DEKRA Testing and Certification, S.A.U.
Parque Tecnológico de Andalucía,
c/ Severo Ochoa nº 2 · 29590 Campanillas · Málaga · España
C.I.F. A29507456

ISED CABid: ES1909

Lab. Company Number: 4621A

Test Report No:

NIE: 74223RRF.004

Test Report

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

(*) Identification of item tested	XS4 One+ sfc Keypad Electronic Lock Series including all mechanical variants
(*) Trademark	SALTO
(*) Model and /or type reference	W61MK (Type reference: E2131)
Other identification of the product	FCC ID: UKCW61MK IC: 10088A-W61MK
(*) Features	Features: Bluetooth LE HW version: 1.0 SW version: 0190 (Control FW), 0186 (FUS FW) 0187 (BLE FW), 0202 (Motor FW)
Applicant	SALTO SYSTEMS, S.L. Arkotz 9, Polígono Lanbarren 20180, Oiartzun, Gipuzkoa, SPAIN
Test method requested, standard	USA FCC Part 15.247 (10-1-21 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (10-1-21 Edition): Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 amendment 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 2023.01.24 08:45:01 +01'00'
Date of issue	2023-01-24
Report template No	FDT08_24 (*) "Data provided by the client"

Index

INDEX 2
ACRONYMS 3
COMPETENCES AND GUARANTEES 3
GENERAL CONDITIONS 4
UNCERTAINTY 4
DATA PROVIDED BY THE CLIENT 4
USAGE OF SAMPLES 5
TEST SAMPLE DESCRIPTION 6
IDENTIFICATION OF THE CLIENT 7
TESTING PERIOD AND PLACE 7
DOCUMENT HISTORY 7
ENVIRONMENTAL CONDITIONS 7
REMARKS AND COMMENTS 8
TESTING VERDICTS 8
SUMMARY 9
APPENDIX A: TEST RESULTS. BLUETOOTH LOW ENERGY 4.2 (1M) 10

Acronyms

Acronym ID	Acronym Description
# of Tx Chains	Number of Transmission Chains
26Ebw	Emission Bandwidth
BW	Bandwidth
Detector	Detector used
Equipment	Equipment Type
Freq	Frequency
Freq Rng	Frequency Range
Inband Peak Lvl	Inband Peak Level
Lvl	Level
MP	Measurement Point
Mod	Modulation
Occ Ch BW	Occupied Channel Bandwidth
PSD	Power Spectrum Density
Peak Power	Maximum Peak Conducted Output Power
Pol	Polarization
Port	Active Port
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl	Unwanted Emissions Level

Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification 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, Company Number: 4621A, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

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

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA Testing and Certification S.A.U.

General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification S.A.U.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the radiated emissions of EUT from 30 MHz to 1 GHz is:
Measurement uncertainty ≤ ± 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 ≤ ± 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 ≤ ± 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 ≤ ± 0,80 dB
Power Spectral Density: Measurement uncertainty ≤ ± 0,99 dB
6dB Bandwidth: Measurement uncertainty ≤ ± 2,84 %
Occupied Channel Bandwidth: Measurement uncertainty ≤ ± 1,17 %
Conducted Band-edge spurious emissions: Measurement uncertainty ≤ ± 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").

2. The sample consists of a XS4 One+ sfc Keypad Electronic Lock Series with RFID Mifare (ISO 14443A & ISO 15693 standard based) and Bluetooth LE technology.

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 Nº	Date of Reception	Application
S/01	74223C_2.1	XS4 One+ sfc Keypad	W61MK	--	2022-12-19	Element Under Test
S/02	74431_6.1	XS4 One+ sfc Keypad (conducted)	W61MK	--	2022-12-19	Element Under Test

Notes referenced to samples during the project:

Id	Type
S/01	Sample used for radiated testing
S/02	Sample used for conducted testing

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:	[ ]	[ ]	[ ]	[ ]	[ ]
	[X]	DC: 4.5 Vdc (3 x LR06 batteries)					

Rated Power.....:	--
Clock frequencies.....:	27.12 MHz, 32 MHz, 32.768 KHz
Other parameters .....:	N/A
Software version.....:	0190 (Control FW) + 0186 (FUS FW) + 0187 (BLE FW) + 0202 (Motor FW)
Hardware version .....:	1.0
Dimensions in cm (W x H x D).....:	6.7 x 29.0 x 2.0 cm

Mounting position .....:	[ ]	Table top equipment
	[ ]	Wall/Ceiling mounted equipment
	[ ]	Floor standing equipment
	[ ]	Hand-held equipment
	[X]	Other: Door mounting

Modules/parts.....:	Module/parts of test item	Type	Manufacturer
	SoC + Antenna	BLE	ST + JOHANSON
	--		
Accessories (not part of the test item).....:	Description	Type	Manufacturer
	--		
Documents as provided by the applicant .....:	Description	File name	Issue date
	User manual		
	FW Explanation		
		.....	.....

(3) Only for Medical Equipment

Identification of the client

SALTO SYSTEMS, S.L.
Arkotz 9, Polígono Lanbarren
20180, Oiartzun, Gipuzkoa, SPAIN

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2022-12-21
Date (finish)	2023-01-18

Document history

Report number	Date	Description
74223RRF.004	2023-01-24	First release.

Environmental conditions

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Jose Manuel Jimenez and Pablo Redondo.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
6064	SEMIANECHOIC ABSORBER LINED CHAMBER	SAC-3	FRANKONIA	N/A
6329	SHIELDED ROOM	--	FRANKONIA	N/A
5641	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2024-09-15
4612	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2024-07-13
9360	PRE-AMPLIFIER G>40dB 1-18 GHz	BLMA 0118-1M	BONN ELEKTRONIK	2023-05-11
8856	PRE-AMPLIFIER G>30dB 17-40GHz	BLMA 1840-4A	BONN ELEKTRONIK	2023-11-02
4657	HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK MESS-ELEKTRONIK	2023-05-05
8866	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2023-09-21
4716	SIGNAL AND SPECTRUM ANALYZER 2Hz-50GHz	FSW50	ROHDE AND SCHWARZ	2024-08-12
4848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A
7794	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2023-02-26
8848	OPEN SWITCH UNIT UP TO 7.5 GHz	OSP-B157W8 PLUS	ROHDE & SCHWARZ	2023-08-20
7798	SOFTWARE FOR EMC/RF TESTING	WMS32	ROHDE AND SCHWARZ	N/A

Testing verdicts

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

Summary

Bluetooth Low Energy 4.2 (1M)

Requirement – Test case FCC PART 15 / RSS-247	Verdict	Remark
FCC 15.247 (a) (2) / RSS-247 5.2 (a) 6 dB Bandwidth	P	--
FCC 15.247 (e) / RSS-247 5.2 (b) Power spectral density	P	--
FCC 15.247 (b) / RSS-247 5.4 (d) Maximum Peak Conducted output power	P	--
FCC 15.247 (d) / RSS-247 5.5 Band-edge emissions compliance (Transmitter)	P	--
FCC 15.247 (d) / RSS-247 5.5 Emission limitations radiated (Transmitter)	P	--
Supplementary information and remarks: None.		

Appendix A: Test results. Bluetooth Low Energy 4.2 (1M)

INDEX

TEST CONDITIONS 12

TEST CASES DETAILS 15

Occupied Channel Bandwidth 99% 15
RSS-247 5.2 (a) / FCC 15.247 (a) (2) 6 dB Bandwidth 19
RSS-247 5.2 (b) / FCC 15.247 (e) Power spectral density 23
RSS-247 5.4 (d) / FCC 15.247 (b) (3) Maximum Peak Conducted output power 27
RSS-247 5.5 / FCC 15.247 (d) Band-edge emissions compliance (Transmitter) 31
RSS-247 5.5 / FCC 15.247 (d) Emission limitations radiated (Transmitter) 37

TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal:	4.5 Vdc
Type of Power Supply:	3 x LR06 batteries

ANTENNA (*):

Type of Antenna:	Integral antenna
Maximum Declared Antenna Gain:	+0.5 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).

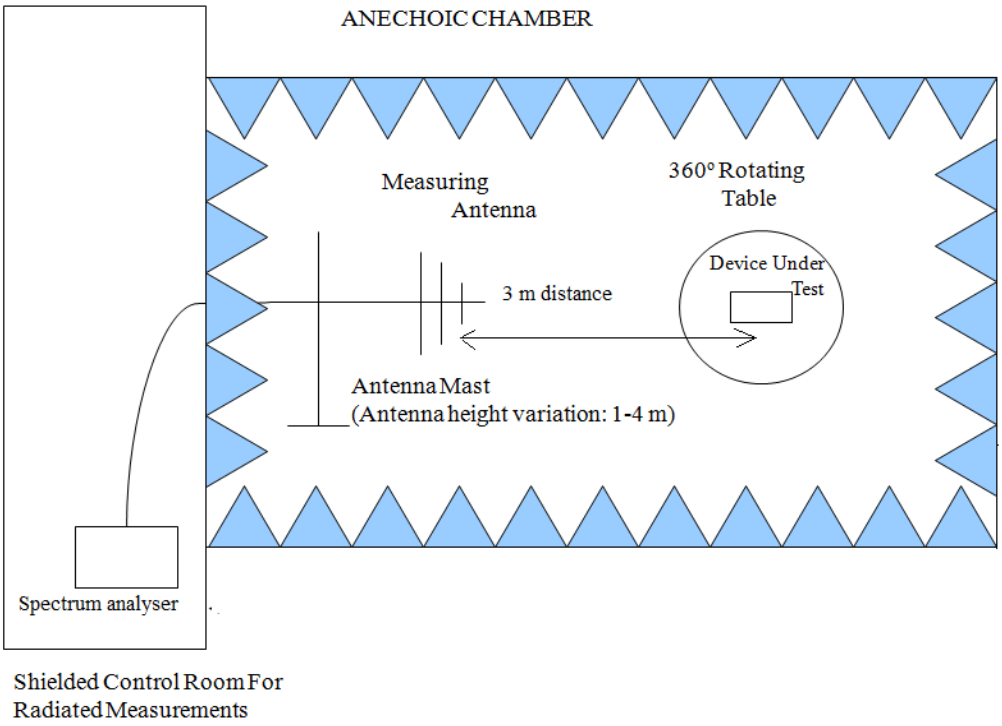
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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 360º and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

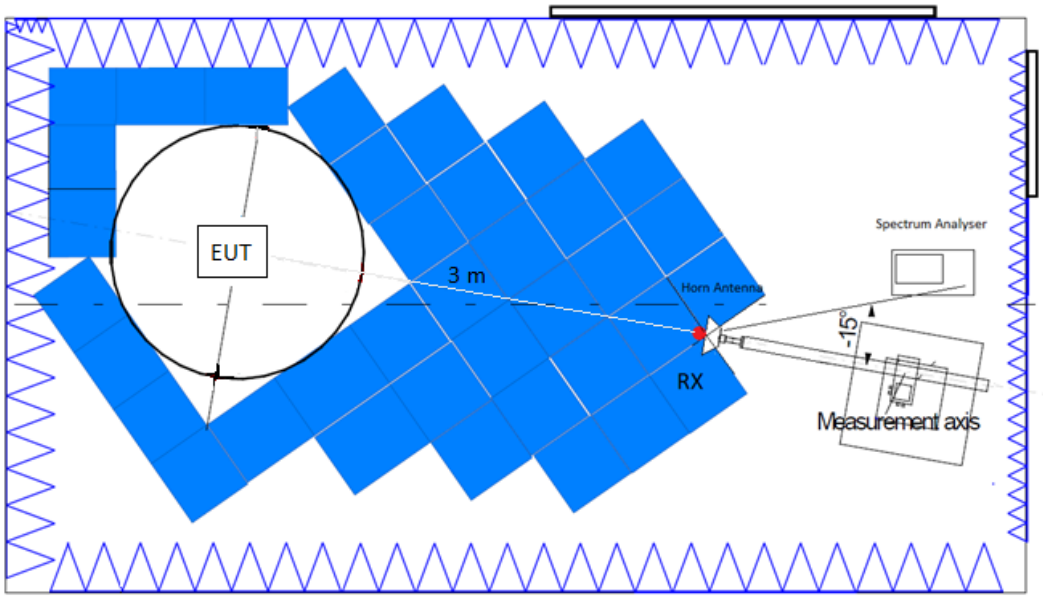
Measurements were made in both horizontal and vertical planes of polarization.

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.

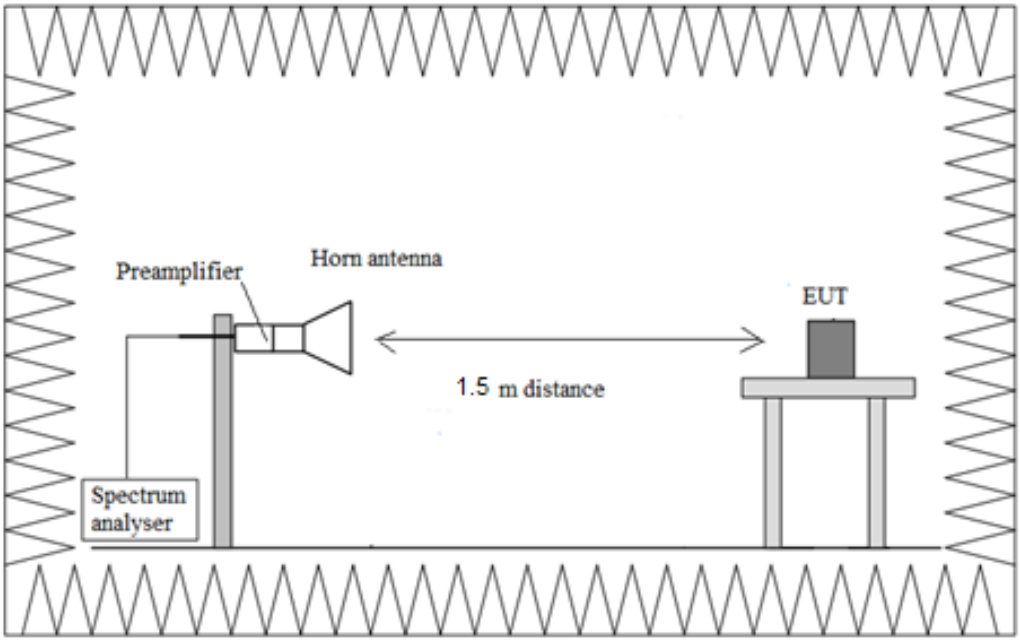
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup f > 17 GHz:



TEST CASES DETAILS

Occupied Channel Bandwidth 99%

Results

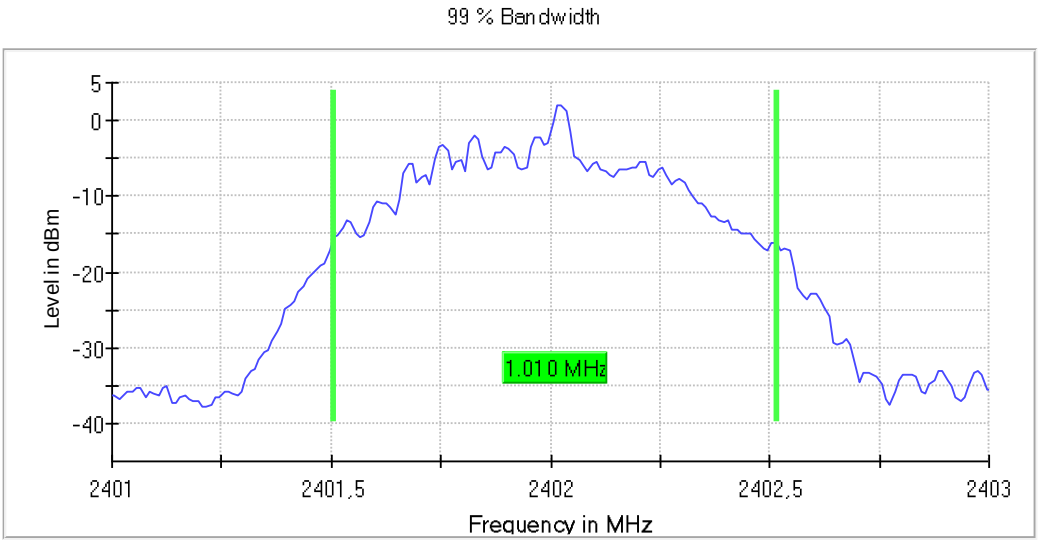
Modulation: BTLE 4.2 (GFSK 1 Mbit/s)

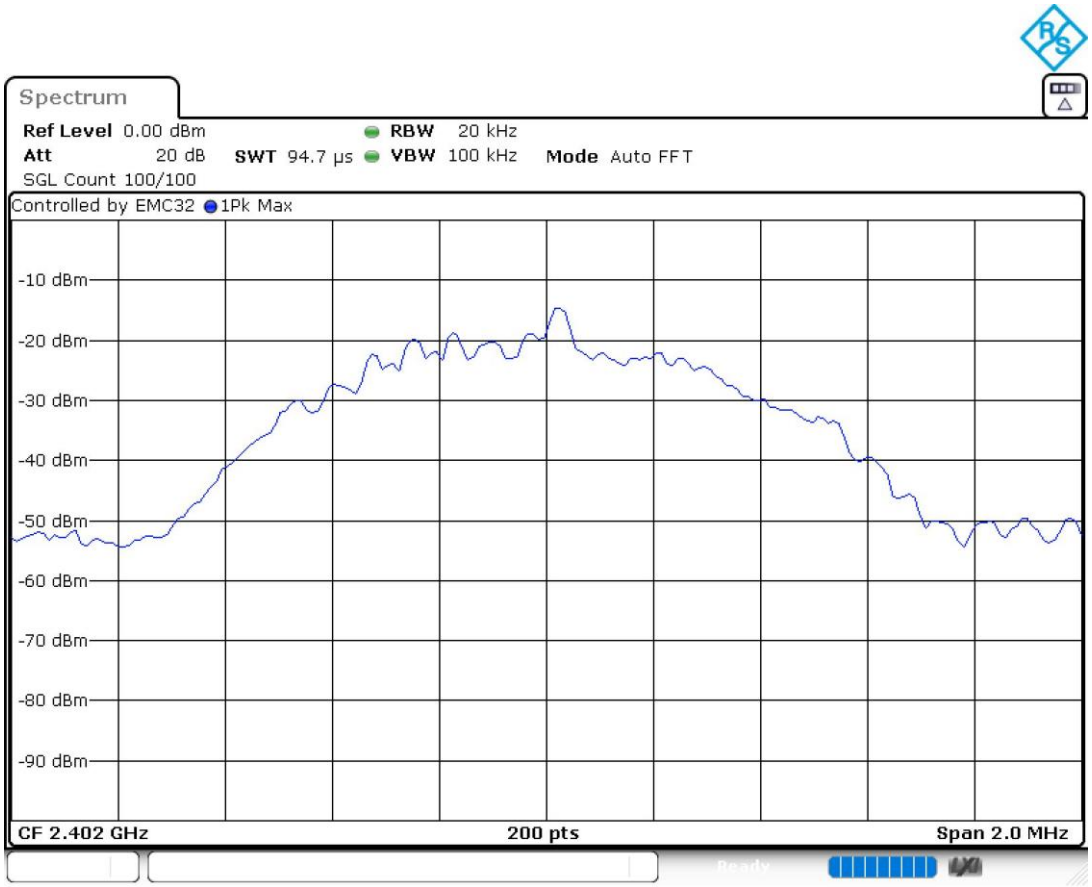
Freq (MHz)	Occ Ch BW (MHz)
2402.00000	1.010
2440.00000	1.010
2480.00000	1.010

Attachments

Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

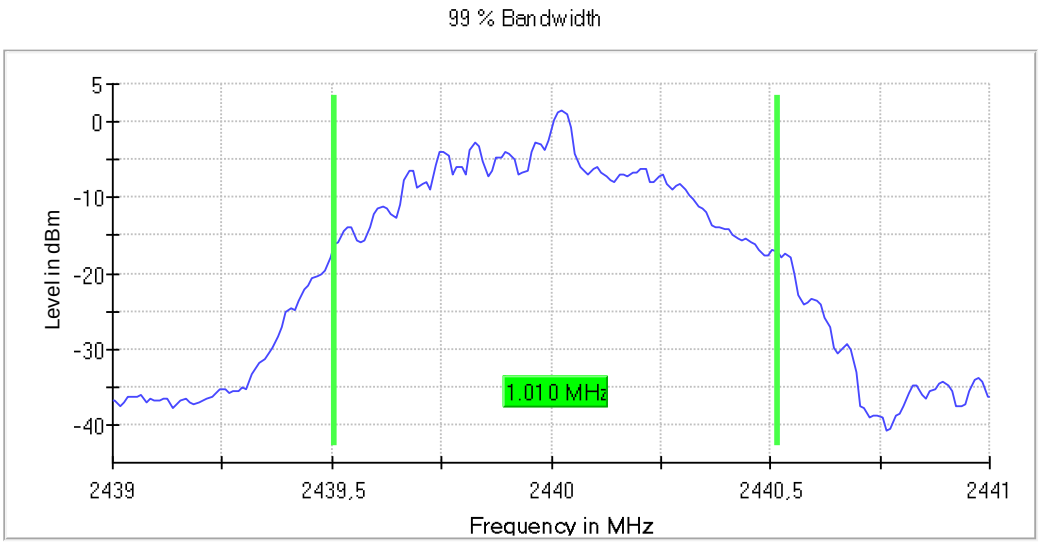
Plots:

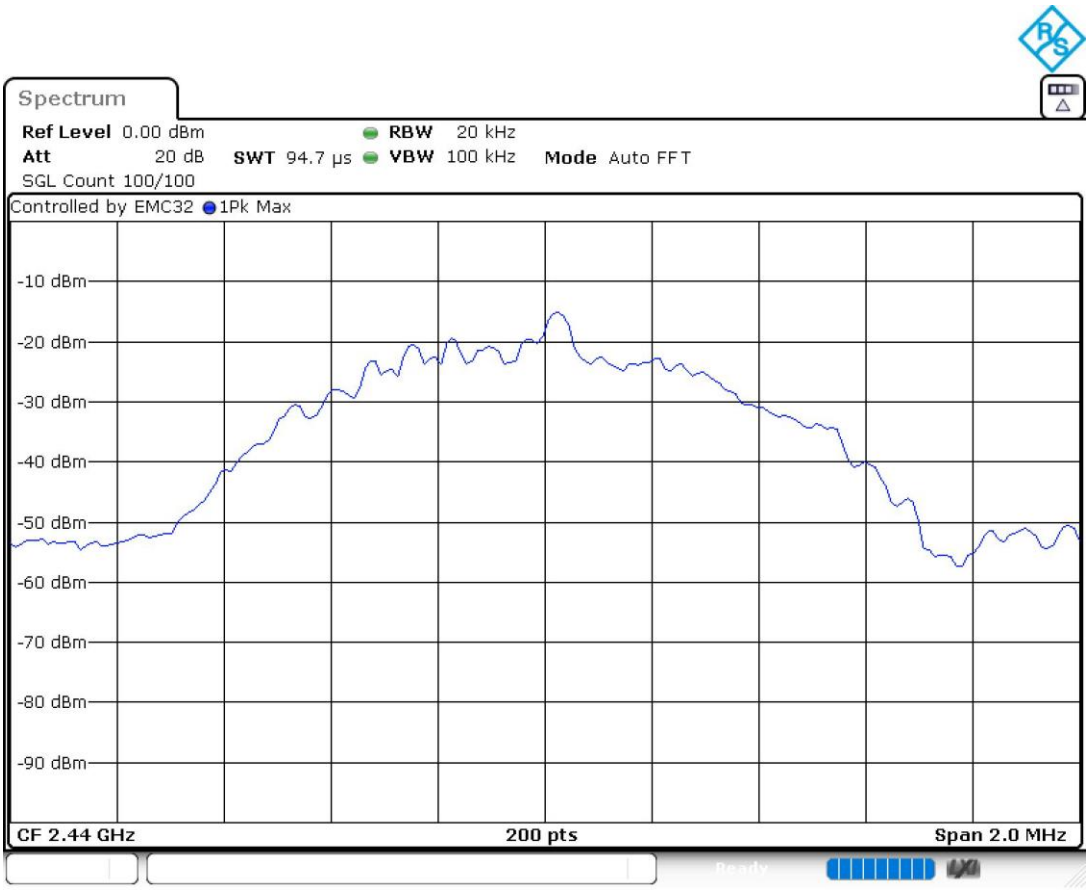




Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

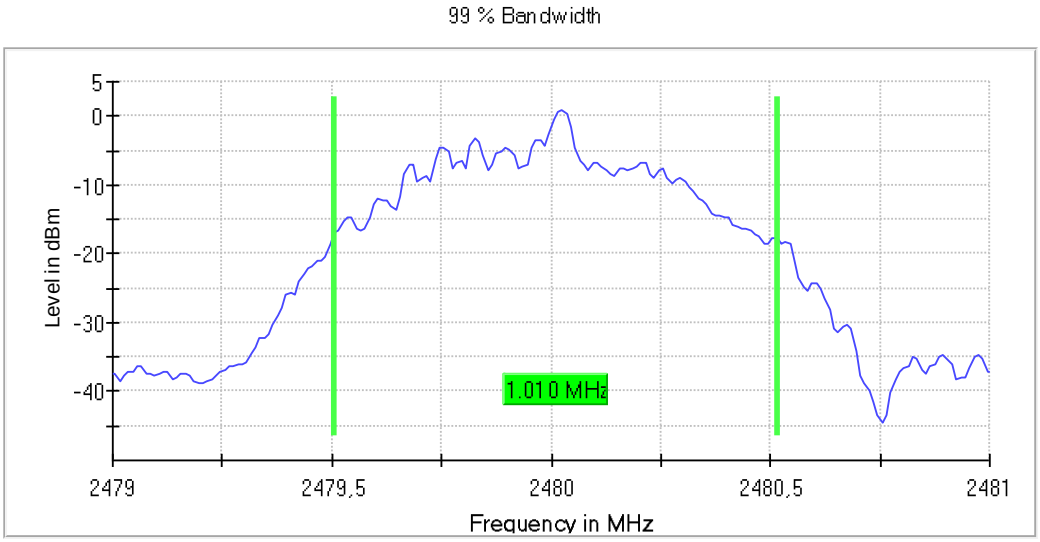
Plots:





Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Plots:



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 4.2 (GFSK 1 Mbit/s)

Freq (MHz)	6 dB Bandwidth (MHz)
2402.00000	0.673
2440.00000	0.673
2480.00000	0.673

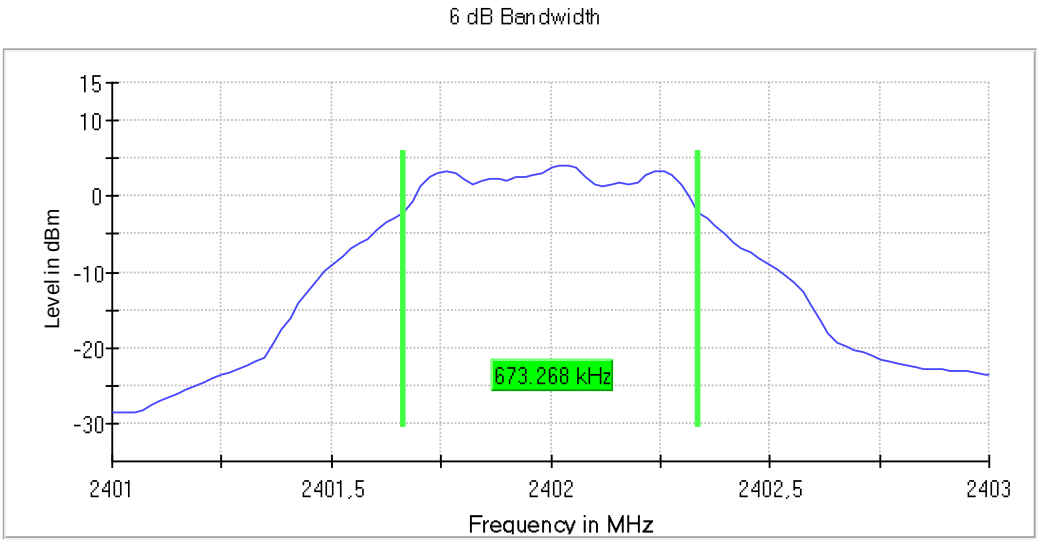
Verdict

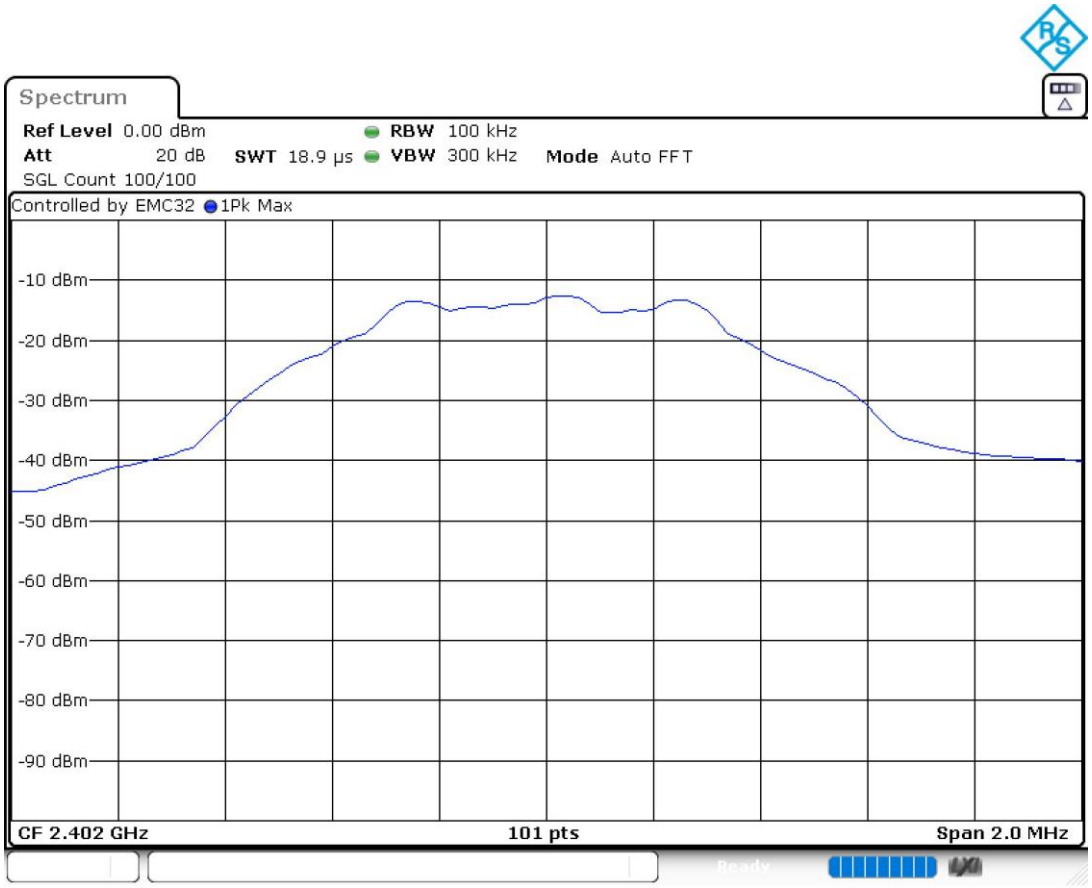
Pass

Attachments

Frequency MHz = 2402.00000, Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

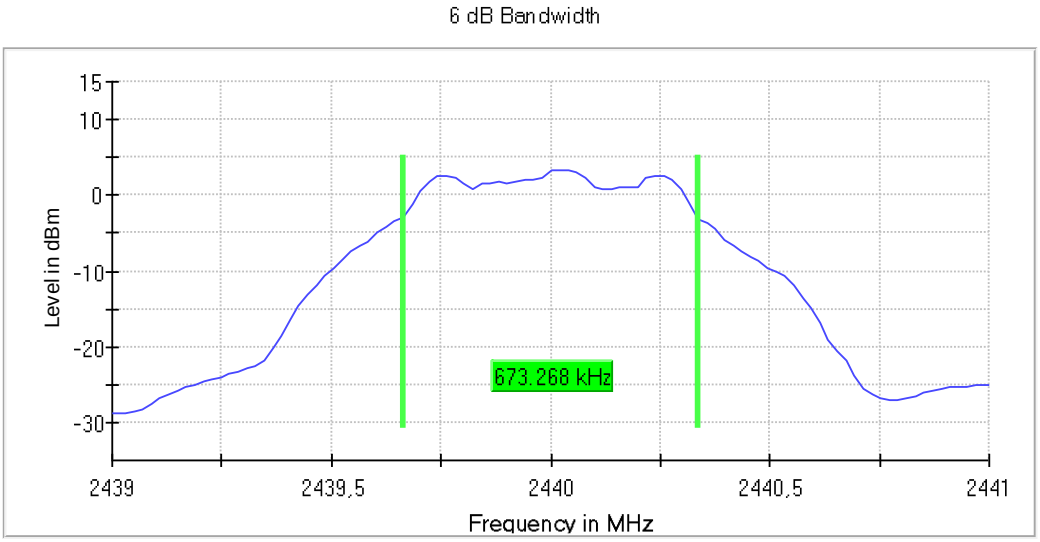
Plots:

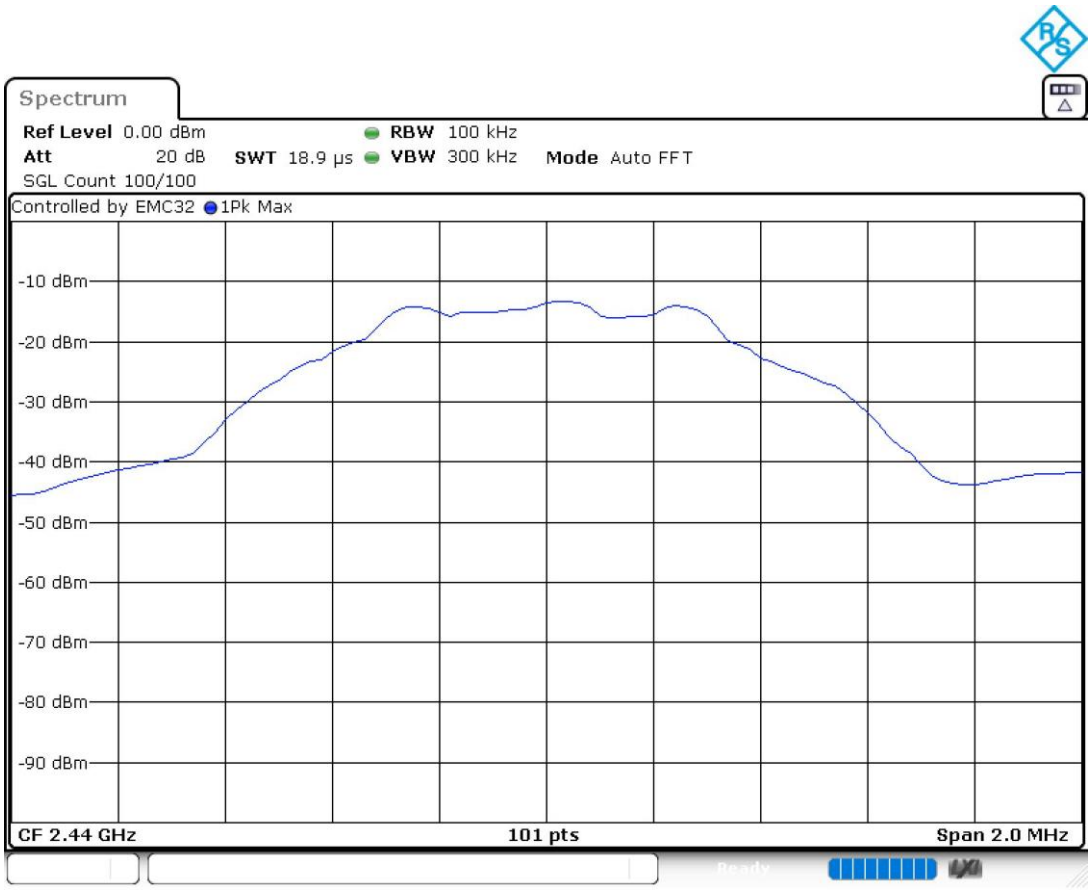




Frequency MHz = 2440.00000, Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

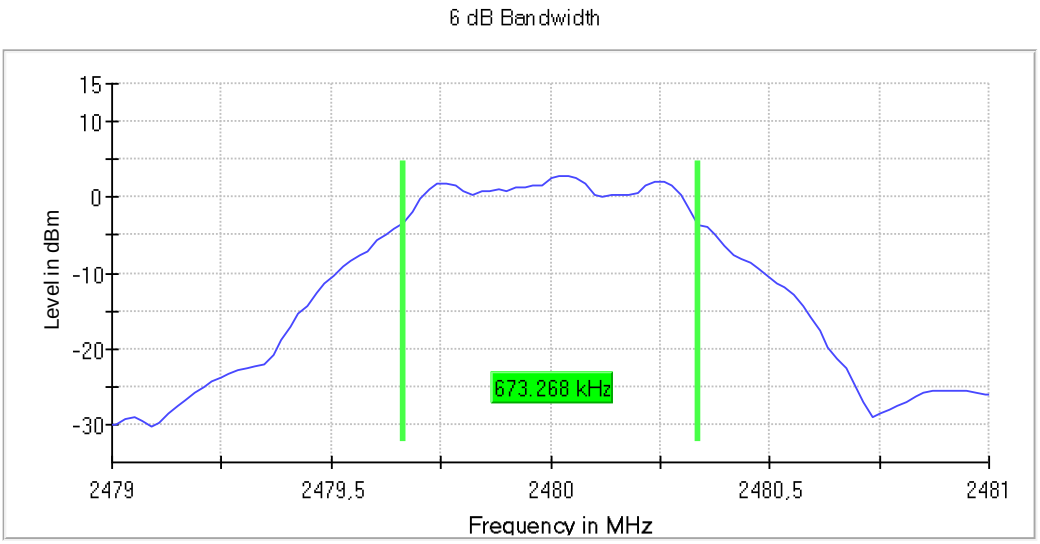
Plots:

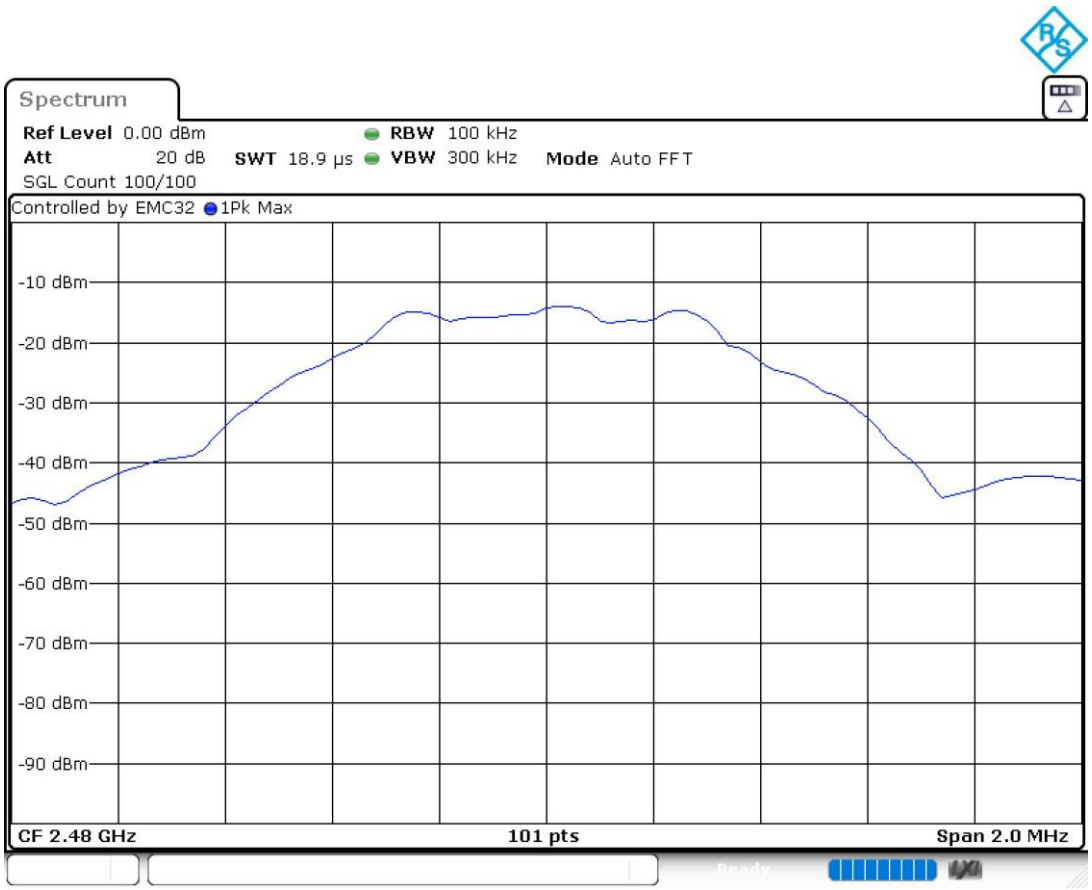




Frequency MHz = 2480.00000, Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Plots:





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

Modulation: BTLE 4.2 (GFSK 1 Mbit/s)

Freq (MHz)	Measured Freq (MHz)	PSD (dBm)
2402.00000	2402.0275	-1.958
2440.00000	2440.0225	-2.413
2480.00000	2480.0225	-3.324

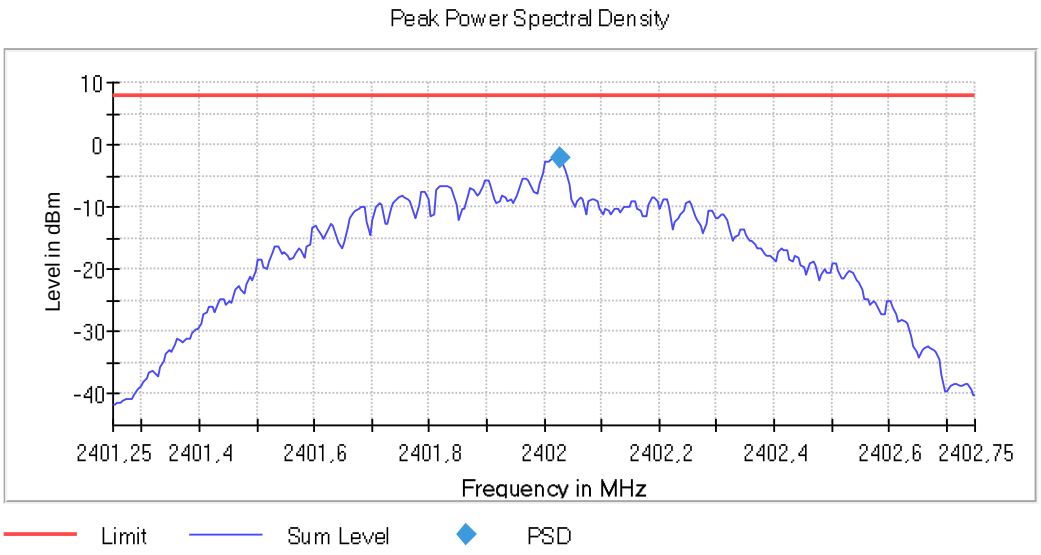
Verdict

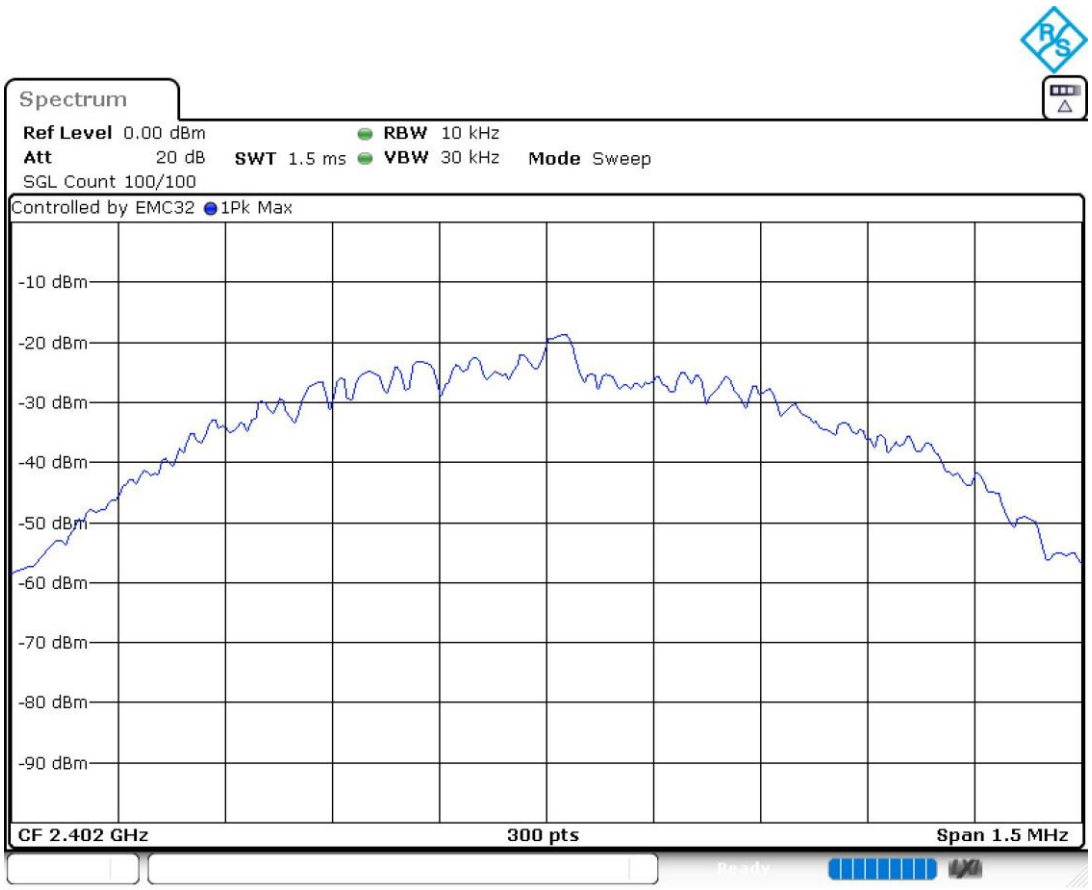
Pass

Attachments

Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

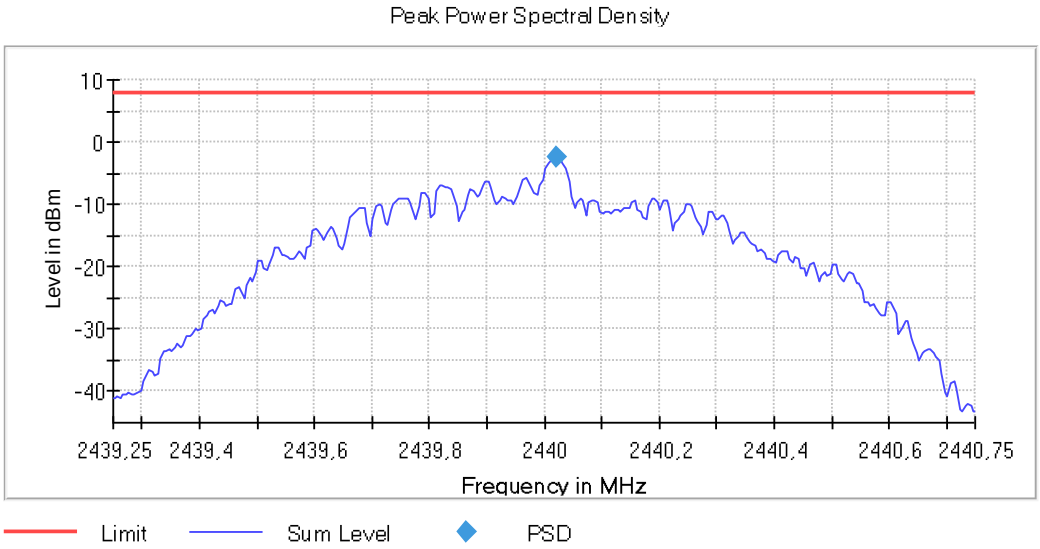
Plots:

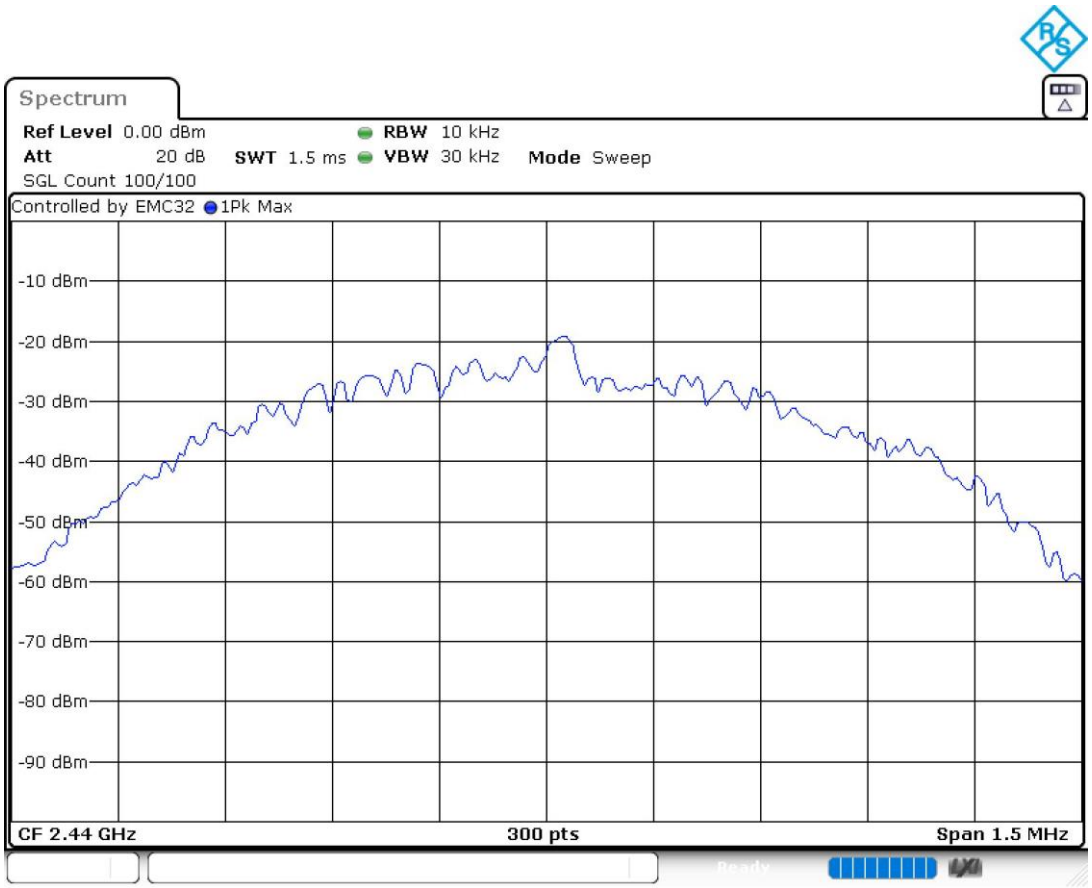




Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

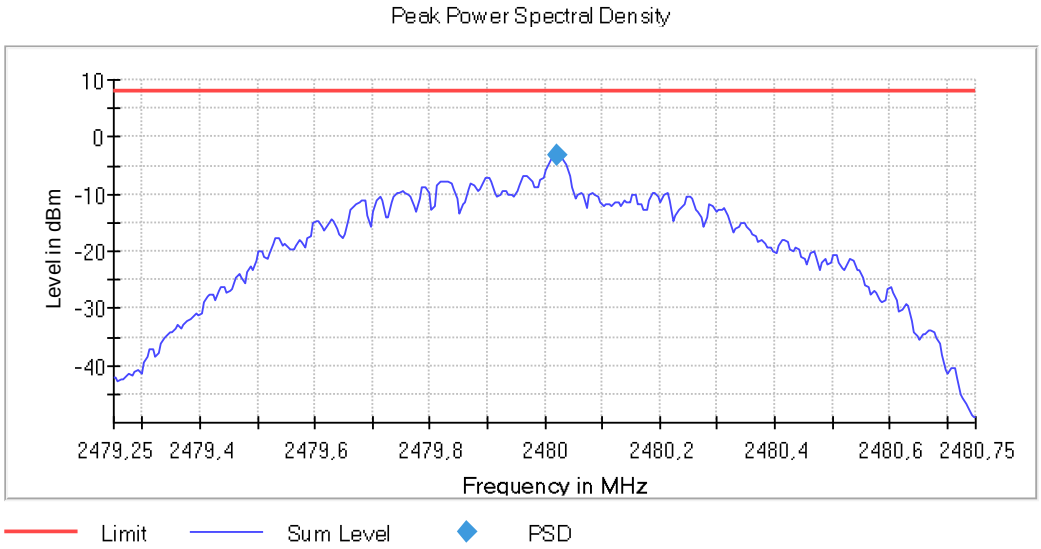
Plots:

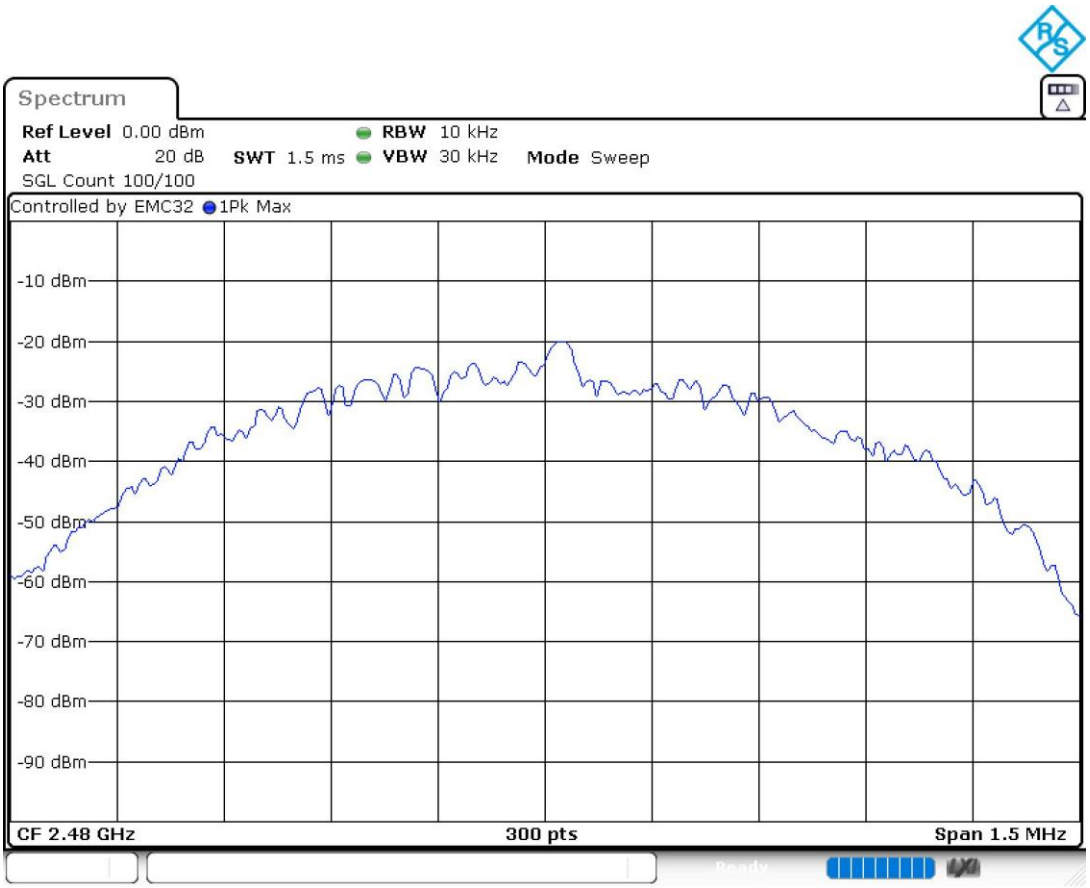




Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Plots:





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) (RSS-247).

The maximum peak conducted output power level in the fundamental emission was measured using the method according to point 11.9.1.1 ”RBW ≥ 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: +0.5 dBi

Results

Modulation: BTLE 4.2 (GFSK 1 Mbit/s)

Freq (MHz)	Maximum Conducted Power (dBm)	Maximum EIRP Power (dBm)
2402.00000	4.154	4.654
2440.00000	3.488	3.988
2480.00000	2.882	3.382

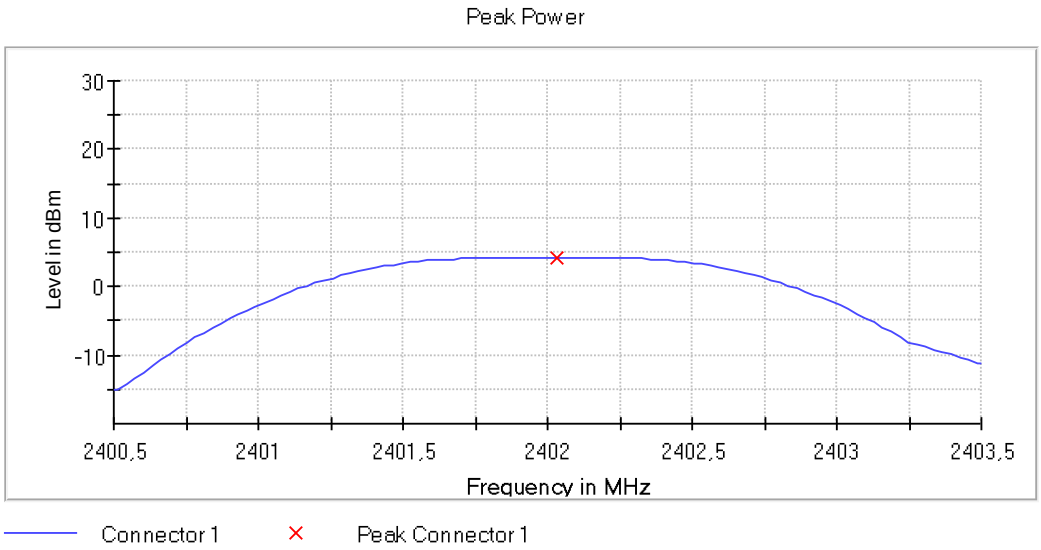
Verdict

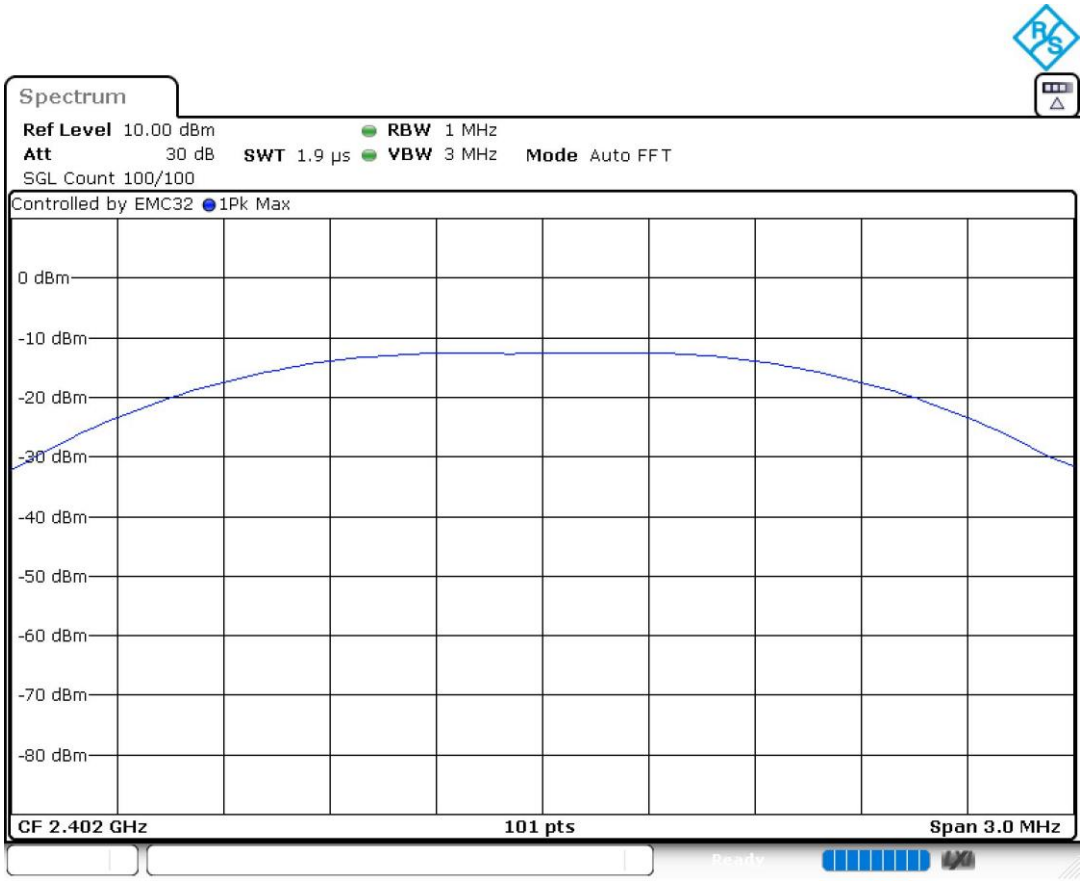
Pass

Attachments

Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

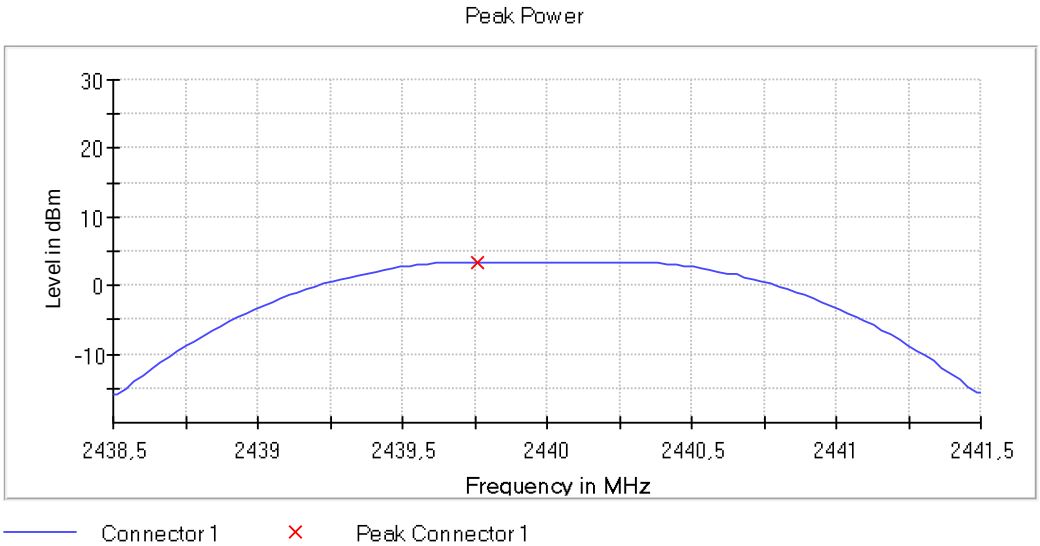
Plots:

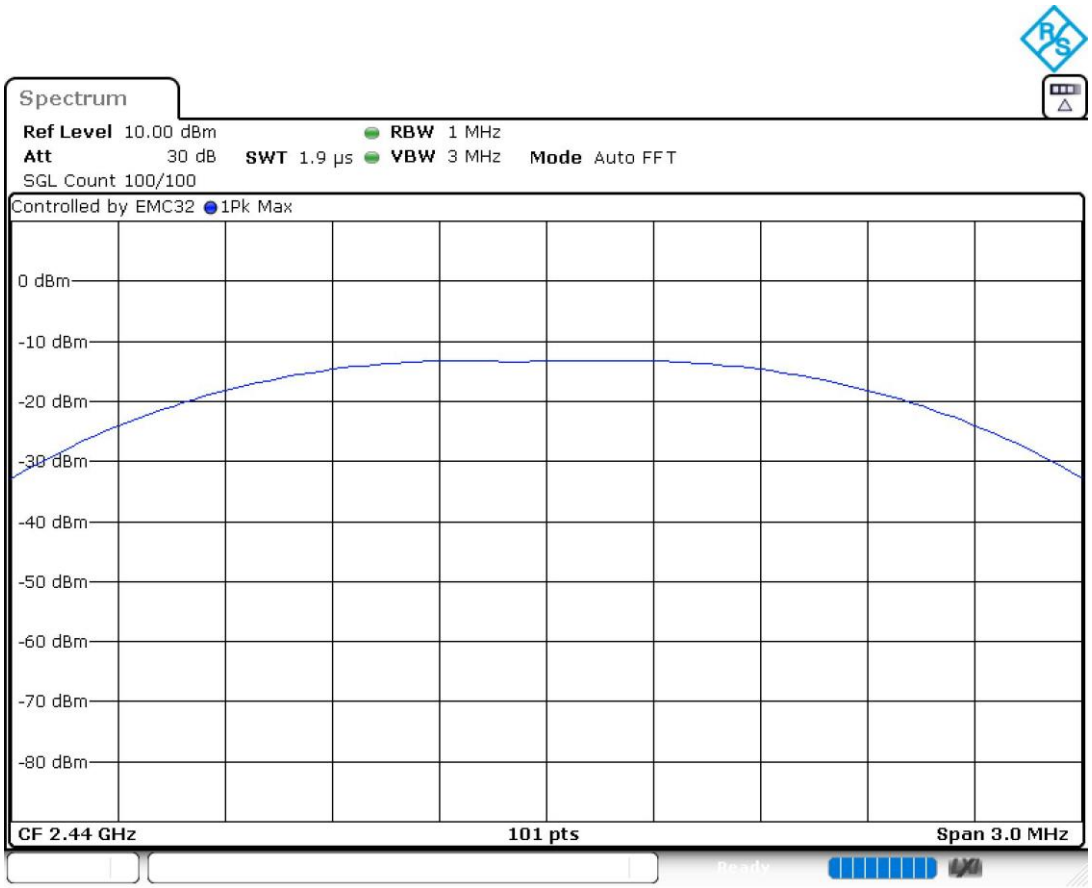




Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

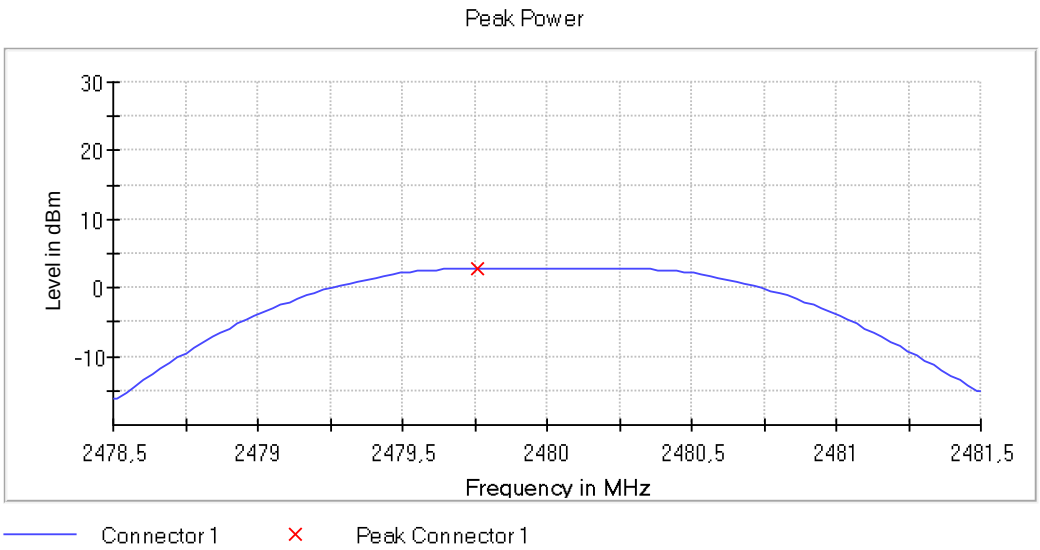
Plots:

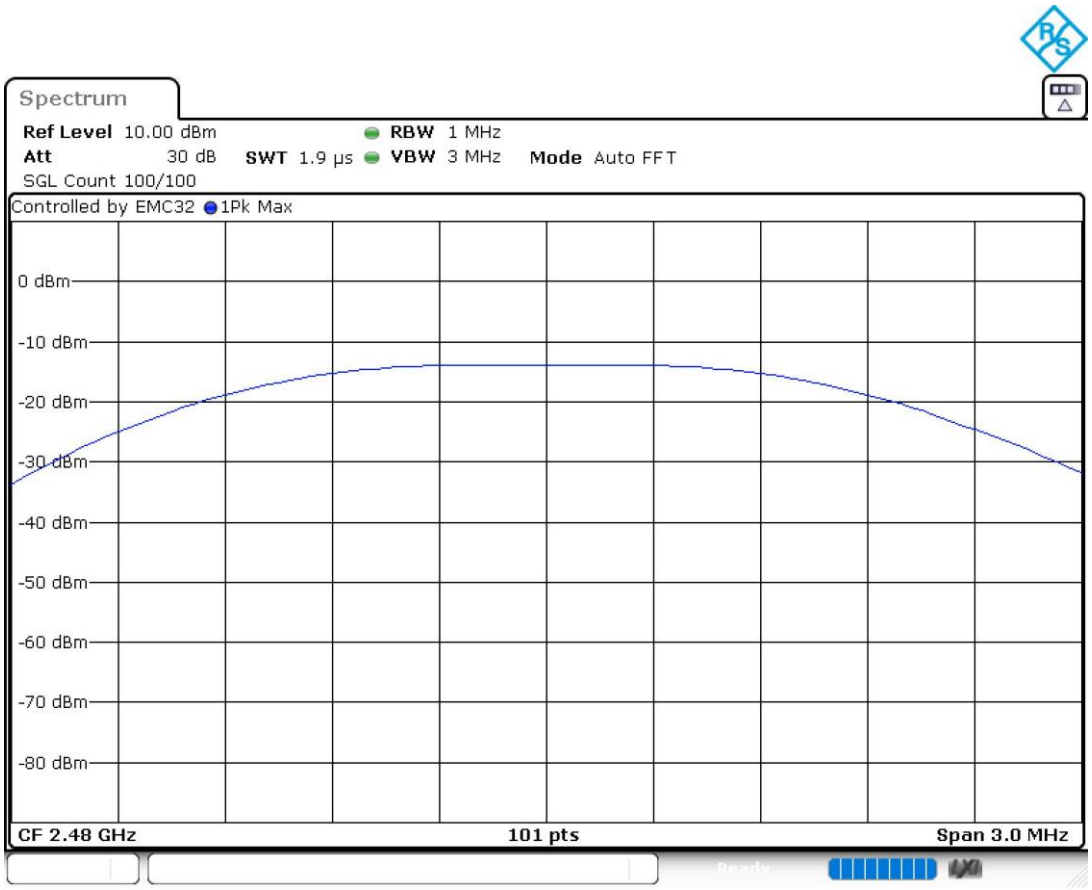




Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Plots:





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.

Modulation: BTLE 4.2 (GFSK 1 Mbit/s)

Freq (MHz)	Inband Peak Level (dBm)	Measured Freq (MHz)	Level (dBm)	Limit (dBm)
2402.00000	3.849	2343.325000	-49.412	-16.151
		2385.775000	-49.430	
		2374.025000	-49.505	
		2312.125000	-49.734	
		2399.375000	-49.753	
		2385.825000	-49.755	
		2312.175000	-49.792	
		2374.075000	-49.829	
		2343.275000	-49.857	
		2341.475000	-50.067	
		2399.325000	-50.152	
		2399.425000	-50.312	
		2373.975000	-50.357	
		2343.375000	-50.414	
		2371.925000	-50.447	

Freq (MHz)	Inband Peak Level (dBm)	Measured Freq (MHz)	Level (dBm)	Limit (dBm)
2480.00000	2.860	2484.675000	-49.367	-17.140
		2487.175000	-49.530	
		2484.625000	-49.567	
		2484.125000	-49.584	
		2485.675000	-49.656	
		2487.125000	-49.668	
		2484.475000	-49.669	
		2484.575000	-49.674	
		2487.475000	-49.688	
		2486.775000	-49.700	
		2485.625000	-49.739	
		2484.525000	-49.750	
		2487.525000	-49.930	
		2486.725000	-49.940	
		2487.075000	-50.082	

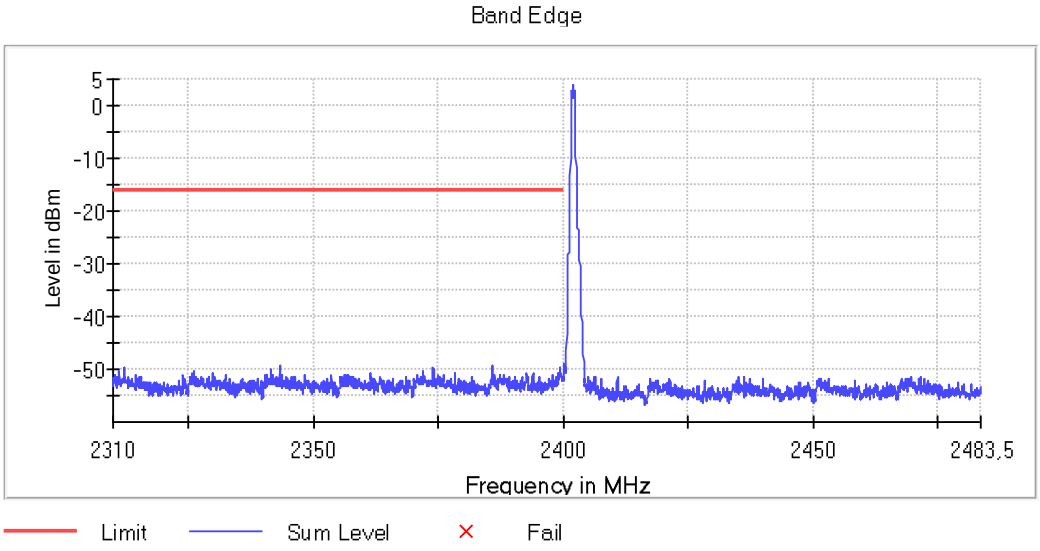
Verdict

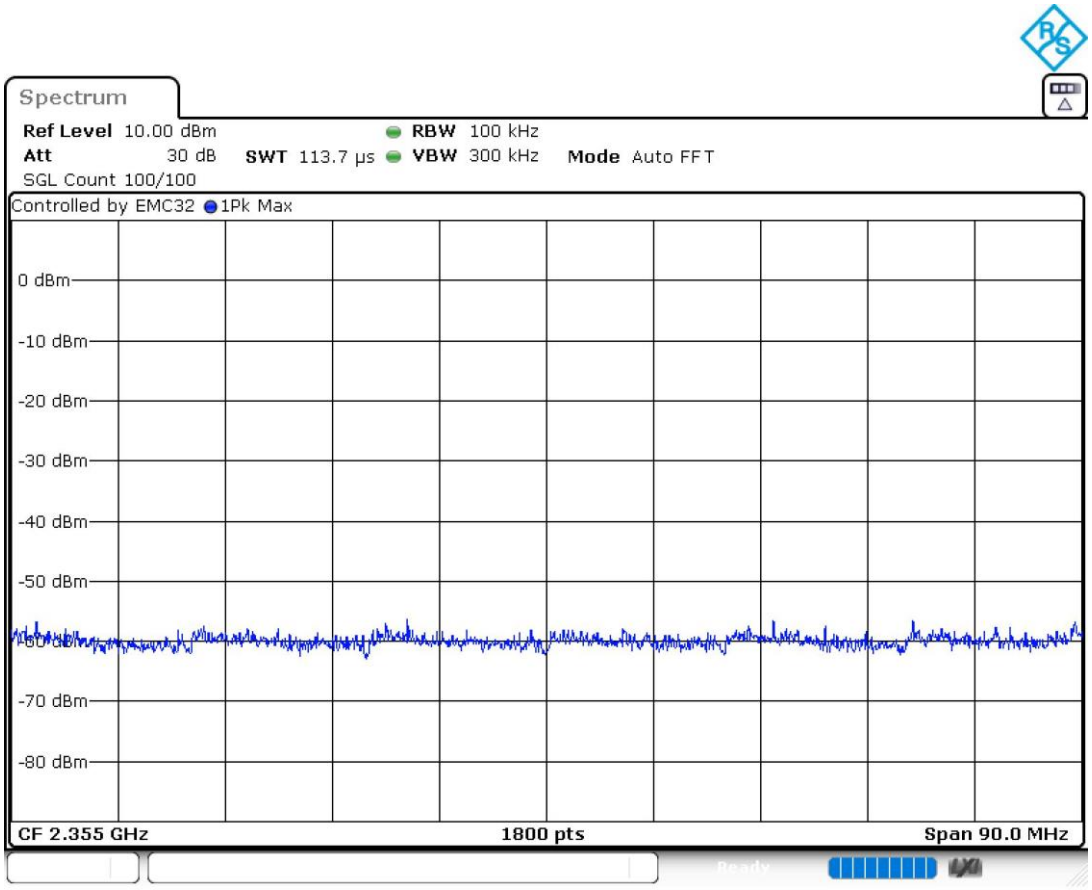
Pass

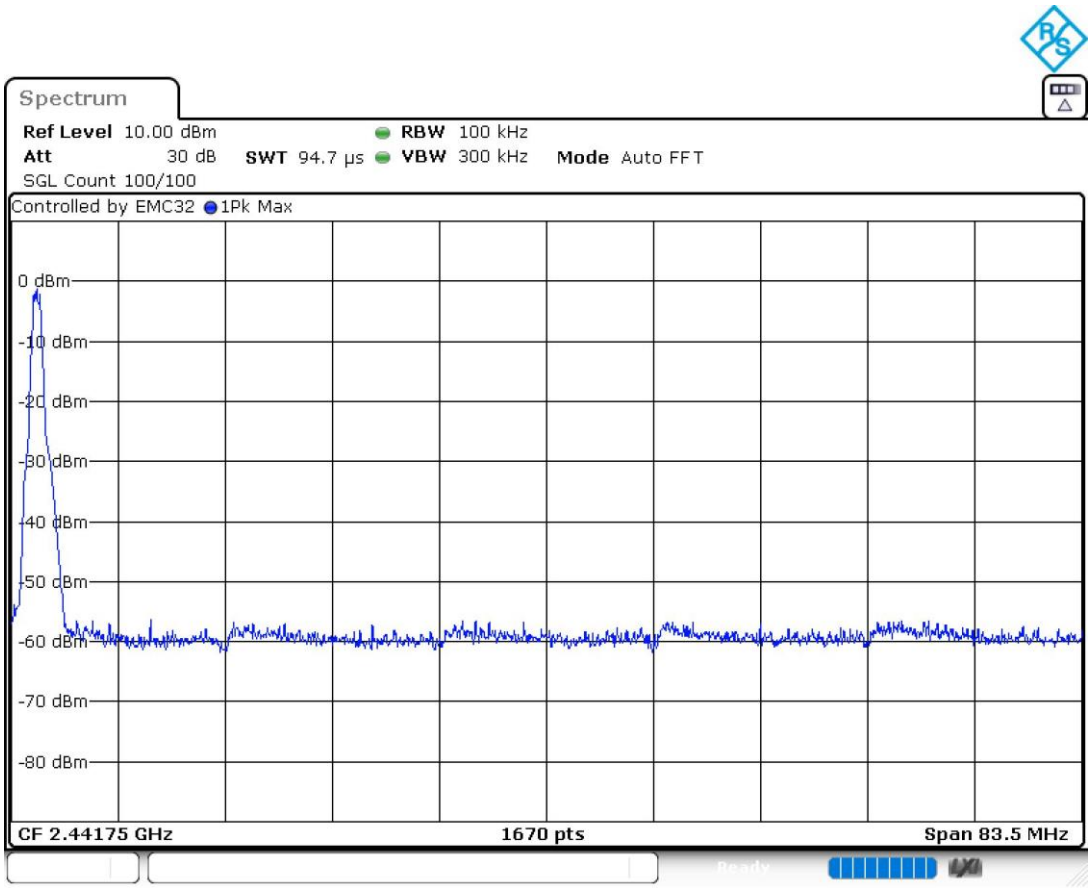
Attachments

Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Measurement Point = 1, Active Port = 1

Plots:

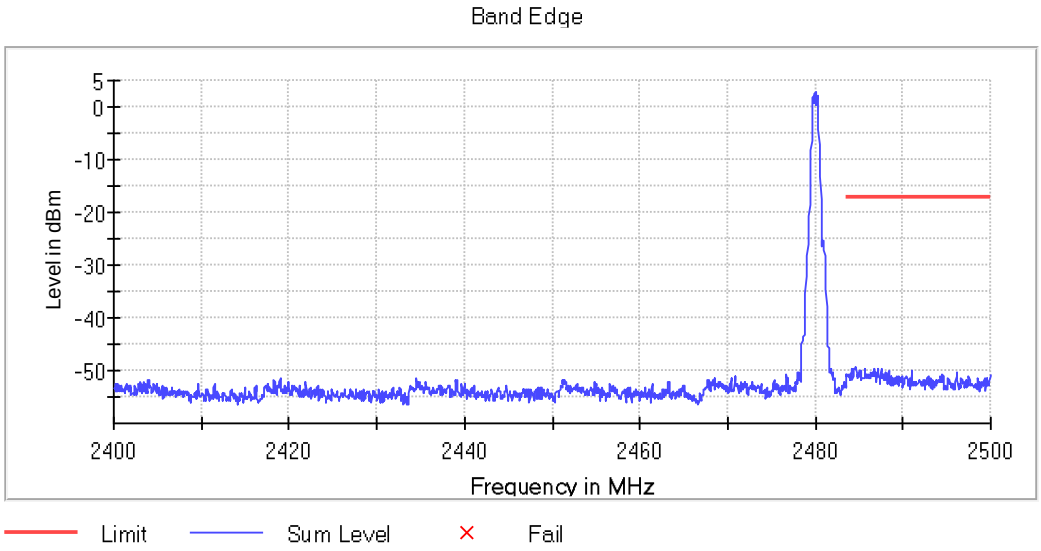


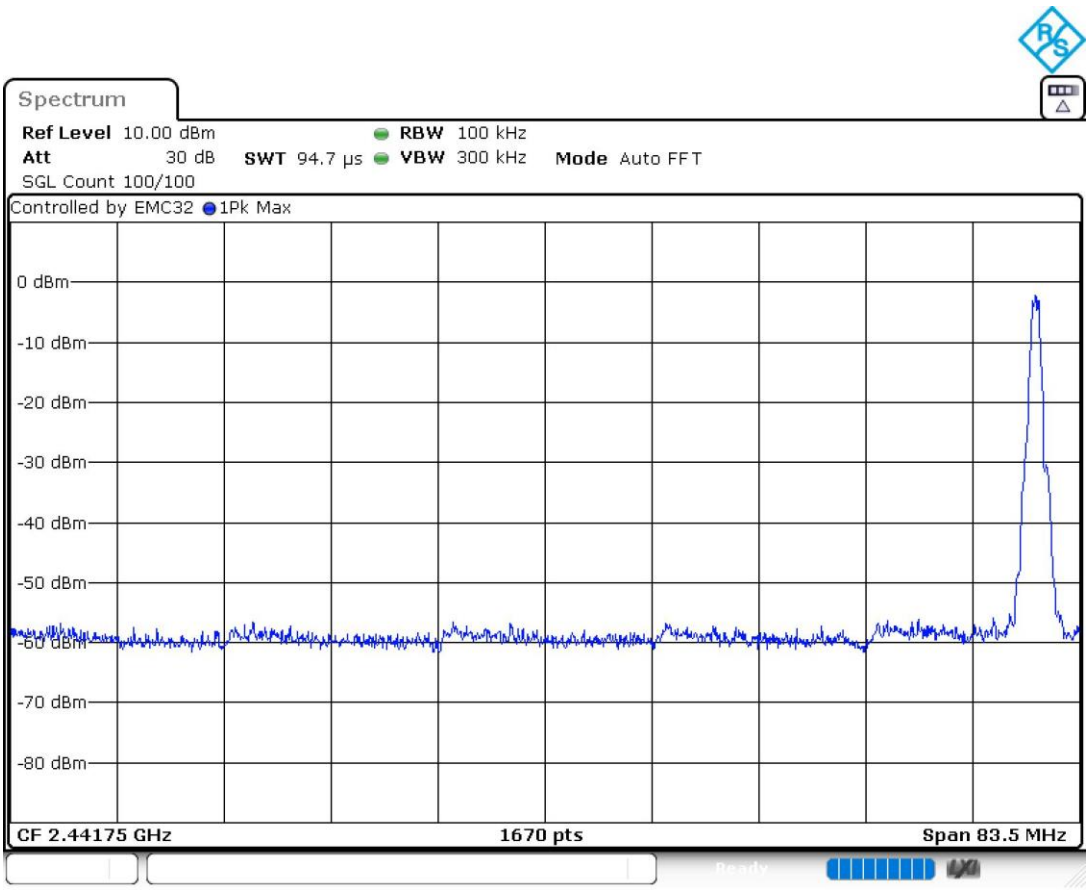


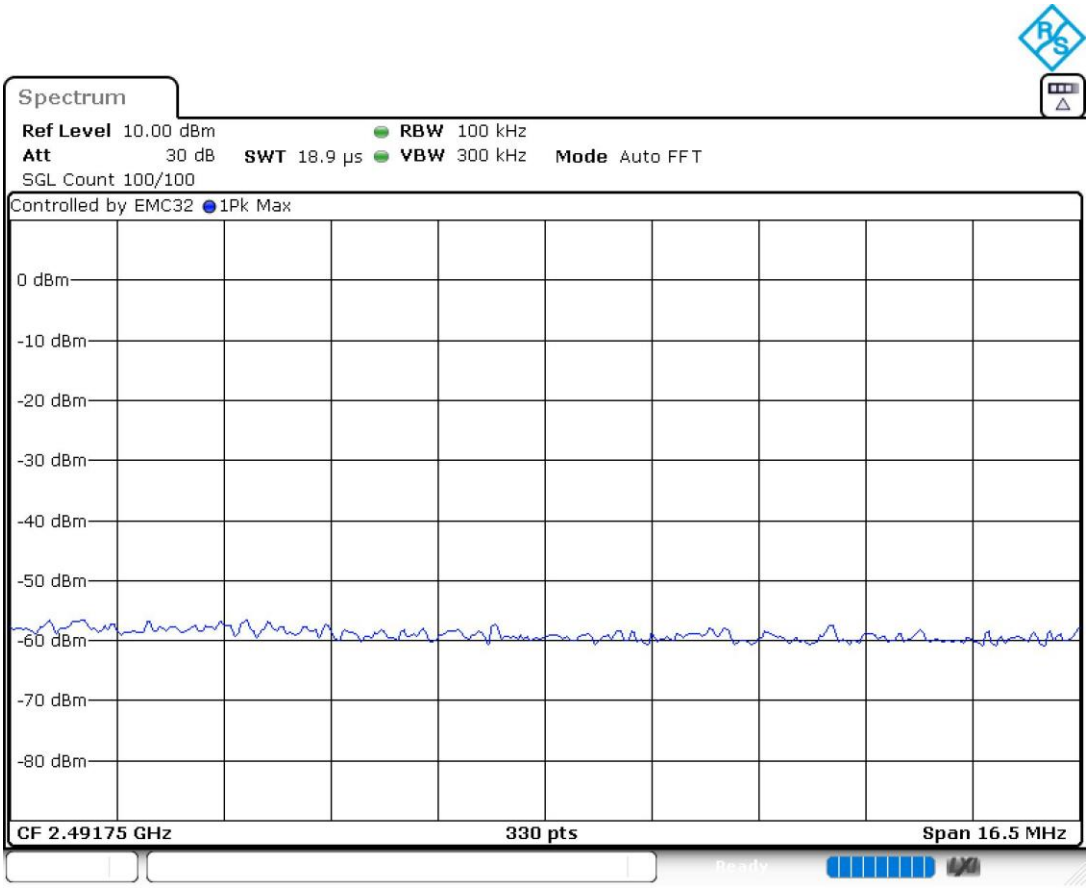

Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 94.7 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
Controlled by EMC32
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.44175 GHz
1670 pts
Span 83.5 MHz

Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Number of Transmission Chains = 1, Measurement Point = 1, Active Port = 1

Plots:






Spectrum
Ref Level 10.00 dBm
RBW 100 kHz
Att 30 dB
SWT 18.9 µs
VBW 300 kHz
Mode Auto FFT
SGL Count 100/100
Controlled by EMC32
1Pk Max
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.49175 GHz
330 pts
Span 16.5 MHz

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 (µV/m)	Field strength (dBµV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

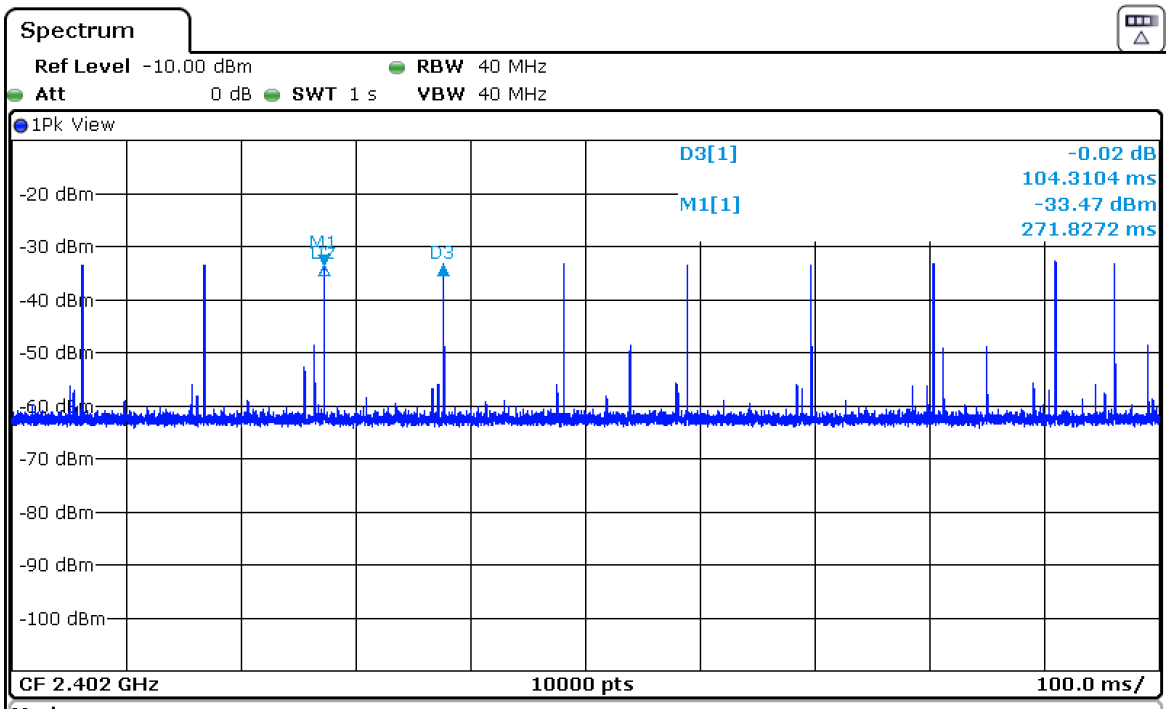
For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247: Attenuation below the general field strength limits specified in RSS-Gen is not required.

Results

Modulation: BTLE 4.2 (GFSK 1 Mbit/s)

Computation of duty-cycle correction factor



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	271.827 ms	-33.47 dBm		
D2	M1	1	400.0 µs	-0.09 dB		
D3	M1	1	104.31 ms	-0.02 dB		

According to ANSI C63.10, paragraph 7.5, we can determinate the Duty Cycle in this way:

Duty cycle correction factor δ = 20 * log (Tx ON (ms) * Number of pulses within 100 ms) / 100 ms

δ = 20 log (400us)/100ms = -47.97 dB.

Frequency range 30 MHz – 1 GHz:

The spurious signals detected do not depend on the operating channel.

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

Frequency range 1 GHz – 26 GHz:

The results below show the maximum measured levels in the 1 – 26 GHz range including the restricted bands 2.31 – 2.39 GHz and 2.4835 – 2.5 GHz.

Spurious frequencies with peak levels above the average limit (54 dBµV/m at 3 m) are measured with average detector for compliance checking with the average limit.

According to 558074 D01 15.247 Meas Guidance v05r02:
Several measurement methods are available for making average measurements for radiated and antenna-port conducted spurious emission provided that:

i. The spurios emission fall in restricted band
ii. Emission are temporally related to the fundamental
iii. The maximum duty cycle used in determining the reduction factor is hardwired such that under no condition can it be changed or modified by either the device or end user
iv. documented justification for use of Section 15.35(c) including the measurements used to determine the worst-case duty cycle must be included in the test report, and
v. the duty cycle correction factor is the worst case operational duty cycle based on the maximum transmission time in any 100 msec period.

If the above criteria are satisfied, one of the following measurement techniques may be used:

Applying a duty cycle correction to the Peak measurement – First, a Peak measurement is made using the Peak detector function of a spectrum analyzer. The spectrum analyzer settings should be such that it meets the requirements of 11.12.2.4 in ANSI C63.10 for making a Peak measurement. Then the operational duty cycle of the EUT may be subtracted from the Peak reading to derive the RMS average value. If the EUT supports more than one operational duty cycle the worst-case value should be used, i.e., the highest operational duty cycle.

** Real Duty Cycle correction factor: -47.97 dB*

Freq (MHz)	Freq Rng (GHz)	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Corrected Unwanted Lvl (dBµV/m)	Pol	Detector
2402.00000	[3, 17]	4804.4150	57.43	--	V	PK
			55.97	8.00		AVG
		7205.1800	52.92	--	H	PK
		12011.1000	52.60	--	V	PK
2440.00000		4879.3600	57.65	--	V	PK
			55.67	7.70		AVG
		7319.1400	53.16	--	H	PK
		12201.0800	51.54	--	H	PK
2480.00000		4960.0000	57.82	--	V	PK
			55.42	7.45		AVG
		7439.2600	52.57	--	H	PK
		12401.2800	51.40	--	H	PK

Verdict

Pass

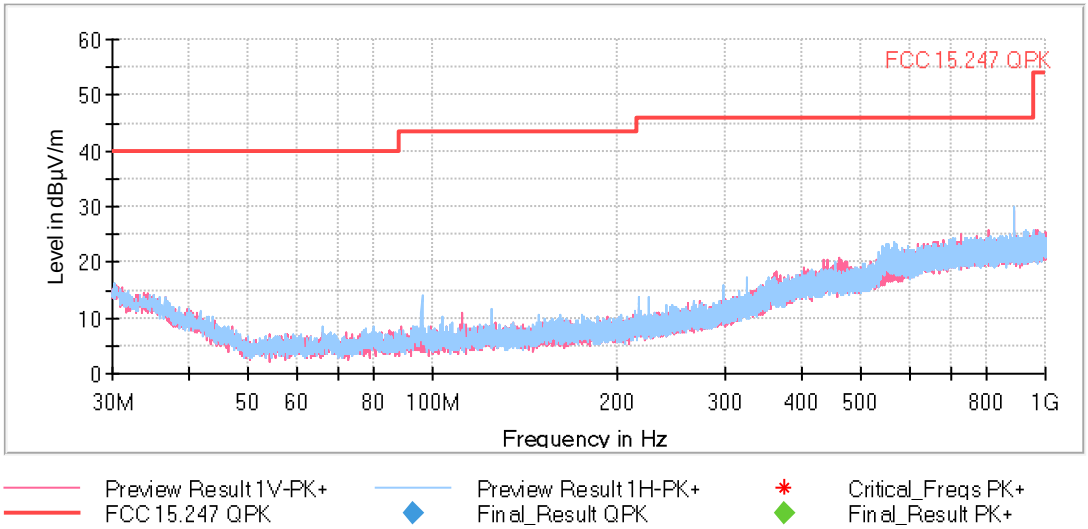
Attachments

Spectrum Analyzer Parameters:

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
Receiver: [ESW 44]					
30 MHz - 1 GHz	30,312 kHz	PK+	100 kHz	1 s	0 dB
Receiver: [ESW 44]					
1 GHz - 3 GHz	30,769 kHz	PK+ ; AVG	1 MHz	1 s	0 dB
Receiver: [ESW 44]					
3 GHz - 17 GHz	140 kHz	PK+ ; AVG	1 MHz	1 s	30 dB
Receiver: [FSW 50]					
17 GHz - 26 GHz	300 kHz	PK+ ; AVG	1 MHz	1 s	0 dB

Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Frequency Range GHz = [0.03, 1]

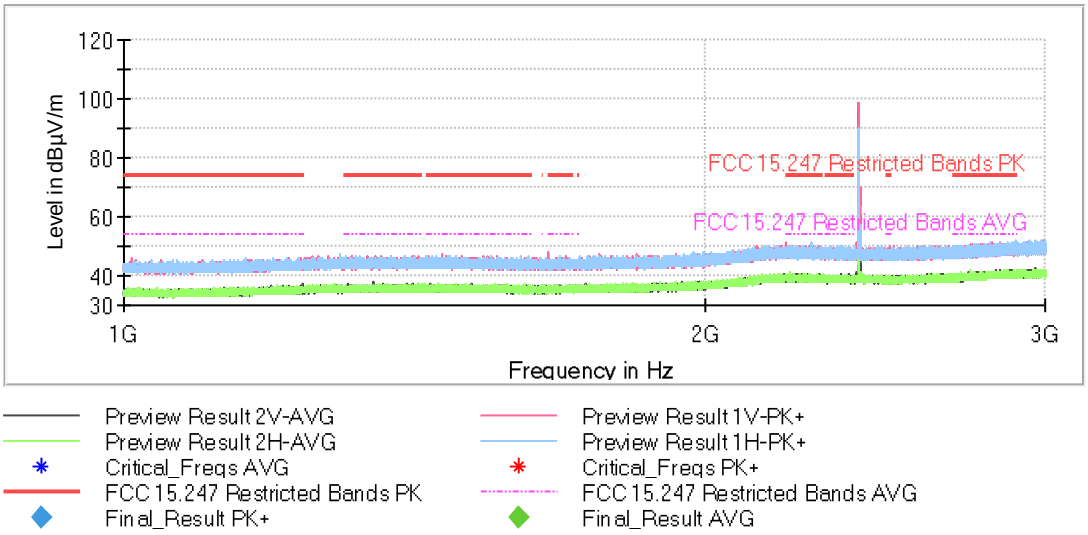
Plots:



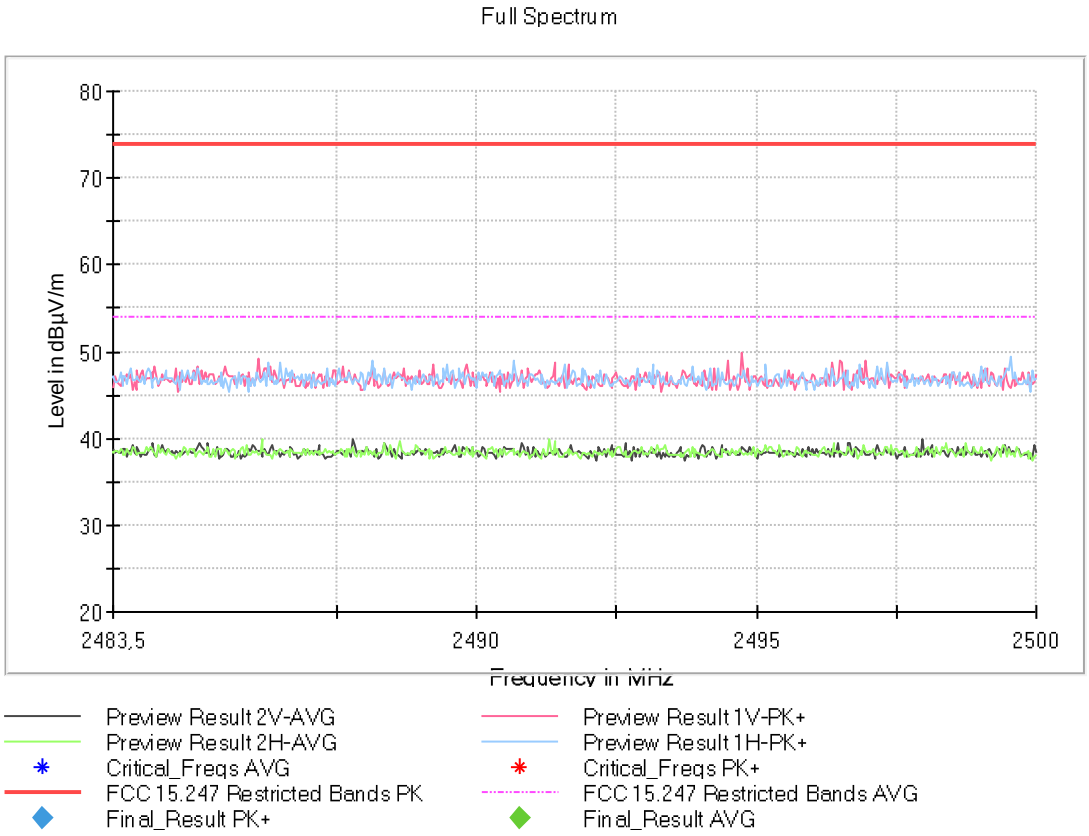
This plot is valid for all channels

Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 3], Number of Transmission Chains = 1, Measurement Point = 1, Active Port = 1

Plots:

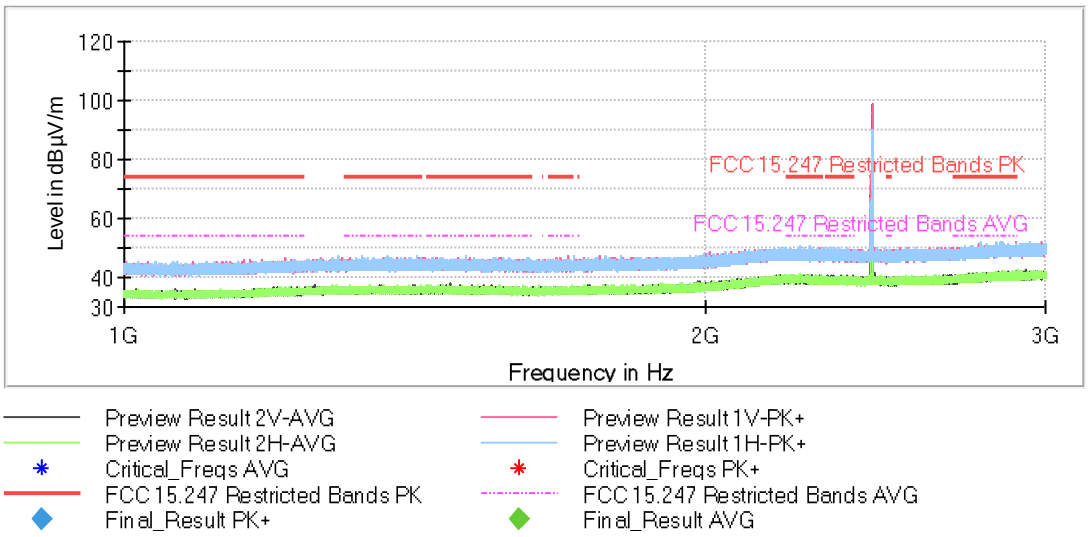


Full Spectrum

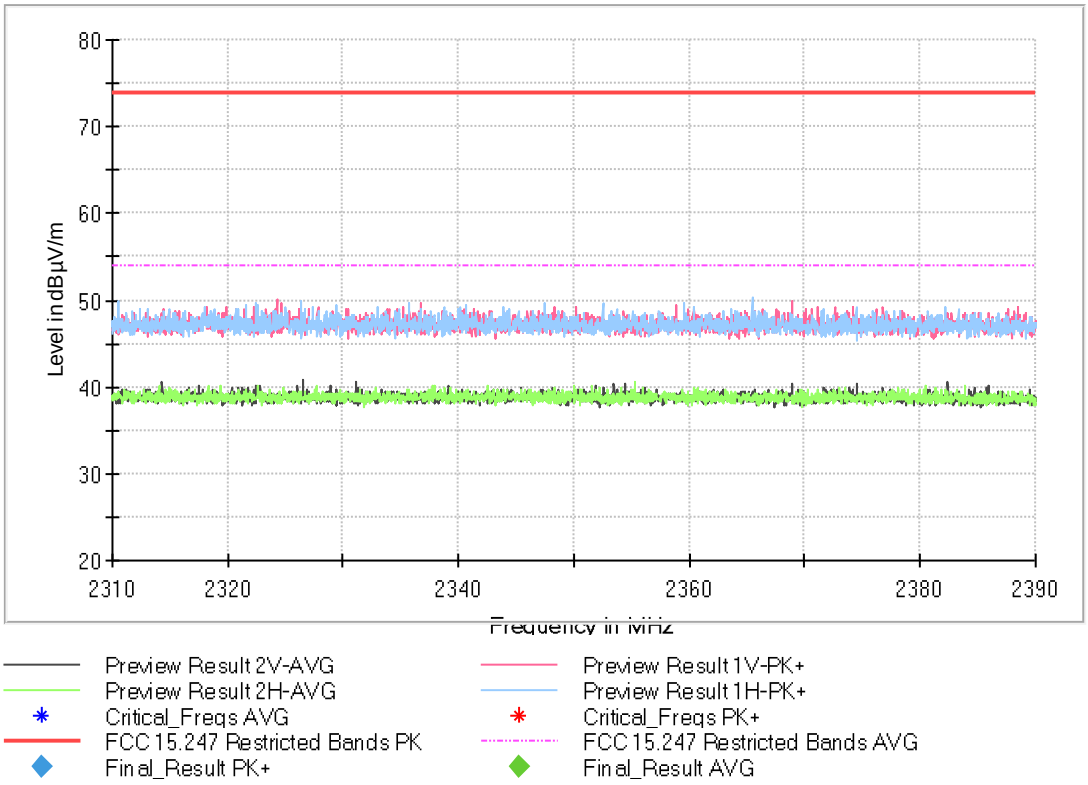

Full Spectrum
Level in dBµV/m
80
70
60
50
40
30
20
2483.5
2490
2495
2500
Frequency in MHz
Preview Result 2V-AVG
Preview Result 2H-AVG
Critical_Freqs AVG
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
Critical_Freqs PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

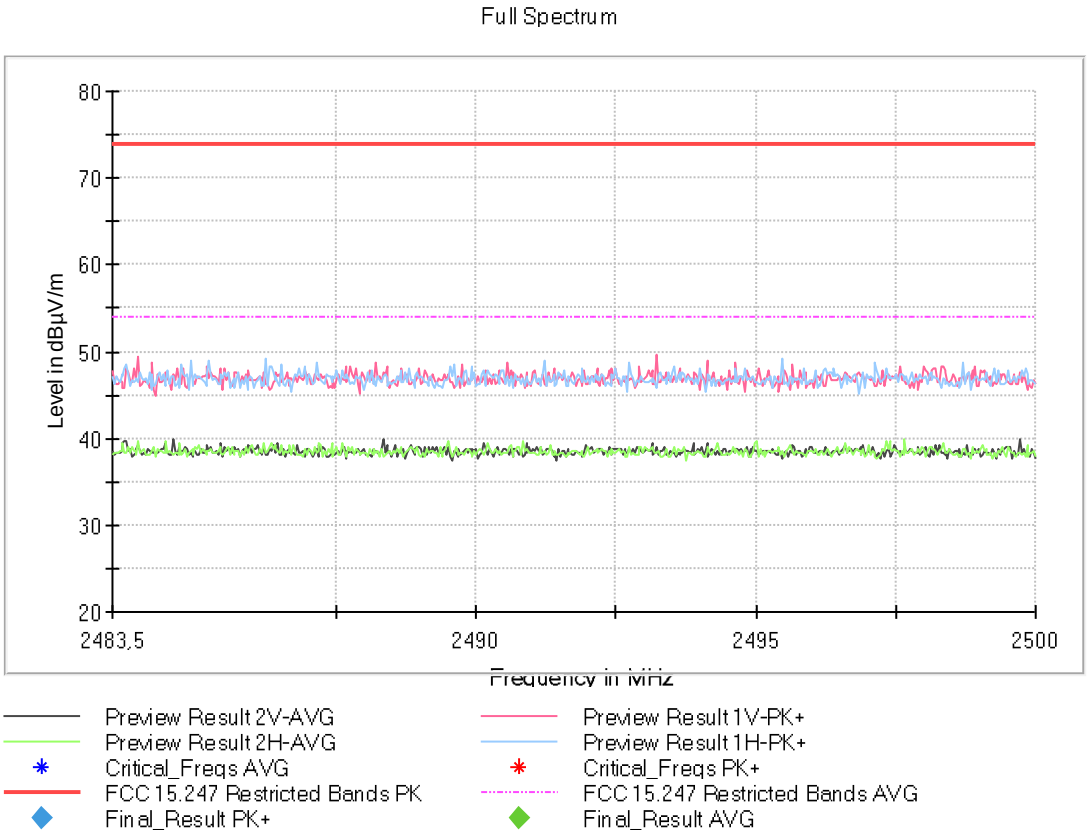
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 3], Number of Transmission Chains = 1, Measurement Point = 1, Active Port = 1

Plots:



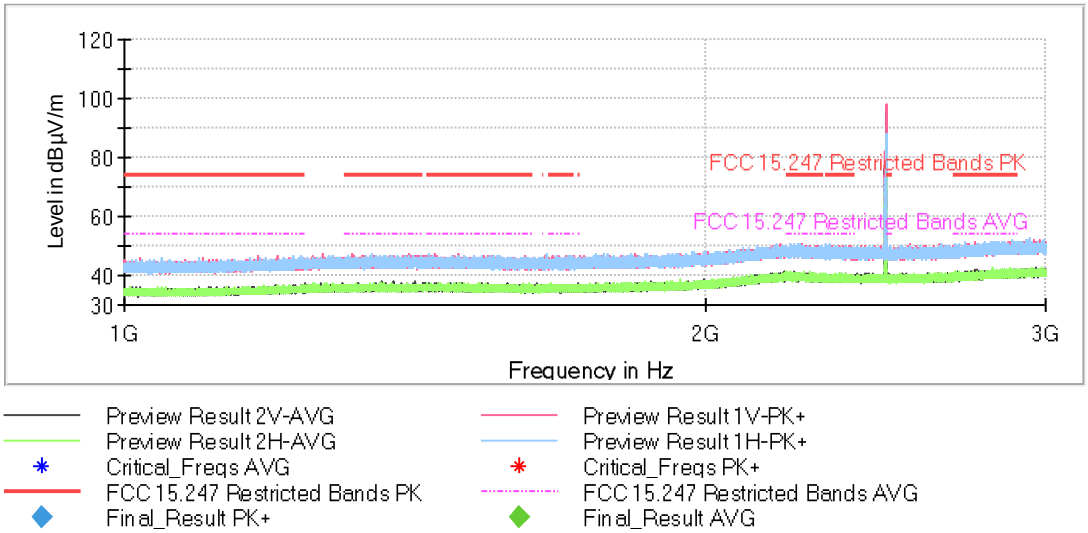
Full Spectrum



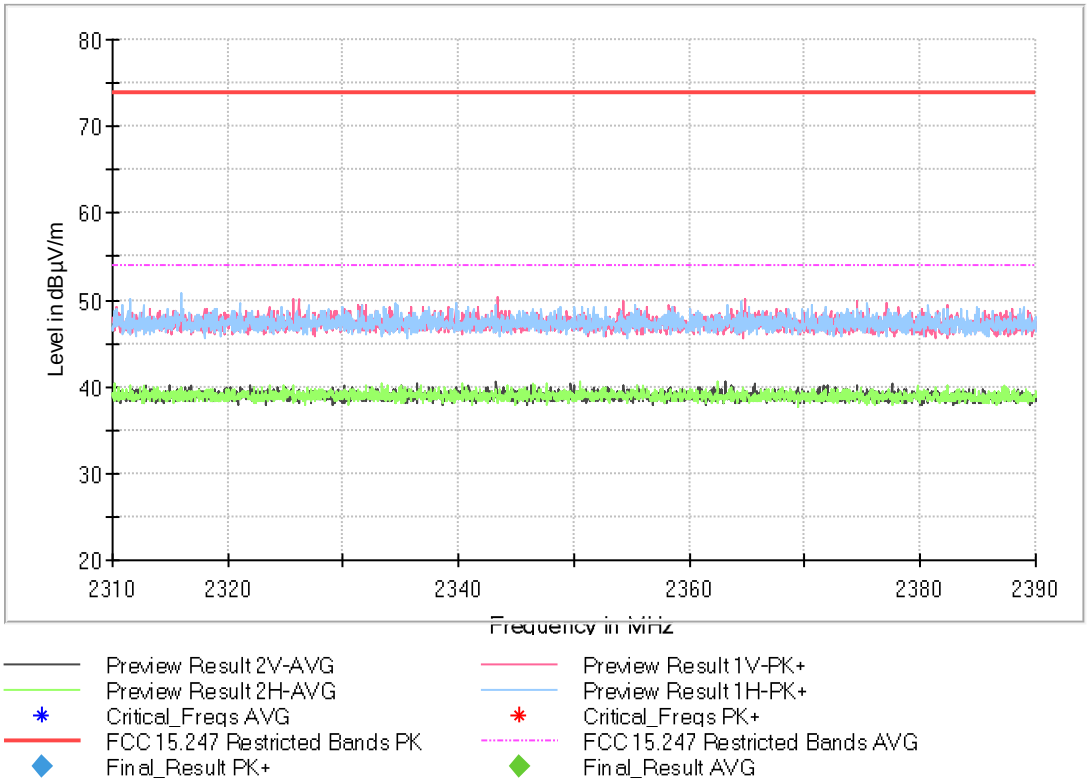

Full Spectrum
Level in dBµV/m
80
70
60
50
40
30
20
2483.5
2490
2495
2500
Frequency in MHz
Preview Result 2V-AVG
Preview Result 1V-PK+
Preview Result 2H-AVG
Preview Result 1H-PK+
Critical_Freqs AVG
Critical_Freqs PK+
FCC 15.247 Restricted Bands PK
FCC 15.247 Restricted Bands AVG
Final_Result PK+
Final_Result AVG

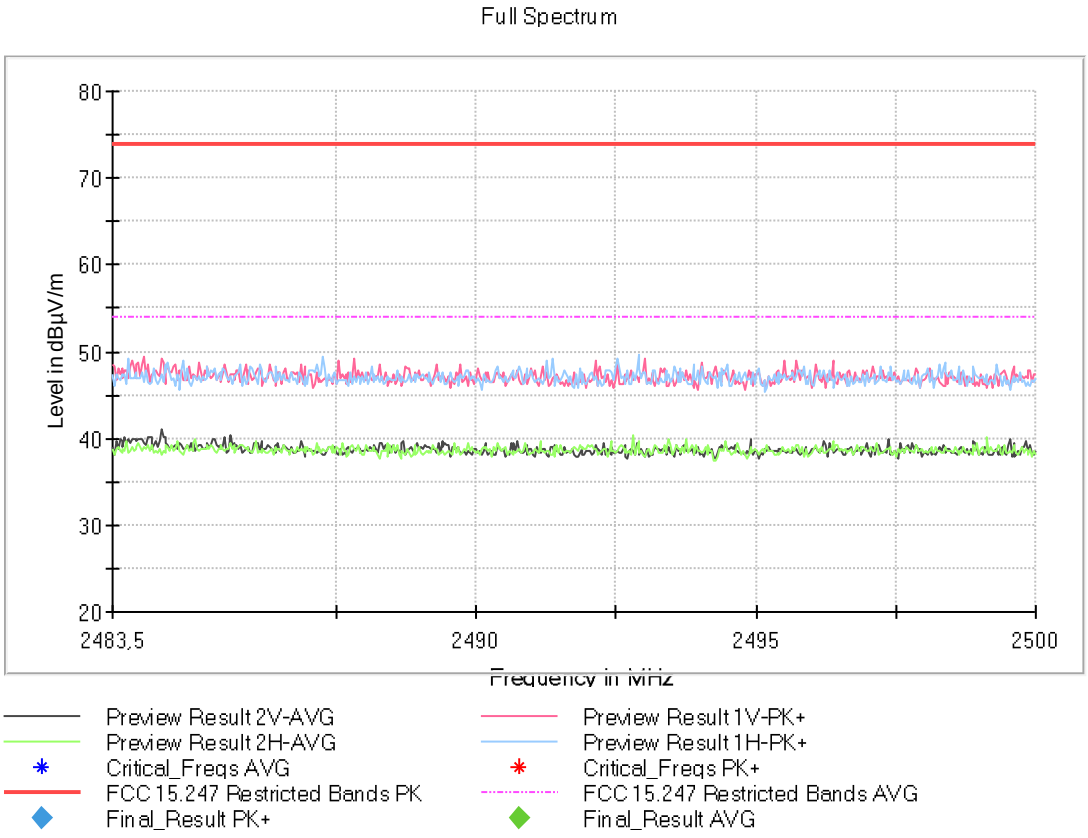
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 3], Number of Transmission Chains = 1, Measurement Point = 1, Active Port = 1

Plots:



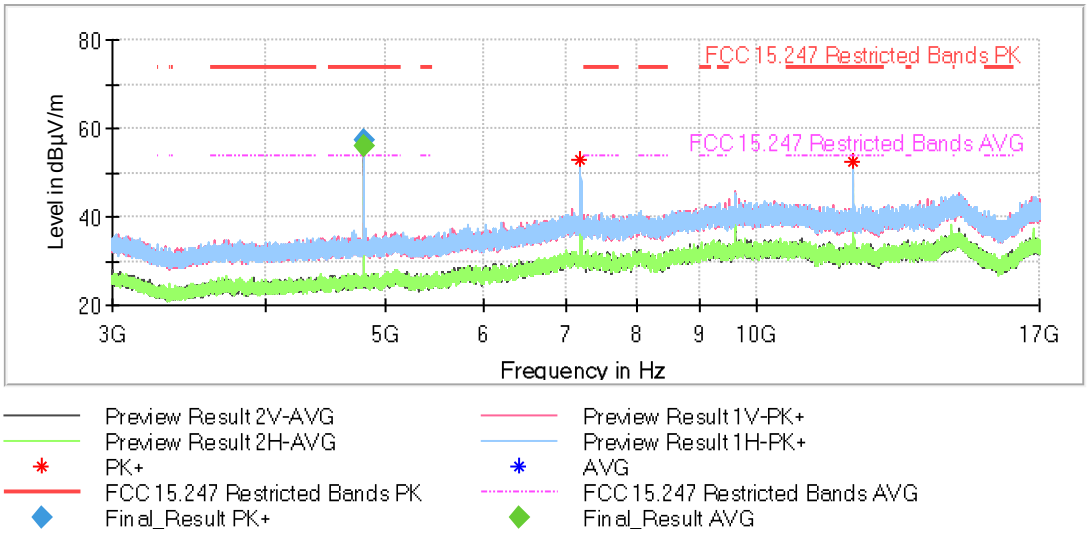
Full Spectrum




Full Spectrum
Level in dBµV/m
80
70
60
50
40
30
20
2483.5
2490
2495
2500
Frequency in MHz
Preview Result 2V-AVG
Preview Result 2H-AVG
Critical_Freqs AVG
FCC 15.247 Restricted Bands PK
Final_Result PK+
Preview Result 1V-PK+
Preview Result 1H-PK+
Critical_Freqs PK+
FCC 15.247 Restricted Bands AVG
Final_Result AVG

Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Frequency Range GHz = [3, 17], Number of Transmission Chains = 1, Measurement Point = 1, Active Port = 1

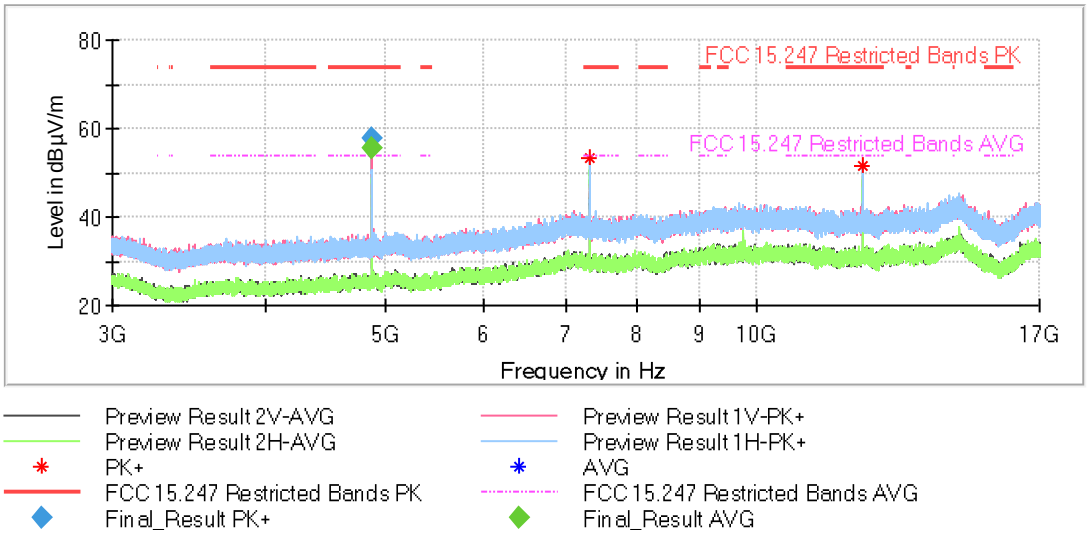
Plots:



*See note, table and comment on page 39 regarding the evaluation of average measurement.

Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Frequency Range GHz = [3, 17], Number of Transmission Chains = 1, Measurement Point = 1, Active Port = 1

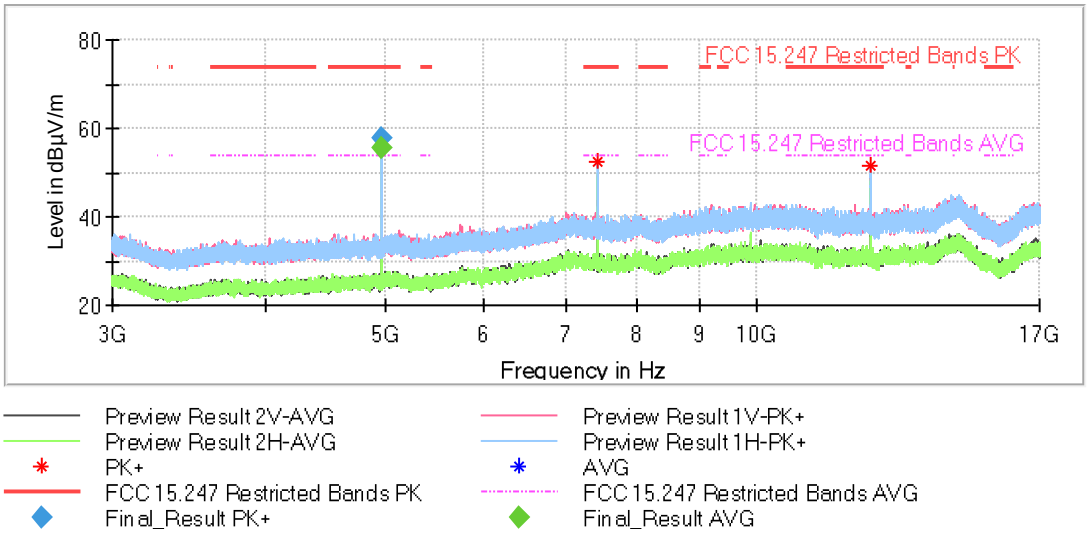
Plots:



*See note, table and comment on page 39 regarding the evaluation of average measurement.

Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Frequency Range GHz = [3, 17], Number of Transmission Chains = 1, Measurement Point = 1, Active Port = 1

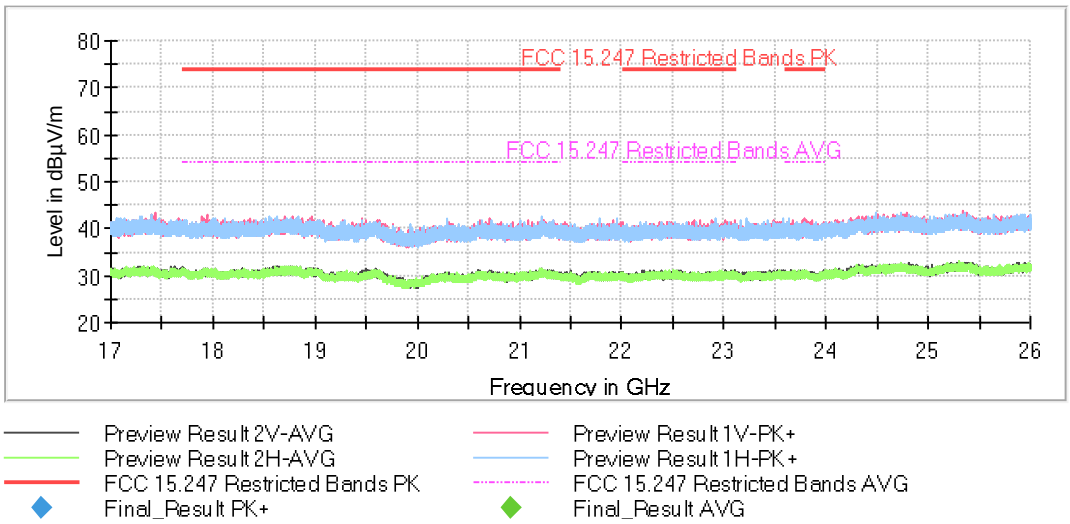
Plots:



*See note, table and comment on page 39 regarding the evaluation of average measurement.

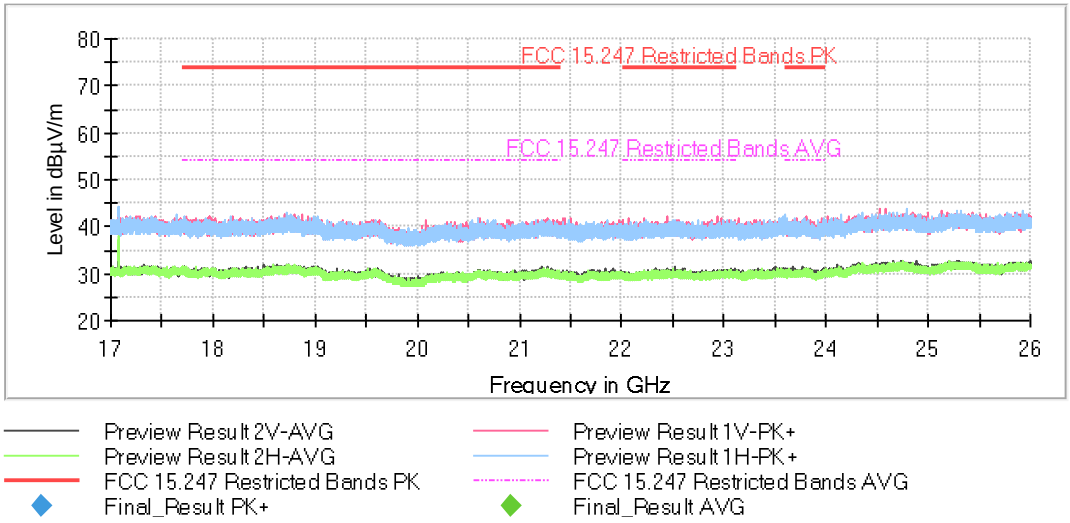
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Frequency Range GHz = [17, 26], Number of Transmission Chains = 1, Measurement Point = 1, Active Port = 1

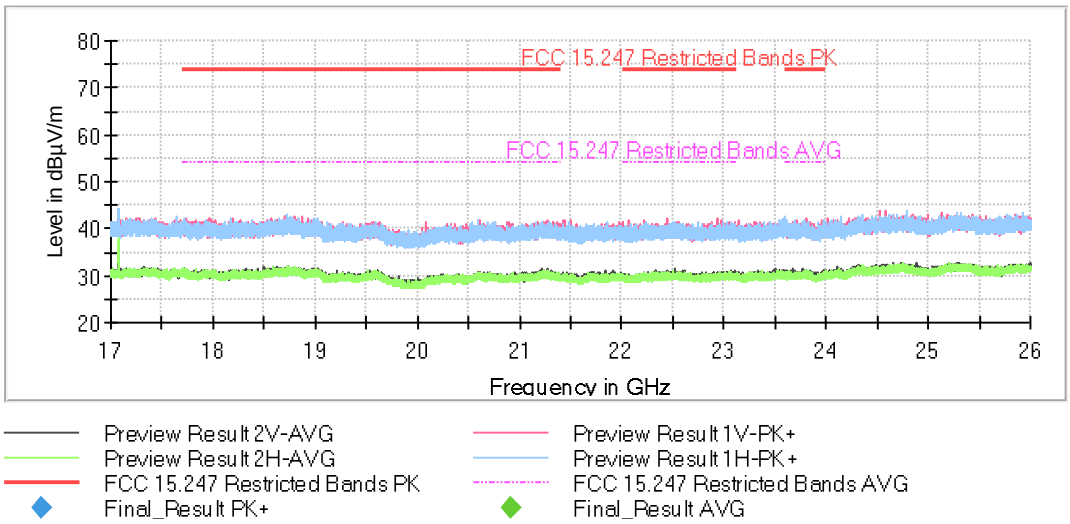
Plots:



Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Frequency Range GHz = [17, 26], Number of Transmission Chains = 1, Measurement Point = 1, Active Port = 1

Plots:



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 4.2 (GFSK 1 Mbit/s), Frequency Range GHz = [17, 26], Number of Transmission Chains = 1, Measurement Point = 1, Active Port = 1

Plots: