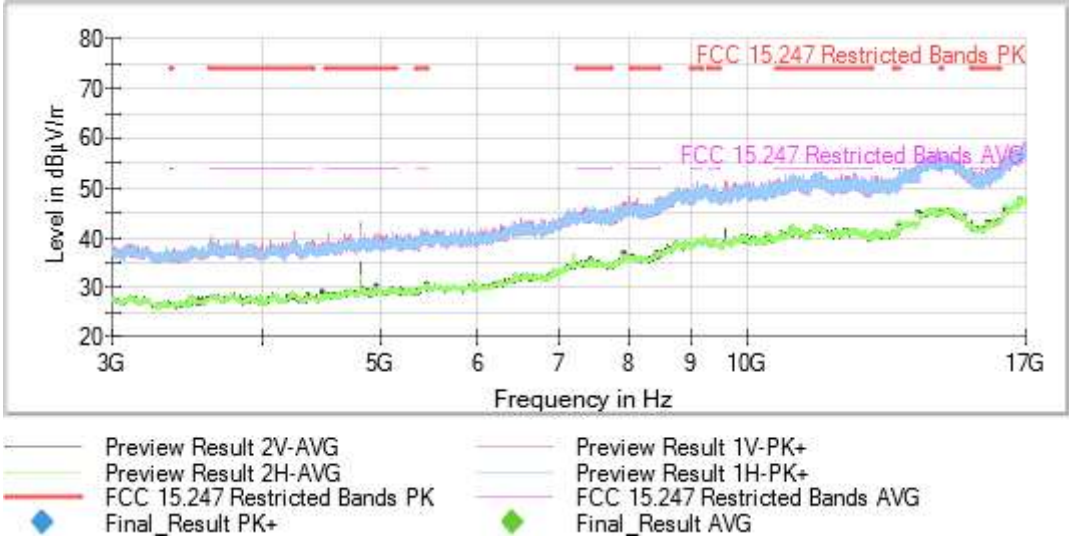
Active Port = 1

Frequency Range GHz = [3, 17]

Frequency MHz = 2402.00000

Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Equipment Type = Digital Transmission System (DTS)

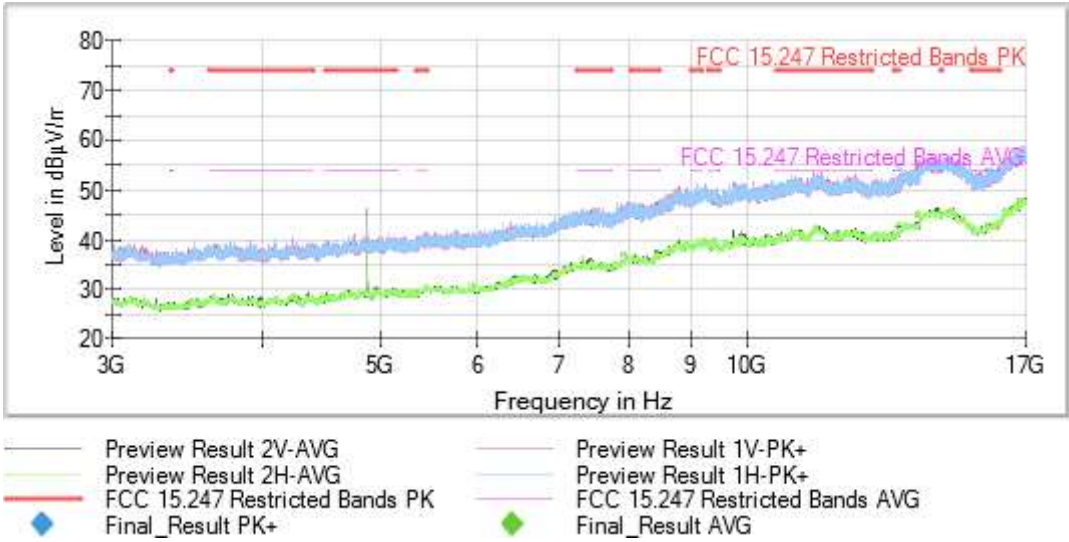
Active Port = 1

Frequency Range GHz = [3, 17]

Frequency MHz = 2440.00000

Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Equipment Type = Digital Transmission System (DTS)

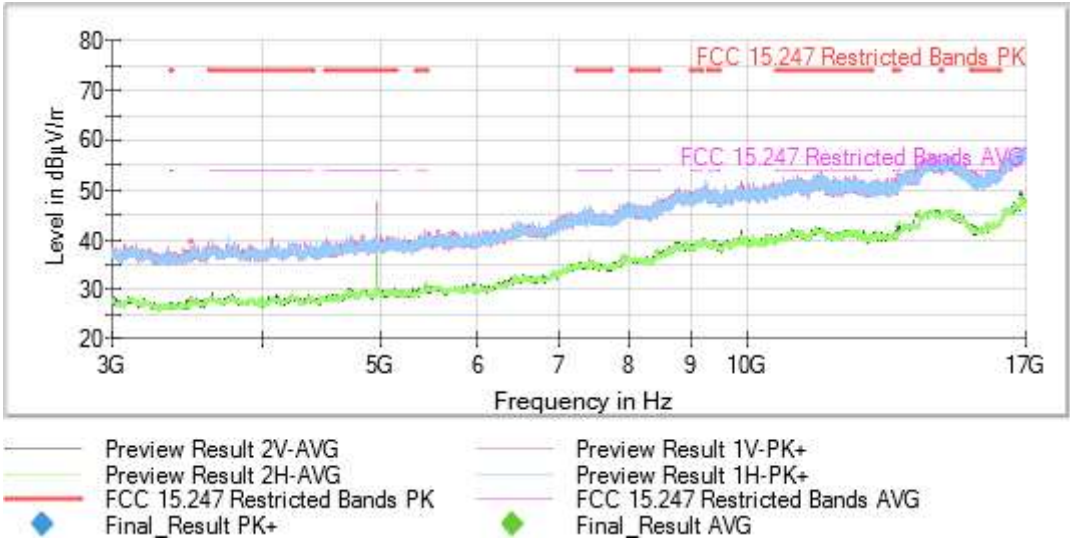
Active Port = 1

Frequency Range GHz = [3, 17]

Frequency MHz = 2480.00000

Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	3 GHz - 17 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Operation Band MHz = [2400, 2483.5]

Frequency Range GHz = [17, 26]

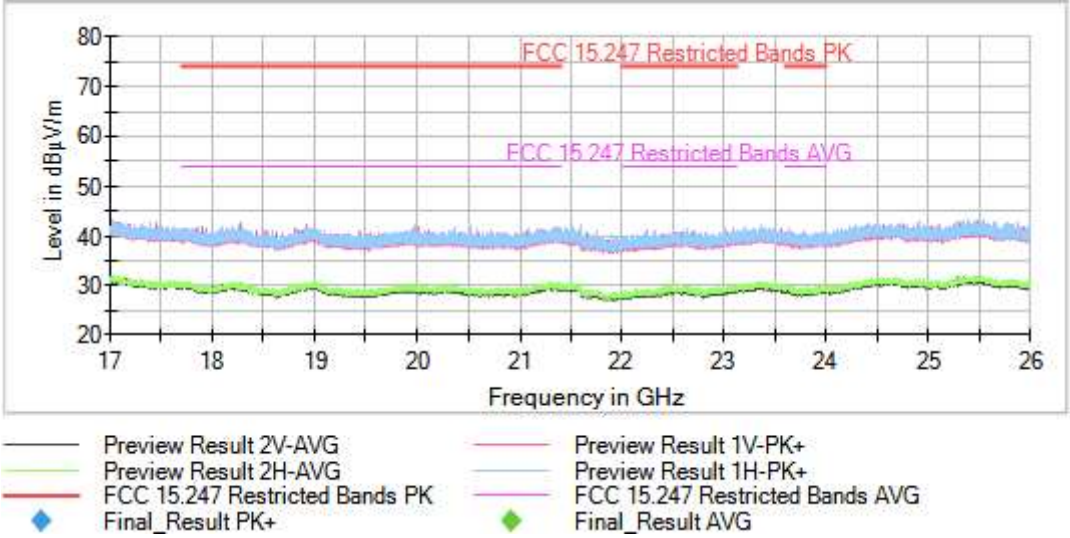
Equipment Type = Digital Transmission System (DTS)

Frequency MHz = 2440.00000

Active Port = 1

Modulation = BTLE 5.2 (GFSK 2 Mbit/s)

Images:



This plot is valid for all channels and modulations

Tables:

Spectrum Analyzer Parameters

	Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
	Receiver: [ESW 44]					
	17 GHz - 26 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	0 dB