FCC TEST REPORT

FCC ID: SY4-A02034

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	:	A2203020-C02-R03
Date of Receipt	:	March 08, 2022
Date of Test	:	March 08, 2022 – April 08, 2022
Date of Report	:	April 08, 2022
Version Number	:	V0

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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:

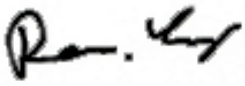
FCC Rules and Regulations Part 15 Subpart C Section 15.247

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…… ……...:	April 08, 2022	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	April 08, 2022	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.

4. The conclusion of this test report is judged by actual test data without considering measurement uncertainty.

2. General Information

2.1.Description of Device (EUT)

Description	:	Geodetic GNSS Receiver
Trademark	:	CHCNAV
Model Number	:	i73+
DIFF.	:	N/A
Test Voltage	:	DC 7.2V from battery, DC 5V for charging
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 1.56dBi.
Software version	:	V1.0
Hardware version	:	V1.7.2

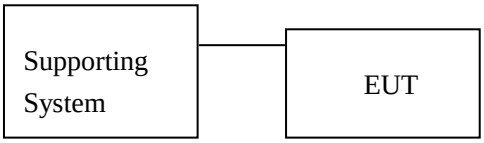
2.2.Accessories of Device (EUT)

Accessories1	:	AC Adapter
Manufacturer	:	Yisheng Electronics Co., Ltd.
Model	:	EA1012AVRU-050
Ratings	:	Input: AC 100-240V, 1.0A, 50-60Hz Output: DC 5V,2.4A

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
	Hopping	2402-2480
π/4 DQPSK	Low :CH0	2402
	Middle: CH39	2441
	High: CH78	2480
	Hopping	2402-2480
8-DPSK	Low :CH0	2402
	Middle: CH39	2441
	High: CH78	2480
	Hopping	2402-2480

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	2020.09.02	3Year
Spectrum analyzer	ROHDE&SCHWARZ	FSV40-N	102137	2021.08.25	1Year
Spectrum analyzer	Agilent	N9020A	MY499100060	2021.08.25	1Year
Receiver	ROHDE&SCHWARZ	ESR	1316.3003K03-102082-Wa	2021.08.25	1Year
Receiver	R&S	ESCI	101165	2021.08.25	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	2021.08.30	2Year
RF Cable	Resenberger	Cable 1	RE1	2021.08.25	1Year
RF Cable	Resenberger	Cable 2	RE2	2021.08.25	1Year
RF Cable	Resenberger	Cable 3	CE1	2021.08.25	1Year
Pre-amplifier	HP	HP8347A	2834A00455	2021.08.25	1Year
Pre-amplifier	Agilent	8449B	3008A02664	2021.08.25	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126-466	2021.08.25	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2021.08.25	1 Year
Horn Antenna	SCHWARZBECK	BBHA9170	00946	2021.08.30	2 Year
Preamplifier	SKET	LNPA_1840-50	SK2018101801	2021.08.25	1 Year
Power Meter	Agilent	E9300A	MY41496628	2021.08.25	1 Year
Power Sensor	DARE	RPR3006W	15100041SNO91	2021.08.25	1 Year
Temp. & Humid. Chamber	Weihuang	WHTH-1000-40-880	100631	2021.04.21	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	20140927-6	2021.08.25	1 Year
10dB Attenuator	Mini-Circuits	N/A	N/A	N/A	N/A
Adjustable attenuator	MWRFtest	N/A	N/A	N/A	N/A

Software Information			
Test Item	Software Name	Manufacturer	Version
RE	EZ-EMC	EZ	Alpha-3A1
CE	EZ-EMC	EZ	Alpha-3A1
RF-CE	MTS 8310	MW	V2.0.0.0

3. Maximum Peak Output Power

3.1.Limit

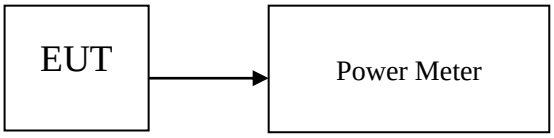
Please refer section15.247.

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	10.499	30	Pass
NVNT	1-DH1	2441	11.721	30	Pass
NVNT	1-DH1	2480	10.284	30	Pass
NVNT	2-DH1	2402	5.744	21	Pass
NVNT	2-DH1	2441	7.505	21	Pass
NVNT	2-DH1	2480	6.593	21	Pass
NVNT	3-DH1	2402	6.165	21	Pass
NVNT	3-DH1	2441	7.133	21	Pass
NVNT	3-DH1	2480	6.384	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.

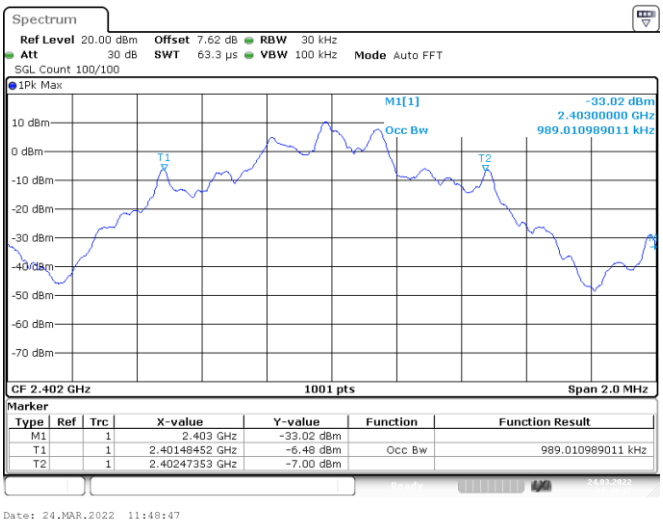
4.2.Test Procedure

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.

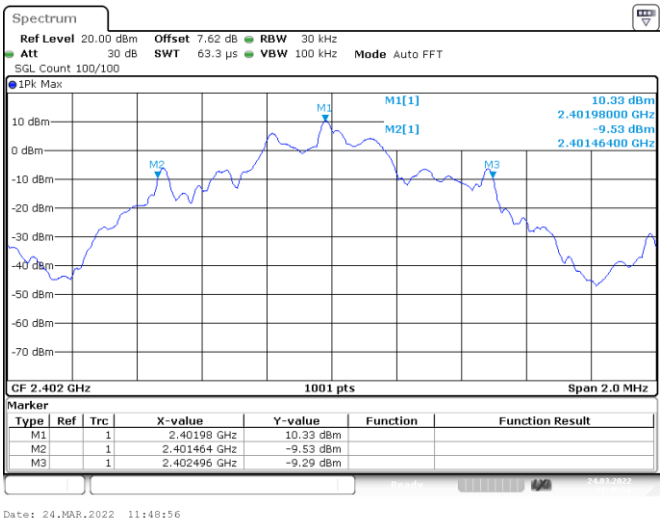
4.3.Test Result

Condition	Mode	Frequency (MHz)	99% OBW (MHz)	-20 dB Bandwidth (MHz)	Limit -20 dB Bandwidth (MHz)	Verdict
NVNT	1-DH1	2402	0.989	1.032	/	Pass
NVNT	1-DH1	2441	0.997	1.032	/	Pass
NVNT	1-DH1	2480	0.995	1.032	/	Pass
NVNT	2-DH1	2402	1.171	1.214	/	Pass
NVNT	2-DH1	2441	1.175	1.216	/	Pass
NVNT	2-DH1	2480	1.171	1.212	/	Pass
NVNT	3-DH1	2402	1.119	1.154	/	Pass
NVNT	3-DH1	2441	1.111	1.17	/	Pass
NVNT	3-DH1	2480	1.103	1.146	/	Pass

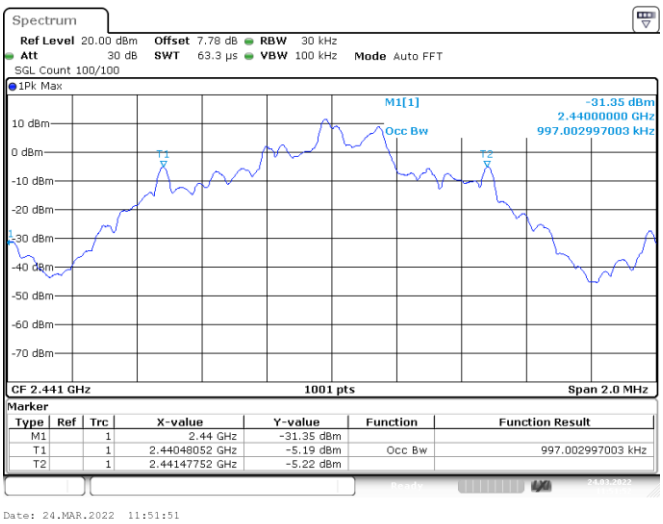
OBW NVNT 1-DH1 2402MHz Ant1



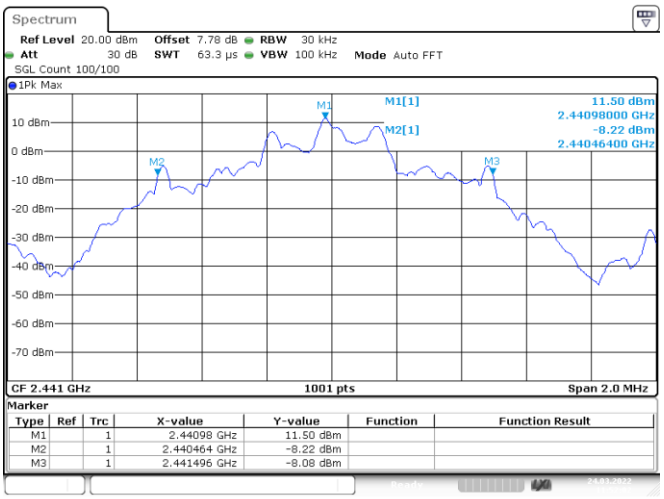
-20 dB BW NVNT 1-DH1 2402MHz Ant1



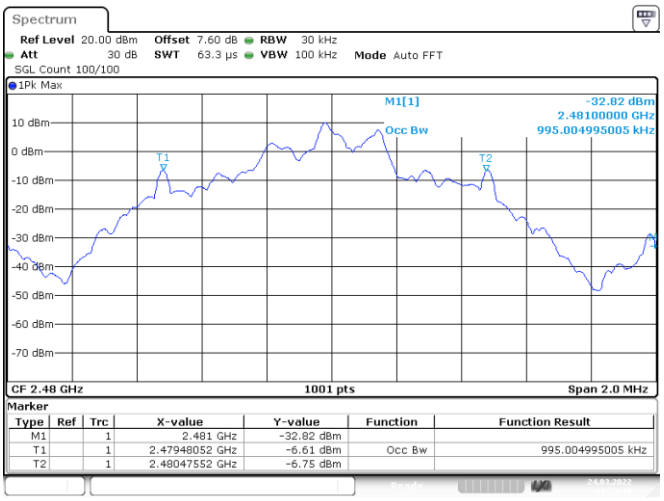
OBW NVNT 1-DH1 2441MHz Ant1



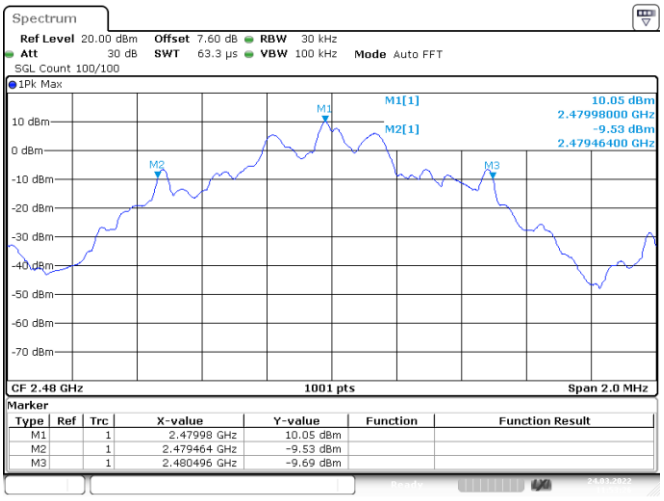
-20 dB BW NVNT 1-DH1 2441MHz Ant1



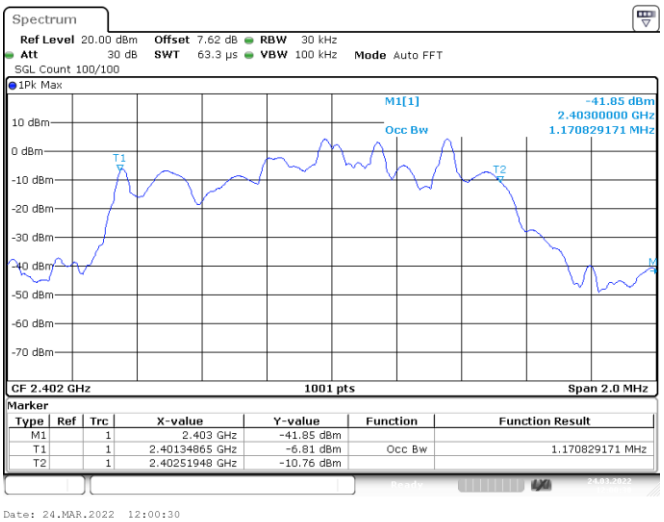
OBW NVNT 1-DH1 2480MHz Ant1



-20 dB BW NVNT 1-DH1 2480MHz Ant1



OBW NVNT 2-DH1 2402MHz Ant1



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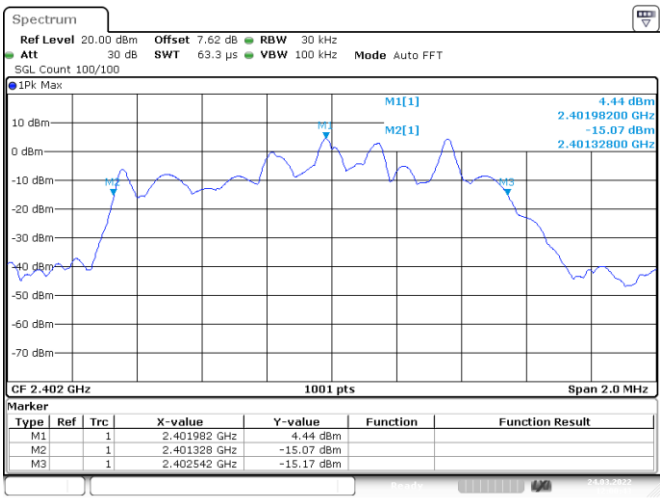

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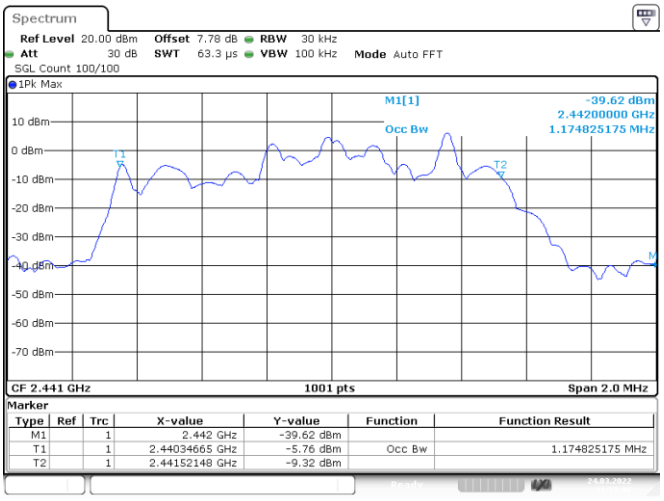

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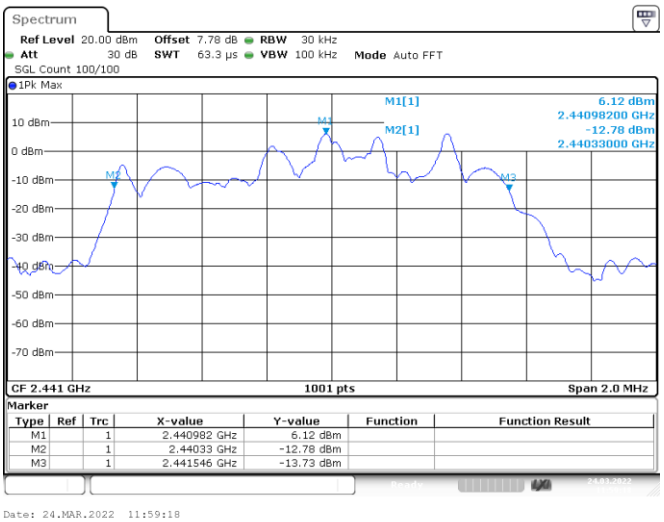

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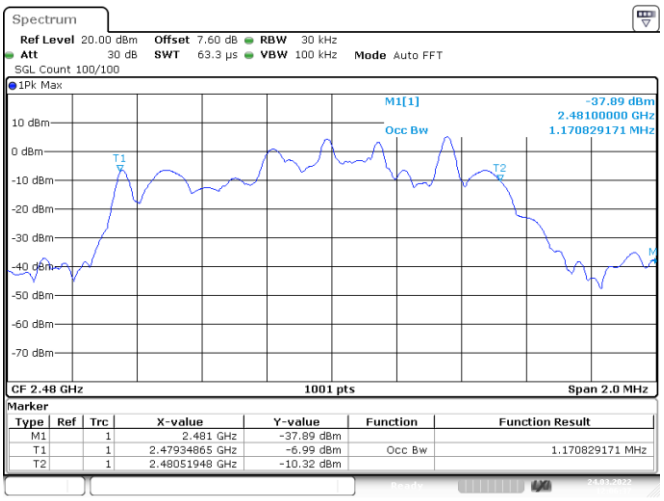

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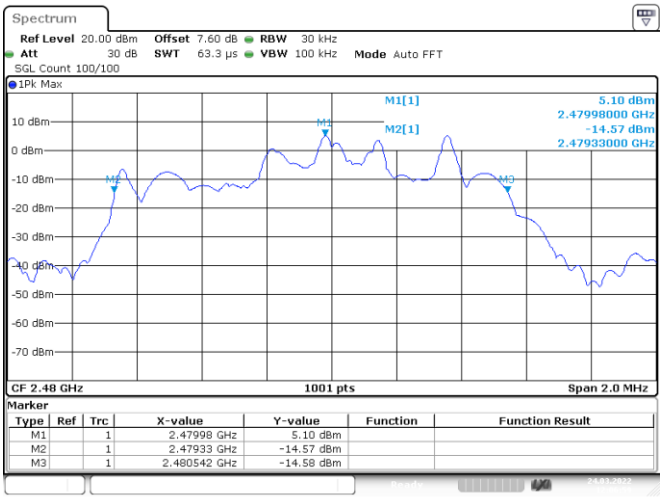

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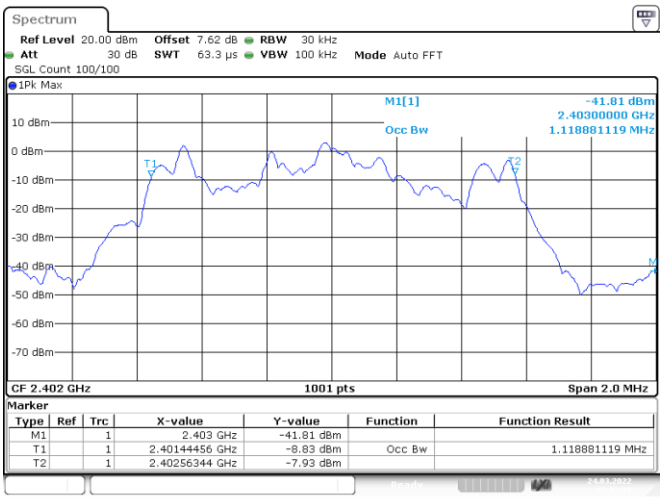

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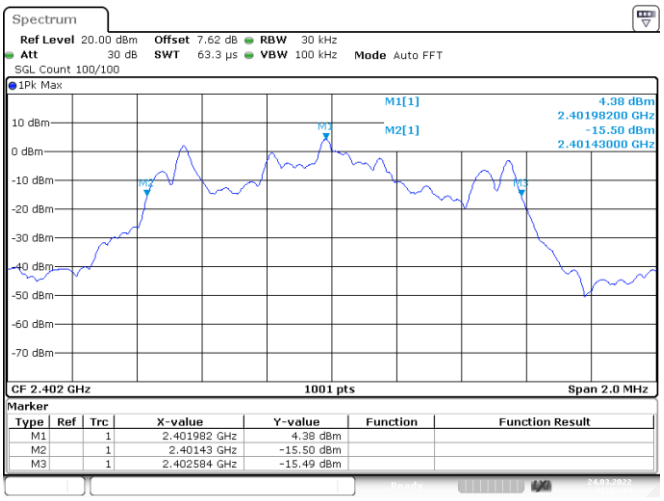

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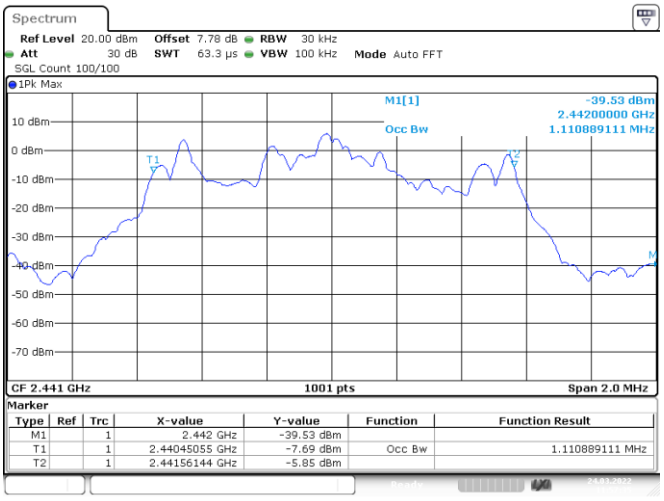

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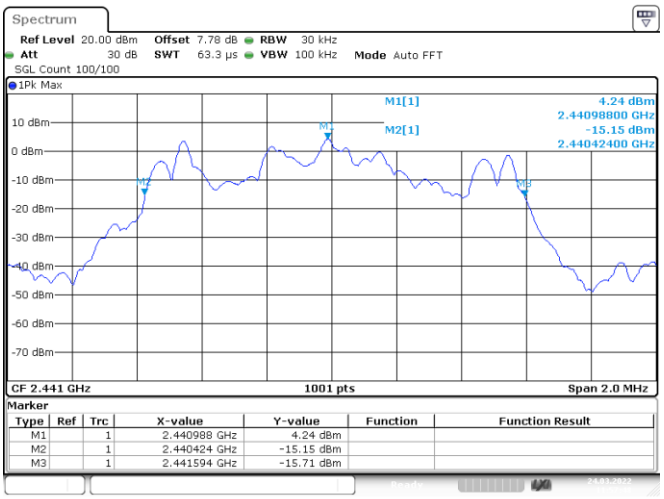
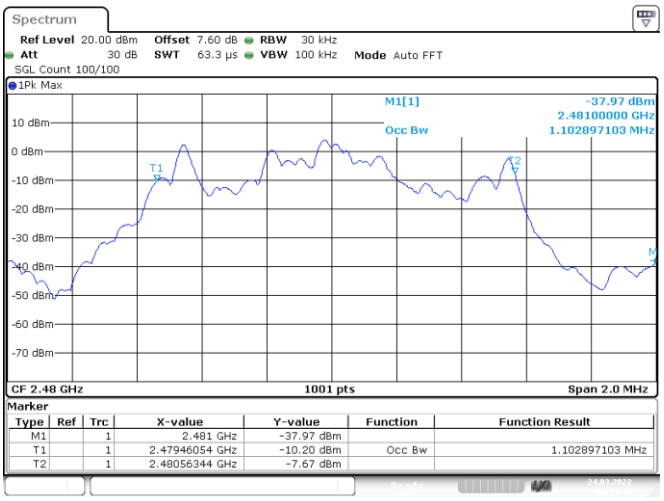
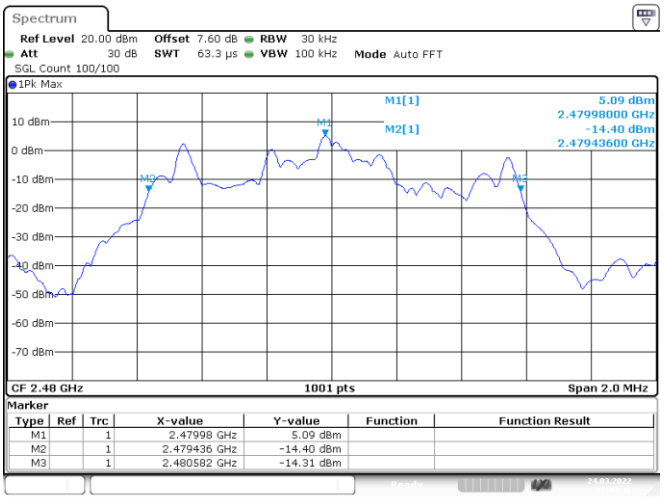


OBW NVNT 3-DH1 2480MHz Ant1



-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

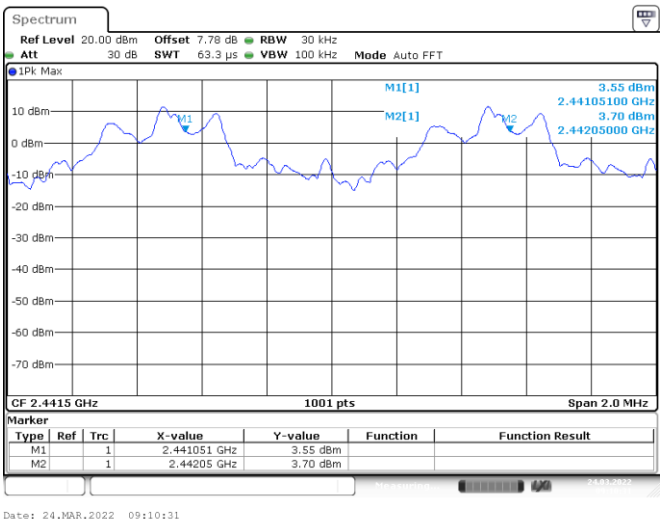
5.2.Test Procedure

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.

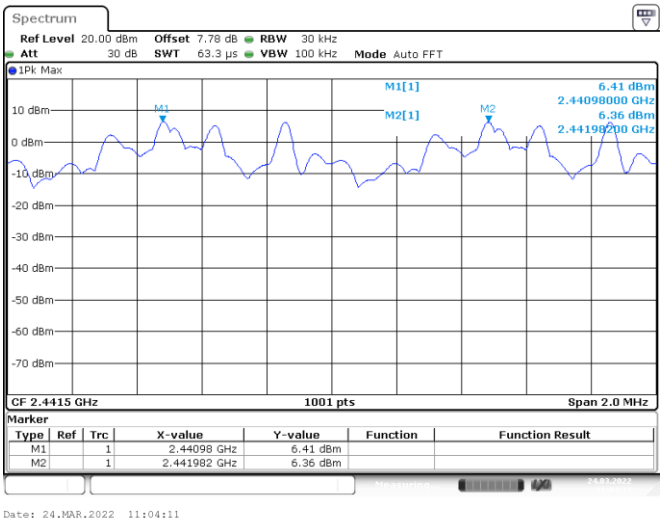
5.3.Test Result

Condition	Mode	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH1	2441.051	2442.05	0.999	0.700	Pass
NVNT	2-DH1	2440.98	2441.982	1.002	0.857	Pass
NVNT	3-DH1	2440.982	2441.982	1	0.857	

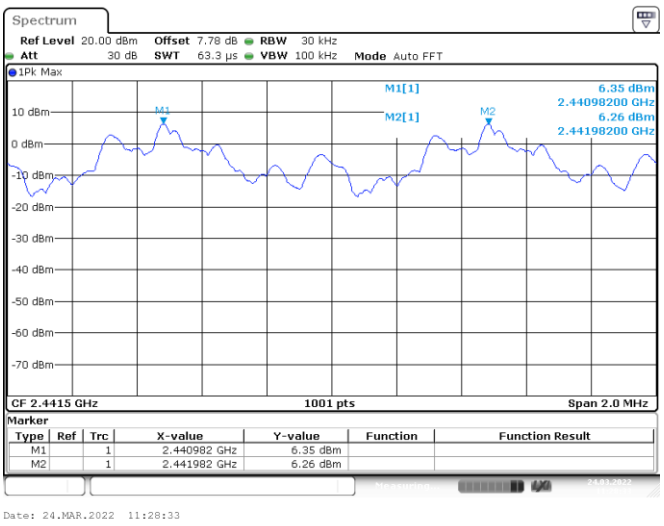
CFS NVNT 1-DH1 2441MHz Ant1



CFS NVNT 2-DH1 2441MHz Ant1



CFS NVNT 3-DH1 2441MHz Ant1



6. Number Of Hopping Channel

6.1.Limit

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

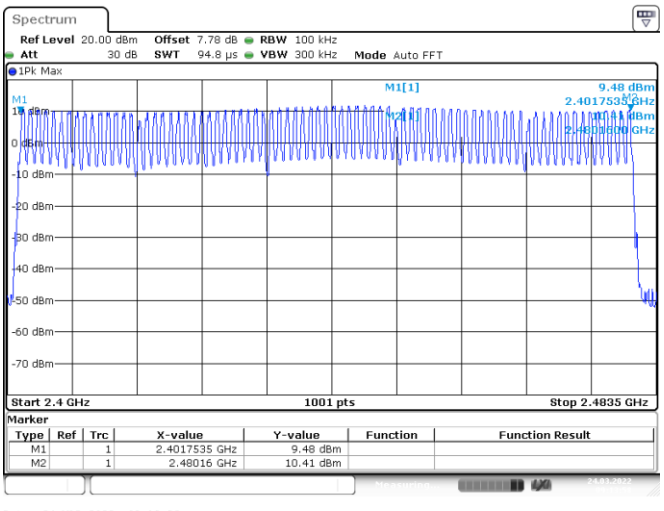
6.2.Test Procedure

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.

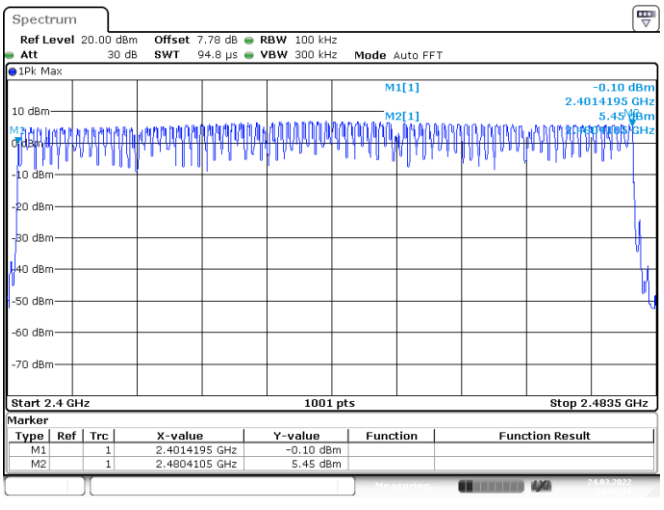
6.3.Test Result

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

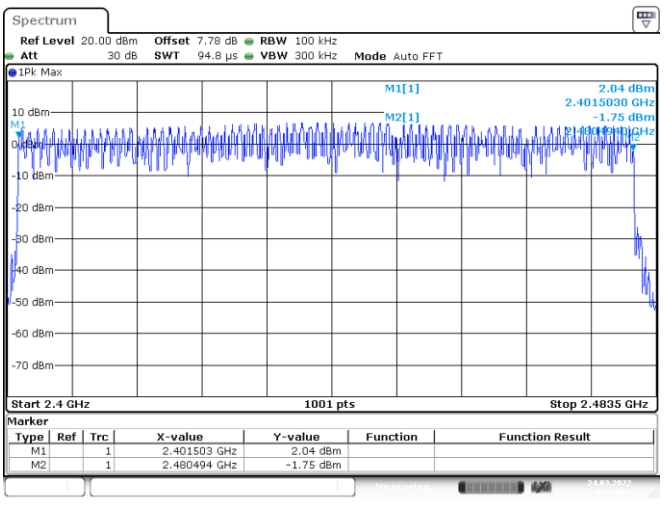
Hopping No. NVNT 1-DH1 2441MHz



Hopping No. NVNT 2-DH1 2441MHz



Hopping No. NVNT 3-DH1 2441MHz



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	0.404	129.280	31600	400	Pass
NVNT	1-DH3	2441	1.659	265.440	31600	400	Pass
NVNT	1-DH5	2441	2.907	310.080	31600	400	Pass
NVNT	2-DH1	2441	0.406	129.920	31600	400	Pass
NVNT	2-DH3	2441	1.659	265.440	31600	400	Pass
NVNT	2-DH5	2441	2.906	309.973	31600	400	Pass
NVNT	3-DH1	2441	0.408	130.560	31600	400	Pass
NVNT	3-DH3	2441	1.658	265.280	31600	400	Pass
NVNT	3-DH5	2441	2.91	310.400	31600	400	Pass

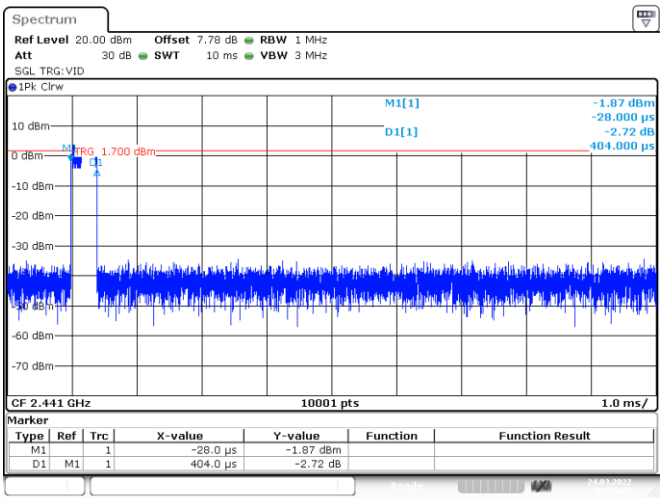
Note: 1 A period time = 0.4 (s) * 79 = 31.6(s)

2 DH1 time slot = Pulse Duration * (1600/(2*79)) * A period time

DH3 time slot = Pulse Duration * (1600/(4*79)) * A period time

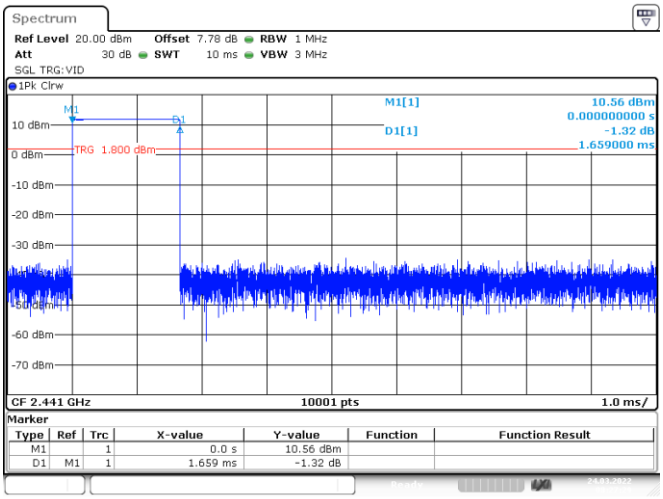
DH5 time slot = Pulse Duration * (1600/(6*79)) * A period time

Dwell NVNT 1-DH1 2441MHz



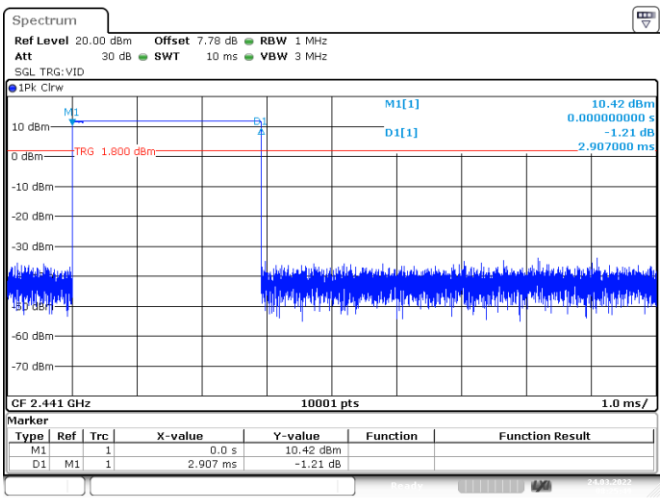
Date: 24.MAR.2022 09:14:05

Dwell NVNT 1-DH3 2441MHz



Date: 24.MAR.2022 08:27:29

Dwell NVNT 1-DH5 2441MHz



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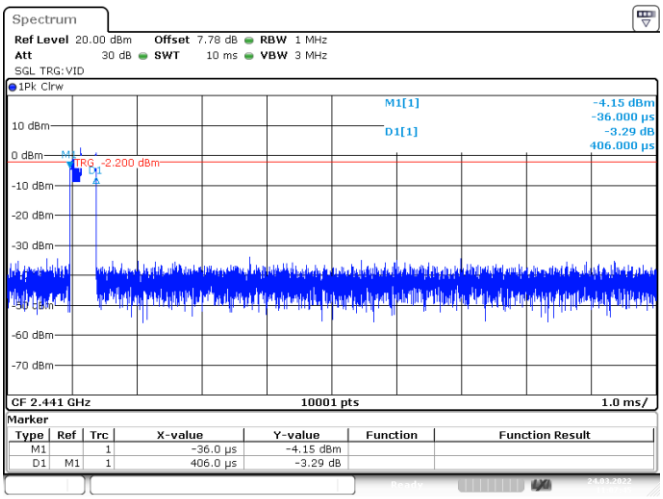
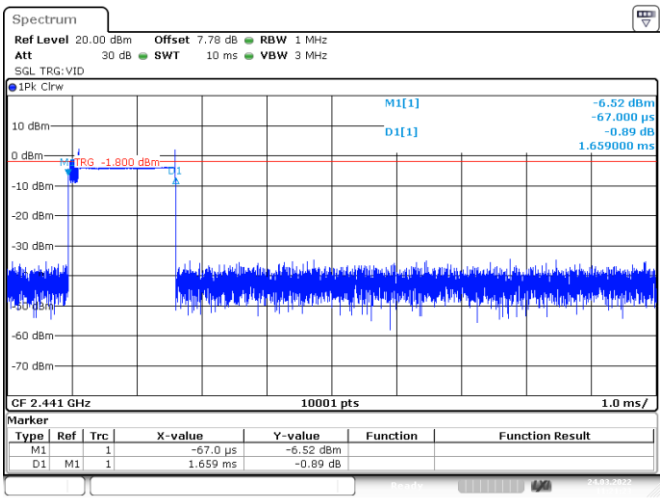
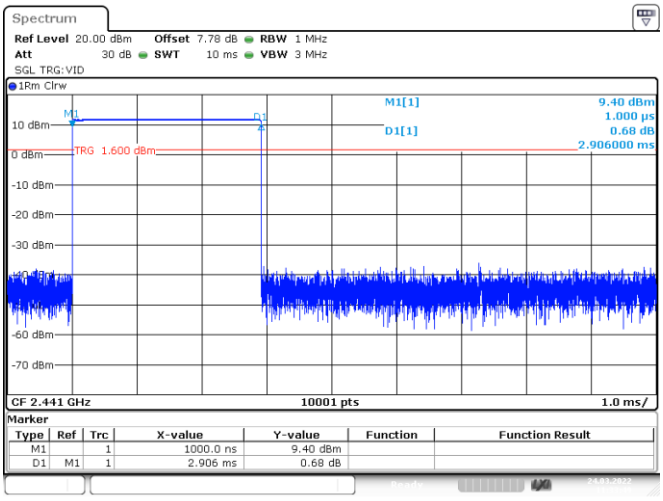
Dwell NVNT 2-DH1 2441MHz



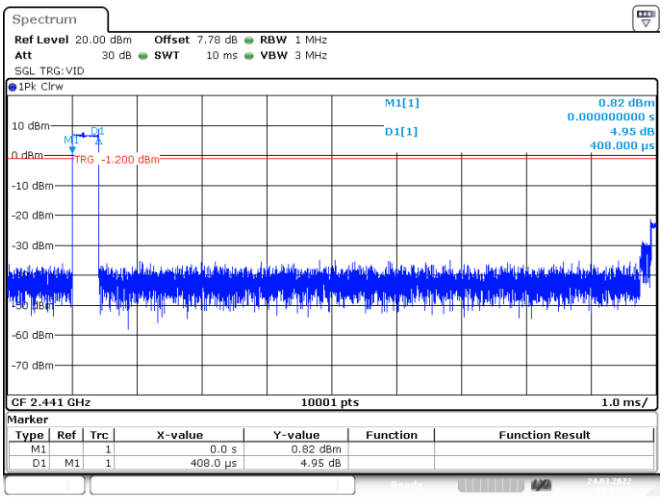
Dwell NVNT 2-DH3 2441MHz



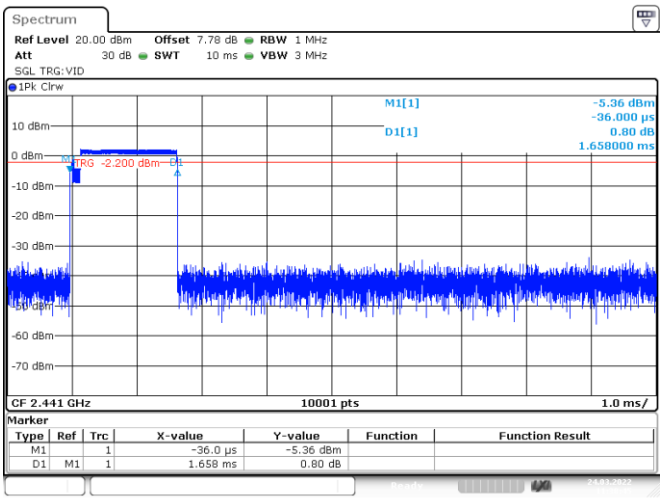
Dwell NVNT 2-DH5 2441MHz



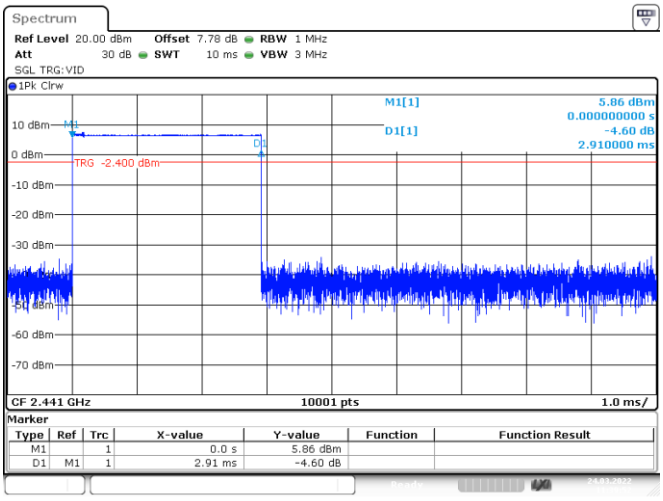
Dwell NVNT 3-DH1 2441MHz



Dwell NVNT 3-DH3 2441MHz



Dwell NVNT 3-DH5 2441MHz



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)	
Note 1: The peak limit is 20 dB higher than the average limit			

Harmonic emissions limits comply with below 54 dBuV/m at 3m. Other emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or comply with the radiated emissions limits specified in section 15.209(a) limit in the table below has to be followed.

8.2.Test Procedure

The measuring distance of 3m shall be used for measurements at frequency up to 1GH and above 1GHz, The EUT was placed on a rotating 0.8 m high above ground for below 1GHz and 1.5m high for above1GHz testing, The table was rotated 360 degrees to determine the position of the highest radiation.

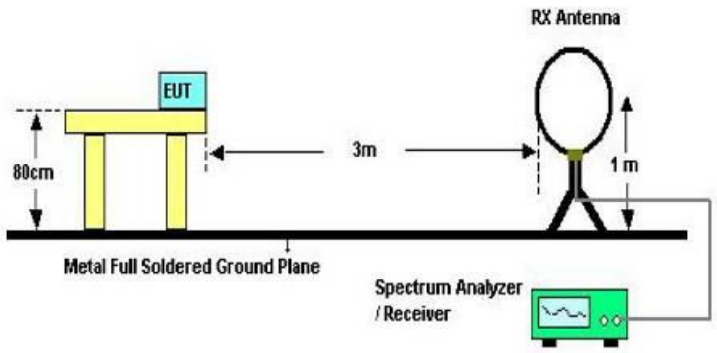
The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set of make measurement.

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 then Qusia Peak Detector mode premeasured

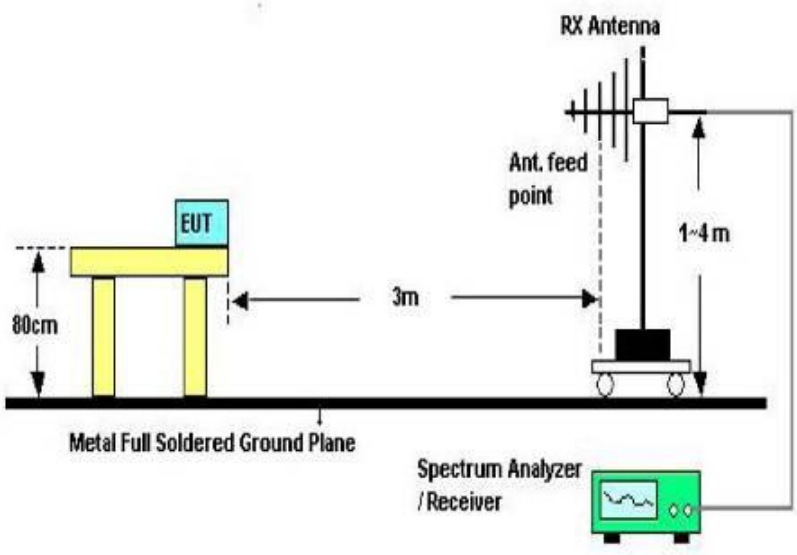
If Peak value comply with QP limit Below 1GHz.The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.

For the actual test configuration, please see the test setup photo.

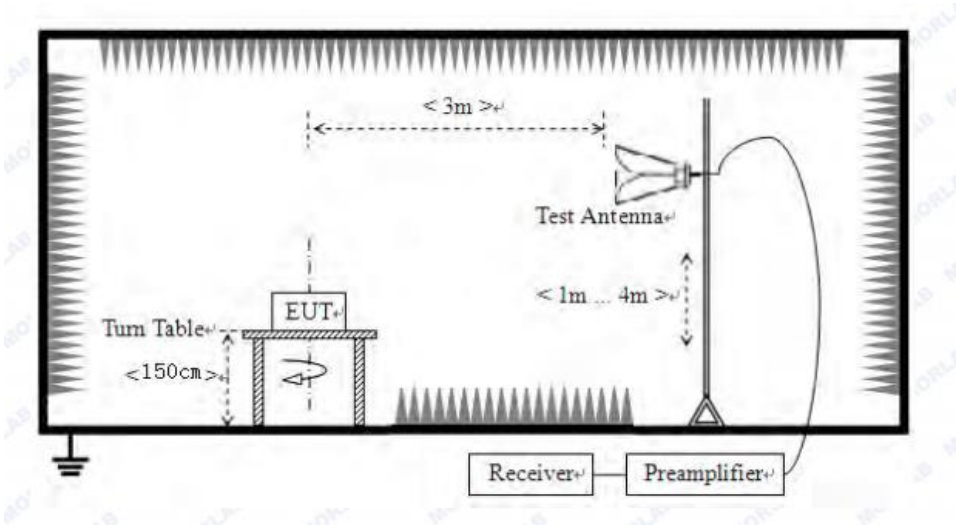
8.3.Block Diagram of Test setup



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

8.4.Test Result

Test Condition

Continual Transmitting in maximum power.

9KHz~150KHz	RBW200Hz	VBW1KHz
150KHz~30MHz	RBW9KHz	VBW 30KHz
30MHZ~1GHz	RBW120KHz	VBW 300KHz
Above1GHz	RBW1MHz	VBW 3MHz

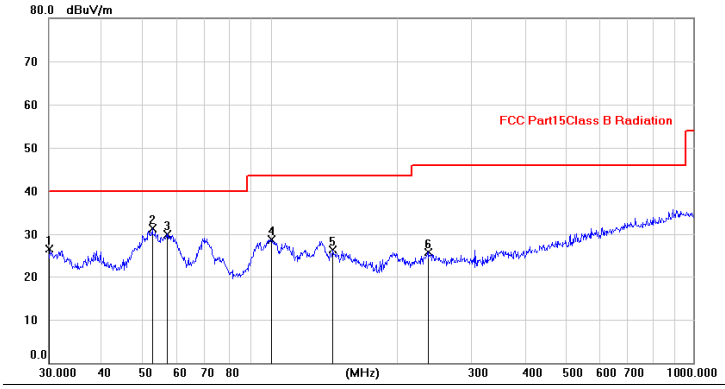
We have scanned the 10th harmonic from 9KHz to the EUT's highest frequency.
Detailed information please see the following page.

From 9KHz to 30MHz: Conclusion: PASS

Note: 1.The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

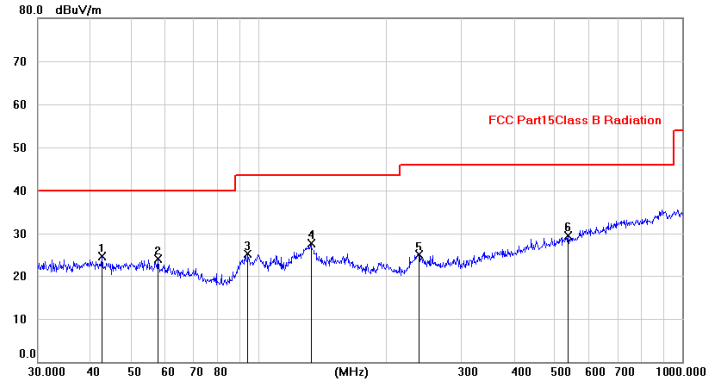
2.Only show the test data of the worst Channel in this report.

From 30MHz to 1000MHz: Conclusion: PASS			
EUT Description	Geodetic GNSS Receiver	**Model No.**	i73+
Temperature	24℃	**Humidity**	56%
Pol	Vertical	**Test date**	2022.03.10
Test Voltage	DC 5V From USB Port	**Test mode**	GFSK (2441MHz)



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		30.0702	13.03	13.52	26.55	40.00	-13.45	peak			
2	*	52.6306	17.45	13.78	31.23	40.00	-8.77	peak			
3		56.9979	16.59	13.41	30.00	40.00	-10.00	peak			
4		100.8278	17.83	10.93	28.76	43.50	-14.74	peak			
5		140.8679	11.91	14.38	26.29	43.50	-17.21	peak			
6		236.1198	13.29	12.46	25.75	46.00	-20.25	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	*	42.5552	10.19	14.28	24.47	40.00	-15.53	peak			
2		57.6007	10.40	13.41	23.81	40.00	-16.19	peak			
3		93.8781	14.81	10.36	25.17	43.50	-18.33	peak			
4		132.7160	13.82	13.79	27.61	43.50	-15.89	peak			
5		238.8959	12.43	12.52	24.95	46.00	-21.05	peak			
6		536.1458	10.55	18.96	29.51	46.00	-16.49	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 (2441MHz) 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	43.73	V	33.95	10.18	34.26	53.60	74	-20.40	PK
4804	35.04	V	33.95	10.18	34.26	44.91	54	-9.09	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	42.83	H	33.95	10.18	34.26	52.70	74	-21.30	PK
4804	35.58	H	33.95	10.18	34.26	45.45	54	-8.55	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: GFSK TX Mid									
4882	45.47	V	33.93	10.2	34.29	55.31	74	-18.69	PK
4882	35.79	V	33.93	10.2	34.29	45.63	54	-8.37	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	44.94	H	33.93	10.2	34.29	54.78	74	-19.22	PK
4882	33.22	H	33.93	10.2	34.29	43.06	54	-10.94	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: GFSK TX High									
4960	44.08	V	33.98	10.22	34.25	54.03	74	-19.97	PK
4960	35.05	V	33.98	10.22	34.25	45.00	54	-9.00	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	47.11	H	33.98	10.22	34.25	57.06	74	-16.94	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	43.69	V	33.95	10.18	34.26	53.56	74	-20.44	PK
4804	35.68	V	33.95	10.18	34.26	45.55	54	-8.45	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	42.53	H	33.95	10.18	34.26	52.40	74	-21.60	PK
4804	34.95	H	33.95	10.18	34.26	44.82	54	-9.18	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: π/4 DQPSK TX Mid									
4882	45.21	V	33.93	10.2	34.25	55.09	74	-18.91	PK
4882	35.38	V	33.93	10.2	34.25	45.26	54	-8.74	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	44.84	H	33.93	10.2	34.29	54.68	74	-19.32	PK
4882	33.85	H	33.93	10.2	34.29	43.69	54	-10.31	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: π/4 DQPSK TX High									
4960	43.52	V	33.98	10.22	34.25	53.47	74	-20.53	PK
4960	35.36	V	33.98	10.22	34.25	45.31	54	-8.69	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	47.35	H	33.98	10.22	34.25	57.30	74	-16.70	PK
4960	36.61	H	33.98	10.22	34.25	46.56	54	-7.44	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/

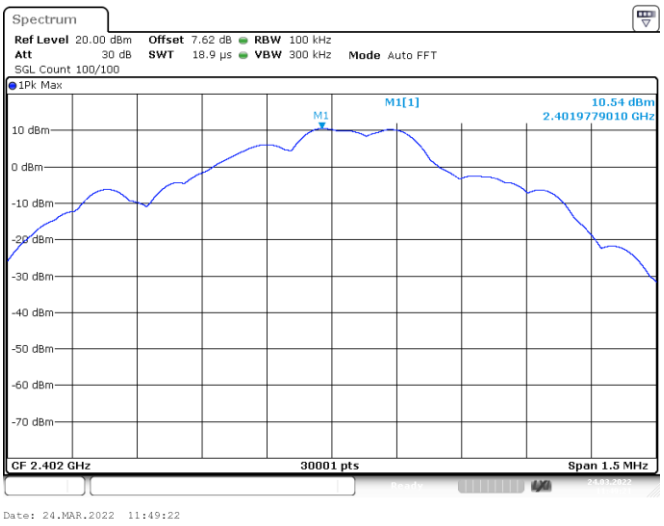
Note:
1, Result = Read level + Antenna factor + cable loss-Amp factor
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Test Mode: 8-DPSK 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	44.21	V	33.95	10.18	34.26	54.08	74	-19.92	PK
4804	35.44	V	33.95	10.18	34.26	45.31	54	-8.69	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	42.89	H	33.95	10.18	34.26	52.76	74	-21.24	PK
4804	34.96	H	33.95	10.18	34.26	44.83	54	-9.17	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: 8-DPSK TX Mid									
4882	45.51	V	33.93	10.2	34.29	55.35	74	-18.65	PK
4882	35.77	V	33.93	10.2	34.29	45.61	54	-8.39	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	44.48	H	33.93	10.2	34.29	54.32	74	-19.68	PK
4882	33.56	H	33.93	10.2	34.29	43.40	54	-10.60	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: 8-DPSK TX High									
4960	44.02	V	33.98	10.22	34.25	53.97	74	-20.03	PK
4960	35.13	V	33.98	10.22	34.25	45.08	54	-8.92	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	46.64	H	33.98	10.22	34.25	56.59	74	-17.41	PK
4960	36.28	H	33.98	10.22	34.25	46.23	54	-7.77	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/

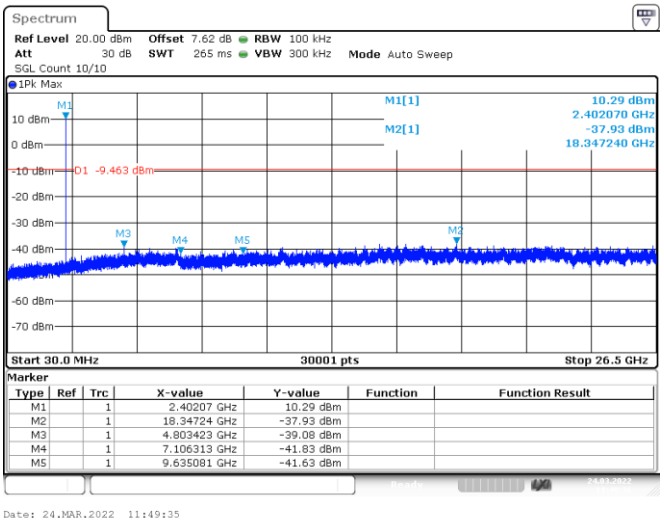
Note:
1, Result = Read level + Antenna factor + cable loss-Amp factor
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Conducted RF Spurious Emission

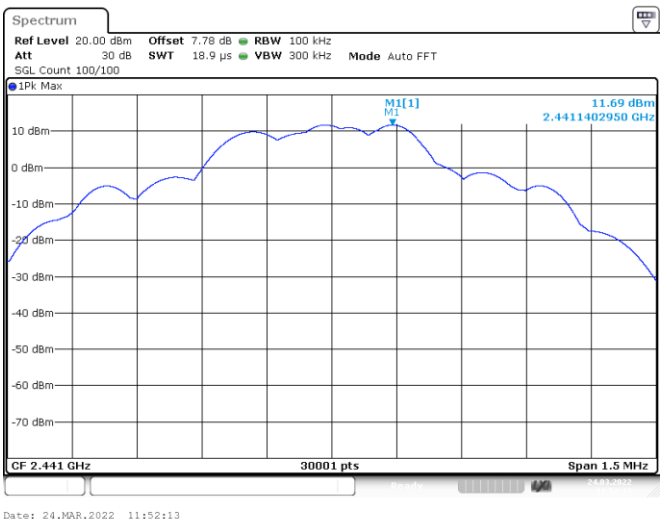
Tx. Spurious NVNT 1-DH1 2402MHz Ant1 Ref



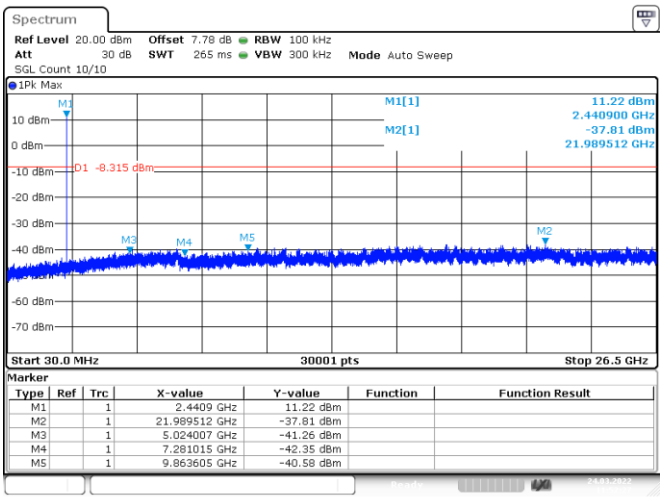
Tx. Spurious NVNT 1-DH1 2402MHz Ant1 Emission



Tx. Spurious NVNT 1-DH1 2441MHz Ant1 Ref

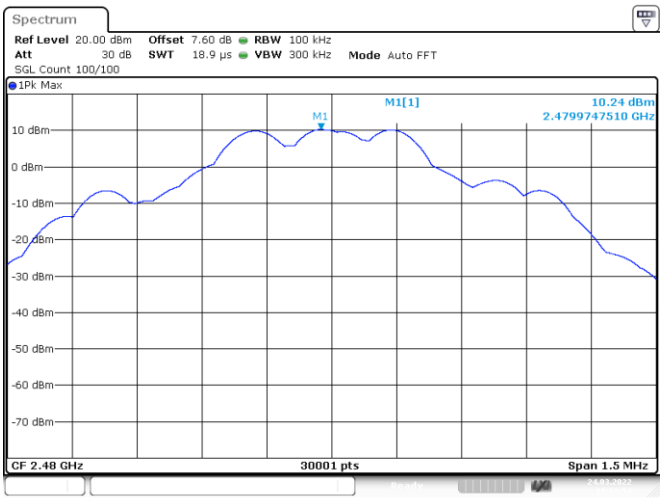


Tx. Spurious NVNT 1-DH1 2441MHz Ant1 Emission



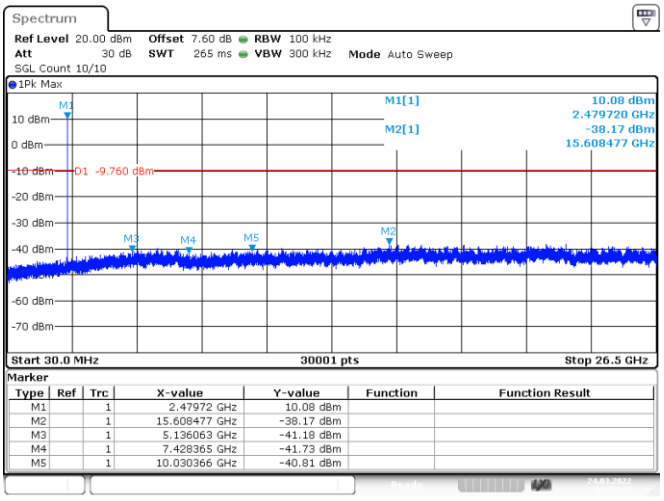
Date: 24.MAR.2022 11:52:27

Tx. Spurious NVNT 1-DH1 2480MHz Ant1 Ref



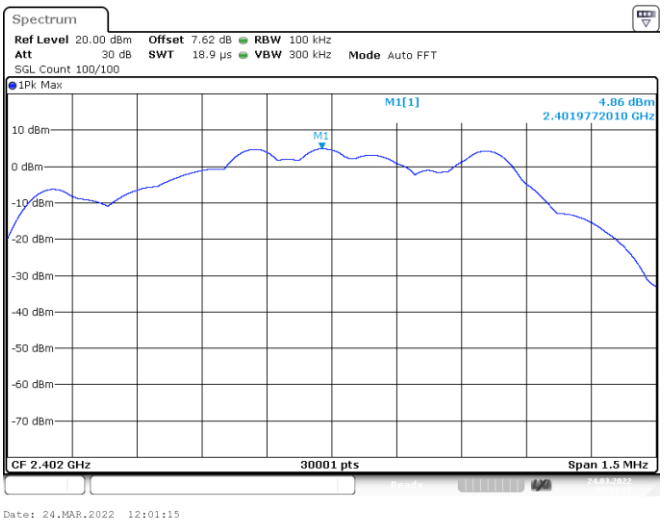
Date: 24.MAR.2022 11:53:54

Tx. Spurious NVNT 1-DH1 2480MHz Ant1 Emission

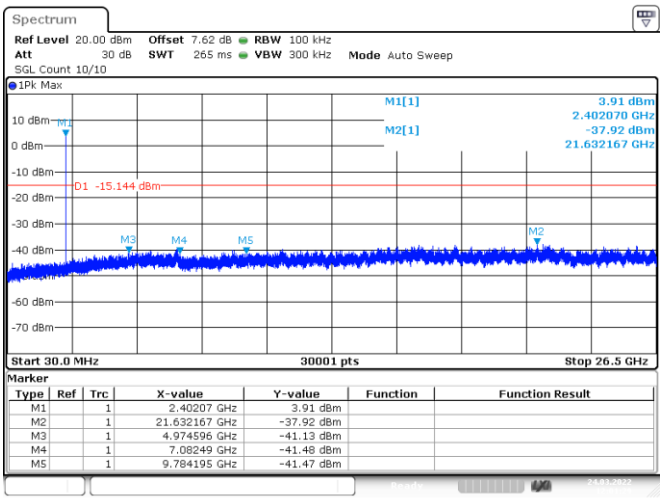


Date: 24.MAR.2022 11:54:07

Tx. Spurious NVNT 2-DH1 2402MHz Ant1 Ref



Tx. Spurious NVNT 2-DH1 2402MHz Ant1 Emission



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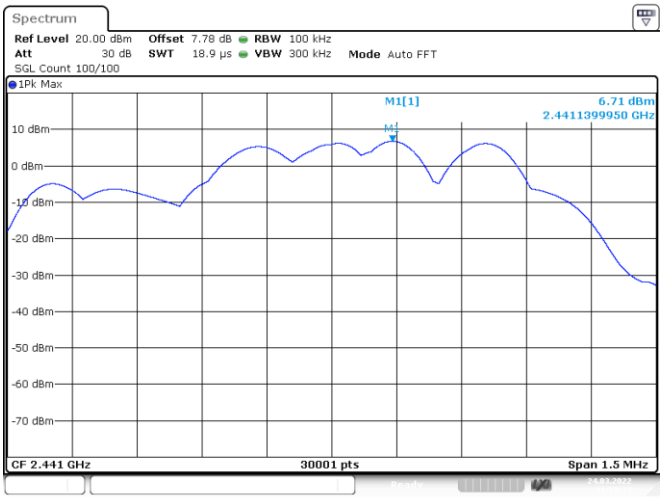

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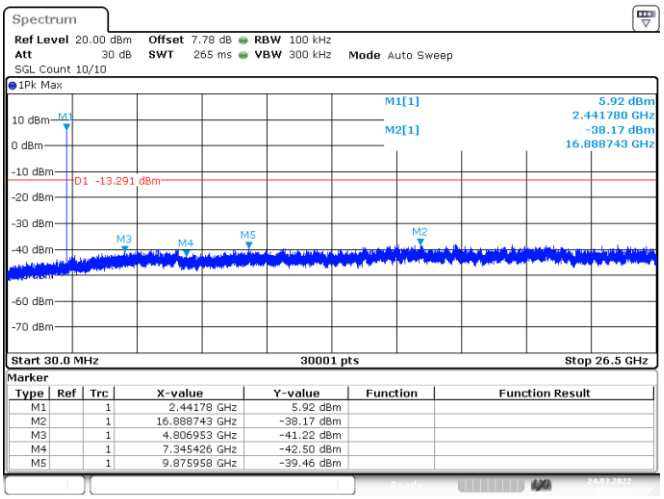

Date: 24.MAR.2022 11:59:46

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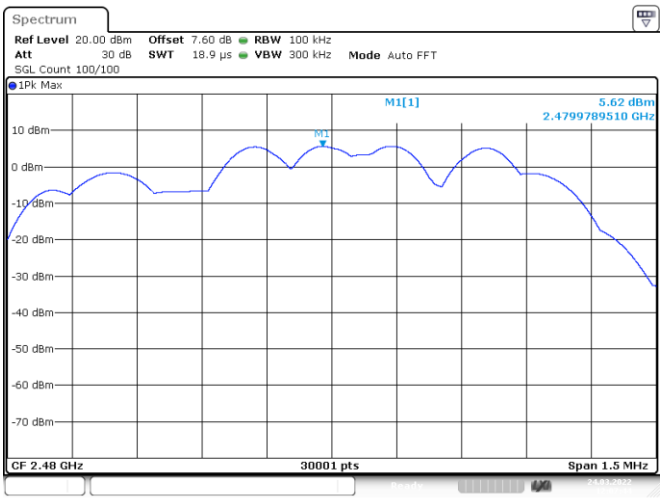

Date: 24.MAR.2022 12:07:44

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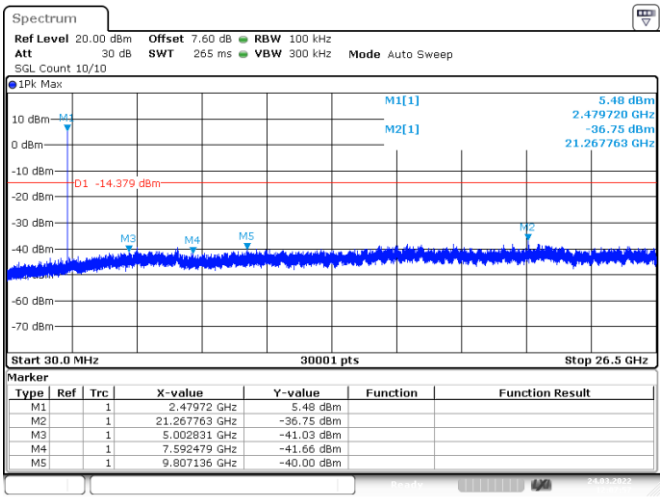

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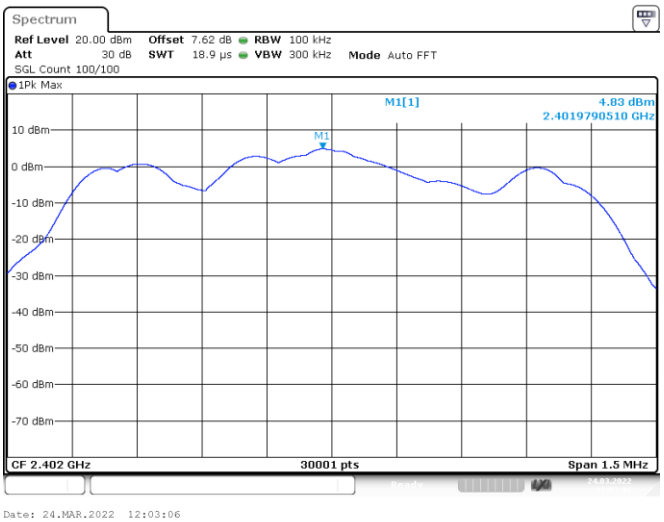

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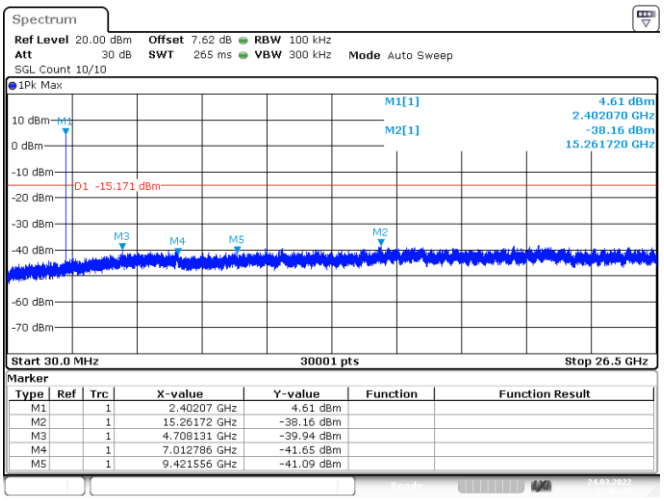

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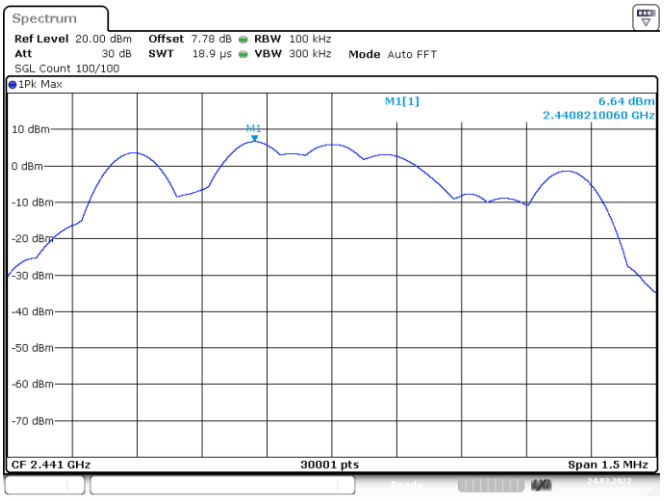

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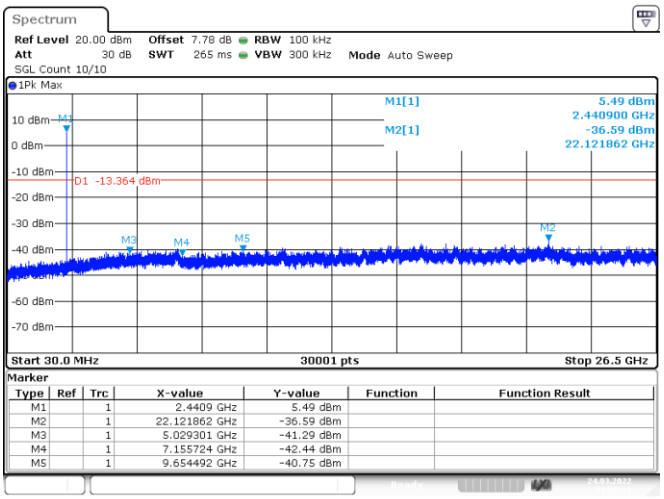

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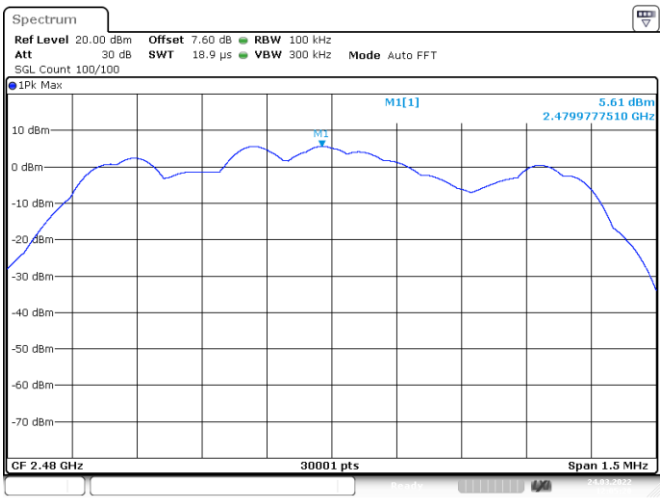

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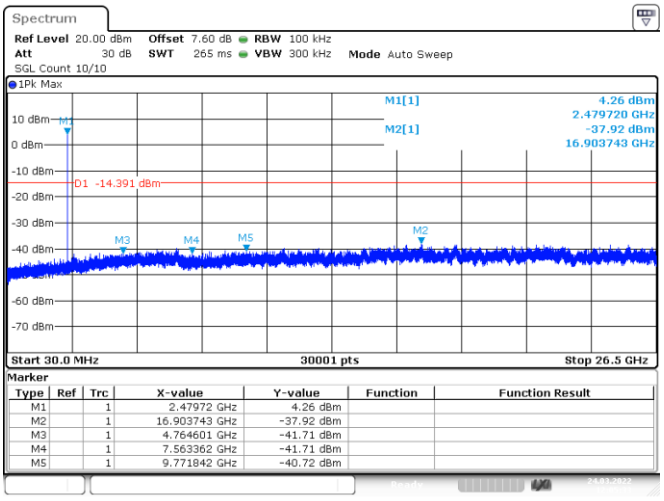


9. Band Edge Compliance

9.1.Limit

All the lower and upper band-edges emissions appearing within 2310MHz to 2390MHz and 2483.5MHz to 2500MHz restricted frequency bands shall not exceed the limits shown in 15.209, all the other emissions outside operation frequency band 2400MHz to 2483.5MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 limits.

9.2.Test Procedure

9.2.1 Put the EUT on a 1.5m high table, power on the EUT. Emissions were scanned and measured rotating the EUT to 360 degrees, Find the maximum Emission

9.2.2 Check the spurious emissions out of band.

9.2.3 RBW 1MHz, VBW 3MHz, peak detector for peak value , RBW 1MHz ,VBW 10Hz , RMS detector for AV value.

9.3.Block Diagram of Test Setup

Same as 8.3.

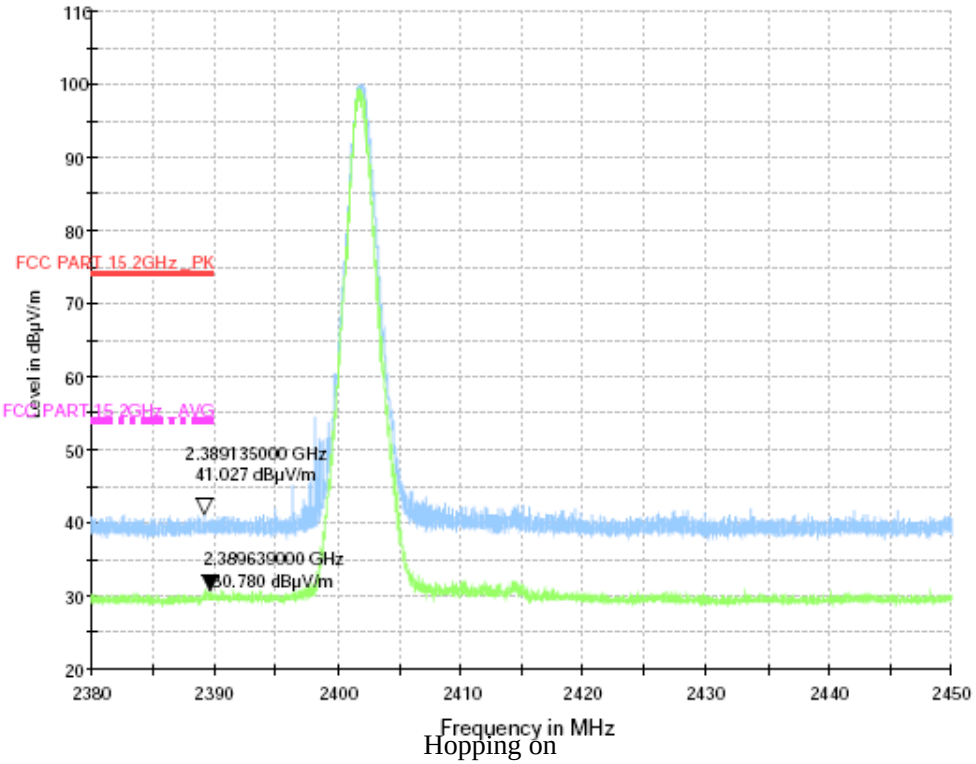
9.4.Test Result

PASS. (See below detailed test data)

Radiated Method:

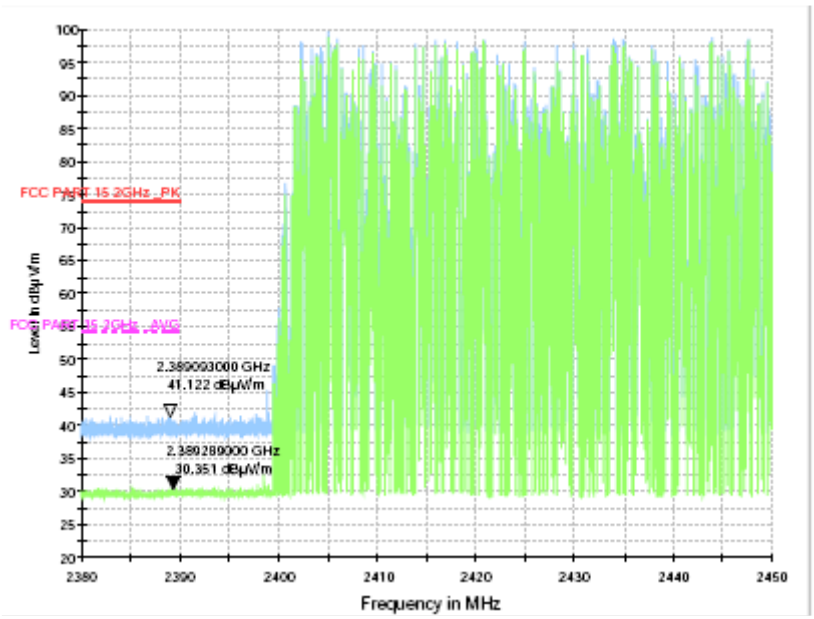
Hopping off

Polarization: Vertical & Horizontal Test Mode: GFSK-Low



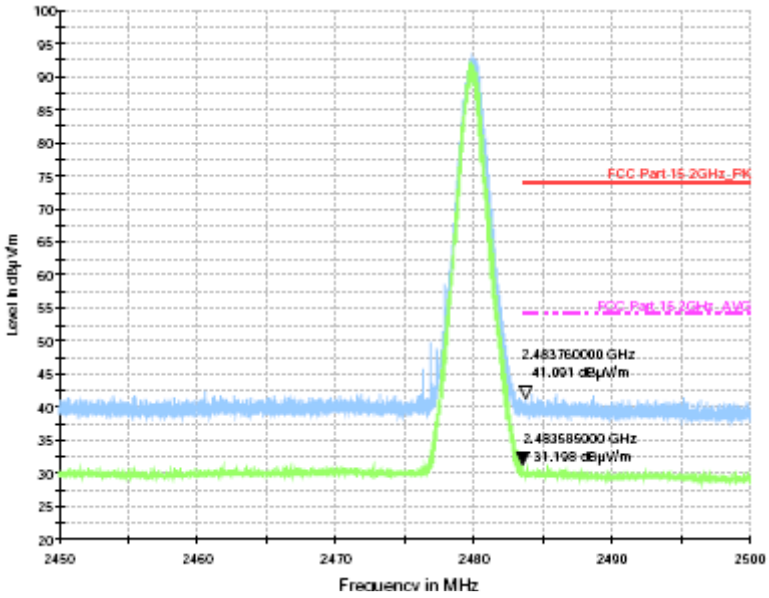
Hopping on

Polarization: Vertical & Horizontal



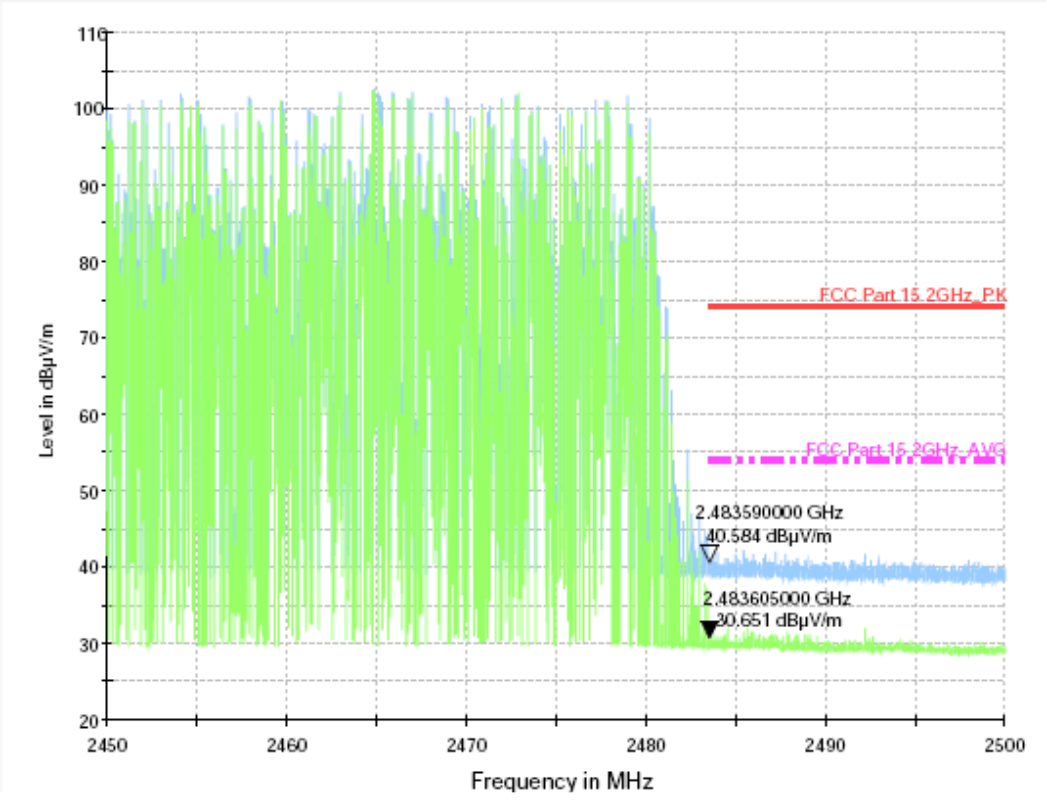
Hopping off

Polarization: Vertical & Horizontal Test Mode: GFSK-High



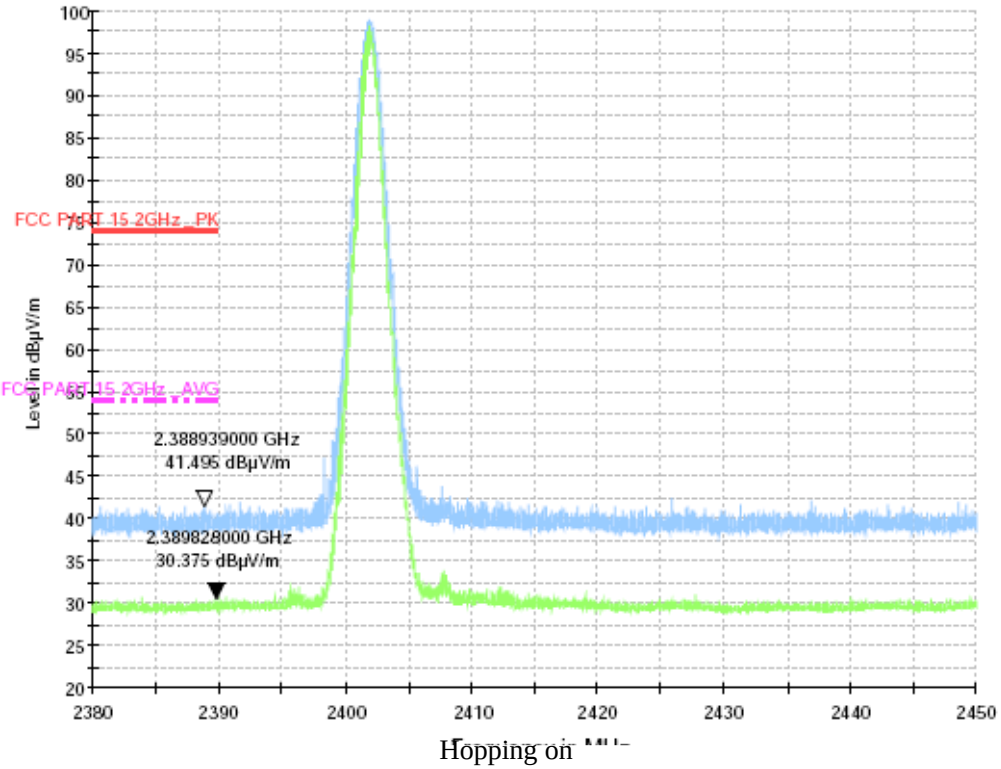
Hopping on

Polarization: Vertical & Horizontal



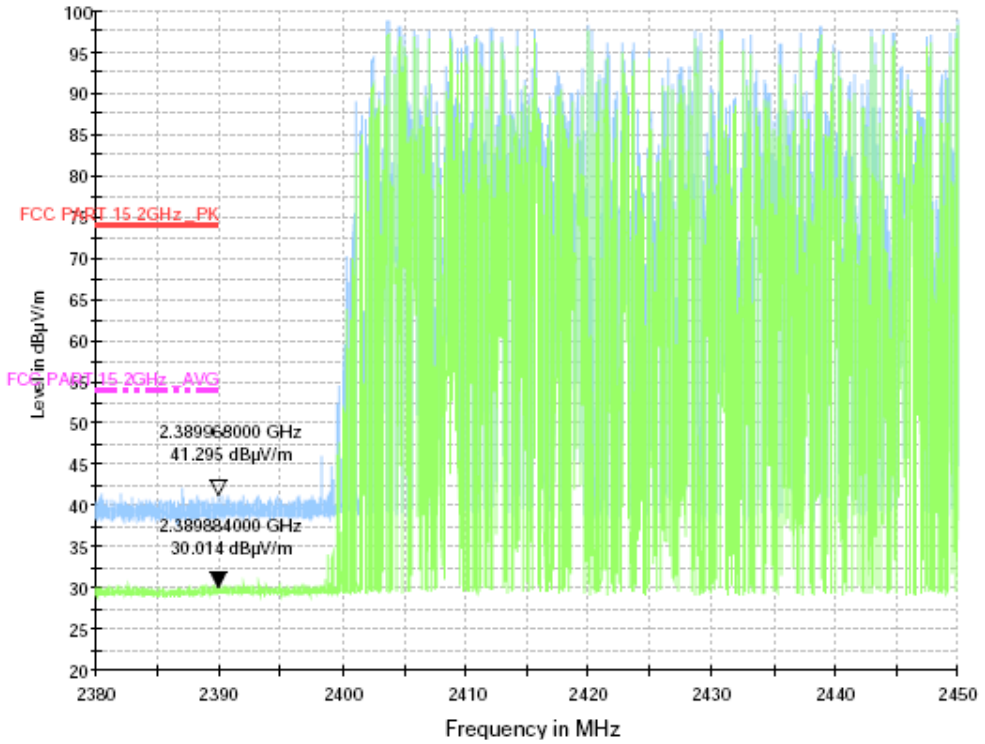
Hopping off

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



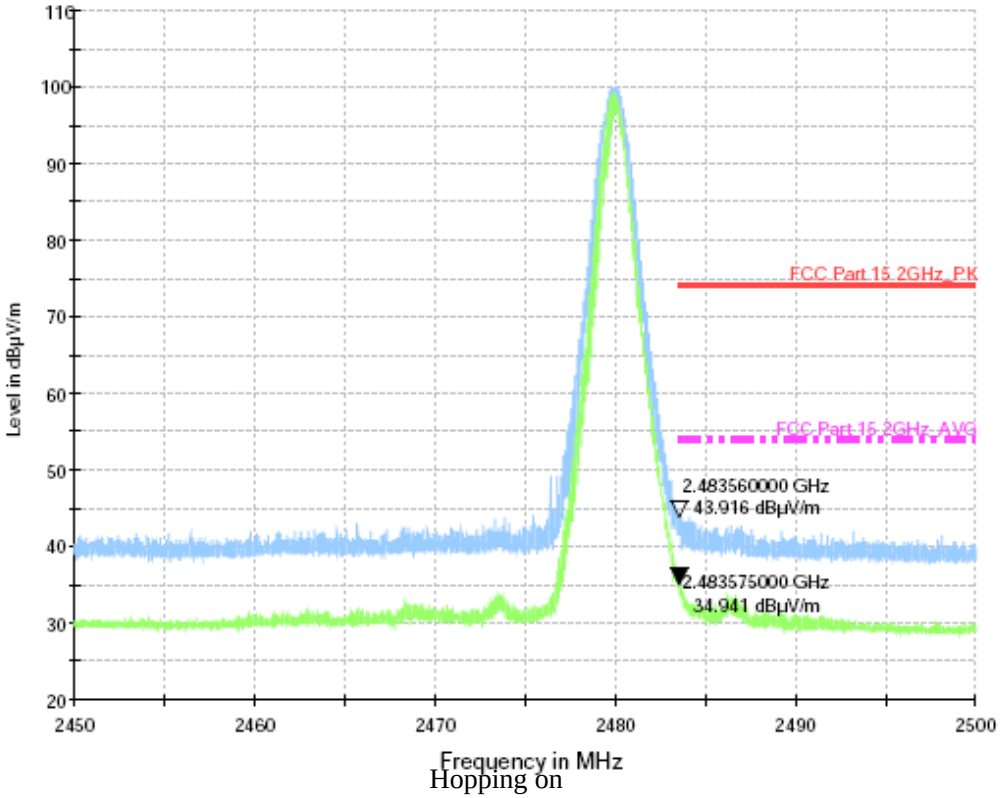
Hopping on

Polarization: Vertical & Horizontal



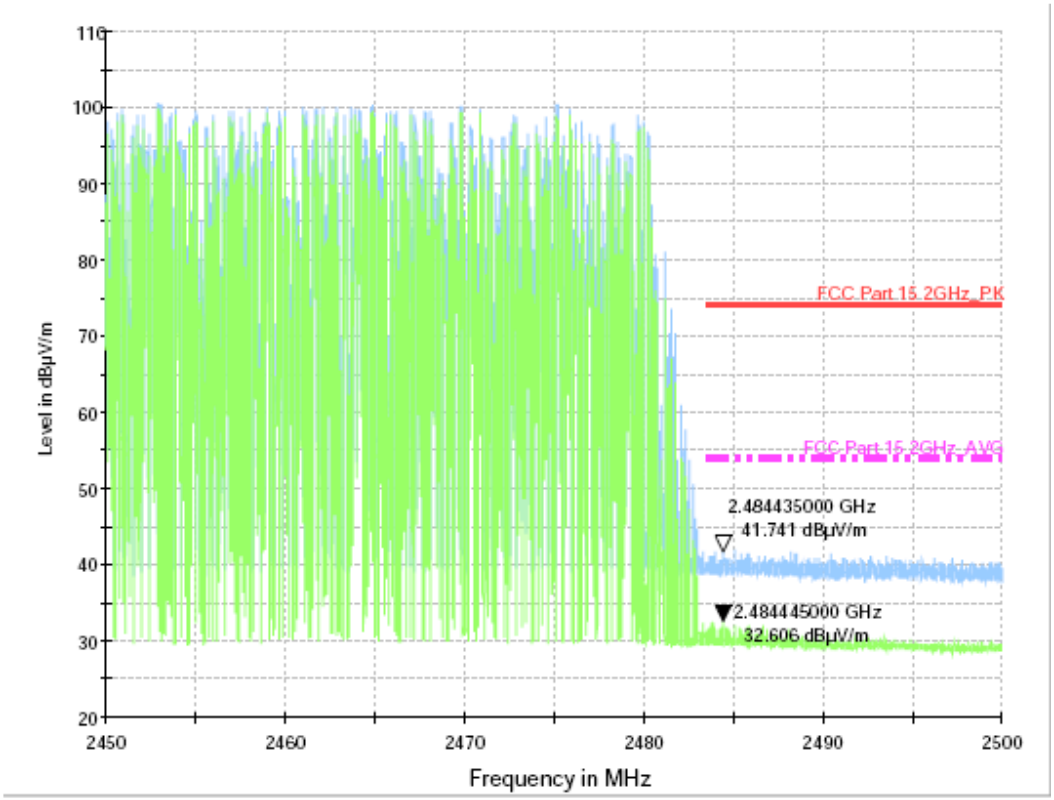
Hopping off

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



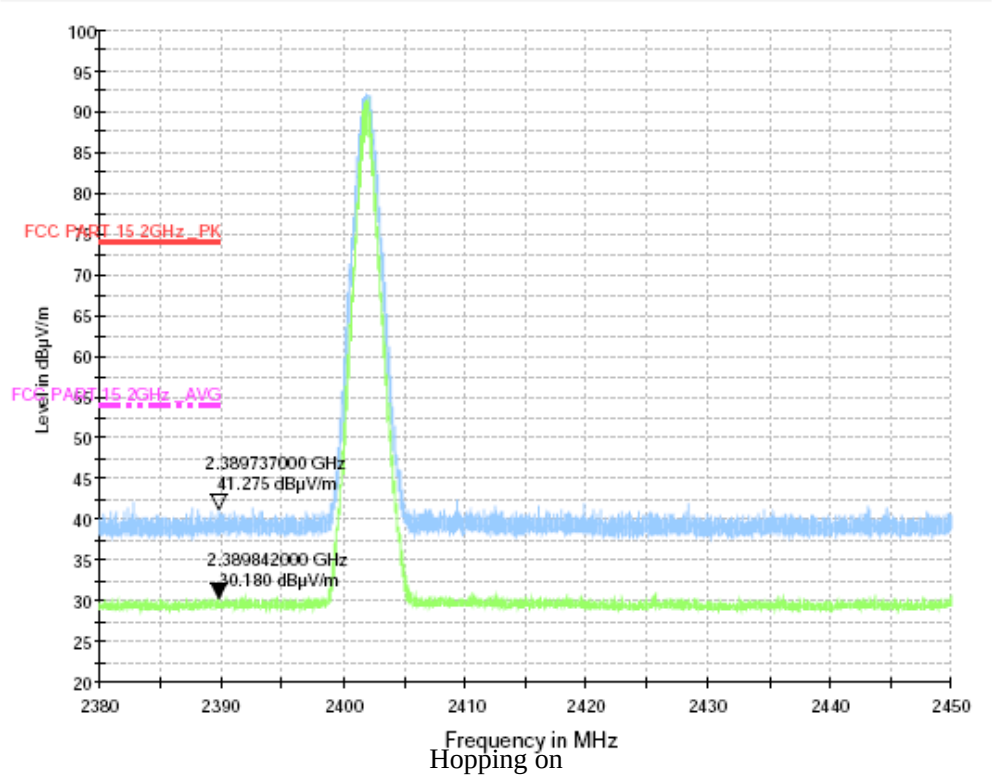
Hopping on

Polarization: Vertical & Horizontal



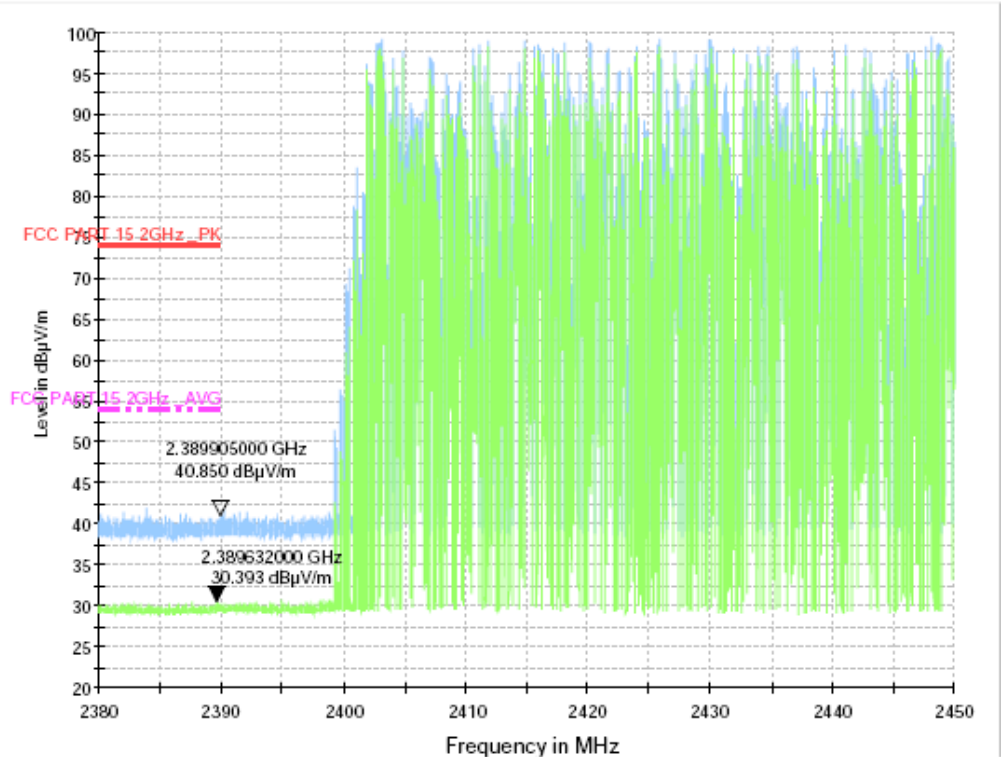
Hopping off

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



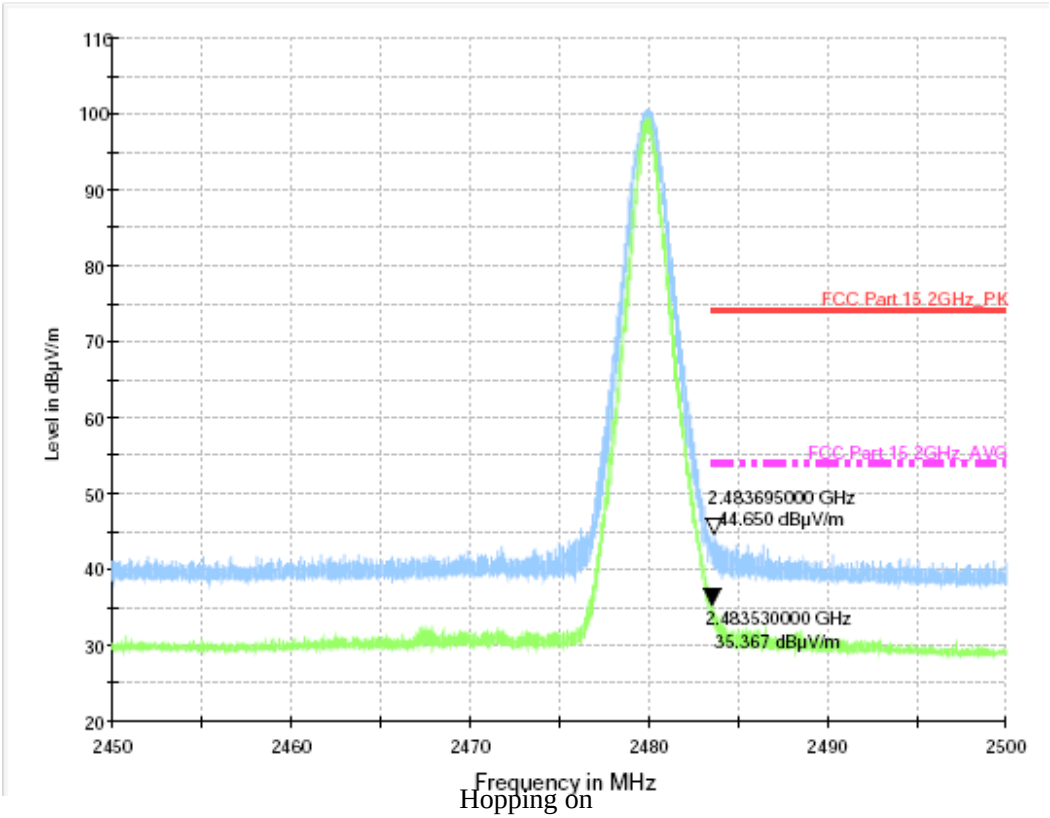
Hopping on

Polarization: Vertical & Horizontal



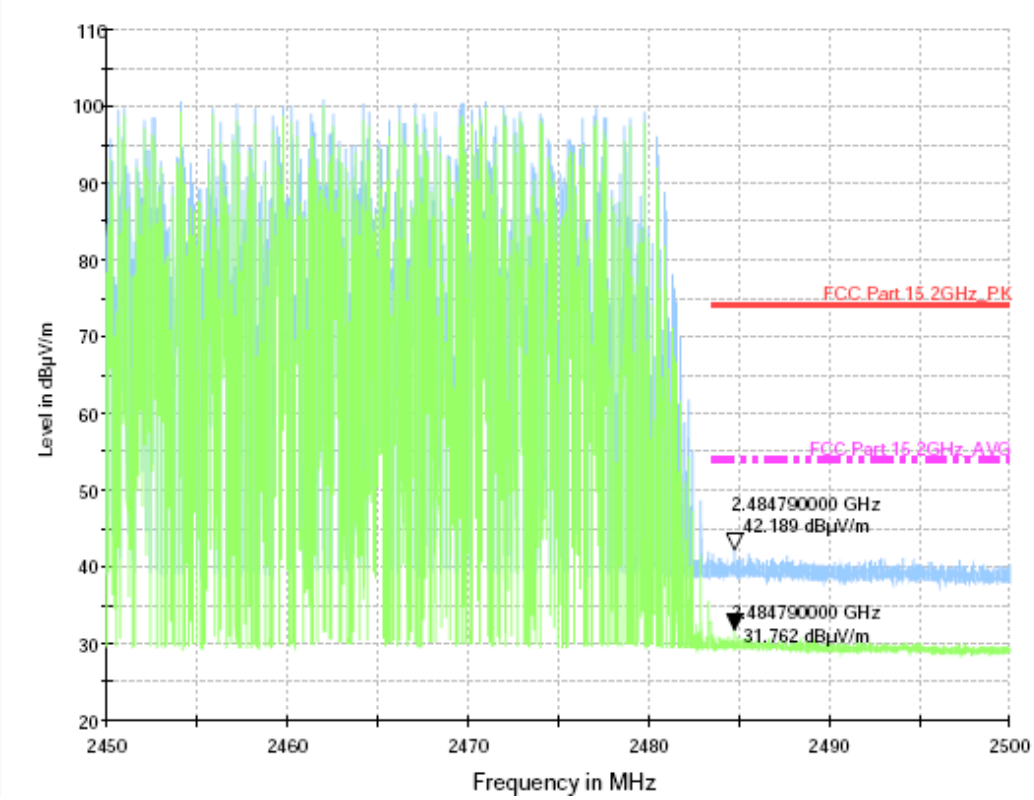
Hopping off

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



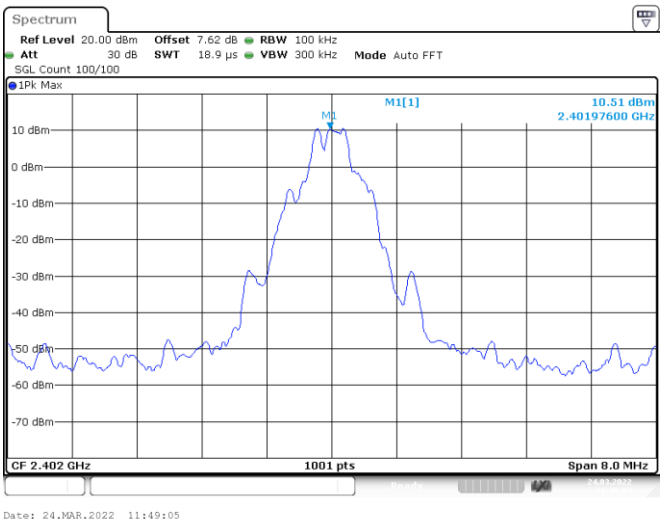
Hopping on

Polarization: Vertical & Horizontal

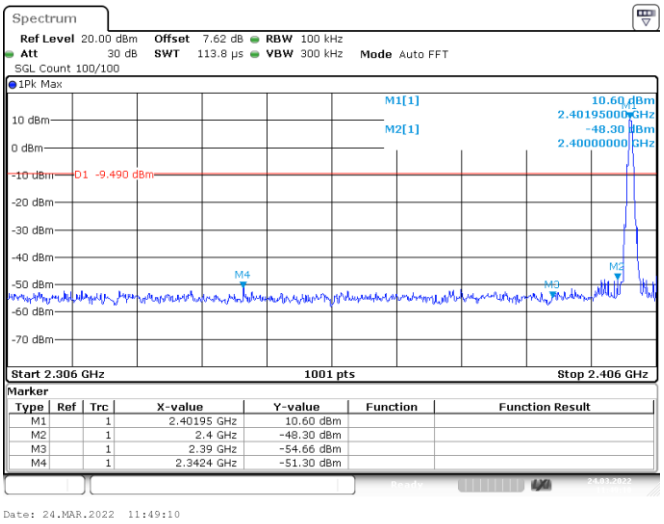


Conducted Method

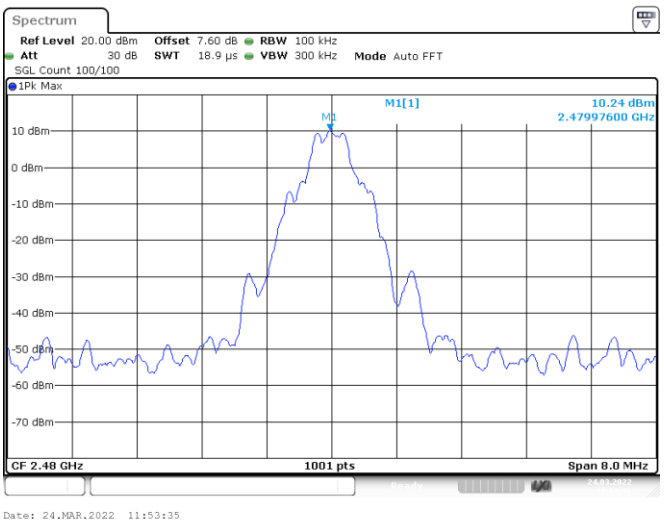
Band Edge NVNT 1-DH1 2402MHz Ant1 No-Hopping Ref



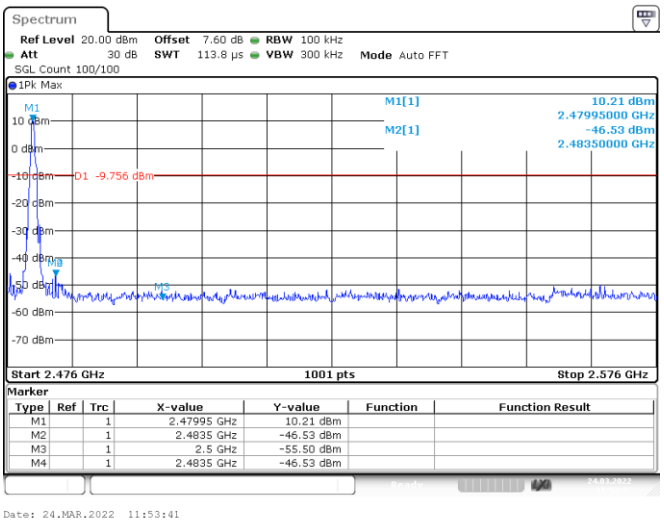
Band Edge NVNT 1-DH1 2402MHz Ant1 No-Hopping Emission



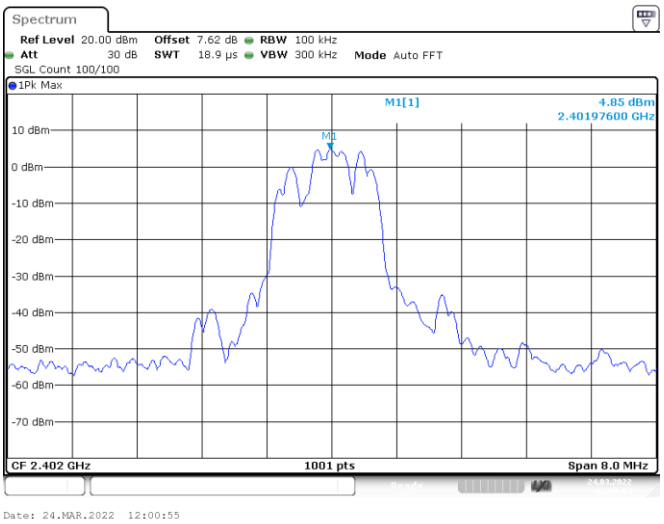
Band Edge NVNT 1-DH1 2480MHz Ant1 No-Hopping Ref



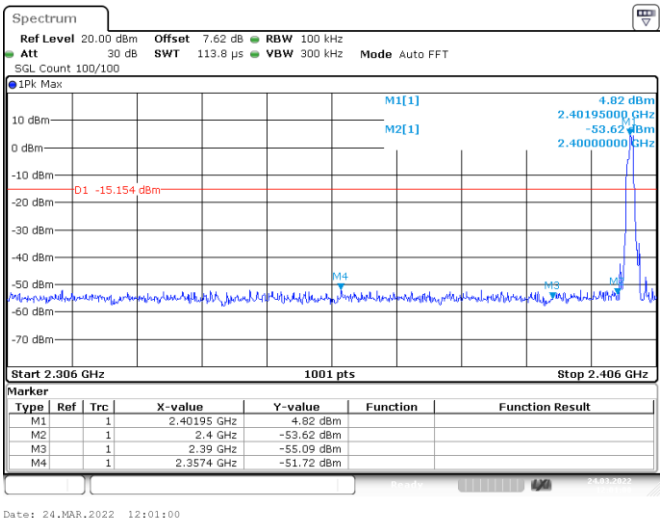
Band Edge NVNT 1-DH1 2480MHz Ant1 No-Hopping Emission



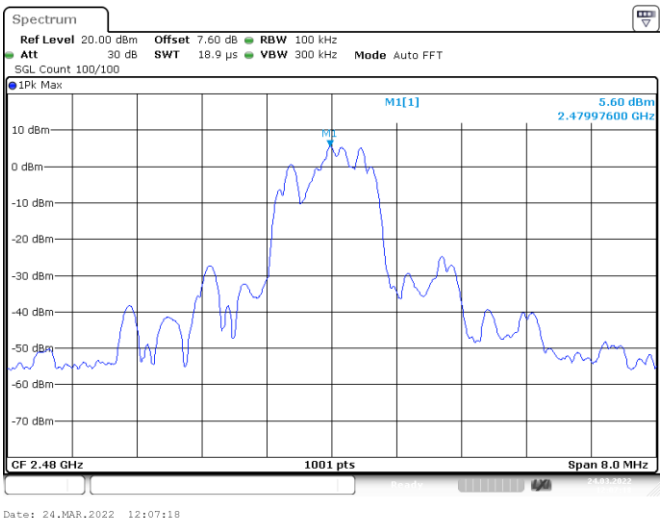
Band Edge NVNT 2-DH1 2402MHz Ant1 No-Hopping Ref



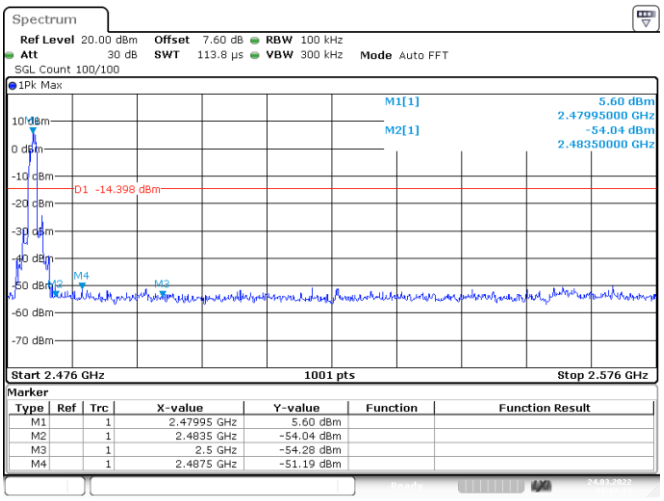
Band Edge NVNT 2-DH1 2402MHz Ant1 No-Hopping Emission



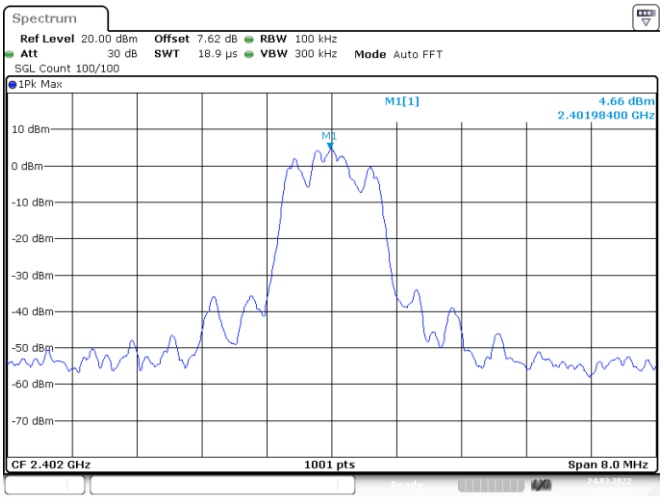
Band Edge NVNT 2-DH1 2480MHz Ant1 No-Hopping Ref



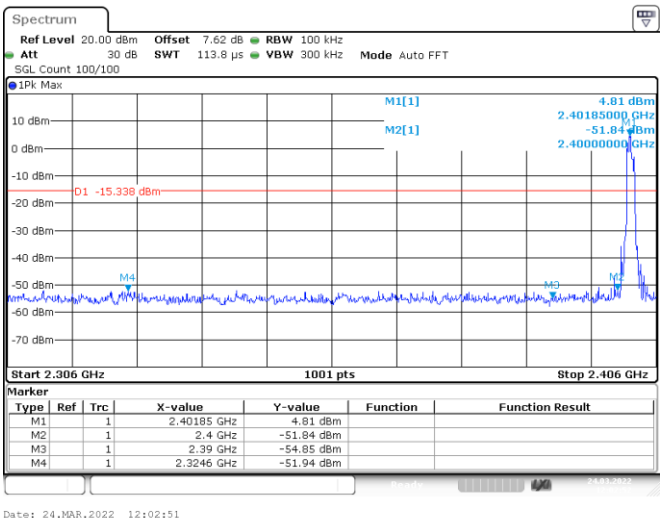
Band Edge NVNT 2-DH1 2480MHz Ant1 No-Hopping Emission



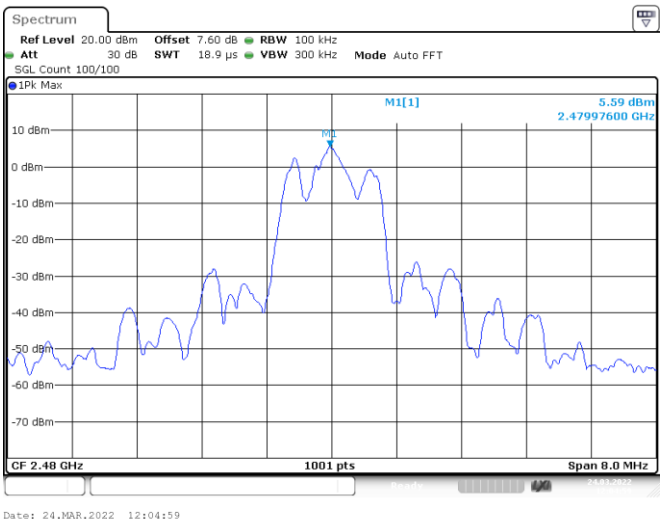
Band Edge NVNT 3-DH1 2402MHz Ant1 No-Hopping Ref



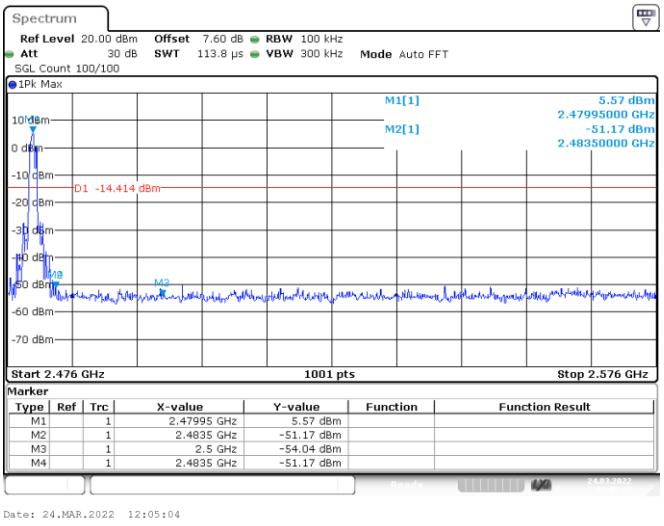
Band Edge NVNT 3-DH1 2402MHz Ant1 No-Hopping Emission



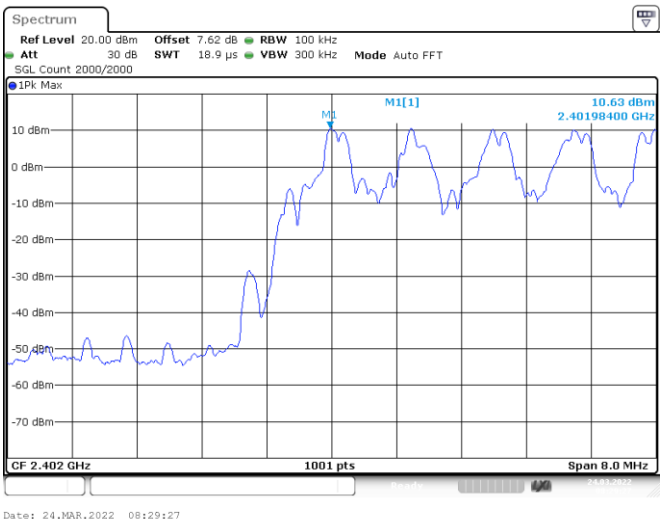
Band Edge NVNT 3-DH1 2480MHz Ant1 No-Hopping Ref



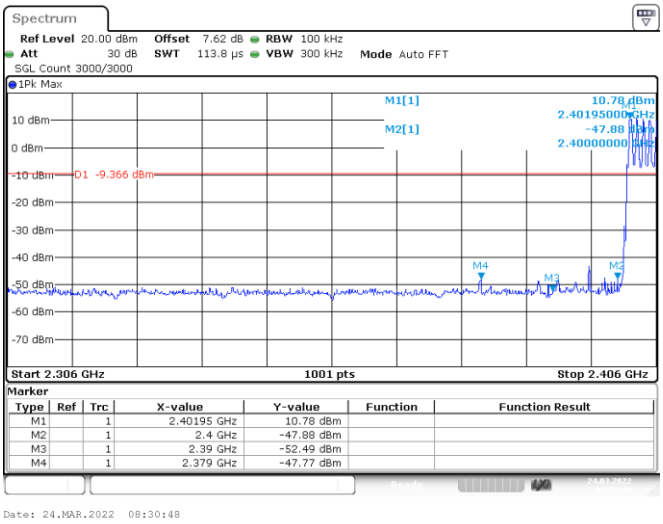
Band Edge NVNT 3-DH1 2480MHz Ant1 No-Hopping Emission



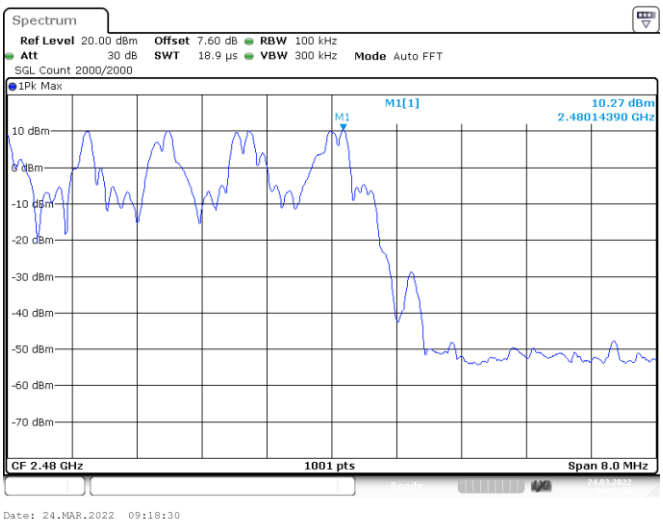
Band Edge(Hopping) NVNT 1-DH1 2402MHz Ant1 Hopping Ref



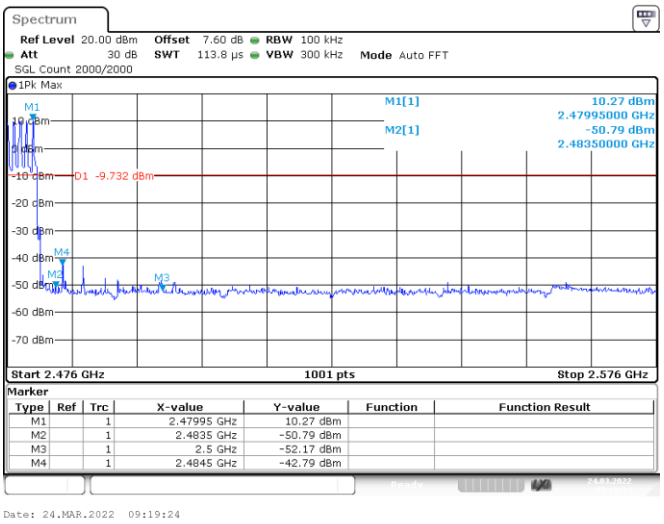
Band Edge(Hopping) NVNT 1-DH1 2402MHz Ant1 Hopping Emission



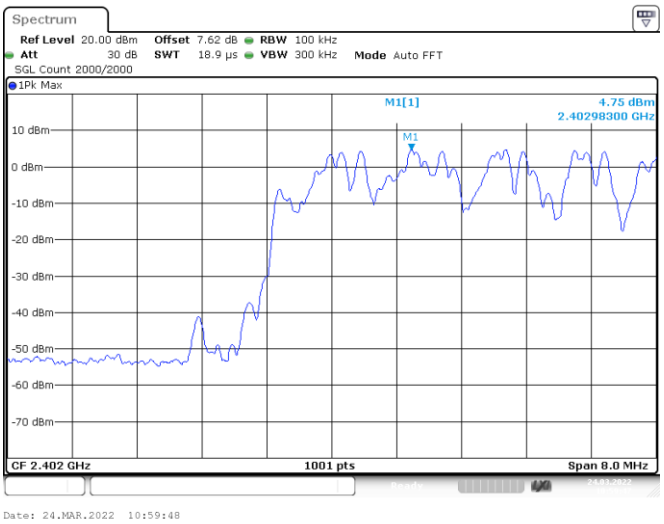
Band Edge(Hopping) NVNT 1-DH1 2480MHz Ant1 Hopping Ref



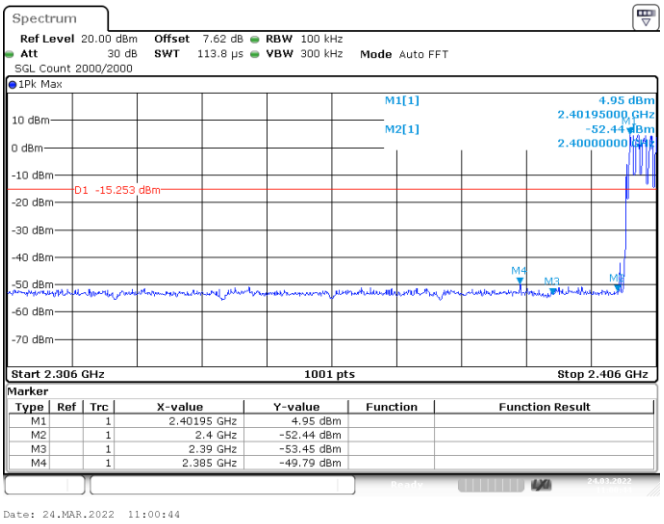
Band Edge(Hopping) NVNT 1-DH1 2480MHz Ant1 Hopping Emission



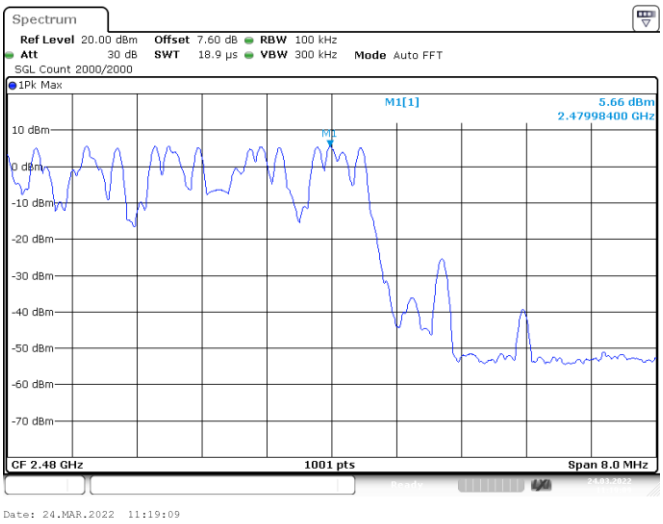
Band Edge(Hopping) NVNT 2-DH1 2402MHz Ant1 Hopping Ref



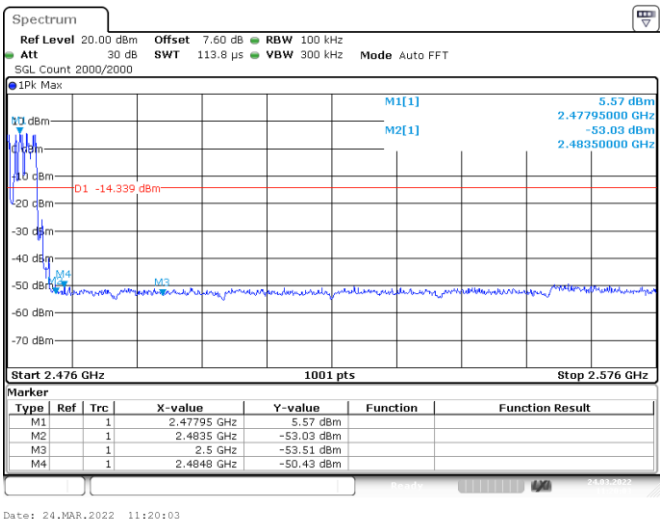
Band Edge(Hopping) NVNT 2-DH1 2402MHz Ant1 Hopping Emission



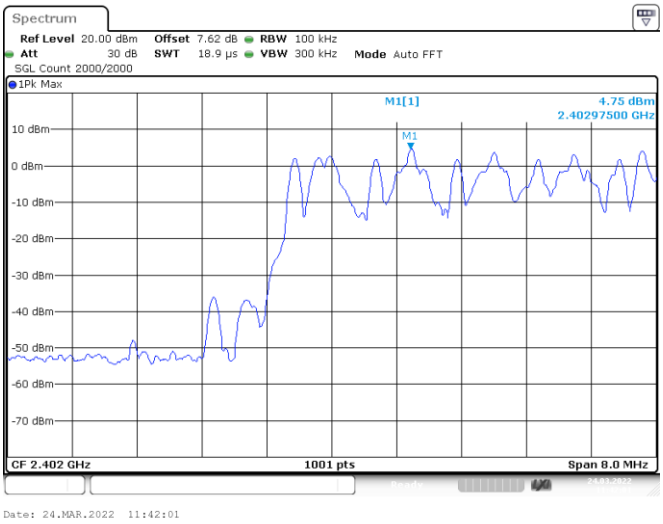
Band Edge(Hopping) NVNT 2-DH1 2480MHz Ant1 Hopping Ref



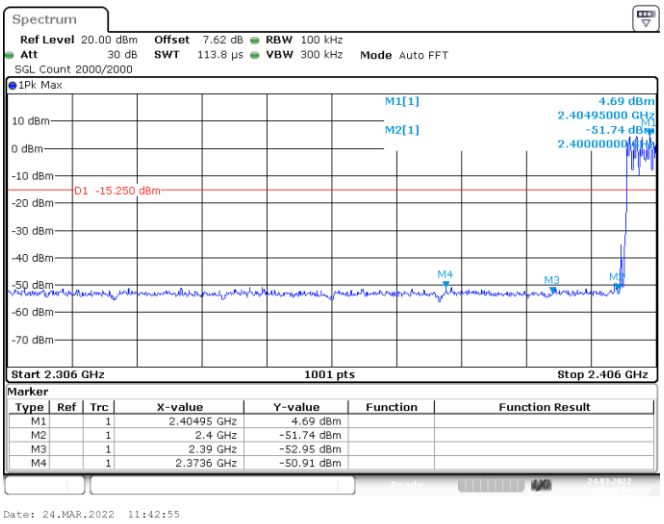
Band Edge(Hopping) NVNT 2-DH1 2480MHz Ant1 Hopping Emission



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

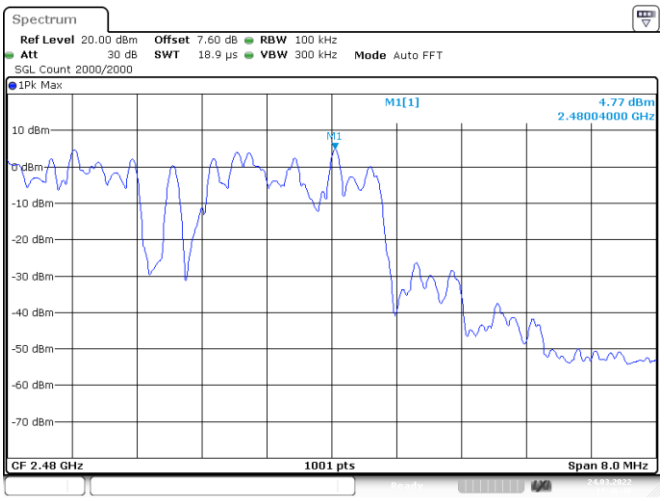


Band Edge(Hopping) NVNT 3-DH1 2402MHz Ant1 Hopping Emission



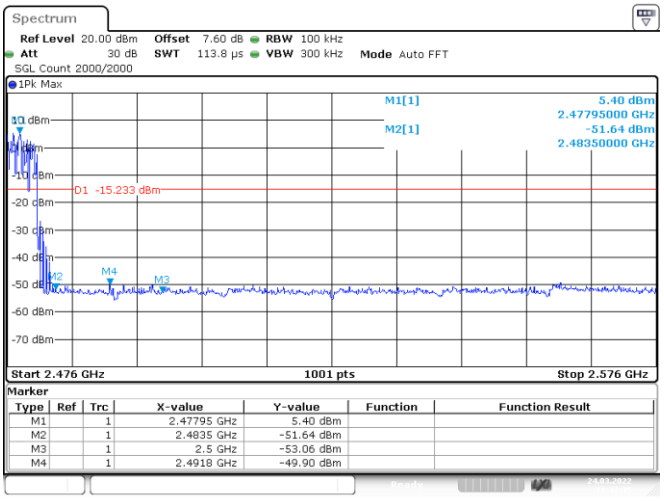
Date: 24.MAR.2022 11:42:55

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



Date: 24.MAR.2022 11:46:40

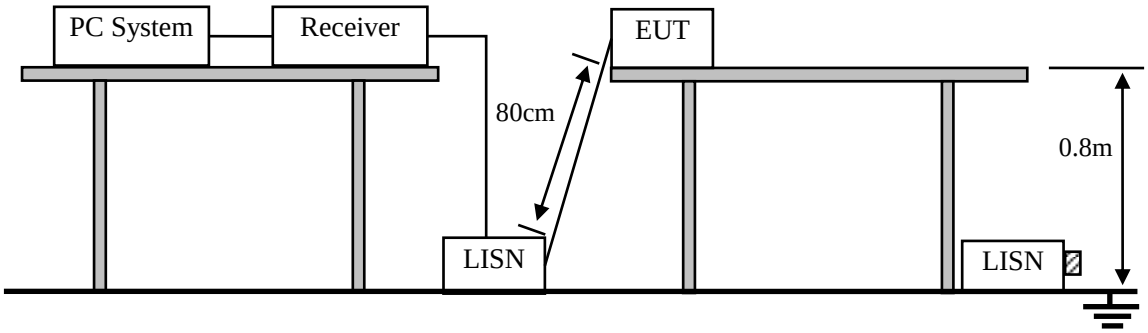
Band Edge(Hopping) NVNT 3-DH1 2480MHz Ant1 Hopping Emission



Date: 24.MAR.2022 11:47:34

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

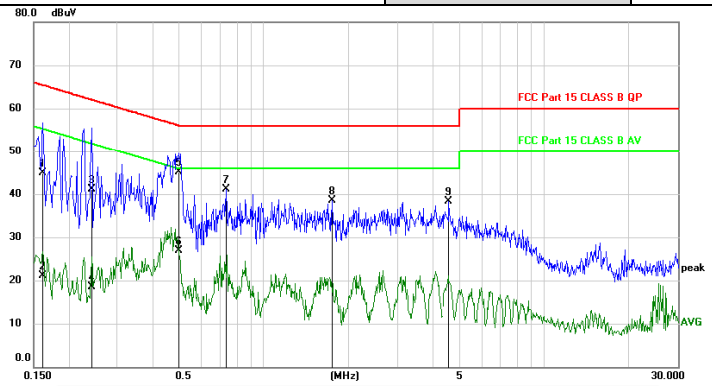
(1) The EUT was placed on a non-metallic table, 80cm above the ground plane.
(2) Setup the EUT and simulator as shown in 10.1
(3) The EUT Power connected to the power mains through a power adapter and a line impedance stabilization network (L.I.S.N1). The other peripheral devices power cord connected 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)

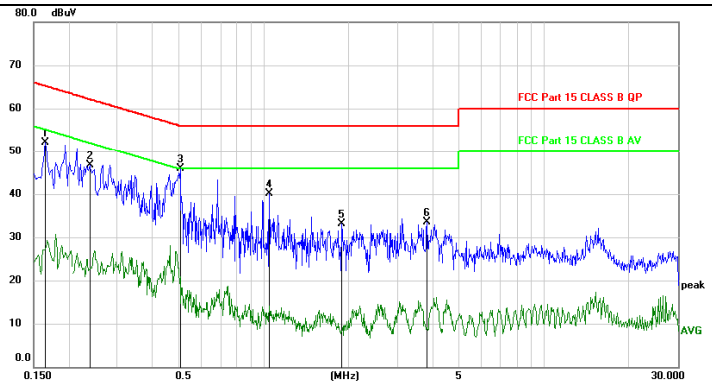
Note: If peak Result comply with AV limit, QP and AV Result is deemed to comply with AV limit

EUT Description	Geodetic GNSS Receiver	Model No.	i73+
Temperature	24℃	Humidity	56%
Pol	Line	Test date	2022.03.10
Test Voltage	AC 120V/ 60Hz	Test mode	GFSK (2441MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1620	35.06	9.93	44.99	65.36	-20.37	QP	
2		0.1620	11.12	9.93	21.05	55.36	-34.31	AVG	
3		0.2430	31.13	9.96	41.09	61.99	-20.90	QP	
4		0.2430	8.51	9.96	18.47	51.99	-33.52	AVG	
5	*	0.4980	35.10	9.96	45.06	56.03	-10.97	QP	
6		0.4980	16.87	9.96	26.83	46.03	-19.20	AVG	
7		0.7350	31.25	9.93	41.18	56.00	-14.82	peak	
8		1.7460	28.66	9.89	38.55	56.00	-17.45	peak	
9		4.5870	28.30	10.01	38.31	56.00	-17.69	peak	

Pol	Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1650	42.09	9.93	52.02	65.21	-13.19	peak	
2		0.2400	36.81	9.96	46.77	62.10	-15.33	peak	
3	*	0.5039	35.97	9.96	45.93	56.00	-10.07	peak	
4		1.0470	30.15	9.92	40.07	56.00	-15.93	peak	
5		1.8930	23.20	9.88	33.08	56.00	-22.92	peak	
6		3.8040	23.51	9.96	33.47	56.00	-22.53	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 (2441MHz) 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.

--------- END OF REPORT-------