FCC TEST REPORT

FCC ID: 2BX28-TUMAI20

On Behalf of

Yiwu Tumai Clothing Co., Ltd

Bluetooth speaker

Model No.: 20 Sound Cup

Prepared for	:	Yiwu Tumai Clothing Co., Ltd
Address	:	Room 1502, Building A, Shihang Center, No. 887, Chengbei Road, Yiwu City, Zhejiang Province

Prepared By	:	Shenzhen PSI Testing Co., Ltd.
Address	:	1-2/F., Building 5, Yudafu Industrial Park, No.10, Xingye West Road, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China

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TEST REPORT DECLARATION

Applicant	:	Yiwu Tumai Clothing Co., Ltd
Address	:	Room 1502, Building A, Shihang Center, No. 887, Chengbei Road, Yiwu City, Zhejiang Province
Manufacturer	:	Yiwu Tumai Clothing Co., Ltd
Address	:	Room 1502, Building A, Shihang Center, No. 887, Chengbei Road, Yiwu City, Zhejiang Province
EUT Description	:	Bluetooth speaker
		(A) Model No. : 20 Sound Cup
		(B) Trademark : N/A

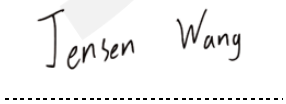
Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247

Test Result: PASS

The device described above is tested by Shenzhen PSI Testing Co., Ltd. to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The test results are contained in this test report and Shenzhen PSI Testing Co., Ltd. is assumed full responsibility for the accuracy and completeness of test. Also, this report shows that the EUT is technically compliant with the FCC Part 15C requirements.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen PSI Testing Co., Ltd.

Tested by (name + signature).....:	Jensen Wang Test Engineer	
Approved by (name + signature).....:	Simple Guan Project Manager	
Date of issue.....:	September 11, 2026	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	September 11, 2026	Initial released Issue	Jensen Wang

1. Summary Of Standards And Results

1.1. Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Test Item	Standards Paragraph	Result
Maximum Peak Output Power	FCC Part 15: 15.247(b)(1), ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024	P
Bandwidth	FCC Part 15: 15.215, ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024	P
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1), ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024	P
Number Of Hopping Channel	FCC Part 15: 15.247(a)(1), ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024	P
Dwell Time	FCC Part 15: 15.247(a)(1), ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024	P
Radiated Spurious Emission	FCC Part 15: 15.209, FCC Part 15: 15.247(d), ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024	P
Out-of-band Emissions	FCC Part 15: 15.247(d) , ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024	P
Radiated Band Edge Emission	FCC Part 15: 15.247(d), ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024	P
Power Line Conducted Emissions	FCC Part 15: 15.207, ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024	P
Antenna requirement	FCC Part 15: 15.203	P

Note: 1. P is an abbreviation for Pass.

2. F is an abbreviation for Fail.

3. N/A is an abbreviation for Not Applicable.

4. Conclusion determination rules of this report: Unless there are clear provisions on measurement uncertainty in the standard or customer requirements, decision by actual test data without considering measurement uncertainty.

5. Measurement method usage KDB 558074 D01 15.247 Meas Guidance v05r02.

2. General Information

2.1. Description of Device (EUT)

Product Name	:	Bluetooth speaker
Model No.	:	20 Sound Cup
Diff	:	N/A
Power supply	:	DC 3.7V from battery, DC 5V from USB
Radio Technology	:	Bluetooth V5.4 EDR
Operation frequency	:	2402-2480MHz
Channel No.	:	79 channels
Channel Separation	:	1MHz
Modulation	:	GFSK, π/4-DQPSK, 8DPSK
Antenna Type	:	Internal Antenna, max gain -0.48dBi
PMN	:	N/A
HVIN	:	N/A
Software version	:	N/A
Hardware version/FVIN	:	N/A
Note	:	1.Antenna information is provided by applicant. Testing lab is not responsible for the accuracy of the information.

2.2. Accessories of Device (EUT)

Accessories 1 : N/A

Manufacturer : N/A

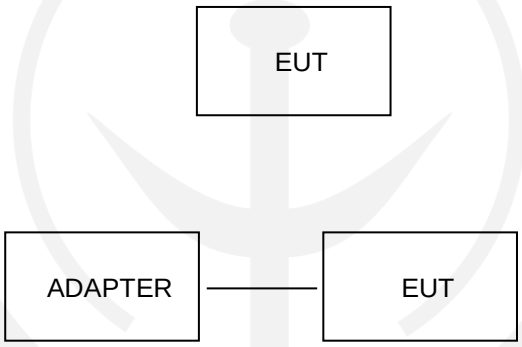
Model : N/A

Rating : N/A

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number
1	Adapter	Baseus	CCXFK65CC	N/A
2	USB Cable	N/A	N/A	N/A

2.4. Block Diagram of connection between EUT and simulators



2.5. Test Mode Description

The test software used to control EUT work in Continuous TX mode, and select test channel, wireless mode

Tested mode, channel, and data rate information		
Mode	Channel	Frequency (MHz)
GFSK / Pi/4-DQPSK / 8DPSK Carrier Tx Mode	CH0	2402
	CH39	2441
	CH78	2480
GFSK / Pi/4-DQPSK / 8DPSK hopping on Tx Mode	CH0	2402
	CH39	2441
	CH78	2480
GFSK / Pi/4-DQPSK / 8DPSK hopping off Tx Mode	CH0	2402
	CH39	2441
	CH78	2480

2.6. Software test version and power setting information

Software testing version	FCC assist.exe		
Mode	The client 's preset testing software is used to control the operation of EUT in continuous transmission mode and select the testing channel, wireless mode:		
Power level setup by client			
Mode	Channel	Frequency (MHz)	Soft Set
GFSK, Pi/4-DQPSK, 8DPSK	CH0	2402	TX level is set as defaults value.
	CH39	2441	TX level is set as defaults value.
	CH78	2480	TX level is set as defaults value.

2.7. Test Conditions

Items	Required	Actual
Temperature range:	15-35℃	26℃
Humidity range:	25-75%	54%
Pressure range:	86-106kPa	101kPa

2.8. Test Facility

Shenzhen PSI Testing Co., Ltd.

1-2/F., Building 5, Yudafu Industrial Park, No.10, Xingye West Road, Shajing Subdistrict, Bao'an District, Shenzhen, Guangdong, China

September 13, 2023 File on Federal Communication Commission
Registration Number: 916281

September 21, 2023 Certificated by IC
Registration Number: 31123
CAB identifier: CN0158

2.9. Measurement Uncertainty

(95% confidence levels, k=2)

Item	Uncertainty
Power Line Conducted Emissions Test	2.13dB
Radiation Emission test in 3m chamber(below 30MHz)	4.07dB
Radiation Emission test in 3m chamber(30MHz to 1GHz)	4.51dB
Radiation Emission test in 3m chamber(1GHz to 18GHz)	5.07dB
Radiation Emission test in 3m chamber(18GHz to 40GHz)	5.21dB
Radio Frequency	48.24KHz
Conducted RF Power	0.41dB
Power Spectral Density	0.39 dB
Occupied-Bandwidth	968Hz
Duty Cycle	1%
Conducted-Spurious Emission	1.26dB

2.10.Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware Version	Last Cal.	Cal. Interval
1.	9*6*6 anechoic chamber	SKET	9*6*6	N/A	/	2025.12.18	3 Year
2.	Test Receiver	Rohde&Schwarz	ESCI 7	101032/003	4.42 SP3	2025.12.18	1 Year
3.	L.I.S.N.#1	Rohde&Schwarz	ENV216	102282	/	2025.12.18	1 Year
4.	L.I.S.N.#2	RFT	NNB111	13835240	/	2025.12.18	1 Year
5.	Loop Antenna	Schwarz beck	FMZB 1519B	00128	/	2025.01.02	2 Year
6.	Bilog Antenna	Schwarz beck	VULB 9168	01448	/	2025.01.02	2 Year
7.	Spectrum Analyzer	Rohde&Schwarz	FSV-40N	101648	3.70	2025.12.18	1 Year
8.	Horn Antenna	Schwarz beck	BBHA 9120 D	02706	/	2025.01.02	2 Year
9.	Amplifier	SKET	LAPA_01G18G-45dB	SK2022032901	/	2025.12.18	1 Year
10.	Horn Antenna	Schwarz beck	BBHA 9170	00946	/	2024.12.31	2 Year
11.	Amplifier	SKET	LNPA_0118G-45	SK2020010801	/	2025.12.18	1 Year
12.	RF Power Probe	Rohde&Schwarz	NRP-Z11	1138.3004.02-11 11533-Fz	/	2025.12.18	1 Year
13.	RF Sensor Unit	Tachoy	TR1029-2	20220428P008	/	2025.12.18	1 Year
14.	Spectrum Analyzer	Agilent	N9020A	MY51281067	A.14.03	2025.12.18	1 Year
15.	Temp. & Humid Chamber	Auchno	9606	/	/	2025.12.18	1 Year
16.	Regulated DC Power Supply	Xinouhua	ADC120V10A	202211251638	/	2025.12.18	1 Year
17.	Cable	SKET	Cable-RE-1	#02/#03	/	2025.12.18	1 Year
18.	Cable	SKET	Cable-RE-2	#01	/	2025.12.18	1 Year
19.	Cable	SKET	Cable-RE-3	#04	/	2025.12.18	1 Year
20.	Cable	SKET	Cable-CE-1	A-E-24	/	2025.12.18	1 Year
21.	6dB Attenuator	Schwarzbeck	DGA 9552N 6dB	CK4186	/	2025.12.18	1 Year
22.	Power meter	Agilent	E4419B	GB40202121	/	2025.12.18	1 Year
23.	Comprehensive Test Instrument	Rohde&Schwarz	CMW 500	145266	/	2025.12.18	1 Year

For Test Software Information

Item	Software Name	Manufacturer	Version
RE	EZ_EMC	Farad	PSI-3A1
CE	EZ_EMC	Farad	PSI-3A1
RF	RTS	TACHOY	V1.0.0

3. Maximum Peak Output Power

3.1. Limit

Please refer FCC part 15.247.

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts, the e.i.r.p shall not exceed 4W

3.2. Test Procedure

ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024, section 7.8.5 Maximum peak conducted output power.

This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:

a) Use the following spectrum analyzer settings:

1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.

2) RBW > 20 dB bandwidth of the emission being measured.

3) VBW >= RBW.

4) Sweep: Auto.

5) Detector function: Peak.

6) Trace: Max hold.

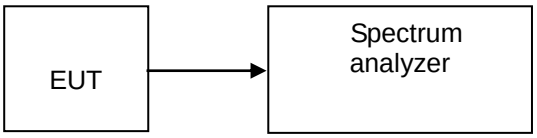
b) Allow trace to stabilize.

c) Use the marker-to-peak function to set the marker to the peak of the emission.

d) The indicated level is the peak output power, after any corrections for external attenuators and cables.

e) A plot of the test results and setup description shall be included in the test report.

3.3. Test Setup



3.4. Test Result

Condition	Antenna	Modulation	Frequency (MHz)	Max. Conducted Power(dBm)	Max. Conducted Power(mW)	Limit(mW)	Result
NVNT	ANT1	1-DH1	2402.00	-0.72	0.85	1000	Pass
NVNT	ANT1	1-DH1	2441.00	-1.18	0.76	1000	Pass
NVNT	ANT1	1-DH1	2480.00	-1.40	0.72	1000	Pass
NVNT	ANT1	2-DH1	2402.00	0.29	1.07	125	Pass
NVNT	ANT1	2-DH1	2441.00	-0.17	0.96	125	Pass
NVNT	ANT1	2-DH1	2480.00	-0.44	0.90	125	Pass
NVNT	ANT1	3-DH1	2402.00	**1.23**	1.33	125	Pass
NVNT	ANT1	3-DH1	2441.00	0.75	1.19	125	Pass
NVNT	ANT1	3-DH1	2480.00	0.39	1.09	125	Pass

Peak_Output_Power_NVNT_ANT1_1-DH1_2402_00

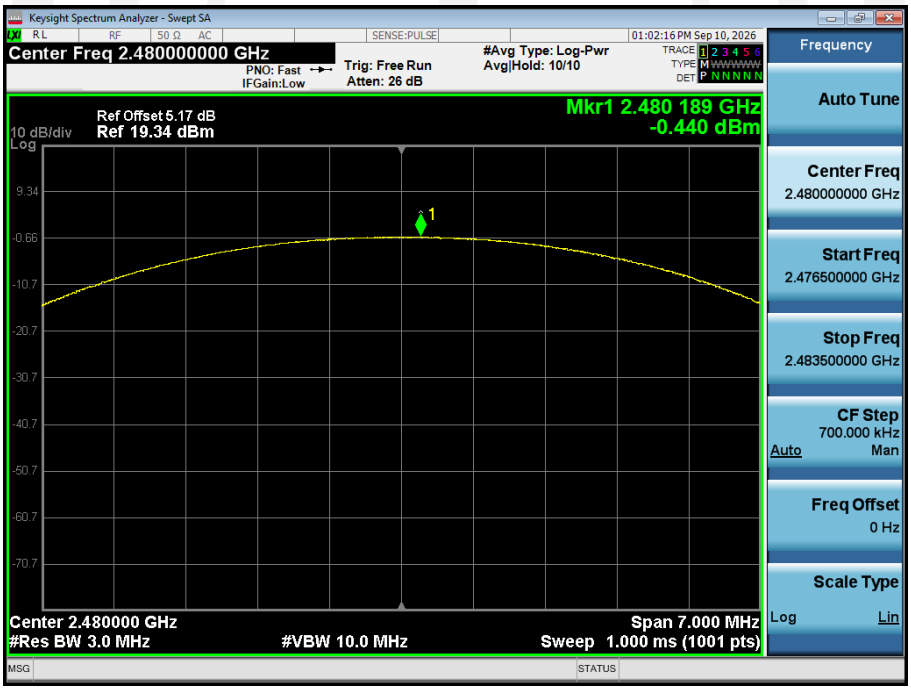
Peak_Output_Power_NVNT_ANT1_1-DH1_2441_00

Peak_Output_Power_NVNT_ANT1_1-DH1_2480_00

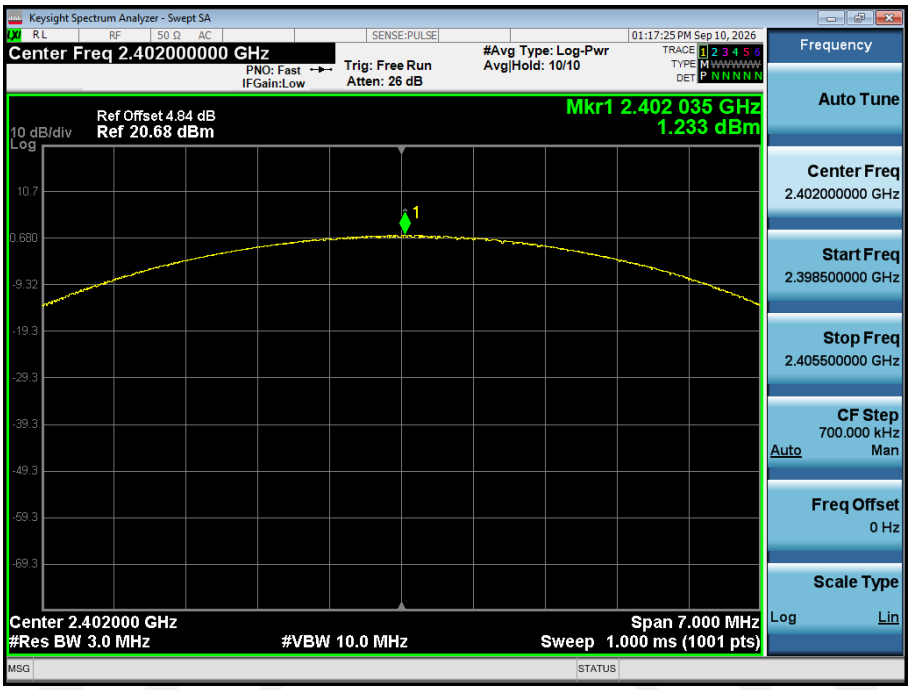
Peak_Output_Power_NVNT_ANT1_2-DH1_2402_00

Peak_Output_Power_NVNT_ANT1_2-DH1_2441_00

Peak_Output_Power_NVNT_ANT1_2-DH1_2480_00



Peak_Output_Power_NVNT_ANT1_3-DH1_2402_00



Peak_Output_Power_NVNT_ANT1_3-DH1_2441_00

Peak_Output_Power_NVNT_ANT1_3-DH1_2480_00

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω
AC
SENSE:PULSE
01:23:29 PM Sep 10, 2026
Center Freq 2.480000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 22 dB
#Avg Type: Log-Pwr
Avg|Hold: 10/10
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P N N N N N
Ref Offset 5.17 dB
10 dB/div
Log
Ref 15.34 dBm
Mkr1 2.480 021 GHz
0.391 dBm
5.34
-4.66
-14.7
-24.7
-34.7
-44.7
-54.7
-64.7
-74.7
1
Center 2.480000 GHz
#Res BW 3.0 MHz
#VBW 10.0 MHz
Span 7.000 MHz
Sweep 1.000 ms (1001 pts)
MSG
STATUS
Frequency
Auto Tune
Center Freq
2.480000000 GHz
Start Freq
2.476500000 GHz
Stop Freq
2.483500000 GHz
CF Step
700.000 kHz
Auto
Man
Freq Offset
0 Hz
Scale Type
Log
Lin

4. Bandwidth

4.1. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in FCC Section 15.247(a)(1), must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

4.2. Test Procedure

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d) Steps a) through c) might require iteration to adjust within the specified tolerances.

e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “−xx dB down” requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.

f) Set detection mode to peak and trace mode to max hold.

g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).

h) Determine the “−xx dB down amplitude” using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

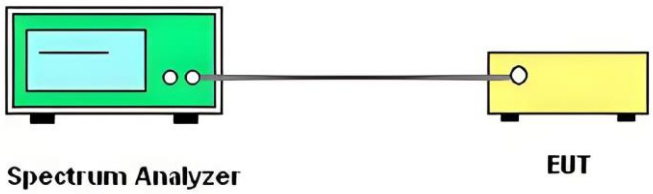
i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).

j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “-xx dB down amplitude” determined in step h). If a marker is below this “−xx dB down amplitude” value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the “-xx dB down amplitude” determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument

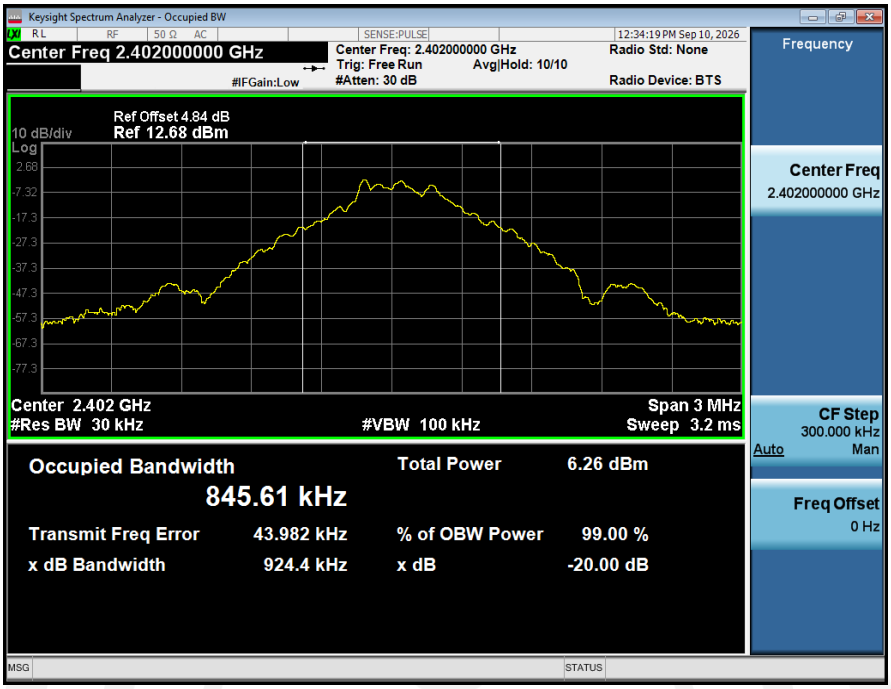
display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

4.3. Test Setup



4.4. Test Result

Condition	Antenna	Modulation	Frequency (MHz)	-20dB BW(MHz)	if larger than CFS
NVNT	ANT1	1-DH1	2402.00	0.924	No
NVNT	ANT1	1-DH1	2441.00	0.917	No
NVNT	ANT1	1-DH1	2480.00	0.878	No
NVNT	ANT1	2-DH1	2402.00	1.265	Yes
NVNT	ANT1	2-DH1	2441.00	1.255	Yes
NVNT	ANT1	2-DH1	2480.00	1.253	Yes
NVNT	ANT1	3-DH1	2402.00	1.225	Yes
NVNT	ANT1	3-DH1	2441.00	1.249	Yes
NVNT	ANT1	3-DH1	2480.00	1.250	Yes

-20dB_Bandwidth_NVNT_ANT1_1-DH1_2402_00


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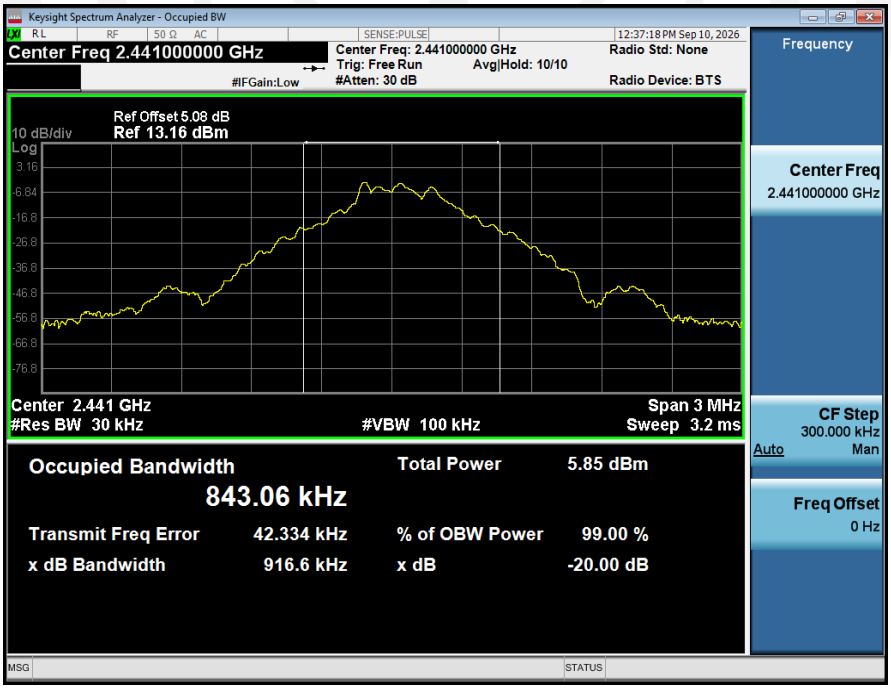

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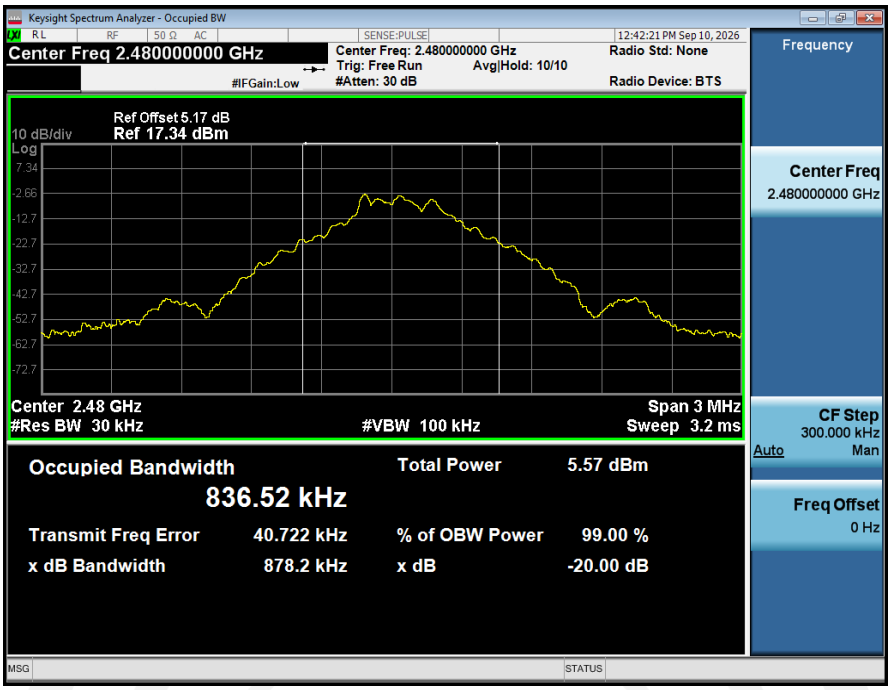

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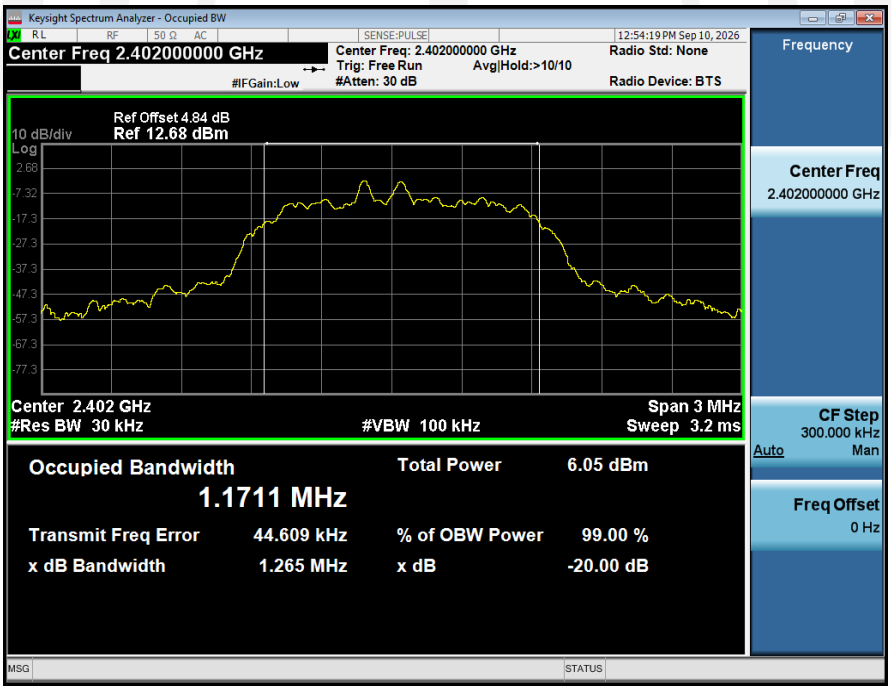

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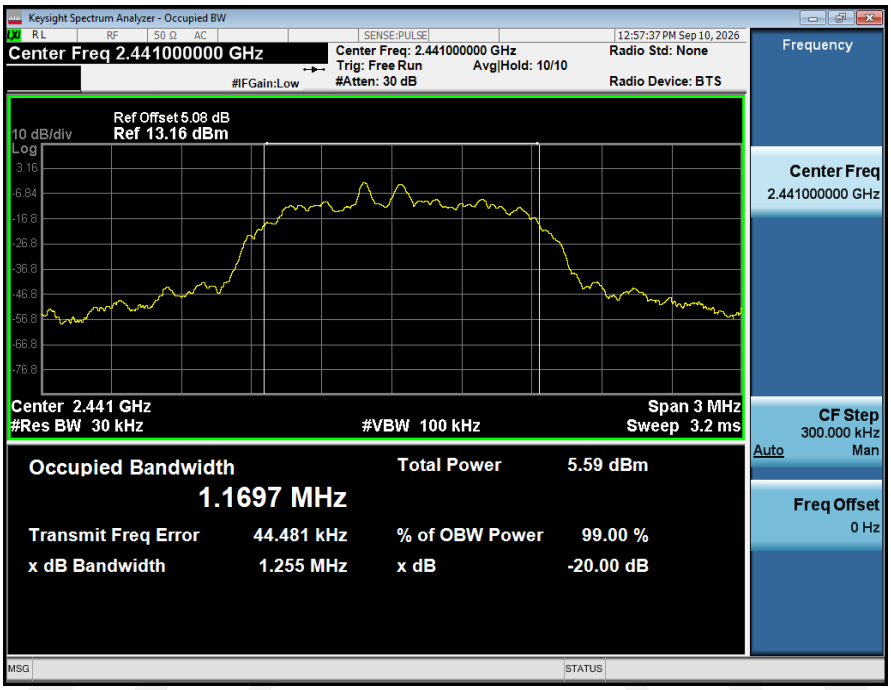
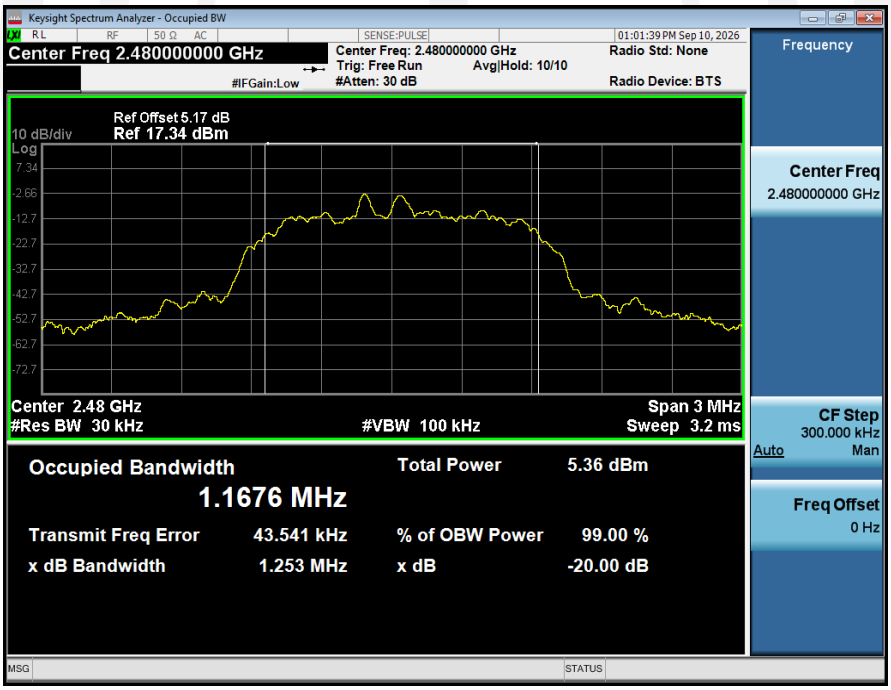
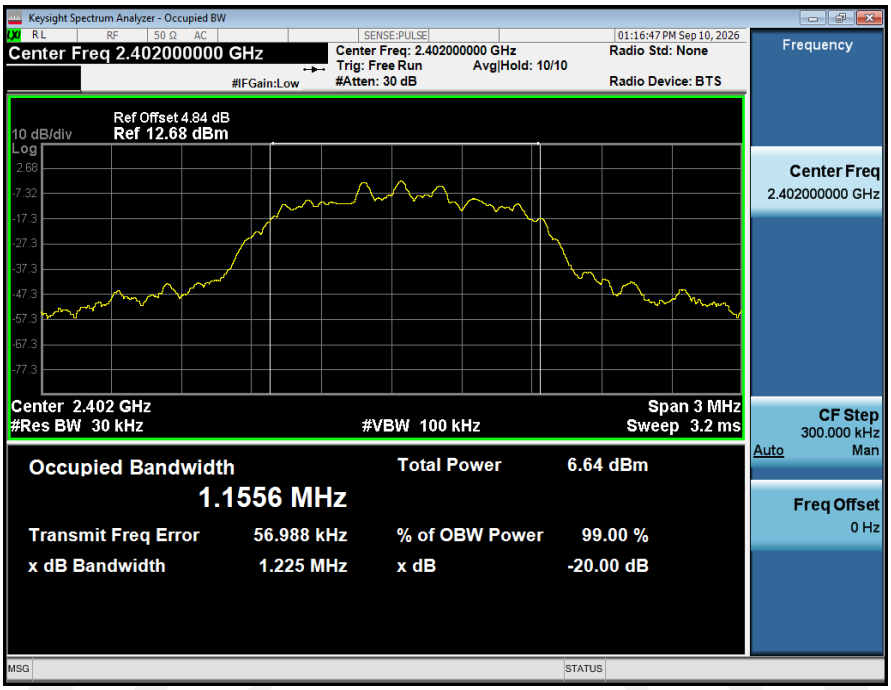


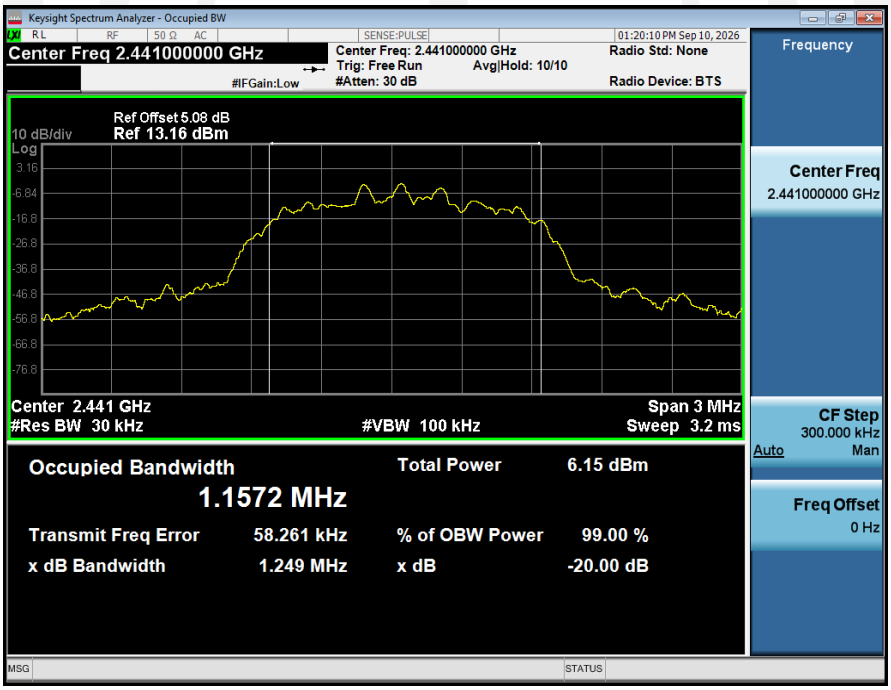
-20dB_Bandwidth_NVNT_ANT1_2-DH1_2480_00



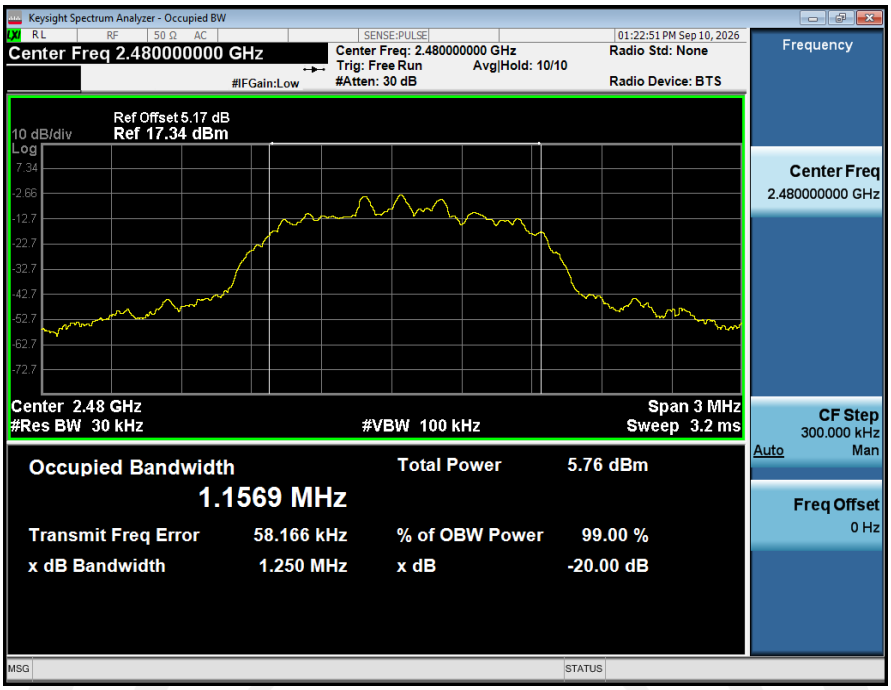
-20dB_Bandwidth_NVNT_ANT1_3-DH1_2402_00



-20dB_Bandwidth_NVNT_ANT1_3-DH1_2441_00

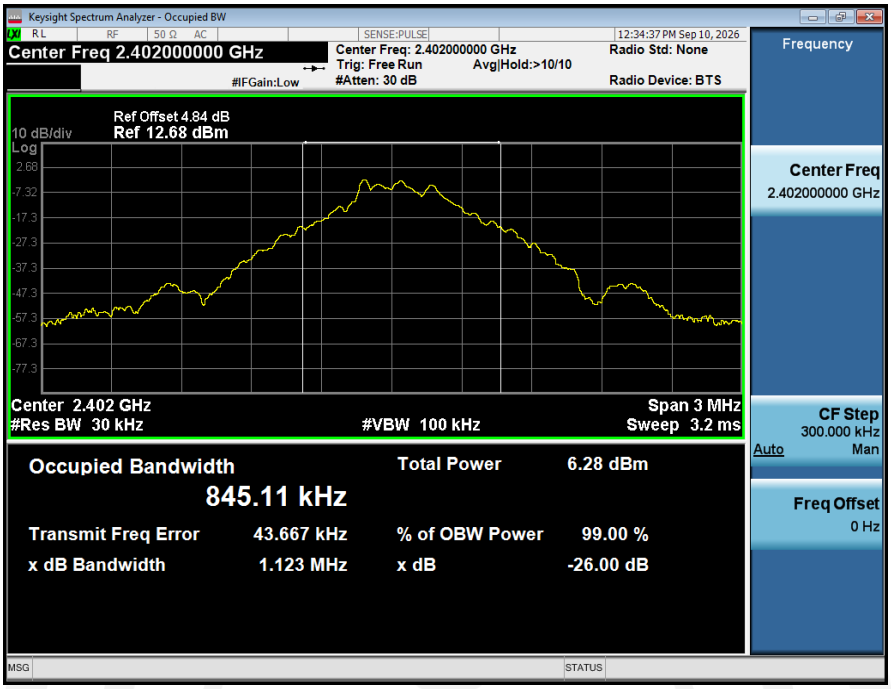


-20dB_Bandwidth_NVNT_ANT1_3-DH1_2480_00

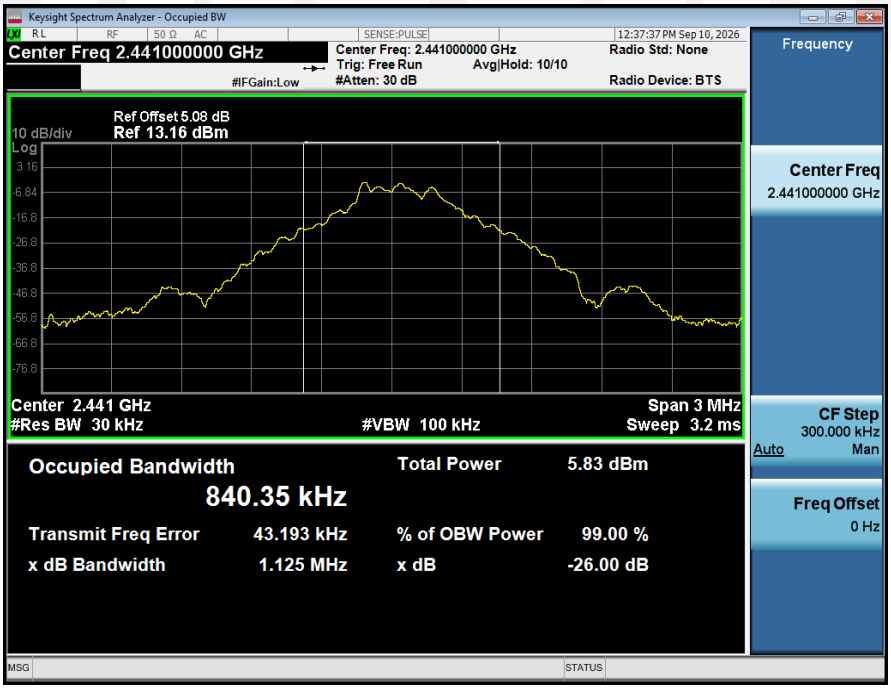

Keysight Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:PULSE
01:22:51 PM Sep 10, 2026
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold: 10/10
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
Ref Offset 5.17 dB
10 dB/div
Ref 17.34 dBm
Log
7.34
-2.66
-12.7
-22.7
-32.7
-42.7
-52.7
-62.7
-72.7
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.1569 MHz
Total Power
5.76 dBm
Transmit Freq Error
58.166 kHz
% of OBW Power
99.00 %
x dB Bandwidth
1.250 MHz
x dB
-20.00 dB
Freq Offset
0 Hz
MSG
STATUS

Condition	Antenna	Modulation	Frequency (MHz)	99%%BW(MHz)
NVNT	ANT1	1-DH1	2402.00	0.845
NVNT	ANT1	1-DH1	2441.00	0.840
NVNT	ANT1	1-DH1	2480.00	0.837
NVNT	ANT1	2-DH1	2402.00	1.171
NVNT	ANT1	2-DH1	2441.00	1.170
NVNT	ANT1	2-DH1	2480.00	1.168
NVNT	ANT1	3-DH1	2402.00	1.155
NVNT	ANT1	3-DH1	2441.00	1.157
NVNT	ANT1	3-DH1	2480.00	1.156

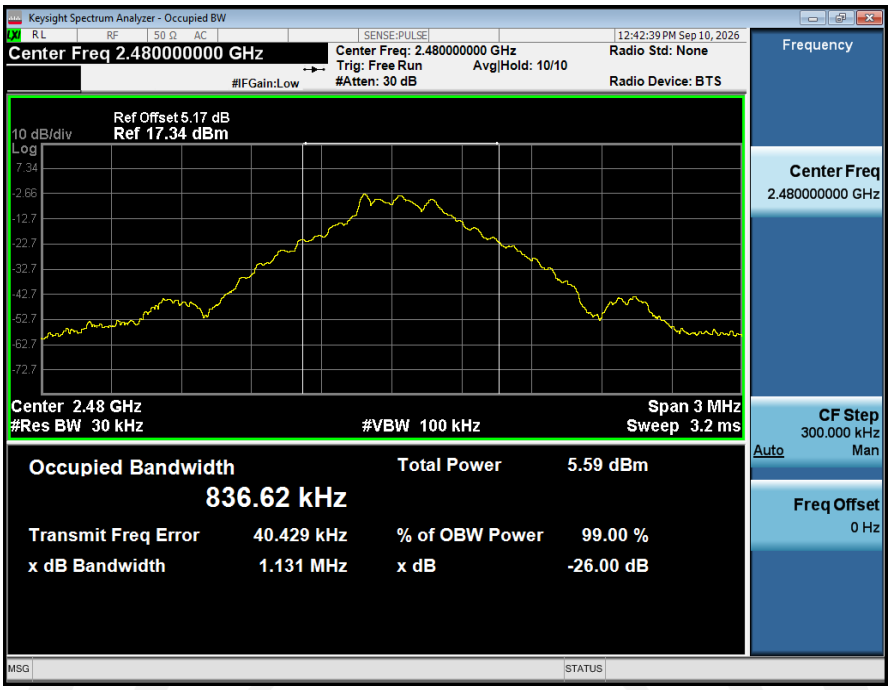
99%_Occupied_Bandwidth_NVNT_ANT1_1-DH1_2402_00



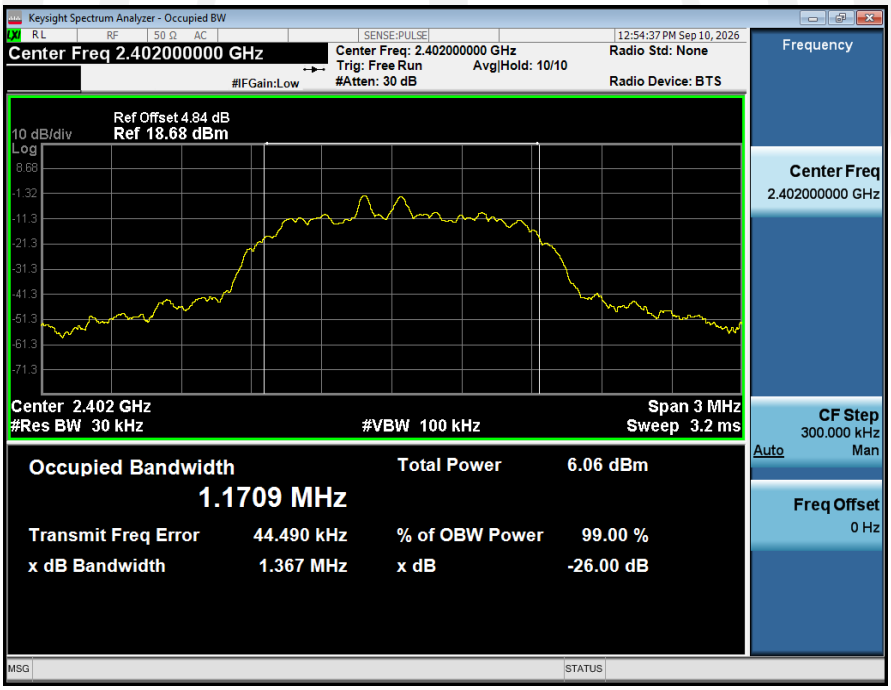
99%_Occupied_Bandwidth_NVNT_ANT1_1-DH1_2441_00



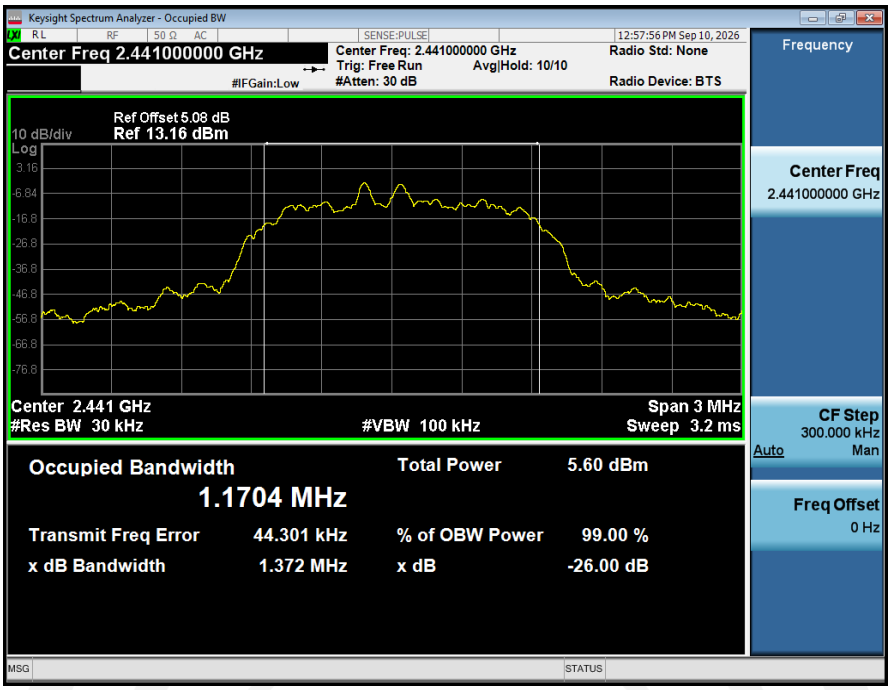
99%_Occupied_Bandwidth_NVNT_ANT1_1-DH1_2480_00



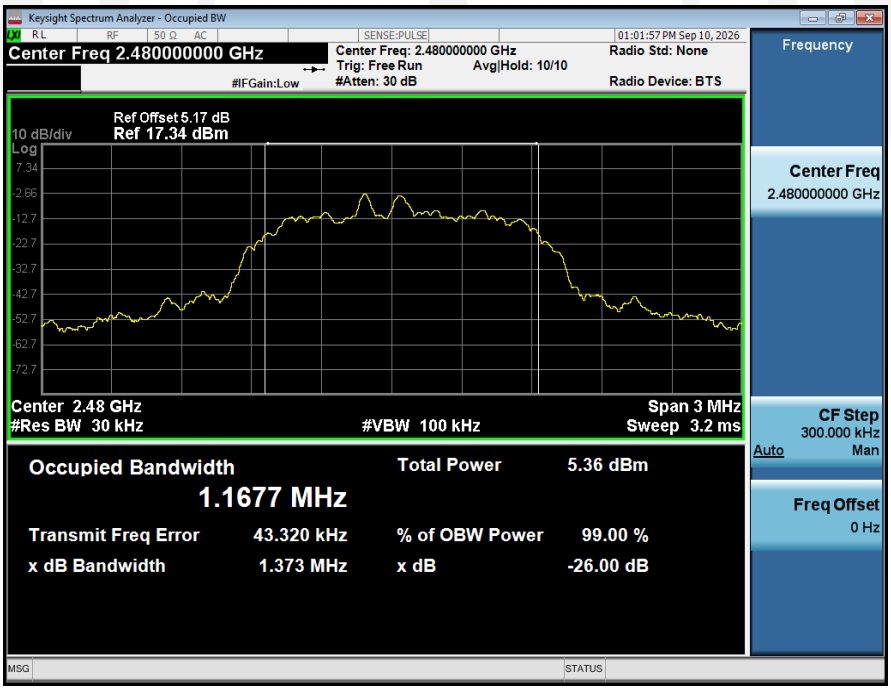
99%_Occupied_Bandwidth_NVNT_ANT1_2-DH1_2402_00



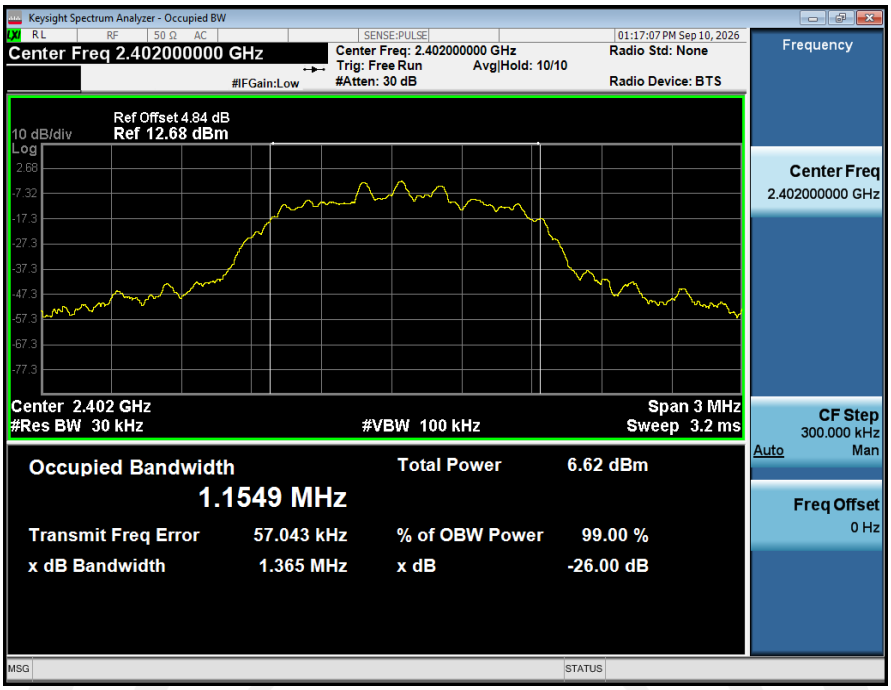
99%_Occupied_Bandwidth_NVNT_ANT1_2-DH1_2441_00



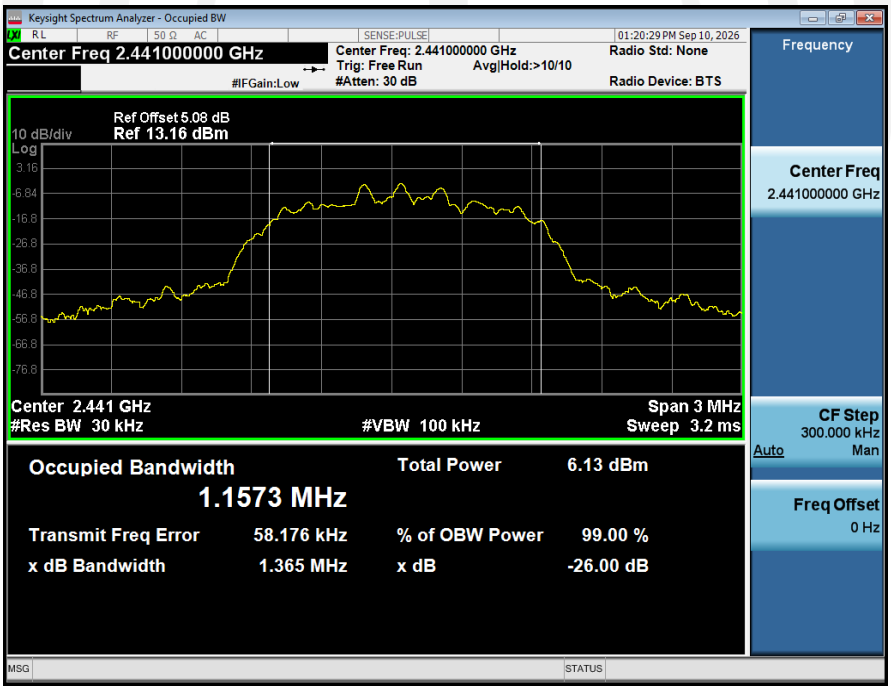
99%_Occupied_Bandwidth_NVNT_ANT1_2-DH1_2480_00



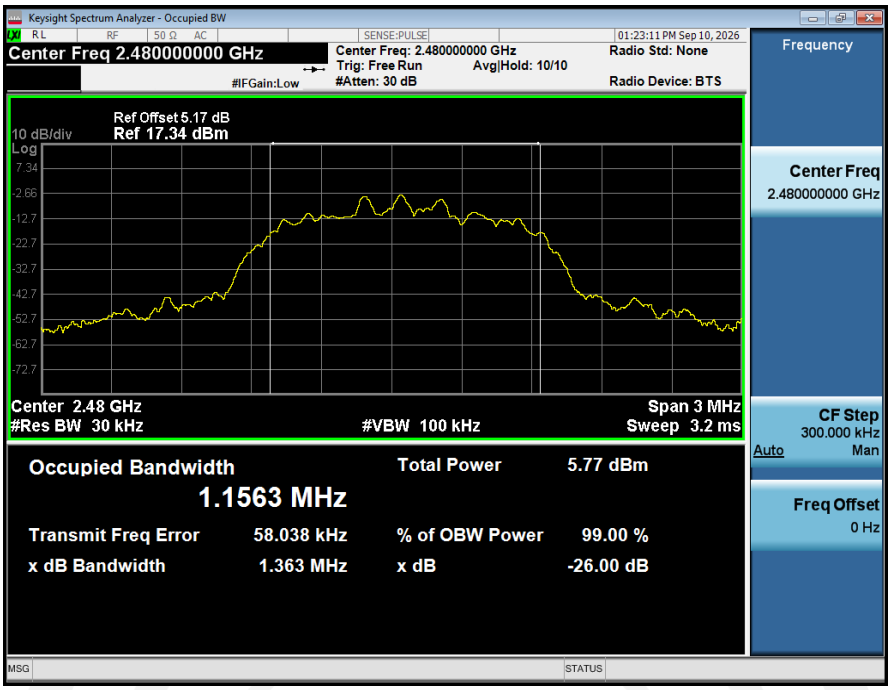
99%_Occupied_Bandwidth_NVNT_ANT1_3-DH1_2402_00



99%_Occupied_Bandwidth_NVNT_ANT1_3-DH1_2441_00



99%_Occupied_Bandwidth_NVNT_ANT1_3-DH1_2480_00


Keysight Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:PULSE
01:23:11 PM Sep 10, 2026
Center Freq 2.480000000 GHz
Center Freq: 2.480000000 GHz
Trig: Free Run
Avg|Hold: 10/10
#IFGain:Low
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
Ref Offset 5.17 dB
10 dB/div
Ref 17.34 dBm
Log
7.34
-2.66
-12.7
-22.7
-32.7
-42.7
-52.7
-62.7
-72.7
Center Freq
2.480000000 GHz
Center 2.48 GHz
#Res BW 30 kHz
#VBW 100 kHz
Span 3 MHz
Sweep 3.2 ms
CF Step
300.000 kHz
Auto
Man
Occupied Bandwidth
1.1563 MHz
Total Power
5.77 dBm
Transmit Freq Error
58.038 kHz
% of OBW Power
99.00 %
x dB Bandwidth
1.363 MHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

5. Carrier Frequency Separation

5.1. Limit

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

Please refer FCC part 15.247.

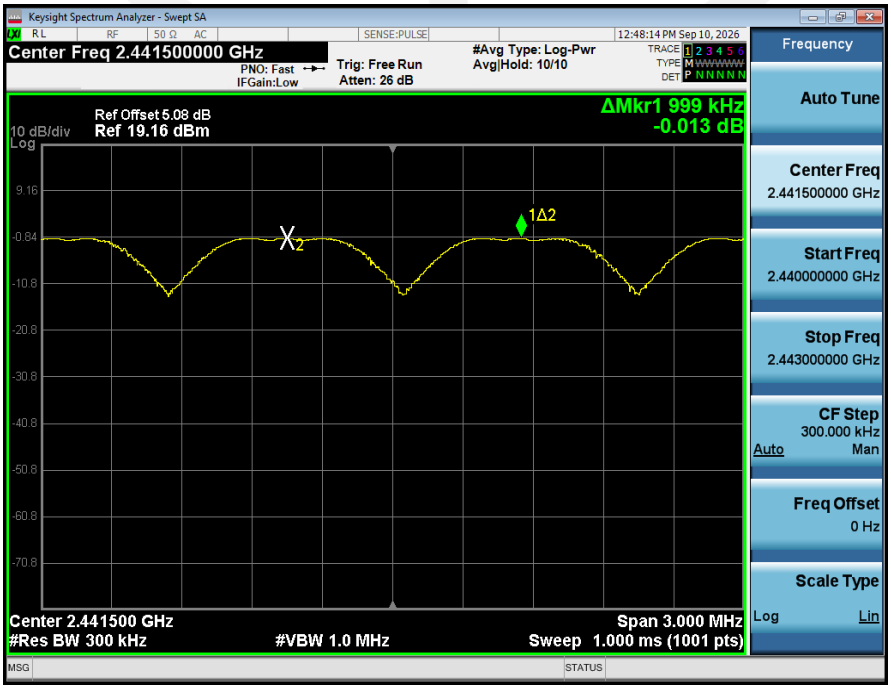
5.2. Test Procedure

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The carrier frequency was measured by spectrum analyzer with 300kHz RBW and 1MHz VBW.

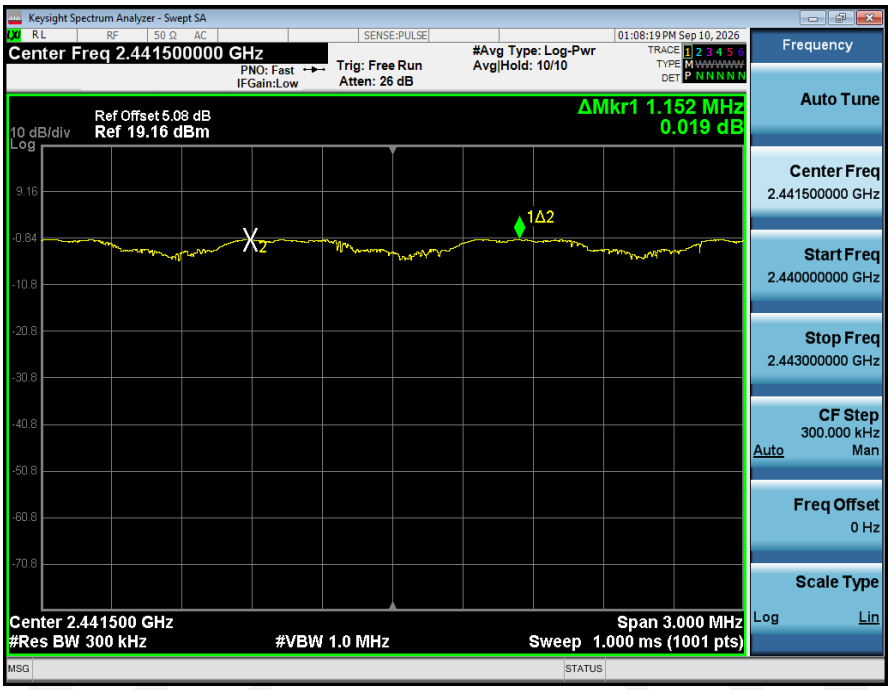
5.3. Test Result

Condition	Antenna	Modulation	Frequency(MHz)	Hopping NO.0 (MHz)	Hopping NO.1 (MHz)	Carrier Frequencies Separation(MHz)	Limit(MHz)	Result
NVNT	ANT1	1-DH1	2441.00	2441.050	2442.049	1.00	0.917	Pass
NVNT	ANT1	2-DH1	2441.00	2440.891	2442.043	1.15	0.837	Pass
NVNT	ANT1	3-DH1	2441.00	2441.212	2442.208	1.00	0.833	Pass

Carrier_Frequencies_Separation_(Hopping)_NVNT_ANT1_1-DH1_Hopping



Carrier_Frequencies_Separation_(Hopping)_NVNT_ANT1_2-DH1_Hopping



Carrier_Frequencies_Separation_(Hopping)_NVNT_ANT1_3-DH1_Hopping

6. Number Of Hopping Channel

6.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. Please refer FCC part 15.247.

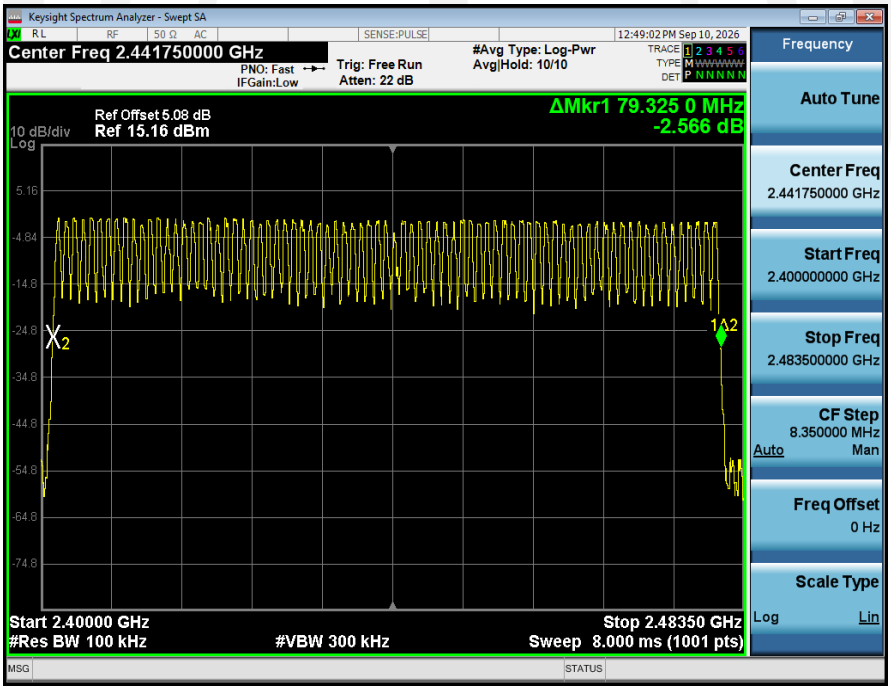
6.2. Test Procedure

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The number of hopping channel was measured by spectrum analyzer with 100kHz RBW and 300KHz VBW.

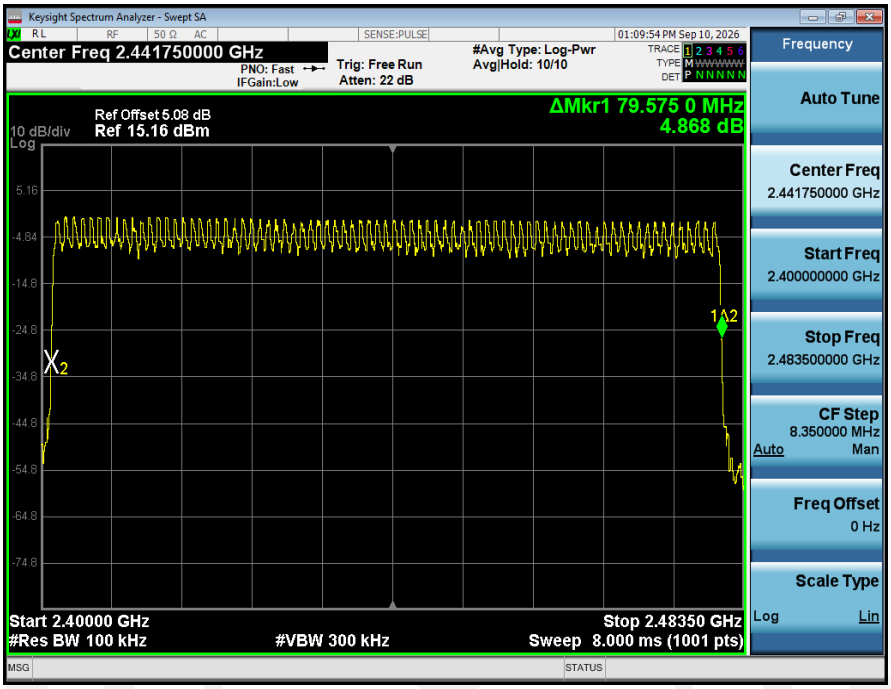
6.3. Test Result

Condition	Antenna	Modulation	Hopping Num	Limit	Result
NVNT	ANT1	1-DH1	79	15	Pass
NVNT	ANT1	2-DH1	79	15	Pass
NVNT	ANT1	3-DH1	79	15	Pass

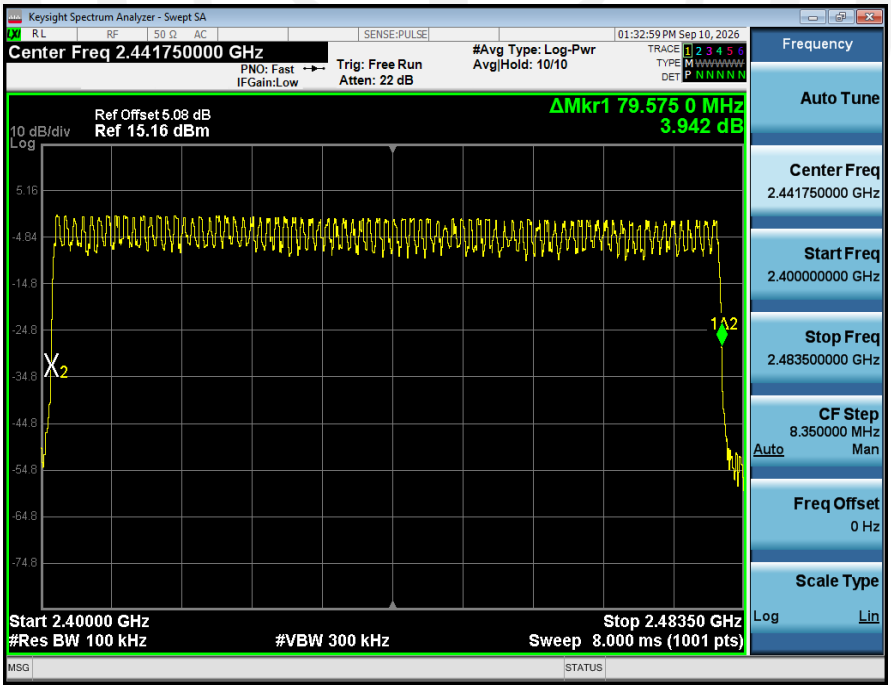
Number_of_Hopping_Channel_(Hopping)_NVNT_ANT1_1-DH1_Hopping



Number_of_Hopping_Channel_(Hopping)_NVNT_ANT1_2-DH1_Hopping



Number_of_Hopping_Channel_(Hopping)_NVNT_ANT1_3-DH1_Hopping



7. Dwell Time

7.1. Test limit

Please refer FCC part 15.247.

Frequency hopping systems operating in the 2400MHz-2483.5MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 sec- onds multiplied by the number of hopping channel employed.

7.2. Test Procedure

7.2.1. Place the EUT on the table and set it in transmitting mode.

7.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

7.2.3. Set center frequency of spectrum analyzer = operating frequency.

7.2.4. Set the spectrum analyzer as RBW=1MHz, VBW=1MHz, Span = 0Hz, Sweep = auto.

7.2.5. Repeat above procedures until all frequency measured were complete.

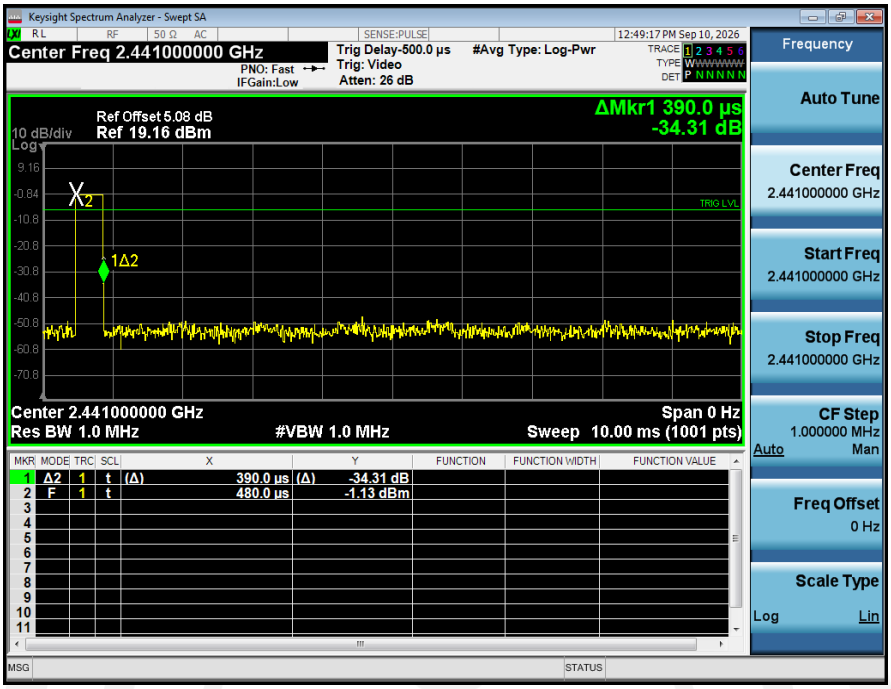
7.2.6. The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s

7.2.7. Dwell Time=Pulse Time* Hops Number

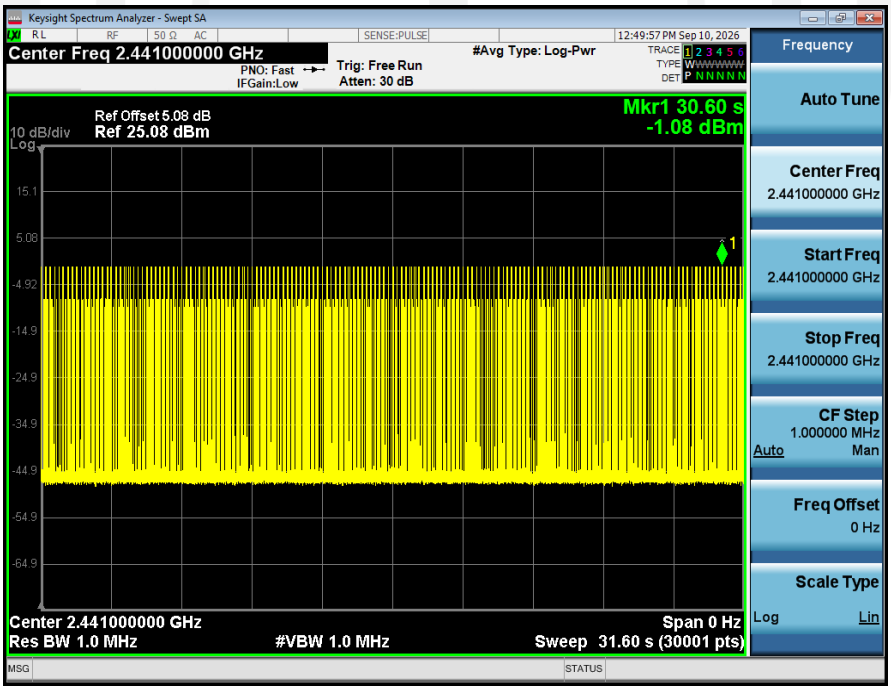
7.3. Test Result

Condition	Antenna	Packet Type	Pulse Time(ms)	Hops	Dwell Time(ms)	Limit(s)	Result
NVNT	ANT1	1-DH1	0.390	320.00	124.800	0.40	Pass
NVNT	ANT1	2-DH1	0.400	319.00	127.600	0.40	Pass
NVNT	ANT1	3-DH1	0.400	319.00	127.600	0.40	Pass
NVNT	ANT1	1-DH3	1.650	157.00	259.050	0.40	Pass
NVNT	ANT1	1-DH5	2.900	110.00	319.000	0.40	Pass
NVNT	ANT1	2-DH3	1.650	163.00	268.950	0.40	Pass
NVNT	ANT1	2-DH5	2.900	112.00	324.800	0.40	Pass
NVNT	ANT1	3-DH3	1.650	167.00	275.550	0.40	Pass
NVNT	ANT1	3-DH5	2.910	117.00	340.470	0.40	Pass

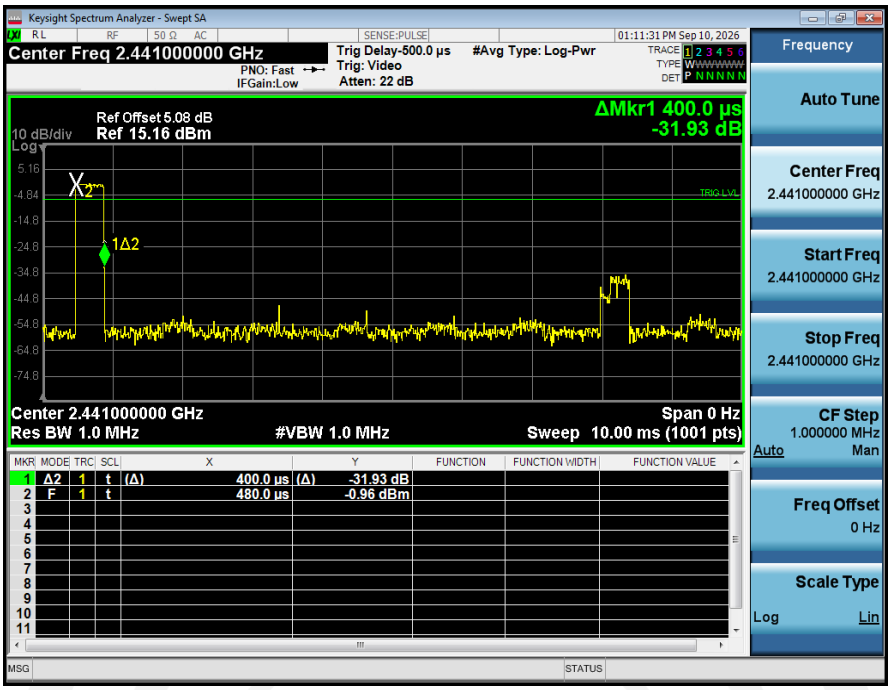
Dwell_Time_(Hopping)_NVNT_ANT1_1-DH1_2441_00_One_Burst_Time



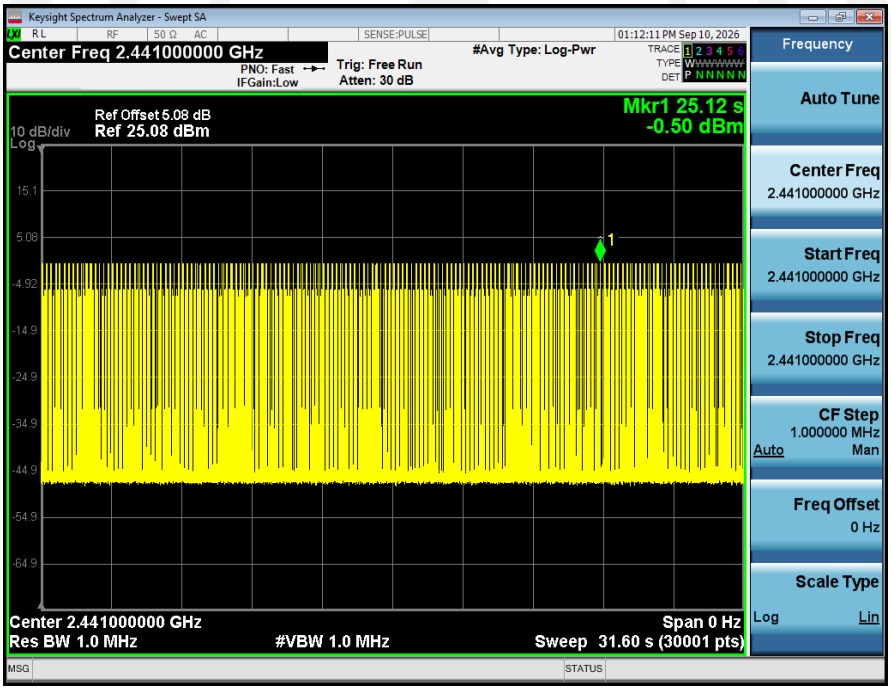
Dwell_Time_(Hopping)_NVNT_ANT1_1-DH1_2441_00_Accumulated



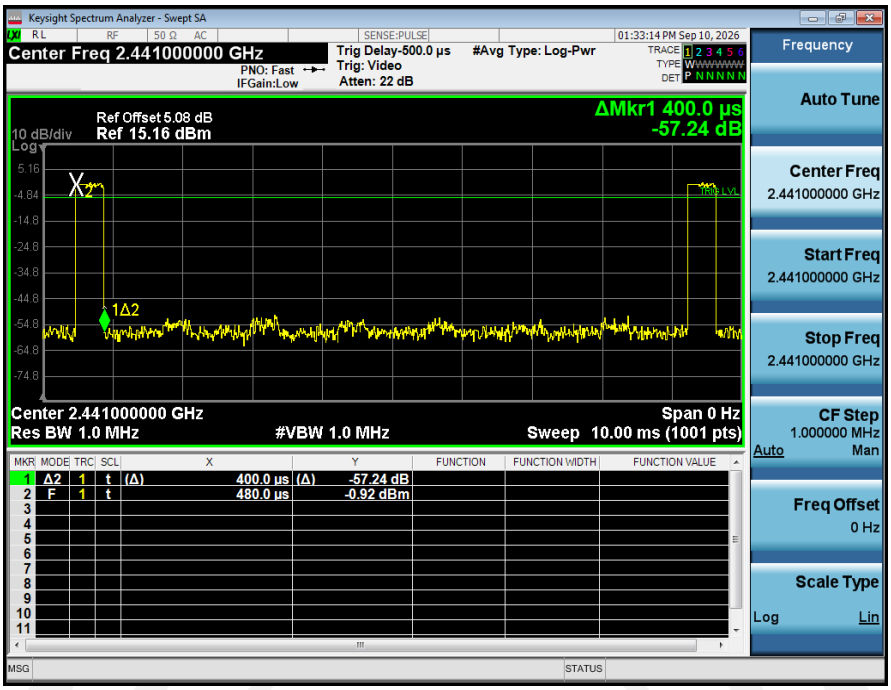
Dwell_Time_(Hopping)_NVNT_ANT1_2-DH1_2441_00_One_Burst_Time



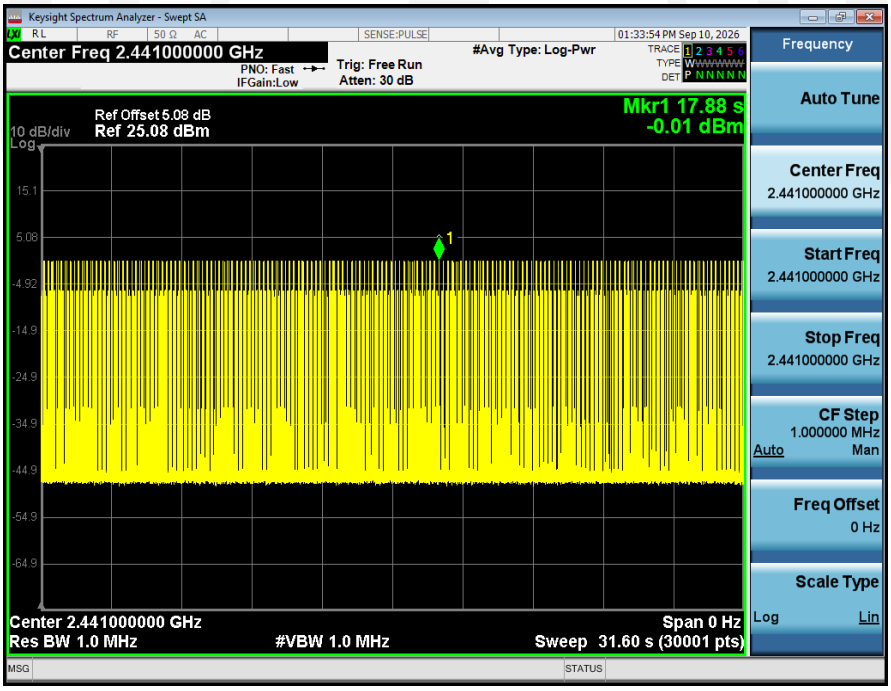
Dwell_Time_(Hopping)_NVNT_ANT1_2-DH1_2441_00_Accumulated



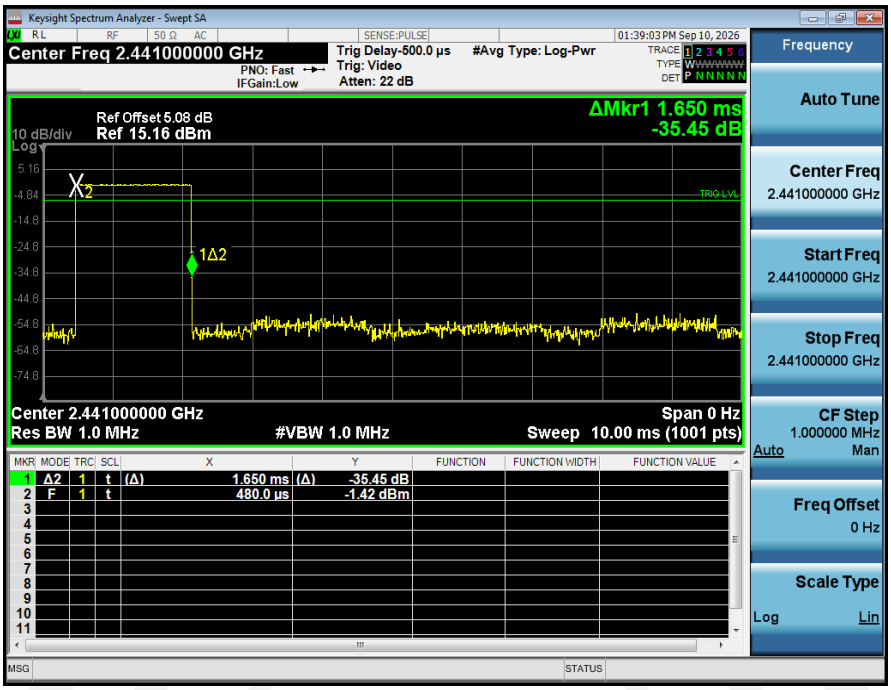
Dwell_Time_(Hopping)_NVNT_ANT1_3-DH1_2441_00_One_Burst_Time



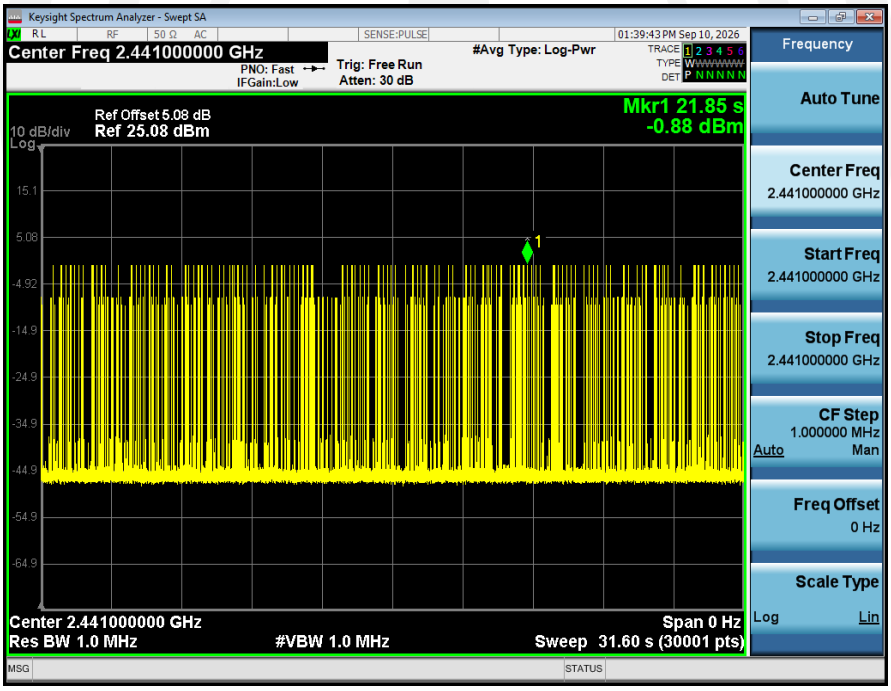
Dwell_Time_(Hopping)_NVNT_ANT1_3-DH1_2441_00_Accumulated



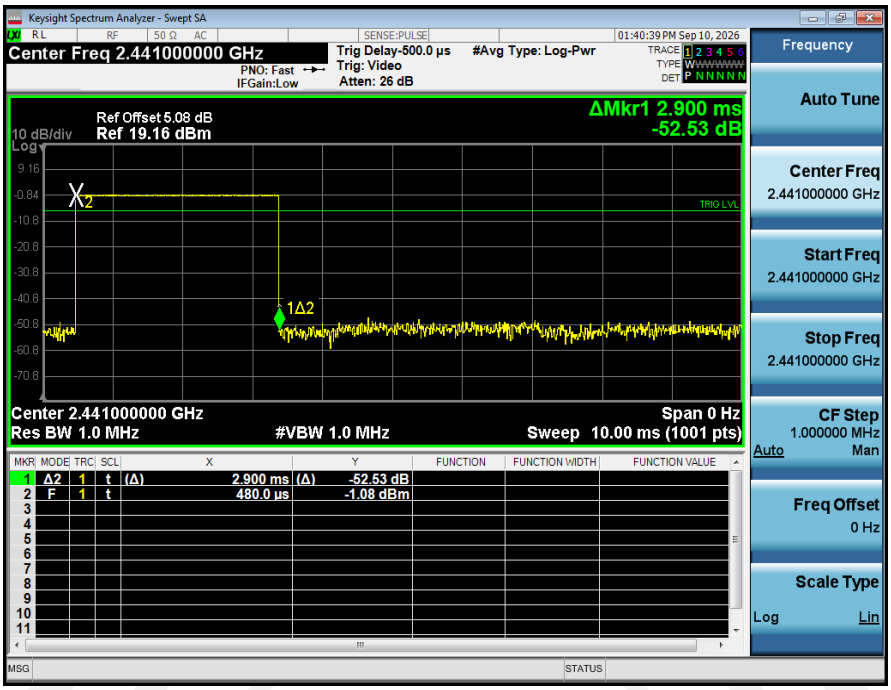
Dwell_Time_(Hopping)_NVNT_ANT1_1-DH3_2441_00_One_Burst_Time



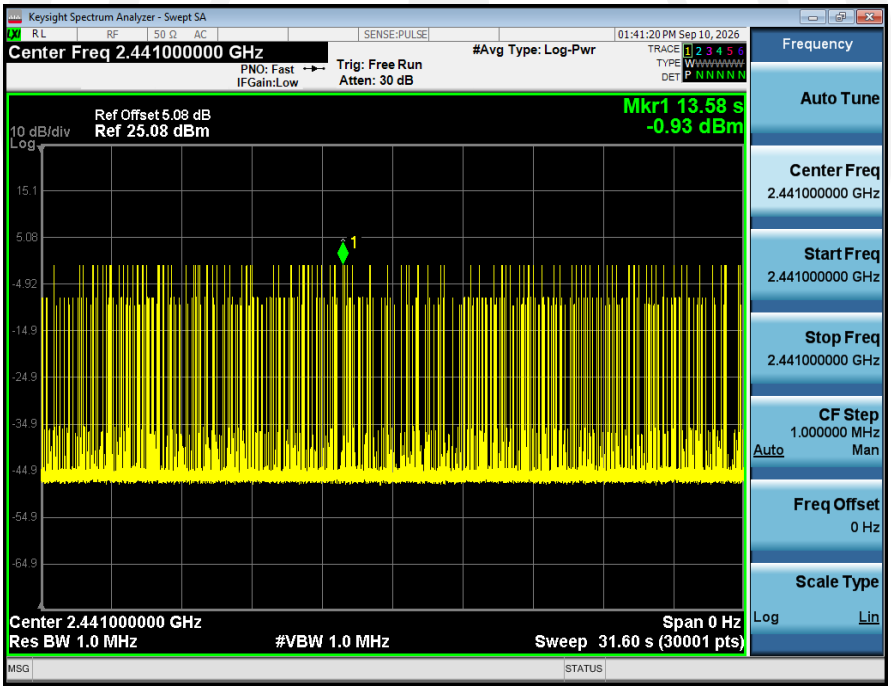
Dwell_Time_(Hopping)_NVNT_ANT1_1-DH3_2441_00_Accumulated



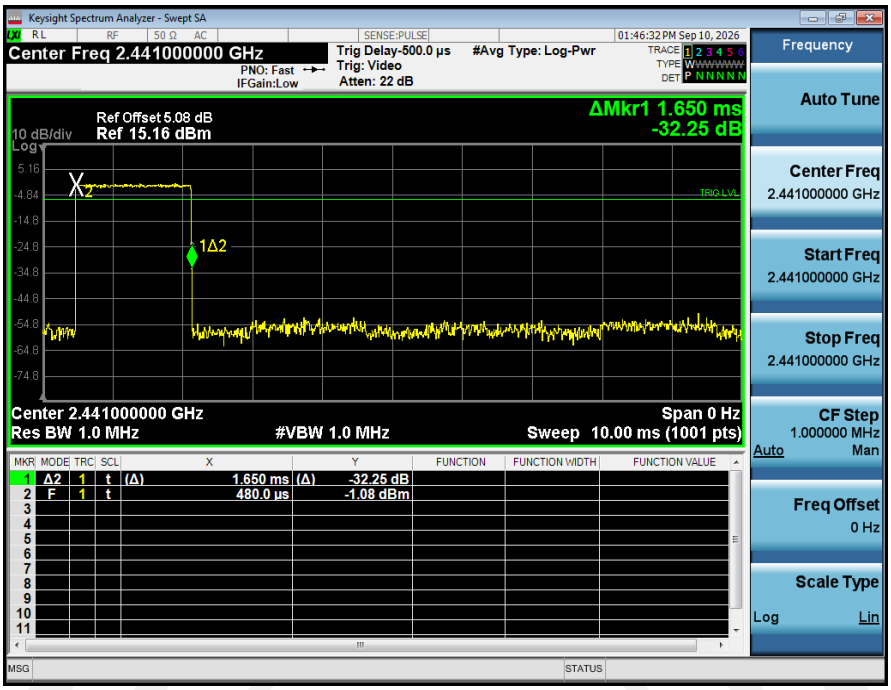
Dwell_Time_(Hopping)_NVNT_ANT1_1-DH5_2441_00_One_Burst_Time



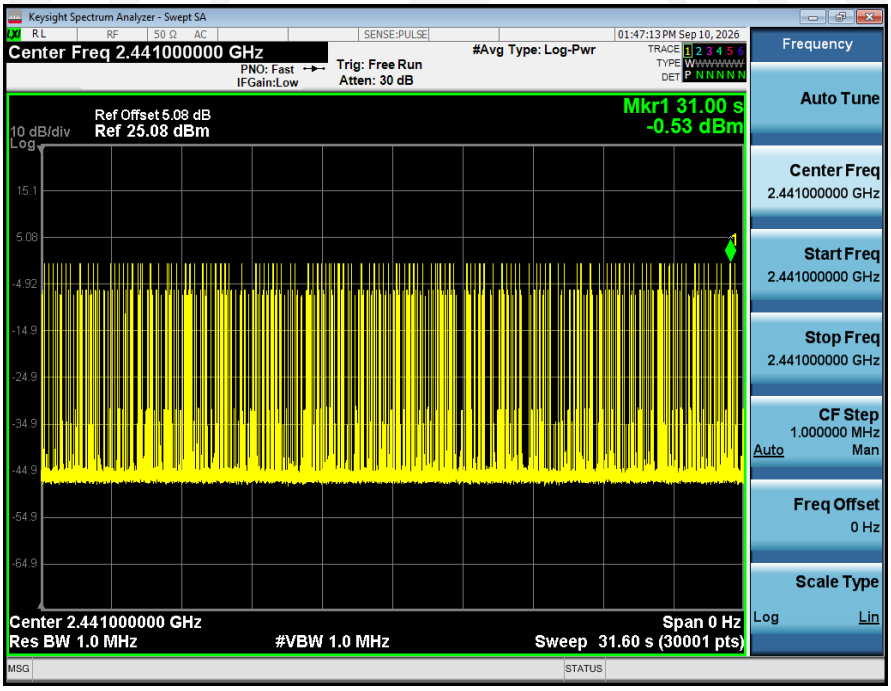
Dwell_Time_(Hopping)_NVNT_ANT1_1-DH5_2441_00_Accumulated



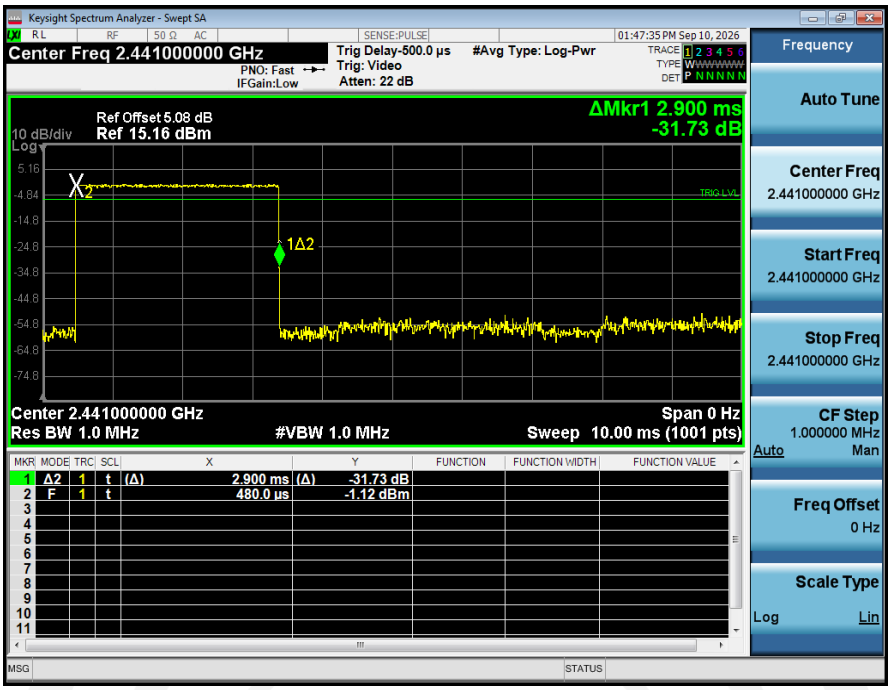
Dwell_Time_(Hopping)_NVNT_ANT1_2-DH3_2441_00_One_Burst_Time



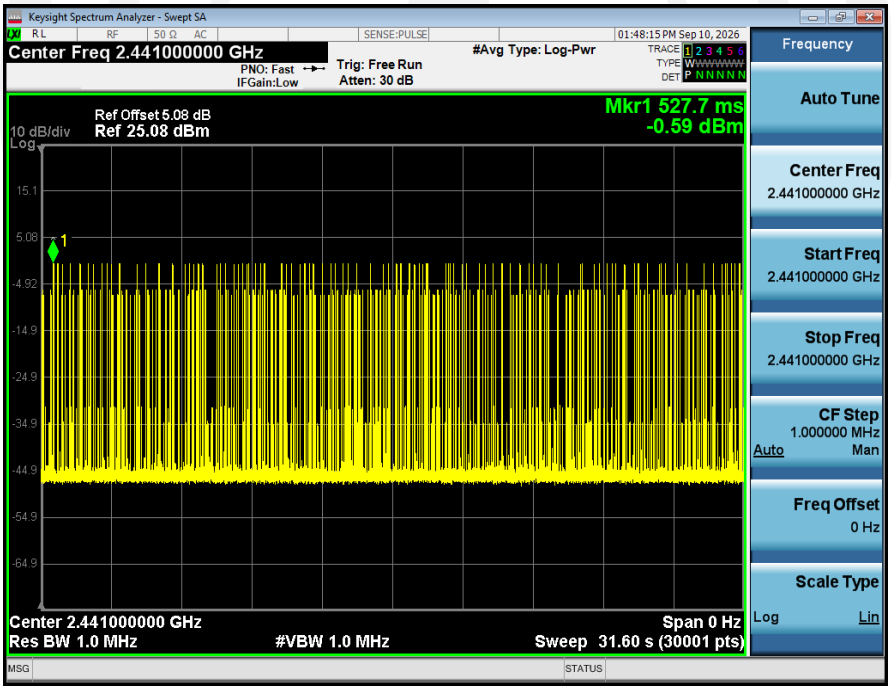
Dwell_Time_(Hopping)_NVNT_ANT1_2-DH3_2441_00_Accumulated



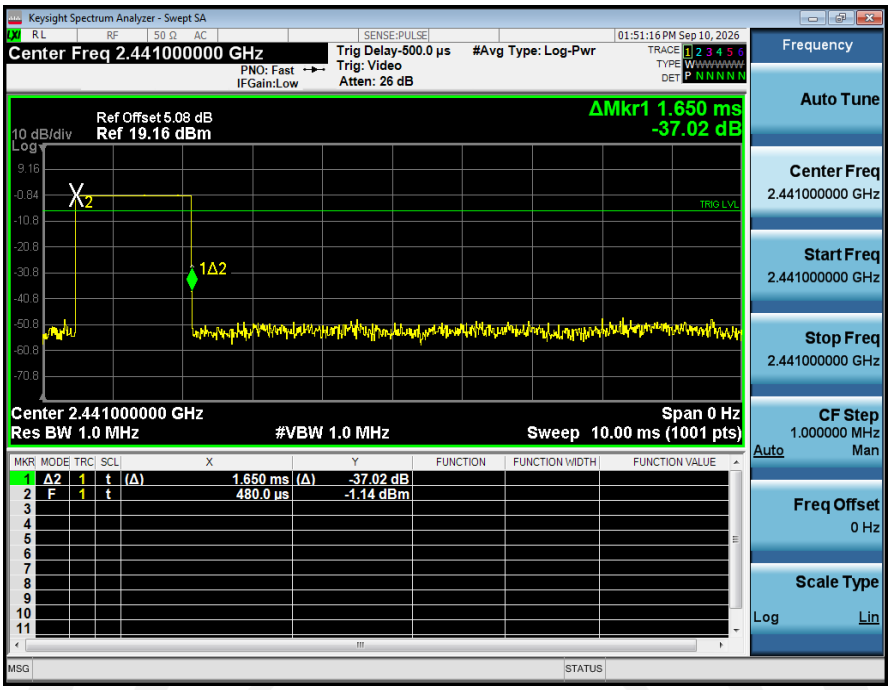
Dwell_Time_(Hopping)_NVNT_ANT1_2-DH5_2441_00_One_Burst_Time



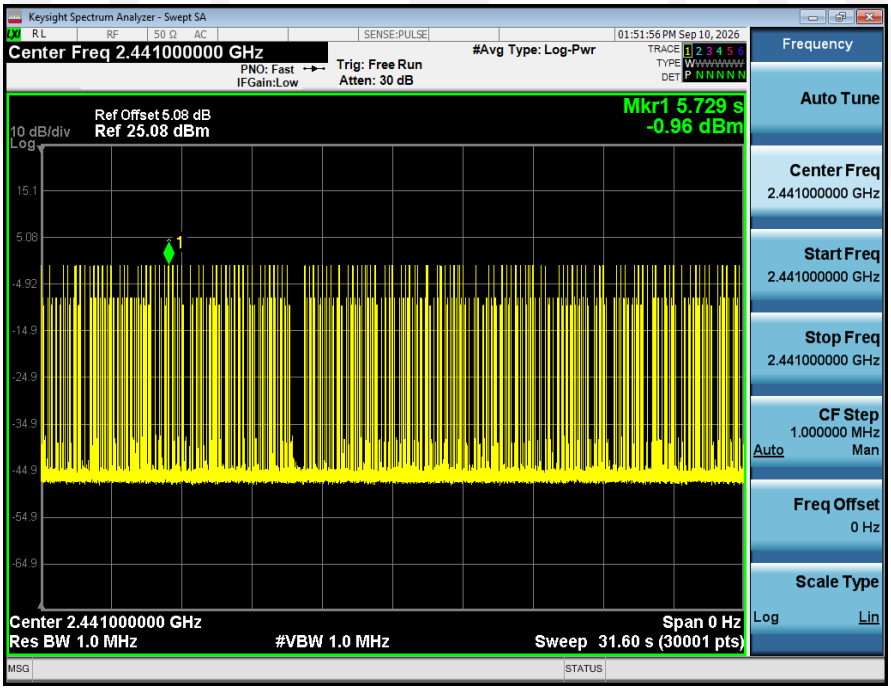
Dwell_Time_(Hopping)_NVNT_ANT1_2-DH5_2441_00_Accumulated



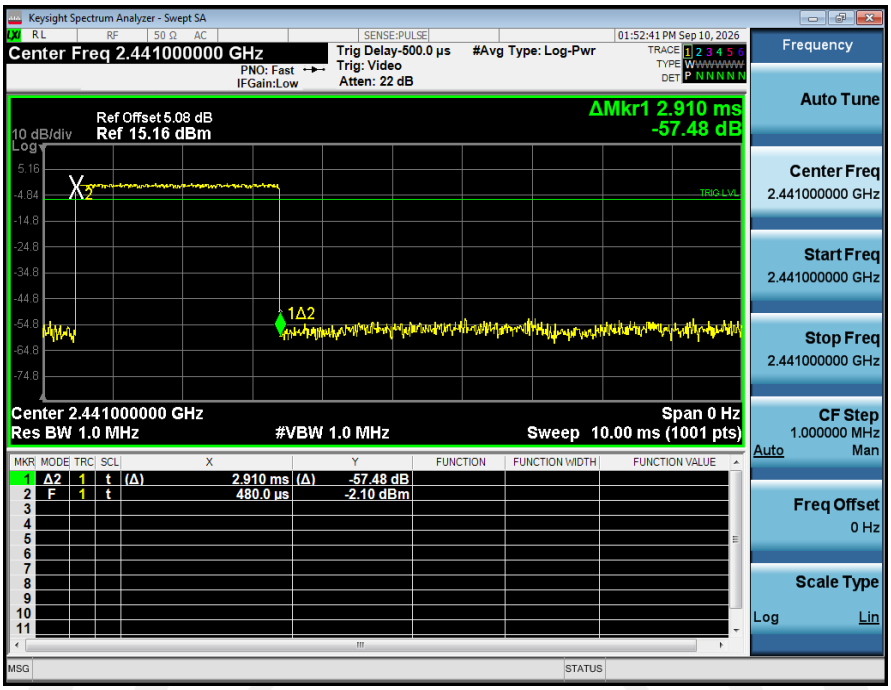
Dwell_Time_(Hopping)_NVNT_ANT1_3-DH3_2441_00_One_Burst_Time



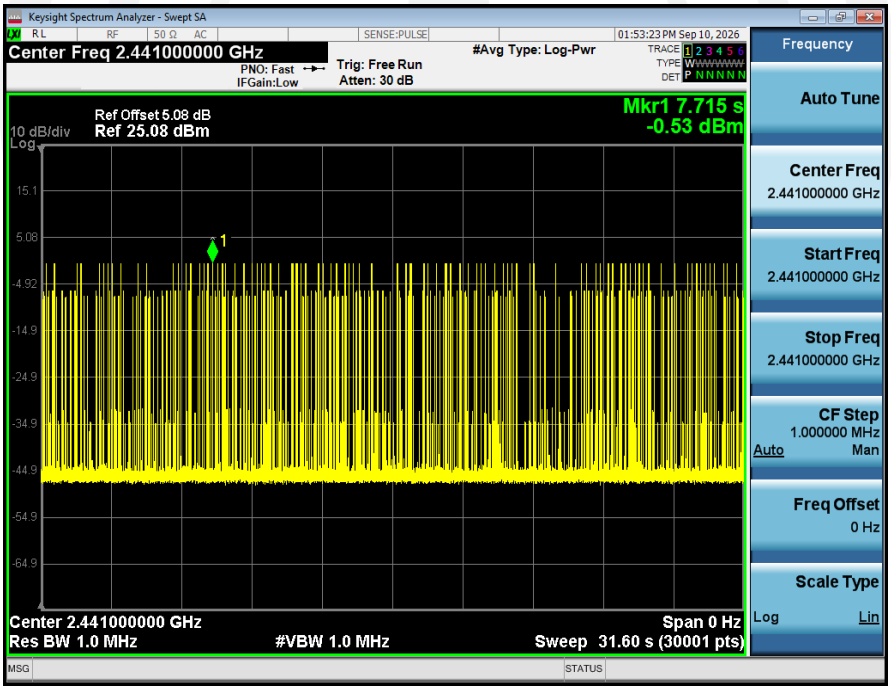
Dwell_Time_(Hopping)_NVNT_ANT1_3-DH3_2441_00_Accumulated



Dwell_Time_(Hopping)_NVNT_ANT1_3-DH5_2441_00_One_Burst_Time



Dwell_Time_(Hopping)_NVNT_ANT1_3-DH5_2441_00_Accumulated



8. Out-of-band Emissions

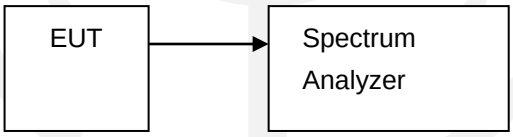
8.1. Test Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or 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, 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, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in FCC Part 15.209(a) is not required.
Please refer section 15.247.

8.2. Test Procedure

Connect the transmitter ouput to spectrum analvzer using a low loss RF cable, and set the spectrum analvzerto RBW=100 kHz, VBW= 300 kHz, peak detector, and max hold. Measurements utilizing these setting aremade of the in-band reference level, bandedge and out-of-band emissions.

8.3. Test Setup



8.4. Test Results

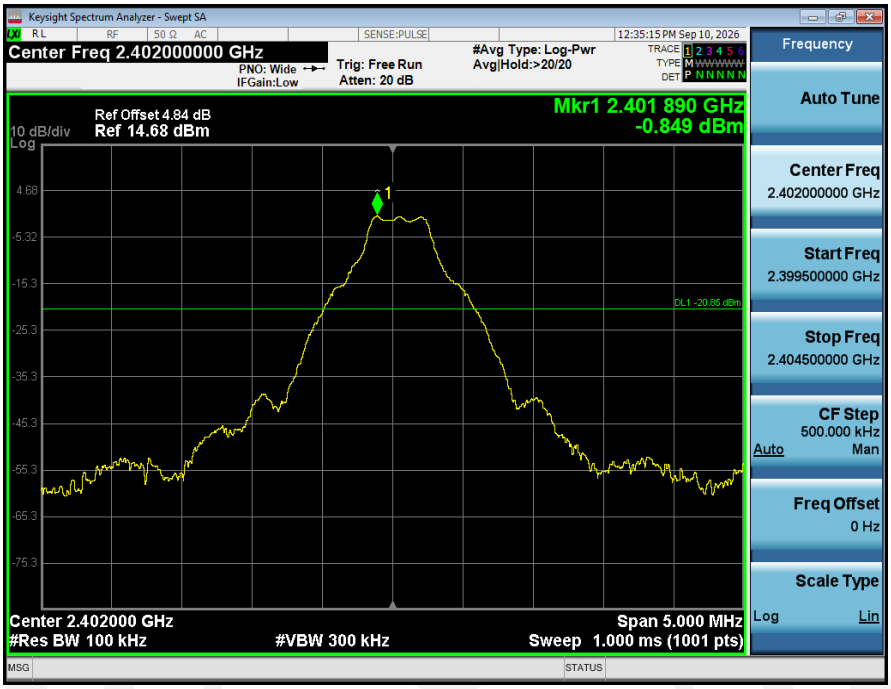
PASS.

The test results are listed in next pages.

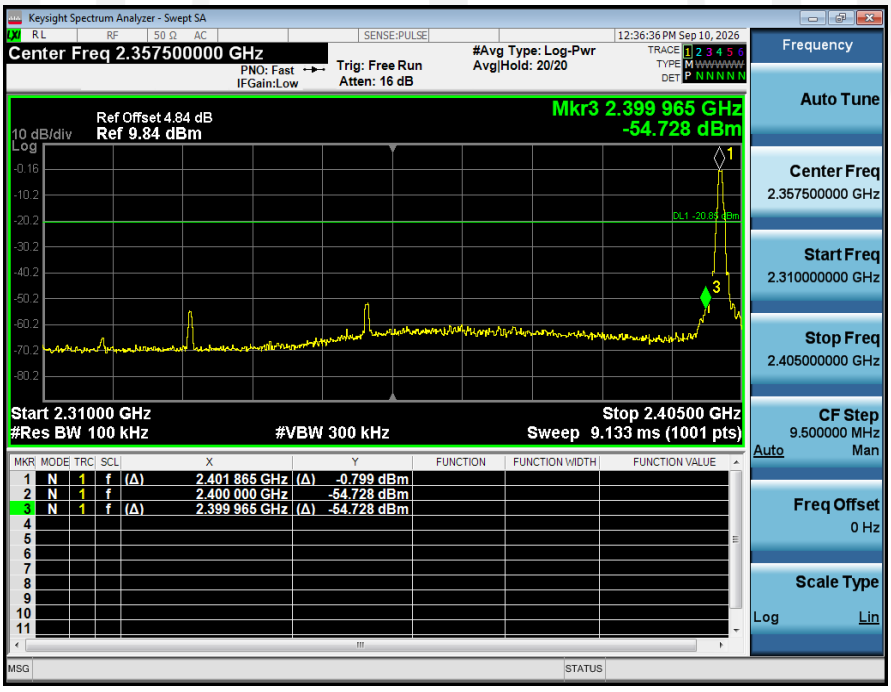
Band Edge: Pass

Condition	Antenna	Modulation	TX Mode	Ref_level(dBm)	Bandedge MAX.Value	Limit	Result
NVNT	ANT1	1-DH1	2402.00	-0.849	-54.728	-20.849	Pass
NVNT	ANT1	1-DH1	Hopping_LCH	-0.770	-52.119	-20.770	Pass
NVNT	ANT1	1-DH1	2480.00	-1.538	-60.894	-21.538	Pass
NVNT	ANT1	1-DH1	Hopping_HCH	-0.311	-46.674	-20.311	Pass
NVNT	ANT1	2-DH1	2402.00	-0.774	-50.685	-20.774	Pass
NVNT	ANT1	2-DH1	Hopping_LCH	-0.827	-52.061	-20.827	Pass
NVNT	ANT1	2-DH1	2480.00	-1.476	-60.934	-21.476	Pass
NVNT	ANT1	2-DH1	Hopping_HCH	-0.164	-50.651	-20.164	Pass
NVNT	ANT1	3-DH1	2402.00	-0.426	-50.242	-20.426	Pass
NVNT	ANT1	3-DH1	Hopping_LCH	-0.553	-50.937	-20.553	Pass
NVNT	ANT1	3-DH1	2480.00	-1.256	-60.345	-21.256	Pass
NVNT	ANT1	3-DH1	Hopping_HCH	-0.048	-51.269	-20.048	Pass

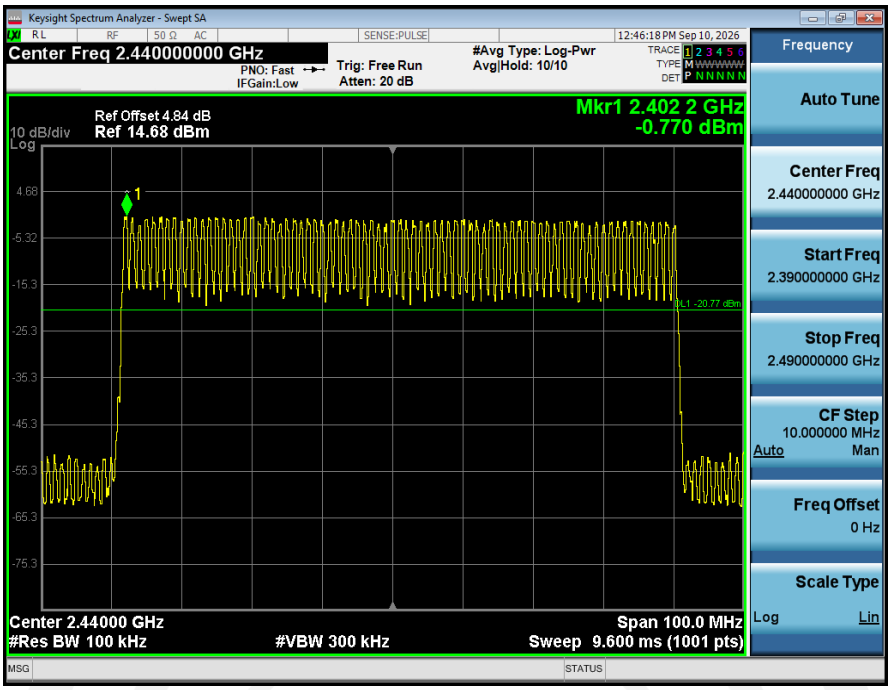
1_Reference_Level_NVNT_ANT1_1-DH1_2402_00



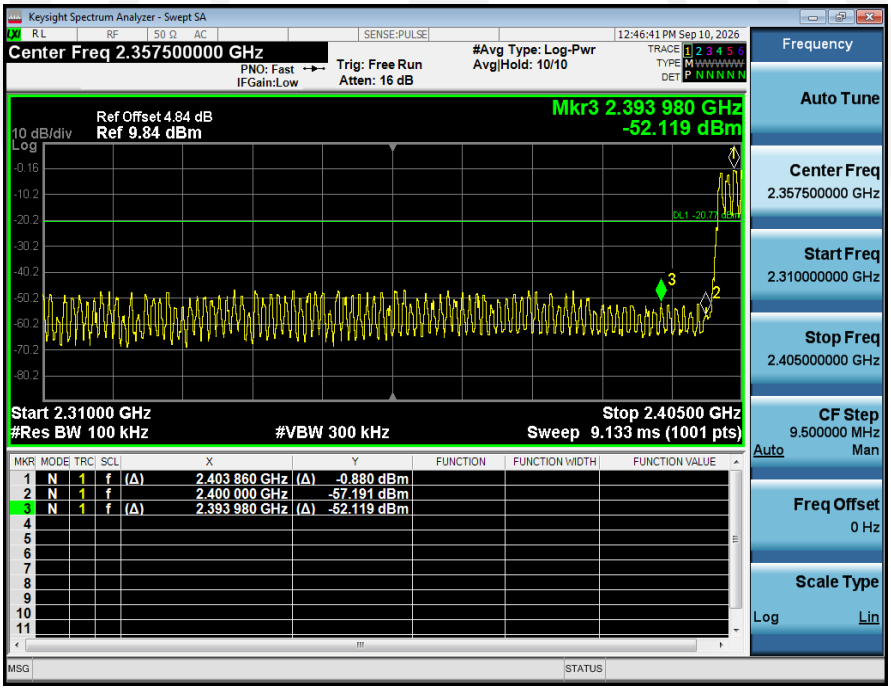
2_Bandedge_NVNT_ANT1_1-DH1_2402_00



1_Reference_Level_Hopping_NVNT_ANT1_1-DH1_Hopping

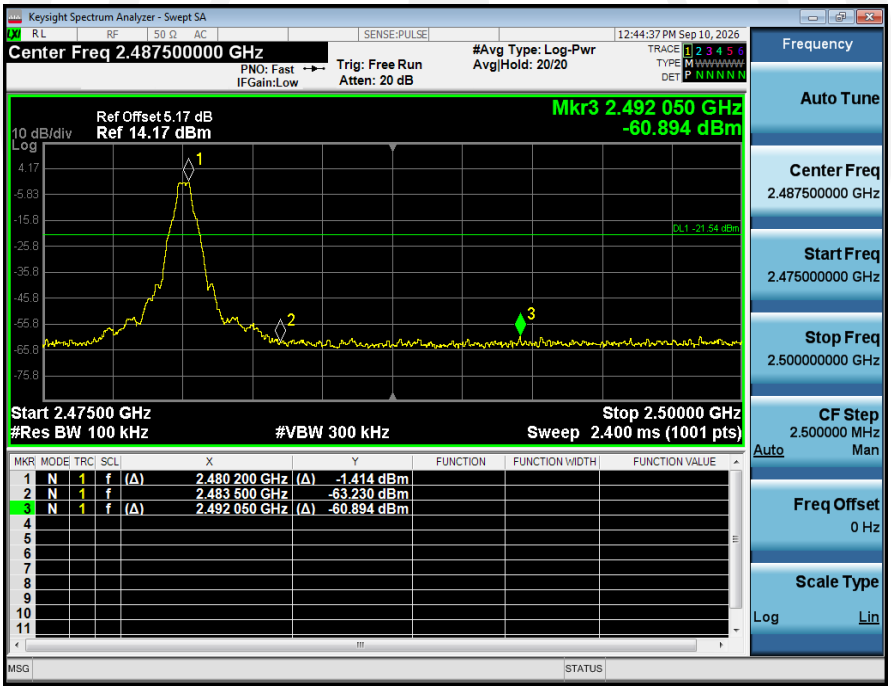


2_Band_Edge_(Hopping)_NVNT_ANT1_1-DH1_Hopping

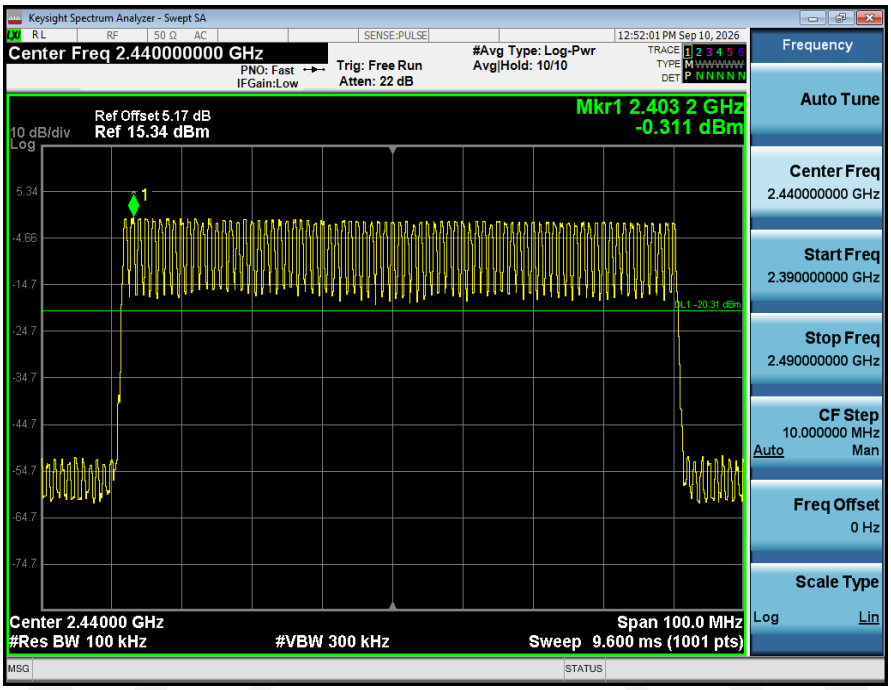


1_Reference_Level_NVNT_ANT1_1-DH1_2480_00

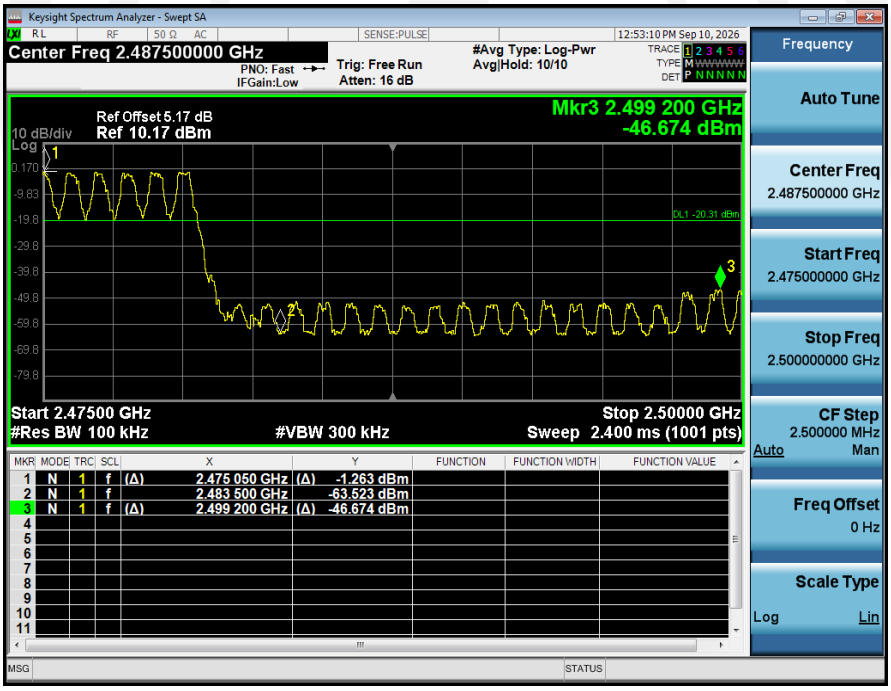
2_Bandedge_NVNT_ANT1_1-DH1_2480_00



1_Reference_Level_Hopping_NVNT_ANT1_1-DH1_Hopping

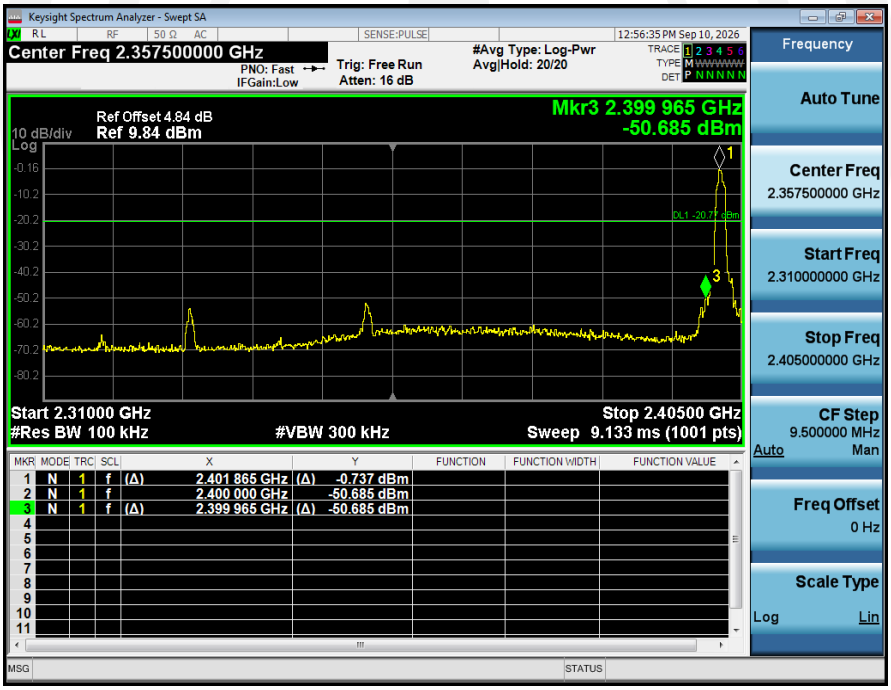


2_Band_Edge_(Hopping)_NVNT_ANT1_1-DH1_Hopping

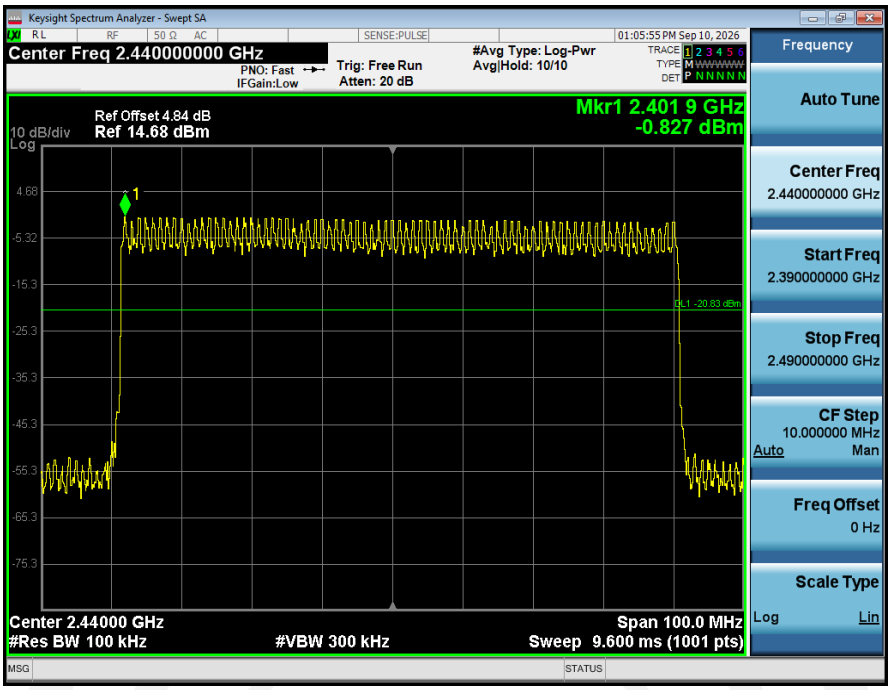


1_Reference_Level_NVNT_ANT1_2-DH1_2402_00

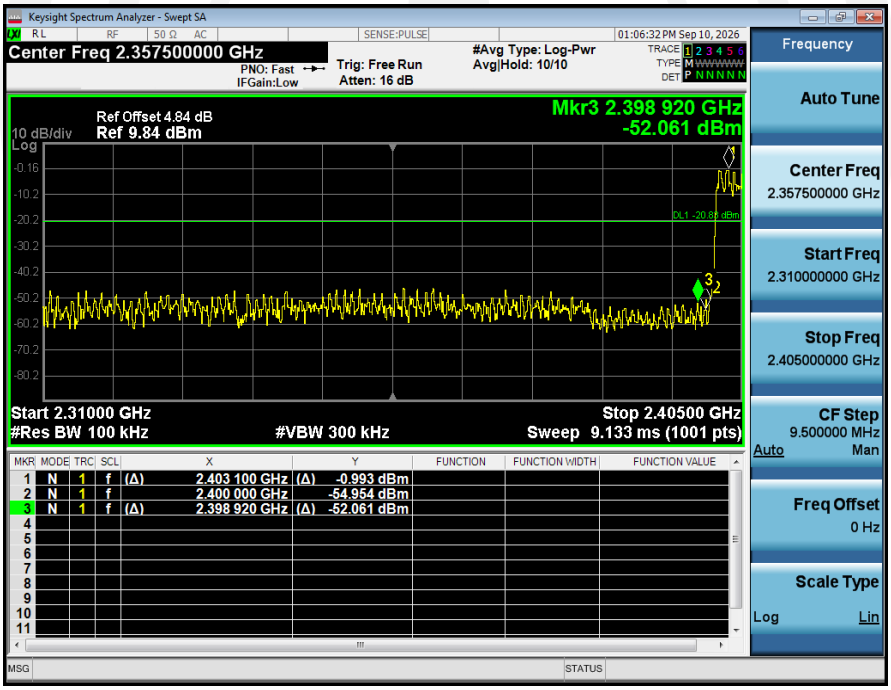
2_Bandedge_NVNT_ANT1_2-DH1_2402_00



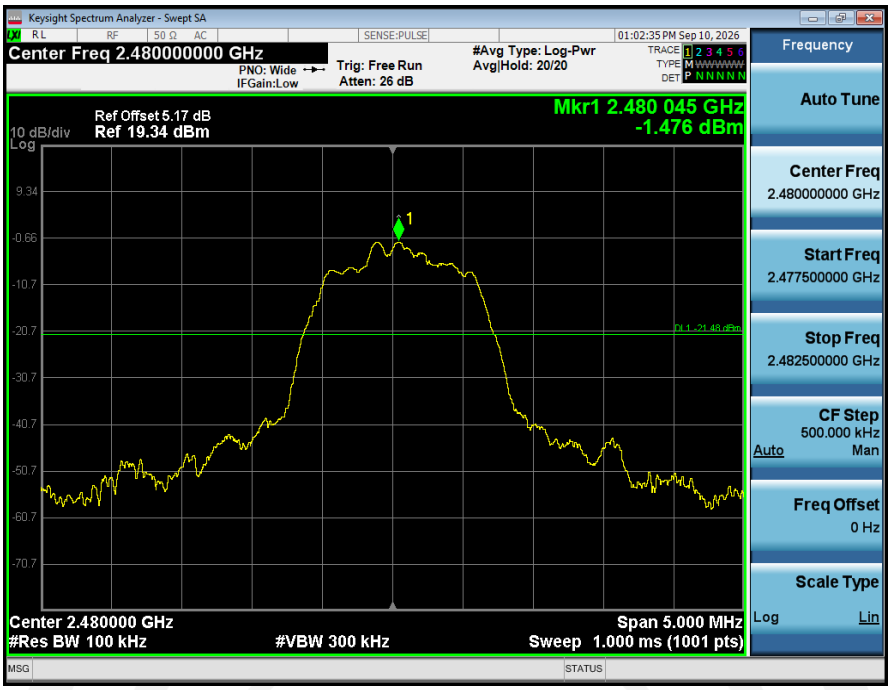
1_Reference_Level_Hopping_NVNT_ANT1_2-DH1_Hopping



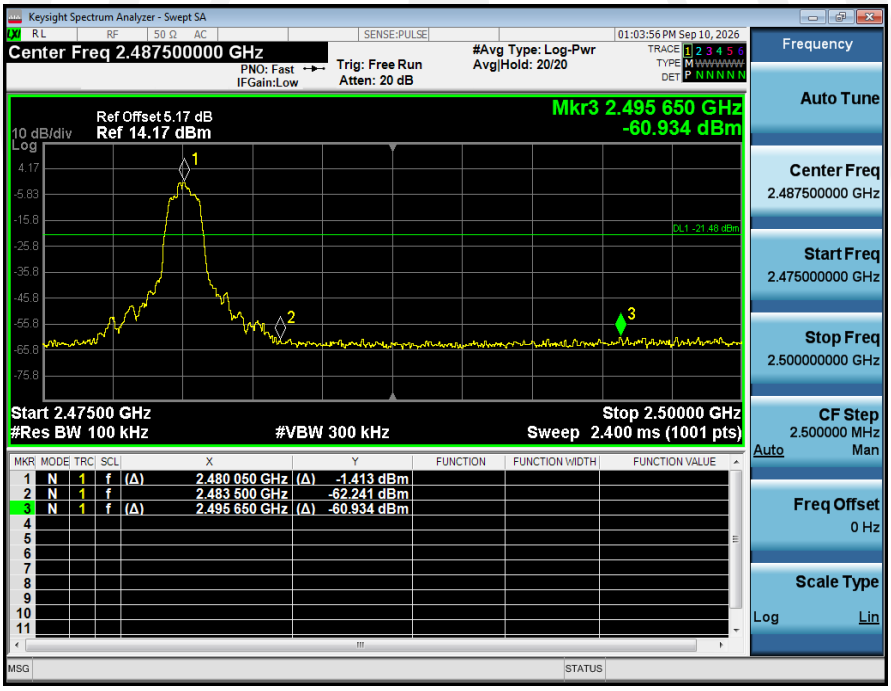
2_Band_Edge_(Hopping)_NVNT_ANT1_2-DH1_Hopping



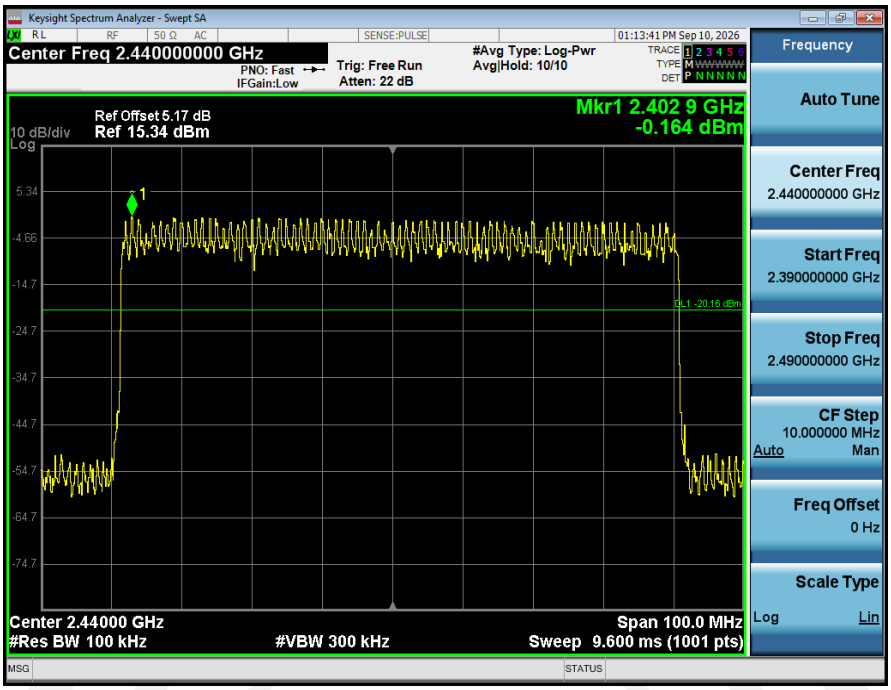
1_Reference_Level_NVNT_ANT1_2-DH1_2480_00



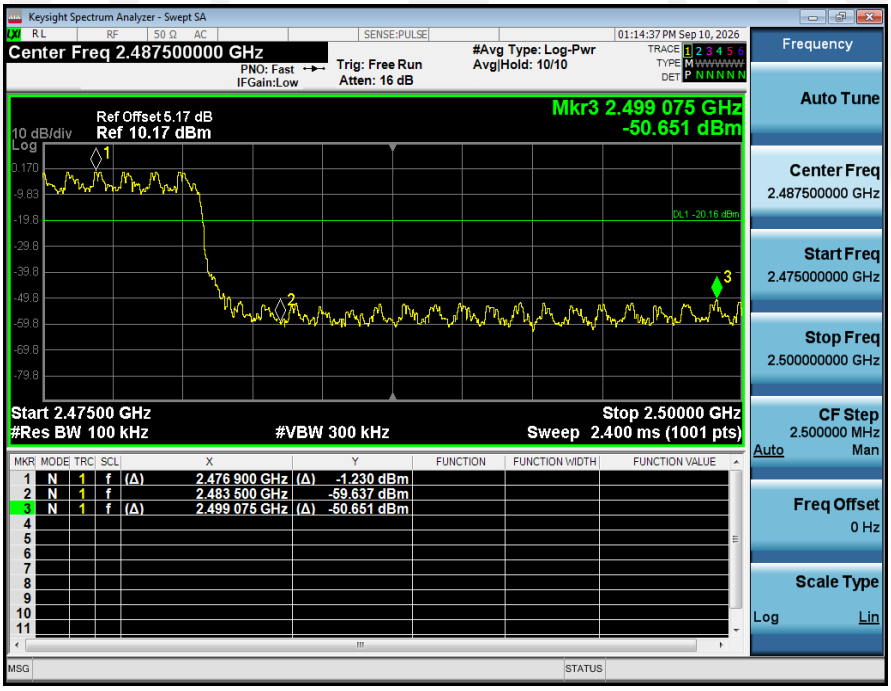
2_Bandedge_NVNT_ANT1_2-DH1_2480_00



1_Reference_Level_Hopping_NVNT_ANT1_2-DH1_Hopping

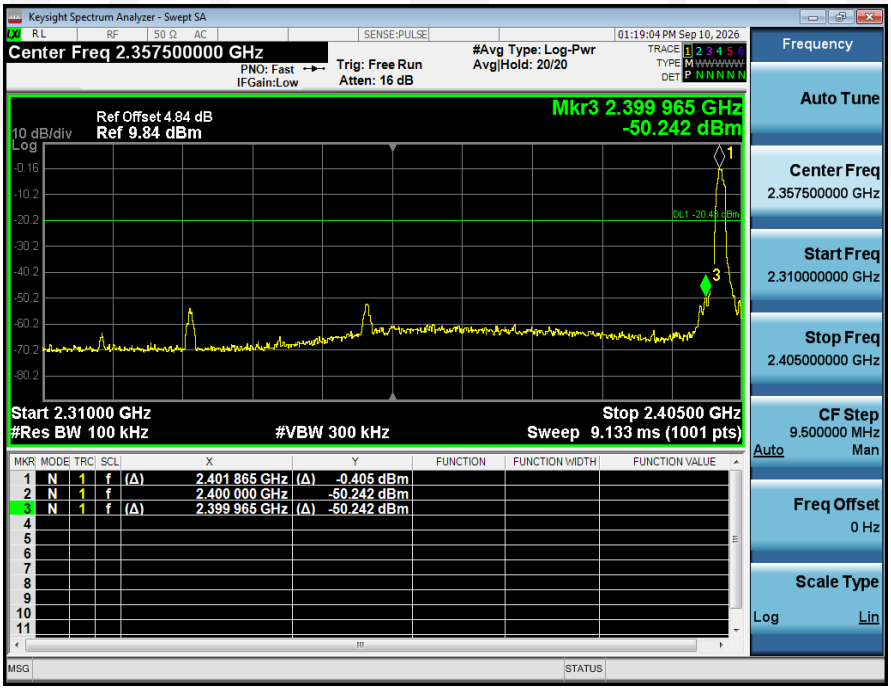


2_Band_Edge_(Hopping)_NVNT_ANT1_2-DH1_Hopping

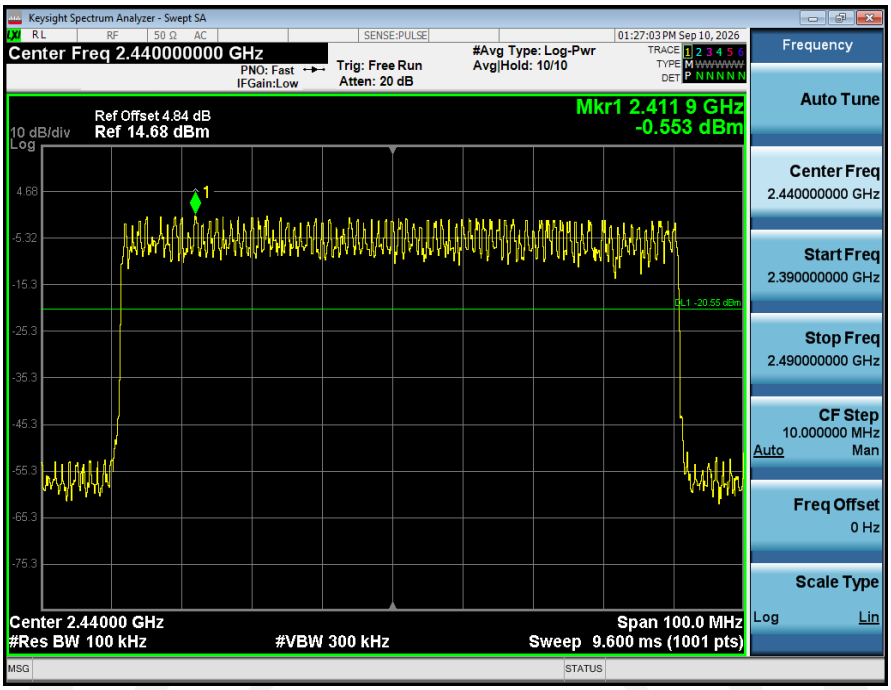


1_Reference_Level_NVNT_ANT1_3-DH1_2402_00

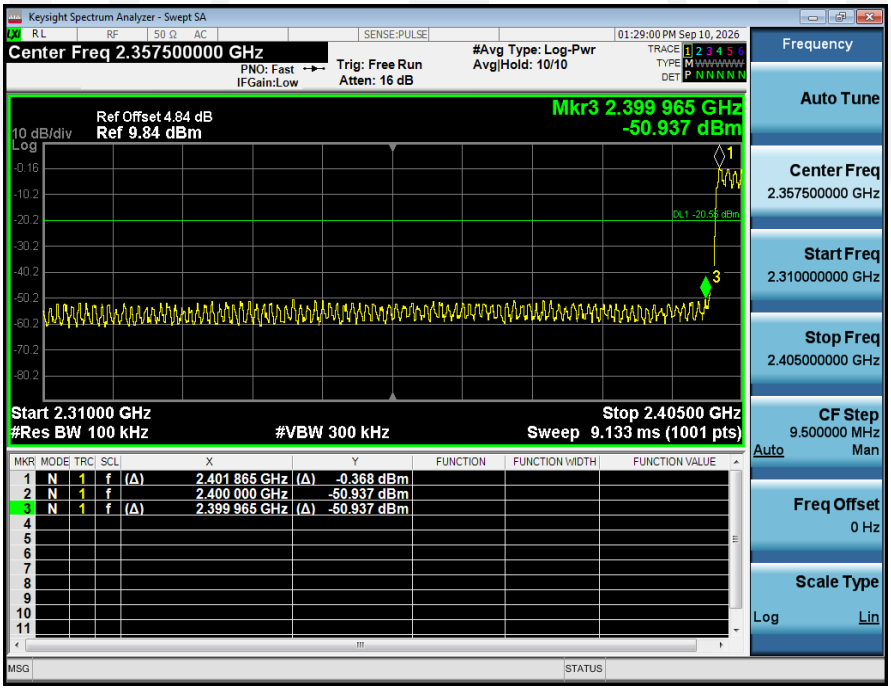
2_Bandedge_NVNT_ANT1_3-DH1_2402_00



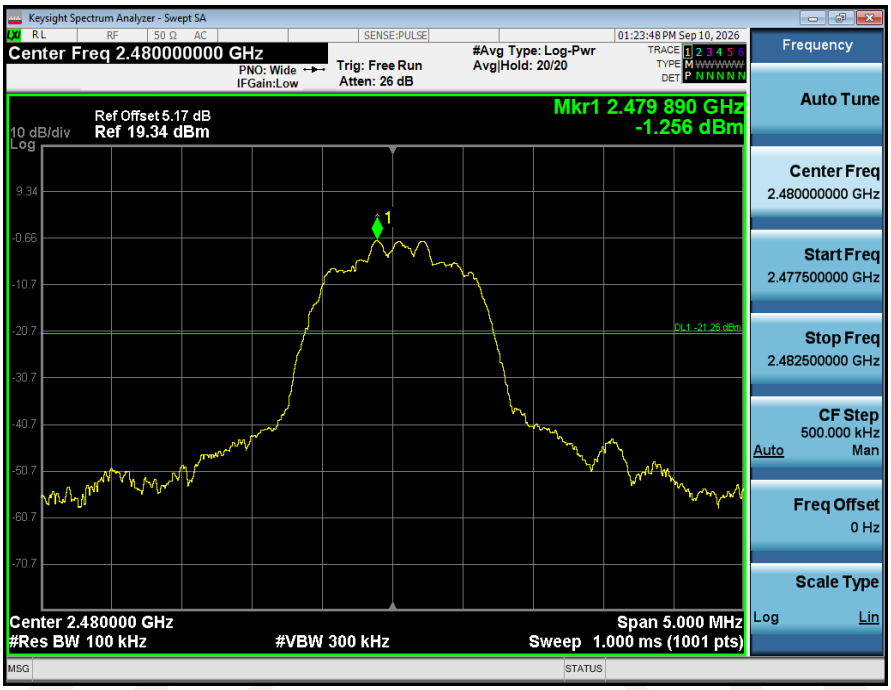
1_Reference_Level_Hopping_NVNT_ANT1_3-DH1_Hopping



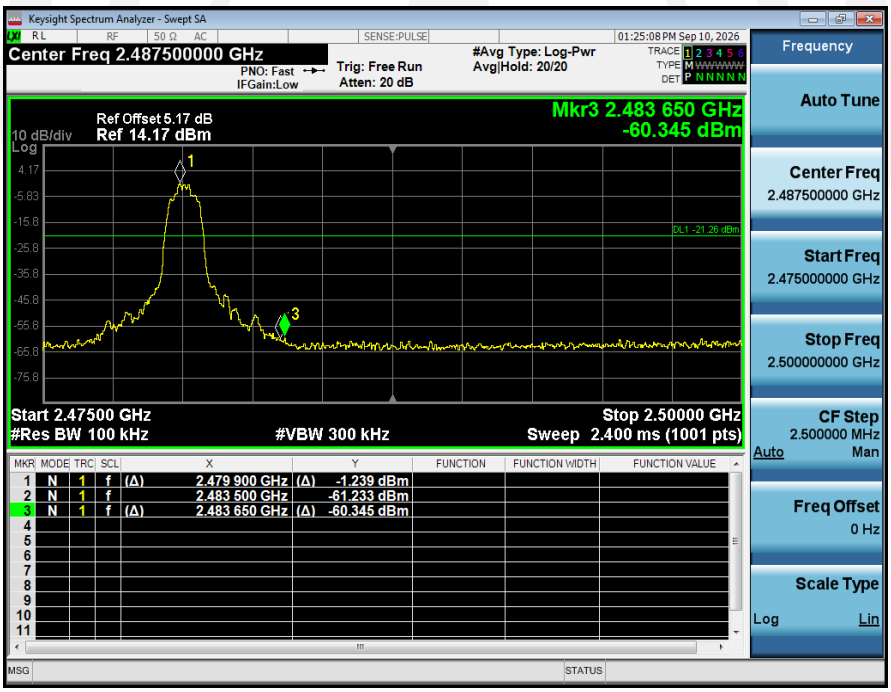
2_Band_Edge_(Hopping)_NVNT_ANT1_3-DH1_Hopping



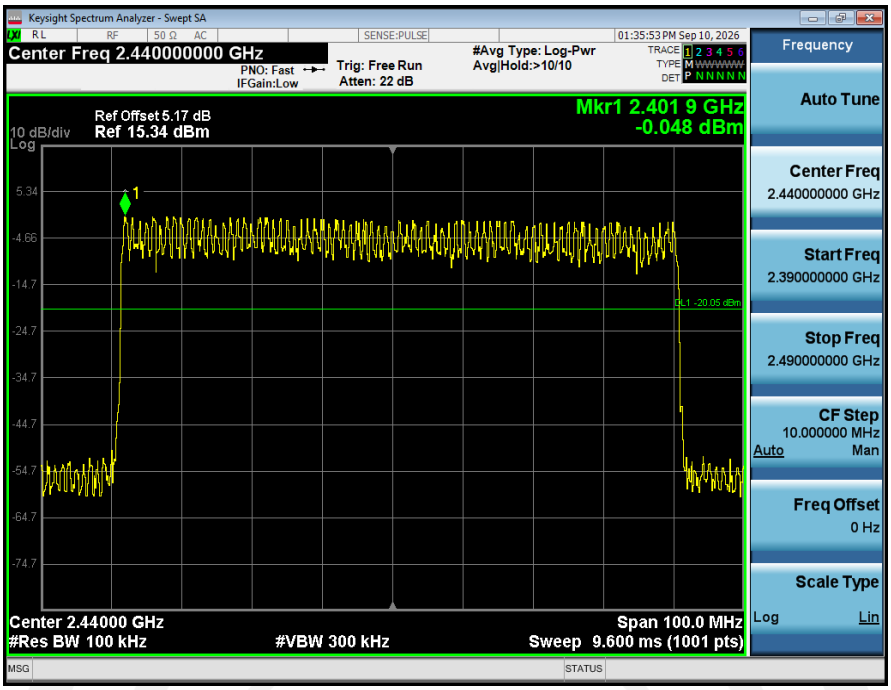
1_Reference_Level_NVNT_ANT1_3-DH1_2480_00



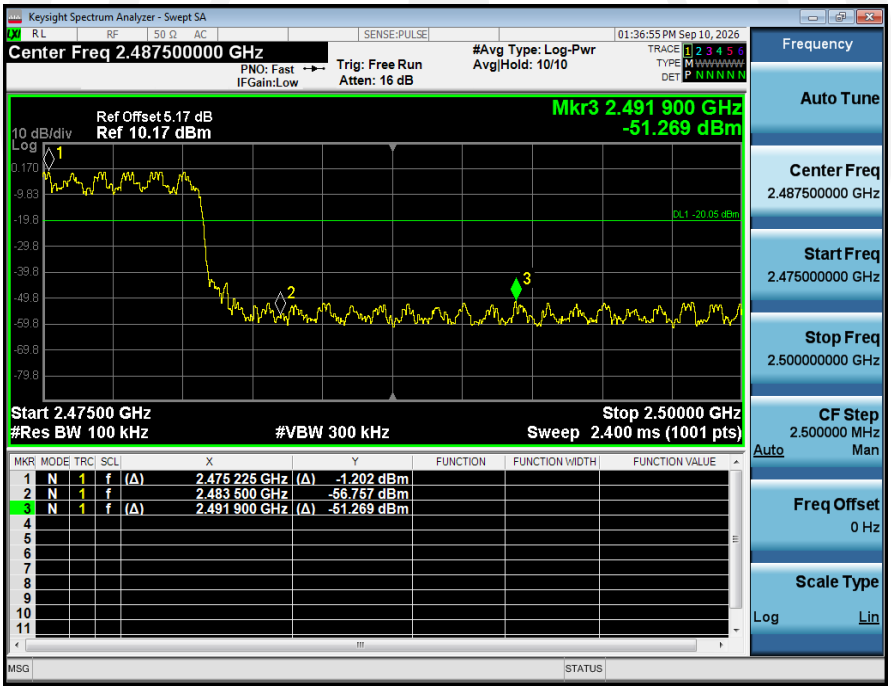
2_Bandedge_NVNT_ANT1_3-DH1_2480_00



1_Reference_Level_Hopping_NVNT_ANT1_3-DH1_Hopping

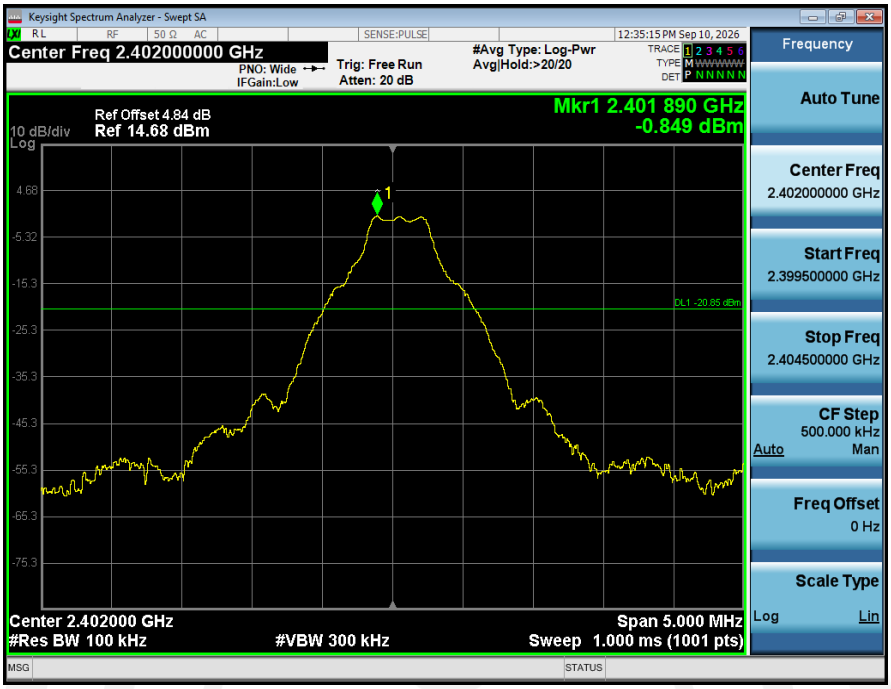


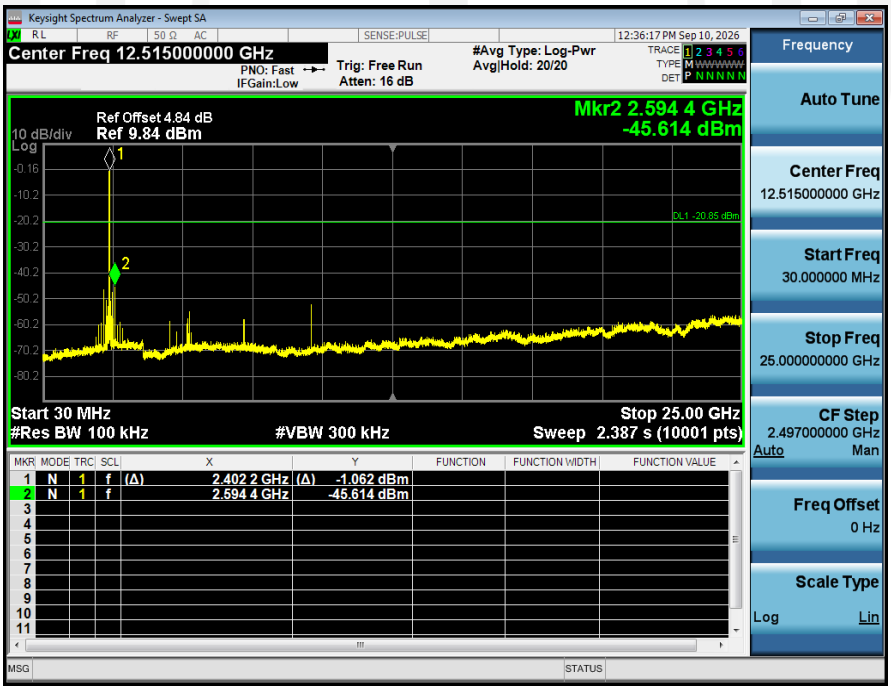
2_Band_Edge_(Hopping)_NVNT_ANT1_3-DH1_Hopping



Conducted spurious emission: Pass

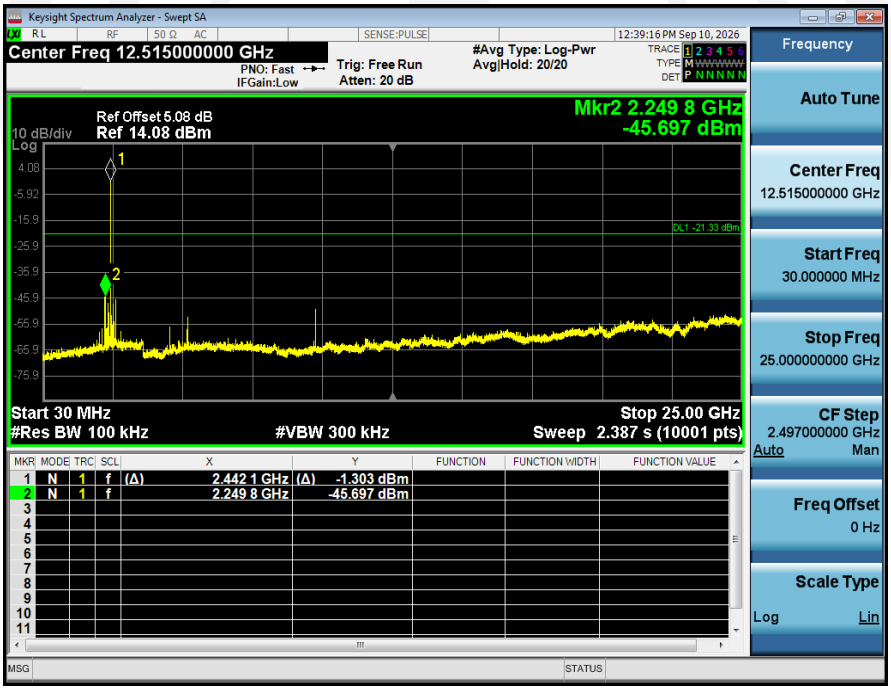
Condition	Antenna	Modulation	TX Mode	Ref_level(dBm)	Spurious MAX.Value(dBm)	Limit	Result
NVNT	ANT1	1-DH1	2402.00	-0.849	-45.614	-20.849	Pass
NVNT	ANT1	1-DH1	2441.00	-1.331	-45.697	-21.331	Pass
NVNT	ANT1	1-DH1	2480.00	-1.538	-43.896	-21.538	Pass
NVNT	ANT1	2-DH1	2402.00	-0.774	-43.020	-20.774	Pass
NVNT	ANT1	2-DH1	2441.00	-1.197	-44.119	-21.197	Pass
NVNT	ANT1	2-DH1	2480.00	-1.476	-45.344	-21.476	Pass
NVNT	ANT1	3-DH1	2402.00	-0.426	-45.448	-20.426	Pass
NVNT	ANT1	3-DH1	2441.00	-0.911	-45.393	-20.911	Pass
NVNT	ANT1	3-DH1	2480.00	-1.256	-44.564	-21.256	Pass

1_Reference_Level_NVNT_ANT1_1-DH1_2402_00


2_Spurious_Emissions_NVNT_ANT1_1-DH1_2402_00


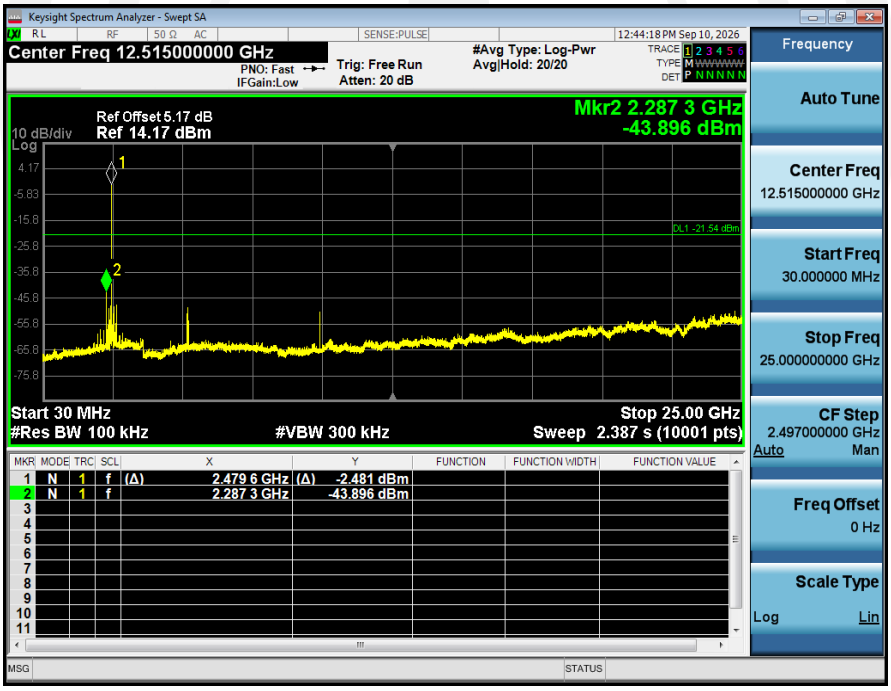
1_Reference_Level_NVNT_ANT1_1-DH1_2441_00

2_Spurious_Emissions_NVNT_ANT1_1-DH1_2441_00



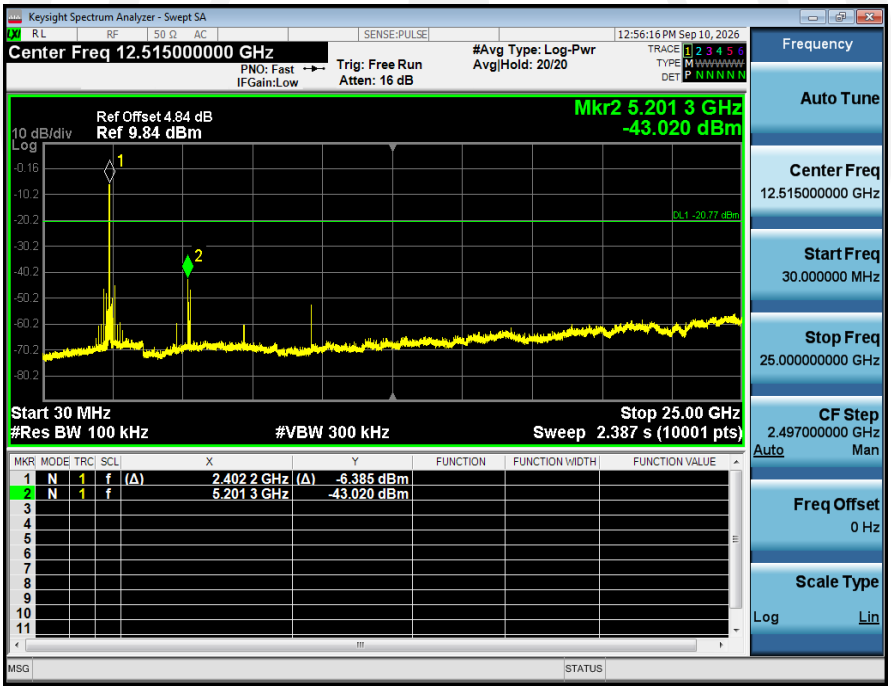
1_Reference_Level_NVNT_ANT1_1-DH1_2480_00

2_Spurious_Emissions_NVNT_ANT1_1-DH1_2480_00



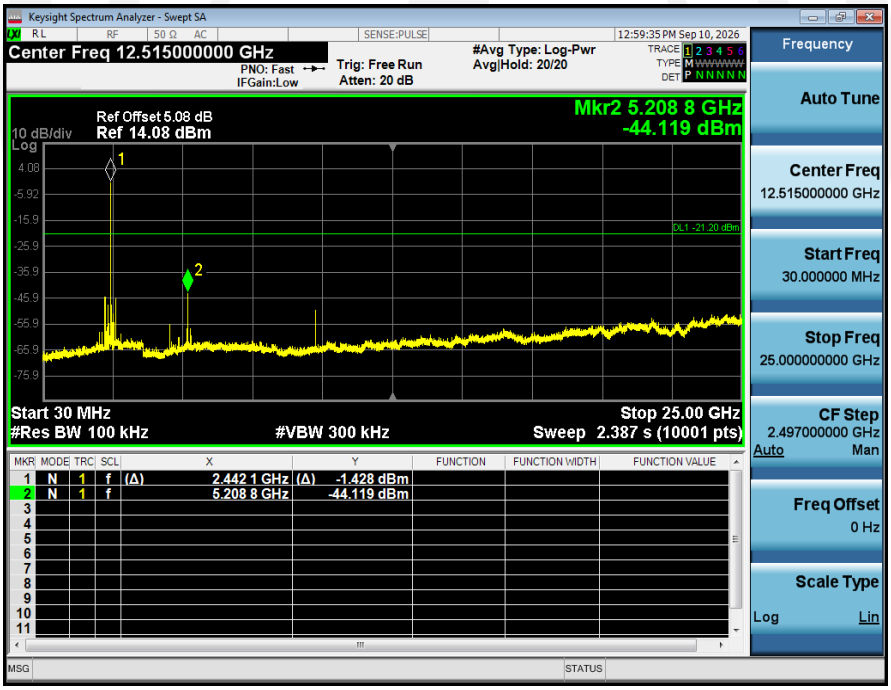
1_Reference_Level_NVNT_ANT1_2-DH1_2402_00

2_Spurious_Emissions_NVNT_ANT1_2-DH1_2402_00

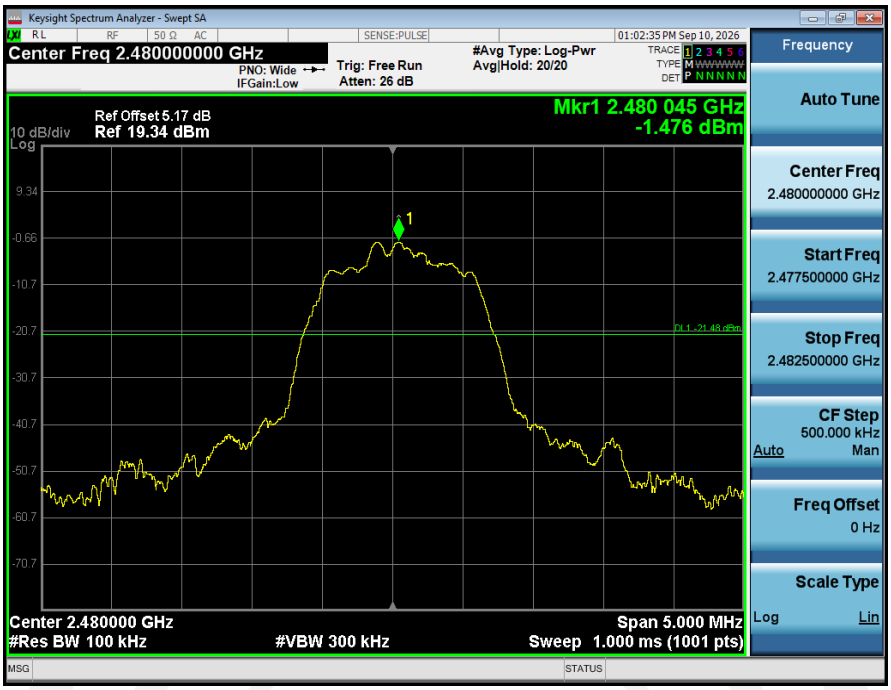


1_Reference_Level_NVNT_ANT1_2-DH1_2441_00

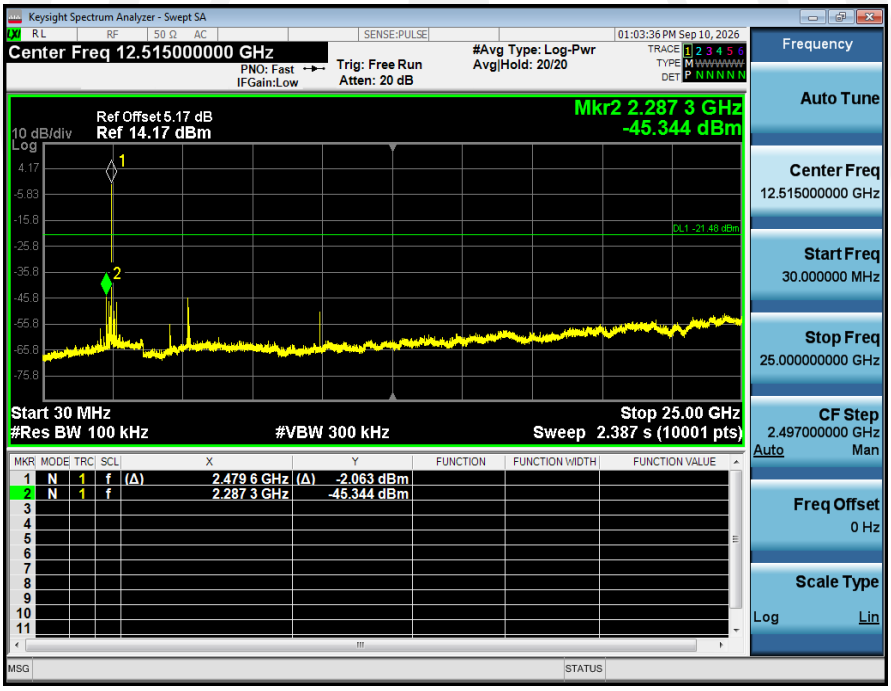
2_Spurious_Emissions_NVNT_ANT1_2-DH1_2441_00



1_Reference_Level_NVNT_ANT1_2-DH1_2480_00

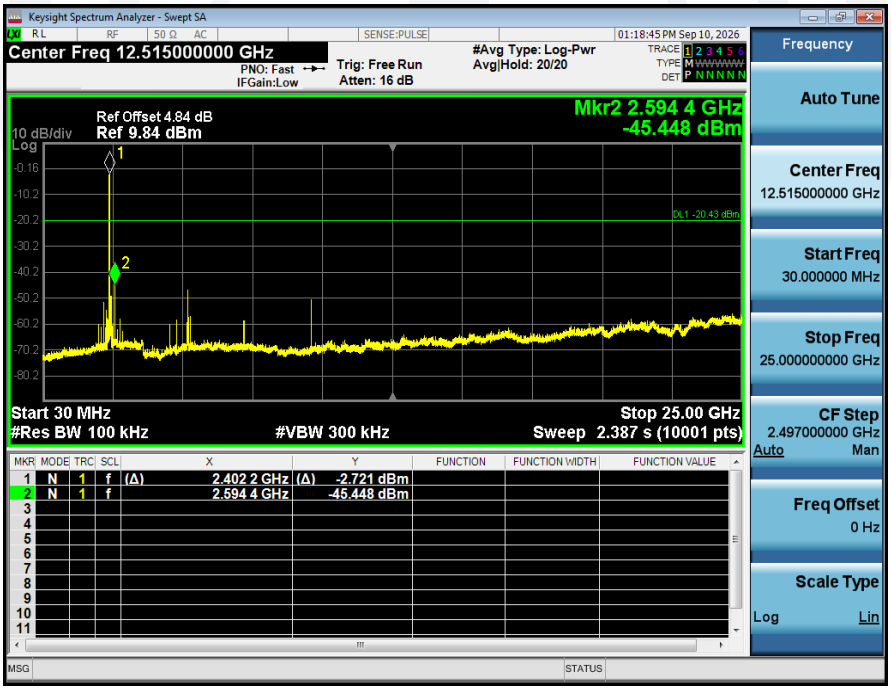


2_Spurious_Emissions_NVNT_ANT1_2-DH1_2480_00



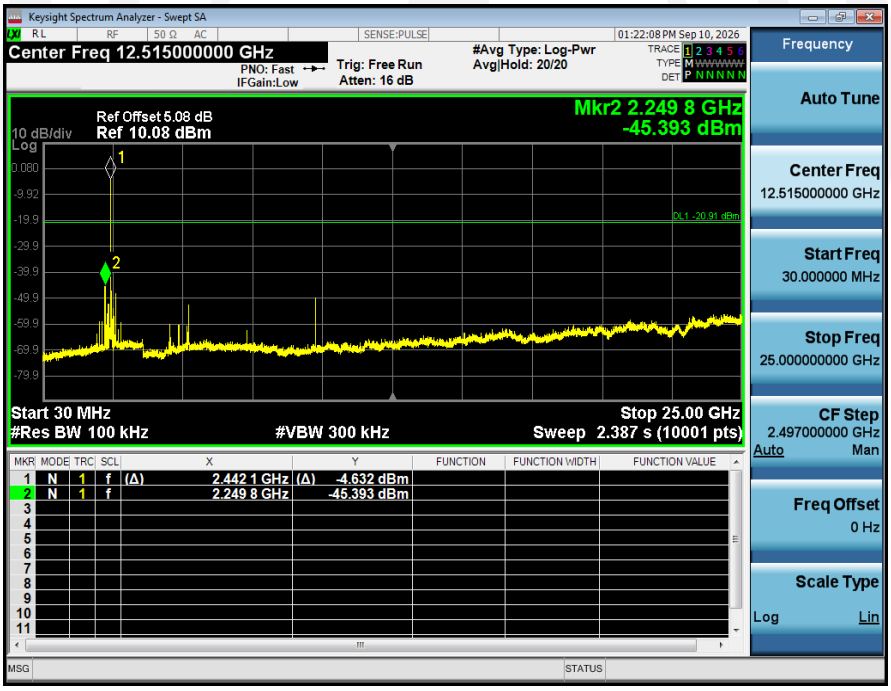
1_Reference_Level_NVNT_ANT1_3-DH1_2402_00

2_Spurious_Emissions_NVNT_ANT1_3-DH1_2402_00

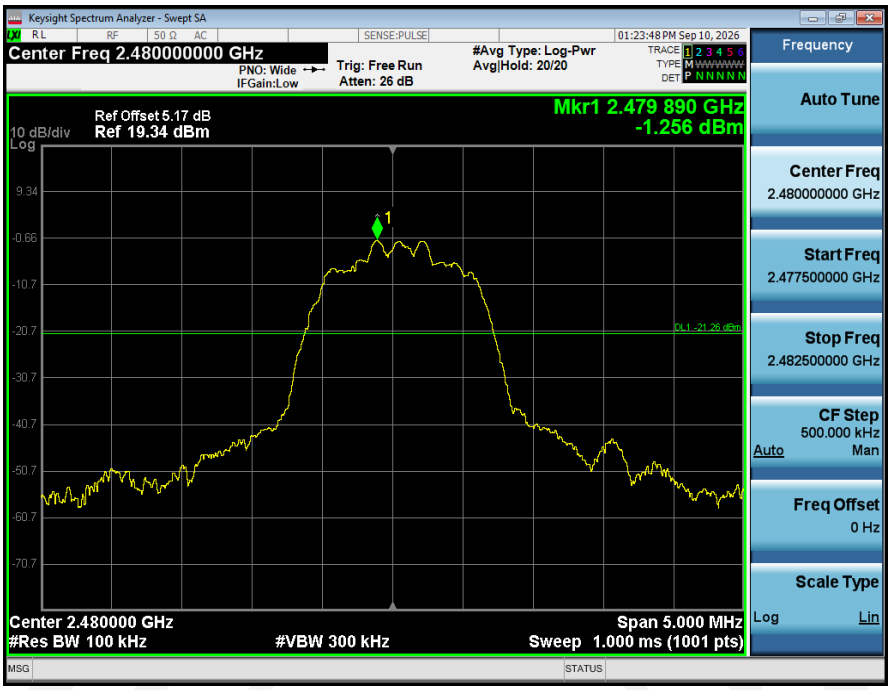


1_Reference_Level_NVNT_ANT1_3-DH1_2441_00

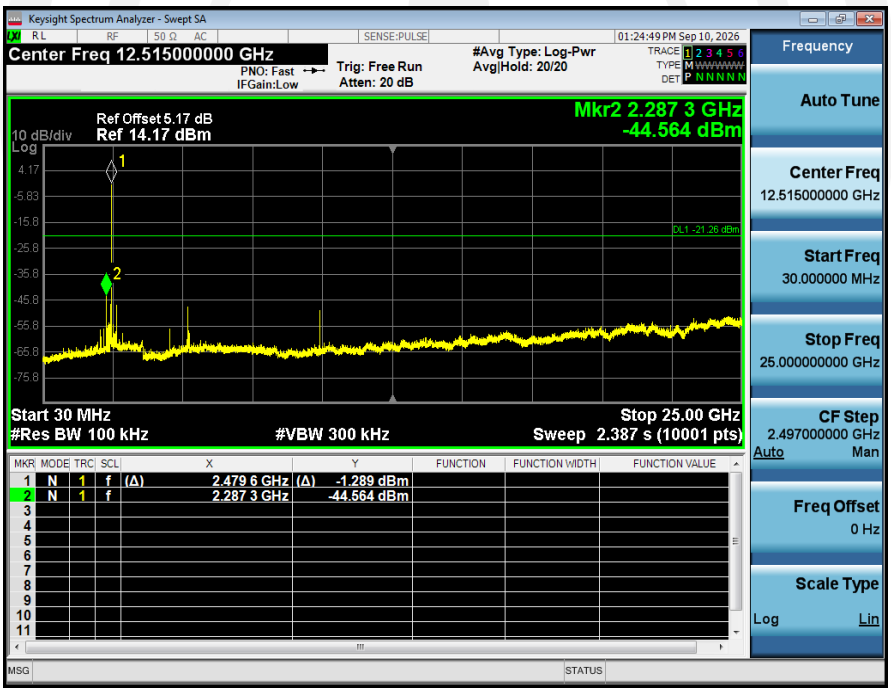
2_Spurious_Emissions_NVNT_ANT1_3-DH1_2441_00



1_Reference_Level_NVNT_ANT1_3-DH1_2480_00



2_Spurious_Emissions_NVNT_ANT1_3-DH1_2480_00



9. Radiated Emissions

9.1. Limit

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

15.209 Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009-0.490	300	2400/F(KHz)	/
0.490-1.705	30	24000/F(KHz)	/
1.705-30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

Note: The peak limit is 20 dB higher than the average limit

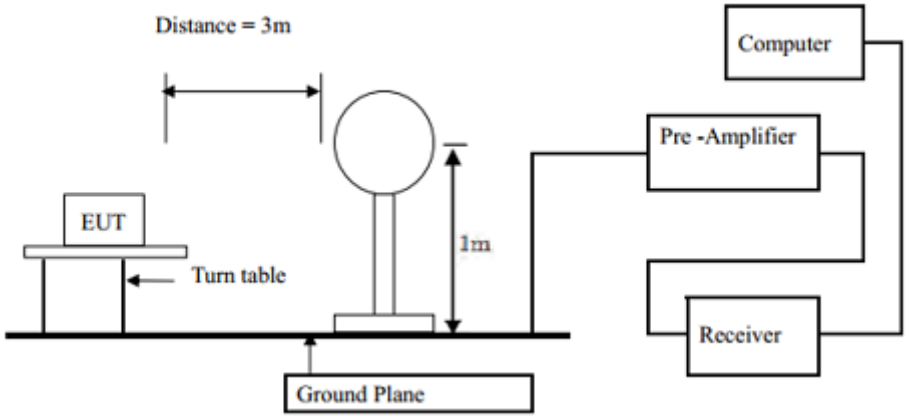
Table 5 – General field strength limits at frequencies above 30 MHz	
Frequency (MHz)	**Field strength (μV/m at 3 m)**
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz		
Frequency	**Magnetic field strength (H-Field) (μA/m)**	**Measurement distance (m)**
9 - 490 kHz[Note 1]	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

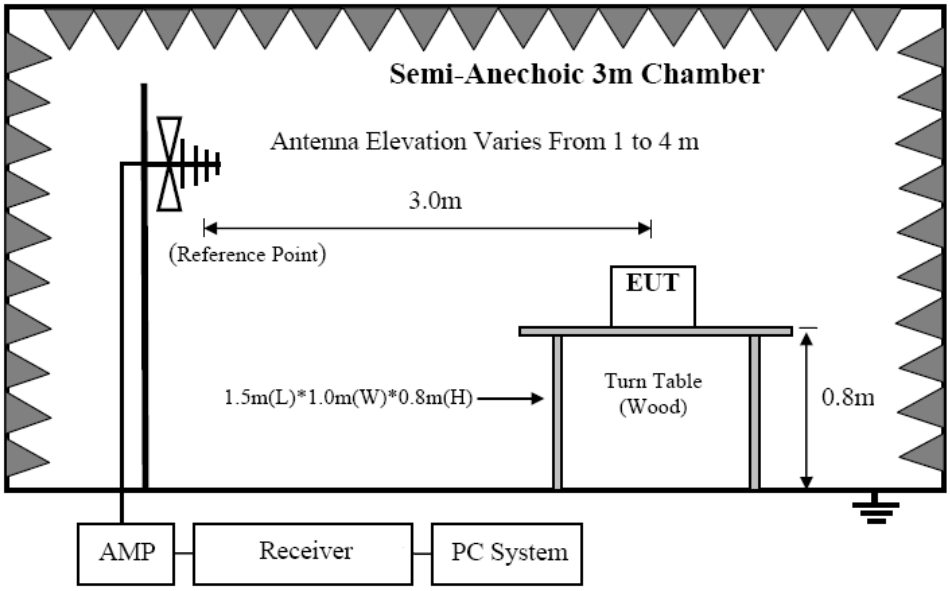
Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

9.2. Block Diagram of Test setup

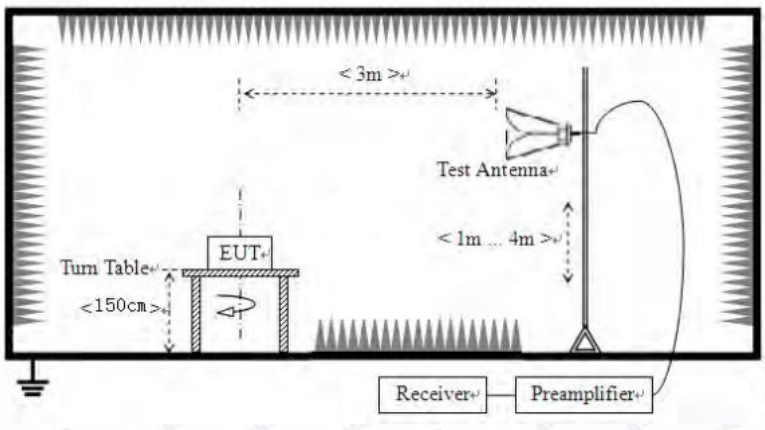
9.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 30MHz



9.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



9.2.2 In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

9.3. Test Procedure

(1) below 1GHz: EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
above 1GHz: EUT was placed on a non-metallic table, 150 cm above the ground plane inside a semi-anechoic chamber.
(2) Setup EUT and simulator
(3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
(a) Change work frequency or channel of device if practicable.
(b) Change modulation type of device if practicable.
(c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
(4) Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated
(5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024 on Radiated Emission test.
(6) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 3MHz for Average measure.

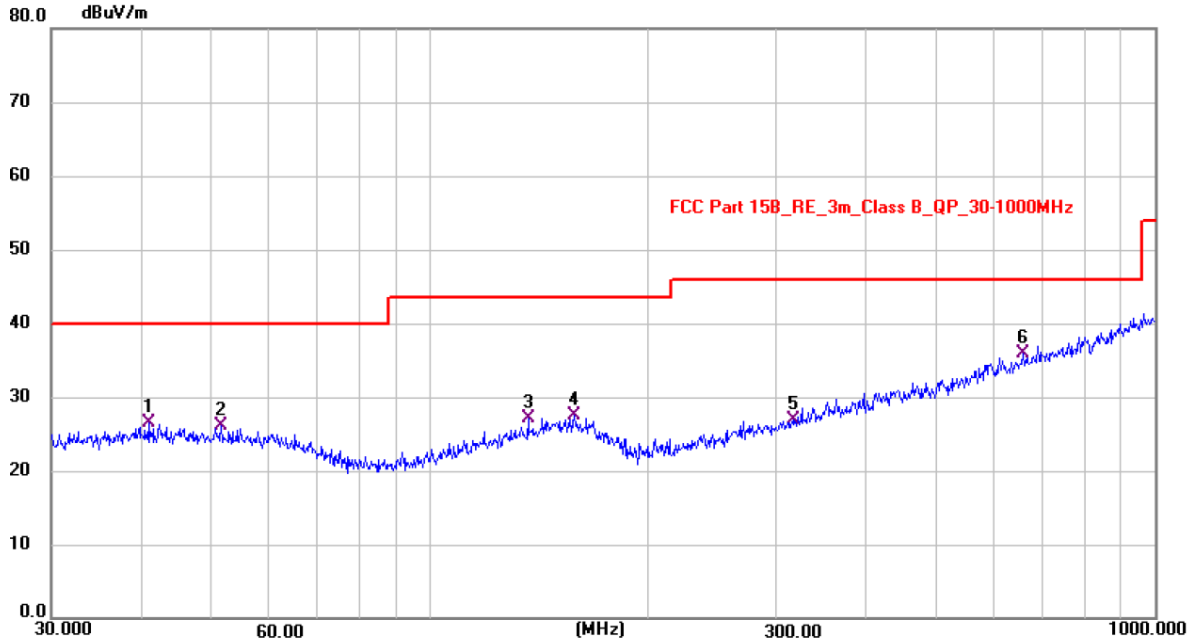
9.4. Test Results

We have scanned from 9kHz to the 10th harmonic of the EUT's highest frequency.
Detailed information please see the following page.

From 9KHz to 30MHz:			
Test Date : 2026.09.08		Temperature : 26℃	
Test Engineer : Jensen Wang		Humidity : 54%	
Test Mode : GFSK mode			
Test Voltage : DC 3.7V from battery			
Test Results : **PASS**			
Note:	The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.		

From 30MHz to 1000MHz:					
Test Date	:	2026.09.08	Temperature	:	26℃
Test Engineer	:	Jensen Wang	Humidity	:	54%
Test Mode	:	GFSK mode			
Test Voltage	:	DC 3.7V from battery			
Test Results	:	**PASS**			
Note:	1. The test results are listed in next pages. 2. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector and quasi-peak detector need not be carried out. 3. All modes have been tested, and only worst data of GFSK mode, Channel 2402MHz was listed in this report.				

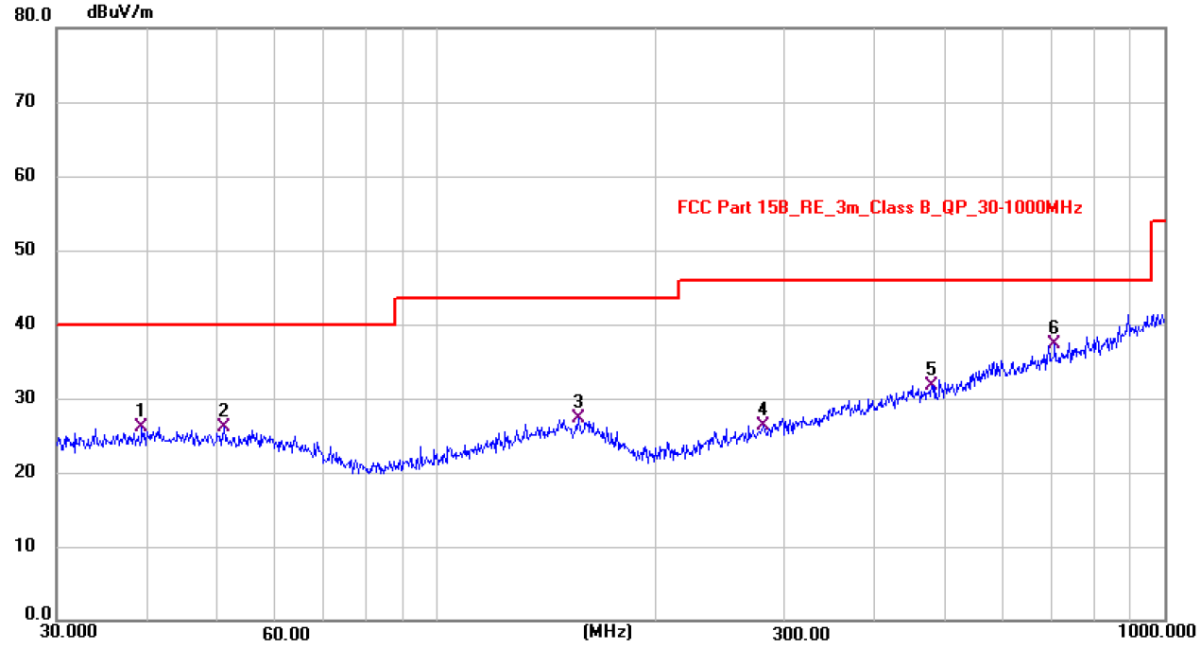
Polarization: Vertical



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	40.9881	12.36	14.21	26.57	40.00	-13.43	QP
2	51.6163	12.39	13.66	26.05	40.00	-13.95	QP
3	136.6394	12.81	14.25	27.06	43.50	-16.44	QP
4	158.5287	12.28	15.17	27.45	43.50	-16.05	QP
5	317.2836	11.29	15.63	26.92	46.00	-19.08	QP
6 *	658.2589	12.84	23.13	35.97	46.00	-10.03	QP

Note: Level = Reading + Factor Margin = Level - Limit

Polarization: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	39.3164	11.95	14.18	26.13	40.00	-13.87	QP
2	51.0314	12.34	13.69	26.03	40.00	-13.97	QP
3	156.6636	12.06	15.18	27.24	43.50	-16.26	QP
4	281.8710	11.75	14.57	26.32	46.00	-19.68	QP
5	479.6858	12.28	19.51	31.79	46.00	-14.21	QP
6 *	707.0097	13.47	23.91	37.38	46.00	-8.62	QP

Note: Level = Reading + Factor Margin = Level - Limit

From 1GHz to 25GHz:					
Test Date	:	2026.09.08	Temperature	:	26℃
Test Engineer	:	Jensen Wang	Humidity	:	54%
Test Mode	:	GFSK, π/4 DQPSK, 8DPSK mode			
Test Voltage	:	DC 3.7V from battery			
Test Results	:	**PASS**			
Note:	1. The test results are listed in next pages. 2. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector and quasi-peak detector need not be carried out. 3. If the limits for the measurement with the average detector are met when using a receiver with a quasi-peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.				

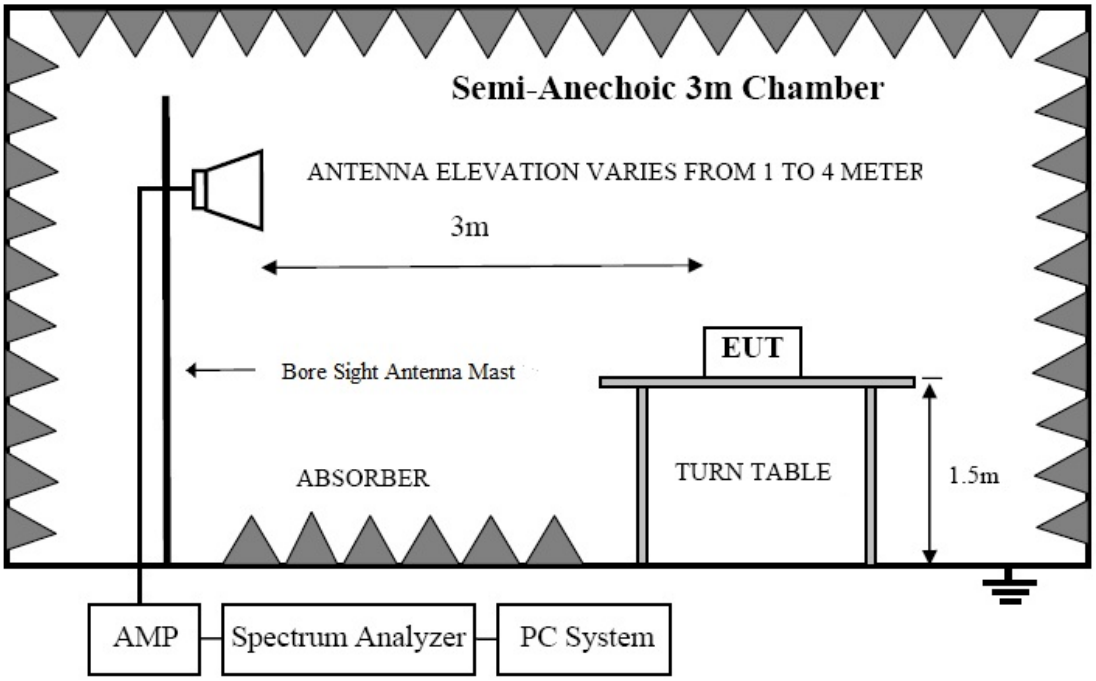
Test Mode : GFSK TX Low								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	4804	V	57.88	-13.25	44.63	74.00	-29.37	Peak
2	4804	V	49.63	-13.25	36.38	54.00	-17.62	Avg
3	7206	--	--	--	--	--	--	--
4	9608	--	--	--	--	--	--	--
5	4804	H	54.86	-13.25	41.61	74.00	-32.39	Peak
6	4804	H	47.62	-13.25	34.37	54.00	-19.63	Avg
7	7206	--	--	--	--	--	--	--
8	9608	--	--	--	--	--	--	--
Test Mode : GFSK TX Mid								
1	4882	V	59.48	-12.98	46.50	74.00	-27.50	Peak
2	4882	V	48.59	-12.98	35.61	54.00	-18.39	Avg
3	7323	--	--	--	--	--	--	--
4	9764	--	--	--	--	--	--	--
5	4882	H	54.97	-12.98	41.99	74.00	-32.01	Peak
6	4882	H	45.12	-12.98	32.14	54.00	-21.86	Avg
7	7323	--	--	--	--	--	--	--
8	9764	--	--	--	--	--	--	--
Test Mode : GFSK TX High								
1	4960	V	57.64	-12.70	44.94	74.00	-29.06	Peak
2	4960	V	48.51	-12.70	35.81	54.00	-18.19	Avg
3	7440	--	--	--	--	--	--	--
4	9920	--	--	--	--	--	--	--
5	4960	H	55.22	-12.70	42.52	74.00	-31.48	Peak
6	4960	H	45.13	-12.70	32.43	54.00	-21.57	Avg
7	7440	--	--	--	--	--	--	--
8	9920	--	--	--	--	--	--	--
Note:	1. Means other frequency and mode comply with standard requirements and at least have 20dB margin. 2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain. Result=Reading + Correct Factor. Margin= Result-Limit.							

Test Mode : π/4 DQPSK TX Low								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	4804	V	57.18	-13.25	43.93	74.00	-30.07	Peak
2	4804	V	48.60	-13.25	35.35	54.00	-18.65	Avg
3	7206	--	--	--	--	--	--	--
4	9608	--	--	--	--	--	--	--
5	4804	H	58.15	-13.25	44.90	74.00	-29.10	Peak
6	4804	H	47.79	-13.25	34.54	54.00	-19.46	Avg
7	7206	--	--	--	--	--	--	--
8	9608	--	--	--	--	--	--	--
Test Mode : π/4 DQPSK TX Mid								
1	4882	V	59.82	-12.98	46.84	74.00	-27.16	Peak
2	4882	V	46.74	-12.98	33.76	54.00	-20.24	Avg
3	7323	--	--	--	--	--	--	--
4	9764	--	--	--	--	--	--	--
5	4882	H	57.01	-12.98	44.03	74.00	-29.97	Peak
6	4882	H	46.74	-12.98	33.76	54.00	-20.24	Avg
7	7323	--	--	--	--	--	--	--
8	9764	--	--	--	--	--	--	--
Test Mode : π/4 DQPSK TX High								
1	4960	V	56.44	-12.70	43.74	74.00	-30.26	Peak
2	4960	V	48.79	-12.70	36.09	54.00	-17.91	Avg
3	7440	--	--	--	--	--	--	--
4	9920	--	--	--	--	--	--	--
5	4960	H	57.34	-12.70	44.64	74.00	-29.36	Peak
6	4960	H	46.10	-12.70	33.40	54.00	-20.60	Avg
7	7440	--	--	--	--	--	--	--
8	9920	--	--	--	--	--	--	--
Note:	1. Means other frequency and mode comply with standard requirements and at least have 20dB margin. 2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain. Result=Reading + Correct Factor. Margin= Result-Limit.							

Test Mode : 8DPSK TX Low								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	4804	V	59.95	-13.25	46.70	74.00	-27.30	Peak
2	4804	V	50.37	-13.25	37.12	54.00	-16.88	Avg
3	7206	--	--	--	--	--	--	--
4	9608	--	--	--	--	--	--	--
5	4804	H	54.50	-13.25	41.25	74.00	-32.75	Peak
6	4804	H	46.68	-13.25	33.43	54.00	-20.57	Avg
7	7206	--	--	--	--	--	--	--
8	9608	--	--	--	--	--	--	--
Test Mode : 8DPSK TX Mid								
1	4882	V	58.81	-12.98	45.83	74.00	-28.17	Peak
2	4882	V	46.91	-12.98	33.93	54.00	-20.07	Avg
3	7323	--	--	--	--	--	--	--
4	9764	--	--	--	--	--	--	--
5	4882	H	56.50	-12.98	43.52	74.00	-30.48	Peak
6	4882	H	48.49	-12.98	35.51	54.00	-18.49	Avg
7	7323	--	--	--	--	--	--	--
8	9764	--	--	--	--	--	--	--
Test Mode : 8D PSK TX High								
1	4960	V	59.76	-12.70	47.06	74.00	-26.94	Peak
2	4960	V	50.61	-12.70	37.91	54.00	-16.09	Avg
3	7440	--	--	--	--	--	--	--
4	9920	--	--	--	--	--	--	--
5	4960	H	57.89	-12.70	45.19	74.00	-28.81	Peak
6	4960	H	45.73	-12.70	33.03	54.00	-20.97	Avg
7	7440	--	--	--	--	--	--	--
8	9920	--	--	--	--	--	--	--
Note:	1. Means other frequency and mode comply with standard requirements and at least have 20dB margin. 2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain. Result=Reading + Correct Factor. Margin= Result-Limit.							

10.Band Edge Test

10.1.Block Diagram of Test Setup



10.2.Test Limit

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)).
Please refer section 15.247.

10.3.Test Procedure

Refer to ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024, Clause 6.10.
All restriction band and non- restriction band have been tested, only worse case is reported.

10.4.Test Results

Test Date	:	2026.09.08	Temperature	:	26℃
Test Engineer	:	Jensen Wang	Humidity	:	54%
Test Results	:	**PASS**			
Test Voltage	:	**DC 3.7V**			

Frequency Range : **2310MHz~2390MHz**								
Test Mode : GFSK TX 2402MHz								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	2390	H	61.30	-20.45	40.85	74.00	-33.15	Peak
2	2390	H	--	-20.45	--	54.00	--	Avg
1	2390	V	62.79	-20.45	42.34	74.00	-31.66	Peak
2	2390	V	--	-20.45	--	54.00	--	Avg
Frequency Range : **2483.5MHz~2500MHz**								
Test Mode : GFSK TX 2480MHz								
1	2483.5	H	62.71	-20.15	42.56	74.00	-31.44	Peak
2	2483.5	H	--	-20.15	--	54.00	--	Avg
1	2483.5	V	66.95	-20.15	46.80	74.00	-27.20	Peak
2	2483.5	V	--	-20.15	--	54.00	--	Avg

Note:
1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.
2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.
Result=Reading + Correct Factor. Margin= Result-Limit.
3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

Frequency Range : **2310MHz~2390MHz**								
Test Mode : π/4 DQPSK TX 2402MHz								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	2390	H	58.74	-20.45	38.29	74.00	-35.71	Peak
2	2390	H	--	-20.45	--	54.00	--	Avg
1	2390	V	61.88	-20.45	41.43	74.00	-32.57	Peak
2	2390	V	--	-20.45	--	54.00	--	Avg
Frequency Range : **2483.5MHz~2500MHz**								
Test Mode : π/4 DQPSK TX 2480MHz								
1	2483.5	H	62.62	-20.15	42.47	74.00	-31.53	Peak
2	2483.5	H	--	-20.15	--	54.00	--	Avg
1	2483.5	V	65.11	-20.15	44.96	74.00	-29.04	Peak
2	2483.5	V	--	-20.15	--	54.00	--	Avg

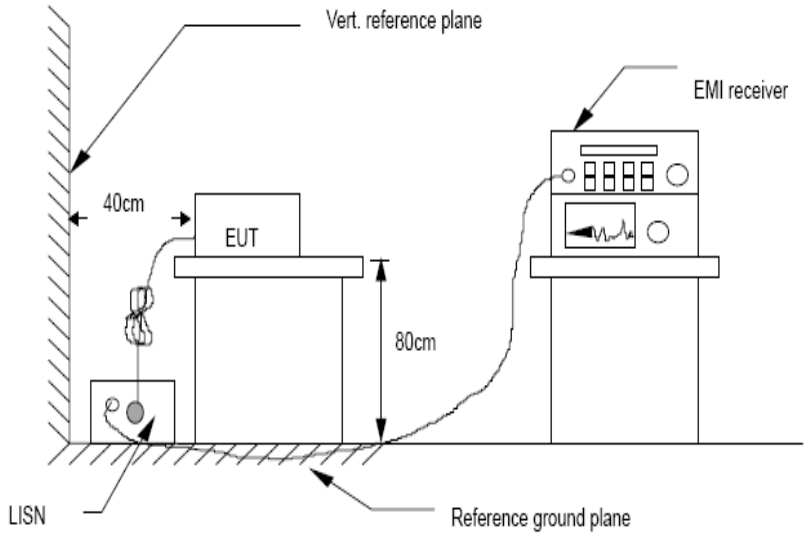
Note:
1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.
2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.
Result=Reading + Correct Factor. Margin= Result-Limit.
3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

Frequency Range : **2310MHz~2390MHz**								
Test Mode : 8DPSK TX 2402MHz								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	2390	H	59.59	-20.45	39.14	74.00	-34.86	Peak
2	2390	H	--	-20.45	--	54.00	--	Avg
1	2390	V	60.48	-20.45	40.03	74.00	-33.97	Peak
2	2390	V	--	-20.45	--	54.00	--	Avg
Frequency Range : **2483.5MHz~2500MHz**								
Test Mode : 8DPSK TX 2480MHz								
1	2483.5	H	60.29	-20.15	40.14	74.00	-33.86	Peak
2	2483.5	H	--	-20.15	--	54.00	--	Avg
1	2483.5	V	66.35	-20.15	46.20	74.00	-27.80	Peak
2	2483.5	V	--	-20.15	--	54.00	--	Avg

Note:
1. Means other frequency and mode comply with standard requirements and at least have 20dB margin.
2. Correct Factor=Cable Loss+ Antenna Factor-Amplifier Gain.
Result=Reading + Correct Factor. Margin= Result-Limit.
3. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out.

11. Power Line Conducted Emissions

11.1.Block Diagram of Test Setup



11.2.Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

Notes: 1. * Decreasing linearly with logarithm of frequency.

2. The lower limit shall apply at the transition frequencies.

11.3.Test Procedure

(1) The EUT was placed on a non-metallic table, 80cm above the ground plane.

(2) Setup the EUT and simulator as shown in 11.1

(3) The EUT Power connected to the power mains through a power adapter and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N2), this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024+Errata to C63.10a-2024 on conducted Emission test.

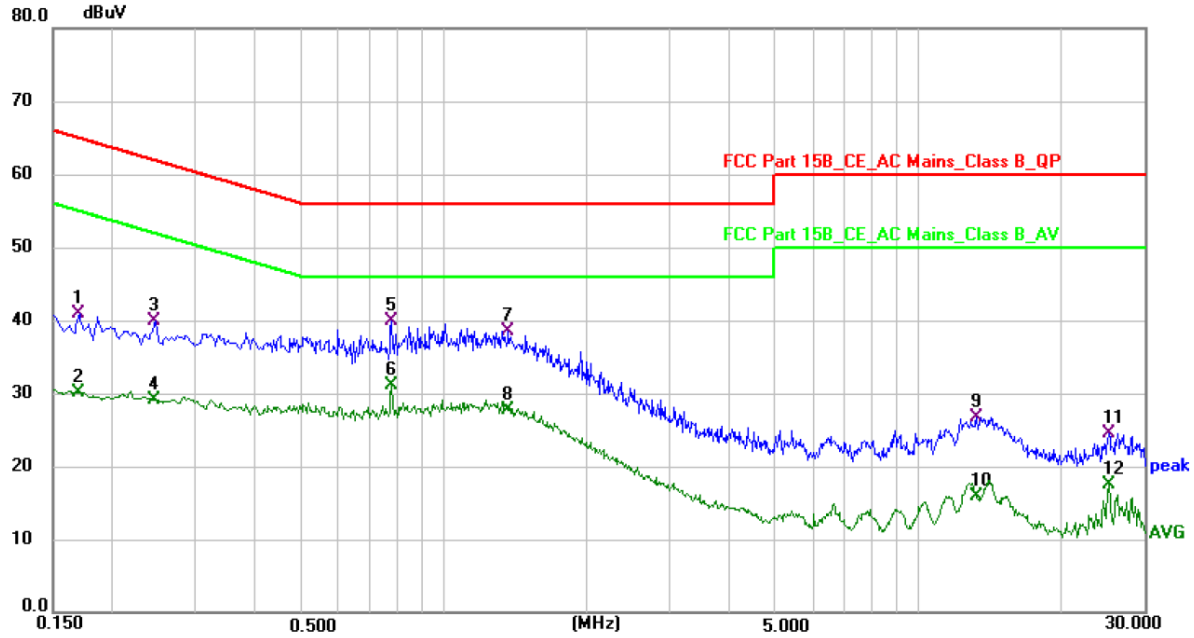
(4) The bandwidth of test receiver is set at 10KHz.

(5) The frequency range from 150 KHz to 30MHz is checked.

11.4.Test Results

Test Date	:	2026.09.07	Temperature	:	24℃
Test Engineer	:	Jensen Wang	Humidity	:	56%
Test Mode	:	GFSK mode			
Test Results	:	**PASS**			
Note:	1. The test results are listed in next pages. 2. If the limits for the measurement with the average detector are met when using a receiver with a peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector and quasi-peak detector need not be carried out. 3. If the limits for the measurement with the average detector are met when using a receiver with a quasi-peak detector, the test unit shall be deemed to meet both limits and the measurement with the average detector need not be carried out. 4. All modes have been tested, and only worst data of GFSK mode, Channel 2402MHz (AC 120V/60Hz) was listed in this report.				

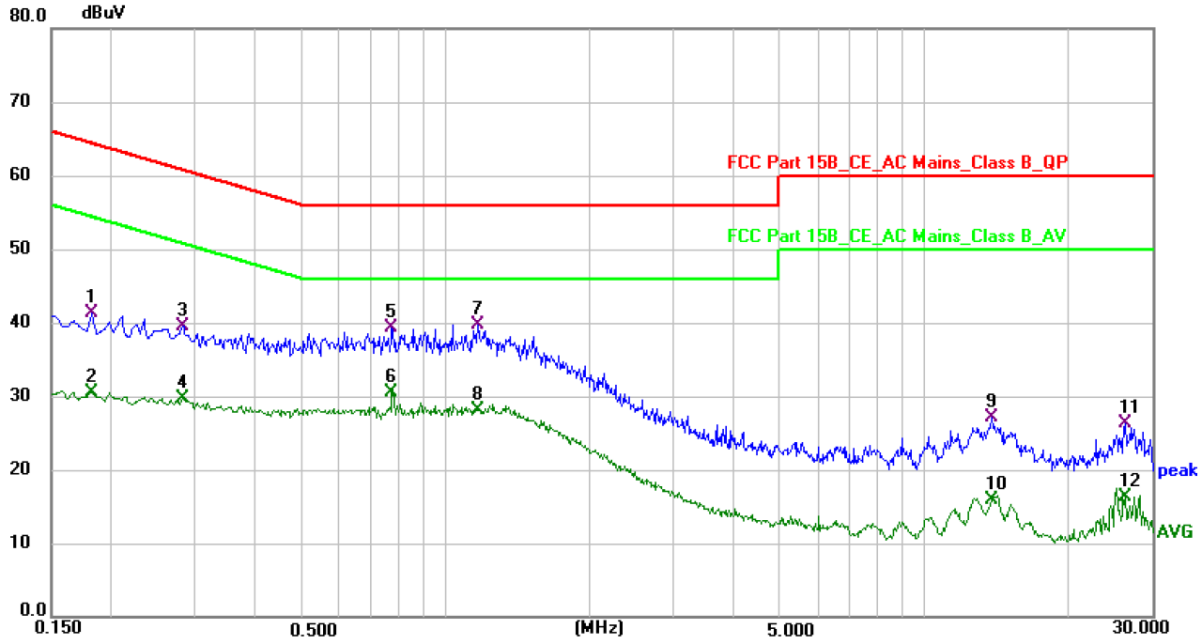
Polarization: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1700	31.22	9.60	40.82	64.96	-24.14	QP
2	0.1700	20.57	9.60	30.17	54.96	-24.79	AVG
3	0.2460	30.53	9.42	39.95	61.89	-21.94	QP
4	0.2460	19.73	9.42	29.15	51.89	-22.74	AVG
5	0.7780	30.45	9.53	39.98	56.00	-16.02	QP
6 *	0.7780	21.63	9.53	31.16	46.00	-14.84	AVG
7	1.3700	28.58	9.87	38.45	56.00	-17.55	QP
8	1.3700	17.81	9.87	27.68	46.00	-18.32	AVG
9	13.3060	16.88	9.84	26.72	60.00	-33.28	QP
10	13.3060	6.12	9.84	15.96	50.00	-34.04	AVG
11	25.2420	14.73	9.73	24.46	60.00	-35.54	QP
12	25.2420	7.74	9.73	17.47	50.00	-32.53	AVG

Note: Level = Reading + Factor Margin = Level - Limit

Polarization: N



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1819	31.75	9.49	41.24	64.40	-23.16	QP
2	0.1819	21.10	9.49	30.59	54.40	-23.81	AVG
3	0.2819	30.14	9.42	39.56	60.76	-21.20	QP
4	0.2819	20.19	9.42	29.61	50.76	-21.15	AVG
5	0.7740	29.45	9.86	39.31	56.00	-16.69	QP
6 *	0.7740	20.58	9.86	30.44	46.00	-15.56	AVG
7	1.1660	30.06	9.60	39.66	56.00	-16.34	QP
8	1.1660	18.58	9.60	28.18	46.00	-17.82	AVG
9	13.8980	17.49	9.59	27.08	60.00	-32.92	QP
10	13.8980	6.28	9.59	15.87	50.00	-34.13	AVG
11	26.3900	16.38	9.94	26.32	60.00	-33.68	QP
12	26.3900	6.45	9.94	16.39	50.00	-33.61	AVG

Note: Level = Reading + Factor Margin = Level - Limit

12. Antenna Requirements

12.1.Limit

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

12.2.Result

The EUT antenna is internal antenna. It complies with the standard requirement.

13. Photos of test setup

Reference to the **appendix I Test Setup Photo** for details.

14. Photos of EUT

Reference to the **appendix II external photos** and **appendix III internal photos** for details.

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