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

ISED CABid: ES1909
Lab. Company Number: 4621A

Test Report No:
NIE: 72976RRF.001A1

# Test Report
## USA FCC Part 15.247, 15.209
## CANADA RSS-247, RSS-Gen

| | |
|---|---|
| (*) Identification of item tested | Connected Instrumentation Cluster for Motorcycles |
| (*) Trademark | BOSCH |
| (*) Model and /or type reference | ICC65V2 |
| Other identification of the product | FCC ID: 2AUXS-ICC65V2<br>IC: 25847-ICC65V2 |
| (*) Features | Bluetooth, Wi-Fi<br>HW version: HW20.04<br>SW version: 124.008.005 |
| Applicant | Robert Bosch GmbH<br>Robert-Bosch-Strasse 200<br>31139, Hildesheim<br>Germany |
| Test method requested, standard | USA FCC Part 15.247 (10-1-21 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.<br>USA FCC Part 15.209 (10-1-21 Edition): Radiated emission limits; general requirements.<br>CANADA RSS-247 Issue 2 (February 2017).<br>CANADA RSS-Gen Issue 5 Amendment 1 (Mar. 2019) + Amendment 2 (Feb. 2021)<br>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.<br>ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices. |
| Summary | IN COMPLIANCE |
| Approved by (name / position & signature) | José Manuel Gómez Galván<br>EMC Consumer & RF<br>Lab. Manager<br>Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456) |
| Date of issue | 2023-02-16 |
| Report template No. | FDT08_24<br>(*) "Data provided by the client" |

# Index

# Acronyms

| Acronym ID | Acronym Description |
|---|---|
| # of Tx Chains | Number of Transmission Chains |
| 26Ebw | 26dB Emission Bandwidth |
| Avg Power | Maximum Average Conducted Output Power |
| BW | Nominal Bandwidth |
| Detector | Detector used |
| Equipment | Equipment Type |
| Freq | Frequency |
| Freq Rng | Frequency Range |
| Freq Sep | Frequency Separation |
| Inband Peak Lvl | Inband Peak Level |
| Lvl | Level |
| Mod | Modulation |
| NHC | Number of Hopping Channels |
| NHp | Number of Hops |
| Occ Ch BW | Occupied Channel Bandwidth |
| PSD | Power Spectral Density |
| Pol | Polarization |
| Port | Active Port |
| Unwanted Freq | Unwanted Emissions Frequency |
| Unwanted Lvl | Unwanted Emissions Level |

# Competences and guarantees

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

DEKRA Testing and Certification is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, with the appropriate scope of accreditation that covers the performed tests in this report.

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

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

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

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

# General conditions

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

# Uncertainty

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

The total uncertainty of the measurement system for the radiated emissions of EUT from 30 MHz to 1 GHz is: Measurement uncertainty ≤ ± 5.35 dB with factor (k = 2).

The total uncertainty of the measurement system for the radiated emissions of EUT from 1 GHz to 17 GHz is: Measurement uncertainty ≤ ± 4.32 dB with factor (k = 2).

The total uncertainty of the measurement system for the radiated emissions of EUT from 17 GHz to 26 GHz is: Measurement uncertainty ≤ ± 5.51 dB with factor (k = 2).

The total uncertainty of the measurement system for the conducted testing of EUT is:
RF Peak Output Power: Measurement uncertainty ≤ ± 0.80 dB
RF Average Output Power: Measurement uncertainty ≤ ± 0.99 dB
Power Spectral Density: Measurement uncertainty ≤ ± 0.99 dB
Accumulated Dwell Time: Measurement uncertainty ≤ ± 0.16 %
Minimum Frequency Occupation Time: Measurement uncertainty ≤ ± 0.53 %
Hopping Frequency Separation: Measurement uncertainty ≤ ± 1.74 %
6dB Bandwidth: Measurement uncertainty ≤ ± 1.14 %
Occupied Channel Bandwidth: Measurement uncertainty ≤ ± 1.40 %
Conducted Band-edge spurious emissions: Measurement uncertainty ≤ ± 1.76 dB

# Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").

2. The sample consists of a Connected Instrumentation Cluster for Motorcycles.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

# Usage of samples

Samples undergoing test have been selected by: The client.

| Id | Control Number | Description | Model | Serial No. | Date of Reception | Application |
|---|---|---|---|---|---|---|
| S/01 | 72976B_3.1 | Cluster | ICC65V2 | -- | 2022-08-18 | Equipment Under Test |
| S/01 | 72976B_41.1 | Device control Box | -- | -- | 2022-08-18 | Auxiliary Equipment |
| S/01 | 72976B_42.1 | Can-Adapter | -- | -- | 2022-08-18 | Auxiliary Equipment |
| S/02 | 72976B_1.1 | Cluster | ICC65V2 | -- | 2022-08-18 | Equipment Under Test |
| S/02 | 72976B_41.1 | Control device Box | -- | -- | 2022-08-18 | Auxiliary Equipment |
| S/02 | 72976B_42.1 | Can-Adapter | -- | -- | 2022-08-18 | Auxiliary Equipment |

Notes referenced to samples during the project:

| Id | Type |
|---|---|
| S/01 | Sample used for Conducted tests. |
| S/02 | Sample used for Radiated tests. |

# Test sample description

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ports…… : | Port name and description | Cable | | | | | |
| | | Specified max length [m] | Attached during test | Shielded | Coupled to patient(3) | | |
| | ..... | ..... | [ ] | [ ] | [ ] | | |
| | ..... | ..... | [ ] | [ ] | [ ] | | |
| | ..... | ..... | [ ] | [ ] | [ ] | | |
| | ..... | ..... | [ ] | [ ] | [ ] | | |
| | ..... | ..... | [ ] | [ ] | [ ] | | |
| | ..... | ..... | [ ] | [ ] | [ ] | | |
| Supplementary information to the ports…… : | ..... | | | | | | |
| Rated power supply .....: | Voltage and Frequency | | Reference poles | | | | |
| | | | L1 | L2 | L3 | N | PE |
| | [ ] | AC: ..... | [ ] | [ ] | [ ] | [ ] | [ ] |
| | [ ] | AC: ..... | [ ] | [ ] | [ ] | [ ] | [ ] |
| | [X] | DC: 9-18V. Nominal 13Vdc by vehicle battery. | | | | | |
| | [ ] | DC: ..... | | | | | |
| Rated Power .....: | ..... | | | | | | |
| Clock frequencies.....: | ..... | | | | | | |
| Other parameters .....: | ..... | | | | | | |
| Software version .....: | 124.008.005 | | | | | | |
| Hardware version .....: | HW20.04 | | | | | | |
| Dimensions in cm (W x H x D) ....: | ..... | | | | | | |
| Mounting position .....: | [ ] | Table top equipment | | | | | |
| | [ ] | Wall/Ceiling mounted equipment | | | | | |
| | [ ] | Floor standing equipment | | | | | |
| | [ ] | Hand-held equipment | | | | | |
| | [X] | Other: Cluster in the motorcycle | | | | | |
| Modules/parts.....: | Module/parts of test item | | Type | Manufacturer | | | |
| | UGKZ7A2001A | | integrated | ALPS | | | |
| | UGXZE-304A | | integrated | ALPS | | | |
| | ..... | | ..... | ..... | | | |
| | ..... | | ..... | ..... | | | |
| Accessories (not part of the test item) .....: | Description | | Type | Manufacturer | | | |
| | ..... | | ..... | ..... | | | |
| | ..... | | ..... | ..... | | | |
| | ..... | | ..... | ..... | | | |
| | ..... | | ..... | ..... | | | |

| Documents as provided by the applicant.....: | Description | File name | Issue date |
|---|---|---|---|
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |
| | ..... | ..... | ..... |

(3) Only for Medical Equipment

# Identification of the client

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

# Testing period and place

| | |
|---|---|
| **Test Location** | DEKRA Testing and Certification S.A.U. |
| **Date (start)** | 2022-09-07 |
| **Date (finish)** | 2022-09-19 |

# Document history

| Report number | Date | Description |
|---|---|---|
| 72976RRF.001 | 2022-12-15 | First release. |
| 72976RRF.001A1 | 2023-02-16 | Second release. Inclusion of SW Version. This modification of test report cancels and replaces the test report 72976RRF.001. |

# Environmental conditions

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

| | |
|---|---|
| **Temperature** | Min. = 15 ºC<br>Max. = 35 ºC |
| **Relative humidity** | Min. = 20 %<br>Max. = 75 % |

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

| | |
|---|---|
| **Temperature** | Min. = 15 ºC<br>Max. = 35 ºC |
| **Relative humidity** | Min. = 20 %<br>Max. = 75 % |

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

| | |
|---|---|
| **Temperature** | Min. = 15 ºC<br>Max. = 35 ºC |
| **Relative humidity** | Min. = 20 %<br>Max. = 75 % |

# Remarks and comments

The tests have been performed by the technical personnel: Alfonso Gutiérrez Martínez and Rafael Fernández Martín.

Used instrumentation:

| Control No. | Equipment | Model | Manufacturer | Next Calibration |
|---|---|---|---|---|
| 6793 | SHIELDED ROOM | S101 | ETS LINDGREN | -- |
| 7445 | DC POWER SUPPLY 30V/5A | U8002A | KEYSIGHT TECHNOLOGIES | -- |
| 7760 | DIGITAL MULTIMETER | 175 | FLUKE | 2022-11-04 |
| 6165 | EMI TEST RECEIVER 9kHz-7GHz | ESR7 | ROHDE AND SCHWARZ | 2023-11-08 |
| 4611 | HORN ANTENNA 1-18GHz | BBHA 9120 D | SCHWARZBECK MESS-ELEKTRONIK | 2022-11-18 |
| 4657 | HORN ANTENNA 18-40GHz | BBHA 9170 | SCHWARZBECK | 2023-05-05 |
| 4578 | HYBRID BILOG ANTENNA 30MHz-6GHz | 3142E | ETS LINDGREN | 2023-04-30 |
| 8848 | OPEN SWITCH UNIT UP TO 7.5 GHz | OSP-B157W8 PLUS | ROHDE & SCHWARZ | 2023-08-20 |
| 0922 | POWER SUPPLY DC 40 V / 40 A | NGPE 40/40 | ROHDE AND SCHWARZ | -- |
| 7862 | PRE-AMPLIFIER G>30dB 17-40GHz | BLMA 1840-3G | BONN ELEKTRONIK | 2023-02-15 |
| 5705 | PRE-AMPLIFIER G>40dB 1-18 GHz | BLMA 0118-1M | BONN ELEKTRONIK | 2023-07-21 |
| 6144 | PRE-AMPLIFIER G>40dB 10MHz-6GHz | BLNA 0160-01N | BONN ELEKTRONIK | 2023-03-17 |
| 4825 | SEMIANECHOIC ABSORBER LINED CHAMBER | FACT 3 200 STP | ETS LINDGREN | -- |
| 4826 | SHIELDED ROOM | S101 | ETS LINDGREN | -- |
| 7794 | SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz | FSV40 | ROHDE AND SCHWARZ | 2023-02-26 |
| 4716 | SIGNAL AND SPECTRUM ANALYZER 2Hz-50GHz | FSW50 | ROHDE AND SCHWARZ | 2024-08-12 |
| 4848 | SOFTWARE FOR EMC/RF TESTING | EMC32 | ROHDE AND SCHWARZ | -- |
| 7798 | SOFTWARE FOR RF TESTING | WMS32 | ROHDE AND SCHWARZ | -- |

# Testing verdicts

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

# Summary

## 1. Bluetooth EDR. Appendixes A and B

| Requirement – Test case | FCC PART 15 / RSS-247 | Verdict | Remark |
|---|---|---|---|
| FCC 15.247 (a) (1) 20 dB Bandwidth and Carrier frequency separation | | P | -- |
| FCC 15.247 (a) (1) (iii) Time of Occupancy (Dwell Time) | | P | -- |
| FCC 15.247 (b) Maximum peak output power and antenna gain | | P | -- |
| FCC 15.247 (a) (1) (iii) Number of hopping channels | | P | -- |
| FCC 15.247 (d) Band-edge emissions compliance (Transmitter) | | P | -- |
| FCC 15.247 (d) Emission limitations radiated (Transmitter) | | P | -- |
| Supplementary information and remarks:<br>None. | | | |

## 2. 802.11 b/g/n20 MHz 1x1. Appendix C

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

# **Appendix A:** Test results. Bluetooth EDR. Chipset 1 (BT_0 Antenna)

# INDEX

# TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

| | |
|---|---|
| Vnominal: | 13 Vdc |
| Type of Power Supply: | External Power supply / Battery |

ANTENNA (*):

| | |
|---|---|
| Type of Antenna: | PCB integrated slot antenna |
| Maximum Declared Antenna Gain: | 1.91 dBi |
| • RF Output Port: | 1 (BT_0 Antenna) |

TEST FREQUENCIES (*):

| | |
|---|---|
| Low Channel: | 2402 MHz |
| Middle Channel: | 2441 MHz |
| High Channel: | 2480 MHz |

During transmitter test the EUT was controlled by a SW tool provided by the client to operate in a continuous transmit mode on the test channels as required.

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is connected to the TS8997 using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.


RADIATED MEASUREMENTS:

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

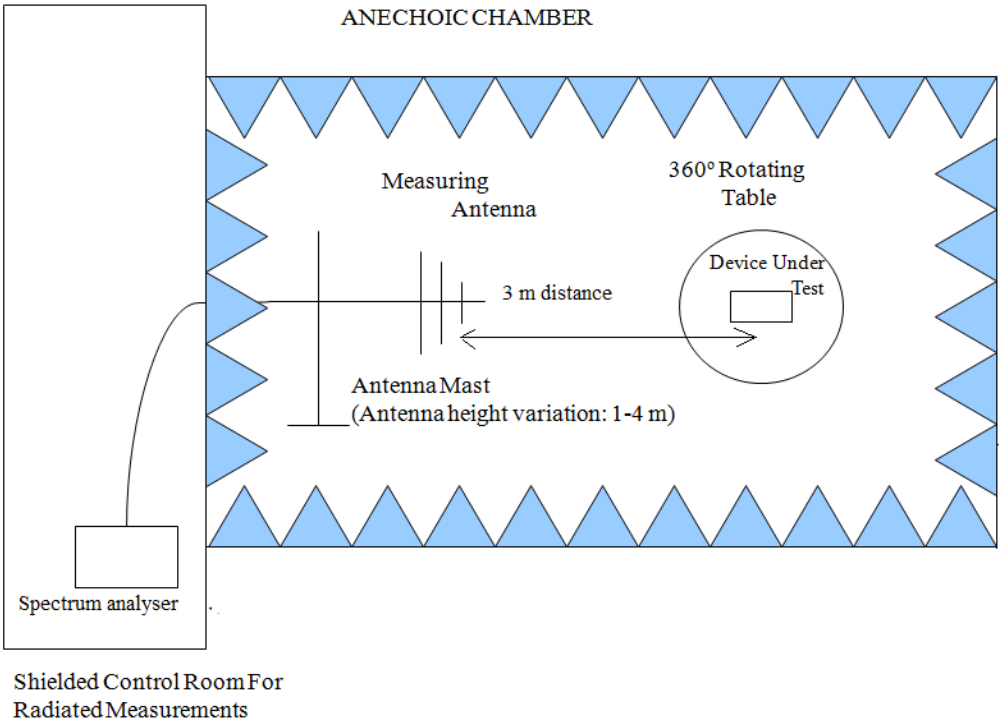
For radiated emissions in the range 17 GHz-26 GHz performed at a distance closer than the distance specified in the standard, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and its situation and orientation were varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters (up to 17 GHz) to find the maximum radiated emission.

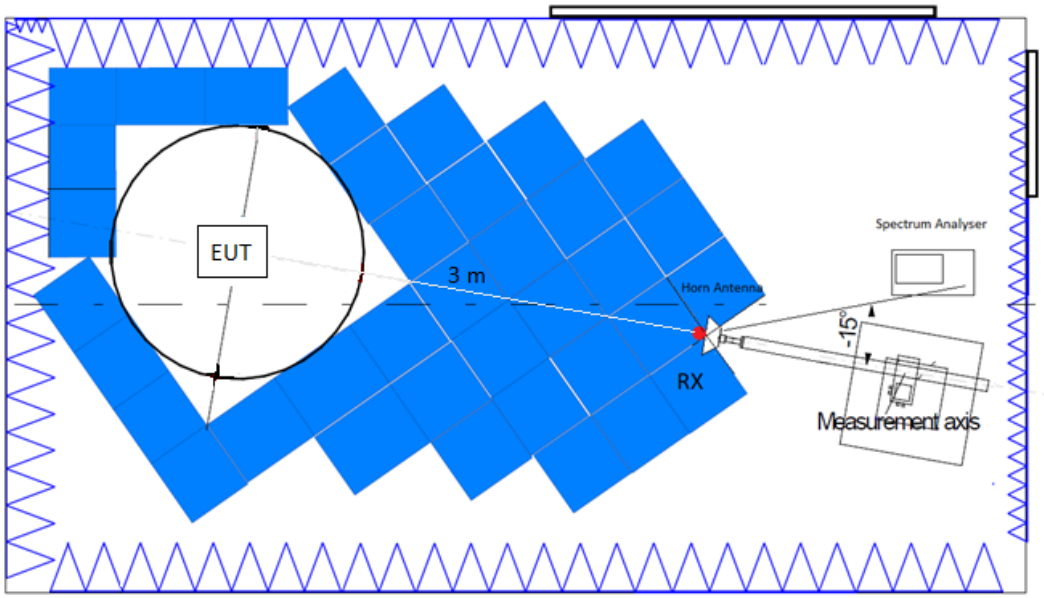
Measurements were made in both horizontal and vertical planes of polarization.

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

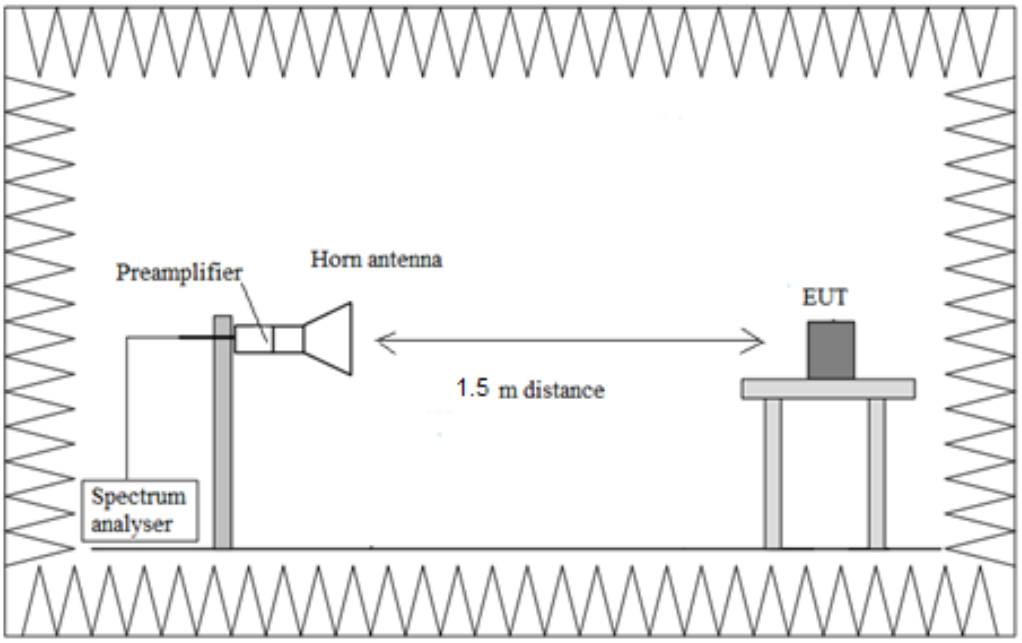
Radiated measurements setup from 30 MHz to 1 GHz:




Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup f > 17 GHz:



# TEST CASES DETAILS

## FCC 47 CFR Part 15.247 / RSS-247

## 99dBw Occupied Channel Bandwidth 99%

***Results***

Modulation: BT (GFSK 1-DH5)

| Freq (MHz) | Equipment | BW (MHz) | # of Tx Chains | Port | Occ Ch BW (MHz) |
|---|---|---|---|---|---|
| 2402.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 0.860 |
| 2441.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 0.860 |
| 2480.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 0.860 |

Modulation: BT (Pi/4 DQPSK 2-DH5)

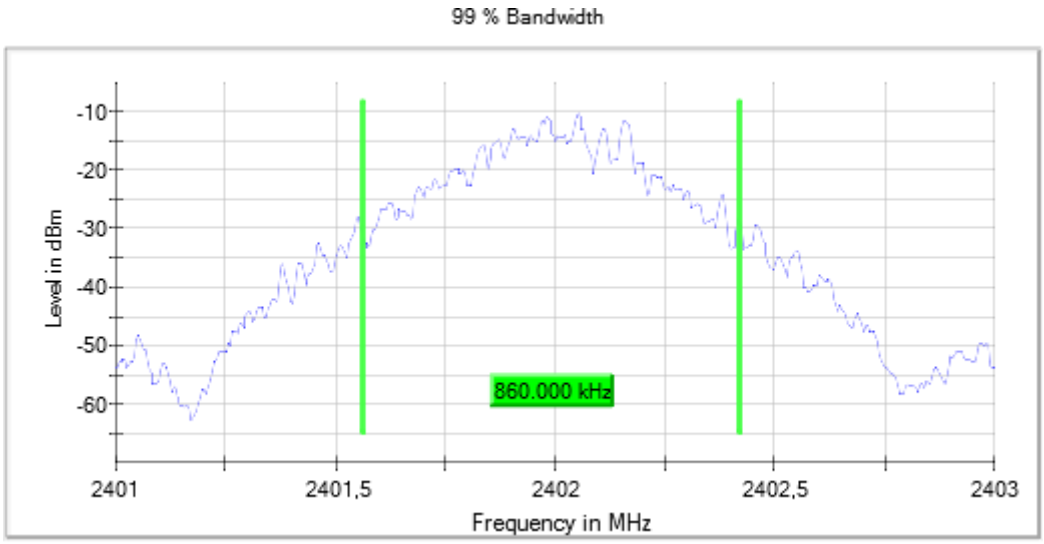
| Freq (MHz) | Equipment | BW (MHz) | # of Tx Chains | Port | Occ Ch BW (MHz) |
|---|---|---|---|---|---|
| 2402.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.170 |
| 2441.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.165 |
| 2480.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.165 |

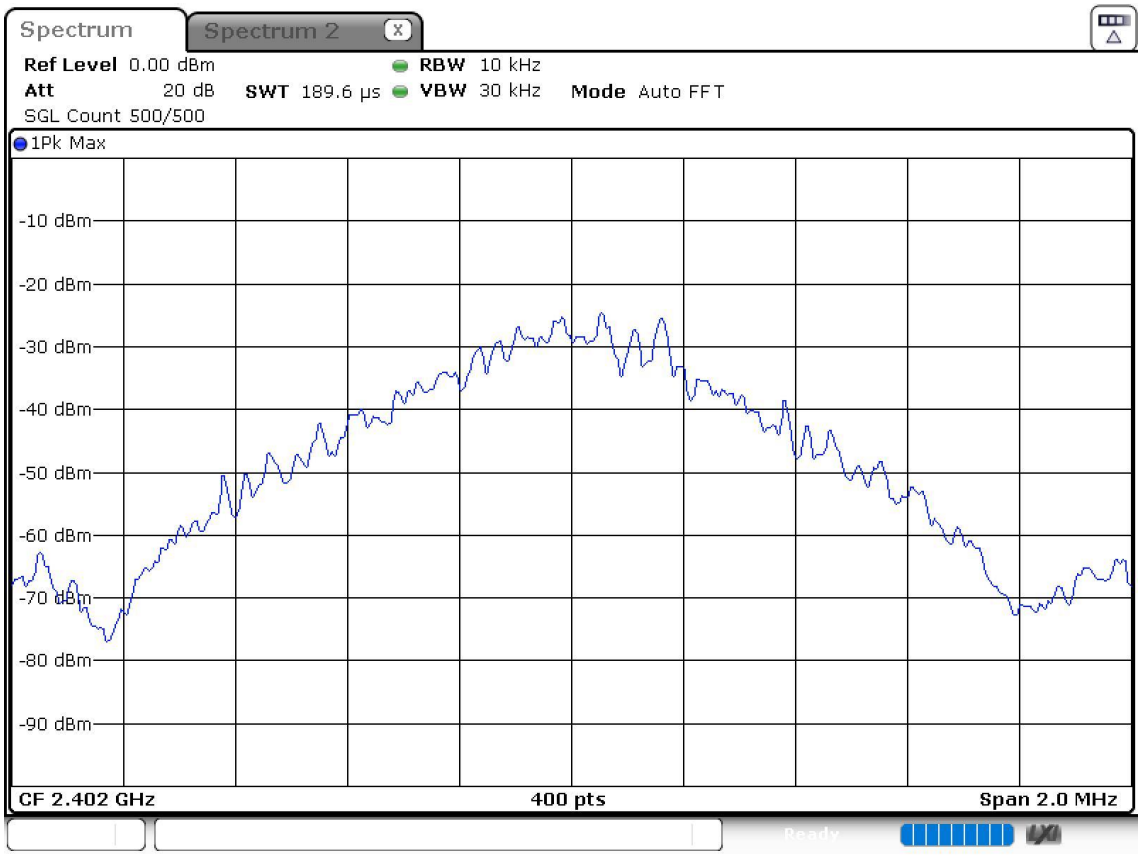
Modulation: BT (8DPSK 3-DH5)

| Freq (MHz) | Equipment | BW (MHz) | # of Tx Chains | Port | Occ Ch BW (MHz) |
|---|---|---|---|---|---|
| 2402.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.170 |
| 2441.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.170 |
| 2480.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.170 |

**Frequency (MHz) = 2402.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (GFSK 1-DH5), Number of Transmission Chains = 1, Active Port: 1**

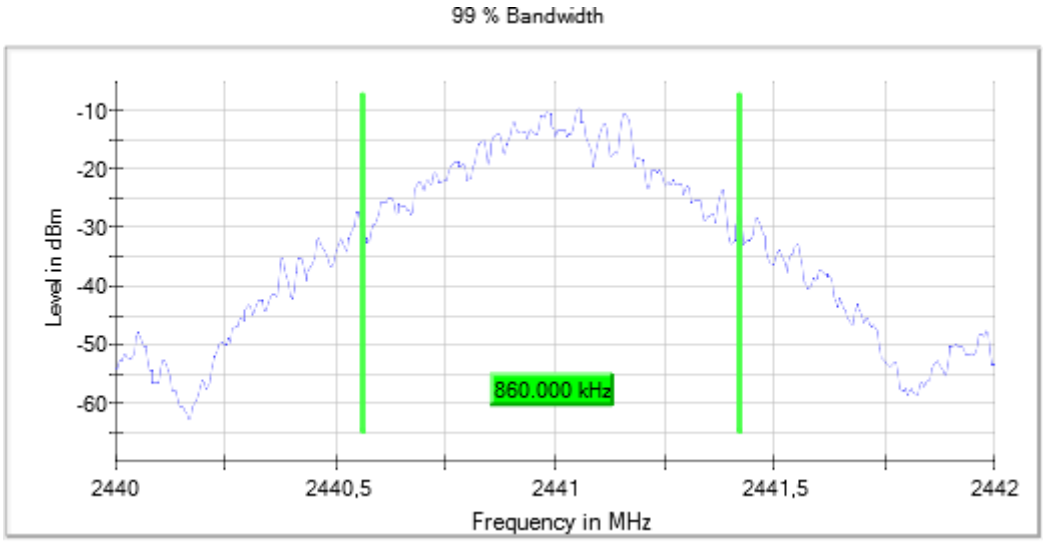
**Plots:**

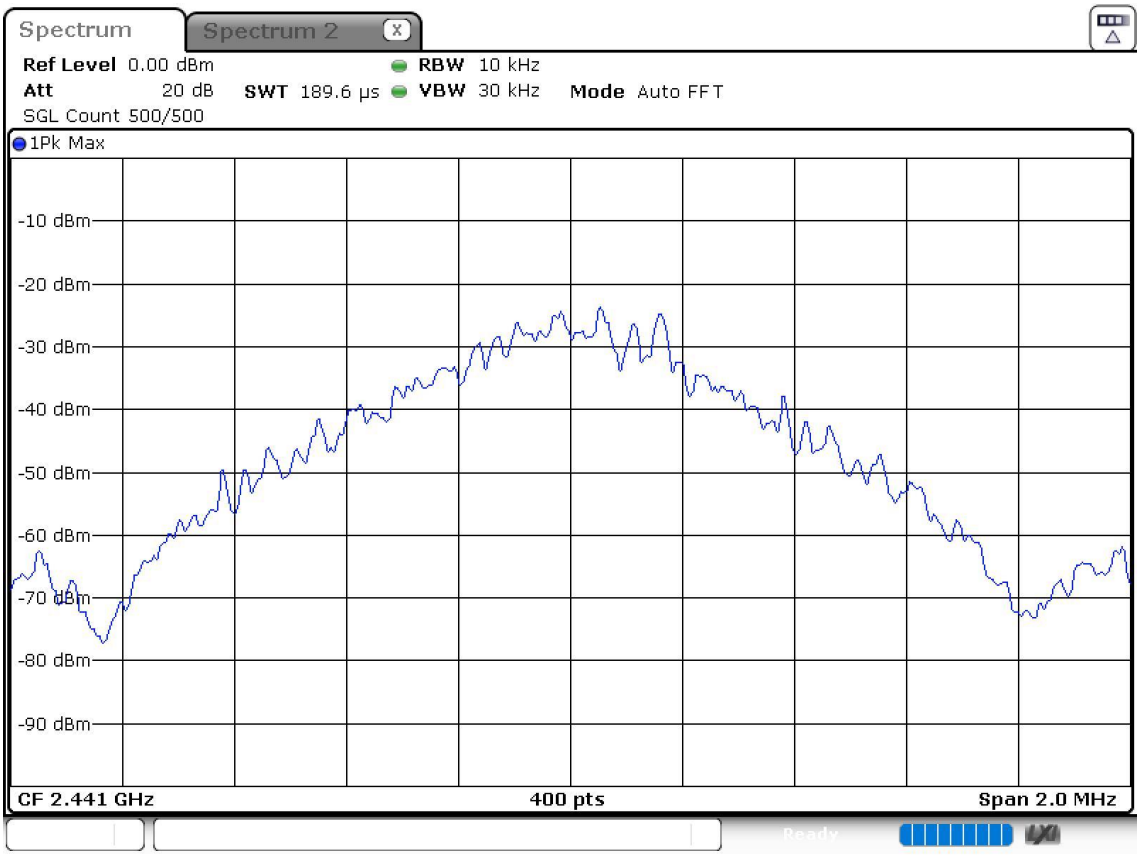


**Frequency (MHz) = 2441.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (GFSK 1-DH5), Number of Transmission Chains = 1, Active Port: 1**

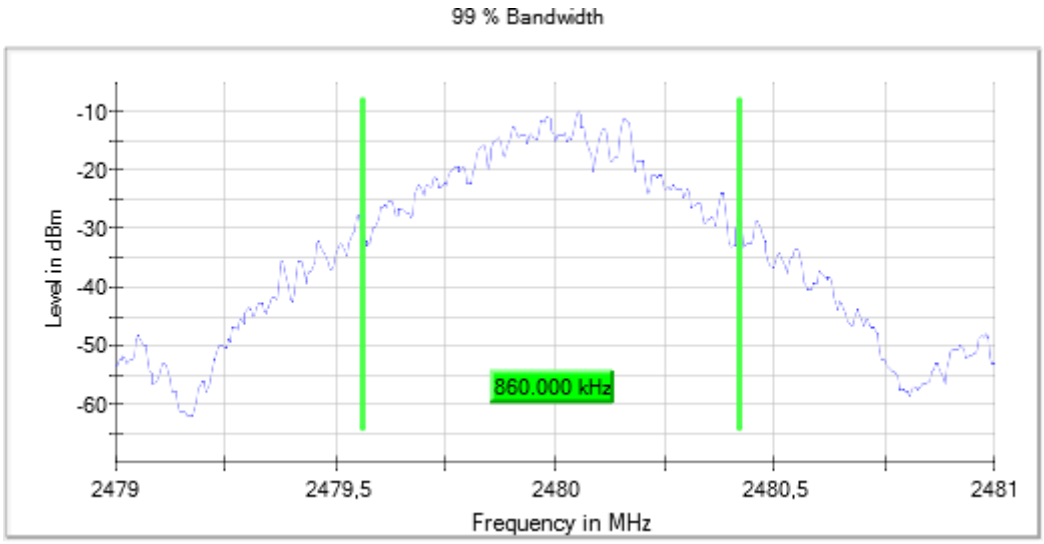
**Plots:**

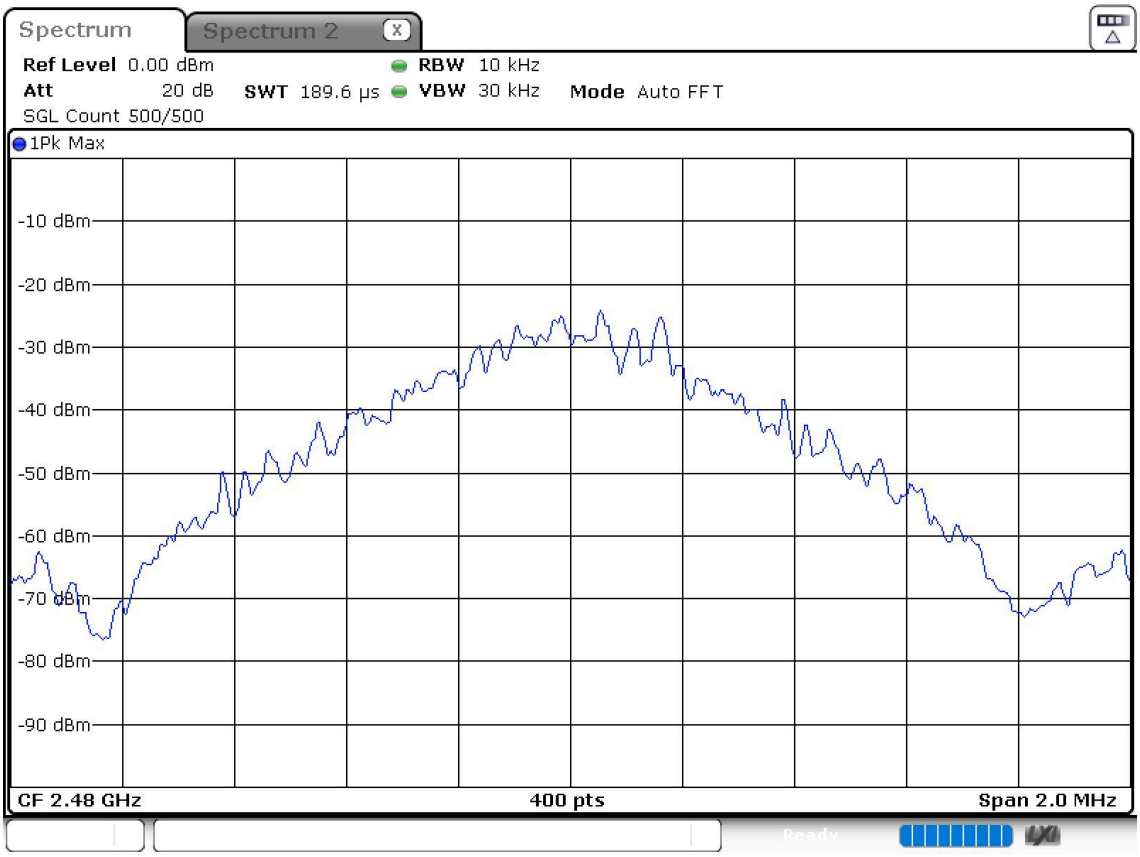


**Frequency (MHz) = 2480.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (GFSK 1-DH5), Number of Transmission Chains = 1, Active Port: 1**

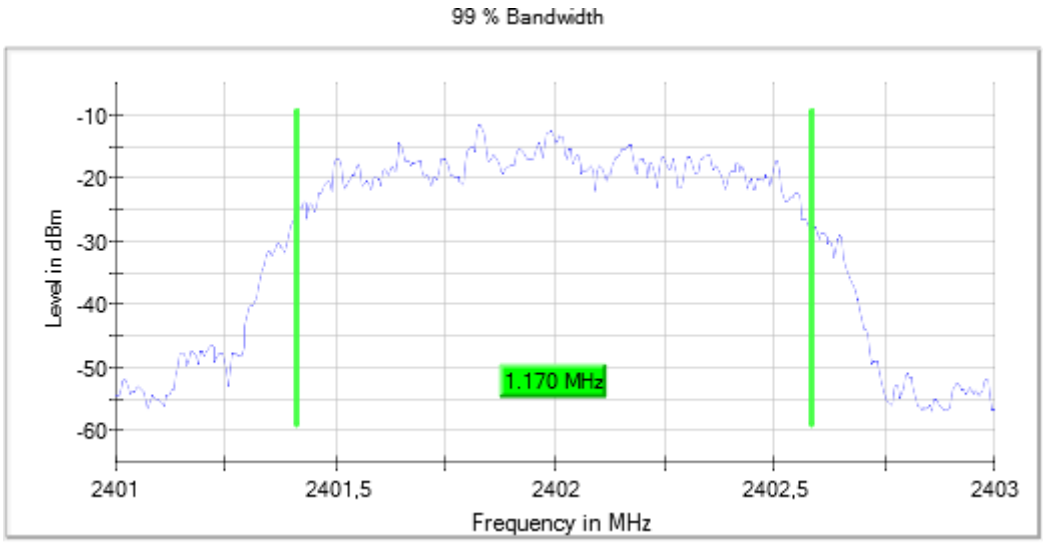
**Plots:**

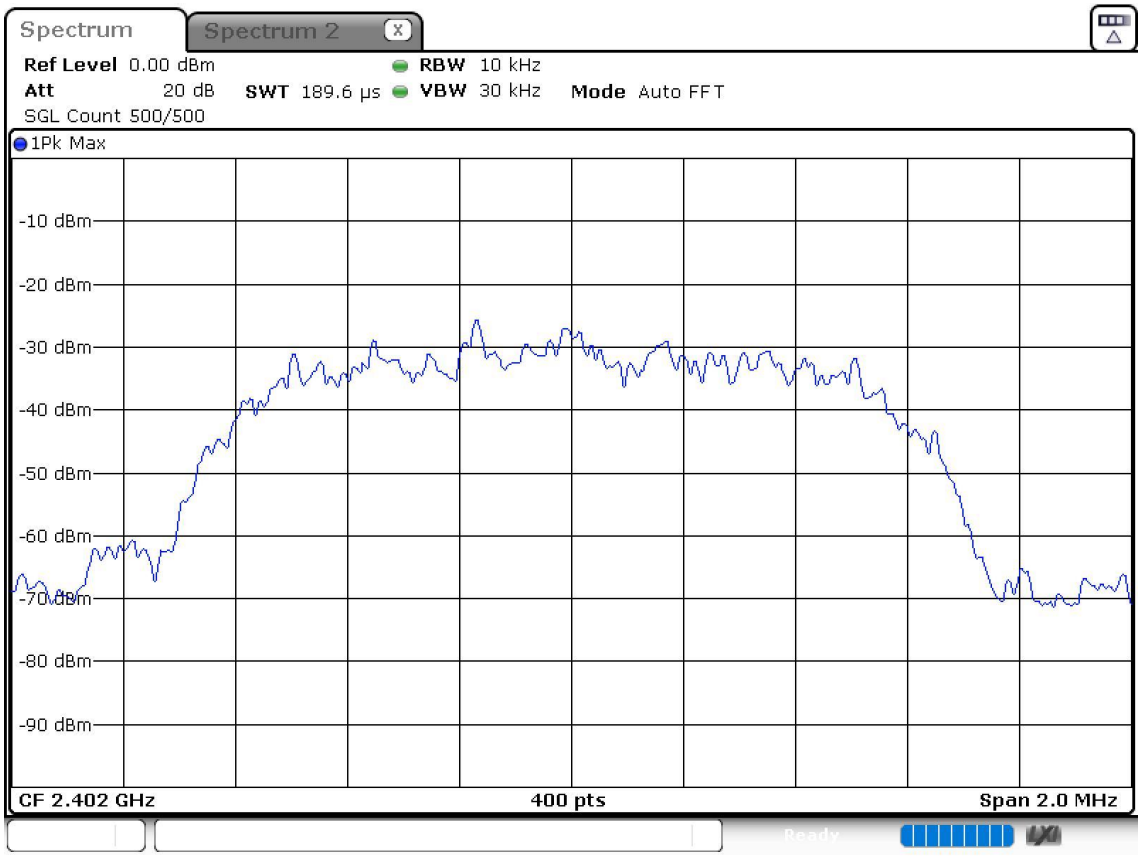


**Frequency (MHz) = 2402.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (Pi/4 DQPSK 2-DH5), Number of Transmission Chains = 1, Active Port: 1**

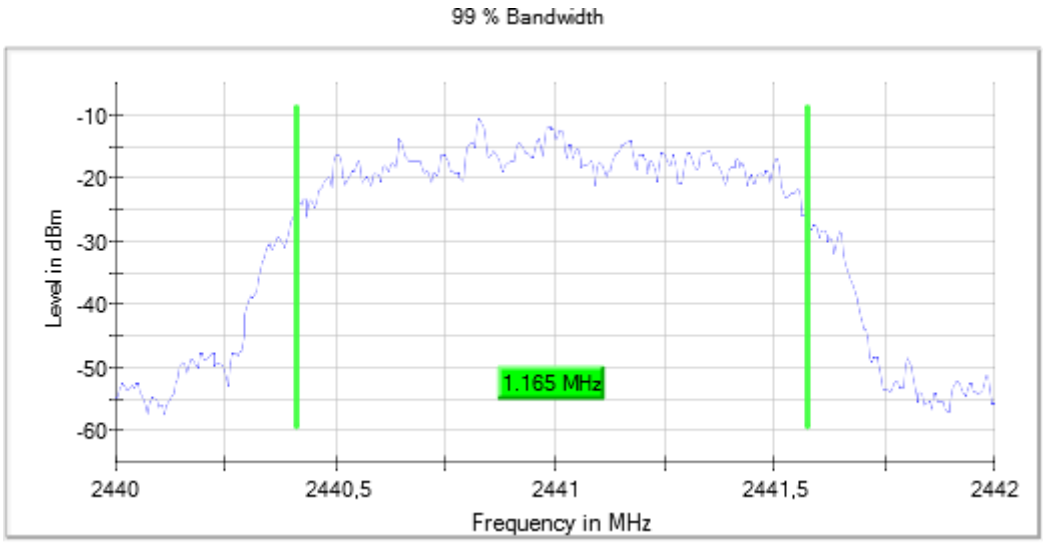
**Plots:**

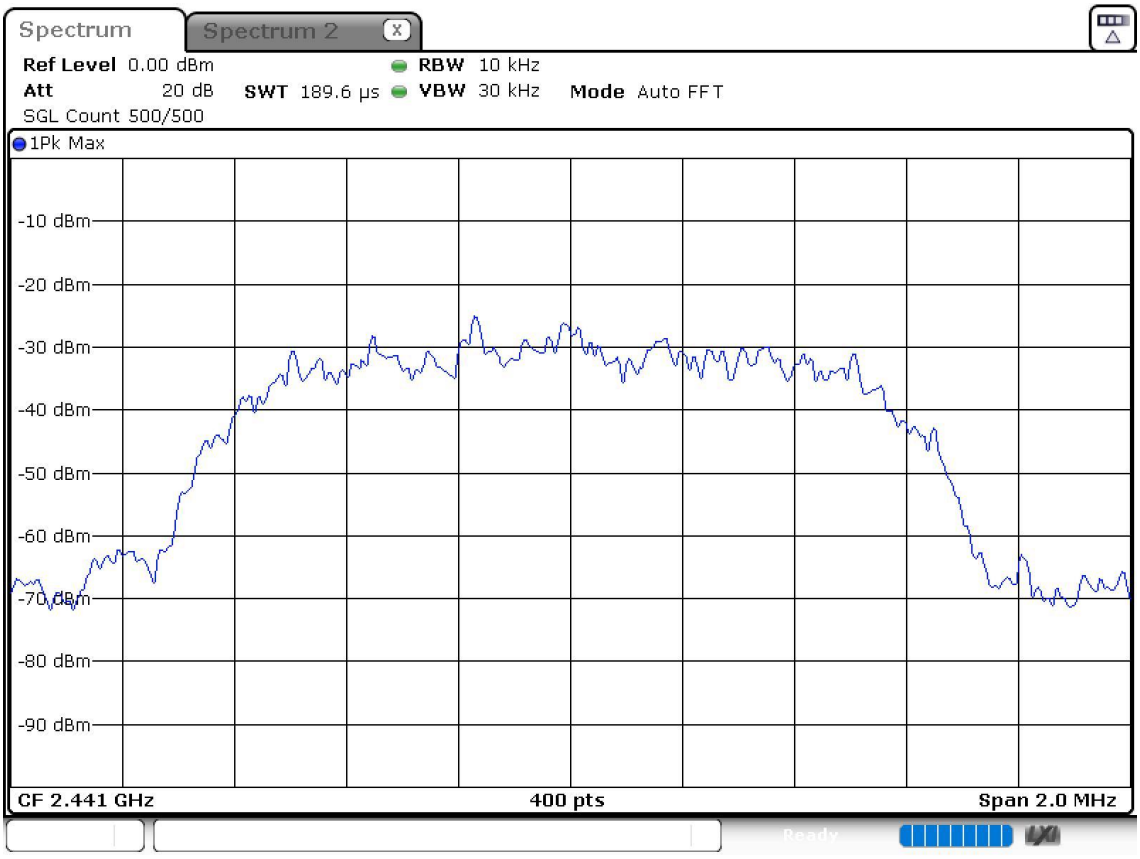


**Frequency (MHz) = 2441.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (Pi/4 DQPSK 2-DH5), Number of Transmission Chains = 1, Active Port: 1**

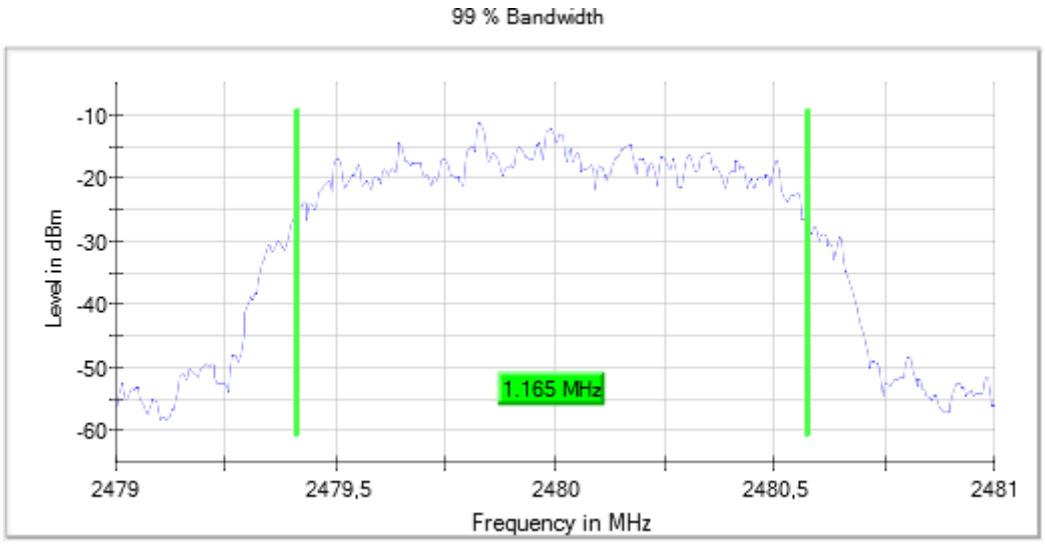
**Plots:**

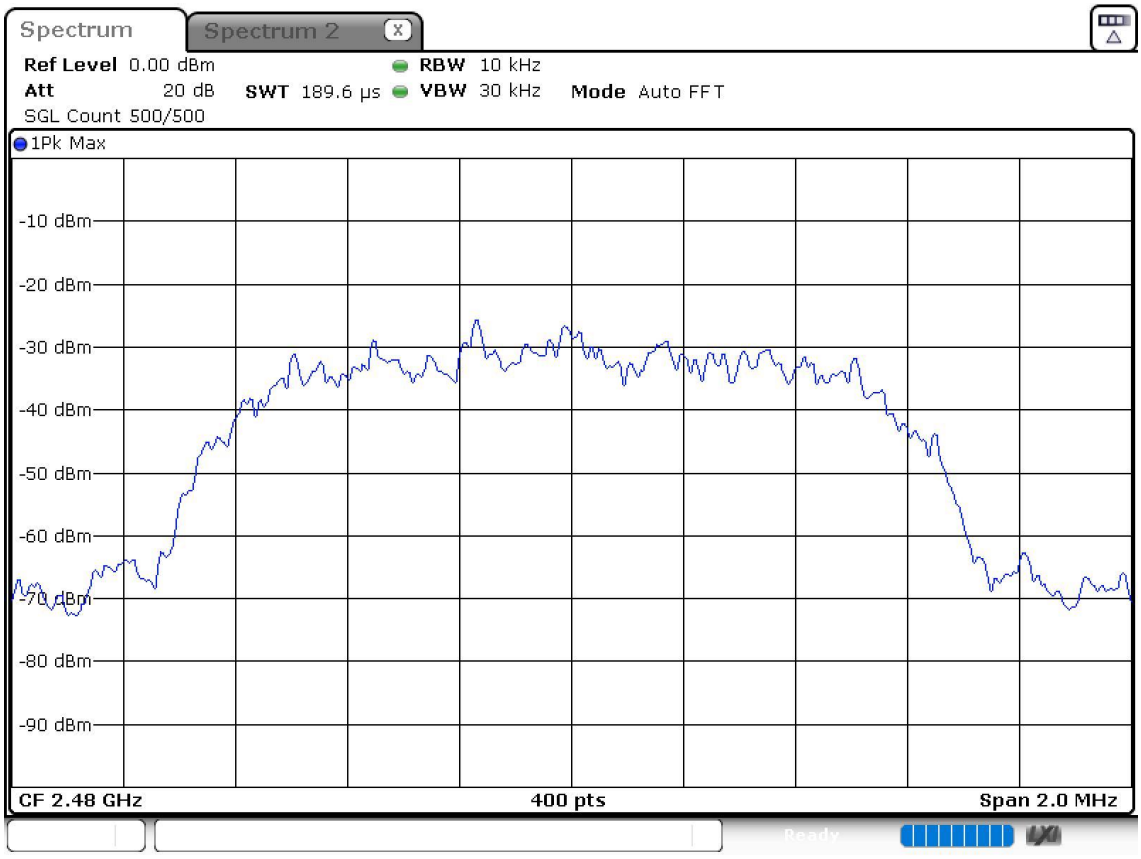


**Frequency (MHz) = 2480.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (Pi/4 DQPSK 2-DH5), Number of Transmission Chains = 1, Active Port: 1**

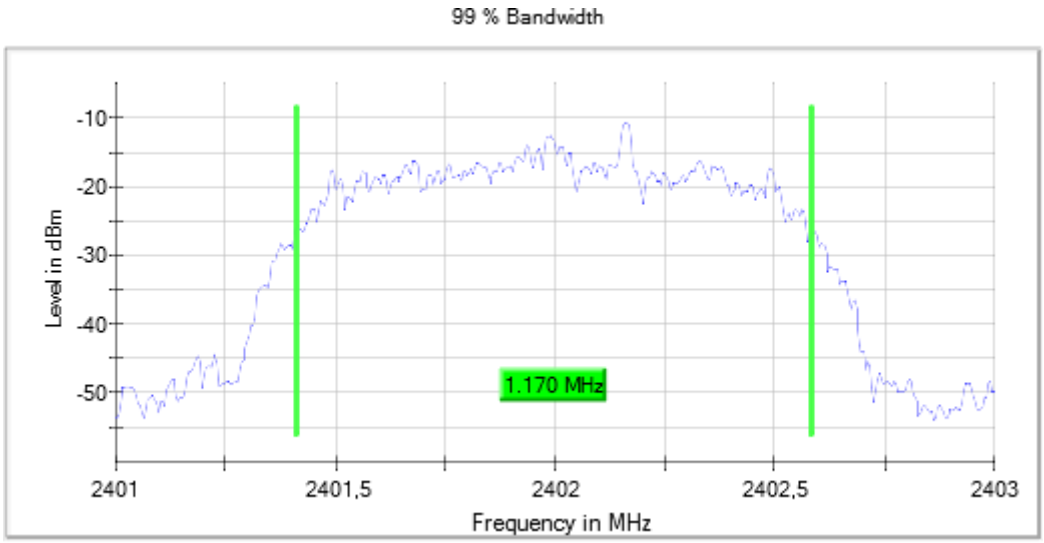
**Plots:**

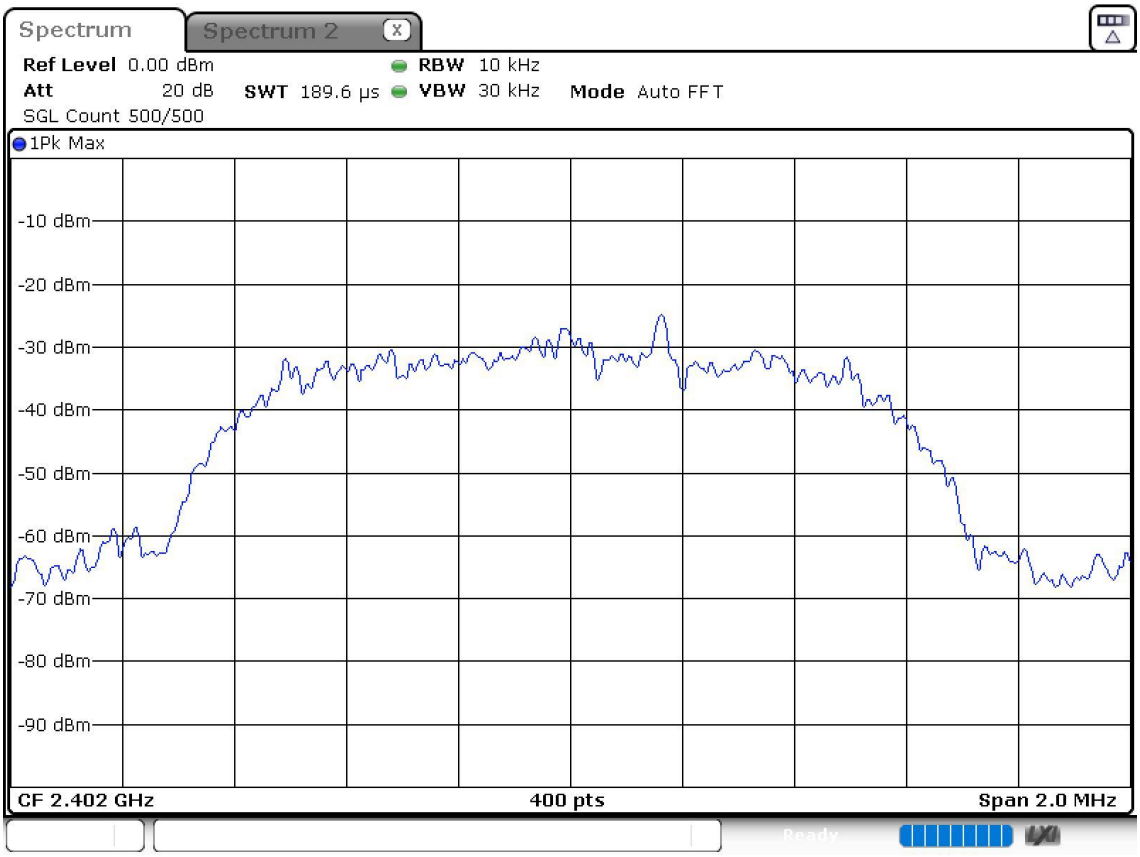


**Frequency (MHz) = 2402.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (8DPSK 3-DH5), Number of Transmission Chains = 1, Active Port: 1**

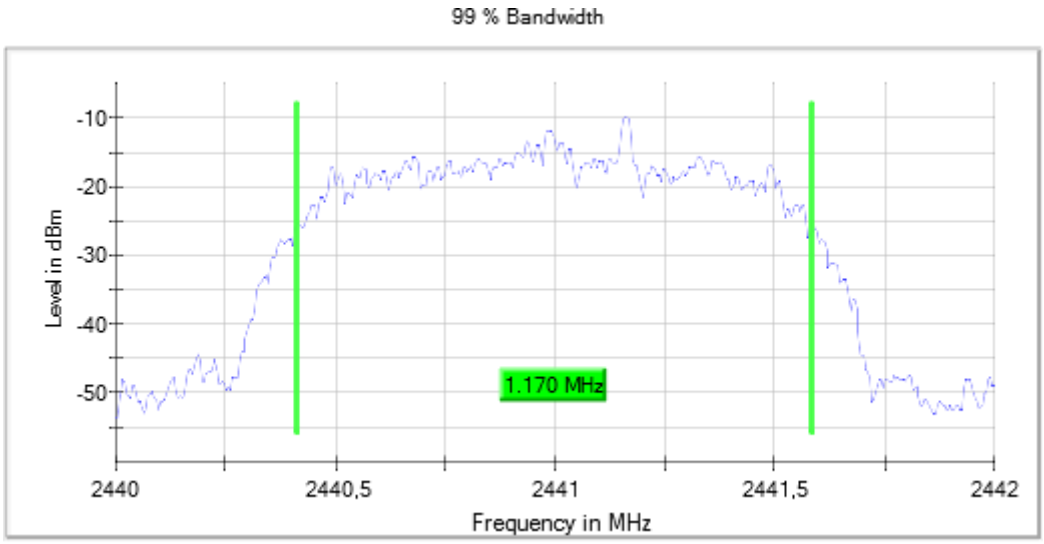
**Plots:**

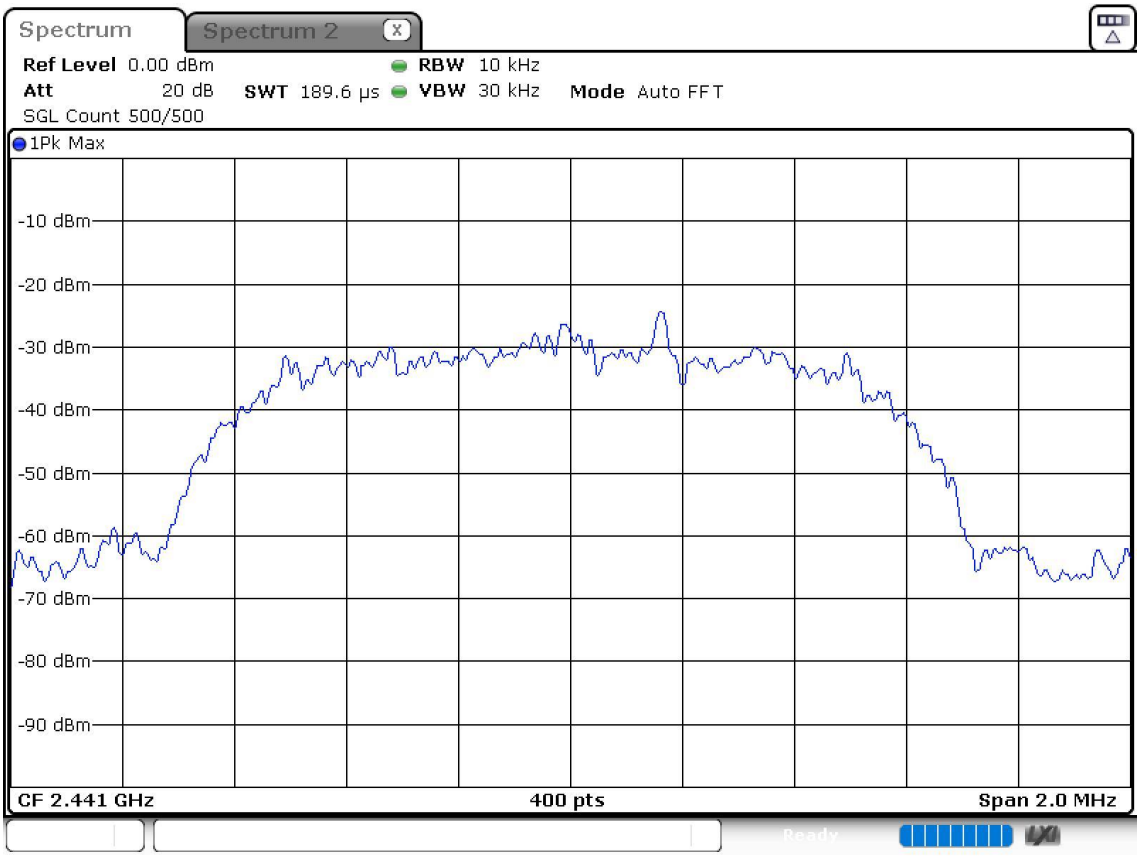


**Frequency (MHz) = 2441.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (8DPSK 3-DH5), Number of Transmission Chains = 1, Active Port: 1**

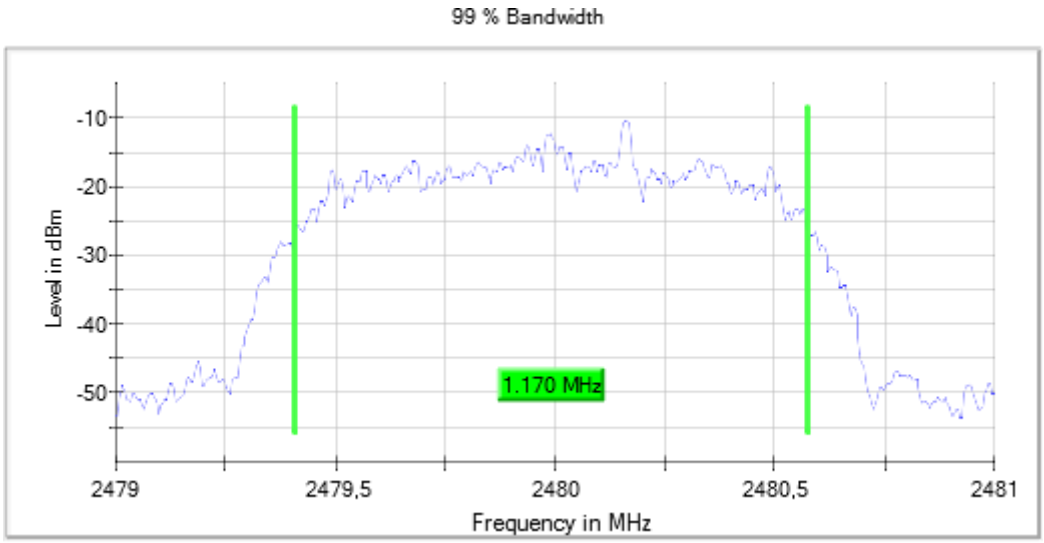
**Plots:**

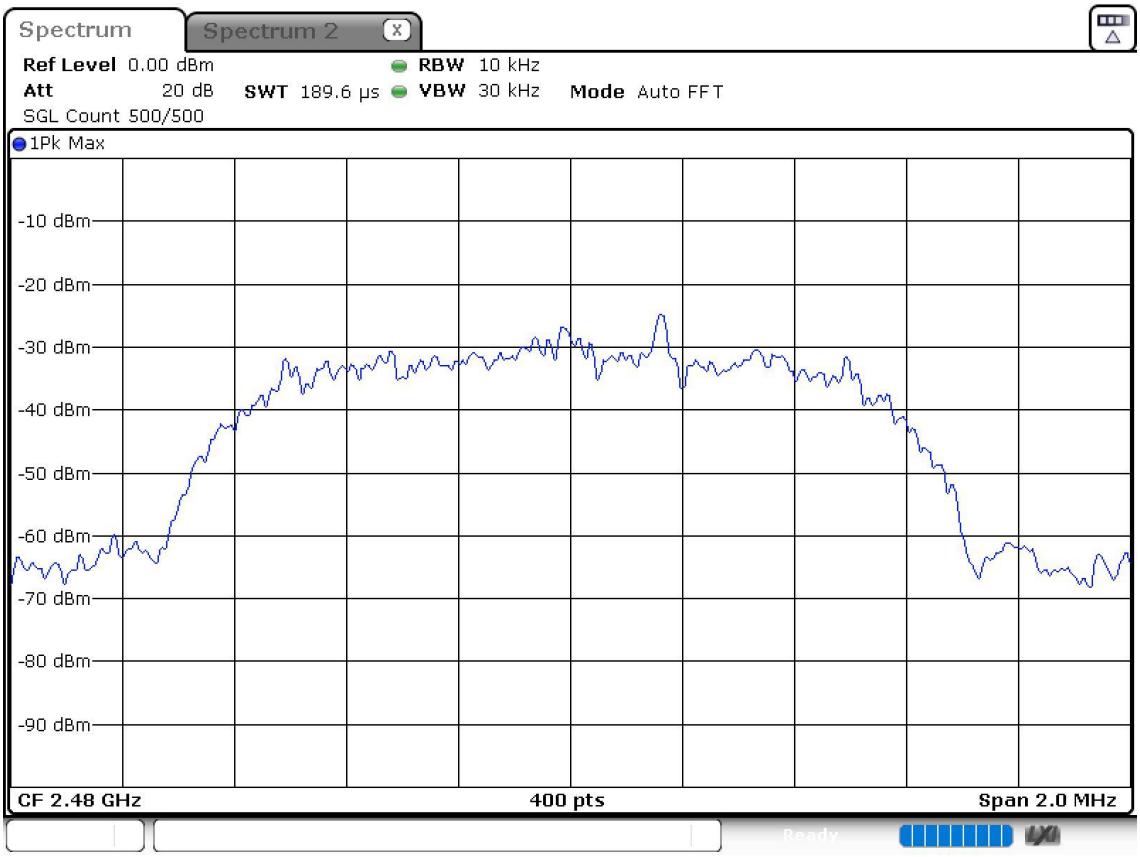


**Frequency (MHz) = 2480.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (8DPSK 3-DH5), Number of Transmission Chains = 1, Active Port: 1**

**Plots:**



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

***Results***

Modulation: BT (GFSK 1-DH5)

| Freq (MHz) | Equipment | BW (MHz) | # of Tx Chains | Port | 20dB BW (MHz) |
|---|---|---|---|---|---|
| 2402.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 0.930 |
| 2441.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 0.925 |
| 2480.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 0.930 |

Modulation: BT (Pi/4 DQPSK 2-DH5)

| Freq (MHz) | Equipment | BW (MHz) | # of Tx Chains | Port | 20dB BW (MHz) |
|---|---|---|---|---|---|
| 2402.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.300 |
| 2441.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.315 |
| 2480.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.315 |

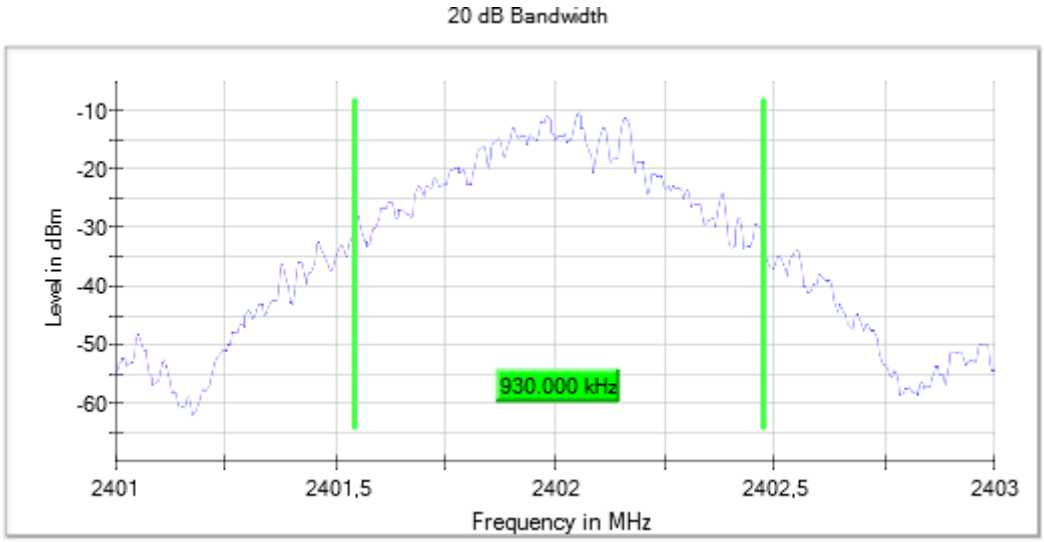
Modulation: BT (8DPSK 3-DH5)

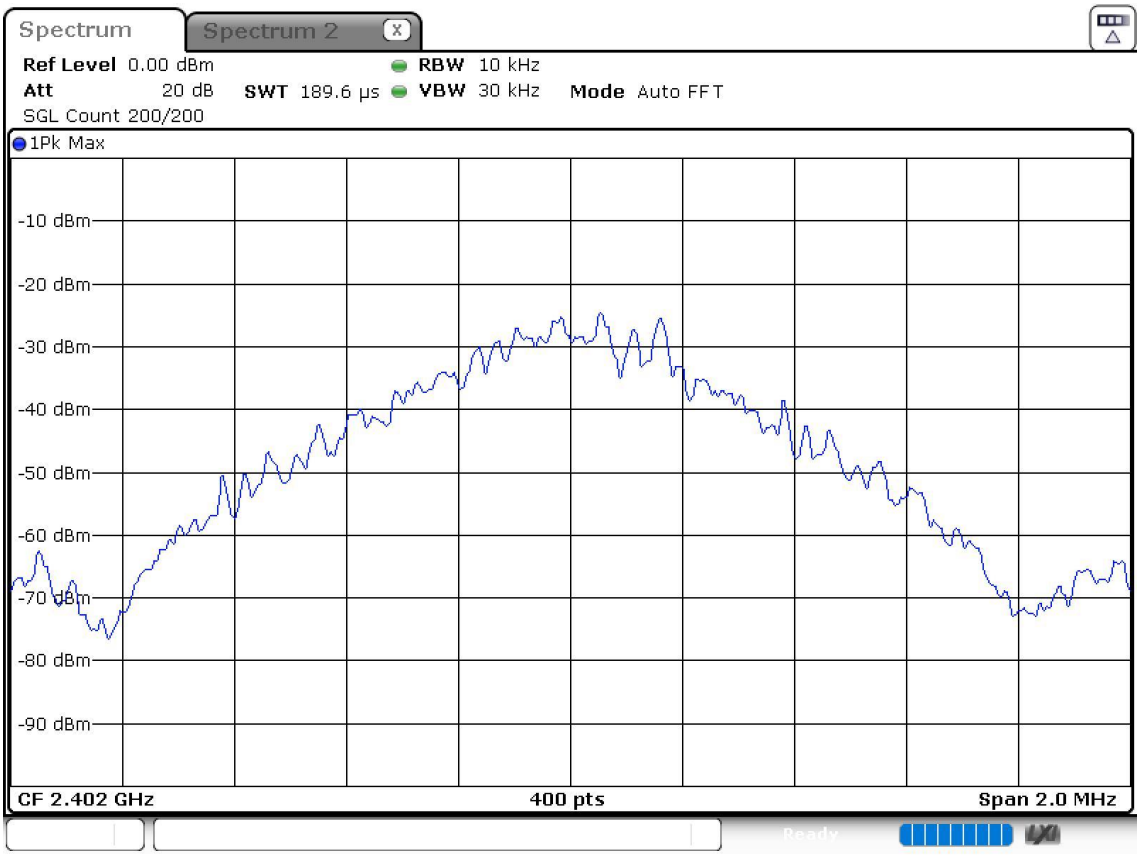
| Freq (MHz) | Equipment | BW (MHz) | # of Tx Chains | Port | 20dB BW (MHz) |
|---|---|---|---|---|---|
| 2402.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.260 |
| 2441.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.260 |
| 2480.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.270 |

### *Attachments*

**Frequency (MHz) = 2402.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (GFSK 1-DH5), Number of Transmission Chains = 1, Active Port: 1**

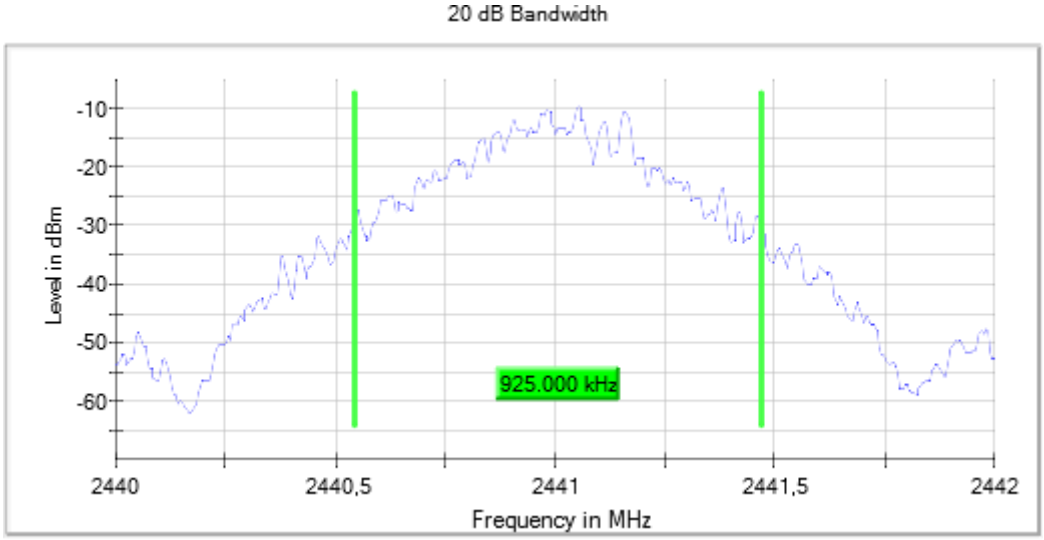
**Plots:**

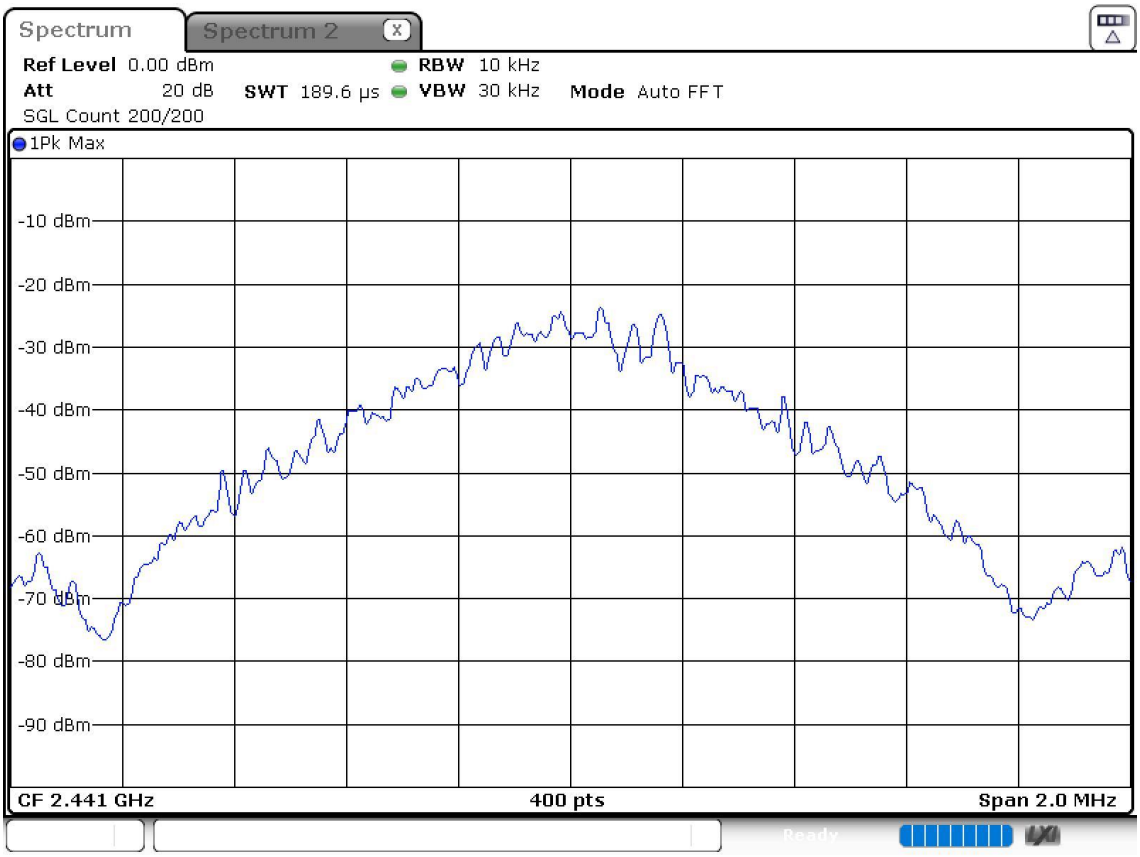


**Frequency (MHz) = 2441.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (GFSK 1-DH5), Number of Transmission Chains = 1, Active Port: 1**

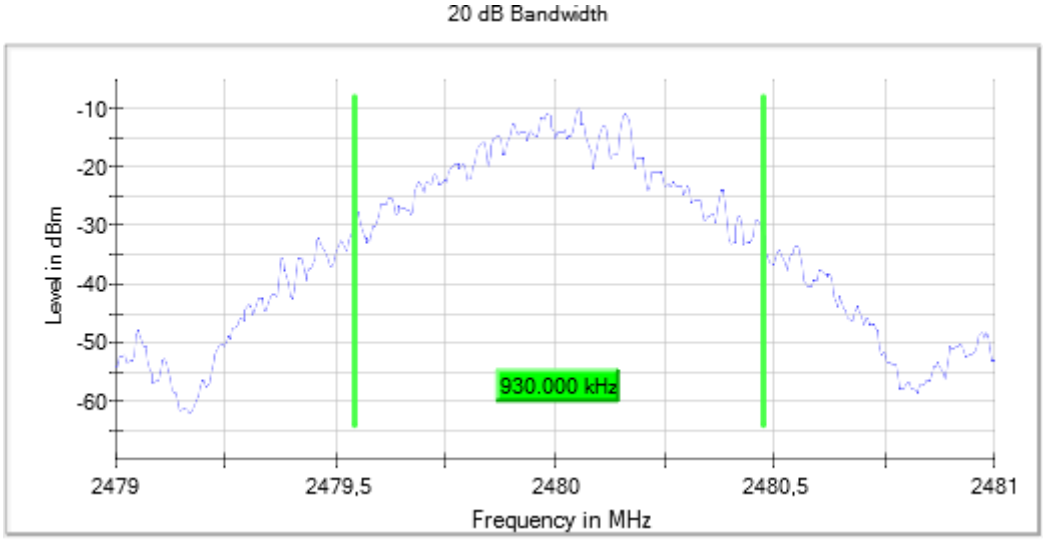
**Plots:**

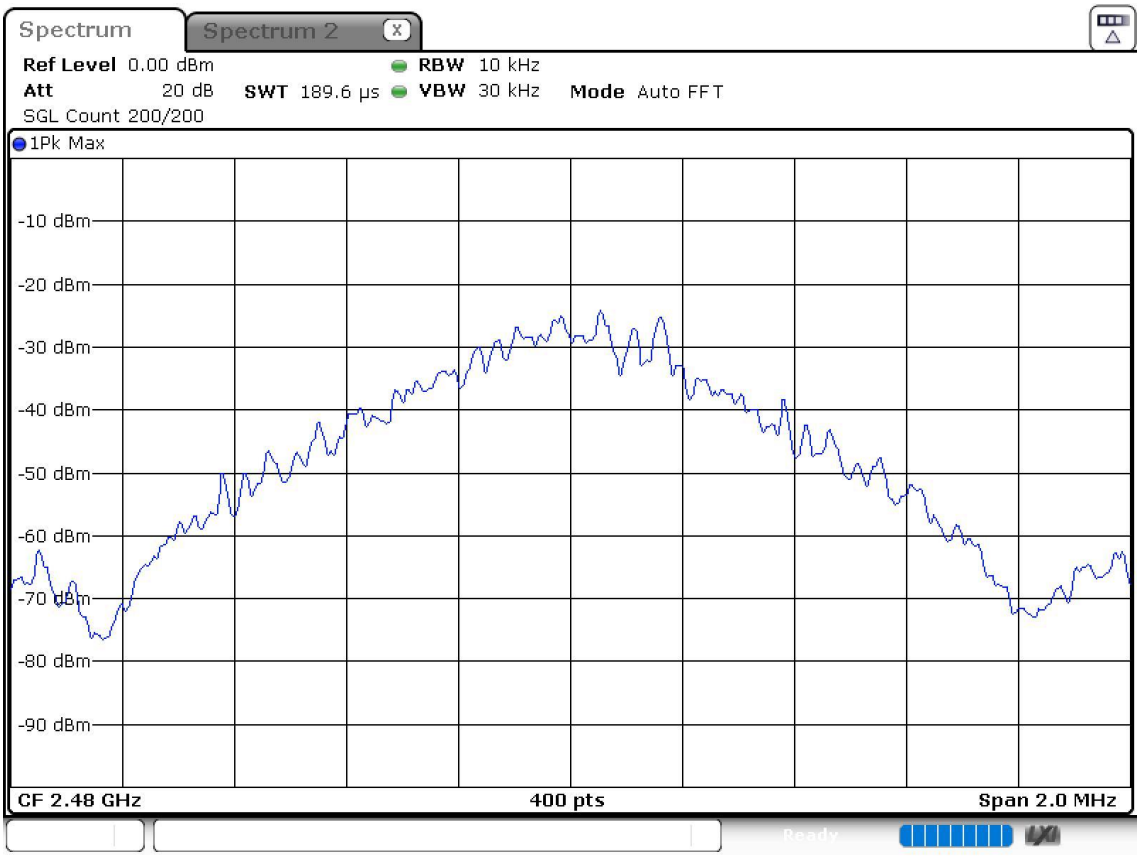


**Frequency (MHz) = 2480.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (GFSK 1-DH5), Number of Transmission Chains = 1, Active Port: 1**

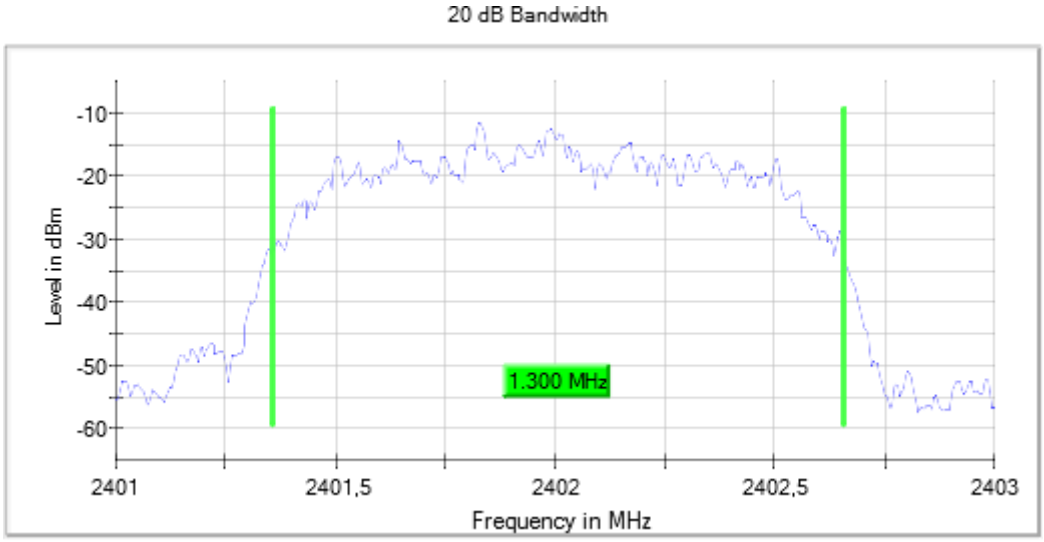
**Plots:**

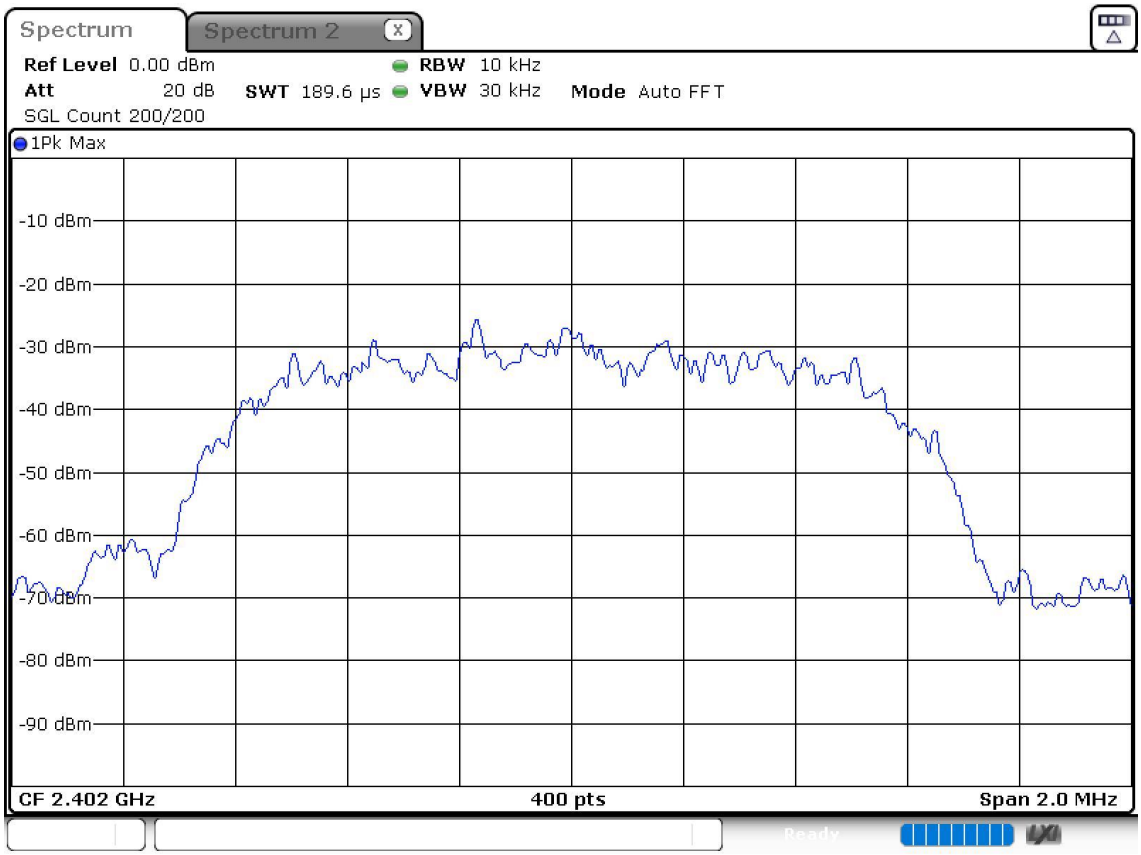


**Frequency (MHz) = 2402.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (Pi/4 DQPSK 2-DH5), Number of Transmission Chains = 1, Active Port: 1**

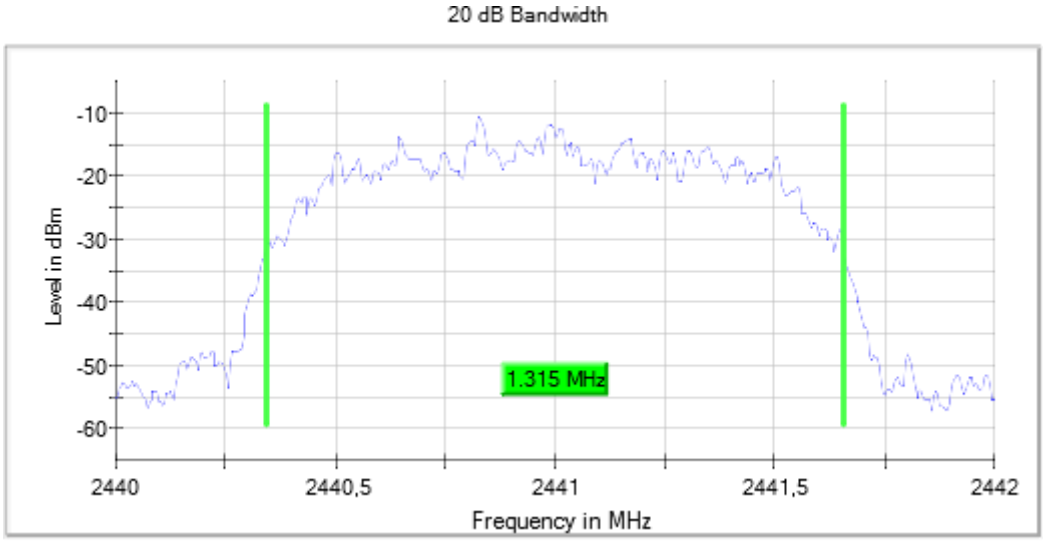
**Plots:**



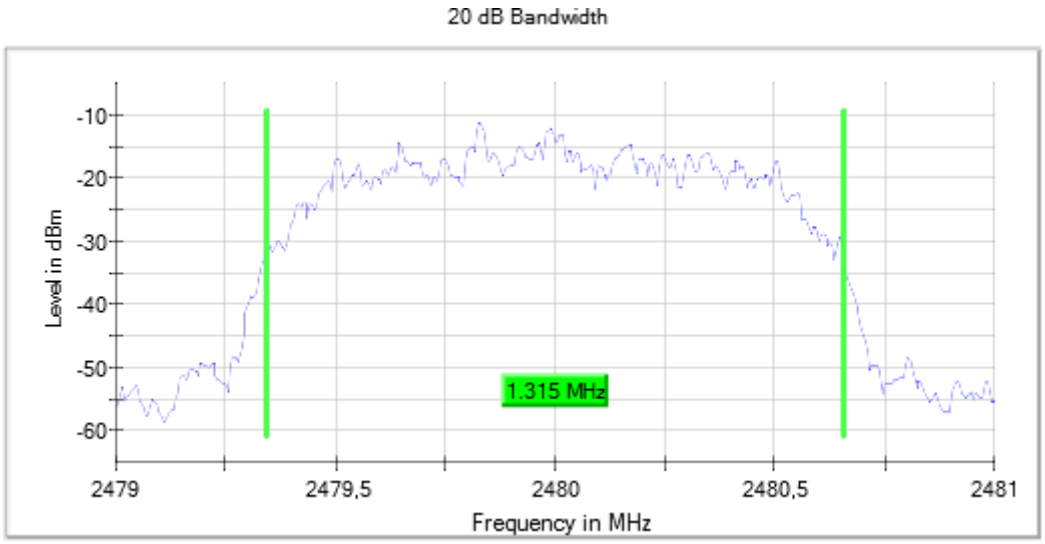
**Frequency (MHz) = 2441.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (Pi/4 DQPSK 2-DH5), Number of Transmission Chains = 1, Active Port: 1**

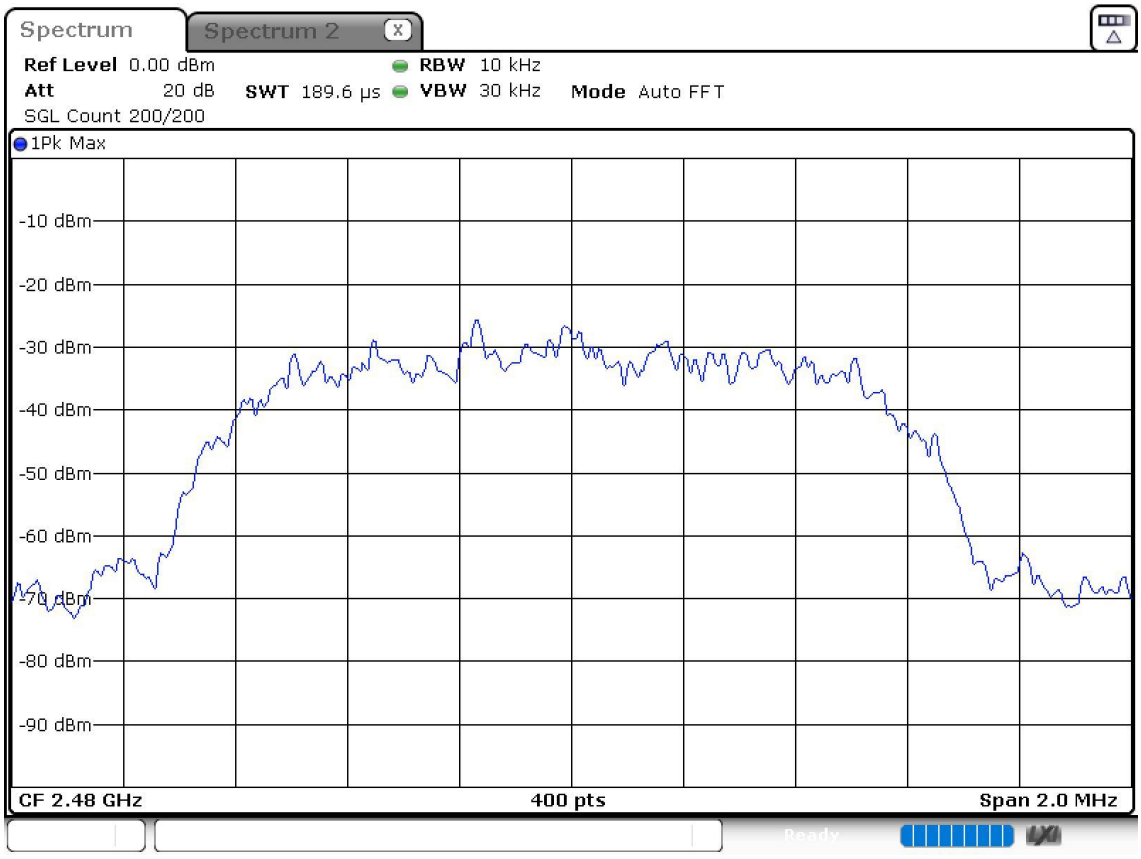
**Plots:**




**Frequency (MHz) = 2480.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (Pi/4 DQPSK 2-DH5), Number of Transmission Chains = 1, Active Port: 1**

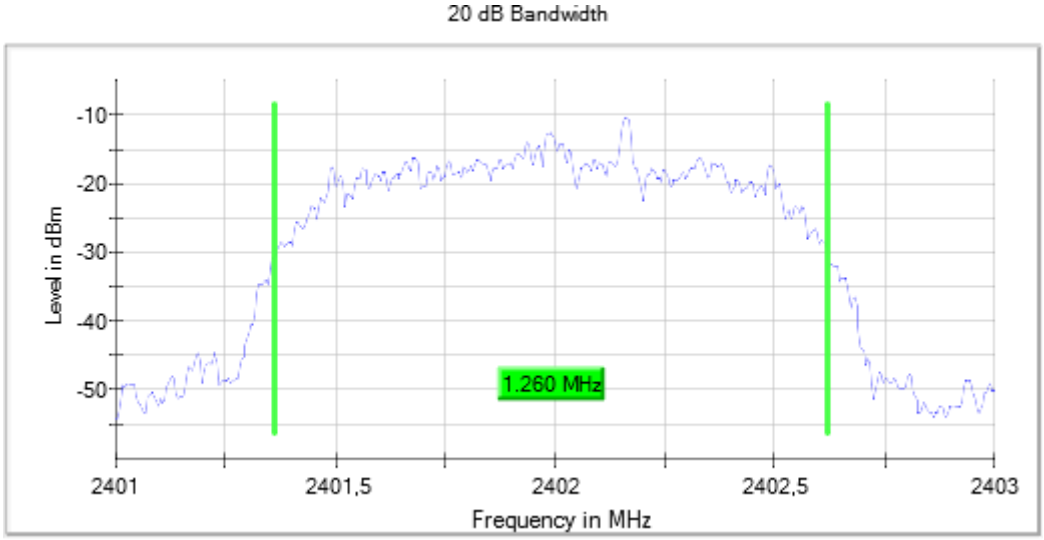
**Plots:**

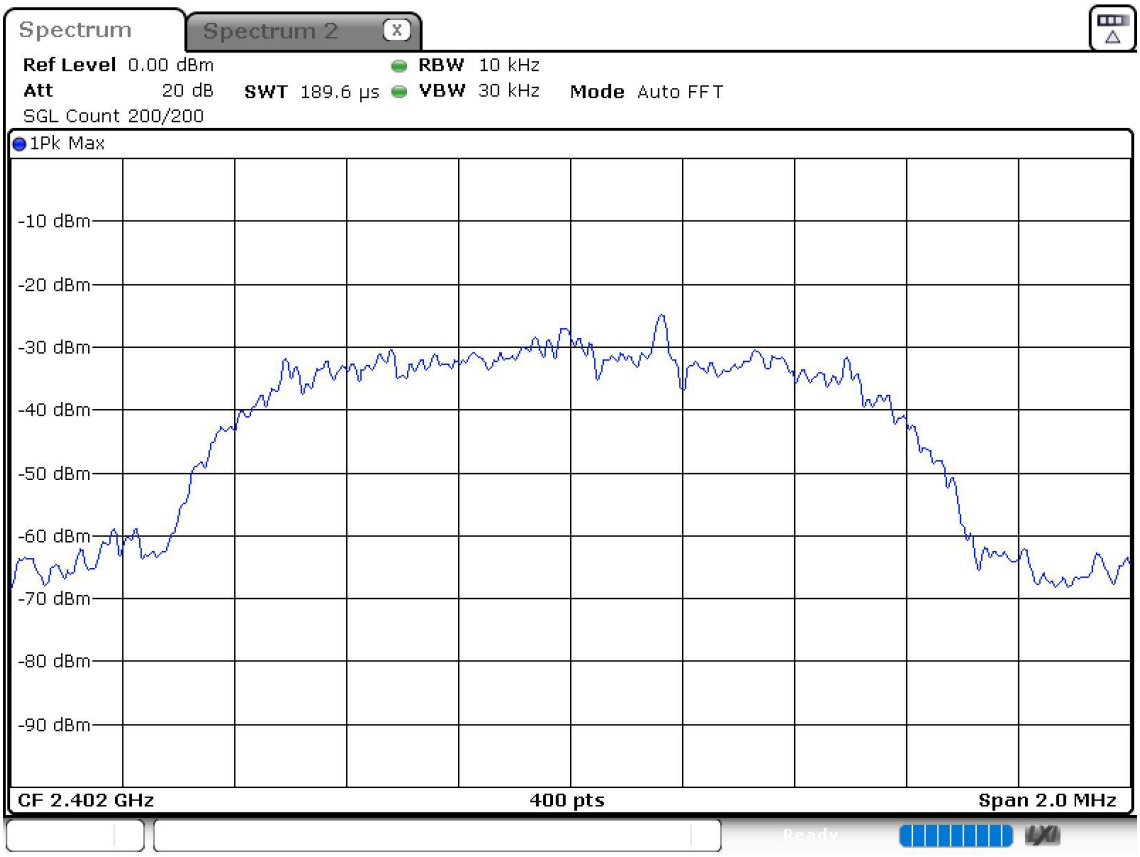


**Frequency (MHz) = 2402.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (8DPSK 3-DH5), Number of Transmission Chains = 1, Active Port: 1**

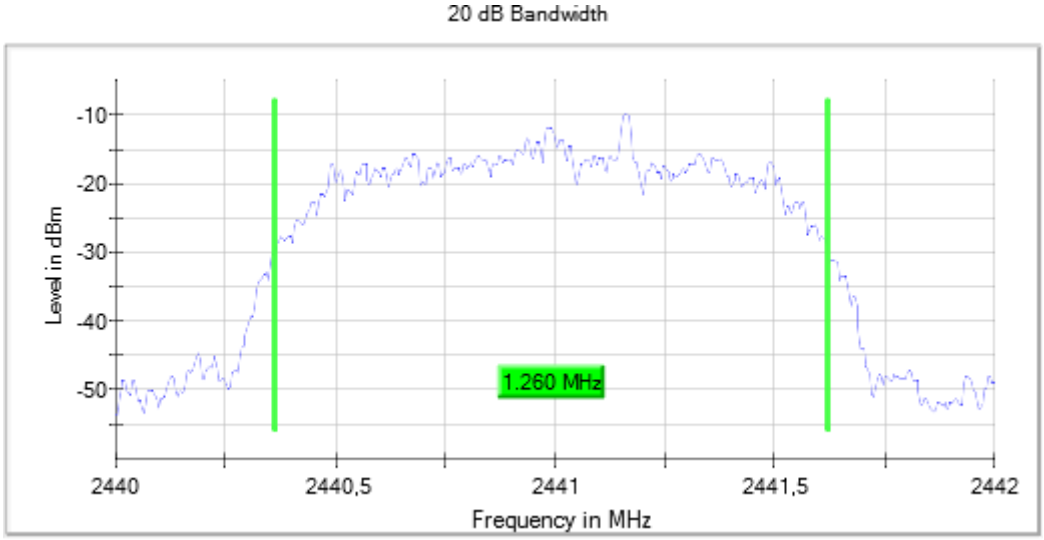
**Plots:**



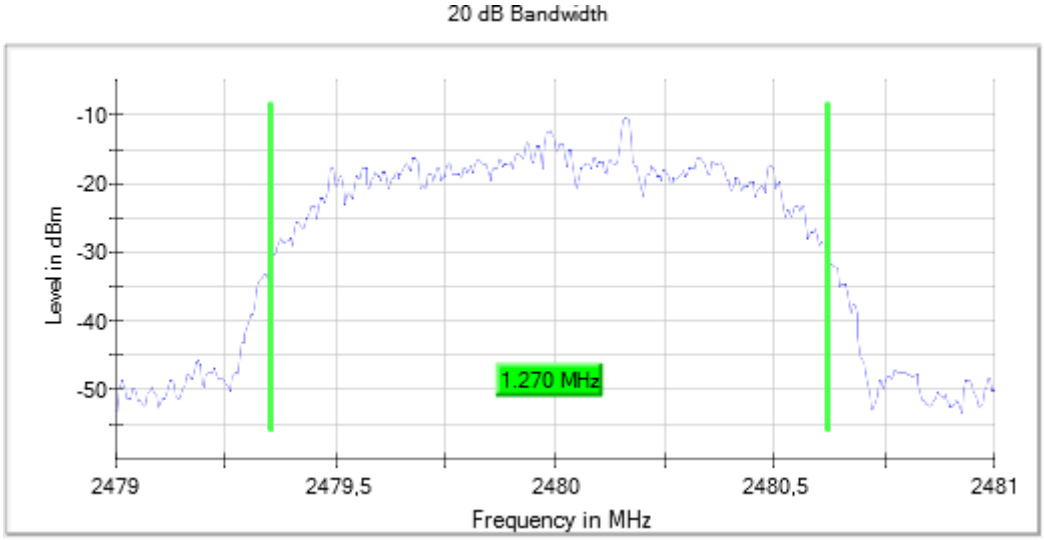
**Frequency (MHz) = 2441.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (8DPSK 3-DH5), Number of Transmission Chains = 1, Active Port: 1**

**Plots:**




**Frequency (MHz) = 2480.00000, Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (8DPSK 3-DH5), Number of Transmission Chains = 1, Active Port: 1**

**Plots:**




# 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.

***Results***

Modulation: BT (GFSK 1-DH5)

| Equipment | BW (MHz) | # of Tx Chains | Port | Freq Sep (MHz) |
|---|---|---|---|---|
| Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 0.98 |

Modulation: BT (Pi/4 DQPSK 2-DH5)

| Equipment | BW (MHz) | # of Tx Chains | Port | Freq Sep (MHz) |
|---|---|---|---|---|
| Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.03 |

Modulation: BT (8DPSK 3-DH5)

| Equipment | BW (MHz) | # of Tx Chains | Port | Freq Sep (MHz) |
|---|---|---|---|---|
| Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 1.03 |

The hopping channel carrier frequencies are separated by a minimum of two-thirds of the 20 dB bandwidth of the hopping channel.

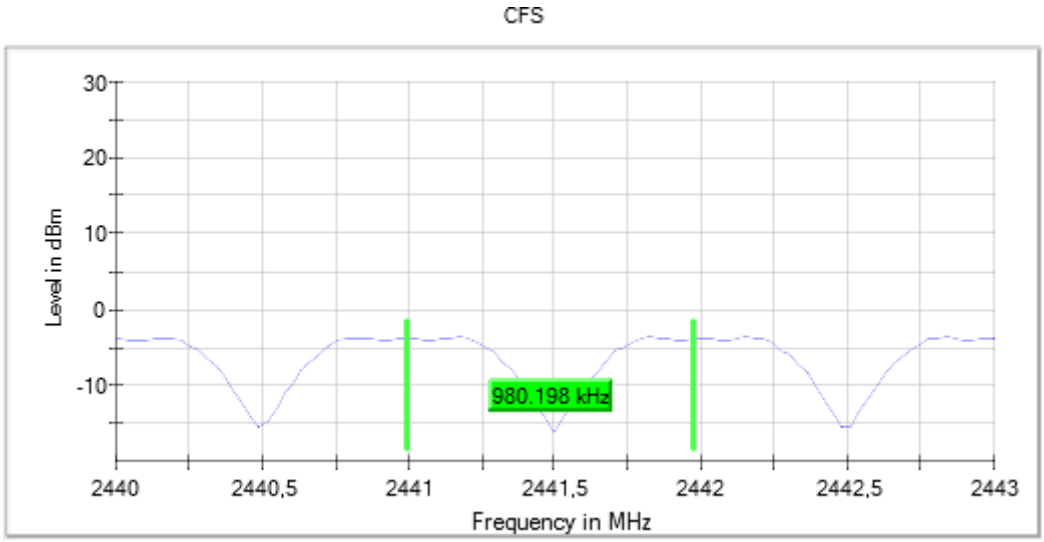
***Verdict***

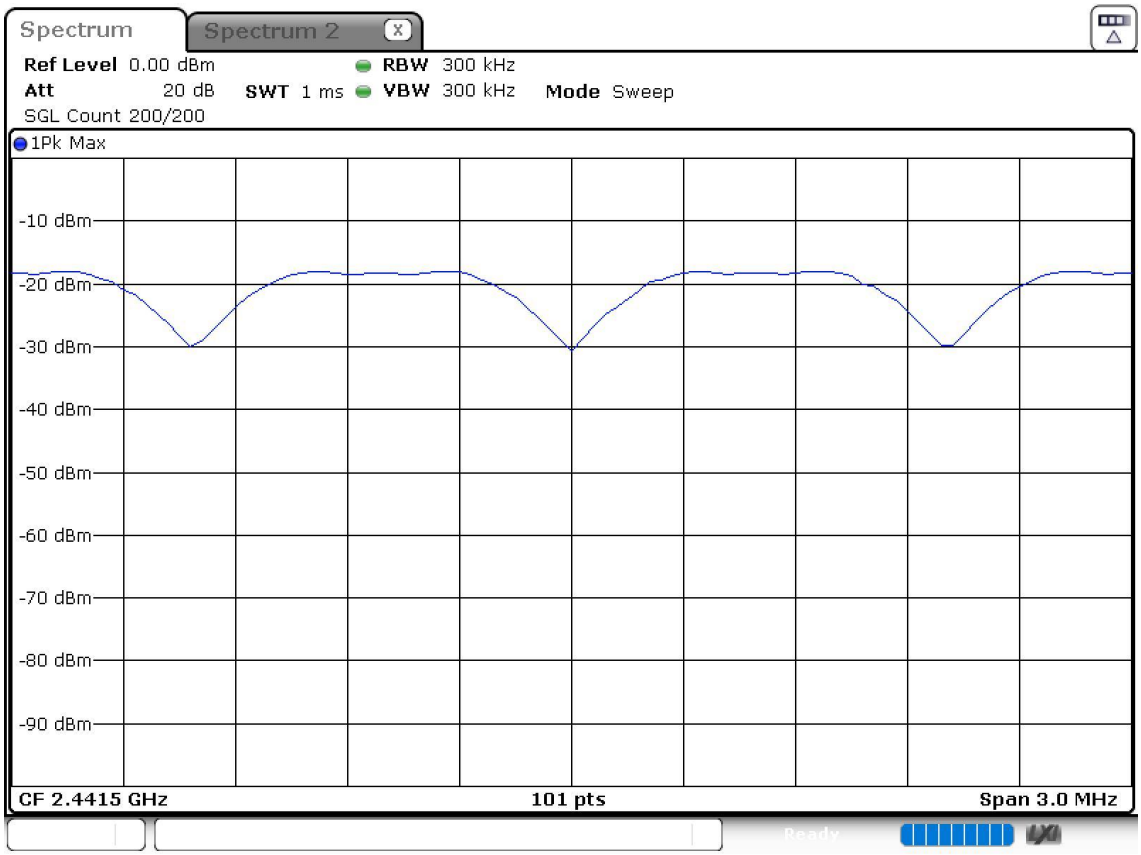
Pass

***Attachments***

**Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (GFSK 1-DH5), Number of Transmission Chains = 1, Active Port: 1**

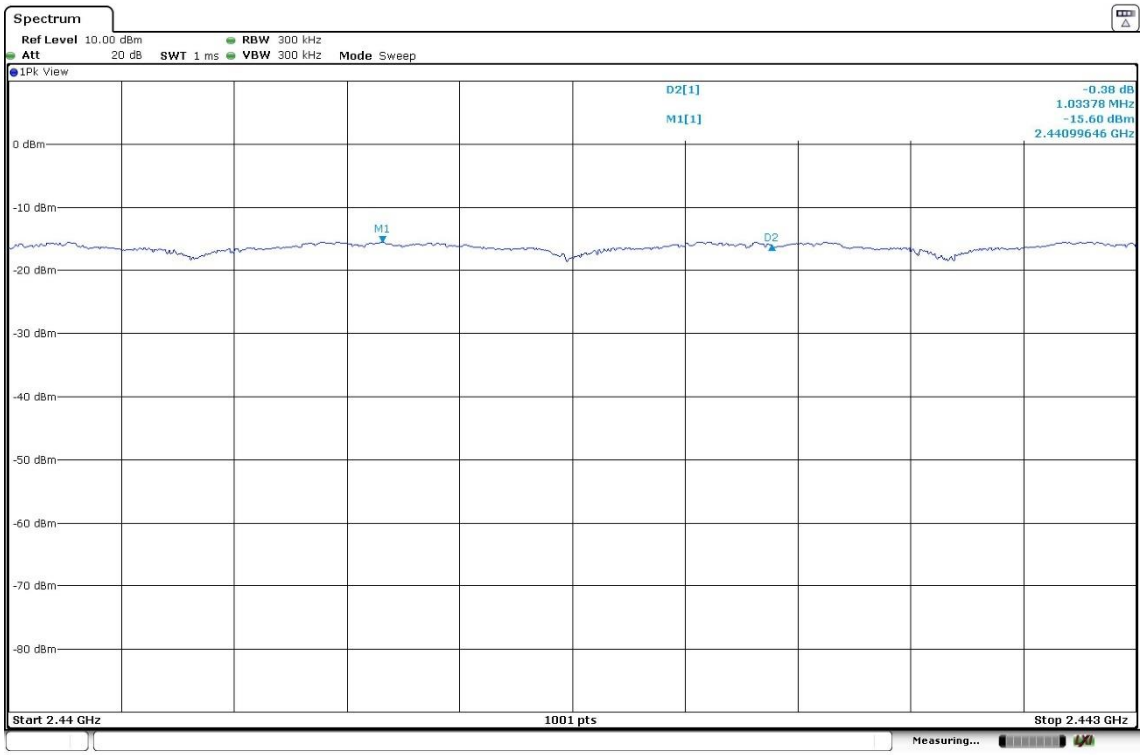
**Plots:**



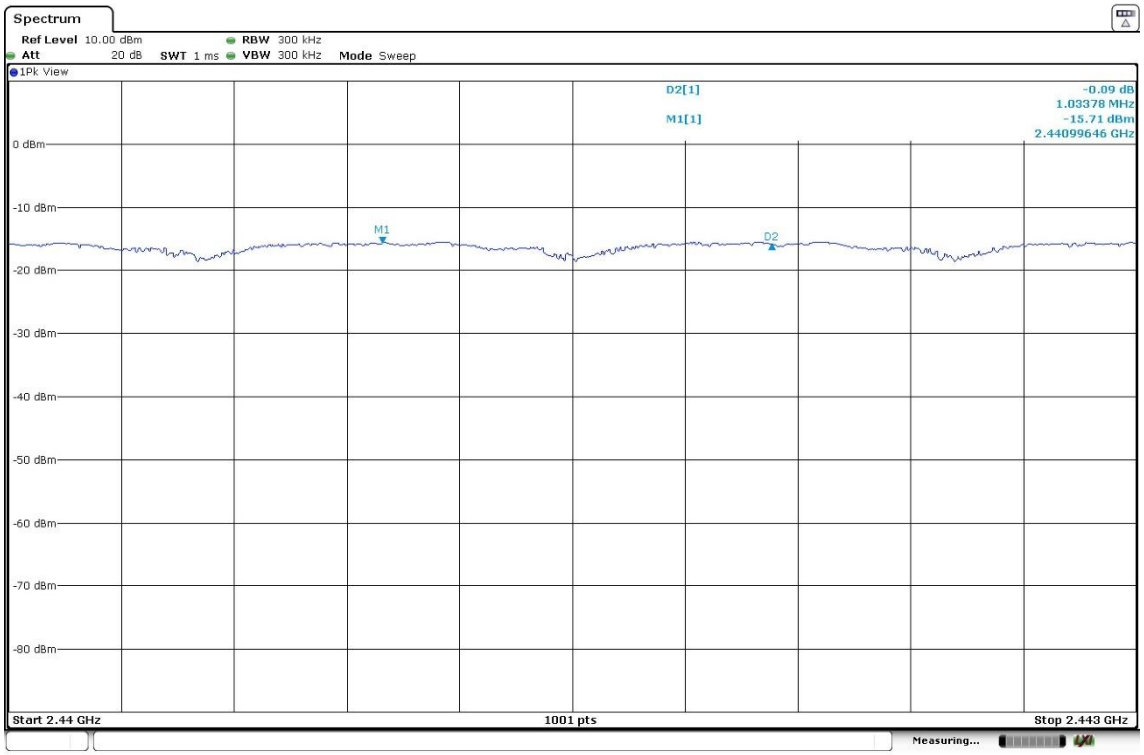
**Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (Pi/4 DQPSK 2-DH5), Number of Transmission Chains = 1, Active Port: 1**

**Plots:**



**Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (8DPSK 3-DH5), Number of Transmission Chains = 1, Active Port: 1**

**Plots:**



# RSS-247 5.1 (d) / FCC 15.247 (a) (1) (iii) [DwT] 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.

***Results***

The average time of occupancy was measured on low, middle and high channels for each modulation and worst case (highest Avg COT) is reported.

Modulation: BT (GFSK 1-DH5)

| Equipment | BW (MHz) | # of Tx Chains | Port | NHp | Avg COT (ms) |
|---|---|---|---|---|---|
| Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 112 | 327.49 |

Modulation: BT (Pi/4 DQPSK 2-DH5)

| Equipment | BW (MHz) | # of Tx Chains | Port | NHp | Avg COT (ms) |
|---|---|---|---|---|---|
| Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 113 | 300.18 |

Modulation: BT (8DPSK 3-DH5)

| Equipment | BW (MHz) | # of Tx Chains | Port | NHp | Avg COT (ms) |
|---|---|---|---|---|---|
| Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | 107 | 286.54 |

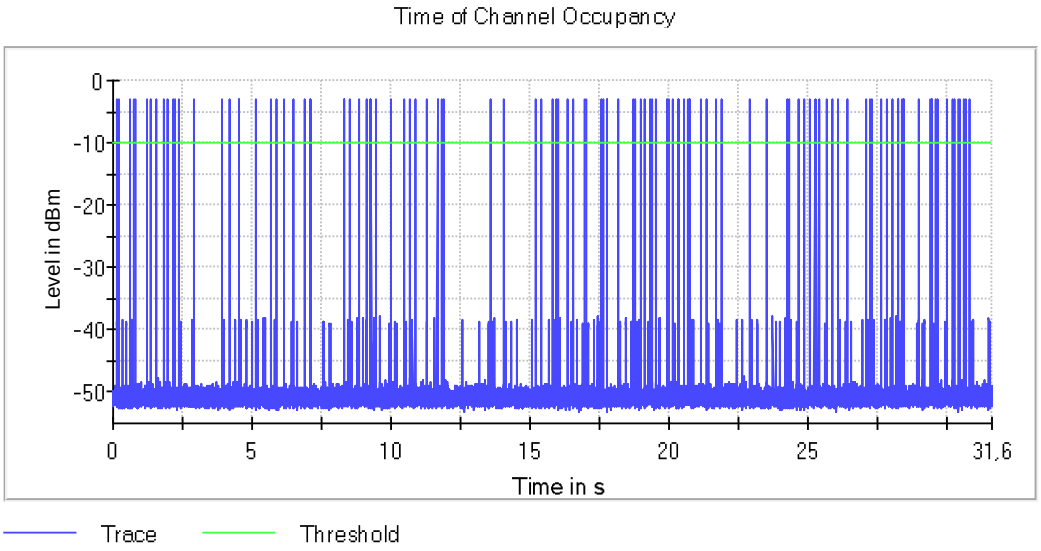
***Verdict***

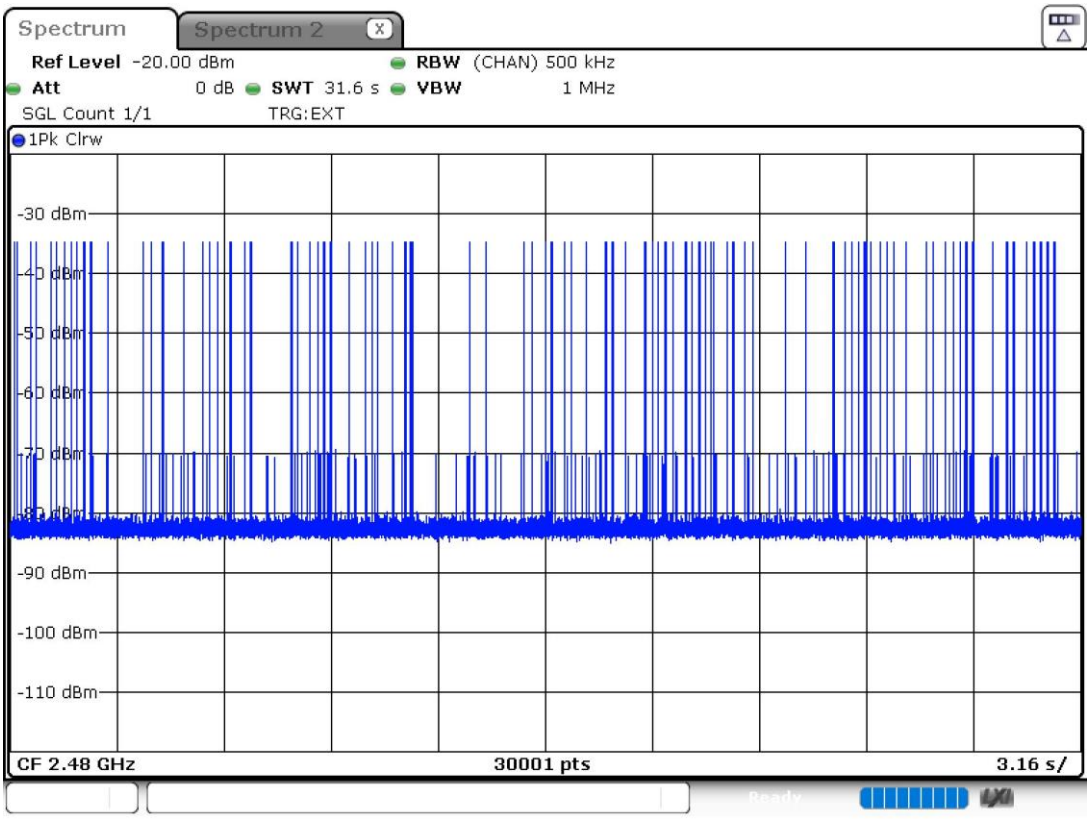
Pass

***Attachments***

**Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (GFSK 1-DH5), Number of Transmission Chains = 1, Active Port: 1**

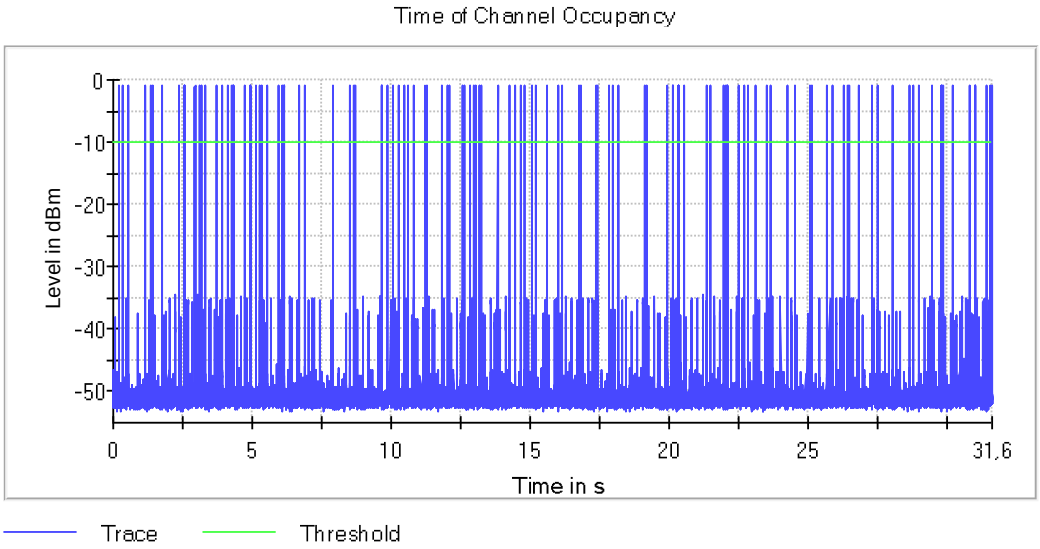
**Plots:**

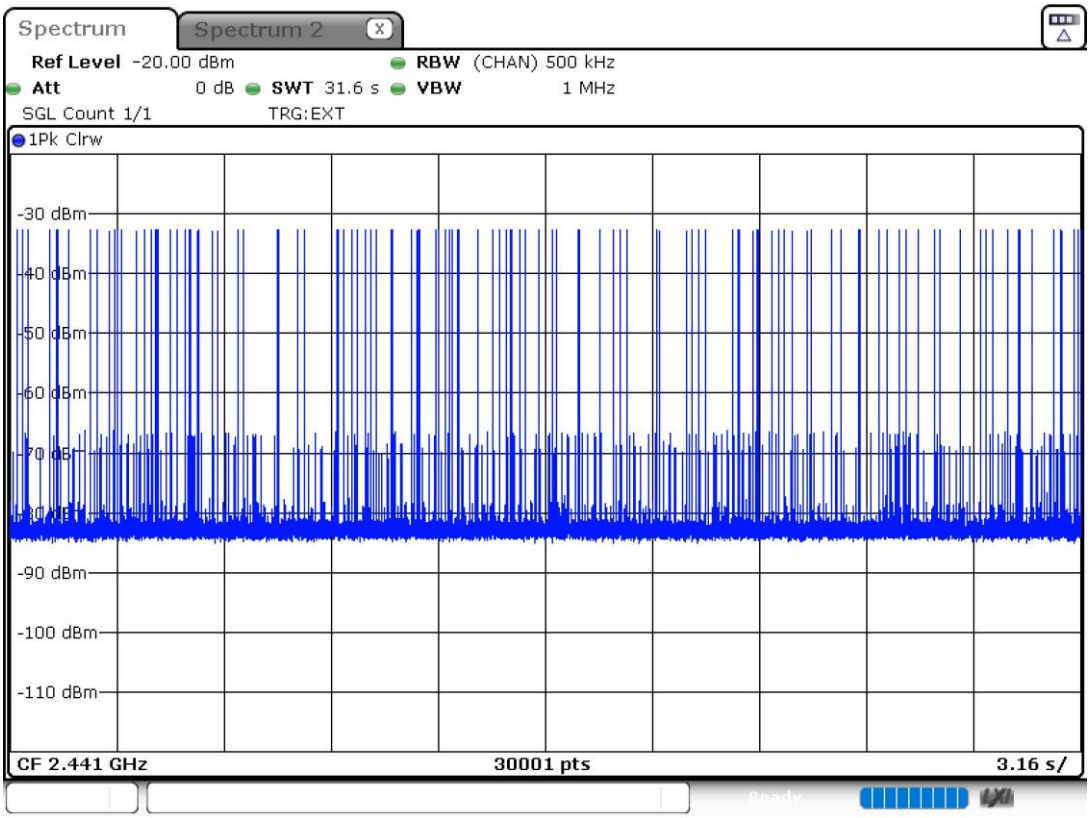


**Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (Pi/4 DQPSK 2-DH5), Number of Transmission Chains = 1, Active Port: 1**

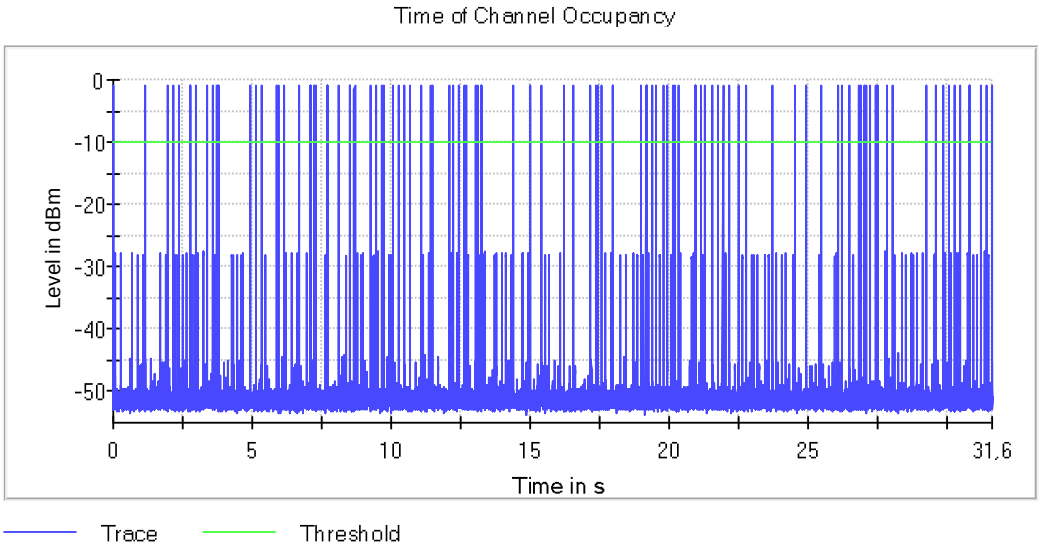
**Plots:**

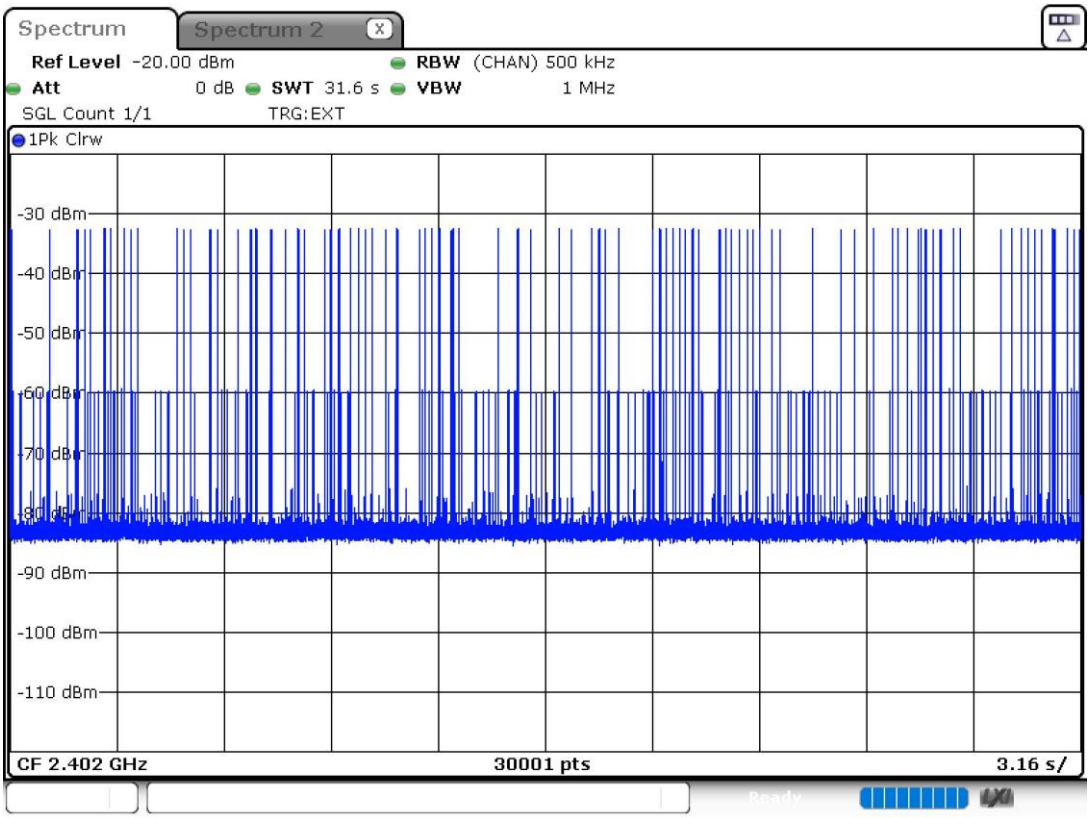


**Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (8DPSK 3-DH5), Number of Transmission Chains = 1, Active Port: 1**

**Plots:**



# 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.

***Results***

Modulation: BT (GFSK 1-DH5)

| Operation Band (MHz) | Equipment | NHC |
|---|---|---|
| [2400, 2483.5] | Frequency Hopping Spread Spectrum systems (FHSS) | 79 |

Modulation: BT (Pi/4 DQPSK 2-DH5)

| Operation Band (MHz) | Equipment | NHC |
|---|---|---|
| [2400, 2483.5] | Frequency Hopping Spread Spectrum systems (FHSS) | 79 |

Modulation: BT (8DPSK 3-DH5)

| Operation Band (MHz) | Equipment | NHC |
|---|---|---|
| [2400, 2483.5] | Frequency Hopping Spread Spectrum systems (FHSS) | 79 |

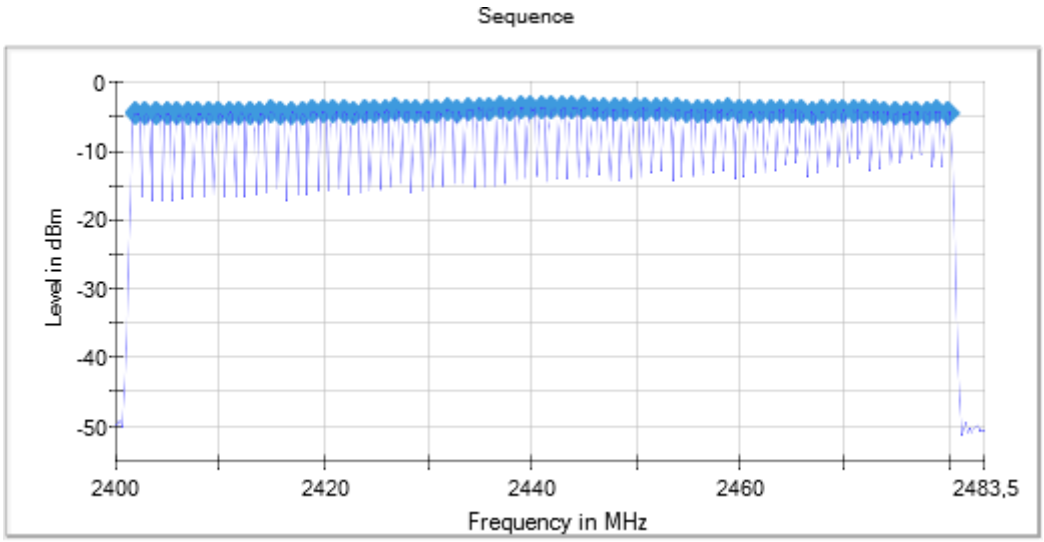
***Verdict***

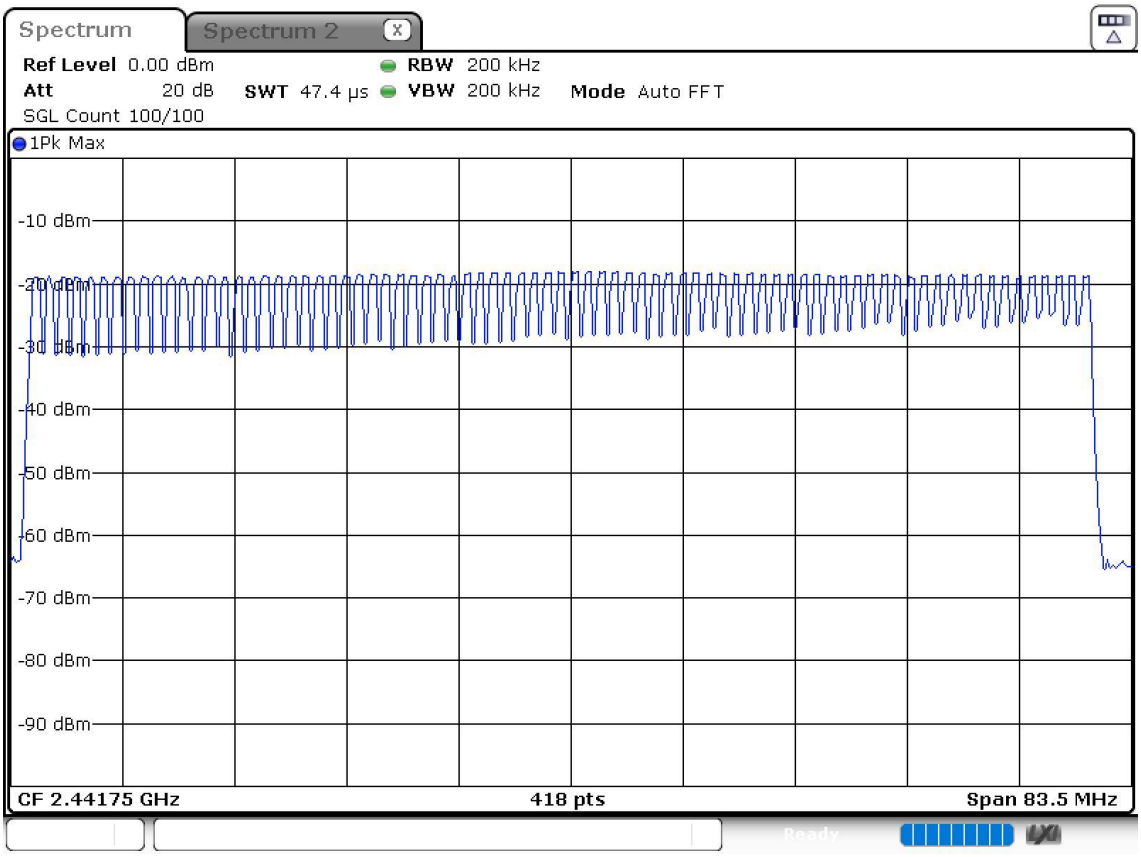
Pass

### *Attachments*

**Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (GFSK 1-DH5), Number of Transmission Chains = 1, Active Port: 1**

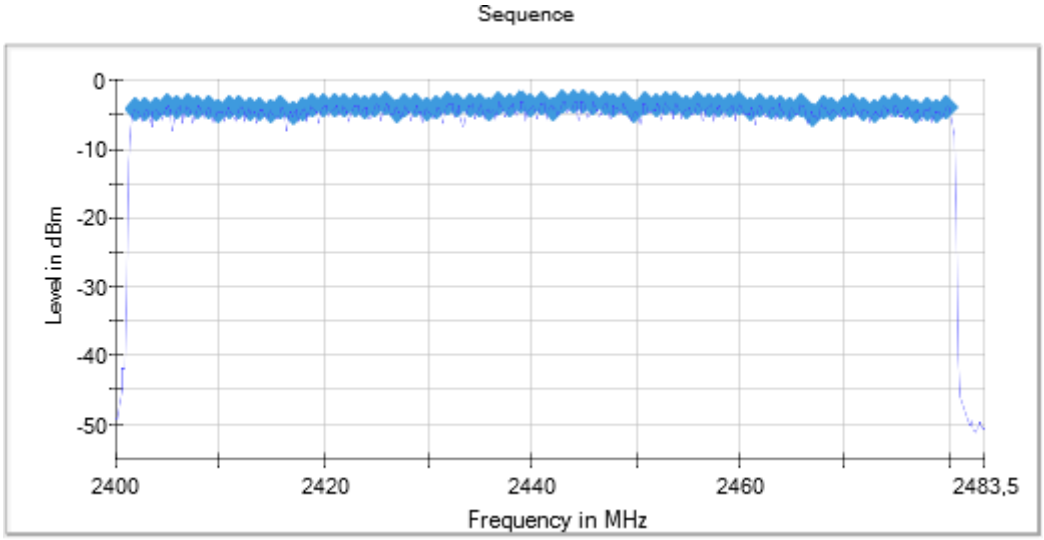
**Plots:**

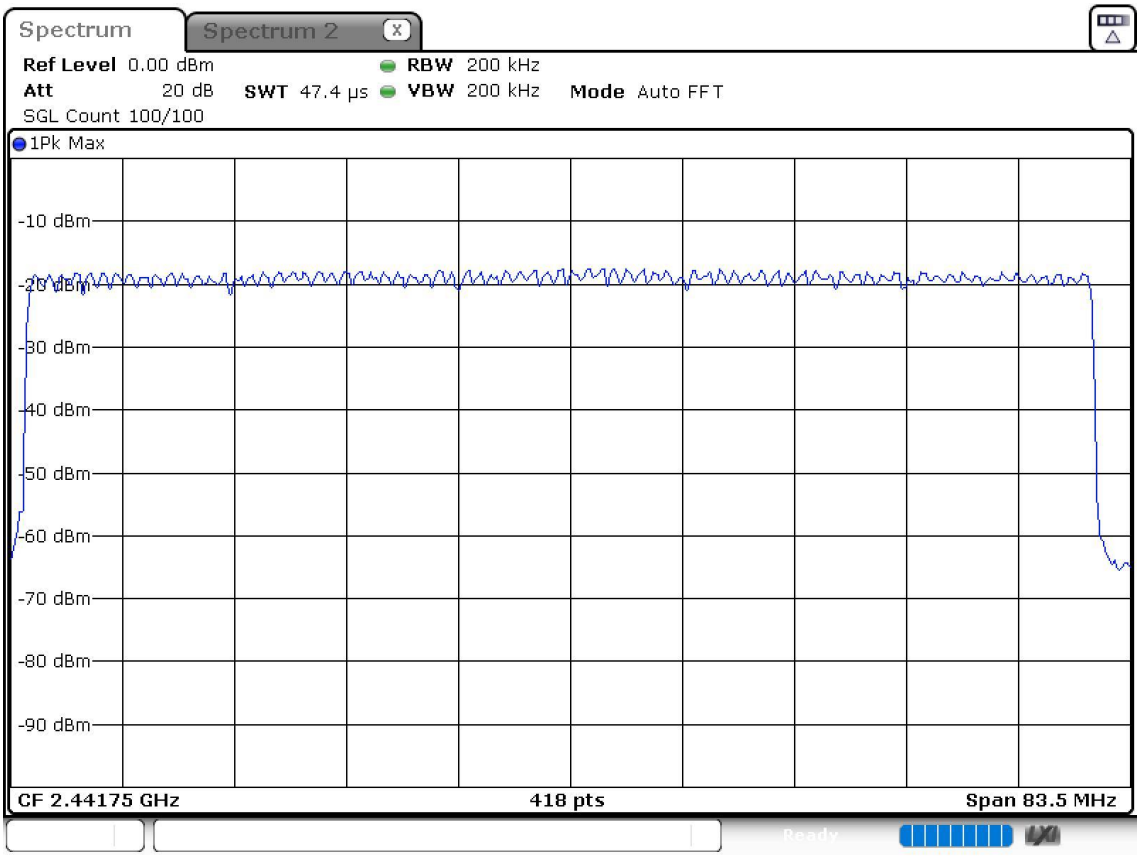


**Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (Pi/4 DQPSK 2-DH5), Number of Transmission Chains = 1, Active Port: 1**

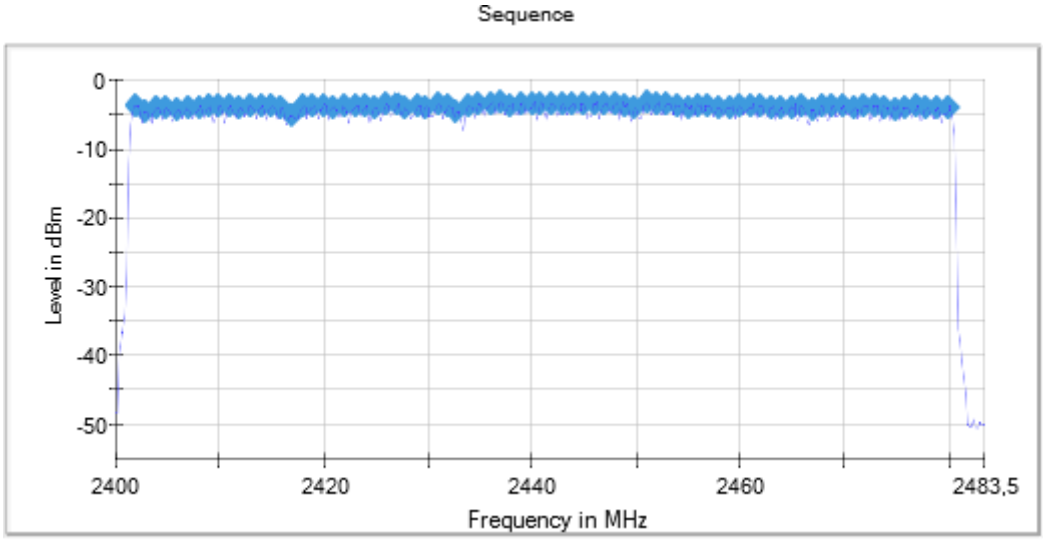
**Plots:**

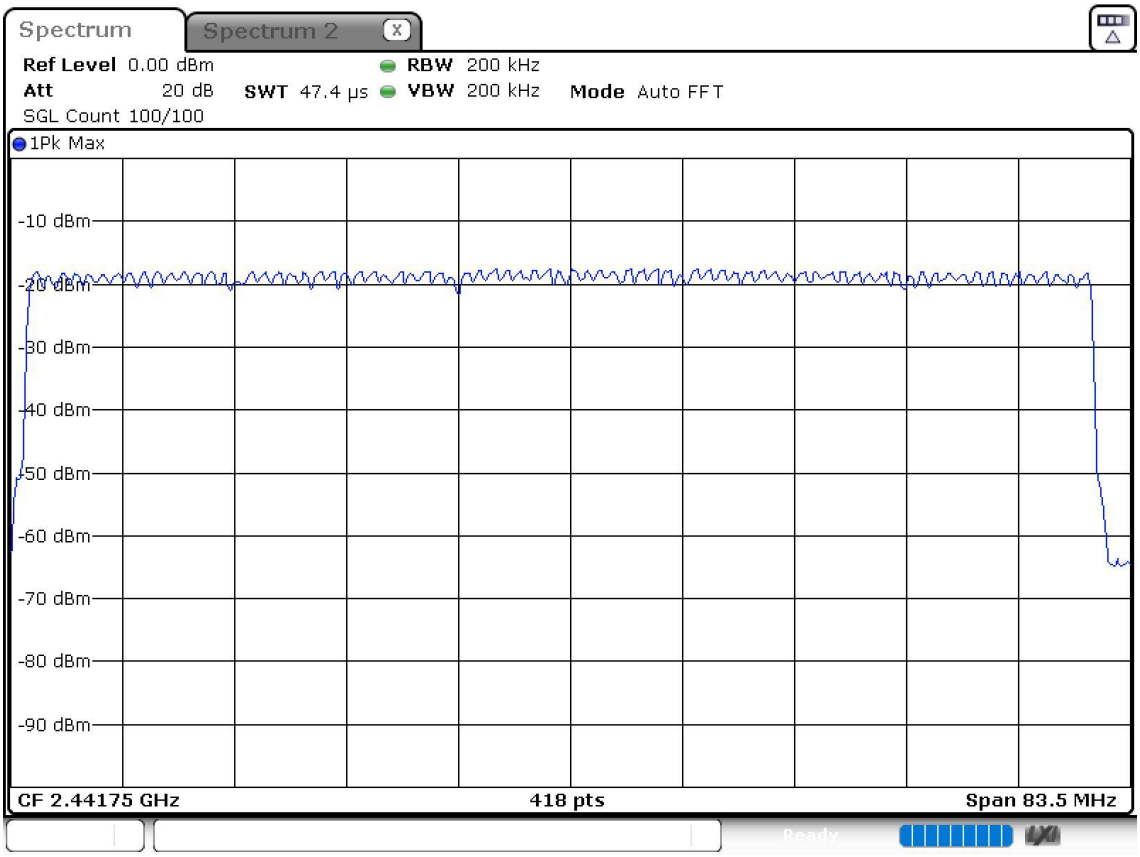


**Equipment Type: Frequency Hopping Spread Spectrum systems (FHSS), Bandwidth (MHz) = 1, Modulation: BT (8DPSK 3-DH5), Number of Transmission Chains = 1, Active Port: 1**

**Plots:**



# 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 conducted output power limit is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

***Results***

The maximum peak conducted output power level of the fundamental emission was measured according to clause 7.8.5 “Output power test procedure for frequency-hopping spread-spectrum (FHSS) devices” of ANSI C63.10-2013.

The EIRP power (dBm) is calculated by adding the maximum declared antenna gain to the measured conducted power.

Maximum Declared Antenna Gain: 1.91 dBi

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

Modulation: BT (GFSK 1-DH5)

| Freq (MHz) | Equipment | BW (MHz) | # of Tx Chains | Port | Peak Power (dBm) | Peak Power E.I.R.P (dBm) |
|---|---|---|---|---|---|---|
| 2402.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | -4.40 | -2.49 |
| 2441.00000 | | 1 | 1 | 1 | -3.50 | -1.59 |
| 2480.00000 | | 1 | 1 | 1 | -4.00 | -2.09 |

Modulation: BT (Pi/4 DQPSK 2-DH5)

| Freq (MHz) | Equipment | BW (MHz) | # of Tx Chains | Port | Peak Power (dBm) | Peak Power E.I.R.P (dBm) |
|---|---|---|---|---|---|---|
| 2402.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | -1.60 | 0.31 |
| 2441.00000 | | 1 | 1 | 1 | -0.90 | 1.01 |
| 2480.00000 | | 1 | 1 | 1 | -1.50 | 0.41 |

Modulation: BT (8DPSK 3-DH5)

| Freq (MHz) | Equipment | BW (MHz) | # of Tx Chains | Port | Peak Power (dBm) | Peak Power E.I.R.P (dBm) |
|---|---|---|---|---|---|---|
| 2402.00000 | Frequency Hopping Spread Spectrum systems (FHSS) | 1 | 1 | 1 | -1.20 | 0.71 |
| 2441.00000 | | 1 | 1 | 1 | -0.50 | 1.41 |
| 2480.00000 | | 1 | 1 | 1 | -1.20 | 0.71 |

***Verdict***

Pass