FCC TEST REPORT

FCC ID: 2A7ZH-PROMINI

On Behalf of

MedicAir DentAir Ltd

Air Purifier

Model No.: Pro Mini

Prepared for	:	MedicAir DentAir Ltd
Address	:	The Barns Hilltop Farm Lyne Lane Lyne CHERTSEY Surrey, KT16 0AW, GBR

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

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Version Number	:	V0

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TABLE OF CONTENTS

Description **Page**

1. Summary Of Standards And Results----------5
1.1. Description of Standards and Results ----------5
2. General Information ----------6
2.1. Description of Device (EUT) ----------6
2.2. Accessories of Device (EUT) ----------7
2.3. Tested Supporting System Details----------7
2.4. Block Diagram of connection between EUT and simulators ----------7
2.5. Test Mode Description----------8
2.6. Test Conditions----------9
2.7. Test Facility----------9
2.8. Measurement Uncertainty ---------- 10
2.9. Test Equipment List ---------- 11
3. Spurious Emission---------- 12
3.1. Test Limits ---------- 12
3.2. Test Procedure ---------- 14
3.3. Test Setup ---------- 14
3.4. Test Results ---------- 16
4. Power Line Conducted Emission ---------- 27
4.1. Test Limits ---------- 27
4.2. Test Procedure ---------- 27
4.3. Test Setup ---------- 27
4.4. Test Results ---------- 28
5. Conducted Maximum Output Power ---------- 30
5.1. Test limits ---------- 30
5.2. Test Procedure ---------- 30
5.3. Test Setup ---------- 30
5.4. Test Results ---------- 30
6. Peak Power Spectral Density---------- 32
6.1. Test limits ---------- 32
6.2. Test Procedure ---------- 32
6.3. Test Setup ---------- 32
6.4. Test Results ---------- 33
7. Bandwidth ---------- 39
7.1. Test limits ---------- 39
7.2. Test Procedure ---------- 39
7.3. Test Setup ---------- 39
7.4. Test Results ---------- 39
8. Band Edge Check ---------- 49
8.1. Test limits ---------- 49
8.2. Test Procedure ---------- 49
8.3. Test Setup ---------- 49
8.4. Test Results ---------- 49
9. Antenna Requirement---------- 56
9.1. Standard Requirement ---------- 56
9.2. Antenna Connected Construction ---------- 56
9.3. Results ---------- 56
10. Photos Of Test Setup---------- 57
10.1. Photos of Radiated emission ---------- 57
10.2. Photo of Power Line Conducted ---------- 58
11. Photos Of EUT---------- 59

TEST REPORT DECLARATION

Applicant	:	MedicAir DentAir Ltd
Address	:	The Barns Hilltop Farm Lyne Lane Lyne CHERTSEY Surrey, KT16 0AW, GBR
Manufacturer	:	MedicAir DentAir Ltd
Address	:	The Barns Hilltop Farm Lyne Lane Lyne CHERTSEY Surrey, KT16 0AW, GBR
EUT Description	:	Air Purifier
		(A) Model No. : Pro Mini
		(B) Trademark : MedicAir

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247

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).....…..:	Yannis Wen Project Engineer	Yannis Wen
Approved by (name + signature)…....:	Simple Guan Project Manager	
Date of issue…… ……..:	July 12, 2022	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	July 12, 2022	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
Conducted Emission	FCC Part 15: 15.207	P
6dB Bandwidth	FCC PART 15:15.247(a)(2)	P
Output Power	FCC Part 15: 15.247(b)(3)	P
Radiated Spurious Emission	FCC Part 15: 15.209 FCC Part 15: 15.247(d)	P
Conducted Spurious & Band Edge Emission	FCC Part 15: 15.247(d)	P
Power Spectral Density	FCC PART 15:15.247(e)	P
Radiated Band Edge Emission	FCC Part 15: 15.247(d)	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/PMN	:	Air Purifier
Model Number/HVIN(s)	:	Pro Mini
Diff.	:	N/A
Trademark	:	MedicAir
Test Voltage	:	DC 24V from adapter with AC 120V/60Hz
Operation frequency	:	2412MHz-2462MHz for IEEE 802.11 b, g. n/HT20
Modulation type	:	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n :OFDM(64QAM, 16QAM, QPSK, BPSK)
Channel No.	:	802.11b/802.11g /802.11n(HT20): 11
Antenna Type	:	Internal Antenna, max gain 2.54dBi. Antenna information is provided by applicant.
Software version / FVIN	:	94V-0

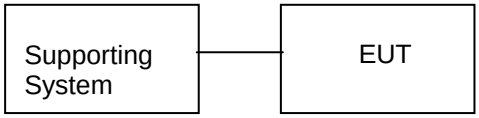
2.2. Accessories of Device (EUT)

Accessories1	:	CLASS 2 POWER SUPPLY
Manufacturer	:	SHENZHEN SUNLIGHT ELECTRONIC CO.,LTD
Model	:	GA240020
INPUT	:	100-240~50/60Hz 1.0A
OUTPUT	:	24.0V⎓2.0A 48W

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or SDOC
1.	Notebook PC	Lenovo	ThinkPad E14	N/A	**SDOC**

2.4. Block Diagram of connection between EUT and simulators



2.5. Test Mode Description

Duty cycle :100%Keeping TX			
Mode	**data rate (Mbps)(see Note)**	**Channel**	**Frequency (MHz)**
IEEE 802.11b	1	Low :CH1	2412
	1	Middle: CH6	2437
	1	High: CH11	2462
IEEE 802.11g	6	Low :CH1	2412
	6	Middle: CH6	2437
	6	High: CH11	2462
IEEE 802.11 n/HT20	6.5	Low :CH1	2412
	6.5	Middle: CH6	2437
	6.5	High: CH11	2462
Note: According exploratory test, EUT will have maximum output power in those data rate. so those data rate were used for all test.			

Channel list:					
For IEEE 802.11b, g, n/HT20					
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
CH1	2412	CH5	2432	CH9	2452
CH2	2417	CH6	2437	CH10	2457
CH3	2422	CH7	2442	CH11	2462
CH4	2427	CH8	2447		

Setting output power (Max)			
802.11b	802.11g	802.11n(HT20)	802.11n(HT40)
19±1dBm	20±1dBm	20±1dBm	/

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: 12135A

2.8. Measurement Uncertainty

(95% confidence levels, k=2)

Item	Uncertainty
Uncertainty for Power point Conducted Emissions Test	1.63dB
Uncertainty for Radiation Emission test in 3m chamber (below 30MHz)	3.5dB
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.74dB(Polarize: V)
	3.76dB(Polarize: H)
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	3.77dB(Polarize: V)
	3.80dB(Polarize: H)
Uncertainty for radio frequency	5.06×10^{-8}GHz
Uncertainty for conducted RF Power	0.40dB
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.	Firmware version	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	2.3	102137	2021.08.25	1Year
Spectrum analyzer	Agilent	N9020A	A.14.16	MY499100060	2021.08.25	1Year
Receiver	ROHDE&SCHWARZ	ESR	2.28 SP1	1316.3003K03-102082-Wa	2021.08.25	1Year
Receiver	R&S	ESCI	4.42 SP1	101165	2021.08.25	1Year
Bilog Antenna	Schwarzbeck	VULB 9168	/	VULB 9168#627	2021.08.30	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	/	2106	2021.08.30	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	2022.04.22	1 Year
Switching Mode Power Supply	JUNKE	JK12010S	/	20140927-6	2021.08.25	1 Year
Adjustable attenuator	MWRFtest	N/A	/	N/A	N/A	N/A
10dB Attenuator	Mini-Circuits	DC-6G	/	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. Spurious Emission

3.1. Test Limits

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			
Note 2: Peak limit applies (AVG limit + 20 dB) as well as RSS-247 Section 5.5			

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.

Table 5 – General field strength limits at frequencies above 30 MHz	
Frequency (MHz)	**Field strength (μV/m at 3 m)**
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

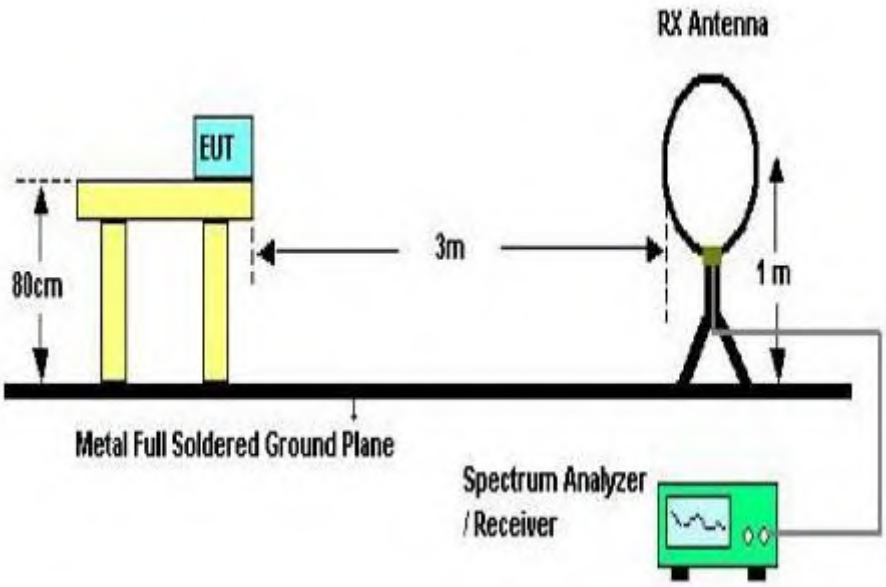
Table 6 – General field strength limits at frequencies below 30 MHz		
Frequency	**Magnetic field strength (H-Field) (μA/m)**	**Measurement distance (m)**
9 - 490 kHz[Note 1]	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

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

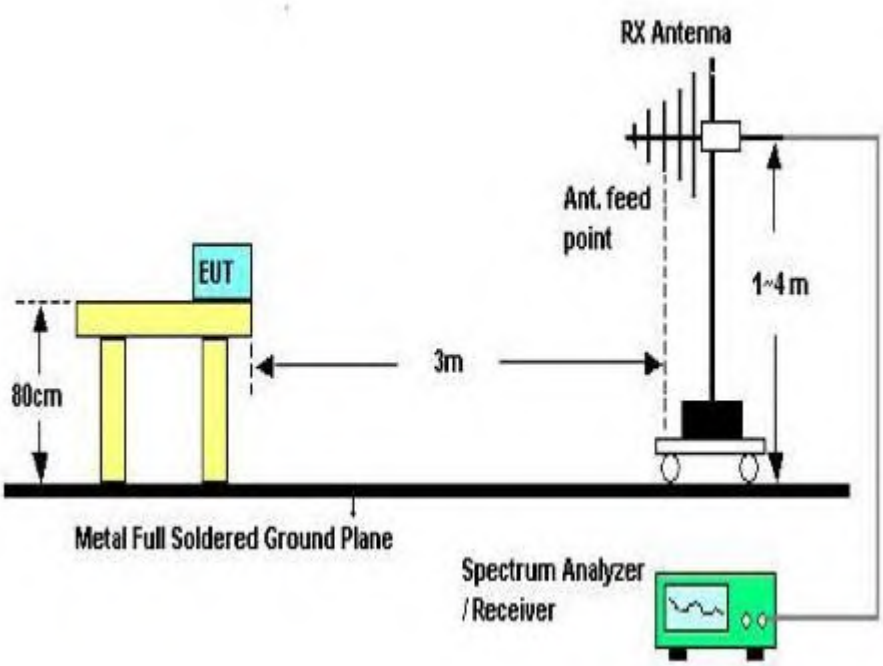
3.2. Test Procedure

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 radiated emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significant Peaks are then marked. and then Quasi 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.

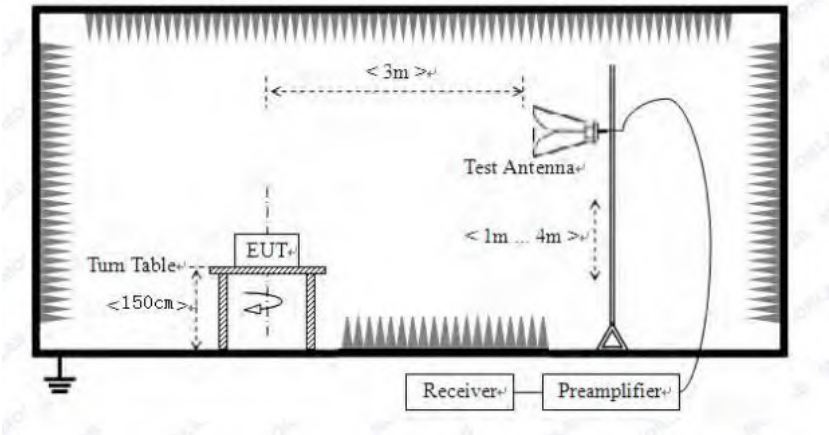
3.3. Test Setup



Below 30MHz Test Setup



Above 30MHz Test Setup



Above 1GHz Test Setup

3.4. Test Results

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 EUT from 9kHz up to the 10th harmonic of the fundamental.

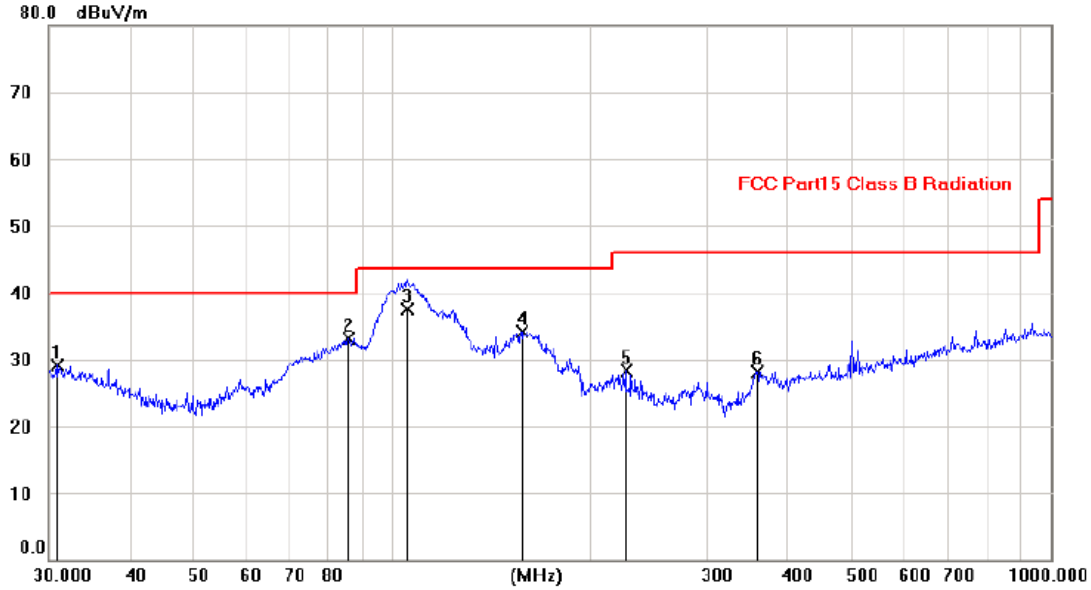
Detailed information please see the following page.

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.

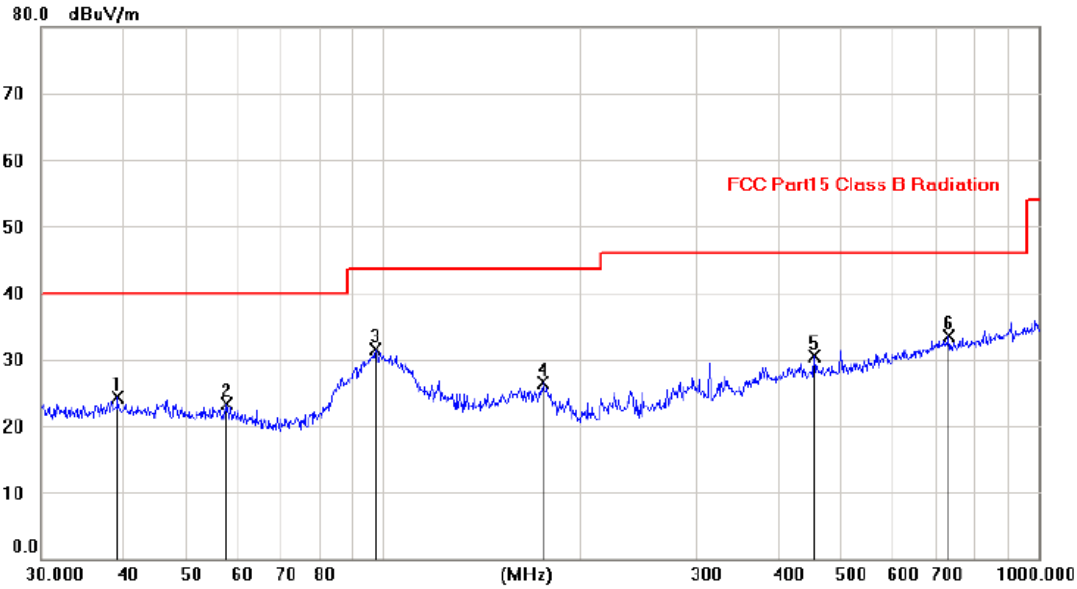
Test result for 802.11b (High Channel), AC 120V/ 60Hz
Vertical:



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		30.8751	15.45	13.58	29.03	40.00	-10.97	peak			
2		85.7579	23.14	9.98	33.12	40.00	-6.88	peak			
3	*	105.3826	26.20	11.38	37.58	43.50	-5.92	QP			
4		157.7985	19.16	15.04	34.20	43.50	-9.30	peak			
5		226.6551	16.18	12.12	28.30	46.00	-17.70	peak			
6		358.5568	12.73	15.40	28.13	46.00	-17.87	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

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		39.3681	9.84	14.46	24.30	40.00	-15.70	peak			
2		57.7422	9.99	13.41	23.40	40.00	-16.60	peak			
3	*	97.2739	20.82	10.68	31.50	43.50	-12.00	peak			
4		175.4259	13.22	13.32	26.54	43.50	-16.96	peak			
5		454.7350	12.89	17.61	30.50	46.00	-15.50	peak			
6		731.6637	11.34	22.16	33.50	46.00	-12.50	peak			

Note:1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level+Correct Factor; Correct Factor=Antenna Factor+Cable Loss.

From 1G-25GHz

Test Mode: IEEE 802.11b 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
4824	44.15	V	33.95	10.18	34.26	54.02	74	-19.98	PK
4824	35.68	V	33.95	10.18	34.26	45.55	54	-8.45	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	46.17	H	33.95	10.18	34.26	56.04	74	-17.96	PK
4824	35.57	H	33.95	10.18	34.26	45.44	54	-8.56	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX Mid									
4874	46.73	V	33.93	10.2	34.29	56.57	74	-17.43	PK
4874	33.01	V	33.93	10.2	34.29	42.85	54	-11.15	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	46.63	H	33.93	10.2	34.29	56.47	74	-17.53	PK
4874	32.71	H	33.93	10.2	34.29	42.55	54	-11.45	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX High									
4924	48.23	V	33.98	10.22	34.25	58.18	74	-15.82	PK
4924	36.38	V	33.98	10.22	34.25	46.33	54	-7.67	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	46.85	H	33.98	10.22	34.25	56.80	74	-17.20	PK
4924	35.20	H	33.98	10.22	34.25	45.15	54	-8.85	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/

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: IEEE 802.11g 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
4824	44.86	V	33.95	10.18	34.26	54.73	74	-19.27	PK
4824	33.57	V	33.95	10.18	34.26	43.44	54	-10.56	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	46.33	H	33.95	10.18	34.26	56.20	74	-17.80	PK
4824	36.16	H	33.95	10.18	34.26	46.03	54	-7.97	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX Mid									
4874	46.13	V	33.93	10.2	34.29	55.97	74	-18.03	PK
4874	31.19	V	33.93	10.2	34.29	41.03	54	-12.97	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	45.75	H	33.93	10.2	34.29	55.59	74	-18.41	PK
4874	33.03	H	33.93	10.2	34.29	42.87	54	-11.13	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX High									
4924	46.57	V	33.98	10.22	34.25	56.52	74	-17.48	PK
4924	35.18	V	33.98	10.22	34.25	45.13	54	-8.87	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	48.91	H	33.98	10.22	34.25	58.86	74	-15.14	PK
4924	32.98	H	33.98	10.22	34.25	42.93	54	-11.07	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/

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 ModeIEEE 802.11n HT20 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
4824	44.86	V	33.95	10.18	34.26	54.73	74	-19.27	PK
4824	36.96	V	33.95	10.18	34.26	46.83	54	-7.17	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	43.87	H	33.95	10.18	34.26	53.74	74	-20.26	PK
4824	35.40	H	33.95	10.18	34.26	45.27	54	-8.73	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode:IEEE 802.11n HT20 TX Mid									
4874	45.50	V	33.93	10.2	34.29	55.34	74	-18.66	PK
4874	30.91	V	33.93	10.2	34.29	40.75	54	-13.25	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	47.65	H	33.93	10.2	34.29	57.49	74	-16.51	PK
4874	35.77	H	33.93	10.2	34.29	45.61	54	-8.39	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode:IEEE 802.11n HT20 TX High									
4924	46.39	V	33.98	10.22	34.25	56.34	74	-17.66	PK
4924	36.54	V	33.98	10.22	34.25	46.49	54	-7.51	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	48.40	H	33.98	10.22	34.25	58.35	74	-15.65	PK
4924	34.39	H	33.98	10.22	34.25	44.34	54	-9.66	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/

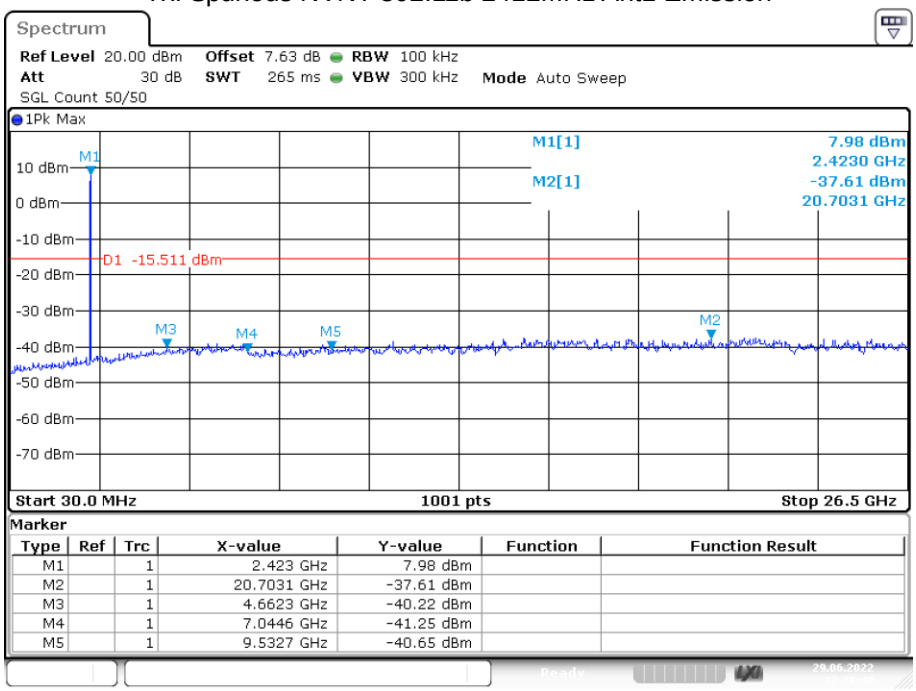
Note:

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 802.11b 2412MHz Ant1 Emission

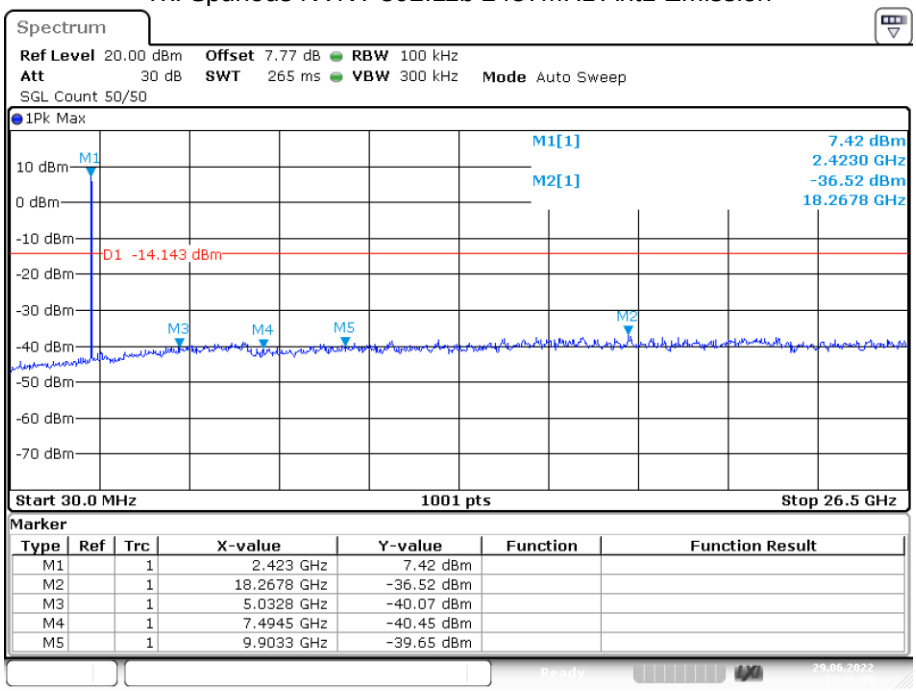


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	7.98 dBm		
M2		1	20.7031 GHz	-37.61 dBm		
M3		1	4.6623 GHz	-40.22 dBm		
M4		1	7.0446 GHz	-41.25 dBm		
M5		1	9.5327 GHz	-40.65 dBm		

Date: 29.JUN.2022 12:38:40

Tx. Spurious NVNT 802.11b 2437MHz Ant1 Emission

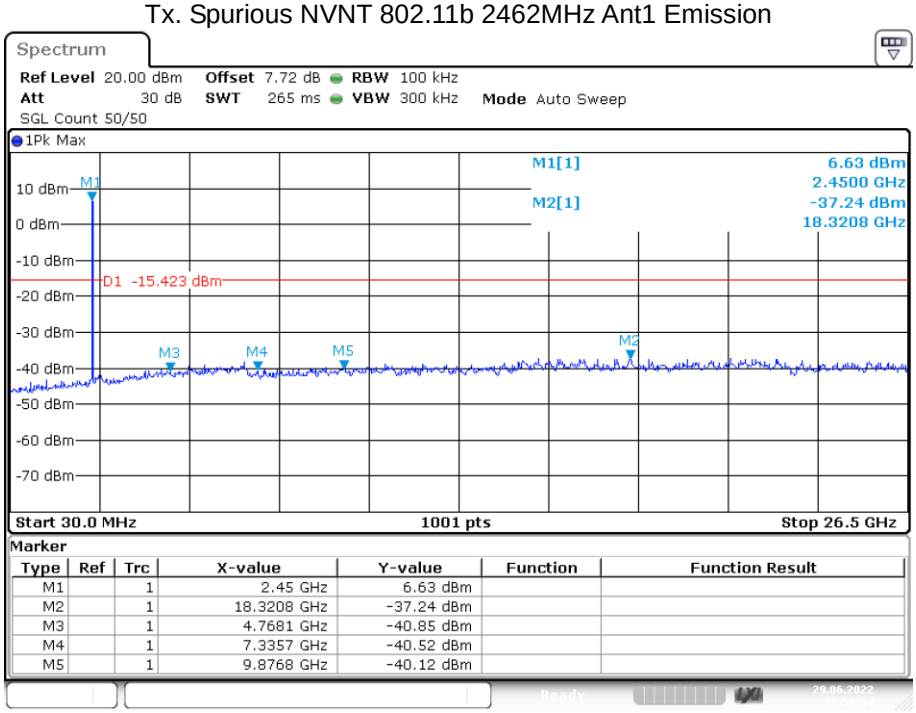


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	7.42 dBm		
M2		1	18.2678 GHz	-36.52 dBm		
M3		1	5.0328 GHz	-40.07 dBm		
M4		1	7.4945 GHz	-40.45 dBm		
M5		1	9.9033 GHz	-39.65 dBm		

Date: 29.JUN.2022 12:47:00

Tx. Spurious NVNT 802.11b 2462MHz Ant1 Emission

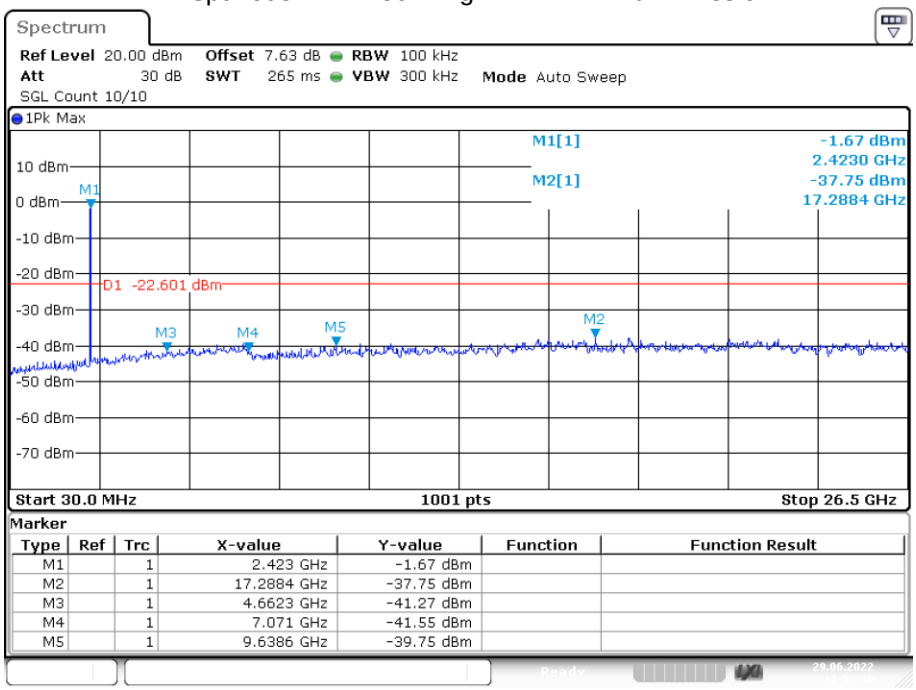


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	6.63 dBm		
M2		1	18.3208 GHz	-37.24 dBm		
M3		1	4.7681 GHz	-40.85 dBm		
M4		1	7.3357 GHz	-40.52 dBm		
M5		1	9.8768 GHz	-40.12 dBm		

Date: 29.JUN.2022 12:50:34

Tx. Spurious NVNT 802.11g 2412MHz Ant1 Emission

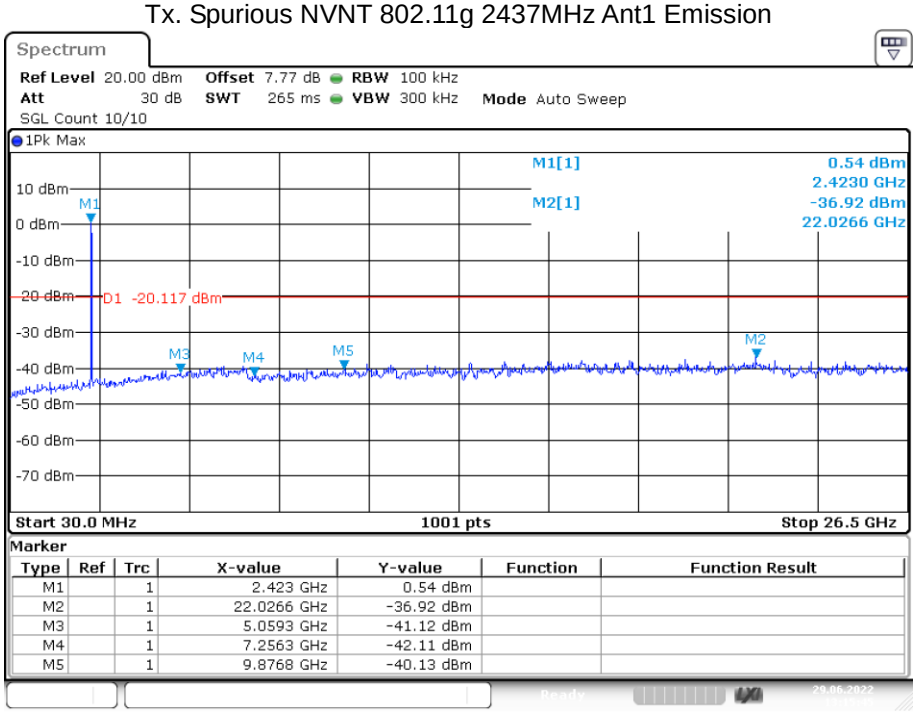


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	-1.67 dBm		
M2		1	17.2884 GHz	-37.75 dBm		
M3		1	4.6623 GHz	-41.27 dBm		
M4		1	7.071 GHz	-41.55 dBm		
M5		1	9.6386 GHz	-39.75 dBm		

Date: 29.JUN.2022 12:53:30

Tx. Spurious NVNT 802.11g 2437MHz Ant1 Emission

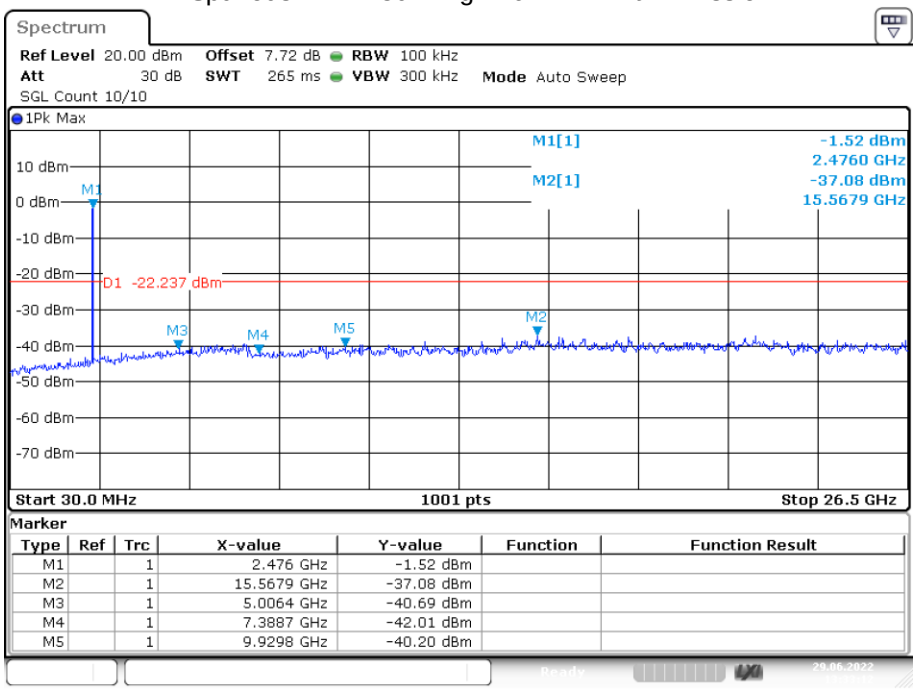


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	0.54 dBm		
M2		1	22.0266 GHz	-36.92 dBm		
M3		1	5.0593 GHz	-41.12 dBm		
M4		1	7.2563 GHz	-42.11 dBm		
M5		1	9.8768 GHz	-40.13 dBm		

Date: 29.JUN.2022 13:15:45

Tx. Spurious NVNT 802.11g 2462MHz Ant1 Emission

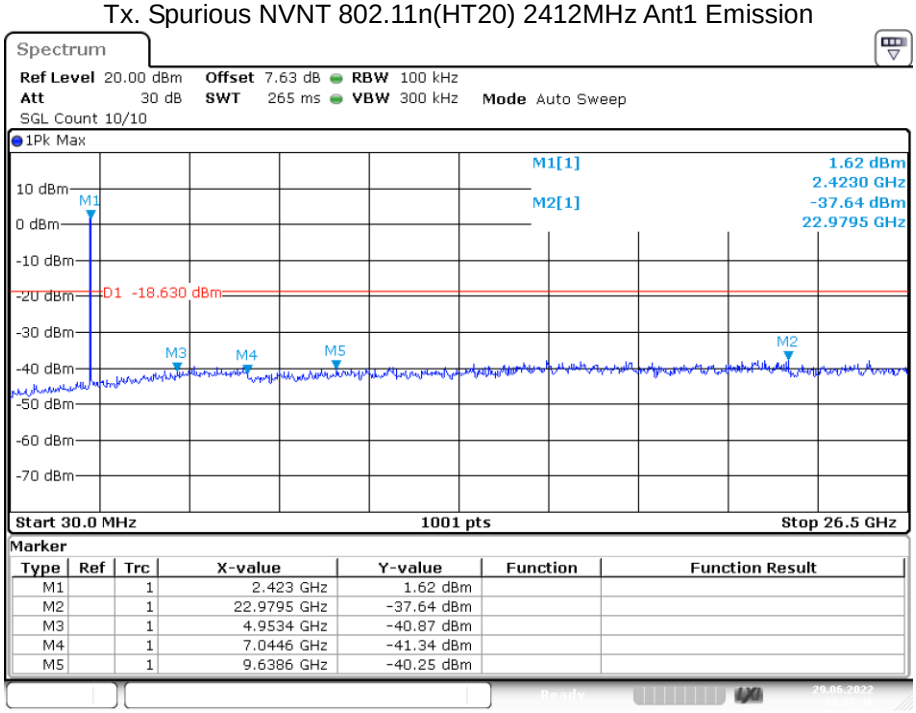


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.476 GHz	-1.52 dBm		
M2		1	15.5679 GHz	-37.08 dBm		
M3		1	5.0064 GHz	-40.69 dBm		
M4		1	7.3887 GHz	-42.01 dBm		
M5		1	9.9298 GHz	-40.20 dBm		

Date: 29.JUN.2022 13:33:11

Tx. Spurious NVNT 802.11n(HT20) 2412MHz Ant1 Emission

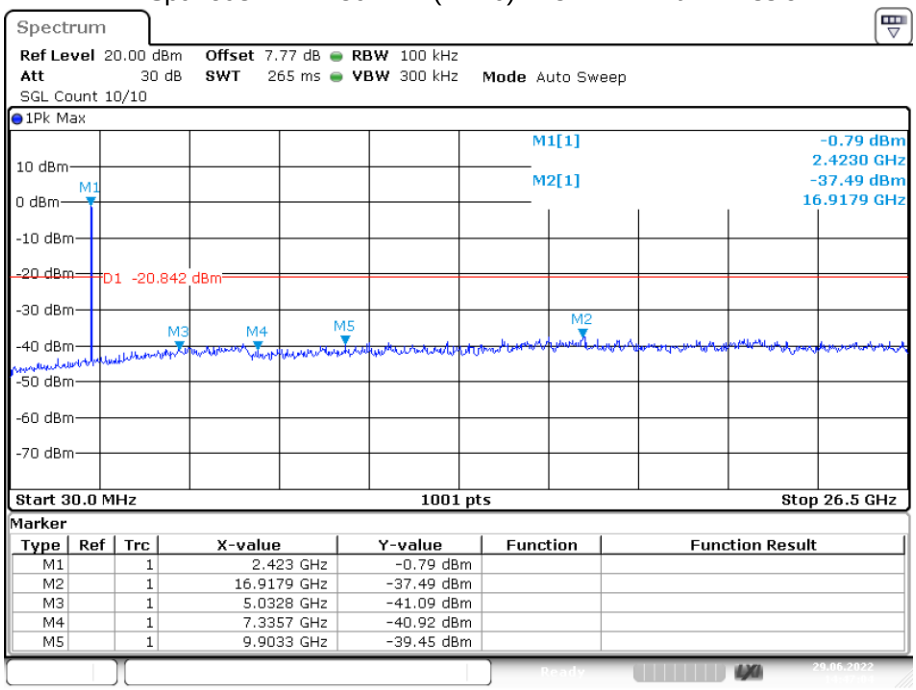


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	1.62 dBm		
M2		1	22.9795 GHz	-37.64 dBm		
M3		1	4.9534 GHz	-40.87 dBm		
M4		1	7.0446 GHz	-41.34 dBm		
M5		1	9.6386 GHz	-40.25 dBm		

Date: 29.JUN.2022 13:37:46

Tx. Spurious NVNT 802.11n(HT20) 2437MHz Ant1 Emission

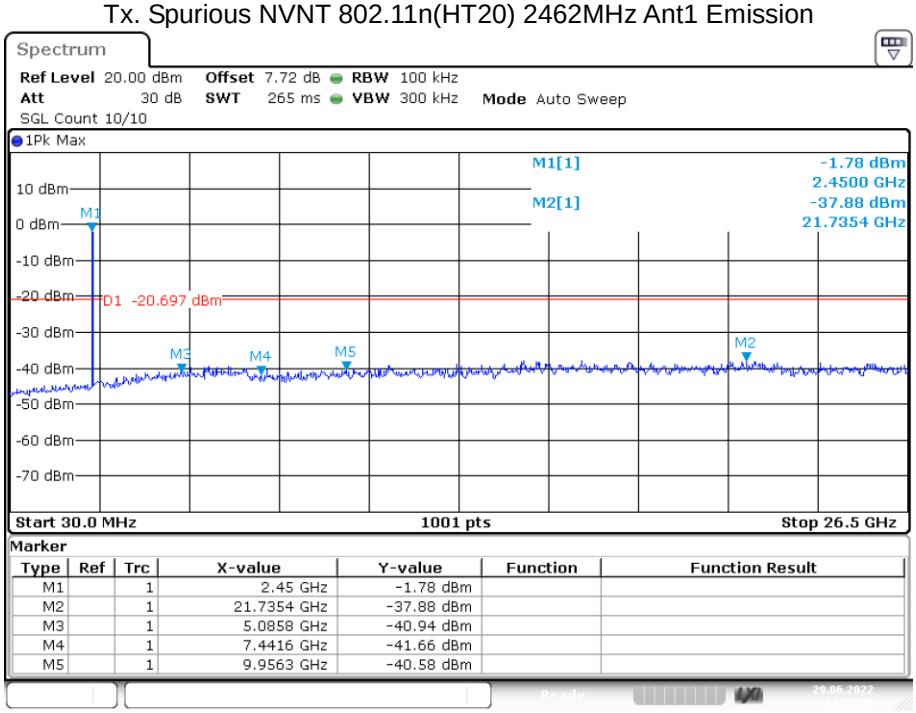


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.423 GHz	-0.79 dBm		
M2		1	16.9179 GHz	-37.49 dBm		
M3		1	5.0328 GHz	-41.09 dBm		
M4		1	7.3357 GHz	-40.92 dBm		
M5		1	9.9033 GHz	-39.45 dBm		

Date: 29.JUN.2022 14:47:03

Tx. Spurious NVNT 802.11n(HT20) 2462MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.45 GHz	-1.78 dBm		
M2		1	21.7354 GHz	-37.88 dBm		
M3		1	5.0858 GHz	-40.94 dBm		
M4		1	7.4416 GHz	-41.66 dBm		
M5		1	9.9563 GHz	-40.58 dBm		

Date: 29.JUN.2022 14:51:00

4. Power Line Conducted Emission

4.1. Test Limits

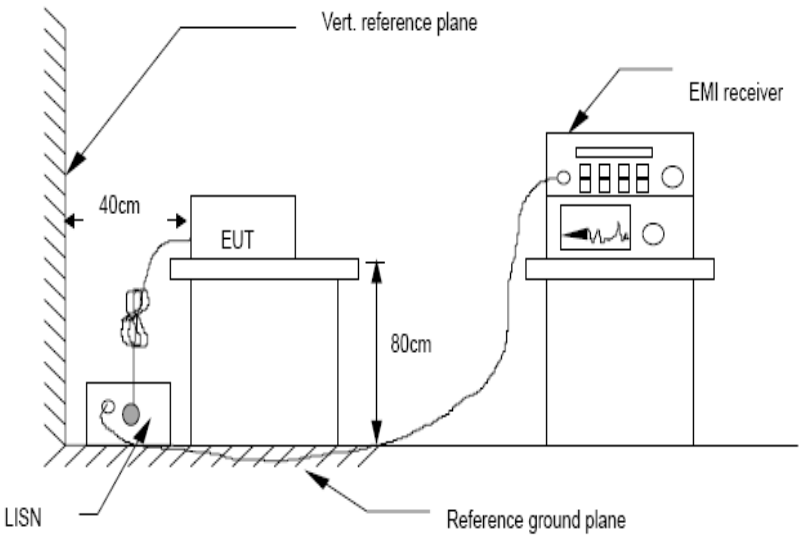
Frequency	Limits dB(μV)	
MHz	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.
3.The limit decreases in line with the logarithm of the frequency in the rang of 0.15 to 0.50 MHz.

4.2. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs.
Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10:2013 on Conducted Emission Measurement.
The bandwidth of test receiver is set at 9 kHz.

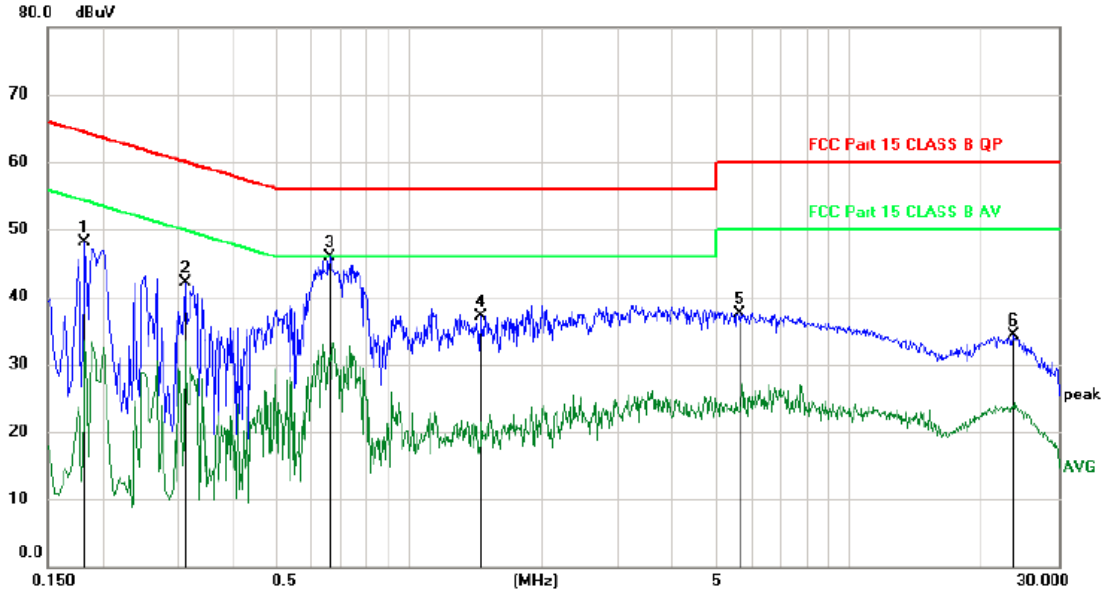
4.3. Test Setup



4.4. Test Results

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:

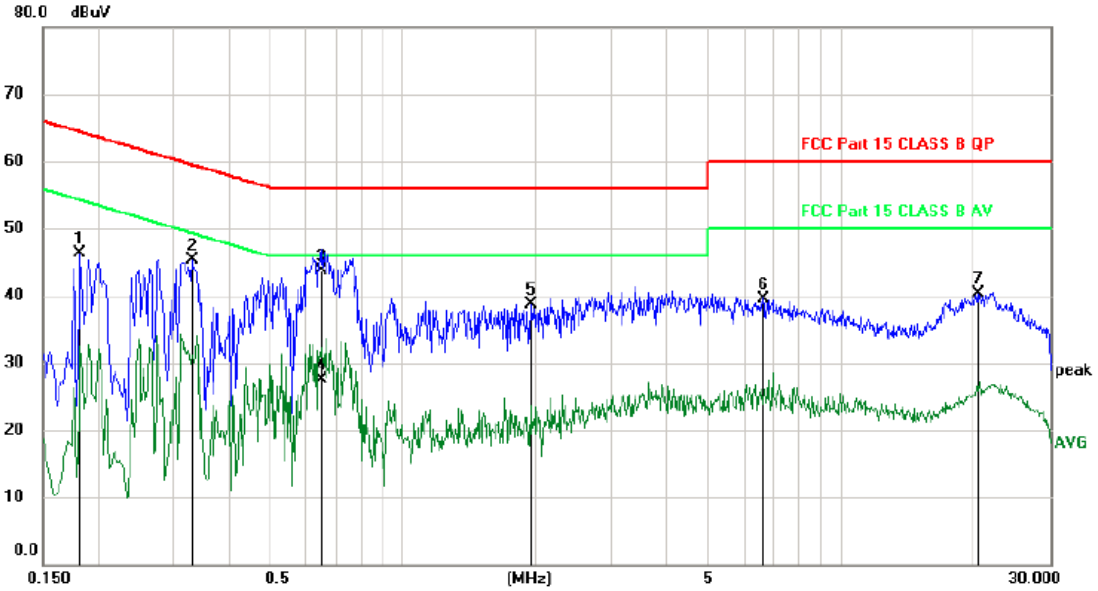


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1830	38.18	9.93	48.11	64.35	-16.24	peak	
2		0.3090	32.17	9.93	42.10	60.00	-17.90	peak	
3	*	0.6600	36.05	9.93	45.98	56.00	-10.02	peak	
4		1.4520	27.20	9.89	37.09	56.00	-18.91	peak	
5		5.6670	27.52	10.07	37.59	60.00	-22.41	peak	
6		23.6400	23.90	10.45	34.35	60.00	-25.65	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

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

Neutral:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1830	36.38	9.93	46.31	64.35	-18.04	peak	
2		0.3300	35.29	9.94	45.23	59.45	-14.22	peak	
3	*	0.6480	33.84	9.92	43.76	56.00	-12.24	QP	
4		0.6480	17.58	9.92	27.50	46.00	-18.50	AVG	
5		1.9560	28.83	9.88	38.71	56.00	-17.29	peak	
6		6.6540	29.49	10.11	39.60	60.00	-20.40	peak	
7		20.5260	29.76	10.47	40.23	60.00	-19.77	peak	

*:Maximum data x:Over limit !:over margin 〈Reference Only

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

5. Conducted Maximum Output Power

5.1. Test limits

Please refer RSS-247 & FCC PART 15: 15.247.

Regulation 15.247(b) The limit of Maximum Peak Output Power Measurement is 1 W(30dBm)

5.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

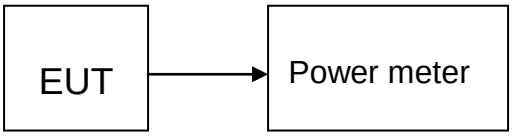
5.2.1 Place the EUT on the table and set it in transmitting mode.

5.2.2 Connected the EUT's antenna port to peak power meter by 20dB attenuator.

5.2.3 Measure out each mode and each bands AVG output power of EUT.

Note: The cable loss and attenuator loss were offset into measure device as amplitude offset.

5.3. Test Setup



5.4. Test Results

PASS

Detailed information please sees the following page.

Mode	Frequency (MHz)	PK Output power(dBm)	Limit (dBm)	Result
IEEE 802.11 b	CH1: 2412	19.28	30	PASS
	CH6: 2437	19.33	30	PASS
	CH11: 2462	19.148	30	PASS
IEEE 802.11 g	CH1: 2412	20.233	30	PASS
	CH6: 2437	20.03	30	PASS
	CH11: 2462	20.508	30	PASS
IEEE 802.11 n/HT20	CH1: 2412	19.999	30	PASS
	CH6: 2437	20.725	30	PASS
	CH11: 2462	21.089	30	PASS

6. Peak Power Spectral Density

6.1. Test limits

6.1.1 Please refer RSS-247 & FCC PART 15: 15.247.

6.1.2 For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

6.1.3 The direct sequence operating of the hybrid system, with the frequency hopping operation turned off, shall comply with the power density requirements of paragraph (d) of this section.

6.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

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

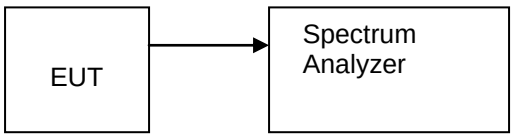
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Set the spectrum analyzer as RBW = 100kHz(Set the RBW to: 3 kHz≤RBW≤100 kHz.), VBW = 300kHz(Set the VBW≥3×RBW), span≥1.5×DTS bandwidth., detail see the test plot.

6.2.4 Record the max reading.

6.2.5 Repeat the above procedure until the measurements for all frequencies are completed.

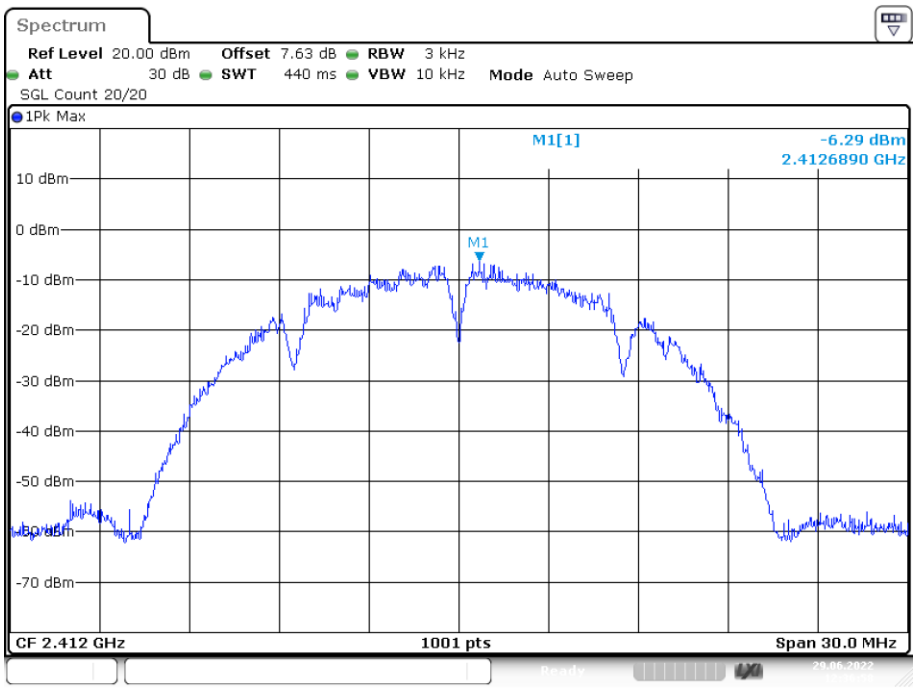
6.3. Test Setup



6.4. Test Results

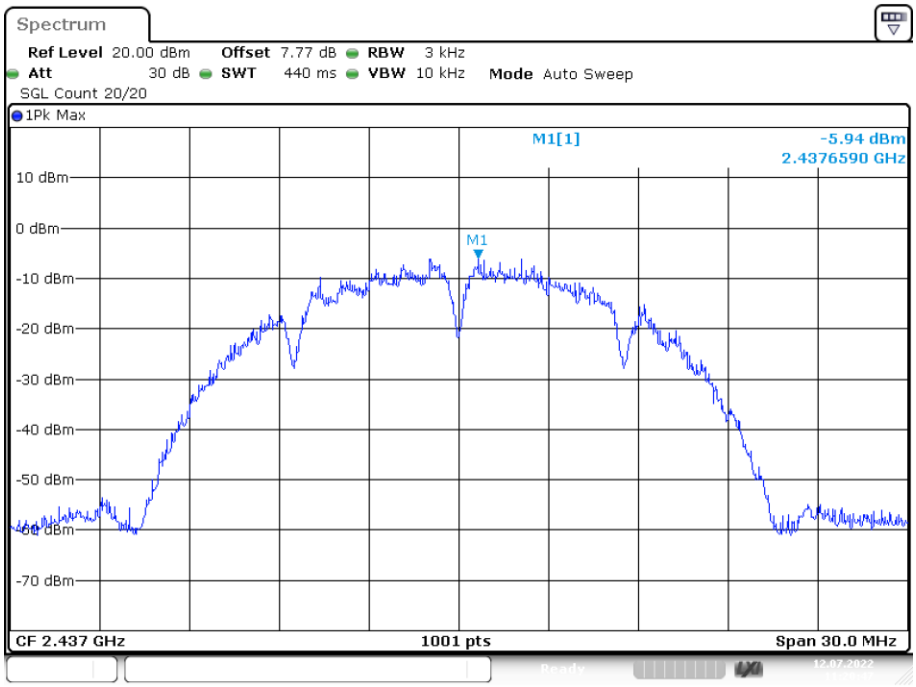
Condition	Mode	Frequency (MHz)	Antenna	Max PSD (dBm)	Limit (dBm)	Verdict
NVNT	b	2412	Ant1	-6.292	8	Pass
NVNT	b	2437	Ant1	-5.941	8	Pass
NVNT	b	2462	Ant1	-6.075	8	Pass
NVNT	g	2412	Ant1	-12.485	8	Pass
NVNT	g	2437	Ant1	-11.925	8	Pass
NVNT	g	2462	Ant1	-12.582	8	Pass
NVNT	n20	2412	Ant1	-7.82	8	Pass
NVNT	n20	2437	Ant1	-10.932	8	Pass
NVNT	n20	2462	Ant1	-11.54	8	Pass

PSD NVNT b 2412MHz Ant1



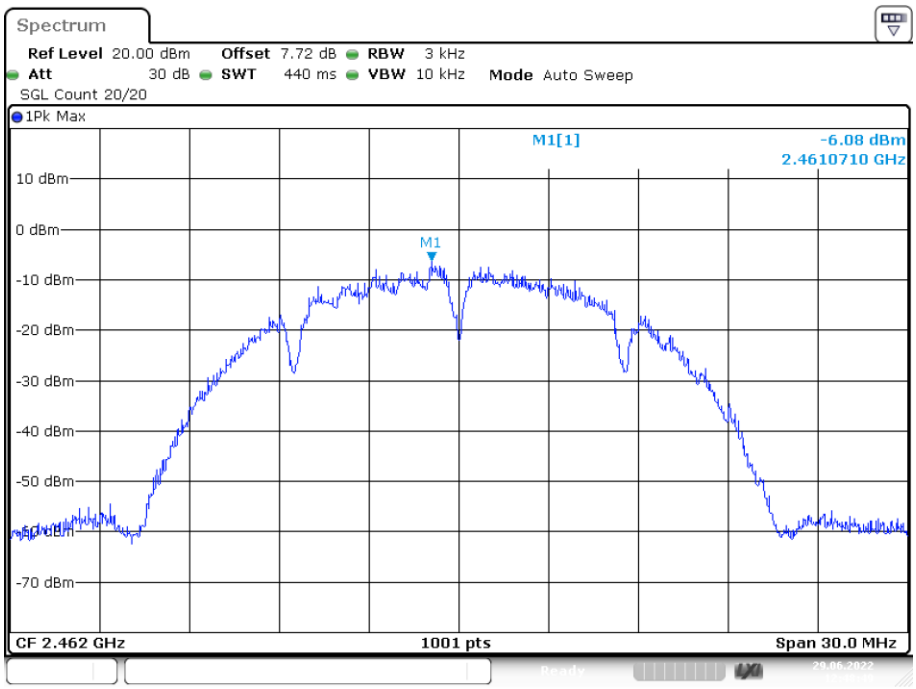
Date: 29.JUN.2022 12:36:57

PSD NVNT b 2437MHz Ant1



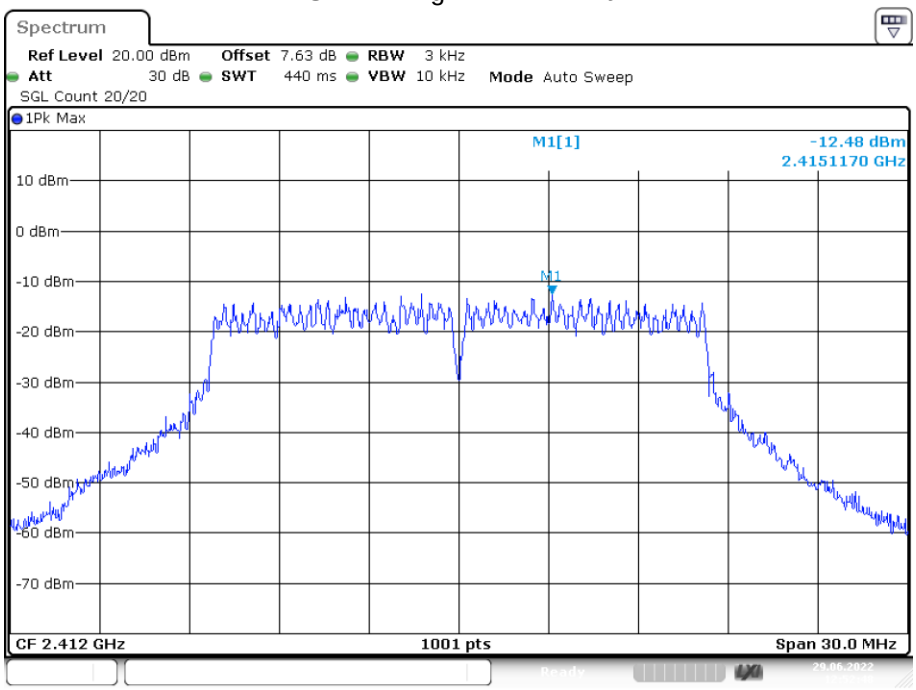
Date: 12.JUL.2022 11:20:47

PSD NVNT b 2462MHz Ant1



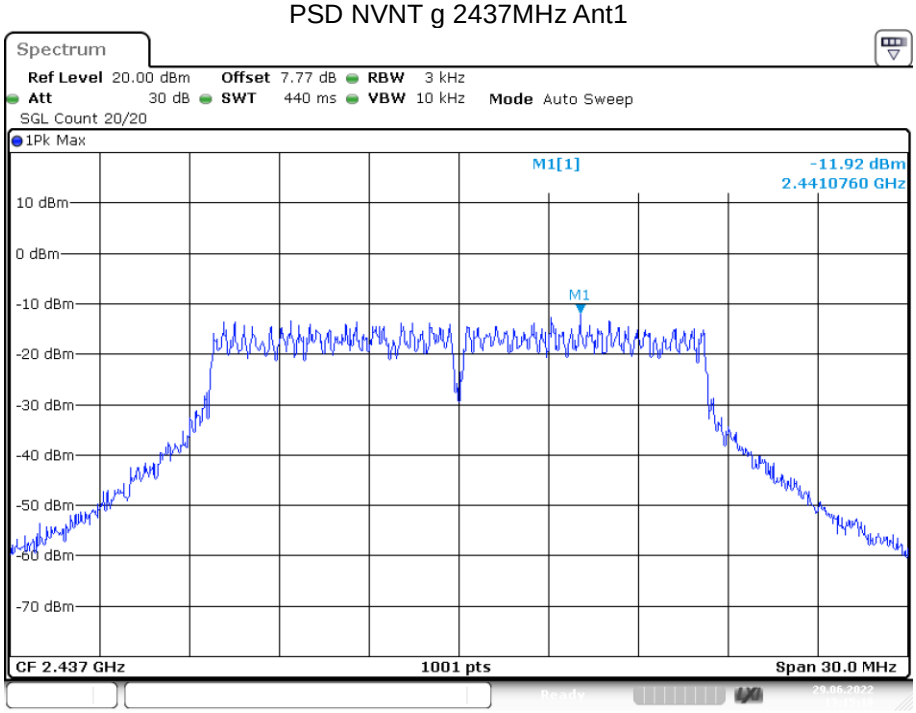
Date: 29.JUN.2022 12:48:49

PSD NVNT g 2412MHz Ant1



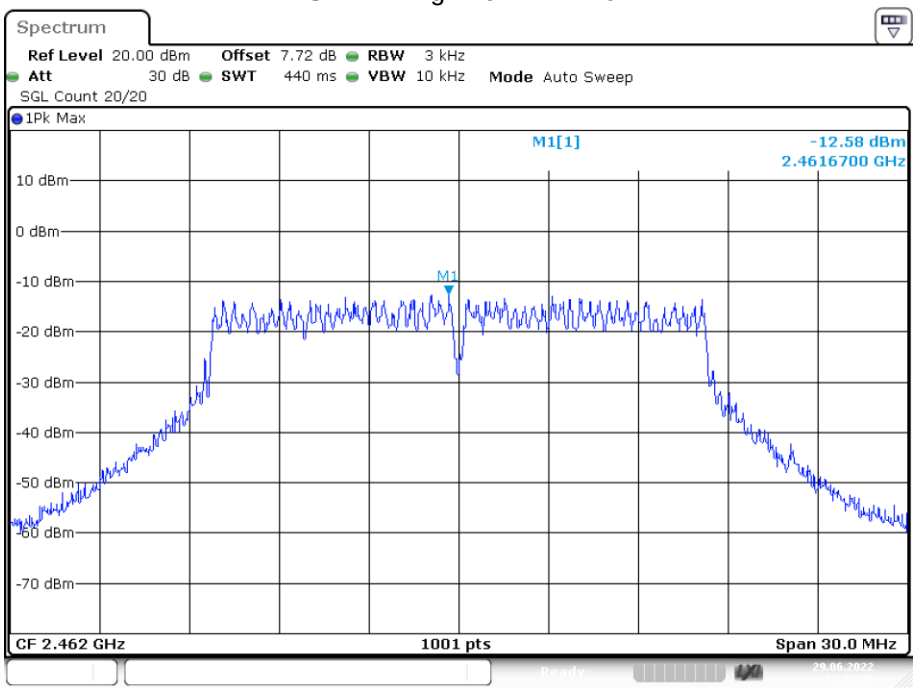
Date: 29.JUN.2022 12:52:47

PSD NVNT g 2437MHz Ant1



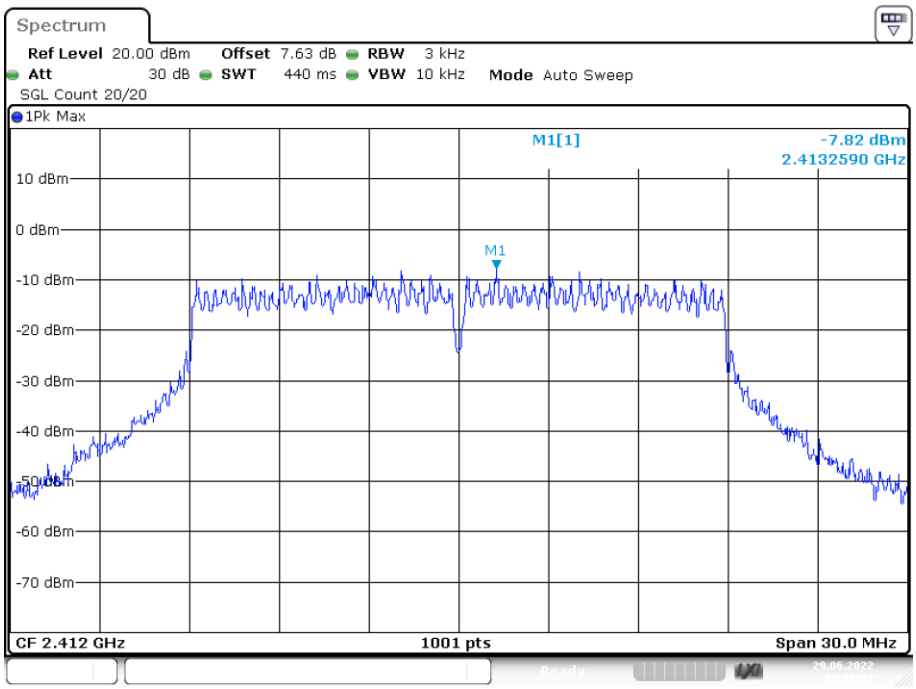
Date: 29.JUN.2022 13:15:17

PSD NVNT g 2462MHz Ant1



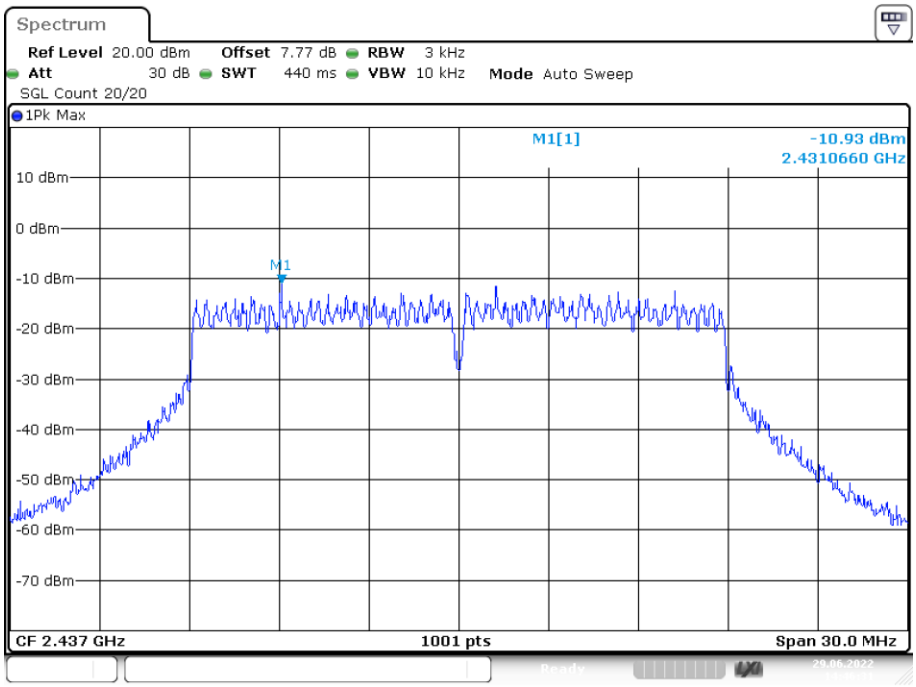
Date: 29.JUN.2022 13:32:25

PSD NVNT n20 2412MHz Ant1



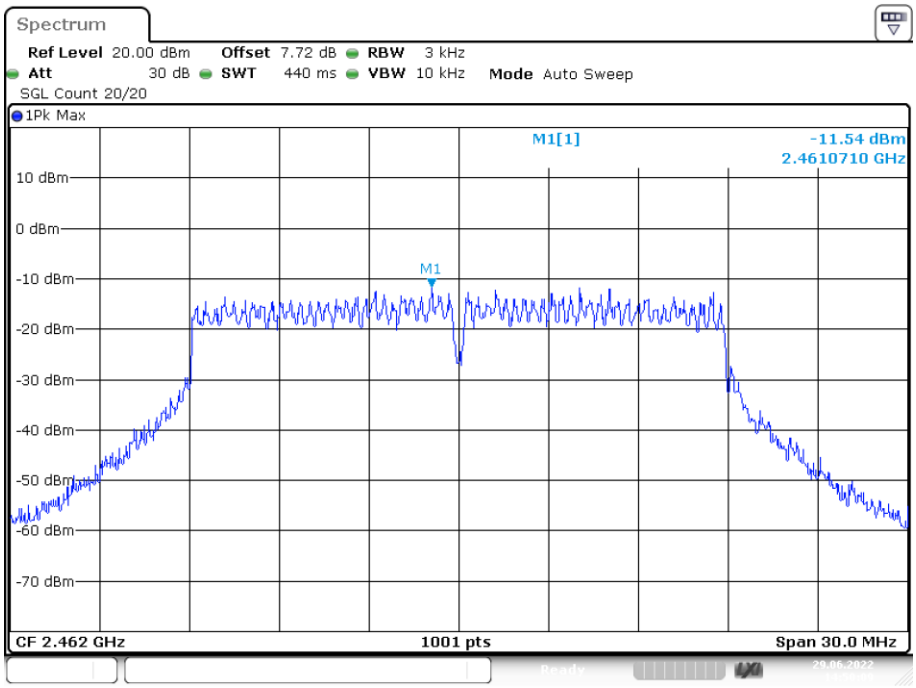
Date: 29.JUN.2022 13:36:57

PSD NVNT n20 2437MHz Ant1



Date: 29.JUN.2022 14:46:31

PSD NVNT n20 2462MHz Ant1



Date: 29.JUN.2022 14:50:09

7. Bandwidth

7.1. Test limits

Please refer RSS-247 & FCC PART 15: 15.247
For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz.

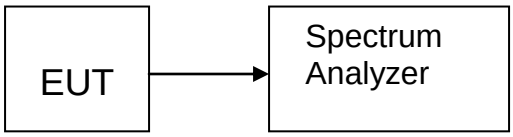
7.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

a) The bandwidth is measured at an amplitude level reduced 6dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

b) The test receiver set RBW = 100kHz, VBW≥3*RBW =300kHz,, Peak Detector, Sweep time set auto, detail see the test plot.

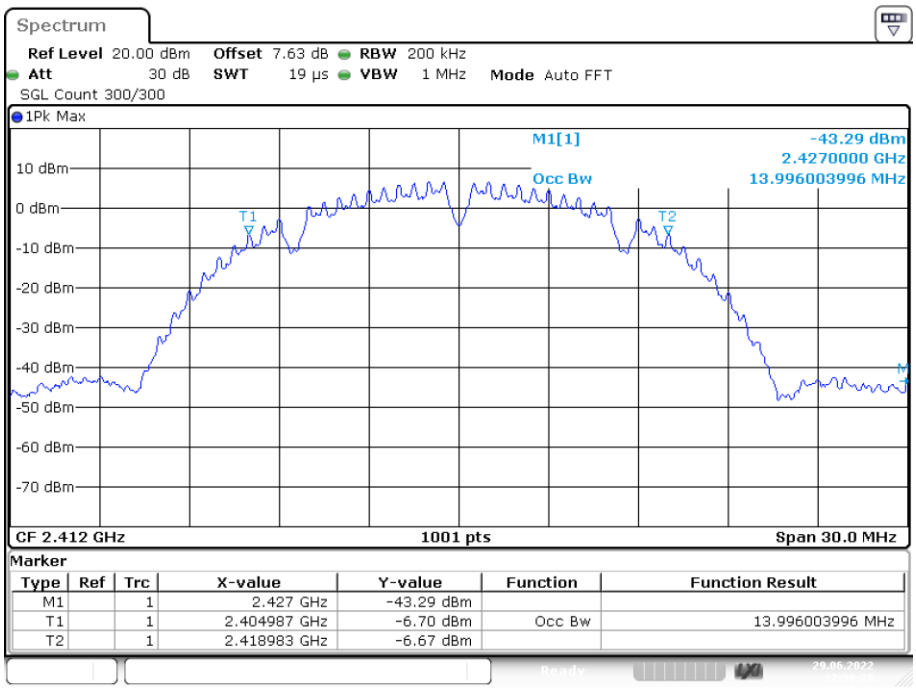
7.3. Test Setup



7.4. Test Results

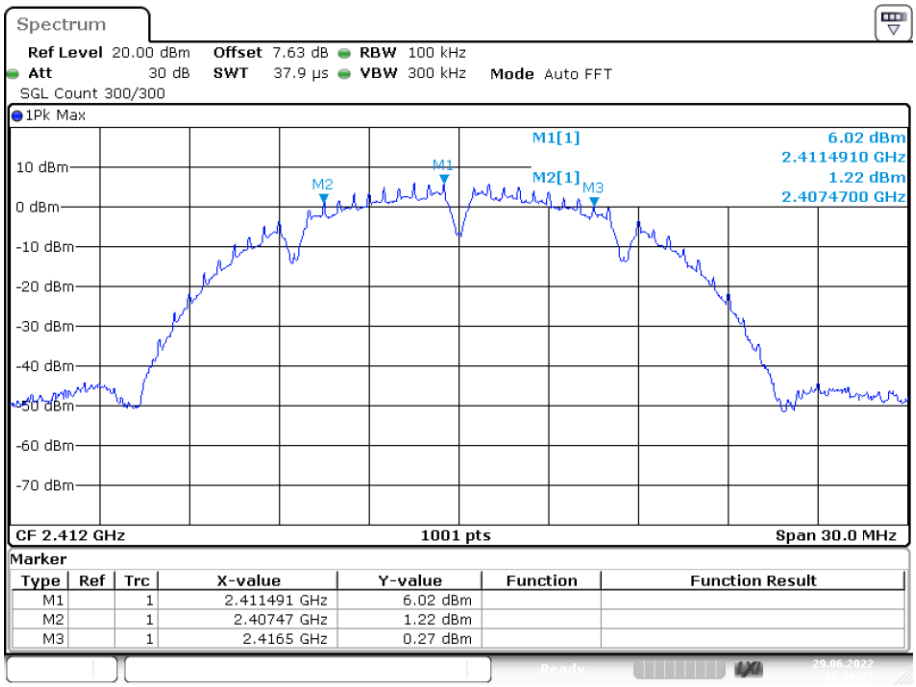
Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	802.11b	2412	Ant 1	13.996	9.03	0.5	Pass
NVNT	802.11b	2437	Ant 1	14.026	9.03	0.5	Pass
NVNT	802.11b	2462	Ant 1	14.026	9.06	0.5	Pass
NVNT	802.11g	2412	Ant 1	16.573	16.56	0.5	Pass
NVNT	802.11g	2437	Ant 1	16.753	16.32	0.5	Pass
NVNT	802.11g	2462	Ant 1	16.543	16.35	0.5	Pass
NVNT	802.11n(HT20)	2412	Ant 1	17.682	17.79	0.5	Pass
NVNT	802.11n(HT20)	2437	Ant 1	17.682	17.58	0.5	Pass
NVNT	802.11n(HT20)	2462	Ant 1	17.682	17.58	0.5	Pass

OBW NVNT 802.11b 2412MHz Ant1



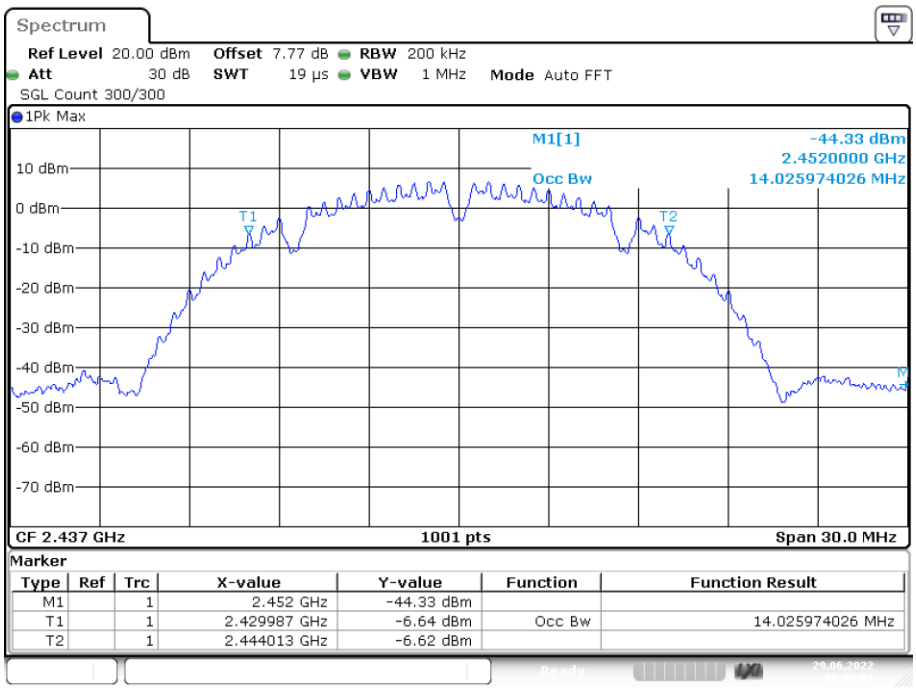
Date: 29.JUN.2022 12:36:27

-6 dB BW NVNT 802.11b 2412MHz Ant1



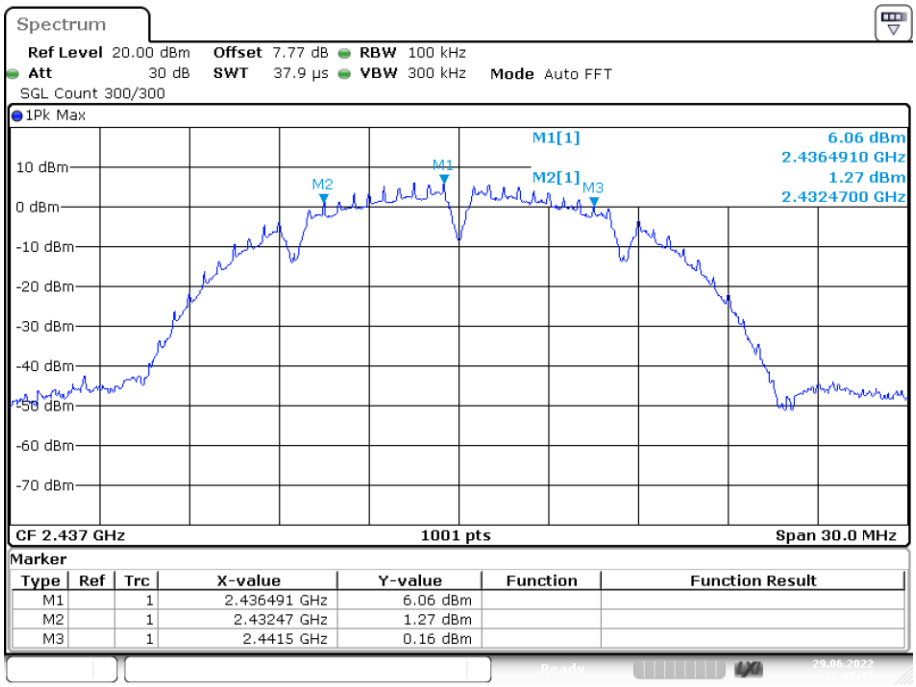
Date: 29.JUN.2022 12:36:38

OBW NVNT 802.11b 2437MHz Ant1



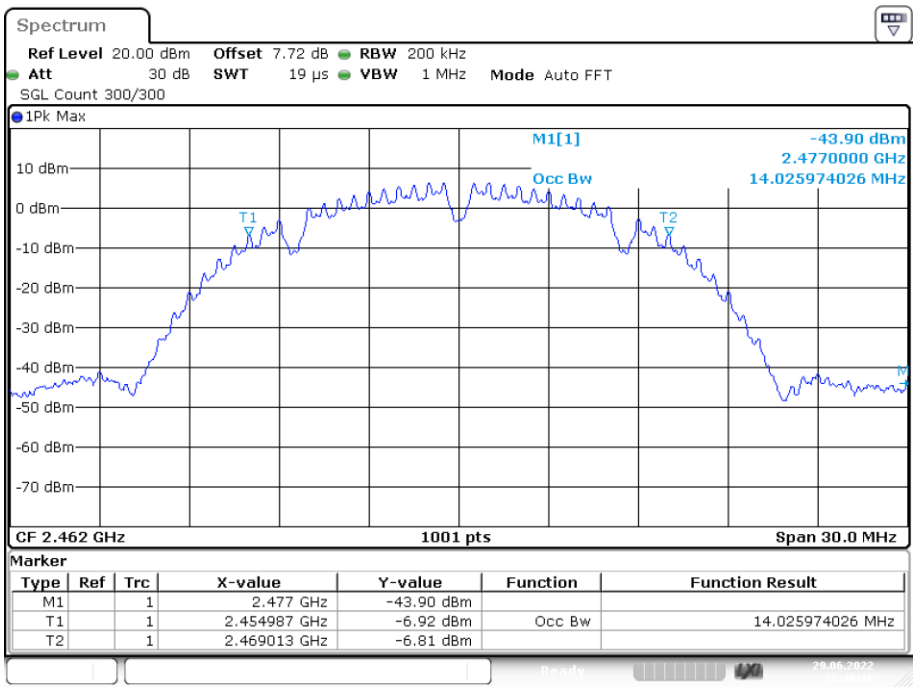
Date: 29.JUN.2022 12:45:03

-6 dB BW NVNT 802.11b 2437MHz Ant1



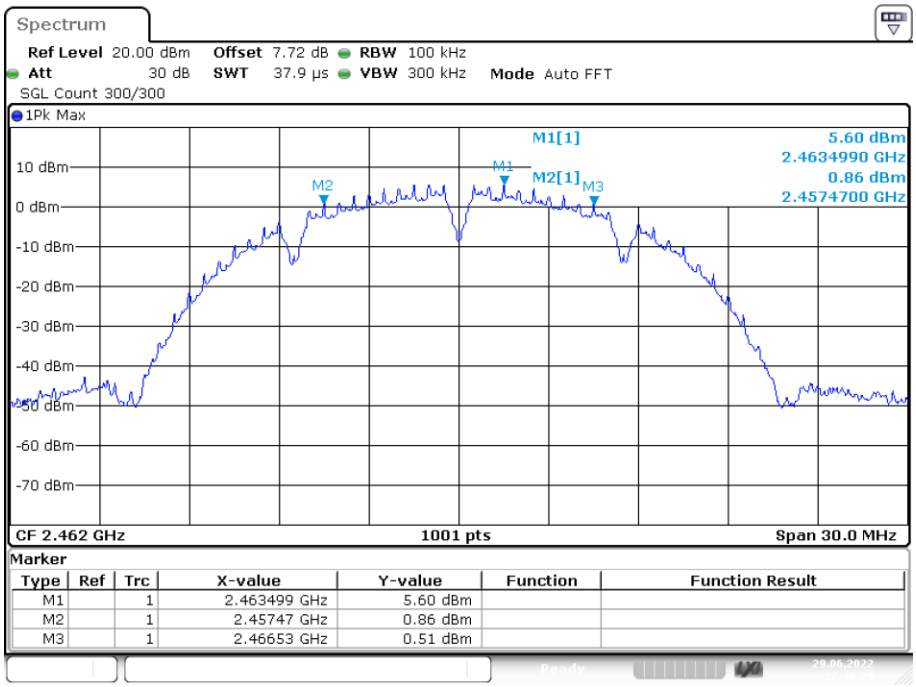
Date: 29.JUN.2022 12:45:15

OBW NVNT 802.11b 2462MHz Ant1



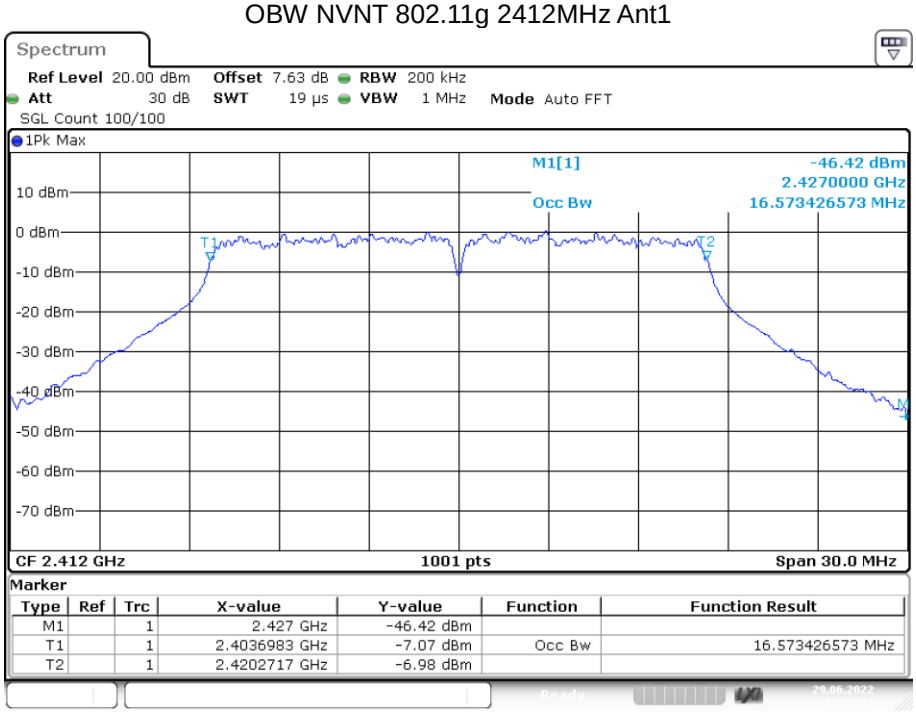
Date: 29.JUN.2022 12:48:17

-6 dB BW NVNT 802.11b 2462MHz Ant1



Date: 29.JUN.2022 12:48:28

OBW NVNT 802.11g 2412MHz Ant1



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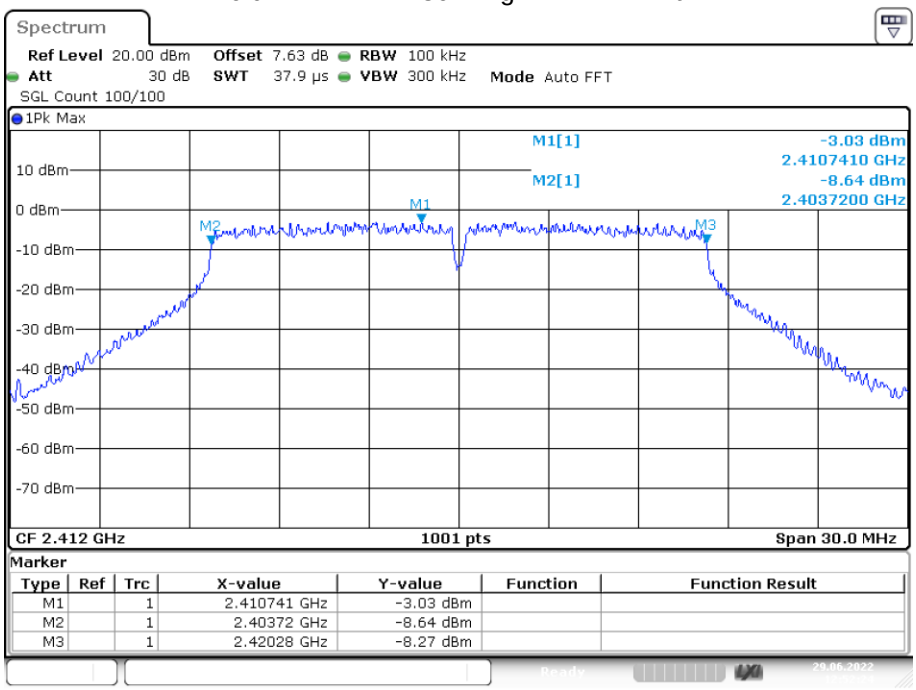
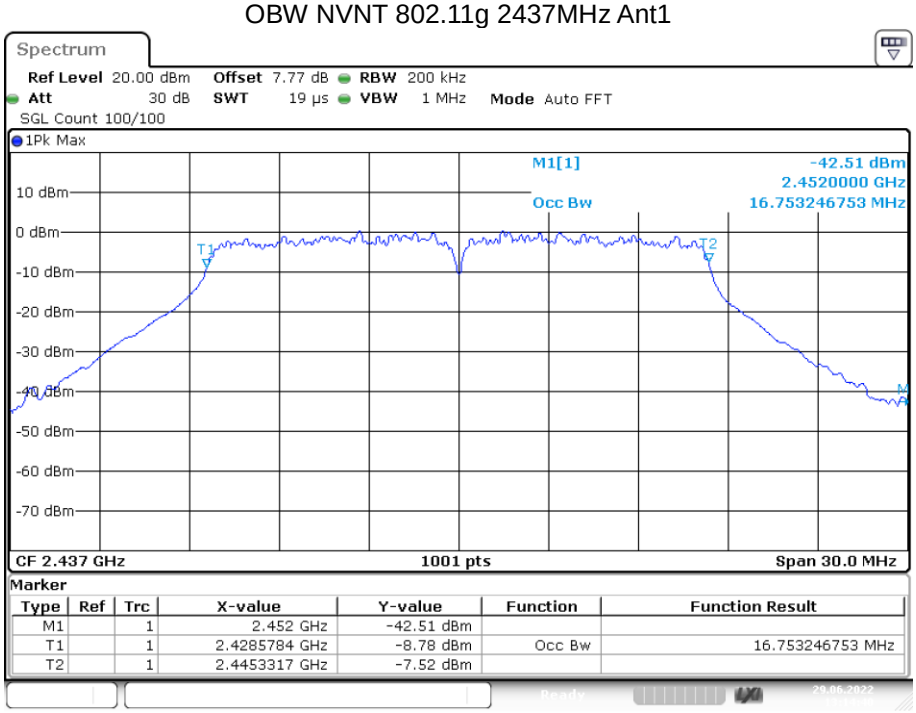
-6 dB BW NVNT 802.11g 2412MHz Ant1



Date: 29.JUN.2022 12:52:24

OBW NVNT 802.11g 2437MHz Ant1



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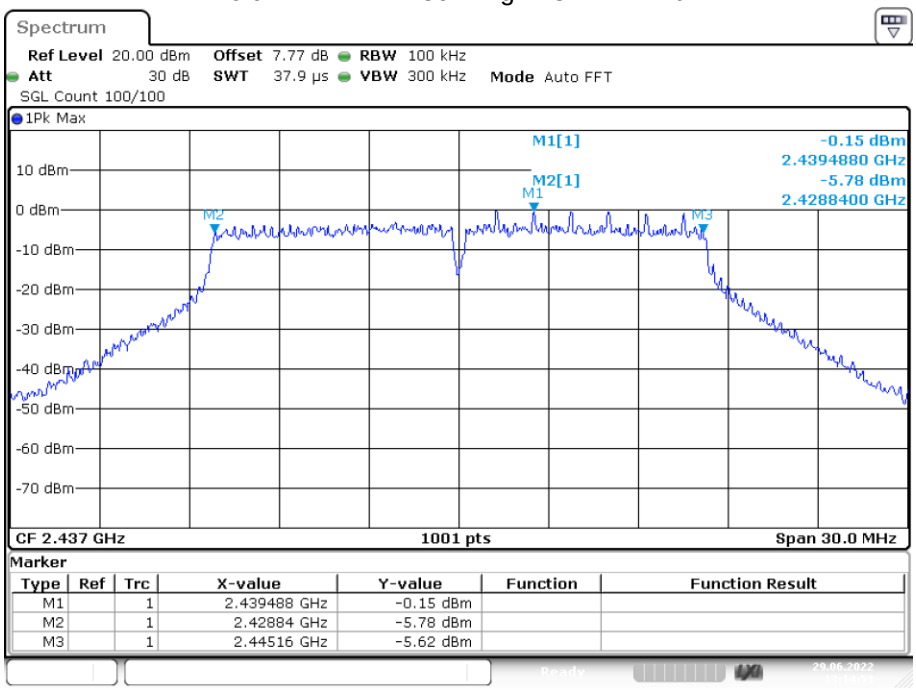
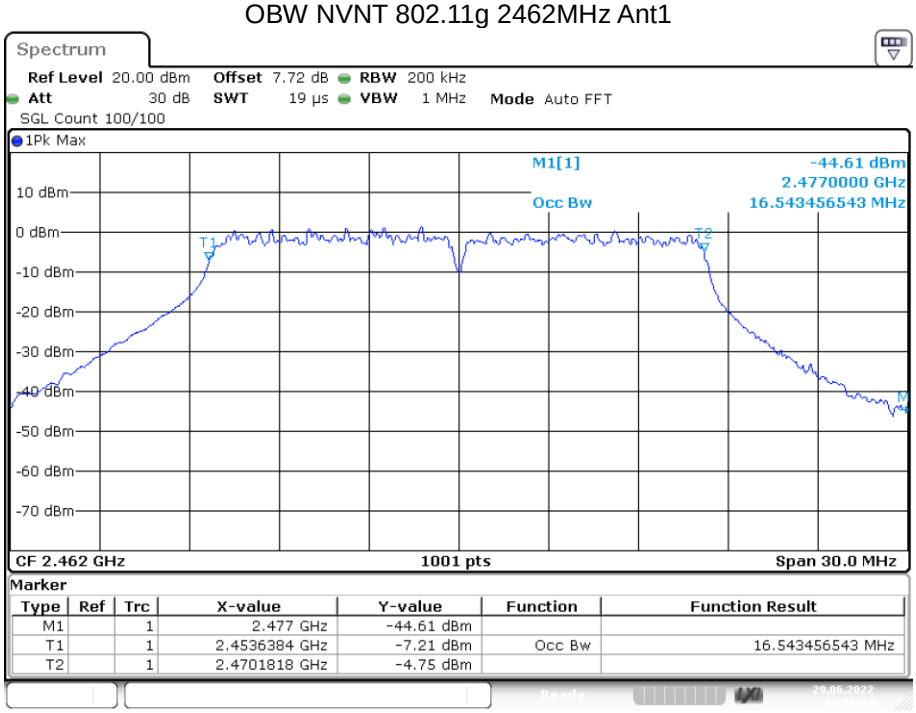
-6 dB BW NVNT 802.11g 2437MHz Ant1



Date: 29.JUN.2022 13:14:52

OBW NVNT 802.11g 2462MHz Ant1



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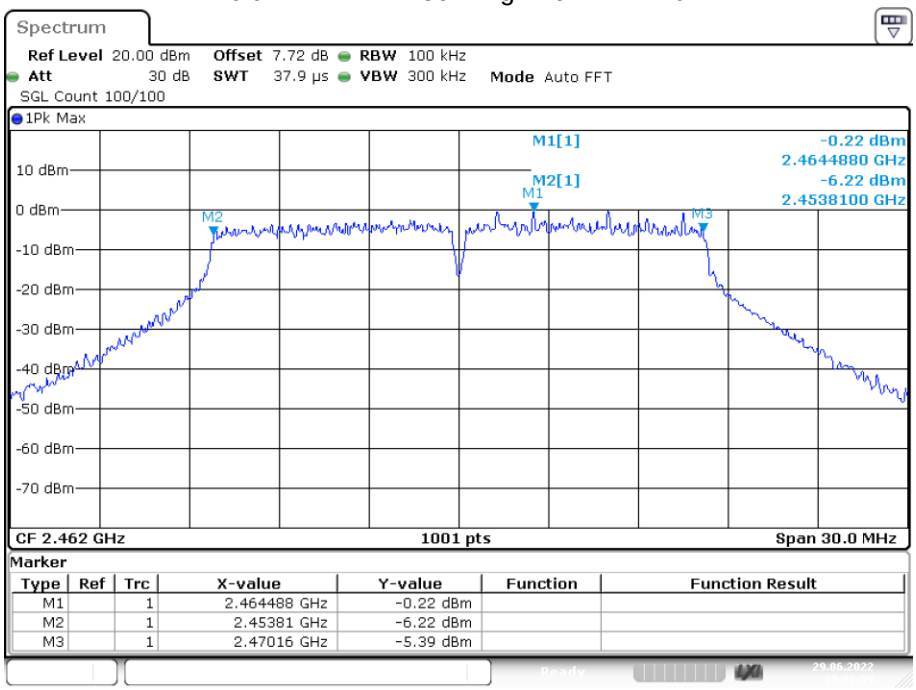
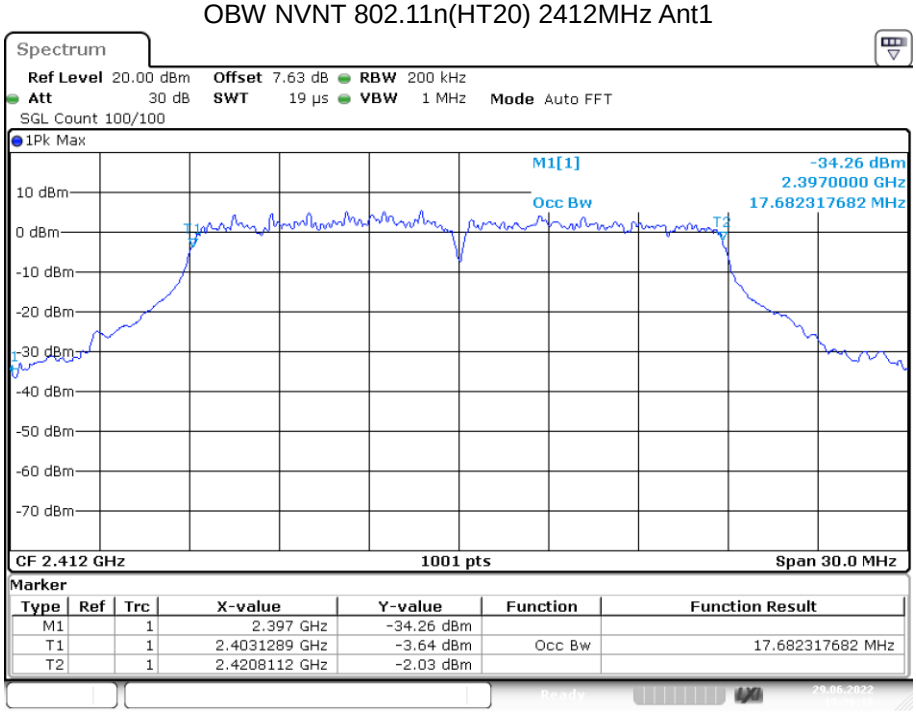
-6 dB BW NVNT 802.11g 2462MHz Ant1



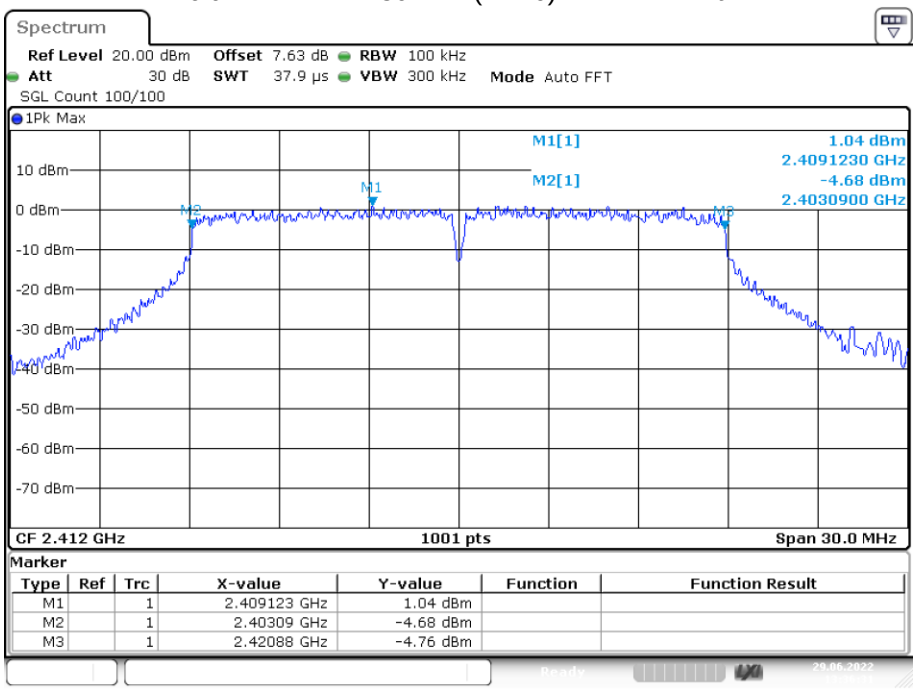
Date: 29.JUN.2022 13:31:59

OBW NVNT 802.11n(HT20) 2412MHz Ant1



Date: 29.JUN.2022 13:36:16

-6 dB BW NVNT 802.11n(HT20) 2412MHz Ant1



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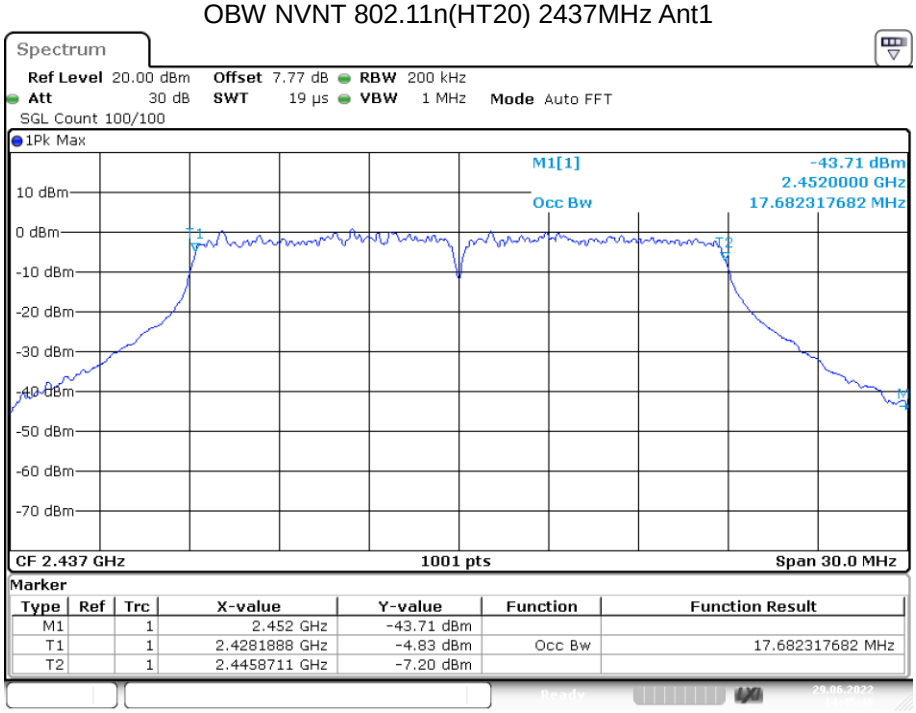
OBW NVNT 802.11n(HT20) 2437MHz Ant1



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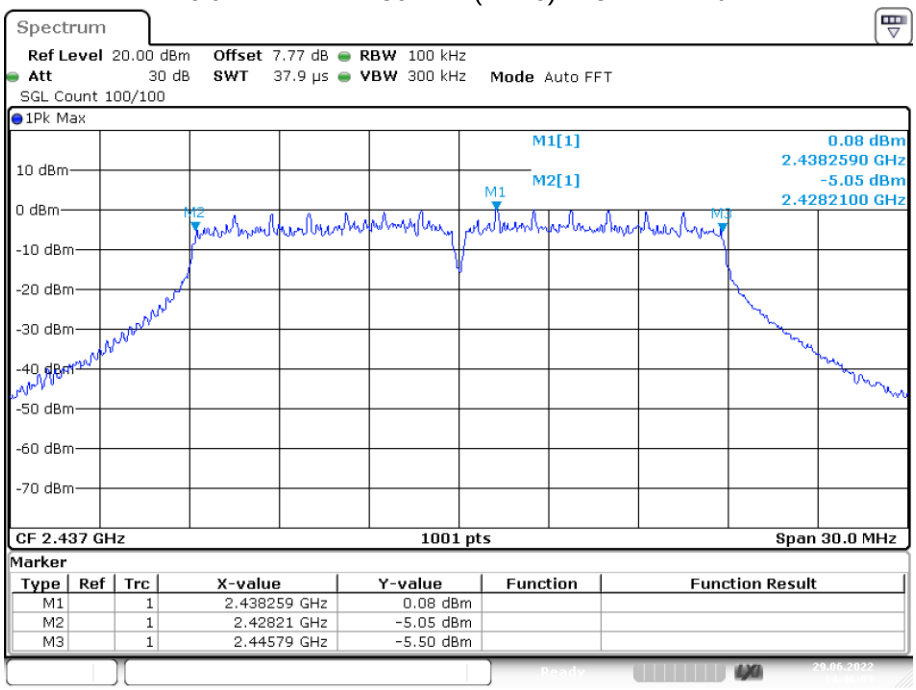
-6 dB BW NVNT 802.11n(HT20) 2437MHz Ant1



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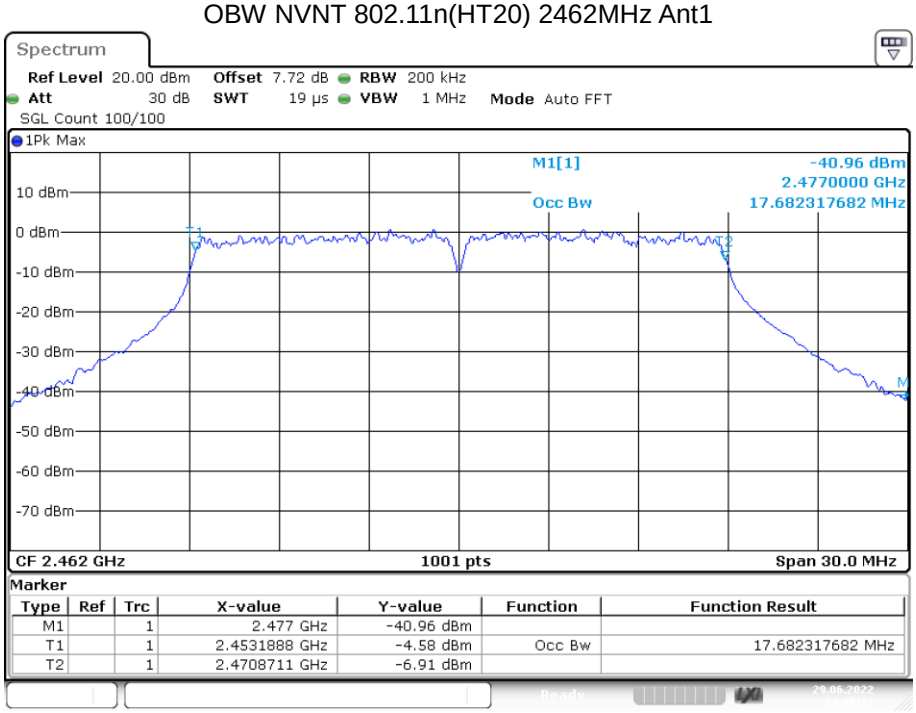
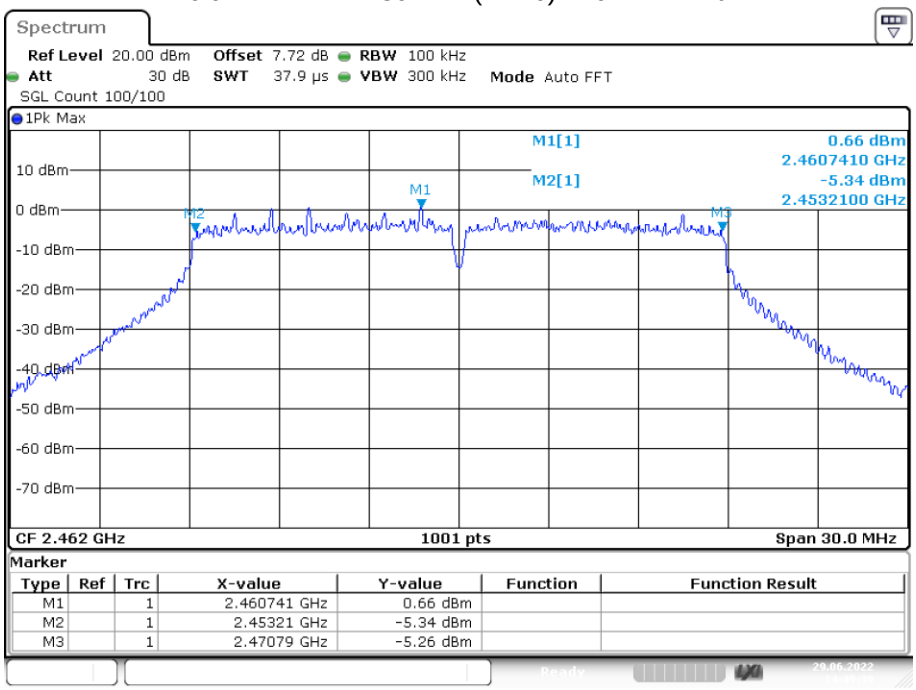
OBW NVNT 802.11n(HT20) 2462MHz Ant1



Date: 29.JUN.2022 14:49:17

-6 dB BW NVNT 802.11n(HT20) 2462MHz Ant1



Date: 29.JUN.2022 14:49:39

8. Band Edge Check

8.1. Test limits

Please refer RSS-GEN & FCC PART 15: 15.247

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 and RSS-GEN limits.

8.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

8.2.1 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

8.2.2 Check the spurious emissions out of band.

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

8.3. Test Setup

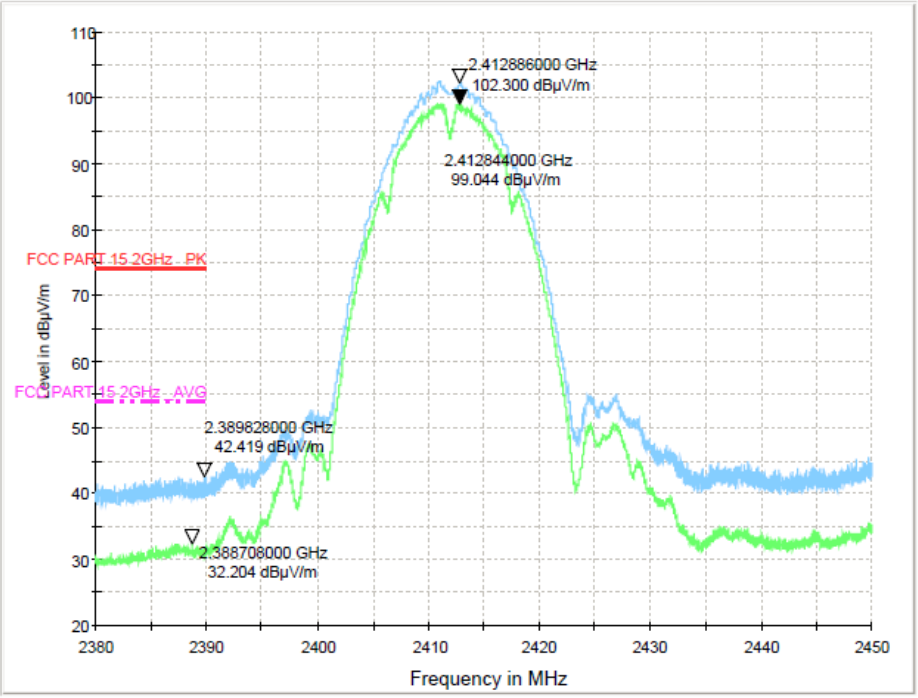
Same as 5.2.2.

8.4. Test Results

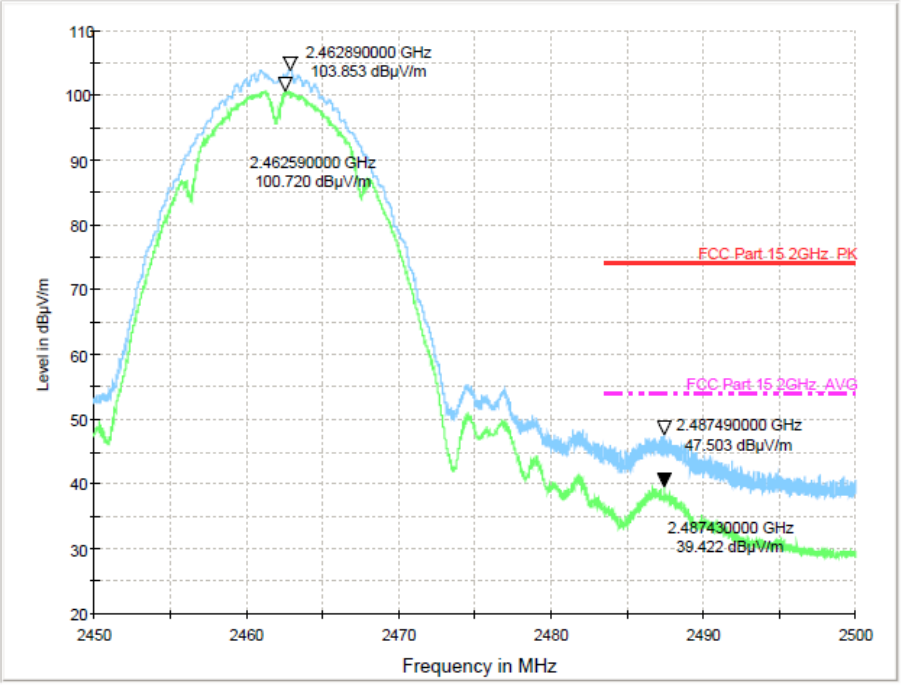
PASS.

Detailed information please see the following page.

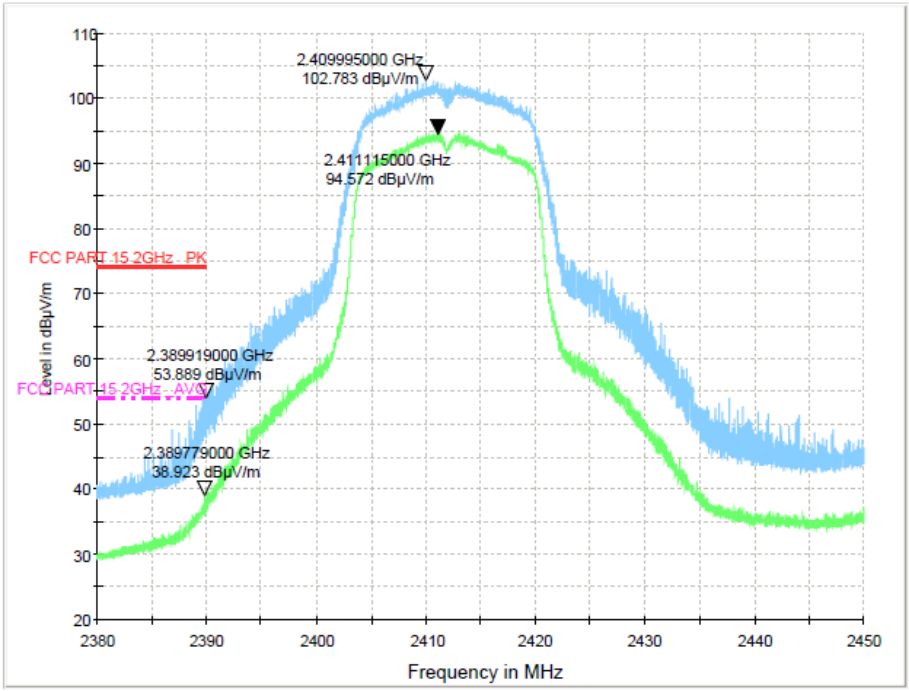
Test Mode: IEEE 802.11b-Low



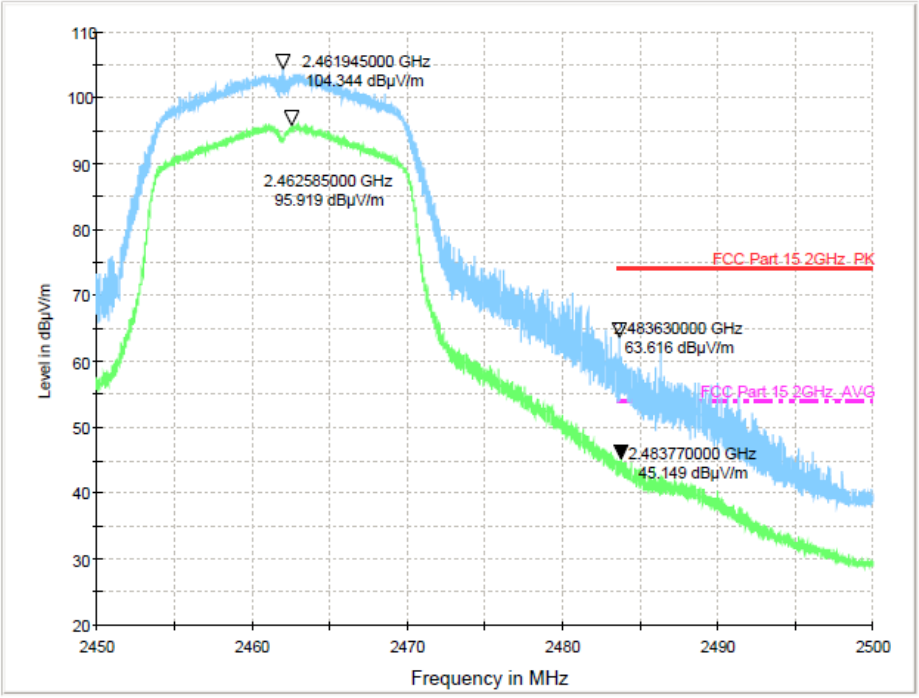
Test Mode: IEEE 802.11b-High



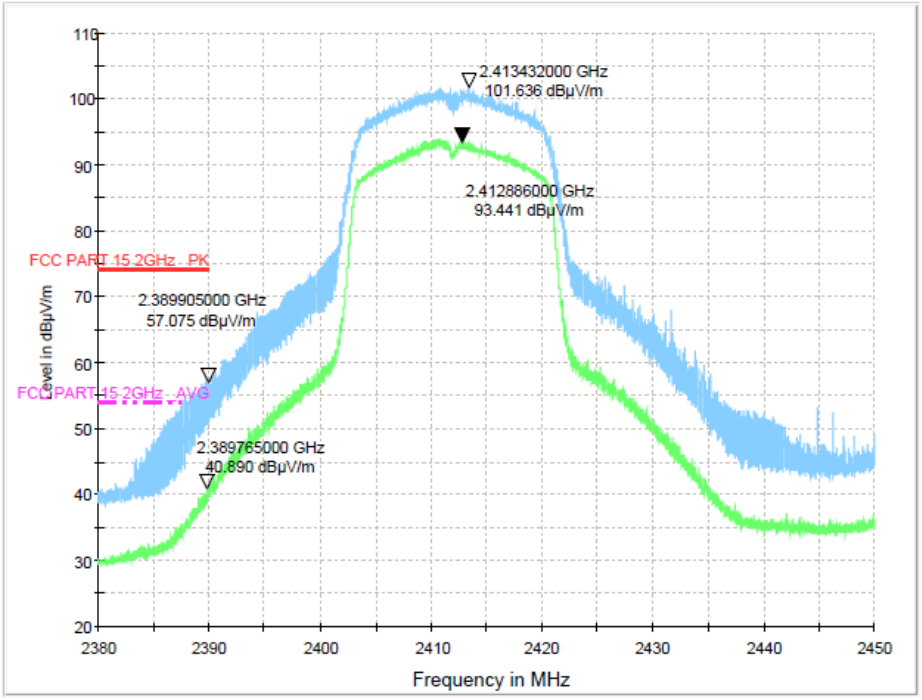
Test Mode: IEEE 802.11g-Low



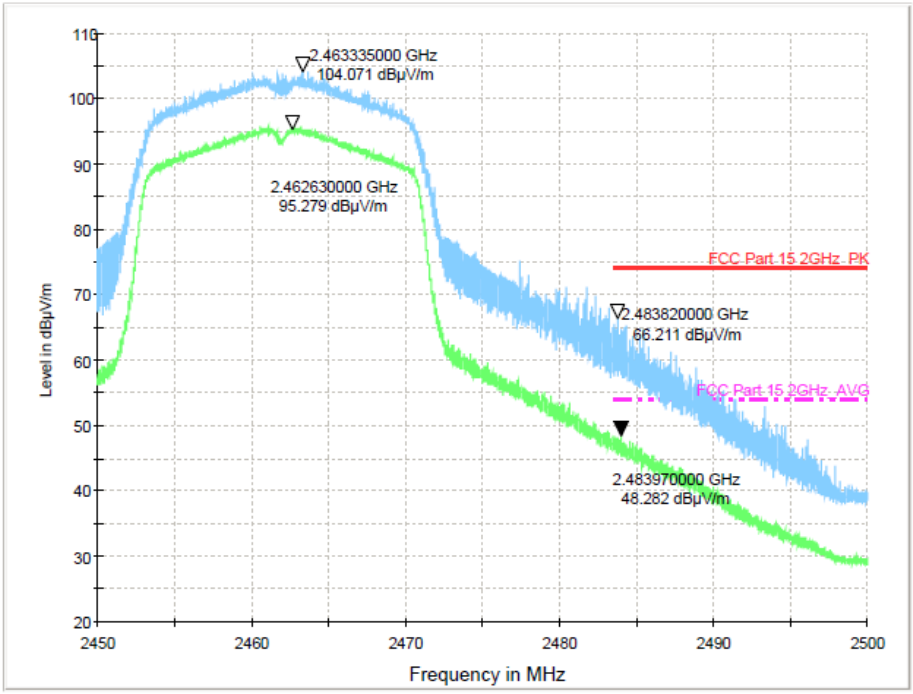
Test Mode: IEEE 802.11g-High



Test Mode: IEEE 802.11n20-Low

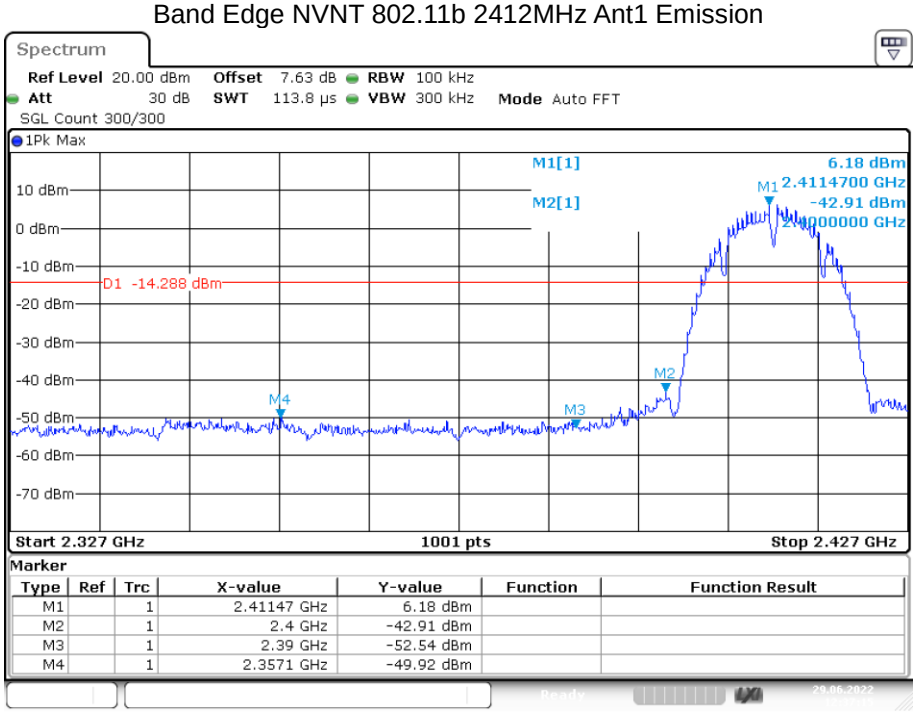


Test Mode: IEEE 802.11n20-High



Note: 1. *:Maximum data; x:Over limit; !:over margin.
2.Measurement=Reading Level + Correct Factor; Correct Factor=Antenna Factor + Cable Loss.

Band Edge NVNT 802.11b 2412MHz Ant1 Emission

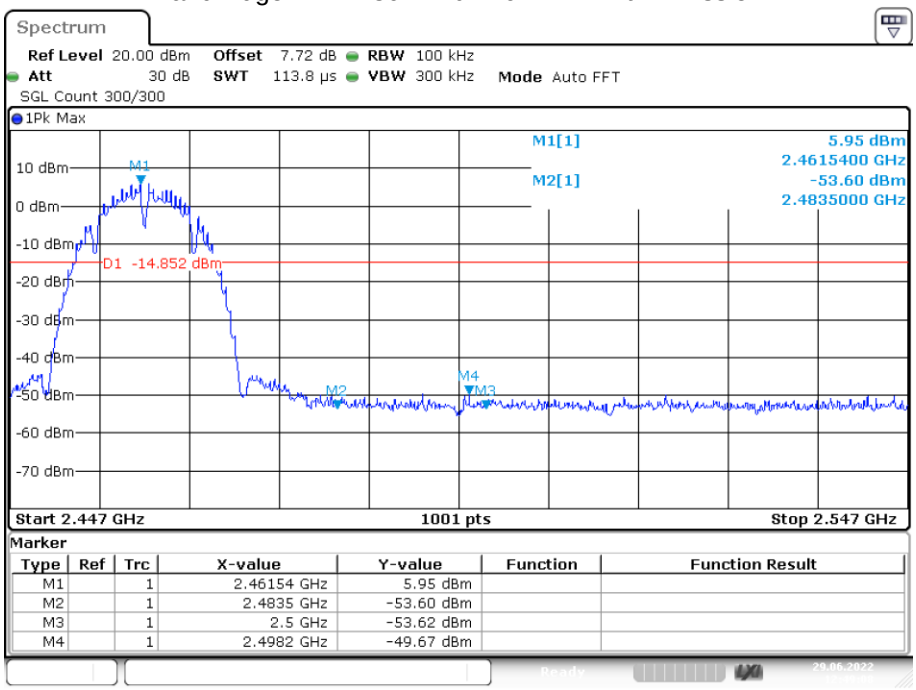


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41147 GHz	6.18 dBm		
M2		1	2.4 GHz	-42.91 dBm		
M3		1	2.39 GHz	-52.54 dBm		
M4		1	2.3571 GHz	-49.92 dBm		

Date: 29.JUN.2022 12:37:15

Band Edge NVNT 802.11b 2462MHz Ant1 Emission

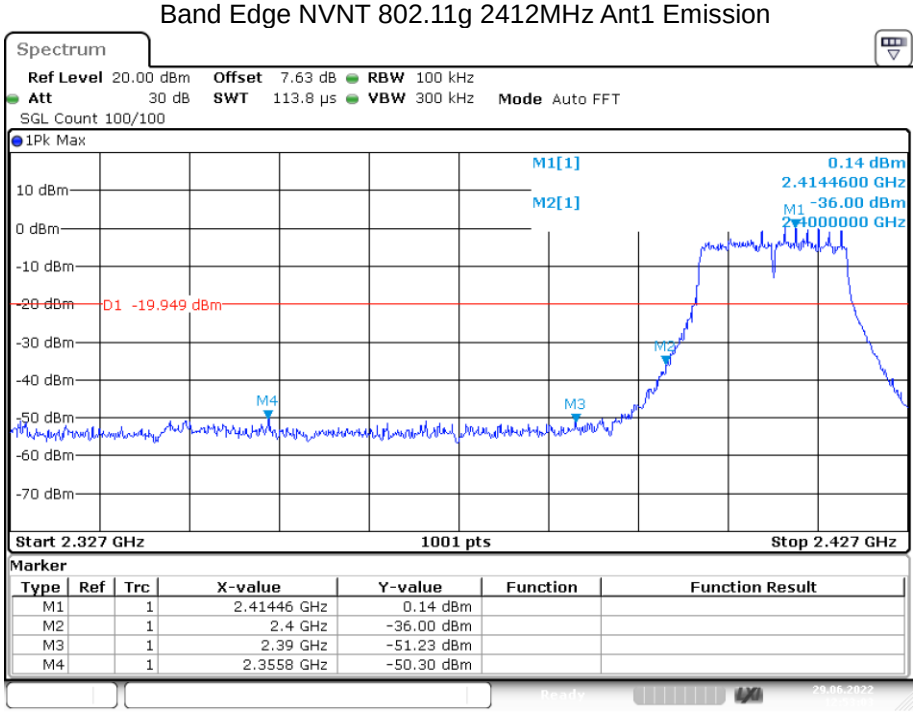


Marker

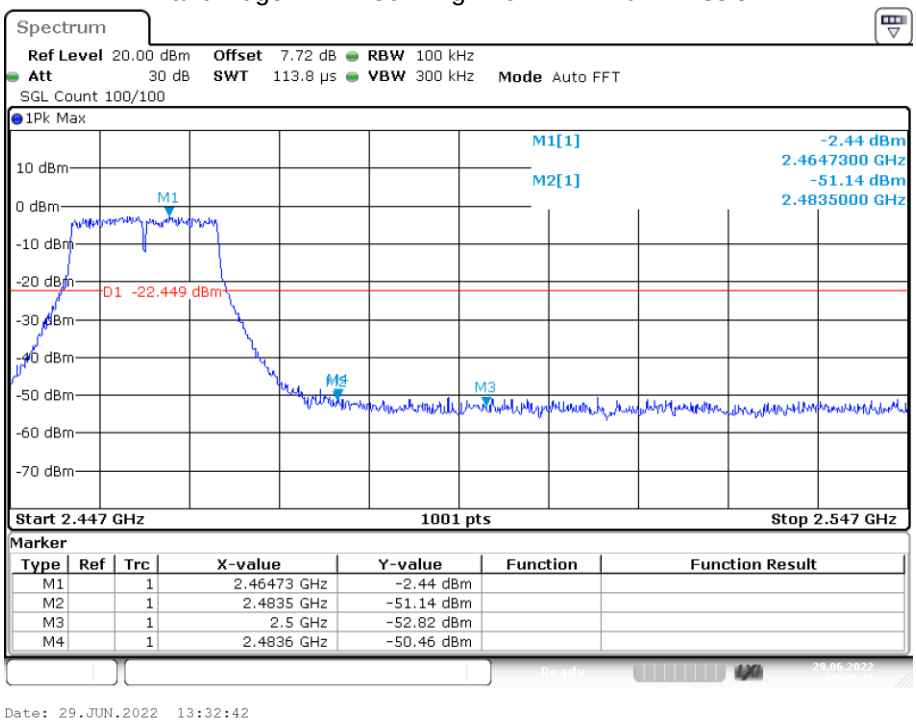
Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46154 GHz	5.95 dBm		
M2		1	2.4835 GHz	-53.60 dBm		
M3		1	2.5 GHz	-53.62 dBm		
M4		1	2.4982 GHz	-49.67 dBm		

Date: 29.JUN.2022 12:49:08

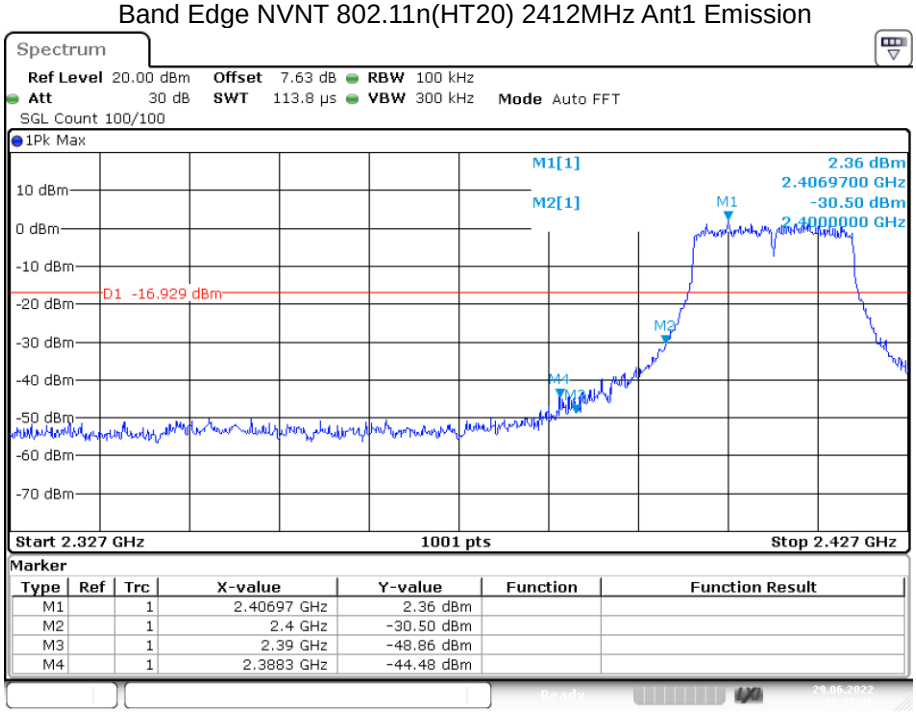
Band Edge NVNT 802.11g 2412MHz Ant1 Emission



Band Edge NVNT 802.11g 2462MHz Ant1 Emission



Band Edge NVNT 802.11n(HT20) 2412MHz Ant1 Emission

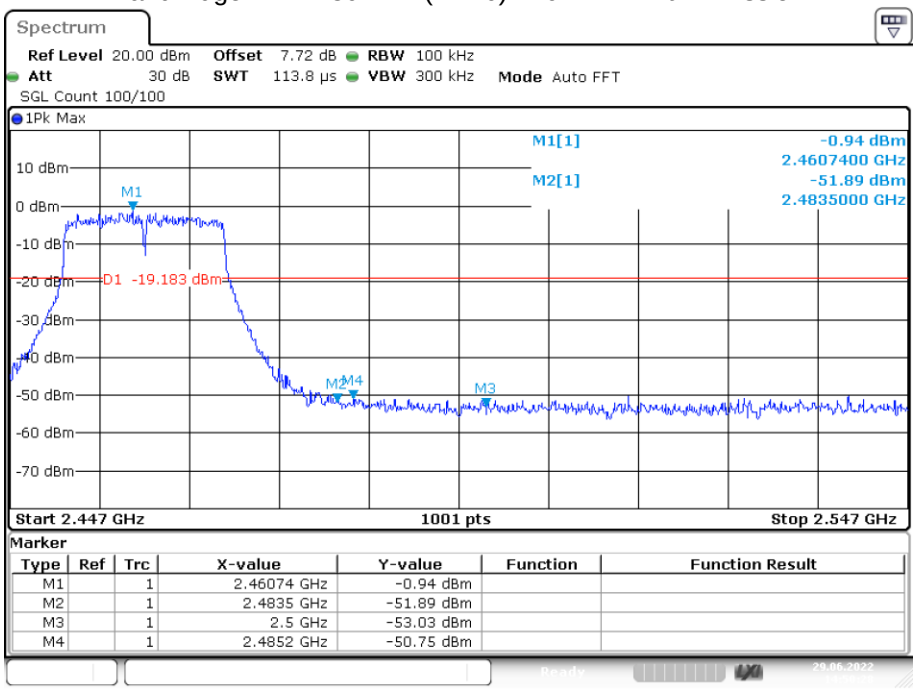


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.40697 GHz	2.36 dBm		
M2		1	2.4 GHz	-30.50 dBm		
M3		1	2.39 GHz	-48.86 dBm		
M4		1	2.3883 GHz	-44.48 dBm		

Date: 29.JUN.2022 13:37:16

Band Edge NVNT 802.11n(HT20) 2462MHz Ant1 Emission



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46074 GHz	-0.94 dBm		
M2		1	2.4835 GHz	-51.89 dBm		
M3		1	2.5 GHz	-53.03 dBm		
M4		1	2.4852 GHz	-50.75 dBm		

Date: 29.JUN.2022 14:50:28

9. Antenna Requirement

9.1. Standard Requirement

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

9.2. Antenna Connected Construction

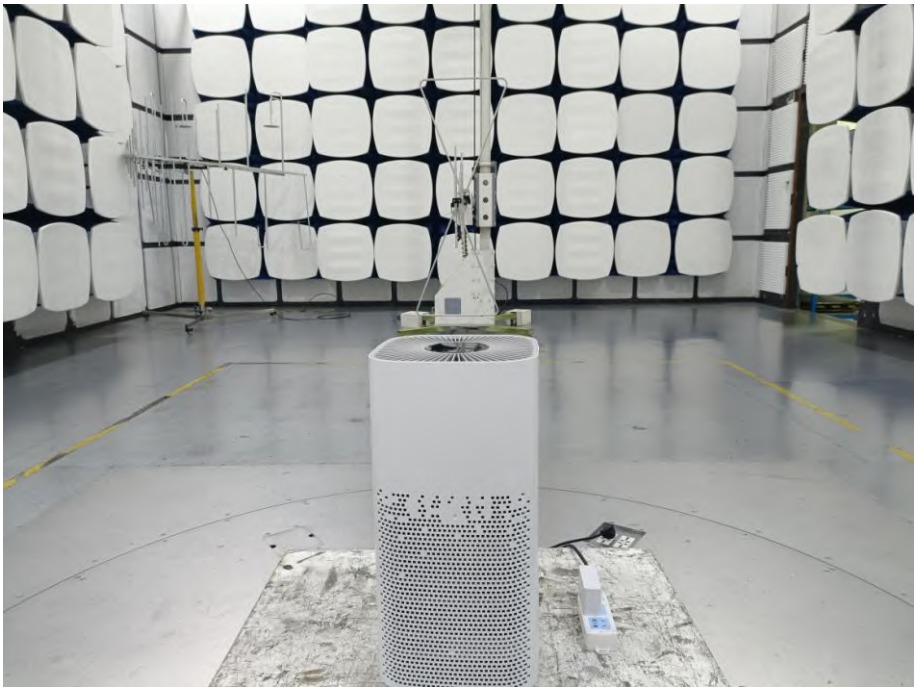
The antenna connector is unique antenna and no consideration of replacement. Please see EUT photo for details.

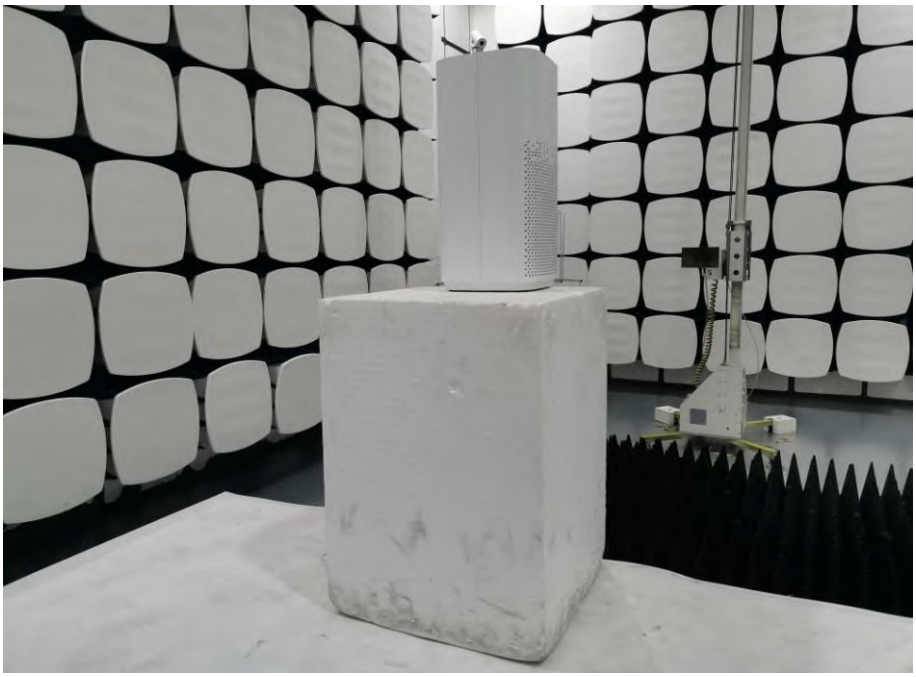
9.3. Results

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

10. Photos Of Test Setup

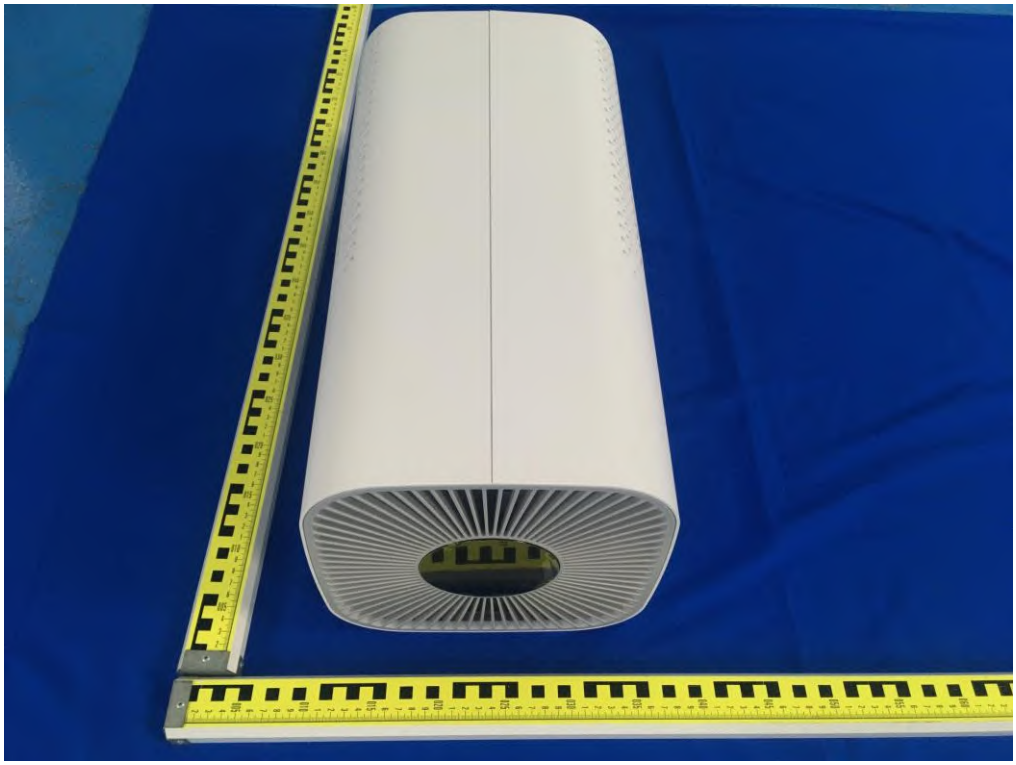
10.1.Photos of Radiated emission

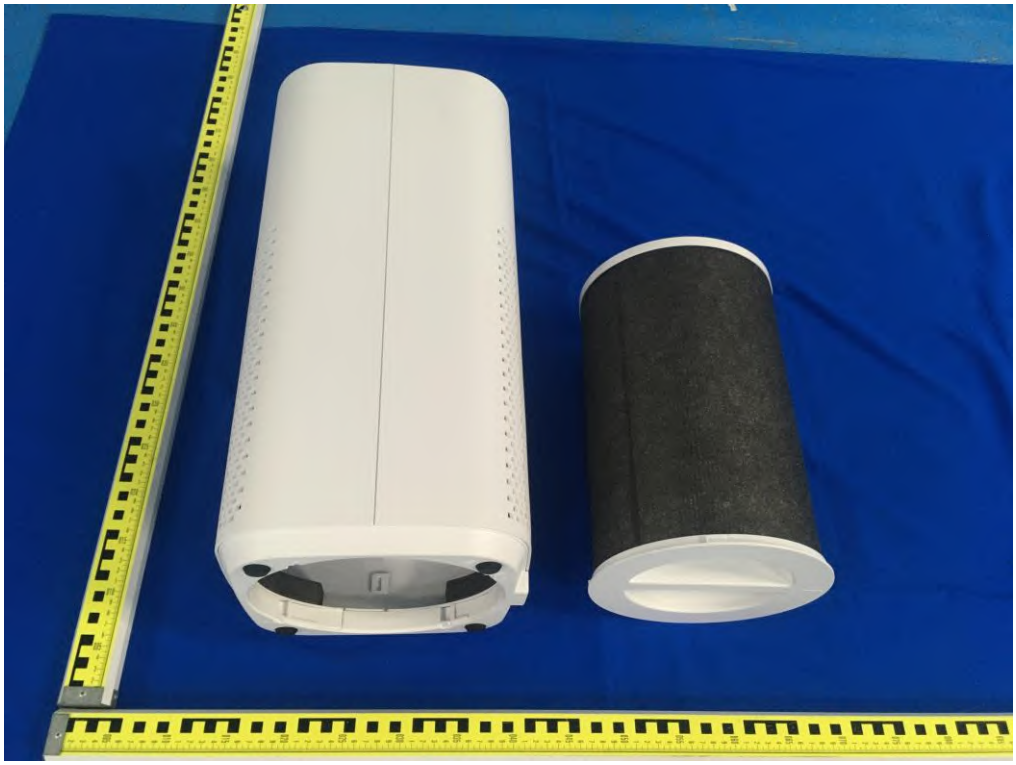


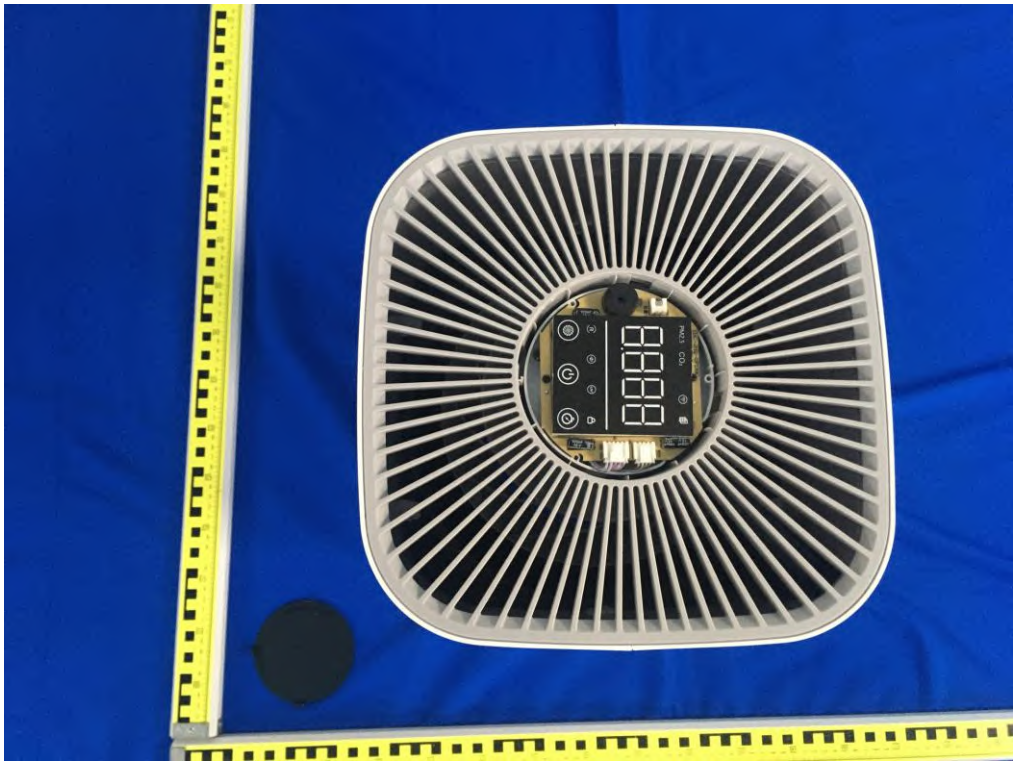


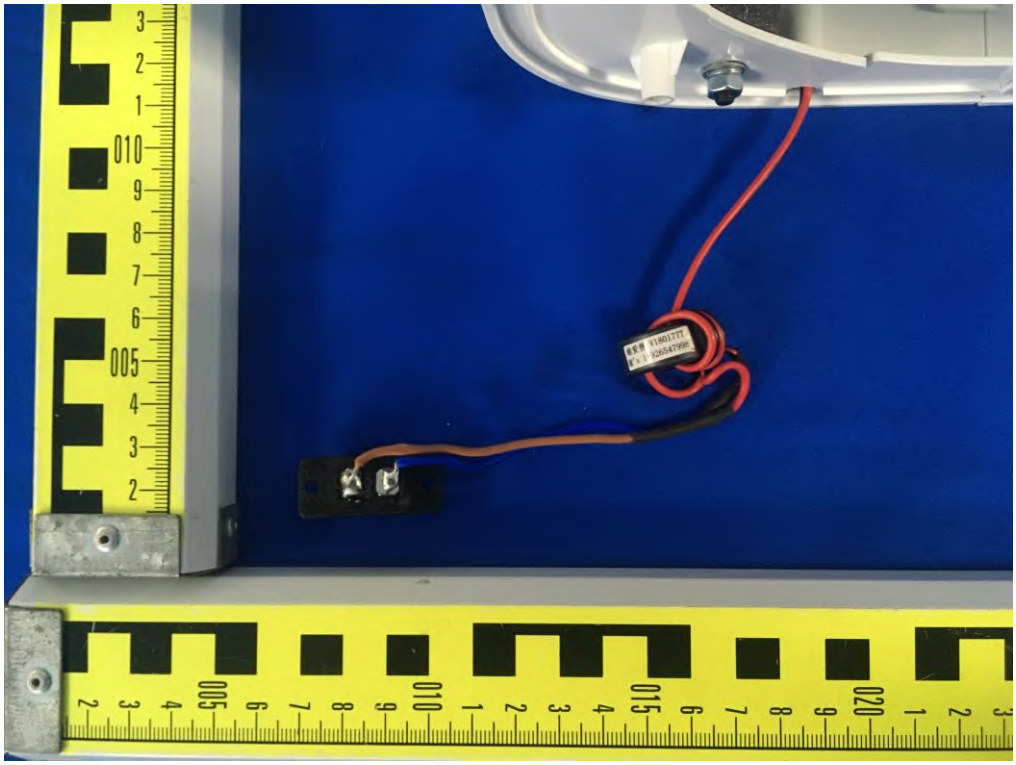
10.2.Photo of Power Line Conducted

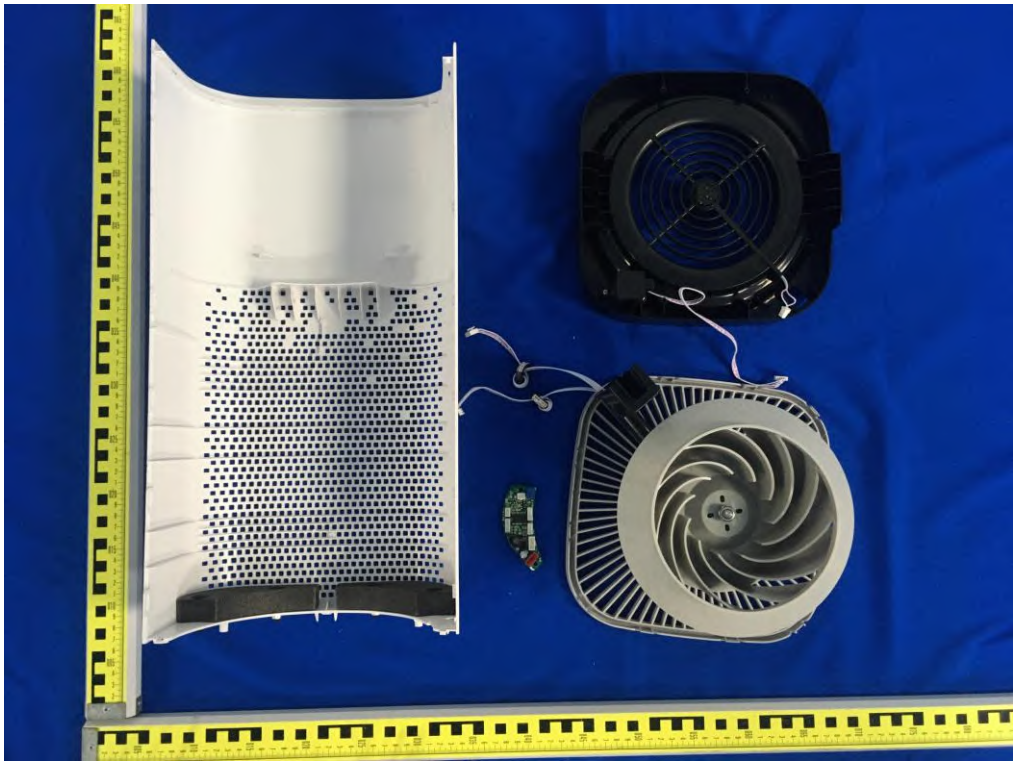
11. Photos Of EUT

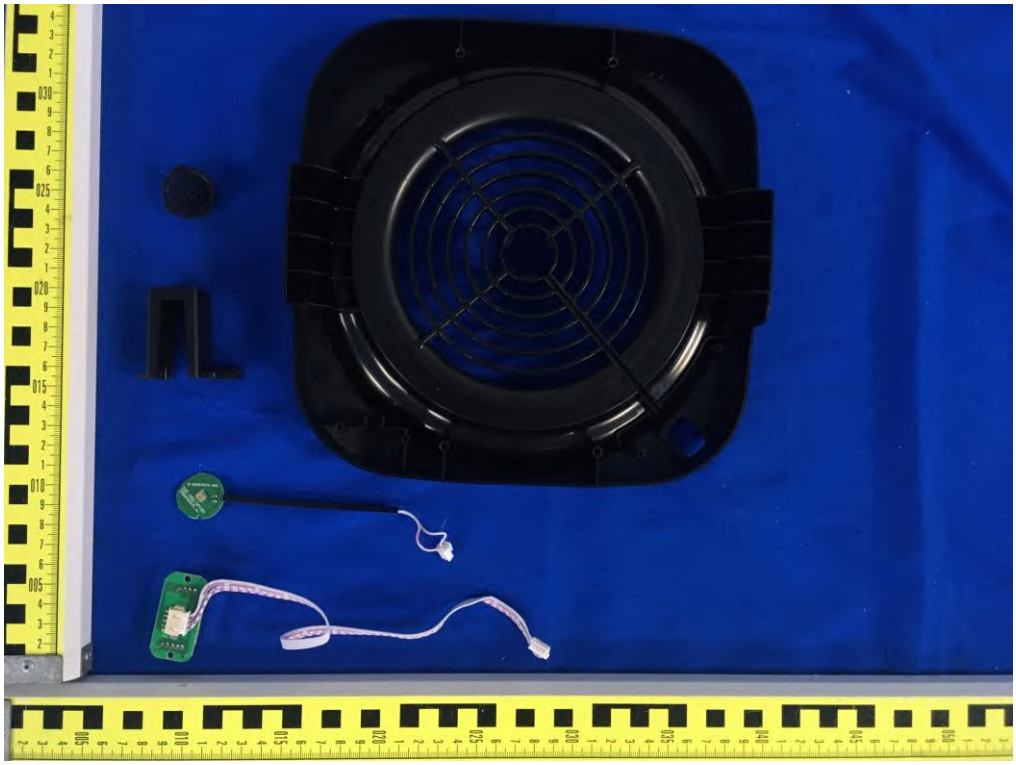


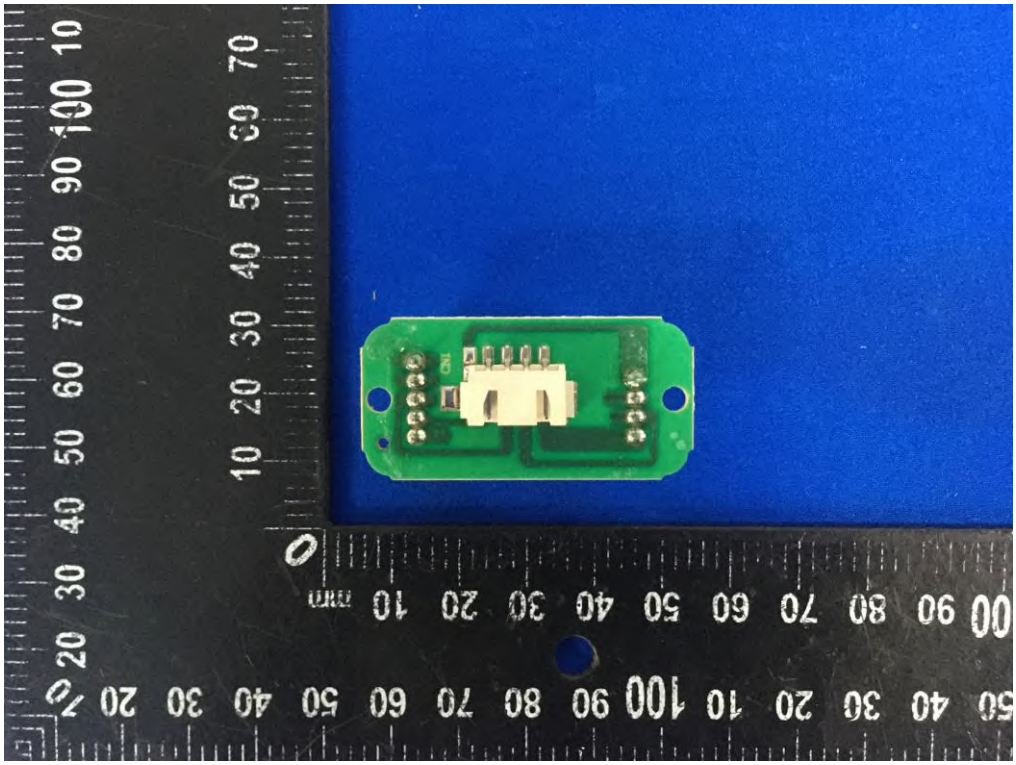


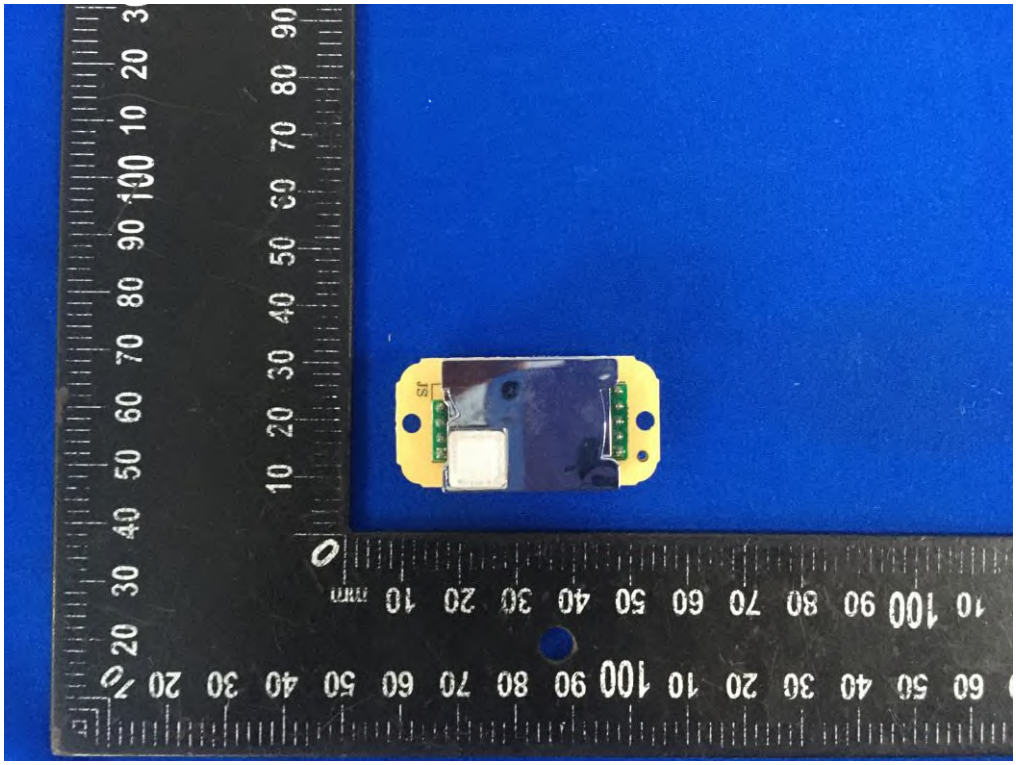

PM2.5
CO2

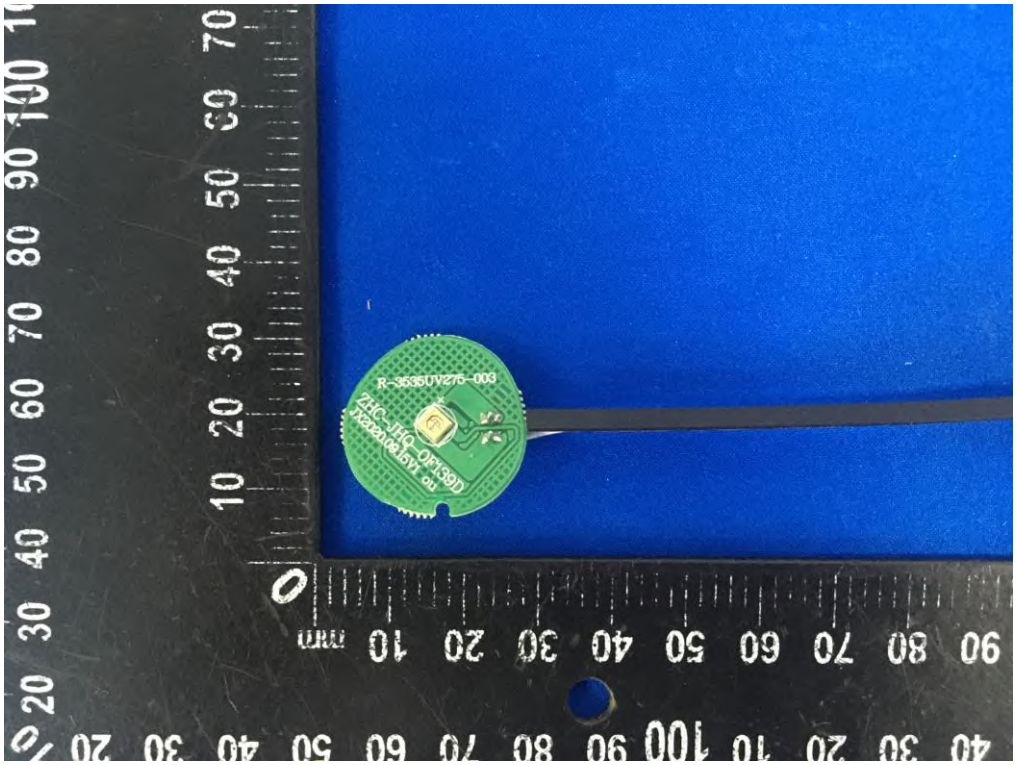








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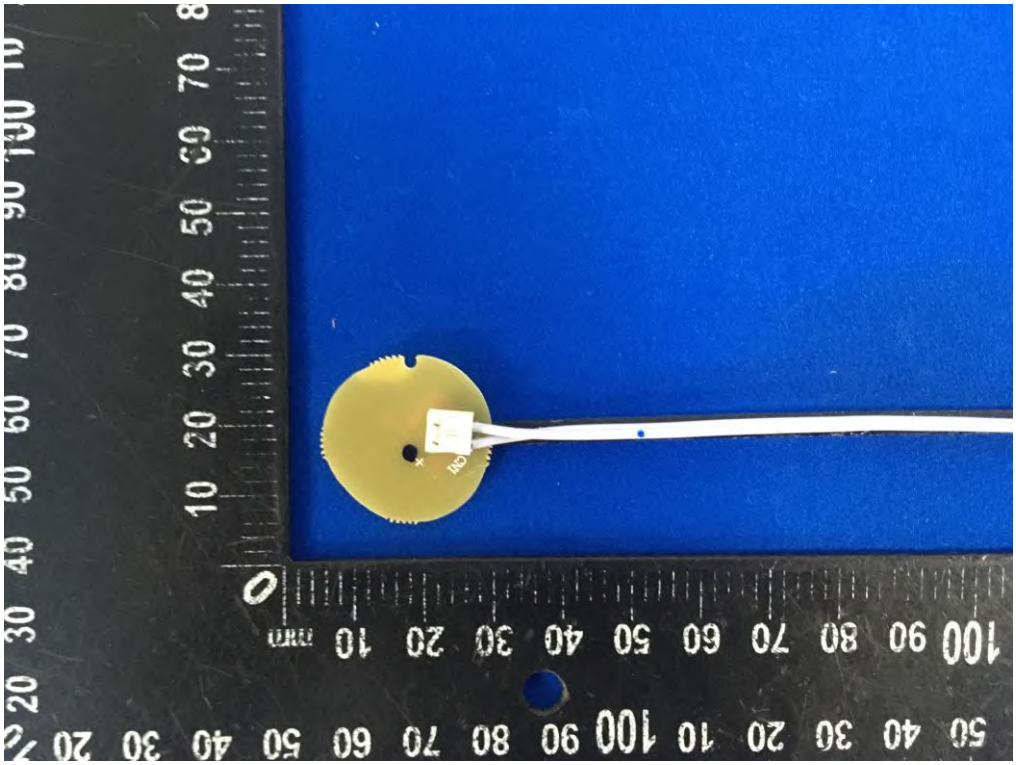

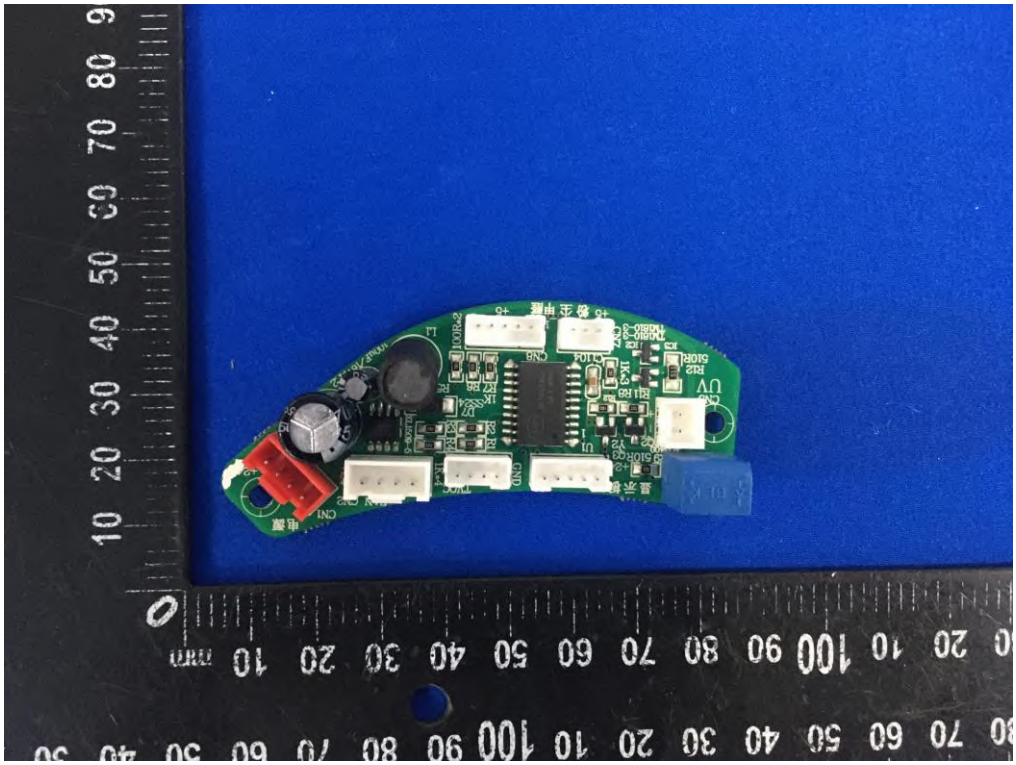

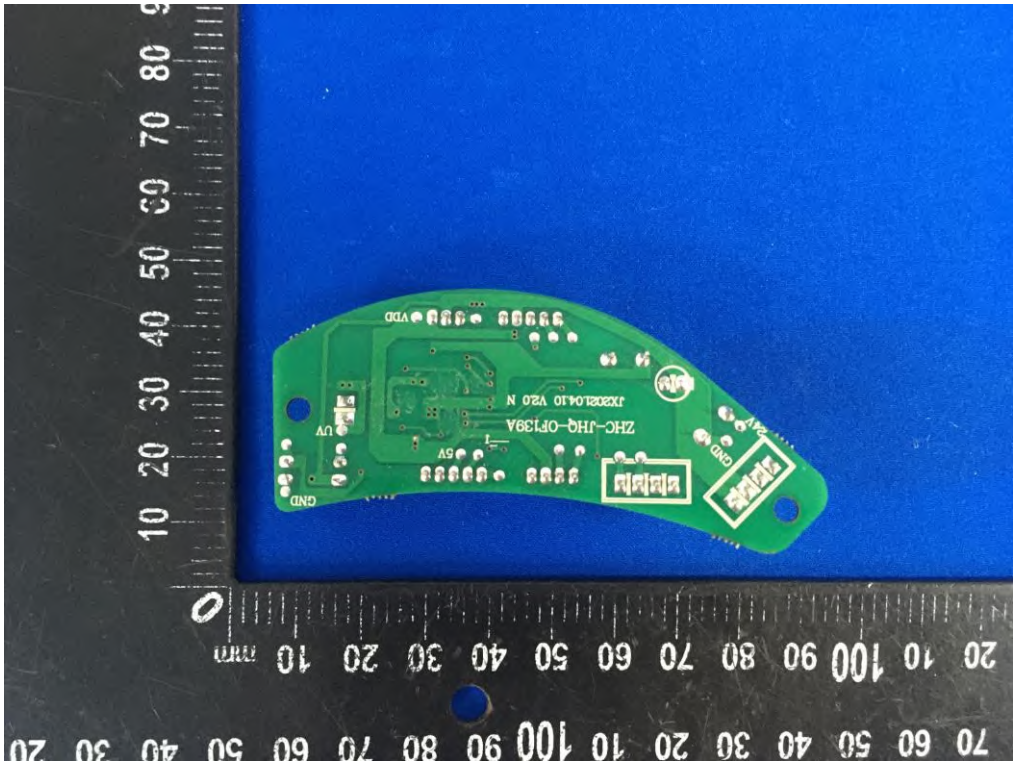

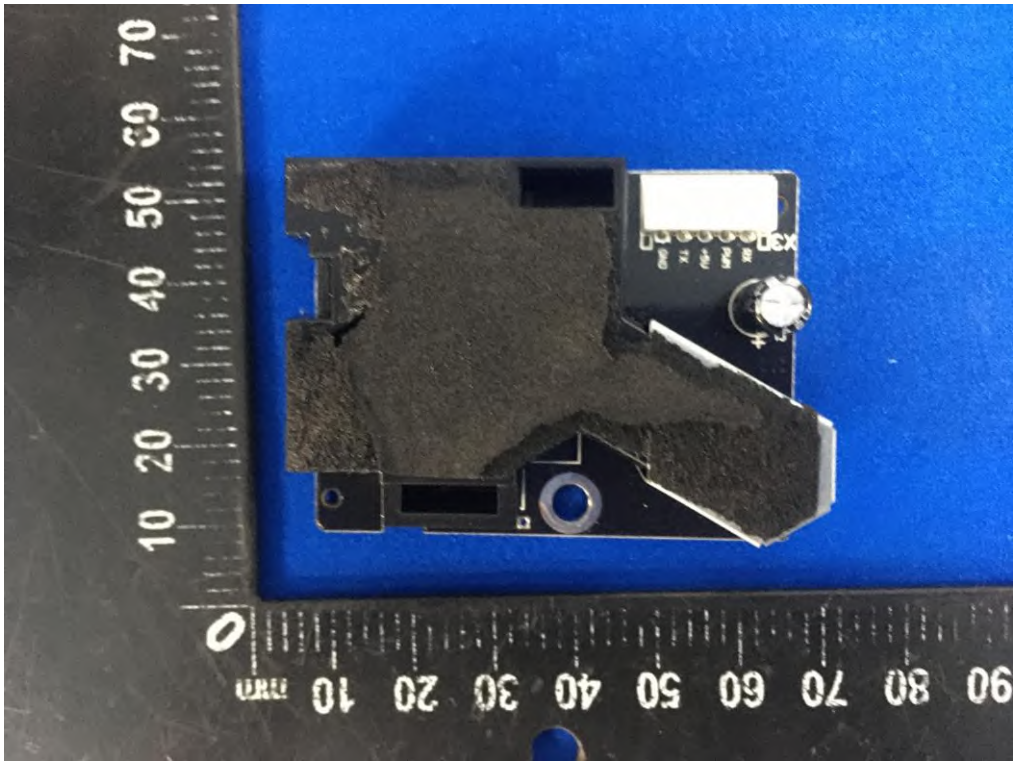

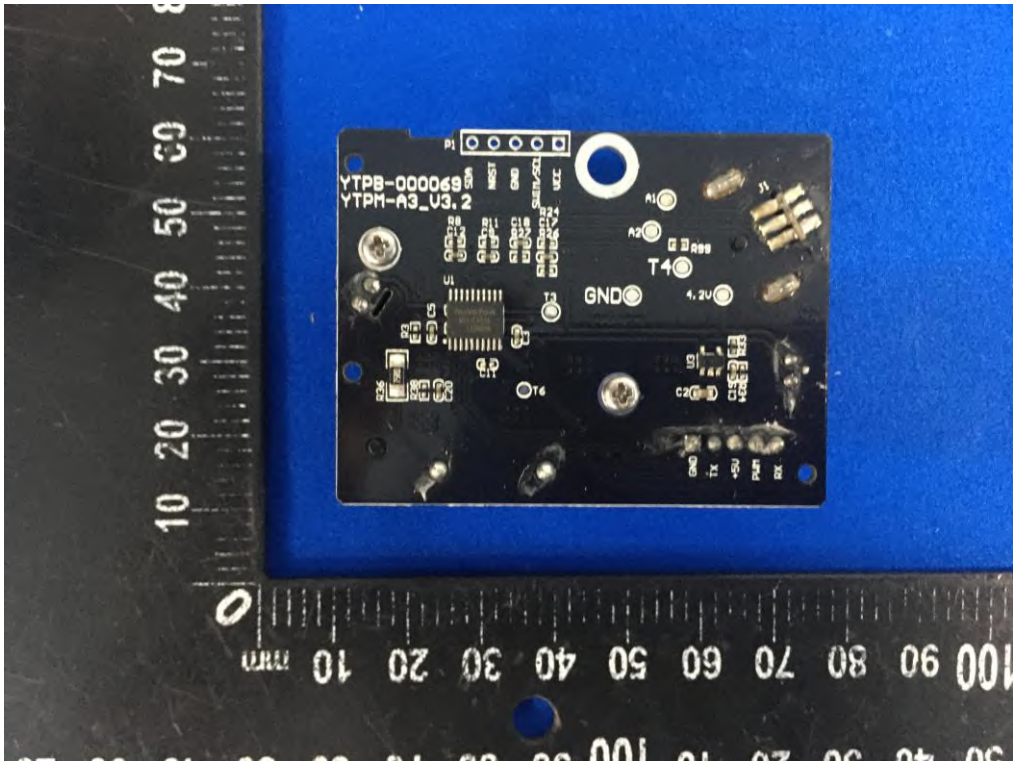
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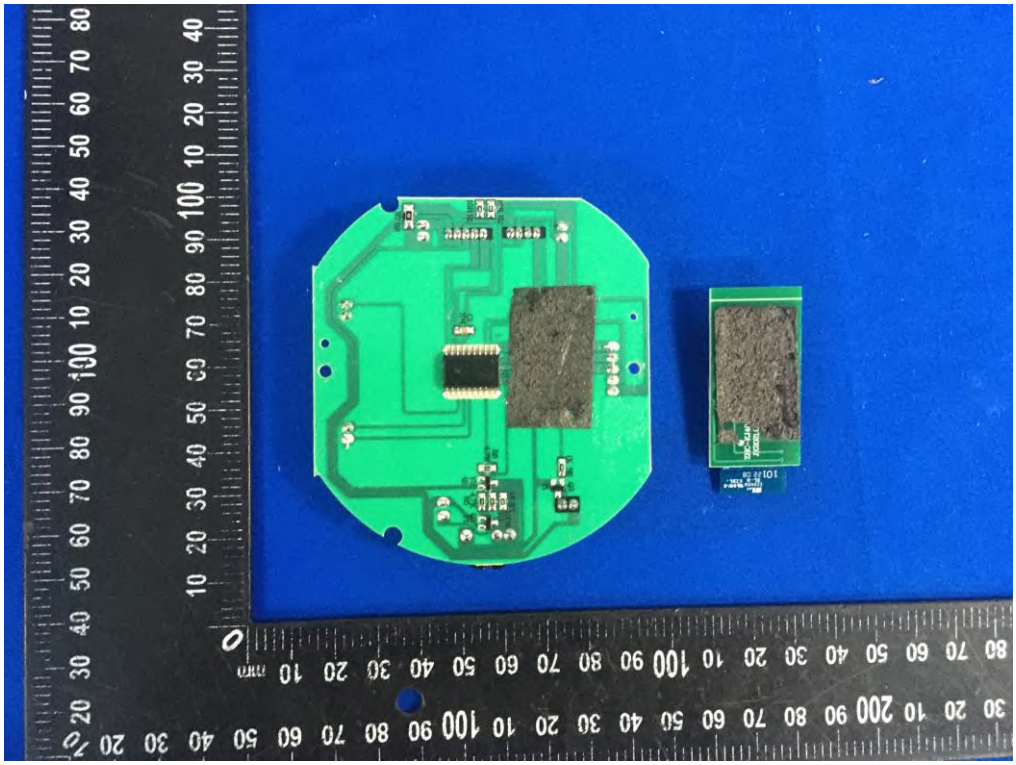

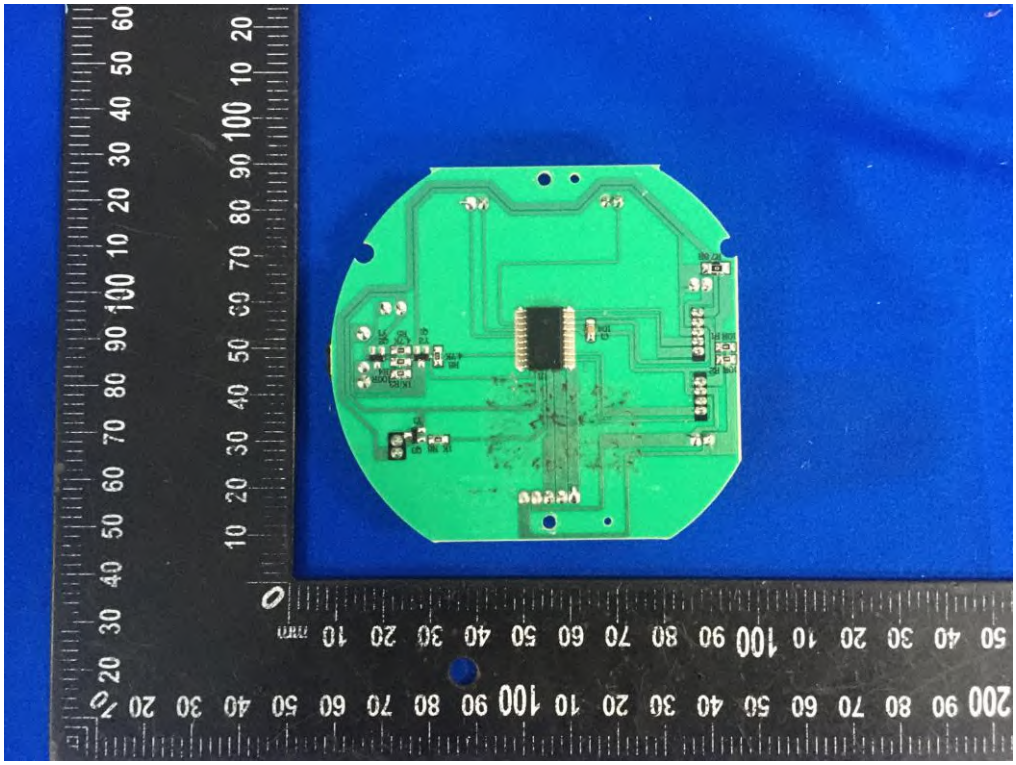

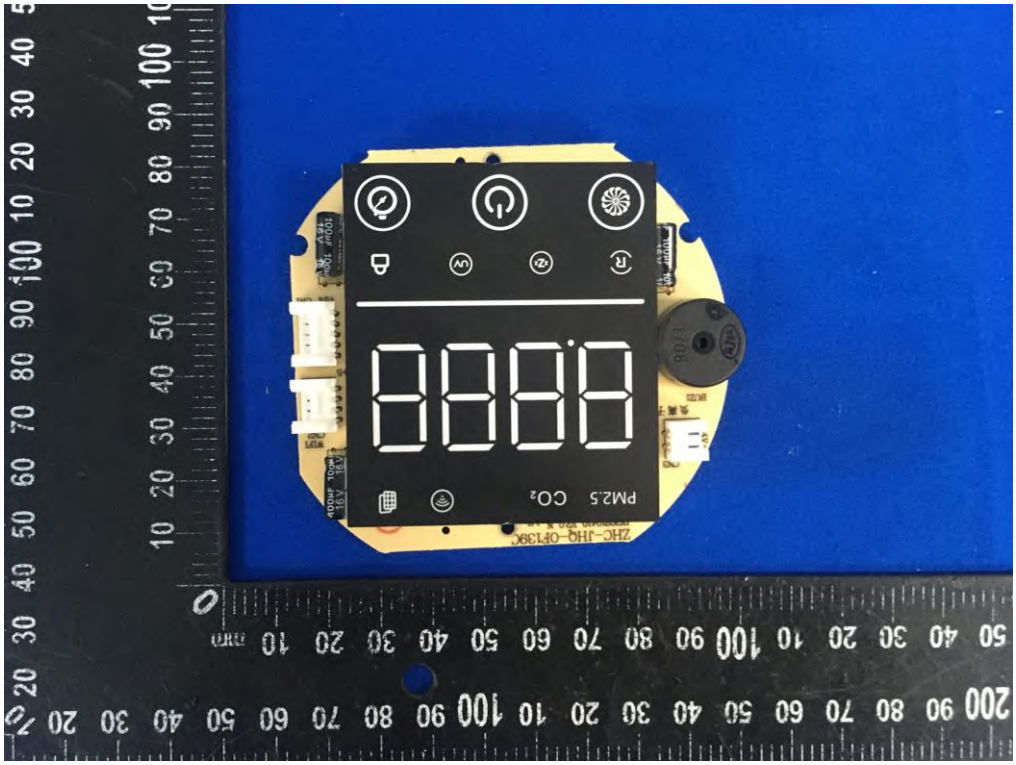
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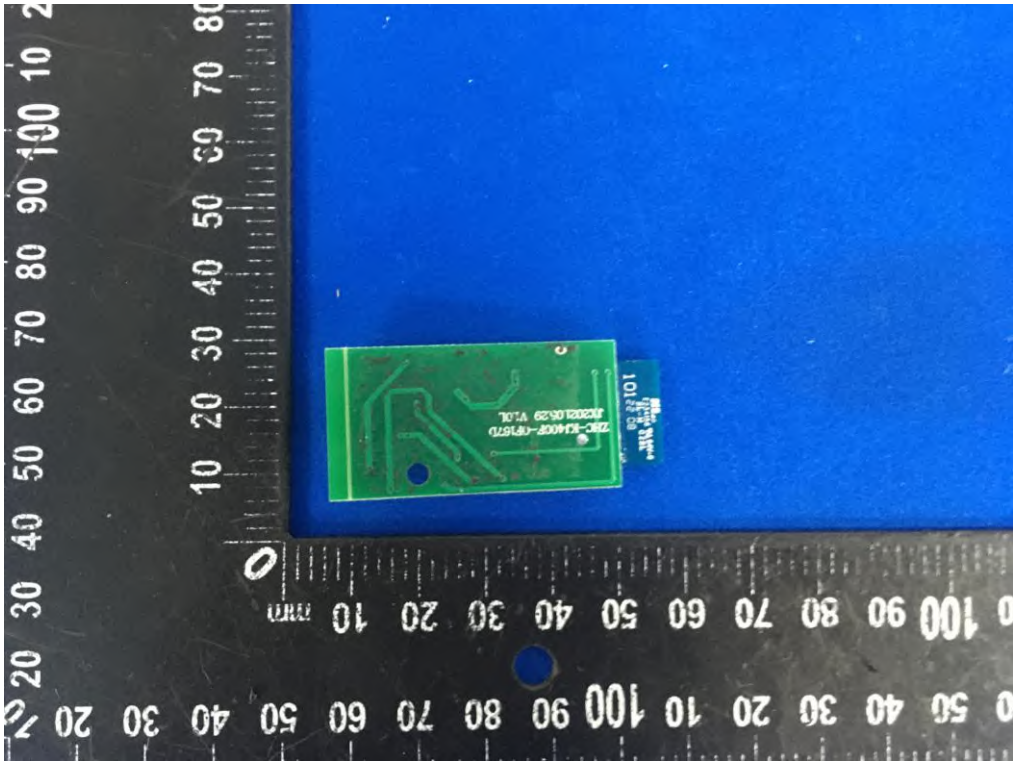

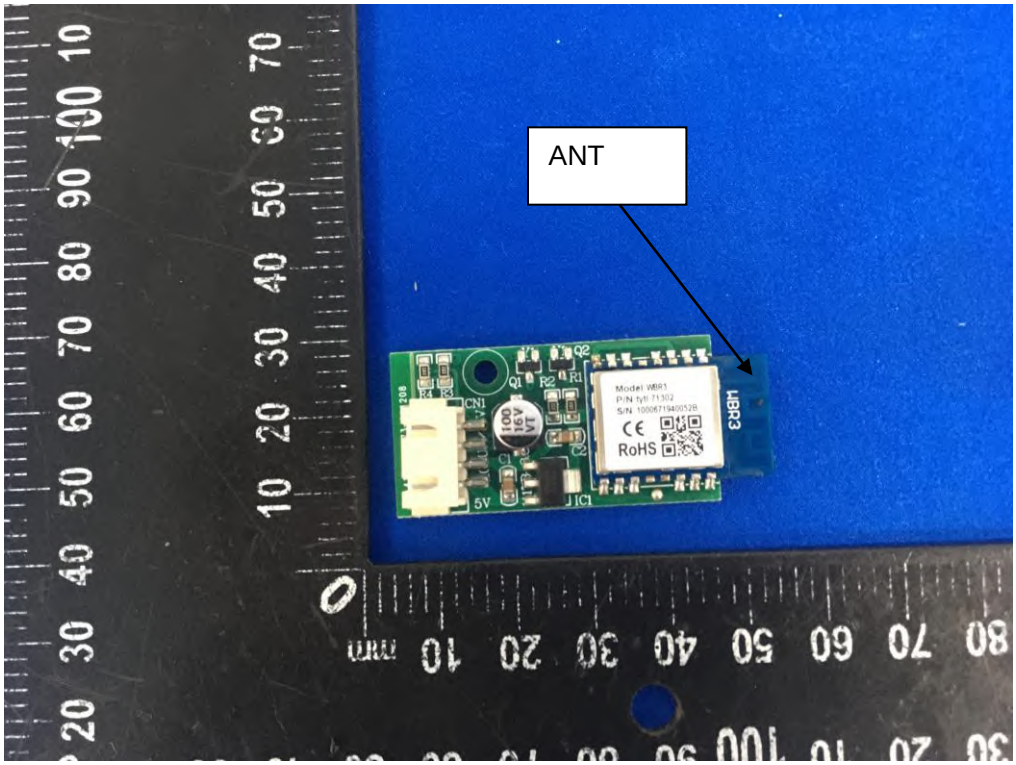
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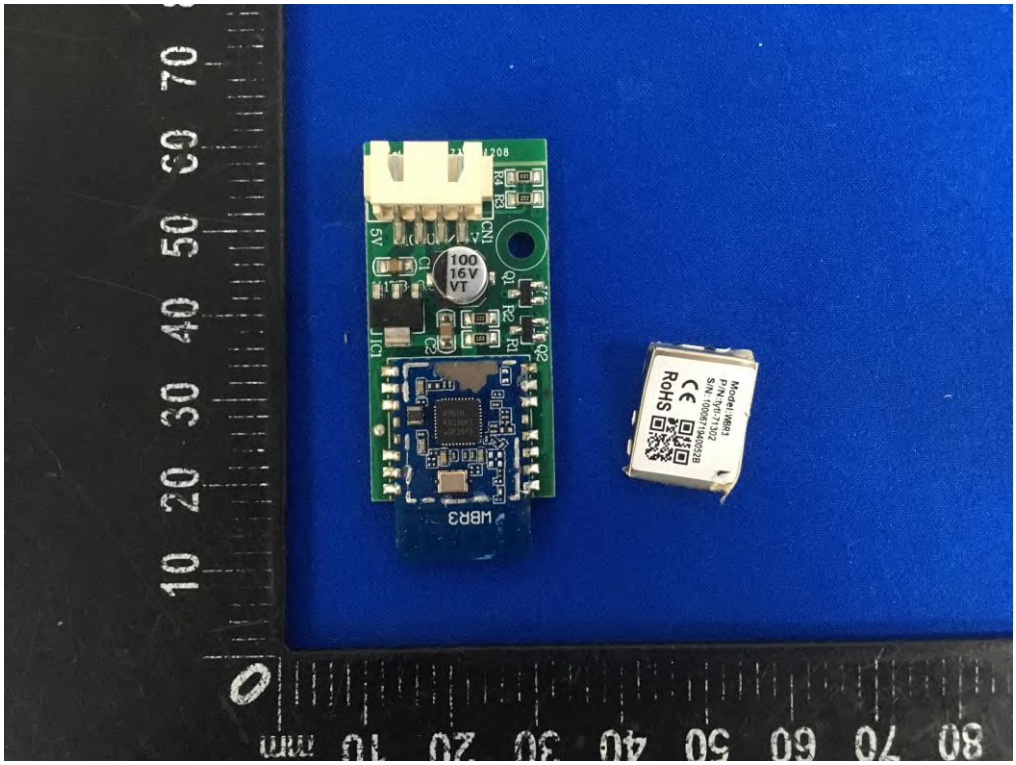

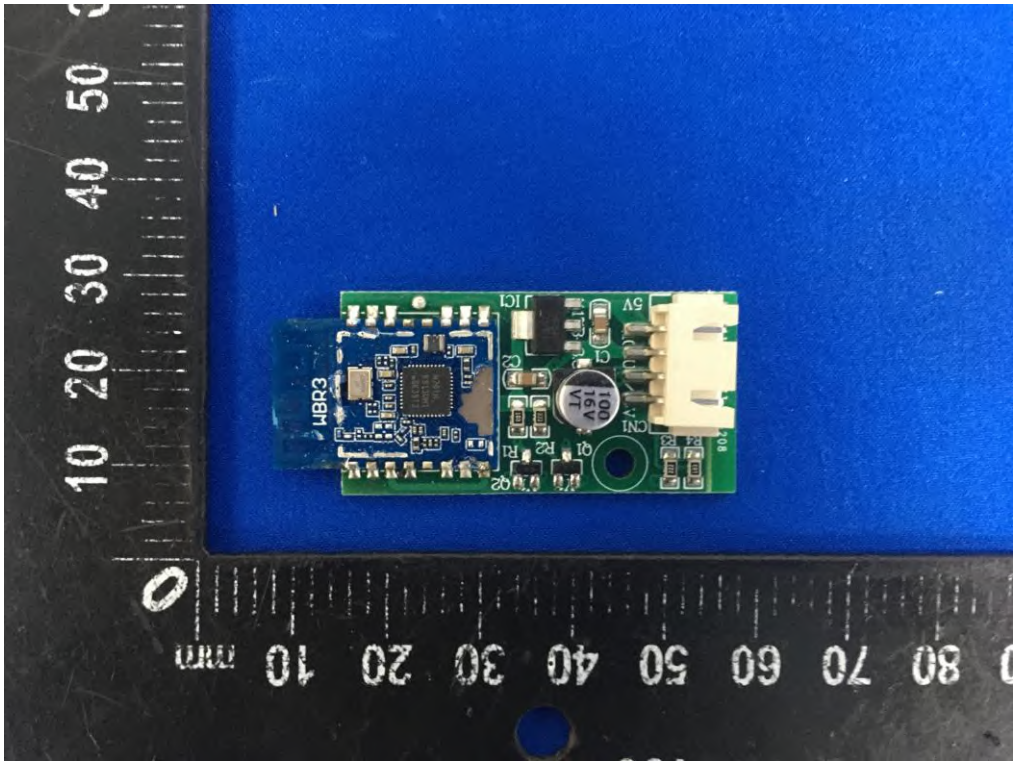

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