



FCC LISTED, REGISTRATION  
 NUMBER: 2764.01

ISED LISTED REGISTRATION  
 NUMBER: 23595-1

Test Report No:  
**4235ERM.002A1**

## Test Report

### USA FCC Part 15.247, 15.209, 15.207; & CANADA RSS-247, RSS-Gen

Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices.

(*) Identification of item tested	VAS2
(*) Trademark	Vehicle Access System 2.0
(*) Model and /or type reference	Vehicle Access System 2.0
Other identification of the product	FCC ID: 2AW3A-2WWG23VAS IC: 26958-2WWG23VAS
(*) Features	UWB/BLE
Manufacturer	Rivian Automotive LLC. 14600 Myford Road Irvine, CA 92606, USA
Test method requested, standard	USA FCC Part 15.247 (2020): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (2021): Radiated emission limits; general requirements. USA FCC Part 15.207 (2017): Conducted emission limits. CANADA RSS-247 Issue 3 (August 2023). 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)	Domingo Galvez EMC&RF Lab Manager
Date of issue	03-01-2024
Report template No	FDT08_23 (* "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 .....	8
REMARKS AND COMMENTS .....	8
TESTING VERDICTS .....	9
SUMMARY .....	9
LIST OF EQUIPMENT USED DURING THE TEST .....	10
APPENDIX A: BLUETOOTH LOW ENERGY .....	11

## Acronyms

Acronym ID	Acronym Description
# of Tx Chains	Number of Transmission Chains
26Ebw	Emission Bandwidth
Avg COT	Average Channel Occupancy Time
BW	Bandwidth
Equipment	Equipment Type
Freq	Frequency
Freq Sep	Frequency Separation
Inband Peak Lvl	Inband Peak Level
Lvl	Level
MP	Measurement Point
Mod	Modulation
NHC	Number of Hopping Channels
NHp	Number of hops over the period
Occ Ch BW	Occupied Channel Bandwidth
Peak Power	Maximum Peak Conducted Output Power
Port	Active Port

## Competences and guarantees

DEKRA Certification Inc. is a testing laboratory accredited by A2LA (The American Association for Laboratory Accreditation), to perform the tests indicated in the Certificate 2764.01

DEKRA Certification Inc. is a testing laboratory competent to carry out the tests described in this report.

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

DEKRA Certification Inc. 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 Certification at the time of performance of the test.

DEKRA Certification Inc. 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 Certification Inc.

## 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 Certification Inc.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Certification Inc. and the Accreditation Bodies.

## Uncertainty

Uncertainty (factor k=2) was calculated according to the DEKRA Certification internal document PODT000.

Test case	Frequency (MHz)	U (k=2)	Units
RF Power and PSD	5150-5850	0.88	dB
Occupied Bandwidth		1.87	%
Dwell Time		0.01	%
Band Edge		0.64	dB
Radiated Spurious Emission	30-180	4.27	dB
	180-1000	3.14	dB
	1000-18000	3.30	dB
	18000-40000	3.49	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 Vehicle Access System Sensor based of KW45 BLE and DW3300 UWB.

DEKRA 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.

The sample(s) is composed of the following elements, accessories and auxiliary equipment:

Id	Control Number	Description	Manufacturer / Model	Serial N°	Date of Reception	Application
S/01	4235/01	VAS2 Sample	Rivian Automotive / Vehicle Access System 2.0	000366	12-07-2023	Element Under Test
S/01	4250/05	PCAN-USB Adapter	Phytools / PEAK-System	031650	09-20-2023	Accessory
S/01	4250/06	Harness	Rivian Automotive	--	09-20-2023	Accessory
S/01	1482	Laptop	LENOVO / V14 G2 ITL	PF3QAFFH	--	Auxiliary Element

Notes referenced to samples during the project:

Id	Type	Note
S/01	Commercial	Sample S/01 was used for: All Radiated test(s) indicated in appendix A.

The sample(s) is composed of the following elements, accessories, and auxiliary equipment:

Id	Control Number	Description	Manufacturer / Model	Serial N°	Date of Reception	Application
S/02	4250/03	VAS2 Sample	Rivian Automotive / Vehicle Access System 2.0	000017	09-20-2023	Element Under Test
S/02	4250/05	PCAN-USB Adapter	Phytools / PEAK-System	031650	09-20-2023	Accessory
S/02	4250/06	Harness	Rivian Automotive	--	09-20-2023	Accessory
S/02	1482	Laptop	LENOVO / V14 G2 ITL	PF3QAFFH	--	Auxiliary Element

Notes referenced to samples during the project:

Id	Type	Note
S/02	Commercial	Sample S/02 was used for: All Conducted test(s) indicated in appendix A

## Test sample description

Test Sample description (compulsory information for EMC and RF testing services)

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient <sup>(3)</sup>		
	RF (radiated)		[ ]	[ ]	[ ]		
	.....	.....	[ ]	[ ]	[ ]		
	.....	.....	[ ]	[ ]	[ ]		
	.....	.....	[ ]	[ ]	[ ]		
	.....	.....	[ ]	[ ]	[ ]		
Supplementary information to the ports..... :	No Data provided.						
Rated power supply ..... :	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	[ ]	AC: .....	[ ]	[ ]	[ ]	[ ]	[ ]
	[ ]	AC: .....	[ ]	[ ]	[ ]	[ ]	[ ]
	[X]	DC: 13.5 Nominal (9.8~16V)					
[ ]	DC: .....						
Rated Power..... :	6W						
Clock frequencies..... :	38.4 MHz, 32.768 kHz, 32MHz						
Other parameters..... :	No Data provided						
Software version..... :	23.46.3						
Hardware version..... :	D						
Dimensions in (W x H x D)..... :	2 x 2 x0.5 inches						
Mounting position..... :	[ ]	Table top equipment					
	[ ]	Wall/Ceiling mounted equipment					
	[ ]	Floor standing equipment					
	[ ]	Hand-held equipment					
	[X]	Other: Vehicular					
Modules/parts..... :	Module/parts of test item		Type	Manufacturer			
	N/A		.....	.....			
	.....		.....	.....			
	.....		.....	.....			
	.....		.....	.....			
Accessories (not part of the test item)..... :	Description		Type	Manufacturer			
	N/A		.....	.....			
	.....		.....	.....			
	.....		.....	.....			
	.....		.....	.....			

Documents as provided by the applicant .....	Description	File name	Issue date
	Declaration Equipment Data	FDT30_18 Declaration Equipment Data filled DEC 12 2023	12/12/2023
	Operational Description	VAS2OPSEDES	TBD
	Vehicle User Manual	UM	TBD
	Sch/Bom (Long Term Confidential)	SCH_BOM	TBD
	Label Sample	LS	TBD

<sup>(3)</sup> Only for Medical Equipment

## Identification of the client

Rivian Automotive LLC.  
 14600 Myford Road  
 Irvine, CA 92606,  
 USA

## Testing period and place

<b>Test Location</b>	DEKRA Certification Inc.
<b>Date (start)</b>	02-20-2024
<b>Date (finish)</b>	02-22-2024

## Document history

Report number	Date	Description
4235ERM.002	02-02-2024	First release.
4235ERM.002A1	03-01-2024	Second release. Standard information updated in cover page and results for the different data rates also added in Appendix A. This modified test report cancels and replaces the test report 4235ERM.002

## Environmental conditions

---

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

<b>Temperature</b>	Min. = 15 °C Max. = 35 °C
<b>Relative humidity</b>	Min. = 30 % Max. = 75 %
<b>Air pressure</b>	Min. = 860mbar Max. = 1060mbar

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

<b>Temperature</b>	Min. = 15 °C Max. = 35 °C
<b>Relative humidity</b>	Min. = 30 % Max. = 75 %
<b>Air pressure</b>	Min. = 860mbar Max. = 1060mbar

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

<b>Temperature</b>	Min. = 15 °C Max. = 35 °C
<b>Relative humidity</b>	Min. = 30 % Max. = 75 %
<b>Air pressure</b>	Min. = 860mbar Max. = 1060mbar

## Remarks and comments

---

- The tests have been performed by the technical personnel: Juliana Cherry, Yuqi Wang, Yuri Barone, Ivy Yousuf Moutushi, Victor Albrecht, and Koji Nishimoto.



## Testing verdicts

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

## Summary

### Appendix A: Bluetooth Low Energy

Requirement – Test case	FCC PART 15C PARAGRAPH / RSS-247	Verdict	Remark
RSS-GEN 8.8 / FCC 15.207 - Conducted Emission limits.		N/A	Refer 1
RSS-247 5.2 (a) / FCC 15.247 (a) (2) - 6 dB Bandwidth		P	N/A
FCC 2.1049 - 99dBw Occupied Channel Bandwidth 99%		P	N/A
RSS-247 5.2 (b) / FCC 15.247 (e) - Power spectral density		P	N/A
RSS-247 5.4 (d) / FCC 15.247 (b) (3) - Maximum Peak Conducted output power		P	N/A
RSS-247 5.5 / FCC 15.247 (d) - Band-edge emissions compliance (Transmitter)		P	N/A
RSS-247 5.5 / FCC 15.247 (d) - Emissions compliance (Transmitter) - Conducted		N/A	Refer 2
RSS-247 5.5 / FCC 15.247 (d) - Emissions compliance (Transmitter) - Radiated		P	N/A

Supplementary information and remarks:

- 1) According with the requirements of FCC Rules and Regulations, title 47, Chapter I, Subchapter A, Part 15, Subpart C, §15.207 (c), Conducted limits, Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation, and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provision for, the use of battery chargers which permit operating while charging, AC adaptors or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.
- 2) The DUT has an integral antenna, and no conducted testing is required.

## List of equipment used during the test

### Conducted Measurements

Control No.	Equipment	Model	Manufacturer	Next Calibration
897	Power supply	PROG-DC-PS	AMETEK	N/A
1014	FSV40 Signal Analyzer 40GHz	FSV40	Rhode & Schwarz	2024-08-01
1107	Ethernet SNMP Thermometer-RF1 Room	HWg-STE Plain	HW Group	2024-10-18
1313	Wireless Measurement Software R&S EMC32	--	Rhode & Schwarz	--

### Radiated Measurements

Control No.	Equipment	Model	Manufacturer	Next Calibration
1010	EMI Test Receiver	ESR7	Rhode & Schwarz	2024-10-14
1014	Signal Analyzer 40GHz	FSV40	Rhode & Schwarz	2024-08-01
1055	Double-Ridged Waveguide Horn Antenna (18-40GHz)	3116C	ETS Lindgren	2026-02-06
1057	Double-Ridged Waveguide Horn Antenna (750 MHz-18 GHz)	3115	ETS Lindgren	2026-07-18
1064	Biconilog Antenna	3142E	ETS Lindgren	2024-12-13
1108	Ethernet SNMP Thermometer-SAC1 Room	HWg-STE Plain	HW Group	2024-10-17
1111	Ethernet SNMP Thermometer-CR1 Room	HWg-STE Plain	HW Group	2024-10-18
1179	Semi-Anechoic Chamber	SAC 3plus 'L'	Frankonia	--
1217	Frankonia Transparent Test Table 1	FFT-Square	Frankonia	--
1314	Wireless Measurement Software R&S EMC32	--	Rhode & Schwarz	--

## Appendix A: Bluetooth Low Energy

# Appendix A

---

PRODUCT INFORMATION.....	13
TEST CONDITIONS .....	14
TEST CASES DETAILS .....	18
RSS-247 5.2 (a) / FCC 15.247 (a) (2) - 6 dB Bandwidth.....	18
FCC 2.1049 - 99dBw Occupied Channel Bandwidth 99% .....	30
RSS-247 5.2 (b) / FCC 15.247 (e) - Power spectral density .....	42
RSS-247 5.4 (d) / FCC 15.247 (b) (3) - Maximum Peak Conducted output power.....	54
RSS-247 5.5 / FCC 15.247 (d) - Band-edge emissions compliance (Transmitter) .....	66
RSS-247 5.5 / FCC 15.247 (d) - Emissions compliance (Transmitter) - Radiated.....	75

## PRODUCT INFORMATION

---

The following information is provided by the client

Information	Description
Modulation	GFSK
Operation mode:	
• Operating Frequency Range	2402 – 2480 MHz
• Nominal Channel Bandwidth	1 MHz, 2 MHz
• RF Output Power	7 dBm EIRP
Antenna type	Integral PCB antenna
Antenna gain	3.45 dBic
Nominal Voltage	
• Supply Voltage	13.5 Vdc
• Type of power source	DC voltage
Equipment type	Bluetooth Low Energy
Data Rates	125 Kbps, 500 Kbps, 1 Mbps, 2 Mbps

## TEST CONDITIONS

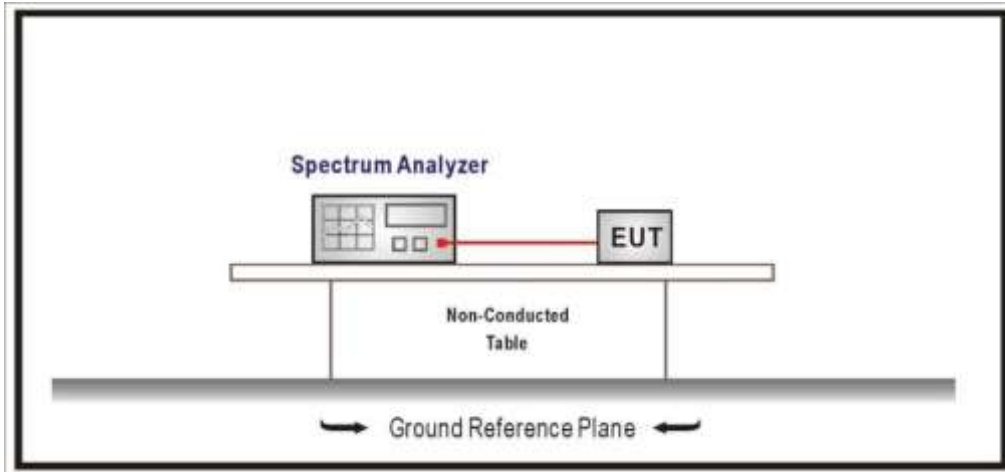
(\*): Data provided by the client.

TEST CONDITIONS	DESCRIPTION
<p>TC/01 (125 kbps)</p>	<p><u>Power supply (V):</u> V<sub>nominal</sub>: 13.5 Vdc</p> <p><u>Temperature:</u> T<sub>nominal</sub>: +15 to +35 °C</p> <p>Data Rate: 125 kbps Bandwidth: 1 MHz</p> <p><u>Test Frequencies for Conducted/ Radiated tests:</u>            Lowest channel: 2402 MHz            Middle channel: 2440 MHz            Highest channel: 2480 MHz</p>
<p>TC/02 (500 kbps)</p>	<p><u>Power supply (V):</u> V<sub>nominal</sub>: 13.5 Vdc</p> <p><u>Temperature:</u> T<sub>nominal</sub>: +15 to +35 °C</p> <p>Data Rate: 500 kbps Bandwidth: 1 MHz</p> <p><u>Test Frequencies for Conducted/ Radiated tests:</u>            Lowest channel: 2402 MHz            Middle channel: 2440 MHz            Highest channel: 2480 MHz</p>
<p>TC/03 (1 Mbps)</p>	<p><u>Power supply (V):</u> V<sub>nominal</sub>: 13.5 Vdc</p> <p><u>Temperature:</u> T<sub>nominal</sub>: +15 to +35 °C</p> <p>Data Rate: 1 Mbps Bandwidth: 1 MHz</p> <p><u>Test Frequencies for Conducted/ Radiated tests:</u>            Lowest channel: 2402 MHz            Middle channel: 2440 MHz            Highest channel: 2480 MHz</p>
<p>TC/04 (2 Mbps)</p>	<p><u>Power supply (V):</u> V<sub>nominal</sub>: 13.5 Vdc</p> <p><u>Temperature:</u> T<sub>nominal</sub>: +15 to +35 °C</p> <p>Data Rate: 2 Mbps Bandwidth: 2 MHz</p> <p><u>Test Frequencies for Conducted/ Radiated tests:</u>            Lowest channel: 2402 MHz            Middle channel: 2440 MHz            Highest channel: 2480 MHz</p>

See below the results for Maximum Peak Conducted output power:

Maximum Peak Conducted output power	Data Rates	Frequencies (MHz)	Peak Power (dBm)	EIRP (dBm)
	125 Kbps	2402	9.4	9.8
		2440	9.0	9.4
		2480	8.8	9.3
	500 Kbps	2402	8.6	9.0
		2440	9.0	9.4
		2480	8.9	9.3
	1 Mbps	2402	10.0	10.5
		2440	9.4	9.9
		2480	9.4	9.9
2 Mbps	2402	9.2	9.7	
	2440	8.6	9.1	
	2480	8.5	9.0	

CONDUCTED MEASUREMENTS:



RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at 3 m for the frequency range 30-1000 MHz (Bilog antenna) and 1-18 GHz (Double ridge horn antenna), and 1m for the frequency range 18 GHz- 26 GHz (Double ridge horn antenna).

For radiated emissions in the range 18 - 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 was varied from 1 to 4 meters to find the maximum radiated emission.

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

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.



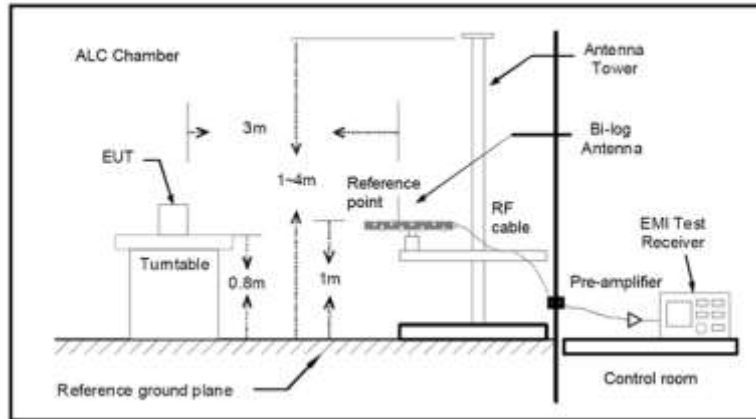


Fig A1: Radiated measurements Setup  $f < 1$  GHz

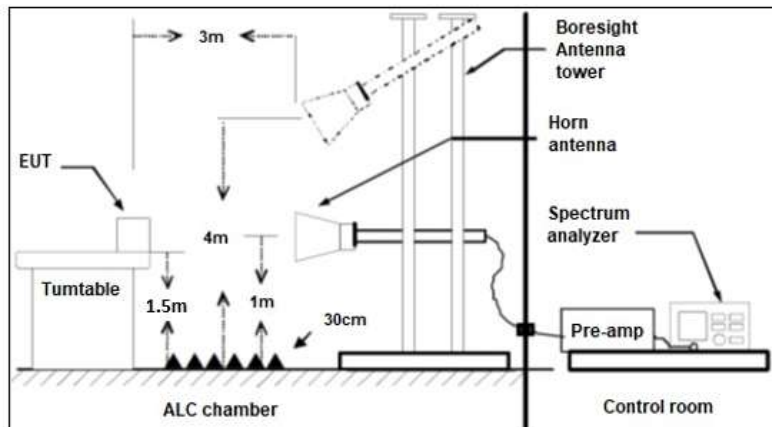


Fig A2: Radiated measurements setup  $f > 1-18$  GHz

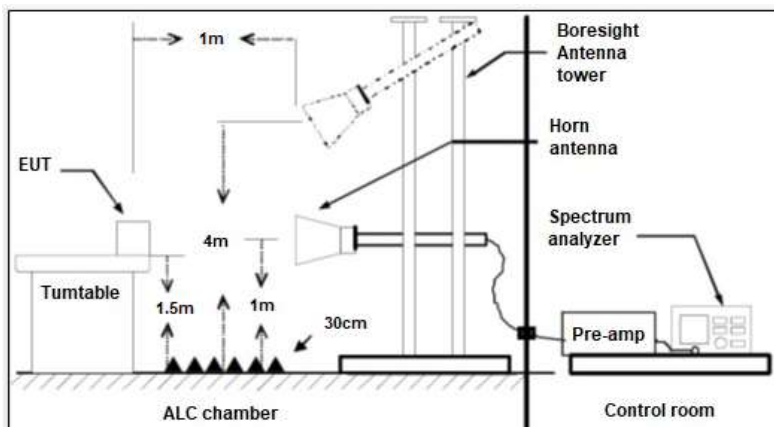


Fig A3: Radiated measurements setup  $f > 18$  GHz

## TEST CASES DETAILS

---

### 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 5.1 (GFSK 125 Kbit/s)

#### Results

Freq (MHz)	BW (MHz)	Emission Bandwidth (MHz)
2402.00000	1	0.648
2440.00000	1	0.678
2480.00000	1	0.634

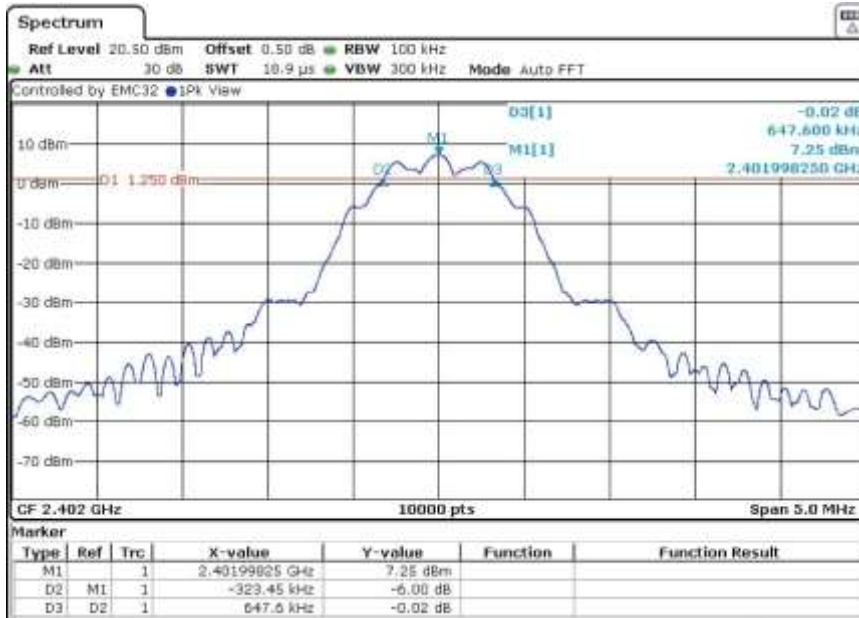
#### Verdict

Pass

**Attachments**

Frequency MHz = 2402.00000, Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 125 Kbit/s)

Images:



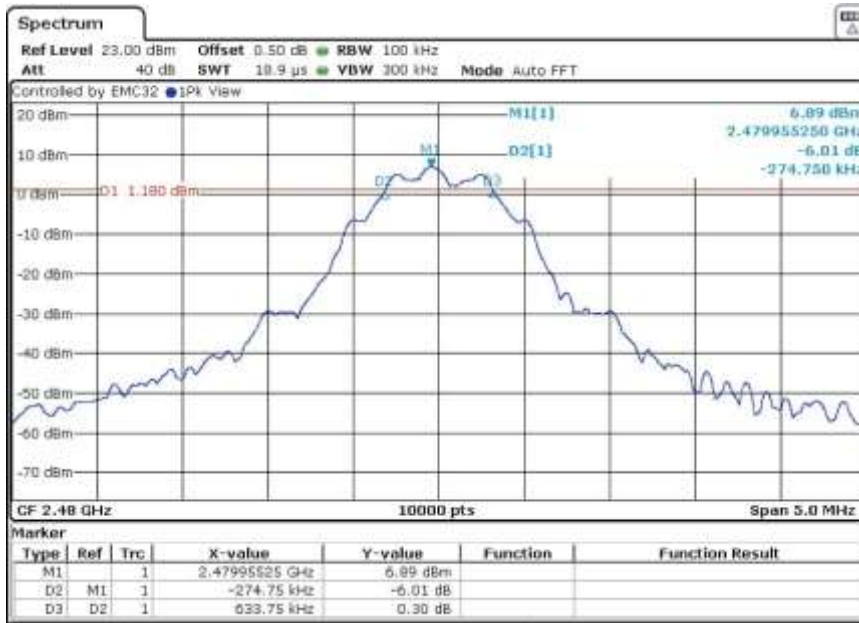
Frequency MHz = 2440.00000, Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 125 Kbit/s)

Images:



Frequency MHz = 2480.00000, Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 125 Kbit/s)

Images:



Modulation: BTLE 5.1 (GFSK 500 Kbit/s)

**Results**

Freq (MHz)	BW (MHz)	Emission Bandwidth (MHz)
2402.00000	1	0.709
2440.00000	1	0.655
2480.00000	1	0.656

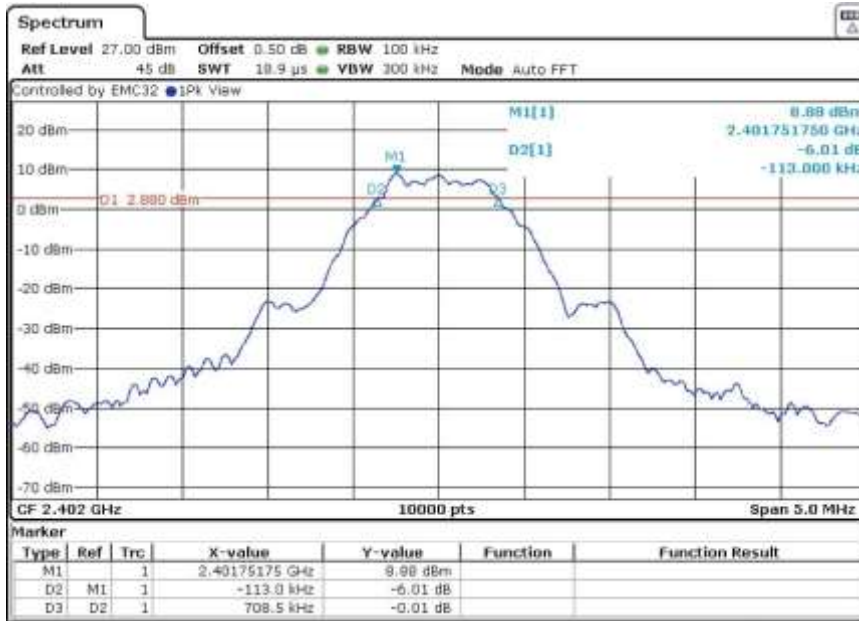
**Verdict**

Pass

**Attachments**

**Frequency MHz = 2402.00000, Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 500 Kbit/s)**

**Images:**



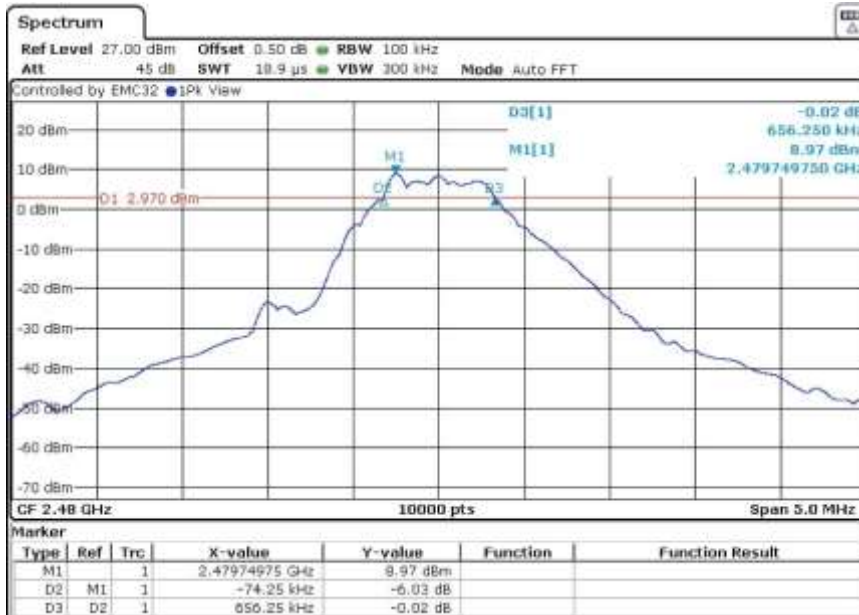
**Frequency MHz = 2440.00000, Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 500 Kbit/s)**

**Images:**



Frequency MHz = 2480.00000, Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 500 Kbit/s)

Images:



Modulation: BTLE 5.1 (GFSK 1 Mbit/s)

**Results**

Freq (MHz)	BW (MHz)	Emission Bandwidth (MHz)
2402.00000	1	0.792
2440.00000	1	0.832
2480.00000	1	0.792

**Verdict**

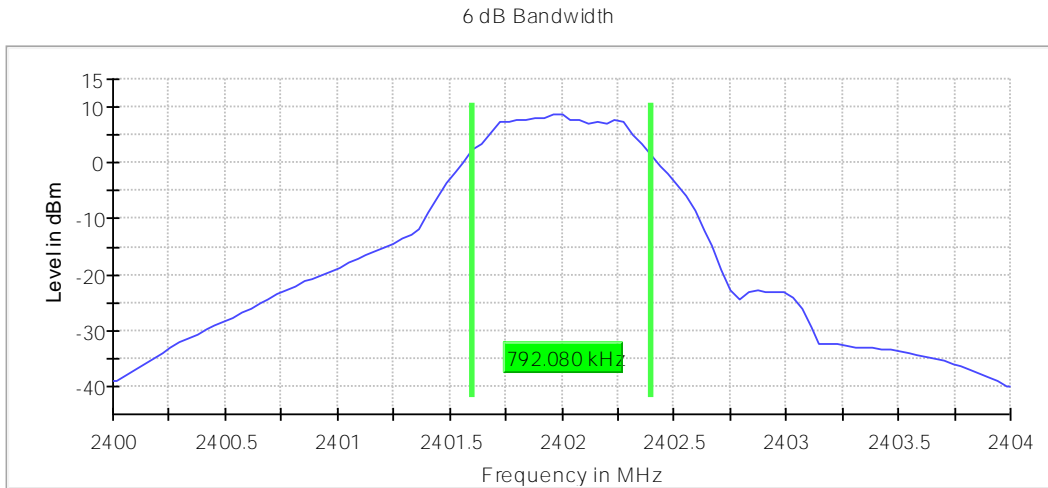
Pass



**Attachments**

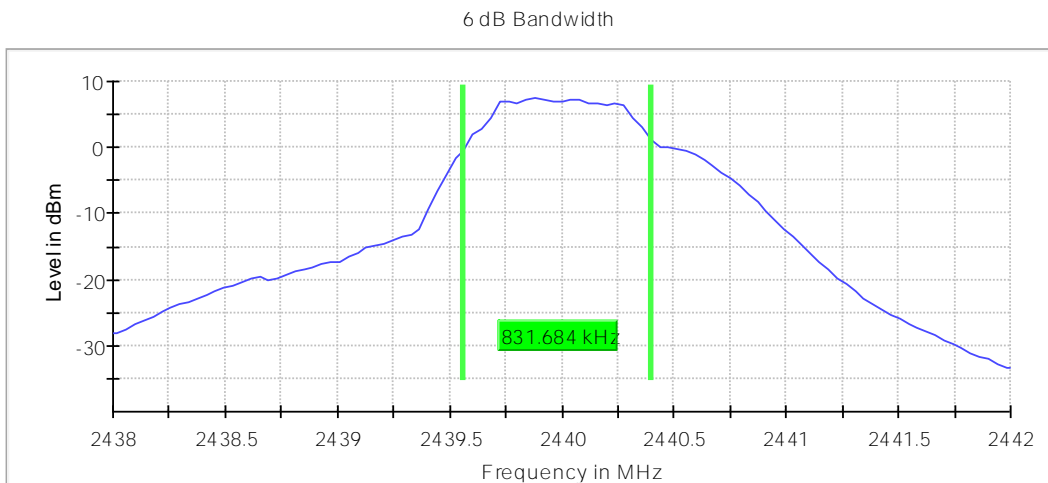
**Frequency MHz = 2402.00000, Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 1 Mbit/s)**

**Images:**



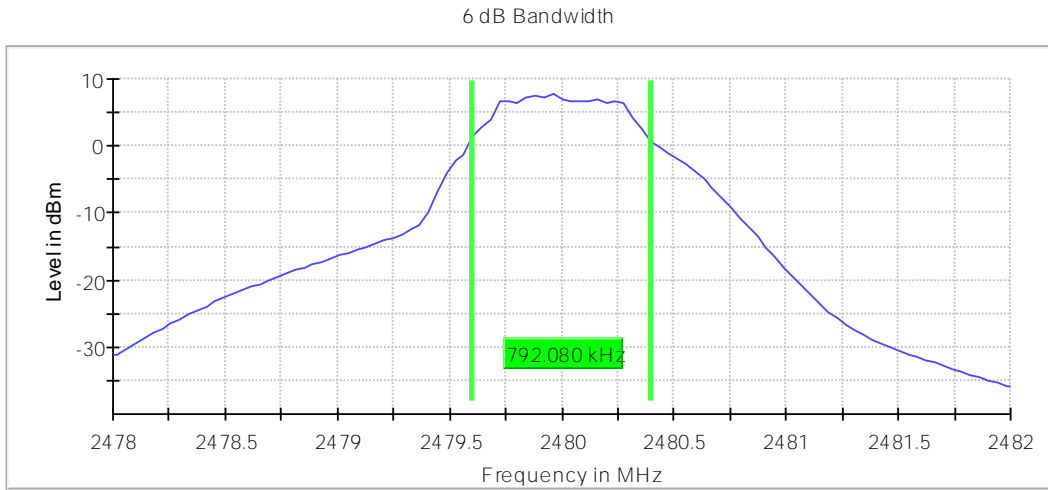
**Frequency MHz = 2440.00000, Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 1 Mbit/s)**

**Images:**



Frequency MHz = 2480.00000, Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 1 Mbit/s)

Images:



Modulation: BTLE 5.1 (GFSK 2 Mbit/s)

**Results**

Freq (MHz)	BW (MHz)	Emission Bandwidth (MHz)
2402.00000	2	1.505
2440.00000	2	1.465
2480.00000	2	1.426

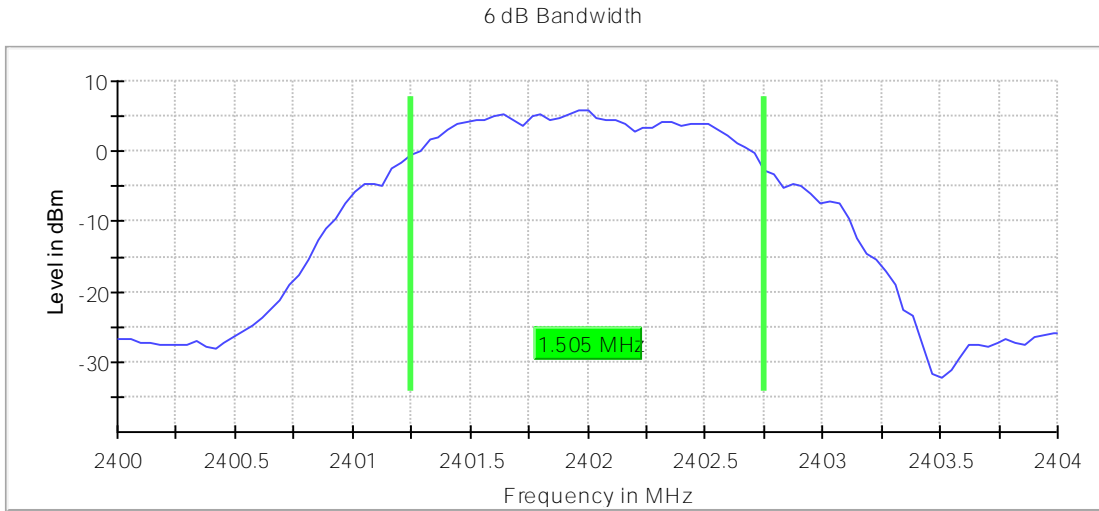
**Verdict**

Pass

**Attachments**

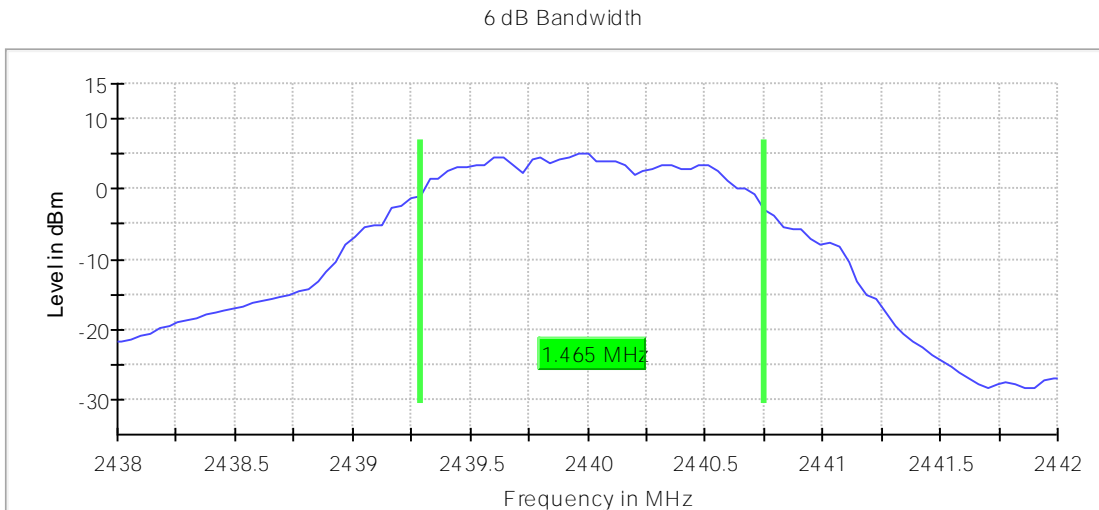
**Frequency MHz = 2402.00000, Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)**

**Images:**



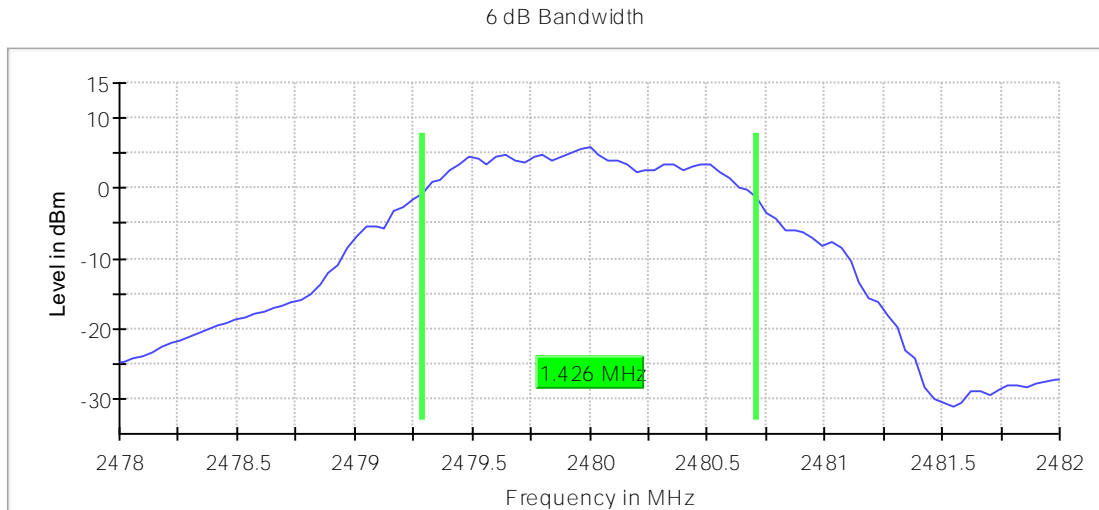
**Frequency MHz = 2440.00000, Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)**

**Images:**



Frequency MHz = 2480.00000, Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)

Images:



### Spectrum Analyzer Parameters

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.43800 GHz	2.47800 GHz
Stop Frequency	2.40400 GHz	2.44200 GHz	2.48200 GHz
Span	4.000 MHz	4.000 MHz	4.000 MHz
RBW	100.000 kHz	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz	300.000 kHz
SweepPoints	101	101	101
Sweeptime	41.830 $\mu$ s	41.830 $\mu$ s	41.830 $\mu$ s
Reference Level	0.000 dBm	0.000 dBm	0.000 dBm
Attenuation	10.000 dB	10.000 dB	10.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
SweepCount	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweeptype	FFT	FFT	FFT
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.50 dB	0.50 dB	0.50 dB
Run	19 / max. 150	10 / max. 150	16 / max. 150
Stable	5 / 5	5 / 5	5 / 5
Max Stable Difference	0.00 dB	0.27 dB	0.08 dB

FCC 2.1049 - 99dBw Occupied Channel Bandwidth 99%

**Limits**

No Limit has been set to this test case

Modulation: BTLE 5.1 (GFSK 125 Kbit/s)

**Results**

Freq (MHz)	BW (MHz)	Occ Ch BW (MHz)
2402.00000		1.050
2440.00000	1	1.053
2480.00000		1.043

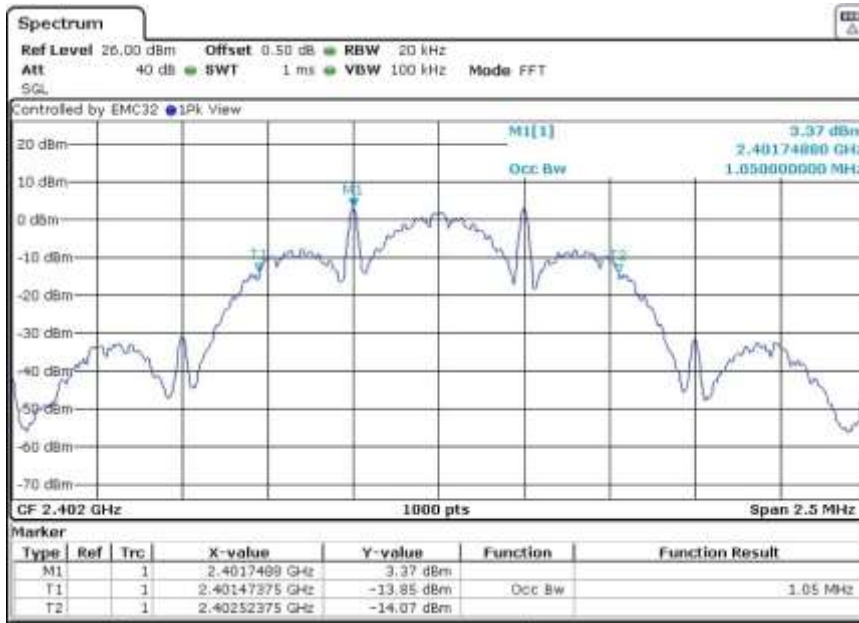
**Verdict**

Pass

**Attachments**

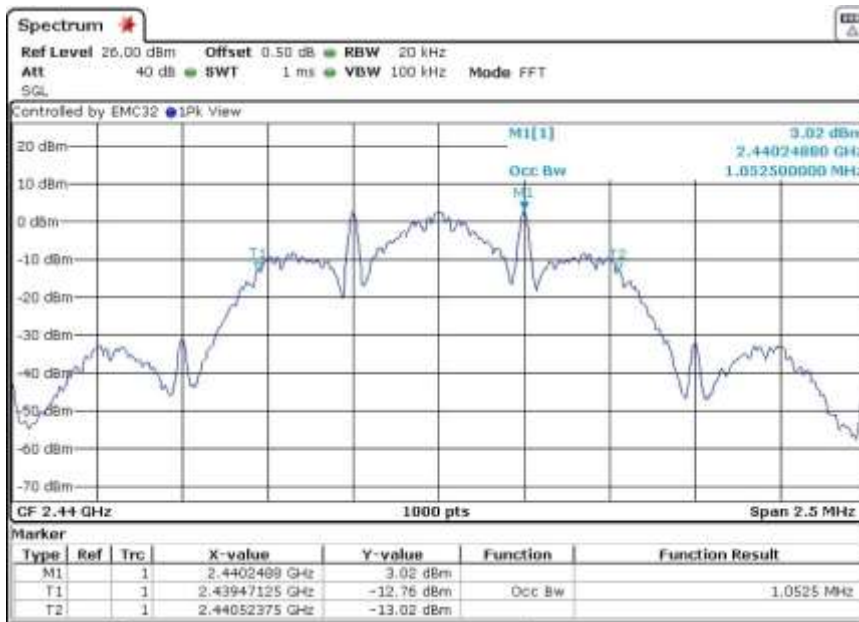
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 125 Kbit/s)**

**Images:**



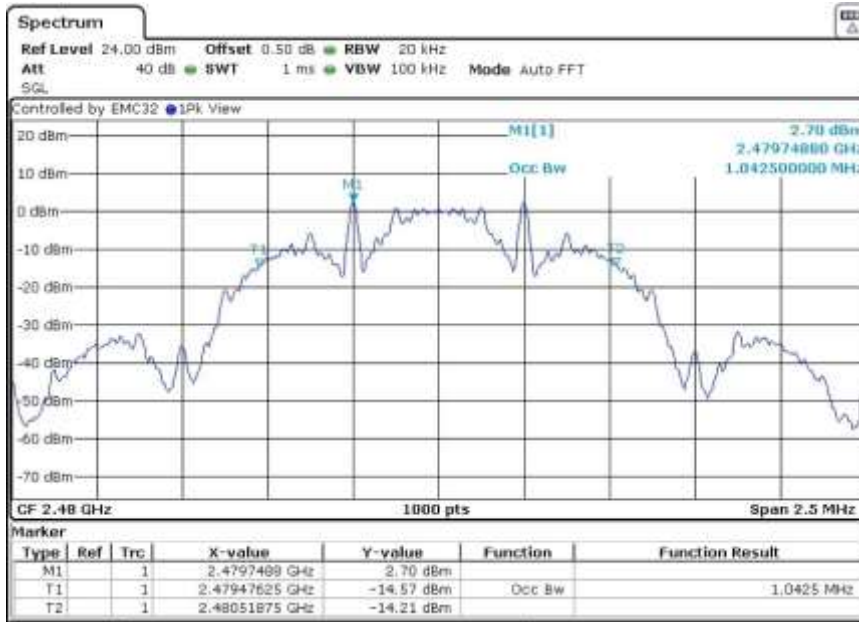
**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 125 Kbit/s)**

**Images:**



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1,  
 Modulation = BTLE 5.1 (GFSK 125 Kbit/s)

Images:





Modulation: BTLE 5.1 (GFSK 500 Kbit/s)

**Results**

Freq (MHz)	BW (MHz)	Occ Ch BW (MHz)
2402.00000		1.015
2440.00000	1	1.010
2480.00000		1.010

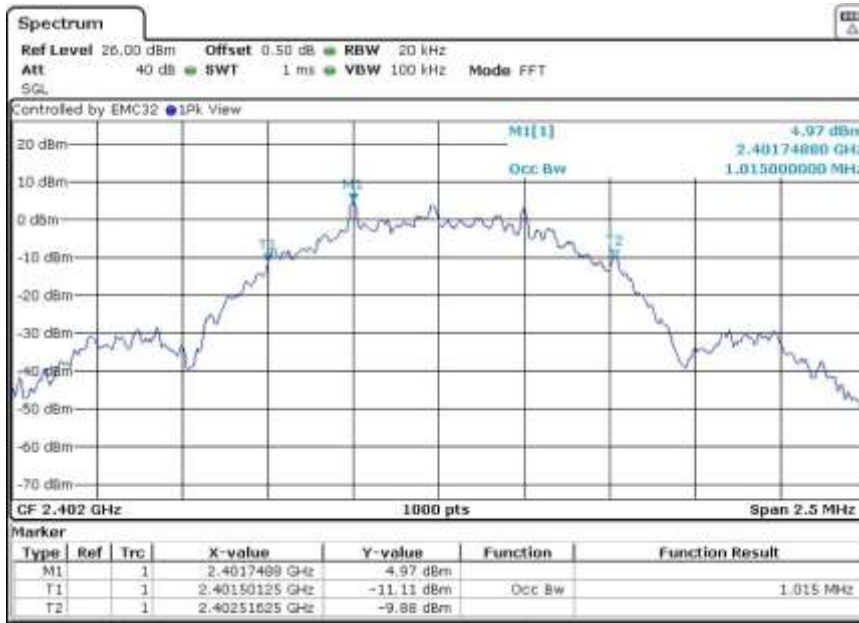
**Verdict**

Pass

**Attachments**

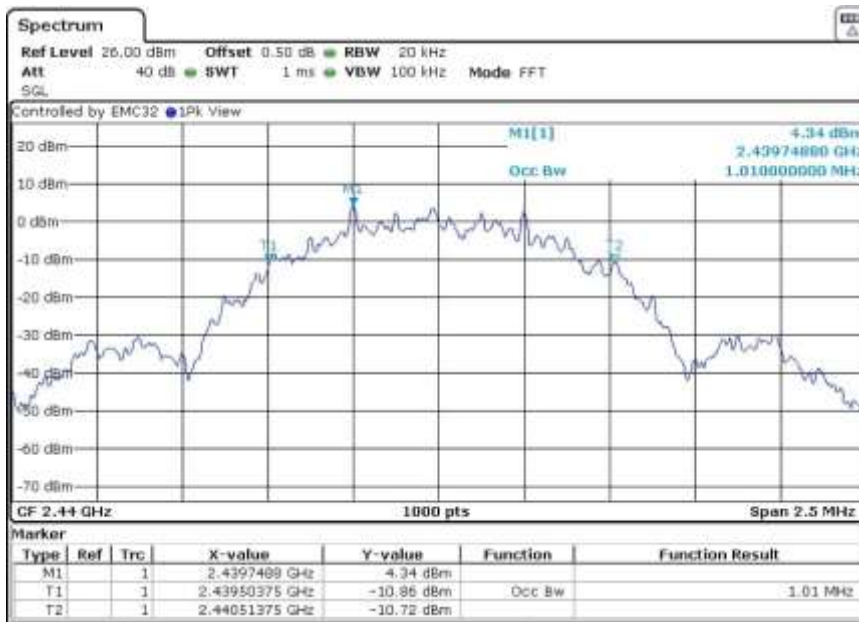
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 500 Kbit/s)**

**Images:**



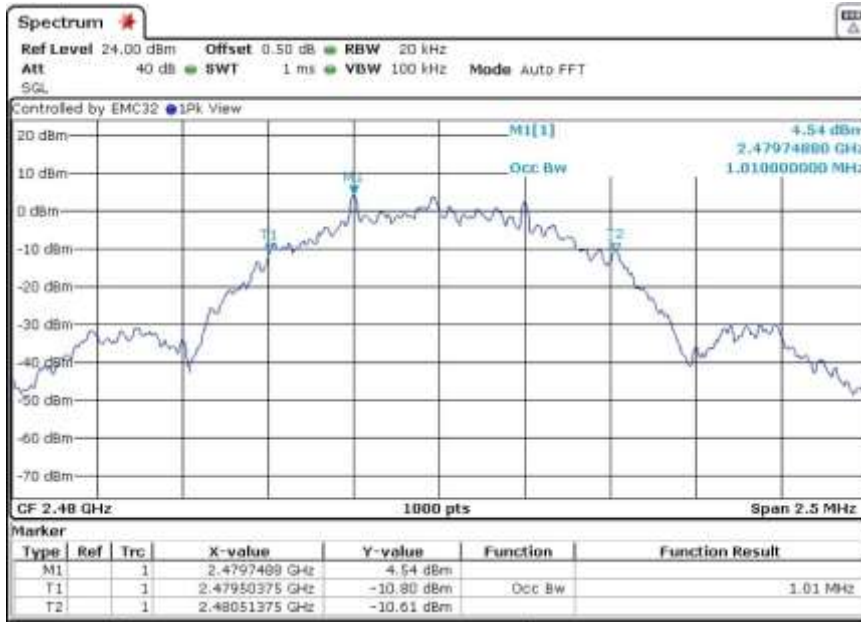
**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 500 Kbit/s)**

**Images:**



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1,  
 Modulation = BTLE 5.1 (GFSK 500 Kbit/s)

Images:



Limits

Modulation: BTLE 5.1 (GFSK 1 Mbit/s)

**Results**

Freq (MHz)	BW (MHz)	Occ Ch BW (MHz)
2402.00000		1.020
2440.00000	1	1.190
2480.00000		1.060

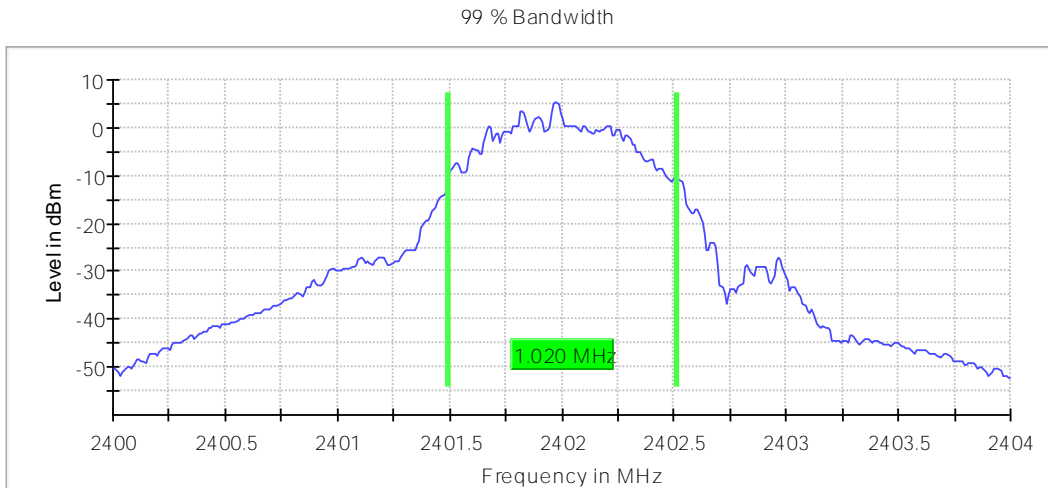
**Verdict**

Pass

**Attachments**

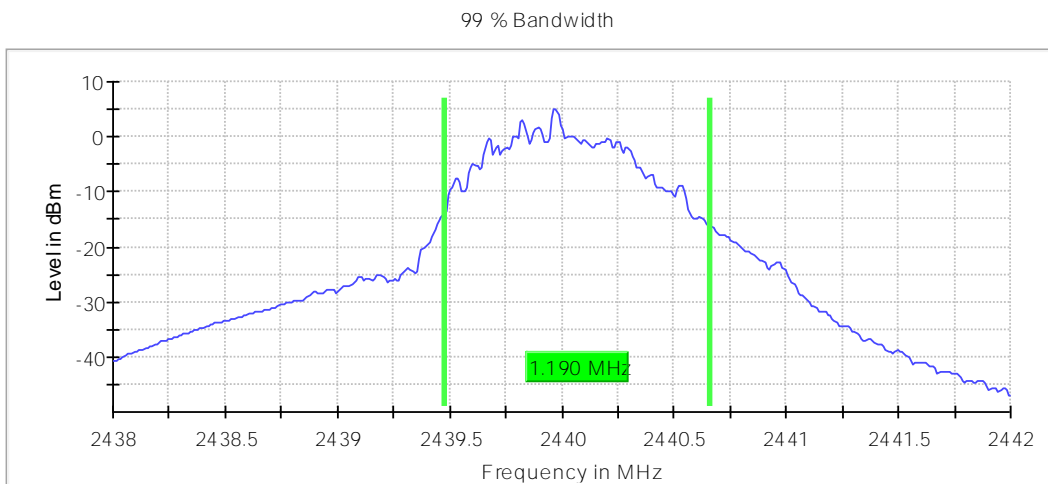
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 1 Mbit/s)**

**Images:**



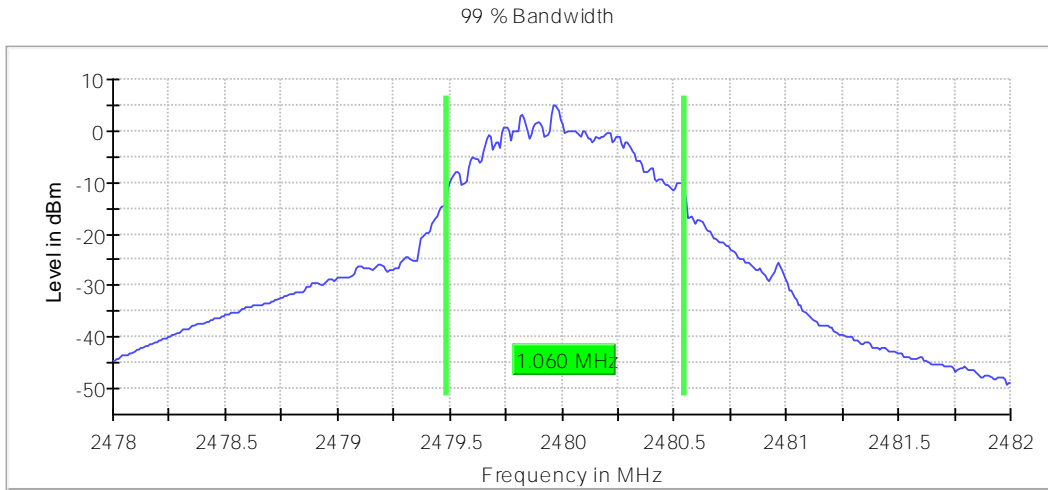
**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 1 Mbit/s)**

**Images:**



**Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 1 Mbit/s)**

**Images:**



### Limits

No Limit has been set to this test case

Modulation: BTLE 5.1 (GFSK 2 Mbit/s)

**Results**

Freq (MHz)	BW (MHz)	Occ Ch BW (MHz)
2402.00000		2.010
2440.00000	2	2.040
2480.00000		2.020

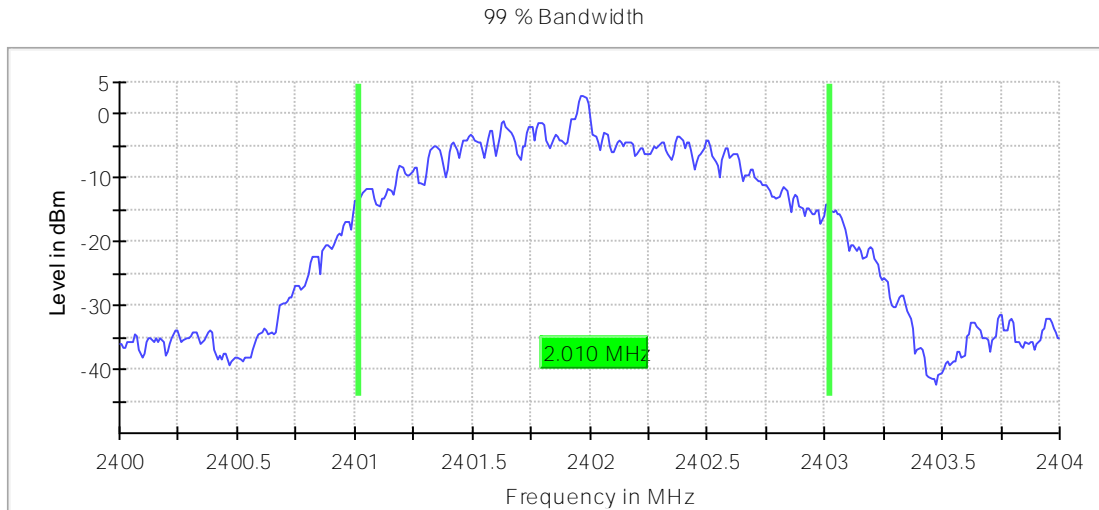
**Verdict**

Pass

**Attachments**

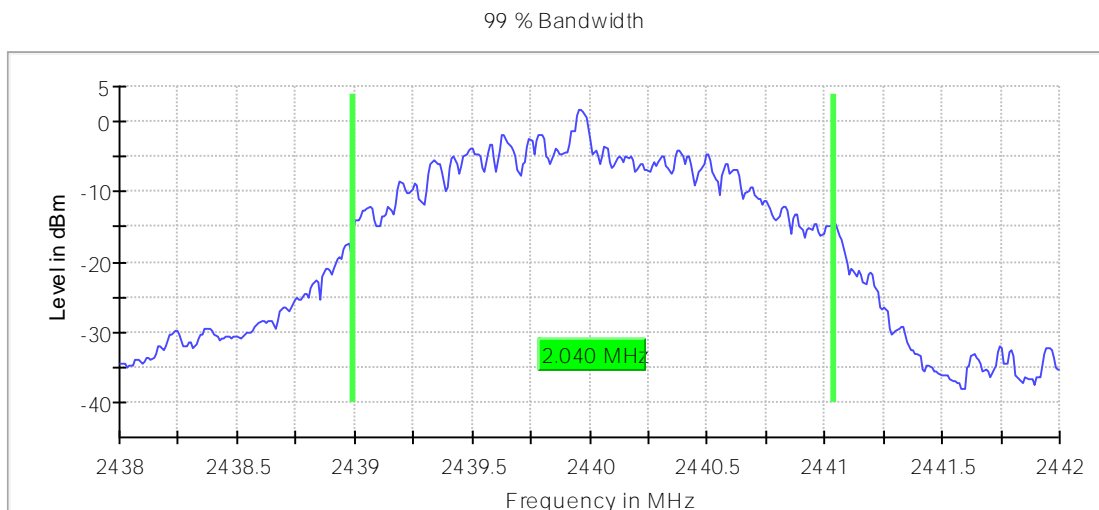
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)**

**Images:**



**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)**

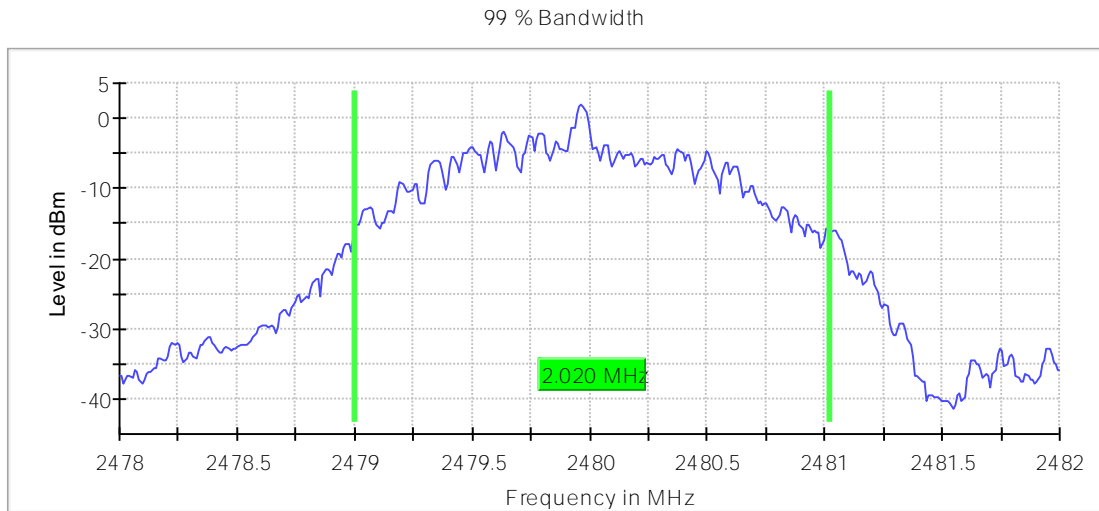
**Images:**





**Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)**

Images:



### Spectrum Analyzer Parameters

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40000 GHz	2.43800 GHz	2.47800 GHz
Stop Frequency	2.40400 GHz	2.44200 GHz	2.48200 GHz
Span	4.000 MHz	4.000 MHz	4.000 MHz
RBW	20.000 kHz	20.000 kHz	20.000 kHz
VBW	100.000 kHz	100.000 kHz	100.000 kHz
SweepPoints	400	400	400
Sweeptime	210.000 $\mu$ s	210.000 $\mu$ s	210.000 $\mu$ s
Reference Level	0.000 dBm	0.000 dBm	0.000 dBm
Attenuation	10.000 dB	10.000 dB	10.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
SweepCount	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweeptype	FFT	FFT	FFT
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.30 dB	0.30 dB	0.30 dB
Run	8 / max. 150	5 / max. 150	11 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.11 dB	0.18 dB	0.07 dB

## 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 5.1 (GFSK 125 Kbit/s)

### Results

Freq (MHz)	BW (MHz)	PSD (dBm)
2402.00000		1.46
2440.00000	1	0.96
2480.00000		1.02

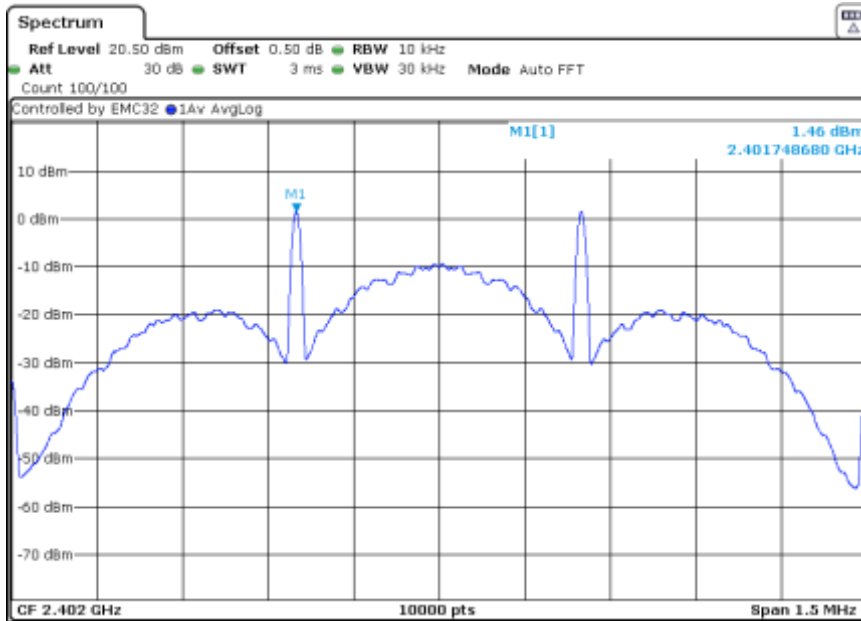
### Verdict

Pass

**Attachments**

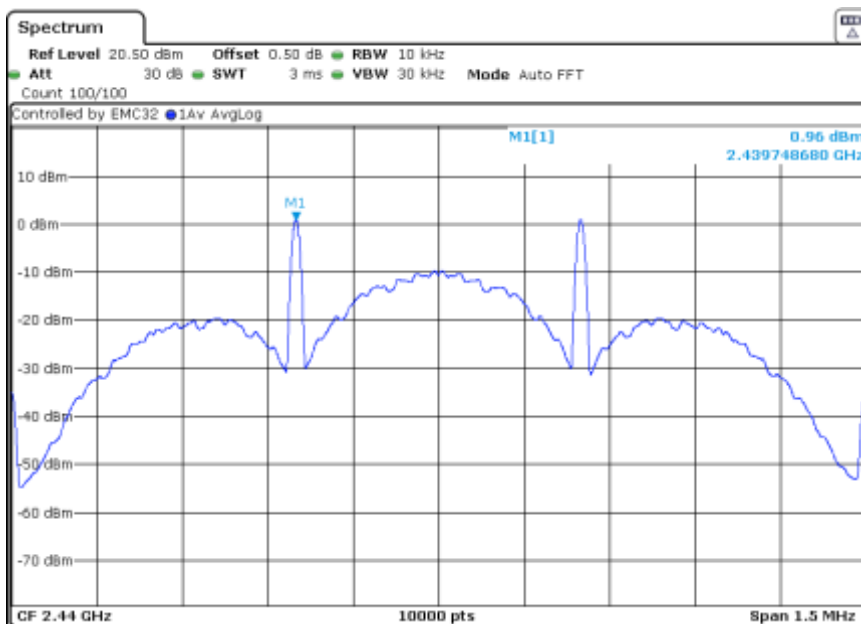
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 125 Kbit/s)**

**Images:**



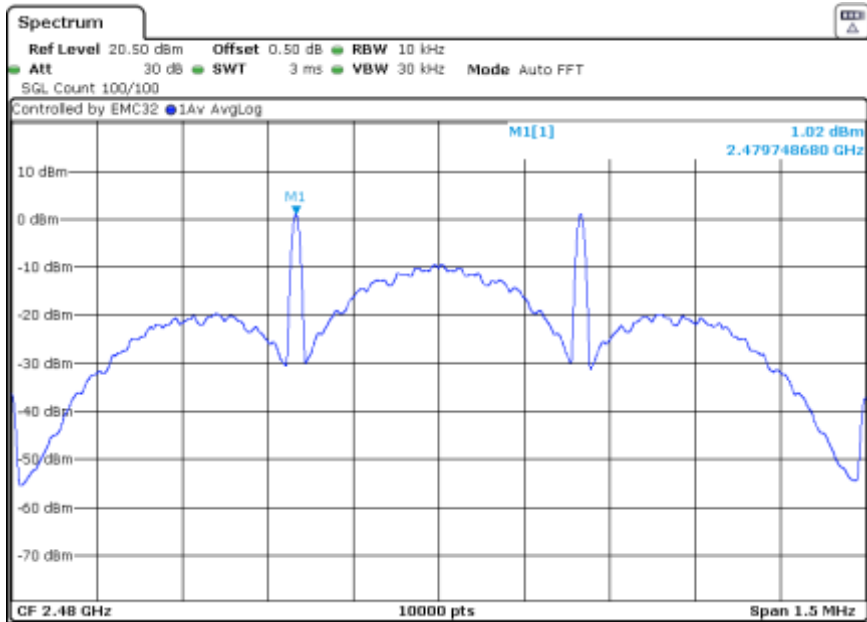
**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 125 Kbit/s)**

**Images:**



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1,  
Modulation = BTLE 5.1 (GFSK 125 Kbit/s)

Images:



Modulation: BTLE 5.1 (GFSK 500 Kbit/s)

**Results**

Freq (MHz)	BW (MHz)	PSD (dBm)
2402.00000		-3.81
2440.00000	1	-4.12
2480.00000		-4.12

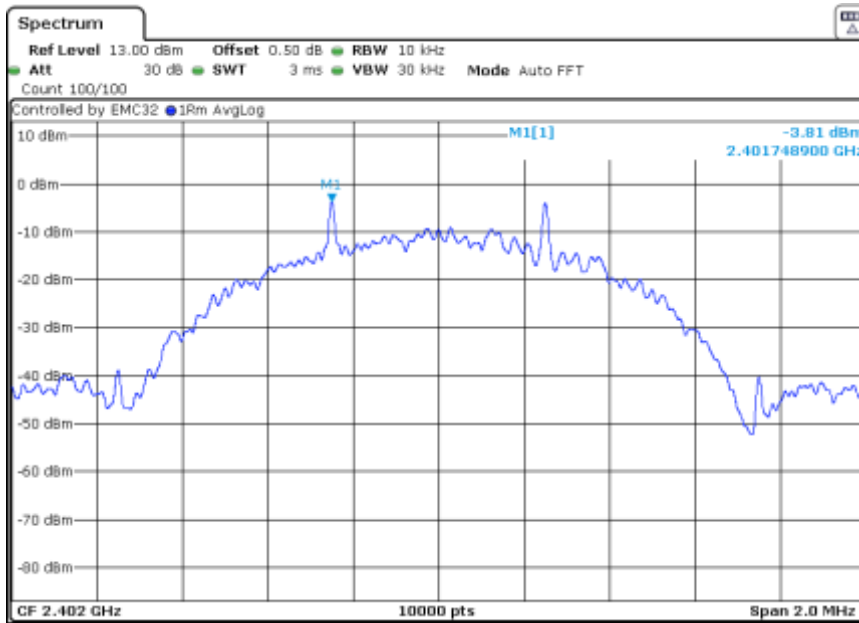
**Verdict**

Pass

**Attachments**

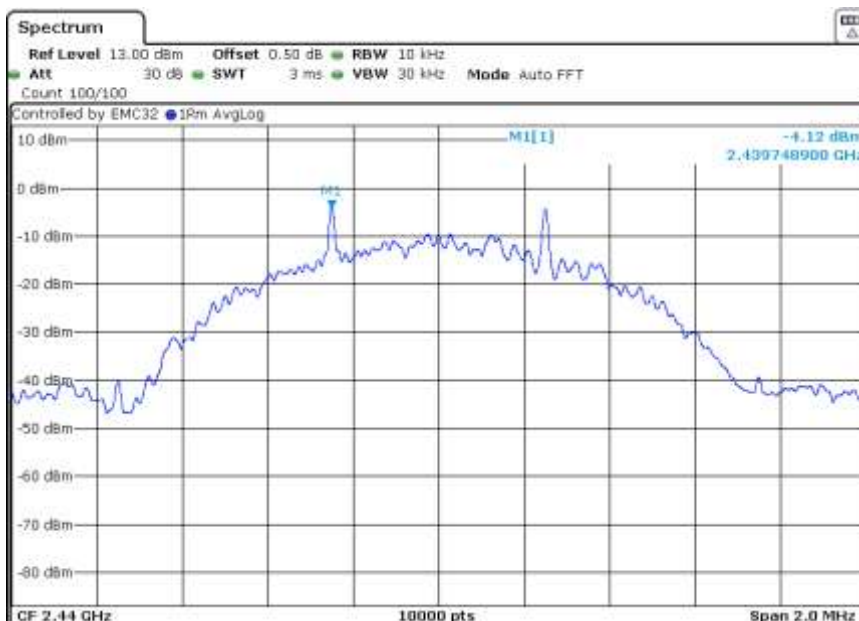
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 500 Kbit/s)**

**Images:**



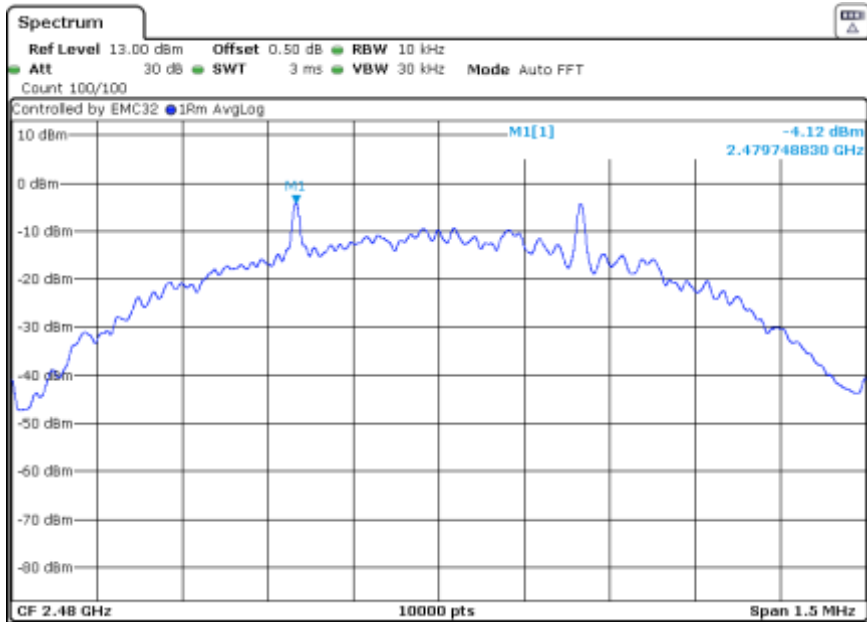
**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 500 Kbit/s)**

**Images:**



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1,  
Modulation = BTLE 5.1 (GFSK 500 Kbit/s)

Images:



Modulation: BTLE 5.1 (GFSK 1 Mbit/s)

**Results**

Freq (MHz)	BW (MHz)	PSD (dBm)
2402.00000		0.99
2440.00000	1	0.45
2480.00000		0.37

**Verdict**

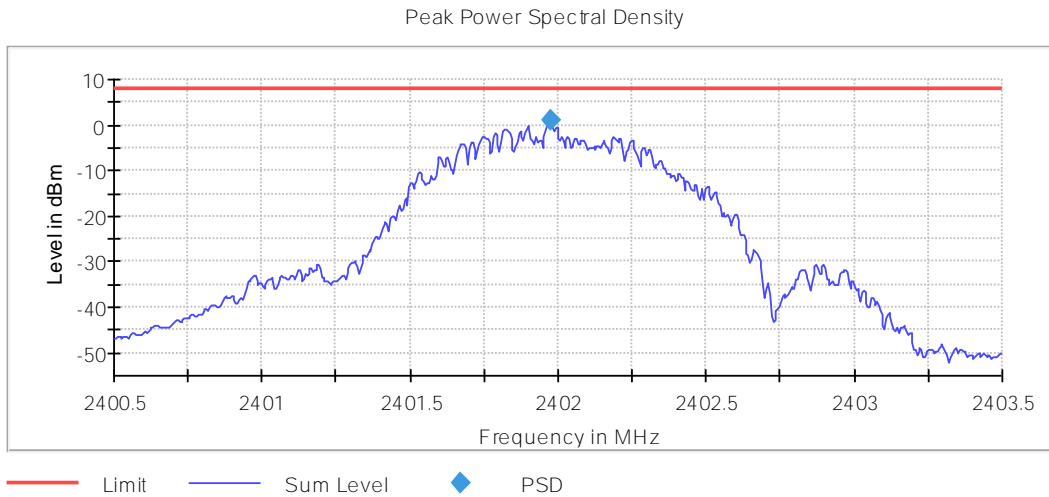
Pass



**Attachments**

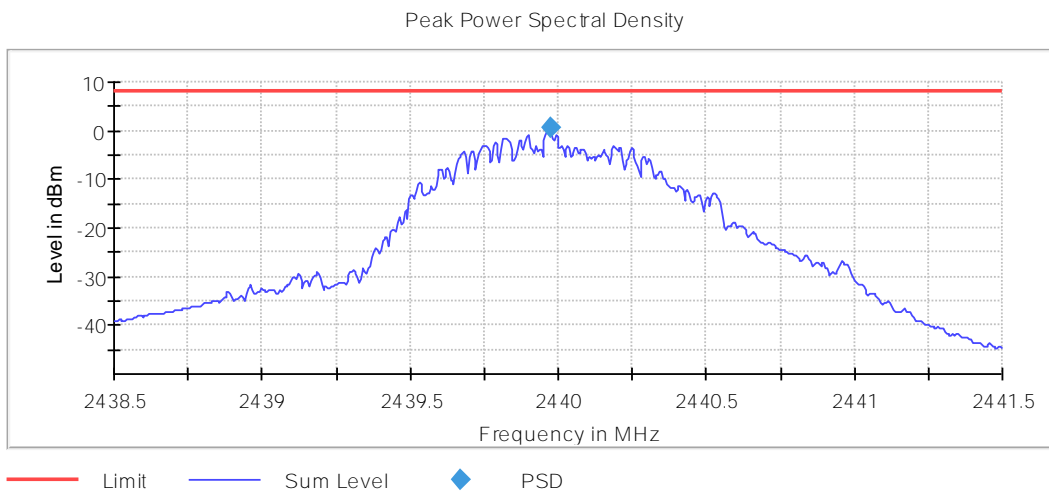
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 1 Mbit/s)**

**Images:**



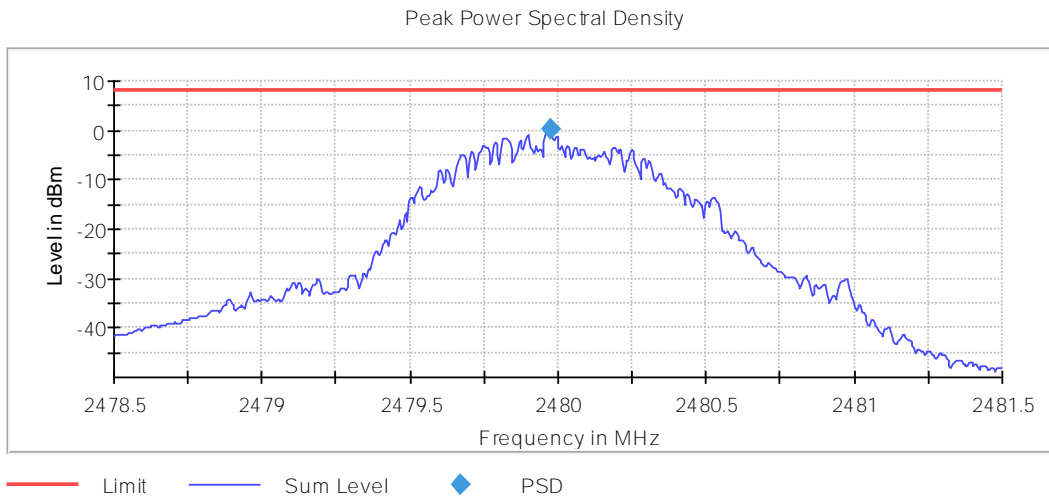
**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 1 Mbit/s)**

**Images:**



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1,  
Modulation = BTLE 5.1 (GFSK 1 Mbit/s)

Images:



Modulation: BTLE 5.1 (GFSK 2 Mbit/s)

**Results**

Freq (MHz)	BW (MHz)	PSD (dBm)
2402.00000		-1.83
2440.00000	2	-2.41
2480.00000		-2.53

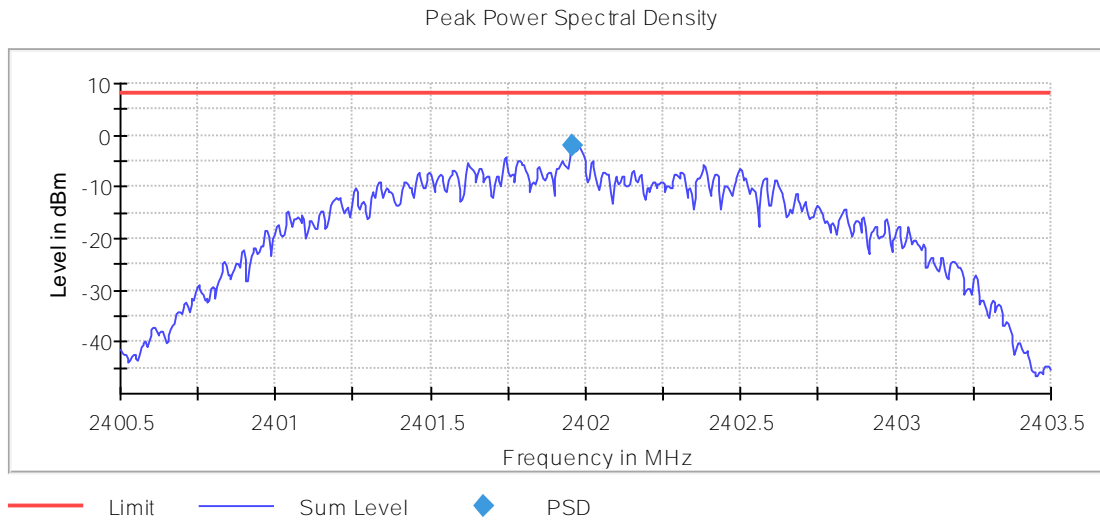
**Verdict**

Pass

**Attachments**

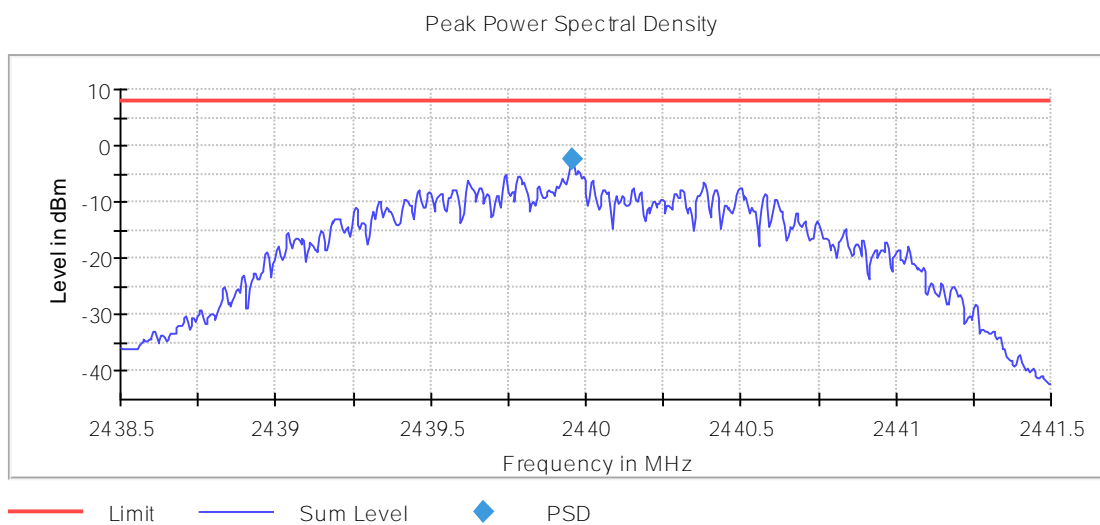
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)**

**Images:**



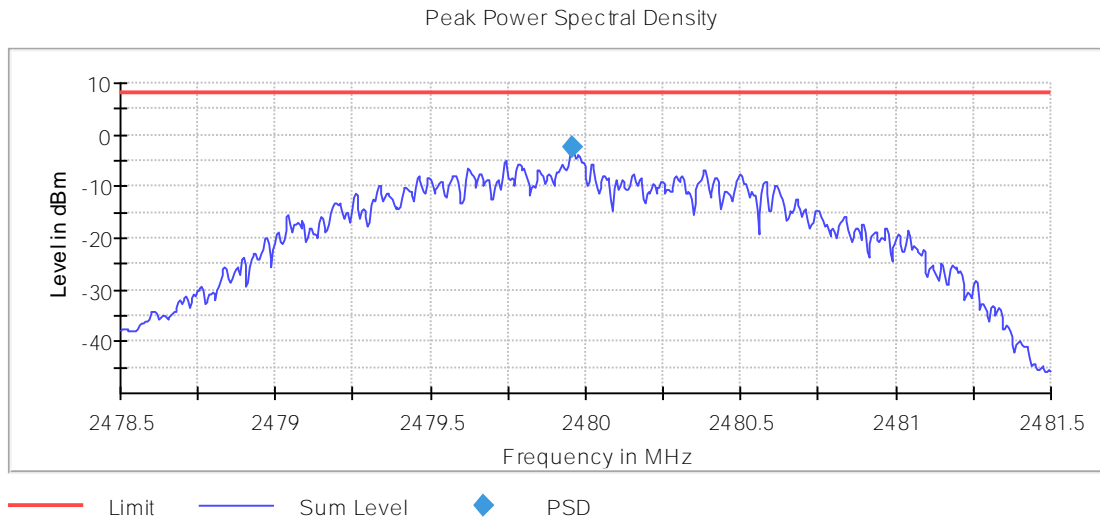
**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)**

**Images:**



**Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)**

Images:



### Spectrum Analyzer Parameters

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.40050 GHz	2.43850 GHz	2.47850 GHz
Stop Frequency	2.40350 GHz	2.44150 GHz	2.48150 GHz
Span	3.000 MHz	3.000 MHz	3.000 MHz
RBW	10.000 kHz	10.000 kHz	10.000 kHz
VBW	30.000 kHz	30.000 kHz	30.000 kHz
SweepPoints	600	600	600
Sweeptime	3.000 ms	3.000 ms	3.000 ms
Reference Level	0.000 dBm	0.000 dBm	0.000 dBm
Attenuation	10.000 dB	10.000 dB	10.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
SweepCount	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweeptype	Sweep	Sweep	Sweep
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.50 dB	0.50 dB	0.50 dB
Run	3 / max. 150	4 / max. 150	3 / max. 150
Stable	2 / 2	2 / 2	2 / 2
Max Stable Difference	0.37 dB	0.10 dB	0.39 dB

### 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: 3.45 dBic

Modulation: BTLE 5.1 (GFSK 125 Kbit/s)

#### Results

Freq (MHz)	BW (MHz)	Peak Power (dBm)	Maximum EIRP power (dBm)
2402.00000		9.35	12.80
2440.00000	1	8.97	12.42
2480.00000		8.84	12.29

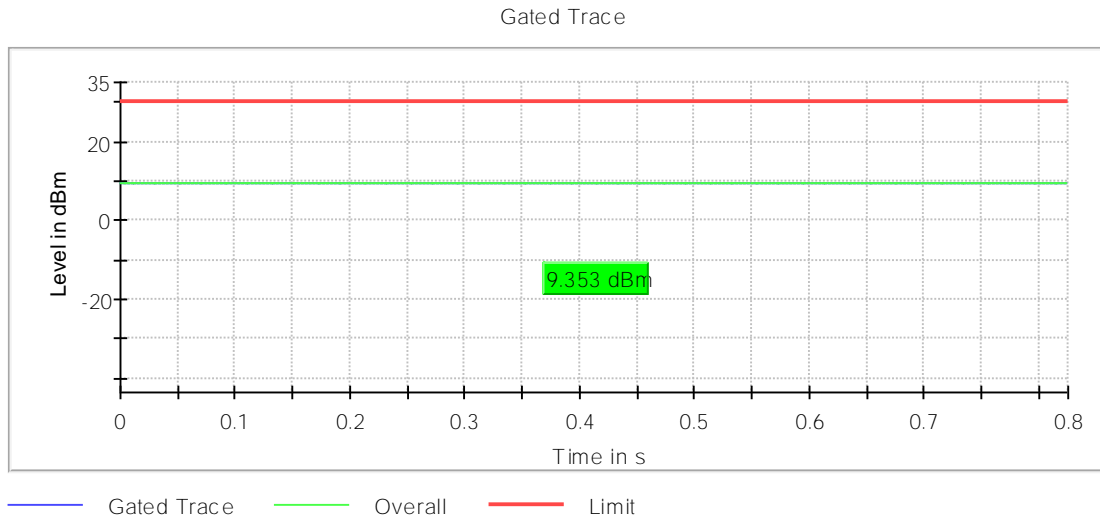
#### Verdict

Pass

**Attachments**

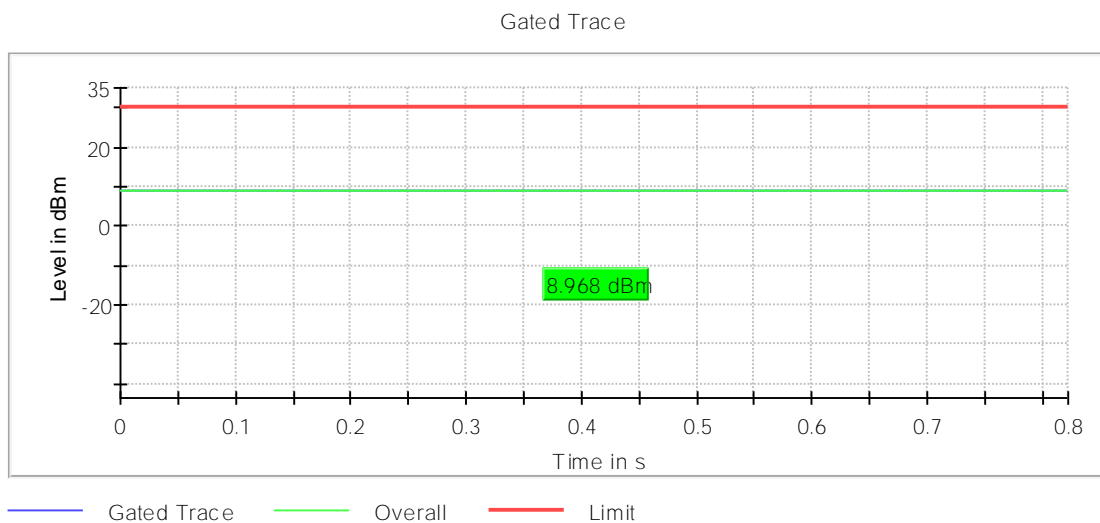
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 125 Kbit/s)**

**Images:**



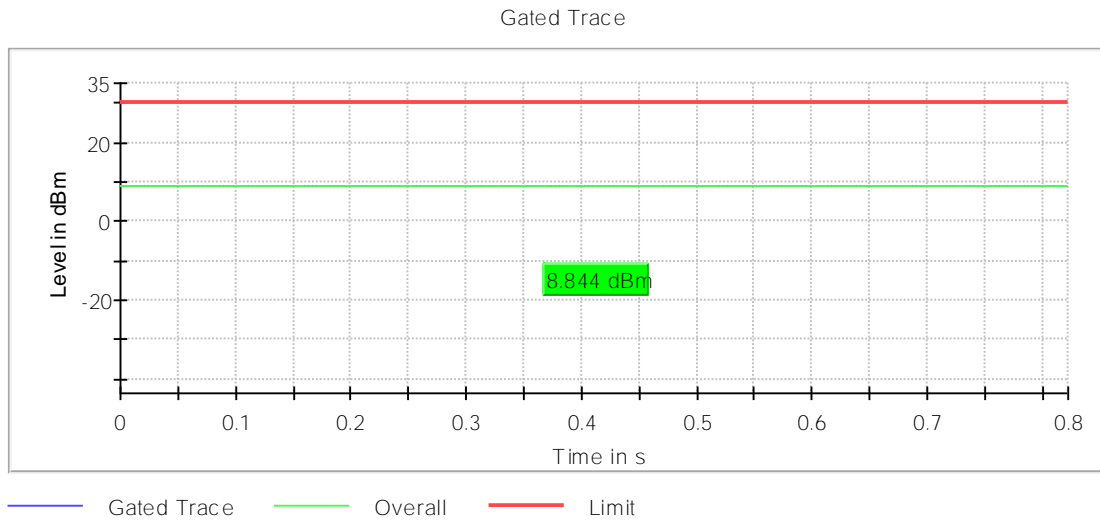
**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 125 Kbit/s)**

**Images:**



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1,  
Modulation = BTLE 5.1 (GFSK 125 Kbit/s)

Images:





Maximum declared antenna gain: 3.45 dBic

Modulation: BTLE 5.1 (GFSK 500 Kbit/s)

**Results**

Freq (MHz)	BW (MHz)	Peak Power (dBm)	Maximum EIRP power (dBm)
2402.00000		8.57	12.02
2440.00000	1	8.98	12.43
2480.00000		8.85	12.30

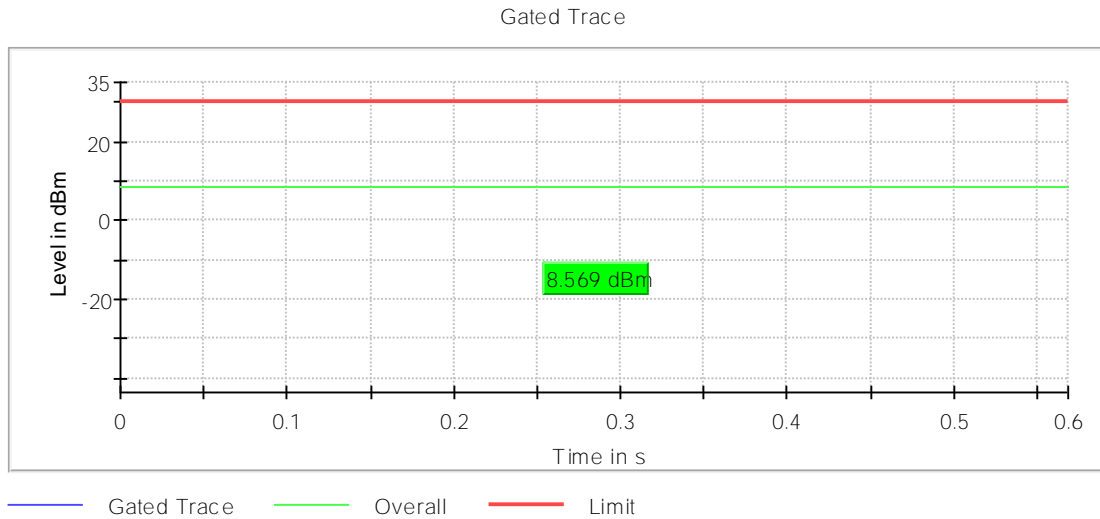
**Verdict**

Pass

**Attachments**

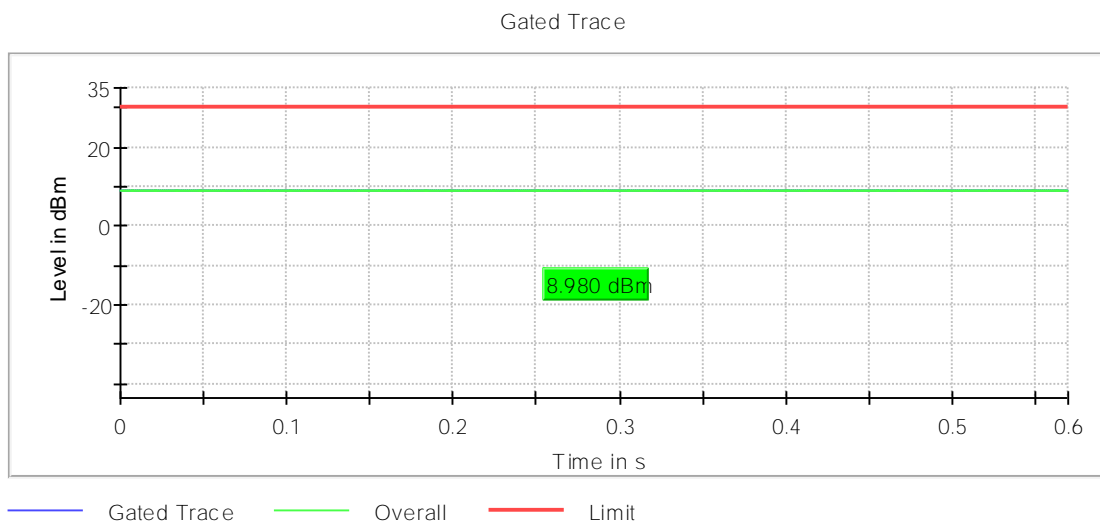
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 500 Kbit/s)**

**Images:**



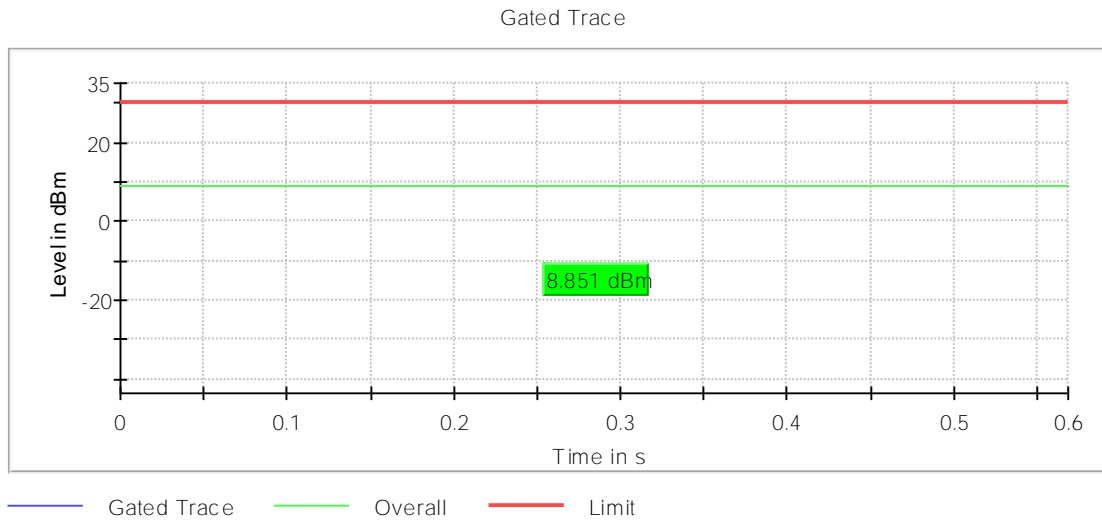
**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 500 Kbit/s)**

**Images:**



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1,  
Modulation = BTLE 5.1 (GFSK 500 Kbit/s)

Images:



Maximum declared antenna gain: 3.45 dBic

Modulation: BTLE 5.1 (GFSK 1 Mbit/s)

**Results**

Freq (MHz)	BW (MHz)	Peak Power (dBm)	Maximum EIRP power (dBm)
2402.00000		10.00	13.45
2440.00000	1	9.40	12.85
2480.00000		9.40	12.85

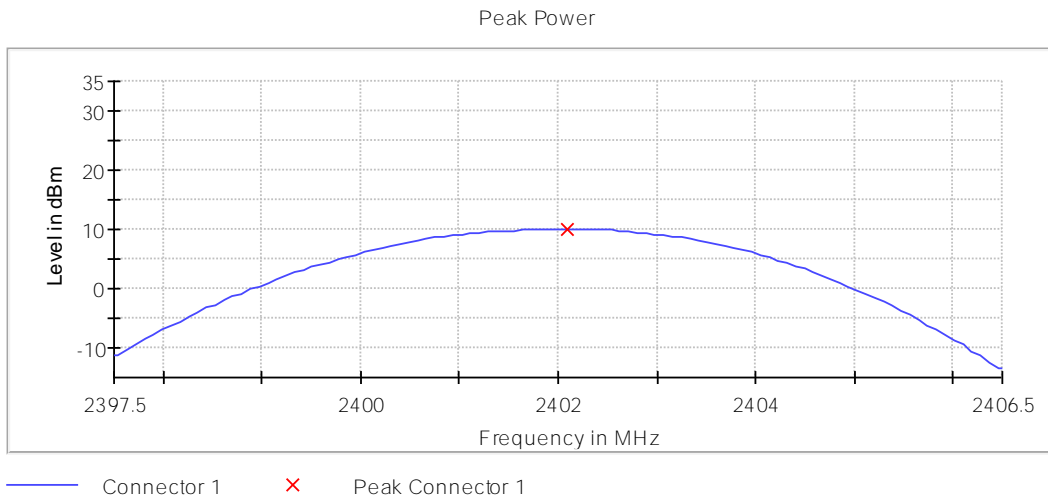
**Verdict**

Pass

**Attachments**

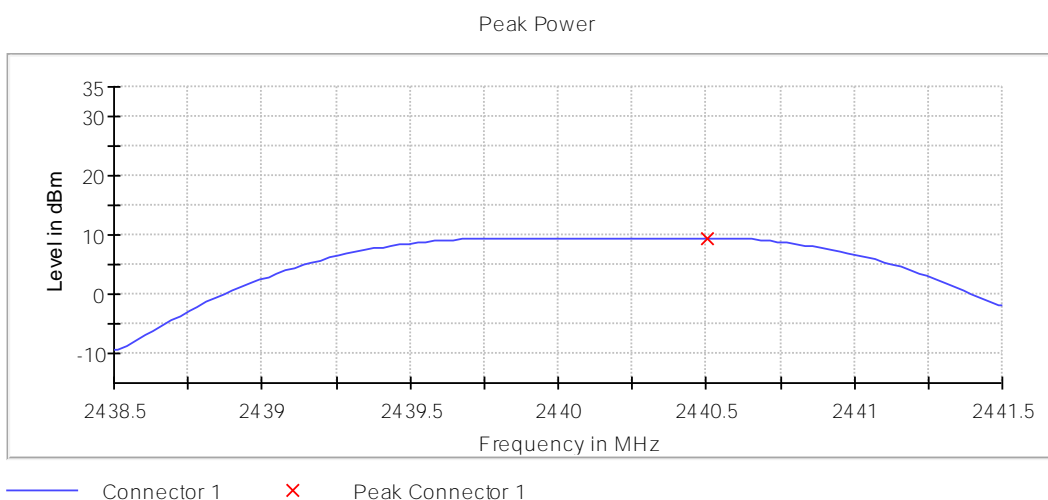
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 1 Mbit/s)**

**Images:**



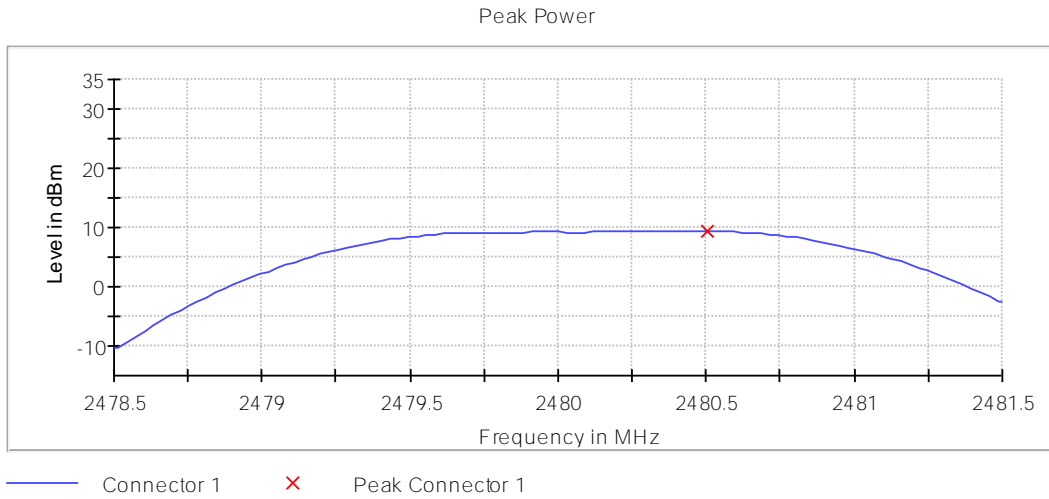
**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 1 Mbit/s)**

**Images:**



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1,  
Modulation = BTLE 5.1 (GFSK 1 Mbit/s)

Images:



### Limits

Maximum declared antenna gain: 3.45 dBic

Modulation: BTLE 5.1 (GFSK 2 Mbit/s)

**Results**

Freq (MHz)	BW (MHz)	Peak Power (dBm)	Maximum EIRP power (dBm)
2402.00000		9.20	12.65
2440.00000	2	8.60	12.05
2480.00000		8.50	11.95

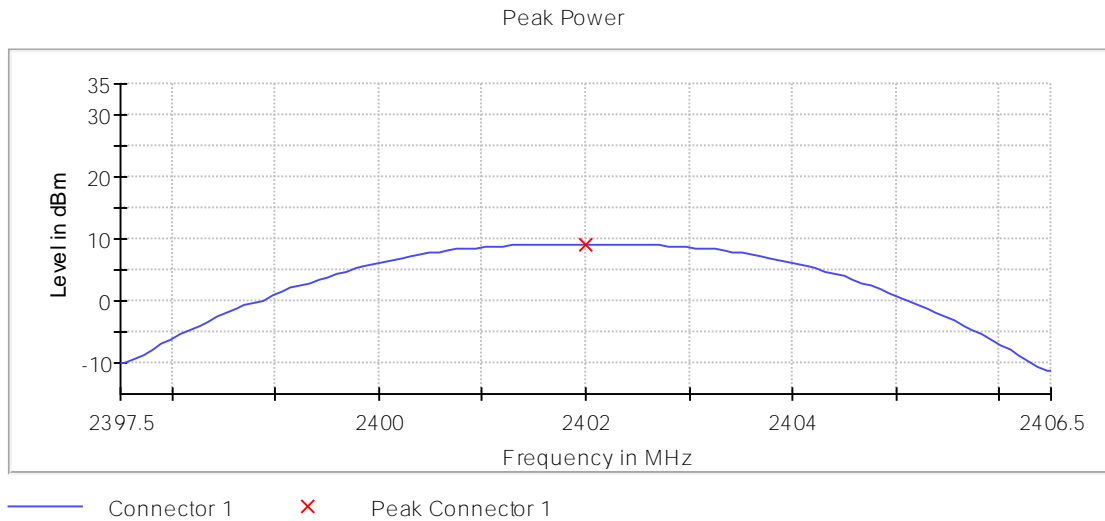
**Verdict**

Pass

**Attachments**

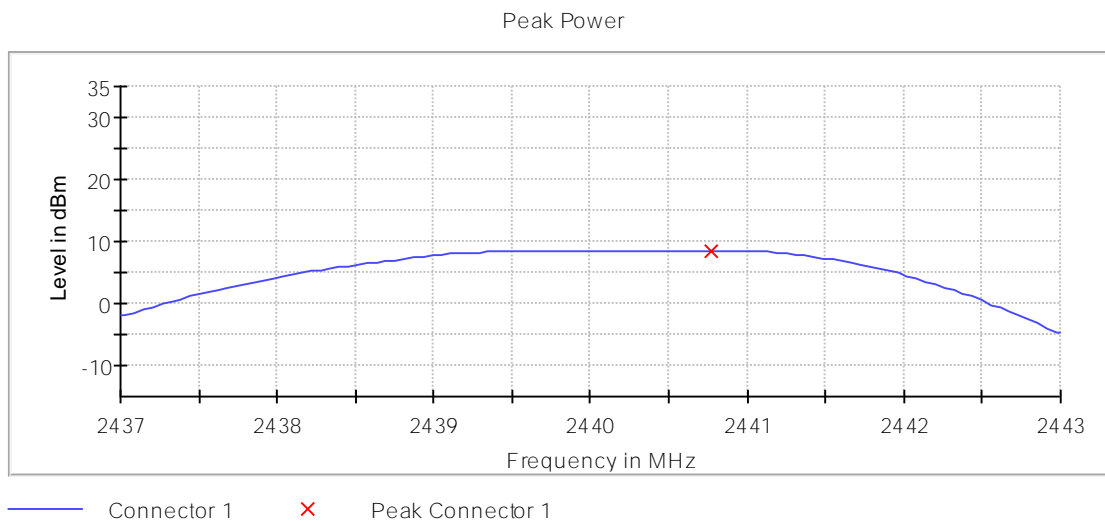
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)**

**Images:**



**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)**

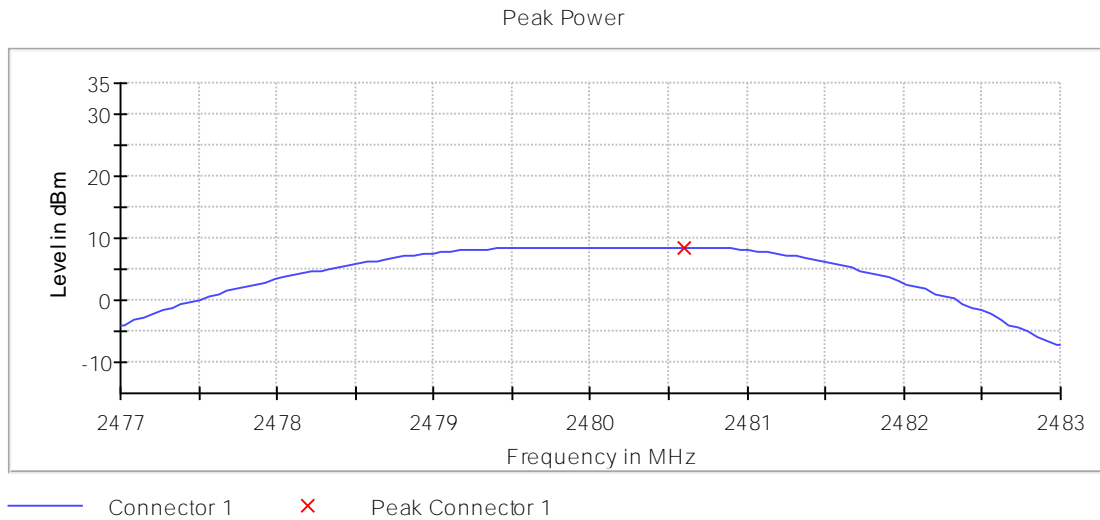
**Images:**





**Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)**

Images:



### Spectrum Analyzer Parameters

Setting	Instrument Value	Instrument Value	Instrument Value
Start Frequency	2.39750 GHz	2.43850 GHz	2.47850 GHz
Stop Frequency	2.40650 GHz	2.44150 GHz	2.48150 GHz
Span	9.000 MHz	3.000 MHz	3.000 MHz
RBW	3.000 MHz	1.000 MHz	1.000 MHz
VBW	10.000 MHz	3.000 MHz	3.000 MHz
SweepPoints	101	101	101
Sweeptime	1.000 ms	4.210 µs	4.210 µs
Reference Level	10.000 dBm	10.000 dBm	10.000 dBm
Attenuation	20.000 dB	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
SweepCount	100	100	100
Filter	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold
Sweeptype	Sweep	FFT	FFT
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.50 dB	0.50 dB	0.50 dB
Run	4 / max. 150	6 / max. 150	6 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.04 dB	0.01 dB	0.01 dB

## 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 5.1 (GFSK 125 Kbit/s)

### Results

Conducted spurious signals detected were minimum 19 dB below the reference limit for the lowest and highest operating channels.

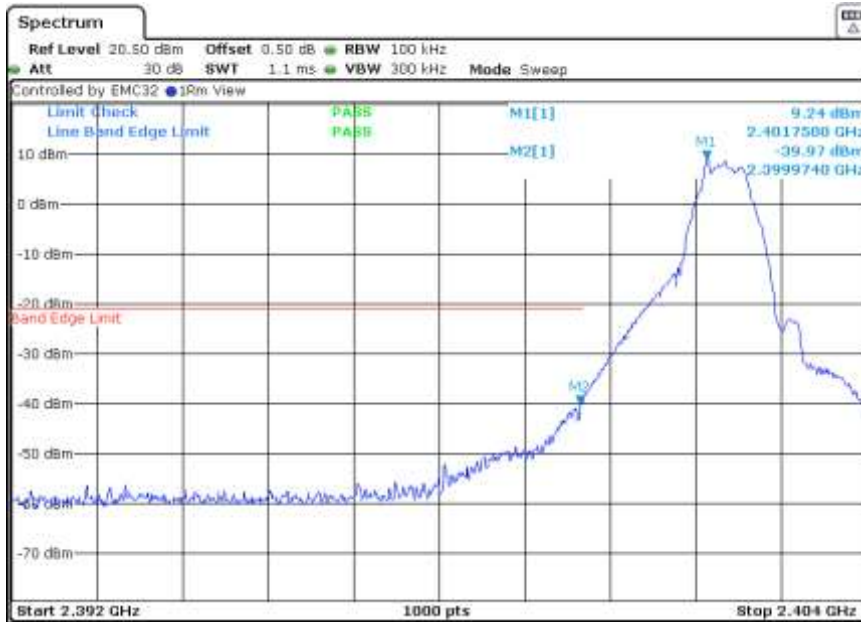
### Verdict

Pass

**Attachments**

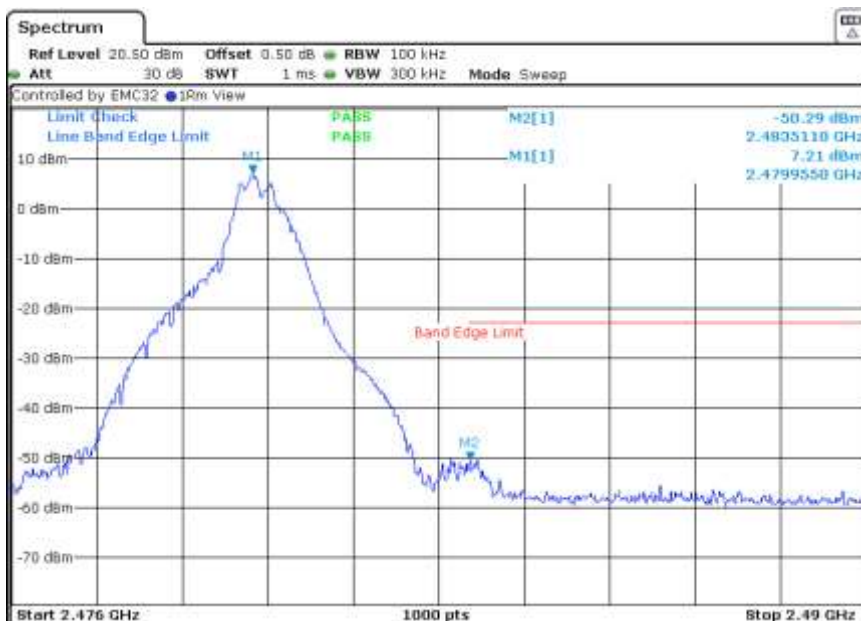
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 125 Kbit/s)**

**Images:**



**Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 125 Kbit/s)**

**Images:**



Modulation: BTLE 5.1 (GFSK 500 Kbit/s)

### **Results**

Conducted spurious signals detected were minimum 20 dB below the reference limit for the lowest and highest operating channels.

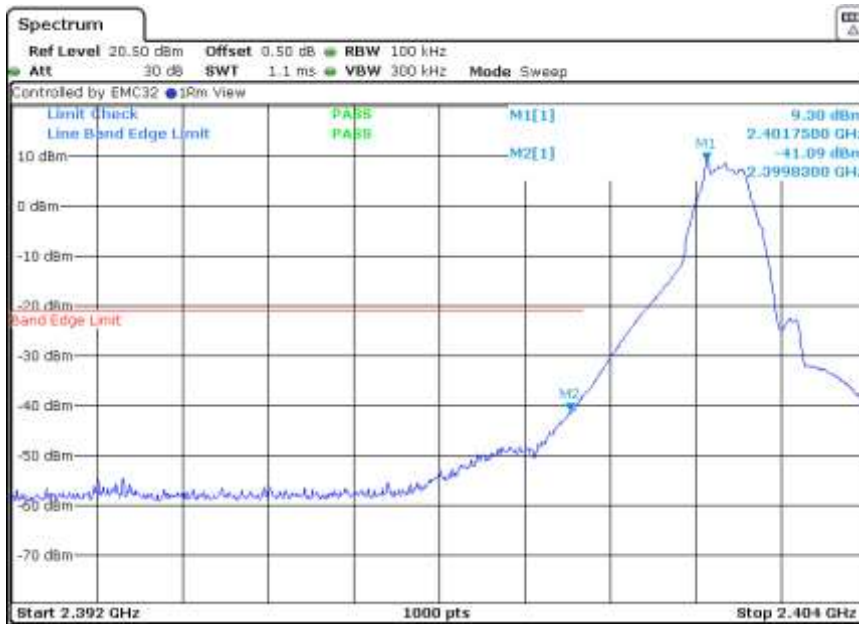
### **Verdict**

Pass

**Attachments**

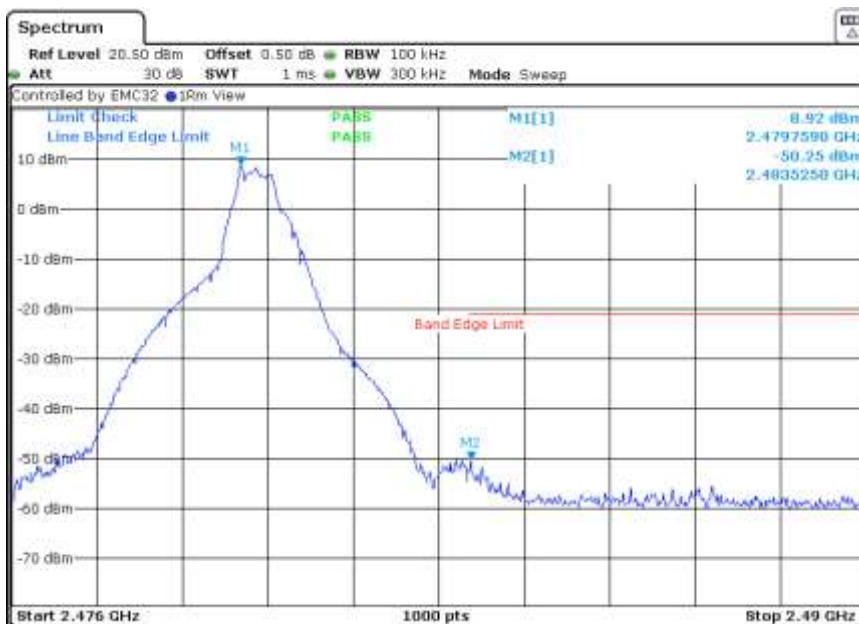
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1 , Modulation = BTLE 5.1 (GFSK 500 Kbit/s)**

**Images:**



**Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 500 Kbit/s)**

**Images:**



Modulation: BTLE 5.1 (GFSK 1 Mbit/s)

**Results**

DUT Frequency (MHz)	Result
2402.000000	PASS

DUT Frequency (MHz)	Result
2480.000000	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-37.0	26.2	-10.8	PASS
2399.925000	-37.8	27.0	-10.8	PASS
2399.875000	-39.1	28.3	-10.8	PASS
2399.825000	-39.6	28.8	-10.8	PASS
2399.775000	-40.6	29.7	-10.8	PASS
2399.725000	-41.1	30.3	-10.8	PASS
2399.675000	-43.1	32.3	-10.8	PASS
2399.625000	-43.2	32.4	-10.8	PASS
2399.575000	-43.6	32.7	-10.8	PASS
2385.625000	-44.4	33.5	-10.8	PASS
2385.675000	-44.4	33.6	-10.8	PASS
2385.725000	-44.4	33.6	-10.8	PASS
2385.575000	-44.5	33.7	-10.8	PASS
2385.425000	-44.6	33.8	-10.8	PASS
2385.375000	-44.6	33.8	-10.8	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2495.025000	-44.6	33.1	-11.6	PASS
2495.125000	-44.7	33.2	-11.6	PASS
2495.075000	-44.7	33.2	-11.6	PASS
2494.975000	-44.8	33.2	-11.6	PASS
2495.175000	-44.8	33.2	-11.6	PASS
2494.925000	-44.8	33.3	-11.6	PASS
2495.275000	-45.0	33.5	-11.6	PASS
2495.225000	-45.0	33.5	-11.6	PASS
2495.325000	-45.1	33.6	-11.6	PASS
2495.375000	-45.4	33.8	-11.6	PASS
2494.875000	-45.6	34.0	-11.6	PASS
2494.825000	-45.6	34.1	-11.6	PASS
2494.775000	-45.7	34.1	-11.6	PASS
2495.425000	-45.8	34.2	-11.6	PASS
2495.475000	-46.0	34.4	-11.6	PASS

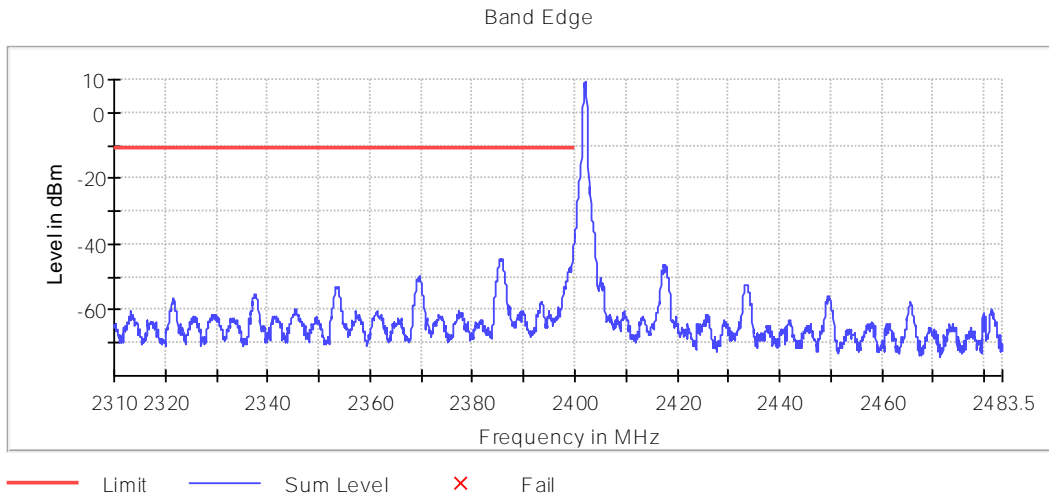
**Verdict**

Pass

**Attachments**

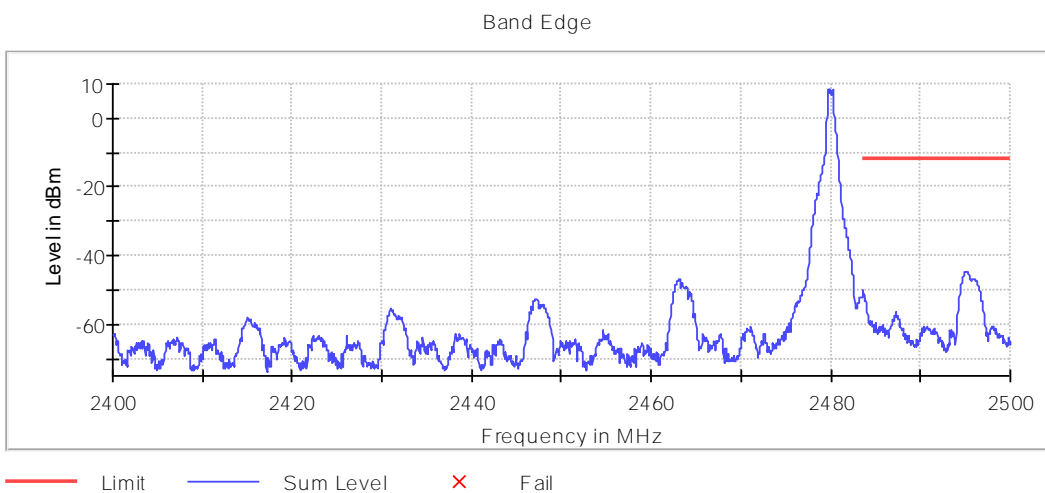
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 1 Mbit/s)**

**Images:**



**Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.1 (GFSK 1 Mbit/s)**

**Images:**



Modulation: BTLE 5.1 (GFSK 2 Mbit/s)

**Results**

DUT Frequency (MHz)	Result
2402.000000	PASS

DUT Frequency (MHz)	Result
2480.000000	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-22.6	11.0	-11.6	PASS
2399.925000	-24.2	12.6	-11.6	PASS
2399.875000	-26.4	14.8	-11.6	PASS
2399.825000	-30.2	18.6	-11.6	PASS
2399.775000	-32.4	20.8	-11.6	PASS
2399.725000	-33.8	22.2	-11.6	PASS
2399.675000	-36.6	25.0	-11.6	PASS
2399.625000	-38.5	26.9	-11.6	PASS
2399.575000	-39.8	28.2	-11.6	PASS
2399.525000	-40.1	28.5	-11.6	PASS
2399.475000	-40.3	28.7	-11.6	PASS
2399.425000	-41.5	29.9	-11.6	PASS
2399.375000	-41.6	30.0	-11.6	PASS
2399.325000	-42.1	30.5	-11.6	PASS
2399.275000	-42.7	31.1	-11.6	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2494.875000	-45.6	33.2	-12.4	PASS
2494.925000	-45.6	33.2	-12.4	PASS
2494.775000	-45.6	33.2	-12.4	PASS
2494.825000	-45.6	33.2	-12.4	PASS
2494.725000	-45.6	33.3	-12.4	PASS
2494.625000	-45.7	33.3	-12.4	PASS
2494.675000	-45.7	33.3	-12.4	PASS
2494.975000	-45.8	33.4	-12.4	PASS
2494.575000	-46.4	34.0	-12.4	PASS
2494.525000	-46.4	34.1	-12.4	PASS
2494.475000	-46.6	34.2	-12.4	PASS
2495.075000	-46.6	34.3	-12.4	PASS
2495.025000	-46.8	34.4	-12.4	PASS
2495.125000	-46.9	34.5	-12.4	PASS
2494.425000	-47.0	34.6	-12.4	PASS

**Verdict**

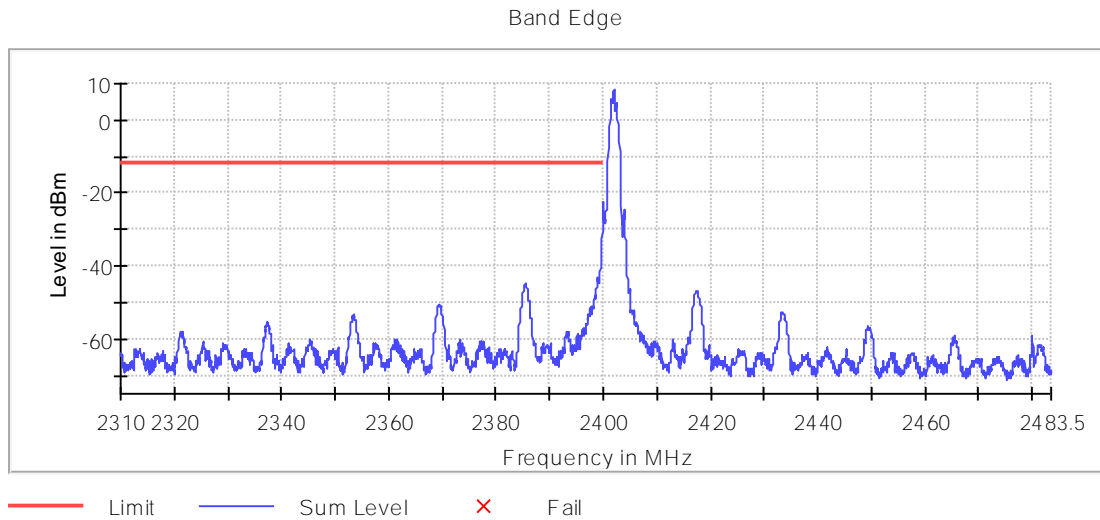
Pass



**Attachments**

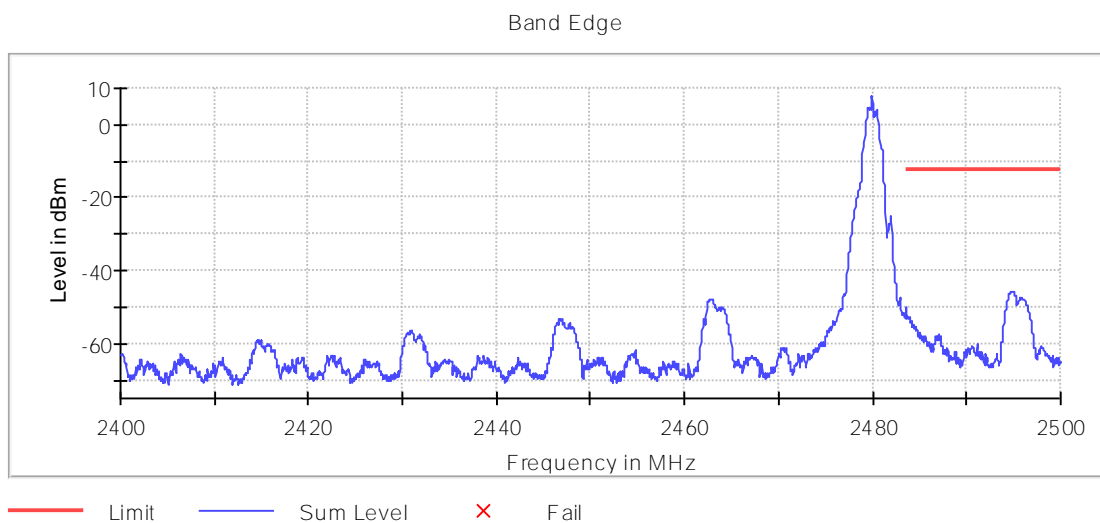
**Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)**

**Images:**



**Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.1 (GFSK 2 Mbit/s)**

**Images:**



### Spectrum Analyzer Parameters

Setting	Instrument Value	Instrument Value
Start Frequency	2.31000 GHz	2.40000 GHz
Stop Frequency	2.40000 GHz	2.48350 GHz
Span	90.000 MHz	83.500 MHz
RBW	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz
SweepPoints	1800	1670
Sweeptime	1.800 ms	1.670 ms
Reference Level	0.000 dBm	0.000 dBm
Attenuation	10.000 dB	10.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
SweepType	Sweep	Sweep
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	9 / max. 150	5 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.00 dB

RSS-247 5.5 / FCC 15.247 (d) - Emissions compliance (Transmitter) - Radiated

**Limits**

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §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
960 - 25000	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

**The following tables and plots show the results for the worst case**

**Verdict**

Pass

Modulation: BTLE 5.1 (GFSK 1 Mbit/s)

**Results**

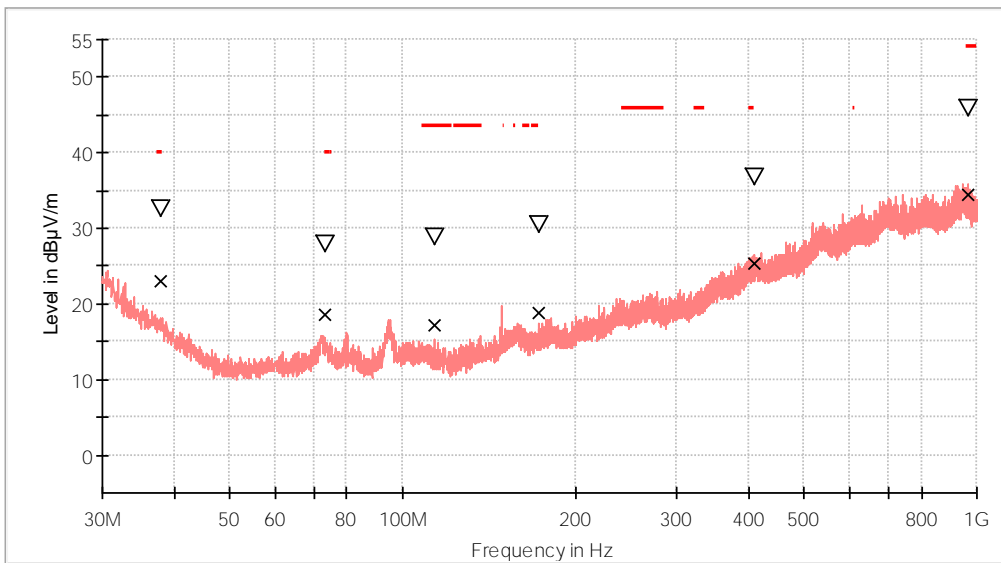
**Frequency range 0.03 - 1 GHz**

**The spurious emissions below 1 GHz do not depend on the operating channel selected in the EUT.**

**Lowest Channel**

**Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.1 (GFSK 1 Mbit/s), Frequency Range GHz = [0.03, 1]**

RF\_FCC\_15.247\_E Field\_30MHz\_1GHz\_SAC2



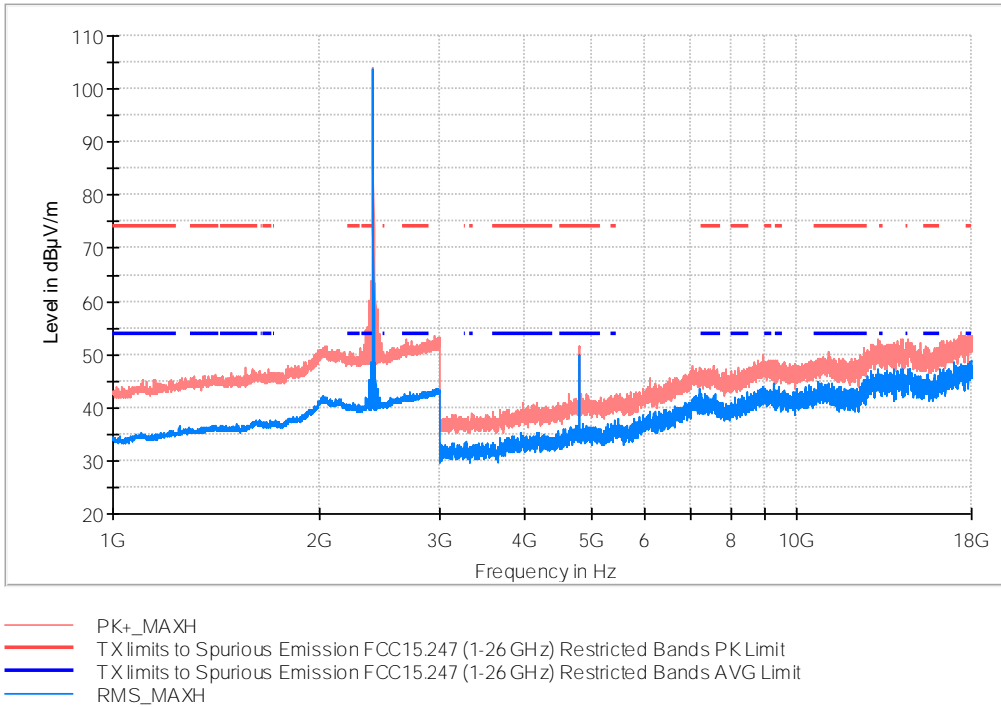
- PK+\_MAXH
- - - TX limits to Spurious Emission FCC15.247 (30MHz to 1GHz) Restricted Bands QPK Limit
- ▽ MaxPeak-PK+ (Single)
- × QuasiPeak-QPK (Single)

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Pol	Margin - QPK (dB)	Limit - QPK (dBµV/m)
37.954000	32.6	23.1	V	16.9	40.0
73.165000	28.0	18.6	H	21.4	40.0
113.808000	28.7	17.2	V	26.3	43.5
172.202000	30.4	18.8	V	24.7	43.5
409.173000	36.8	25.4	V	20.6	46.0
962.364000	45.9	34.5	H	19.5	54.0

**Frequency range 1 - 18 GHz**

**Lowest Channel**

**Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS),  
 Modulation = BTLE 5.1 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 18]**

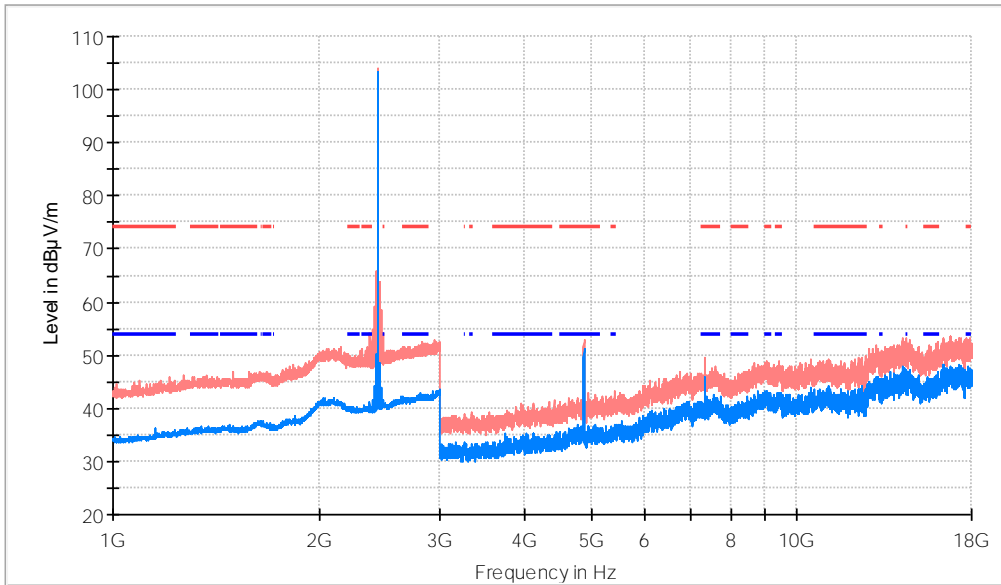


Frequency (MHz)	PK+_ MAXH (dBµV/m)	RMS_MAXH (dBµV/m)	Pol	Margin - RMS (dB)	Limit - RMS (dBµV/m)	Comment
2402.000000	104.2	103.6	V	---	---	Fundamental
4803.500000	51.4	49.8	H	4.2	54.0	2nd harmonic
11235.000000	47.4	44.6	V	9.4	54.0	

**Frequency range 1 - 18 GHz**

**Middle Channel**

**Frequency MHz = 2440.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS),  
 Modulation = BTLE 5.1 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 18]**



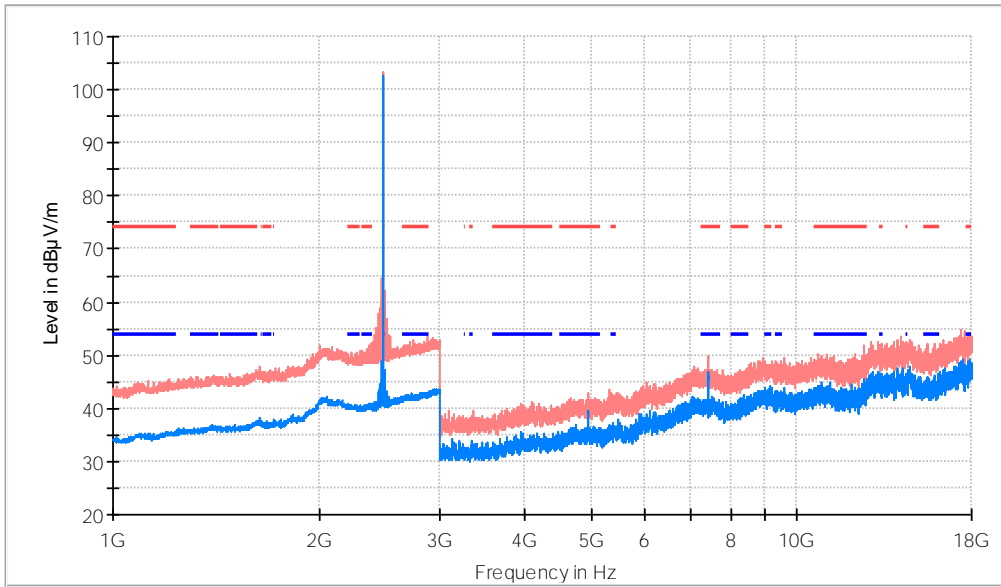
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 (1-26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1-26 GHz) Restricted Bands AVG Limit
- RMS\_MAXH

Frequency (MHz)	PK+_MAXH (dBµV/m)	RMS_MAXH (dBµV/m)	Pol	Margin - RMS (dB)	Limit - RMS (dBµV/m)	Comment
2440.000000	104.1	103.4	V	---	---	Fundamental
4880.000000	52.8	51.2	H	2.8	54.0	2nd Harmonic
7321.000000	49.0	46.0	V	8.0	54.0	3rd Harmonic

**Frequency range 1 - 18 GHz**

**Highest Channel**

**Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.1 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 18]**



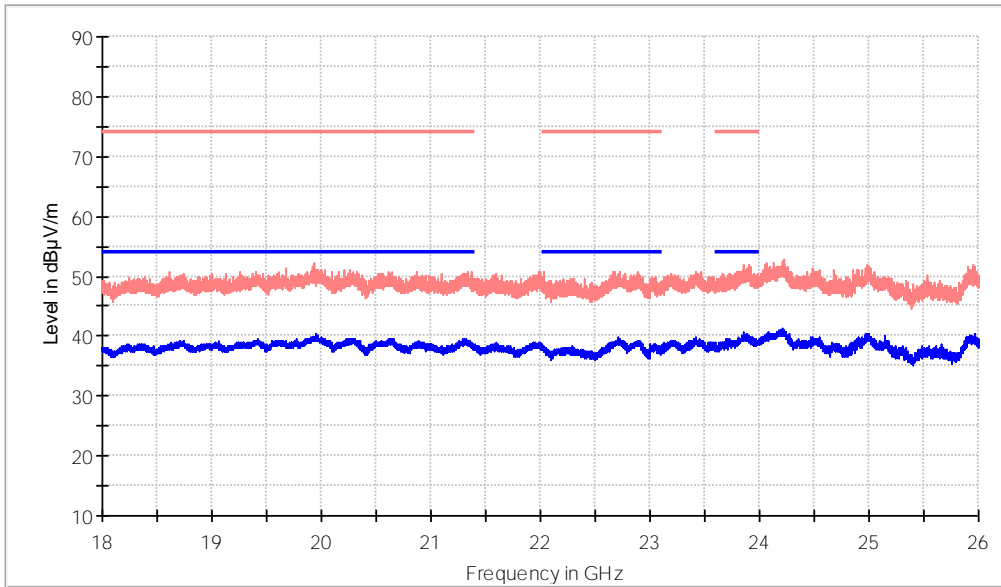
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 (1-26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1-26 GHz) Restricted Bands AVG Limit
- RMS\_MAXH

Frequency (MHz)	PK+_MAXH (dBµV/m)	RMS_MAXH (dBµV/m)	Pol	Margin - RMS (dB)	Limit - RMS (dBµV/m)	Comment
2480.00000	103.3	102.7	V	---	---	Fundamental
4959.50000	42.5	39.6	V	14.4	54.0	2nd Harmonic
7440.50000	49.9	46.7	V	7.3	54.0	3rd Harmonic

**Frequency range 18 - 26 GHz**

**Lowest Channel**

**Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.1 (GFSK 1 Mbit/s), Frequency Range GHz = [18, 26]**



- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247(1-26G) Restricted Bands AVG Limit

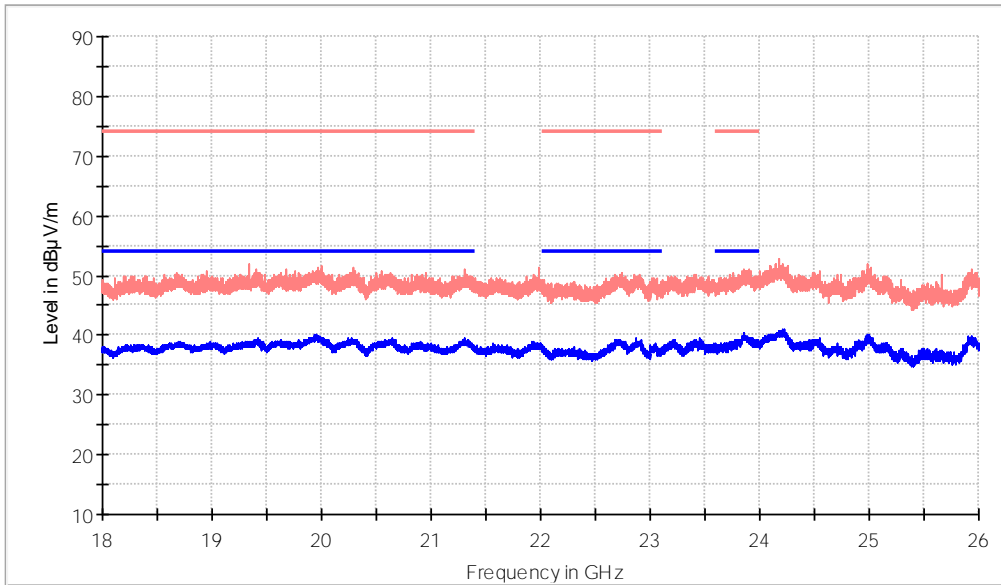
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
19957.000000	50.1	40.3	V	13.7	54.0
22714.500000	49.4	39.9	V	14.1	54.0
23862.500000	50.8	40.6	V	13.4	54.0



**Frequency range 18 - 26 GHz**

**Middle Channel**

**Frequency MHz = 2440.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.1 (GFSK 1 Mbit/s), Frequency Range GHz = [18, 26]**



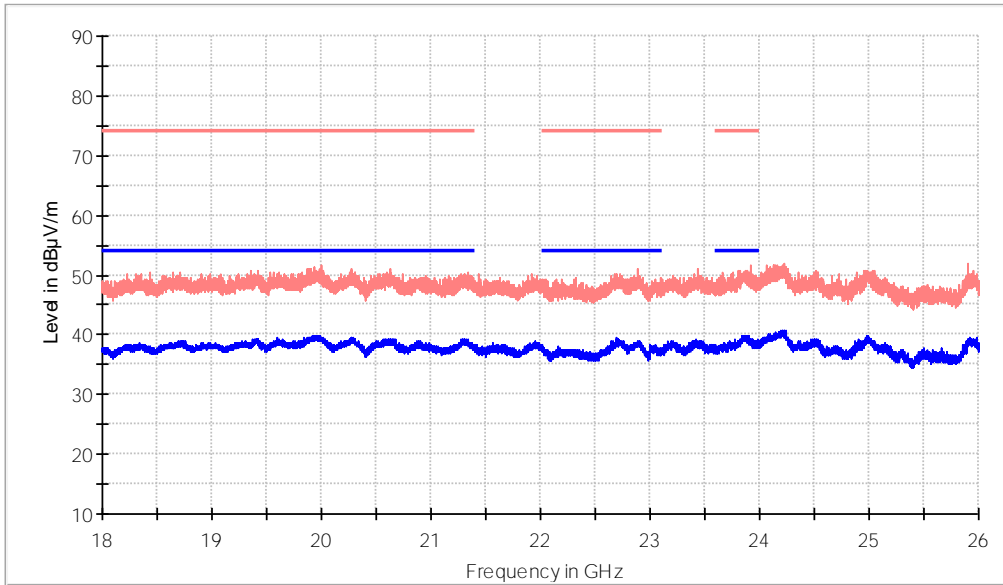
- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247(1-26G) Restricted Bands AVG Limit

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	PoI	Margin - AVG (dB)	Limit - AVG (dBµV/m)
19949.500000	49.7	40.2	V	13.9	54.0
21312.000000	49.0	39.5	V	14.5	54.0
23859.500000	49.4	40.3	V	13.7	54.0

**Frequency range 18 - 26 GHz**

**Highest Channel**

**Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.1 (GFSK 1 Mbit/s), Frequency Range GHz = [18, 26]**



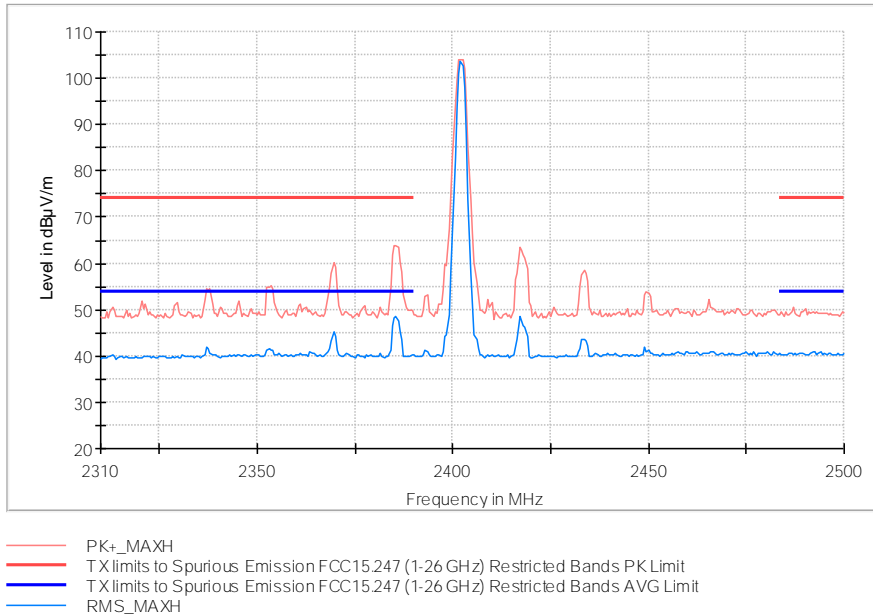
- AVG\_MAXH
- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247(1-26G) Restricted Bands AVG Limit

Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
19969.000000	49.1	39.8	V	14.2	54.0
22691.500000	48.8	39.5	V	14.5	54.0
23879.000000	49.4	39.9	V	14.1	54.0

**Restricted Bands (2.31 GHz - 2.5 GHz)**

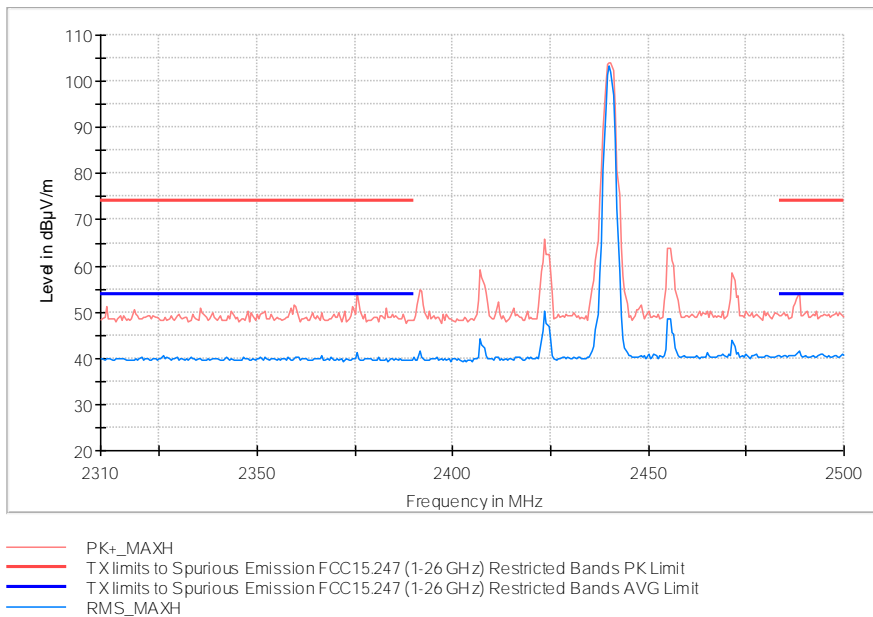
**Lowest Channel**

**Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.1 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 18]**



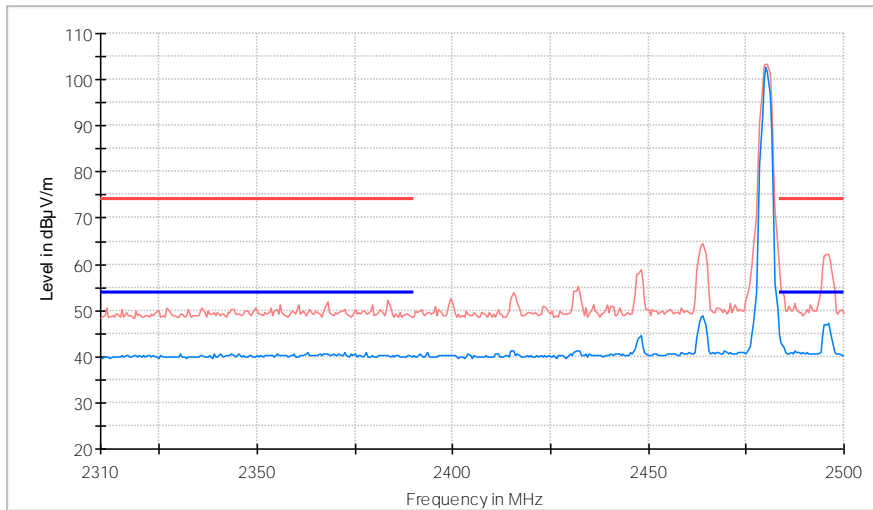
**Middle Channel**

**Frequency MHz = 2440.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.1 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 18]**



**Highest Channel**

**Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.1 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 18]**



- PK+\_MAXH
- TX limits to Spurious Emission FCC15.247 (1-26 GHz) Restricted Bands PK Limit
- TX limits to Spurious Emission FCC15.247 (1-26 GHz) Restricted Bands AVG Limit
- RMS\_MAXH

**Spectrum Analyzer Parameters**

Subrange	Step Size	Detectors	Bandwidth	Sweep Time
30 MHz - 1 GHz	48.5 kHz	RMS ; PK+	100 kHz	1 s

**Spectrum Analyzer Parameters**

Subrange	Step Size	Detectors	Bandwidth	Sweep Time
1 GHz - 3 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s
3 GHz - 18 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s

**Spectrum Analyzer Parameters**

Subrange	Step Size	Detectors	Bandwidth	Sweep Time
18 GHz - 26 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s