

ISED CABid: ES1909

Lab. Company Number: 4621A

Test Report No:

78983RRF.002A1

Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

(*) Identification of item tested	A multifunctional device that powers bicycle lights, charges external devices via USB-C, stores energy in an external battery, and connects to a mobile phone via Bluetooth LE to display device and battery status.
(*) Trademark	Canyon
(*) Model and /or type reference	GP0625-01
Other identification of the product	FCC ID: 2BNCI-GP062501 IC: 33475-GP062501
(*) Features	Bluetooth LE HW version: 0.0.1 SW version: 0.0.1
Applicant	Canyon Bicycles GmbH KARL TESCHE STRASSE 12, 56073 KOBLENZ, Germany
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 3 (August 2023). 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 C63.10-2013: 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	2025-02-14
Report template No	FDT08_25 (*) "Data provided by the client"

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Acronyms

Acronym ID	Acronym Description
Detector	Detector used
Equipment	Equipment Type
EUT	Equipment Under Test
Freq	Frequency
Freq Rng	Frequency Range
MP	Measurement Point
Mod	Modulation
Mode	MIMO Mode
OM	Operation Mode
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.

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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General conditions

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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 multifunctional device that powers bicycle lights, charges external devices via USB-C, stores energy in an external battery, and connects to a mobile phone via Bluetooth LE to display device and battery status. A device that powers bicycle lights by drawing energy from either a bicycle dynamo or a USB-C input, storing it in an external battery connected to the device. It can also use the stored energy to charge external devices through the same USB-C interface. Additionally, the device supports Bluetooth LE, allowing it to connect to a mobile phone to display information about the device and the battery's state of charge.

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

Samples undergoing test have been selected by: The client.

Id	Control Number	Description	Model	Serial N°	Date of Reception	Application
S/01	78983B_1.1	Connected Power Supply	GP0625-01	-	2024-11-21	Element Under Test
	78983B_12.1	USB - Serial Cable (TTL-232R-3V3)	-	-	2024-11-21	Auxiliary Element
	78983B_13.1	Li-Ion Battery	7.2V 3.5 Ah	-	2024-11-21	Auxiliary Element
	78983B_18.1	Headlight	-	-	2024-11-21	Auxiliary Element
	78983B_19.1	Rear Light	-	-	2024-11-21	Auxiliary Element
S/02	78983B_4.1	Connected Power Supply	GP0625-01	-	2024-11-21	Element Under Test
	78983B_12.1	USB - Serial Cable (TTL-232R-3V3)	-	-	2024-11-21	Auxiliary Element
	78983B_14.1	Li-Ion Battery	7.2V 3.5 Ah	-	2024-11-21	Auxiliary Element
	78983B_16.1	Headlight	-	-	2024-11-21	Auxiliary Element
	78983B_19.1	Rear Light	-	-	2024-11-21	Auxiliary Element
	78983B_22.1	SMA Cable	-	-	2024-11-21	Auxiliary Element

Notes referenced to samples during the project:

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

Test sample description

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded			
	Battery	1m	[]	[]			
	Front light	1m	[]	[]			
	Rear Light	1m	[]	[]			
	USB	1m	[]	[]			
	Dynamo	1m	[]	[]			
.....		[]	[]				
Supplementary information to the ports..... :							
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	[]	AC:	[]	[]	[]	[]	[]
	[X]	DC: Battery at 7.2V					
	[X]	DC: USB-C PD(5V/9V) or Dynamo Input regulated at max 19V					
Rated Power	15W for USB-C/ 8W for Dynamo/Battery is 25Wh						
Clock frequencies..... :							
Other parameters							
Software version	0.0.1						
Hardware version	0.0.1						
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: Inside a bicycle frame					
Modules/parts..... :	Module/parts of test item		Type	Manufacturer			
							
Accessories (not part of the test item)	Description		Type	Manufacturer			
							
Documents as provided by the applicant..... :	Description		File name	Issue date			
							

Identification of the client

Canyon Bicycles GmbH
KARL TESCHE STRASSE 12, 56073 KOBLENZ, Germany

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2024-12-04
Date (finish)	2024-12-17

Document history

Report number	Date	Description
78983RRF.002	2025-01-20	First release.
78983RRF.002A1	2025-02-14	Second release. Modification due to typos. This modification test report cancels and replaces the test report 78983RRF.002.

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: Rafael Fernandez Martin.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
06791	SEMIANECHOIC ABSORBER LINED CHAMBER IV	FACT 3 200 STP	ETS LINDGREN	N/A
06792	SHIELDED ROOM	S101	ETS LINDGREN	N/A
06609	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2025-04-22
06615	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2025-04-04
06143	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2027-01-22
06142	PRE-AMPLIFIER G>38dB 30MHz-6GHz	BLNA 0360-01N	BONN ELEKTRONIK	2025-07-25
06496	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK	2026-12-01
03783	PRE-AMPLIFIER G>30dB 1GHz-18GHz	BLMA 0118-3A	BONN ELEKTRONIK	2025-03-15
04657	HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK	2026-06-12
08856	PRE-AMPLIFIER G>30dB 18-40GHz	BLMA 1840-4A	BONN ELEKTRONIK	2025-02-27
07817	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2026-07-01
07445	DC POWER SUPPLY 30V/5A	U8002A	KEYSIGHT TECHNOLOGIES	N/A
07760	DIGITAL MULTIMETER	175	FLUKE	2025-11-07
04848	SOFTWARE FOR EMC/RF TESTING	EMC32	ROHDE AND SCHWARZ	N/A
06793	SHIELDED ROOM	S101	ETS LINDGREN	N/A
06611	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2025-04-04
06668	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2024-12-14
08848	OPEN SWITCH UNIT UP TO 7.5 GHz	OSP-B157W8 PLUS	ROHDE & SCHWARZ	2026-12-30
07040	EXTENSION FOR OPEN SWITCH UNIT UP TO 40GHz	OSP-B157Wx	ROHDE AND SCHWARZ	2025-04-19
07798	WMS32	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 (2M, 1M)

FCC PART 15 PARAGRAPH/ RSS-247			
Requirement – Test case		Verdict	Remark
FCC 15.247 (a)(2) / RSS-247 5.2. (a)	6 dB Bandwidth	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 (2M, 1M)

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RSS-247 5.5 / FCC 15.247 (d) Band-edge emissions compliance (Transmitter)47

RSS-247 5.5 / FCC 15.247 (d) Emission limitations radiated (Transmitter)59

TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal: 7.2 Vdc
Type of Power Supply: External power supply / Battery

ANTENNA (*):

Type of Antenna: Integral antenna (PCB embedded antenna)
Maximum Declared Antenna Gain: -1 dBi

TEST FREQUENCIES (*):

Modulation	Data rates	Low Channel	Middle Channel	High Channel
BTLE GFSK	1M 1 Mbit/s	2402 MHz	2440 MHz	2480 MHz
BTLE GFSK	2M 2 Mbit/s	2402 MHz	2440 MHz	2480 MHz

POWER ADJUSTMENT (*): +8 dBm

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.



RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1.5 m for the frequency range 17 GHz-26 GHz (17 GHz-40 GHz horn antenna).

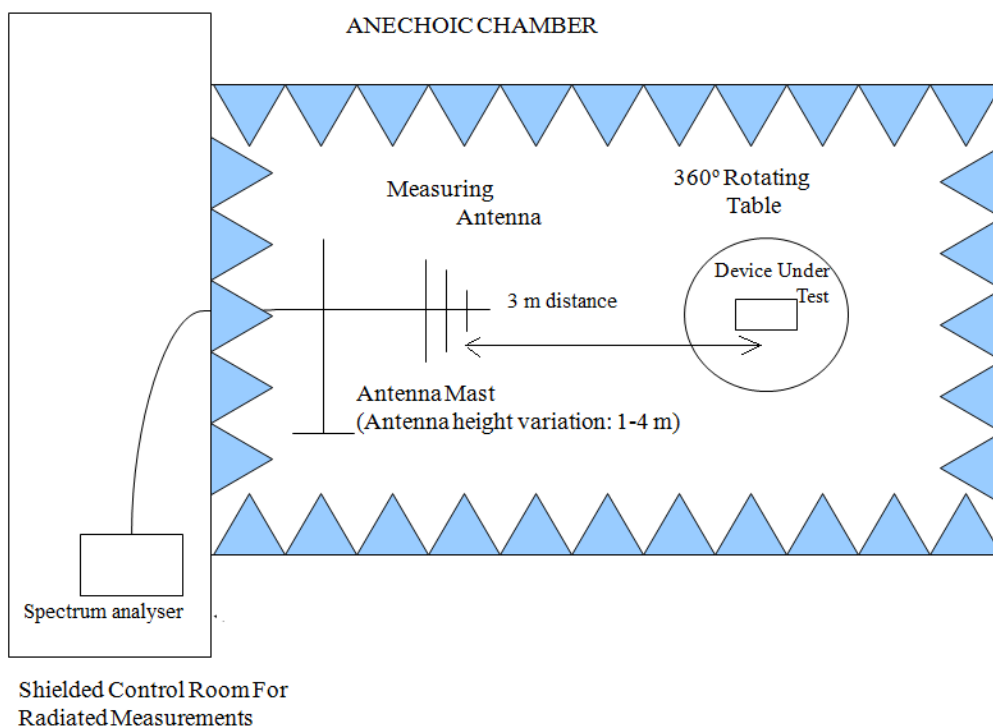
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

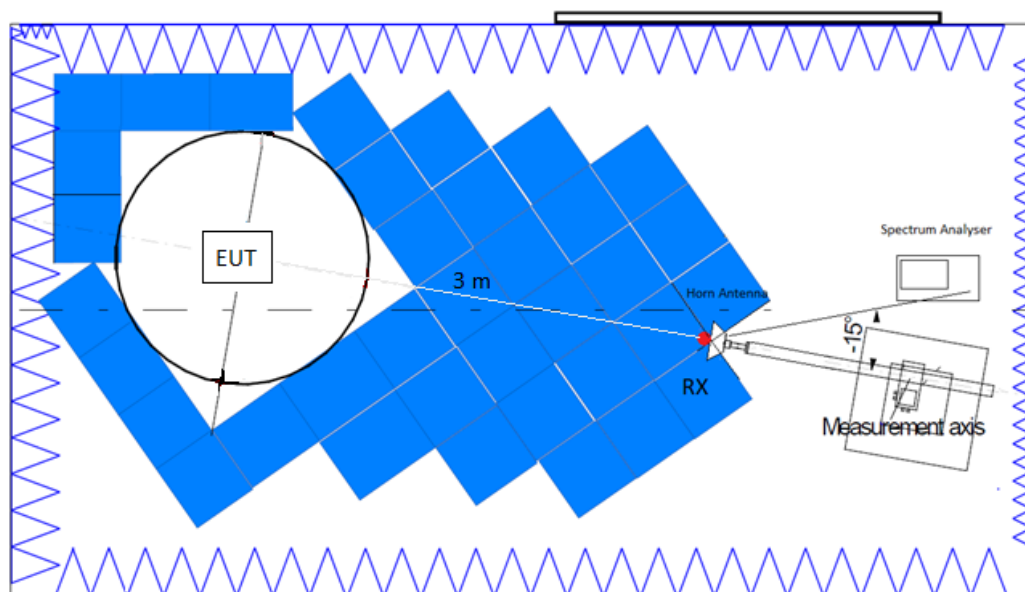
Measurements were made in both horizontal and vertical planes of polarization.

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

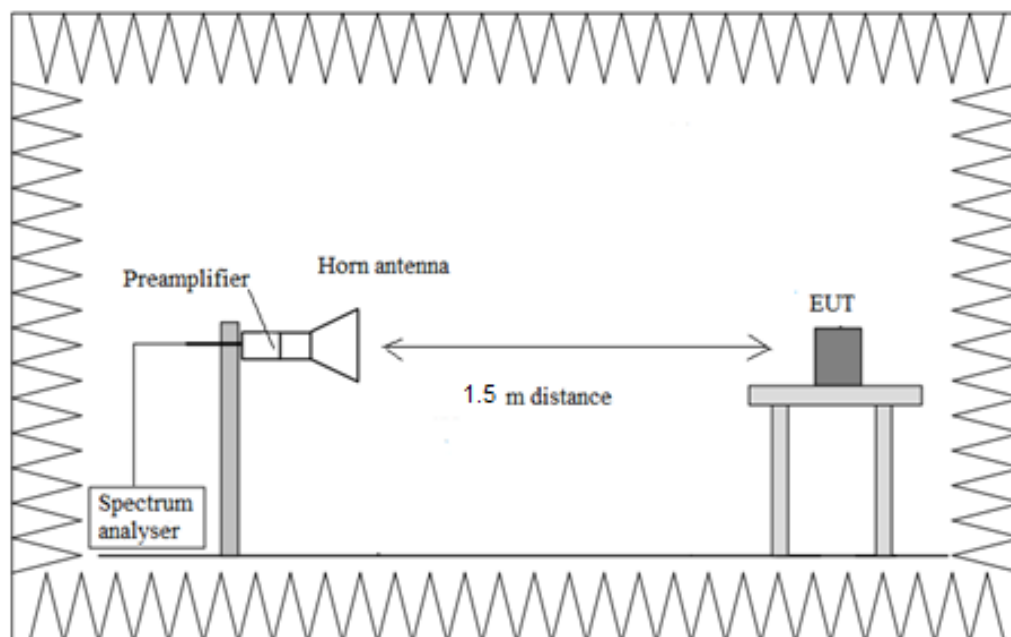
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



TEST CASES DETAILS

FCC 47 CFR Part 15.247 / RSS-247 Occupied Channel Bandwidth 99%

Specification

FCC Rules and Regulations 47 CFR Part 2, Secs. 2.1049:

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

RSS-Gen Issue 5, Secs. 6.7:

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

Results

Modulation: BTLE 5.4 (GFSK 1 Mbit/s)

Operation Mode: SISO

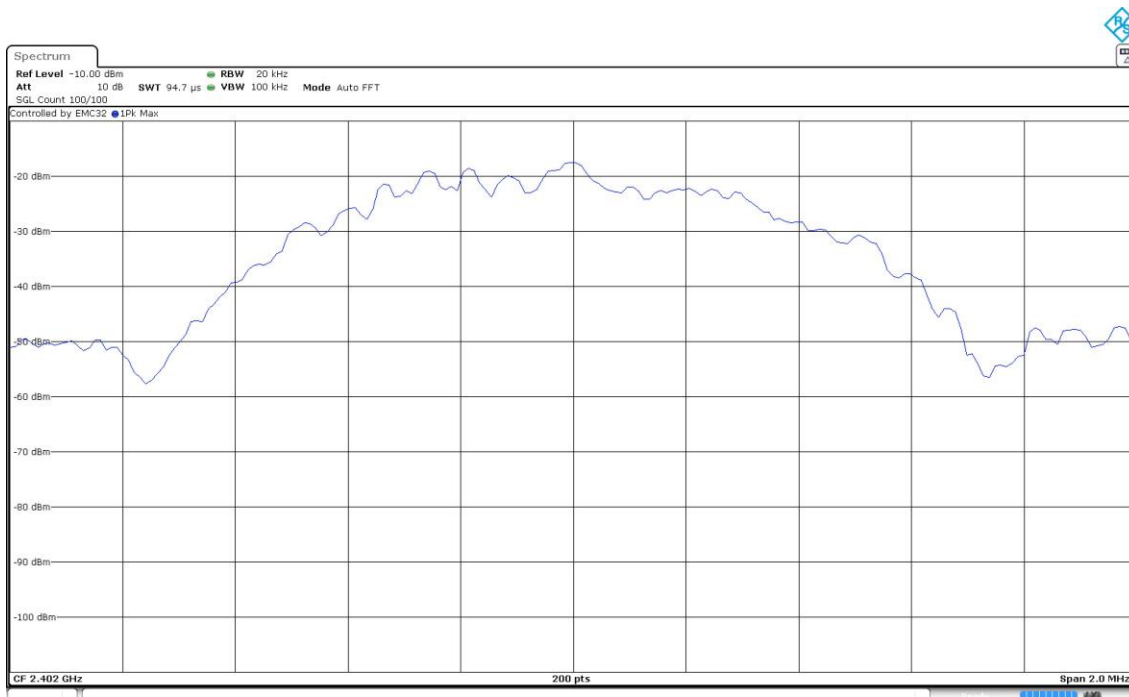
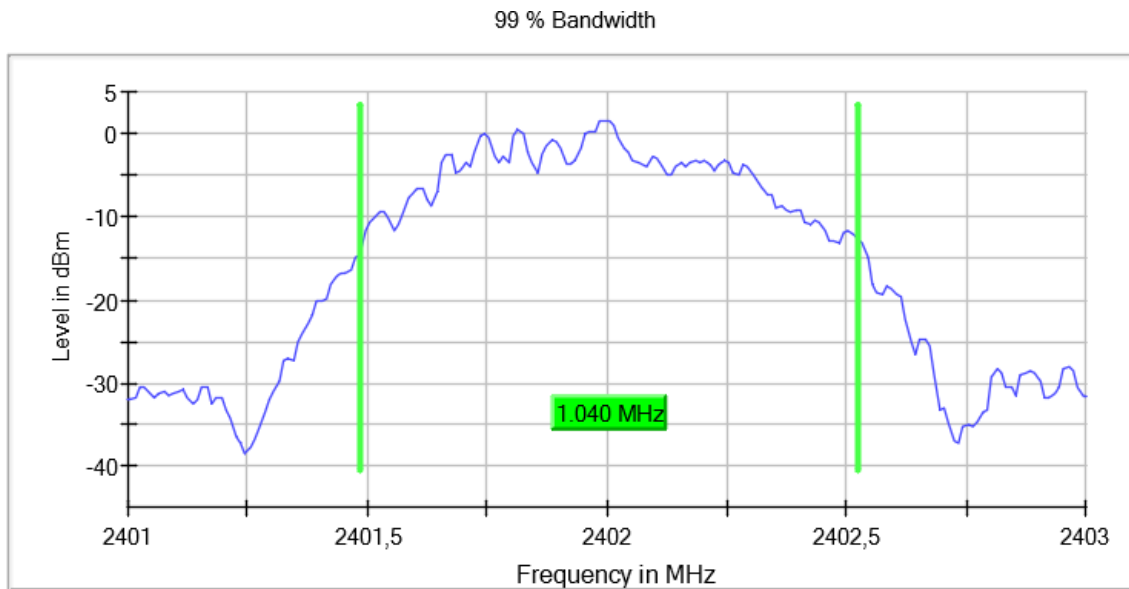
Equipment	BW (MHz)	Freq (MHz)	Port	Occ Ch BW (MHz)
Digital Transmission System (DTS)	1	2402.00000	1	1.040
		2440.00000		1.050
		2480.00000		1.050

Attachments

Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1
Modulation = BTLE 5.4 (GFSK 1 Mbit/s) Frequency MHz = 2402.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

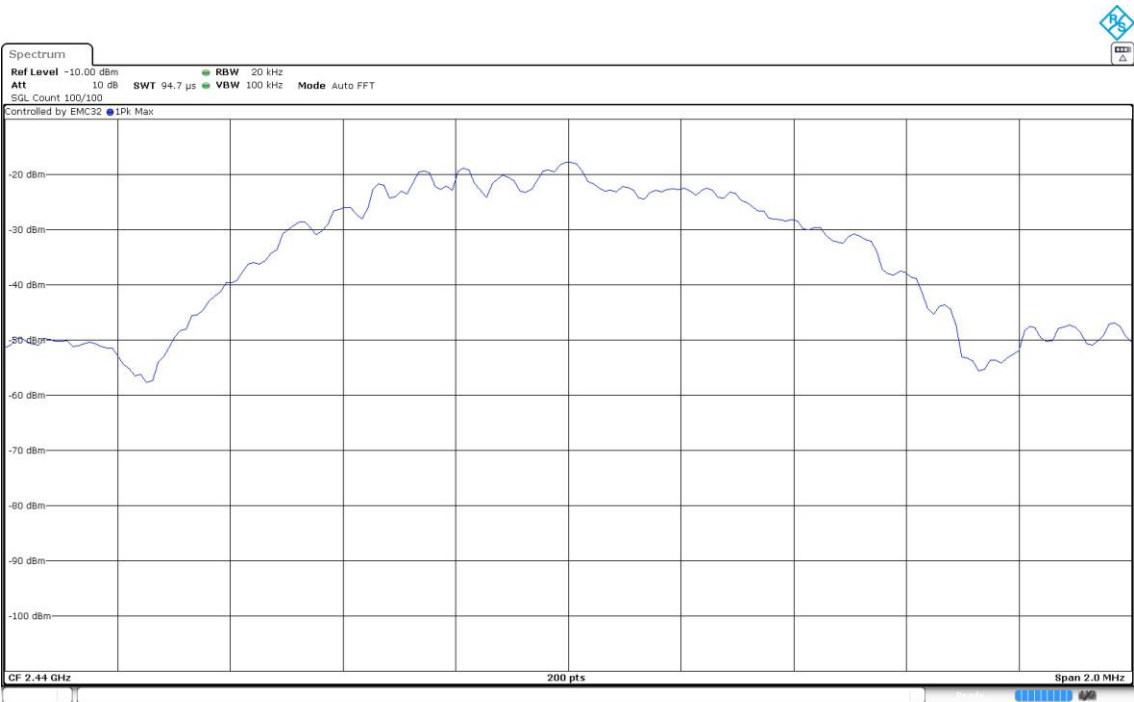
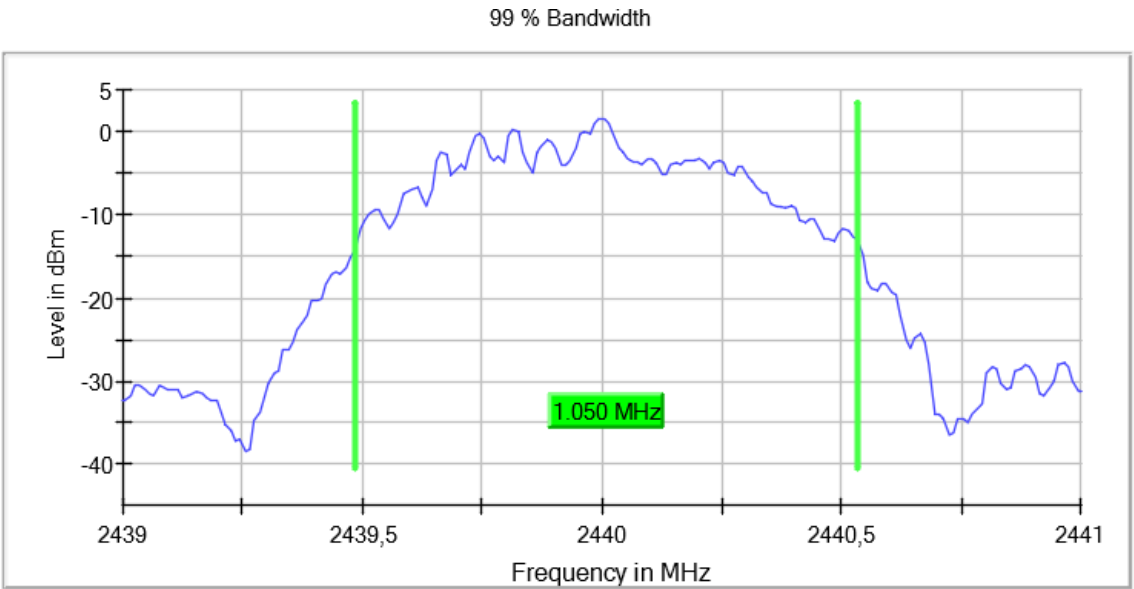
Images:



Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1
Modulation = BTLE 5.4 (GFSK 1 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

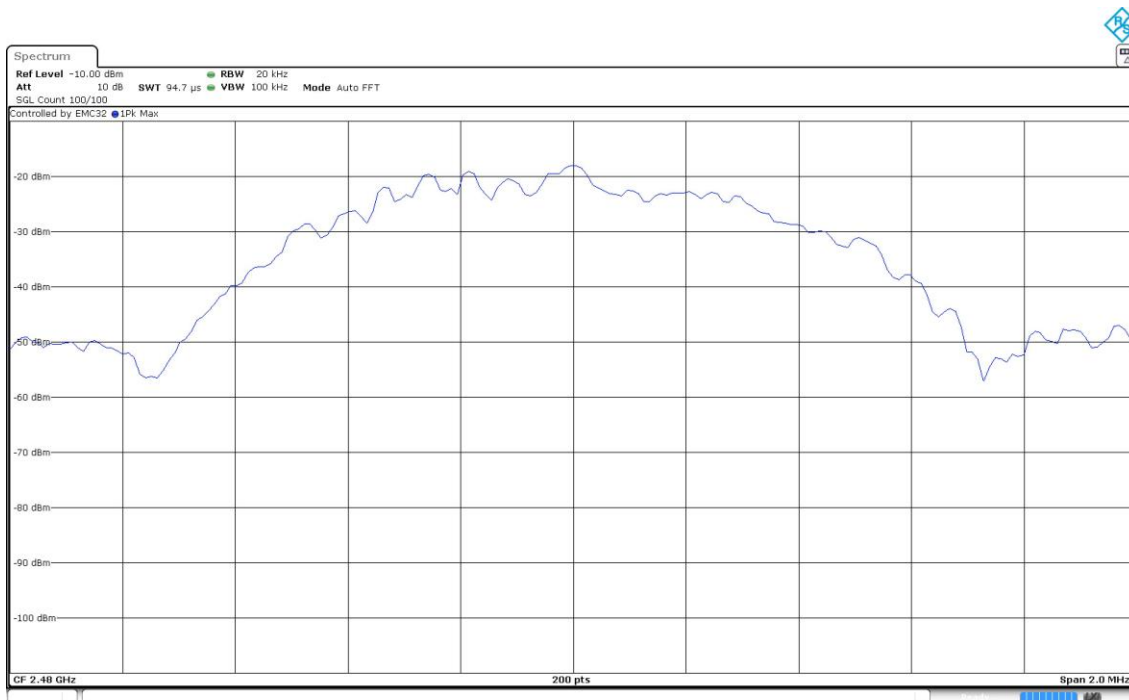
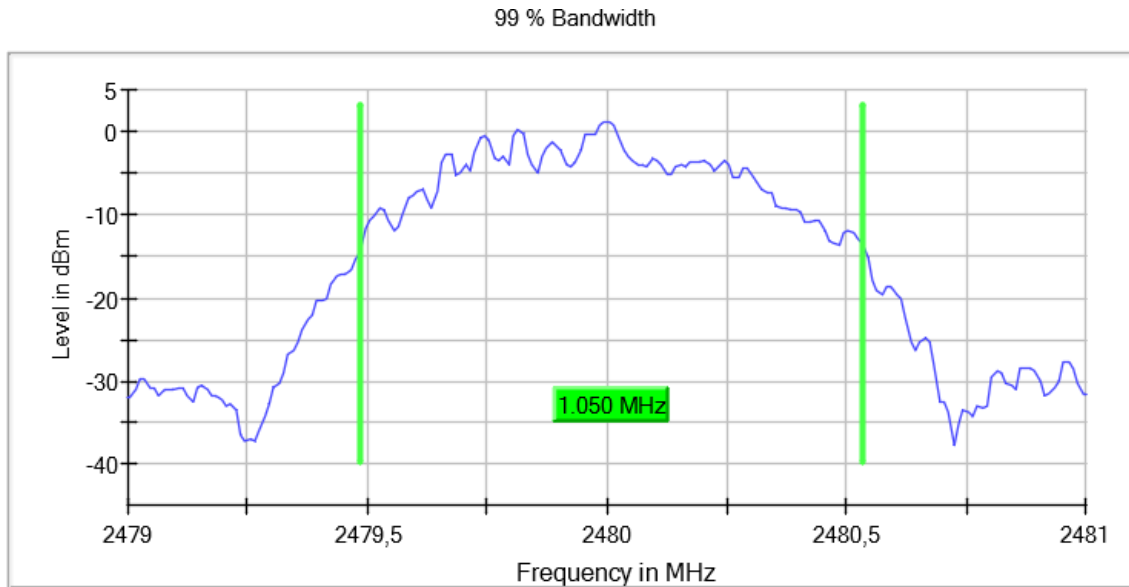
Images:



Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1
 Modulation = BTLE 5.4 (GFSK 1 Mbit/s) Frequency MHz = 2480.00000
 MIMO Mode = SISO Active Port = 1

Operation Mode:

Images:



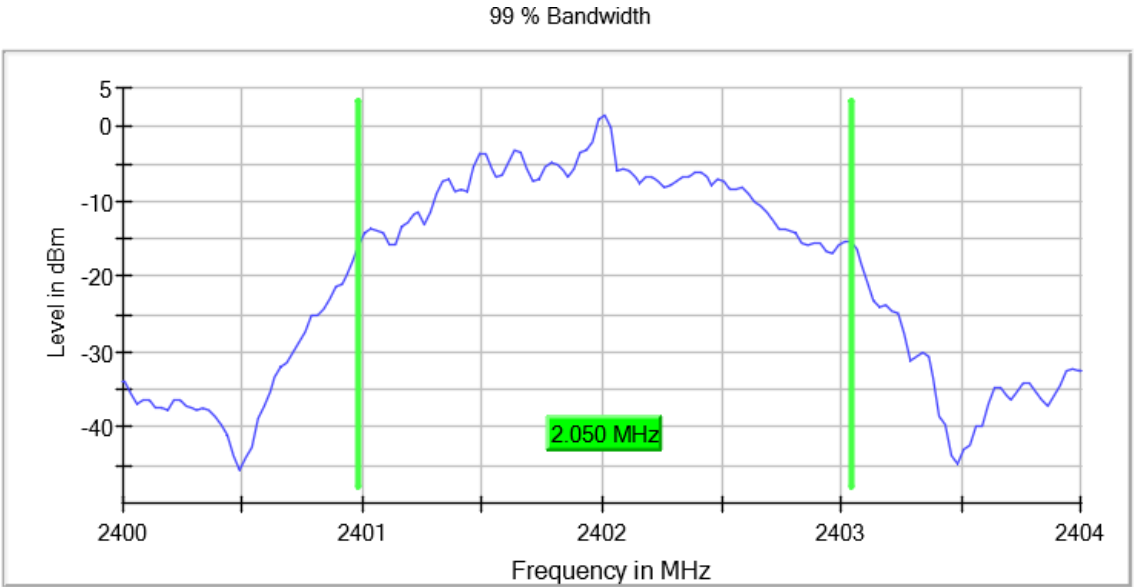
Modulation: BTLE 5.4 (GFSK 2 Mbit/s)

Operation Mode: SISO

Equipment	BW (MHz)	Freq (MHz)	Port	Occ Ch BW (MHz)
Digital Transmission System (DTS)	2	2402.00000	1	2.050
		2440.00000		2.050
		2480.00000		2.050

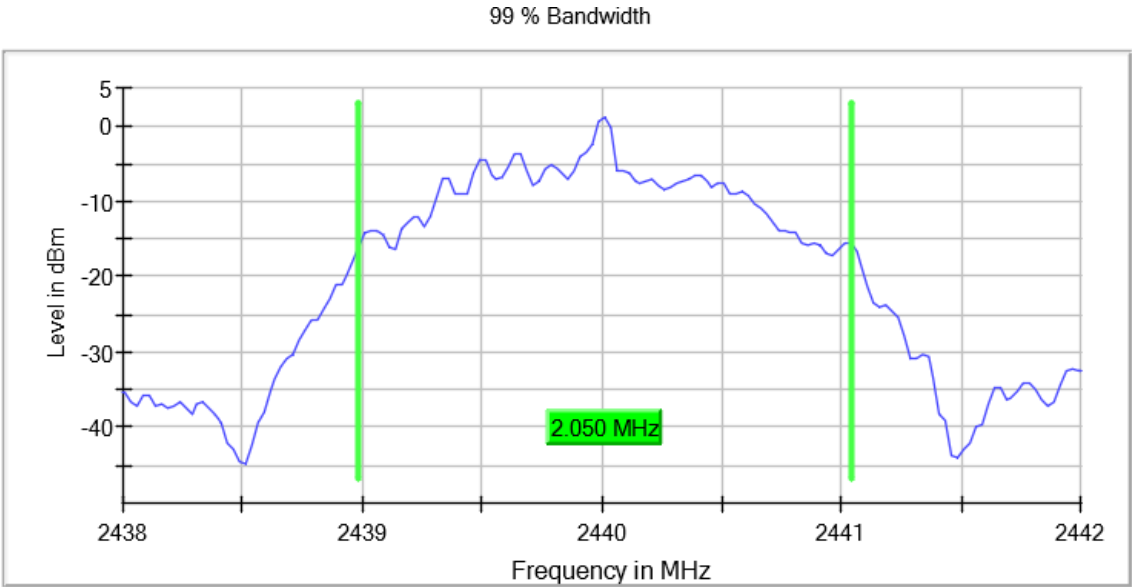
Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2
Modulation = BTLE 5.4 (GFSK 2 Mbit/s) Frequency MHz = 2402.00000
MIMO Mode = SISO Active Port = 1

Images:



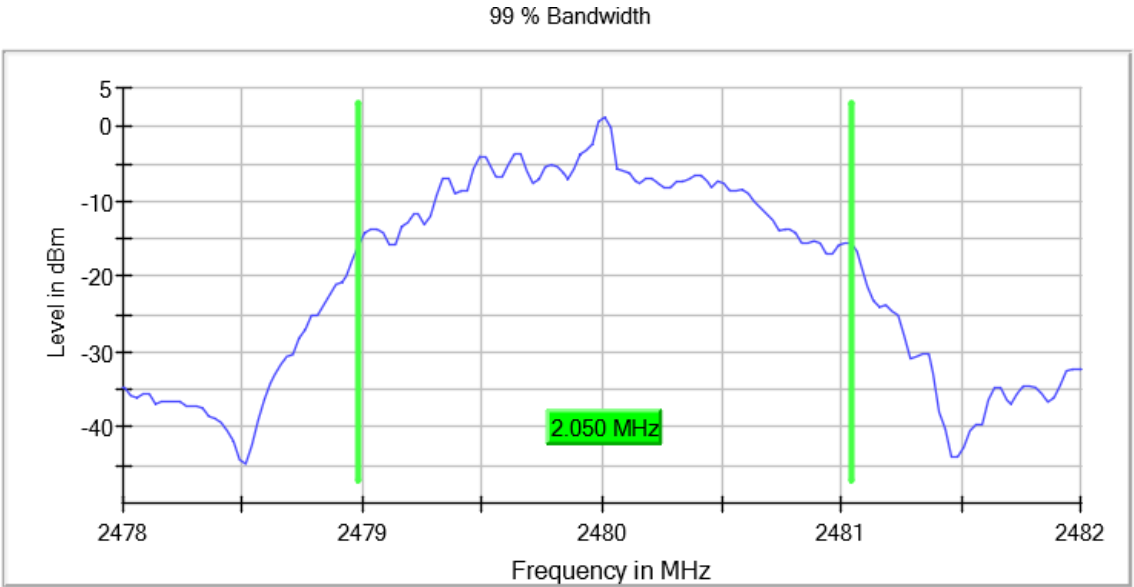
Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2
Modulation = BTLE 5.4 (GFSK 2 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Active Port = 1

Images:



Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2
Modulation = BTLE 5.4 (GFSK 2 Mbit/s) Frequency MHz = 2480.00000
MIMO Mode = SISO Active Port = 1

Images:



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

Limits

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

Results

Modulation: BTLE 5.4 (GFSK 1 Mbit/s)

Operation Mode: SISO

BW (MHz)	Freq (MHz)	Port	Ebw (MHz)
1	2402.00000	1	0.713
	2440.00000		0.713
	2480.00000		0.752

Verdict

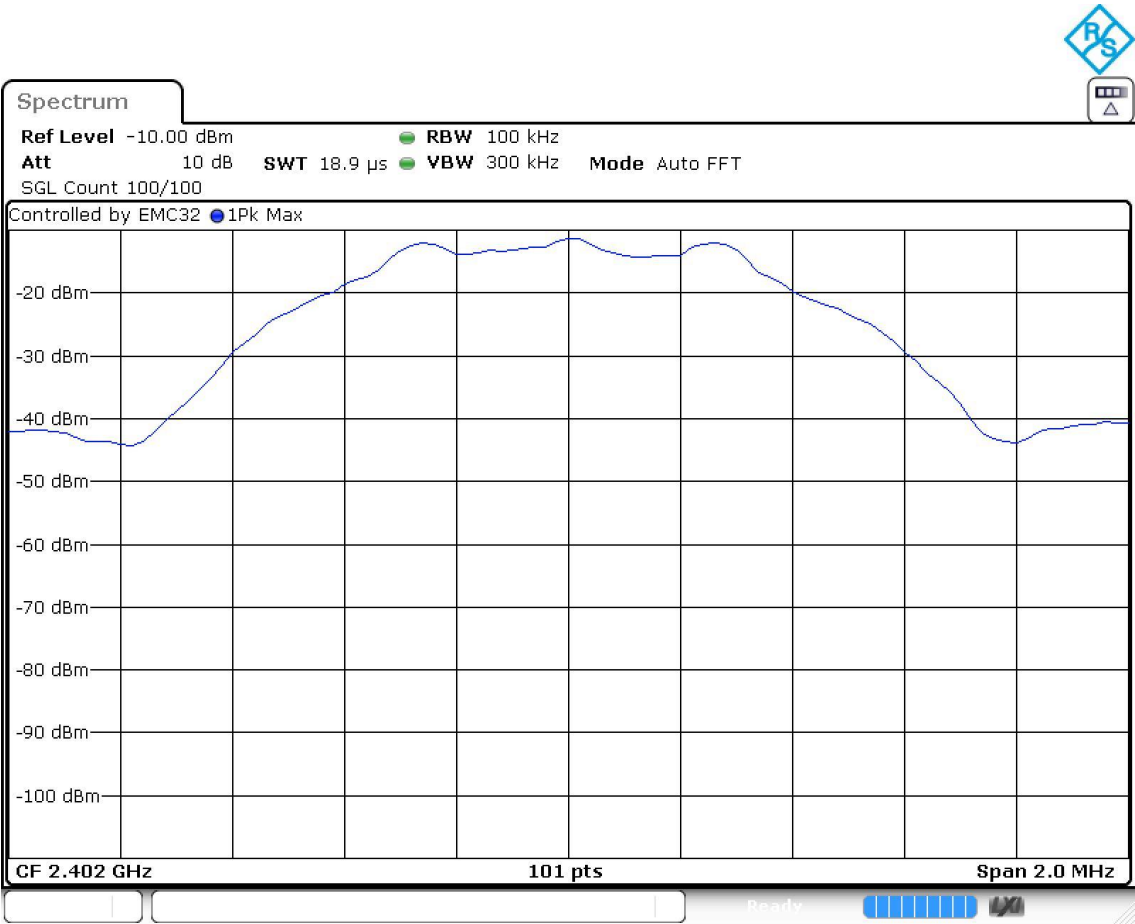
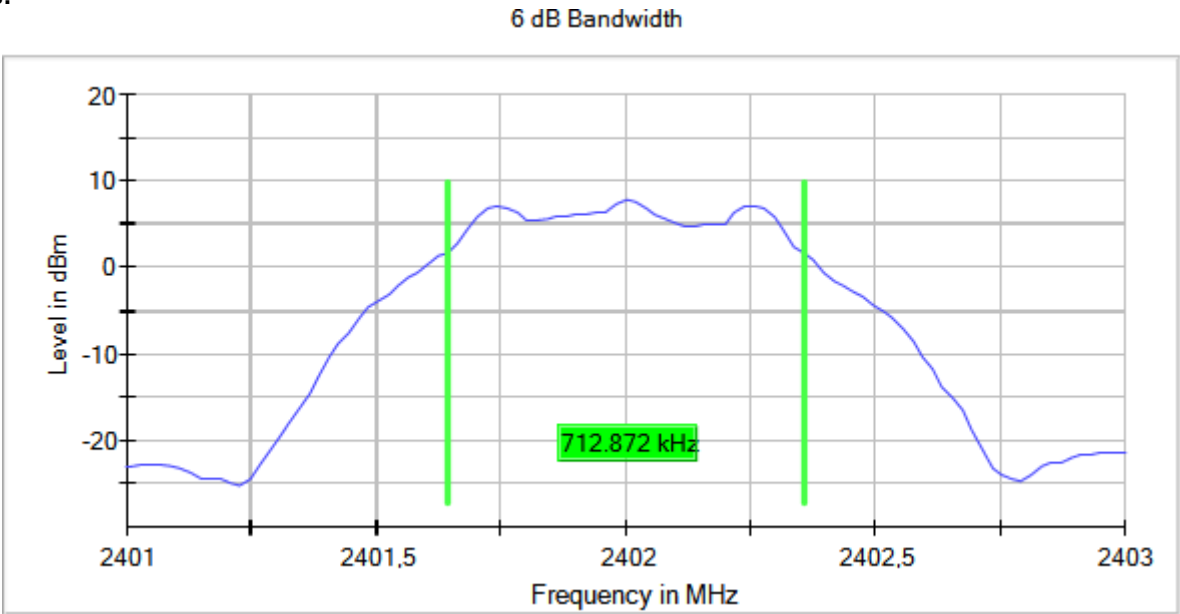
Pass

Attachments

Bandwidth MHz = 1 Modulation = BTLE 5.4 (GFSK 1 Mbit/s)
Frequency MHz = 2402.00000 MIMO Mode = SISO
Active Port = 1

Operation Mode:

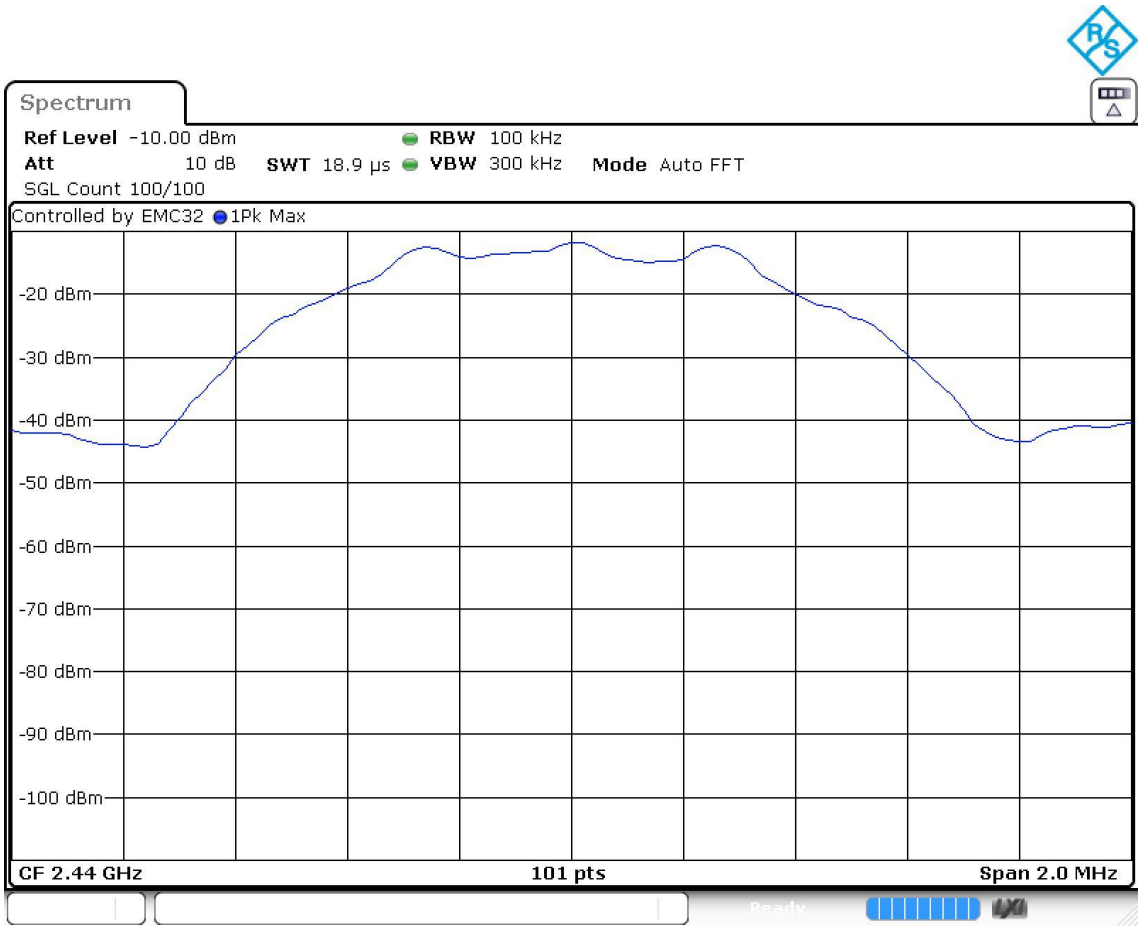
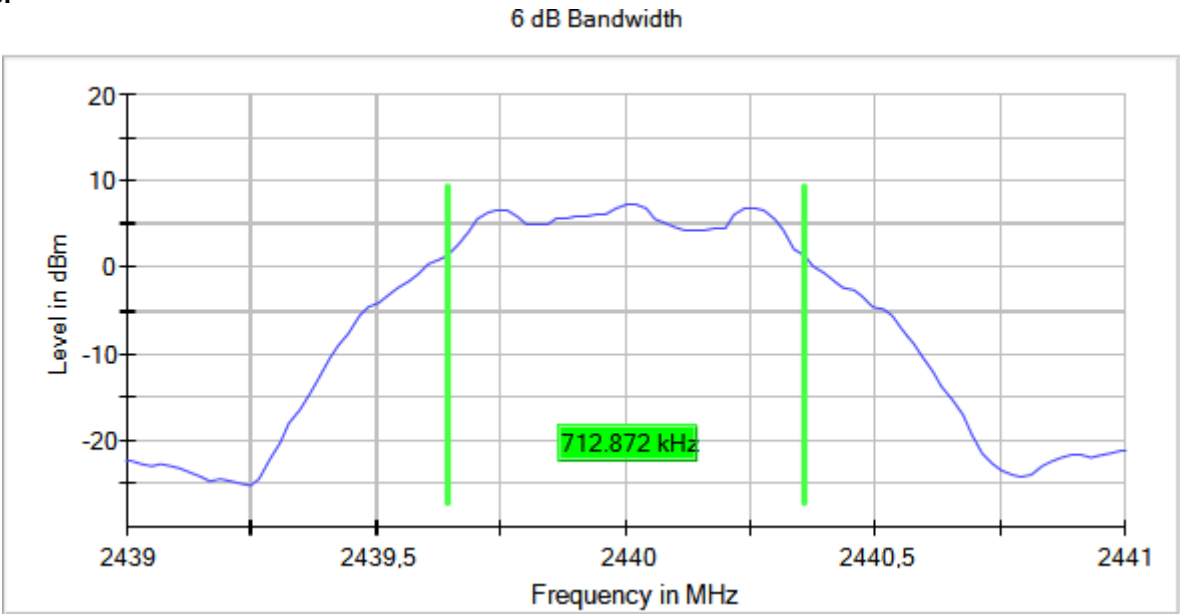
Images:



Bandwidth MHz = 1 Modulation = BTLE 5.4 (GFSK 1 Mbit/s)
Frequency MHz = 2440.00000 MIMO Mode = SISO
Active Port = 1

Operation Mode:

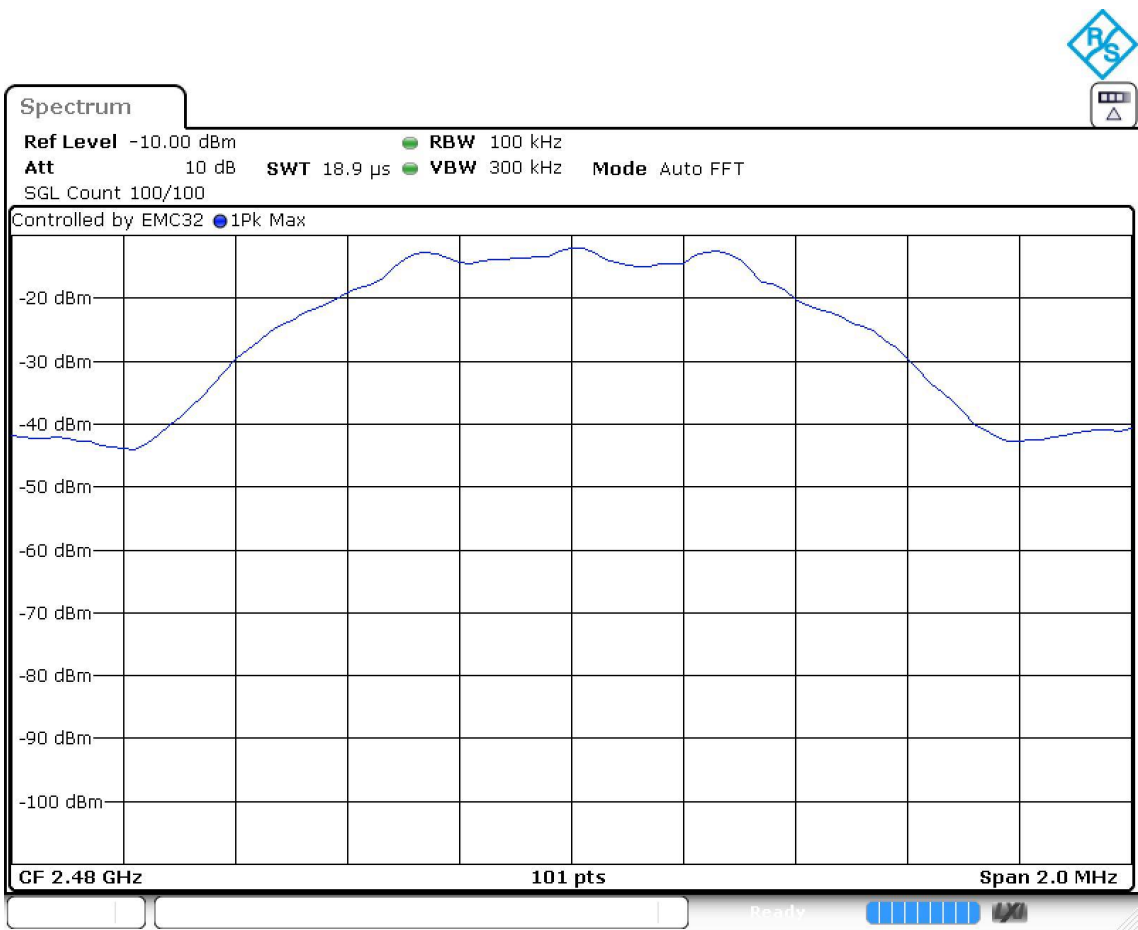
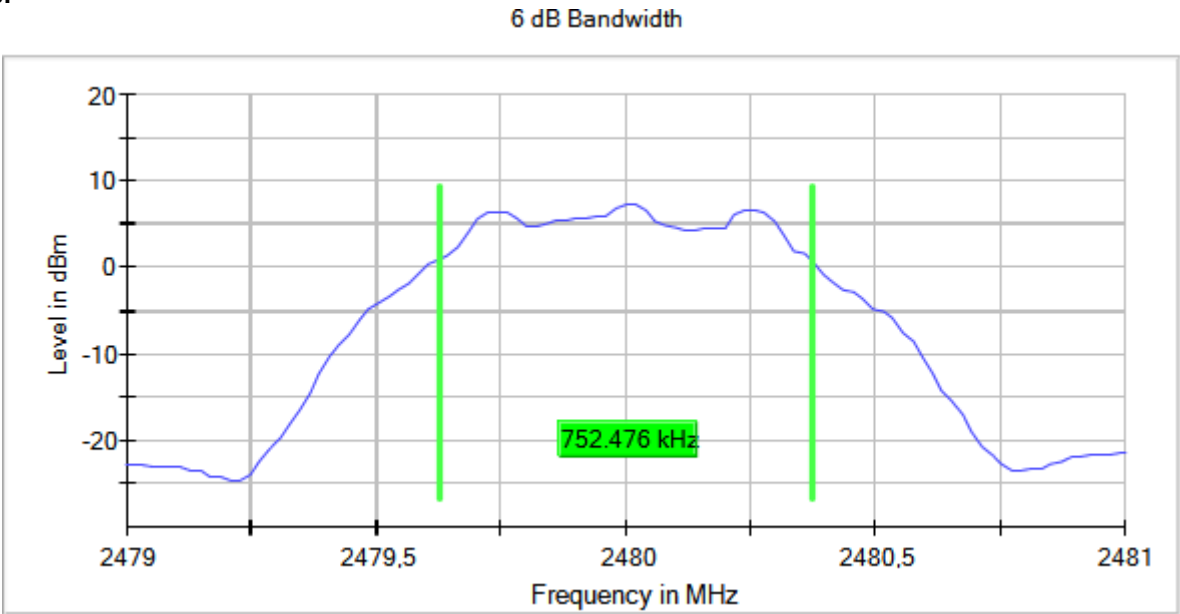
Images:



Bandwidth MHz = 1 Modulation = BTLE 5.4 (GFSK 1 Mbit/s)
Frequency MHz = 2480.00000 MIMO Mode = SISO
Active Port = 1

Operation Mode:

Images:



Results

Modulation: BTLE 5.4 (GFSK 2 Mbit/s)
Operation Mode: SISO

BW (MHz)	Freq (MHz)	Port	Ebw (MHz)
2	2402.00000	1	1.188
	2440.00000		1.188
	2480.00000		1.188

Verdict

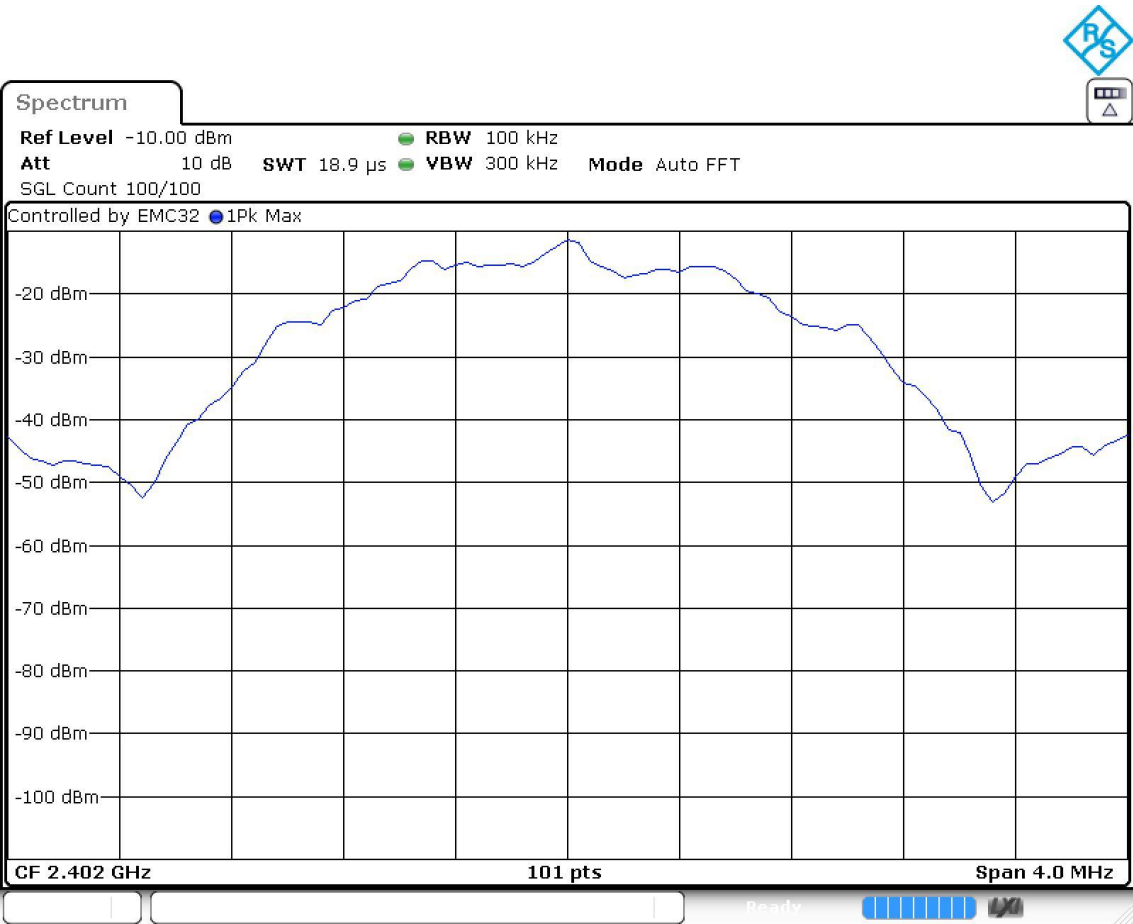
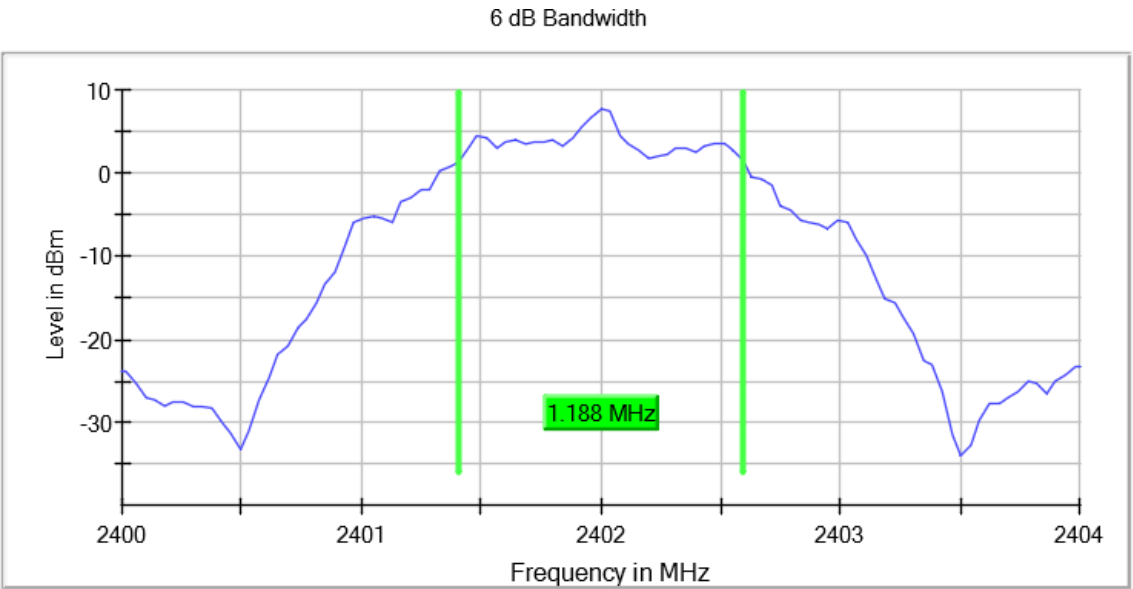
Pass

Attachments

Bandwidth MHz = 2 Modulation = BTLE 5.4 (GFSK 2 Mbit/s)
Frequency MHz = 2402.00000 MIMO Mode = SISO
Active Port = 1

Operation Mode:

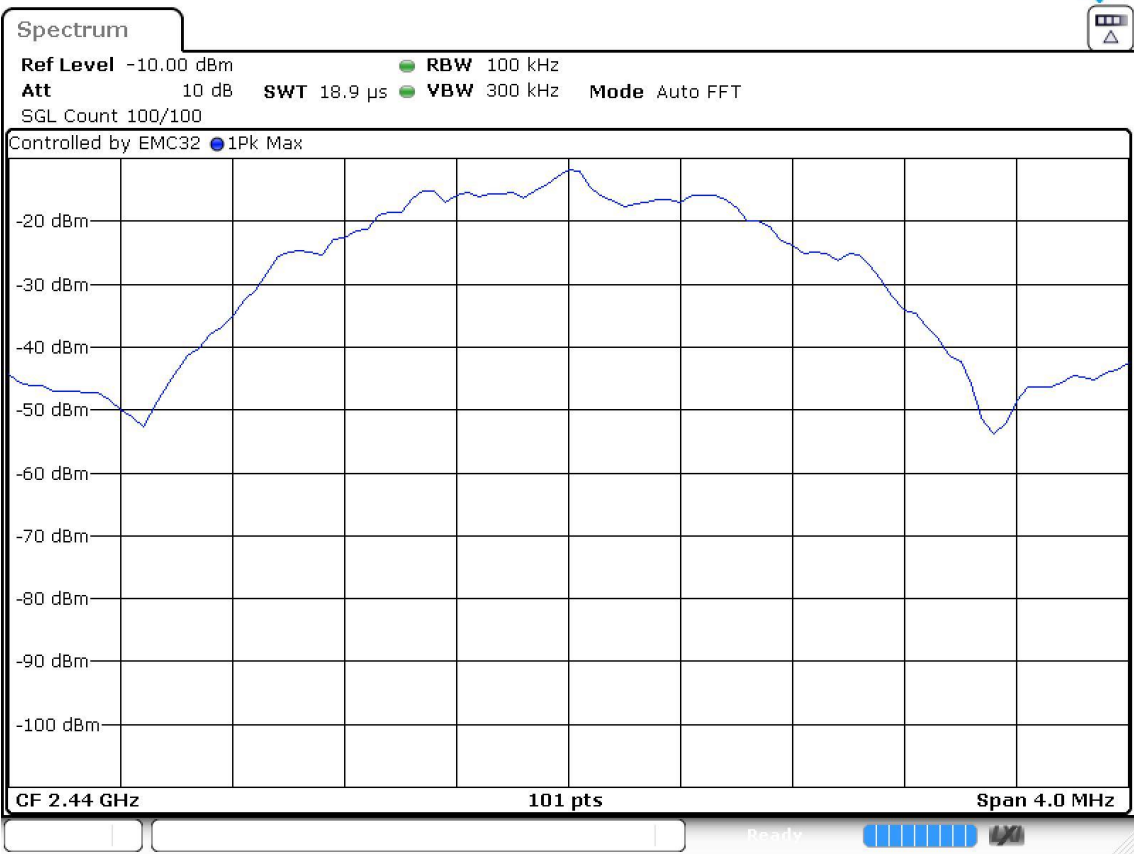
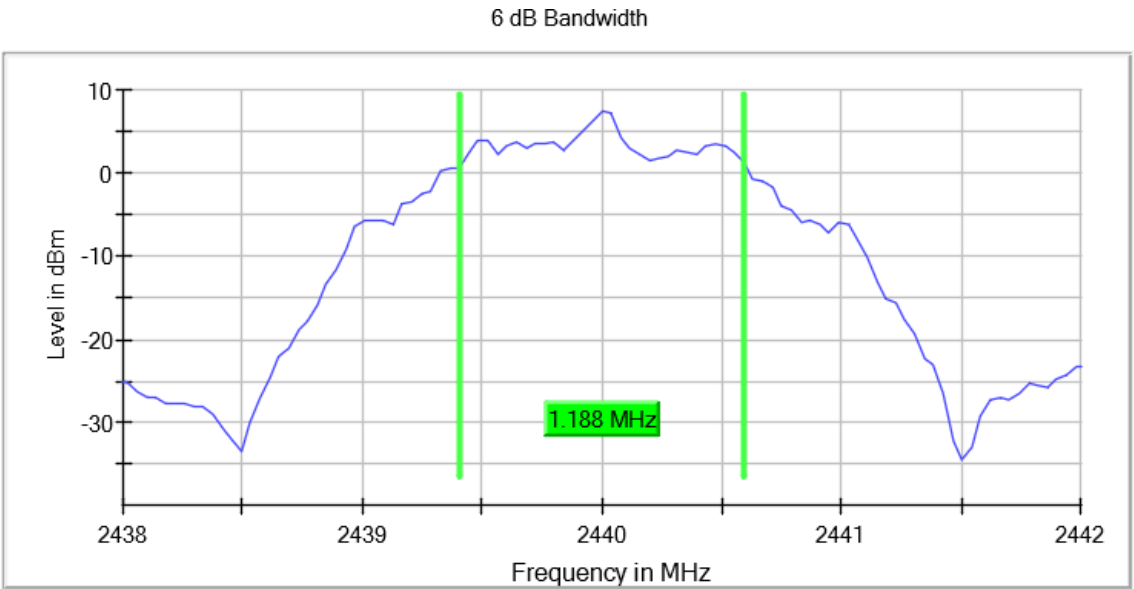
Images:



Bandwidth MHz = 2 Modulation = BTLE 5.4 (GFSK 2 Mbit/s)
Frequency MHz = 2440.00000 MIMO Mode = SISO
Active Port = 1

Operation Mode:

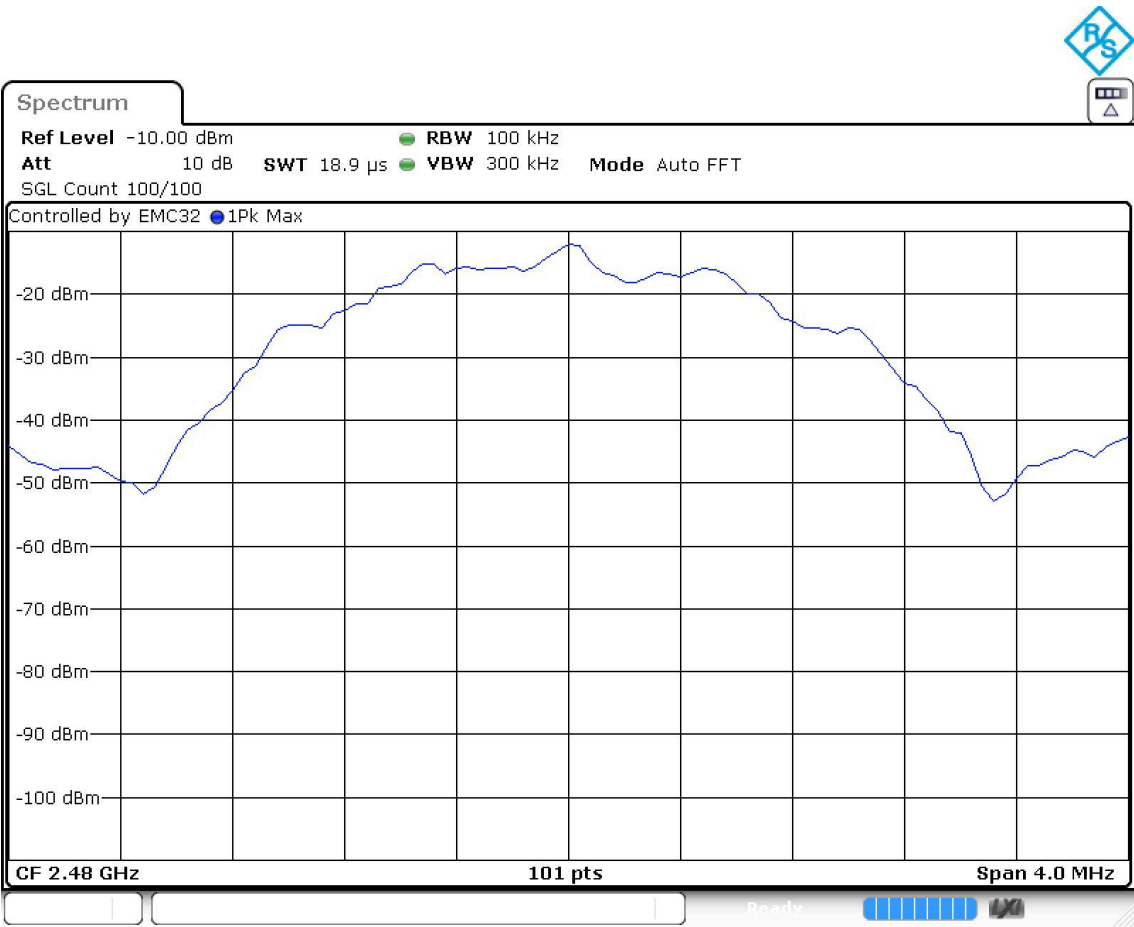
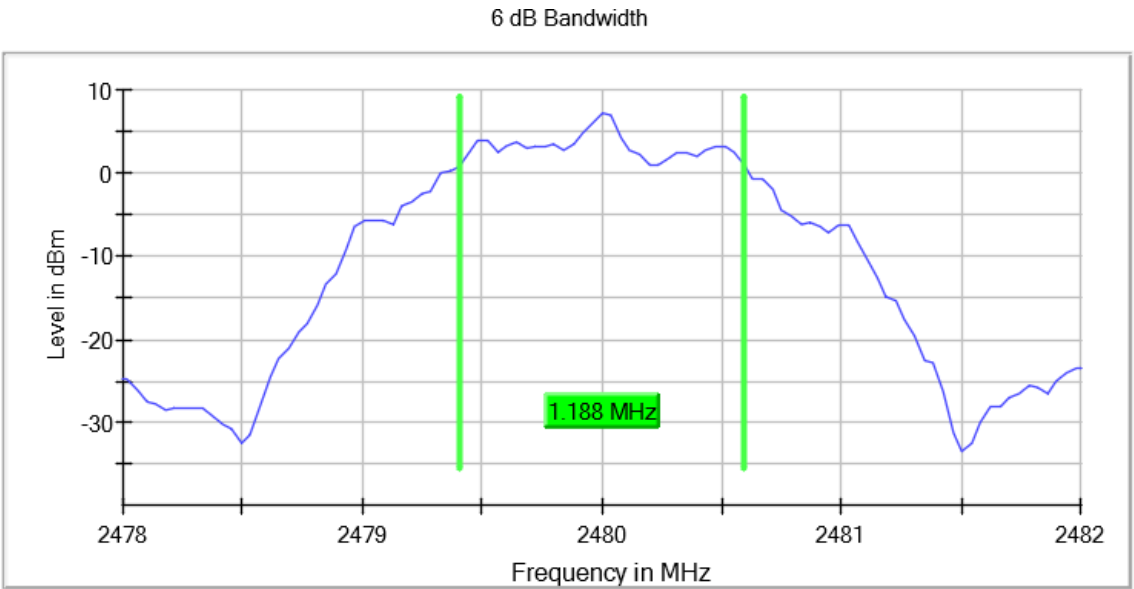
Images:



Bandwidth MHz = 2 Modulation = BTLE 5.4 (GFSK 2 Mbit/s)
Frequency MHz = 2480.00000 MIMO Mode = SISO
Active Port = 1

Operation Mode:

Images:



RSS-247 5.2 (b) / FCC 15.247 (e) Power spectral density

Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Results

Modulation: BTLE 5.4 (GFSK 1 Mbit/s)

Operation Mode: SISO

Equipment	BW (MHz)	Freq (MHz)	Port	PSD (dBm)
Digital Transmission System (DTS)	1	2402.00000	1	-1.94
		2440.00000		-2.24
		2480.00000		-2.55

Verdict

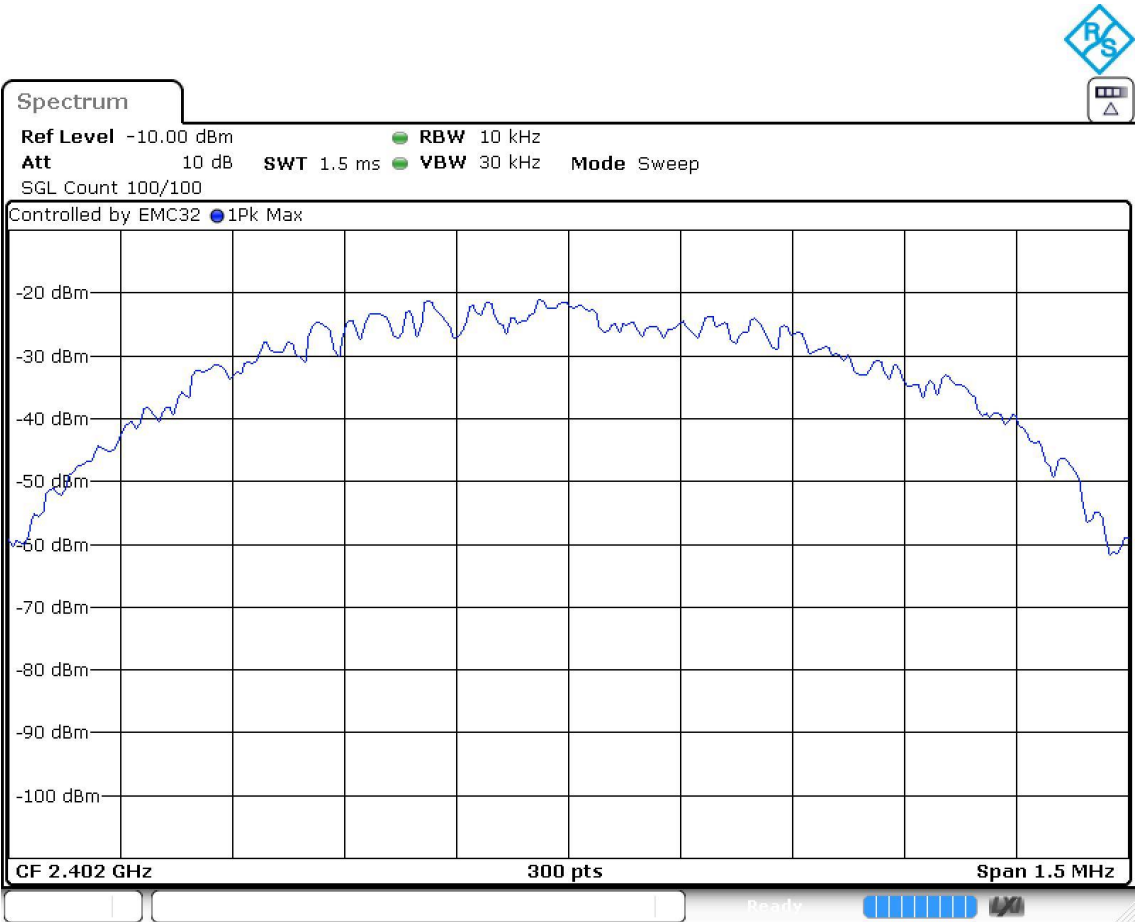
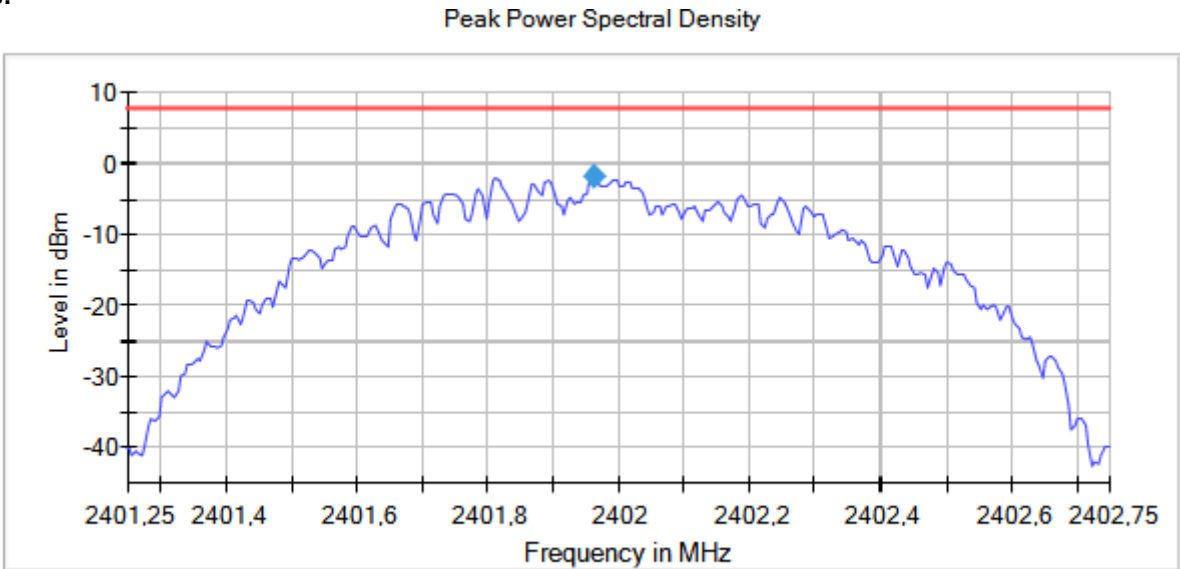
Pass

Attachments

Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1
Modulation = BTLE 5.4 (GFSK 1 Mbit/s) Frequency MHz = 2402.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

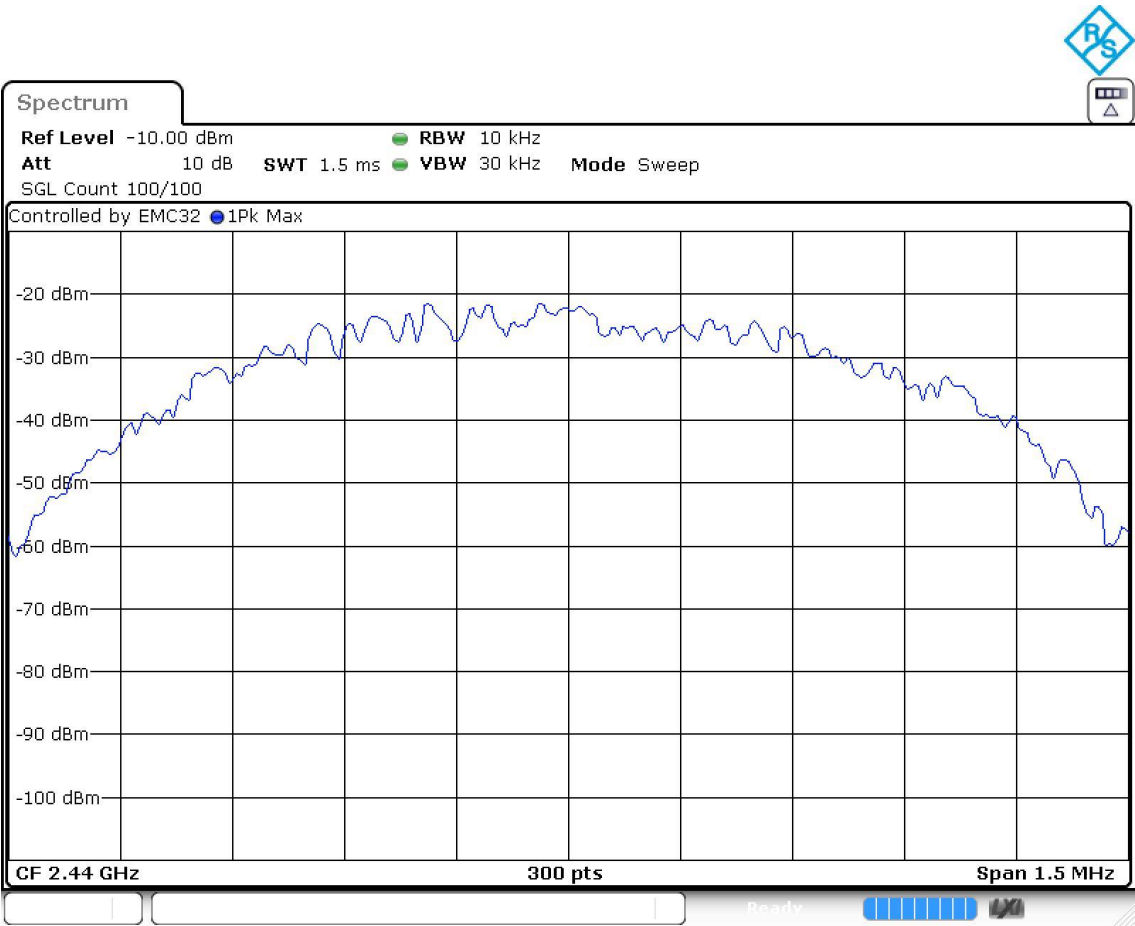
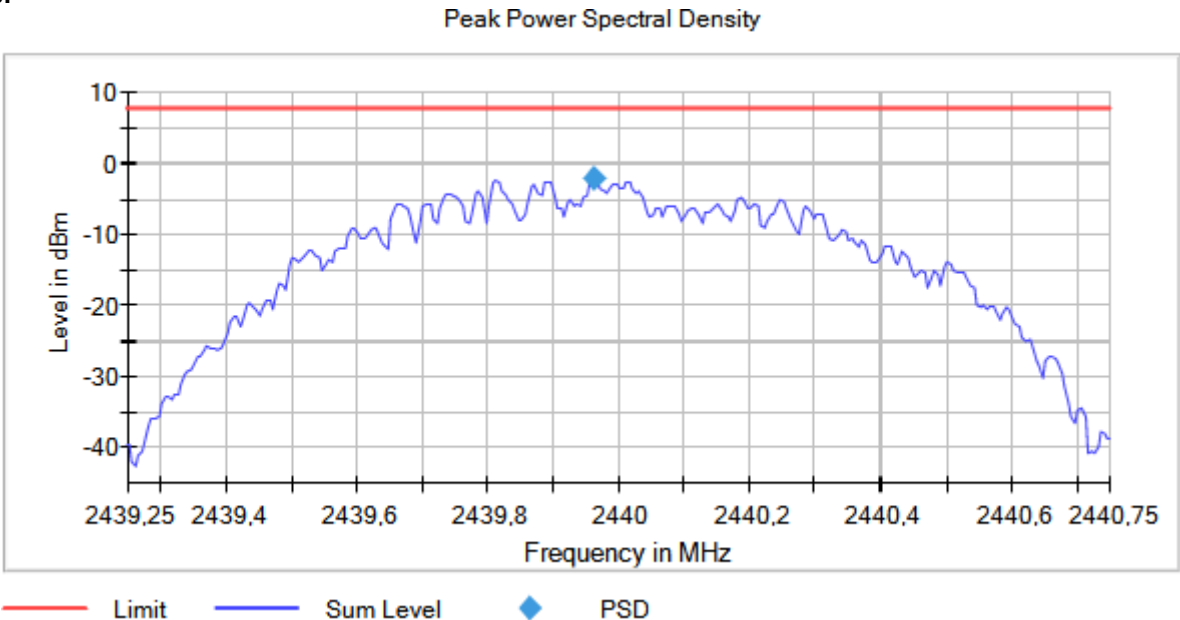
Images:



Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1
Modulation = BTLE 5.4 (GFSK 1 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

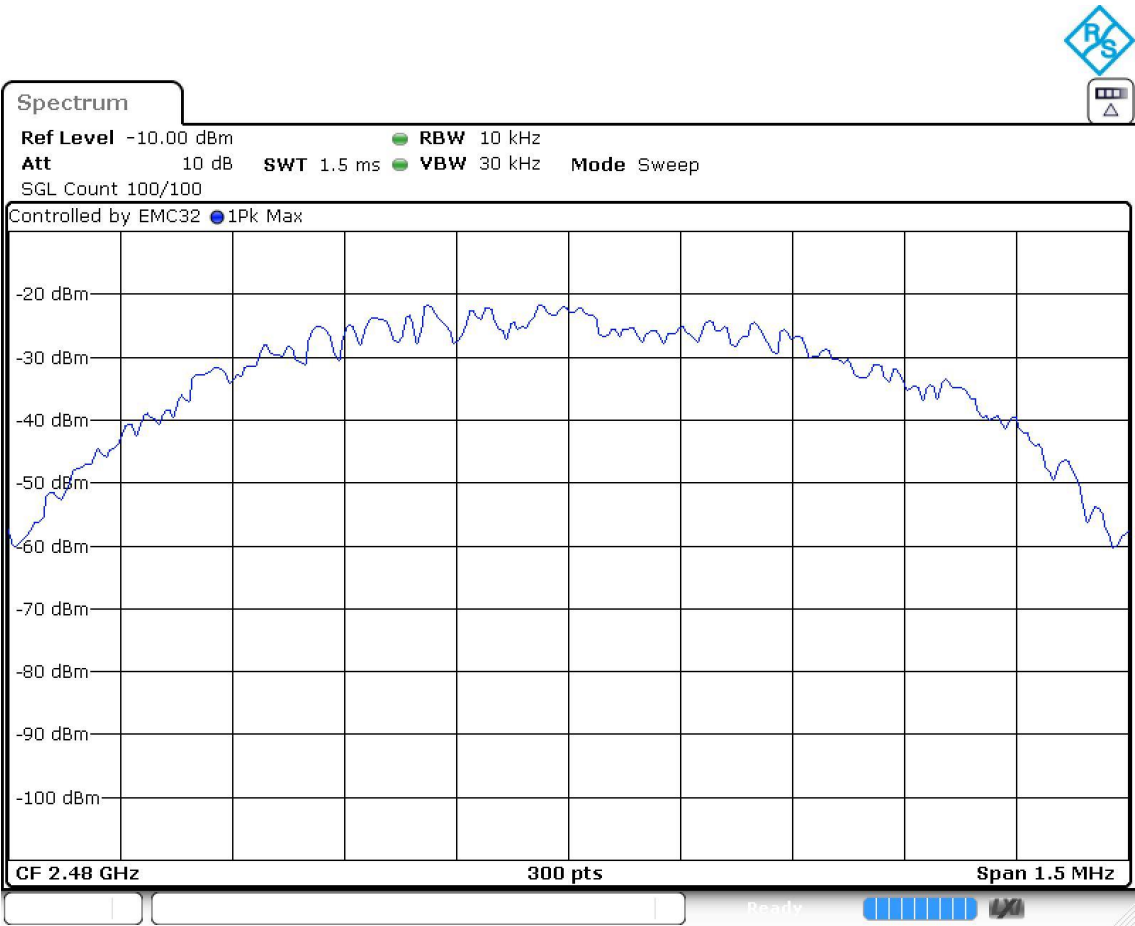
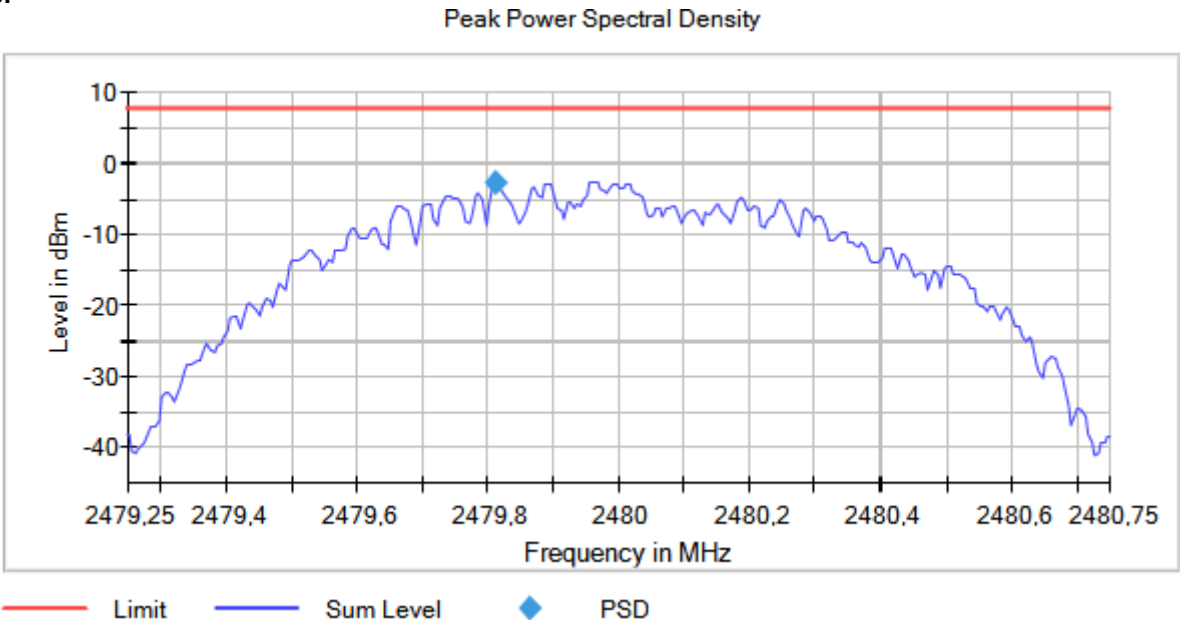
Images:



Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1
Modulation = BTLE 5.4 (GFSK 1 Mbit/s) Frequency MHz = 2480.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

Images:



Results

Modulation: BTLE 5.4 (GFSK 2 Mbit/s)
Operation Mode: SISO

Equipment	BW (MHz)	Freq (MHz)	Port	PSD (dBm)
Digital Transmission System (DTS)	2	2402.00000	1	-2.46
		2440.00000		-2.76
		2480.00000		-3.11

Verdict

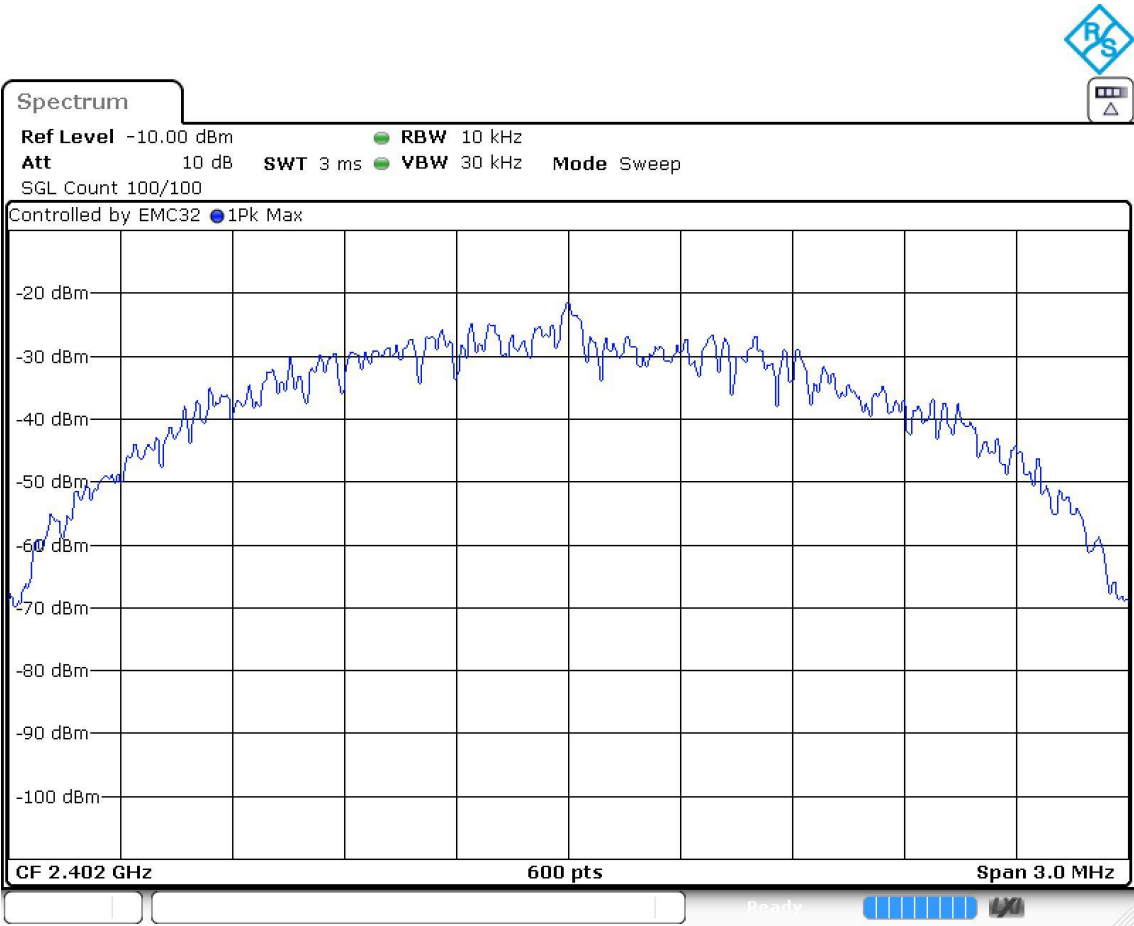
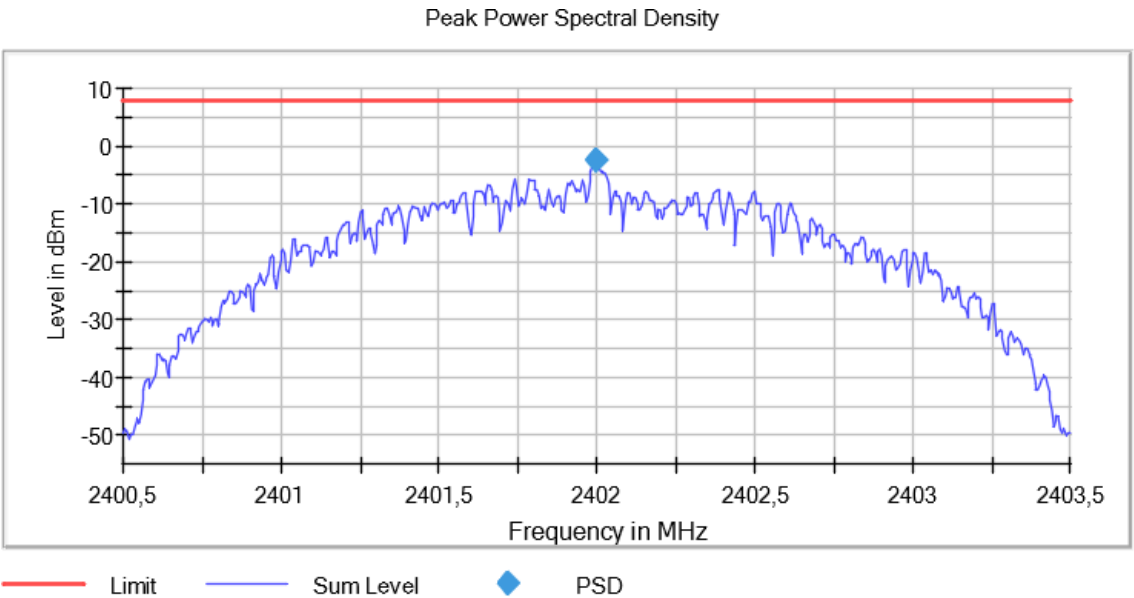
Pass

Attachments

Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2
Modulation = BTLE 5.4 (GFSK 2 Mbit/s) Frequency MHz = 2402.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

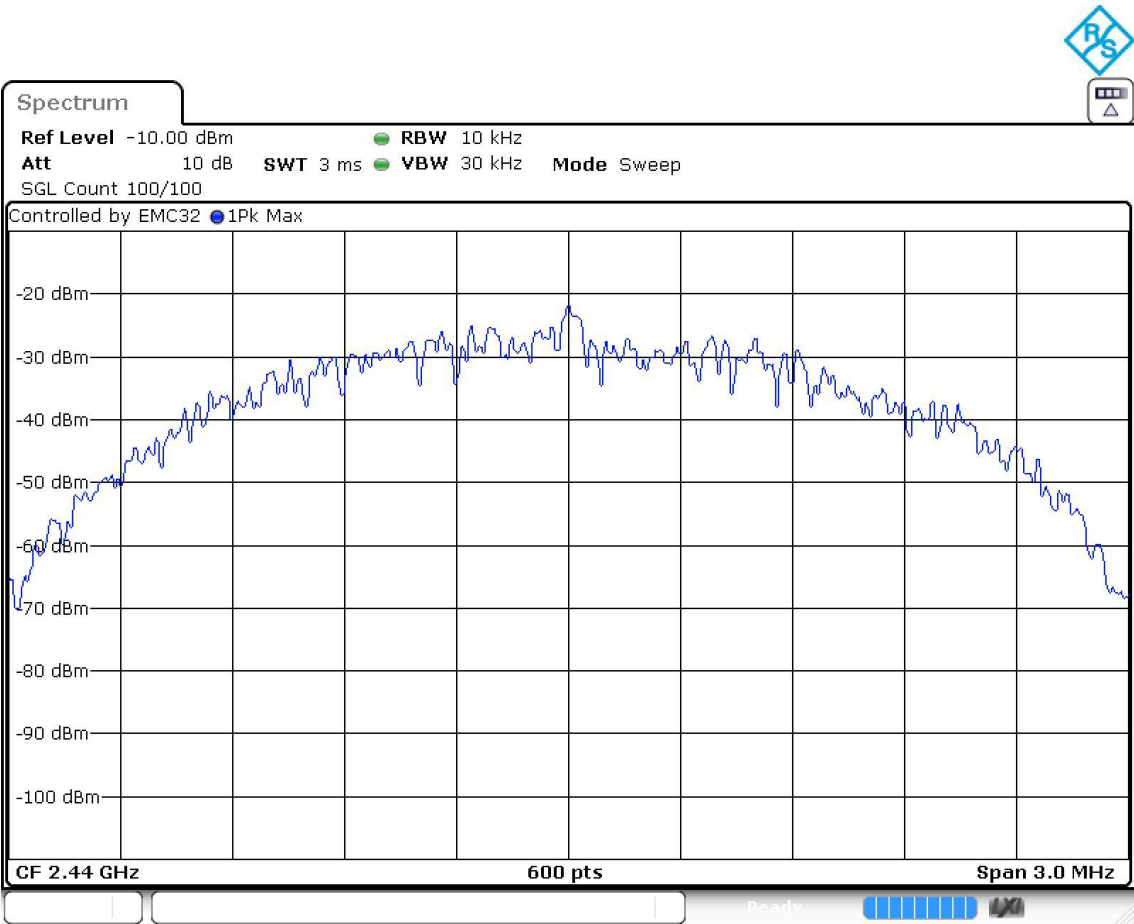
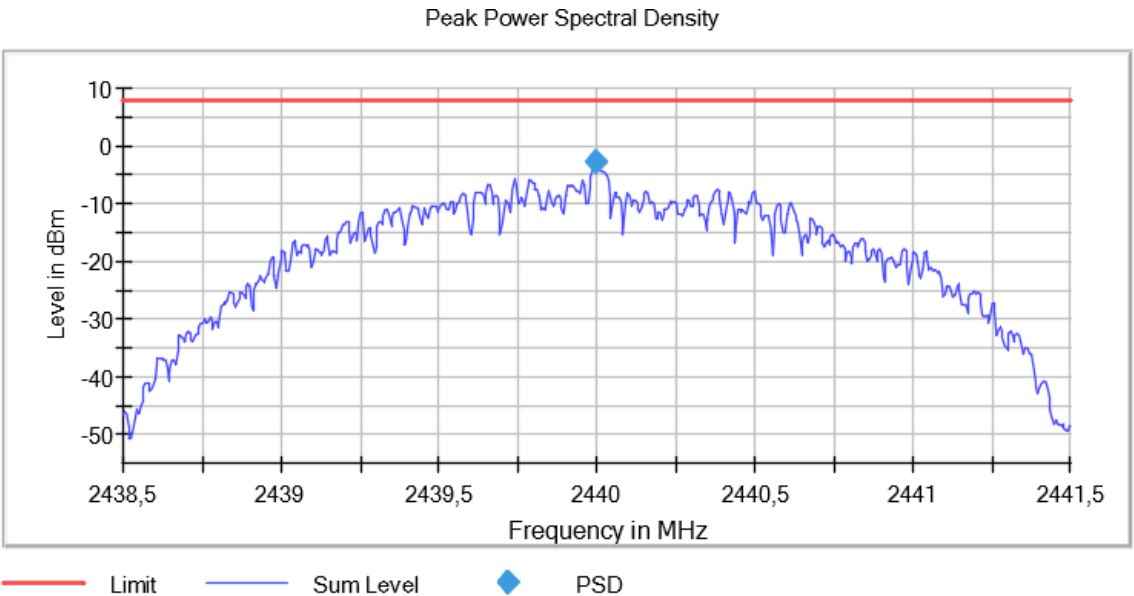
Images:



Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2
Modulation = BTLE 5.4 (GFSK 2 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

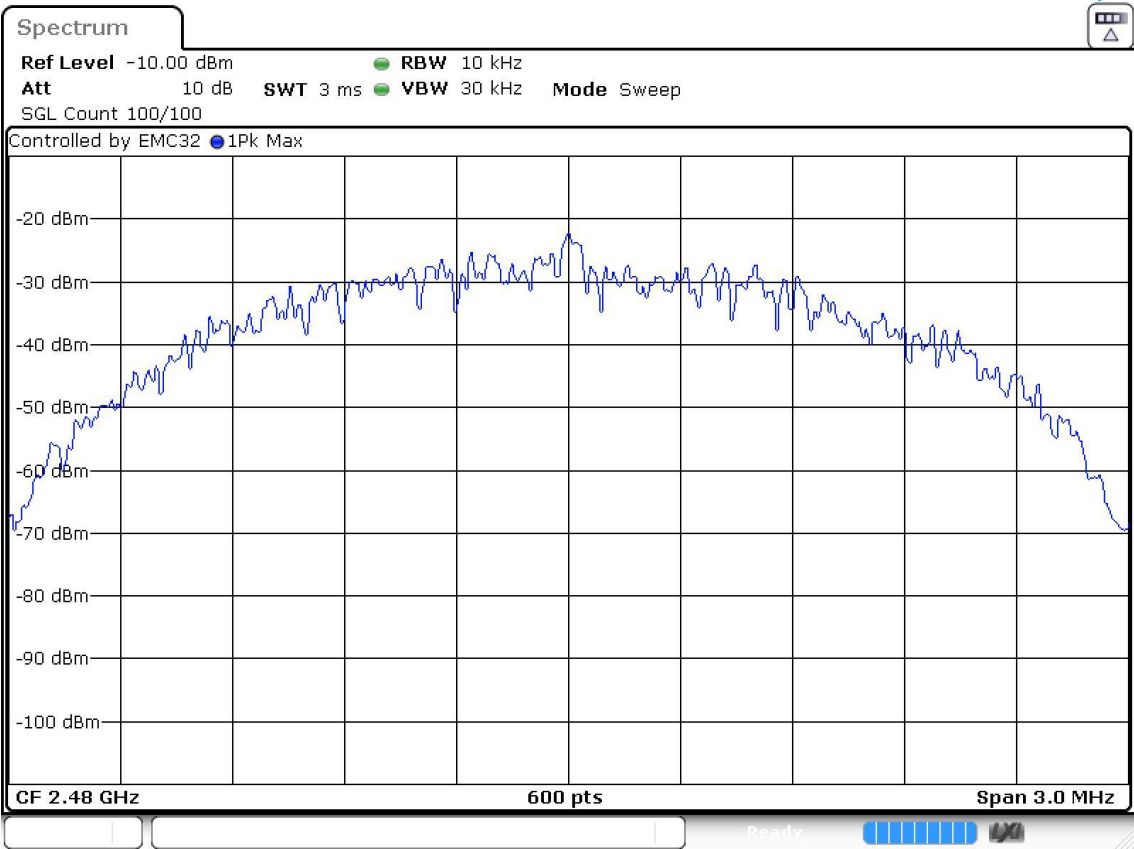
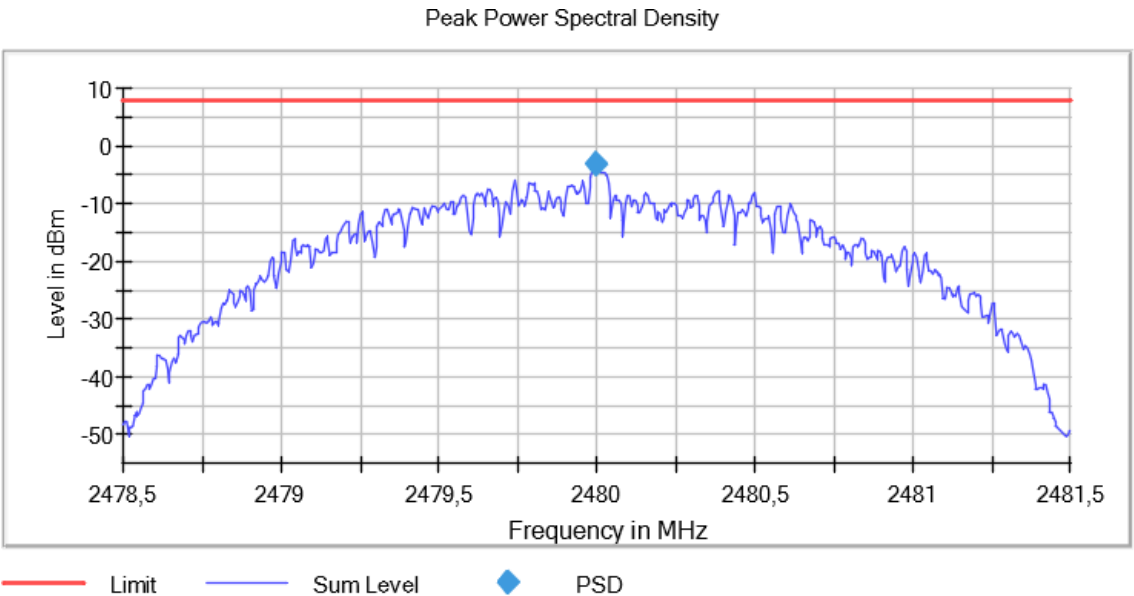
Images:



Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2
Modulation = BTLE 5.4 (GFSK 2 Mbit/s) Frequency MHz = 2480.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

Images:



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

Limits

For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).
The e.i.r.p. shall not exceed 4 W (36 dBm) (Canada).
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.

Results

Modulation: BTLE 5.4 (GFSK 1 Mbit/s)
Operation Mode: SISO

Equipment	BW (MHz)	Freq (MHz)	Port	Peak Power (dBm)	EIRP (dBm)
Digital Transmission System (DTS)	1	2402.00000	1	7.8100	6.8100
		2440.00000		7.5110	6.5110
		2480.00000		7.3320	6.3320

Verdict

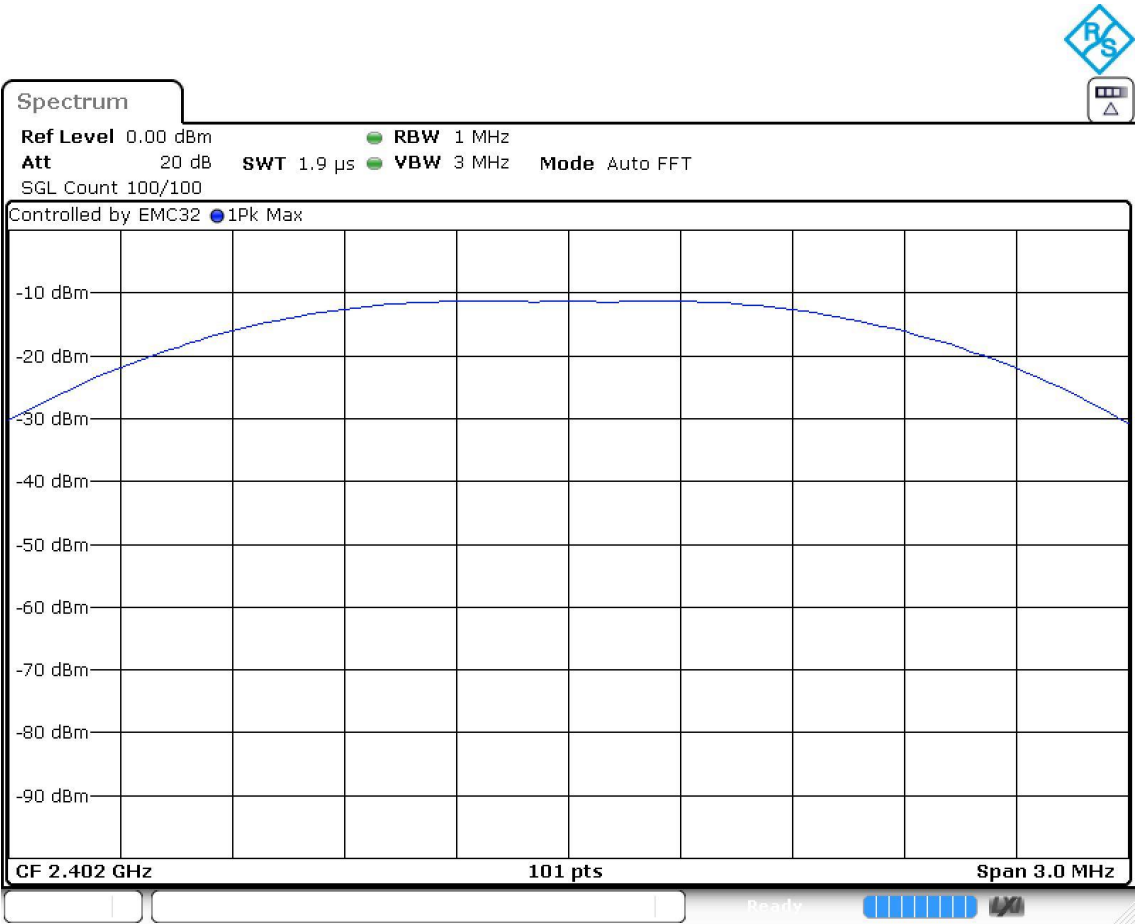
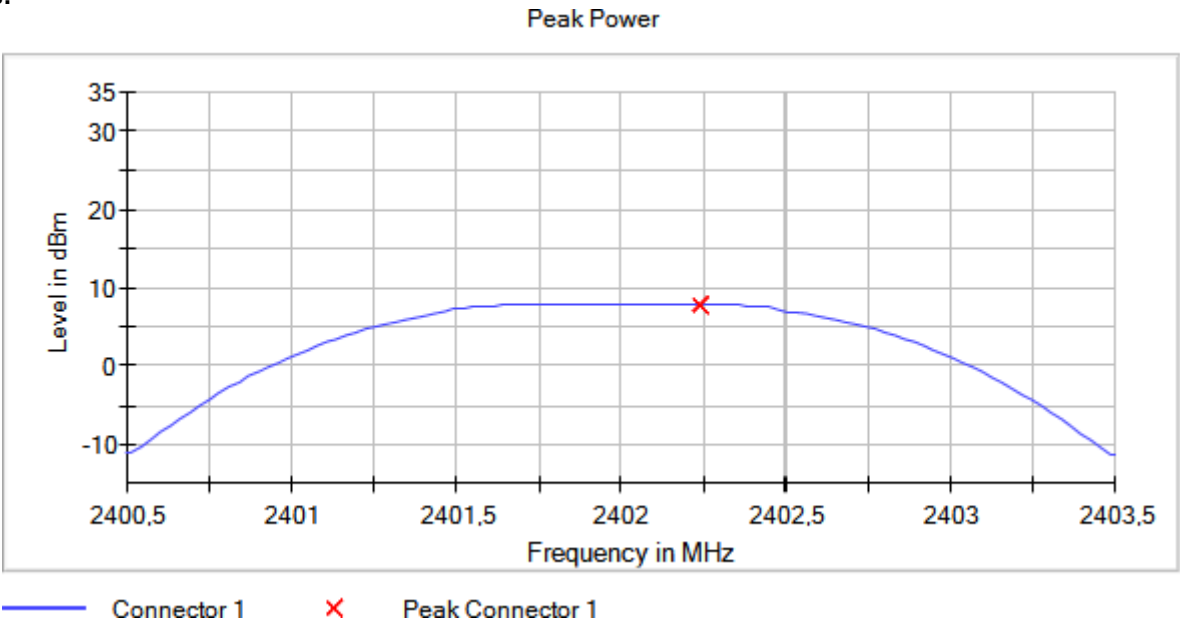
Pass

Attachments

Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1
Modulation = BTLE 5.4 (GFSK 1 Mbit/s) Frequency MHz = 2402.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

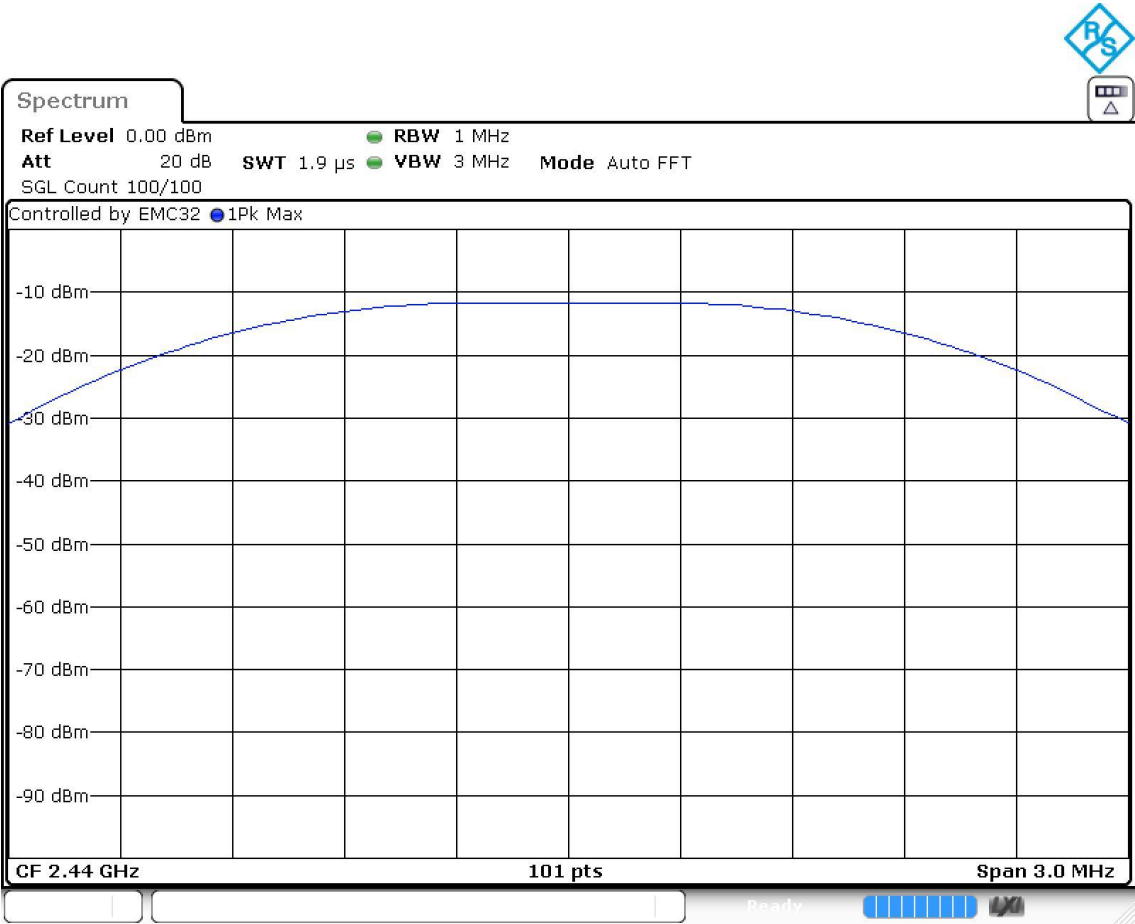
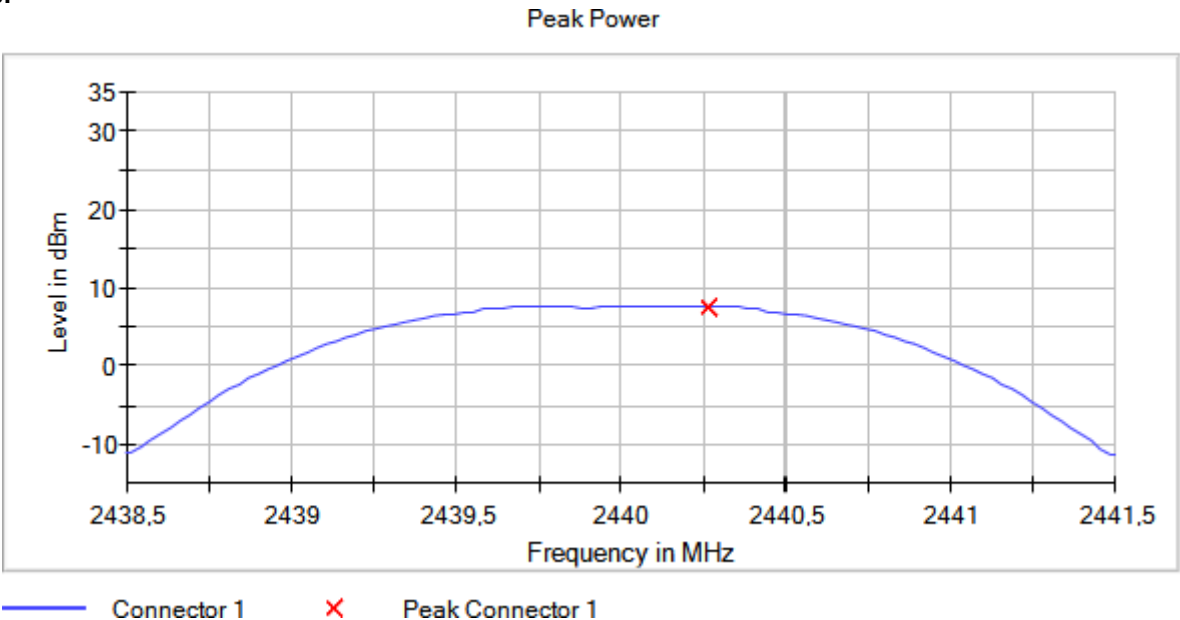
Images:



Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1
Modulation = BTLE 5.4 (GFSK 1 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

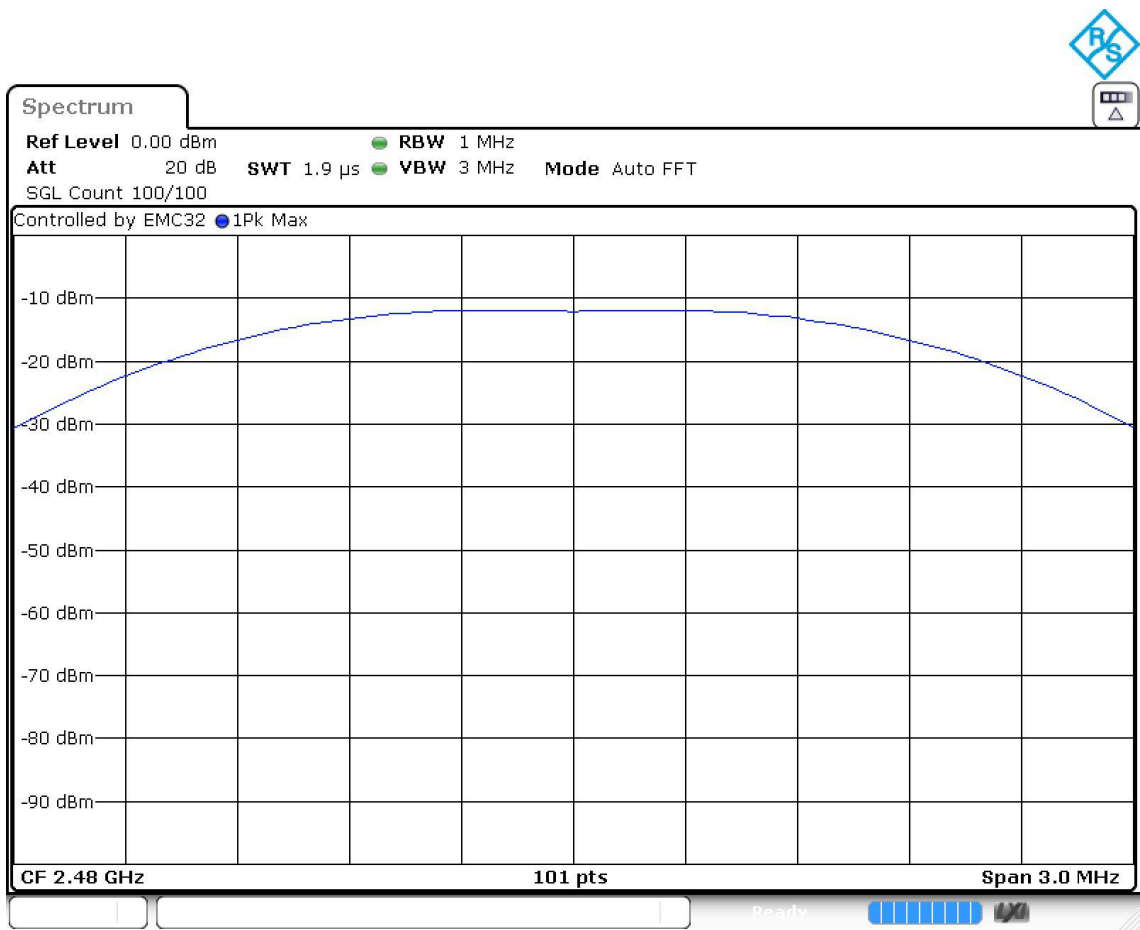
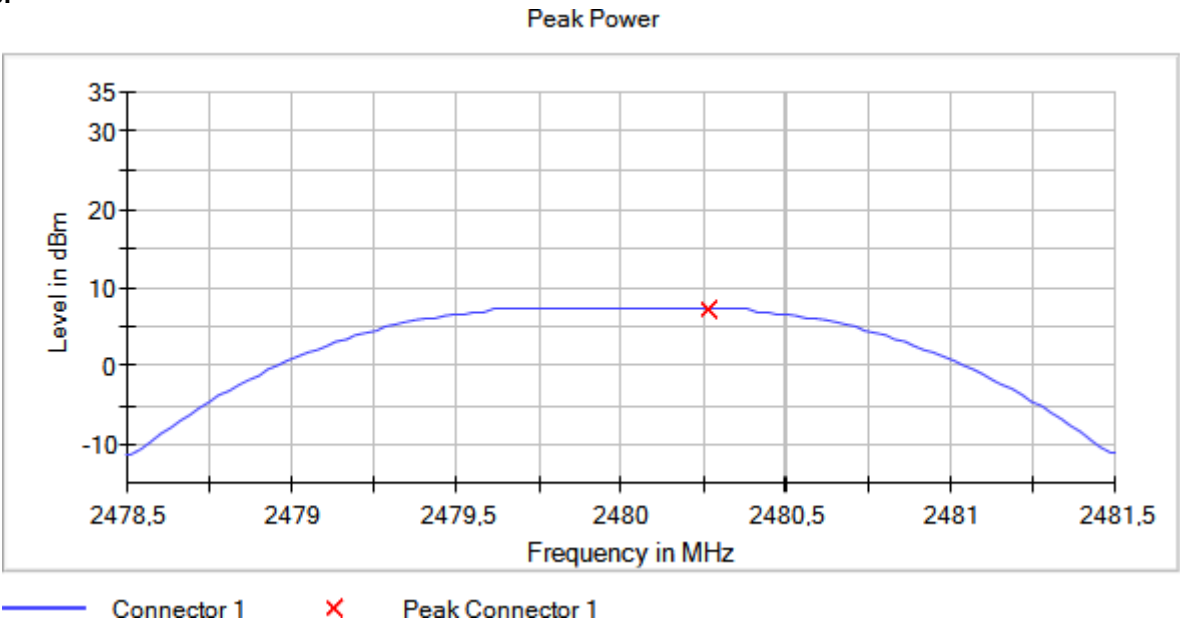
Images:



Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1
Modulation = BTLE 5.4 (GFSK 1 Mbit/s) Frequency MHz = 2480.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

Images:



Results

Modulation: BTLE 5.4 (GFSK 2 Mbit/s)

Operation Mode: SISO

Equipment	BW (MHz)	Freq (MHz)	Port	Peak Power (dBm)	EIRP (dBm)
Digital Transmission System (DTS)	2	2402.00000	1	7.7970	6.7970
		2440.00000		7.5250	6.5250
		2480.00000		7.3640	6.3640

Verdict

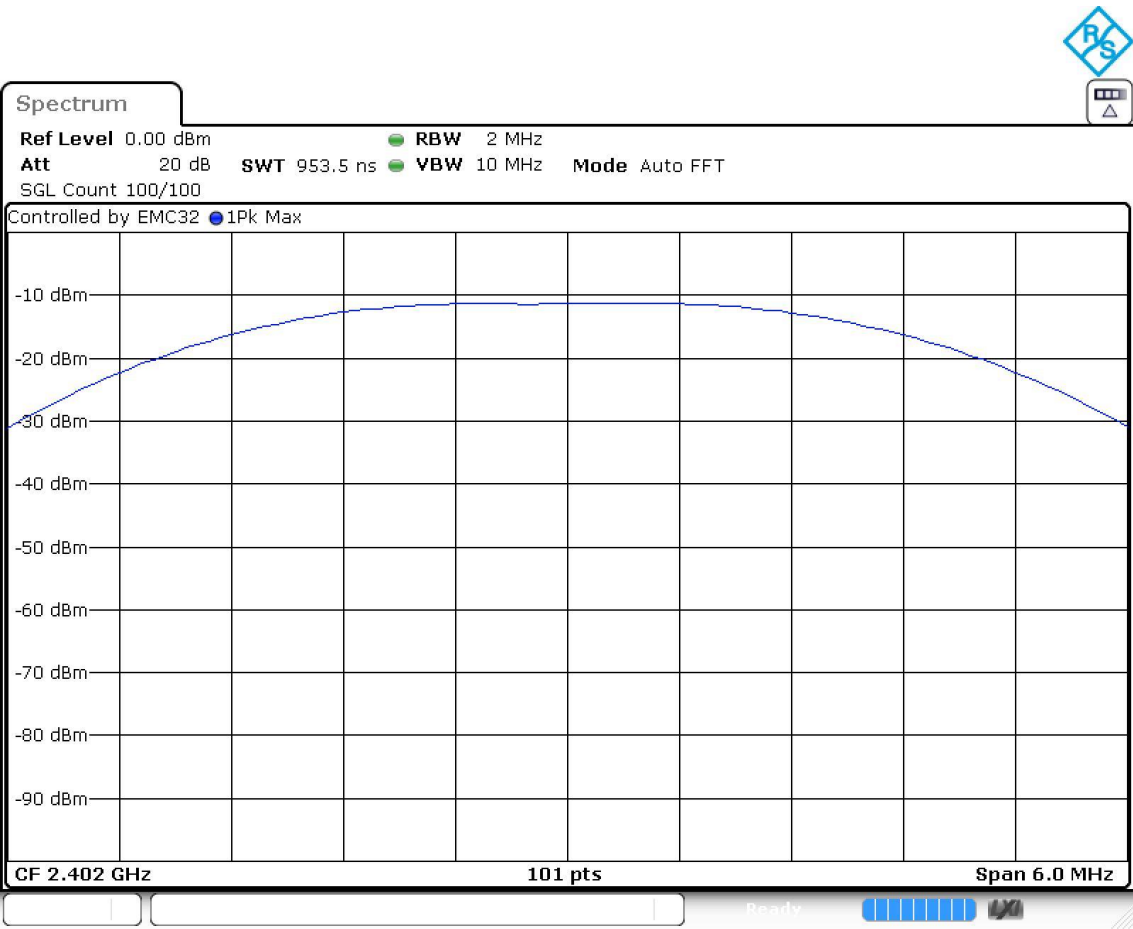
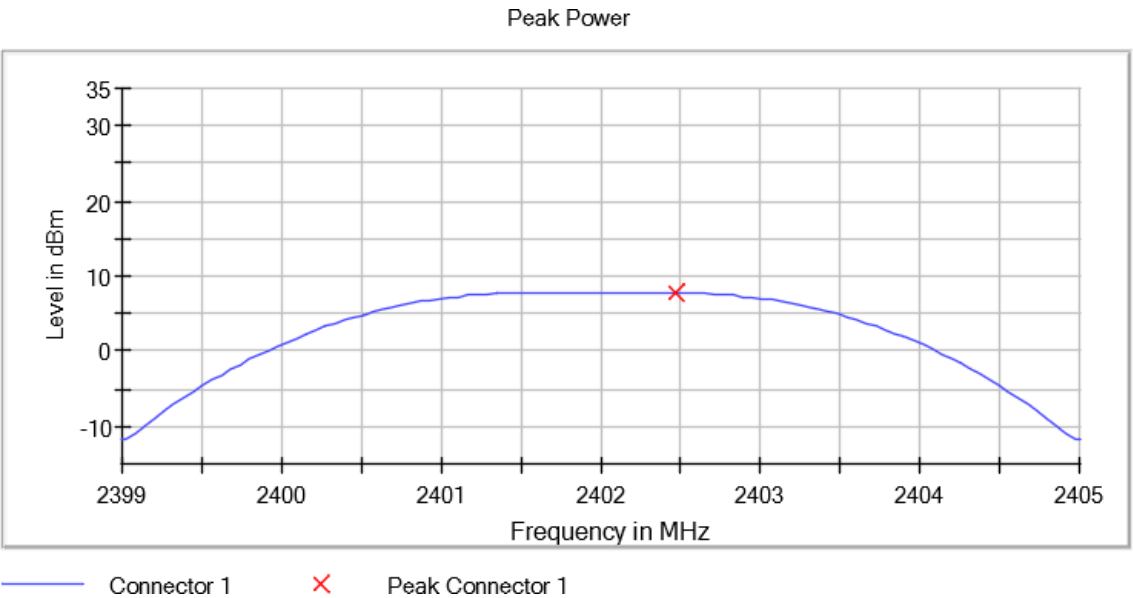
Pass

Attachments

Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2
Modulation = BTLE 5.4 (GFSK 2 Mbit/s) Frequency MHz = 2402.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

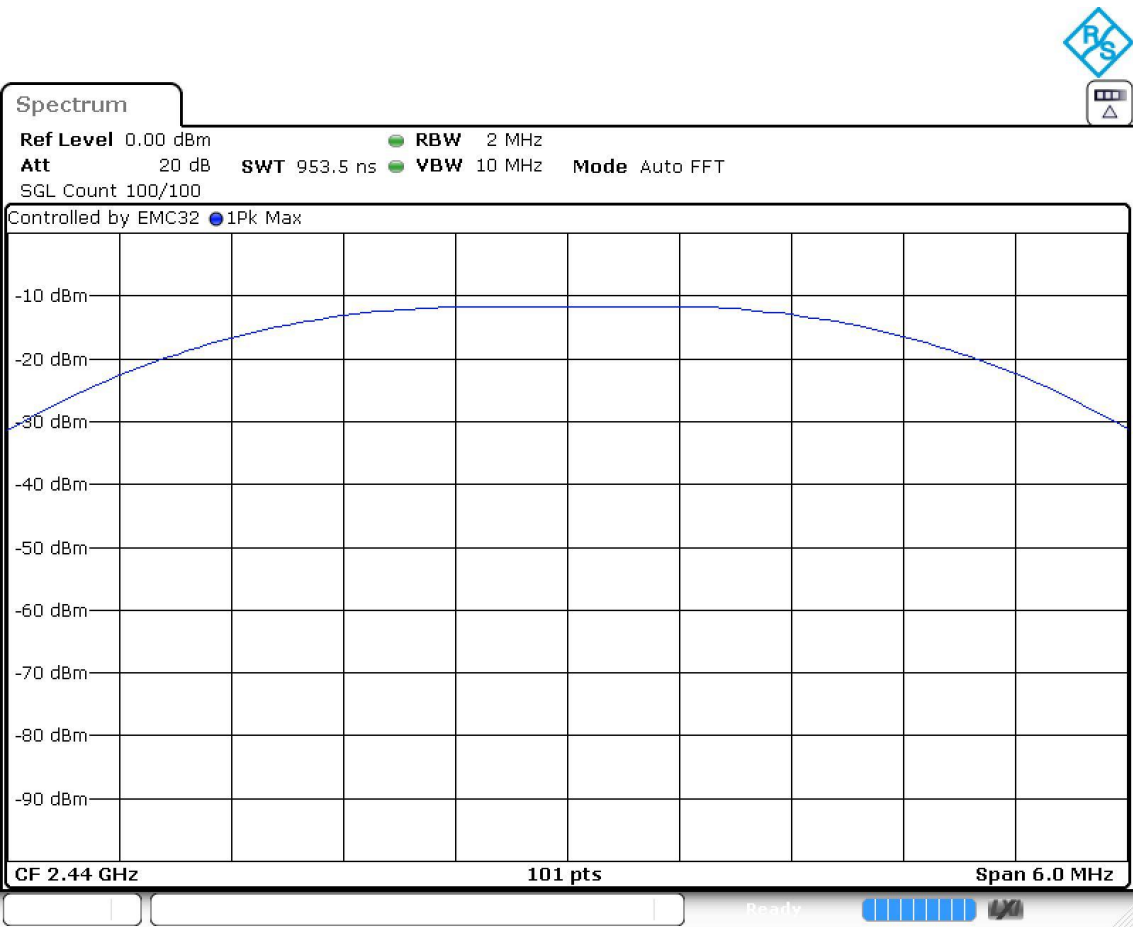
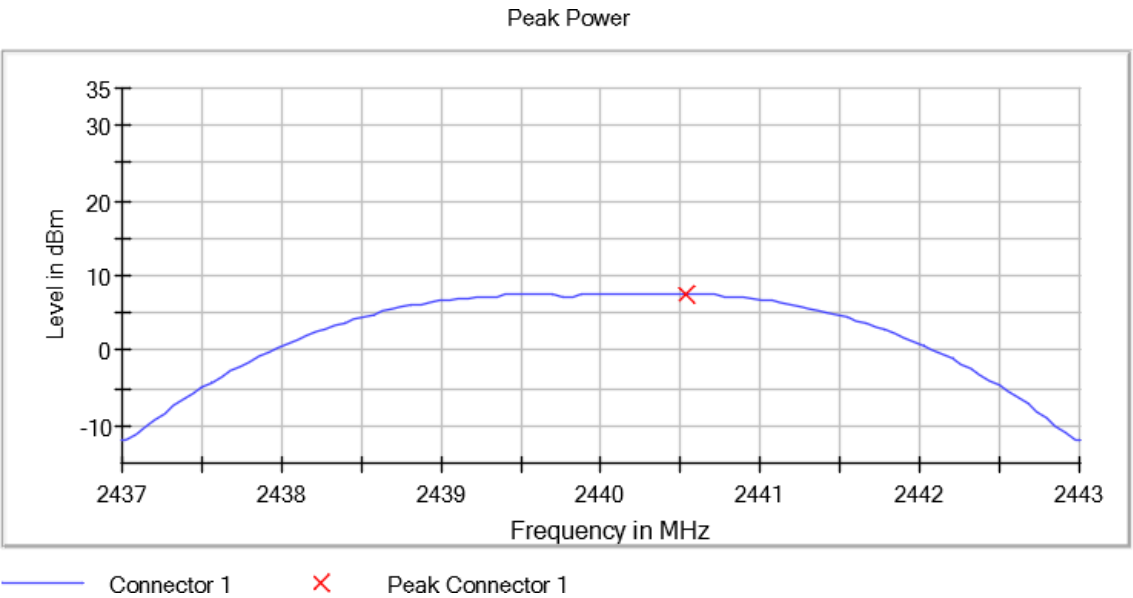
Images:



Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2
Modulation = BTLE 5.4 (GFSK 2 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

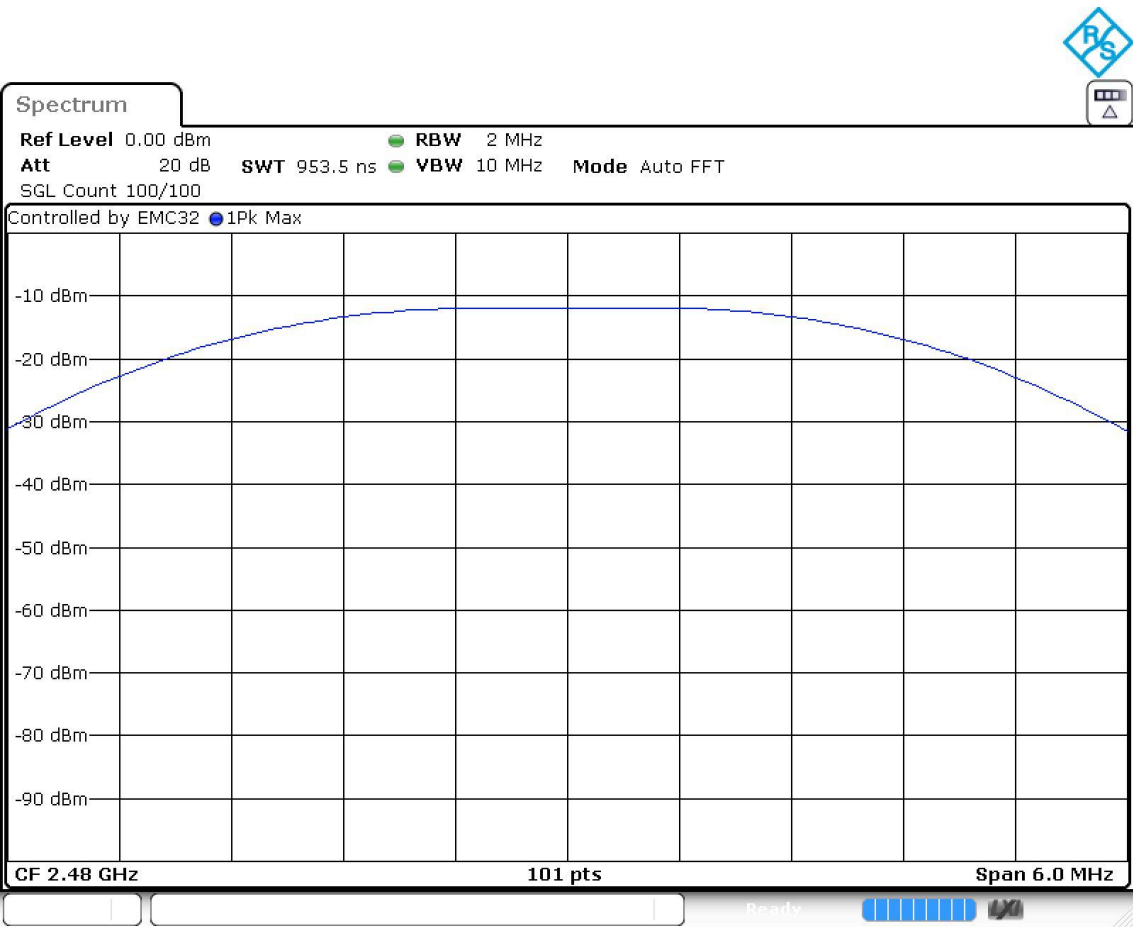
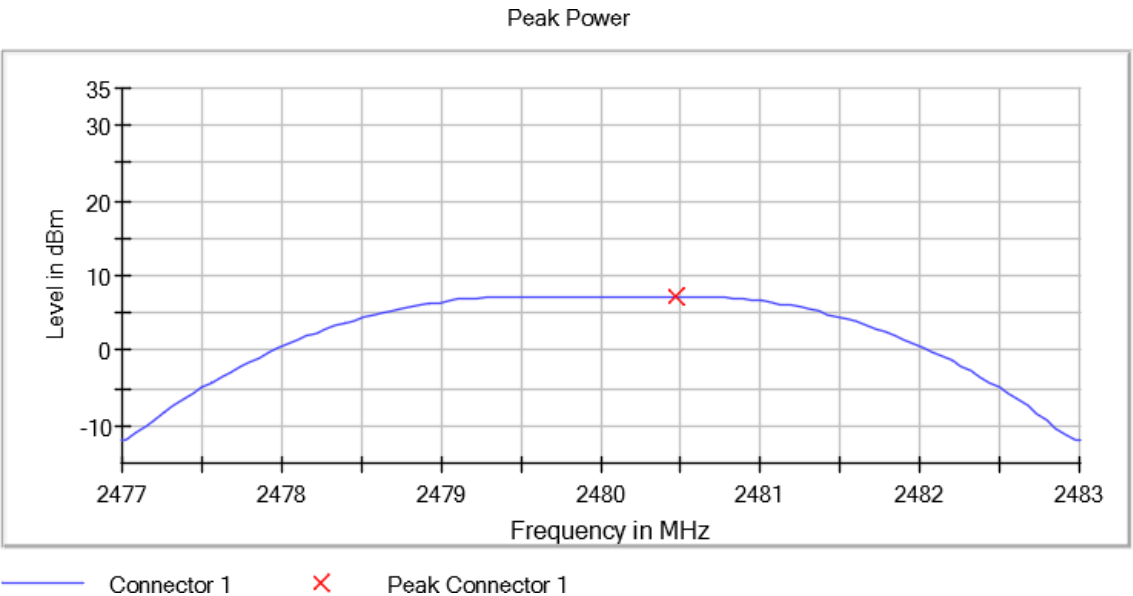
Images:



Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2
Modulation = BTLE 5.4 (GFSK 2 Mbit/s) Frequency MHz = 2480.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

Images:



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

Limits

In any 100 kHz bandwidths outside the frequency band in which the intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Results

Modulation: BTLE 5.4 (GFSK 1 Mbit/s)

Operation Mode: SISO

Verdict

Pass

Attachments

Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1

Modulation = BTLE 5.4 (GFSK 1 Mbit/s)

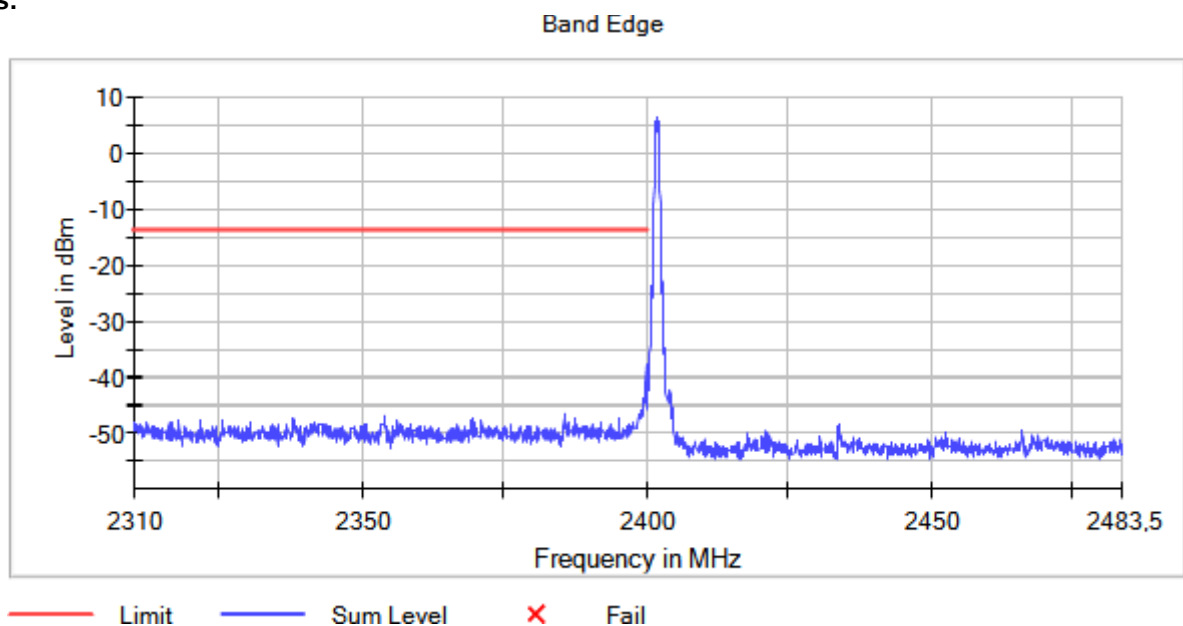
Frequency MHz = 2402.00000

MIMO Mode = SISO

Active Port = 1

Operation Mode:

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	10.000 dBm	10.000 dBm
Attenuation	30.000 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	11 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.00 dB	0.50 dB

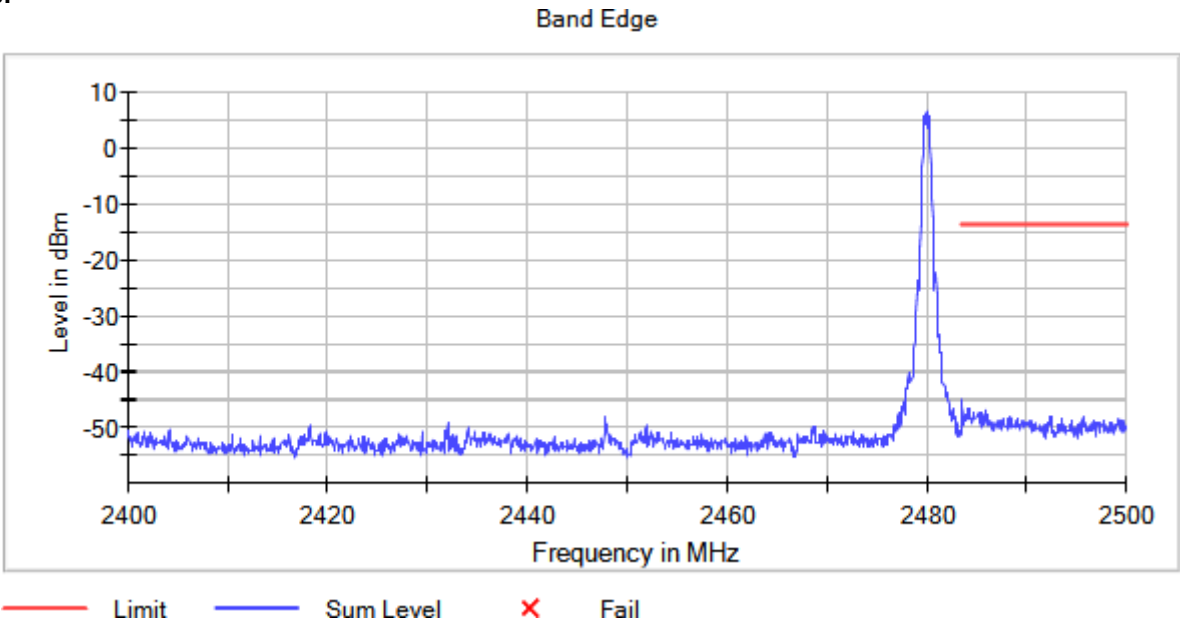
Spectrum Analyzer Parameters 2

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	10.000 dBm	10.000 dBm
Attenuation	30.000 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	9 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.11 dB	0.50 dB

Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1
Modulation = BTLE 5.4 (GFSK 1 Mbit/s) Frequency MHz = 2480.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

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	10.000 dBm	10.000 dBm
Attenuation	30.000 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	11 / 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	10.000 dBm	10.000 dBm
Attenuation	30.000 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	9 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.11 dB	0.50 dB

Results

Modulation: BTLE 5.4 (GFSK 2 Mbit/s)

Operation Mode: SISO

Verdict

Pass

Attachments

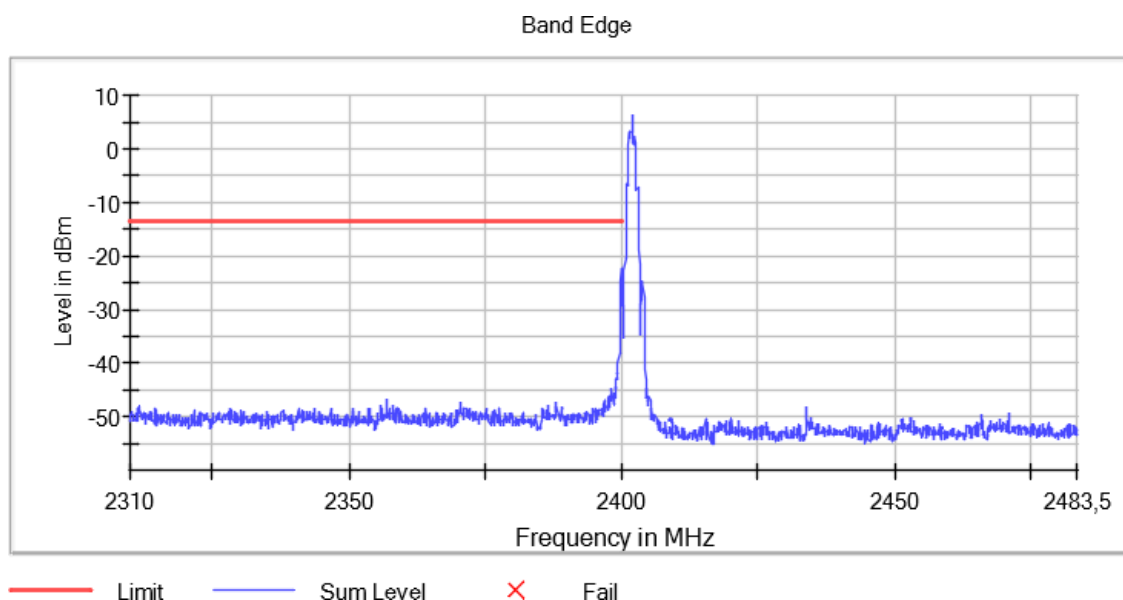
Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2

Modulation = BTLE 5.4 (GFSK 2 Mbit/s) Frequency MHz = 2402.00000

MIMO Mode = SISO Active Port = 1

Operation Mode:

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	10.000 dBm	10.000 dBm
Attenuation	30.000 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	8 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.14 dB	0.50 dB

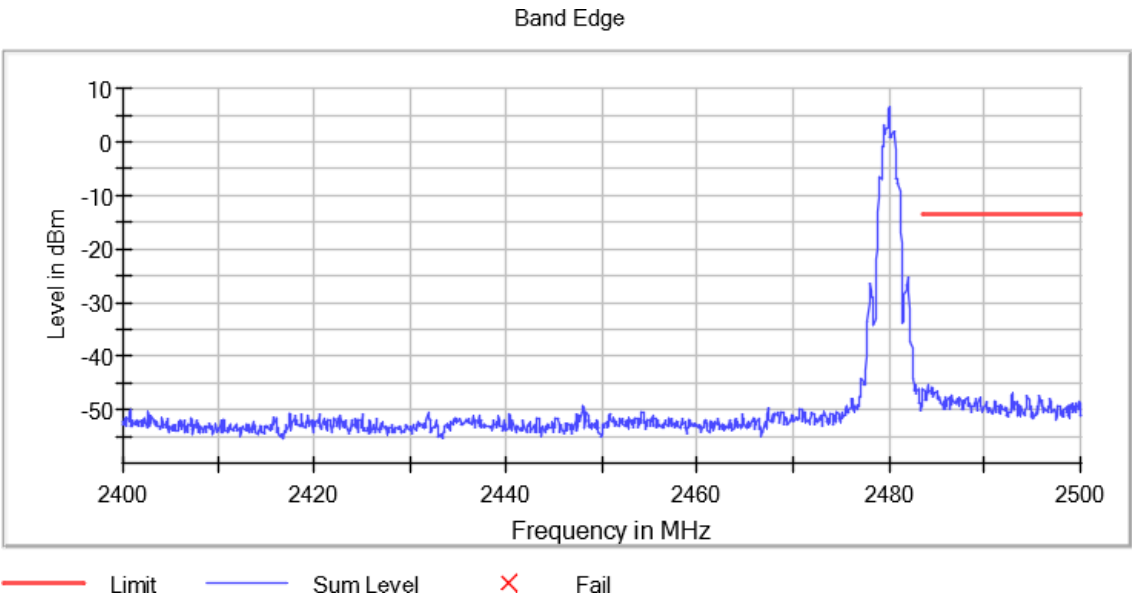
Spectrum Analyzer Parameters 2

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	10.000 dBm	10.000 dBm
Attenuation	30.000 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	9 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.44 dB	0.50 dB

Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2
Modulation = BTLE 5.4 (GFSK 2 Mbit/s) Frequency MHz = 2480.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

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	10.000 dBm	10.000 dBm
Attenuation	30.000 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	8 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.14 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	10.000 dBm	10.000 dBm
Attenuation	30.000 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	9 / max. 150	max. 150
Stable	3 / 3	3
Max Stable Difference	0.44 dB	0.50 dB

RSS-247 5.5 / FCC 15.247 (d) Emission limitations radiated (Transmitter)

Limits

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)/RSS-Gen):

Frequency Range (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
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.

Results

Modulation: BTLE (GFSK 1 Mbit/s)

Operation Mode: SISO

Freq Rng (GHz)	Equipment	Freq (MHz)	Port	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
[0.03, 1]	Digital Transmission System (DTS)	2402.00000		42.077	22.07	V	QP
					24.01	V	PK
				95.960	24.12	V	PK
					22.55	V	QP
				105.805	25.54	V	PK
					24.32	V	QP
212.506		23.97		V	QP		
		25.43		V	PK		
[1, 17]		2402.00000		7204.667 (*)	57.61	H	PK
				9607.067	53.14	V	PK
		41.77			V	AVG	
		2440.00000		7319.000	56.89	V	PK
					51.12	V	AVG
		2480.00000		2483.600	60.66	V	PK
	50.35		V		AVG		
	7440.333		56.53	V	PK		
50.96			V	AVG			

Modulation: BTLE (GFSK 2 Mbit/s)

Operation Mode: SISO

Freq Rng (GHz)	Equipment	Freq (MHz)	Port	Unwanted Freq (MHz)	Unwanted Lvl (dBµV/m)	Pol	Detector
[1, 17]	Digital Transmission System (DTS)	2402.00000	1	7204.667 (*)	59.81	H	PK
		2440.00000		7319.467	56.89	V	PK
					51.67	V	AVG
		2480.00000		7439.867	56.80	H	PK
					50.78	H	AVG

(*) These frequencies are outside the restricted band and the emission levels are more than 20 dB below the carrier level as indicated in FCC 15.247 (d).

Verdict

Pass

Attachments

Frequency Range GHz = [0.03, 1]

Equipment Type = Digital Transmission System (DTS)

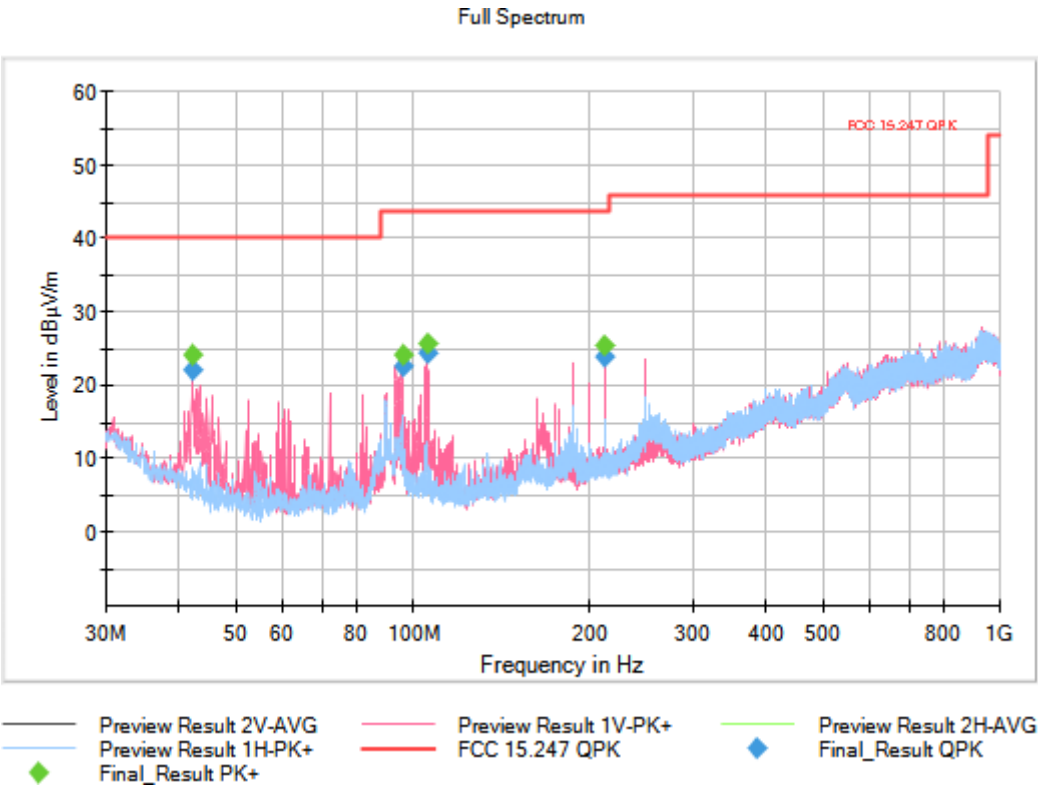
Modulation = The spurious frequencies detected do not depend on the modulation.

Frequency MHz = The spurious frequencies detected do not depend on the operating channel.

MIMO Mode = SISO

Active Port = 1

Images:



Tables:

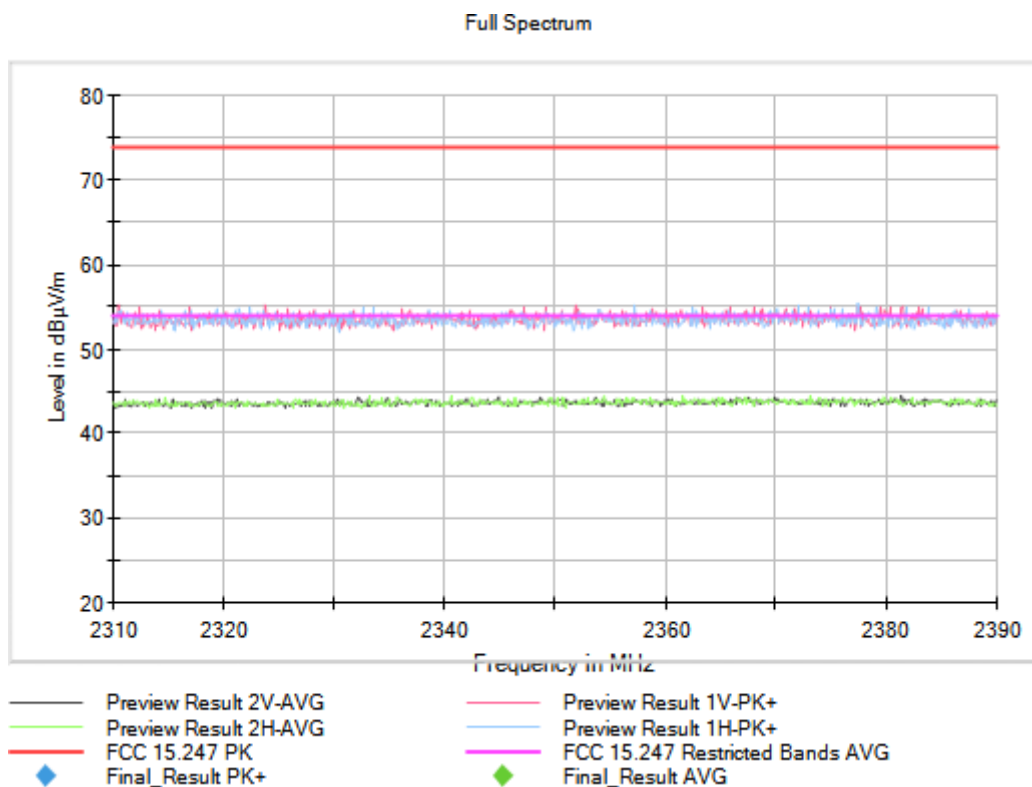
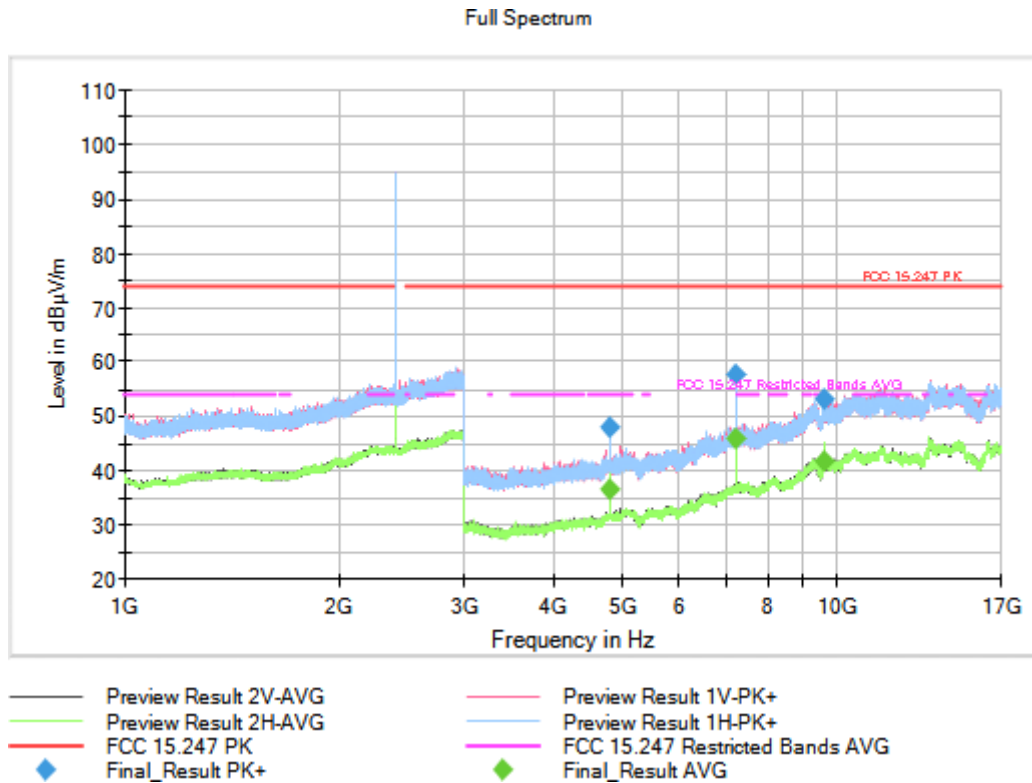
Spectrum Analyzer Parameters

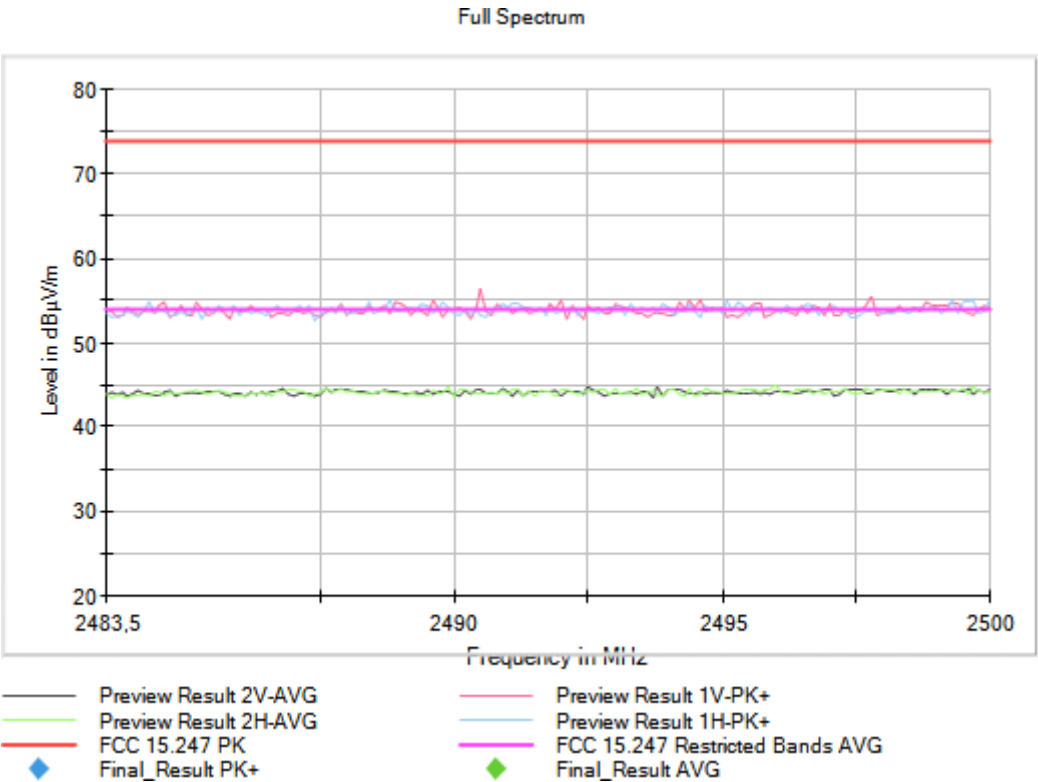
Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
30 MHz - 1 GHz	48,5 kHz	PK+	100 kHz	1 s	0 dB

Frequency Range GHz = [1, 17] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE (GFSK 1 Mbit/s) Frequency MHz = 2402.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

Images:

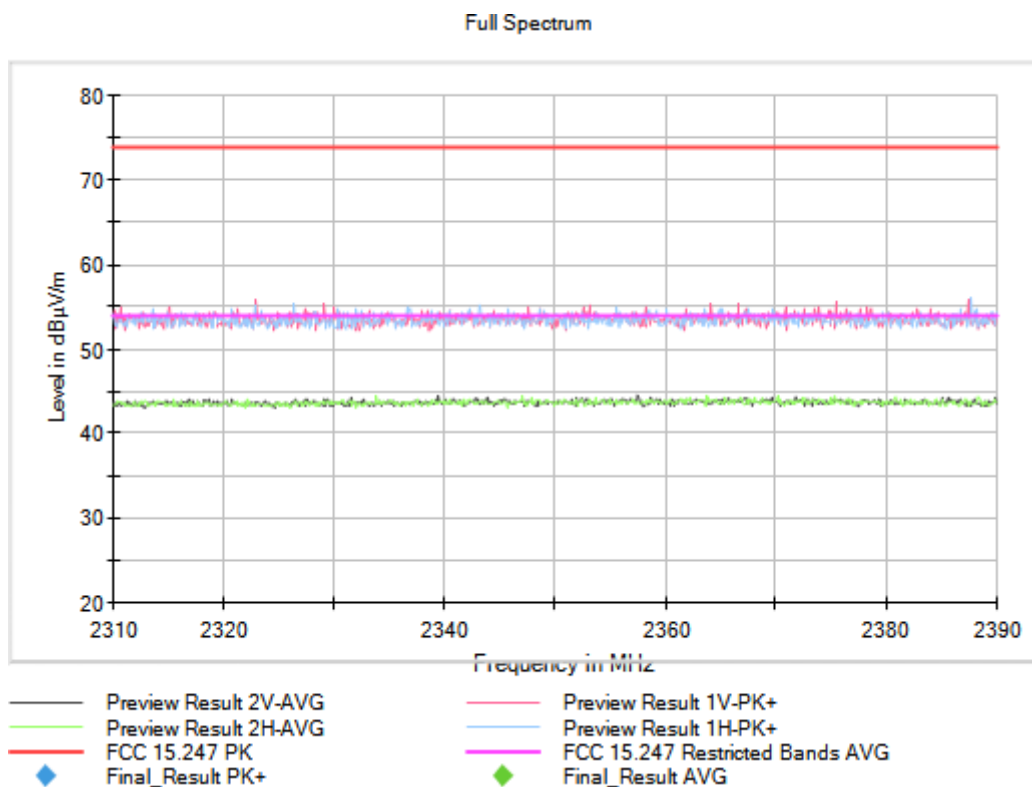
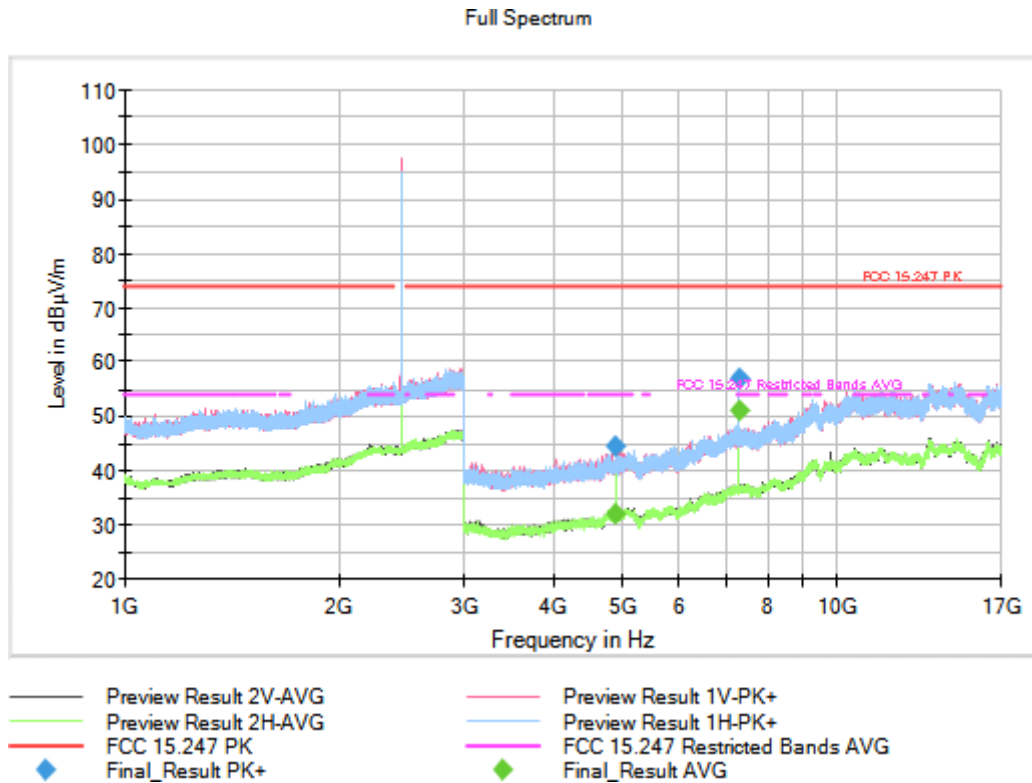


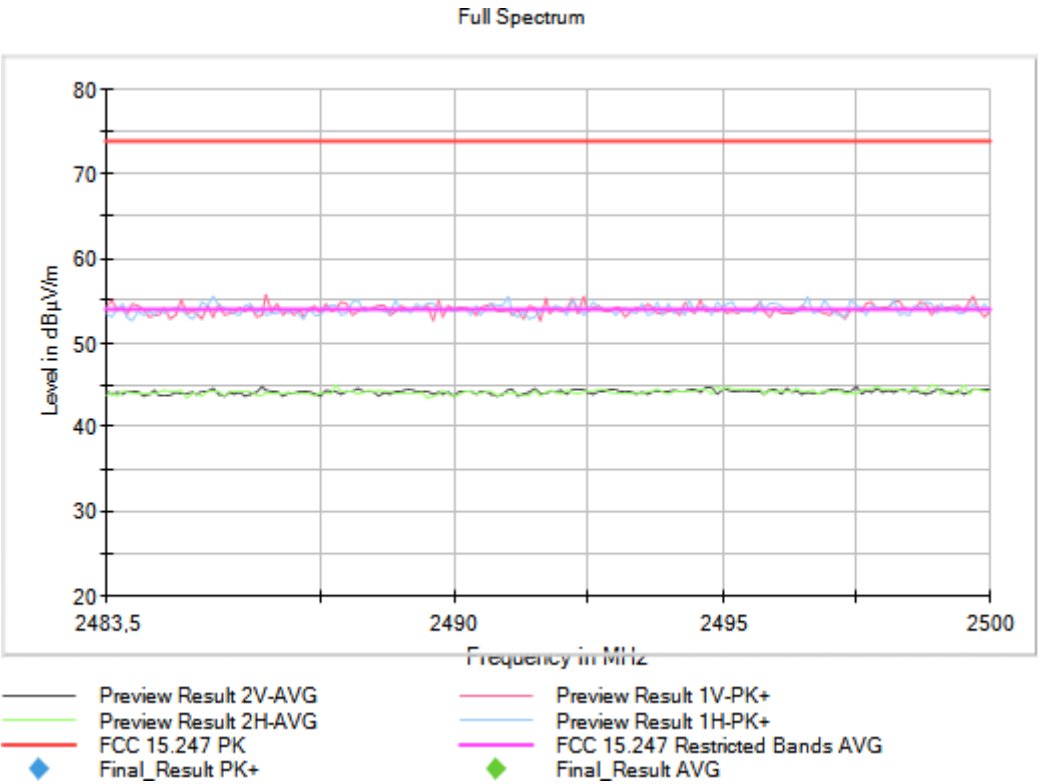


Frequency Range GHz = [1, 17] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE (GFSK 1 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

Images:

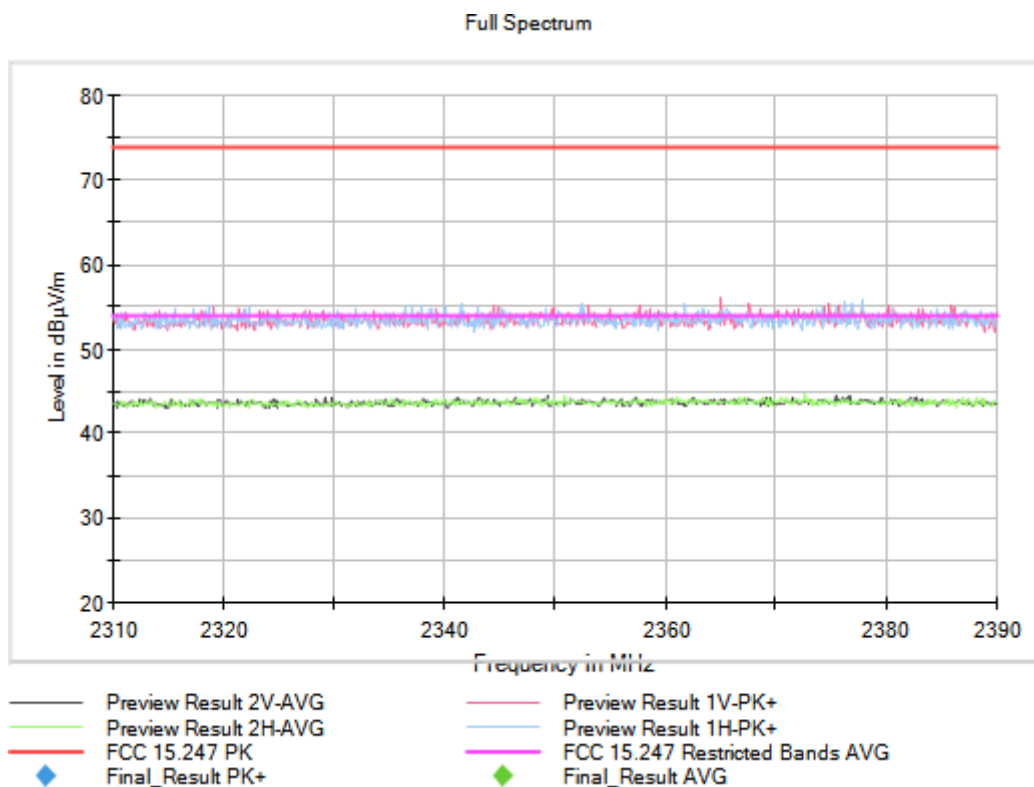
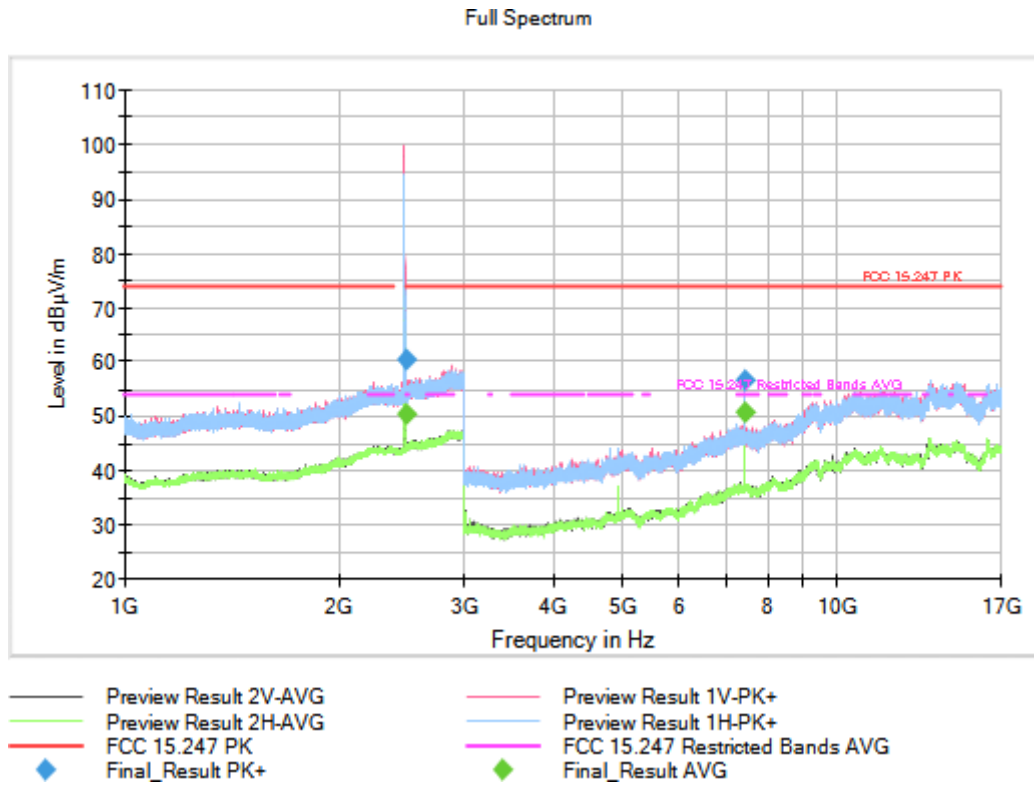


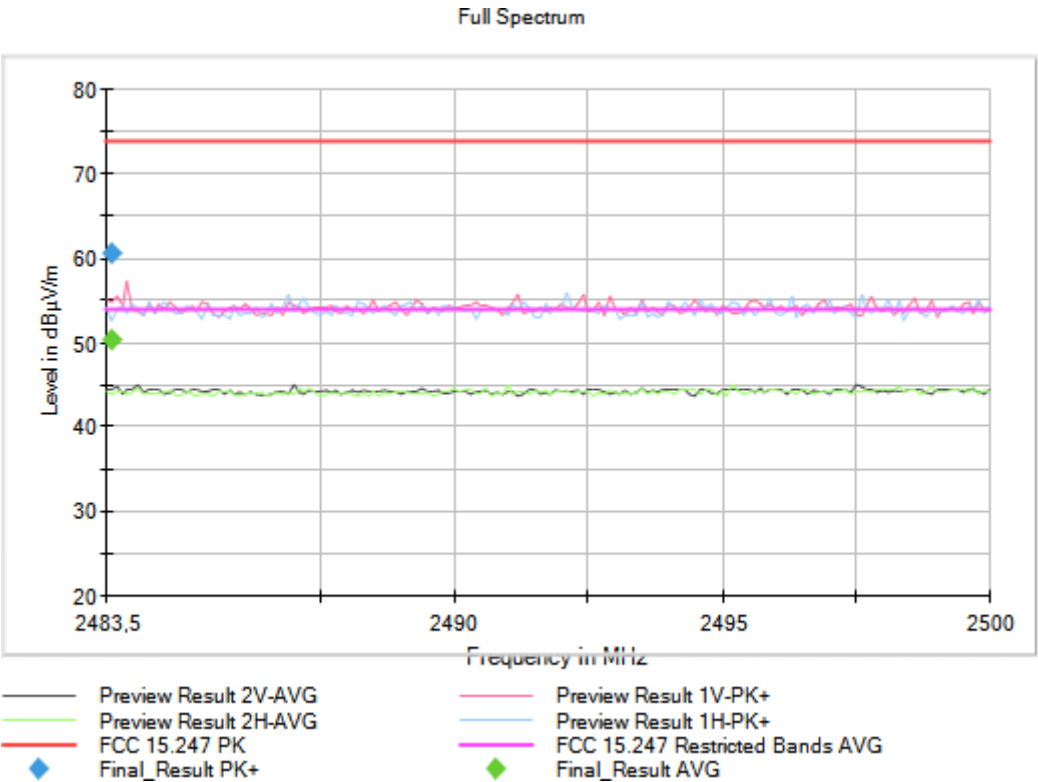


Frequency Range GHz = [1, 17] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE (GFSK 1 Mbit/s) Frequency MHz = 2480.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

Images:

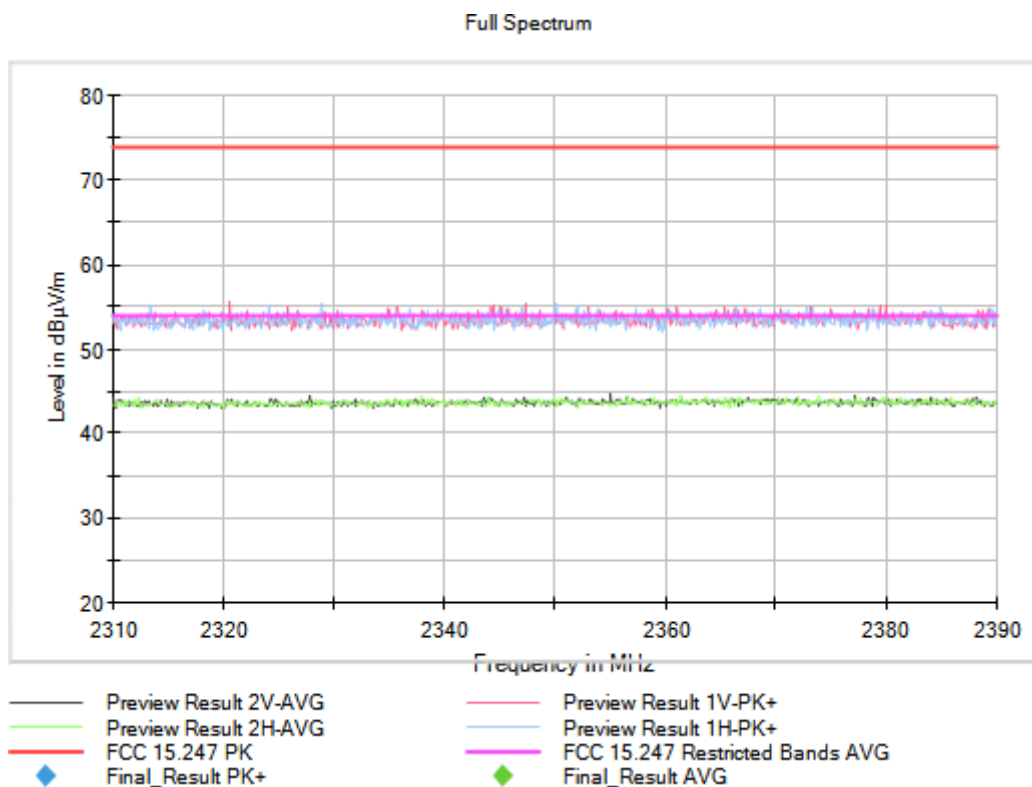
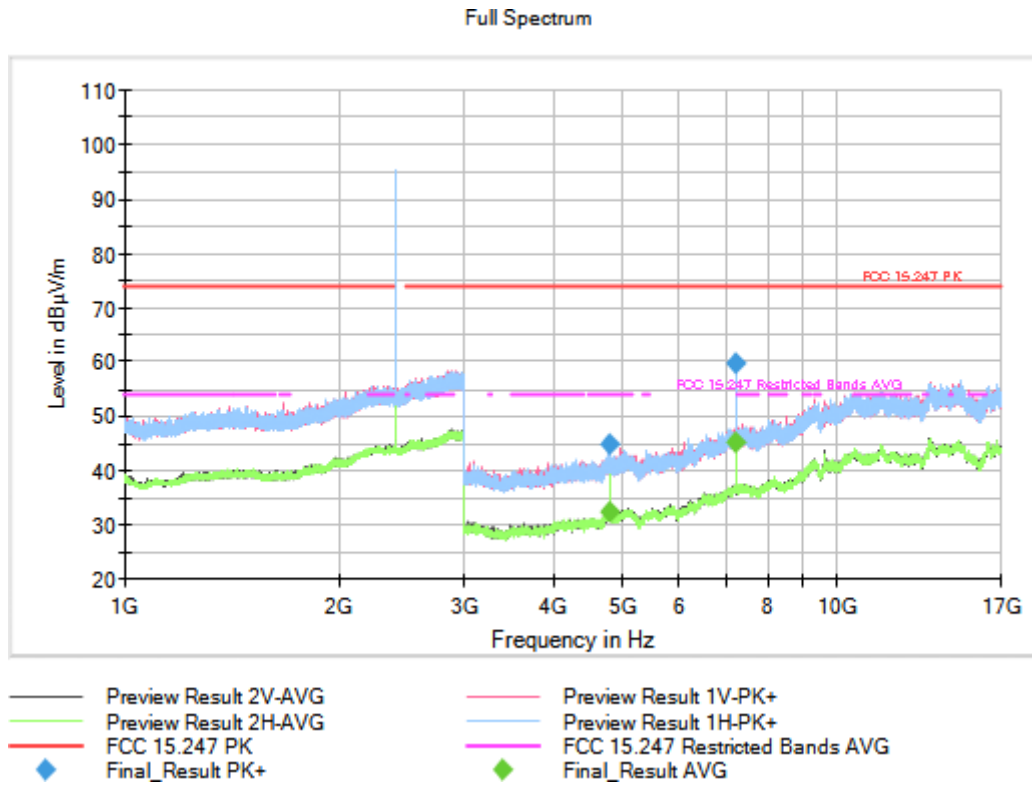


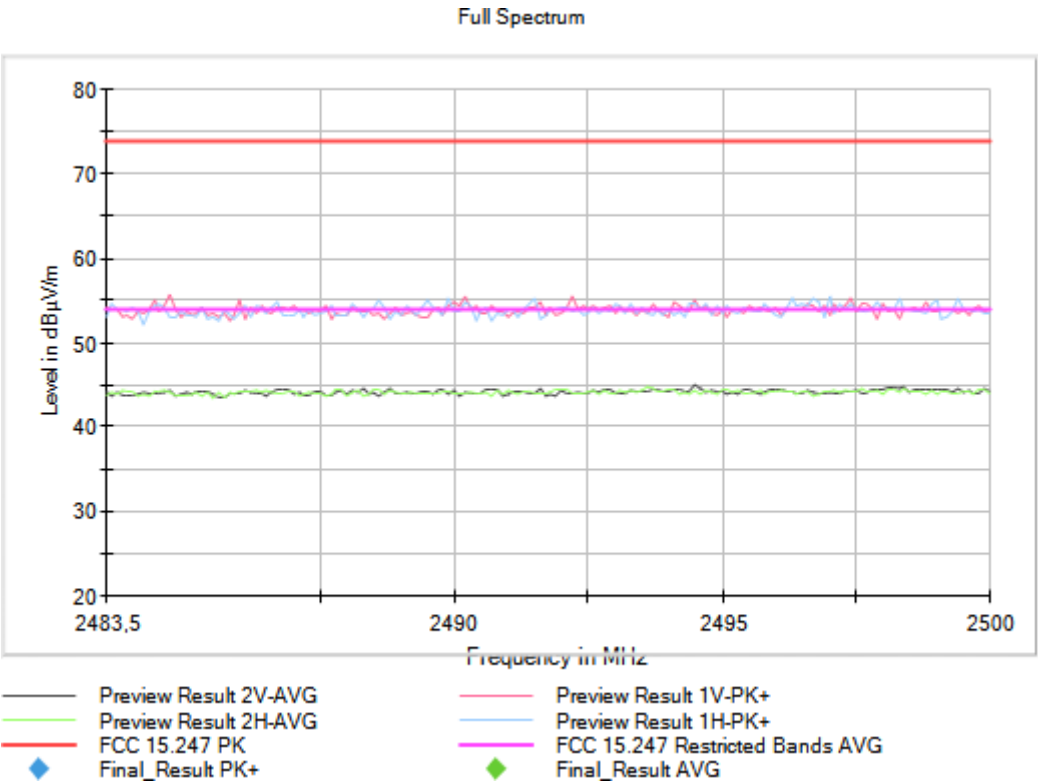


Frequency Range GHz = [1, 17] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE (GFSK 2 Mbit/s) Frequency MHz = 2402.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

Images:

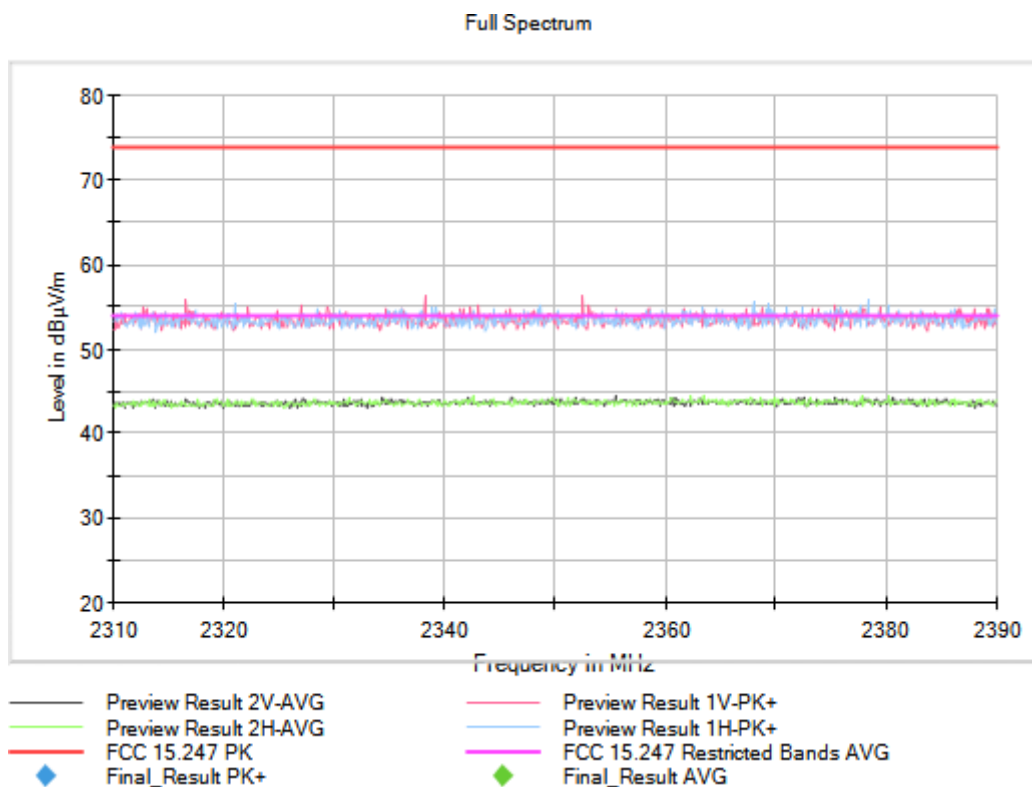
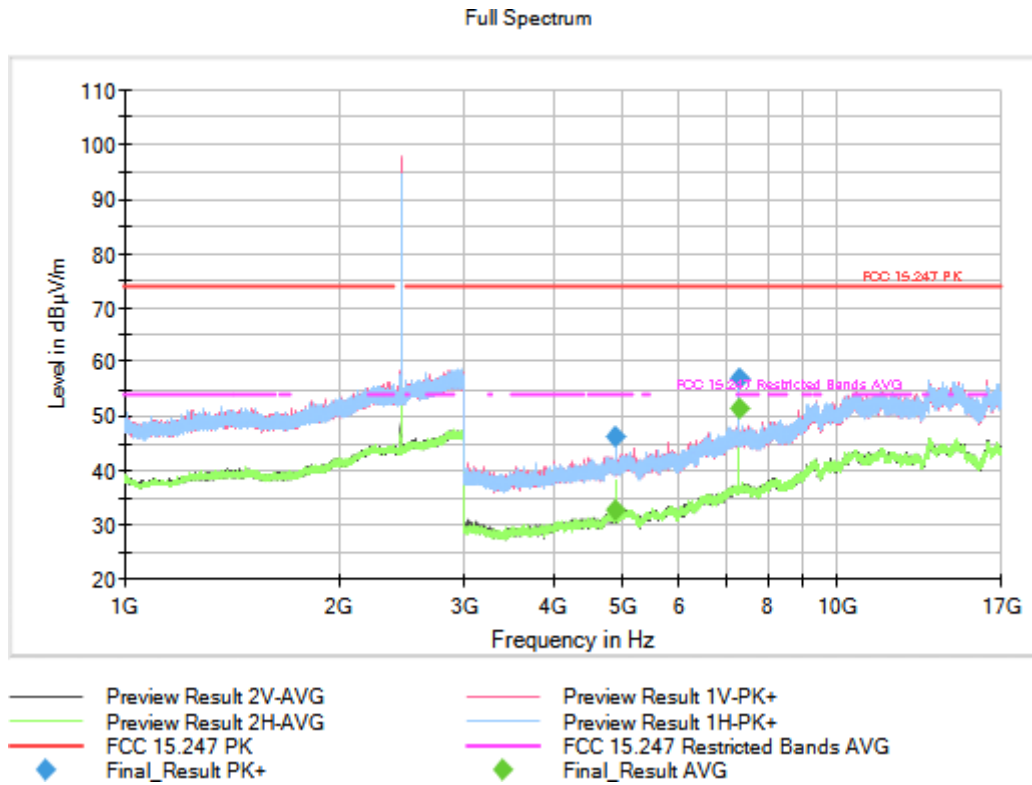


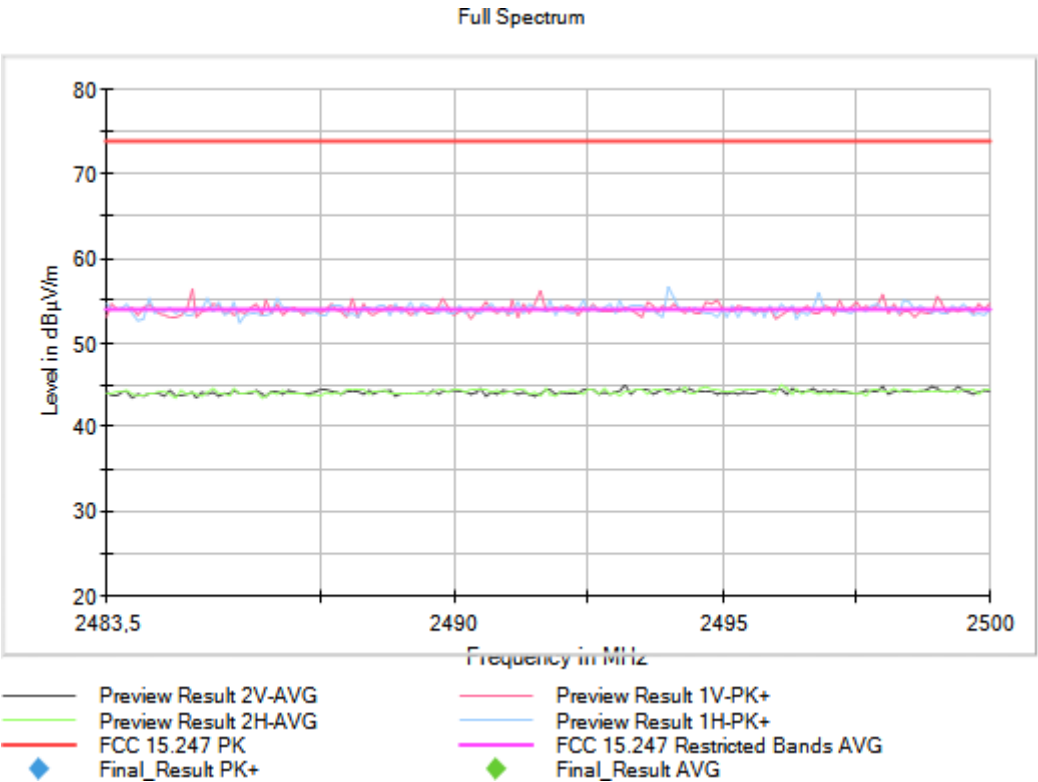


Frequency Range GHz = [1, 17] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE (GFSK 2 Mbit/s) Frequency MHz = 2440.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

Images:

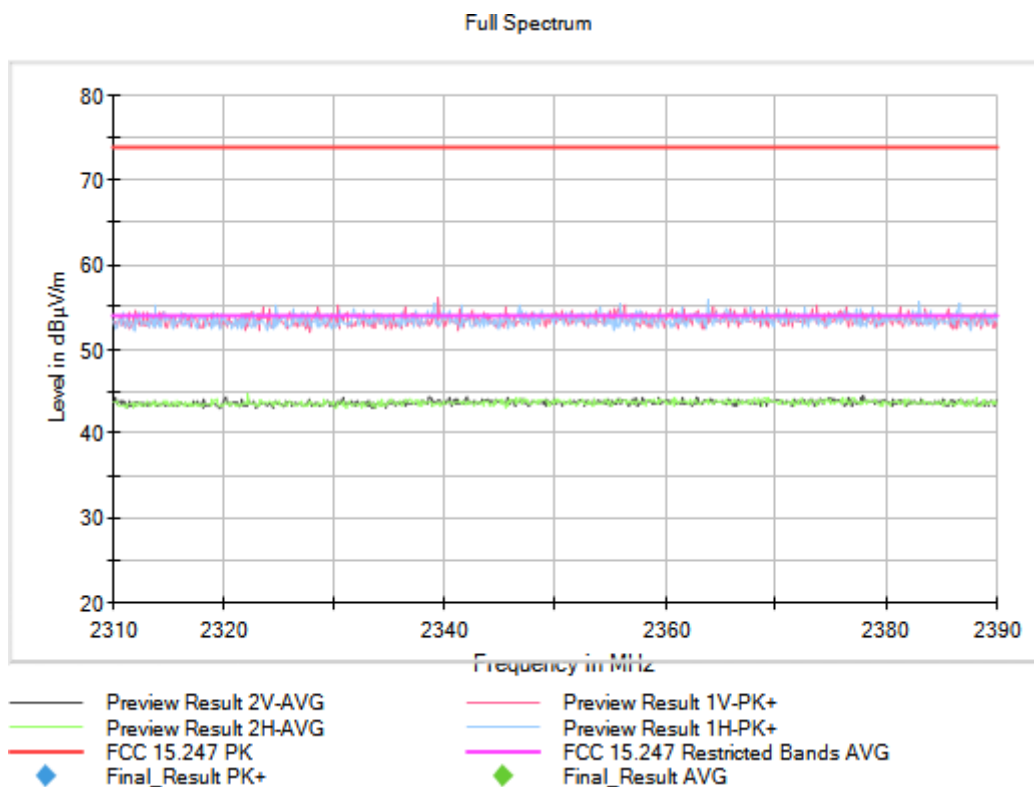
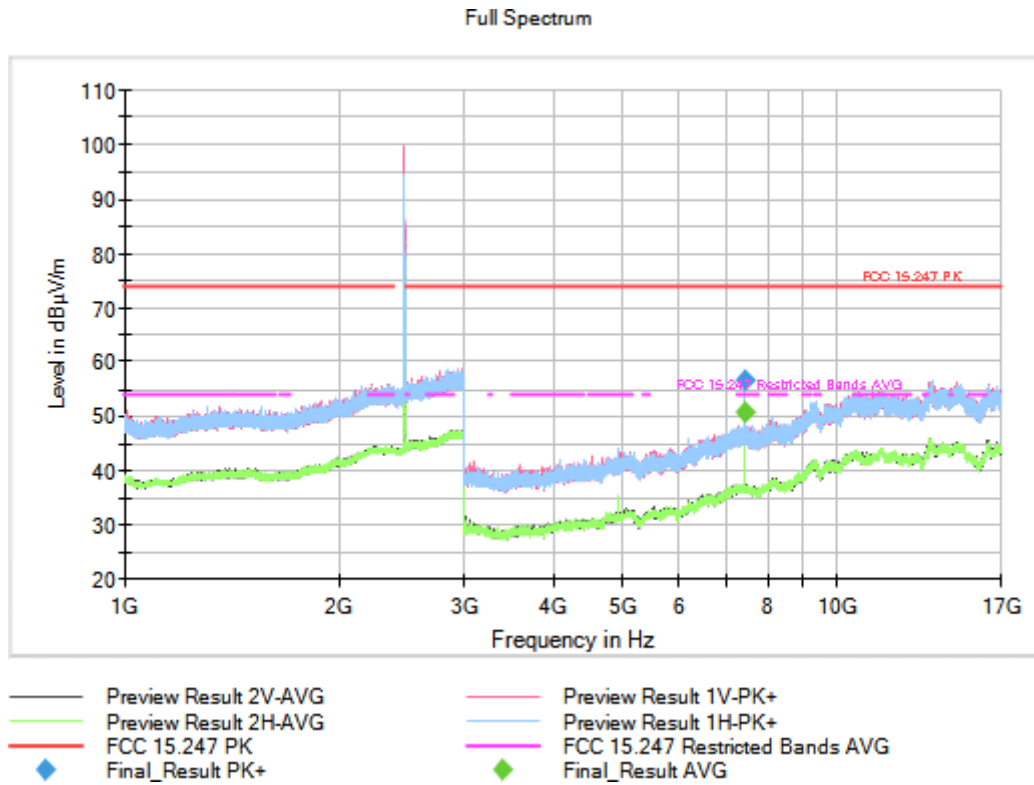


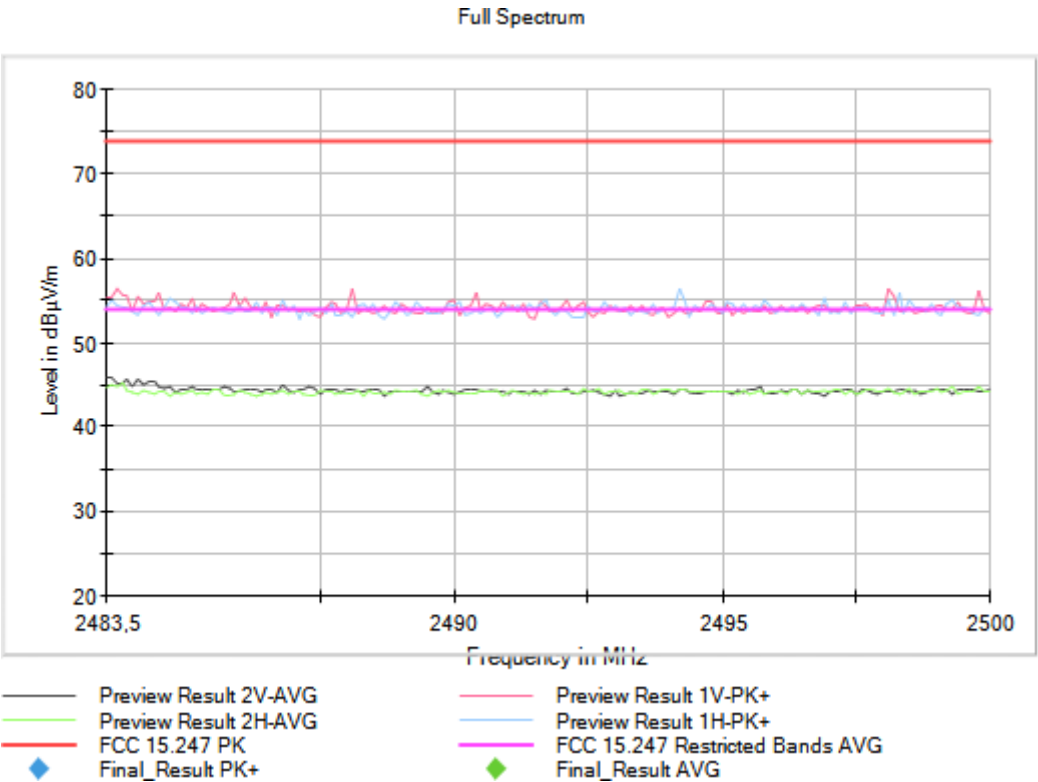


Frequency Range GHz = [1, 17] Equipment Type = Digital Transmission System (DTS)
Modulation = BTLE (GFSK 2 Mbit/s) Frequency MHz = 2480.00000
MIMO Mode = SISO Active Port = 1

Operation Mode:

Images:





Frequency Range GHz = [17, 26]

Equipment Type = Digital Transmission System (DTS)

Modulation = The spurious frequencies detected do not depend on the modulation.

Frequency MHz = The spurious frequencies detected do not depend on the operation channel.

MIMO Mode = SISO

Active Port = 1

Images:

