

FCC TEST REPORT
for
Risecomm Microelectronics (Shenzhen) Co., Ltd.

Smart Router
Model No.: ZNLY-201

Prepared for : Risecomm Microelectronics (Shenzhen) Co., Ltd.
Address : Skyworth Bldg. C501, Hi-Tech Industrial Park, Nanshan District,
Shenzhen, China

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited
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Report Number : R011505471I
Date of Test : Jul. 01~ 28, 2015
Date of Report : Jul. 28, 2015

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TEST REPORT

Applicant : Risecomm Microelectronics (Shenzhen) Co., Ltd.
Manufacturer : Risecomm Microelectronics (Shenzhen) Co., Ltd.
EUT : Smart Router
Model No. : ZNLY-201
Serial No. : N.A.
Trade Mark : N.A.
Rating : AC 100-240V, 50/60Hz, 38mA

Measurement Procedure Used:
FCC Part15 Subpart C 2014, Paragraph 15.247

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.


This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : Jul. 01~ 28, 2015

Prepared by :


(Tested Engineer / Kebo Zhang)

Reviewer :


(Project Manager / Amy Ding)

Approved & Authorized Signer :


(Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : Smart Router

Model Number : ZNLY-201

Test Power Supply : AC 120V, 60Hz

RF Transmission : 2412MHz~2462MHz (802.11b/802.11g)
Frequency

Channels : 11 For (802.11b/802.11g)

Modulation : 802.11b CCK
802.11g OFDM

Antenna Gain: : 2dBi

Applicant : Risecomm Microelectronics (Shenzhen) Co., Ltd.
Address : Skyworth Bldg. C501, Hi-Tech Industrial Park, Nanshan District,
Shenzhen, China

Manufacturer : Risecomm Microelectronics (Shenzhen) Co., Ltd.
Address : Skyworth Bldg. C501, Hi-Tech Industrial Park, Nanshan District,
Shenzhen, China

Factory : Risecomm Microelectronics (Shenzhen) Co., Ltd.
Address : Skyworth Bldg. C501, Hi-Tech Industrial Park, Nanshan District,
Shenzhen, China

Date of receipt : Jul. 01, 2015

Date of Test : Jul. 01~ 28, 2015

1.2. Auxiliary Equipment Used during Test

PC	: Manufacturer: DELL M/N: Optiplex 3020 MT S/N: CN-079V51-70163-4AD-089K-A00 Input Rating: AC 100-240V, 50-60Hz 5.4A CE , FCC DOC, CCC
MONITOR	: Manufacturer: DELL M/N: UZ2215Hf S/N: CN-035VN6-72872-45A-A3AB Input Rating: AC 100-240V, 50-60Hz, 1.5A Output Rating: DC 19.5V, 4.62A TUV-GS FCC CE KCC VCCI
MOUSE	: Manufacturer: DELL M/N: MS111-T S/N: CN-0KW2YH-71616-488-1CBJ Input Rating: DC 5V,0.1A Cable: 1.8m, unshielded CE FCC VCCI KCC TUV-GS
KEYBOARD	: Manufacturer: DELL M/N: SK-8120 S/N: CN-0DJ365-71616-49J-0MVR-A00 Input Rating: DC 5V,0.05A CE FCC VCCI KCC TUV-GS Cable: 1.8m, unshielded
Printer	: Manufacturer: Brother M/N: MFC-3360C S/N: N/A CE, FCC:DOC
Power Line	: Non-Shielded, 1.5m
VGA Cable	: Non-Shielded, 1.5m
A/C Manager	: KTJ-KM02J

1.3. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS - LAB Code: L3503

Shenzhen Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

FCC-Registration No.: 752021

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 752021, July 10, 2013.

IC-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A, February 22, 2013.

Test Location

All Emissions tests were performed at
Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC
Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong,
China

1.4. Measurement Uncertainty

Radiation Uncertainty : Ur = 4.1 dB (Horizontal)
Ur = 4.3 dB (Vertical)

Conduction Uncertainty : Uc = 3.4dB

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC Part 15, Paragraph 15.247.

2.1. Summary of Test Results

The EUT has been tested according to the following specifications:

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.107, 15.207	Conducted Emission Test	PASS	Complies
FCC Part 15, Paragraph 15.247(b)(1)	Maximum Output Power	PASS	Complies
FCC Part 15, Paragraph 15.247(a)(2)	6dB Bandwidth	PASS	Complies
FCC Part 15, Paragraph 15.247(c)	100kHz Bandwidth of Frequency Band Edges	PASS	Complies
FCC Part 15, Paragraph 15.209(a)(f)	Spurious Emission	PASS	Complies
FCC Part 15, Paragraph 15.247(a)(1)	Frequency Separation	-	N/A
FCC Part 15, Paragraph 15.247(a)(1)(iii)	Number of Hopping Frequency	-	N/A
FCC Part 15, Paragraph 15.247(a)(1)(iii)	Time of Occupancy	-	N/A
FCC Part 15, Paragraph 15.247(c)	Peak Power Density	PASS	Complies

2.2. Description of Test Modes

The EUT has been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

IEEE802.11b: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 1 Mbps lowest data rate (worst case) are chosen for the final testing.

IEEE802.11g: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 6 Mbps lowest data rate (the worst case) are chosen for the final testing.

2.3. List of channels:

√ - available

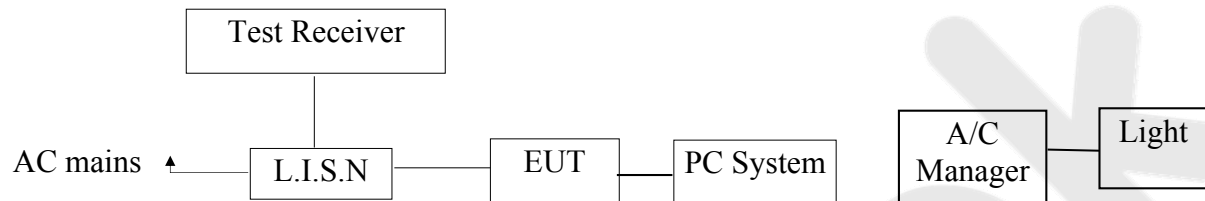
X - tested

Number	Frequency(MHz)		802.11 b/g
1	2412	√	X
2	2417	√	
3	2422	√	
4	2427	√	
5	2432	√	
6	2437	√	X
7	2442	√	
8	2447	√	
9	2452	√	
10	2457	√	
11	2462	√	X

3. Conducted Emission Test

3.1. Block Diagram of Test Setup

3.1.1. Block diagram of connection between the EUT and simulators



3.2. Power Line Conducted Emission Measurement Limits (15.207)

Frequency MHz	Limits dB(μV)	
	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.

3.3. Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4. Operating Condition of EUT

- 3.4.1. Setup the EUT and simulator as shown as Section 3.1.
- 3.4.2. Turn on the power of all equipment.
- 3.4.3. Let the EUT work in test mode (ON) and measure it.

3.5. Test Procedure

The EUT system 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 line 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 FCC ANSI C63.10-2013 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9KHz.

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

The test results are reported on Section 3.6.

3.6. Test equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Two-Line V-network	Rohde & Schwarz	ENV216	100055	Apr. 17, 2015	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 17, 2015	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 17, 2015	1 Year

3.7. Power Line Conducted Emission Measurement Results

PASS.

The frequency range from 150KHz to 30 MHz is investigated.

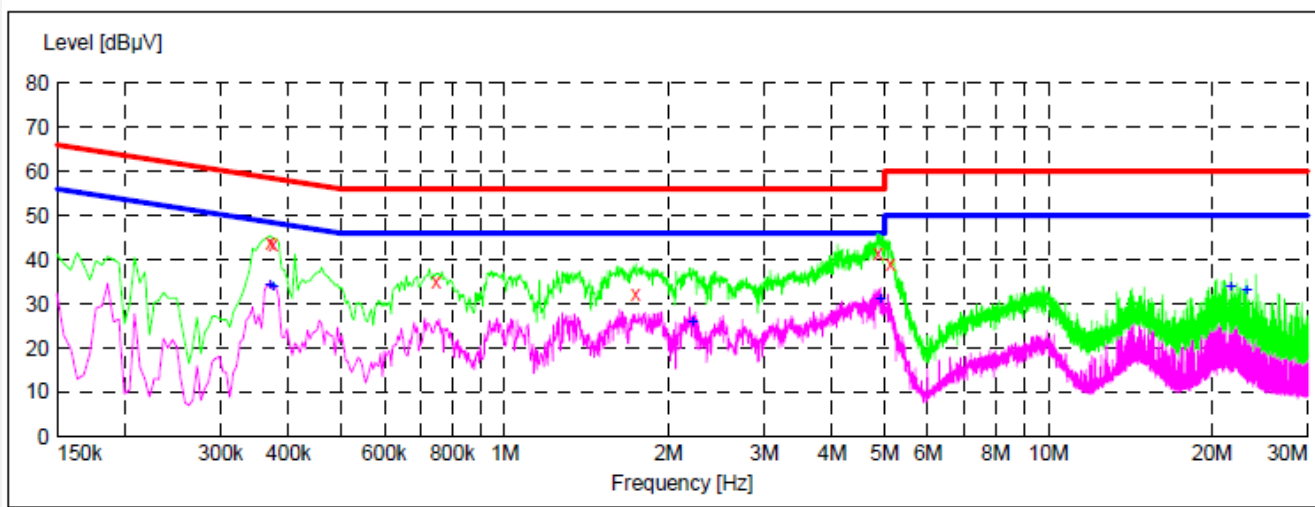
Please refer the following pages.

CONDUCTED EMISSION TEST DATA

Test Site: 1# Shielded Room
Operating Condition: ON
Test Specification: AC 120V/60Hz
Comment: Live Line
Tem:25°C Hum:50%

SCAN TABLE: "Voltage (150K~30M) FIN"

Short Description: 150K-30M Disturbance Voltages



Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.370500	44.00	20.1	59	14.5	QP	L1	GND
0.375000	43.70	20.1	58	14.7	QP	L1	GND
0.748500	35.10	20.1	56	20.9	QP	L1	GND
1.742500	32.40	20.3	56	23.6	QP	L1	GND
4.852000	41.50	20.5	56	14.5	QP	L1	GND
5.122000	39.20	20.5	60	20.8	QP	L1	GND

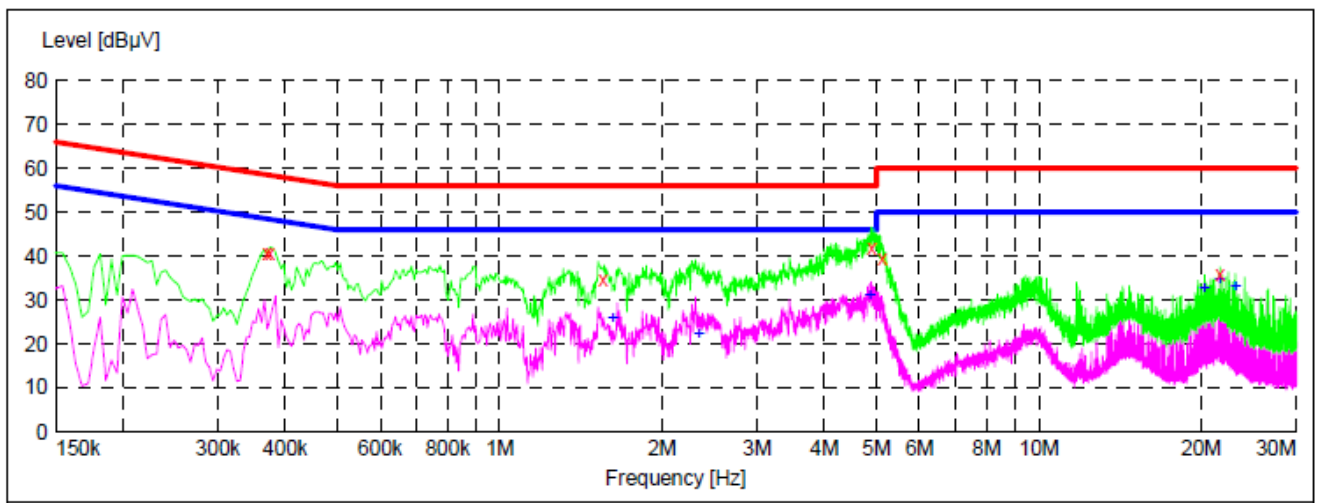
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.370500	34.10	20.1	49	14.4	AV	L1	GND
0.375000	34.00	20.1	48	14.4	AV	L1	GND
2.215000	25.70	20.3	46	20.3	AV	L1	GND
4.892500	31.10	20.5	46	14.9	AV	L1	GND
21.664000	34.00	20.8	50	16.0	AV	L1	GND
23.131000	33.20	20.8	50	16.8	AV	L1	GND

CONDUCTED EMISSION TEST DATA

Test Site: 1# Shielded Room
Operating Condition: ON
Test Specification: AC 120V/60Hz
Comment: Neutral Line
Tem:25°C Hum:50%

SCAN TABLE: "Voltage (150K~30M) FIN"

Short Description: 150K-30M Disturbance Voltages



Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.370500	40.60	20.1	59	17.9	QP	N	GND
0.375000	40.80	20.1	58	17.6	QP	N	GND
1.553500	34.50	20.3	56	21.5	QP	N	GND
4.892500	41.90	20.5	56	14.1	QP	N	GND
5.113000	39.40	20.5	60	20.6	QP	N	GND
21.664000	35.90	20.8	60	24.1	QP	N	GND

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
1.621000	25.70	20.3	46	20.3	AV	N	GND
2.341000	22.40	20.3	46	23.6	AV	N	GND
4.852000	31.00	20.5	46	15.0	AV	N	GND
20.260000	32.50	20.8	50	17.5	AV	N	GND
21.664000	34.90	20.8	50	15.1	AV	N	GND
23.131000	33.30	20.8	50	16.7	AV	N	GND

4. FCC Part 15.247 Requirements for DSSS & OFDM Modulation

4.1 Test Setup



4.2 6dB Bandwidth

a. Limit

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

b. Test Procedure

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as:
RBW = 100kHz, VBW $\geq 3 \times$ RBW = 300kHz,
Detector= Peak
Trace mode= Max hold.
Sweep- auto couple.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

20dB Bandwidth:

C63.10

Occupied Bandwidth (OBW=20dB Bandwidth)

1. Set RBW=1%~5% OBW
2. Set the VBW $\geq 3 \times$ RBW
3. Set the span range between 2 times and 5 times of the OBW
4. Sweep Time= Auto
Detector= Peak
Trace= Max hold
5. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce the worst case (i.e. the widest) bandwidth. Unless otherwise specified for an unlicensed wireless device, measure the bandwidth at the -20dB levels with respect to the reference level.

c. Test Setup See 4.1

d. Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Apr. 17, 2015	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Apr. 17, 2015	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 17, 2015	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 20, 2015	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 20, 2015	1 Year
6.	Pre-amplifier	SONOMA	310N	186860	Apr. 17, 2015	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

e. Test Results

Pass.

f. Test Data**6dB Bandwidth**

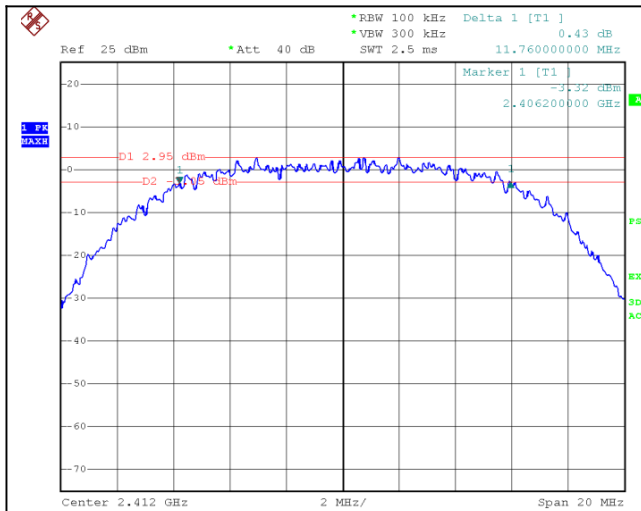
Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	11.76	>500	Pass
Mid	2437	11.76		Pass
High	2462	11.76		Pass

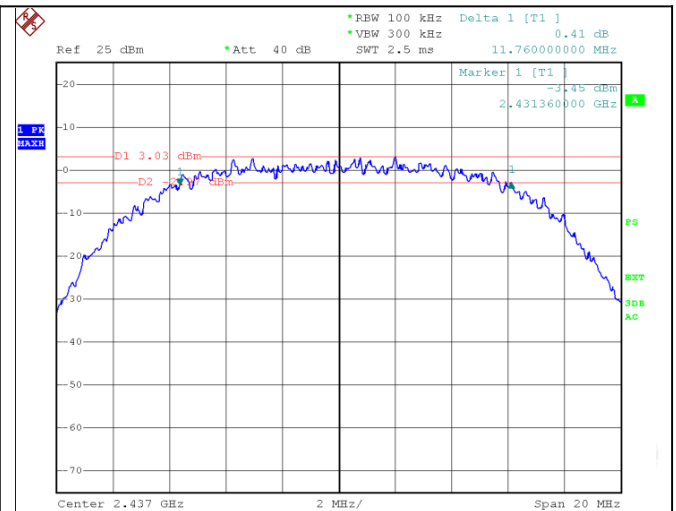
Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit (kHz)	Results
Low	2412	16.56	>500	Pass
Mid	2437	15.52		Pass
High	2462	16.56		Pass

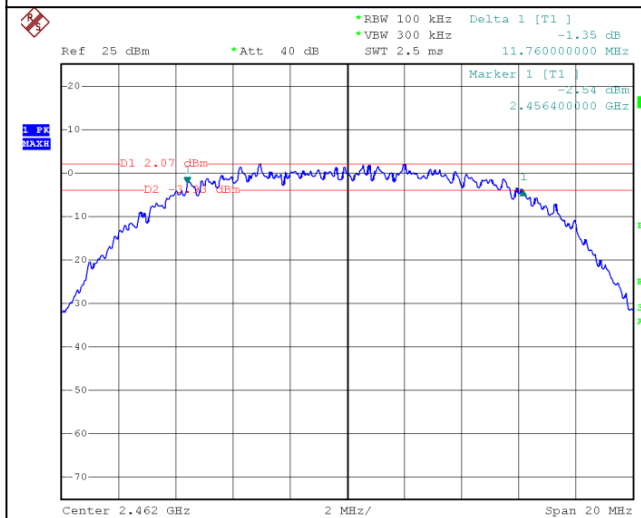
Test Plots See the following page.



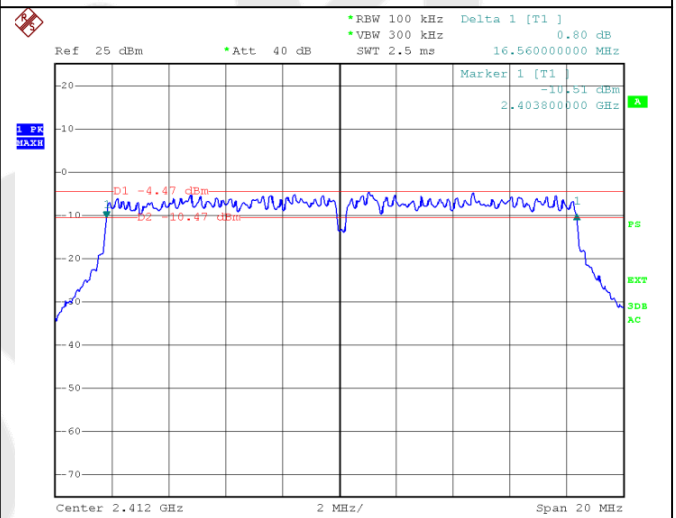
Test Mode: 802.11b---Low



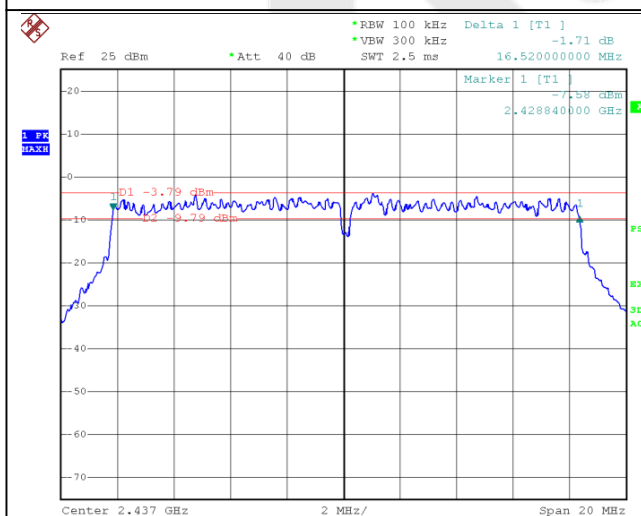
Test Mode: 802.11b---Mid



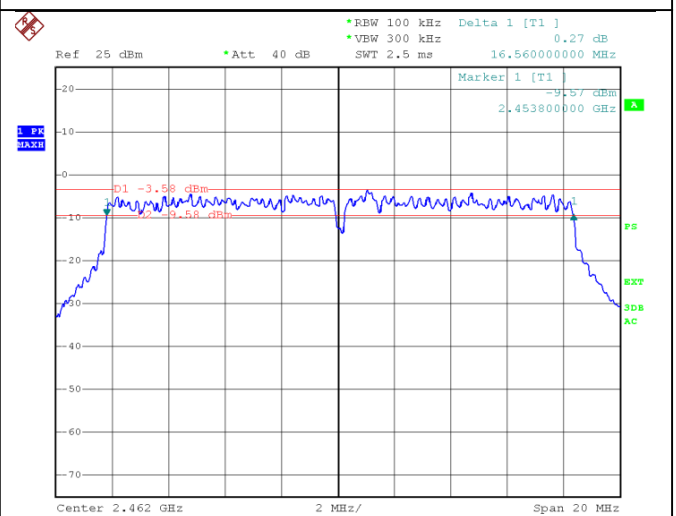
Test Mode: 802.11b---High



Test Mode: 802.11g---Low



Test Mode: 802.11g---Mid



Test Mode: 802.11g---High

20dB Bandwidth

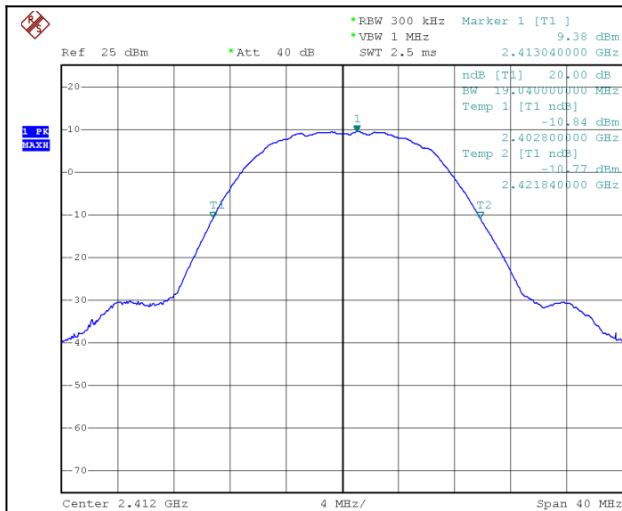
Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Bandwidth (MHz)	Results
Low	2412	19.04	Pass
Mid	2437	19.04	Pass
High	2462	18.96	Pass

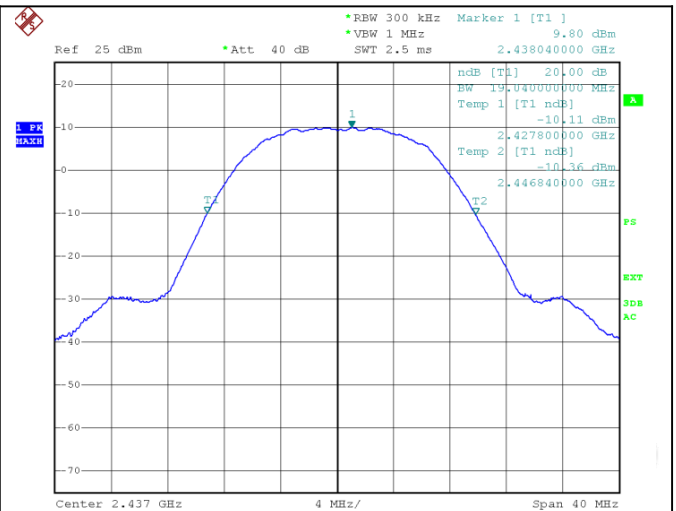
Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Bandwidth (MHz)	Results
Low	2412	23.32	Pass
Mid	2437	22.64	Pass
High	2462	23.32	Pass

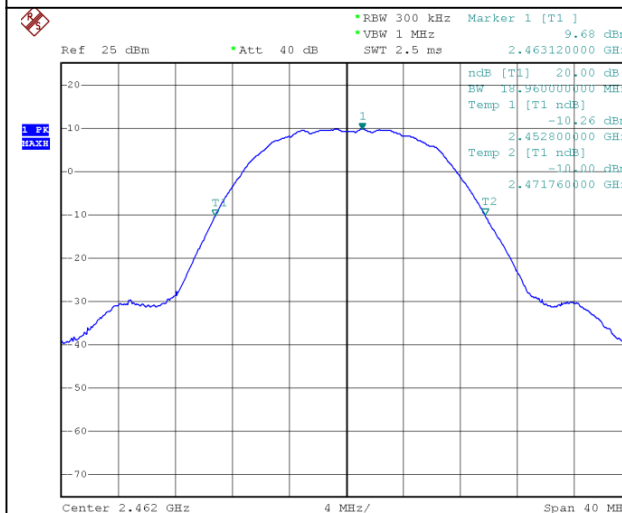
Test Plots See the following page.



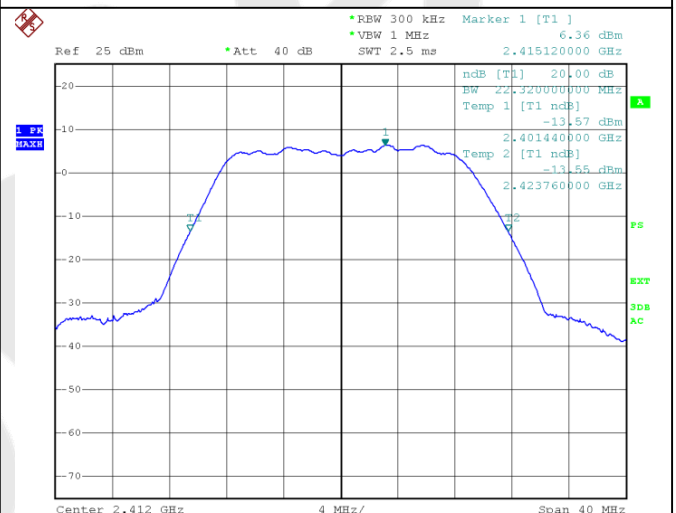
Test Mode: 802.11b---Low



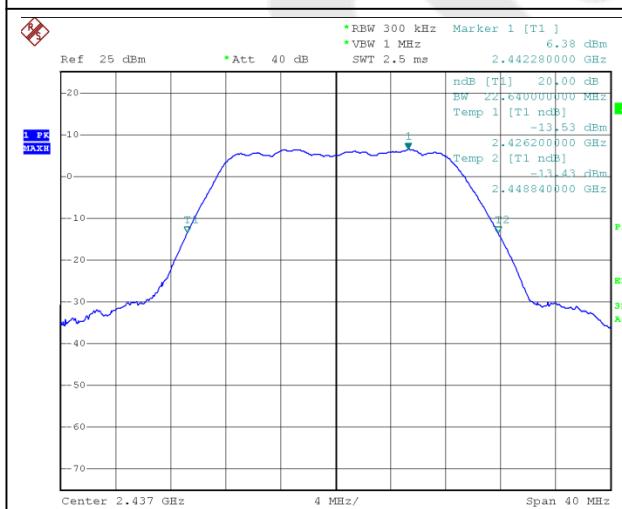
Test Mode: 802.11b---Mid



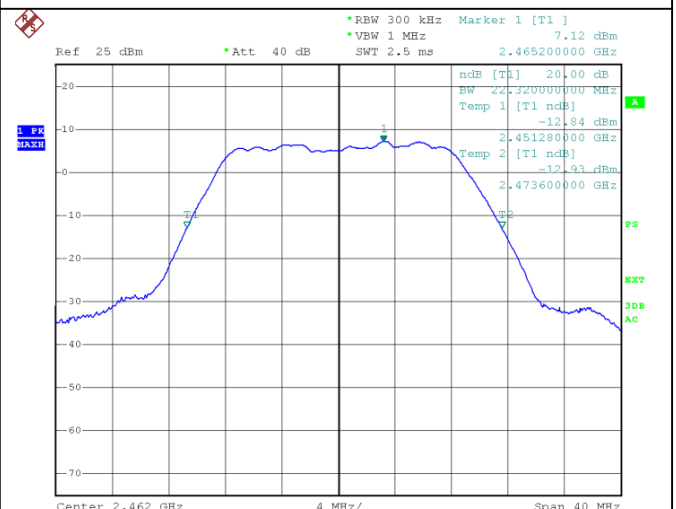
Test Mode: 802.11b---High



Test Mode: 802.11g---Low



Test Mode: 802.11g---Mid



Test Mode: 802.11g---High

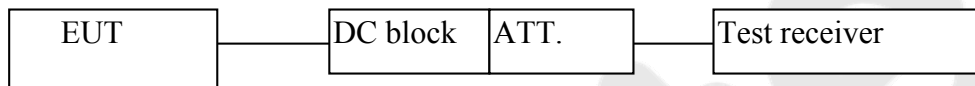
4.3. Maximum Output Power Test

a. Limit

The maximum output power of the intentional radiator shall not exceed the following:

1. For systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 watt (30dBm).
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antenna of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

b. Configuration of Measurement



c. Data Rates

IEEE802.11b: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 1 Mbps data rate (worst case) are chosen for the final testing.

IEEE802.11g: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 6 Mbps data rate (the worst case) are chosen for the final testing.

IEEE802.11n (HT20: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 6.5Mbps data rate (the worst case) are chosen for the final testing.

IEEE802.11n (HT40: Channel 3(2422MHz), Channel 6(2437MHz) and Channel 9(2452MHz) with 13.5Mbps data rate (the worst case) are chosen for the final testing.

d. Test Procedure

This test was according the kDB 558074 9.2.2:

1. Set span to at least 1.5 times the OBW.
2. Set the RBW =1~5% of the OBW, not to exceed 1MHz.
3. Set VBW $\geq 3 \times$ RBW.
4. Detector = Average.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.

e. Test Equipment

Same as the equipment listed in 4.2.

f. Test Results

Pass.

g. Test Data

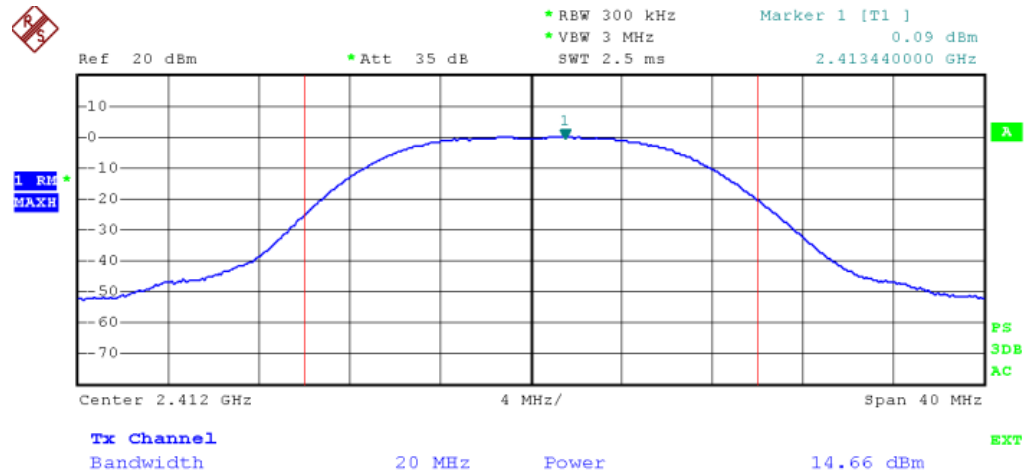
Test mode: IEEE 802.11b

Channel	Frequency (MHz)	Maximum transmit power	Limit		Result
		(dBm)	(dBm)	(watts)	
Low	2412	14.66	30	1	Pass
Mid	2437	14.55			Pass
High	2462	14.17			Pass

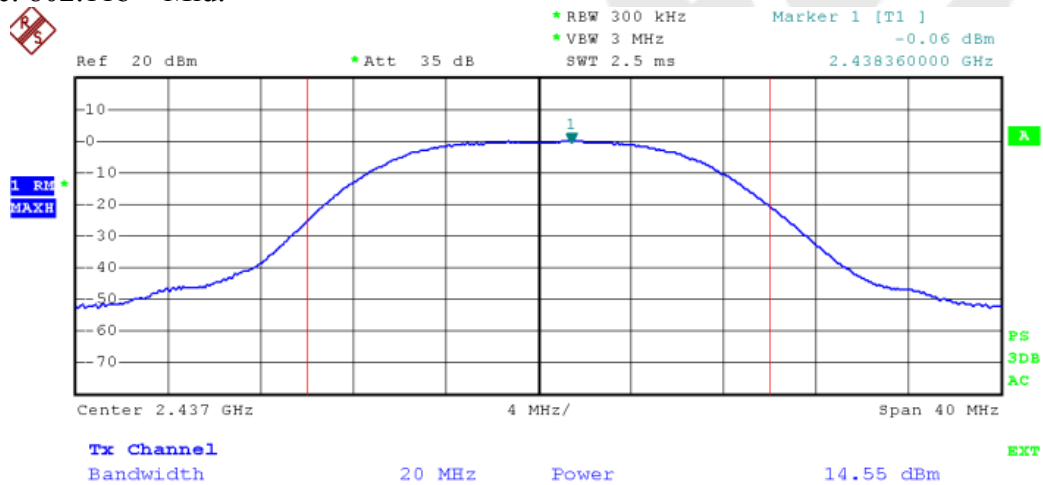
Test mode: IEEE 802.11g

Channel	Frequency (MHz)	Maximum transmit power	Limit		Result
		(dBm)	(dBm)	(watts)	
Low	2412	10.36	30	1	Pass
Mid	2437	10.73			Pass
High	2462	10.76			Pass

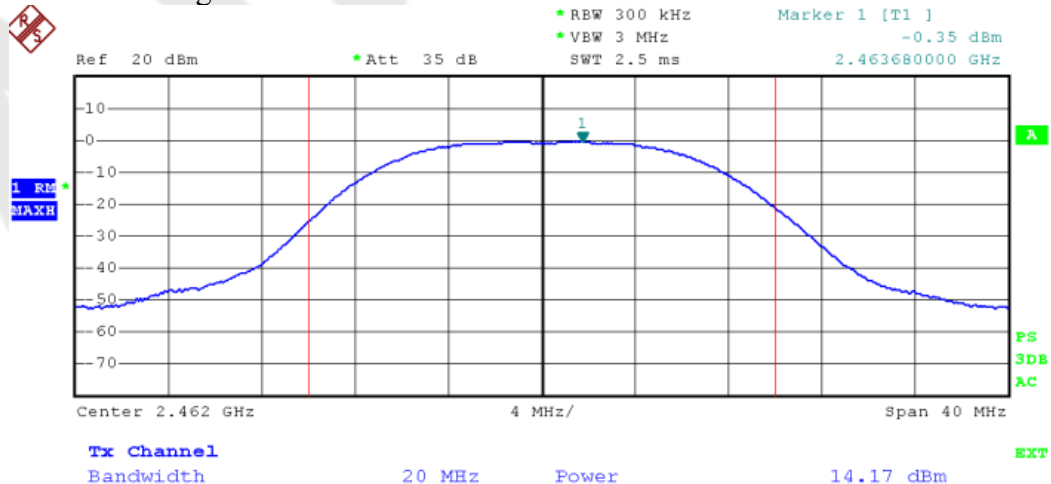
Test Mode: 802.11b---Low:



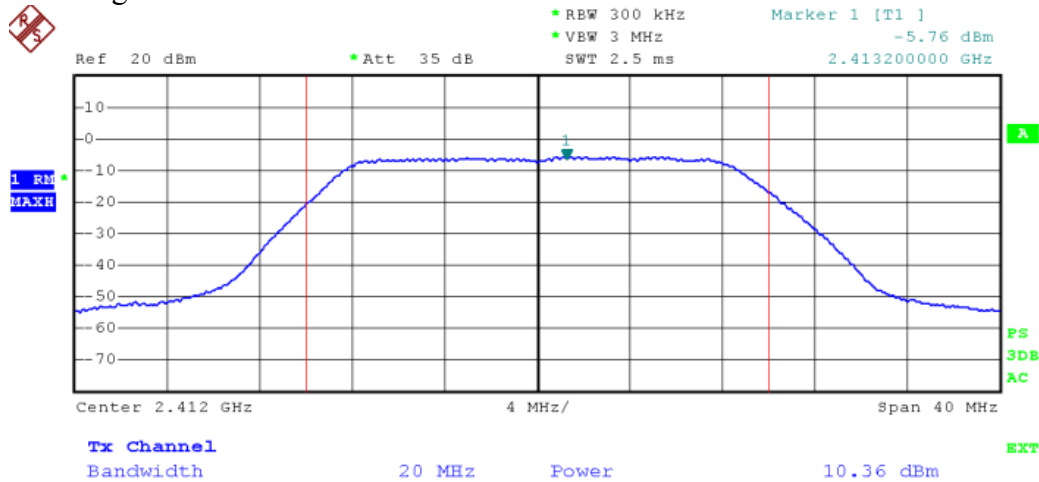
Test Mode: 802.11b---Mid:



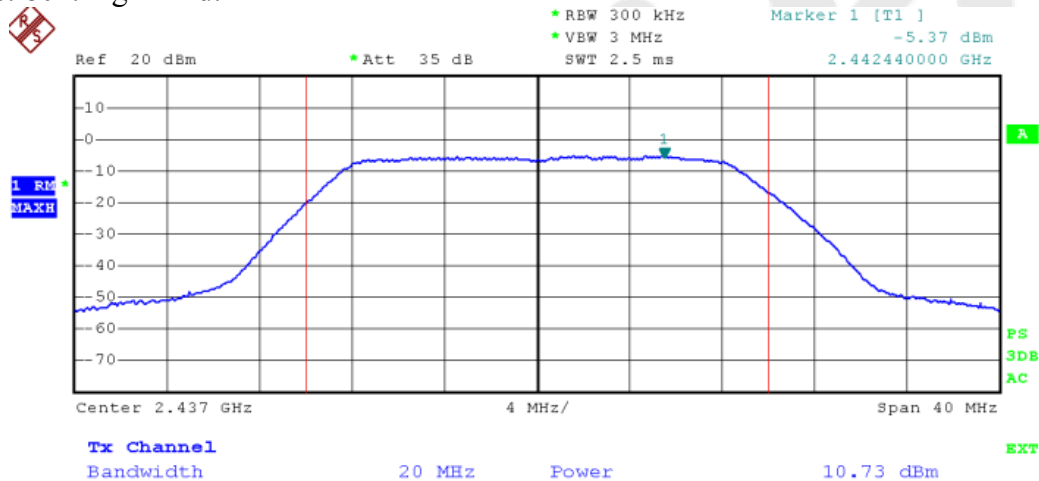
Test Mode: 802.11b---High:



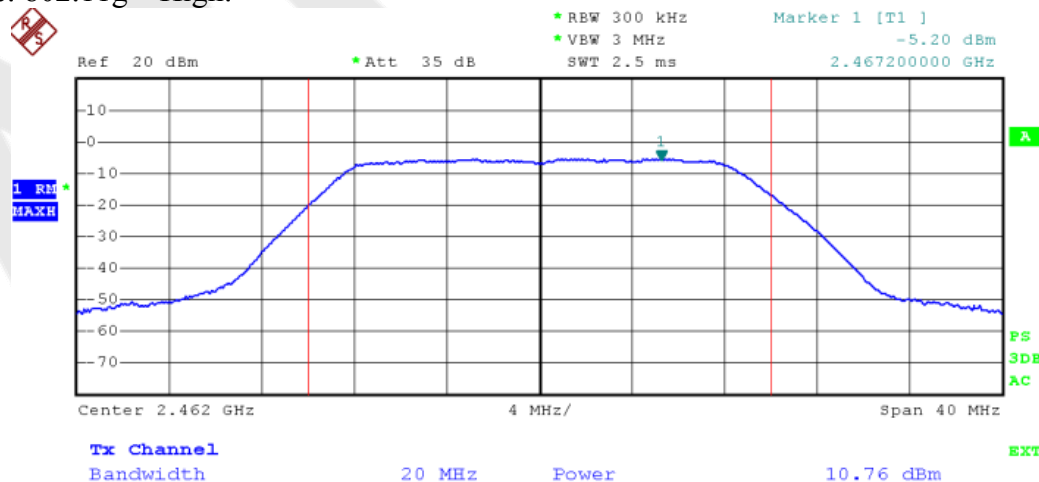
Test Mode: 802.11g---Low:



Test Mode: 802.11g---Mid:



Test Mode: 802.11g---High:



4.4. Band Edges Measurement

a. Limit

According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

b. Test Procedure

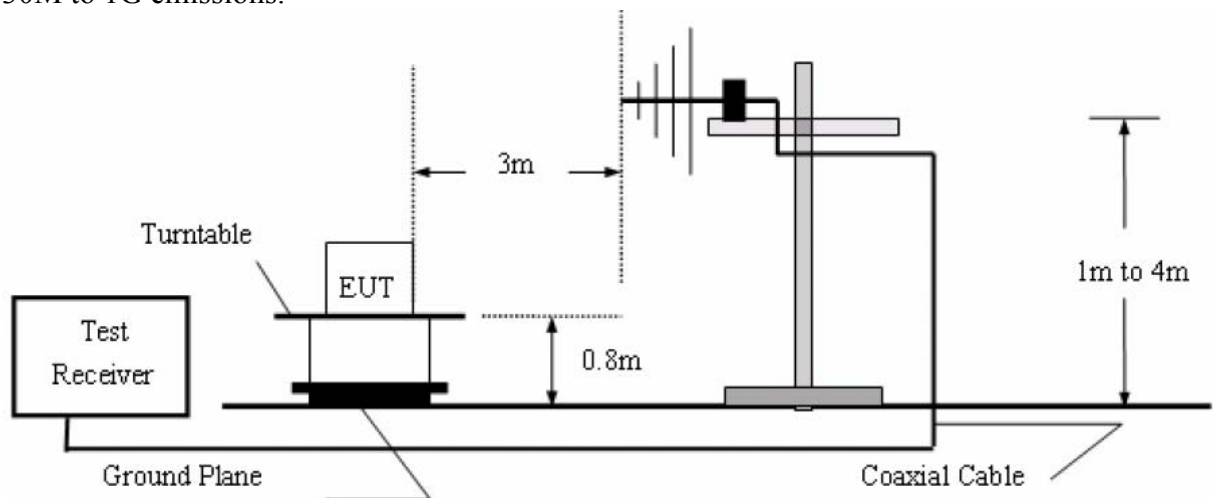
1. Conducted Method:

- 1) Set RBW=100KHz, VBW=300KHz
- 2) Detector=peak
- 3) Sweep time= auto
- 4) Trace mode=max hold.

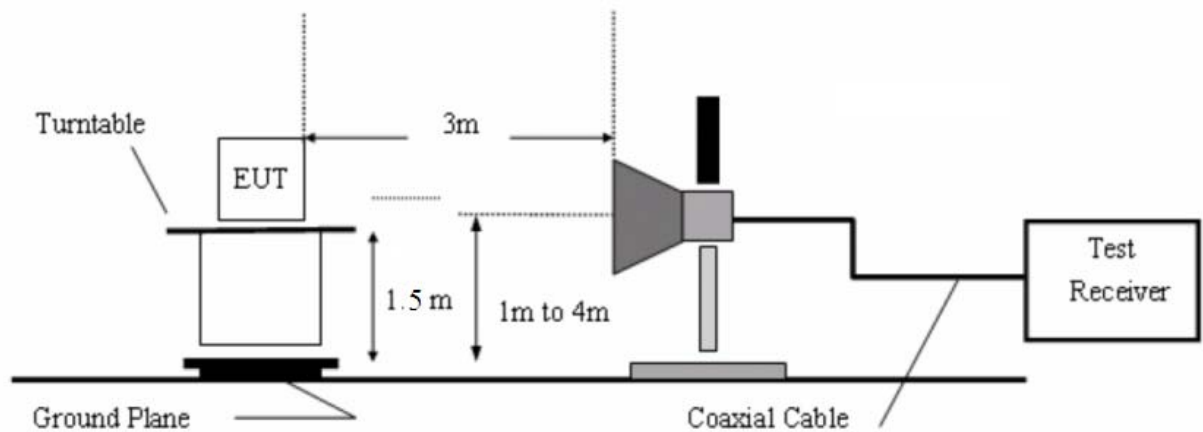
2. Radiated Method:

- 1) For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane. The EUT is tested in 9*6*6 Chamber.
For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane. The EUT is tested in 9*6*6 Chamber.
- 2) The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
- 4) Peak detector: RBW=1MHz, VBW=3MHz, SWT=AUTO
Average detector: RBW=1MHz, VBW=10Hz, SWT=AUTO
The EUT is tested in 9*6*6 Chamber.
- 5) Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

30M to 1G emissions:



1G to 40G emissions:



c. Test Equipment

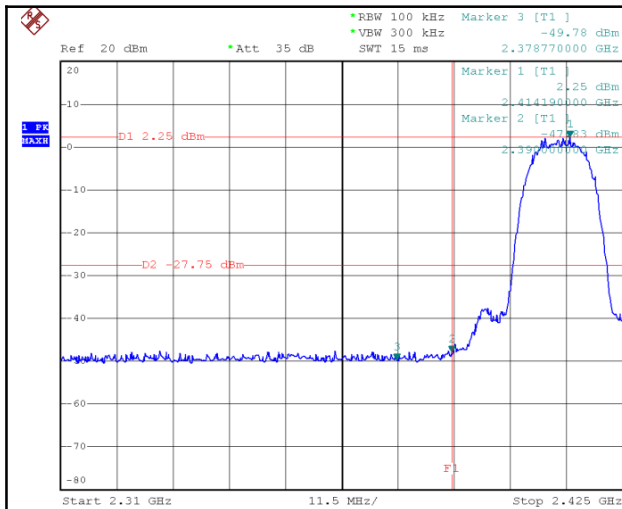
Same as the equipment listed in 4.2.

d. Test Results

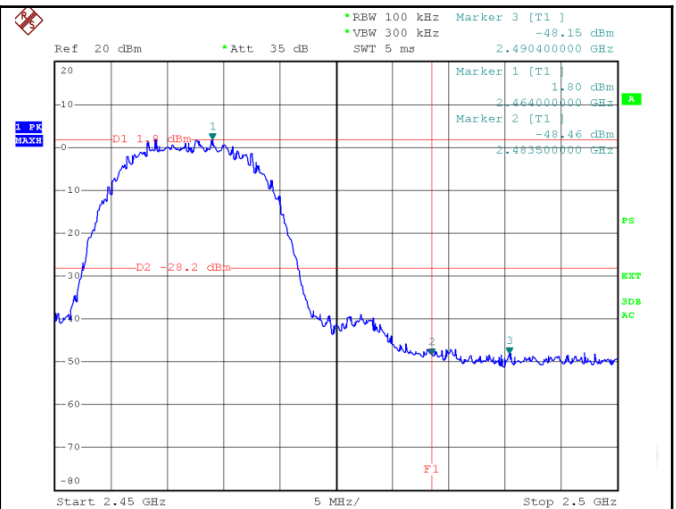
Pass.

e. Test Plots

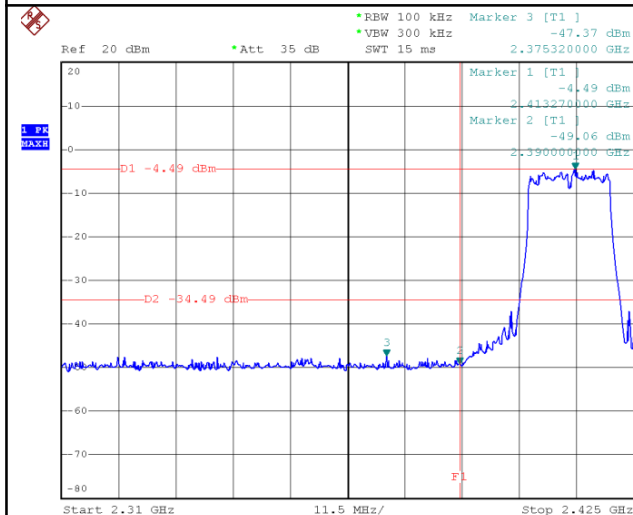
See the following page.



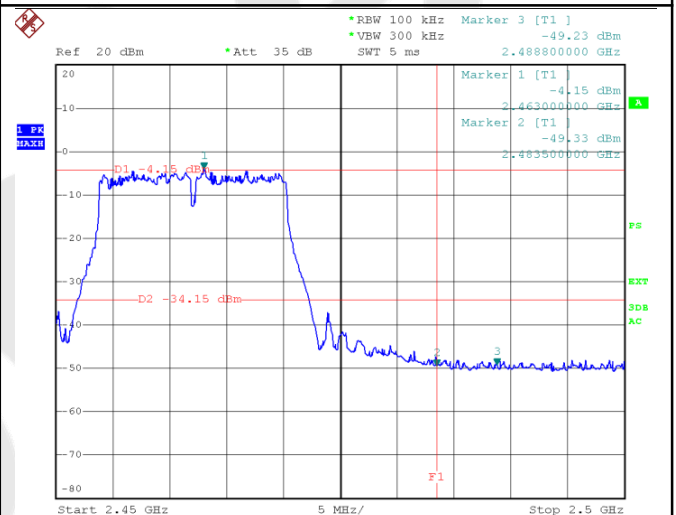
Test Mode: 802.11b---Low



Test Mode: 802.11b---High



Test Mode: 802.11g---Low

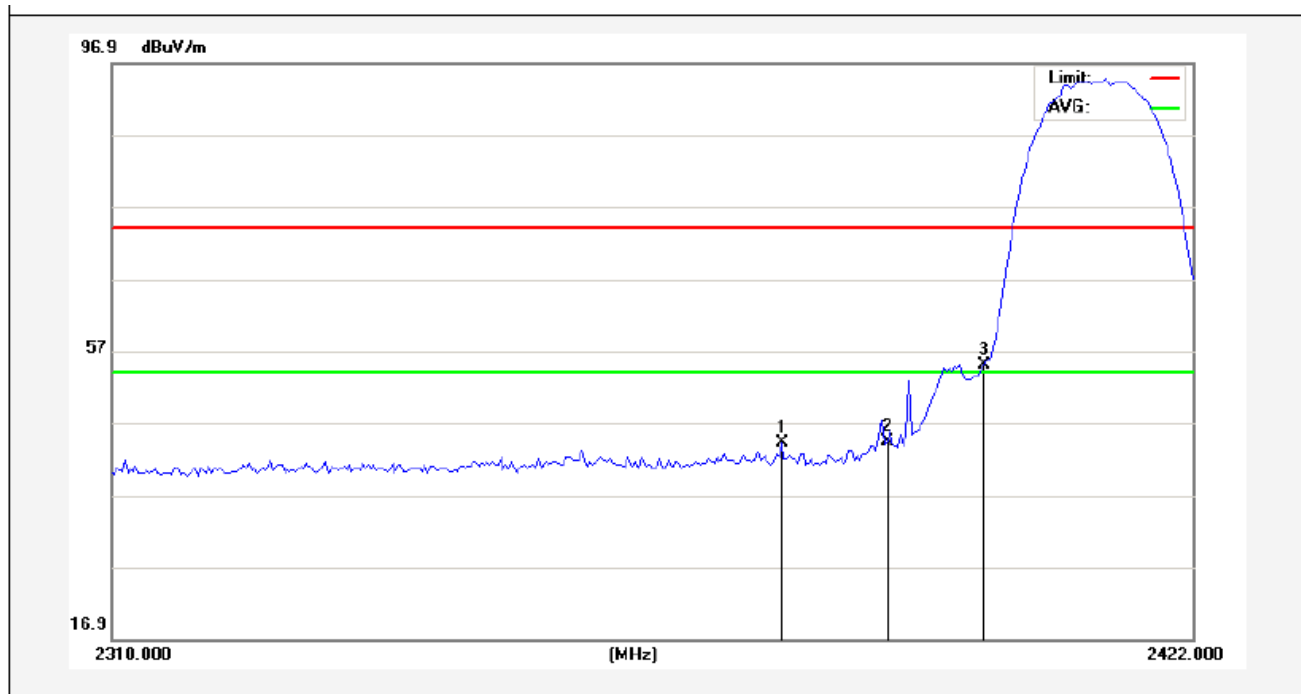


Test Mode: 802.11g---High

Test Mode: 802.11b

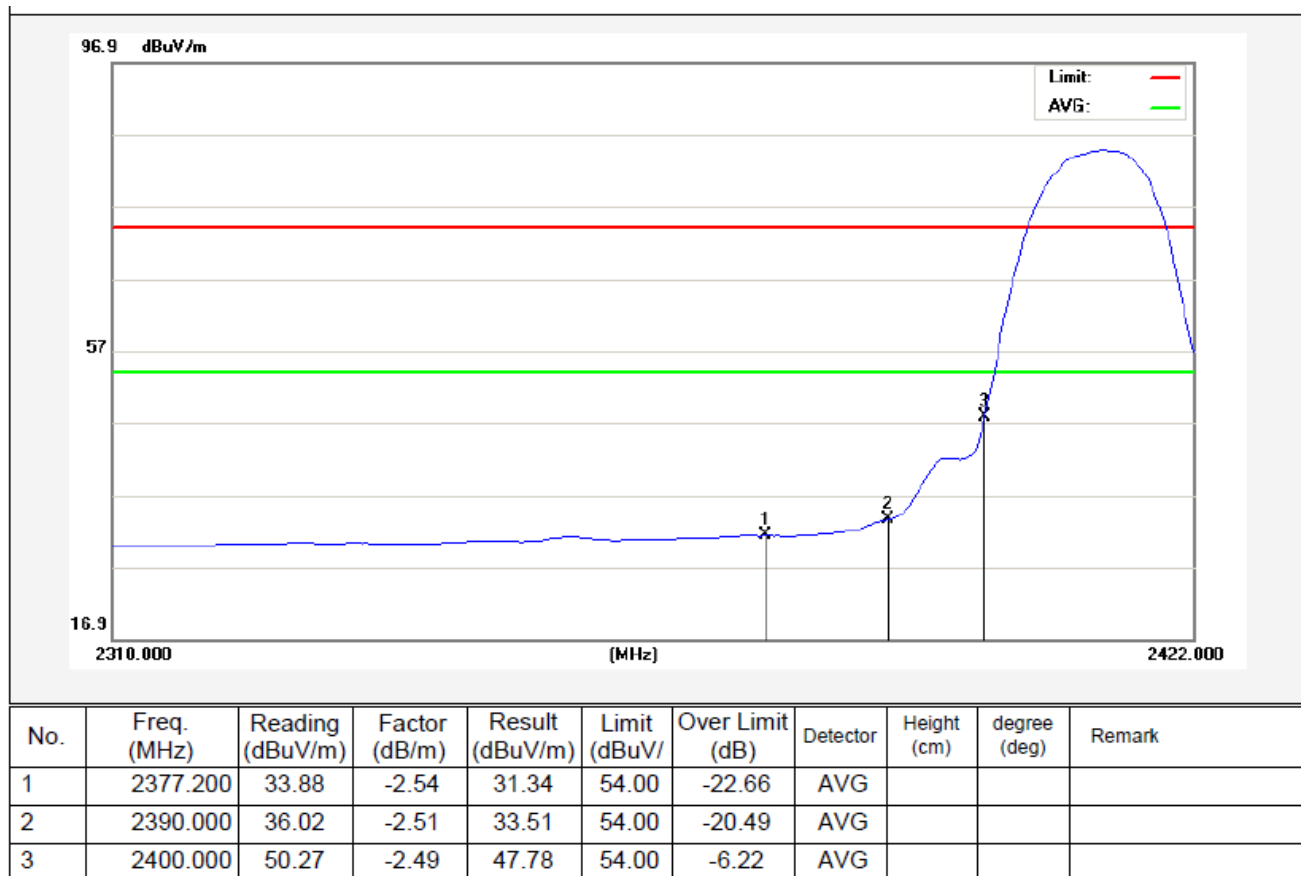
2412MHz

Horizontal-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2378.880	46.78	-2.54	44.24	74.00	-29.76	peak			
2	2390.000	46.82	-2.51	44.31	74.00	-29.69	peak			
3	2400.000	57.49	-2.49	55.00	74.00	-19.00	peak			

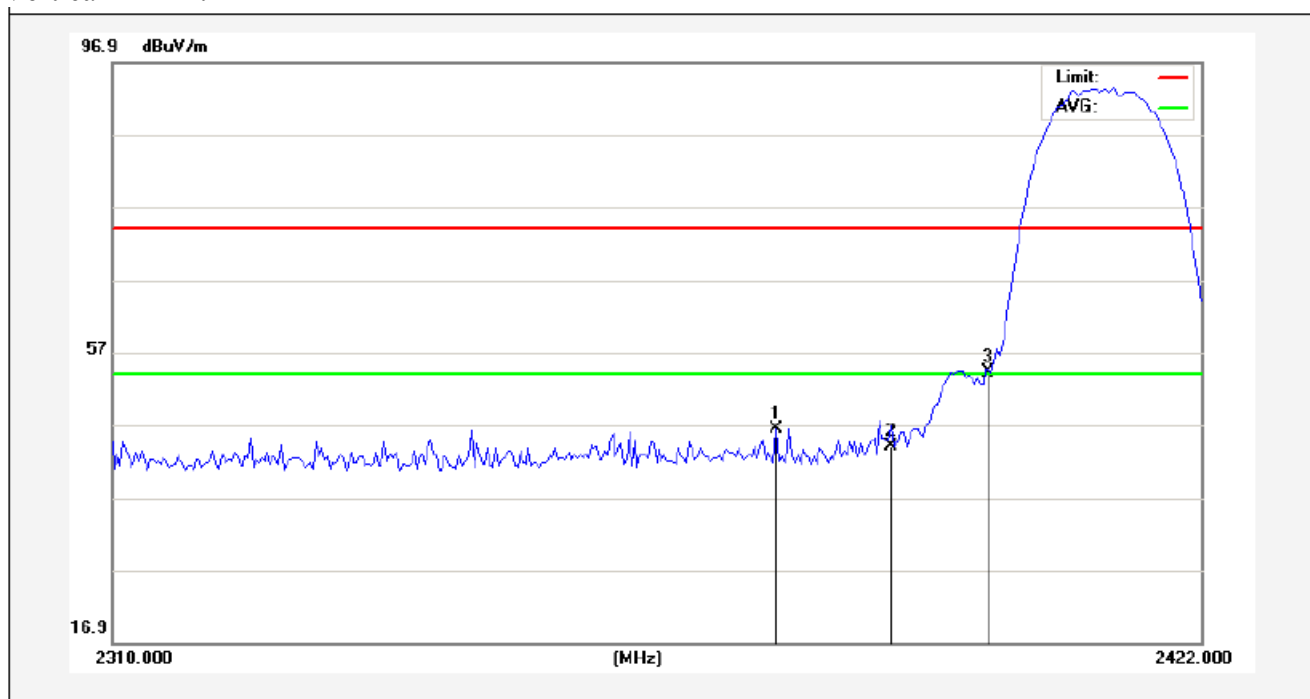
Horizontal-AV:



Test Mode: 802.11b

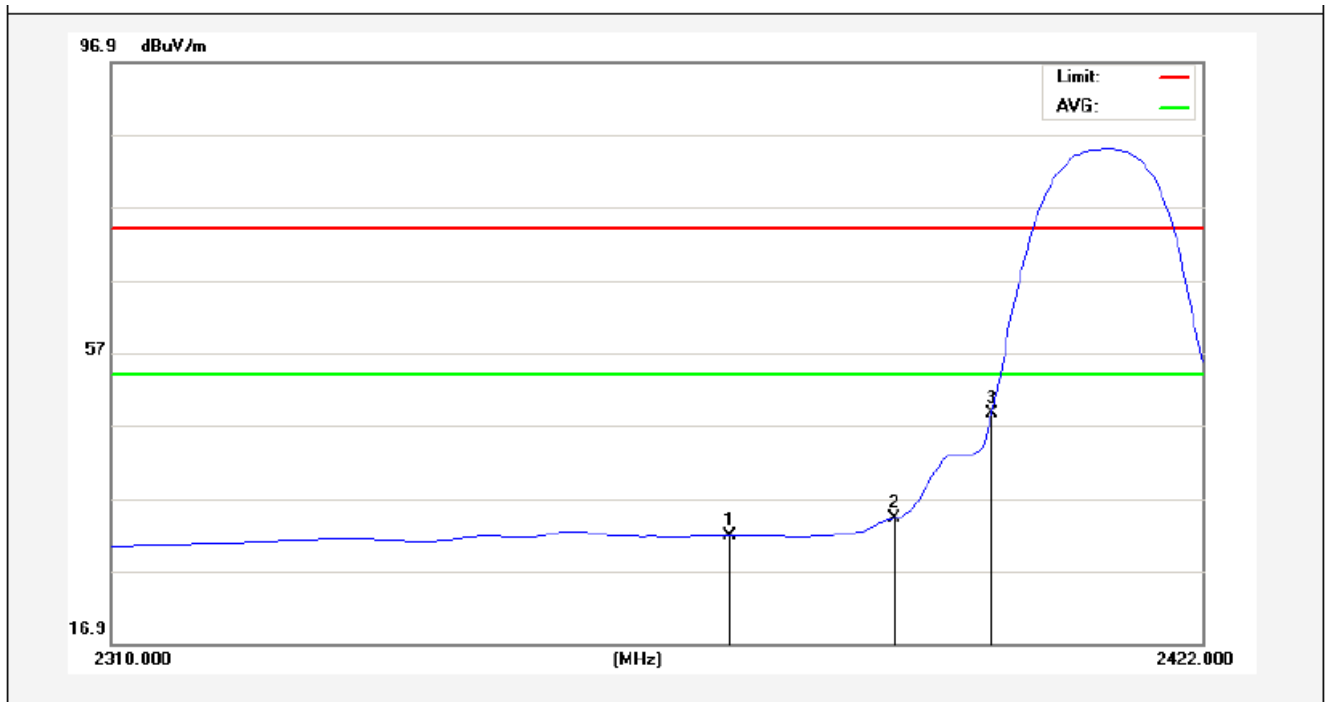
2412MHz

Vertical-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2377.760	49.02	-2.54	46.48	74.00	-27.52	peak			
2	2390.000	46.58	-2.51	44.07	74.00	-29.93	peak			
3	2400.000	56.64	-2.49	54.15	74.00	-19.85	peak			

Vertical-AV:

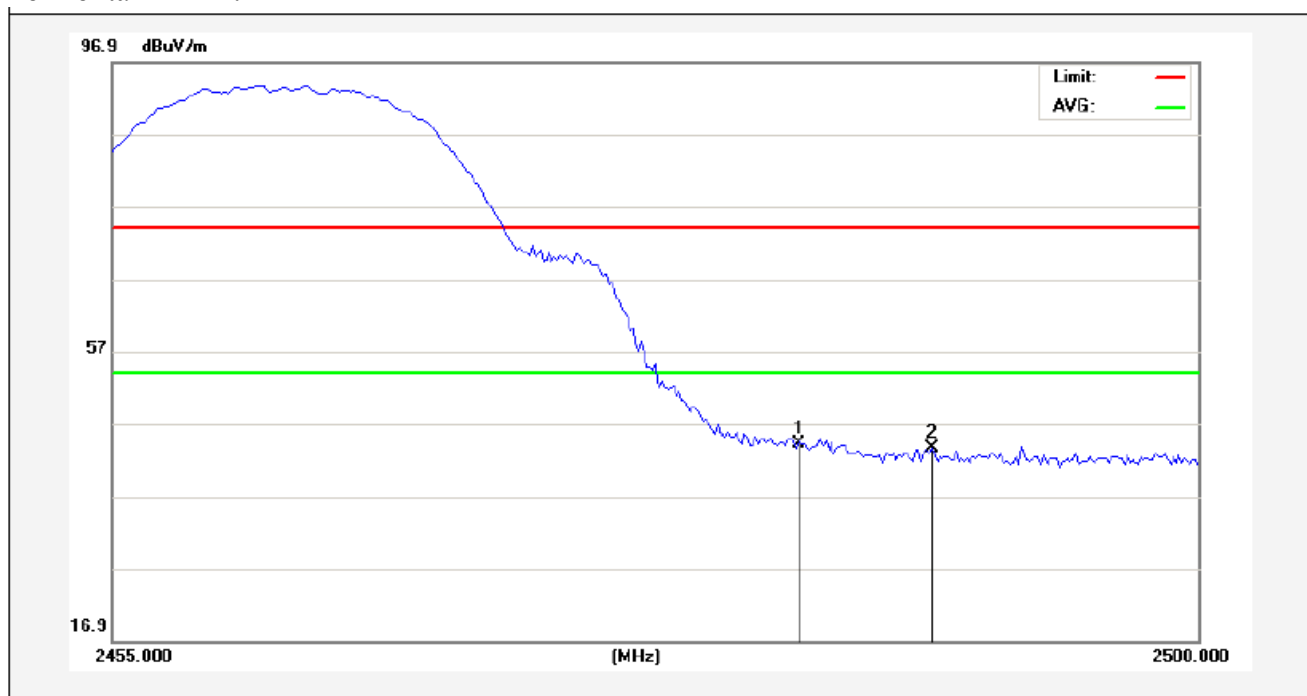


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2373.000	34.42	-2.55	31.87	54.00	-22.13	AVG			
2	2390.000	36.67	-2.51	34.16	54.00	-19.84	AVG			
3	2400.000	51.11	-2.49	48.62	54.00	-5.38	AVG			

Test Mode: 802.11b

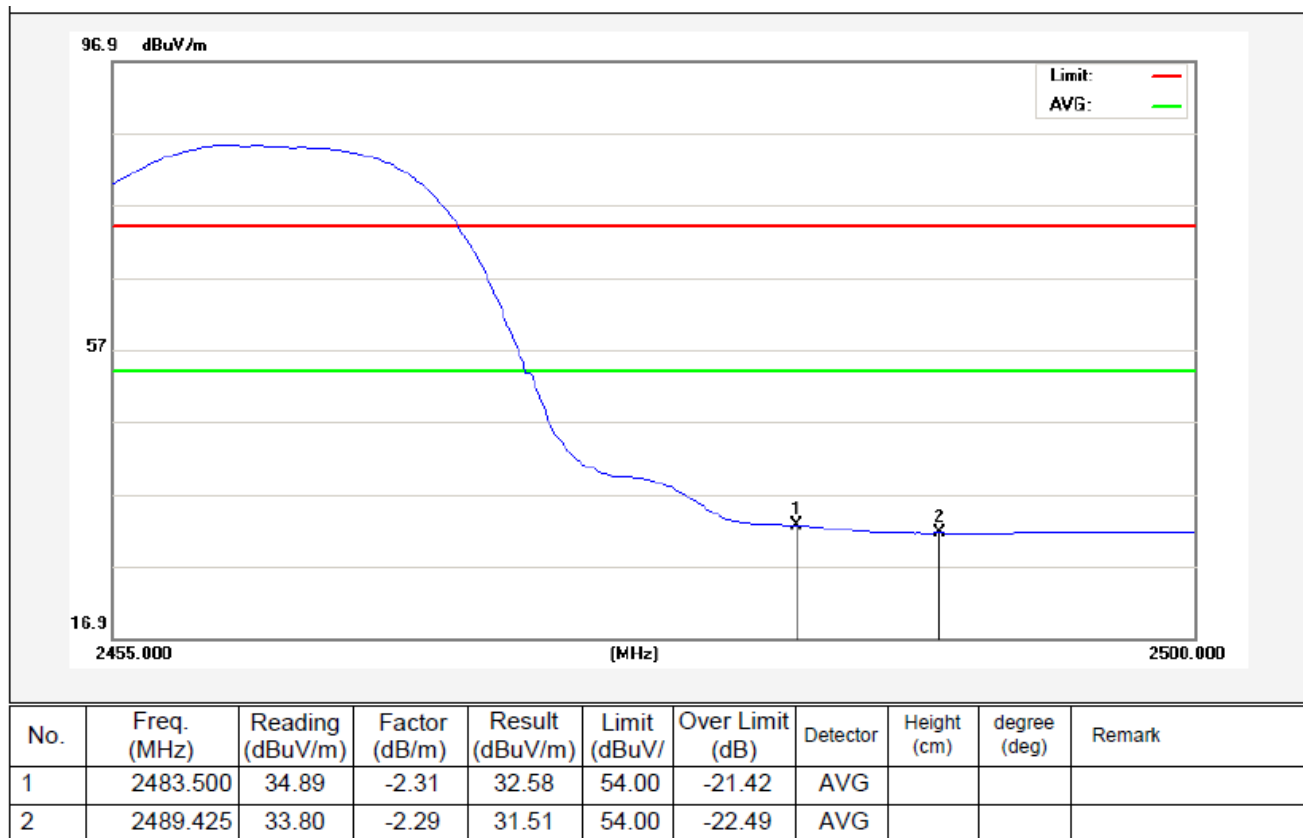
2462MHz

Horizontal-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	46.60	-2.31	44.29	74.00	-29.71	peak			
2	2488.975	45.92	-2.29	43.63	74.00	-30.37	peak			

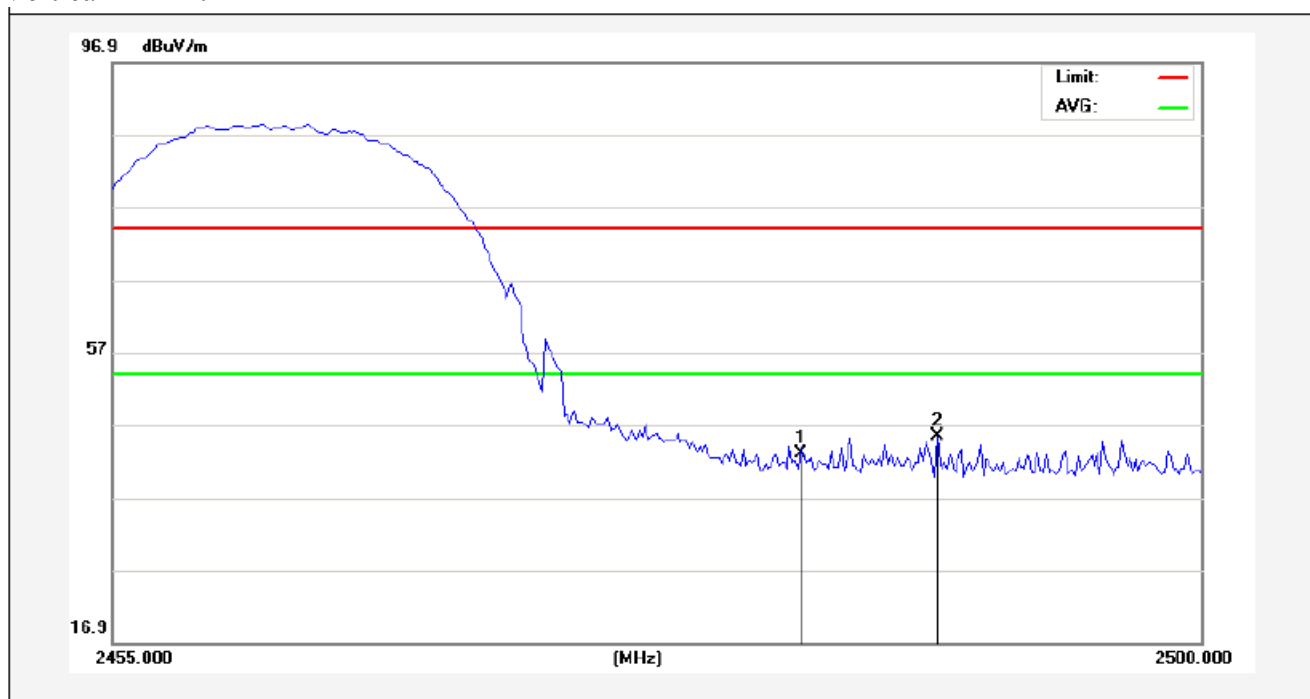
Horizontal-AV:



Test Mode: 802.11b

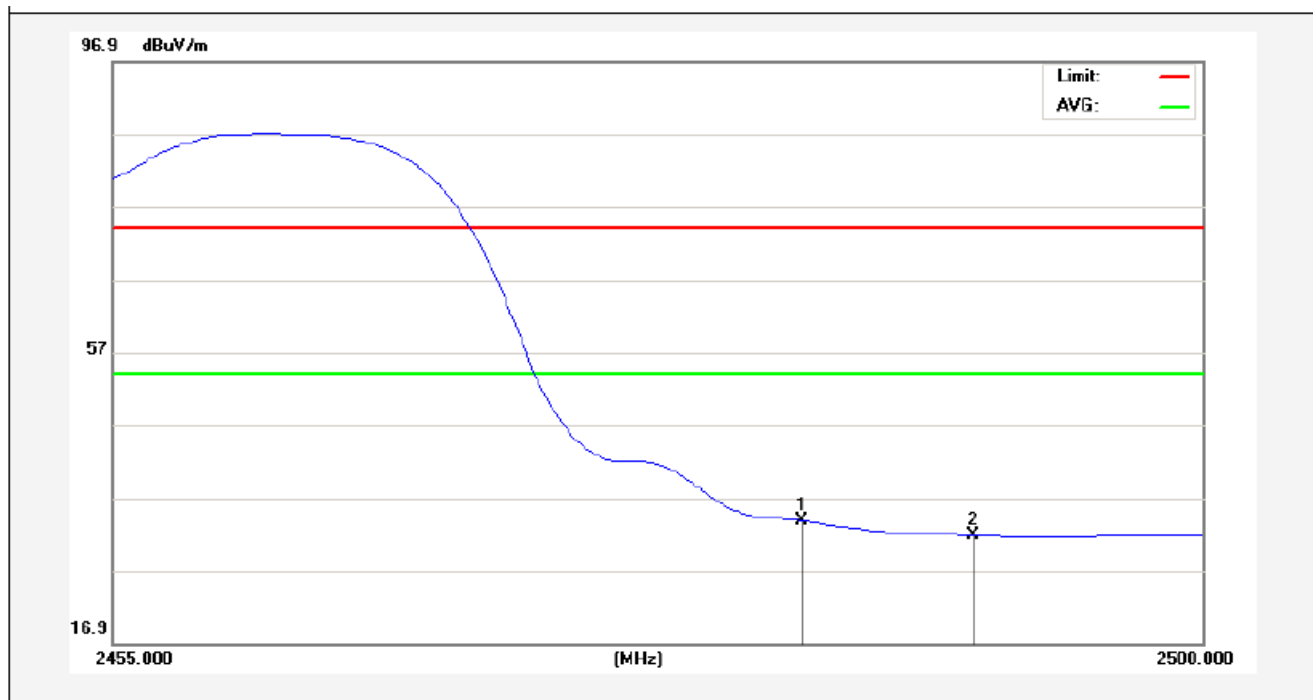
2462MHz

Vertical-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	45.25	-2.31	42.94	74.00	-31.06	peak			
2	2489.088	47.62	-2.29	45.33	74.00	-28.67	peak			

Vertical-AV:

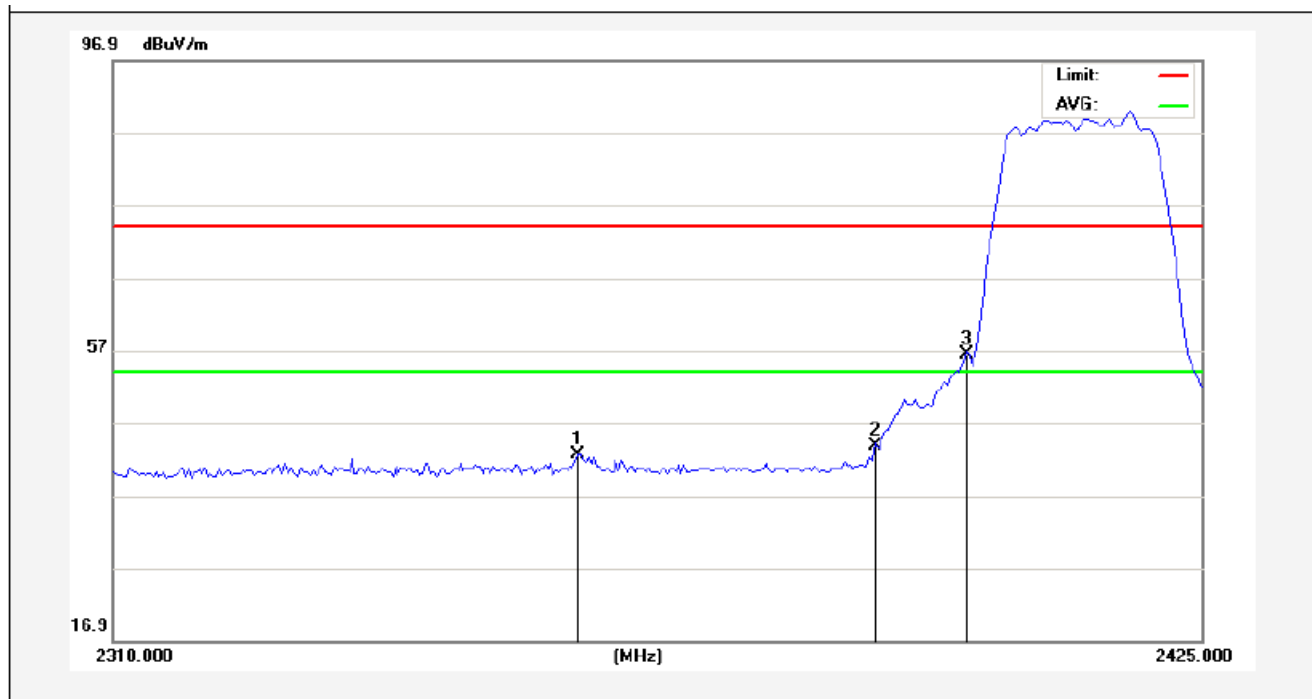


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	36.09	-2.31	33.78	54.00	-20.22	AVG			
2	2490.550	34.10	-2.29	31.81	54.00	-22.19	AVG			

Test Mode: 802.11g

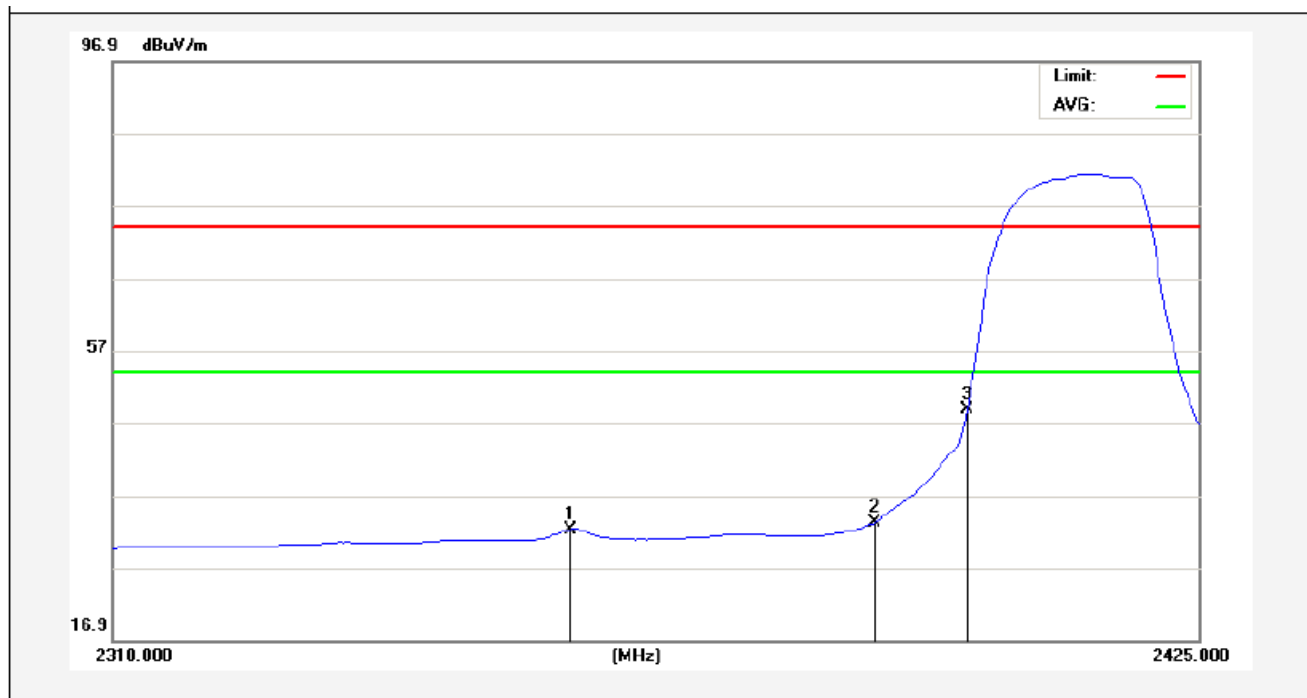
2412MHz

Horizontal-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2358.588	45.14	-2.58	42.56	74.00	-31.44	peak			
2	2390.000	46.25	-2.51	43.74	74.00	-30.26	peak			
3	2400.000	58.93	-2.49	56.44	74.00	-17.56	peak			

Horizontal-AV:

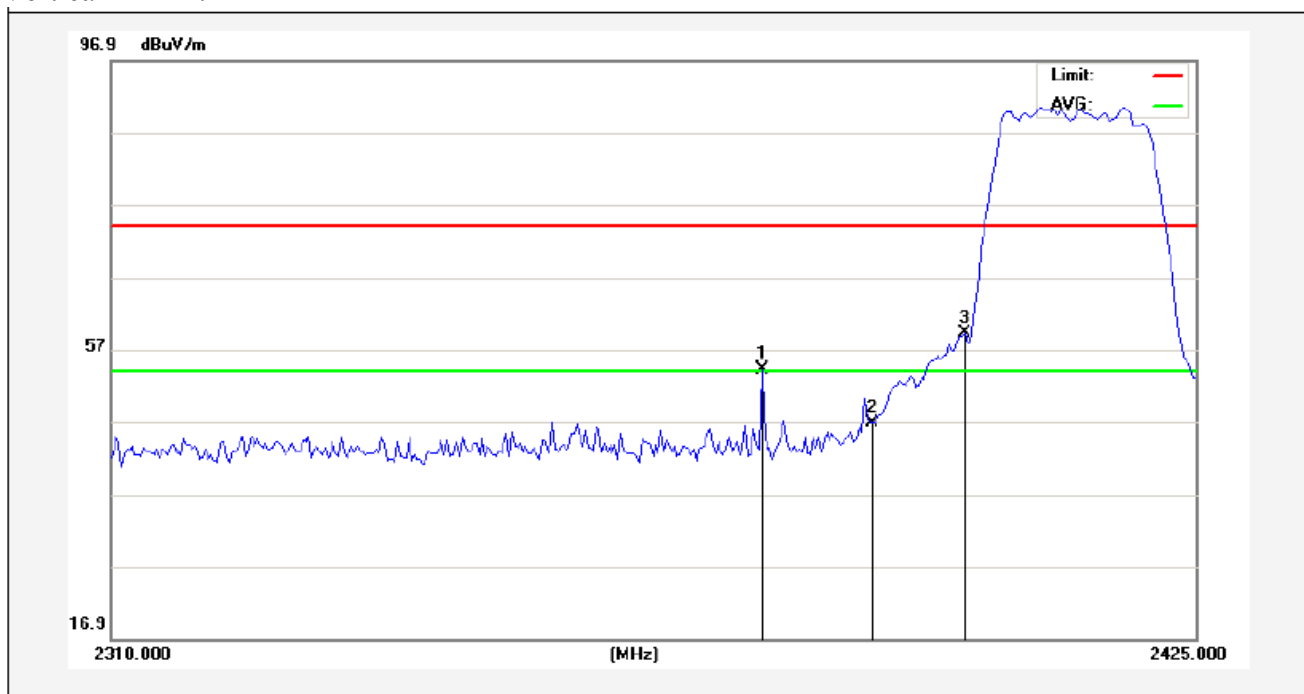


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2358.012	34.88	-2.59	32.29	54.00	-21.71	AVG			
2	2390.000	35.77	-2.51	33.26	54.00	-20.74	AVG			
3	2400.000	51.29	-2.49	48.80	54.00	-5.20	AVG			

Test Mode: 802.11g

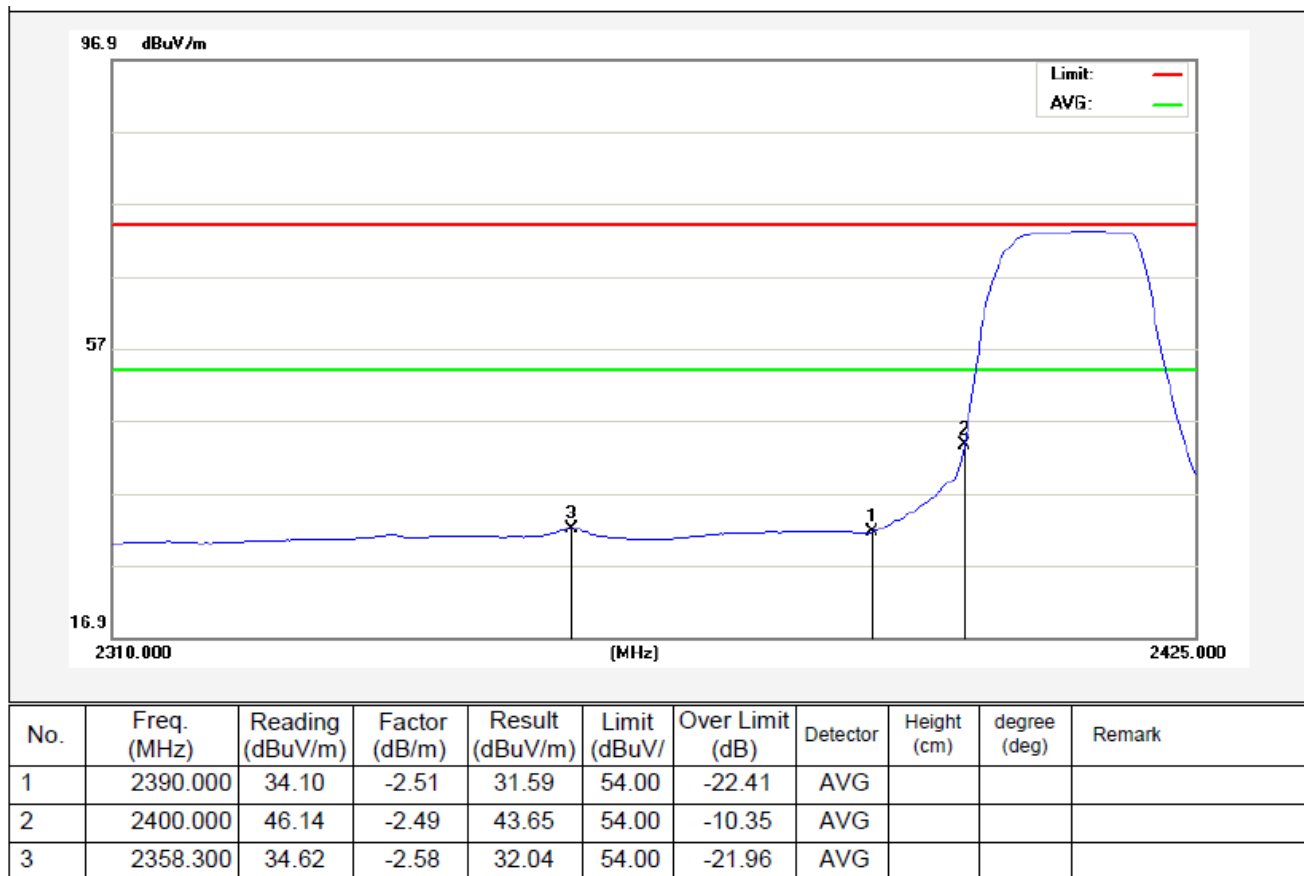
2412MHz

Vertical-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2378.425	56.79	-2.54	54.25	74.00	-19.75	peak			
2	2390.000	49.33	-2.51	46.82	74.00	-27.18	peak			
3	2400.000	61.65	-2.49	59.16	74.00	-14.84	peak			

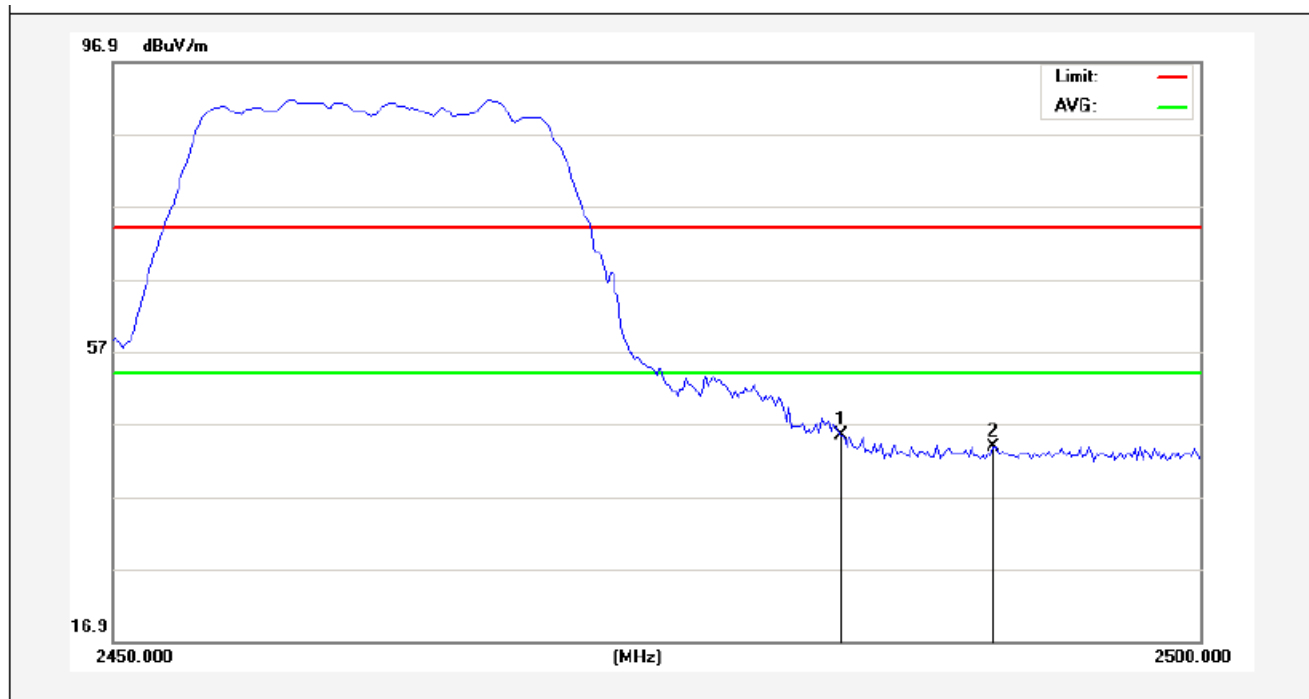
Vertical-AV:



Test Mode: 802.11g

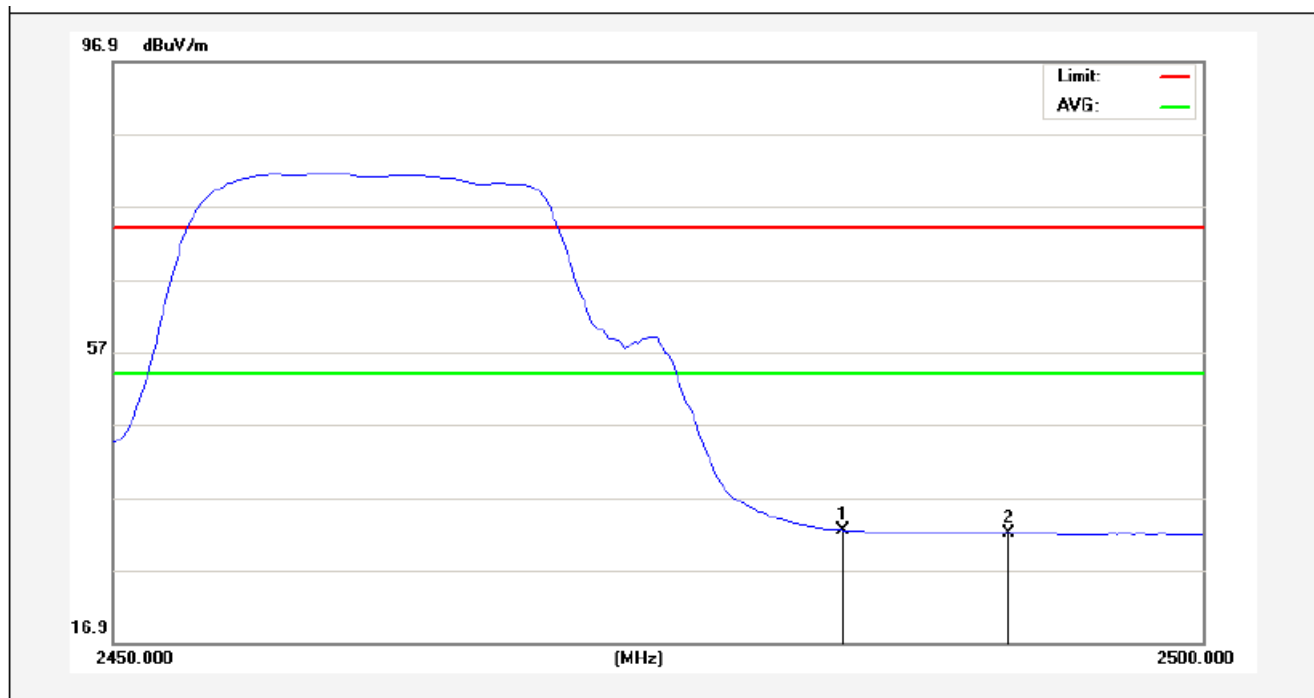
2462MHz

Horizontal-PEAK:



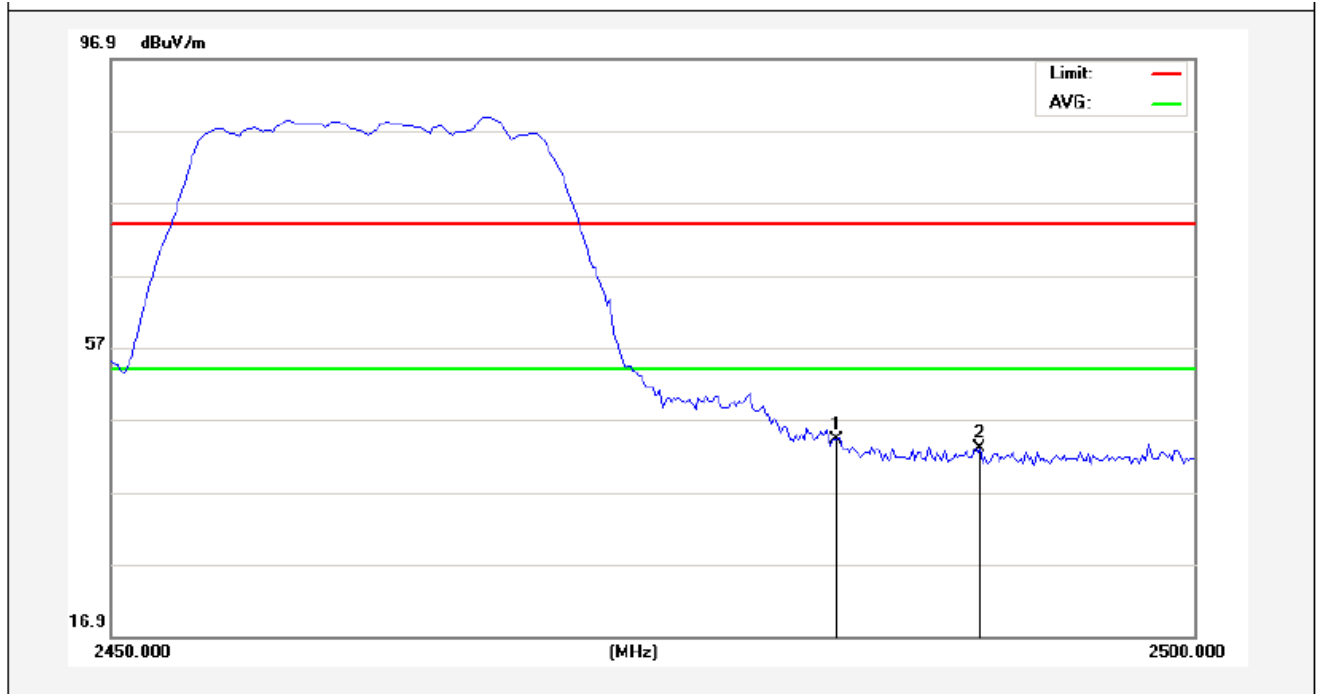
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	47.64	-2.31	45.33	74.00	-28.67	peak			
2	2490.500	46.13	-2.29	43.84	74.00	-30.16	peak			

Horizontal-AV:



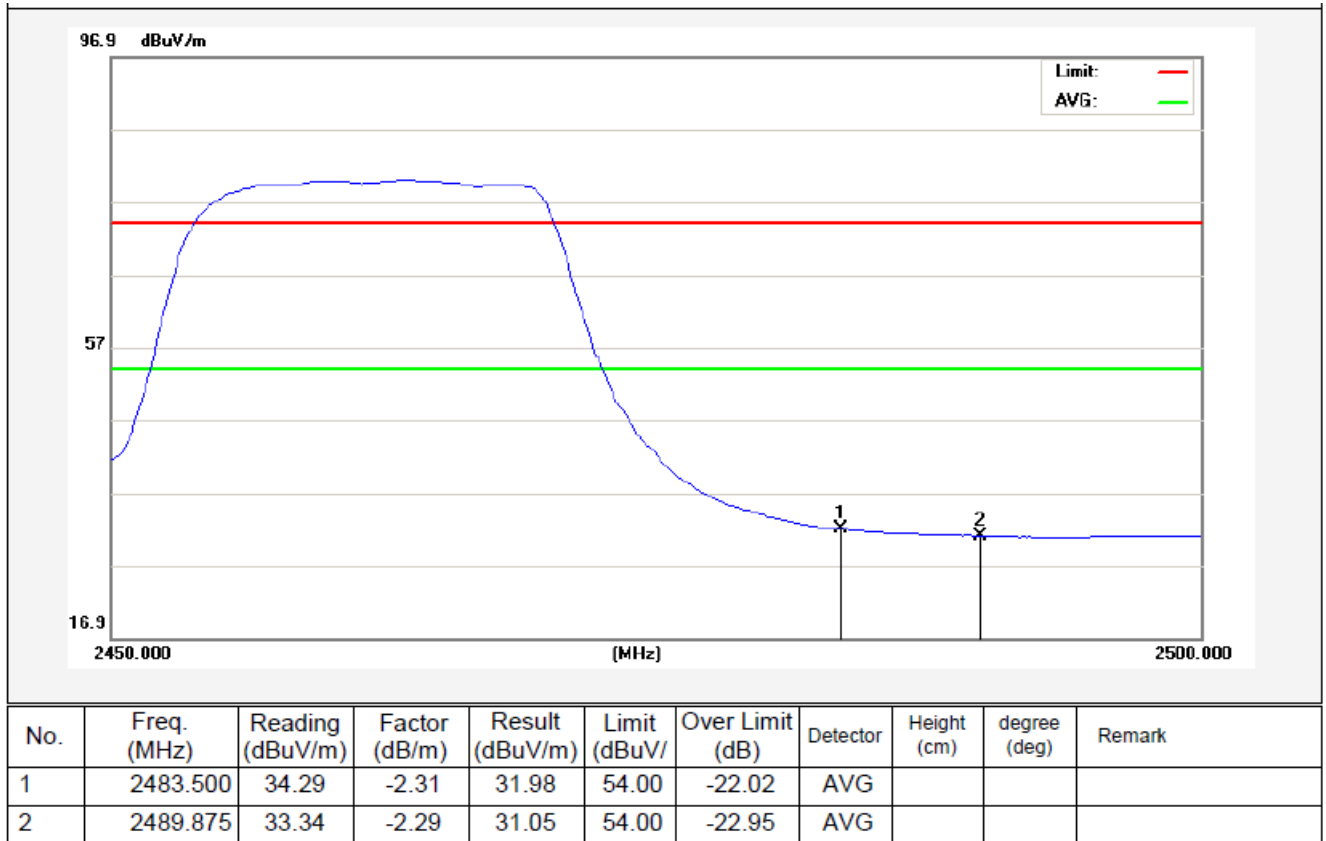
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	34.79	-2.31	32.48	54.00	-21.52	AVG			
2	2491.125	34.27	-2.29	31.98	54.00	-22.02	AVG			

Test Mode: 802.11g
2462MHz
Vertical-PEAK:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	46.53	-2.31	44.22	74.00	-29.78	peak			
2	2490.125	45.30	-2.29	43.01	74.00	-30.99	peak			

Vertical-AV:



4.5. Peak Power Spectral Density

a. Limit

1. 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.
2. 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.

b. Test Procedure

1. Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 1.5 times DTS BW, Sweep=500s
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

c. Test Equipment

Same as the equipment listed in 4.2.

d. Test Setup

See 4.1

e. Test Results

Pass

f. Test Data

Please refer to the following data.

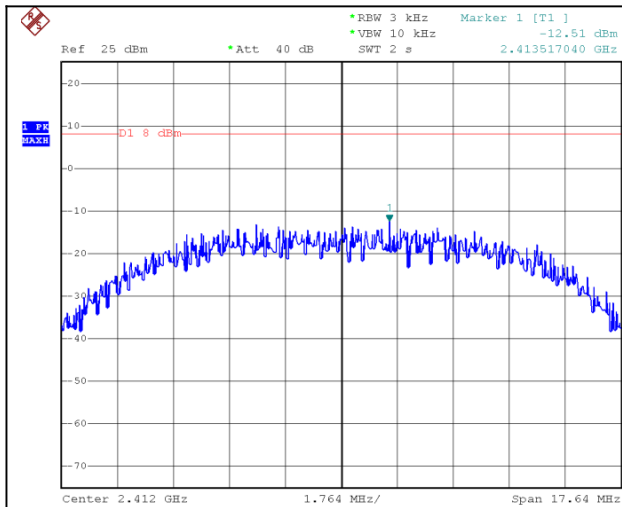
g. Test Plot See the following pages

Test mode: IEEE 802.11b

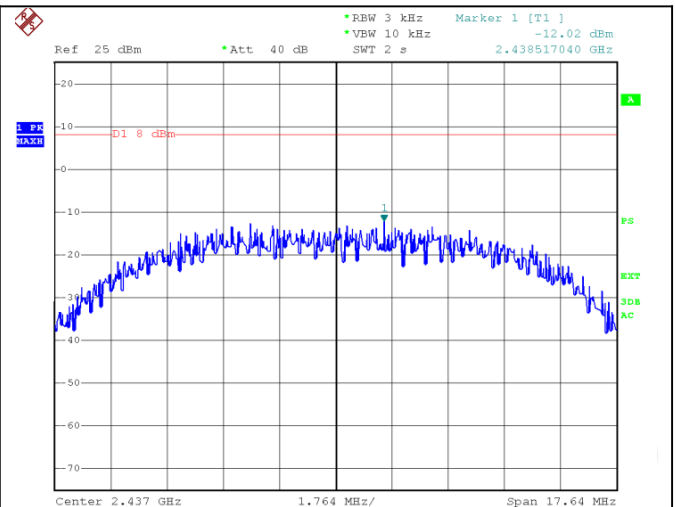
Channel	Frequency (MHz)	PPSD (dBm/3KHz)	Σ PPSD (dBm/3KHz)	Limit (dBm)	Result
Low	2412	-12.51	-	8.00	Pass
Mid	2437	-12.02	-		Pass
High	2462	-13.13	-		Pass

Test mode: IEEE 802.11g

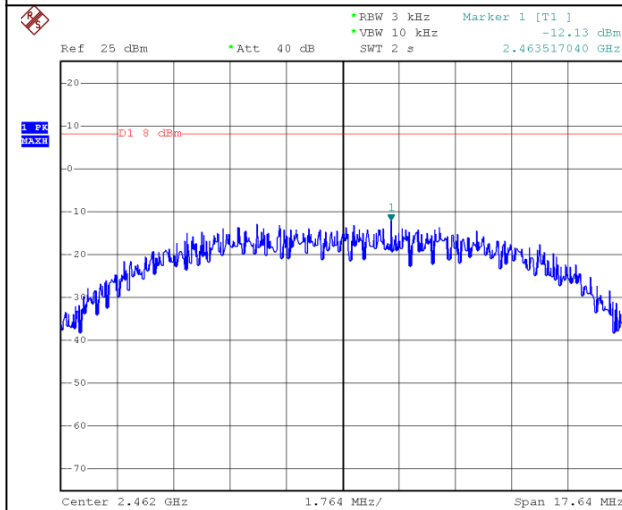
Channel	Frequency (MHz)	PPSD (dBm)	Σ PPSD (dBm)	Limit (dBm)	Result
Low	2412	-18.96	-	8.00	Pass
Mid	2437	-18.18	-		Pass
High	2462	-17.85	-		Pass



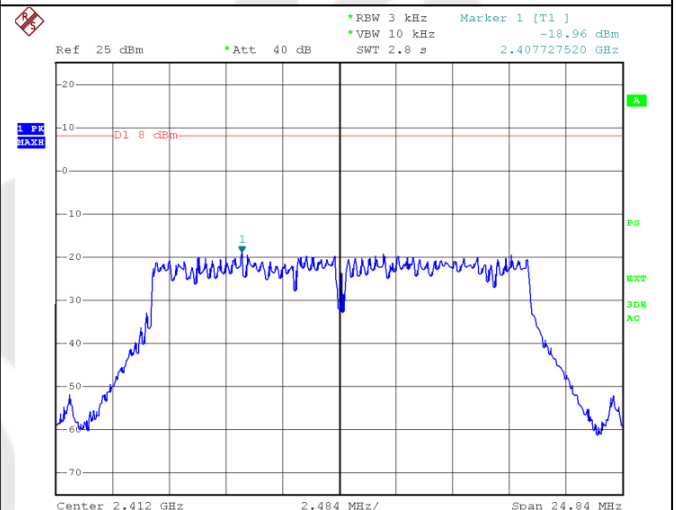
Test Mode: 802.11b---Low



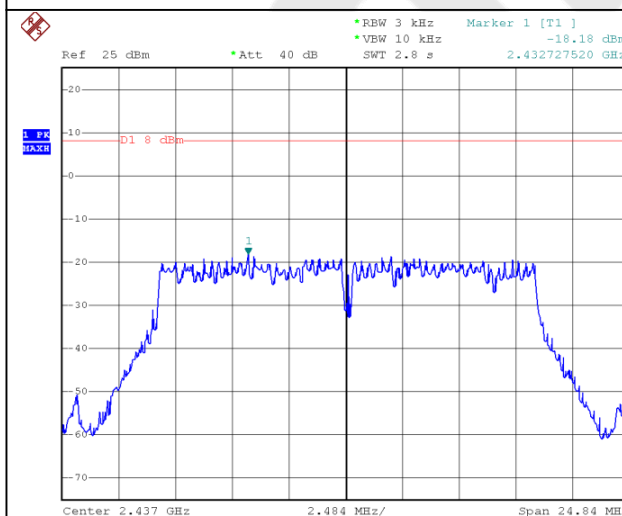
Test Mode: 802.11b---Mid



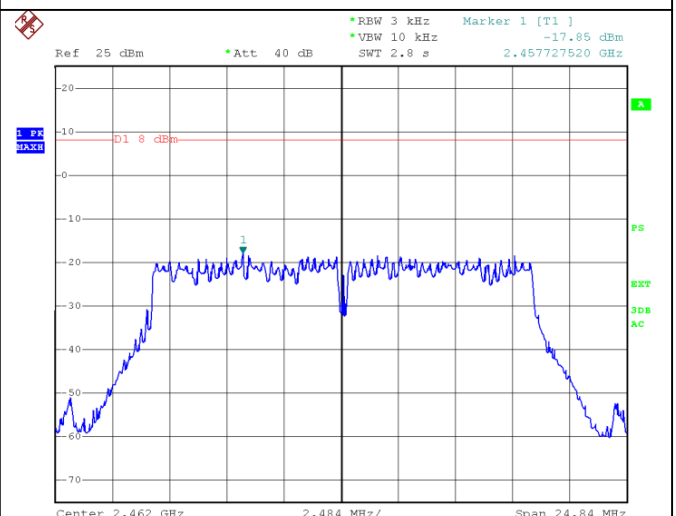
Test Mode: 802.11b---High



Test Mode: 802.11g---Low



Test Mode: 802.11g---Mid



Test Mode: 802.11g---High

4.6. Radiated Emissions

4.6.1.1. Test Limits (< 30 MHZ)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30

4.6.1.2. Test Limits (\geq 30 MHZ)

FIELD STRENGTH of Fundamental: @3M	FIELD STRENGTH of Harmonics	S15.209 30 - 88 MHz	40 dBuV/m
902-928 MHZ		88 - 216 MHz	43.5
2.4-2.4835 GHz		216 - 960 MHz	46
94 dBuV/m @3m	54 dBuV/m @3m	ABOVE 960 MHz	54dBuV/m

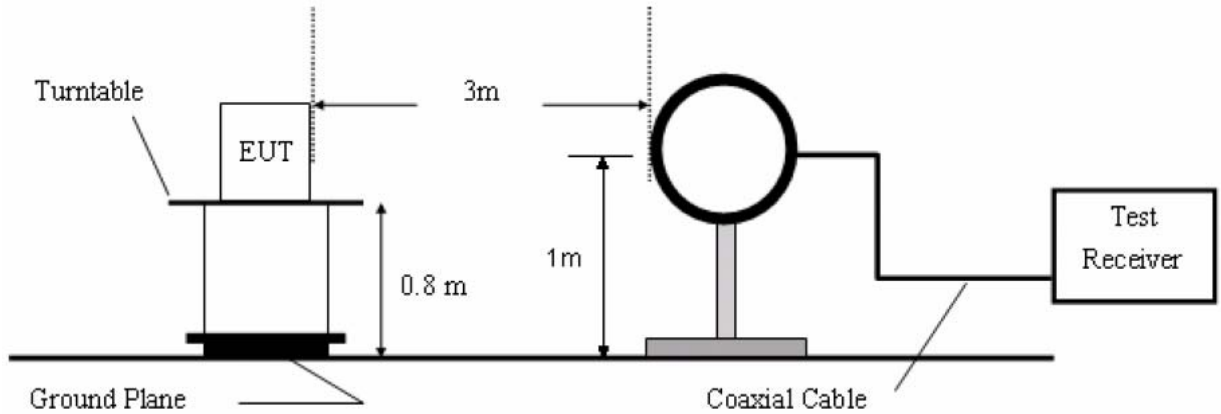
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Test Equipment

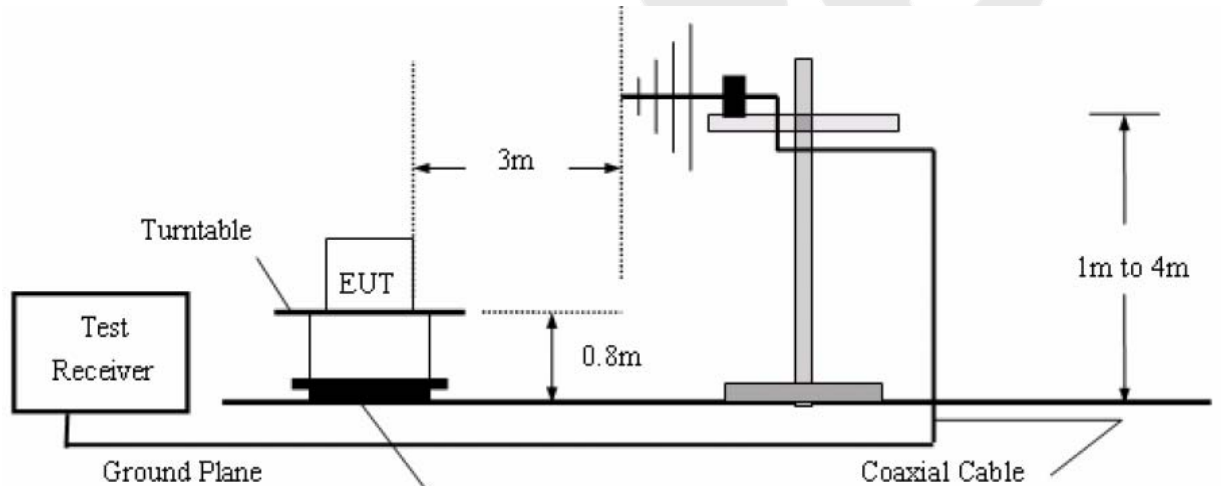
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Apr. 17, 2015	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Apr. 17, 2015	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 17, 2015	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 20, 2015	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 20, 2015	1 Year
6.	Pre-amplifier	SONOMA	310N	186860	Apr. 17, 2015	1 Year
7.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

4.6.2. Test Configuration:

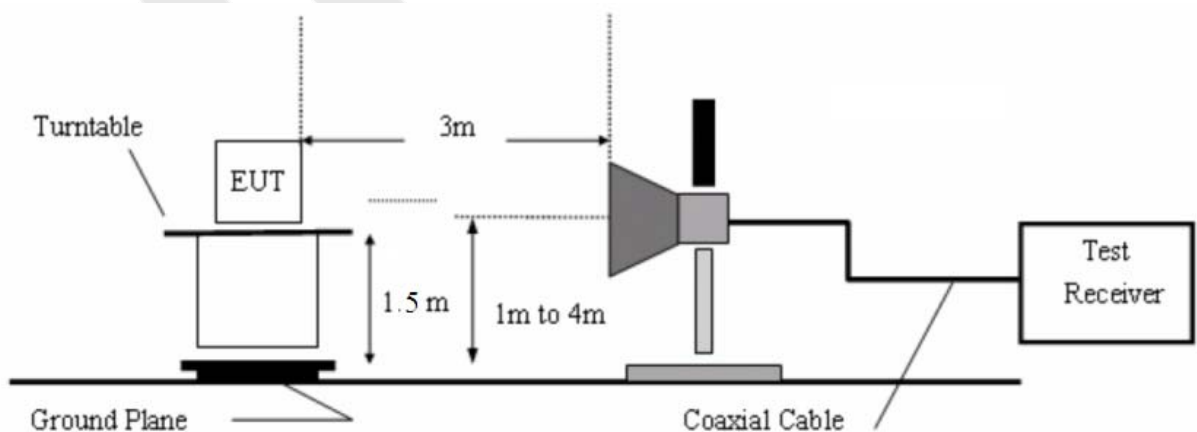
4.6.2.1. 9k to 30MHz emissions:



4.6.2.2. 30M to 1G emissions:



4.6.2.3. 1G to 40G emissions:



4.6.3. Test Procedure

For below 1GHz: The EUT is placed on a turntable, which is 0.8m above the ground plane.
For above 1GHz: The EUT is placed on a turntable, which is 1.5m above the ground plane.
The turn table can rotate 360 degrees to determine the position of the maximum emission level.
The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower.
The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

Measurements are made on 9KHz to 30MHz and 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

All readings from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120kHz. All reading are above 1GHz, peak & average values with a resolution bandwidth of 1MHz.

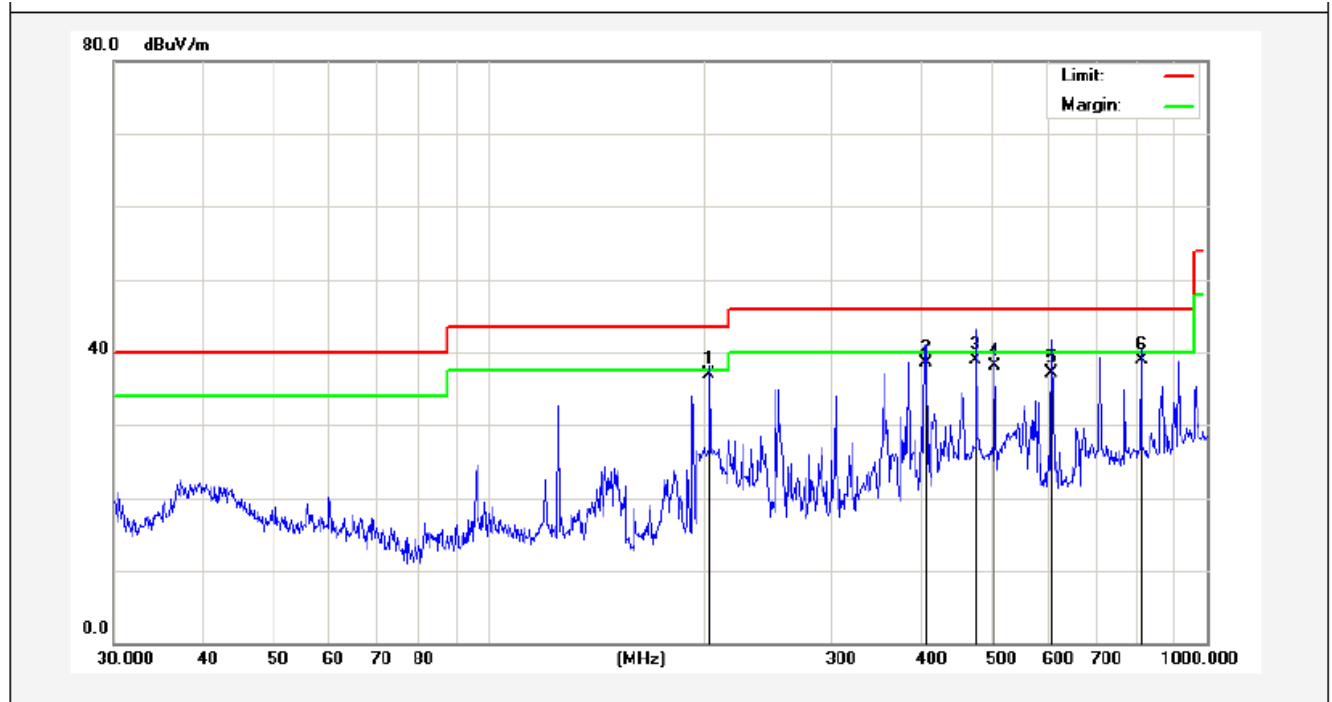
The EUT is tested in 9*6*6 Chamber. The device is evaluated in xyz orientation.

The test results are listed in Section 4.6.4.

4.6.4. Test Results

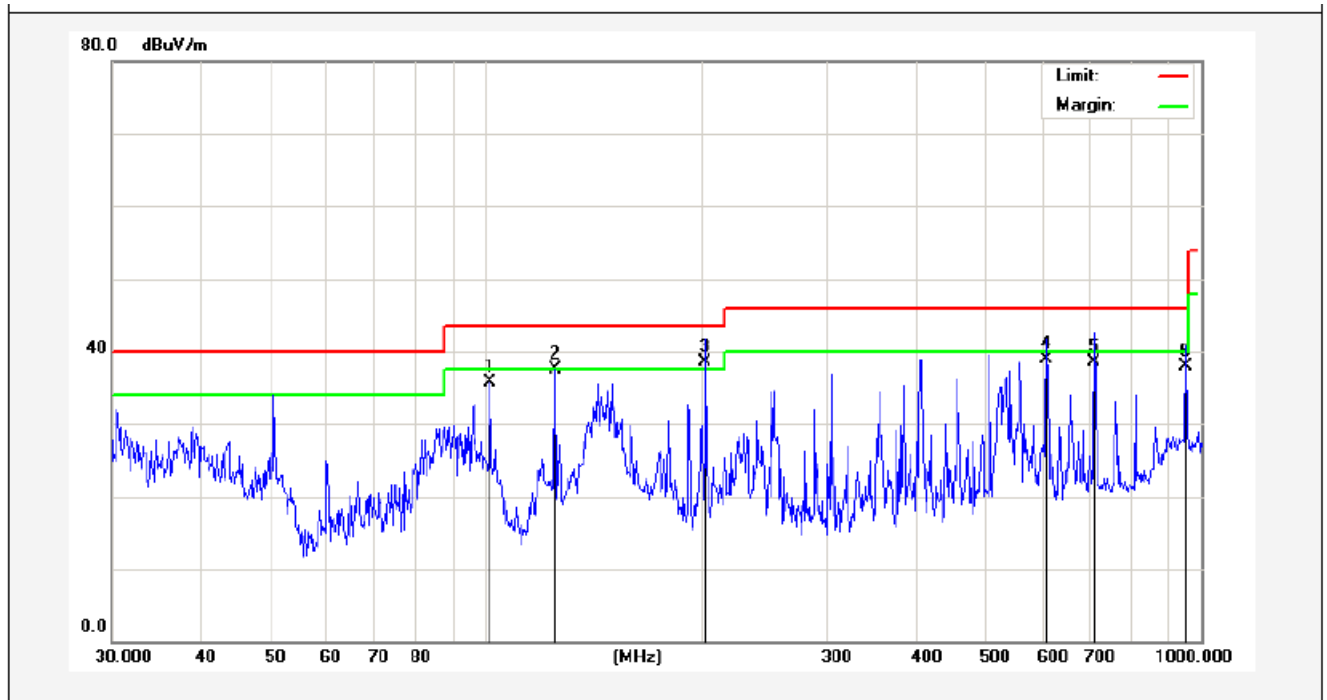
The EUT was tested on (Playing, WiFi and BT Mode, Charging) modes, only the worst data of (Charging) is attached in the following pages. Only the worst case (x orientation).

Job No.:	011505471I	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V, 60Hz
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Test Mode:	ON	Distance:	3m



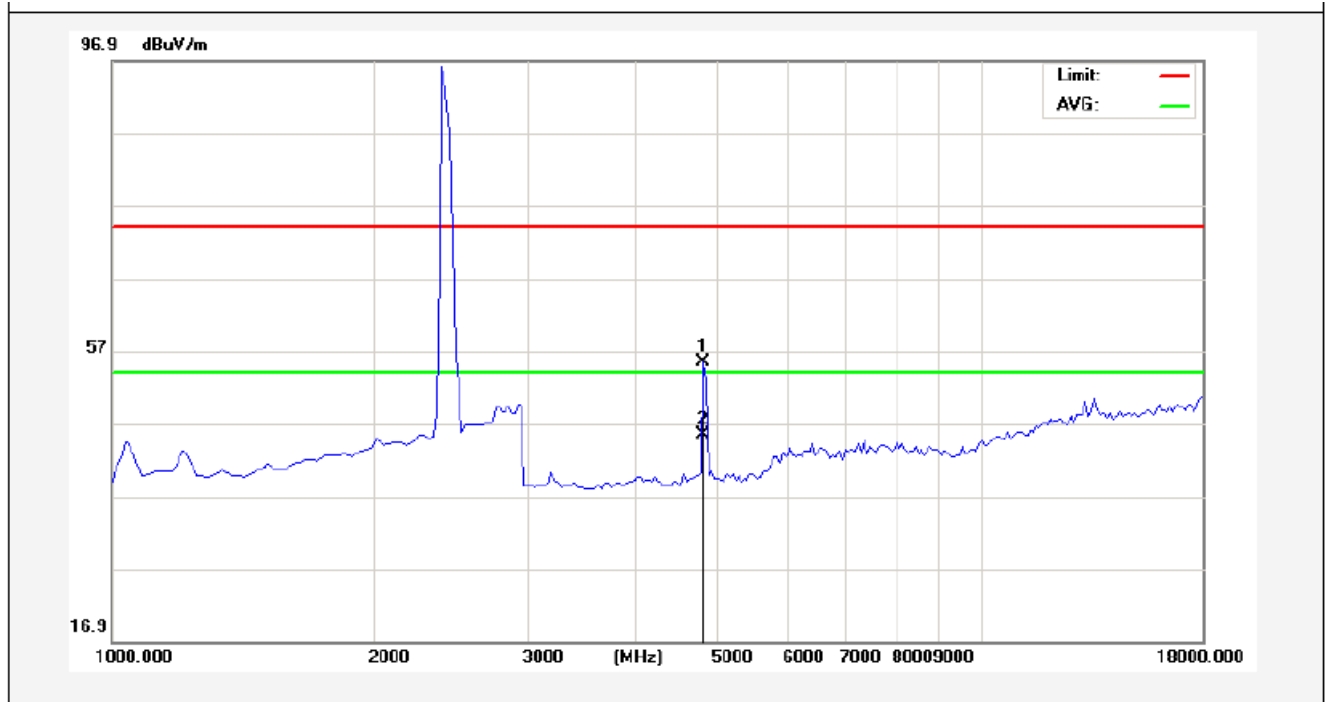
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	202.8103	54.64	-17.77	36.87	43.50	-6.63	AVG	100	0	
2	406.0880	51.27	-12.72	38.55	46.00	-7.45	AVG	100	360	
3	477.1693	50.49	-11.62	38.87	46.00	-7.13	AVG	100	0	
4	506.4791	49.11	-10.97	38.14	46.00	-7.86	AVG	100	360	
5	607.7866	48.22	-11.03	37.19	46.00	-8.81	AVG	100	0	
6	810.2653	45.37	-6.38	38.99	46.00	-7.01	AVG	100	360	

Job No.:	011505471I	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V, 60Hz
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Test Mode:	ON	Distance:	3m



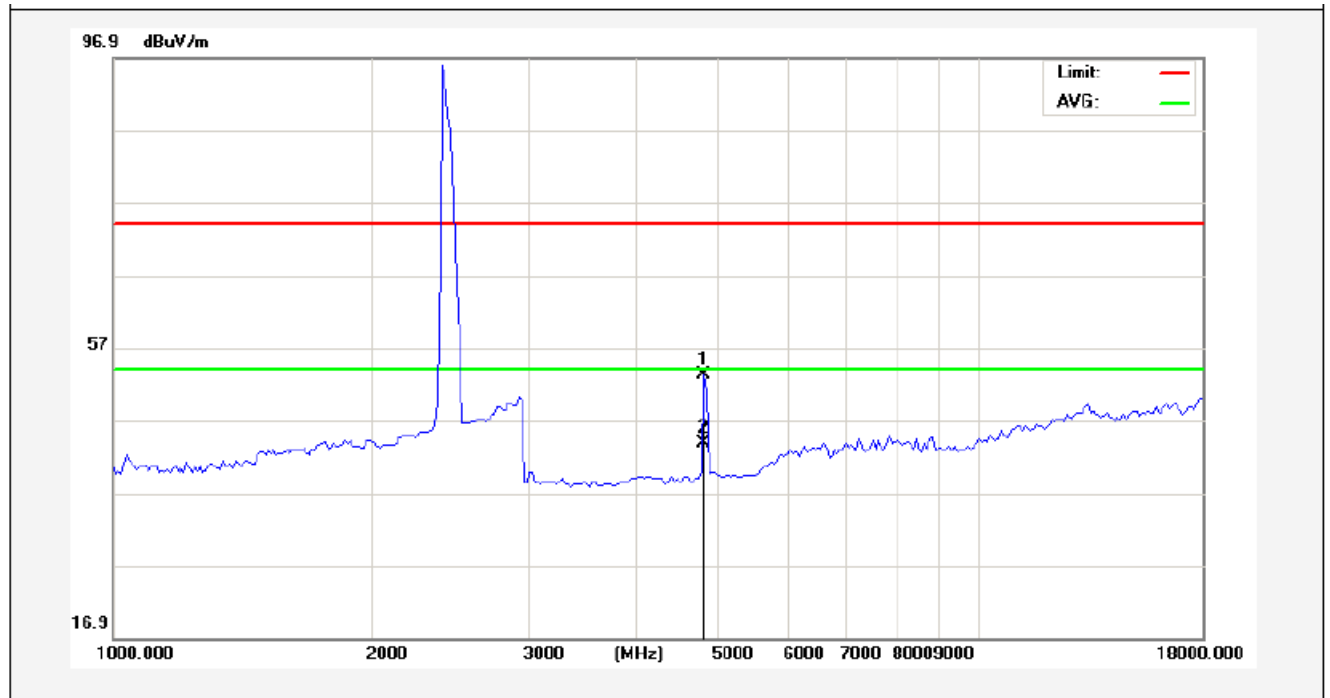
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	101.2883	51.54	-15.75	35.79	43.50	-7.71	peak			
2	125.0066	54.58	-17.08	37.50	43.50	-6.00	peak			
3	202.8103	54.24	-15.77	38.47	43.50	-5.03	AVG	100	0	
4	607.7866	48.03	-9.18	38.85	46.00	-7.15	AVG	100	360	
5	709.1823	46.66	-8.21	38.45	46.00	-7.55	AVG	100	0	
6	952.0937	40.77	-2.93	37.84	46.00	-8.16	AVG	100	360	

Job No.:	011505471I	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V, 60Hz
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	802.11b(2412MHz)	Distance:	3m



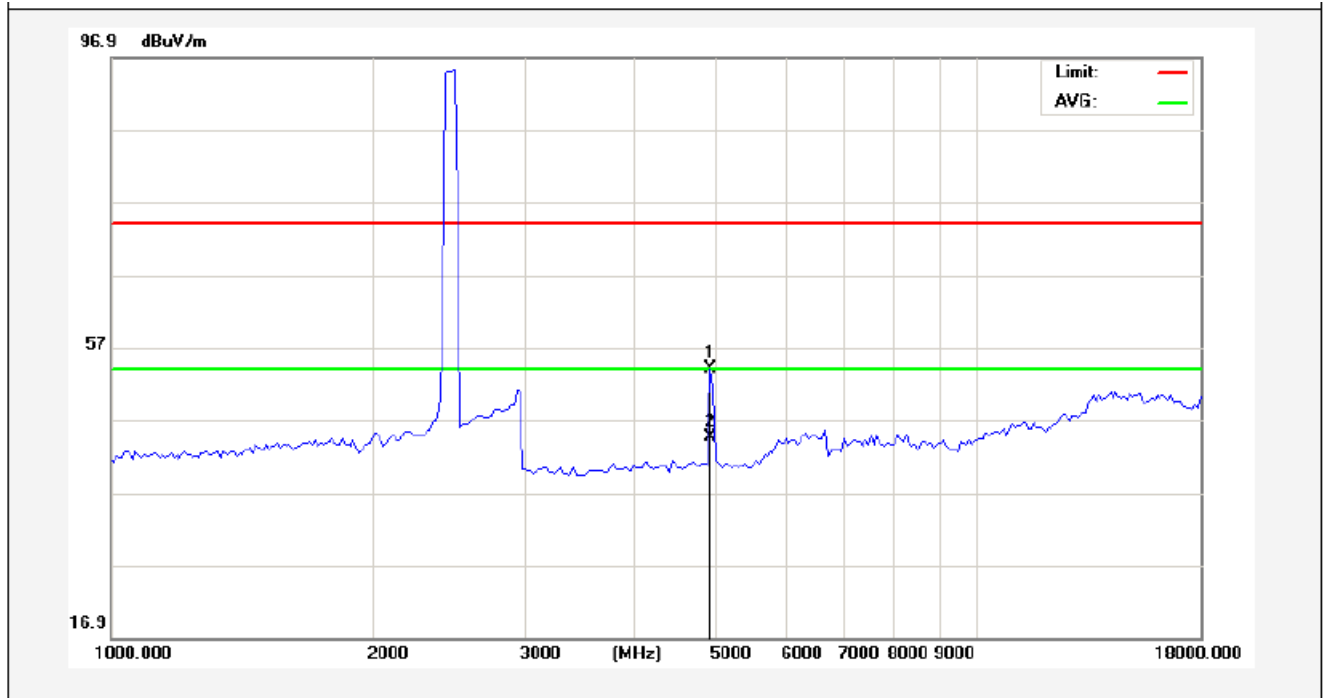
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4825.000	52.10	3.34	55.44	74.00	-18.56	peak			
2	4825.000	42.02	3.34	45.36	54.00	-8.64	AVG			

Job No.:	011505471I	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V, 60Hz
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	802.11b(2412MHz)	Distance:	3m



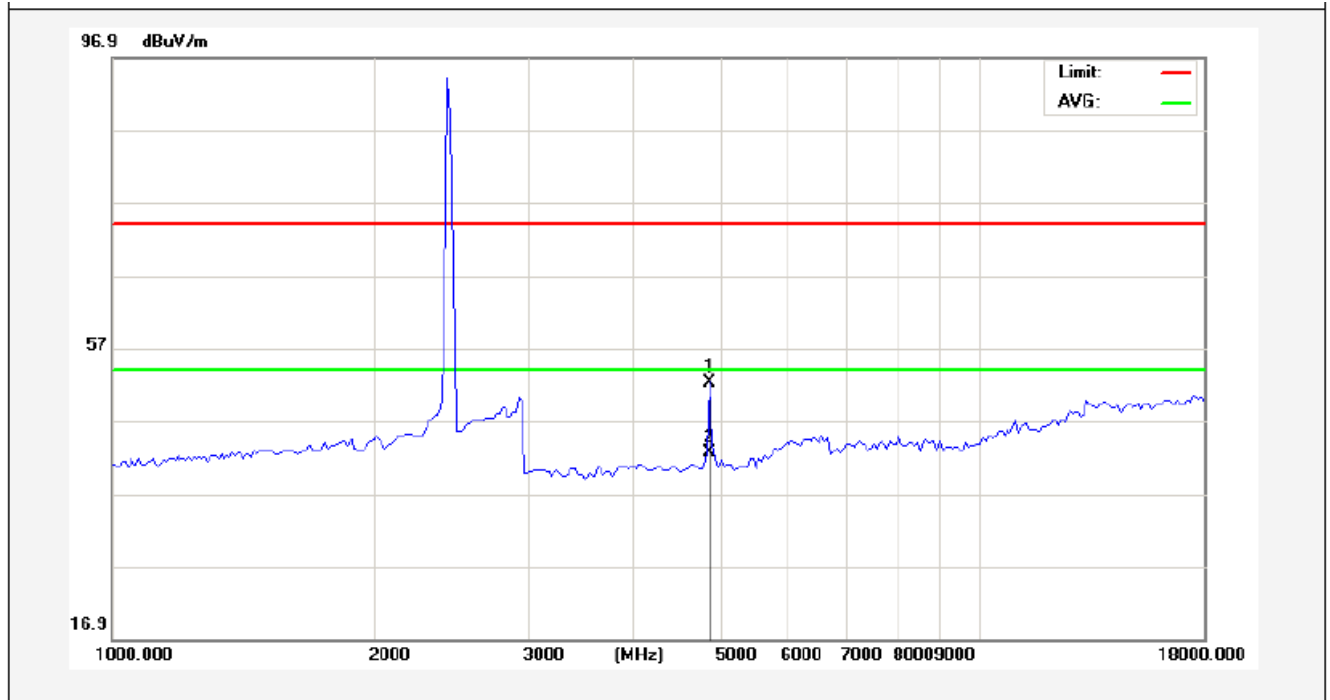
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4825.000	49.87	3.34	53.21	74.00	-20.79	peak			
2	4825.000	40.40	3.34	43.74	54.00	-10.26	AVG			

Job No.:	011505471I	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V, 60Hz
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	802.11b(2437MHz)	Distance:	3m



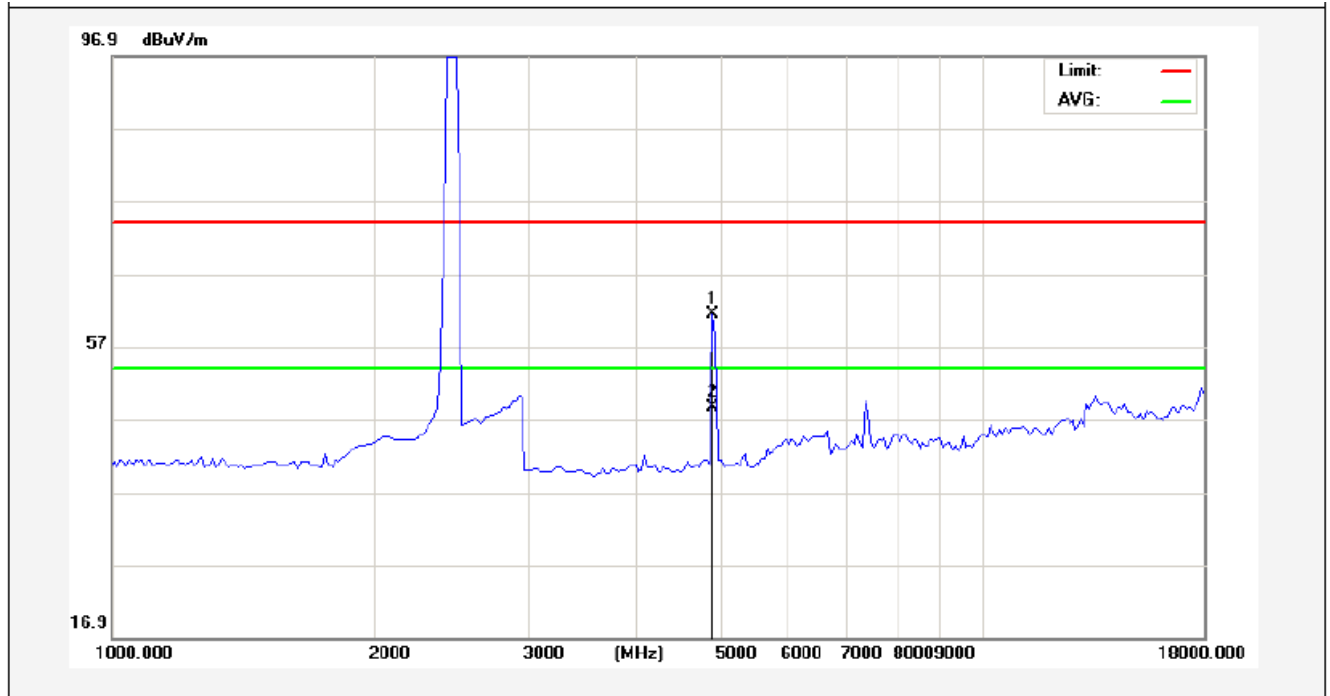
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4910.000	50.53	3.49	54.02	74.00	-19.98	peak			
2	4910.000	41.19	3.49	44.68	54.00	-9.32	AVG			

Job No.:	011505471I	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V, 60Hz
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	802.11b(2437MHz)	Distance:	3m



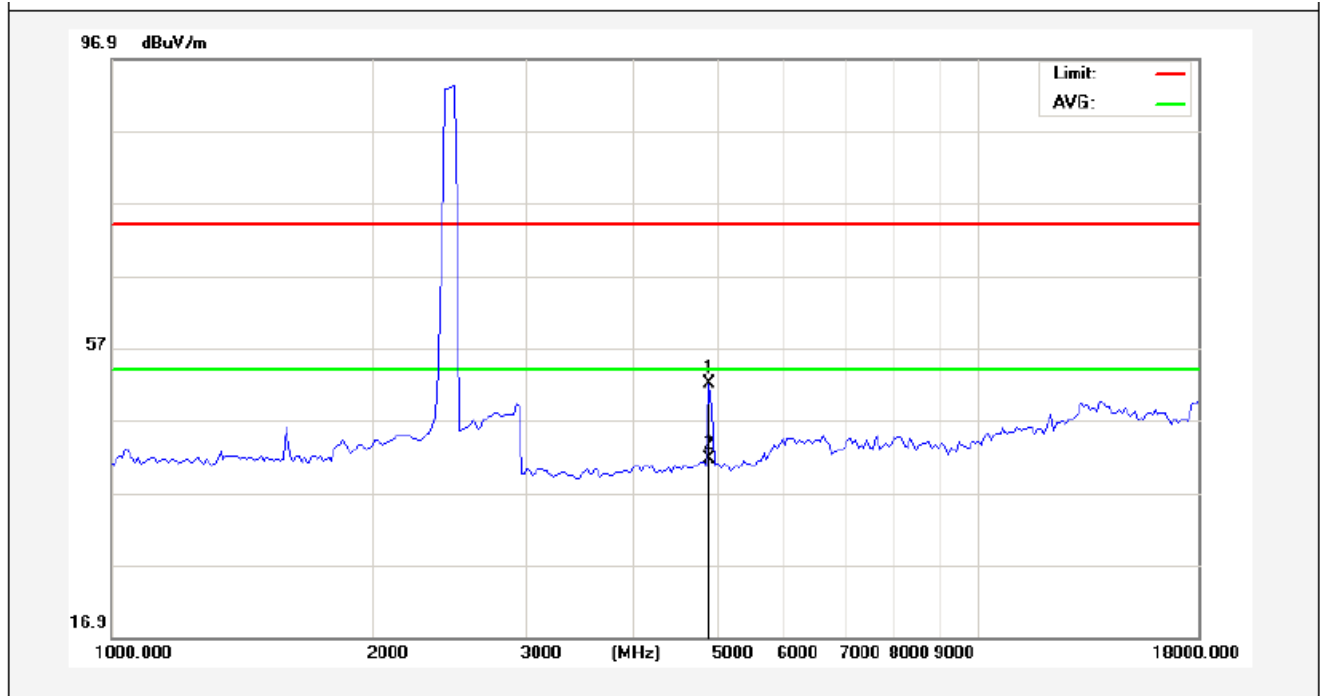
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4867.500	48.89	3.41	52.30	74.00	-21.70	peak			
2	4867.500	39.24	3.41	42.65	54.00	-11.35	AVG			

Job No.:	011505471I	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V, 60Hz
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	802.11b(2462MHz)	Distance:	3m



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4910.000	57.87	3.49	61.36	74.00	-12.64	peak			
2	4910.000	45.16	3.49	48.65	54.00	-5.35	AVG			

Job No.:	011505471I	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	AC 120V, 60Hz
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	802.11b(2462MHz)	Distance:	3m



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	4902.300	48.46	3.48	51.94	74.00	-22.06	peak			
2	4902.300	38.17	3.48	41.65	54.00	-12.35	AVG			

5. ANTENNA APPLICATION

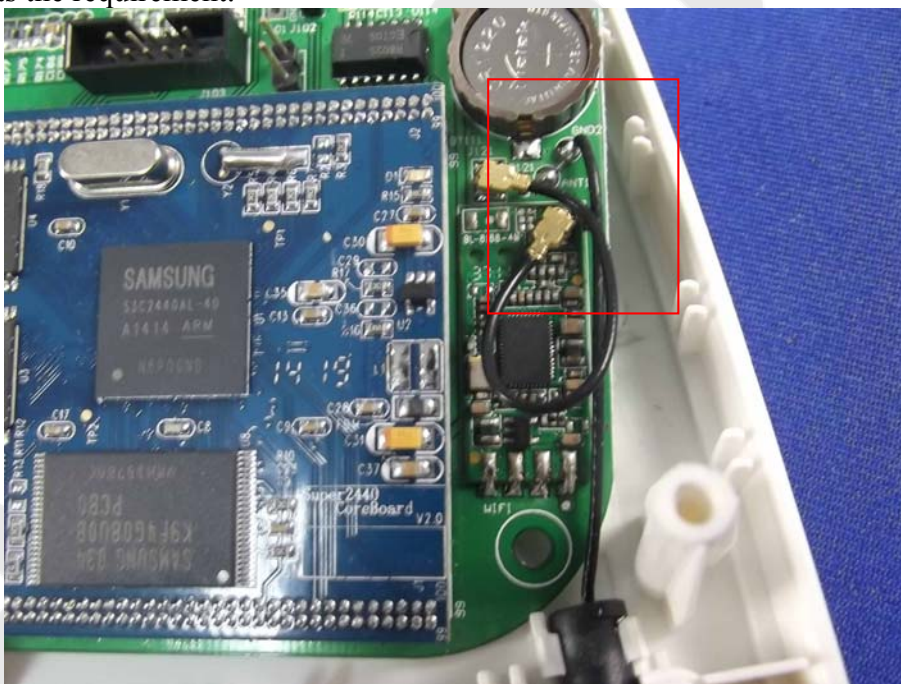
5.1. Antenna requirement

The EUT'S antenna is met the requirement of FCC part 15C section 15.203.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

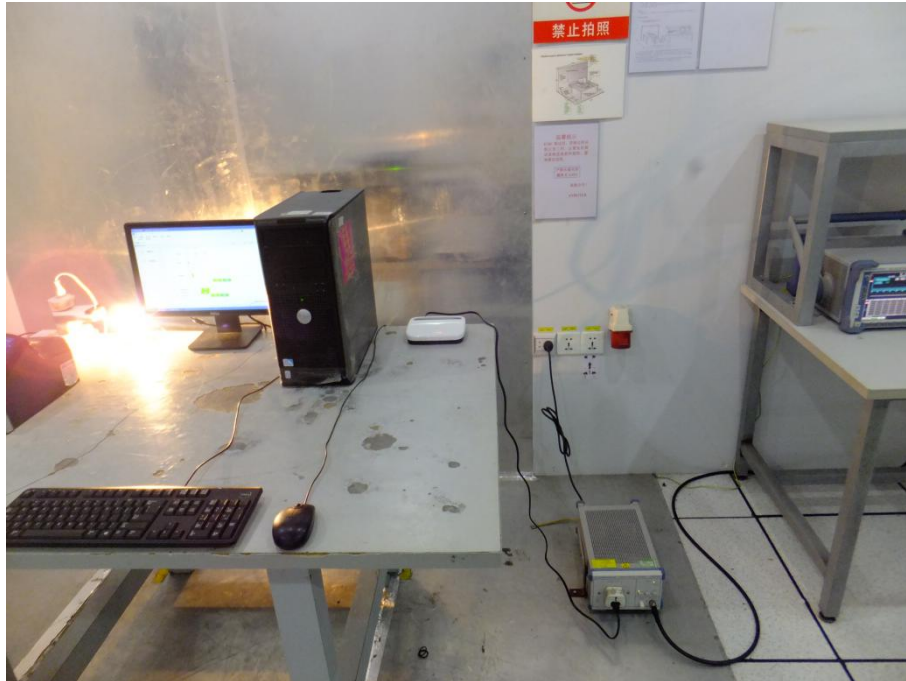
5.2. Result

The EUT's antenna used a Peripheral antenna which is permanently attached, The antenna's gain is 2.0dBi and meets the requirement.



6. PHOTOGRAPH

6.1. Photo of Conducted Emission Measurement



6.2. Photo of Radiation Emission Test



APPENDIX I (EXTERNAL PHOTOS)

Figure 1
The EUT-Overall View



Figure 2
The EUT-Top View



Figure 3
The EUT-Bottom View



Figure 4
The EUT-Front View

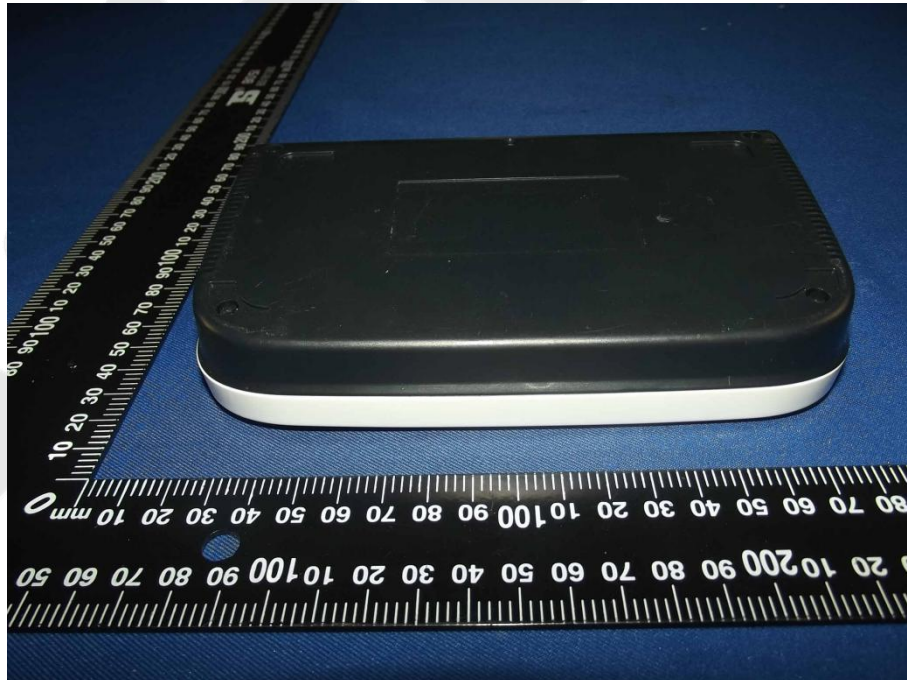


Figure 5
The EUT-Back View

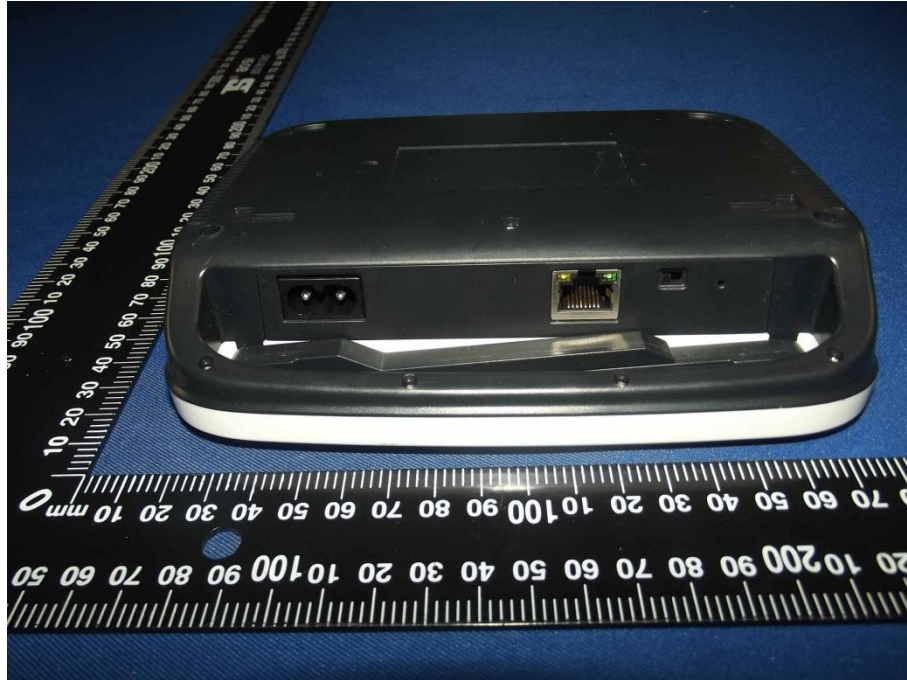


Figure 6
The EUT-Right View



Figure 7
The EUT-Left View



APPENDIX II (INTERNAL PHOTOS)

Figure 8
The EUT-Inside View



Figure 9
The EUT-Antenna View (433.92MHz)



Figure 10
The EUT-Antenna View (WiFi)

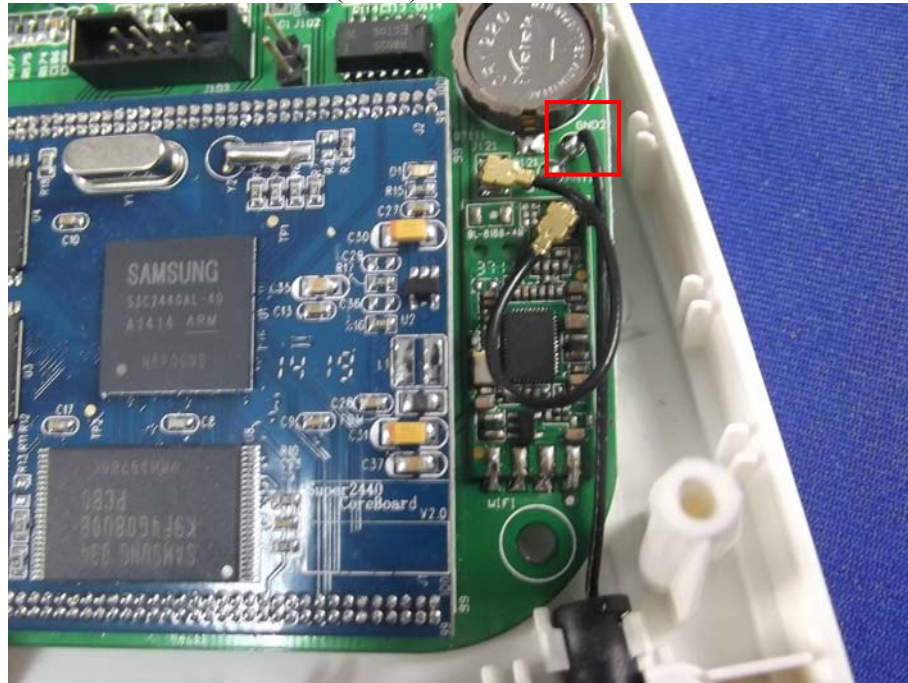


Figure 11
The EUT-Inside View



Figure 12
PCB of the EUT-Front View

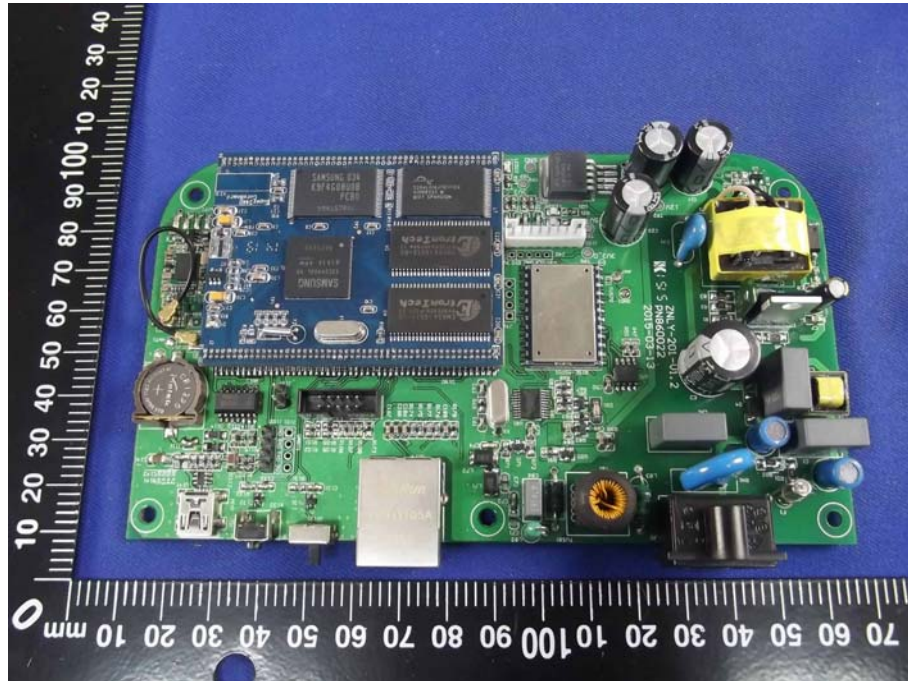


Figure 13
PCB of the EUT-Back View

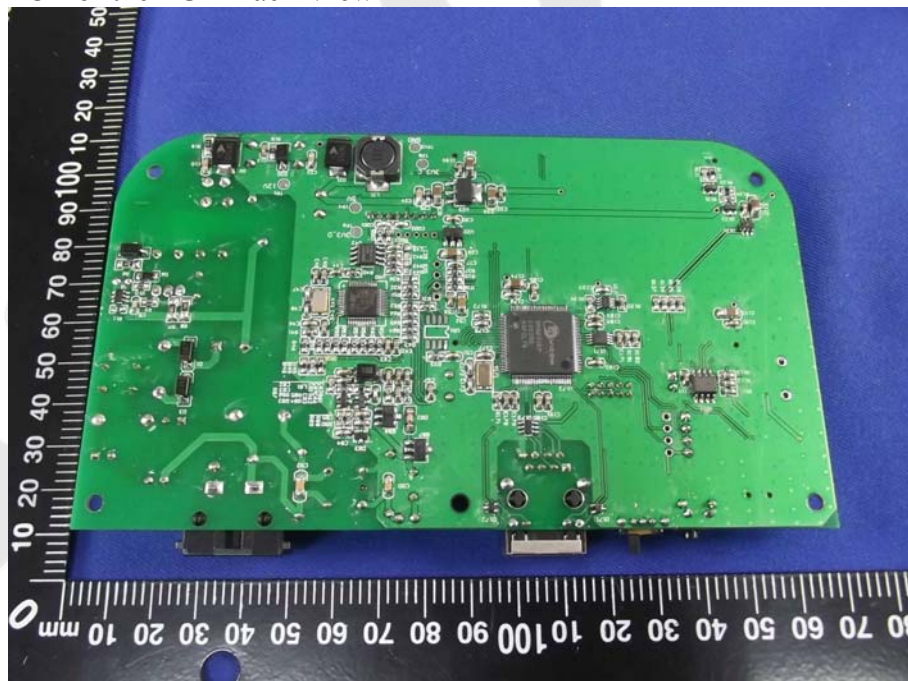


Figure 14
PCB of the EUT-Front View



Figure 15
PCB of the EUT-Back View

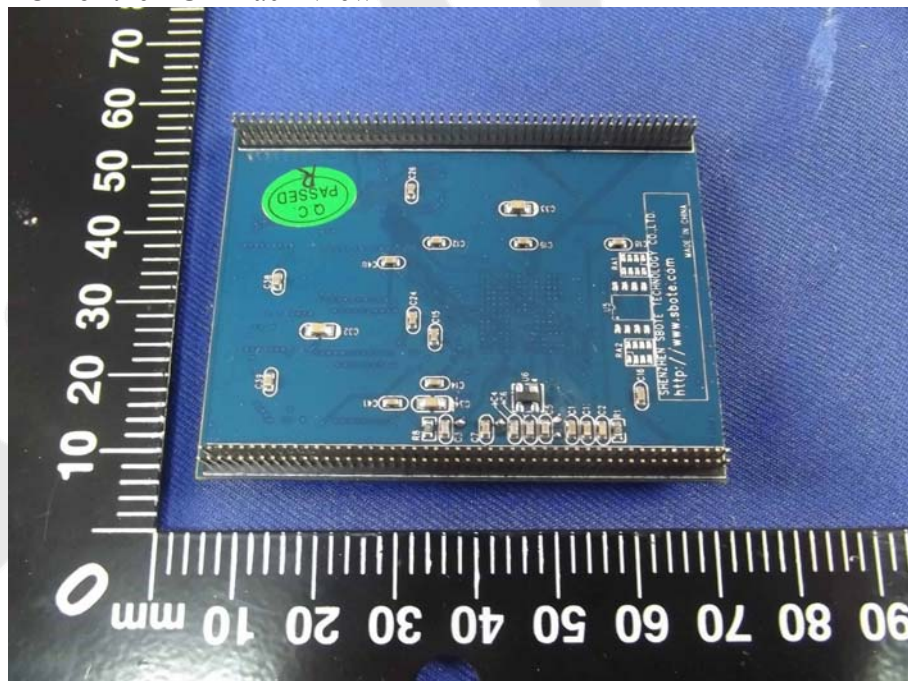


Figure 16
PCB of the EUT-Front View (WiFi Module)

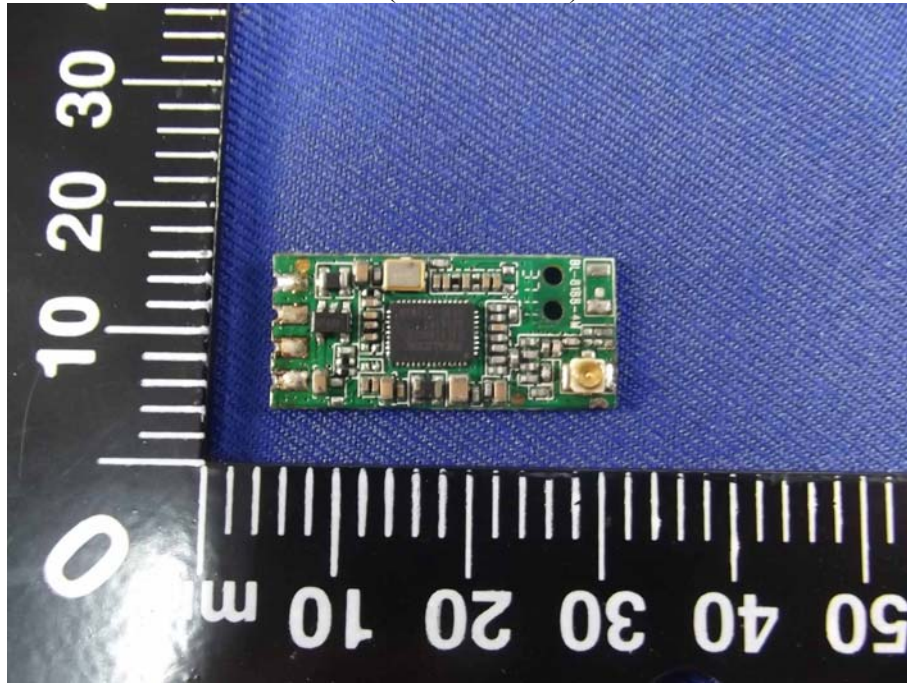


Figure 17
PCB of the EUT-Back View (WiFi Module)

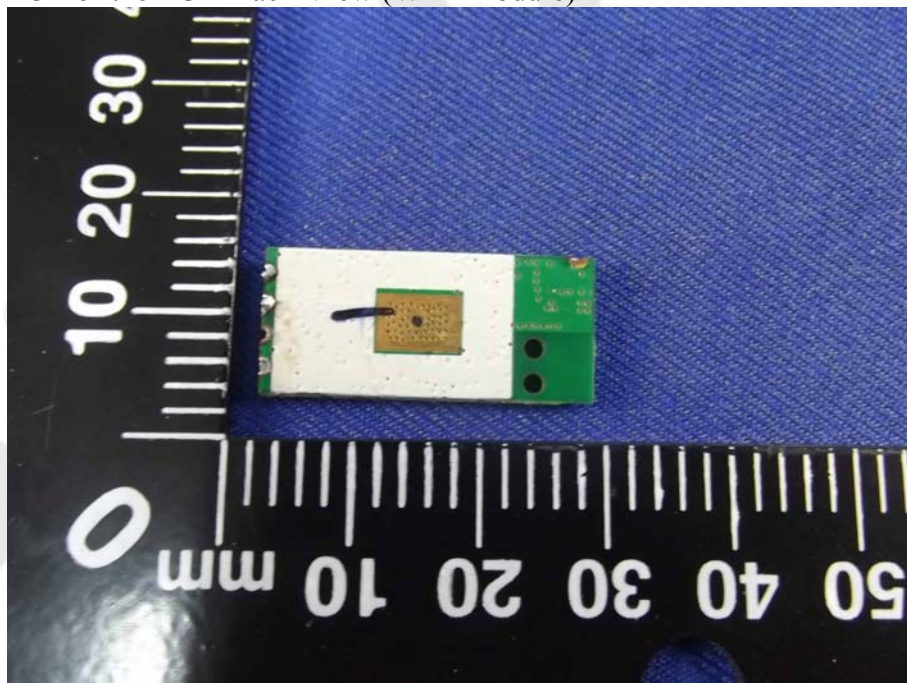


Figure 18
PCB of the EUT-Front View (WiFi Module)

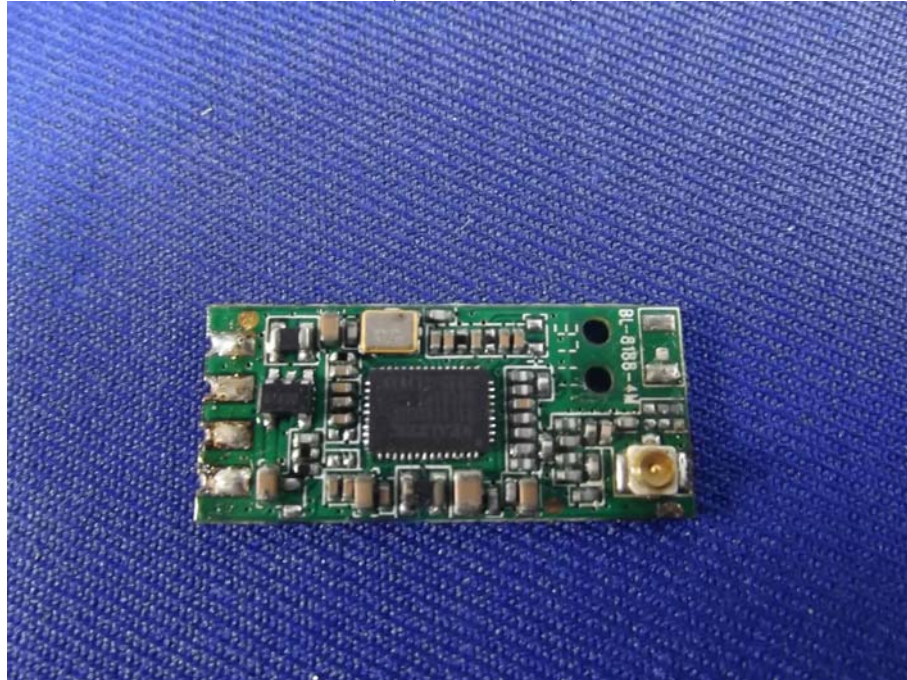


Figure 19
PCB of the EUT-Back View (WiFi Module)

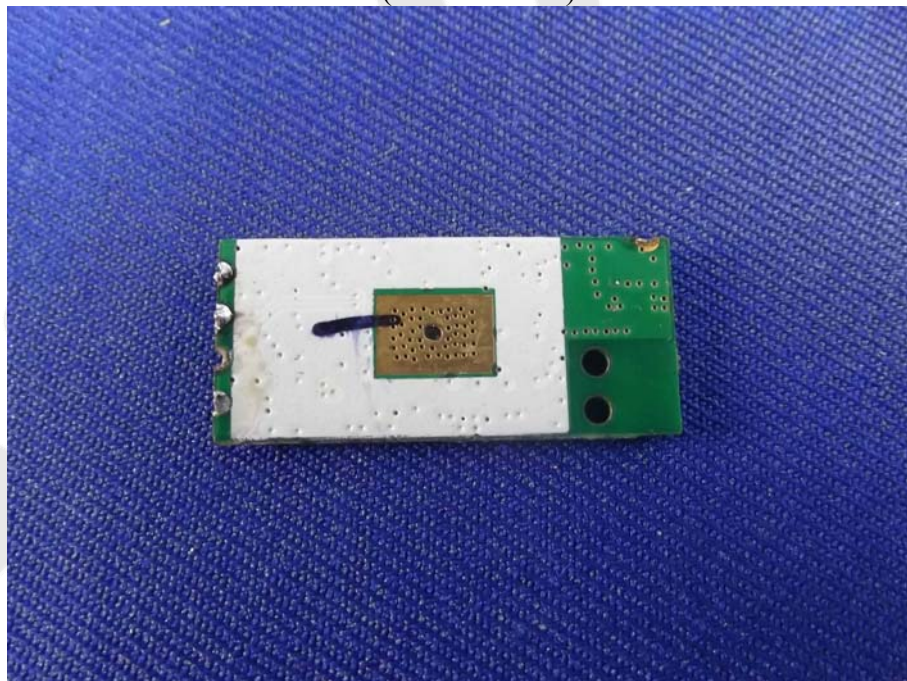


Figure 20
PCB of the EUT-Front View (433.92MHz Module)

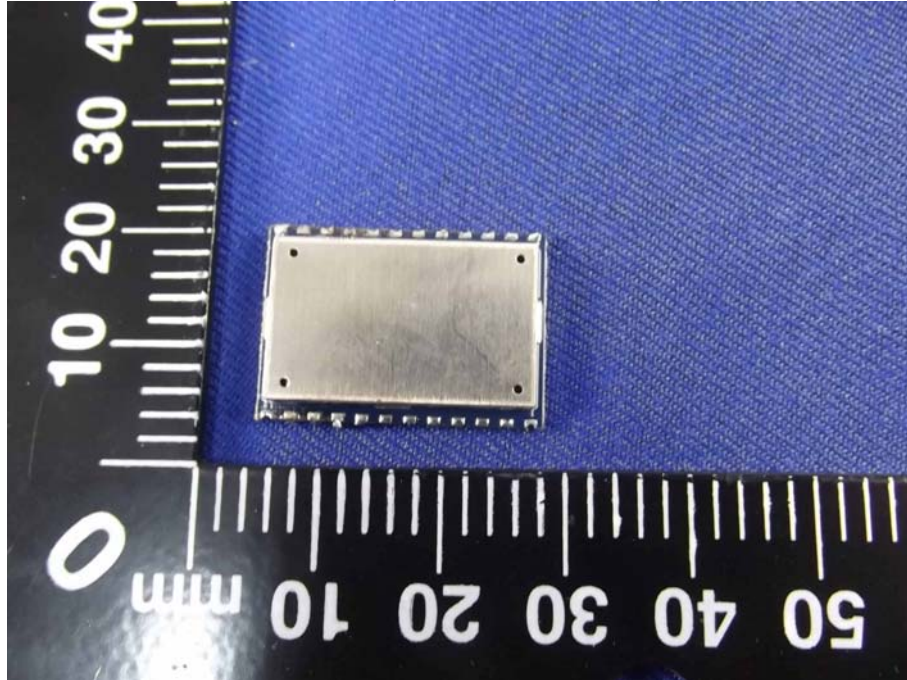


Figure 21
PCB of the EUT-Back View (433.92MHz Module)

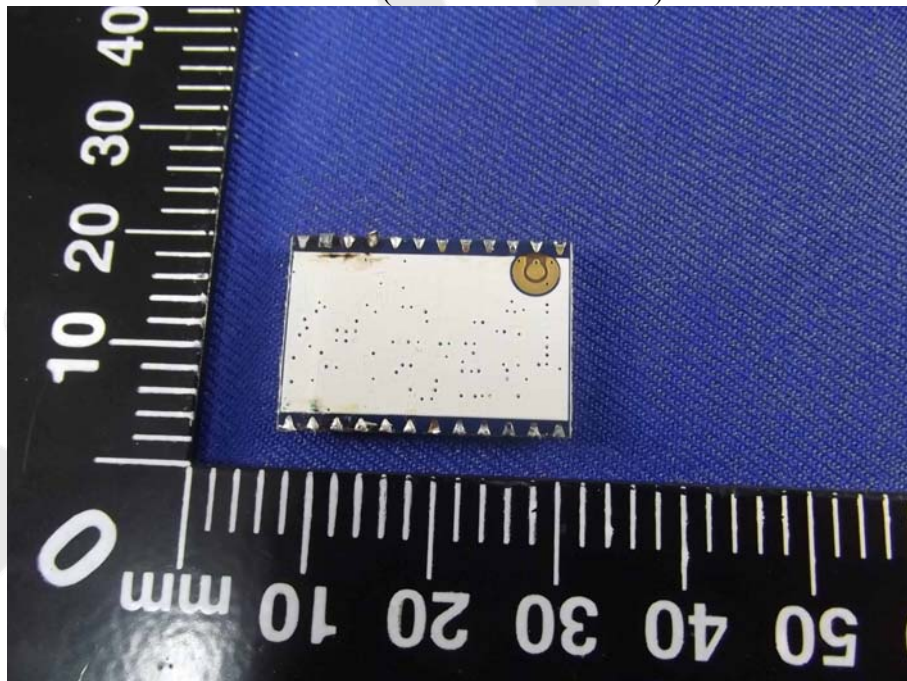


Figure 22
PCB of the EUT-Front View (433.92MHz Module)



Figure 23
PCB of the EUT-Back View (433.92MHz Module)

