



FCC TEST REPORT

FCC ID: 2BH58-A9PRO

On Behalf of

Dong Guan Yinyuezhitong Electronics Co.,LTD

Smart wireless stereo bluetooth headphone

Model No.: A9 Pro, A10 Pro, WT-2, Z50, T13

Prepared for : Dong Guan Yinyuezhitong Electronics Co.,LTD
Address : Building A, 419 Jinxing Road, Liaobu, Dongguan

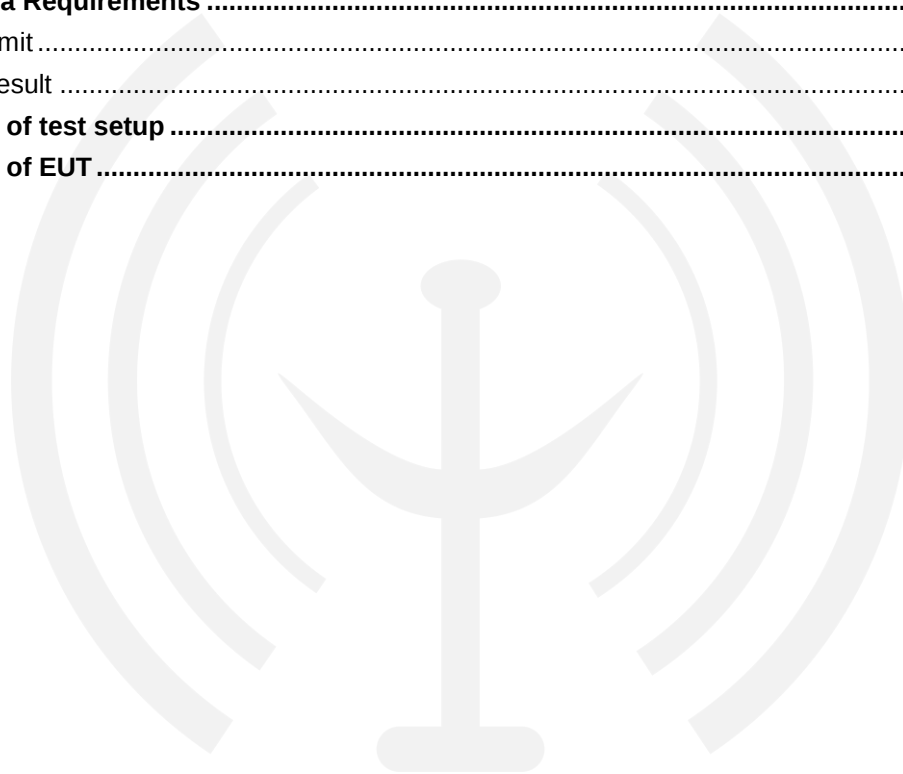
Prepared By : Shenzhen PSI Testing Co., Ltd.
Address : 1-2/F., Building 5, Yudafu Industrial Park, No.10, Xingye West Road,
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Date of Receipt : July 23, 2024
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Date of Report : July 29, 2024
Version Number : V0

TABLE OF CONTENTS

Description	Page
1. Summary Of Standards And Results.....	6
1.1. Description of Standards and Results	6
2. General Information.....	7
2.1. Description of Device (EUT)	7
2.2. Accessories of Device (EUT)	8
2.3. Tested Supporting System Details	8
2.4. Block Diagram of connection between EUT and simulators	8
2.5. Test Mode Description	8
2.6. Test Conditions	9
2.7. Test Facility	9
2.8. Measurement Uncertainty	9
2.9. Test Equipment List	10
3. Maximum Peak Output Power	11
3.1. Limit	11
3.2. Test Procedure	11
3.3. Test Setup.....	11
3.4. Test Result.....	11
4. Bandwidth	12
4.1. Limit	12
4.2. Test Procedure	12
4.3. Test Result.....	12
5. Carrier Frequency Separation	23
5.1. Limit	23
5.2. Test Procedure	23
5.3. Test Result.....	23
6. Number Of Hopping Channel	25
6.1. Limit	25
6.2. Test Procedure	25
6.3. Test Result.....	25
7. Dwell Time	27
7.1. Test limit.....	27
7.2. Test Procedure	27
7.3. Test Result.....	27
8. Out-of-band Emissions	37
8.1. Test Limits.....	37
8.2. Test Procedure	37
8.3. Test Setup.....	37
8.4. Test Results	37
9. Radiated Emissions.....	61
9.1. Limit	61
9.2. Block Diagram of Test setup.....	62
9.3. Test Procedure	63

9.4. Test Results	63
10. Band Edge Test.....	71
10.1. Block Diagram of Test Setup	71
10.2. Test Limit	71
10.3. Test Procedure	71
10.4. Test Results	72
11. Power Line Conducted Emissions.....	75
11.1. Block Diagram of Test Setup	75
11.2. Limit.....	75
11.3. Test Procedure	75
11.4. Test Results	76
12. Antenna Requirements	79
12.1. Limit.....	79
12.2. Result	79
13. Photos of test setup	80
14. Photos of EUT	80



TEST REPORT DECLARATION

Applicant : Dong Guan Yinyuezhitong Electronics Co.,LTD
Address : Building A, 419 Jinxing Road, Liaobu, Dongguan
Manufacturer : Dong Guan Yinyuezhitong Electronics Co.,LTD
Address : Building A, 419 Jinxing Road, Liaobu, Dongguan
EUT Description : Smart wireless stereo bluetooth headphone
(A) Model No. : A9 Pro, A10 Pro, WT-2, Z50, T13
(B) Trademark : N/A

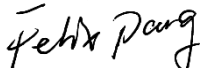
Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247

ANSI C63.10-2013

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 Part15 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).....: Felix Pang
Test Engineer 

Approved by (name + signature).....: Simple Guan
Project Manager 

Date of issue.....: July 29, 2024

Revision History

Revision	Issue Date	Revisions	Revised By
V0	July 29, 2024	Initial released Issue	Felix Pang



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)	P
Bandwidth	FCC Part 15:15.247(a)(1)	P
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1)	P
Number Of Hopping Channel	FCC Part 15: 15.247(a)(1)	P
Dwell Time	FCC Part 15: 15.247(a)(1)	P
Radiated Spurious Emission	FCC Part 15: 15.209 FCC Part 15: 15.205	P
Out-of-band Emissions	FCC Part 15: 15.247(d)	P
Radiated Band Edge Emission	FCC Part 15: 15.247(d)	P
Power Line Conducted Emissions	FCC Part 15: 15.207	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 : Smart wireless stereo bluetooth headphone
Model No. : A9 Pro, A10 Pro, WT-2, Z50, T13
Diff : There is no difference except the name of the model. All tests are made with the A9 Pro model.
Power supply : DC 3.7V from battery, DC 5V from Earphone box

Radio Technology	: Bluetooth V5.3 EDR
Operation frequency	: 2402-2480MHz
Channel No.	: 79 channels
Channel Separation	: 1MHz
Modulation	: GFSK, $\pi/4$ -DQPSK, 8DPSK
Antenna Type	: Internal antenna, Maximum Gain is 1.7dBi.
Software version	: V1.0
Hardware version	: V1.0
Intend use environment	: Residential, commercial and light industrial environment
Note	: 1. Antenna information is provided by applicant. Testing lab is not responsible for the accuracy of the information.

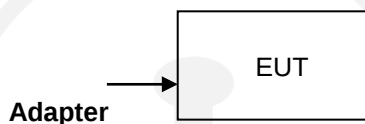
2.2. Accessories of Device (EUT)

Accessories : Type-C cable
Manufacturer : N/A
Model : 0.5m
Ratings : DC 5V

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number
1	Adapter	Keyulong	KE020A-PCD	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 to CH78	2402 to 2480
GFSK / Pi/4-DQPSK / 8DPSK hopping off Tx Mode	CH0	2402
	CH39	2441
	CH78	2480

2.6. Test Conditions

Items	Required	Actual
Temperature range:	15-35℃	26℃
Humidity range:	25-75%	54%
Pressure range:	86-106kPa	98kPa

2.7. 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

2.8. Measurement Uncertainty

(95% confidence levels, k=2)

Item	Uncertainty
Uncertainty for Power point Conducted Emissions Test	2.17dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	3.5dB
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	2.74dB(Polarize: V)
	2.76dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 18GHz)	4.29dB(Polarize: V)
	4.82dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (18GHz to 40GHz)	4.31 dB(Polarize: V)
	4.30 dB(Polarize: H)
Uncertainty for radio frequency	48.24KHz
Uncertainty for conducted RF Power	0.41dB
Occupied Channel Bandwidth	968Hz

2.9. 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	/	2022.12.20	3 Year
2.	Test Receiver	Rohde&Schwarz	ESCI 7	101032/003	4.42 SP3	2023.12.19	1 Year
3.	L.I.S.N.#1	Rohde&Schwarz	ENV216	102282	/	2023.12.19	1 Year
4.	L.I.S.N.#2	RFT	NNB111	13835240	/	2023.12.19	1 Year
5.	Loop Antenna	Schwarz beck	FMZB 1519B	00128	/	2023.04.03	2 Year
6.	Bilog Antenna	Schwarz beck	VULB 9168	01448	/	2022.12.26	2 Year
7.	Spectrum Analyzer	Rohde&Schwarz	FSV-40N	101648	3.70	2023.12.19	1 Year
8.	Horn Antenna	Schwarz beck	BBHA 9120 D	02706	/	2022.12.26	2 Year
9.	Amplifier	SKET	LAPA_01G18G-45dB	SK2022032901	/	2023.12.19	1 Year
10.	Horn Antenna	Schwarz beck	BBHA 9170	00946	/	2022.12.25	2 Year
11.	Amplifier	SKET	LNPA_0118G-45	SK2020010801	/	2023.12.19	1 Year
12	RF Power Probe	Rohde&Schwarz	NRP-Z11	1138.3004.02-1111533-Fz	/	2023.12.19	1 Year
13	RF Sensor Unit	Tachoy	TR1029-2	20220428P008	/	2023.12.19	1 Year
14	Spectrum Analyzer	Agilent	N9020A	MY51281067	A.14.03	2023.12.19	1 Year
15	Temp. & Humid Chamber	Auchno	9606	/	/	2023.12.19	1 Year
16	Regulated DC Power Supply	Xinouhua	ADC120V10A	202211251638		2023.12.19	1 Year

For Test Software Information

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

3. Maximum Peak Output Power

3.1. Limit

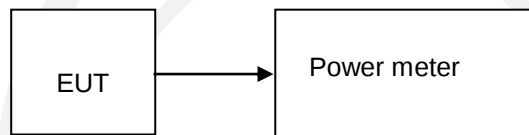
Please refer FCC part 15.247 & RSS-247.

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

The transmitter output is connected to the RF Power meter. The Power meter is set to the peak power detection.

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	3.10	2.04	1000	Pass
NVNT	ANT1	1-DH1	2441.00	5.40	3.47	1000	Pass
NVNT	ANT1	1-DH1	2480.00	4.30	2.69	1000	Pass
NVNT	ANT1	2-DH1	2402.00	3.33	2.15	125	Pass
NVNT	ANT1	2-DH1	2441.00	5.34	3.42	125	Pass
NVNT	ANT1	2-DH1	2480.00	4.82	3.04	125	Pass
NVNT	ANT1	3-DH1	2402.00	3.27	2.12	125	Pass
NVNT	ANT1	3-DH1	2441.00	5.37	3.45	125	Pass
NVNT	ANT1	3-DH1	2480.00	4.78	3.00	125	Pass

4. Bandwidth

4.1. Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in RSS-GEN, 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

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30kHz RBW and 100kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.3. Test Result

Condition	Antenna	Modulation	Frequency (MHz)	-20dB BW(MHz)	if larger than CFS
NVNT	ANT1	1-DH1	2402.00	0.802	No
NVNT	ANT1	1-DH1	2441.00	0.801	No
NVNT	ANT1	1-DH1	2480.00	0.799	No
NVNT	ANT1	2-DH1	2402.00	1.111	Yes
NVNT	ANT1	2-DH1	2441.00	1.114	Yes
NVNT	ANT1	2-DH1	2480.00	1.114	Yes
NVNT	ANT1	3-DH1	2402.00	1.171	Yes
NVNT	ANT1	3-DH1	2441.00	1.170	Yes
NVNT	ANT1	3-DH1	2480.00	1.171	Yes

-20dB_Bandwidth_NVNT_ANT1_1-DH1_2402_00**-20dB_Bandwidth_NVNT_ANT1_1-DH1_2441_00**

-20dB_Bandwidth_NVNT_ANT1_1-DH1_2480_00**-20dB_Bandwidth_NVNT_ANT1_2-DH1_2402_00**

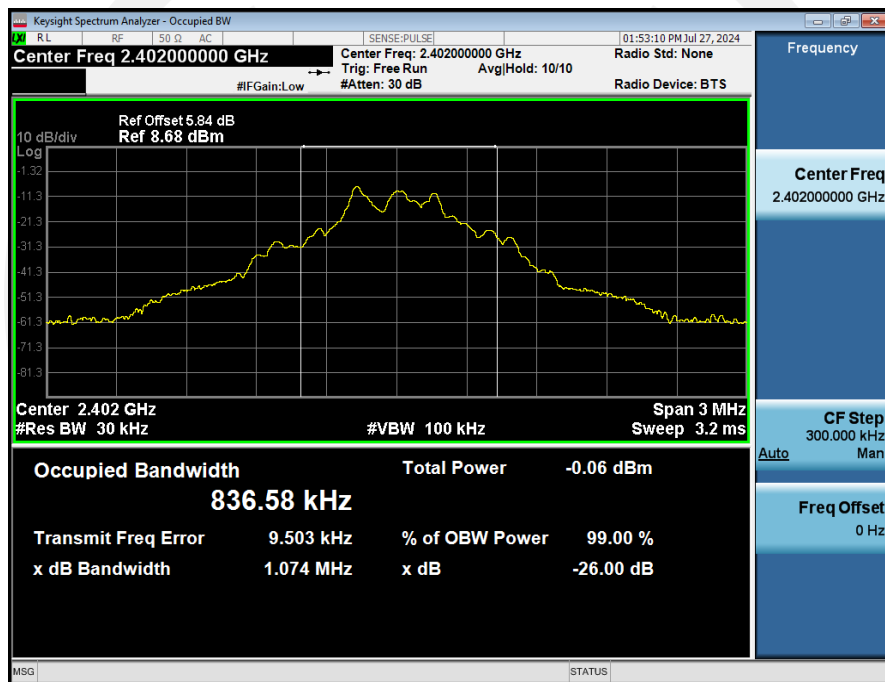
-20dB_Bandwidth_NVNT_ANT1_2-DH1_2441_00**-20dB_Bandwidth_NVNT_ANT1_2-DH1_2480_00**

-20dB_Bandwidth_NVNT_ANT1_3-DH1_2402_00**-20dB_Bandwidth_NVNT_ANT1_3-DH1_2441_00**

-20dB_Bandwidth_NVNT_ANT1_3-DH1_2480_00

Condition	Antenna	Modulation	Frequency (MHz)	99%BW(MHz)
NVNT	ANT1	1-DH1	2402.00	0.837
NVNT	ANT1	1-DH1	2441.00	0.842
NVNT	ANT1	1-DH1	2480.00	0.850
NVNT	ANT1	2-DH1	2402.00	1.073
NVNT	ANT1	2-DH1	2441.00	1.074
NVNT	ANT1	2-DH1	2480.00	1.074
NVNT	ANT1	3-DH1	2402.00	1.118
NVNT	ANT1	3-DH1	2441.00	1.118
NVNT	ANT1	3-DH1	2480.00	1.119

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



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.

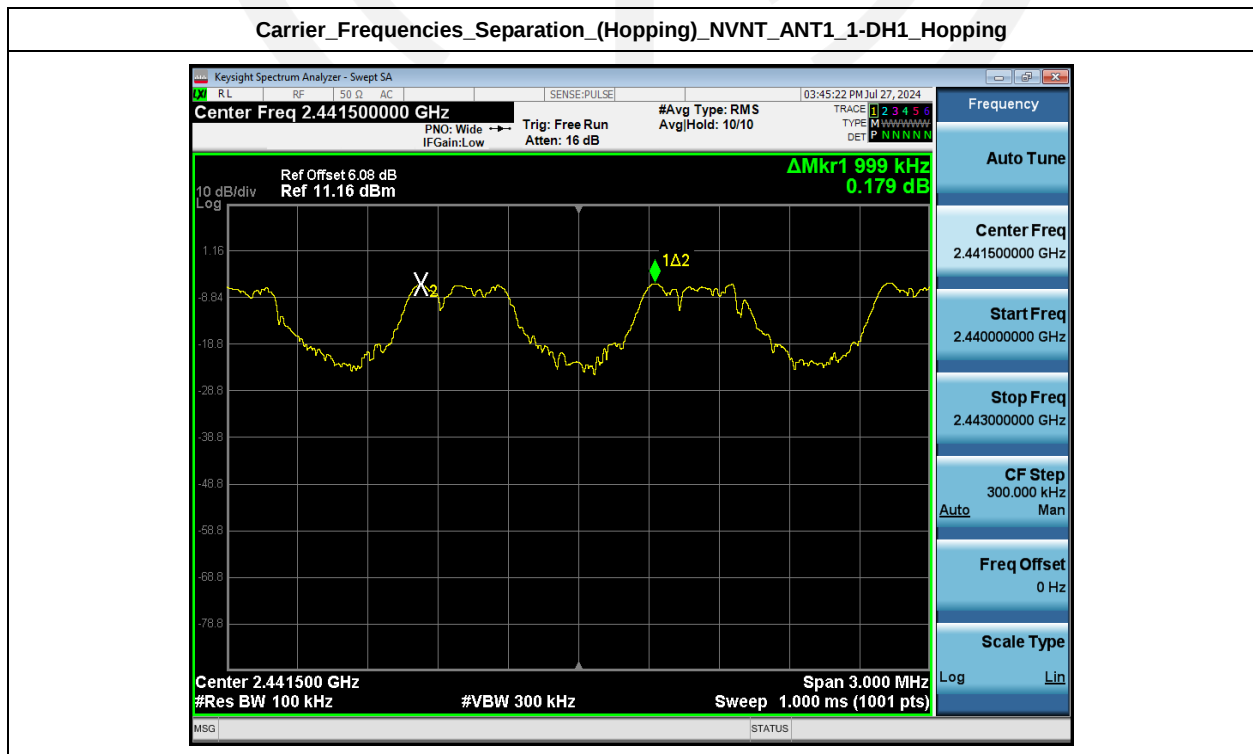
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than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

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 100kHz RBW and 300kHz 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	2440.828	2441.827	1.00	0.801	Pass
NVNT	ANT1	2-DH1	2441.00	2440.993	2441.836	0.84	0.743	Pass
NVNT	ANT1	3-DH1	2441.00	2440.828	2441.827	1.00	0.780	Pass



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 75 channels,
For all other frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

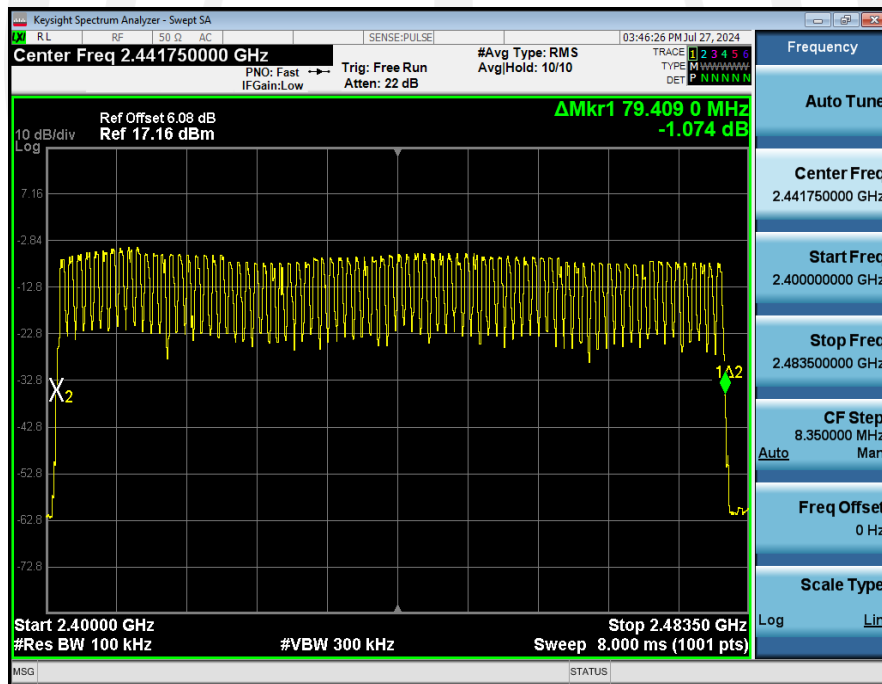
6.2. Test Procedure

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.

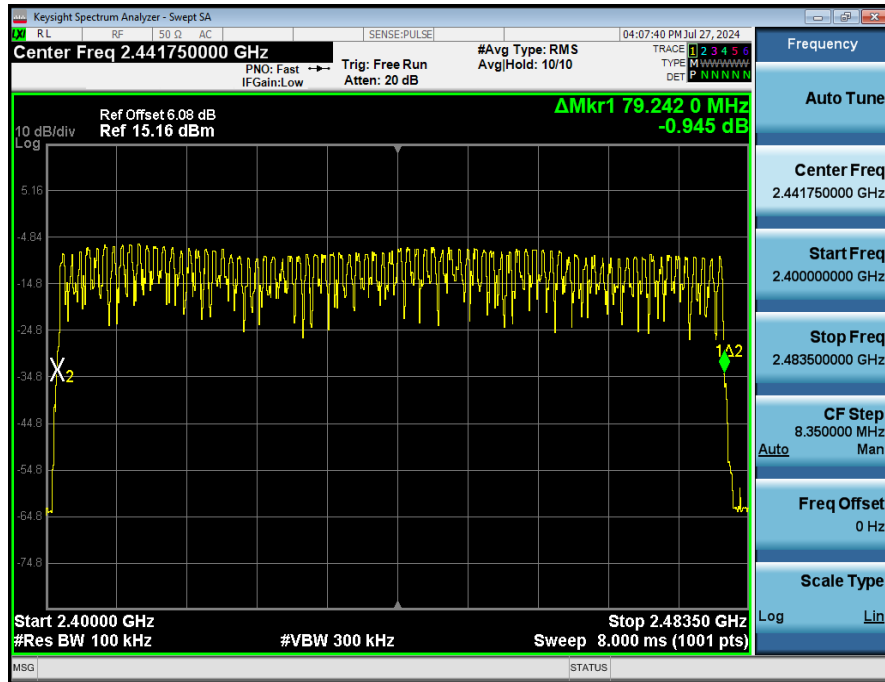
6.3. Test Result

Condition	Antenna	Modulation	Hopping Num	Limit	Result
NVNT	ANT1	1-DH1	79	75	Pass
NVNT	ANT1	2-DH1	79	15	Pass
NVNT	ANT1	3-DH1	79	15	Pass

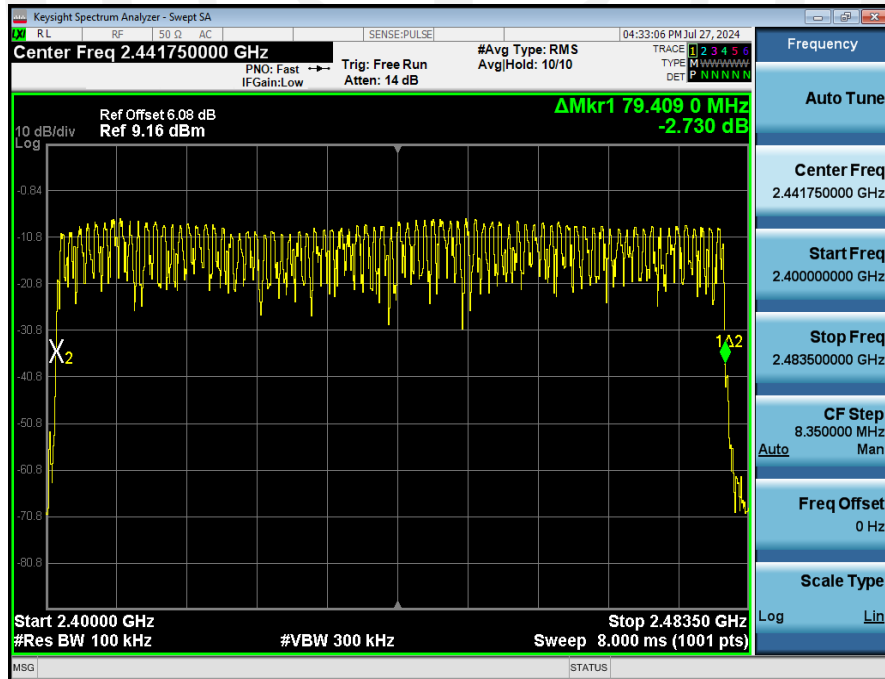
Number_of_Hopping_Channel_(Hopping)_NVNT_ANT1_1-DH1_Hopping



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 & RSS-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 seconds multiplied by the number of hopping channel employed.

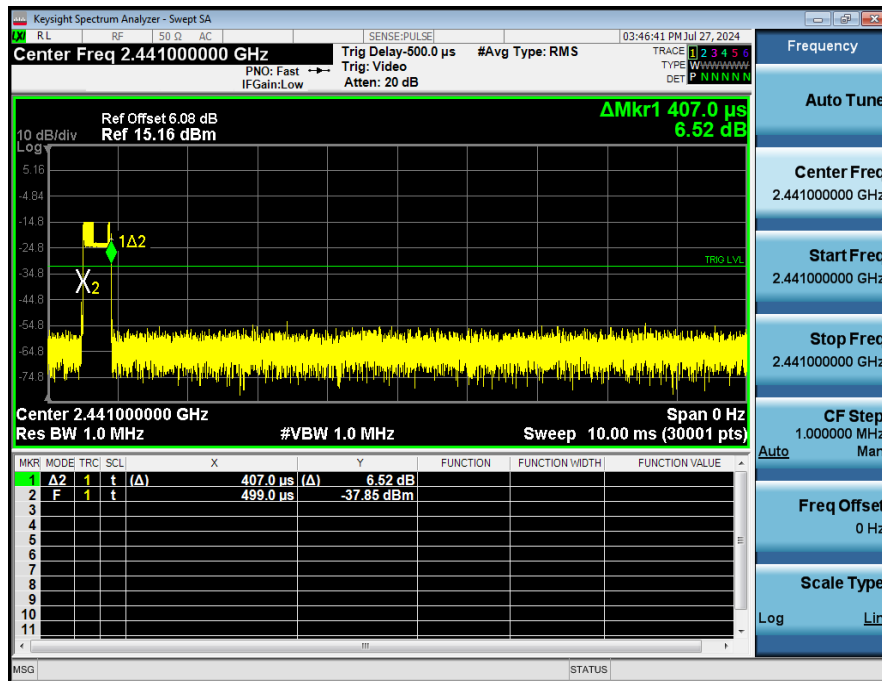
7.2. Test Procedure

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Sweep = auto.
5. Repeat above procedures until all frequency measured were complete.
6. The test period: $T = 0.4 \text{ Second/Channel} \times 79 \text{ Channel} = 31.6 \text{ s}$
7. Dwell Time=Pulse Time* Hops Number

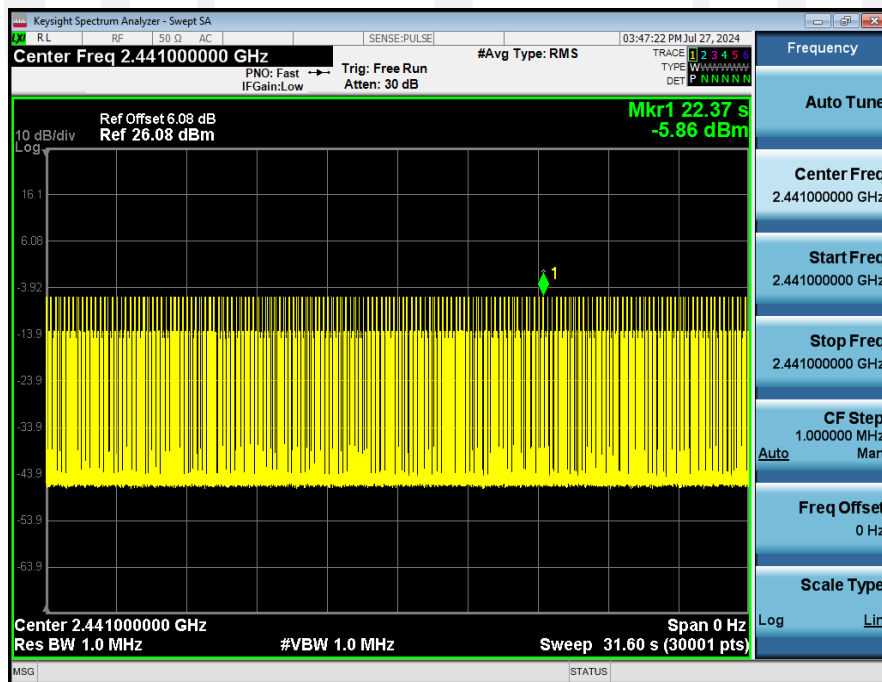
7.3. Test Result

Condition	Antenna	Packet Type	Pulse Time(ms)	Hops	Dwell Time(ms)	Limit(s)	Result
NVNT	ANT1	1-DH1	0.407	319.00	129.833	0.40	Pass
NVNT	ANT1	2-DH1	0.407	318.00	129.426	0.40	Pass
NVNT	ANT1	3-DH1	0.407	320.00	130.240	0.40	Pass
NVNT	ANT1	1-DH3	1.663	161.00	267.743	0.40	Pass
NVNT	ANT1	1-DH5	2.911	118.00	343.498	0.40	Pass
NVNT	ANT1	2-DH3	1.663	170.00	282.710	0.40	Pass
NVNT	ANT1	2-DH5	2.911	106.00	308.566	0.40	Pass
NVNT	ANT1	3-DH3	1.663	149.00	247.787	0.40	Pass
NVNT	ANT1	3-DH5	2.911	100.00	291.100	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_1-DX3-2441_00_One_Burst_Time

Keysight Spectrum Analyzer - Swept SA
R.L RF 50 Ω AC SENSE:PULSE 04:36:58 PM Jul 27, 2024

Center Freq 2.441000000 GHz Trig Delay: 500.0 μs #Avg Type: RMS
PNO: Fast → IF Gain: Low Trig: Video Atten: 20 dB TRACE 1 2 3 4 5 6 TYPE WXXXXXXXXXX DET P NNNNNN

Ref Offset: 6.08 dB ΔMkr1 1.663 ms
Log Ref 15.16 dBm 11.60 dB

X₂ TRIG LVL

Center 2.441000000 GHz Span 0 Hz
Res BW 1.0 MHz #VBW 1.0 MHz Sweep 10.00 ms (30001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ2	t	(Δ)	1.663 ms	(Δ) 11.60 dB			
2	F	t		499.0 μs	-40.26 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

MSG STATUS

Frequency
Auto Tune
Center Freq 2.441000000 GHz
Start Freq 2.441000000 GHz
Stop Freq 2.441000000 GHz
CF Step 1.000000 MHz Man
Aut
Freq Offset 0 Hz
Scale Type Lin
Log

Keysight Spectrum Analyzer - Swept SA

Center Freq 2.441000000 GHz

Ref Offset 6.08 dB
Ref 26.08 dBm

Mkr1 1.179 s
-5.88 dBm

10 dB/div
Log

Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Sweep 31.60 s (30001 pts)

Span 0 Hz

Frequency

Auto Tune

Center Freq
2.441000000 GHz

Start Freq
2.441000000 GHz

Stop Freq
2.441000000 GHz

CF Step
1.000000 MHz
Man

Freq Offset
0 Hz

Scale Type
Log

The image shows a Keysight Spectrum Analyzer interface. The main display area shows a spectrum plot with a dense signal at 2.441 GHz. The y-axis is labeled '10 dB/div Log' and ranges from -63.9 to 16.1. The x-axis is labeled 'Center 2.441000000 GHz' and 'Span 0 Hz'. A marker 'Mkr1' is placed at 1.179 s with a value of -5.88 dBm. The plot shows a dense signal with a peak at approximately -3.92 dBm. The signal is centered at 2.441 GHz with a resolution bandwidth of 1.0 MHz. The sweep time is 31.60 s (30001 pts). The display also shows various settings like 'Center Freq 2.441000000 GHz', 'Ref Offset 6.08 dB', 'Ref 26.08 dBm', 'PNO: Fast', 'IFGain: Low', 'Trig: Free Run', 'Atten: 30 dB', '#Avg Type: RMS', 'TRACE 1 2 3 4 5 6', 'TYPE W W W W W W W W', and 'DET P N N N N N'. The right side of the interface has a 'Frequency' panel with 'Auto Tune', 'Center Freq', 'Start Freq', 'Stop Freq', 'CF Step', 'Freq Offset', and 'Scale Type'.

Dwell Time (Hopping) NVNT_ANT1_1-DH5_2441_00_One_Burst_Time

Keysight Spectrum Analyzer - Swept SA
 R L RF 50 Ω AC SENSE:PULSE 04:46:33 PM Jul 27, 2024

Center Freq 2.441000000 GHz Trig Delay: 500.0 μs #Avg Type: RMS
 PNO: Fast → IFGain: Low Trig: Video Atten: 20 dB
 TRACE 1 2 3 4 5 6 TYPE W W W W W W W W DET P N N N N N

Ref Offset 6.08 dB ΔMkr1 2.911 ms
 Ref 15.16 dBm 15.95 dBm

10 dB/div Log
 X₂ TRIG LVL

Center 2.441000000 GHz Span 0 Hz
Res BW 1.0 MHz #VBW 1.0 MHz Sweep 10.00 ms (30001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ2	1	t	(Δ)	2.911 ms	(Δ)	15.95 dB	
2	F	1	t		499.0 μs		-41.64 dBm	
3								
4								
5								
6								
7								
8								
9								
10								
11								

MSG STATUS

Frequency
 Auto Tune
 Center Freq 2.441000000 GHz
 Start Freq 2.441000000 GHz
 Stop Freq 2.441000000 GHz
 CF Step 1.000000 MHz Man
 Freq Offset 0 Hz
 Scale Type Log Lin

Keysight Spectrum Analyzer - Swept SA

Center Freq 2.441000000 GHz

Ref Offset 6.08 dB
Ref 26.08 dBm

Mkr1 5.192 s
-5.96 dBm

10 dB/div
Log

Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Sweep 31.60 s (30001 pts)

Span 0 Hz

Frequency

Auto Tune

Center Freq
2.441000000 GHz

Start Freq
2.441000000 GHz

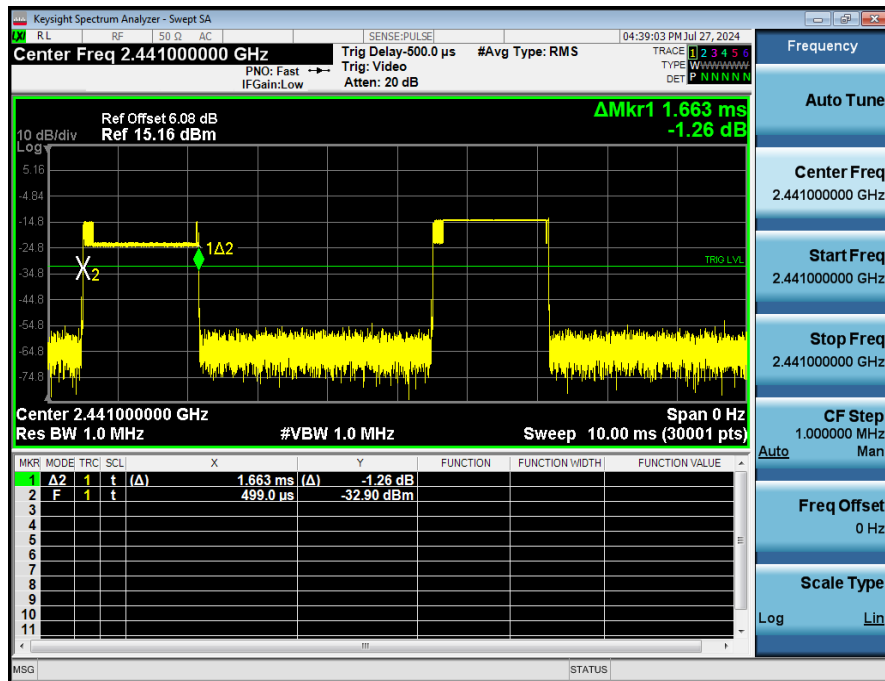
Stop Freq
2.441000000 GHz

CF Step
1.000000 MHz
Man

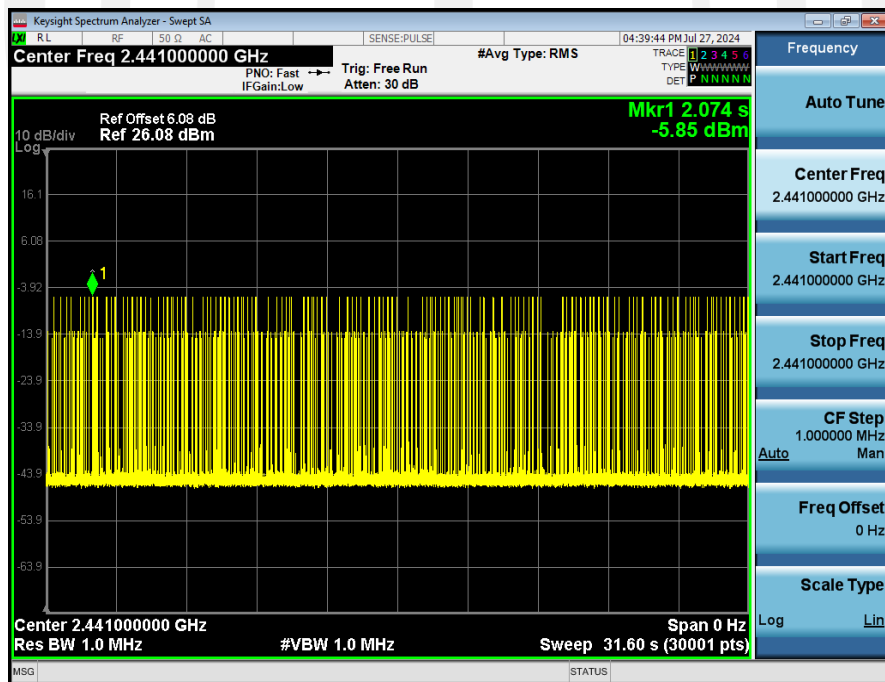
Freq Offset
0 Hz

Scale Type
Log

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

Keysight Spectrum Analyzer - Swept SA
R.L RF 50 Ω AC SENSE-PULSE 04:49:05 PM Jul 27, 2024

Center Freq 2.441000000 GHz Trig Delay-500.0 μs #Avg Type: RMS TRACE [1] 2 3 4 5 6
PNO: Fast → IFGainLow Attenuation: 20 dB TYPE WXXXXXXXXX DET P NNNNNN

Ref Offset 6.08 dB ΔMkr1 2.911 ms
Ref 15.16 dBm 8.93 dB

10 dB/div Log

X₂

TRIG LVL

Center 2.441000000 GHz Span 0 Hz
Res BW 1.0 MHz #VBW 1.0 MHz Sweep 10.00 ms (30001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ2	t	(Δ)	2.911 ms	(Δ)	8.93 dB		
2	F	t		499.0 μs	-34.77 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								

MSG STATUS

Frequency Auto Tune Center Freq 2.441000000 GHz Start Freq 2.441000000 GHz Stop Freq 2.441000000 GHz CF Step 1.000000 MHz Man Scale Type Lin

Keysight Spectrum Analyzer - Swept SA

Center Freq 2.441000000 GHz

Ref Offset 6.08 dB
Ref 26.08 dBm

Mkr1 153.8 ms
-5.93 dBm

10 dB/div
Log

Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Sweep 31.60 s (30001 pts)

Span 0 Hz

Frequency

Auto Tune

Center Freq
2.441000000 GHz

Start Freq
2.441000000 GHz

Stop Freq
2.441000000 GHz

CF Step
1.000000 MHz
Auto

Freq Offset
0 Hz

Scale Type
Log

The image shows a Keysight Spectrum Analyzer interface. The main display is a frequency spectrum plot with a black background and a yellow grid. The horizontal axis represents frequency, centered at 2.441000000 GHz. The vertical axis represents power in dBm, ranging from -63.9 to 10 dBm. A dense, noisy signal is visible across the entire frequency range. A green marker labeled 'Mkr1' is positioned at 153.8 ms and -5.93 dBm. The signal level is approximately -43.9 dBm. The plot is labeled '10 dB/div' and 'Log'. The top of the screen shows the center frequency and various settings like 'PNO: Fast', 'IFGain: Low', 'Trig: Free Run', and 'Atten: 30 dB'. The bottom of the screen shows the center frequency, resolution bandwidth (1.0 MHz), video bandwidth (1.0 MHz), and sweep time (31.60 s). On the right side, there is a control panel with buttons for 'Frequency', 'Auto Tune', 'Center Freq', 'Start Freq', 'Stop Freq', 'CF Step', 'Freq Offset', and 'Scale Type'.

The screenshot displays a Keysight Spectrum Analyzer interface. The main plot shows a frequency spectrum from 2.43 GHz to 2.45 GHz. A prominent yellow trace indicates a signal burst centered at 2.44 GHz. The burst has a duration of approximately 1.663 ms and a peak level of -25.47 dBm. The background noise floor is around -74 dBm. The analyzer settings include a center frequency of 2.44 GHz, a resolution bandwidth (RBW) of 1.0 MHz, and a video bandwidth (VBW) of 1.0 MHz. The sweep rate is 10.00 ms. The right-hand panel shows various control knobs and sliders, including Frequency, Auto Tune, Center Freq, Start Freq, Stop Freq, CF Step, Freq Offset, Scale Type, and Log.

Keysight Spectrum Analyzer - Swept SA

Center Freq 2.441000000 GHz

Ref Offset 6.08 dB
Ref 26.08 dBm

Mkr1 12.15 s
-5.91 dBm

Auto Tune

Center Freq
2.441000000 GHz

Start Freq
2.441000000 GHz

Stop Freq
2.441000000 GHz

CF Step
1.000000 MHz
Auto Man

Freq Offset
0 Hz

Scale Type
Log Lin

Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Sweep 31.60 s (30001 pts)

MSG STATUS

Dwell Time (Hopping)_NVNT_ANT1_3-DH5_2441_00_One_Burst_Time

Keysight Spectrum Analyzer - Swept SA
R.L RF 50 Ω AC SENSE:PULSE 04:50:32 PM Jul 27, 2024

Center Freq 2.441000000 GHz Trig Delay-500.0 μs #Avg Type: RMS TRACE 1 2 3 4 5 6
PNO: Fast → IFGain:Low Trig: Video TYPE WXXXXXXXXXX
Atten: 20 dB DET P NNNNN

Ref Offset 6.08 dB ΔMkr1 2.911 ms
Ref 15.16 dBm -27.57 dBm

10 dB/div Log
X₂ Δ2 TRIG LVL

Center 2.441000000 GHz Span 0 Hz
Res BW 1.0 MHz #VBW 1.0 MHz Sweep 10.00 ms (30001 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	Δ2	1	t	(Δ)	2.911 ms	(Δ)	-27.57 dBm	
2	F	1	t		500.0 μs		-13.96 dBm	
3								
4								
5								
6								
7								
8								
9								
10								
11								

MSG STATUS

Frequency
Auto Tune
Center Freq 2.441000000 GHz
Start Freq 2.441000000 GHz
Stop Freq 2.441000000 GHz
CF Step 1.000000 MHz Man
Auto
Freq Offset 0 Hz
Scale Type Log Lin

Keysight Spectrum Analyzer - Swept SA

Center Freq 2.441000000 GHz

Ref Offset 6.08 dB
Ref 26.08 dBm

Mkr1 25.55 s
-5.91 dBm

1

Center 2.441000000 GHz
Res BW 1.0 MHz
#VBW 1.0 MHz
Sweep 31.60 s (30001 pts)

Span 0 Hz

Frequency

Auto Tune

Center Freq
2.441000000 GHz

Start Freq
2.441000000 GHz

Stop Freq
2.441000000 GHz

CF Step
1.000000 MHz
Man

Freq Offset
0 Hz

Scale Type
Log

The image shows a Keysight Spectrum Analyzer interface. The main display is a log-scale plot of power spectral density versus frequency. The center frequency is set to 2.441 GHz. The vertical axis (power) ranges from -63.9 dBm to 10 dBm/div. A dense signal is visible across the entire span. A marker is placed on the signal at -5.91 dBm. The horizontal axis (frequency) is set to a span of 0 Hz. The resolution bandwidth (Res BW) is 1.0 MHz. The video bandwidth (VBW) is 1.0 MHz. The sweep time is 31.60 seconds. The display is titled 'Keysight Spectrum Analyzer - Swept SA'. The right side of the interface contains a control panel with various settings like 'Auto Tune', 'Center Freq', 'Start Freq', 'Stop Freq', 'CF Step', 'Freq Offset', and 'Scale Type'.

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.

8.2. Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, band edge and out-of-band emissions.

8.3. Test Setup



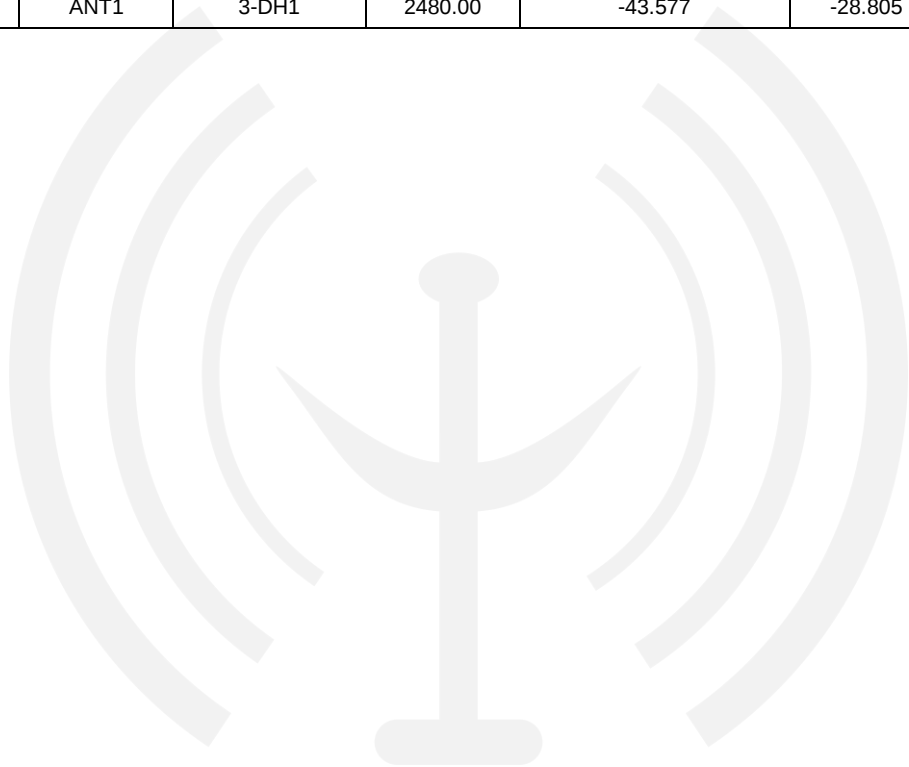
8.4. Test Results

PASS.

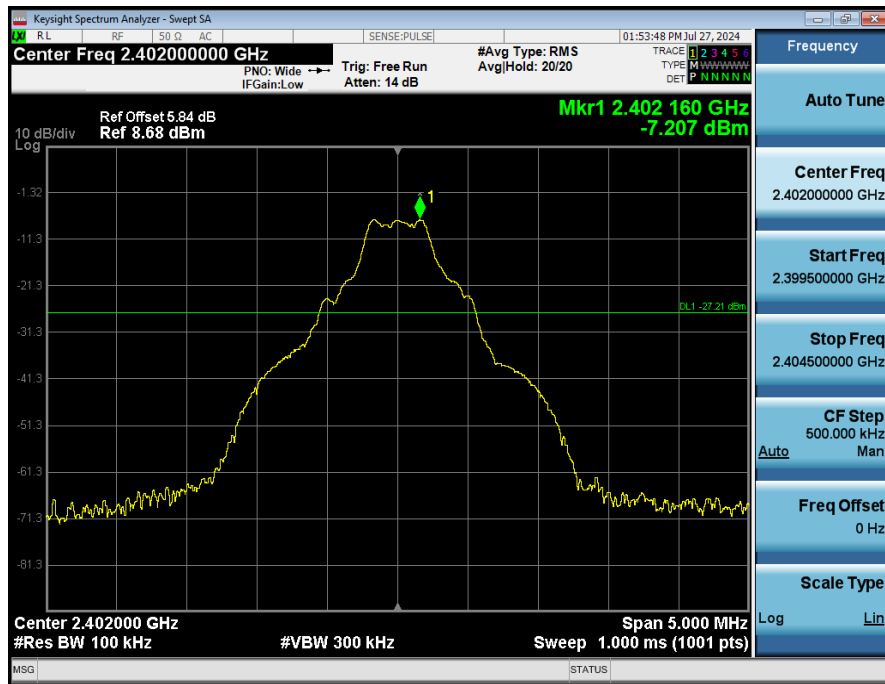
The test results are listed in next pages.

Conducted spurious emission: Pass

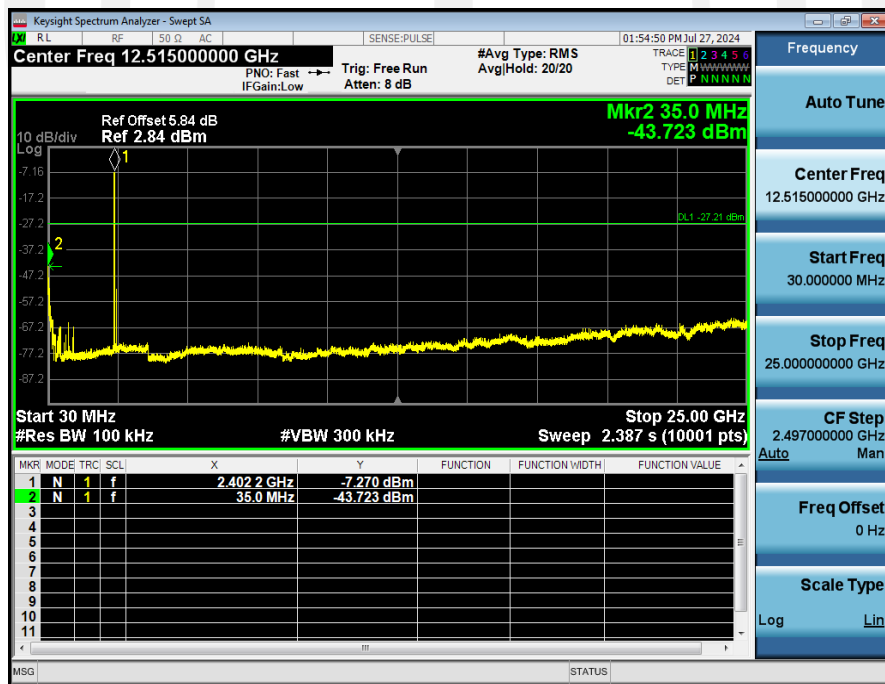
Condition	Antenna	Modulation	TX Mode	Spurious MAX.Value(dBm)	Limit	Result
NVNT	ANT1	1-DH1	2402.00	-43.723	-27.207	Pass
NVNT	ANT1	1-DH1	2441.00	-45.165	-25.627	Pass
NVNT	ANT1	1-DH1	2480.00	-44.315	-27.327	Pass
NVNT	ANT1	2-DH1	2402.00	-45.948	-28.816	Pass
NVNT	ANT1	2-DH1	2441.00	-45.478	-27.885	Pass
NVNT	ANT1	2-DH1	2480.00	-45.291	-29.068	Pass
NVNT	ANT1	3-DH1	2402.00	-45.428	-28.860	Pass
NVNT	ANT1	3-DH1	2441.00	-44.652	-27.803	Pass
NVNT	ANT1	3-DH1	2480.00	-43.577	-28.805	Pass



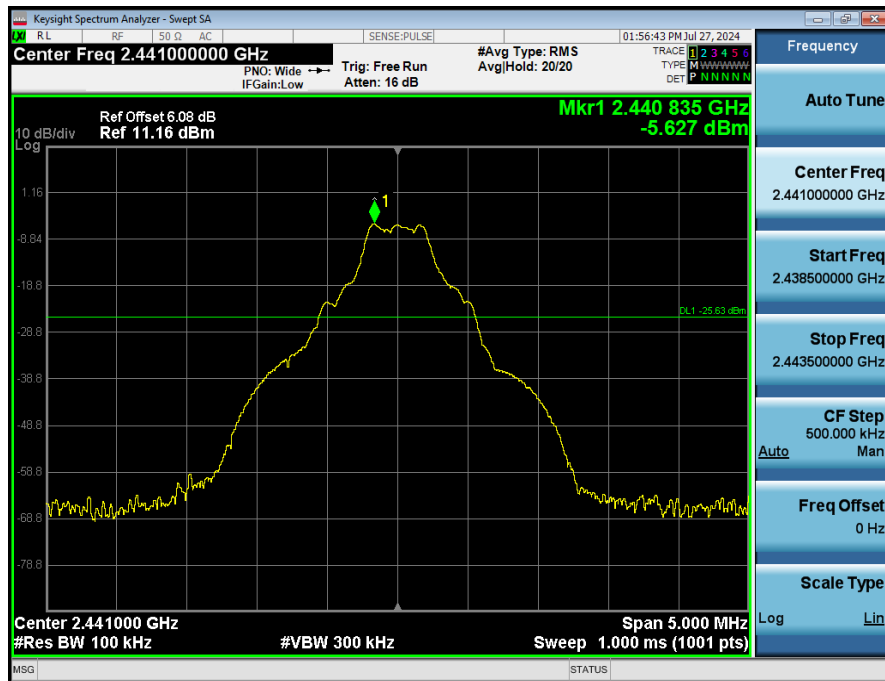
1_Reference_Level_NVNT_ANT1_1-DH1_2402_00



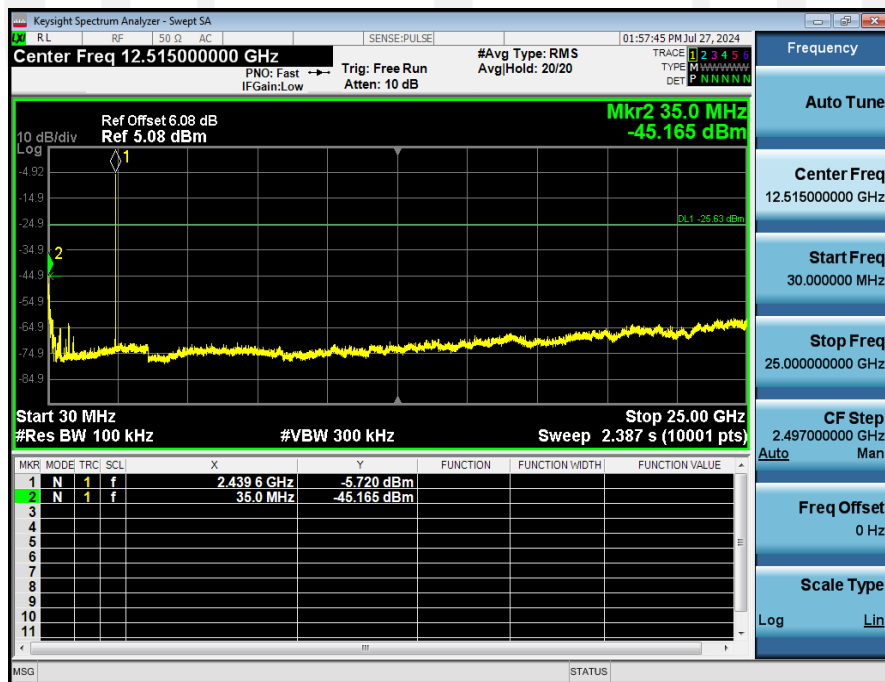
2_Spurious_Emissions_NVNT_ANT1_1-DH1_2402_00



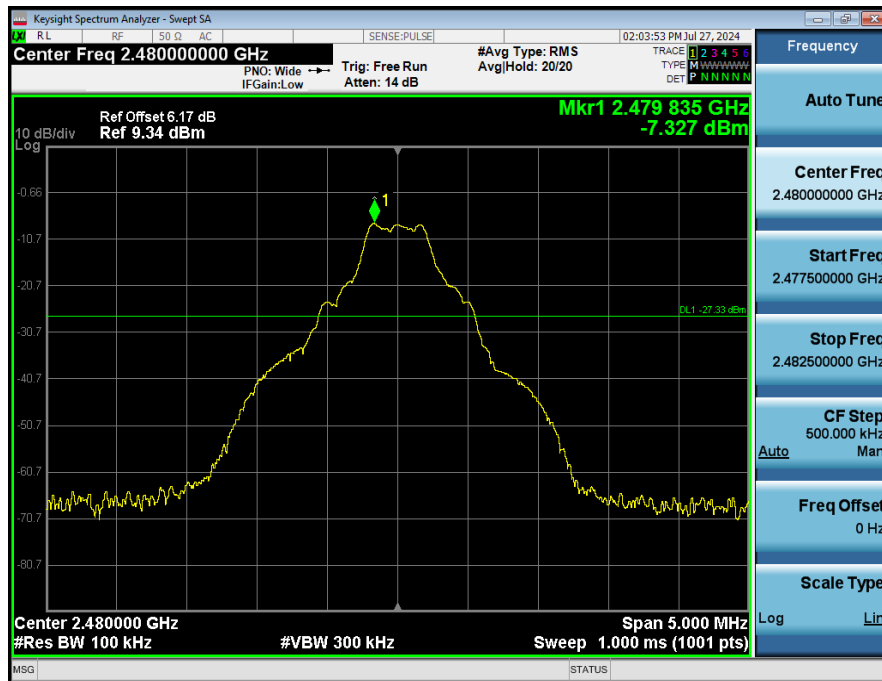
1_Reference_Level_NVNT_ANT1_1-DH1_2441_00



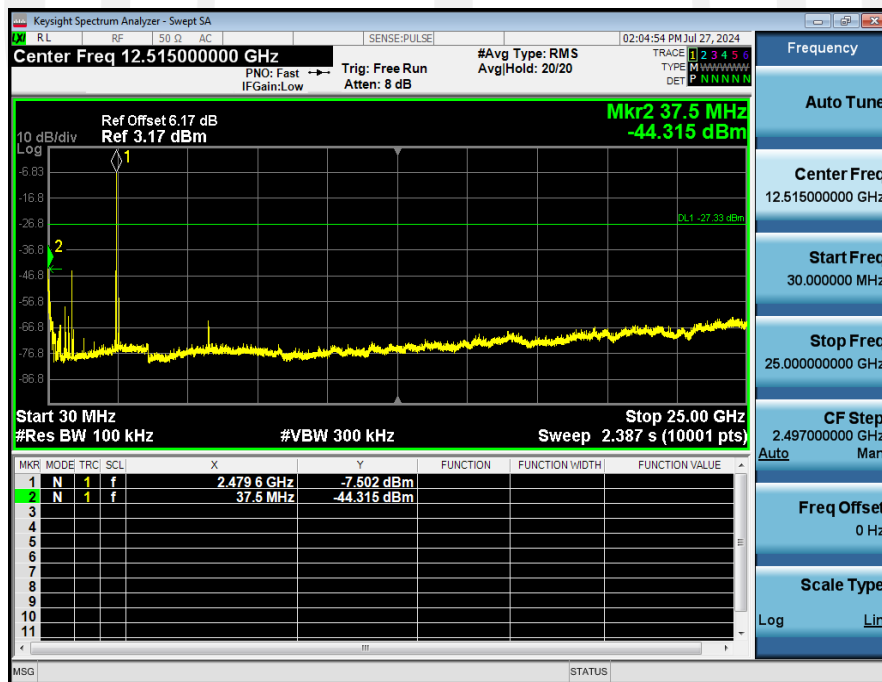
2_Spurious_Emissions_NVNT_ANT1_1-DH1_2441_00



1_Reference_Level_NVNT_ANT1_1-DH1_2480_00



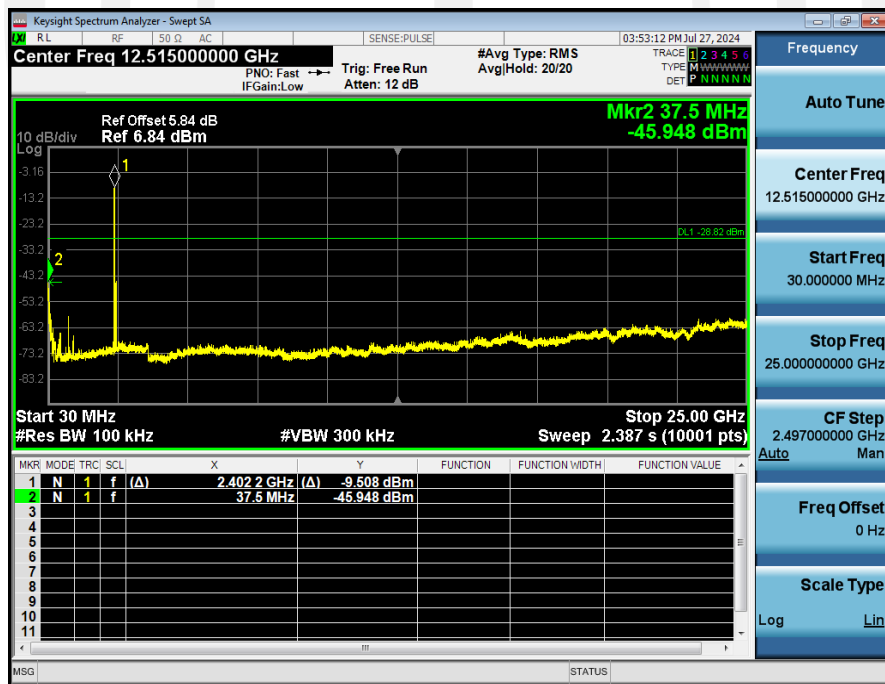
2_Spurious_Emissions_NVNT_ANT1_1-DH1_2480_00



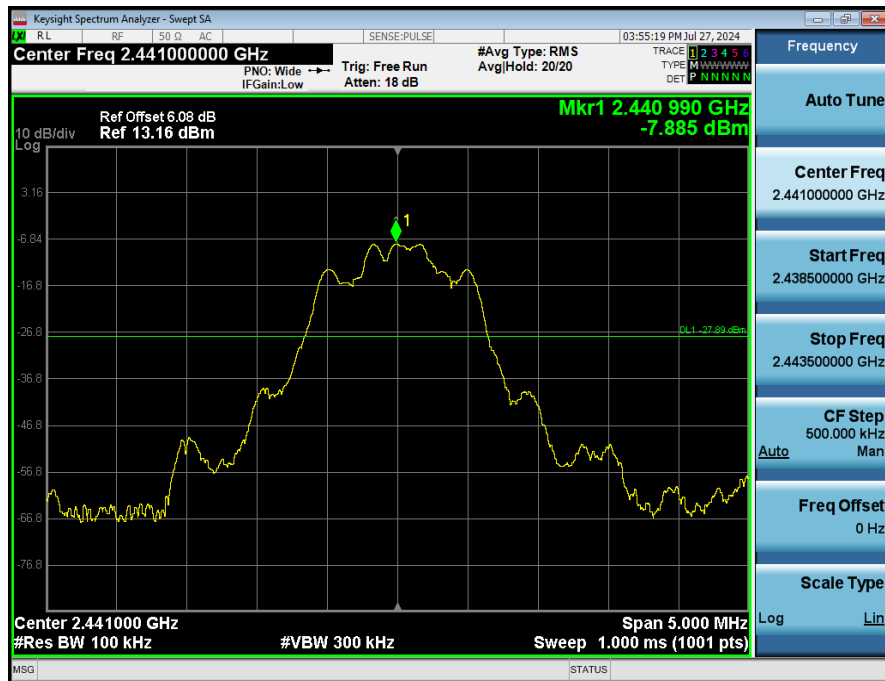
1_Reference_Level_NVNT_ANT1_2-DH1_2402_00



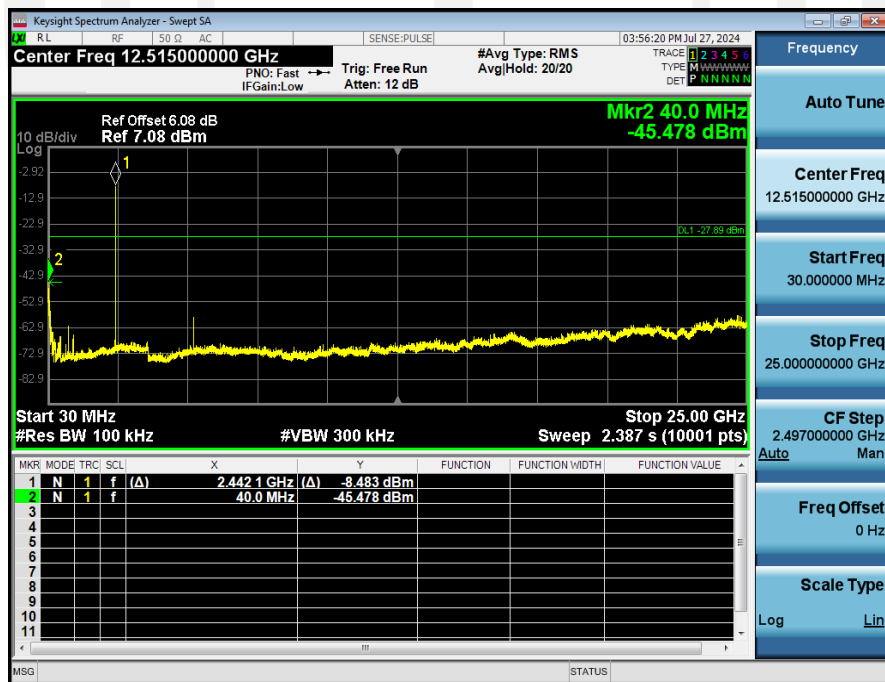
2_Spurious_Emissions_NVNT_ANT1_2-DH1_2402_00



1_Reference_Level_NVNT_ANT1_2-DH1_2441_00



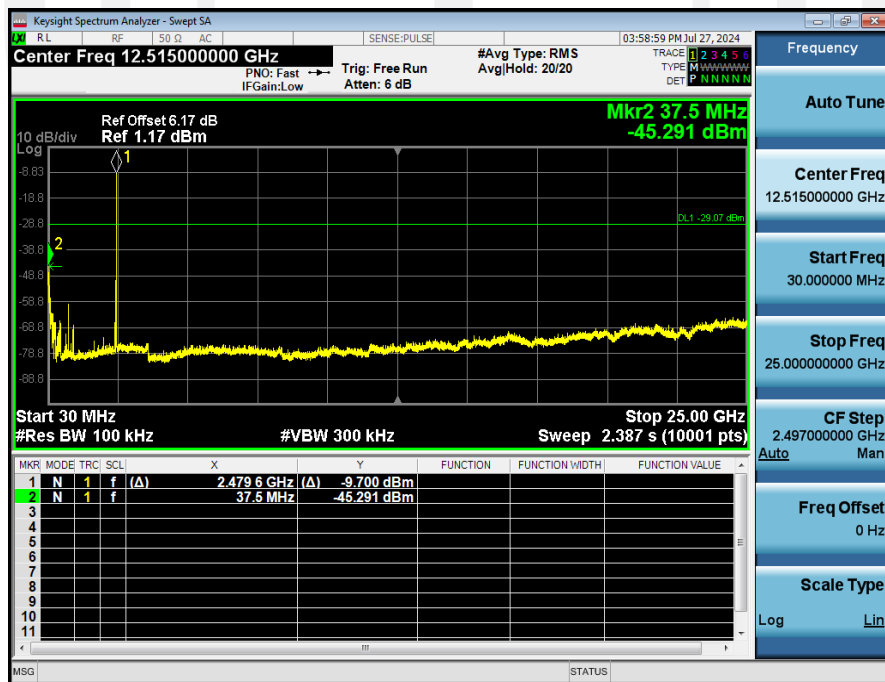
2_Spurious_Emissions_NVNT_ANT1_2-DH1_2441_00



1_Reference_Level_NVNT_ANT1_2-DH1_2480_00



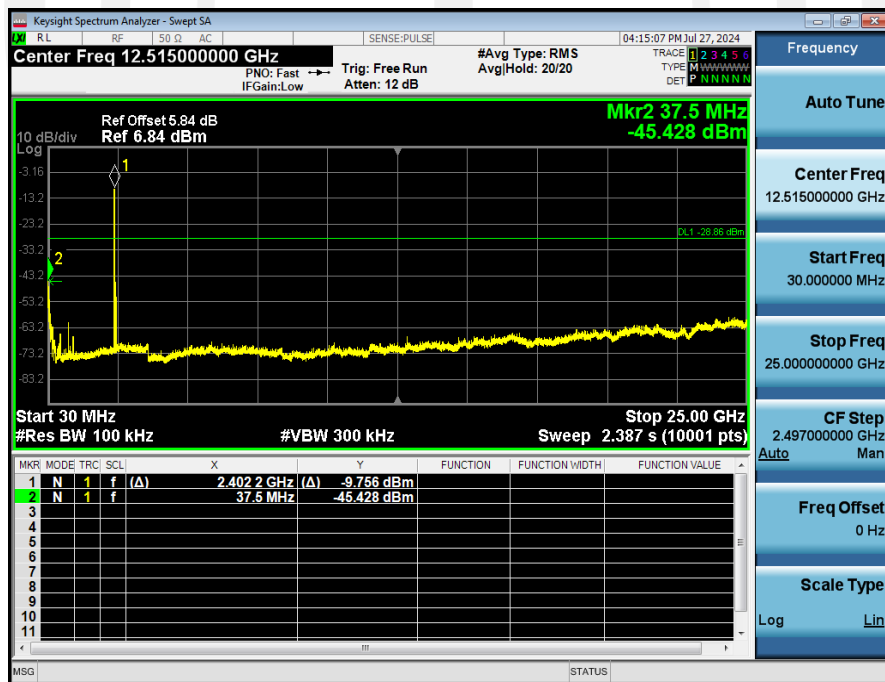
2_Spurious_Emissions_NVNT_ANT1_2-DH1_2480_00



1_Reference_Level_NVNT_ANT1_3-DH1_2402_00



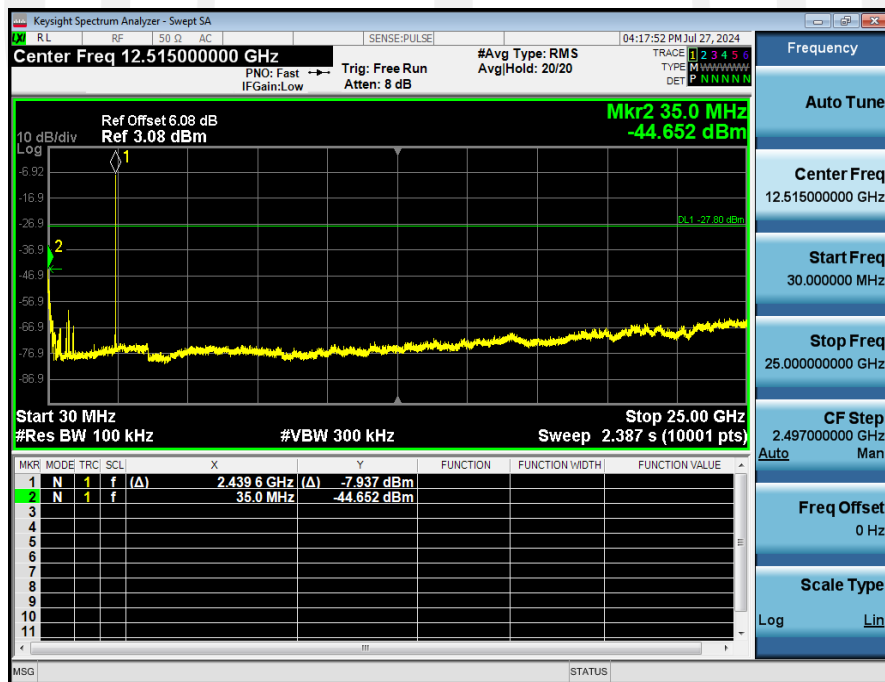
2_Spurious_Emissions_NVNT_ANT1_3-DH1_2402_00



1_Reference_Level_NVNT_ANT1_3-DH1_2441_00



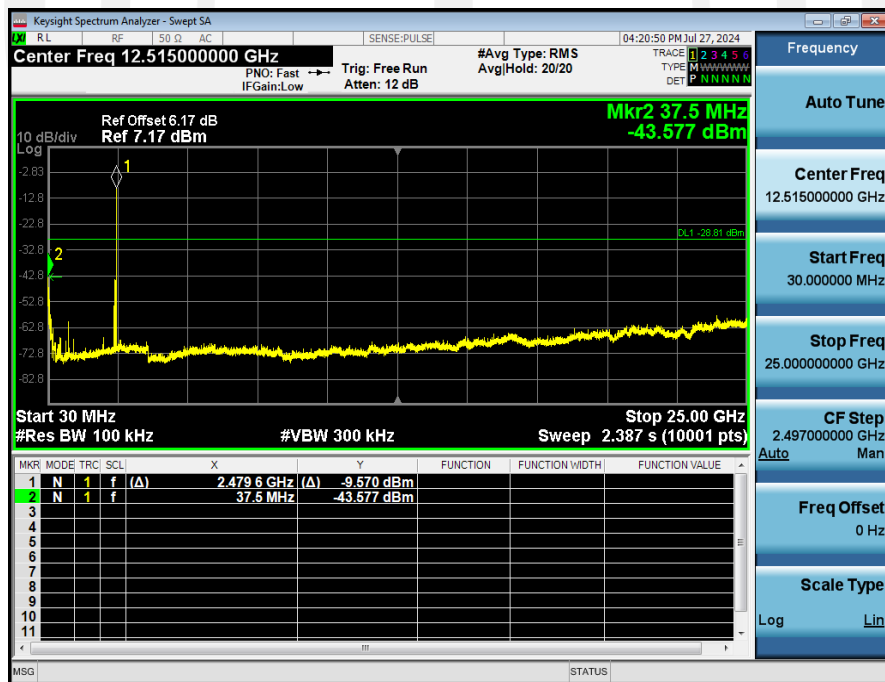
2_Spurious_Emissions_NVNT_ANT1_3-DH1_2441_00



1_Reference_Level_NVNT_ANT1_3-DH1_2480_00



2_Spurious_Emissions_NVNT_ANT1_3-DH1_2480_00

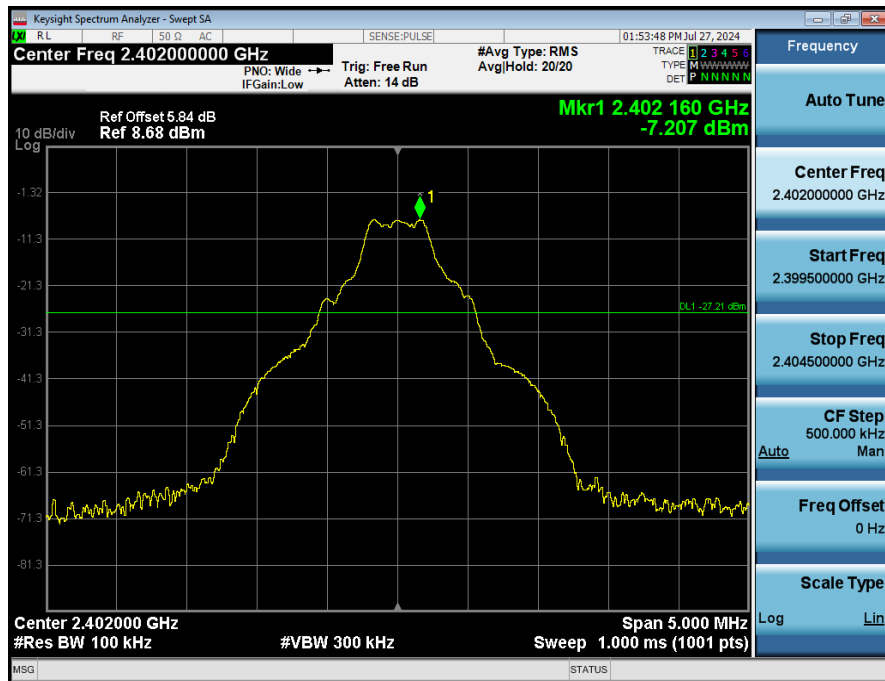


Band Edge: Pass

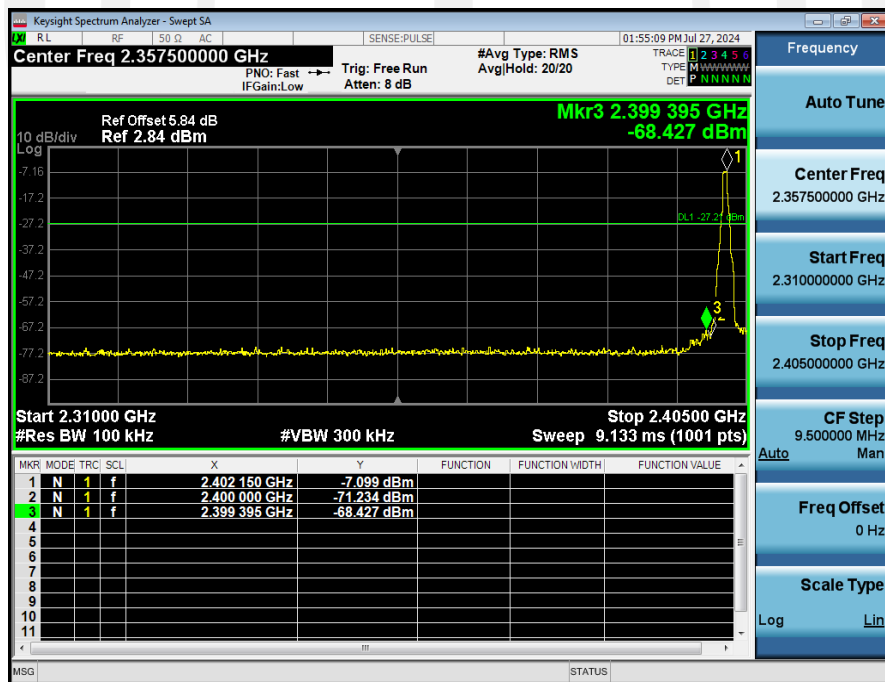
Condition	Antenna	Modulation	TX Mode	Bandedge MAX.Value	Limit	Result
NVNT	ANT1	1-DH1	2402.00	-68.427	-27.207	Pass
NVNT	ANT1	1-DH1	Hopping_LCH	-60.287	-24.249	Pass
NVNT	ANT1	1-DH1	2480.00	-67.876	-27.327	Pass
NVNT	ANT1	1-DH1	Hopping_HCH	-65.021	-24.250	Pass
NVNT	ANT1	2-DH1	2402.00	-68.043	-28.816	Pass
NVNT	ANT1	2-DH1	Hopping_LCH	-72.668	-25.962	Pass
NVNT	ANT1	2-DH1	2480.00	-67.549	-29.068	Pass
NVNT	ANT1	2-DH1	Hopping_HCH	-67.354	-25.766	Pass
NVNT	ANT1	3-DH1	2402.00	-67.127	-28.860	Pass
NVNT	ANT1	3-DH1	Hopping_LCH	-70.369	-26.863	Pass
NVNT	ANT1	3-DH1	2480.00	-66.620	-28.805	Pass
NVNT	ANT1	3-DH1	Hopping_HCH	-67.584	-26.546	Pass



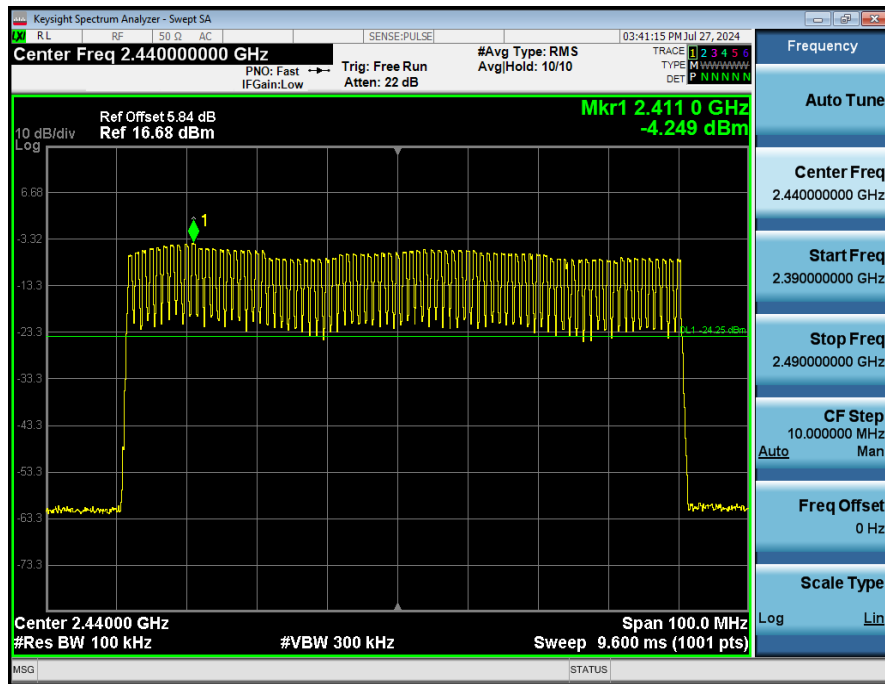
1_Reference_Level_NVNT_ANT1_1-DH1_2402_00



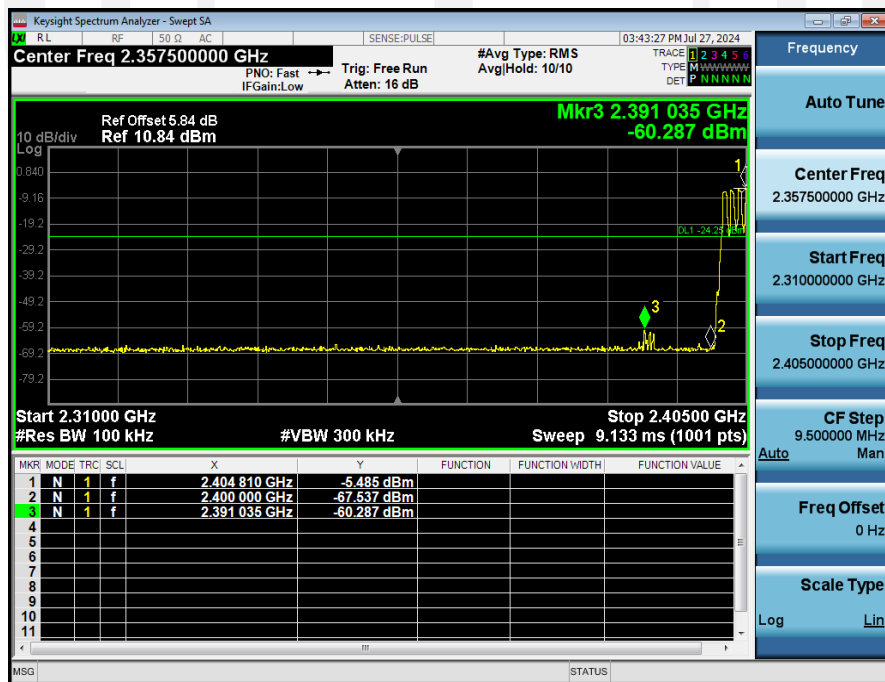
2_Bandedge_NVNT_ANT1_1-DH1_2402_00



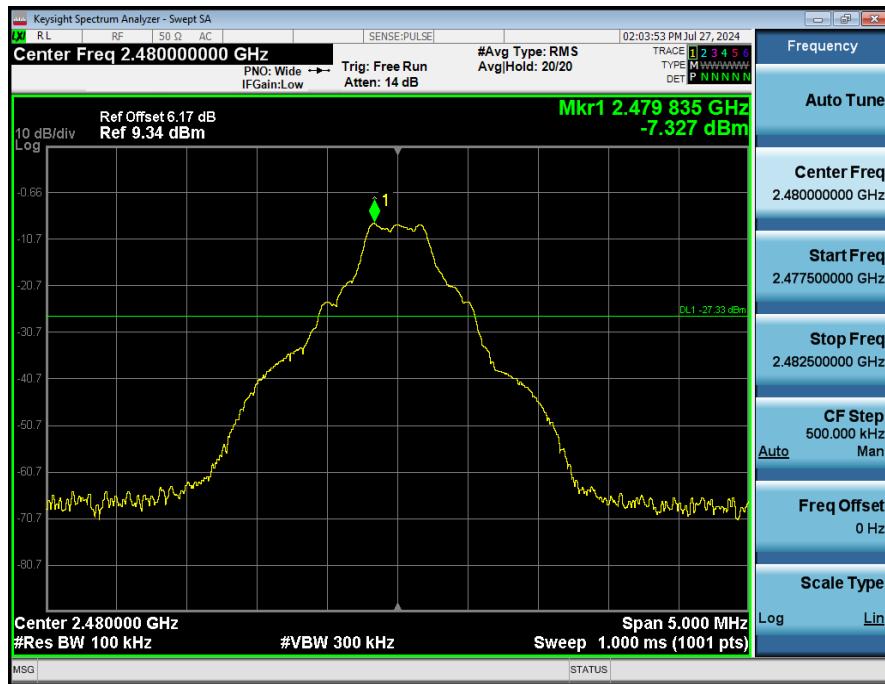
1_Reference_Level_Hopping_NVNT_ANT1_1-DH1_Hopping



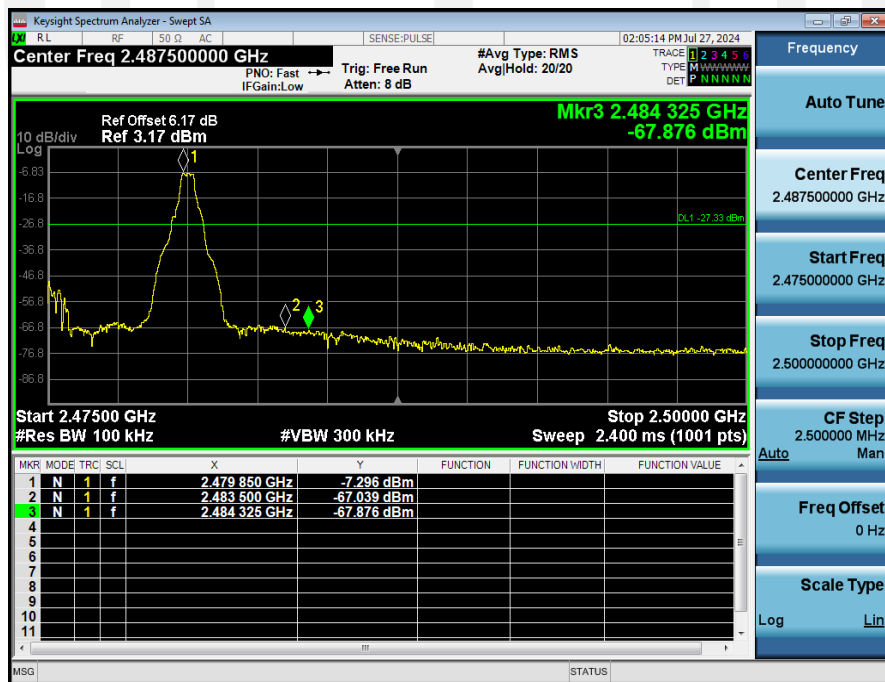
2_Band_Edge_(Hopping)_NVNT_ANT1_1-DH1_Hopping



1_Reference_Level_NVNT_ANT1_1-DH1_2480_00



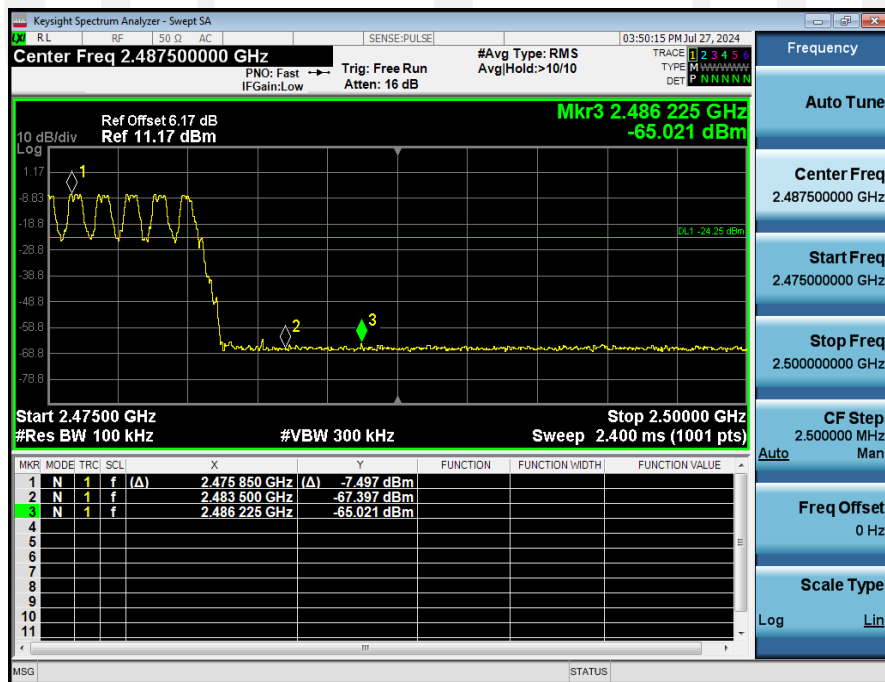
2_Bandedge_NVNT_ANT1_1-DH1_2480_00



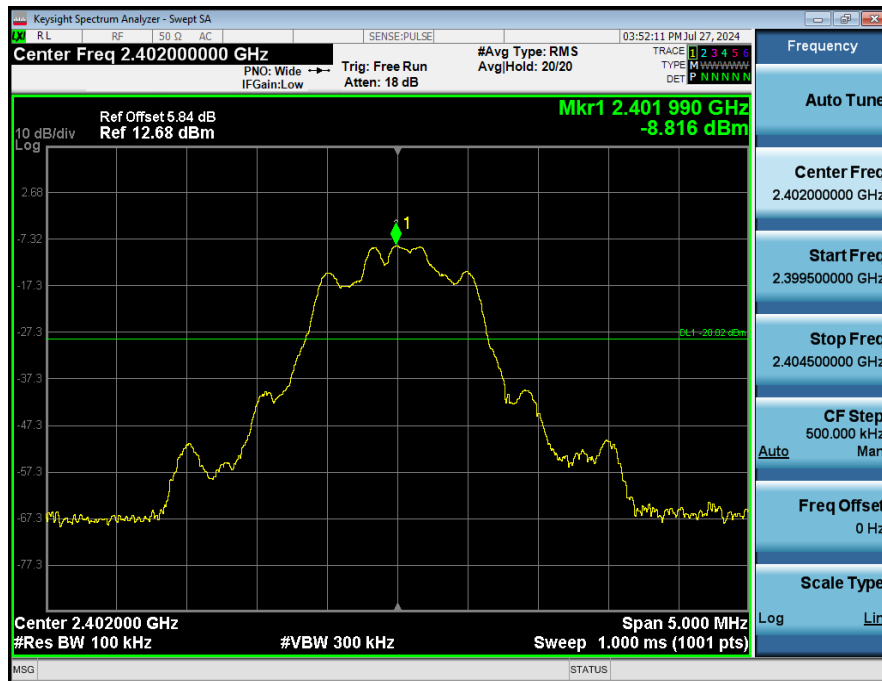
1_Reference_Level_Hopping_NVNT_ANT1_1-DH1_Hopping



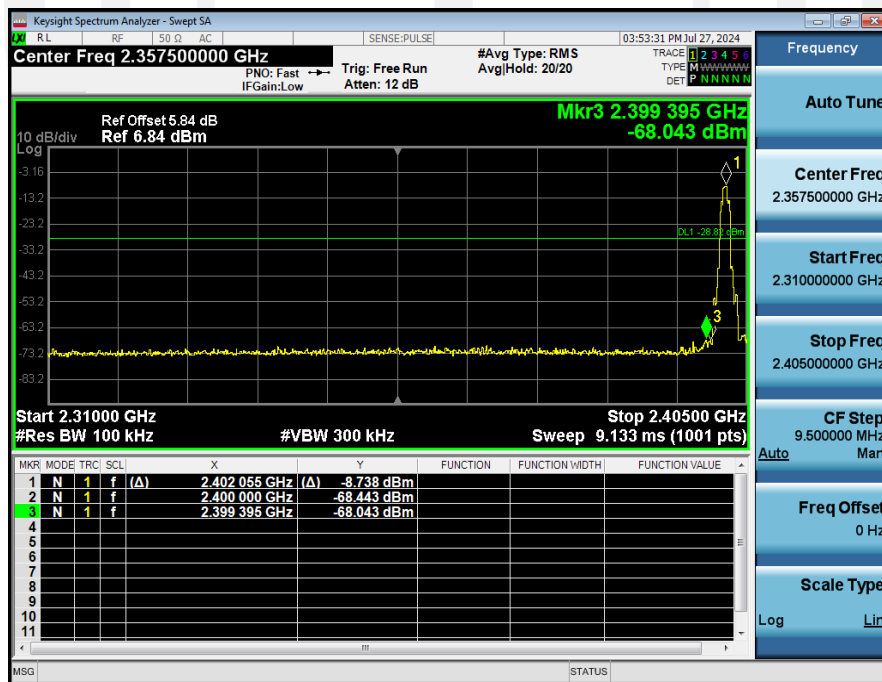
2_Band_Edge_(Hopping)_NVNT_ANT1_1-DH1_Hopping



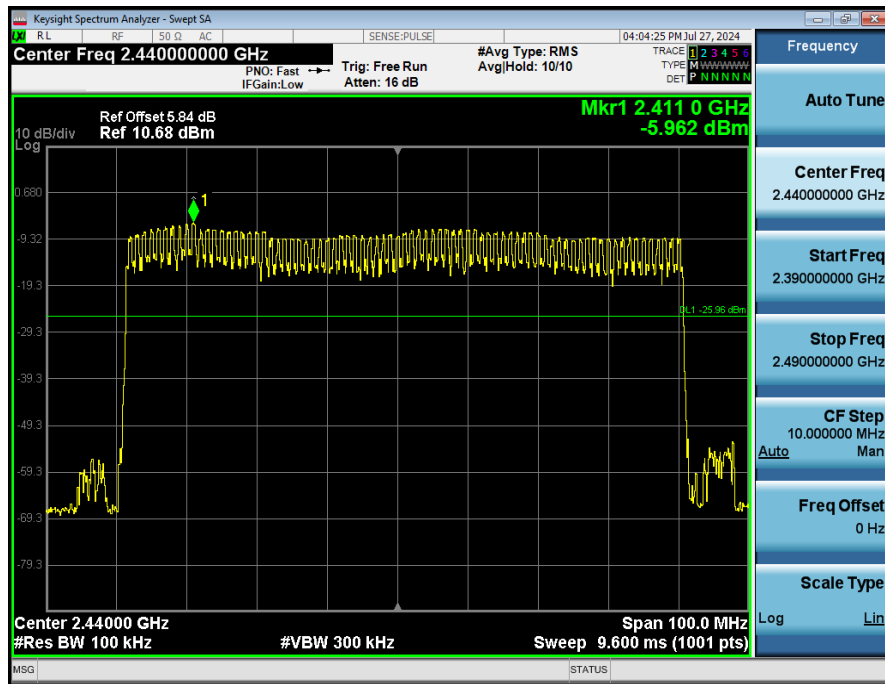
1_Reference_Level_NVNT_ANT1_2-DH1_2402_00



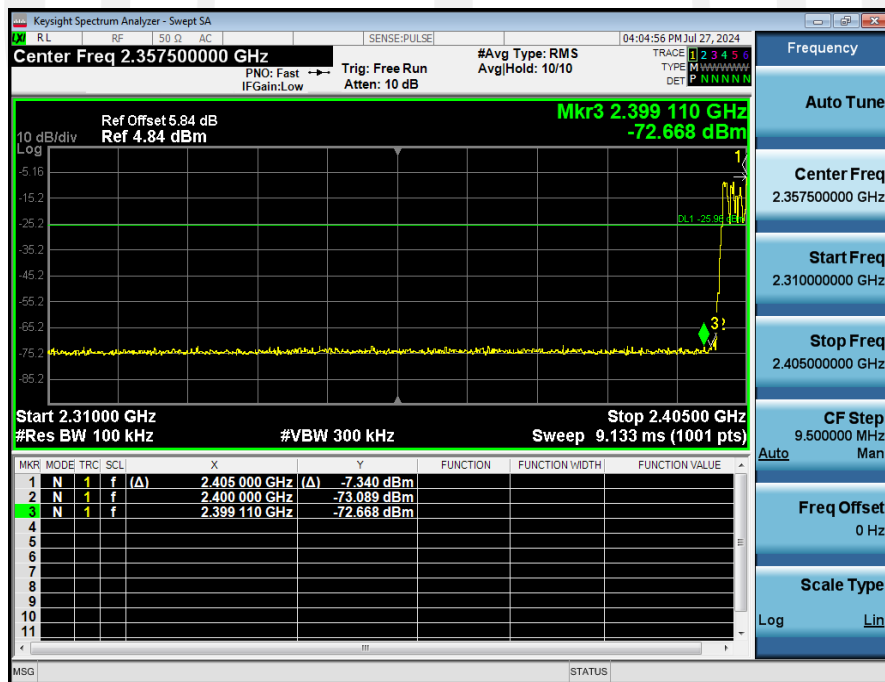
2_Bandedge_NVNT_ANT1_2-DH1_2402_00



1_Reference_Level_Hopping_NVNT_ANT1_2-DH1_Hopping



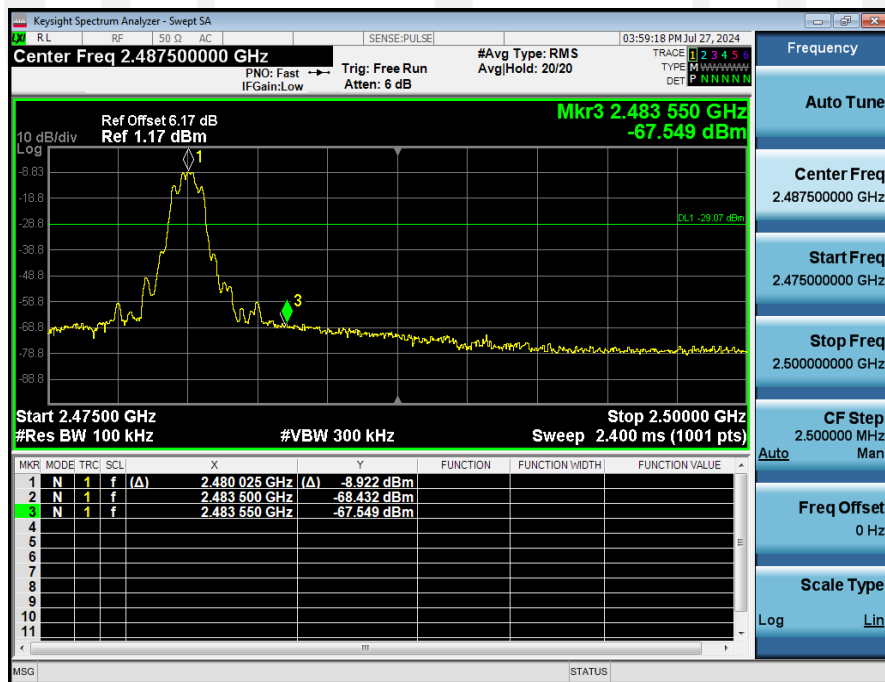
2_Band_Edge_(Hopping)_NVNT_ANT1_2-DH1_Hopping



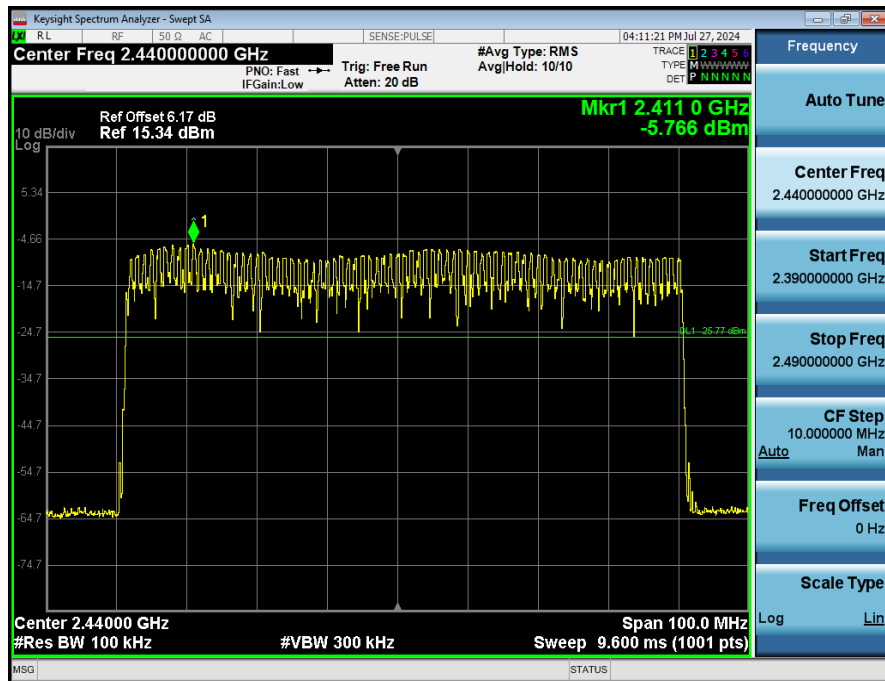
1_Reference_Level_NVNT_ANT1_2-DH1_2480_00



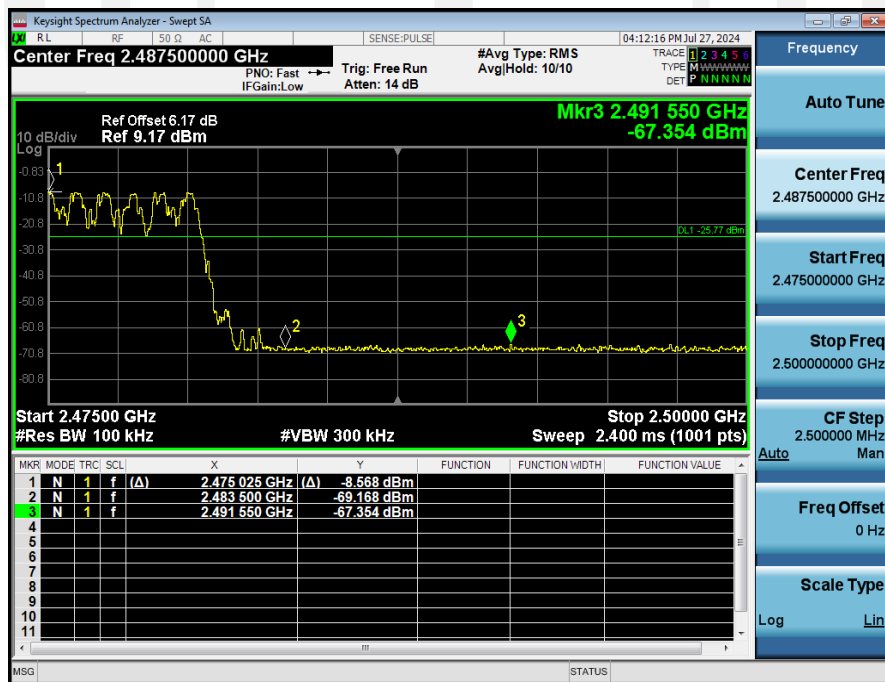
2_Bandedge_NVNT_ANT1_2-DH1_2480_00



1_Reference_Level_Hopping_NVNT_ANT1_2-DH1_Hopping



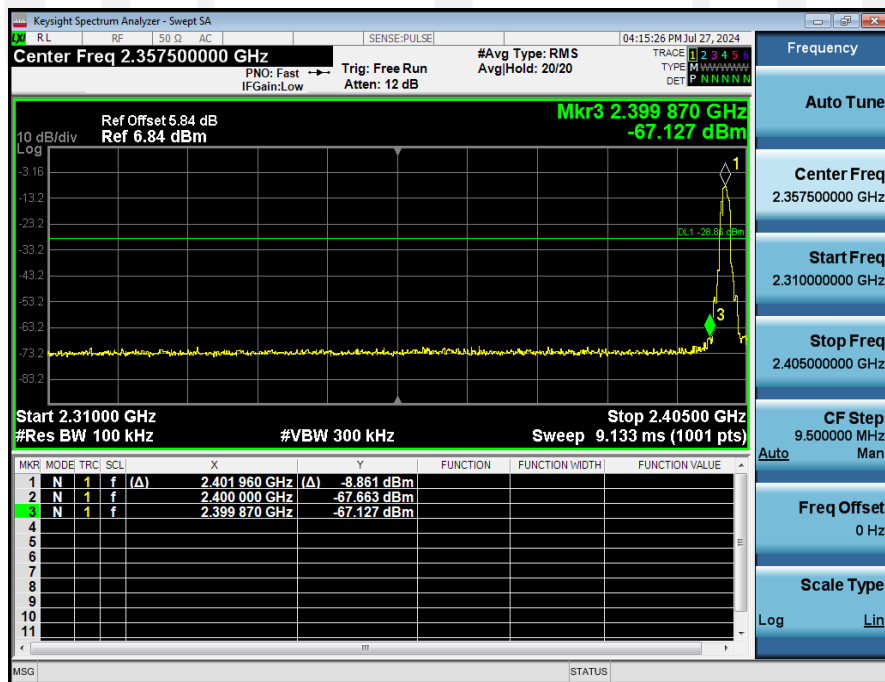
2_Band_Edge_(Hopping)_NVNT_ANT1_2-DH1_Hopping



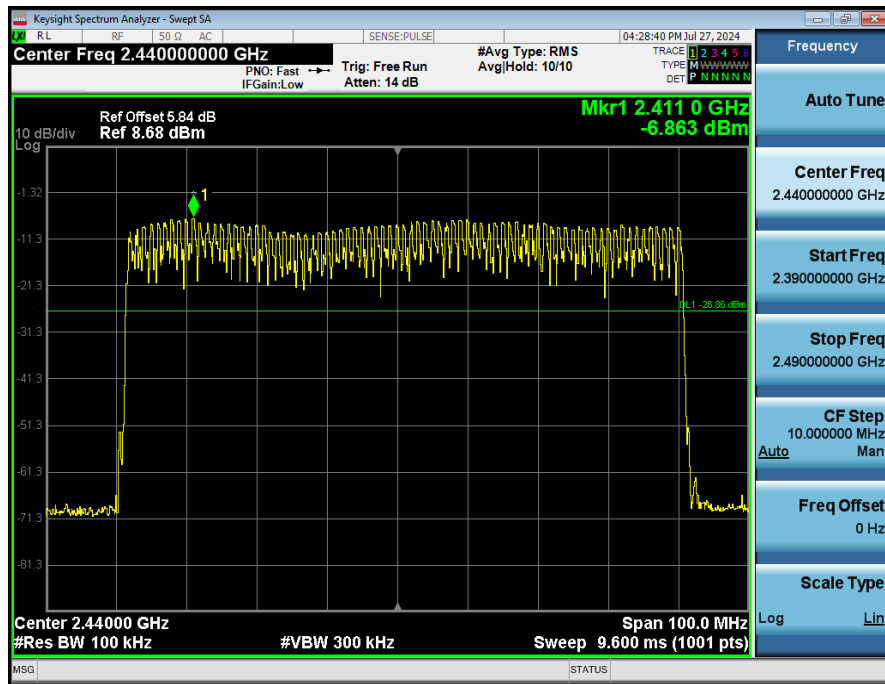
1_Reference_Level_NVNT_ANT1_3-DH1_2402_00



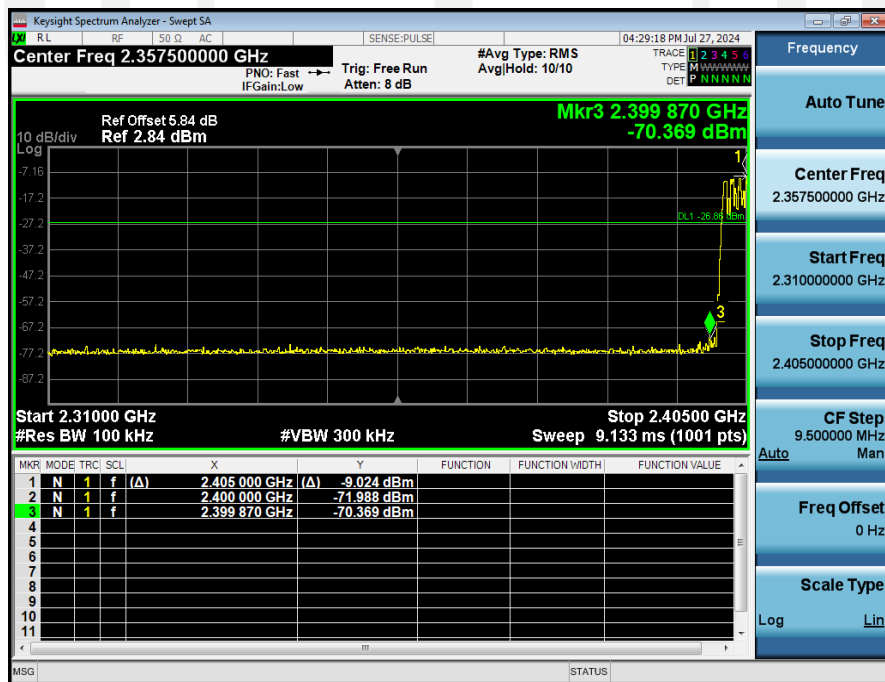
2_Bandedge_NVNT_ANT1_3-DH1_2402_00



1_Reference_Level_Hopping_NVNT_ANT1_3-DH1_Hopping



2_Band_Edge_(Hopping)_NVNT_ANT1_3-DH1_Hopping



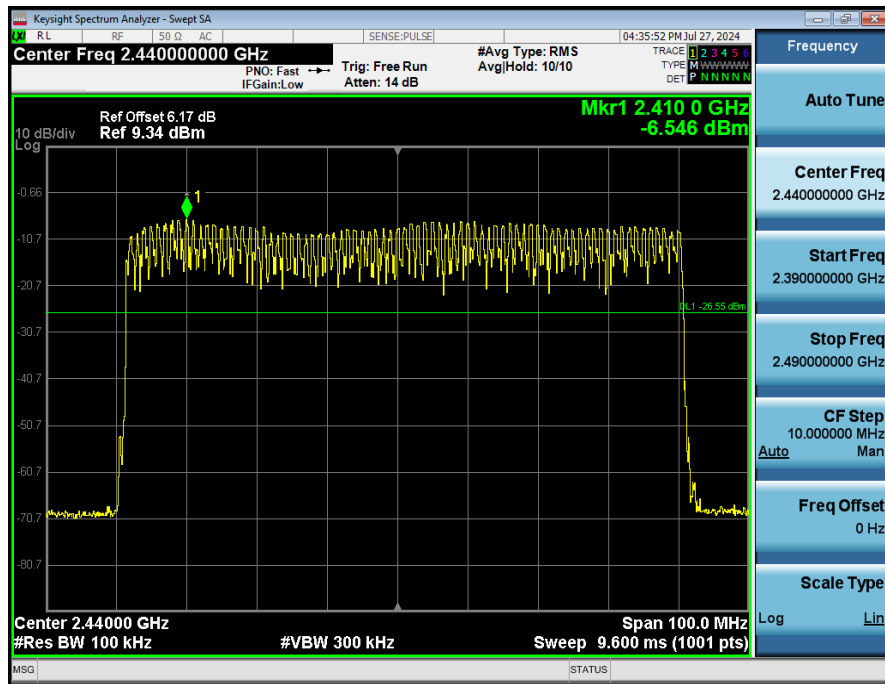
1_Reference_Level_NVNT_ANT1_3-DH1_2480_00



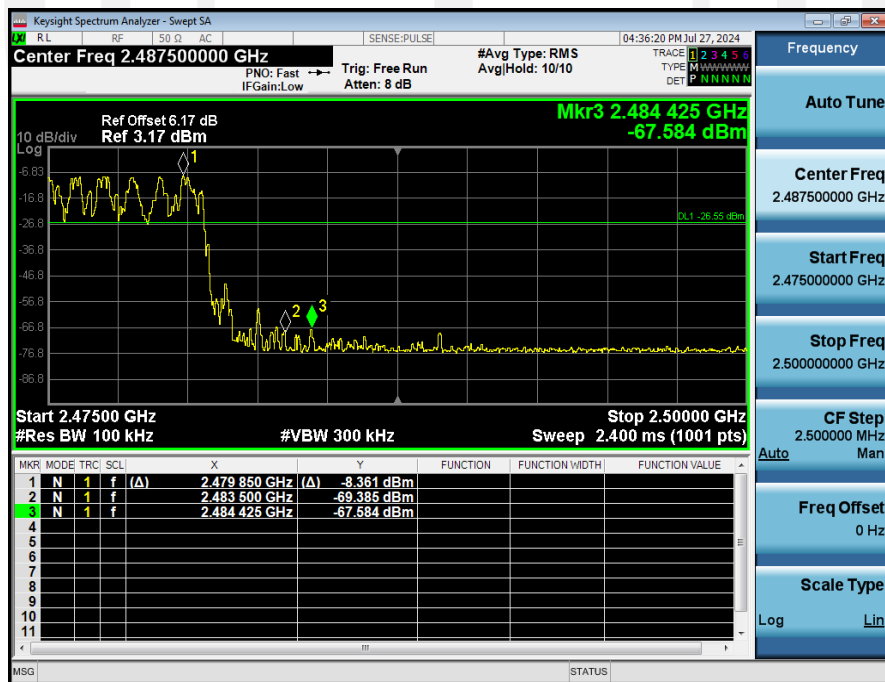
2_Bandedge_NVNT_ANT1_3-DH1_2480_00



1_Reference_Level_Hopping_NVNT_ANT1_3-DH1_Hopping



2_Band_Edge_(Hopping)_NVNT_ANT1_3-DH1_Hopping



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)

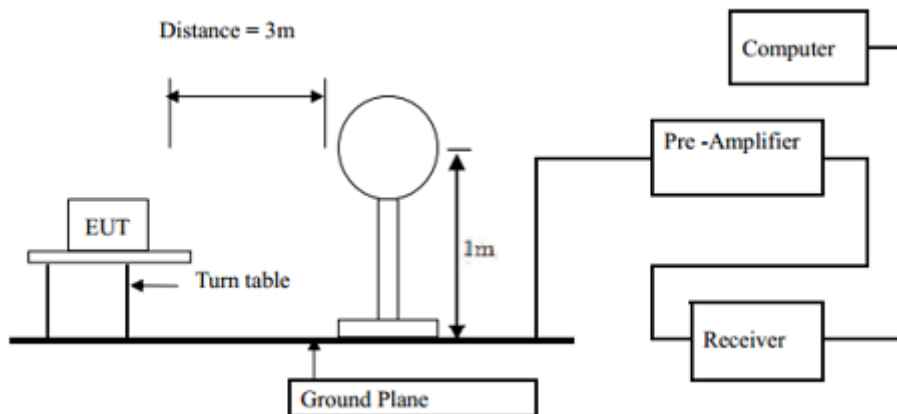
15.209 Limit

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)	

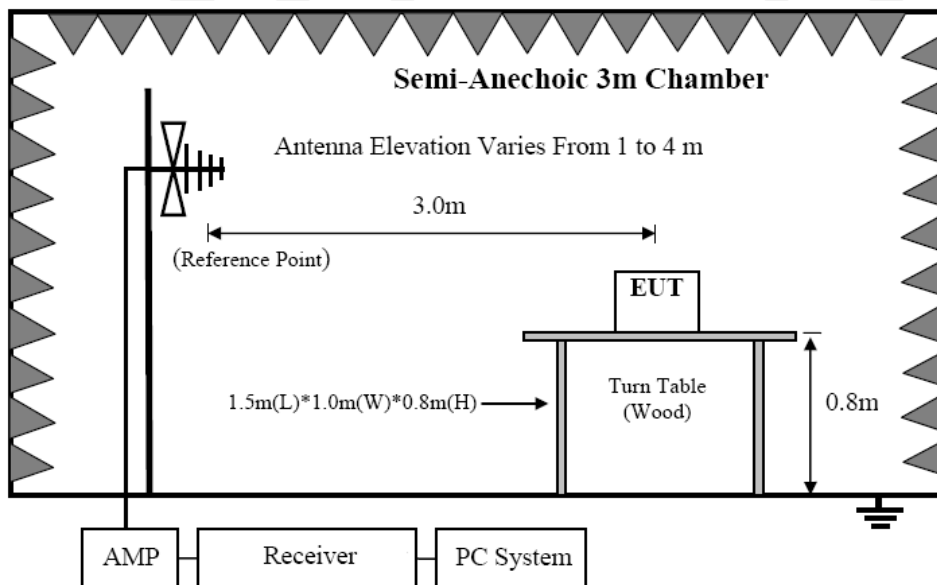
Note: The peak limit is 20 dB higher than the average limit

9.2. Block Diagram of Test setup

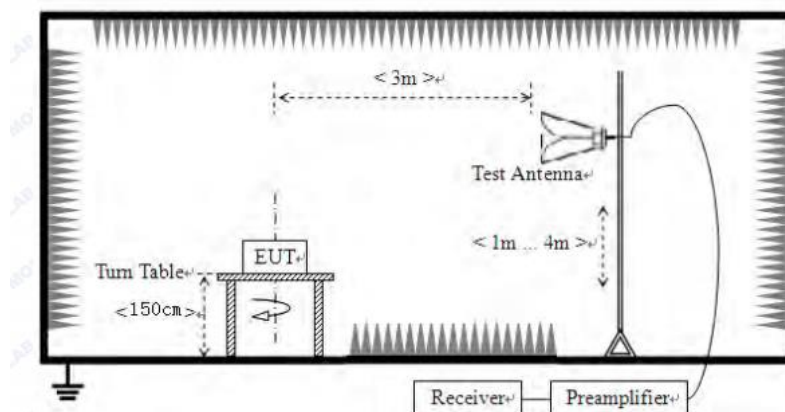
9.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 30MHz



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) EUT was placed on a non-metallic table, 80 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 :2013on 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 10Hz for Average measure.

9.4. Test Results

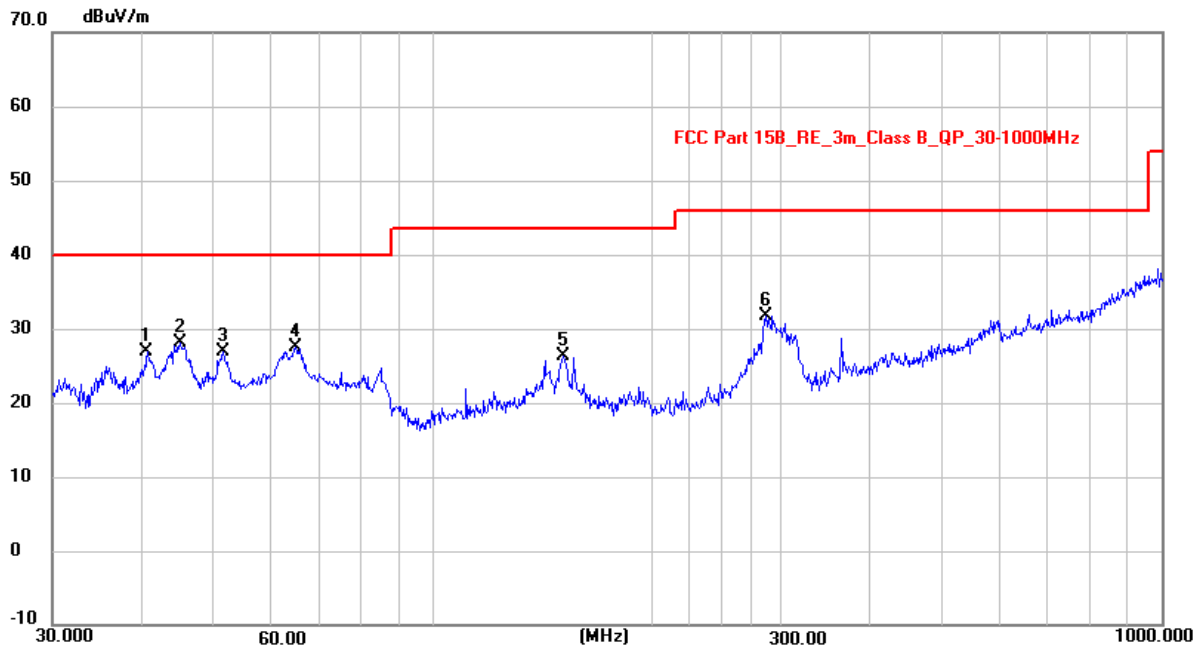
We have scanned from 9kHz to the 10th harmonic of the EUT's highest frequency.

Detailed information please see the following page.

From 9KHz to 30MHz:	
Test Date : 2024.07.25	Temperature : 26℃
Test Engineer : Felix Pang	Humidity : 54%
Test Mode : GFSK mode	
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.

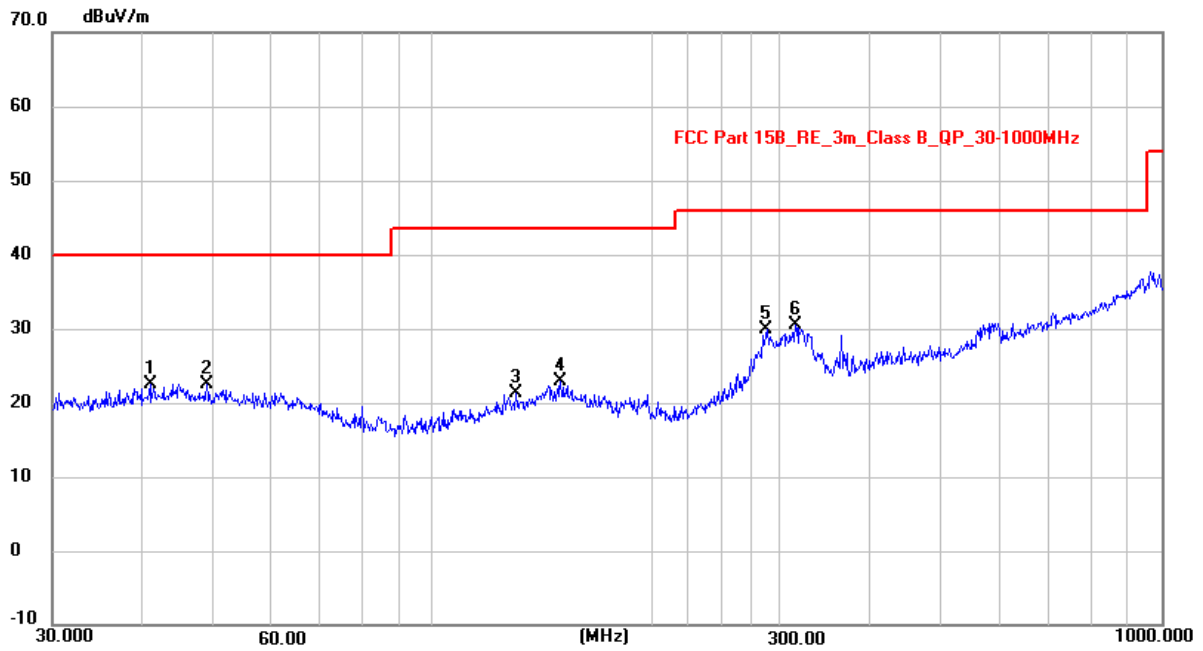
From 30MHz to 1000MHz:	
Test Date : 2024.07.25	Temperature : 26℃
Test Engineer : Felix Pang	Humidity : 54%
Test Mode : GFSK mode	
Test Results : PASS	
Note:	1. The test results are listed in next pages. 2. If the limits for the measurement with the average detector are met when using a receiver with 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. All modes have been tested, and only worst data of GFSK mode, Channel 2402MHz (AC 120V/ 60Hz) 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	40.5769	13.20	13.62	26.82	40.00	-13.18	QP
2 *	45.0386	14.59	13.42	28.01	40.00	-11.99	QP
3	51.6163	13.80	13.03	26.83	40.00	-13.17	QP
4	64.8013	15.86	11.64	27.50	40.00	-12.50	QP
5	151.2652	13.26	13.07	26.33	43.50	-17.17	QP
6	286.9823	18.21	13.44	31.65	46.00	-14.35	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	40.9342	8.92	13.60	22.52	40.00	-17.48	QP
2	49.0145	9.34	13.24	22.58	40.00	-17.42	QP
3	130.0365	9.08	12.15	21.23	43.50	-22.27	QP
4	149.9451	9.80	13.04	22.84	43.50	-20.66	QP
5	287.3599	16.53	13.45	29.98	46.00	-16.02	QP
6 *	314.5143	16.44	14.03	30.47	46.00	-15.53	QP

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

From 1GHz to 25GHz:	
Test Date : 2024.07.25	Temperature : 26℃
Test Engineer : Felix Pang	Humidity : 54%
Test Mode : GFSK, $\pi/4$ DQPSK, 8DPSK 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.



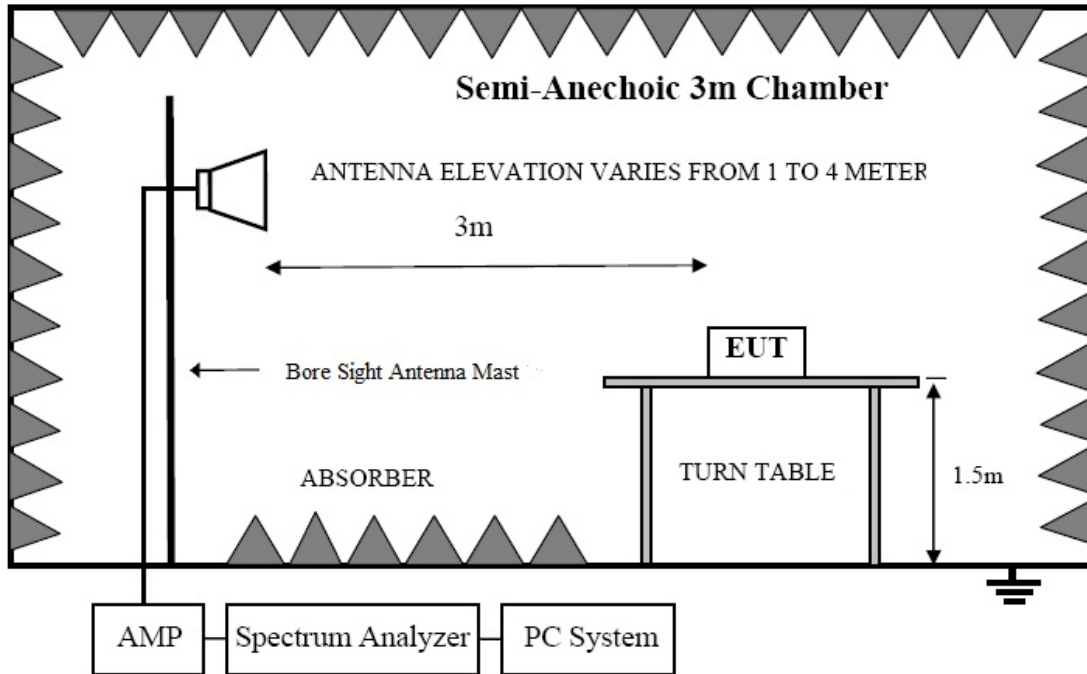
Test Mode : GFSK TX Low								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	4804	V	84.01	-27.27	56.74	74.00	-17.26	Peak
2	4804	V	65.93	-27.27	38.66	54.00	-15.34	Avg
3	7206	--	--	--	--	--	--	--
4	9608	--	--	--	--	--	--	--
5	4804	H	82.13	-27.27	54.86	74.00	-19.14	Peak
6	4804	H	74.57	-27.27	47.30	54.00	-6.70	Avg
7	7206	--	--	--	--	--	--	--
8	9608	--	--	--	--	--	--	--
Test Mode : GFSK TX Mid								
1	4882	V	86.68	-27.79	58.89	74.00	-15.11	Peak
2	4882	V	64.84	-27.79	37.05	54.00	-16.95	Avg
3	7323	--	--	--	--	--	--	--
4	9764	--	--	--	--	--	--	--
5	4882	H	82.09	-27.79	54.30	74.00	-19.70	Peak
6	4882	H	73.16	-27.79	45.37	54.00	-8.63	Avg
7	7323	--	--	--	--	--	--	--
8	9764	--	--	--	--	--	--	--
Test Mode : GFSK TX High								
1	4960	V	86.43	-28.30	58.13	74.00	-15.87	Peak
2	4960	V	68.27	-28.30	39.97	54.00	-14.03	Avg
3	7440	--	--	--	--	--	--	--
4	9920	--	--	--	--	--	--	--
5	4960	H	81.31	-28.30	53.01	74.00	-20.99	Peak
6	4960	H	70.24	-28.30	41.94	54.00	-12.06	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 : $\pi/4$ DQPSK TX Low								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	4804	V	83.92	-27.27	56.65	74.00	-17.35	Peak
2	4804	V	66.03	-27.27	38.76	54.00	-15.24	Avg
3	7206	--	--	--	--	--	--	--
4	9608	--	--	--	--	--	--	--
5	4804	H	82.64	-27.27	55.37	74.00	-18.63	Peak
6	4804	H	72.18	-27.27	44.91	54.00	-9.09	Avg
7	7206	--	--	--	--	--	--	--
8	9608	--	--	--	--	--	--	--
Test Mode : $\pi/4$ DQPSK TX Mid								
1	4882	V	87.94	-27.79	60.15	74.00	-13.85	Peak
2	4882	V	66.20	-27.79	38.41	54.00	-15.59	Avg
3	7323	--	--	--	--	--	--	--
4	9764	--	--	--	--	--	--	--
5	4882	H	83.71	-27.79	55.92	74.00	-18.08	Peak
6	4882	H	70.35	-27.79	42.56	54.00	-11.44	Avg
7	7323	--	--	--	--	--	--	--
8	9764	--	--	--	--	--	--	--
Test Mode : $\pi/4$ DQPSK TX High								
1	4960	V	83.29	-28.30	54.99	74.00	-19.01	Peak
2	4960	V	69.75	-28.30	41.45	54.00	-12.55	Avg
3	7440	--	--	--	--	--	--	--
4	9920	--	--	--	--	--	--	--
5	4960	H	82.70	-28.30	54.40	74.00	-19.60	Peak
6	4960	H	71.10	-28.30	42.80	54.00	-11.20	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	84.38	-27.27	57.11	74.00	-16.89	Peak
2	4804	V	64.27	-27.27	37.00	54.00	-17.00	Avg
3	7206	--	--	--	--	--	--	--
4	9608	--	--	--	--	--	--	--
5	4804	H	80.50	-27.27	53.23	74.00	-20.77	Peak
6	4804	H	71.75	-27.27	44.48	54.00	-9.52	Avg
7	7206	--	--	--	--	--	--	--
8	9608	--	--	--	--	--	--	--
Test Mode : 8DPSK TX Mid								
1	4882	V	86.17	-27.79	58.38	74.00	-15.62	Peak
2	4882	V	64.69	-27.79	36.90	54.00	-17.10	Avg
3	7323	--	--	--	--	--	--	--
4	9764	--	--	--	--	--	--	--
5	4882	H	82.30	-27.79	54.51	74.00	-19.49	Peak
6	4882	H	69.91	-27.79	42.12	54.00	-11.88	Avg
7	7323	--	--	--	--	--	--	--
8	9764	--	--	--	--	--	--	--
Test Mode : 8D PSK TX High								
1	4960	V	83.27	-28.30	54.97	74.00	-19.03	Peak
2	4960	V	70.21	-28.30	41.91	54.00	-12.09	Avg
3	7440	--	--	--	--	--	--	--
4	9920	--	--	--	--	--	--	--
5	4960	H	81.16	-28.30	52.86	74.00	-21.14	Peak
6	4960	H	72.98	-28.30	44.68	54.00	-9.32	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)).

10.3. Test Procedure

Refer to ANSI C 63.10, Clause 6.10.

All restriction band and non- restriction band have been tested, only worse case is reported.

10.4. Test Results

Test Date	: 2024.07.25	Temperature	: 26℃
Test Engineer	: Felix Pang	Humidity	: 54%
Test Results	: PASS		

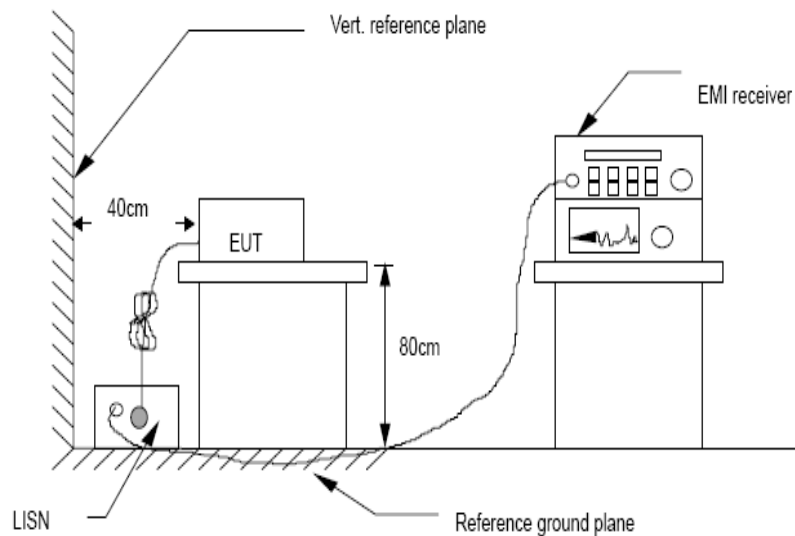
Frequency Range : 2310MHz~2410MHz								
Test Mode : GFSK TX 2402MHz								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	2390	H	73.36	-21.62	51.74	74.00	-22.26	Peak
2	2390	H	--	-21.62	--	54.00	--	Avg
3	2400	H	77.47	-26.08	51.39	74.00	-22.61	Peak
4	2400	H	--	-26.08	--	54.00	--	Avg
1	2390	V	67.16	-21.62	45.54	74.00	-28.46	Peak
2	2390	V	--	-21.62	--	54.00	--	Avg
3	2400	V	76.16	-26.08	50.08	74.00	-23.92	Peak
4	2400	V	--	-26.08	--	54.00	--	Avg
Frequency Range : 2450MHz~2550MHz								
Test Mode : GFSK TX 2480MHz								
1	2483.5	H	77.03	-25.84	51.19	74.00	-22.81	Peak
2	2483.5	H	--	-25.84	--	54.00	--	Avg
1	2483.5	V	73.81	-25.84	47.97	74.00	-26.03	Peak
2	2483.5	V	--	-25.84	--	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~2410MHz								
Test Mode : $\pi/4$ DQPSK TX 2402MHz								
No.	Freq MHz	Polarity	Reading (dBuV/m)	Correct Factor	Result (dBuV/m)	Limit (dBuV/m)	Margin	Remark
1	2390	H	72.07	-21.62	50.45	74.00	-23.55	Peak
2	2390	H	--	-21.62	--	54.00	--	Avg
3	2400	H	78.56	-26.08	52.48	74.00	-21.52	Peak
4	2400	H	--	-26.08	--	54.00	--	Avg
1	2390	V	67.69	-21.62	46.07	74.00	-27.93	Peak
2	2390	V	--	-21.62	--	54.00	--	Avg
3	2400	V	78.20	-26.08	52.12	74.00	-21.88	Peak
4	2400	V	--	-26.08	--	54.00	--	Avg
Frequency Range : 2450MHz~2550MHz								
Test Mode : $\pi/4$ DQPSK TX 2480MHz								
1	2483.5	H	74.25	-25.84	48.41	74.00	-25.59	Peak
2	2483.5	H	--	-25.84	--	54.00	--	Avg
1	2483.5	V	72.05	-25.84	46.21	74.00	-27.79	Peak
2	2483.5	V	--	-25.84	--	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~2410MHz								
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	70.90	-21.62	49.28	74.00	-24.72	Peak
2	2390	H	--	-21.62	--	54.00	--	Avg
3	2400	H	76.44	-26.08	50.36	74.00	-23.64	Peak
4	2400	H	--	-26.08	--	54.00	--	Avg
1	2390	V	69.10	-21.62	47.48	74.00	-26.52	Peak
2	2390	V	--	-21.62	--	54.00	--	Avg
3	2400	V	78.67	-26.08	52.59	74.00	-21.41	Peak
4	2400	V	--	-26.08	--	54.00	--	Avg
Frequency Range : 2450MHz~2550MHz								
Test Mode : 8DPSK TX 2480MHz								
1	2483.5	H	74.45	-25.84	48.61	74.00	-25.39	Peak
2	2483.5	H	--	-25.84	--	54.00	--	Avg
1	2483.5	V	74.06	-25.84	48.22	74.00	-25.78	Peak
2	2483.5	V	--	-25.84	--	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(μ V)	Average Level dB(μ V)
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.

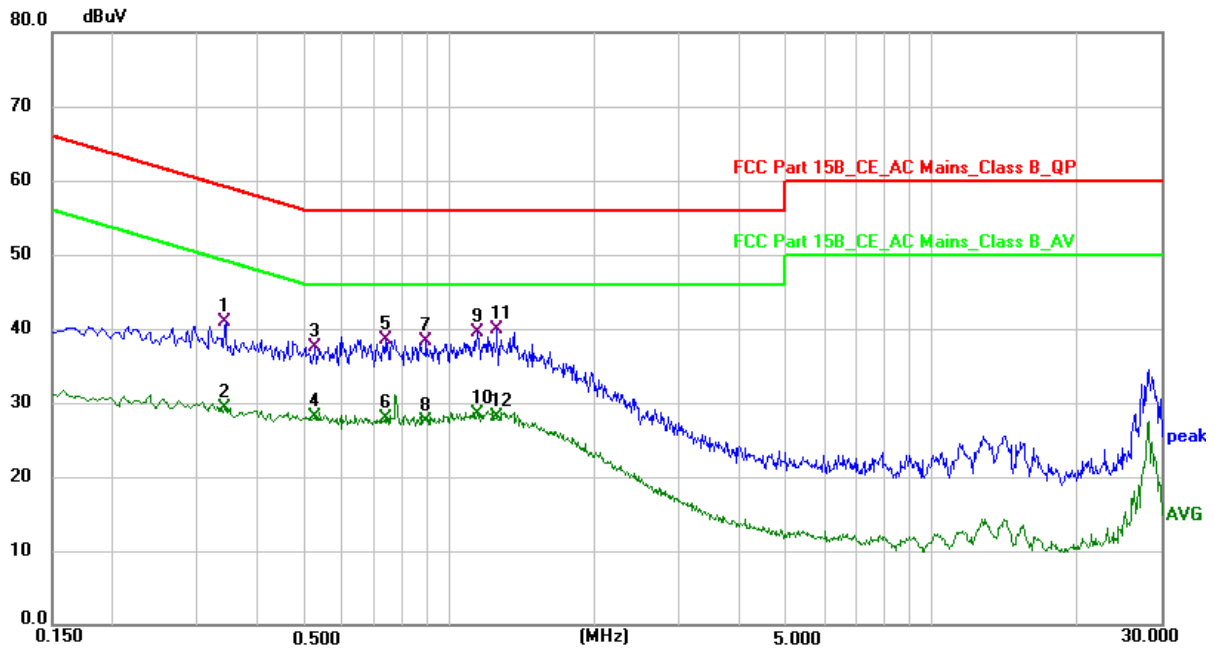
11.3. Test Procedure

- (1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
- (2) Setup the EUT and simulator as shown in 10.1
- (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 C63.10:2013on 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	: 2024.07.23	Temperature	: 26°C
Test Engineer	: Felix Pang	Humidity	: 54%
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.		

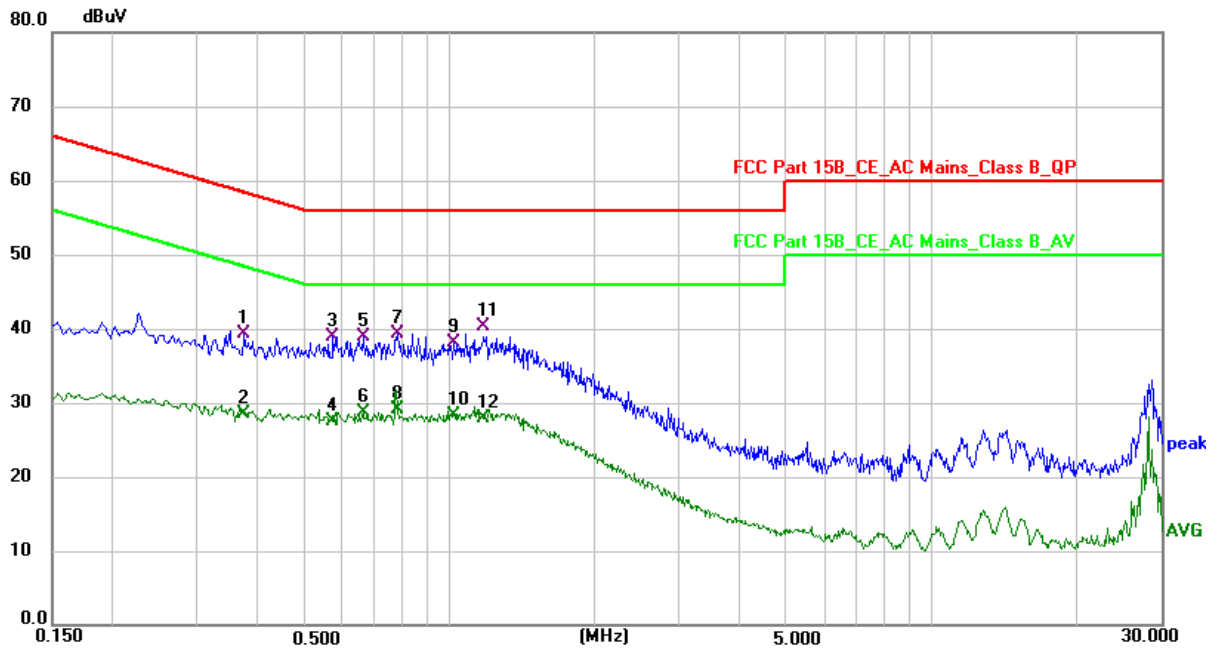
Polarization: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.3420	31.16	9.83	40.99	59.15	-18.16	QP	P
2	0.3420	19.55	9.83	29.38	49.15	-19.77	AVG	P
3	0.5260	27.75	9.85	37.60	56.00	-18.40	QP	P
4	0.5260	18.17	9.85	28.02	46.00	-17.98	AVG	P
5	0.7380	29.14	9.43	38.57	56.00	-17.43	QP	P
6	0.7380	18.38	9.43	27.81	46.00	-18.19	AVG	P
7	0.8980	28.83	9.42	38.25	56.00	-17.75	QP	P
8	0.8980	18.18	9.42	27.60	46.00	-18.40	AVG	P
9	1.1420	30.15	9.41	39.56	56.00	-16.44	QP	P
10	1.1420	19.07	9.41	28.48	46.00	-17.52	AVG	P
11 *	1.2620	30.52	9.40	39.92	56.00	-16.08	QP	P
12	1.2620	18.65	9.40	28.05	46.00	-17.95	AVG	P

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

Polarization: N



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.3740	29.76	9.61	39.37	58.41	-19.04	QP	P
2	0.3740	18.91	9.61	28.52	48.41	-19.89	AVG	P
3	0.5740	29.18	9.78	38.96	56.00	-17.04	QP	P
4	0.5740	17.72	9.78	27.50	46.00	-18.50	AVG	P
5	0.6620	29.03	9.78	38.81	56.00	-17.19	QP	P
6	0.6620	18.92	9.78	28.70	46.00	-17.30	AVG	P
7	0.7820	29.67	9.71	39.38	56.00	-16.62	QP	P
8	0.7820	19.38	9.71	29.09	46.00	-16.91	AVG	P
9	1.0220	28.54	9.50	38.04	56.00	-17.96	QP	P
10	1.0220	18.80	9.50	28.30	46.00	-17.70	AVG	P
11 *	1.1820	30.85	9.46	40.31	56.00	-15.69	QP	P
12	1.1820	18.49	9.46	27.95	46.00	-18.05	AVG	P

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

12. Antenna Requirements

12.1.Limit

For intentional device, according to FCC 47 CFR Section 15.203 and RSS-GEN, 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.

----- END OF REPORT-----

