

ISED CABid: ES1909

Test Report No:

Lab. Company Number: 4621A

NIE: 72449RRF.008

Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

(*) Identification of item tested	XS4 Original+ Electronic Lock Series including all mechanical variants
(*) Trademark	SALTO
(*) Model and /or type reference	W61M (Type reference: E2131)
(*) Derived model not tested	XS4 One+ sfc Electronic Lock Series including all mechanical variants.
Other identification of the product	FCC ID: UKCW61M IC: 10088A-W61M
(*) Features	Features: Bluetooth LE HW version: 1.0 SW version: 0174 (Control FW), 0186 (FUS FW) 0187 (BLE FW), 0202 (Motor FW)
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)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager
Date of issue	2023-02-24
Report template No	FDT08_24 (* "Data provided by the client")

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Acronyms

Acronym ID	Acronym Description
# of Tx Chains	Number of Transmission Chains
BW	Bandwidth
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
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 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.

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

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

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

Uncertainty

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

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

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

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

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

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").
2. The sample consists of a XS4 Original+ 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 N°	Date of Reception	Application
S/01	72449_9.1	XS4 Original+ Electronic Lock	W61M	--	2022-10-21	Element Under Test
S/02	72449_5.1	XS4 Original+ Electronic Lock	W61M	--	2022-10-21	Element Under Test

Notes referenced to samples during the project:

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

Test sample description

Ports..... :	Port name and description	Cable				
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾	
	--		[]	[]	[]	
Supplementary information to the ports..... :	--					
Rated power supply	Voltage and Frequency		Reference poles			
			L1	L2	L3	N
	[]	AC:	[]	[]	[]	[]
	[X]	DC: 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	0174 (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)	2022-09-05
Date (finish)	2022-12-22

Document history

Report number	Date	Description
72449RRF.008	2023-02-24	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: José Manuel Jiménez, Miguel Manuel López, Pablo Redondo and Sergio Carrasco.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
6791	SEMIANECHOIC ABSORBER LINED CHAMBER	FACT 3 200 STP	ETS LINDGREN	N/A
6792	SHIELDED ROOM	S101	ETS LINDGREN	N/A
6143	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2023-10-29
6142	PRE-AMPLIFIER G>38dB 30MHz-6GHz	BLNA 0360-01N	BONN ELEKTRONIK	2023-06-16
7817	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2023-12-30
6496	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK	2023-08-24
3783	PRE-AMPLIFIER G>30dB 1GHz-18GHz	BLMA 0118-3A	BONN ELEKTRONIK	2023-12-29
4657	HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK	2023-05-05
8856	PRE-AMPLIFIER G>30dB 17-40GHz	BLMA 1840-4A	BONN ELEKTRONIK	2023-11-02
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).

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

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

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TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal:	4.5Vdc
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).

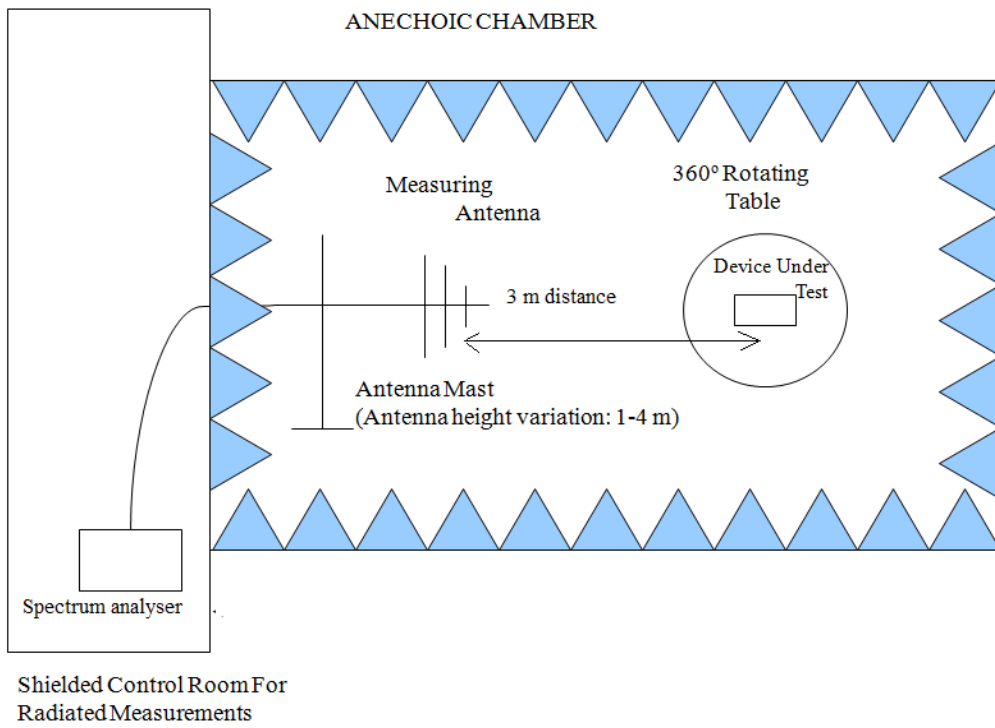
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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

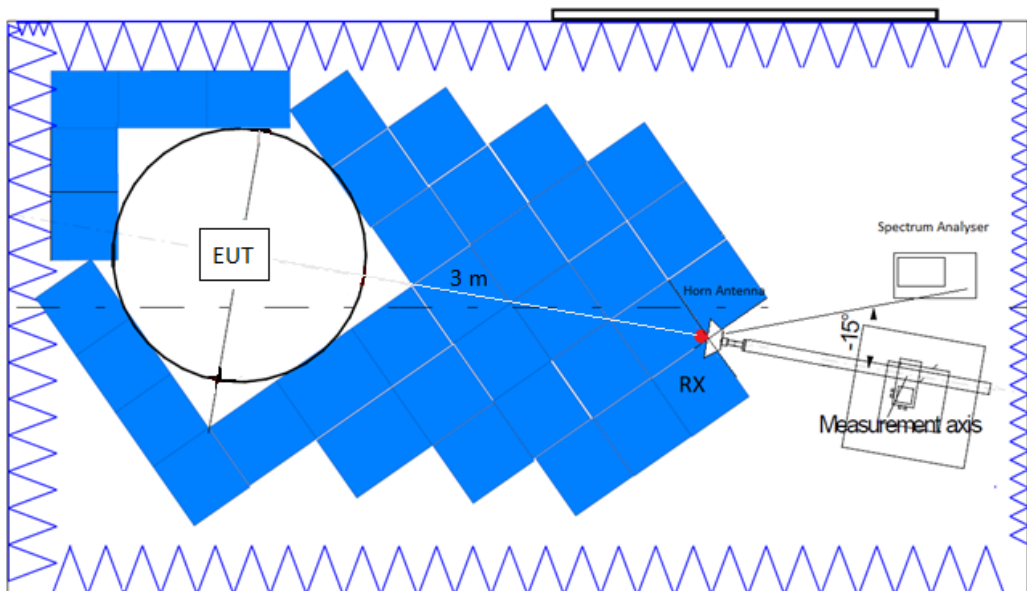
Measurements were made in both horizontal and vertical planes of polarization.

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

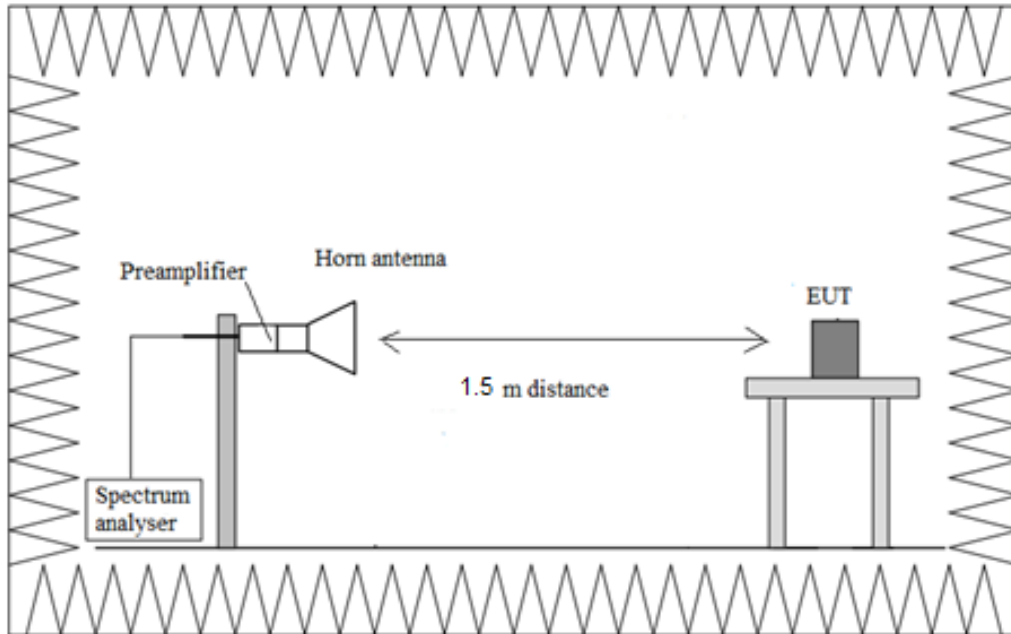
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



TEST CASES DETAILS

Occupied Channel Bandwidth 99%

Modulation: BTLE 4.2 (GFSK 1 Mbit/s)

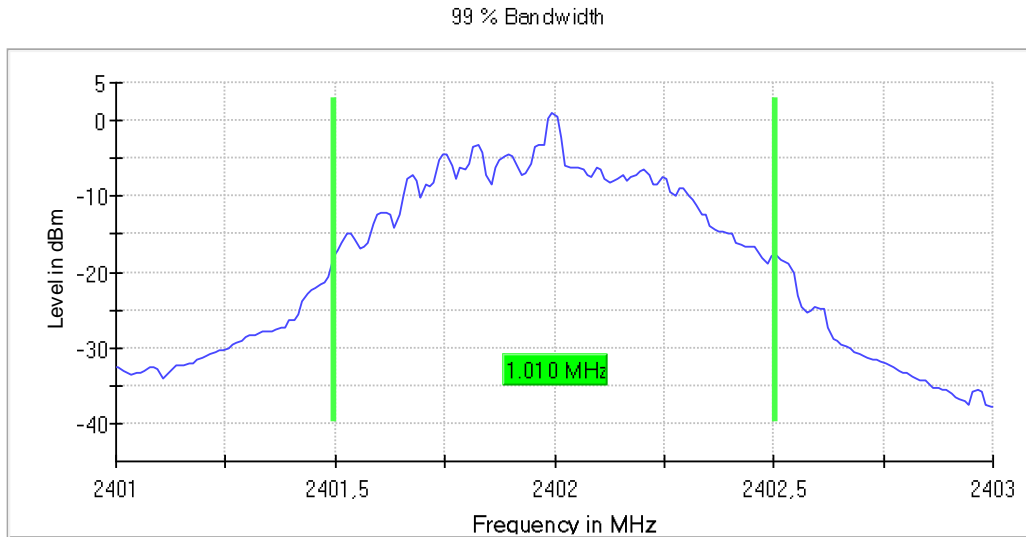
Results

Freq (MHz)	Occ Ch BW (MHz)
2402.00000	1.010
2440.00000	1.010
2480.00000	1.020

Attachments

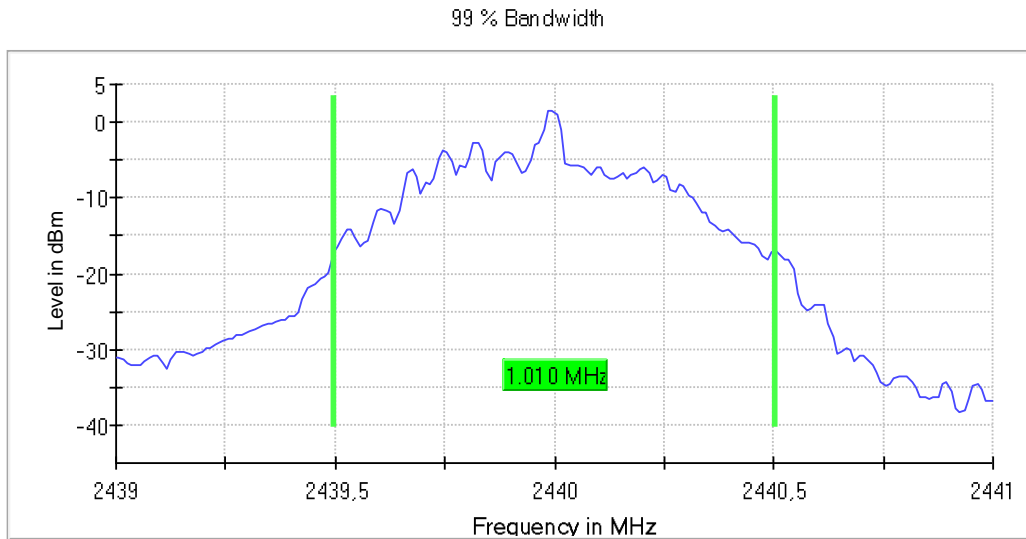
Frequency MHz = 2402.00000 Equipment Type = Digital Transmission System (DTS)
Bandwidth MHz = 1 Modulation = BTLE 4.2 (GFSK 1 Mbit/s)
Number of Transmission Chains = 1 Active Port = 1

Plots:



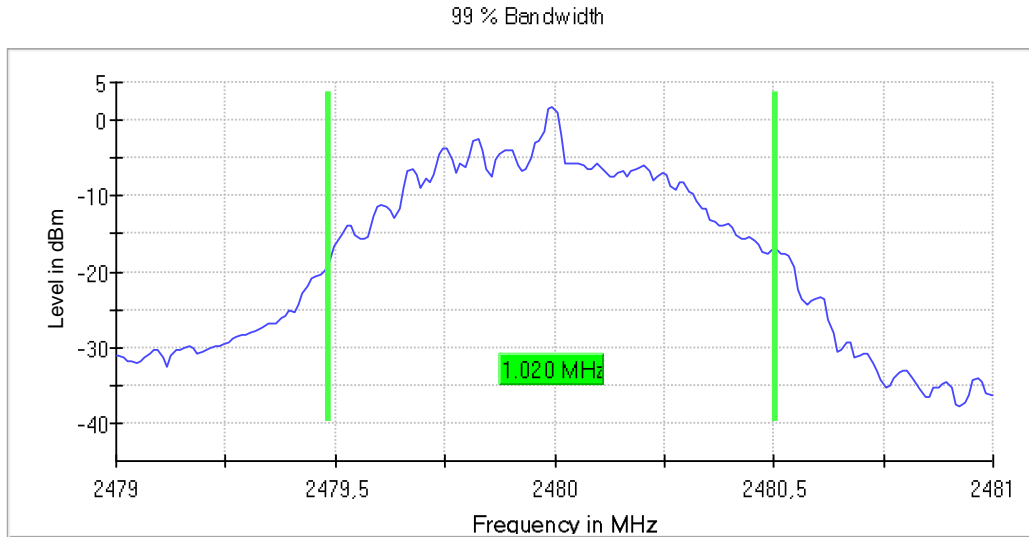
Frequency MHz = 2440.00000 Equipment Type = Digital Transmission System (DTS)
 Bandwidth MHz = 1 Modulation = BTLE 4.2 (GFSK 1 Mbit/s)
 Number of Transmission Chains = 1 Active Port = 1

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.

Modulation: BTLE 4.2 (GFSK 1 Mbit/s)

Results

Freq (MHz)	6 dB Bandwidth (MHz)
2402.00000	0.673
2440.00000	0.693
2480.00000	0.693

Verdict

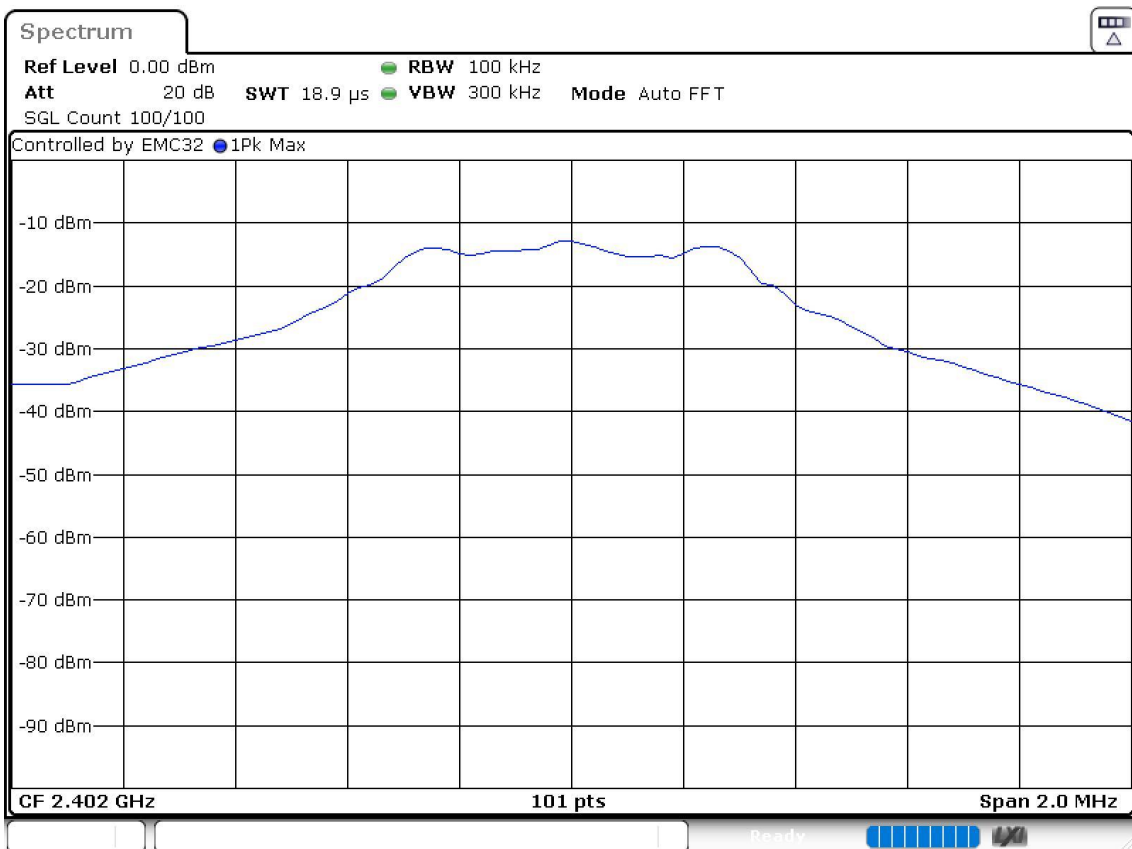
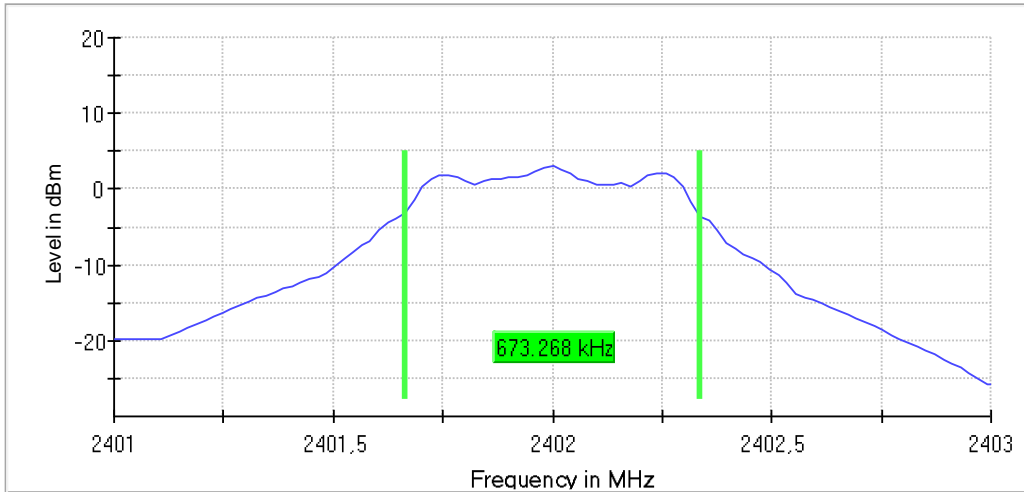
Pass

Attachments

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

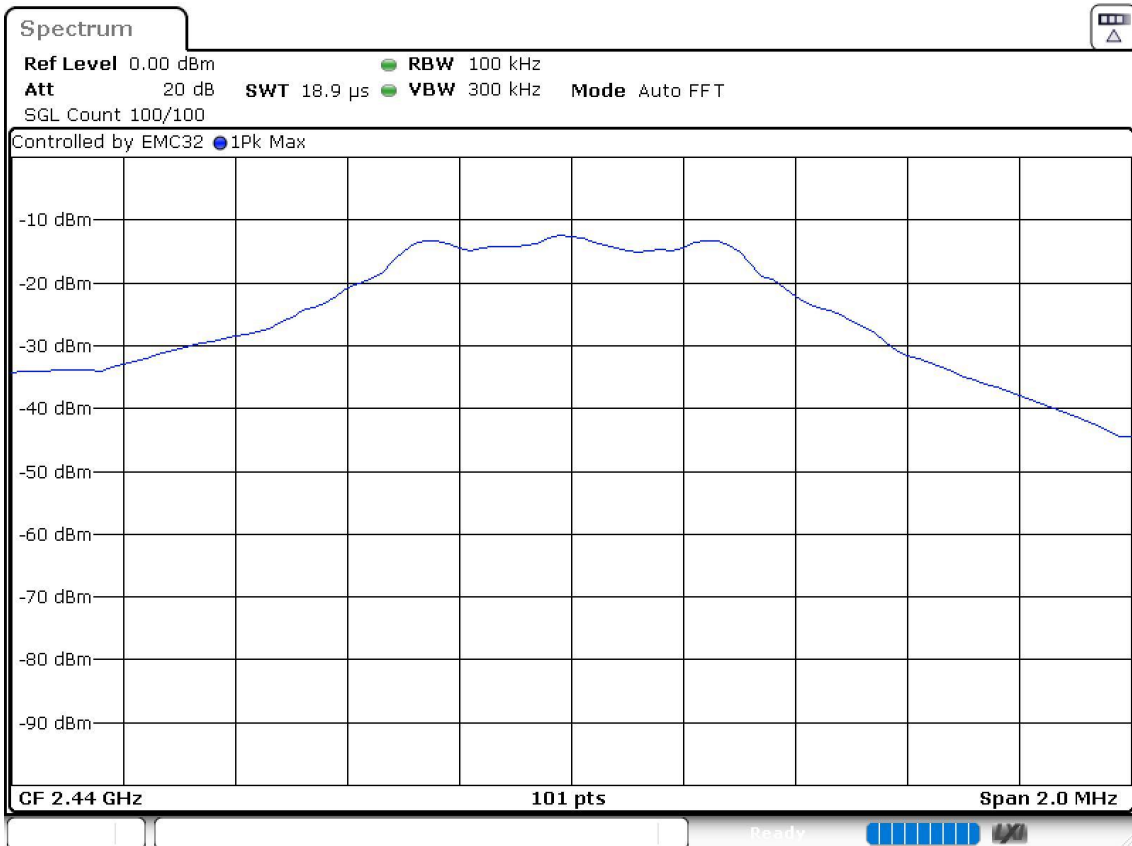
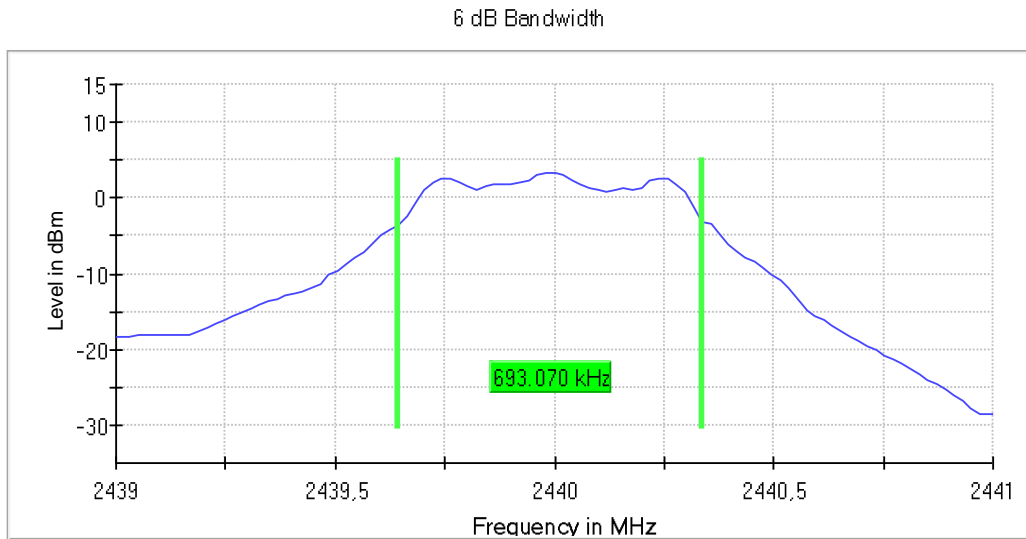
Plots:

6 dB Bandwidth



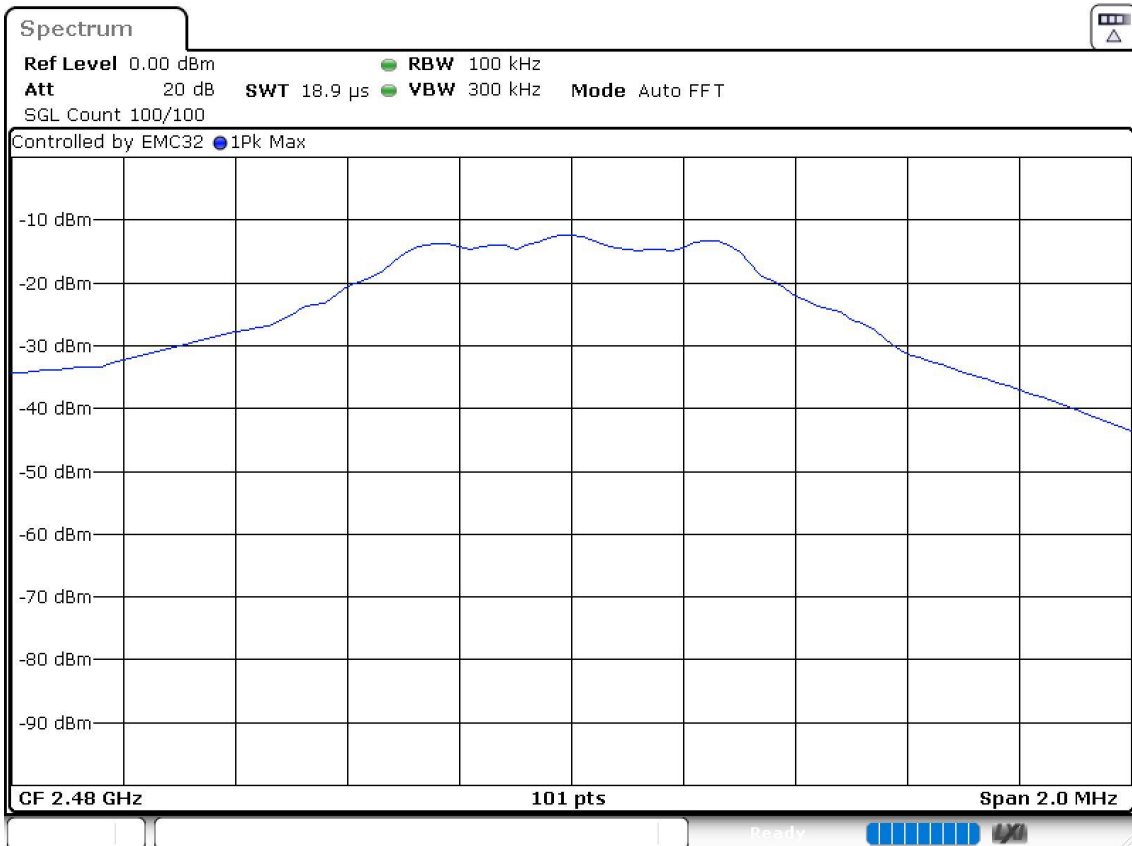
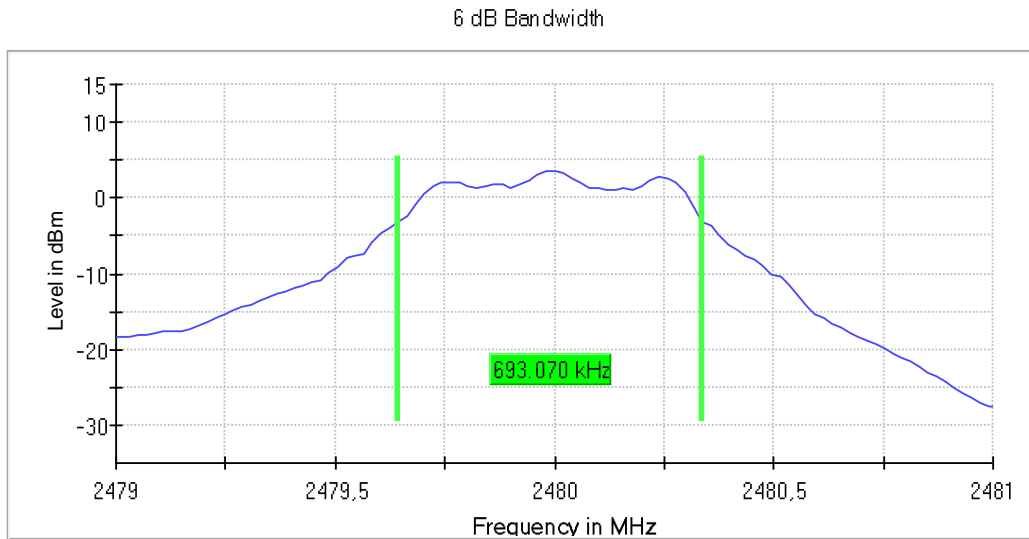
Frequency MHz = 2440.00000 Bandwidth MHz = 1
Modulation = BTLE 4.2 (GFSK 1 Mbit/s) Number of Transmission Chains = 1
Active Port = 1

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.

Modulation: BTLE 4.2 (GFSK 1 Mbit/s)

Results

Freq (MHz)	Measured Freq (MHz)	PSD (dBm)
2402.00000	2401.9925	-3.177
2440.00000	2439.9875	-2.472
2480.00000	2479.9925	-2.312

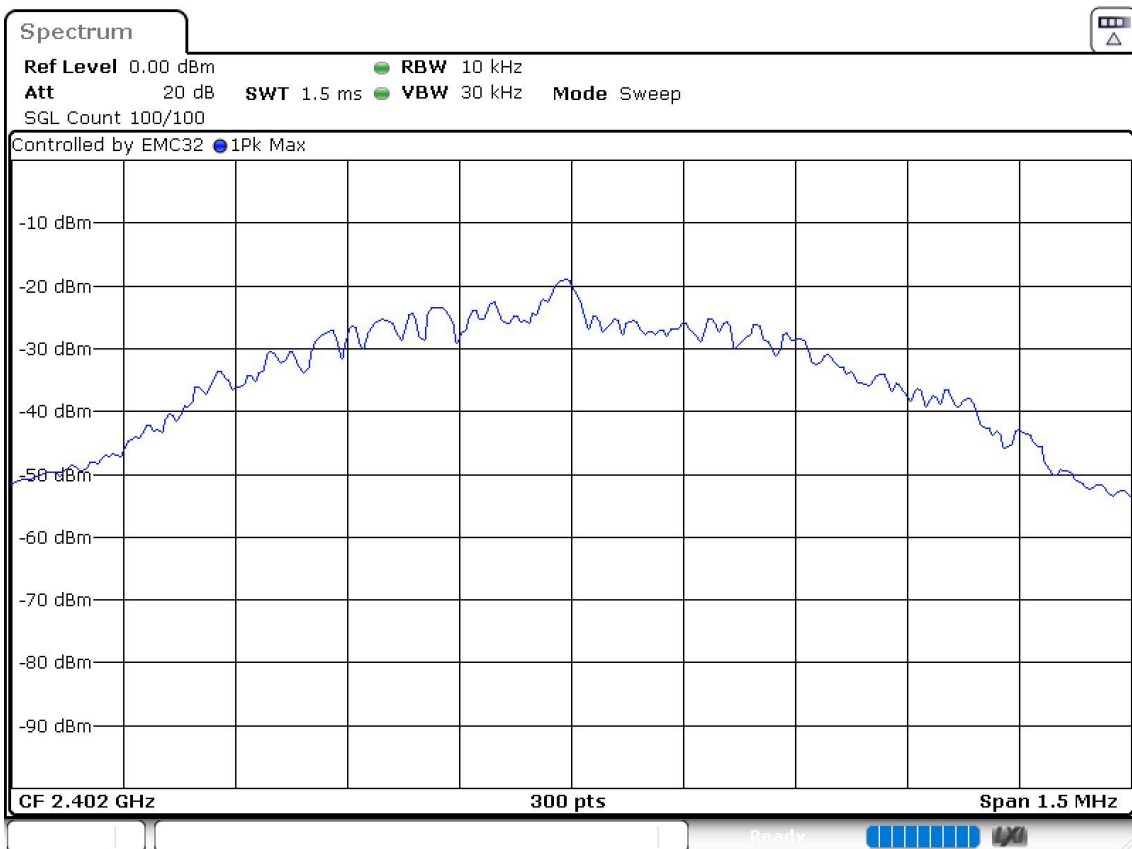
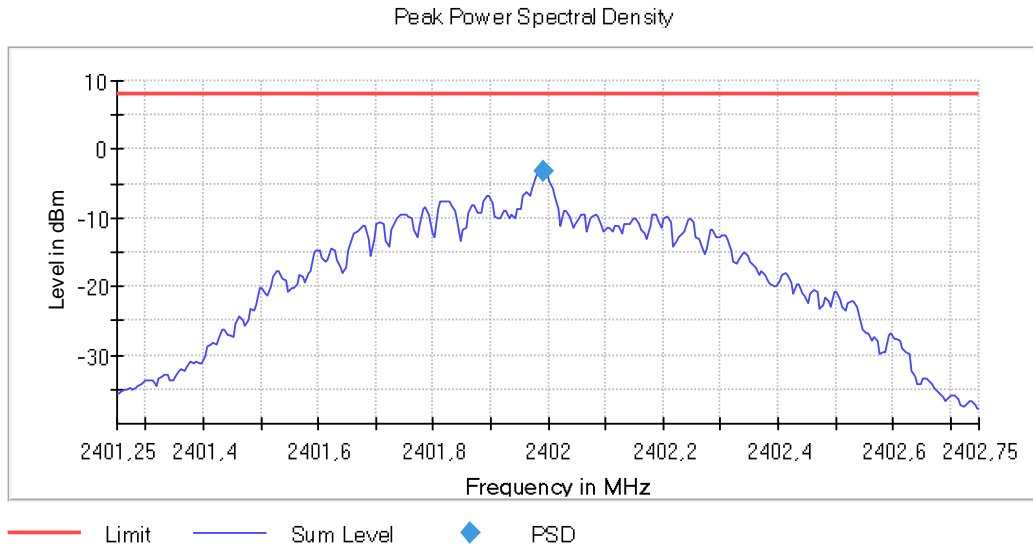
Verdict

Pass

Attachments

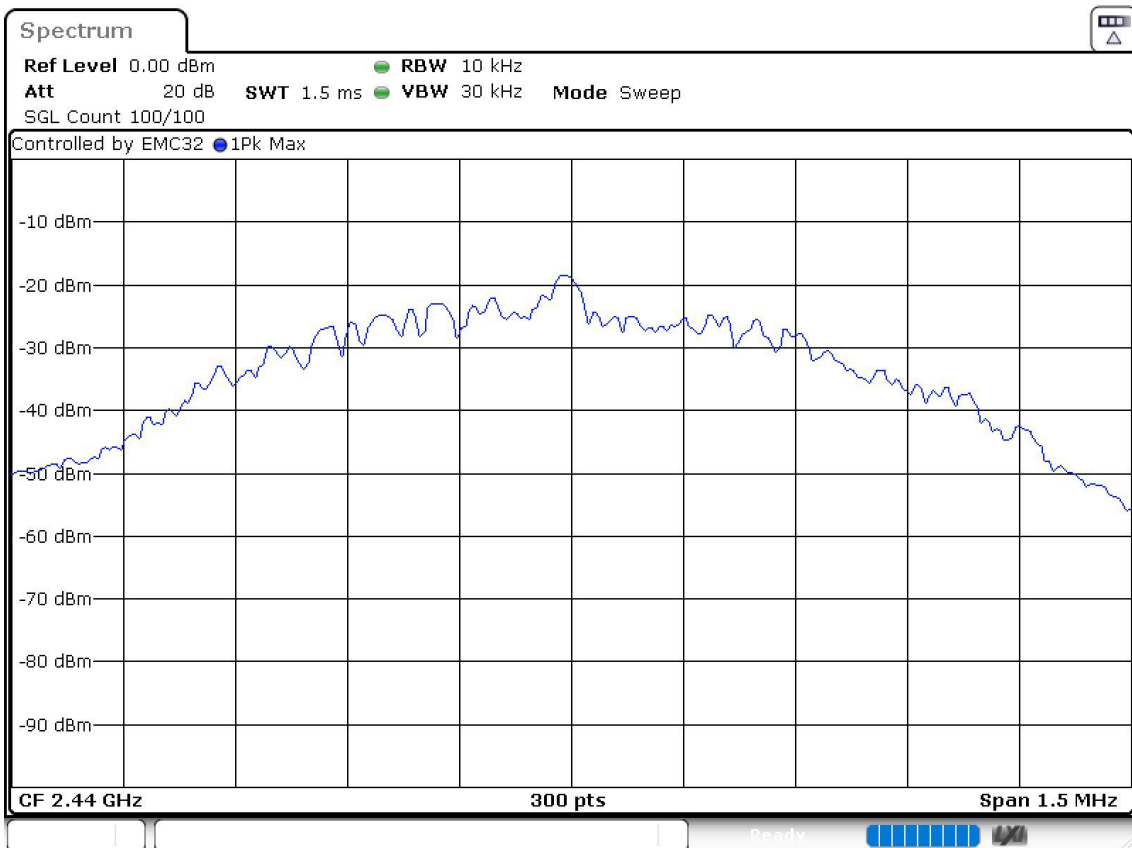
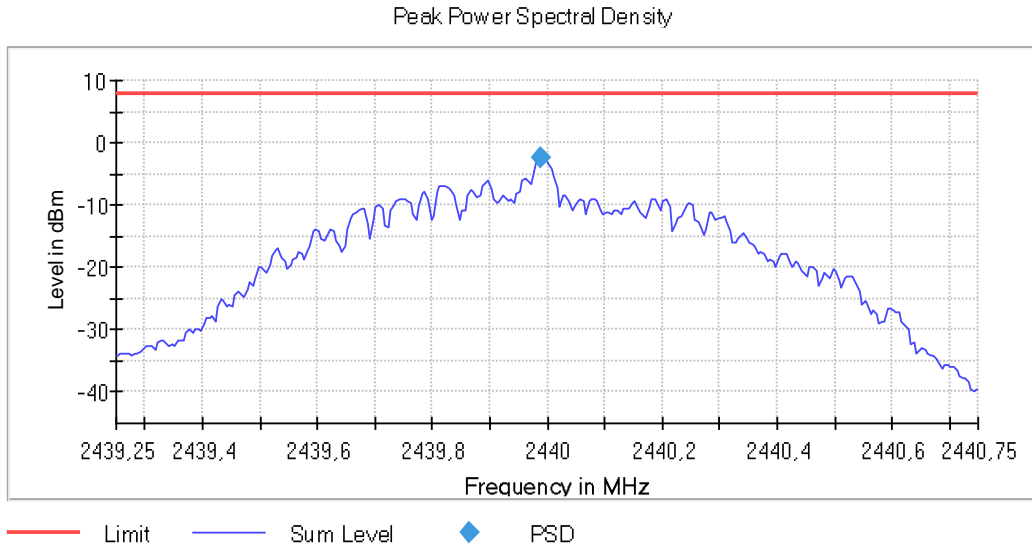
Frequency MHz = 2402.00000 Equipment Type = Digital Transmission System (DTS)
 Bandwidth MHz = 1 Modulation = BTLE 4.2 (GFSK 1 Mbit/s)
 Number of Transmission Chains = 1 Active Port = 1

Plots:



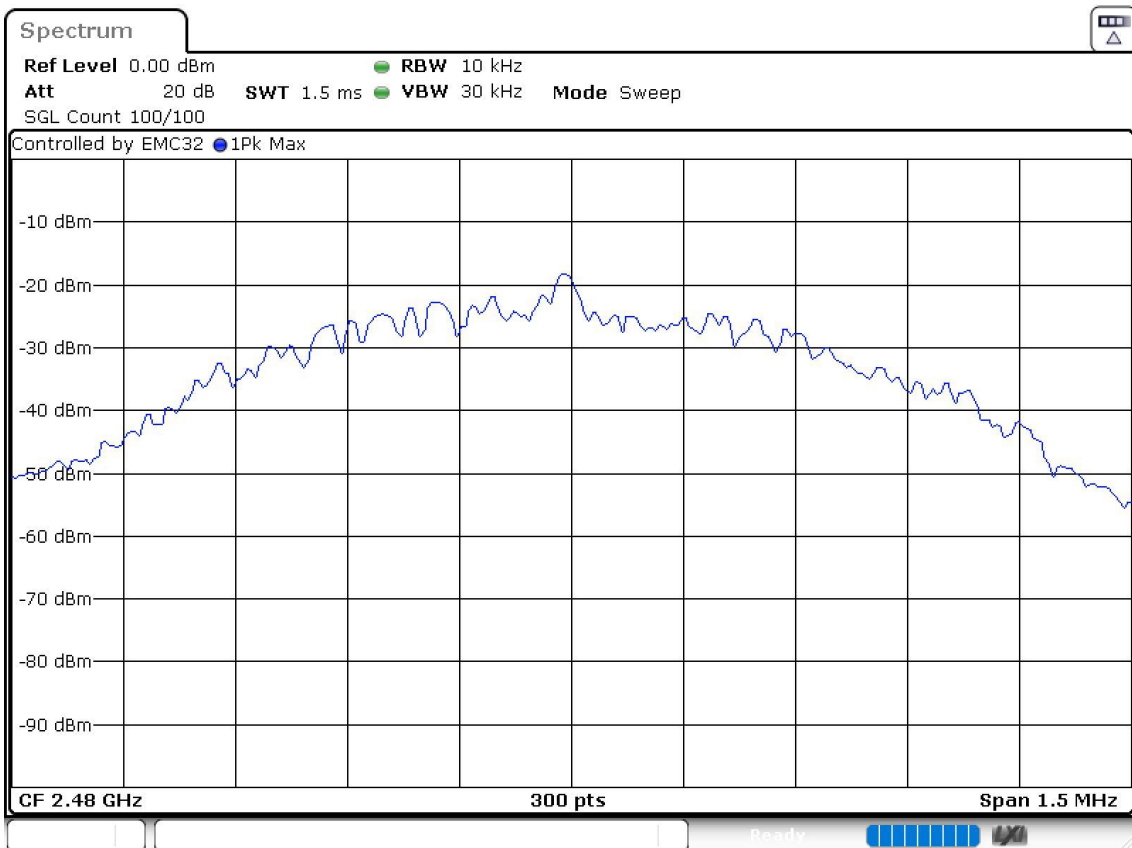
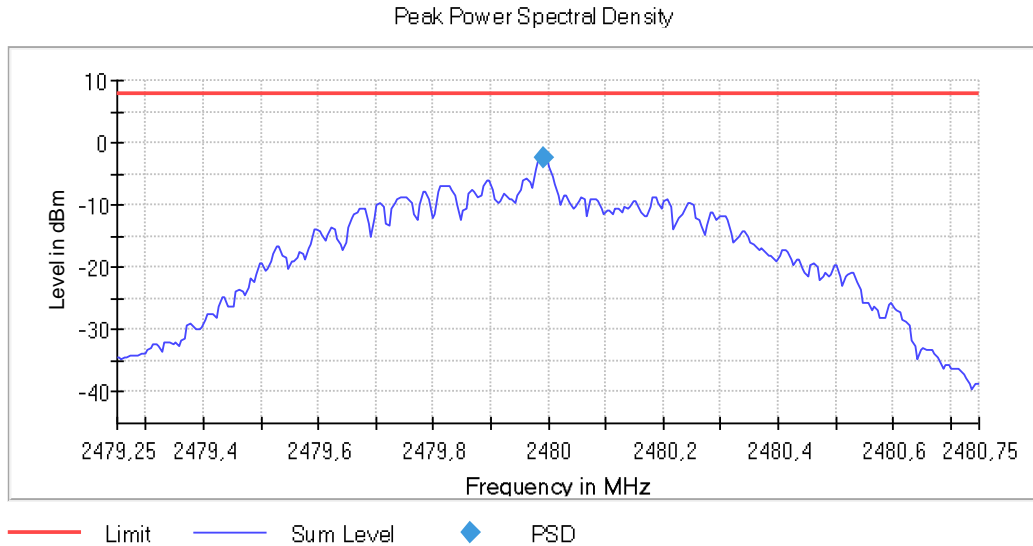
Frequency MHz = 2440.00000 Equipment Type = Digital Transmission System (DTS)
 Bandwidth MHz = 1 Modulation = BTLE 4.2 (GFSK 1 Mbit/s)
 Number of Transmission Chains = 1 Active Port = 1

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) (Canada).

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

Maximum Declared Antenna Gain: +0.5 dBi

Modulation: BTLE 4.2 (GFSK 1 Mbit/s)

Results

Freq (MHz)	Maximum Conducted Power (dBm)	Maximum EIRP Power (dBm)
2402.00000	3.074	3.574
2440.00000	3.473	3.973
2480.00000	3.673	4.173

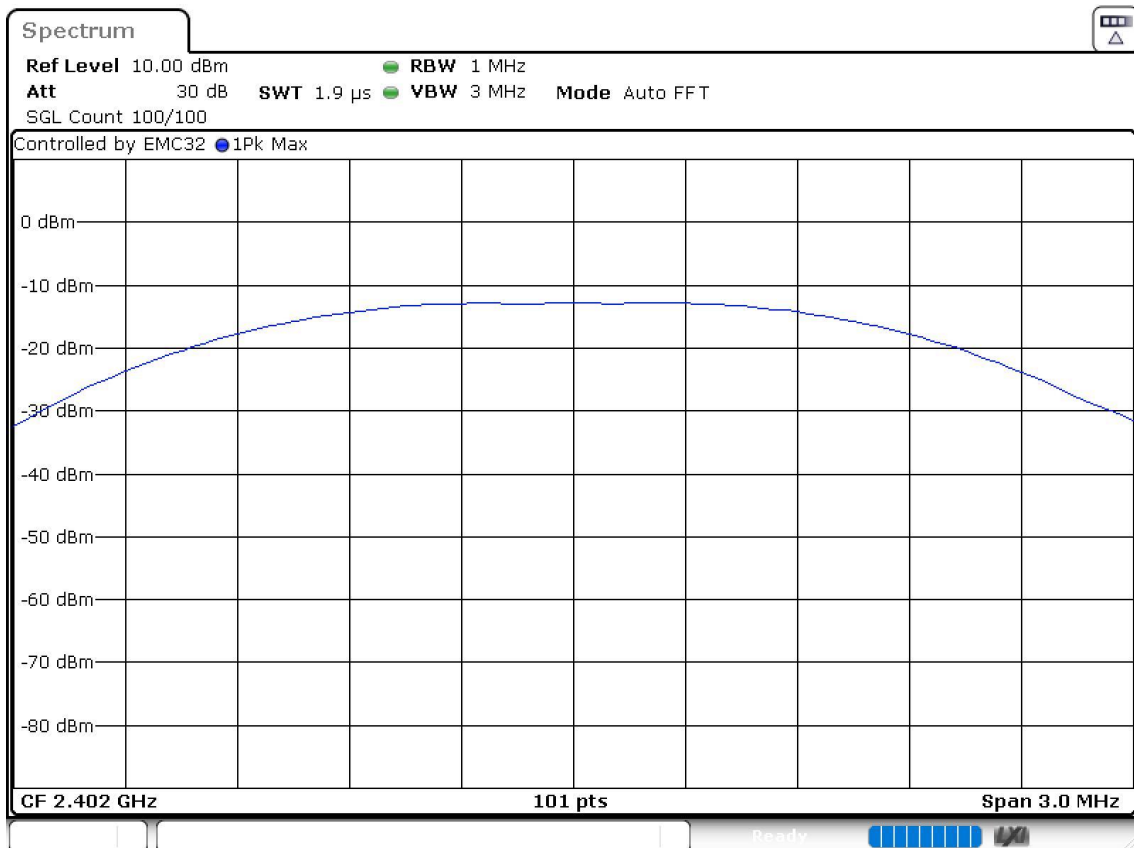
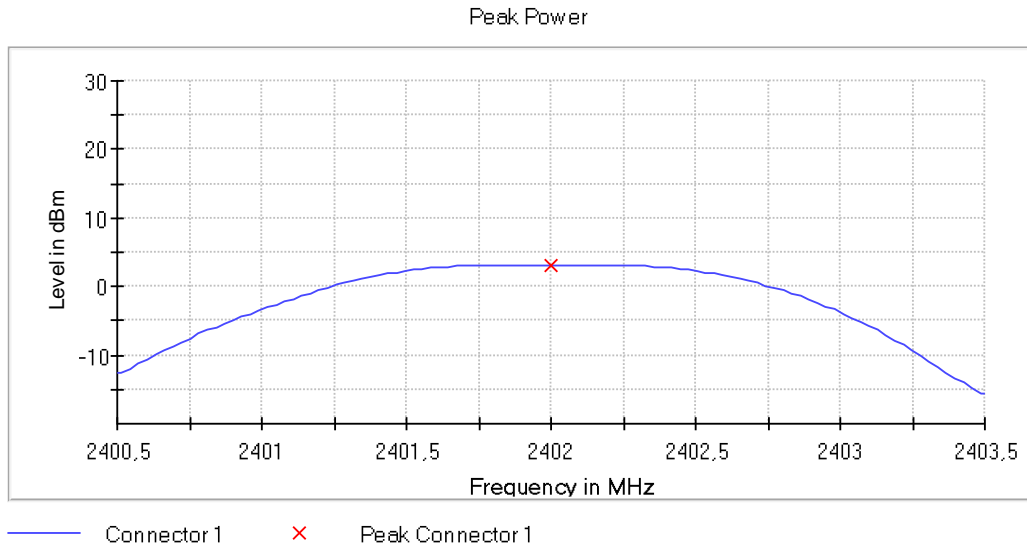
Verdict

Pass

Attachments

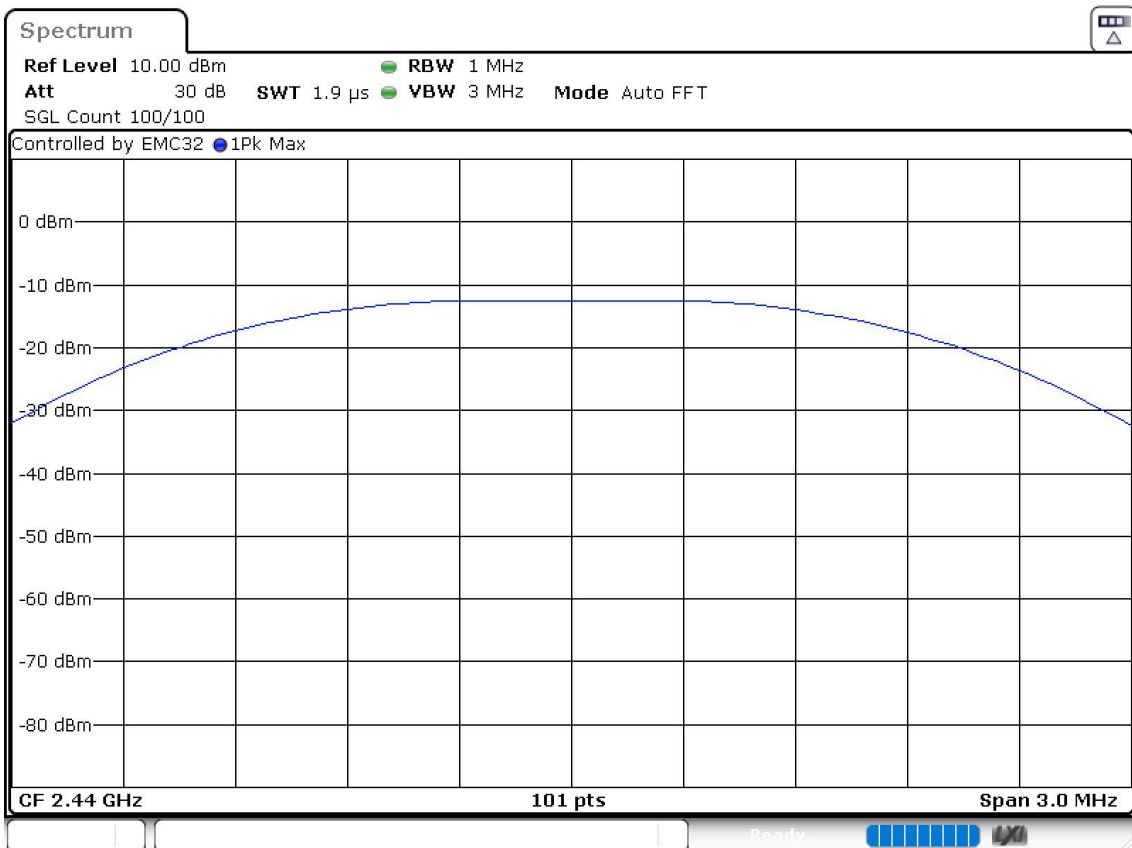
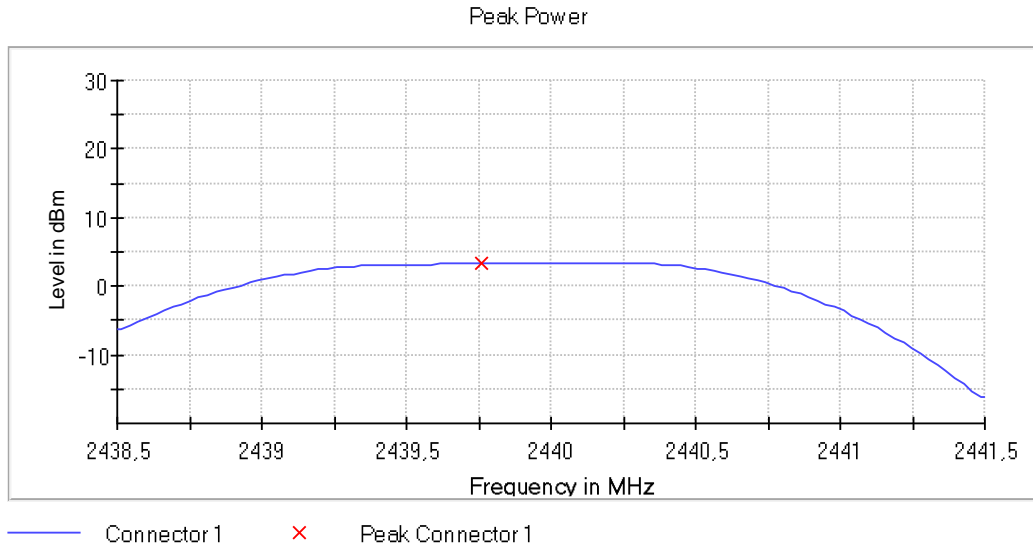
Frequency MHz = 2402.00000 Equipment Type = Digital Transmission System (DTS)
 Bandwidth MHz = 1 Modulation = BTLE 4.2 (GFSK 1 Mbit/s)
 Number of Transmission Chains = 1 Active Port = 1

Plots:



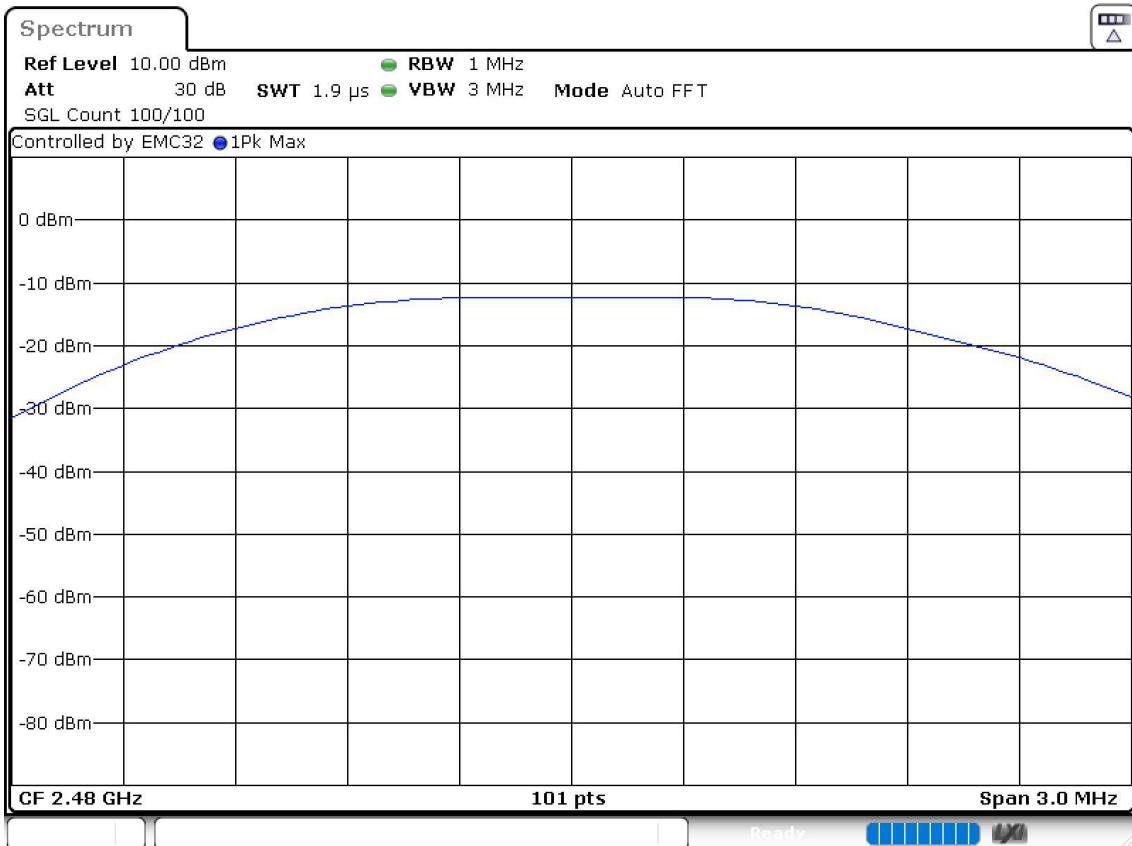
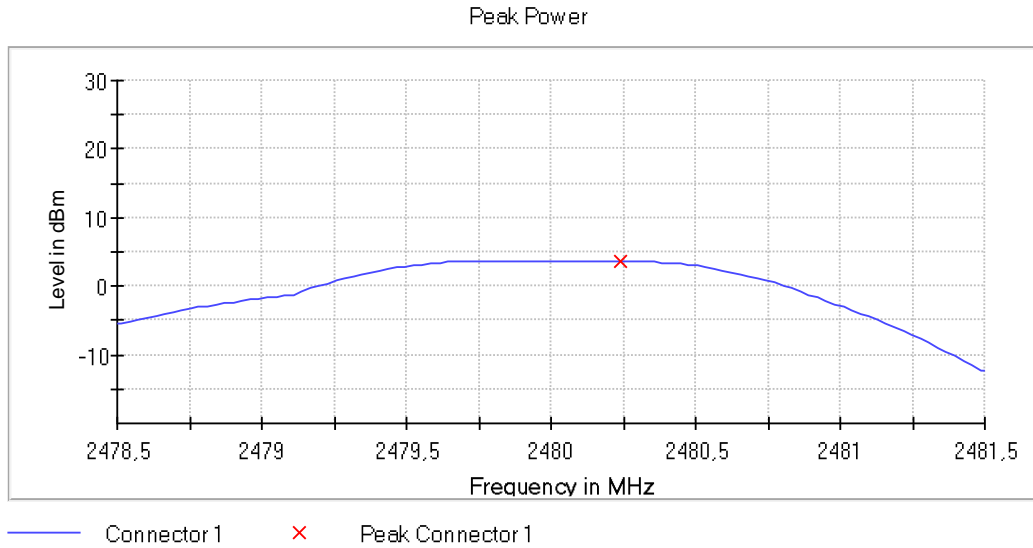
Frequency MHz = 2440.00000 Equipment Type = Digital Transmission System (DTS)
 Bandwidth MHz = 1 Modulation = BTLE 4.2 (GFSK 1 Mbit/s)
 Number of Transmission Chains = 1 Active Port = 1

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)

Results

Freq (MHz)	Inband Peak Level (dBm)	Measured Freq (MHz)	Level (dBm)	Limit (dBm)
2402.00000	3.331	2399.975000	-24.497	-16.669
		2399.925000	-25.403	
		2399.875000	-26.322	
		2399.825000	-27.238	
		2399.775000	-28.149	
		2399.725000	-29.039	
		2399.675000	-29.843	
		2399.625000	-30.599	
		2399.575000	-31.497	
		2399.525000	-32.541	
		2399.475000	-33.545	
		2399.425000	-34.608	
		2399.375000	-35.786	
		2399.325000	-36.842	
2399.275000	-37.768			

Freq (MHz)	Inband Peak Level (dBm)	Measured Freq (MHz)	Level (dBm)	Limit (dBm)
2480.00000	3.217	2484.525000	-48.962	-16.783
		2483.575000	-49.312	
		2485.975000	-49.352	
		2484.575000	-49.416	
		2485.925000	-49.442	
		2483.525000	-49.456	
		2487.125000	-49.485	
		2487.075000	-49.530	
		2487.475000	-49.729	
		2486.025000	-49.760	
		2487.425000	-49.767	
		2485.275000	-49.791	
		2485.875000	-49.839	
		2484.475000	-49.987	
		2488.075000	-50.042	

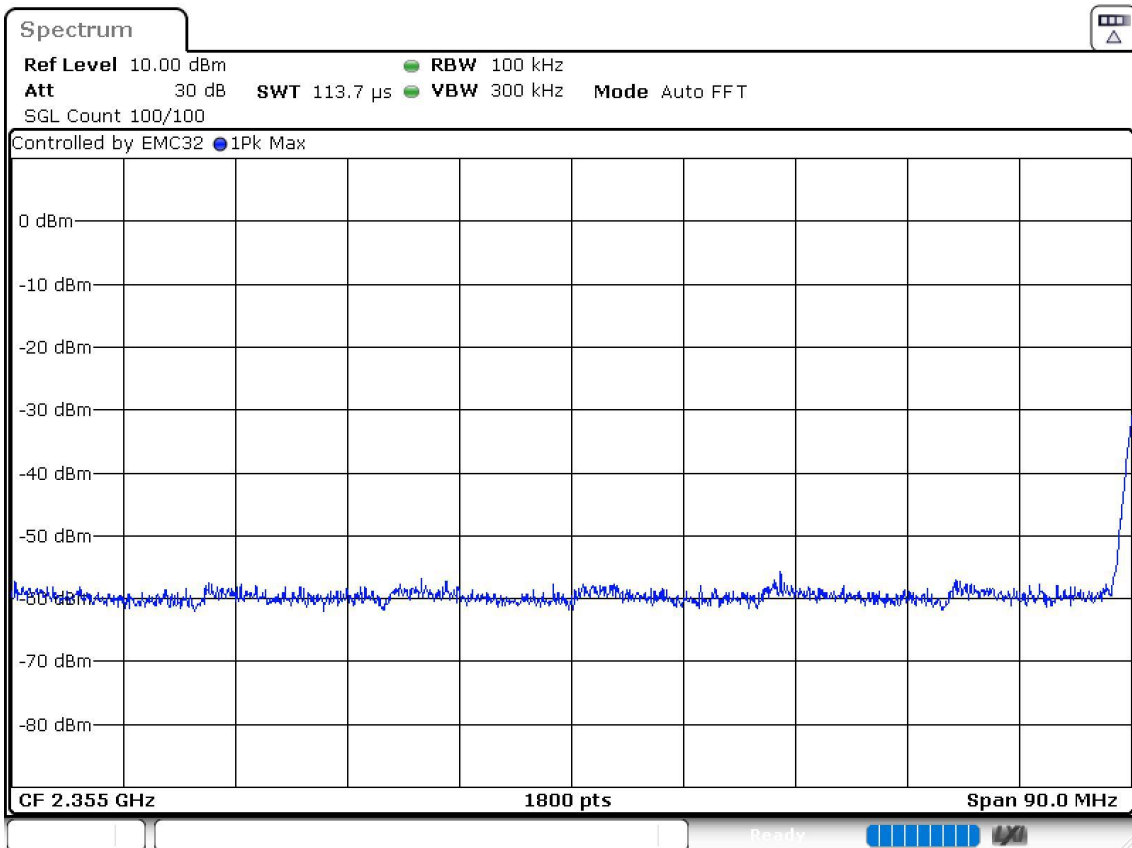
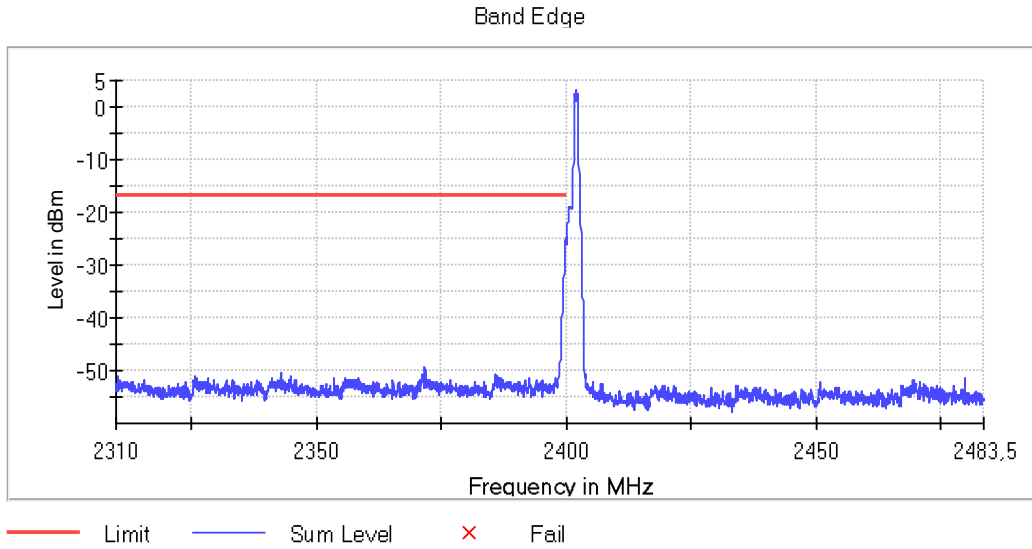
Verdict

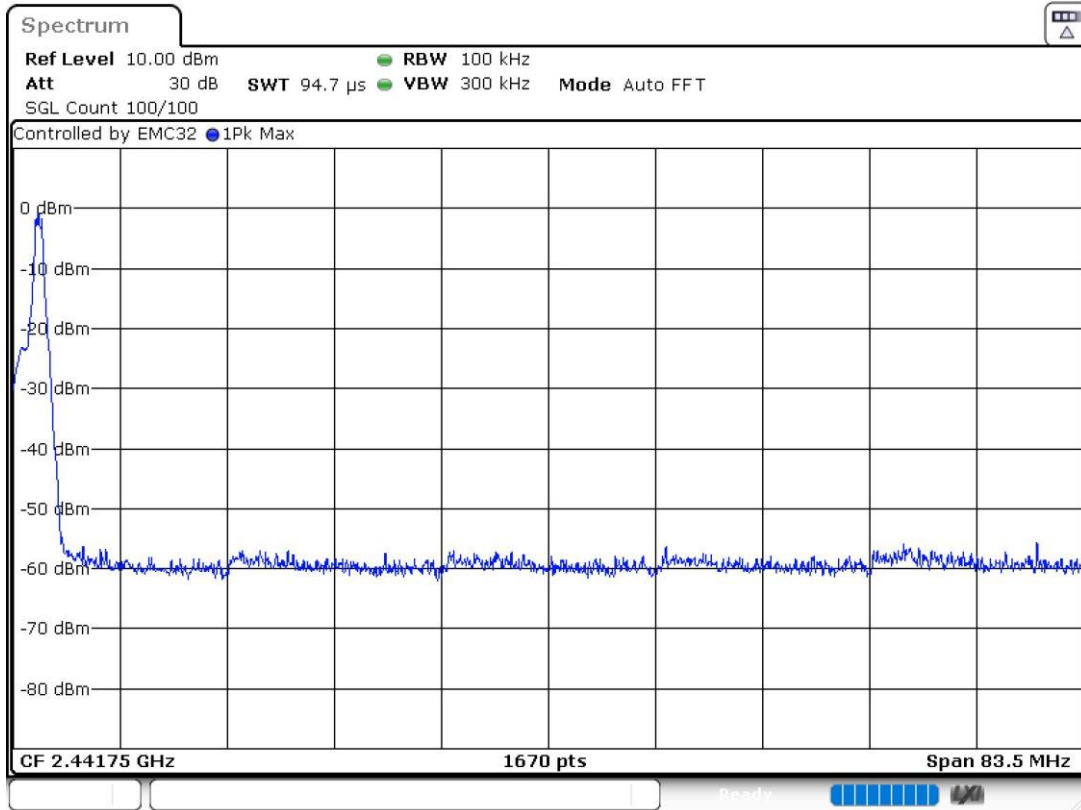
Pass

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:





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:

