DEKRA Certification, Inc.
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Sterling, VA 20164
United States of America

FCC LISTED, REGISTRATION NUMBER: 2764.01

ISED LISTED REGISTRATION NUMBER: 23595-1

Test Report No:
3853ERM.010A1

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	CIVIC (Central In-Vehicle Infotainment Computer)
(*) Trademark	BOSCH
(*) Model and /or type reference	MBCI2LS3PN1
Other identification of the product	FCC ID: 2AUXS-MBCI2LS3PN1 (NA) IC: 25847-MBCI2LS3PN1 (NA) HVIN: MBCI2LS3PN1
(*) Features	AM/FM/DAB/SIRIUS, GNSS, 2.4/5GHz WLAN, Bluetooth 5.1, Video/Audio etc
Manufacturer	Robert Bosch GmbH Robert-Bosch-Strasse 200, 31139 Hildesheim Germany
Test method requested, standard	USA FCC Part 15.247 (10-1-20 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz USA FCC Part 15.209 (10-1-20 Edition): Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 amendment 1 (March 2019). Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules. 558074 D01 Meas Guidance v05r02 dated April 2, 2019. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Domingo Galvez EMC&RF Lab Manager Digitally signed by Domingo Galvez DN: cn=Domingo Galvez, o=DEKRA Certification Inc., ou=Regulatory Lab, email=dgalvez@dekra.com, c=US
Date of issue	12-02-2022
Report template No	FDT08_23 (*) "Data provided by the client"

Index

Acronyms

Acronym ID	Acronym Description
# of Tx Chains	Number of Transmission Chains
26Ebw	Emission Bandwidth
BW	Bandwidth
Equipment	Equipment Type
Freq	Frequency
In band Peak Lvl	In band Peak Level
Lvl	Level
MP	Measurement Point
Mod	Modulation
Occ Ch BW	Occupied Channel Bandwidth
PSD	Power Spectrum Density
Peak Power	Maximum Peak Conducted Output Power
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.

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 CIVIC Central In-Vehicle Infotainment Computer, including WLAN/ Bluetooth, GPS, AM/FM/DAB receiver.

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 used for testing have been selected by: The client.

Sample S/01 is composed of the following elements, accessories and auxiliary equipment:

Id	Control Number	Description	Manufacturer / Model	Serial Nº	Date of Reception	Application
S/01	3853/09	Central In-Vehicle Infotainment Computer	Bosch / MBCI2LS3PN1	CM0427N0006029	09/09/2022	Element Under Test
S/01	3853/18	Harness – Main connector A	-	-	09/09/2022	Accessory
S/01	3853/64	Cable 4 in 1 – BT/Wi-Fi connector	-	-	09/09/2022	Accessory
S/01	3853/67	Cable – USB MMB Connector	-	-	09/09/2022	Accessory
S/01	3853/74	Harness – Main connector B	-	-	09/09/2022	Accessory

1. Sample S/01 was used for the test(s): All Conducted Tests Indicated in Appendix A, B, and C.

Sample S/02 is composed of the following elements, accessories and auxiliary equipment:

Id	Control Number	Description	Manufacturer / Model	Serial Nº	Date of Reception	Application
S/02	3853/08	Central In-Vehicle Infotainment Computer	Bosch / MBCI2LS3PN1	CM0427N0006010	09/09/2022	Element Under Test
S/02	3853/16	Harness – Main connector A	-	-	09/09/2022	Accessory
S/02	3853/19	Antenna	Bosch / A1779052902/002	057577	09/09/2022	Element Under Test
S/02	3853/20	Antenna	Bosch / A1779052902/002	008686	09/09/2022	Element Under Test
S/02	3853/21	Antenna	Bosch / A1779052902/002	057584	09/09/2022	Element Under Test
S/02	3853/22	Antenna	Bosch / A1779052902/002	008733	09/09/2022	Element Under Test
S/02	3853/51	Cable – GNSS Connector	-	-	09/09/2022	Accessory
S/02	3853/55	Cable 4 in 1 – BT/Wi-Fi connector	-	-	09/09/2022	Accessory
S/02	3853/73	Cable – USB MMB Connector	-	-	09/09/2022	Accessory
S/02	3853/73.1	USB Load (dongle)	-	-	09/09/2022	Accessory
S/02	3853/75	Harness – Main connector B	-	-	09/09/2022	Accessory

2. Sample S/02 was used for the test(s): All Radiated tests indicated in appendix A, B, and C.

Test sample description

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

Ports…… :	Port name and description		Cable				
			Specified length [m]	Attached during test	Shielded	Coupled to patient	
	Main Connector A		2	☒	☐	☐	
	Main Connector B		2	☒	☐	☐	
	Fakra Quad Connector AM/FM/DAB			☒	☒	☐	
	Fakra Single Connector GPS			☒	☒	☐	
	Fakra Quad Connector WLAN/BT			☒	☐	☐	
Supplementary information to the ports…… :	No Data Provided						
Rated power supply .....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 9-16V nominal 12 VDC by vehicle battery					
	☐	DC:					
Rated Power .....:	3.8 A						
Clock frequencies.....:	No Data Provided						
Other parameters .....:	No Data Provided						
Software version .....:	E030.6						
Hardware version .....:	D1.1						
Dimensions in cm (W x H x D) ....:	No Data Provided						
Mounting position .....:	☐	Table top equipment					
	☐	Wall/Ceiling mounted equipment					
	☐	Floor standing equipment					
	☐	Hand-held equipment					
	☒	Other: Cluster in the car					

Modules/parts .....:	Module/parts of test item	Type	Manufacturer
	Antennas		
	HUD		
	SA2 Panel		
	Cameras		
Accessories (not part of the test item) .....:	Description	Type	Manufacturer
	No Data Provided		
Documents as provided by the applicant.....:	Description	File name	Issue date
	Declaration Equipment Data	LS3_Plus_FDT30_18 Declaration Equipment Data_V1_signed	11/09/2022
Copy of marking plate:			

Identification of the client

Robert Bosch GmbH
Robert-Bosch-Strasse 200,
31139 Hildesheim
Germany

Testing period and place

Test Location	DEKRA Certification Inc.
Date (start)	09-29-2022
Date (finish)	11-02-2022

Document history

Report number	Date	Description
3853ERM010	11-23-2022	First release.
3583ERM.010A1	12-02-2022	Second release. Added the antenna gain MIMO calculations. This modification of the test report cancels and replaces the test report 3853ERM.010

Environmental conditions

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %

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

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Lakshmi Gollamudi, Juliana Cherry, Yuri Barone, Nasir Khan and Koji Nishimoto.

List of equipment used during the test

Conducted Measurements

CONTROL NUMBER	DESCRIPTION	Serial No	LAST CALIBRATION	NEXT CALIBRATION
897	AMETEK DC Power Supply	1707A01906	N/A	N/A
1014	FSV40 Signal Analyser 40GHz	101626	2021-05-19	2023-05-19
1107	Ethernet SNMP Thermometer-RF1 Room	60038026952	2022-10-18	2024-10-18
1313	Wireless Measurement Software R&S EMC32	-	N/A	N/A

Radiated Measurements

CONTROL NUMBER	DESCRIPTION	Serial No	LAST CALIBRATION	NEXT CALIBRATION
897	Power Supply (ETS-Lindgren / Switch-7001-003)	SN00206275	N/A	N/A
981	Low Noise Preamplifier	1711156B	2020-11-10	2022-11-10
1012	ESR26 EMI Test Receiver	101478	2022-04-12	2024-04-12
1014	FSV40 Signal Analyzer 40GHz	101626	2021-05-19	2023-05-19
1056	3116C Double-Ridged Waveguide Horn Antenna 19-40 GHz	213179	2020-01-10	2023-01-10
1057	3115 Double-Ridged Waveguide Horn Antenna 1-18 GHz	211373	2020-06-03	2023-06-03
1065	Ethernet SNMP Thermometer-CR Room	208587	2020-08-13	2023-08-13
1108	Ethernet SNMP Thermometer-SAC	60038026954	2022-10-18	2024-10-18
1111	Semi anechoic Absorber Lined Chamber	60038026577	2022-10-18	2024-10-18
1179	Wireless Measurement Software R&S EMC32	F169021	N/A	N/A
1314	Low Noise Preamplifier	1040-OT102236	N/A	N/A

Testing verdicts

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

Summary

Bluetooth Low Energy

Requirement – Test case	FCC PART 15 PARAGRAPH / RSS-247	Verdict	Remark
RSS-247 5.2 (a) / FCC 15.247 (a) (2) 6 dB Bandwidth		Pass	N/A
FCC 2.1049 / 99dBw Occupied Channel Bandwidth 99%		Pass	N/A
RSS-247 5.2 (b) / FCC 15.247 (e) Power spectral density		Pass	N/A
RSS-247 5.4 (d) / FCC 15.247 (b) (3) Maximum Peak Conducted output power		Pass	N/A
RSS-247 5.5 / FCC 15.247 (d) Band-edge emissions compliance (Transmitter)		Pass	N/A
RSS-247 5.5 / FCC 15.247 (d) Emissions compliance (Transmitter) - Conducted		Pass	N/A
RSS-247 5.5 / FCC 15.247 (d) Emissions compliance (Transmitter) - Radiated		Pass	N/A
Supplementary information and remarks: None			

Bluetooth EDR

Requirement – Test case	FCC PART 15 PARAGRAPH / RSS-247	Verdict	Remark
RSS-247 5.1 (b) / FCC 15.247 (a) (1) 20 dB Bandwidth		Pass	N/A
FCC 2.1049 / 99dBw Occupied Channel Bandwidth 99%		Pass	N/A
RSS-247 5.1 (b) / FCC 15.247 (a) (1) Carrier Frequency Separation		Pass	N/A
RSS-247 5.1 (d) / FCC 15.247 (a) (1) (iii) Time of Occupancy (Dwell Time)		Pass	N/A
RSS-247 5.1 (d) / FCC 15.247 (a) (1) (iii) Number of hopping channels		Pass	N/A
RSS-247 5.4 (b) / FCC 15.247 (b) (1) Maximum Peak Conducted output power & Antenna gain		Pass	N/A
RSS-247 5.5 / FCC 15.247 (d) Band-edge emissions compliance (Transmitter) - Conducted		Pass	N/A
RSS-247 5.5 / FCC 15.247 (d) Emissions compliance (Transmitter) - Conducted		Pass	N/A
RSS-247 5.5 / FCC 15.247 (d) Emissions compliance (Transmitter) - Radiated		Pass	N/A
Supplementary information and remarks: None			

Wi-Fi 2.4GHz

Requirement – Test case	FCC PART 15 PARAGRAPH / RSS-247	Verdict	Remark
RSS-247 5.2 (a) / FCC 15.247 (a) (2) 6 dB Bandwidth		Pass	N/A
FCC 2.1049 / 99dBw Occupied Channel Bandwidth 99%		Pass	N/A
RSS-247 5.2 (b) / FCC 15.247 (e) Power spectral density		Pass	N/A
RSS-247 5.4 (d) / FCC 15.247 (b) (1) Maximum Average Conducted Output Power		Pass	N/A
RSS-247 5.5 / FCC 15.247 (d) Band-edge emissions compliance (Transmitter) - Conducted		Pass	N/A
RSS-247 5.5 / FCC 15.247 (d) Emissions compliance (Transmitter) - Conducted		Pass	N/A
RSS-247 5.5 / FCC 15.247 (d) Emissions compliance (Transmitter) - Radiated		Pass	N/A
Supplementary information and remarks: Appendix C1: SISO A Appendix C2: SISO B Appendix C3: MIMO			

Appendix A: Test results. Bluetooth Low Energy 5.0 (2M, 1M)

Appendix A

PRODUCT INFORMATION

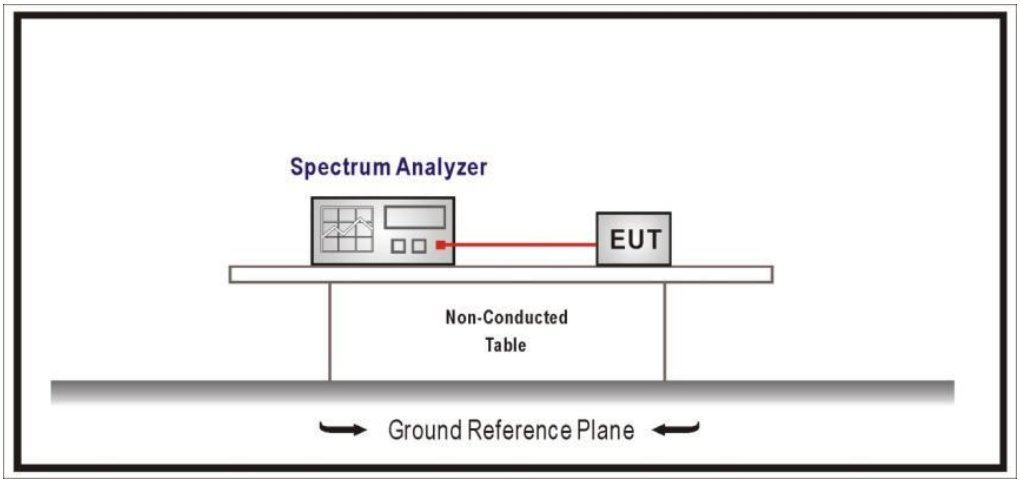
Information	Description
Modulation	GFSK
Operation mode 1: Single Antenna Equipment	
• Operating Frequency Range	2402 – 2480 MHz
• Nominal Channel Bandwidth	1 MHz, 2 MHz
• RF Output Power	10 dBm
Antenna type	External
Antenna gain	2 dBi
Nominal Voltage	
• Supply Voltage	12 Vdc
• Type of power source	DC voltage
Equipment type	Bluetooth Low Energy

TEST CONDITIONS

(*): Data provided by the client.

TEST CONDITIONS	DESCRIPTION
TC#01 (1 Mbps)	Power supply (V): $V_{nominal}$ = 12 V dc Data Rate: 1 Mbps Bandwidth: 1 MHz Test Frequencies for Conducted/ Radiated tests: Lowest channel: 2402 MHz Middle channel: 2440 MHz Highest channel: 2480 MHz
TC#02 (2 Mbps)	Power supply (V): $V_{nominal}$ = 12 V dc Data Rate: 2 Mbps Bandwidth: 2 MHz Test Frequencies for Conducted/ Radiated tests: Lowest channel: 2402 MHz Middle channel: 2440 MHz Highest channel: 2480 MHz

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 360º 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.

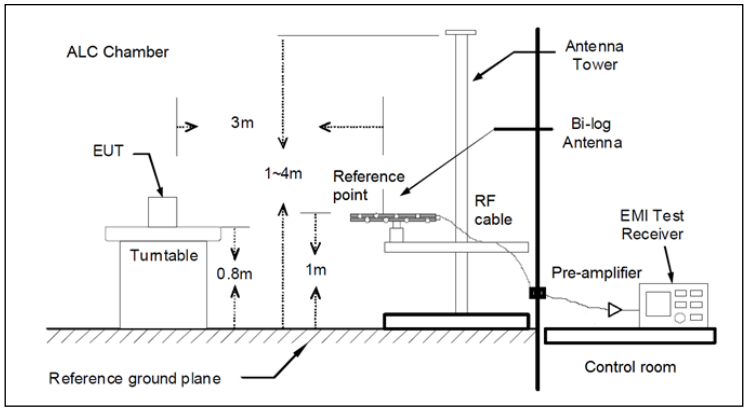


Fig A1: Radiated measurements Setup f < 1 GHz

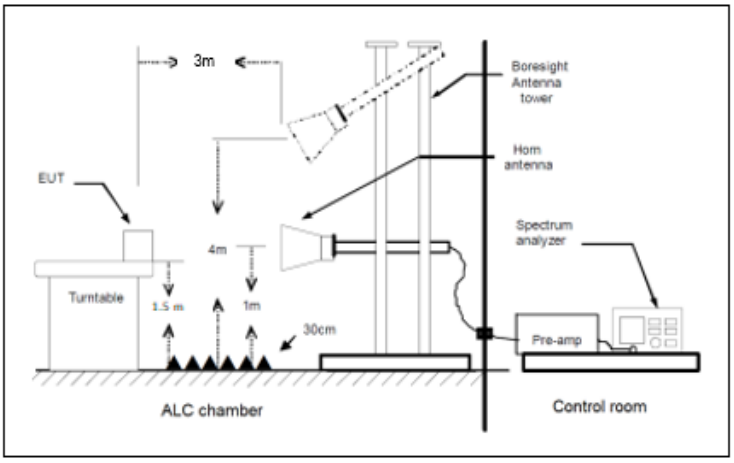


Fig A2: Radiated measurements setup f > 1-18 GHz

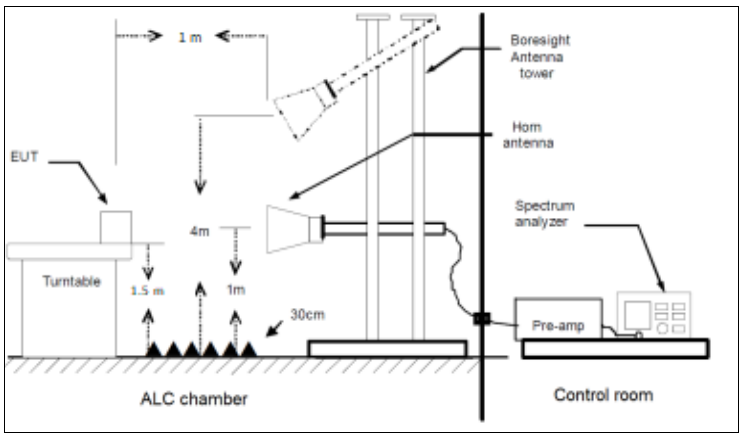


Fig A3: Radiated measurements setup f > 18 GHz

TEST CASES DETAILS

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

Limits

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

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)
Results

Freq (MHz)	BW (MHz)	Emission Bandwidth (MHz)
2402.00000	1	0.693
2440.00000	1	0.693
2480.00000	1	0.713

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)
Results

Freq (MHz)	BW (MHz)	Emission Bandwidth (MHz)
2402.00000	2	1.188
2440.00000	2	1.228
2480.00000	2	1.228

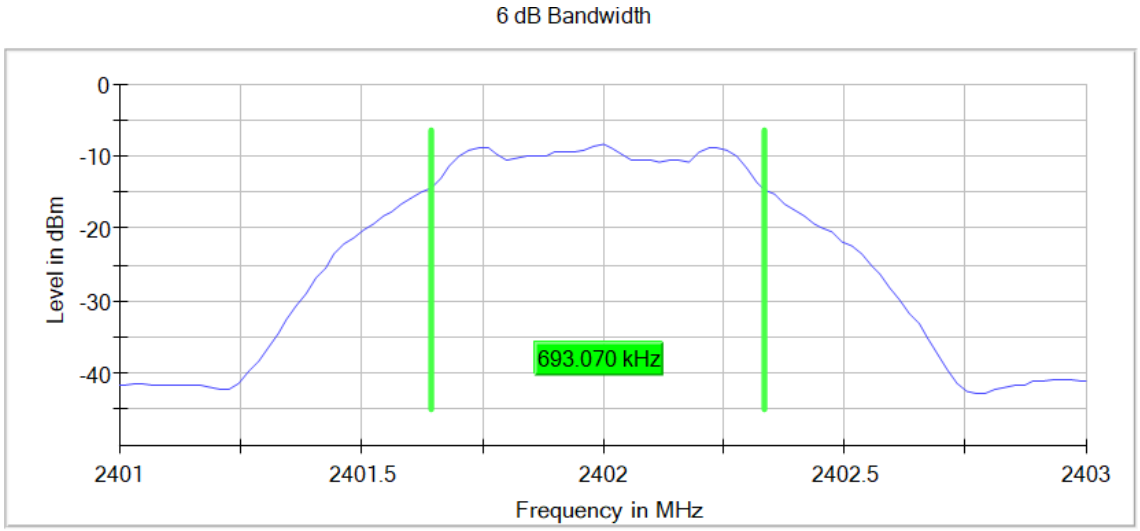
Verdict

Pass

Attachments

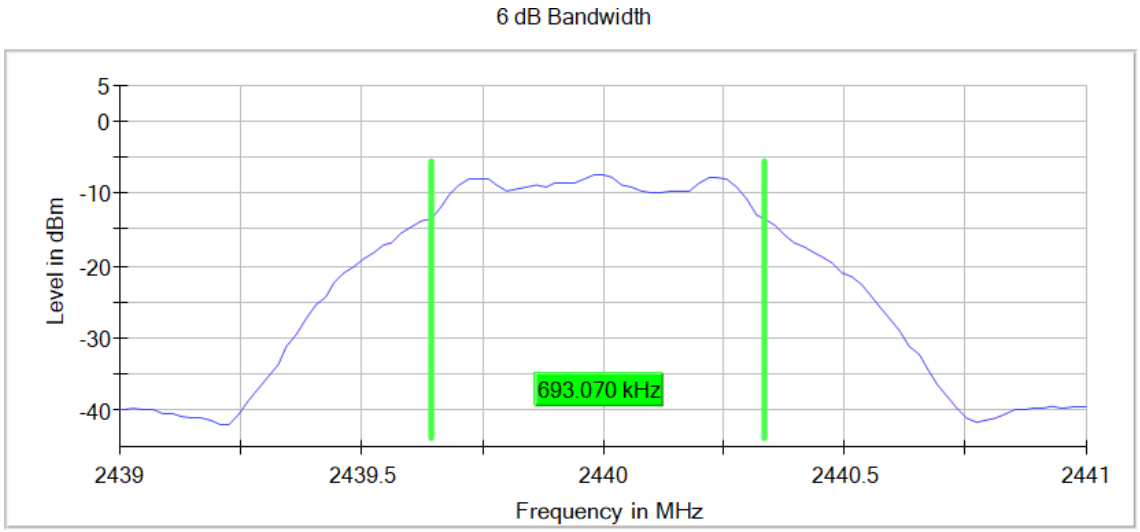
Frequency MHz = 2402.00000, Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



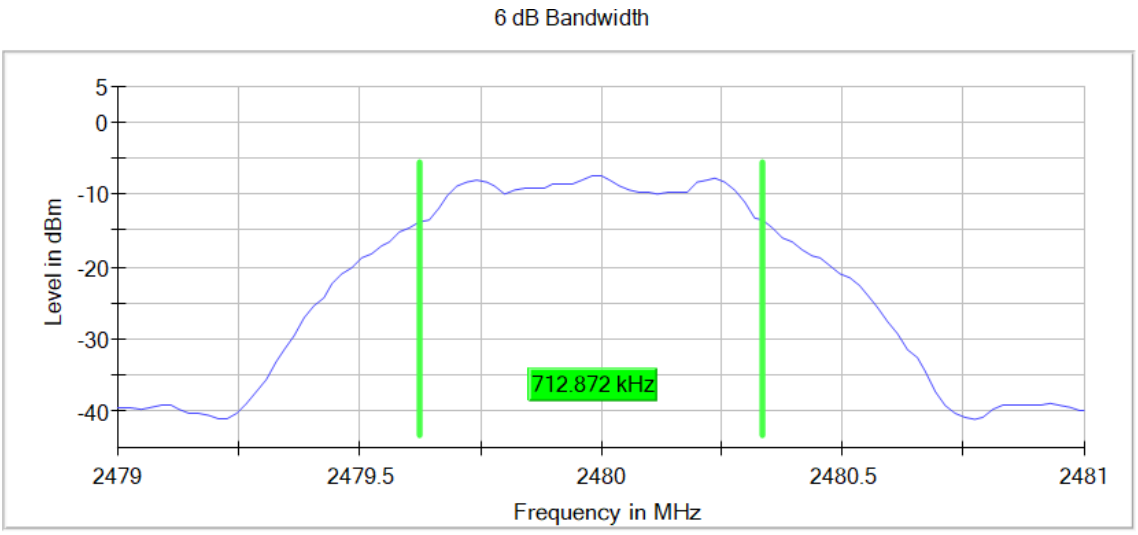
Frequency MHz = 2440.00000, Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



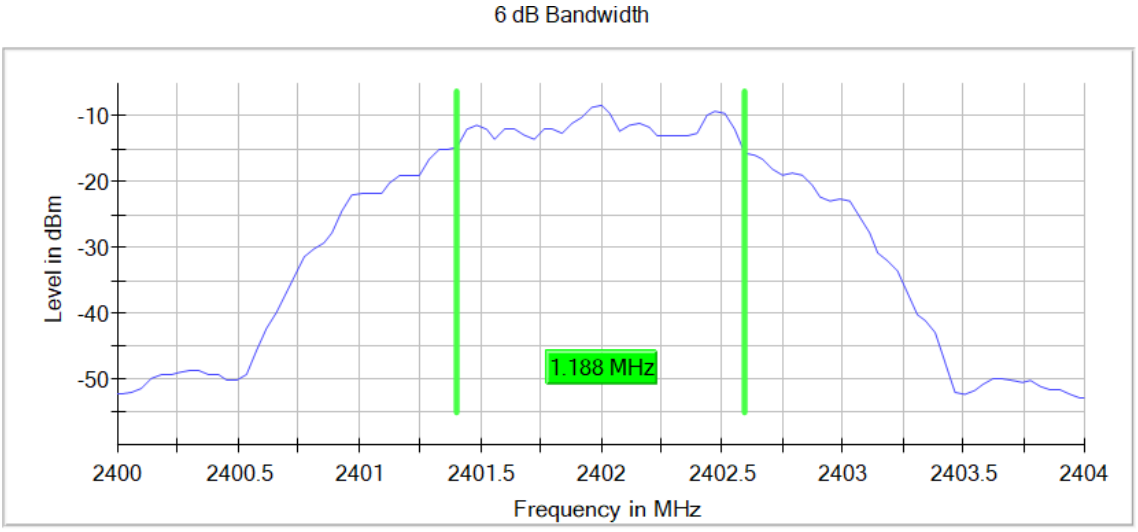
Frequency MHz = 2480.00000, Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



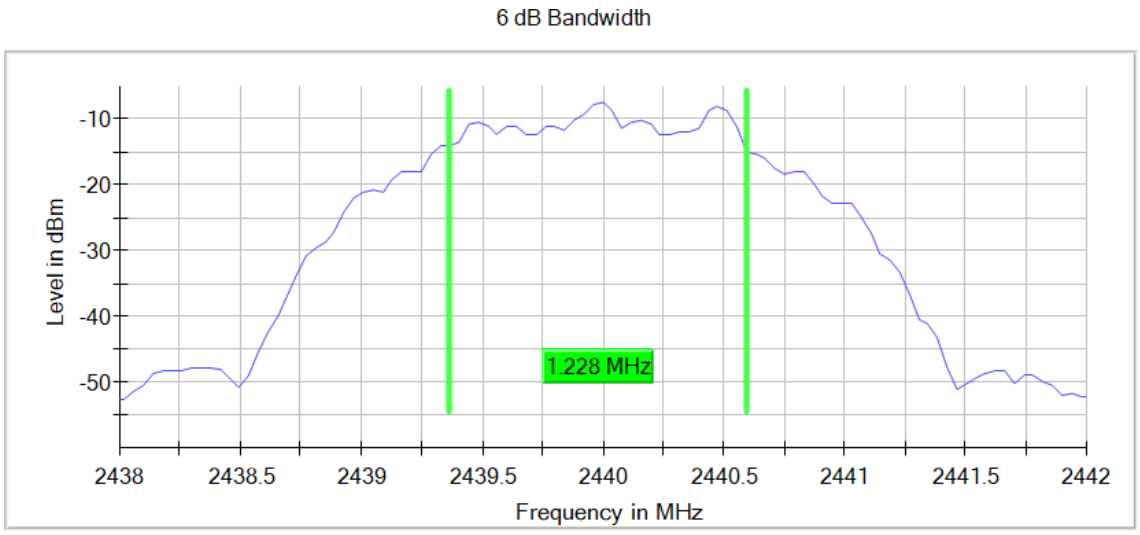
Frequency MHz = 2402.00000, Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



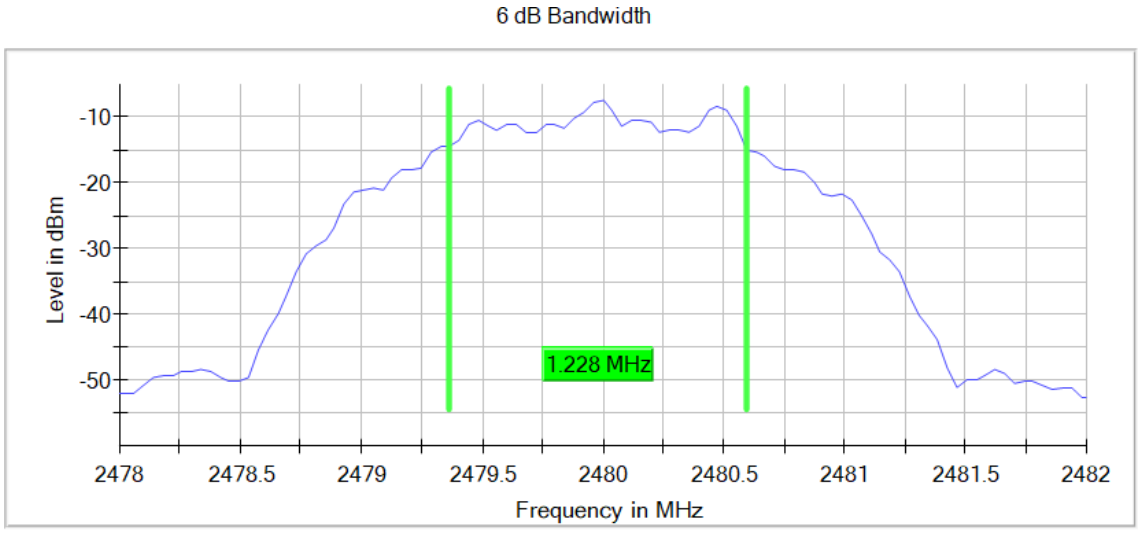
Frequency MHz = 2440.00000, Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



Frequency MHz = 2480.00000, Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



Spectrum Analyzer Parameters

Setting	Instrument Value
Start Frequency	2.40100 GHz
Stop Frequency	2.40300 GHz
Span	2.000 MHz
RBW	100.000 kHz
VBW	300.000 kHz
SweepPoints	101
Sweeptime	18.938 µs
Reference Level	0.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	9 / max. 150
Stable	5 / 5
Max Stable Difference	0.28 dB

99dBw Occupied Channel Bandwidth 99%

Limits

No Limit has been set to this test case

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)
Results

Freq (MHz)	Equipment	BW (MHz)	Occ Ch BW (MHz)
2402.00000	Digital Transmission System (DTS)	1	1.015
2440.00000	Digital Transmission System (DTS)		1.020
2480.00000	Digital Transmission System (DTS)		1.020

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)
Results

Freq (MHz)	Equipment	BW (MHz)	Occ Ch BW (MHz)
2402.00000	Digital Transmission System (DTS)	2	1.990
2440.00000	Digital Transmission System (DTS)		1.970
2480.00000	Digital Transmission System (DTS)		1.970

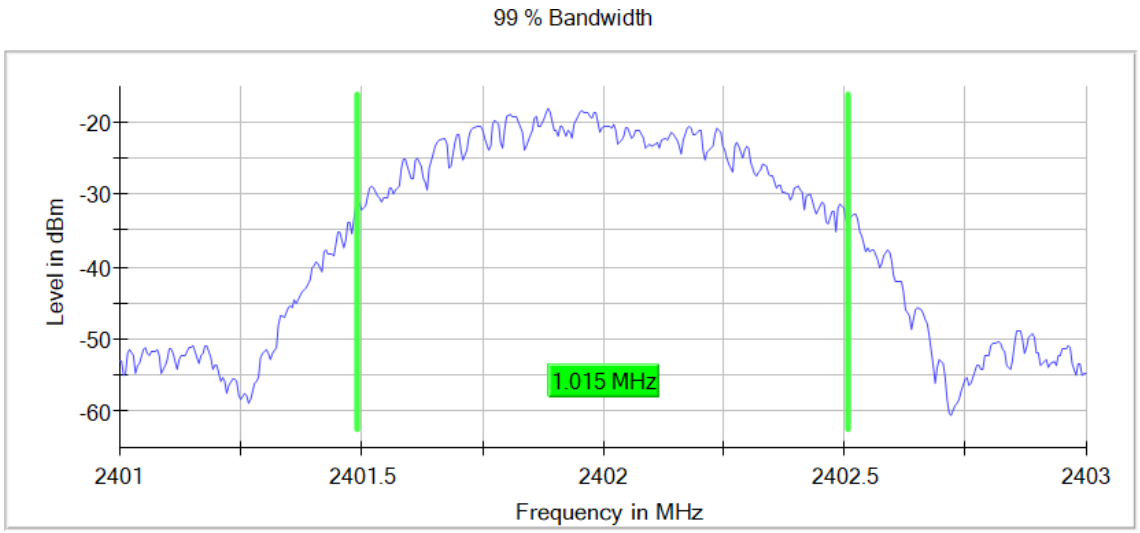
Verdict

Pass

Attachments

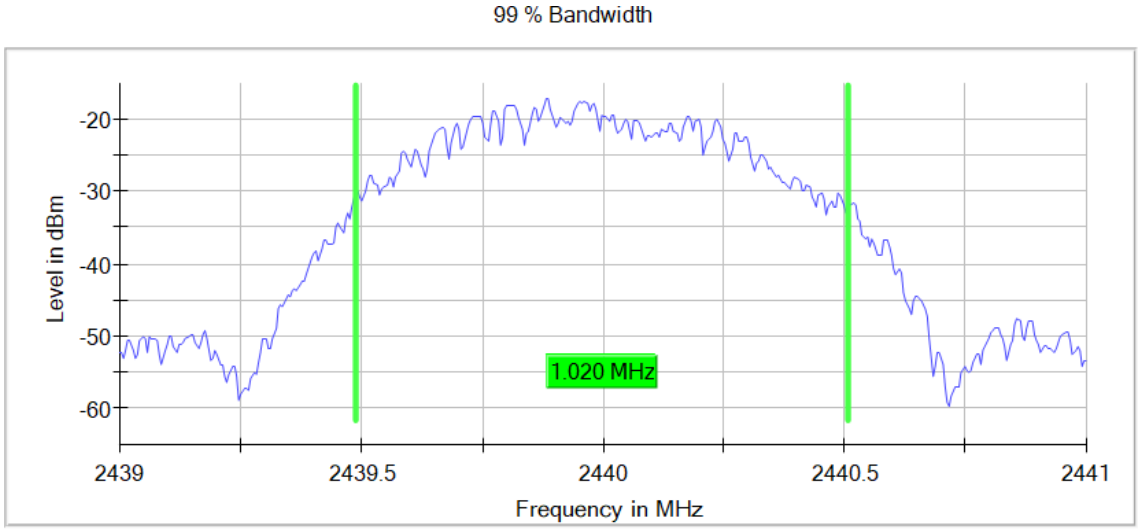
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



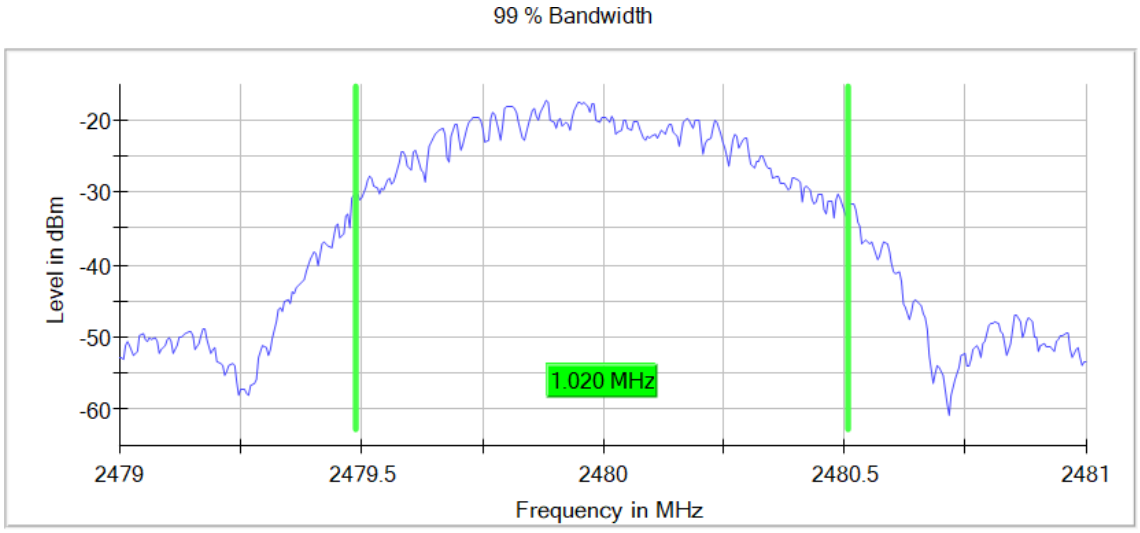
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



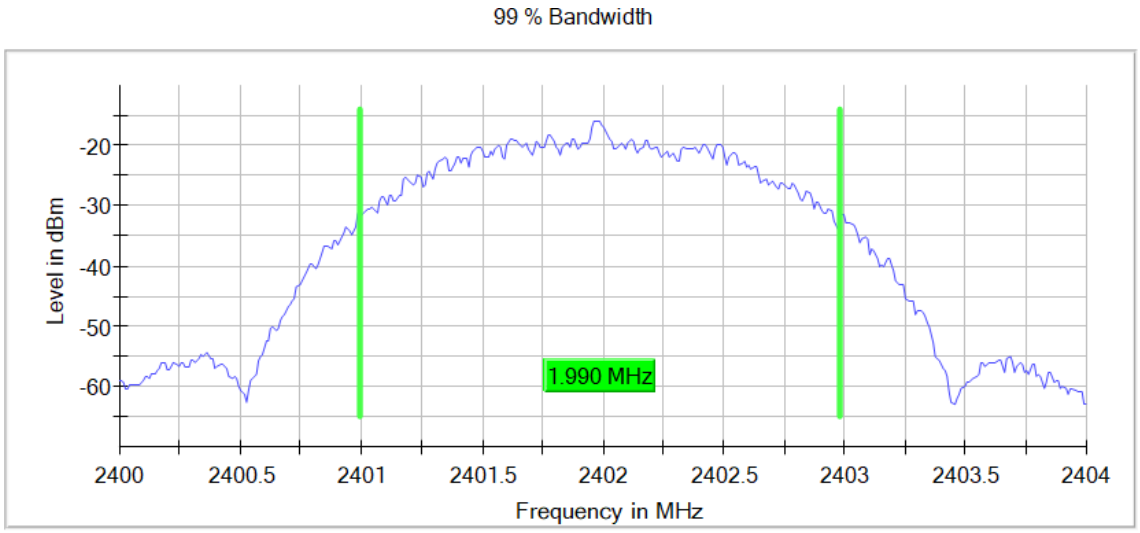
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



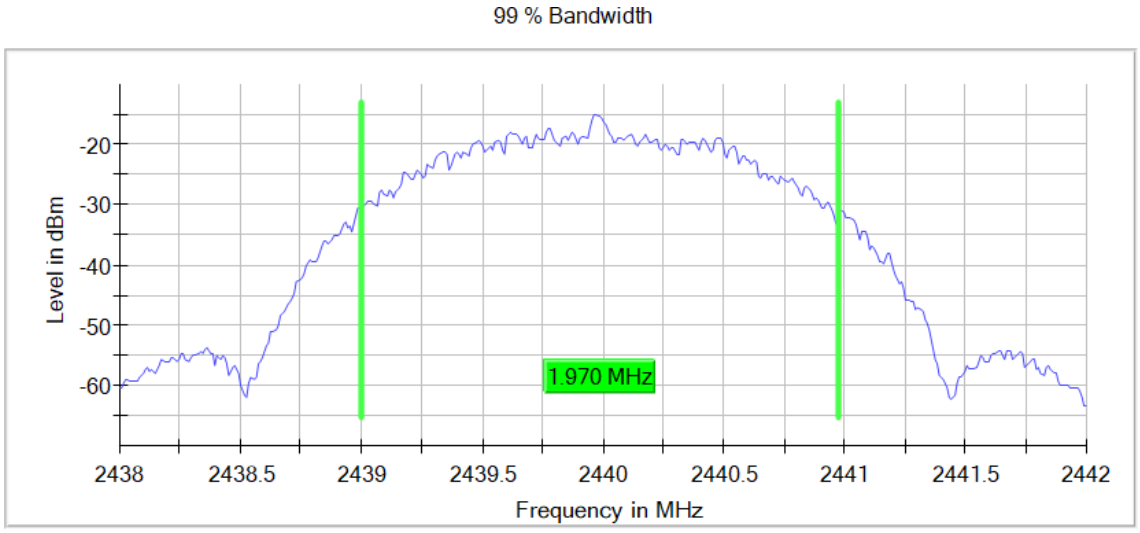
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



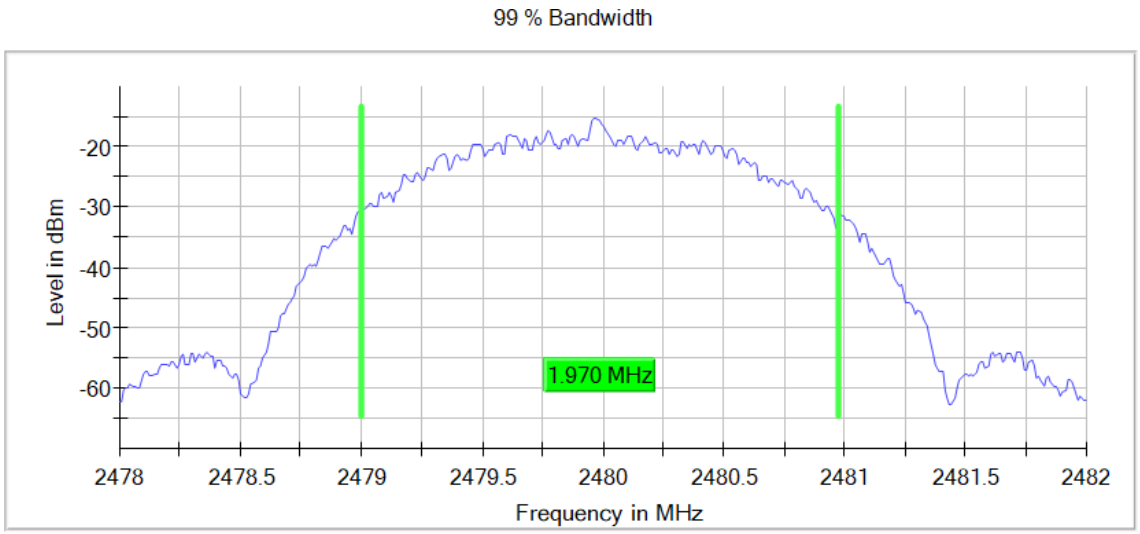
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



Spectrum Analyzer Parameters

Setting	Instrument Value
Start Frequency	2.40100 GHz
Stop Frequency	2.40300 GHz
Span	2.000 MHz
RBW	10.000 kHz
VBW	30.000 kHz
SweepPoints	400
Sweeptime	189.648 µs
Reference Level	0.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	5 / max. 150
Stable	3 / 3
Max Stable Difference	0.07 dB

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

Limits

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

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)
Results

Freq (MHz)	Equipment	BW (MHz)	PSD (dBm)
2402.00000	Digital Transmission System (DTS)	1	-18.02
2440.00000	Digital Transmission System (DTS)		-17.13
2480.00000	Digital Transmission System (DTS)		-17.15

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)
Results

Freq (MHz)	Equipment	BW (MHz)	PSD (dBm)
2402.00000	Digital Transmission System (DTS)	2	-20.65
2440.00000	Digital Transmission System (DTS)		-19.78
2480.00000	Digital Transmission System (DTS)		-19.87

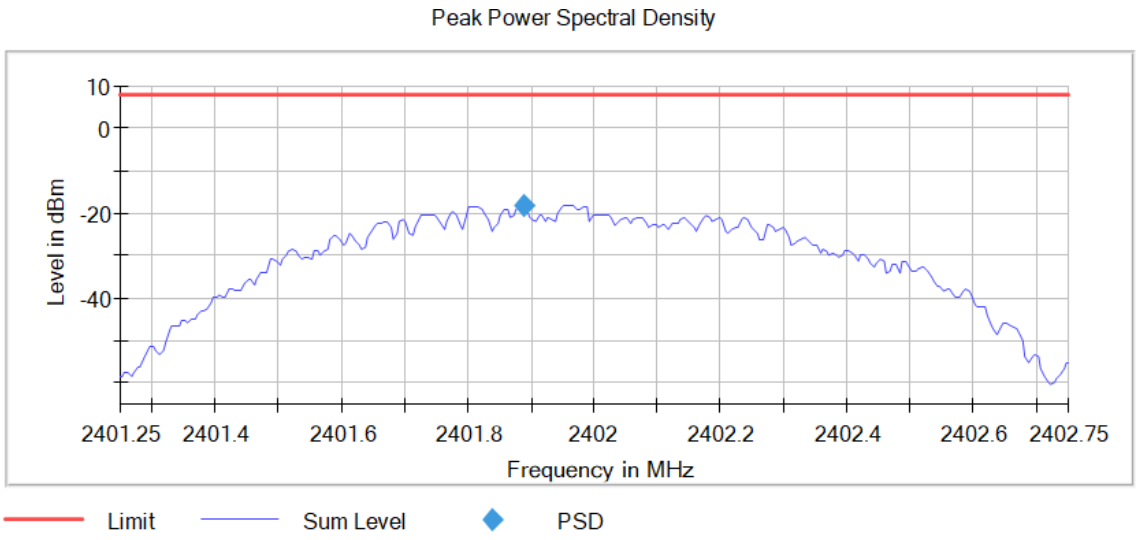
Verdict

Pass

Attachments

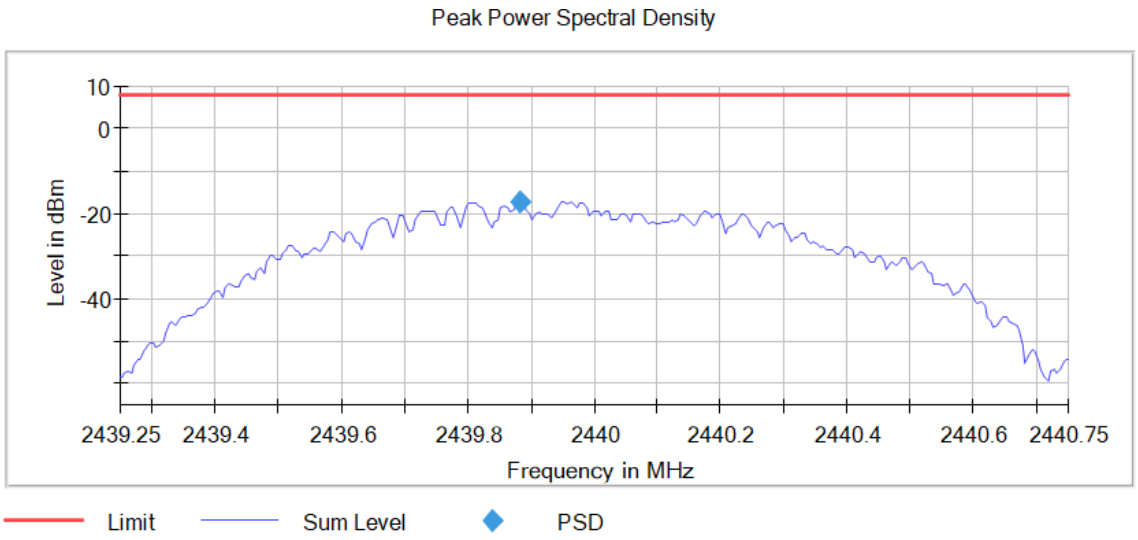
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



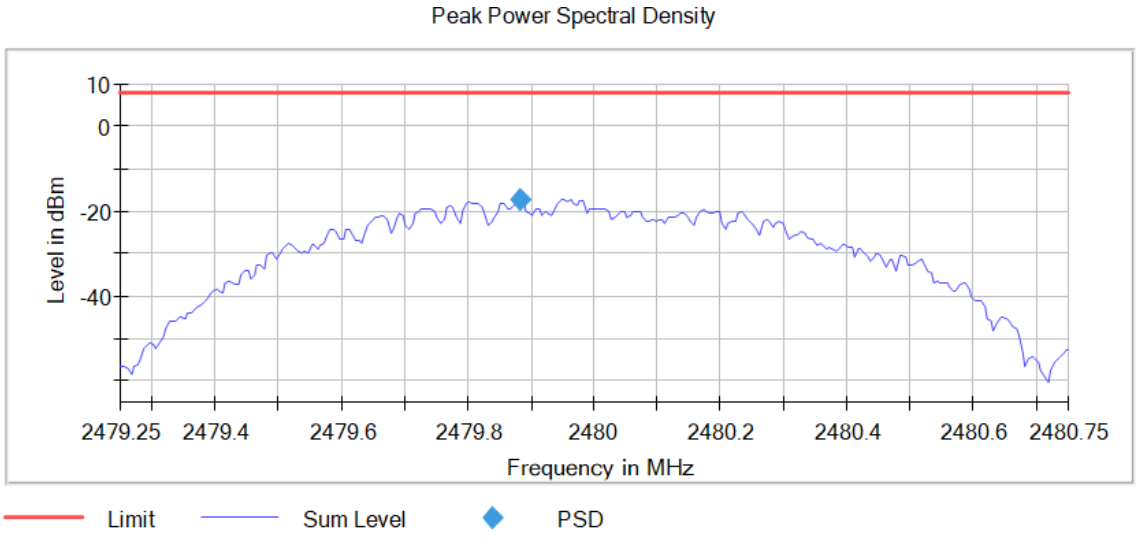
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



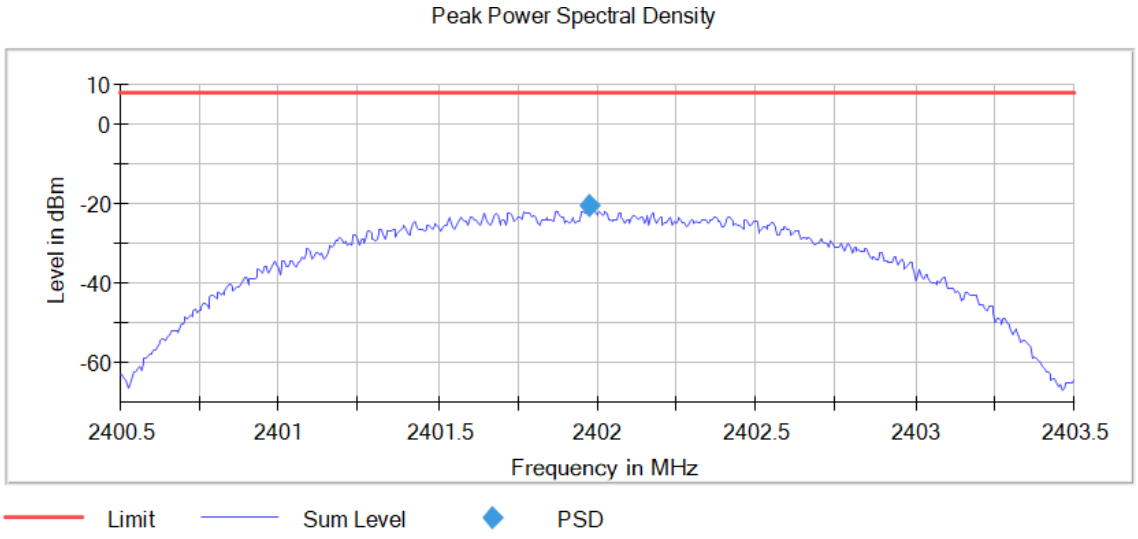
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



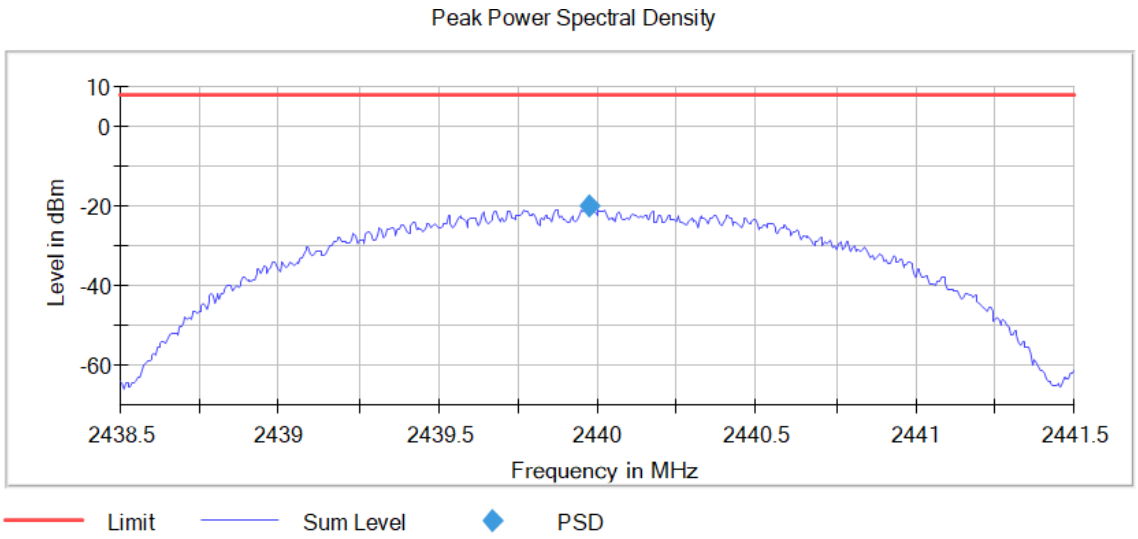
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



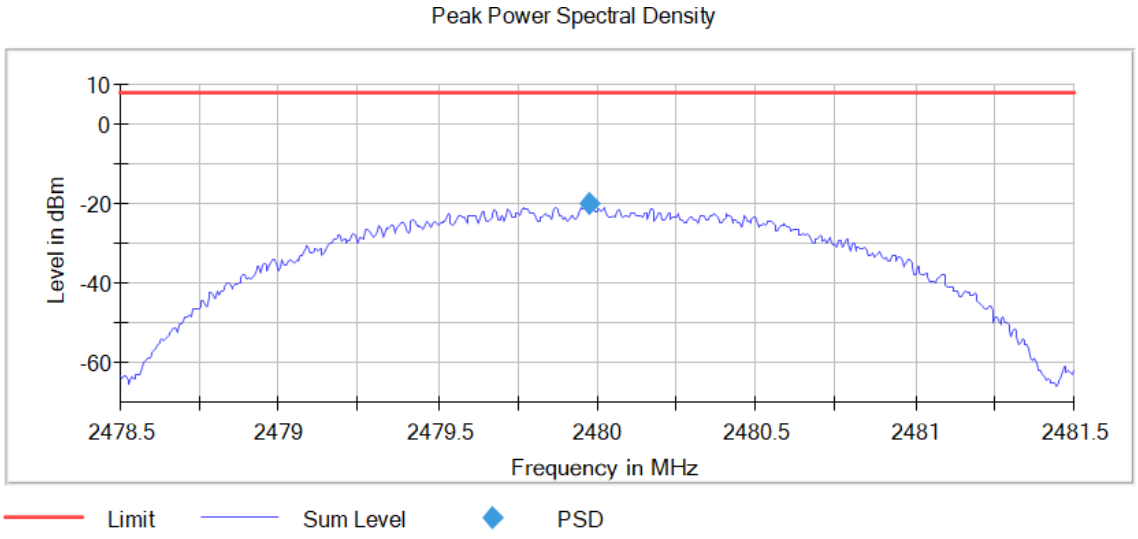
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



Spectrum Analyzer Parameters

Setting	Instrument Value
Start Frequency	2.40125 GHz
Stop Frequency	2.40275 GHz
Span	1.500 MHz
RBW	10.000 kHz
VBW	30.000 kHz
SweepPoints	300
Sweeptime	1.500 ms
Reference Level	0.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	Sweep
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	3 / max. 150
Stable	2 / 2
Max Stable Difference	0.15 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 ≥ DTS bandwidth” of ANSI C.63.10-2013.

Maximum declared antenna gain: 2.0 dBi

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)
Results

Freq (MHz)	BW (MHz)	Peak Power (dBm)	Maximum EIRP power (dBm)
2402.00000		-7.8	-5.8
2440.00000	1	-7.0	-5.0
2480.00000		-6.9	-4.9

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)
Results

Freq (MHz)	BW (MHz)	Peak Power (dBm)	Maximum EIRP power (dBm)
2402.00000		-7.7	-5.7
2440.00000	2	-6.9	-4.9
2480.00000		-6.9	-4.9

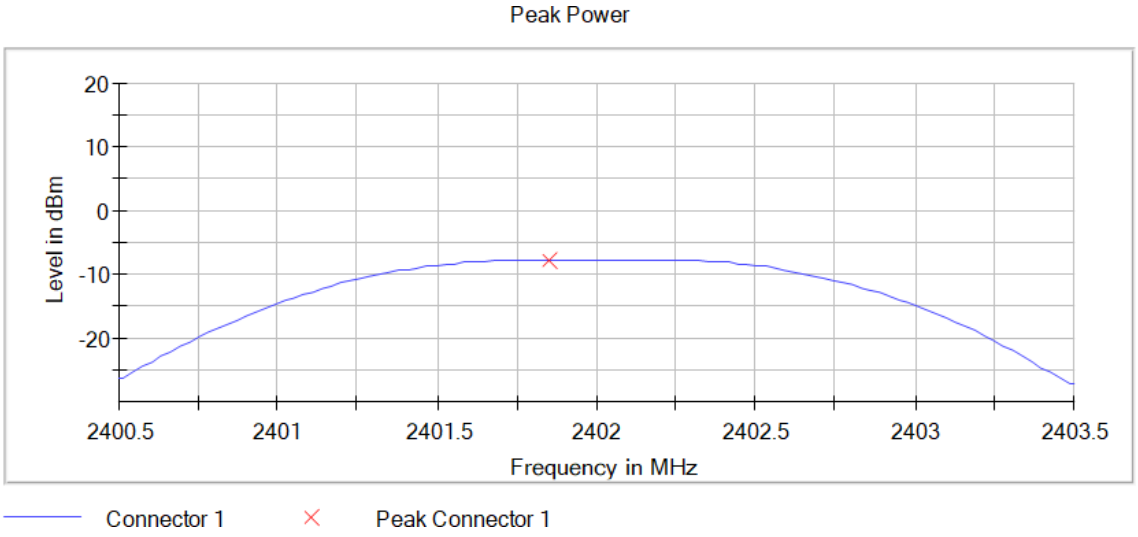
Verdict

Pass

Attachments

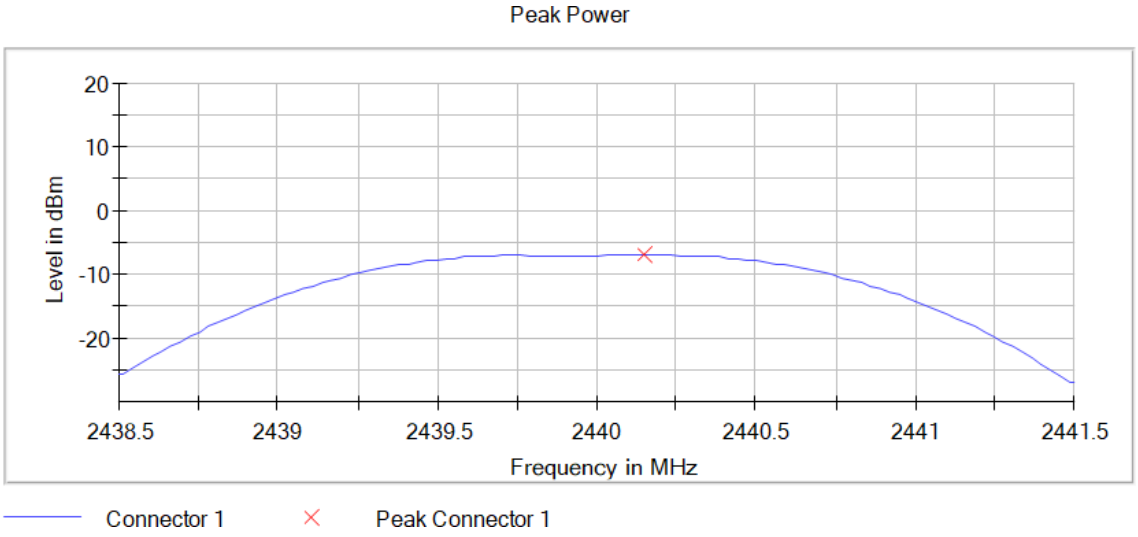
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



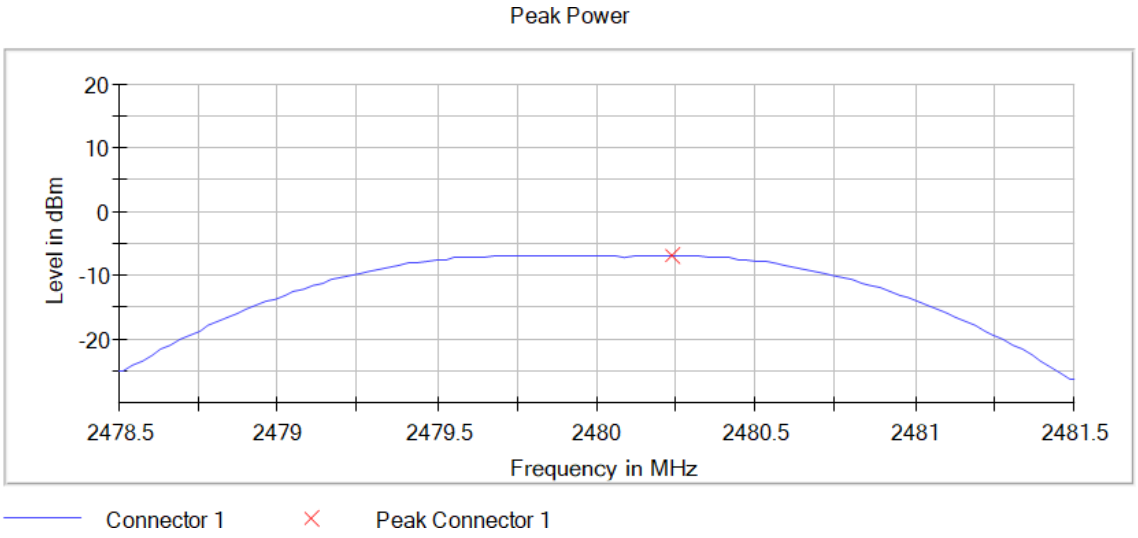
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



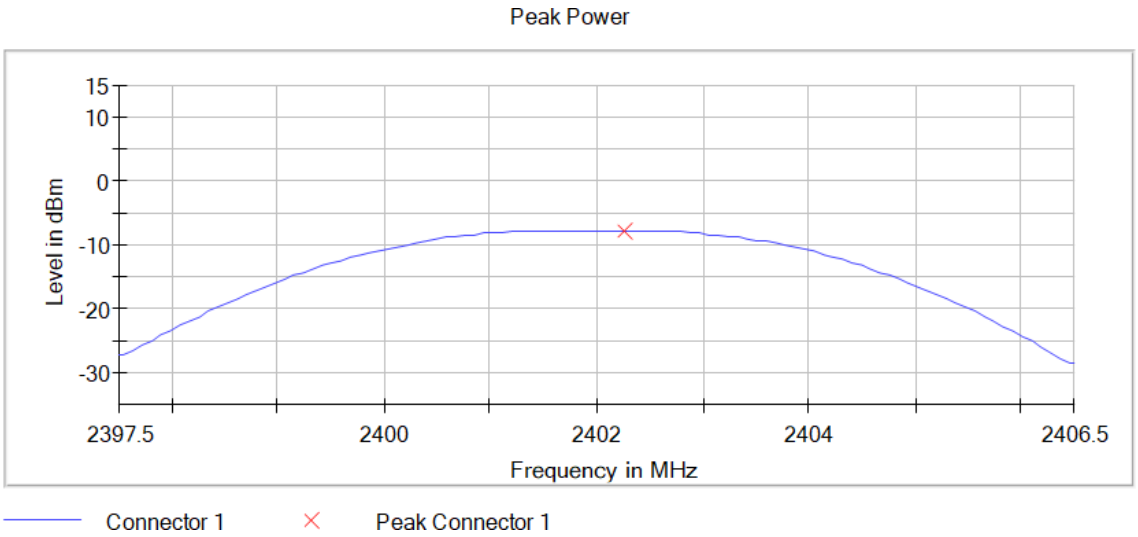
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



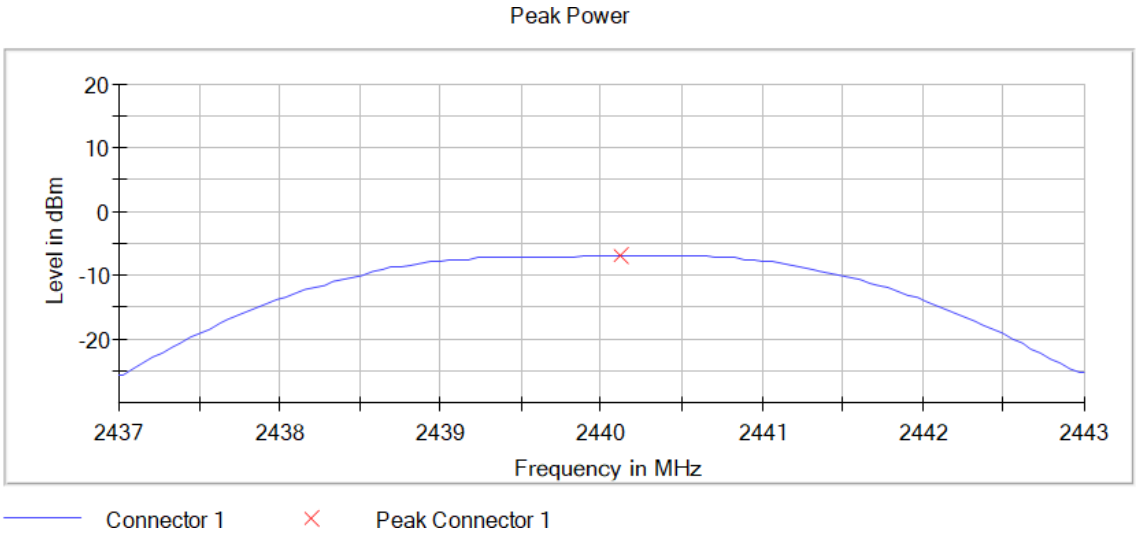
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



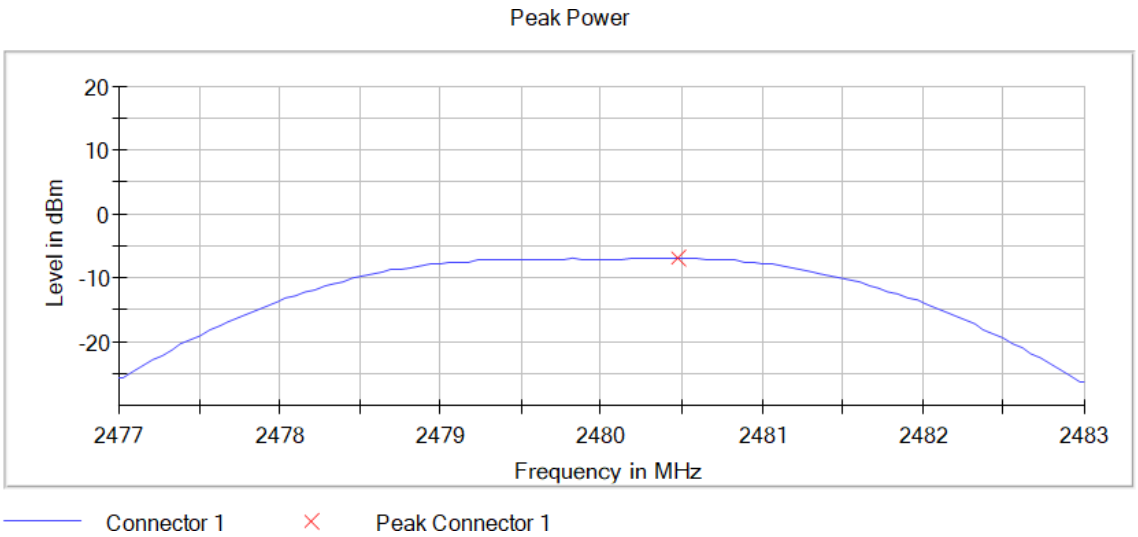
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



Spectrum Analyzer Parameters

Setting	Instrument Value
Start Frequency	2.40050 GHz
Stop Frequency	2.40350 GHz
Span	3.000 MHz
RBW	1.000 MHz
VBW	3.000 MHz
SweepPoints	101
Sweeptime	1.907 µs
Reference Level	10.000 dBm
Attenuation	30.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	4 / max. 150
Stable	3 / 3
Max Stable Difference	0.06 dB

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

Limits

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

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)
Results

DUT Frequency	Result
2402.000000	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2313.075000	-54.6	26.3	-28.3	PASS
2311.075000	-54.6	26.3	-28.3	PASS
2313.025000	-54.8	26.5	-28.3	PASS
2341.925000	-54.9	26.6	-28.3	PASS
2322.375000	-54.9	26.6	-28.3	PASS
2371.775000	-54.9	26.7	-28.3	PASS
2356.675000	-55.0	26.7	-28.3	PASS
2371.825000	-55.0	26.8	-28.3	PASS
2341.725000	-55.0	26.8	-28.3	PASS
2341.875000	-55.1	26.8	-28.3	PASS
2310.275000	-55.1	26.8	-28.3	PASS
2341.675000	-55.1	26.8	-28.3	PASS
2356.725000	-55.1	26.9	-28.3	PASS
2313.125000	-55.2	26.9	-28.3	PASS
2310.325000	-55.2	26.9	-28.3	PASS

DUT Frequency	Result
2480.000000	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.525000	-54.5	27.1	-27.4	PASS
2486.025000	-54.5	27.1	-27.4	PASS
2485.975000	-54.5	27.2	-27.4	PASS
2483.575000	-54.6	27.2	-27.4	PASS
2488.225000	-54.8	27.5	-27.4	PASS
2488.275000	-55.0	27.6	-27.4	PASS
2484.075000	-55.1	27.7	-27.4	PASS
2499.725000	-55.2	27.8	-27.4	PASS
2497.825000	-55.3	27.9	-27.4	PASS
2484.125000	-55.3	27.9	-27.4	PASS
2497.875000	-55.4	28.0	-27.4	PASS
2499.675000	-55.5	28.1	-27.4	PASS
2484.825000	-55.5	28.1	-27.4	PASS
2491.925000	-55.5	28.1	-27.4	PASS
2485.425000	-55.5	28.1	-27.4	PASS

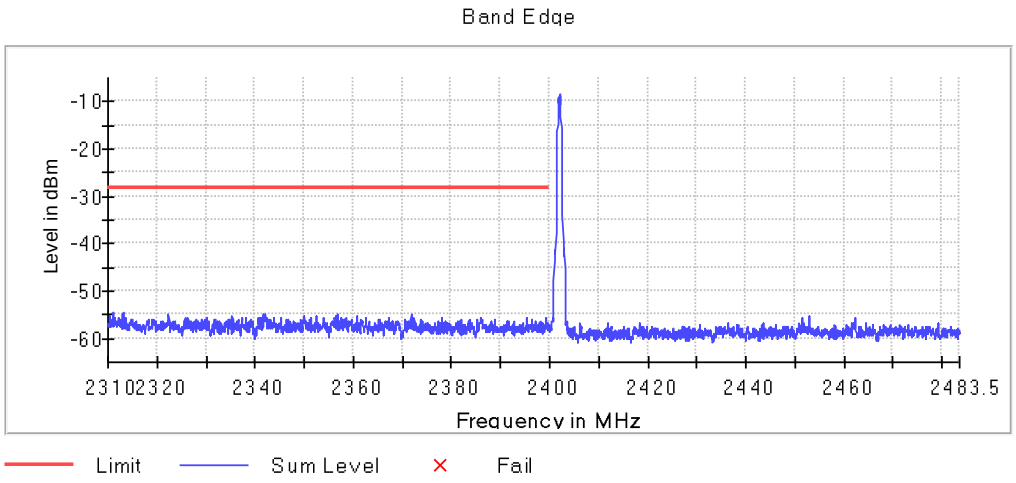
Verdict

Pass

Attachments

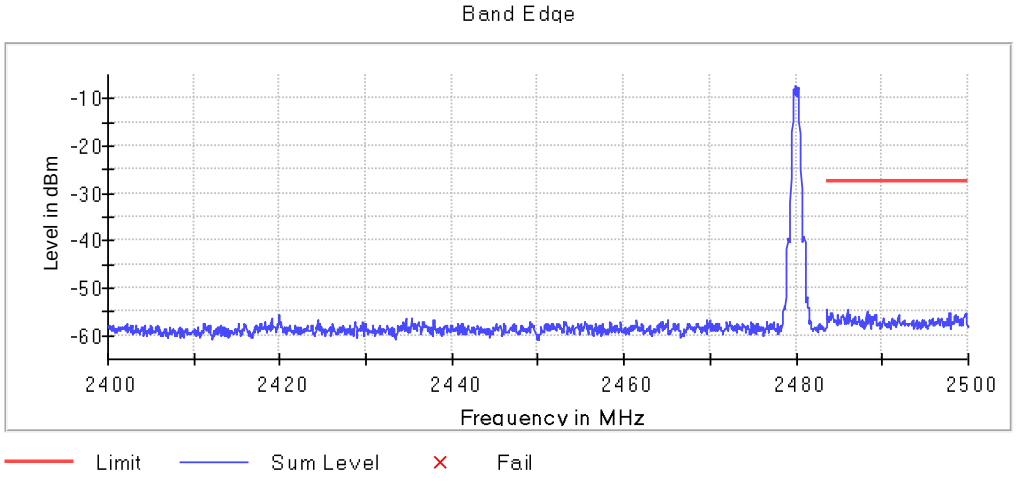
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 1, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



Modulation: BTLE 5.0 (GFSK 2 Mbit/s)
Results

DUT Frequency	Result
2402.000000	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-51.5	23.2	-28.4	PASS
2399.875000	-52.8	24.4	-28.4	PASS
2399.925000	-52.8	24.4	-28.4	PASS
2353.775000	-53.9	25.5	-28.4	PASS
2371.025000	-54.1	25.7	-28.4	PASS
2353.825000	-54.1	25.7	-28.4	PASS
2371.075000	-54.1	25.8	-28.4	PASS
2333.325000	-54.6	26.3	-28.4	PASS
2342.475000	-54.7	26.3	-28.4	PASS
2342.425000	-54.7	26.3	-28.4	PASS
2310.175000	-54.8	26.4	-28.4	PASS
2355.825000	-54.8	26.5	-28.4	PASS
2362.225000	-54.8	26.5	-28.4	PASS
2312.175000	-54.8	26.5	-28.4	PASS
2310.125000	-54.9	26.5	-28.4	PASS

DUT Frequency	Result
2480.000000	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2496.775000	-53.1	25.5	-27.6	PASS
2496.825000	-53.7	26.1	-27.6	PASS
2496.725000	-53.7	26.2	-27.6	PASS
2485.475000	-54.0	26.4	-27.6	PASS
2485.525000	-54.2	26.6	-27.6	PASS
2484.225000	-54.2	26.6	-27.6	PASS
2484.175000	-54.4	26.9	-27.6	PASS
2491.725000	-54.6	27.0	-27.6	PASS
2491.775000	-54.6	27.0	-27.6	PASS
2484.825000	-54.9	27.4	-27.6	PASS
2489.375000	-55.1	27.5	-27.6	PASS
2484.275000	-55.2	27.6	-27.6	PASS
2485.975000	-55.2	27.6	-27.6	PASS
2489.325000	-55.3	27.7	-27.6	PASS
2485.925000	-55.3	27.7	-27.6	PASS

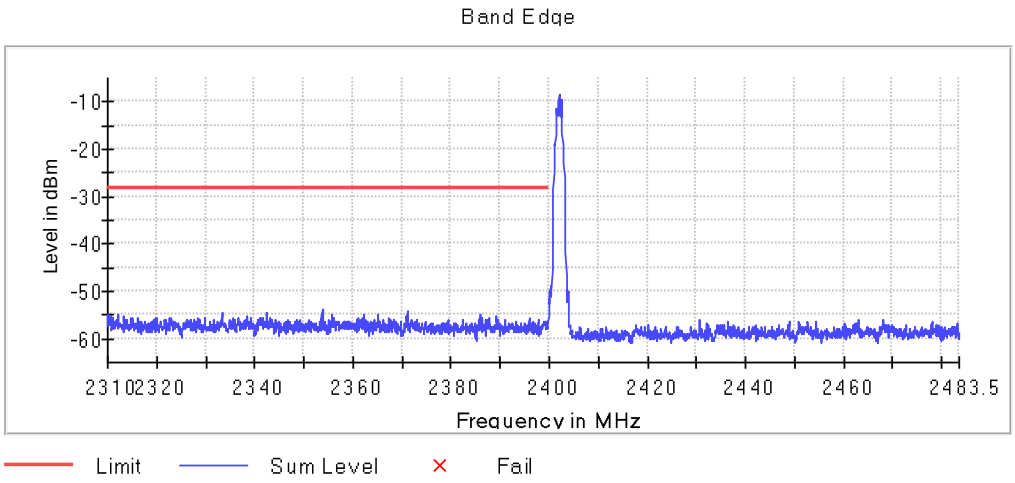
Verdict

Pass

Attachments

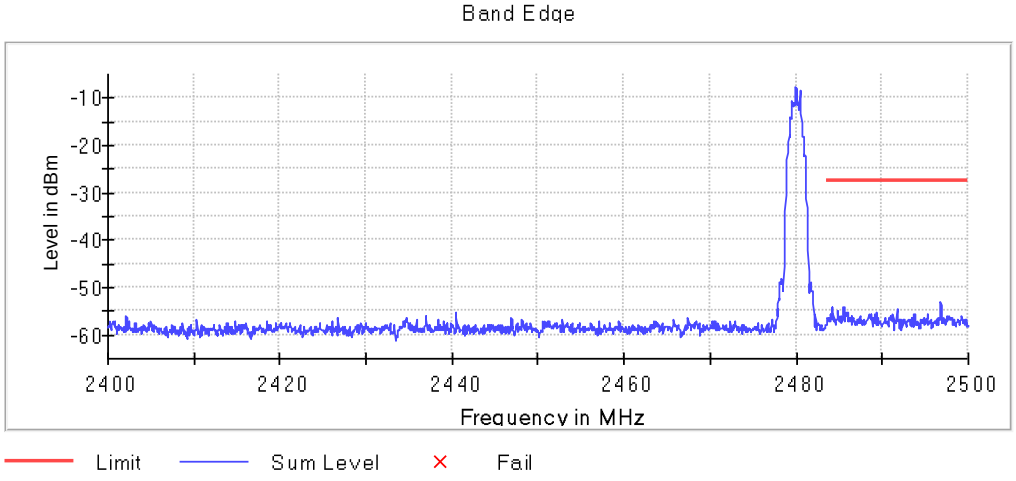
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 2, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



Spectrum Analyzer Parameters

Setting	Instrument Value 1	Instrument Value 2
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	113.672 µs	94.727 µs
Reference Level	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Max Hold	Max Hold
Sweeptype	FFT	FFT
Preamp	off	off
Stablemode	Trace	Trace
Stablevalue	0.50 dB	0.50 dB
Run	4 / max. 150	8 / max. 150
Stable	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.06 dB

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

Limits

In any 100 kHz bandwidth outside the frequency band in which the digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

Conducted spurious signals detected were minimum 20 dB respect to the limit for the lowest, middle and highest operating channels.

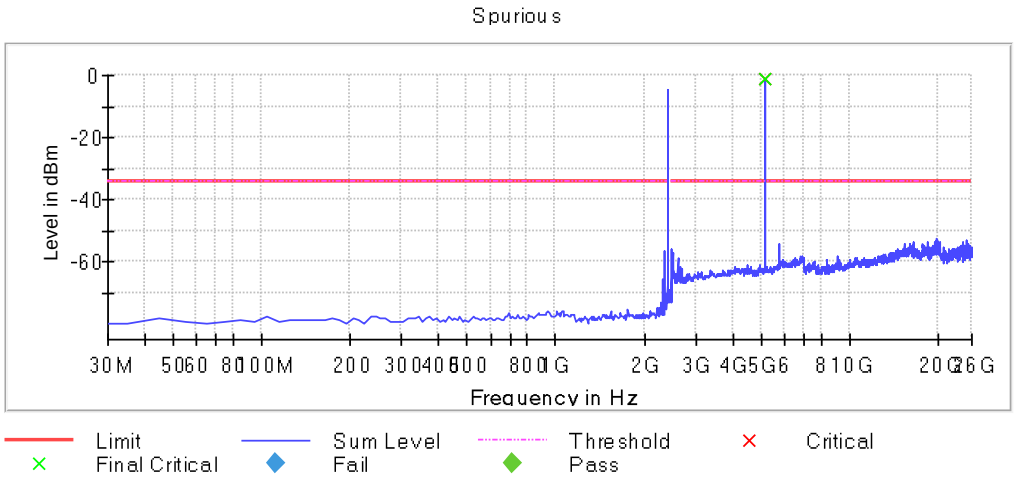
Verdict

Pass

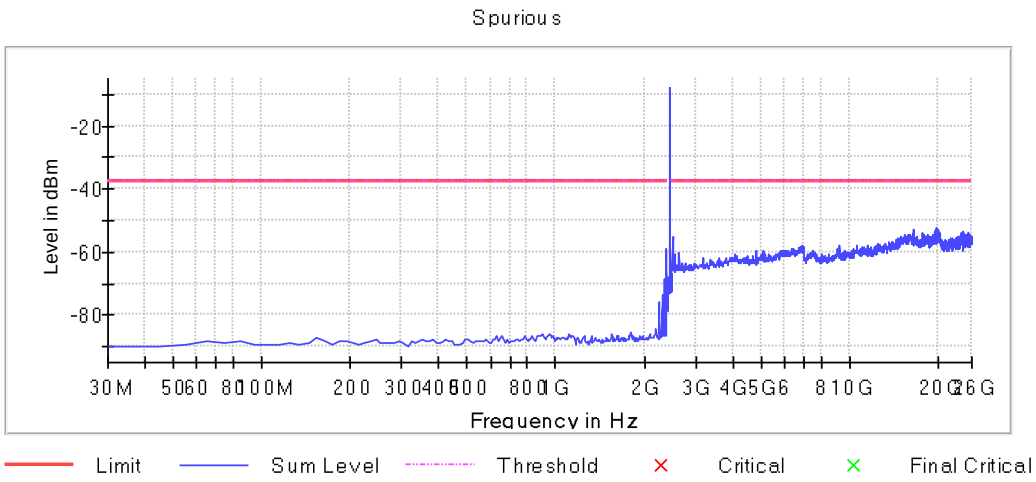
Results

Note: Fundamental signals are above the limit and shown in the frequency range of 2402 - 2480 MHz in the plots

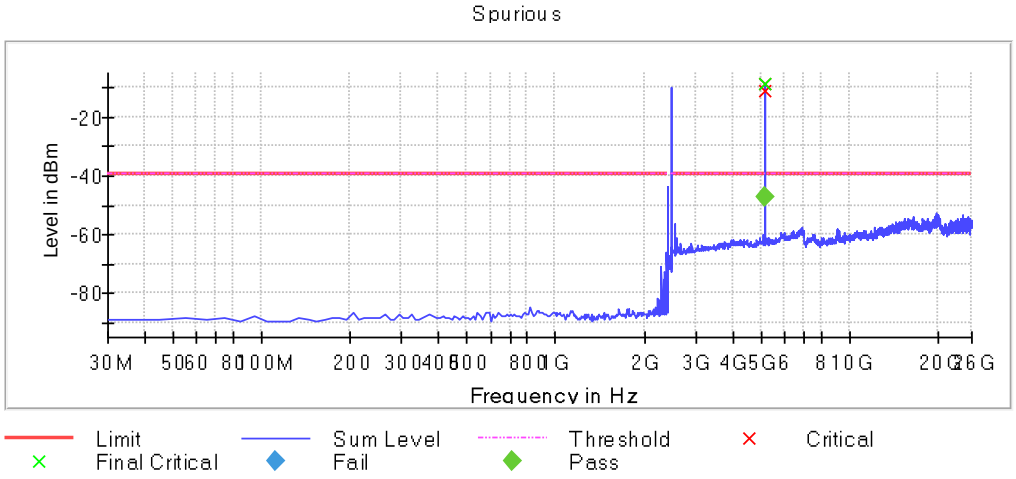
Lowest Channel (2402 MHz)



Middle Channel (2440 MHz)



Highest Channel (2480 MHz)



Spectrum Analyzer Parameters

Setting	Instrument Value	Target Value
RBW	100.000 kHz	<= 100.000 kHz
VBW	300.000 kHz	>= 300.000 kHz
SweepPoints	401	~ 401
Sweeptime	37.907 µs	AUTO
Reference Level	-30.000 dBm	-30.000 dBm
Attenuation	0.000 dB	AUTO
Detector	Sample	Sample
SweepCount	100	100
Filter	3 dB	3 dB
Trace Mode	Average Linear	Average Linear
Sweeptype	FFT	AUTO
Preamp	off	off

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

Verdict

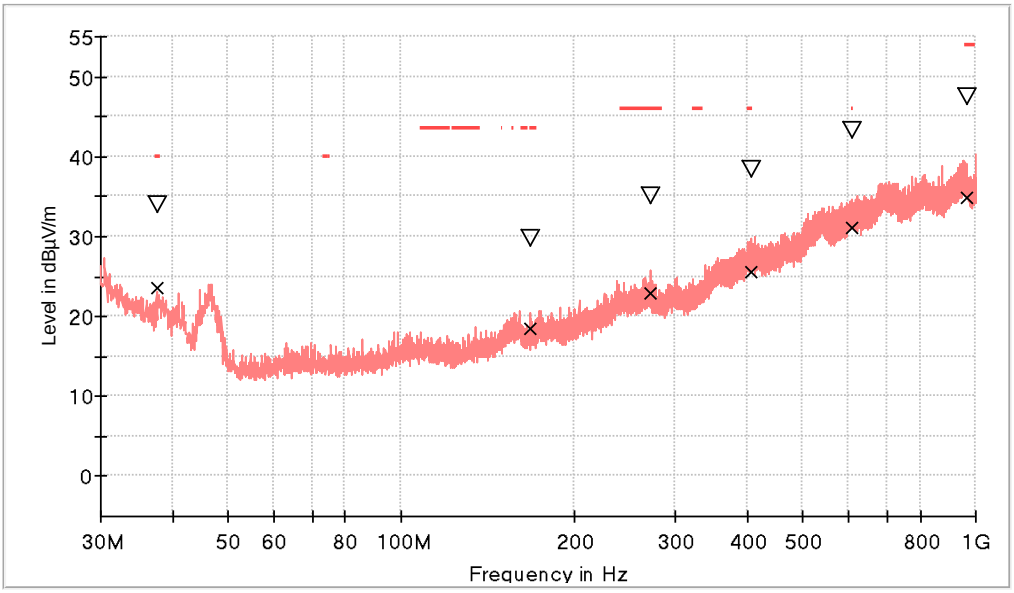
Pass

Modulation: BTLE 5.0 (GFSK 2 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 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [0.03, 1]



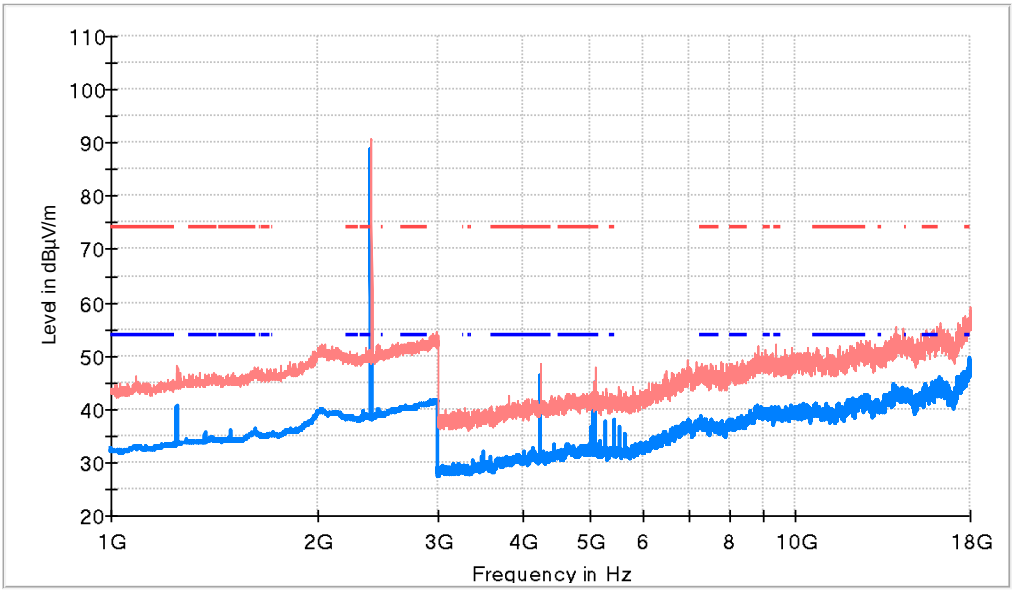
PK+_MAXH
TX limits to Spurious Emission FCC15.247 (30MHz to 1GHz) Restricted Bands QPK Limit
MaxPeak-PK+ (Single)
QuasiPeak-QPK (Single)

Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Pol	Margin - QPK (dB)	Limit - QPK (dBµV/m)
37.517500	33.9	23.5	V	16.5	40.0
168.225000	29.7	18.4	V	25.1	43.5
272.354500	35.0	22.9	V	23.1	46.0
407.233000	38.4	25.7	V	20.3	46.0
610.884500	43.2	31.2	V	14.8	46.0

Frequency range 1 - 18 GHz

Lowest Channel

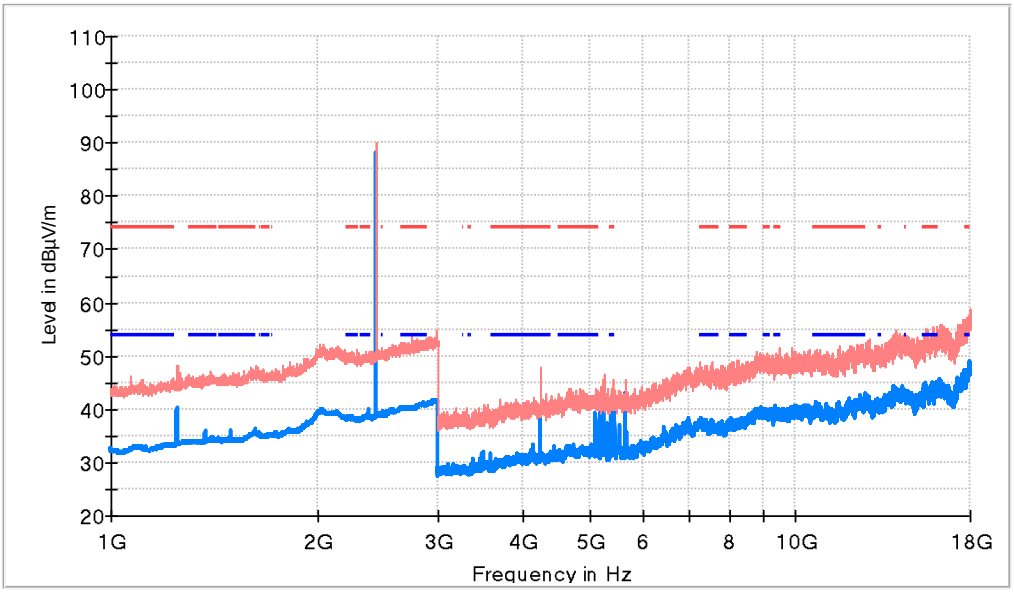
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 18]



Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2402.000000	90.5	88.8	H	---	---	Fundamental
4233.000000	48.5	46.3	V	7.7	54.0	
5098.000000	47.8	44.8	H	9.2	54.0	

Frequency range 1 - 18 GHz

Middle Channel
Frequency MHz = 2440.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 18]

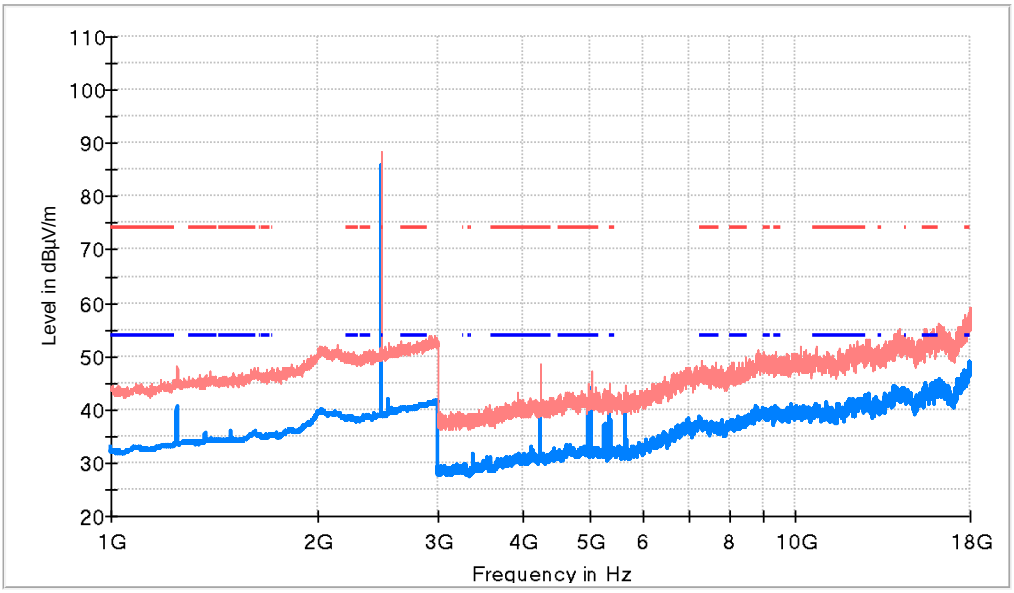


Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2440.000000	89.7	88.1	V	---	---	Fundamental
4233.000000	47.5	39.0	V	15.0	54.0	
5424.000000	44.2	40.1	V	13.9	54.0	

Frequency range 1 - 18 GHz

Highest Channel

Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 18]

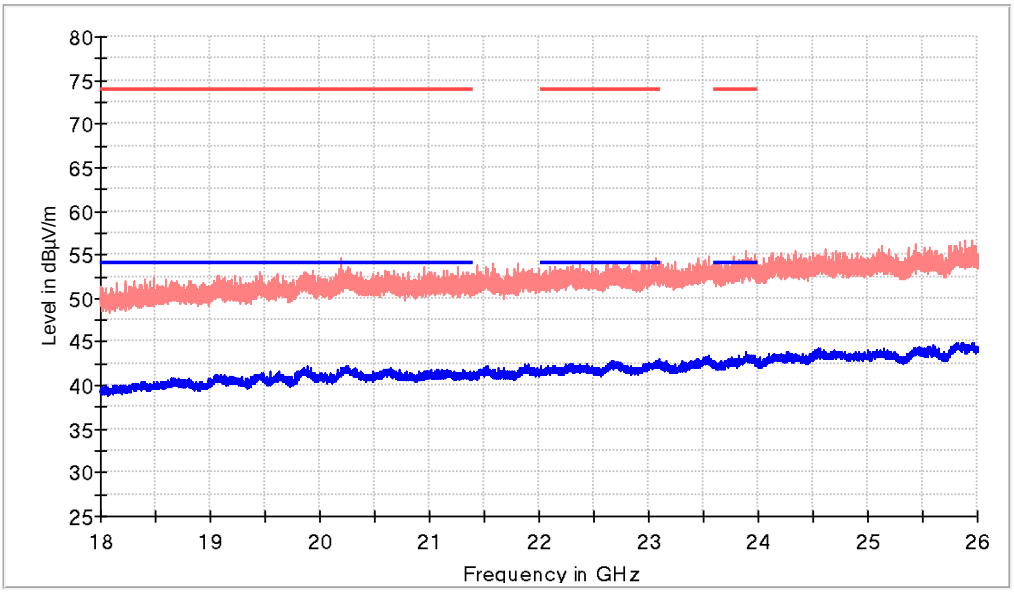


Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2480.000000	88.4	85.8	V	---	---	Fundamental
5045.500000	47.3	43.9	H	10.1	54.0	
5352.500000	44.8	41.0	V	13.0	54.0	

Frequency range 18 - 26 GHz

Lowest Channel

Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [18, 26]

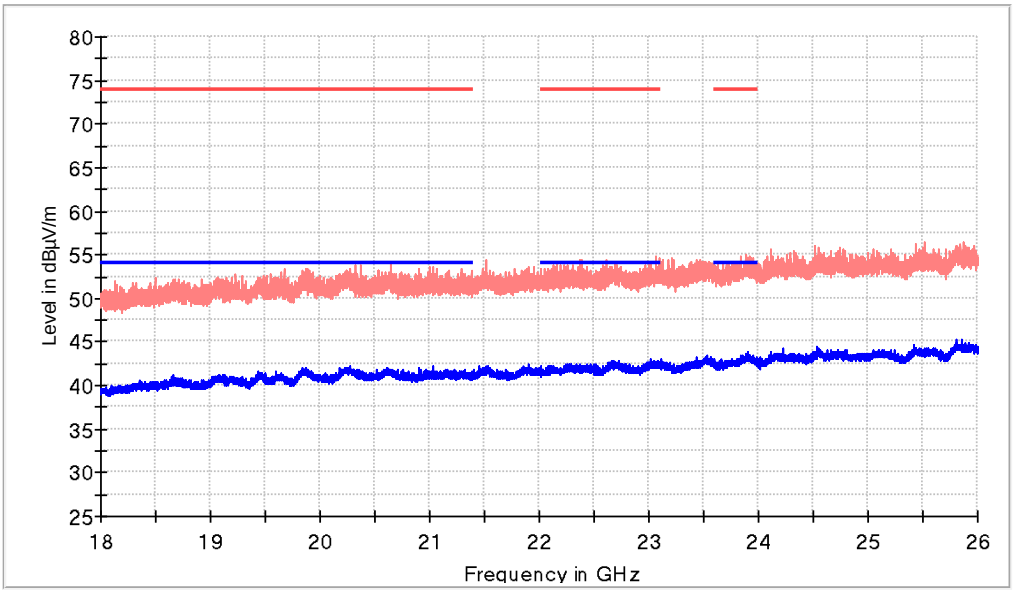


Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
20198.000000	54.6	41.4	V	12.6	54.0
23060.000000	54.6	42.4	V	11.6	54.0
23894.000000	55.4	43.1	V	10.9	54.0

Frequency range 18 - 26 GHz

Middle Channel

Frequency MHz = 2440.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [18, 26]

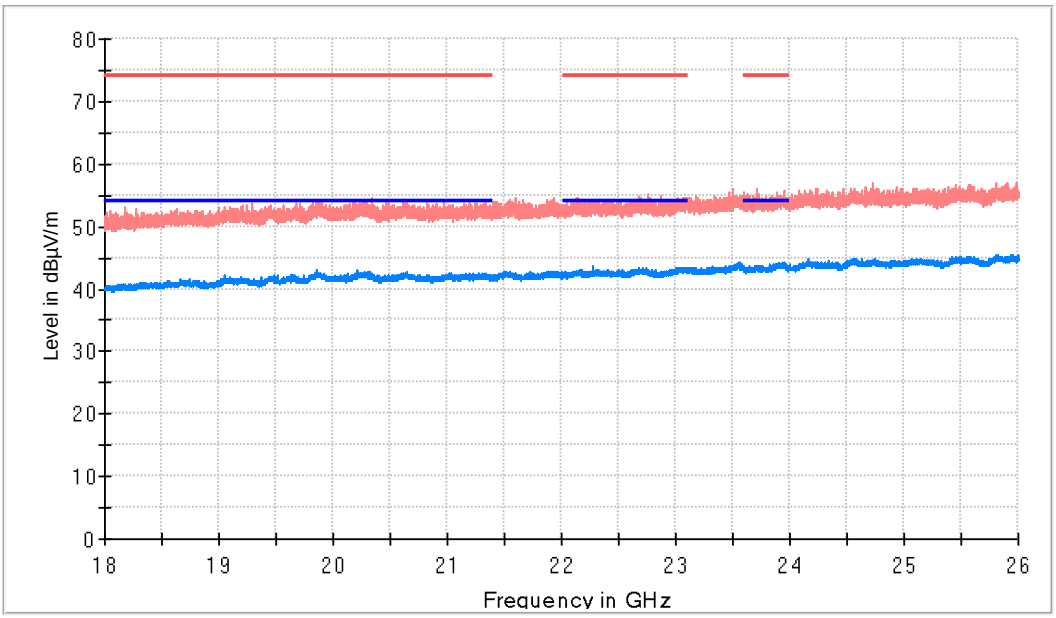


Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
20638.500000	54.3	41.7	H	12.3	54.0
23069.000000	54.8	42.5	H	11.5	54.0
23885.000000	55.1	42.9	H	11.1	54.0

Frequency range 18 - 26 GHz

Highest Channel

Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [18, 26]

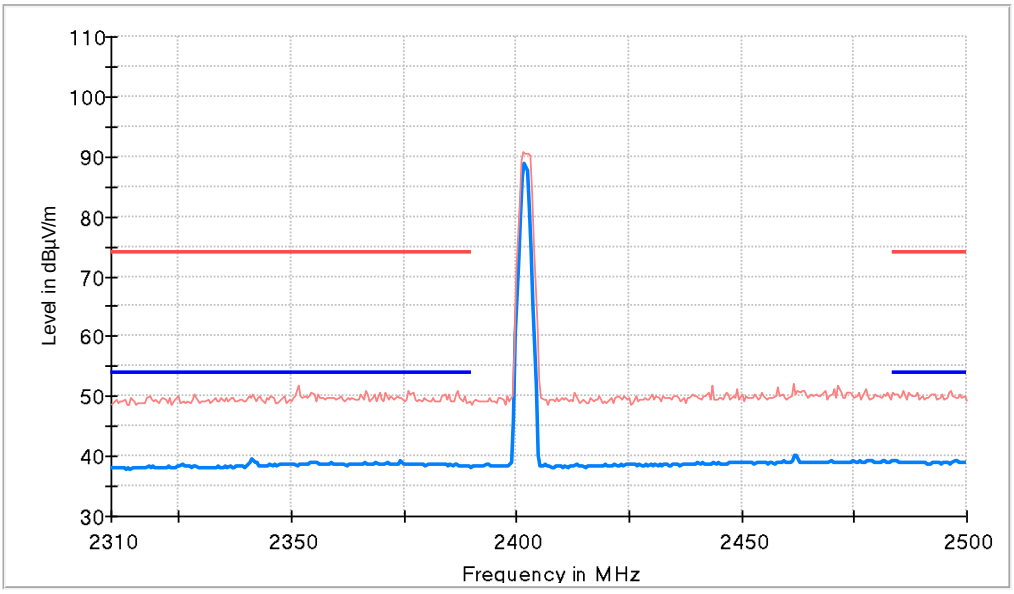


Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
20589.000000	52.2	42.3	H	11.7	54.0
22682.500000	53.7	43.0	H	11.0	54.0
23903.500000	52.9	44.0	H	10.0	54.0

Restricted Bands (2.31 GHz - 2.5 GHz)

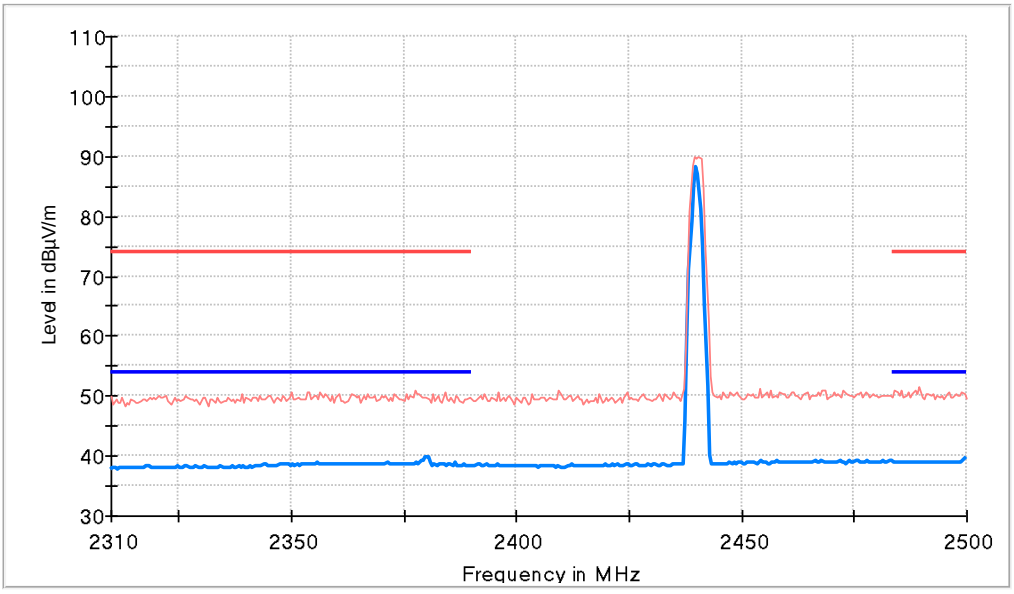
Lowest Channel

Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 18]

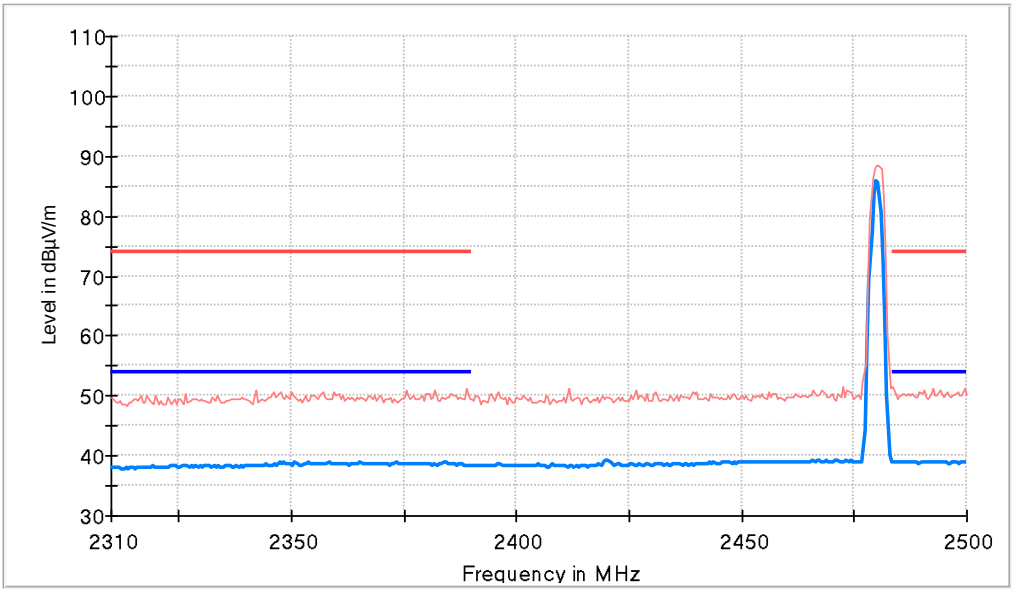


Middle Channel

Frequency MHz = 2440.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 18]



Highest Channel
Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 18]



Spectrum Analyzer Parameters

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
1 GHz - 3 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	20 dB
3 GHz - 18 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	20 dB

Appendix B: Test results. Bluetooth EDR

Appendix B

PRODUCT INFORMATION

Information	Description
Modulation	GFSK, π/4-DQPSK, 8-DPSK
Operation mode 1: Single Antenna Equipment	
• Operating Frequency Range	2402 – 2480 MHz
• Nominal Channel Bandwidth	1 MHz
• RF Output Power	10 dBm
Antenna type	External
Antenna gain	2 dBi
Nominal Voltage	
• Supply Voltage	12 Vdc
• Type of power source	DC voltage
Equipment type	Bluetooth Classic

TEST CONDITIONS

(*): Data provided by the client.

TEST CONDITIONS	DESCRIPTION
TC#01	Power supply (V): $V_{nominal}$ = 12 Vdc Modulation: GFSK Test Frequencies for conducted/Radiated tests: Lowest range: 2402 MHz Middle channel: 2441 MHz Highest range: 2480 MHz
TC#02	Power supply (V): $V_{nominal}$ = 12 Vdc Modulation: π/4-DQPSK Test Frequencies for Conducted/Radiated tests: Lowest range: 2402 MHz Middle channel: 2441 MHz Highest range: 2480 MHz
TC#03	Power supply (V): $V_{nominal}$ = 12 Vdc Modulation: 8-DPSK Test Frequencies for Conducted/Radiated tests: Lowest range: 2402 MHz Middle channel: 2441 MHz Highest range: 2480 MHz

TEST CASES DETAILS

RSS-247 5.1 (b) / FCC 15.247 (a) (1) [20dBW] 20 dB Bandwidth

Limits

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Modulation: BT (GFSK 1-DH5)
Results

Freq (MHz)	Equipment	BW (MHz)	20 dB Emission Bandwidth (MHz)
2402.00000	Frequency Hopping Spread Spectrum systems (DSS)	1	0.910
2441.00000			0.910
2480.00000			0.905

Modulation: BT (π/4 DQPSK 2-DH1)
Results

Freq (MHz)	Equipment	BW (MHz)	20 dB Emission Bandwidth (MHz)
2402.00000	Frequency Hopping Spread Spectrum systems (DSS)	1	1.265
2441.00000			1.260
2480.00000			1.260

Modulation: BT (8DPSK 3-DH5)
Results

Freq (MHz)	Equipment	BW (MHz)	20 dB Emission Bandwidth (MHz)
2402.00000	Frequency Hopping Spread Spectrum systems (DSS)	**1**	1.260
2441.00000			1.260
2480.00000			1.260

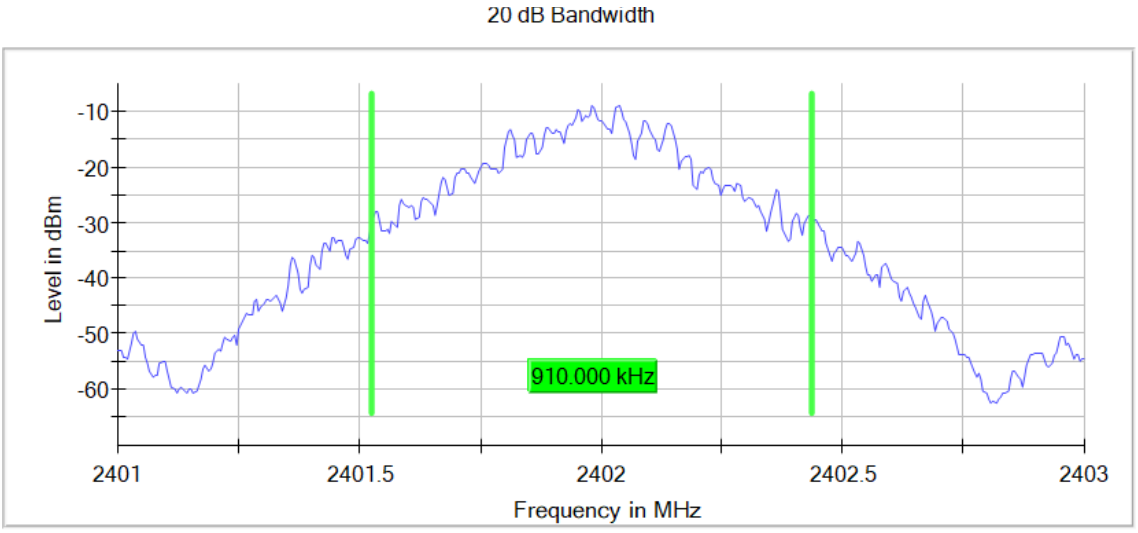
Verdict

Pass

Attachments

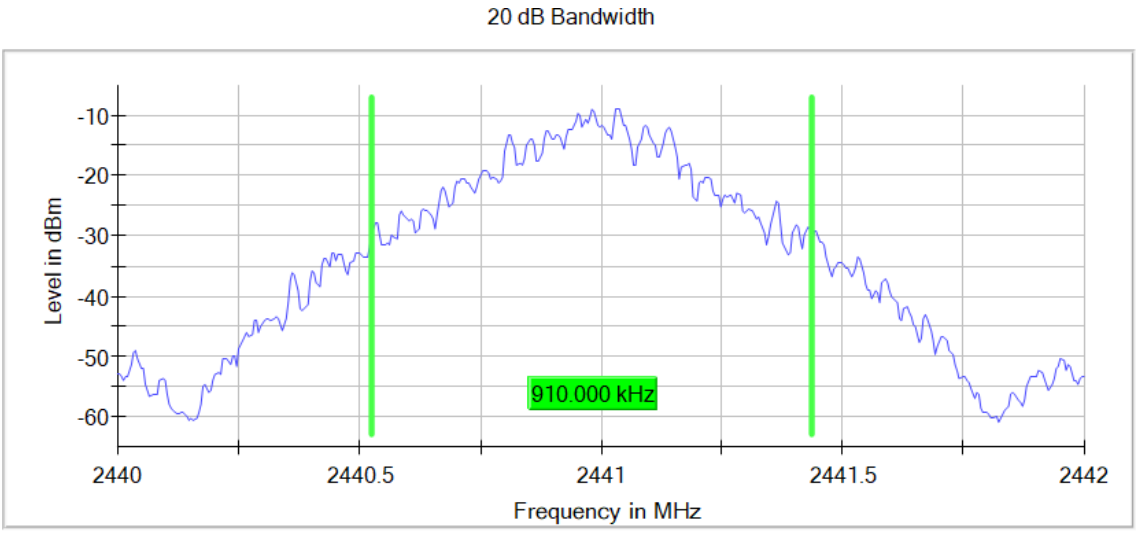
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



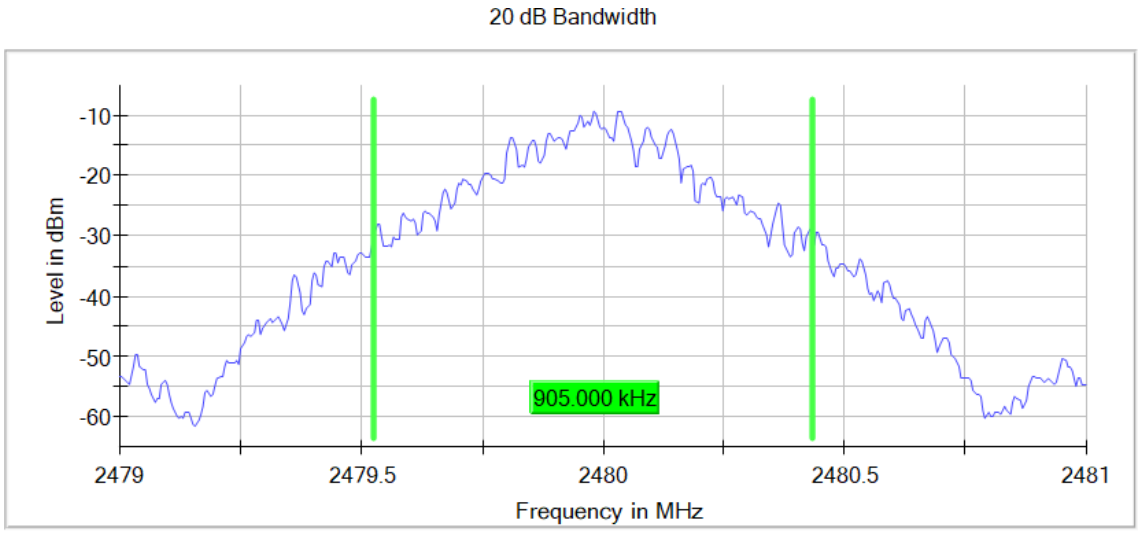
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



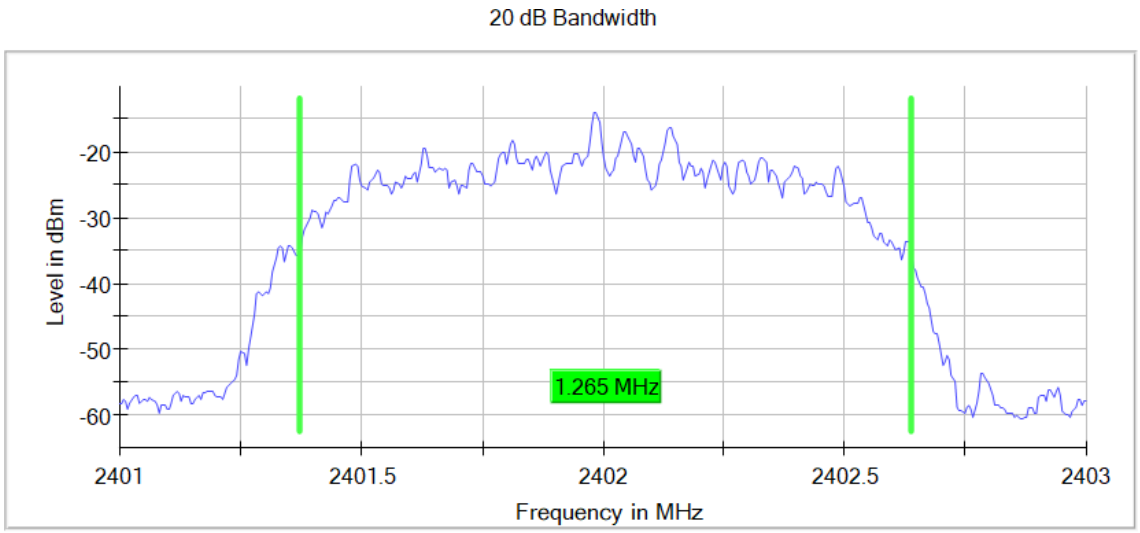
Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



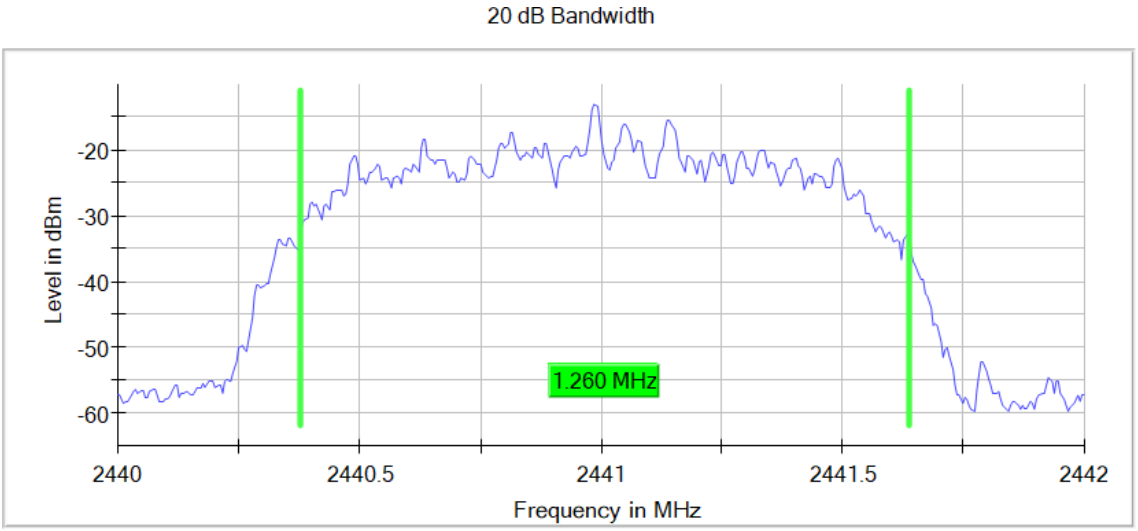
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (Π/4 DQPSK 2-DH1)

Images:



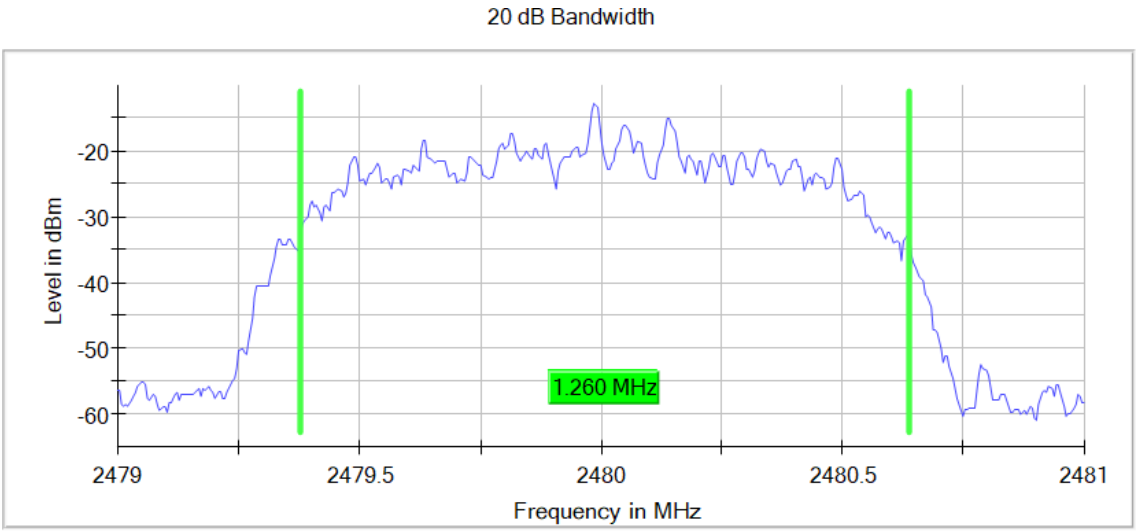
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (Π/4 DQPSK 2-DH1)

Images:



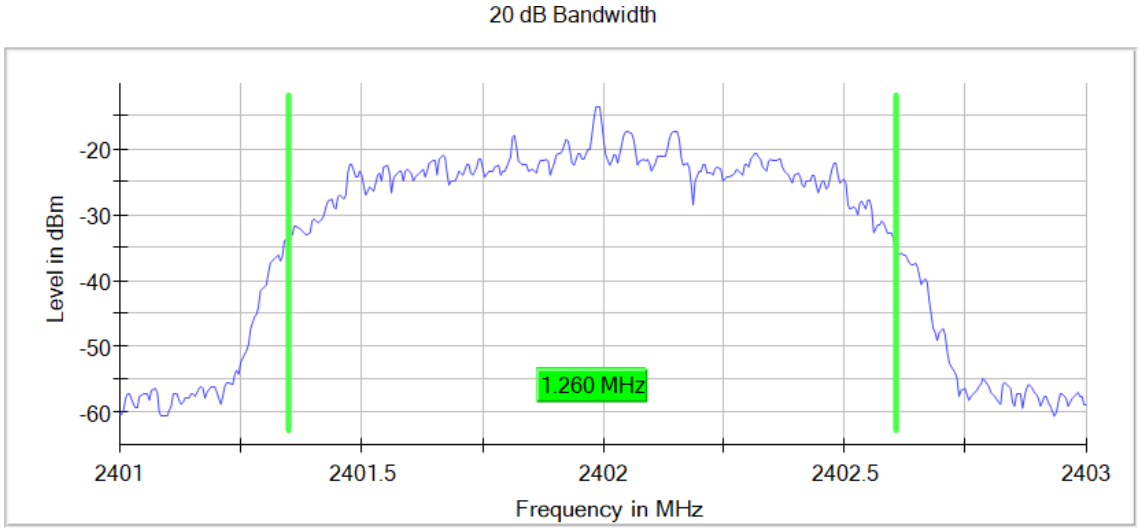
Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (Π/4 DQPSK 2-DH1)

Images:



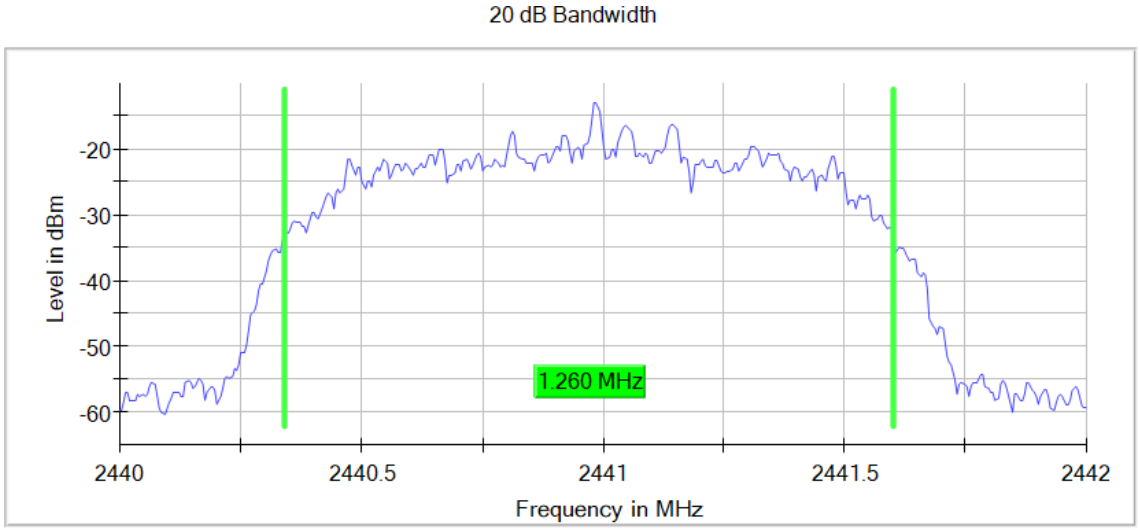
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



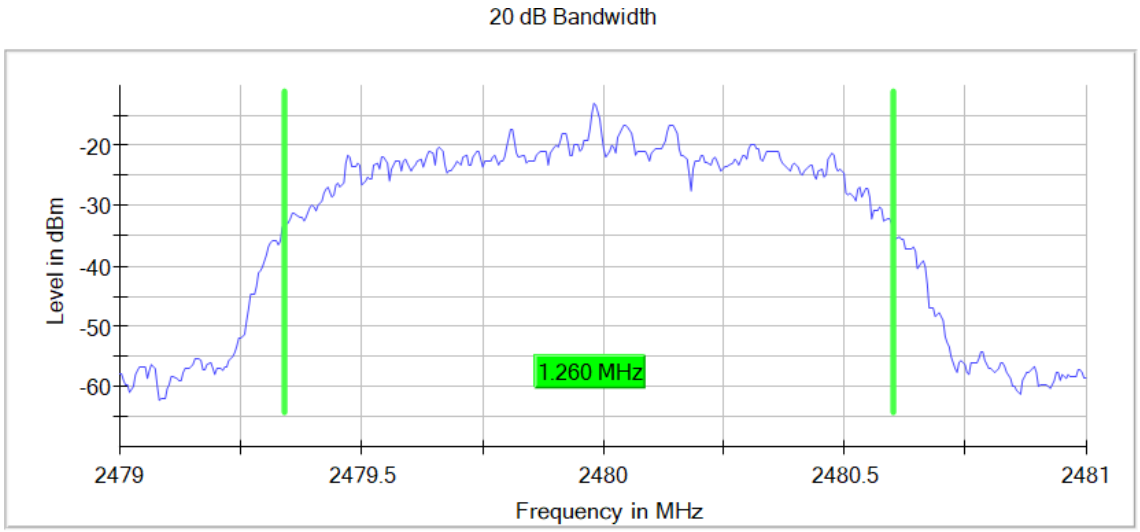
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



Spectrum Analyzer Parameters

Setting	Instrument Value
Start Frequency	2.40100 GHz
Stop Frequency	2.40300 GHz
Span	2.000 MHz
RBW	10.000 kHz
VBW	30.000 kHz
SweepPoints	400
Sweeptime	189.648 µs
Reference Level	0.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	6 / max. 150
Stable	5 / 5
Max Stable Difference	0.48 dB

FCC 2.1049 / 99dBw Occupied Channel Bandwidth 99%

Limits

No Limit has been set to this test case

Modulation: BT (GFSK 1-DH5)
Results

Freq (MHz)	Equipment	BW (MHz)	Occ Ch BW (MHz)
2402.00000	Frequency Hopping Spread Spectrum systems (DSS)	1	0.830
2441.00000		1	0.835
2480.00000		1	0.830

Modulation: BT (Π/4 DQPSK 2-DH1)
Results

Freq (MHz)	Equipment	BW (MHz)	Occ Ch BW (MHz)
2402.00000	Frequency Hopping Spread Spectrum systems (DSS)	1	1.170
2441.00000		1	1.170
2480.00000		1	1.170

Modulation: BT (8DPSK 3-DH5)
Results

Freq (MHz)	Equipment	BW (MHz)	Occ Ch BW (MHz)
2402.00000	Frequency Hopping Spread Spectrum systems (DSS)	1	1.180
2441.00000		1	1.175
2480.00000		1	1.175

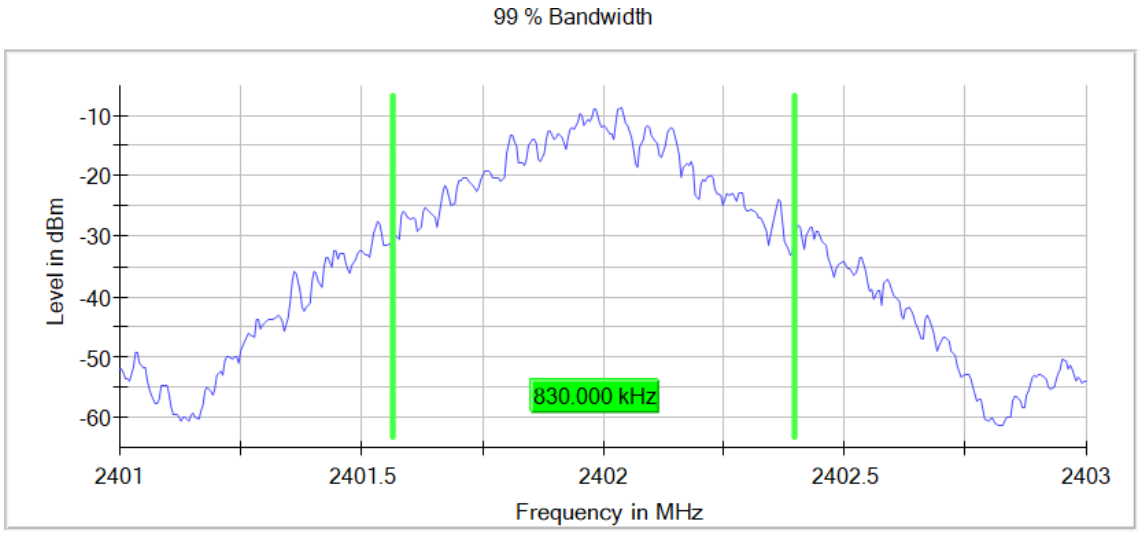
Verdict

Pass

Attachments

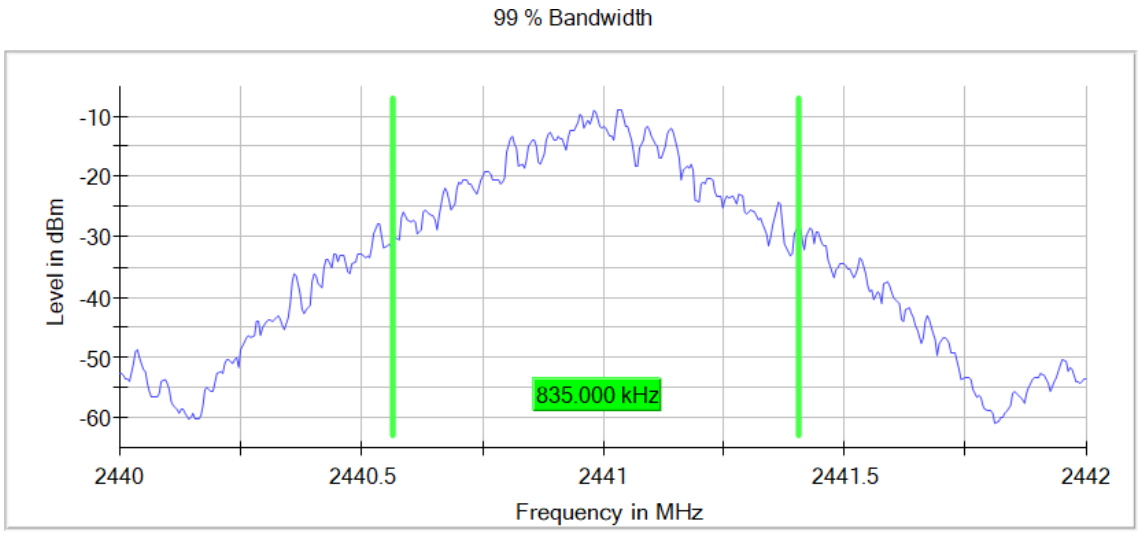
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



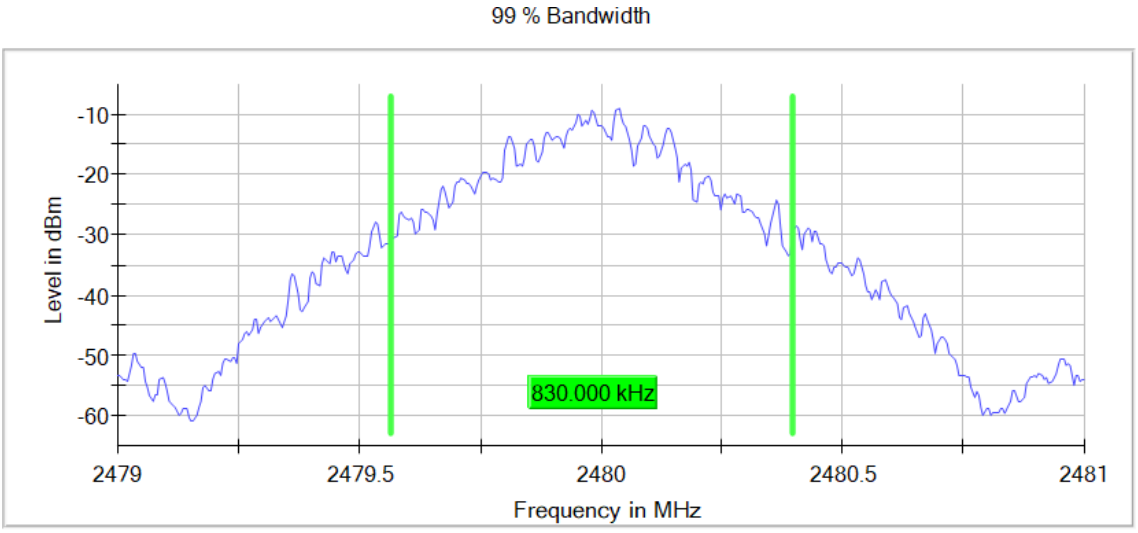
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



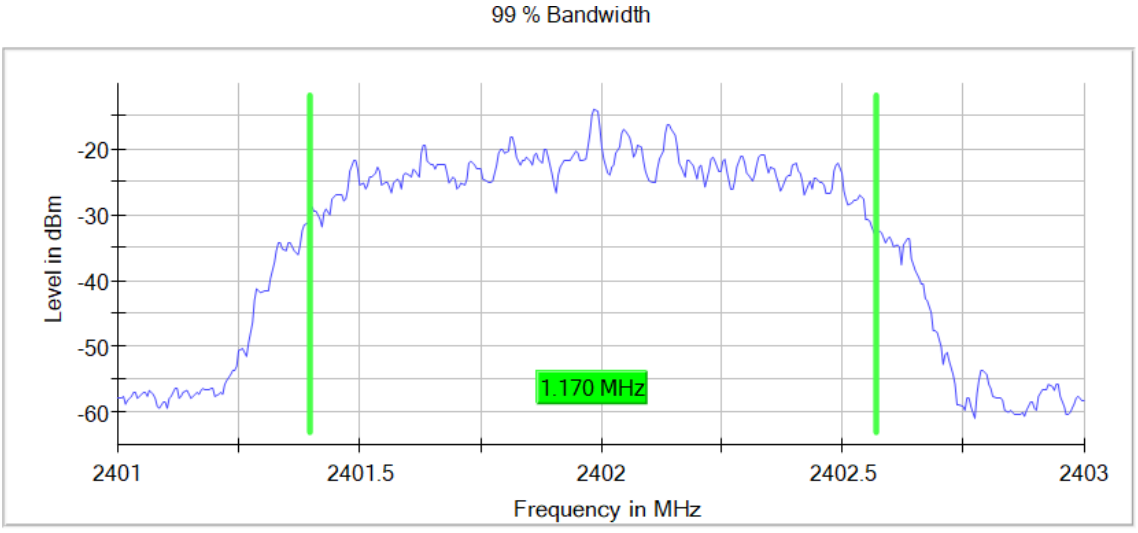
Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



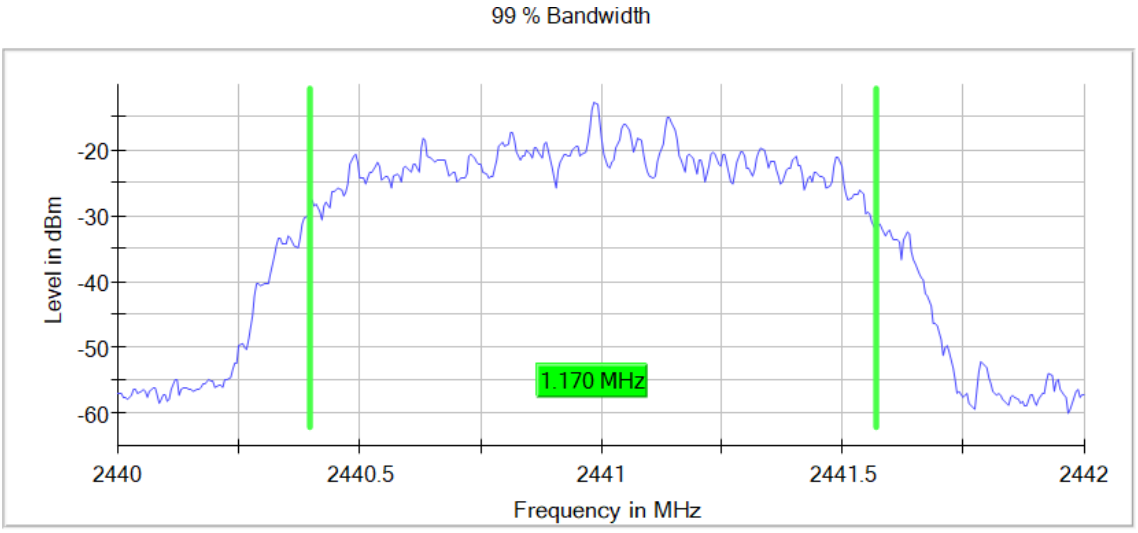
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (Π/4 DQPSK 2-DH1)

Images:



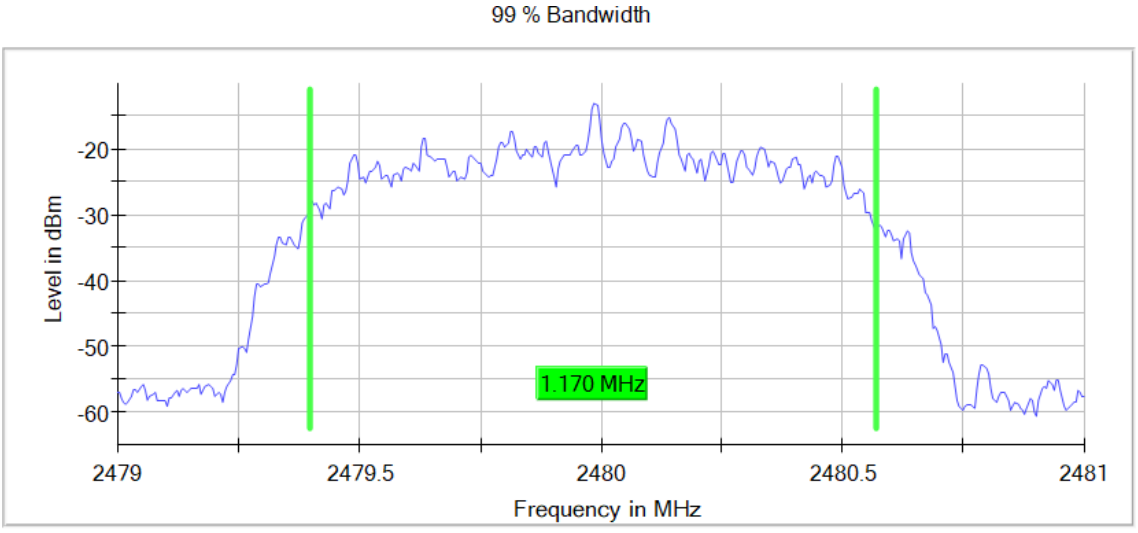
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (Π/4 DQPSK 2-DH1)

Images:



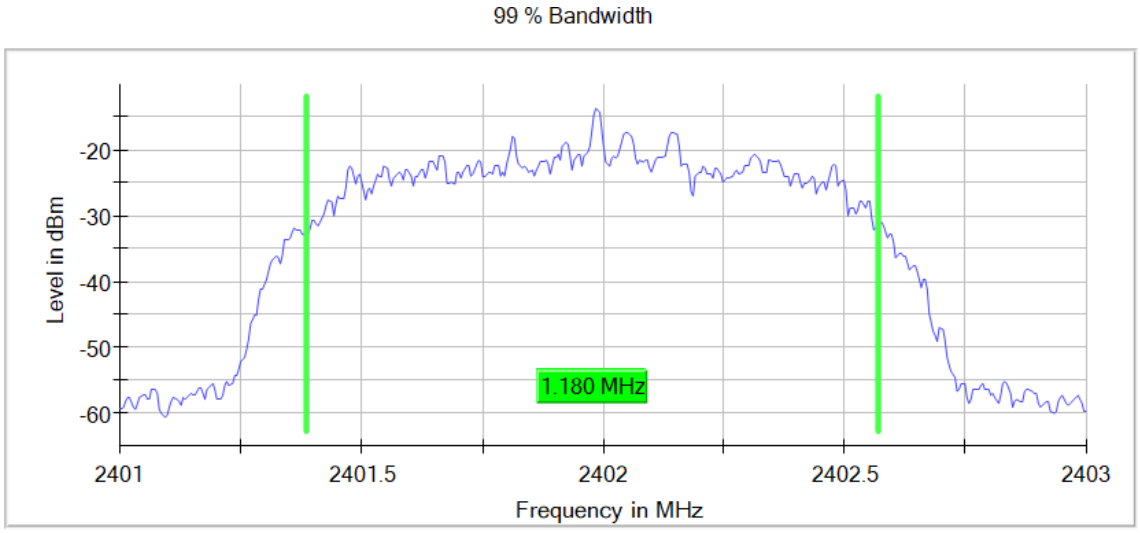
Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (Π/4 DQPSK 2-DH1)

Images:



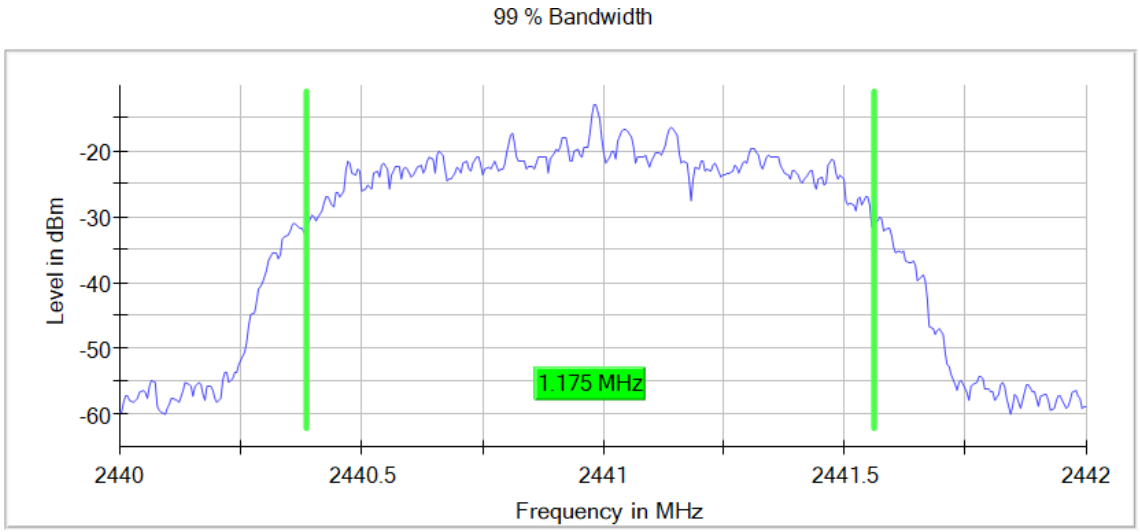
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



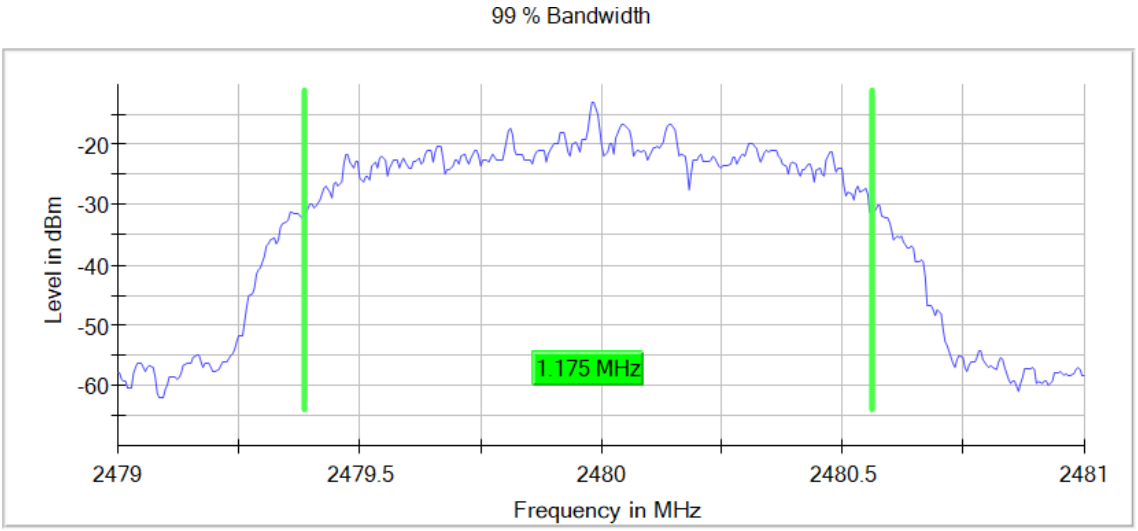
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



Spectrum Analyzer Parameters

Setting	Instrument Value
Start Frequency	2.40100 GHz
Stop Frequency	2.40300 GHz
Span	2.000 MHz
RBW	10.000 kHz
VBW	30.000 kHz
SweepPoints	400
Sweeptime	189.648 µs
Reference Level	0.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	500
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	5 / max. 150
Stable	3 / 3
Max Stable Difference	0.06 dB

RSS-247 5.1 (b) / FCC 15.247 (a) (1) [CFS] Carrier Frequency Separation

Limits

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

Modulation: BT (GFSK 1-DH5)
Results

Equipment	BW (MHz)	Freq Sep (MHz)
Frequency Hopping Spread Spectrum systems (DSS)	1	1.01

Modulation: BT (π/4 DQPSK 2-DH1)
Results

Equipment	BW (MHz)	Freq Sep (MHz)
Frequency Hopping Spread Spectrum systems (DSS)	1	0.95

Modulation: BT (8DPSK 3-DH5)
Results

Equipment	BW (MHz)	Freq Sep (MHz)
Frequency Hopping Spread Spectrum systems (DSS)	1	0.98

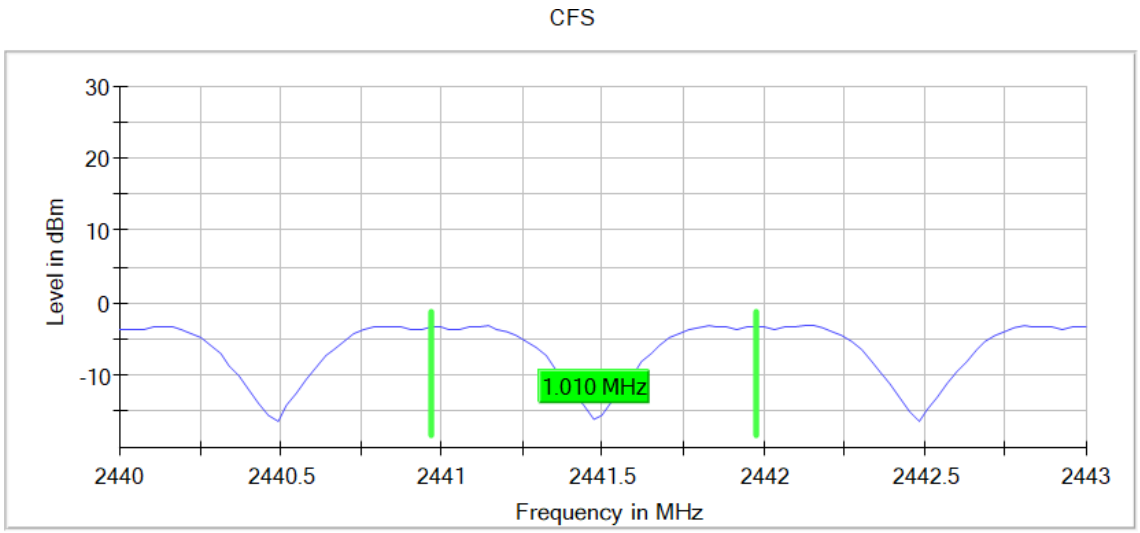
Verdict

Pass

Attachments

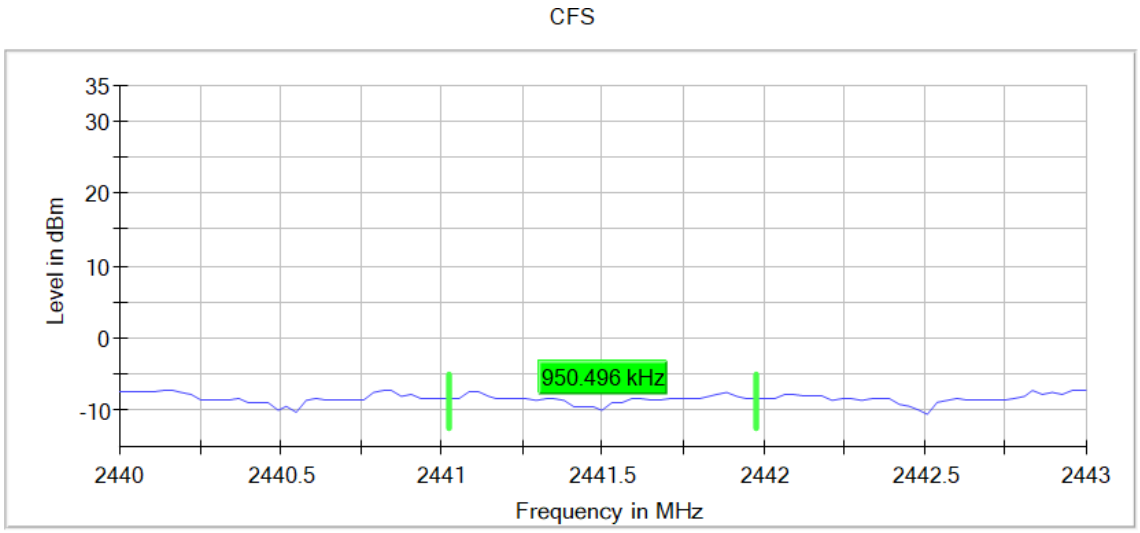
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



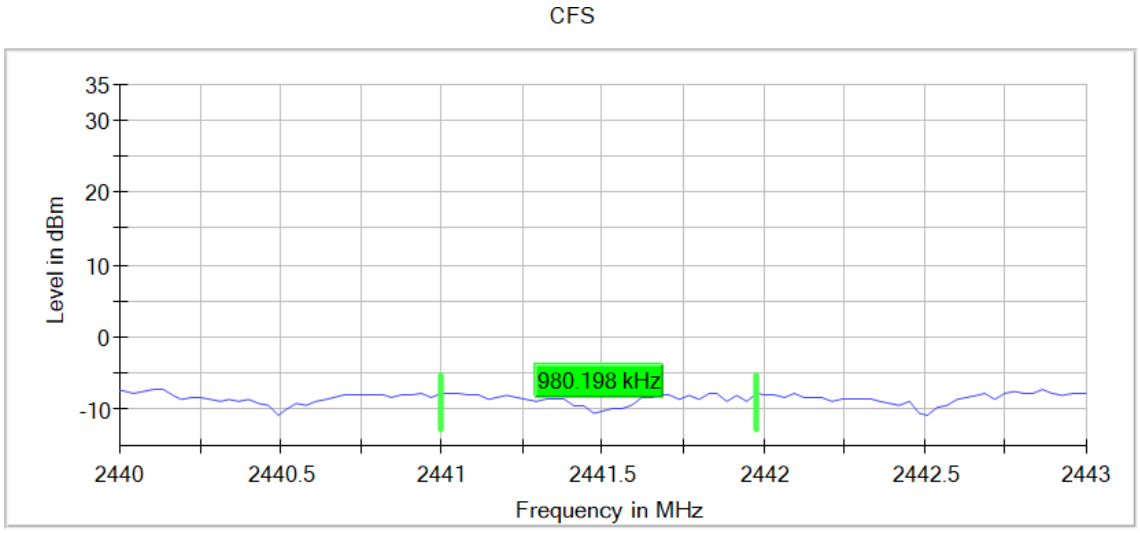
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (Π/4 DQPSK 2-DH1)

Images:



Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



Spectrum Analyzer Parameters

Setting	Instrument Value
Start Frequency	2.44000 GHz
Stop Frequency	2.44300 GHz
Span	3.000 MHz
RBW	300.000 kHz
VBW	300.000 kHz
SweepPoints	101
Sweeptime	1.000 ms
Reference Level	0.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	Sweep
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	12 / max. 150
Stable	10 / 10
Max Stable Difference	0.00 dB

RSS-247 5.1 (d) / FCC 15.247 (a) (1) (iii) Time of Occupancy (Dwell Time)

Limits

The average time of occupancy on any channel shall not be greater than 0.4 seconds (400 ms) within a period of 0.4 seconds multiplied by the number of hopping channels employed = 0.4 x 79= 31.6 seconds.

Modulation: BT (GFSK 1-DH1)
Results

Equipment	BW (MHz)	NHp	Avg COT (ms)
Frequency Hopping Spread Spectrum systems (DSS)	1	17	6.83

Modulation: BT (GFSK 1-DH3)
Results

Equipment	BW (MHz)	NHp	Avg COT (ms)
Frequency Hopping Spread Spectrum systems (DSS)	1	10	19.62

Modulation: BT (GFSK 1-DH5)
Results

Equipment	BW (MHz)	NHp	Avg COT (ms)
Frequency Hopping Spread Spectrum systems (DSS)	1	2	8.65

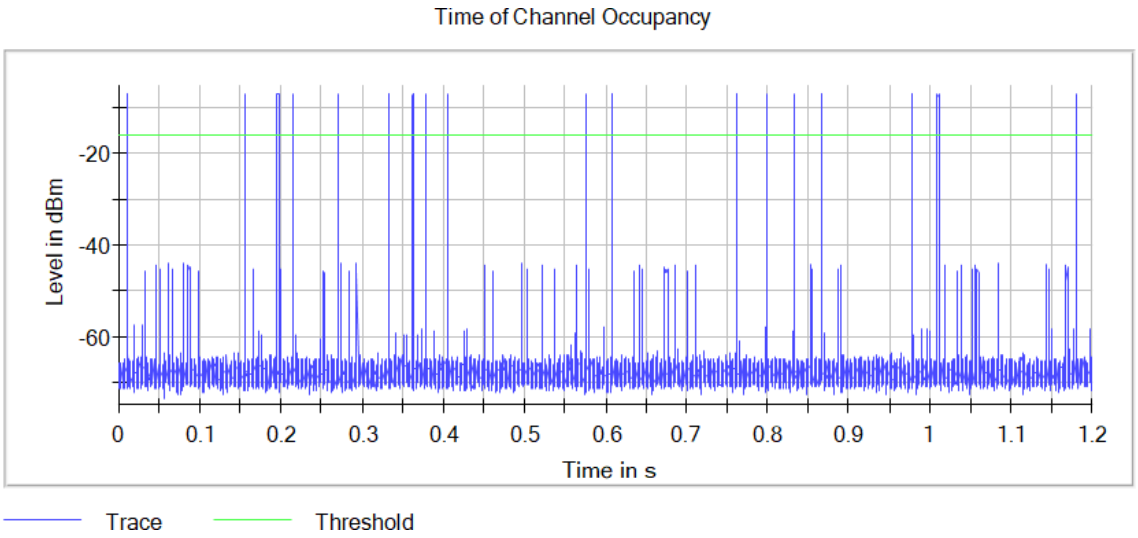
Verdict

Pass

Attachments

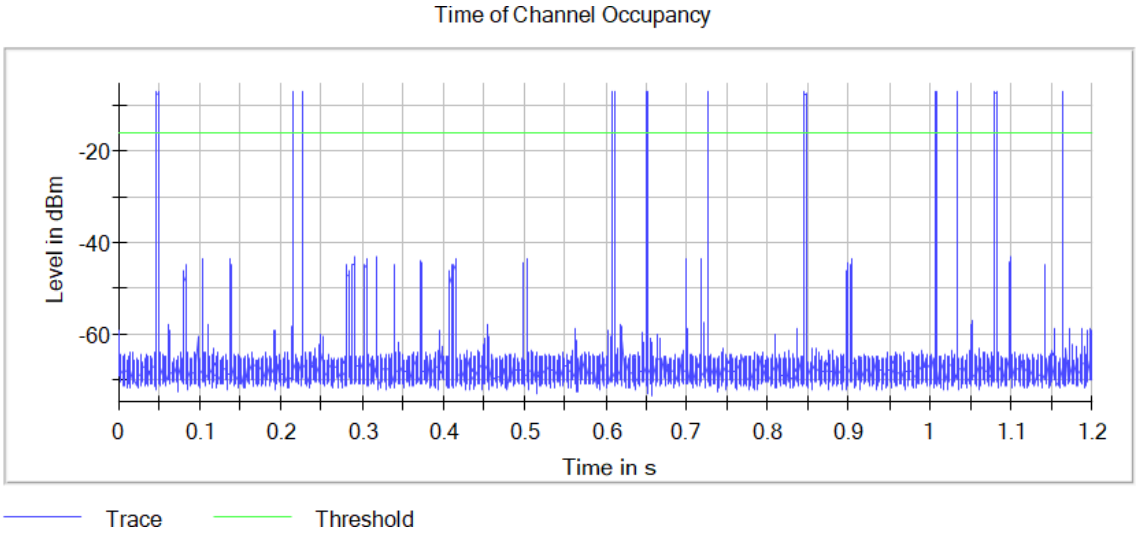
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH1)

Images:



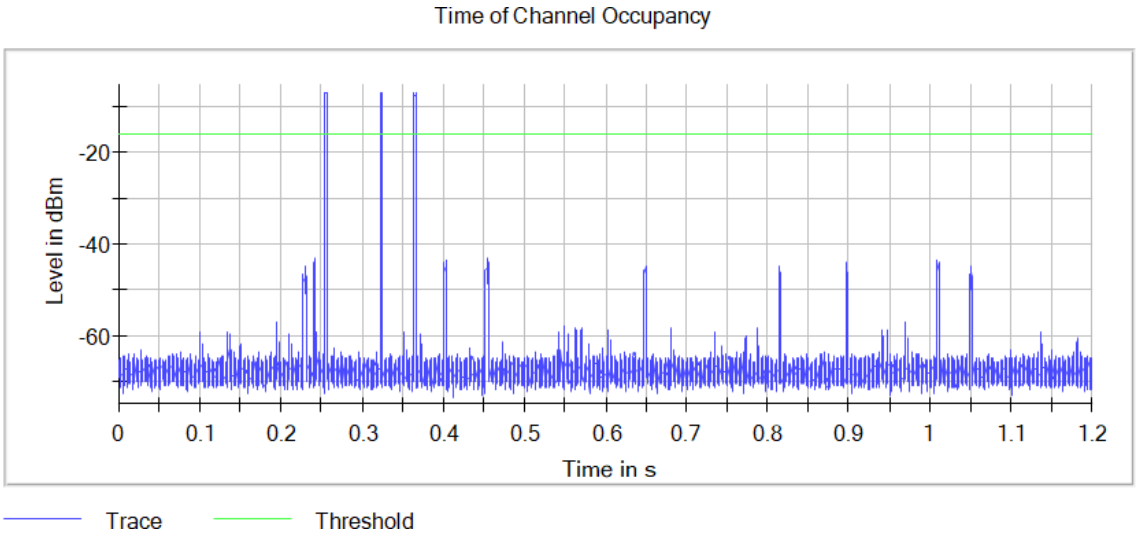
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH3)

Images:



Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



Modulation: BT (π/4 DQPSK 2-DH1)
Results

Equipment	BW (MHz)	NHp	Avg COT (ms)
Frequency Hopping Spread Spectrum systems (DSS)	1	16	6.12

Modulation: BT (π/4 DQPSK 2-DH3)
Results

Equipment	BW (MHz)	NHp	Avg COT (ms)
Frequency Hopping Spread Spectrum systems (DSS)	1	6	9.85

Modulation: BT (π/4 DQPSK 2-DH5)
Results

Equipment	BW (MHz)	NHp	Avg COT (ms)
Frequency Hopping Spread Spectrum systems (DSS)	1	7	20.18

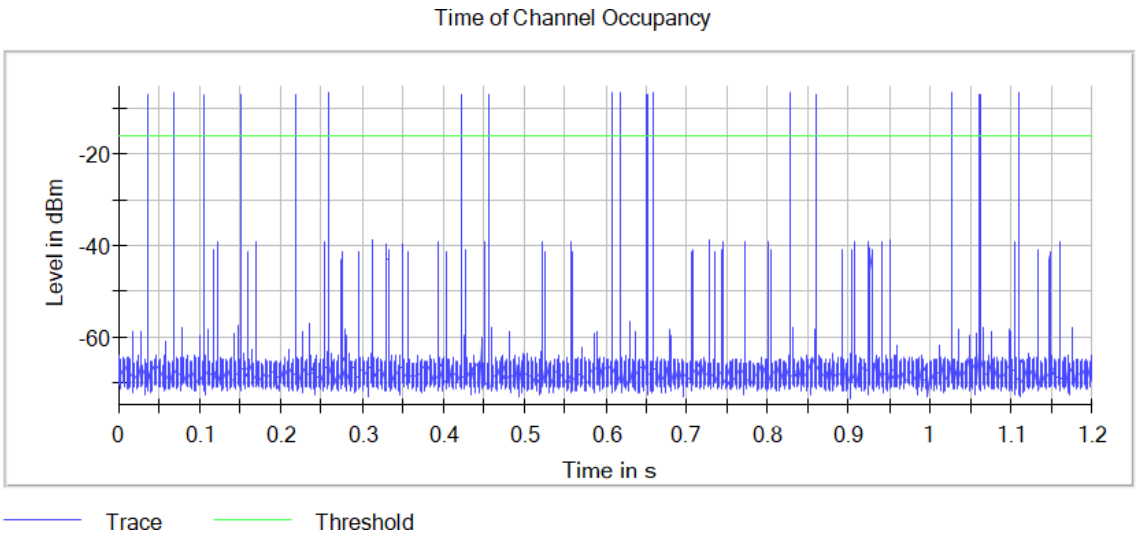
Verdict

Pass

Attachments

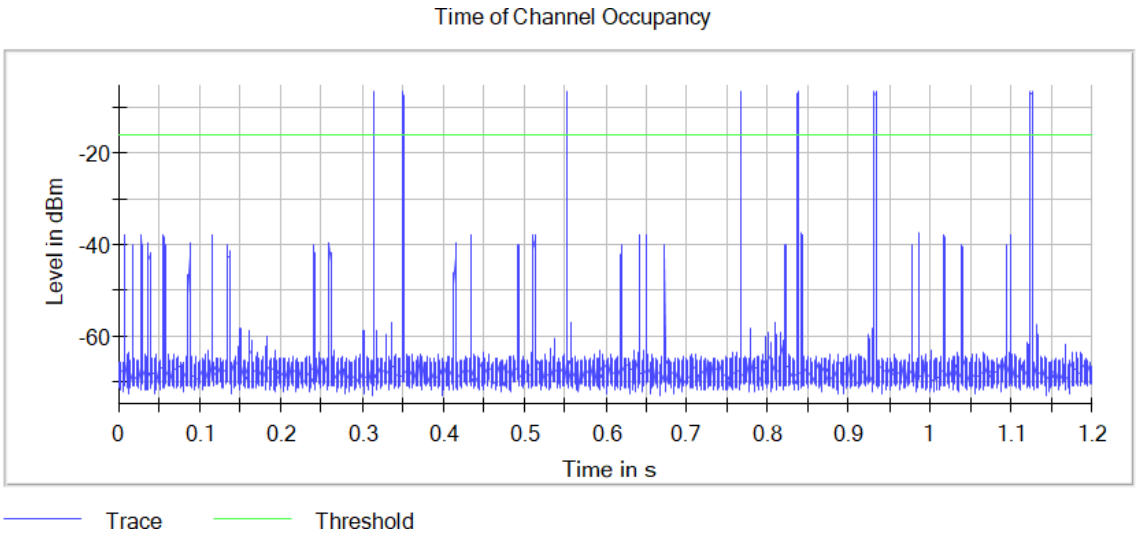
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (π/4 DQPSK 2-DH1)

Images:



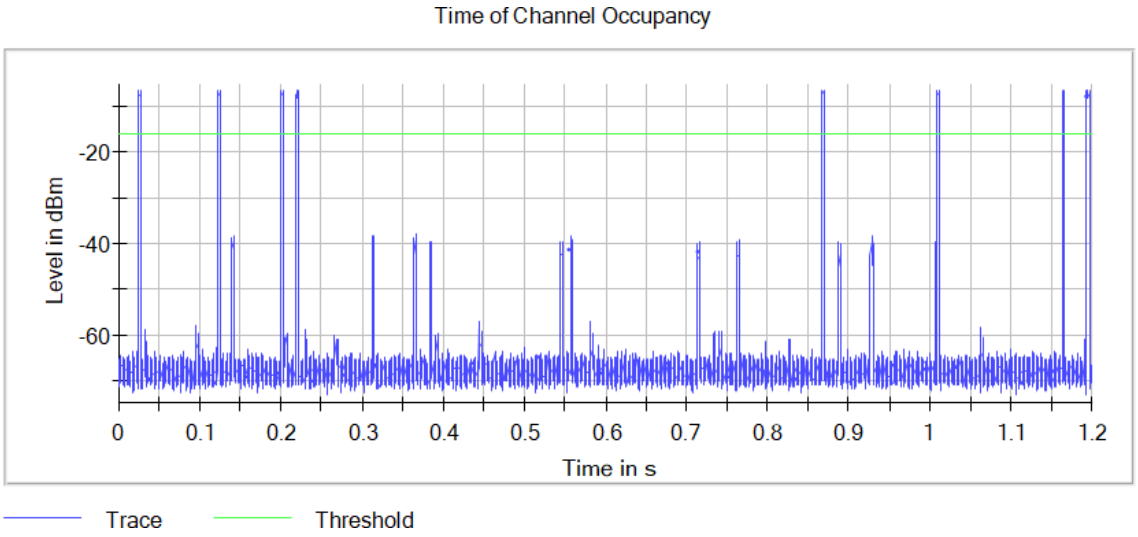
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (π/4 DQPSK 2-DH3)

Images:



Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (π/4 DQPSK 2-DH5)

Images:



Modulation: BT (8DPSK 3-DH1)
Results

Equipment	BW (MHz)	NHp	Avg COT (ms)
Frequency Hopping Spread Spectrum systems (DSS)	1	8	17.28

Modulation: BT (8DPSK 3-DH3)
Results

Equipment	BW (MHz)	NHp	Avg COT (ms)
Frequency Hopping Spread Spectrum systems (DSS)	1	16	23.85

Modulation: BT (8DPSK 3-DH5)
Results

Equipment	BW (MHz)	NHp	Avg COT (ms)
Frequency Hopping Spread Spectrum systems (DSS)	1	1	5.01

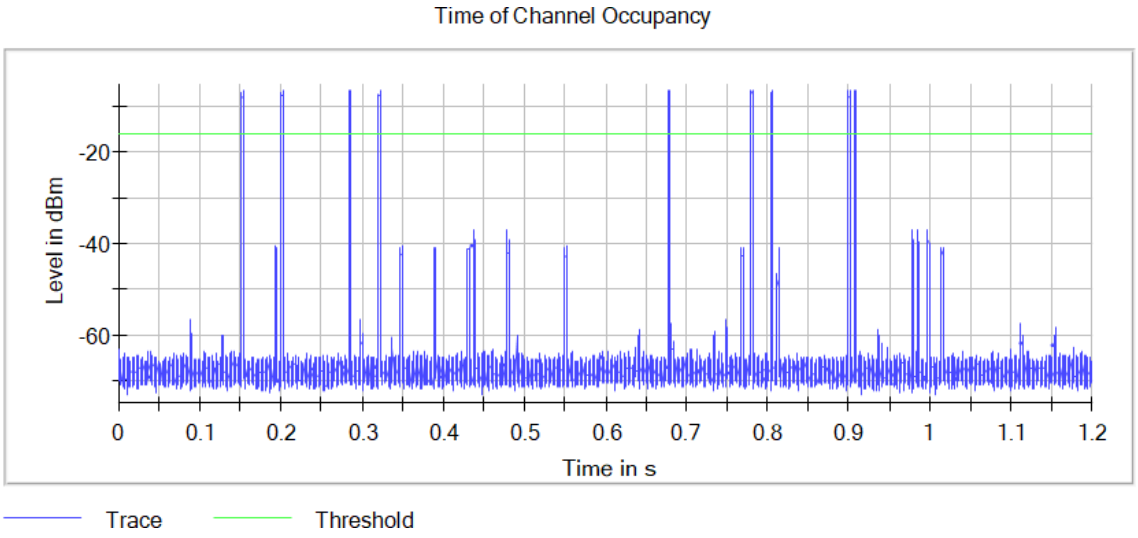
Verdict

Pass

Attachments

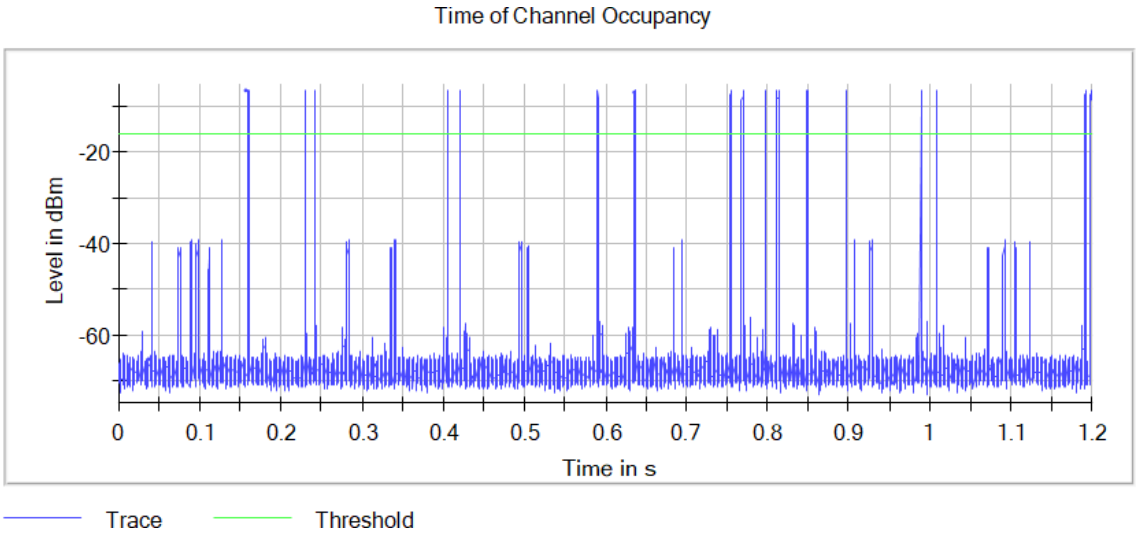
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH1)

Images:



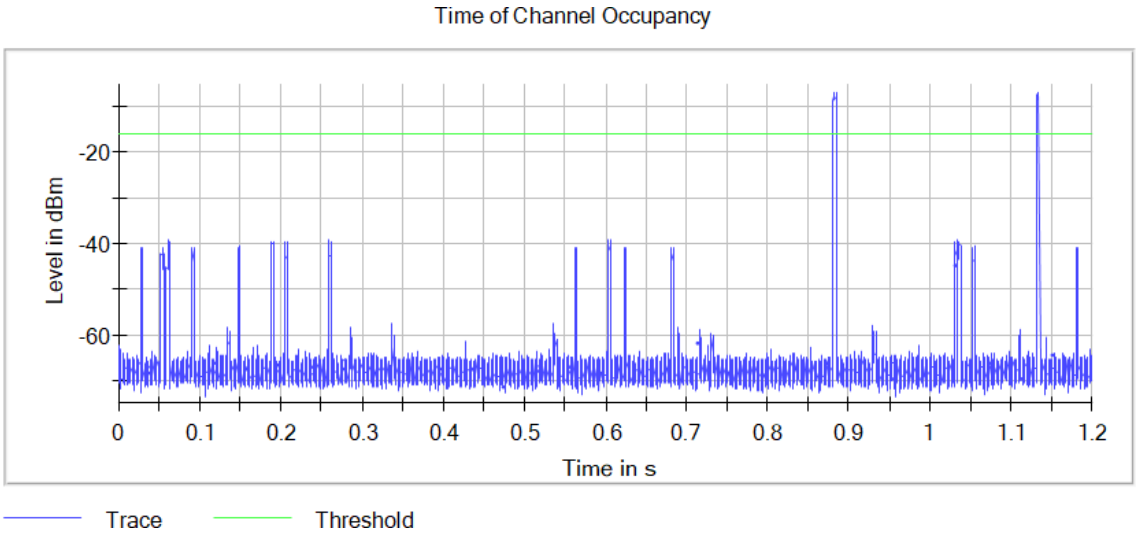
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH3)

Images:



Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



Spectrum Analyzer Parameters

Setting	Instrument Value (GFSK)	Instrument Value (π/4 DQPSK)	Instrument Value (8DPSK)
Center Frequency	2.44100 GHz	2.44100 GHz	2.44100 GHz
Span	ZeroSpan	ZeroSpan	ZeroSpan
RBW	500.000 kHz	500.000 kHz	500.000 kHz
VBW	1.000 MHz	1.000 MHz	1.000 MHz
SweepPoints	30001	30001	30001
Sweeptime	1.200 s	1.200 s	1.200 s
Reference Level	-10.000 dBm	-10.000 dBm	-10.000 dBm
Attenuation	0.000 dB	0.000 dB	0.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak
SweepCount	1	1	1
Filter	Channel	Channel	Channel
Trace Mode	Clear Write	Clear Write	Clear Write
Sweeptype	Sweep	Sweep	Sweep
Preamp	off	off	off
Trigger	External	External	External
Trigger Offset	0.000 s	0.000 s	0.000 s

RSS-247 5.1 (d) / FCC 15.247 (a) (1) (iii) [NHC] Number of hopping channels

Limits

Frequency hopping system in the 2400-2483.5 MHz band shall use at least 15 channels.

Modulation: BT (GFSK 1-DH5)
Results

Equipment	BW (MHz)	NHC
Frequency Hopping Spread Spectrum systems (DSS)	1	79

Modulation: BT (π/4 DQPSK 2-DH1)
Results

Equipment	BW (MHz)	NHC
Frequency Hopping Spread Spectrum systems (DSS)	1	79

Modulation: BT (8DPSK 3-DH5)
Results

Equipment	BW (MHz)	NHC
Frequency Hopping Spread Spectrum systems (DSS)	1	79

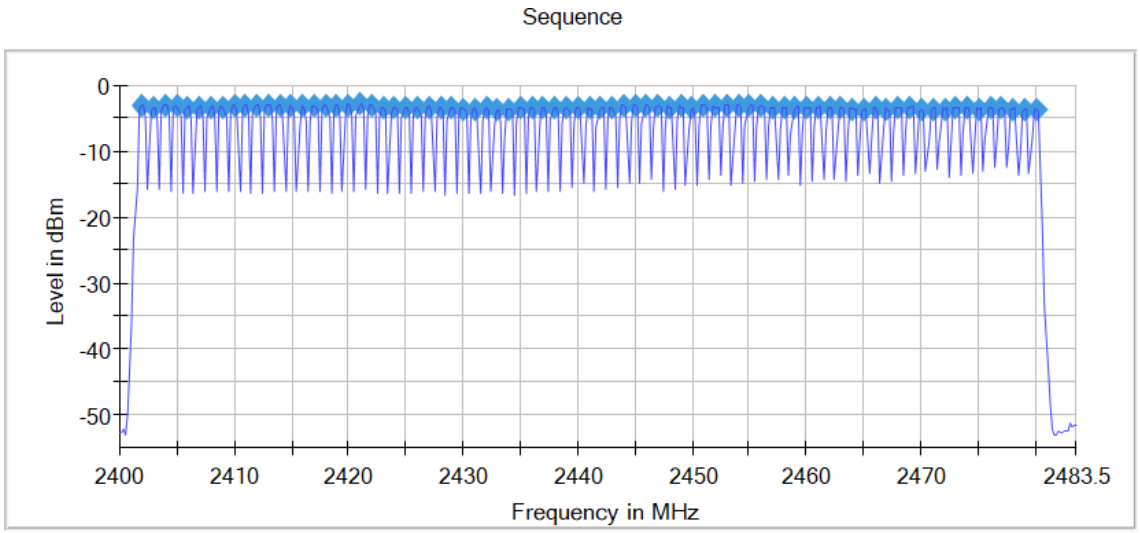
Verdict

Pass

Attachments

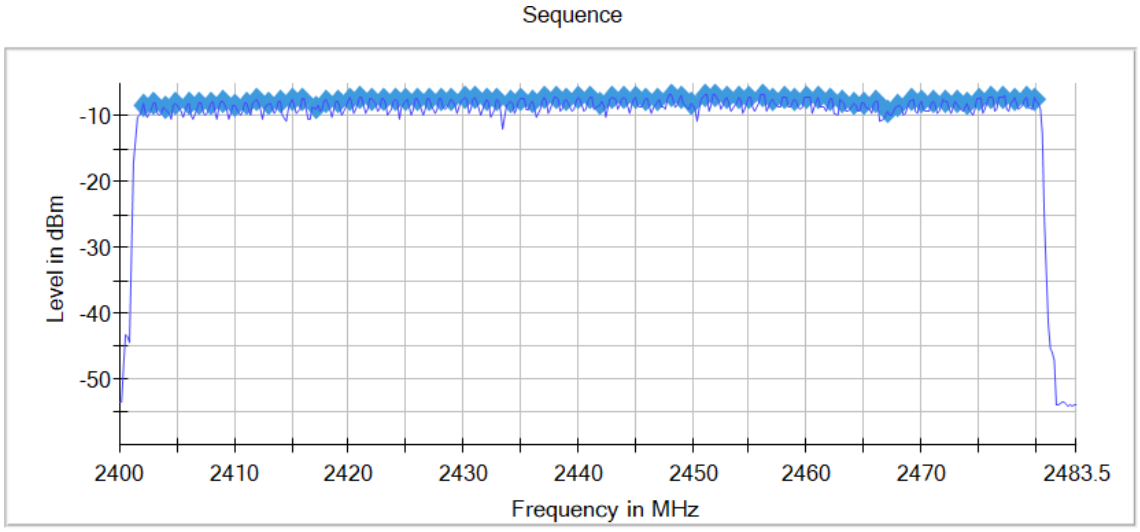
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



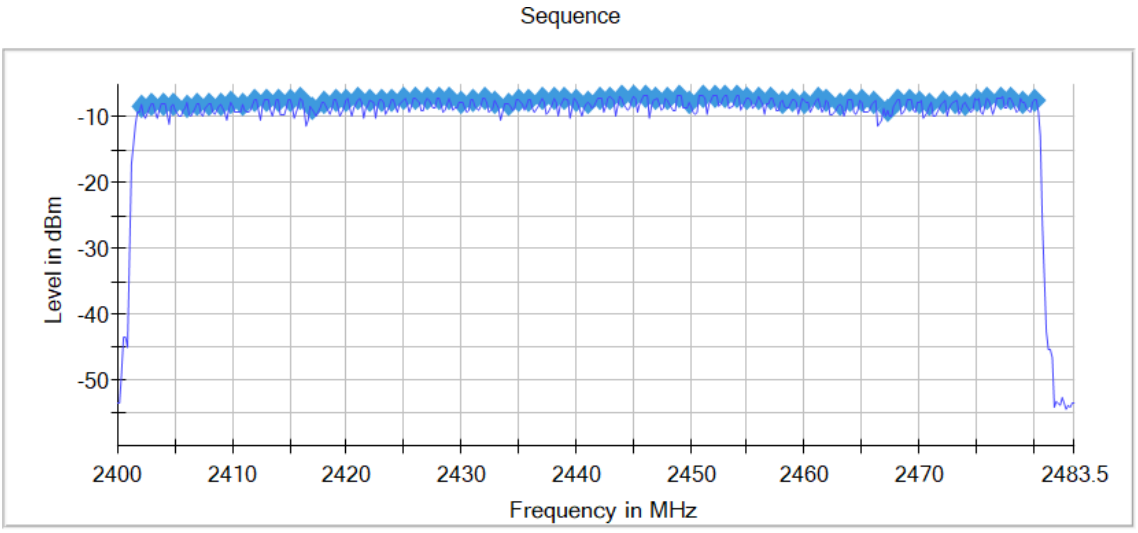
Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (π/4 DQPSK 2-DH1)

Images:



Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



Spectrum Analyzer Parameters

Setting	Instrument Value (GFSK)	Instrument Value (π/4 DQPSK)	Instrument Value (8DPSK)
Start Frequency	2.40000 GHz	2.40000 GHz	2.40000 GHz
Stop Frequency	2.48350 GHz	2.48350 GHz	2.48350 GHz
Span	83.500 MHz	83.500 MHz	83.500 MHz
RBW	200.000 kHz	200.000 kHz	200.000 kHz
VBW	200.000 kHz	200.000 kHz	200.000 kHz
SweepPoints	418	418	418
Sweeptime	47.405 µs	47.405 µs	47.405 µs
Reference Level	0.000 dBm	0.000 dBm	0.000 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	FFT	FFT	FFT
Preamp	off	off	off
Stablemode	Trace	Trace	Trace
Stablevalue	0.50 dB	0.50 dB	0.50 dB
Run	66 / max. 150	119 / max. 150	121 / max. 150
Stable	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.31 dB	0.01 dB	0.17 dB

RSS-247 5.4 (b) / FCC 15.247 (b) (1) [Pkcp] Maximum Peak Conducted output power

Limits

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels: 1 watt (30 dBm). The e.i.r.p. shall not exceed 4 W (RSS-247).

Maximum declared antenna gain: 2 dBi
Modulation: BT (GFSK 1-DH5)
Results

Freq (MHz)	Equipment	Peak Power (dBm)	Maximum EIRP power (dBm)
2402.00000	Frequency Hopping Spread Spectrum systems (DSS)	7.8	9.8
2441.00000	Frequency Hopping Spread Spectrum systems (DSS)	7.7	9.7
2480.00000	Frequency Hopping Spread Spectrum systems (DSS)	7.2	9.2

Modulation: BT (π/4 DQPSK 2-DH1)
Results

Freq (MHz)	Equipment	Peak Power (dBm)	Maximum EIRP power (dBm)
2402.00000	Frequency Hopping Spread Spectrum systems (DSS)	6.6	8.6
2441.00000	Frequency Hopping Spread Spectrum systems (DSS)	6.1	8.1
2480.00000	Frequency Hopping Spread Spectrum systems (DSS)	4.8	6.8

Modulation: BT (8DPSK 3-DH5)
Results

Freq (MHz)	Equipment	Peak Power (dBm)	Maximum EIRP power (dBm)
2402.00000	Frequency Hopping Spread Spectrum systems (DSS)	6.6	8.6
2441.00000	Frequency Hopping Spread Spectrum systems (DSS)	6.3	8.3
2480.00000	Frequency Hopping Spread Spectrum systems (DSS)	5.1	8.1

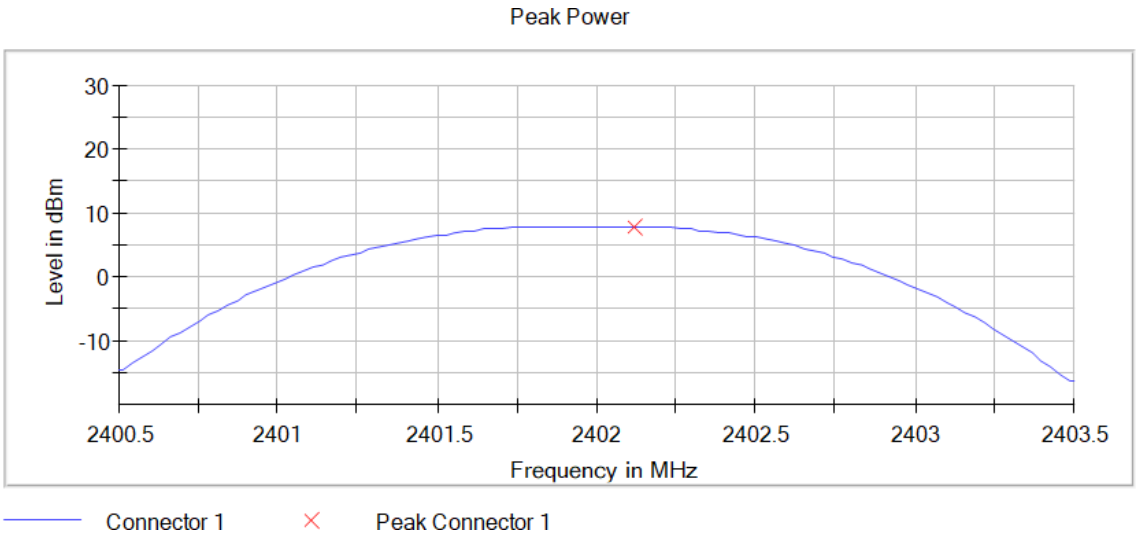
Verdict

Pass

Attachments

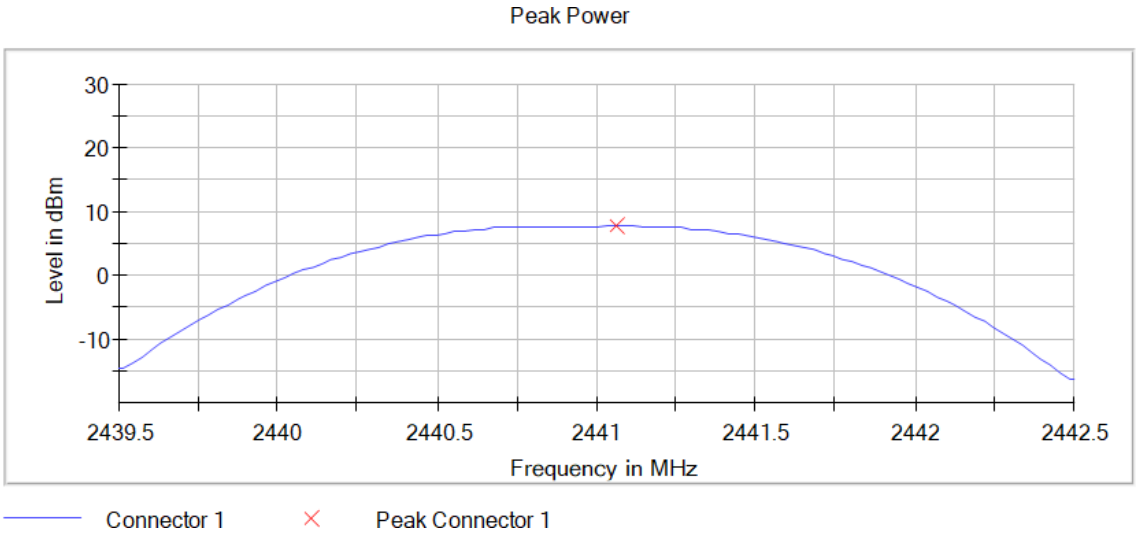
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



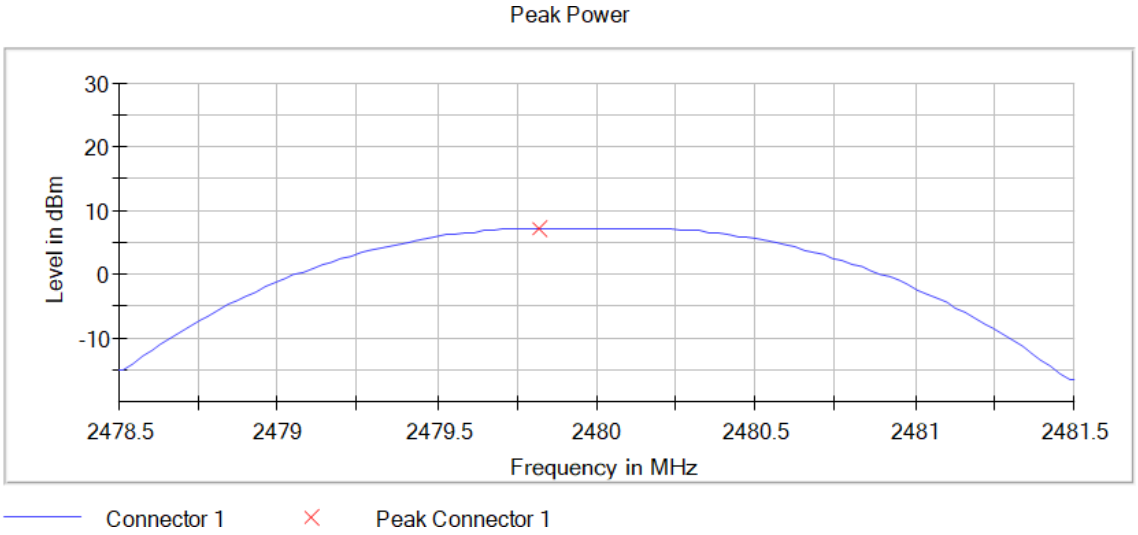
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



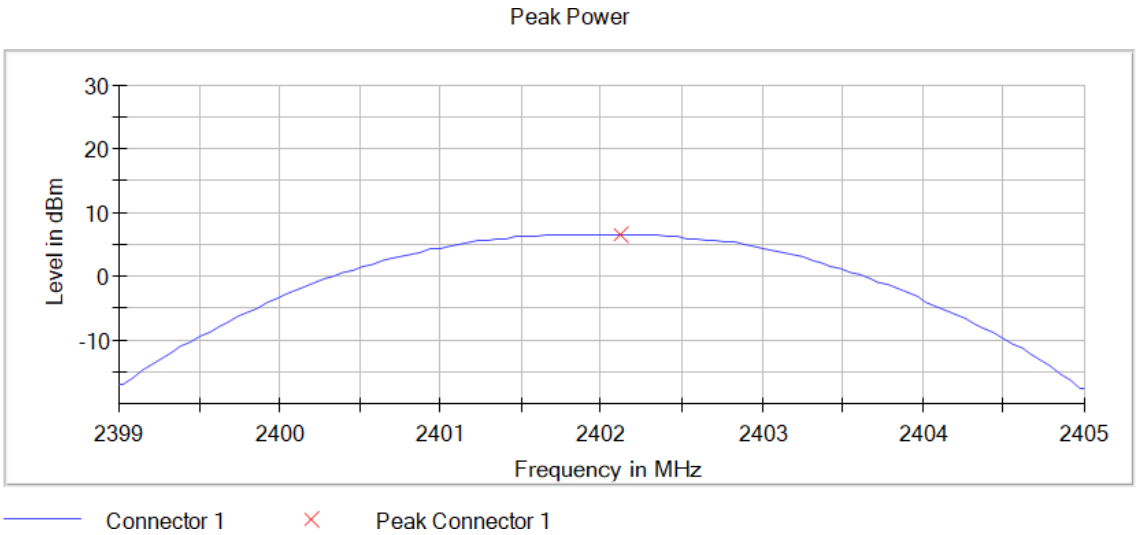
Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



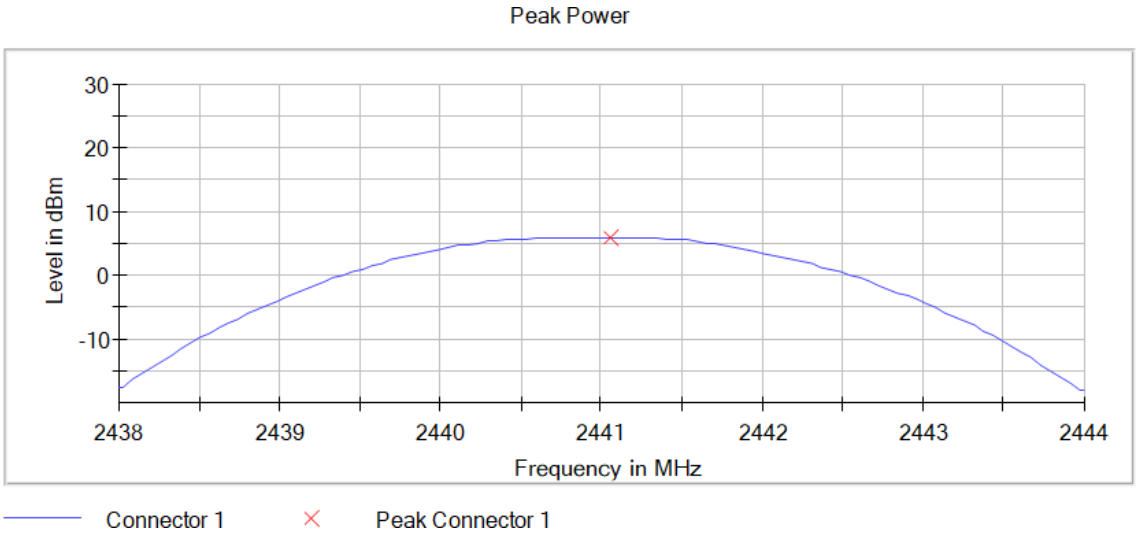
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (π/4 DQPSK 2-DH1)

Images:



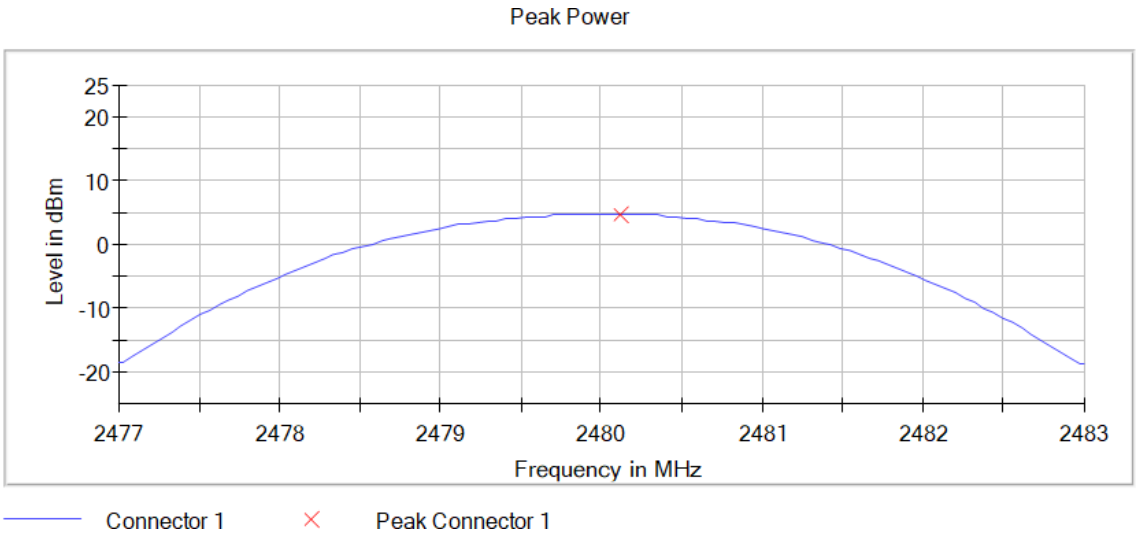
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (π/4 DQPSK 2-DH1)

Images:



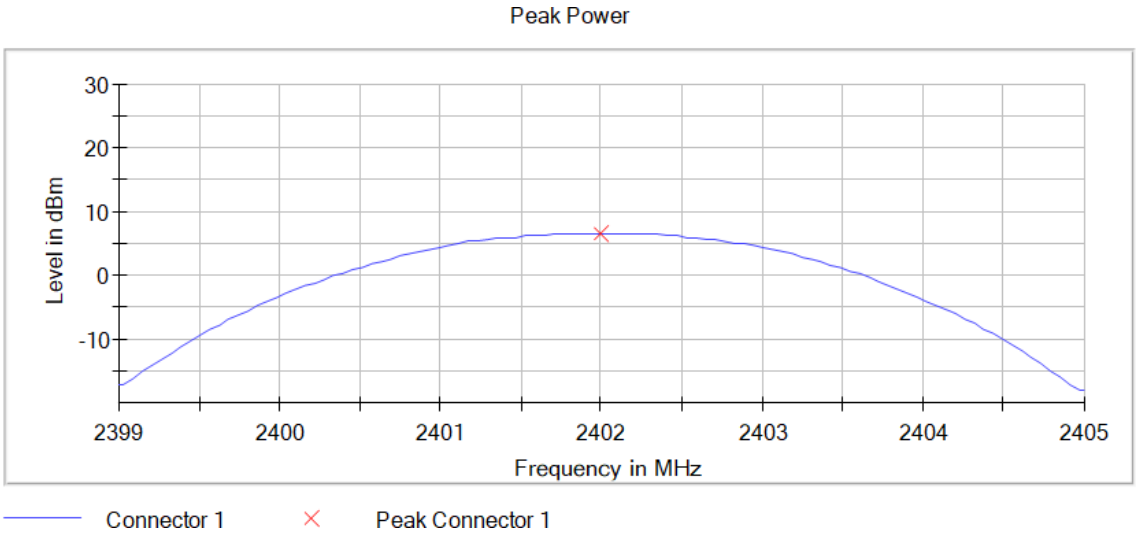
Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (π/4 DQPSK 2-DH1)

Images:



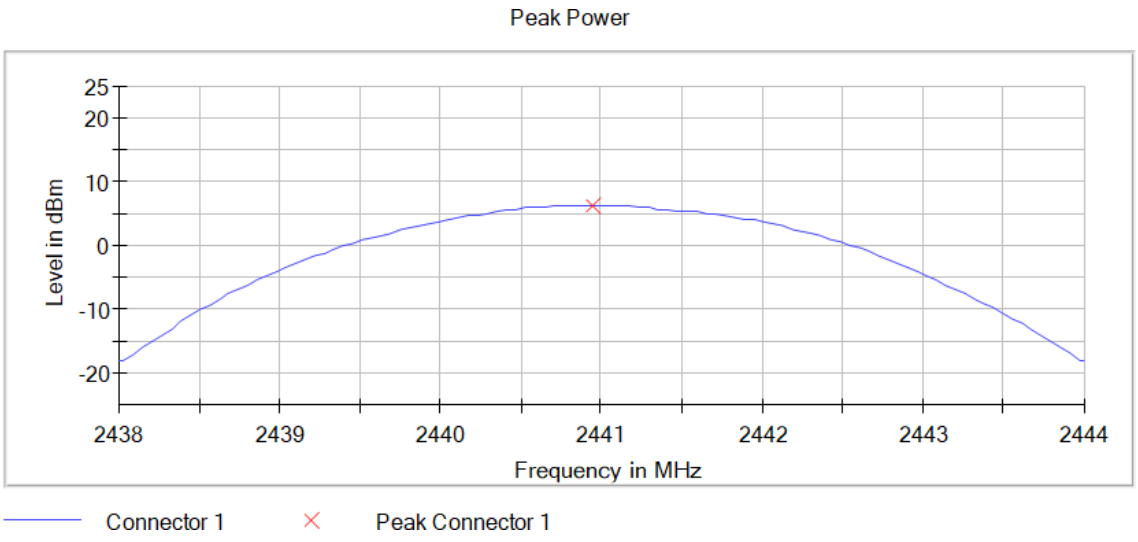
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



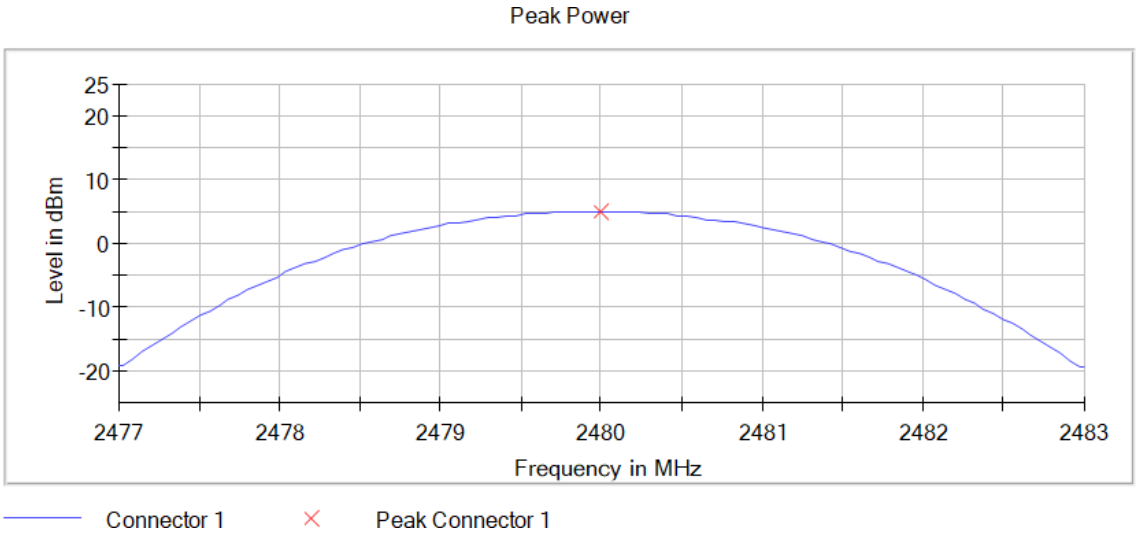
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



Spectrum Analyzer Parameters

Setting	Instrument Value
Start Frequency	2.40050 GHz
Stop Frequency	2.40350 GHz
Span	3.000 MHz
RBW	1.000 MHz
VBW	3.000 MHz
SweepPoints	101
Sweeptime	1.907 µs
Reference Level	10.000 dBm
Attenuation	30.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	4 / max. 150
Stable	3 / 3
Max Stable Difference	0.03 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: BT (GFSK 1-DH5) - HOPPING OFF

Results

DUT Frequency	Result
2402.000000	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2341.975000	-52.7	29.7	-23.0	PASS
2342.125000	-52.8	29.8	-23.0	PASS
2311.225000	-52.9	29.9	-23.0	PASS
2311.275000	-52.9	29.9	-23.0	PASS
2342.025000	-53.0	29.9	-23.0	PASS
2342.175000	-53.0	30.0	-23.0	PASS
2341.925000	-53.1	30.1	-23.0	PASS
2332.775000	-53.4	30.4	-23.0	PASS
2392.125000	-53.4	30.4	-23.0	PASS
2332.825000	-53.5	30.5	-23.0	PASS
2392.175000	-53.6	30.5	-23.0	PASS
2334.825000	-53.6	30.6	-23.0	PASS
2363.775000	-53.7	30.6	-23.0	PASS
2387.575000	-53.7	30.6	-23.0	PASS
2395.025000	-53.7	30.7	-23.0	PASS

DUT Frequency	Result
2480.000000	PASS

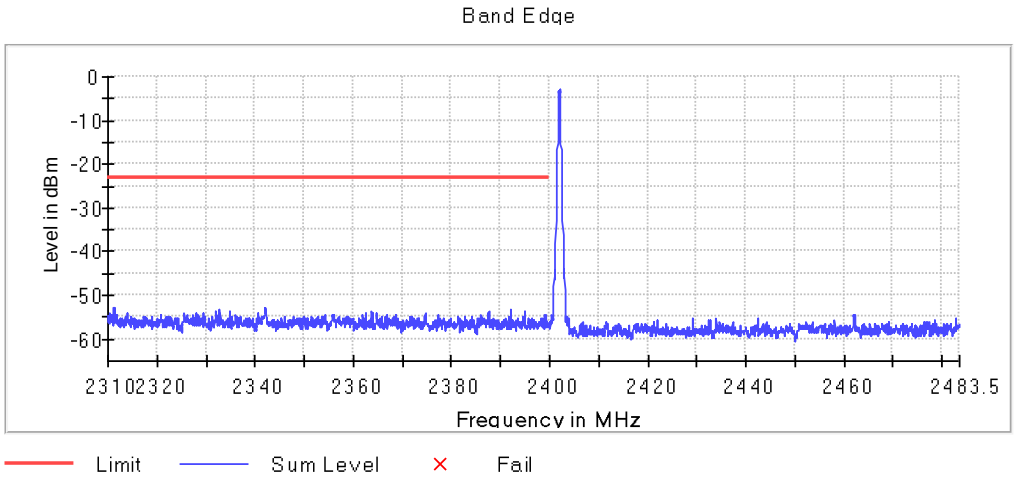
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2489.525000	-53.8	29.9	-23.9	PASS
2489.575000	-53.8	29.9	-23.9	PASS
2484.925000	-54.1	30.1	-23.9	PASS
2497.325000	-54.1	30.2	-23.9	PASS
2483.925000	-54.1	30.2	-23.9	PASS
2485.375000	-54.1	30.2	-23.9	PASS
2483.575000	-54.2	30.2	-23.9	PASS
2483.625000	-54.2	30.2	-23.9	PASS
2484.875000	-54.2	30.3	-23.9	PASS
2484.375000	-54.2	30.3	-23.9	PASS
2485.325000	-54.2	30.3	-23.9	PASS
2484.325000	-54.3	30.4	-23.9	PASS
2487.675000	-54.3	30.4	-23.9	PASS
2497.375000	-54.3	30.4	-23.9	PASS
2495.675000	-54.3	30.4	-23.9	PASS

Verdict

Pass

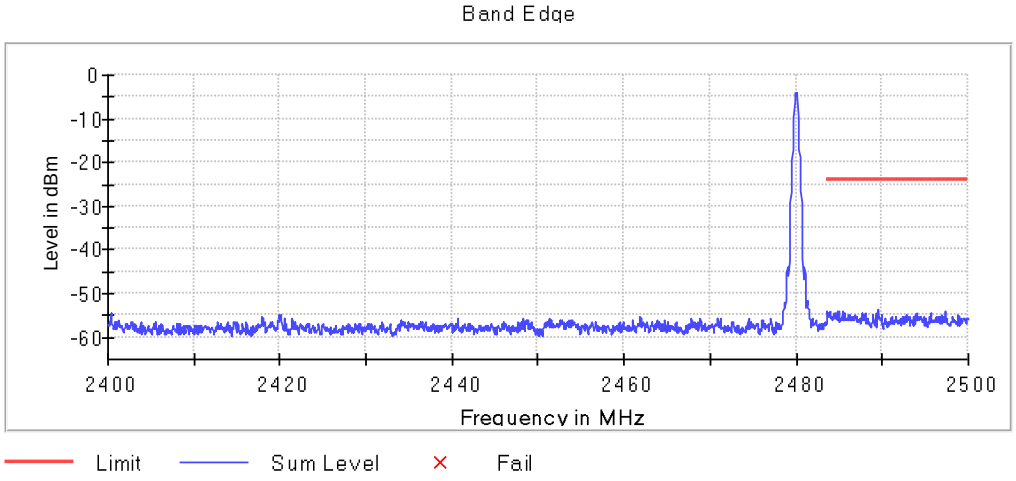
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



Modulation: BT (GFSK 1-DH5) - HOPPING ON

Results

DUT Frequency	Result
2402.000000	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2377.925000	-53.2	30.3	-22.9	PASS
2377.975000	-53.2	30.3	-22.9	PASS
2364.025000	-53.5	30.6	-22.9	PASS
2311.125000	-53.5	30.6	-22.9	PASS
2316.125000	-53.5	30.7	-22.9	PASS
2311.075000	-53.5	30.7	-22.9	PASS
2325.975000	-53.6	30.7	-22.9	PASS
2383.875000	-53.6	30.7	-22.9	PASS
2328.175000	-53.6	30.7	-22.9	PASS
2325.925000	-53.6	30.7	-22.9	PASS
2338.625000	-53.6	30.8	-22.9	PASS
2344.575000	-53.7	30.8	-22.9	PASS
2344.525000	-53.7	30.8	-22.9	PASS
2382.025000	-53.7	30.8	-22.9	PASS
2328.225000	-53.7	30.8	-22.9	PASS

DUT Frequency	Result
2480.000000	PASS

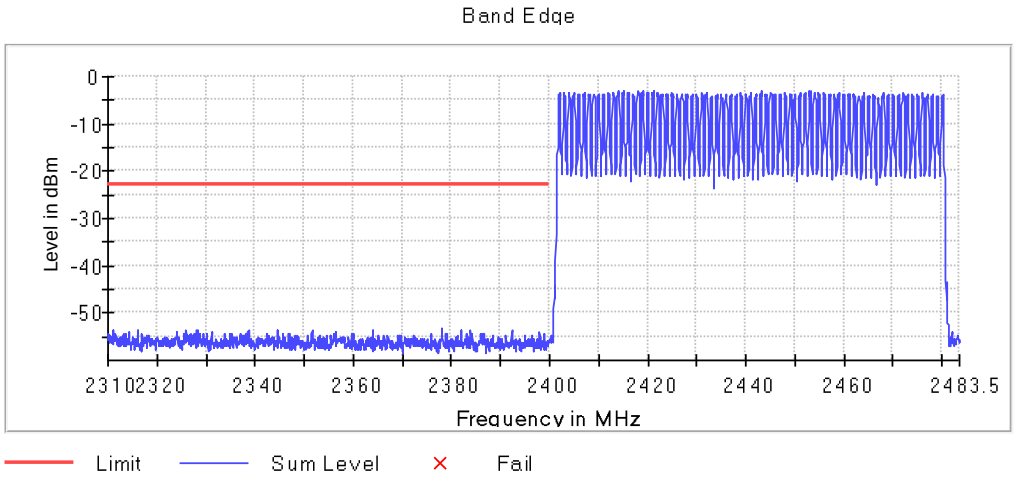
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2499.875000	-51.1	28.1	-23.0	PASS
2499.925000	-51.9	28.8	-23.0	PASS
2499.825000	-52.2	29.2	-23.0	PASS
2486.825000	-52.9	29.9	-23.0	PASS
2486.875000	-53.1	30.1	-23.0	PASS
2499.975000	-53.1	30.1	-23.0	PASS
2500.000000	-53.1	30.1	-23.0	PASS
2487.975000	-53.7	30.7	-23.0	PASS
2488.025000	-53.8	30.8	-23.0	PASS
2487.025000	-53.8	30.8	-23.0	PASS
2487.875000	-53.9	30.9	-23.0	PASS
2492.675000	-54.1	31.1	-23.0	PASS
2494.925000	-54.2	31.2	-23.0	PASS
2486.375000	-54.2	31.2	-23.0	PASS
2494.875000	-54.3	31.2	-23.0	PASS

Verdict

Pass

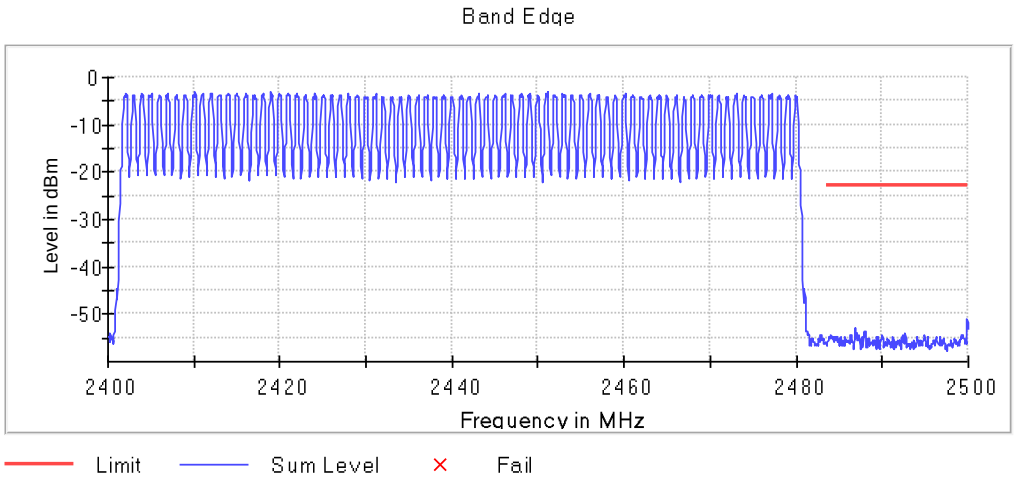
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (GFSK 1-DH5)

Images:



Modulation: BT (π/4 DQPSK 2-DH1) - HOPPING OFF

Results

DUT Frequency	Result
2402.000000	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2341.975000	-54.1	25.8	-28.3	PASS
2341.925000	-54.3	26.0	-28.3	PASS
2345.425000	-54.5	26.2	-28.3	PASS
2345.475000	-54.6	26.3	-28.3	PASS
2313.475000	-54.7	26.5	-28.3	PASS
2341.625000	-54.8	26.5	-28.3	PASS
2386.625000	-54.8	26.5	-28.3	PASS
2387.175000	-55.0	26.7	-28.3	PASS
2387.225000	-55.0	26.7	-28.3	PASS
2385.675000	-55.0	26.7	-28.3	PASS
2313.525000	-55.0	26.7	-28.3	PASS
2341.575000	-55.0	26.7	-28.3	PASS
2371.075000	-55.0	26.8	-28.3	PASS
2386.675000	-55.1	26.8	-28.3	PASS
2342.425000	-55.1	26.8	-28.3	PASS

DUT Frequency	Result
2480.000000	PASS

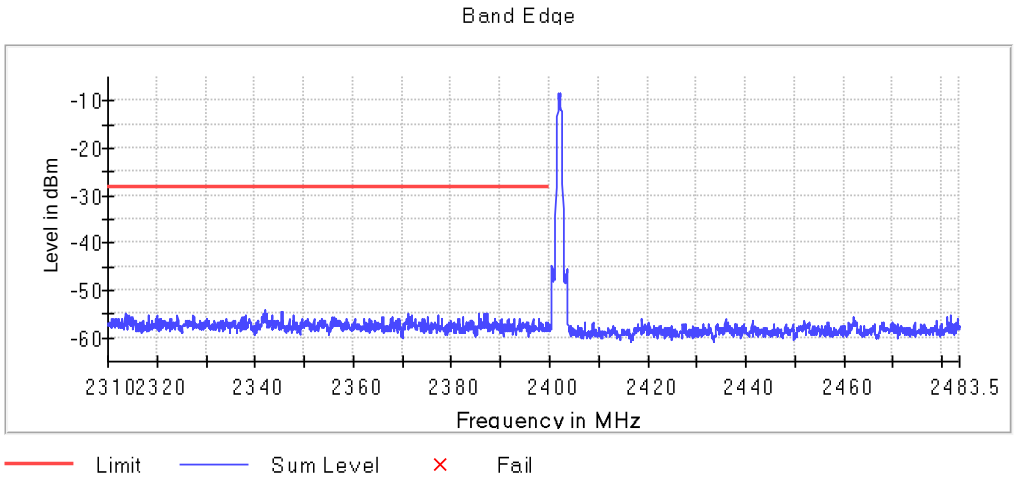
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2485.275000	-54.2	26.9	-27.3	PASS
2484.625000	-54.3	27.0	-27.3	PASS
2483.525000	-54.4	27.1	-27.3	PASS
2484.675000	-54.5	27.2	-27.3	PASS
2485.325000	-54.7	27.4	-27.3	PASS
2492.375000	-54.7	27.4	-27.3	PASS
2485.225000	-54.8	27.5	-27.3	PASS
2492.325000	-54.9	27.6	-27.3	PASS
2498.125000	-54.9	27.6	-27.3	PASS
2498.175000	-55.1	27.8	-27.3	PASS
2486.175000	-55.4	28.1	-27.3	PASS
2486.225000	-55.4	28.1	-27.3	PASS
2488.475000	-55.5	28.2	-27.3	PASS
2484.575000	-55.5	28.2	-27.3	PASS
2498.675000	-55.5	28.2	-27.3	PASS

Verdict

Pass

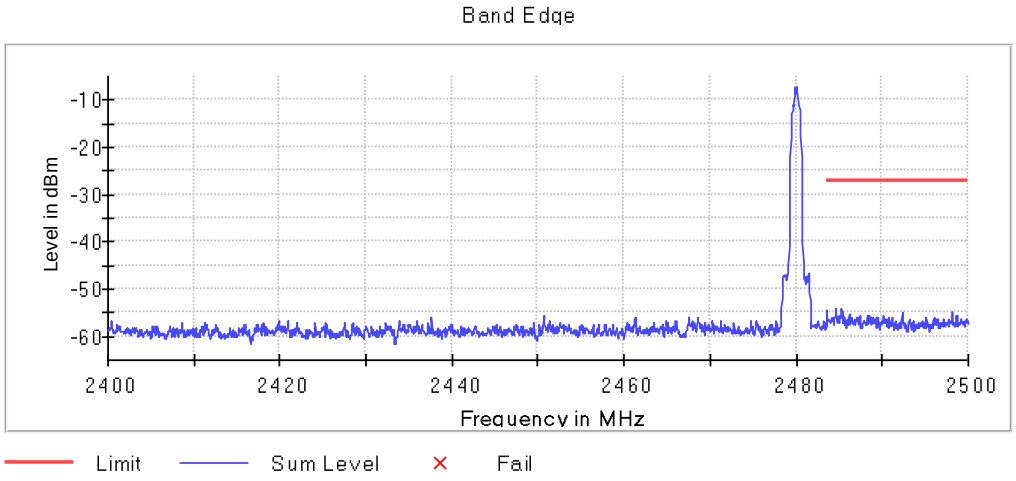
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (Π/4 DQPSK 2-DH1)

Images:



Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (Π/4 DQPSK 2-DH1)

Images:



Modulation: BT (π/4 DQPSK 2-DH1) - HOPPING ON

Results

DUT Frequency	Result
2402.000000	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2331.475000	-54.8	27.9	-26.9	PASS
2313.925000	-55.0	28.1	-26.9	PASS
2318.925000	-55.0	28.1	-26.9	PASS
2313.875000	-55.0	28.1	-26.9	PASS
2354.475000	-55.1	28.2	-26.9	PASS
2314.075000	-55.1	28.2	-26.9	PASS
2342.925000	-55.2	28.3	-26.9	PASS
2356.275000	-55.3	28.4	-26.9	PASS
2338.975000	-55.3	28.4	-26.9	PASS
2372.175000	-55.3	28.4	-26.9	PASS
2337.125000	-55.3	28.4	-26.9	PASS
2320.375000	-55.3	28.4	-26.9	PASS
2383.125000	-55.3	28.4	-26.9	PASS
2331.525000	-55.3	28.4	-26.9	PASS
2341.575000	-55.3	28.4	-26.9	PASS

DUT Frequency	Result
2480.000000	PASS

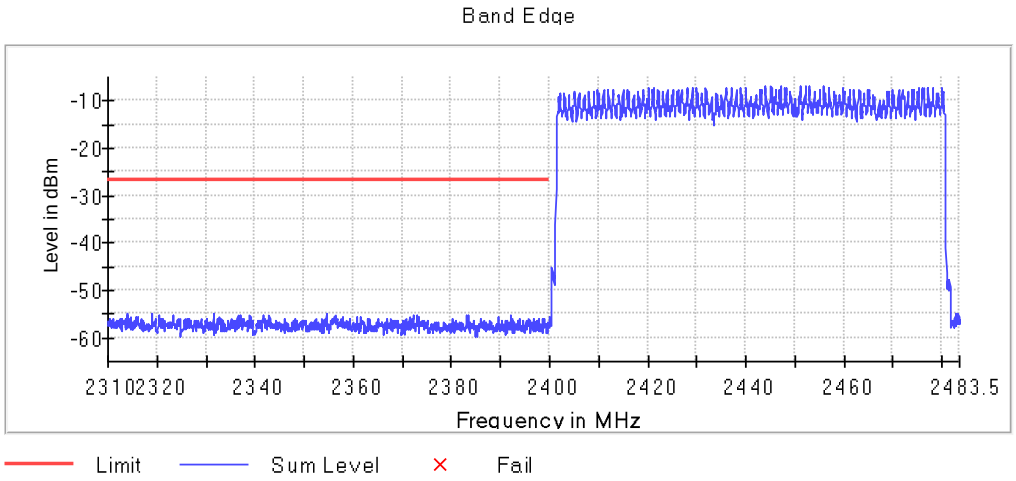
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2498.225000	-54.1	27.2	-26.9	PASS
2484.875000	-54.3	27.4	-26.9	PASS
2498.275000	-54.5	27.6	-26.9	PASS
2484.825000	-54.5	27.6	-26.9	PASS
2484.975000	-54.8	27.9	-26.9	PASS
2484.925000	-54.9	27.9	-26.9	PASS
2485.425000	-55.0	28.0	-26.9	PASS
2483.825000	-55.0	28.1	-26.9	PASS
2483.775000	-55.0	28.1	-26.9	PASS
2487.925000	-55.0	28.1	-26.9	PASS
2486.475000	-55.1	28.1	-26.9	PASS
2485.475000	-55.1	28.2	-26.9	PASS
2489.575000	-55.1	28.2	-26.9	PASS
2486.425000	-55.1	28.2	-26.9	PASS
2498.175000	-55.2	28.3	-26.9	PASS

Verdict

Pass

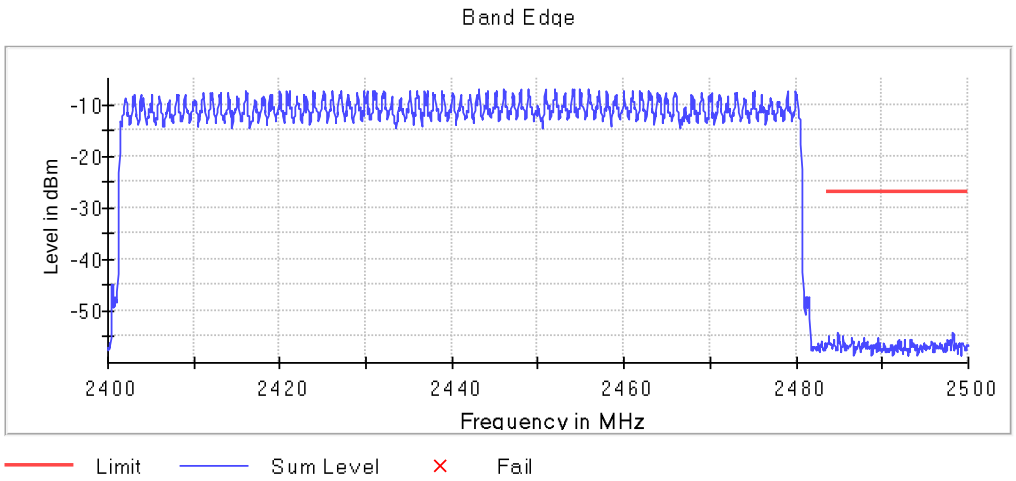
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (Π/4 DQPSK 2-DH1)

Images:



Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (Π/4 DQPSK 2-DH1)

Images:



Modulation: BT (8DPSK 3-DH5) - HOPPING OFF

Results

DUT Frequency	Result
2402.000000	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2335.975000	-54.2	26.1	-28.1	PASS
2335.925000	-54.4	26.3	-28.1	PASS
2341.525000	-54.6	26.5	-28.1	PASS
2355.775000	-54.6	26.5	-28.1	PASS
2355.725000	-54.6	26.6	-28.1	PASS
2310.825000	-54.7	26.6	-28.1	PASS
2341.825000	-54.8	26.7	-28.1	PASS
2310.875000	-54.8	26.7	-28.1	PASS
2341.875000	-54.9	26.8	-28.1	PASS
2382.675000	-54.9	26.9	-28.1	PASS
2312.125000	-54.9	26.9	-28.1	PASS
2341.575000	-54.9	26.9	-28.1	PASS
2312.075000	-54.9	26.9	-28.1	PASS
2382.725000	-55.0	26.9	-28.1	PASS
2343.925000	-55.2	27.1	-28.1	PASS

DUT Frequency	Result
2480.000000	PASS

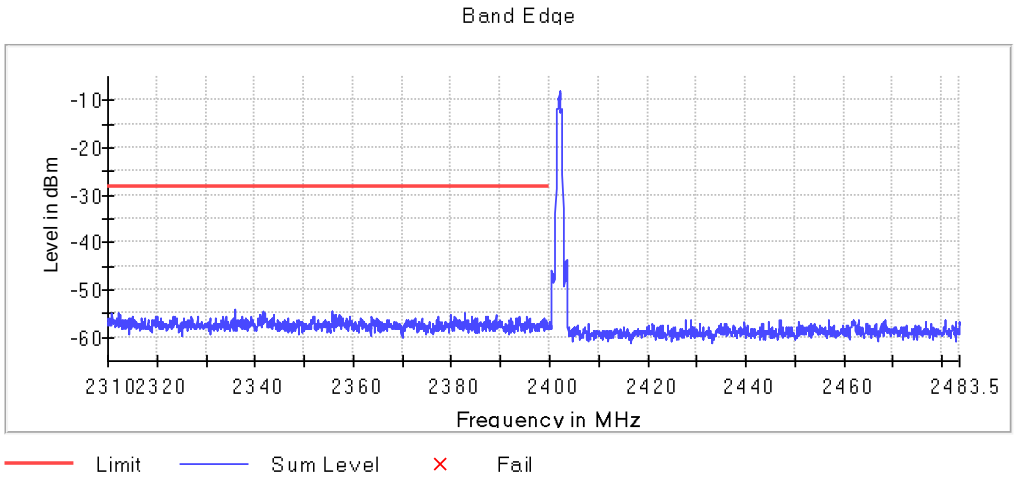
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2492.825000	-54.5	27.1	-27.4	PASS
2492.775000	-54.5	27.1	-27.4	PASS
2496.675000	-55.0	27.6	-27.4	PASS
2484.375000	-55.0	27.6	-27.4	PASS
2484.325000	-55.2	27.9	-27.4	PASS
2488.825000	-55.3	27.9	-27.4	PASS
2488.875000	-55.3	27.9	-27.4	PASS
2495.725000	-55.3	27.9	-27.4	PASS
2492.575000	-55.4	28.0	-27.4	PASS
2499.025000	-55.5	28.1	-27.4	PASS
2496.625000	-55.5	28.1	-27.4	PASS
2493.225000	-55.6	28.2	-27.4	PASS
2492.525000	-55.7	28.3	-27.4	PASS
2483.575000	-55.7	28.3	-27.4	PASS
2483.825000	-55.7	28.3	-27.4	PASS

Verdict

Pass

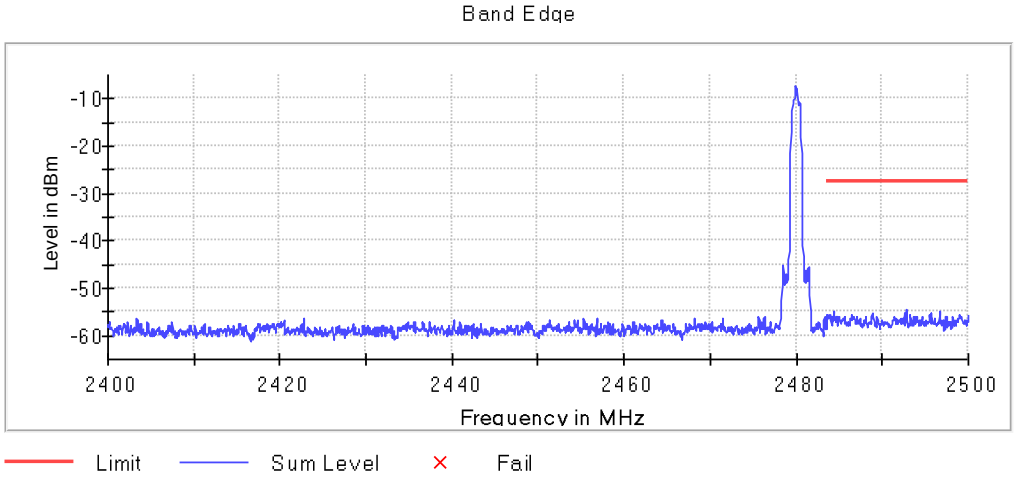
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



Modulation: BT (8DPSK 3-DH5) - HOPPING ON

Results

DUT Frequency	Result
2402.000000	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2310.225000	-54.2	27.3	-26.9	PASS
2327.925000	-54.3	27.5	-26.9	PASS
2362.225000	-54.5	27.6	-26.9	PASS
2362.175000	-54.5	27.6	-26.9	PASS
2310.275000	-54.6	27.7	-26.9	PASS
2327.875000	-54.6	27.7	-26.9	PASS
2325.925000	-54.8	27.9	-26.9	PASS
2366.475000	-54.8	28.0	-26.9	PASS
2398.875000	-54.9	28.0	-26.9	PASS
2366.525000	-54.9	28.0	-26.9	PASS
2312.725000	-54.9	28.0	-26.9	PASS
2312.825000	-54.9	28.0	-26.9	PASS
2313.525000	-54.9	28.1	-26.9	PASS
2398.825000	-55.0	28.1	-26.9	PASS
2355.575000	-55.0	28.1	-26.9	PASS

DUT Frequency	Result
2480.000000	PASS

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2495.375000	-53.9	27.1	-26.8	PASS
2495.325000	-54.2	27.5	-26.8	PASS
2486.225000	-54.3	27.6	-26.8	PASS
2490.125000	-54.4	27.6	-26.8	PASS
2486.175000	-54.5	27.7	-26.8	PASS
2484.725000	-54.5	27.7	-26.8	PASS
2483.675000	-54.5	27.8	-26.8	PASS
2483.725000	-54.5	27.8	-26.8	PASS
2487.025000	-54.6	27.9	-26.8	PASS
2484.775000	-54.7	27.9	-26.8	PASS
2496.325000	-54.7	27.9	-26.8	PASS
2490.175000	-54.7	27.9	-26.8	PASS
2496.375000	-54.7	28.0	-26.8	PASS
2492.475000	-54.8	28.0	-26.8	PASS
2495.425000	-54.9	28.2	-26.8	PASS

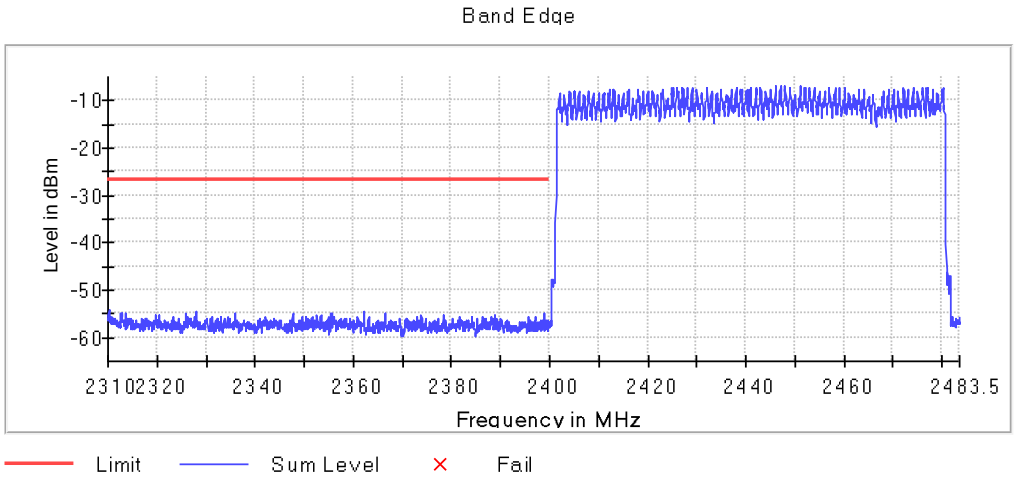
Verdict

Pass

140

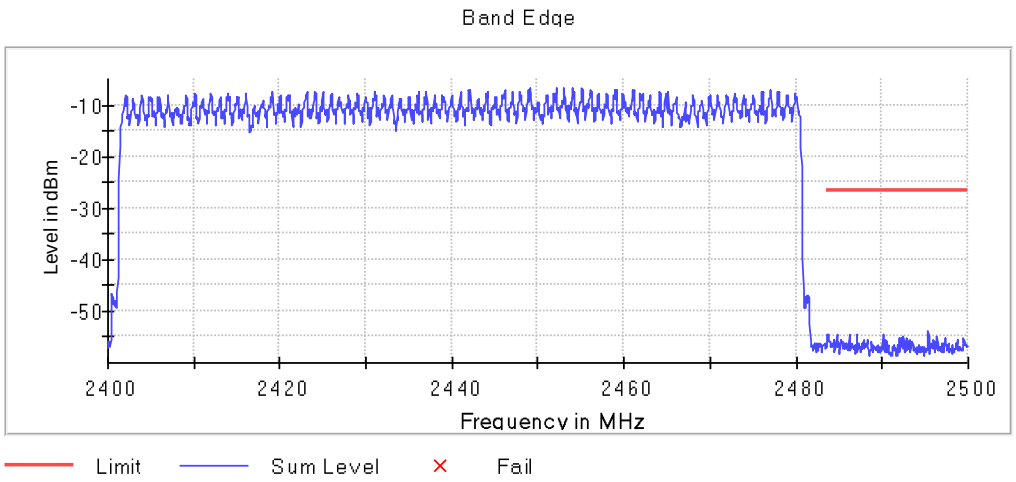
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Bandwidth MHz = 1, Modulation = BT (8DPSK 3-DH5)

Images:



Spectrum Analyzer Parameters

Setting	HOPPING OFF		HOPPING ON	
	Instrument Value - low	Instrument Value- high	Instrument Value- low	Instrument Value- high
Start Frequency	2.31000 GHz	2.40000 GHz	2.31000 GHz	2.40000 GHz
Stop Frequency	2.40000 GHz	2.48350 GHz	2.40000 GHz	2.48350 GHz
Span	90.000 MHz	83.500 MHz	90.000 MHz	83.500 MHz
RBW	100.000 kHz	100.000 kHz	100.000 kHz	100.000 kHz
VBW	300.000 kHz	300.000 kHz	300.000 kHz	300.000 kHz
SweepPoints	1800	1670	1800	1670
Sweeptime	113.672 µs	94.727 µs	113.672 µs	94.727 µs
Reference Level	0.000 dBm	0.000 dBm	0.000 dBm	0.000 dBm
Attenuation	20.000 dB	20.000 dB	20.000 dB	20.000 dB
Detector	MaxPeak	MaxPeak	MaxPeak	MaxPeak
SweepCount	100	100	100	100
Filter	3 dB	3 dB	3 dB	3 dB
Trace Mode	Max Hold	Max Hold	Max Hold	Max Hold
Sweeptype	FFT	FFT	FFT	FFT
Preamp	off	off	off	off
Stablemode	Trace	Trace	Trace	Trace
Stablevalue	0.50 dB	0.50 dB	0.50 dB	0.50 dB
Run	4 / max. 150	5 / max. 150	4 / max. 150	139 / max. 150
Stable	3 / 3	3 / 3	3 / 3	3 / 3
Max Stable Difference	0.00 dB	0.12 dB	0.00 dB	0.00 dB

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

Limits

In any 100 kHz bandwidth outside the frequency band in which the digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

Conducted spurious signals detected were minimum 20 dB respect to the limit for the lowest, middle and highest operating channels.

Verdict

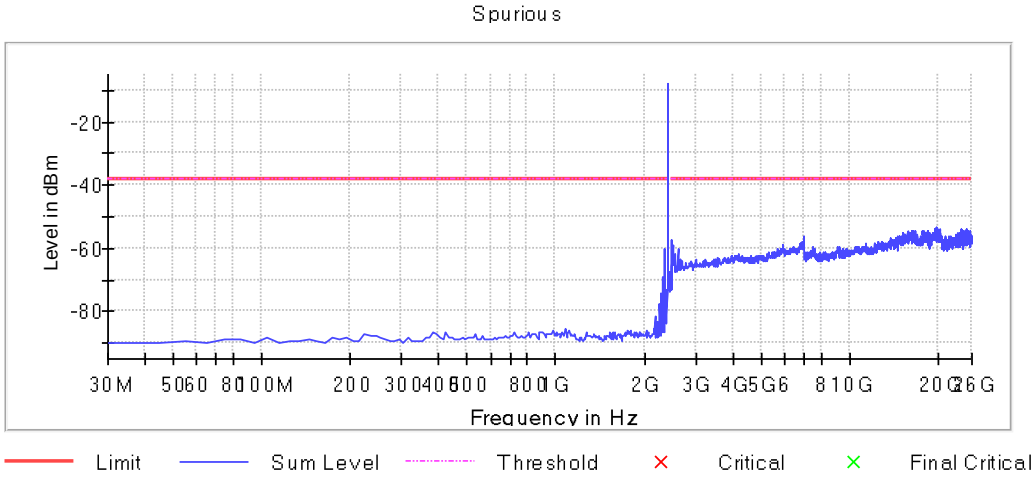
Pass

Results

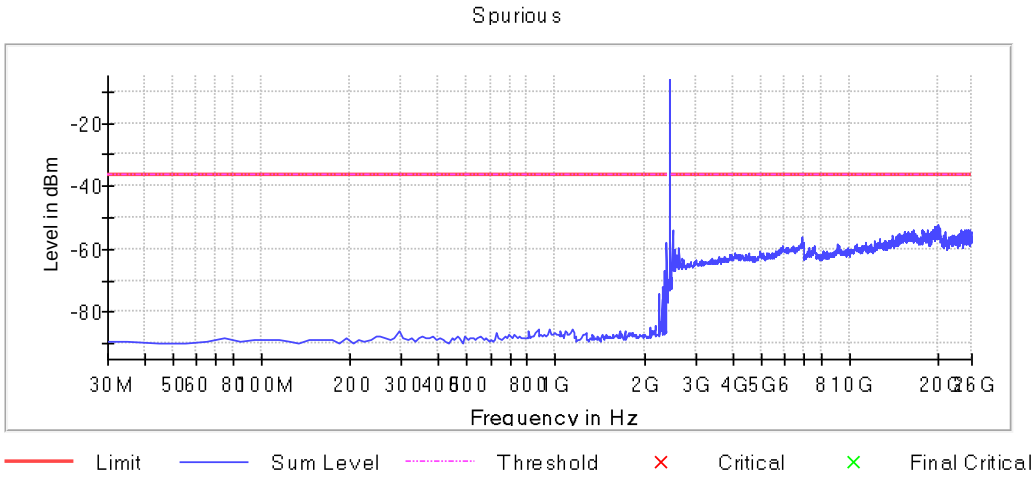
Modulation: BTBR (GFSK 1-DH5)

Note: Fundamental signals are above the limit and shown in the frequency range of 2402 - 2480 MHz in the plots

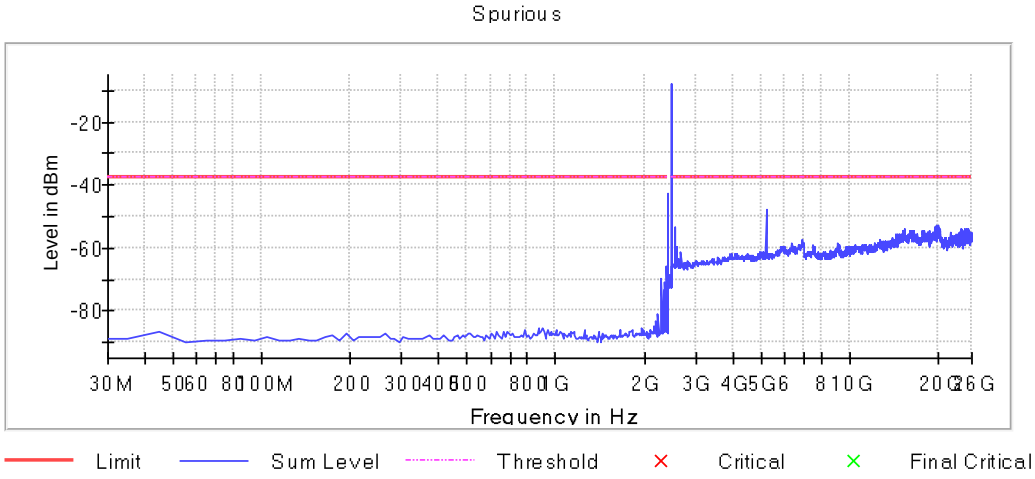
Lowest Channel (2402 MHz)



Middle Channel (2440 MHz)

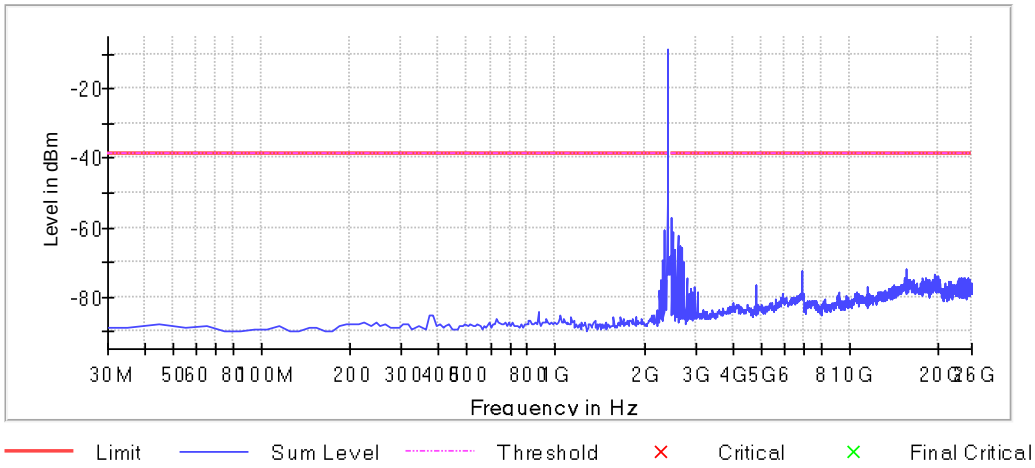


Highest Channel (2480 MHz)

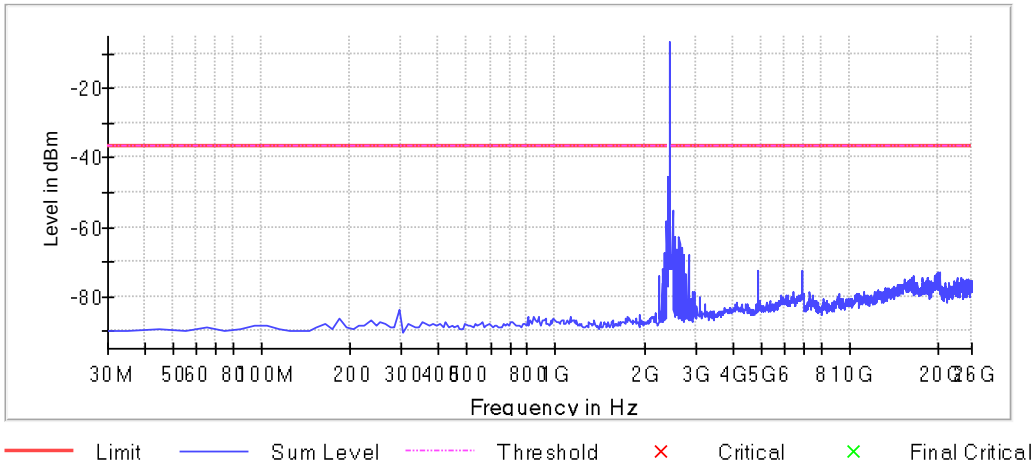


Results: Modulation: BTBR (π/4 DQPSK 2-DH1)

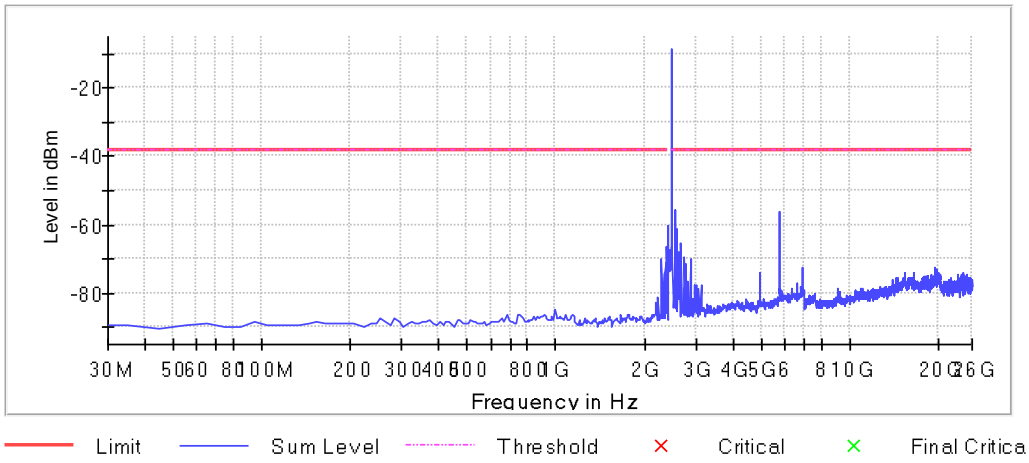
Lowest Channel (2402 MHz)



Middle Channel (2440 MHz)

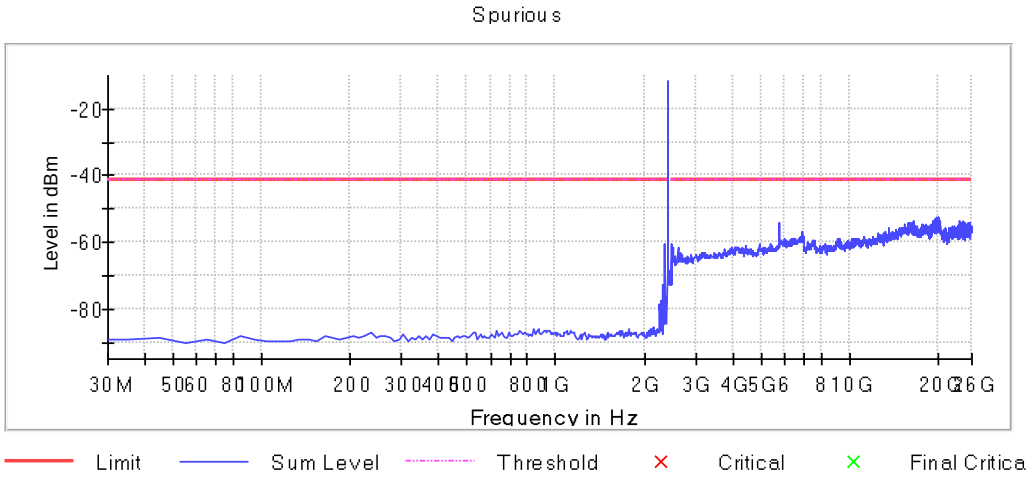


Highest Channel (2480 MHz)

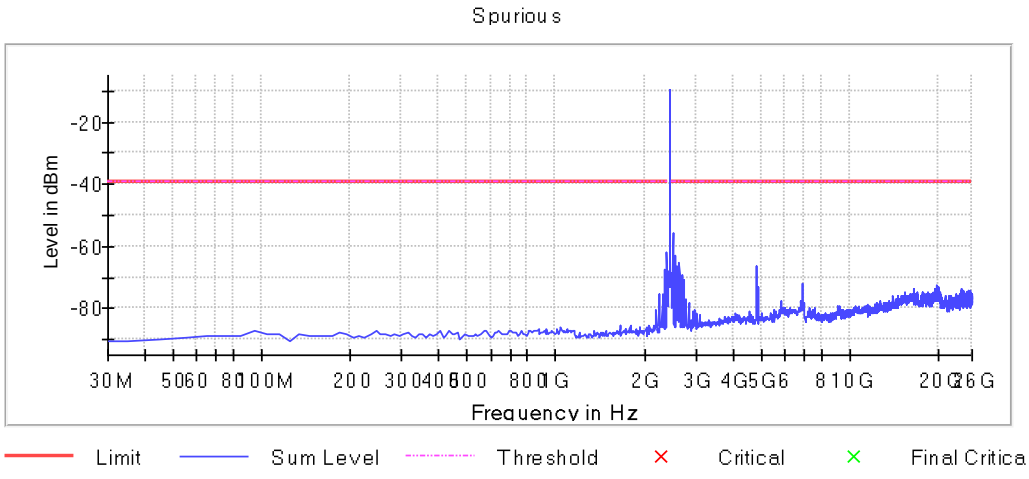


Results: Modulation: BTBR (8DPSK 3-DH5)

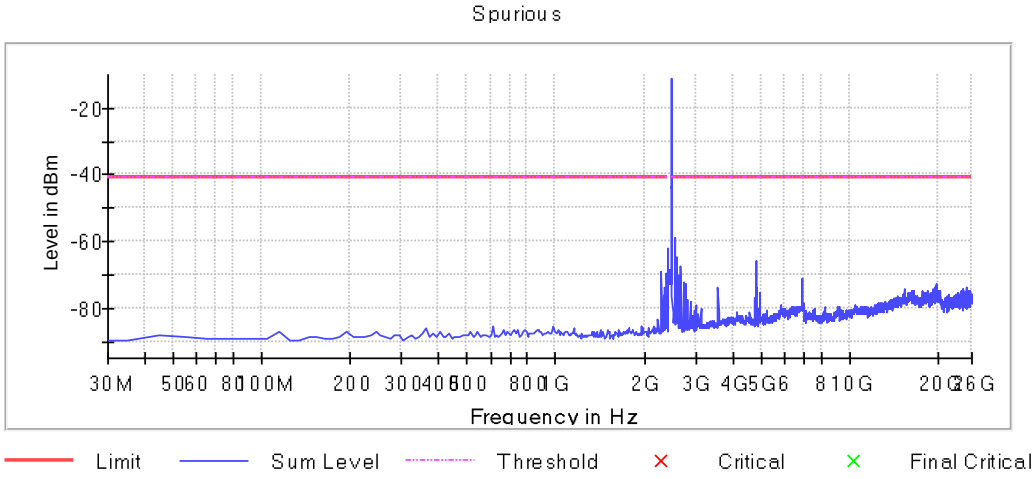
Lowest Channel (2402 MHz)



Middle Channel (2440 MHz)



Highest Channel (2480 MHz)



Spectrum Analyzer Parameters

Setting	Instrument Value
RBW	100.000 kHz
VBW	300.000 kHz
SweepPoints	238
Sweeptime	23.700 ms
Reference Level	-30.000 dBm
Attenuation	0.000 dB
Detector	MaxPeak
SweepCount	3
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	Sweep
Preamp	off
Stablemode	Trace
Stablevalue	0.50 dB
Run	4 / max. 40
Stable	3 / 3
Max Stable Difference	0.00 dB

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

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

Verdict

Pass

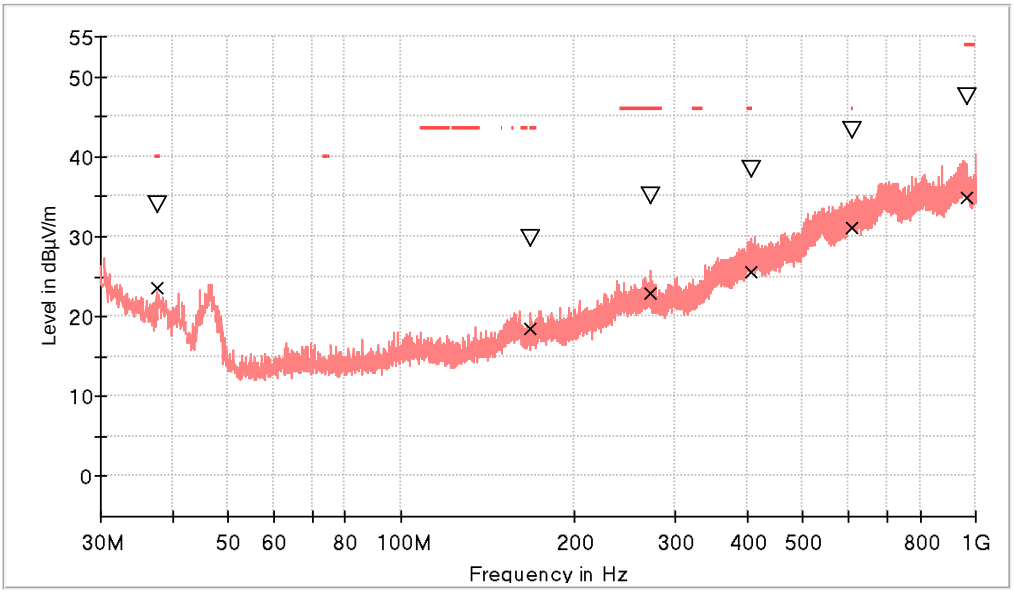
Modulation: BT (GFSK 1-DH5)
Results

Frequency range 0.03 - 1 GHz
The spurious emissions below 1 GHz do not depend on the operating channel selected in the EUT.

Middle Channel

Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK 1-DH5), Frequency Range GHz = [0.03, 1]

Images:



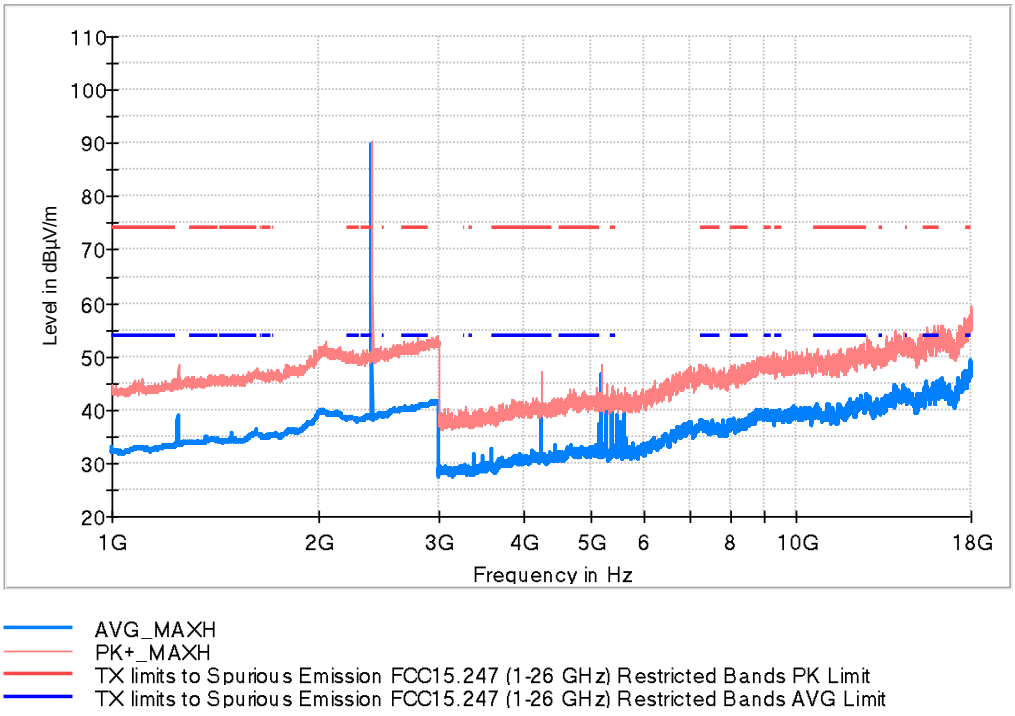
Frequency (MHz)	MaxPeak (dBµV/m)	QuasiPeak (dBµV/m)	Pol	Margin - QPK (dB)	Limit - QPK (dBµV/m)
37.517500	33.9	23.5	V	16.5	40.0
168.225000	29.7	18.4	V	25.1	43.5
272.354500	35.0	22.9	V	23.1	46.0
407.233000	38.4	25.7	V	20.3	46.0
610.884500	43.2	31.2	V	14.8	46.0
964.449500	47.5	35.0	V	19.0	54.0

Frequency range 1 - 18 GHz

Lowest Channel

Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK 1-DH5), Frequency Range GHz = [1, 18]

Images:



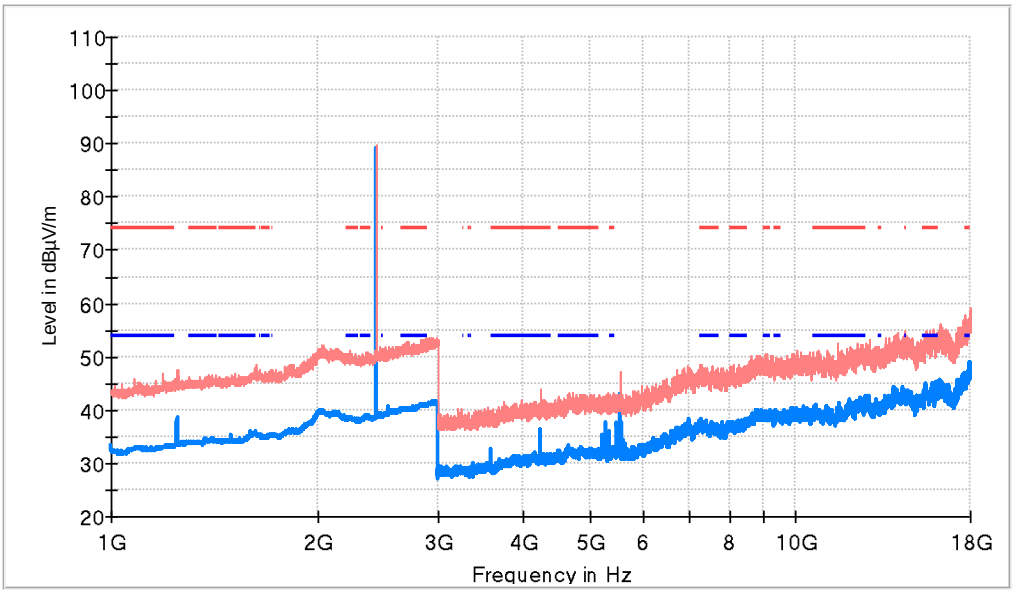
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2402.000000	90.3	89.6	H	---	---	Fundamental
4233.000000	47.2	39.3	V	14.7	54.0	
5392.500000	40.5	32.0	H	22.0	54.0	

Frequency range 1 - 18 GHz

Middle Channel

Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK 1-DH5), Frequency Range GHz = [1, 18]

Images:



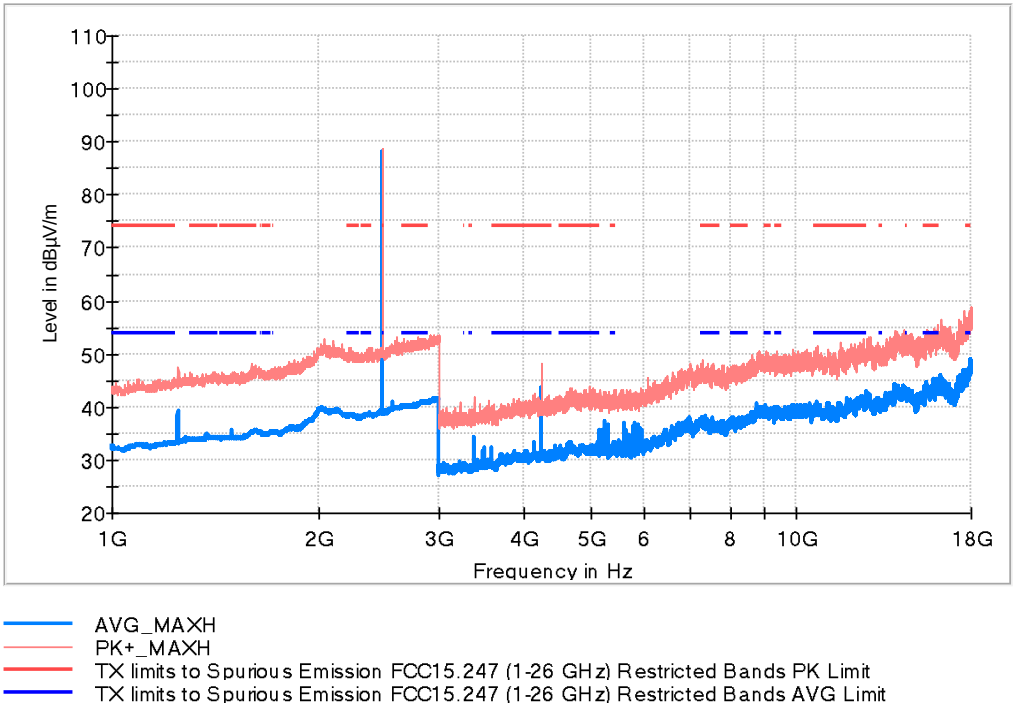
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2441.000000	89.6	88.9	V	---	---	Fundamental
4233.000000	44.0	36.2	V	17.8	54.0	
17983.500000	57.1	48.9	H	5.1	54.0	

Frequency range 1 - 18 GHz

Highest Channel

Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK 1-DH5), Frequency Range GHz = [1, 18]

Images:



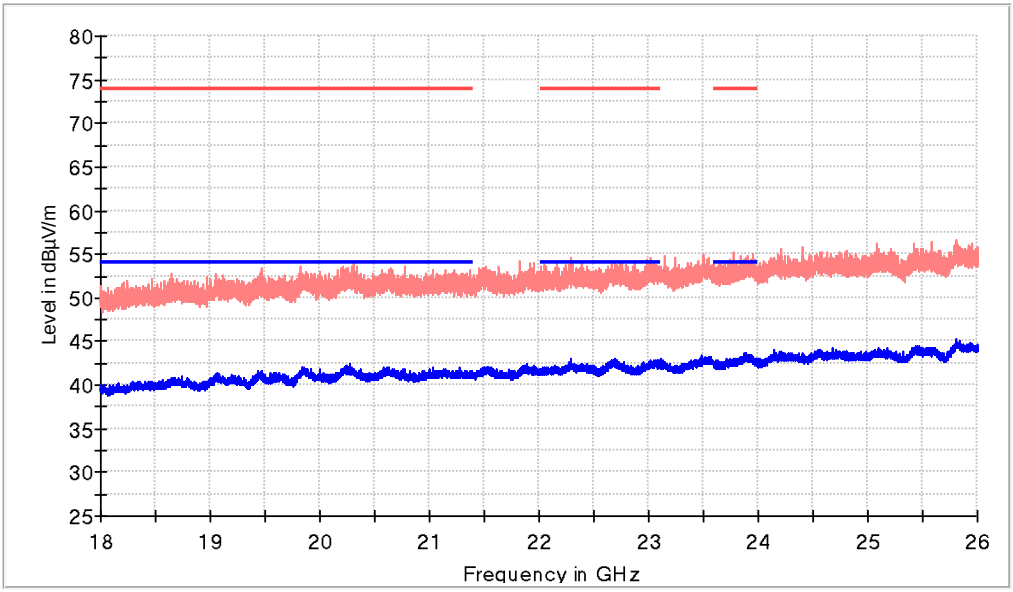
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2480.000000	88.9	88.2	V	---	---	Fundamental
4233.000000	47.9	43.6	V	10.5	54.0	
17990.000000	58.6	49.0	V	5.0	54.0	

Frequency range 18 - 26 GHz

Lowest Channel

Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK 1-DH5), Frequency Range GHz = [18, 26]

Images:



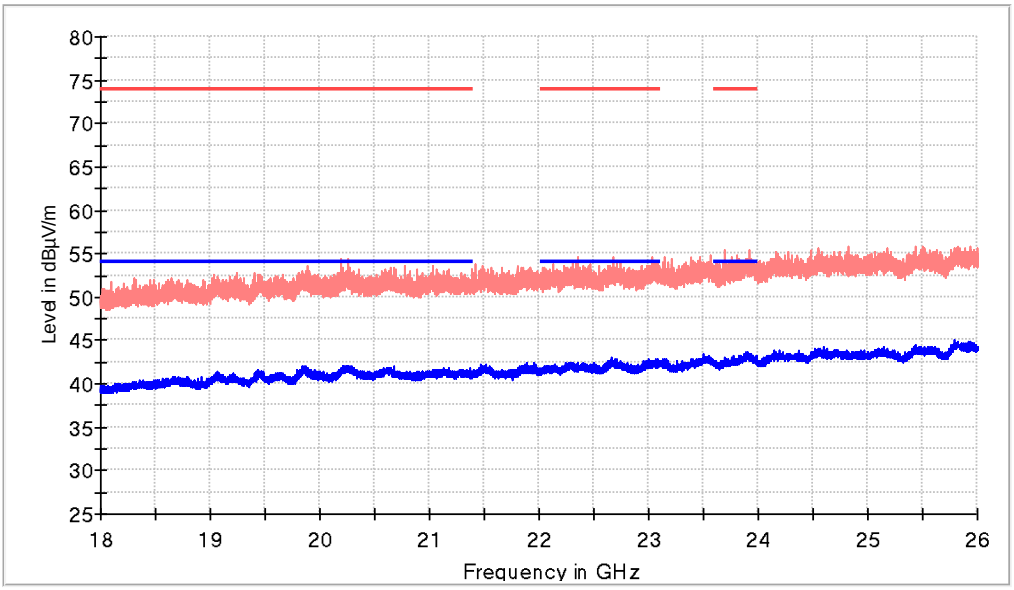
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
20281.500000	52.1	42.5	V	11.5	54.0
22292.000000	53.2	43.0	H	11.0	54.0
23774.500000	55.3	42.6	H	11.4	54.0

Frequency range 18 - 26 GHz

Middle Channel

Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK 1-DH5), Frequency Range GHz = [18, 26]

Images:



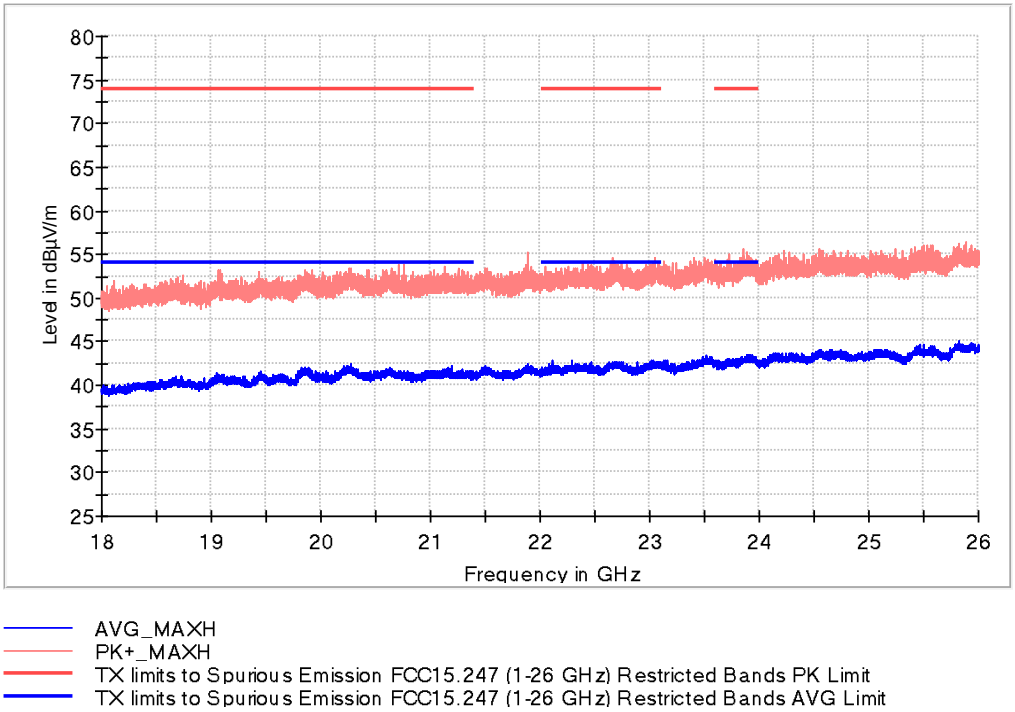
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
20197.000000	54.4	41.7	V	12.3	54.0
22347.500000	54.7	42.1	V	11.9	54.0
23700.000000	55.4	42.3	V	11.7	54.0

Frequency range 18 - 26 GHz

Highest Channel

Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK 1-DH5), Frequency Range GHz = [18, 26]

Images:

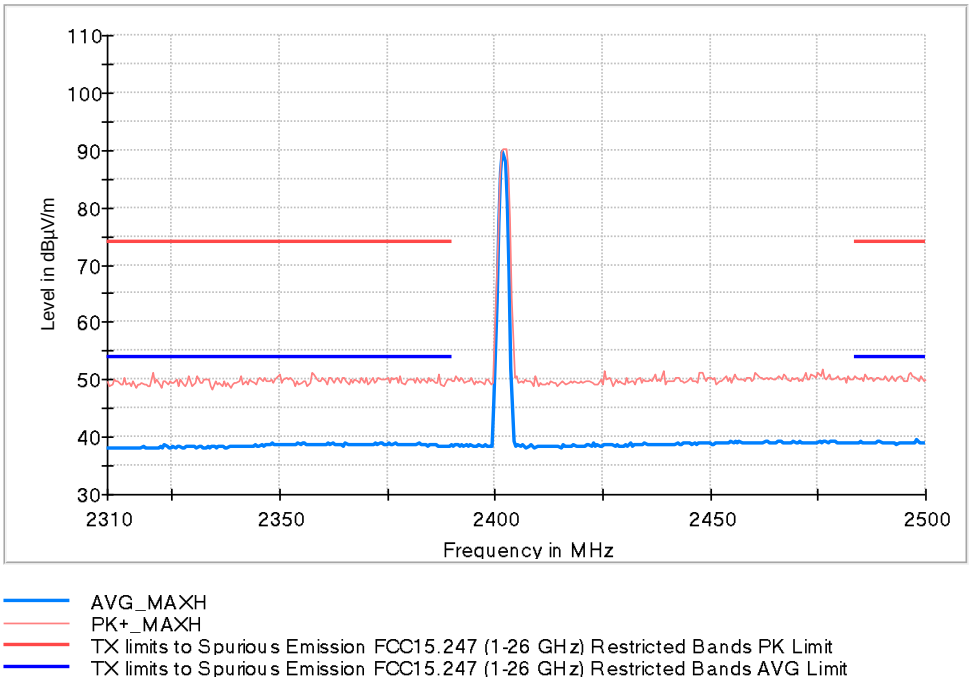


Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
20707.500000	53.9	41.1	V	12.9	54.0
23047.000000	54.7	42.1	H	11.9	54.0
23848.500000	55.6	42.8	H	11.2	54.0

Restricted Bands (2.31 GHz - 2.5 GHz)

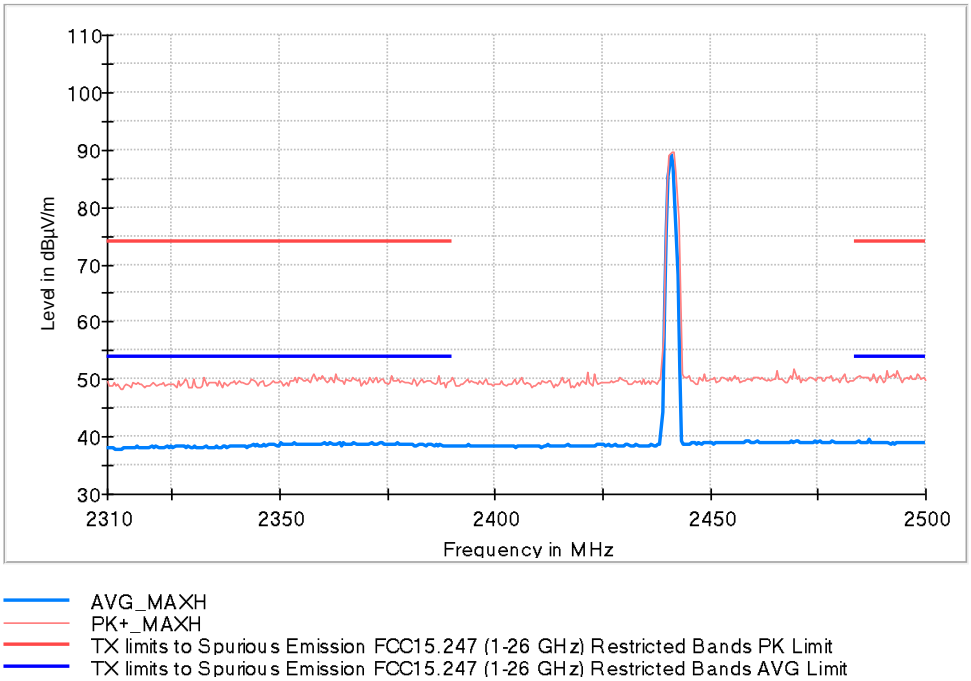
Lowest Channel
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK 1-DH5), Frequency Range GHz = [1, 18]

Images:



Middle Channel
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK 1-DH5), Frequency Range GHz = [1, 18]

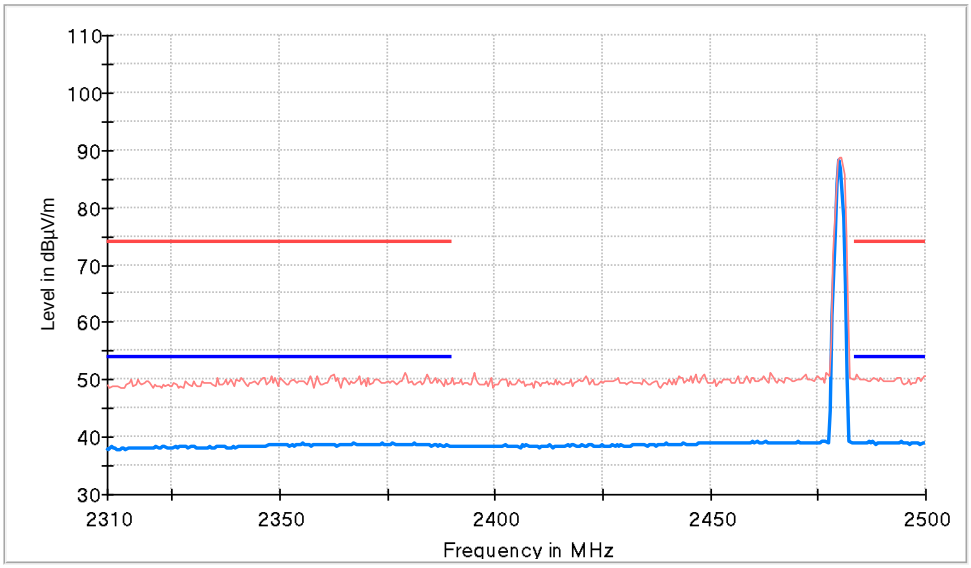
Images:



Highest Channel

Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (GFSK 1-DH5), Frequency Range GHz = [1, 18]

Images:



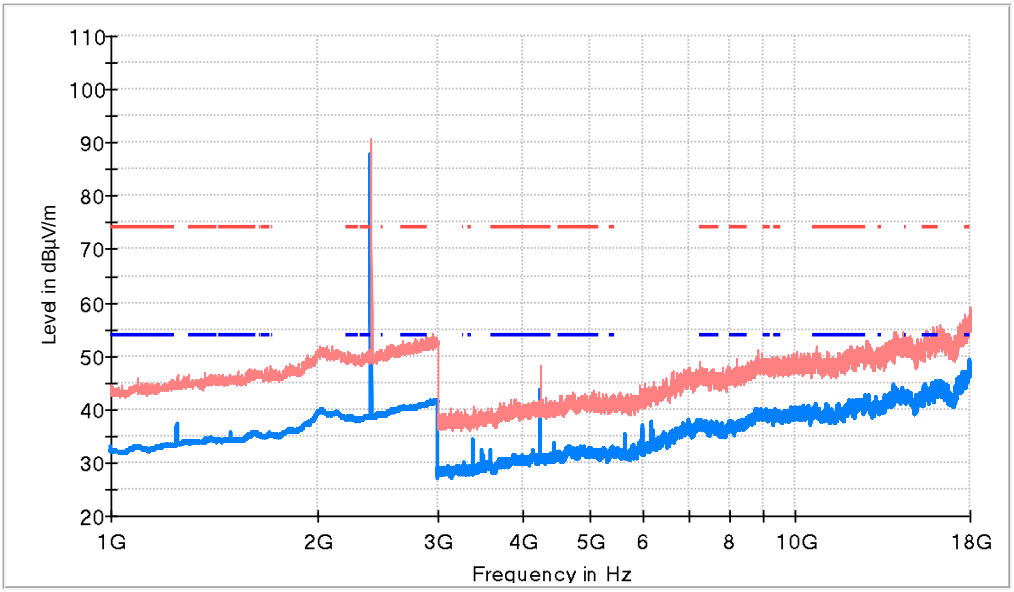
Modulation: BT (π/4 DQPSK 2-DH1)
Results

Frequency range 1 - 18 GHz

Lowest Channel

Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (π/4 DQPSK 2-DH1), Frequency Range GHz = [1, 18]

Images:



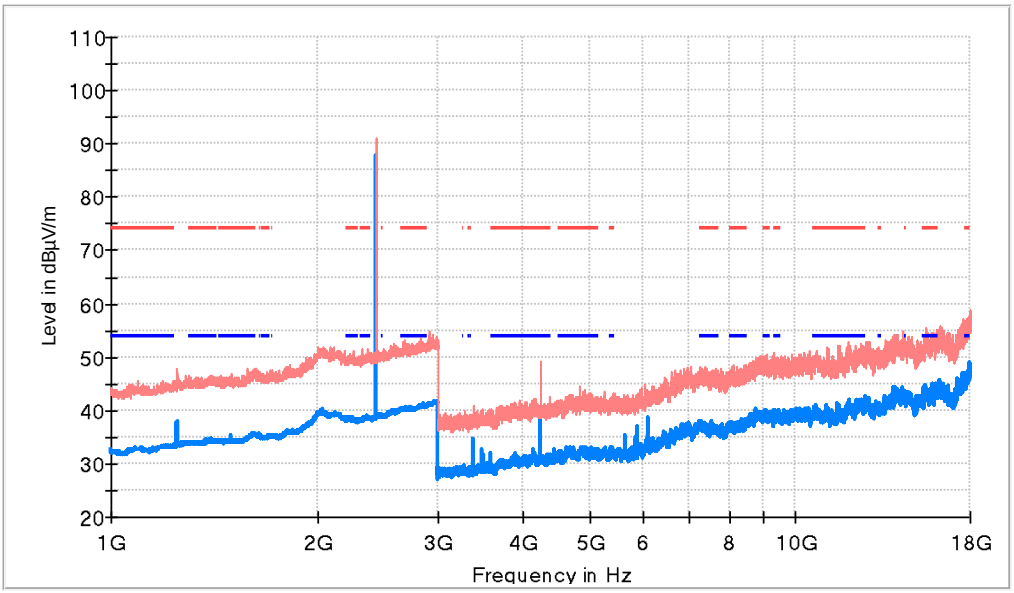
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2402.000000	90.9	87.7	H	---	---	Fundamental
4233.000000	48.1	43.5	V	10.5	54.0	
17993.000000	57.9	49.2	H	4.8	54.0	

Frequency range 1 - 18 GHz

Middle Channel

Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (π/4 DQPSK 2-DH1), Frequency Range GHz = [1, 18]

Images:



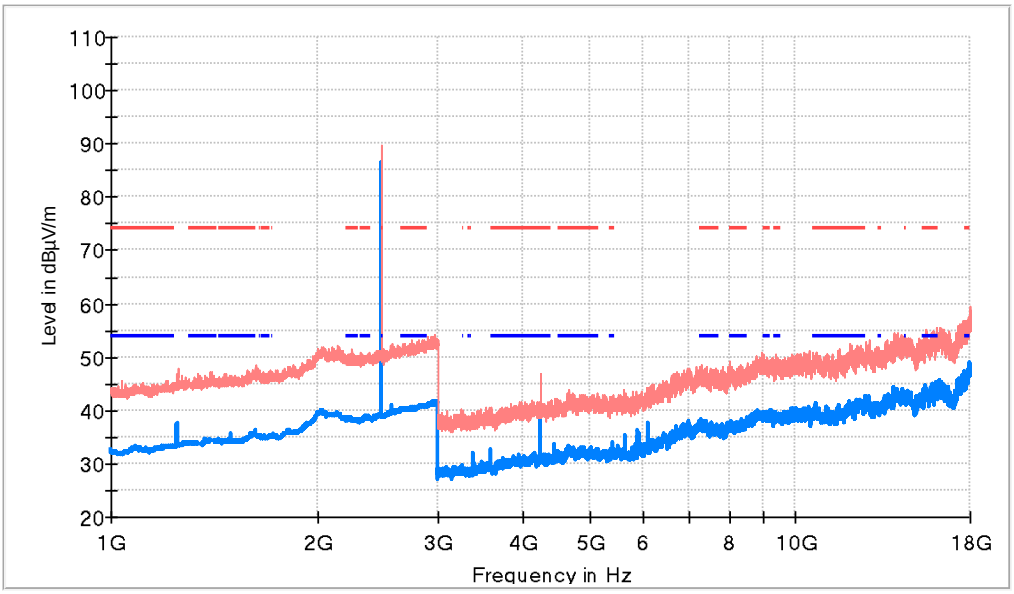
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2441.000000	91.0	87.7	H	---	---	Fundamental
4233.000000	47.7	39.5	V	14.5	54.0	
17980.500000	56.6	48.2	H	5.8	54.0	

Frequency range 1 - 18 GHz

Highest Channel

Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (π/4 DQPSK 2-DH1), Frequency Range GHz = [1, 18]

Images:



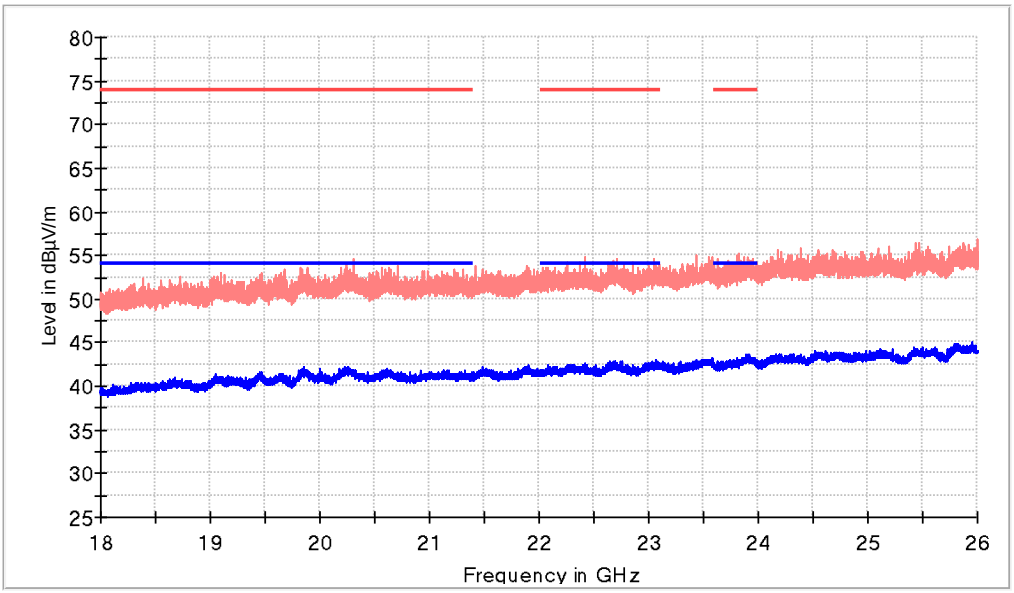
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2480.000000	89.7	86.4	V	---	---	Fundamental
4233.000000	47.0	39.5	V	14.5	54.0	
16042.500000	54.4	45.1	H	8.9	54.0	

Frequency range 18 - 26 GHz

Lowest Channel

Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (π/4 DQPSK 2-DH1), Frequency Range GHz = [18, 26]

Images:



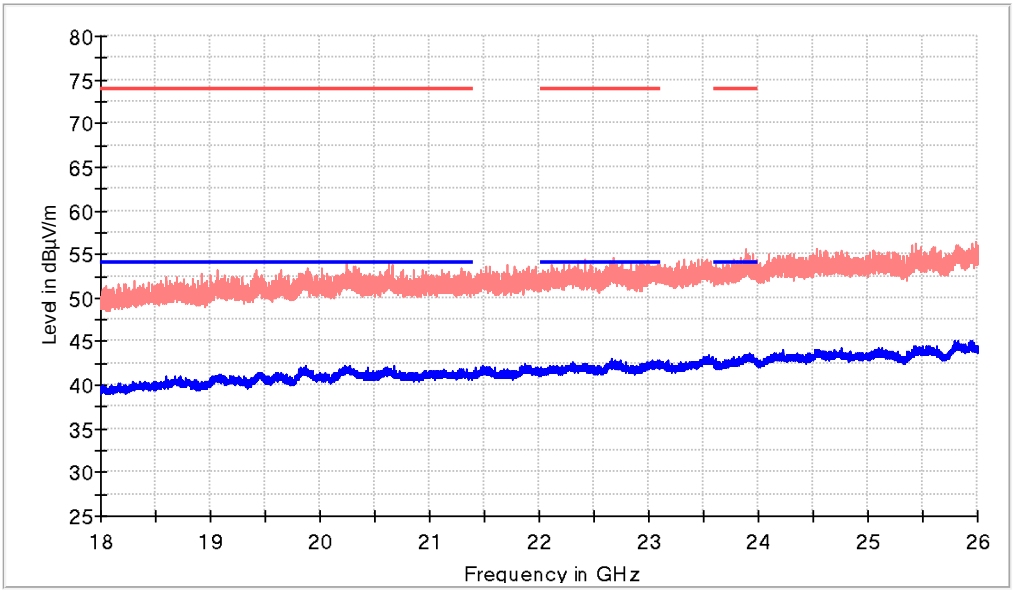
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
20299.000000	54.7	41.6	H	12.4	54.0
22417.000000	54.8	41.8	V	12.2	54.0
23826.500000	55.2	42.9	V	11.1	54.0

Frequency range 18 - 26 GHz

Middle Channel

Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (π/4 DQPSK 2-DH1), Frequency Range GHz = [18, 26]

Images:



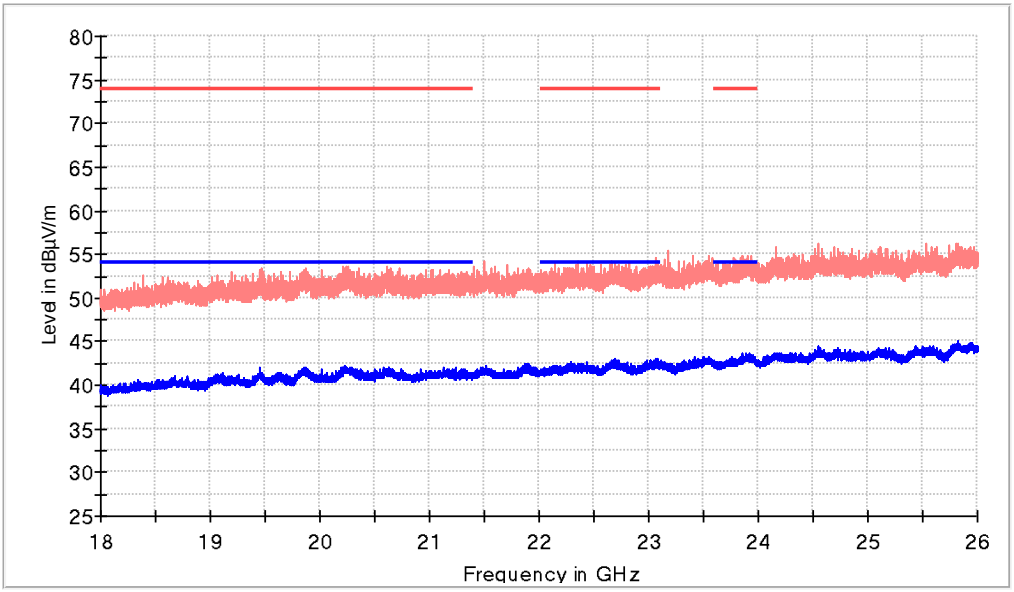
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
19872.000000	52.4	42.3	H	11.7	54.0
22679.000000	54.6	42.1	V	11.9	54.0
23879.500000	55.6	43.1	V	10.9	54.0

Frequency range 18 - 26 GHz

Highest Channel

Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (π/4 DQPSK 2-DH1), Frequency Range GHz = [18, 26]

Images:

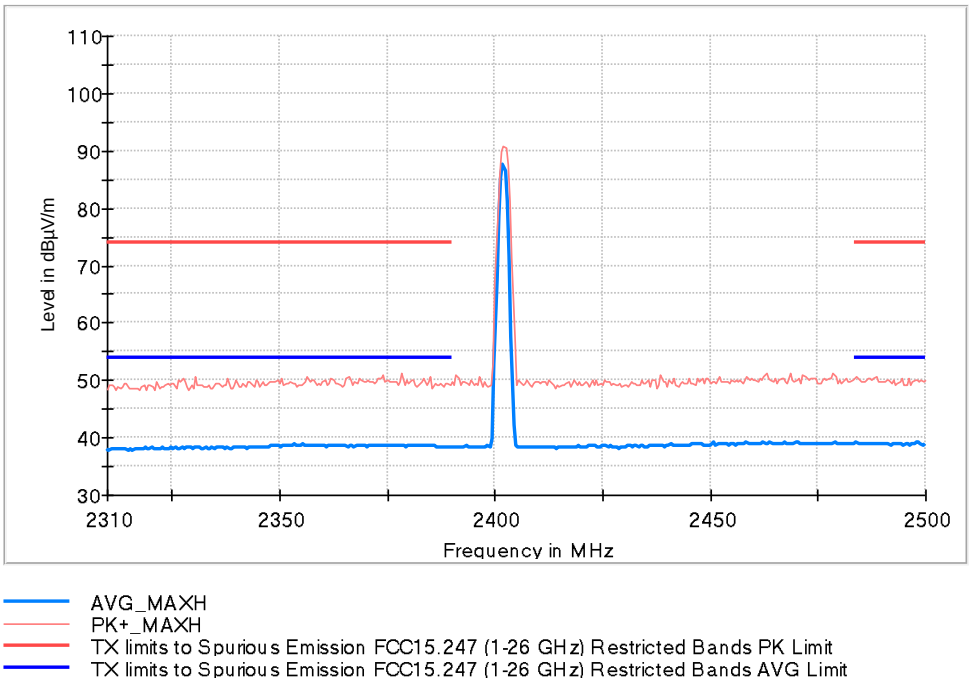


Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
19445.000000	51.3	41.9	V	12.1	54.0
23057.500000	54.6	42.3	V	11.7	54.0
23898.500000	54.9	43.2	V	10.8	54.0

Restricted Bands (2.31 GHz - 2.5 GHz)

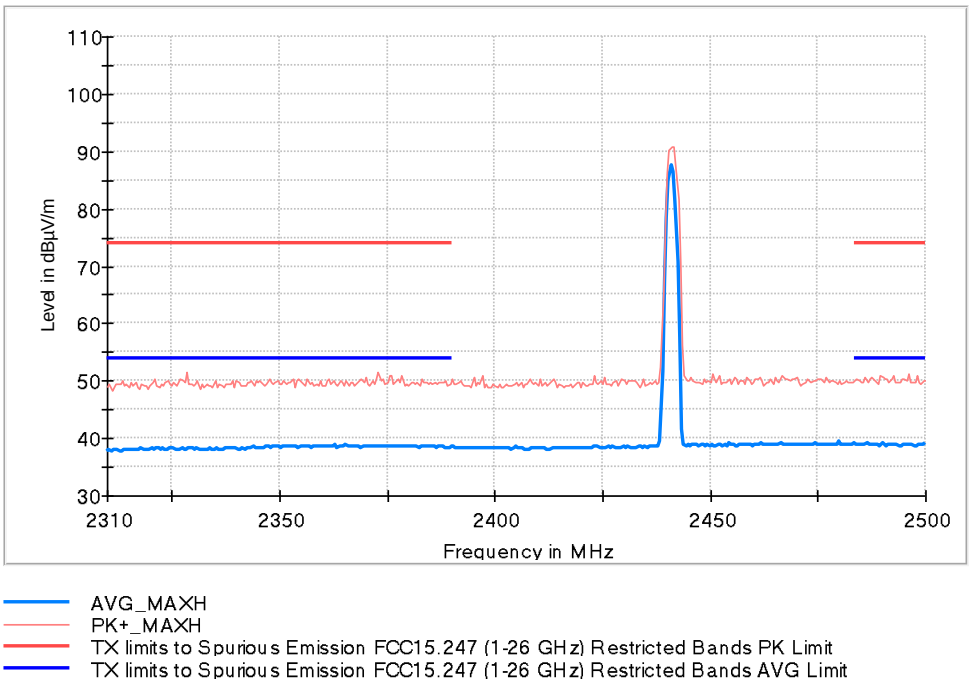
Lowest Channel
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (π/4 DQPSK 2-DH1), Frequency Range GHz = [1, 18]

Images:



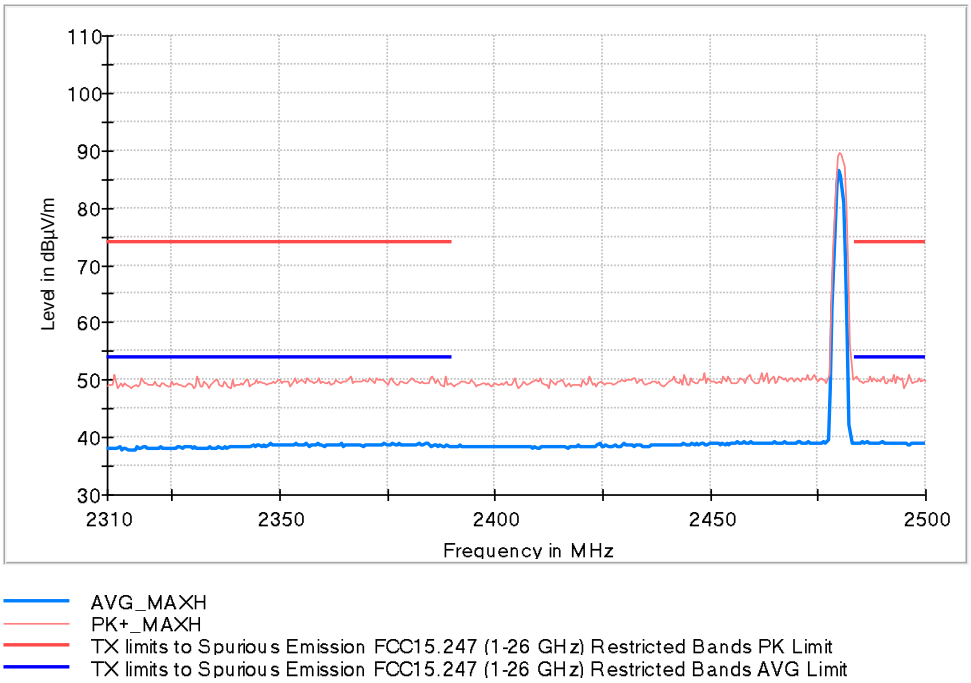
Middle Channel
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (π/4 DQPSK 2-DH1), Frequency Range GHz = [1, 18]

Images:



Highest Channel
Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (π/4 DQPSK 2-DH1), Frequency Range GHz = [1, 18]

Images:



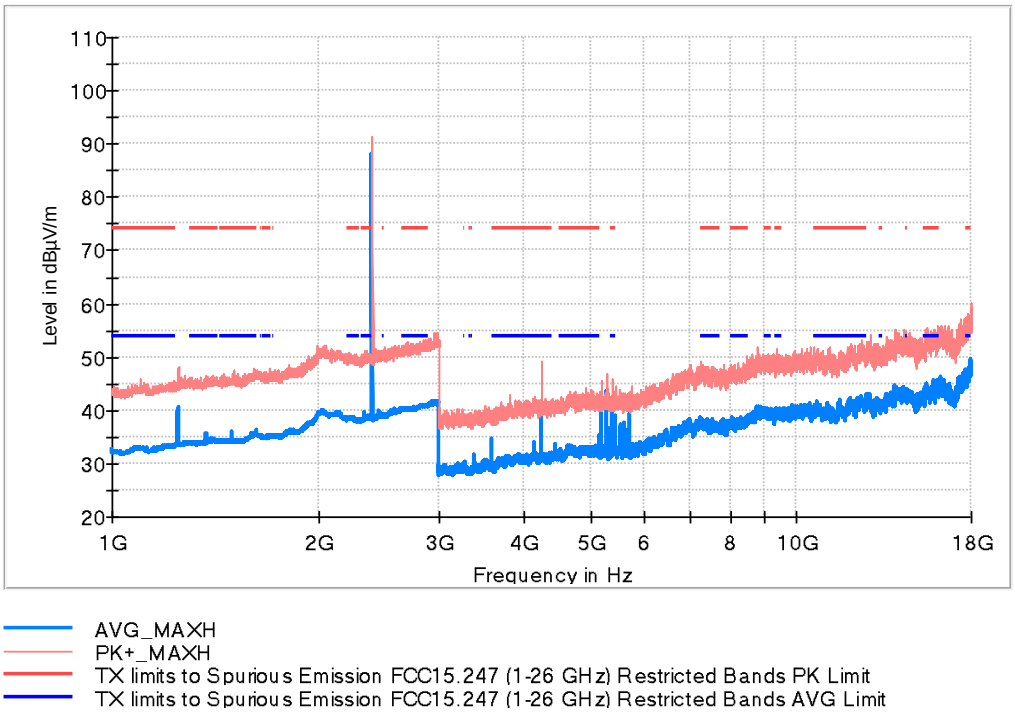
Modulation: BT (8DPSK 3-DH5)
Results

Frequency range 1 - 18 GHz

Lowest Channel

Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (8DPSK 3-DH5), Frequency Range GHz = [1, 18]

Images:



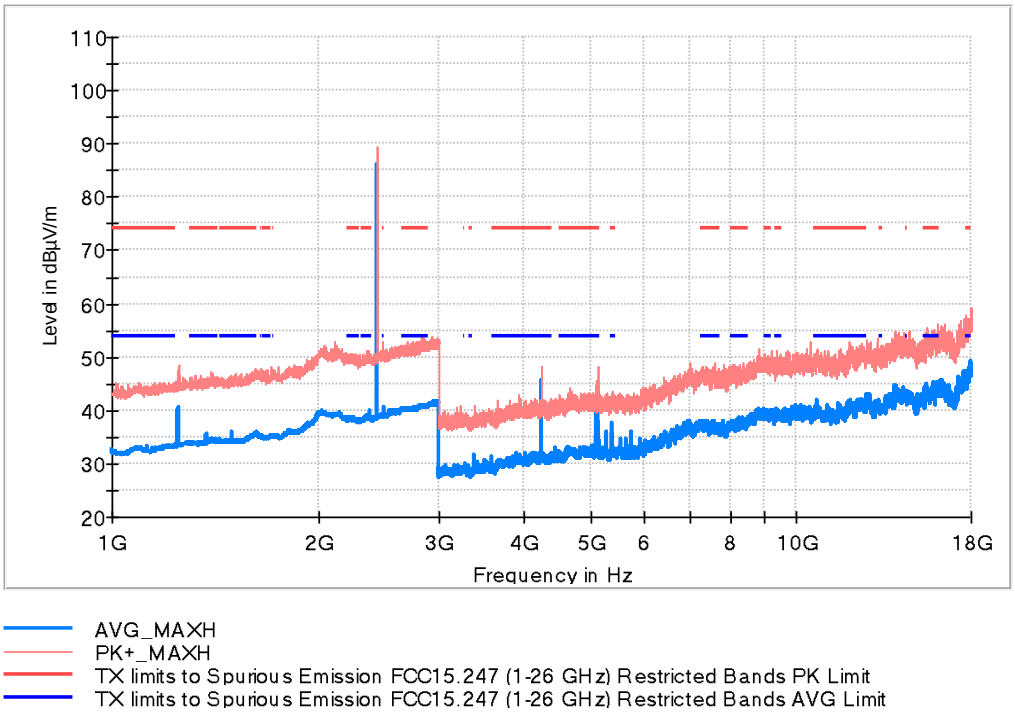
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2402.000000	91.4	88.2	H	---	---	Fundamental
5368.000000	45.6	40.0	H	14.0	54.0	
17985.500000	57.7	49.3	V	4.7	54.0	

Frequency range 1 - 18 GHz

Middle Channel

Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (8DPSK 3-DH5), Frequency Range GHz = [1, 18]

Images:



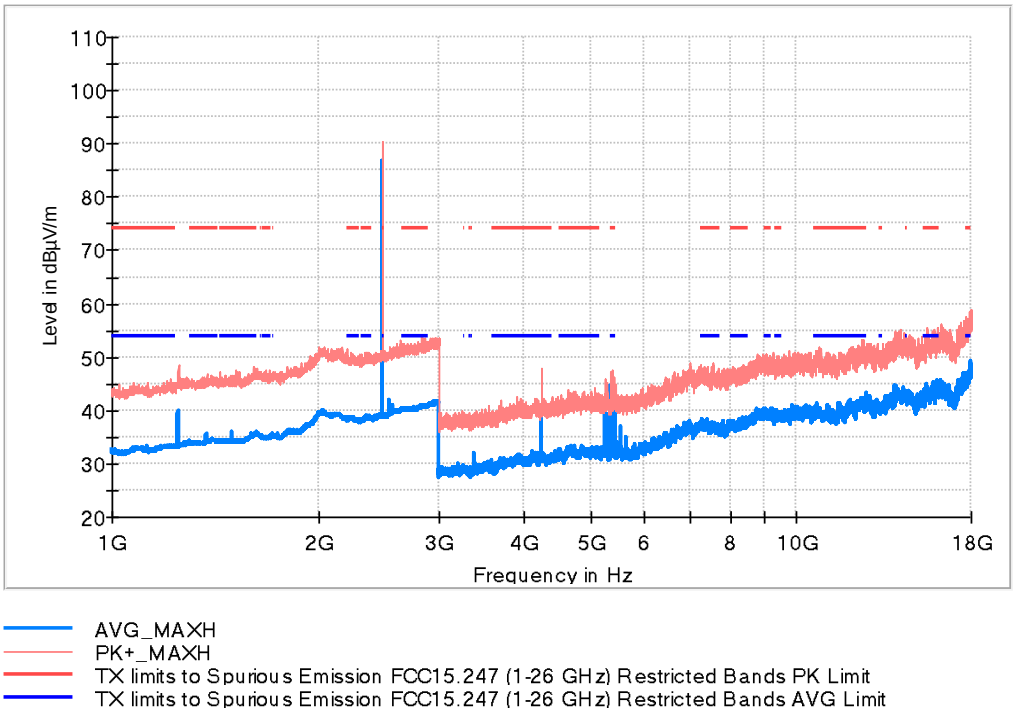
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2441.000000	89.4	86.2	H	---	---	Fundamental
4233.000000	48.1	45.5	V	8.5	54.0	
5126.500000	48.2	44.6	H	9.4	54.0	

Frequency range 1 - 18 GHz

Highest Channel

Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (8DPSK 3-DH5), Frequency Range GHz = [1, 18]

Images:



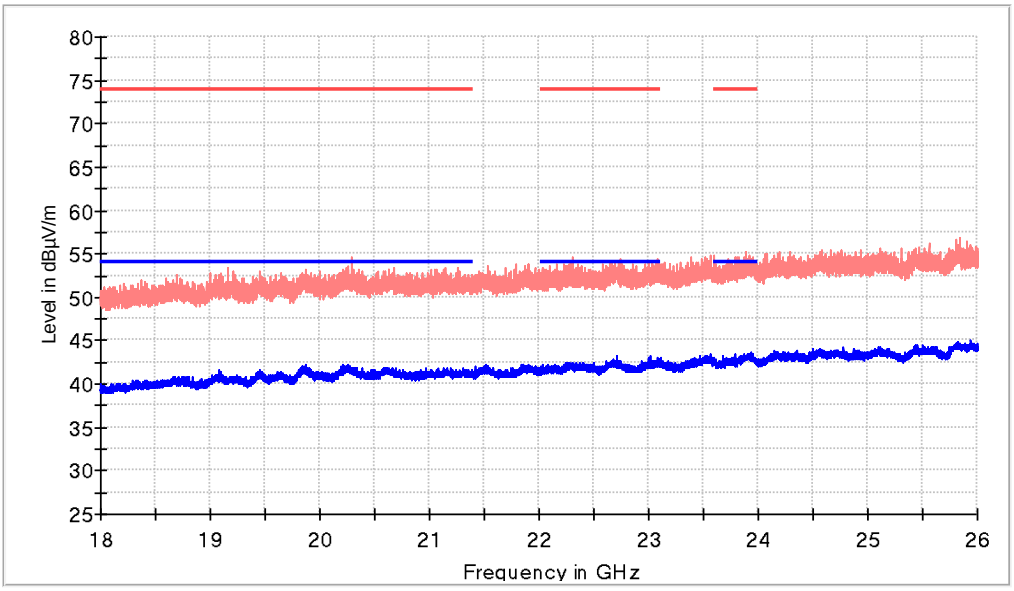
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)	Comment
2480.000000	90.4	86.8	V	---	---	Fundamental
5356.500000	47.4	44.7	V	9.3	54.0	
5389.500000	46.5	43.2	H	10.8	54.0	

Frequency range 18 - 26 GHz

Lowest Channel

Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (8DPSK 3-DH5), Frequency Range GHz = [18, 26]

Images:



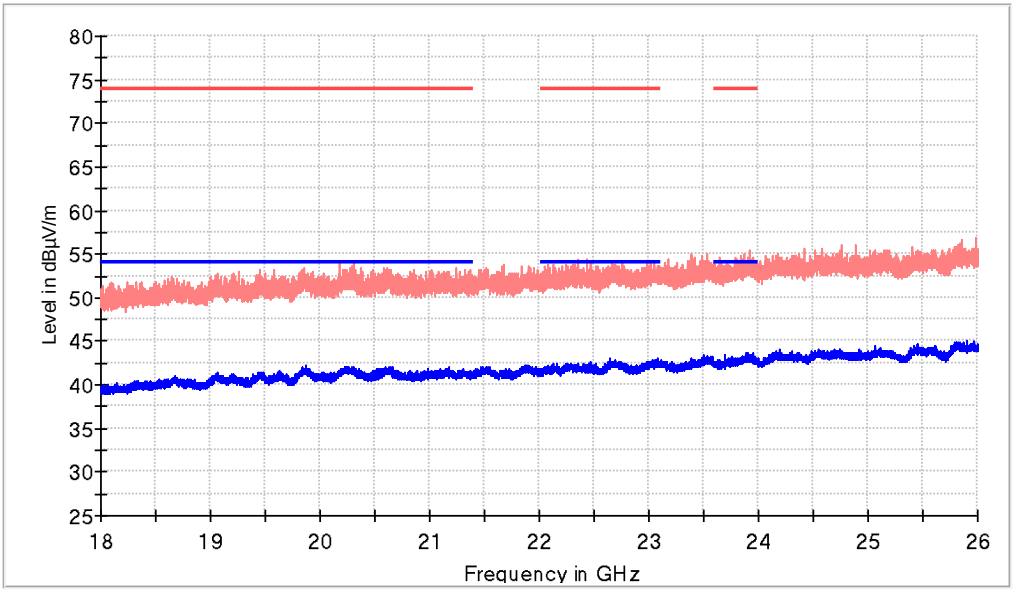
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
20286.500000	54.6	41.8	H	12.2	54.0
22302.000000	54.7	42.0	V	12.0	54.0
23887.000000	55.1	43.1	H	10.9	54.0

Frequency range 18 - 26 GHz

Middle Channel

Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (8DPSK 3-DH5), Frequency Range GHz = [18, 26]

Images:



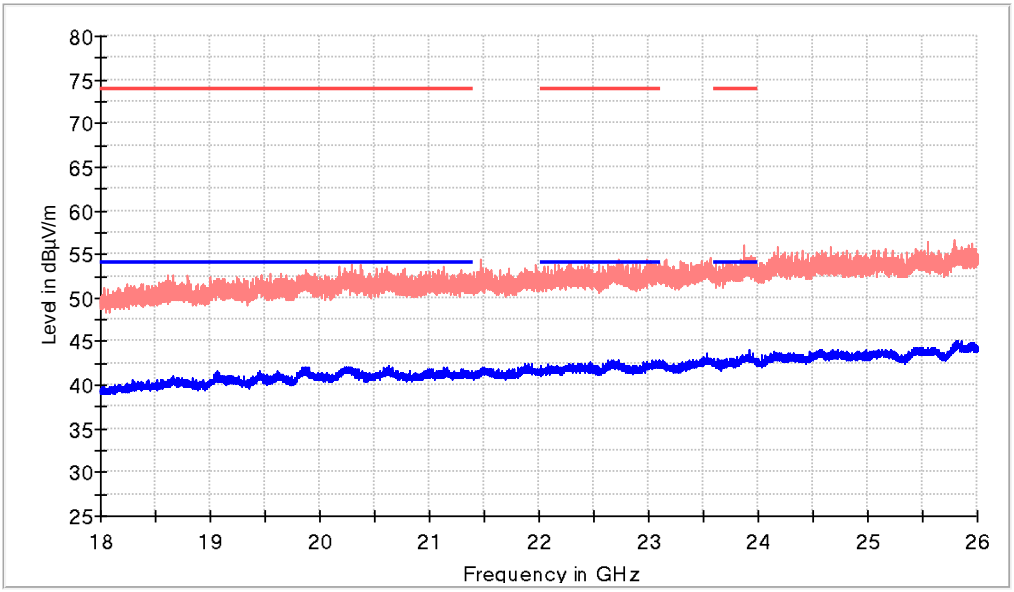
Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
20171.000000	54.1	41.1	V	12.9	54.0
22442.000000	54.5	42.1	V	11.9	54.0
23921.000000	55.5	42.8	V	11.2	54.0

Frequency range 18 - 26 GHz

Highest Channel

Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (8DPSK 3-DH5), Frequency Range GHz = [18, 26]

Images:

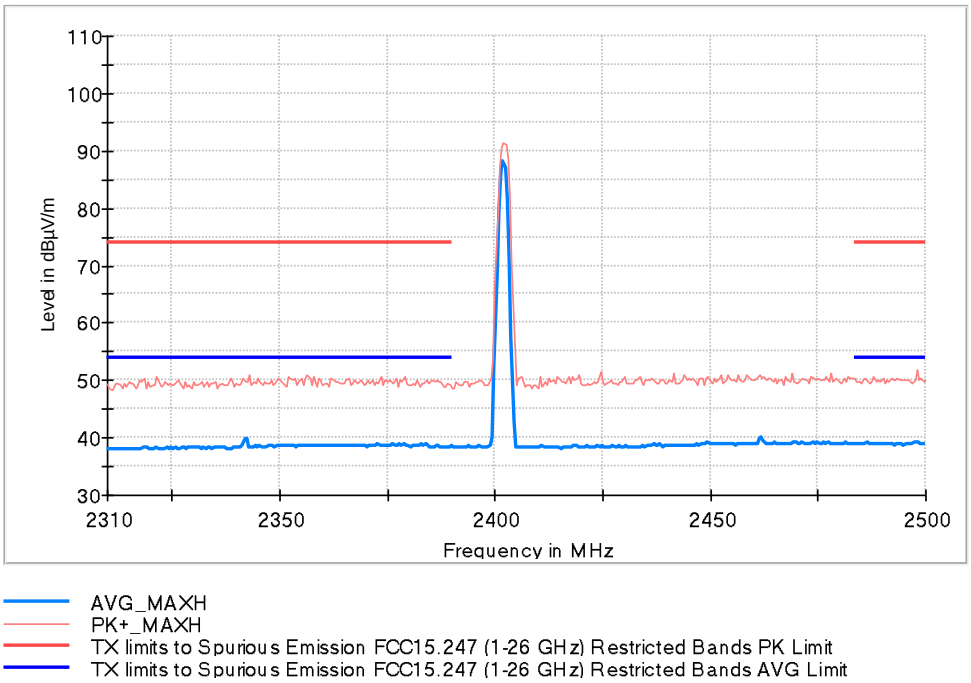


Frequency (MHz)	PK+_MAXH (dBµV/m)	AVG_MAXH (dBµV/m)	Pol	Margin - AVG (dB)	Limit - AVG (dBµV/m)
19844.000000	50.8	42.1	H	11.9	54.0
22636.000000	52.2	42.8	H	11.2	54.0
23916.500000	53.7	44.1	V	9.9	54.0

Restricted Bands (2.31 GHz - 2.5 GHz)

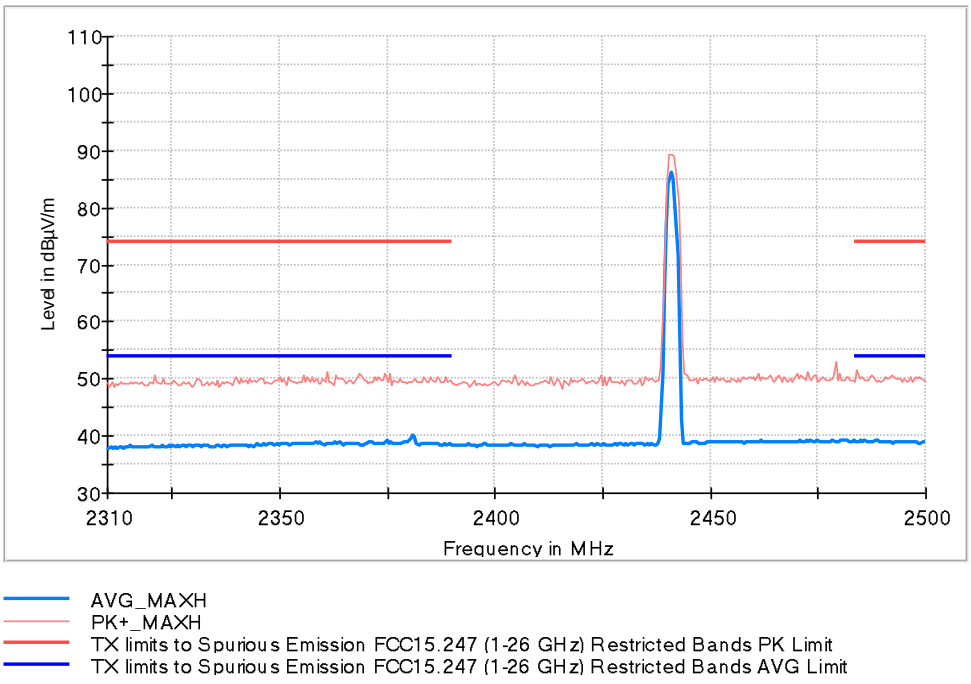
Lowest Channel
Frequency MHz = 2402.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (8DPSK 3-DH5), Frequency Range GHz = [1, 18]

Images:



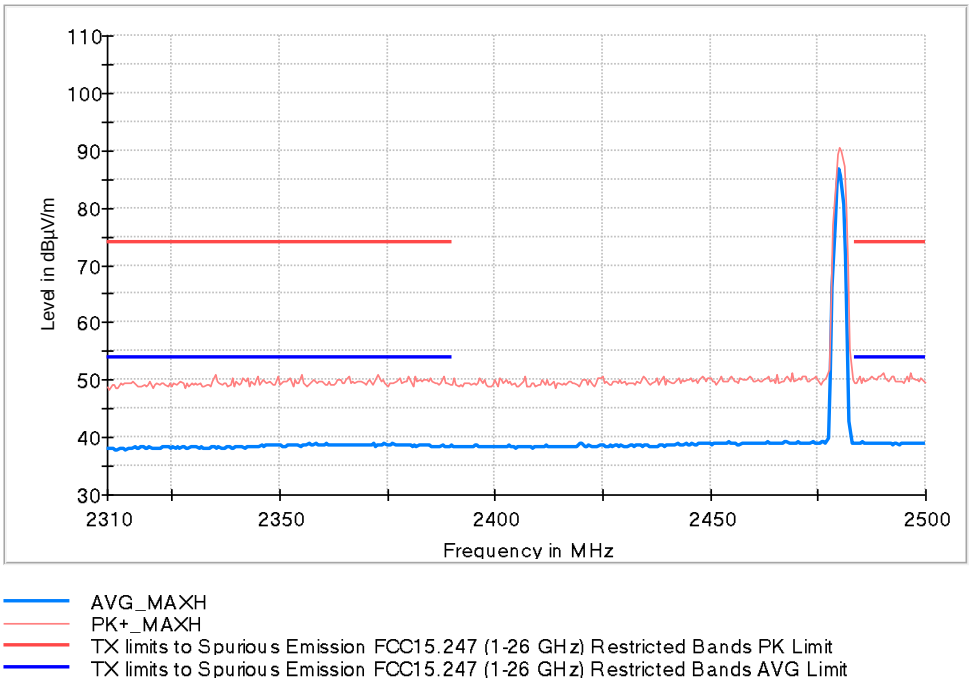
Middle Channel
Frequency MHz = 2441.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (8DPSK 3-DH5), Frequency Range GHz = [1, 18]

Images:



Highest Channel
Frequency MHz = 2480.00000, Equipment Type = Frequency Hopping Spread Spectrum systems (DSS), Modulation = BT (8DPSK 3-DH5), Frequency Range GHz = [1, 18]

Images:



Spectrum Analyzer Parameters

Subrange	Step Size	Detectors	Bandwidth	Sweep Time	Preamp
1 GHz - 3 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	20 dB
3 GHz - 18 GHz	500 kHz	PK+ ; AVG	1 MHz	1 s	20 dB

Appendix C: Test results. Wi-Fi 2.4GHz

Appendix C

PRODUCT INFORMATION

Information	Description
Modulation	CCK, DSSS, OFDM, (BPSK, QPSK, 16/64QAM)
Operation mode:	
• Operating Frequency Range	2400 – 2483.5 MHz
• Nominal Channel Bandwidth	20 MHz
• Maximum RF Output Power	9 dBm
Antenna type	External
Antenna gain	2 dBi
Nominal Voltage	
• Supply Voltage	12 Vdc
• Type of power source	DC voltage
Equipment type	Wi-Fi 2.4 GHz b/g/n20/ax20

TEST CONDITIONS

(*): Data provided by the client.

TEST CONDITIONS	DESCRIPTION
TC#01(1) **(b mode)**	Power supply (V): $V_{nominal}$ = 12 Vdc Channel Bandwidth: 20 MHz Test Frequencies for Conducted/Radiated tests (**SISO A, SISO B, Radio A + B MIMO**): Lowest channel: 2412 MHz Middle channel: 2437 MHz Highest channel: 2462 MHz
TC#02(1) **(g mode)**	Power supply (V): $V_{nominal}$ = 12 Vdc Channel Bandwidth: 20 MHz Test Frequencies for Conducted/Radiated tests (**SISO A, SISO B, Radio A + B MIMO**): Lowest channel: 2412 MHz Middle channel: 2437 MHz Highest channel: 2462 MHz
TC#03(1) **(n mode)**	Power supply (V): $V_{nominal}$ = 12 Vdc Channel Bandwidth: 20 MHz Channel Bandwidth: 20 MHz Test Frequencies for Conducted/Radiated tests (**SISO A, SISO B, Radio A + B MIMO**): Lowest channel: 2412 MHz Middle channel: 2437 MHz Highest channel: 2462 MHz
TC#05(1)(2) **(ax mode RU)**	Power supply (V): $V_{nominal}$ = 12 Vdc Channel Bandwidth: 20 MHz Test Frequencies for Conducted/Radiated tests (**Radio A + B MIMO**): Lowest channel: 2412 MHz Middle channel: 2437 MHz Highest channel: 2462 MHz

Note (1): The following tables and plots show the results for the worst case in OFDM for modulation (802.11b) and modulation (802.11n); The data rates of 1Mb/s for 802.11b, 6Mb/s for 802.11g, HT20 (OFDM MCS0) for 802.11n, HE20 (OFDMA MCS0) for 802.11ax were selected based on preliminary testing that identified those rates corresponding to the worst cases.
(2)Preliminary measurements determined 26 tones as the worst-case RU (Resource Unit) carrier allocation.
The measured RU offset is indicated as following: Offset ChLow: 0, Offset ChMid:4, & Offset ChHigh: 8

Directional Antenna Gain Calculations for CDD MIMO In-Band Measurements:

For 2Tx CDD MIMO modes, in accordance with KDB 662911 D01 v02r01 Section F)2)f)i), directional gain was calculated as follows:

- For power spectral density (PSD) measurements:

  Directional gain $_{PSD}$ = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi

  N_{SS} = 1 (worst case), N_{ANT} = 2, G_{ANT} = +2 dBi

  Directional gain $_{PSD}$ = 2 + 10 log(2/1) = 2 + 10log(2) = 2 + 3.01 = + 5.01 dBi

  PSD Antenna Gain MIMO Chain 0 & 1: + 5.01 dBi

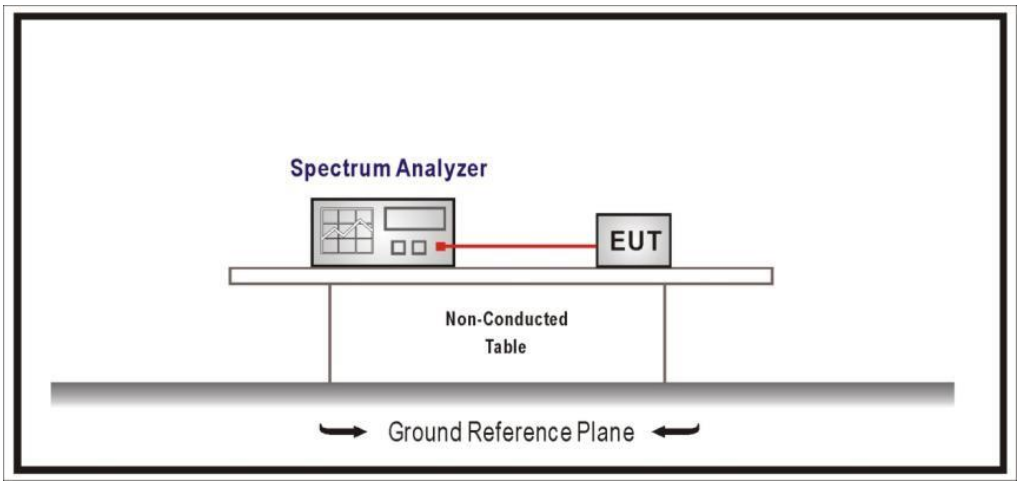
- For power measurements:

  Directional gain $_{POWER}$ = G_{ANT} dBi (N_{ANT} < 4)

  Directional gain $_{POWER}$ = G_{ANT} =+ 2 dBi

  Power Antenna Gain MIMO Chain 0 & 1: + 2 dBi

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 360º 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.

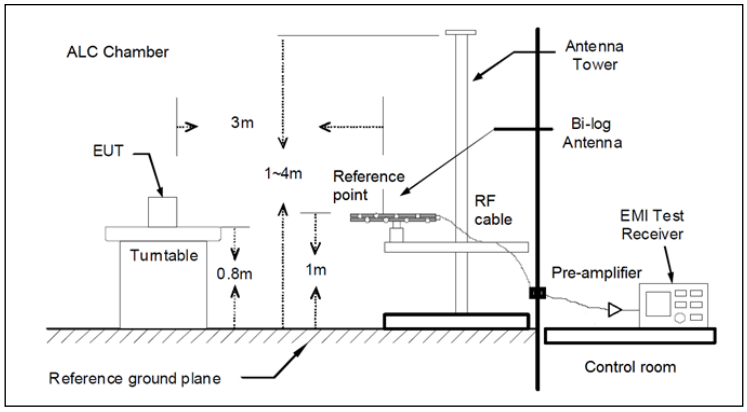


Fig A1: Radiated measurements Setup f < 1 GHz

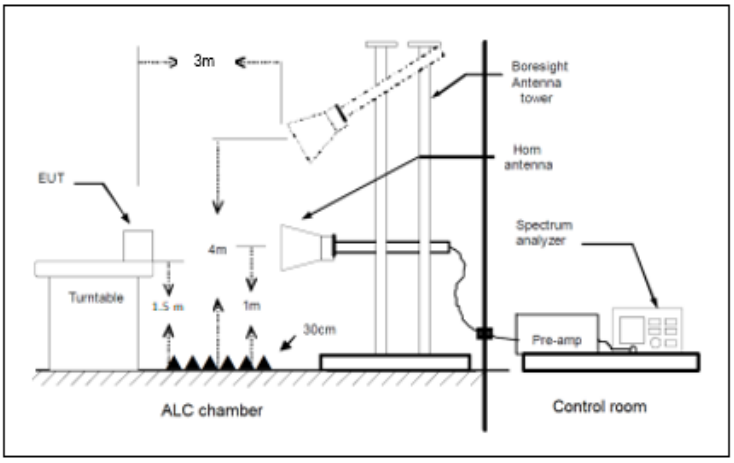


Fig A2: Radiated measurements setup f > 1-18 GHz

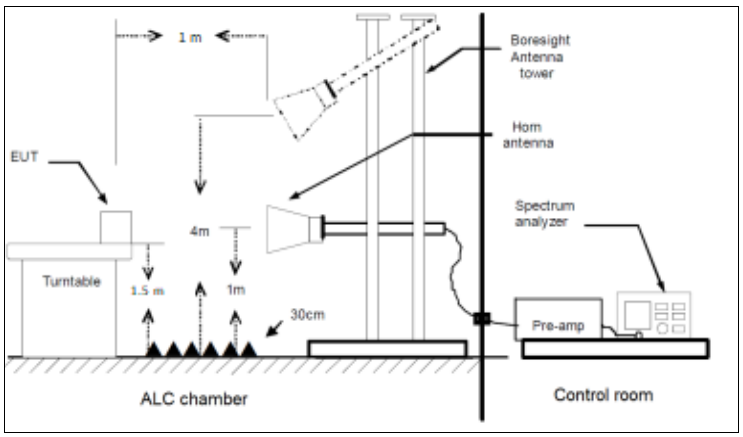


Fig A3: Radiated measurements setup f > 18 GHz

Appendix C.1: SISO A

TEST CASES DETAILS

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

Limits

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

Modulation: 802.11b (DSSS 1 Mbit/s)

Results

Freq (MHz)	BW (MHz)	# of Tx Chains	Port	Emission Bandwidth (MHz)
2412.00000				7.45
2437.00000	20	1	1	7.45
2462.00000				7.45

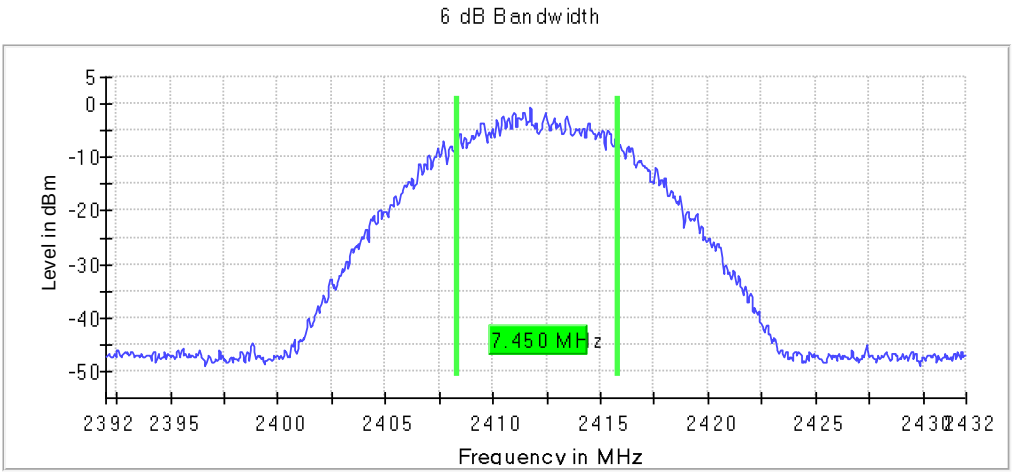
Verdict

Pass

Attachments

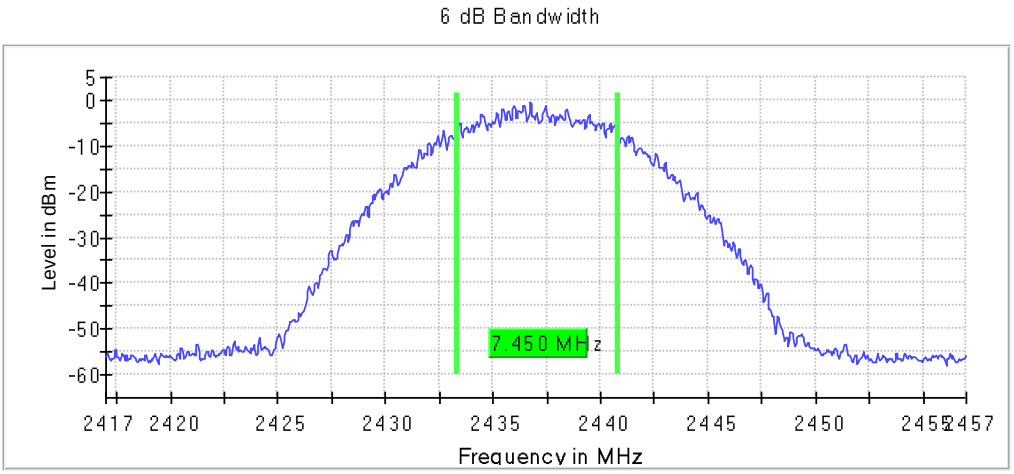
Frequency MHz = 2412.00000, Bandwidth MHz = 20, Modulation = 802.11b (DSSS 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



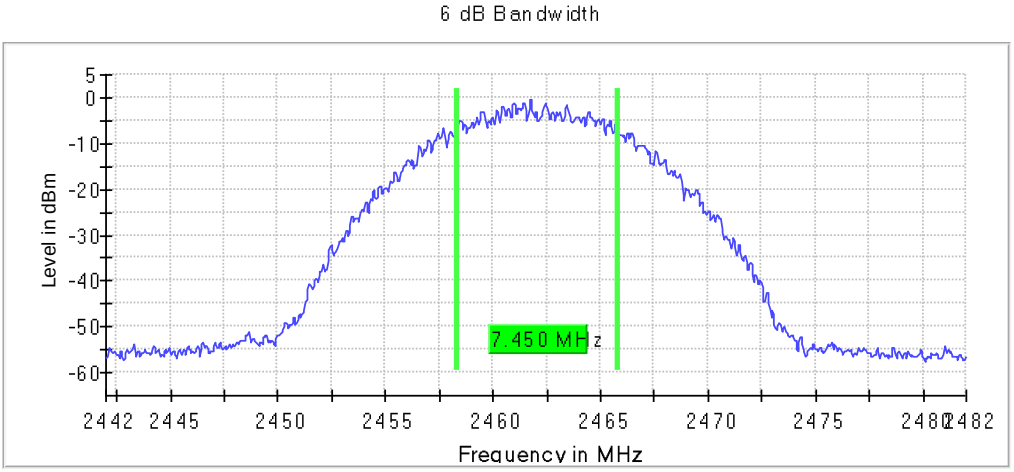
Frequency MHz = 2437.00000, Bandwidth MHz = 20, Modulation = 802.11b (DSSS 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



Frequency MHz = 2462.00000, Bandwidth MHz = 20, Modulation = 802.11b (DSSS 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



Modulation: 802.11g (OFDM 6 Mbit/s)

Results

Freq (MHz)	BW (MHz)	# of Tx Chains	Port	Emission Bandwidth (MHz)
2412.00000				16.600
2437.00000	20	1	1	16.550
2462.00000				16.600

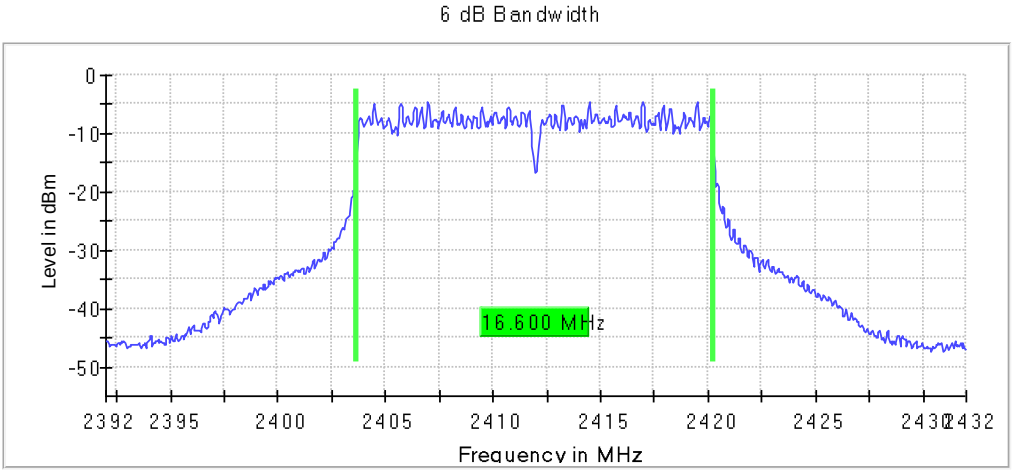
Verdict

Pass

Attachments

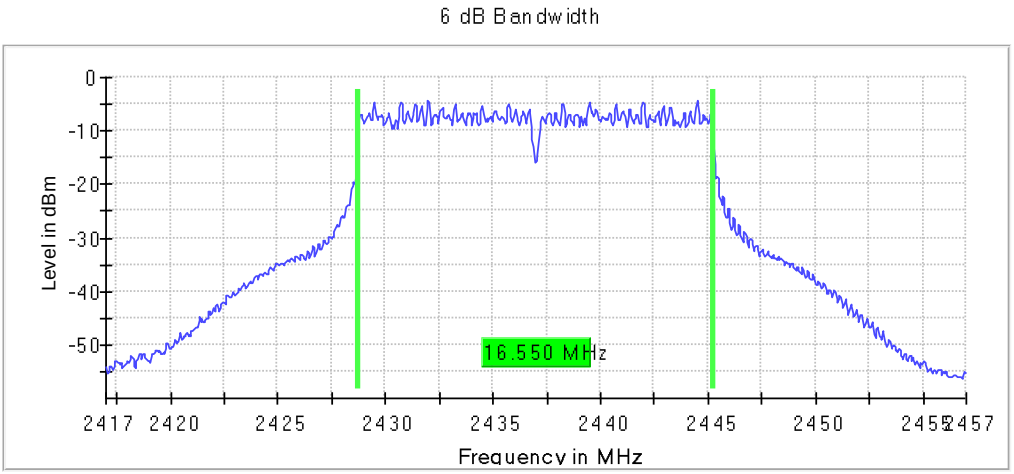
Frequency MHz = 2412.00000, Bandwidth MHz = 20, Modulation = 802.11g (OFDM 6 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



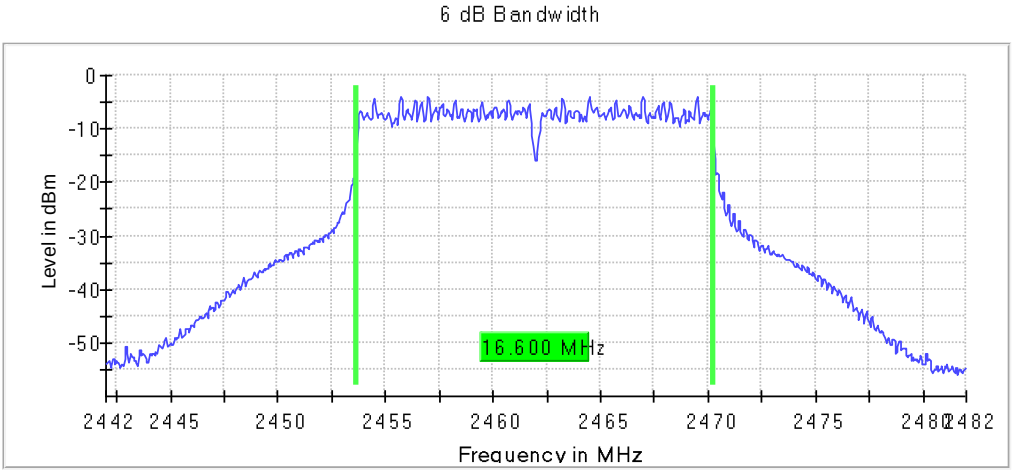
Frequency MHz = 2437.00000, Bandwidth MHz = 20, Modulation = 802.11g (OFDM 6 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



Frequency MHz = 2462.00000, Bandwidth MHz = 20, Modulation = 802.11g (OFDM 6 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



Modulation: 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Results

Freq (MHz)	BW (MHz)	# of Tx Chains	Port	Emission Bandwidth (MHz)
2412.00000				17.900
2437.00000	20	1	1	17.900
2462.00000				17.900

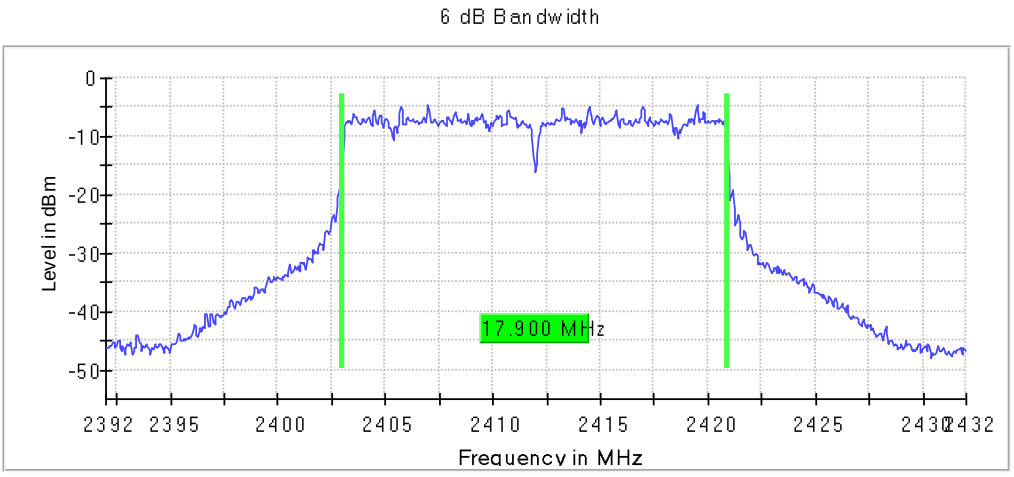
Verdict

Pass

Attachments

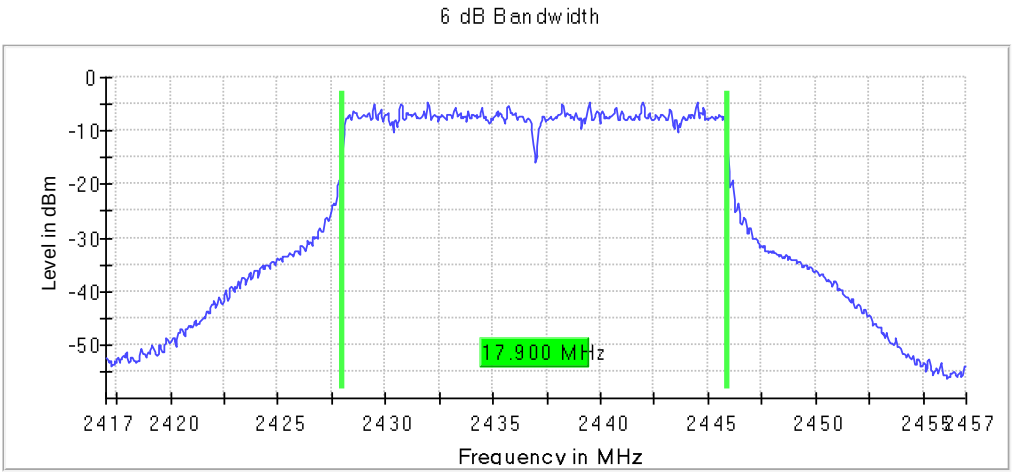
Frequency MHz = 2412.00000, Bandwidth MHz = 20, Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



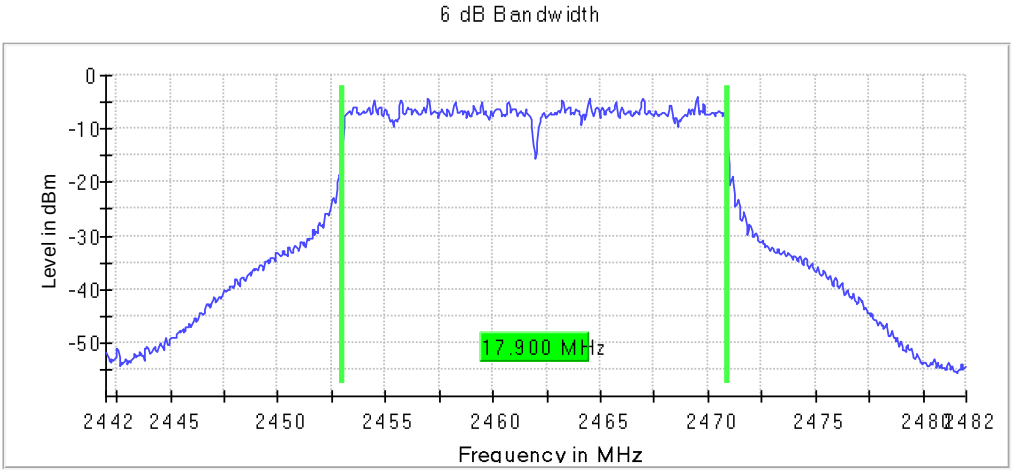
Frequency MHz = 2437.00000, Bandwidth MHz = 20, Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



Frequency MHz = 2462.00000, Bandwidth MHz = 20, Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



Modulation: 802.11ax HE20 (OFDMA MCS0) – RU Partial

The next RU combinations were tested as worst cases:

Low Channel:	RU26 Offset 0
Middle Channel:	RU26 Offset 4
High Channel:	RU26 Offset 8

Results

Freq (MHz)	BW (MHz)	# of Tx Chains	Port	Emission Bandwidth (MHz)
2412.00000				2.150
2437.00000	20	1	1	2.700
2462.00000				2.100

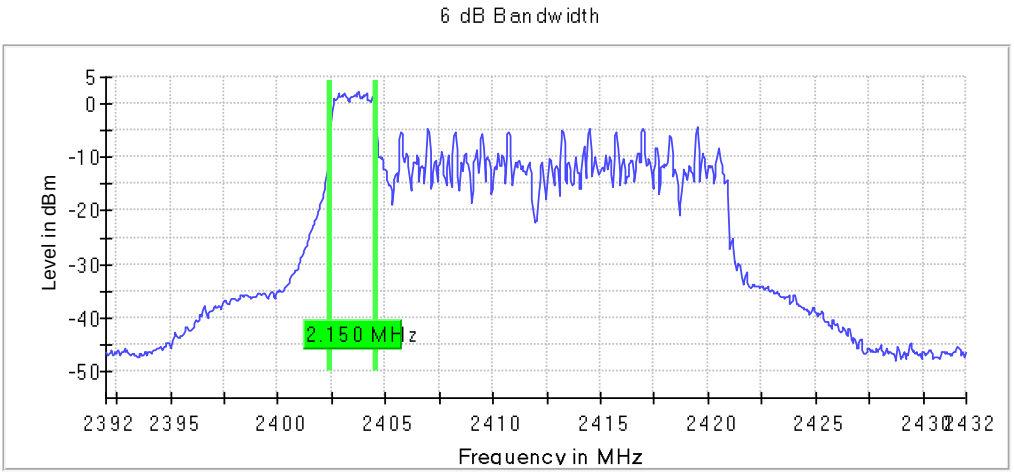
Verdict

Pass

Attachments

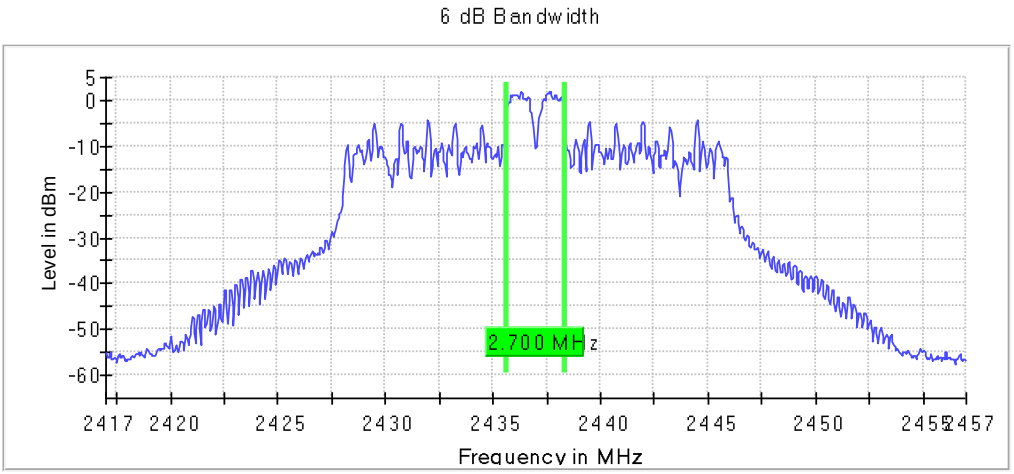
Frequency MHz = 2412.00000, Bandwidth MHz = 20, Modulation = 802.11ax HE20 (OFDMA MCS0), Number of Transmission Chains = 1, Active Port = 1

Images:



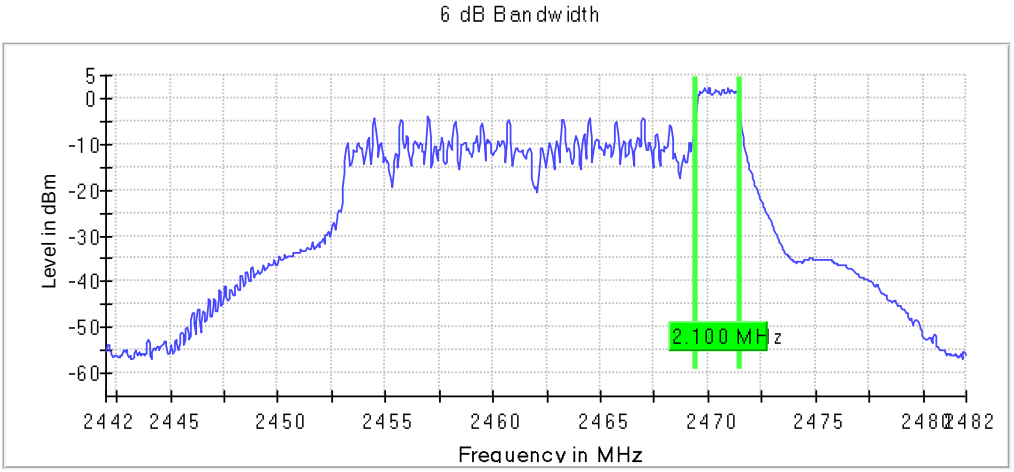
Frequency MHz = 2437.00000, Bandwidth MHz = 20, Modulation = 802.11ax HE20 (OFDMA MCS0), Number of Transmission Chains = 1, Active Port = 1

Images:



Frequency MHz = 2462.00000, Bandwidth MHz = 20, Modulation = 802.11ax HE20 (OFDMA MCS0), Number of Transmission Chains = 1, Active Port = 1

Images:



Modulation: 802.11ax HE20 (OFDMA MCS0) – RU Full

Results

Freq (MHz)	BW (MHz)	# of Tx Chains	Port	Emission Bandwidth (MHz)
2412.00000				19.150
2437.00000	20	1	1	2.750
2462.00000				19.200

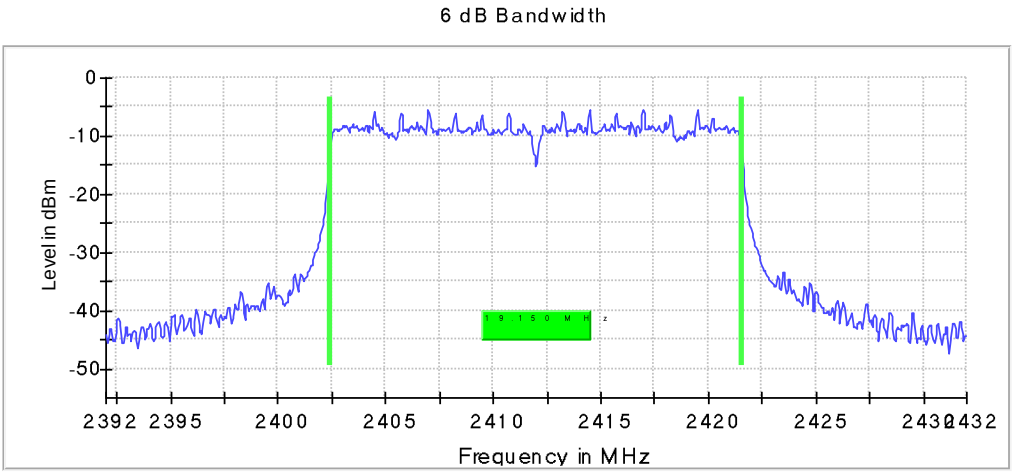
Verdict

Pass

Attachments

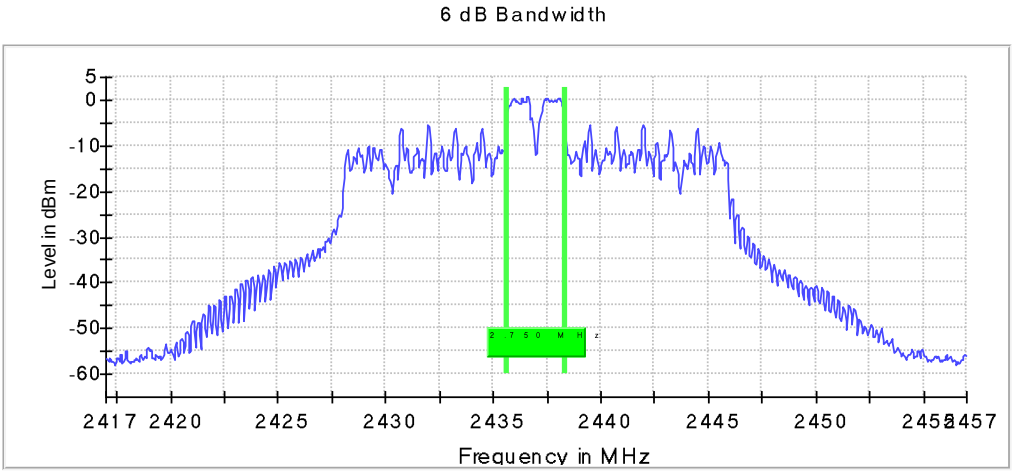
Frequency MHz = 2412.00000, Bandwidth MHz = 20, Modulation = 802.11ax HE20 (OFDMA MCS0), Number of Transmission Chains = 1, Active Port = 1

Images:



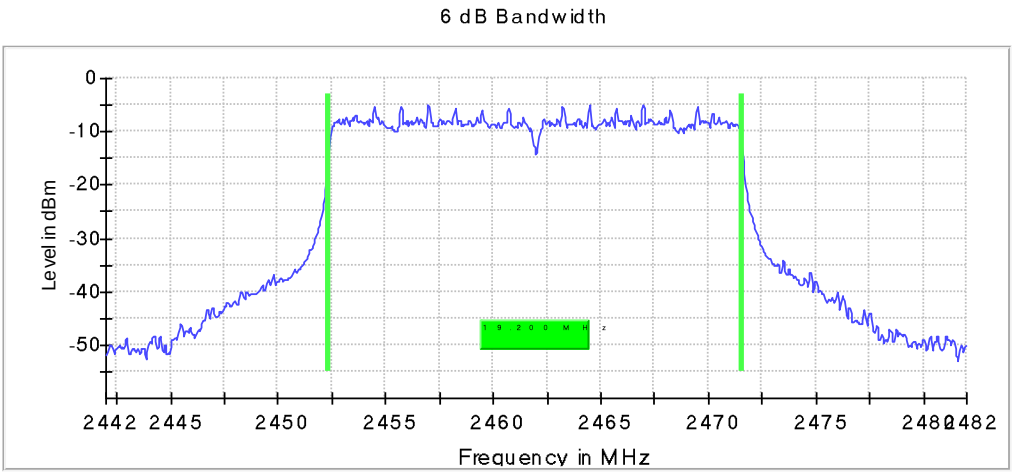
Frequency MHz = 2437.00000, Bandwidth MHz = 20, Modulation = 802.11ax HE20 (OFDMA MCS0), Number of Transmission Chains = 1, Active Port = 1

Images:



Frequency MHz = 2462.00000, Bandwidth MHz = 20, Modulation = 802.11ax HE20 (OFDMA MCS0), Number of Transmission Chains = 1, Active Port = 1

Images:



Spectrum Analyzer Parameters

Setting	Instrument Value	Target Value
Measurement Time	1.000 s	1.000 s
Points	1000000	1000000
Time resolution	1.000 µs	1.000 µs

FCC 2.1049 / 99dBw Occupied Channel Bandwidth 99%

Limits

No Limit has been set to this test case

Modulation: 802.11b (DSSS 1 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Occ Ch BW (MHz)
2412.00000	Digital Transmission System (DTS)	20	1	1	12.800
2437.00000					12.800
2462.00000					12.800

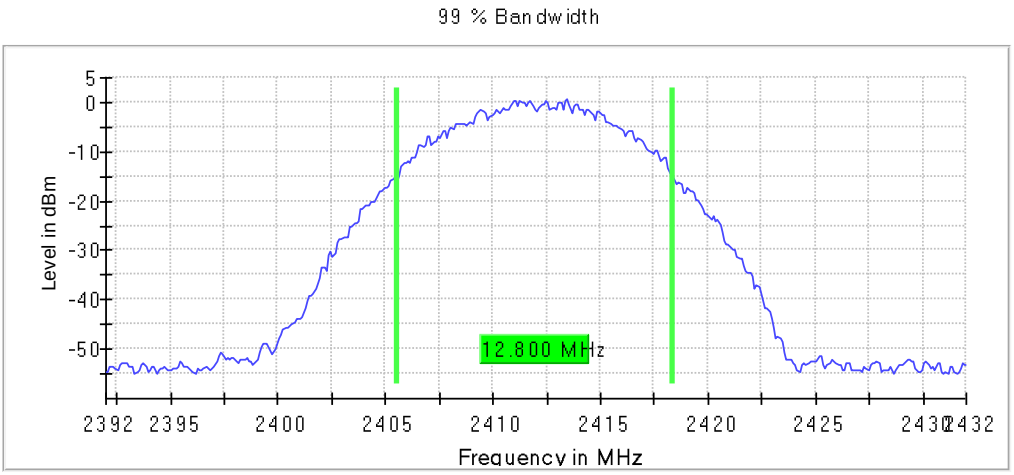
Verdict

Pass

Attachments

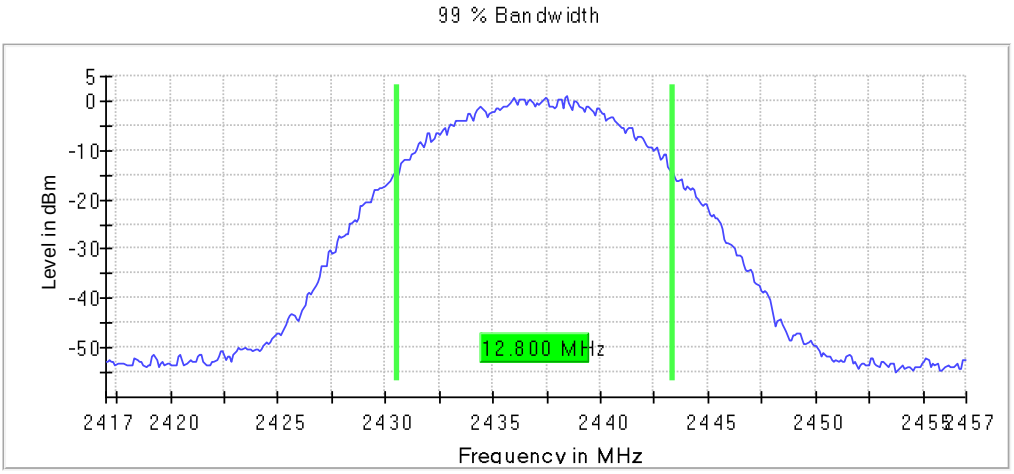
Frequency MHz = 2412.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11b (DSSS 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



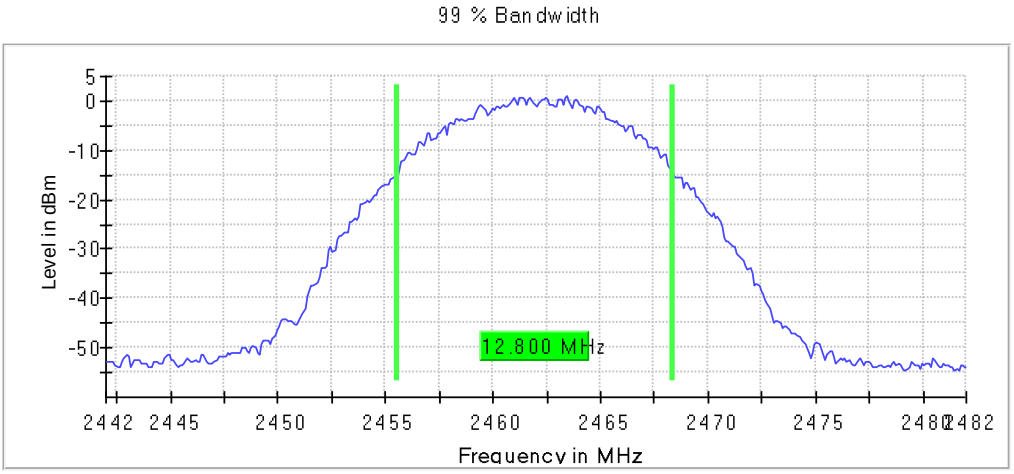
Frequency MHz = 2437.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11b (DSSS 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



Frequency MHz = 2462.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11b (DSSS 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



Modulation: 802.11g (OFDM 6 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Occ Ch BW (MHz)
2412.00000	Digital Transmission System (DTS)	20	1	1	16.500
2437.00000					16.600
2462.00000					16.600

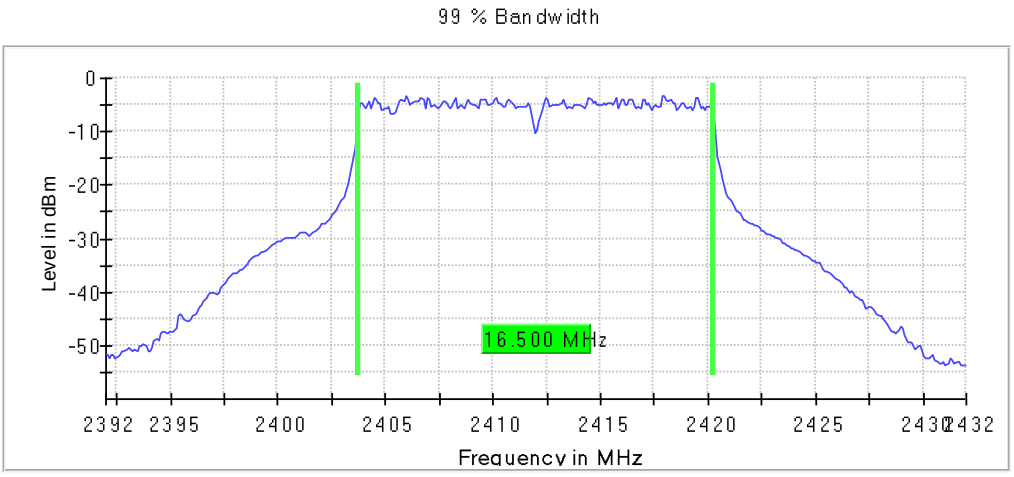
Verdict

Pass

Attachments

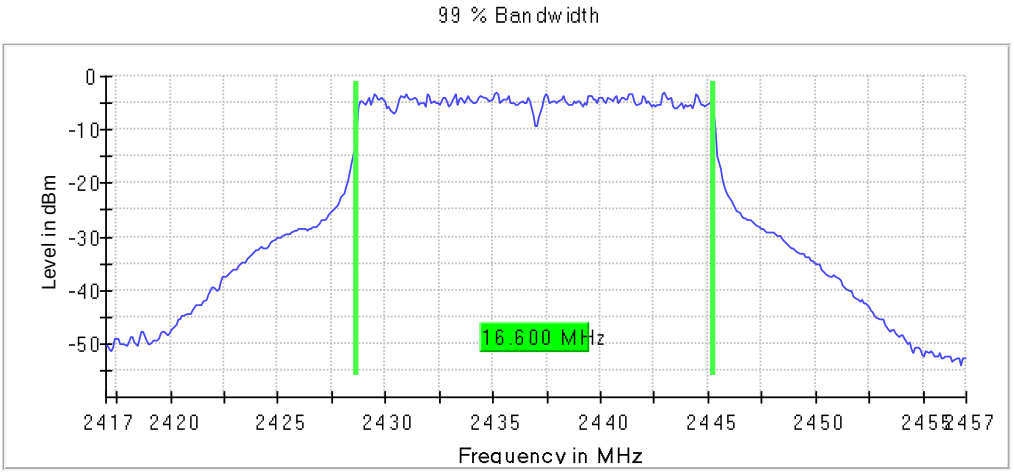
Frequency MHz = 2412.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11g (OFDM 6 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



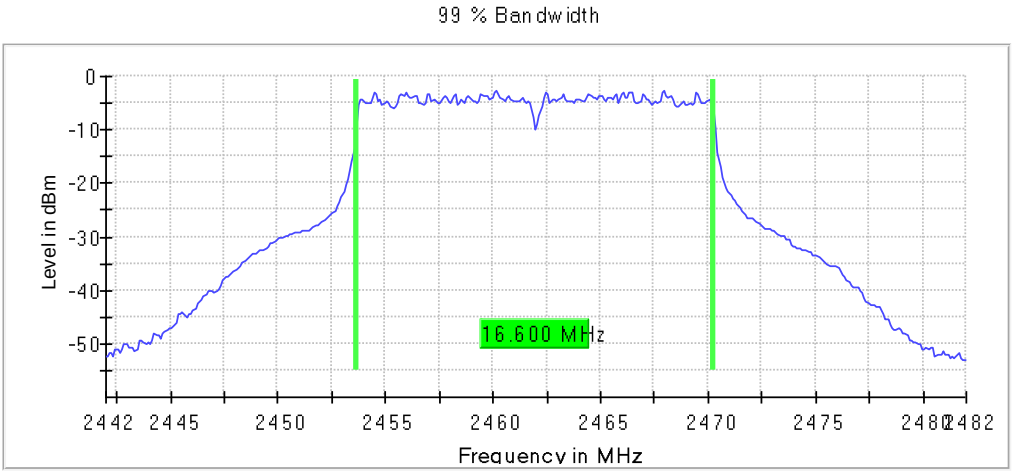
Frequency MHz = 2437.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11g (OFDM 6 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



Frequency MHz = 2462.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11g (OFDM 6 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



Modulation: 802.11n HT20 (OFDM MCS0 6.5 Mbit/s)

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Occ Ch BW (MHz)
2412.00000	Digital Transmission System (DTS)	20	1	1	17.800
2437.00000					17.800
2462.00000					17.800

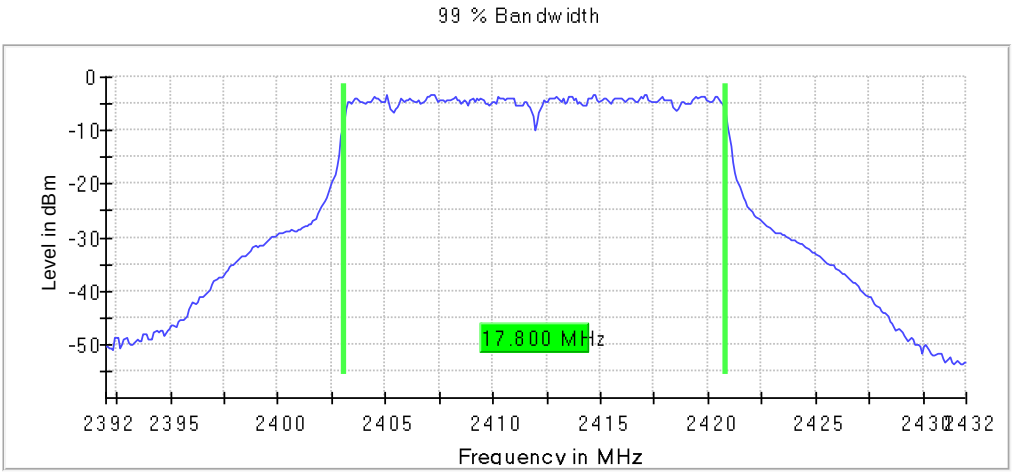
Verdict

Pass

Attachments

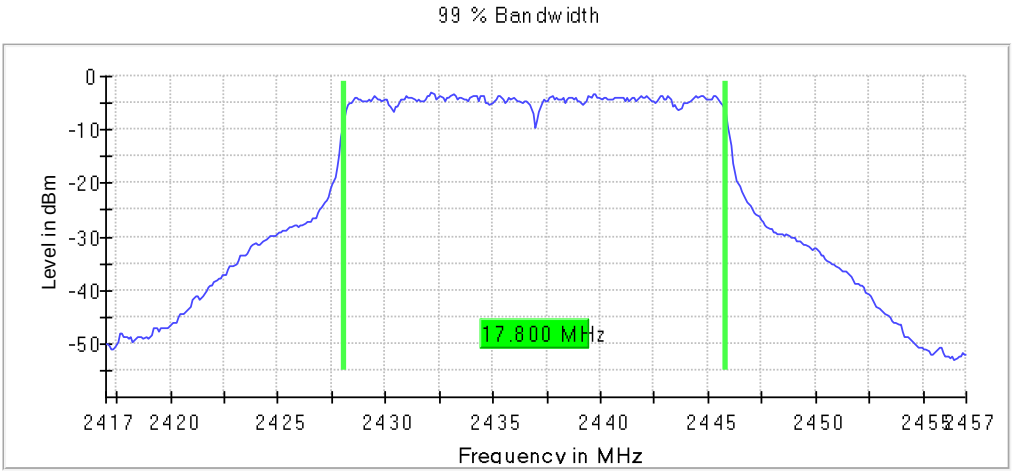
Frequency MHz = 2412.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



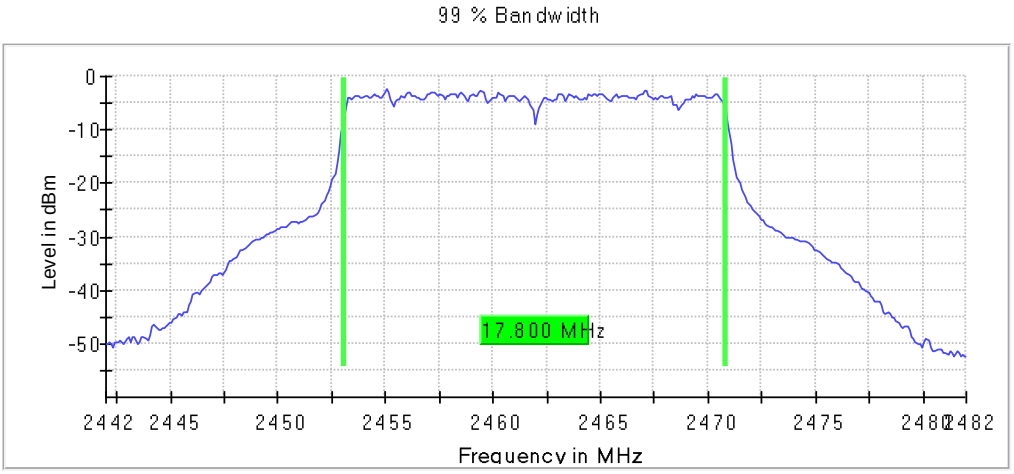
Frequency MHz = 2437.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



Frequency MHz = 2462.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11n HT20 (OFDM MCS0 6.5 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images:



Modulation: 802.11ax HE20 (OFDMA MCS0) – RU Partial

The next RU combinations were tested as worst cases:

Low Channel:	RU26 Offset 0
Middle Channel:	RU26 Offset 4
High Channel:	RU26 Offset 8

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Occ Ch BW (MHz)
2412.00000	Digital Transmission System (DTS)	20	1	1	18.500
2437.00000					17.300
2462.00000					18.500

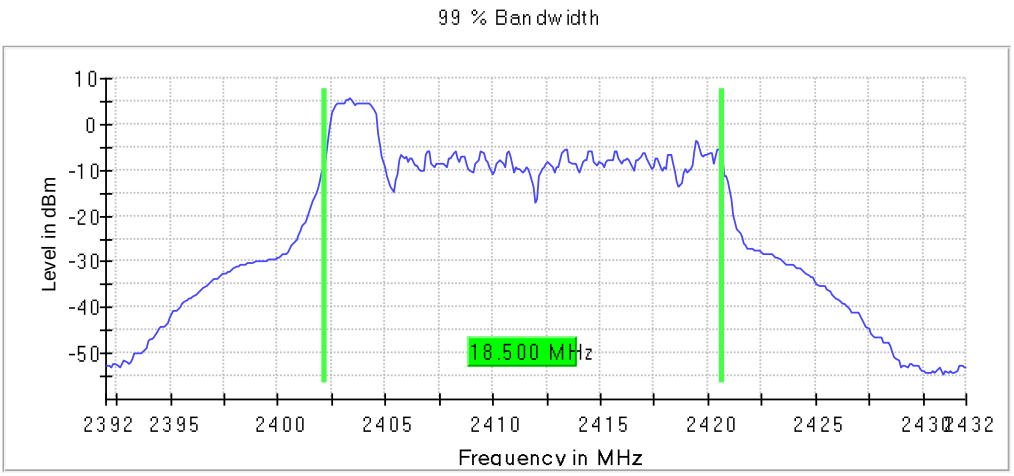
Verdict

Pass

Attachments

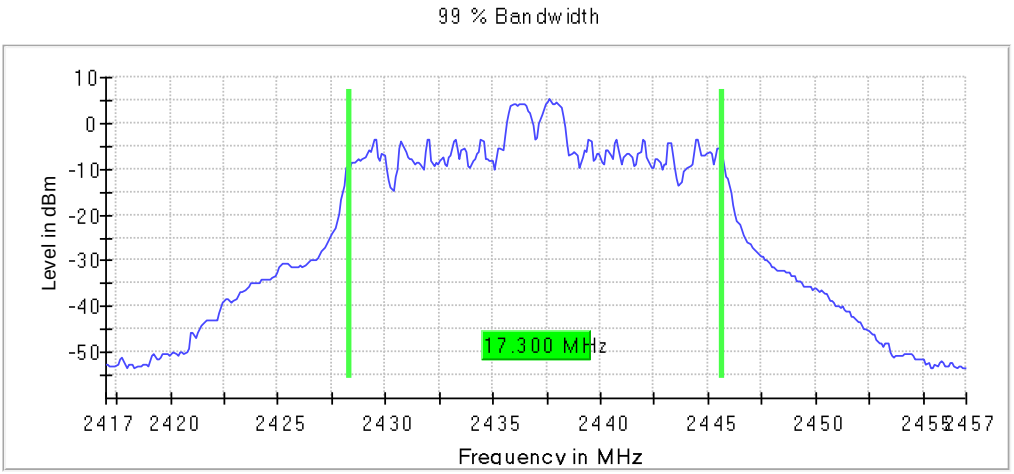
Frequency MHz = 2412.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11ax HE20 (OFDMA MCS0), Number of Transmission Chains = 1, Active Port = 1

Images:



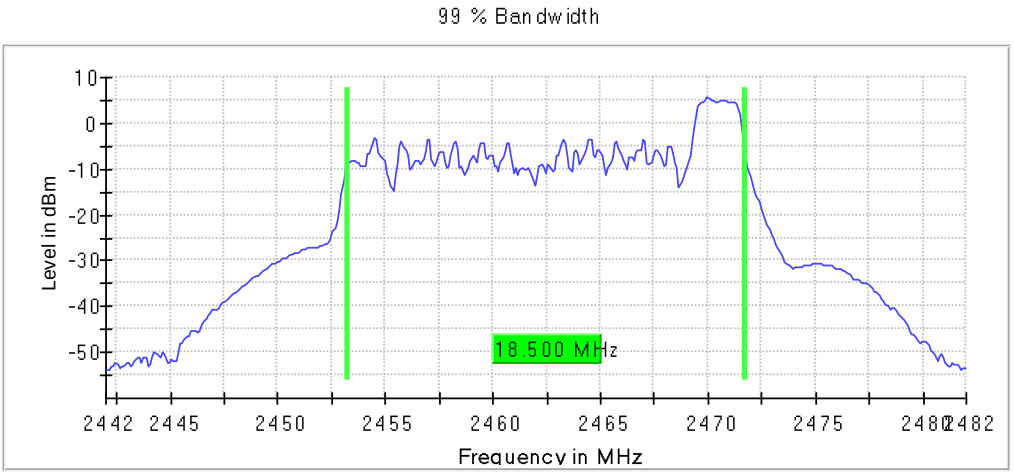
Frequency MHz = 2437.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11ax HE20 (OFDMA MCS0), Number of Transmission Chains = 1, Active Port = 1

Images:



Frequency MHz = 2462.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11ax HE20 (OFDMA MCS0), Number of Transmission Chains = 1, Active Port = 1

Images:



Modulation: 802.11ax HE20 (OFDMA MCS0) – RU Full

Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	Occ Ch BW (MHz)
2412.00000	Digital Transmission System (DTS)	20	1	1	19.100
2437.00000					17.300
2462.00000					19.200

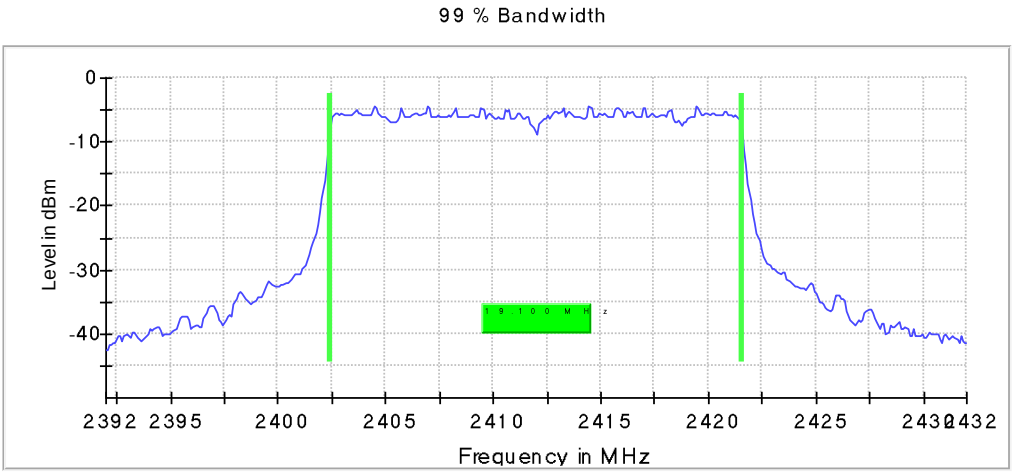
Verdict

Pass

Attachments

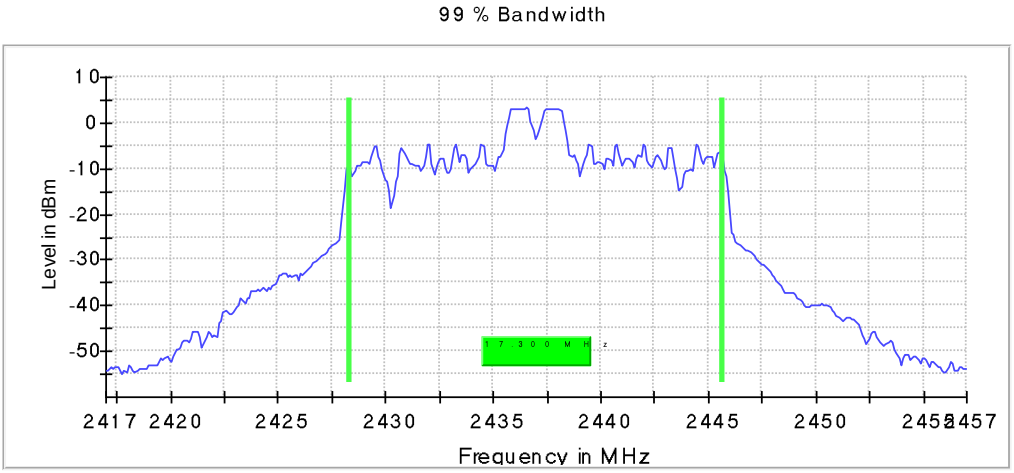
Frequency MHz = 2412.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11ax HE20 (OFDMA MCS0), Number of Transmission Chains = 1, Active Port = 1

Images:



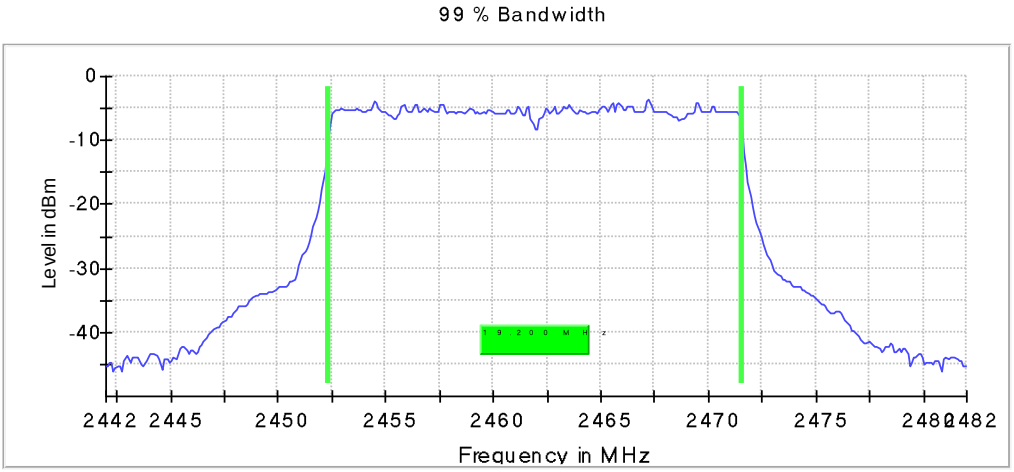
Frequency MHz = 2437.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11ax HE20 (OFDMA MCS0), Number of Transmission Chains = 1, Active Port = 1

Images:



Frequency MHz = 2462.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11ax HE20 (OFDMA MCS0), Number of Transmission Chains = 1, Active Port = 1

Images:



Spectrum Analyzer Parameters

Setting	Instrument Value
Start Frequency	2.39200 GHz
Stop Frequency	2.43200 GHz
Span	40.000 MHz
RBW	200.000 kHz
VBW	1.000 MHz
SweepPoints	400
Sweeptime	28.477 µs
Reference Level	0.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	100
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	9 / max. 150
Stable	3 / 3
Max Stable Difference	0.20 dB

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

Limits

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

Modulation: 802.11b (DSSS 1 Mbit/s)
Results

Freq (MHz)	Equipment	BW (MHz)	# of Tx Chains	Port	PSD (dBm)
2412.00000	Digital Transmission System (DTS)	20	1	1	-4.364
2437.00000					-4.053
2462.00000					-3.962

Verdict

Pass

Attachments

Frequency MHz = 2412.00000, Equipment Type = Digital Transmission System (DTS), Bandwidth MHz = 20, Modulation = 802.11b (DSSS 1 Mbit/s), Number of Transmission Chains = 1, Active Port = 1

Images: