FCC TEST REPORT

FCC ID: SY4-A02020

On Behalf of

Shanghai Huace Navigation Technology LTD.

Geodetic GNSS Receiver

Model No.: i73

Prepared for	:	Shanghai Huace Navigation Technology LTD.
Address	:	599 Gaojing Road, Building D, Shanghai 201702, China

Prepared By	:	Shenzhen Alpha Product Testing Co., Ltd.
Address	:	Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China

Report Number	:	A2007281-C02-R01
Date of Receipt	:	August 01, 2020
Date of Test	:	August 01, 2020 –August 10, 2020
Date of Report	:	August 10, 2020
Version Number	:	V0

TABLE OF CONTENTS

Description Page

TEST REPORT DECLARATION

Applicant	:	Shanghai Huace Navigation Technology LTD.
Address	:	599 Gaojing Road, Building D, Shanghai 201702, China
Manufacturer	:	Shanghai Huace Navigation Technology LTD.
Address	:	599 Gaojing Road, Building D, Shanghai 201702, China
EUT Description	:	Geodetic GNSS Receiver
	(A) Model No.	: i73
	(B) Trademark	: CHCNAV

Measurement Standard Used:

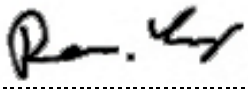
FCC Rules and Regulations Part 15 Subpart C Section 15.247

ANSI C63.10:2013

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits both conducted and radiated emissions. The test results are contained in this test report and Shenzhen Alpha Product Testing Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

After the test, our opinion is that EUT compliance with the requirement of the above standards.

This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Shenzhen Alpha Product Testing Co., Ltd.

Tested by (name + signature).....…..:	Reak Yang Project Engineer	
Approved by (name + signature)…....:	Simple Guan Project Manager	
Date of issue…… ……...:	August 10, 2020	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	August 10, 2020	Initial released Issue	Reak Yang

1. Summary Of Standards And Results

1.1.Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Test Item	Standards Paragraph	Result
Maximum Peak Output Power	FCC Part 15: 15.247(b)(1) ANSI C63.10 :2013	P
Bandwidth	FCC Part 15: 15.215 ANSI C63.10 :2013	P
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1) ANSI C63.10 :2013	P
Number Of Hopping Channel	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 :2013	P
Dwell Time	FCC Part 15: 15.247(a)(1)(iii) ANSI C63.10 :2013	P
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) ANSI C63.10 :2013	P
Band Edge Compliance	FCC Part 15: 15.247(d) ANSI C63.10 :2013	P
Power Line Conducted Emissions	FCC Part 15: 15.207 ANSI C63.10 :2013	P
Antenna requirement	FCC Part 15: 15.203	P
Note:	1. P is an abbreviation for Pass. 2. F is an abbreviation for Fail. 3. N/A is an abbreviation for Not Applicable.	

2. General Information

2.1.Description of Device (EUT)

Description	:	Geodetic GNSS Receiver
Trademark	:	CHCNAV
Model Number	:	i73
DIFF.	:	N/A
Test Voltage	:	DC 3.7V From Battery, DC 5V From Adapter, DC 5V From PC
BT		
Radio Technology	:	Bluetooth (BR+EDR)
Operation frequency	:	2402-2480MHz
Channel No.	:	79 Channels
Modulation type	:	GFSK, π/4 DQPSK, 8 - DPSK
Antenna Type	:	Internal antenna, Maximum Gain is 1dBi.
Software version	:	V1.0
Hardware version	:	i73_MAIN_V2.1

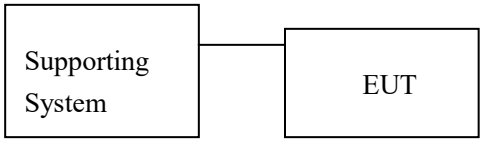
2.2.Accessories of Device (EUT)

Accessories1	:	AC/DC ADAPTER
Manufacturer	:	Shenzhen Jiuzhou Power Technology Co.,LTD.
Model	:	JZB110-050200WU
Ratings	:	Input: AC 100-240V, 50-60Hz, 0.35A Output: DC 5V/2A

2.3.Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDOC
1.	Notebook PC	DELL	Latitude 3490	--	SDOC

2.4.Block Diagram of connection between EUT and simulators



2.5.Test Mode Description

Tested mode, channel, and data rate information		
Mode	**Channel**	**Frequency (MHz)**
GFSK	Low :CH0	2402
	Middle: CH39	2441
	High: CH78	2480
π/4 DQPSK	Low :CH0	2402
	Middle: CH39	2441
	High: CH78	2480
8- DPSK	Low :CH0	2402
	Middle: CH39	2441
	High: CH78	2480

2.6.Test Conditions

Items	Required	Actual
Temperature range:	15-35℃	24℃
Humidity range:	25-75%	56%
Pressure range:	86-106kPa	98kPa

2.7.Test Facility

Shenzhen Alpha Product Testing Co., Ltd
Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103,
Shenzhen, Guangdong, China

June 21, 2018 File on Federal Communication Commission
Registration Number: 293961
Designation Number: CN1236
July 15, 2019 Certificated by IC
Registration Number: CN0085

2.8.Measurement Uncertainty

(95% confidence levels, k=2)

Item	**Uncertainty**
Uncertainty for Power point Conducted Emissions Test	2.74dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	2.13 dB(Polarize: V)
	2.57dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.77dB(Polarize: V)
	3.80dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	4.16dB(Polarize: H)
	4.13dB(Polarize: V)
Uncertainty for radio frequency	5.4×10-8
Uncertainty for conducted RF Power	0.37dB
Uncertainty for temperature	0.2℃
Uncertainty for humidity	1%
Uncertainty for DC and low frequency voltages	0.06%

2.9.Test Equipment List

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	CHENYU	9*6*6	N/A	2019.09.06	1Year
Spectrum analyzer	ROHDE&SCHWARZ	FSU	1166.1660.26	2019.09.06	1Year
Spectrum analyzer	Agilent	N9020A	MY499100060	2019.09.05	1Year
Receiver	ROHDE&SCHWARZ	ESR	1316.3003K03-102082-Wa	2019.09.06	1Year
Receiver	R&S	ESCI	101165	2019.09.05	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	VULB9168-438	2020.04.12	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2020.04.12	2Year
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00059	2019.09.07	2Year
Cable	Resenberger	N/A	No.1	2019.09.05	1Year
Cable	Resenberger	N/A	No.2	2019.09.05	1Year
Cable	Resenberger	N/A	No.3	2019.09.05	1Year
Pre-amplifier	HP	HP8347A	2834A00455	2019.09.05	1Year
Pre-amplifier	Agilent	8449B	3008A02664	2019.09.05	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2019.09.05	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2019.09.05	1 Year
20db Attenuator	ICPROBING	IATS1	82347	2019.09.20	1 Year
Horn Antenna	A-INFOMW	LB-180100-KF	J211020657	2019.09.20	2 Year
Preamplifier	SKET	LNPA_1840-50	SK2018101801	2019.09.05	1 Year
Power Meter	Agilent	E9300A	MY41496625	2019.09.06	1 Year
Temp. & Humid. Chamber	Weihuang	WHTH-1000-40-880	100631	2019.09.10	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	20140927-6	2019.09.10	1 Year

3. Maximum Peak Output Power

3.1.Limit

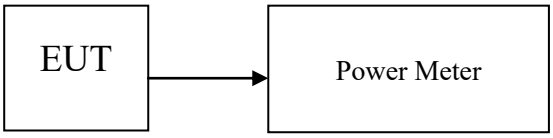
Please refer section15.247.

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts, the e.i.r.p shall not exceed 4W

3.2.Test Procedure

The transmitter output is connected to the RF Power Meter. The RF Power Meter is set to the average power detection.

3.3.Test Setup



3.4.Test Result

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Verdict
NVNT	1-DH1	2402	0.223	30	Pass
NVNT	1-DH1	2441	-1.008	30	Pass
NVNT	1-DH1	2480	0.667	30	Pass
NVNT	2-DH1	2402	0.041	21	Pass
NVNT	2-DH1	2441	-0.644	21	Pass
NVNT	2-DH1	2480	0.21	21	Pass
NVNT	3-DH1	2402	0.27	21	Pass
NVNT	3-DH1	2441	-1.135	21	Pass
NVNT	3-DH1	2480	0.244	21	Pass

4. Bandwidth

4.1.Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

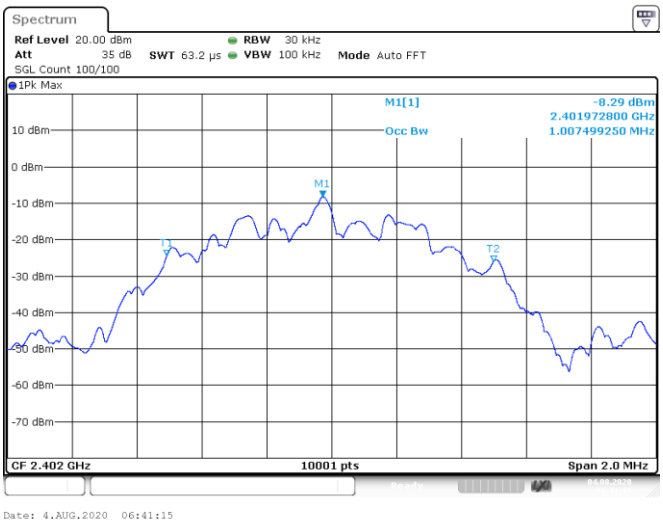
4.2.Test Procedure

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

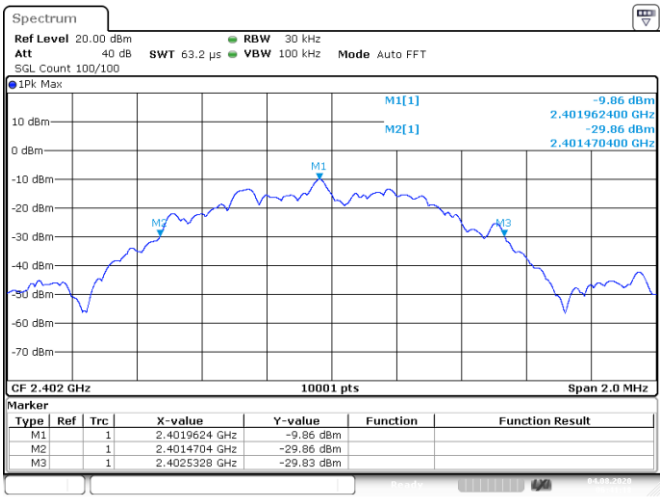
4.3.Test Result

Condition	Mode	Frequency (MHz)	99% OBW (MHz)	-20 dB Bandwidth (MHz)	Limit -20 dB Bandwidth (MHz)	Verdict
NVNT	1-DH1	2402	1.0075	1.0624	/	Pass
NVNT	1-DH1	2441	0.9943	1.0322	/	Pass
NVNT	1-DH1	2480	0.9947	1.0328	/	Pass
NVNT	2-DH1	2402	1.1439	1.2154	/	Pass
NVNT	2-DH1	2441	1.1787	1.1254	/	Pass
NVNT	2-DH1	2480	1.1697	1.2298	/	Pass
NVNT	3-DH1	2402	1.1083	1.1544	/	Pass
NVNT	3-DH1	2441	1.1781	1.2118	/	Pass
NVNT	3-DH1	2480	1.0983	1.1668	/	Pass

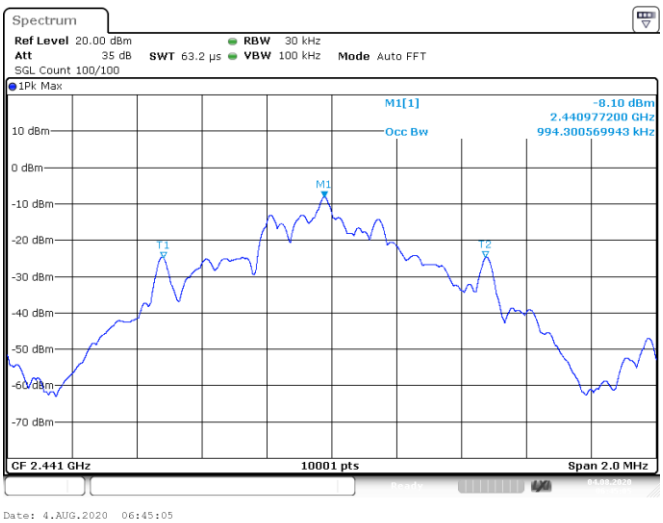
OBW NVNT 1-DH1 2402MHz Ant1



-20 dB BW NVNT 1-DH1 2402MHz Ant1



OBW NVNT 1-DH1 2441MHz Ant1



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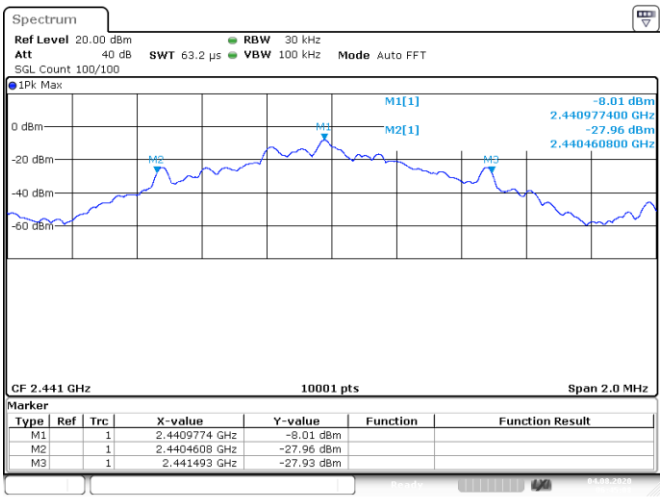
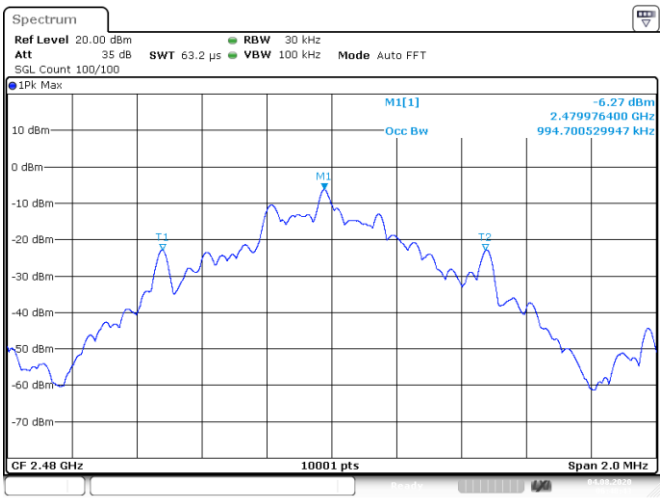
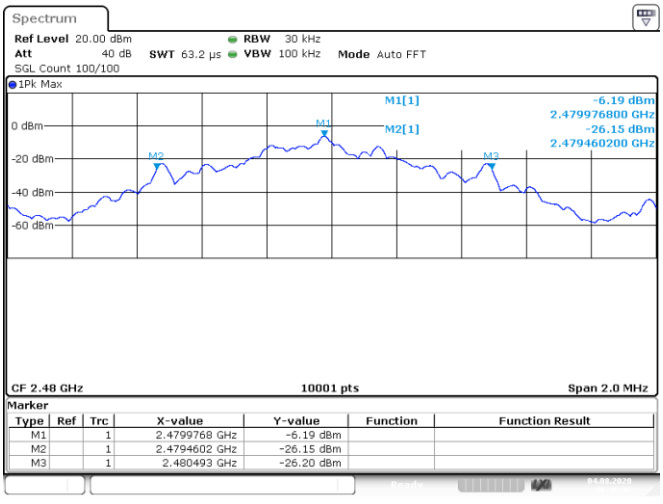


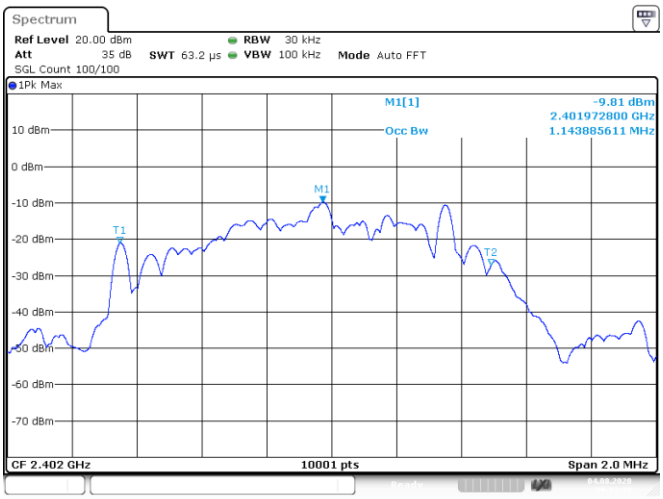
OBW NVNT 1-DH1 2480MHz Ant1



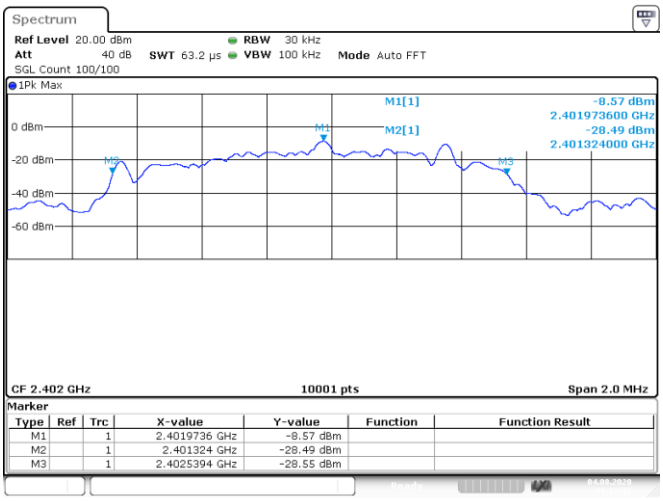
-20 dB BW NVNT 1-DH1 2480MHz Ant1



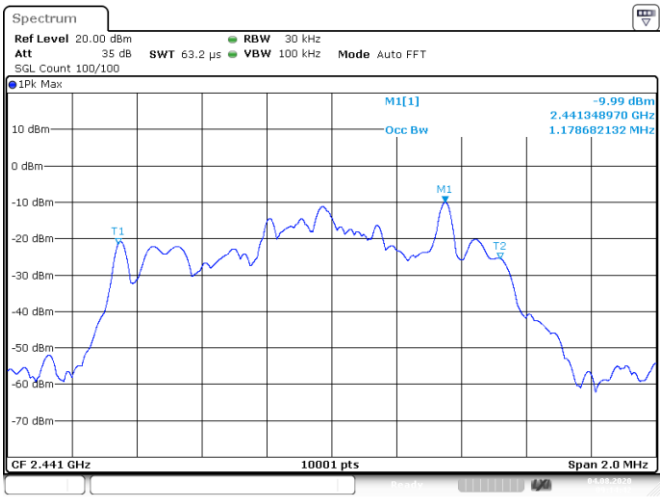
OBW NVNT 2-DH1 2402MHz Ant1



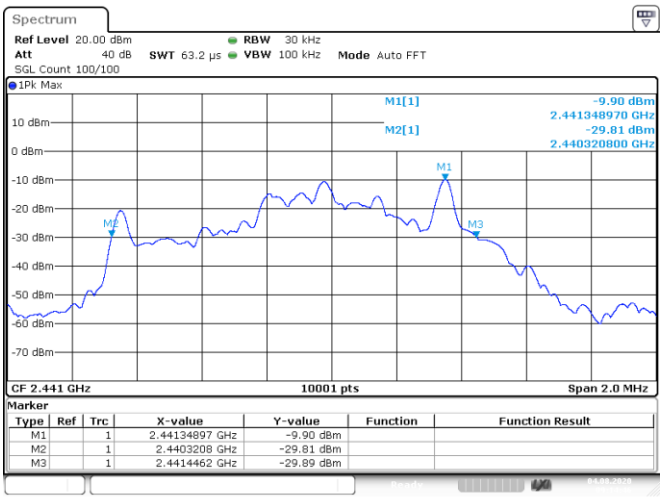
-20 dB BW NVNT 2-DH1 2402MHz Ant1



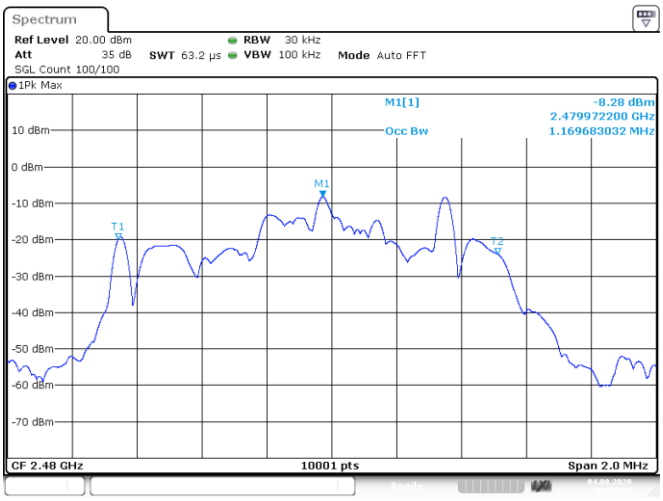
OBW NVNT 2-DH1 2441MHz Ant1



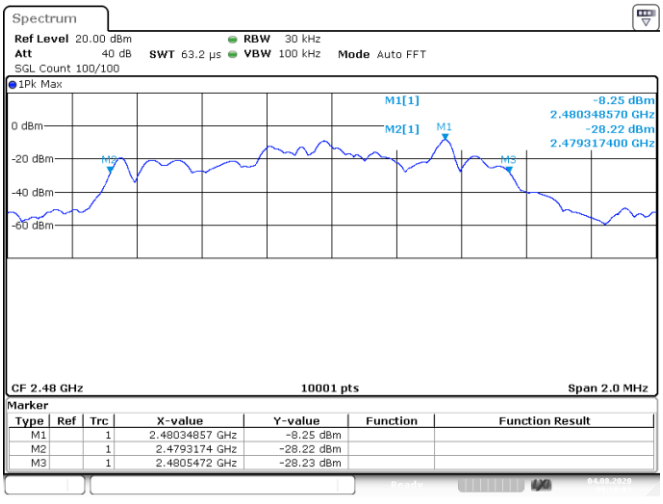
-20 dB BW NVNT 2-DH1 2441MHz Ant1



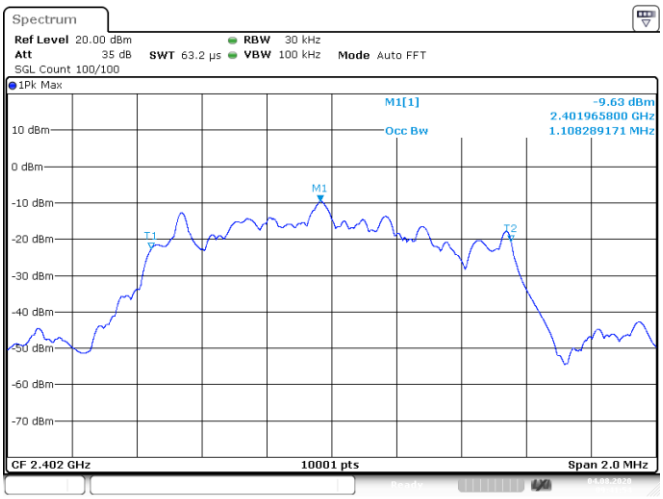
OBW NVNT 2-DH1 2480MHz Ant1



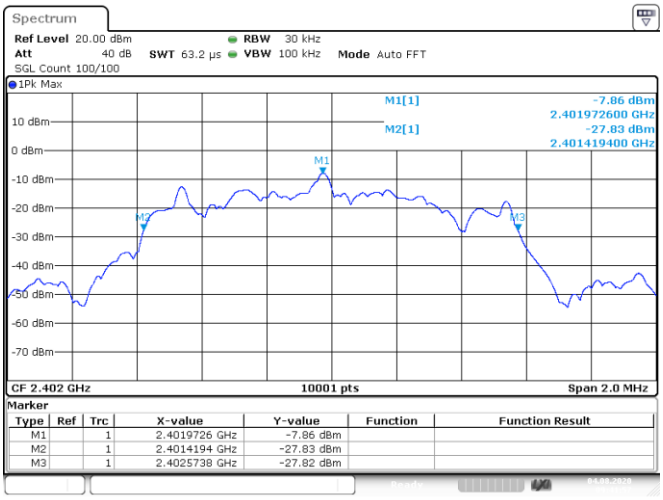
-20 dB BW NVNT 2-DH1 2480MHz Ant1



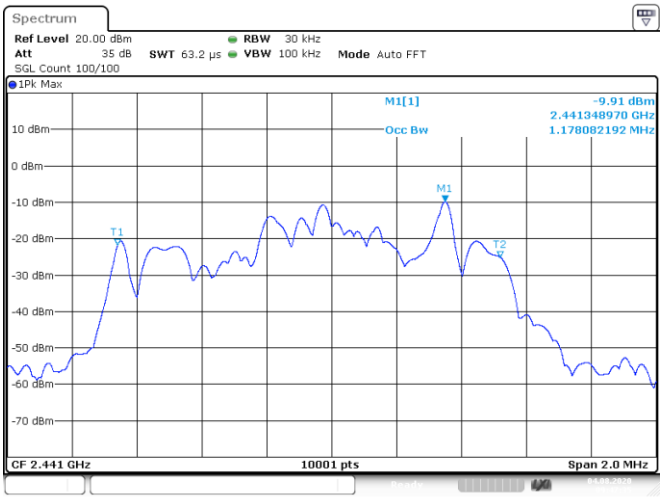
OBW NVNT 3-DH1 2402MHz Ant1



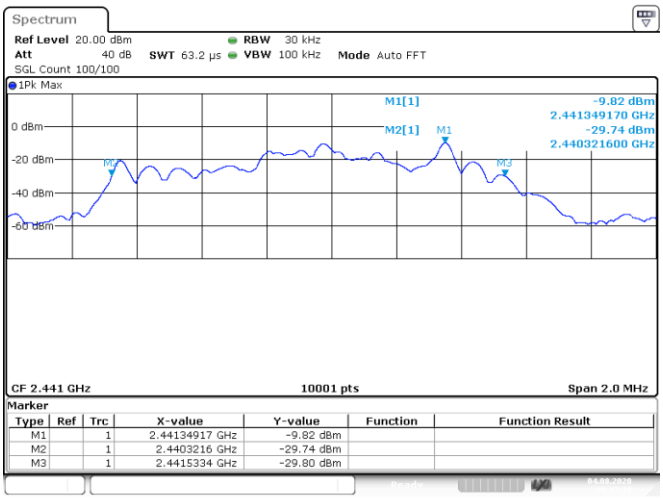
-20 dB BW NVNT 3-DH1 2402MHz Ant1



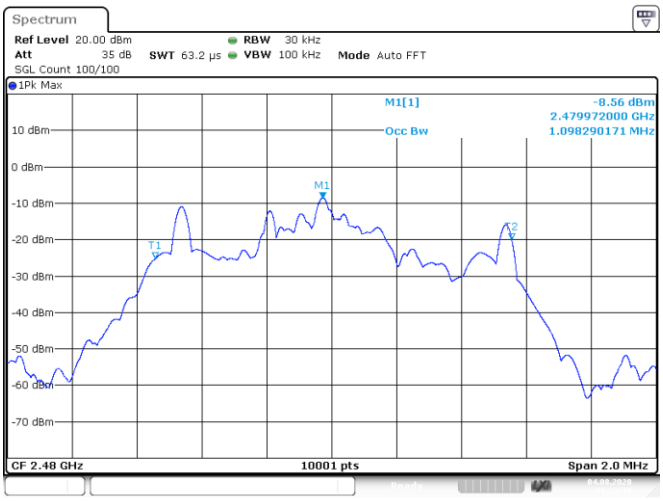
OBW NVNT 3-DH1 2441MHz Ant1



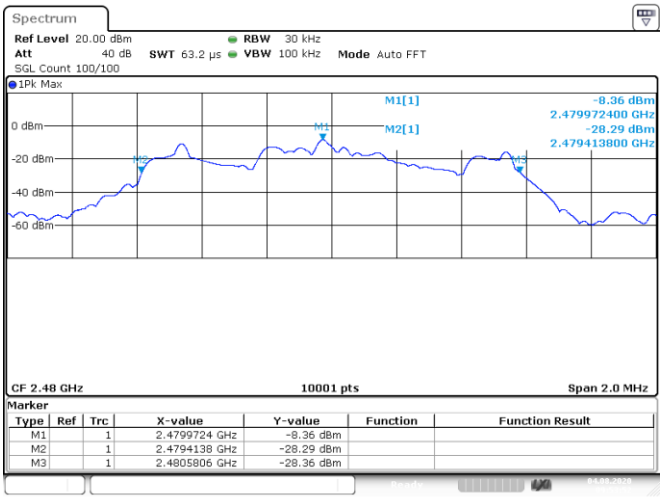
-20 dB BW NVNT 3-DH1 2441MHz Ant1



OBW NVNT 3-DH1 2480MHz Ant1



-20 dB BW NVNT 3-DH1 2480MHz Ant1



5. Carrier Frequency Separation

5.1.Limit

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

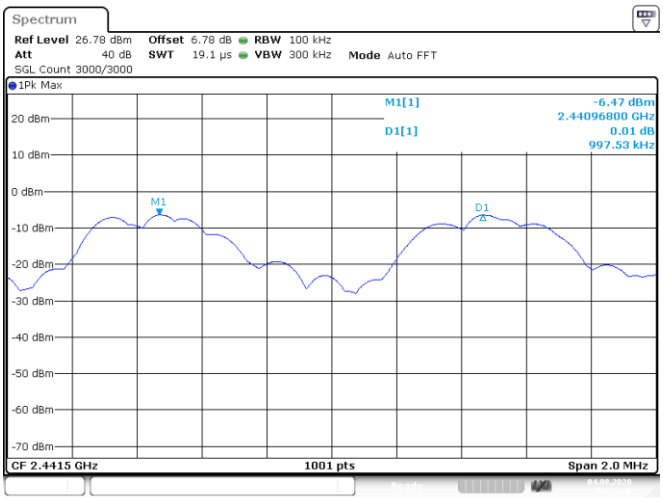
5.2.Test Procedure

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The carrier frequency was measured by spectrum analyzer with 20kHz RBW and 62kHz VBW.

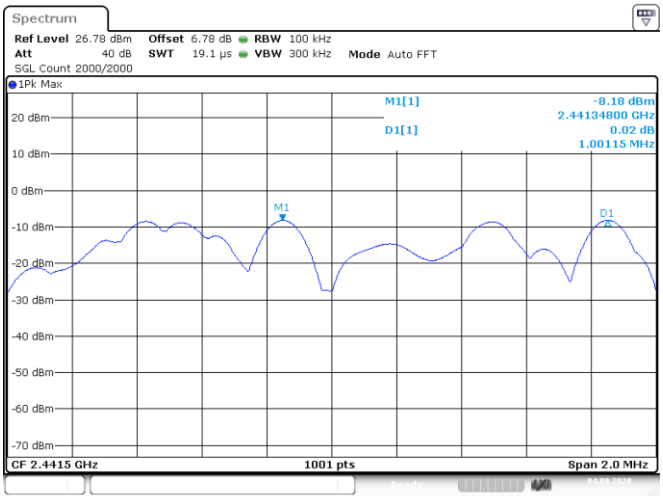
5.3.Test Result

Condition	Mode	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH1	2440.968	2441.964	0.996	0.689	Pass
NVNT	2-DH1	2441.348	2442.348	1	0.689	Pass
NVNT	3-DH1	2440.92	2441.976	1.056	0.82	Pass

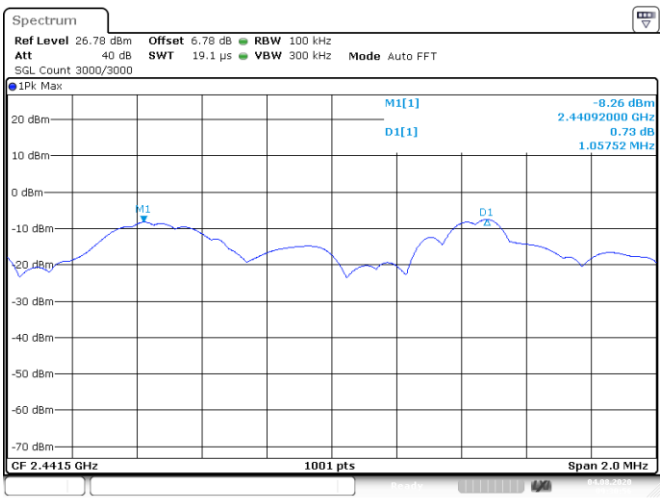
CFS NVNT 1-DH1 2441MHz



CFS NVNT 2-DH1 2441MHz



CFS NVNT 3-DH1 2441MHz



6. Number Of Hopping Channel

6.1.Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels

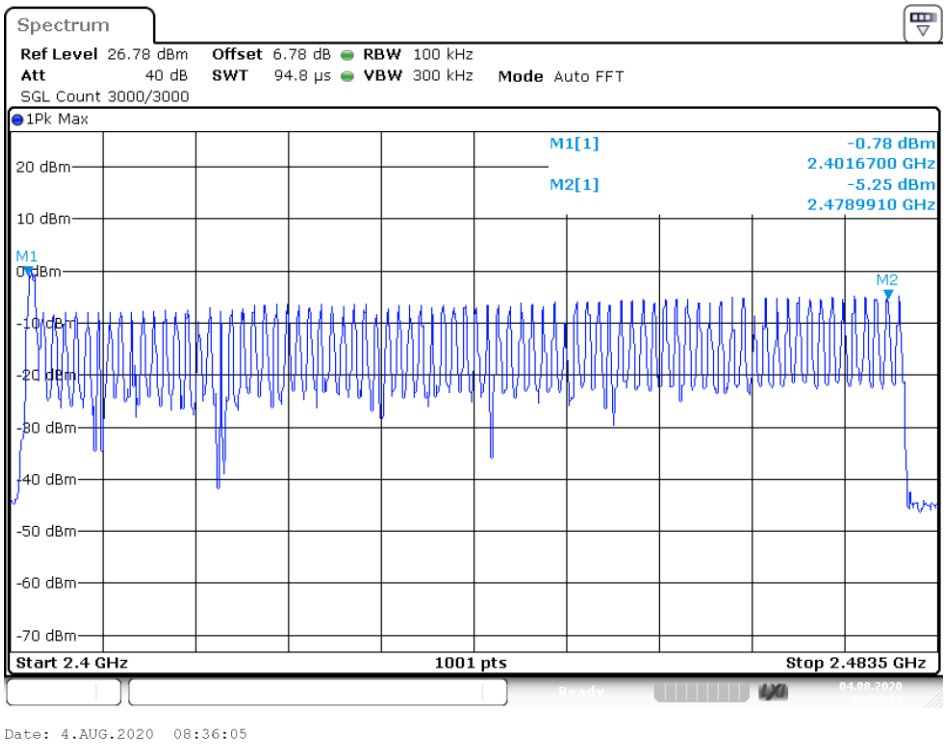
6.2.Test Procedure

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The number of hopping channel was measured by spectrum analyzer with 100kHz RBW and 300KHz VBW.

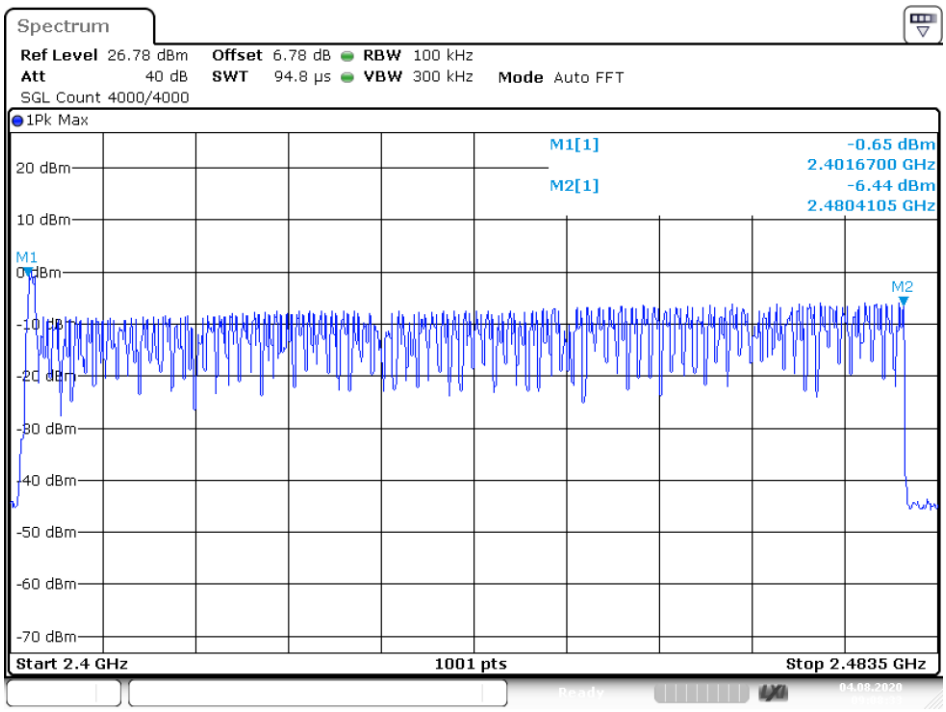
6.3.Test Result

Condition	Mode	Hopping Number	Limit	Verdict
NVNT	1-DH1	79	15	Pass
NVNT	2-DH1	79	15	Pass
NVNT	3-DH1	79	15	Pass

Hopping No. NVNT 1-DH1 2441MHz



Hopping No. NVNT 2-DH1 2441MHz



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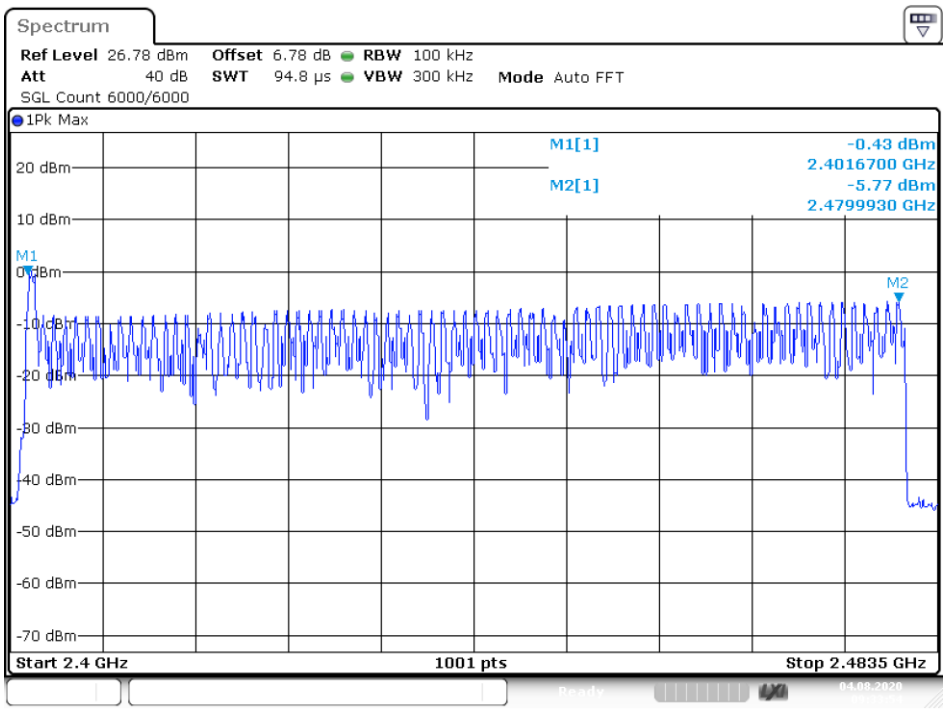
Hopping No. NVNT 3-DH1 2441MHz



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7. Dwell Time

7.1.Test limit

Please refer section15.247

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 sec- onds multiplied by the number of hopping channel employed.

7.2.Test Procedure

7.2.1. Place the EUT on the table and set it in transmitting mode.

7.2.2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

7.2.3. Set center frequency of spectrum analyzer = operating frequency.

7.2.4. Set the spectrum analyzer as RBW=1MHz, VBW=1MHz, Span = 0Hz, Sweep = auto.

7.2.5. Repeat above procedures until all frequency measured were complete.

7.3.Test Result

PASS.

Condition	Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Period Time (ms)	Limit (ms)	Verdict
NVNT	1-DH1	2441	0.403	128.96	31600	400	Pass
NVNT	1-DH3	2441	1.658	265.28	31600	400	Pass
NVNT	1-DH5	2441	2.906	309.97	31600	400	Pass
NVNT	2-DH1	2441	0.408	130.56	31600	400	Pass
NVNT	2-DH3	2441	1.66	265.60	31600	400	Pass
NVNT	2-DH5	2441	2.908	310.19	31600	400	Pass
NVNT	3-DH1	2441	0.186	59.52	31600	400	Pass
NVNT	3-DH3	2441	1.658	265.28	31600	400	Pass
NVNT	3-DH5	2441	2.91	310.40	31600	400	Pass

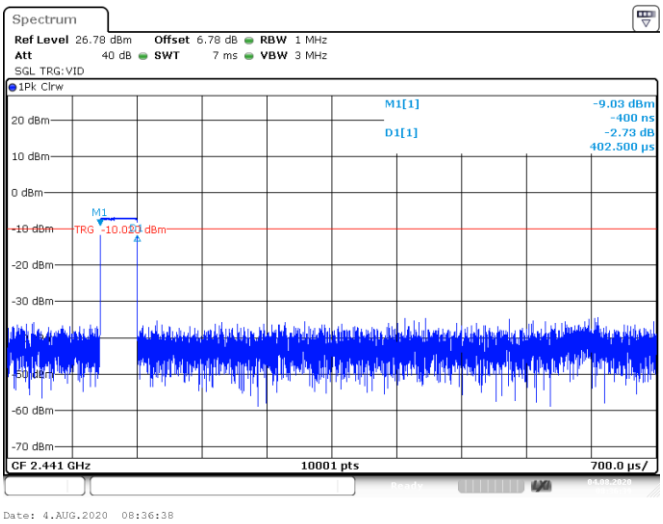
Note:

Dwell time=Pulse time (ms) × (1600 ÷ 2 ÷ 79) ×31.6 Second for DH1, 2-DH1, 3-DH1

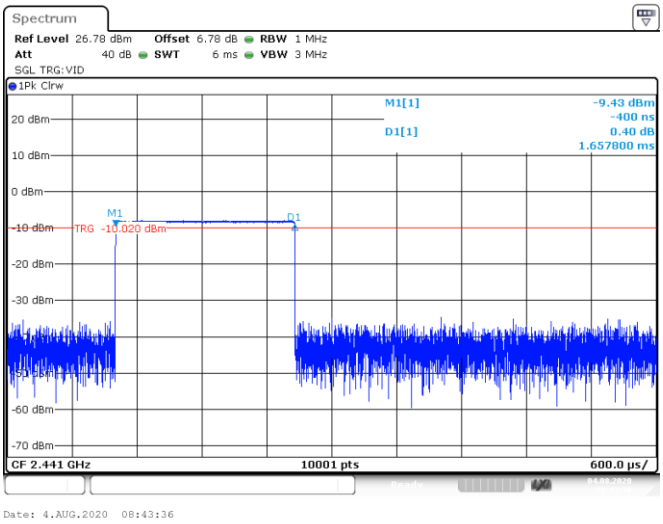
Dwell time=Pulse time (ms) × (1600 ÷ 4 ÷ 79) ×31.6 Second for DH3, 2-DH3, 3-DH3

Dwell time=Pulse time (ms) × (1600 ÷ 6 ÷ 79) ×31.6 Second for DH5, 2-DH5, 3-DH5

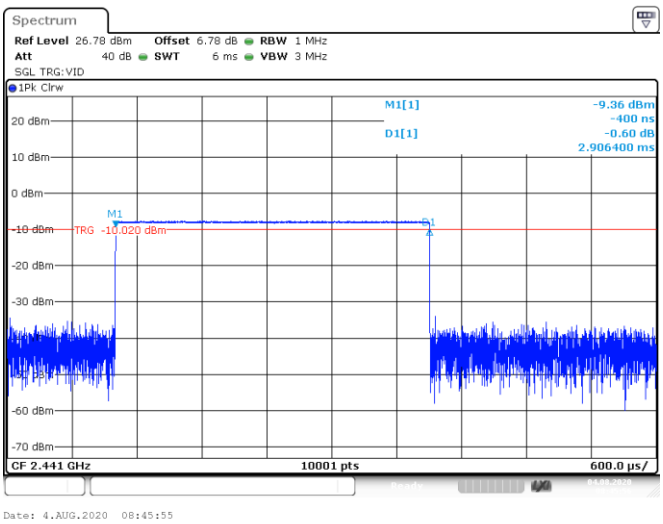
Dwell NVNT 1-DH1 2441MHz



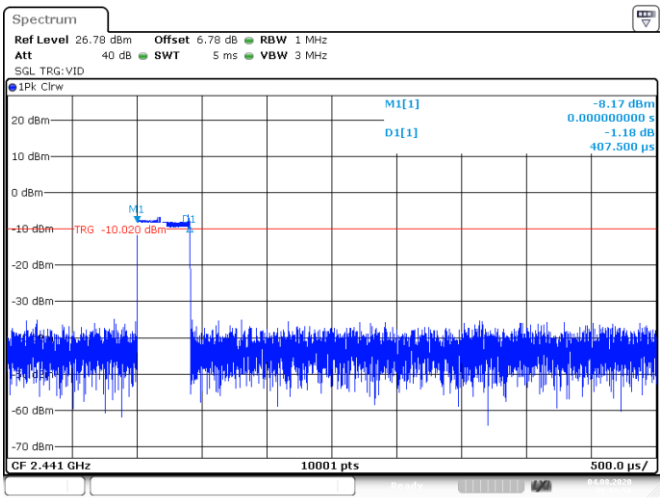
Dwell NVNT 1-DH3 2441MHz



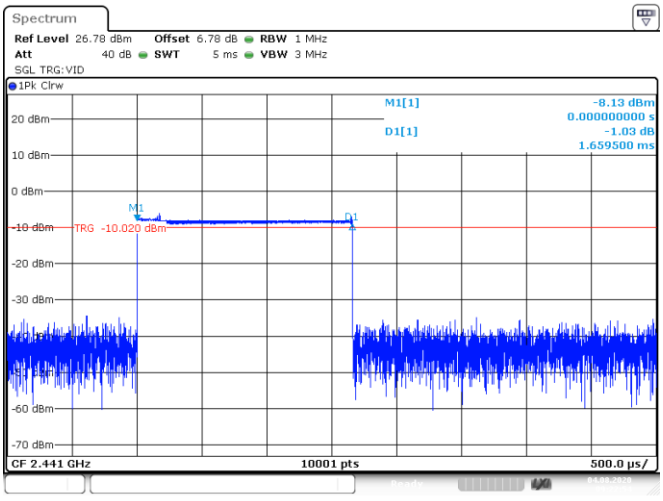
Dwell NVNT 1-DH5 2441MHz



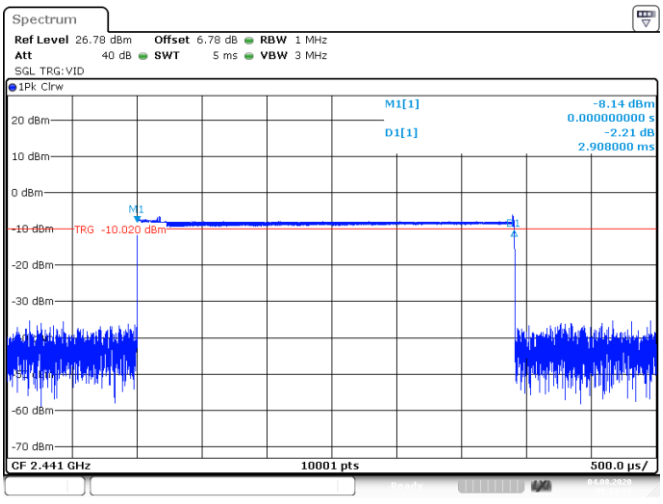
Dwell NVNT 2-DH1 2441MHz



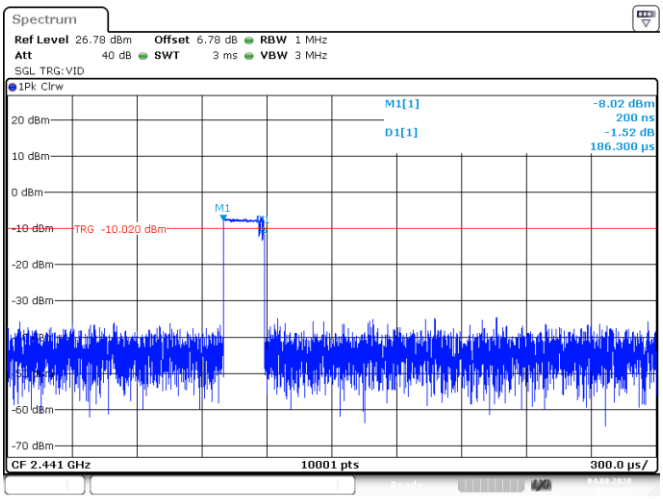
Dwell NVNT 2-DH3 2441MHz



Dwell NVNT 2-DH5 2441MHz

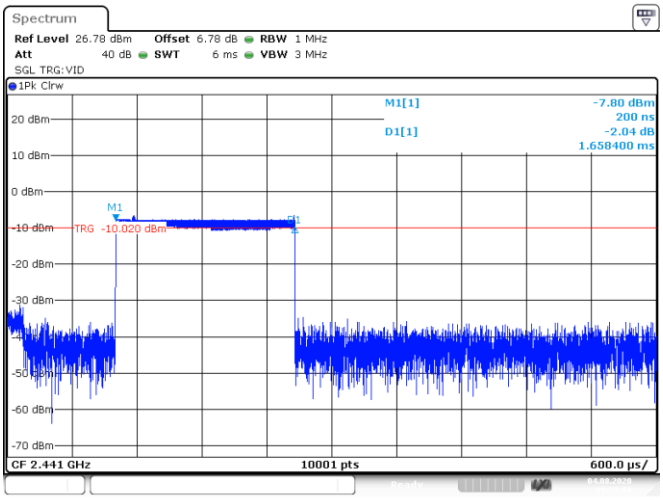


Dwell NVNT 3-DH1 2441MHz



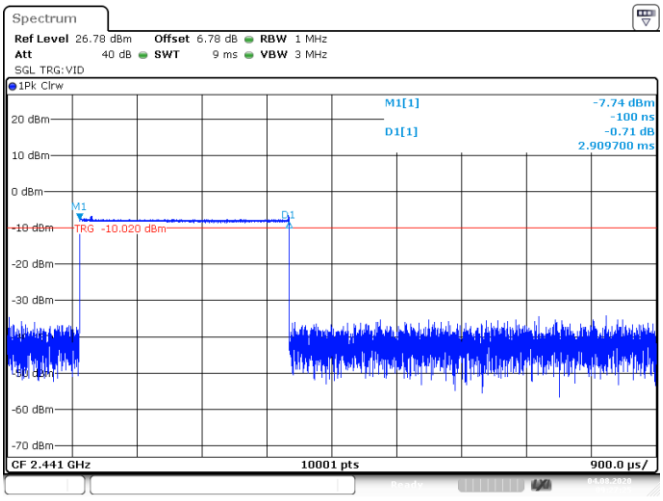
Date: 4.AUG.2020 09:34:28

Dwell NVNT 3-DH3 2441MHz



Date: 4.AUG.2020 09:27:00

Dwell NVNT 3-DH5 2441MHz



Date: 4.AUG.2020 09:27:25

8. Radiated emissions

8.1.Limit

All the emissions appearing within 15.205 restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

15.205 Restricted frequency band

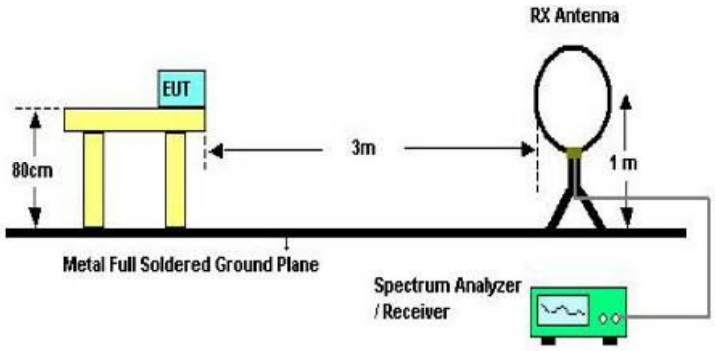
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])

15.209 Limit

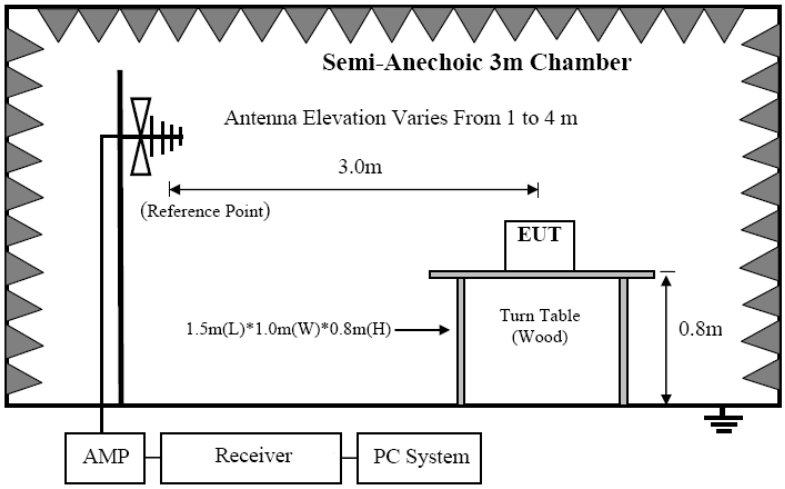
FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
0.009-0.490	300	2400/F(KHz)	/
0.490-1.705	30	24000/F(KHz)	/
1.705-30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	

8.2.Block Diagram of Test setup

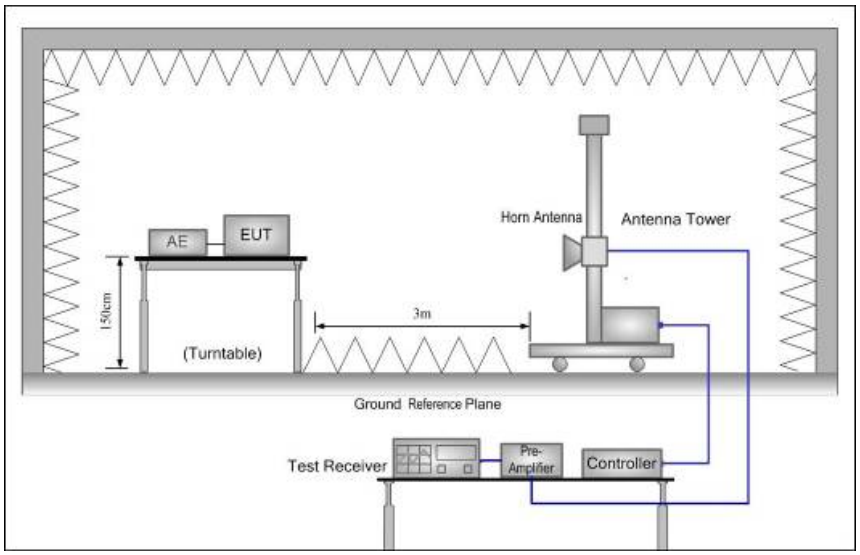
8.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 30MHz



8.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 1GHz



8.2.2 In 3m Anechoic Chamber Test Setup Diagram for frequency above 1GHz



Note: For harmonic emissions test a appropriate high pass filter was inserted in the input port of AMP.

8.3.Test Procedure

(1) EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber.
(2) Setup EUT and simulator as shown in section 1.4 and 6.1
(3) Test antenna was located 3m from the EUT on an adjustable mast. Below pre-scan procedure was first performed in order to find prominent radiated emissions.
(a) Change work frequency or channel of device if practicable.
(b) Change modulation type of device if practicable.
(c) Rotated EUT though three orthogonal axes to determine the attitude of EUT arrangement produces highest emissions
(4) Spectrum frequency from 9KHz to 25GHz (tenth harmonic of fundamental frequency) was investigated
(5) For final emissions measurements at each frequency of interest, the EUT were rotated and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 :2013on Radiated Emission test.
(6) For emissions above 1GHz, both Peak and Average level were measured with Spectrum Analyzer, and the RBW is set at 1MHz, VBW is set at 3MHz for Peak measure; RBW is set at 1MHz, VBW is set at 10Hz for Average measure.

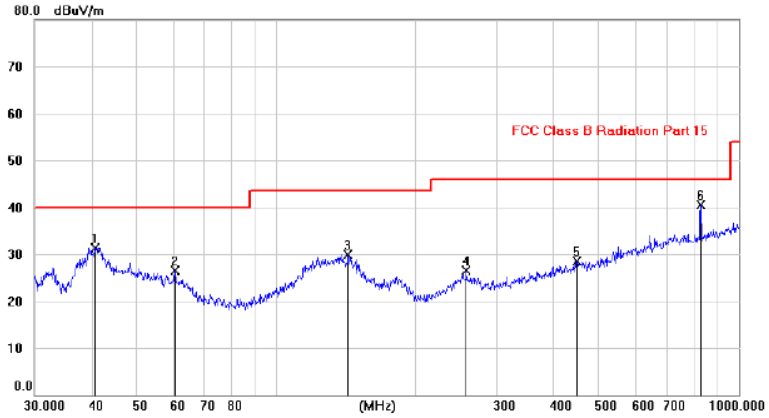
8.4.Test Result

We have scanned the 10th harmonic from 9KHz to the EUT's highest frequency..
Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

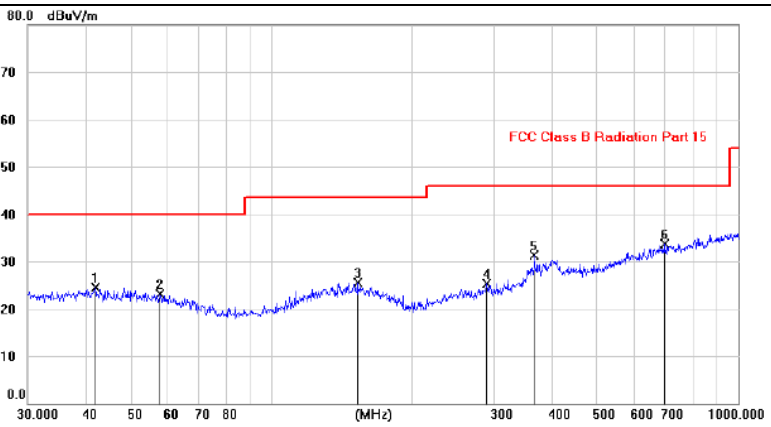
Note: The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

From 30MHz to 1000MHz: Conclusion: PASS			
EUT Description	Geodetic GNSS Receiver	**Model No.**	i73
Temperature	24℃	**Humidity**	56%
Pol	Vertical	**Test date**	2020/08/06
Test Voltage	DC 5V From Adapter	**Test mode**	GFSK (2402MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree Comment
1		40.6874	16.92	14.38	31.30	40.00	-8.70	peak		
2		60.4707	13.39	13.07	26.46	40.00	-13.54	peak		
3		143.3261	15.42	14.56	29.98	43.50	-13.52	peak		
4		258.2358	13.49	12.93	26.42	46.00	-19.58	peak		
5		446.8839	11.03	17.49	28.52	46.00	-17.48	peak		
6	*	827.7836	17.33	23.18	40.51	46.00	-5.49	peak		

Pol	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree Comment
1		41.8888	10.10	14.35	24.45	40.00	-15.55	peak		
2		57.7759	9.62	13.41	23.03	40.00	-16.97	peak		
3		153.0927	10.54	15.05	25.59	43.50	-17.91	peak		
4		289.3061	11.42	13.86	25.28	46.00	-20.72	peak		
5		366.0520	15.82	15.56	31.38	46.00	-14.62	peak		
6	*	695.6359	12.04	21.66	33.70	46.00	-12.30	peak		

*:Maximum data x:Over limit !:over margin

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

Remark: All modes have been tested, and only worst data of GFSK (2402MHz) was listed in this report.

From 1G-25GHz

Test Mode: GFSK TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4804	44.29	V	33.95	10.18	34.26	54.16	74	-19.84	PK
4804	35.17	V	33.95	10.18	34.26	45.04	54	-8.96	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	42.13	H	33.95	10.18	34.26	52.00	74	-22.00	PK
4804	35.59	H	33.95	10.18	34.26	45.46	54	-8.54	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: GFSK TX Mid									
4882	45.48	V	33.93	10.2	34.29	55.32	74	-18.68	PK
4882	35.93	V	33.93	10.2	34.29	45.77	54	-8.23	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	44.65	H	33.93	10.2	34.29	54.49	74	-19.51	PK
4882	33.57	H	33.93	10.2	34.29	43.41	54	-10.59	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: GFSK TX High									
4960	43.33	V	33.98	10.22	34.25	53.28	74	-20.72	PK
4960	35.02	V	33.98	10.22	34.25	44.97	54	-9.03	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	46.71	H	33.98	10.22	34.25	56.66	74	-17.34	PK
4960	36.58	H	33.98	10.22	34.25	46.53	54	-7.47	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/

Note:
1, Result = Read level + Antenna factor + cable loss-Amp factor
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

From 1G-25GHz

Test Mode: π/4 DQPSK TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4804	43.94	V	33.95	10.18	34.26	53.81	74	-20.19	PK
4804	35.50	V	33.95	10.18	34.26	45.37	54	-8.63	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	42.60	H	33.95	10.18	34.26	52.47	74	-21.53	PK
4804	35.12	H	33.95	10.18	34.26	44.99	54	-9.01	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: π/4 DQPSK TX Mid									
4882	45.17	V	33.93	10.2	34.25	55.05	74	-18.95	PK
4882	35.30	V	33.93	10.2	34.25	45.18	54	-8.82	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	44.30	H	33.93	10.2	34.29	54.14	74	-19.86	PK
4882	33.59	H	33.93	10.2	34.29	43.43	54	-10.57	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: π/4 DQPSK TX High									
4960	43.55	V	33.98	10.22	34.25	53.50	74	-20.50	PK
4960	35.47	V	33.98	10.22	34.25	45.42	54	-8.58	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	46.92	H	33.98	10.22	34.25	56.87	74	-17.13	PK
4960	35.99	H	33.98	10.22	34.25	45.94	54	-8.06	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/

Note:
1, Result = Read level + Antenna factor + cable loss-Amp factor
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

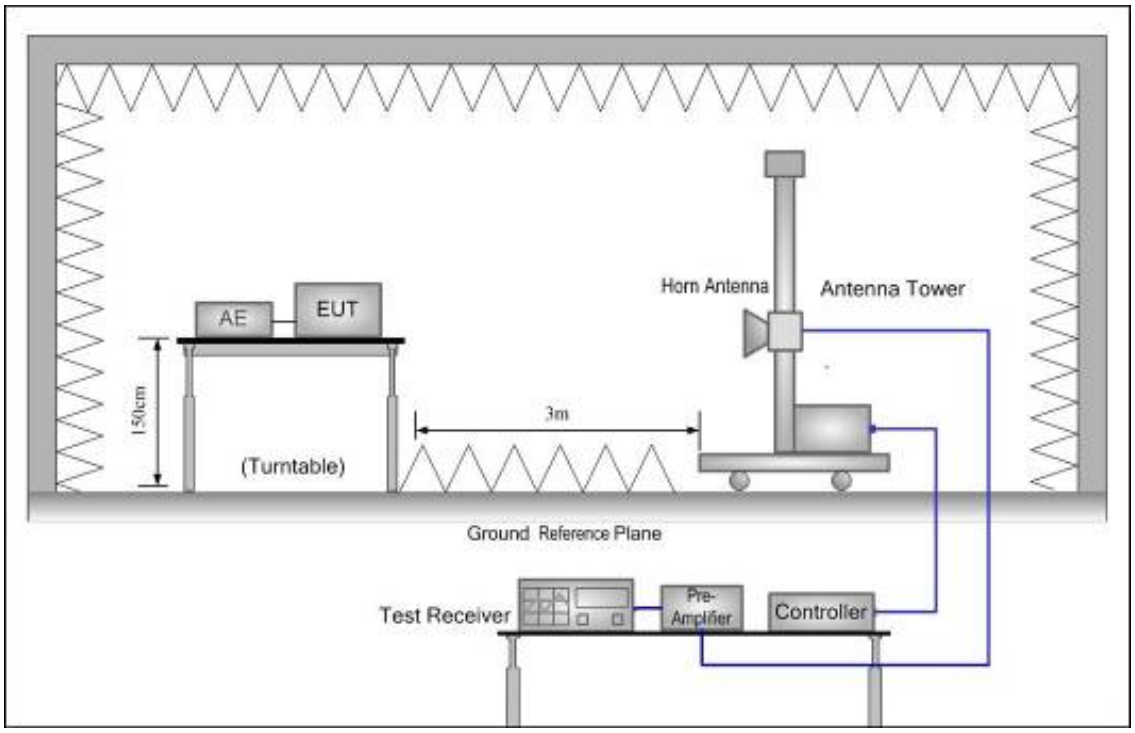
From 1G-25GHz

Test Mode: 8- DQPSK TX Low									
Freq (MHz)	Read Level (dBuV/m)	Polar (H/V)	Antenna Factor (dB/m)	Cable loss(dB)	Amp Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
4804	43.97	V	33.95	10.18	34.26	53.84	74	-20.16	PK
4804	35.77	V	33.95	10.18	34.26	45.64	54	-8.36	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	42.49	H	33.95	10.18	34.26	52.36	74	-21.64	PK
4804	35.23	H	33.95	10.18	34.26	45.10	54	-8.90	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: 8- DQPSK TX Mid									
4882	45.93	V	33.93	10.2	34.29	55.77	74	-18.23	PK
4882	35.69	V	33.93	10.2	34.29	45.53	54	-8.47	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	44.29	H	33.93	10.2	34.29	54.13	74	-19.87	PK
4882	33.84	H	33.93	10.2	34.29	43.68	54	-10.32	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: 8- DQPSK TX High									
4960	43.78	V	33.98	10.22	34.25	53.73	74	-20.27	PK
4960	35.58	V	33.98	10.22	34.25	45.53	54	-8.47	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	42.42	H	33.98	10.22	34.25	52.37	74	-21.63	PK
4960	32.82	H	33.98	10.22	34.25	42.77	54	-11.23	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/

Note:
1, Result = Read level + Antenna factor + cable loss-Amp factor
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

9. Band Edge Compliance

9.1.Block Diagram of Test Setup



9.2.Limit

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

9.3.Test Procedure

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

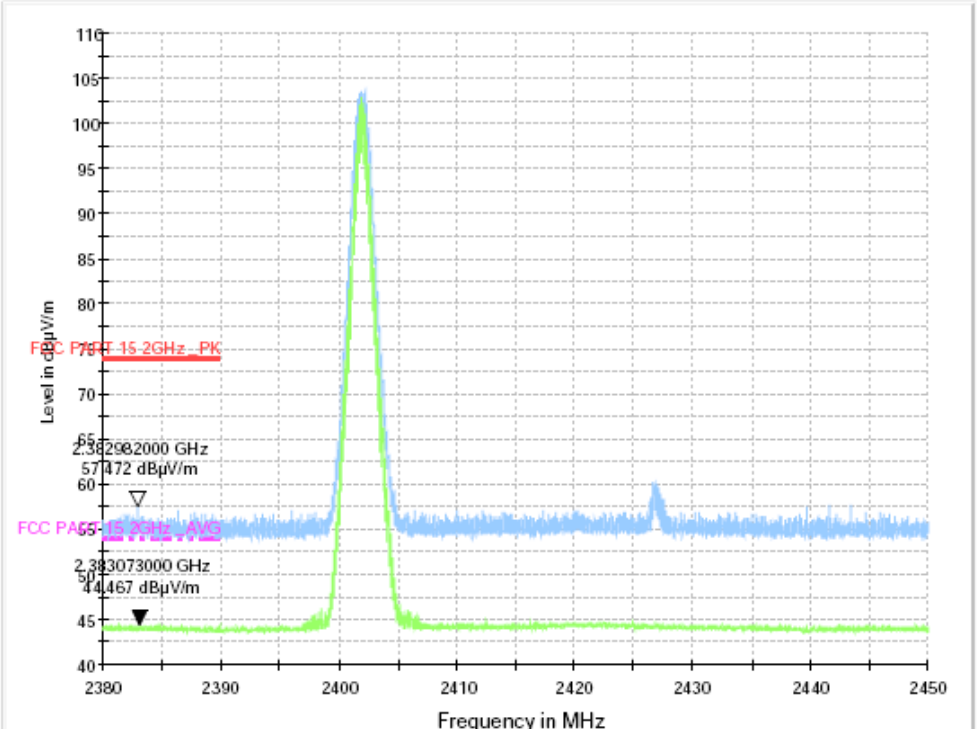
9.4.Test Result

PASS. (See below detailed test data)

Radiated Method:

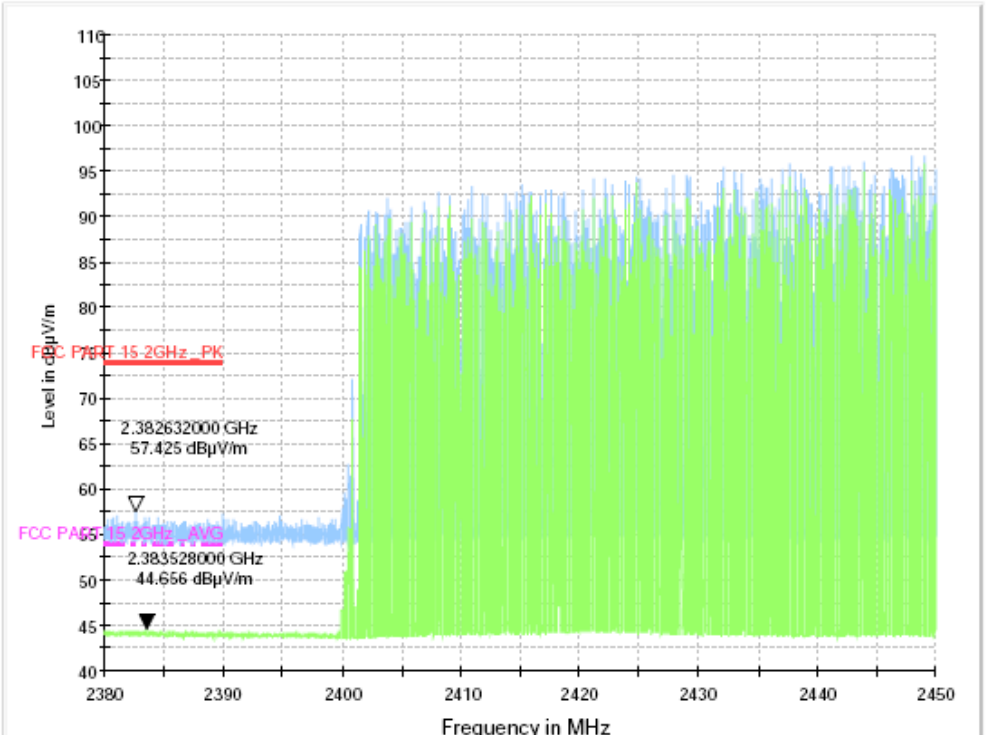
Hopping off

Polarization: Vertical & Horizontal Test Mode: GFSK-Low



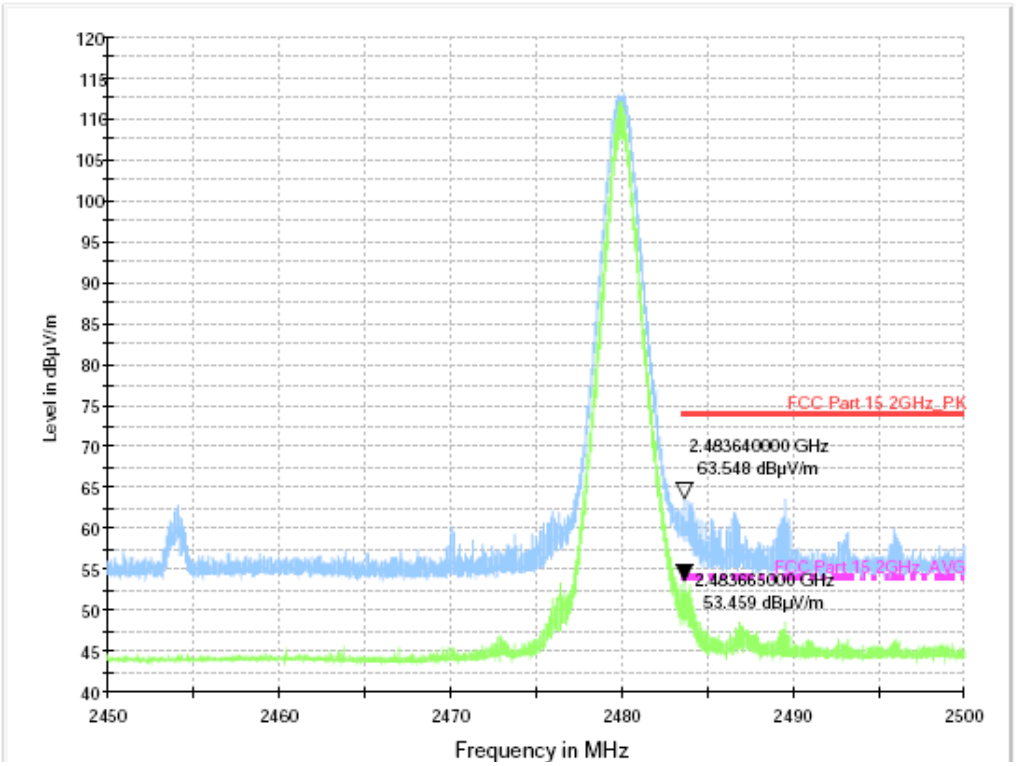
Hopping on

Polarization: Vertical & Horizontal



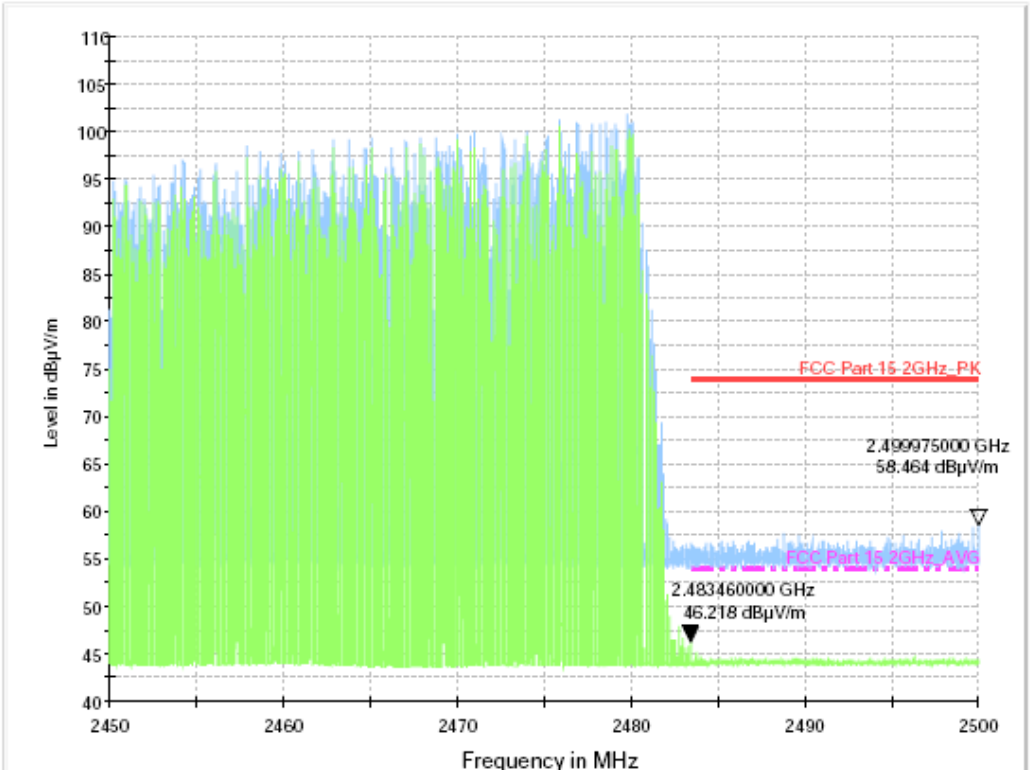
Hopping off

Polarization: Vertical & Horizontal Test Mode: GFSK-High



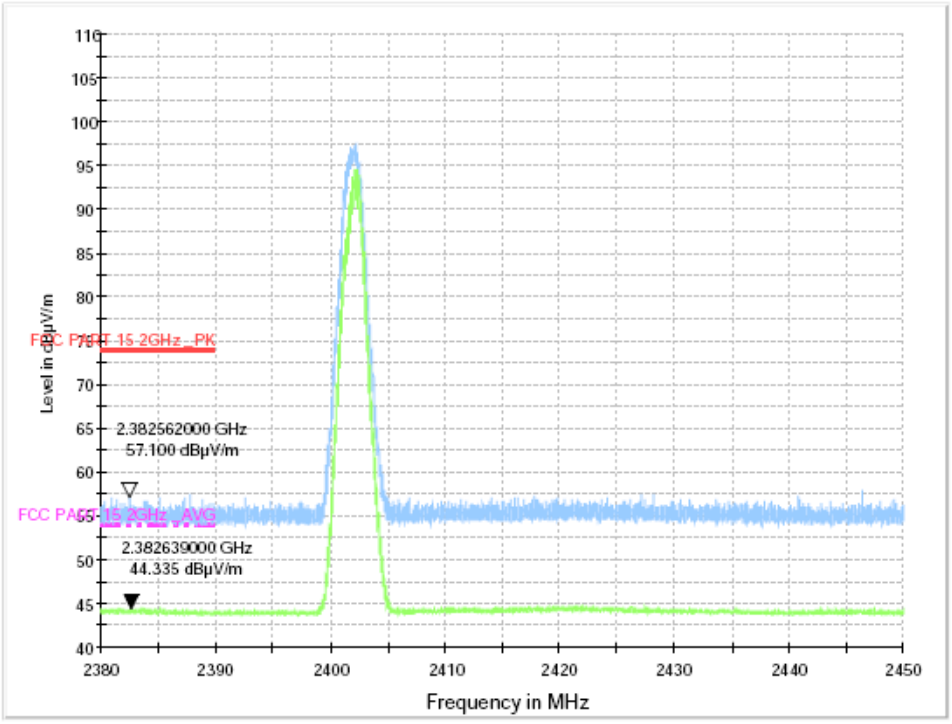
Hopping on

Polarization: Vertical & Horizontal



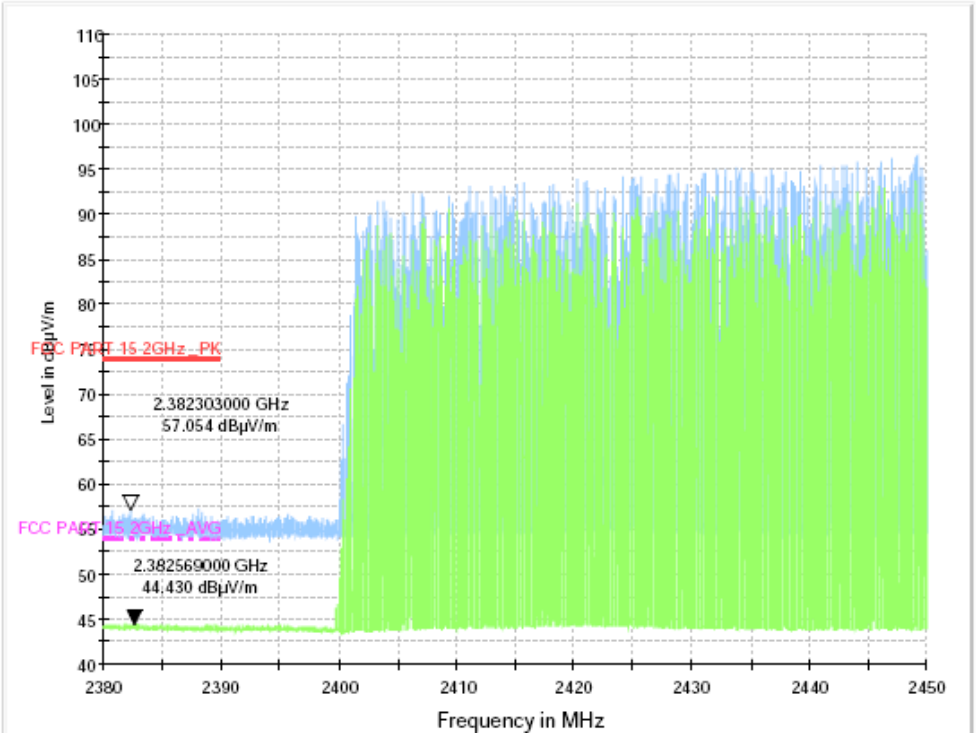
Hopping off

Polarization: Vertical & Horizontal Test Mode: π/4 DQPSK -Low



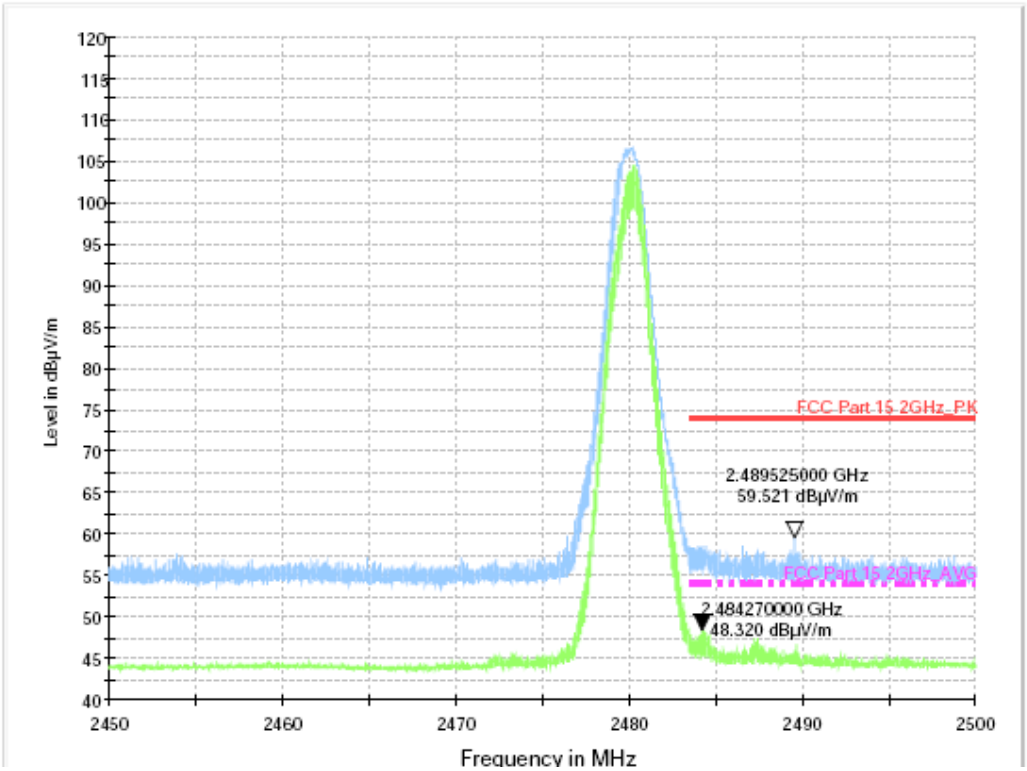
Hopping on

Polarization: Vertical & Horizontal



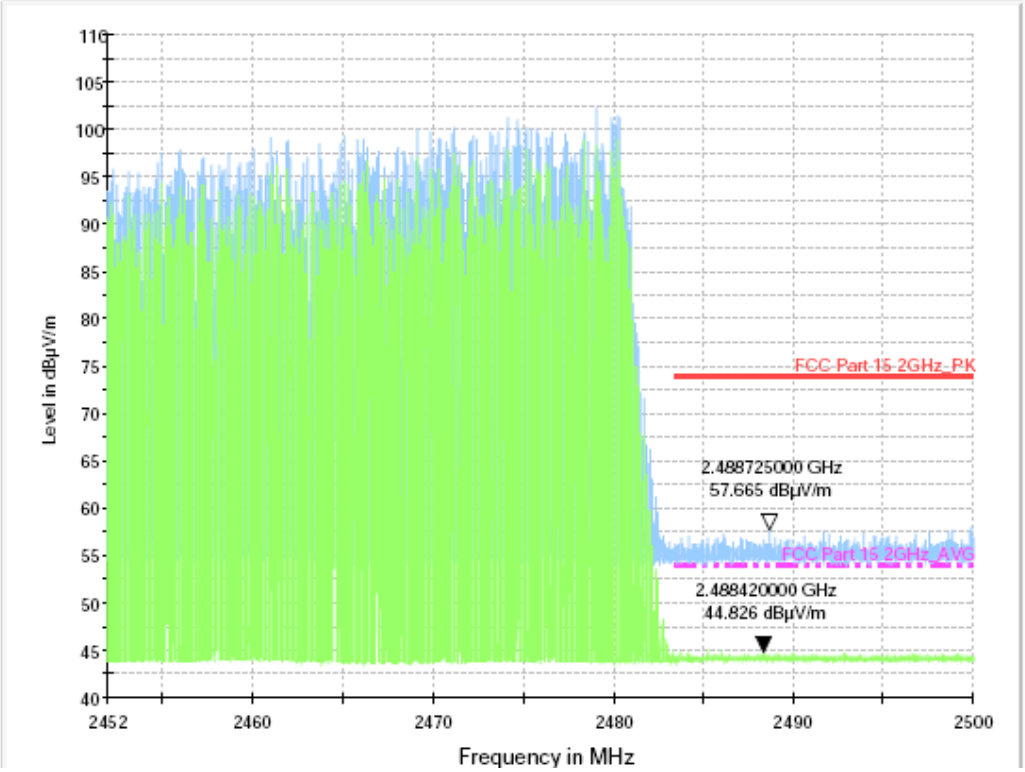
Hopping off

Polarization: Vertical & Horizontal Test Mode: π/4 DQPSK -High



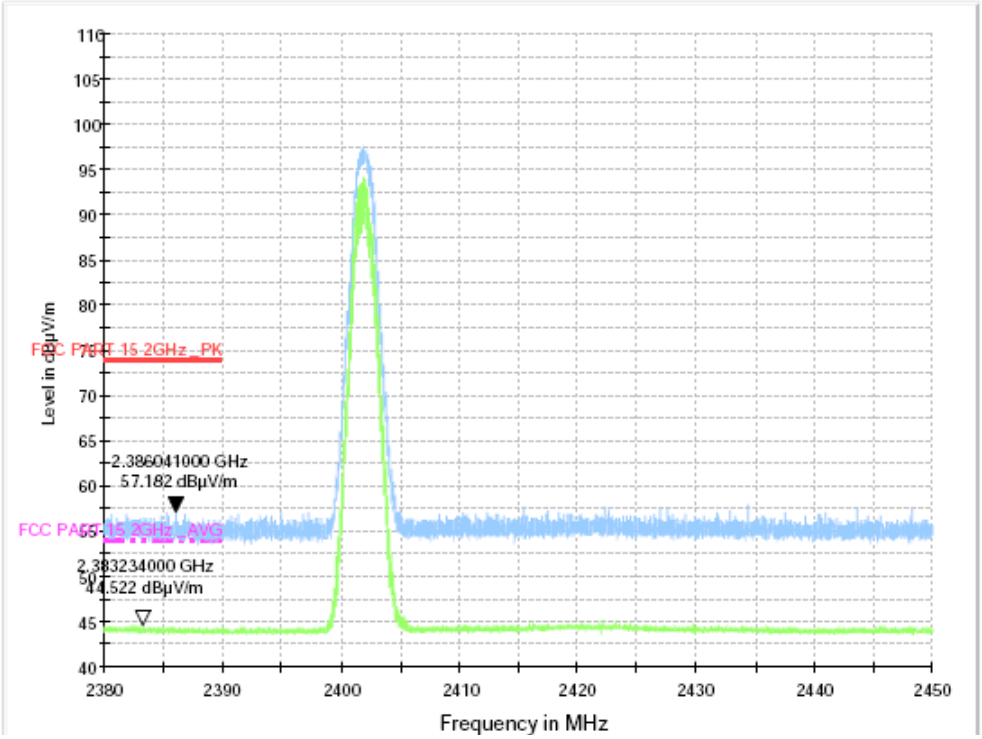
Hopping on

Polarization: Vertical & Horizontal



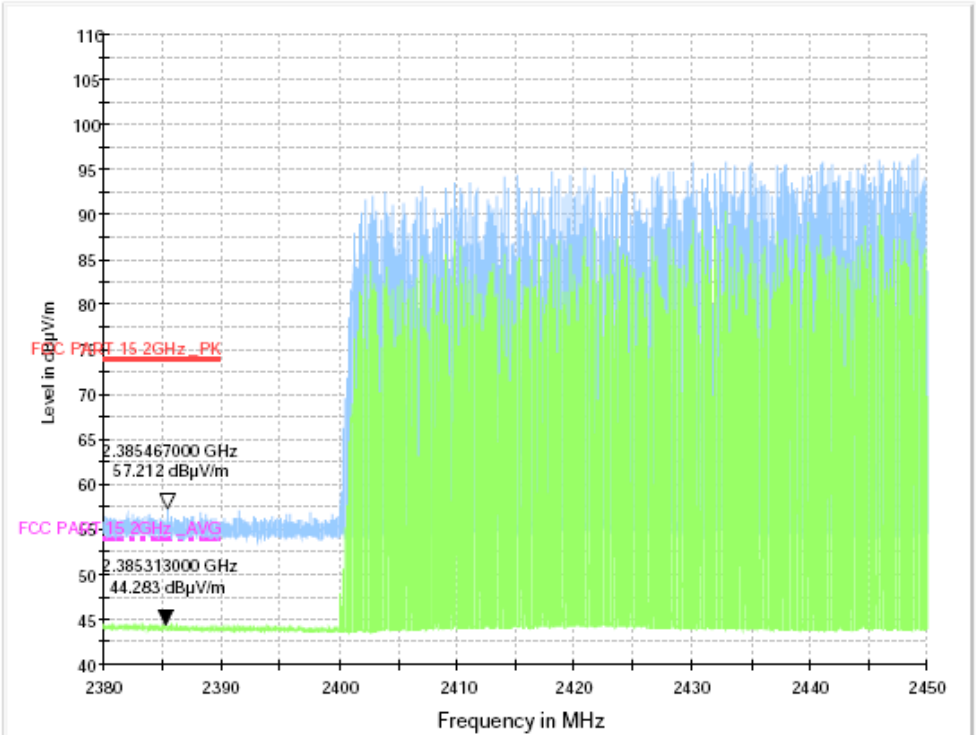
Hopping off

Polarization: Vertical & Horizontal Test Mode: 8DPSK-Low



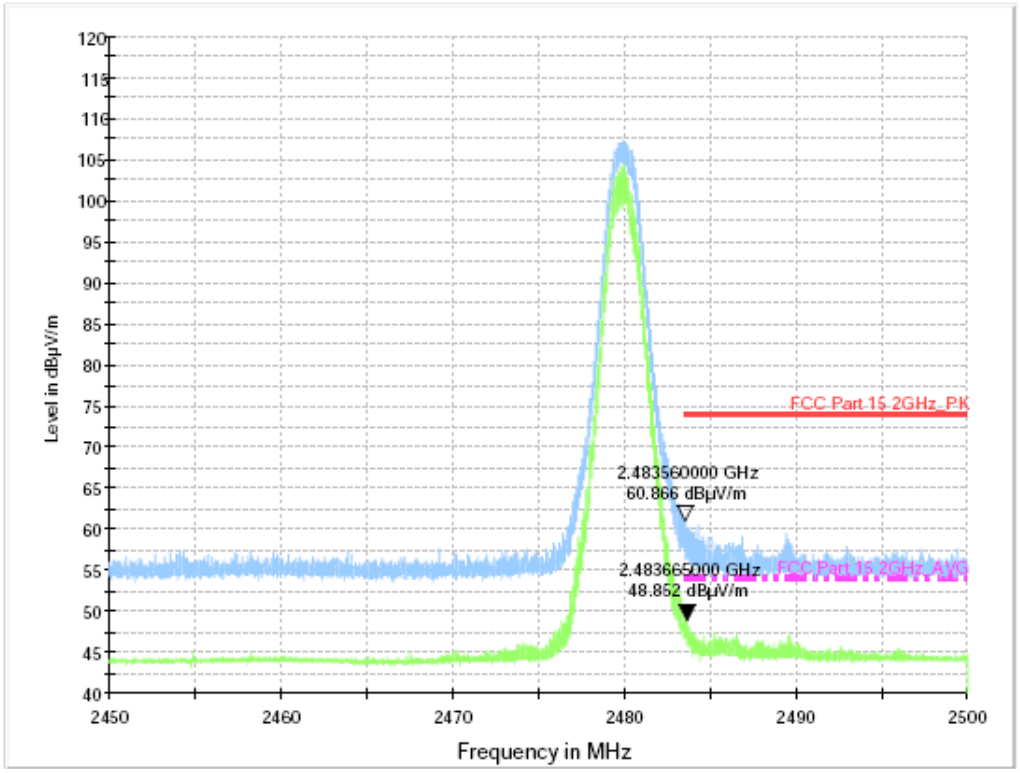
Hopping on

Polarization: Vertical & Horizontal



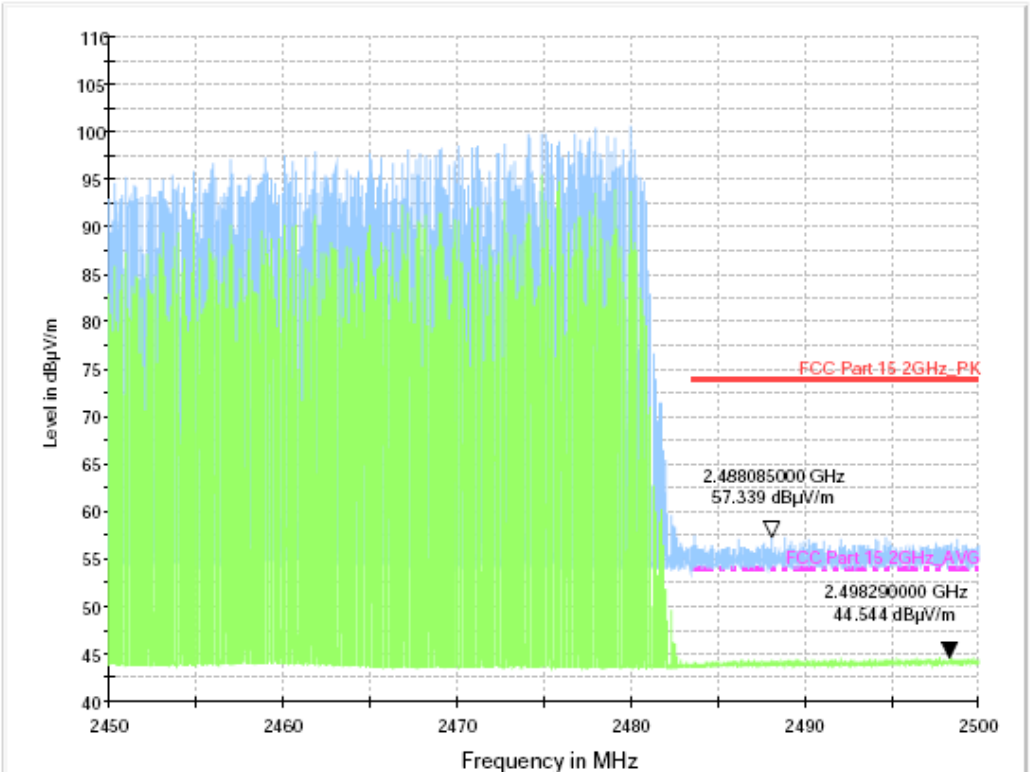
Hopping off

Polarization: Vertical & Horizontal Test Mode: 8DPSK-High



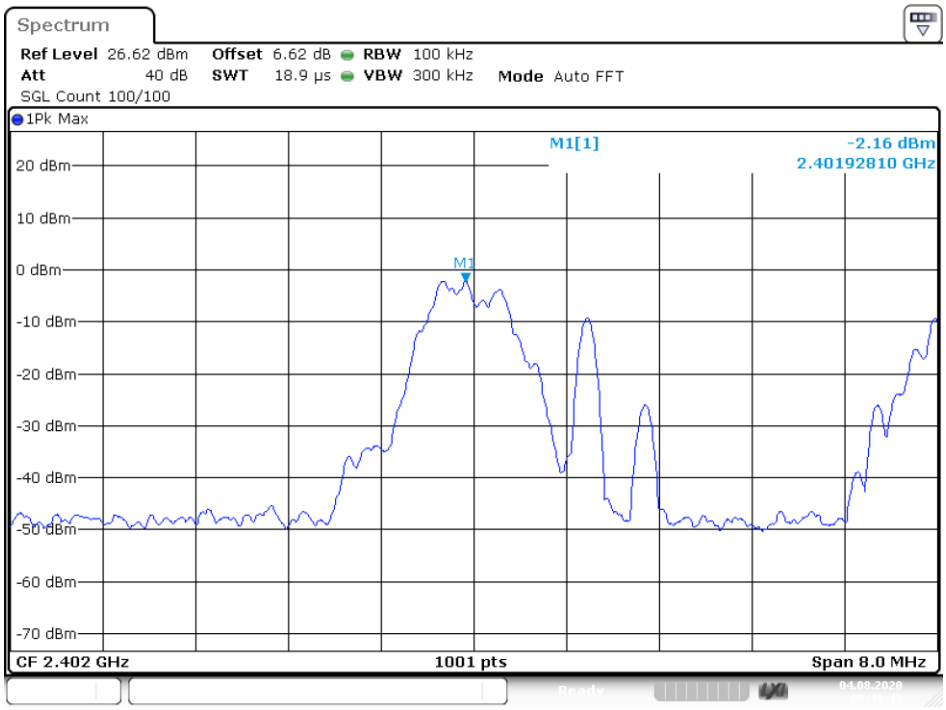
Hopping on

Polarization: Vertical & Horizontal



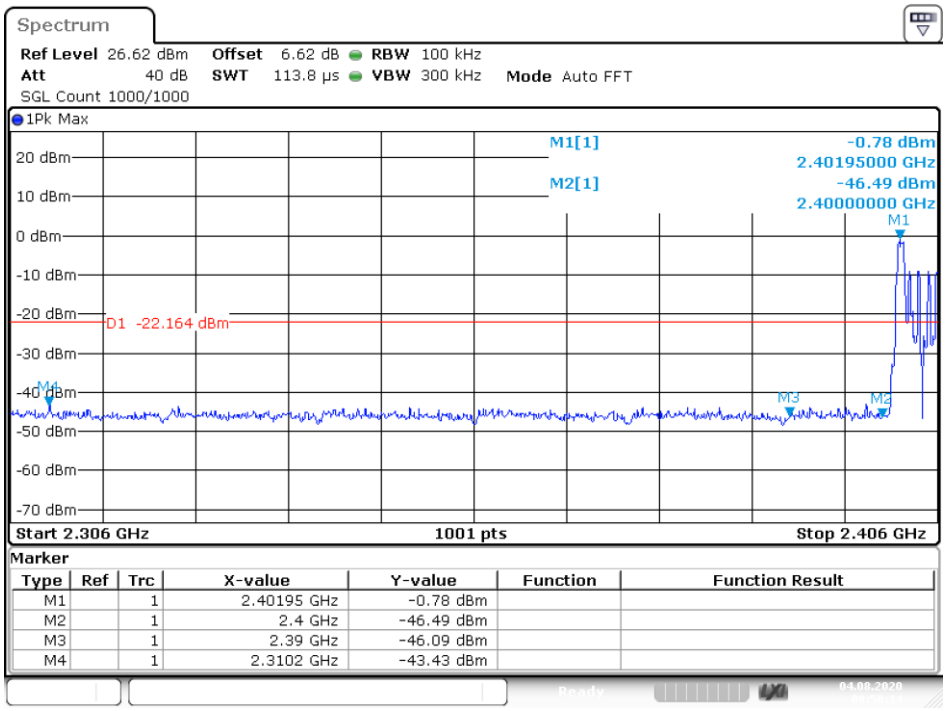
Conducted Method

Band Edge NVNT 1-DH1 2402MHz Ant1 Hopping Ref



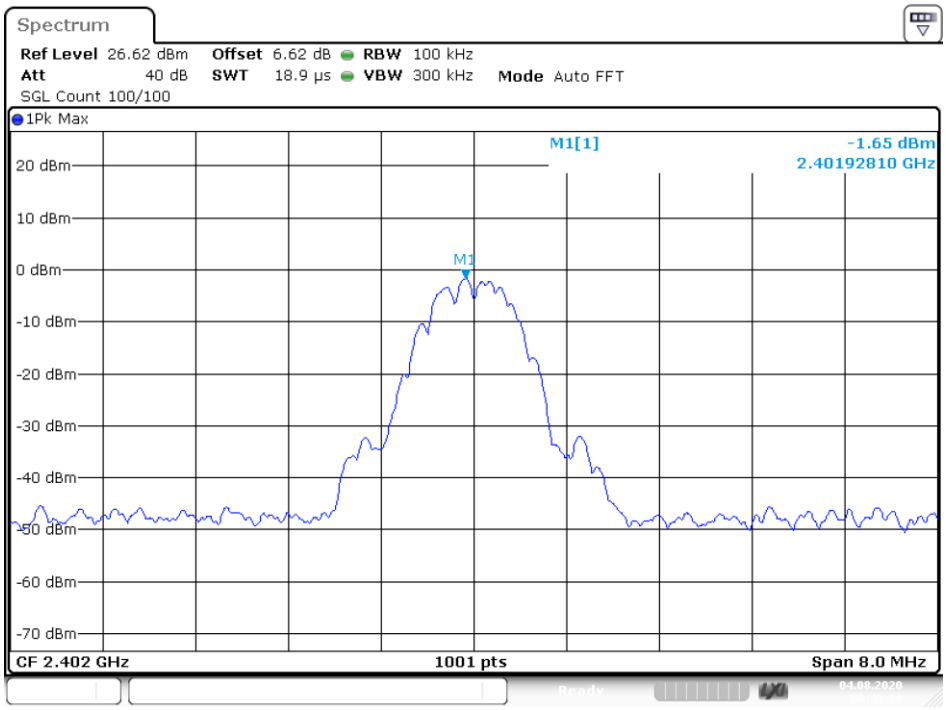
Date: 4.AUG.2020 08:49:45

Band Edge NVNT 1-DH1 2402MHz Ant1 Hopping Emission

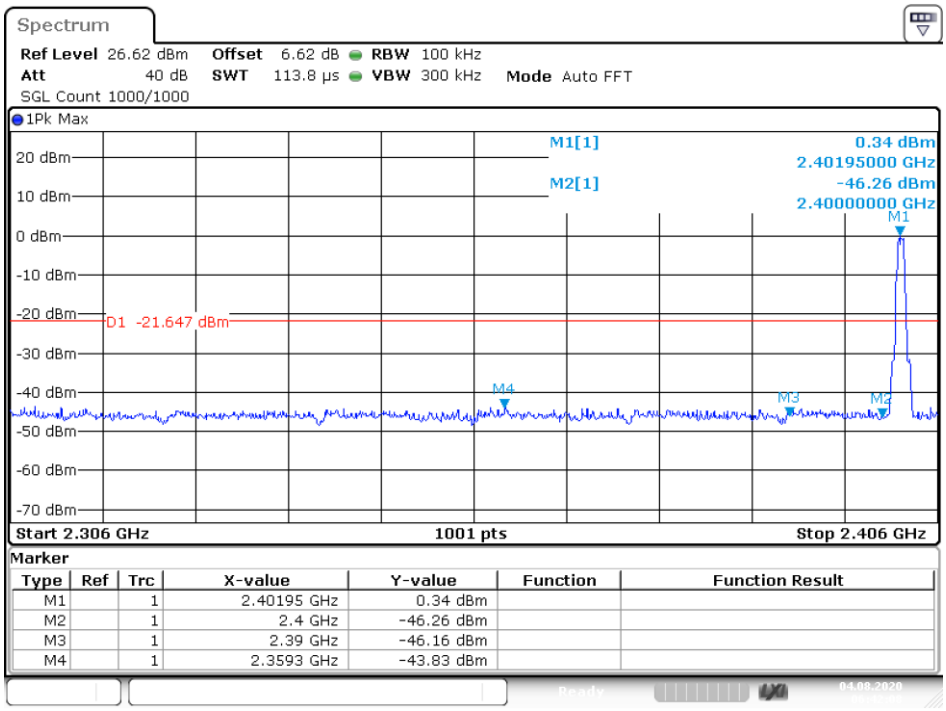


Date: 4.AUG.2020 08:50:14

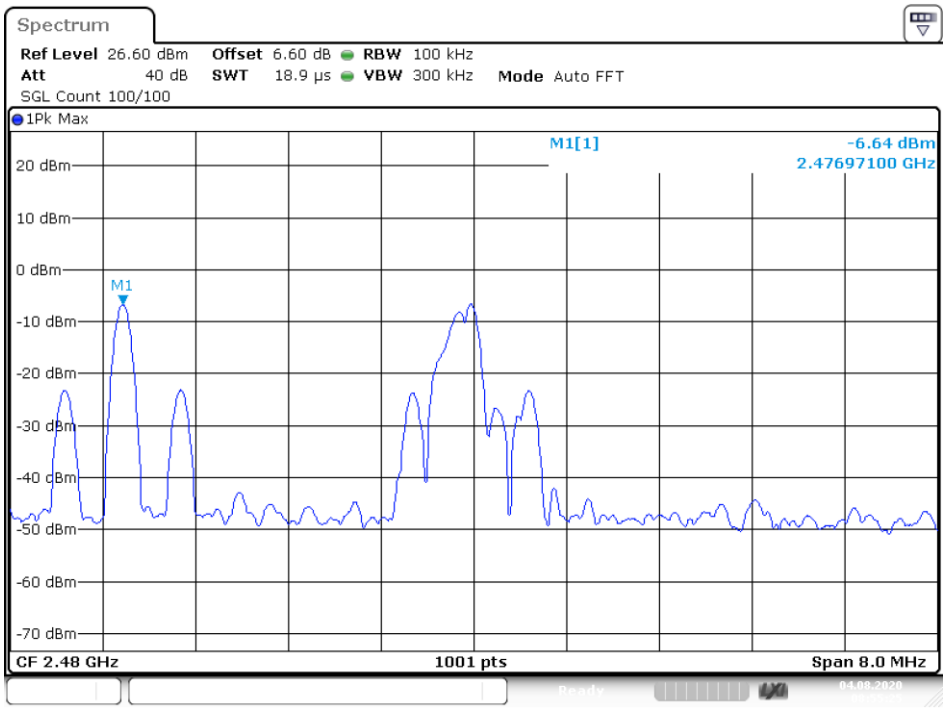
Band Edge NVNT 1-DH1 2402MHz Ant1 No-Hopping Ref



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

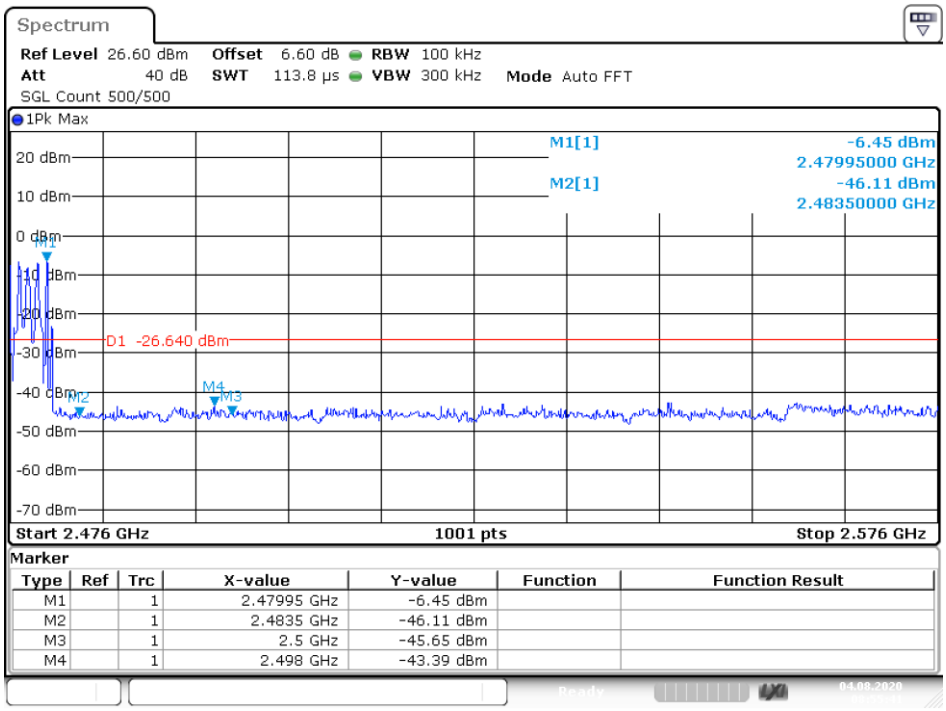


Band Edge NVNT 1-DH1 2480MHz Ant1 Hopping Ref



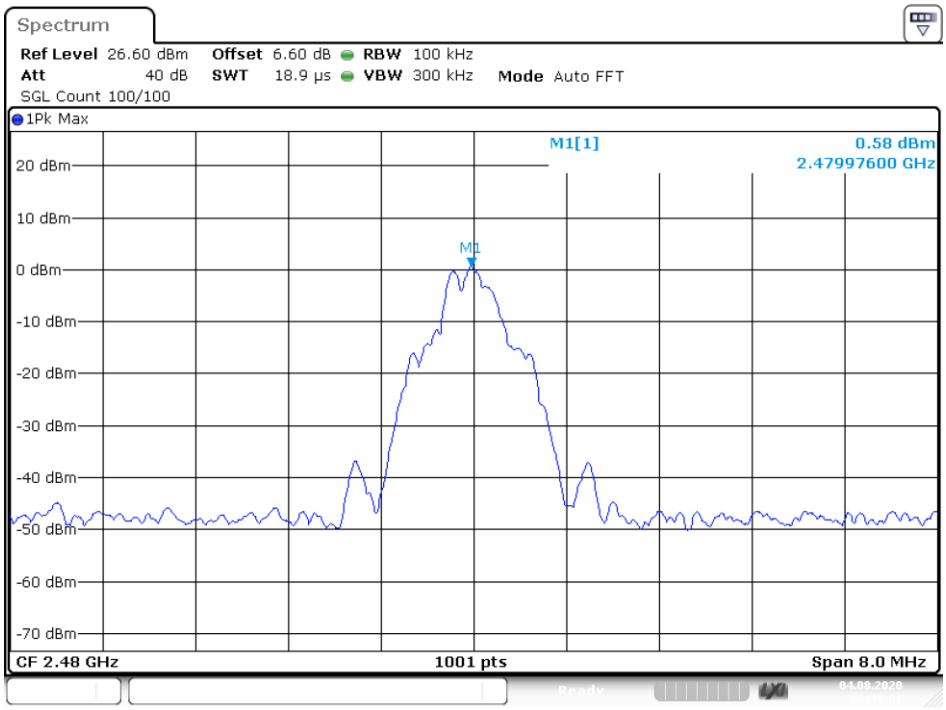
Date: 4.AUG.2020 08:55:25

Band Edge NVNT 1-DH1 2480MHz Ant1 Hopping Emission



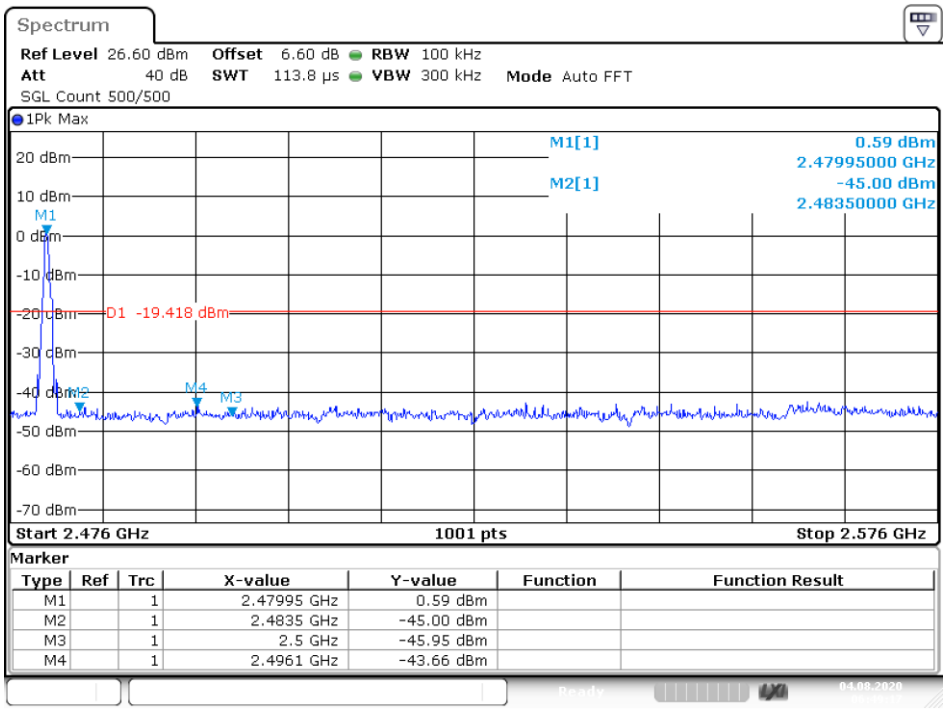
Date: 4.AUG.2020 08:55:41

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



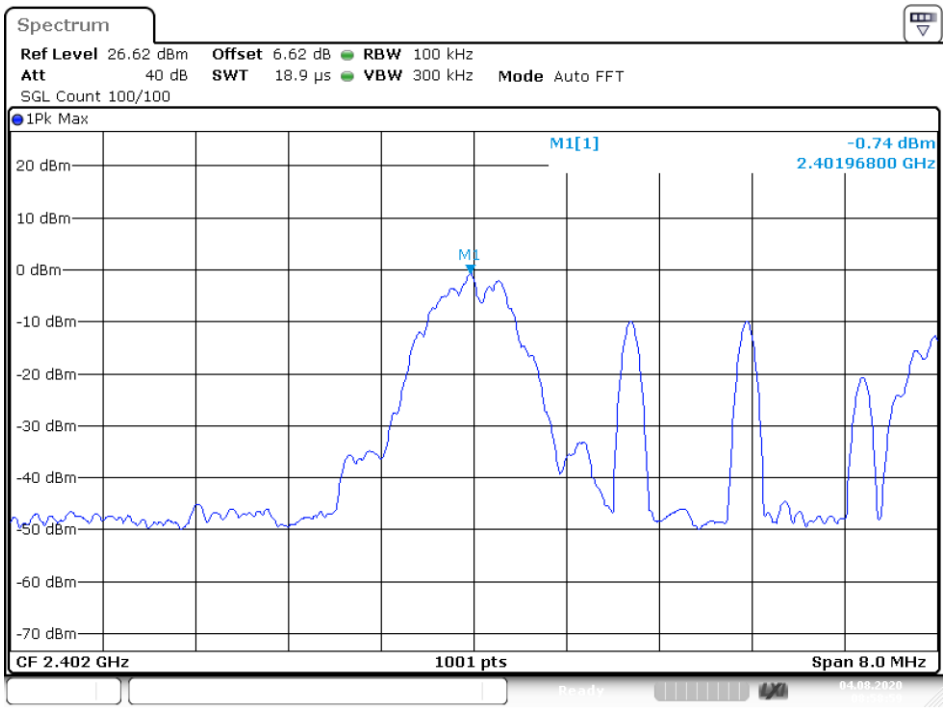
Date: 4.AUG.2020 06:49:00

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



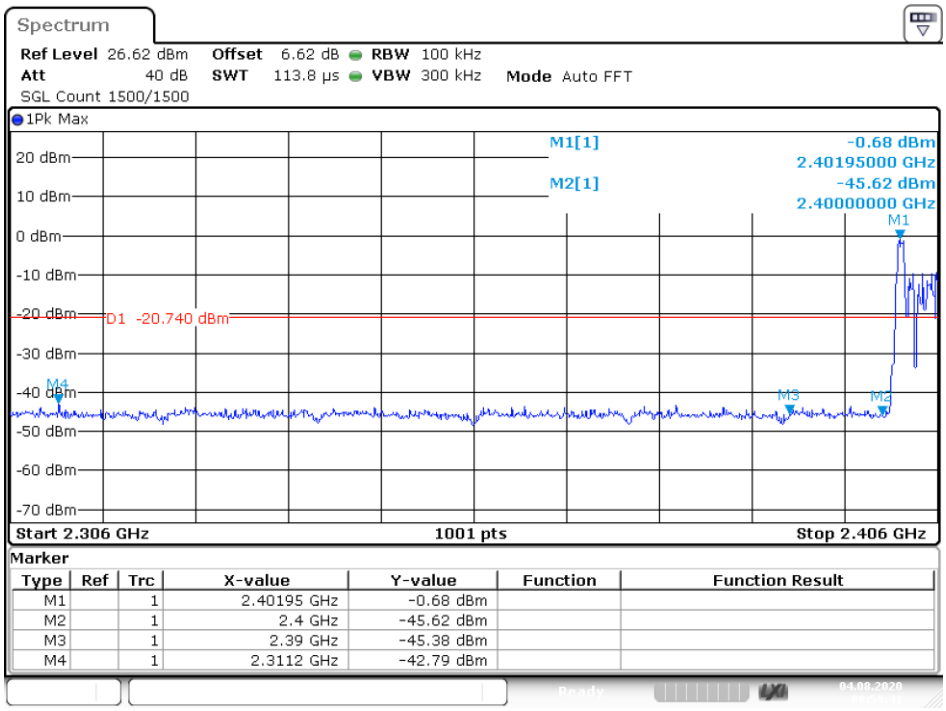
Date: 4.AUG.2020 06:49:16

Band Edge NVNT 2-DH1 2402MHz Ant1 Hopping Ref



Date: 4.AUG.2020 08:58:59

Band Edge NVNT 2-DH1 2402MHz Ant1 Hopping Emission

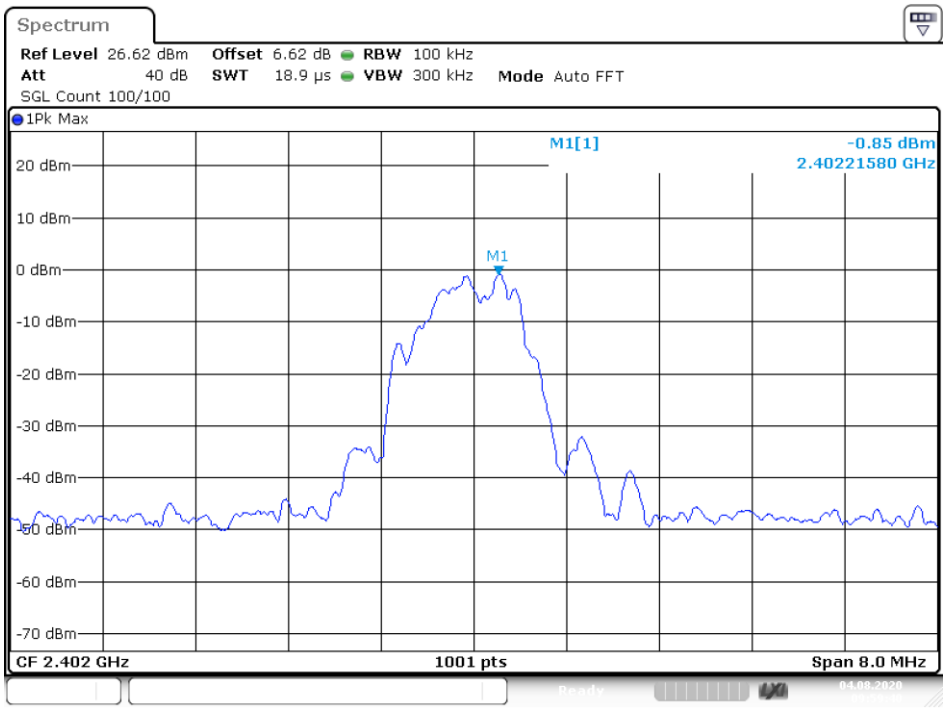


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40195 GHz	-0.68 dBm		
M2		1	2.4 GHz	-45.62 dBm		
M3		1	2.39 GHz	-45.38 dBm		
M4		1	2.3112 GHz	-42.79 dBm		

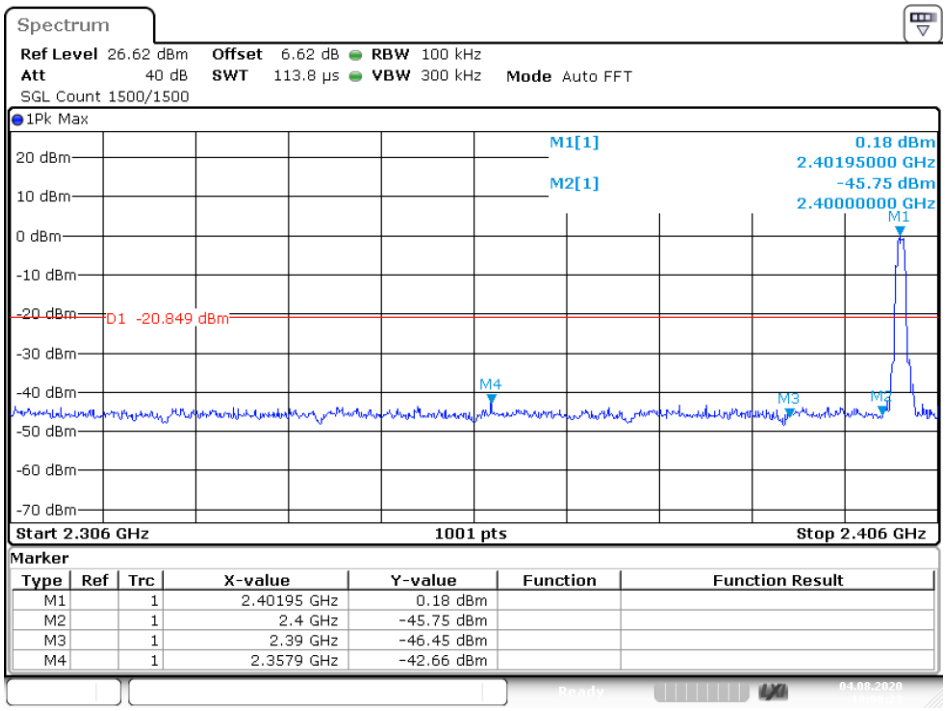
Date: 4.AUG.2020 08:59:41

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



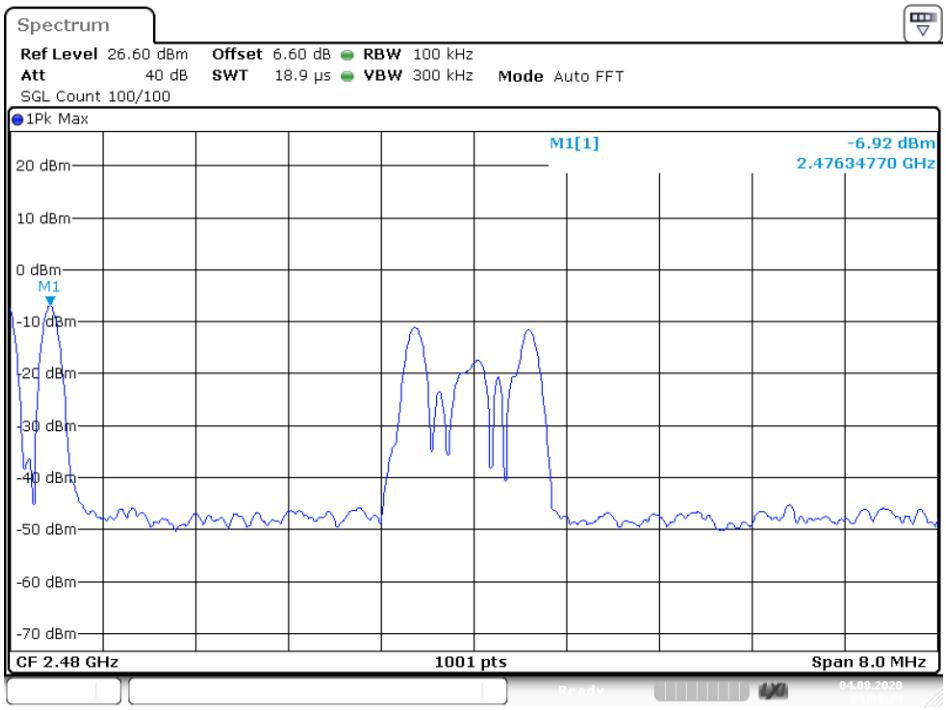
Date: 4.AUG.2020 09:59:40

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



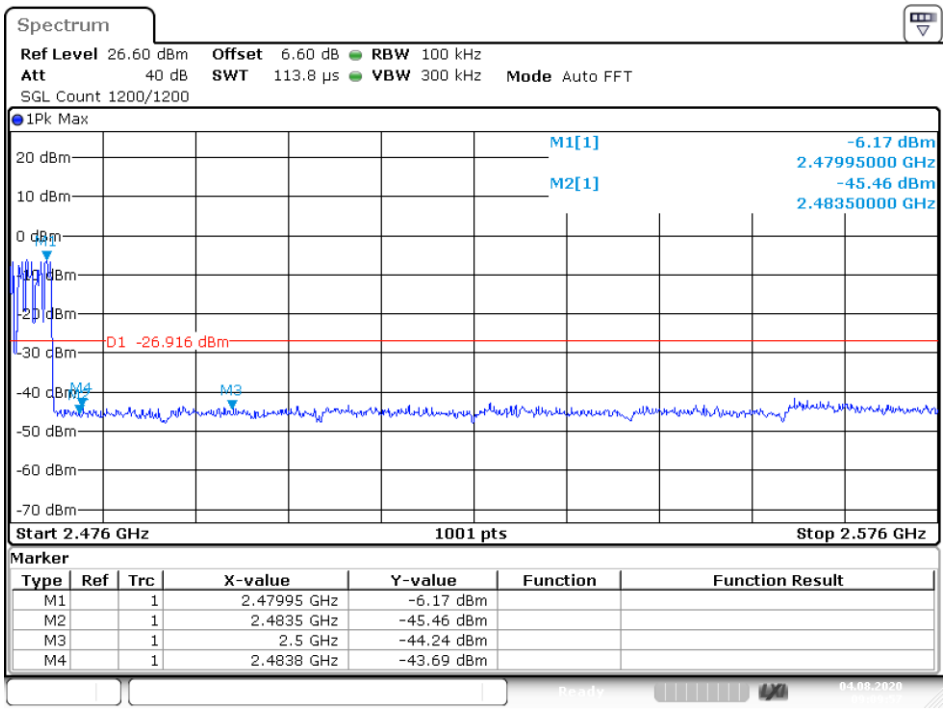
Date: 4.AUG.2020 10:00:22

Band Edge NVNT 2-DH1 2480MHz Ant1 Hopping Ref



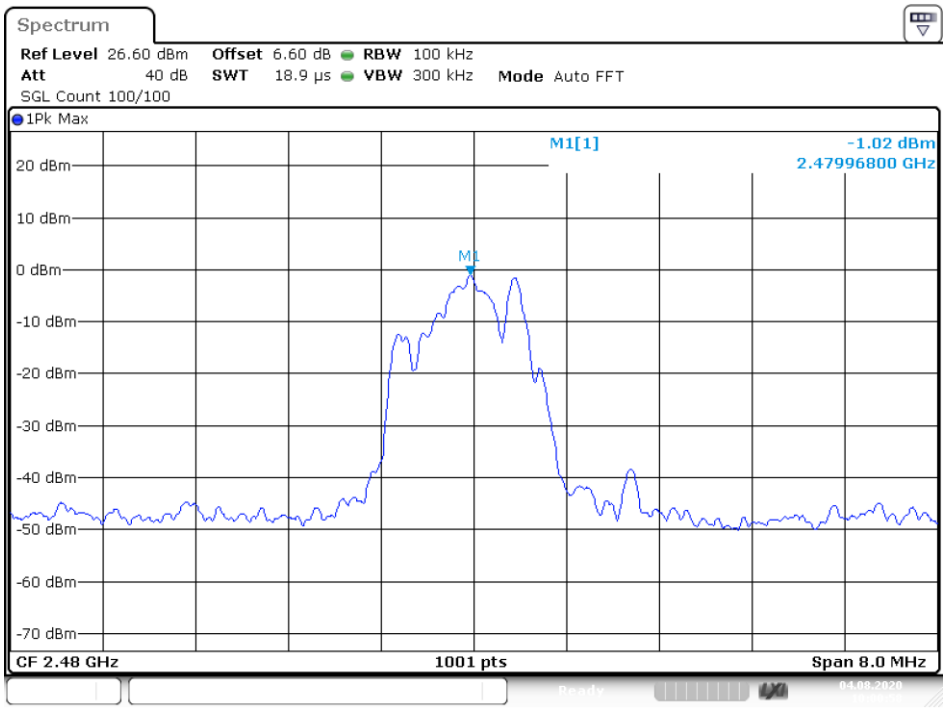
Date: 4.AUG.2020 09:09:24

Band Edge NVNT 2-DH1 2480MHz Ant1 Hopping Emission



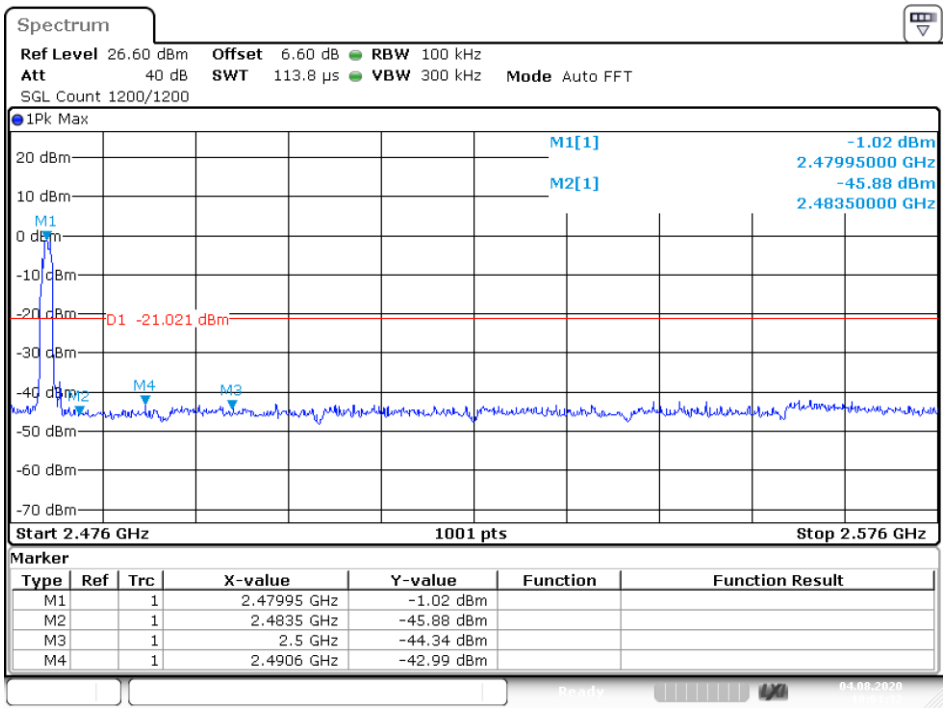
Date: 4.AUG.2020 09:09:57

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



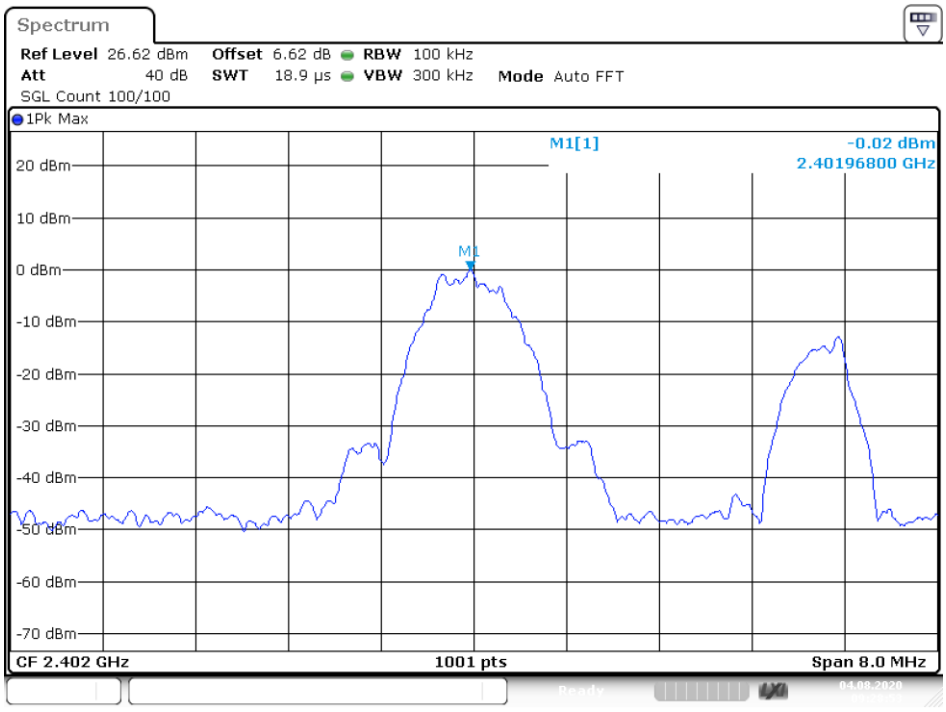
Date: 4.AUG.2020 10:00:58

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



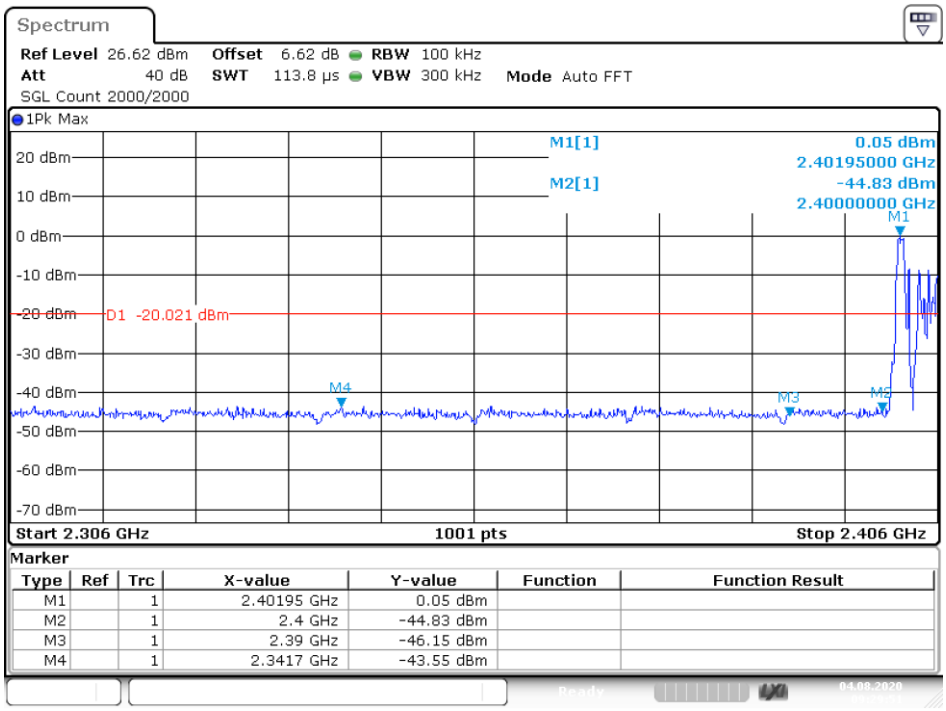
Date: 4.AUG.2020 10:01:32

Band Edge NVNT 3-DH1 2402MHz Ant1 Hopping Ref



Date: 4.AUG.2020 09:28:53

Band Edge NVNT 3-DH1 2402MHz Ant1 Hopping Emission

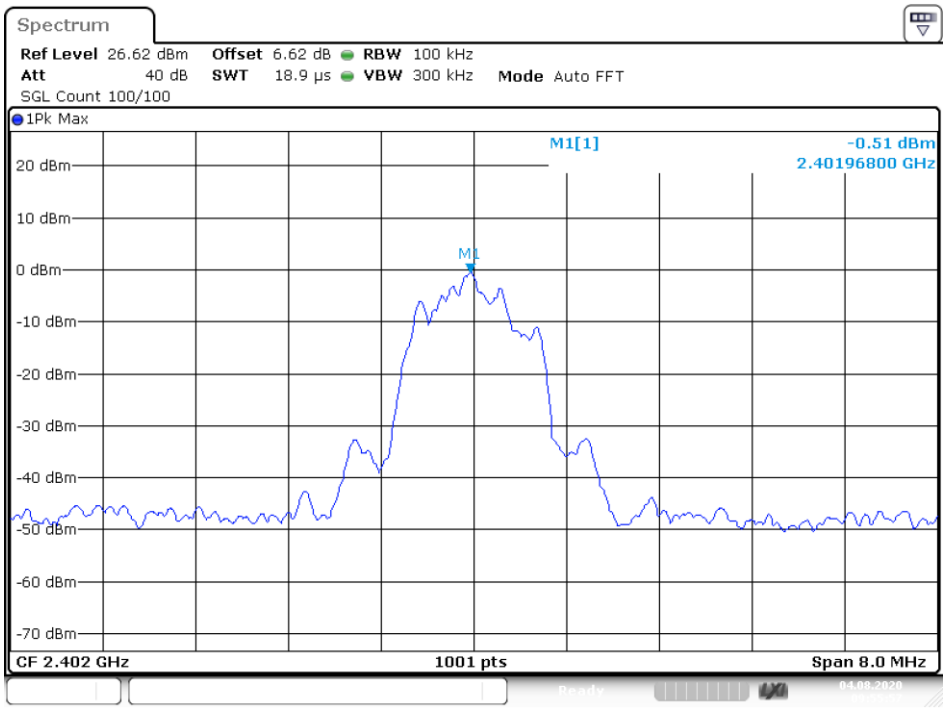


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40195 GHz	0.05 dBm		
M2		1	2.4 GHz	-44.83 dBm		
M3		1	2.39 GHz	-46.15 dBm		
M4		1	2.3417 GHz	-43.55 dBm		

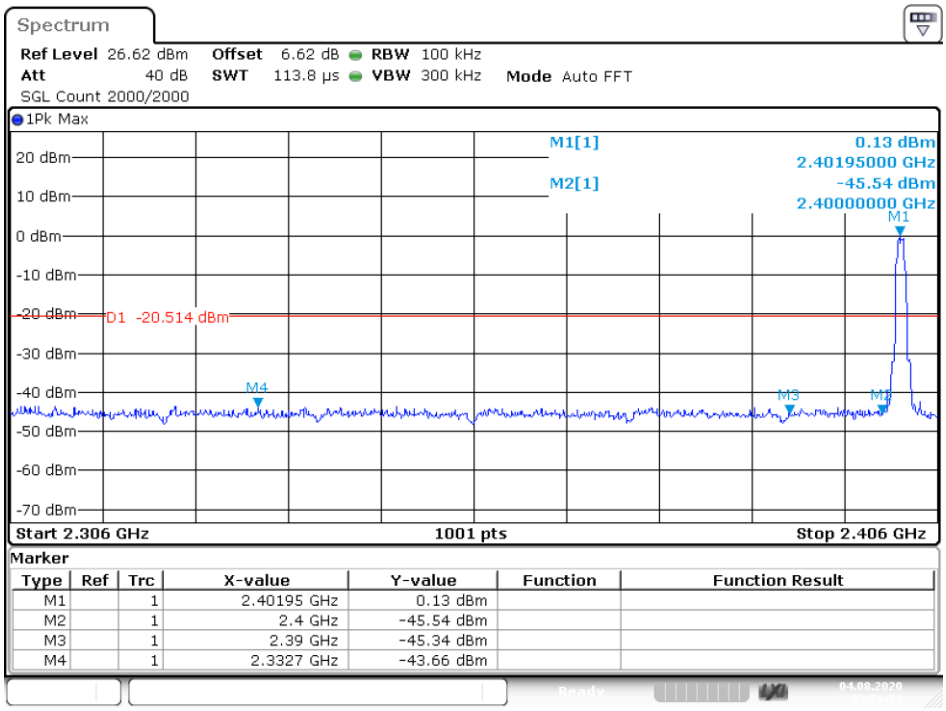
Date: 4.AUG.2020 09:29:50

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



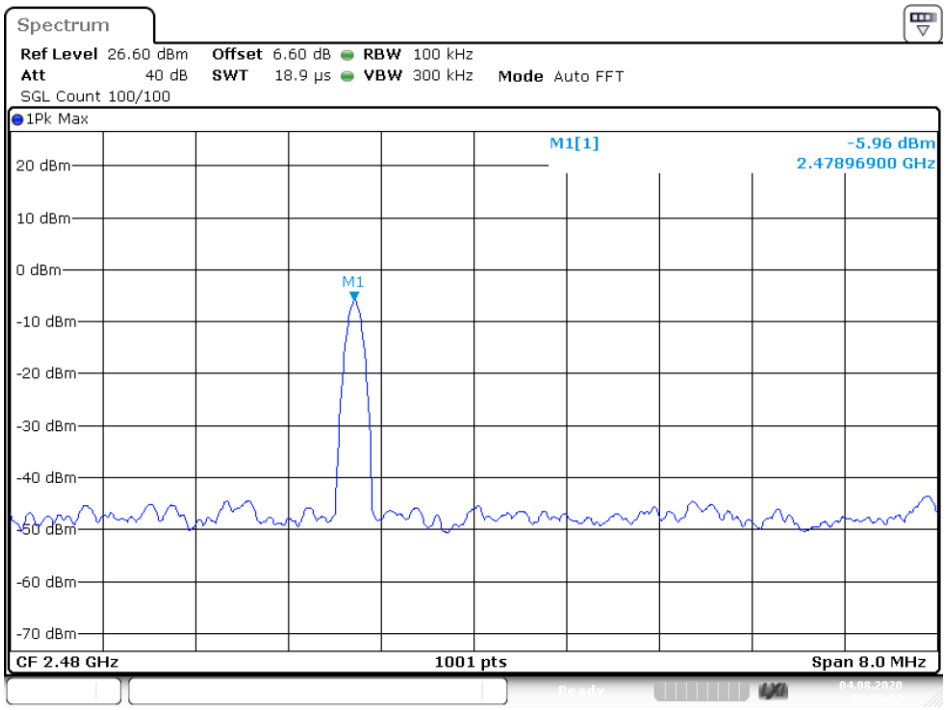
Date: 4.AUG.2020 09:55:57

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



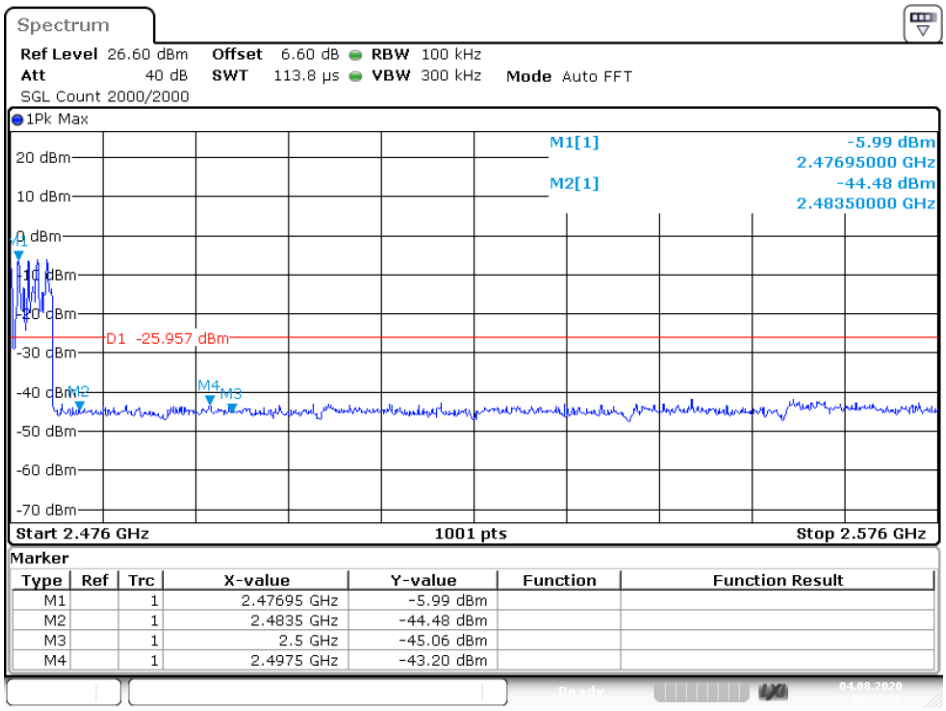
Date: 4.AUG.2020 09:56:51

Band Edge NVNT 3-DH1 2480MHz Ant1 Hopping Ref



Date: 4.AUG.2020 09:36:42

Band Edge NVNT 3-DH1 2480MHz Ant1 Hopping Emission

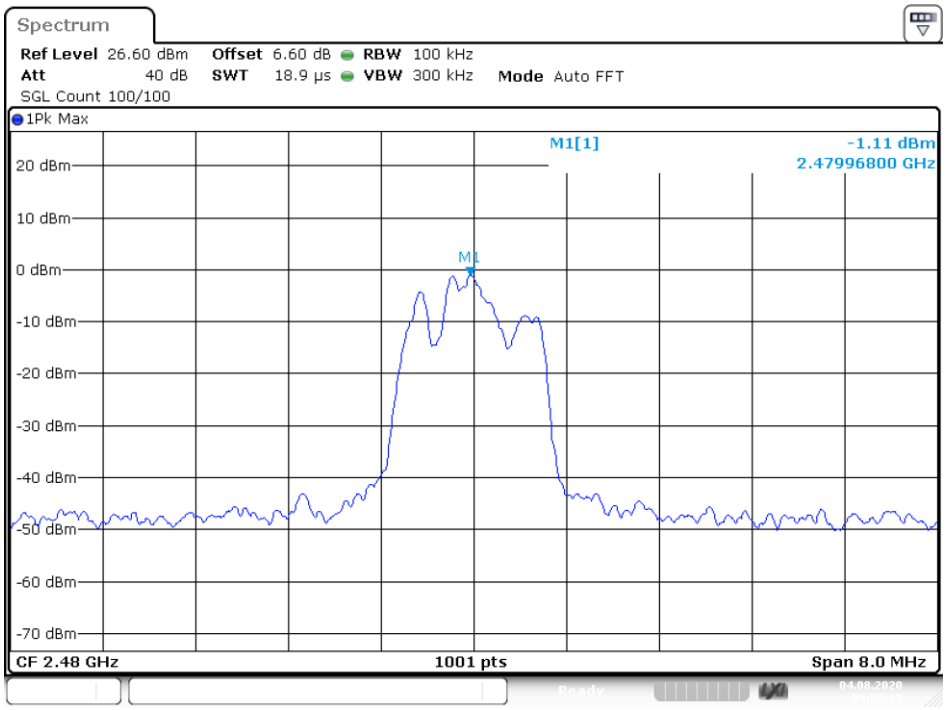


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.47695 GHz	-5.99 dBm		
M2		1	2.4835 GHz	-44.48 dBm		
M3		1	2.5 GHz	-45.06 dBm		
M4		1	2.4975 GHz	-43.20 dBm		

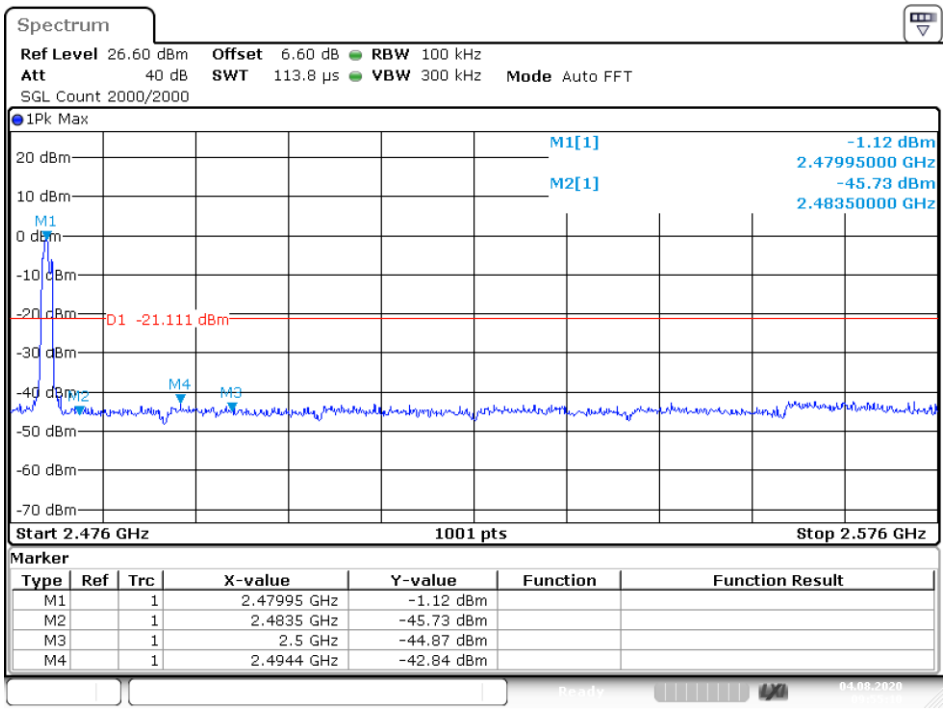
Date: 4.AUG.2020 09:37:36

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



Date: 4.AUG.2020 09:54:15

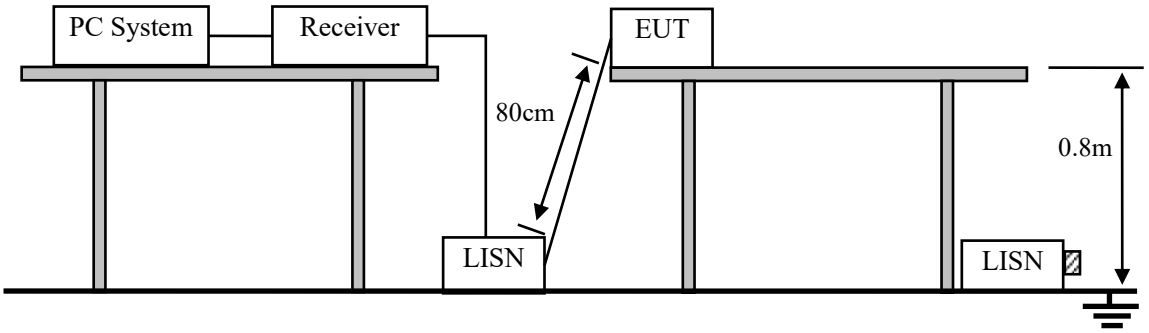
Band Edge NVNT 3-DH1 2480MHz Ant1 No-Hopping Emission



Date: 4.AUG.2020 09:55:09

10. Power Line Conducted Emissions

10.1. Block Diagram of Test Setup



:50Ω Terminator

10.2. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μV)	Average Level dB(μV)
150kHz ~ 500kHz	66 ~ 56*	56 ~ 46*
500kHz ~ 5MHz	56	46
5MHz ~ 30MHz	60	50

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

10.3. Test Procedure

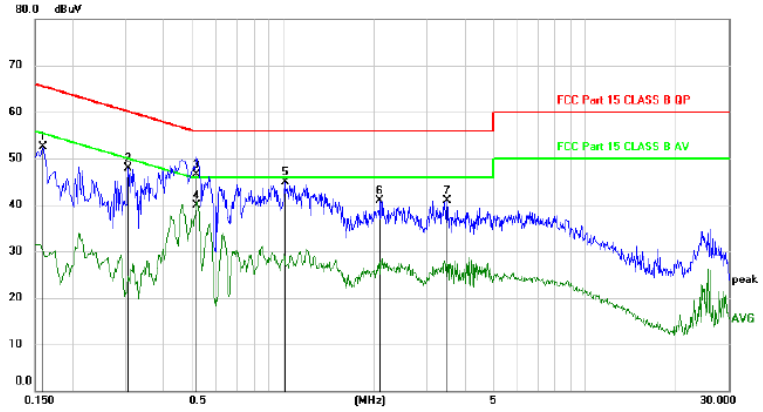
(1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
(2) Setup the EUT and simulator as shown in 10.1
(3) The EUT Power connected to the power mains through a power adapter and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected to the power mains through a line impedance stabilization network (L.I.S.N2), this provided a 50-ohm coupling impedance for the EUT (Please refer to the block diagram of the test setup and photographs). Both sides of power line were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.10 :2013on conducted Emission test.
(4) The bandwidth of test receiver is set at 10KHz.
(5) The frequency range from 150 KHz to 30MHz is checked.

10.4. Test Result

PASS. (See below detailed test data)

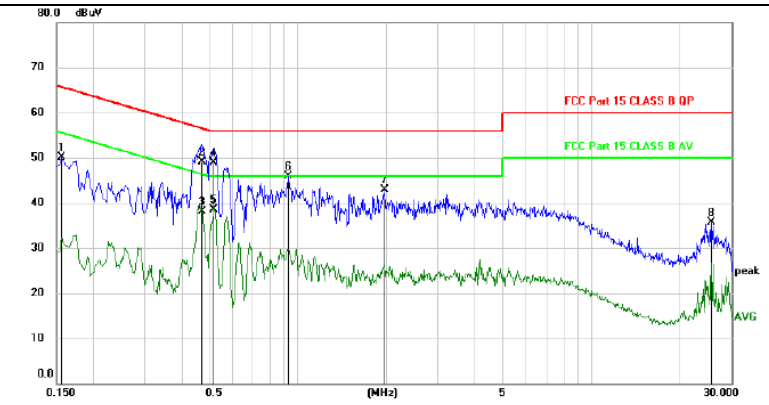
Note: If peak Result comply with AV limit, QP and AV Result is deemed to comply with AV limit

EUT Description	Geodetic GNSS Receiver	Model No.	i73
Temperature	24℃	Humidity	56%
Pol	Line	Test date	2020/08/05
Test Voltage	AC 120V/ 60Hz	Test mode	GFSK (2402MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1590	42.61	9.94	52.55	65.52	-12.97	peak	
2		0.3060	37.89	9.92	47.81	60.08	-12.27	peak	
3		0.5130	36.59	9.95	46.54	56.00	-9.46	QP	
4	*	0.5130	29.96	9.95	39.91	46.00	-6.09	AVG	
5		1.0140	35.06	9.92	44.98	56.00	-11.02	peak	
6		2.0970	30.98	9.88	40.86	56.00	-15.14	peak	
7		3.4920	30.98	9.96	40.94	56.00	-15.06	peak	

Pol	Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1560	40.07	9.94	50.01	65.67	-15.66	peak	
2		0.4710	39.25	9.95	49.20	56.50	-7.30	QP	
3		0.4710	28.11	9.95	38.06	46.50	-8.44	AVG	
4	*	0.5160	38.86	9.95	48.81	56.00	-7.19	QP	
5		0.5160	28.50	9.95	38.45	46.00	-7.55	AVG	
6		0.9270	36.04	9.96	46.00	56.00	-10.00	peak	
7		1.9740	32.98	9.88	42.86	56.00	-13.14	peak	
8		25.6950	25.30	10.47	35.77	60.00	-24.23	peak	

*:Maximum data x:Over limit !:over margin

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

Remark: All modes have been tested, and only worst data of GFSK (2402MHz) was listed in this report.

11. Antenna Requirements

11.1. Limit

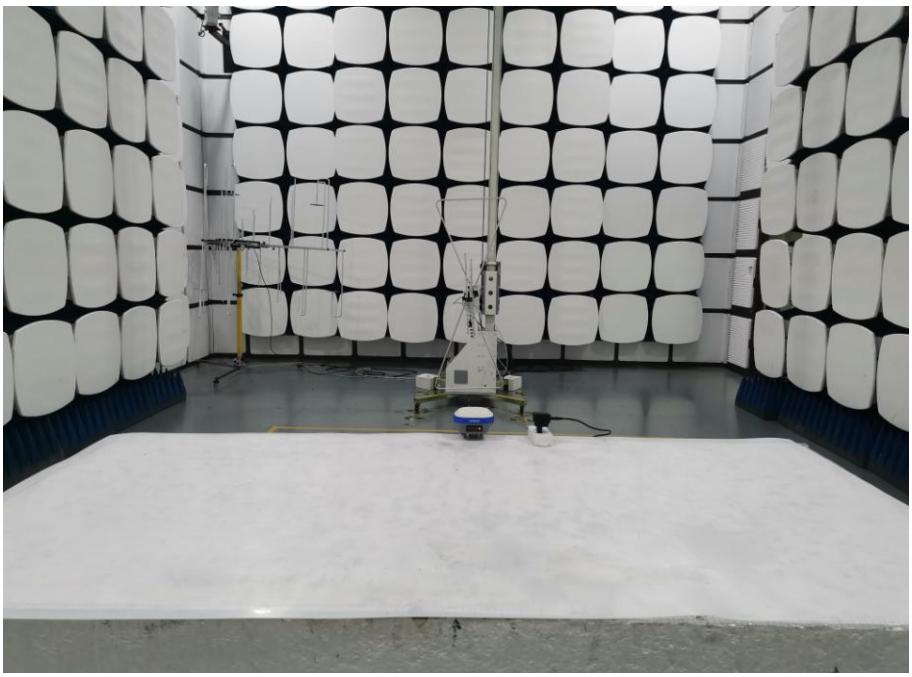
For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

11.2. Result

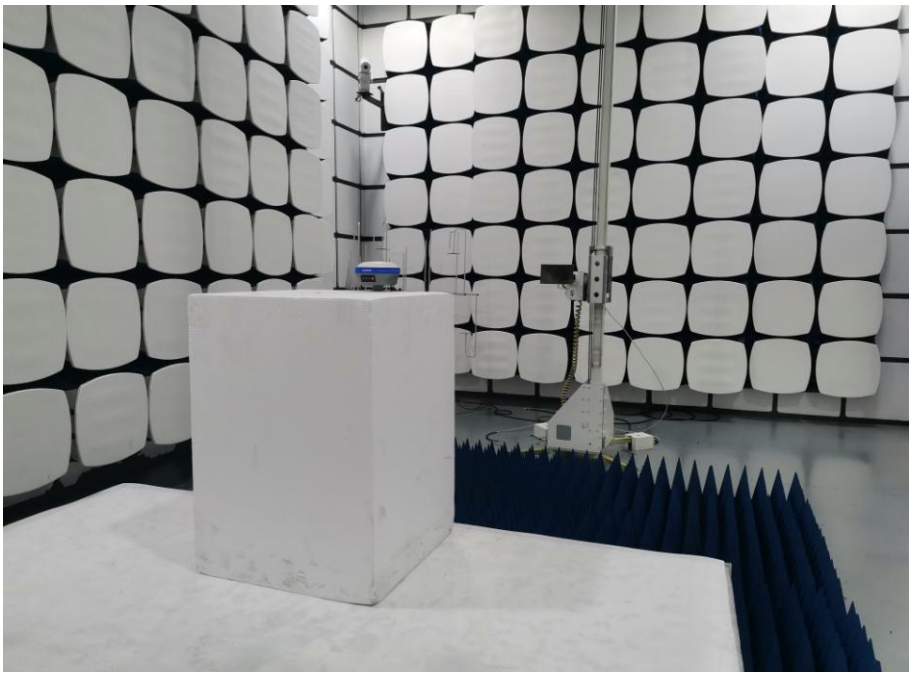
The EUT antenna is internal antenna. It complies with the standard requirement.

12. Test Setup Photo

12.1.Photos of Radiated Emission Test (In Semi Anechoic Chamber 30MHz~1GHz)



12.2.Photos of Radiated Emission Test (In Semi Anechoic Chamber above 1GHz)



12.3.Photos of Conducted disturbance at mains terminals test