FCC Part 15C Test Report
FCC ID: 2BG2N-Y83

Applicant:	Qile (Shenzhen) Technology Co., Ltd
Address:	8031, Baode Industrial Center, Lixin South Road, Huaide Community, Fuyong Street, Bao'an District, Shenzhen
Manufacturer:	Qile (Shenzhen) Technology Co., Ltd
Address:	8031, Baode Industrial Center, Lixin South Road, Huaide Community, Fuyong Street, Bao'an District, Shenzhen
EUT:	Bluetooth headphones
Trade Mark:	N/A
Model Number:	Y83, J1,J2,J3,J5,J6,J7,J8,J9,J10,J11,Q1,Q2,Q3,Q5,Q6,Q7,Q8,Q9,Q10,Q11
Date of Receipt:	June. 14, 2024
Test Date:	June. 14, 2024 - June. 24, 2024
Date of Report:	June. 24, 2024
Prepared By:	Shenzhen DL Testing Technology Co., Ltd.
Address:	101-201, Building C, Shuanghuan, No.8, Baoqing Road, Baolong Industrial Zone, Baolong Street, Longgang District, Shenzhen, Guangdong, China
Applicable Standards:	FCC PART 15 C 15.247 ANSI C63.10:2013
Test Result:	Pass
Report Number:	DL-20240202065E

Prepared (Engineer):	Alisa Song
Reviewer (Supervisor):	Jack Bu
Approved (Manager):	Jade Yang

This test report is based on a single evaluation of one sample of above mentioned products. It is not permitted to be duplicated in extracts without written approval of Shenzhen DL Testing Technology Co., Ltd.

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247(c)	Radiated Spurious Emission	PASS	
15.205	Band Edge Emission	PASS	
15.247(b)(1)	Peak Output Power	PASS	
15.247(a)(iii)	Number of Hopping Frequency	PASS	
15.247(a)(iii)	Dwell Time	PASS	
15.247(a)(1)	Bandwidth	PASS	
15.247(a)(1)	Hopping Channel Separation	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**, where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

No.	Item	Uncertainty
1	Conducted Emission Test	±2.56dB
2	RF power,conducted	±0.42dB
3	Spurious emissions,conducted	±2.76dB
4	All emissions,radiated(<1G)	±3.65dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product Name:	Bluetooth headphones
Trademark	N/A
Model No.:	Y83, J1,J2,J3,J5,J6,J7,J8,J9,J10,J11,Q1,Q2,Q3,Q5,Q6,Q7,Q8,Q9,Q10,Q11
Model Difference	PCB board, structure and internal of these model(s) are the same, So no additional models were tested.
BT Version:	5.4
Operation Frequency:	2402~2480MHz
Channel numbers:	79 Channels
Channel separation:	1/2/3M
Modulation technology:	GFSK ,π/4 DQPSK, 8DPSK
Antenna Type:	Chip Antenna
Antenna gain:	2.36dBi
Power supply:	Input: DC 5V DC 3.7V,30mAh by Rechargeable Li-ion Battery

Note:

1.For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.The EUT's all information provided by client.

2.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
~	~	~	~	~	~
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2441	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
~	~	~	~	~	~
14	2416	41	2443	68	2470
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

2.2 DESCRIPTION OF TEST MODES

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.

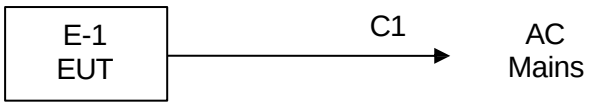
Pretest Mode	Description	
Mode 1	CH00	GFSK, π /4 DQPSK,8DPSK
Mode 2	CH39	
Mode 3	CH78	
Mode 4	Link Mode	
For Conducted & Radiated Emission		
Final Test Mode	Description	
Mode 1	CH00	GFSK, π /4 DQPSK,8DPSK
Mode 2	CH39	
Mode 3	CH78	
Mode 4	Link Mode	

Note:

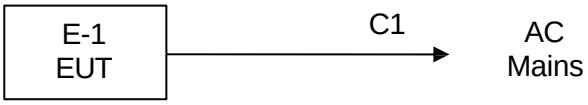
(1) The measurements are performed at the highest, middle, lowest available channels.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conducted Spurious Emission Test



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Model/Type No.	Series No.	Note
E-1				
E-1				

Item	Shielded Type	Ferrite Core	Length	Note
C1				

Note:

(1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 TABLE OF PARAMETERS OF TEST 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 end product.

Test software Version	Test program: BT_Tool		
Frequency	2402 MHz	2441 MHz	2480 MHz
Power Setting of Softwave	10	10	10

2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation test, Band-edge test and 6db bandwidth test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	Spectrum Analyzer (9kHz-26.5GHz)	Agilent	E4408B	MY50140780	Dec. 06, 2023	Dec. 07, 2024
2	Test Receiver (9kHz-7GHz)	R&S	ESRP7	101393	Dec. 06, 2023	Dec. 07, 2024
3	Bilog Antenna (30MHz-1GHz)	R&S	VULB9162	00306	Dec. 06, 2023	Dec. 07, 2024
4	Horn Antenna (1GHz-18GHz)	Schwarzbeck	BBHA9120D	02139	Dec. 06, 2023	Dec. 07, 2024
5	Horn Antenna (18GHz-40GHz)	A.H. Systems	SAS-574	588	Dec. 06, 2023	Dec. 07, 2024
6	Amplifier (9KHz-6GHz)	Schwarzbeck	BBV9743B	00153	Dec. 06, 2023	Dec. 07, 2024
7	Amplifier (1GHz-18GHz)	EMEC	EM01G8GA	00270	Dec. 06, 2023	Dec. 07, 2024
8	Amplifier (18GHz-40GHz)	Quanjuda	DLE-161	97	Dec. 06, 2023	Dec. 07, 2024
9	Loop Antenna (9KHz-30MHz)	Schwarzbeck	FMZB1519B	00014	Dec. 06, 2023	Dec. 07, 2024
10	RF cables1 (9kHz-1GHz)	ChengYu	966	004	Dec. 06, 2023	Dec. 07, 2024
11	RF cables2 (1GHz-40GHz)	ChengYu	966	003	Dec. 06, 2023	Dec. 07, 2024
12	Antenna connector	Florida RF Labs	N/A	RF 01#	Dec. 06, 2023	Dec. 07, 2024
13	Power probe	KEYSIGHT	U2021XA	MY55210018	Dec. 06, 2023	Dec. 07, 2024
14	Signal Analyzer 9kHz-26.5GHz	Agilent	N9020A	MY55370280	Dec. 06, 2023	Dec. 07, 2024
15	Test Receiver 20kHz-40GHz	R&S	ESU 40	100376	Dec. 06, 2023	Dec. 07, 2024
16	D.C. Power Supply	LongWei	PS-305D	010964729	Dec. 06, 2023	Dec. 07, 2024
17	Antenna Mast	HaiYue	TPAM-4A	4265214	Dec. 06, 2023	Dec. 07, 2024

Conduction Test equipment

Item	Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
1	843 Shielded Room	ChengYu	843 Room	843	Nov. 24, 2022	Nov. 23, 2025
2	EMI Receiver	R&S	ESR	101421	Dec. 07, 2023	Dec. 06, 2024
3	LISN	R&S	ENV216	102417	Dec. 07, 2023	Dec. 06, 2024
4	843 Cable 1#	ChengYu	CE Cable	001	Dec. 07, 2023	Dec. 06, 2024
5	Pulse Limiter	R&S	VTSD 9561F	12561	Dec. 07, 2023	Dec. 06, 2024

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ_EMC	EMC-CON 3A1.1
2	EMC radiation test system	FALA	EZ_EMC	FA-03A2
3	RF test system	MAIWEI	MTS8310	2.0.0.0
4	RF communication test system	MAIWEI	MTS8200	2.0.0.0

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

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

3.1.2 TEST PROCEDURE

a. The EUT was placed 0.1 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

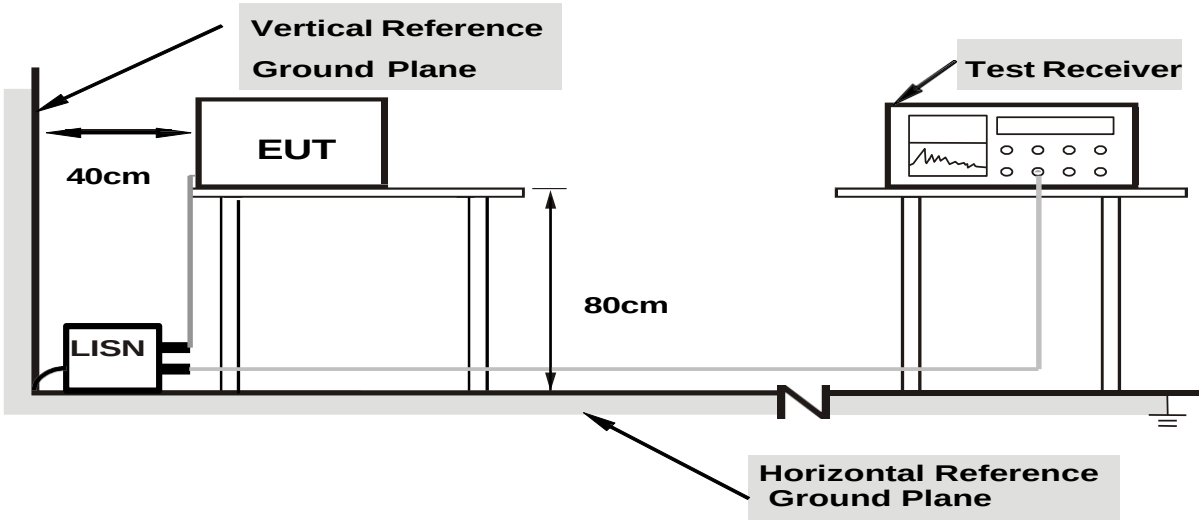
d. LISN at least 80 cm from nearest part of EUT chassis.

e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

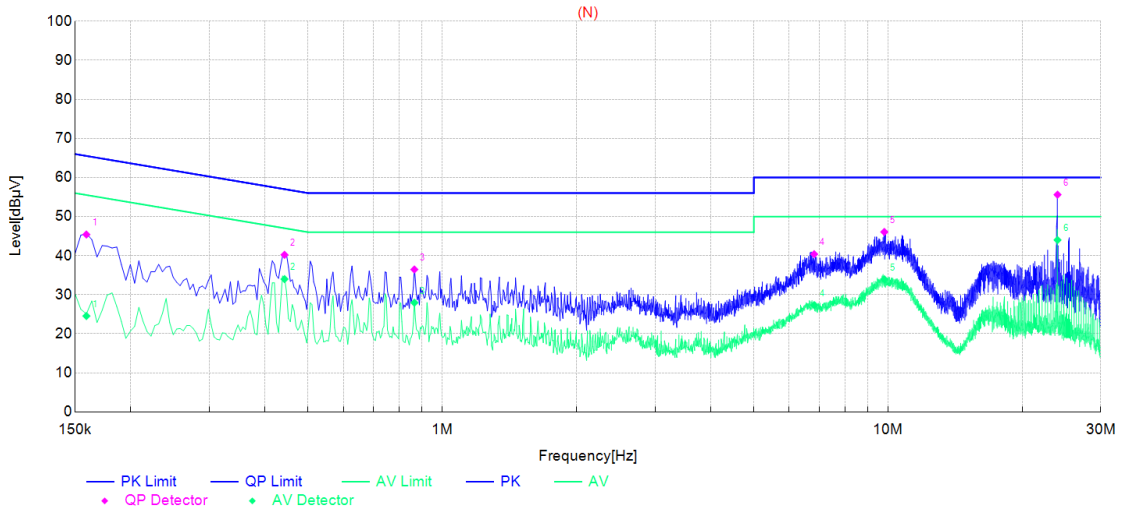
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

CD (dBuV) = RA (dBuV) + PL (dB) + CL (dB)

Where CD = Conducted Disturbance	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	PL = 10 dB Pulse Limiter Factor

3.1.6 TEST RESULTS

Temperature:	24.1 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 1

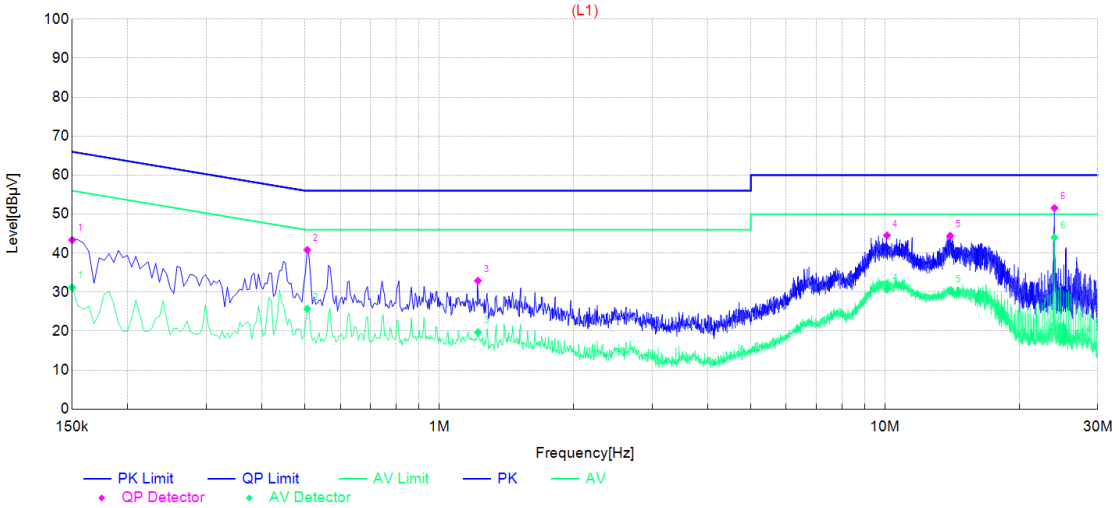


Note:1. Result (dBµV) = Reading (dBµV) + Factor (dB).
2. Factor (dB) = Cable loss (dB) + LISN Factor (dB).

Final Data List

NO.	Frequency [MHz]	QP Reading [dBµV]	AVG. Reading [dBµV]	Factor [dB]	QP Result [dBµV]	AVG. Result [dBµV]	QP Limit [dBµV]	AVG. Limit [dBµV]	QP Margin [dB]	AVG. Margin [dB]	Line	Remark
1	0.159	35.09	14.24	10.3	45.40	24.55	65.52	55.52	20.12	30.97	N	PASS
2	0.4425	30.00	23.78	10.2	40.21	33.99	57.01	47.01	16.80	13.02	N	PASS
3	0.8655	26.23	17.72	10.2	36.46	27.95	56.00	46.00	19.54	18.05	N	PASS
4	6.828	29.86	16.82	10.5	40.37	27.33	60.00	50.00	19.63	22.67	N	PASS
5	9.8115	35.49	23.38	10.5	46.06	33.95	60.00	50.00	13.94	16.05	N	PASS
6	24.0045	44.09	32.49	11.5	55.60	44.00	60.00	50.00	4.40	6.00	N	PASS

Temperature:	24.1 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode:	Mode 1



Note:1. Result (dBµV) = Reading (dBµV) + Factor (dB).
2. Factor (dB) = Cable loss (dB) + LISN Factor (dB).

Final Data List

NO.	Frequency [MHz]	QP Reading [dBµV]	AVG. Reading [dBµV]	Factor [dB]	QP Result [dBµ	AVG. Result [dBµV]	QP Limit [dBµV]	AVG. Limit [dBµV]	QP Margin [dB]	AVG. Margin [dB]	Line	Remark
1	0.15	33.01	20.87	10.3	43.36	31.22	66.0	56.00	22.64	24.7	L1	PASS
2	0.5055	30.56	15.48	10.2	40.81	25.73	56.0	46.00	15.19	20.2	L1	PASS
3	1.221	22.69	9.50	10.2	32.91	19.72	56.0	46.00	23.09	26.2	L1	PASS
4	10.0995	33.95	20.12	10.5	44.54	30.71	60.0	50.00	15.46	19.2	L1	PASS
5	14.001	33.60	19.45	10.8	44.46	30.31	60.0	50.00	15.54	19.6	L1	PASS
6	23.9955	40.00	32.43	11.5	51.57	44.00	60.0	50.00	8.43	6.00	L1	PASS

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

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.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

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).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	25GHz
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

Below 1GHz test procedure as below:

a. The EUT was placed on the top of a rotating table 0.1 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:

g. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.1 metre to 0.1 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).
h. Test the EUT in the lowest channel ,the middle channel ,the Highest channel

Note:

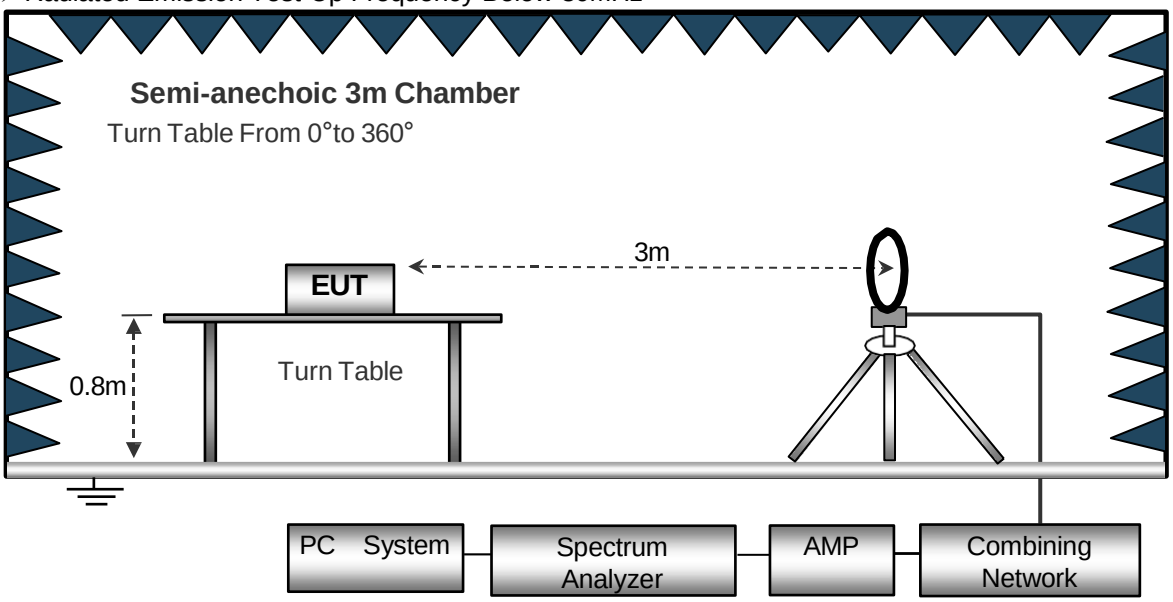
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

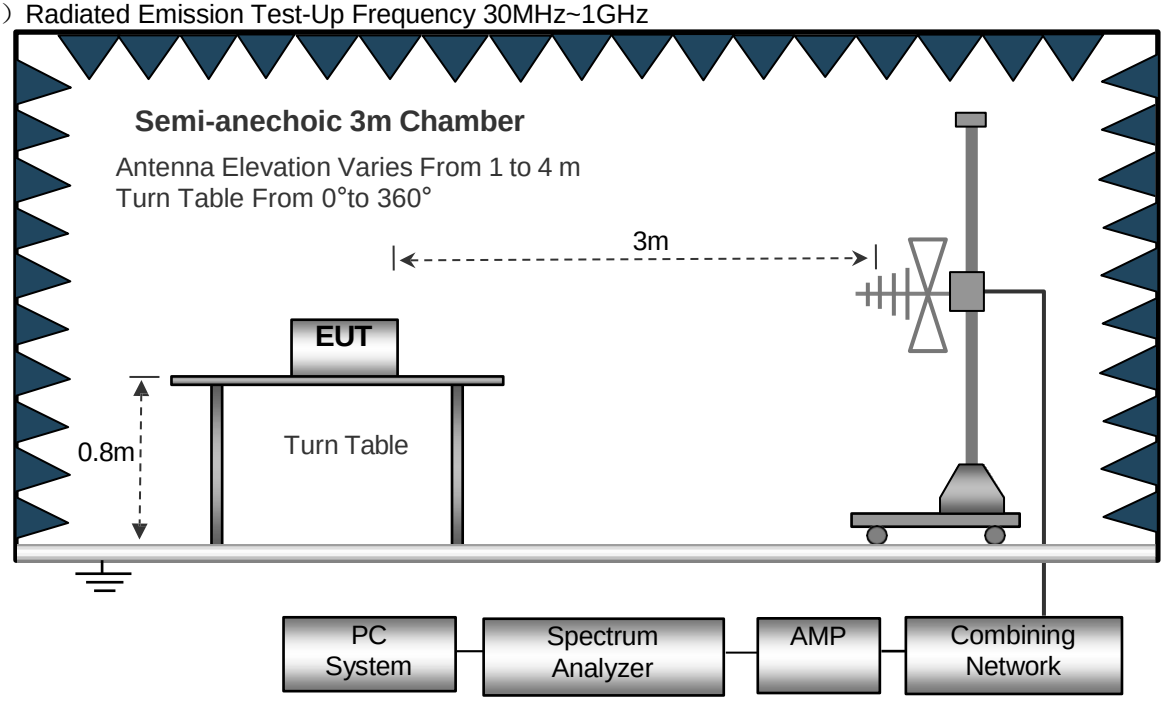
No deviation

3.2.4 TEST SETUP

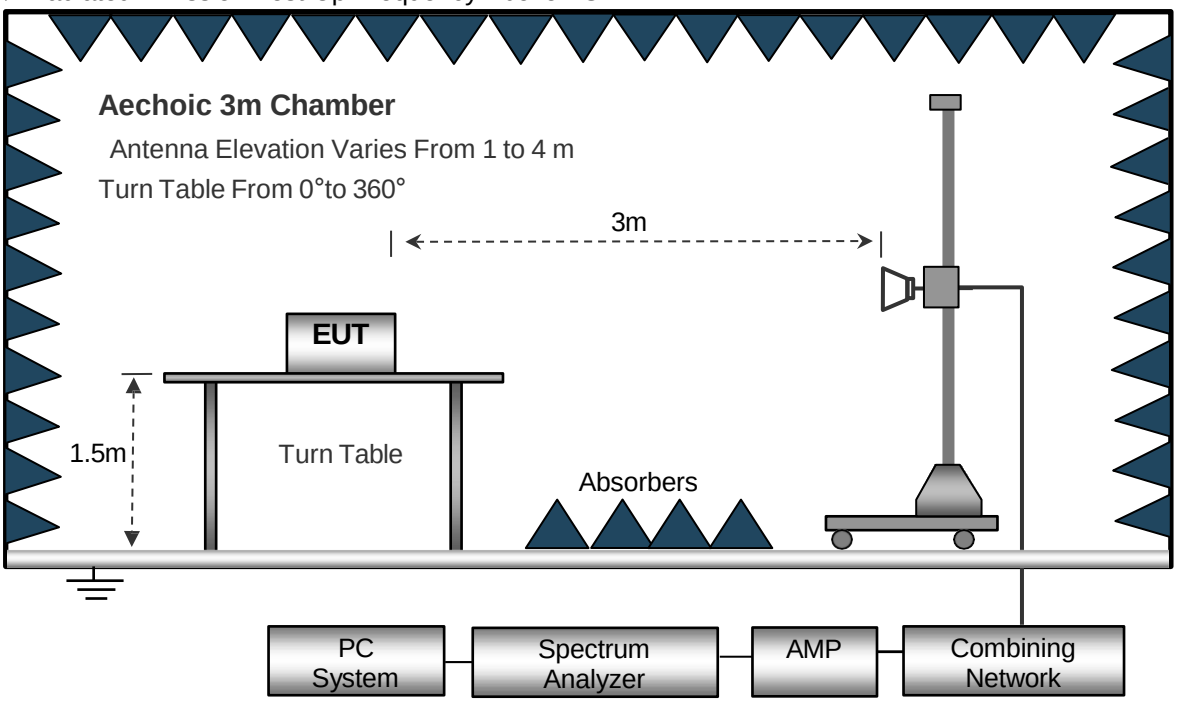
（A）Radiated Emission Test-Up Frequency Below 30MHz



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



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



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

Temperature:	20℃	Relative Humidtity:	48%
Pressure:	1010 hPa	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

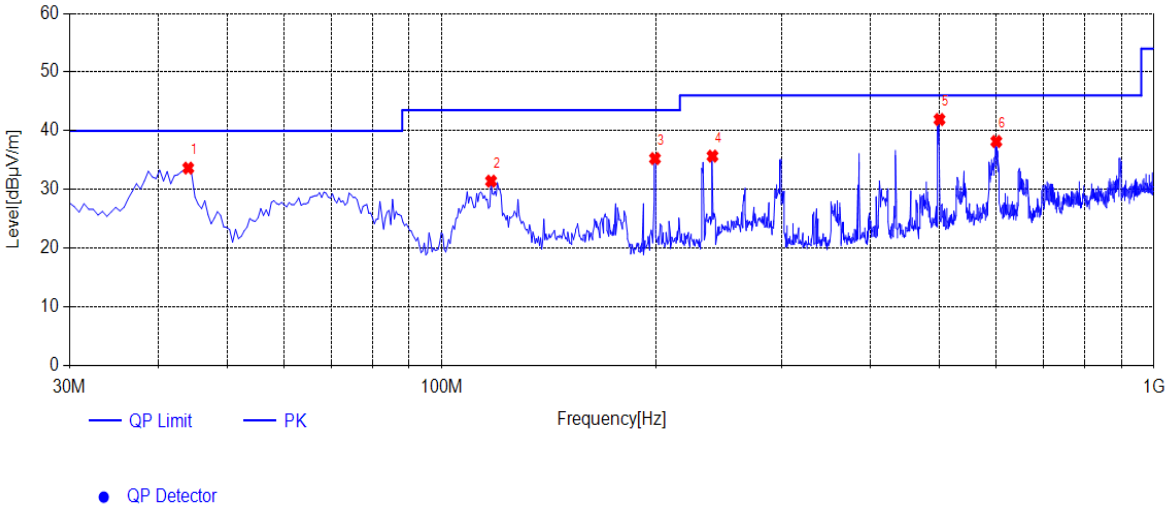
NOTE:

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);
FS (dBuV/m) = RA (dBuV) + AF (dB/m) + CL (dB) – AG (dB)

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 3.7V		
Test Mode :	Mode 1		

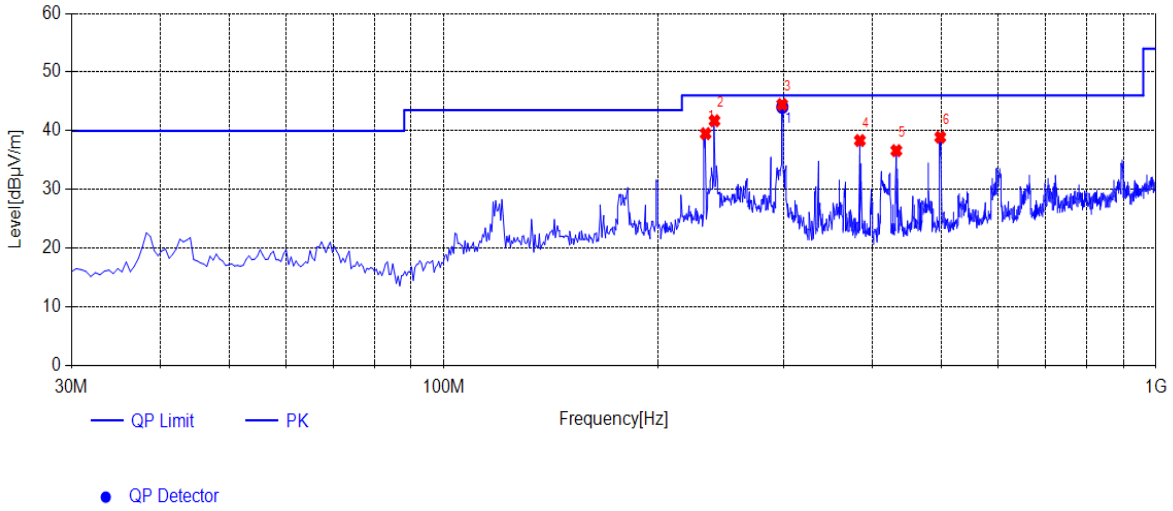


NO.	Frequency [MHz]	Reading [dBμV/m]	Factor [dB]	Result [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Detector	Polarity	Remark
1	44.065	45.08	-11.45	33.63	40.00	6.37	QP	Vertical	PASS
2	117.3	43.71	-12.31	31.40	43.50	12.10	QP	Vertical	PASS
3	199.265	45.50	-10.25	35.25	43.50	8.25	QP	Vertical	PASS
4	240.005	44.74	-9.07	35.67	46.00	10.33	QP	Vertical	PASS
5	499.965	44.54	-2.62	41.92	46.00	4.08	QP	Vertical	PASS
6	600.845	38.71	-0.54	38.17	46.00	7.83	QP	Vertical	PASS

Note:1. Result (dBμV/m) = Reading(dBμV/m) + Factor (dB) .

2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB)
Pre Amplifier gain (dB).

Temperature:	26℃	Relative Humidity:	54%
Pressure:	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 3.7V		
Test Mode :	Mode 1		



NO.	Frequency [MHz]	Reading [dBµV/]	Factor [ ]	Result [dBµV/]	Limit [dBµV/]	Margin [ ]	Detector	Polarity	Remark
1	233.215	48.76	-9.25	39.51	46.00	6.49	QP	Horizont	PASS
2	240.005	50.77	-9.07	41.70	46.00	4.30	QP	Horizont	PASS
3	298.69	51.97	-7.50	44.47	46.00	1.53	QP	Horizont	PASS
4	384.05	43.91	-5.58	38.33	46.00	7.67	QP	Horizont	PASS
5	432.065	40.88	-4.27	36.61	46.00	9.39	QP	Horizont	PASS
6	498.025	41.52	-2.63	38.89	46.00	7.11	QP	Horizont	PASS

Note:

1. Result (dBµV/m) = Reading(dBµV/m) + Factor (dB) .

2. Factor (dB) = Antenna Factor (dB/m) + Cable loss (dB) Pre Amplifier gain (dB).

3.2.8 TEST RESULTS (1GHZ~25GHZ)

GFSK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2402									
V	4804.00	64.26	50.64	6.78	31.25	51.65	74	-22.35	PK
V	4804.00	58.32	50.64	6.78	31.25	45.71	54	-8.29	AV
V	7206.00	61.36	49.95	7.11	36.53	55.05	74	-18.95	PK
V	7206.00	51.55	49.95	7.11	36.53	45.24	54	-8.76	AV
V	16132.00	46.87	51.56	11.36	41.57	48.24	74	-25.76	PK
H	4804.00	67.03	50.64	6.78	31.25	54.42	74	-19.58	PK
H	4804.00	59.12	50.64	6.78	31.25	46.51	54	-7.49	AV
H	7206.00	67.63	49.95	7.11	36.53	61.32	74	-12.68	PK
H	7206.00	53.05	49.95	7.11	36.53	46.74	54	-7.26	AV
H	16132.00	42.36	51.56	11.36	41.57	43.73	74	-30.27	PK
operation frequency:2441									
V	4882.00	64.32	50.69	6.83	31.37	51.83	74	-22.17	PK
V	4882.00	56.35	50.69	6.83	31.37	43.86	54	-10.14	AV
V	7323.00	64.28	49.99	7.22	36.53	58.04	74	-15.96	PK
V	7323.00	53.65	49.99	7.22	36.53	47.41	54	-6.59	AV
V	16132.00	42.63	51.56	11.36	41.57	44.00	74	-30.00	PK
H	4882.00	69.61	50.69	6.83	31.37	57.12	74	-16.88	PK
H	4882.00	58.62	50.69	6.83	31.37	46.13	54	-7.87	AV
H	7323.00	64.26	49.99	7.22	36.53	58.02	74	-15.98	PK
H	7323.00	54.62	49.99	7.22	36.53	48.38	54	-5.62	AV
H	16132.00	43.65	51.56	11.36	41.57	45.02	74	-28.98	PK
operation frequency:2480									
V	4960.00	67.25	50.86	6.86	31.41	54.66	74	-19.34	PK
V	4960.00	59.62	50.86	6.86	31.41	47.03	54	-6.97	AV
V	7440.00	65.03	50.14	7.27	36.58	58.74	74	-15.26	PK
V	7440.00	53.65	50.14	7.27	31.28	42.06	54	-11.94	AV
V	16132.00	48.02	51.56	11.36	41.57	49.39	74	-24.61	PK
H	4960.00	64.52	50.86	6.86	31.41	51.93	74	-22.07	PK
H	4960.00	54.85	50.86	6.86	31.41	42.26	54	-11.74	AV
H	7440.00	69.07	50.14	7.27	36.58	62.78	74	-11.22	PK
H	7440.00	54.51	50.14	7.27	31.28	42.92	54	-11.08	AV
H	16132.00	46.28	51.56	11.36	41.57	47.65	74	-26.35	PK

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

π /4 DQPSK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2402									
V	4804.00	68.51	50.64	6.78	31.25	55.90	74	-18.10	PK
V	4804.00	57.52	50.64	6.78	31.25	44.91	54	-9.09	AV
V	7206.00	68.52	49.95	7.11	36.53	62.21	74	-11.79	PK
V	7206.00	53.21	49.95	7.11	36.53	46.90	54	-7.10	AV
V	16132.00	44.02	51.56	11.36	41.57	45.39	74	-28.61	PK
H	4804.00	68.01	50.64	6.78	31.25	55.40	74	-18.60	PK
H	4804.00	56.04	50.64	6.78	31.25	43.43	54	-10.57	AV
H	7206.00	64.52	49.95	7.11	36.53	58.21	74	-15.79	PK
H	7206.00	57.52	49.95	7.11	36.53	51.21	54	-2.79	AV
H	16132.00	42.52	51.56	11.36	41.57	43.89	74	-30.11	PK
operation frequency:2441									
V	4882.00	66.21	50.69	6.83	31.37	53.72	74	-20.28	PK
V	4882.00	53.62	50.69	6.83	31.37	41.13	54	-12.87	AV
V	7323.00	64.52	49.99	7.22	36.53	58.28	74	-15.72	PK
V	7323.00	53.03	49.99	7.22	36.53	46.79	54	-7.21	AV
V	16132.00	46.85	51.56	11.36	41.57	48.22	74	-25.78	PK
H	4882.00	64.21	50.69	6.83	31.37	51.72	74	-22.28	PK
H	4882.00	54.32	50.69	6.83	31.37	41.83	54	-12.17	AV
H	7323.00	68.21	49.99	7.22	36.53	61.97	74	-12.03	PK
H	7323.00	56.32	49.99	7.22	36.53	50.08	54	-3.92	AV
H	16132.00	42.58	51.56	11.36	41.57	43.95	74	-30.05	PK
operation frequency:2480									
V	4960.00	64.63	50.86	6.86	31.41	52.04	74	-21.96	PK
V	4960.00	56.21	50.86	6.86	31.41	43.62	54	-10.38	AV
V	7440.00	64.32	50.14	7.27	36.58	58.03	74	-15.97	PK
V	7440.00	53.25	50.14	7.27	36.58	46.96	54	-7.04	AV
V	16132.00	44.03	51.56	11.36	41.57	45.40	74	-28.60	PK
H	4960.00	68.21	50.86	6.86	31.41	55.62	74	-18.38	PK
H	4960.00	58.3	50.86	6.86	31.41	45.71	54	-8.29	AV
H	7440.00	66.52	50.14	7.27	36.58	60.23	74	-13.77	PK
H	7440.00	52.63	50.14	7.27	36.58	46.34	54	-7.66	AV
H	16132.00	46.38	51.56	11.36	41.57	47.75	74	-26.25	PK

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

8DPSK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2402									
V	4804.00	68.41	50.64	6.78	31.25	55.80	74	-18.20	PK
V	4804.00	54.25	50.64	6.78	31.25	41.64	54	-12.36	AV
V	7206.00	64.02	49.95	7.11	36.53	57.71	74	-16.29	PK
V	7206.00	56.32	49.95	7.11	36.53	50.01	54	-3.99	AV
V	16132.00	44.25	51.56	11.36	41.57	45.62	74	-28.38	PK
H	4804.00	66.32	50.64	6.78	31.25	53.71	74	-20.29	PK
H	4804.00	54.52	50.64	6.78	31.25	41.91	54	-12.09	AV
H	7206.00	66.25	49.95	7.11	36.53	59.94	74	-14.06	PK
H	7206.00	53.78	49.95	7.11	36.53	47.47	54	-6.53	AV
H	16132.00	42.15	51.56	11.36	41.57	43.52	74	-30.48	PK
operation frequency:2441									
V	4882.00	62.32	50.69	6.83	31.37	49.83	74	-24.17	PK
V	4882.00	54.21	50.69	6.83	31.37	41.72	54	-12.28	AV
V	7323.00	63.51	49.99	7.22	36.53	57.27	74	-16.73	PK
V	7323.00	53.47	49.99	7.22	36.53	47.23	54	-6.77	AV
V	16132.00	46.285	51.56	11.36	41.57	47.66	74	-26.35	PK
H	4882.00	65.21	50.69	6.83	31.37	52.72	74	-21.28	PK
H	4882.00	53.21	50.69	6.83	31.37	40.72	54	-13.28	AV
H	7323.00	64.12	49.99	7.22	36.53	57.88	74	-16.12	PK
H	7323.00	56.38	49.99	7.22	36.53	50.14	54	-3.86	AV
H	16132.00	48.12	51.56	11.36	41.57	49.49	74	-24.51	PK
operation frequency:2480									
V	4960.00	63.12	50.86	6.86	31.41	50.53	74	-23.47	PK
V	4960.00	53.05	50.86	6.86	31.41	40.46	54	-13.54	AV
V	7440.00	64.25	50.14	7.27	36.58	57.96	74	-16.04	PK
V	7440.00	56.32	50.14	7.27	36.58	50.03	54	-3.97	AV
V	16132.00	41.23	51.56	11.36	41.57	42.60	74	-31.40	PK
H	4960.00	64.44	50.86	6.86	31.41	51.85	74	-22.15	PK
H	4960.00	57.36	50.86	6.86	31.41	44.77	54	-9.23	AV
H	7440.00	64.63	50.14	7.27	36.58	58.34	74	-15.66	PK
H	7440.00	55.36	50.14	7.27	36.58	49.07	54	-4.93	AV
H	16132.00	43.15	51.56	11.36	41.57	44.52	74	-29.48	PK

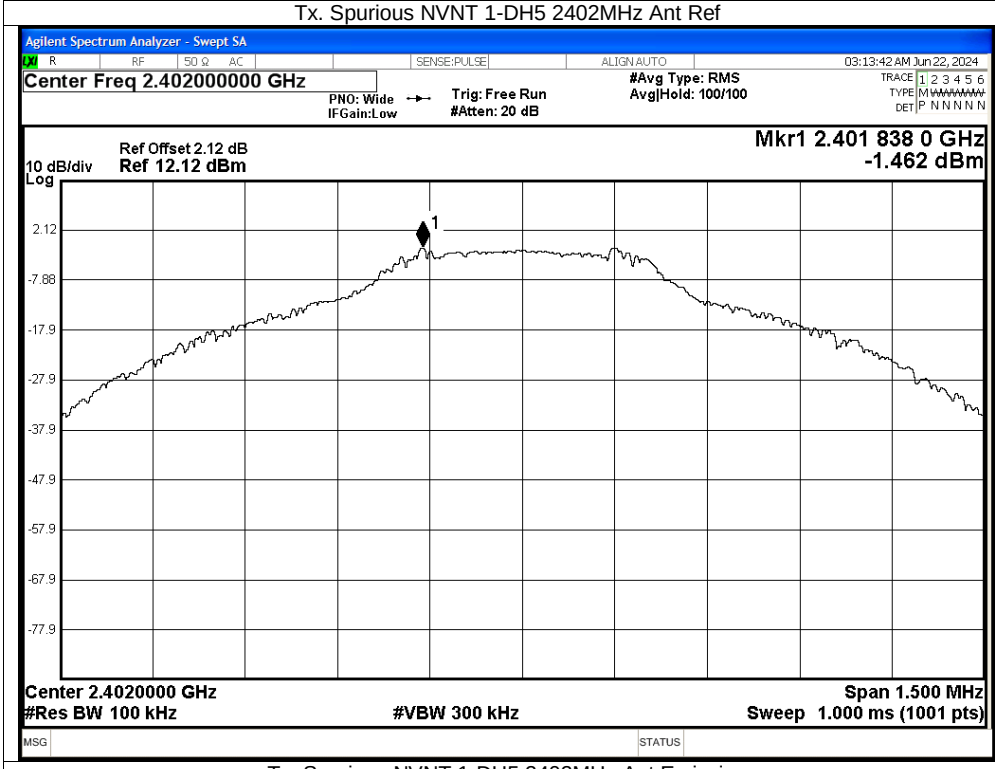
Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier,
Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

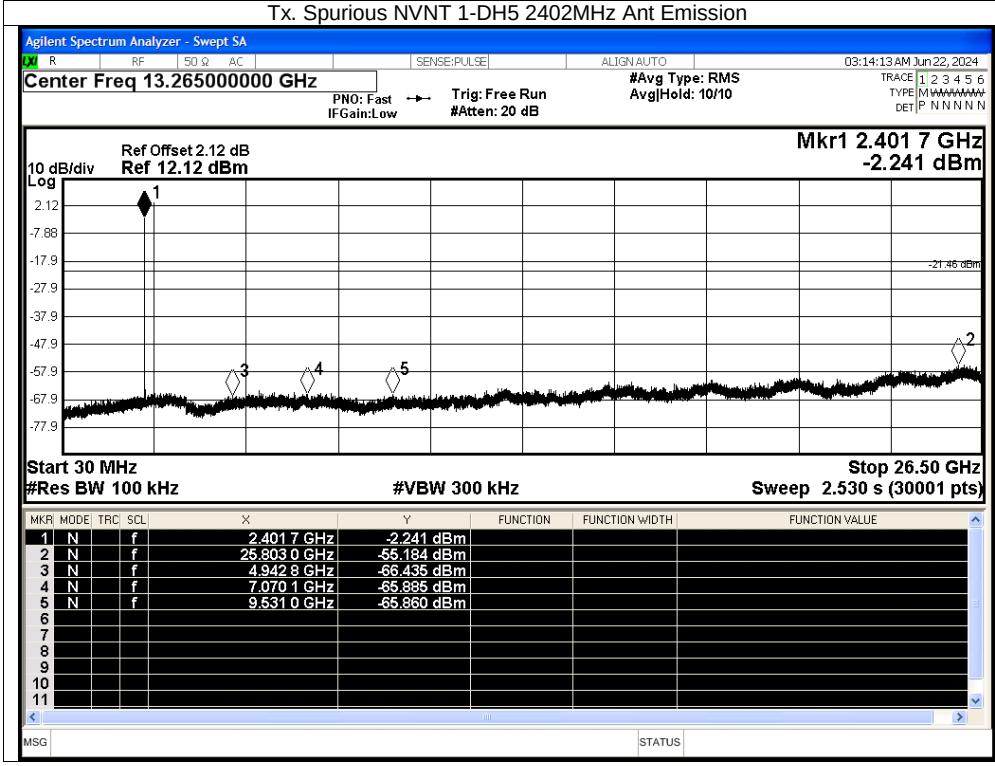
For Conducted

Test Graphs

Tx. Spurious NVNT 1-DH5 2402MHz Ant Ref

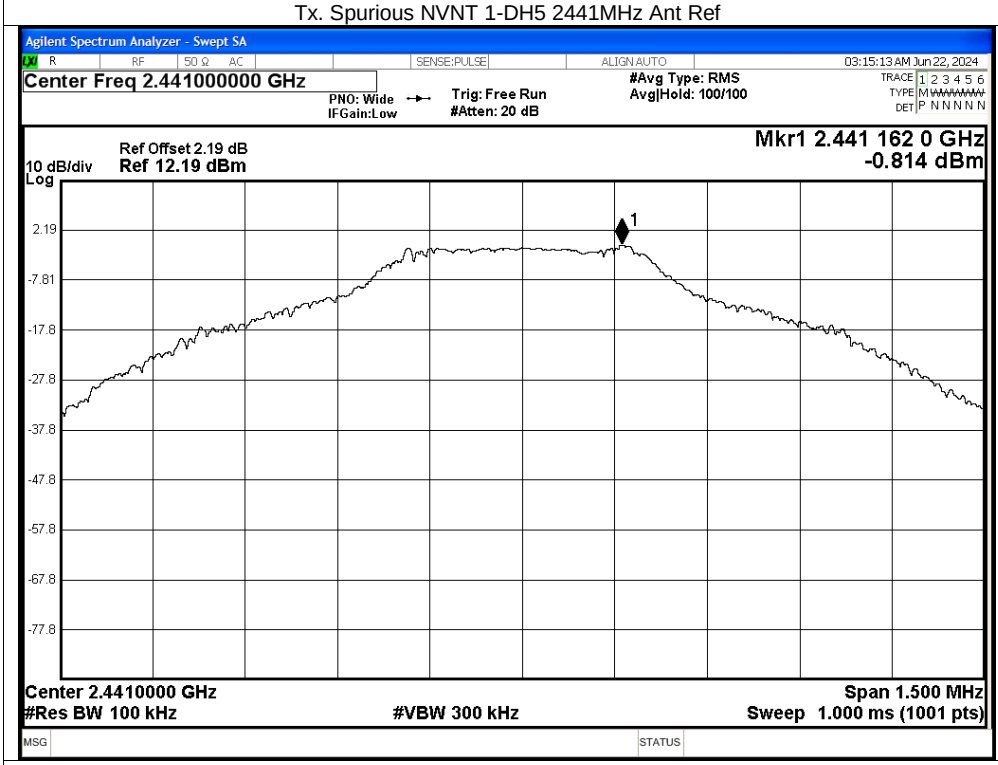


Tx. Spurious NVNT 1-DH5 2402MHz Ant Emission

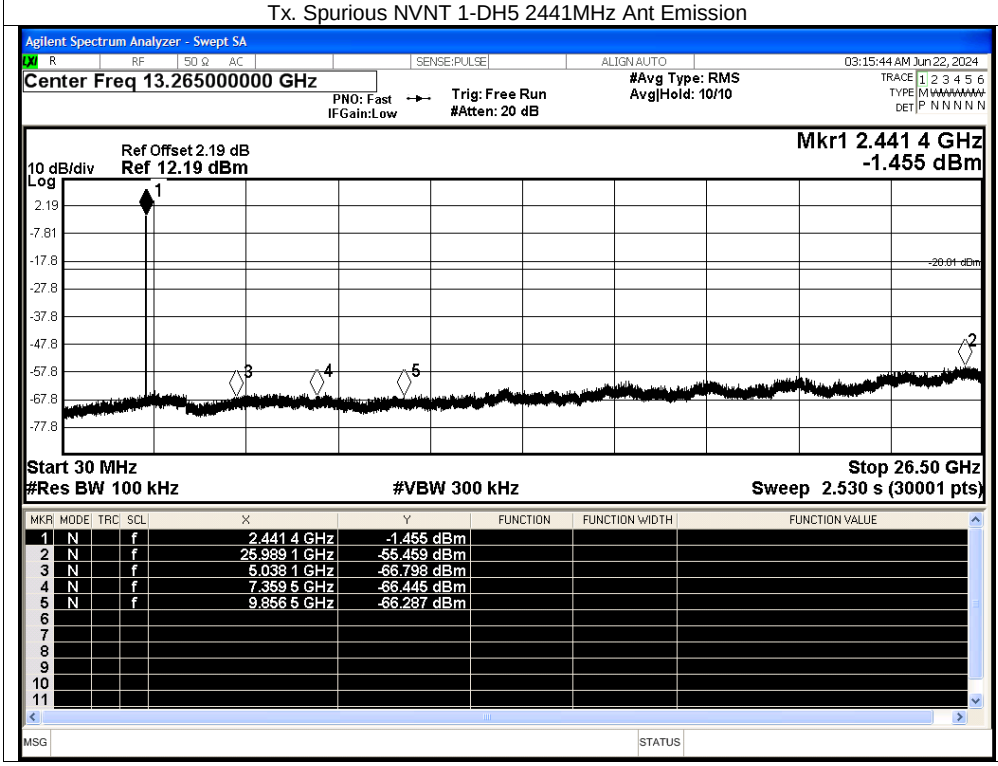


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.401 7 GHz	-2.241 dBm			
2	N		f	25.803 0 GHz	-55.184 dBm			
3	N		f	4.942 8 GHz	-66.435 dBm			
4	N		f	7.070 1 GHz	-65.885 dBm			
5	N		f	9.531 0 GHz	-65.860 dBm			
6								
7								
8								
9								
10								
11								

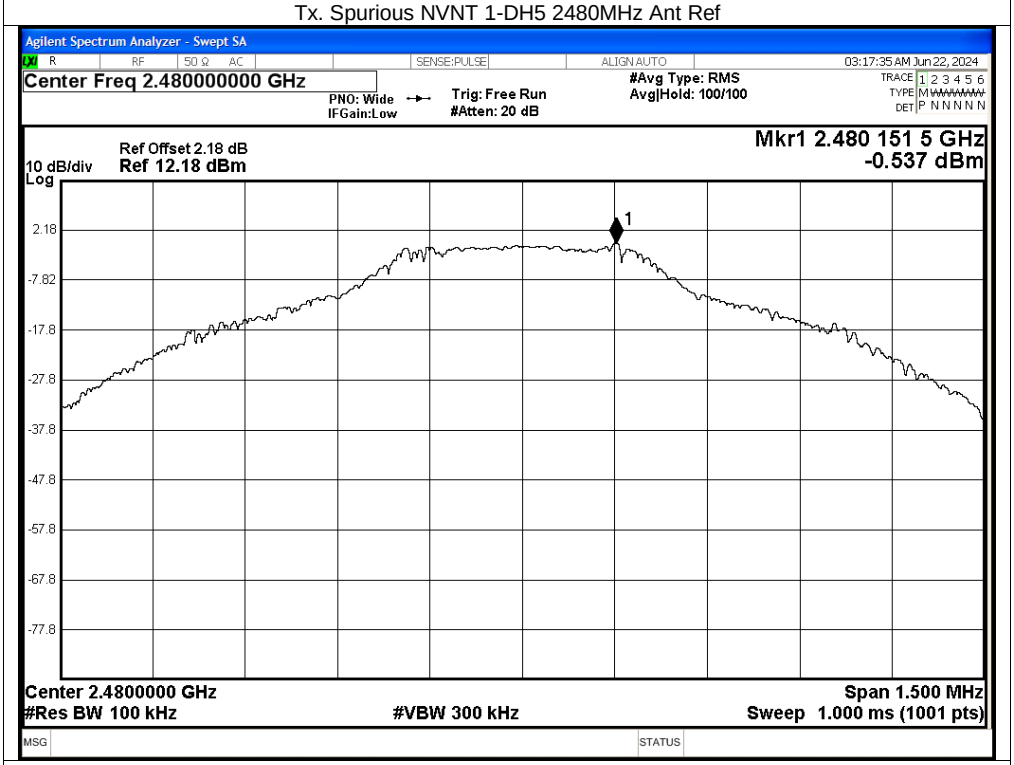
Tx. Spurious NVNT 1-DH5 2441MHz Ant Ref



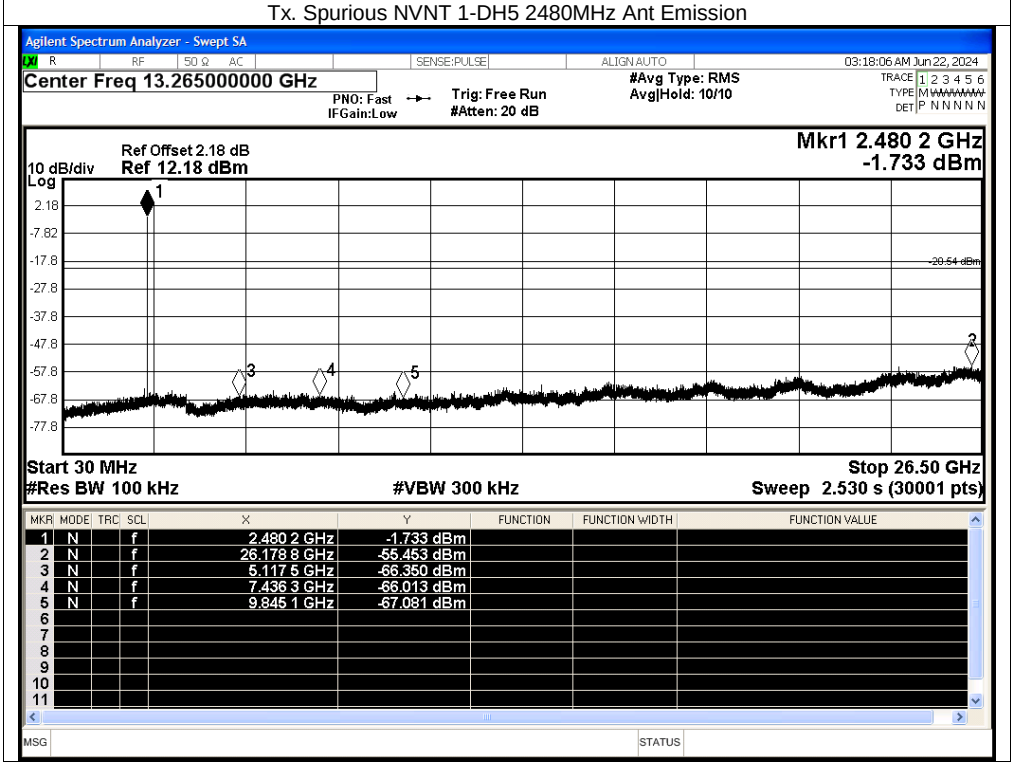
Tx. Spurious NVNT 1-DH5 2441MHz Ant Emission



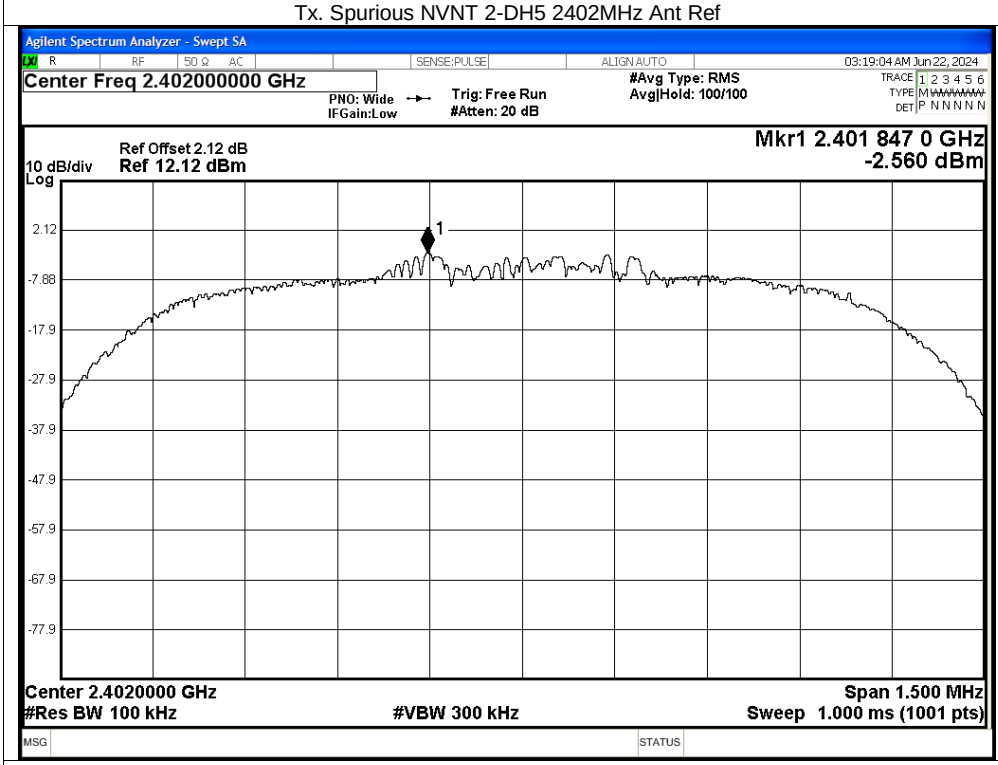
Tx. Spurious NVNT 1-DH5 2480MHz Ant Ref



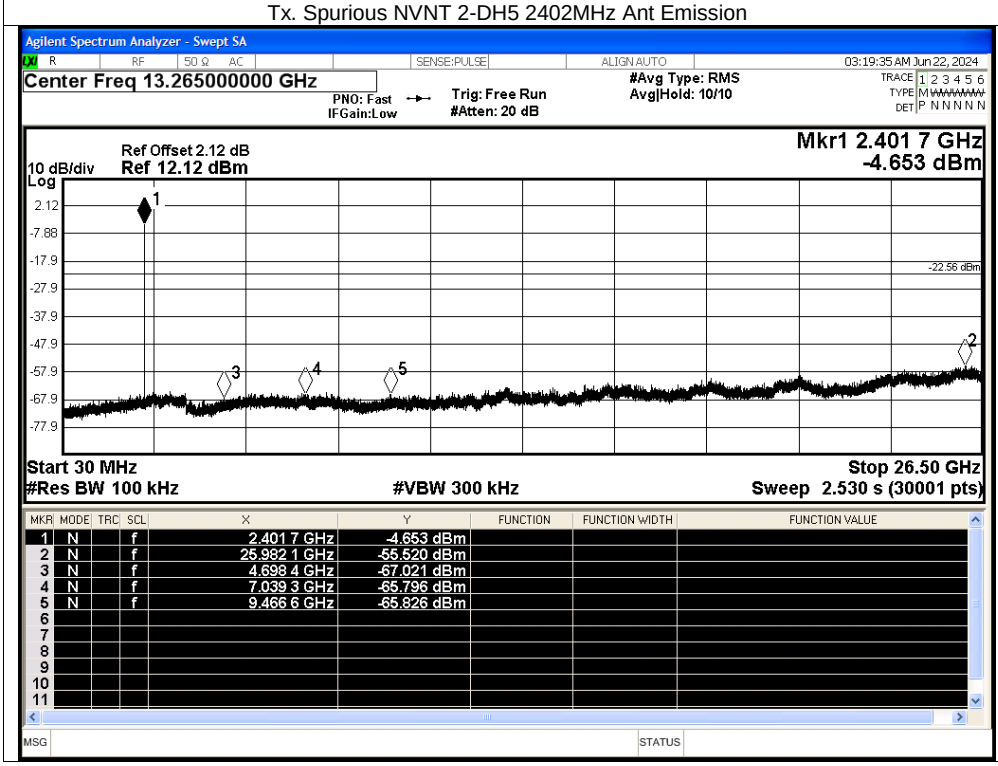
Tx. Spurious NVNT 1-DH5 2480MHz Ant Emission



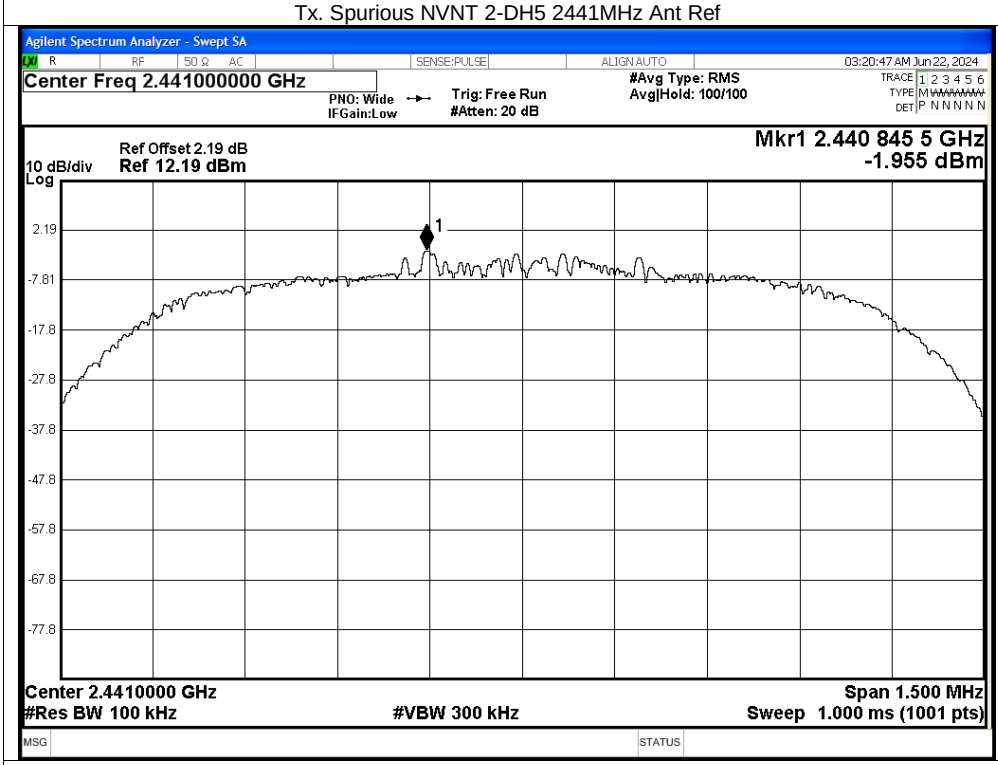
Tx. Spurious NVNT 2-DH5 2402MHz Ant Ref



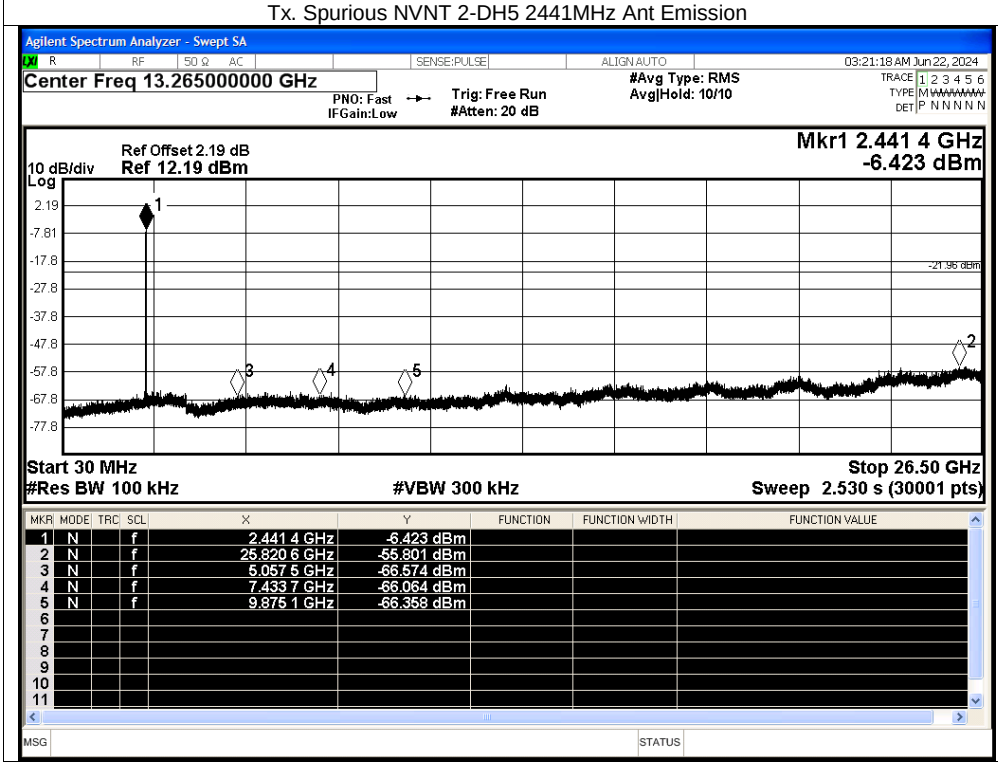
Tx. Spurious NVNT 2-DH5 2402MHz Ant Emission



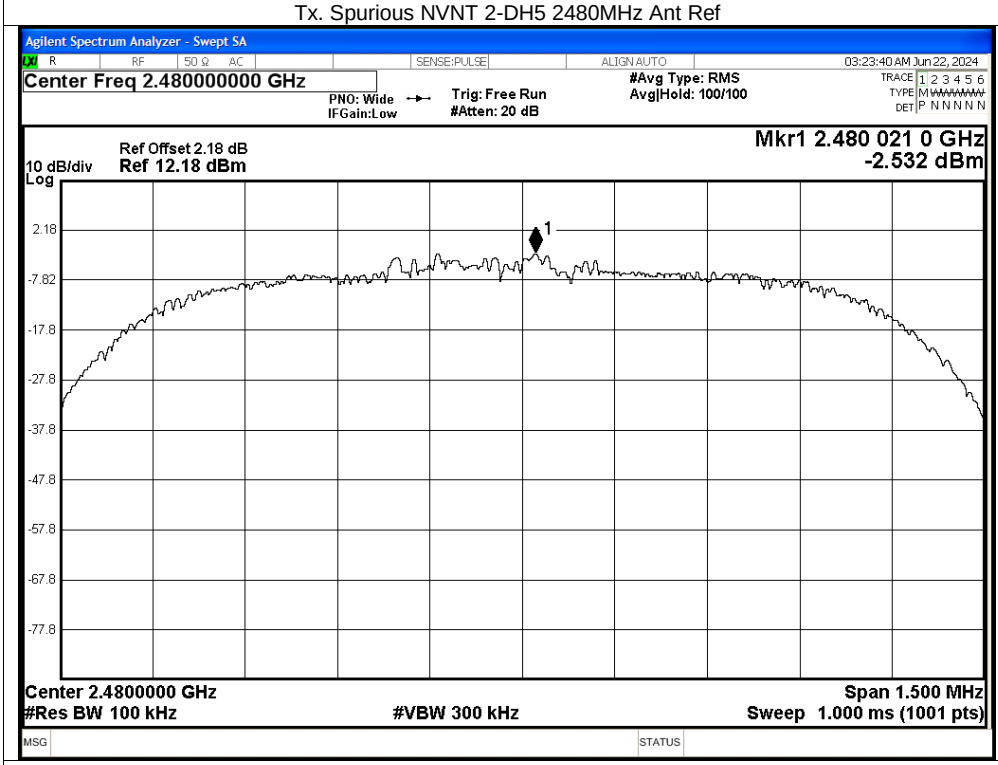
Tx. Spurious NVNT 2-DH5 2441MHz Ant Ref



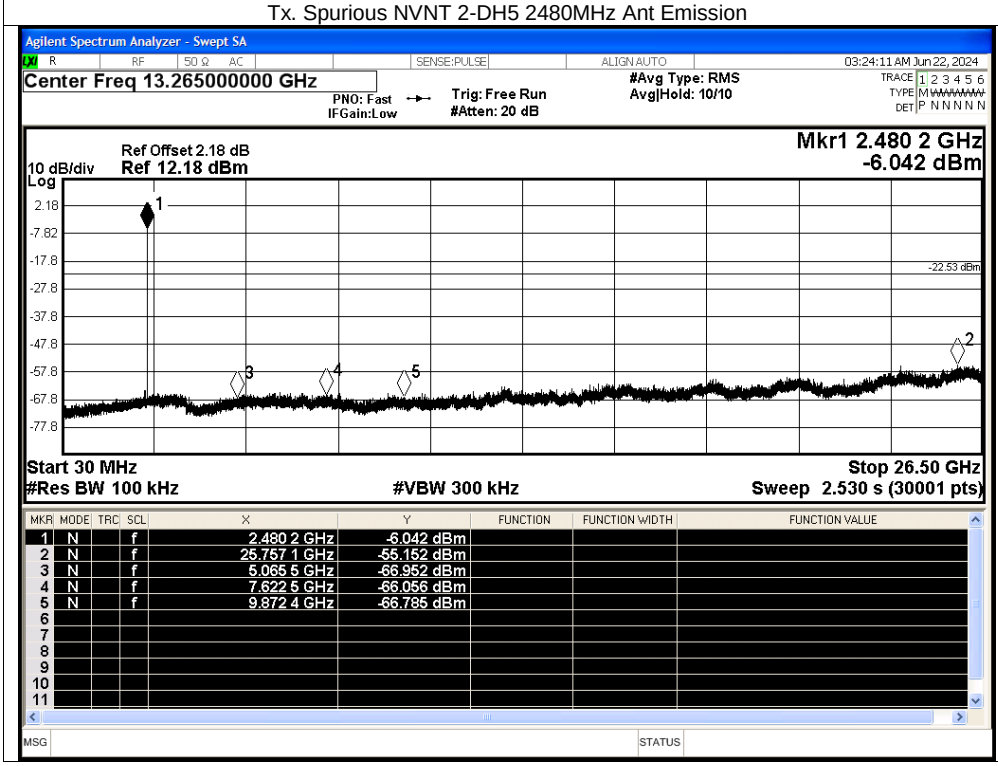
Tx. Spurious NVNT 2-DH5 2441MHz Ant Emission



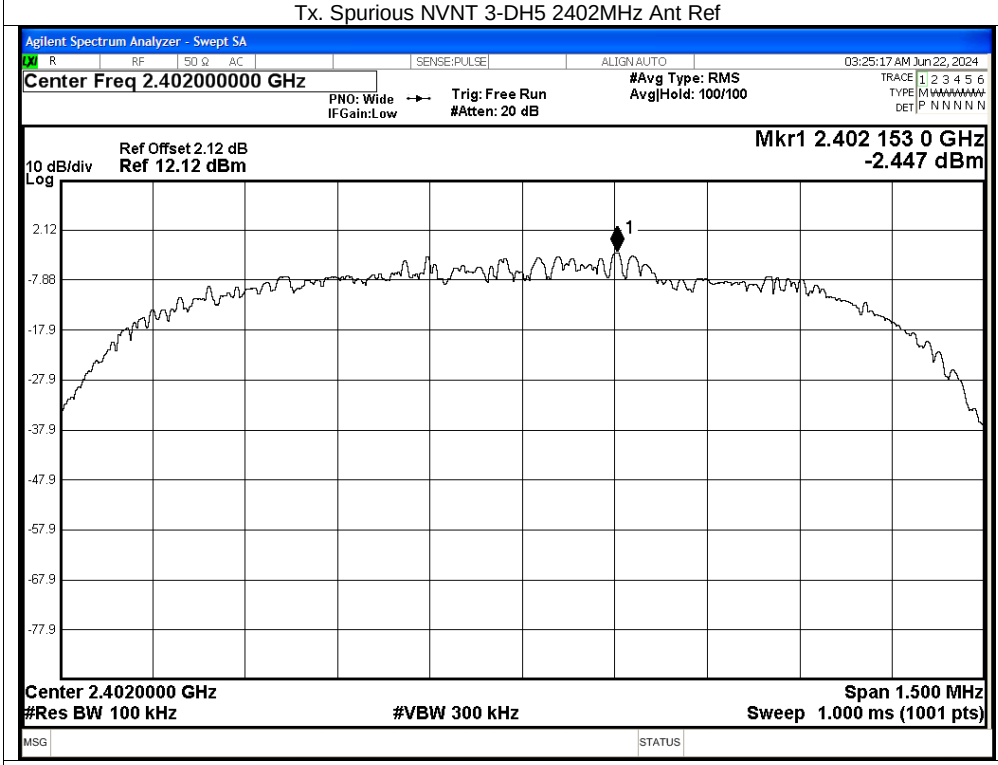
Tx. Spurious NVNT 2-DH5 2480MHz Ant Ref



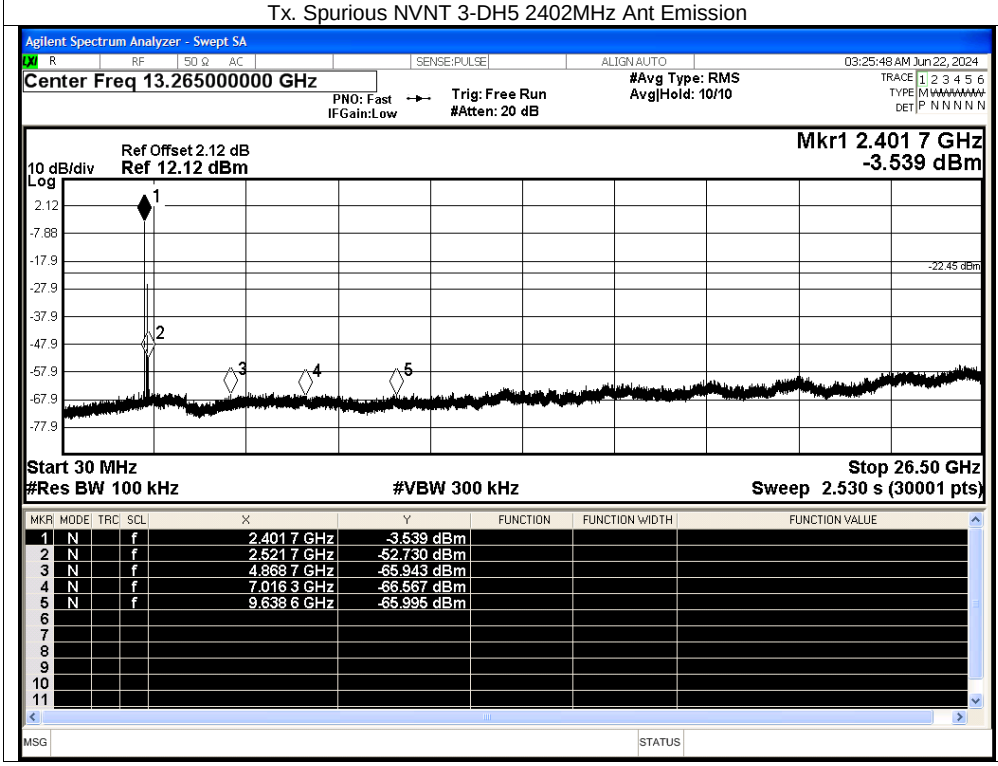
Tx. Spurious NVNT 2-DH5 2480MHz Ant Emission



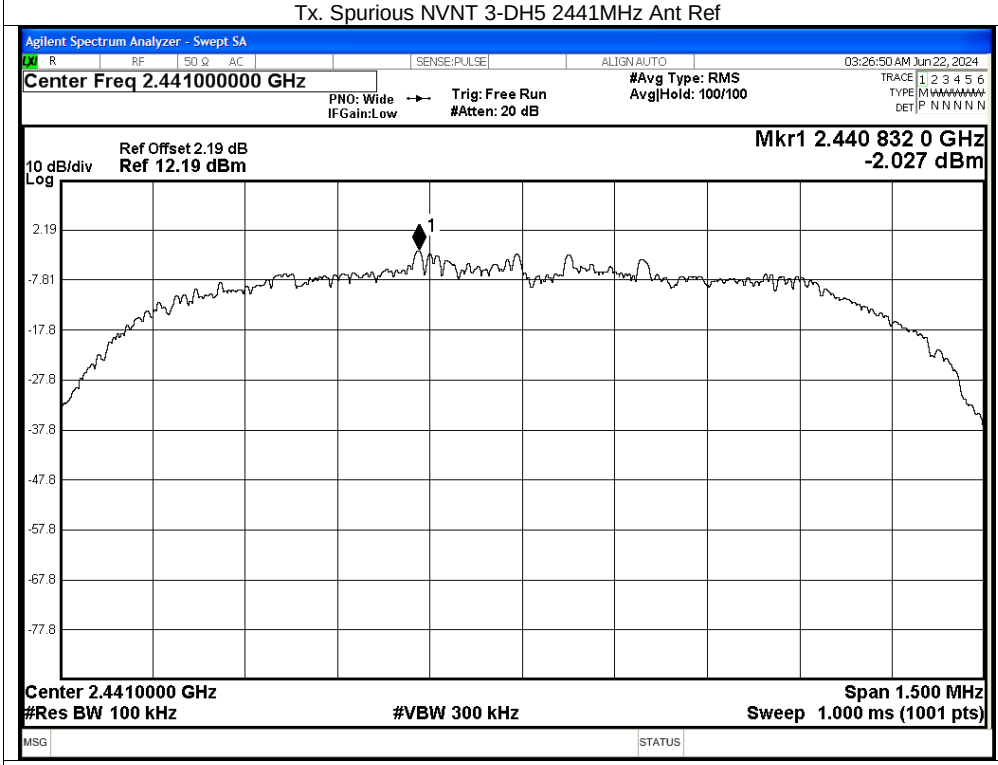
Tx. Spurious NVNT 3-DH5 2402MHz Ant Ref



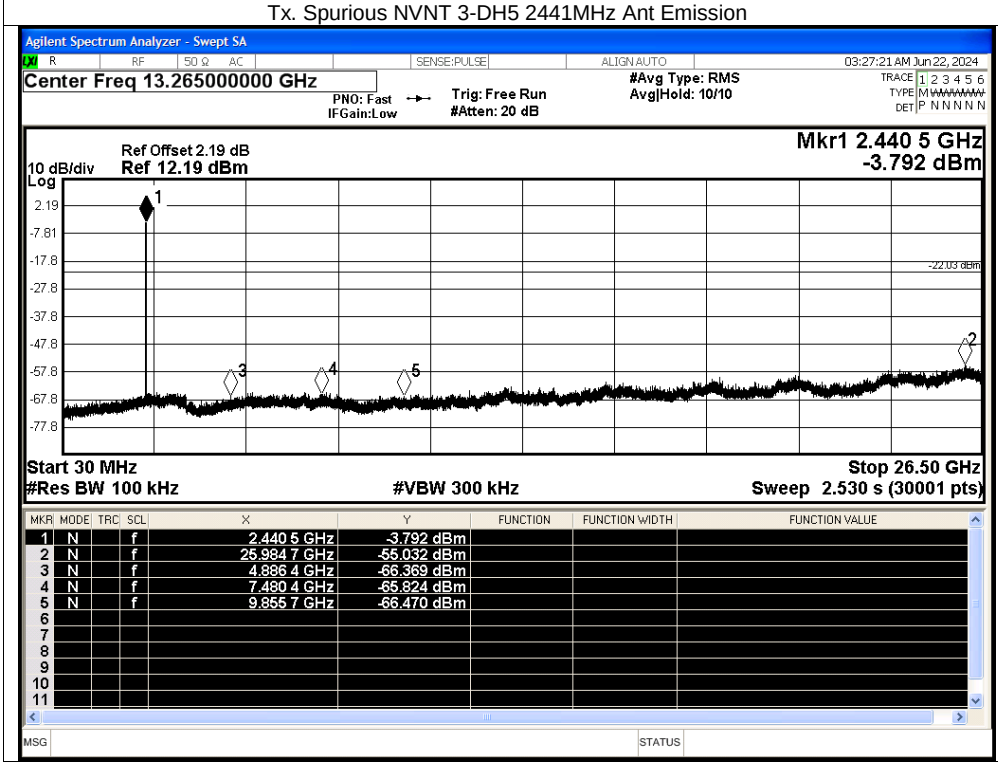
Tx. Spurious NVNT 3-DH5 2402MHz Ant Emission



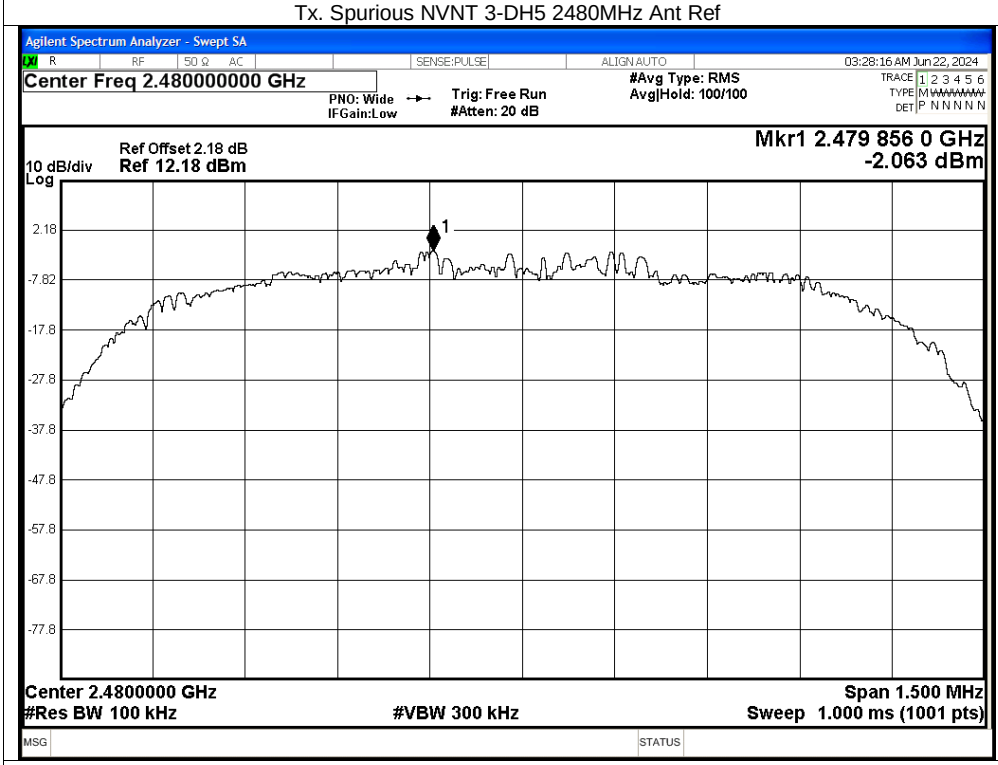
Tx. Spurious NVNT 3-DH5 2441MHz Ant Ref



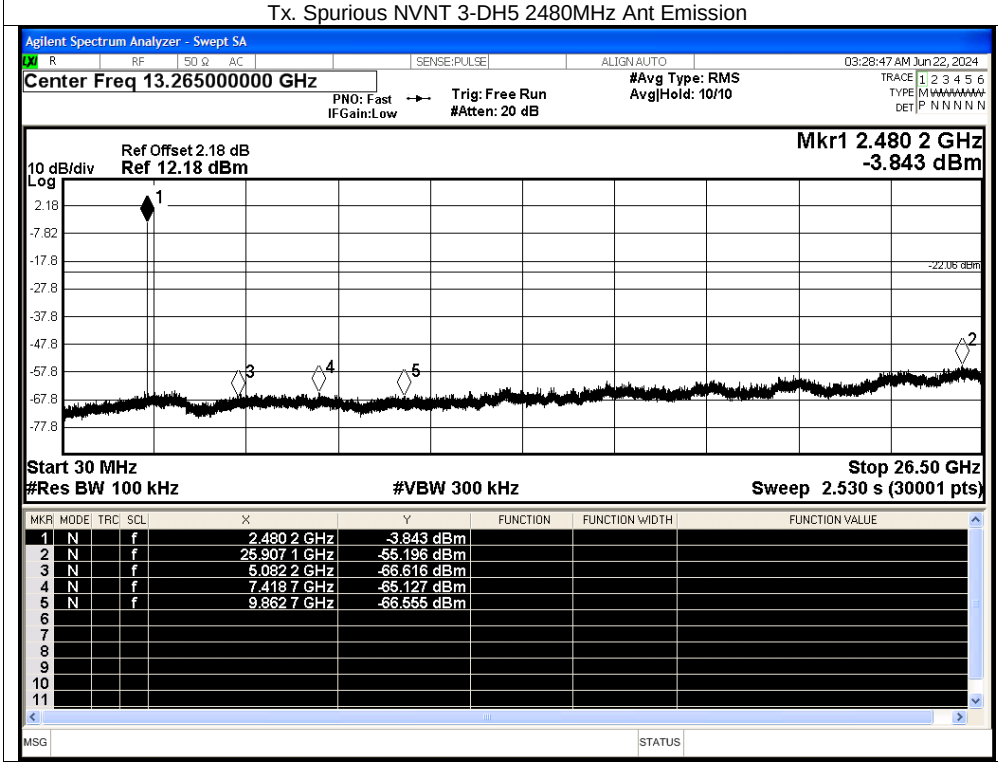
Tx. Spurious NVNT 3-DH5 2441MHz Ant Emission



Tx. Spurious NVNT 3-DH5 2480MHz Ant Ref



Tx. Spurious NVNT 3-DH5 2480MHz Ant Emission



During the test, pre-scan the GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK, Pi/4QPSK, 8DPSK modulation which it is worse case.

3.3 RADIATED BAND EMISSION MEASUREMENT

3.3.1 TEST REQUIREMENT:

FCC Part15 C Section 15.209 and 15.205

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).

Spectrum 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

3.3.2 TEST PROCEDURE

Above 1GHz test procedure as below:

a. 1. The EUT was placed on the top of a rotating table 0.1 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 Highest channel

Note:

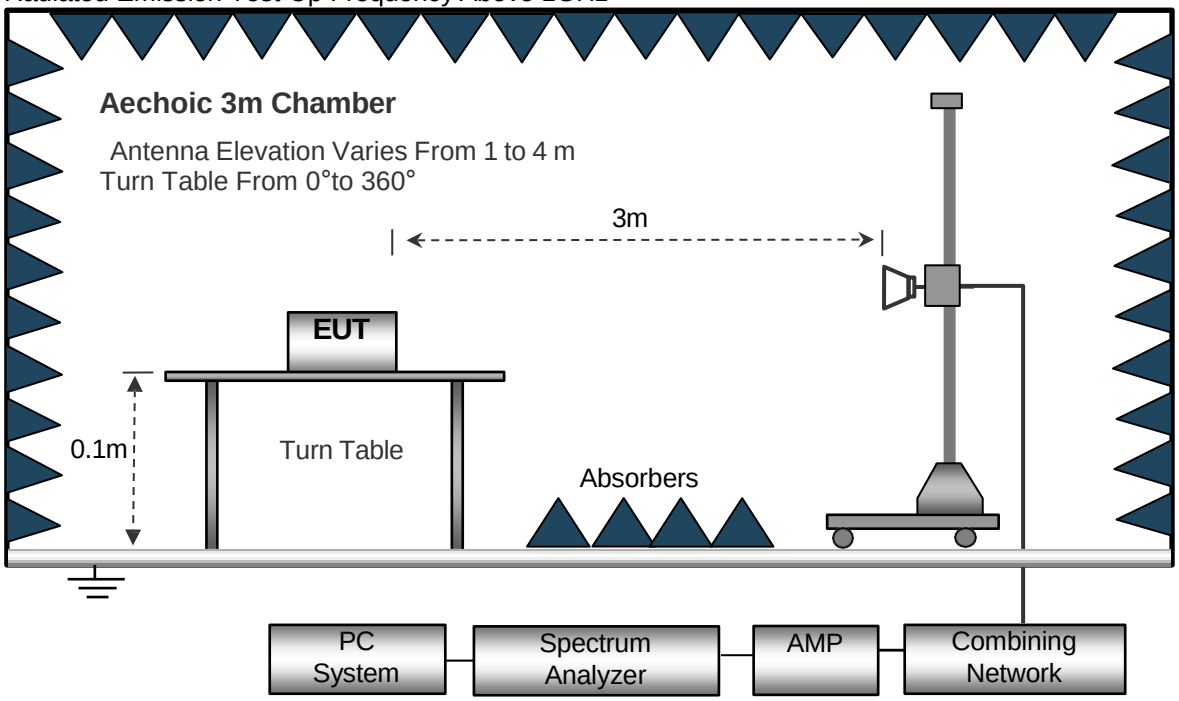
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

3.3.3 DEVIATION FROM TEST STANDARD

No deviation

3.3.4 TEST SETUP

Radiated Emission Test-Up Frequency Above 1GHz



3.3.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

3.3.6 TEST RESULT

GFSK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2402									
V	2390.00	74.16	52.12	2.73	27.38	52.15	74	-21.85	PK
V	2390.00	64.02	52.12	2.73	27.38	42.01	54	-11.99	AV
V	2400.00	73.05	52.16	2.78	27.41	51.08	74	-22.92	PK
V	2400.00	65.01	52.16	2.78	27.41	43.04	54	-10.96	AV
H	2390.00	75.15	52.12	2.73	27.38	53.14	74	-20.86	PK
H	2390.00	64.63	52.12	2.73	27.38	42.62	54	-11.38	AV
H	2400.00	74.35	52.12	2.78	27.41	52.42	74	-21.58	PK
H	2400.00	65.23	52.12	2.78	27.41	43.30	54	-10.70	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2480									
V	2483.50	73.85	52.23	2.86	27.44	51.92	74	-22.08	PK
V	2483.50	63.52	52.23	2.86	27.44	41.59	54	-12.41	AV
V	2500.00	77.15	52.26	2.88	27.49	55.26	74	-18.74	PK
V	2500.00	64.63	52.26	2.88	27.49	42.74	54	-11.26	AV
H	2483.50	73.05	52.23	2.86	27.44	51.12	74	-22.88	PK
H	2483.50	64.85	52.23	2.86	27.44	42.92	54	-11.08	AV
H	2500.00	73.52	52.26	2.88	27.49	51.63	74	-22.37	PK
H	2500.00	66.85	52.26	2.88	27.49	44.96	54	-9.04	AV

Remark:

1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

π /4 DQPSK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2402									
V	2390.00	73.65	52.12	2.73	27.38	51.64	74	-22.36	PK
V	2390.00	64.52	52.12	2.73	27.38	42.51	54	-11.49	AV
V	2400.00	76.87	52.16	2.78	27.41	54.90	74	-19.10	PK
V	2400.00	64.63	52.16	2.78	27.41	42.66	54	-11.34	AV
H	2390.00	77.85	52.12	2.73	27.38	55.84	74	-18.16	PK
H	2390.00	63.51	52.12	2.73	27.38	41.50	54	-12.50	AV
H	2400.00	74.52	52.12	2.78	27.41	52.59	74	-21.41	PK
H	2400.00	66.02	52.12	2.78	27.41	44.09	54	-9.91	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2480									
V	2483.50	79.52	52.23	2.86	27.44	57.59	74	-16.41	PK
V	2483.50	63.52	52.23	2.86	27.44	41.59	54	-12.41	AV
V	2500.00	78.41	52.26	2.88	27.49	56.52	74	-17.48	PK
V	2500.00	65.21	52.26	2.88	27.49	43.32	54	-10.68	AV
H	2483.50	74.63	52.23	2.86	27.44	52.70	74	-21.30	PK
H	2483.50	64.63	52.23	2.86	27.44	42.70	54	-11.30	AV
H	2500.00	78.15	52.26	2.88	27.49	56.26	74	-17.74	PK
H	2500.00	66.24	52.26	2.88	27.49	44.35	54	-9.65	AV

Remark:

1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

8DPSK

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2402									
V	2390.00	78.52	52.12	2.73	27.38	56.51	74	-17.49	PK
V	2390.00	63.62	52.12	2.73	27.38	41.61	54	-12.39	AV
V	2400.00	77.63	52.16	2.78	27.41	55.66	74	-18.34	PK
V	2400.00	65.21	52.16	2.78	27.41	43.24	54	-10.76	AV
H	2390.00	74.26	52.12	2.73	27.38	52.25	74	-21.75	PK
H	2390.00	65.63	52.12	2.73	27.38	43.62	54	-10.38	AV
H	2400.00	77.02	52.12	2.78	27.41	55.09	74	-18.91	PK
H	2400.00	68.36	52.12	2.78	27.41	46.43	54	-7.57	AV

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Pre-amplifier (dB)	Cable Loss (dB)	Antenna Factor (dB/m)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Detector Type
operation frequency:2480									
V	2483.50	75.63	52.23	2.86	27.44	53.70	74	-20.30	PK
V	2483.50	68.63	52.23	2.86	27.44	46.70	54	-7.30	AV
V	2500.00	77.52	52.26	2.88	27.49	55.63	74	-18.37	PK
V	2500.00	68.52	52.26	2.88	27.49	46.63	54	-7.37	AV
H	2483.50	77.63	52.23	2.86	27.44	55.70	74	-18.30	PK
H	2483.50	67.63	52.23	2.86	27.44	45.70	54	-8.30	AV
H	2500.00	75.63	52.26	2.88	27.49	53.74	74	-20.26	PK
H	2500.00	64.62	52.26	2.88	27.49	42.73	54	-11.27	AV

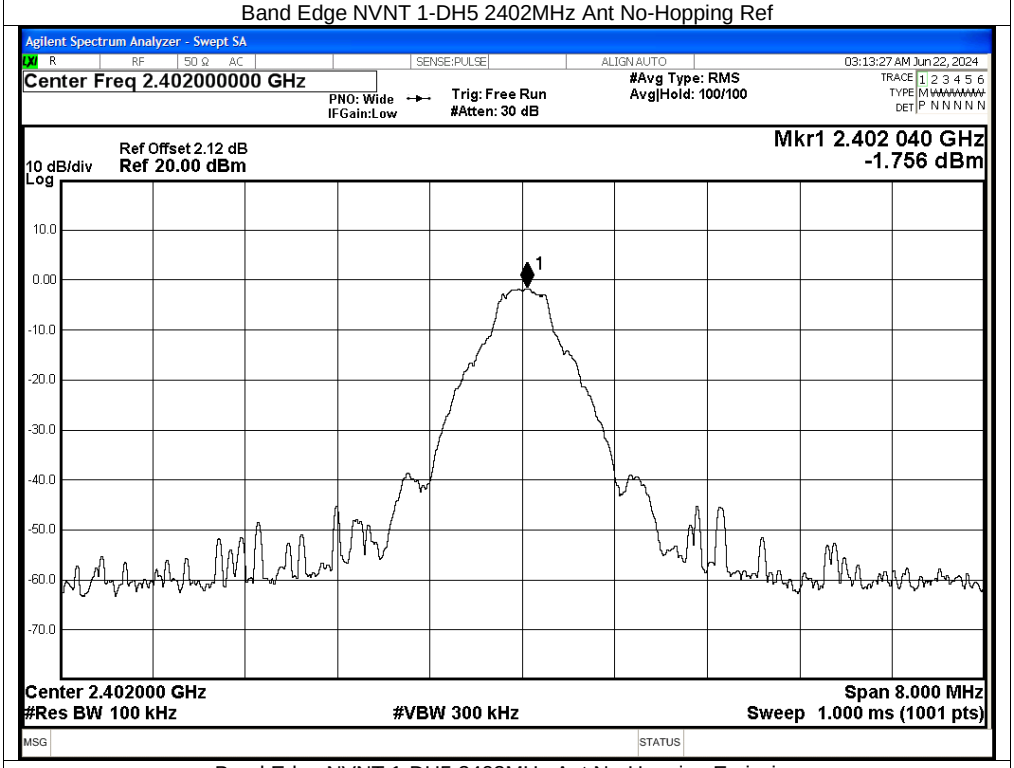
Remark:

1. Emission Level = Meter Reading + Factor, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

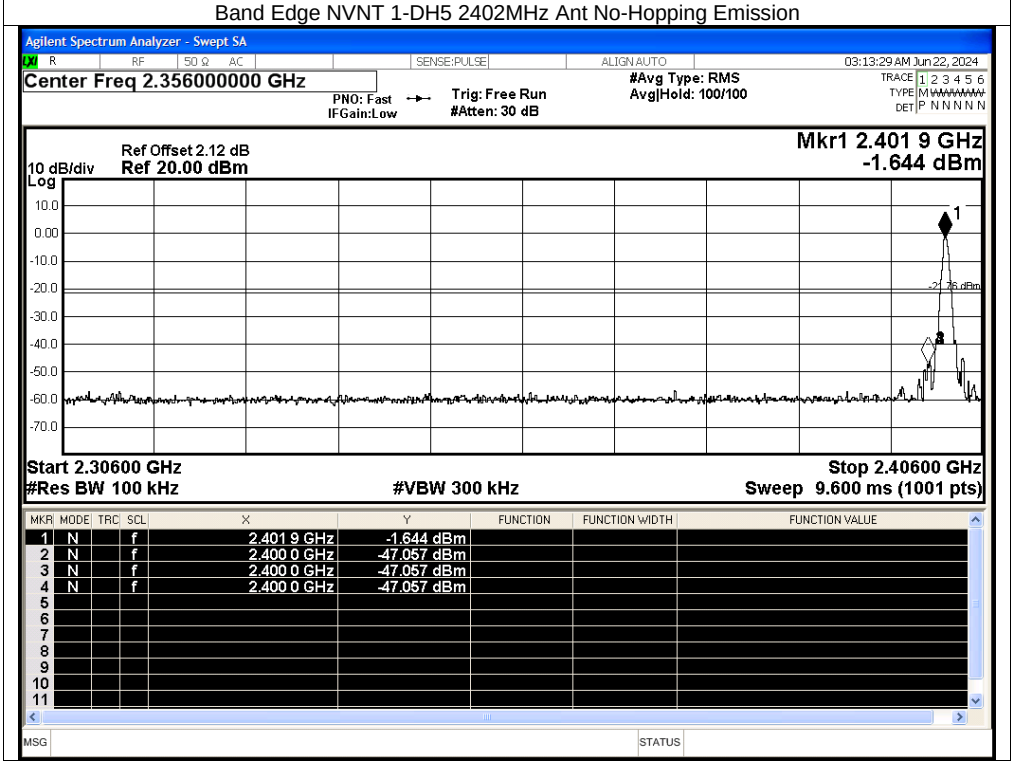
For Conducted(No-Hopping)

Test Graphs

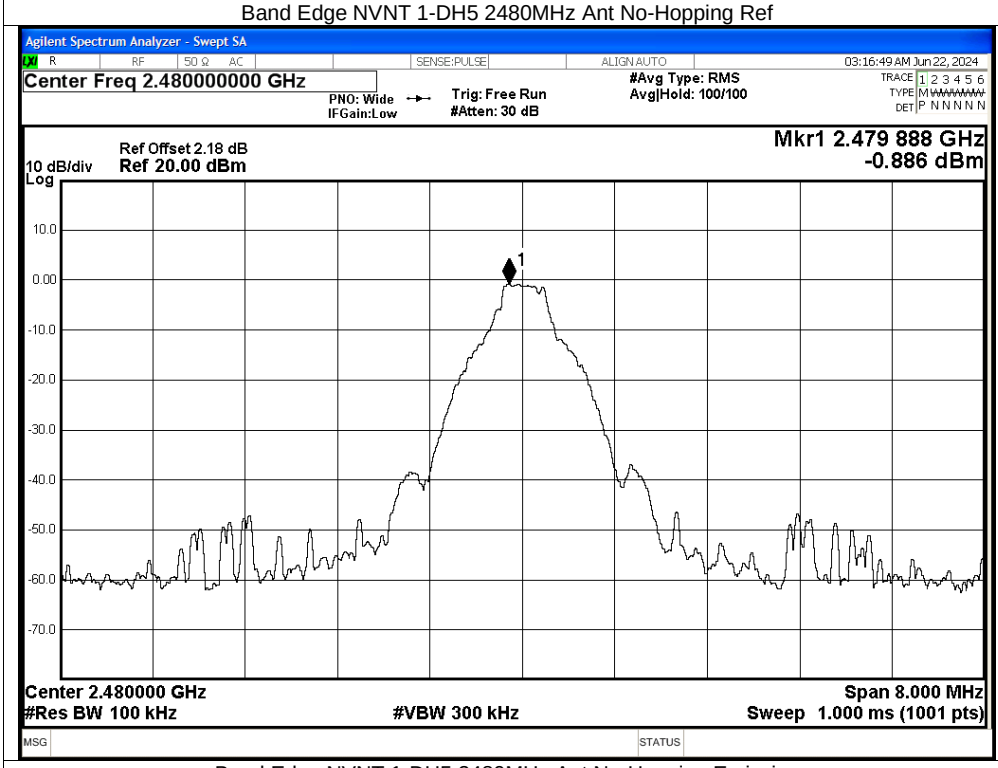
Band Edge NVNT 1-DH5 2402MHz Ant No-Hopping Ref



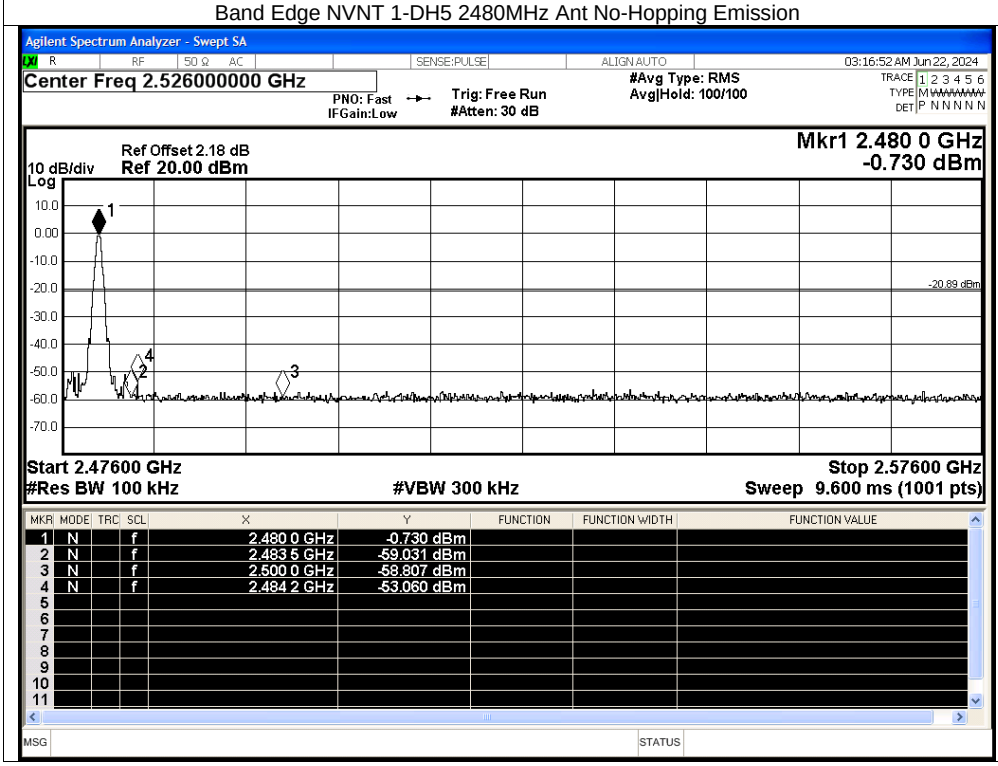
Band Edge NVNT 1-DH5 2402MHz Ant No-Hopping Emission



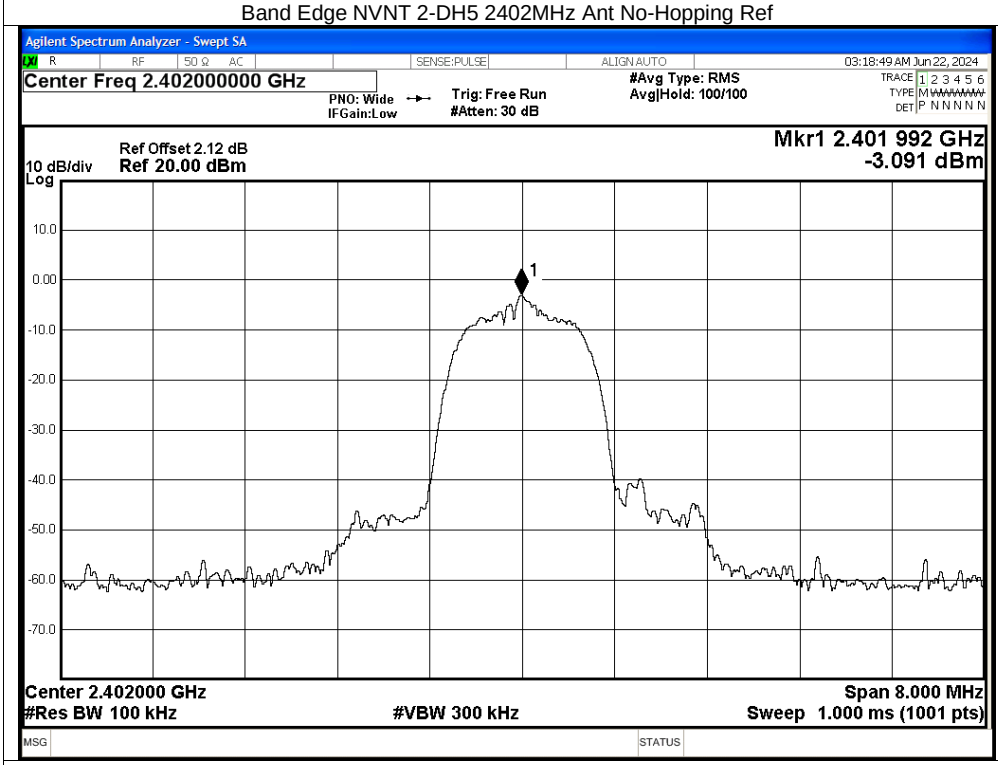
Band Edge NVNT 1-DH5 2480MHz Ant No-Hopping Ref



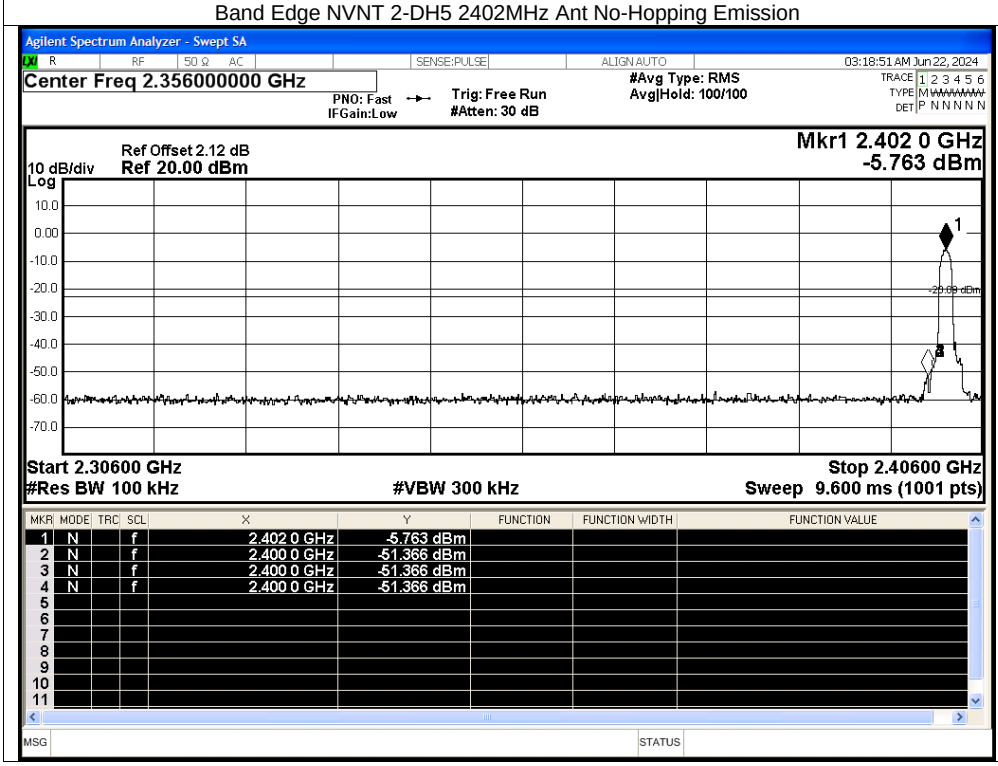
Band Edge NVNT 1-DH5 2480MHz Ant No-Hopping Emission



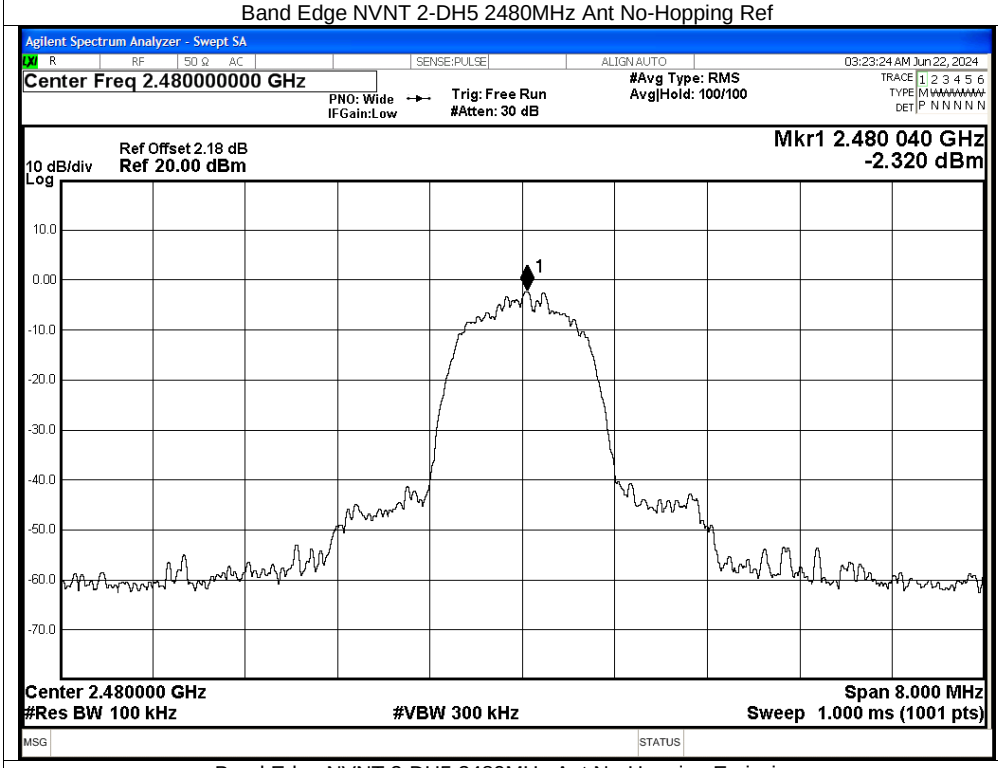
Band Edge NVNT 2-DH5 2402MHz Ant No-Hopping Ref



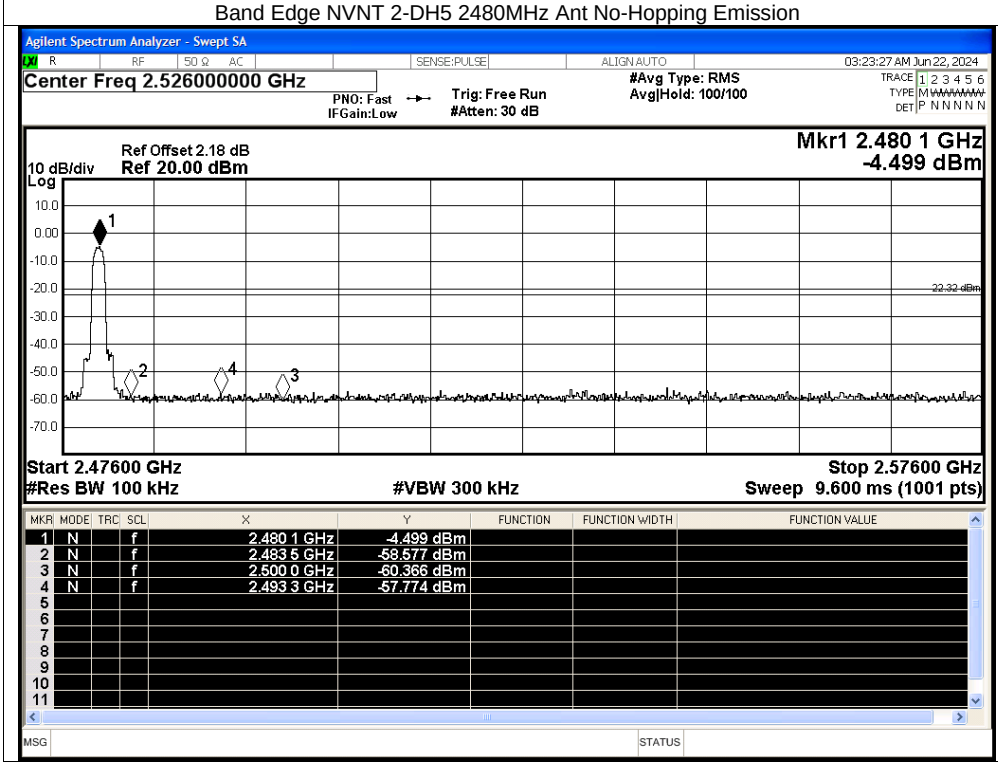
Band Edge NVNT 2-DH5 2402MHz Ant No-Hopping Emission



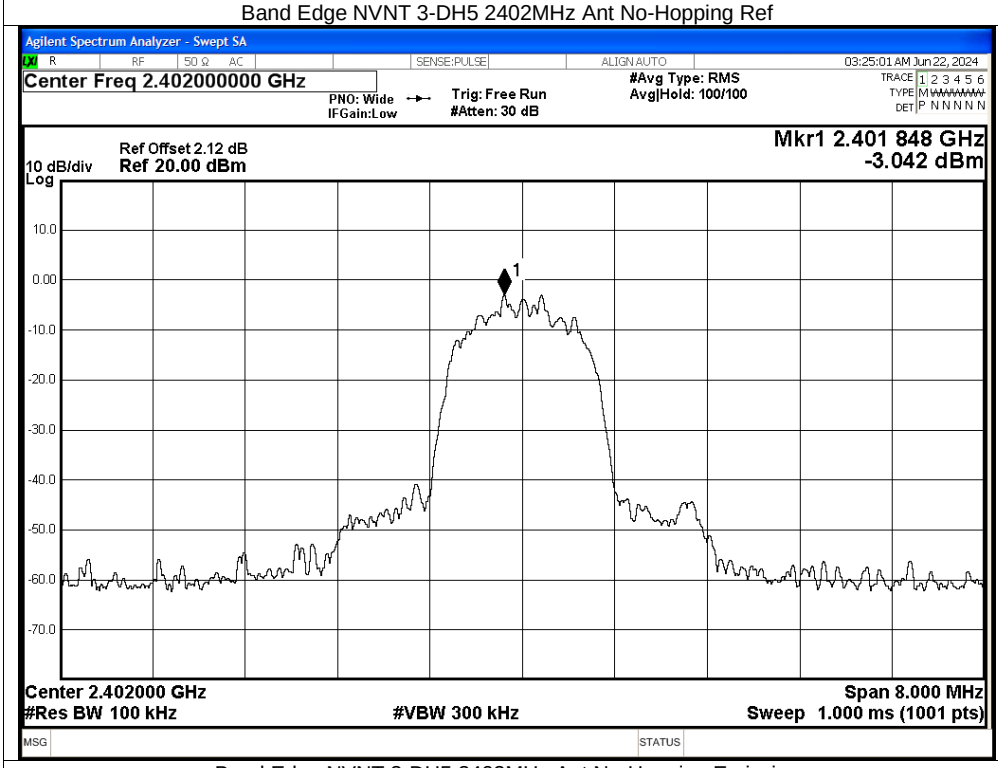
Band Edge NVNT 2-DH5 2480MHz Ant No-Hopping Ref



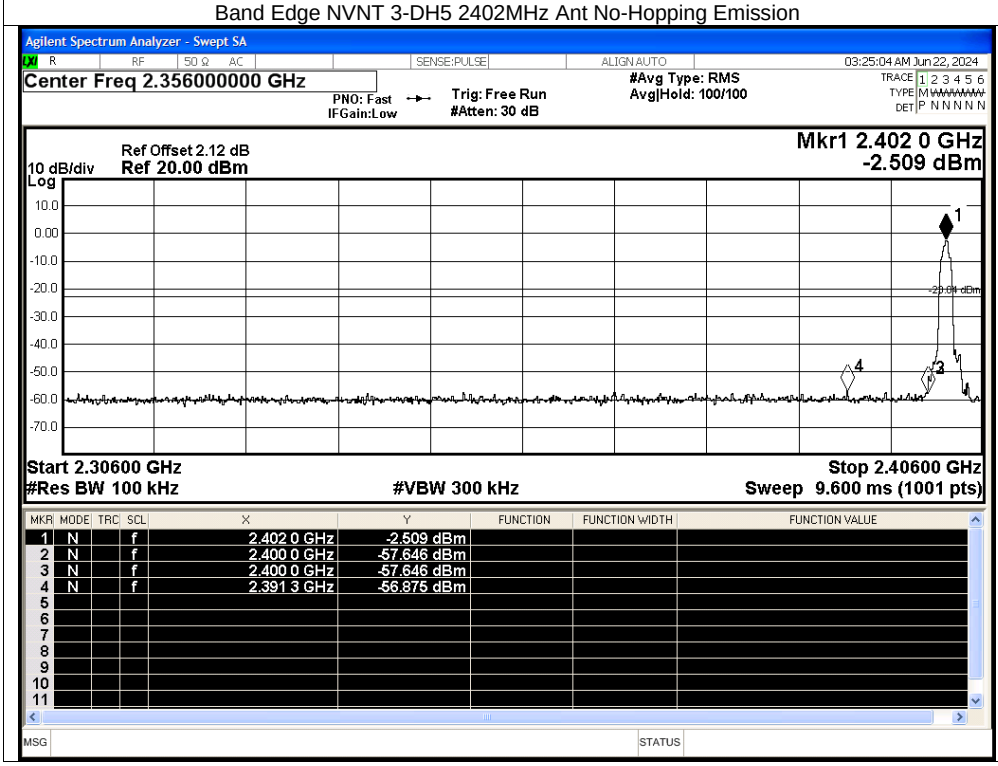
Band Edge NVNT 2-DH5 2480MHz Ant No-Hopping Emission



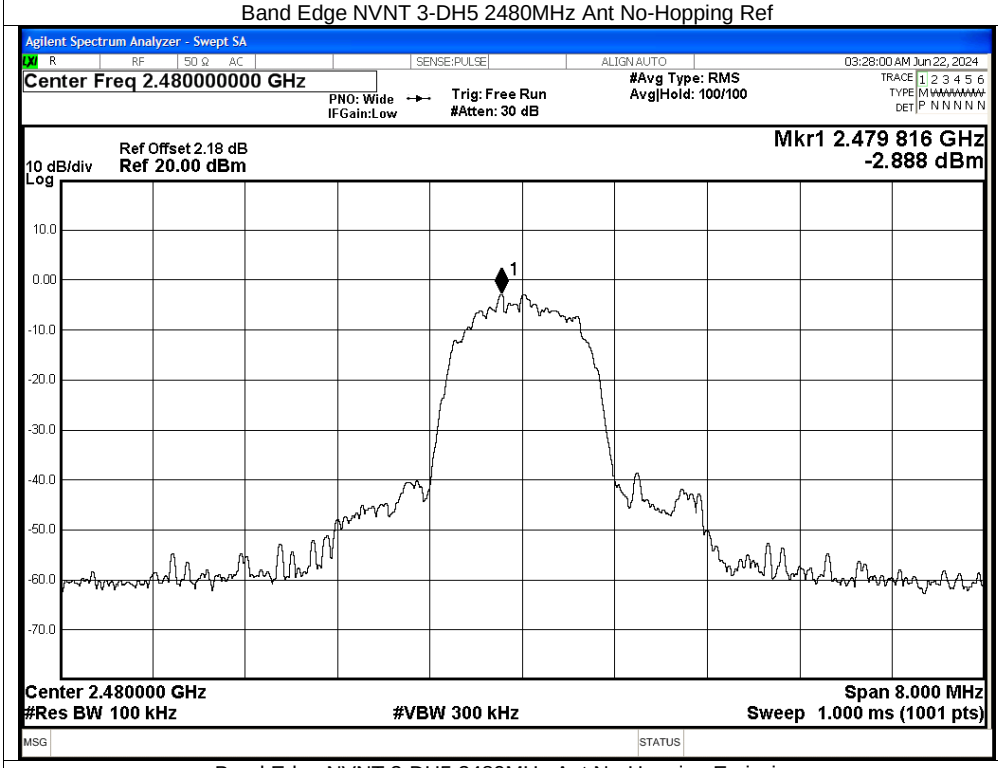
Band Edge NVNT 3-DH5 2402MHz Ant No-Hopping Ref



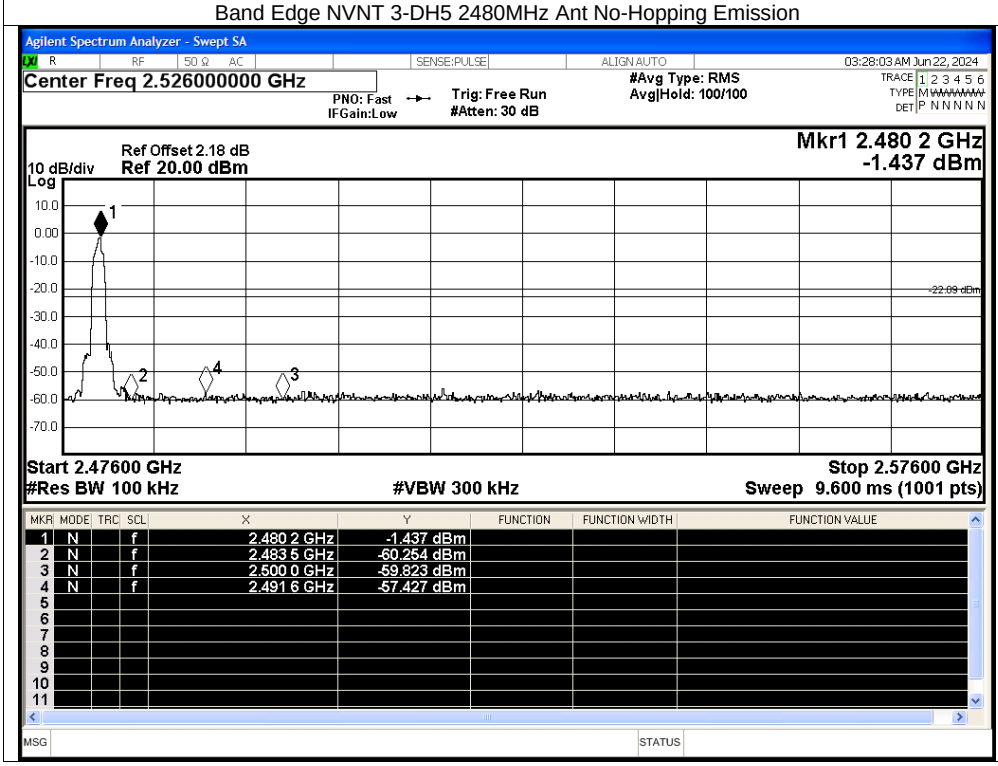
Band Edge NVNT 3-DH5 2402MHz Ant No-Hopping Emission



Band Edge NVNT 3-DH5 2480MHz Ant No-Hopping Ref



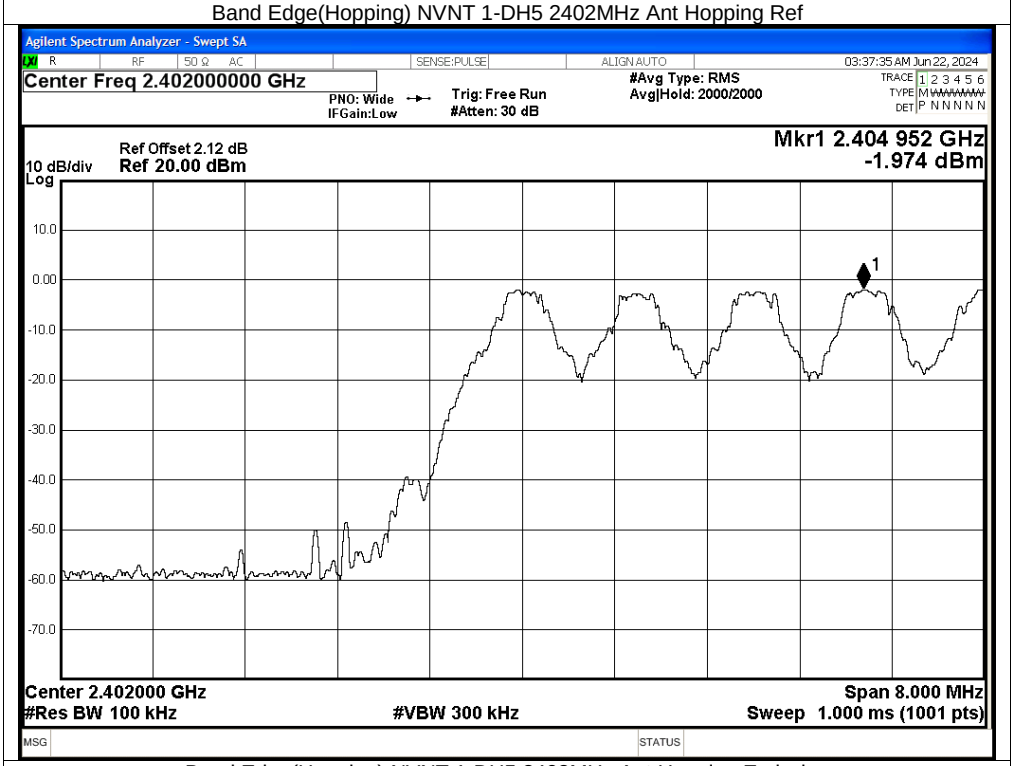
Band Edge NVNT 3-DH5 2480MHz Ant No-Hopping Emission



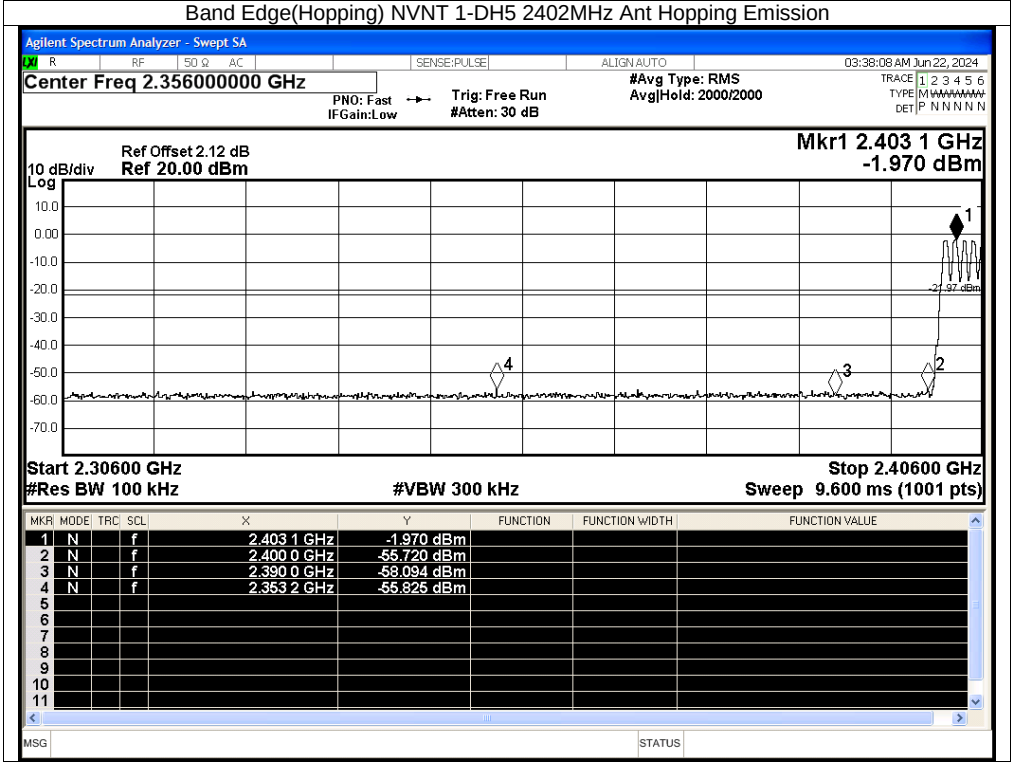
For Conducted(Hopping)

Test Graphs

Band Edge(Hopping) NVNT 1-DH5 2402MHz Ant Hopping Ref

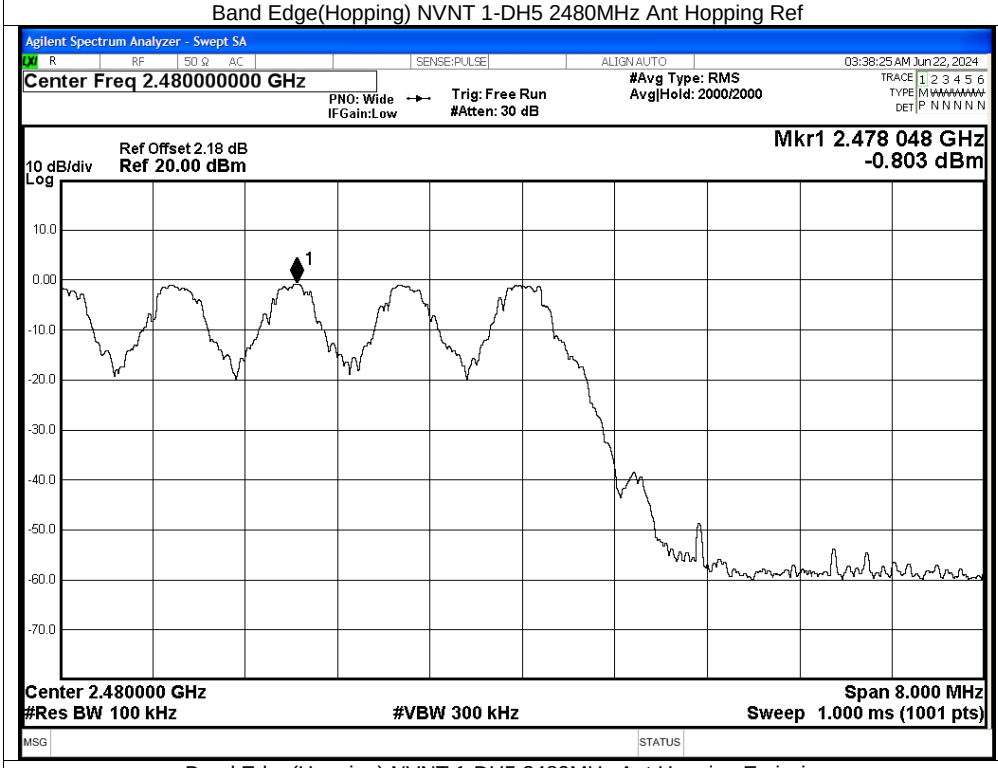


Band Edge(Hopping) NVNT 1-DH5 2402MHz Ant Hopping Emission

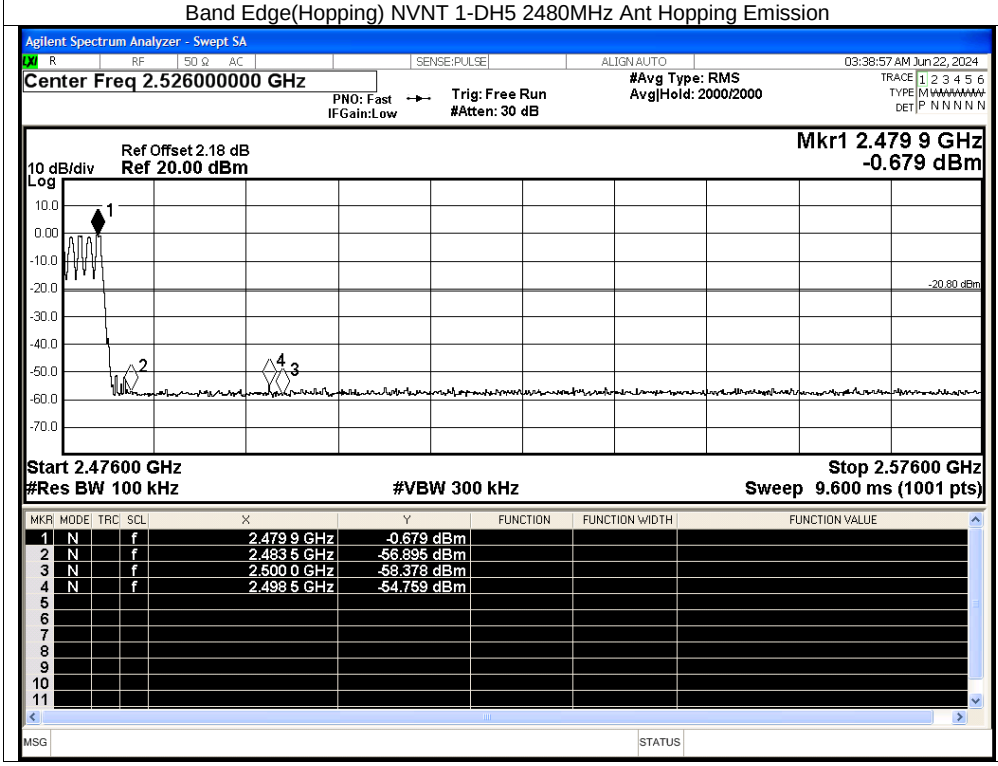


MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N		f	2.403 1 GHz	-1.970 dBm			
2	N		f	2.400 0 GHz	-55.720 dBm			
3	N		f	2.390 0 GHz	-58.094 dBm			
4	N		f	2.353 2 GHz	-55.825 dBm			
5								
6								
7								
8								
9								
10								
11								

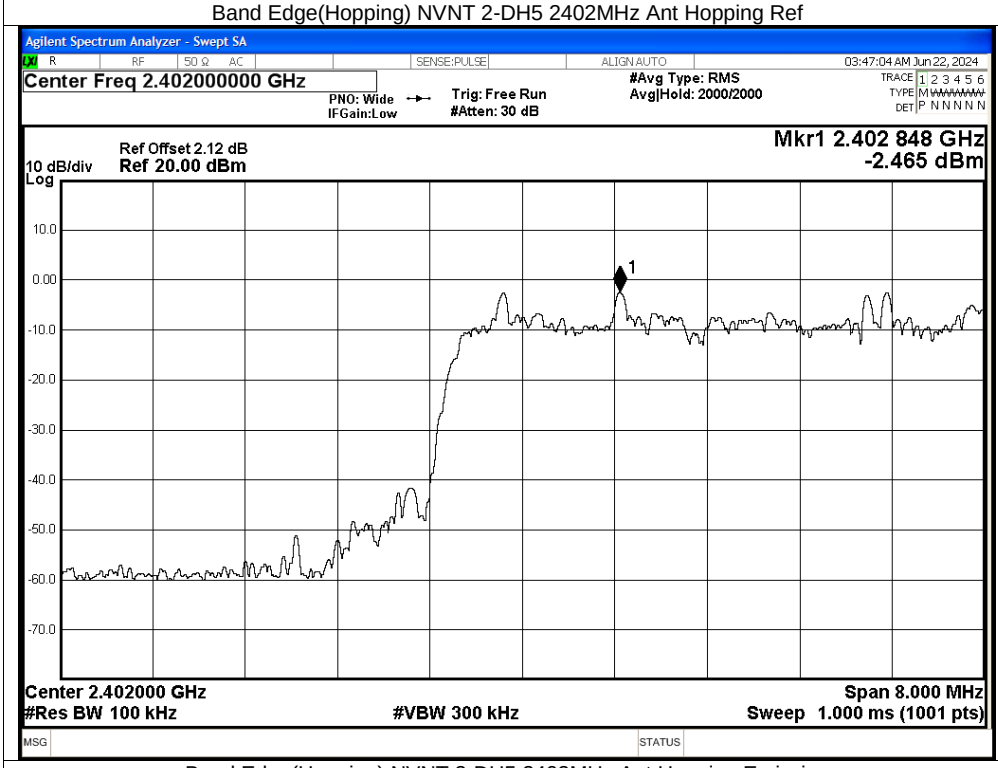
Band Edge(Hopping) NVNT 1-DH5 2480MHz Ant Hopping Ref



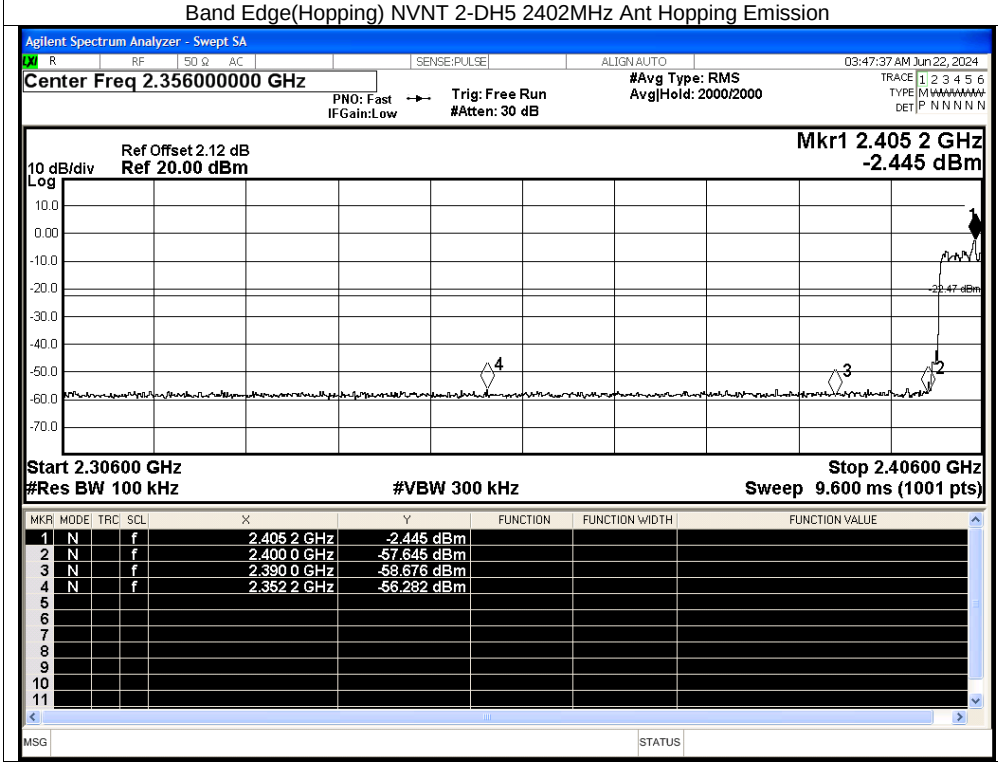
Band Edge(Hopping) NVNT 1-DH5 2480MHz Ant Hopping Emission



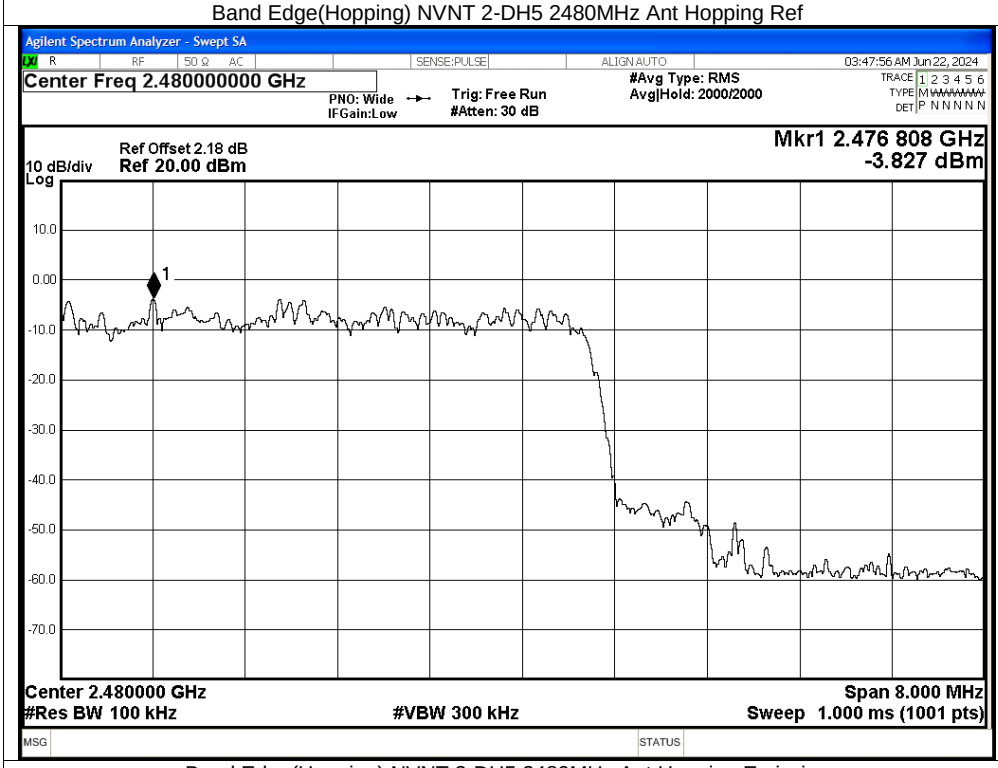
Band Edge(Hopping) NVNT 2-DH5 2402MHz Ant Hopping Ref



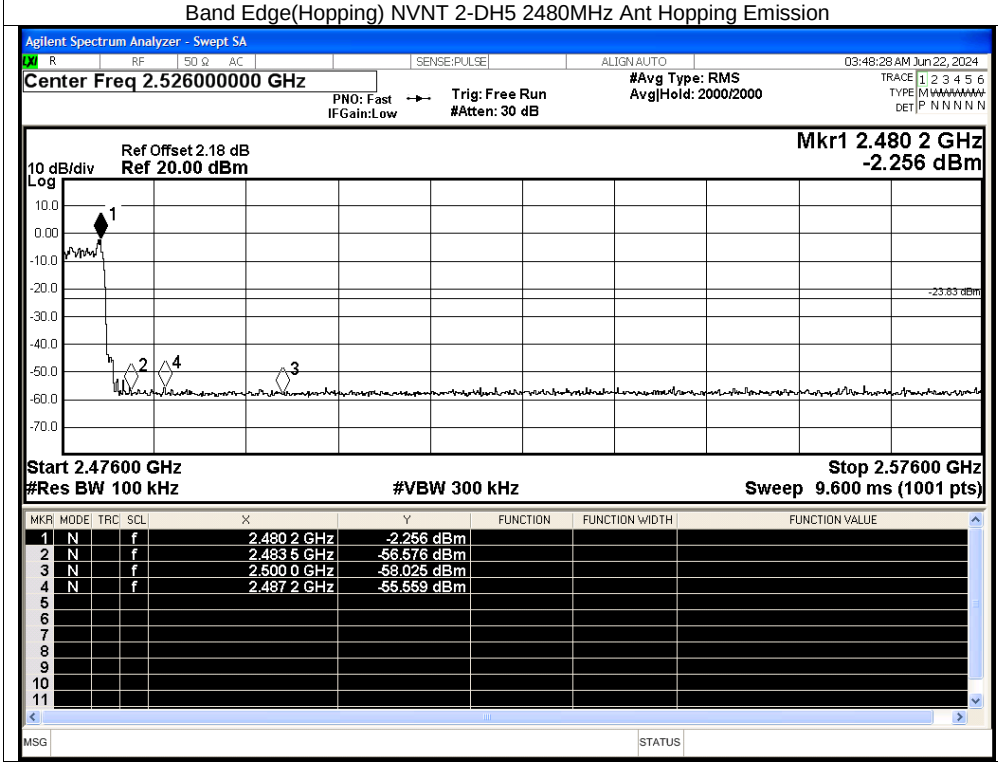
Band Edge(Hopping) NVNT 2-DH5 2402MHz Ant Hopping Emission



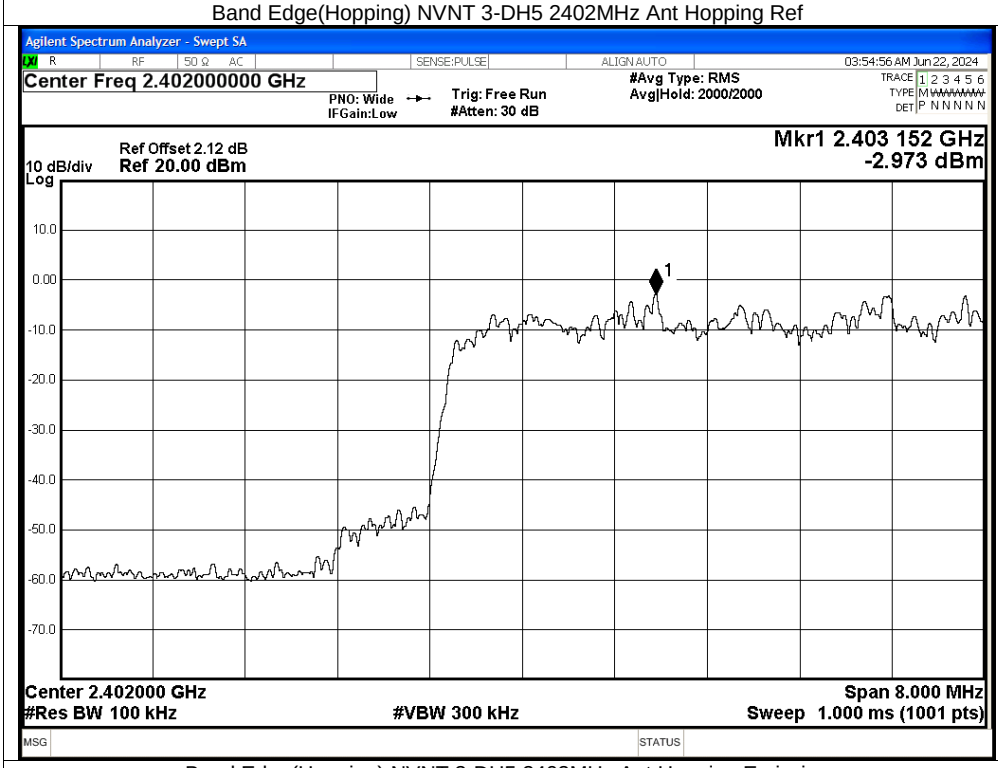
Band Edge(Hopping) NVNT 2-DH5 2480MHz Ant Hopping Ref



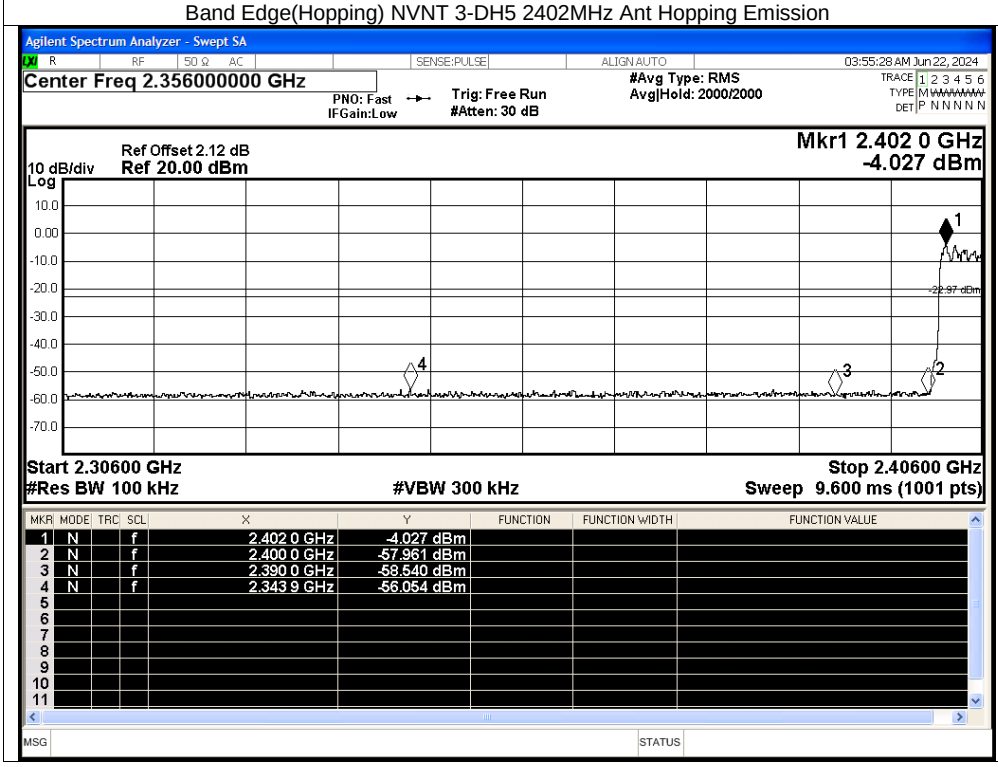
Band Edge(Hopping) NVNT 2-DH5 2480MHz Ant Hopping Emission



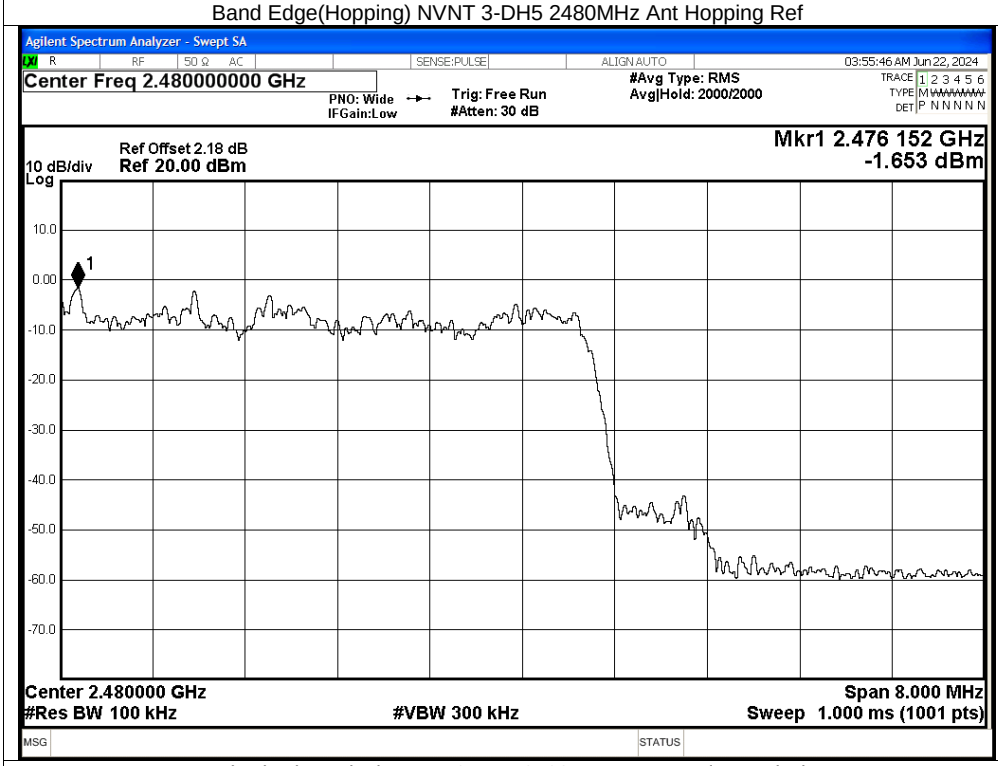
Band Edge(Hopping) NVNT 3-DH5 2402MHz Ant Hopping Ref



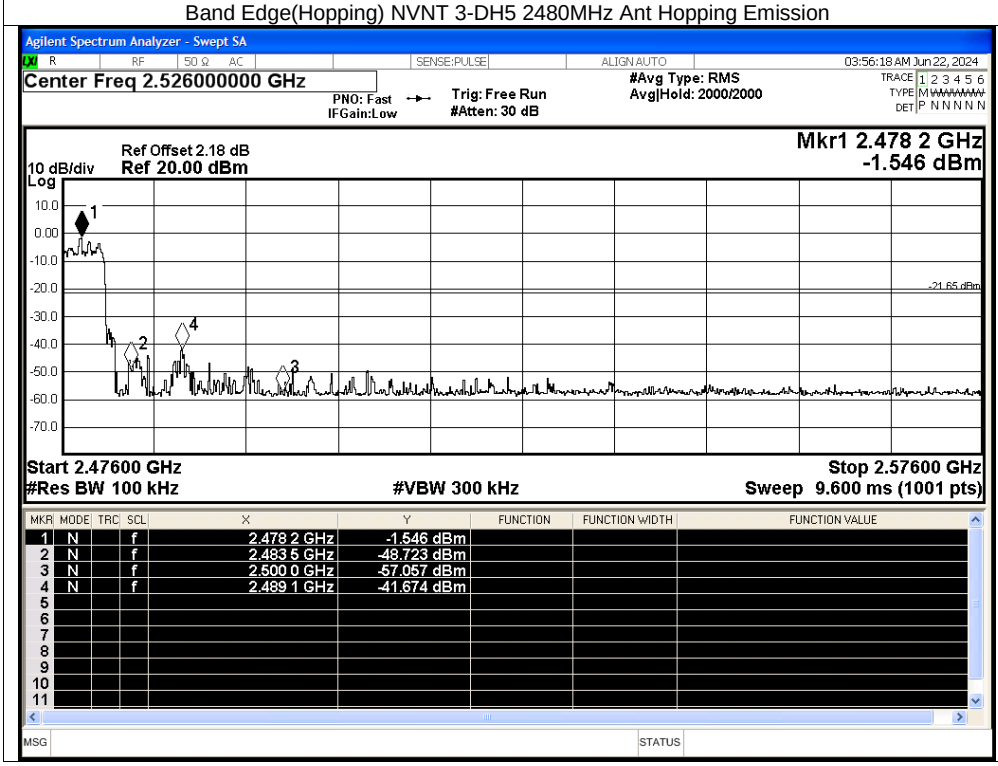
Band Edge(Hopping) NVNT 3-DH5 2402MHz Ant Hopping Emission



Band Edge(Hopping) NVNT 3-DH5 2480MHz Ant Hopping Ref



Band Edge(Hopping) NVNT 3-DH5 2480MHz Ant Hopping Emission



4. PEAK OUTPUT POWER

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(i)	Peak Output Power	30Bm or 20.96dBm	2400-2483.5	PASS

4.1.1 TEST PROCEDURE

a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,

b. Spectrum Setting : RBW > the 20 dB bandwidth of the emission being measured

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

VBW ≥ RBW

Sweep = auto

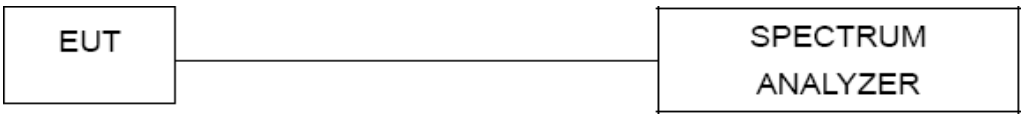
Detector function = peak

Trace = max hold

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

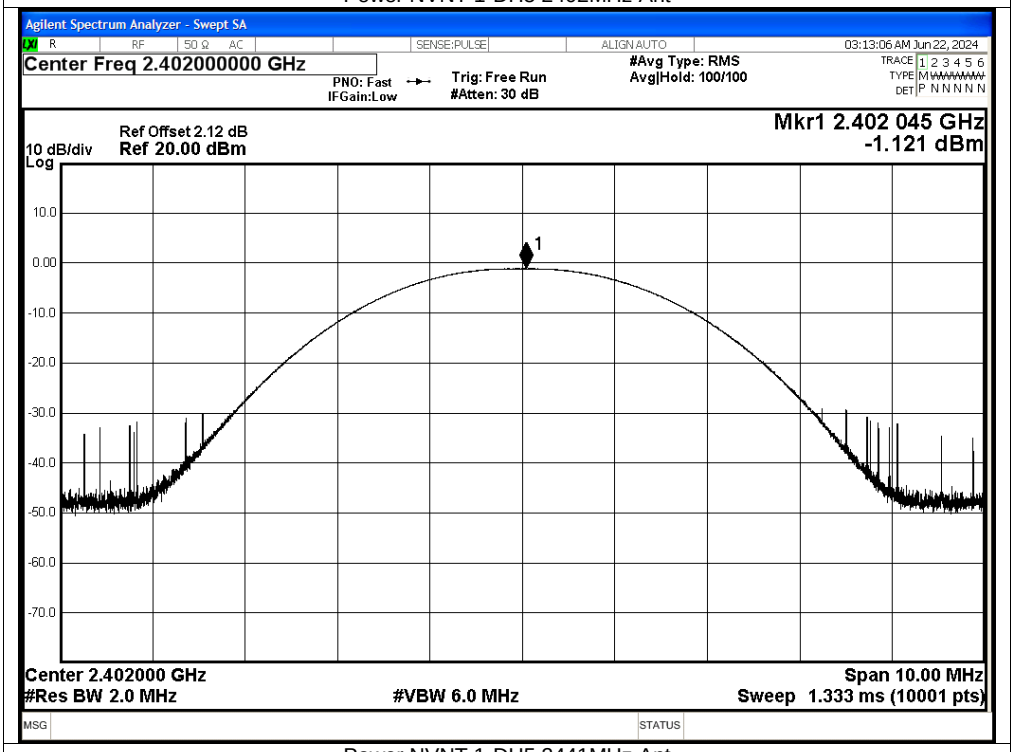
4.1.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00/ CH39 /CH78 (1M/2M/3Mbps Mode)		

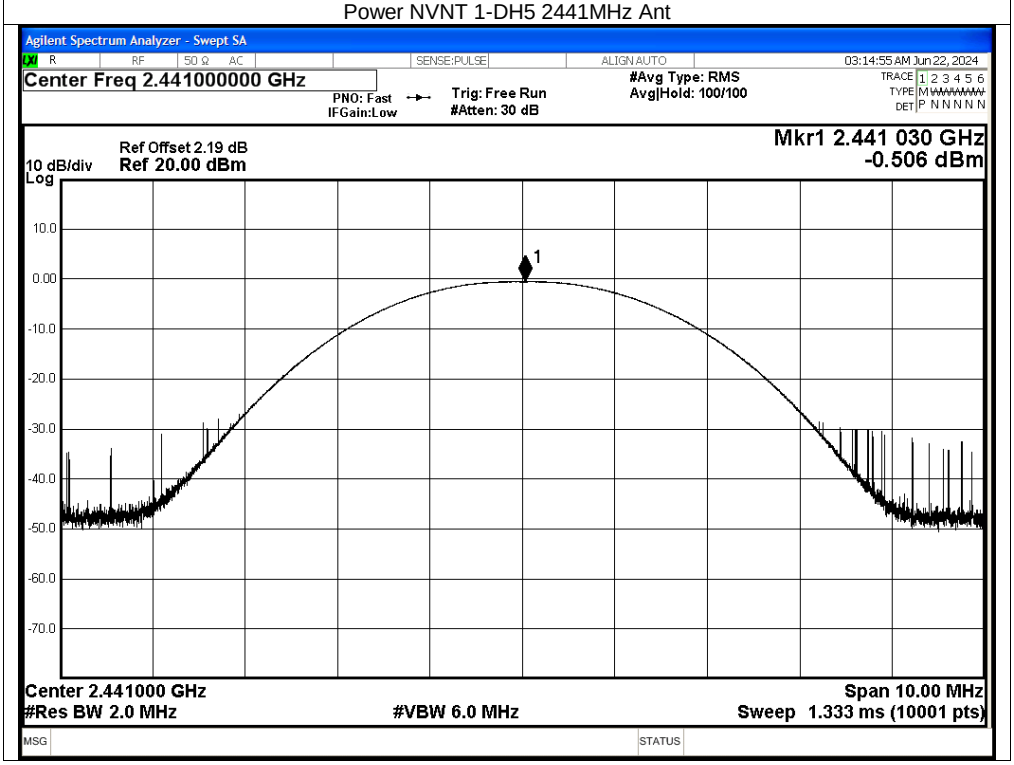
Mode	Test Channel	Peak Output Power (dBm)	LIMIT (dBm)
GFSK	CH00	-1.12	30.00
	CH39	-0.51	30.00
	CH78	-0.17	30.00
π/4 DQPSK	CH00	-1.49	20.96
	CH39	-0.76	20.96
	CH78	-0.41	20.96
8DPSK	CH00	-1.3	20.96
	CH39	-0.71	20.96
	CH78	-0.33	20.96

Test Graphs

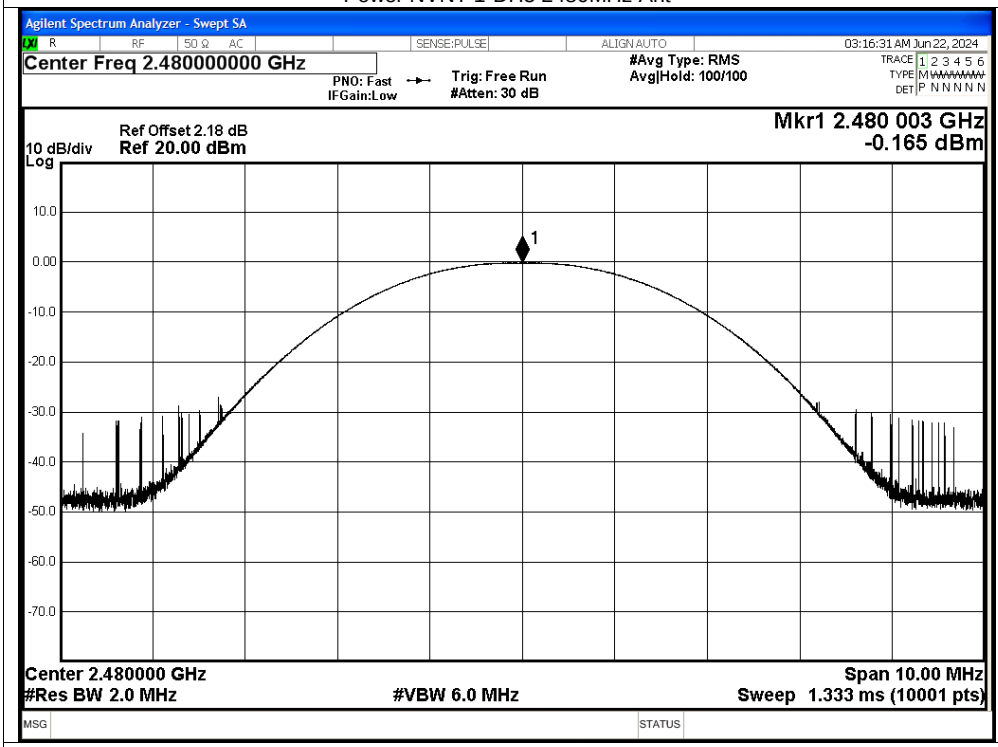
Power NVNT 1-DH5 2402MHz Ant



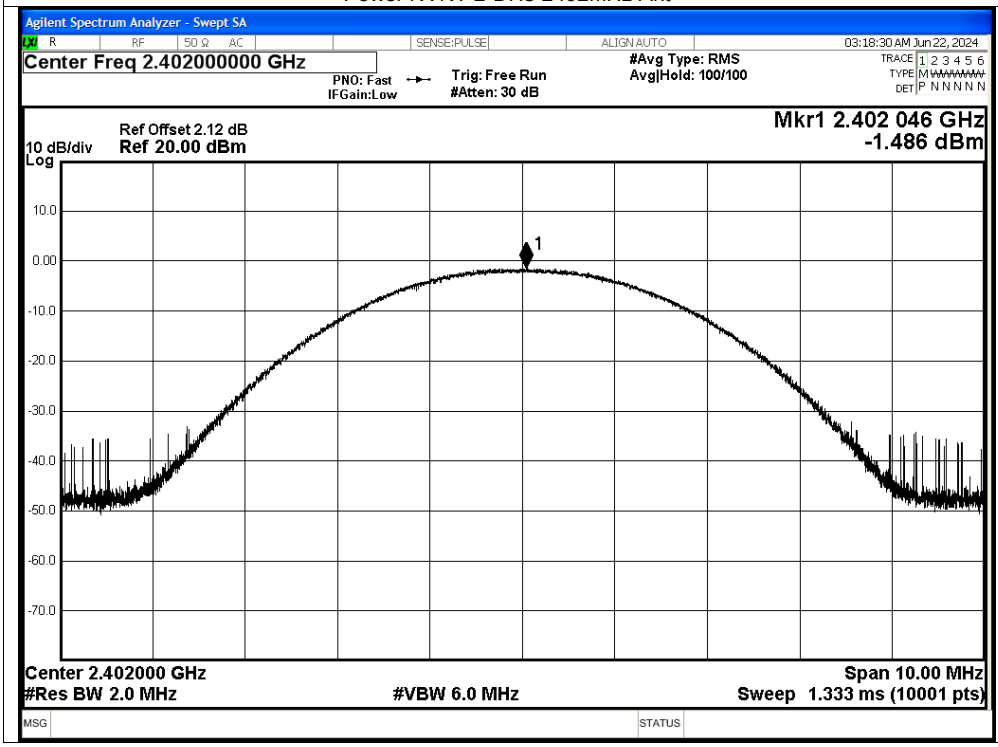
Power NVNT 1-DH5 2441MHz Ant



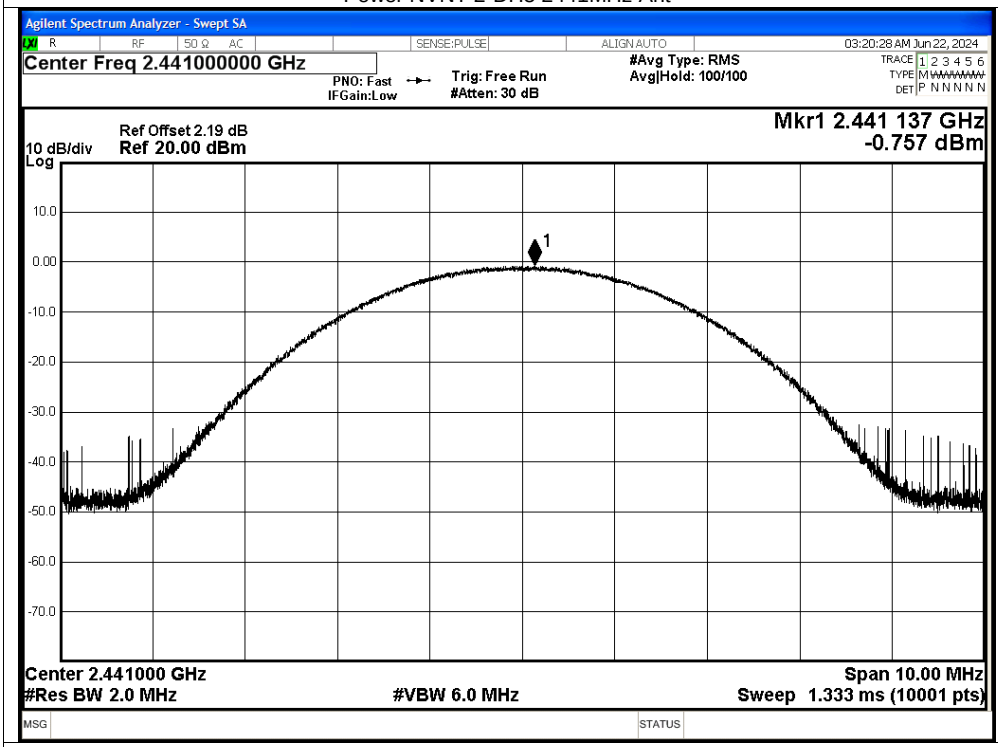
Power NVNT 1-DH5 2480MHz Ant



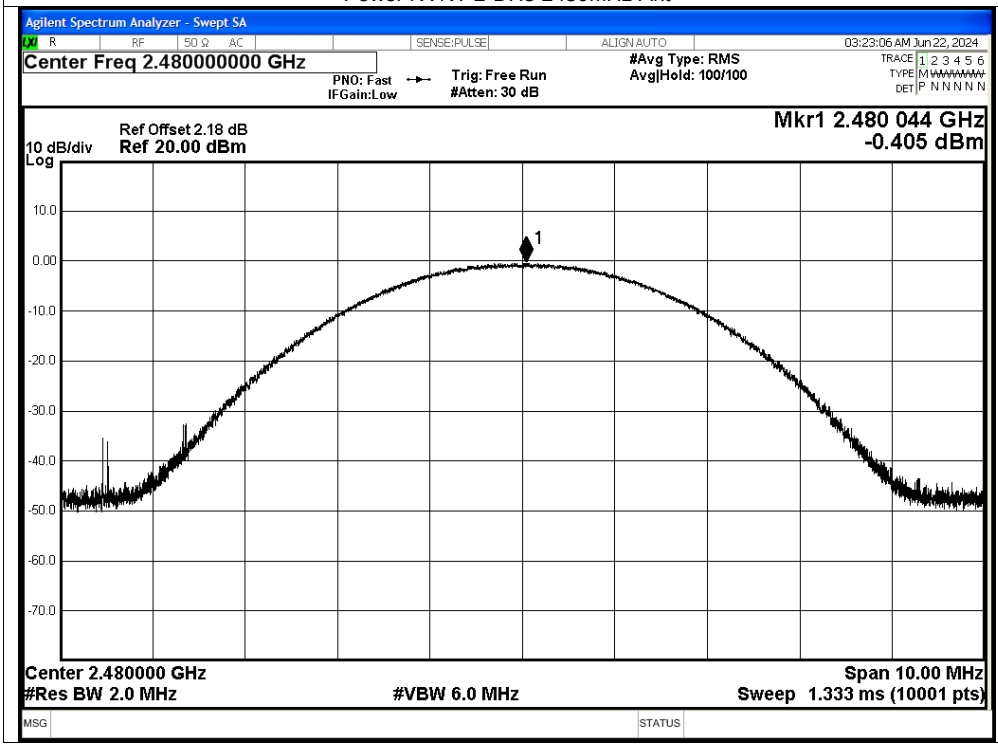
Power NVNT 2-DH5 2402MHz Ant



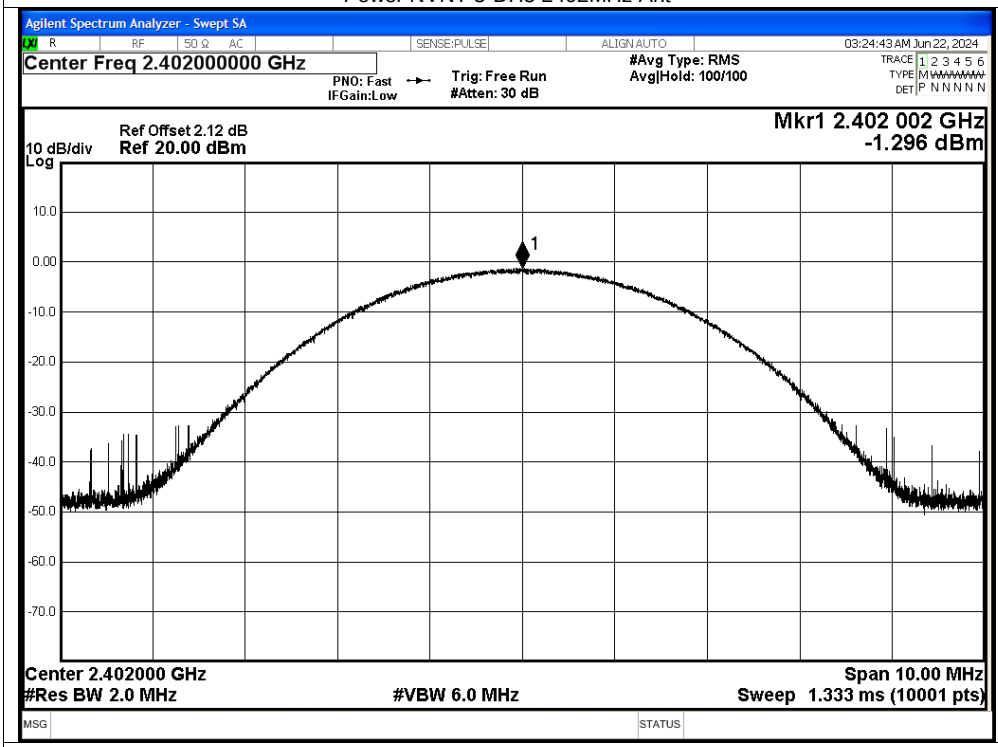
Power NVNT 2-DH5 2441MHz Ant



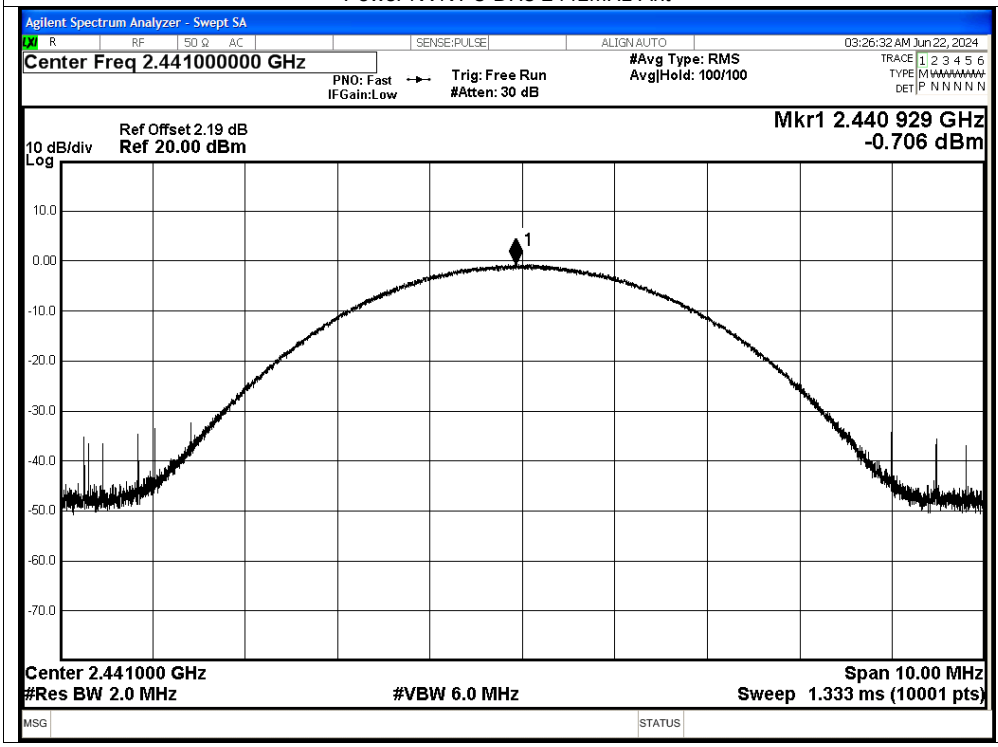
Power NVNT 2-DH5 2480MHz Ant



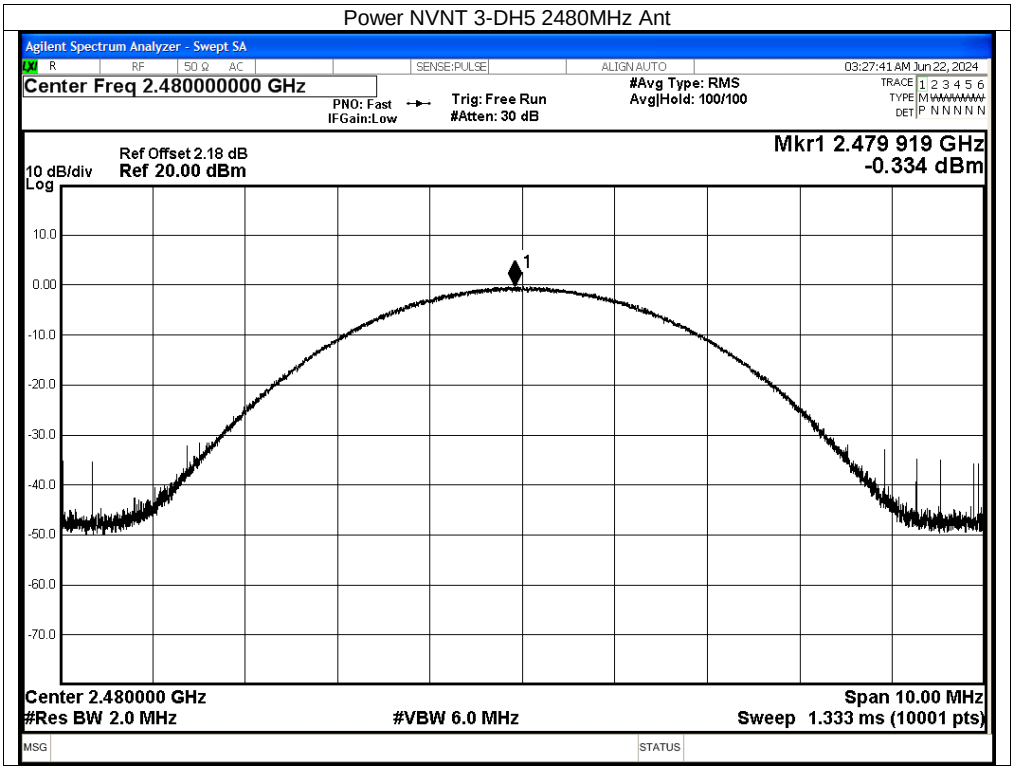
Power NVNT 3-DH5 2402MHz Ant



Power NVNT 3-DH5 2441MHz Ant



Power NVNT 3-DH5 2480MHz Ant



5. NUMBER OF HOPPING CHANNEL

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	RBW ≥ 1% of the span
VB	VBW ≥ RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

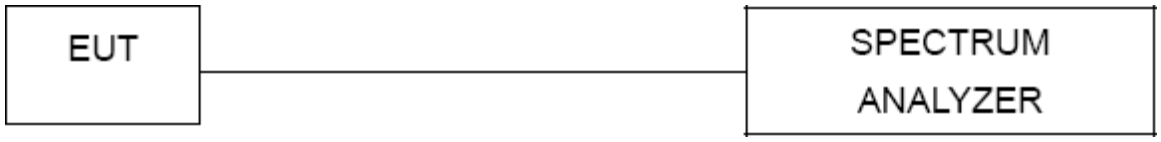
5.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = Auto.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

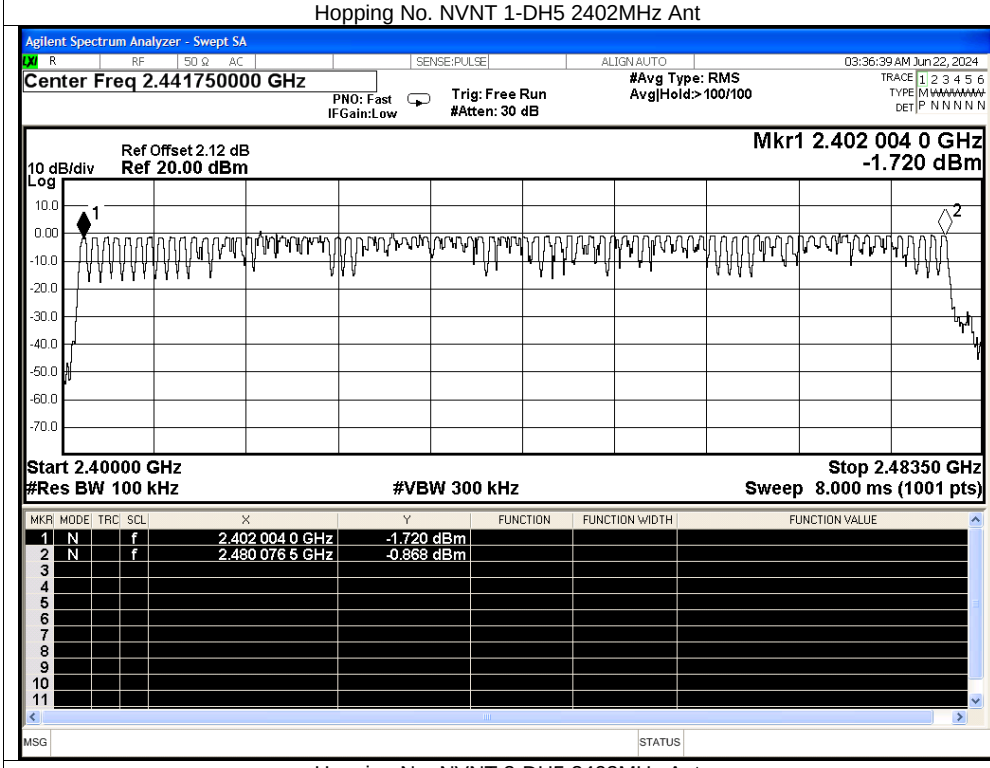
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

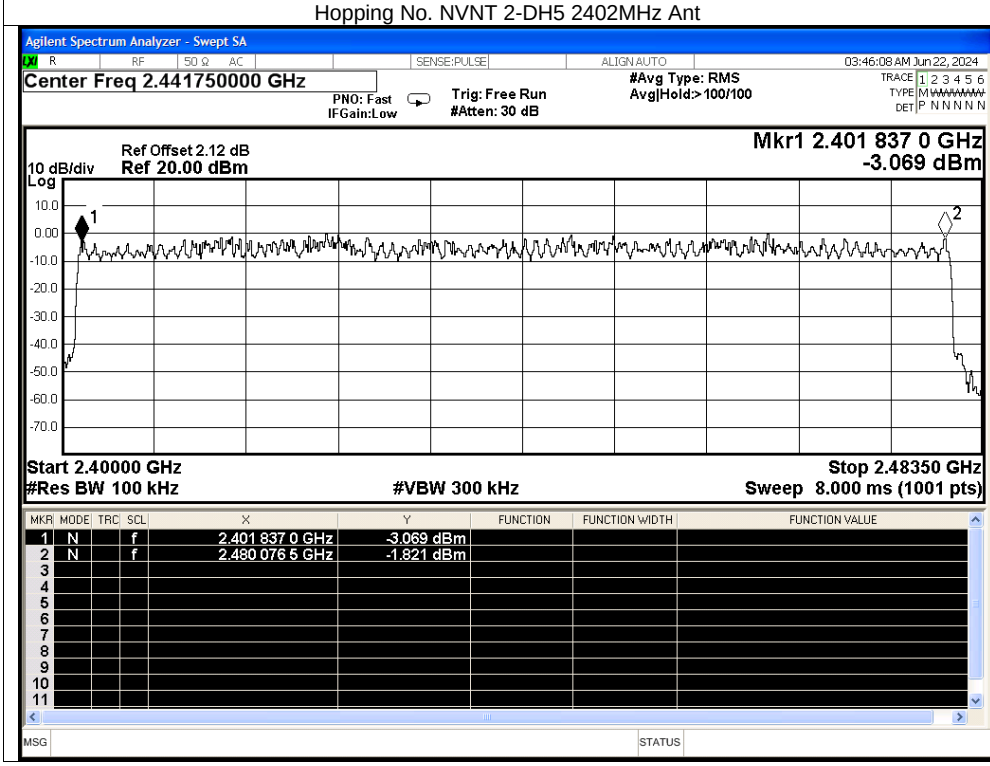
Test Mode :	Hopping Mode

Number of Hopping Channel	GFSK	79
	π /4 DQPSK	79
	8DPSK	79

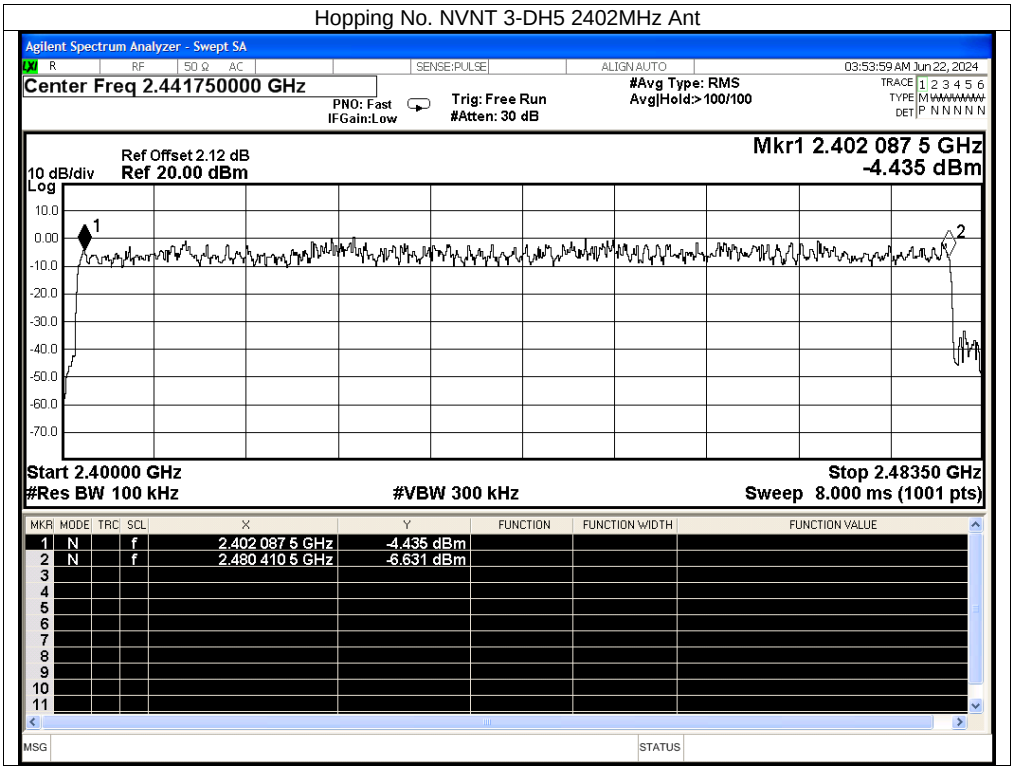
Hopping No. NVNT 1-DH5 2402MHz Ant



Hopping No. NVNT 2-DH5 2402MHz Ant



Hopping No. NVNT 3-DH5 2402MHz Ant



6. BANDWIDTH TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C	
Section	Test Item
15.247(a)(2)	20dB Bandwidth

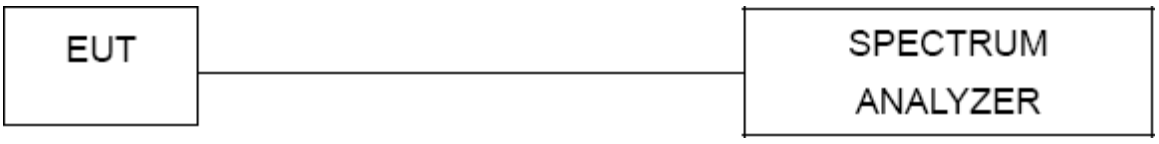
6.1.1 TEST PROCEDURE

1. Set RBW = 30 kHz.
2. Set the video bandwidth (VBW) ≥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 20 dB relative to the maximum level measured in the fundamental emission.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

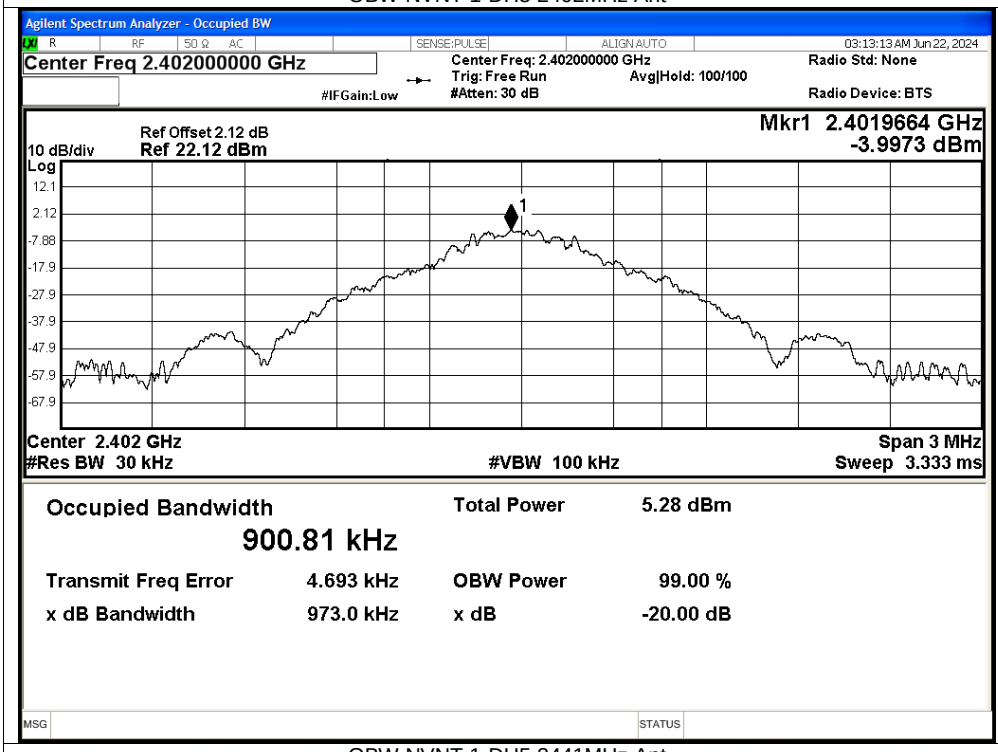
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS

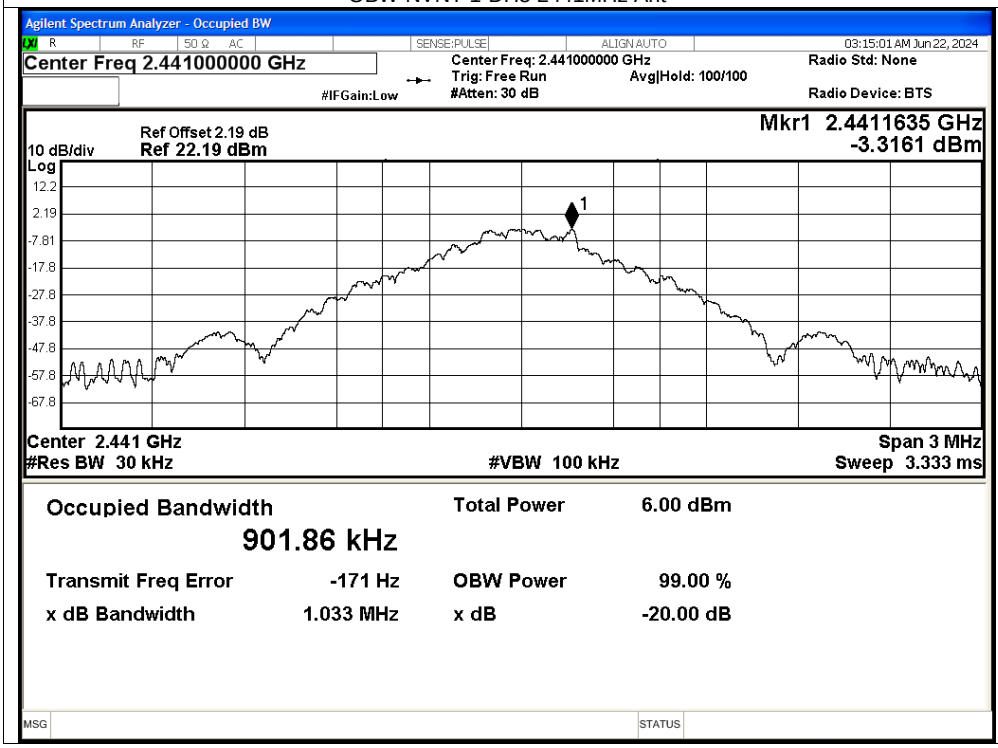
	Frequency (MHz)	20dB Bandwidth (MHz)	Result
GFSK	2402	0.901	Pass
	2441	0.902	Pass
	2480	0.903	Pass
π/4 DQPSK	2402	1.182	Pass
	2441	1.18	Pass
	2480	1.18	Pass
8DPSK	2402	1.18	Pass
	2441	1.184	Pass
	2480	1.183	Pass

Test Graphs

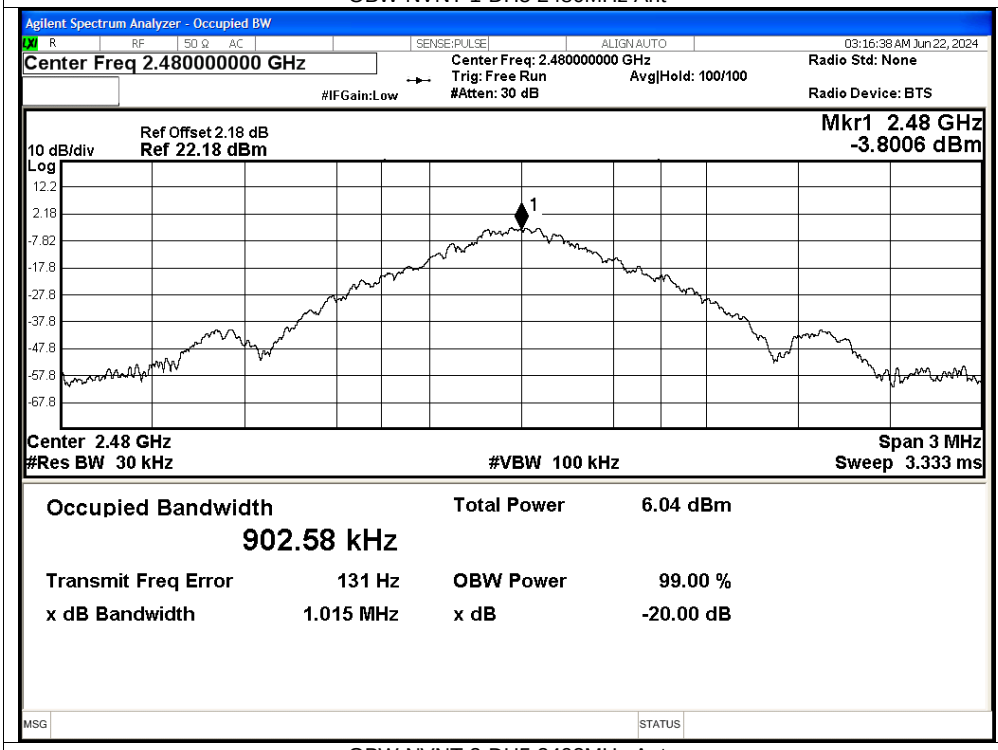
OBW NVNT 1-DH5 2402MHz Ant



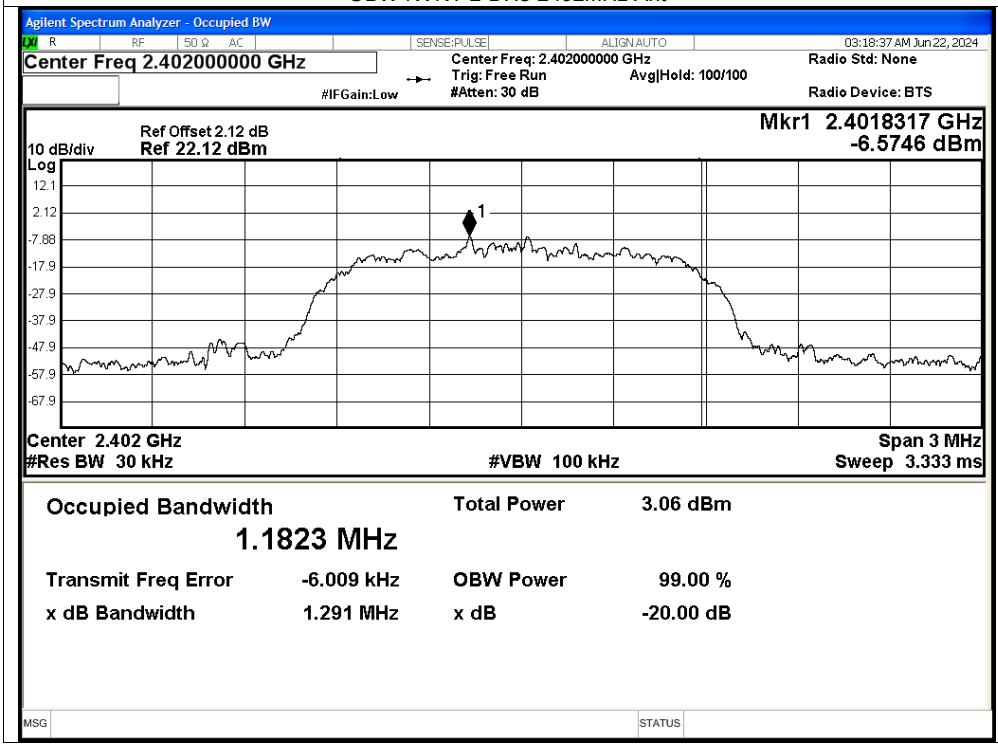
OBW NVNT 1-DH5 2441MHz Ant



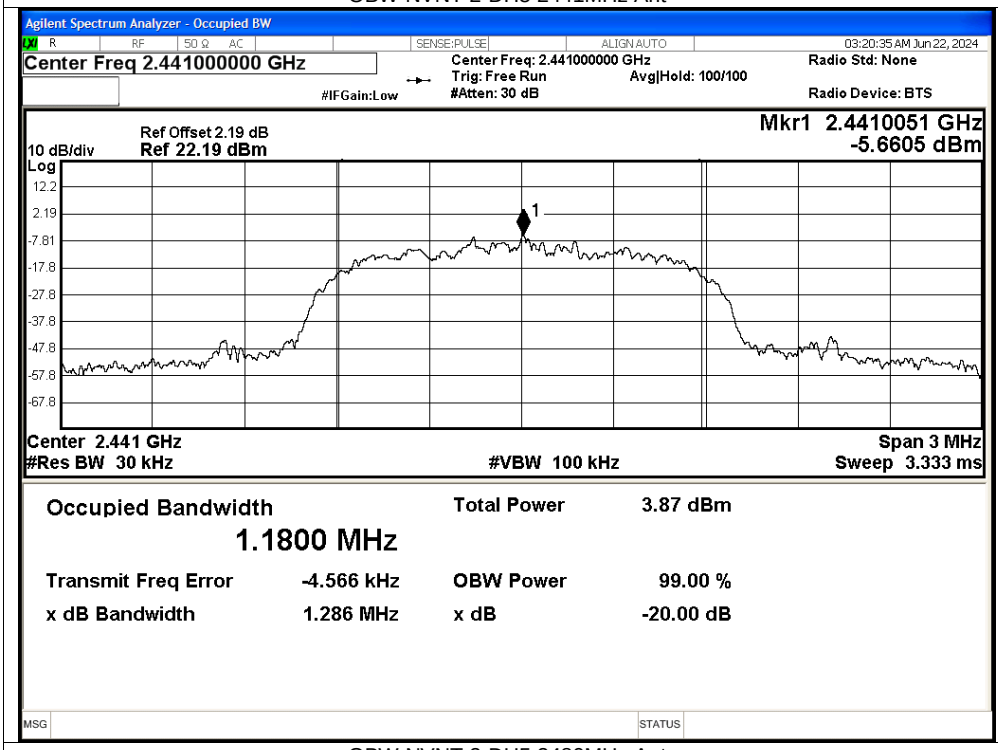
OBW NVNT 1-DH5 2480MHz Ant



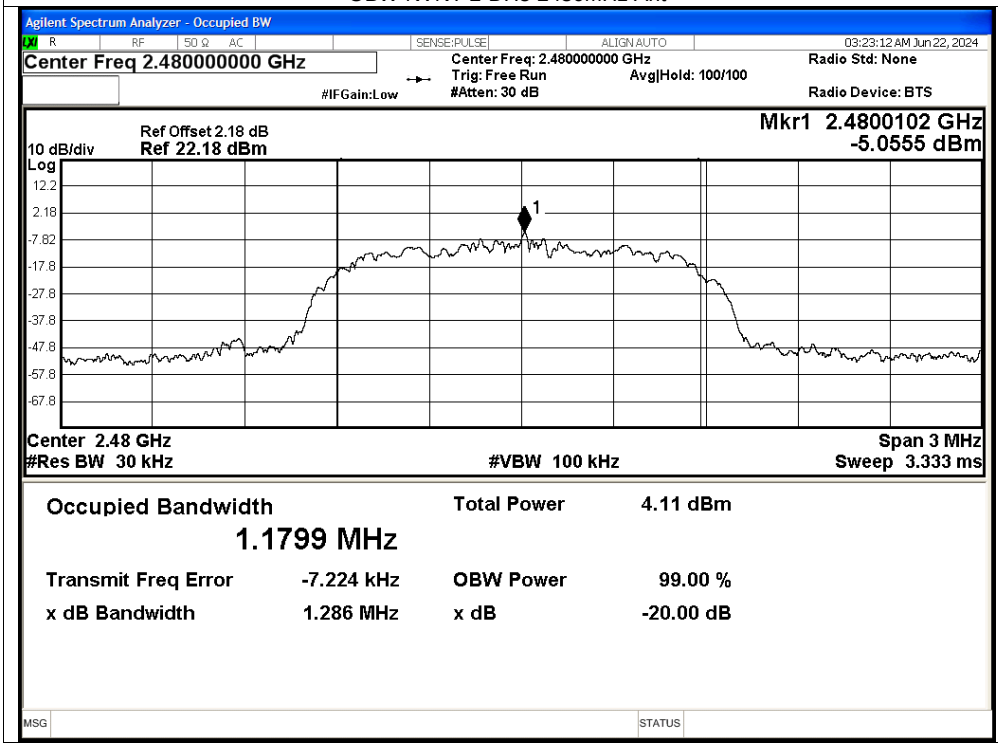
OBW NVNT 2-DH5 2402MHz Ant



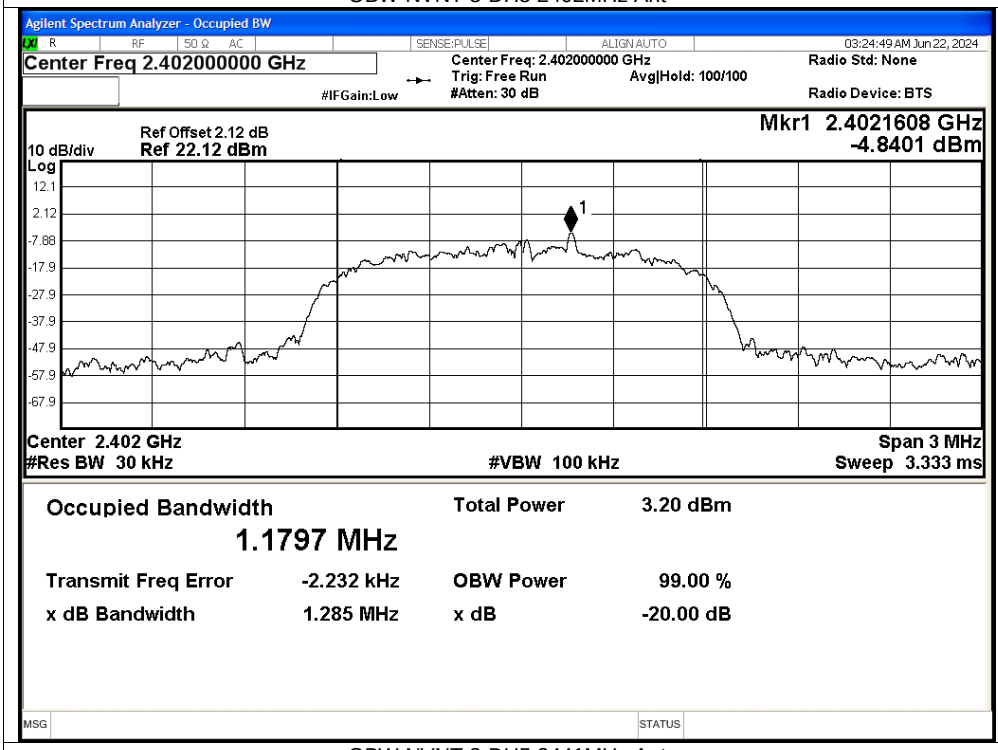
OBW NVNT 2-DH5 2441MHz Ant



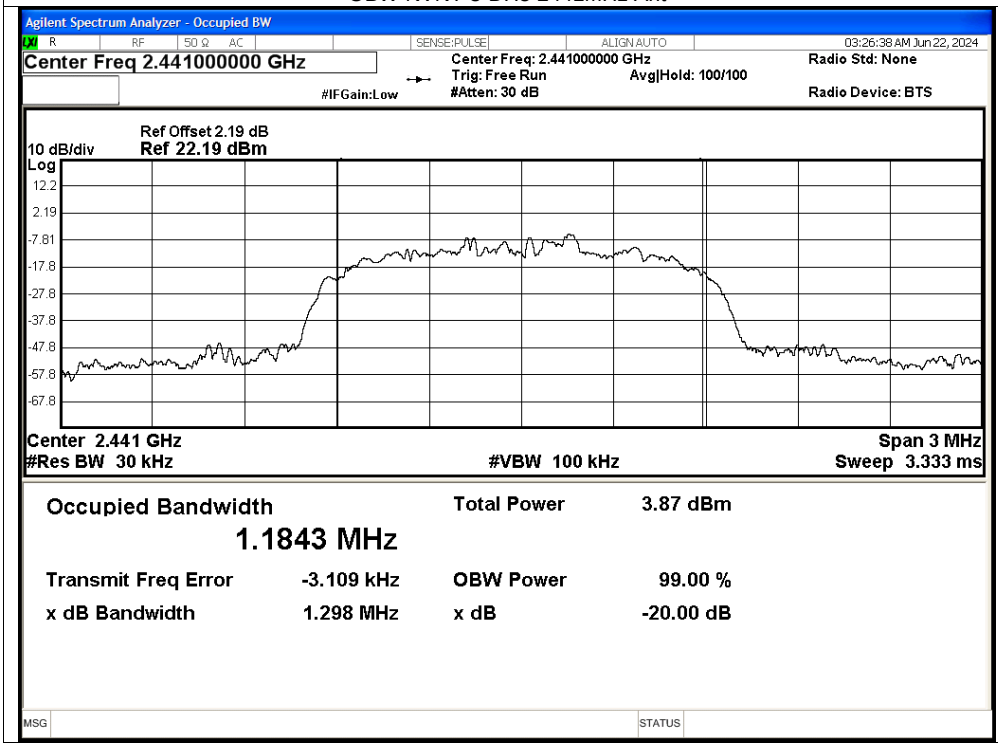
OBW NVNT 2-DH5 2480MHz Ant



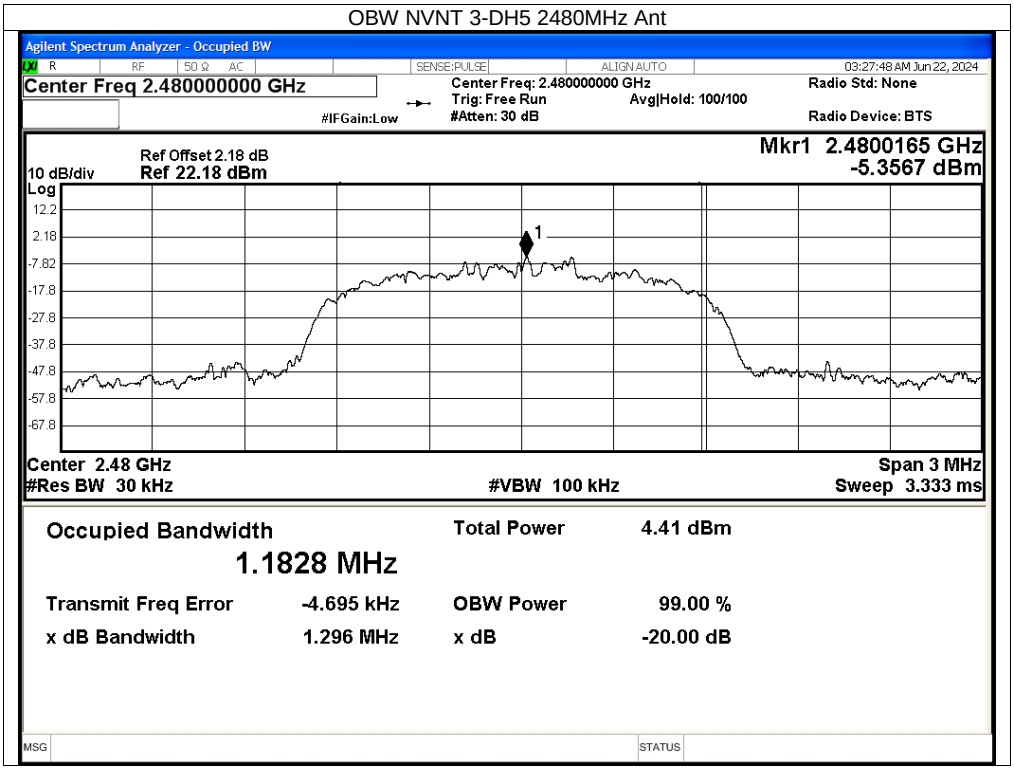
OBW NVNT 3-DH5 2402MHz Ant



OBW NVNT 3-DH5 2441MHz Ant



OBW NVNT 3-DH5 2480MHz Ant



7. HOPPING CHANNEL SEPARATION MEASUREMENT

7.1 APPLIED PROCEDURES / LIMIT

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.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz (Channel Separation)
VB	300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

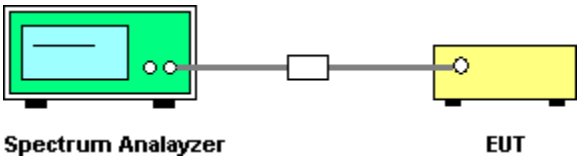
7.1.1 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
b. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

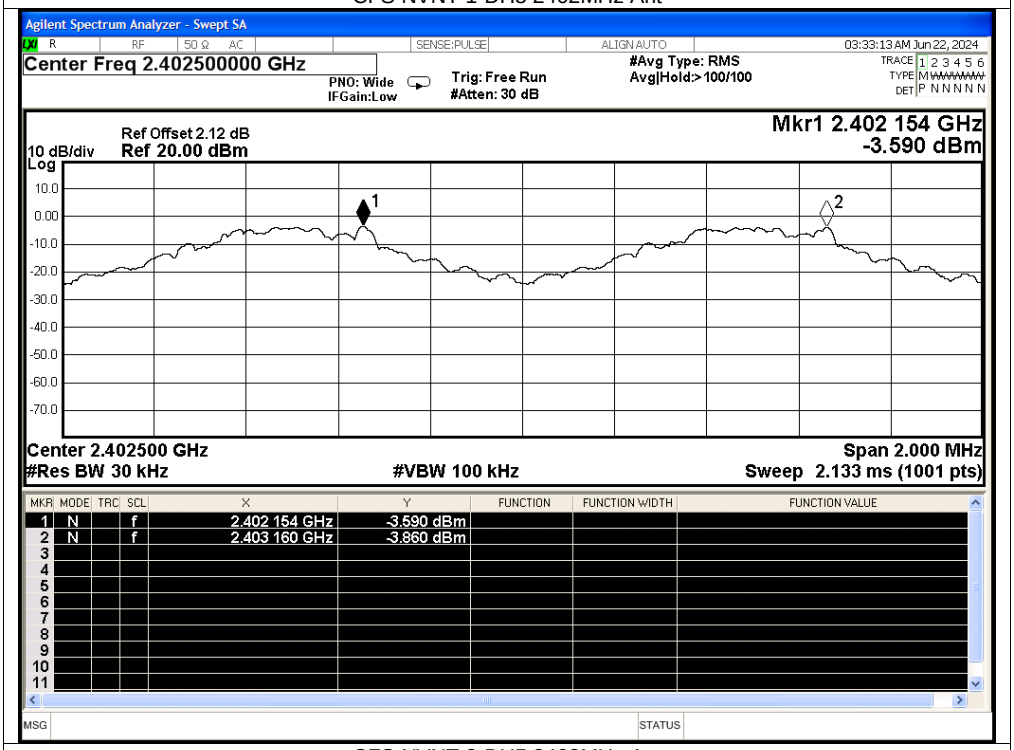
7.1.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage :	DC 3.7V

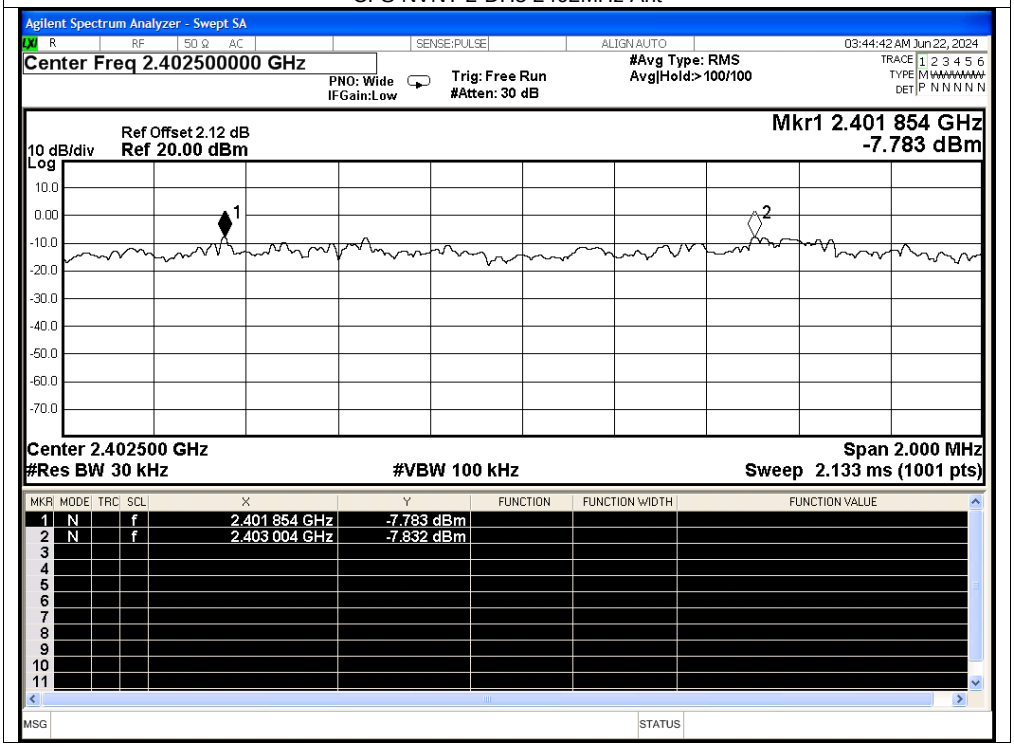
Test Mode	Antenna	Frequency[MHz]	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant	Hop_2440	1.006	≥0.639	PASS
2DH5	Ant	Hop_2440	1.15	≥0.857	PASS
3DH5	Ant	Hop_2440	1	≥0.874	PASS

Test Graphs

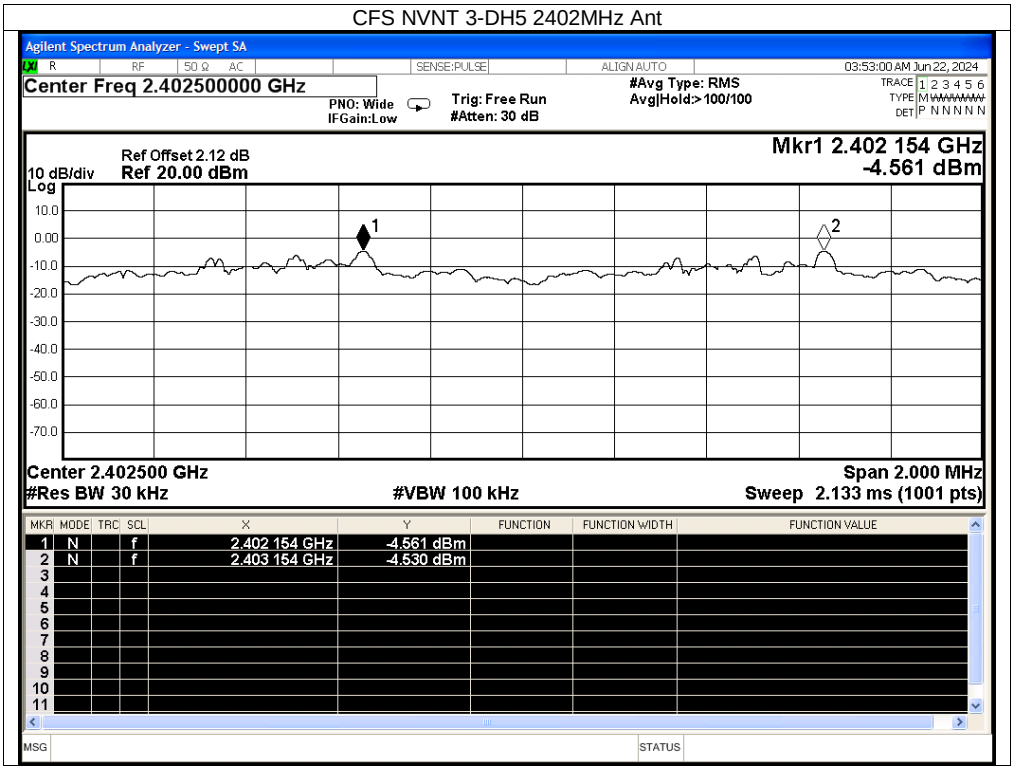
CFS NVNT 1-DH5 2402MHz Ant



CFS NVNT 2-DH5 2402MHz Ant



CFS NVNT 3-DH5 2402MHz Ant



8. DWELL TIME OF OCCUPANCY

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

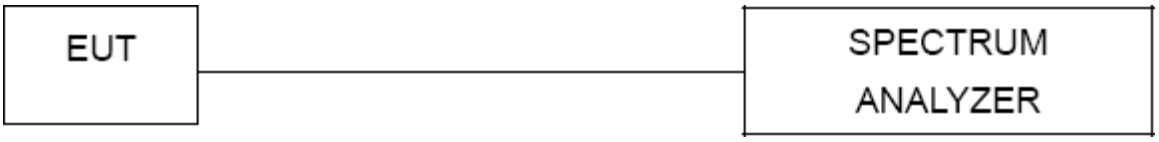
8.1.1 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyzer
b. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.
g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
h. Measure the maximum time duration of one single pulse.
i. A Period Time = (channel number)*0.4
DH1 Time Slot: Reading * (1600/2)*31.6/(channel number)
DH3 Time Slot: Reading * (1600/4)*31.6/(channel number)
DH5 Time Slot: Reading * (1600/6)*31.6/(channel number)

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

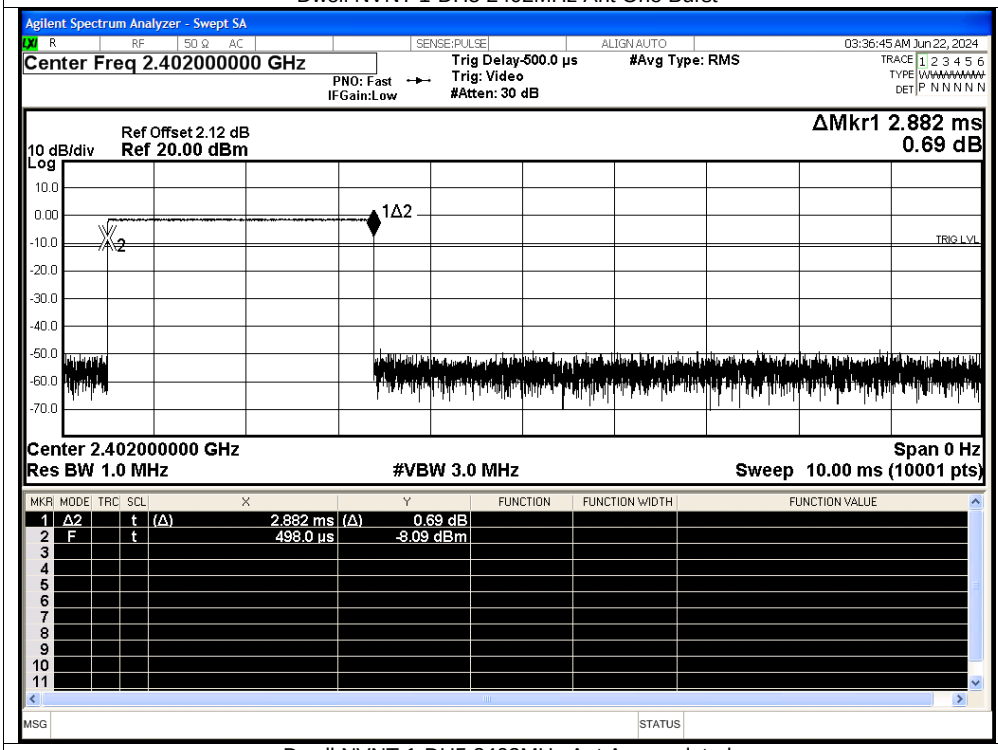
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.1.5 TEST RESULTS

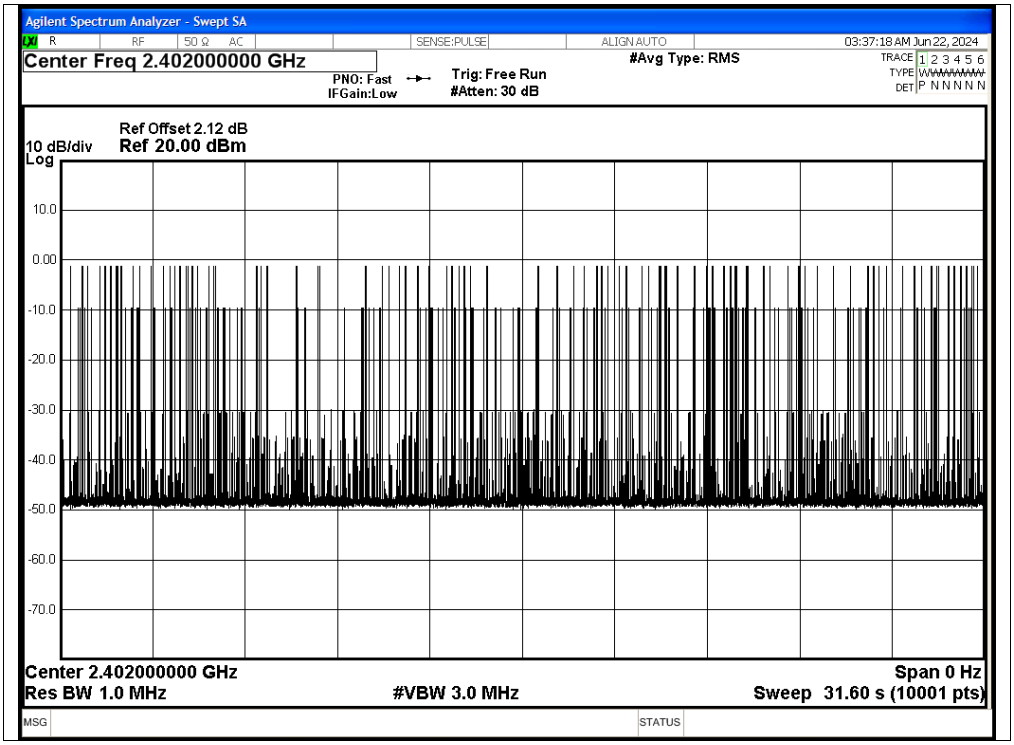
Test Mode	Antenna	Frequency[MHz]	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH5	Ant	Hop	2.882	114	0.329	≤0.4	PASS
2DH5	Ant	Hop	2.88	106	0.305	≤0.4	PASS
3DH5	Ant	Hop	2.887	109	0.315	≤0.4	PASS

Test Graphs

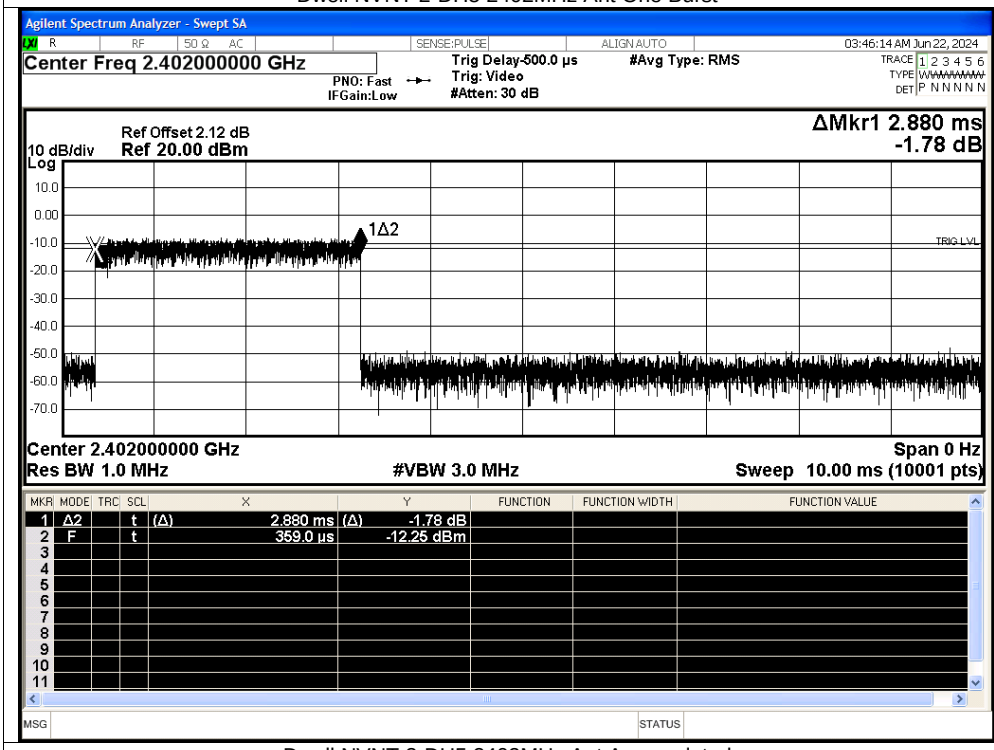
Dwell NVNT 1-DH5 2402MHz Ant One Burst



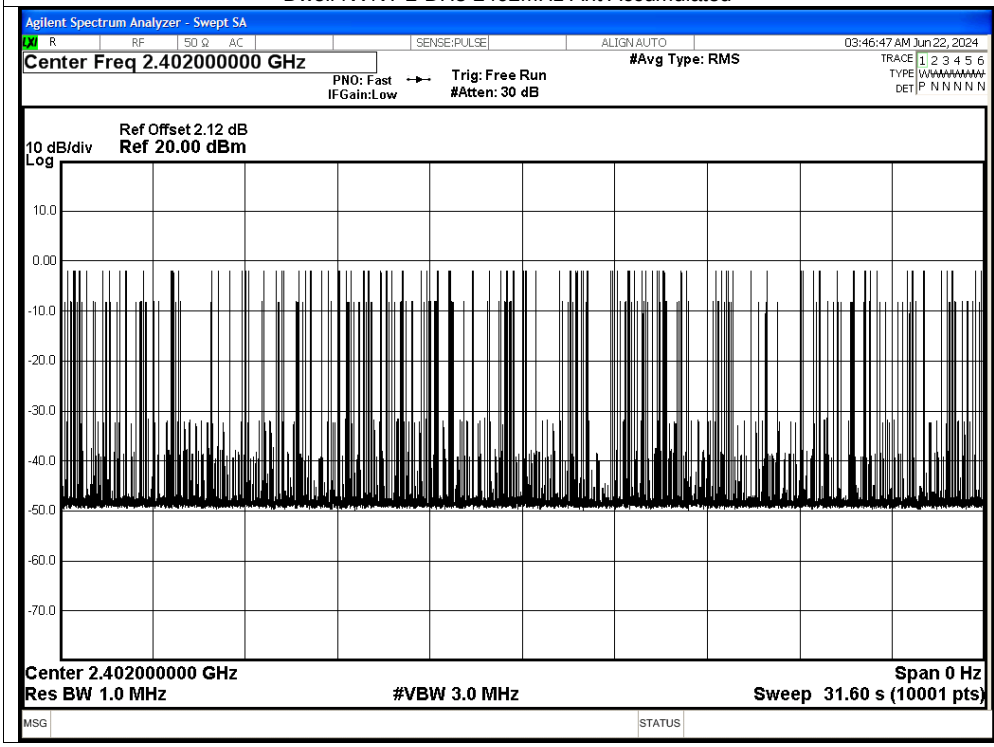
Dwell NVNT 1-DH5 2402MHz Ant Accumulated


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.402000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
03:37:18 AM Jun 22, 2024
Ref Offset 2.12 dB
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Center 2.402000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 31.60 s (10001 pts)

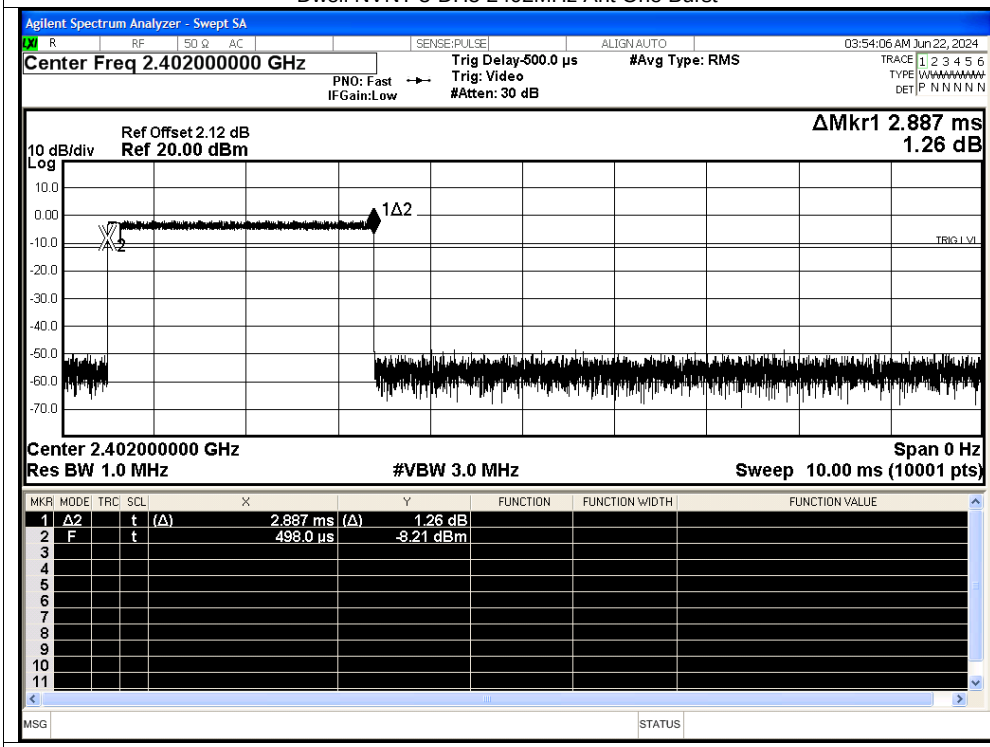
Dwell NVNT 2-DH5 2402MHz Ant One Burst



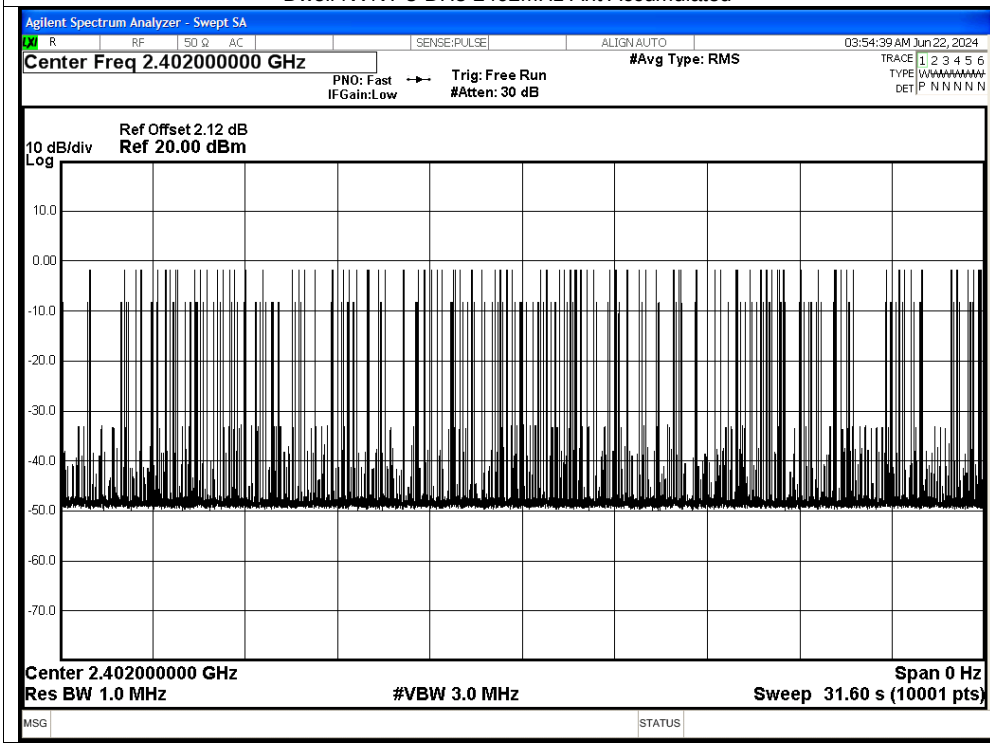
Dwell NVNT 2-DH5 2402MHz Ant Accumulated



Dwell NVNT 3-DH5 2402MHz Ant One Burst



Dwell NVNT 3-DH5 2402MHz Ant Accumulated



9. ANTENNA REQUIREMENT

9.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 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.

9.2 EUT ANTENNA

The EUT antenna is Chip Antenna,. It comply with the standard requirement.

10. TEST SEUUP PHOTO

Please refer to the Test setup Photos

11. EUT PHOTO

Please refer to the External Photos and Internal Photos

※※※※※ **END OF REPORT** ※※※※※