TEST REPORT

Report No.:	BCTC2307991182E
Applicant:	DP AUDIO VIDEO LLC
Product Name:	Karaoke Microphone
Model/Type reference:	PKMC500
Tested Date:	2023-07-19 to 2023-08-02
Issued Date:	2023-08-02

Shenzhen BCTC Testing Co., Ltd.

FCC ID:2AVRVPKMC500

Product Name:	Karaoke Microphone
Trademark:	Packed Party
Model/Type Reference:	PKMC500 PKMC500ST, PKMC500LP
Prepared For:	DP AUDIO VIDEO LLC
Address:	920 Malcolm Ave Los Angeles, California, USA 90024
Manufacturer:	GUANGDONG KAIGE TECHNOLOGY CO., LTD
Address:	XiuShui Road, Laimei Industrial Park, Fengxiang Street, Chenghai District, Shantou, Guangdong, China
Prepared By:	Shenzhen BCTC Testing Co., Ltd.
Address:	1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date:	2023-07-19
Sample tested Date:	2023-07-19 to 2023-08-02
Issue Date:	2023-08-02
Report No.:	BCTC2307991182E
Test Standards	FCC Part15.247 ANSI C63.10-2013
Test Results	PASS
Remark:	This is Bluetooth Classic radio test report.

Tested by:	Approved by:
Jeff.Fu/Project Handler	Zero Zhou/Reviewer

Table Of Content

(Note: N/A Means Not Applicable)

1. Version

Report No.	Issue Date	Description	Approved
BCTC2307991182E	2023-08-02	Original	Valid

2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No	Results
1	Conducted emission AC power port	§15.207	PASS
2	Conducted peak output power for FHSS	§15.247(b)(1)	PASS
3	20dB Occupied bandwidth	§15.247(a)(1)	PASS
4	Hopping channel separation	§15.247(a)(1)	PASS
5	Number of hopping frequencies	§15.247(a)(1)(iii)	PASS
6	Dwell Time	§15.247(a)(1)(iii)	PASS
7	Spurious RF conducted emissions	§15.247(d)	PASS
8	Band edge	§15.247(d)	PASS
9	Spurious radiated emissions for transmitter	§15.247(d) & §15.209 & §15.205	PASS
10	Antenna Requirement	15.203	PASS

3. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Uncertainty
1	3m chamber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
2	3m chamber Radiated spurious emission(9KHz-30MHz)	U=3.7dB
3	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
4	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
5	Conducted Emission (150kHz-30MHz)	U=3.20dB
6	Conducted Adjacent channel power	U=1.38dB
7	Conducted output power uncertainty Above 1G	U=1.576dB
8	Conducted output power uncertainty below 1G	U=1.28dB
9	humidity uncertainty	U=5.3%
10	Temperature uncertainty	U=0.59℃

4. Product Information And Test Setup

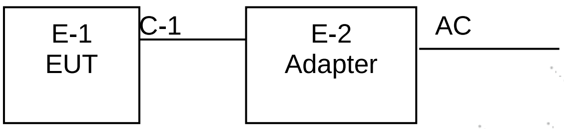
4.1 Product Information

Model/Type reference:	PKMC500 PKMC500ST, PKMC500LP
Model differences:	All the model are the same circuit and RF module, except model names.
Bluetooth Version:	5.3
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	2402-2480MHz
Type of Modulation:	GFSK, π/ 4 DQPSK, 8DPSK
Number Of Channel	79CH
Antenna installation:	PCB antenna
Antenna Gain:	-0.58 dBi
Ratings:	USB: DC 5V Battery: DC 3.7V

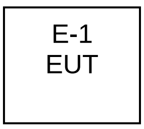
4.2 Test Setup Configuration

See test photographs attached in *EUT TEST SETUP PHOTOGRAPHS* for the actual connections between Product and support equipment.

Conducted Emission:



Radiated Spurious Emission



4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
E-1	Karaoke Microphone	Packed Party	PKMC500	N/A	EUT
E-2	Adapter	N/A	CD122	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note
C-1	N/A	N/A	0.5M	DC cable unshielded

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

4.4 Channel List

CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)	CH	Frequency (MHz)
0	2402	1	2403	2	2404	3	2405
4	2406	5	2407	6	2408	7	2409
8	2410	9	2411	10	2412	11	2413
12	2414	13	2415	14	2416	15	2417
16	2418	17	2419	18	2420	19	2421
20	2422	21	2423	22	2424	23	2425
24	2426	25	2427	26	2428	27	2429
28	2430	29	2431	30	2432	31	2433
32	2434	33	2435	34	2436	35	2437
36	2438	37	2439	38	2440	39	2441
40	2442	41	2443	42	2444	43	2445
44	2446	45	2447	46	2448	47	2449
48	2450	49	2451	50	2452	51	2453
52	2454	53	2455	54	2456	55	2457
56	2458	57	2459	58	2460	59	2461
60	2462	61	2463	62	2464	63	2465
64	2466	65	2467	66	2468	67	2469
68	2470	69	2471	70	2472	71	2473
72	2474	73	2475	74	2476	75	2477
76	2478	77	2479	78	2480	79	/

4.5 Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Test Mode	Test mode	Low channel	Middle channel	High channel
1	Transmitting(GFSK)	2402MHz	2441MHz	2480MHz
2	Transmitting(π/ 4 DQPSK)	2402MHz	2441MHz	2480MHz
3	Transmitting(8DPSK)	2402MHz	2441MHz	2480MHz
4	Transmitting (Conducted emission & Radiated emission)			

Note:
(1) The measurements are performed at the highest, middle, lowest available channels.
(2) Fully-charged battery is used during the test

4.6 Table Of Parameters Of Text Software Setting

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters

Test software Version	FCC_assist_1.0.2.2		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters	DEF	DEF	DEF

5. Test Facility And Test Instrument Used

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. Address: 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.
FCC Test Firm Registration Number: 712850
A2LA certificate registration number is: CN1212
ISED Registered No.: 23583
ISED CAB identifier: CN0017

5.2 Test Instrument Used

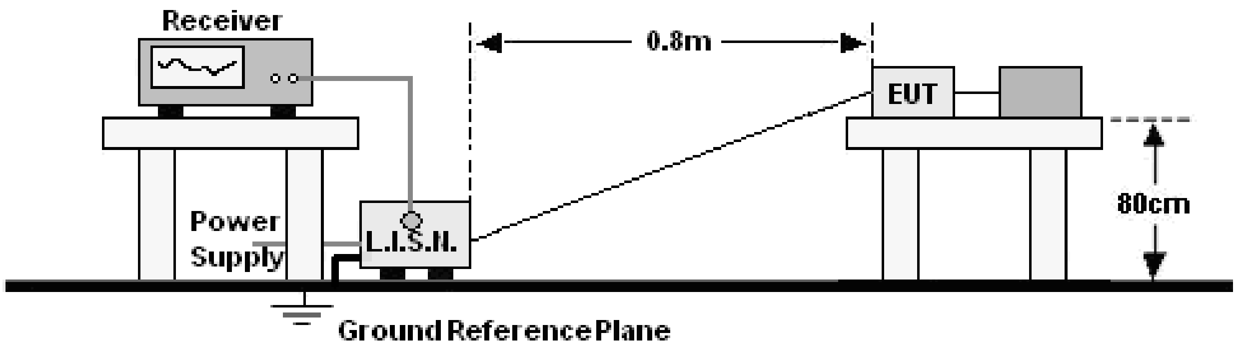
Conducted Emissions Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Receiver	R&S	ESR3	102075	May 15, 2023	May 14, 2024
LISN	R&S	ENV216	101375	May 15, 2023	May 14, 2024
Software	Frad	EZ-EMC	EMC-CON 3A1	\	\
Attenuator	\	10dB DC-6GHz	1650	May 15, 2023	May 14, 2024

RF Conducted Test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Power Meter	Keysight	E4419	\	May 15, 2023	May 14, 2024
Power Sensor (AV)	Keysight	E9300A	\	May 15, 2023	May 14, 2024
Signal Analyzer20kHz-26.5GHz	Keysight	N9020A	MY49100060	May 15, 2023	May 14, 2024
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 15, 2023	May 14, 2024
Radio frequency control box	MAIWEI	MW100-RFCB	\	\	\
Software	MAIWEI	MTS 8310	\	\	\

Radiated Emissions Test (966 Chamber01)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
966 chamber	ChengYu	966 Room	966	May 15, 2023	May 14, 2026
Receiver	R&S	ESR3	102075	May 15, 2023	May 14, 2024
Receiver	R&S	ESRP	101154	May 15, 2023	May 14, 2024
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 15, 2023	May 14, 2024
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	942	May 29, 2023	May 28, 2024
Loop Antenna(9KHz -30MHz)	Schwarzbeck	FMZB1519B	00014	May 31, 2023	May 30, 2024
Amplifier	SKET	LAPA_01G18 G-45dB	\	May 15, 2023	May 14, 2024
Horn Antenna	Schwarzbeck	BBHA9120D	1541	May 31, 2023	May 30, 2024
Amplifier(18G Hz-40GHz)	MITEQ	TTA1840-35-HG	2034381	May 15, 2023	May 14, 2024
Horn Antenna(18G Hz-40GHz)	Schwarzbeck	BBHA9170	00822	May 31, 2023	May 30, 2024
Spectrum Analyzer9kHz-40GHz	R&S	FSP40	100363	May 15, 2023	May 14, 2024
Software	Frad	EZ-EMC	FA-03A2 RE	\	\

6. Conducted Emissions

6.1 Block Diagram Of Test Setup



6.2 Limit

Frequency (MHz)	Limit (dBuV)	
	Quas-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Notes:
1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

6.3 Test procedure

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

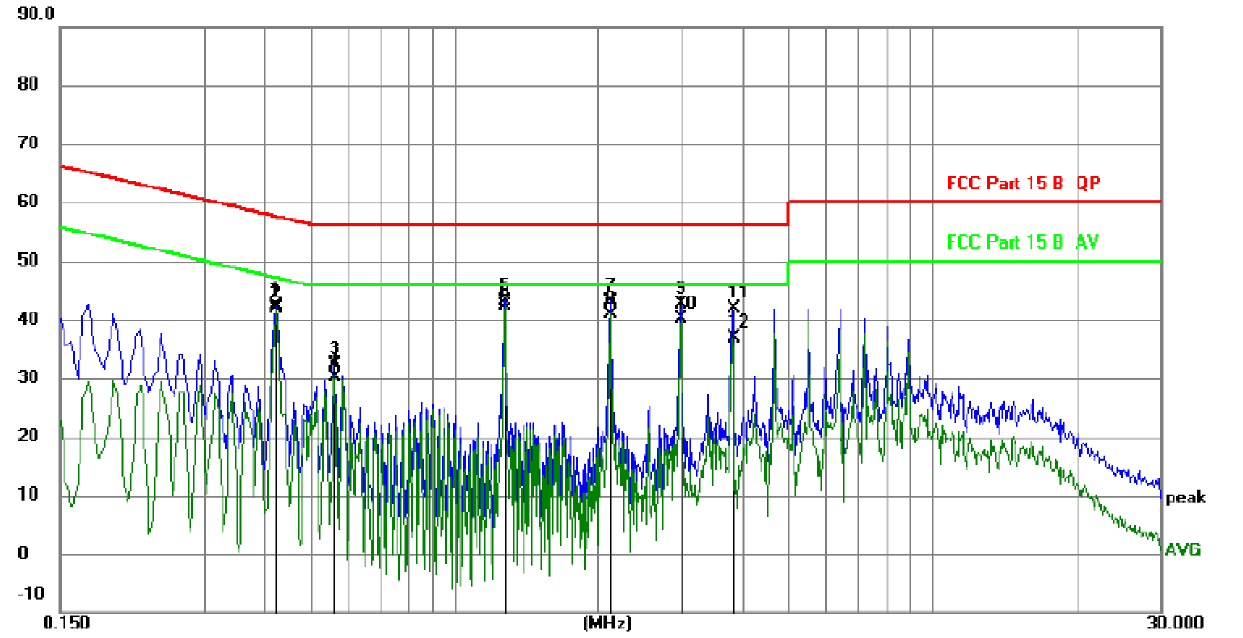
a. The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
b. The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
c. For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

6.4 EUT operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

6.5 Test Result

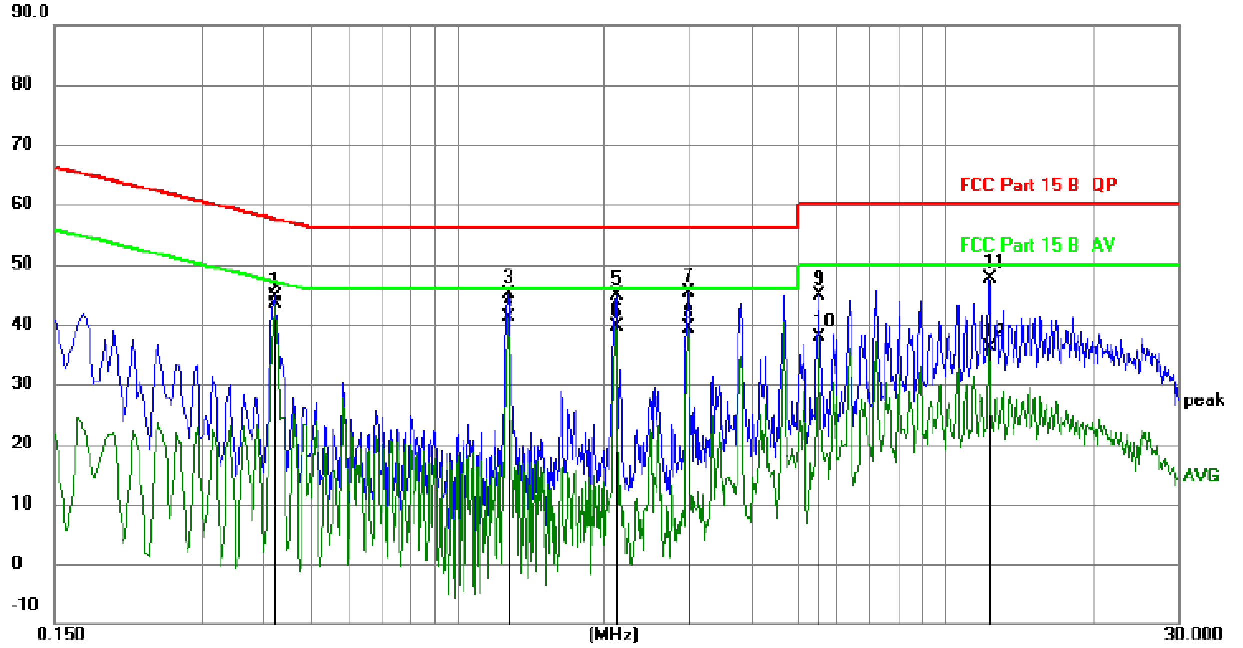
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	L
Test Mode:	Mode 4	Test Voltage :	AC120V/60Hz



Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. Measurement = Reading Level + Correct Factor
4. Over = Measurement - Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz		dB	dBuV	dBuV	dB	Detector
1		0.4245	32.83	9.62	42.45	57.36	-14.91	QP
2		0.4245	32.29	9.62	41.91	47.36	-5.45	AVG
3		0.5639	22.73	9.62	32.35	56.00	-23.65	QP
4		0.5639	20.45	9.62	30.07	46.00	-15.93	AVG
5		1.2750	33.43	9.73	43.16	56.00	-12.84	QP
6	*	1.2750	32.54	9.73	42.27	46.00	-3.73	AVG
7		2.1300	33.29	9.74	43.03	56.00	-12.97	QP
8		2.1300	31.12	9.74	40.86	46.00	-5.14	AVG
9		2.9849	32.75	9.78	42.53	56.00	-13.47	QP
10		2.9849	30.27	9.78	40.05	46.00	-5.95	AVG
11		3.8310	32.03	9.83	41.86	56.00	-14.14	QP
12		3.8310	27.05	9.83	36.88	46.00	-9.12	AVG

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	N
Test Mode:	Mode 4	Test Voltage :	AC120V/60Hz



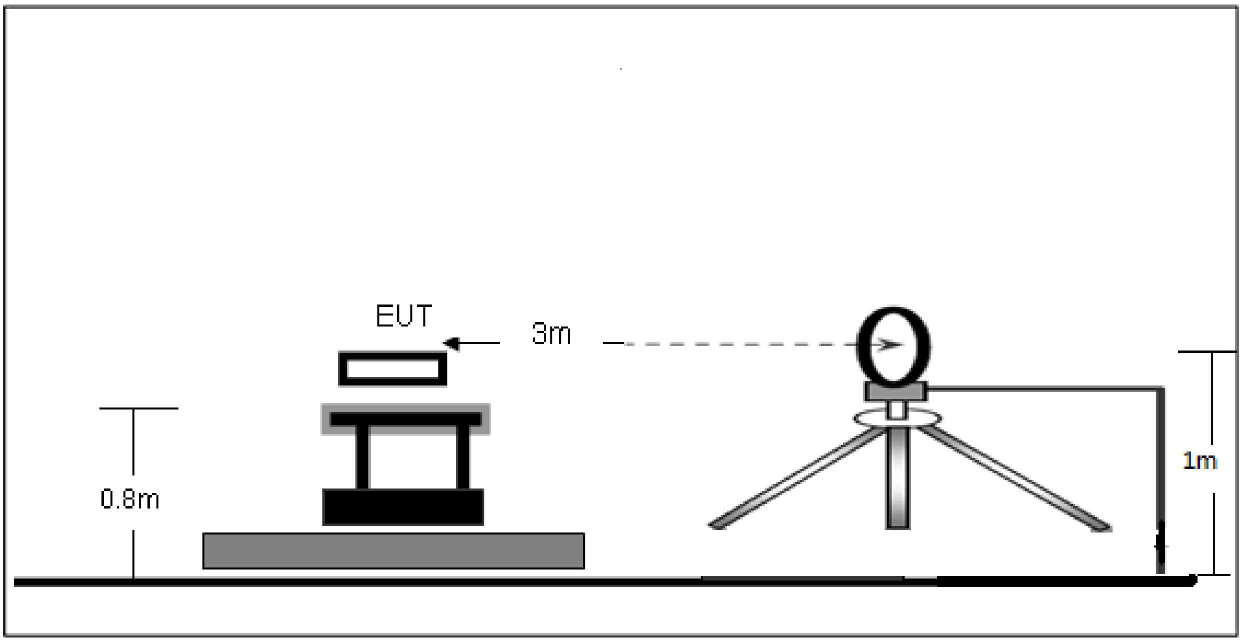
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.
3. Measurement = Reading Level + Correct Factor
4. Over = Measurement - Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz		dB	dBuV	dBuV	dB	Detector
1		0.4245	35.13	9.62	44.75	57.36	-12.61	QP
2	*	0.4245	33.69	9.62	43.31	47.36	-4.05	AVG
3		1.2750	35.46	9.73	45.19	56.00	-10.81	QP
4		1.2750	31.37	9.73	41.10	46.00	-4.90	AVG
5		2.1210	35.08	9.74	44.82	56.00	-11.18	QP
6		2.1210	29.93	9.74	39.67	46.00	-6.33	AVG
7		2.9760	35.50	9.78	45.28	56.00	-10.72	QP
8		2.9760	29.70	9.78	39.48	46.00	-6.52	AVG
9		5.5230	34.99	9.79	44.78	60.00	-15.22	QP
10		5.5230	28.08	9.79	37.87	50.00	-12.13	AVG
11		12.3180	37.99	9.66	47.65	60.00	-12.35	QP
12		12.3180	26.43	9.66	36.09	50.00	-13.91	AVG

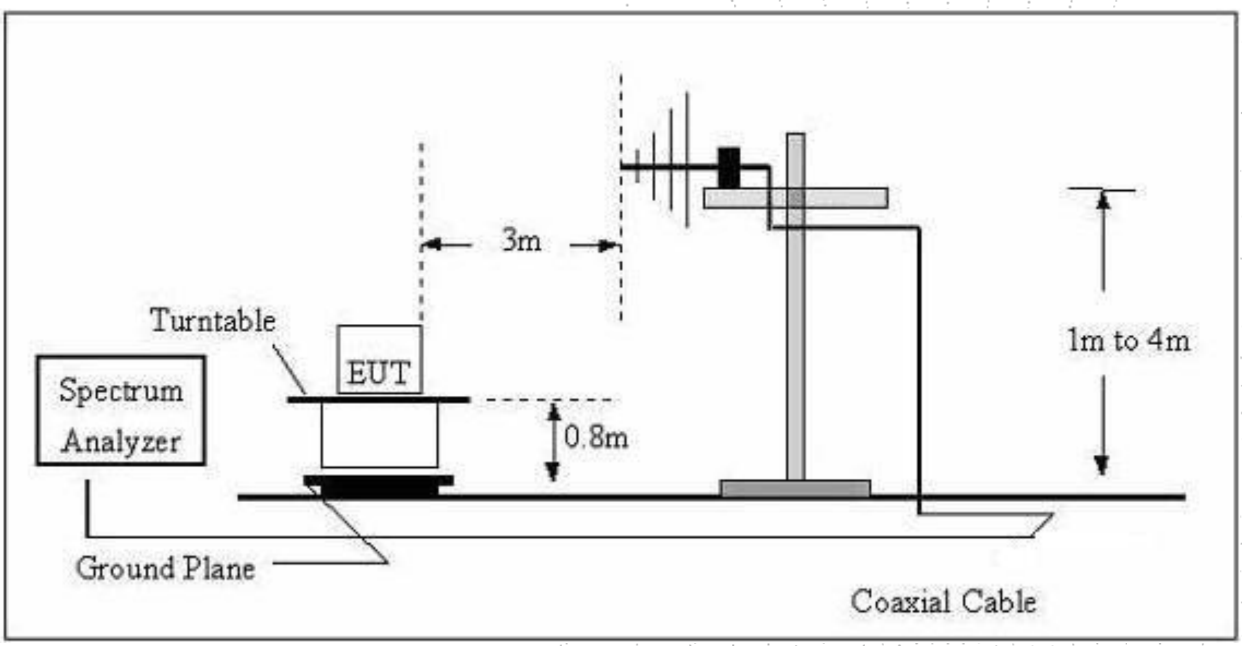
7. Radiated emissions

7.1 Block Diagram Of Test Setup

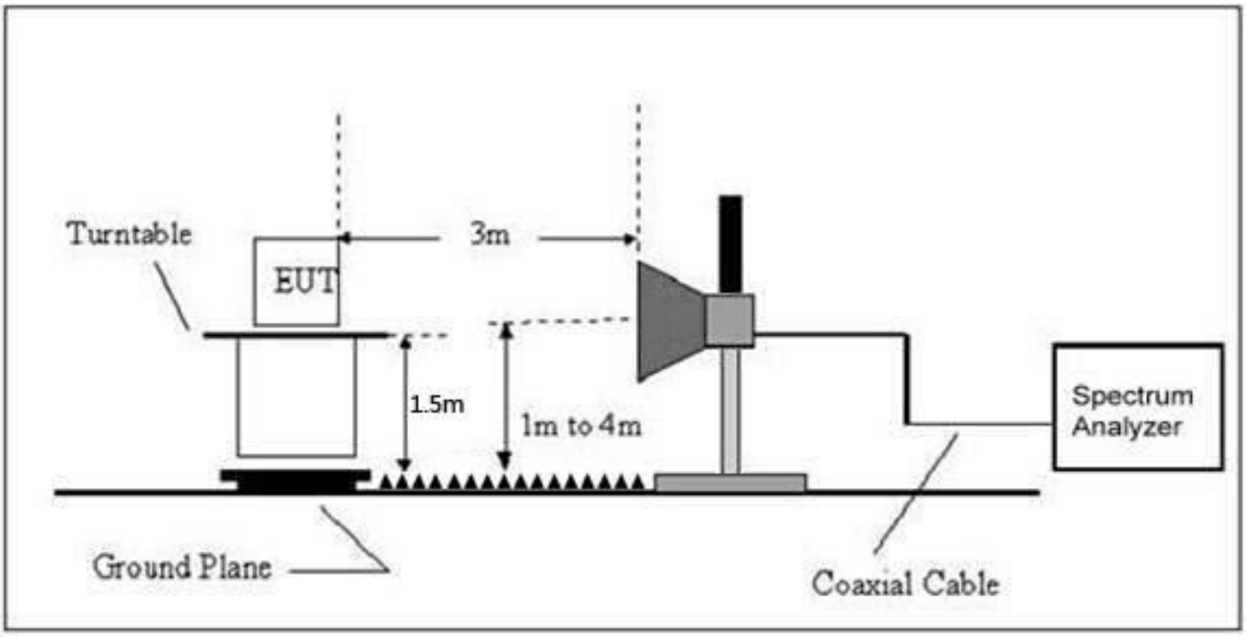
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



7.2 Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequency	Field Strength	Distance	Field Strength Limit at 3m Distance	
(MHz)	uV/m	(m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))}$ + 80
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))}$ + 40
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)}$ + 40
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

Limits Of Radiated Emission Measurement (Above 1000MHz)

Frequency (MHz)	Limit (dBuV/m) (at 3M)	
	Peak	Average
Above 1000	74	54

Notes:
(1)The limit for radiated test was performed according to FCC PART 15C
(2)The tighter limit applies at the band edges.
(3) Emission level (dBuV/m)=20log Emission level (uV/m).

Frequency Range Of Radiated Measurement

(a) For an intentional radiator the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in this paragraph:

(1) If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
(2) If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.
(3) If the intentional radiator operates at or above 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.
(4) If the intentional radiator operates at or above 95 GHz: To the third harmonic of the highest fundamental frequency or to 750 GHz, whichever is lower, unless specified otherwise elsewhere in the rules.
(5) If the intentional radiator contains a digital device, regardless of whether this digital device controls the functions of the intentional radiator or the digital device is used for additional control or function purposes other than to enable the operation of the intentional radiator, the frequency range shall be investigated up to the range specified in paragraphs (a) (1)through (4) of this section or the range applicable to the digital device, as shown in paragraph (b)(1) of this section, whichever is the higher frequency range of investigation.

7.3 Test procedure

Receiver Parameter	Setting
Attenuation	Auto
9kHz~150kHz	RBW 200Hz for QP
150kHz~30MHz	RBW 9kHz for QP
30MHz~1000MHz	RBW 120kHz for QP

Spectrum Parameter	Setting
1-25GHz	RBW 1 MHz /VBW 1 MHz for Peak, RBW 1 MHz / VBW 10Hz for Average

Below 1GHz test procedure as below:
a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

a.The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b.The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c.The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d.For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
e.The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the middlest channel, the Highest channel.
Note:
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

7.4 EUT operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

7.5 Test Result

Below 30MHz

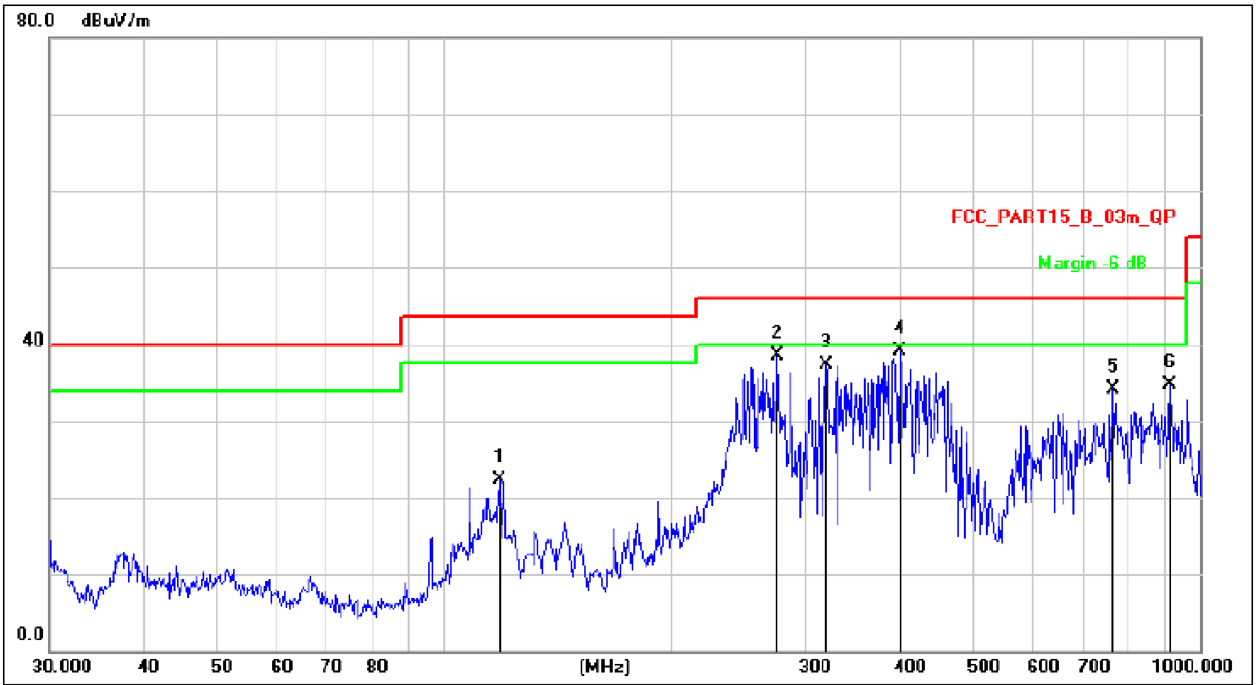
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Test Voltage :	DC 3.7V
Test Mode:	Mode 4	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

Note:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

Between 30MHz – 1GHz

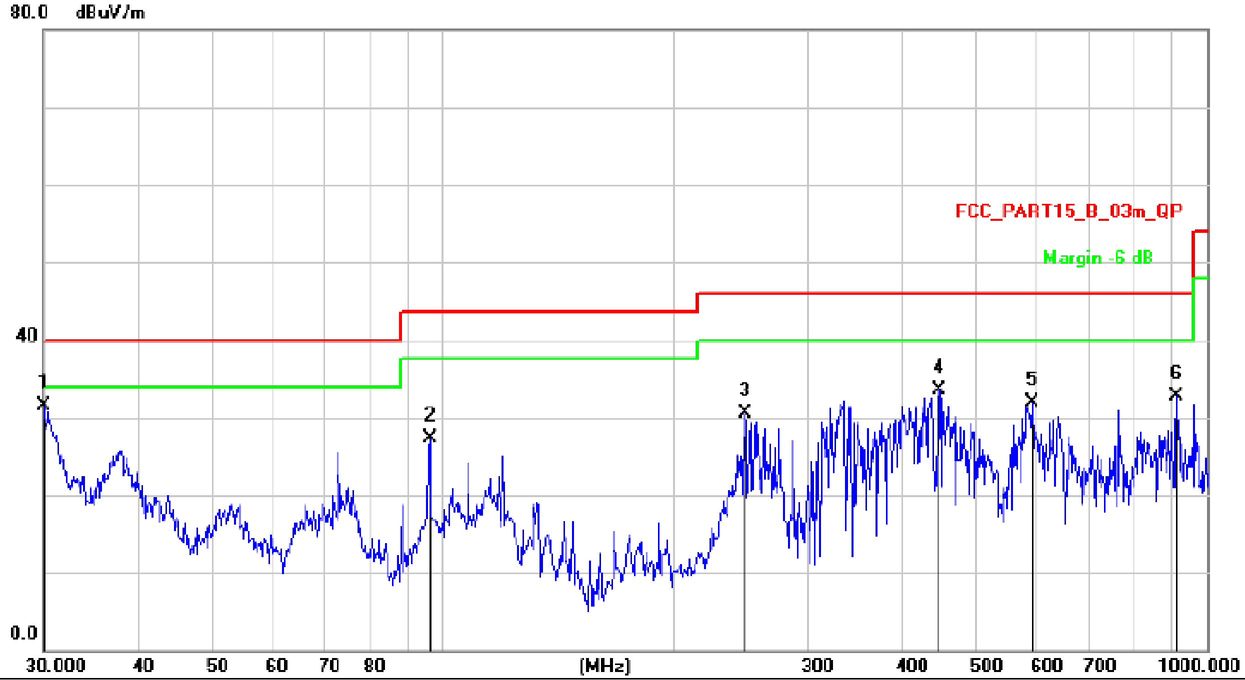
Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Horizontal
Test Mode:	Mode 4	Test Voltage :	DC 3.7V



Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Measurement = Reading Level + Correct Factor
3. Over = Measurement - Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		118.1862	41.21	-18.96	22.25	43.50	-21.25	QP
2		276.1235	53.62	-15.18	38.44	46.00	-7.56	QP
3		319.9370	51.12	-13.87	37.25	46.00	-8.75	QP
4	*	400.4319	51.26	-12.20	39.06	46.00	-6.94	QP
5		768.7481	40.12	-6.07	34.05	46.00	-11.95	QP
6		912.8620	39.10	-4.45	34.65	46.00	-11.35	QP

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	101KPa	Phase :	Vertical
Test Mode:	Mode 4	Test Voltage :	DC 3.7V



Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.
2. Measurement = Reading Level + Correct Factor
3. Over = Measurement - Limit

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	*	30.0000	49.87	-18.38	31.49	40.00	-8.51	QP
2		96.0986	45.61	-18.33	27.28	43.50	-16.22	QP
3		248.5519	46.47	-15.87	30.60	46.00	-15.40	QP
4		446.4141	45.04	-11.54	33.50	46.00	-12.50	QP
5		590.9737	40.56	-8.60	31.96	46.00	-14.04	QP
6		912.8620	37.20	-4.45	32.75	46.00	-13.25	QP

Between 1GHz – 25GHz

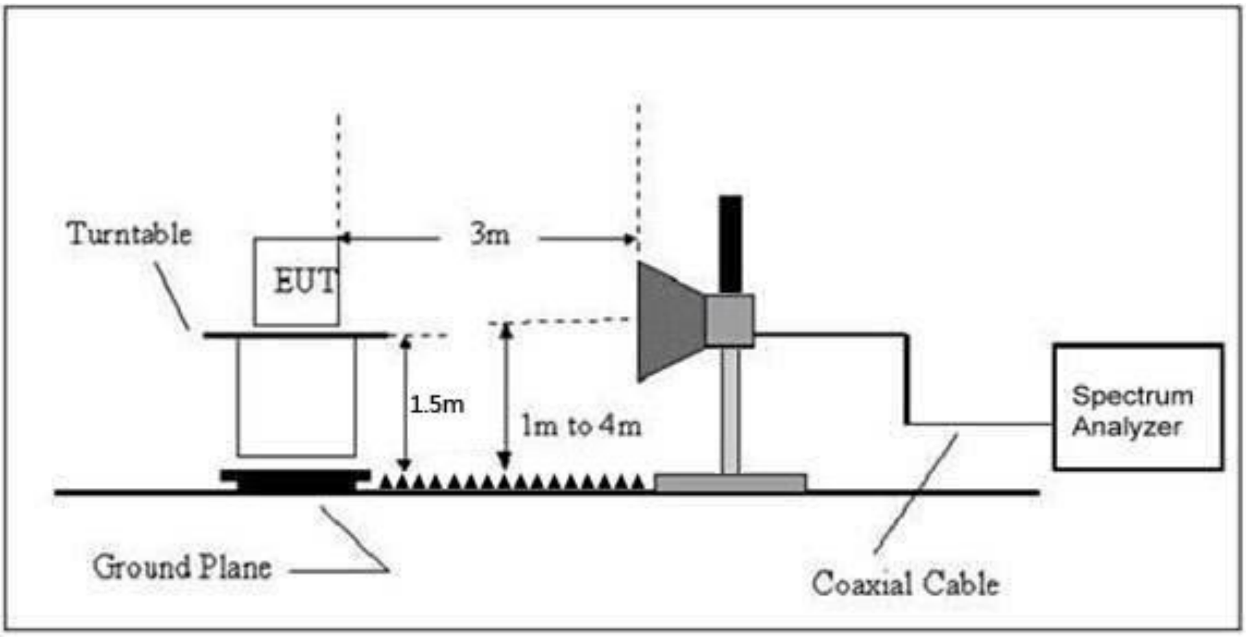
Polar (H/V)	Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Over	Detector Type
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
GFSK Low channel							
V	4804.00	68.04	-19.84	48.20	74.00	-25.80	PK
V	4804.00	58.28	-19.84	38.44	54.00	-15.56	AV
V	7206.00	58.03	-13.9	44.13	74.00	-29.87	PK
V	7206.00	47.09	-13.9	33.19	54.00	-20.81	AV
H	4804.00	66.02	-19.84	46.18	74.00	-27.82	PK
H	4804.00	56.52	-19.84	36.68	54.00	-17.32	AV
H	7206.00	55.96	-13.9	42.06	74.00	-31.94	PK
H	7206.00	48.59	-13.9	34.69	54.00	-19.31	AV
GFSK Middle channel							
V	4882.00	68.27	-19.68	48.59	74.00	-25.41	PK
V	4882.00	57.72	-19.68	38.04	54.00	-15.96	AV
V	7323.00	60.29	-13.57	46.72	74.00	-27.28	PK
V	7323.00	50.86	-13.57	37.29	54.00	-16.71	AV
H	4882.00	64.58	-19.68	44.90	74.00	-29.10	PK
H	4882.00	55.14	-19.68	35.46	54.00	-18.54	AV
H	7323.00	58.39	-13.57	44.82	74.00	-29.18	PK
H	7323.00	49.92	-13.57	36.35	54.00	-17.65	AV
GFSK High channel							
V	4960.00	66.86	-19.99	46.87	74.00	-27.13	PK
V	4960.00	56.12	-19.99	36.13	54.00	-17.87	AV
V	7440.00	57.10	-14.22	42.88	74.00	-31.12	PK
V	7440.00	47.37	-14.22	33.15	54.00	-20.85	AV
H	4960.00	62.61	-19.99	42.62	74.00	-31.38	PK
H	4960.00	52.29	-19.99	32.30	54.00	-21.70	AV
H	7440.00	55.87	-14.22	41.65	74.00	-32.35	PK
H	7440.00	46.98	-14.22	32.76	54.00	-21.24	AV

Remark:
1.Emission Level = Meter Reading + Factor, Factor = Antenna Factor + Cable Loss – Pre-amplifier. Over= Emission Level - Limit
2.If peak below the average limit, the average emission was no test.
3. In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
5.All the Modulation are test, the worst mode is GFSK, the data recording in the report.

8. Radiated Band Emission Measurement And Restricted Bands Of Operation

8.1 Block Diagram Of Test Setup

Radiated Emission Test-Up Frequency Above 1GHz



8.2 Limit

FCC Part15 C Section 15.209 and 15.205

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

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])
13.36-13.41			

Limits Of Radiated Emission Measurement (Above 1000MHz)

Frequency (MHz)	Limit (dBuV/m) (at 3M)	
	Peak	Average
Above 1000	74	54

Notes:
(1)The limit for radiated test was performed according to FCC PART 15C.
(2)The tighter limit applies at the band edges.
(3)Emission level (dBuV/m)=20log Emission level (uV/m).

8.3 Test procedure

Receiver Parameter	Setting
Attenuation	Auto
Start Frequency	2300MHz
Stop Frequency	2520
RB / VB (Emission In Restricted Band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Above 1GHz test procedure as below:
a.The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
b.The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c.The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d.For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
e.The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
g. Test the EUT in the lowest channel, the middlest channel, the Highest channel.

Note:
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

8.4 EUT operating Conditions

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

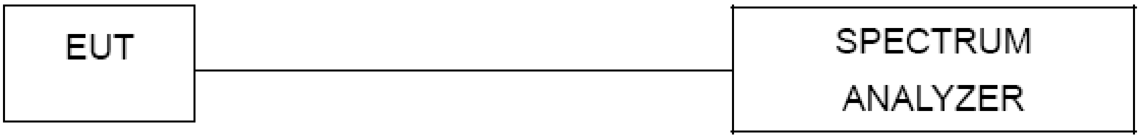
8.5 Test Result

Test mode	Polar (H/V)	Frequency (MHz)	Reading Level (dBuV/m)	Correct Factor (dB)	Measure-ment (dBuV/m)	Limits (dBuV/m)		Result
					PK	PK	AV	
GFSK	Low Channel 2402MHz							
	H	2390.00	69.53	-25.43	44.10	74.00	54.00	PASS
	H	2400.00	78.89	-25.40	53.49	74.00	54.00	PASS
	V	2390.00	70.10	-25.43	44.67	74.00	54.00	PASS
	V	2400.00	77.87	-25.40	52.47	74.00	54.00	PASS
	High Channel 2480MHz							
	H	2483.50	67.57	-25.15	42.42	74.00	54.00	PASS
	H	2500.00	61.34	-25.10	36.24	74.00	54.00	PASS
	V	2483.50	70.56	-25.15	45.41	74.00	54.00	PASS
	V	2500.00	63.27	-25.10	38.17	74.00	54.00	PASS
π/4DQPSK	Low Channel 2402MHz							
	H	2390.00	65.12	-25.43	39.69	74.00	54.00	PASS
	H	2400.00	74.75	-25.40	49.35	74.00	54.00	PASS
	V	2390.00	64.89	-25.43	39.46	74.00	54.00	PASS
	V	2400.00	73.02	-25.40	47.62	74.00	54.00	PASS
	High Channel 2480MHz							
	H	2483.50	65.17	-25.15	40.02	74.00	54.00	PASS
	H	2500.00	61.82	-25.10	36.72	74.00	54.00	PASS
	V	2483.50	65.15	-25.15	40.00	74.00	54.00	PASS
	V	2500.00	61.80	-25.10	36.70	74.00	54.00	PASS
8DPSK	Low Channel 2402MHz							
	H	2390.00	64.42	-25.43	38.99	74.00	54.00	PASS
	H	2400.00	73.70	-25.40	48.30	74.00	54.00	PASS
	V	2390.00	63.53	-25.43	38.10	74.00	54.00	PASS
	V	2400.00	71.55	-25.40	46.15	74.00	54.00	PASS
	High Channel 2480MHz							
	H	2483.50	63.28	-25.15	38.13	74.00	54.00	PASS
	H	2500.00	60.52	-25.10	35.42	74.00	54.00	PASS
	V	2483.50	61.85	-25.15	36.70	74.00	54.00	PASS
	V	2500.00	58.87	-25.10	33.77	74.00	54.00	PASS

Remark:
1. Emission Level = Meter Reading + Factor, Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Over= Emission Level – Limit
2. If the PK measured levels comply with average limit, then the average level were deemed to comply with average limit.
3 In restricted bands of operation, The spurious emissions below the permissible value more than 20dB
4. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

9. Spurious RF Conducted Emissions

9.1 Block Diagram Of Test Setup



9.2 Limit

Regulation 15.247 (d),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 §15.209(a) is not required. In addition, 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))

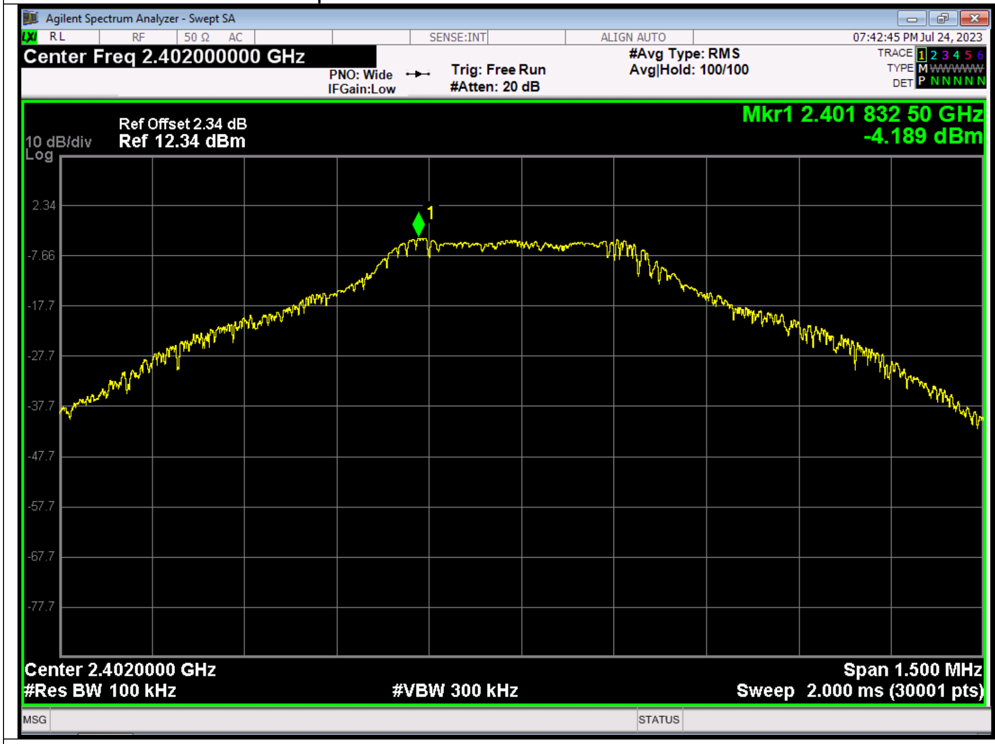
9.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer:
Below 30MHz:
RBW = 100kHz, VBW = 300kHz, Sweep = auto
Detector function = peak, Trace = max hold
Above 30MHz:
RBW = 100KHz, VBW = 300KHz, Sweep = auto
Detector function = peak, Trace = max hold

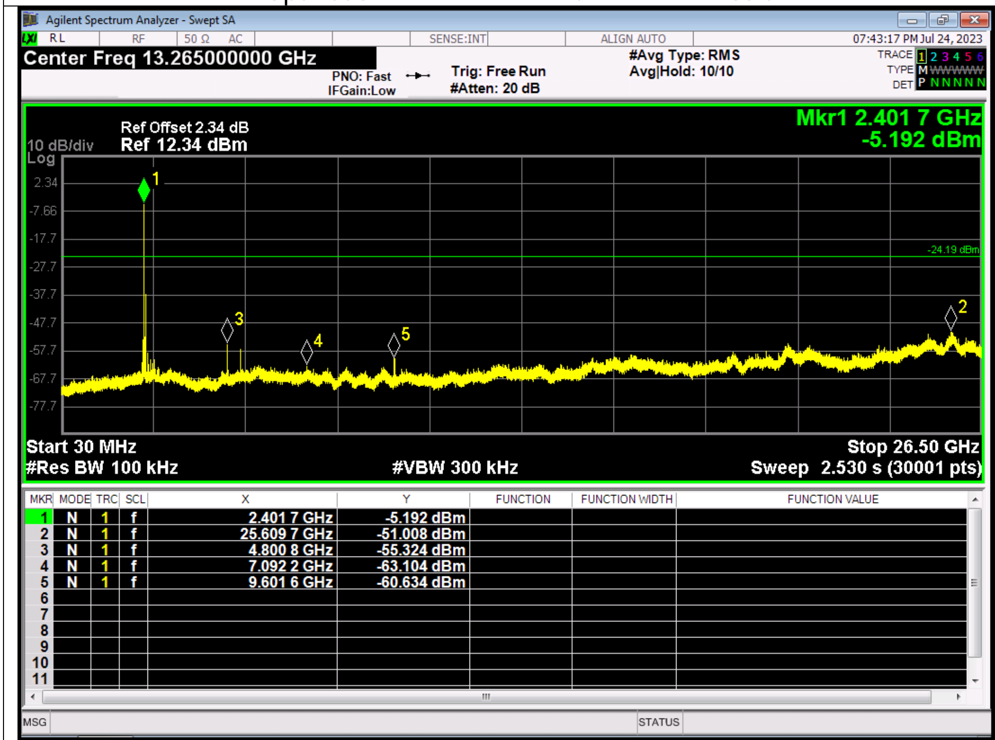
9.4 Test Result

Test Graphs

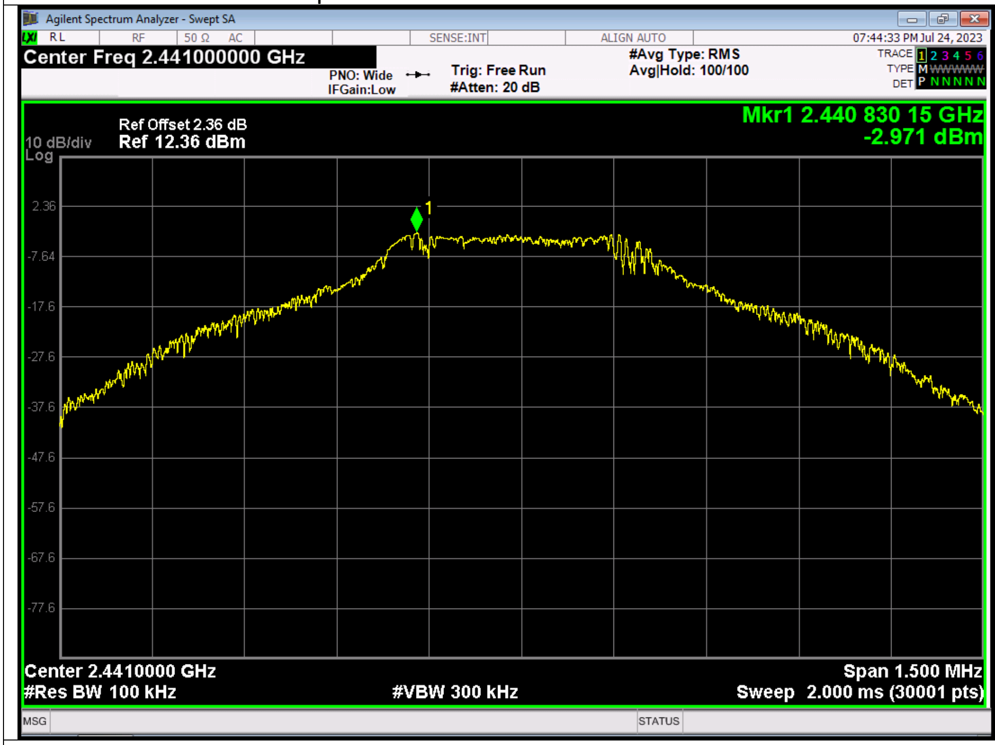
Tx. Spurious NVNT 1-DH1 2402MHz Ref



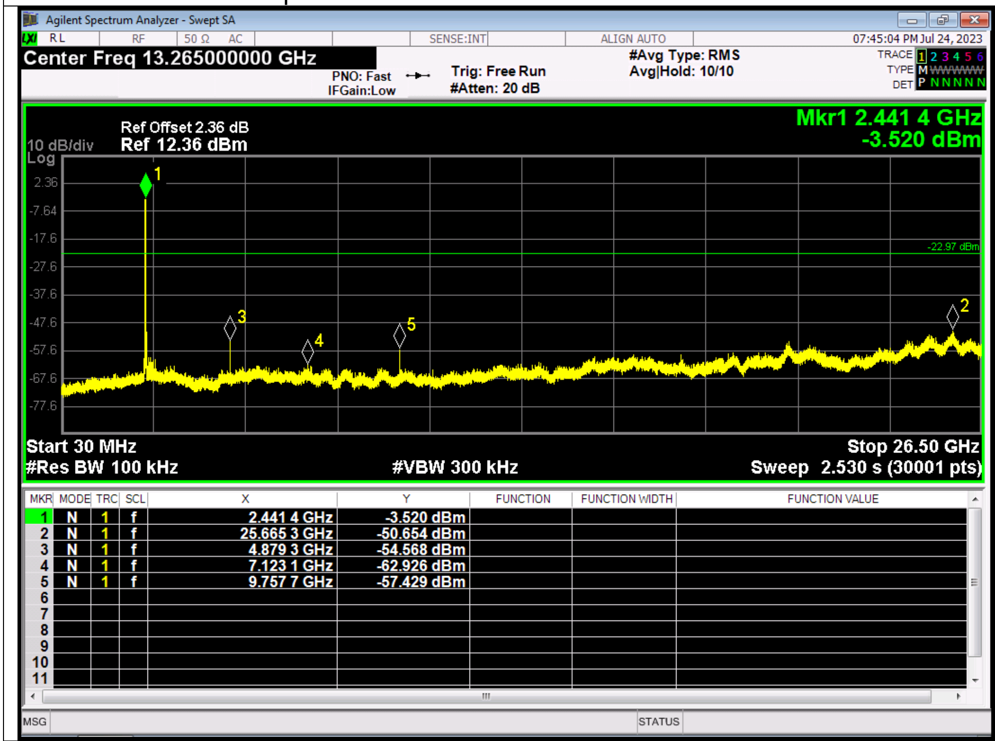
Tx. Spurious NVNT 1-DH1 2402MHz Emission



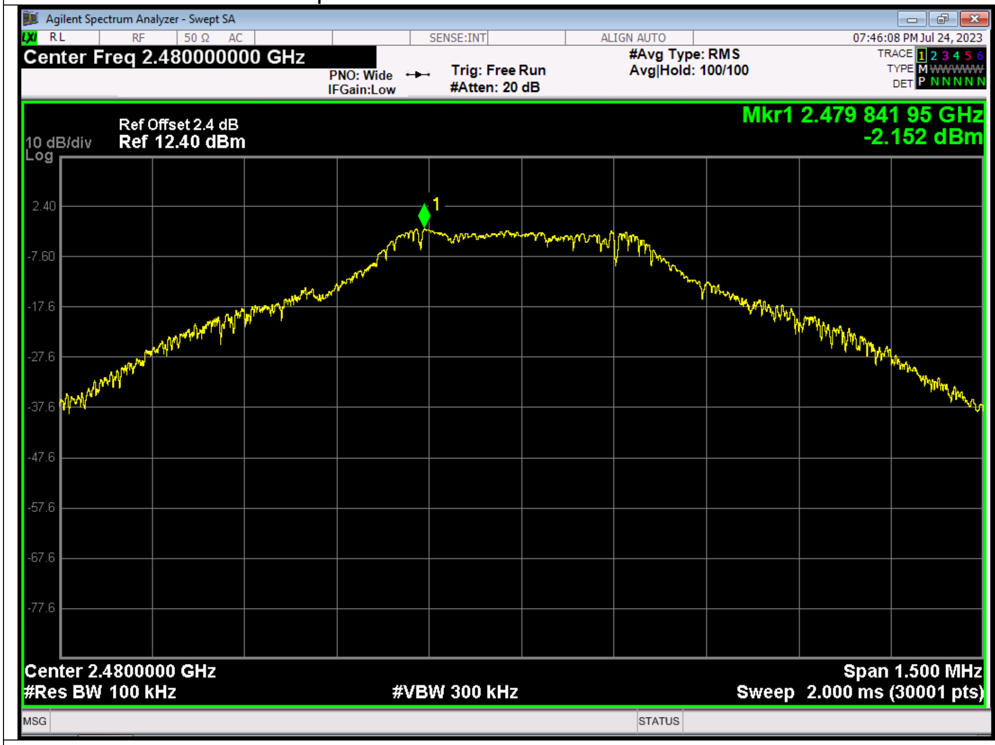
Tx. Spurious NVNT 1-DH1 2441MHz Ref



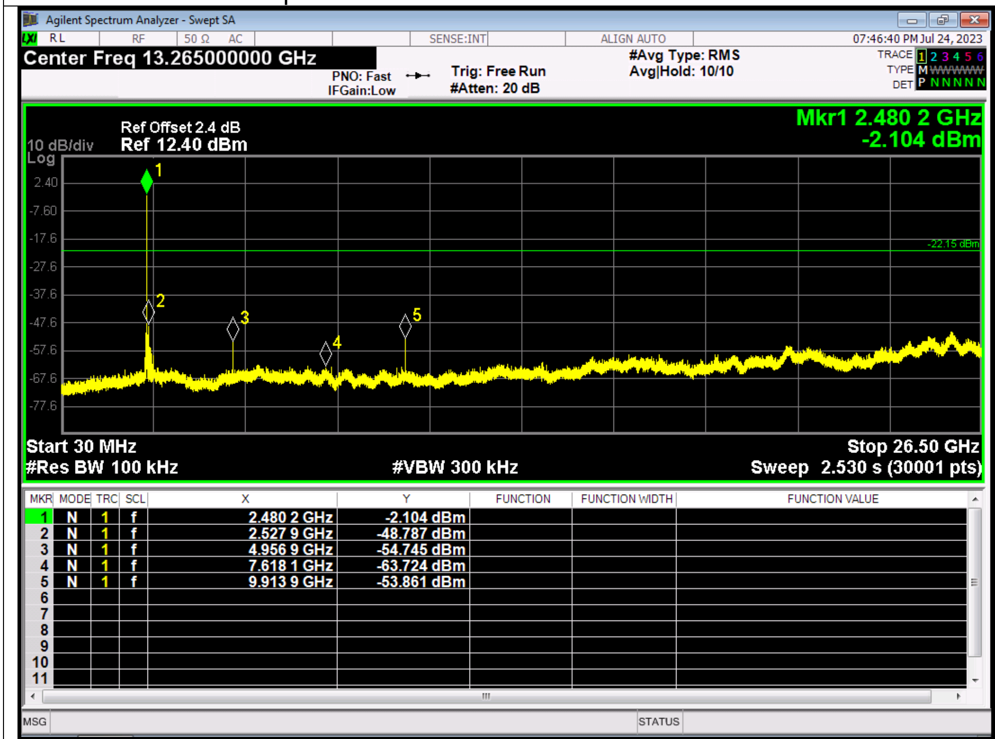
Tx. Spurious NVNT 1-DH1 2441MHz Emission



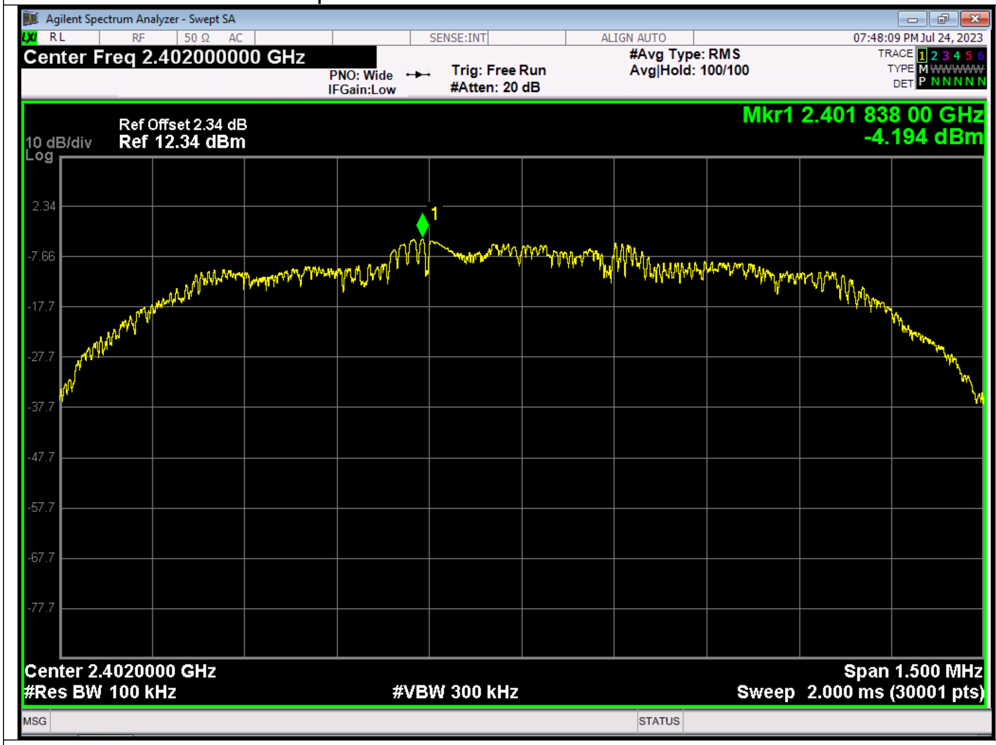
Tx. Spurious NVNT 1-DH1 2480MHz Ref



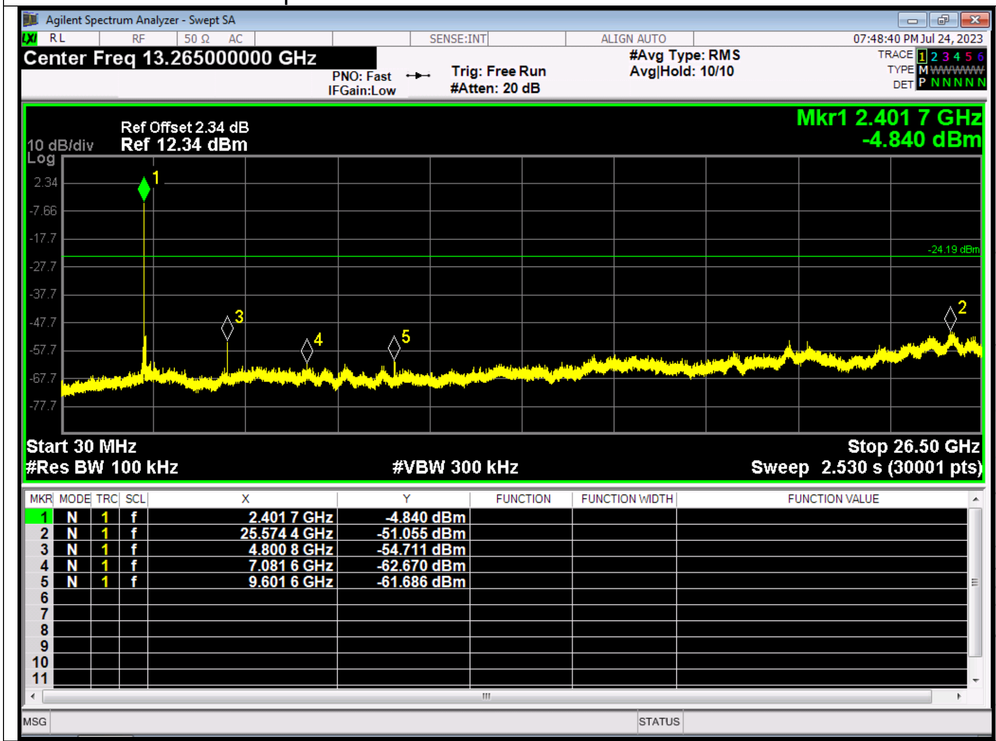
Tx. Spurious NVNT 1-DH1 2480MHz Emission



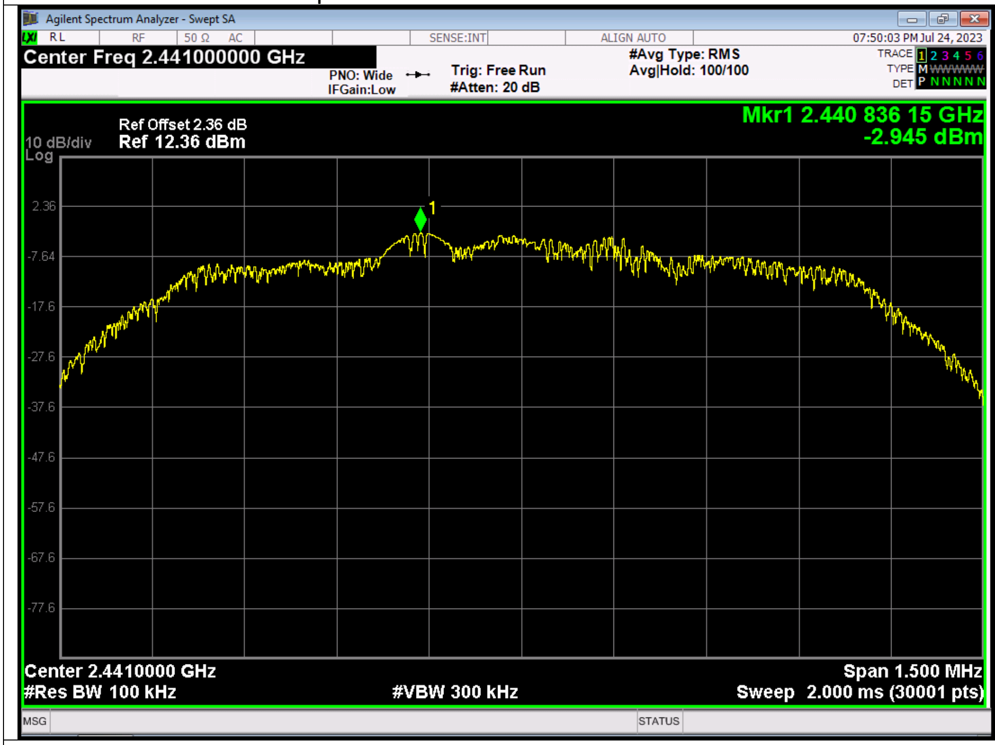
Tx. Spurious NVNT 2-DH1 2402MHz Ref



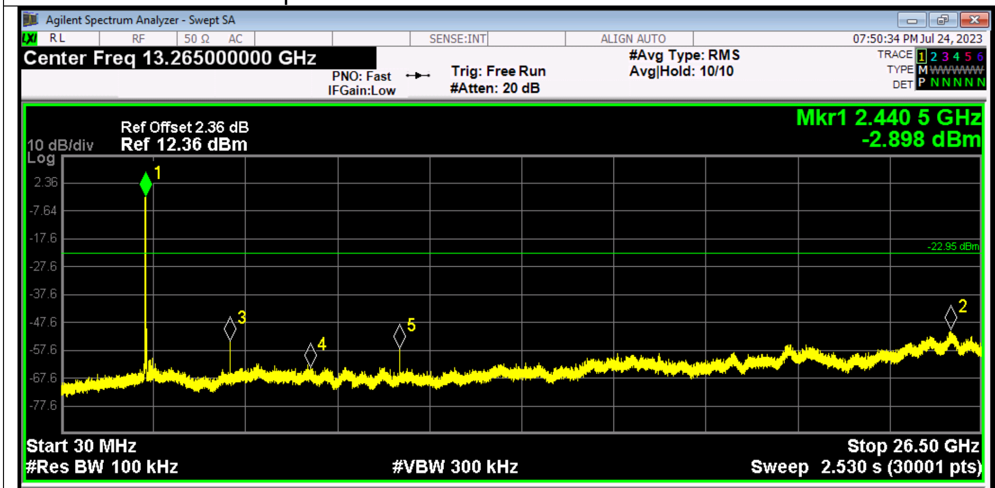
Tx. Spurious NVNT 2-DH1 2402MHz Emission



Tx. Spurious NVNT 2-DH1 2441MHz Ref

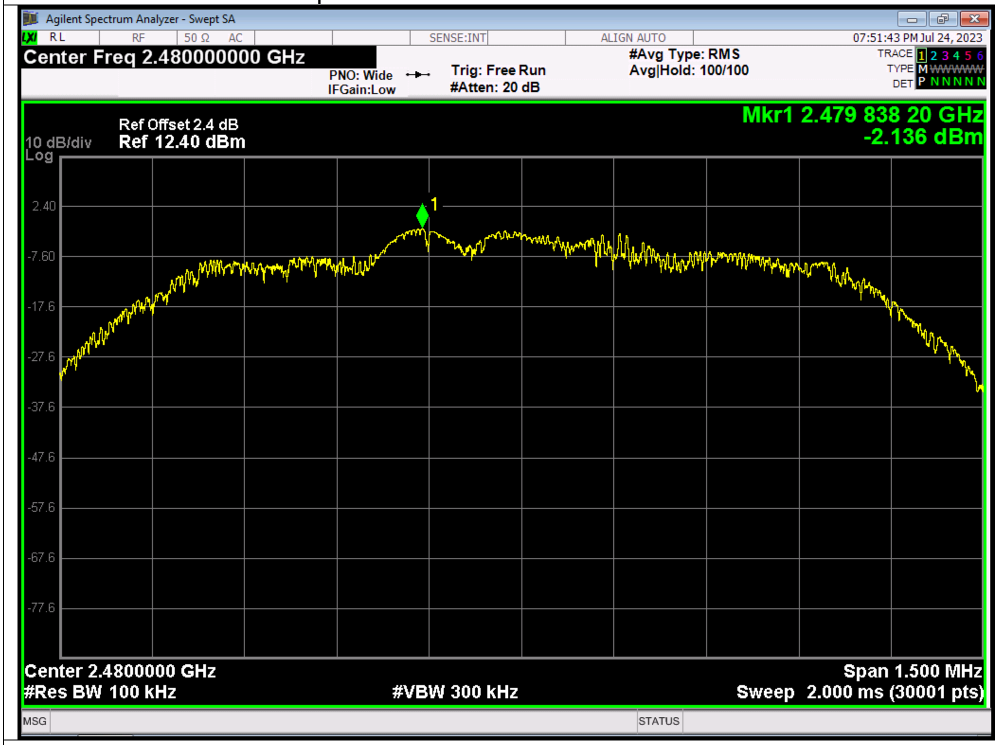


Tx. Spurious NVNT 2-DH1 2441MHz Emission



MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.440 5 GHz	-2.898 dBm			
2	N	1	f	25.588 5 GHz	-50.918 dBm			
3	N	1	f	4.879 3 GHz	-54.761 dBm			
4	N	1	f	7.185 7 GHz	-64.306 dBm			
5	N	1	f	9.757 7 GHz	-57.499 dBm			
6								
7								
8								
9								
10								
11								

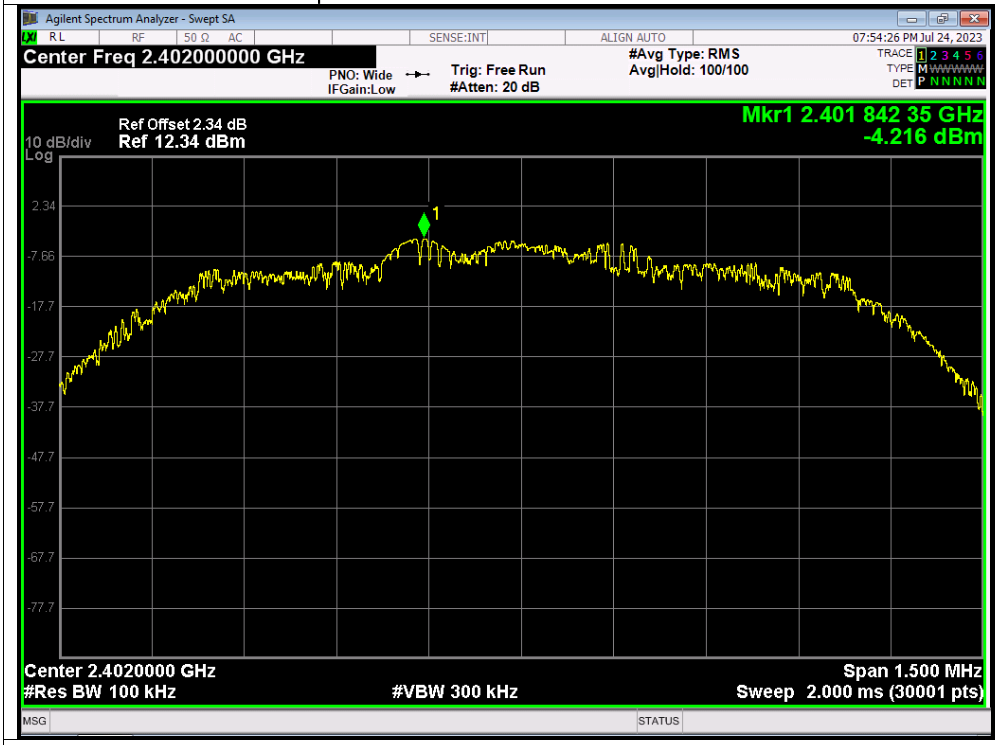
Tx. Spurious NVNT 2-DH1 2480MHz Ref



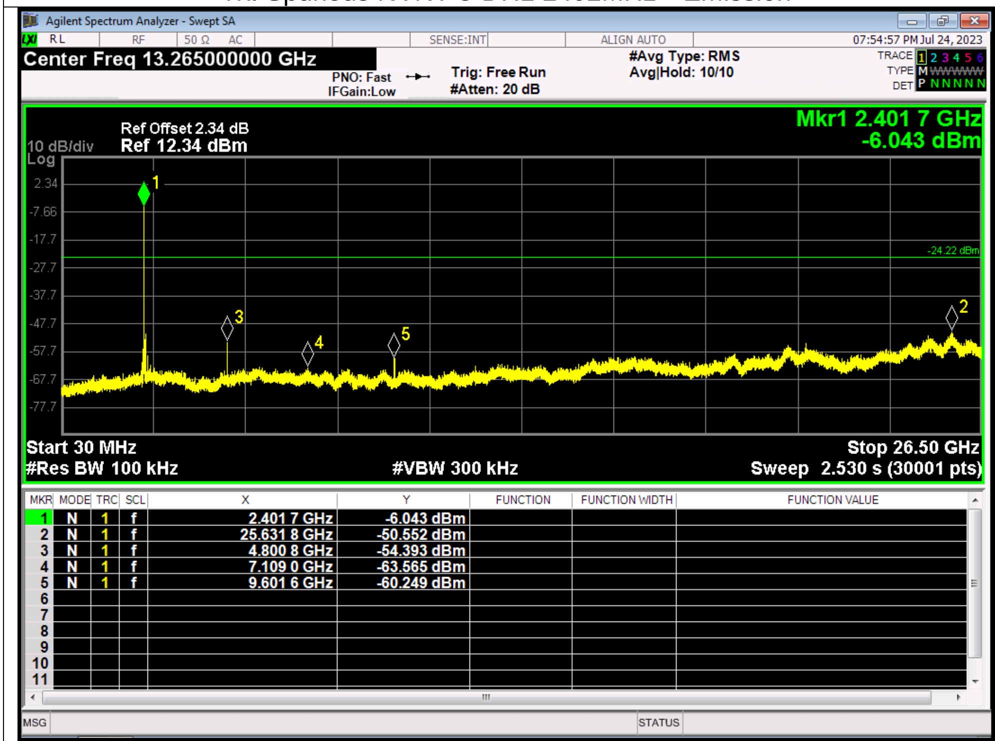
Tx. Spurious NVNT 2-DH1 2480MHz Emission

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.480 2 GHz	-7.911 dBm			
2	N	1	f	25.637 1 GHz	-51.300 dBm			
3	N	1	f	4.956 9 GHz	-54.304 dBm			
4	N	1	f	7.632 2 GHz	-64.665 dBm			
5	N	1	f	9.913 9 GHz	-53.657 dBm			
6								
7								
8								
9								
10								
11								

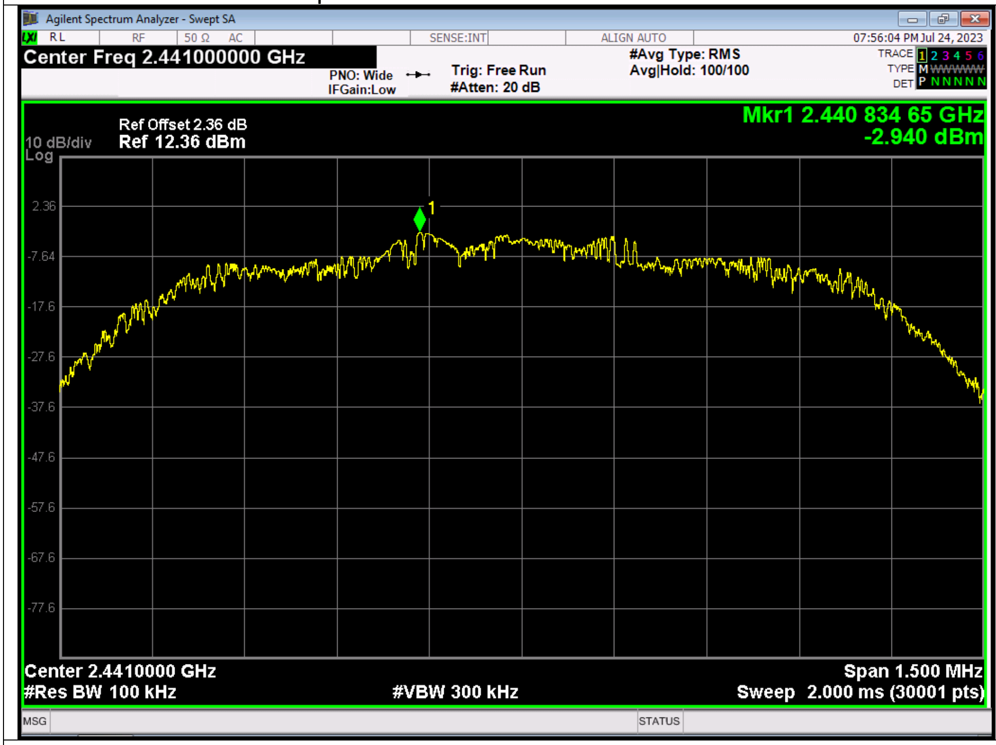
Tx. Spurious NVNT 3-DH1 2402MHz Ref



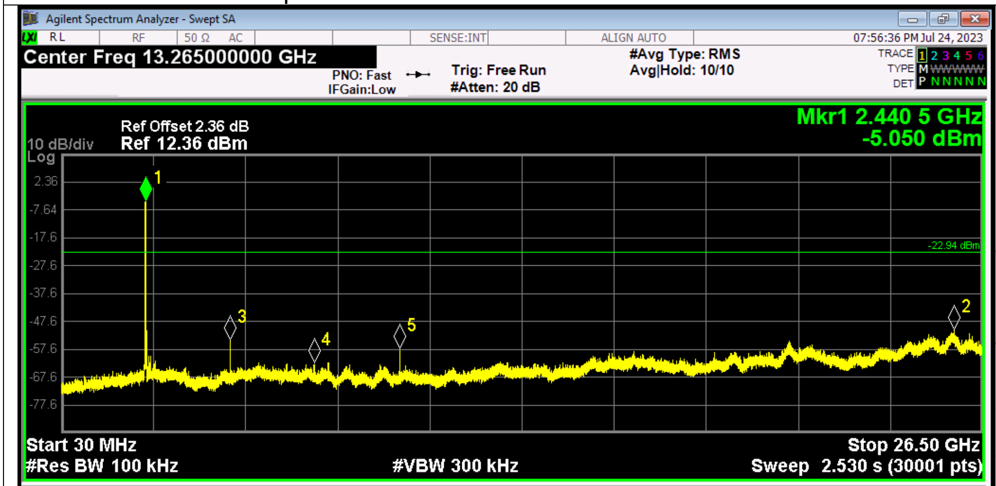
Tx. Spurious NVNT 3-DH1 2402MHz Emission



Tx. Spurious NVNT 3-DH1 2441MHz Ref

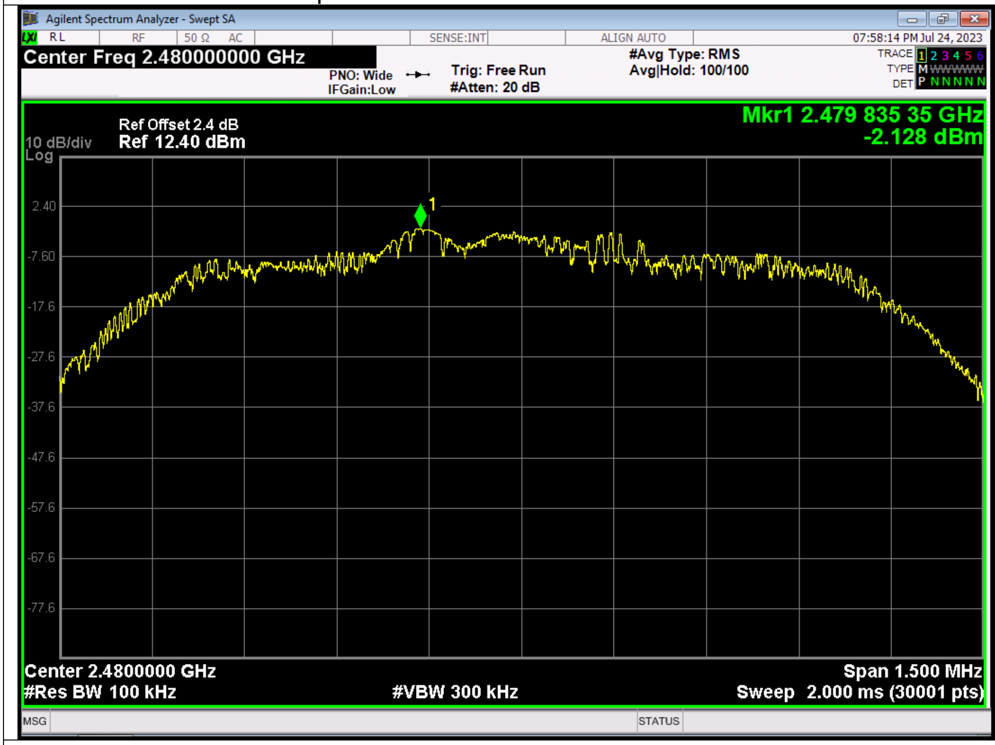


Tx. Spurious NVNT 3-DH1 2441MHz Emission



MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.440 5 GHz	-5.050 dBm			
2	N	1	f	25.683 0 GHz	-51.170 dBm			
3	N	1	f	4.879 3 GHz	-54.853 dBm			
4	N	1	f	7.288 1 GHz	-63.168 dBm			
5	N	1	f	9.757 7 GHz	-58.106 dBm			
6								
7								
8								
9								
10								
11								

Tx. Spurious NVNT 3-DH1 2480MHz Ref

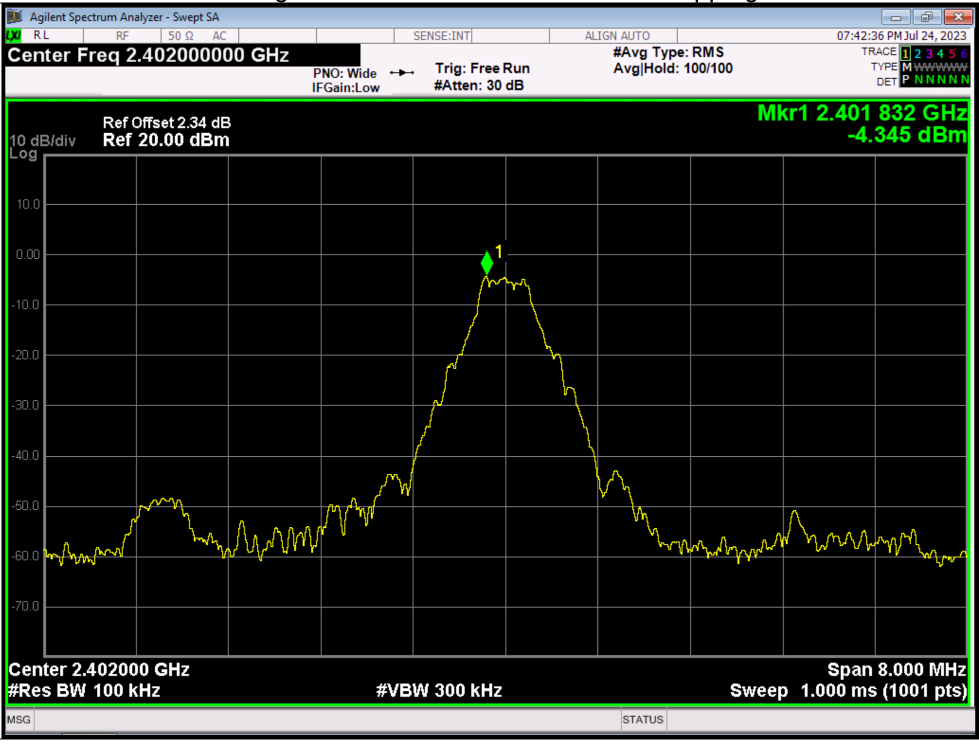


Tx. Spurious NVNT 3-DH1 2480MHz Emission

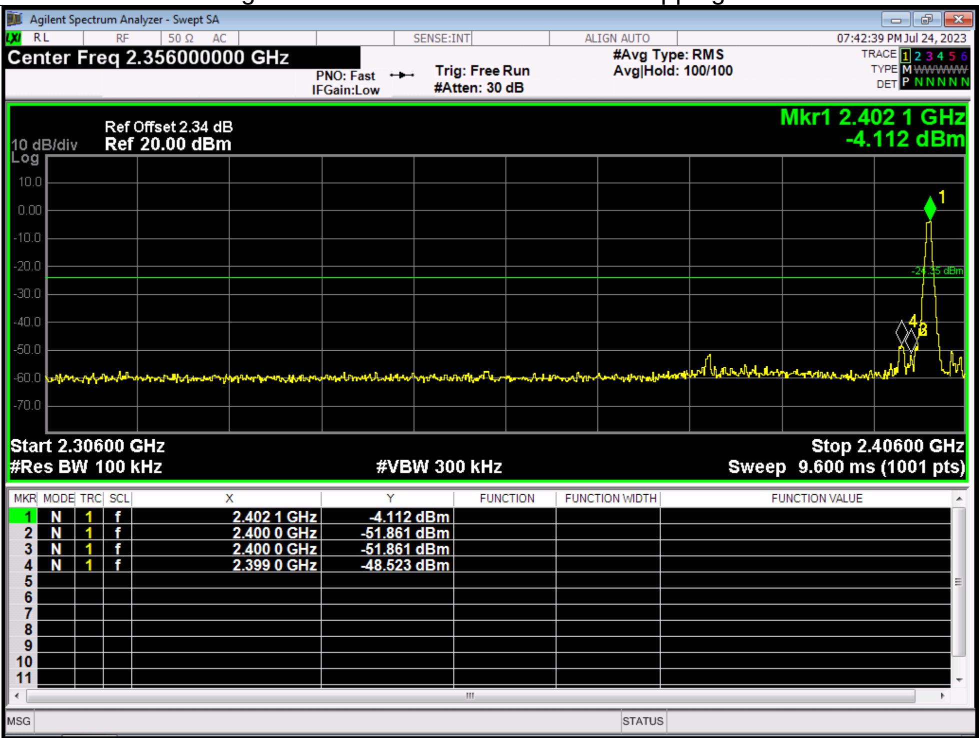
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.480 2 GHz	-5.437 dBm			
2	N	1	f	25.638 8 GHz	-50.405 dBm			
3	N	1	f	4.956 9 GHz	-54.910 dBm			
4	N	1	f	7.618 1 GHz	-63.336 dBm			
5	N	1	f	9.913 9 GHz	-53.961 dBm			
6								
7								
8								
9								
10								
11								

Test Graphs

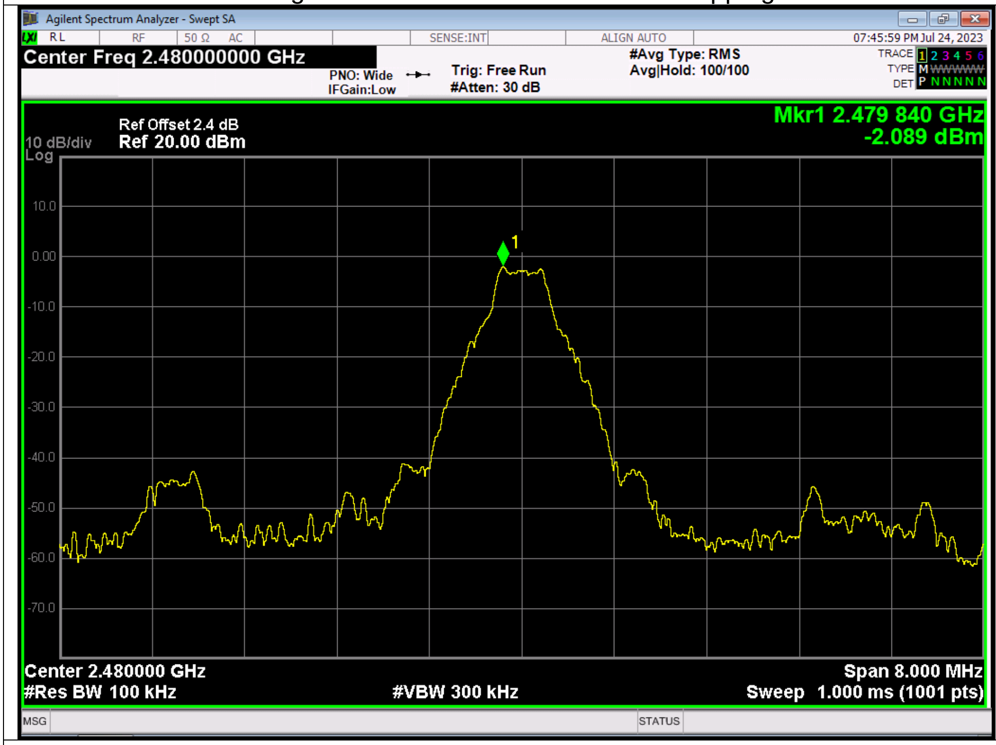
Band Edge NVNT 1-DH1 2402MHz No-Hopping Ref



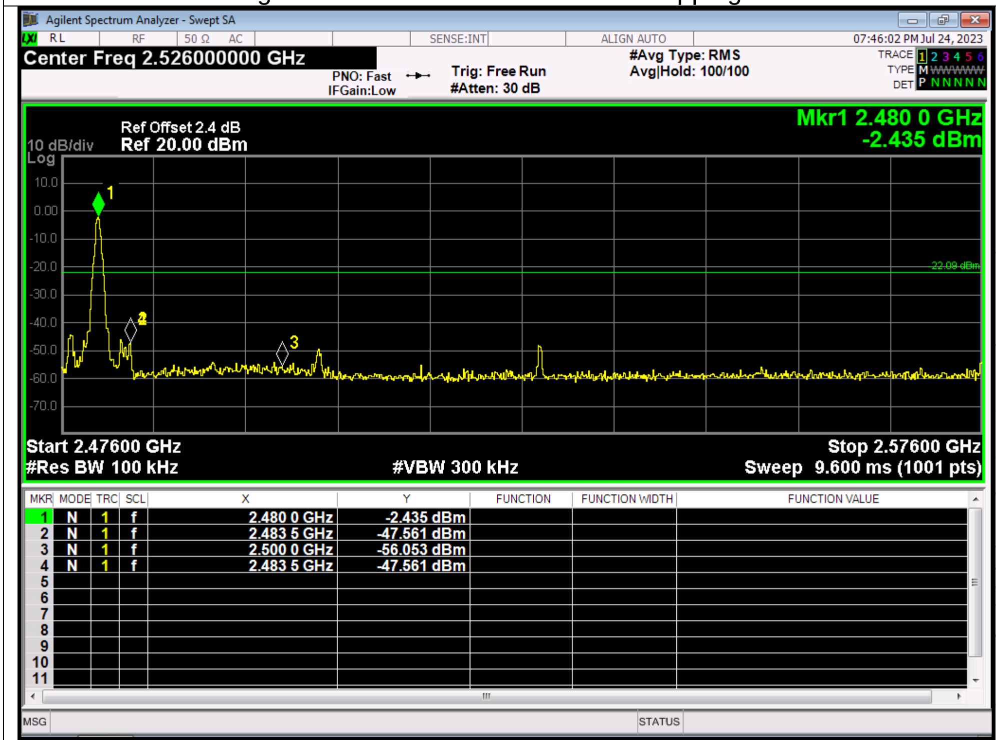
Band Edge NVNT 1-DH1 2402MHz No-Hopping Emission



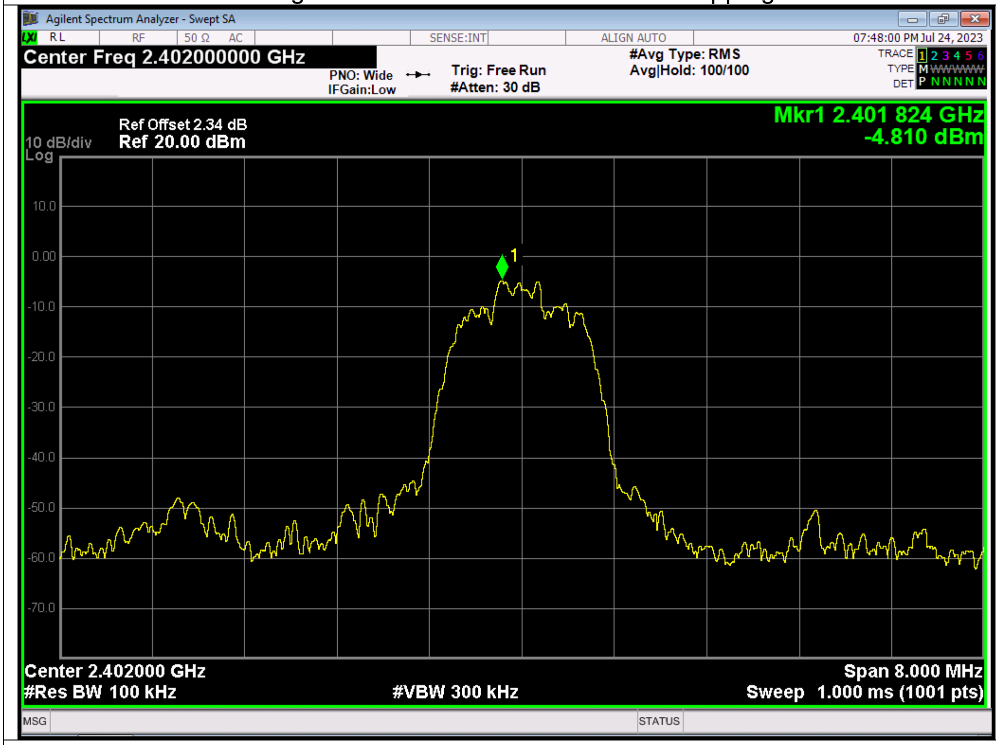
Band Edge NVNT 1-DH1 2480MHz No-Hopping Ref



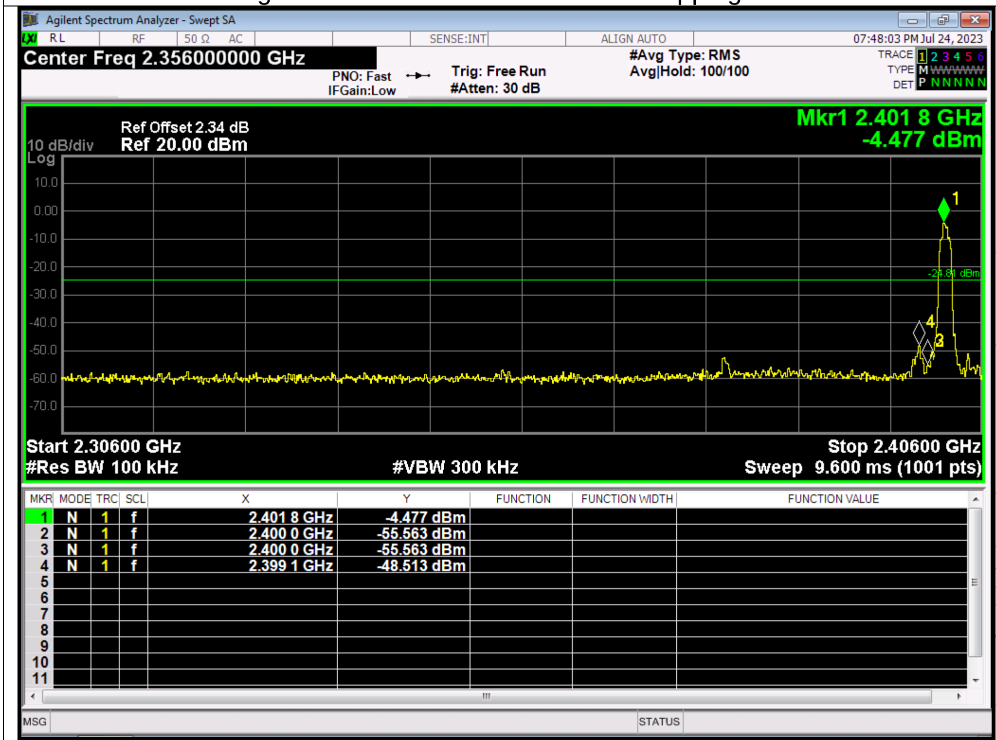
Band Edge NVNT 1-DH1 2480MHz No-Hopping Emission



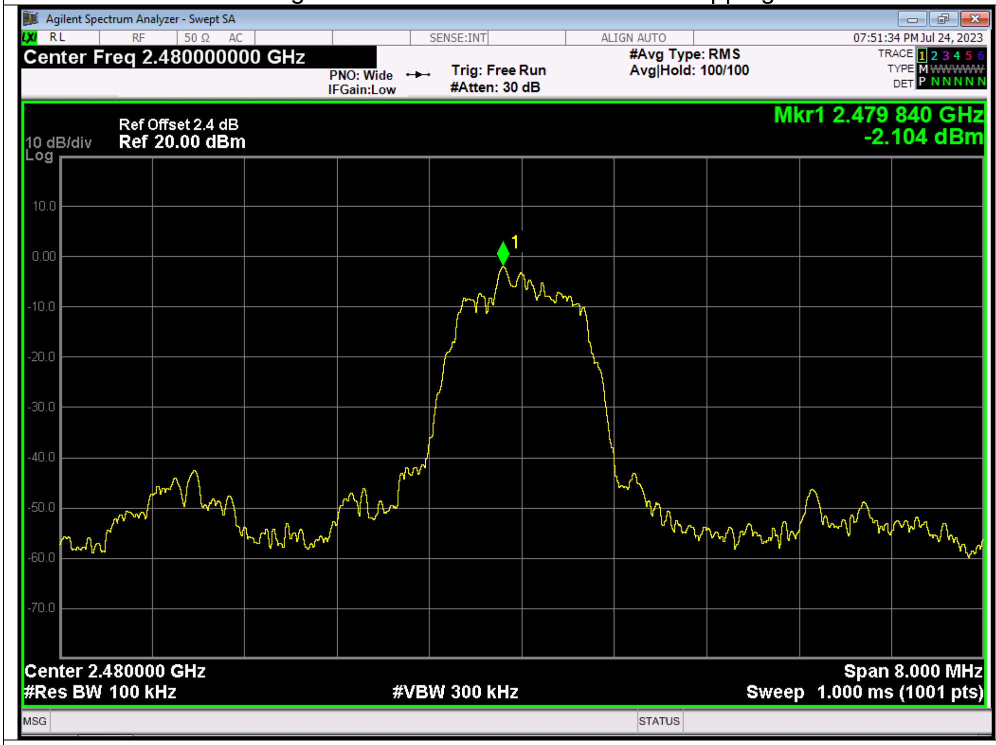
Band Edge NVNT 2-DH1 2402MHz No-Hopping Ref



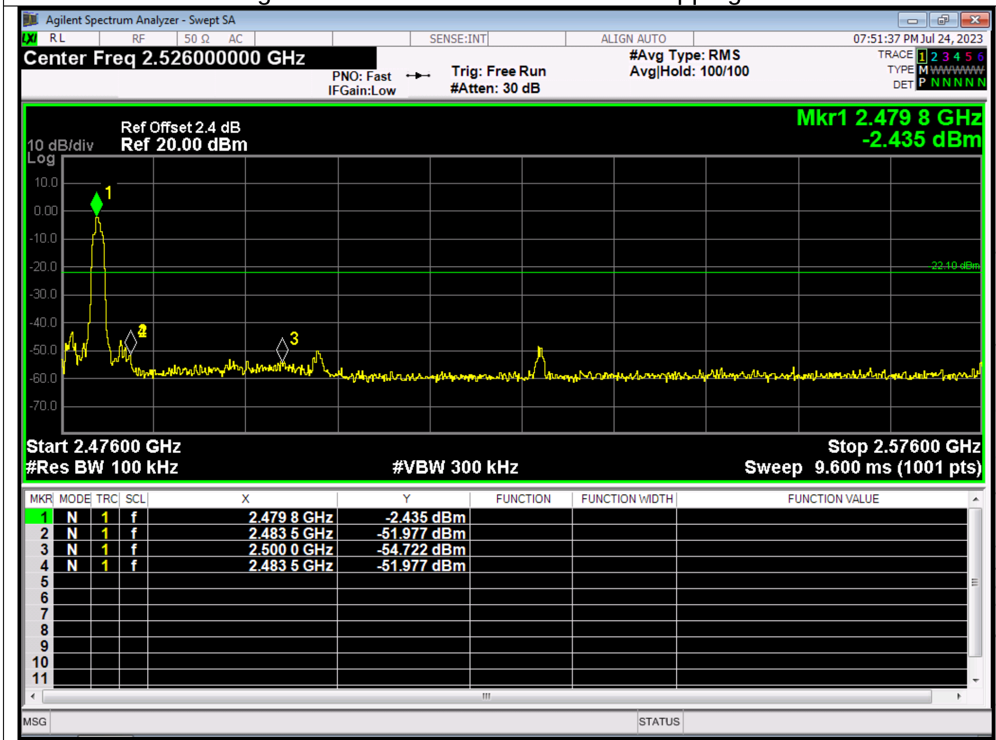
Band Edge NVNT 2-DH1 2402MHz No-Hopping Emission



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

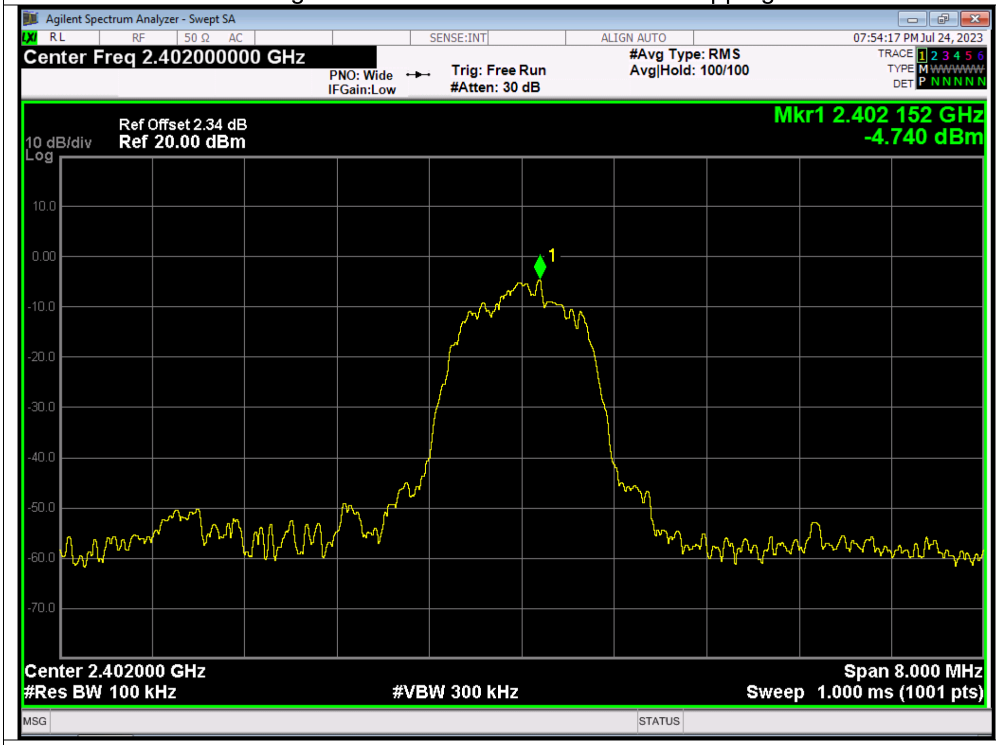


Band Edge NVNT 2-DH1 2480MHz No-Hopping Emission

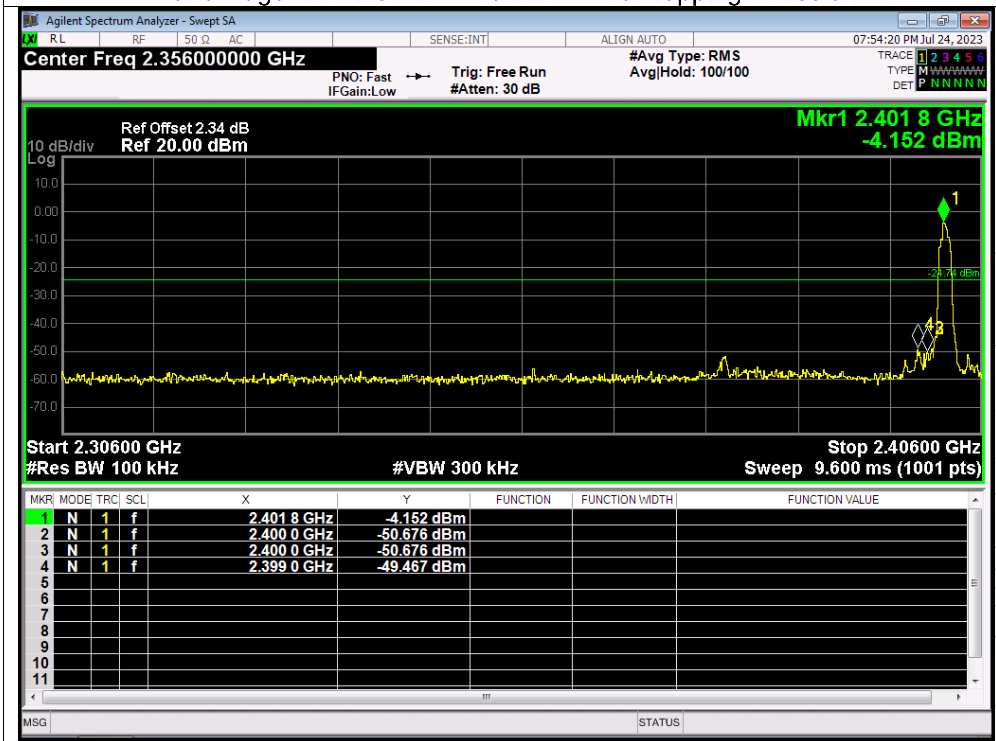


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.479 8 GHz	-2.435 dBm			
2	N	1	f	2.483 5 GHz	-51.977 dBm			
3	N	1	f	2.500 0 GHz	-54.722 dBm			
4	N	1	f	2.483 5 GHz	-51.977 dBm			

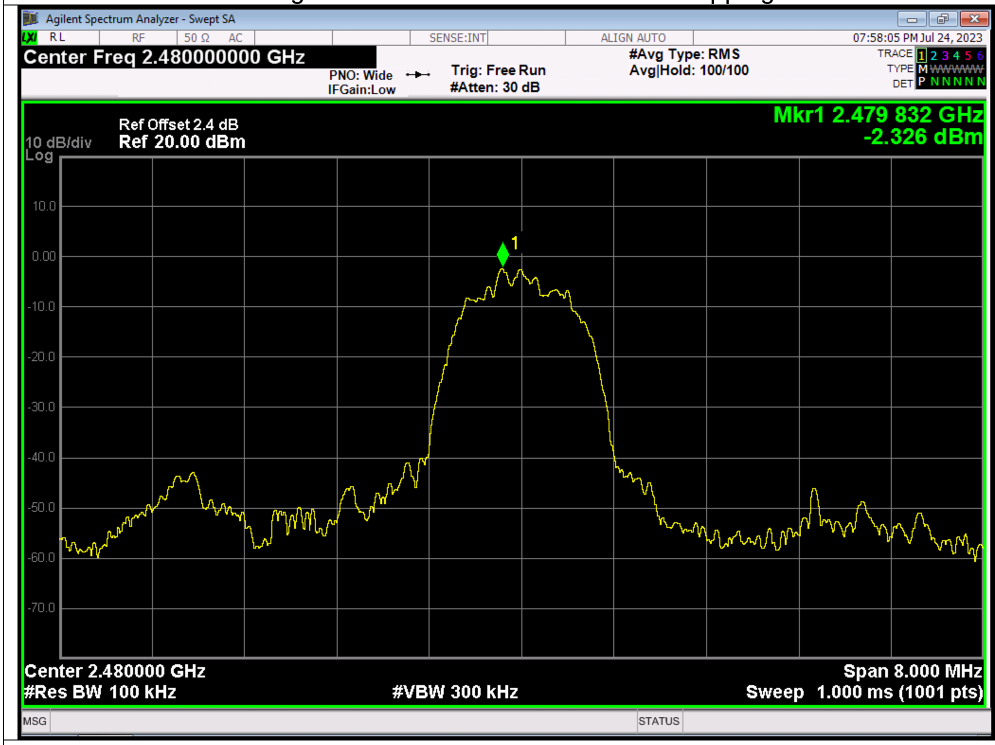
Band Edge NVNT 3-DH1 2402MHz No-Hopping Ref



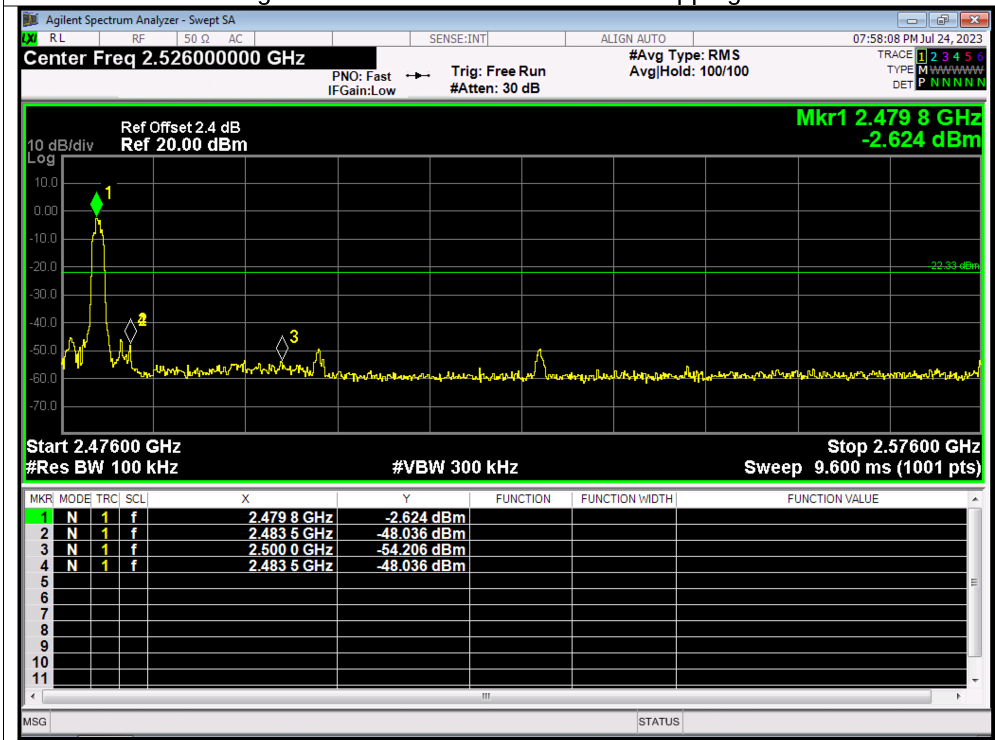
Band Edge NVNT 3-DH1 2402MHz No-Hopping Emission



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



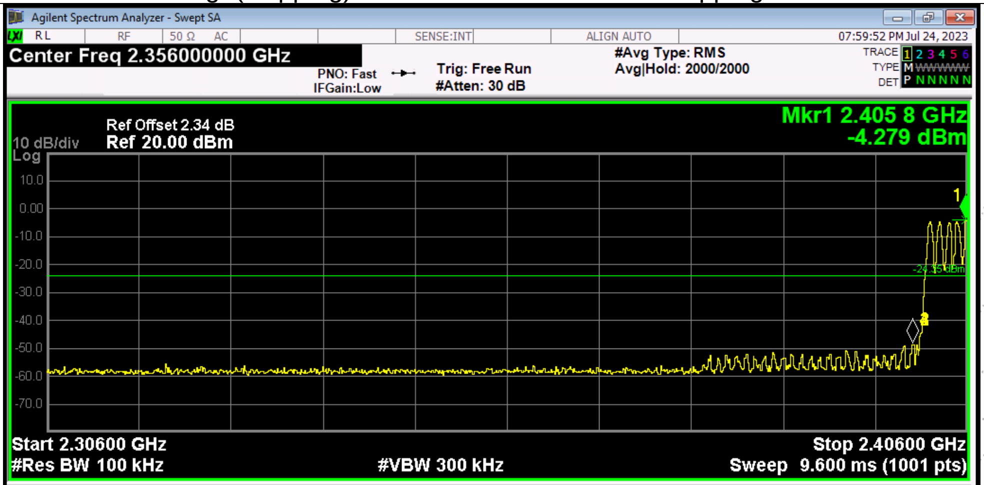
Band Edge NVNT 3-DH1 2480MHz No-Hopping Emission



Test Graphs

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

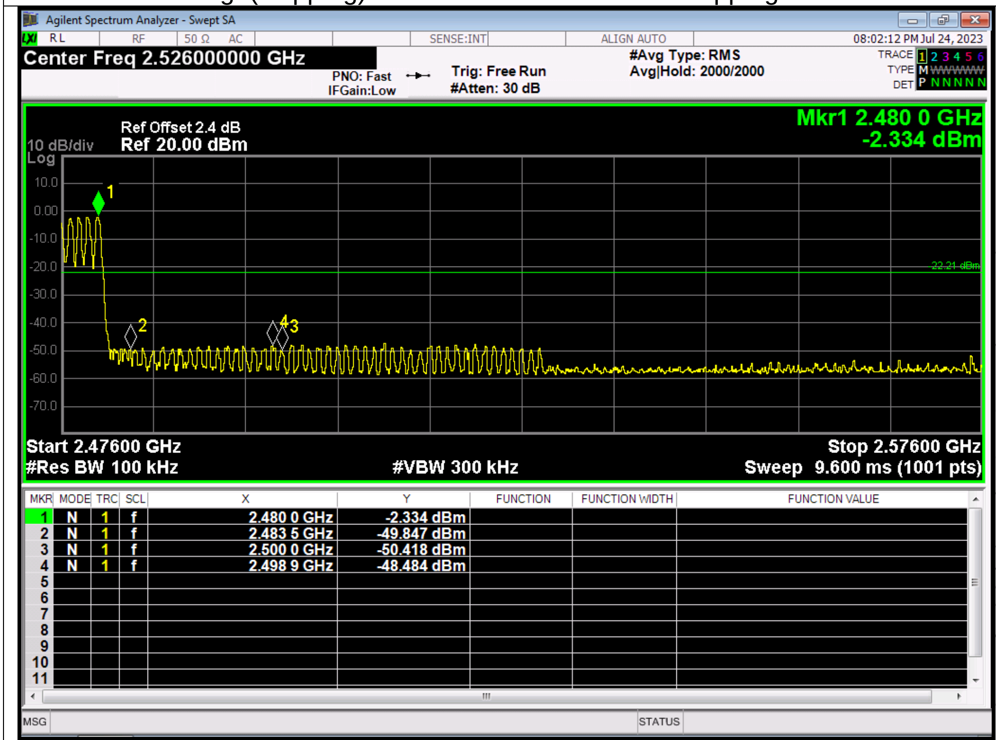
Band Edge(Hopping) NVNT 1-DH1 2402MHz Hopping Emission



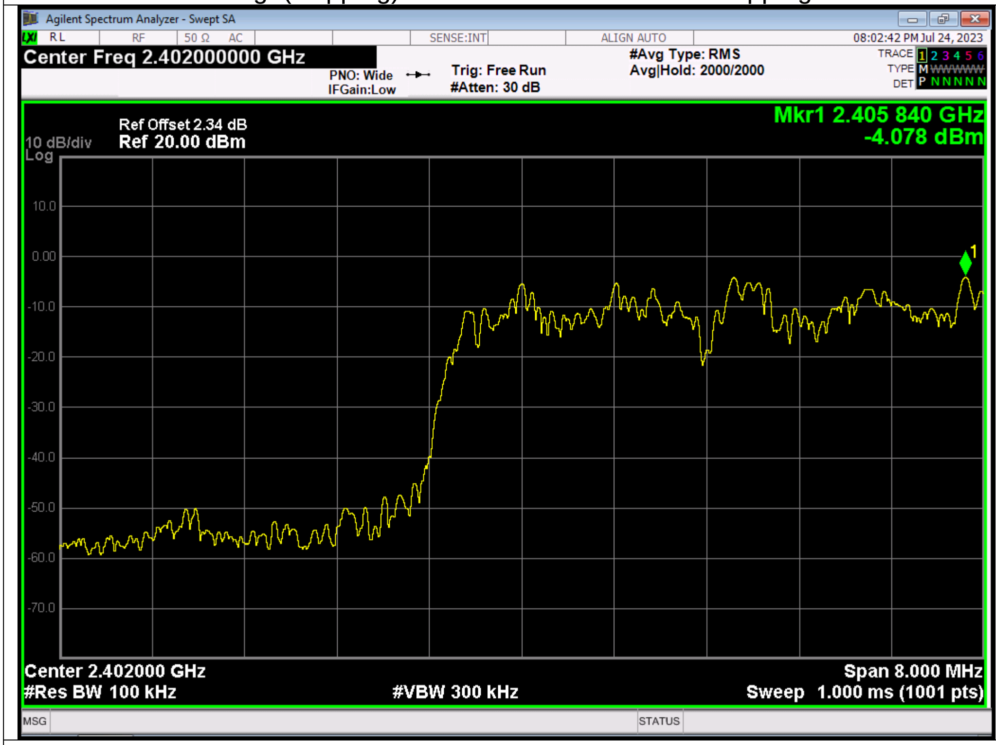
MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.405 8 GHz	-4.279 dBm			
2	N	1	f	2.400 0 GHz	-48.795 dBm			
3	N	1	f	2.400 0 GHz	-48.795 dBm			
4	N	1	f	2.400 0 GHz	-48.795 dBm			
5								
6								
7								
8								
9								
10								
11								

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

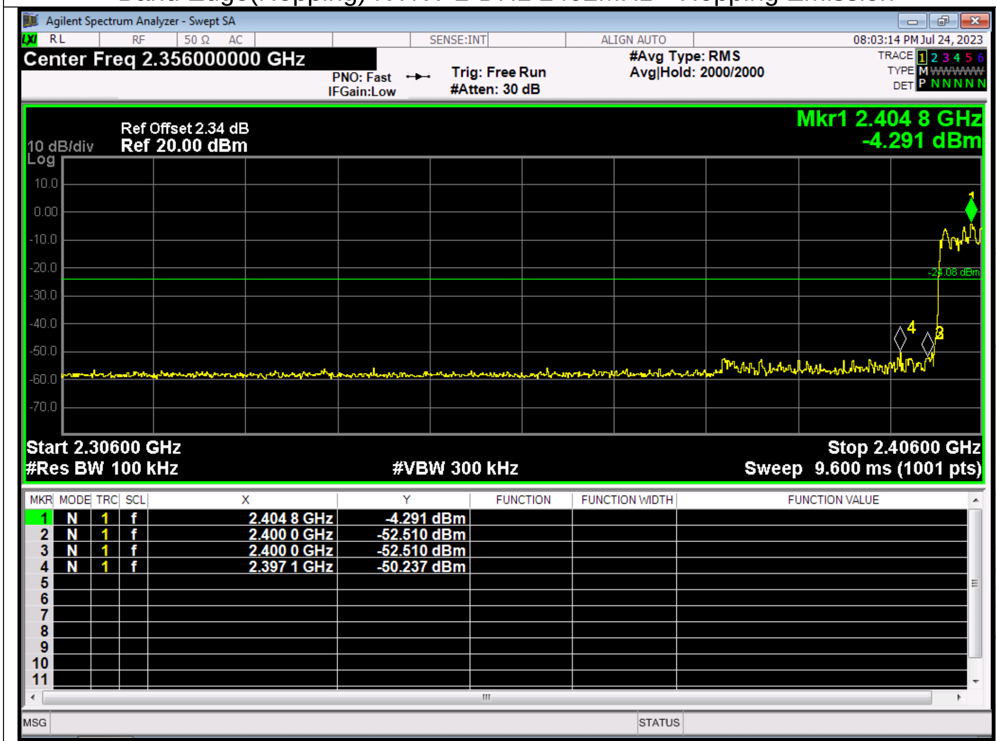
Band Edge(Hopping) NVNT 1-DH1 2480MHz Hopping Emission



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

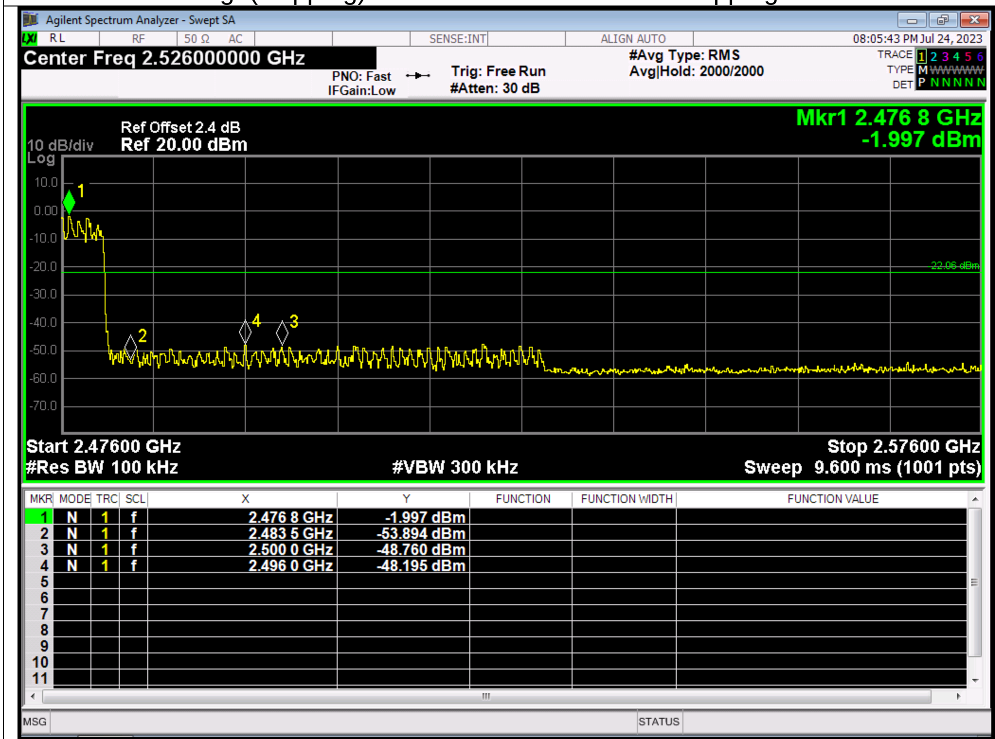


Band Edge(Hopping) NVNT 2-DH1 2402MHz Hopping Emission



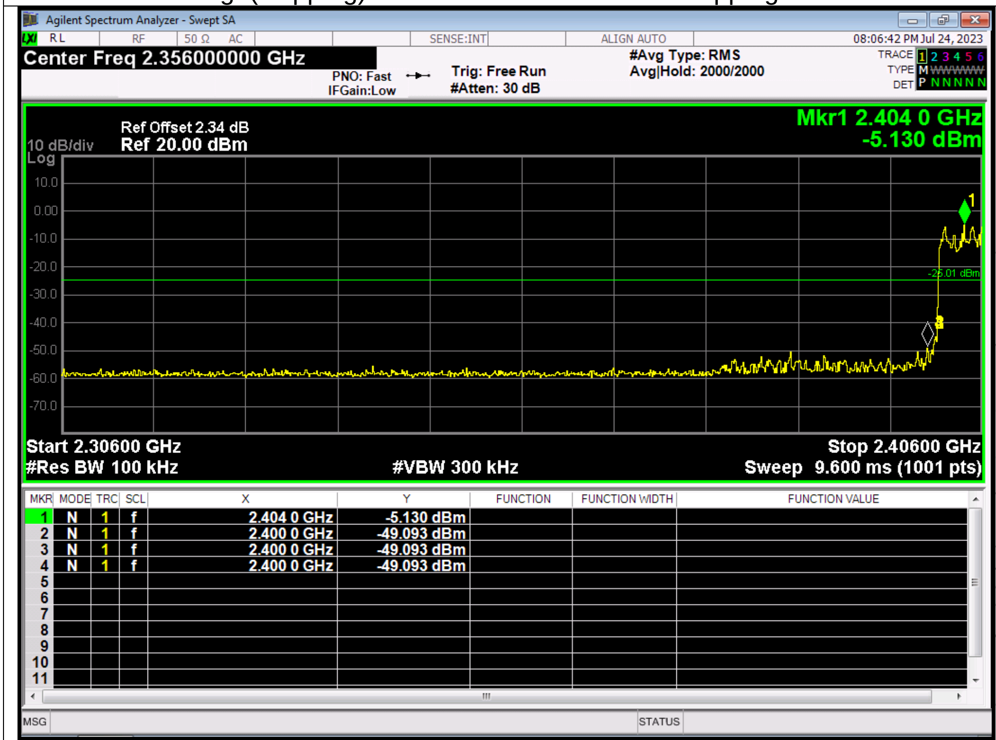
Band Edge(Hopping) NVNT 2-DH1 2480MHz Hopping Ref

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



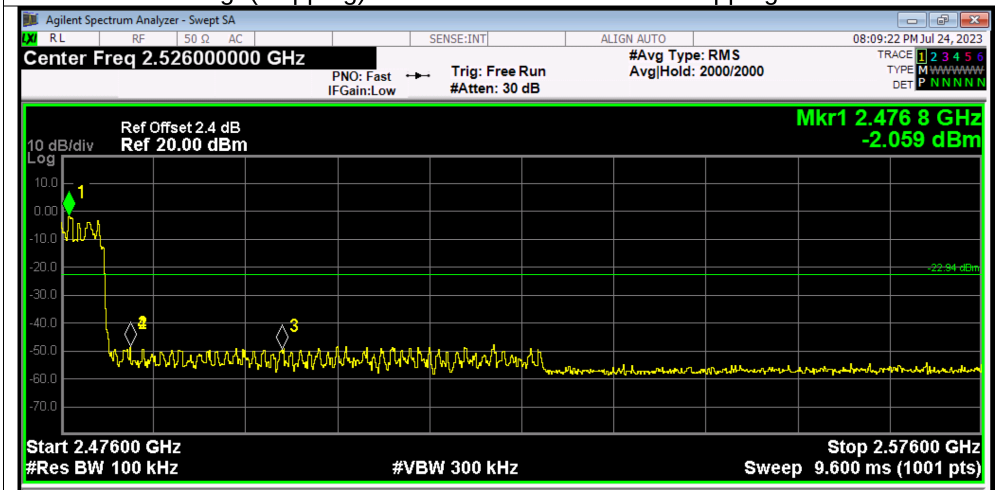
Band Edge(Hopping) NVNT 3-DH1 2402MHz Hopping Ref

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



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

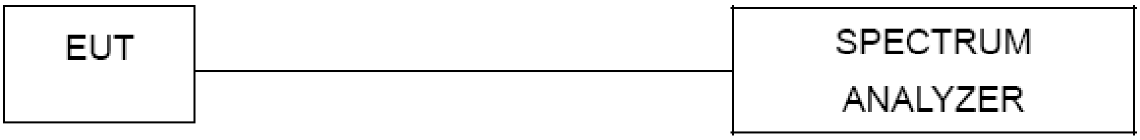
Band Edge(Hopping) NVNT 3-DH1 2480MHz Hopping Emission



MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	f	2.476 8 GHz	-2.059 dBm			
2	N	1	f	2.483 5 GHz	-48.828 dBm			
3	N	1	f	2.500 0 GHz	-49.927 dBm			
4	N	1	f	2.483 5 GHz	-48.828 dBm			
5								
6								
7								
8								
9								
10								
11								

10. 20 dB Bandwidth

10.1 Block Diagram Of Test Setup



10.2 Limit

N/A

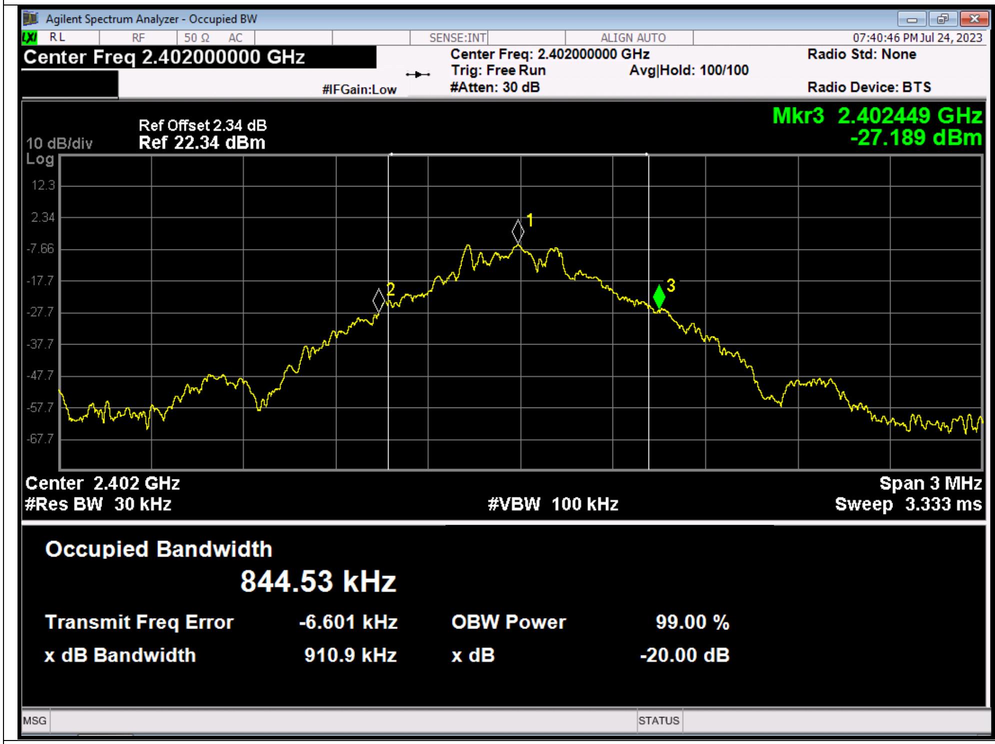
10.3 Test procedure

1. Set RBW = 30kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

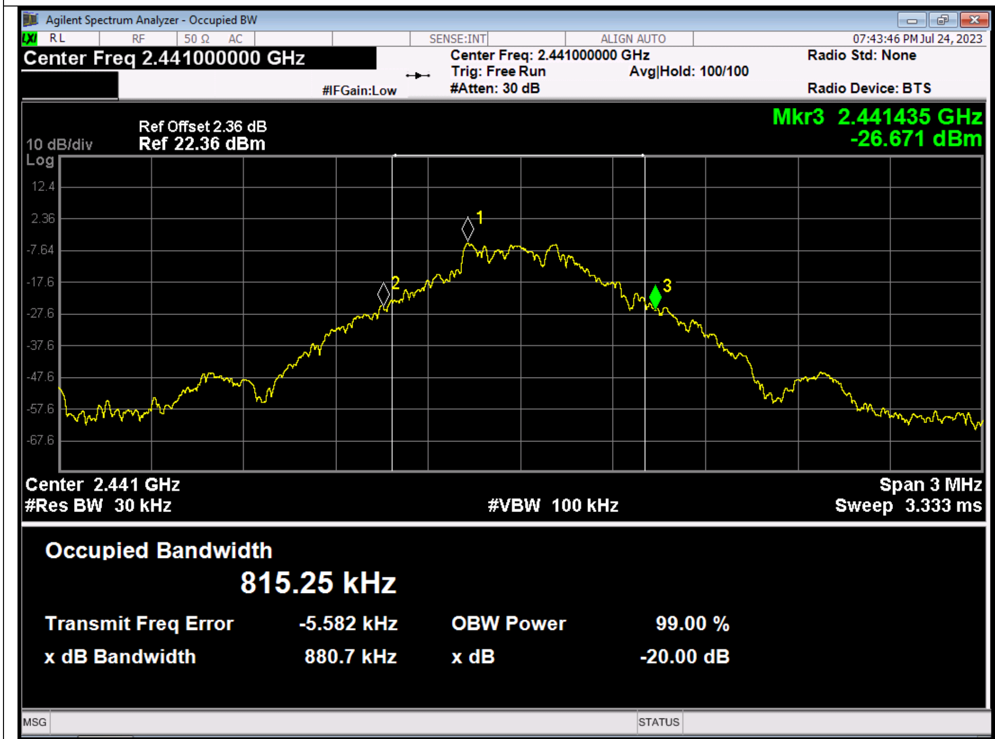
10.4 Test Result

Condition	Mode	Frequency (MHz)	-20 dB Bandwidth (MHz)	Verdict
NVNT	1-DH1	2402	0.911	Pass
NVNT	1-DH1	2441	0.881	Pass
NVNT	1-DH1	2480	0.858	Pass
NVNT	2-DH1	2402	1.257	Pass
NVNT	2-DH1	2441	1.225	Pass
NVNT	2-DH1	2480	1.252	Pass
NVNT	3-DH1	2402	1.220	Pass
NVNT	3-DH1	2441	1.221	Pass
NVNT	3-DH1	2480	1.223	Pass

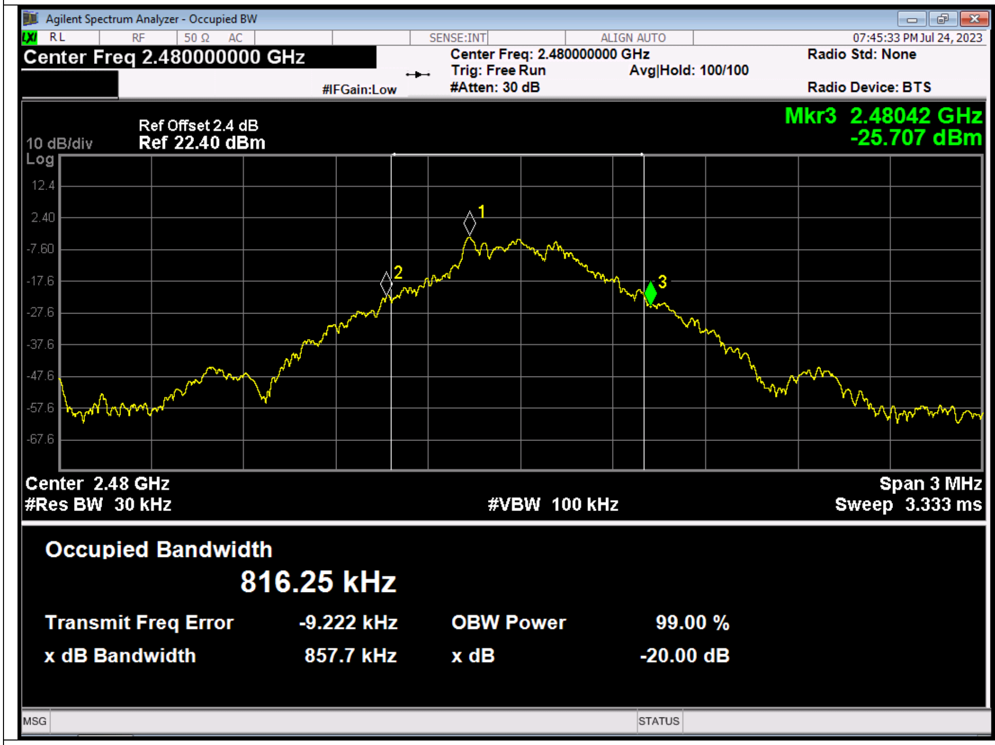
Test Graphs
-20dB Bandwidth NVNT 1-DH1 2402MHz



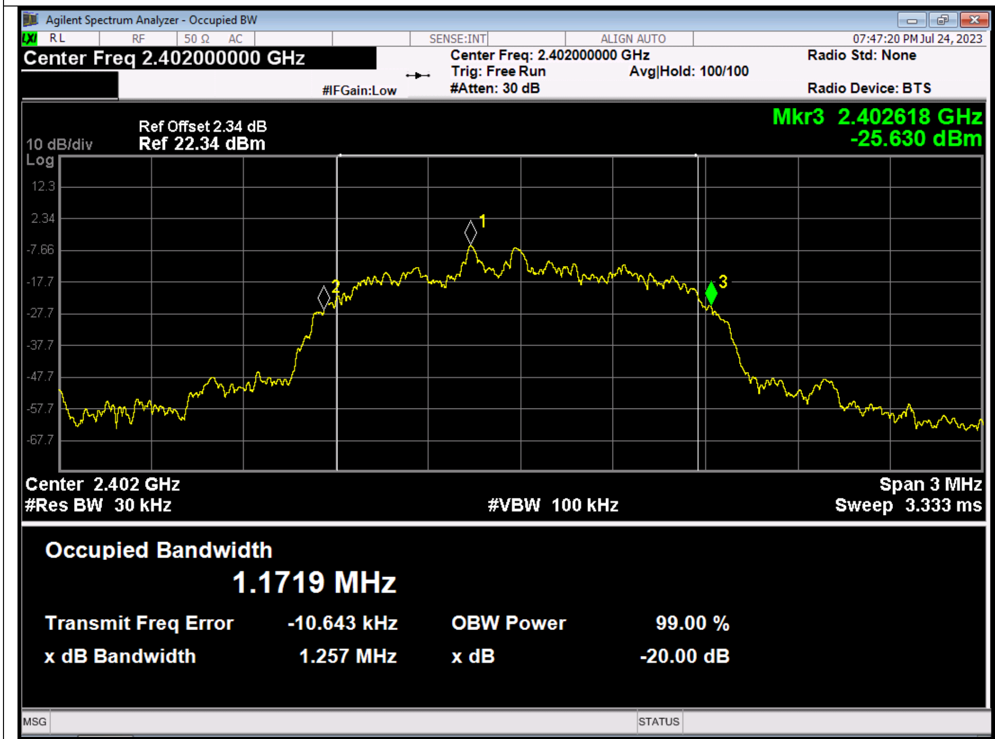
-20dB Bandwidth NVNT 1-DH1 2441MHz



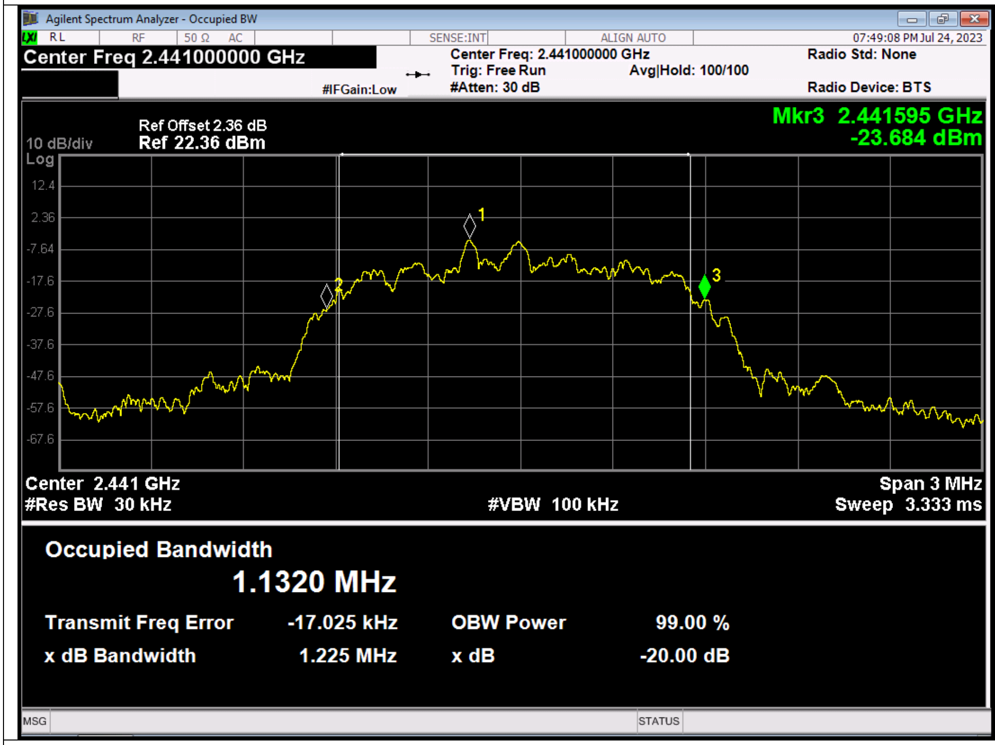
-20dB Bandwidth NVNT 1-DH1 2480MHz



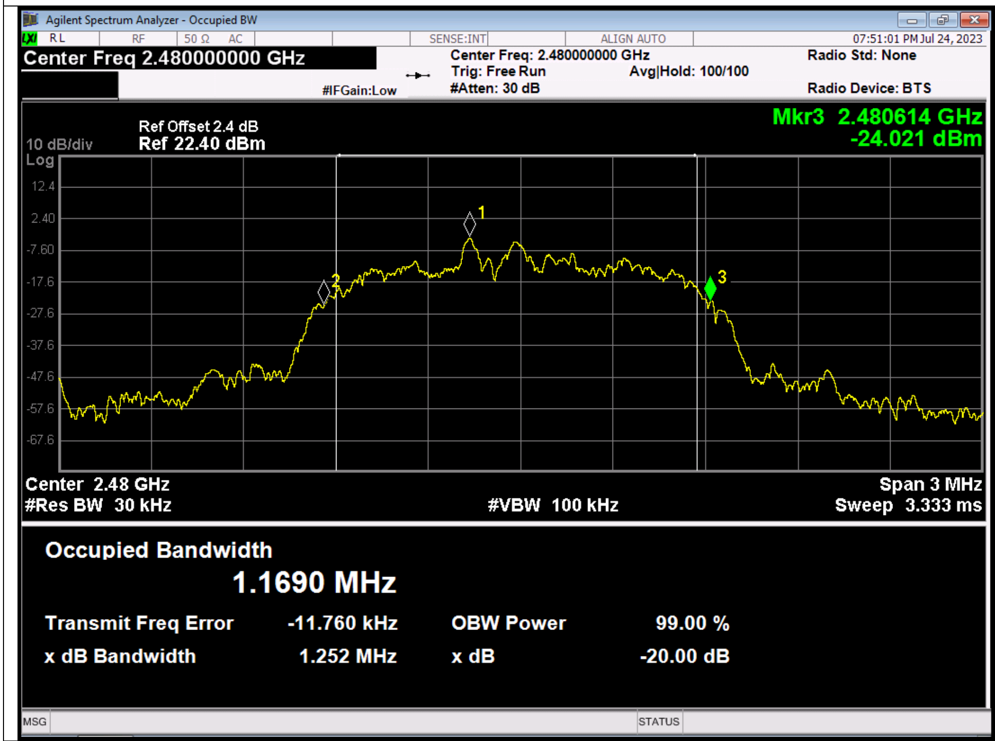
-20dB Bandwidth NVNT 2-DH1 2402MHz



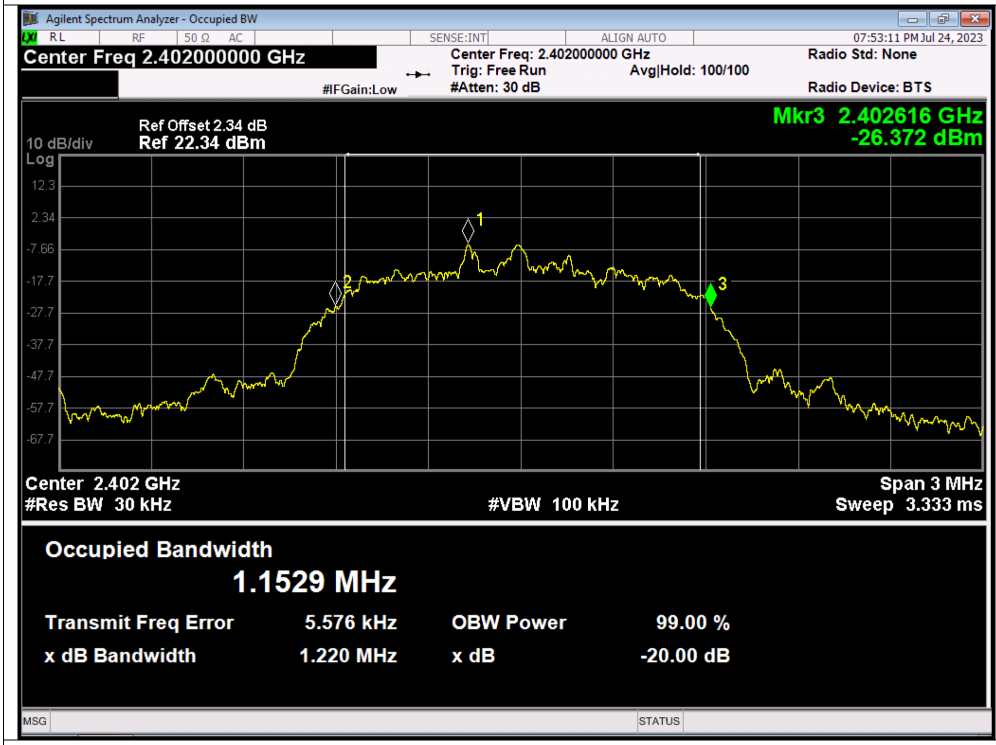
-20dB Bandwidth NVNT 2-DH1 2441MHz



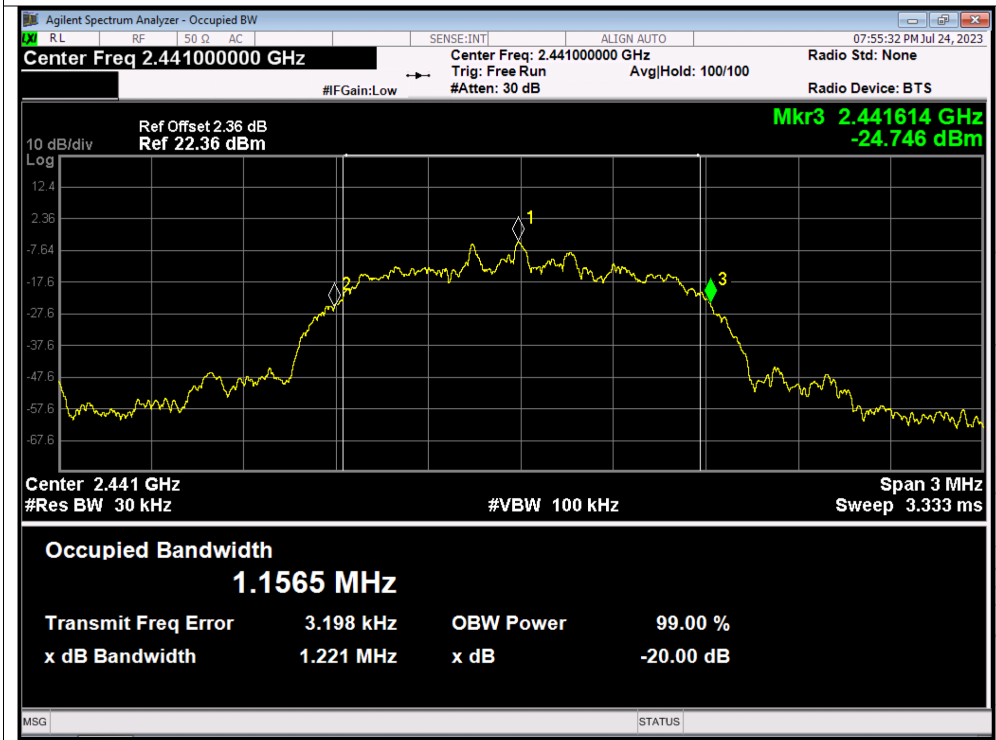
-20dB Bandwidth NVNT 2-DH1 2480MHz



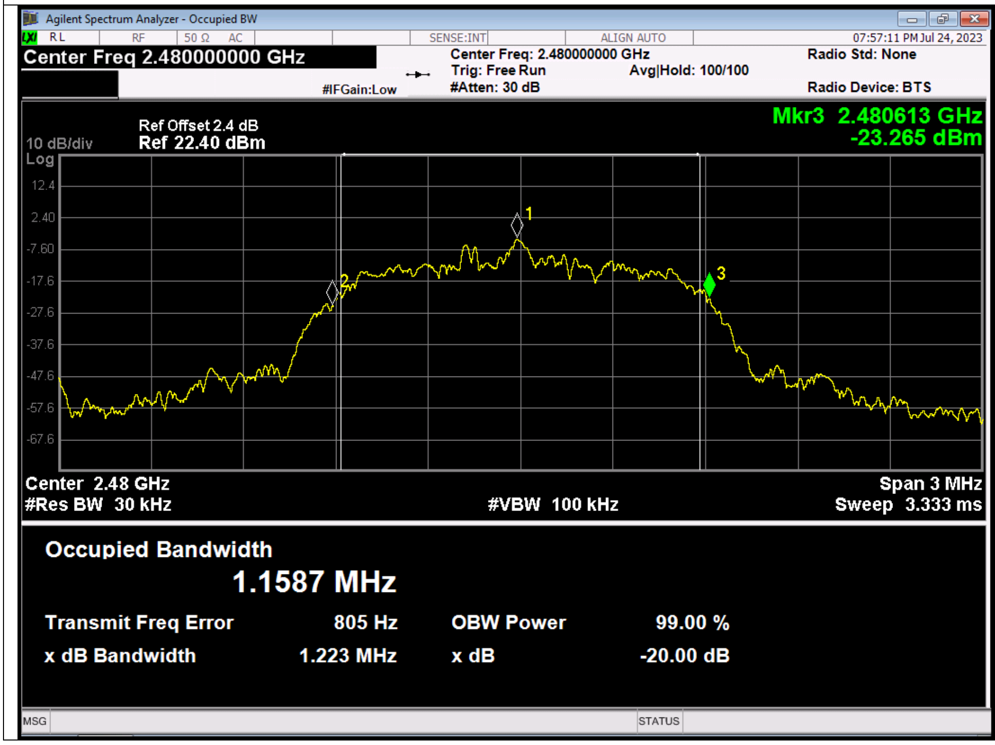
-20dB Bandwidth NVNT 3-DH1 2402MHz



-20dB Bandwidth NVNT 3-DH1 2441MHz

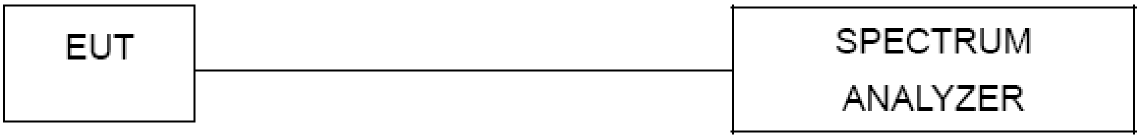


-20dB Bandwidth NVNT 3-DH1 2480MHz



11. Maximum Peak Output Power

11.1 Block Diagram Of Test Setup



11.2 Limit

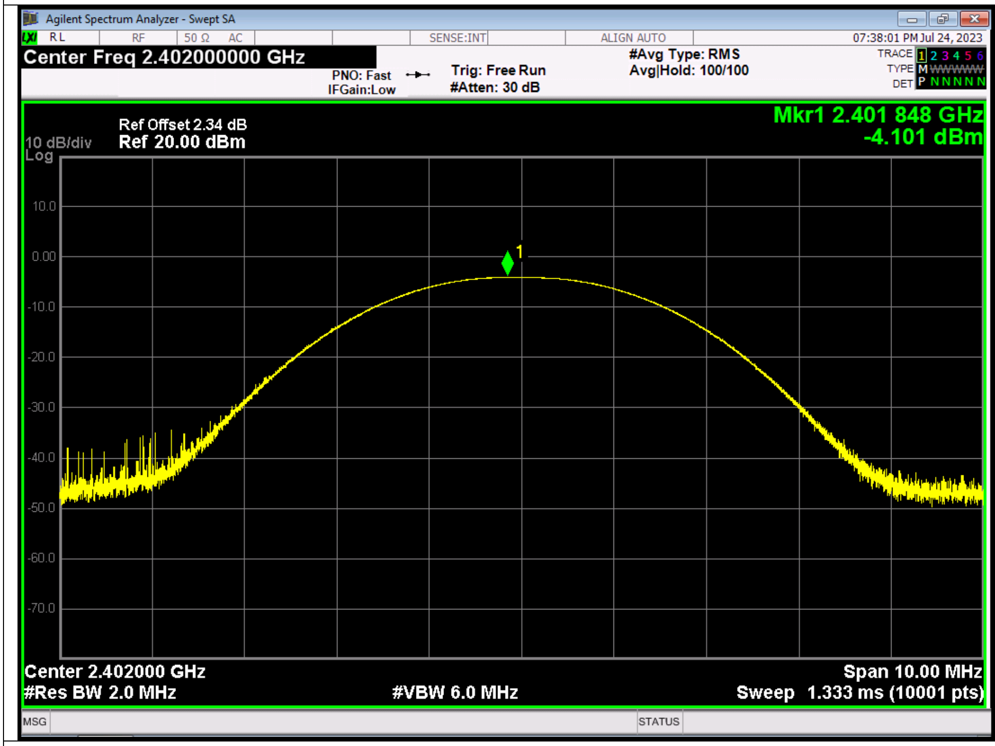
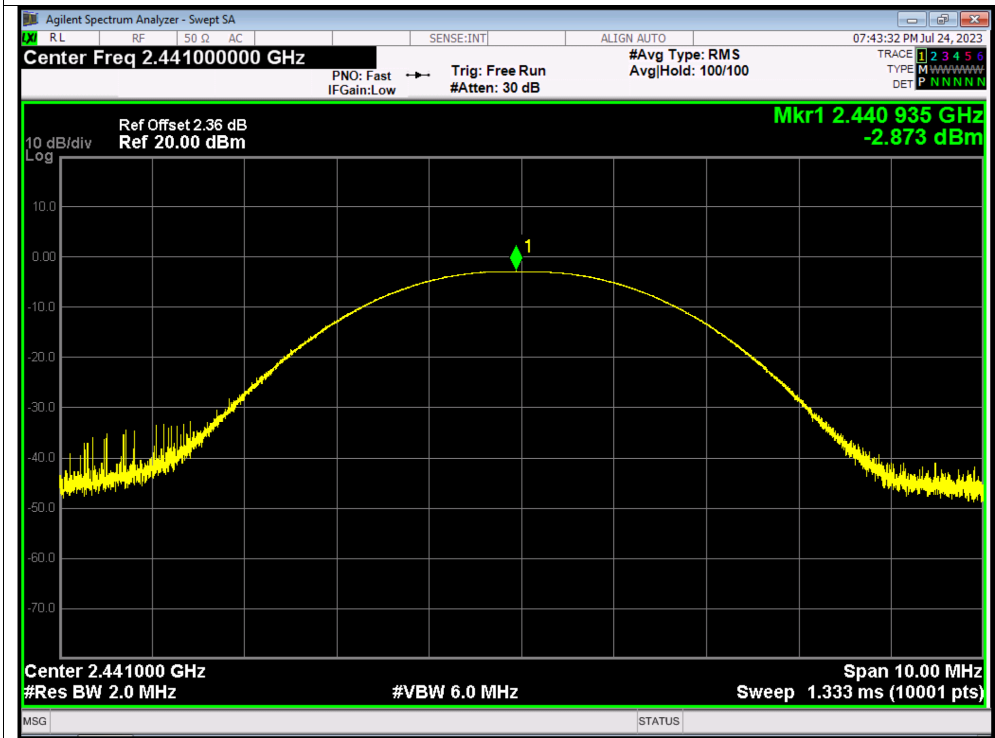
FCC Part15 (15.247) , Subpart C				
Section	**Test Item**	**Limit**	**Frequency Range (MHz)**	**Result**
15.247(b)(1)	Peak Output Power	0.125 watt or 21dBm	2400-2483.5	PASS

11.3 Test procedure

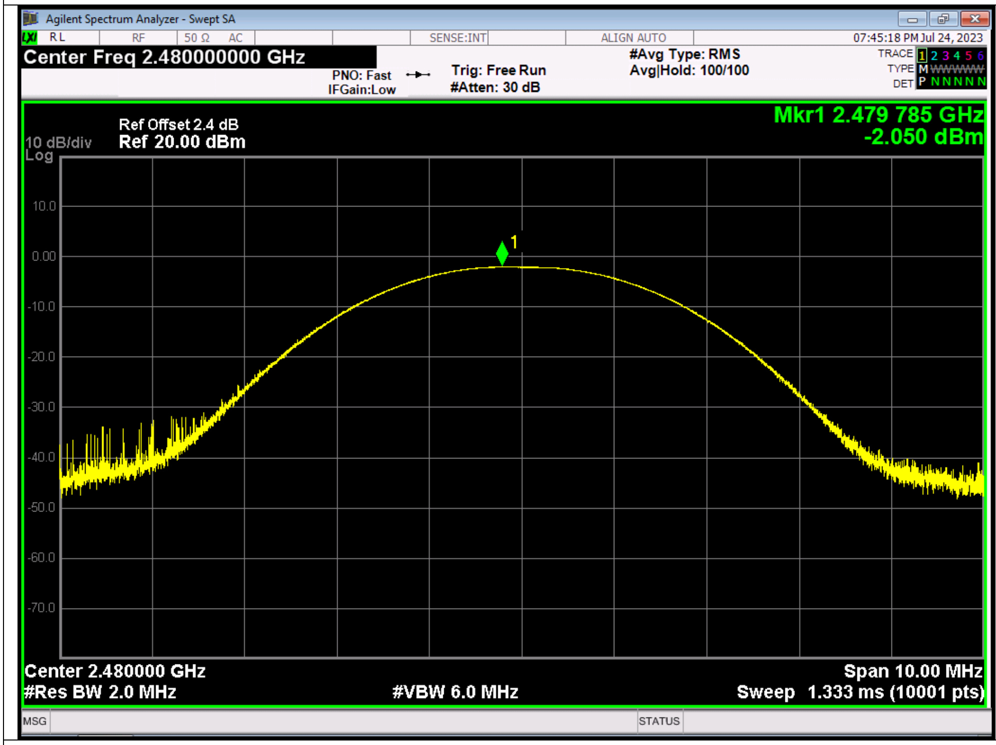
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 2MHz. VBW = 6MHz. Sweep = auto; Detector Function = Peak.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

11.4 Test Result

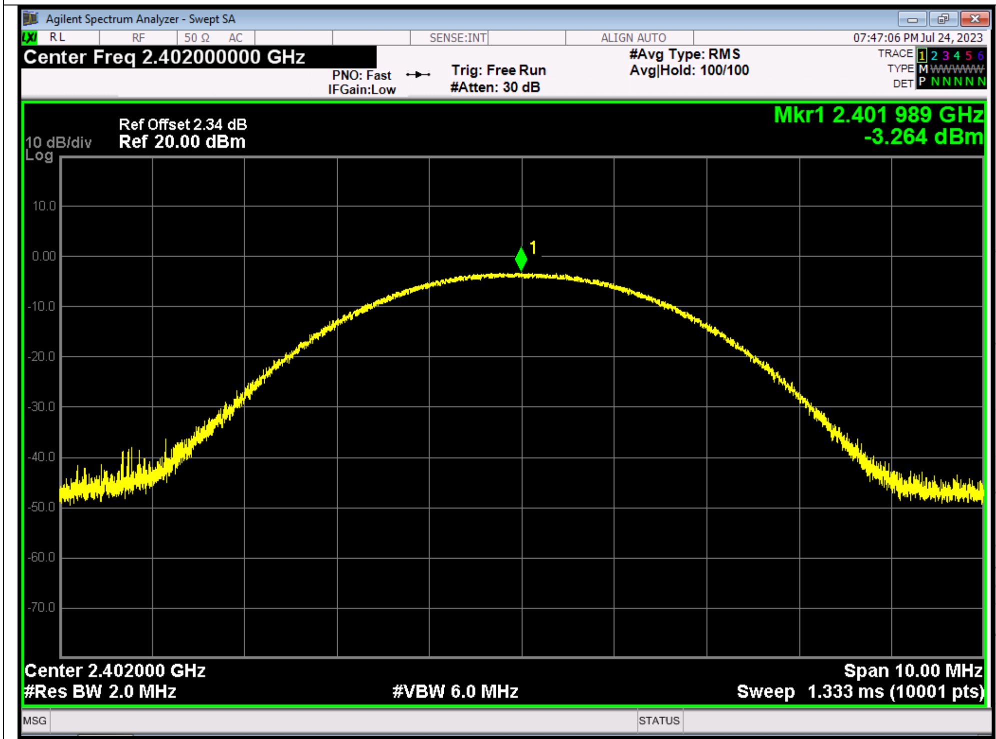
Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	1-DH1	2402	-4.10	21	Pass
NVNT	1-DH1	2441	-2.87	21	Pass
NVNT	1-DH1	2480	-2.05	21	Pass
NVNT	2-DH1	2402	-3.26	21	Pass
NVNT	2-DH1	2441	-1.99	21	Pass
NVNT	2-DH1	2480	-1.18	21	Pass
NVNT	3-DH1	2402	-2.65	21	Pass
NVNT	3-DH1	2441	-1.39	21	Pass
NVNT	3-DH1	2480	-0.55	21	Pass

Test Graphs
Power NVNT 1-DH1 2402MHz

Power NVNT 1-DH1 2441MHz


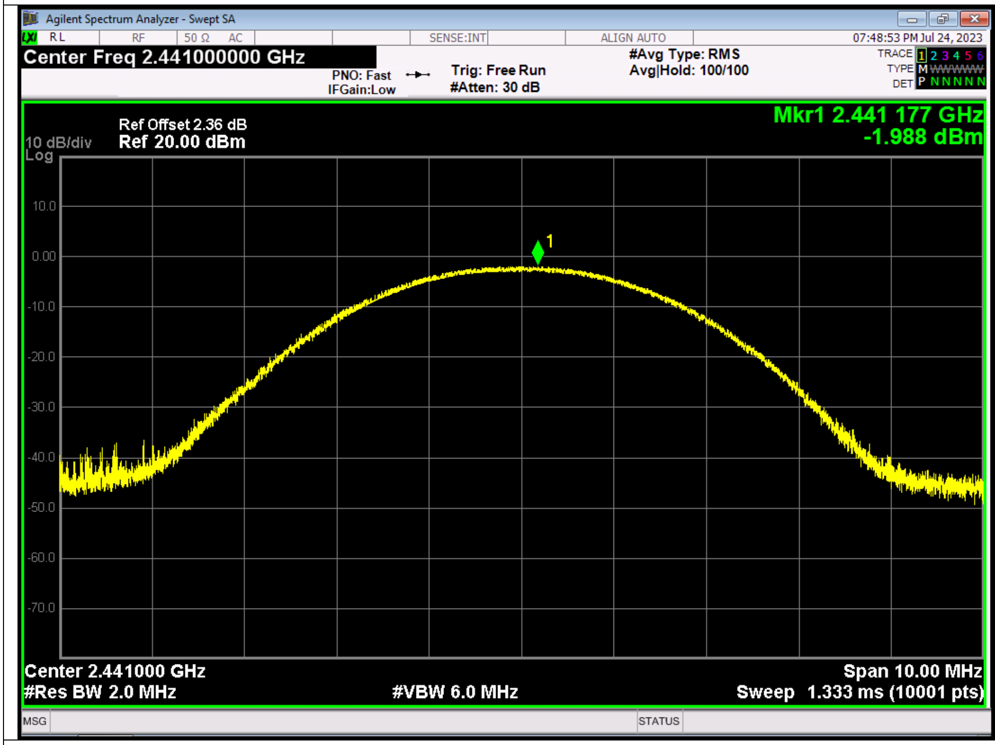
Power NVNT 1-DH1 2480MHz



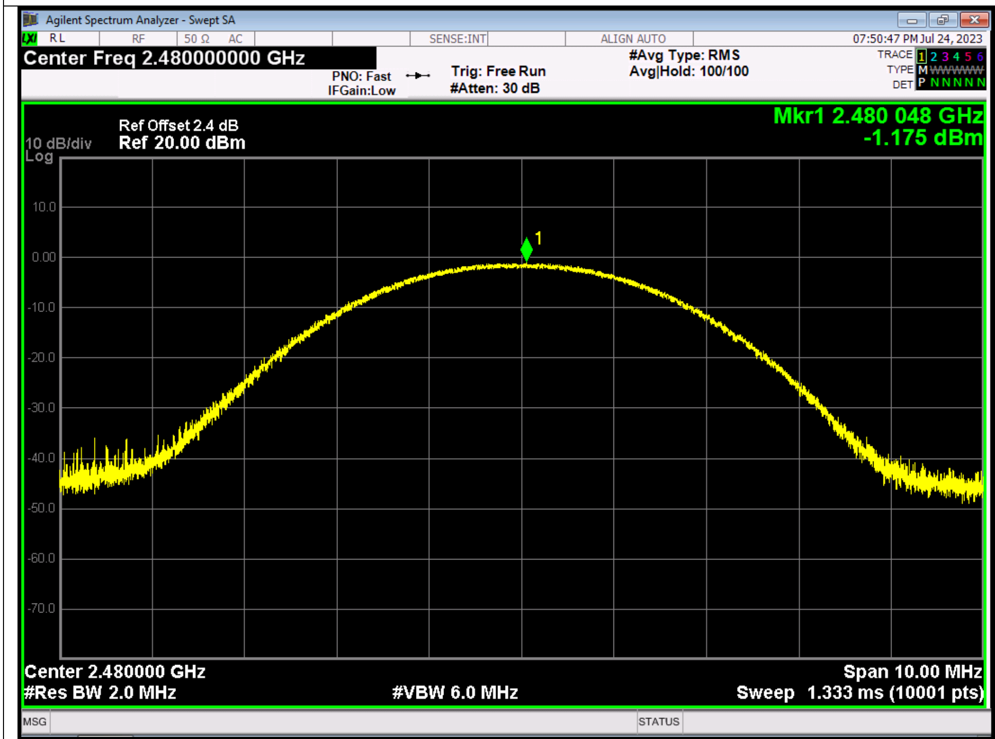
Power NVNT 2-DH1 2402MHz



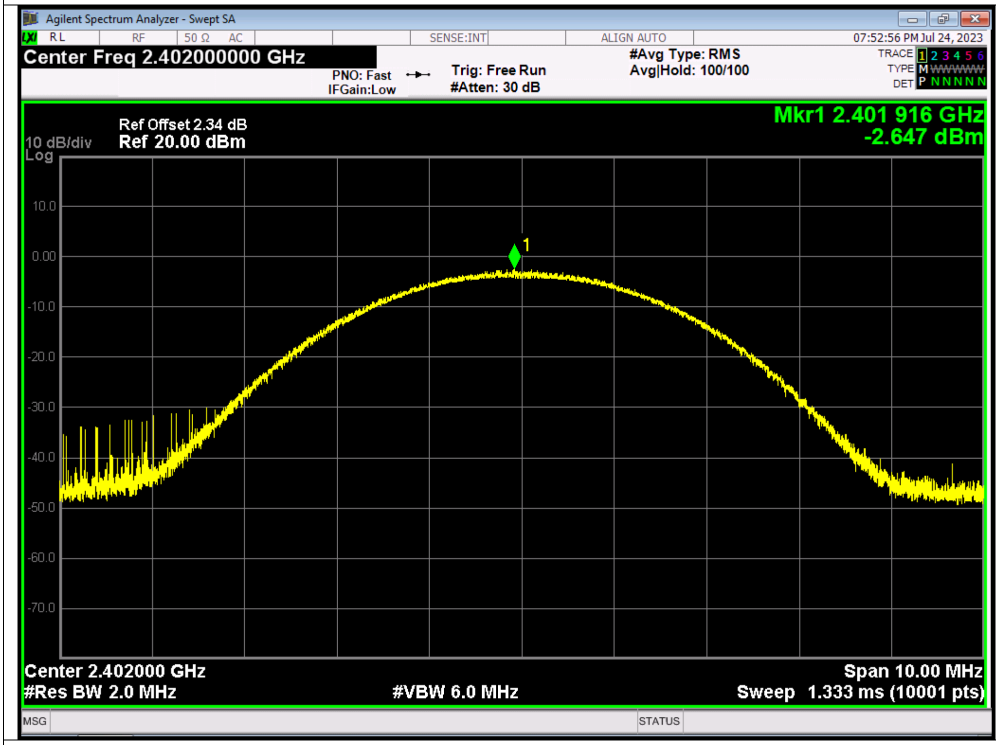
Power NVNT 2-DH1 2441MHz



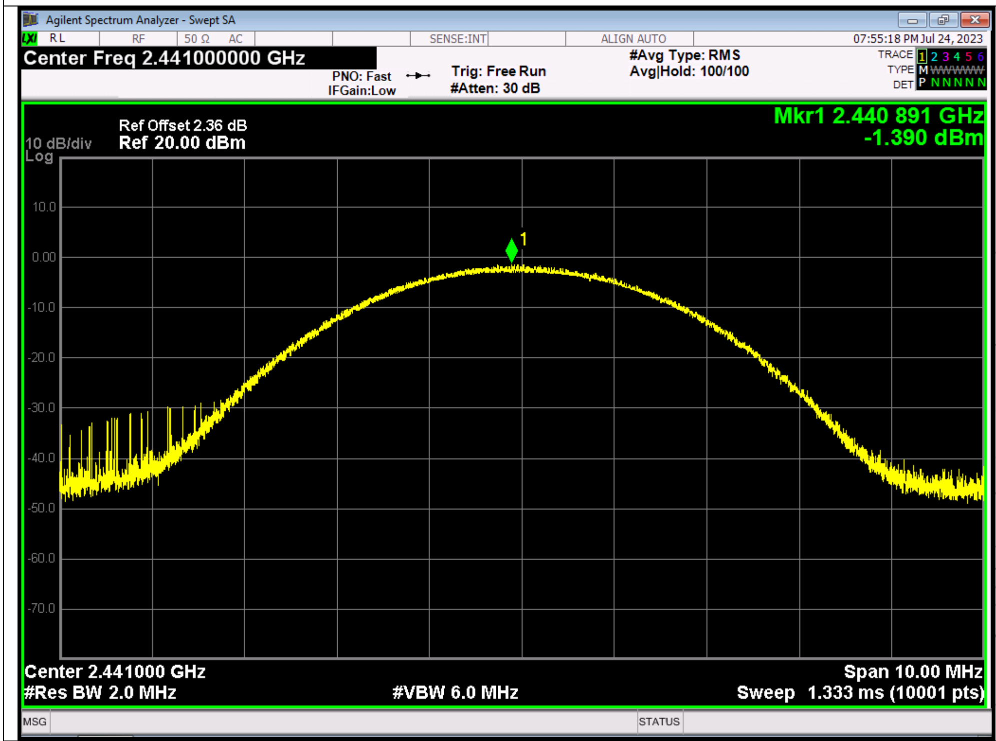
Power NVNT 2-DH1 2480MHz



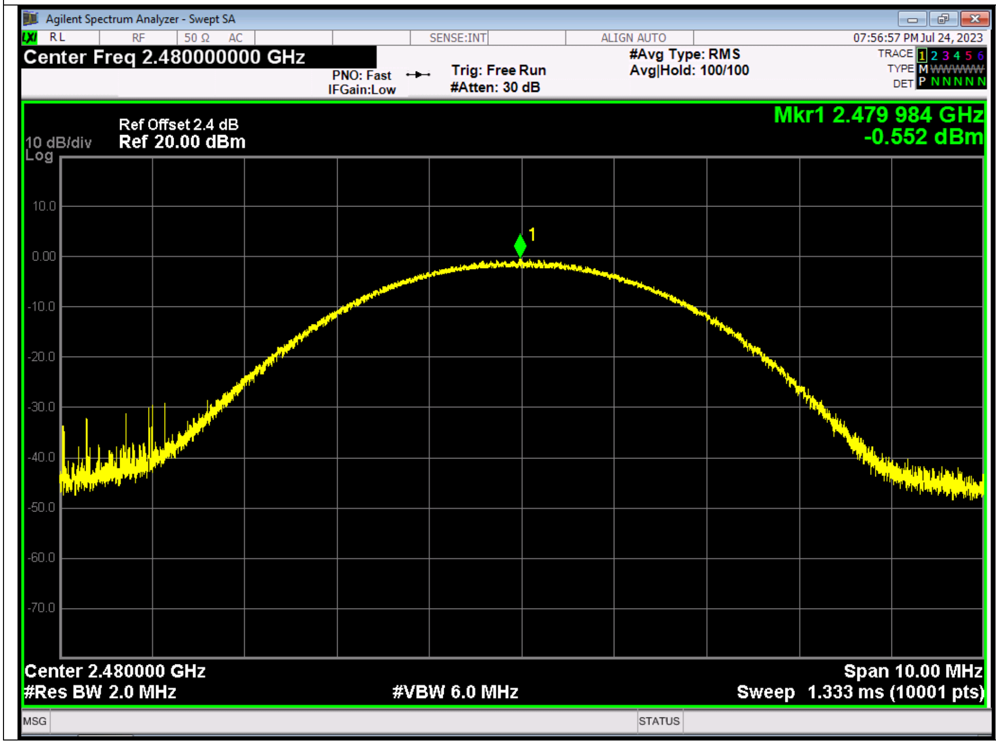
Power NVNT 3-DH1 2402MHz



Power NVNT 3-DH1 2441MHz

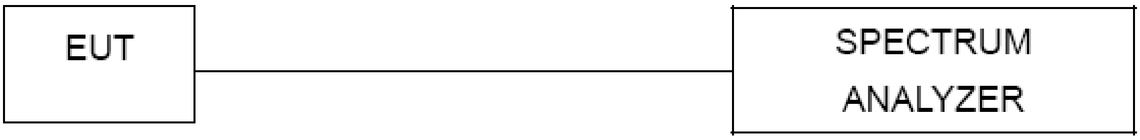


Power NVNT 3-DH1 2480MHz



12. Hopping Channel Separation

12.1 Block Diagram Of Test Setup



12.2 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 0.125W.

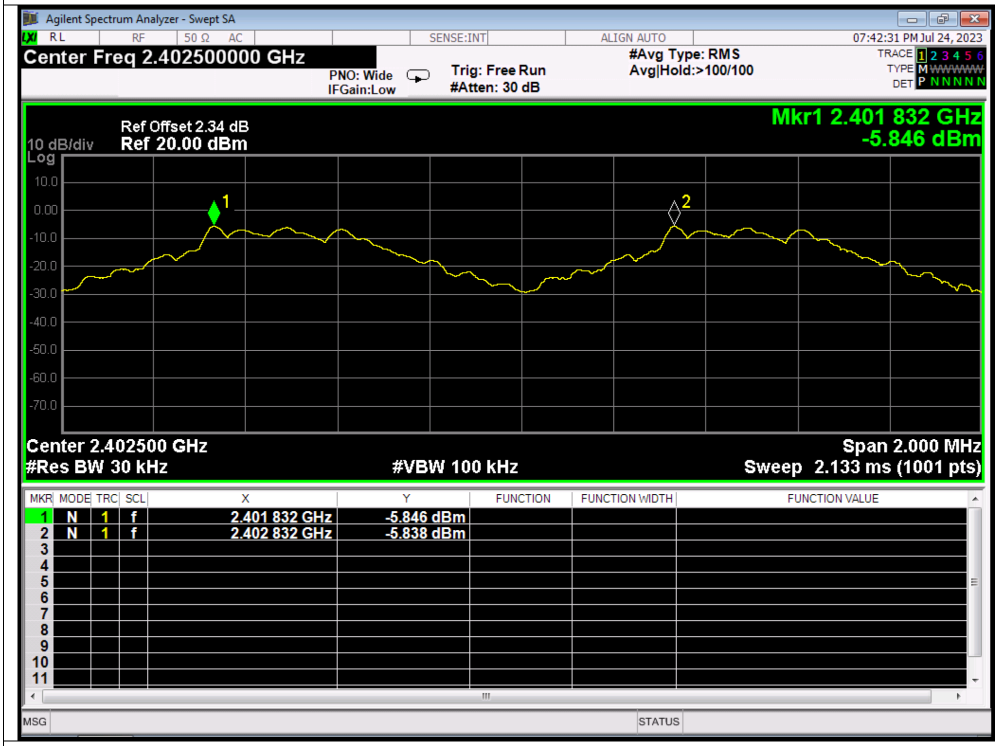
12.3 Test procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 30kHz. VBW = 100kHz , Span = 2.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

12.4 Test Result

Condition	Mode	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH1	2401.832	2402.832	1	0.911	Pass
NVNT	1-DH1	2440.832	2441.834	1.002	0.881	Pass
NVNT	1-DH1	2478.832	2479.832	1	0.858	Pass
NVNT	2-DH1	2401.834	2402.834	1	0.838	Pass
NVNT	2-DH1	2440.832	2441.832	1	0.817	Pass
NVNT	2-DH1	2478.834	2479.834	1	0.835	Pass
NVNT	3-DH1	2401.832	2402.832	1	0.813	Pass
NVNT	3-DH1	2440.834	2441.834	1	0.814	Pass
NVNT	3-DH1	2478.832	2479.832	1	0.815	Pass

Test Graphs
CFS NVNT 1-DH1 2402MHz



CFS NVNT 1-DH1 2441MHz