

FCC TEST REPORT
for
Shenzhen Lantian Electronics Co., Ltd

Receiver
Model No.: R-591G, M2CLK591G, 44369

Prepared for : Shenzhen Lantian Electronics Co., Ltd
Address : Building A2, Area 4, Fuqiao Industrial Park, Qiaotou Village,
Fuyong Town, Bao'an Zone, Shenzhen, China

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Report Number : R011507235I
Date of Test : Jul. 09~ 24, 2015
Date of Report : Jul. 25, 2015

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TEST REPORT

Applicant : Shenzhen Lantian Electronics Co., Ltd
Manufacturer : Huizhou Kerecsen Opto-Electronics Co., Ltd
EUT : Receiver
Model No. : R-591G, M2CLK591G, 44369
Serial No. : N.A.
Trade Mark : N.A.
Rating : DC 5V Via USB Port

Measurement Procedure Used:

FCC Part15 Subpart C, Paragraph 15.207, 15.249 & 15.209

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. 09~24, 2015

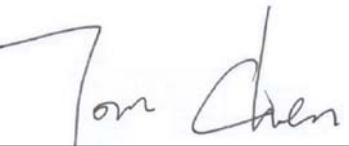
Prepared by :


(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 : Receiver

Model Number : R-591G, M2CLK591G, 44369
(Note: All samples are the same except the model number and colour, so we prepare “R-591G” for test only.)

Test Power Supply : AC 120V, 60Hz for PC/
AC 240V, 60Hz for PC

Frequency : 2406-2477MHz

Channel Space : 1MHz

No. of Channels : 72

Antenna Specification : PCB Antenna:0 dBi

Applicant Address : Shenzhen Lantian Electronics Co., Ltd
: Building A2, Area 4, Fuqiao Industrial Park, Qiaotou Village,
Fuyong Town, Bao'an Zone, Shenzhen, China

Manufacturer Address : Huizhou Kerecsen Opto-Electronics Co., Ltd
: Rongsheng Industrial Park, Xintang, Huiyang, Huizhou, China

Factory Address : Huizhou Kerecsen Opto-Electronics Co., Ltd
: Rongsheng Industrial Park, Xintang, Huiyang, Huizhou, China

Date of receipt : Jul. 09, 2015

Date of Test : Jul. 09~ 24, 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
Wireless Keyboard	: LK-591G
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

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-1, 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 Procedure

GENERAL: This report shall NOT be reproduced except in full without the written approval of Shenzhen Anbotek Compliance Laboratory Limited. The EUT was transmitting a test signal during the testing.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.10-2013 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz) METER READING + ACF = FS
20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

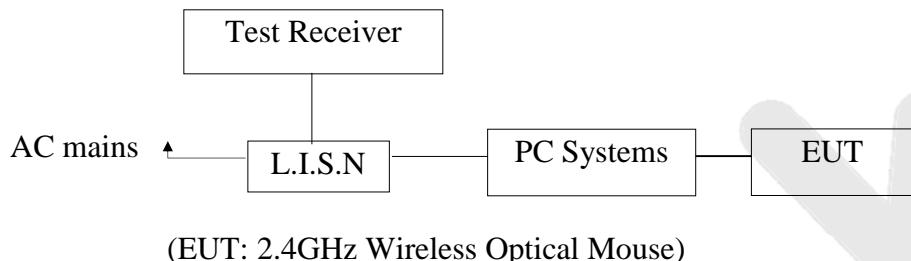
ANSI STANDARD C63.10-2013 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

3. Conducted Limits

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(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.

3.3. 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.

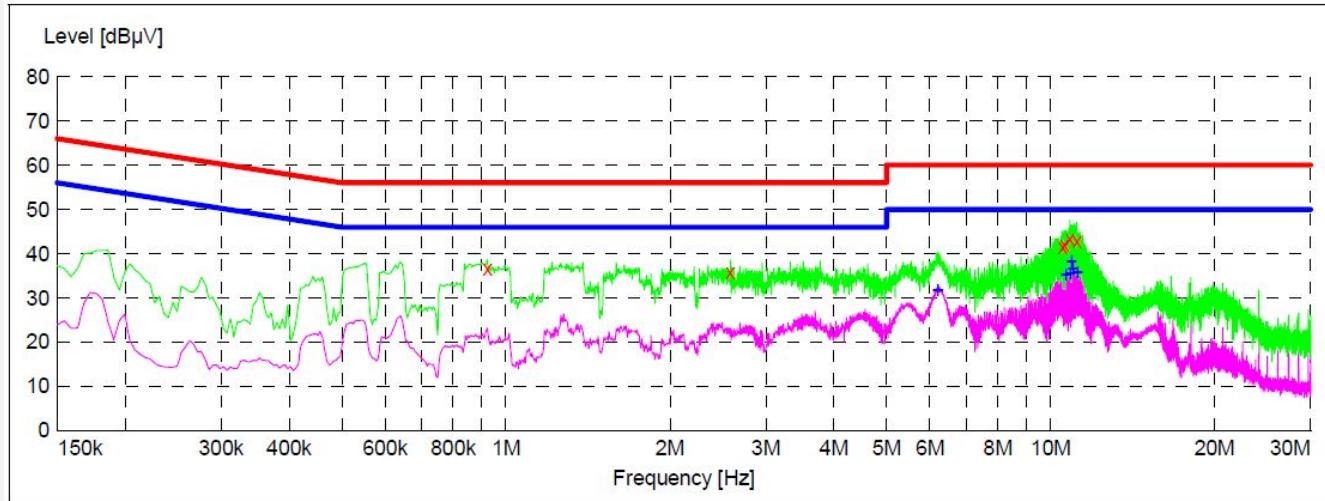
Please refer the following pages.

CONDUCTED EMISSION TEST DATA

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

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

Short Description: 150K-30M Disturbance Voltages



Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.924000	36.60	20.1	56	19.4	QP	L1	GND
2.584000	35.80	20.4	56	20.2	QP	L1	GND
10.531000	41.50	20.6	60	18.5	QP	L1	GND
10.589500	42.10	20.6	60	17.9	QP	L1	GND
10.855000	43.30	20.6	60	16.7	QP	L1	GND
11.183500	42.90	20.6	60	17.1	QP	L1	GND

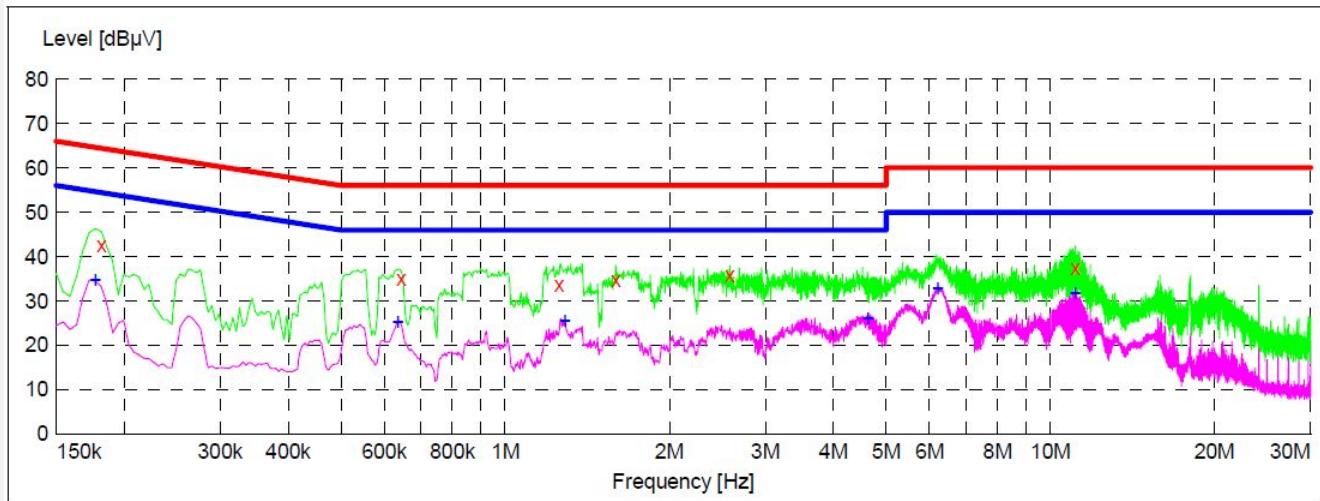
Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
6.202000	31.80	20.5	50	18.2	AV	L1	GND
10.661500	35.20	20.6	50	14.8	AV	L1	GND
10.859500	35.50	20.6	50	14.5	AV	L1	GND
10.922500	38.40	20.6	50	11.6	AV	L1	GND
10.990000	36.60	20.6	50	13.4	AV	L1	GND
11.188000	35.90	20.6	50	14.1	AV	L1	GND

CONDUCTED EMISSION TEST DATA

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

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

Short Description: 150K-30M Disturbance Voltages



Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.181500	42.60	20.1	64	21.8	QP	N	GND
0.645000	35.00	20.1	56	21.0	QP	N	GND
1.256500	33.80	20.2	56	22.2	QP	N	GND
1.594000	34.80	20.3	56	21.2	QP	N	GND
2.584000	35.70	20.4	56	20.3	QP	N	GND
11.107000	37.40	20.6	60	22.6	QP	N	GND

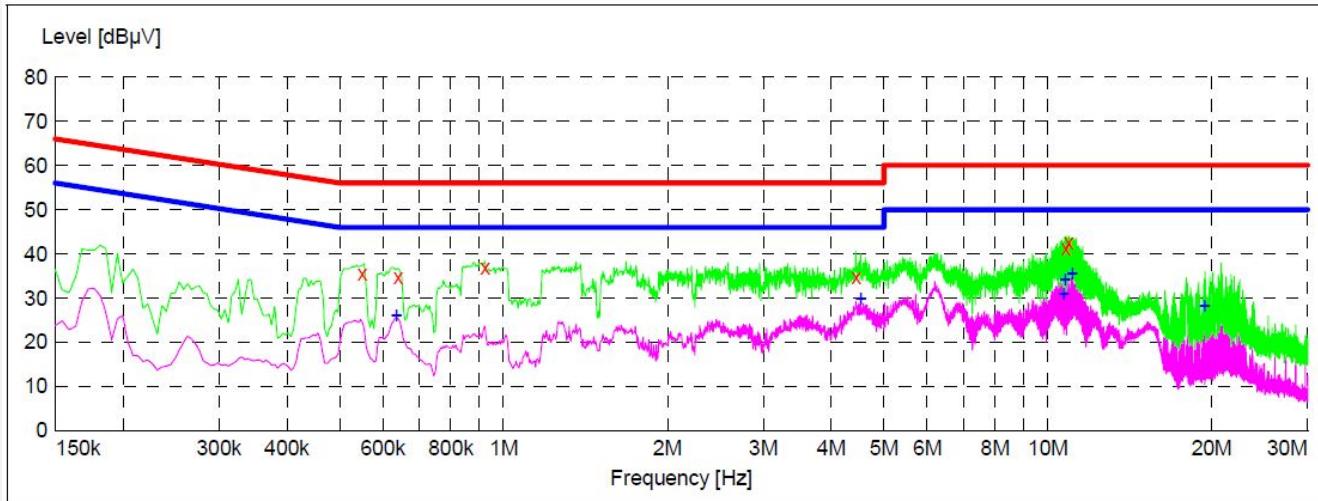
Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.177000	34.80	20.1	55	19.8	AV	N	GND
0.636000	25.30	20.1	46	20.7	AV	N	GND
1.288000	25.60	20.2	46	20.4	AV	N	GND
4.622500	26.00	20.5	46	20.0	AV	N	GND
6.211000	32.80	20.5	50	17.2	AV	N	GND
11.116000	31.80	20.6	50	18.2	AV	N	GND

CONDUCTED EMISSION TEST DATA

Test Site: 1# Shielded Room
 Operating Condition: ON
 Test Specification: AC 240V, 60Hz for PC
 Comment: Live Line
 Tem:25°C Hum:50%

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

Short Description: 150K-30M Disturbance Voltages



Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.550500	35.60	20.1	56	20.4	QP	L1	GND
0.640500	34.90	20.1	56	21.1	QP	L1	GND
0.924000	37.00	20.1	56	19.0	QP	L1	GND
4.438000	34.80	20.5	56	21.2	QP	L1	GND
10.792000	41.40	20.6	60	18.6	QP	L1	GND
10.936000	42.60	20.6	60	17.4	QP	L1	GND

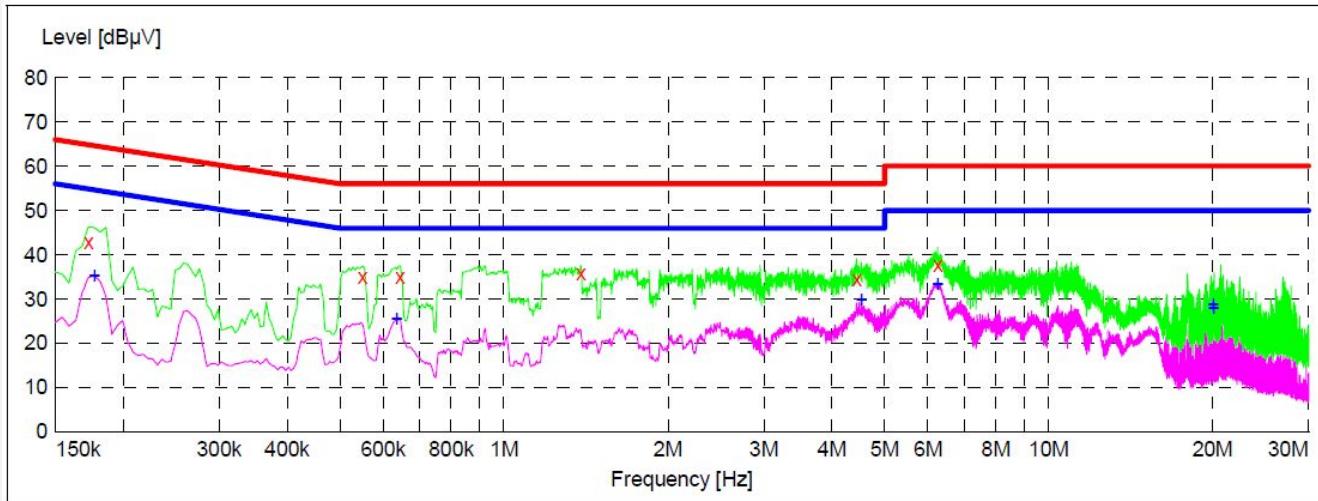
Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.636000	26.00	20.1	46	20.0	AV	L1	GND
4.532500	29.90	20.5	46	16.1	AV	L1	GND
10.675000	31.00	20.6	50	19.0	AV	L1	GND
10.738000	34.20	20.6	50	15.8	AV	L1	GND
11.066500	35.50	20.6	50	14.5	AV	L1	GND
19.418500	28.40	20.8	50	21.6	AV	L1	GND

CONDUCTED EMISSION TEST DATA

Test Site: 1# Shielded Room
 Operating Condition: ON
 Test Specification: AC 240V, 60Hz for PC
 Comment: Neutral Line
 Tem:25°C Hum:50%

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

Short Description: 150K-30M Disturbance Voltages



Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.172500	42.80	20.1	65	22.0	QP	N	GND
0.550500	35.00	20.1	56	21.0	QP	N	GND
0.645000	35.00	20.1	56	21.0	QP	N	GND
1.382500	35.70	20.2	56	20.3	QP	N	GND
4.438000	34.60	20.5	56	21.4	QP	N	GND
6.251500	37.80	20.5	60	22.2	QP	N	GND

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Detector	Line	PE
0.177000	35.20	20.1	55	19.4	AV	N	GND
0.636000	25.60	20.1	46	20.4	AV	N	GND
4.532500	29.80	20.5	46	16.2	AV	N	GND
6.251500	33.50	20.5	50	16.5	AV	N	GND
20.039500	28.90	20.8	50	21.1	AV	N	GND
20.089000	28.10	20.8	50	21.9	AV	N	GND

4. Radiation Interference

4.1. Requirements (15.249, 15.209):

FIELD STRENGTH of Fundamental: @3M 902-928 MHZ 2.4-2.4835 GHz 94 dB μ V/m @3m	FIELD STRENGTH of Harmonics 54 dB μ V/m @3m	S15.209 30 - 88 MHz 88 - 216 MHz 216 - 960 MHz ABOVE 960 MHz	40 dB μ V/m 43.5 46 54dB μ V/m
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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 to the general radiated emission limits in 15.209, whichever is the lesser attenuation.

4.2. Test Procedure

For below 1GHz, the EUT is placed on a turn table which is 0.8 meter high above the ground. For above 1GHz, the EUT is placed on a turn table which is 1.5 meter high above the ground. 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.

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 4.3.

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

4.3. Test Results

PASS.

Please refer the following pages. Only the worst case (x orientation).

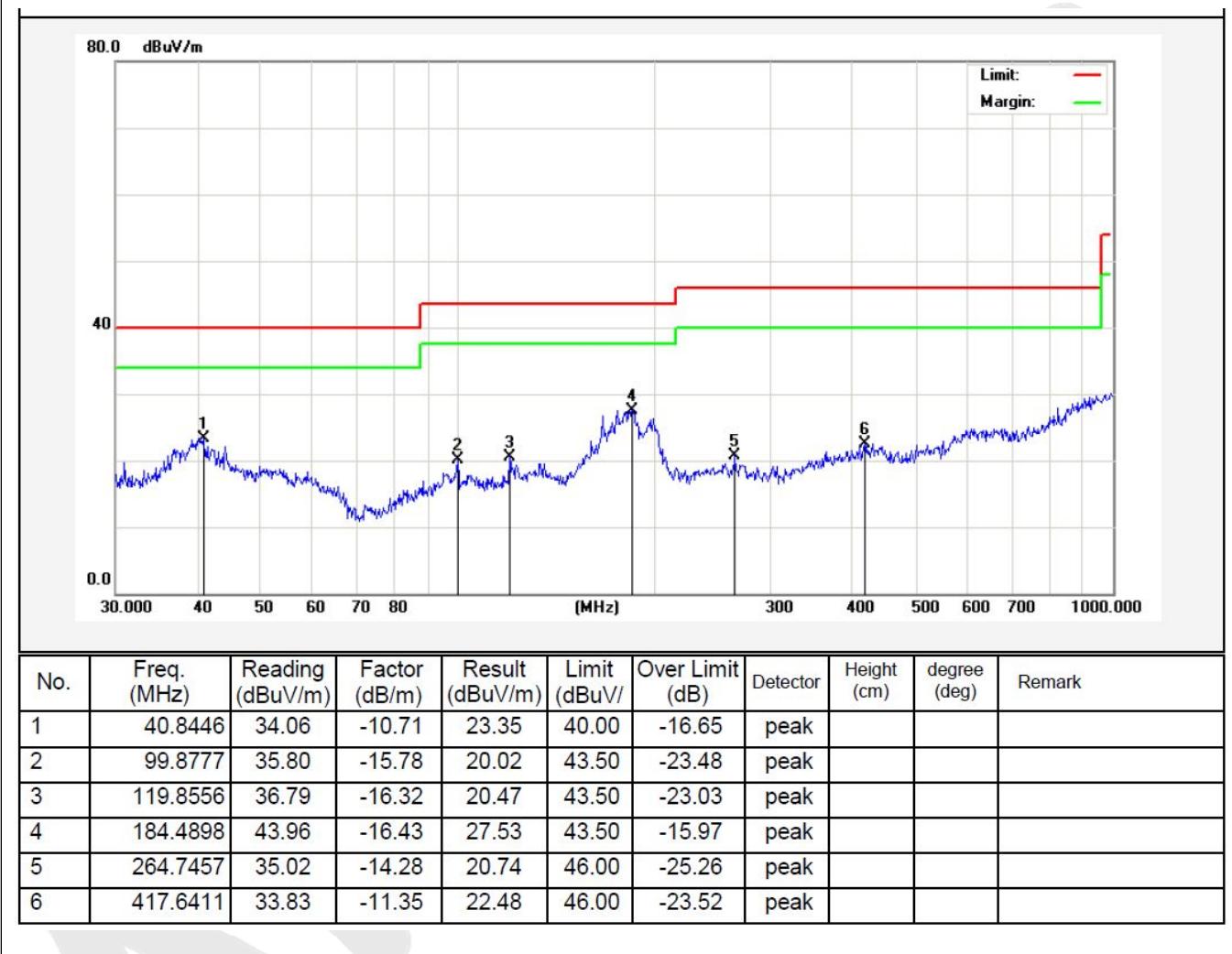
Below 1GHz:

Job No.:	011507235I	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 5V Via USB Port
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Mode:	ON	Distance:	3m
Note:	30-1000MHz		



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	30.9619	38.19	-16.44	21.75	40.00	-18.25	peak			
2	37.5479	34.21	-12.30	21.91	40.00	-18.09	peak			
3	99.8777	38.31	-20.78	17.53	43.50	-25.97	peak			
4	156.4578	39.41	-23.04	16.37	43.50	-27.13	peak			
5	410.3825	33.95	-12.62	21.33	46.00	-24.67	peak			
6	550.9480	34.45	-11.10	23.35	46.00	-22.65	peak			

Job No.:	011507235I	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 5V Via USB Port
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Mode:	ON	Distance:	3m
Note:	30-1000MHz		



Above 1 GHz:

**Horizontal
CH Low (2406MHz)**

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB μ V	Level dB μ V/m	Limit dB μ V/m	Over Limit dB	Remark
2406.000	2.17	31.21	35.30	85.74	83.82	114.0	-30.18	Peak
2406.000	2.17	31.21	35.30	72.18	70.26	94.0	-23.74	AV
4812.370	2.56	34.01	34.71	47.66	49.52	74.0	-24.48	Peak
4812.370	2.56	34.01	34.71	32.74	34.60	54.0	-19.40	AV
7218.290	2.98	36.16	35.15	41.27	45.26	74.0	-28.74	Peak
7218.290	2.98	36.16	35.15	28.07	32.06	54.0	-21.94	AV
9624.000	---	---	---	---	---	---	---	---
12030.00	---	---	---	---	---	---	---	---
14436.00	---	---	---	---	---	---	---	---
16842.00	---	---	---	---	---	---	---	---
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**Vertical
CH Low (2406MHz)**

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB μ V	Level dB μ V/m	Limit dB μ V/m	Over Limit dB	Remark
2406.000	2.17	31.21	35.30	87.24	85.32	114.0	-28.68	Peak
2406.000	2.17	31.21	35.30	75.16	73.24	94.0	-20.76	AV
4812.830	2.56	34.01	34.71	49.47	51.33	74.0	-22.67	Peak
4812.830	2.56	34.01	34.71	28.36	30.22	54.0	-23.78	AV
7218.460	2.98	36.16	35.15	44.08	48.07	74.0	-25.93	Peak
7218.460	2.98	36.16	35.15	31.66	35.65	54.0	-18.35	AV
9624.000	---	---	---	---	---	---	---	---
12030.00	---	---	---	---	---	---	---	---
14436.00	---	---	---	---	---	---	---	---
16842.00	---	---	---	---	---	---	---	---
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Horizontal
CH Middle (2444MHz)

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB μ V	Level dB μ V/m	Limit dB μ V/m	Over Limit dB	Remark
2444.000	2.19	31.22	34.60	86.54	85.35	114.0	-28.65	Peak
2444.000	2.19	31.22	34.60	74.69	73.50	94.0	-20.50	AV
4888.150	2.57	35.00	34.58	40.17	43.16	74.0	-30.84	Peak
4888.150	2.57	35.00	34.58	32.78	35.77	54.0	-18.23	AV
7332.400	3.00	36.17	35.14	47.86	51.89	74.0	-22.11	Peak
7332.400	3.00	36.17	35.14	32.63	36.66	54.0	-17.34	AV
9776.000	---	---	---	---	---	---	---	---
12220.00	---	---	---	---	---	---	---	---
14664.00	---	---	---	---	---	---	---	---
17108.00	---	---	---	---	---	---	---	---

Vertical
CH Middle (2444MHz)

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB μ V	Level dB μ V/m	Limit dB μ V/m	Over Limit dB	Remark
2444.000	2.19	31.22	34.60	88.39	87.20	114.0	-26.80	Peak
2444.000	2.19	31.22	34.60	77.82	76.63	94.0	-17.37	AV
4888.510	2.57	35.00	34.58	45.33	48.32	74.0	-25.68	Peak
4888.510	2.57	35.00	34.58	32.67	35.66	54.0	-18.34	AV
7332.220	3.00	36.17	35.14	46.94	50.97	74.0	-23.03	Peak
7332.220	3.00	36.17	35.14	33.49	37.52	54.0	-16.48	AV
9776.000	---	---	---	---	---	---	---	---
12220.00	---	---	---	---	---	---	---	---
14664.00	---	---	---	---	---	---	---	---
17108.00	---	---	---	---	---	---	---	---

Horizontal
 CH High (2477MHz)

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB μ V	Level dB μ V/m	Limit dB μ V/m	Over Limit dB	Remark
2477.000	2.20	31.65	36.00	90.54	88.39	114.0	-25.61	Peak
2477.000	2.20	31.65	36.00	77.79	75.64	94.0	-18.36	AV
4954.270	2.58	35.06	34.79	53.67	56.52	74.0	-17.48	Peak
4954.270	2.58	35.06	34.79	30.28	33.13	54.0	-20.87	AV
7431.630	3.02	36.19	34.90	43.43	47.74	74.0	-26.26	Peak
7431.630	3.02	36.20	35.20	34.30	38.32	54.0	-15.68	AV
9908.000	---	---	---	---	---	---	---	---
12385.00	---	---	---	---	---	---	---	---
14862.00	---	---	---	---	---	---	---	---
17339.00	---	---	---	---	---	---	---	---

 Vertical
 CH High (2477MHz)

Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dB μ V	Level dB μ V/m	Limit dB μ V/m	Over Limit dB	Remark
2477.000	2.20	31.65	36.00	92.25	90.10	114.0	-23.90	Peak
2477.000	2.20	31.65	36.00	78.36	76.21	94.0	-17.79	AV
4954.340	2.58	35.06	34.79	48.24	51.09	74.0	-22.91	Peak
4954.340	2.58	35.06	34.79	31.43	34.28	54.0	-19.72	AV
7431.610	3.02	36.19	34.90	49.39	53.70	74.0	-20.30	Peak
7431.610	3.02	36.20	35.20	36.62	40.64	54.0	-13.36	AV
9908.000	---	---	---	---	---	---	---	---
12385.00	---	---	---	---	---	---	---	---
14862.00	---	---	---	---	---	---	---	---
17339.00	---	---	---	---	---	---	---	---

NOTE: “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured. The results of different modulations are the same.

5. Bandedge

5.1. Requirements (15.249):

The field strength of any emissions appearing outside the band edges and up to 10 kHz above and below the band edges shall be attenuated at least 50 dB below the level of the carrier or to the general limits of 15.249.

5.2. Test Procedure

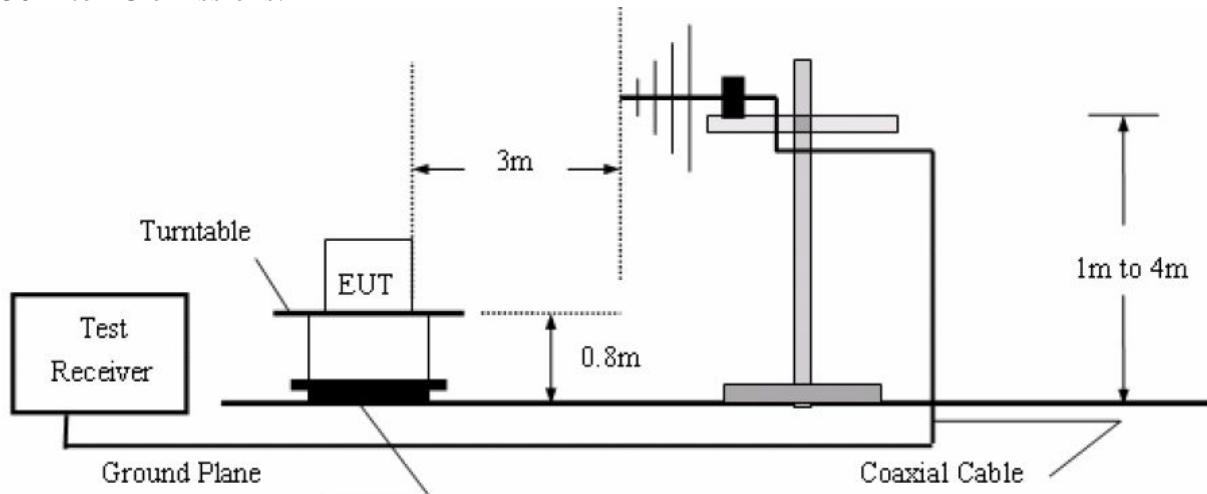
The EUT is placed on a turn table which is 1.5 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test. The device is evaluated in xyz orientation.

Test Equipment

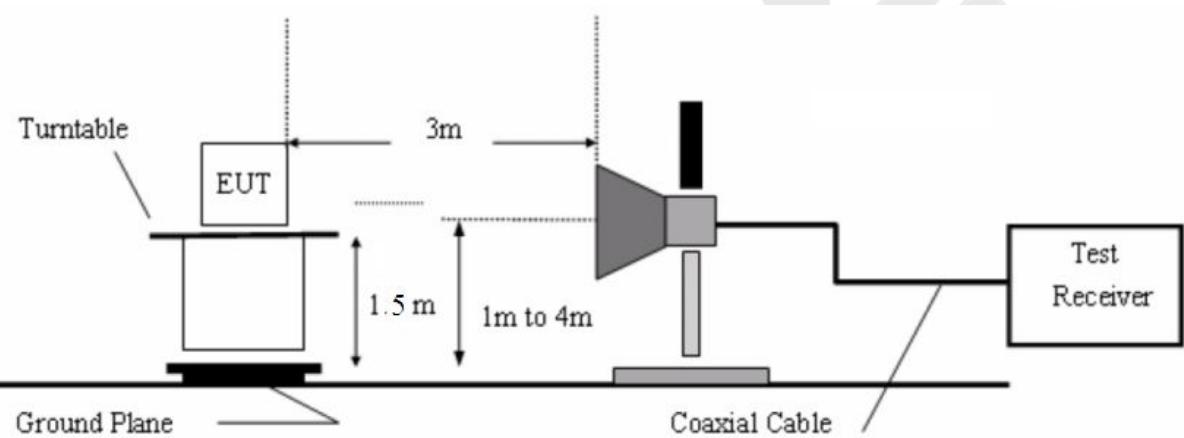
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Apr. 17, 2015	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Apr. 17, 2015	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 17, 2015	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 20, 2015	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB9163-289	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

5.3. Test Configuration:

30M to 1G emissions:



1G to 40G emissions:

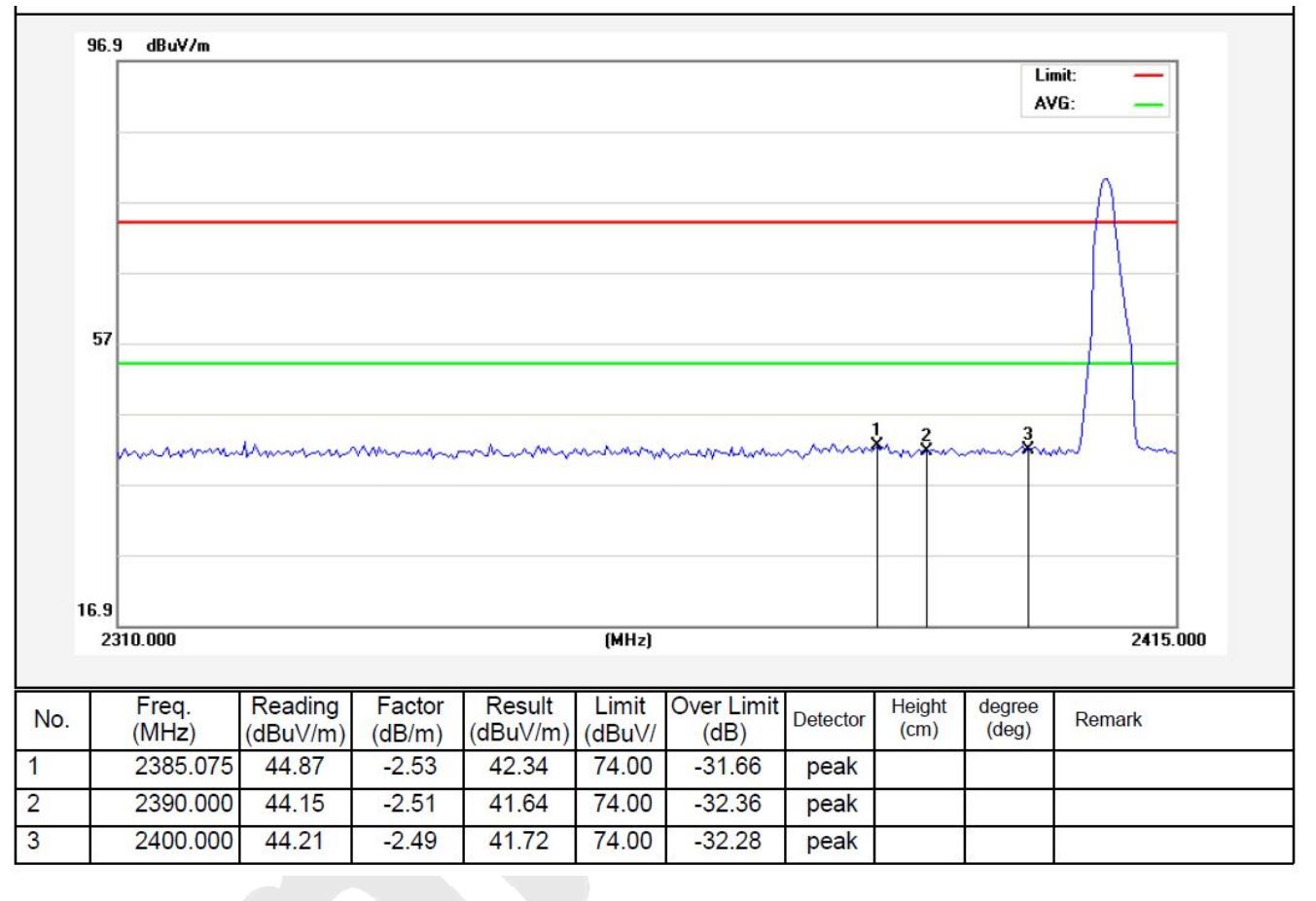


5.4. Test Results

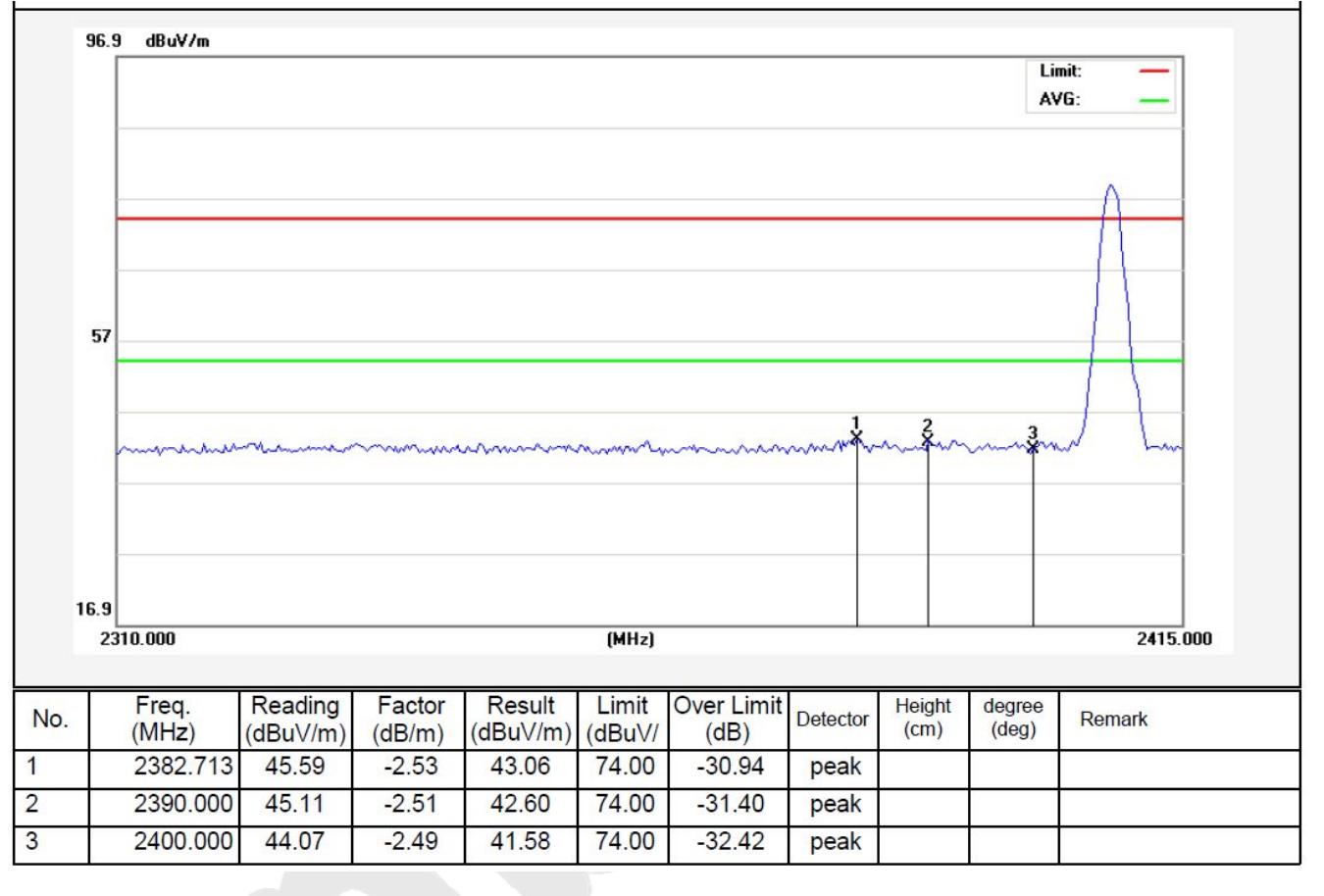
Pass.

Please refer the following plot. Only the worst case (x orientation).

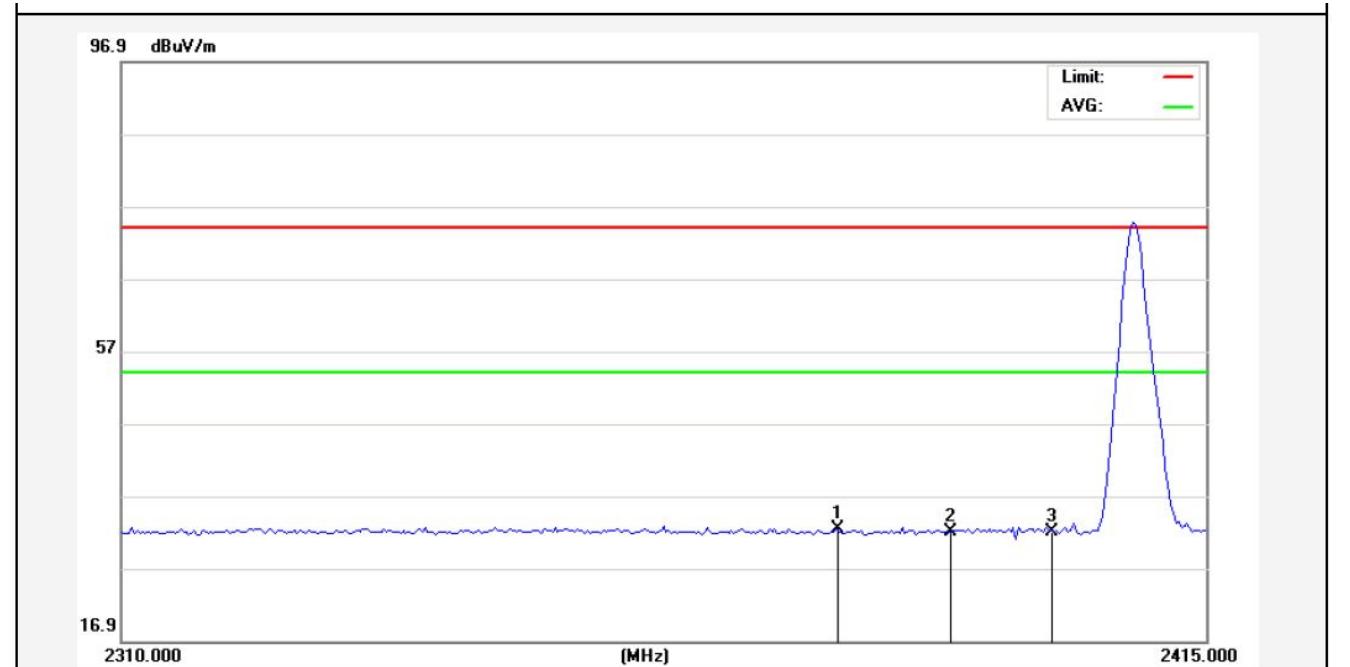
Job No.:	011507235I	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 5V Via USB Port
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	PEAK	Distance:	3m



Job No.:	011507235I	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 5V Via USB Port
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	PEAK	Distance:	3m

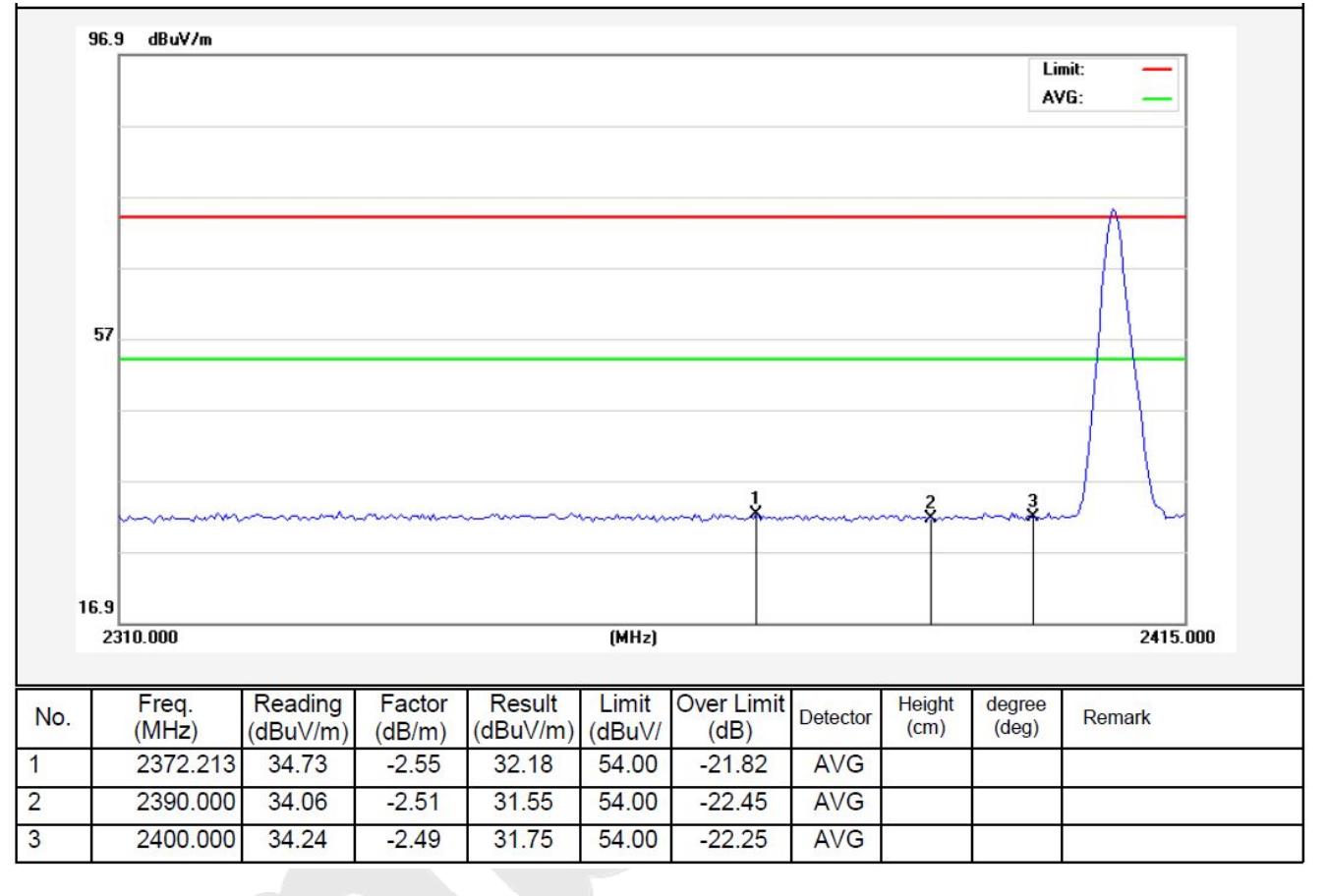


Job No.:	011507235I	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 5V Via USB Port
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	AV	Distance:	3m

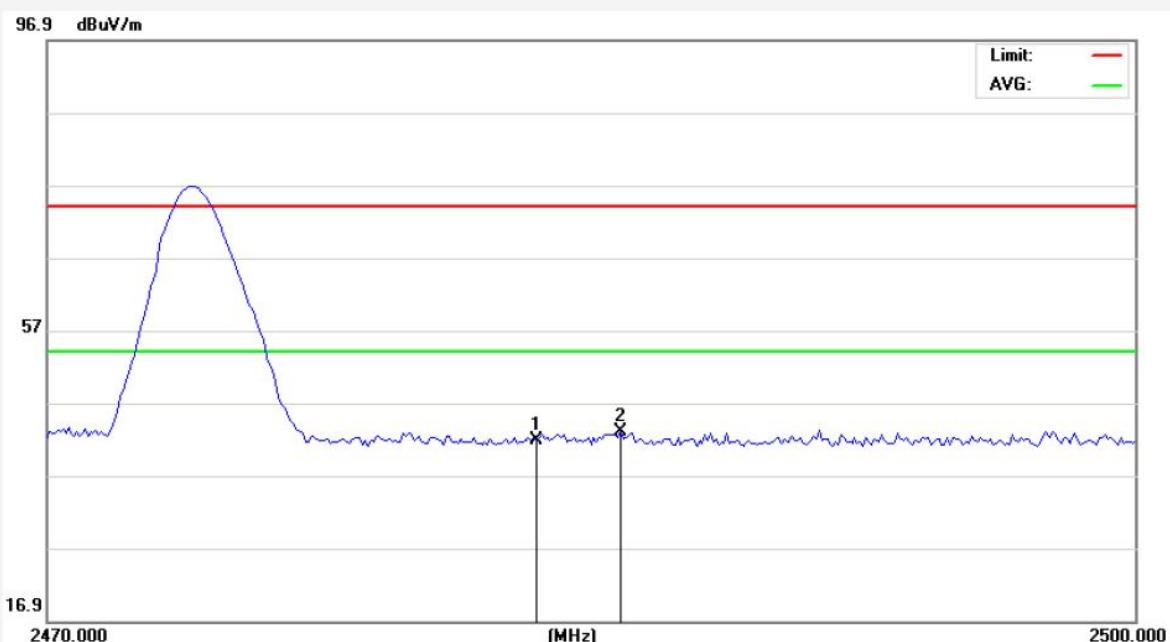


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2379.037	35.00	-2.54	32.46	54.00	-21.54	AVG			
2	2390.000	34.44	-2.51	31.93	54.00	-22.07	AVG			
3	2400.000	34.49	-2.49	32.00	54.00	-22.00	AVG			

Job No.:	011507235I	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 5V Via USB Port
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	AV	Distance:	3m

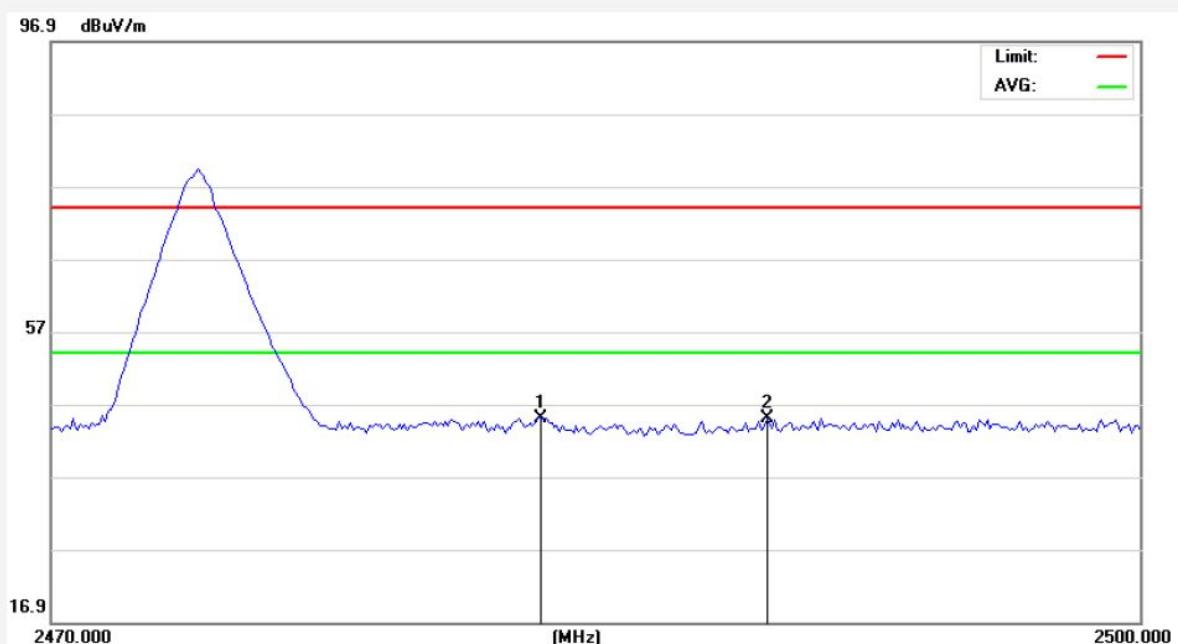


Job No.:	011507235I	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 5V Via USB Port
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	PEAK	Distance:	3m



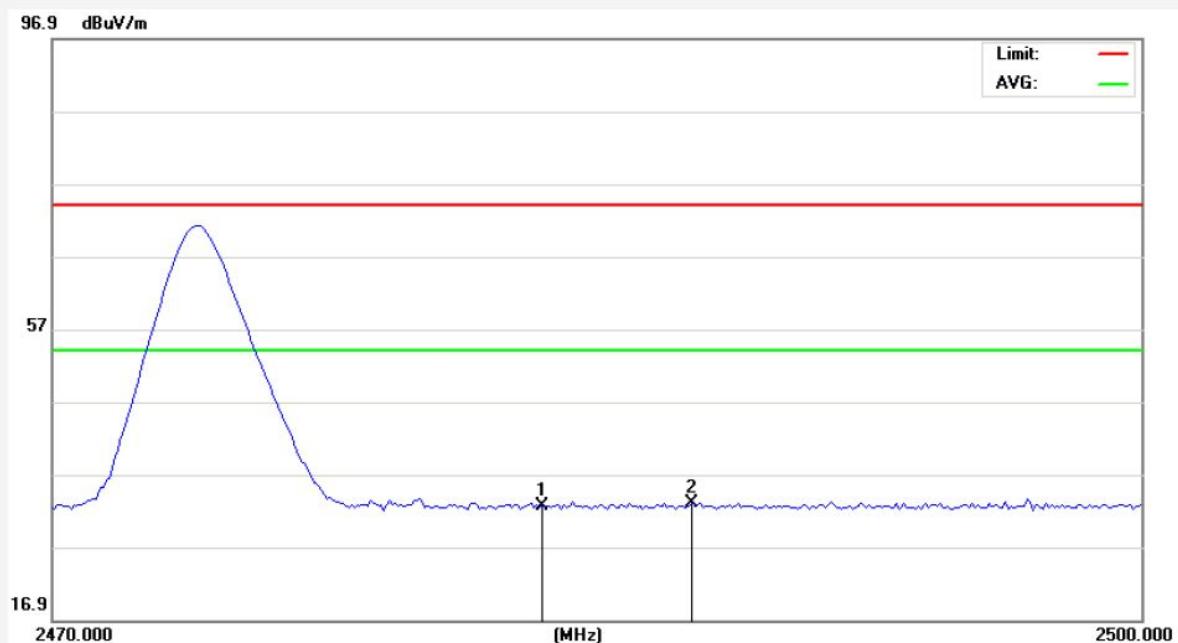
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	44.03	-2.31	41.72	74.00	-32.28	peak			
2	2485.825	45.25	-2.30	42.95	74.00	-31.05	peak			

Job No.:	011507235I	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 5V Via USB Port
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	PEAK	Distance:	3m



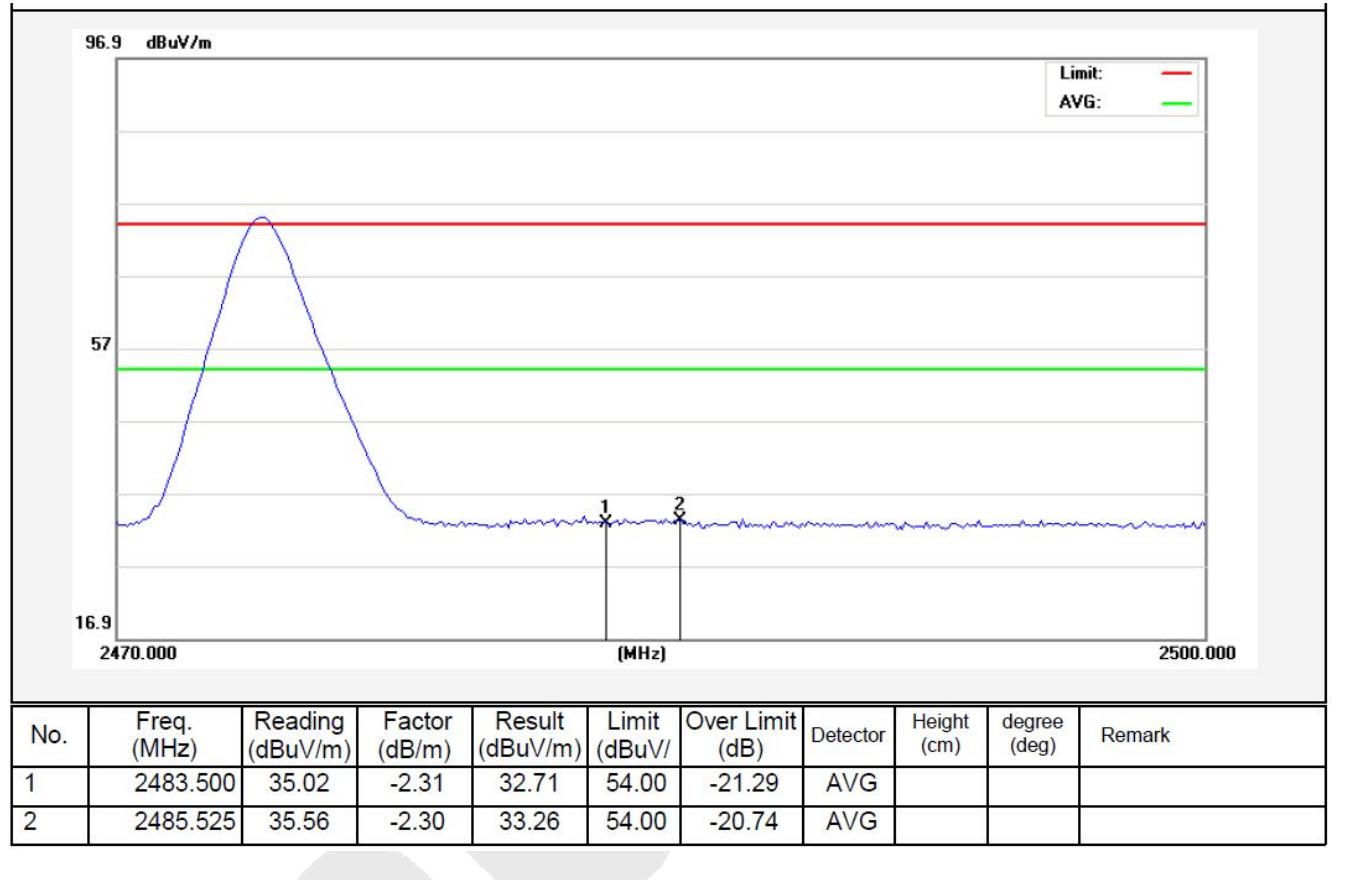
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	2483.500	47.23	-2.31	44.92	74.00	-29.08	peak			
2	2489.725	47.27	-2.29	44.98	74.00	-29.02	peak			

Job No.:	011507235I	Polarization:	Horizontal
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 5V Via USB Port
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	AV	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	2483.500	34.95	-2.31	32.64	54.00	-21.36	AVG			
2	2487.625	35.29	-2.30	32.99	54.00	-21.01	AVG			

Job No.:	011507235I	Polarization:	Vertical
Standard:	(RE)FCC PART15 C _3m	Power Source:	DC 5V Via USB Port
Test item:	Radiation Test	Temp.(C)/Hum.(%RH):	24.3(C)/55%RH
Note:	AV	Distance:	3m

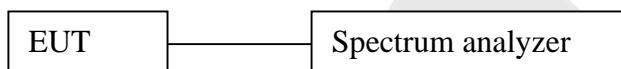


6. Occupied Bandwidth

6.1. Requirements :

According to 15.215 (c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

6.2. Test SET-UP



6.3 Test Equipment

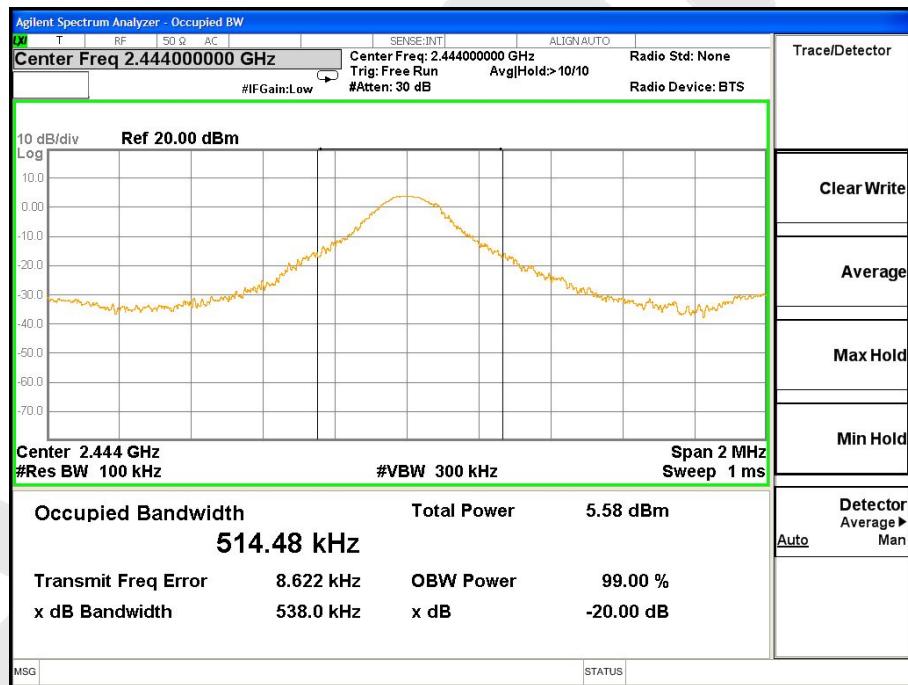
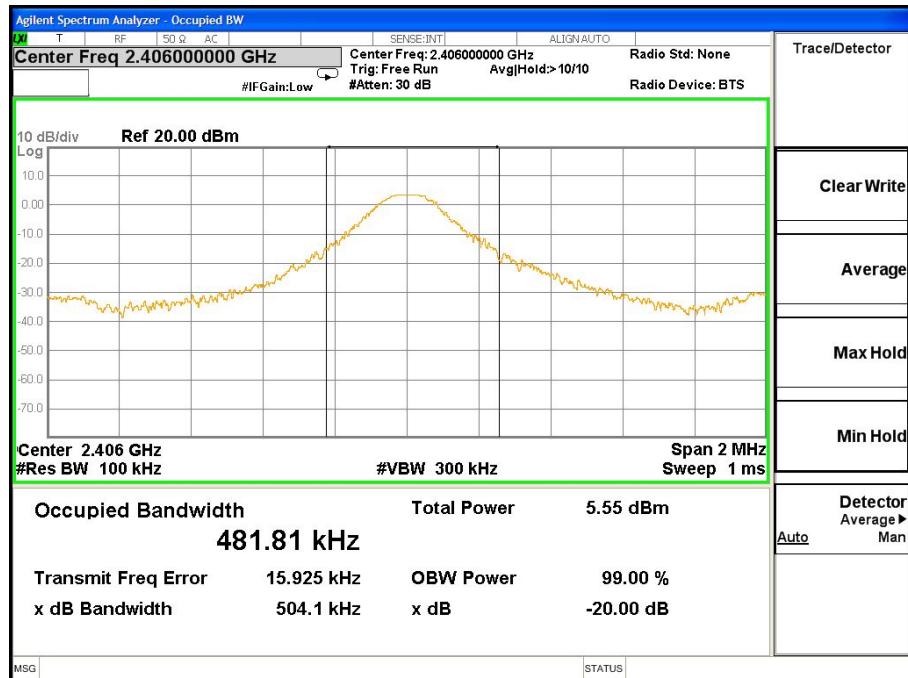
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Spectrum Analysis	Agilent	E4407B	US39390582	Apr. 17, 2015	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	Apr. 17, 2015	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 17, 2015	1 Year
4.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 20, 2015	1 Year
5.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB9163-289	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

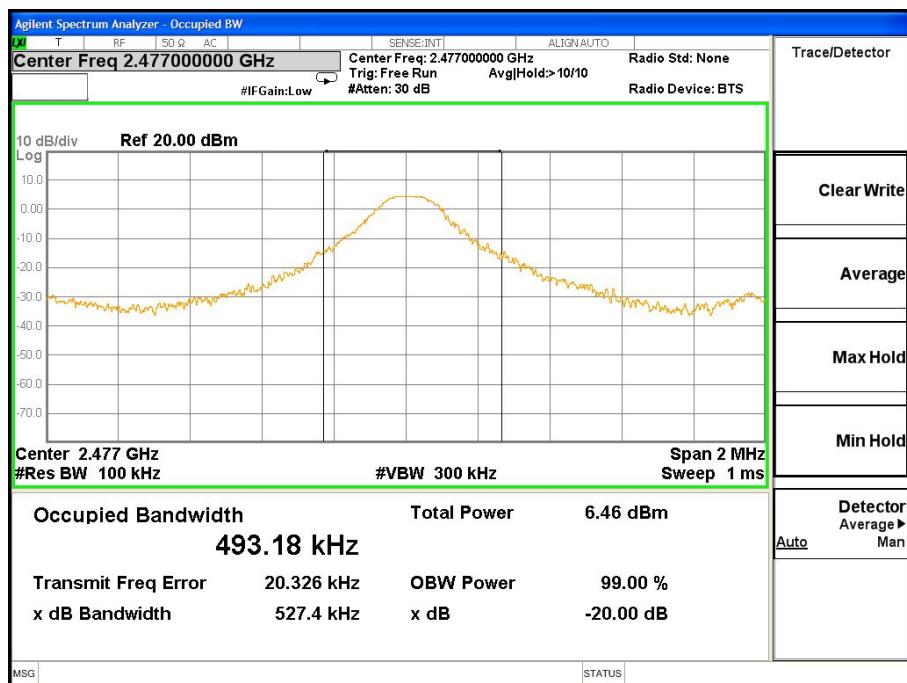
6.4. Test Results

Pass.

Please refer the following plot.

20dB Down:





7. ANTENNA APPLICATION

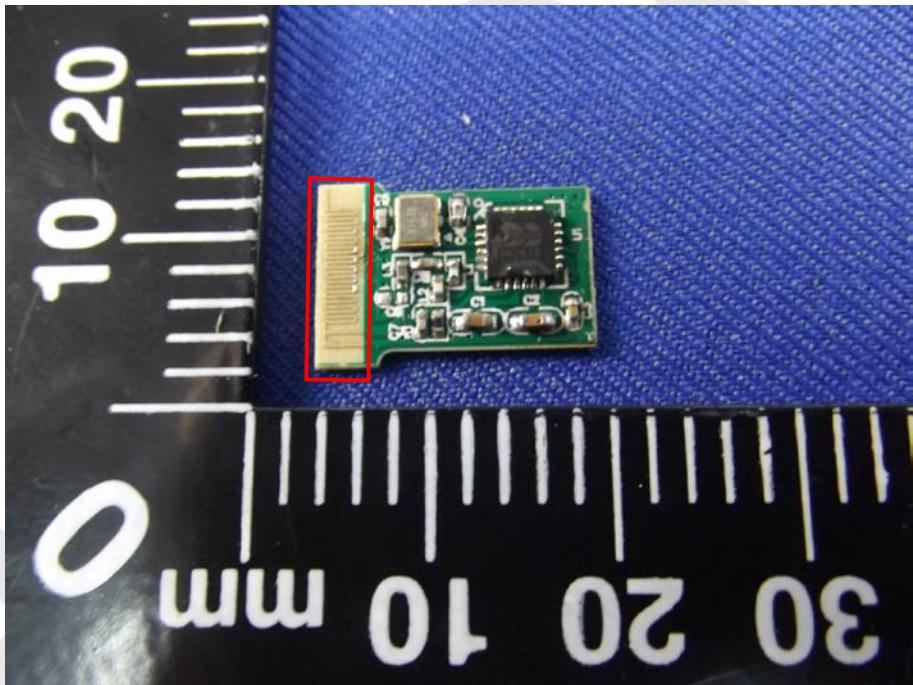
7.1. Antenna requirement

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.

7.2. Result

The EUT's antenna used a PCB antenna which is permanently attached, The antenna's gain is 0dBi and meets the requirement.

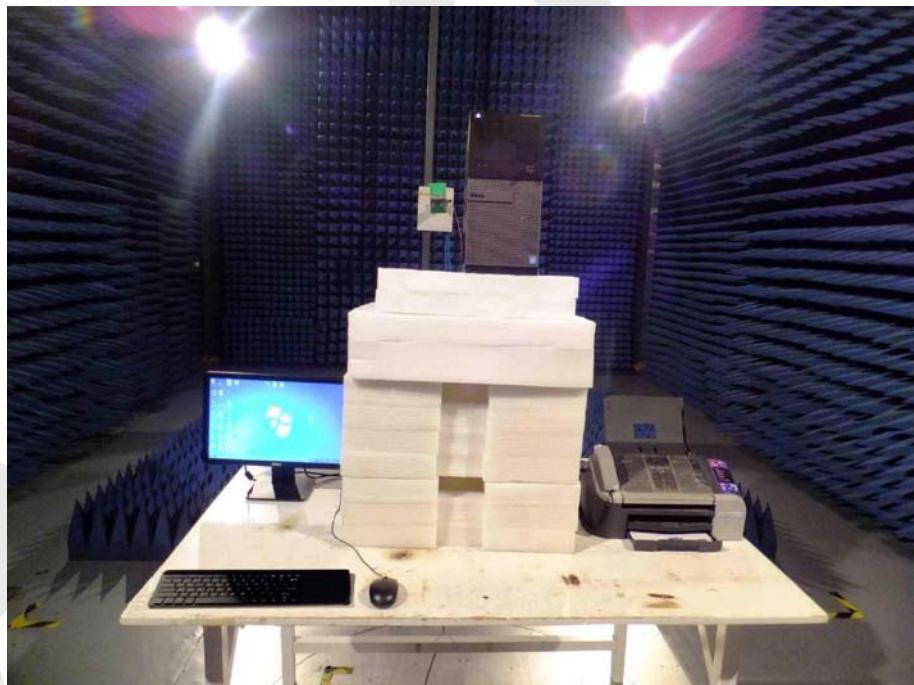


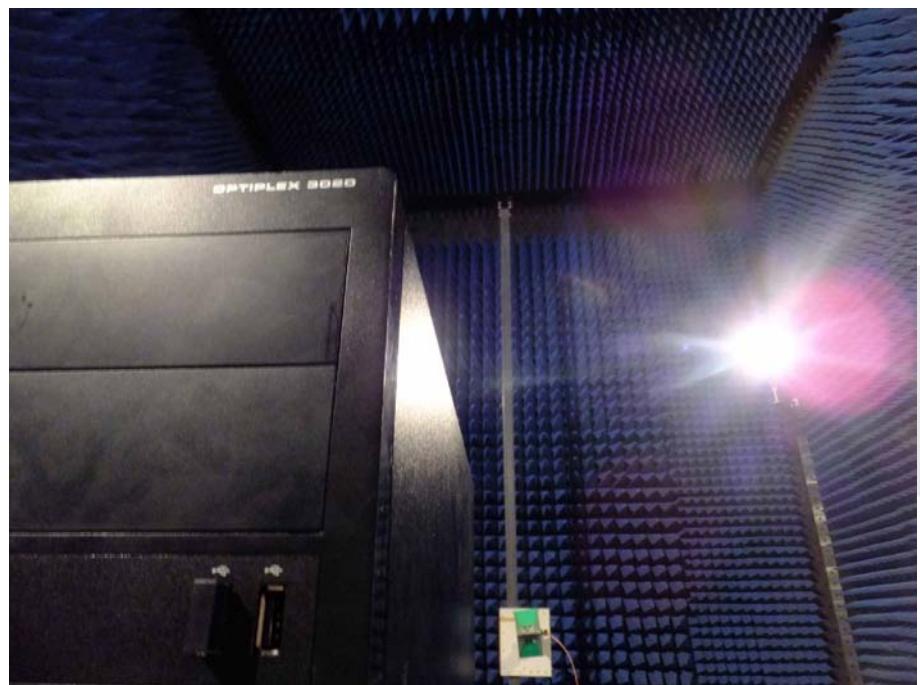
8. PHOTOGRAPH

8.1. Photo of Power Line Conducted Emission Measurement



8.2 Photo of Radiation Emission Test





Anbotek

APPENDIX I (External Photos)

Figure 1
The EUT-Top View

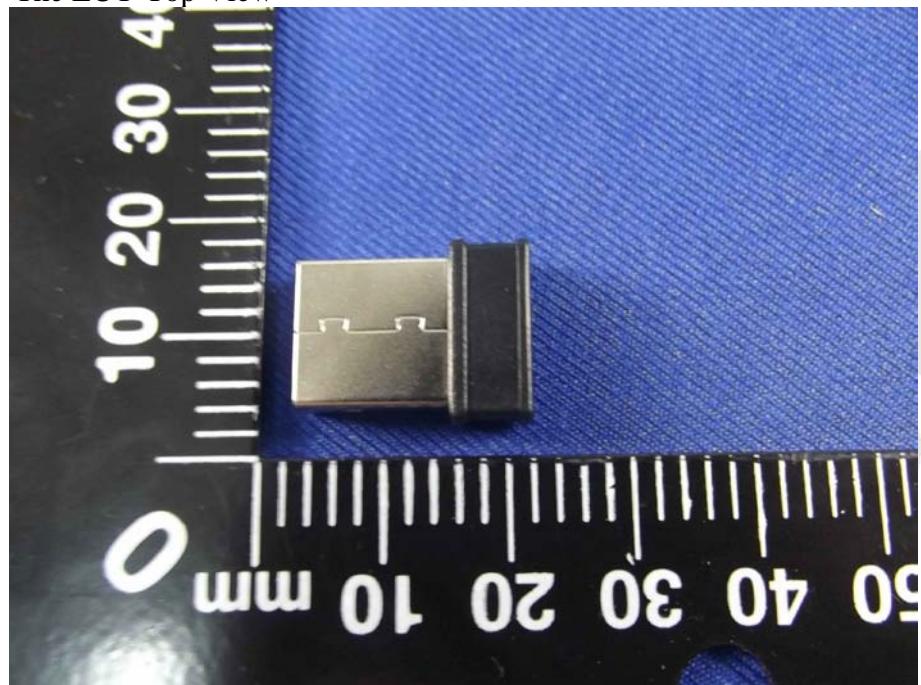


Figure 2
The EUT-Bottom View

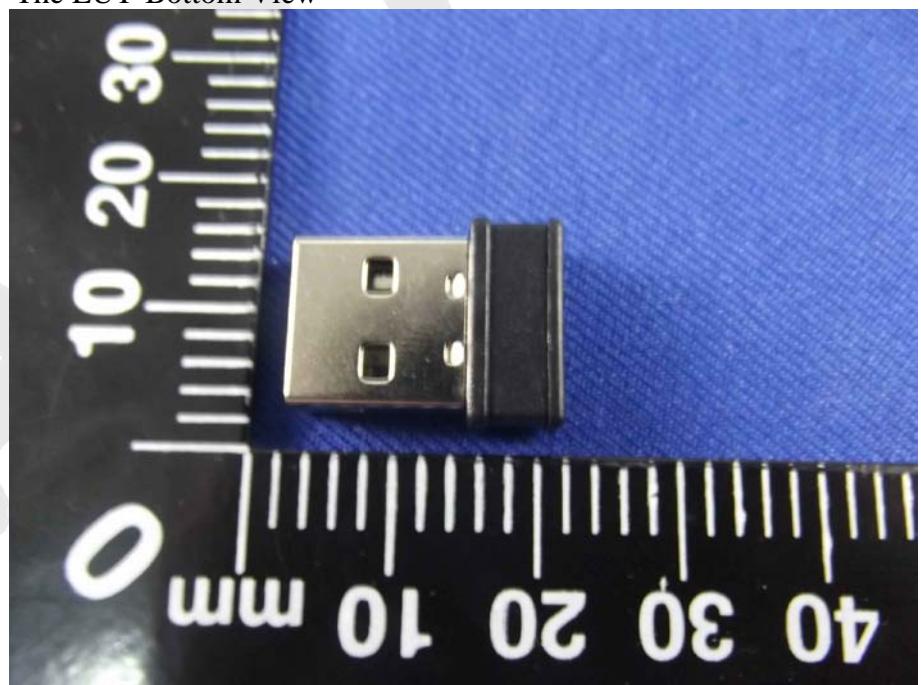


Figure 3
The EUT-Front View

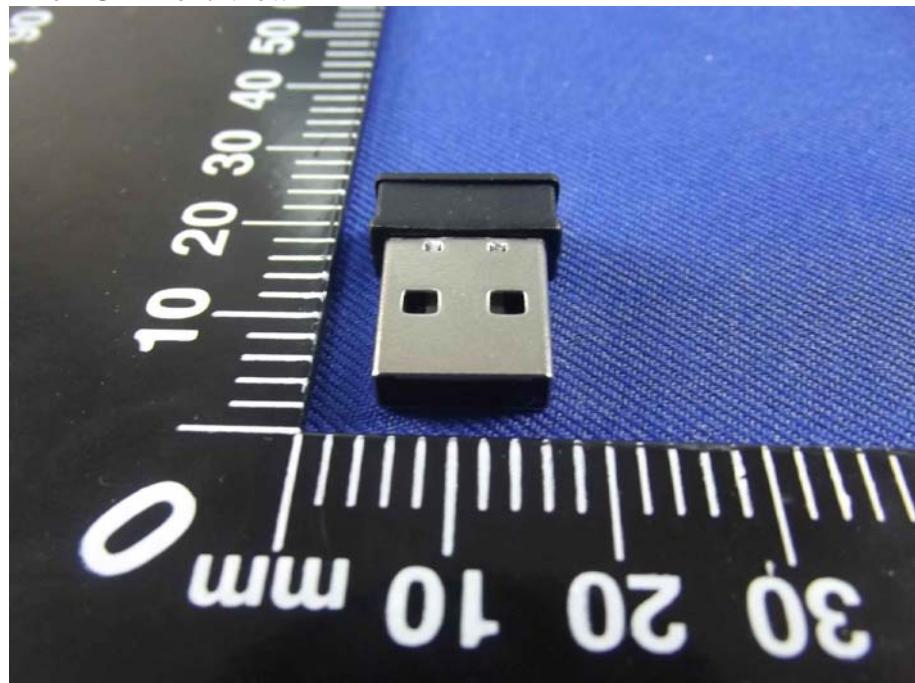


Figure 4
The EUT-Back View

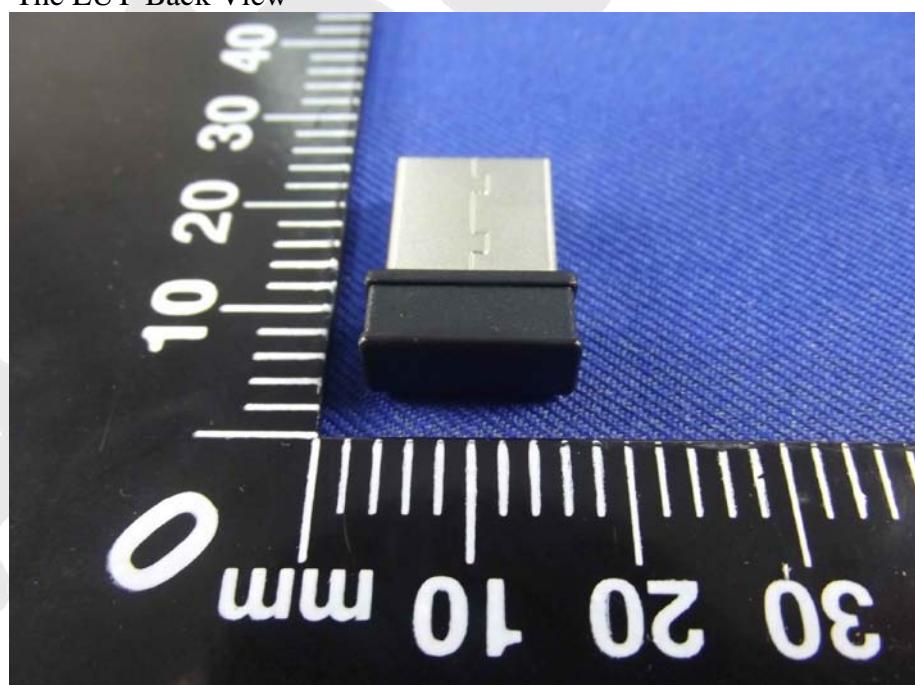


Figure 5
The EUT-Left View

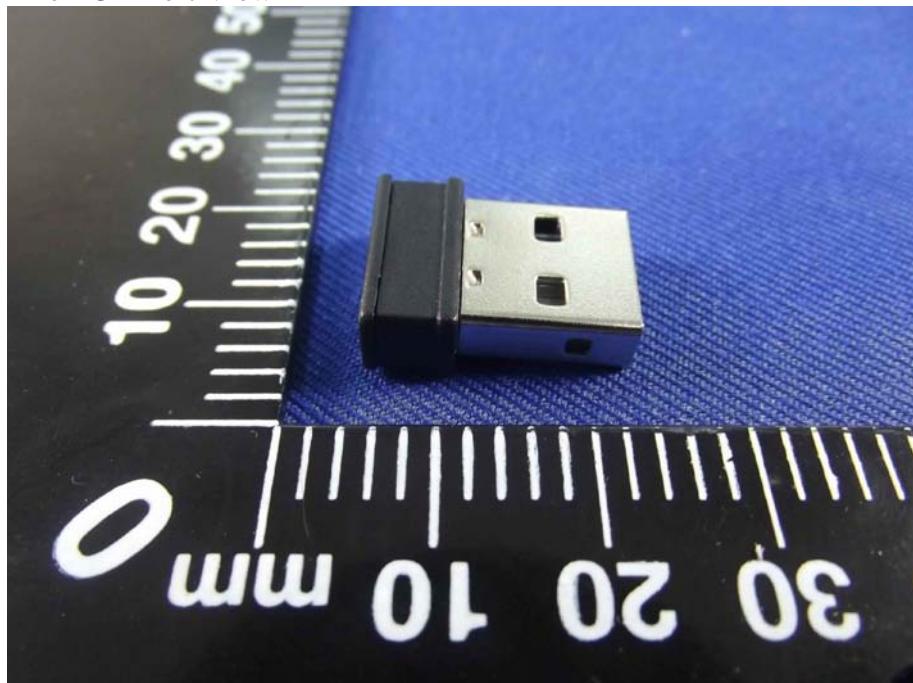
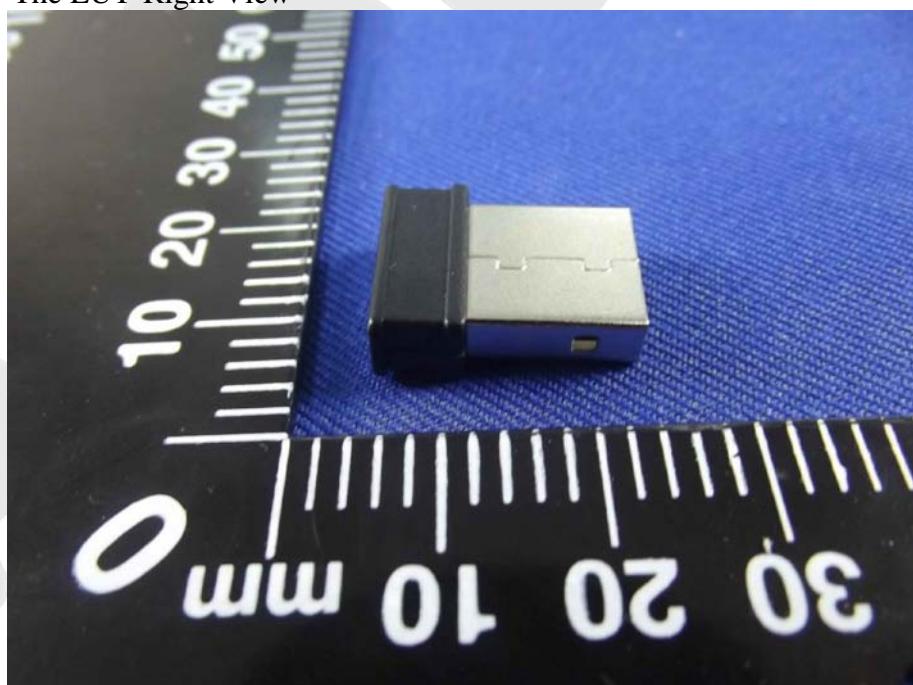


Figure 6
The EUT-Right View



APPENDIX II (Internal Photos)

Figure 7
The EUT-Inside View

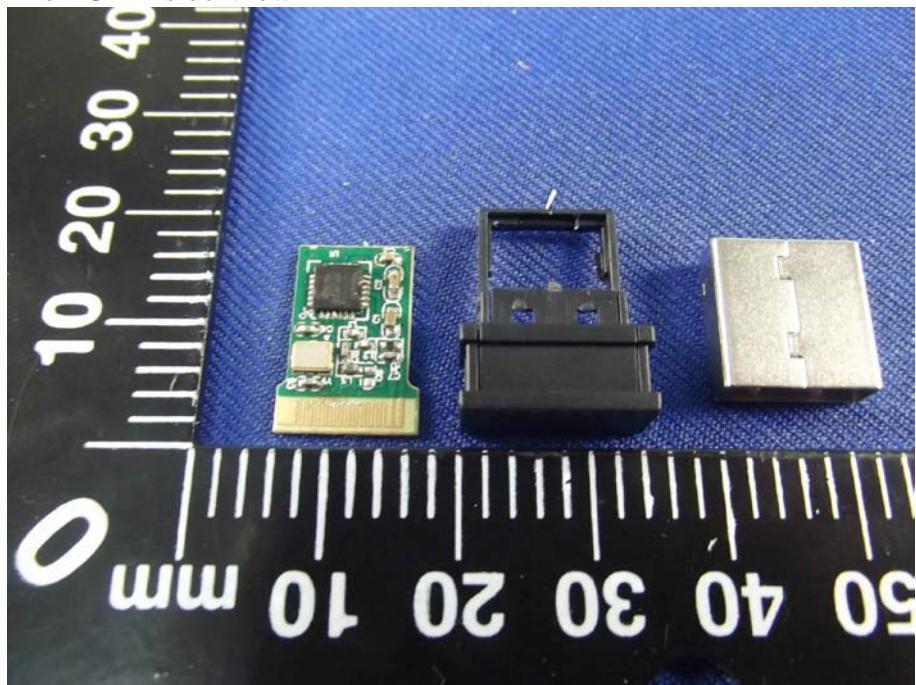


Figure 8
PCB of the EUT-Front View

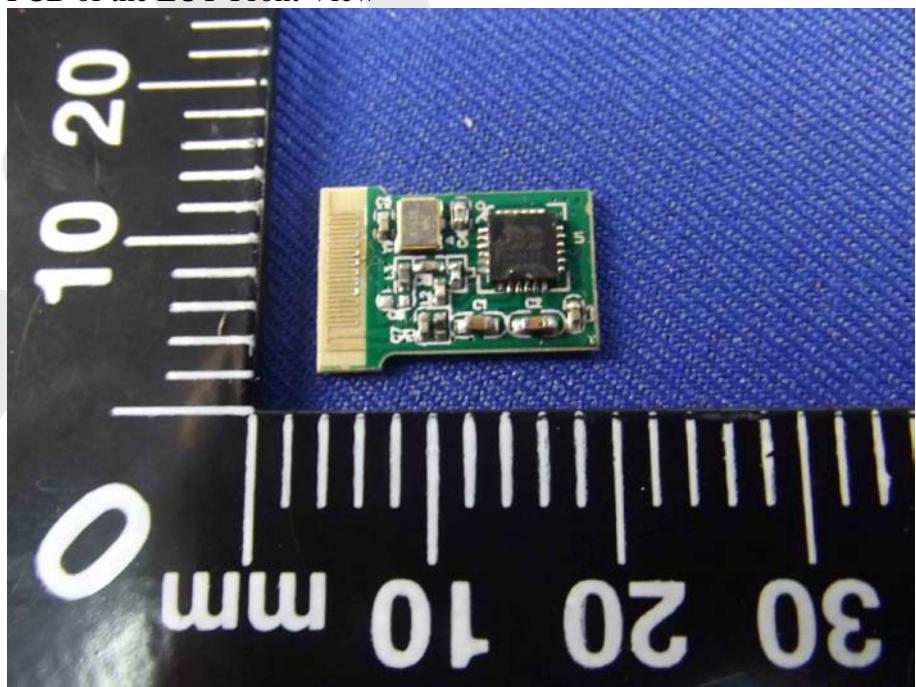


Figure 9
PCB of the EUT-Back View

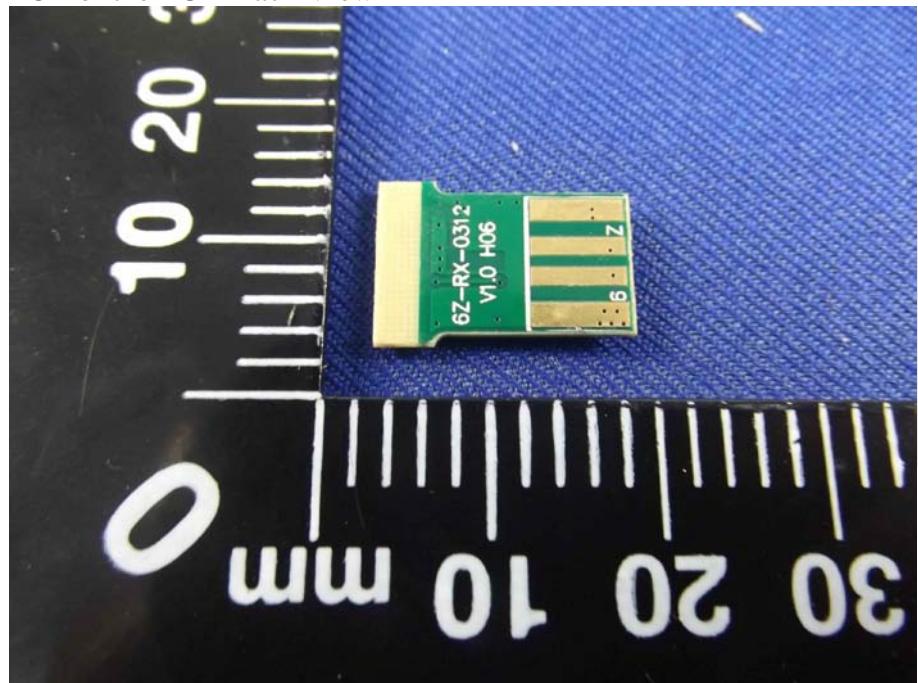


Figure 10
PCB of the EUT-Front View



Figure 11
PCB of the EUT-Back View

