



FCC TEST REPORT
FCC ID: 2AN9Q-THIAMISX

On Behalf of

Netronix Group.INC
Thiamis Embedded Platform
Model No.: Thiamis X module

Prepared for : Netronix Group.INC
Address : 3401 Greys Ferry Avenue Philadelphia,PA 19146

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

Applicant : Netronix Group.INC
 Address : 3401 Greys Ferry Avenue Philadelphia,PA 19146
 Manufacturer : Netronix Group.INC
 Address : 3401 Greys Ferry Avenue Philadelphia,PA 19146
 EUT Description : Thiamis Embedded Platform
 (A) Model No. : Thiamis X module
 (B) Trademark : N/A

Measurement Standard Used:

**FCC Rules and Regulations Part 15 Subpart C Section 15.247: 2017,
ANSI C63.10-2013**

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

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

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

Tested by (name + signature).....: Reak Yang
 Project Engineer 

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

Date of issue.....: July 02, 2018

Revision History

Revision	Issue Date	Revisions	Revised By
00	July 02, 2018	Initial released Issue	Simple Guan

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 15:2017	15.207	P
6dB Bandwidth	FCC PART 15:2017	15.247 (a)(2)	P
Output Power	FCC PART 15:2017	15.247 (b)(3)	P
Radiated Spurious Emission	FCC PART 15:2017	15.247 (c)	P
Conducted Spurious & Band Edge Emission	FCC PART 15:2017	15.247 (d)	P
Power Spectral Density	FCC PART 15:2017	15.247 (e)	P
Radiated Band Edge Emission	FCC PART 15:2017	15.205	P
Antenna Requirement	FCC PART 15:2017	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	: Thiamis Embedded Platform
Model Number	: Thiamis X module
Diff	: N/A
Trademark	: N/A
Test Voltage	: DC 3.9V from Main Board
Operation frequency	: IEEE 802.11b/g: 2412MHz-2462MHz IEEE 802.11n HT20: 2412MHz-2462MHz
Channel No.	: IEEE 802.11b/g: 11 Channels IEEE 802.11n HT20: 11 Channels IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
Modulation type	: IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n :OFDM(64QAM, 16QAM, QPSK, BPSK)
Antenna Type	: Ceramics Antenna, Maximum Gain is 1.0dBi
Software version	: 0C010101
Hardware version	: 102

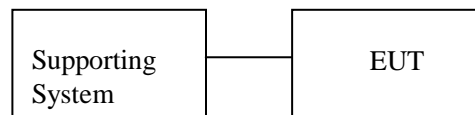
2.2. Accessories of Device (EUT)

Power Source : N/A

2.3. Tested Supporting System Details

No.	Description	Manufacturer	Model	Serial Number	Certification or DOC
1	Notebook	ACER	ZQT	N/A	DOC
2.	CC Debugger	TI	CC Debugger	N/A	N/A
3.	Serial board	TI	YP-05	N/A	N/A
4.	Serial board	TI	YP-05	N/A	N/A
5.	Development Board	Netronix	Thiamis X & G Development Board	N/A	N/A
6.	Power Supply	ABT	ABT030120	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

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 and IEEE 802.11n/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		

Setting output power (Max)			
802.11b	802.11g	802.11n(HT20)	802.11n(HT40)
14.0dBm	18.5dBm	19.0dBm	/

2.6. Test Conditions

Items	Required	Actual
Temperature range:	15-35°C	27°C
Humidity range:	25-75%	56%
Pressure range:	86-106kPa	980kPa

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 25, 2017 Certificated by IC
 Registration Number: 12135A

2.8.Measurement Uncertainty

(95% confidence levels, k=2)

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

2.9. Test Equipment List

Equipment	Manufacturer	Model No.	Serial No.	Last cal.	Cal. Due day
Spectrum analyzer	Agilent	E4407B	MY49510055	2017.09.23	2018.09.22
Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D(1201)	2016.09.30	2018.09.29
Filter	KANGMAI	ZLPF-LDC-1000- 1959	1209002075	2017.09.22	2018.09.21
Filter	WAINWRIGHT	WHKX2.80 /18G- 12SS	SN1	2017.09.22	2018.09.21
RF Cable	Resenberger	Cable 4	N/A	2017.09.22	2018.09.21
Signal Analyzer	Agilent	N9020A	MY499100060	2017.09.23	2018.09.22
Amplifier	HP	HP8347A	2834A00455	2017.09.23	2018.09.22
Amplifier	Agilent	8449B	3008A02664	2017.09.23	2018.09.22
Filter	WAINWRIGHT	WHKX1.0G/15G- 10SS	SN40	2017.09.22	2018.09.21
Test Receiver	ROHDE&SCHWARZ	ESR	1316.3003K03-102082-Wa	2017.09.23	2018.09.22
Bilog Antenna	SCHWARZBECK	VULB 9168	9168-438	2016.09.30	2018.09.29
9*6*6 anechoic chamber	CHENYU	9*6*6	N/A	2016.07.21	2020.07.20
RF Cable	Resenberger	Cable 1	N/A	2017.09.22	2018.09.21
RF Cable	Resenberger	Cable 2	N/A	2017.09.22	2018.09.21
RF Cable	Resenberger	Cable 3	N/A	2017.09.28	2018.09.27
Power Sensor	DARE	RPR3006W	15100041SNO91	2017.09.23	2018.09.22
Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2016.09.29	2018.09.28
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170294	2017.02.22	2019.02.21
Preamplifier	SCHWARZBECK	BBV9721	9721-031	2017.09.03	2018.09.02
Attenuator	HP	8494B	DC-18G	2017.10.22	2018.10.23
Spectrum analyzer	ROHDE&SCHWARZ	FSQ40	200061	2017.12.28	2018.12.27
Power meter	Agilent	E4419B	GB40202122	2017.09.22	2018.09.21
20dB Attenuator	ICPROBING	IATS1	82347	2017.09.22	2018.09.21
L.I.S.N.#1	Schwarzbeck	NSLK8126	8126466	2017.09.22	2018.09.21

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 up to 1GHz and above 1GHz, The EUT was placed on a rotating 0.8 m high above ground, The table was rotated 360 degrees to determine the position of the highest radiation

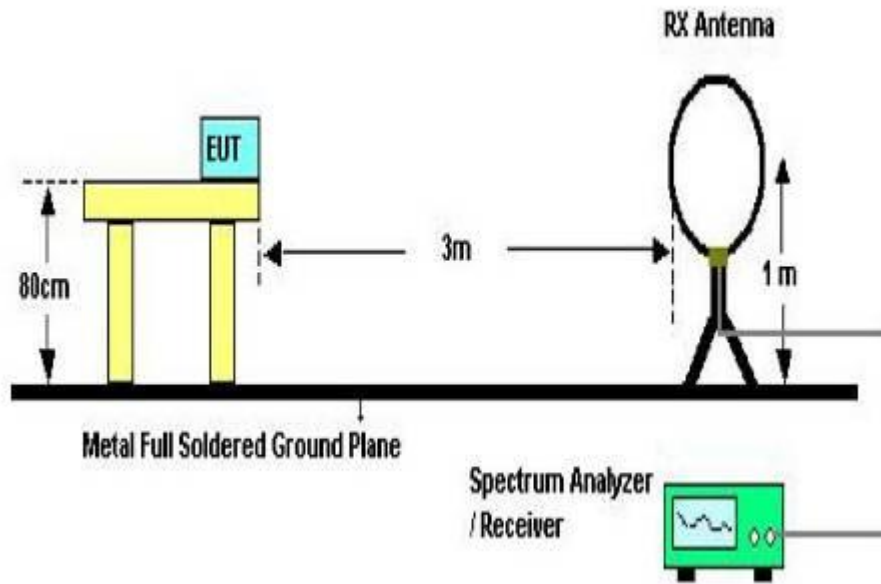
The Test antenna shall vary between 1m and 4m,Both Horizontal and Vertical antenna are set of make measurement.

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 Quisia Peak Detector mode premeasured

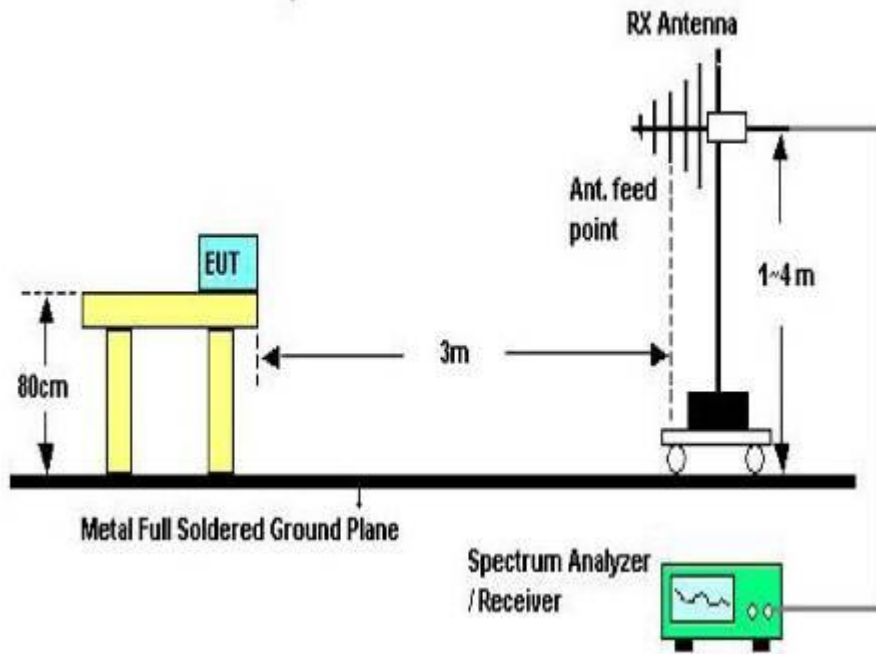
If Peak value comply with QP limit Below 1GHz.The EUT deemed to comply with QP limit. But the Peak value and average value both need to comply with applicable limit above 1GHz.

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

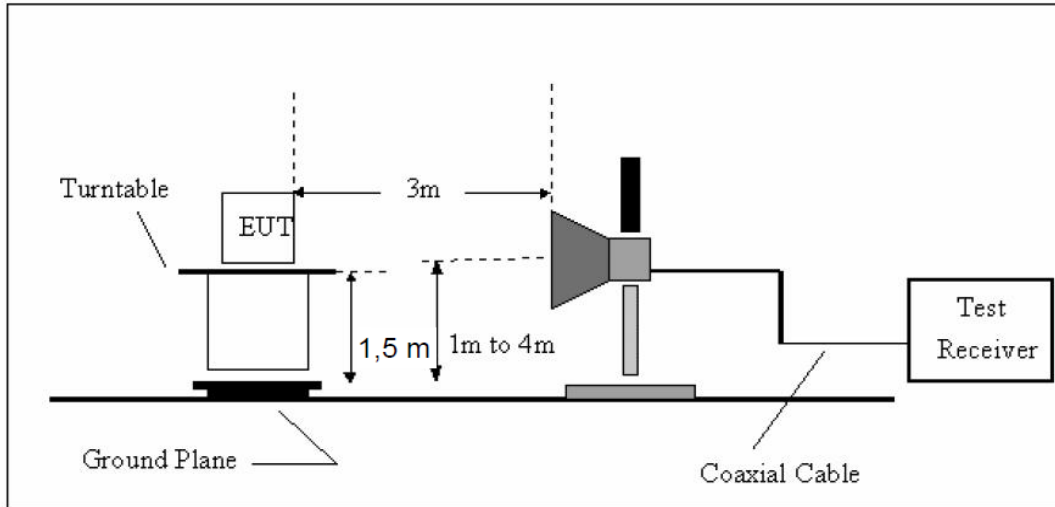
3.3. Test Setup



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.

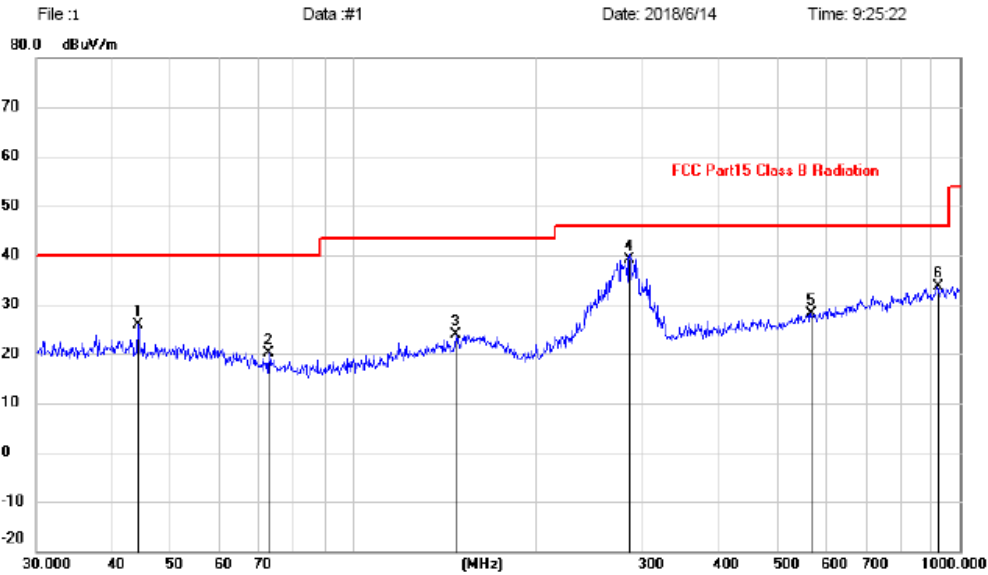
2.Only show the test data of the worst Channel in this report.

Site LAB
 Limit: FCC Part15 Class B Radiation
 EUT: Thiamis Embedded Platform
 M/N: Thiamis X module
 Mode: WIFI g 2462
 Note:
 Engineer Signature:

Polarization: *Horizontal*
 Power: AC 120V/60Hz
 Distance: 3m

Temperature: 23.9
 Humidity: 46 %

Radiated Emission Measurement

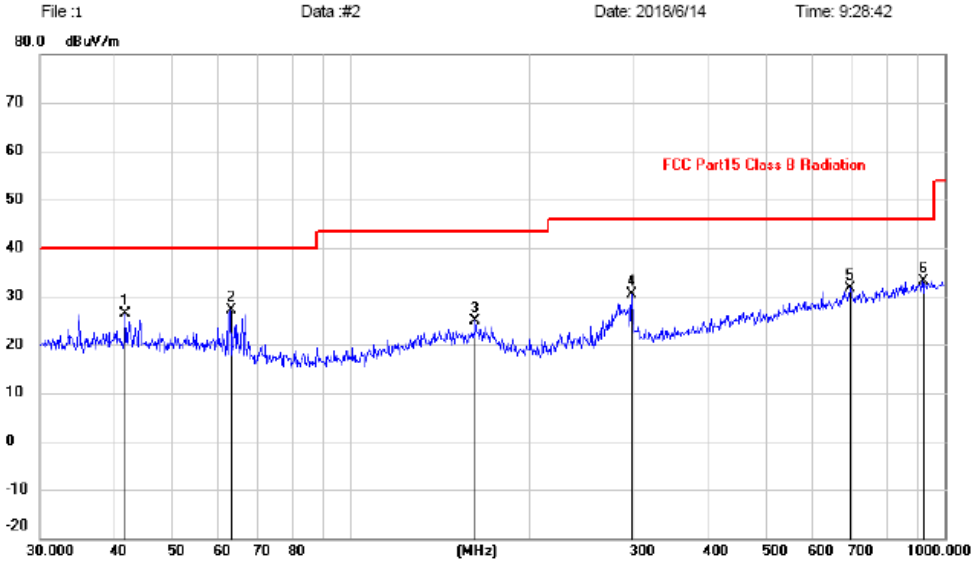


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		44.1202	12.07	13.85	25.92	40.00	-14.08			peak
2		72.5916	9.71	10.53	20.24	40.00	-19.76			peak
3		147.4036	9.50	14.36	23.86	43.50	-19.64			peak
4	*	284.9767	26.03	13.04	39.07	46.00	-6.93			QP
5		568.6127	9.06	19.07	28.13	46.00	-17.87			peak
6		919.2866	10.14	23.59	33.73	46.00	-12.27			peak

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

Site: LAB	Polarization: <i>Vertical</i>	Temperature: 23.9
Limit: FCC Part15 Class B Radiation	Power: AC 120V/60Hz	Humidity: 46 %
EUT: Thiamis Embedded Platform	Distance: 3m	
M/N: Thiamis X module		
Mode: WIFI g 2462		
Note:		
Engineer Signature:		

Radiated Emission Measurement



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		41.7129	12.29	14.12	26.41	40.00	-13.59	peak		
2		62.8708	14.80	12.24	27.04	40.00	-12.96	peak		
3		162.6106	10.63	14.37	25.00	43.50	-18.50	peak		
4		297.2241	16.98	13.39	30.37	46.00	-15.63	peak		
5		691.9867	10.80	20.77	31.57	46.00	-14.43	peak		
6	*	919.2866	9.58	23.59	33.17	46.00	-12.83	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 and channels have been tested and only listed TX 802.11g 2462MHz mode that is worst data

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	43.35	V	33.95	10.18	34.26	54.04	74	19.96	PK
4824	33.17	V	33.95	10.18	34.26	43.91	54	10.09	AV
7236									
9648									
4824	42.05	H	33.95	10.18	34.26	52.76	74	21.24	PK
4824	31.30	H	33.95	10.18	34.26	41.54	54	12.46	AV
7236									
9648									
Test Mode: IEEE 802.11b TX Mid									
4874	41.01	V	33.93	10.2	34.29	50.82	74	23.18	PK
4874	33.73	V	33.93	10.2	34.29	42.67	54	11.33	AV
7311									
9748									
4874	42.04	H	33.93	10.2	34.29	51.77	74	22.23	PK
4874	33.49	H	33.93	10.2	34.29	42.46	54	11.54	AV
7311									
9748									
Test Mode: IEEE 802.11b TX High									
4924	41.82	V	33.98	10.22	34.25	52.3	74	21.7	PK
4924	31.86	V	33.98	10.22	34.25	42.27	54	11.73	AV
7386									
9848									
4924	41.84	H	33.98	10.22	34.25	52.21	74	21.79	PK
4924	30.96	H	33.98	10.22	34.25	41.72	54	12.28	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 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	43.05	V	33.95	10.18	34.26	53.32	74	20.68	PK
4824	31.50	V	33.95	10.18	34.26	41.56	54	12.44	AV
7236									
9648									
4824	43.01	H	33.95	10.18	34.26	53.63	74	20.37	PK
4824	34.41	H	33.95	10.18	34.26	44.28	54	9.72	AV
7236									
9648									
Test Mode: IEEE 802.11g TX Mid									
4874	40.84	V	33.93	10.2	34.29	51	74	23	PK
4874	32.81	V	33.93	10.2	34.29	42.86	54	11.14	AV
7311									
9748									
4874	41.63	H	33.93	10.2	34.29	51.99	74	22.01	PK
4874	32.14	H	33.93	10.2	34.29	42.41	54	11.59	AV
7311									
9748									
Test Mode: IEEE 802.11g TX High									
4924	42.06	V	33.98	10.22	34.25	51.71	74	22.29	PK
4924	33.10	V	33.98	10.22	34.25	42.74	54	11.26	AV
7386									
9848									
4924	42.70	H	33.98	10.22	34.25	51.87	74	22.13	PK
4924	32.67	H	33.98	10.22	34.25	42.26	54	11.74	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 802.11n 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	45.13	V	33.95	10.18	34.26	54.07	74	19.93	PK
4824	32.08	V	33.95	10.18	34.26	41.25	54	12.75	AV
7236									
9648									
4824	42.97	H	33.95	10.18	34.26	52.33	74	21.67	PK
4824	32.55	H	33.95	10.18	34.26	42.02	54	11.98	AV
7236									
9648									
Test Mode:IEEE 802.11n HT20 TX Mid									
4874	41.26	V	33.93	10.2	34.29	51.35	74	22.65	PK
4874	31.48	V	33.93	10.2	34.29	42.31	54	11.69	AV
7311									
9748									
4874	40.80	H	33.93	10.2	34.29	51.28	74	22.72	PK
4874	31.74	H	33.93	10.2	34.29	42.13	54	11.87	AV
7311									
9748									
Test Mode:IEEE 802.11n HT20 TX High									
4924	41.30	V	33.98	10.22	34.25	52.03	74	21.97	PK
4924	31.76	V	33.98	10.22	34.25	42.28	54	11.72	AV
7386									
9848									
4924	41.15	H	33.98	10.22	34.25	51.87	74	22.13	PK
4924	31.87	H	33.98	10.22	34.25	42.26	54	11.74	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.									

4. POWER LINE CONDUCTED EMISSION

4.1. Test Limits

Frequency MHz	Limits dB(μ V)	
	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

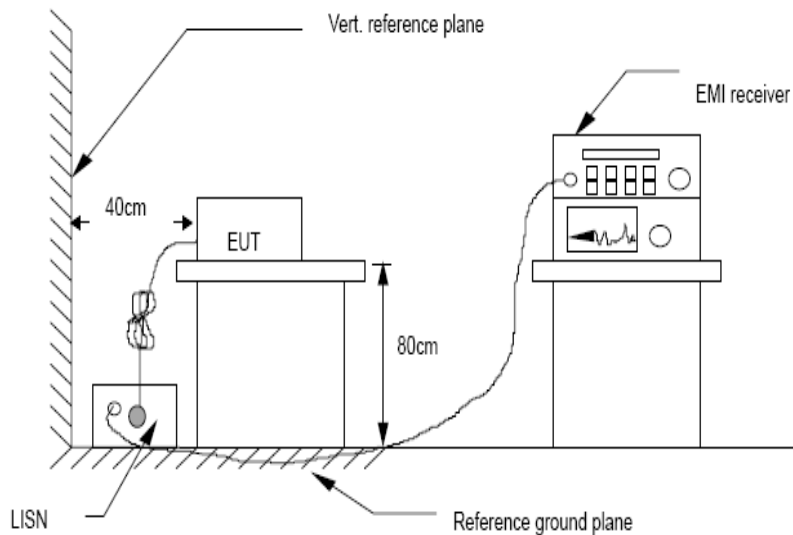
- Notes: 1. *Decreasing linearly with logarithm of frequency.
 2. The lower limit shall apply at the transition frequencies.
 3. The limit decreases in line with the logarithm of the frequency in the rang of 0.15 to 0.50 MHz.

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

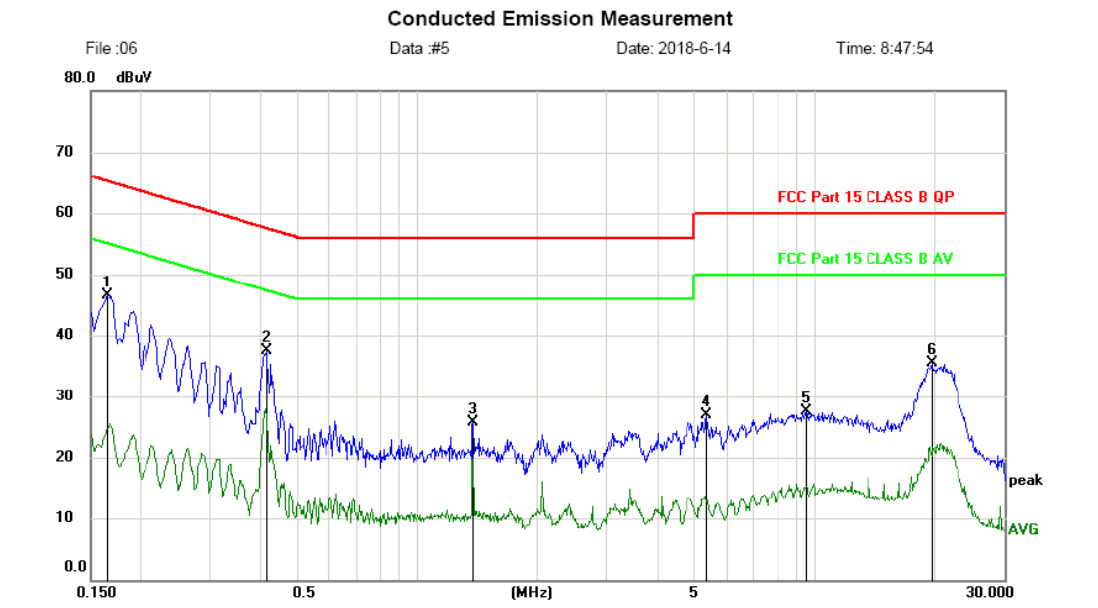


4.4. Test Results

Site LAB
 Limit: FCC Part 15 CLASS B QP
 EUT: Thiamis Embedded Platform
 M/N: Thiamis X module
 Mode: WIFI g 2462
 Note:
 Engineer Signature:

Phase: **L1**
 Power: AC 120V/60Hz

Temperature: 24.9
 Humidity: 47 %



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measurement dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1650	36.79	9.73	46.52	65.21	-18.69	peak	
2		0.4170	27.68	9.78	37.46	57.51	-20.05	peak	
3		1.3740	15.79	9.86	25.65	56.00	-30.35	peak	
4		5.3490	16.71	10.20	26.91	60.00	-33.09	peak	
5		9.5130	17.07	10.34	27.41	60.00	-32.59	peak	
6		19.7250	25.03	10.50	35.53	60.00	-24.47	peak	

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

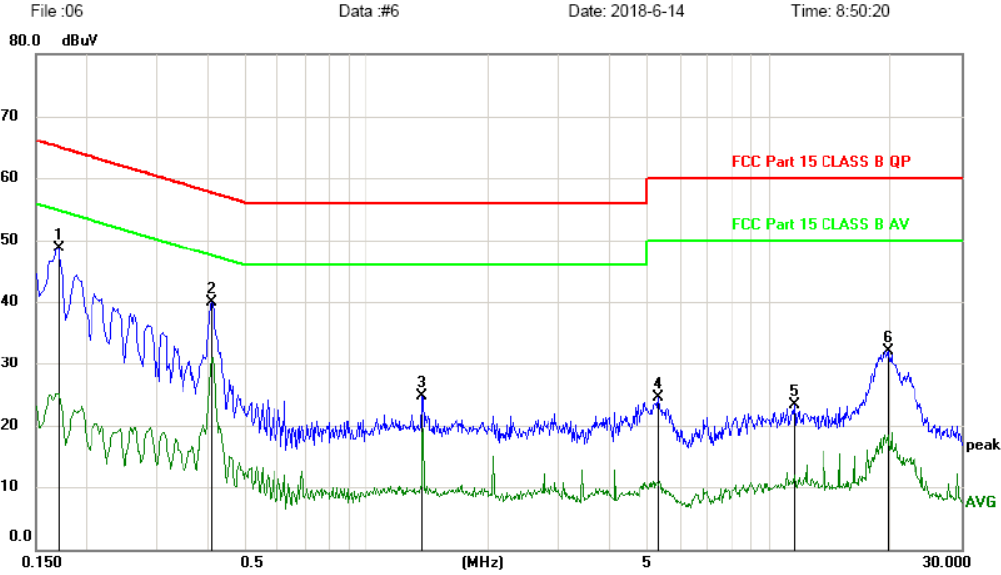
Note: Measurement=Reading Level+Correc Factor. Factor=(LISN or ISN or PLC or Current Probe)Factor+Cable

Site LAB
 Limit: FCC Part 15 CLASS B QP
 EUT: Thiamis Embedded Platform
 M/N: Thiamis X module
 Mode: WIFI g 2462
 Note:
 Engineer Signature:

Phase: **N**
 Power: AC 120V/60Hz

Temperature: 24.9
 Humidity: 47 %

Conducted Emission Measurement



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Margin dB	Detector	Comment
1	*	0.1710	39.04	9.73	48.77	64.91	-16.14	peak	
2		0.4110	30.06	9.78	39.84	57.63	-17.79	peak	
3		1.3710	14.93	9.86	24.79	56.00	-31.21	peak	
4		5.2860	14.37	10.20	24.57	60.00	-35.43	peak	
5		11.5170	12.90	10.35	23.25	60.00	-36.75	peak	
6		19.7280	21.57	10.50	32.07	60.00	-27.93	peak	

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

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

Remark: All modes and channels have been tested and only listed TX 802.11g 2462MHz mode that is worst data

5. CONDUCTED MAXIMUM OUTPUT POWER

5.1. Test limits

Please refer section 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 V04

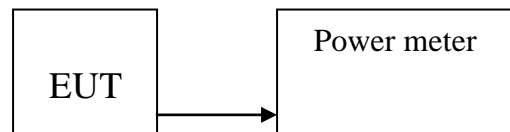
5.2.1 Place the EUT on the table and set it in transmitting mode.

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 peak 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)	Ant Port	PK Output power(dBm)		Limit (dBm)	Margin (dB)
IEEE 802.11 b	CH1: 2412	0	12.44	12.44	30	17.56
		1	/			
	CH6: 2437	0	13.40	13.40	30	16.60
		1	/			
	CH11: 2462	0	11.24	11.24	30	18.76
		1	/			
IEEE 802.11 g	CH1: 2412	0	15.05	15.05	30	14.95
		1	/			
	CH6: 2437	0	17.95	17.95	30	12.05
		1	/			
	CH11: 2462	0	13.57	13.57	30	16.43
		1	/			
IEEE 802.11 n/HT20 with 2.4G	CH1: 2412	0	14.47	14.47	30	15.33
		1	/			
	CH6: 2437	0	18.20	18.20	30	11.80
		1	/			
	CH11: 2462	0	13.04	13.04	30	16.96
		1	/			
Conclusion: PASS						

6. PEAK POWER SPECTRAL DENSITY

6.1. Test limits

6.1.1 Please refer section 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 V04

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

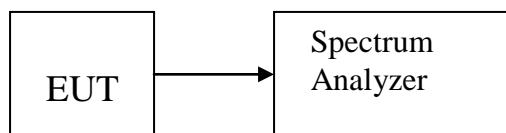
6.2.2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

6.2.3 Set the spectrum analyzer as $RBW = 3\text{kHz}$ (Set the RBW to: $3\text{ kHz} \leq RBW \leq 100\text{ kHz}$), $VBW = 10\text{kHz}$ (Set the $VBW \geq 3 \times RBW$), $\text{span} = 1.5 \times \text{DTS bandwidth}$., 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.

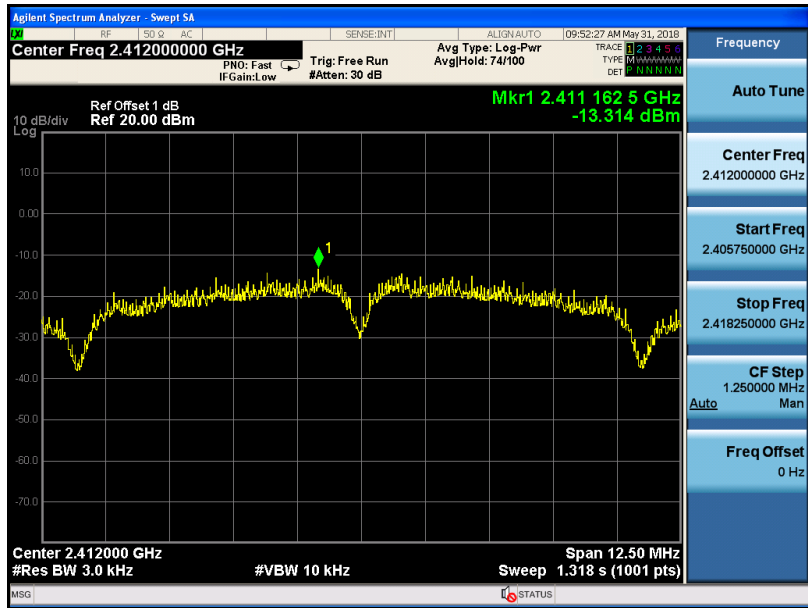
6.3. Test Setup



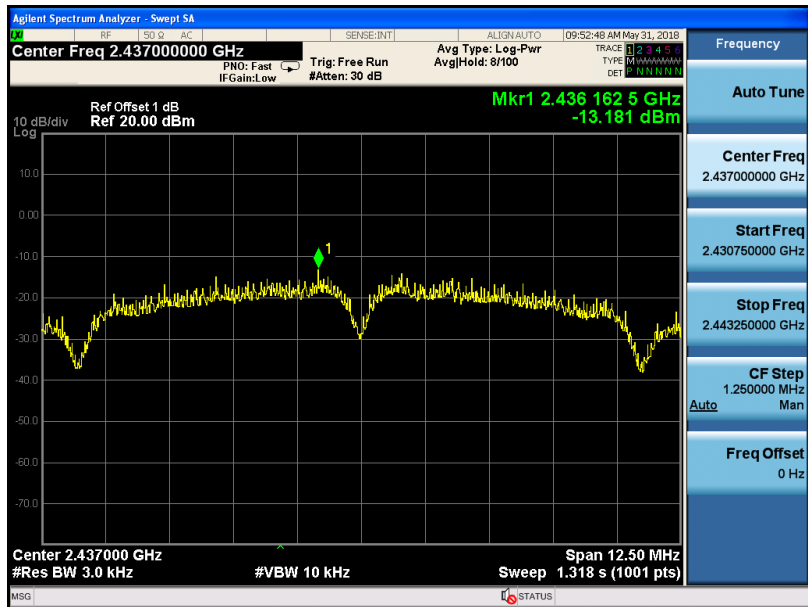
6.4. Test Results

Mode	Frequency (MHz)	Ant Port	PK Output power(dBm)		Limit (dBm)	Result
IEEE 802.11 b	CH1: 2412	0	-13.314	-13.314	8	PASS
		1	/			
	CH6: 2437	0	-13.181	-13.181	8	PASS
		1	/			
	CH11: 2462	0	-15.241	-15.241	8	PASS
		1	/			
IEEE 802.11 g	CH1: 2412	0	-18.784	-18.784	8	PASS
		1	/			
	CH6: 2437	0	-15.586	-15.586	8	PASS
		1	/			
	CH11: 2462	0	-20.710	-20.710	8	PASS
		1	/			
IEEE 802.11 n/HT20 with 2.4G	CH1: 2412	0	-19.118	-19.118	8	PASS
		1	/			
	CH6: 2437	0	-15.388	-15.388	8	PASS
		1	/			
	CH11: 2462	0	-21.700	-21.700	8	PASS
		1	/			
Conclusion: PASS						

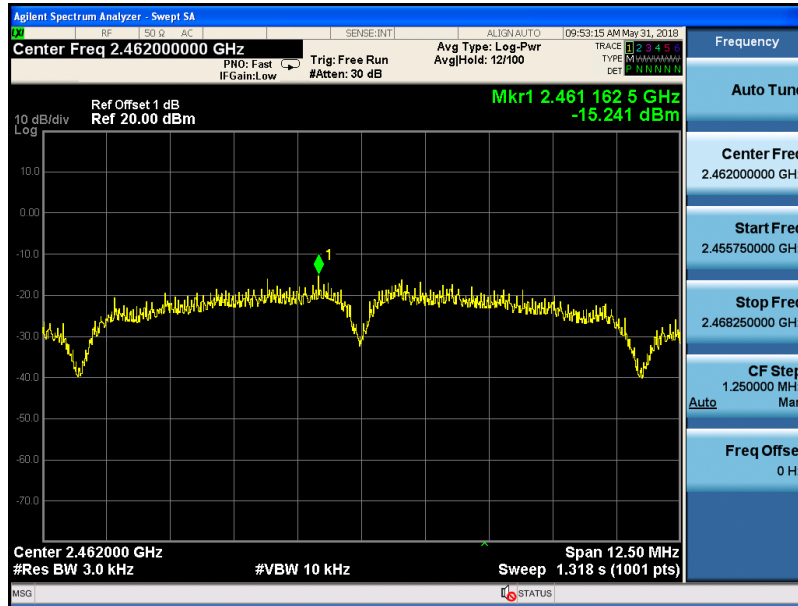
IEEE 802.11b :
CH Low :



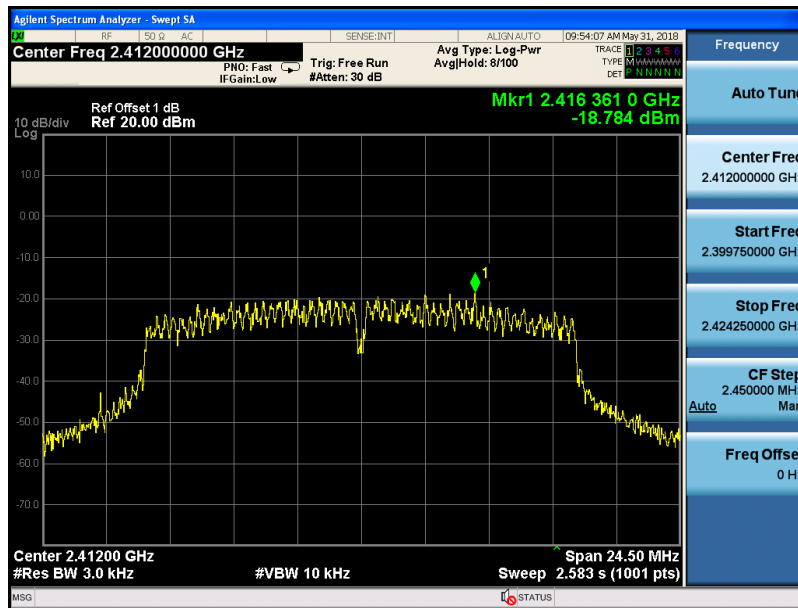
CH Mid:



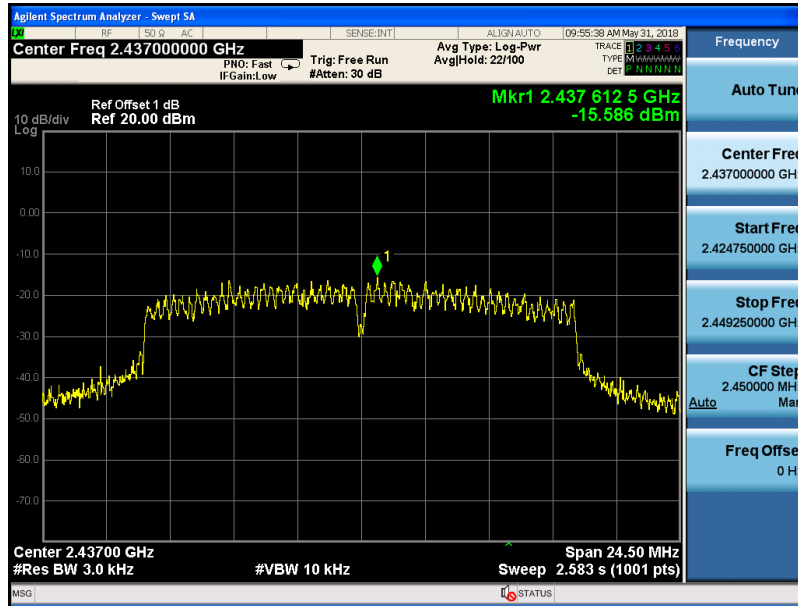
CH Hig:



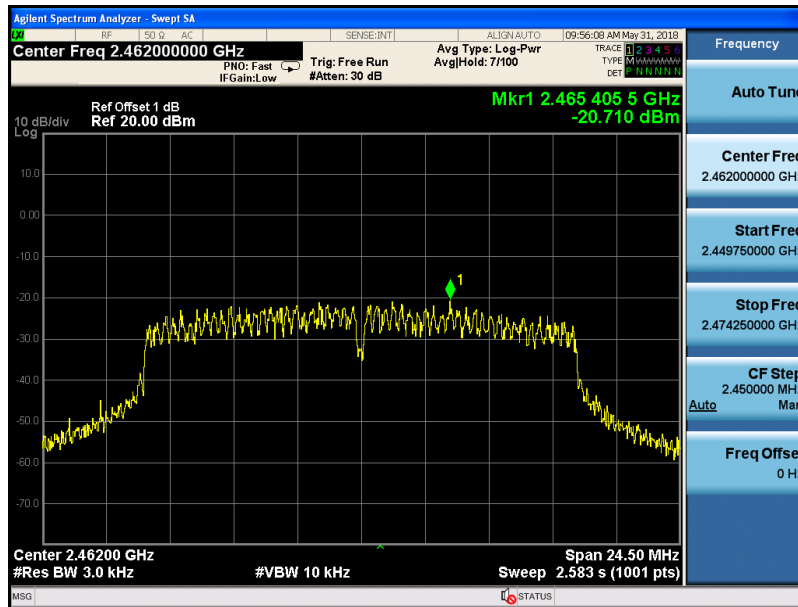
IEEE 802.11g :
CH Low



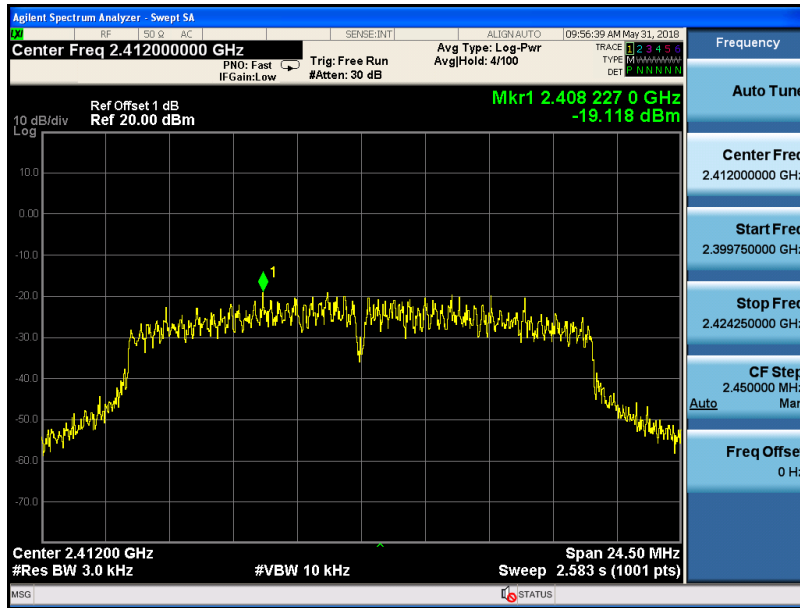
CH Mid:



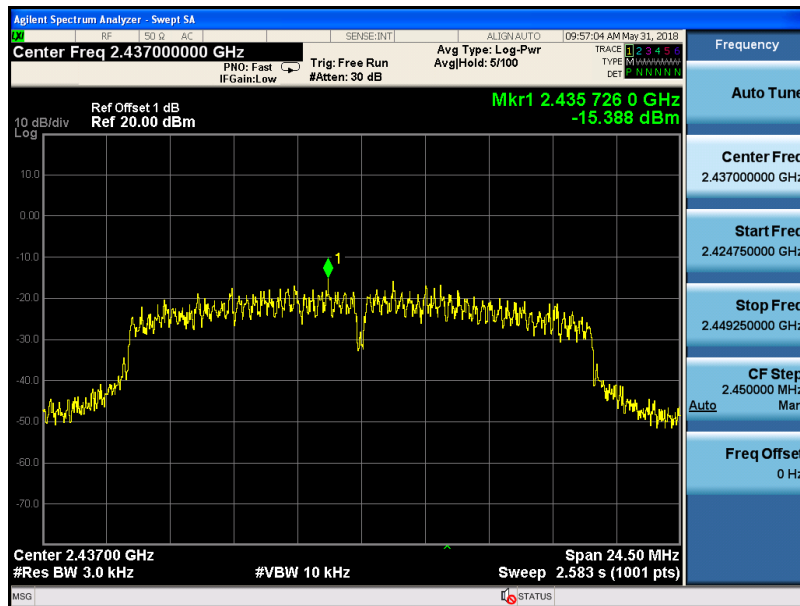
CH Hig:



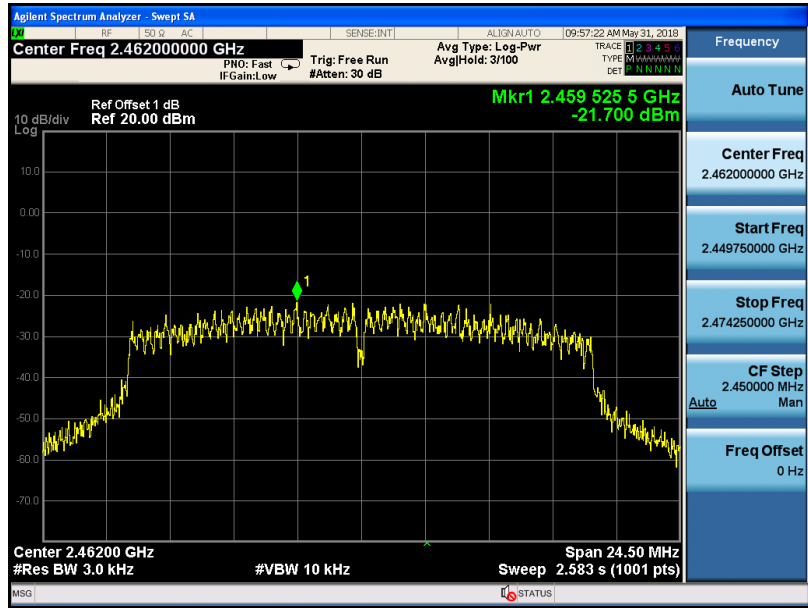
IEEE 802.11n HT20 :
CH Low :



CH Mid:



CH High:



7. BANDWIDTH

7.1. Test limits

Please refer section 15.247

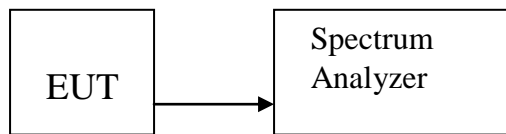
For direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz.

7.2. Test Procedure

Details see the KDB558074 D01 Meas Guidance V04

- a) The bandwidth is measured at an amplitude level reduced 20dB 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 $RBW = 100\text{kHz}$, $VBW \geq 3 * RBW = 300\text{kHz}$, Peak Detector, Sweep time set auto, detail see the test plot.

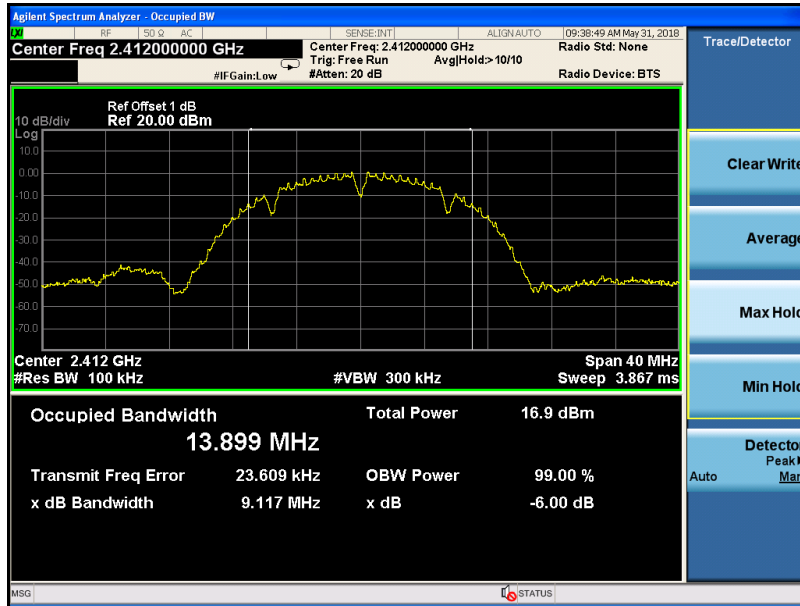
7.3. Test Setup



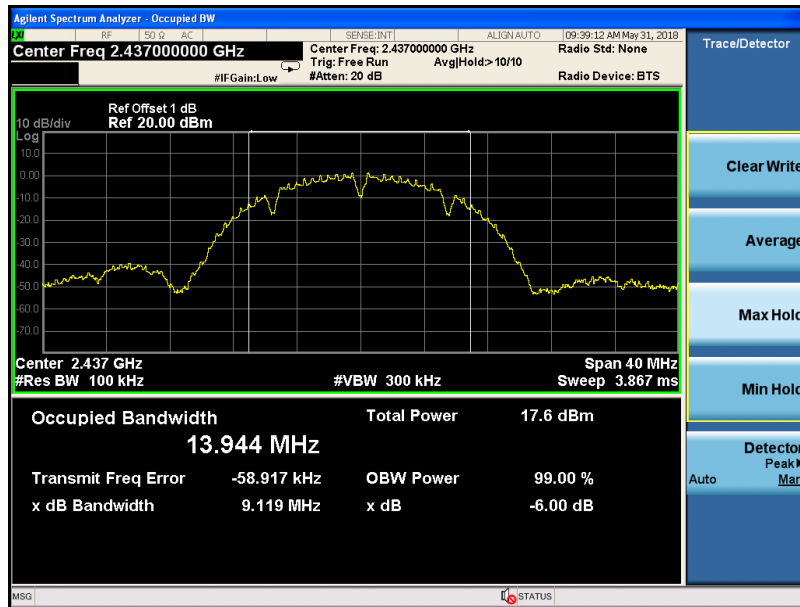
7.4. Test Results

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
IEEE 802.11b:					
Low	2412	9.117	13.899	0.5	PASS
Mid	2437	9.119	13.944	0.5	PASS
High	2462	9.112	13.946	0.5	PASS
IEEE 802.11g					
Low	2412	15.13	16.294	0.5	PASS
Mid	2437	15.12	16.541	0.5	PASS
High	2462	15.13	16.295	0.5	PASS
IEEE 802.11n/HT20					
Low	2412	15.13	17.422	0.5	PASS
Mid	2437	15.09	17.638	0.5	PASS
High	2462	15.13	17.421	0.5	PASS

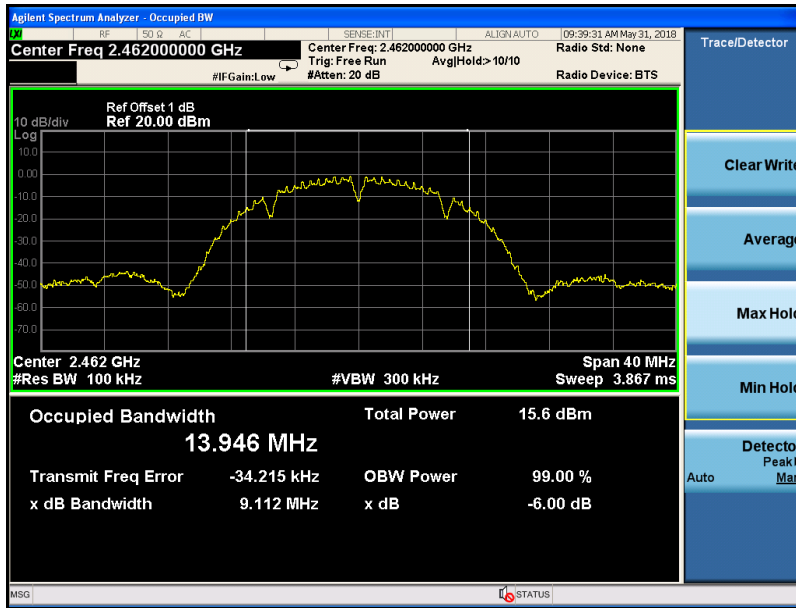
IEEE 802.11b:
CH Low :



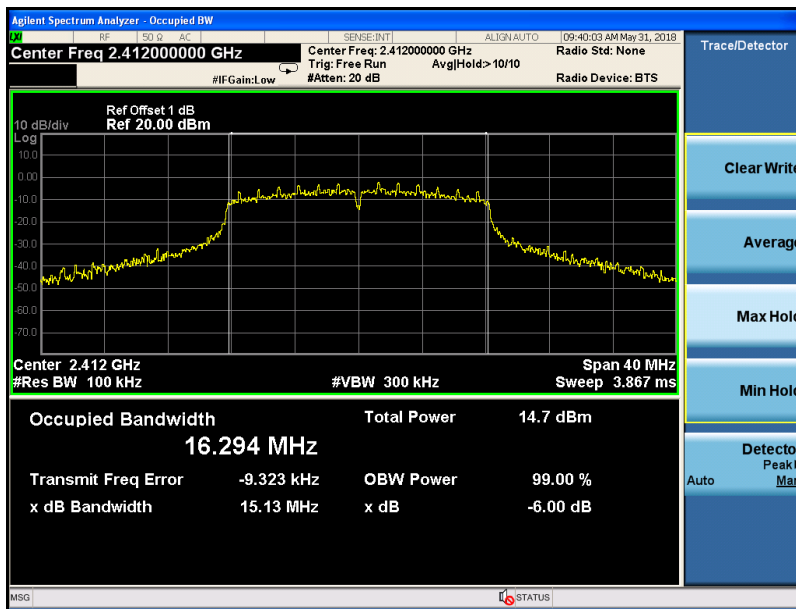
CH Mid :



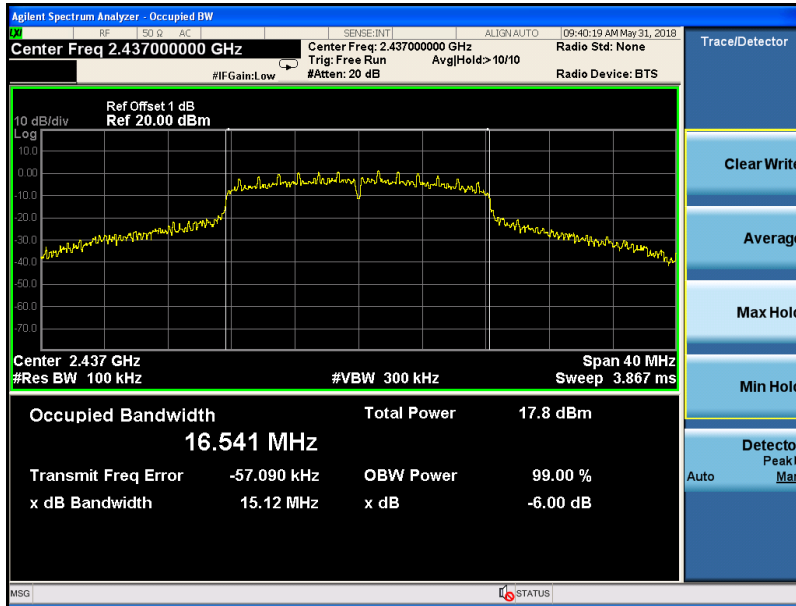
CH High :



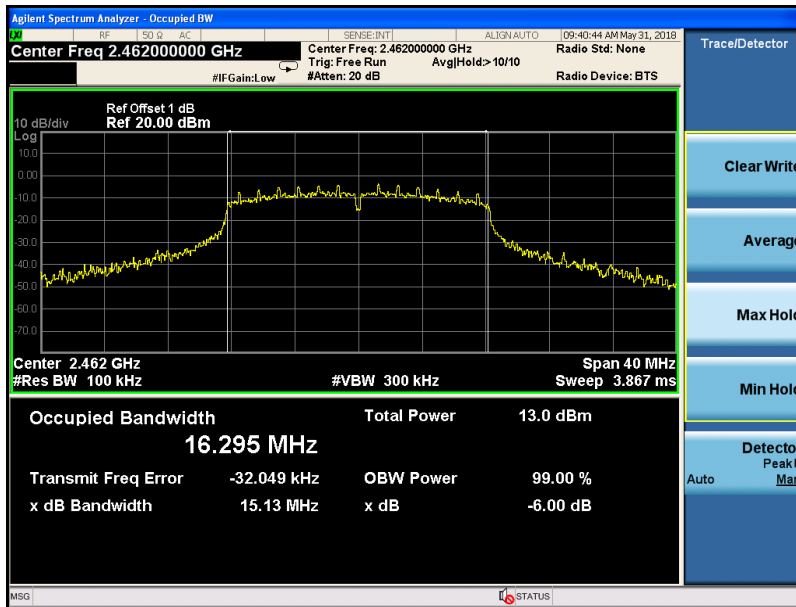
IEEE 802.11g:
CH Low :



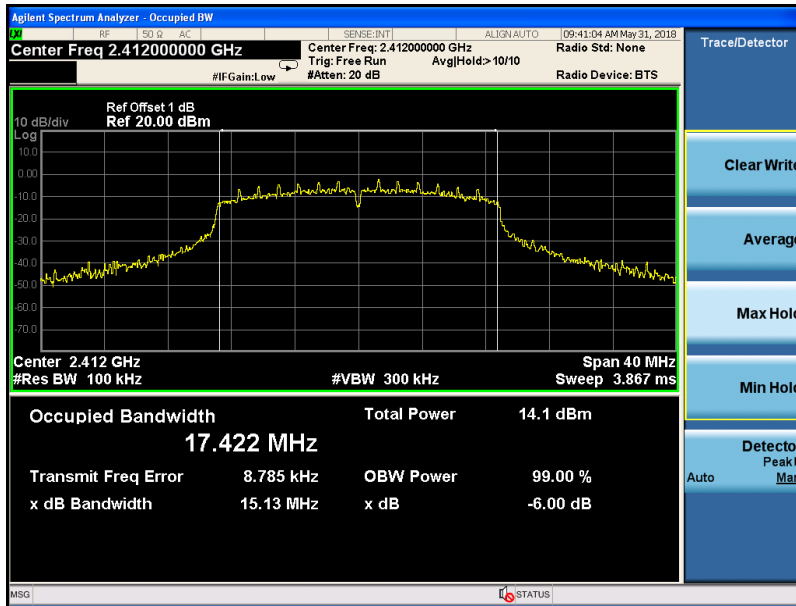
CH Mid:



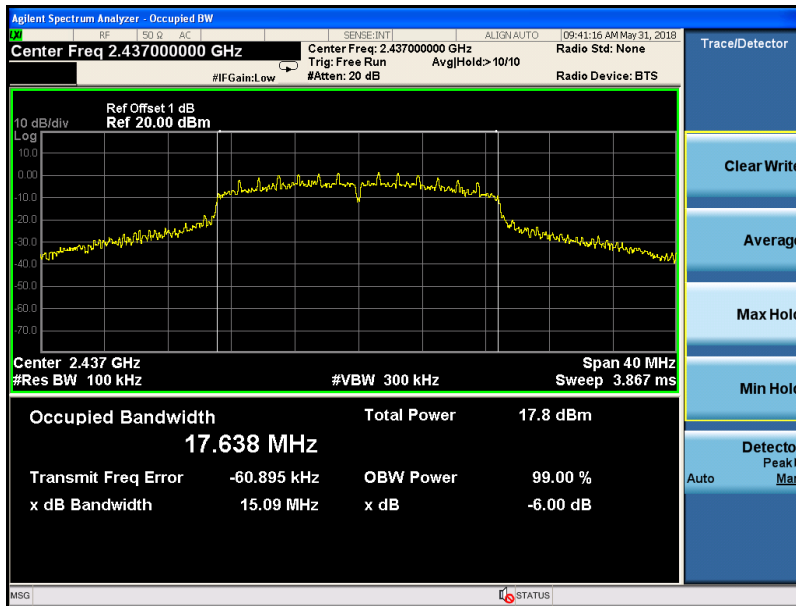
CH High



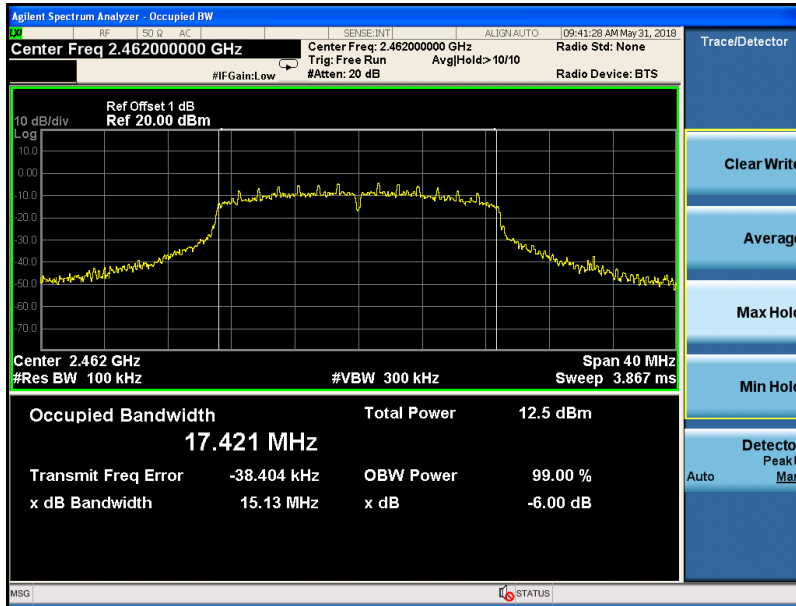
IEEE 802.11n HT20:
CH Low :



CH Mid :



CH High :



8. BAND EDGE CHECK

8.1. Test limits

Please refer section 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 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 V04

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.

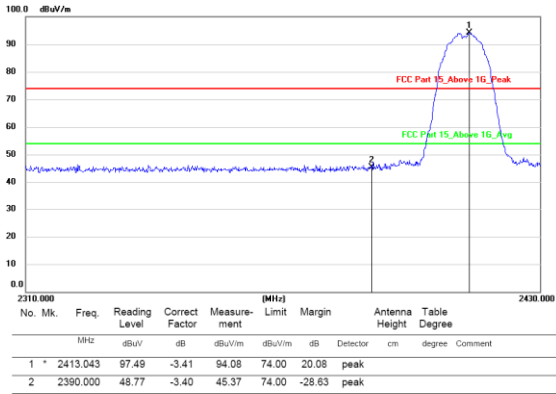
Detailed information please see the following page.

Radiated Method:

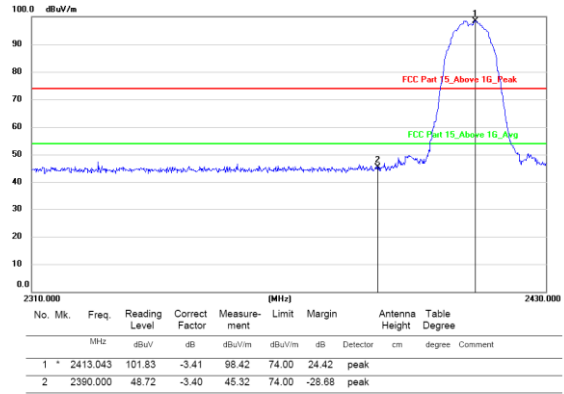
Note: 1. *:Maximum data; x:Over limit; !:over margin.

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

IEEE 802.11b TX LOW

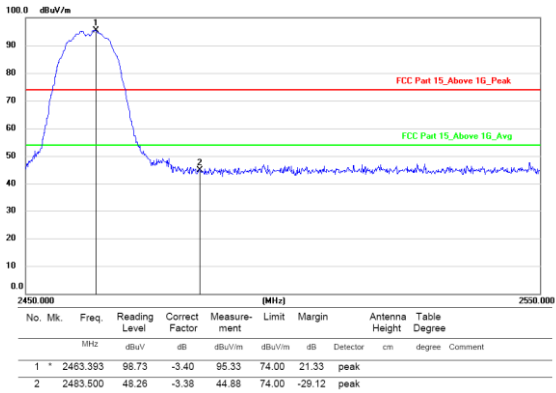


Vertical

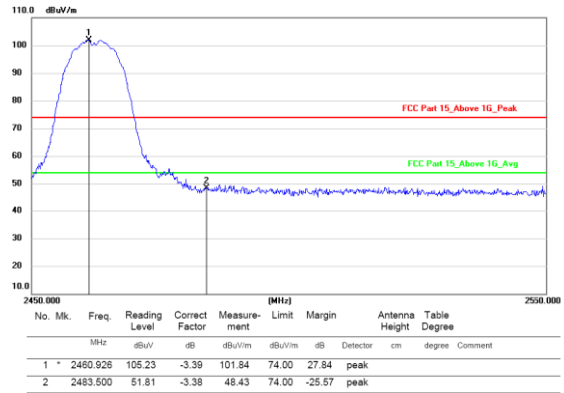


Horizontal

IEEE 802.11b TX High



Vertical



Horizontal

IEEE 802.11g TX LOW



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	
1	*	2414.635	100.18	-3.41	96.77	74.00	22.77			peak
2		2390.000	51.83	-3.40	48.43	74.00	-25.57			peak

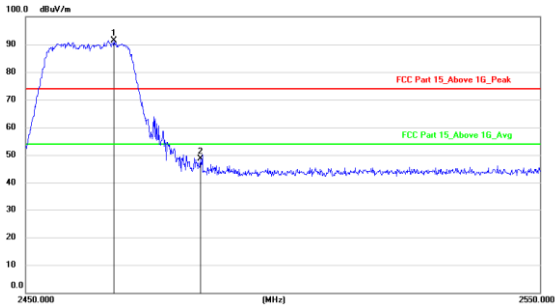
Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	
1		2390.000	60.66	-3.40	57.26	74.00	-16.74			peak
2	*	2414.635	105.92	-3.41	102.51	74.00	28.51			peak
3		2390.000	41.47	-3.40	38.07	74.00	-35.93			AVG

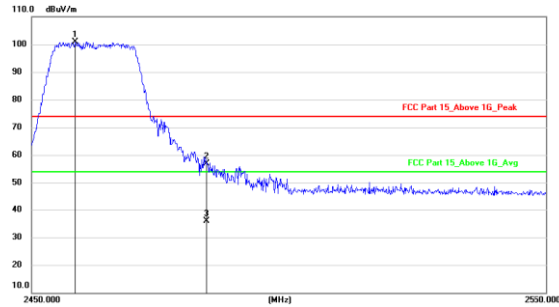
Horizontal

IEEE 802.11g TX High



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	
1	*	2466.852	94.82	-3.39	91.43	74.00	17.43			peak
2		2483.500	52.11	-3.38	48.73	74.00	-25.27			peak

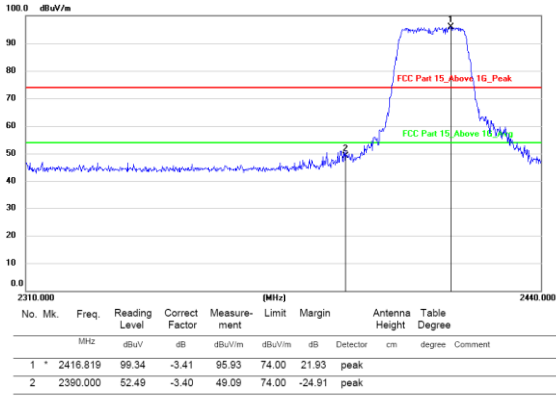
Vertical



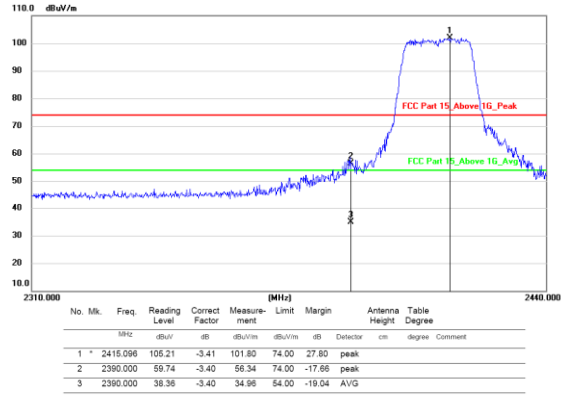
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	
1	*	2466.852	104.36	-3.39	100.97	74.00	26.97			peak
2		2483.500	60.30	-3.38	56.92	74.00	-17.08			peak
3		2483.500	39.23	-3.38	35.85	74.00	-38.15			AVG

Horizontal

IEEE 802.11n HT20 TX LOW

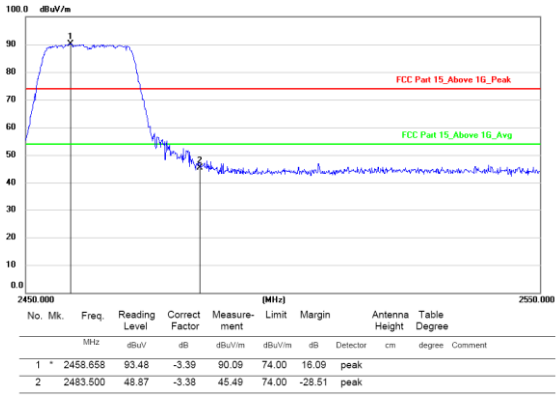


Vertical



Horizontal

IEEE 802.11n HT20 TX High

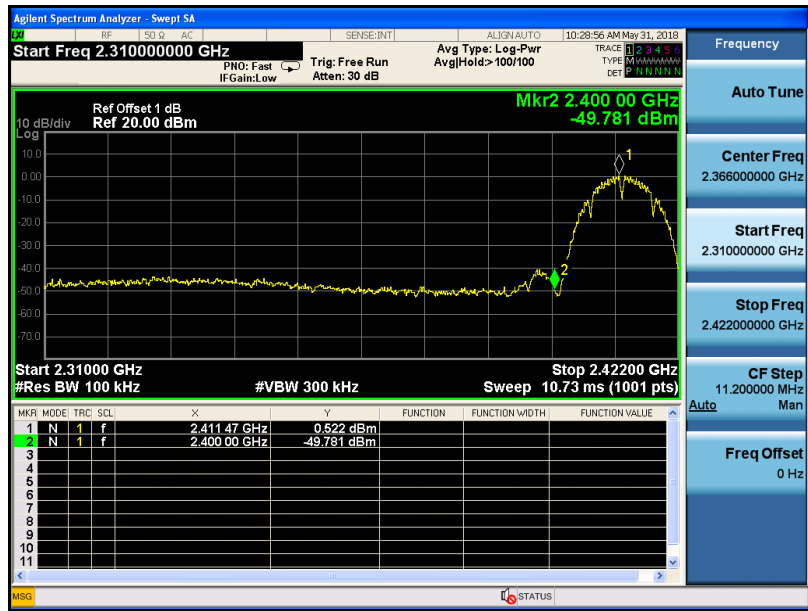


Vertical

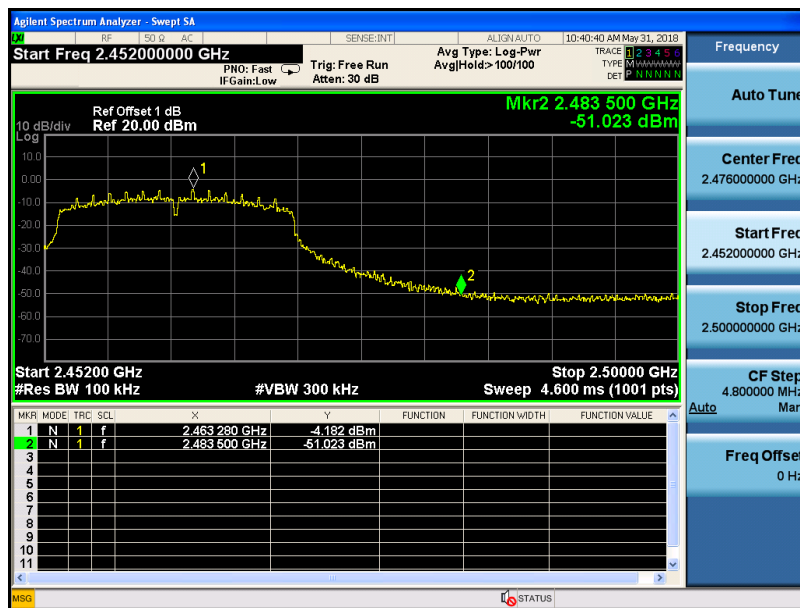
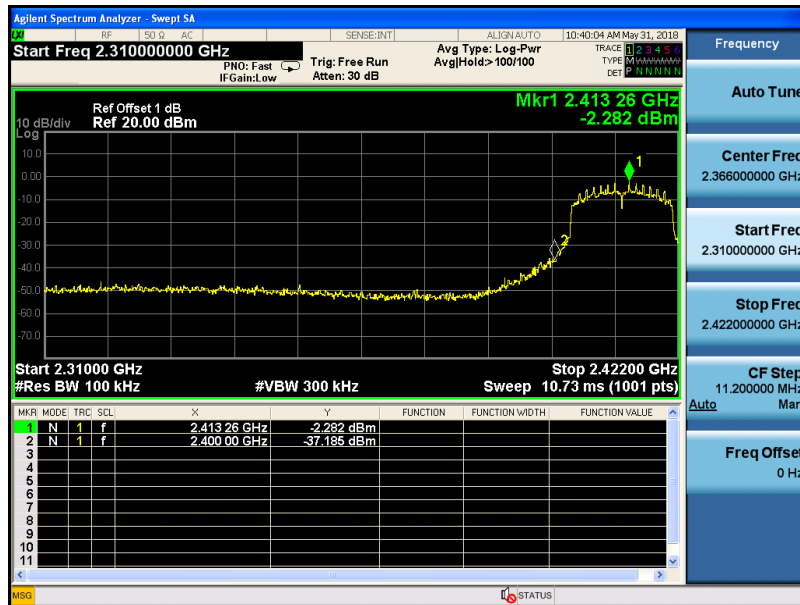


Horizontal

802.11b



802.11n HT20



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

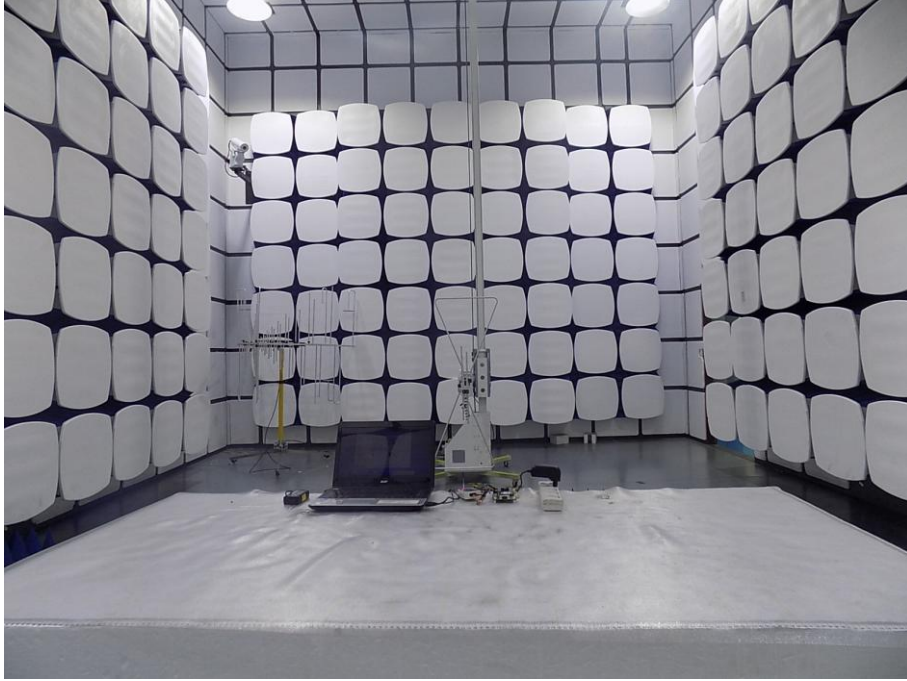
The antenna connector is unique antenna and no consideration of replacement. Please see EUT photo for details.

9.3. Results

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

10. TEST SETUP PHOTO

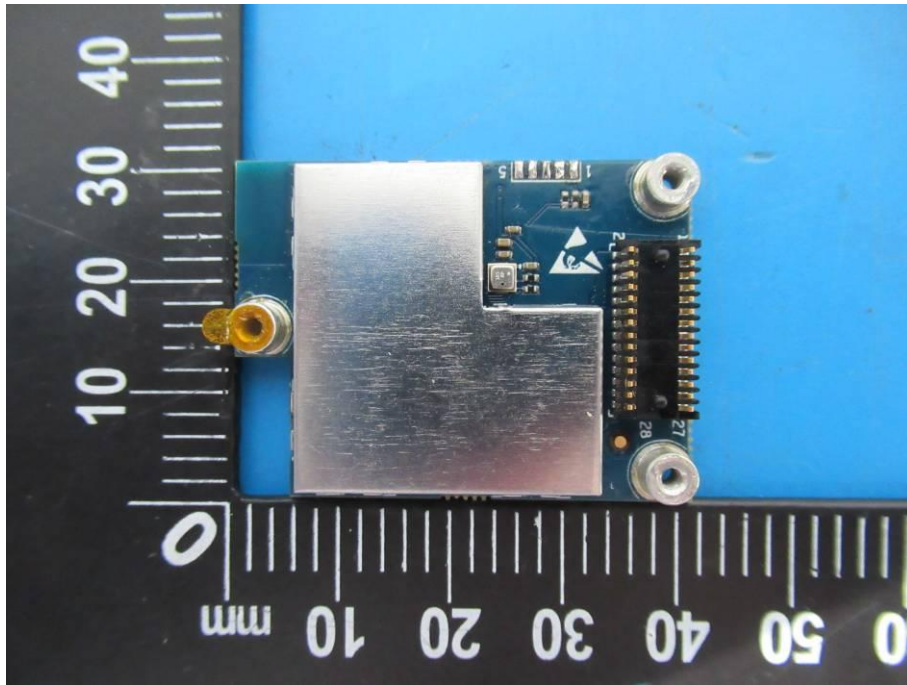
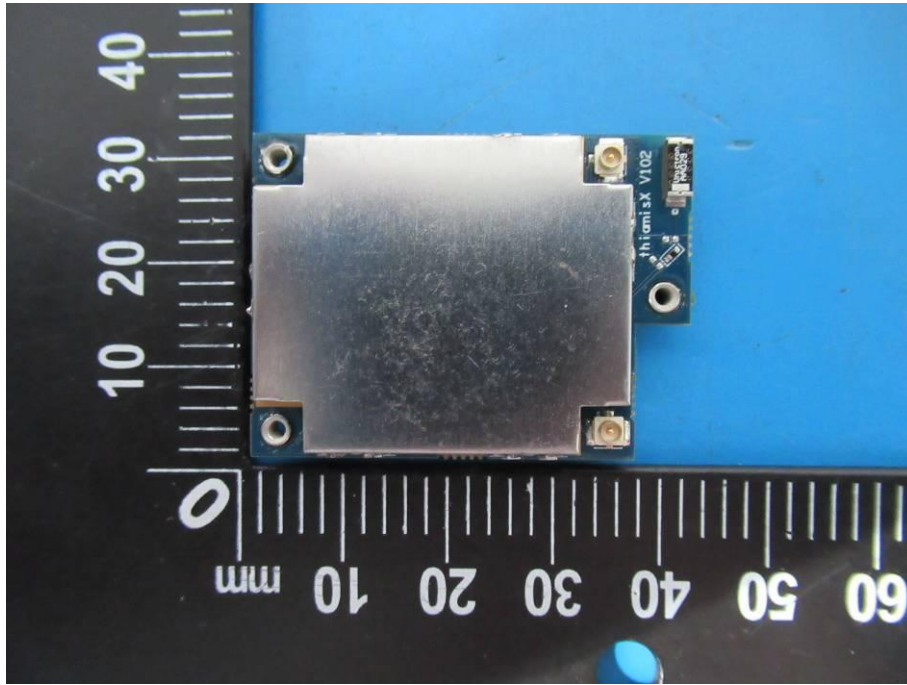
10.1.Photos of Radiated emission

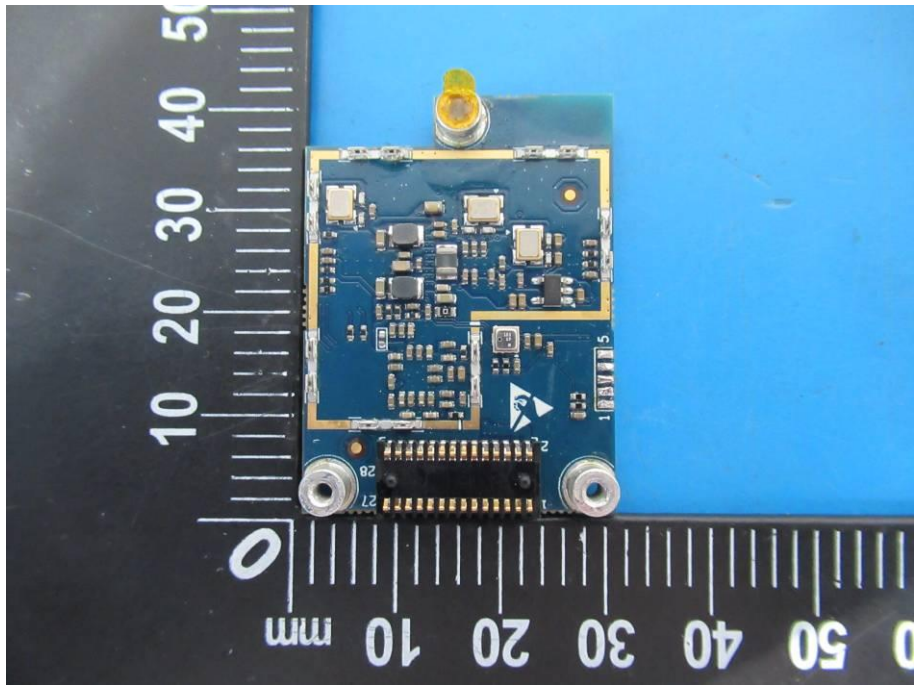
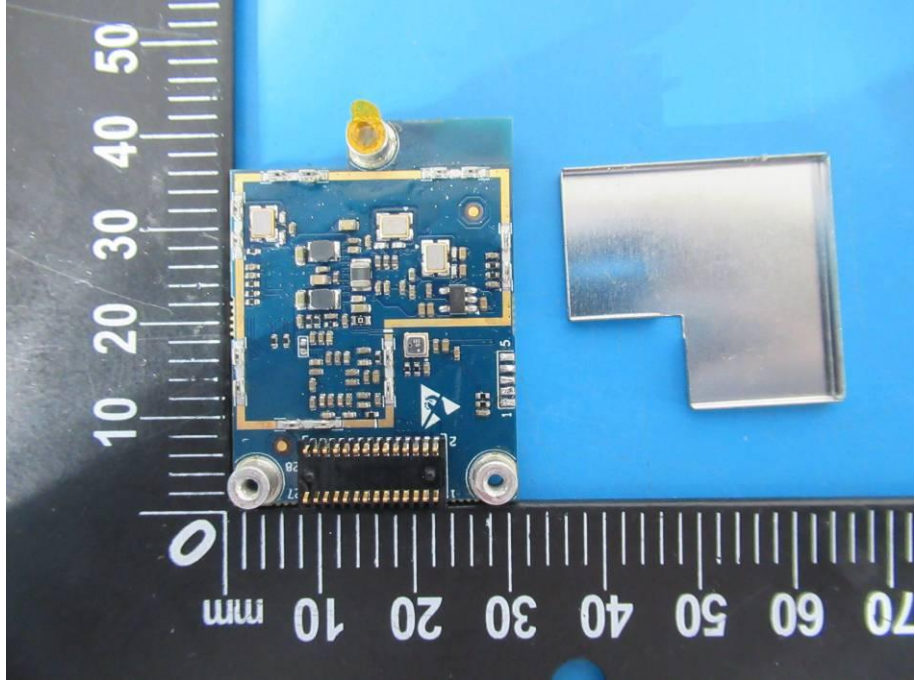


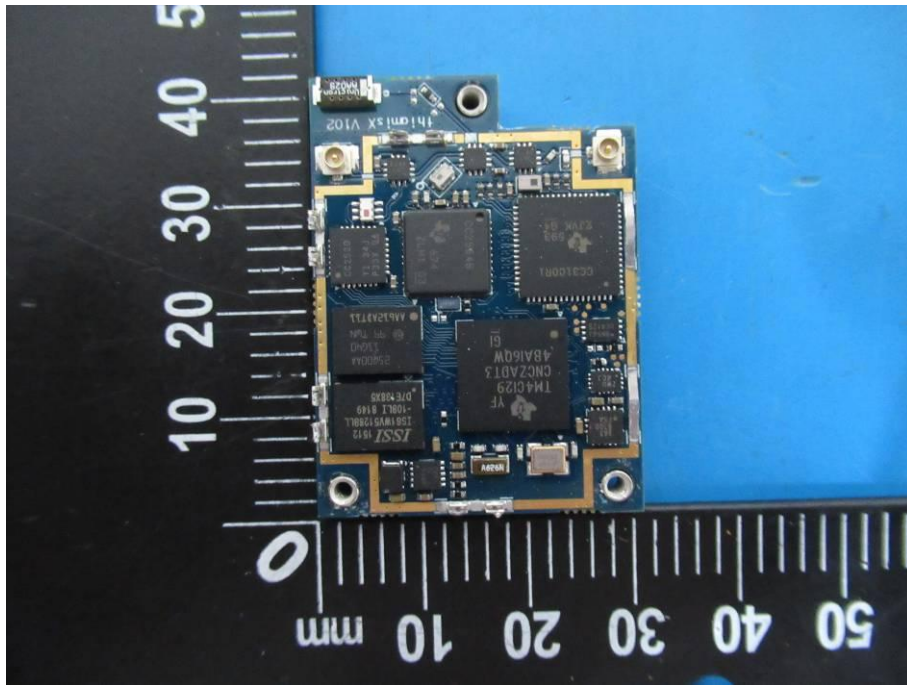
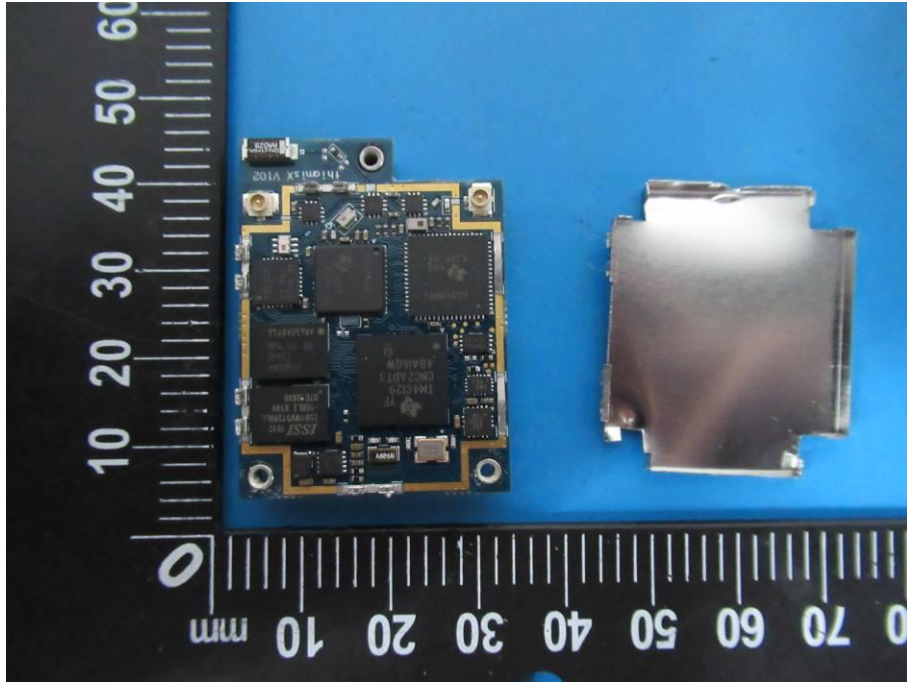
10.2.Photos of Conducted Emission test



11. TEST SETUP PHOTO







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