



FCC&IC TEST REPORT

FCC ID: 2AKRP-VR156

On Behalf of

SHENZHEN BVSION TECHNOLOGY CO.,LTD

intelligent touch all in one pc

Model No.: See Annex for details

Prepared for : SHENZHEN BVSION TECHNOLOGY CO.,LTD
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Date of Report : July 28, 2021
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TEST REPORT DECLARATION

Applicant : SHENZHEN BVSION TECHNOLOGY CO.,LTD
Address : Floor 5, Buliding 9, HuaFeng Industry Park, No.535,Feng Tong Road, Baoan Strict, Shenzhen, China
Manufacturer : SHENZHEN BVSION TECHNOLOGY CO.,LTD
Address : Floor 5, Buliding 9, HuaFeng Industry Park, No.535,Feng Tong Road, Baoan Strict, Shenzhen, China
EUT Description : intelligent touch all in one pc
(A) Model No. : See Annex for details
(B) Trademark : 

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247,

RSS-247 Issue 2, RSS-Gen Issue 5, ANSI C63.10:2013, CISPR 16-1-4:2010

The device described above is tested by Shenzhen Alpha Product Testing Co., Ltd. to determine the maximum emission levels emanating from the device. 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).....: Yannis Wen
Project Engineer



Approved by (name + signature).....: Simple Guan
Project Manager



Date of issue..... : July 28, 2021

Revision History

Revision	Issue Date	Revisions	Revised By
V0	July 28, 2021	Initial released Issue	Yannis Wen

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) RSS-247(5.4 b) ANSI C63.10 :2013	P
Bandwidth	FCC Part 15: 15.215 RSS-247(5.1 a) ANSI C63.10 :2013	P
Carrier Frequency Separation	FCC Part 15: 15.247(a)(1) RSS-247(5.1 b) ANSI C63.10 :2013	P
Number Of Hopping Channel	FCC Part 15: 15.247(a)(1) RSS-247(5.1 d) ANSI C63.10 :2013	P
Dwell Time	FCC Part 15: 15.247(a)(1) RSS-247(5.1 d) ANSI C63.10 :2013	P
Radiated Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d) RSS-Gen(8.9), RSS-247(5.5) ANSI C63.10 :2013	P
Band Edge Compliance	FCC Part 15: 15.247(d) RSS-Gen(8.9), RSS-247(5.5) ANSI C63.10 :2013	P
Power Line Conducted Emissions	FCC Part 15: 15.207 RSS-GEN(8.8) ANSI C63.10 :2013	P
Frequency stability	RSS-GEN(6.11)	P
Antenna requirement	FCC Part 15: 15.203 RSS-GEN(6.8)	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/PMN : intelligent touch all in one pc

Model : See Annex for details

Number/FVIN(s)

Diff. : There is no difference except the name of the model. All tests are made with the VR156 model.

Trademark :



Test Voltage : AC 120V/60Hz

Radio Technology : Bluetooth (EDR)

Operation frequency : 2402-2480MHz

Channel No. : 79 Channels

Modulation type : GFSK, $\pi/4$ DQPSK, 8- DPSK

Antenna Type : Internal antenna, Maximum Gain is 2dBi.

Software version : V1.0

Hardware : V1.0

Version/FVIN

Remark: The worst-case simultaneous transmission configuration was evaluated with no non-compliance found. Results in this report are only for Bluetooth (EDR) function, and there is no other transmitter involved.

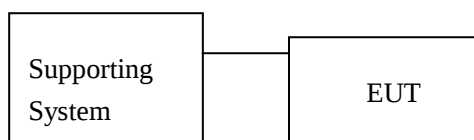
2.2. Accessories of Device (EUT)

Accessories1 : /
 Manufacturer : /
 Model : /
 Ratings : /

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDOC
1.	N/A	N/A	N/A	N/A	N/A

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 :CH1	2402
	Middle: CH40	2441
	High: CH79	2480
$\pi/4$ DQPSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480
8- DPSK	Low :CH1	2402
	Middle: CH40	2441
	High: CH79	2480

2.6.Test Conditions

Items	Required	Actual
Temperature range:	15-35°C	25°C
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: 12135A

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°C
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	2020.09.02	1Year
Spectrum analyzer	Agilent	N9020A	MY499100060	2020.09.02	1Year
Receiver	ROHDE&SCHWARZ	ESR	1316.3003K03-102082-Wa	2020.09.02	1Year
Receiver	R&S	ESCI	101165	2020.09.02	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	2020.09.02	1Year
Cable	Resenberger	N/A	No.2	2020.09.02	1Year
Cable	Resenberger	N/A	No.3	2020.09.02	1Year
Pre-amplifier	HP	HP8347A	2834A00455	2020.09.02	1Year
Pre-amplifier	Agilent	8449B	3008A02664	2020.09.02	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2020.09.02	1Year
L.I.S.N.#2	ROHDE&SCHWARZ	ENV216	101043	2020.09.02	1 Year
20db Attenuator	ICPROBING	IATS1	82347	2020.09.02	1 Year
Horn Antenna	SCHWARZBECK	BBHA9170	00946	2019.09.07	2 Year
Preamplifier	SKET	LNPA_1840-50	SK2018101801	2020.09.02	1 Year
Power Meter	Agilent	E9300A	MY41496625	2020.09.02	1 Year
Power Sensor	DARE	RPR3006W	15100041SNO91	2020.09.02	1 Year
Temp. & Humid. Chamber	Wei Huang	WHTH-1000-40-880	100631	2020.09.02	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	20140927-6	2020.09.02	1 Year

3. Maximum Peak Output Power

3.1.Limit

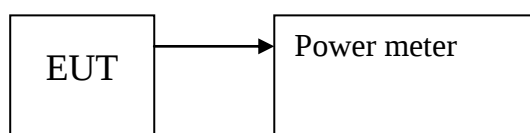
Please refer FCC part 15.247 & RSS-247..

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 Power meter is set to the peak power detection.

3.3.Test Setup



3.4.Test Result

Mode	Freq (MHz)	PK Output Power (dBm)	Limit (dBm)	Result
GFSK	2402	1.68	30	Pass
	2441	5.29	30	Pass
	2480	6.41	30	Pass
$\pi/4$ DQPSK	2402	-0.366	21	Pass
	2441	3.609	21	Pass
	2480	3.505	21	Pass
8- DPSK	2402	0.178	21	Pass
	2441	3.754	21	Pass
	2480	3.696	21	Pass
Conclusion: PASS				

4. Bandwidth

4.1.Limit

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in RSS-GEN, FCC Section 15.247(a)(1), 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.

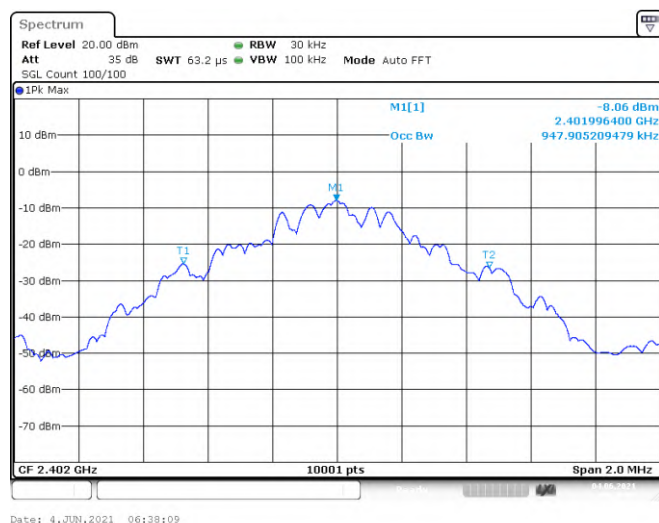
4.2.Test Procedure

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.

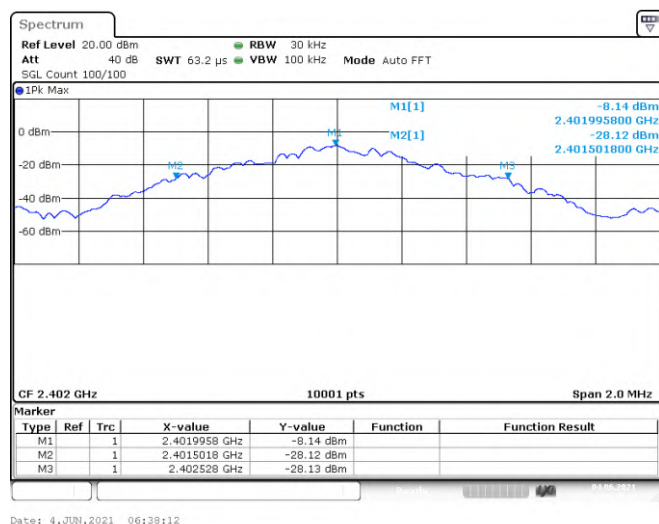
4.3.Test Result

Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)	-20 dB Bandwidth (MHz)	Limit -20 dB Bandwidth (MHz)	Verdict
NVNT	1-DH1	2402	Ant 1	0.9479	1.0262	N/A	Pass
NVNT	1-DH1	2441	Ant 1	0.8783	0.9974	N/A	Pass
NVNT	1-DH1	2480	Ant 1	0.9593	1.047	N/A	Pass
NVNT	2-DH1	2402	Ant 1	1.1995	1.3328	N/A	Pass
NVNT	2-DH1	2441	Ant 1	1.1911	1.3442	N/A	Pass
NVNT	2-DH1	2480	Ant 1	1.1923	1.3274	N/A	Pass
NVNT	3-DH1	2402	Ant 1	1.1779	1.3038	N/A	Pass
NVNT	3-DH1	2441	Ant 1	1.1789	1.3336	N/A	Pass
NVNT	3-DH1	2480	Ant 1	1.1789	1.2622	N/A	Pass

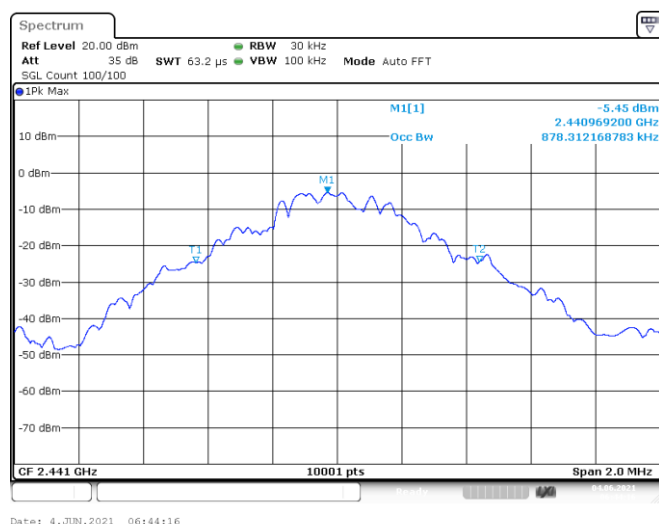
OBW NVNT 1-DH1 2402MHz Ant1

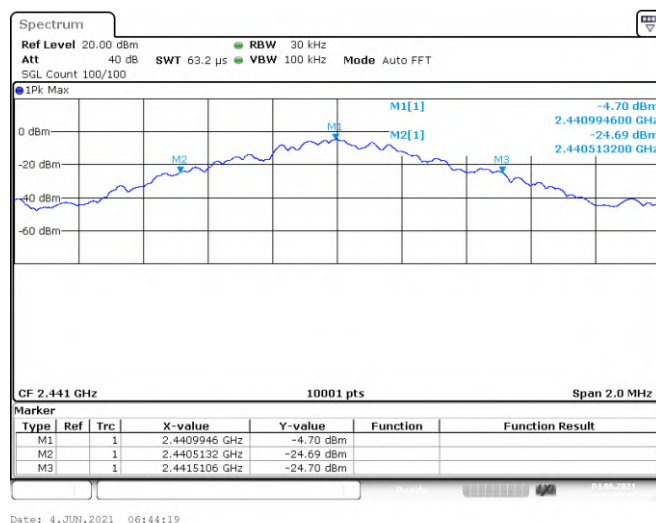
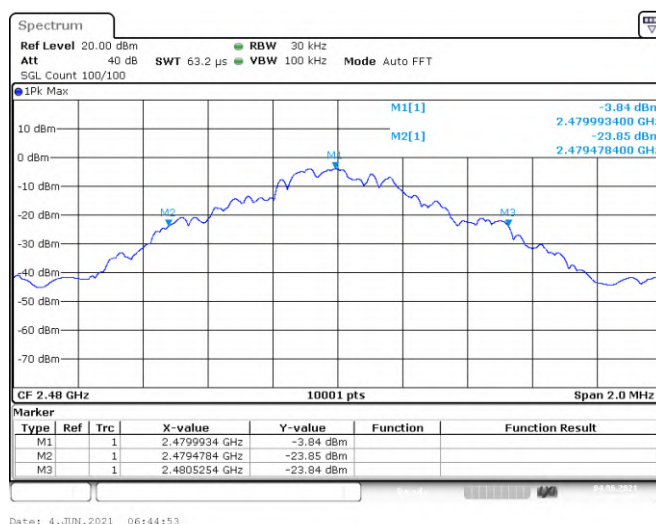


-20 dB BW NVNT 1-DH1 2402MHz Ant1

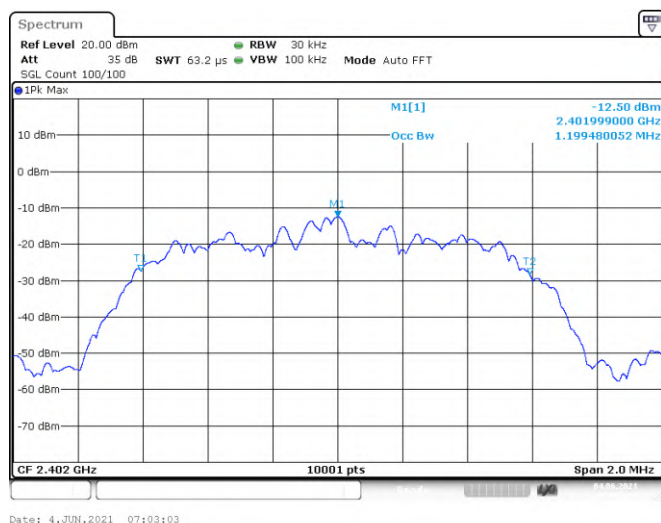


OBW NVNT 1-DH1 2441MHz Ant1

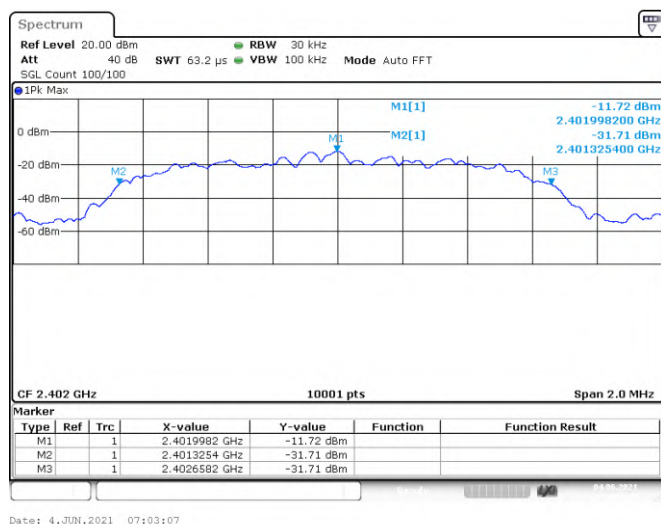


-20 dB BW NVNT 1-DH1 2441MHz Ant1**OBW NVNT 1-DH1 2480MHz Ant1****-20 dB BW NVNT 1-DH1 2480MHz Ant1**

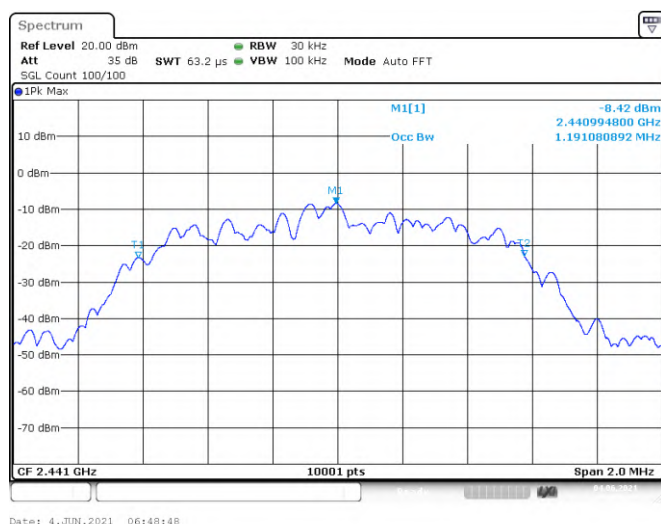
OBW NVNT 2-DH1 2402MHz Ant1

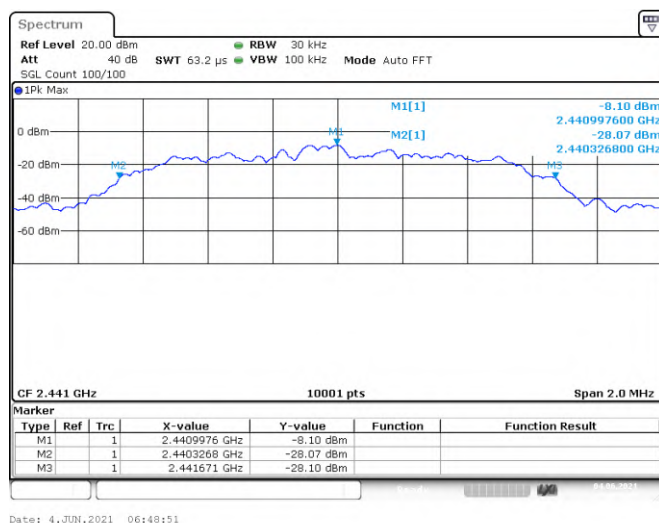
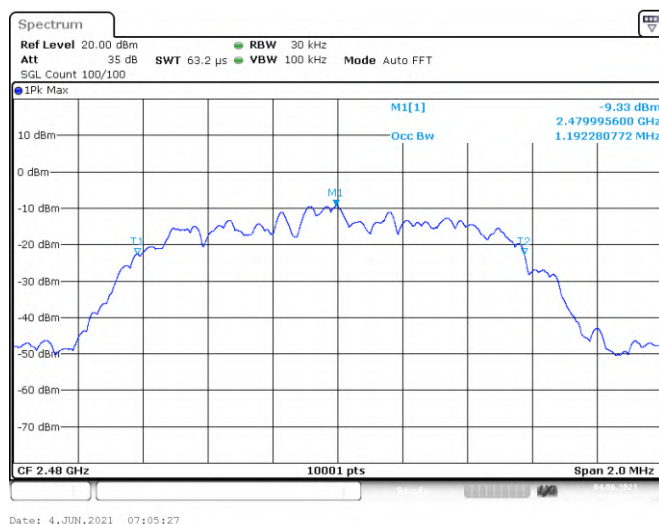
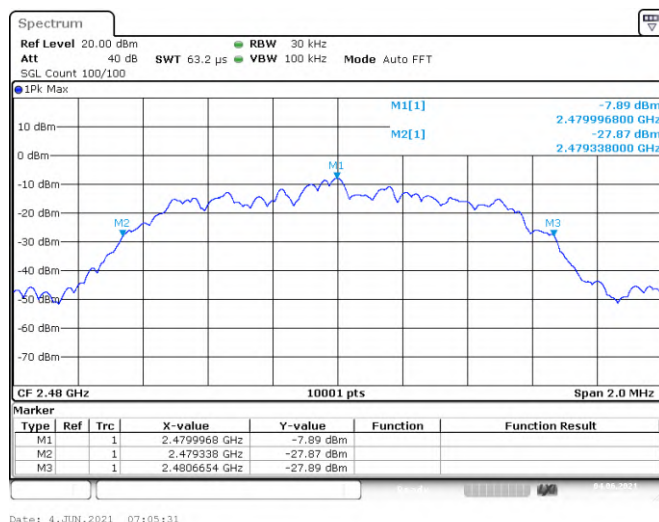


-20 dB BW NVNT 2-DH1 2402MHz Ant1

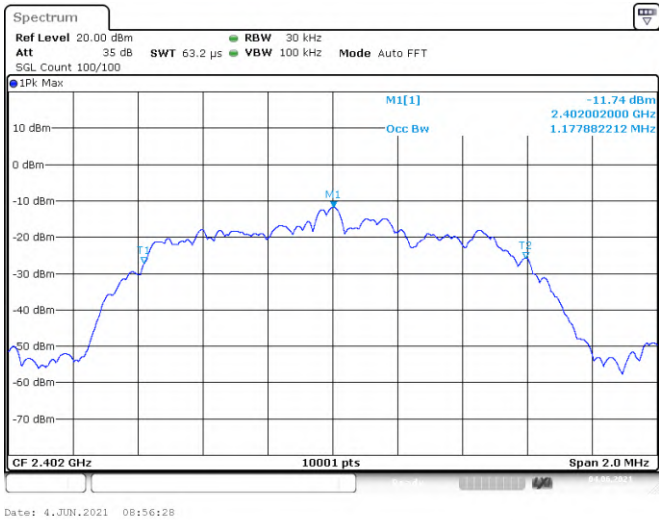


OBW NVNT 2-DH1 2441MHz Ant1

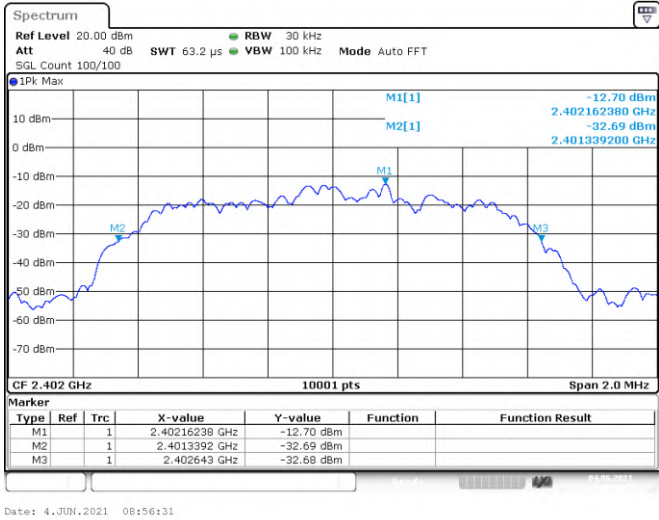


-20 dB BW NVNT 2-DH1 2441MHz Ant1**OBW NVNT 2-DH1 2480MHz Ant1****-20 dB BW NVNT 2-DH1 2480MHz Ant1**

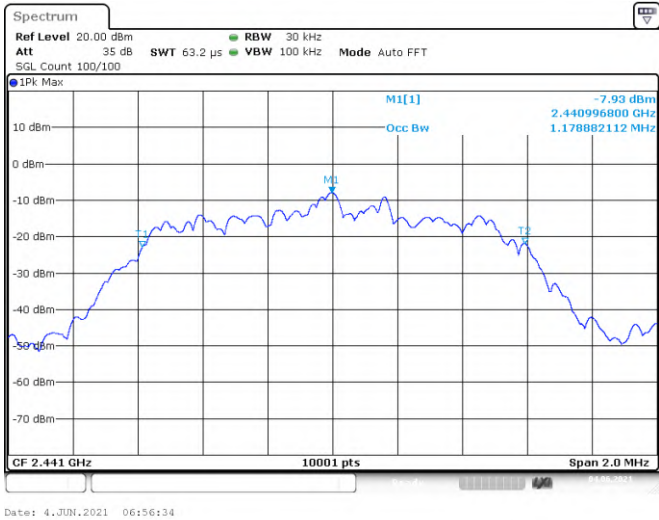
OBW NVNT 3-DH1 2402MHz Ant1

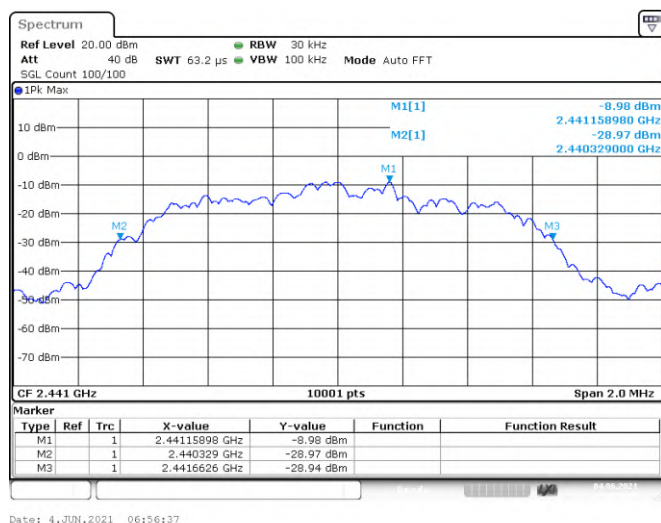
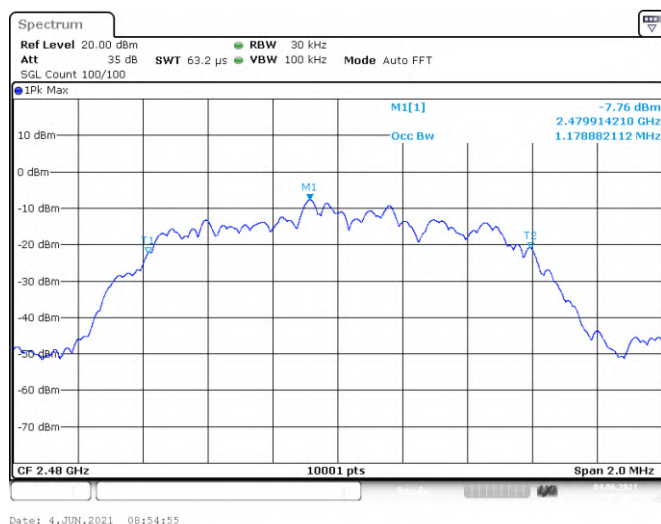
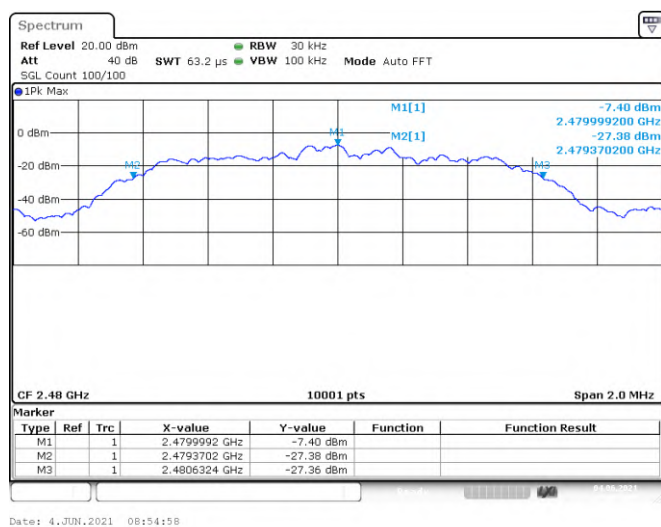


-20 dB BW NVNT 3-DH1 2402MHz Ant1



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

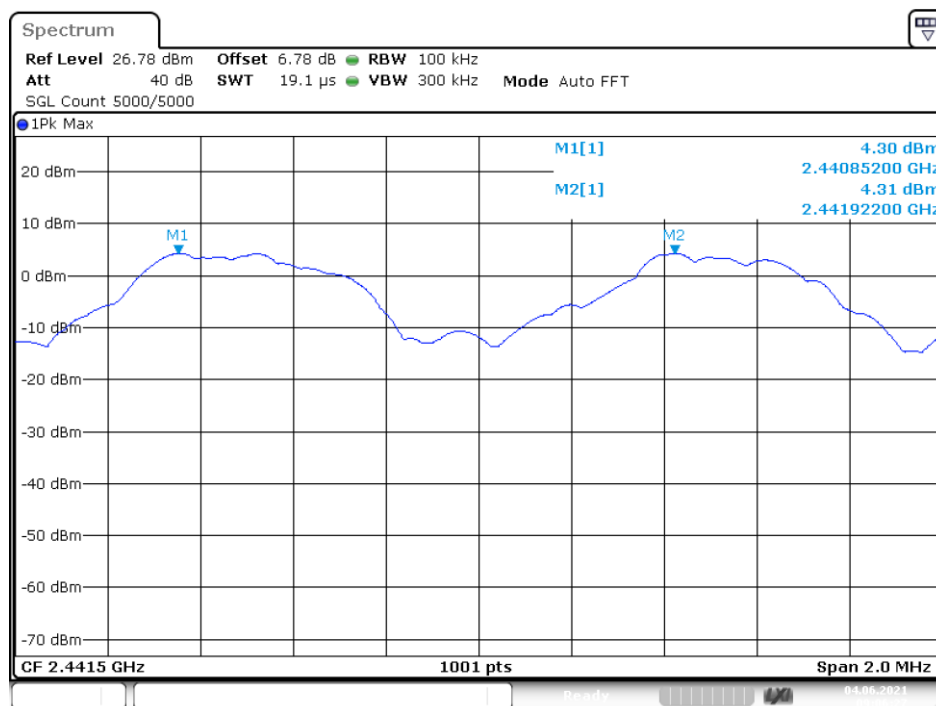
5.2.Test Procedure

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 30kHz RBW and 100kHz VBW.

5.3.Test Result

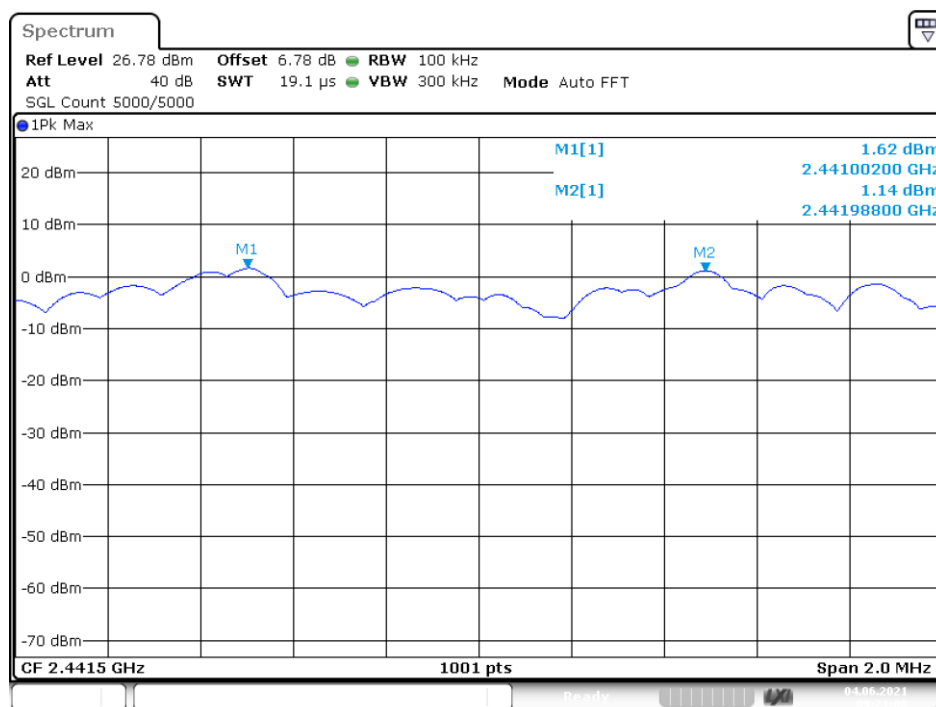
Condition	Mode	Hopping Freq1 (MHz)	Hopping Freq2 (MHz)	HFS (MHz)	Limit (MHz)	Verdict
NVNT	1-DH1	2440.852	2441.922	1.07	0.869	Pass
NVNT	2-DH1	2441.002	2441.988	0.986	0.869	Pass
NVNT	3-DH1	2440.978	2441.998	1.02	0.869	Pass

CFS NVNT 1-DH1 2441MHz



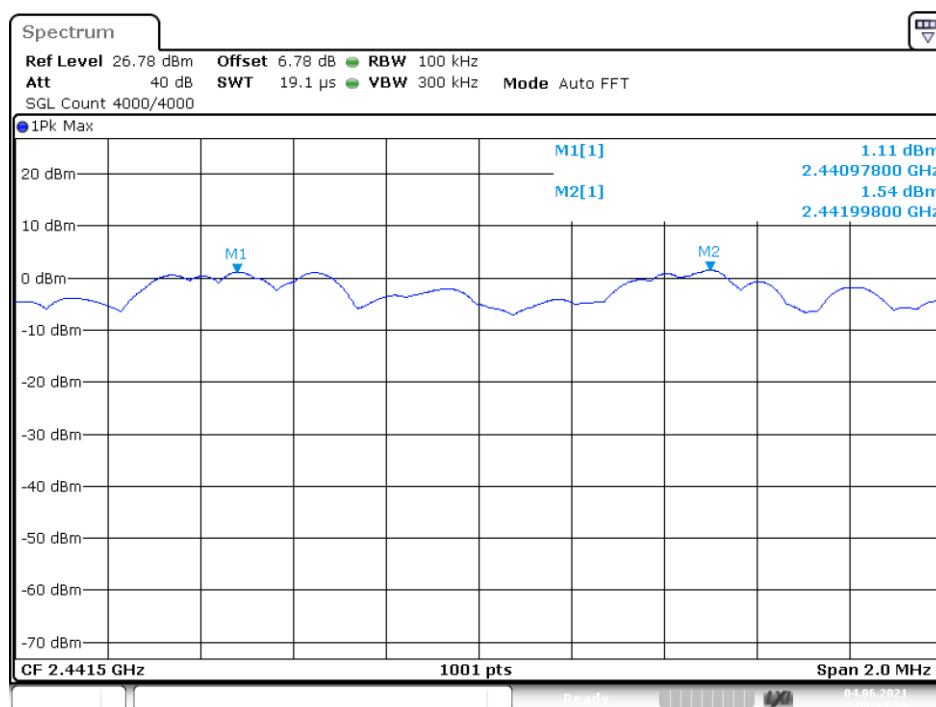
Date: 4.JUN.2021 09:06:27

CFS NVNT 2-DH1 2441MHz



Date: 4.JUN.2021 09:21:08

CFS NVNT 3-DH1 2441MHz



Date: 4.JUN.2021 09:32:38

6. Number Of Hopping Channel

6.1.Limit

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

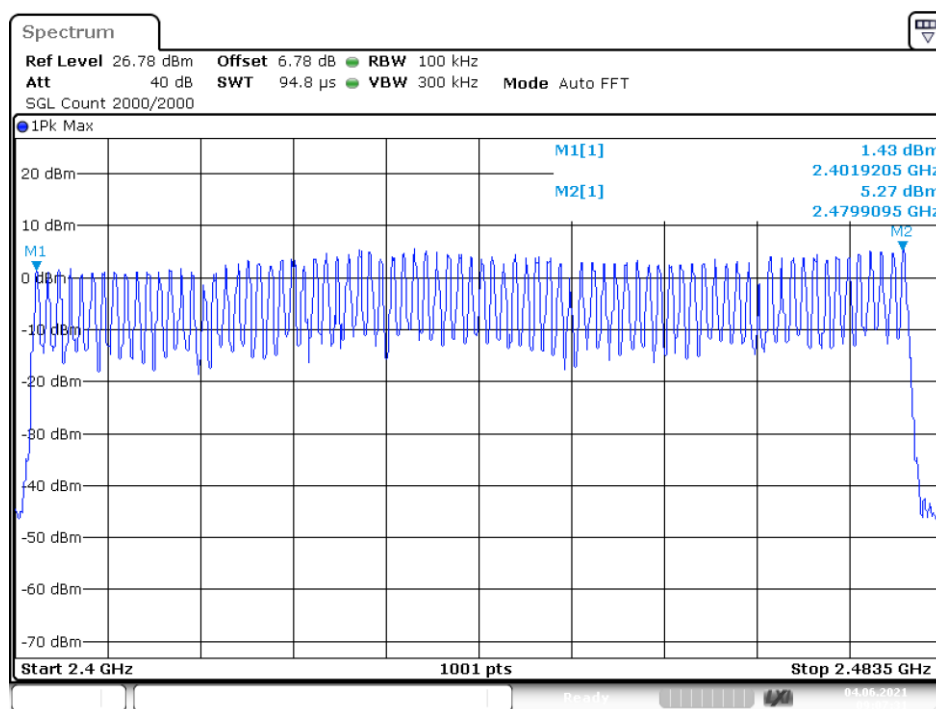
6.2.Test Procedure

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

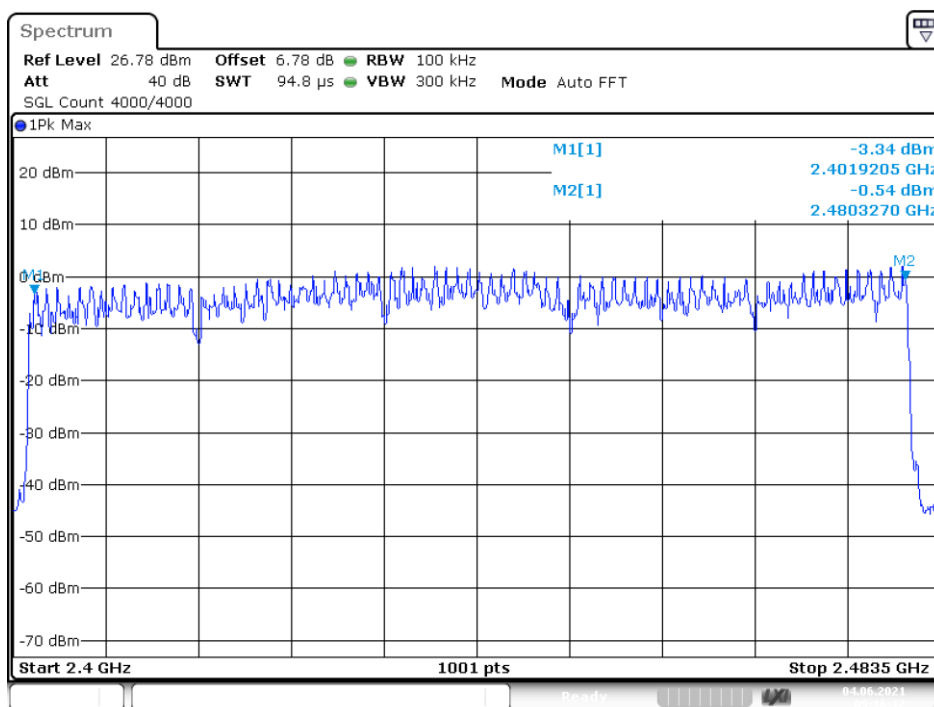
Condition	Mode	Hopping Number	Limit	Verdict
NVNT	1-DH1	79	15	Pass
NVNT	2-DH1	79	15	Pass
NVNT	3-DH1	79	15	Pass

Hopping No. NVNT 1-DH1 2441MHz



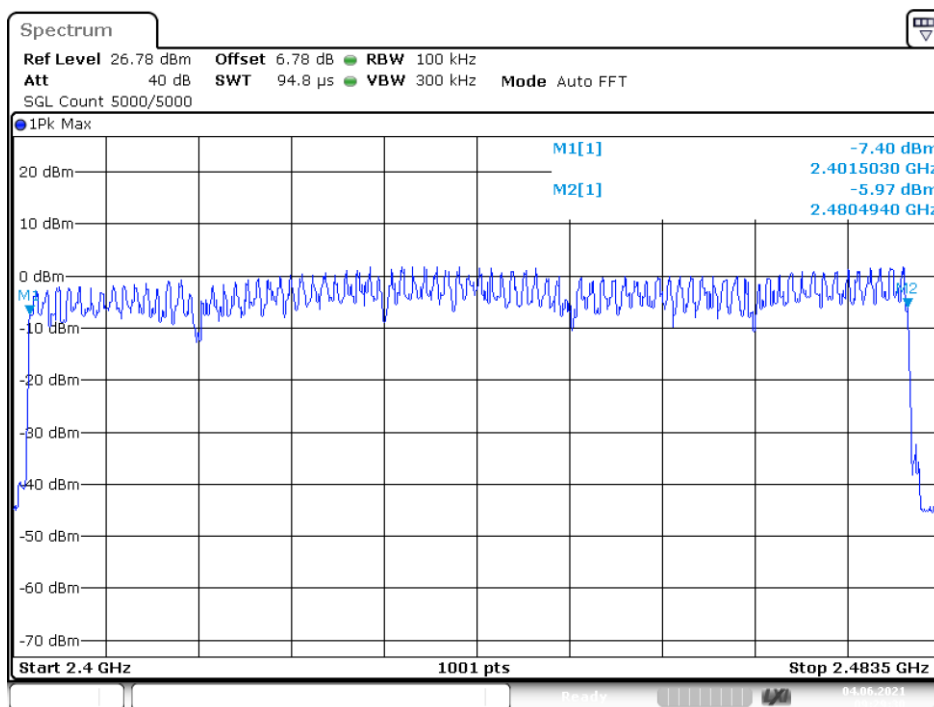
Date: 4.JUN.2021 09:07:31

Hopping No. NVNT 2-DH1 2441MHz



Date: 4.JUN.2021 09:16:12

Hopping No. NVNT 3-DH1 2441MHz



Date: 4.JUN.2021 09:29:30

7. Dwell Time

7.1. Test limit

Please refer FCC part 15.247 & RSS-247.

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 seconds 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, VBW=1MHz, Span = 0Hz, Sweep = auto.

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

7.3. Test Result

Condition	Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Period Time (ms)	Limit (ms)	Verdict
NVNT	1-DH1	2402	0.383	122.560	31600	400	Pass
NVNT	1-DH1	2441	0.383	122.560	31600	400	Pass
NVNT	1-DH1	2480	0.383	122.560	31600	400	Pass
NVNT	1-DH3	2441	1.639	262.240	31600	400	Pass
NVNT	1-DH5	2441	2.887	307.947	31600	400	Pass
NVNT	2-DH1	2402	0.378	120.960	31600	400	Pass
NVNT	2-DH1	2441	0.382	122.240	31600	400	Pass
NVNT	2-DH1	2480	0.388	124.160	31600	400	Pass
NVNT	2-DH3	2441	1.64	262.400	31600	400	Pass
NVNT	2-DH5	2441	2.889	308.160	31600	400	Pass
NVNT	3-DH1	2402	0.378	120.960	31600	400	Pass
NVNT	3-DH1	2441	0.378	120.960	31600	400	Pass
NVNT	3-DH1	2480	0.388	124.160	31600	400	Pass
NVNT	3-DH3	2441	1.64	262.400	31600	400	Pass
NVNT	3-DH5	2441	2.881	307.307	31600	400	Pass

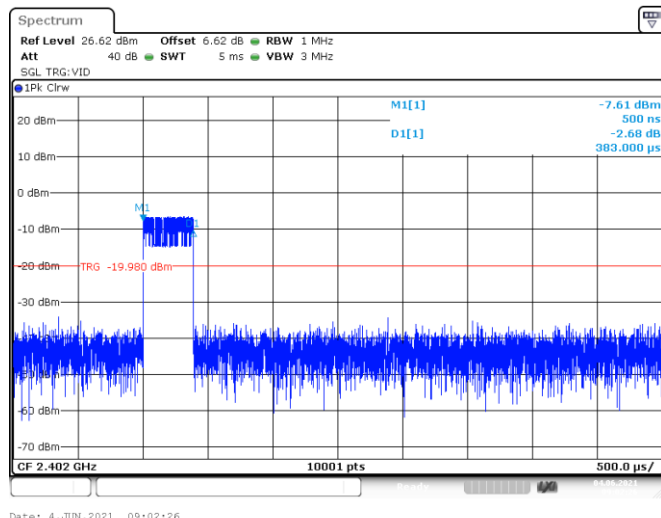
Note: 1 A period time = $0.4 \text{ (s)} * 79 = 31.6 \text{ (s)}$

2 DH1 time slot = Pulse Duration * $(1600/(2*79)) * \text{A period time}$

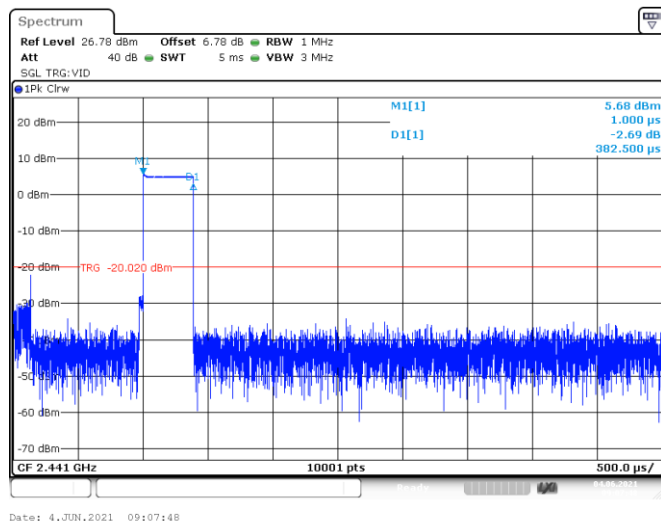
DH3 time slot = Pulse Duration * $(1600/(4*79)) * \text{A period time}$

DH5 time slot = Pulse Duration * $(1600/(6*79)) * \text{A period time}$

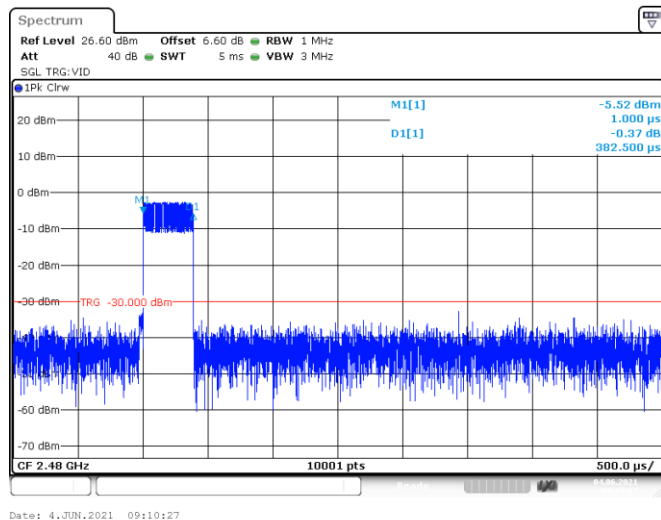
Dwell NVNT 1-DH1 2402MHz



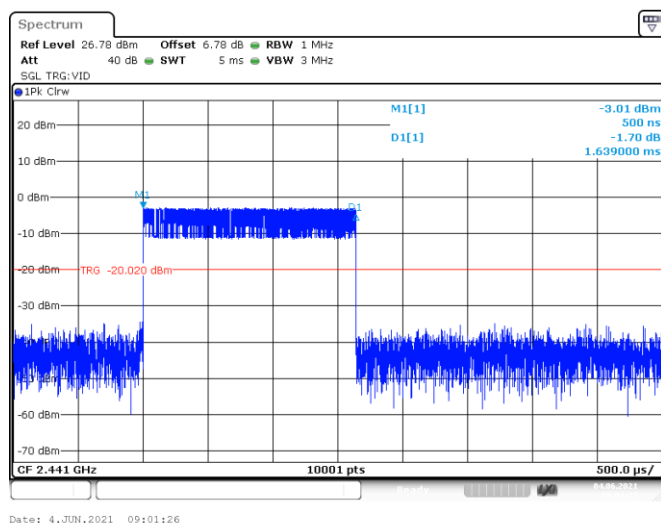
Dwell NVNT 1-DH1 2441MHz



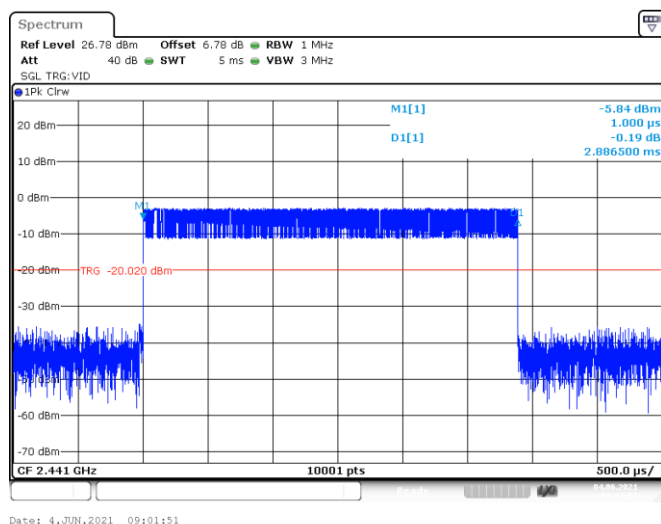
Dwell NVNT 1-DH1 2480MHz



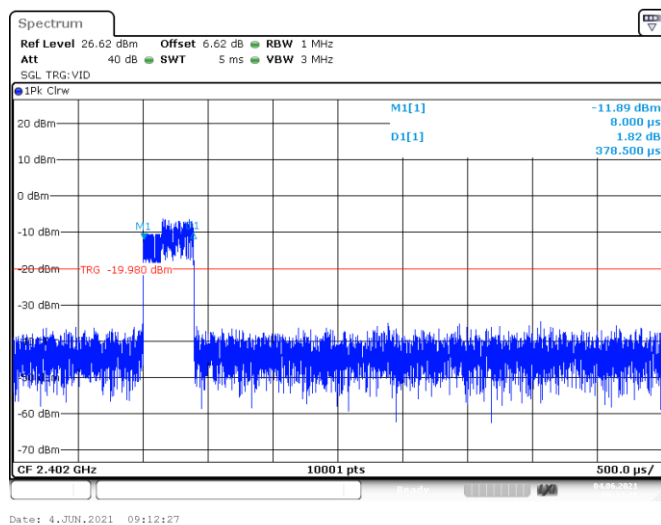
Dwell NVNT 1-DH3 2441MHz



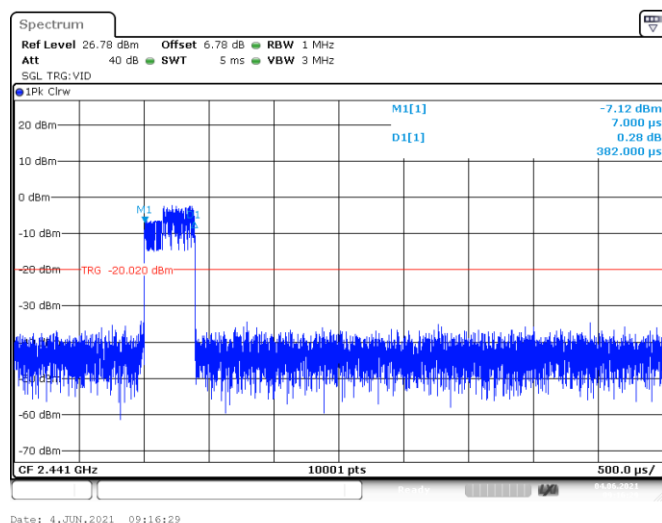
Dwell NVNT 1-DH5 2441MHz



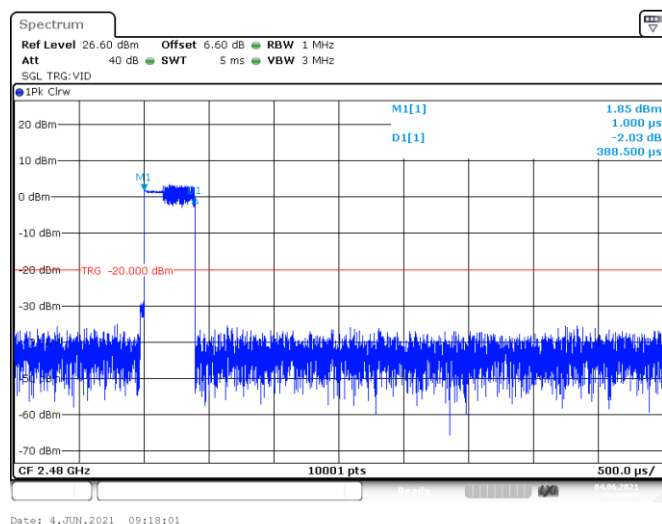
Dwell NVNT 2-DH1 2402MHz



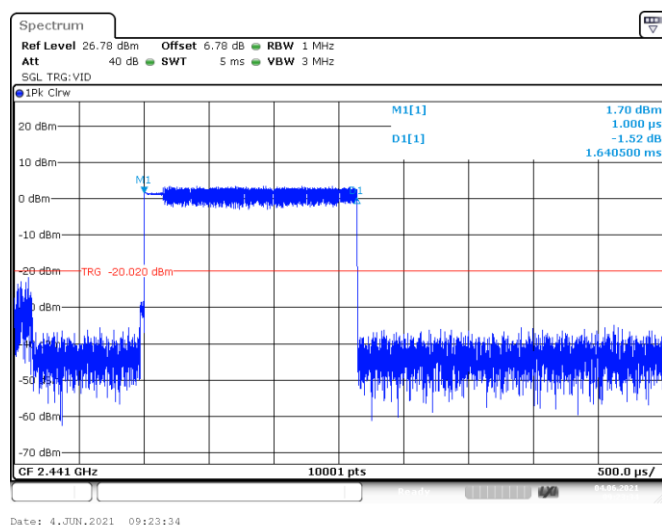
Dwell NVNT 2-DH1 2441MHz



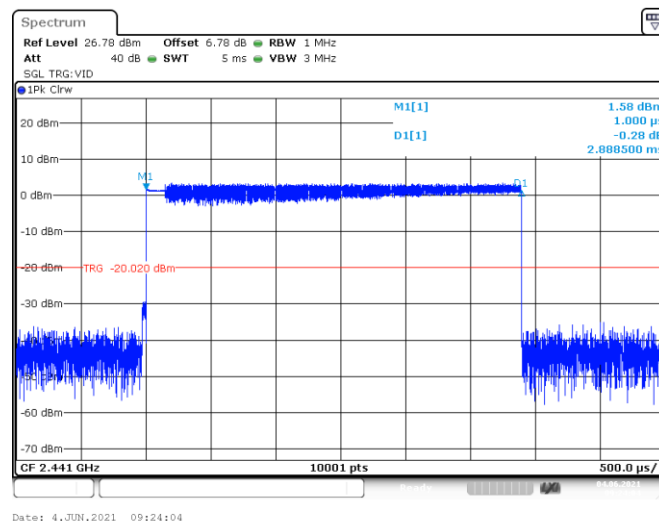
Dwell NVNT 2-DH1 2480MHz



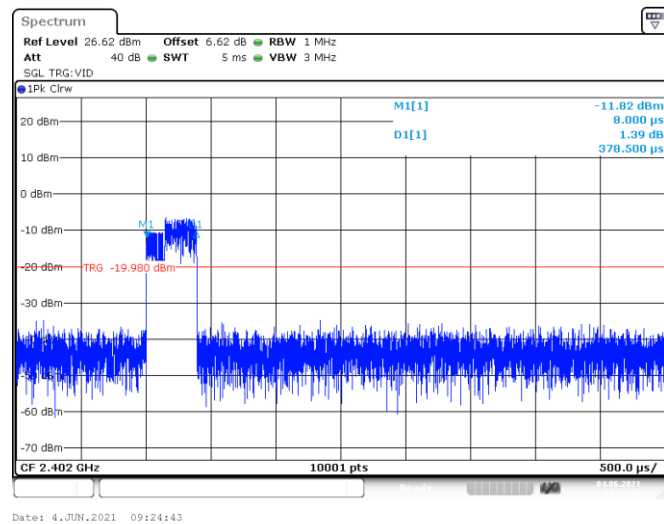
Dwell NVNT 2-DH3 2441MHz



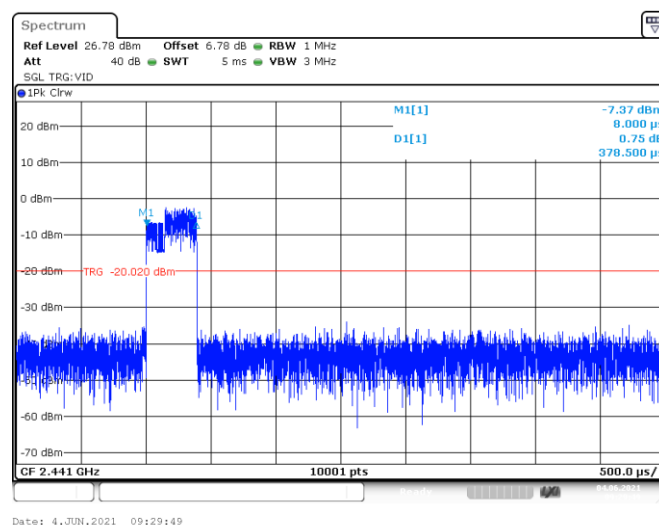
Dwell NVNT 2-DH5 2441MHz



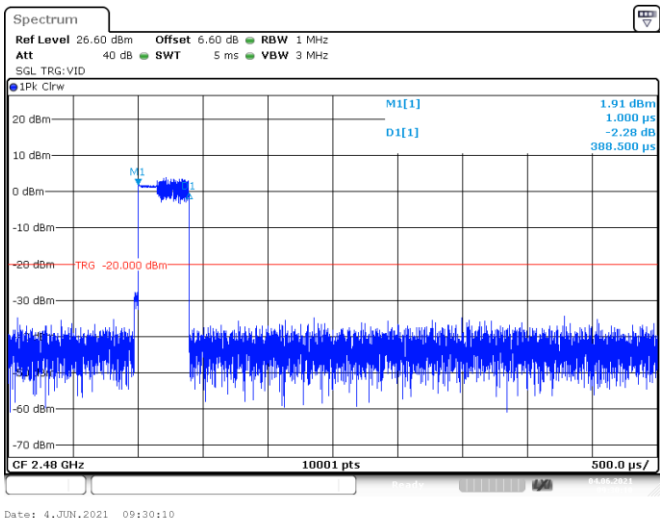
Dwell NVNT 3-DH1 2402MHz



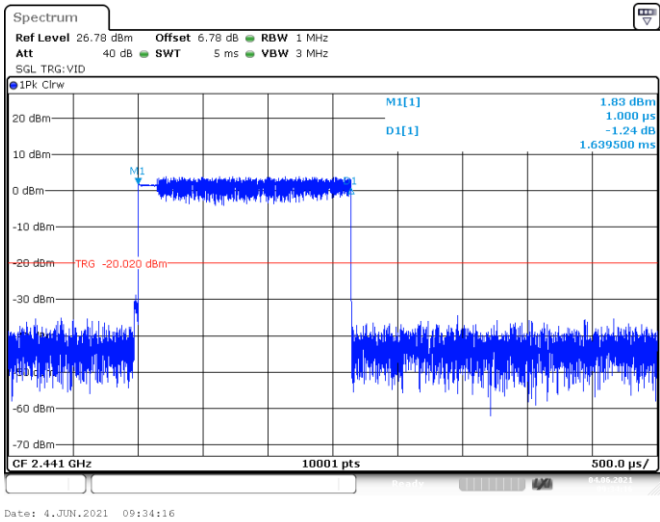
Dwell NVNT 3-DH1 2441MHz



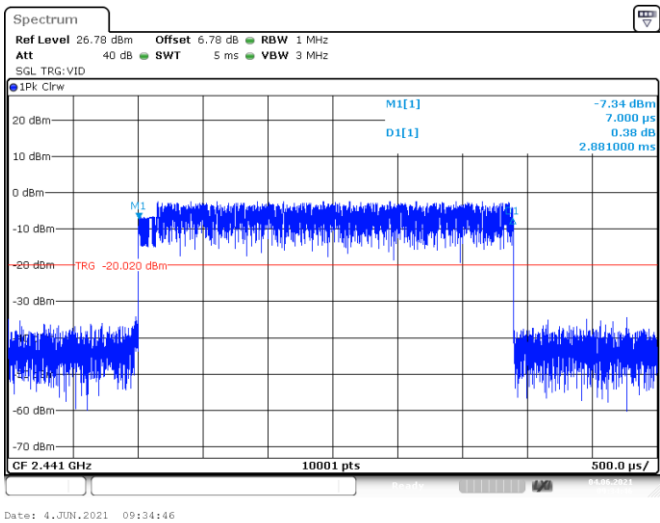
Dwell NVNT 3-DH1 2480MHz



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)

RSS-GEN Restricted frequency band

Table 7 – Restricted frequency bands ^{Note 1}

MHz	MHz	GHz
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 – 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0

6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 – 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 – 8500	
108 – 138		

Note 1: Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

15.209 Limit

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
0.009-0.490	300	$2400/\text{F}(\text{KHz})$	/
0.490-1.705	30	$24000/\text{F}(\text{KHz})$	/
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 $\text{dB}(\mu\text{V})/\text{m}$ (Peak) 54.0 $\text{dB}(\mu\text{V})/\text{m}$ (Average)	

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

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field strength ($\mu\text{V/m}$ at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

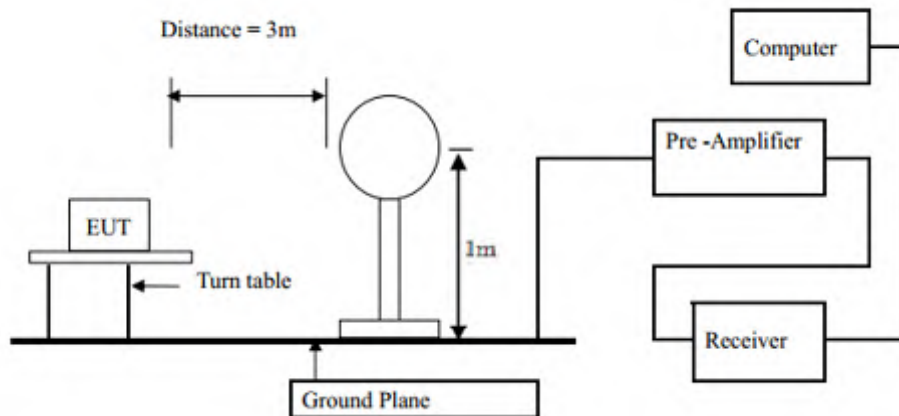
Table 6 – General field strength limits at frequencies below 30 MHz

Frequency	Magnetic field strength (H-Field) ($\mu\text{A/m}$)	Measurement distance (m)
9 - 490 kHz ^{Note 1}	$6.37/\text{F}$ (F in kHz)	300
490 - 1705 kHz	$63.7/\text{F}$ (F in kHz)	30
1.705 - 30 MHz	0.08	30

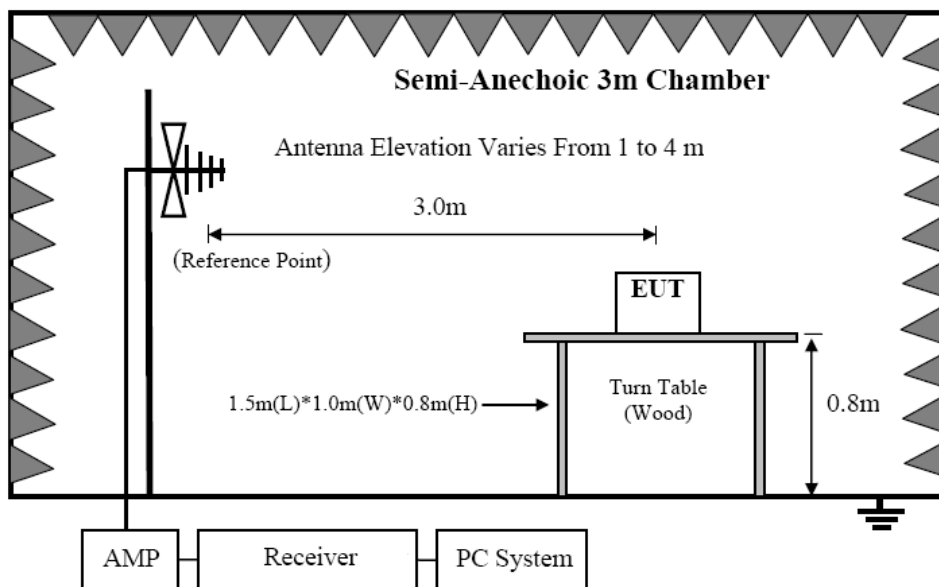
Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

8.2. Block Diagram of Test setup

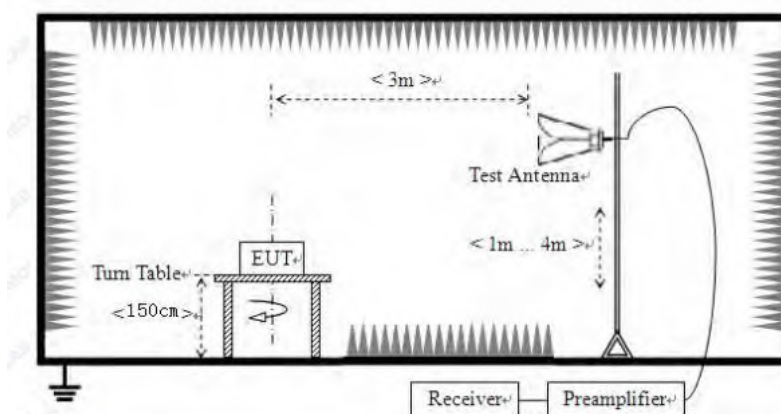
8.2.1 In 3m Anechoic Chamber Test Setup Diagram for below 30MHz



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, 0.8 m high above ground for below 1GHz testing and 1.5m high for above 1GHz testing inside a semi-anechoic chamber.
- (2) Setup EUT and simulator
- (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 through 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 :2013 on 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

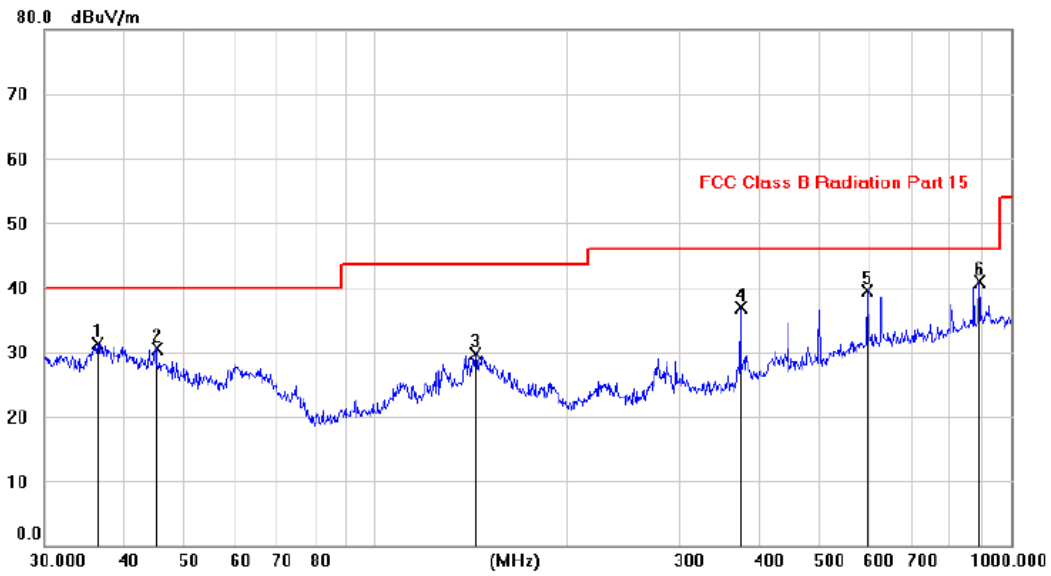
We have scanned from 9kHz to the 10th harmonic of the EUT's highest frequency.
Detailed information please see the following page.

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.

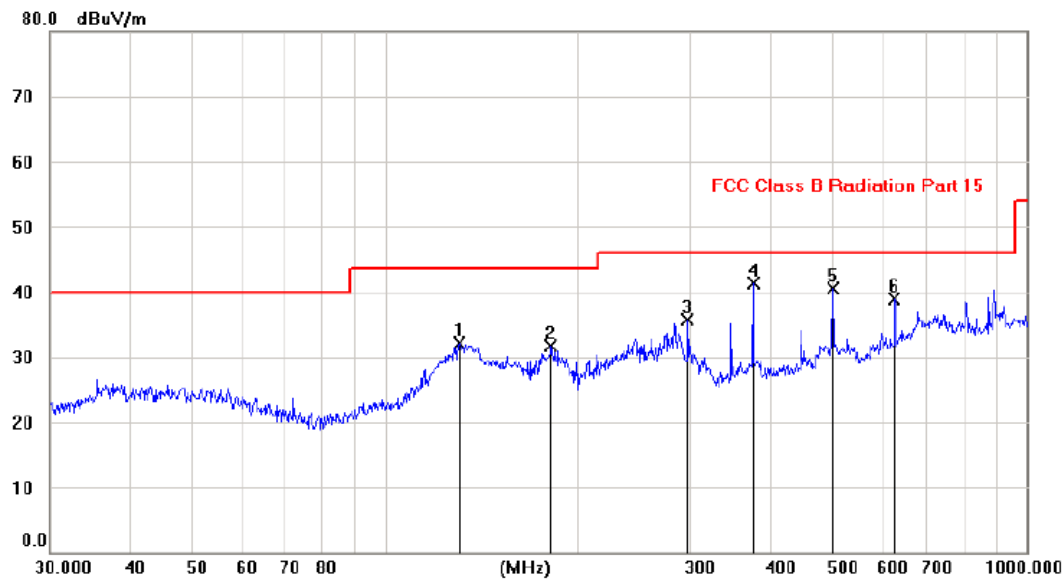
From 30MHz to 1000MHz: Conclusion: PASS

Vertical:



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		36.4878	17.41	13.92	31.33	40.00	-8.67	peak		
2		45.0583	16.45	14.10	30.55	40.00	-9.45	peak		
3		143.6947	15.04	14.59	29.63	43.50	-13.87	peak		
4		375.0167	21.12	15.78	36.90	46.00	-9.10	peak		
5		594.0901	19.35	20.10	39.45	46.00	-6.55	peak		
6	*	891.0401	17.02	23.92	40.94	46.00	-5.06	peak		

Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		130.6990	18.53	13.64	32.17	43.50	-11.33	peak		
2		181.7501	19.32	12.47	31.79	43.50	-11.71	peak		
3		296.9809	21.64	14.03	35.67	46.00	-10.33	peak		
4	*	375.0167	25.57	15.78	41.35	46.00	-4.65	peak		
5		500.0086	22.37	18.21	40.58	46.00	-5.42	peak		
6		625.0049	18.25	20.72	38.97	46.00	-7.03	peak		

Remark: All modes have been tested, and only worst data of 8-DPSK mode, Channel 2480MHz (AC 120V/60Hz) was listed in this report.

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	47.99	V	33.95	10.18	34.26	57.86	74	-16.14	PK
4804	38.35	V	33.95	10.18	34.26	48.22	54	-5.78	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	47.66	H	33.95	10.18	34.26	57.53	74	-16.47	PK
4804	37.94	H	33.95	10.18	34.26	47.81	54	-6.19	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: GFSK TX Mid									
4882	44.68	V	33.93	10.2	34.29	54.52	74	-19.48	PK
4882	35.98	V	33.93	10.2	34.29	45.82	54	-8.18	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	44.50	H	33.93	10.2	34.29	54.34	74	-19.66	PK
4882	33.02	H	33.93	10.2	34.29	42.86	54	-11.14	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: GFSK TX High									
4960	43.47	V	33.98	10.22	34.25	53.42	74	-20.58	PK
4960	36.19	V	33.98	10.22	34.25	46.14	54	-7.86	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	43.31	H	33.98	10.22	34.25	53.26	74	-20.74	PK
4960	32.69	H	33.98	10.22	34.25	42.64	54	-11.36	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: $\pi/4$ 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	48.17	V	33.95	10.18	34.26	58.04	74	-15.96	PK
4804	35.92	V	33.95	10.18	34.26	45.79	54	-8.21	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	44.41	H	33.95	10.18	34.26	54.28	74	-19.72	PK
4804	36.59	H	33.95	10.18	34.26	46.46	54	-7.54	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: $\pi/4$ DQPSK TX Mid									
4882	41.72	V	33.93	10.2	34.29	51.56	74	-22.44	PK
4882	36.13	V	33.93	10.2	34.29	45.97	54	-8.03	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	46.22	H	33.93	10.2	34.29	56.06	74	-17.94	PK
4882	35.47	H	33.93	10.2	34.29	45.31	54	-8.69	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: $\pi/4$ DQPSK TX High									
4960	42.86	V	33.98	10.22	34.25	52.81	74	-21.19	PK
4960	36.20	V	33.98	10.22	34.25	46.15	54	-7.85	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	42.70	H	33.98	10.22	34.25	52.65	74	-21.35	PK
4960	35.38	H	33.98	10.22	34.25	45.33	54	-8.67	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- 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	47.50	V	33.95	10.18	34.26	57.37	74	-16.63	PK
4804	35.82	V	33.95	10.18	34.26	45.69	54	-8.31	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
4804	45.02	H	33.95	10.18	34.26	54.89	74	-19.11	PK
4804	34.51	H	33.95	10.18	34.26	44.38	54	-9.62	AV
7206	/	/	/	/	/	/	/	/	/
9608	/	/	/	/	/	/	/	/	/
Test Mode: 8- DQPSK TX Mid									
4882	45.13	V	33.93	10.2	34.29	54.97	74	-19.03	PK
4882	34.86	V	33.93	10.2	34.29	44.70	54	-9.30	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
4882	43.04	H	33.93	10.2	34.29	52.88	74	-21.12	PK
4882	32.91	H	33.93	10.2	34.29	42.75	54	-11.25	AV
7323	/	/	/	/	/	/	/	/	/
9764	/	/	/	/	/	/	/	/	/
Test Mode: 8- DQPSK TX High									
4960	44.00	V	33.98	10.22	34.25	53.95	74	-20.05	PK
4960	36.67	V	33.98	10.22	34.25	46.62	54	-7.38	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/
4960	43.65	H	33.98	10.22	34.25	53.60	74	-20.40	PK
4960	33.56	H	33.98	10.22	34.25	43.51	54	-10.49	AV
7440	/	/	/	/	/	/	/	/	/
9920	/	/	/	/	/	/	/	/	/

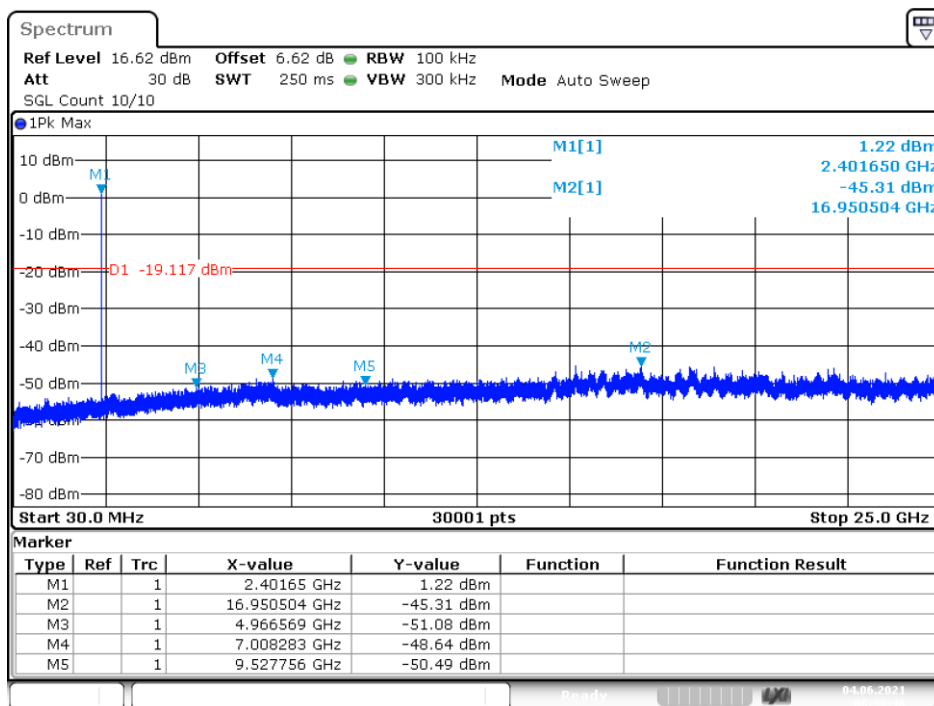
Note:

1, Result = Read level + Antenna factor + cable loss-Amp factor

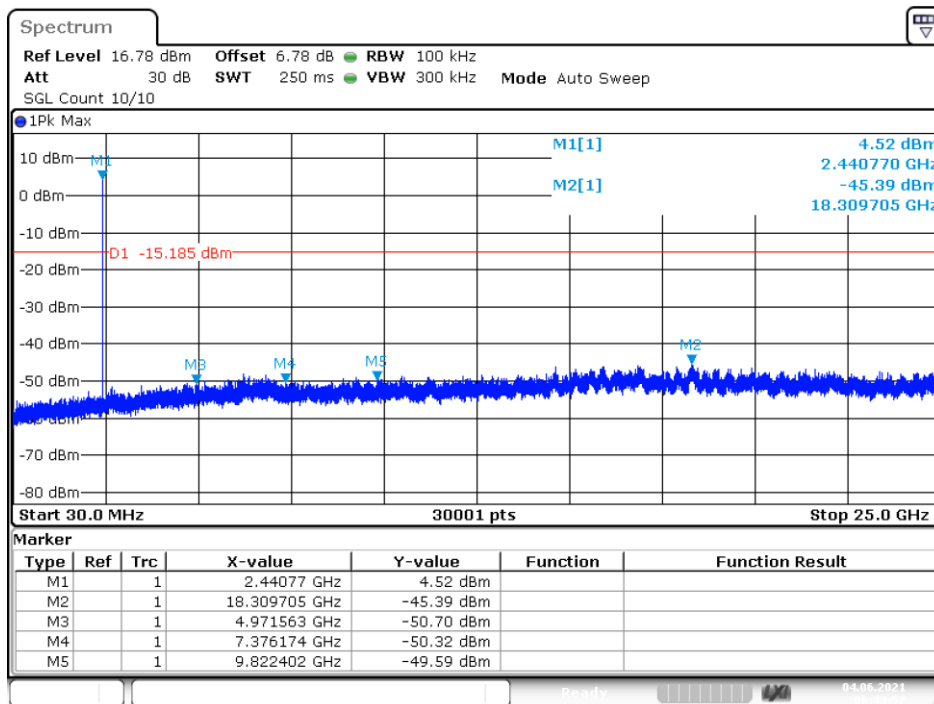
2, All the other emissions not reported were too low to read and deemed to comply with FCC limit.

Conducted method:

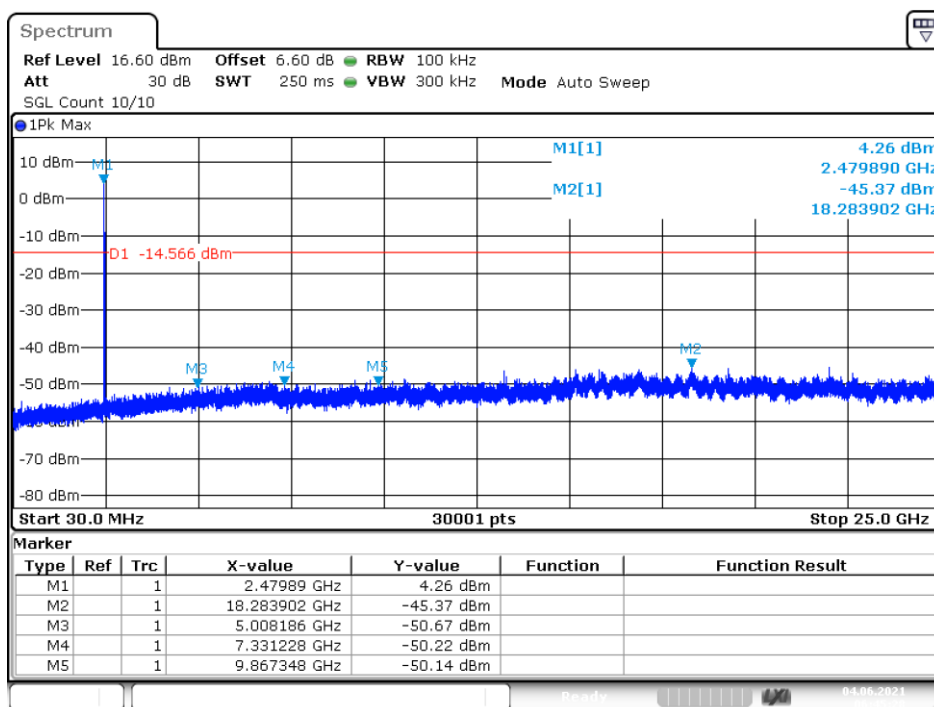
Tx. Spurious NVNT 1-DH1 2402MHz Ant1 Emission



Tx. Spurious NVNT 1-DH1 2441MHz Ant1 Emission

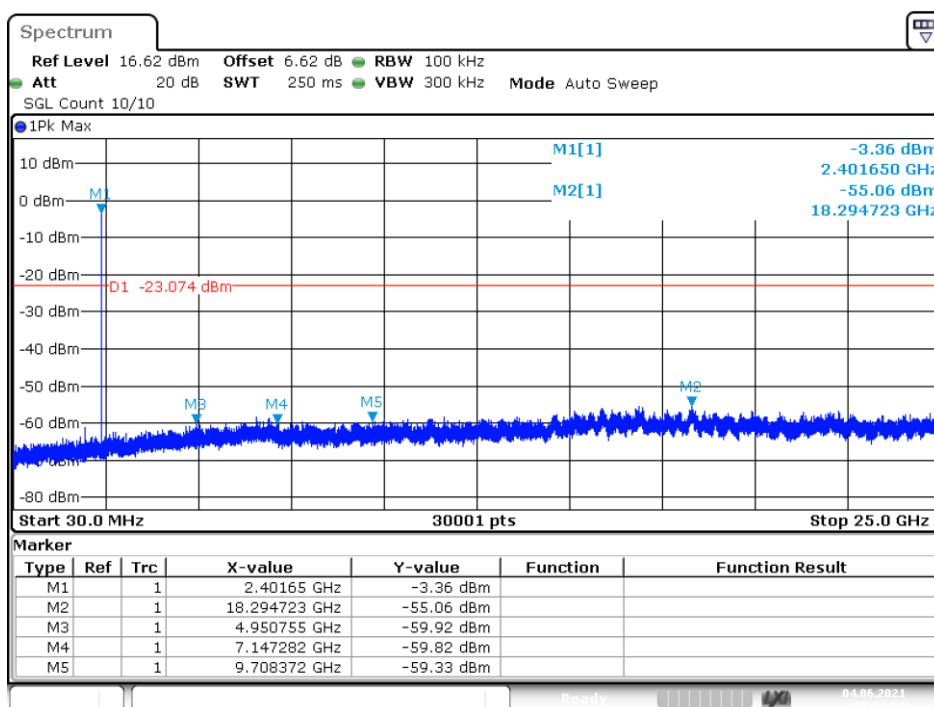


Tx. Spurious NVNT 1-DH1 2480MHz Ant1 Emission



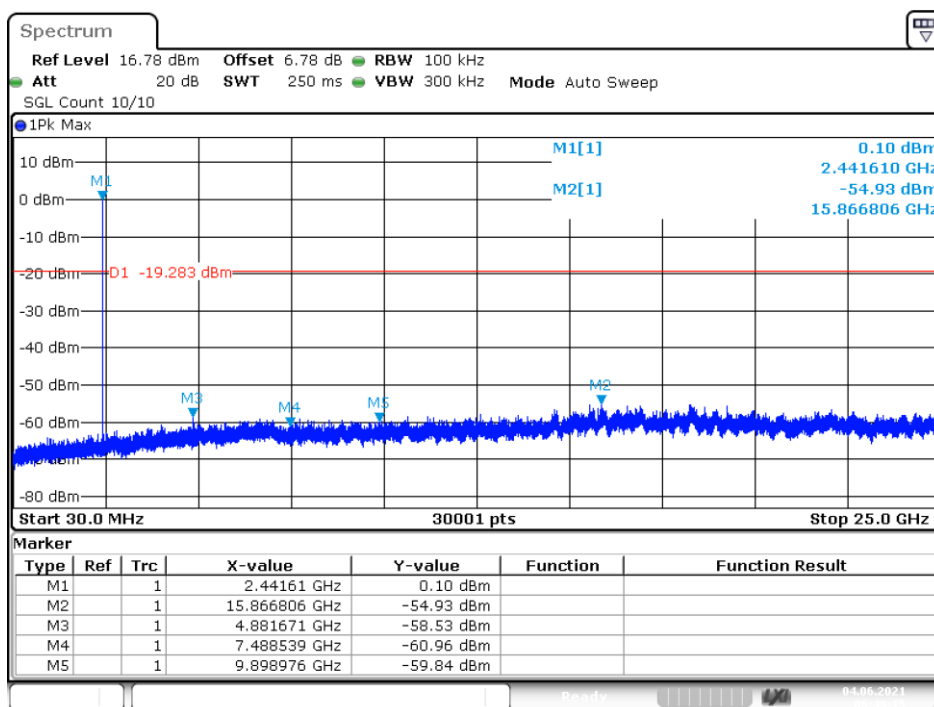
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Tx. Spurious NVNT 2-DH1 2402MHz Ant1 Emission



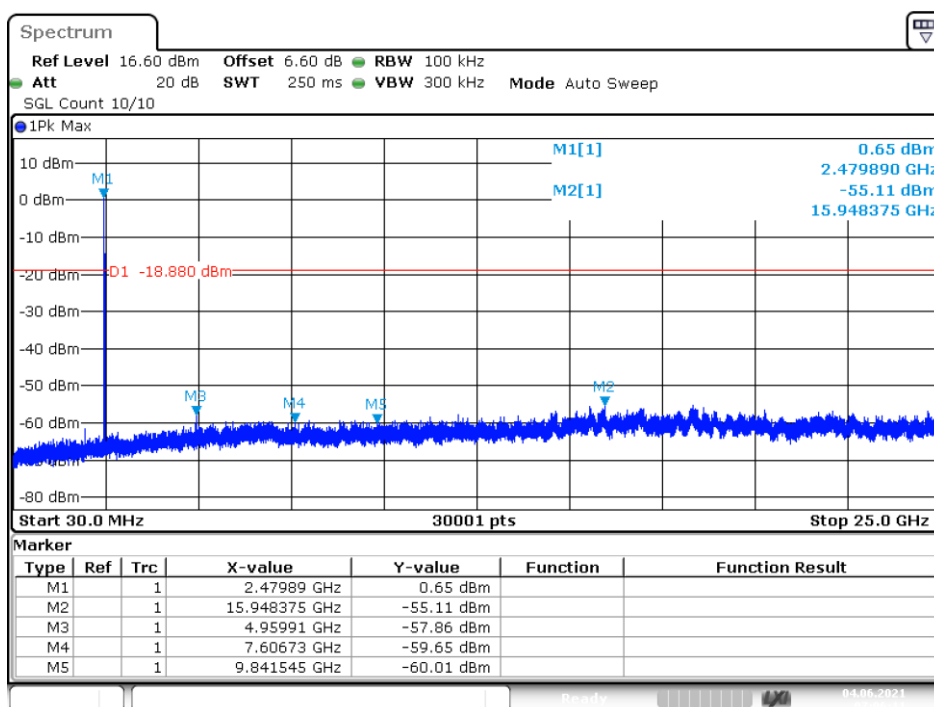
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Tx. Spurious NVNT 2-DH1 2441MHz Ant1 Emission



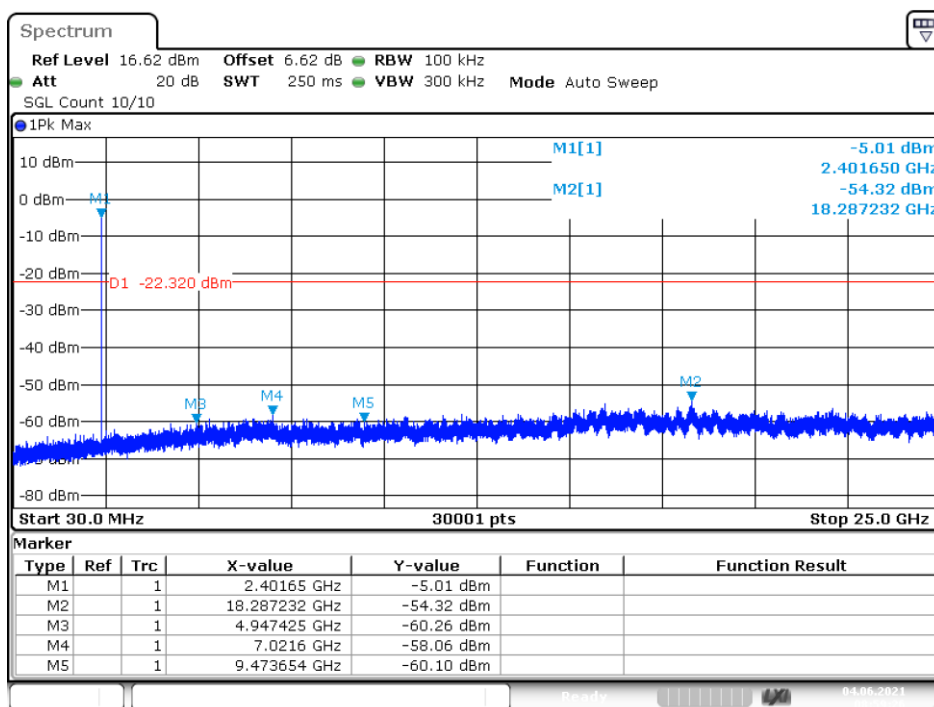
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Tx. Spurious NVNT 2-DH1 2480MHz Ant1 Emission



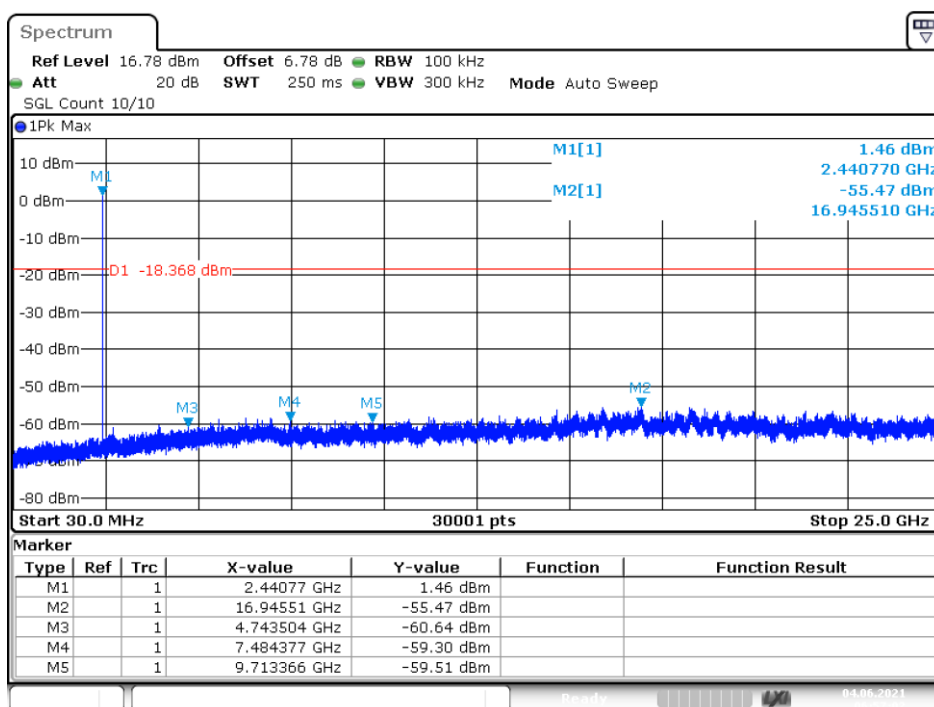
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Tx. Spurious NVNT 3-DH1 2402MHz Ant1 Emission



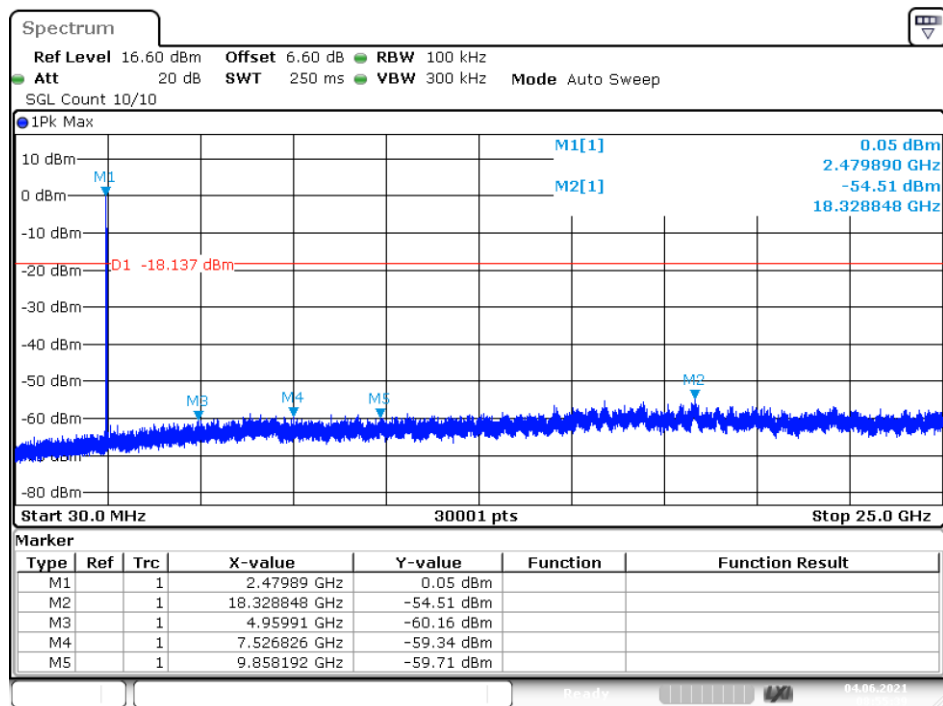
Date: 4.JUN.2021 08:59:25

Tx. Spurious NVNT 3-DH1 2441MHz Ant1 Emission



Date: 4.JUN.2021 06:57:01

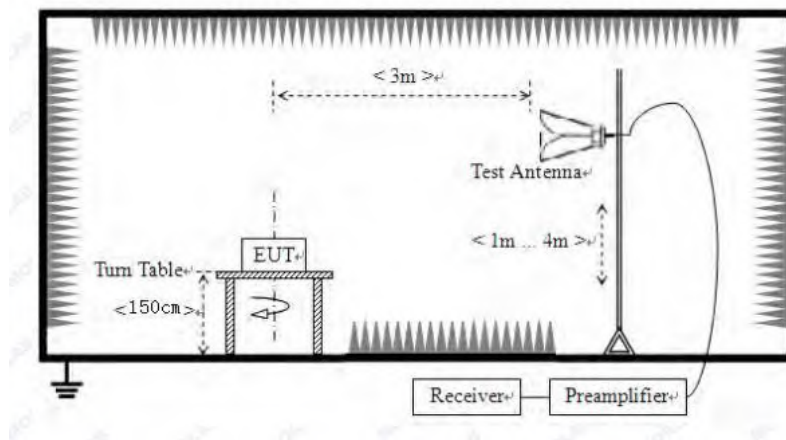
Tx. Spurious NVNT 3-DH1 2480MHz Ant1 Emission



Date: 4.JUN.2021 08:55:39

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 FCC part 15.209 and RSS-GEN, all the other emissions outside operation shall be at least 20dB below the fundamental emissions, or comply with FCC part 15.209 and RSS-GEN limits.

9.3. Test Procedure

Refer to ANSI C 63.10, Clause 6.10.

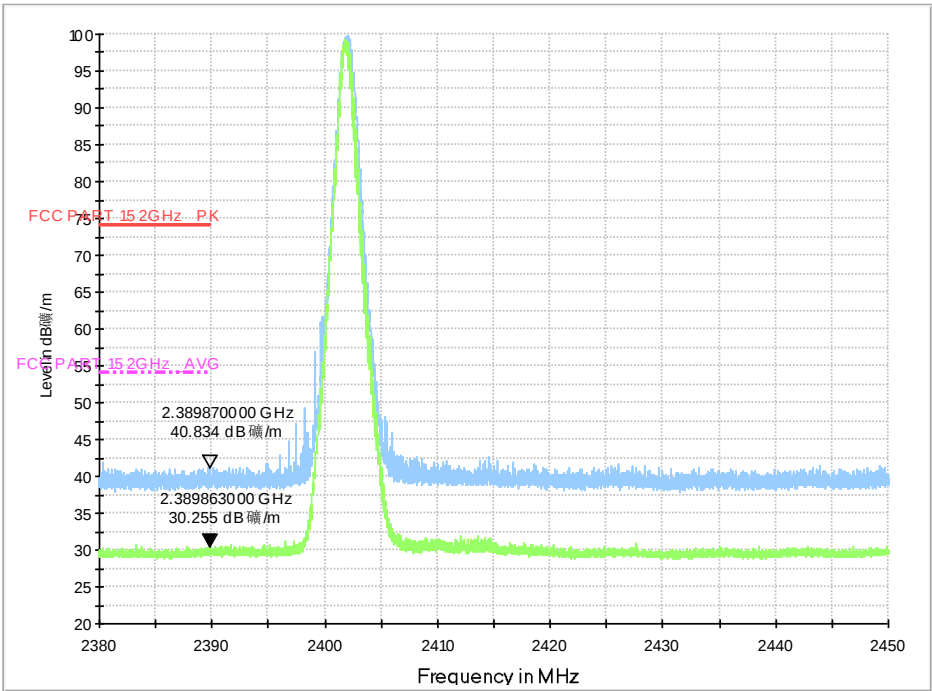
All restriction band and non- restriction band have been tested, only worse case is reported.

9.4. Test Result

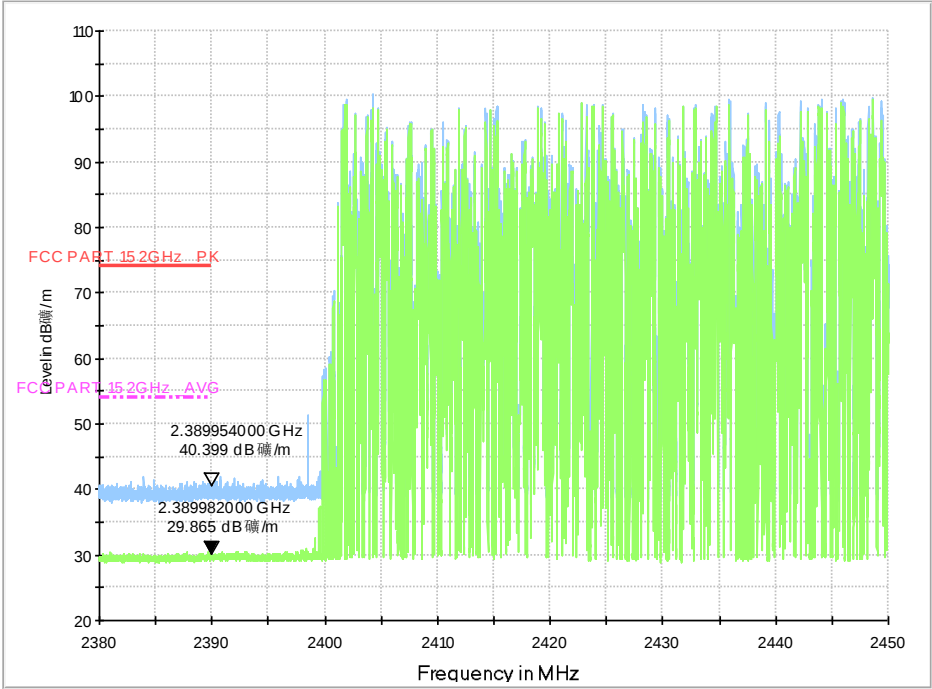
PASS. (See below detailed test data)

Radiated Method:

Test Mode: GFSK-Low

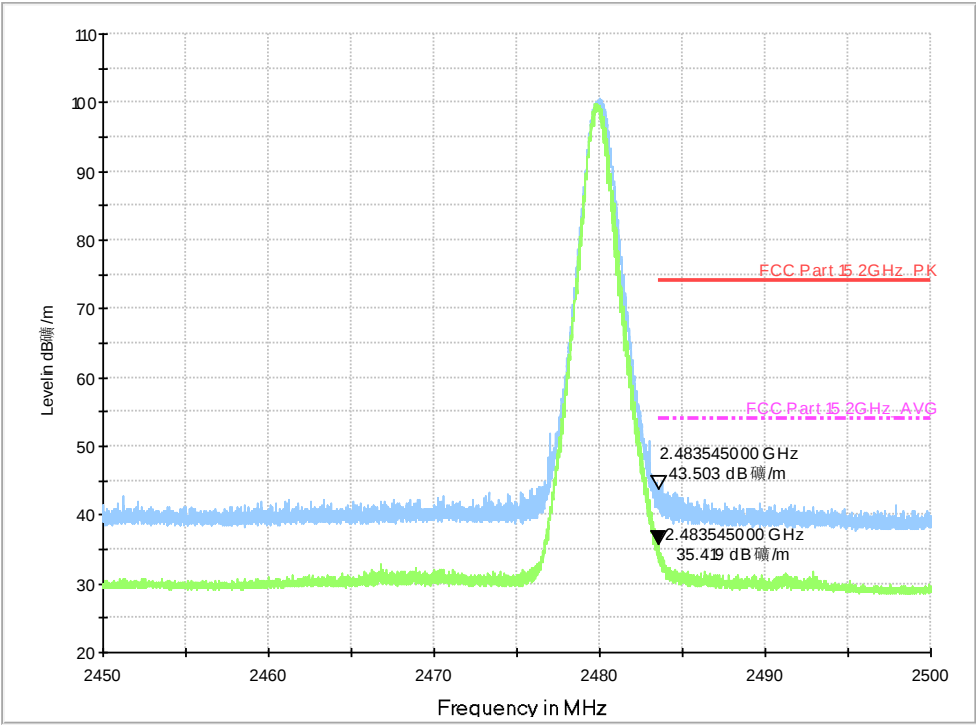


hopping-off

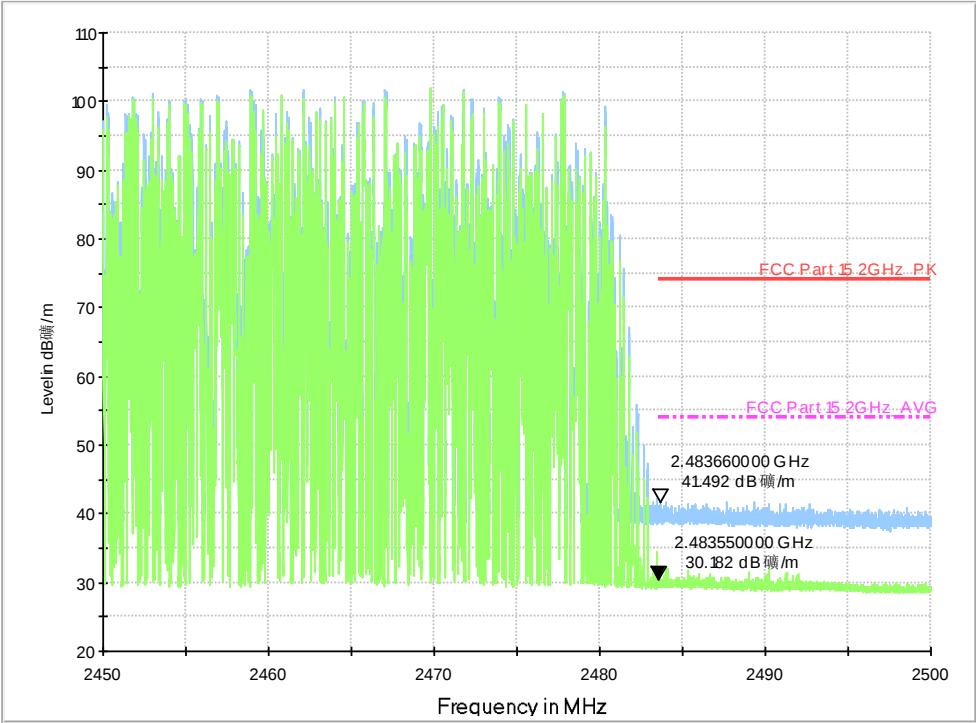


hopping-on

Test Mode: GFSK-High

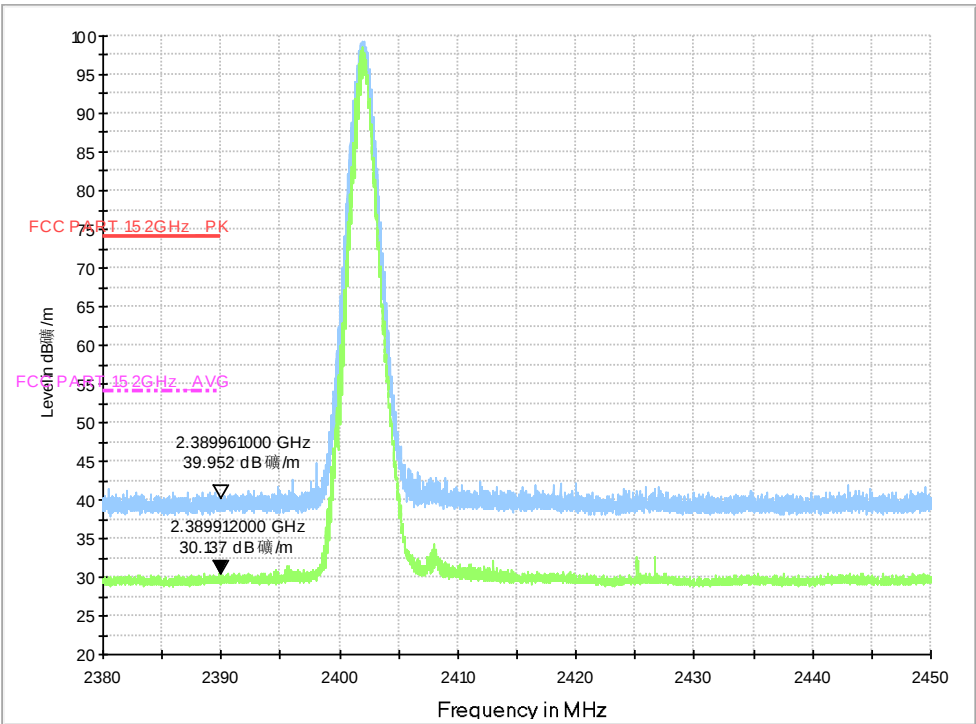


hopping-off

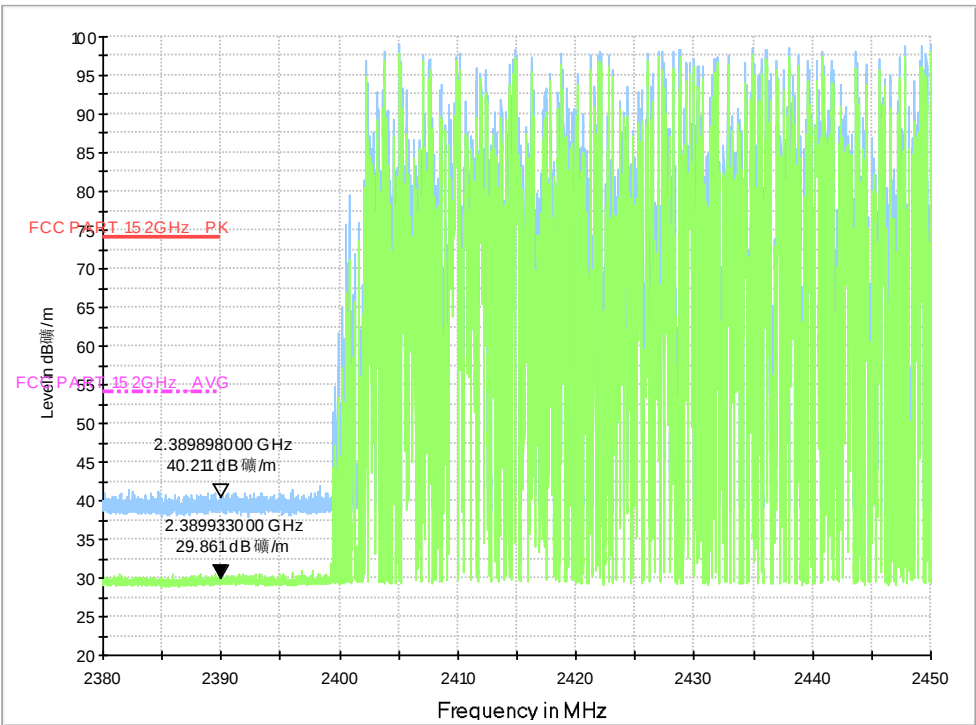


hopping-on

Test Mode: $\pi/4$ DQPSK-Low

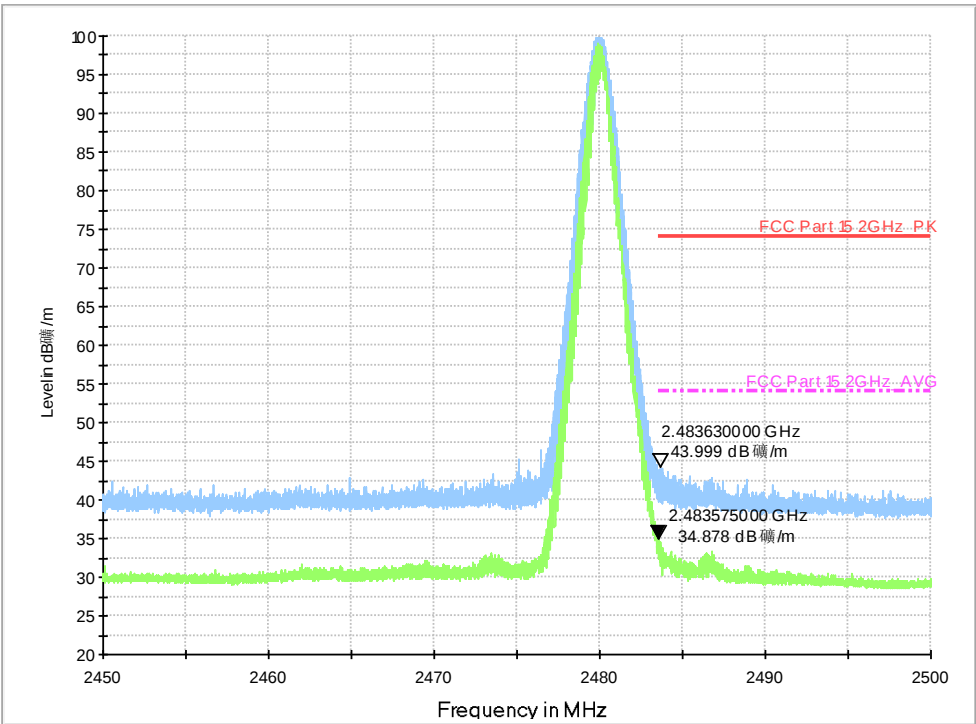


hopping-off

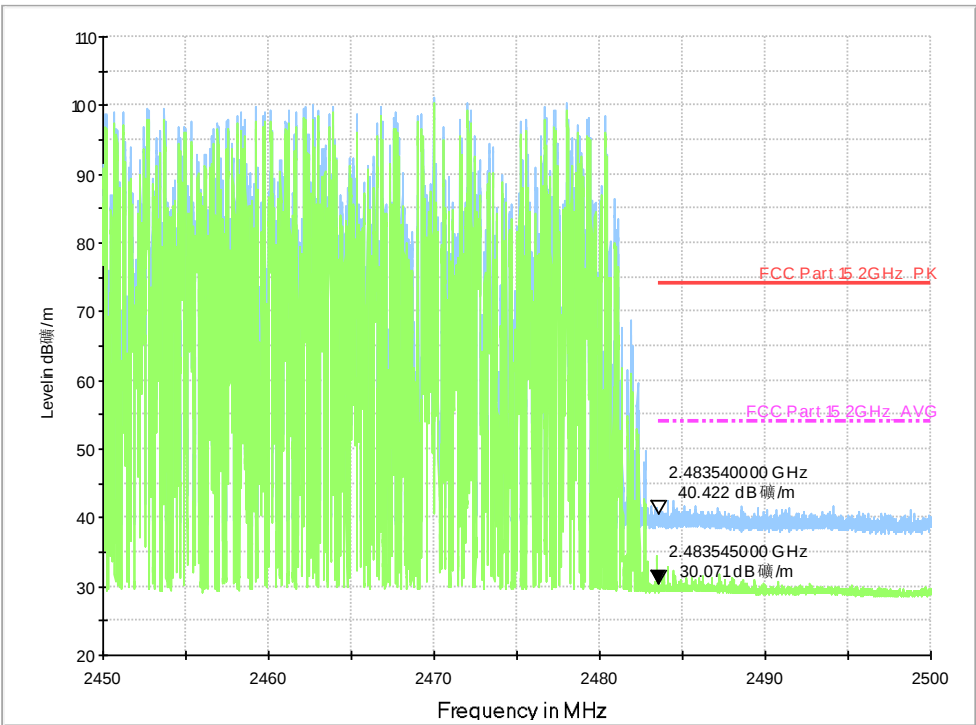


hopping-on

Test Mode: $\pi/4$ DQPSK-High

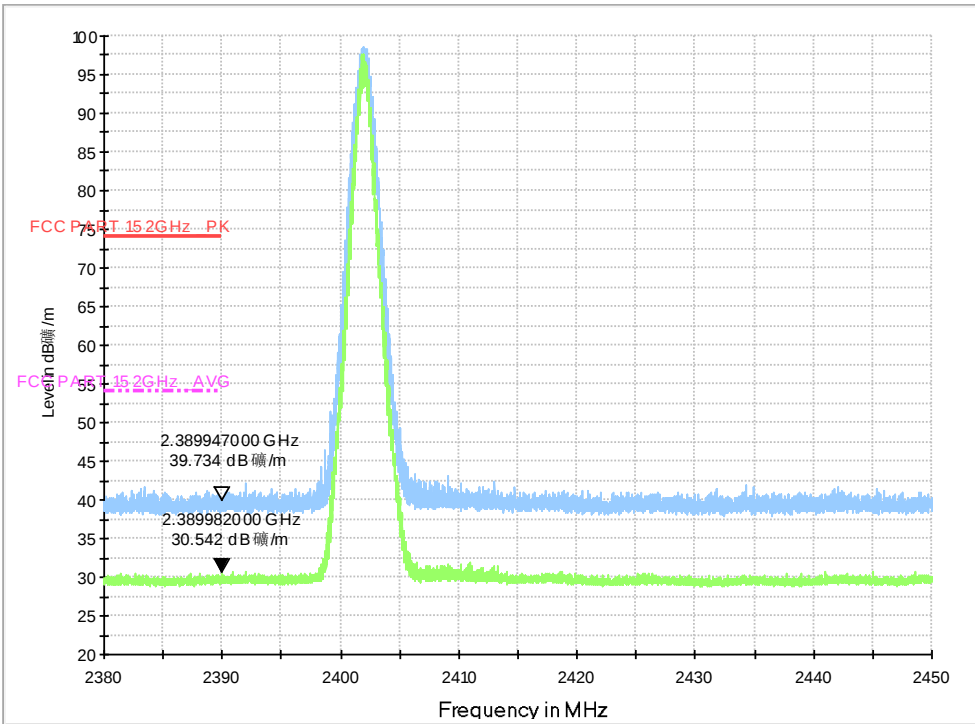


hopping-off

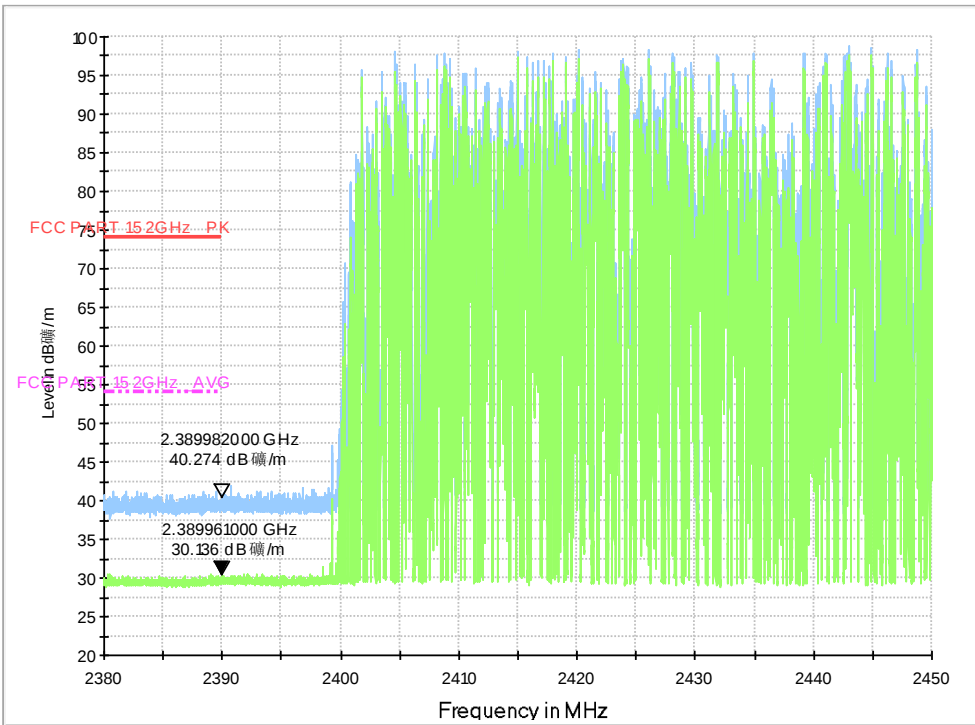


hopping-on

Test Mode: 8DPSK-Low

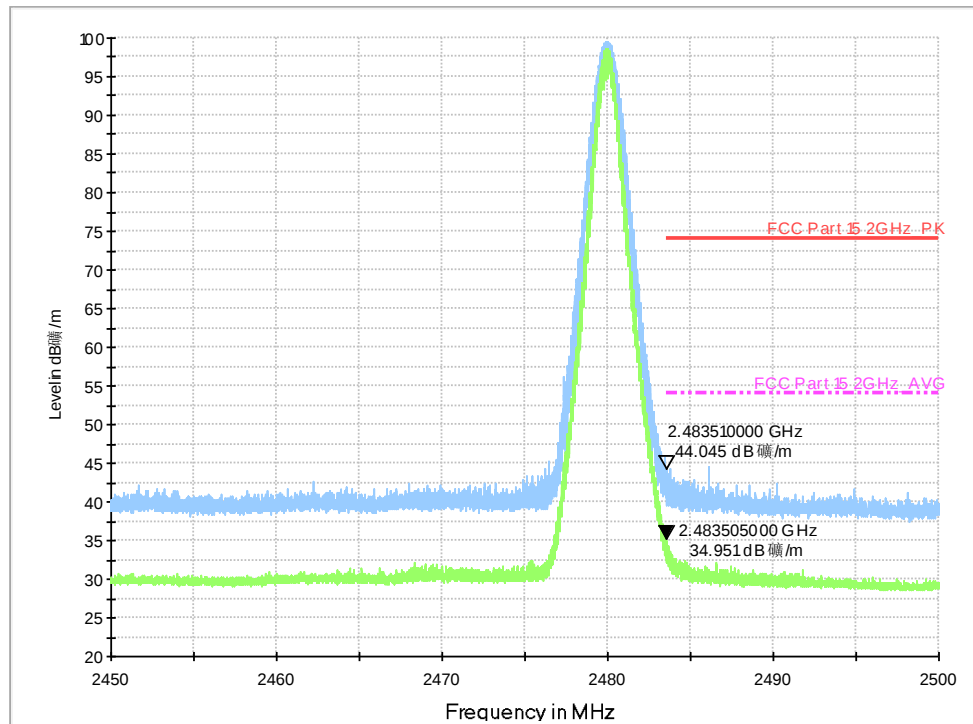


hopping-off

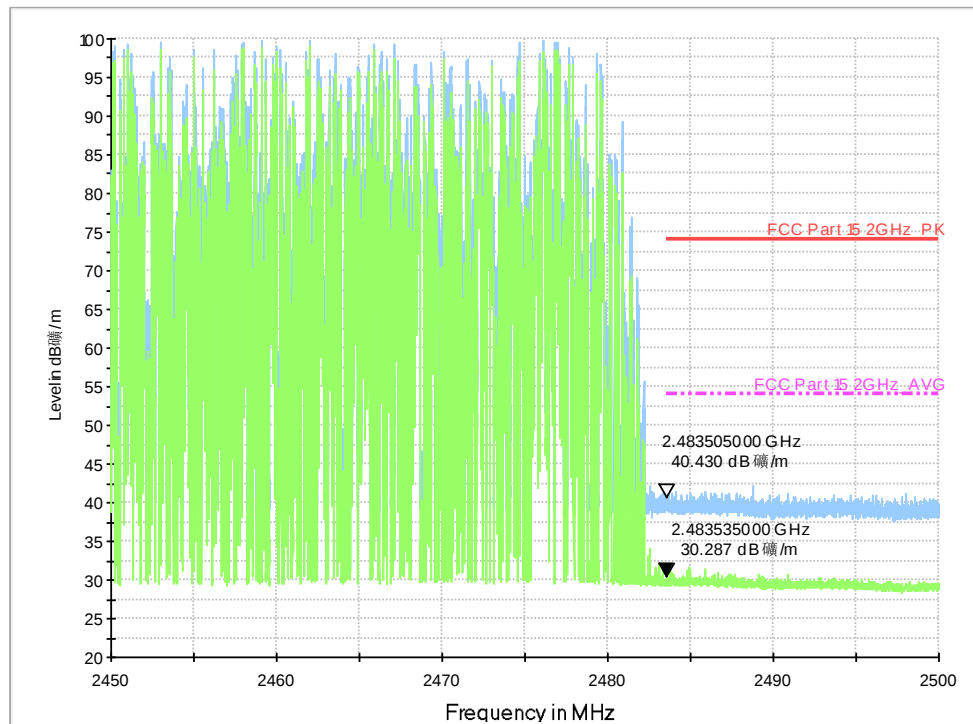


hopping-on

Test Mode: 8DPSK-High



hopping-off



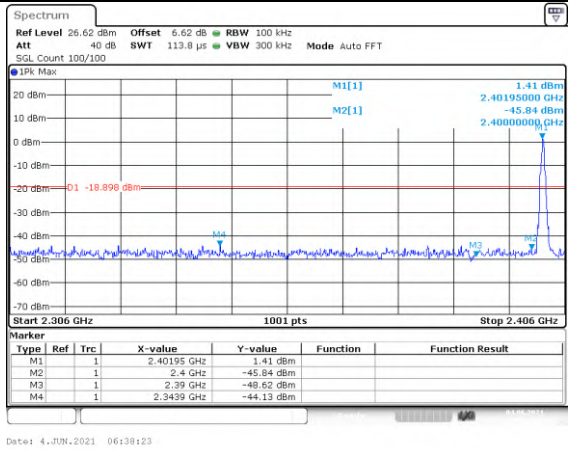
hopping-on

Note: 1. *:Maximum data; x:Over limit; !:over margin.

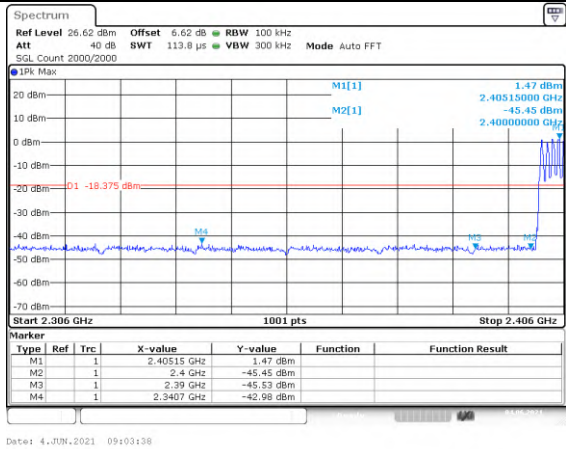
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

Conducted Method
GFSK Mode:

Test channel:	Lowest channel
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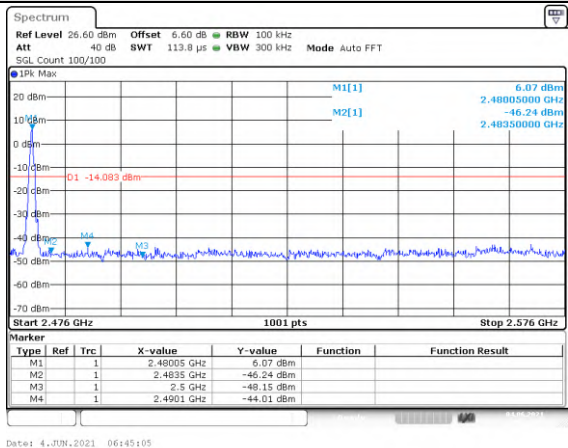


No-hopping mode

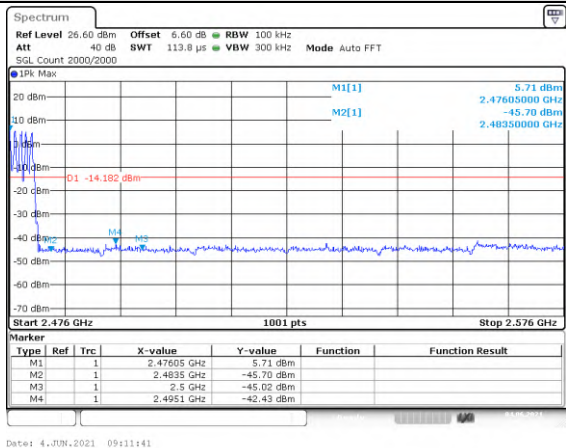


Hopping mode

Test channel:	Highest channel
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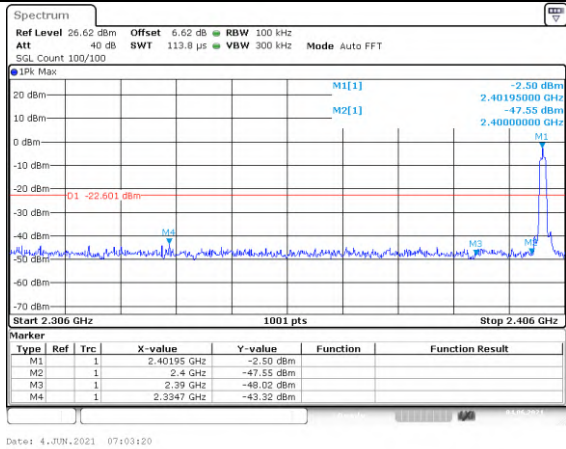
No-hopping mode



Hopping mode

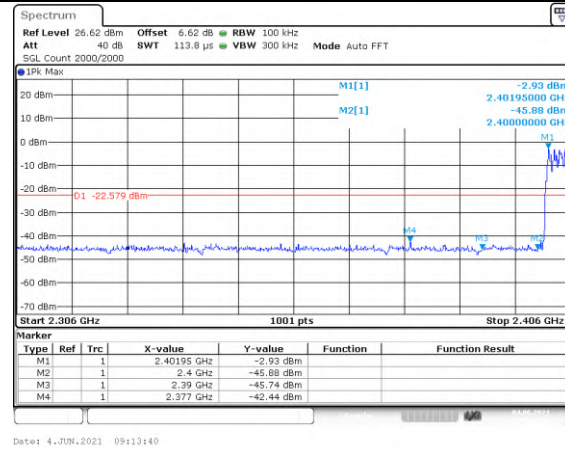
Pi/4QPSK Mode:

Test channel:



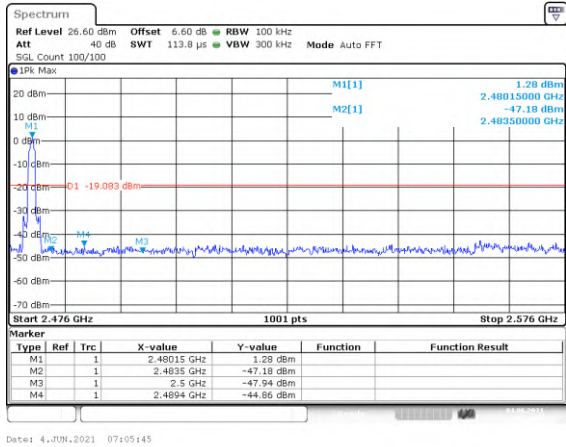
No-hopping mode

Lowest channel



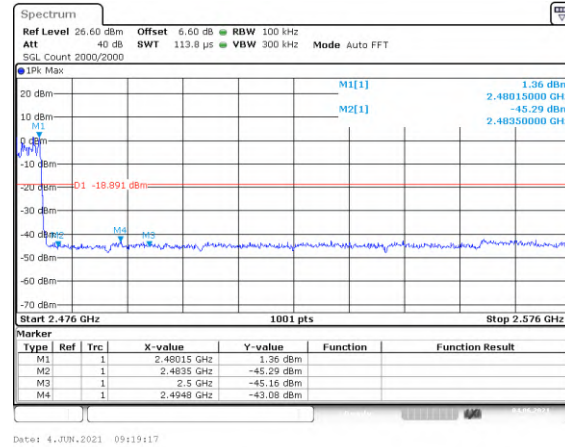
Hopping mode

Test channel:



No-hopping mode

Highest channel

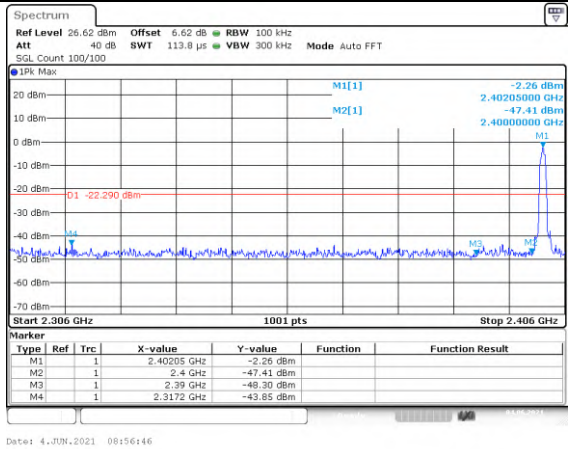


Hopping mode

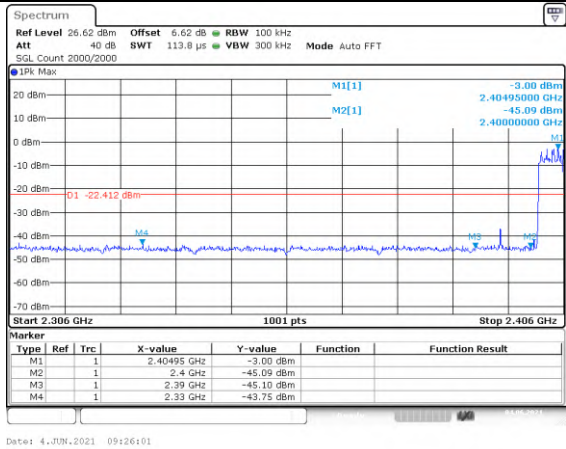
8DPSK Mode:

Test channel:

Lowest channel



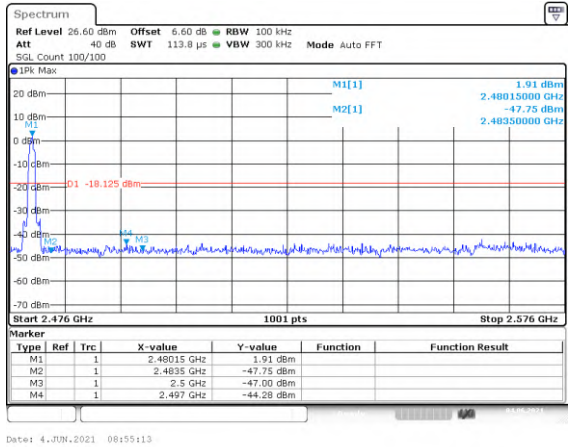
No-hopping mode



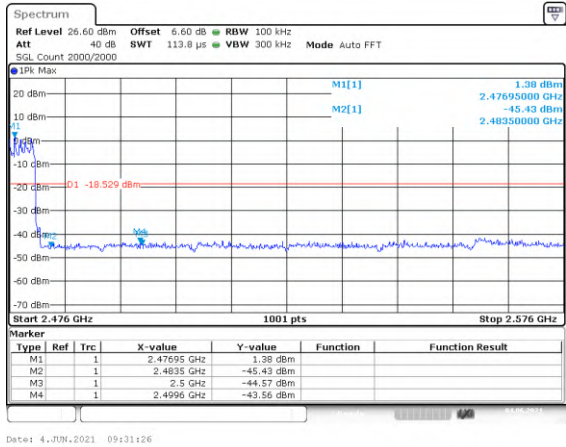
Hopping mode

Test channel:

Highest channel



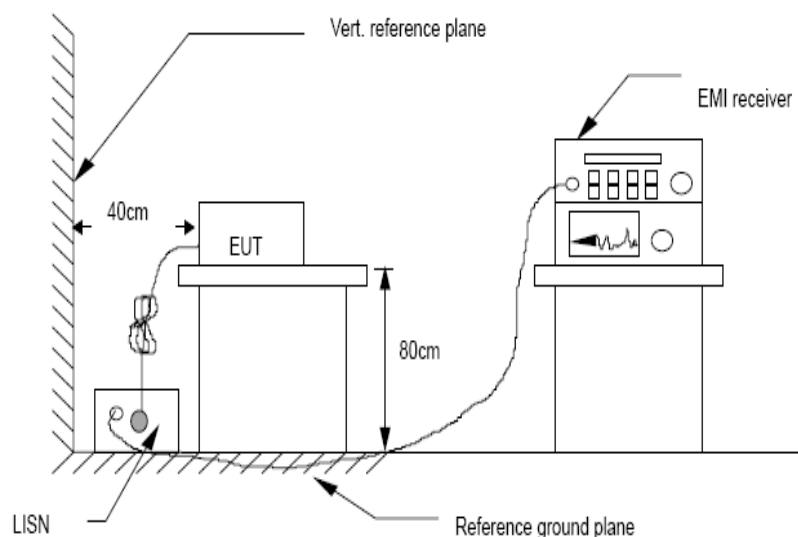
No-hopping mode



Hopping mode

10. Power Line Conducted Emissions

10.1. Block Diagram of Test Setup



10.2. Limit

Frequency	Maximum RF Line Voltage	
	Quasi-Peak Level dB(μ V)	Average Level dB(μ V)
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.

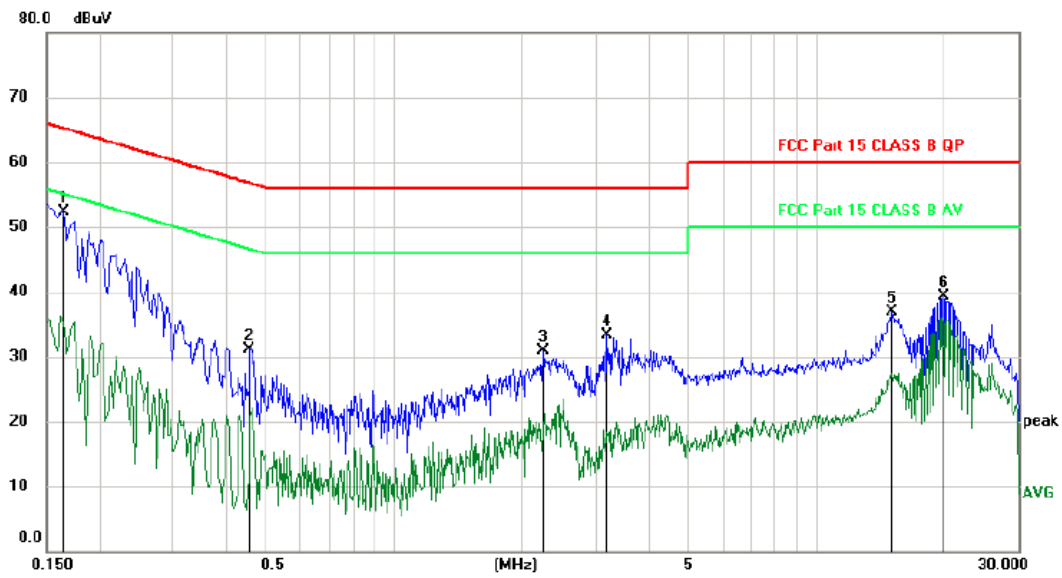
(5) The frequency range from 150 KHz to 30MHz is checked.

10.4. Test Result

PASS. (See below detailed test data)

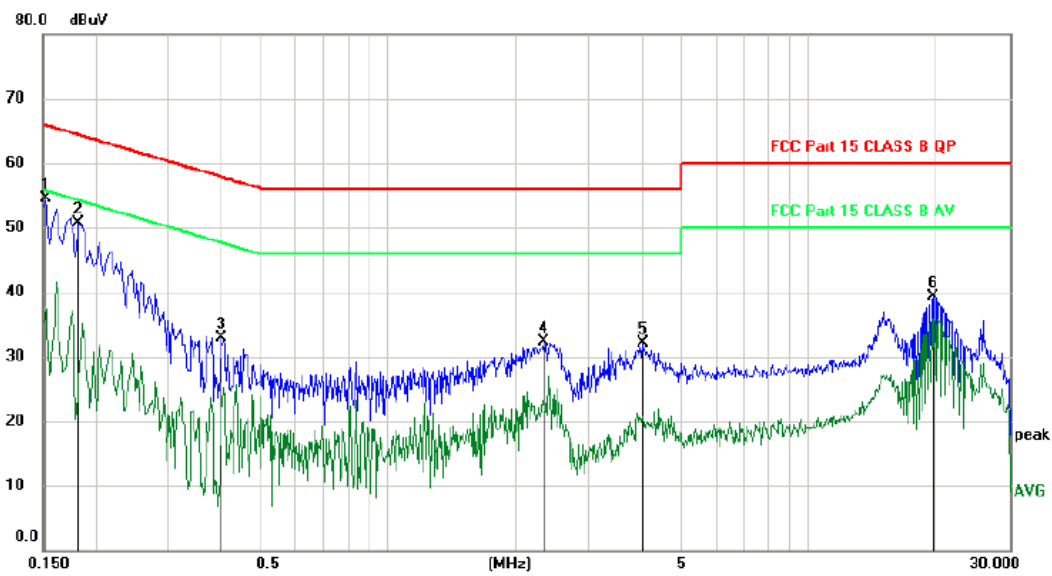
Note: If peak Result comply with AV limit, QP and AV Result is deemed to comply with AV limit

Line:



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1650	42.40	9.93	52.33	65.21	-12.88	peak	
2		0.4560	21.18	9.95	31.13	56.77	-25.64	peak	
3		2.2530	20.95	9.90	30.85	56.00	-25.15	peak	
4		3.1980	23.36	9.96	33.32	56.00	-22.68	peak	
5		15.1320	26.55	10.33	36.88	60.00	-23.12	peak	
6		19.9830	28.79	10.47	39.26	60.00	-20.74	peak	

Neutral:



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1530	44.62	9.94	54.56	65.84	-11.28	peak	
2		0.1830	40.77	9.93	50.70	64.35	-13.65	peak	
3		0.3990	22.97	9.94	32.91	57.87	-24.96	peak	
4		2.3400	22.40	9.90	32.30	56.00	-23.70	peak	
5		4.0080	22.09	9.97	32.06	56.00	-23.94	peak	
6		19.8360	28.87	10.47	39.34	60.00	-20.66	peak	

Remark: All modes have been tested, and only worst data of 8-DPSK mode, Channel 2480MHz (AC 120V/ 60Hz) was listed in this report.

11. Antenna Requirements

11.1.Limit

For intentional device, according to FCC 47 CFR Section 15.203 and RSS-GEN, 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



12.2.Photos of Power Line Conducted Emission Test



13. Photos Of The EUT

Please refer to test report A2105176-C01-R01.

14. Annex

Model List				
VR156	VA156	VR121	VA121	VR133
VA133	VR140	VA140	VR185	VA185
QR104	QA104	QW104	QR121	QA121
QW121	QR150	QA150	QW150	QR156
QW156	QR185	QA185	QW185	QR215
QA215	QW215	QR270	QA270	QW270
QR320	QA320	QW320	QA156	

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