Radio Test Report

Report No.: STS2307086W01

Issued for

FrSky Electronic Co., Ltd.

F-4, Building C, Zhongxiu Technology Park, No.3 Yuanxi Road, Wuxi, 214125, Jiangsu, China

Product Name:	Wireless digital signal module
Brand Name:	FRSKY
Model Name:	TD PRO Module
Series Model(s):	N/A
FCC ID:	XYFTDPROMDL
Test Standards:	FCC Part15.247

TEST REPORT

Applicant's Name ..... :	FrSky Electronic Co., Ltd.
Address ..... :	F-4, Building C, Zhongxiu Technology Park, No.3 Yuanxi Road, Wuxi, 214125, Jiangsu, China
Manufacturer's Name ..... :	FrSky Electronic Co., Ltd.
Address ..... :	F-4, Building C, Zhongxiu Technology Park, No.3 Yuanxi Road, Wuxi, 214125, Jiangsu, China

Product Description

Product Name ..... :	Wireless digital signal module
Brand Name ..... :	FRSKY
Model Name ..... :	TD PRO Module
Series Model(s) ..... :	N/A
Test Standards ..... :	FCC Part15.247
Test Procedure ..... :	ANSI C63.10-2013

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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Date of Test ..... :

Date of receipt of test item ..... :	20 July 2023
Date (s) of performance of tests :	20 July 2023 ~ 24 Aug. 2023
Date of Issue ..... :	24 Aug. 2023
Test Result ..... :	Pass

Testing Engineer : Aaron Bu

(Aaron Bu)

Technical Manager : Sean She

(Sean she)

Authorized Signatory : Chris Chen

(Chris Chen)

SHENZHEN STS TEST SERVICES CO.,LTD. TESTING APPROVAL

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Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	24 Aug. 2023	STS2307086W01	ALL	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
KDB 558074 D01 15.247 Meas Guidance v05r02.

FCC Part 15.247,Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	--
15.247(a)(1)	Hopping Channel Separation	PASS	--
15.247(a)(1)&(b)(1)	Output Power	PASS	--
15.209	Radiated Spurious Emission	PASS	--
15.247(d)	Conducted Spurious & Band Edge Emission	PASS	--
15.247(a)(1)(iii)	Number of Hopping Frequency	PASS	--
15.247(a)(1)(iii)	Dwell Time	PASS	--
15.247(a)(1)	Bandwidth	PASS	--
15.205	Restricted bands of operation	PASS	--
Part 15.247(d)/part 15.209(a)	Band Edge Emission	PASS	--
15.203	Antenna Requirement	PASS	--

NOTE:

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

(2) All tests are according to ANSI C63.10-2013.

1.1 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD
Add. :101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China
FCC test Firm Registration Number: 625569
IC test Firm Registration Number: 12108A
A2LA Certificate No.: 4338.01

1.2 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	RF output power, conducted	±1.197dB
2	Unwanted Emissions, conducted	±2.896dB
3	All emissions, radiated 9K-30MHz	±3.84dB
4	All emissions, radiated 30M-1GHz	±3.94dB
5	All emissions, radiated 1G-6GHz	±4.59dB
6	All emissions, radiated>6G	±5.22dB
7	Conducted Emission (9KHz-150KHz)	±2.14dB
8	Conducted Emission (150KHz-30MHz)	±2.54dB
9	Occupied Channel Bandwidth	±3.5%
10	Dwell time	±3.2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

<table>
<tr><td>Product Name</td><td>Wireless digital signal module</td></tr>
<tr><td>Brand Name</td><td>FRSKY</td></tr>
<tr><td>Model Name</td><td>TD PRO Module</td></tr>
<tr><td>Series Model(s)</td><td>N/A</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>Product Description</td><td>The EUT is a Wireless digital signal module
<table>
<tr><td>Operation Frequency:</td><td>2400.7~2482.5MHz</td></tr>
<tr><td>Modulation Type:</td><td>LoRa</td></tr>
<tr><td>Number Of Channel:</td><td>CH 165</td></tr>
<tr><td>Antenna Designation:</td><td>Please refer to the Note 3.</td></tr>
<tr><td>Antenna Gain (dBi)</td><td>ANT 1: 3.74dBi ,ANT 2: 3.95dBi
MIMO 1+2: 6.86 dBi</td></tr>
</table></td></tr>
<tr><td>Channel List</td><td>Please refer to the Note 4.</td></tr>
<tr><td>Rating</td><td>Input: DC 7.4V</td></tr>
<tr><td>Hardware version number</td><td>Rev0.3</td></tr>
<tr><td>Software version number</td><td>1.0.8</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the Note 1.</td></tr>
</table>

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.
2.

Test Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2400.7	84	2442	165	2482.5

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	FRSKY	TD PRO Module	PIFA	N/A	ANT 1: 3.74dBi , ANT 2: 3.95dBi MIMO 1+2: 6.86 dBi	ANT

Note: The antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report.

4.

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2400.7	--	--	85	2442.5	--	--
02	2401	--	--	86	2443	--	--
03	2401.5	--	--	87	2443.5	--	--
04	2402	--	--	88	2444	--	--
05	2402.5	--	--	--	--	160	2480
06	2403	--	--	--	--	161	2480.5
--	--	81	2440.5	--	--	162	2481
--	--	82	2441	--	--	163	2481.5
--	--	83	2441.5	--	--	164	2482
--	--	84	2442	--	--	165	2482.5

2.2 DESCRIPTION OF THE 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.

Worst Mode	Description	Data Rate/Modulation
Mode 1	TX CH01	LoRa
Mode 2	TX CH84	LoRa
Mode 3	TX CH165	LoRa

Note:

(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported.

For AC Conducted Emission

Test Case	
AC Conducted Emission	Mode 4 : Keeping TX

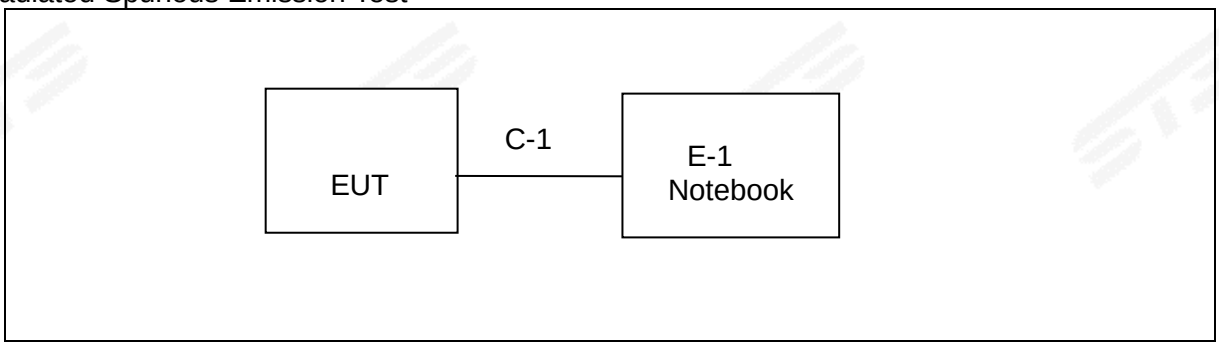
2.3 TEST SOFTWARE AND POWER LEVEL

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level.

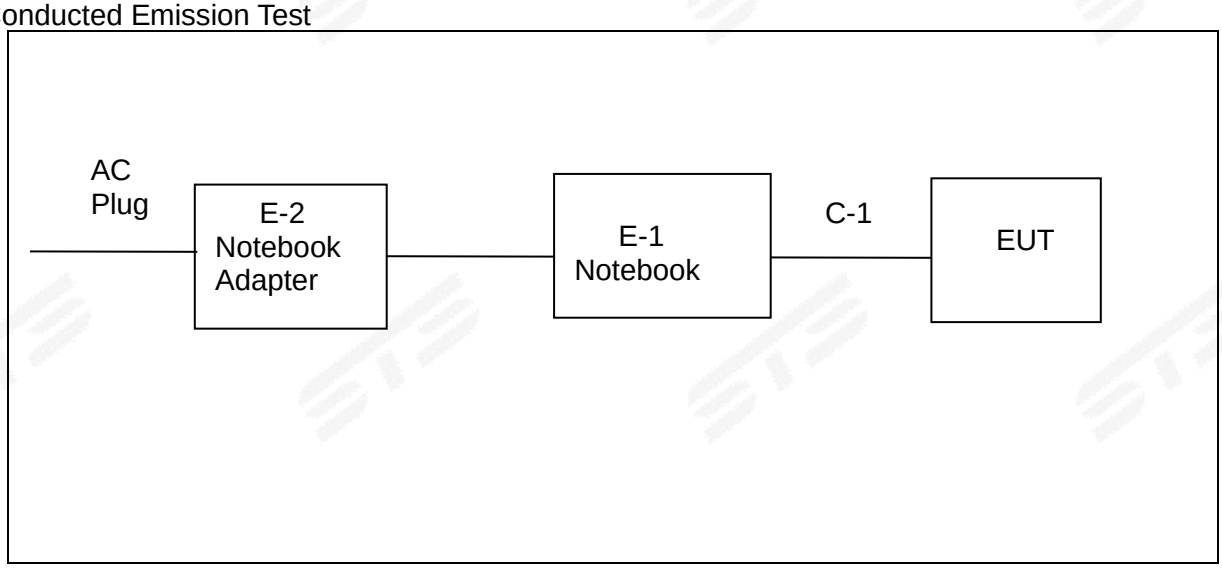
RF Function	Type	Mode Or Modulation type	ANT Gain(dBi)	Power Class	Software For Testing
SRD	2.4G	LoRa	ANT1:3.74 ANT2:3.95 MIMO:6.86	Default	The EUT has signal transmission when it is powered on

2.4 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conducted Emission Test



2.5 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

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.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
E-1	Notebook	LENOVO	Think Pad E470	N/A	N/A
E-2	Notebook Adapter	LENOVO	ADLX45DLC3A	N/A	N/A
C-1	USB Cable	N/A	N/A	150cm	NO

Note:

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

(2) “YES” is means “with core”; “NO” is means “without core”.

2.6 EQUIPMENTS LIST

RF Radiation Test Equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Temperature & Humidity	SW-108	SuWei	N/A	2023.03.03	2024.03.02
Pre-Amplifier (0.1M-3GHz)	EM	EM330	060665	2023.02.28	2024.02.27
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2022.09.29	2023.09.28
18GHz-40GHz Filter	XINGBO	XBLBQ-GTA44	22062003-1	2023.03.06	2024.03.05
Pre-mplifier (18G-40G)	SKET	LNPA_1840-50	SK2018101801	2023.03.06	2024.03.05
Positioning Controller	MF	MF-7802	MF-780208587	N/A	N/A
Signal Analyzer	R&S	FSV 40-N	101823	2022.09.29	2023.09.28
Switch Control Box	N/A	N/A	N/A	N/A	N/A
Filter Box	BALUN Technology	SU319E	BL-SZ1530051	N/A	N/A
Active loop Antenna	ZHINAN	ZN30900C	16035	2023.02.28	2024.02.27
Bilog Antenna	TESEQ	CBL6111D	34678	2022.09.30	2024.09.29
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	2021.10.11	2023.10.10
Horn Antenna	A-INFOMW	LB-180400-KF	J211020657	2021.09.28	2023.09.27
Antenna Mast	MF	MFA-440H	N/A	N/A	N/A
Turn Table	MF	SC100_1	60531	N/A	N/A
AC Power Source	APC	KDF-11010G	F214050035	N/A	N/A
DC Power Supply	Zhaoxin	RXN 605D	20R605D11010081	N/A	N/A
Test SW	EZ-EMC	Ver.STSLAB-03A1 RE			
Conduction Test equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	101427	2022.09.29	2023.09.28
LISN	R&S	ENV216	101242	2022.09.28	2023.09.27
LISN	EMCO	3810/2NM	23625	2022.09.28	2023.09.27
Temperature & Humidity	HH660	Mieo	N/A	2022.09.30	2023.09.29
Test SW	EZ-EMC	Ver.STSLAB-03A1 CE			
RF Connected Test					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Signal Analyzer	Agilent	N9020A	MY51510623	2023.03.01	2024.02.28
Switch control box	MW	MW100-RFCB	N/A	N/A	N/A
Temperature & Humidity	HH660	Mieo	N/A	2022.09.30	2023.09.29
Test SW	MW	MTS 8310_2.0.0.0			

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table.

FREQUENCY (MHz)	Conducted Emissionlimit (dBuV)	
	Quasi-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

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.

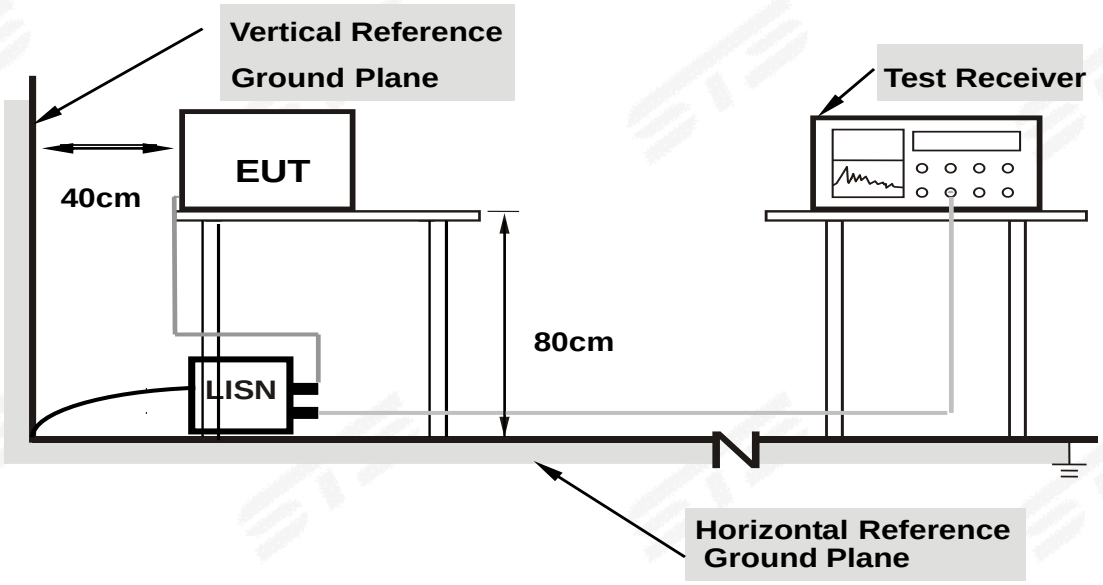
The following table is the setting of the receiver

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 is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 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 is at least 80 cm from the nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 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 cm from other units and other metal planes support units.

3.1.4 EUT OPERATING CONDITIONS

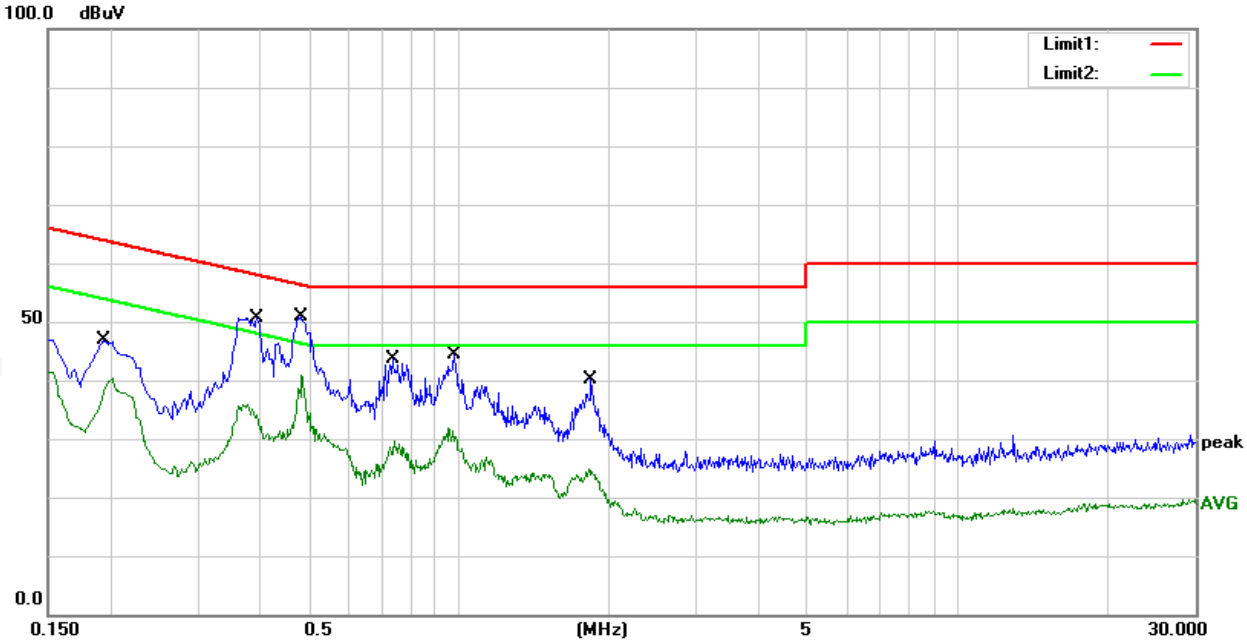
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.5 TEST RESULT

Temperature:	26.5(C)	Relative Humidity:	59%RH
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode 4		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1940	26.46	20.39	46.85	63.86	-17.01	QP
2	0.1940	19.89	20.39	40.28	53.86	-13.58	AVG
3	0.3940	30.16	20.58	50.74	57.98	-7.24	QP
4	0.3940	15.29	20.58	35.87	47.98	-12.11	AVG
5	0.4860	30.29	20.50	50.79	56.24	-5.45	QP
6	0.4860	20.38	20.50	40.88	46.24	-5.36	AVG
7	0.7380	23.20	20.36	43.56	56.00	-12.44	QP
8	0.7380	9.14	20.36	29.50	46.00	-16.50	AVG
9	0.9820	24.06	20.30	44.36	56.00	-11.64	QP
10	0.9820	11.66	20.30	31.96	46.00	-14.04	AVG
11	1.8420	19.74	20.38	40.12	56.00	-15.88	QP
12	1.8420	4.46	20.38	24.84	46.00	-21.16	AVG

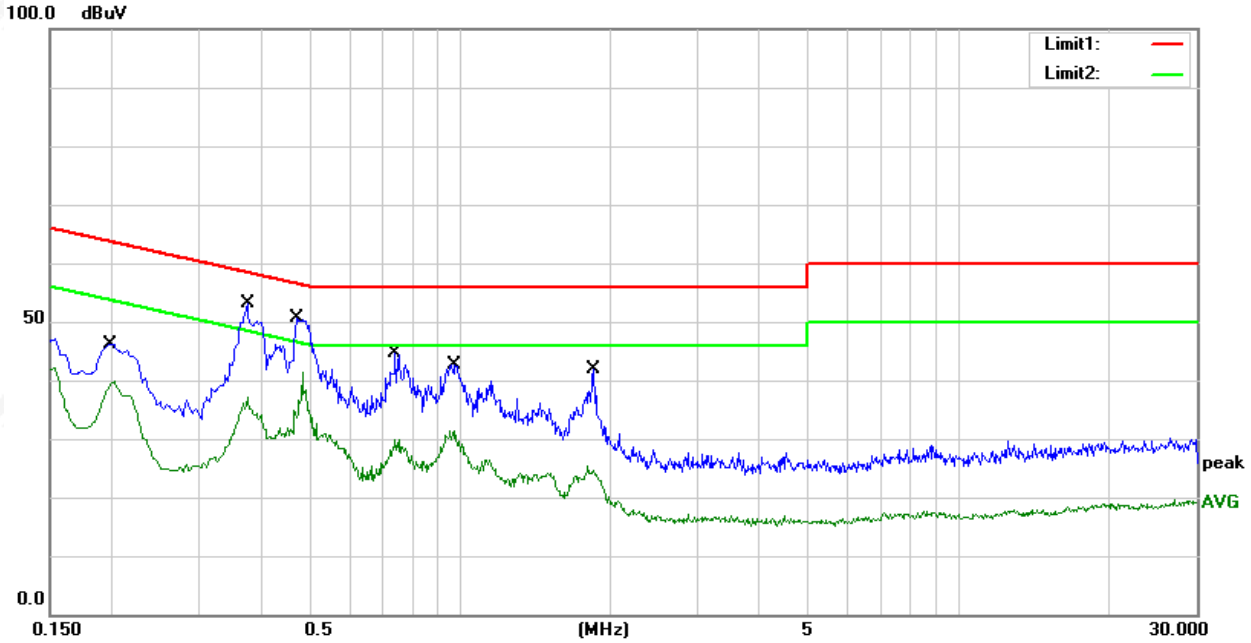
Remark:
1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor=LISN factor+Cable loss+Limiter (10dB)



Temperature:	26.5(C)	Relative Humidity:	59%RH
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode 4		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1980	25.84	20.40	46.24	63.69	-17.45	QP
2	0.1980	19.55	20.40	39.95	53.69	-13.74	AVG
3	0.3740	32.49	20.63	53.12	58.41	-5.29	QP
4	0.3740	16.47	20.63	37.10	48.41	-11.31	AVG
5	0.4700	30.17	20.51	50.68	56.51	-5.83	QP
6	0.4700	20.90	20.51	41.41	46.51	-5.10	AVG
7	0.7420	24.39	20.36	44.75	56.00	-11.25	QP
8	0.7420	9.54	20.36	29.90	46.00	-16.10	AVG
9	0.9740	22.43	20.31	42.74	56.00	-13.26	QP
10	0.9740	11.19	20.31	31.50	46.00	-14.50	AVG
11	1.8500	21.46	20.38	41.84	56.00	-14.16	QP
12	1.8500	5.07	20.38	25.45	46.00	-20.55	AVG

Remark:
1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor=LISN factor+Cable loss+Limiter (10dB)



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205 (a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (0.009MHz - 1000MHz)

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 (1GHz-25 GHz)

FREQUENCY (MHz)	(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).

LIMITS OF RESTRICTED FREQUENCY BANDS

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
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	Above 38.6
13.36-13.41			

For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP/AV
Start Frequency	9 KHz/150KHz(Peak/QP/AV)
Stop Frequency	150KHz/30MHz(Peak/QP/AV)
RB / VB (emission in restricted band)	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz); 200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/QP
Start Frequency	30 MHz(Peak/QP)
Stop Frequency	1000 MHz (Peak/QP)
RB / VB (emission in restricted band)	120 KHz / 300 KHz

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak/AV
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted band)	1 MHz / 3 MHz(Peak) 1 MHz/1/T MHz(AVG)

For Restricted band

Spectrum Parameter	Setting
Detector	Peak/AV
Start/Stop Frequency	Lower Band Edge: 2310 to 2410 MHz Upper Band Edge: 2476 to 2500 MHz
RB / VB	1 MHz / 3 MHz(Peak) 1 MHz/1/T MHz(AVG)

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

a. The measuring distance at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
b. The EUT was placed on the top of a rotating table 0.8 m (above 1GHz is 1.5 m) above the ground at a 3 m anechoic chamber test site. The table was rotated 360 degree to determine the position of the highest radiation.
c. The height of the equipment shall be 0.8 m (above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarization of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and QuasiPeak detector mode will be re-measured.
e. If the Peak Mode measured value is compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and no additional QP Mode measurement was performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

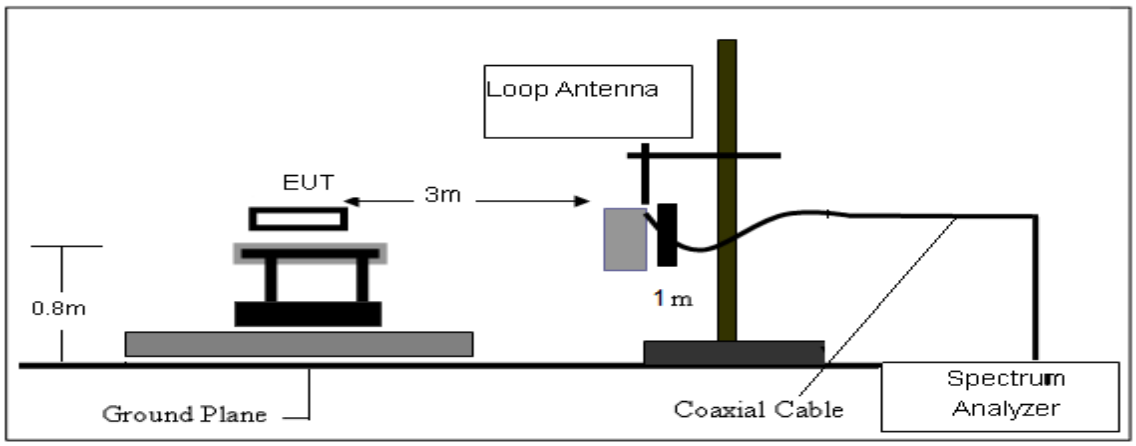
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

3.2.3 DEVIATION FROM TEST STANDARD

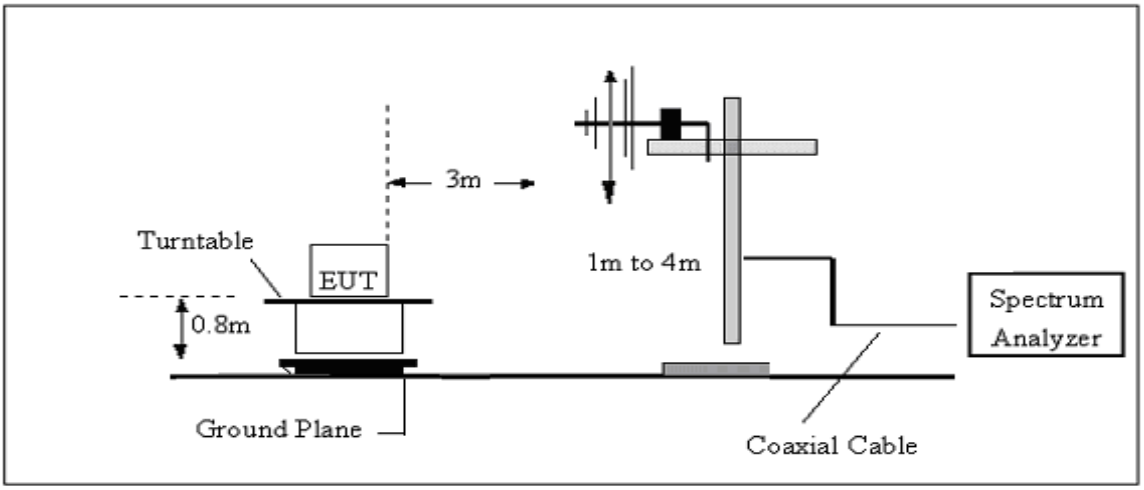
No deviation.

3.2.4 TESTSETUP

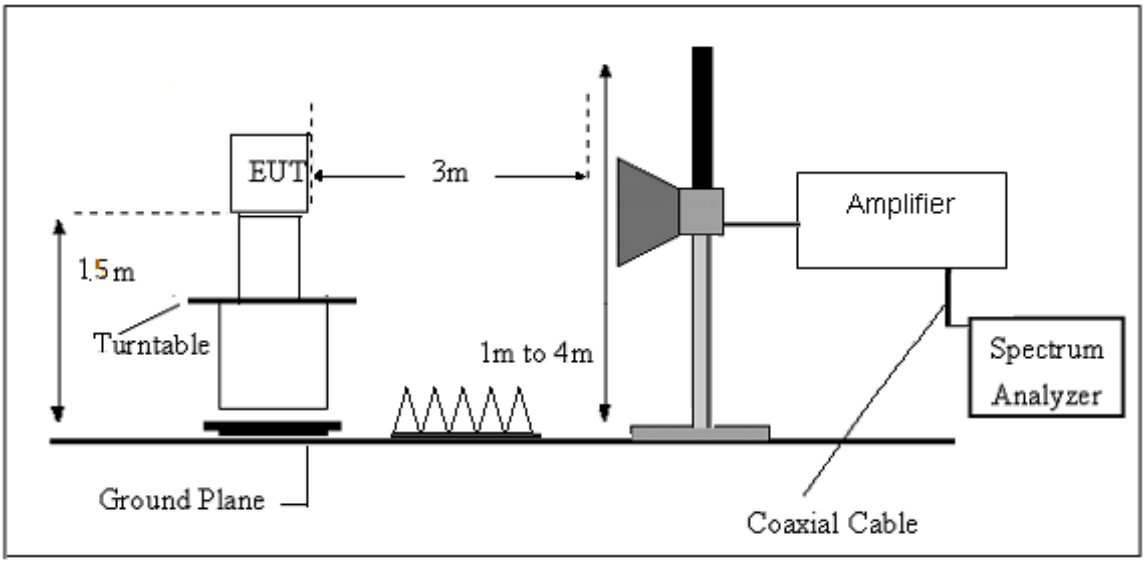
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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



3.2.5 EUT OPERATING CONDITIONS

Please refer to section 3.1.4 of this report.

3.2.6 FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where

FS = Field Strength

CL = Cable Attenuation Factor (Cable Loss)

RA = Reading Amplitude

AG = Amplifier Gain

AF = Antenna Factor

For example

Frequency	FS	RA	AF	CL	AG	Factor
(MHz)	(dBμV/m)	(dBμV/m)	(dB)	(dB)	(dB)	(dB)
300	40	58.1	12.2	1.6	31.9	-18.1

Factor=AF+CL-AG

3.2.7 TEST RESULTS

(9KHz-30MHz)

Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 7.4V	Test Mode:	TX Mode

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

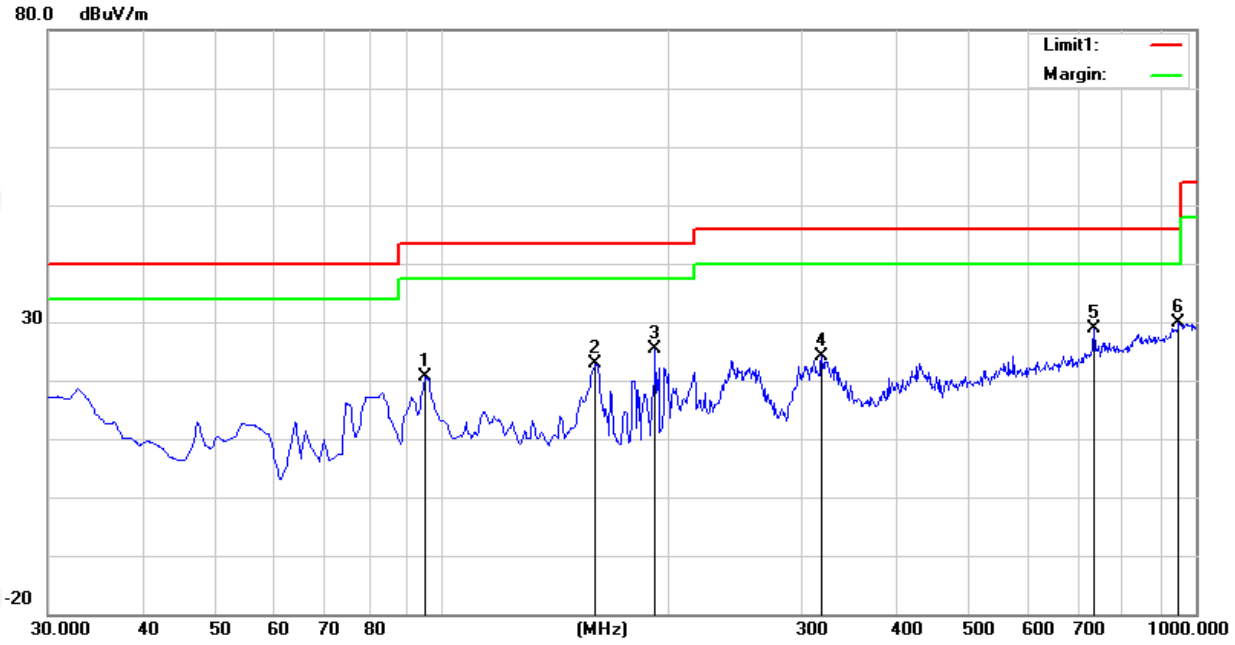
Note:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits (dBuv) + distance extrapolation factor.

(30MHz-1000MHz)

Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 7.4V	Phase:	Horizontal
Test Mode:	Mode 1/2/3 (Mode 3 worst mode)		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	94.9900	41.34	-20.78	20.56	43.50	-22.94	peak
2	159.9800	41.58	-18.81	22.77	43.50	-20.73	peak
3	191.9900	46.53	-21.04	25.49	43.50	-18.01	peak
4	319.0600	38.22	-14.05	24.17	46.00	-21.83	peak
5	733.2500	31.29	-2.35	28.94	46.00	-17.06	peak
6	950.5300	28.38	1.61	29.99	46.00	-16.01	peak

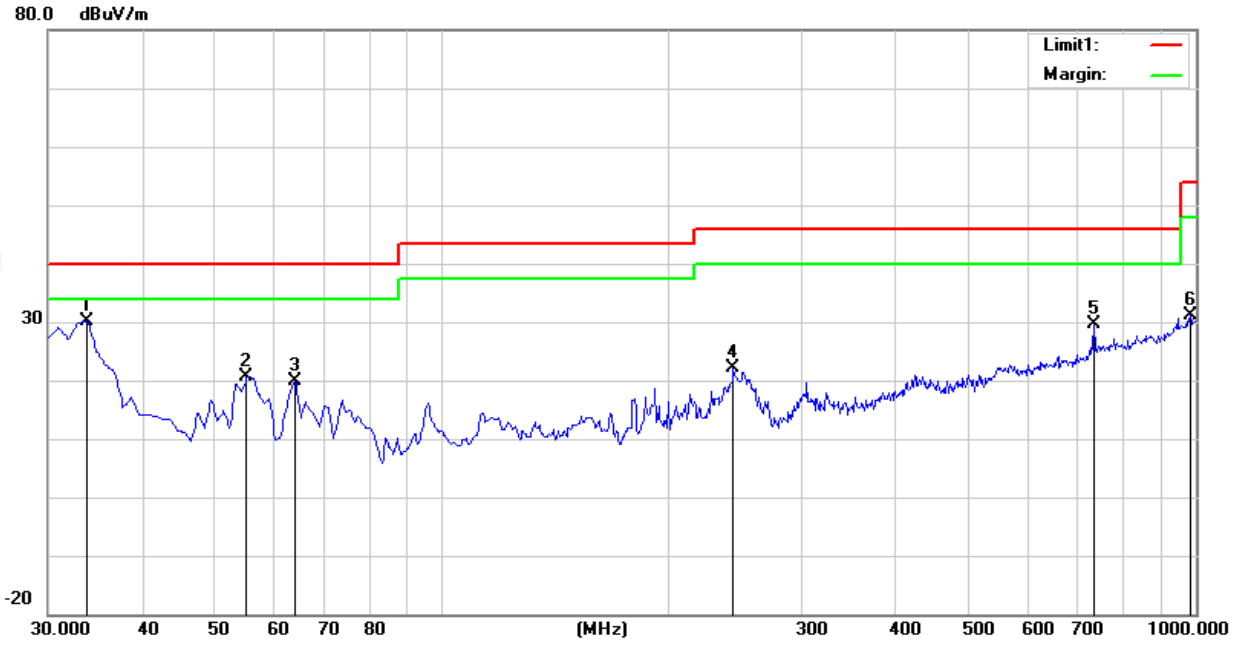
Remark:
1. Margin = Result (Result =Reading + Factor)–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain



Temperature:	23.1(C)	Relative Humidity:	60%RH
Test Voltage:	DC 7.4V	Phase:	Vertical
Test Mode:	Mode 1/2/3 (Mode 3 worst mode)		

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	33.8800	44.94	-14.80	30.14	40.00	-9.86	peak
2	55.2200	45.67	-25.04	20.63	40.00	-19.37	peak
3	63.9500	45.59	-25.64	19.95	40.00	-20.05	peak
4	243.4000	39.40	-17.32	22.08	46.00	-23.92	peak
5	733.2500	31.87	-2.35	29.52	46.00	-16.48	peak
6	984.4800	28.84	2.40	31.24	54.00	-22.76	peak

Remark:
1. Margin = Result (Result =Reading + Factor)–Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain



(1GHz~25GHz) Spurious emission Requirements

Frequency	Meter Reading	Amplifier	Loss	Antenna Factor	Corrected Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	(dB)	(dB/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
Low Channel (2400.7 MHz)										
3263.03	61.68	44.70	6.70	28.20	-9.80	51.88	74.00	-22.12	PK	Vertical
3263.03	50.77	44.70	6.70	28.20	-9.80	40.97	54.00	-13.03	AV	Vertical
3262.87	60.89	44.70	6.70	28.20	-9.80	51.09	74.00	-22.91	PK	Horizontal
3262.87	50.14	44.70	6.70	28.20	-9.80	40.34	54.00	-13.66	AV	Horizontal
4801.98	58.70	44.20	9.04	31.60	-3.56	55.14	74.00	-18.86	PK	Vertical
4801.98	50.56	44.20	9.04	31.60	-3.56	47.00	54.00	-7.00	AV	Vertical
4801.72	59.30	44.20	9.04	31.60	-3.56	55.74	74.00	-18.26	PK	Horizontal
4801.72	50.01	44.20	9.04	31.60	-3.56	46.45	54.00	-7.55	AV	Horizontal
5356.86	49.36	44.20	9.86	32.00	-2.34	47.02	74.00	-26.98	PK	Vertical
5356.86	39.51	44.20	9.86	32.00	-2.34	37.17	54.00	-16.83	AV	Vertical
5356.71	47.77	44.20	9.86	32.00	-2.34	45.42	74.00	-28.58	PK	Horizontal
5356.71	38.25	44.20	9.86	32.00	-2.34	35.90	54.00	-18.10	AV	Horizontal
7201.87	53.88	43.50	11.40	35.50	3.40	57.28	74.00	-16.72	PK	Vertical
7201.87	44.32	43.50	11.40	35.50	3.40	47.72	54.00	-6.28	AV	Vertical
7201.89	54.42	43.50	11.40	35.50	3.40	57.82	74.00	-16.18	PK	Horizontal
7201.89	44.53	43.50	11.40	35.50	3.40	47.93	54.00	-6.07	AV	Horizontal
Middle Channel (2442 MHz)										
3265.64	61.70	44.70	6.70	28.20	-9.80	51.90	74.00	-22.10	PK	Vertical
3265.64	50.51	44.70	6.70	28.20	-9.80	40.71	54.00	-13.29	AV	Vertical
3265.80	61.96	44.70	6.70	28.20	-9.80	52.16	74.00	-21.84	PK	Horizontal
3265.80	49.94	44.70	6.70	28.20	-9.80	40.14	54.00	-13.86	AV	Horizontal
4884.02	58.31	44.20	9.04	31.60	-3.56	54.75	74.00	-19.25	PK	Vertical
4884.02	49.75	44.20	9.04	31.60	-3.56	46.19	54.00	-7.81	AV	Vertical
4884.10	58.98	44.20	9.04	31.60	-3.56	55.42	74.00	-18.58	PK	Horizontal
4884.10	50.29	44.20	9.04	31.60	-3.56	46.73	54.00	-7.27	AV	Horizontal
5361.44	49.08	44.20	9.86	32.00	-2.34	46.74	74.00	-27.26	PK	Vertical
5361.44	39.46	44.20	9.86	32.00	-2.34	37.11	54.00	-16.89	AV	Vertical
5361.55	47.72	44.20	9.86	32.00	-2.34	45.38	74.00	-28.62	PK	Horizontal
5361.55	39.05	44.20	9.86	32.00	-2.34	36.71	54.00	-17.29	AV	Horizontal
7326.40	54.57	43.50	11.40	35.50	3.40	57.97	74.00	-16.03	PK	Vertical
7326.40	44.07	43.50	11.40	35.50	3.40	47.47	54.00	-6.53	AV	Vertical
7326.43	53.54	43.50	11.40	35.50	3.40	56.94	74.00	-17.06	PK	Horizontal
7326.43	44.21	43.50	11.40	35.50	3.40	47.61	54.00	-6.39	AV	Horizontal

High Channel (2482.5 MHz)										
3267.91	61.66	44.70	6.70	28.20	-9.80	51.86	74.00	-22.14	PK	Vertical
3267.91	51.08	44.70	6.70	28.20	-9.80	41.28	54.00	-12.72	AV	Vertical
3267.92	60.96	44.70	6.70	28.20	-9.80	51.16	74.00	-22.84	PK	Horizontal
3267.92	50.65	44.70	6.70	28.20	-9.80	40.85	54.00	-13.15	AV	Horizontal
4965.37	58.76	44.20	9.04	31.60	-3.56	55.20	74.00	-18.80	PK	Vertical
4965.37	49.65	44.20	9.04	31.60	-3.56	46.09	54.00	-7.91	AV	Vertical
4965.51	58.93	44.20	9.04	31.60	-3.56	55.37	74.00	-18.63	PK	Horizontal
4965.51	49.23	44.20	9.04	31.60	-3.56	45.67	54.00	-8.33	AV	Horizontal
5365.12	49.44	44.20	9.86	32.00	-2.34	47.10	74.00	-26.90	PK	Vertical
5365.12	40.33	44.20	9.86	32.00	-2.34	37.99	54.00	-16.01	AV	Vertical
5365.07	48.22	44.20	9.86	32.00	-2.34	45.88	74.00	-28.12	PK	Horizontal
5365.07	39.21	44.20	9.86	32.00	-2.34	36.87	54.00	-17.13	AV	Horizontal
7447.34	54.21	43.50	11.40	35.50	3.40	57.61	74.00	-16.39	PK	Vertical
7447.34	44.19	43.50	11.40	35.50	3.40	47.59	54.00	-6.41	AV	Vertical
7447.21	54.91	43.50	11.40	35.50	3.40	58.31	74.00	-15.69	PK	Horizontal
7447.21	44.55	43.50	11.40	35.50	3.40	47.95	54.00	-6.05	AV	Horizontal

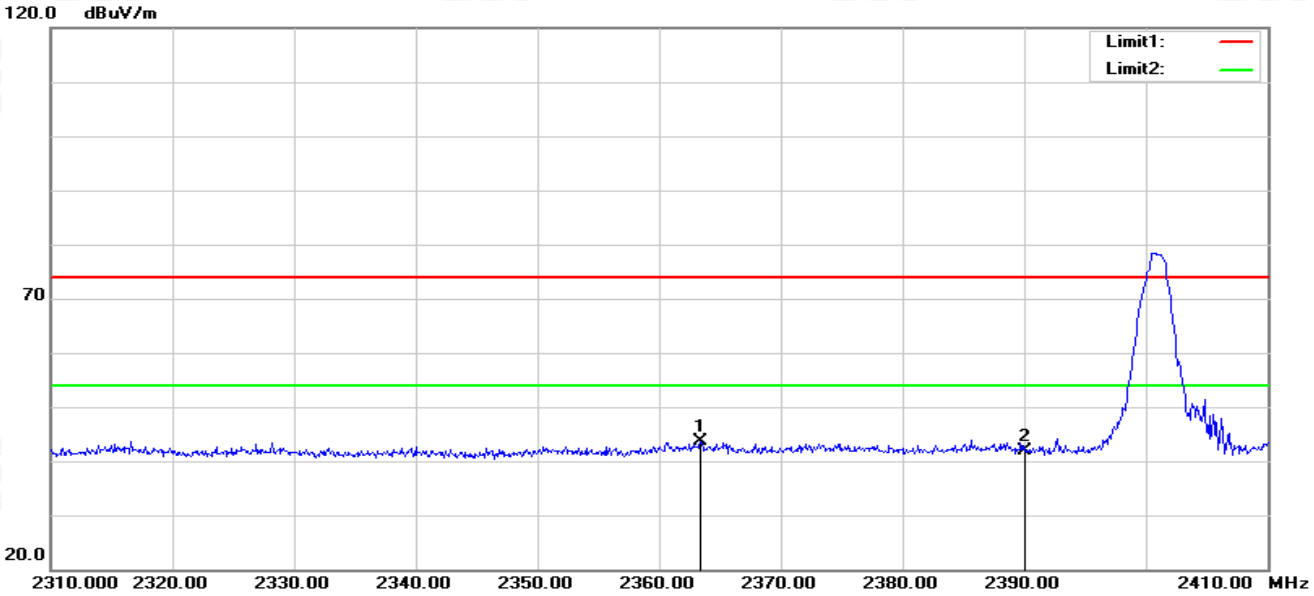
Note:

1) Factor = Antenna Factor + Cable Loss – Pre-amplifier.
   Emission Level = Reading + Factor
2) The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.

Restricted band Requirements

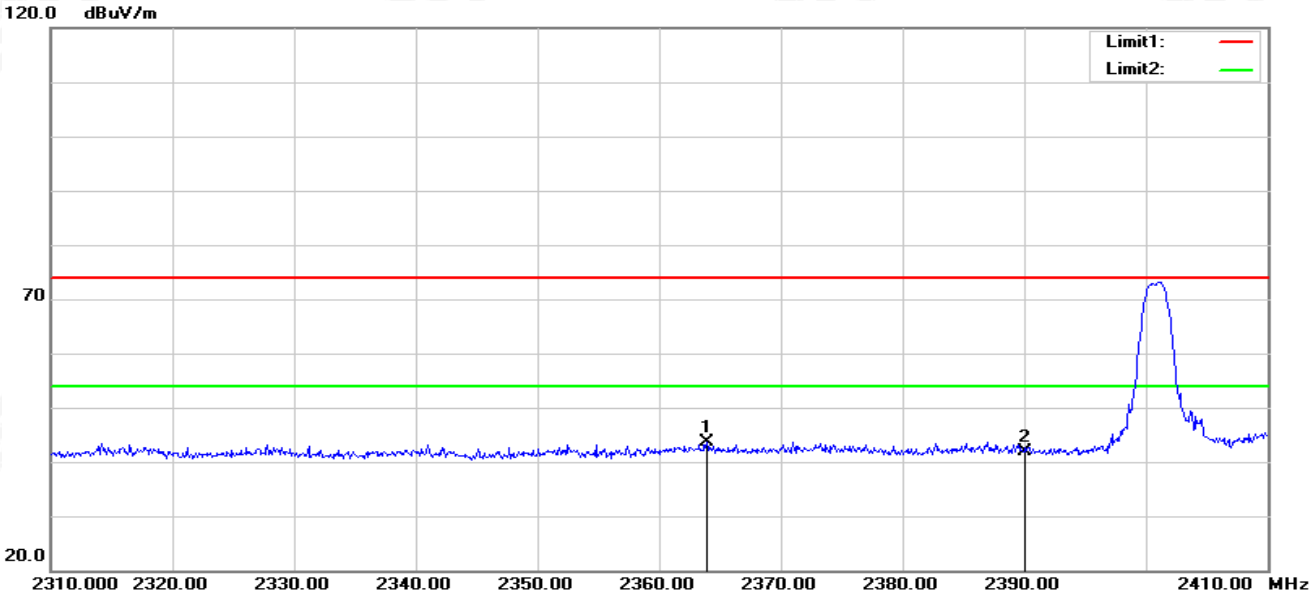
2.4G-LoRa-Low

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2363.400	39.66	3.95	43.61	74.00	-30.39	peak
2	2390.000	37.66	4.34	42.00	74.00	-32.00	peak

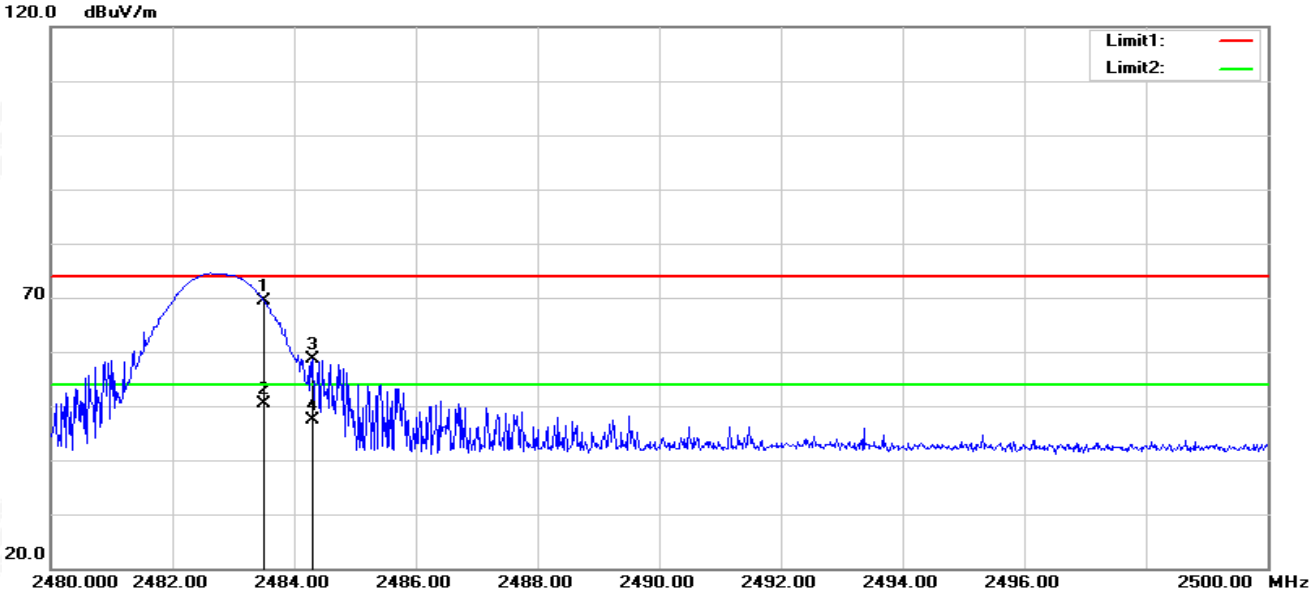
Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2363.900	39.71	3.95	43.66	74.00	-30.34	peak
2	2390.000	37.48	4.34	41.82	74.00	-32.18	peak

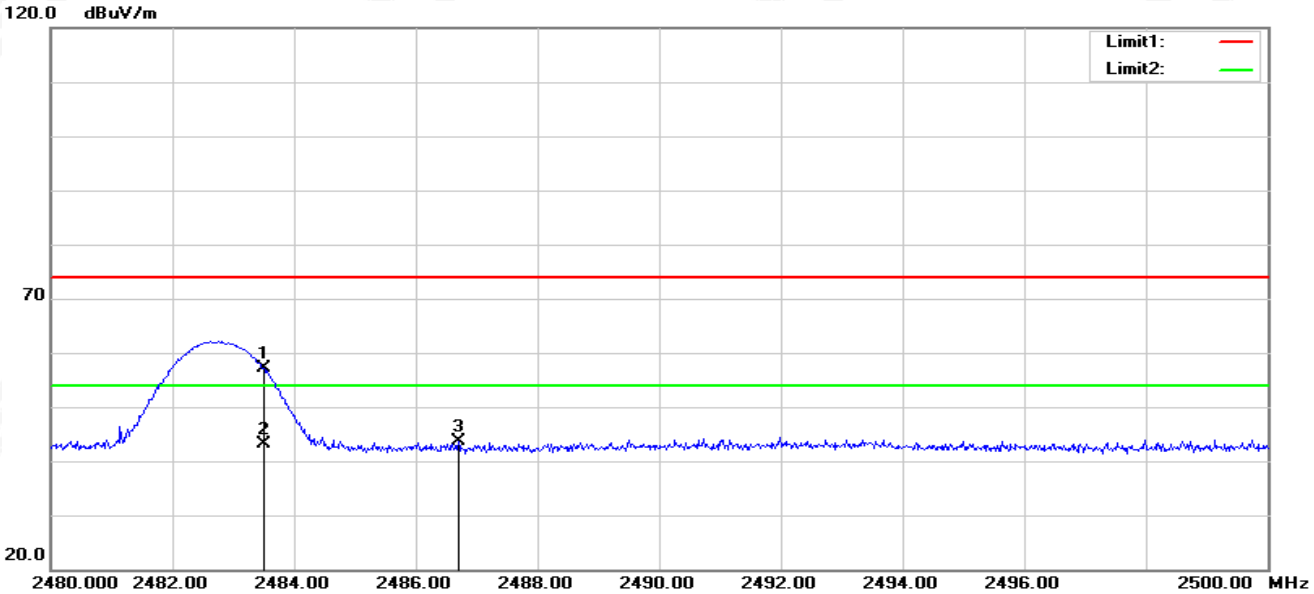
2.4G-LoRa-High

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	64.84	4.60	69.44	74.00	-4.56	peak
2	2483.500	45.84	4.60	50.44	54.00	-3.56	AVG
3	2484.300	54.01	4.61	58.62	74.00	-15.38	peak
4	2484.300	42.79	4.61	47.40	54.00	-6.60	AVG

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	52.49	4.60	57.09	74.00	-16.91	peak
2	2483.500	38.49	4.60	43.09	54.00	-10.91	AVG
3	2486.700	39.04	4.61	43.65	74.00	-30.35	peak

4. CONDUCTED SPURIOUS & BAND EDGE EMISSION

4.1 LIMIT

According to FCC section 15.247(d), in any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

4.2 TEST PROCEDURE

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2300 – 2407 MHz Upper Band Edge: 2475 – 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

For Hopping Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2300– 2403 MHz Upper Band Edge: 2479 – 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

4.3 TEST SETUP

The EUT is connected to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. Tune the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, the span is set to be greater than RBW.

4.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

4.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

5. NUMBER OF HOPPING CHANNEL

5.1 LIMIT

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

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating FrequencyRange
RB	100KHz
VB	300KHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.2 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.

5.3 TEST SETUP

5.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

5.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

6. AVERAGE TIME OF OCCUPANCY

6.1 LIMIT

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

6.2 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyzer.
b. Set RBW =1MHz/VBW =3MHz.
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. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is 3.37 x 31.6 = 106.6.
j. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is 5.06 x 31.6 = 160.
k. DH1 Packet permit maximum 1600 / 79 / 2 = 10.12 hops per second in each channel (1 time slot RX, 1 time slot TX). So the number of pulses in the observation period of 31.6 seconds is 10.12 x 31.6 = 320.

6.3 TEST SETUP

6.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

6.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

7. HOPPING CHANNEL SEPARATION MEASUREMEN

7.1 LIMIT

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

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> 20 dB Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

7.2 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
c. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for channel separation measurement.

7.3 TEST SETUP

7.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

7.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

8. BANDWIDTH TEST

8.1 LIMIT

FCC Part15 15.247,Subpart C				
Section	Test Item	Limit	FrequencyRange (MHz)	Result
15.247 (a)(1)	Bandwidth	N/A	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 30 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

8.2 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= 30KHz, VBW=100KHz, Sweep time = Auto.

8.3 TEST SETUP

8.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

8.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

9. OUTPUT POWER TEST

9.1 LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)&(b)(1)	Output Power	1 W or 0.125W if channel separation > 2/3 bandwidthprovided thesystems operatewith an output power no greater than125 mW(20.97dBm)	2400-2483.5	PASS

9.2 TEST PROCEDURE

This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. The hopping shall be disabled for this test:
a) Use the following spectrum analyzer settings:
1) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
2) RBW > 20 dB bandwidth of the emission being measured.
3) VBW ≥ RBW.
4) Sweep: Auto.
5) Detector function: Peak.
6) Trace: Max hold.
b) Allow trace to stabilize.
c) Use the marker-to-peak function to set the marker to the peak of the emission.
d) The indicated level is the peak output power, after any corrections for external attenuators and cables.
e) A plot of the test results and setup description shall be included in the test report.
NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.
PKPM1 Peak power meter method:
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DSS bandwidth and shall use a fast-responding diode detector.

9.3 TEST SETUP

9.4 EUT OPERATION CONDITIONS

Please refer to section 3.1.4 of this report.

9.5 TEST RESULTS

Note: The test data please refer to APPENDIX 1.

10. ANTENNA REQUIREMENT

10.1 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.

10.2 EUT ANTENNA

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

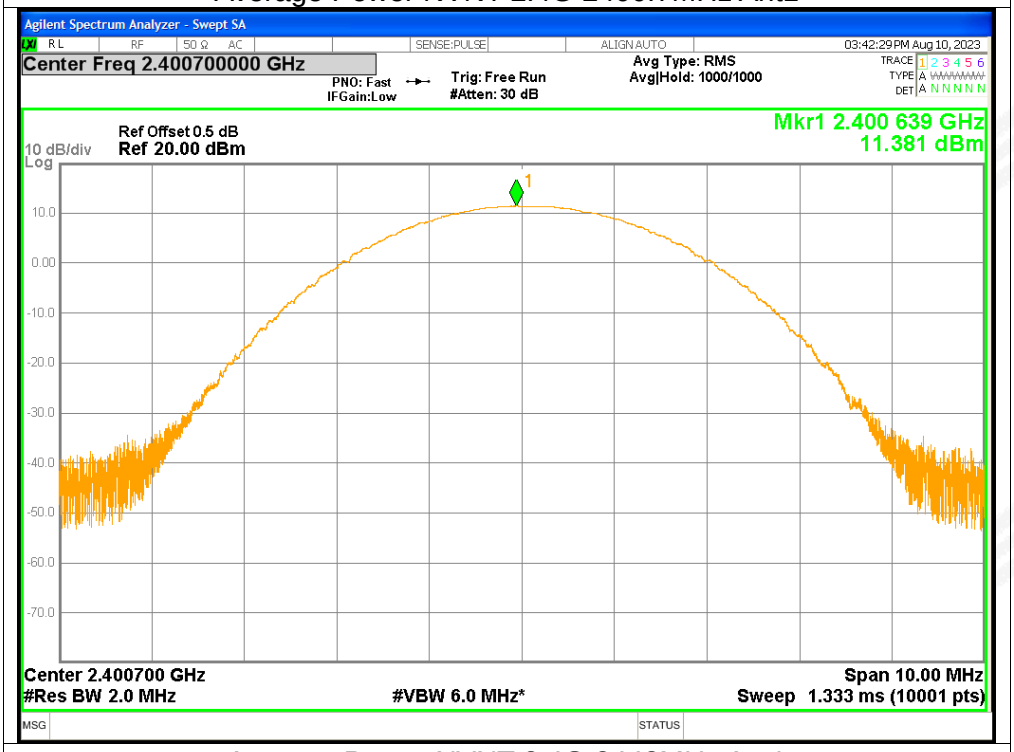
APPENDIX 1-TEST DATA

1. Maximum Average Conducted Output Power

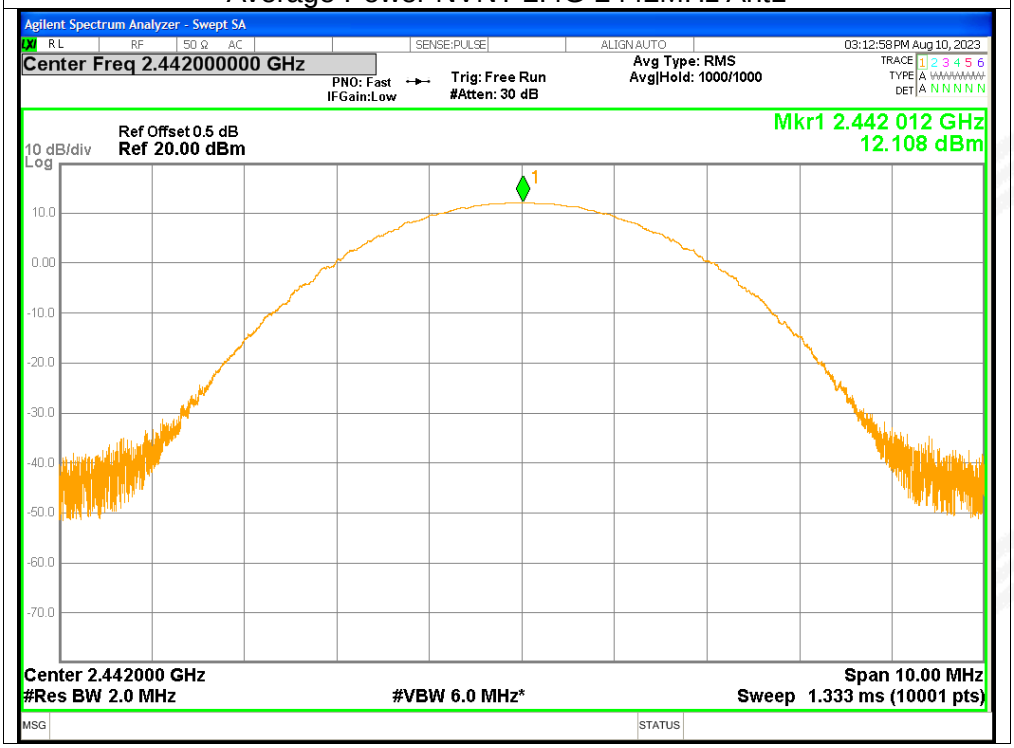
Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	2.4G	2400.7	Ant1	11.38	<=30	Pass
NVNT	2.4G	2442	Ant1	12.11	<=30	Pass
NVNT	2.4G	2482.5	Ant1	6.13	<=30	Pass
NVNT	2.4G	2400.7	Ant2	11.53	<=30	Pass
NVNT	2.4G	2442	Ant2	11.43	<=30	Pass
NVNT	2.4G	2482.5	Ant2	4.81	<=30	Pass
NVNT	2.4G	2400.7	sum	14.47	<=29.23	Pass
NVNT	2.4G	2442	sum	14.79	<=29.23	Pass
NVNT	2.4G	2482.5	sum	8.53	<=29.23	Pass

Test Graphs

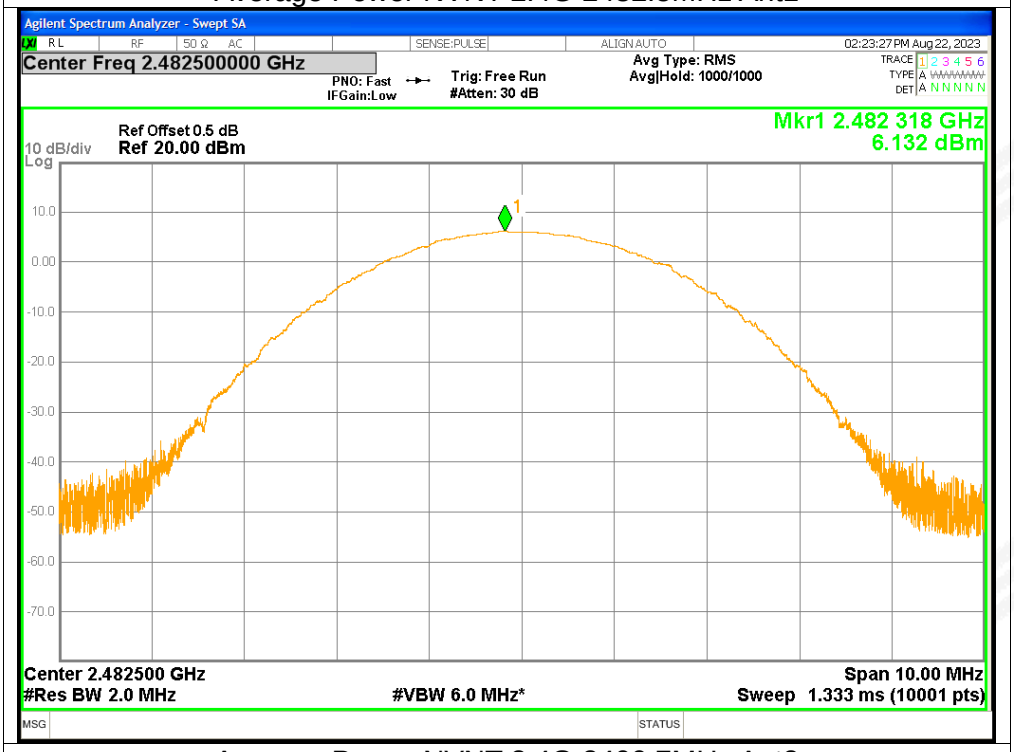
Average Power NVNT 2.4G 2400.7MHz Ant1



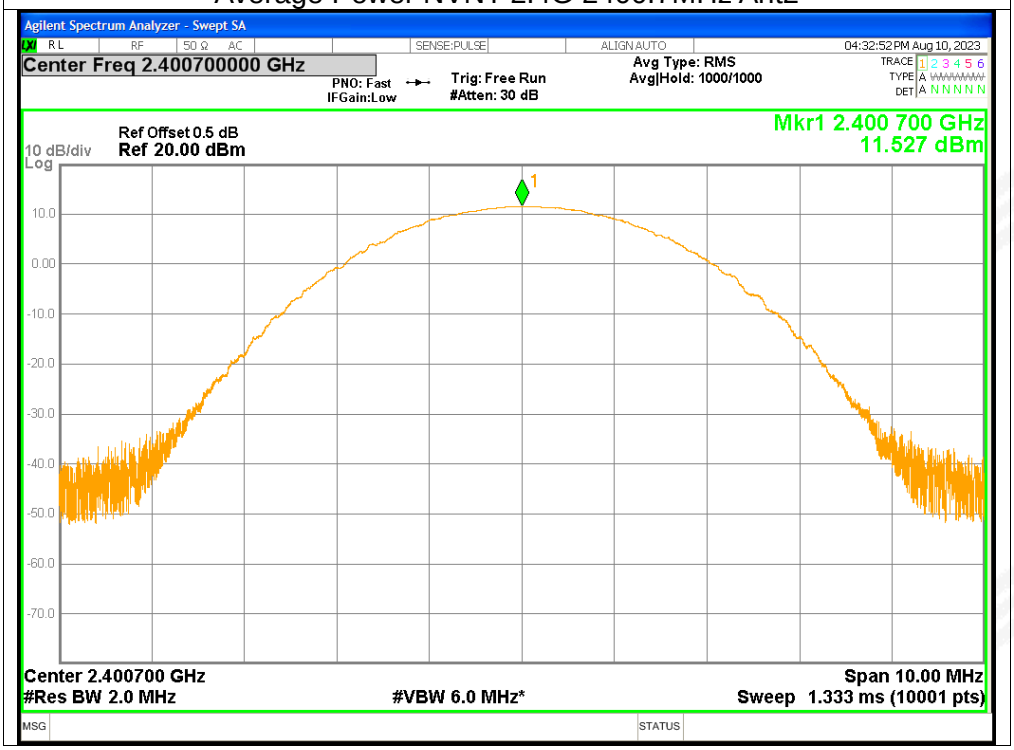
Average Power NVNT 2.4G 2442MHz Ant1



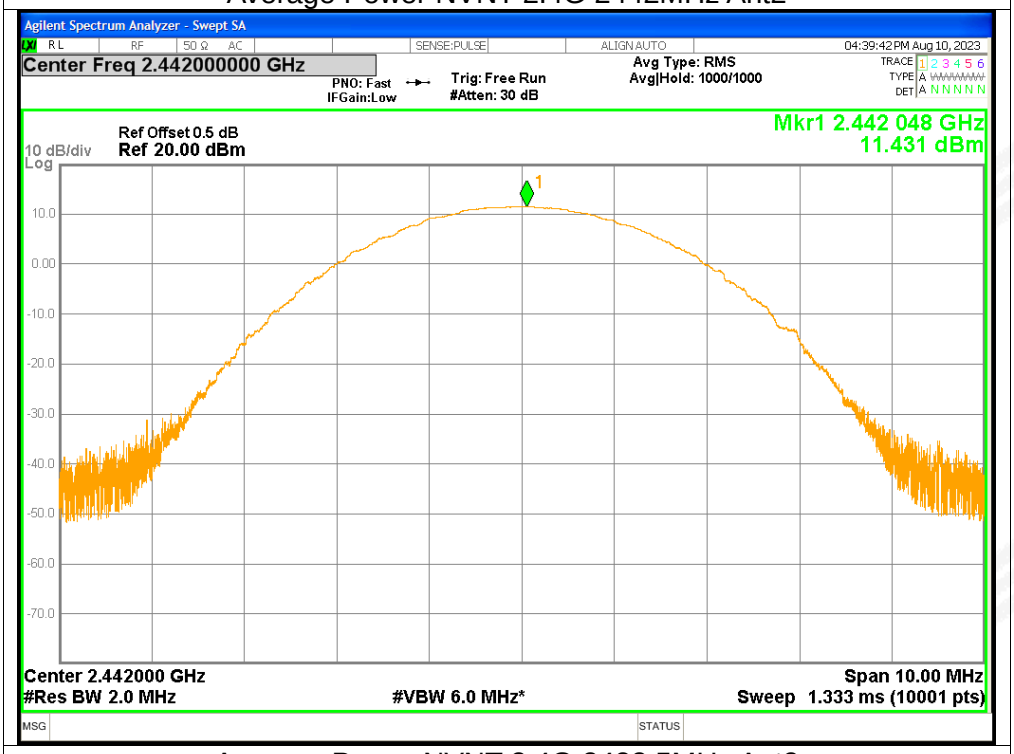
Average Power NVNT 2.4G 2482.5MHz Ant1



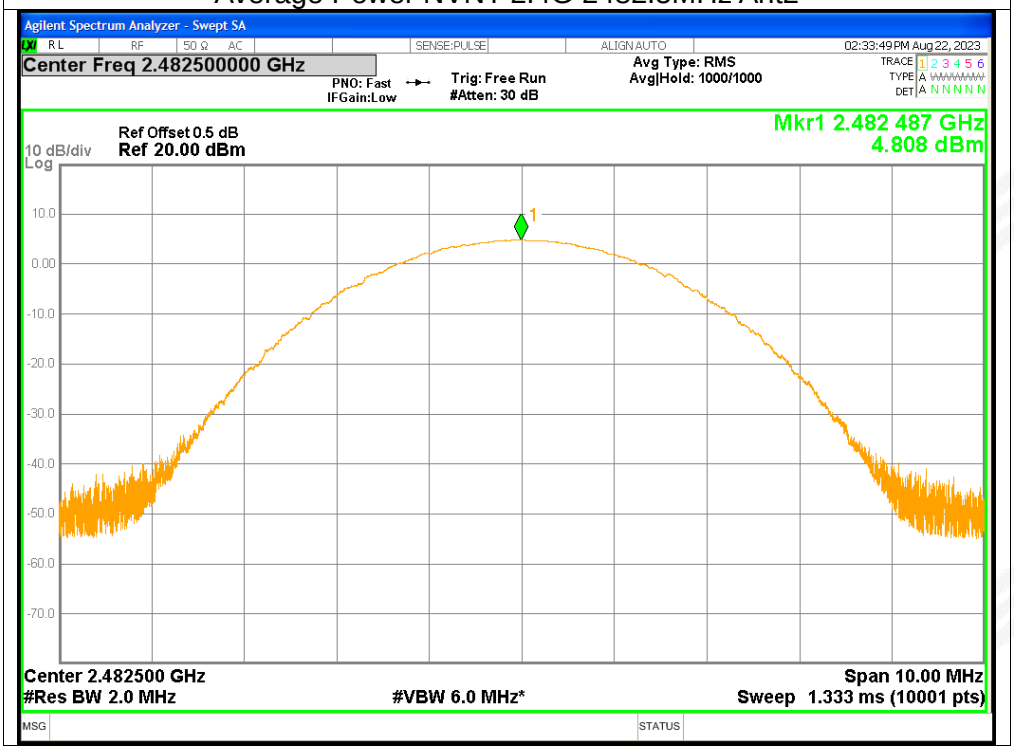
Average Power NVNT 2.4G 2400.7MHz Ant2



Average Power NVNT 2.4G 2442MHz Ant2



Average Power NVNT 2.4G 2482.5MHz Ant2

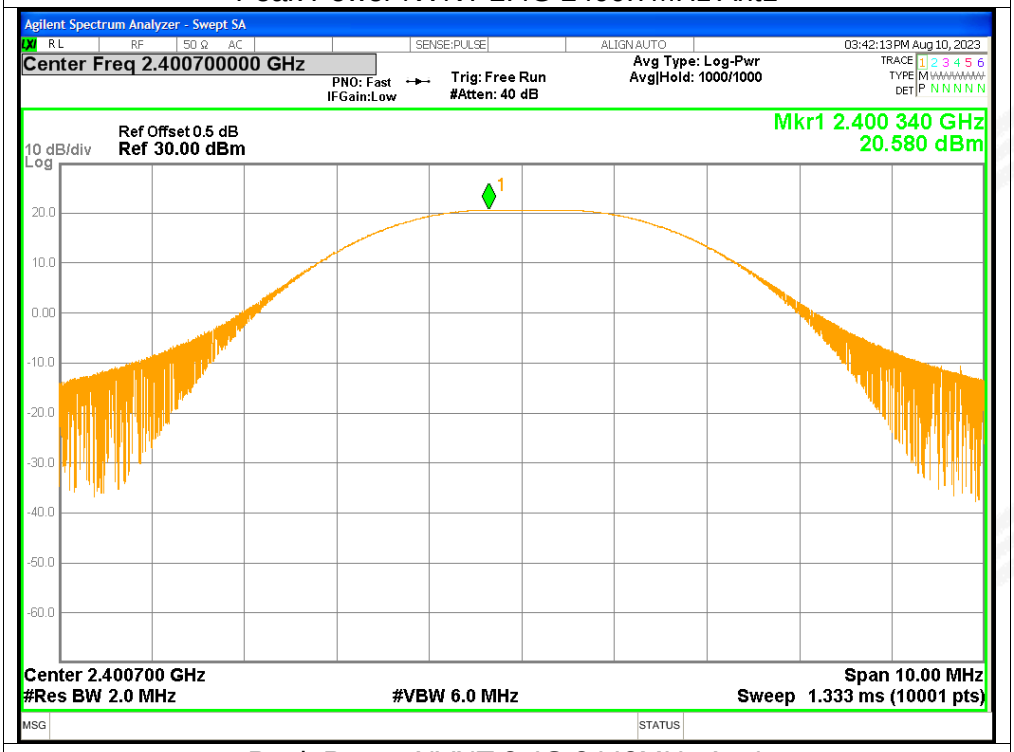


2. Maximum Peak Conducted Output Power

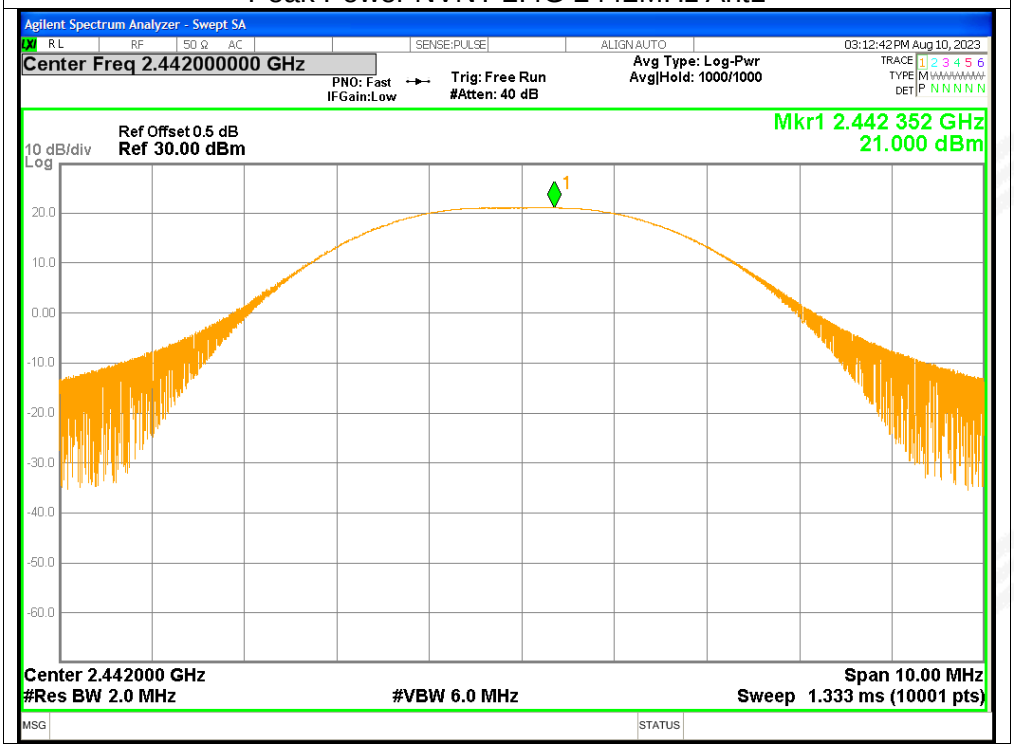
Condition	Mode	Frequency (MHz)	Antenna	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	2.4G	2400.7	Ant1	20.58	<=30	Pass
NVNT	2.4G	2442	Ant1	21	<=30	Pass
NVNT	2.4G	2482.5	Ant1	15.56	<=30	Pass
NVNT	2.4G	2400.7	Ant2	20.37	<=30	Pass
NVNT	2.4G	2442	Ant2	20.8	<=30	Pass
NVNT	2.4G	2482.5	Ant2	14.53	<=30	Pass
NVNT	2.4G	2400.7	sum	23.49	<=29.23	Pass
NVNT	2.4G	2442	sum	23.91	<=29.23	Pass
NVNT	2.4G	2482.5	sum	18.09	<=29.23	Pass

Test Graphs

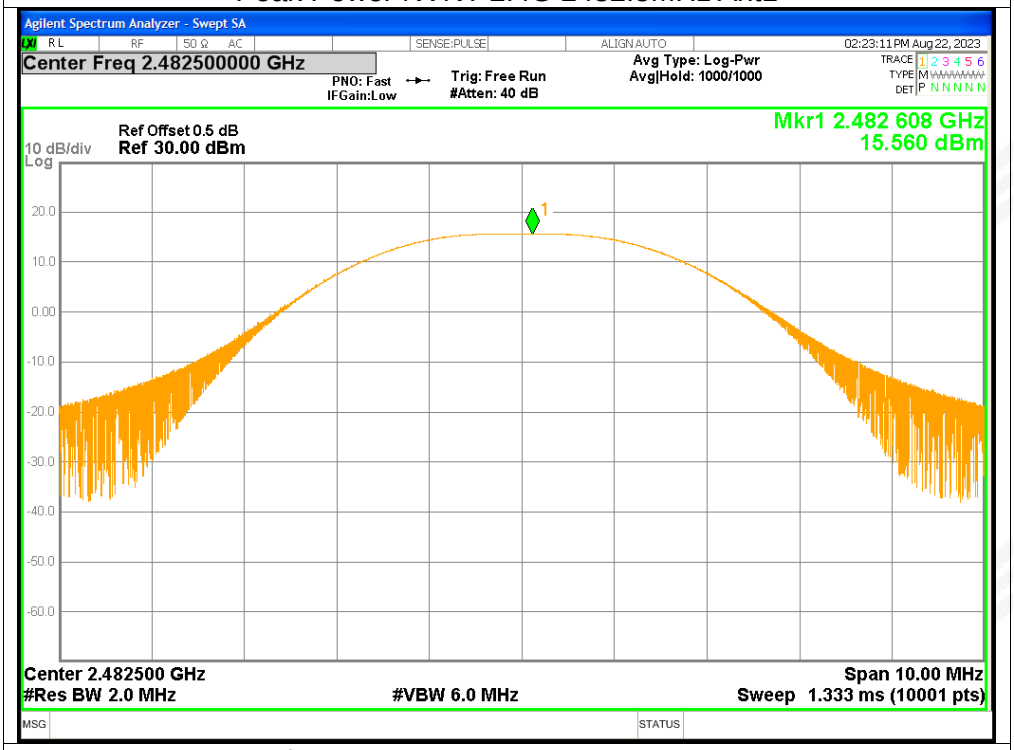
Peak Power NVNT 2.4G 2400.7MHz Ant1



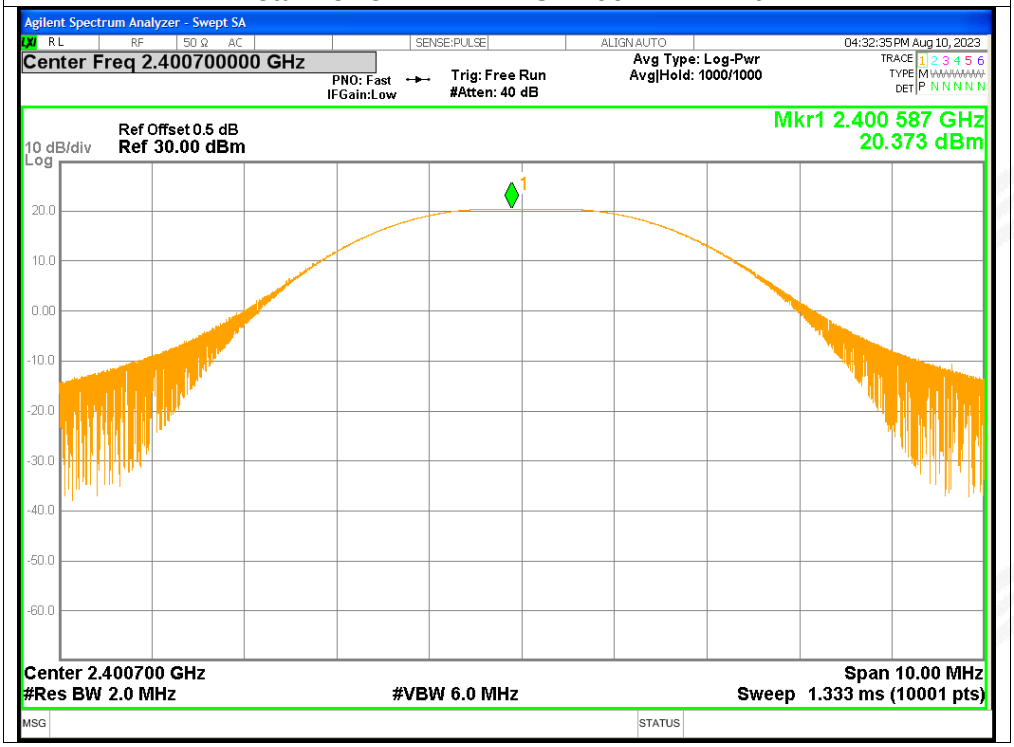
Peak Power NVNT 2.4G 2442MHz Ant1



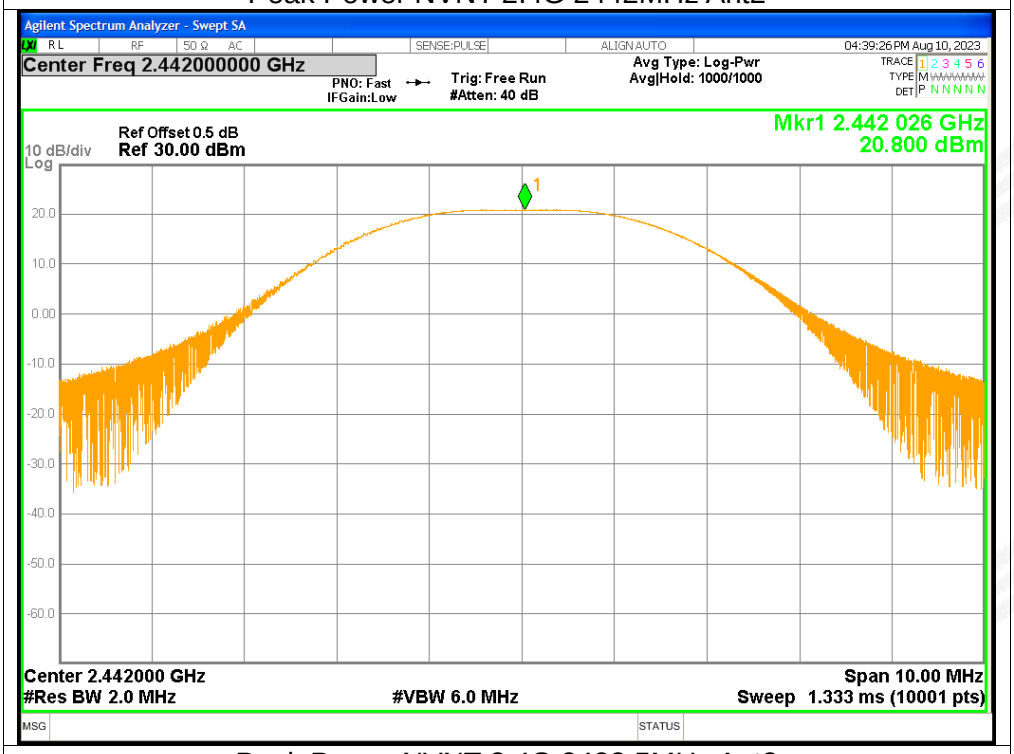
Peak Power NVNT 2.4G 2482.5MHz Ant1



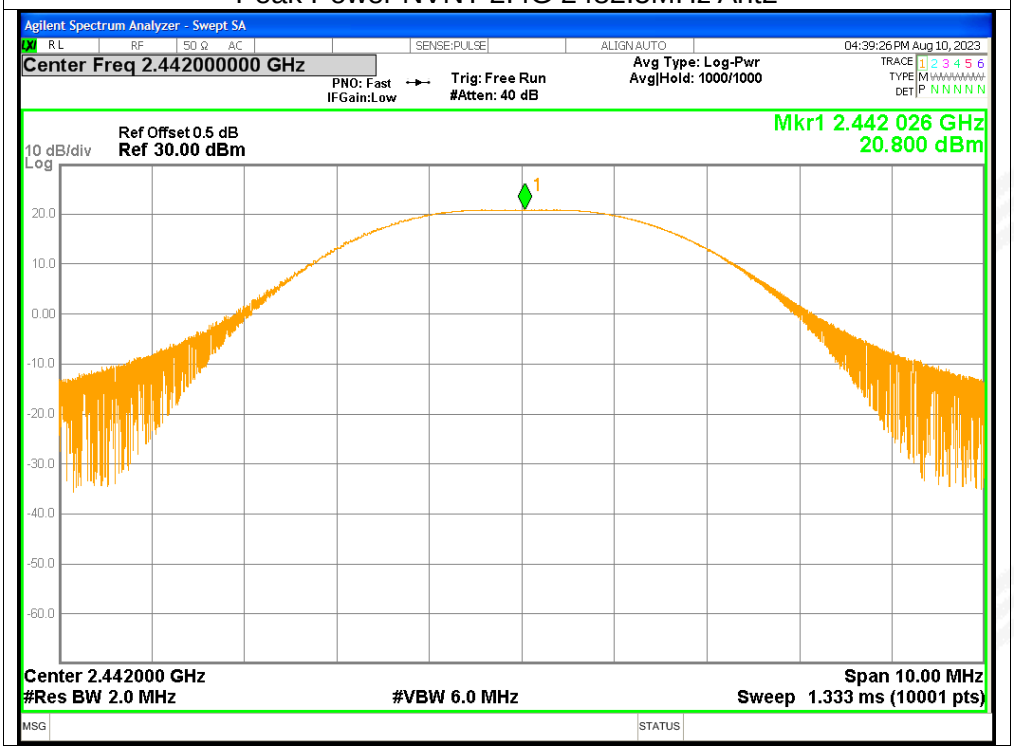
Peak Power NVNT 2.4G 2400.7MHz Ant2



Peak Power NVNT 2.4G 2442MHz Ant2



Peak Power NVNT 2.4G 2482.5MHz Ant2

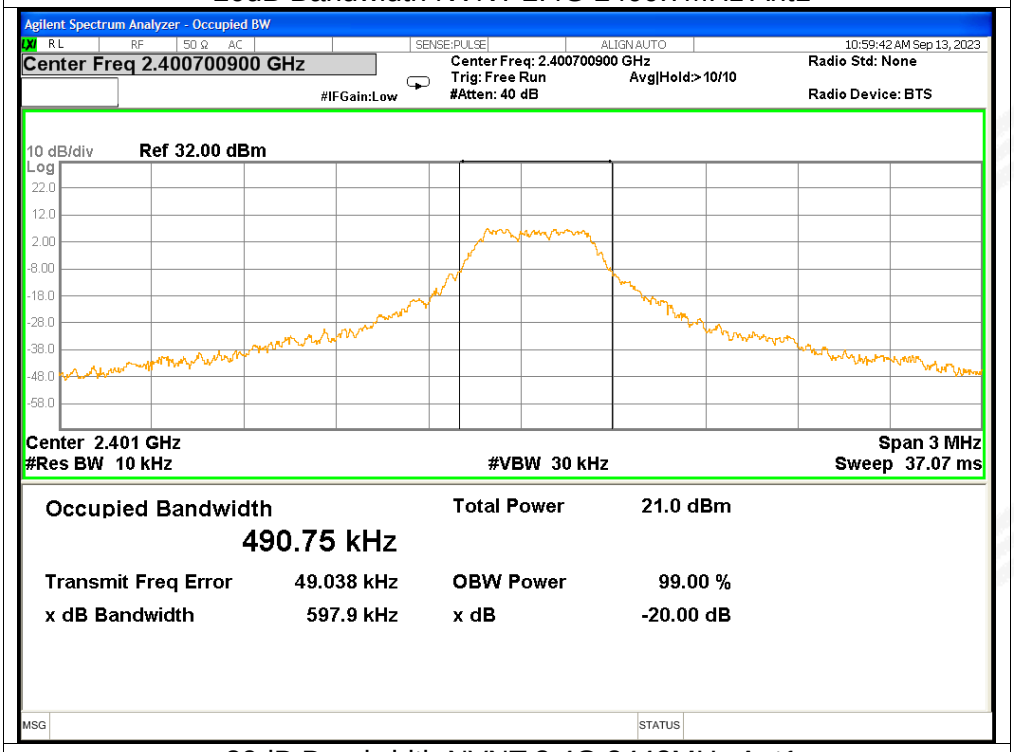


3. -20dB Bandwidth

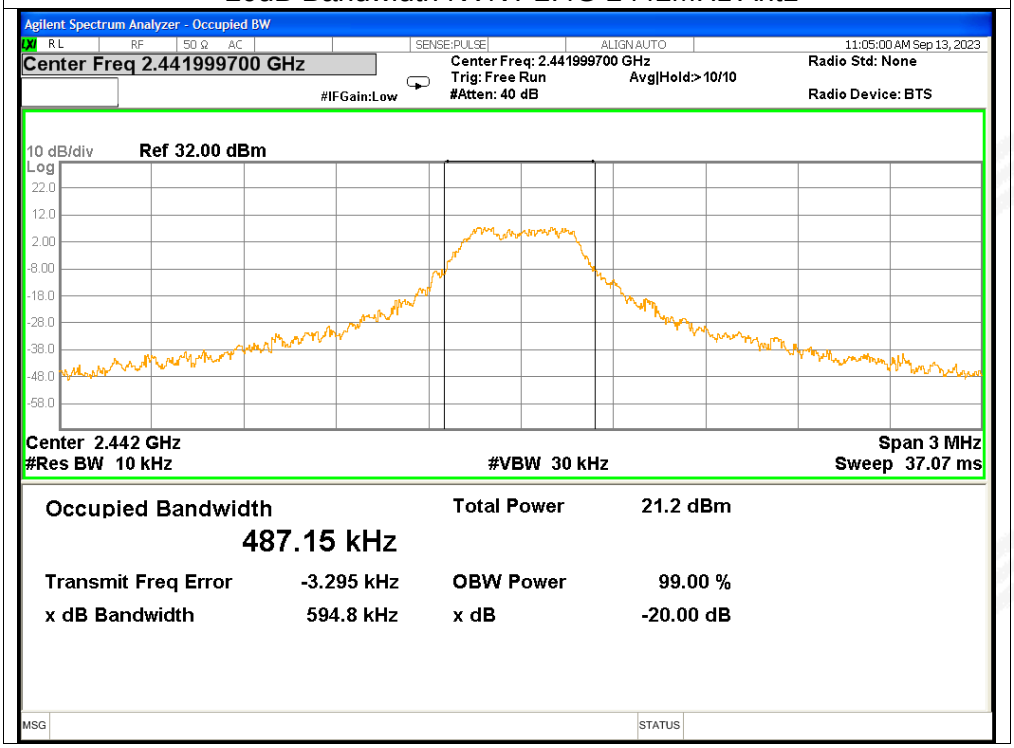
Condition	Mode	Frequency (MHz)	Antenna	-20 dB Bandwidth (MHz)	Verdict
NVNT	2.4G	2400.7	Ant1	0.5979	Pass
NVNT	2.4G	2442	Ant1	0.5948	Pass
NVNT	2.4G	2482.5	Ant1	0.6022	Pass
NVNT	2.4G	2400.7	Ant2	0.5925	Pass
NVNT	2.4G	2442	Ant2	0.5896	Pass
NVNT	2.4G	2482.5	Ant2	0.5943	Pass

Test Graphs

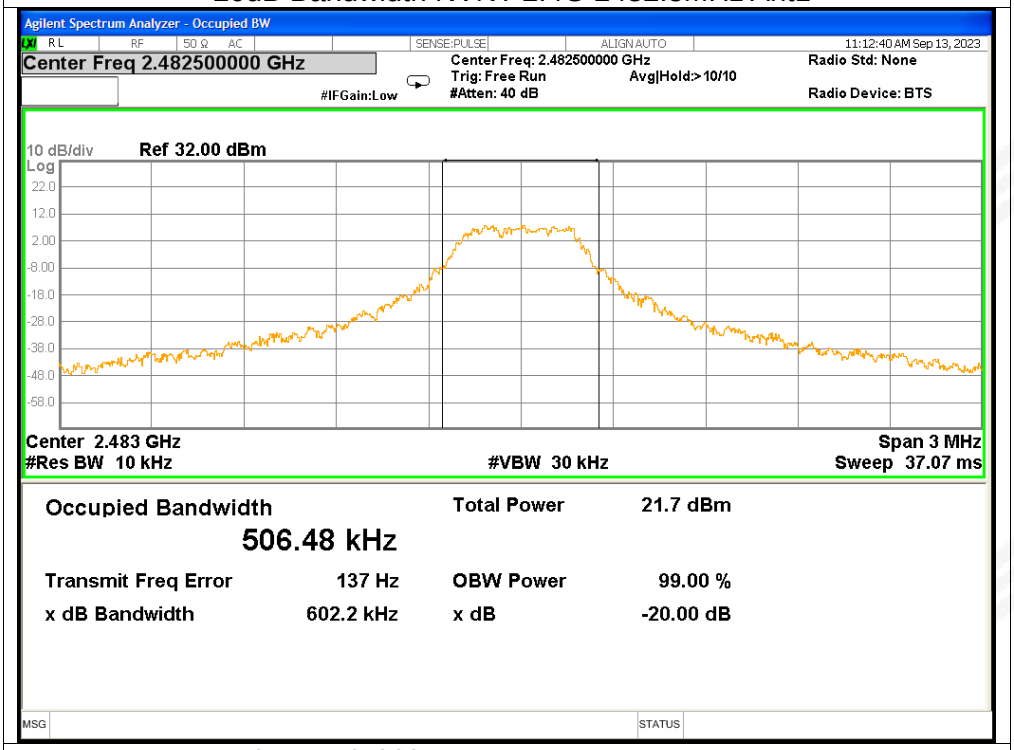
-20dB Bandwidth NVNT 2.4G 2400.7MHz Ant1



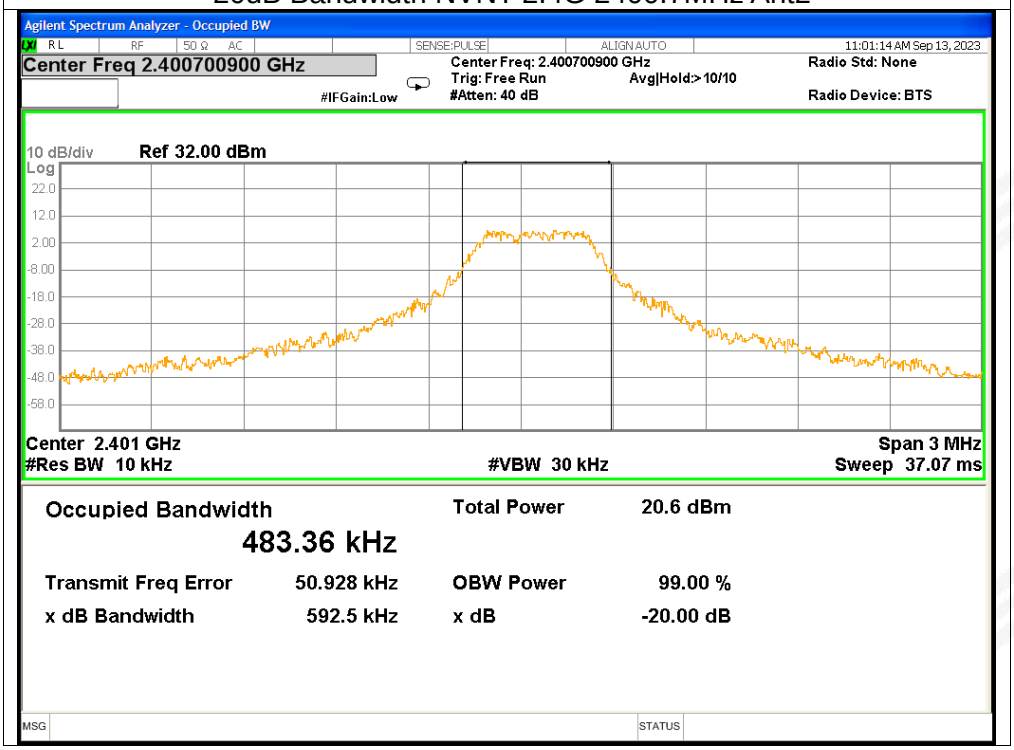
-20dB Bandwidth NVNT 2.4G 2442MHz Ant1



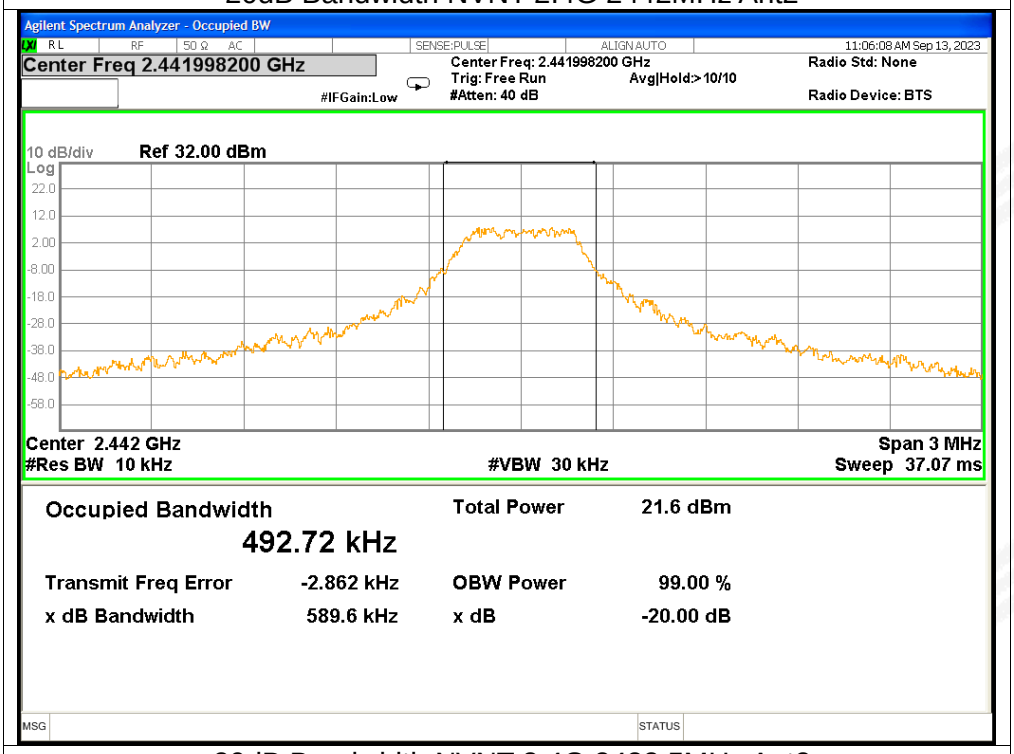
-20dB Bandwidth NVNT 2.4G 2482.5MHz Ant1



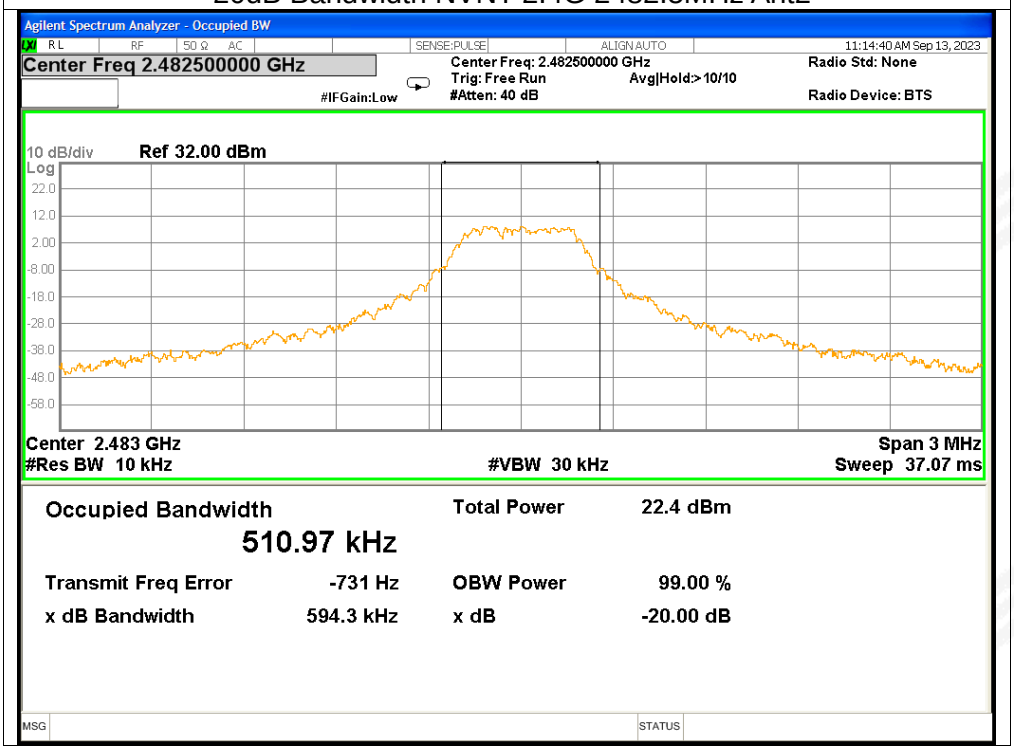
-20dB Bandwidth NVNT 2.4G 2400.7MHz Ant2



-20dB Bandwidth NVNT 2.4G 2442MHz Ant2



-20dB Bandwidth NVNT 2.4G 2482.5MHz Ant2

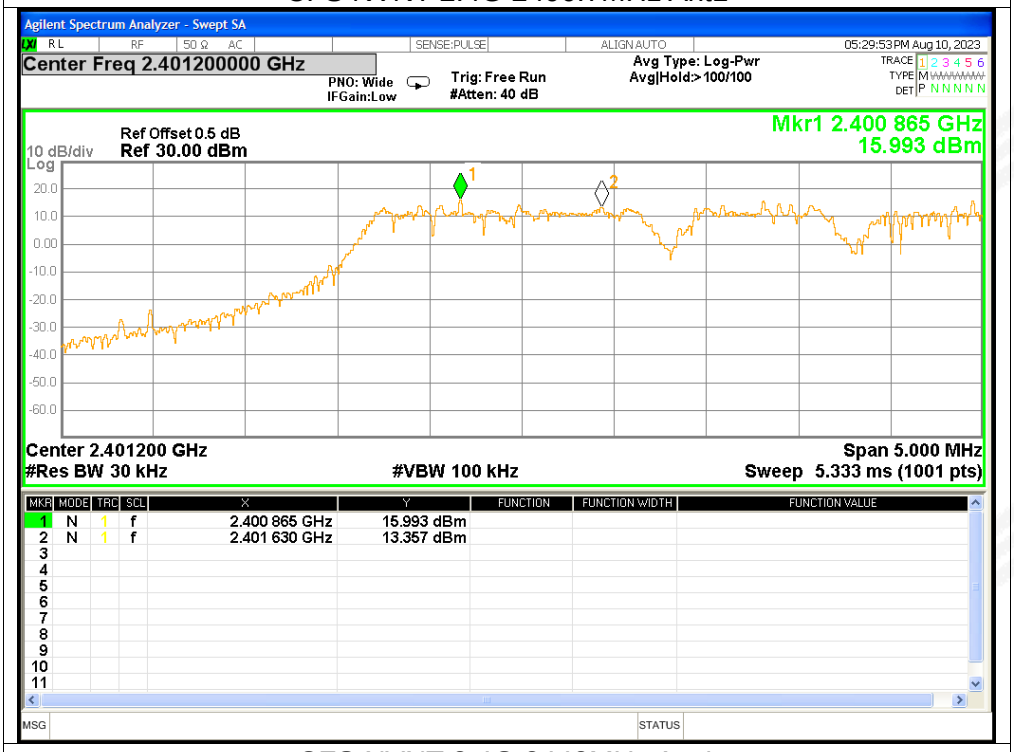


4. Carrier Frequencies Separation

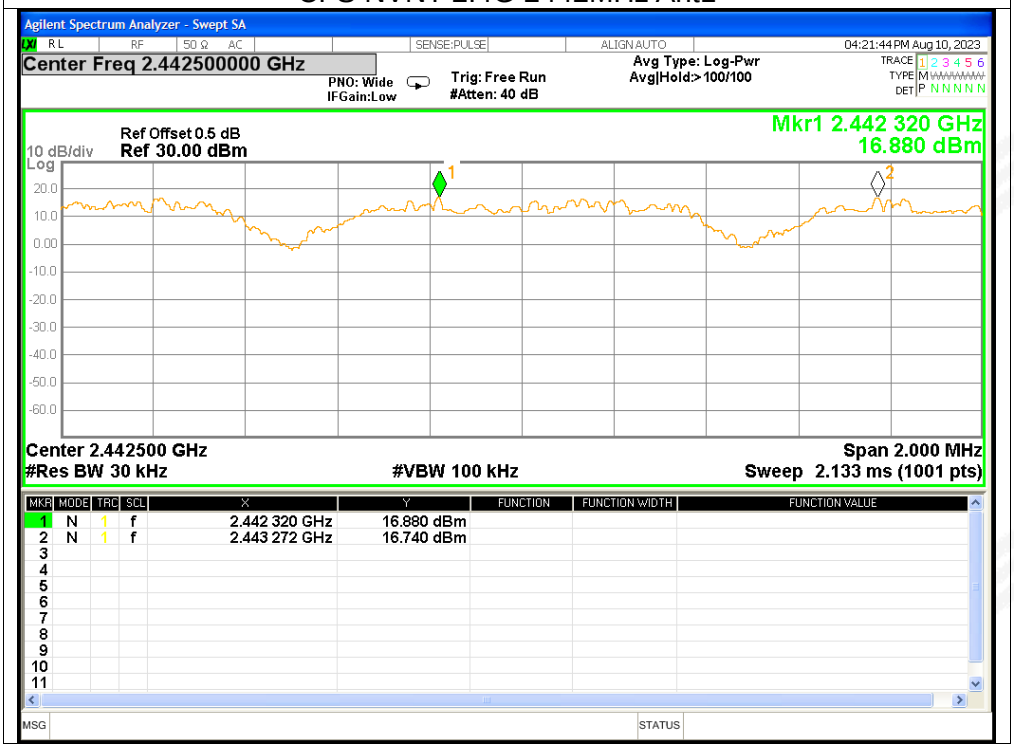
Condition	Mode	Antenna	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	2.4G	Ant1	2400.865	2401.63	0.765	>=0.5979	Pass
NVNT	2.4G	Ant1	2442.32	2443.272	0.952	>=0.5948	Pass
NVNT	2.4G	Ant1	2481.758	2482.66	0.902	>=0.6022	Pass
NVNT	2.4G	Ant2	2400.939	2402.175	1.236	>=0.5925	Pass
NVNT	2.4G	Ant2	2441.714	2442.72	1.006	>=0.5896	Pass
NVNT	2.4G	Ant2	2481.325	2482.75	1.425	>=0.5943	Pass

Test Graphs

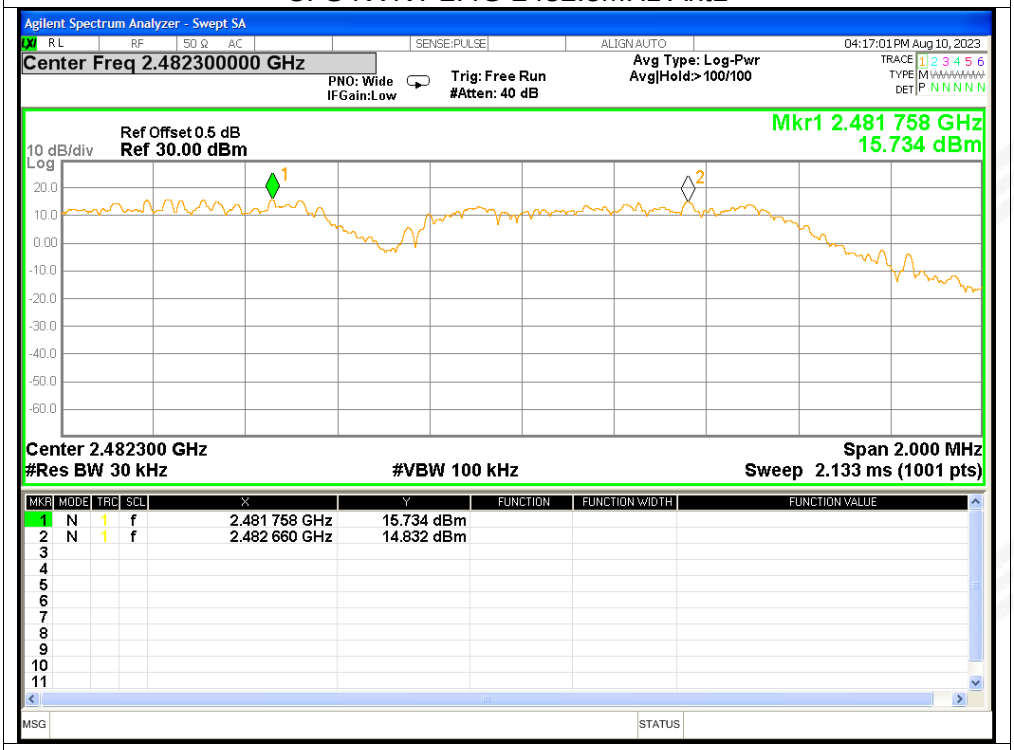
CFS NVNT 2.4G 2400.7MHz Ant1



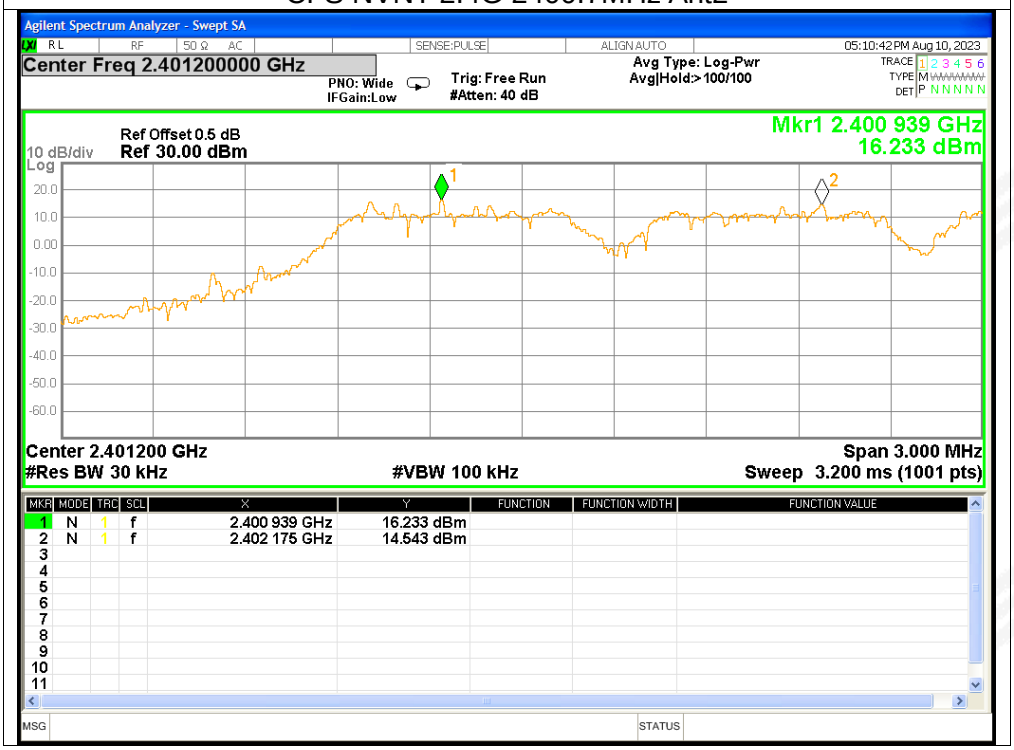
CFS NVNT 2.4G 2442MHz Ant1



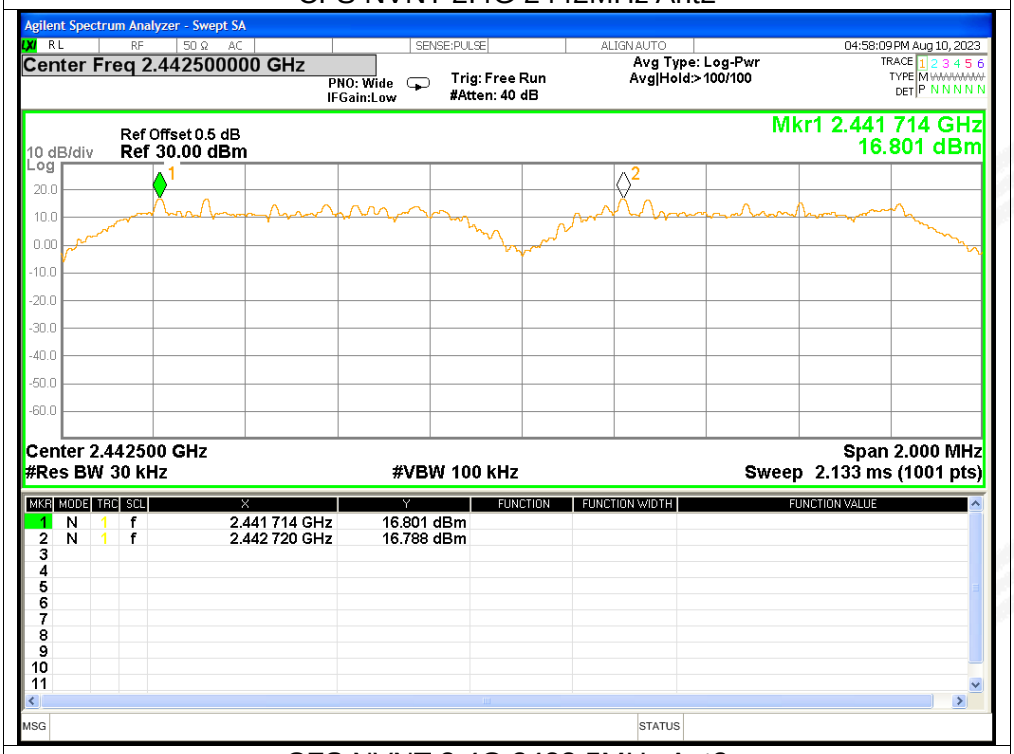
CFS NVNT 2.4G 2482.5MHz Ant1



CFS NVNT 2.4G 2400.7MHz Ant2



CFS NVNT 2.4G 2442MHz Ant2



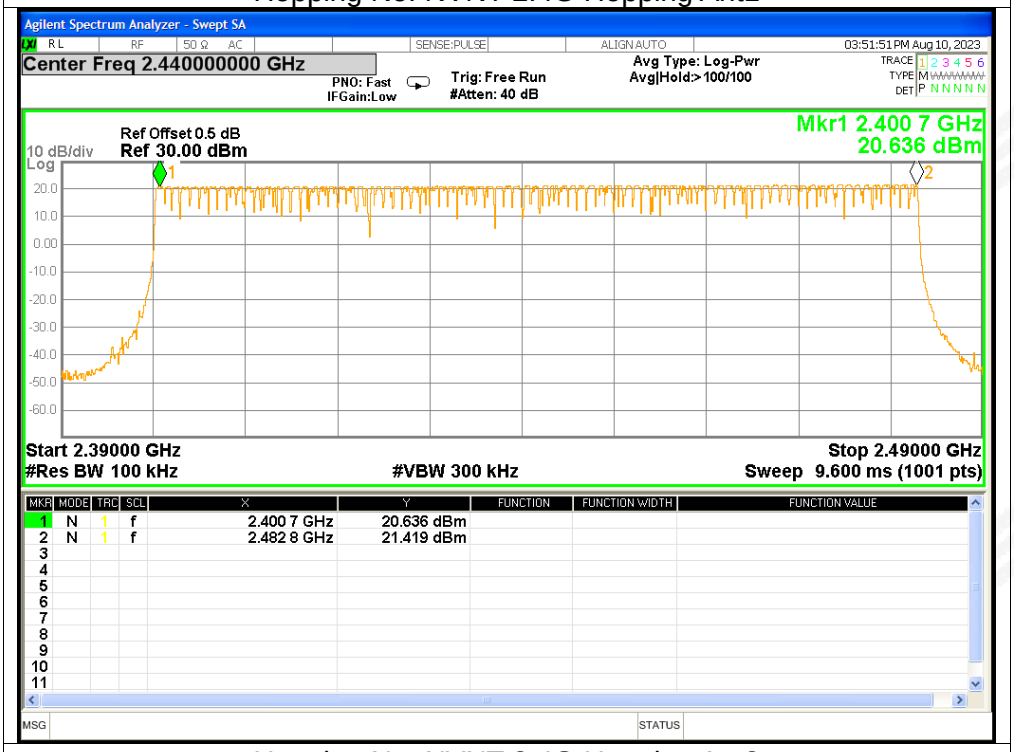
CFS NVNT 2.4G 2482.5MHz Ant2

5. Number of Hopping Channel

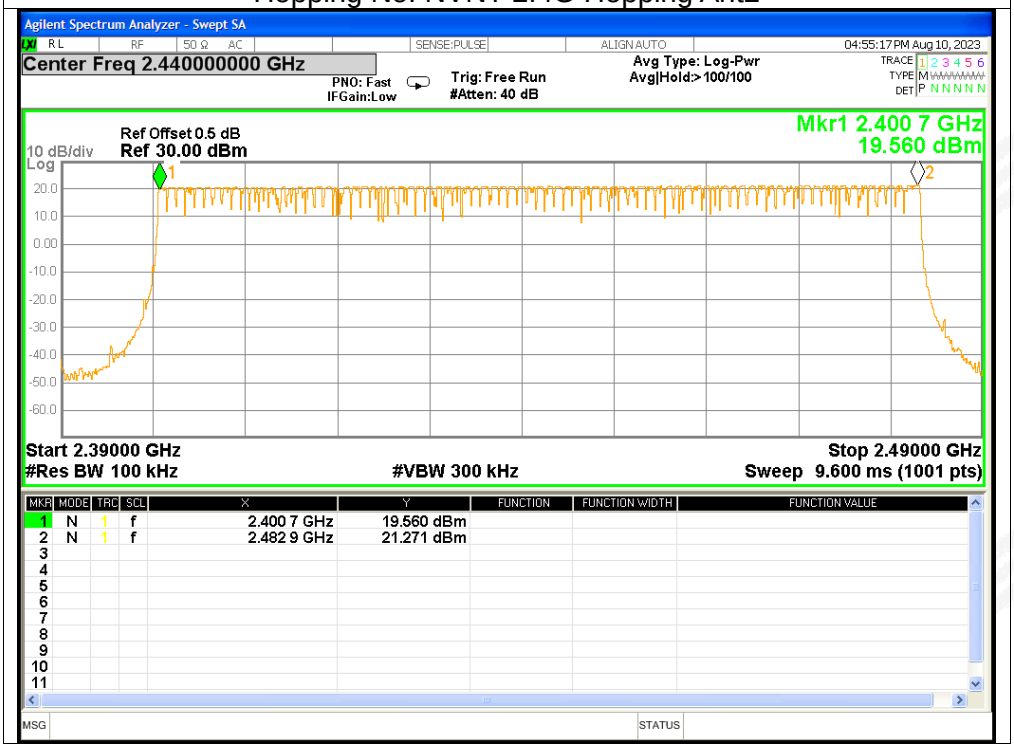
Condition	Mode	Antenna	Hopping Number	Limit	Verdict
NVNT	2.4G	Ant1	165	>=15	Pass
NVNT	2.4G	Ant2	165	>=15	Pass

Test Graphs

Hopping No. NVNT 2.4G Hopping Ant1



Hopping No. NVNT 2.4G Hopping Ant2

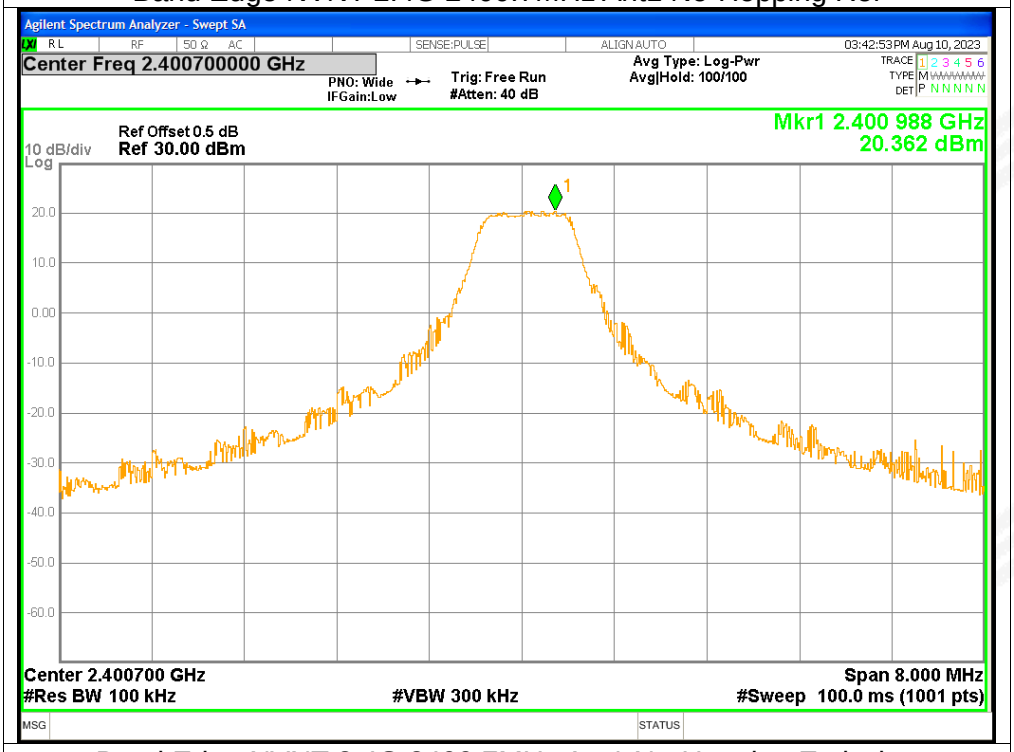


6. Band Edge

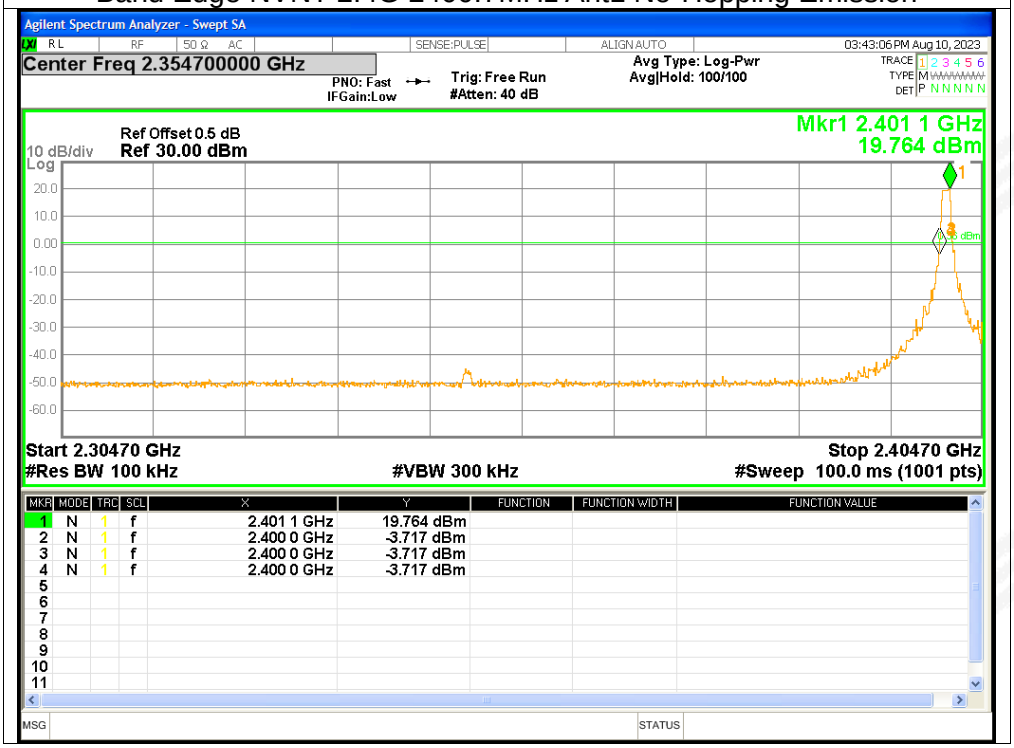
Condition	Mode	Frequency (MHz)	Antenna	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	2.4G	2400.7	Ant1	No-Hopping	-24.07	<=-20	Pass
NVNT	2.4G	2482.5	Ant1	No-Hopping	-29.54	<=-20	Pass
NVNT	2.4G	2400.7	Ant2	No-Hopping	-22.26	<=-20	Pass
NVNT	2.4G	2482.5	Ant2	No-Hopping	-30.71	<=-20	Pass

Test Graphs

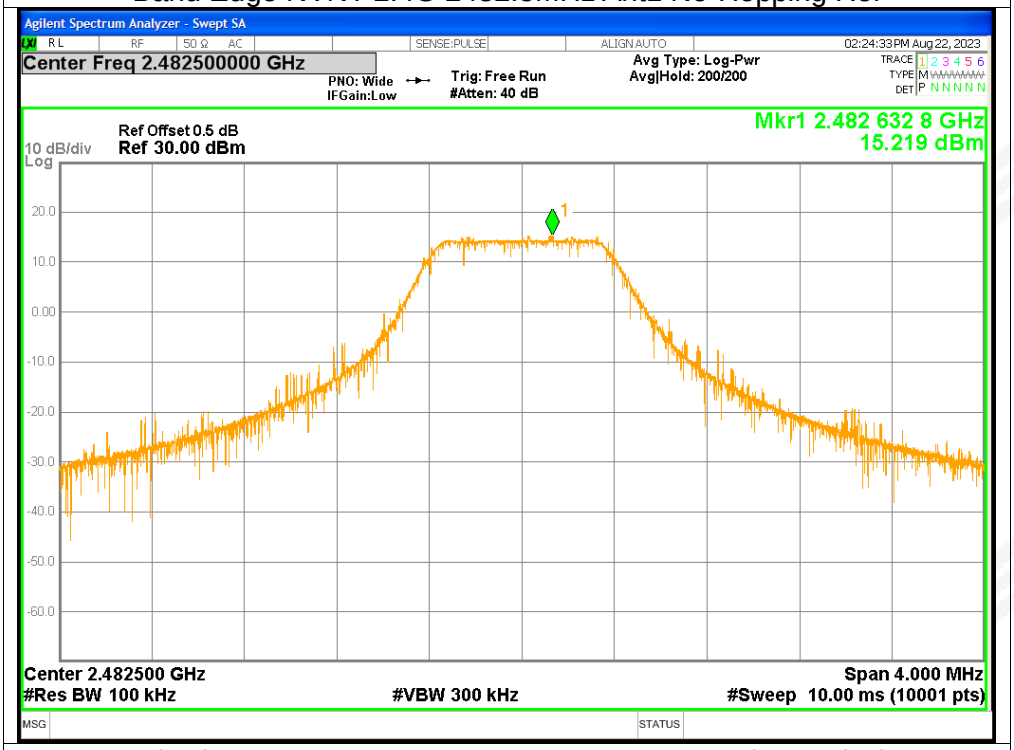
Band Edge NVNT 2.4G 2400.7MHz Ant1 No-Hopping Ref



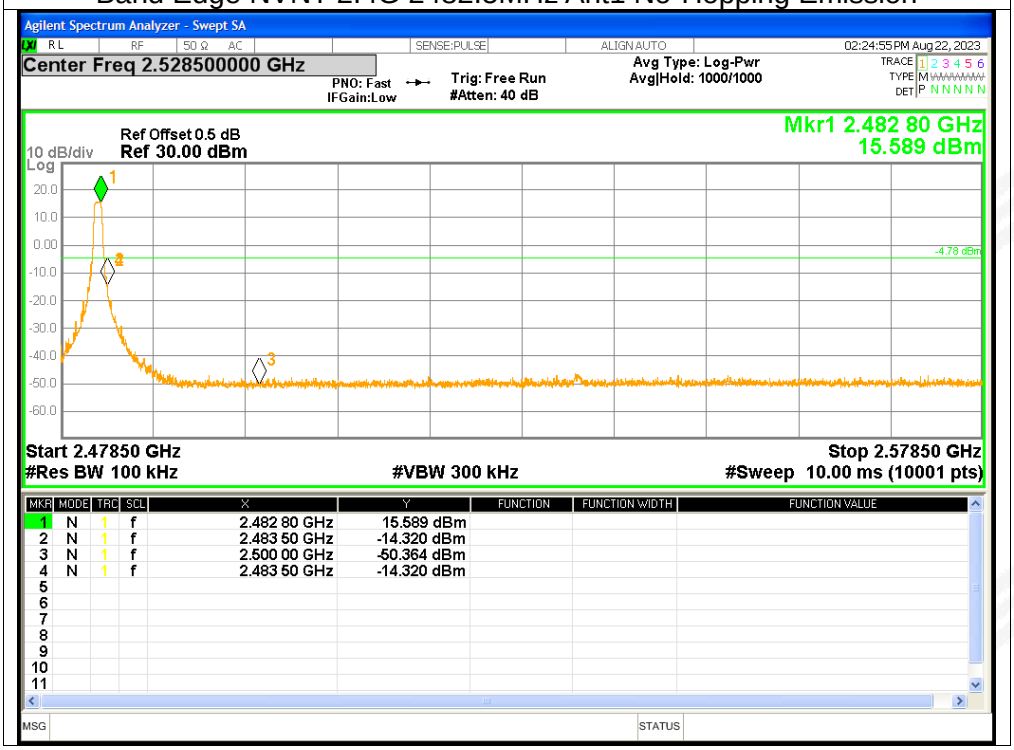
Band Edge NVNT 2.4G 2400.7MHz Ant1 No-Hopping Emission



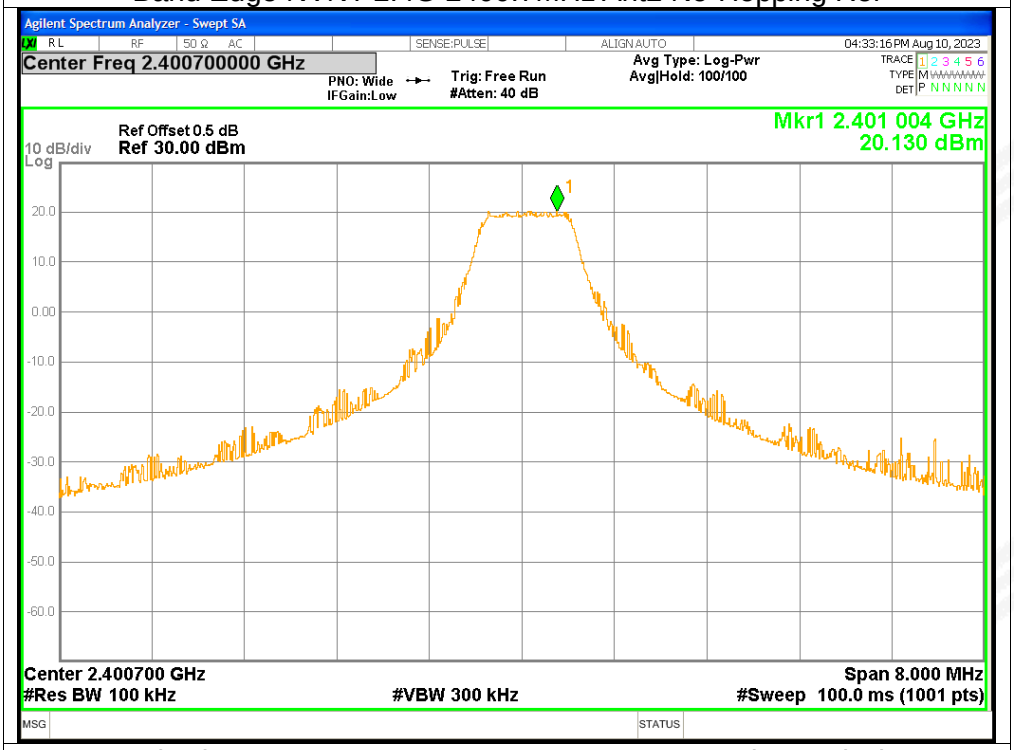
Band Edge NVNT 2.4G 2482.5MHz Ant1 No-Hopping Ref



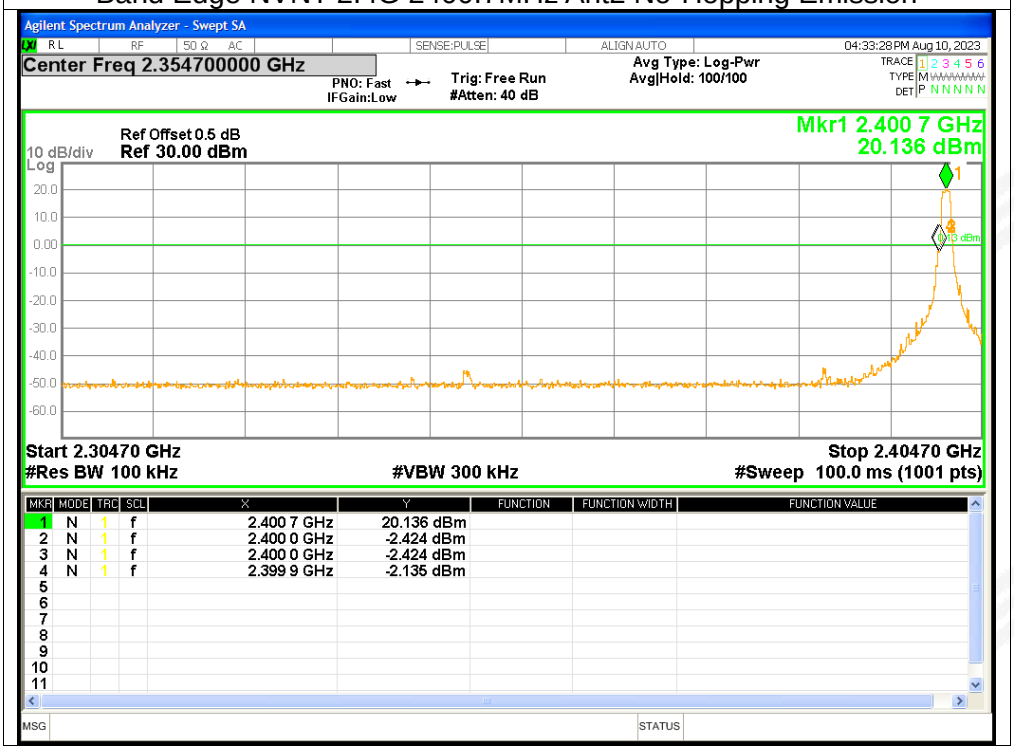
Band Edge NVNT 2.4G 2482.5MHz Ant1 No-Hopping Emission



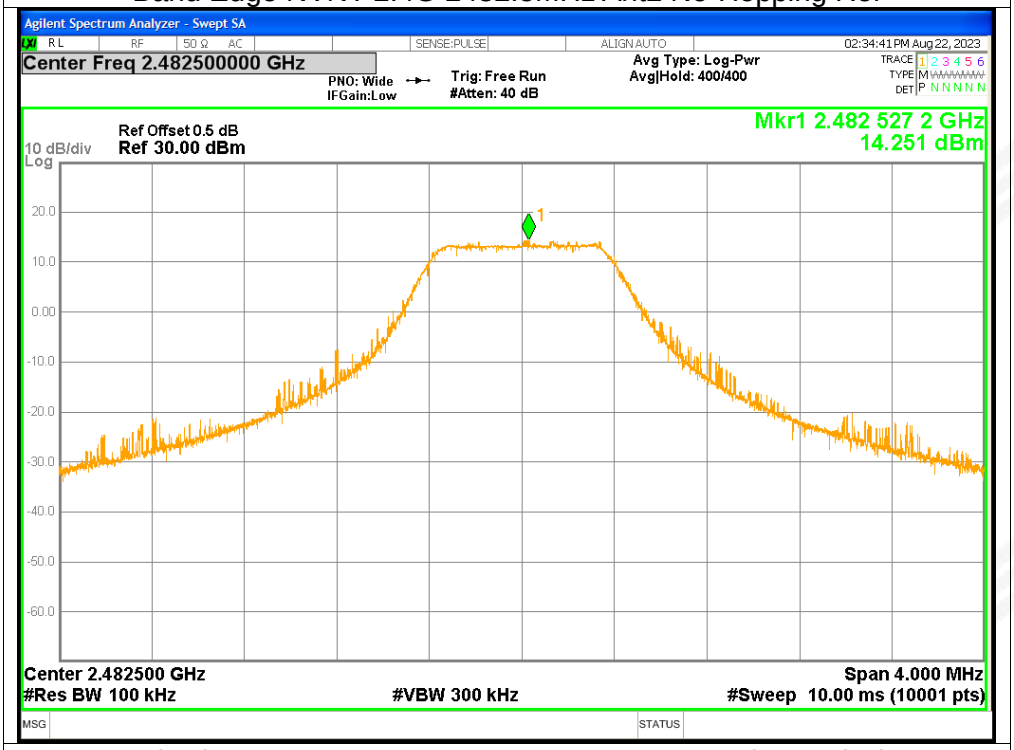
Band Edge NVNT 2.4G 2400.7MHz Ant2 No-Hopping Ref



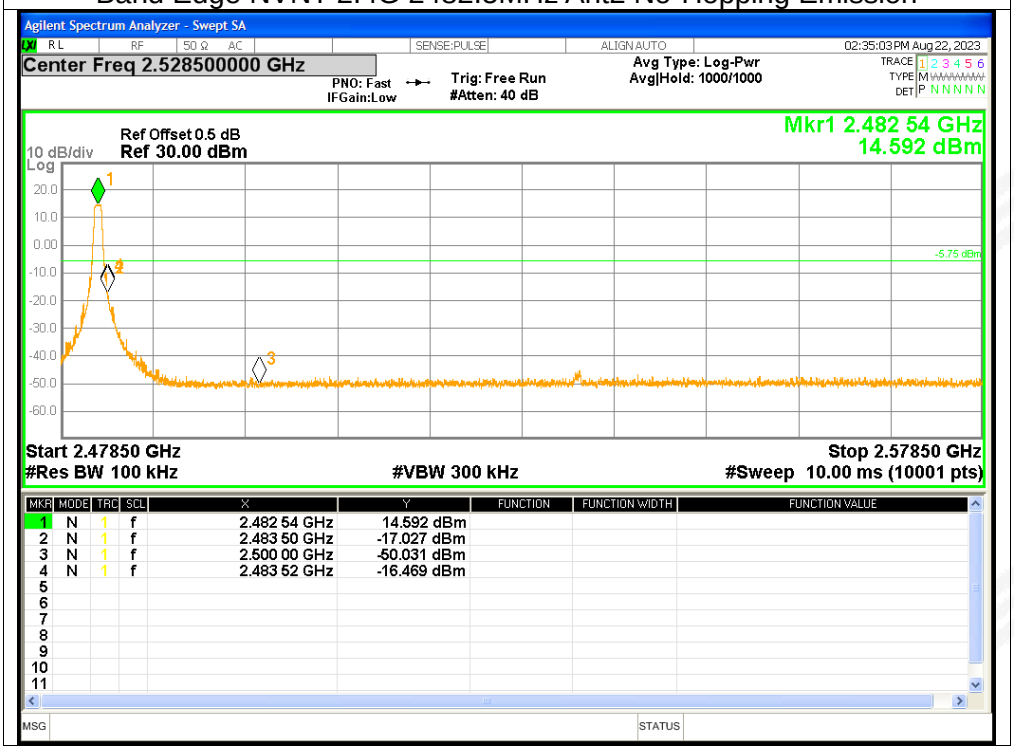
Band Edge NVNT 2.4G 2400.7MHz Ant2 No-Hopping Emission



Band Edge NVNT 2.4G 2482.5MHz Ant2 No-Hopping Ref



Band Edge NVNT 2.4G 2482.5MHz Ant2 No-Hopping Emission

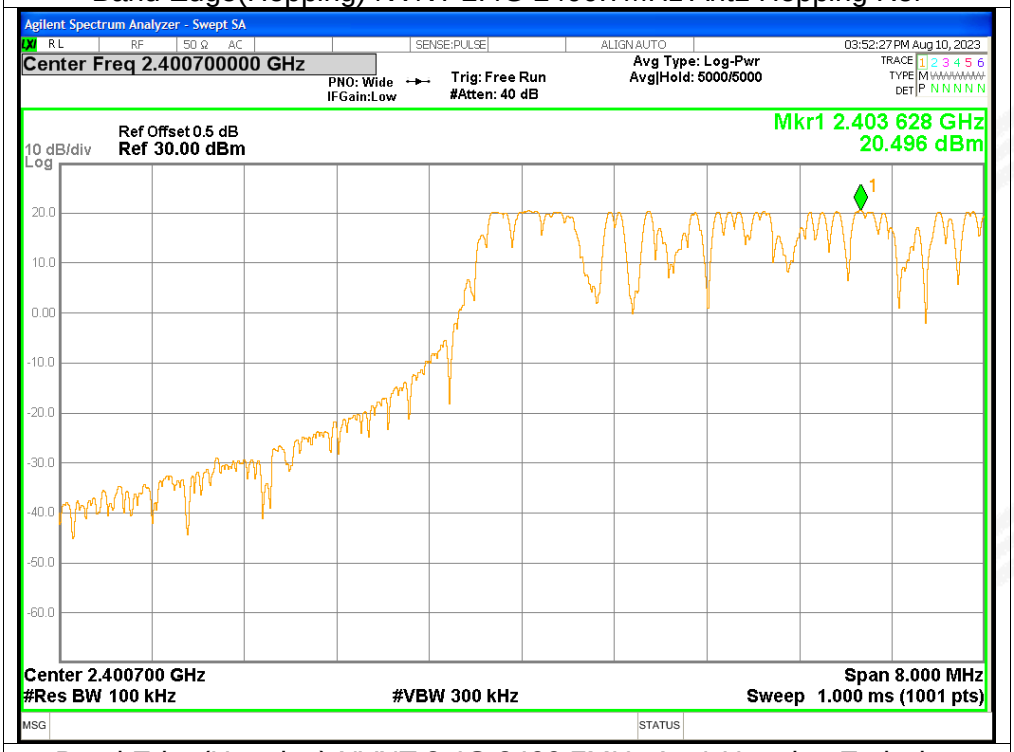


7. Band Edge(Hopping)

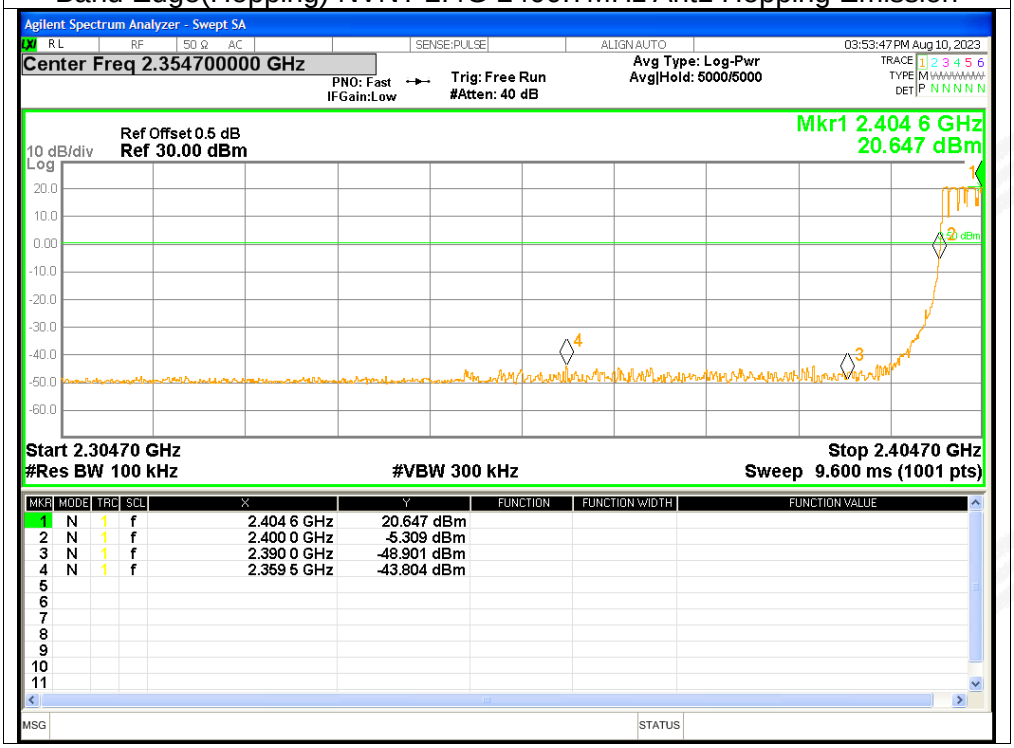
Condition	Mode	Frequency (MHz)	Antenna	Hopping Mode	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	2.4G	2400.7	Ant1	Hopping	-64.3	<=-20	Pass
NVNT	2.4G	2482.5	Ant1	Hopping	-34.72	<=-20	Pass
NVNT	2.4G	2400.7	Ant2	Hopping	-61.23	<=-20	Pass
NVNT	2.4G	2482.5	Ant2	Hopping	-28.41	<=-20	Pass

Test Graphs

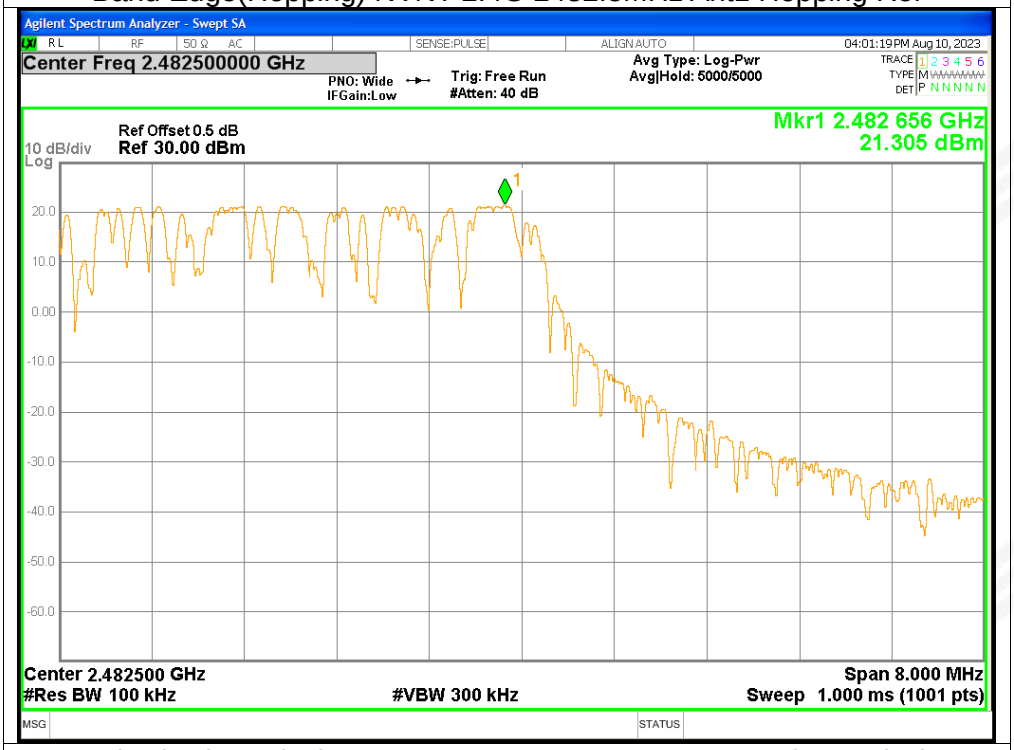
Band Edge(Hopping) NVNT 2.4G 2400.7MHz Ant1 Hopping Ref



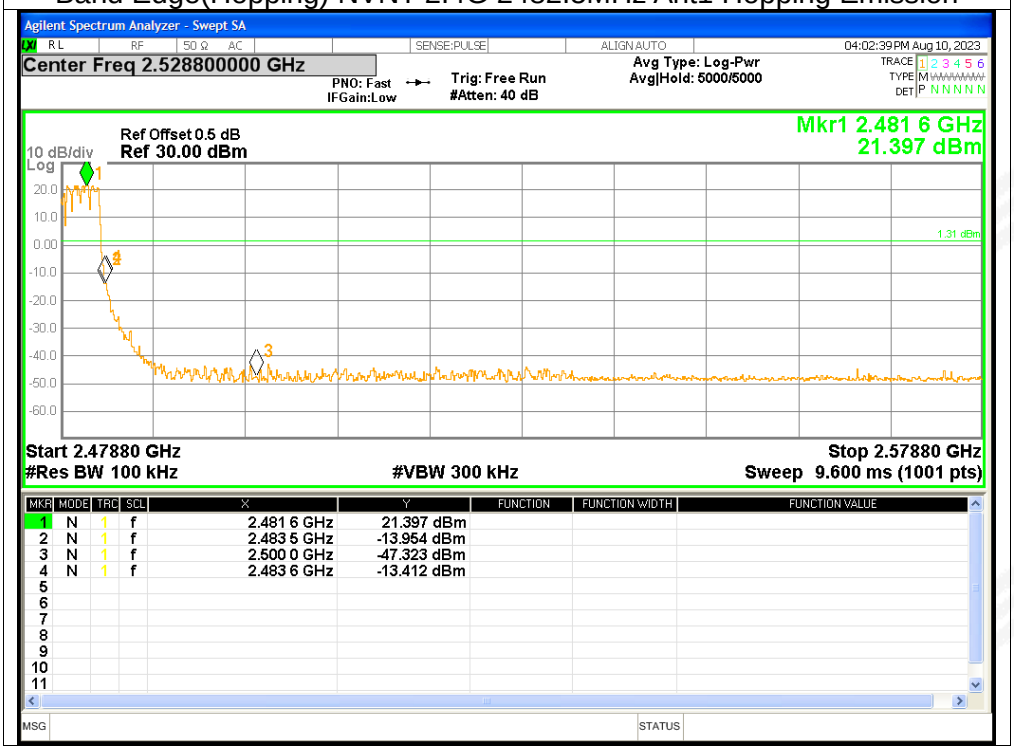
Band Edge(Hopping) NVNT 2.4G 2400.7MHz Ant1 Hopping Emission



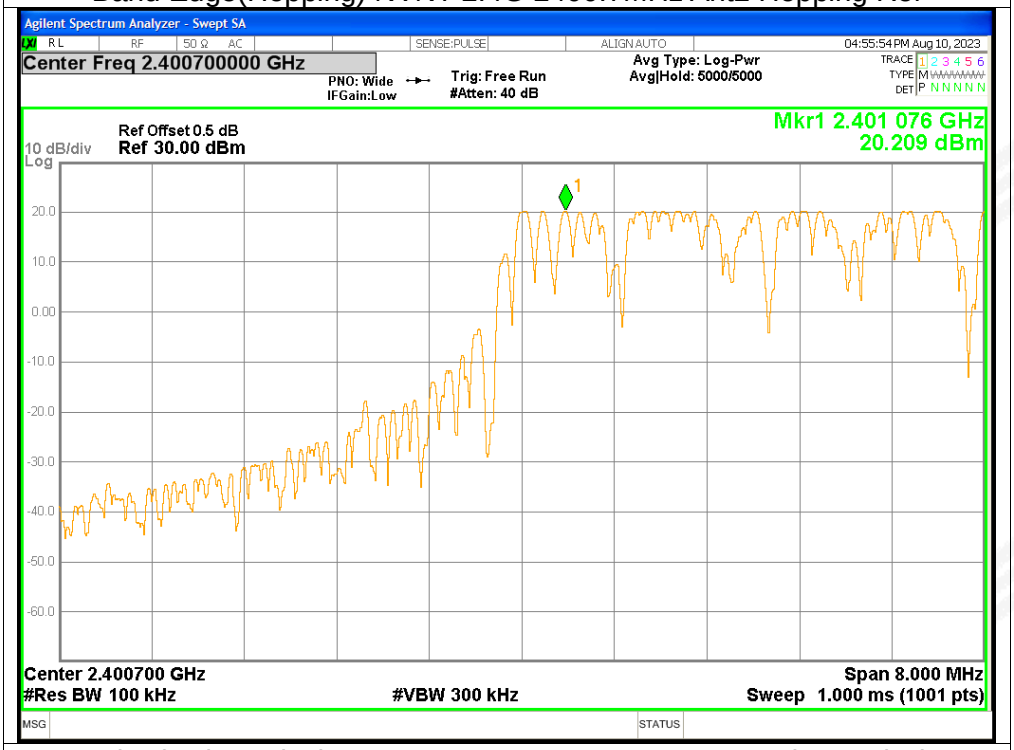
Band Edge(Hopping) NVNT 2.4G 2482.5MHz Ant1 Hopping Ref



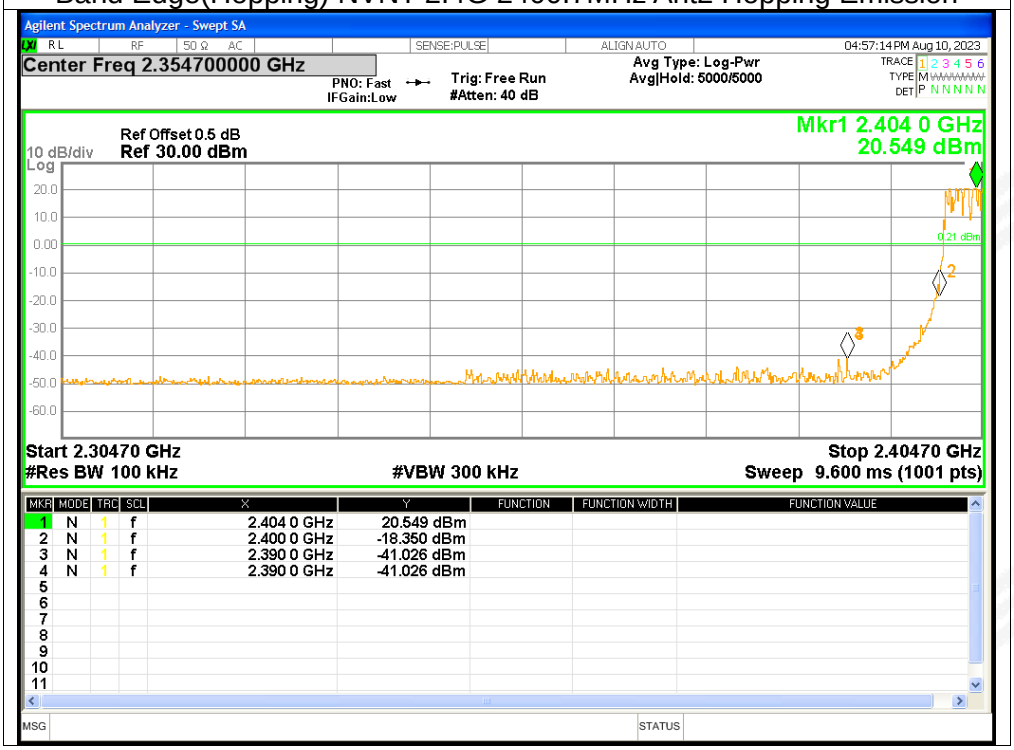
Band Edge(Hopping) NVNT 2.4G 2482.5MHz Ant1 Hopping Emission



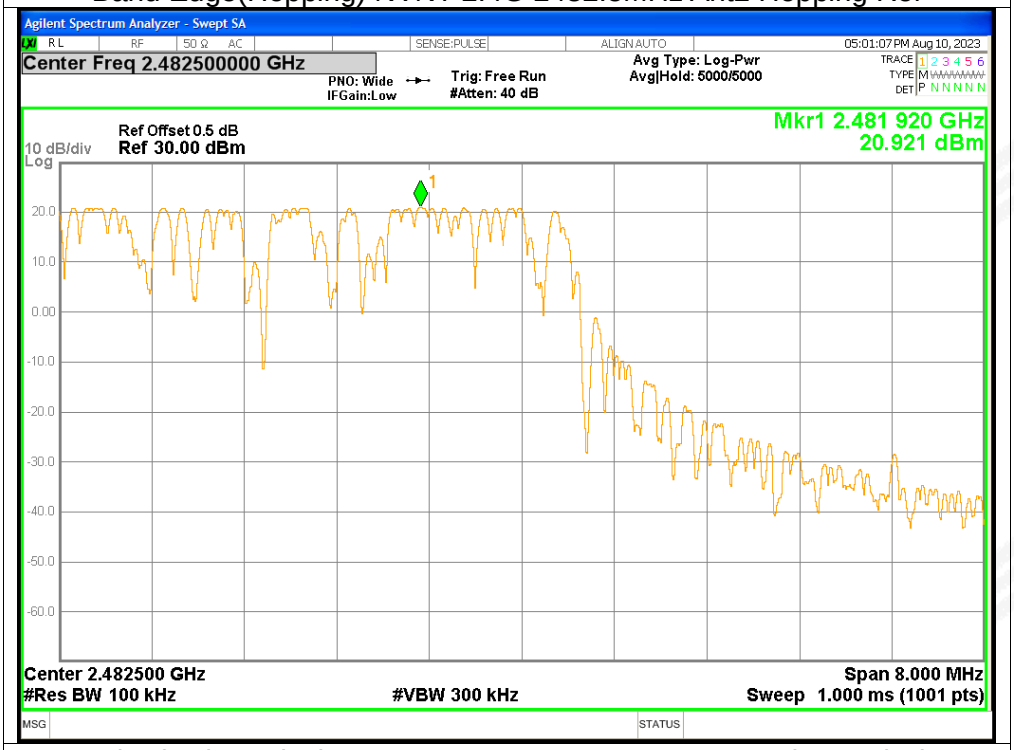
Band Edge(Hopping) NVNT 2.4G 2400.7MHz Ant2 Hopping Ref



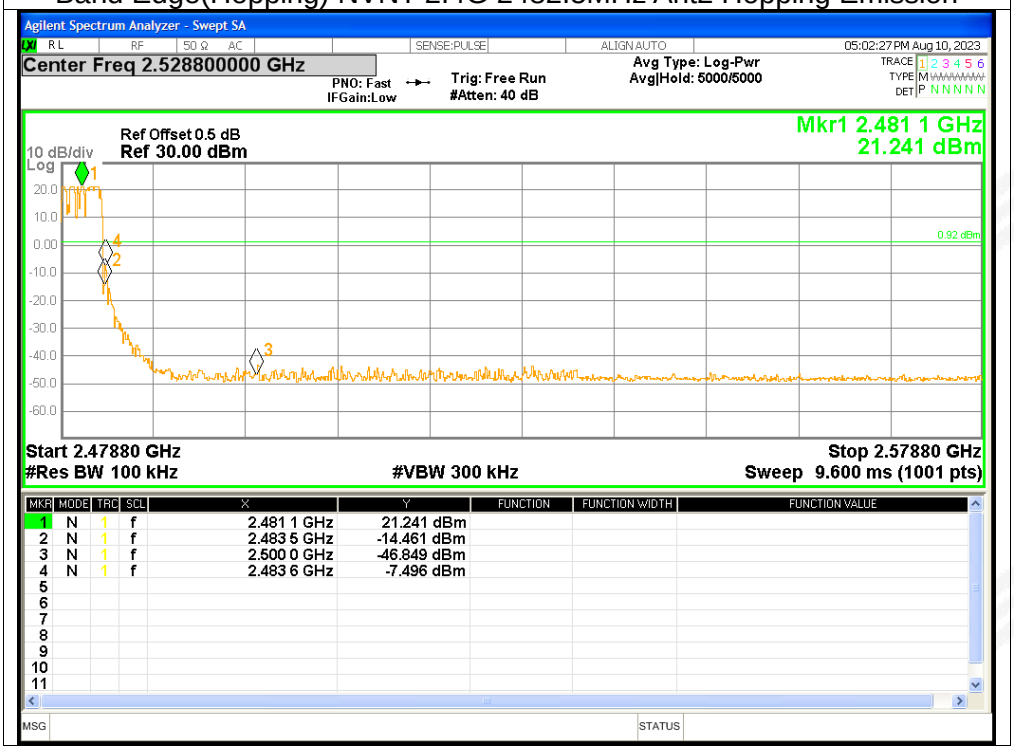
Band Edge(Hopping) NVNT 2.4G 2400.7MHz Ant2 Hopping Emission



Band Edge(Hopping) NVNT 2.4G 2482.5MHz Ant2 Hopping Ref



Band Edge(Hopping) NVNT 2.4G 2482.5MHz Ant2 Hopping Emission

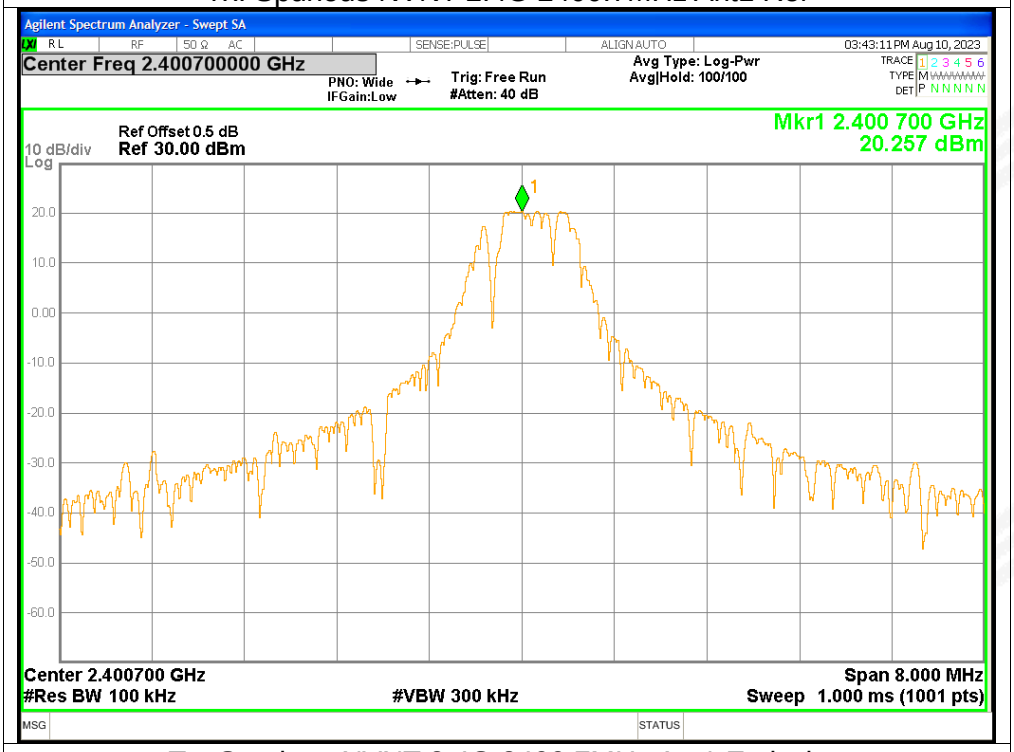


8. Conducted RF Spurious Emission

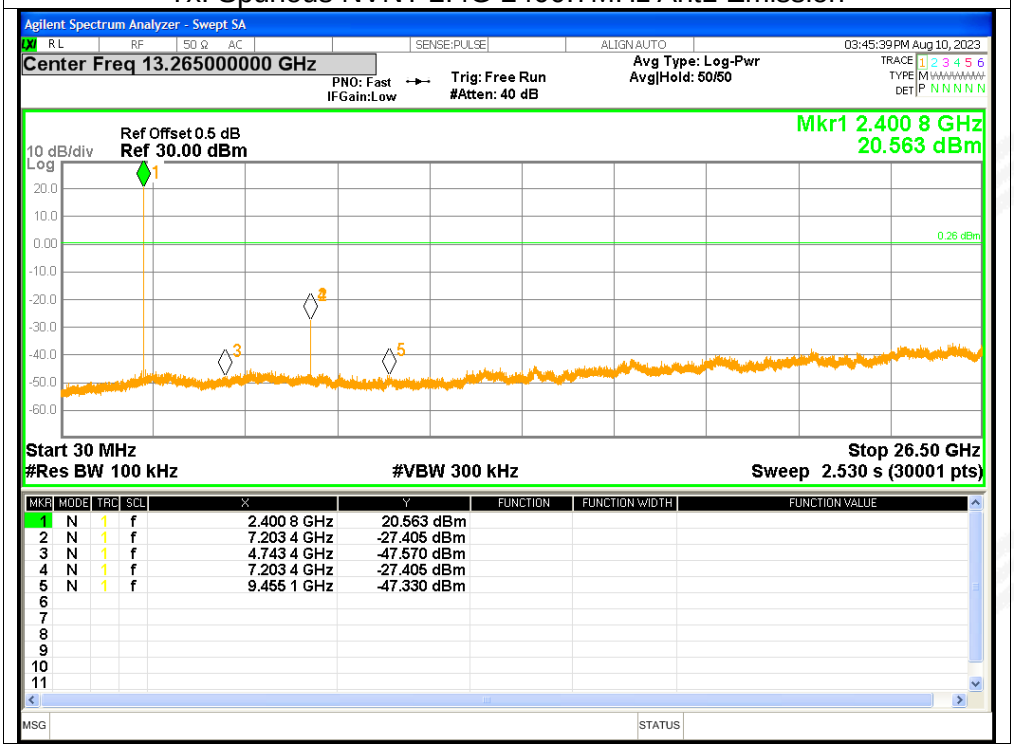
Condition	Mode	Frequency (MHz)	Antenna	Max Value (dBc)	Limit (dBc)	Verdict
NVNT	2.4G	2400.7	Ant1	-47.66	<=-20	Pass
NVNT	2.4G	2442	Ant1	-57.21	<=-20	Pass
NVNT	2.4G	2482.5	Ant1	-52.06	<=-20	Pass
NVNT	2.4G	2400.7	Ant2	-47.94	<=-20	Pass
NVNT	2.4G	2442	Ant2	-52.2	<=-20	Pass
NVNT	2.4G	2482.5	Ant2	-51.23	<=-20	Pass

Test Graphs

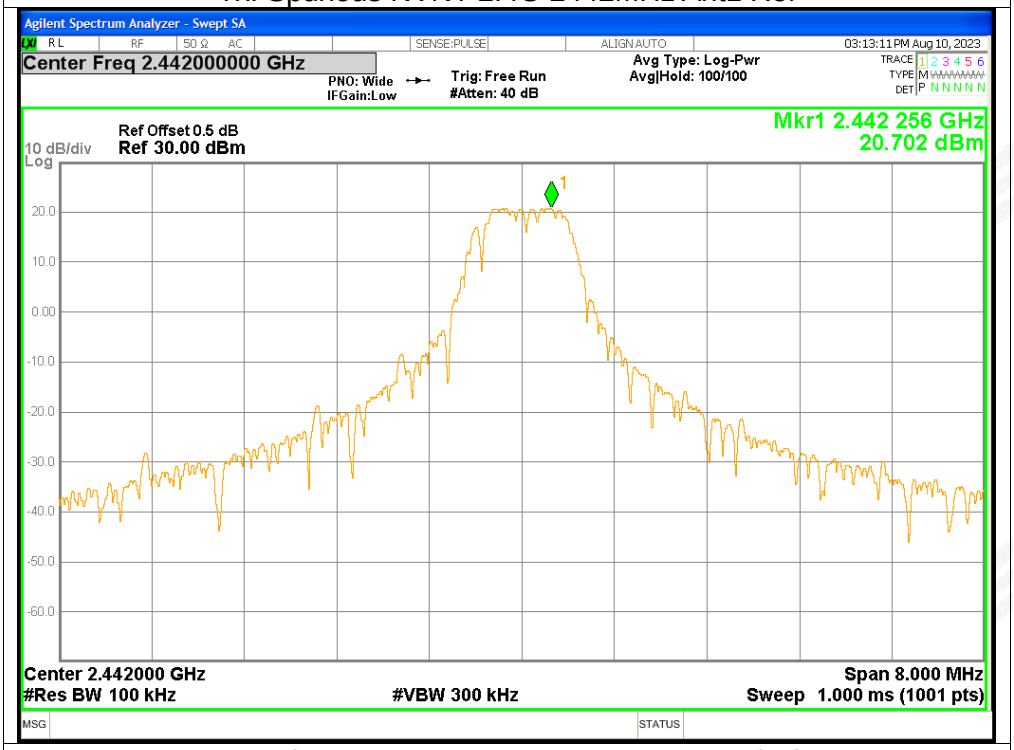
Tx. Spurious NVNT 2.4G 2400.7MHz Ant1 Ref



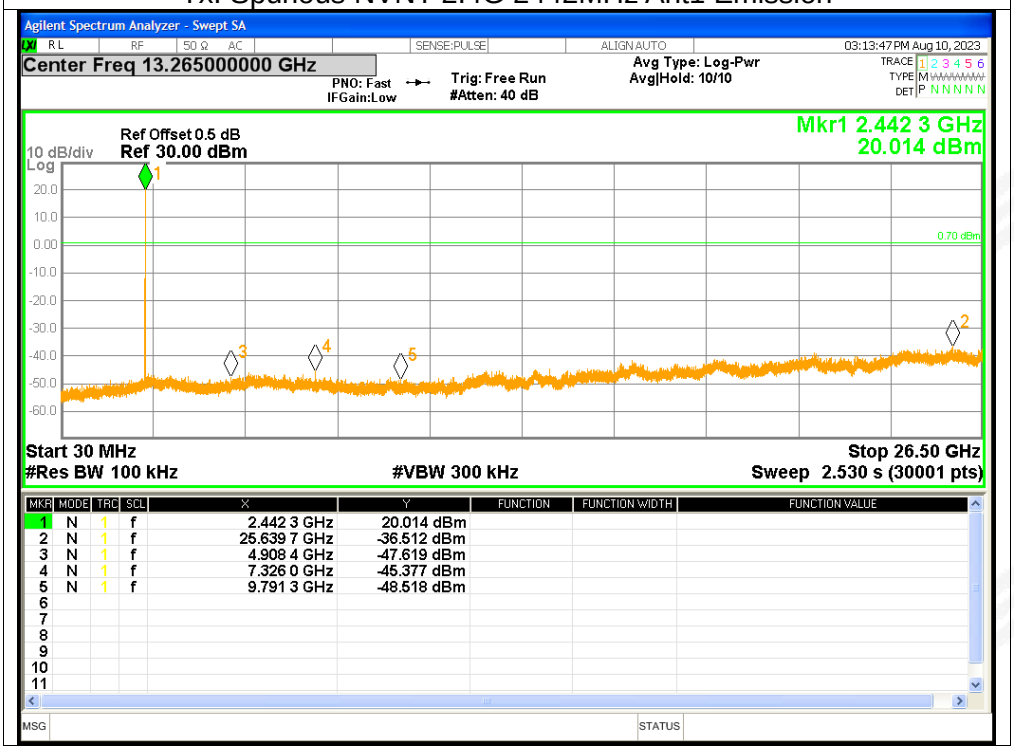
Tx. Spurious NVNT 2.4G 2400.7MHz Ant1 Emission



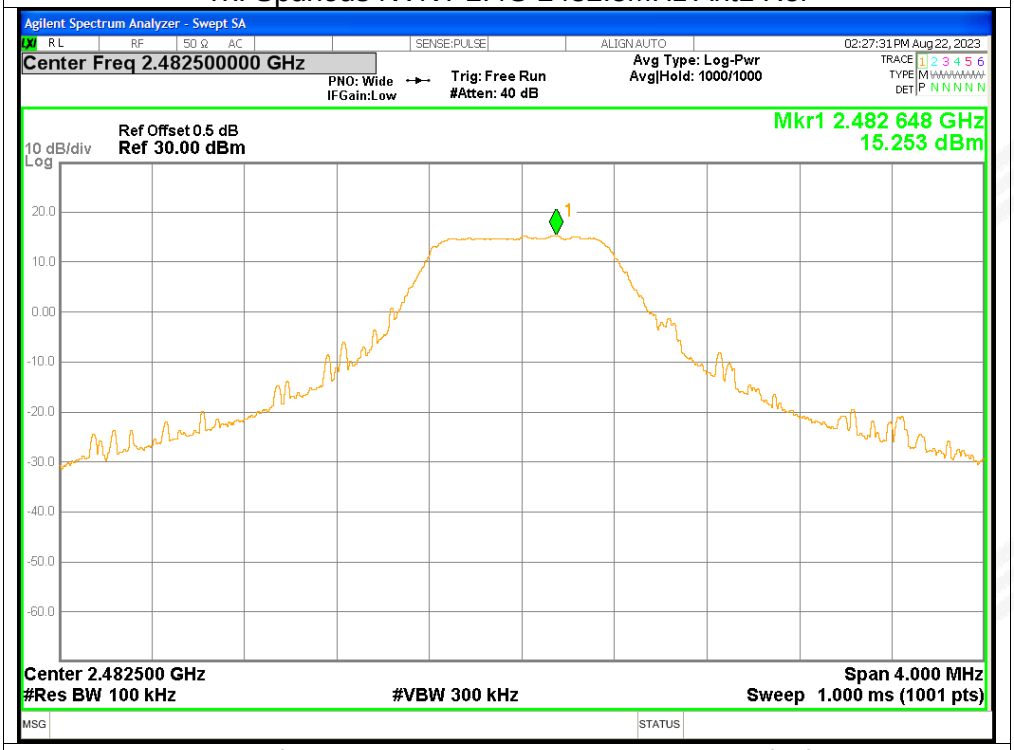
Tx. Spurious NVNT 2.4G 2442MHz Ant1 Ref



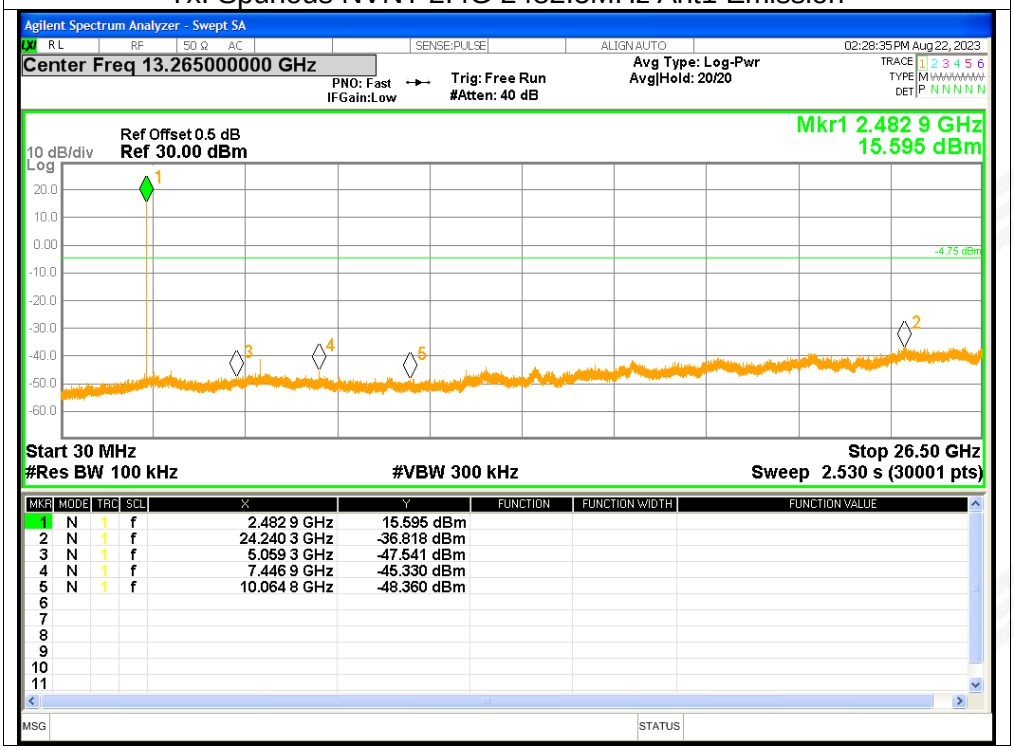
Tx. Spurious NVNT 2.4G 2442MHz Ant1 Emission



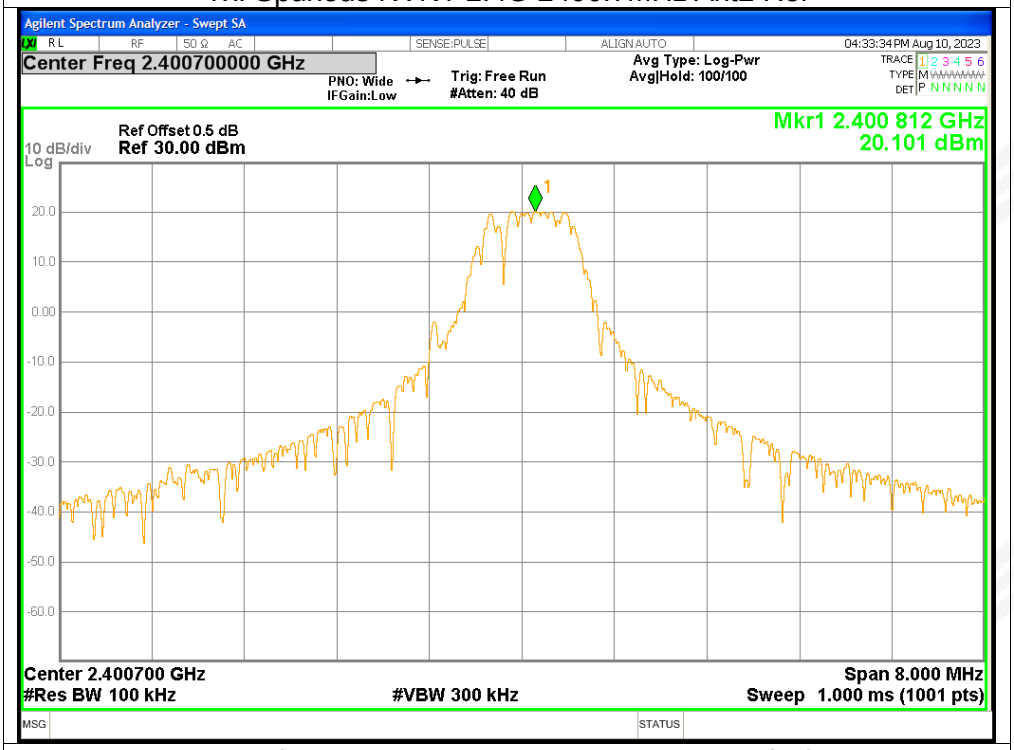
Tx. Spurious NVNT 2.4G 2482.5MHz Ant1 Ref



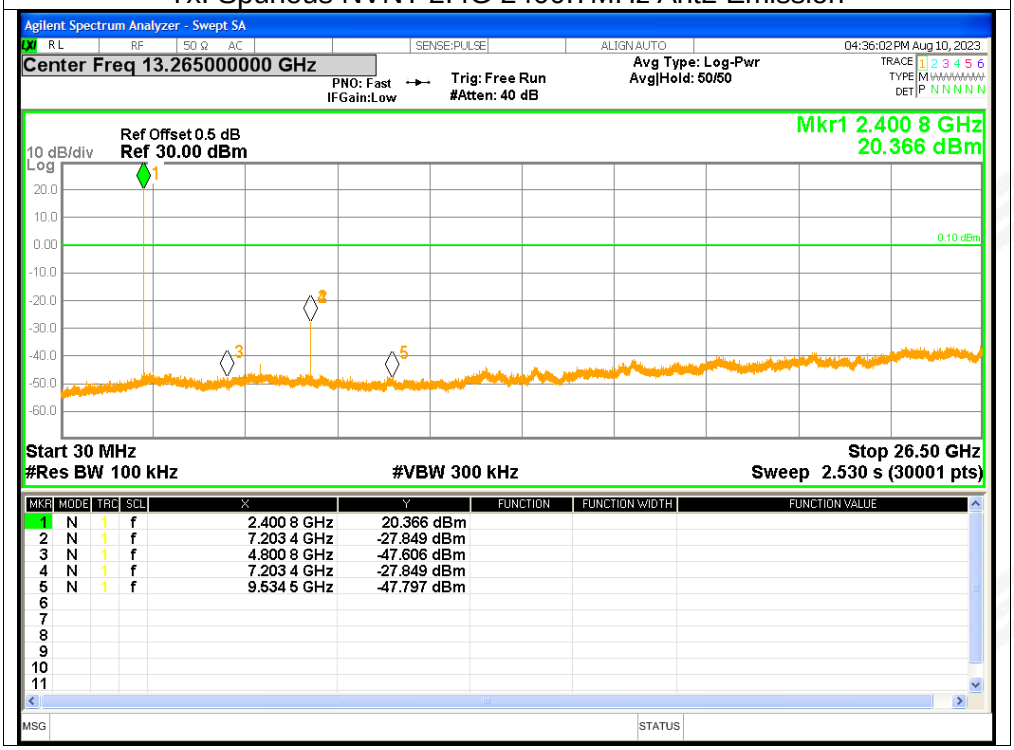
Tx. Spurious NVNT 2.4G 2482.5MHz Ant1 Emission



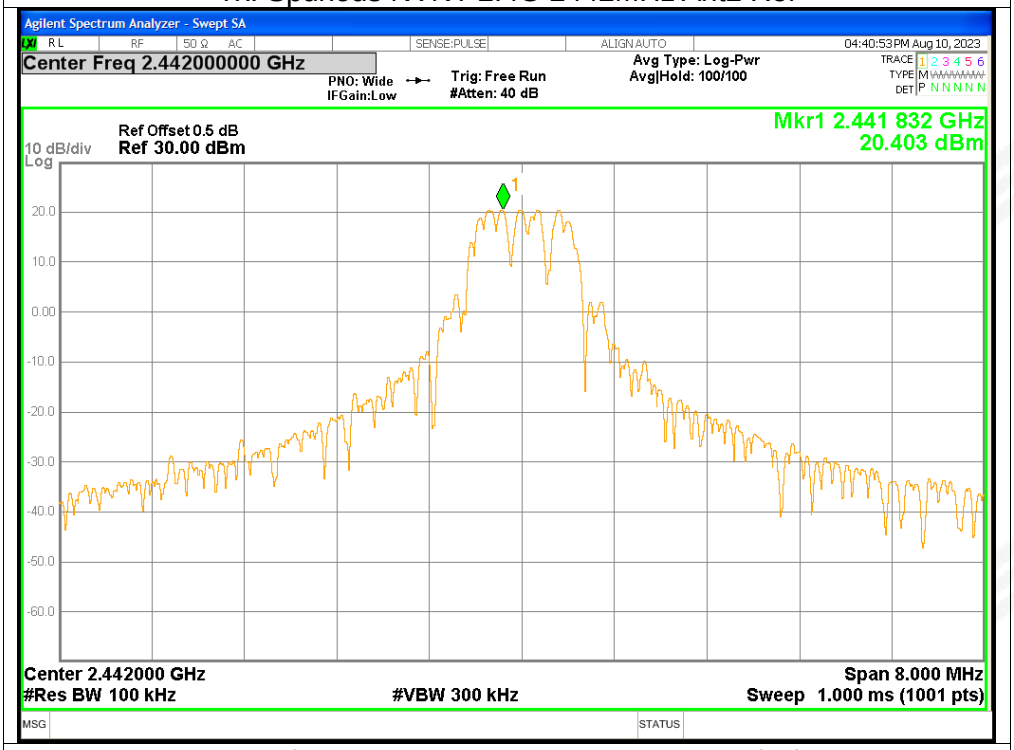
Tx. Spurious NVNT 2.4G 2400.7MHz Ant2 Ref



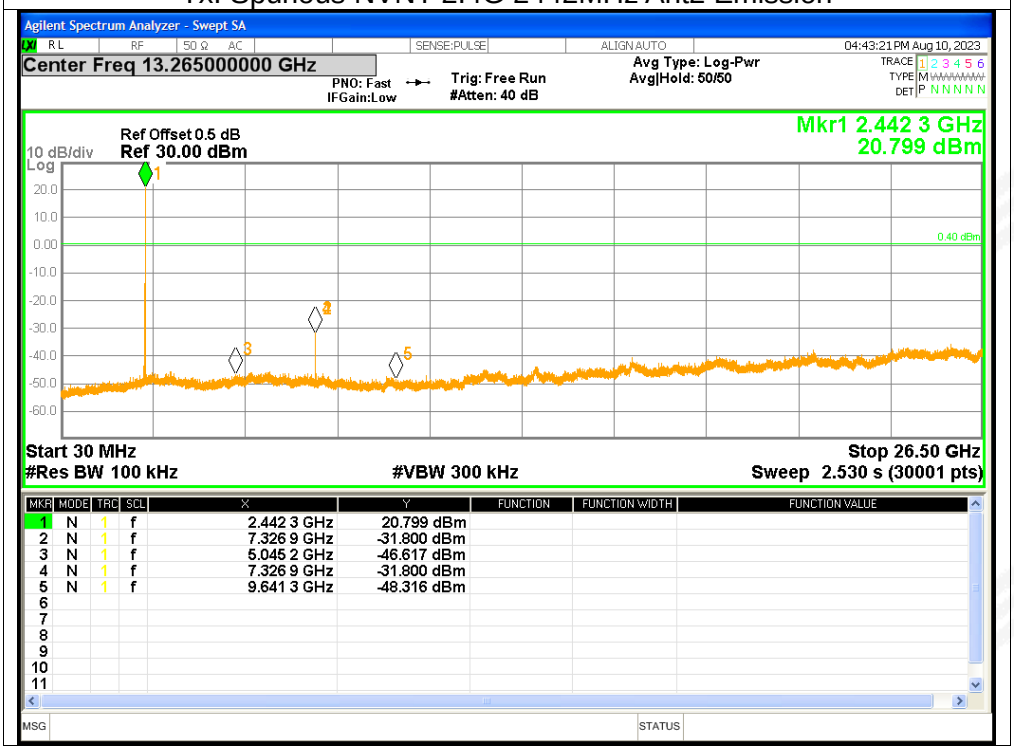
Tx. Spurious NVNT 2.4G 2400.7MHz Ant2 Emission



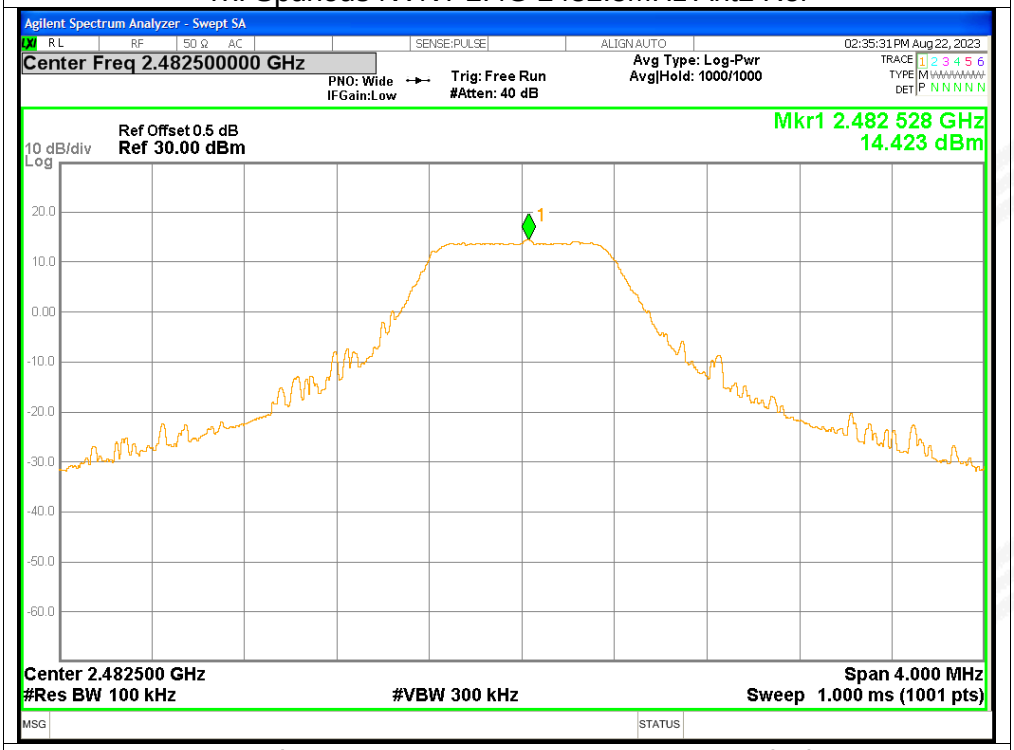
Tx. Spurious NVNT 2.4G 2442MHz Ant2 Ref



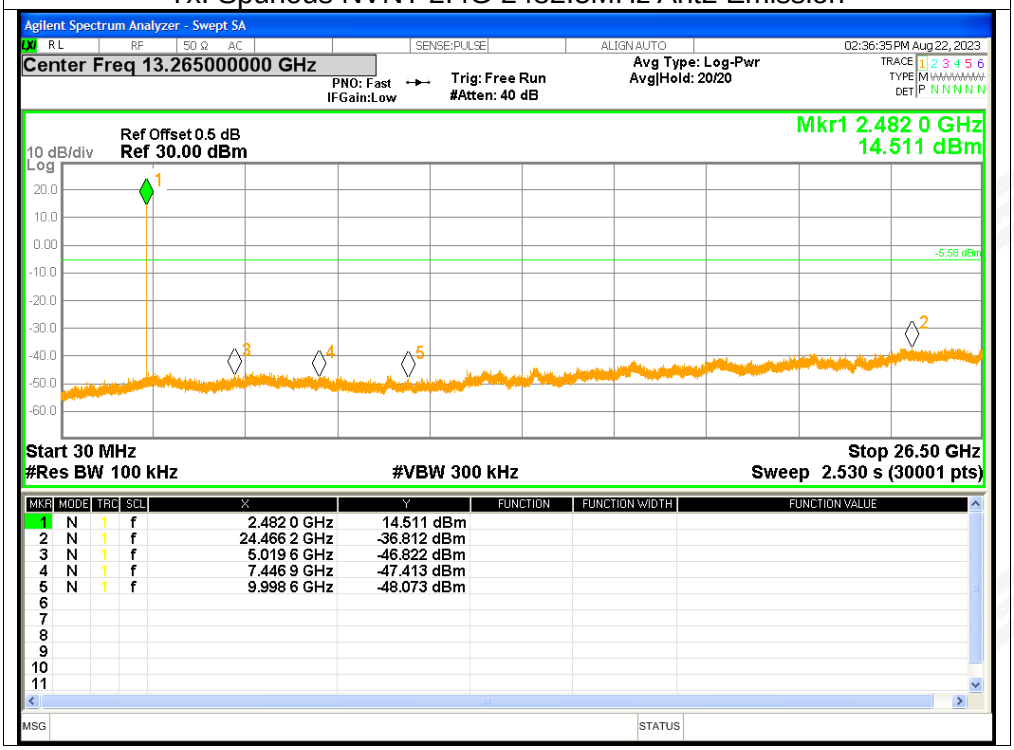
Tx. Spurious NVNT 2.4G 2442MHz Ant2 Emission



Tx. Spurious NVNT 2.4G 2482.5MHz Ant2 Ref



Tx. Spurious NVNT 2.4G 2482.5MHz Ant2 Emission



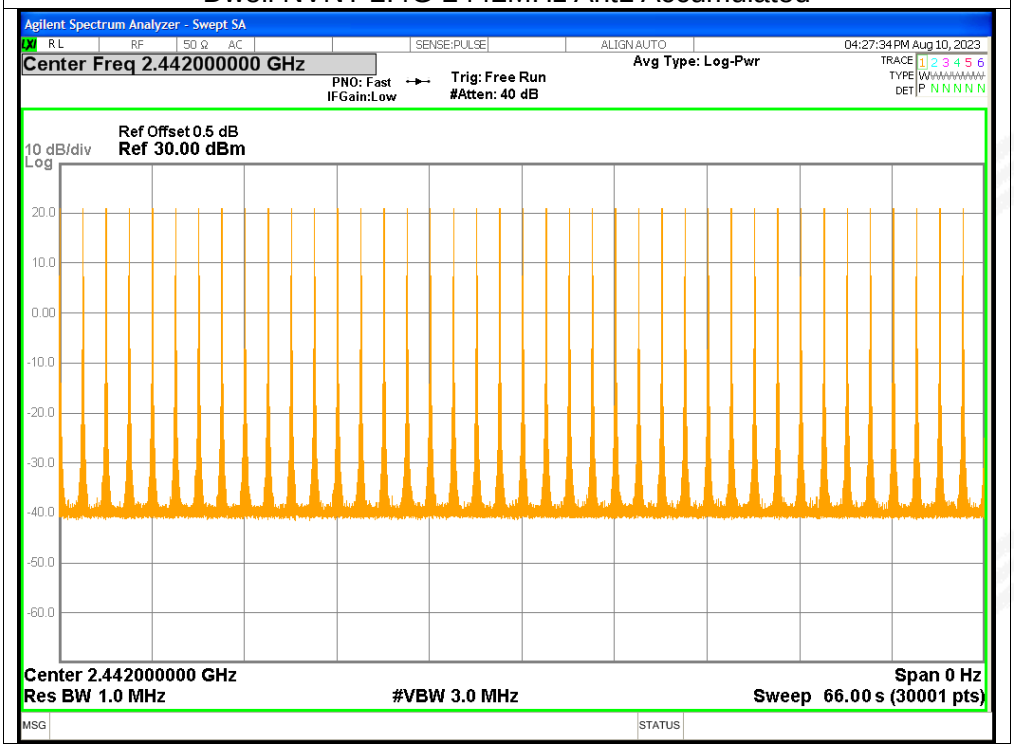
9. Dwell Time

Condition	Mode	Frequency (MHz)	Antenna	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	2.4G	2442	Ant1	2.481	198.48	80	66000	<=400	Pass
NVNT	2.4G	2442	Ant2	2.486	298.32	120	66000	<=400	Pass

Test Graphs

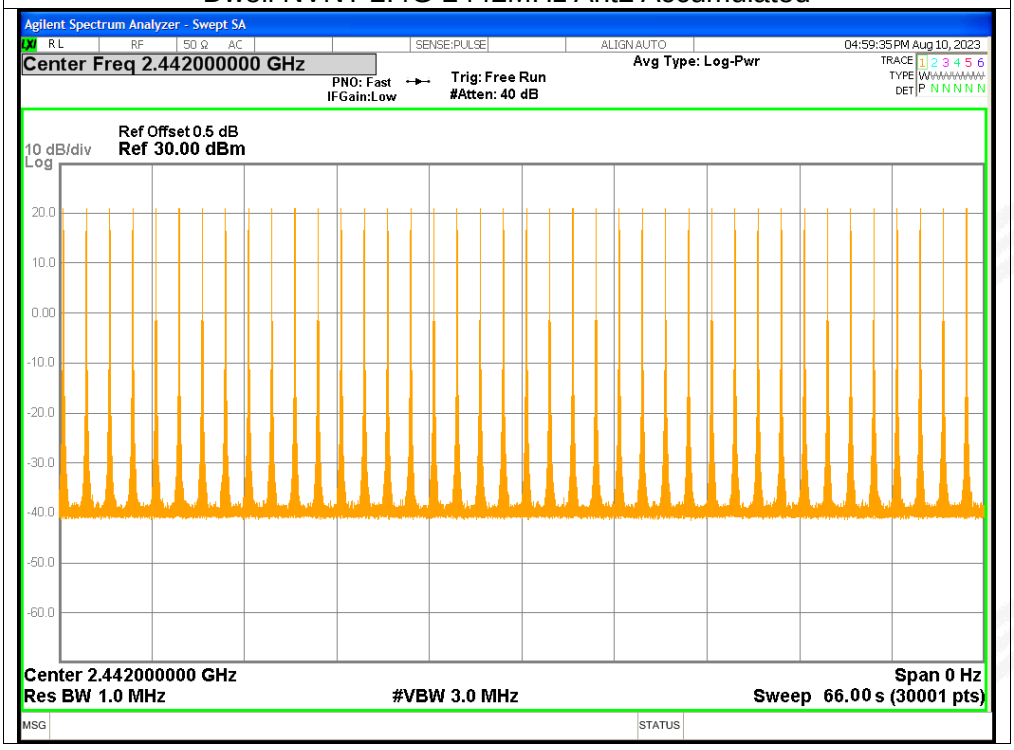
Dwell NVNT 2.4G 2442MHz Ant1 One Burst

Dwell NVNT 2.4G 2442MHz Ant1 Accumulated



Dwell NVNT 2.4G 2442MHz Ant2 One Burst

Dwell NVNT 2.4G 2442MHz Ant2 Accumulated



APPENDIX 2-PHOTOS OF TEST SETUP

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

※※※※※END OF THE REPORT※※※※※