TEST REPORT

Product Name	**:**	**RETRO PORTABLE CD BOOMBOX**
Model Number	**:**	**See Page 6 for details**
FCC ID	**:**	**2AB4KMTYH8236**

Prepared for	:	MET INDUSTRIAL LTD
Address	:	Room 605, 6/F., No. 9 Wing Hong Street, Lai Chi Kok, Kowloon, Hong Kong
Prepared by	:	EMTEK (SHENZHEN) CO., LTD.
Address	:	Building 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China
		Tel: (0755) 26954280 Fax: (0755) 26954282
Report Number	:	ENS2309120006W00201R
Date(s) of Tests	:	September 12, 2023 to October 13, 2023
Date of issue	:	October 18, 2023

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1 TEST RESULT CERTIFICATION

Applicant:	MET INDUSTRIAL LTD Room 605, 6/F., No. 9 Wing Hong Street, Lai Chi Kok, Kowloon, Hong Kong
Manufacture:	Dongguan City Wangniudun Yinghui Electronics Factory Chijiaoluduan Zhengzhong Road Wangniudun Town Dongguan City, China
Product Description:	RETRO PORTABLE CD BOOMBOX
Model Number:	See Page 6 for details
Trade Mark:	MET, EMERSON, NAXA, VICTOR

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C	PASS

The above equipment was tested by EMTEK(SHENZHEN) CO., LTD.The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2 and Part 15.247

The test results of this report relate only to the tested sample identified in this report.

Date of Test : September 12, 2023 to October 13, 2023

Prepared by : Una Yu /Editor

Reviewer : Joe Xia/Supervisor

Approve & Authorized Signer : Lisa Wang/Manager

EMTEK (SHENZHEN) CO., LTD. TESTING

2 EUT TECHNICAL DESCRIPTION

Characteristics	Description
Product:	RETRO PORTABLE CD BOOMBOX
Model Number:	See Page 6 for details
Modulation:	GFSK modulation; pi/4-DQPSK modulation; 8DPSK modulation.
Operating Frequency Range(s):	2402-2480MHz
Number of Channels:	79 channels
Transmit Power Max:	-0.14 dBm
Antenna Type:	PCB antenna
Antenna Gain:	-0.58 dBi
Power supply:	AC120V/60Hz DC 7.4V from internal battery

Note: for more details, please refer to the User's manual of the EUT.

Modified Information

Version	Report No.	Revision Date	Summary
V1.0	ENS2309120006W00201R	/	Original Report

Declaration on model difference

Production name	Trade mark	Model no.
RETRO PORTABLE CD BOOMBOX	MET, EMERSON, NAXA, VICTOR	MET8236,EPB-3004,EPB-3004-YY, EPB-XXXX-YY，NPB-3004-YY, NPB-XXXX-YY，VPB-3004-YY, VPB-XXXX-YY(where X or Y denote any printable characters in the ASCII Standard Character Table to represent variances in cosmetics or buyers)
Note: N/A		

3 SUMMARY OF TEST RESULT

FCC PartClause	Test Parameter	Verdict	Remark
15.247(a)(1)	20 dB Bandwidth	PASS	
15.247(a)(1)	Carrier Frequency Separation	PASS	
15.247(a)(1)	Number of Hopping Frequencies	PASS	
15.247(a)(1)	Average Time of Occupancy (Dwell Time)	PASS	
15.247(b)(1)	Maximum Peak Conducted Output Power	PASS	
15.247(c)	Conducted Spurious Emissions	PASS	
15.247(d) 15.209	Radiated Spurious Emissions	PASS	
15.207	Conducted Emission	PASS	
15.203	Antenna Application	PASS	
NOTE1:N/A (Not Applicable)			

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: 2AB4KMTYH8236 filing to comply with Section 15.247 of the FCC Part 15, Subpart C.

4 TEST METHODOLOGY

4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:
FCC 47 CFR Part 2, Subpart J
FCC 47 CFR Part 15, Subpart C
FCC KDB 558074 D01 15.247 Meas Guidance v05r02

4.2 MEASUREMENT EQUIPMENT USED

4.2.1 Conducted Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LASTCAL.	DUE CAL.
EMI Test Receiver	Rohde & Schwarz	ESCI	101384	2023/5/13	2024/5/12
AMN	Rohde & Schwarz	ENV216	101161	2023/5/13	2024/5/12
AMN	Kyoritsu	KNW-407	8-1492-9	2023/5/11	2024/5/10

4.2.2 Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
Pre-Amplifier	HP	8447F	2944A07999	2023/5/13	2024/5/12
EMI Test Receiver	Rohde & Schwarz	ESCI	101414	2023/5/13	2024/5/12
Loop Antenna	Schwarzbeck	FMZB 1519	1519-012	2023/5/12	2025/5/11
Bilog Antenna	Schwarzbeck	VULB9163	9163142	2022/7/24	2024/7/23
Cable	Schwarzbeck	AK9513	ACRX1	2023/5/13	2024/5/12
Cable	Rosenberger	N/A	FP2RX2	2023/5/13	2024/5/12
Cable	Schwarzbeck	AK9513	CRPX1	2023/5/13	2024/5/12
EMI Test Receiver	Rohde & Schwarz	ESU 26	100154	2023/5/13	2024/5/12
Pre-Amplifier	Lunar EM	LNA30M3G-25	J10100000070	2023/5/13	2024/5/12
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1177	2023/5/12	2025/5/11
Horn Antenna	Schwarzbeck	BBHA9170	9170-399	2023/5/12	2025/5/11
Cable	H+B	0.5M SF104-26.5	289147/4	2023/5/13	2024/5/12
Cable	H+B	3M SF104-26.5	295838/4	2023/5/13	2024/5/12
Cable	H+B	6M SF104-26.5	295840/4	2023/5/13	2024/5/12

4.2.3 Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LASTCAL.	DUE CAL.
Wideband Radio Communication Tester	R&S	CMW500	171168	2022/11/2	2023/11/1
Frequency Extender	R&S	CMW-Z800A	100430	2022/11/2	2023/11/1
Spectrum Analyzer	R&S	FSV3044	MY60242456	2022/11/2	2023/11/1
Analog Signal Generator	R&S	SMB100A	MY61252625	2022/11/2	2023/11/1
Vector Signal Generator	R&S	SMM100A	MY61252674	2022/11/2	2023/11/1
RF Control Unit	Tonscend	JS0806-2	22C8060567	2022/11/2	2023/11/1

Temperature&Humidity Chamber	ESPEC	EL-02KA	12107166	2023/5/13	2024/5/12

Remark: *Each piece of equipment is scheduled for calibration once a year*

4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.
The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Frequency and Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	39	2441	…	…
1	2403	40	2442	76	2478
2	2404	41	2443	77	2479
…	…	…	…	78	2480
Note: fc=2402MHz+(k-1)×1MHz k=1 to 79					

Test Frequency and channel:

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	39	2441	78	2480

5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

Bldg 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China
The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab. : **Accredited by CNAS**
The Certificate Registration Number is L2291.
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01 (identical to ISO/IEC 17025:2017)

Accredited by FCC
Designation Number: CN1204
Test Firm Registration Number: 882943

Accredited by A2LA
The Certificate Number is 4321.01.

Accredited by Industry Canada
The Conformity Assessment Body Identifier is CN0008

Name of Firm : EMTEK (SHENZHEN) CO., LTD.
Site Location : Building 69, Majialong Industry Zone, Nanshan District, Shenzhen, Guangdong, China

6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

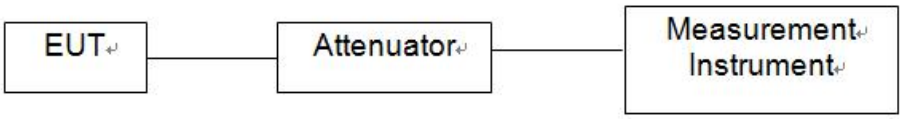
Parameter	Uncertainty
Radio Frequency	±1x10^-5
Maximum Peak Output Power Test	±1.0dB
Conducted Emissions Test	±2.0dB
Radiated Emission Test	±2.0dB
Occupied Bandwidth Test	±1.0dB
Band Edge Test	±3dB
All emission, radiated	±3dB
Antenna Port Emission	±3dB
Temperature	±0.5℃
Humidity	±3%

Measurement Uncertainty for a level of Confidence of 95%

7 SETUP OF EQUIPMENT UNDER TEST

7.1 RADIO FREQUENCY TEST SETUP 1

The Bluetooth DSS component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



7.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz：

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT androtated about its vertical axis formaximum response at each azimuth about the EUT. The center of the loopshall be 1 m above the ground.For certain applications, the loop antennaplane may also need to be positioned horizontally at the specified distance from the EUT.

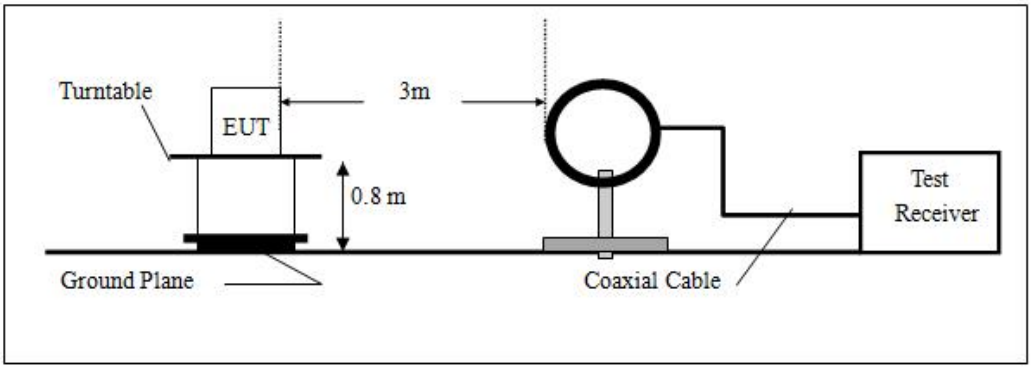
30MHz-1GHz：

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

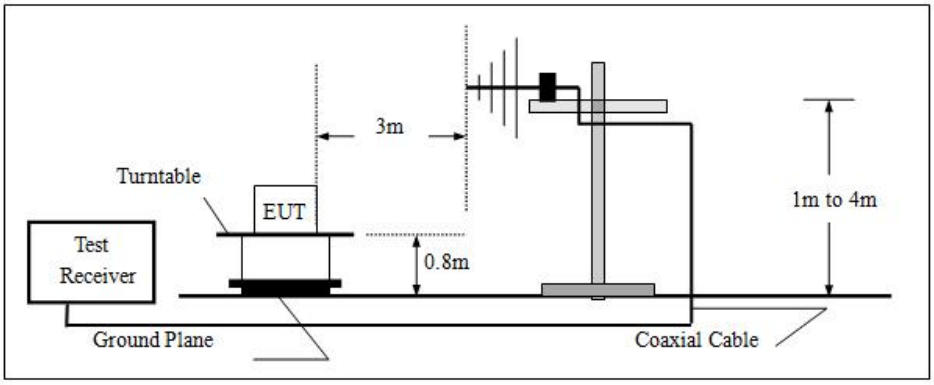
Above 1GHz：

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

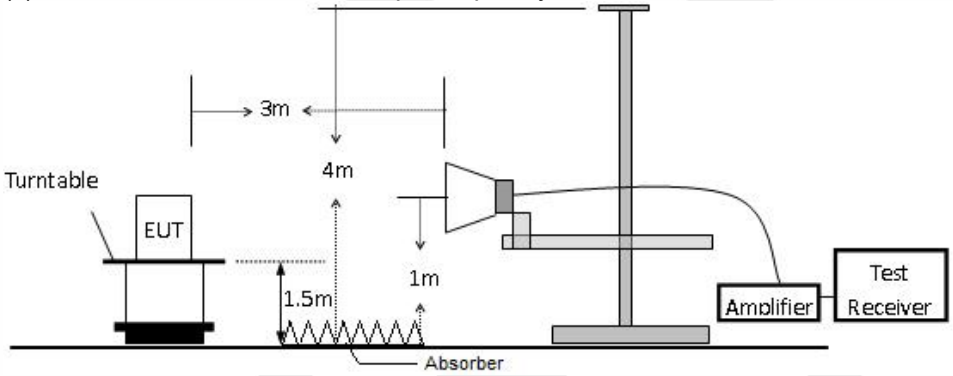
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b)Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

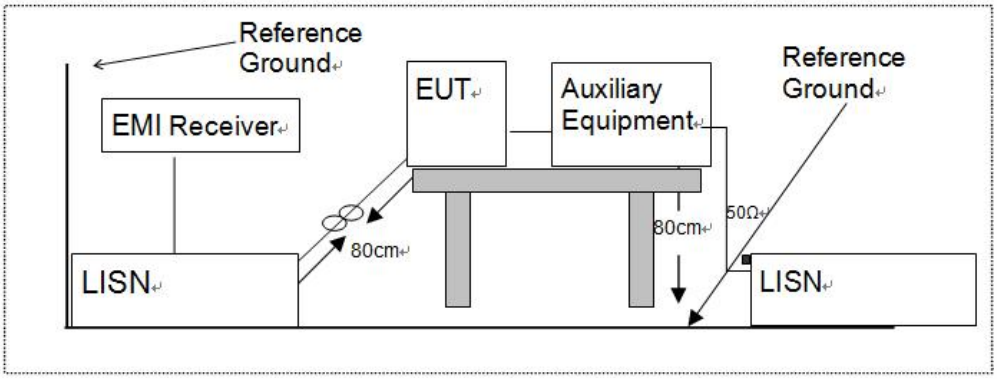


7.3 CONDUCTED EMISSION TEST SETUP

The mains cable of the EUT (Game fitness board) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



7.4 SUPPORT EQUIPMENT

Item	Equipment	Mfr/Brand	Model/Type No.	Note

Notes:

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

8 FREQUENCY HOPPING SYSTEM REQUIREMENTS

8.1 Standard Applicable

According to FCC Part 15.247(a)(1), The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

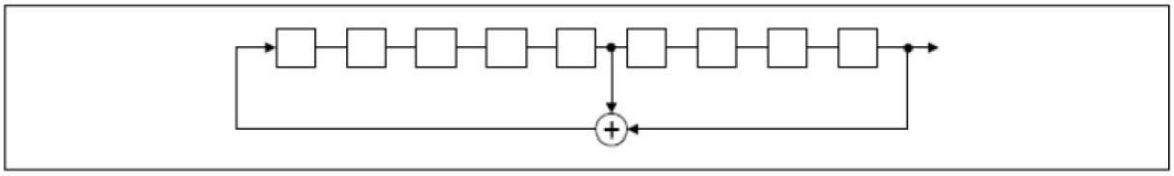
(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

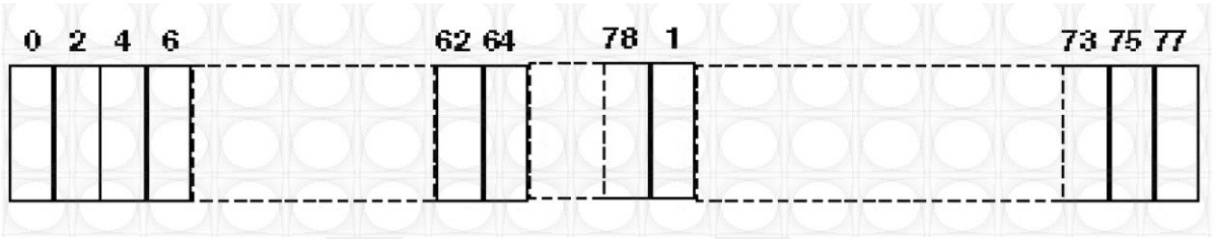
8.2 EUT Pseudorandom Frequency Hopping Sequence

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master; thephase in the hopping sequence is determined by the Bluetooth clock of the master.The channel is divide into time slots where each slot corresponds to an RF hop frequency. Consecutive hopscorrespond to different RF hop frequencies. The normal hop is 1 600 hops/s.

The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage, and the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones. Number of shift register stages: 9
Length of pseudo-random sequence: 29-1 = 524 bits
Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence



Each frequency used equally on the average by each transmitter.
The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

8.3 Equal Hopping Frequency Use

All Bluetooth units participating in the piconet are time and hop-synchronized to the channel.

Example of a 79 hopping sequence in data mode:
35, 27, 6, 44, 14, 61, 74, 32, 1, 11, 23, 2, 55, 65, 29, 3, 9, 52, 78, 58, 40, 25, 0, 7, 18, 26, 76, 60, 47, 50, 2, 5, 16, 37, 70, 63, 66, 54, 20, 13, 4, 8, 15, 21, 26, 10, 73, 77, 67, 69, 43, 24, 57, 39, 46, 72, 48, 33, 17, 31, 75, 19, 41, 62, 68, 28, 51, 66, 30, 56, 34, 59, 71, 22, 49, 64, 38, 45, 36, 42, 53
Each Frequency used equally on the average by each transmitter

8.4 Frequency Hopping System

This transmitter device is frequency hopping device, and complies with FCC part 15.247 rule.

This device uses Bluetooth radio which operates in 2400-2483.5 MHz band. Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands (1 MHz each; centred from 2402 to 2480 MHz) in the range 2,400-2,483.5 MHz. The transmitter switches hop frequencies 1,600 times per second to assure a high degree of data security. All Bluetooth devices participating in a given piconet are synchronized to the frequency-hopping channel for the piconet. The frequency hopping sequence is determined by the master's device address and the phase of the hopping sequence (the frequency to hop at a specific time) is determined by the master's internal clock. Therefore, all slaves in a piconet must know the master's device address and must synchronize their clocks with the master's clock.

Adaptive Frequency Hopping (AFH) was introduced in the Bluetooth specification to provide an effective way for a Bluetooth radio to counteract normal interference. AFH identifies "bad" channels, where either other wireless devices are interfering with the Bluetooth signal or the Bluetooth signal is interfering with another device. The AFH- enabled Bluetooth device will then communicate with other devices within its piconet to share details of any identified bad channels. The devices will then switch to alternative available "good"

channels, away from the areas of interference, thus having no impact on the bandwidth used.

9 TEST REQUIREMENTS

9.1 20DB BANDWIDTH

9.1.1 Applicable Standard

According to FCC Part 15.247(a)(1) and FCC KDB 558074 D01 15.247 Meas Guidance v05r02

9.1.2 Conformance Limit

No limit requirement.

9.1.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

9.1.4 Test Procedure

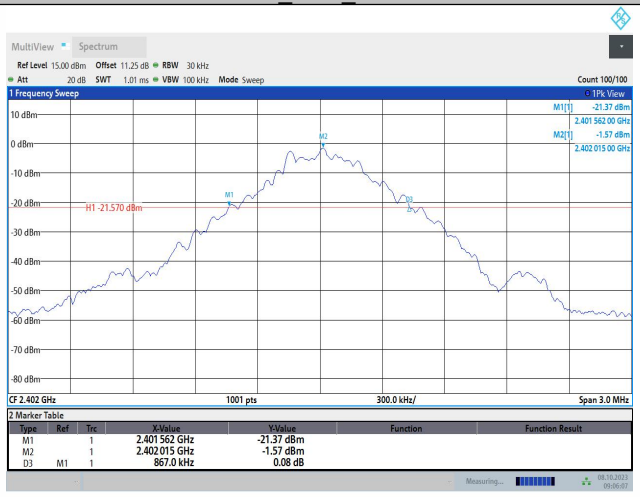
The EUT was operating in Bluetooth v2.1 with classic mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.
The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
Set to the maximum power setting and enable the EUT transmit continuously
Set RBW = 30 kHz.
Set the video bandwidth (VBW) =100kHz.
Set Span= approximately 2 to 3 times the 20 dB bandwidth
Set Detector = Peak.
Set Trace mode = max hold.
Set Sweep = auto couple.
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize.Use the marker-to-peak function to set the marker to the peak of the emission. Use themarker-delta function to measure 20 dB down one side of the emission. Reset the markerdeltafunction, and move the marker to the other side of the emission, until it is (asclose as possible to) even with the reference marker level. The marker-delta reading atthis point is the 20 dB bandwidth of the emission.
If this value varies with differentmodes of operation (e.g., data rate, modulation format, etc.), repeat this test for eachvariation.
Measure and record the results in the test report.

Test Results

Temperature: 25℃ Test By: KK
Humidity: 453 %

TestMode	Antenna	Frequency[MHz]	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
DH5	Ant1	2402	0.87	2401.56	2402.43	---	---
		2441	0.87	2440.56	2441.43	---	---
		2480	0.87	2479.56	2480.42	---	---
2DH5	Ant1	2402	1.30	2401.37	2402.67	---	---
		2441	1.30	2440.37	2441.67	---	---
		2480	1.30	2479.36	2480.66	---	---
3DH5	Ant1	2402	1.27	2401.38	2402.65	---	---
		2441	1.28	2440.37	2441.65	---	---
		2480	1.27	2479.37	2480.64	---	---

DH5_Ant1_2402



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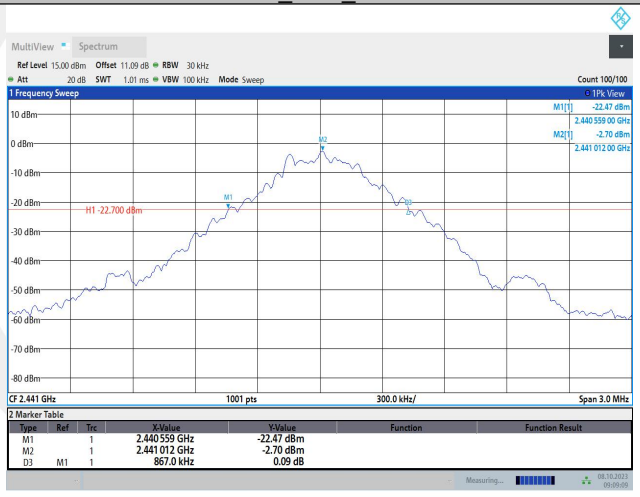
DH5_Ant1_2441



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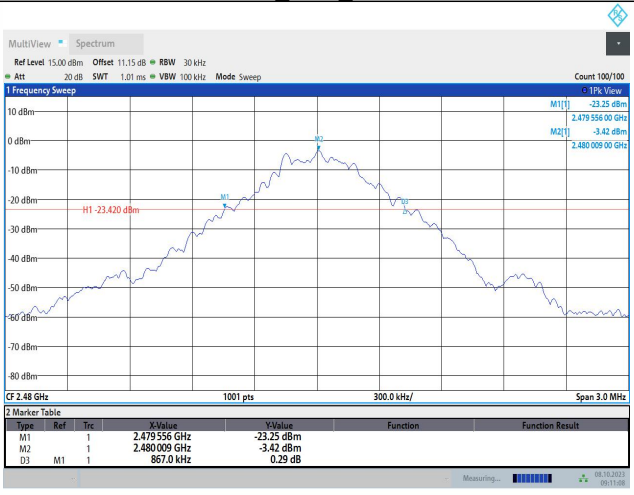
DH5_Ant1_2480



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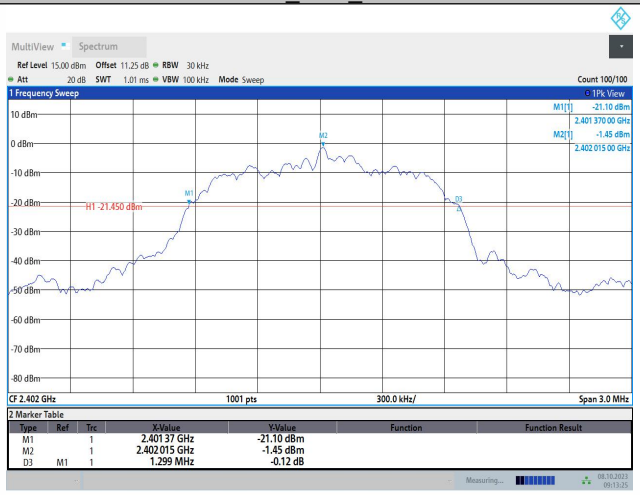
2DH5_Ant1_2402



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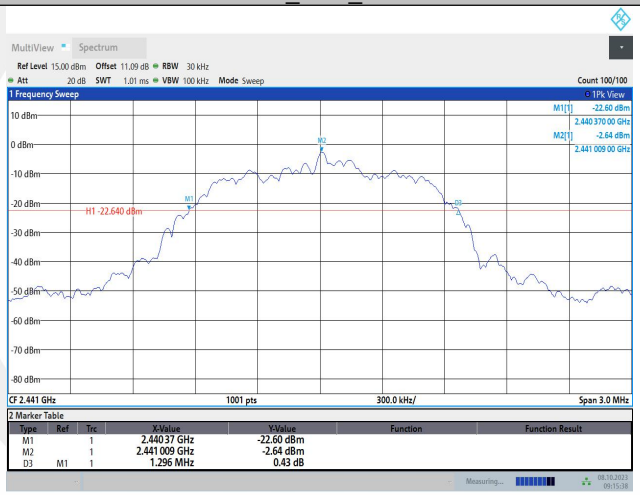
2DH5_Ant1_2441



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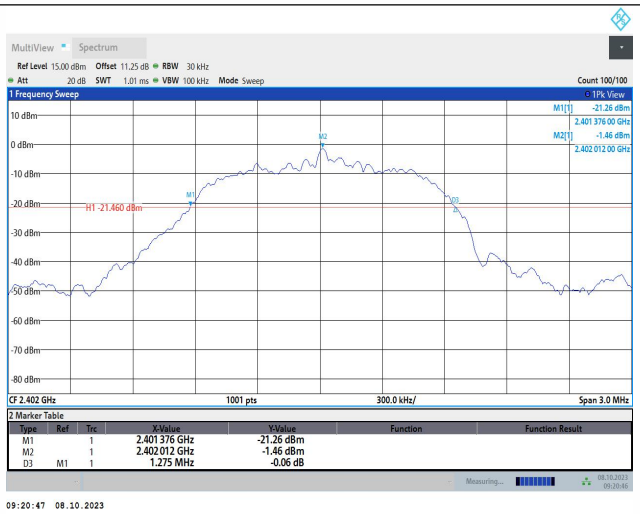
2DH5_Ant1_2480

09:17:38 08.10.2023

3DH5_Ant1_2402



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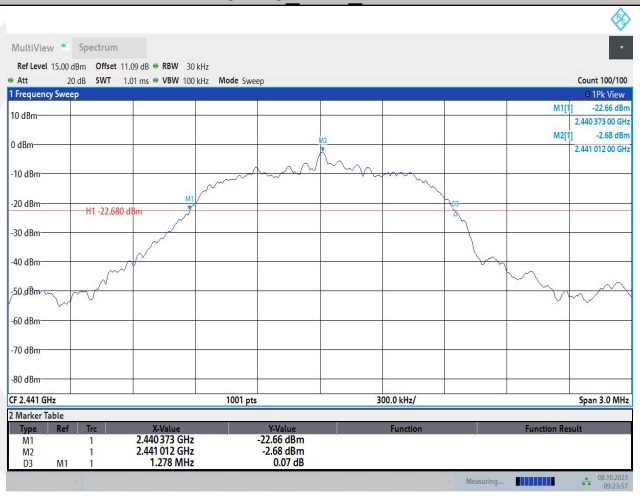


3DH5_Ant1_2480

9.2 CARRIER FREQUENCY SEPARATION

9.2.1 Applicable Standard

According to FCC Part 15.247(a)(1) and FCC KDB 558074 D01 15.247 Meas Guidance v05r02

9.2.2 Conformance Limit

Frequency hopping systems operating in the 2400-2483.5MHz band shall have hoppingchannel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth ofthe hopping channel, whichever is greater.
In case of an output power less than 125mW,the frequency hopping system may have channels separated by a minimum of 25kHz ortwo-thirds of the 20dB bandwidth of the hopping channel, whichever is greater.

9.2.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

9.2.4 Test Procedure

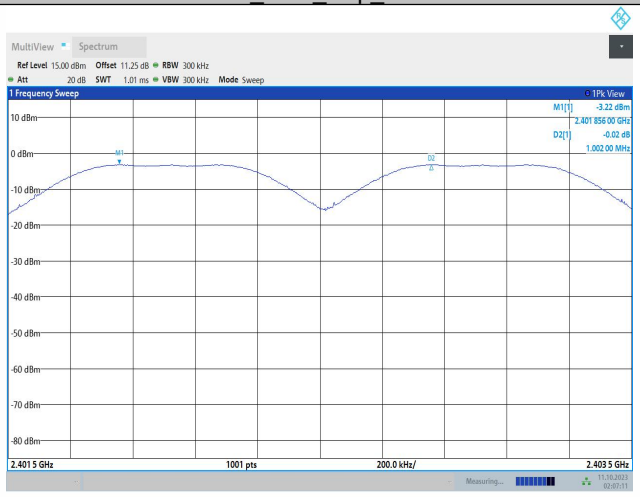
■ According to FCC Part15.247(a)(1)
The EUT must have its hopping function enabled. Use the following spectrum analyzersettings:
Set the RBW =100kHz. Set VBW =300kHz.
Set the span = wide enough to capture the peaks of two adjacent channels
Set Sweep time = auto couple.
Set Detector = peak. Set Trace mode = max hold.
Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section. Submit this plot.

9.2.5 Test Results

Temperature: 25℃ Test By: KK
Humidity: 45 %

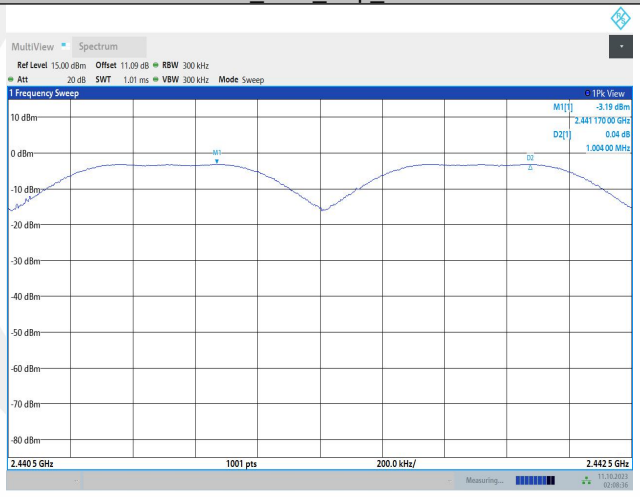
TestMode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Hop_2402	1.002	≥0.870	PASS
		Hop_2441	1.004	≥0.870	PASS
		Hop_2480	1.01	≥0.870	PASS
2DH5	Ant1	Hop_2402	1.016	≥0.867	PASS
		Hop_2441	1.024	≥0.867	PASS
		Hop_2480	1.004	≥0.867	PASS
3DH5	Ant1	Hop_2402	1.006	≥0.853	PASS
		Hop_2441	1.01	≥0.853	PASS
		Hop_2480	1.012	≥0.853	PASS

DH5_Ant1_Hop_2402



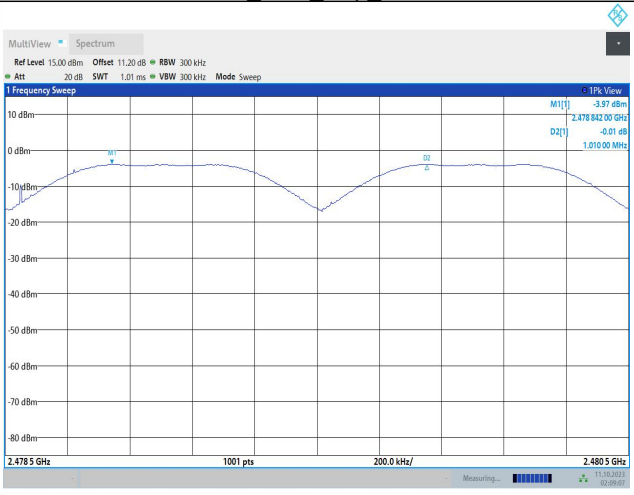
02:07:11 11.10.2023

DH5_Ant1_Hop_2441



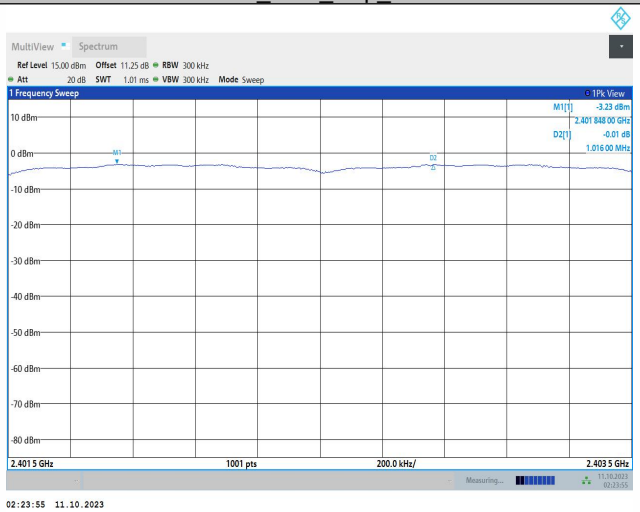
02:08:36 11.10.2023

DH5_Ant1_Hop_2480

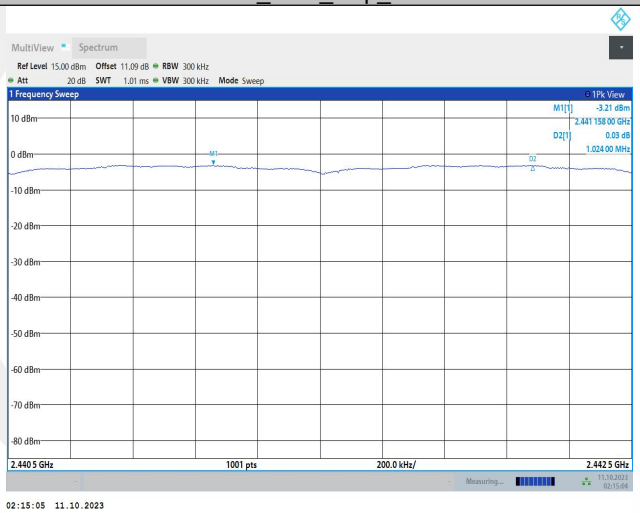


02:09:08 11.10.2023

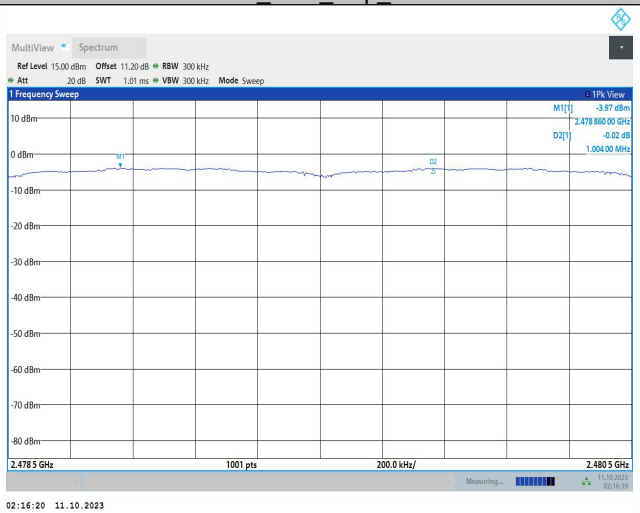
2DH5_Ant1_Hop_2402



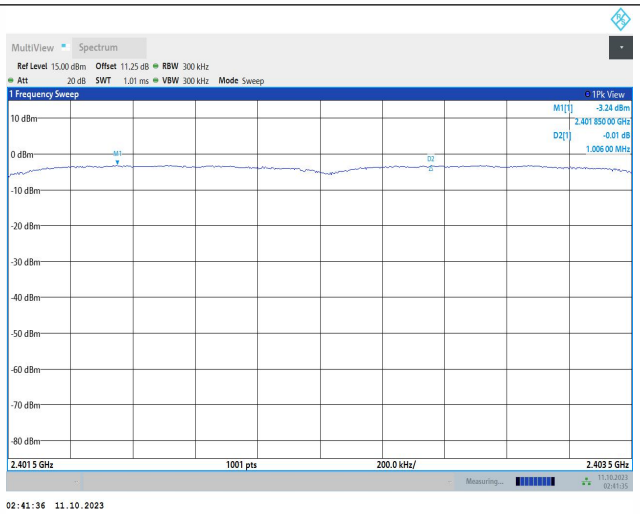
2DH5_Ant1_Hop_2441



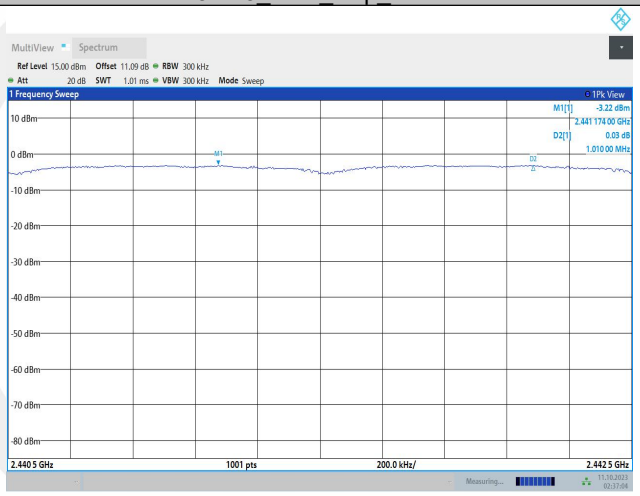
2DH5_Ant1_Hop_2480



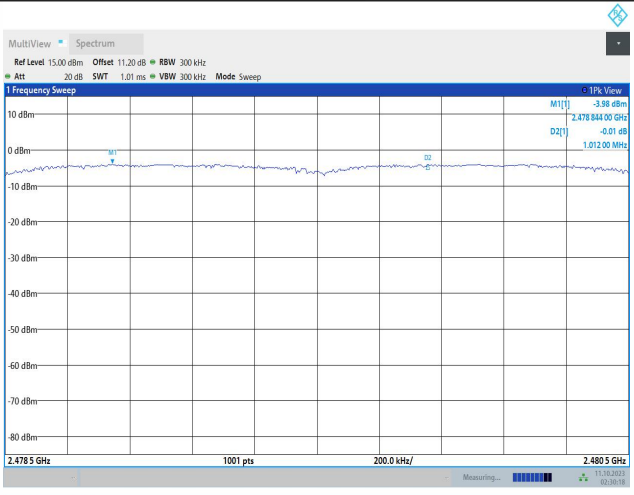
3DH5_Ant1_Hop_2402



3DH5_Ant1_Hop_2441



3DH5_Ant1_Hop_2480



9.3 NUMBER OF HOPPING FREQUENCIES

9.3.1 Applicable Standard

According to FCC Part 15.247(a)(1) (iii)and FCC KDB 558074 D01 15.247 Meas Guidance v05r02

9.3.2 Conformance Limit

Frequency hopping systems operating in the 2400-2483.5MHz band shall use at least15 channels.

9.3.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

9.3.4 Test Procedure

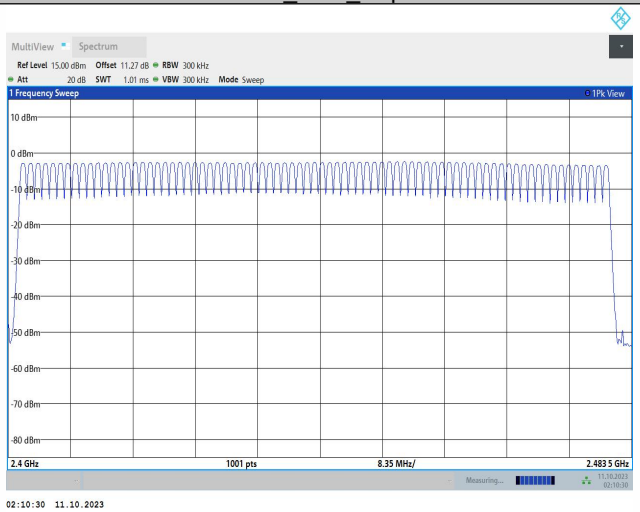
■ According to FCC Part15.247(a)(1)(iii)
The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = the frequency band of operation (2390-2440MHz) and(2440-2490MHz)
RBW = 100kHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. It may prove necessary to break the span up to sections, inorder to clearly show all of the hopping frequencies.

Test Results

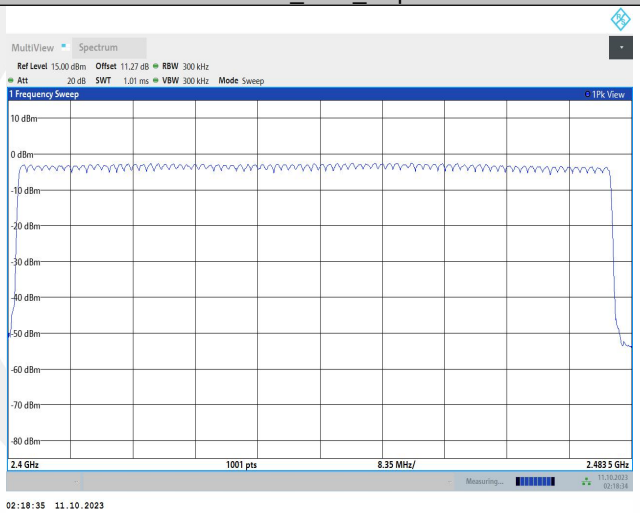
Bluetooth (GFSK, pi/4-DQPSK, 8DPSK) mode have been tested, and the worst result(GFSK)was report as below:
Temperature: 25℃ Test By: KK
Humidity: 45 %

TestMode	Antenna	Frequency[MHz]	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Hop	79	≥15	PASS
2DH5	Ant1	Hop	79	≥15	PASS
3DH5	Ant1	Hop	79	≥15	PASS

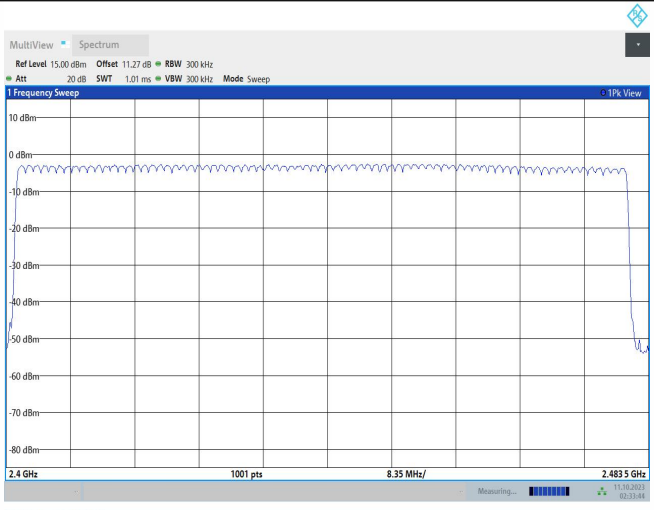
DH5_Ant1_Hop



2DH5_Ant1_Hop



3DH5_Ant1_Hop



9.4 AVERAGE TIME OF OCCUPANCY (DWELL TIME)

9.4.1 Applicable Standard

According to FCC Part 15.247(a)(1)(iii) and FCC KDB 558074 D01 15.247 Meas Guidance v05r02

9.4.2 Conformance Limit

For frequency hopping systems operating in the 2400-2483.5MHz band, the averagetime of occupancy on any channel shall not be greater than 0.4s within a period of 0.4smultiplied by the number of hopping channels employed.

9.4.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

9.4.4 Test Procedure

■ According to FCC Part15.247(a)(1)(iii)
The EUT must have its hopping function enabled. Use the following spectrum analyzersettings:
Span = zero span, centered on a hopping channel
RBW = 1 MHz
VBW ≥ RBW
Sweep = as necessary to capture the entire dwell time per hopping channel
Detector function = peak
Trace = max hold
If possible, use the marker-delta function to determine the dwell time. If this value
varies with different modes of operation (e.g., data rate, modulation format, etc.),
repeat this test for each variation. The limit is specified in one of the subparagraphsof this Section.

9.4.5 Test Results

Bluetooth (GFSK, pi/4-DQPSK, 8DPSK) mode have been tested, and the worst result(GFSK)was report as below:

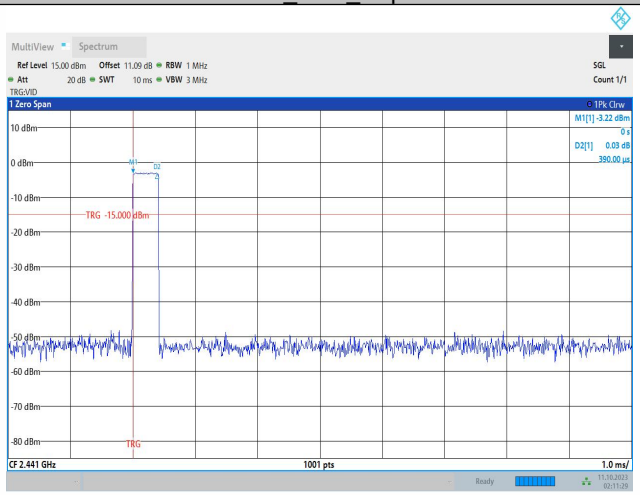
Temperature: 25℃ Test By: KK

Humidity: 45 %

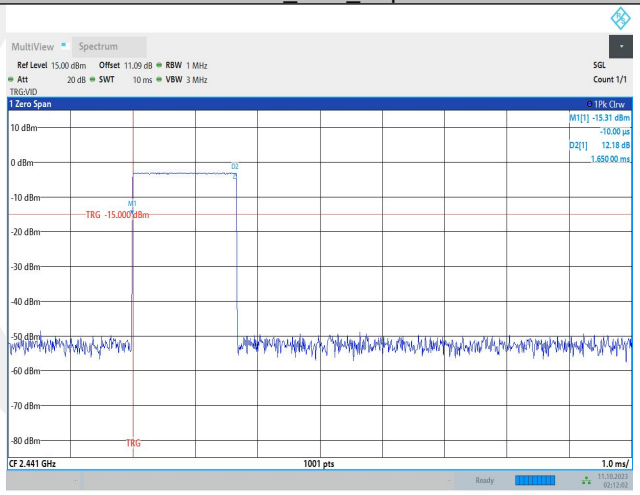
TestMode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Hop	0.390	320	0.125	≤0.4	PASS
DH3	Ant1	Hop	1.650	160	0.264	≤0.4	PASS
DH5	Ant1	Hop	2.900	106.67	0.309	≤0.4	PASS

Note1: DwellTime(DH1)=PW*(1600/2/79)*31.6
DwellTime(DH3)=PW*(1600/4/79)*31.6
DwellTime(DH5)=PW*(1600/6/79)*31.6

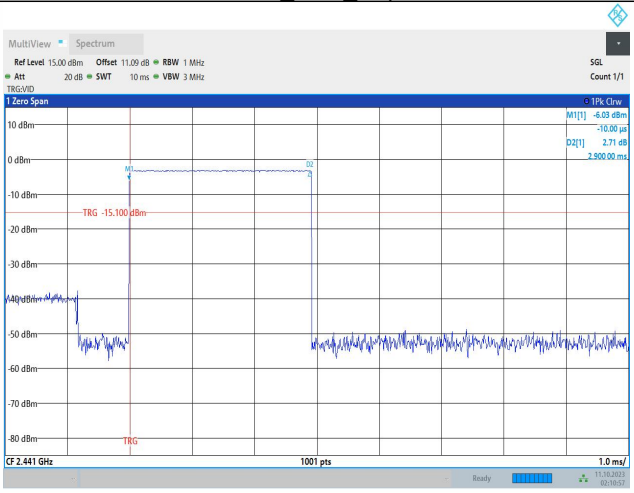
DH1_Ant1_Hop



DH3_Ant1_Hop



DH5_Ant1_Hop



9.5 MAXIMUM PEAK CONDUCTED OUTPUT POWER

9.5.1 Applicable Standard

According to FCC Part 15.247(b)(1) and FCC KDB 558074 D01 15.247 Meas Guidance v05r02

9.5.2 Conformance Limit

The max For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

9.5.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

9.5.4 Test Procedure

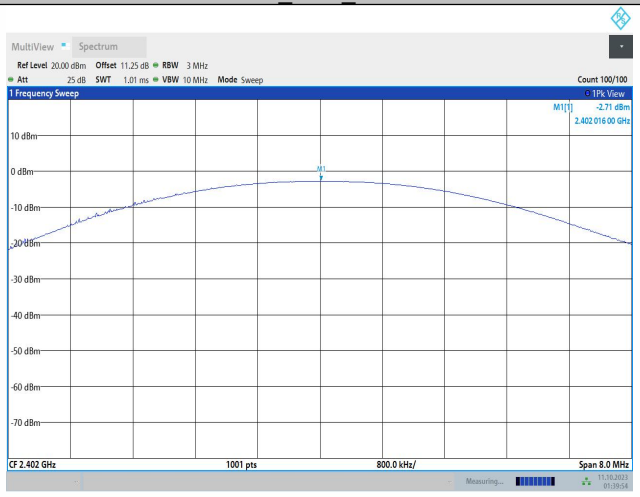
■ According to FCC Part15.247(b)(1)
As an alternative to a peak power measurement, compliance with the limit can be based on a measurement of the maximum conducted output power.
Use the following spectrum analyzer settings:
Set Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel(about 10MHz)
Set RBW > the 20 dB bandwidth of the emission being measured(about 3MHz)
Set VBW ≥ RBW
Set Sweep = auto
Set Detector function = peak
Set Trace = max hold
Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emissionto determine the peak amplitude level.

Test Results

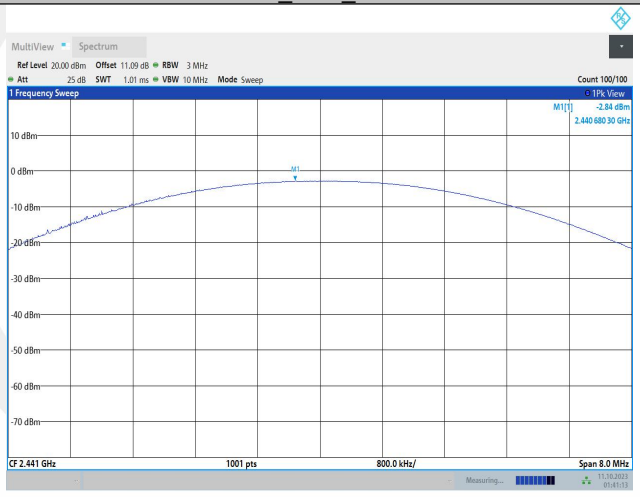
Temperature: 23℃ Test By: KK
Humidity: 53 %

Test Mode	Antenna	Frequency[MHz]	Conducted Peak Powert[dBm]	Conducted Limit[dBm]	Verdict
DH5	Ant1	2402	-2.71	≤20.97	PASS
		2441	-2.84	≤20.97	PASS
		2480	-3.73	≤20.97	PASS
2DH5	Ant1	2402	-0.61	≤20.97	PASS
		2441	-0.57	≤20.97	PASS
		2480	-1.43	≤20.97	PASS
3DH5	Ant1	2402	-0.14	≤20.97	PASS
		2441	-0.14	≤20.97	PASS
		2480	-0.99	≤20.97	PASS

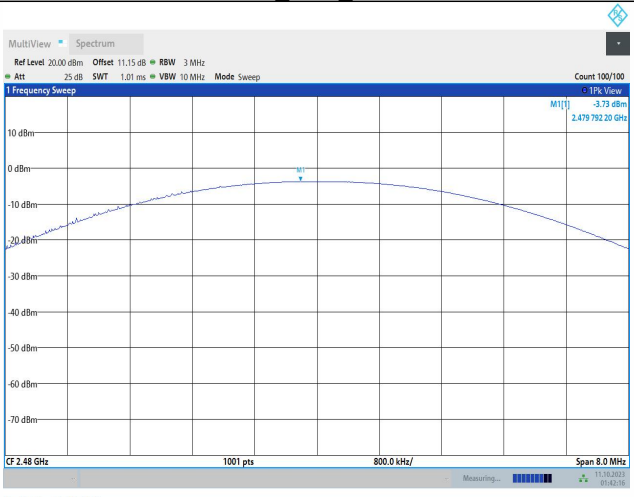
DH5_Ant1_2402

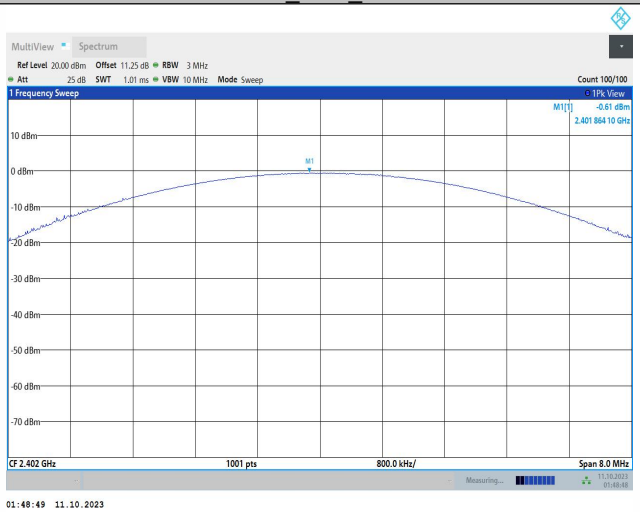
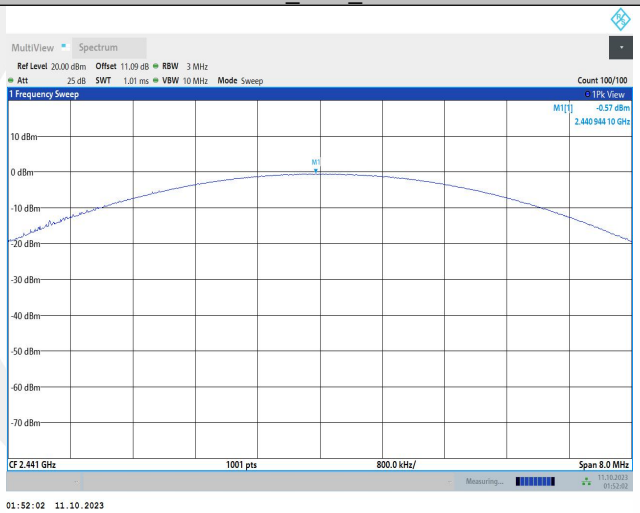
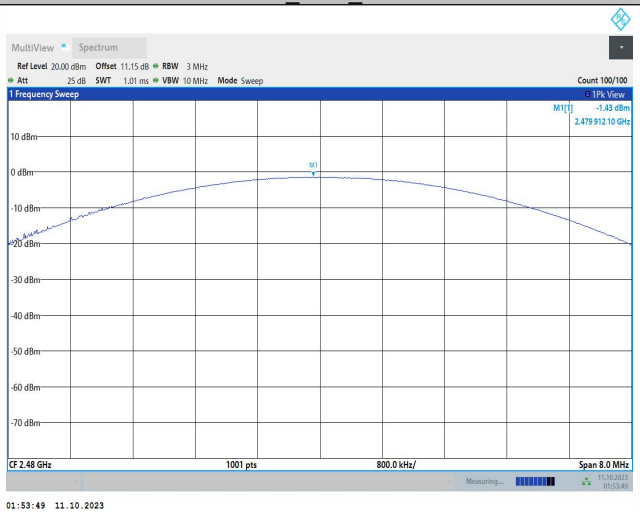


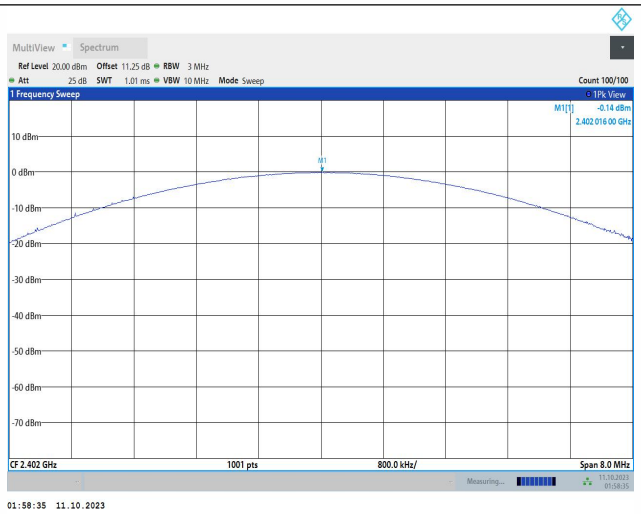
DH5_Ant1_2441



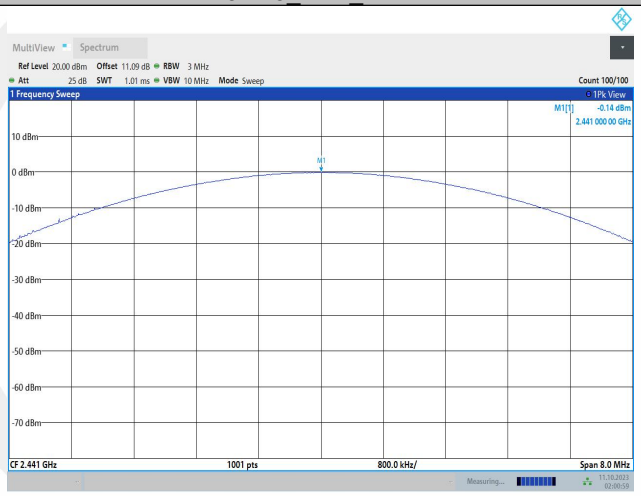
DH5_Ant1_2480



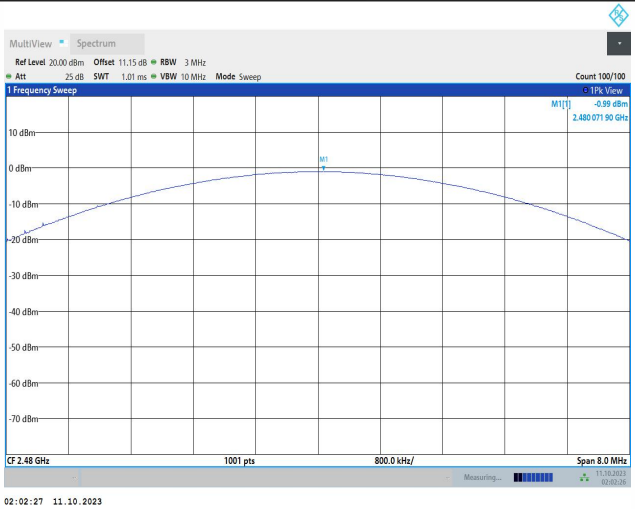
2DH5_Ant1_2402

2DH5_Ant1_2441

2DH5_Ant1_2480

3DH5_Ant1_2402



3DH5_Ant1_2441



3DH5_Ant1_2480



9.6 CONDUCTED SUPRIOUS EMISSION

9.6.1 Applicable Standard

According to FCC Part 15.247(d) and FCC KDB 558074 D01 15.247 Meas Guidance v05r02

9.6.2 Conformance Limit

According to FCC Part 15.247(d):
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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, provided the transmitter demonstrates compliance with the peak conducted power limits.

9.6.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

9.6.4 Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer

- **Reference level measurement**

Establish a reference level by using the following procedure:
Set instrument center frequency to DSS channel center frequency.
Set Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel.
Set the RBW = 100 kHz. Set the VBW ≥ 3 x RBW.
Set Detector = peak. Set Sweep time = auto couple.
Set Trace mode = max hold. Allow trace to fully stabilize.
Use the peak marker function to determine the maximum Maximumconducetedlevel.
Note that the channel found to contain the maximum conduceted level can be used to establish the reference level.

- **Band-edge Compliance of RF Conducted Emissions**

Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the emission operating on the channel closest to the band-edge, as well as any modulation products which fall outside of the authorized band of operation
Set RBW ≥ 1% of the span=100kHzSet VBW ≥ RBW
Set Sweep = autoSetDetector function = peakSetTrace = max hold
Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission.
The marker-delta value now displayed must comply with the limit specified in this Section.
Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

- **ConducetedSpurious RF Conducted Emission**

Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic.(30MHz to 25GHz).Set RBW = 100 kHzSetVBW ≥ RBW
Set Sweep = autoSetDetector function = peakSetTrace = max hold
Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section.

9.6.5 Test Results

Bluetooth (GFSK, pi/4-DQPSK, 8DPSK) mode have been tested, and the worst result was report as below:

Reference level measurement

TestMode	Antenna	Freq(MHz)	Max.Point[MHz]	Result[dBm]
DH5	Ant1	2402	2402.02	-3.34
		2441	2441.01	-3.28
		2480	2479.85	-4.13
2DH5	Ant1	2402	2402.02	-3.33
		2441	2441.02	-3.29
		2480	2480.01	-4.11
3DH5	Ant1	2402	2402.02	-3.32
		2441	2441.01	-3.29
		2480	2480.01	-4.14

Band edge measurements

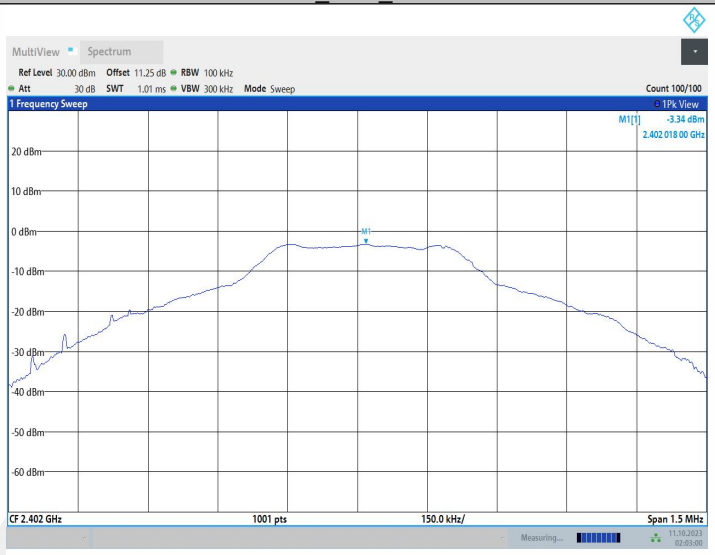
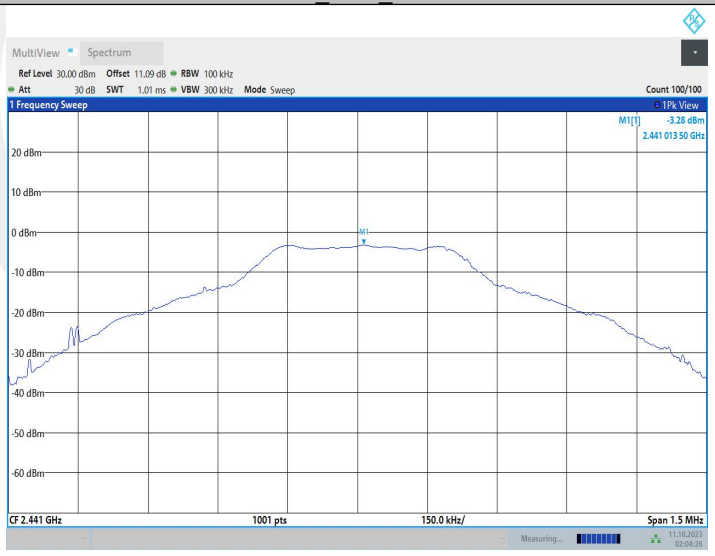
TestMode	Antenna	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	Low	2402	-3.34	-55.55	≤-23.34	PASS
		High	2480	-4.13	-56.78	≤-24.13	PASS
		Low	Hop_2402	-3.40	-56.36	≤-23.4	PASS
		High	Hop_2480	-4.19	-57.18	≤-24.19	PASS
2DH5	Ant1	Low	2402	-3.33	-54.98	≤-23.33	PASS
		High	2480	-4.11	-57.02	≤-24.11	PASS
		Low	Hop_2402	-3.37	-56.41	≤-23.37	PASS
		High	Hop_2480	-4.03	-56.11	≤-24.03	PASS
3DH5	Ant1	Low	2402	-3.32	-55.12	≤-23.32	PASS
		High	2480	-4.14	-56.15	≤-24.14	PASS
		Low	Hop_2402	-3.36	-54.97	≤-23.36	PASS
		High	Hop_2480	-4.04	-55.26	≤-24.04	PASS

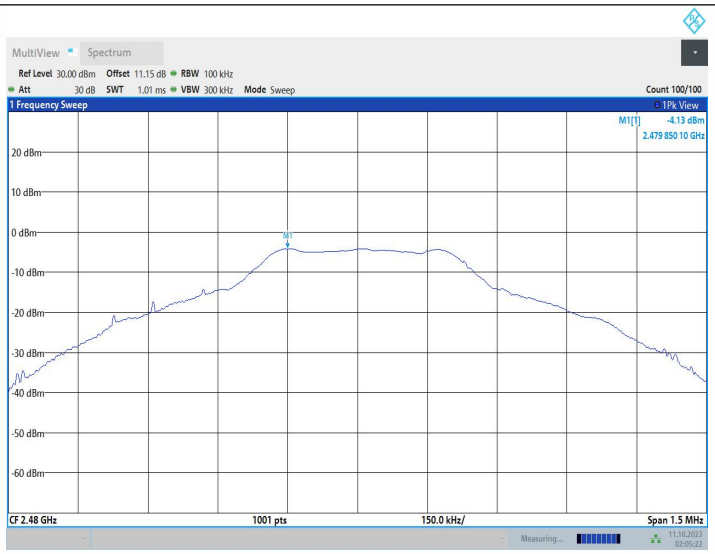
the hopping worst case is DH5 mode

Conducted Spurious Emission

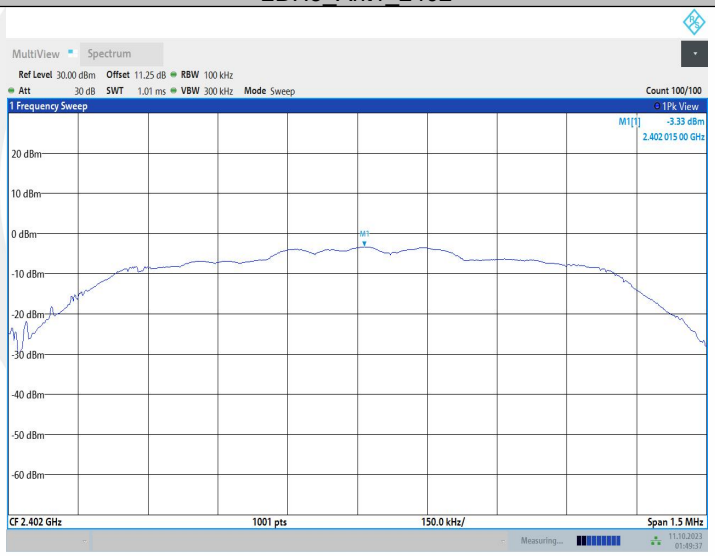
TestMode	Antenna	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Ant1	2402	30~1000	-3.34	-53.59	≤-23.34	PASS
			1000~26500	-3.34	-40.29	≤-23.34	PASS
		2441	30~1000	-3.28	-53.37	≤-23.28	PASS
			1000~26500	-3.28	-41.26	≤-23.28	PASS
		2480	30~1000	-4.13	-53.62	≤-24.13	PASS
			1000~26500	-4.13	-39.39	≤-24.13	PASS
2DH5	Ant1	2402	30~1000	-3.33	-53.34	≤-23.33	PASS
			1000~26500	-3.33	-39.46	≤-23.33	PASS
		2441	30~1000	-3.29	-52.81	≤-23.29	PASS
			1000~26500	-3.29	-38.43	≤-23.29	PASS
		2480	30~1000	-4.11	-53.31	≤-24.11	PASS
			1000~26500	-4.11	-41.57	≤-24.11	PASS
3DH5	Ant1	2402	30~1000	-3.32	-53.26	≤-23.32	PASS
			1000~26500	-3.32	-39.73	≤-23.32	PASS
		2441	30~1000	-3.29	-53.59	≤-23.29	PASS
			1000~26500	-3.29	-38.48	≤-23.29	PASS
		2480	30~1000	-4.14	-53.18	≤-24.14	PASS
			1000~26500	-4.14	-42.81	≤-24.14	PASS

Reference level measurement

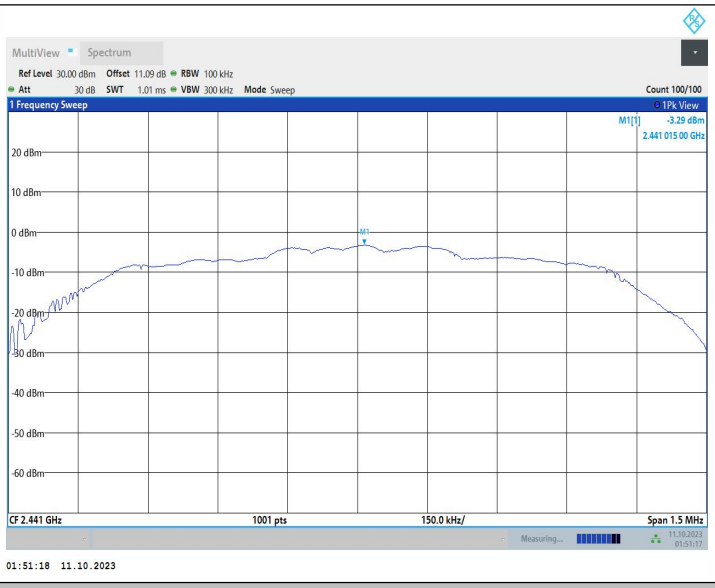
DH5_Ant1_2402

DH5_Ant1_2441

DH5_Ant1_2480



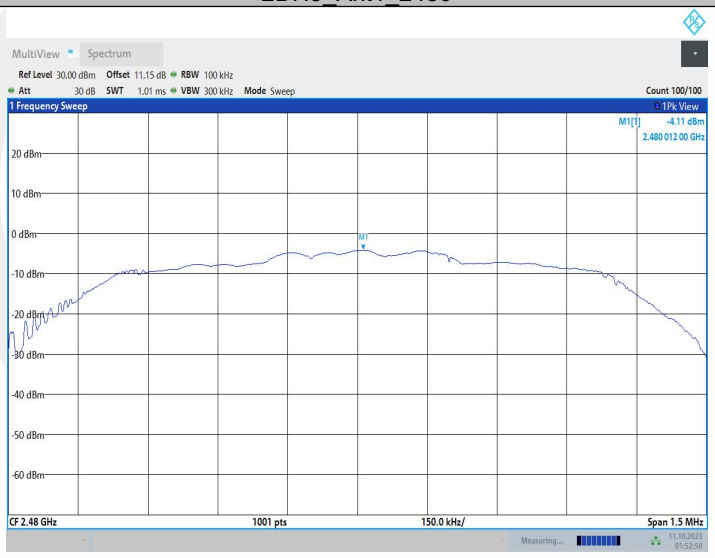
2DH5_Ant1_2402



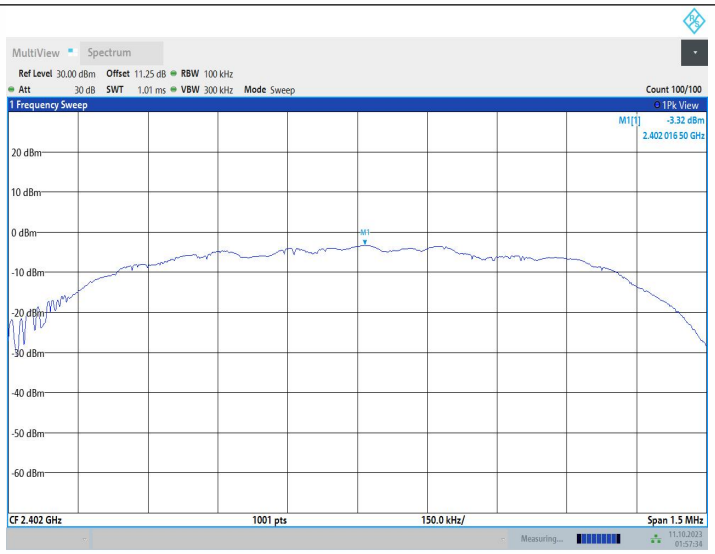
2DH5_Ant1_2441



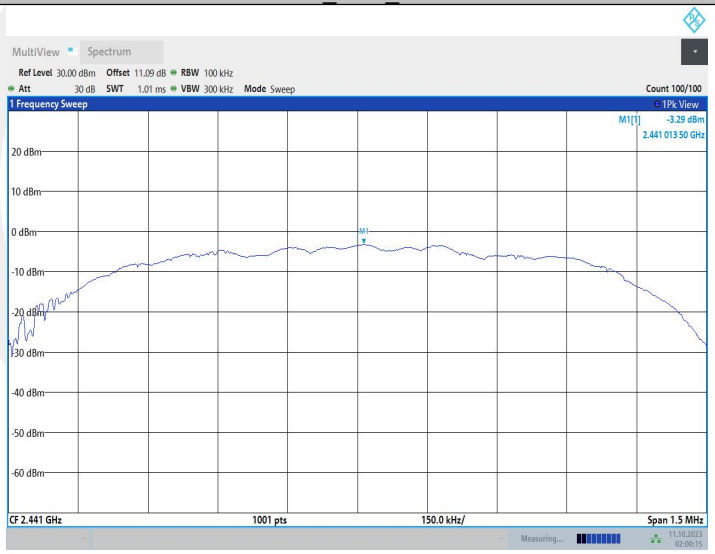
2DH5_Ant1_2480



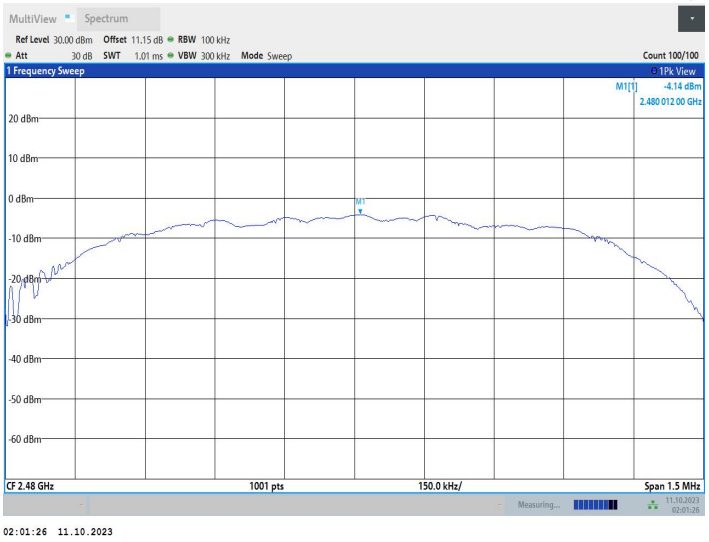
3DH5_Ant1_2402



3DH5_Ant1_2441

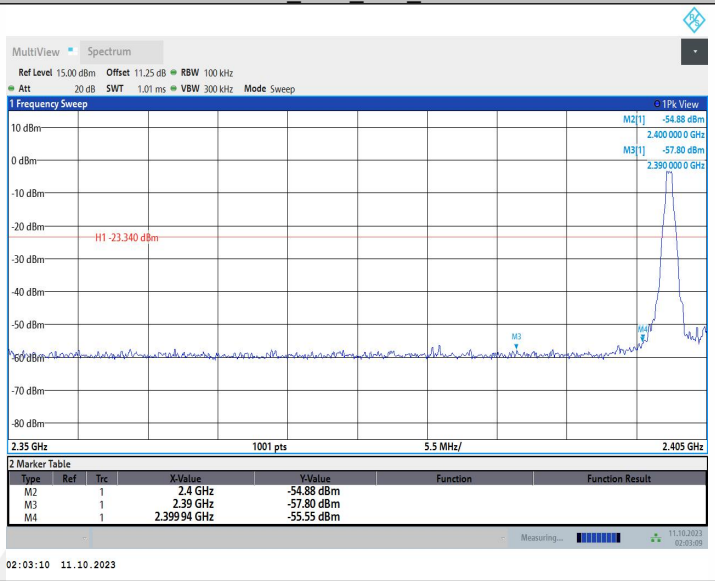


3DH5_Ant1_2480

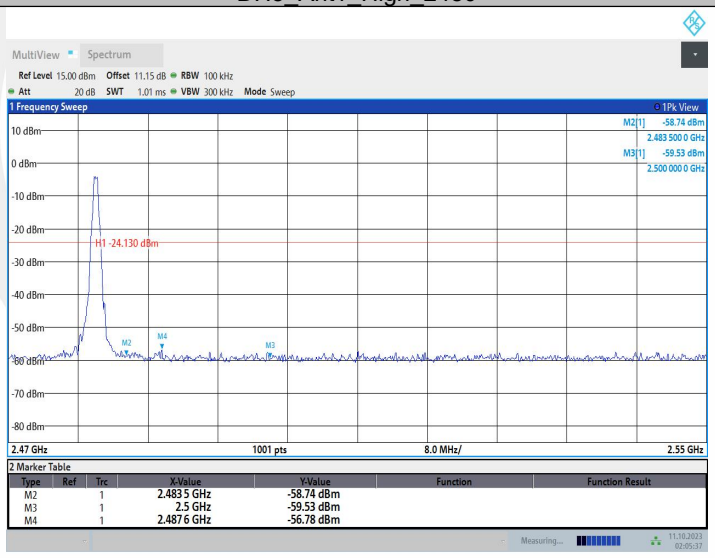

MultiView
Spectrum
Ref Level 30.00 dBm Offset 11.15 dB RBW 100 kHz
Att 30 dB SWT 1.01 ms VBW 300 kHz Mode Sweep
Count 100/100
1 Frequency Sweep
1Pk View
M1[1] -4.14 dBm
2.480 012 00 GHz
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
M1
CF 2.48 GHz
1001 pts
150.0 kHz/
Span 1.5 MHz
Measuring...
02:01:26 11.10.2023

Band edge measurements

DH5_Ant1_Low_2402



DH5_Ant1_High_2480



DH5_Ant1_Low_Hop_2402