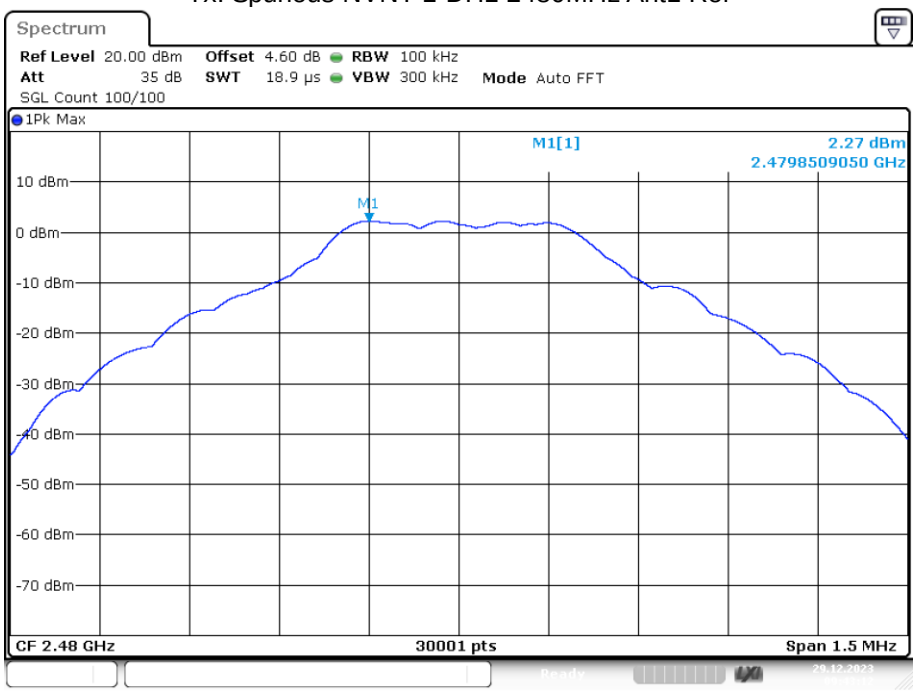
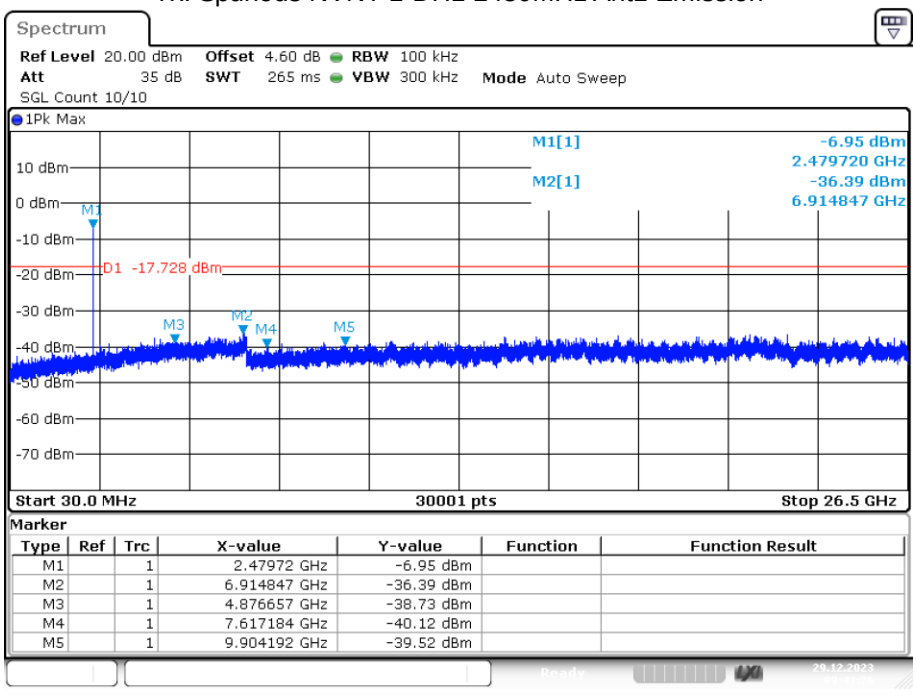
Tx. Spurious NVNT 1-DH1 2480MHz Ant1 Ref



Date: 29.DEC.2023 09:43:11

Tx. Spurious NVNT 1-DH1 2480MHz Ant1 Emission

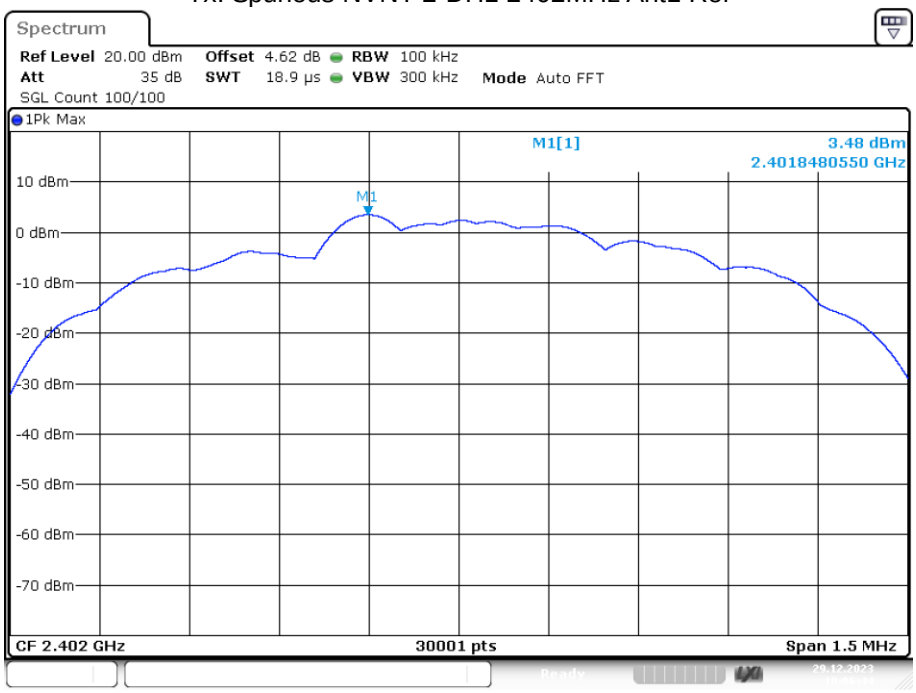


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47972 GHz	-6.95 dBm		
M2		1	6.914847 GHz	-36.39 dBm		
M3		1	4.876657 GHz	-38.73 dBm		
M4		1	7.617184 GHz	-40.12 dBm		
M5		1	9.904192 GHz	-39.52 dBm		

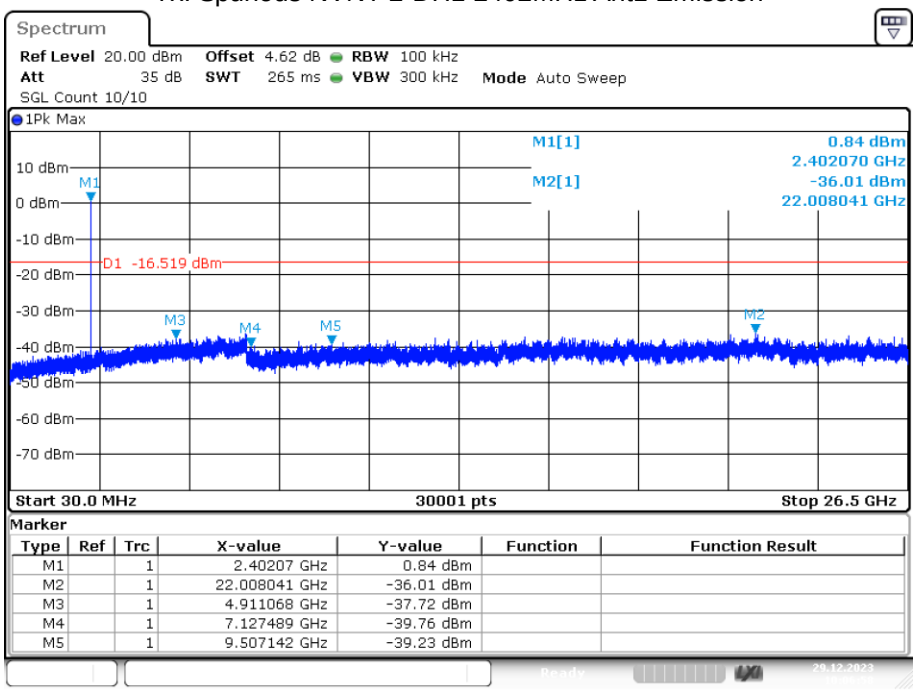
Date: 29.DEC.2023 09:43:25

Tx. Spurious NVNT 2-DH1 2402MHz Ant1 Ref



Date: 29.DEC.2023 10:06:44

Tx. Spurious NVNT 2-DH1 2402MHz Ant1 Emission

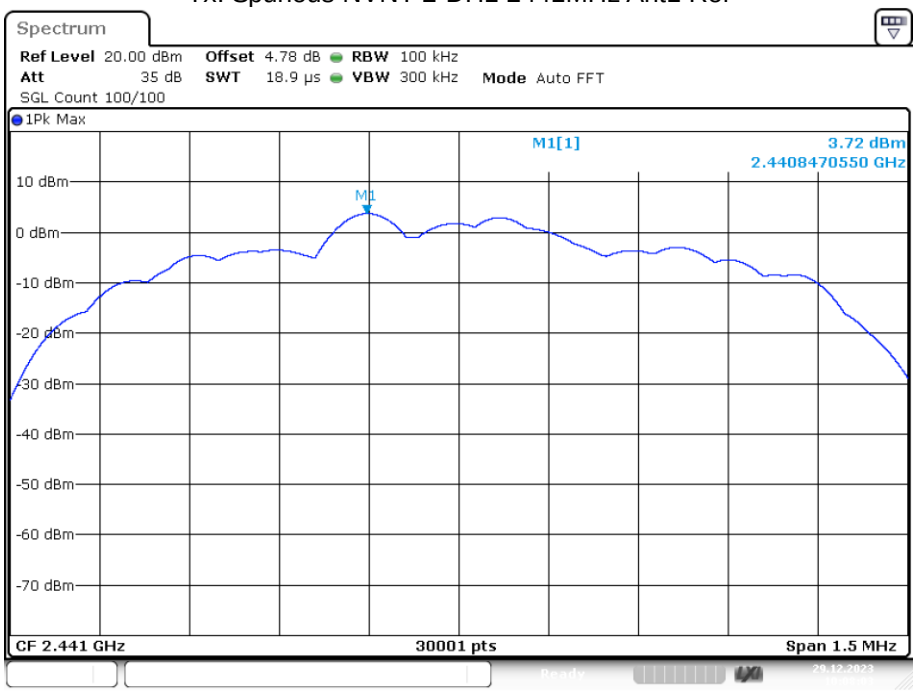


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40207 GHz	0.84 dBm		
M2		1	22.008041 GHz	-36.01 dBm		
M3		1	4.911068 GHz	-37.72 dBm		
M4		1	7.127489 GHz	-39.76 dBm		
M5		1	9.507142 GHz	-39.23 dBm		

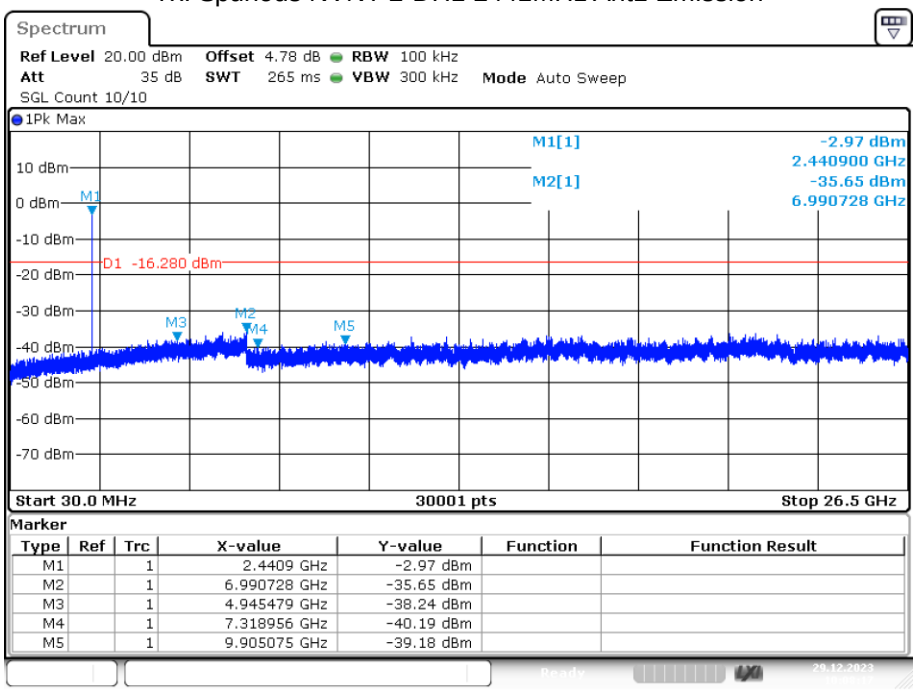
Date: 29.DEC.2023 10:06:58

Tx. Spurious NVNT 2-DH1 2441MHz Ant1 Ref



Date: 29.DEC.2023 10:08:03

Tx. Spurious NVNT 2-DH1 2441MHz Ant1 Emission

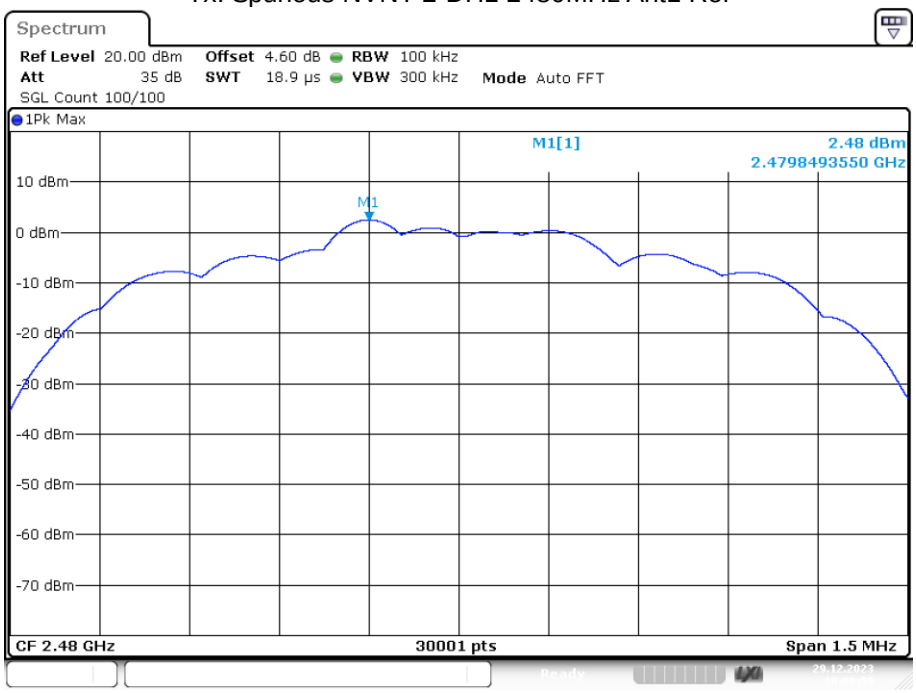


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4409 GHz	-2.97 dBm		
M2		1	6.990728 GHz	-35.65 dBm		
M3		1	4.945479 GHz	-38.24 dBm		
M4		1	7.318956 GHz	-40.19 dBm		
M5		1	9.905075 GHz	-39.18 dBm		

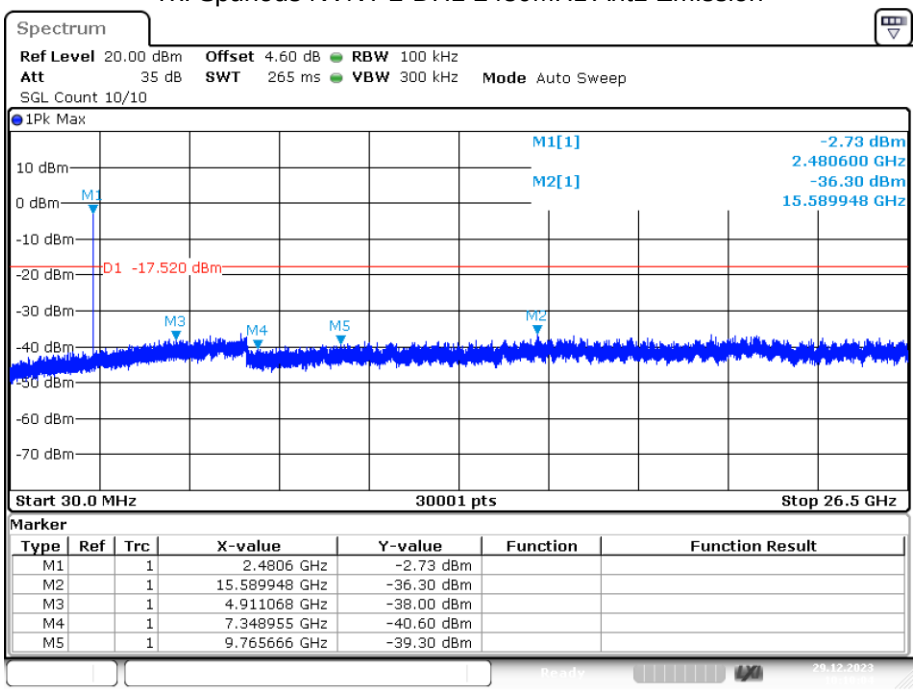
Date: 29.DEC.2023 10:08:17

Tx. Spurious NVNT 2-DH1 2480MHz Ant1 Ref



Date: 29.DEC.2023 10:09:50

Tx. Spurious NVNT 2-DH1 2480MHz Ant1 Emission

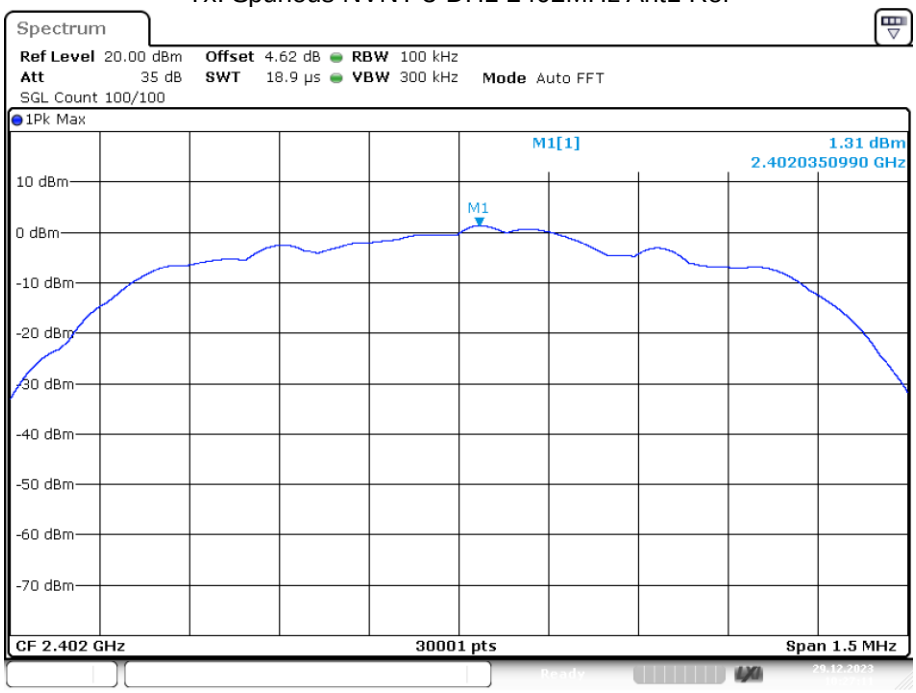


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4806 GHz	-2.73 dBm		
M2		1	15.589948 GHz	-36.30 dBm		
M3		1	4.911068 GHz	-38.00 dBm		
M4		1	7.348955 GHz	-40.60 dBm		
M5		1	9.765666 GHz	-39.30 dBm		

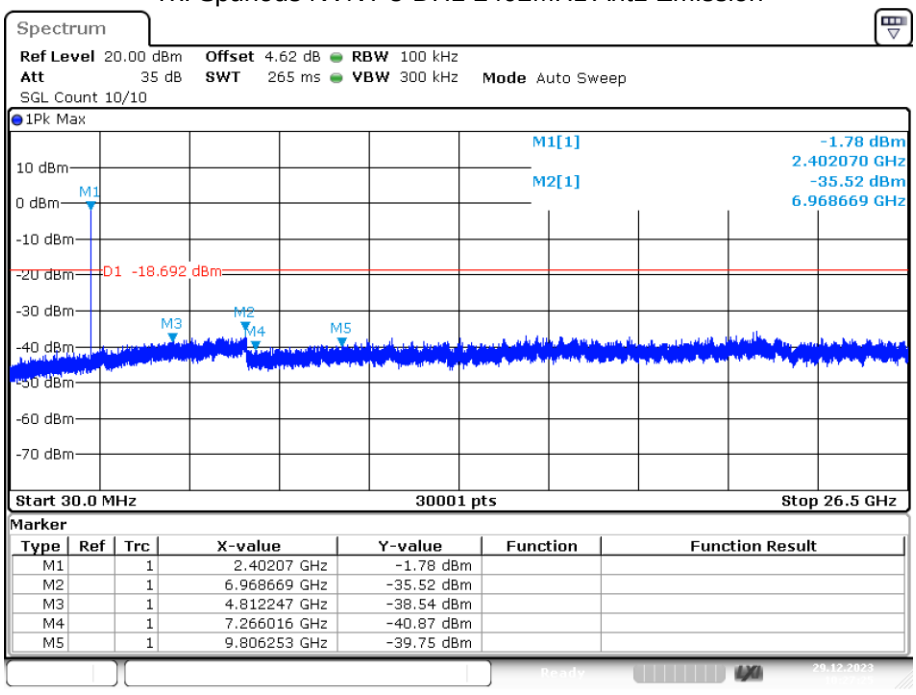
Date: 29.DEC.2023 10:10:04

Tx. Spurious NVNT 3-DH1 2402MHz Ant1 Ref



Date: 29.DEC.2023 10:27:12

Tx. Spurious NVNT 3-DH1 2402MHz Ant1 Emission

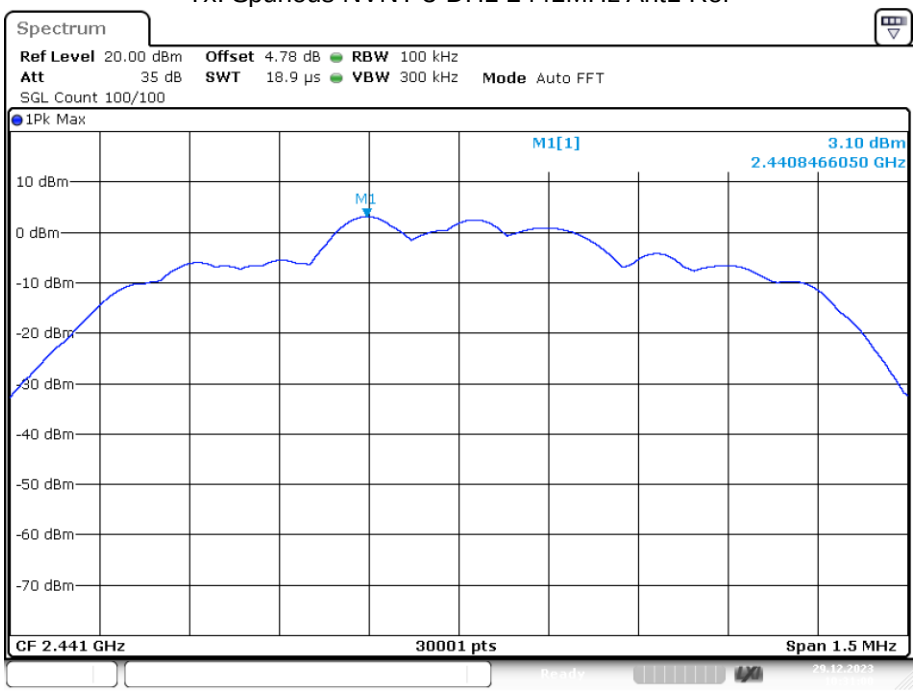


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40207 GHz	-1.78 dBm		
M2		1	6.968669 GHz	-35.52 dBm		
M3		1	4.812247 GHz	-38.54 dBm		
M4		1	7.266016 GHz	-40.87 dBm		
M5		1	9.806253 GHz	-39.75 dBm		

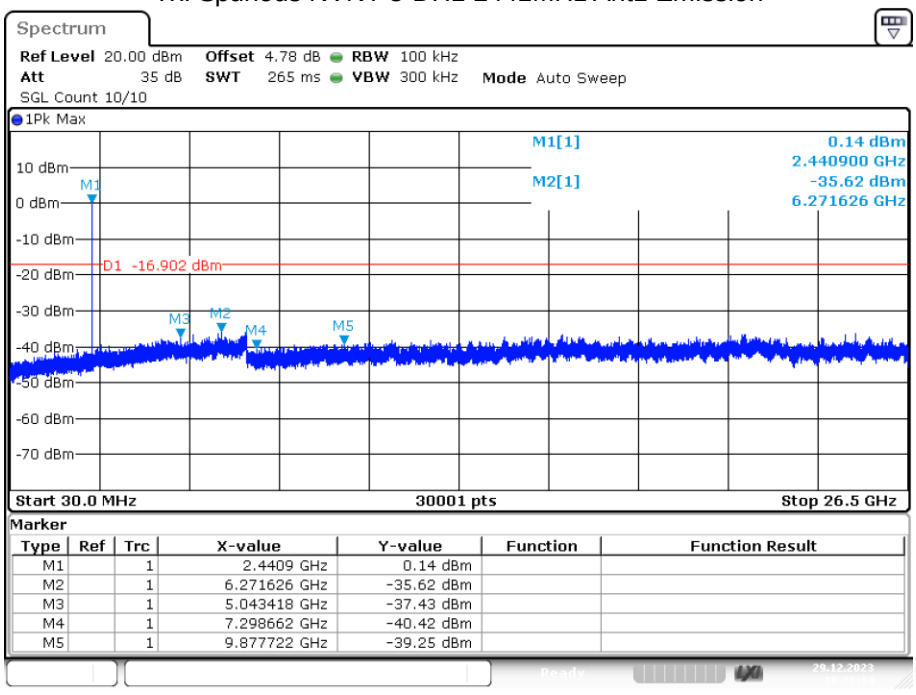
Date: 29.DEC.2023 10:27:26

Tx. Spurious NVNT 3-DH1 2441MHz Ant1 Ref



Date: 29.DEC.2023 10:31:00

Tx. Spurious NVNT 3-DH1 2441MHz Ant1 Emission

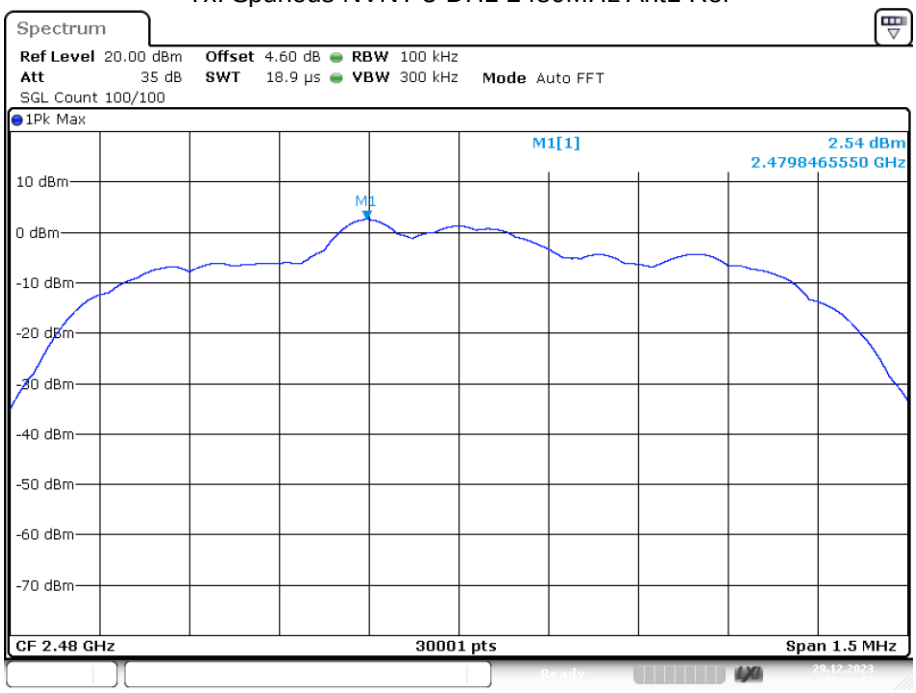


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4409 GHz	0.14 dBm		
M2		1	6.271626 GHz	-35.62 dBm		
M3		1	5.043418 GHz	-37.43 dBm		
M4		1	7.298662 GHz	-40.42 dBm		
M5		1	9.877722 GHz	-39.25 dBm		

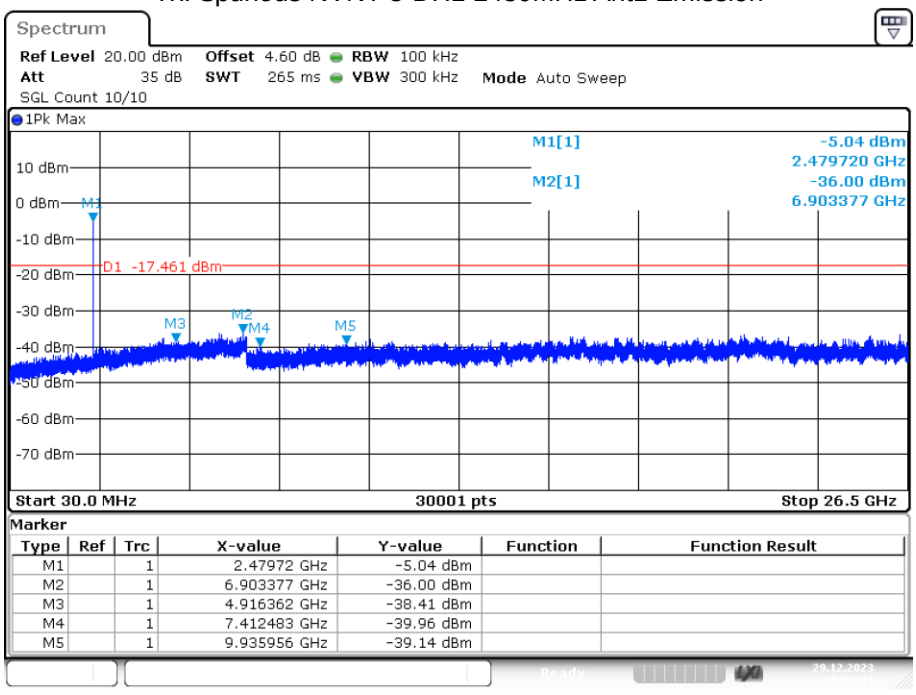
Date: 29.DEC.2023 10:31:14

Tx. Spurious NVNT 3-DH1 2480MHz Ant1 Ref



Date: 29.DEC.2023 10:32:57

Tx. Spurious NVNT 3-DH1 2480MHz Ant1 Emission



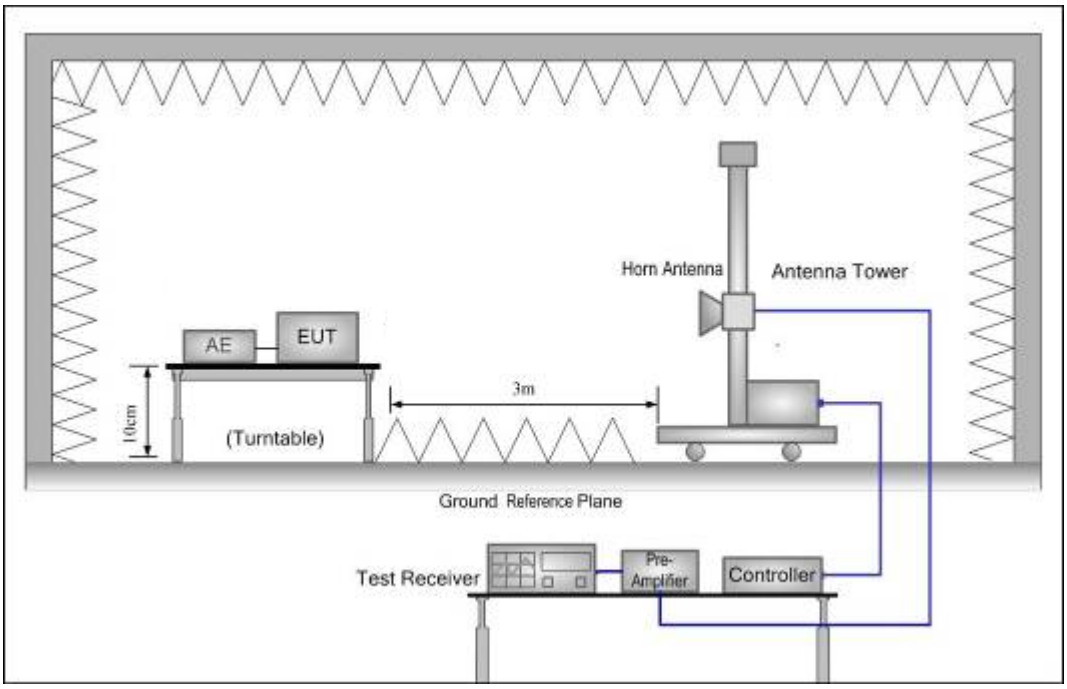
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47972 GHz	-5.04 dBm		
M2		1	6.903377 GHz	-36.00 dBm		
M3		1	4.916362 GHz	-38.41 dBm		
M4		1	7.412483 GHz	-39.96 dBm		
M5		1	9.935956 GHz	-39.14 dBm		

Date: 29.DEC.2023 10:33:11

9. BAND EDGE COMPLIANCE

9.1. Block Diagram of Test Setup



9.2. Limit

All the lower and upper band-edges emissions appearing within restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

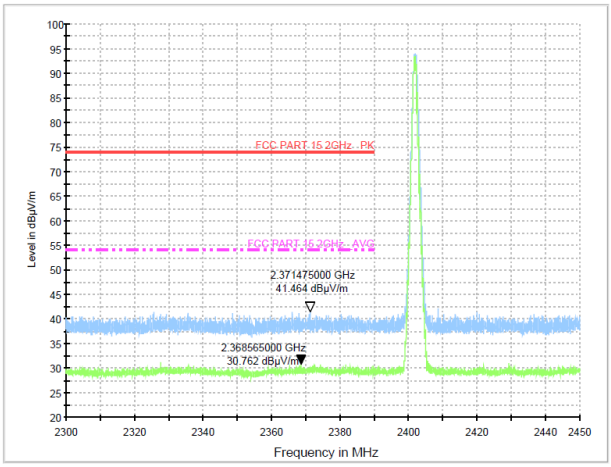
9.3. Test Procedure

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

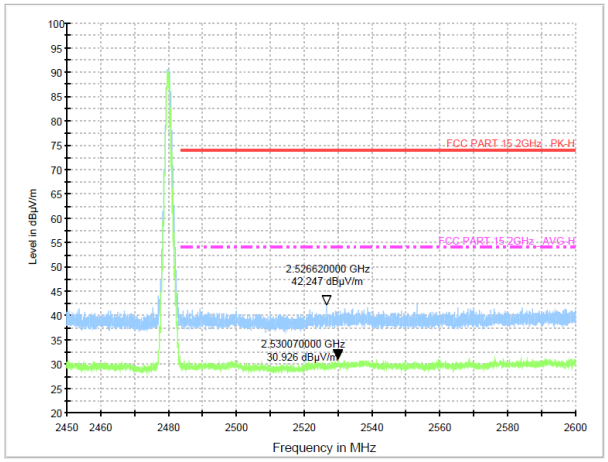
9.4. Test Result

PASS. (See below detailed test data)

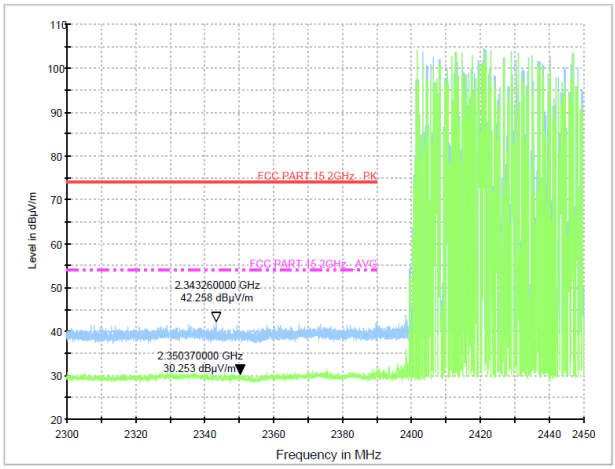
Test Mode: GFSK-Low Hopping-off



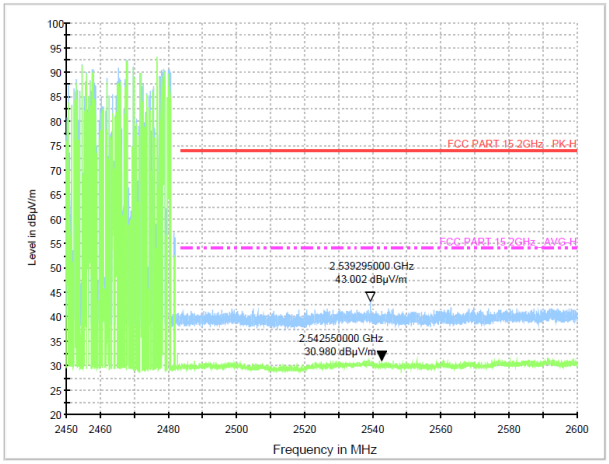
Test Mode: GFSK-High Hopping-off



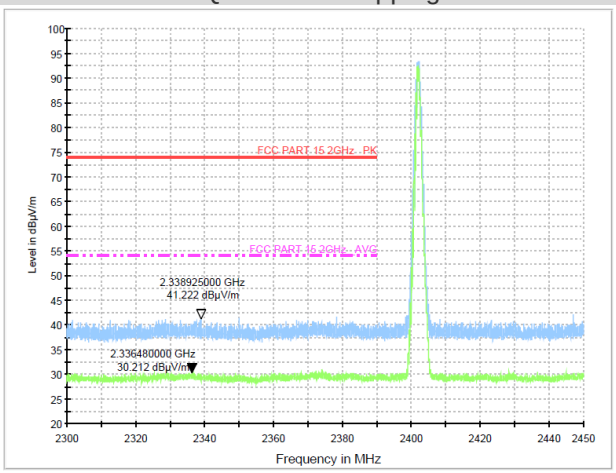
Test Mode: GFSK-Low Hopping-on



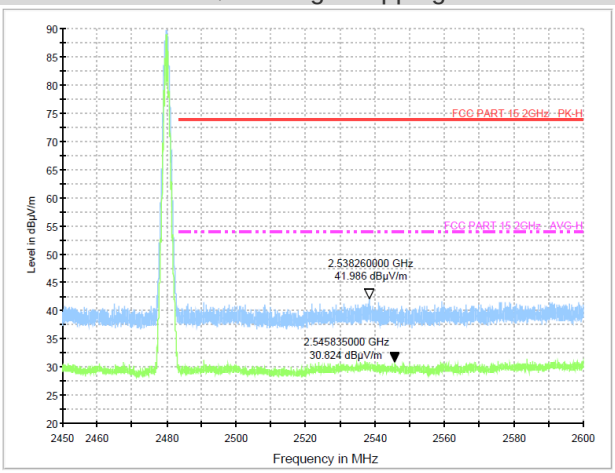
Test Mode: GFSK-High Hopping-on



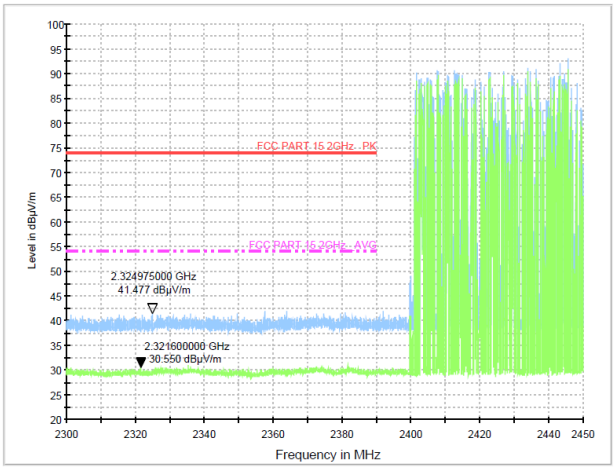
Test Mode: π/4 DQPSK-Low Hopping-off



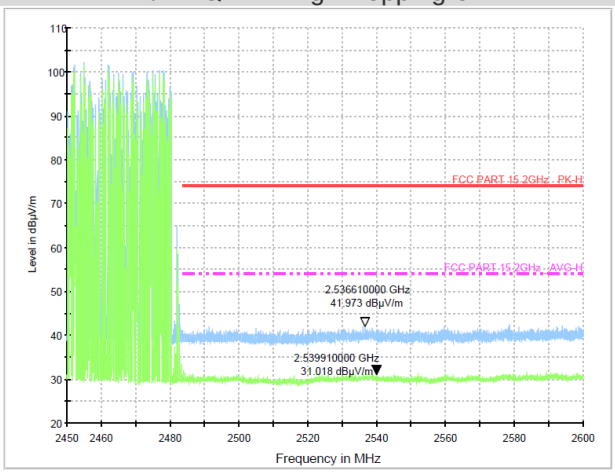
Test Mode: π/4 DQPSK-High Hopping-off



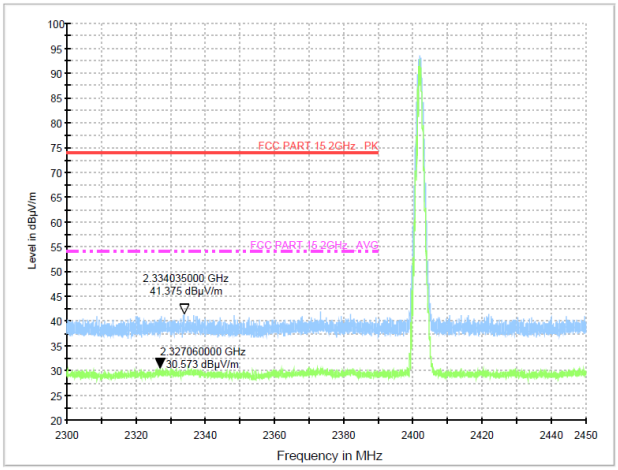
Test Mode: π/4 DQPSK-Low Hopping-on



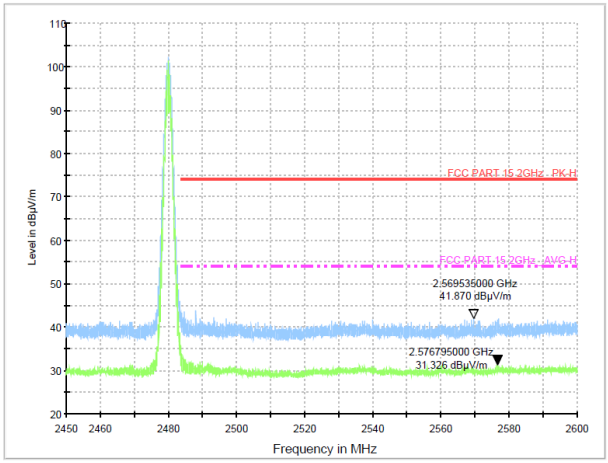
Test Mode: π/4 DQPSK-High Hopping-on



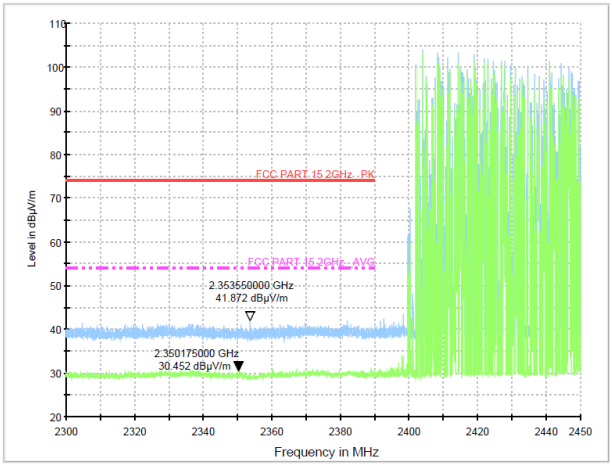
Test Mode: 8DPSK-Low Hopping-off



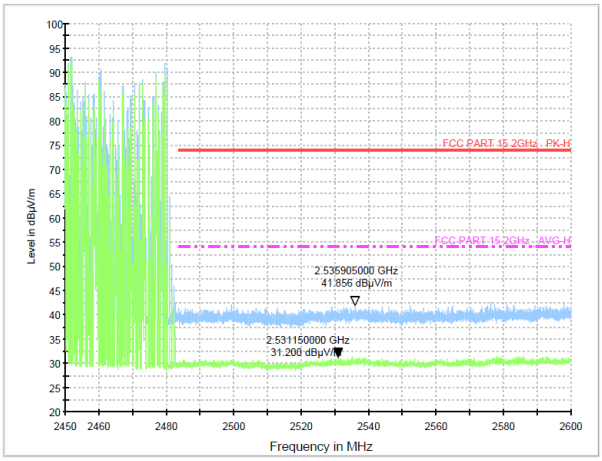
Test Mode: 8DPSK-High Hopping-off



Test Mode: 8DPSK-Low Hopping-on

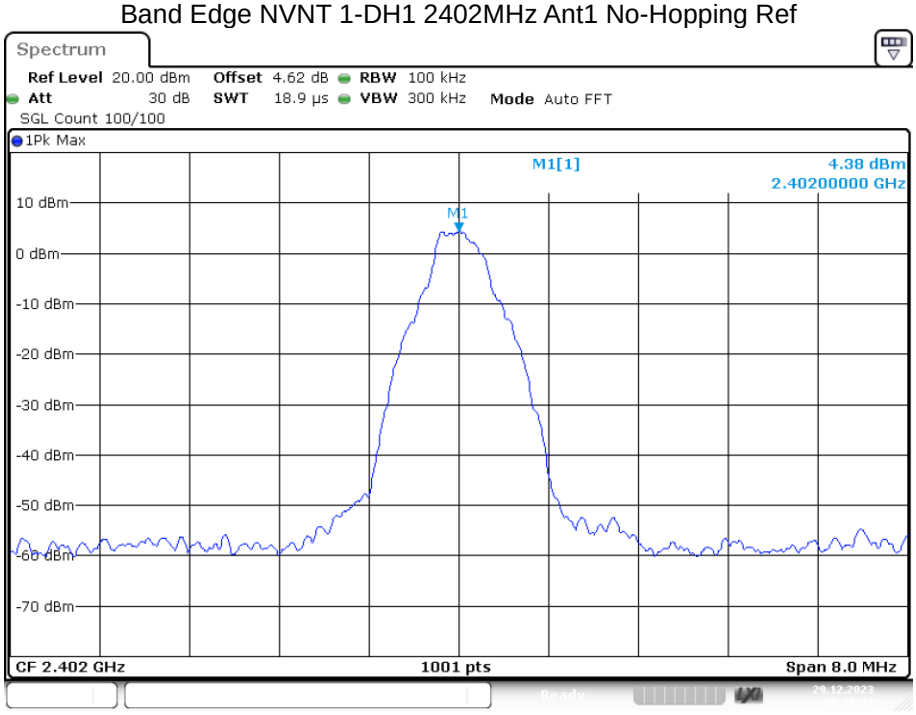


Test Mode: 8DPSK-High Hopping-on



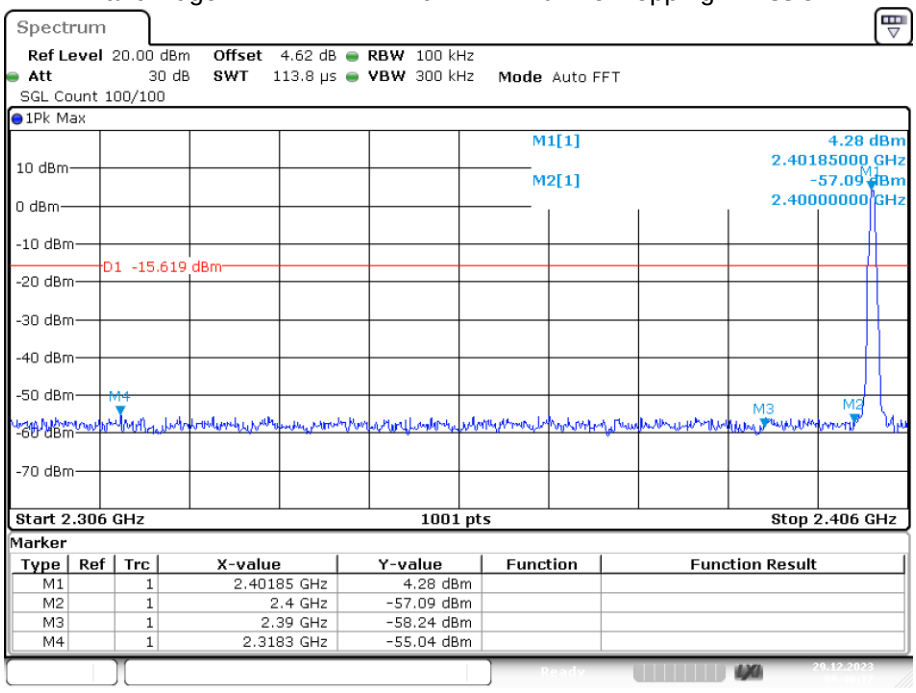
Conducted Method
Band Edge:

Band Edge NVNT 1-DH1 2402MHz Ant1 No-Hopping Ref



Date: 29.DEC.2023 09:40:11

Band Edge NVNT 1-DH1 2402MHz Ant1 No-Hopping Emission

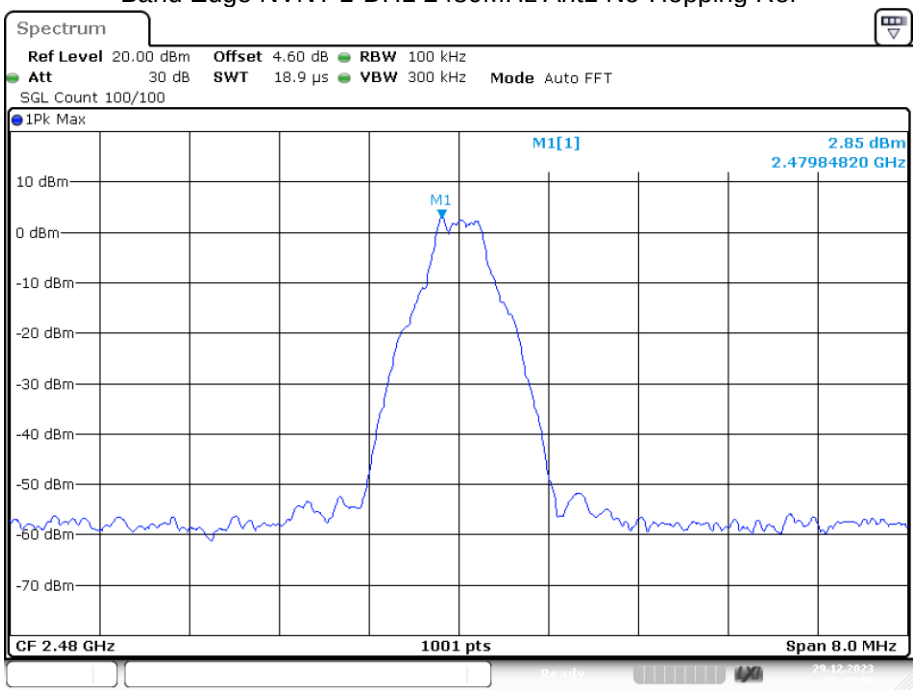


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40185 GHz	4.28 dBm		
M2		1	2.4 GHz	-57.09 dBm		
M3		1	2.39 GHz	-58.24 dBm		
M4		1	2.3183 GHz	-55.04 dBm		

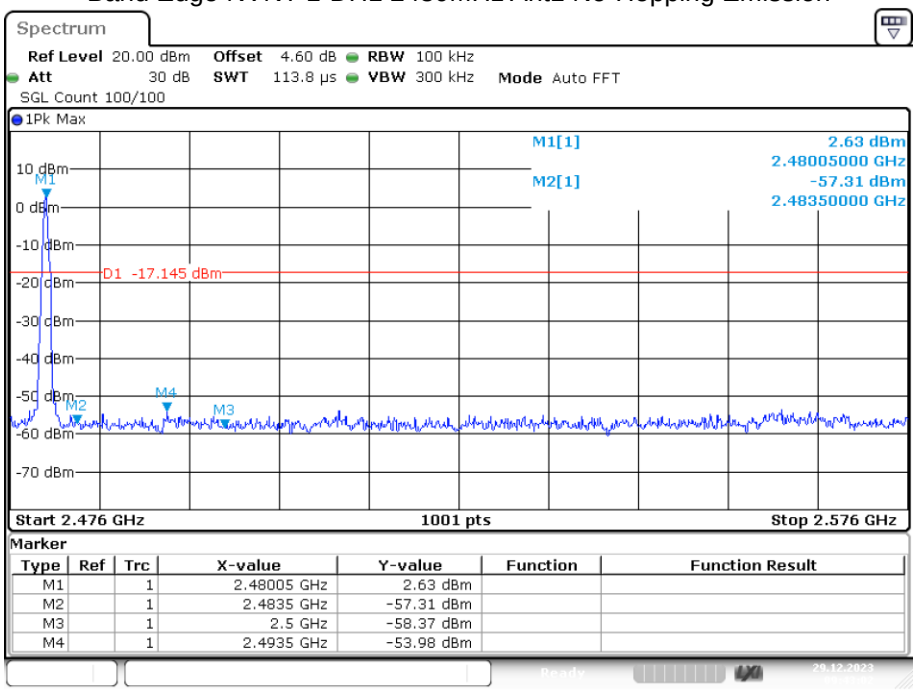
Date: 29.DEC.2023 09:40:17

Band Edge NVNT 1-DH1 2480MHz Ant1 No-Hopping Ref



Date: 29.DEC.2023 09:42:55

Band Edge NVNT 1-DH1 2480MHz Ant1 No-Hopping Emission

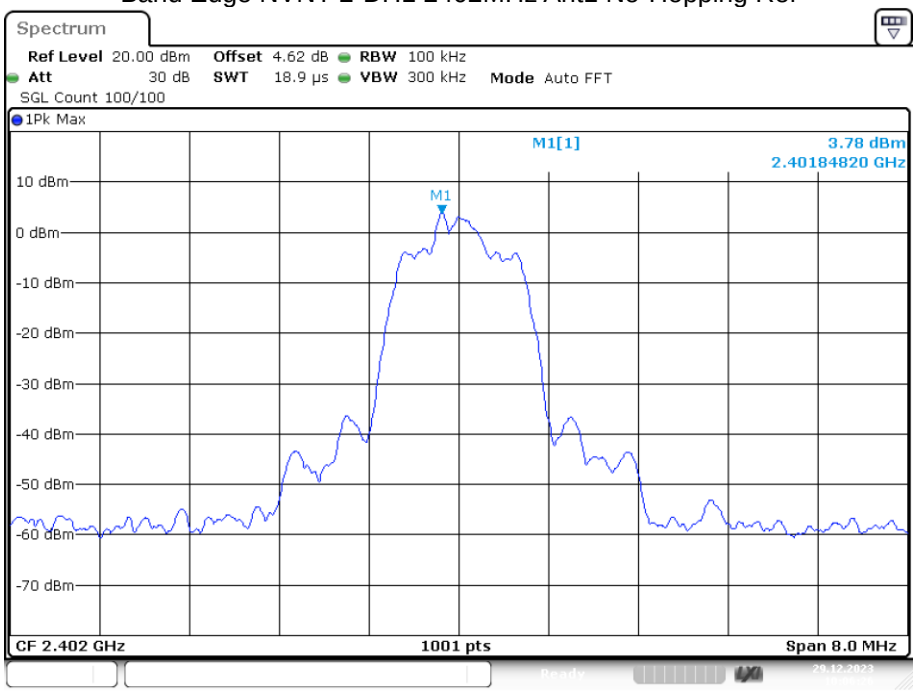


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.48005 GHz	2.63 dBm		
M2		1	2.4835 GHz	-57.31 dBm		
M3		1	2.5 GHz	-58.37 dBm		
M4		1	2.4935 GHz	-53.98 dBm		

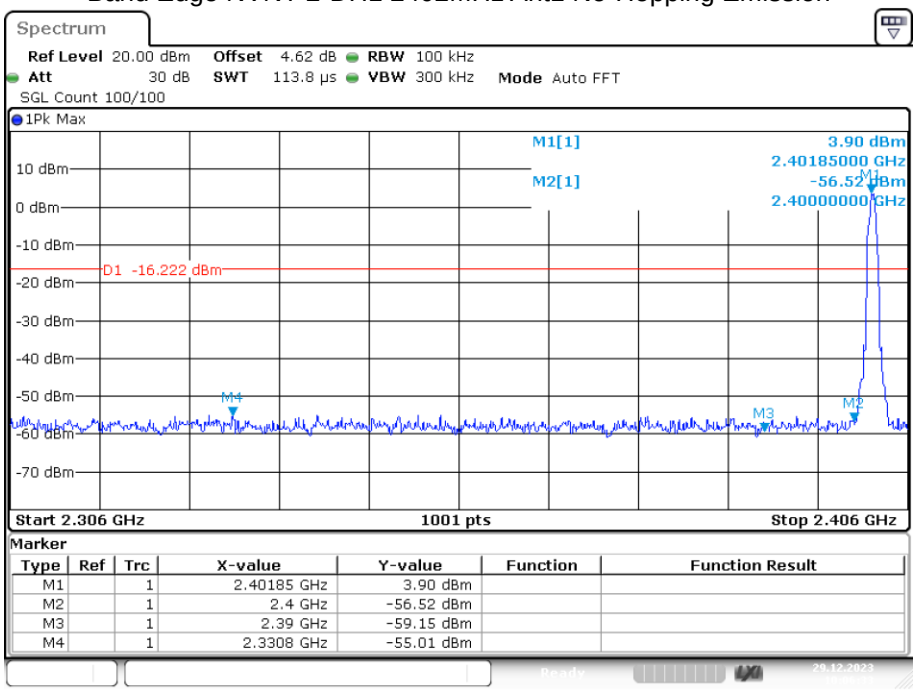
Date: 29.DEC.2023 09:43:01

Band Edge NVNT 2-DH1 2402MHz Ant1 No-Hopping Ref



Date: 29.DEC.2023 10:06:27

Band Edge NVNT 2-DH1 2402MHz Ant1 No-Hopping Emission

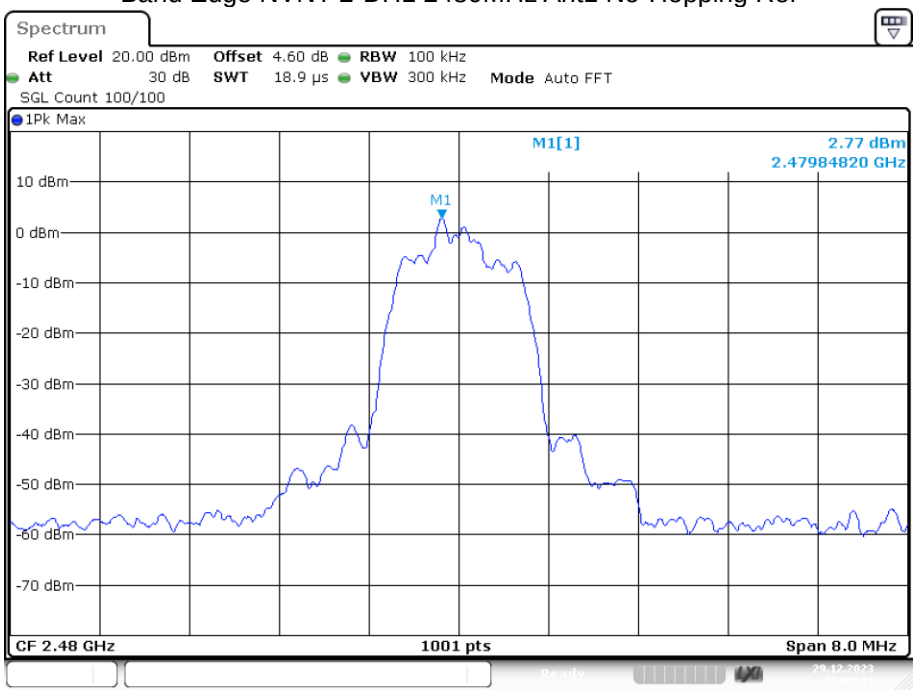


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40185 GHz	3.90 dBm		
M2		1	2.4 GHz	-56.52 dBm		
M3		1	2.39 GHz	-59.15 dBm		
M4		1	2.3308 GHz	-55.01 dBm		

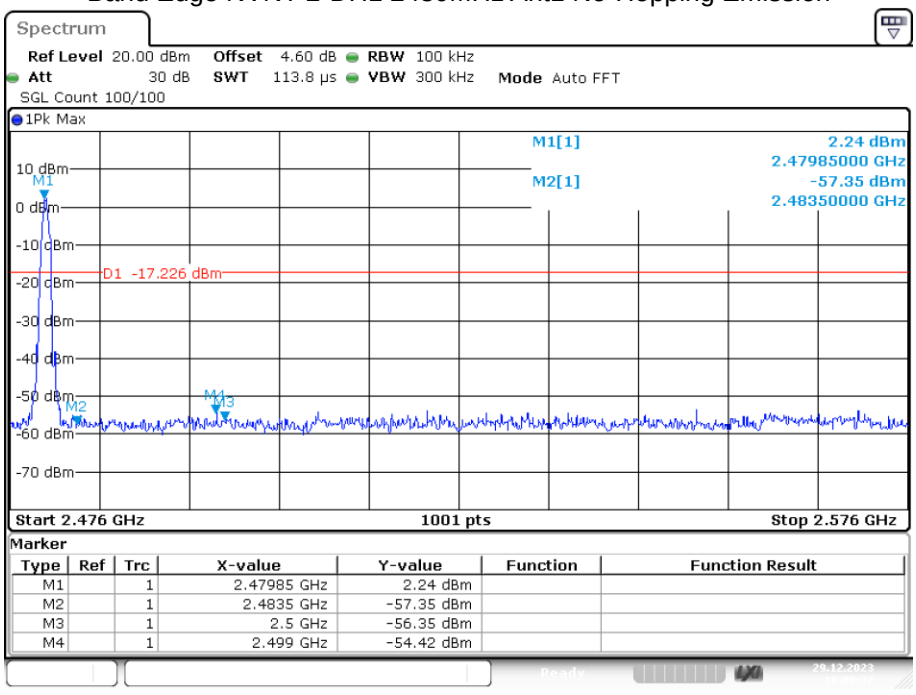
Date: 29.DEC.2023 10:06:32

Band Edge NVNT 2-DH1 2480MHz Ant1 No-Hopping Ref



Date: 29.DEC.2023 10:09:32

Band Edge NVNT 2-DH1 2480MHz Ant1 No-Hopping Emission



Marker

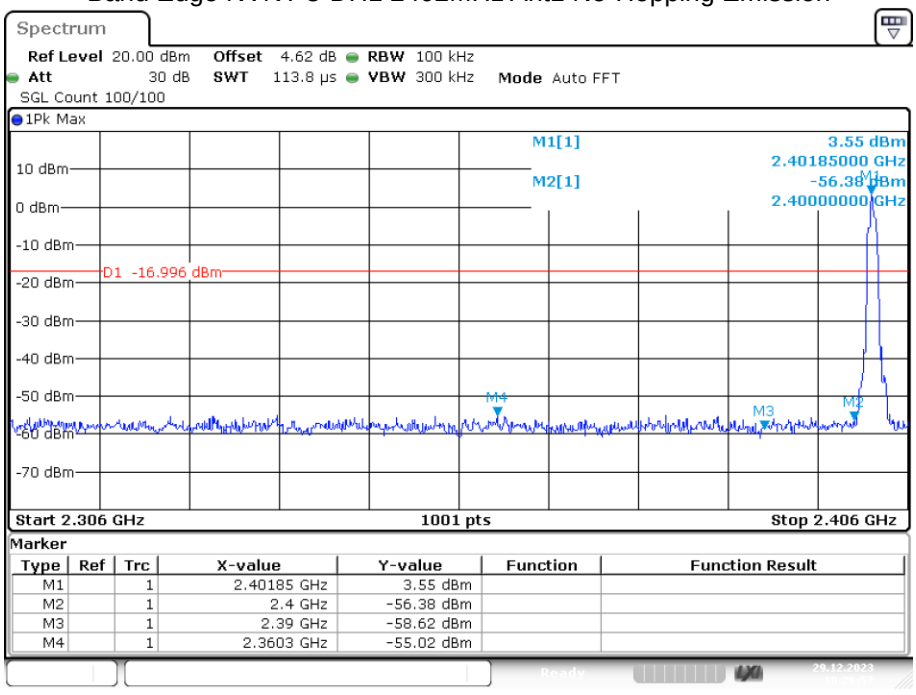
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47985 GHz	2.24 dBm		
M2		1	2.4835 GHz	-57.35 dBm		
M3		1	2.5 GHz	-56.35 dBm		
M4		1	2.499 GHz	-54.42 dBm		

Date: 29.DEC.2023 10:09:37

Band Edge NVNT 3-DH1 2402MHz Ant1 No-Hopping Ref

Date: 29.DEC.2023 10:26:51

Band Edge NVNT 3-DH1 2402MHz Ant1 No-Hopping Emission

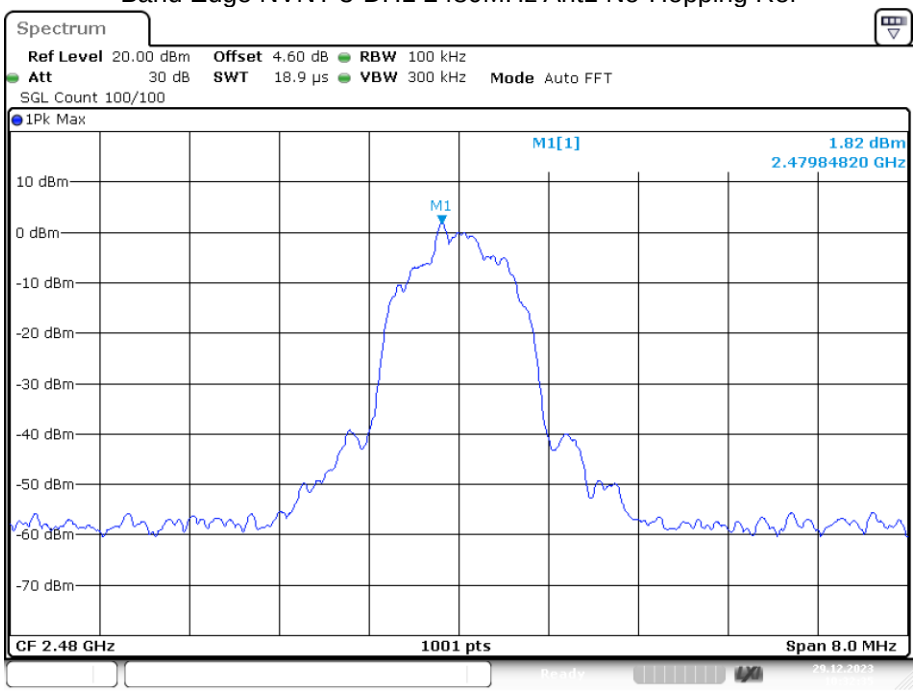


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40185 GHz	3.55 dBm		
M2		1	2.4 GHz	-56.38 dBm		
M3		1	2.39 GHz	-58.62 dBm		
M4		1	2.3603 GHz	-55.02 dBm		

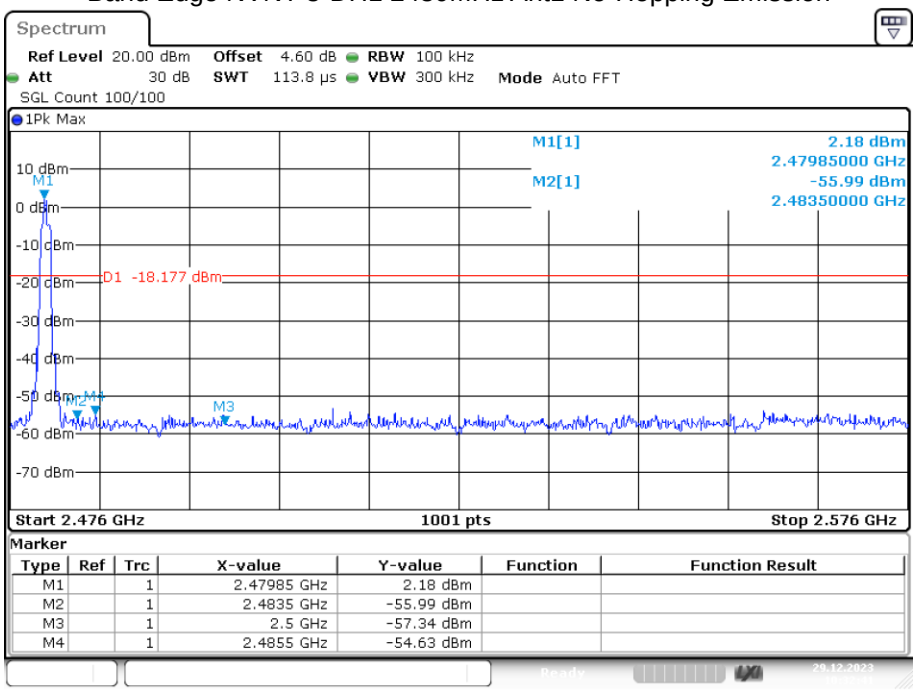
Date: 29.DEC.2023 10:26:57

Band Edge NVNT 3-DH1 2480MHz Ant1 No-Hopping Ref



Date: 29.DEC.2023 10:32:35

Band Edge NVNT 3-DH1 2480MHz Ant1 No-Hopping Emission

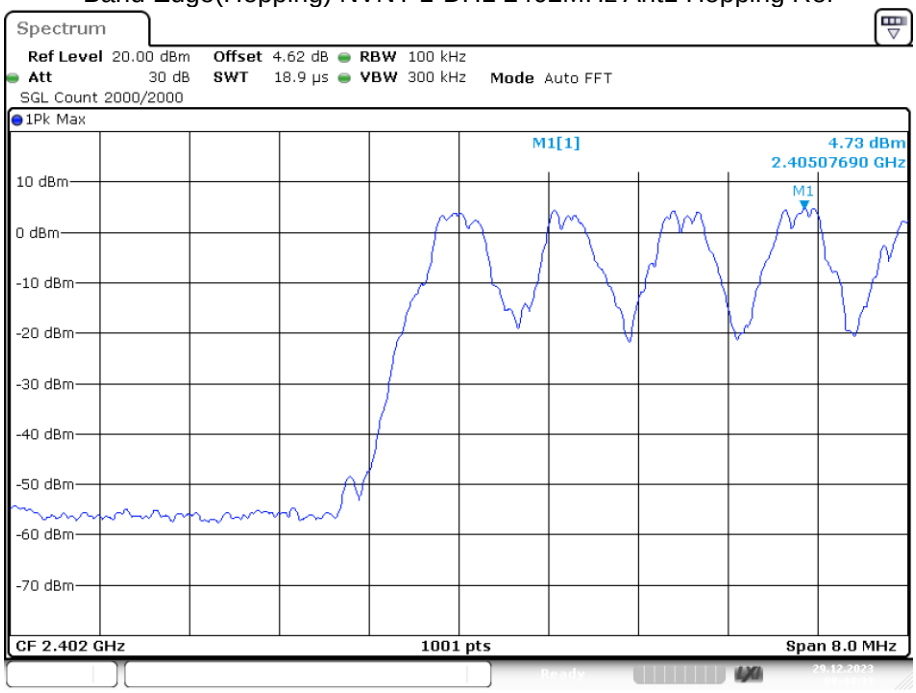


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47985 GHz	2.18 dBm		
M2		1	2.4835 GHz	-55.99 dBm		
M3		1	2.5 GHz	-57.34 dBm		
M4		1	2.4855 GHz	-54.63 dBm		

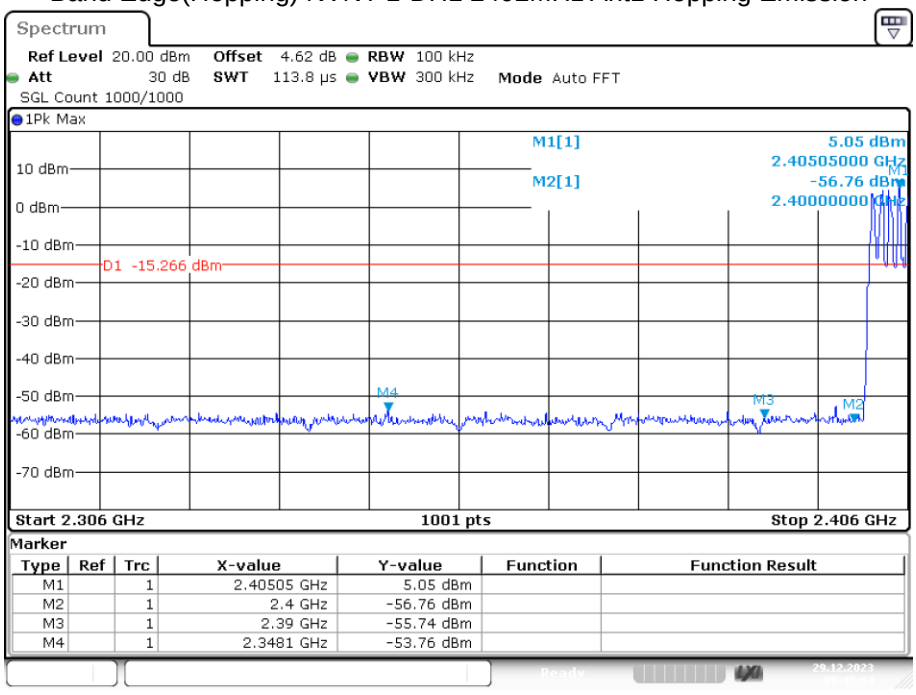
Date: 29.DEC.2023 10:32:41

Band Edge(Hopping) NVNT 1-DH1 2402MHz Ant1 Hopping Ref



Date: 29.DEC.2023 09:44:33

Band Edge(Hopping) NVNT 1-DH1 2402MHz Ant1 Hopping Emission

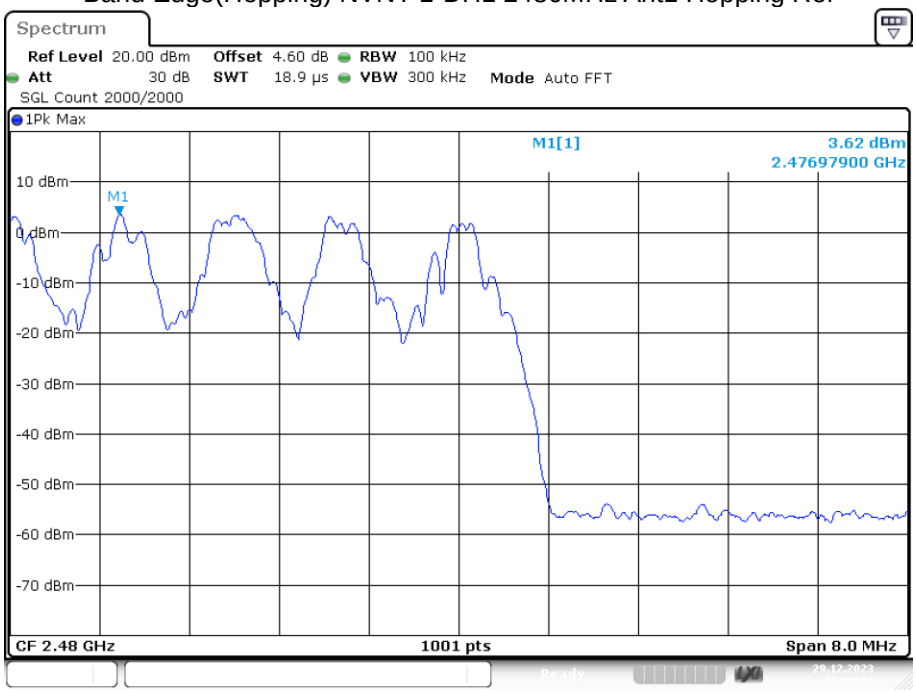


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40505 GHz	5.05 dBm		
M2		1	2.4 GHz	-56.76 dBm		
M3		1	2.39 GHz	-55.74 dBm		
M4		1	2.3481 GHz	-53.76 dBm		

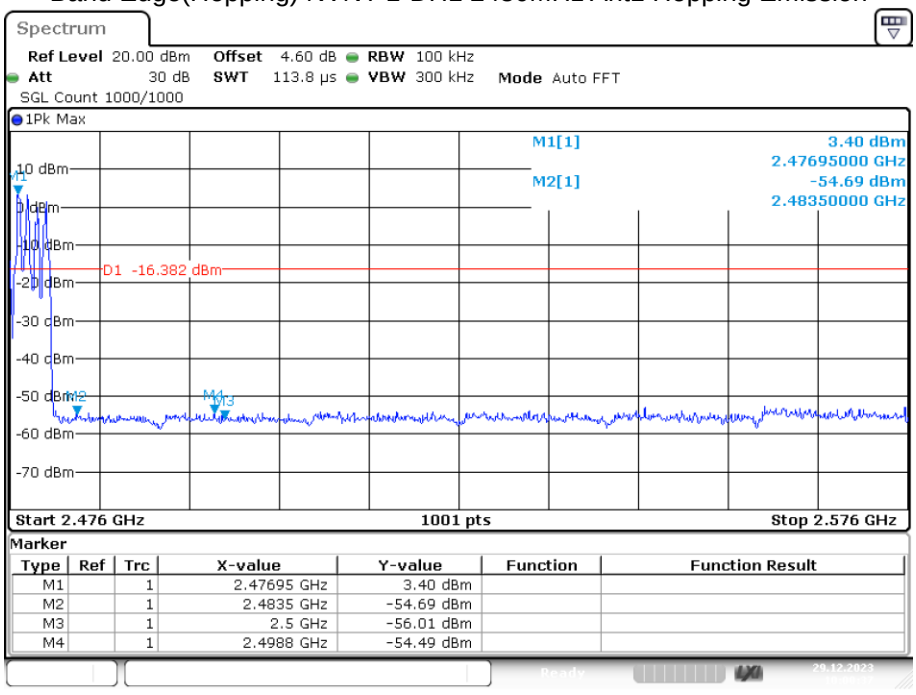
Date: 29.DEC.2023 09:45:04

Band Edge(Hopping) NVNT 1-DH1 2480MHz Ant1 Hopping Ref



Date: 29.DEC.2023 10:00:08

Band Edge(Hopping) NVNT 1-DH1 2480MHz Ant1 Hopping Emission

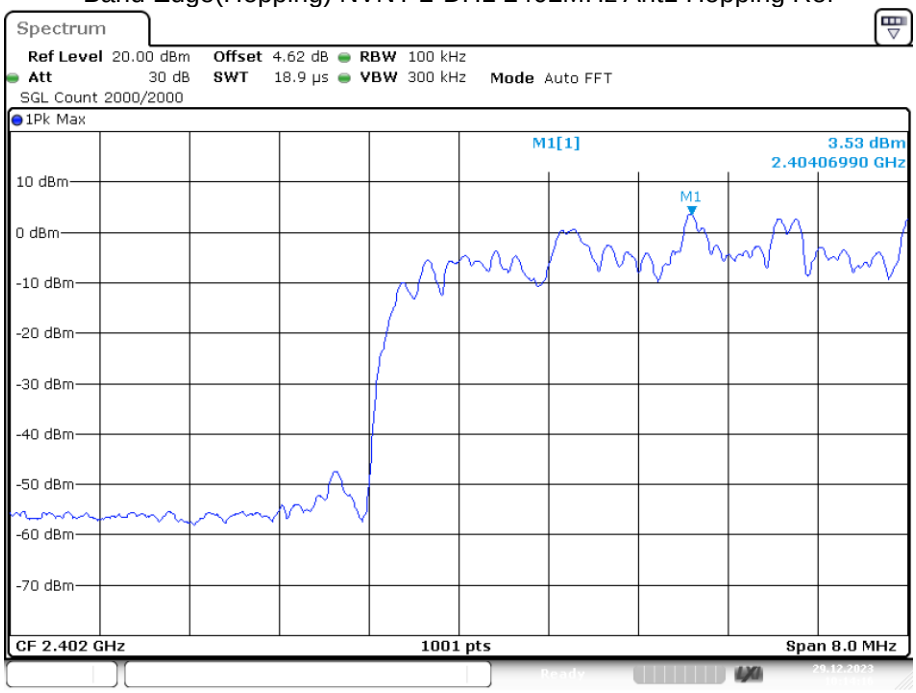


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47695 GHz	3.40 dBm		
M2		1	2.4835 GHz	-54.69 dBm		
M3		1	2.5 GHz	-56.01 dBm		
M4		1	2.4988 GHz	-54.49 dBm		

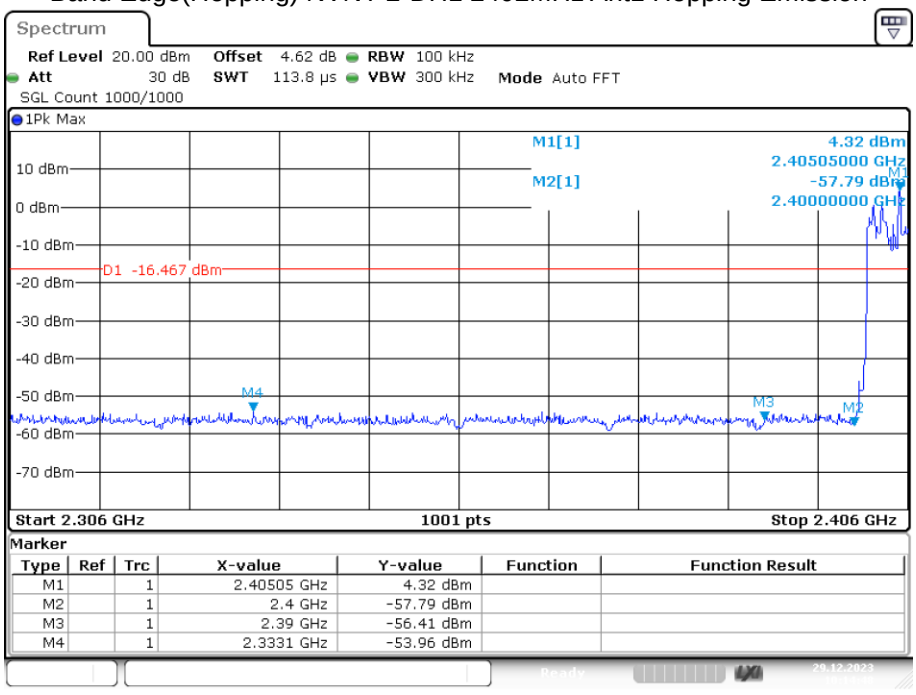
Date: 29.DEC.2023 10:00:37

Band Edge(Hopping) NVNT 2-DH1 2402MHz Ant1 Hopping Ref



Date: 29.DEC.2023 10:14:17

Band Edge(Hopping) NVNT 2-DH1 2402MHz Ant1 Hopping Emission



Marker

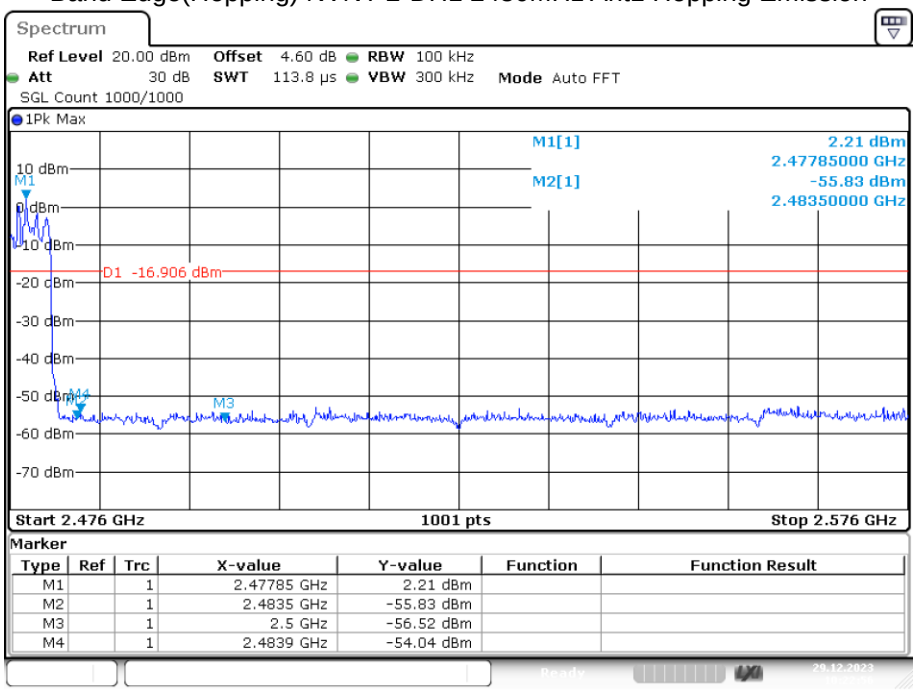
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40505 GHz	4.32 dBm		
M2		1	2.4 GHz	-57.79 dBm		
M3		1	2.39 GHz	-56.41 dBm		
M4		1	2.3331 GHz	-53.96 dBm		

Date: 29.DEC.2023 10:14:48

Band Edge(Hopping) NVNT 2-DH1 2480MHz Ant1 Hopping Ref

Date: 29.DEC.2023 10:22:27

Band Edge(Hopping) NVNT 2-DH1 2480MHz Ant1 Hopping Emission



Marker

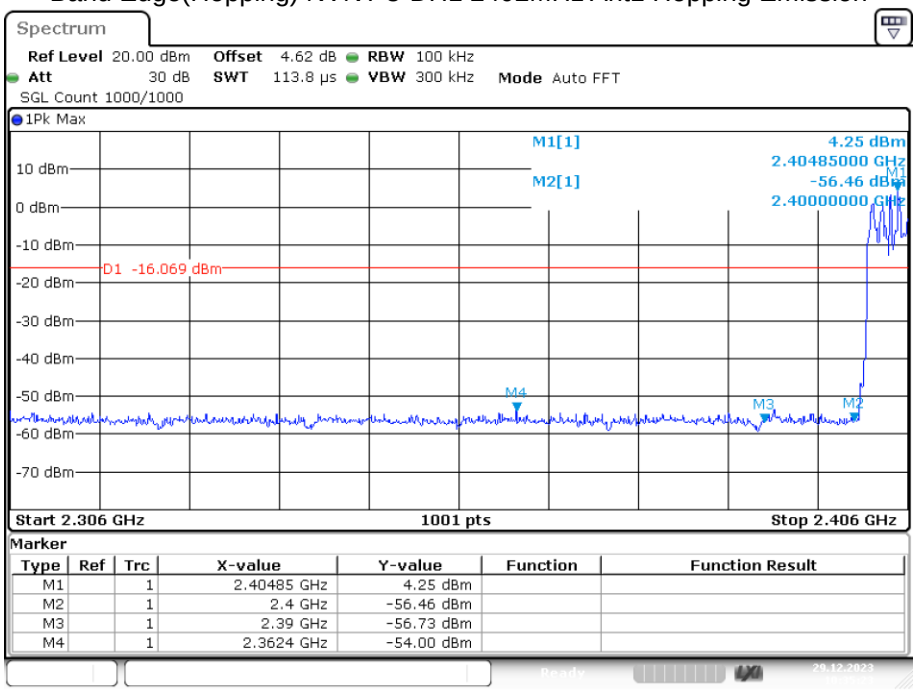
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47785 GHz	2.21 dBm		
M2		1	2.4835 GHz	-55.83 dBm		
M3		1	2.5 GHz	-56.52 dBm		
M4		1	2.4839 GHz	-54.04 dBm		

Date: 29.DEC.2023 10:22:56

Band Edge(Hopping) NVNT 3-DH1 2402MHz Ant1 Hopping Ref

Date: 29.DEC.2023 10:34:53

Band Edge(Hopping) NVNT 3-DH1 2402MHz Ant1 Hopping Emission



Marker

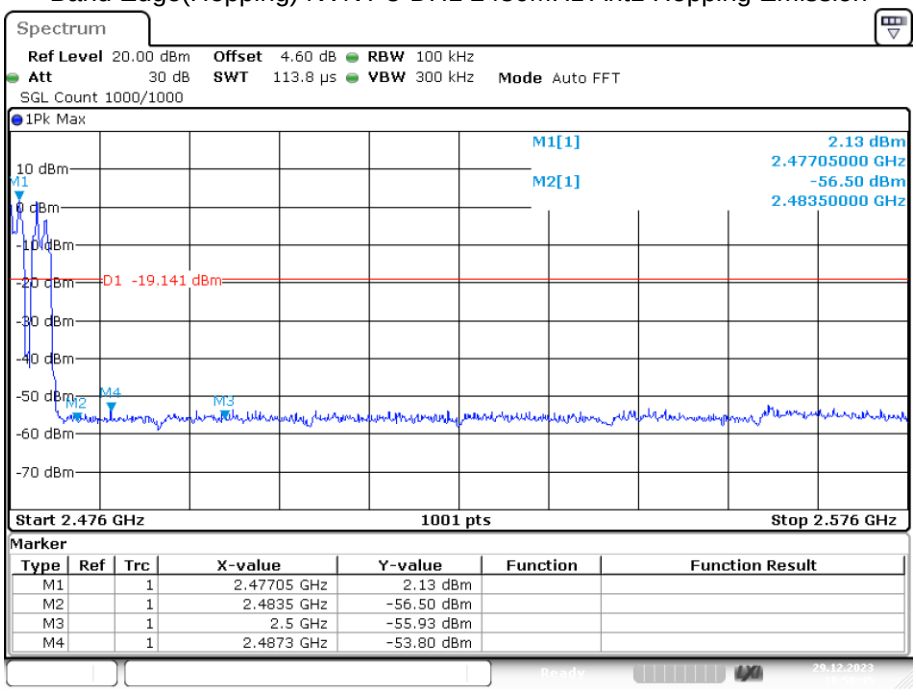
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40485 GHz	4.25 dBm		
M2		1	2.4 GHz	-56.46 dBm		
M3		1	2.39 GHz	-56.73 dBm		
M4		1	2.3624 GHz	-54.00 dBm		

Date: 29.DEC.2023 10:35:23

Band Edge(Hopping) NVNT 3-DH1 2480MHz Ant1 Hopping Ref

Date: 29.DEC.2023 10:50:17

Band Edge(Hopping) NVNT 3-DH1 2480MHz Ant1 Hopping Emission



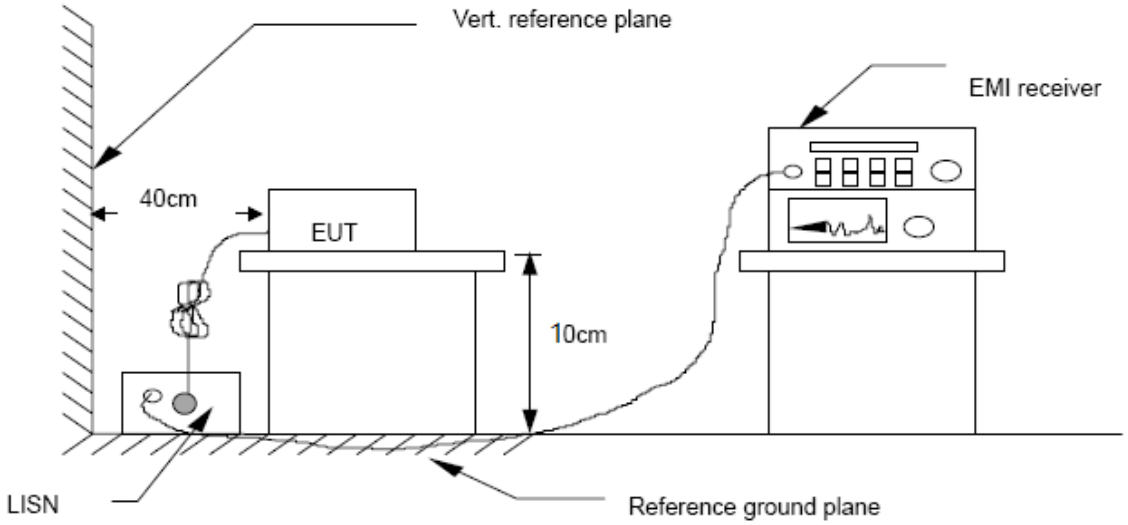
Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47705 GHz	2.13 dBm		
M2		1	2.4835 GHz	-56.50 dBm		
M3		1	2.5 GHz	-55.93 dBm		
M4		1	2.4873 GHz	-53.80 dBm		

Date: 29.DEC.2023 10:50:45

10. POWER LINE CONDUCTED EMISSIONS

10.1.Block Diagram of Test Setup



10.2.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.

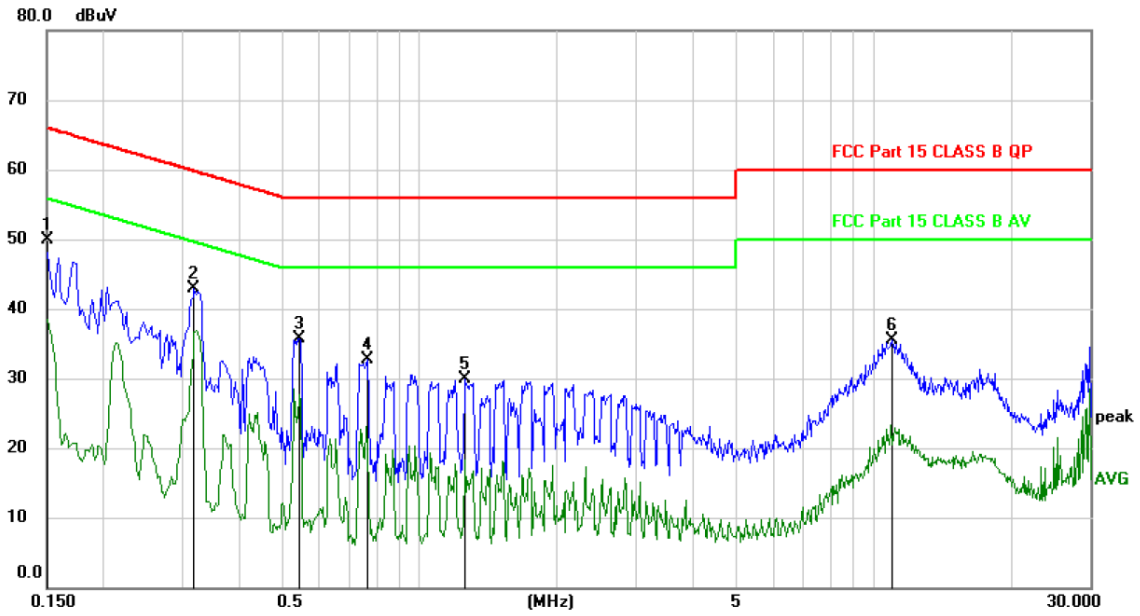
10.3.Test Procedure

(1) The EUT was placed on a non-metallic table, 10cm 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.

10.4.Test Result

PASS. (See below detailed test data)
Note: If peak Result comply with AV limit, QP and AV Result is deemed to comply with AV limit

Line:

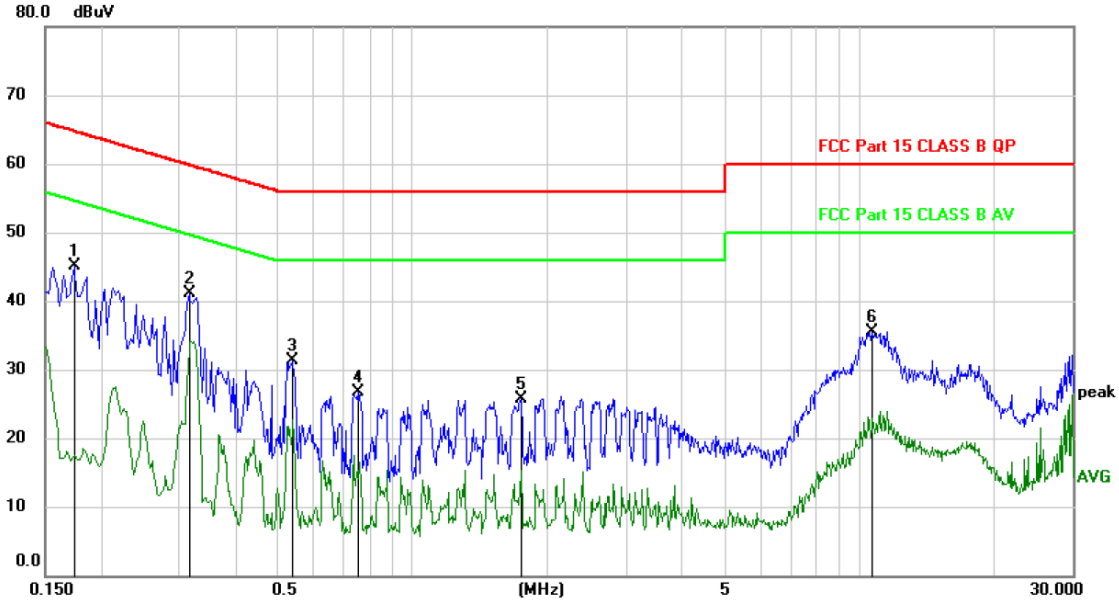


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.1500	39.90	9.94	49.84	66.00	-16.16	peak	
2		0.3180	32.96	9.93	42.89	59.76	-16.87	peak	
3		0.5429	25.83	9.94	35.77	56.00	-20.23	peak	
4		0.7650	22.72	9.94	32.66	56.00	-23.34	peak	
5		1.2570	20.07	9.89	29.96	56.00	-26.04	peak	
6		10.9950	25.30	10.23	35.53	60.00	-24.47	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Neutral:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1740	35.21	9.93	45.14	64.77	-19.63	peak	
2	*	0.3150	31.15	9.93	41.08	59.84	-18.76	peak	
3		0.5370	21.31	9.95	31.26	56.00	-24.74	peak	
4		0.7560	16.82	9.94	26.76	56.00	-29.24	peak	
5		1.7490	15.84	9.88	25.72	56.00	-30.28	peak	
6		10.6590	25.24	10.23	35.47	60.00	-24.53	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Note: 1. Both adapters have been tested and only the worst data is displayed. (Adapter Model: SOY-2400625-094-A)
2. All modes and channels have been tested and only the GFSK 2402MHz mode with the worst data is listed.

11. ANTENNA REQUIREMENTS

11.1.Limit

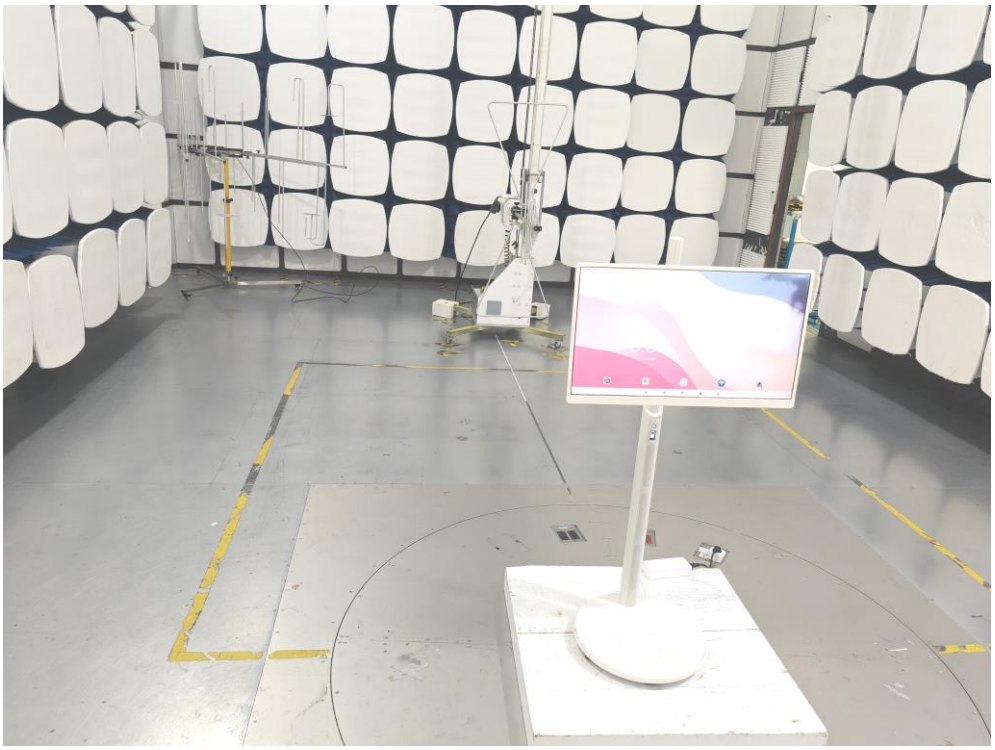
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional 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.

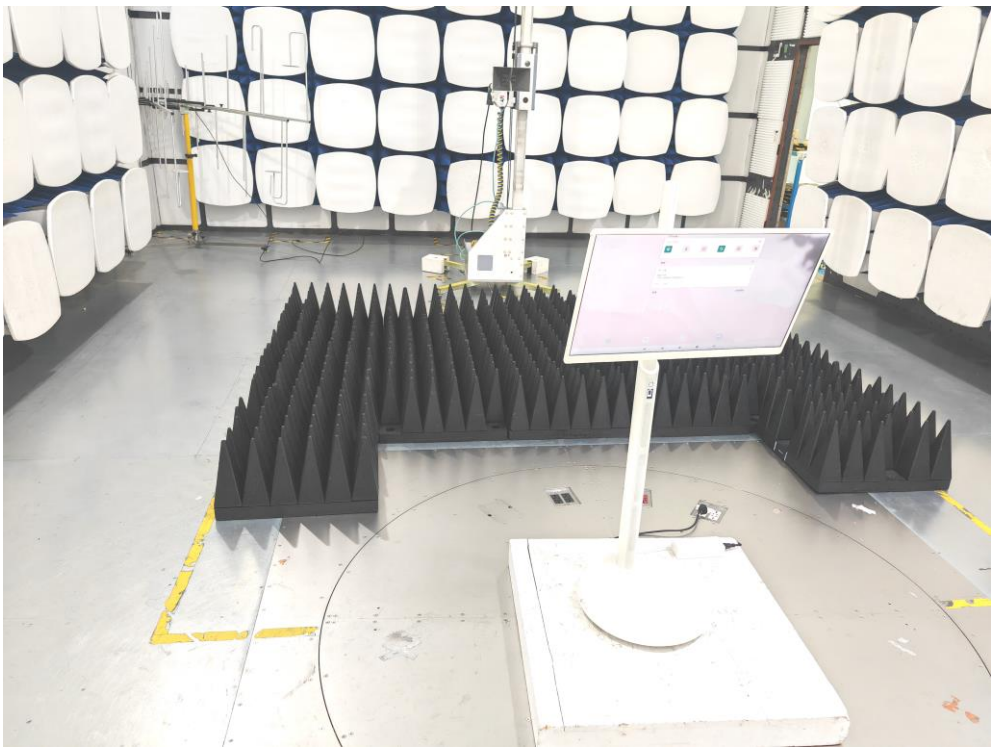
11.2.Result

The use of an antenna that is uniquely coupled to the intended radiator shall be considered sufficient to comply with the provisions of this section.

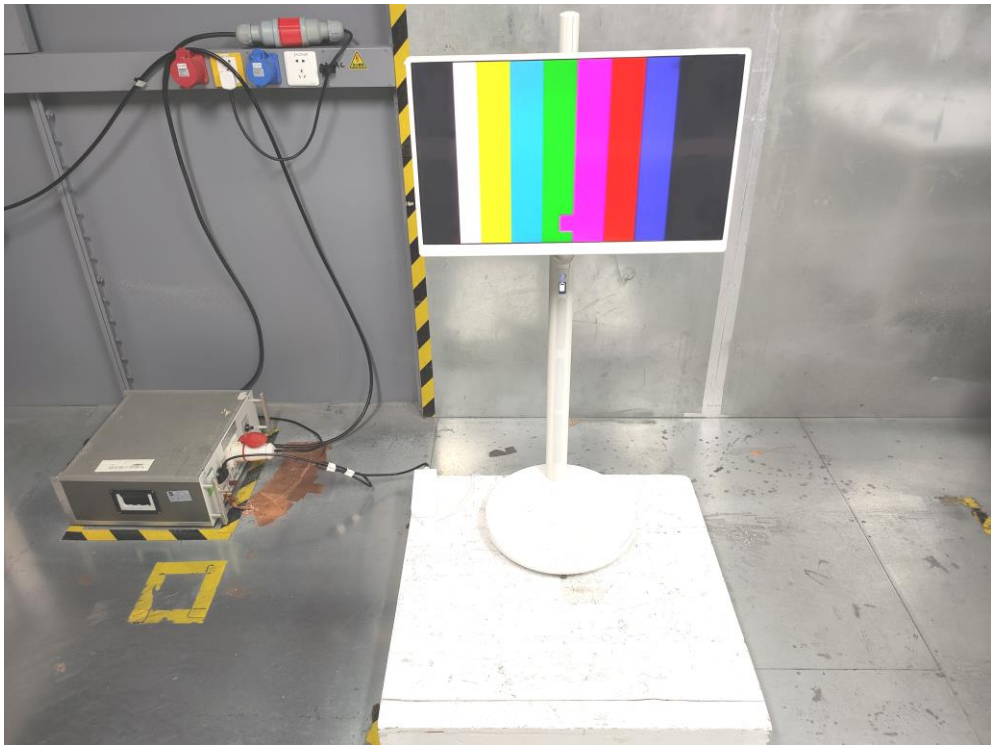
12. TEST SETUP PHOTO

12.1.Photo of Radiated Emission test





12.2.Photo of Conducted Emission test



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