FCC TEST REPORT

FCC ID: 2ARK2-PSG101

On Behalf of

PhotoSpring, Inc.

Digital photo frame

Model No.: PSG101

Prepared for	:	PhotoSpring,Inc.
Address	:	3111 Via Mondo,Compton,California,United States

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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Date of Receipt	:	March 9, 2021
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Date of Report	:	March 29, 2021
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TEST REPORT DECLARATION

Applicant	:	PhotoSpring, Inc.
Address	:	3111 Via Mondo, Compton,California,United States
Manufacturer	:	TOPI TECHNOLOGY CO.,LTD
Address	:	Tuobu Industrial Park, Fuyong Heping Community, Baoan District, Shenzhen
EUT Description	:	Digital photo frame
		(A) Model No. : PSG101
		(B) Trademark : N/A

Measurement Standard Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247

ANSI C63.10:2013

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

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

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

Tested by (name + signature).....…..:	Lucas Pang Project Engineer	Lucas Pang
Approved by (name + signature)…....:	Simple Guan Project Manager	
Date of issue…… ……..:	March 29, 2021	

Revision History

Revision	Issue Date	Revisions	Revised By
V0	March 29, 2021	Initial released Issue	Lucas Pang

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	Test Requirement	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	15.247 (c)	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	15.205	P
Antenna Requirement	FCC PART 15	15.203	P
Note:	1. P is an abbreviation for Pass. 2. F is an abbreviation for Fail. 3. N/A is an abbreviation for Not Applicable.		

2. GENERAL INFORMATION

2.1.Description of Device (EUT)

Description	:	Digital photo frame
Model Number	:	PSG101
Diff	:	N/A
Trademark	:	N/A
Test Voltage	:	DC 5V from adapter DC 3.7V from battery
Operation frequency	:	2412MHz-2462MHz for IEEE 802.11 b, g, n/HT20 2422MHz-2452MHz for IEEE 802.11 n/HT40
Channel No.	:	802.11b/802.11g /802.11n(HT20): 11CH 802.11(HT40): 7CH
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)
Antenna Type	:	Internal antenna, Maximum Gain is 2dBi
Software version	:	venus-a3:8.1.0
Hardware version	:	QR-AP-PS10 V1.1

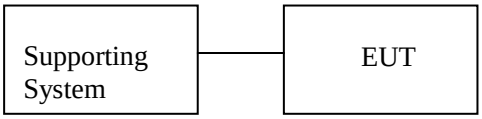
2.2.Accessories of Device (EUT)

Accessories1	:	Switching Power Supply
Manufacturer	:	Shenzhen Sunshine Technological Co,.Ltd
Model	:	XS-0502000SEUU
Input	:	100-240V-50/60Hz 0.3A
Output	:	5V⎓2000mA

2.3.Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification
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

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 with 2.4G	6.5	Low :CH1	2412
	6.5	Middle: CH6	2437
	6.5	High: CH11	2462
IEEE 802.11 n/HT40 with 2.4G	13	Low :CH3	2422
	13	Middle: CH6	2437
	13	High: CH9	2452
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 with 2.4G					
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		
For IEEE 802.11 n/HT40 with 2.4G					
Channel	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**	**Channel**	**Frequency (MHz)**
CH1	/	CH5	2432	CH9	2452
CH2	/	CH6	2437		
CH3	2422	CH7	2442		
CH4	2427	CH8	2447		

Setting output power (Max)			
802.11b	**802.11g**	**802.11n(HT20)**	**802.11n(HT40)**
7±1dBm	7±1dBm	7±1dBm	7±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

July 15, 2019 Certificated by IC
Registration Number: CN0085

2.8.Measurement Uncertainty

(95% confidence levels, k=2)

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

2.9.Test Equipment List

Equipment	Manufacture	Model No.	Serial No.	Last cal.	Cal Interval
9*6*6 anechoic chamber	CHENYU	9*6*6	N/A	2020.09.02	1Year
Spectrum analyzer	ROHDE&SCHWARZ	FSU	1166.1660.26	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	2019.09.07	2Year
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2020.04.12	2Year
Loop Antenna	SCHWARZBECK	FMZB 1519B	00059	2019.09.07	2Year
Cable	Resenberger	N/A	No.1	2020.09.02	1Year
Cable	SCHWARZBECK	N/A	No.2	2020.09.02	1Year
Cable	SCHWARZBECK	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
Temperature controller	Terchy	MHQ	120	2020.09.02	1Year
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126-466	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
Power Meter	Agilent	E9300A	MY41496625	2020.09.02	1 Year

3. SPURIOUS EMISSION

3.1.Test Limits

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

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.

NOTE:

a) The tighter limit applies at the band edges.
b) Emission Level(dB uV/m)=20log Emission Level(Uv/m)

3.2.Test Procedure

The measuring distance of 3m shall be used for measurements at frequency below 1GHz and above 1GHz, The EUT was placed on a rotating 80cm above the ground plane inside a semi-anechoic chamber for below 1GHz and 150cm above the ground plane inside a semi-anechoic chamber for above 1GHz, The table was rotated 360 degrees to determine the position of the highest radiation.

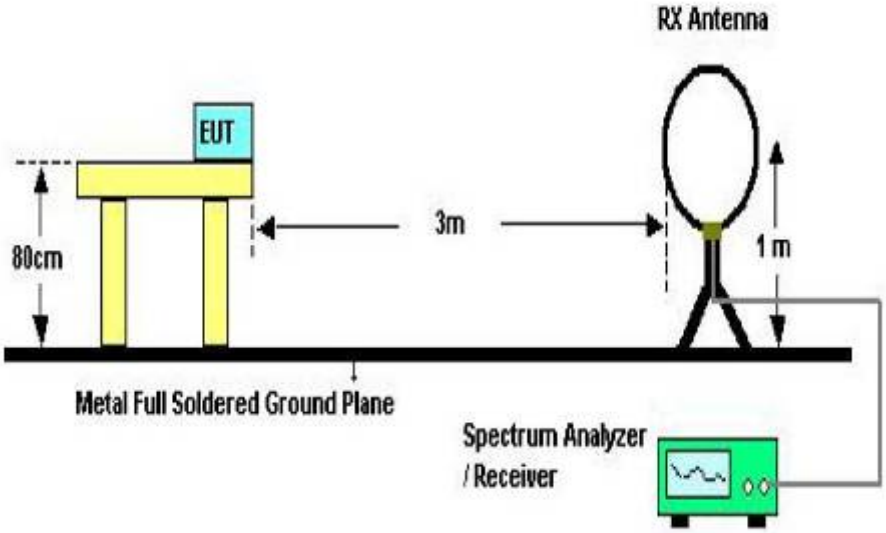
The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set of make measurement.

The initial step in collecting conducted emission data is a spectrum analyzer Peak detector mode pre-scanning the measurement frequency range. Significant Peaks are then marked. and then Qusia Peak Detector mode premeasured.

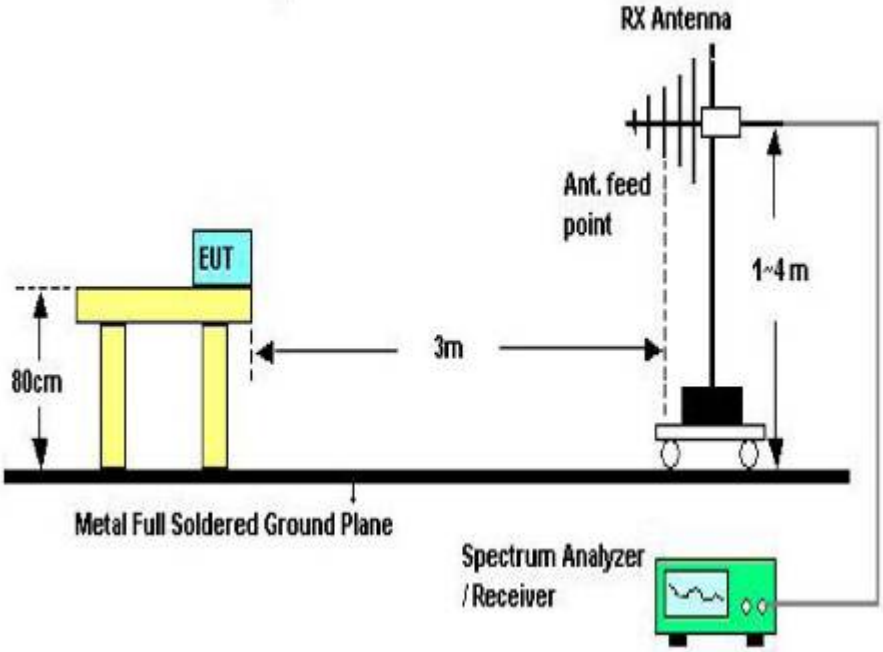
If Peak value comply with QP limit Below 1GHz.The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.

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

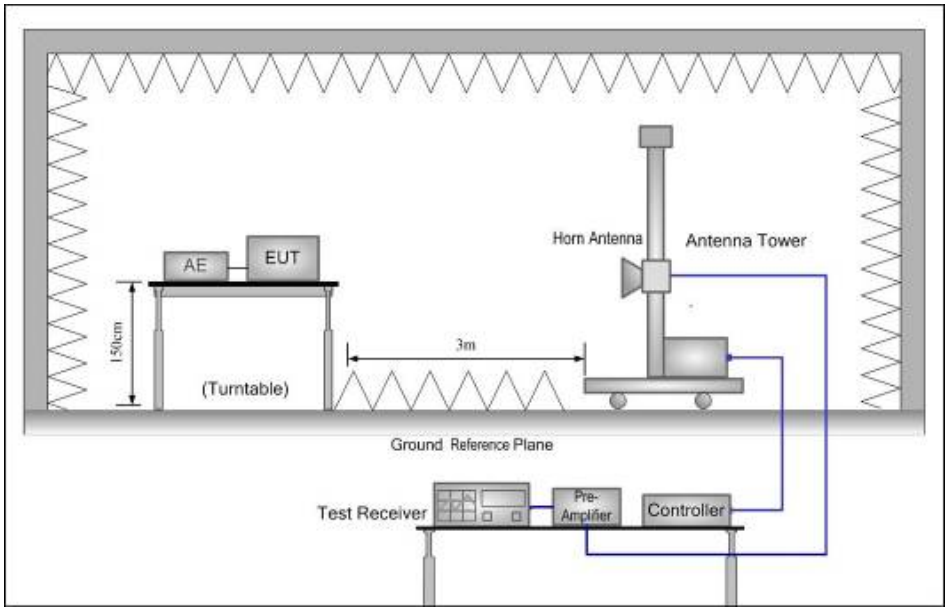
3.3.Test Setup



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 10th harmonic from 9 kHz to the EUT.

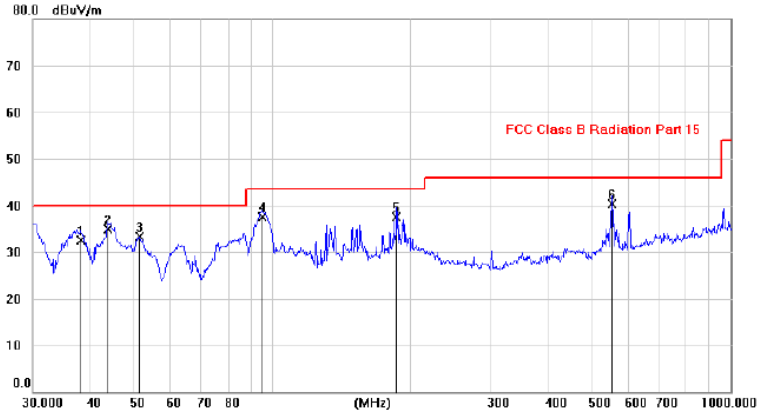
Detailed information please see the following page.

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.

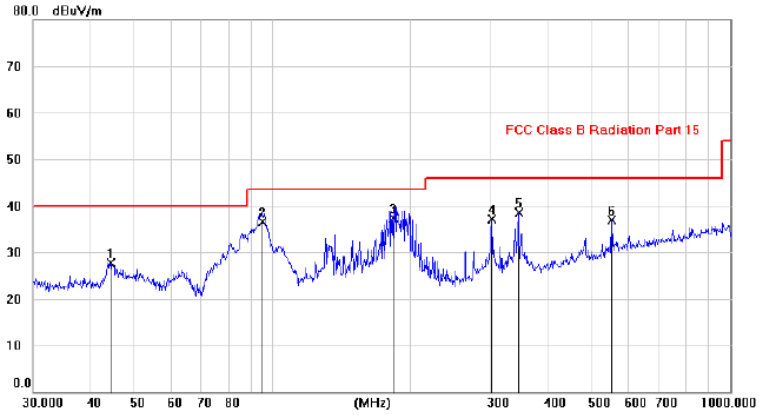
2.Only show the test data of the worst Channel in this report.

EUT Description	Digital photo frame	Model No.	PSG101
Temperature	24℃	Humidity	56%
Pol	Vertical	Test date	2021/3/22
Test Voltage	DC 5V from adapter	Test mode	802.11b (2412MHz)



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		38.1495	18.40	14.16	32.56	40.00	-7.44	QP			
2	*	43.7760	20.58	14.23	34.81	40.00	-5.19	QP			
3		51.2165	19.39	13.88	33.27	40.00	-6.73	peak			
4		95.0596	27.00	10.52	37.52	43.50	-5.98	QP			
5		186.5714	25.63	11.88	37.51	43.50	-5.99	QP			
6		551.9791	21.12	19.23	40.35	46.00	-5.65	QP			

Pol	Horizontal



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		44.3269	13.54	14.18	27.72	40.00	-12.28	peak			
2		95.1038	26.04	10.52	36.56	43.50	-6.94	QP			
3	*	183.8009	25.03	12.22	37.25	43.50	-6.25	QP			
4		301.4927	23.06	14.14	37.20	46.00	-8.80	peak			
5		345.1915	23.37	15.16	38.53	46.00	-7.47	peak			
6		552.0438	17.62	19.23	36.85	46.00	-9.15	peak			

Remark: All modes have been tested, and only worst data of 802.11b (2412MHz) was listed in this report.

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	47.53	V	33.95	10.18	34.26	57.40	74	-16.6	PK
4824	38.68	V	33.95	10.18	34.26	48.55	54	-5.45	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	48.86	H	33.95	10.18	34.26	58.73	74	-15.27	PK
4824	38.06	H	33.95	10.18	34.26	47.93	54	-6.07	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX Mid									
4874	46.41	V	33.93	10.2	34.29	56.25	74	-17.75	PK
4874	34.17	V	33.93	10.2	34.29	44.01	54	-9.99	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	44.13	H	33.93	10.2	34.29	53.97	74	-20.03	PK
4874	32.37	H	33.93	10.2	34.29	42.21	54	-11.79	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11b TX High									
4924	44.87	V	33.98	10.22	34.25	54.82	74	-19.18	PK
4924	34.96	V	33.98	10.22	34.25	44.91	54	-9.09	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	47.59	H	33.98	10.22	34.25	57.54	74	-16.46	PK
4924	36.33	H	33.98	10.22	34.25	46.28	54	-7.72	AV
7386	/	H	/	/	/	/	74	/	/
9848	/	H	/	/	/	/	74	/	/

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	44.49	V	33.95	10.18	34.26	54.36	74	-19.64	PK
4824	38.11	V	33.95	10.18	34.26	47.98	54	-6.02	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	47.21	H	33.95	10.18	34.26	57.08	74	-16.92	PK
4824	37.02	H	33.95	10.18	34.26	46.89	54	-7.11	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX Mid									
4874	43.83	V	33.93	10.2	34.29	53.67	74	-20.33	PK
4874	34.26	V	33.93	10.2	34.29	44.10	54	-9.9	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	47.60	H	33.93	10.2	34.29	57.44	74	-16.56	PK
4874	35.81	H	33.93	10.2	34.29	45.65	54	-8.35	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode: IEEE 802.11g TX High									
4924	47.09	V	33.98	10.22	34.25	57.04	74	-16.96	PK
4924	35.79	V	33.98	10.22	34.25	45.74	54	-8.26	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	48.67	H	33.98	10.22	34.25	58.62	74	-15.38	PK
4924	33.68	H	33.98	10.22	34.25	43.63	54	-10.37	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	44.48	V	33.95	10.18	34.26	54.35	74	-19.65	PK
4824	36.16	V	33.95	10.18	34.26	46.03	54	-7.97	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	48.80	H	33.95	10.18	34.26	58.67	74	-15.33	PK
4824	38.25	H	33.95	10.18	34.26	48.12	54	-5.88	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode:IEEE 802.11n HT20 TX Mid									
4874	46.39	V	33.93	10.2	34.29	56.23	74	-17.77	PK
4874	34.59	V	33.93	10.2	34.29	44.43	54	-9.57	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	46.49	H	33.93	10.2	34.29	56.33	74	-17.67	PK
4874	35.75	H	33.93	10.2	34.29	45.59	54	-8.41	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode:IEEE 802.11n HT20 TX High									
4924	47.55	V	33.98	10.22	34.25	57.50	74	-16.50	PK
4924	34.75	V	33.98	10.22	34.25	44.70	54	-9.30	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	47.85	H	33.98	10.22	34.25	57.80	74	-16.20	PK
4924	34.77	H	33.98	10.22	34.25	44.72	54	-9.28	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 HT40 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	46.12	V	33.95	10.18	34.26	55.99	74	-18.01	PK
4824	38.50	V	33.95	10.18	34.26	48.37	54	-5.63	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
4824	50.38	H	33.95	10.18	34.26	60.25	74	-13.75	PK
4824	37.50	H	33.95	10.18	34.26	47.37	54	-6.63	AV
7236	/	/	/	/	/	/	/	/	/
9648	/	/	/	/	/	/	/	/	/
Test Mode:IEEE 802.11n HT40 TX Mid									
4874	46.33	V	33.93	10.2	34.29	56.17	74	-17.83	PK
4874	30.85	V	33.93	10.2	34.29	40.69	54	-13.31	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
4874	46.99	H	33.93	10.2	34.29	56.83	74	-17.17	PK
4874	33.55	H	33.93	10.2	34.29	43.39	54	-10.61	AV
7311	/	/	/	/	/	/	/	/	/
9748	/	/	/	/	/	/	/	/	/
Test Mode:IEEE 802.11n HT40 TX High									
4924	48.05	V	33.98	10.22	34.25	58.00	74	-16.00	PK
4924	35.07	V	33.98	10.22	34.25	45.02	54	-8.98	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/
4924	45.93	H	33.98	10.22	34.25	55.88	74	-18.12	PK
4924	33.61	H	33.98	10.22	34.25	43.56	54	-10.44	AV
7386	/	/	/	/	/	/	/	/	/
9848	/	/	/	/	/	/	/	/	/

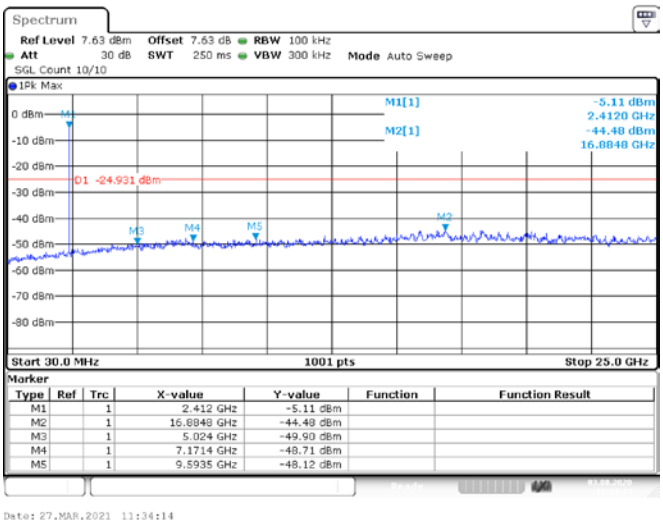
Note:

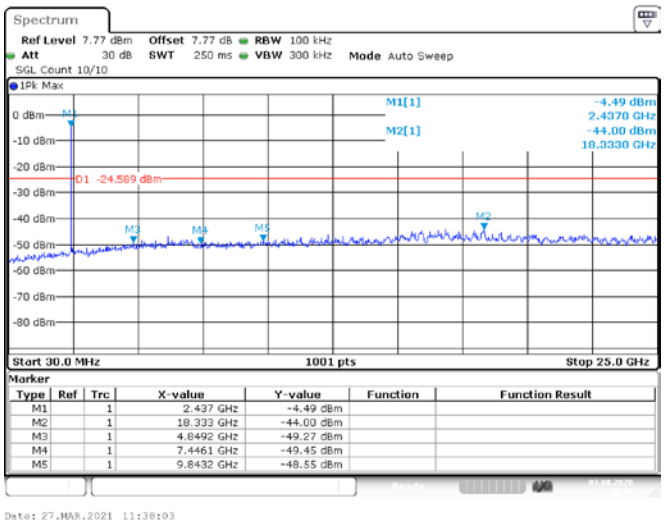
1, Result = Read level + Antenna factor + cable loss-Amp factor

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

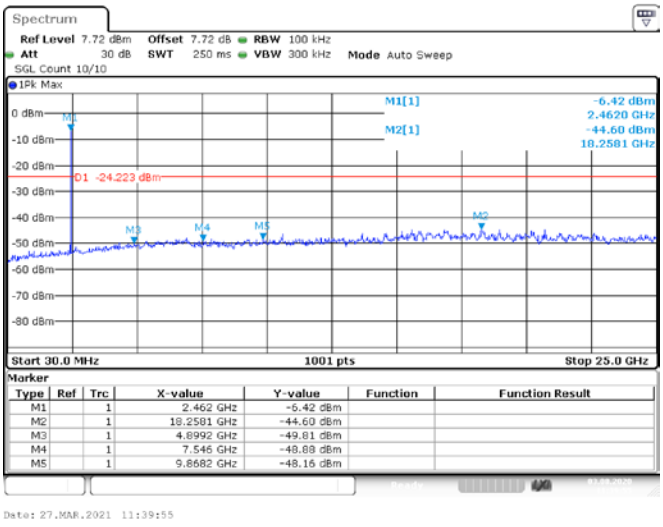
Conducted method

EUT Description	Digital photo frame	Model No.	PSG101
Temperature	24℃	Humidity	56%
Test mode	802.11b (2412MHz)	Test mode	802.11b (2437MHz)

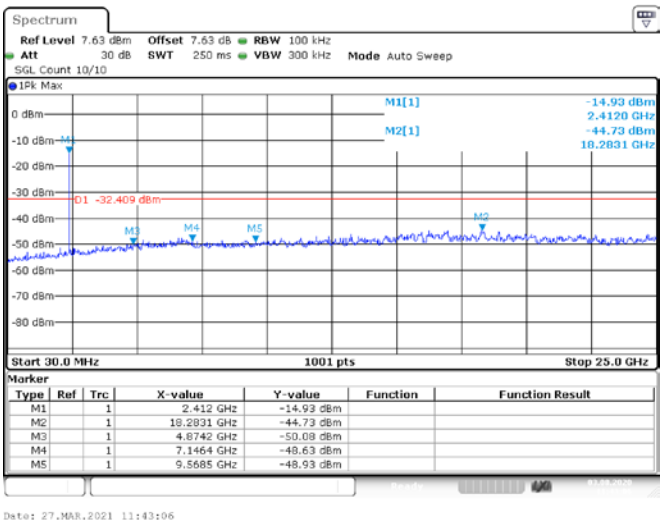


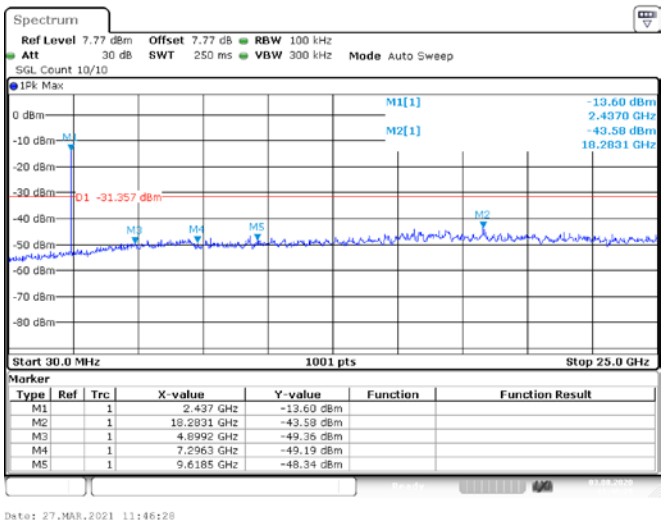


Test mode	802.11b(2462MHz)		

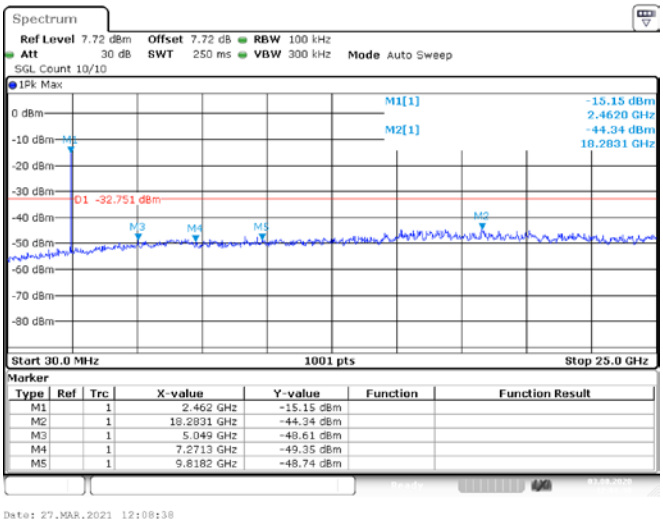


EUT Description	Digital photo frame	Model No.	PSG101
Temperature	24℃	Humidity	56%
Test mode	802.11g (2412MHz)	Test mode	802.11g (2437MHz)

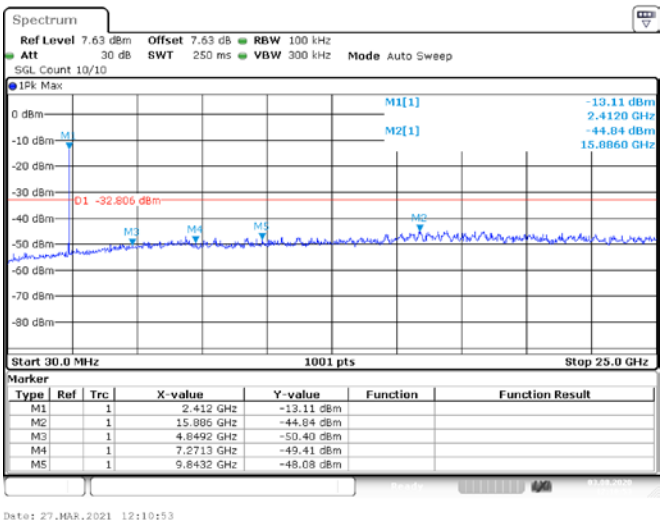


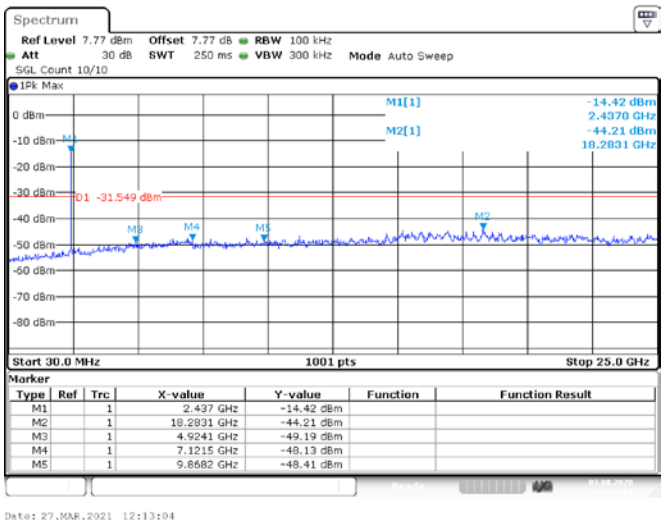


Test mode	802.11g(2462MHz)		

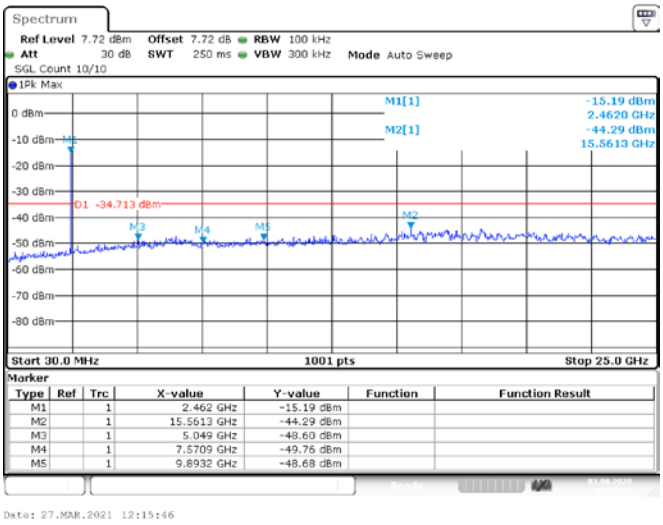


EUT Description	Digital photo frame	Model No.	PSG101
Temperature	24℃	Humidity	56%
Test mode	802.11n20 (2412MHz)	Test mode	802.11n20 (2437MHz)

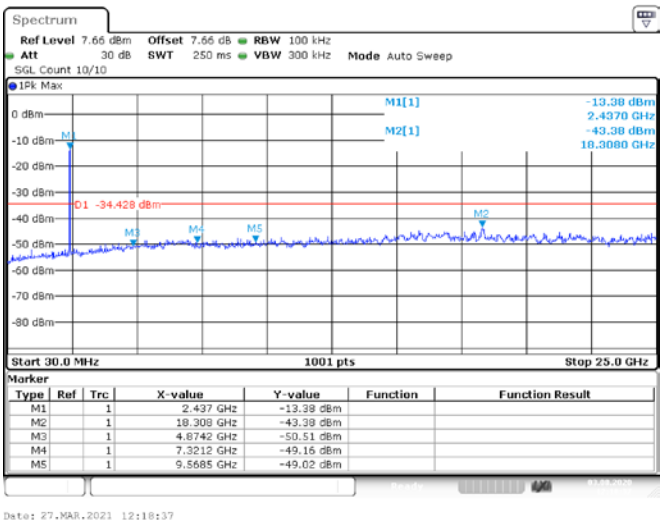


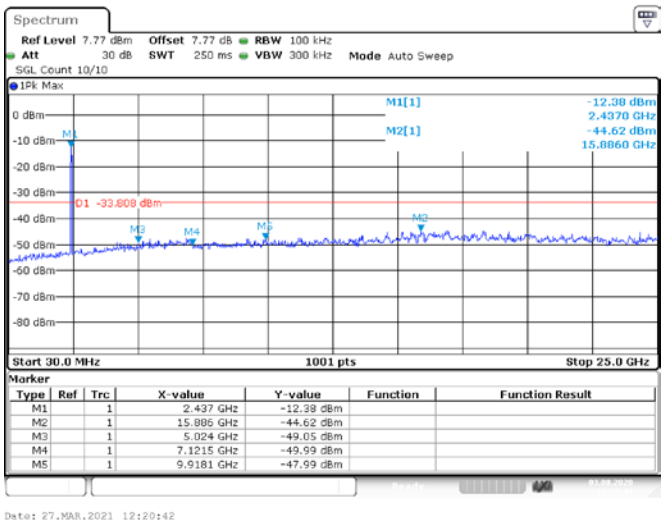


Test mode	802.11n20 (2462MHz)		

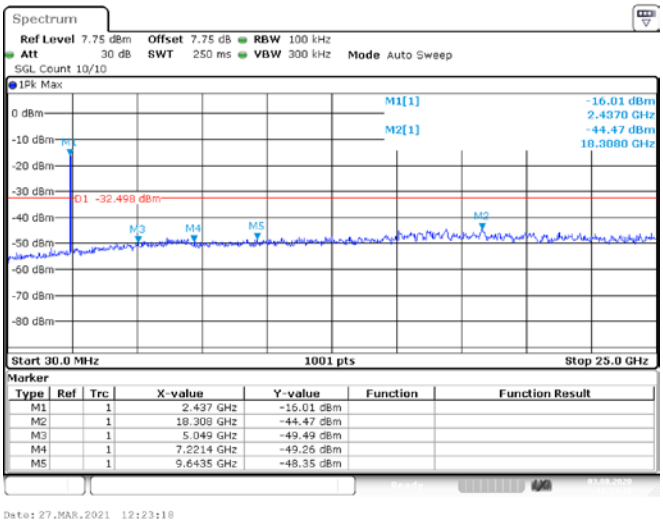


EUT Description	Digital photo frame	Model No.	PSG101
Temperature	24℃	Humidity	56%
Test mode	802.11n40 (2422MHz)	Test mode	802.11n40 (2437MHz)





Test mode	802.11n40 (2452MHz)		



4. POWER LINE CONDUCTED EMISSION

4.1. Test Limits

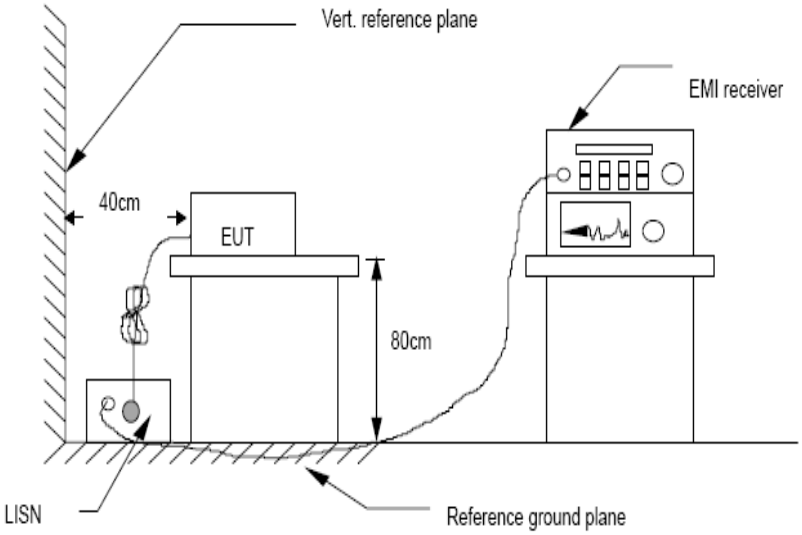
Frequency	Limits dB(μV)	
MHz	Quasi-peak Level	Average Level
0.15 -0.50	66 -56*	56 - 46*
0.50 -5.00	56	46
5.00 -30.00	60	50

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

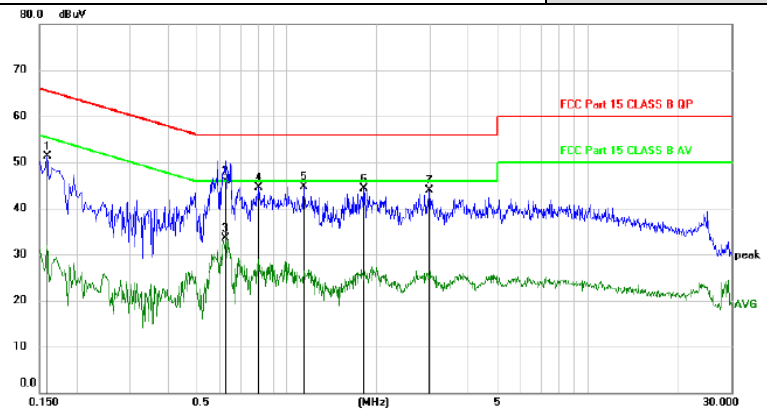
The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both 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



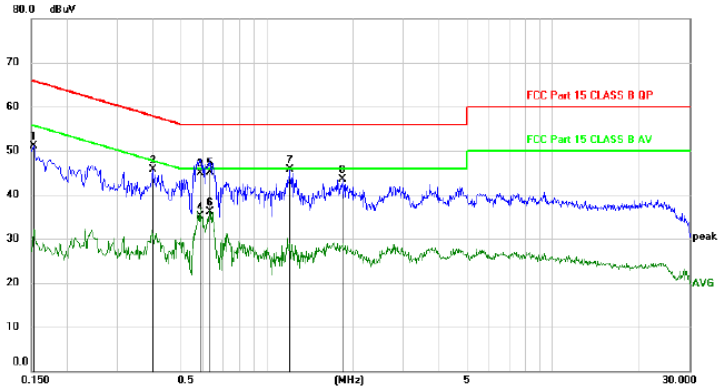
4.4.Test Results

EUT Description	Digital photo frame	Model No.	PSG101
Temperature	24℃	Humidity	56%
Pol	Line	Test date	2021/3/22
Test Voltage	AC 120V/60Hz	Test mode	802.11b (2412MHz)



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1590	41.40	9.94	51.34	65.52	-14.18	peak	
2	*	0.6210	35.91	9.92	45.83	56.00	-10.17	QP	
3		0.6210	23.53	9.92	33.45	46.00	-12.55	AVG	
4		0.8070	34.47	9.94	44.41	56.00	-11.59	peak	
5		1.1400	34.83	9.90	44.73	56.00	-11.27	peak	
6		1.8000	34.48	9.89	44.37	56.00	-11.63	peak	
7		2.9670	34.01	9.95	43.96	56.00	-12.04	peak	

Pol	Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1530	41.18	9.94	51.12	65.84	-14.72	peak	
2		0.3990	35.68	9.94	45.62	57.87	-12.25	peak	
3		0.5850	34.97	9.93	44.90	56.00	-11.10	QP	
4		0.5850	25.14	9.93	35.07	46.00	-10.93	AVG	
5		0.6330	35.21	9.92	45.13	56.00	-10.87	QP	
6	*	0.6330	26.15	9.92	36.07	46.00	-9.93	AVG	
7		1.2000	35.89	9.89	45.78	56.00	-10.22	peak	
8		1.8300	33.63	9.89	43.52	56.00	-12.48	peak	

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

Remark: All modes have been tested, and only worst data of 802.11b (2412MHz) was listed in this report.

5. CONDUCTED MAXIMUM OUTPUT POWER

5.1.Test limits

Please refer section15.247.

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

5.2.Test Procedure

Details see the KDB558074 D01 Meas Guidance v05r02

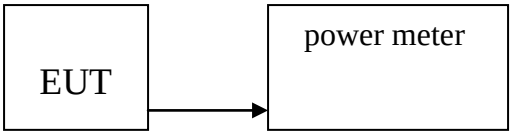
5.2.1 Place the EUT on the table and set it in transmitting mode.

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

5.2.3 Measure out each mode and each bands PK 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 see the following page.

Mode	Frequency (MHz)	PK Output power(dBm)	Limit (dBm)	Result
IEEE 802.11 b	CH1: 2412	7.641	30	PASS
	CH6: 2437	7.775	30	PASS
	CH11: 2462	7.846	30	PASS
IEEE 802.11 g	CH1: 2412	7.897	30	PASS
	CH6: 2437	7.757	30	PASS
	CH11: 2462	7.798	30	PASS
IEEE 802.11 n/HT20	CH1: 2412	7.886	30	PASS
	CH6: 2437	8.084	30	PASS
	CH11: 2462	7.387	30	PASS
IEEE 802.11 n/HT40	CH3: 2422	7.514	30	PASS
	CH6: 2437	7.615	30	PASS
	CH9: 2452	7.757	30	PASS

6. POWER SPECTRAL DENSITY

6.1.Test limits

6.1.1 Please refer section15.247.

6.1.2 For direct sequence systems, the Average 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.

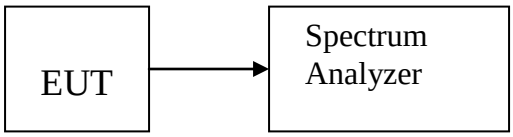
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Detector = RMS. Set the spectrum analyzer as RBW = 3kHz(Set the RBW to: 3 kHz≤RBW ≤100 kHz.), VBW = 10kHz(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.

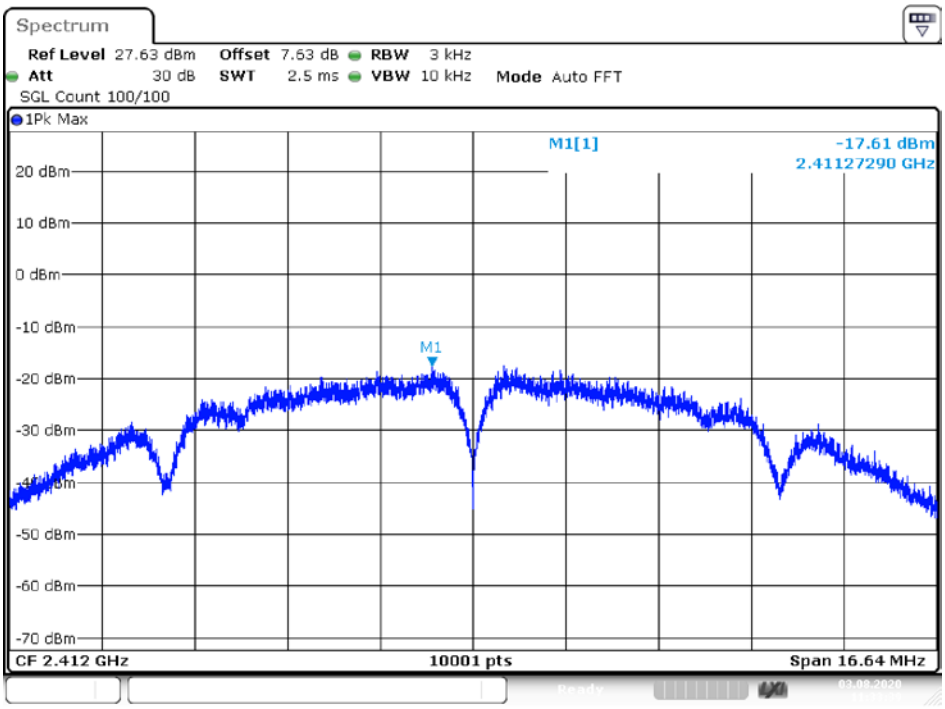
6.3.Test Setup



6.4.Test Results

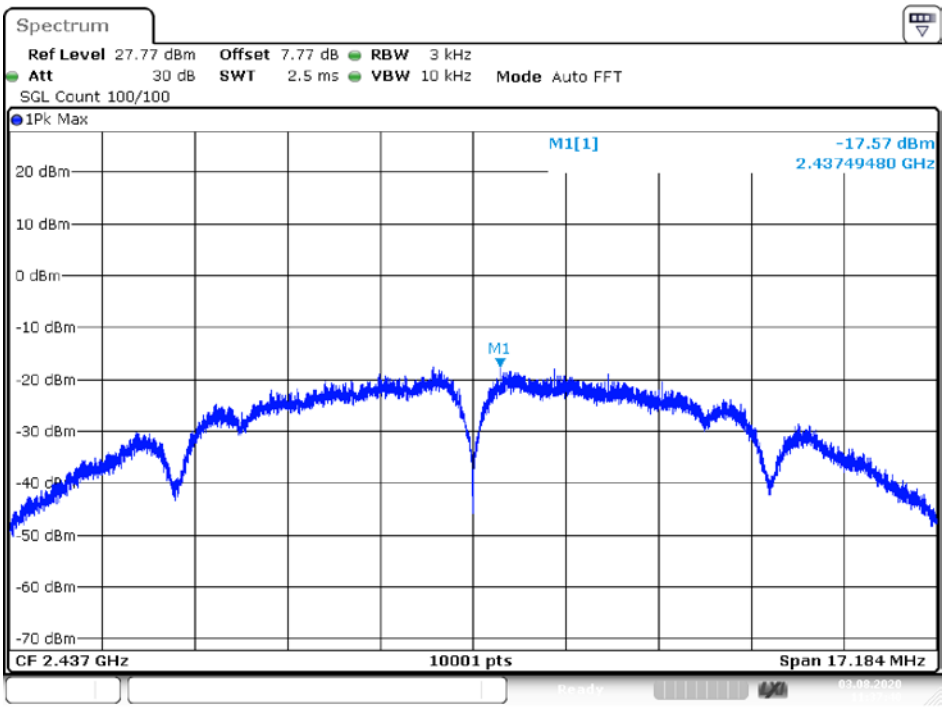
Condition	Mode	Frequency (MHz)	Max PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
NVNT	802.11b	2412	-17.614	8	Pass
NVNT	802.11b	2437	-17.572	8	Pass
NVNT	802.11b	2462	-17.261	8	Pass
NVNT	802.11g	2412	-24.778	8	Pass
NVNT	802.11g	2437	-25.441	8	Pass
NVNT	802.11g	2462	-25.707	8	Pass
NVNT	802.11n(HT20)	2412	-25.986	8	Pass
NVNT	802.11n(HT20)	2437	-25.817	8	Pass
NVNT	802.11n(HT20)	2462	-25.521	8	Pass
NVNT	802.11n(HT40)	2422	-25.895	8	Pass
NVNT	802.11n(HT40)	2437	-26.138	8	Pass
NVNT	802.11n(HT40)	2452	-26.15	8	Pass

PSD NVNT 802.11b 2412MHz Ant1



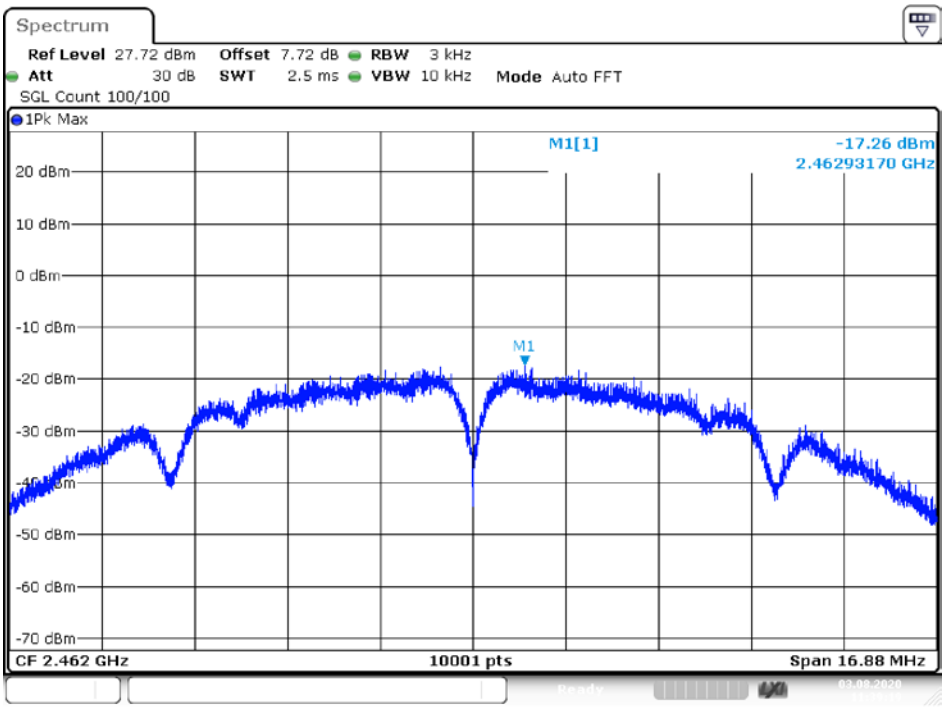
Date: 27.MAR.2021 11:33:39

PSD NVNT 802.11b 2437MHz Ant1



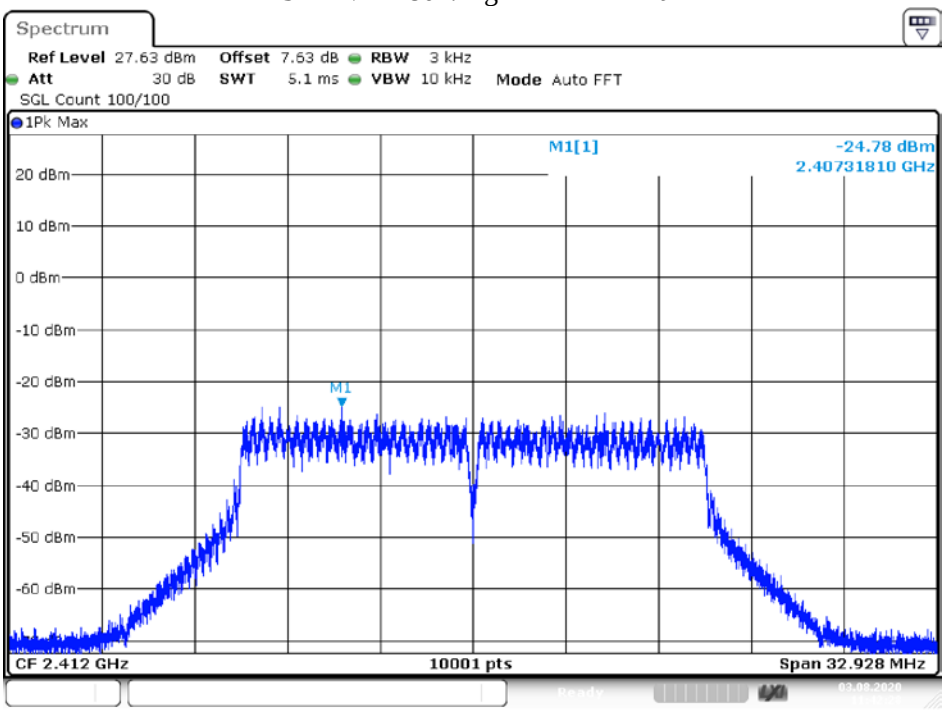
Date: 27.MAR.2021 11:37:39

PSD NVNT 802.11b 2462MHz Ant1



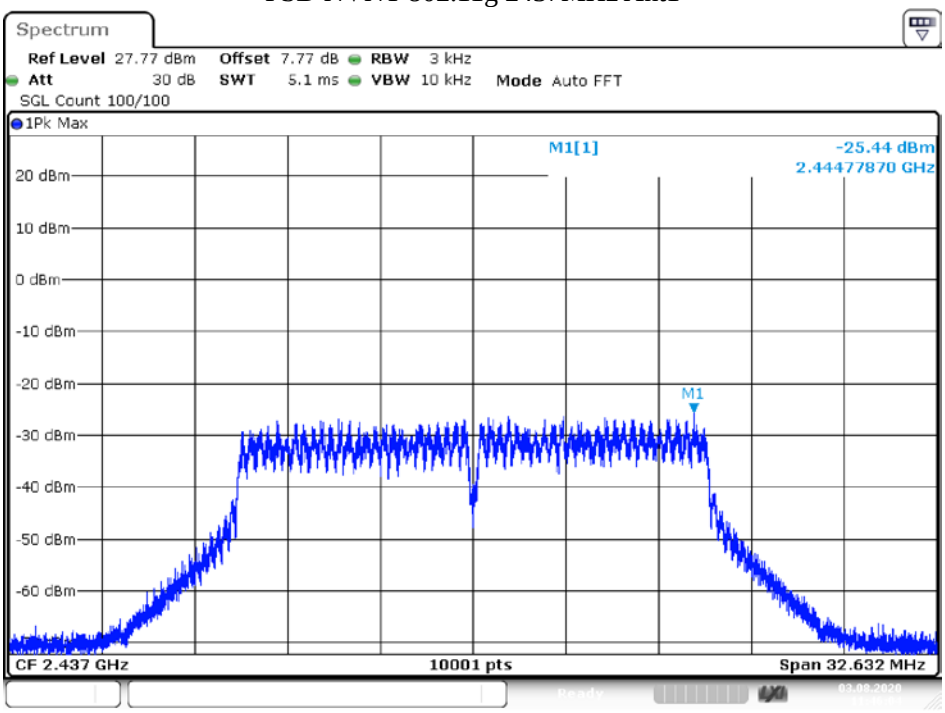
Date: 27.MAR.2021 11:39:19

PSD NVNT 802.11g 2412MHz Ant1



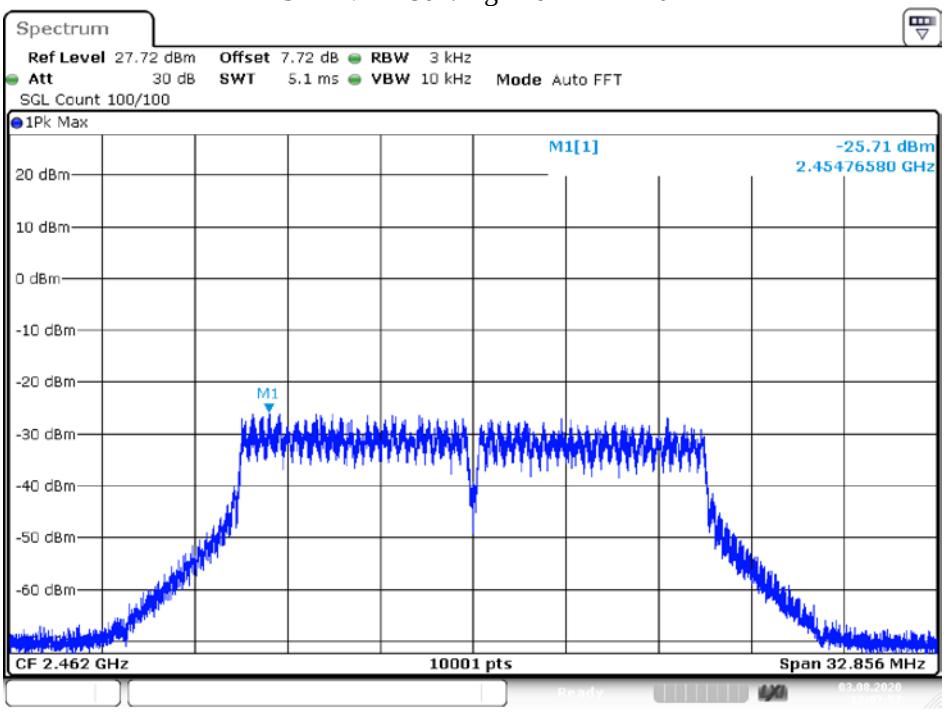
Date: 27.MAR.2021 11:42:28

PSD NVNT 802.11g 2437MHz Ant1



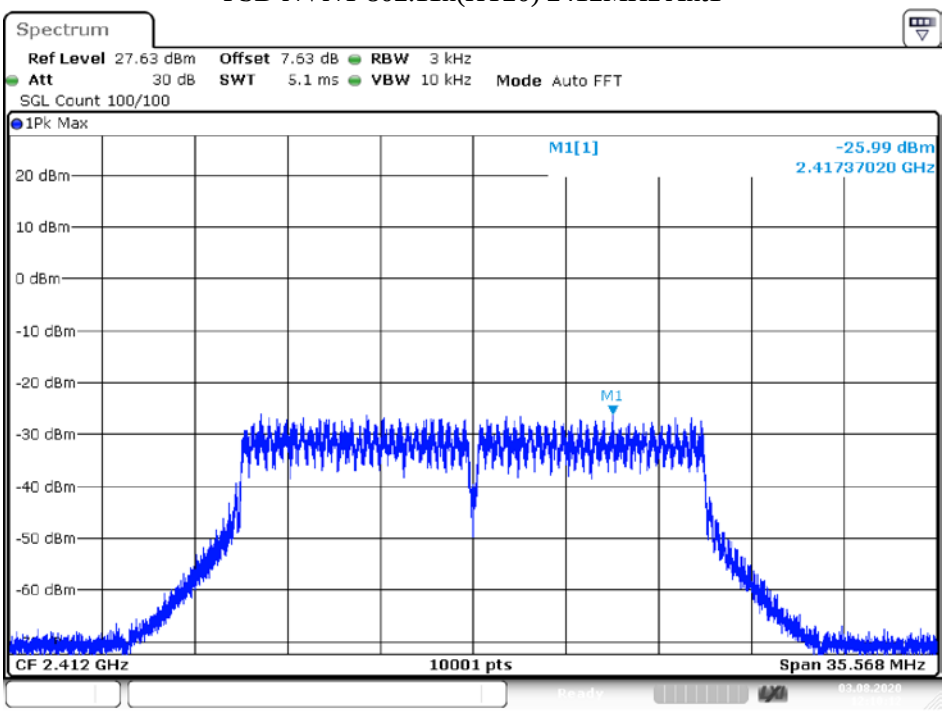
Date: 27.MAR.2021 11:46:03

PSD NVNT 802.11g 2462MHz Ant1



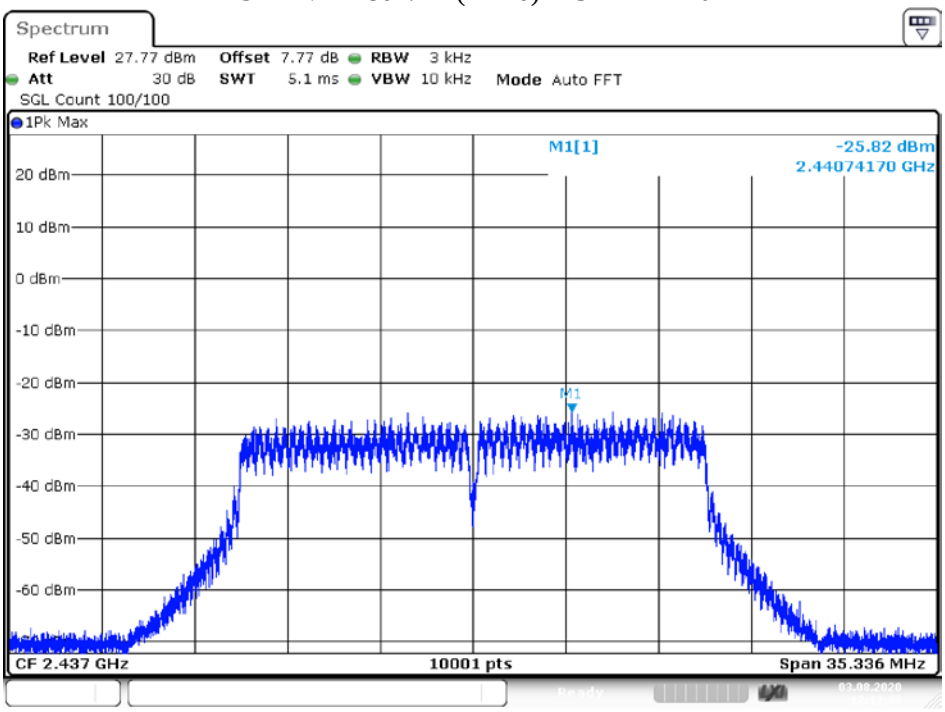
Date: 27.MAR.2021 12:07:57

PSD NVNT 802.11n(HT20) 2412MHz Ant1



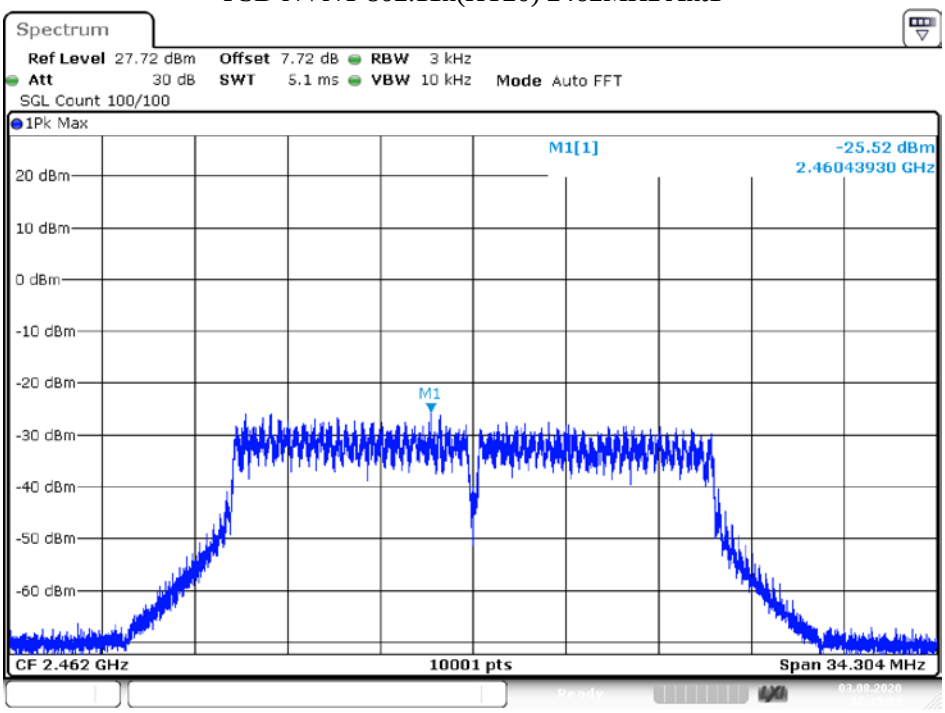
Date: 27.MAR.2021 12:10:11

PSD NVNT 802.11n(HT20) 2437MHz Ant1



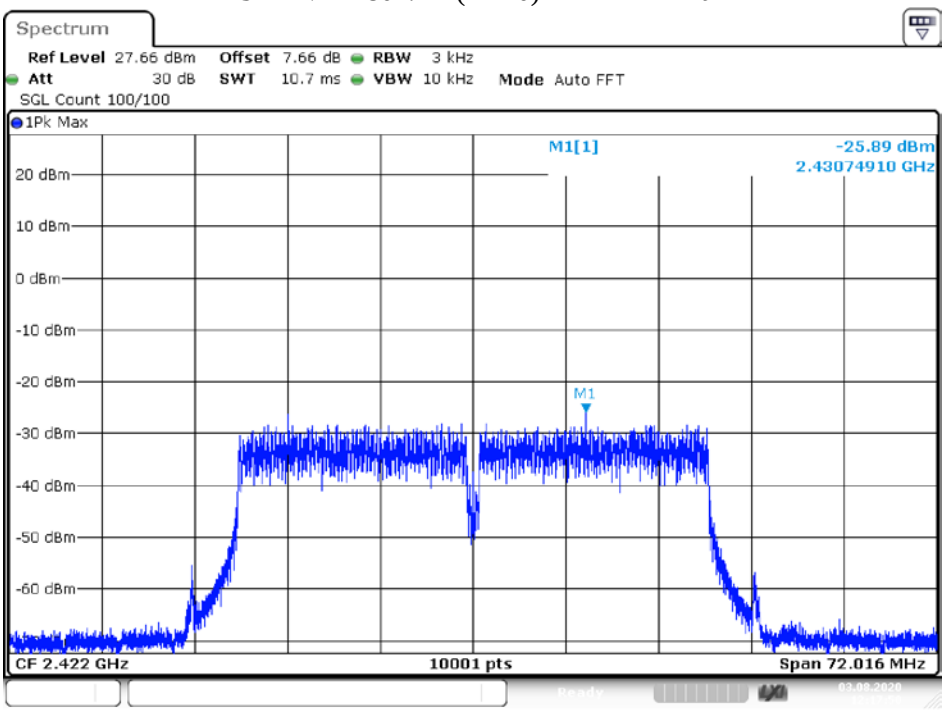
Date: 27.MAR.2021 12:12:37

PSD NVNT 802.11n(HT20) 2462MHz Ant1



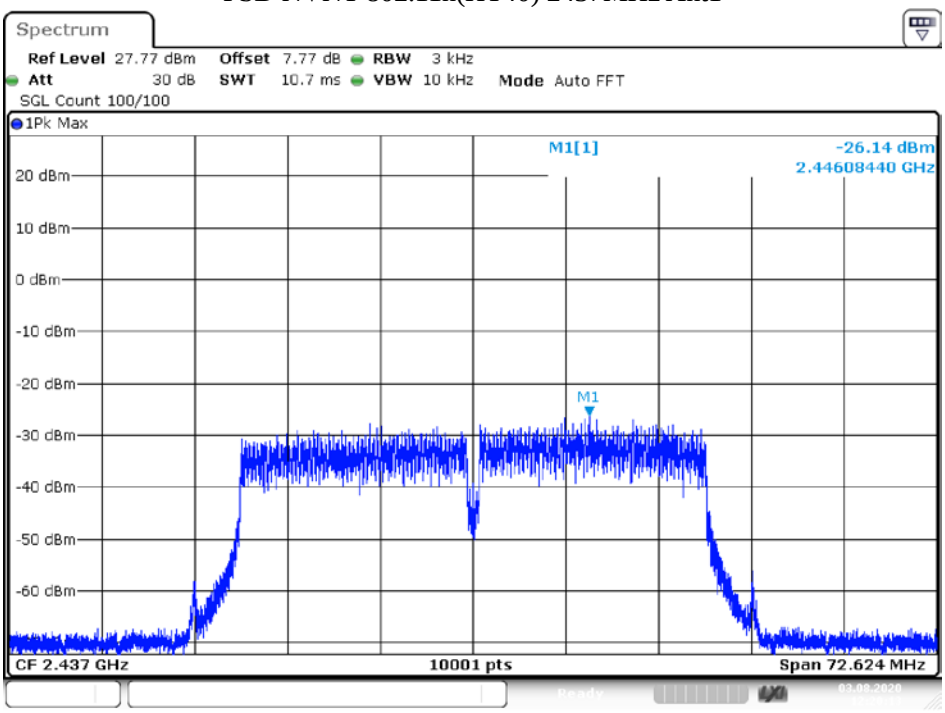
Date: 27.MAR.2021 12:15:02

PSD NVNT 802.11n(HT40) 2422MHz Ant1



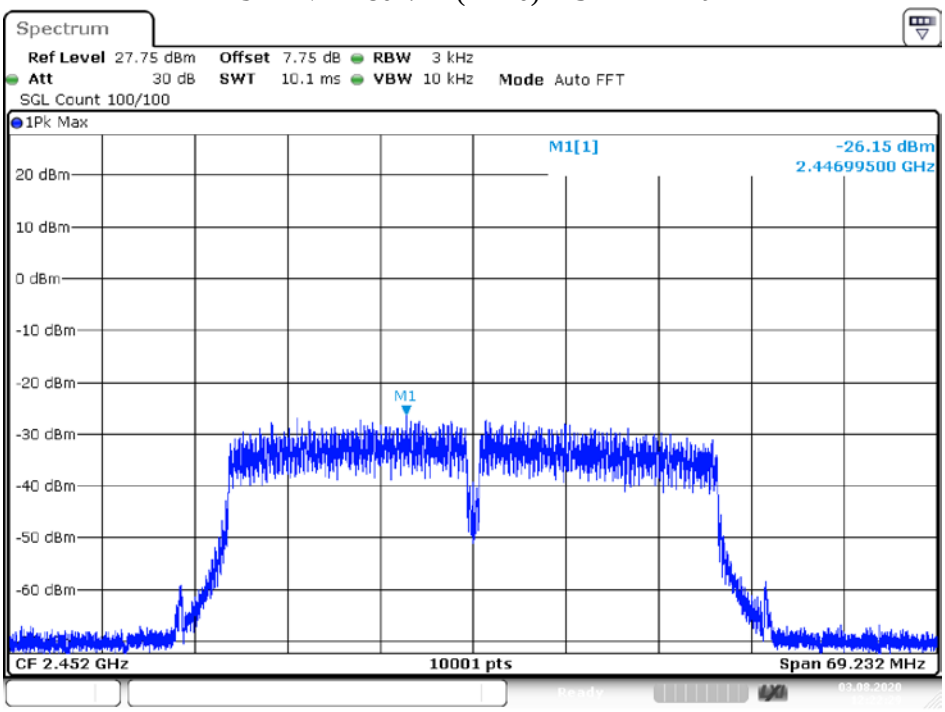
Date: 27.MAR.2021 12:17:50

PSD NVNT 802.11n(HT40) 2437MHz Ant1



Date: 27.MAR.2021 12:20:13

PSD NVNT 802.11n(HT40) 2452MHz Ant1



Date: 27.MAR.2021 12:22:29

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.

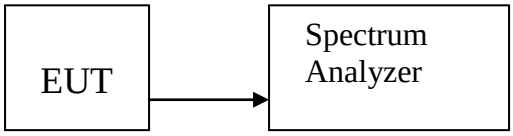
7.2.Test Procedure

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.

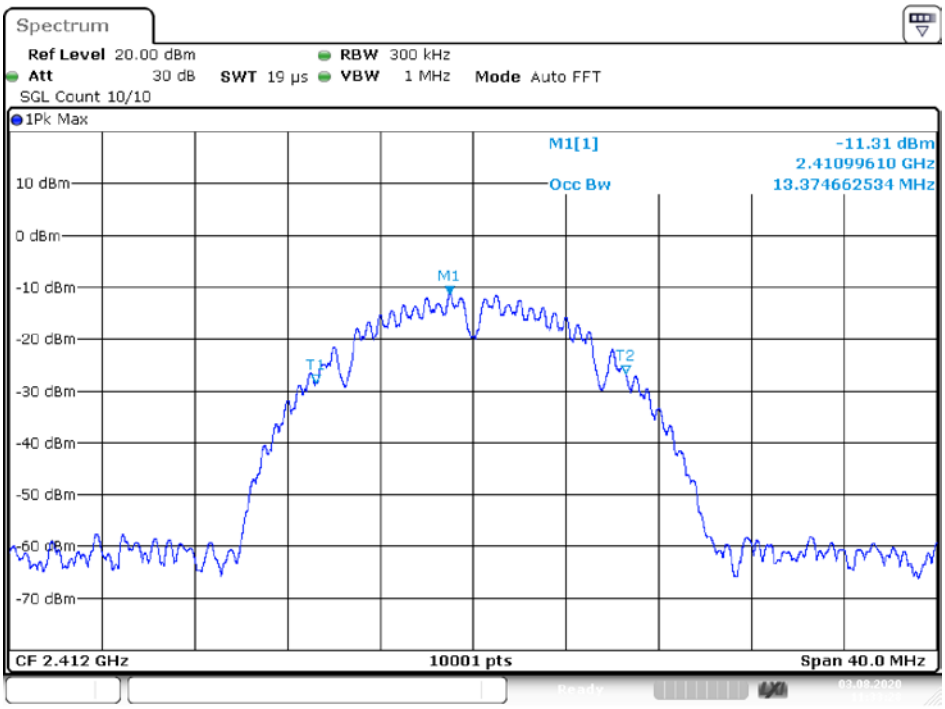
7.3.Test Setup



7.4.Test Results

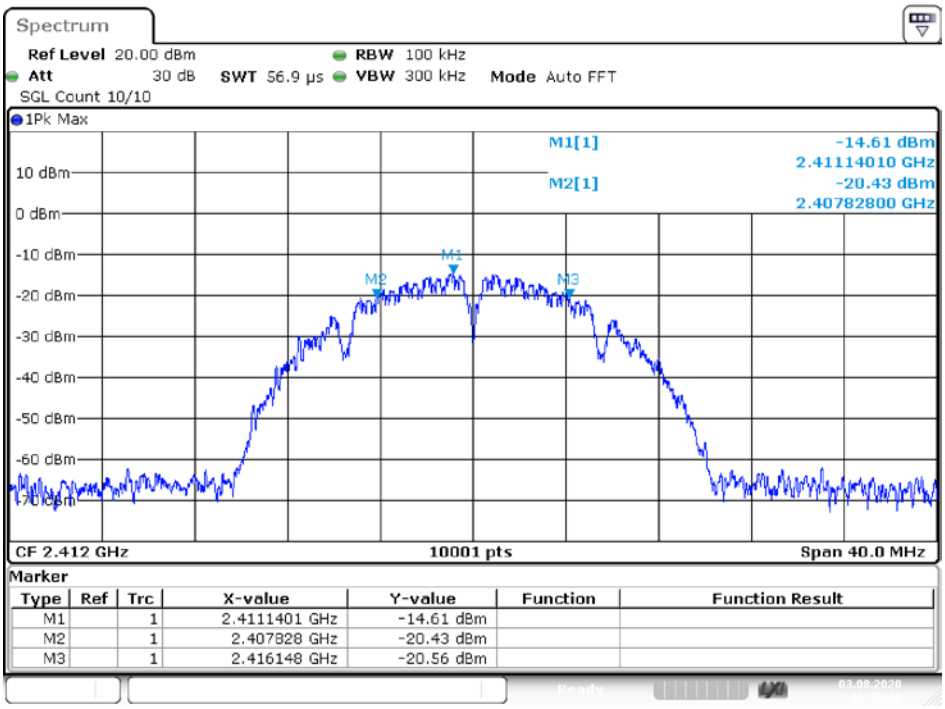
Condition	Mode	Frequency (MHz)	Antenna	99% OBW (MHz)	-6 dB Bandwidth (MHz)	Limit -6 dB Bandwidth (MHz)	Verdict
NVNT	802.11b	2412	Ant 1	13.3747	8.32	0.5	Pass
NVNT	802.11b	2437	Ant 1	13.2107	8.592	0.5	Pass
NVNT	802.11b	2462	Ant 1	13.2067	8.44	0.5	Pass
NVNT	802.11g	2412	Ant 1	16.4624	16.464	0.5	Pass
NVNT	802.11g	2437	Ant 1	16.8383	16.316	0.5	Pass
NVNT	802.11g	2462	Ant 1	16.3584	16.428	0.5	Pass
NVNT	802.11n(HT20)	2412	Ant 1	17.6902	17.784	0.5	Pass
NVNT	802.11n(HT20)	2437	Ant 1	17.8182	17.668	0.5	Pass
NVNT	802.11n(HT20)	2462	Ant 1	17.9382	17.152	0.5	Pass
NVNT	802.11n(HT40)	2422	Ant 1	36.1884	36.008	0.5	Pass
NVNT	802.11n(HT40)	2437	Ant 1	35.9004	36.312	0.5	Pass
NVNT	802.11n(HT40)	2452	Ant 1	35.9404	34.616	0.5	Pass

OBW NVNT 802.11b 2412MHz Ant1



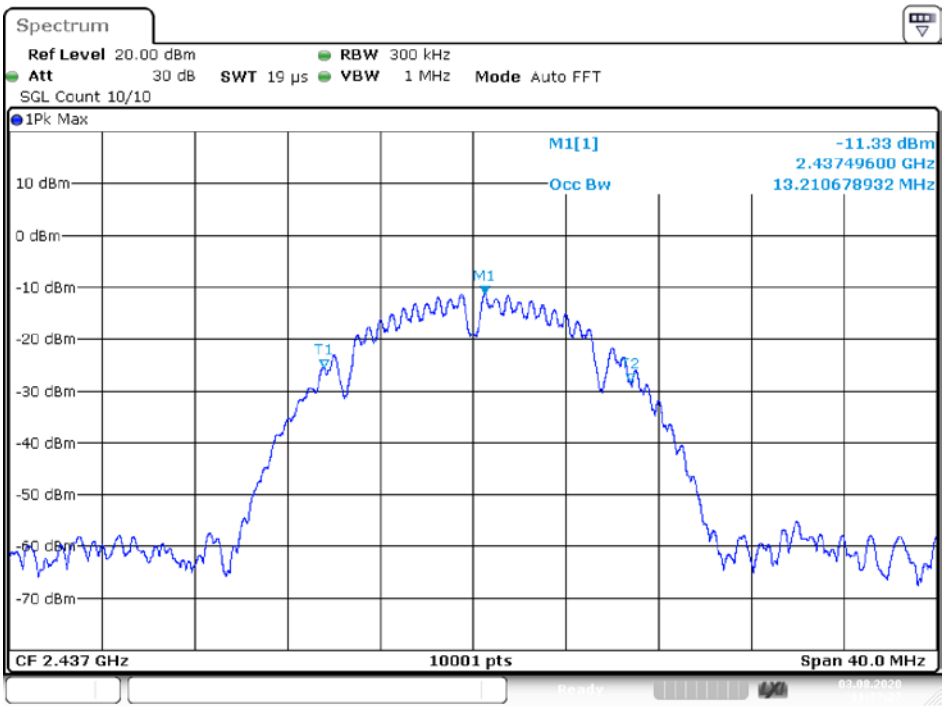
Date: 27.MAR.2021 11:33:28

-6 dB BW NVNT 802.11b 2412MHz Ant1



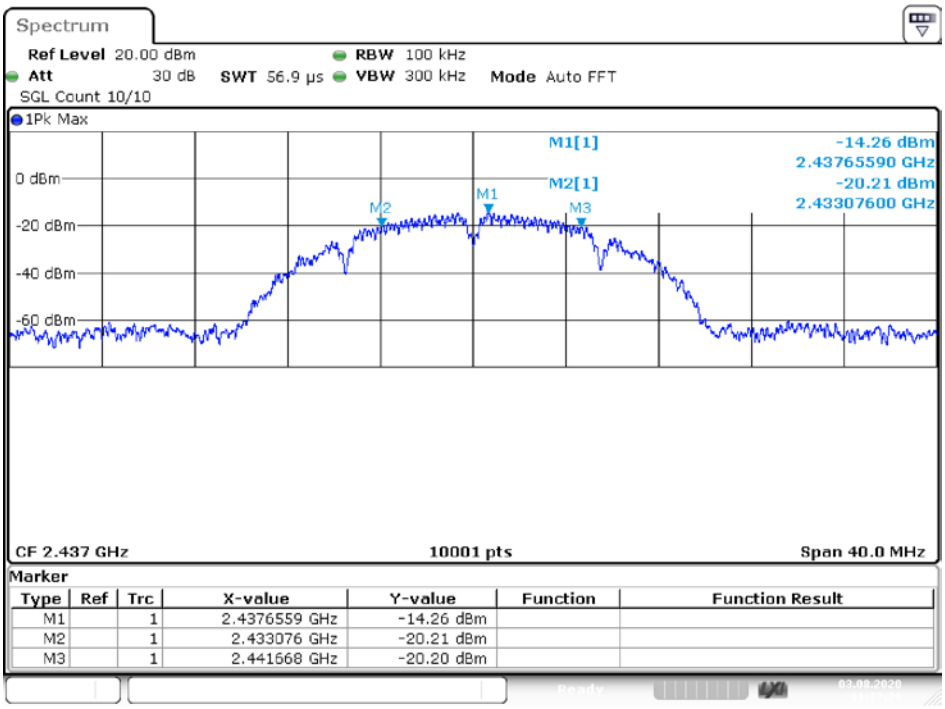
Date: 27.MAR.2021 11:33:31

OBW NVNT 802.11b 2437MHz Ant1



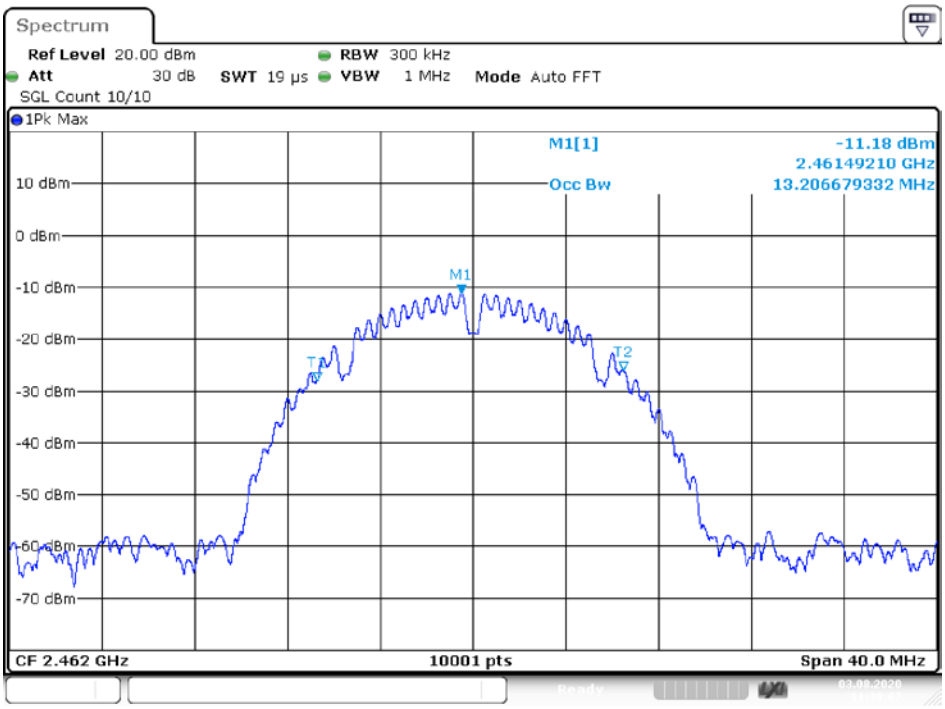
Date: 27.MAR.2021 11:37:27

-6 dB BW NVNT 802.11b 2437MHz Ant1



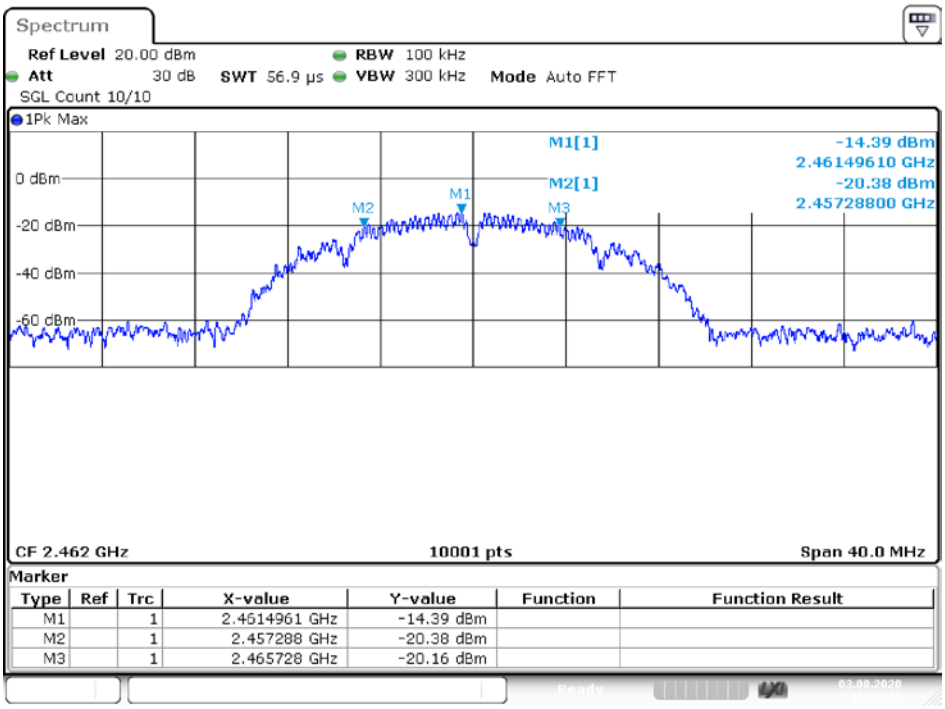
Date: 27.MAR.2021 11:37:30

OBW NVNT 802.11b 2462MHz Ant1



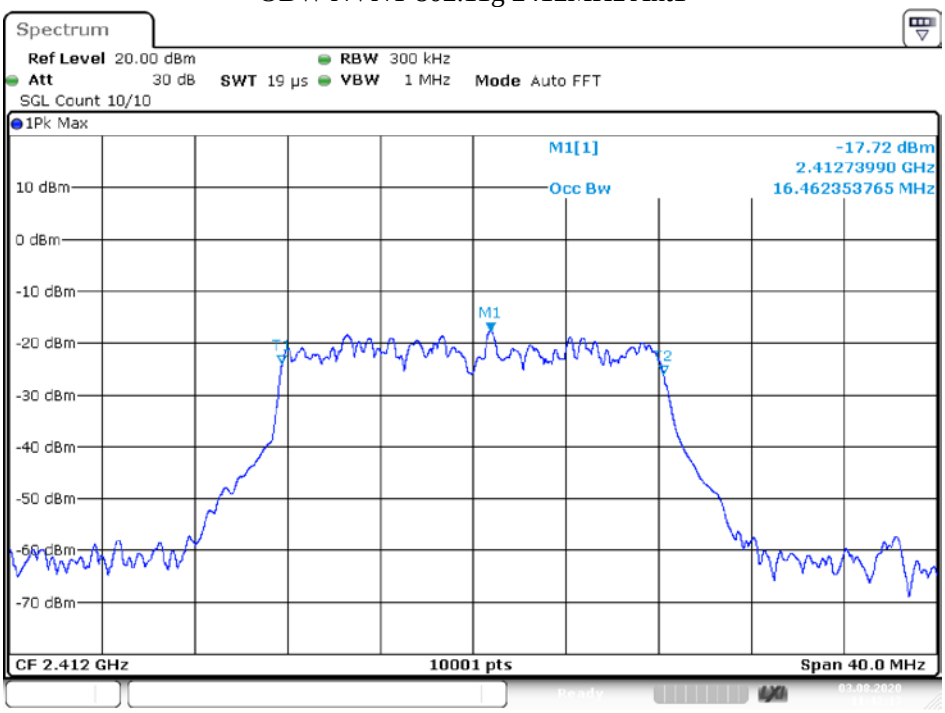
Date: 27.MAR.2021 11:39:06

-6 dB BW NVNT 802.11b 2462MHz Ant1



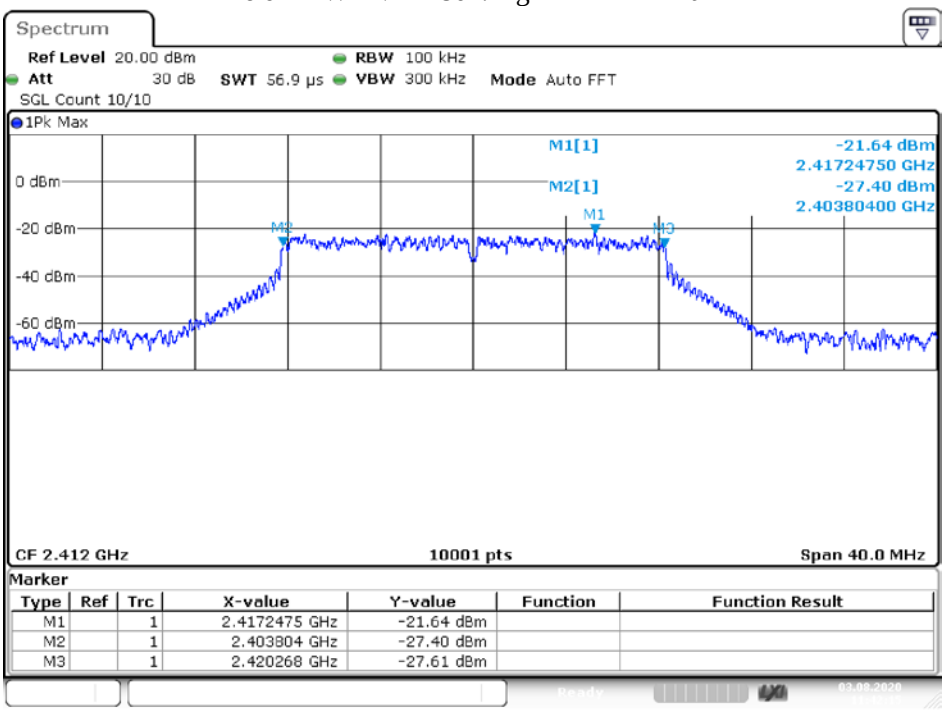
Date: 27.MAR.2021 11:39:09

OBW NVNT 802.11g 2412MHz Ant1



Date: 27.MAR.2021 11:42:13

-6 dB BW NVNT 802.11g 2412MHz Ant1

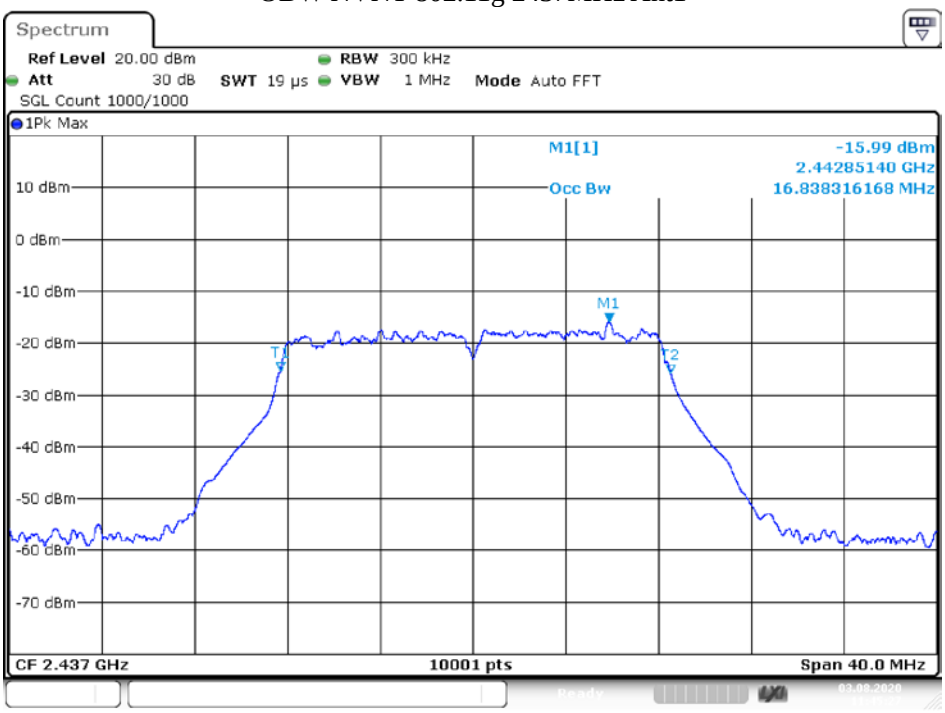


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4172475 GHz	-21.64 dBm		
M2		1	2.403804 GHz	-27.40 dBm		
M3		1	2.420268 GHz	-27.61 dBm		

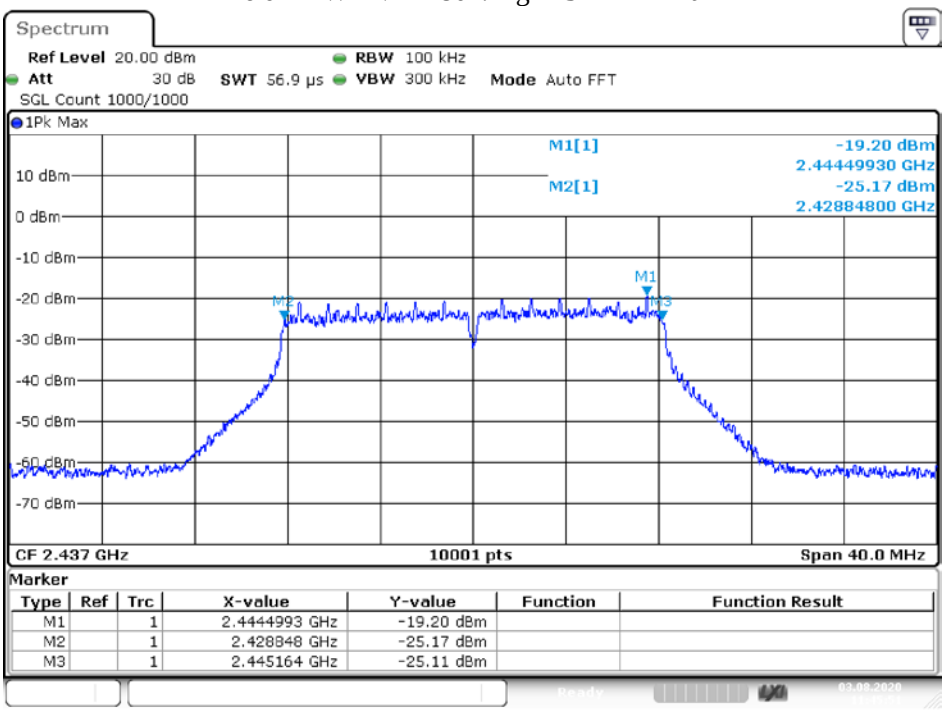
Date: 27.MAR.2021 11:42:16

OBW NVNT 802.11g 2437MHz Ant1



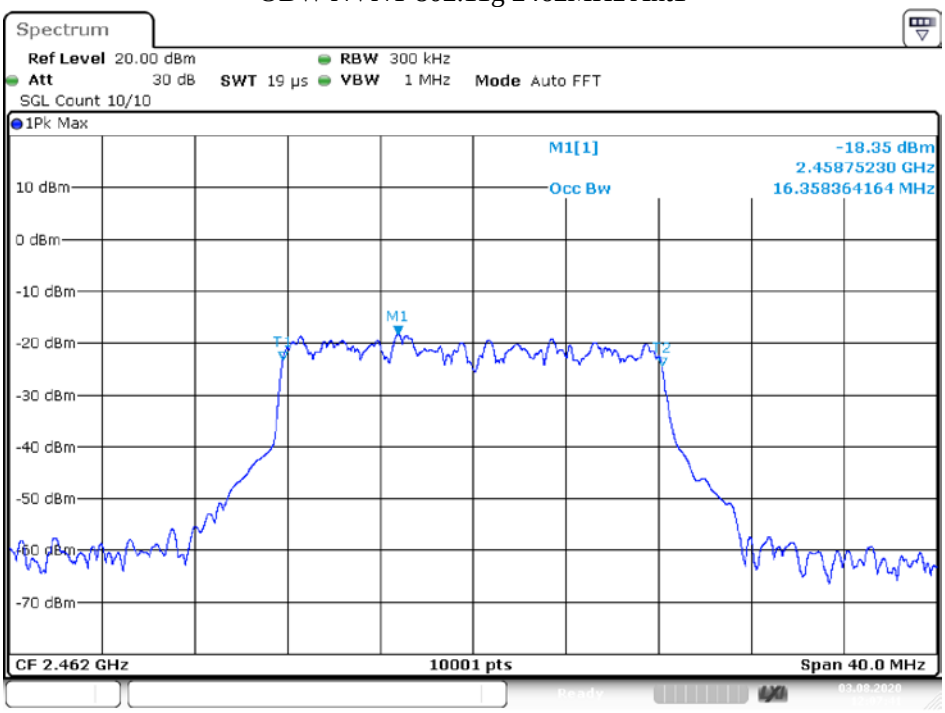
Date: 27.MAR.2021 11:45:27

-6 dB BW NVNT 802.11g 2437MHz Ant1



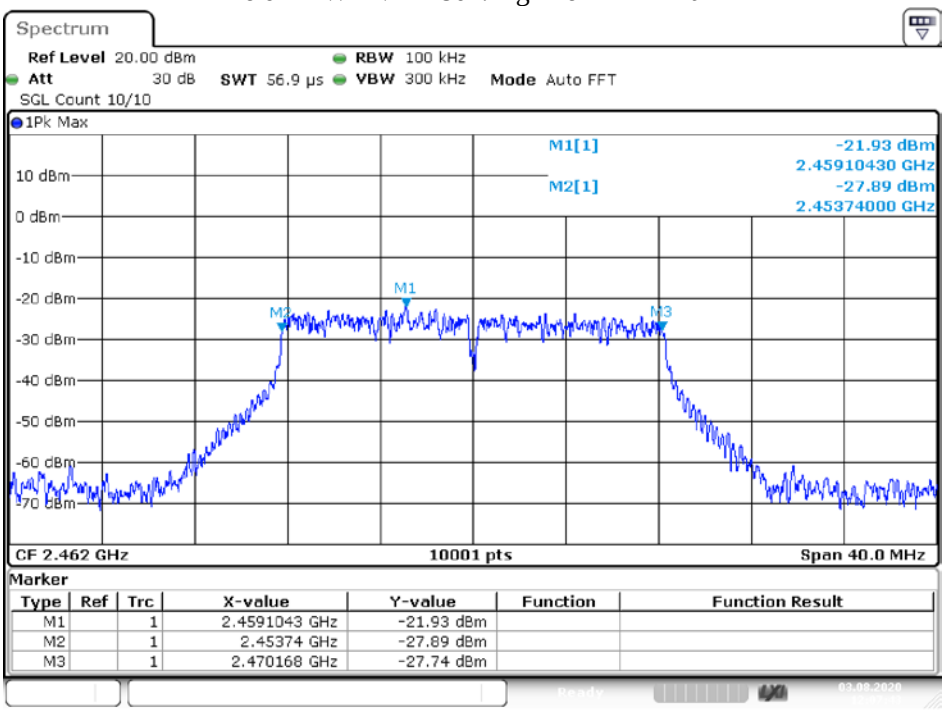
Date: 27.MAR.2021 11:45:50

OBW NVNT 802.11g 2462MHz Ant1



Date: 27.MAR.2021 12:07:41

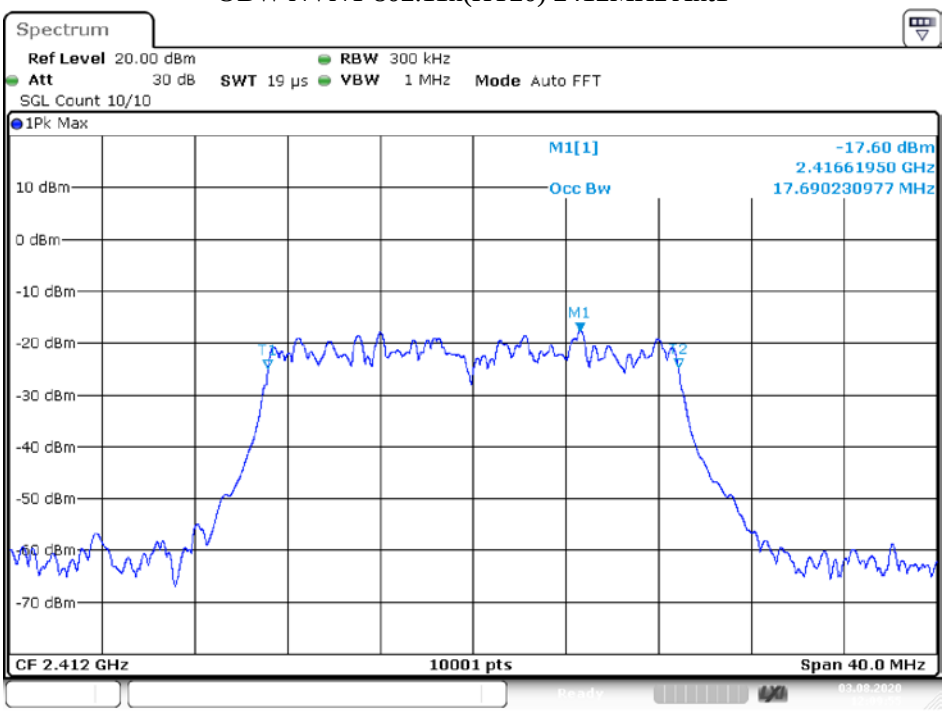
-6 dB BW NVNT 802.11g 2462MHz Ant1



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4591043 GHz	-21.93 dBm		
M2		1	2.45374 GHz	-27.89 dBm		
M3		1	2.470168 GHz	-27.74 dBm		

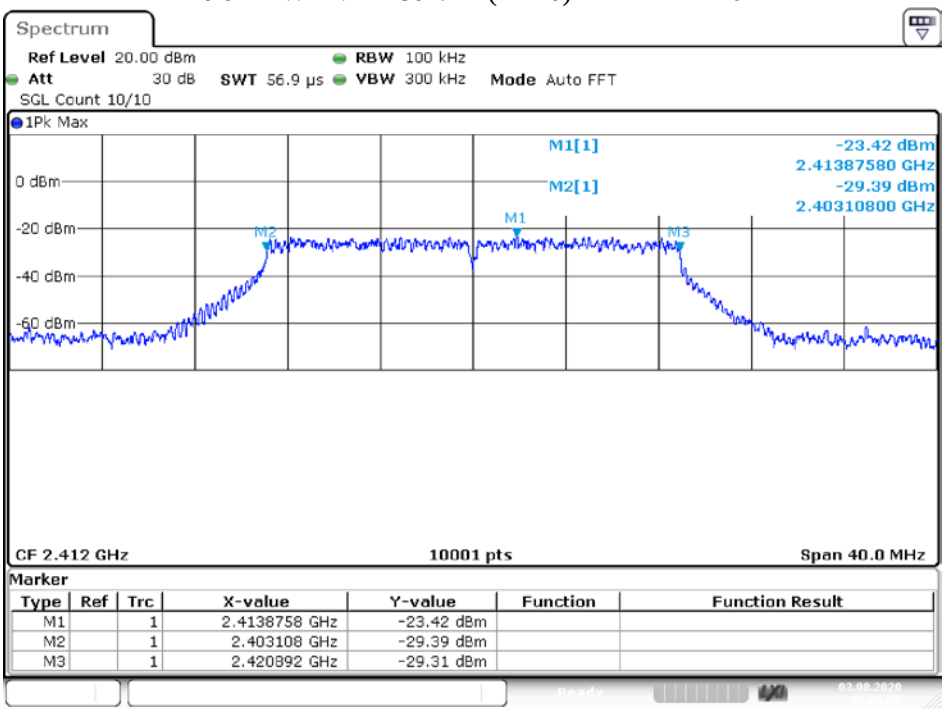
Date: 27.MAR.2021 12:07:44

OBW NVNT 802.11n(HT20) 2412MHz Ant1



Date: 27.MAR.2021 12:09:55

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

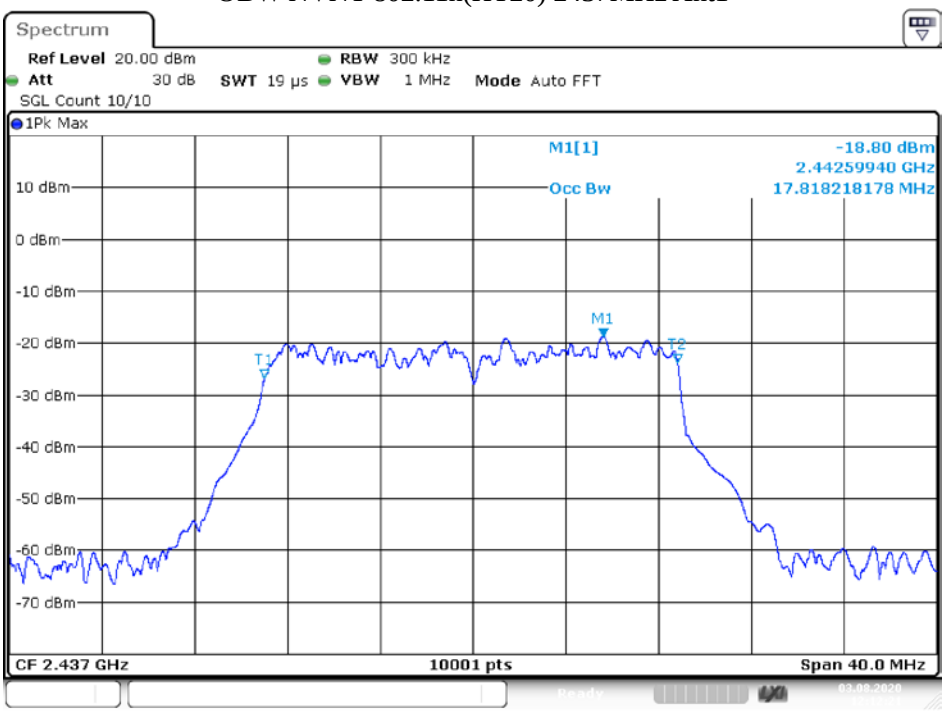


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4138758 GHz	-23.42 dBm		
M2		1	2.403108 GHz	-29.39 dBm		
M3		1	2.420892 GHz	-29.31 dBm		

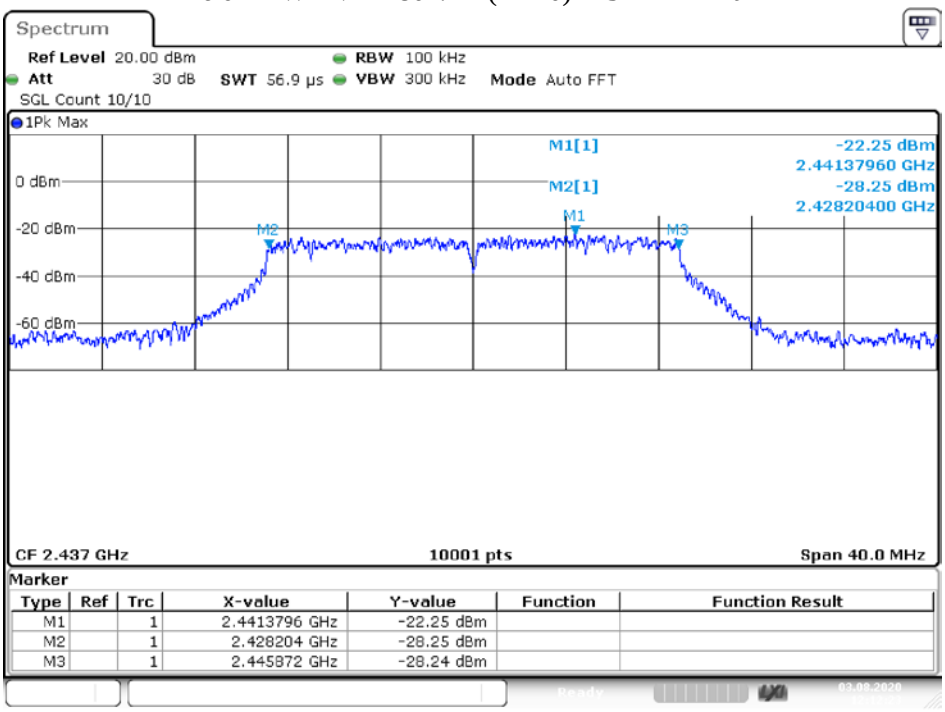
Date: 27.MAR.2021 12:09:57

OBW NVNT 802.11n(HT20) 2437MHz Ant1



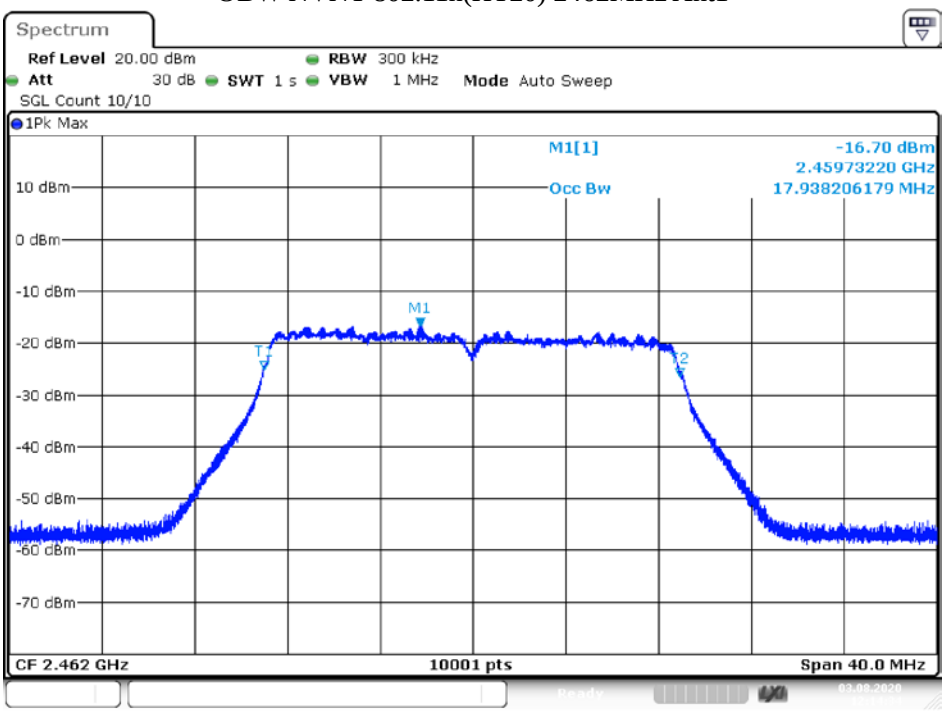
Date: 27.MAR.2021 12:12:20

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



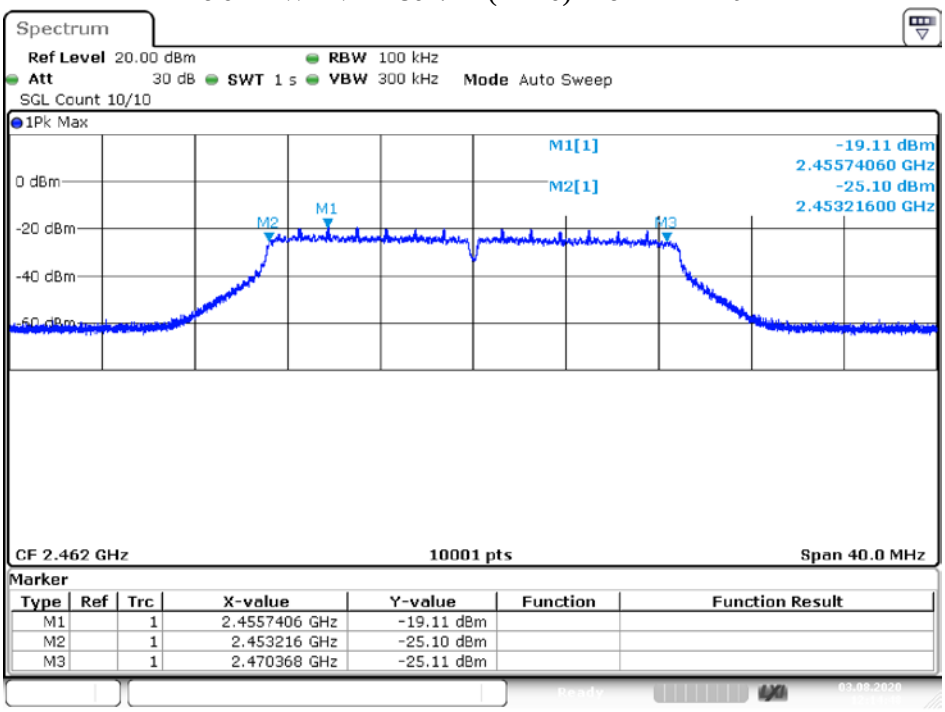
Date: 27.MAR.2021 12:12:23

OBW NVNT 802.11n(HT20) 2462MHz Ant1



Date: 27.MAR.2021 12:14:33

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

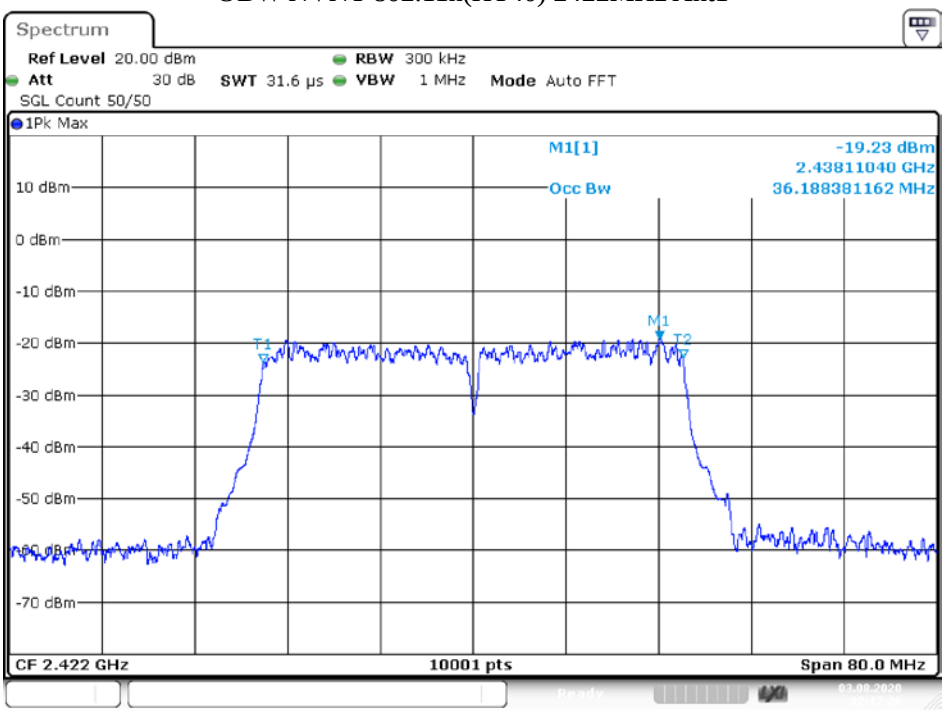


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4557406 GHz	-19.11 dBm		
M2		1	2.453216 GHz	-25.10 dBm		
M3		1	2.470368 GHz	-25.11 dBm		

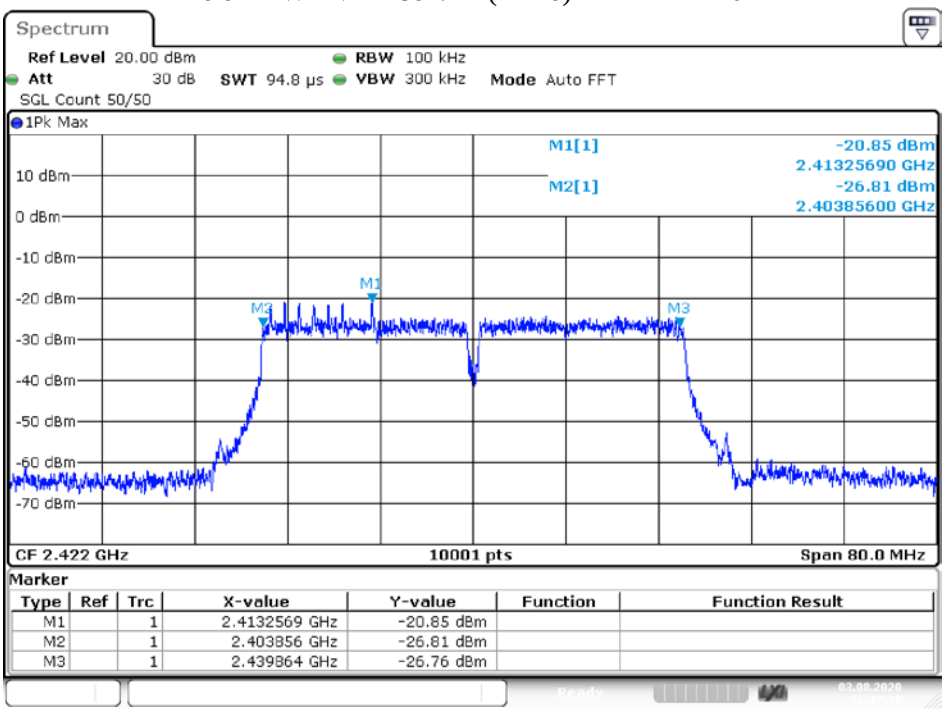
Date: 27.MAR.2021 12:14:47

OBW NVNT 802.11n(HT40) 2422MHz Ant1



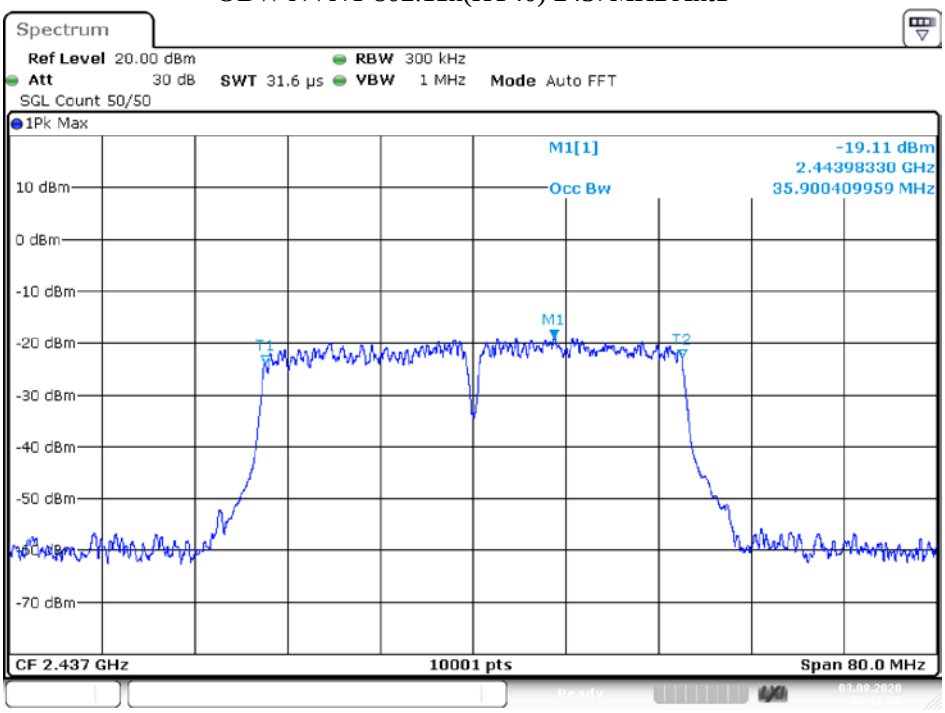
Date: 27.MAR.2021 12:17:26

-6 dB BW NVNT 802.11n(HT40) 2422MHz Ant1



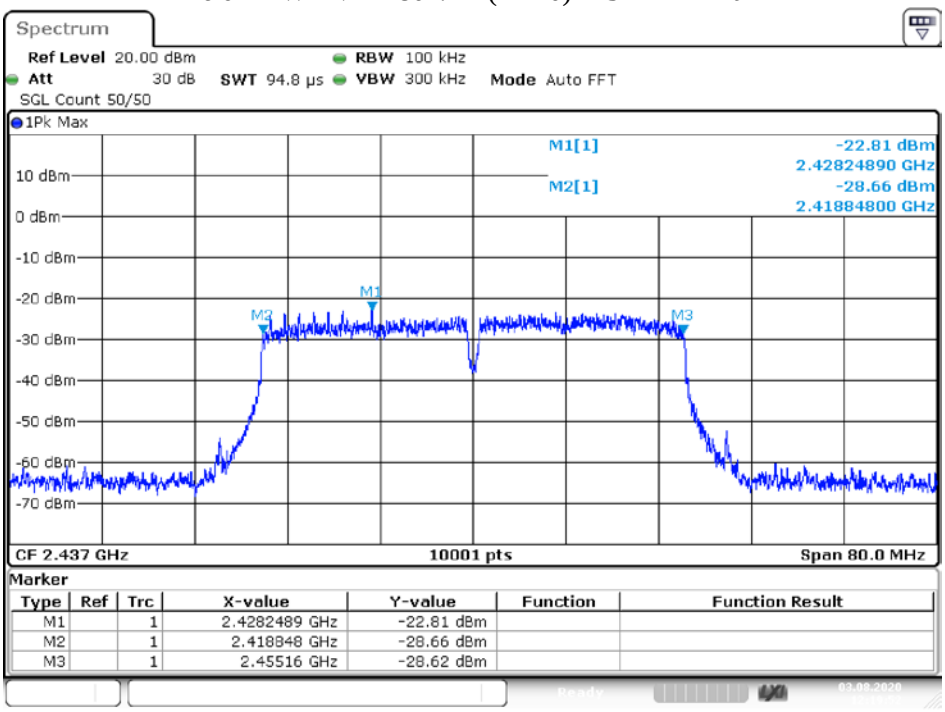
Date: 27.MAR.2021 12:17:30

OBW NVNT 802.11n(HT40) 2437MHz Ant1



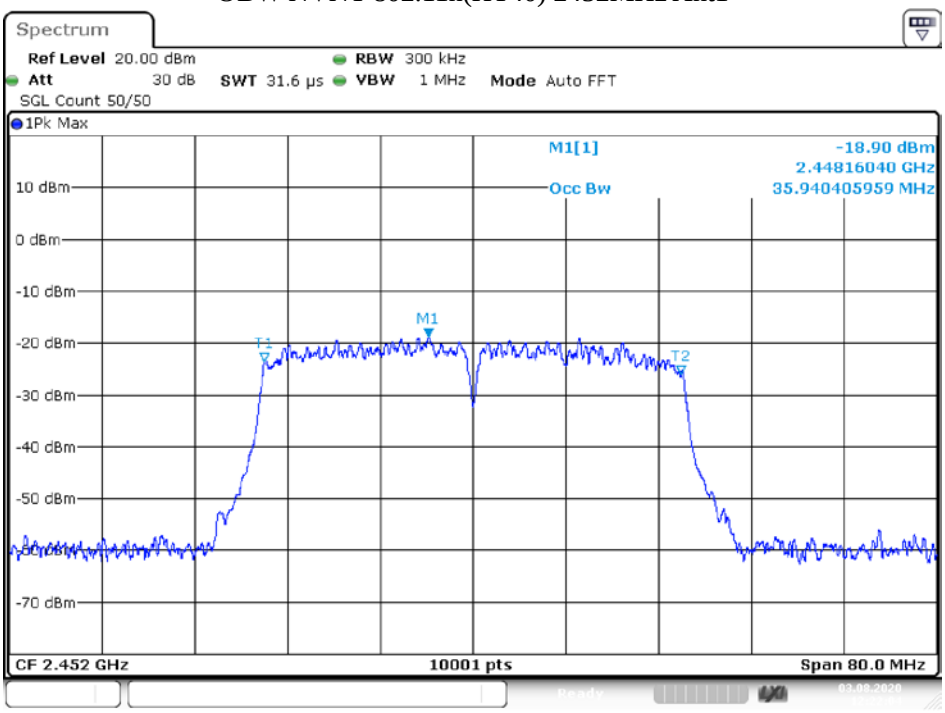
Date: 27.MAR.2021 12:19:48

-6 dB BW NVNT 802.11n(HT40) 2437MHz Ant1



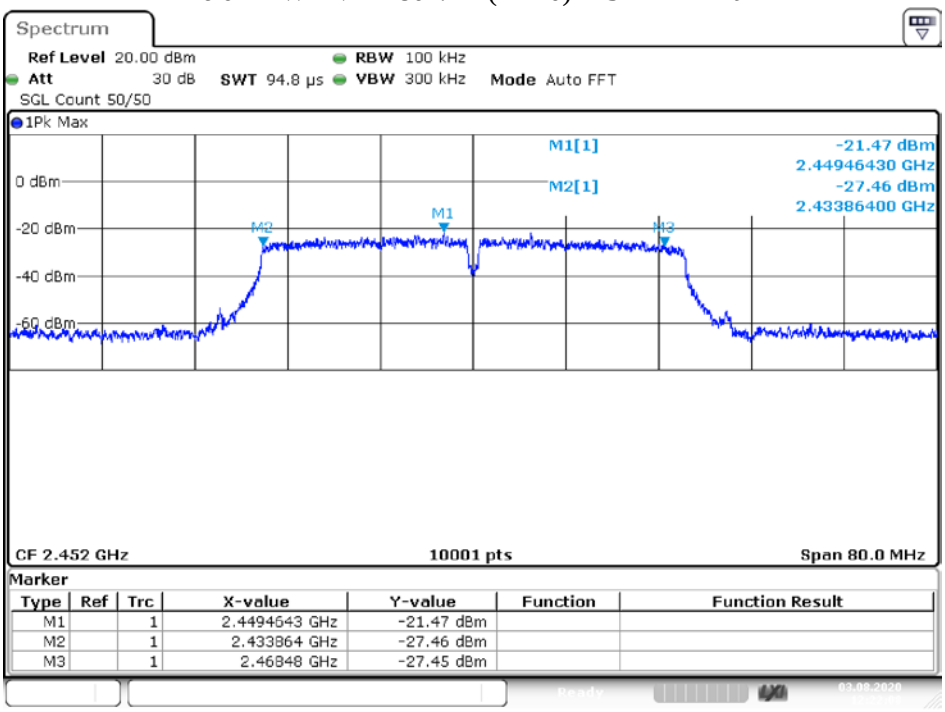
Date: 27.MAR.2021 12:19:52

OBW NVNT 802.11n(HT40) 2452MHz Ant1



Date: 27.MAR.2021 12:22:04

-6 dB BW NVNT 802.11n(HT40) 2452MHz Ant1



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4494643 GHz	-21.47 dBm		
M2		1	2.433864 GHz	-27.46 dBm		
M3		1	2.46848 GHz	-27.45 dBm		

Date: 27.MAR.2021 12:22:08

8. BAND EDGE CHECK

8.1.Test limits

Please refer section15.247

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 and 5725MHz to 5850MHz shall be at least 20dB below the fundamental emissions, or comply with 15.209 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

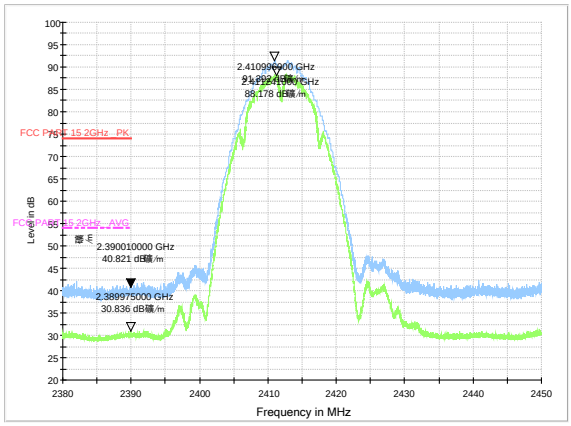
Same as 5.2.2.

8.4.Test Results

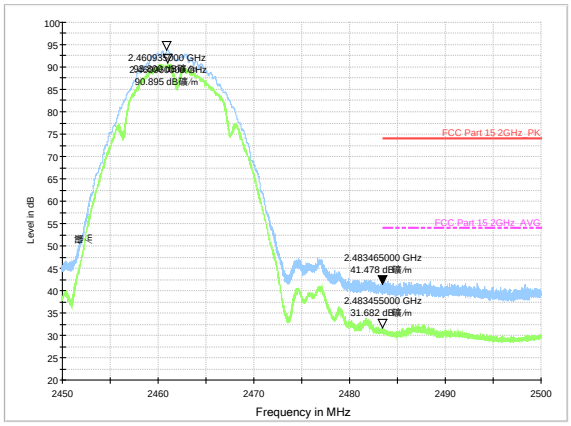
PASS.

Detailed information please see the following page.

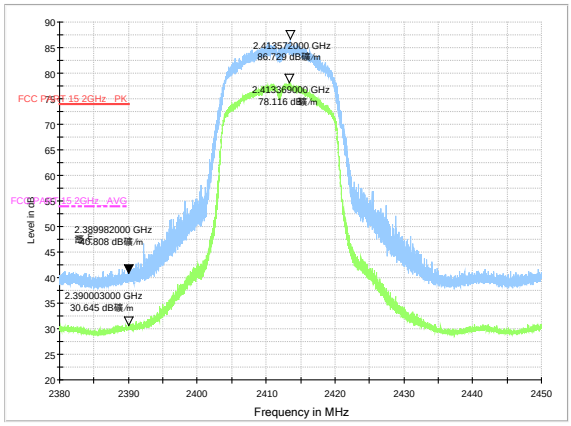
Test Mode: IEEE 802.11b-Low



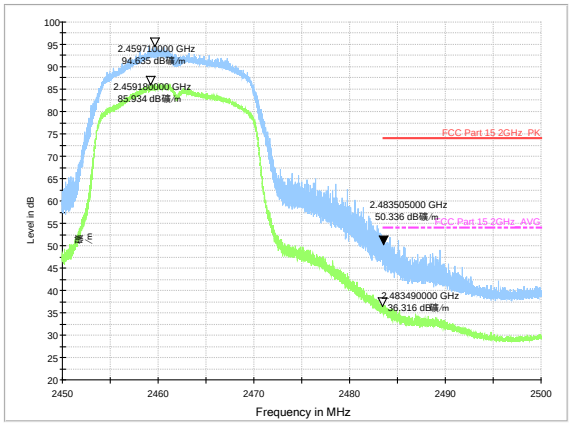
Test Mode: IEEE 802.11b-High



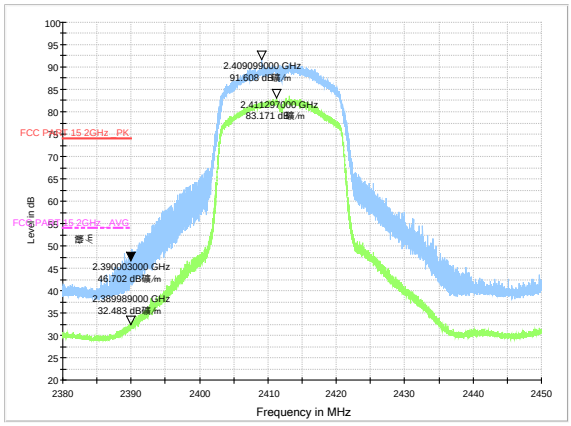
Test Mode: IEEE 802.11g-Low



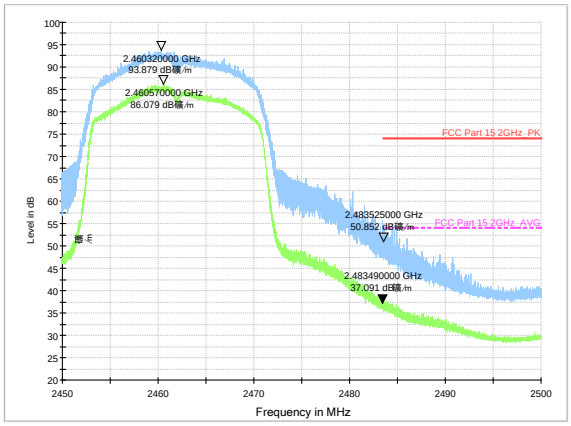
Test Mode: IEEE 802.11g-High



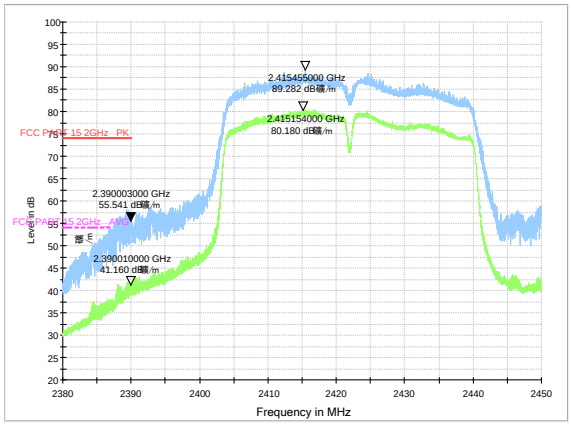
Test Mode: IEEE 802.11n20-Low



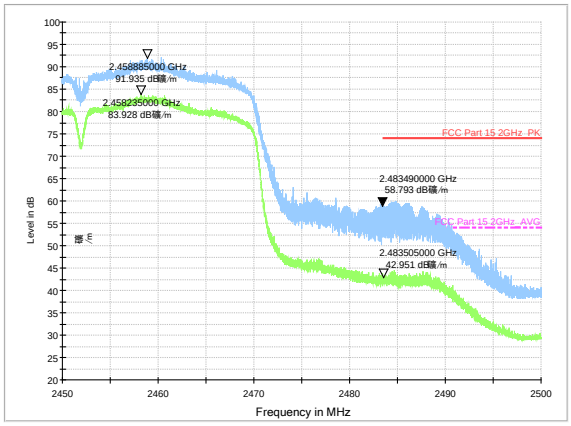
Test Mode: IEEE 802.11n20-High



Test Mode: IEEE 802.11n40-Low

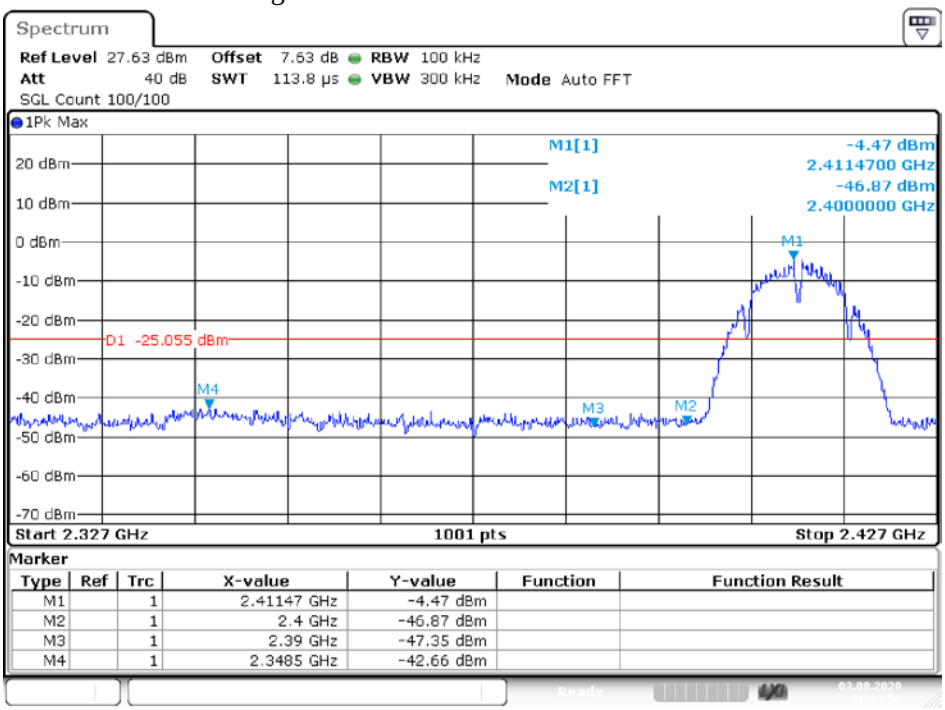


Test Mode: IEEE 802.11n40-High



Conduction Band Edge:

Band Edge NVNT 802.11b 2412MHz Ant1 Emission

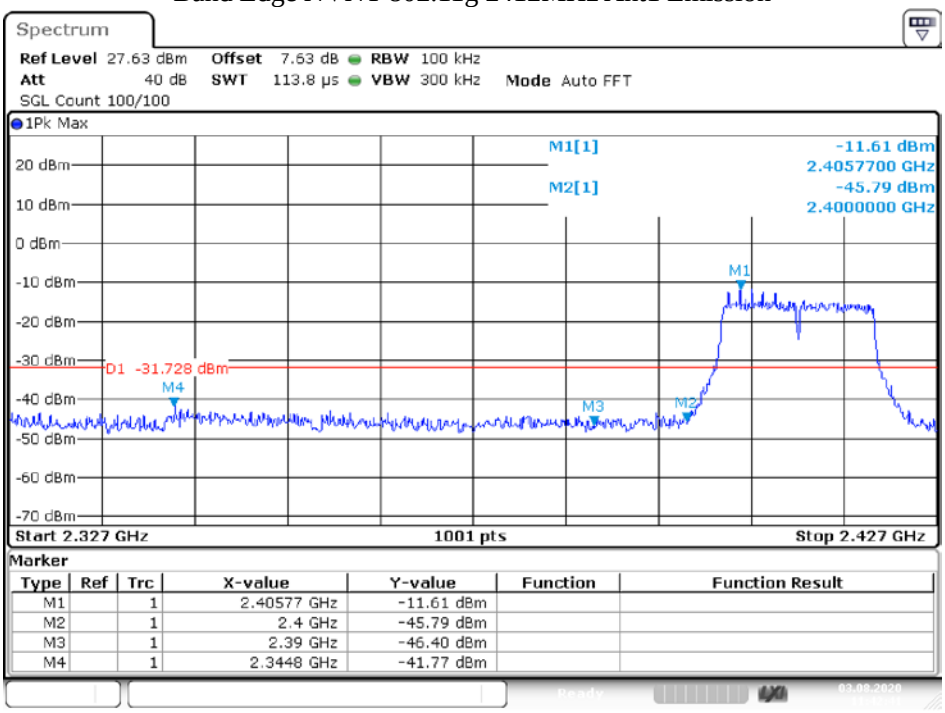


Date: 27.MAR.2021 11:33:50

Band Edge NVNT 802.11b 2462MHz Ant1 Emission

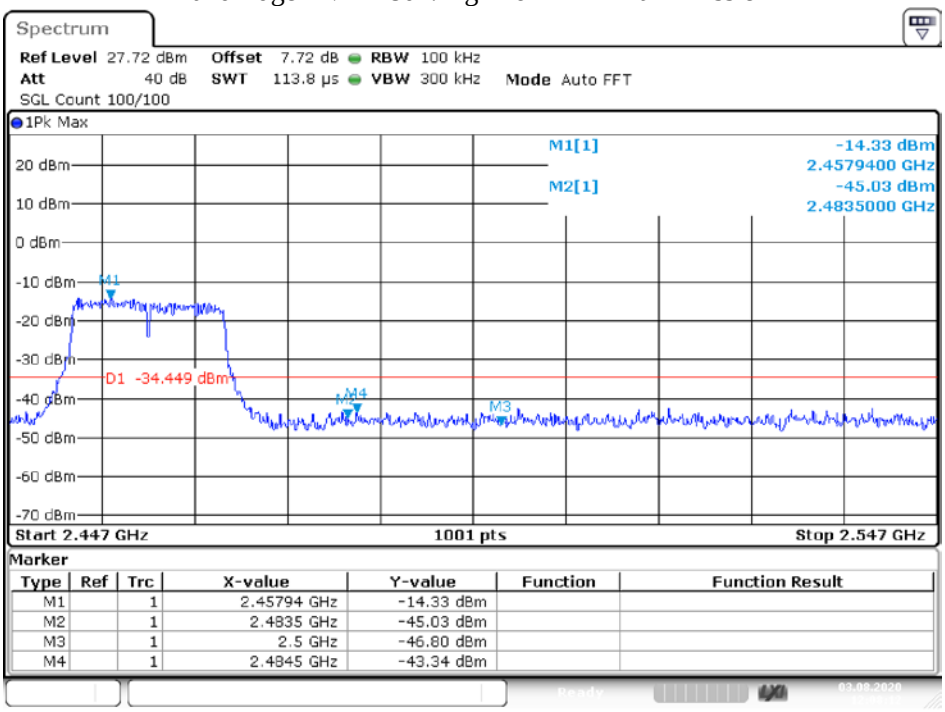
Date: 27.MAR.2021 11:39:31

Band Edge NVNT 802.11g 2412MHz Ant1 Emission



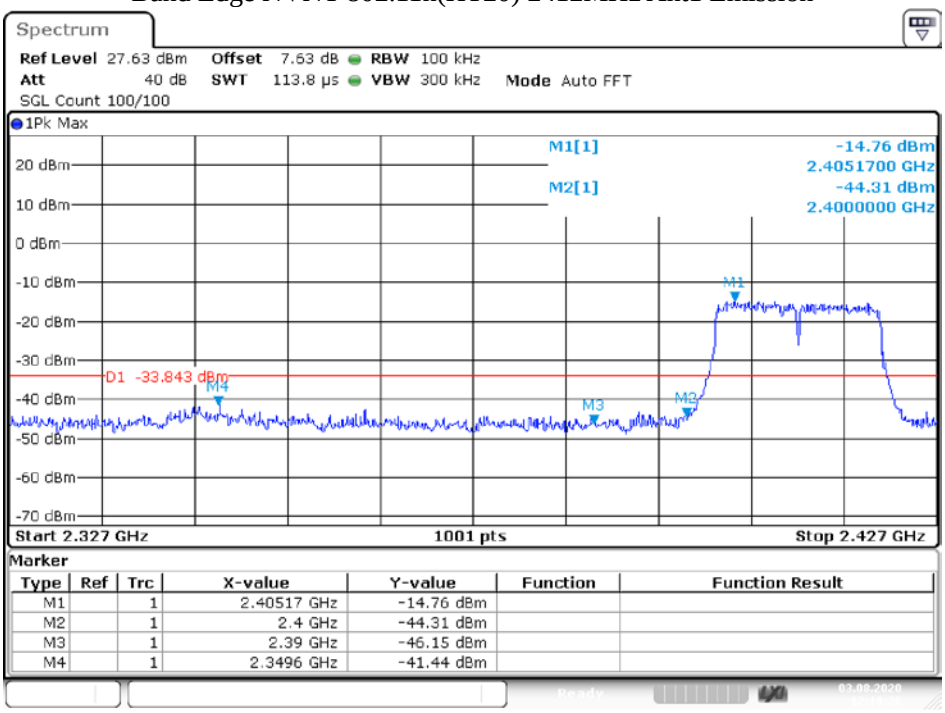
Date: 27.MAR.2021 11:42:41

Band Edge NVNT 802.11g 2462MHz Ant1 Emission



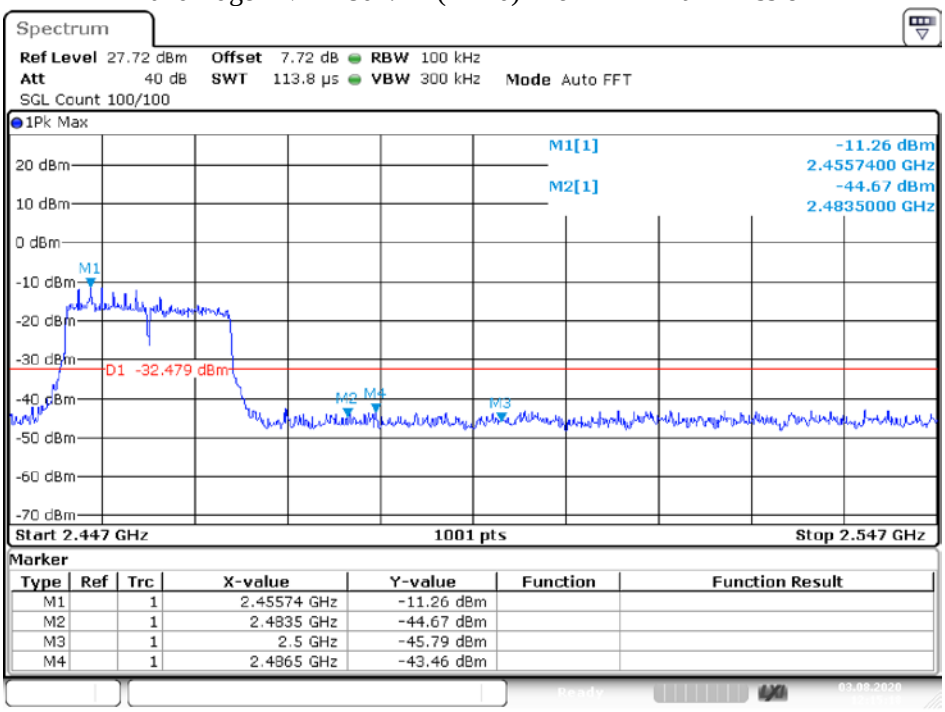
Date: 27.MAR.2021 12:08:11

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



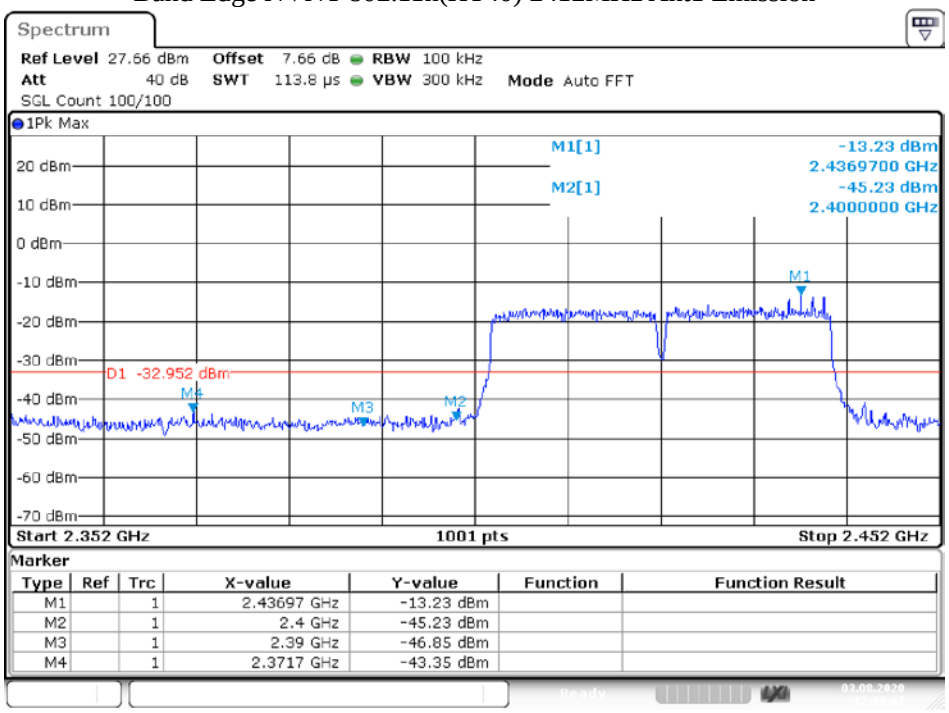
Date: 27.MAR.2021 12:10:26

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



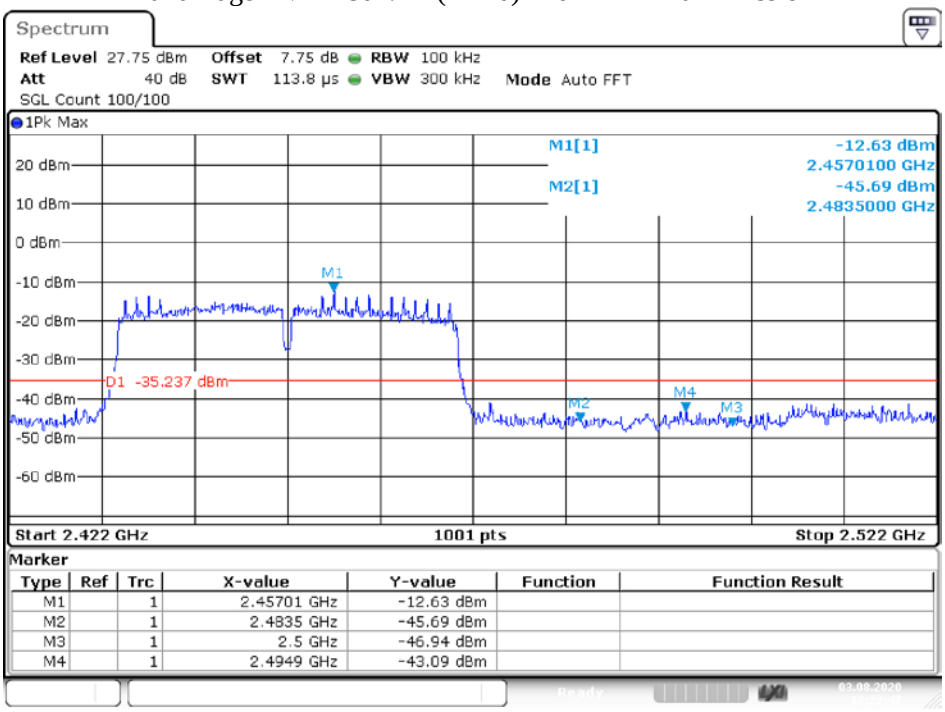
Date: 27.MAR.2021 12:15:18

Band Edge NVNT 802.11n(HT40) 2412MHz Ant1 Emission



Date: 27.MAR.2021 12:18:08

Band Edge NVNT 802.11n(HT40) 2462MHz Ant1 Emission



Date: 27.MAR.2021 12:22:47

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.

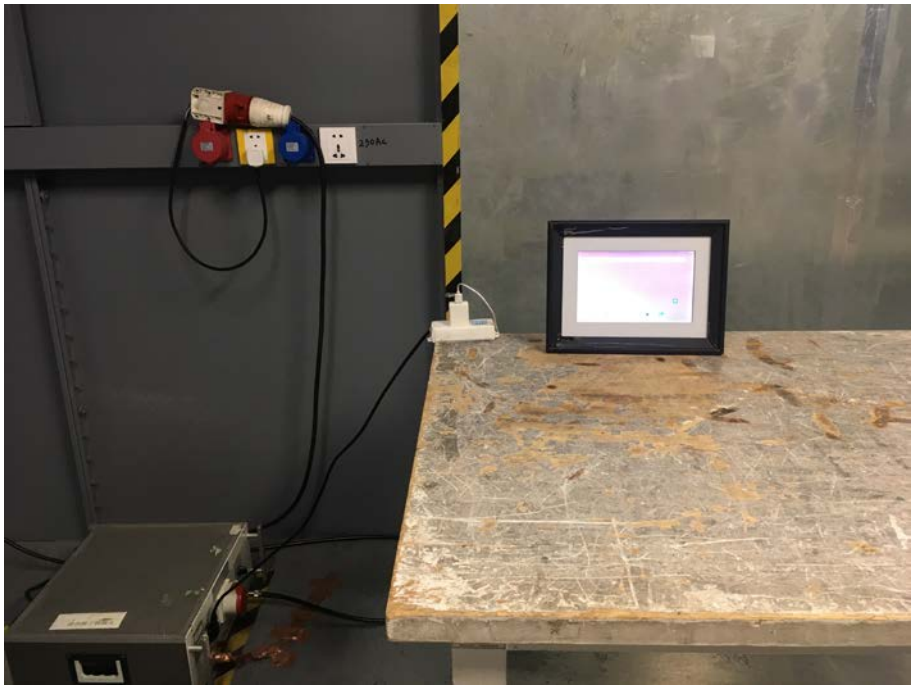
9.3.Results

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

10. TEST SETUP PHOTO

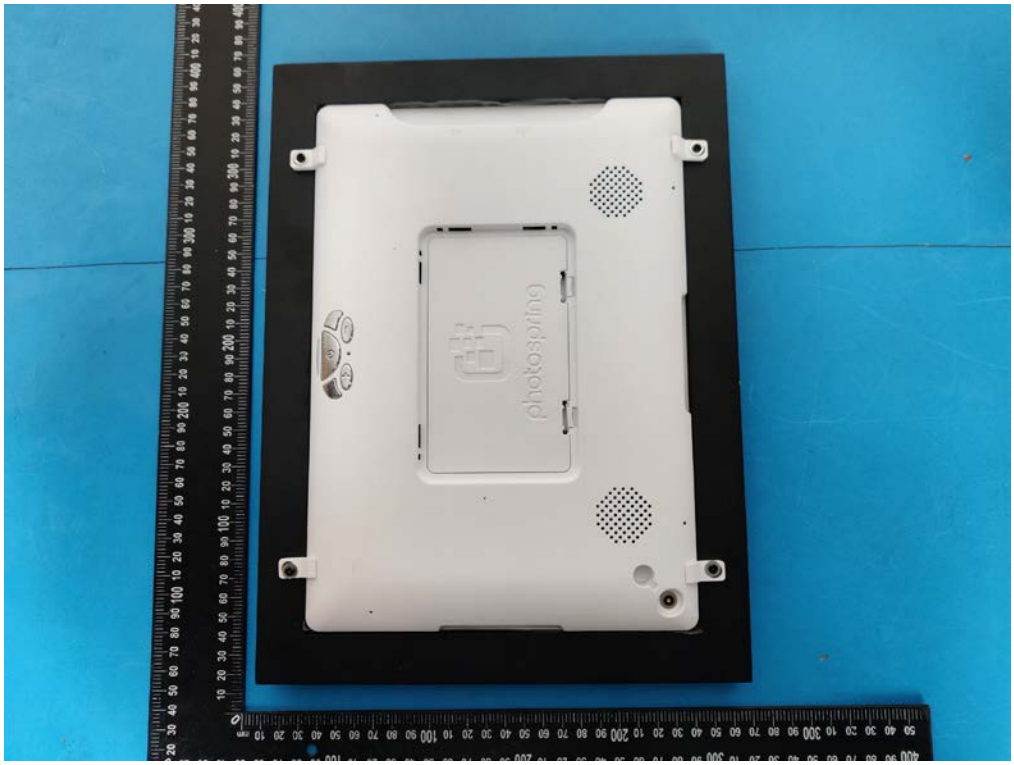
10.1. Photos of Radiated emission

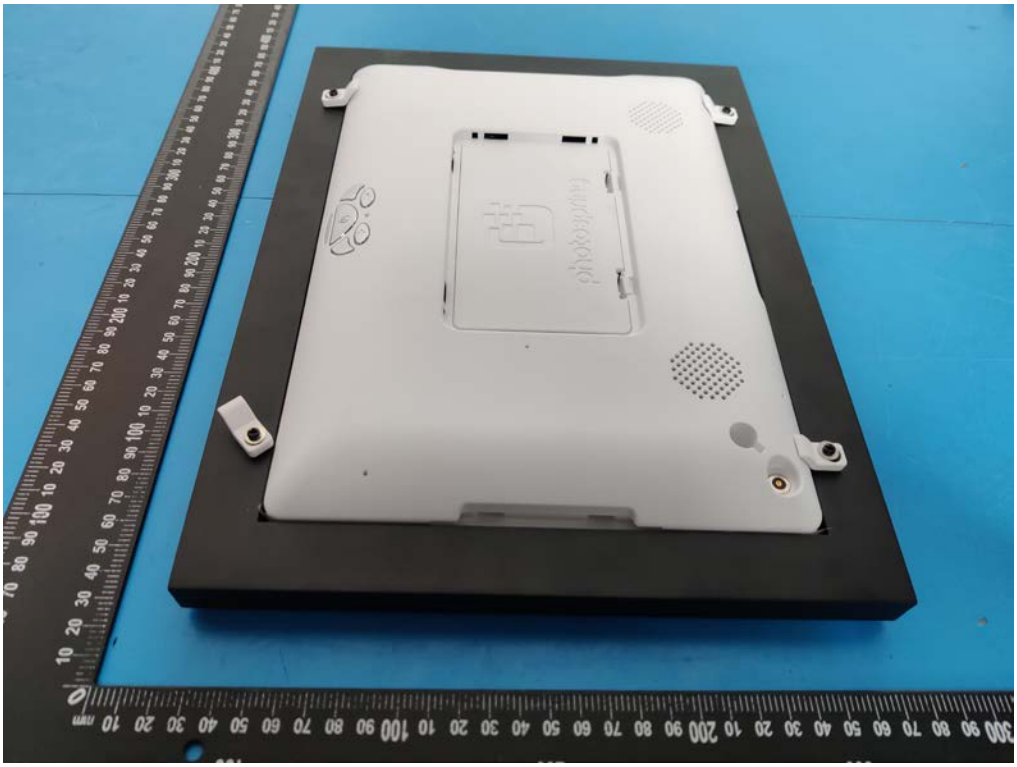
10.2.Photos of Conducted Emission test

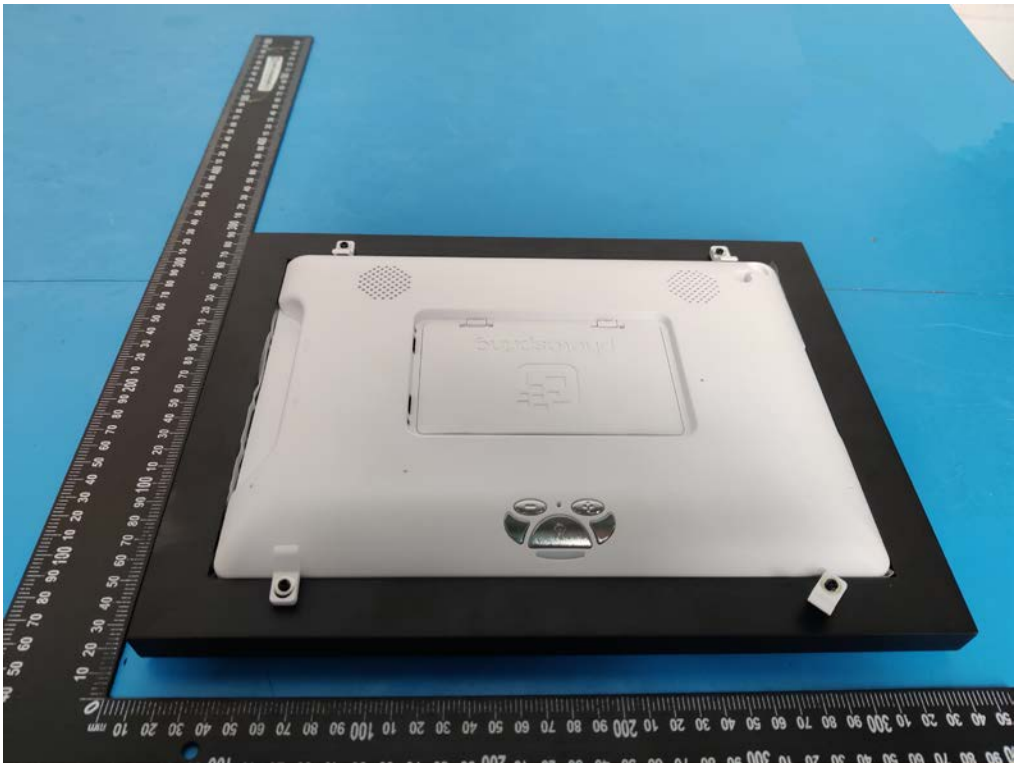


11.EUT PHOTO

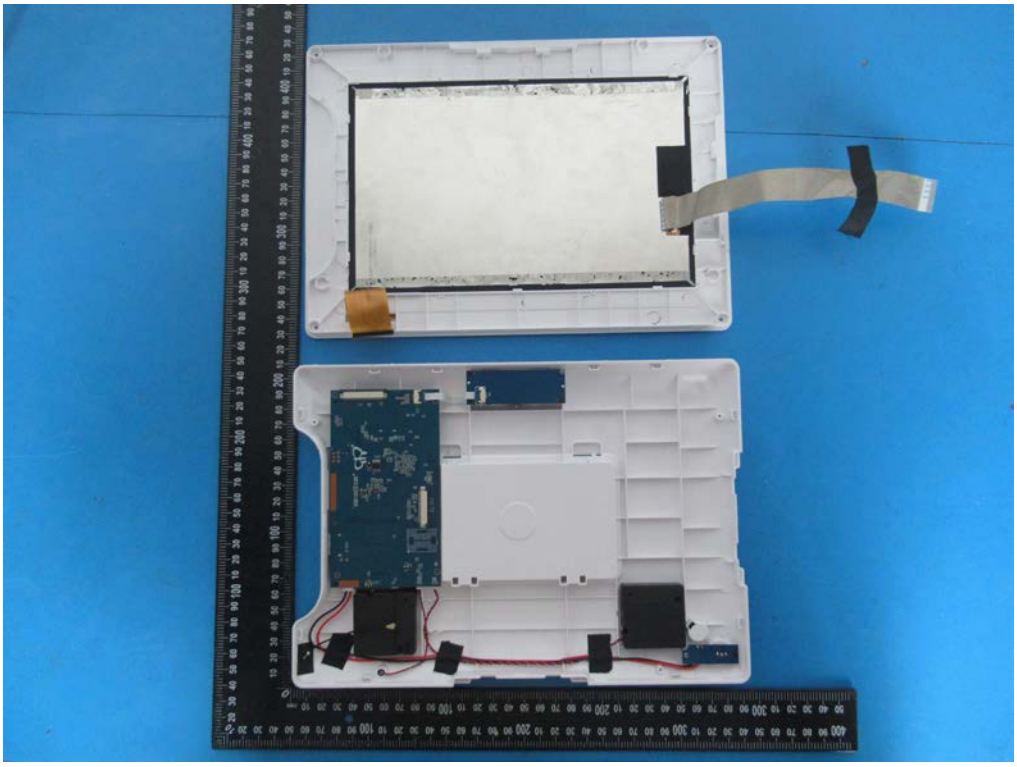
Switching Power Supply
MODEL:XS-0502000SEUU
INPUT:100-240V~50/60Hz 0.3A
OUTPUT:5V ⎓ 2000mA
LPS
I. T. E. POWER SUPPLY
FOR HOME OR OFFICE USE ONLY
Shenzhen Sunshine Technological Co.,Ltd.
2002
MADE IN CHINA

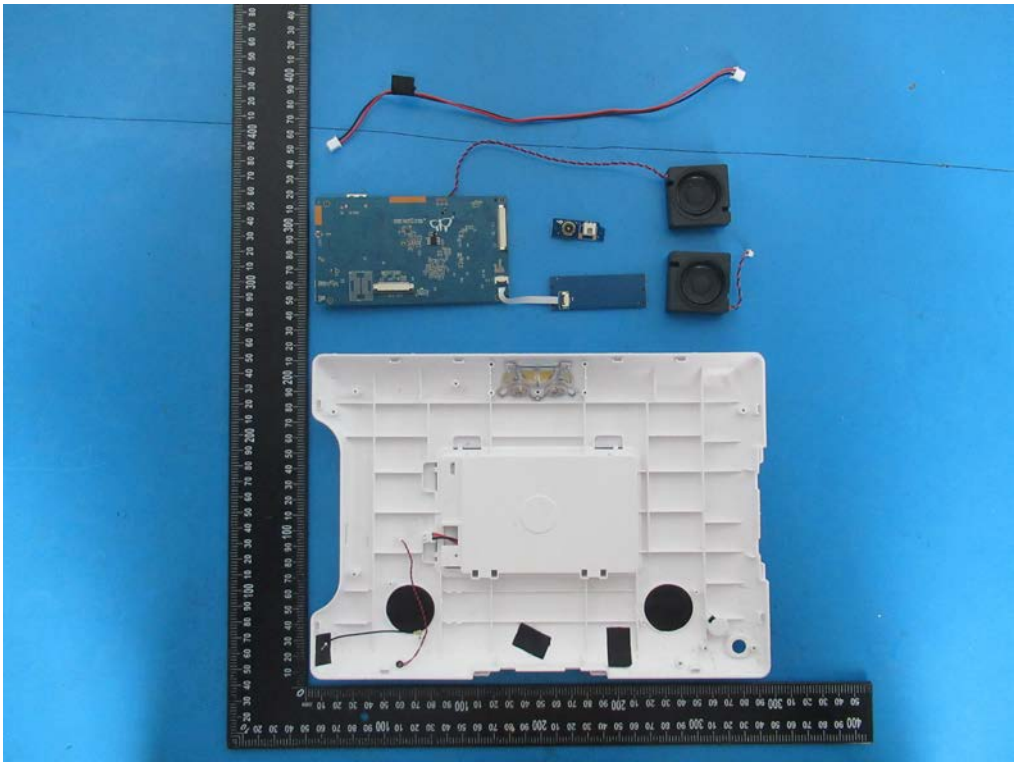

photospring

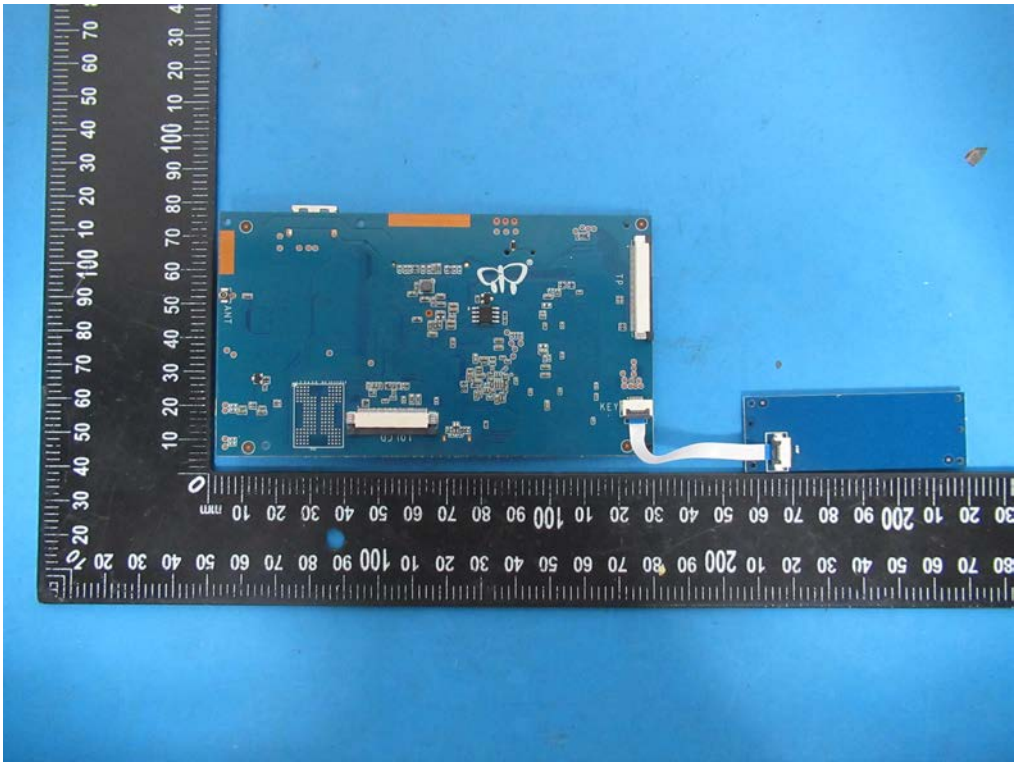


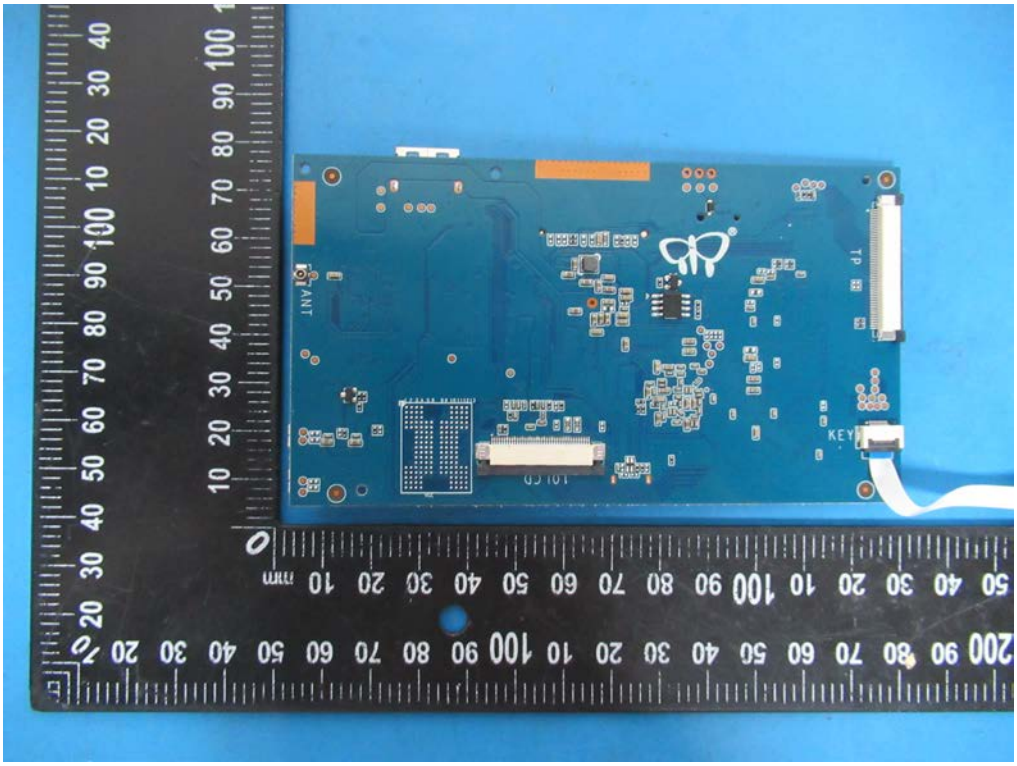


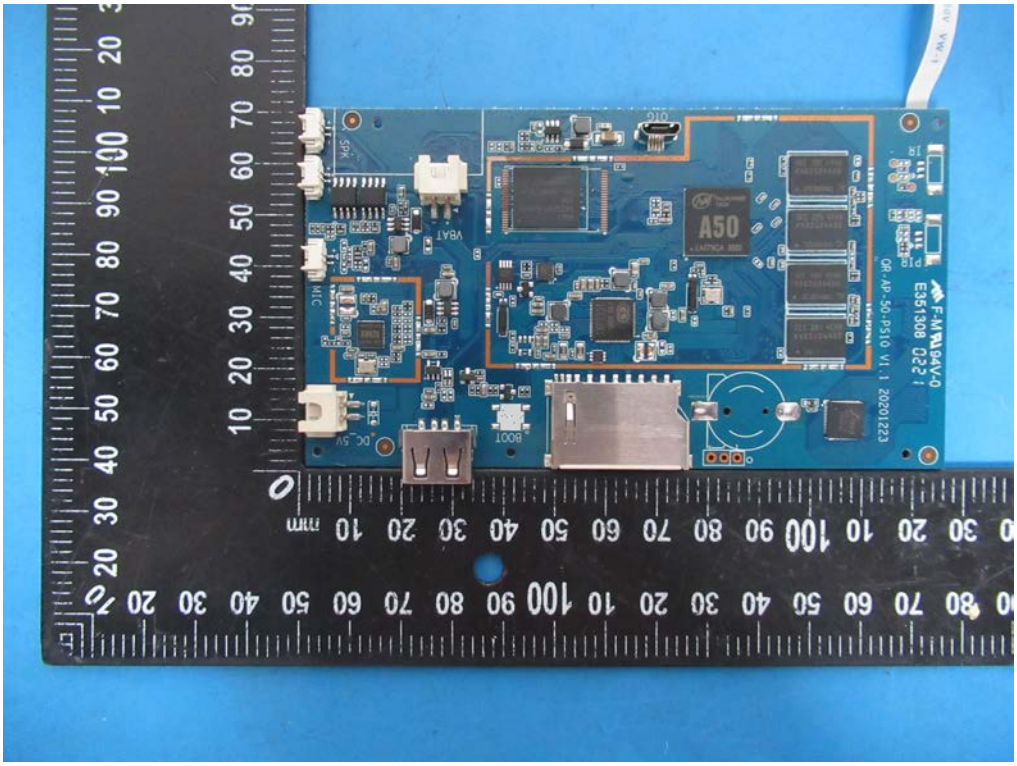
photospring

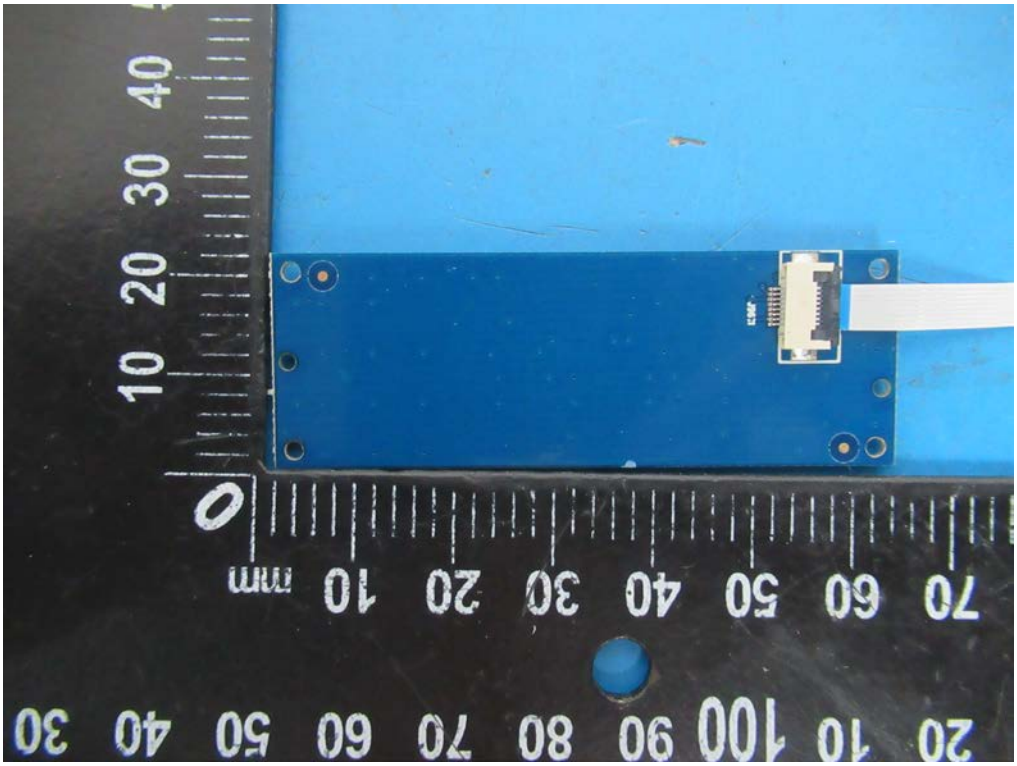


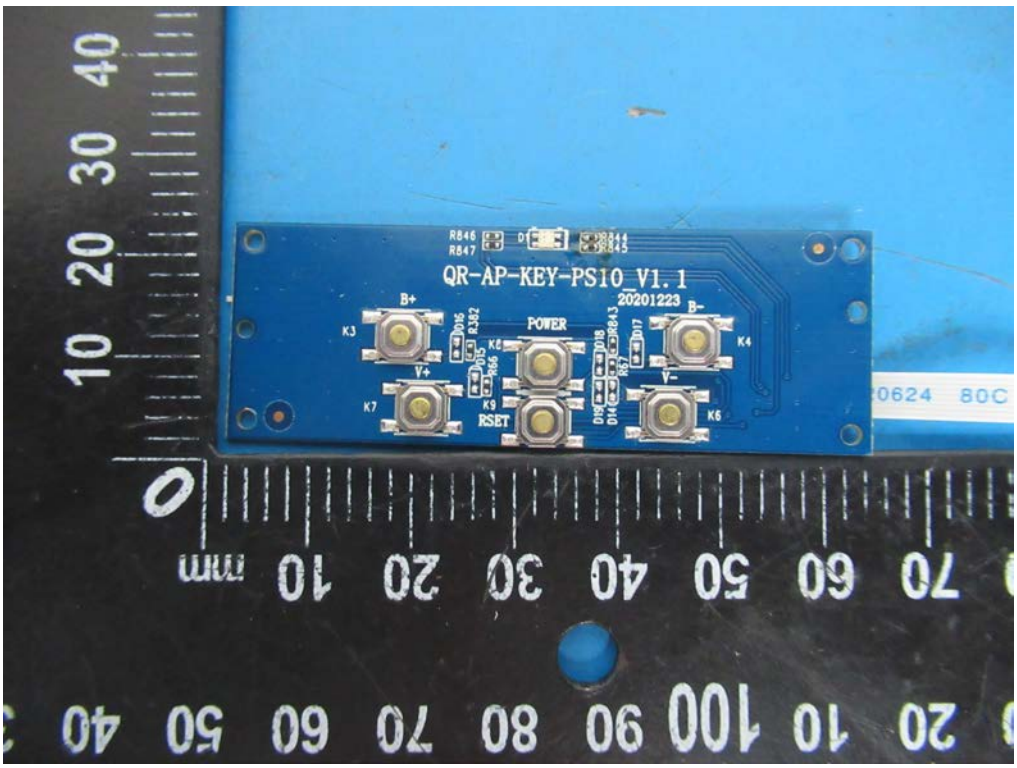


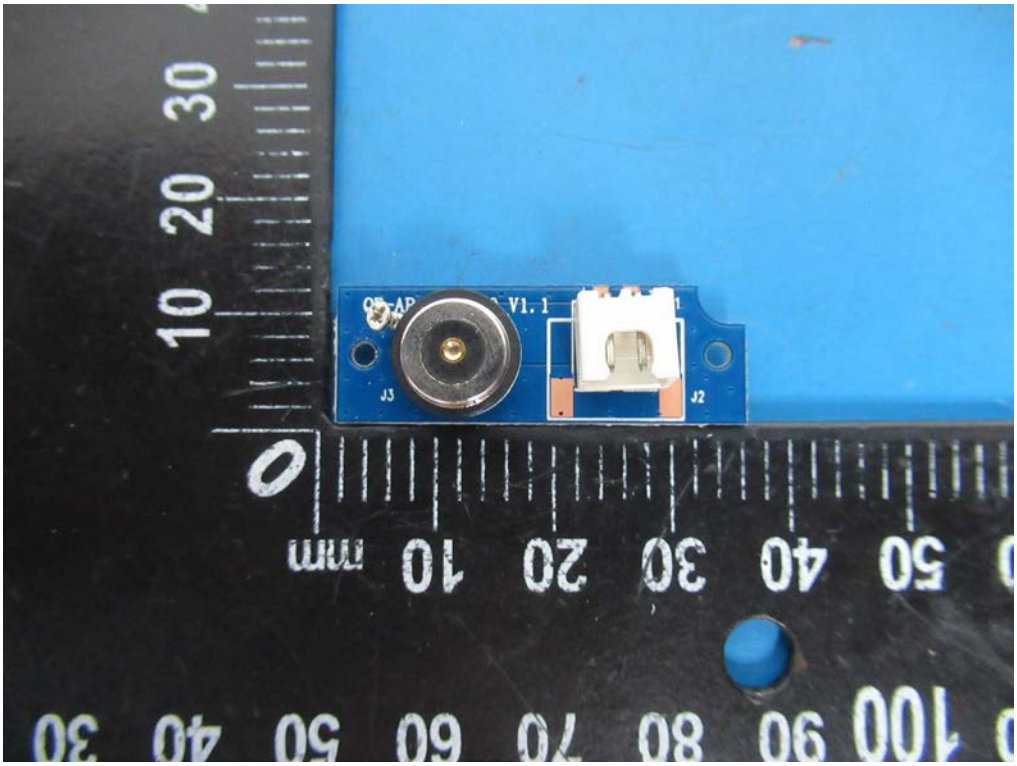


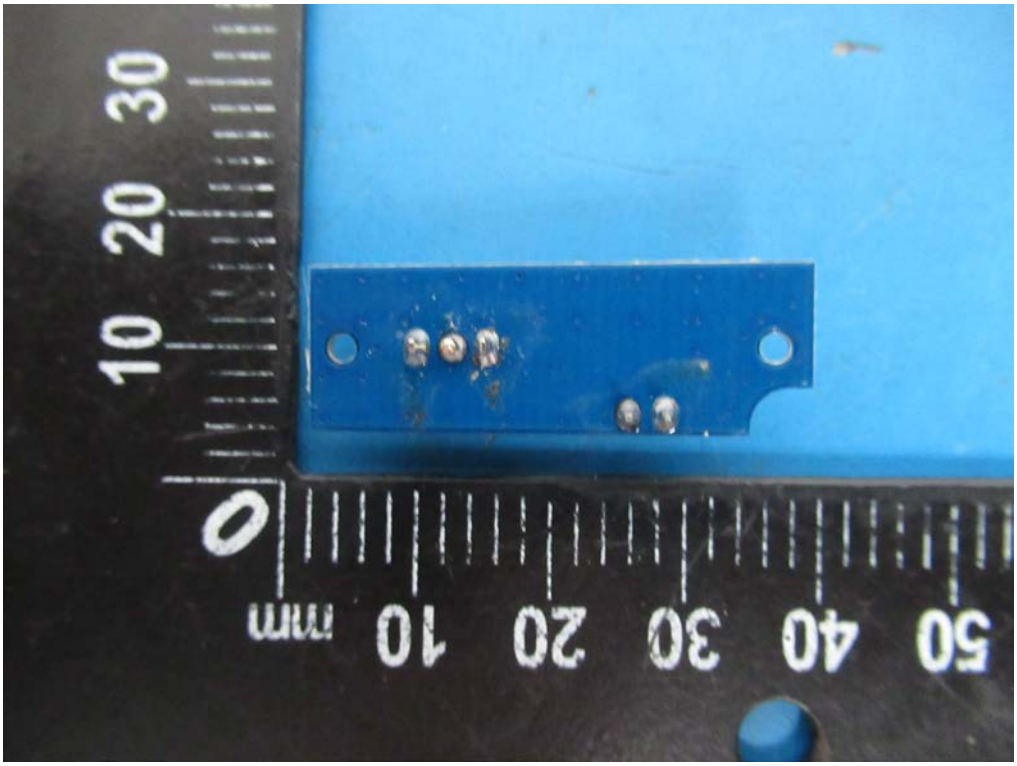

ANT
TP
KEY

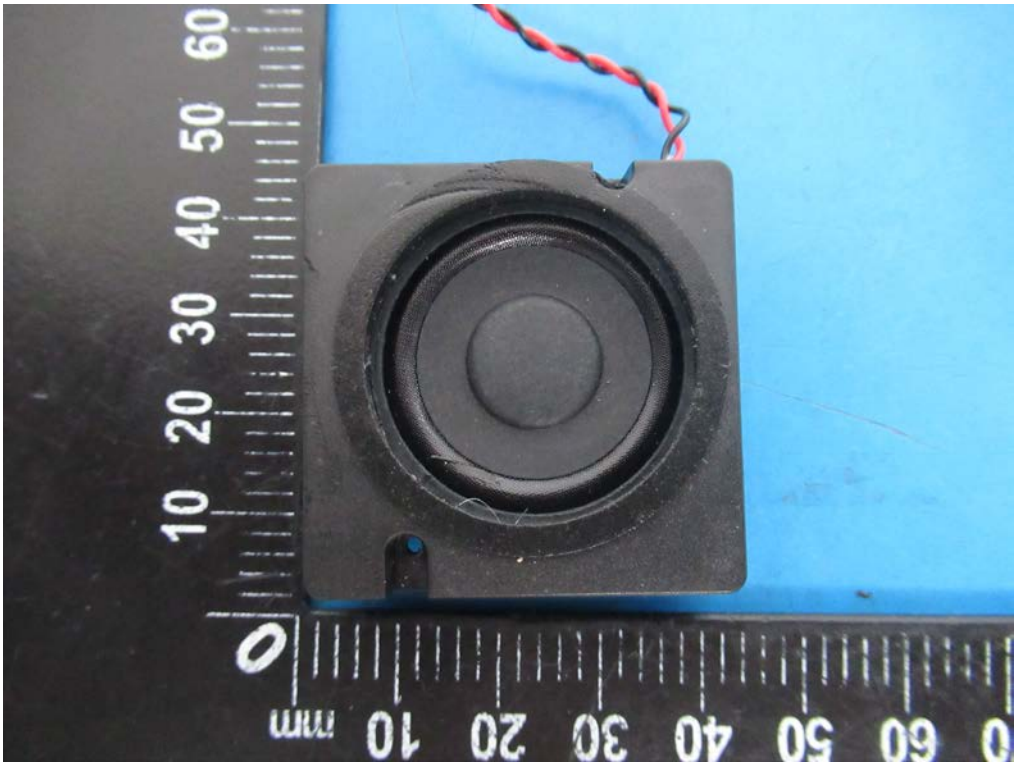

SPK
VBAT
MIC
DC_5V
BOOT
OTG
A50
E351308
OR-AP-50-P510 V1.1 20201223

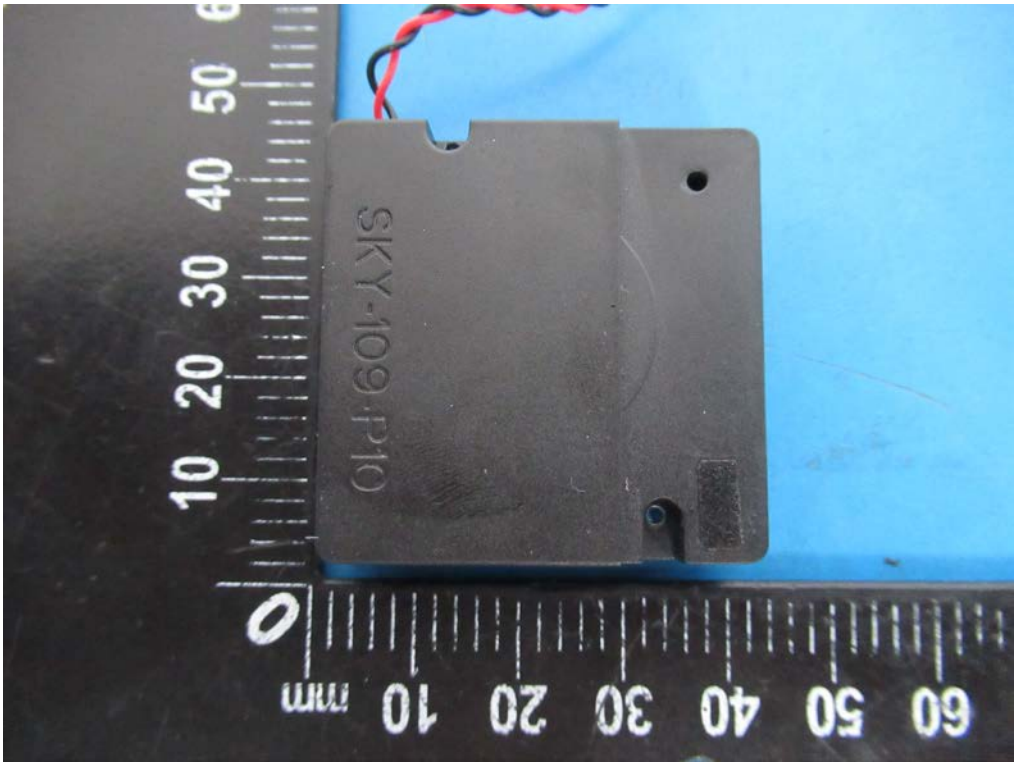


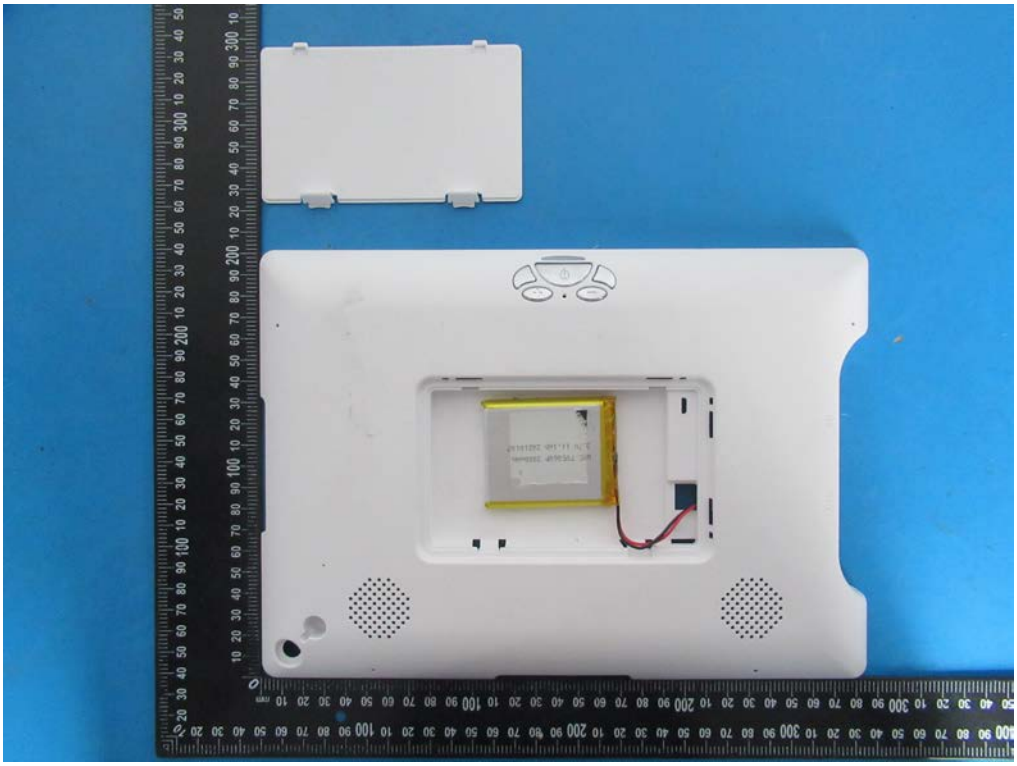

QR-AP-KEY-PS10_V1.1
20201223
B+
B-
V+
V-
POWER
RSET
K3
K4
K5
K6
K7
K8
K9

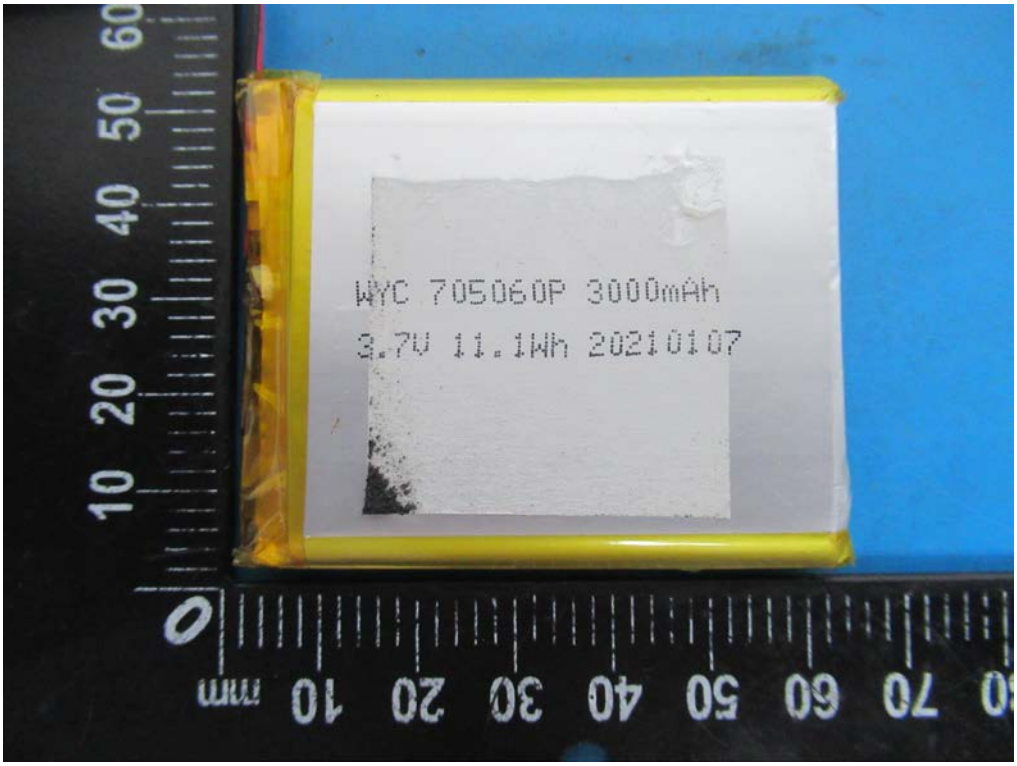

V1.1
J3
J2
mm


mm


mm
0
10
20
30
40
50
60


SKY-109 PIO
mm
0
10
20
30
40
50
60





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