

TEST REPORT

Reference No. : WTS13S1108806E
FCC ID : SJ8-XASW02
Applicant : RDI Technology(Shenzhen) Co., Ltd.
Address : Building C1, Xintang Industrial Park East Baishixia, Fuyong, Baoan, Shenzhen, PRC.
Manufacturer : The same as above
Address : The same as above

Equipment Under Test (EUT) :

Product Name : Wall Mount Stairwell LED Light
Model No. : XASW02
Rules : FCC CFR47 Part 15 Section 15.231: 2012

Date of Receipt sample : Nov. 12, 2013
Date of Test : Nov.12~20, 2013
Date of Issue : Dec.05, 2013

Test Result : **PASS***

Remark:

* The sample described above has been tested to be in compliance with the requirements of ANSI C63.4:2003. The test results have been reviewed and comply with the rules listed above and found to meet their essential requirements.

Prepared By:

Waltek Services (Shenzhen) Co., Ltd.

Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China

Testing location: The same as above

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Compiled by:

Approved by:

Maikou Zhang

Philo Zhong

Maikou Zhang / Project Engineer

Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	PASS
Radiated Spurious Emissions	15.205(a) 15.209 15.231(b)	PASS
Periodic Operation	15.231(a)	PASS
20dB Bandwidth	15.231(c)	PASS
Antenna Requirement	15.203	PASS

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4 General Information

4.1 General Description of E.U.T.

Product Name	: Wall Mount Stairwell LED Light
Model No.	: XASW02
Type of Modulation	: GFSK
Model Description	: N/A
Frequency Range	: 433.222-434.833 MHz
Oscillator	: 26MHz
Antenna installation	: Monopole antenna

4.2 Details of E.U.T.

Technical Data	:AC 120V, 60Hz, 0.5A
Adapter manufacturer	: --
M/N	: --

4.3 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A**

Waltek Services (Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration 7760A, July 12, 2012.

- **FCC – Registration No.: 880581**

Waltek Services (Shenzhen) Co., Ltd. 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 880581, May 26, 2011.

4.4 Test Location

All Emissions tests were performed at:-

Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District, Shenzhen 518105, China.

4.5 General condition

Ambient Condition: 25.5 °C 55 %RH

4.5.1 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Lower channel	Middle channel	Upper channel
Transmitting	433.222MHz	MHz	434.833MHz

5 Equipment Used during Test

5.1 Equipments List

Mains Terminal Disturbance Voltage (Conducted Emission)					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMI Test Receiver	R&S	ESCI	101155	Sep.17,2014
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Sep.17,2014
3.	Cable	LARGE	RF300	-	Sep.17,2014
3m Semi-anechoic Chamber for Radiation					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.17,2014
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.19,2014
3	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.17,2014
4	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.19,2014
5	Broadband Pre-amplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Apr.06,2014
6	Coaxial Cable (above 1GHz)	Top	25MHz-18GHz	EW02014-7	Apr.19,2014

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 4.74 dB (1000M~25000MHz)

5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

6 Conducted Emission

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

6.1 E.U.T. Operation

Operating Environment:

Temperature:	25.5 °C
Humidity:	50 % RH
Atmospheric Pressure:	1010 mbar

EUT Operation:

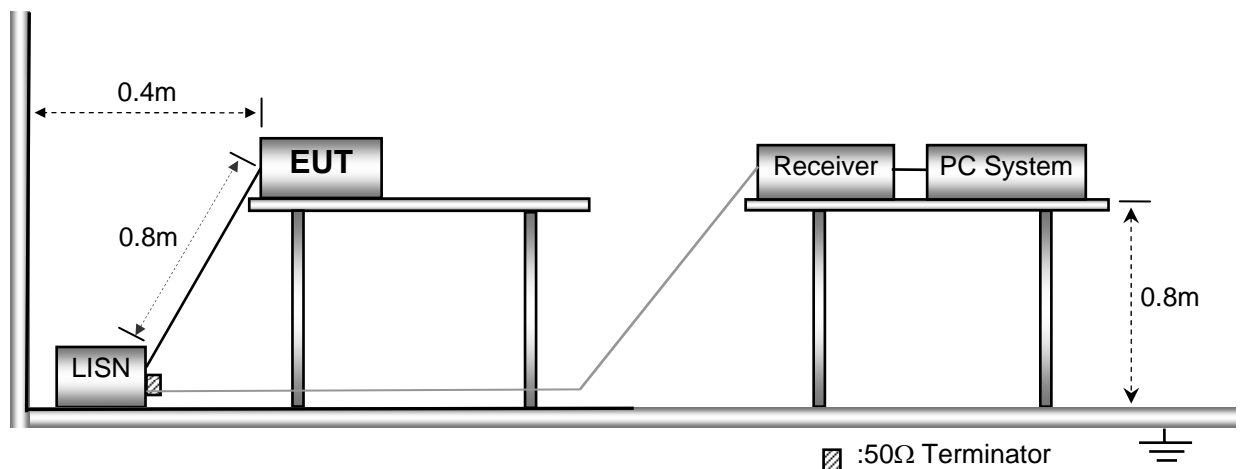
The pre-test was performed in transmit and working mode. The worst case is transmit mode and the test data were shown as follow.

The EUT was tested according to ANSI C63.4:2003. The frequency spectrum from 150kHz to 30MHz was investigated.

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.2 EUT Setup

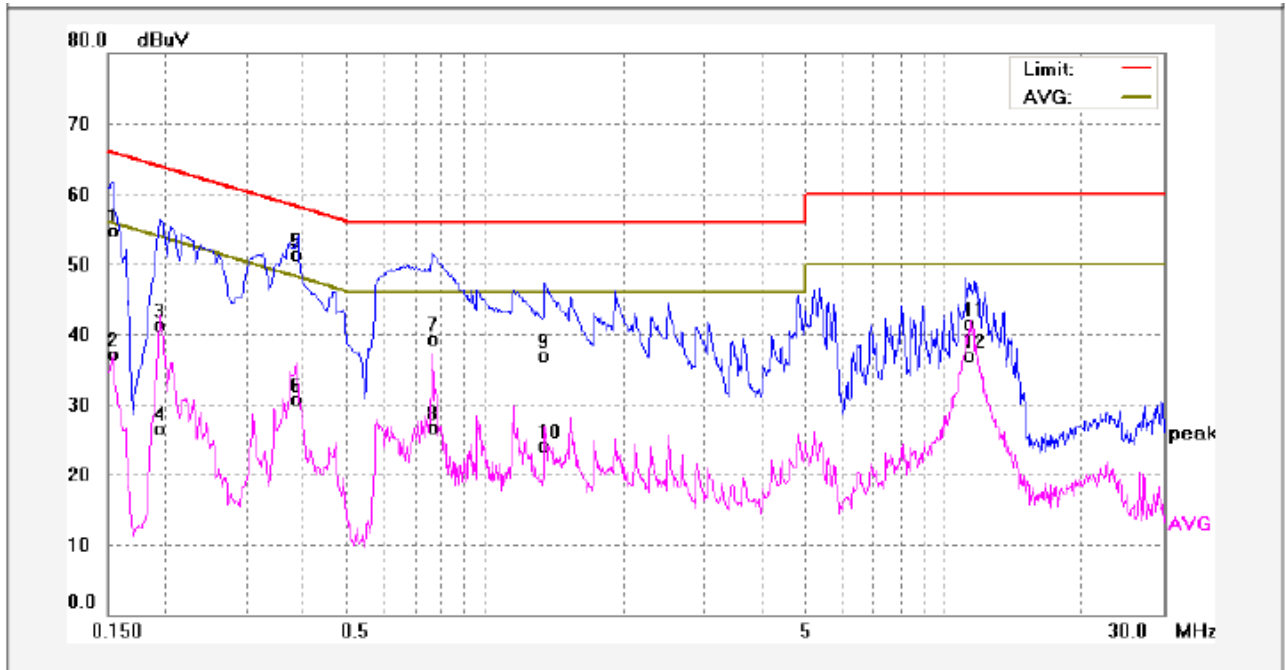
The conducted emission tests were performed using the setup accordance with the ANSI C63.4:2003.



6.3 Conducted Emission Test Result

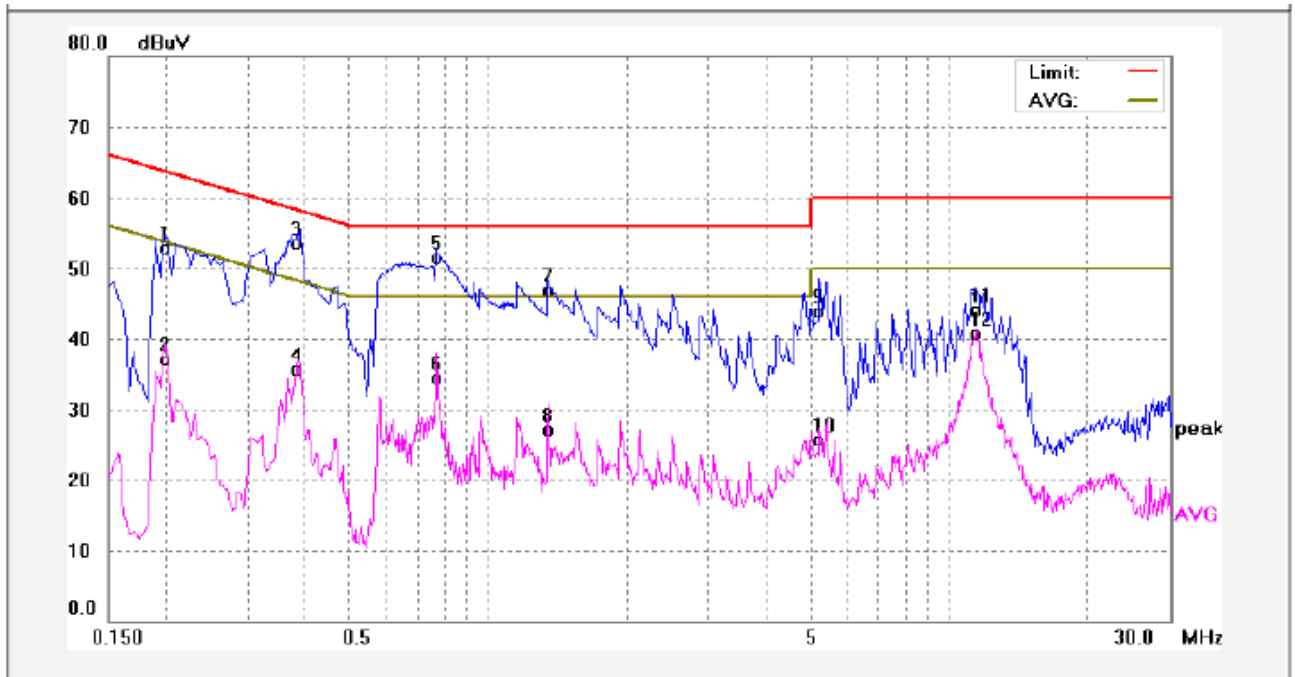
An initial pre-scan was performed on the live and neutral lines.

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	44.83	9.80	54.63	65.99	-11.36	QP	
2	0.1500	27.24	9.80	37.04	55.99	-18.95	AVG	
3	0.1940	31.47	9.84	41.31	63.86	-22.55	QP	
4	0.1940	16.71	9.84	26.55	53.86	-27.31	AVG	
5	0.3899	41.42	9.90	51.32	58.06	-6.74	QP	
6	0.3899	20.88	9.90	30.78	48.06	-17.28	AVG	
7	0.7660	29.32	9.96	39.28	56.00	-16.72	QP	
8	0.7660	16.78	9.96	26.74	46.00	-19.26	AVG	
9	1.3380	27.00	10.00	37.00	56.00	-19.00	QP	
10	1.3380	14.10	10.00	24.10	46.00	-21.90	AVG	
11	11.1940	30.87	10.60	41.47	60.00	-18.53	QP	
12	11.1940	26.33	10.60	36.93	50.00	-13.07	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1980	43.11	9.84	52.95	63.69	-10.74	QP	
2	0.1980	27.29	9.84	37.13	53.69	-16.56	AVG	
3	0.3899	43.63	9.90	53.53	58.06	-4.53	QP	
4	0.3899	25.75	9.90	35.65	48.06	-12.41	AVG	
5	0.7700	41.55	9.96	51.51	56.00	-4.49	QP	
6	0.7700	24.61	9.96	34.57	46.00	-11.43	AVG	
7	1.3460	36.95	10.00	46.95	56.00	-9.05	QP	
8	1.3460	17.08	10.00	27.08	46.00	-18.92	AVG	
9	5.2140	33.88	10.12	44.00	60.00	-16.00	QP	
10	5.2140	15.54	10.12	25.66	50.00	-24.34	AVG	
11	11.4300	33.51	10.61	44.12	60.00	-15.88	QP	
12	11.4300	30.19	10.61	40.80	50.00	-9.20	AVG	

7 Radiation Emission Test

Test Requirement:	FCC Part15 Paragraph 15.231
Test Method:	Based on FCC Part15 Paragraph 15.33
Frequency Range:	9KHz to 5GHz
Measurement Distance:	3m
Test Result:	PASS

7.1 Test Equipment

Please refer to Section 5 this report.

7.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on ANSI C63.4: 2003, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Waltek EMC Lab is +2.9 dB.

7.3 Test Procedure

1. New battery were installed in the equipment under test for radiated emissions test.
2. This is a handheld device, The radiation emission should be tested under 3-axes position (lying, side and stand), After pre-test, It was found that the worse radiation emission was get at the lying position.
3. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.
4. All data was recorded in the peak and average detection mode.
5. The EUT was under working mode during the final qualification test and the configuration was used to represent the worst case results.

7.4 EUT Operation:

Operating Environment:

Temperature:	25.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	1010 mbar

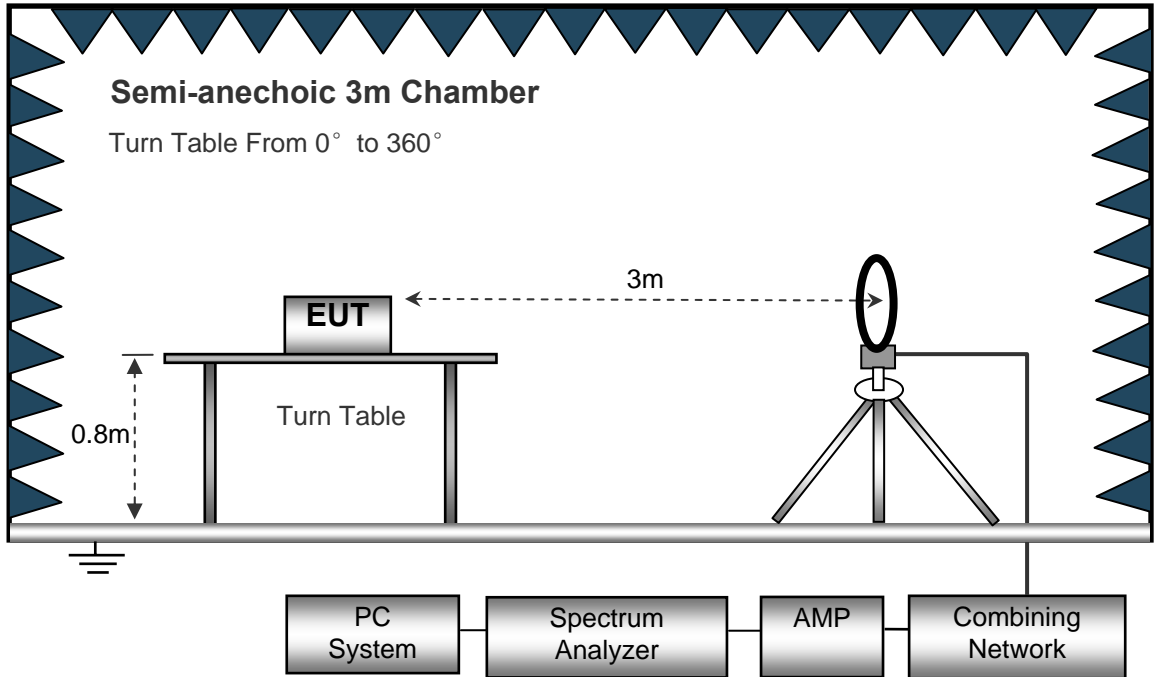
Operation Mode:

The EUT was tested in Transmitting mode. The test data were shown as follow.

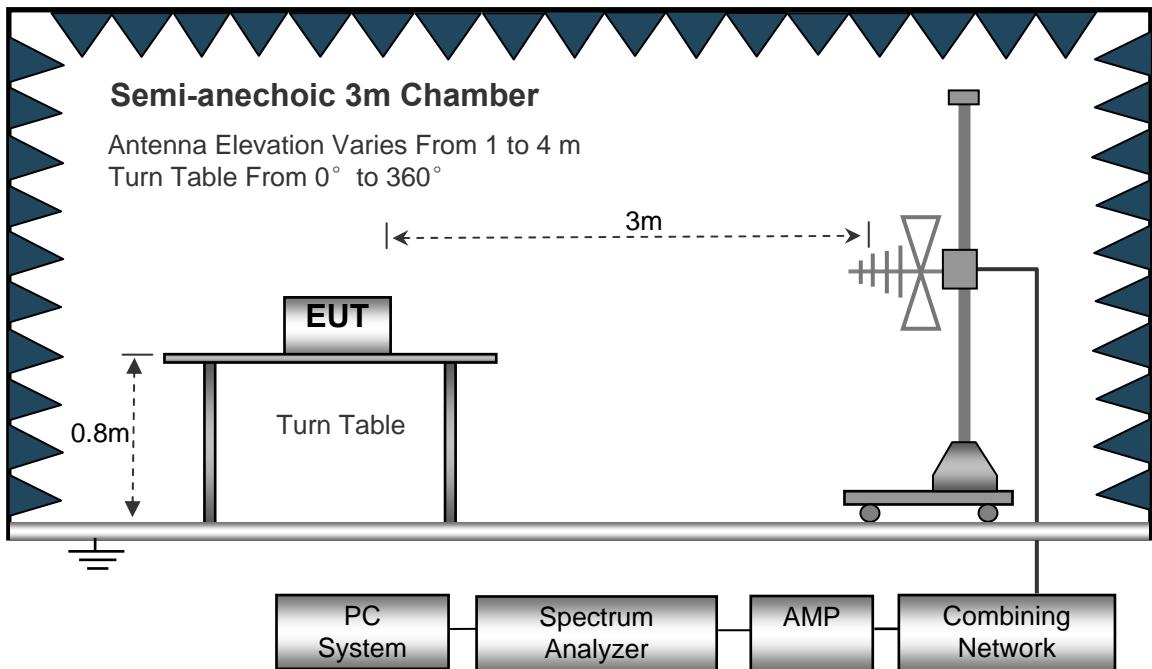
7.5 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4: 2003.

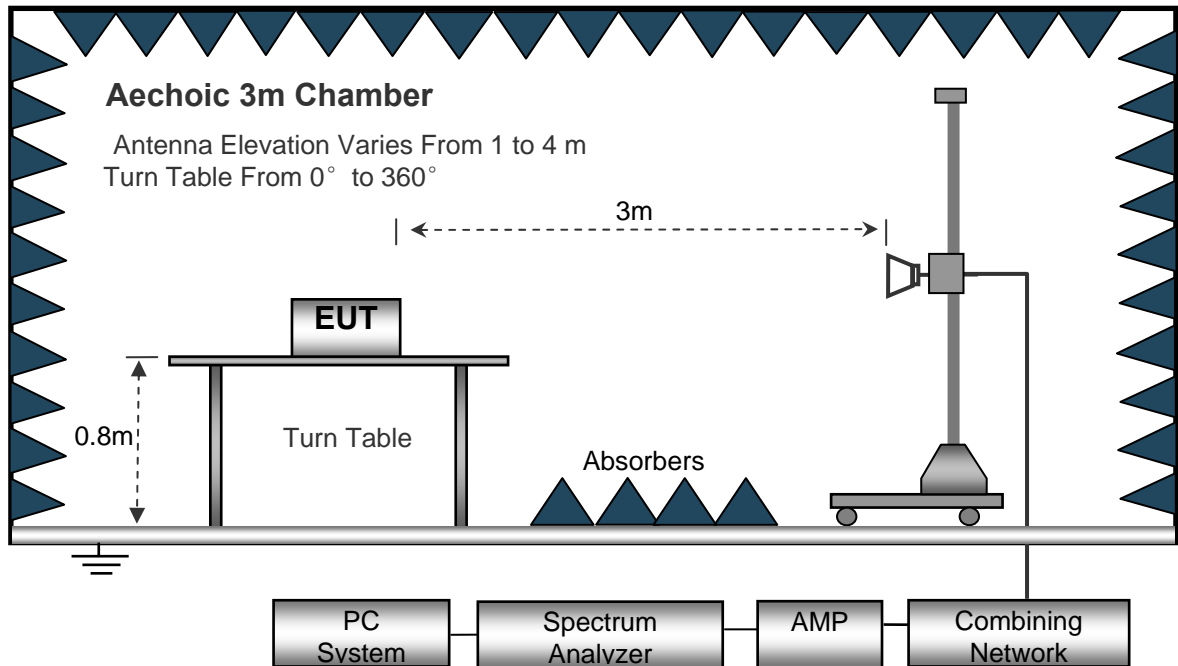
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



7.6 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested from 9KHz to 5GHz.

Below 30MHz

Sweep SpeedAuto
 IF Bandwidth 10 KHz
 Video Bandwidth10KHz
 Resolution Bandwidth 10 KHz

30MHz ~ 1GHz

Sweep SpeedAuto
 IF Bandwidth120 KHz
 Video Bandwidth100KHz
 Quasi-Peak Adapter Bandwidth.....120 KHz
 Quasi-Peak Adapter Mode.....Normal
 Resolution Bandwidth100KHz

Above 1GHz

Sweep SpeedAuto
 IF Bandwidth 120 KHz
 Video Bandwidth3MHz
 Quasi-Peak Adapter Bandwidth.....120 KHz
 Quasi-Peak Adapter Mode.....Normal
 Resolution Bandwidth1MHz

7.7 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
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 moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X, Y, Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand). After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

7.8 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:
Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain the **"Margin"** column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

7.9 Summary of Test Results

Test Frequency :Below 30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency : 30MHz ~ 5GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.231/15.209/205	
				Height	Polar			Limit	Margin
(MHz)	(dB μ V)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dB μ V/m)	(dB μ V/m)	(dB)
Lower channel:433.222MHz									
433.22	65.37	PK	55	1.4	H	19.68	85.05	100.80	-25.75
433.22	63.64	PK	120	1.7	V	19.68	83.32	100.80	-27.48
866.44	28.64	PK	222	1.4	H	29.71	58.35	80.80	-22.45
866.44	28.55	PK	91	1.4	V	29.71	58.26	80.80	-22.54
1299.67	55.38	PK	333	1.9	H	-16.06	39.32	74.00	-34.68
1299.67	49.16	PK	31	1.1	V	-16.06	33.10	74.00	-40.90
1816.80	52.33	PK	341	1.3	H	-16.38	35.95	74.00	-38.05
1816.80	50.89	PK	119	2.0	V	-16.38	34.51	74.00	-39.49
2725.20	51.39	PK	42	1.5	H	-14.87	36.52	74.00	-37.48
2725.20	51.27	PK	206	1.2	V	-14.87	36.40	74.00	-37.60
upper channel:433.833MHz									
434.83	64.62	PK	213	1.1	H	19.68	84.30	100.80	-26.50
434.83	64.42	PK	339	1.3	V	19.68	84.10	100.80	-26.70
869.66	28.60	PK	21	1.3	H	29.71	58.31	80.80	-22.49
869.66	28.48	PK	28	1.0	V	29.71	58.19	80.80	-22.61
1304.49	55.20	PK	333	1.9	H	-16.06	39.32	74.00	-34.68
1304.49	50.04	PK	31	1.1	V	-16.06	33.10	74.00	-40.90
2322.60	53.44	PK	193	1.04	H	-13.10	40.34	74.00	-37.48
2322.60	51.23	PK	136	1.87	V	-13.10	38.13	74.00	-37.60
2923.40	51.33	PK	137	1.33	H	-10.75	40.58	74.00	-33.42
2923.40	48.52	PK	132	1.91	V	-10.75	37.77	74.00	-36.23

AV = Peak +20Log₁₀(duty cycle) =PK+(-28.40) [refer to section 8 for more detail]

Frequency	PK	Turn table Angle	RX Antenna		Duty cycle Factor	AV	FCC Part 15.231/209/205	
			Height	Polar			Limit	Margin
(MHz)	(dBμV/m)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Lower channel:433.222MHz								
433.22	85.05	317	1.0	H	-28.40	56.65	80.82	-25.26
433.22	83.32	147	1.9	V	-28.40	54.92	80.82	-29.77
866.44	58.35	71	1.2	H	-28.40	29.95	60.82	-26.05
866.44	58.26	76	1.9	V	-28.40	29.86	60.82	-23.77
1299.67	39.32	79	1.7	H	-28.40	10.92	54.00	-43.08
1299.67	33.10	316	1.9	V	-28.40	4.70	54.00	-49.30
1816.80	35.95	325	2.0	H	-28.40	7.55	54.00	-42.06
1816.80	34.51	159	1.9	V	-28.40	6.11	54.00	-44.27
2725.20	36.52	159	1.9	H	-28.40	8.12	54.00	-41.82
2725.20	36.40	159	1.9	V	-28.40	8.00	54.00	-44.63
upper channel:433.833MHz								
434.83	84.30	317	1.0	H	-28.40	55.56	80.82	-25.26
434.83	84.10	147	1.9	V	-28.40	51.05	80.82	-29.77
869.66	58.31	71	1.2	H	-28.40	34.77	60.82	-26.05
869.66	58.19	76	1.9	V	-28.40	37.05	60.82	-23.77
1304.49	39.32	79	1.7	H	-28.40	10.92	54.00	-43.08
1304.49	33.10	316	1.9	V	-28.40	4.70	54.00	-49.30
2322.60	40.34	325	2.0	H	-28.40	11.94	54.00	-42.06
2322.60	38.13	159	1.9	V	-28.40	9.73	54.00	-44.27
2923.40	40.58	159	1.9	H	-28.40	12.18	54.00	-41.82
2923.40	37.77	159	1.9	V	-28.40	9.37	54.00	-44.63

8 Periodic Operation

The duty cycle was determined by the following equation:

To calculate the actual field intensity, The duty cycle correction factor in decibel is needed for later use and can be obtained from following conversion

Duty Cycle(%)=

Total On interval in a complete pulse train/ Length of a complete pulse train * %

Duty Cycle Correction Factor(dB)=20 * Log₁₀(Duty Cycle(%))

Pulse Train	Number of Pulse	T(ms)	Total Time(ms)
Pulse 1	1	3.8	3.8

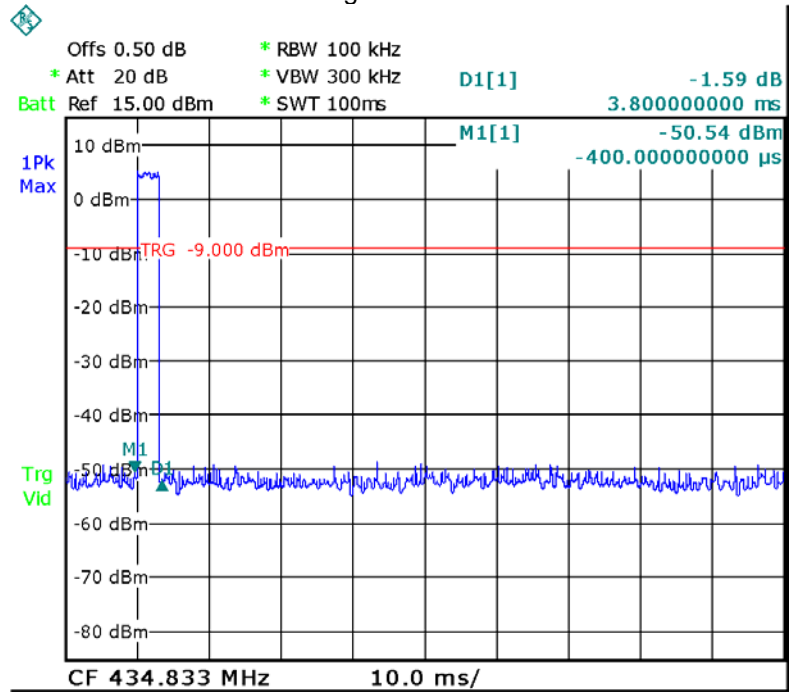
Total On interval in a complete pulse train(ms)	3.8
Length of a complete pulse train(ms)	100
Duty Cycle(%)	3.8
Duty Cycle Correction Factor(dB)	-28.40

Refer to the duty cycle plot (as below), This device meets the FCC requirement.

Length of a complete pulse train:

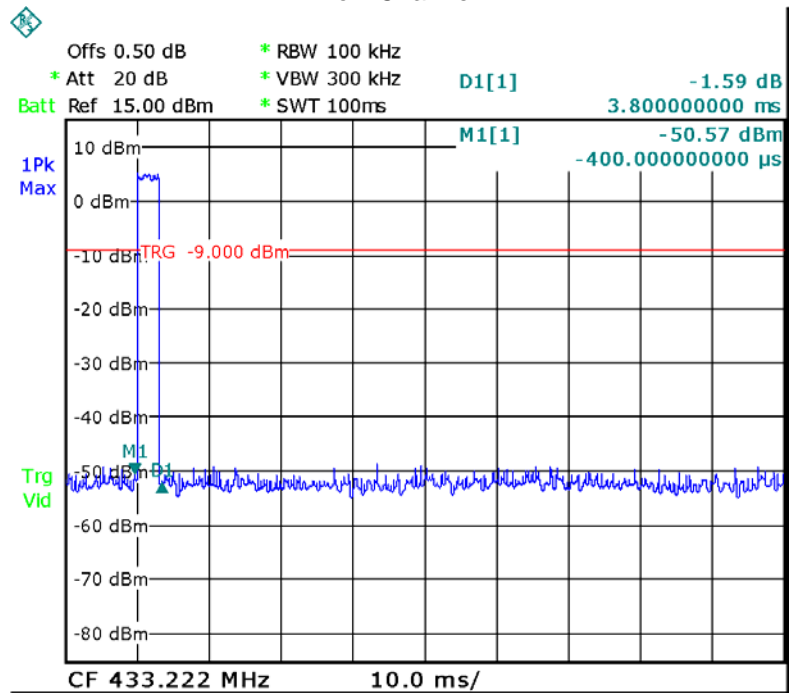
Remark:FCC part15.35(c) required that a complete pulse train is more than 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

High Channel



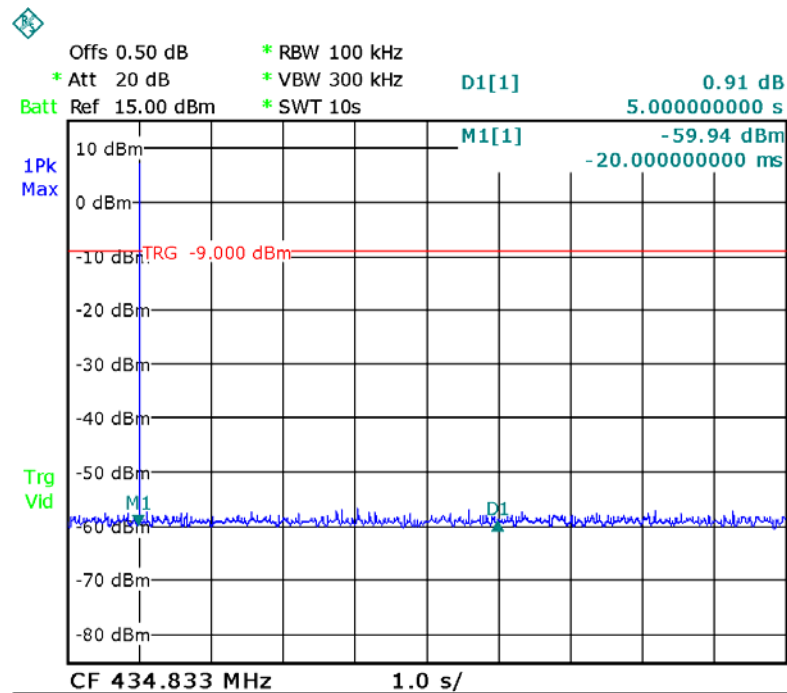
Date: 21.NOV.2013 15:44:59

Low Channel



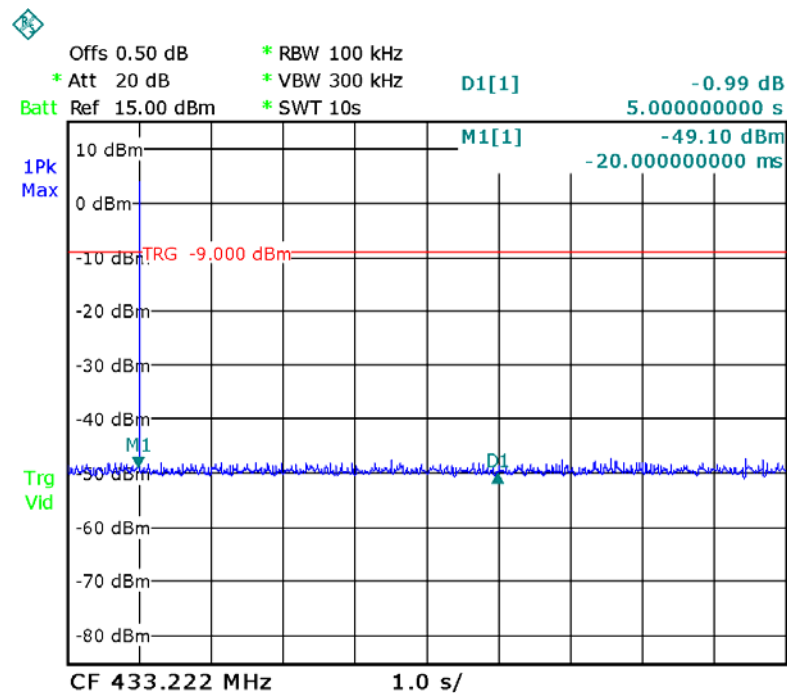
Date: 21.NOV.2013 15:44:51

Refer to the plot (as below),We find a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter immediately, within not more than 5 seconds of being released.



Date: 21.NOV.2013 15:49:23

High Channel



Date: 21.NOV.2013 15:47:11

Low Channel

9 20dB Bandwidth

Test Requirement: FCC Part15 C
 Test Method: FCC Part15 Paragraph 15.231(c)
 Limit The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency.

9.1 Test Procedure

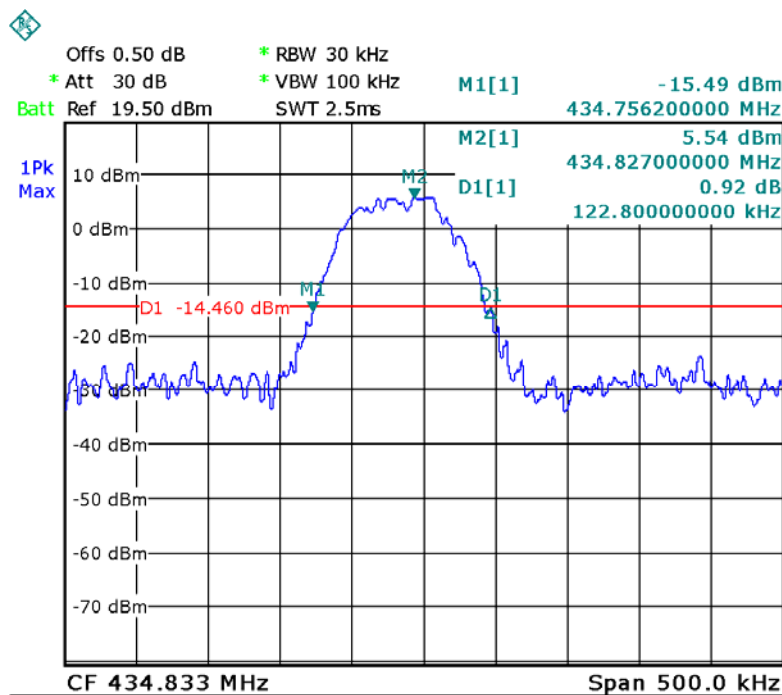
1. The transmitter output (antenna port) was connected to the spectrum analyzer.EUT and its simulators are placed on a table, let EUT working in test mode,then test it.
2. The bandwidth of the fundamental frequency was measure by spectrum analyser with 100KHz RBW and 100KHz VBW.The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power 20dB.

9.2 Test Result

Frequency (MHz)	Bandwidth Emission (KHz)	Limit (KHz)	Result
434.833	122.8	1087.1	Pass
433.222	126.7	1083.1	Pass

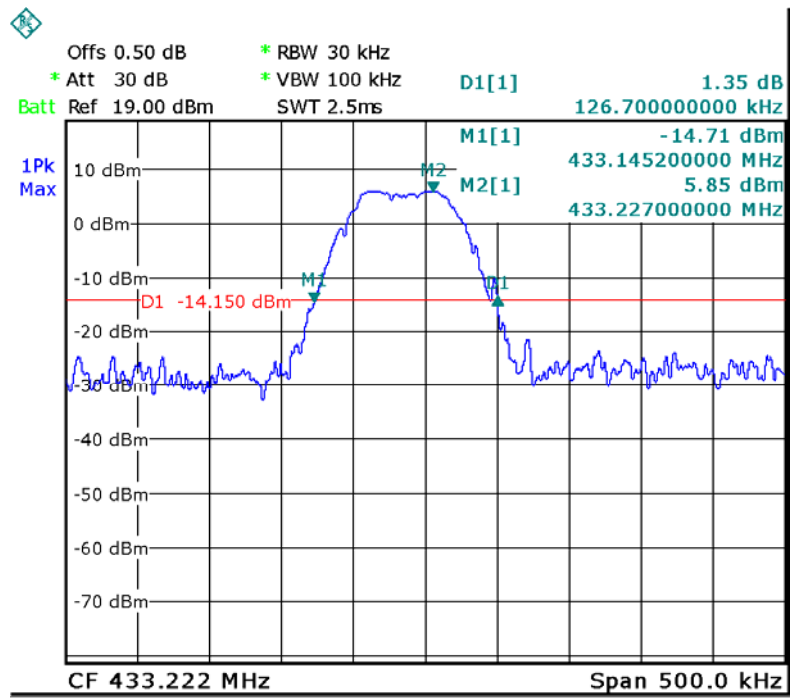
Limit=Center Frequency*0.25%

Test Plot



Date: 21.NOV.2013 10:51:02

High Channel



Date: 21.NOV.2013 10:43:37

Low Channel

10 Antenna Requirement

According to the FCC Part 15 Paragraph 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. This product has a Monopole antenna with RP SMA connector(The whorl is non-standard, it only apply to this model), fulfill the requirement of this section.

11 Photographs of Testing

11.1 Conducted Emission Test View

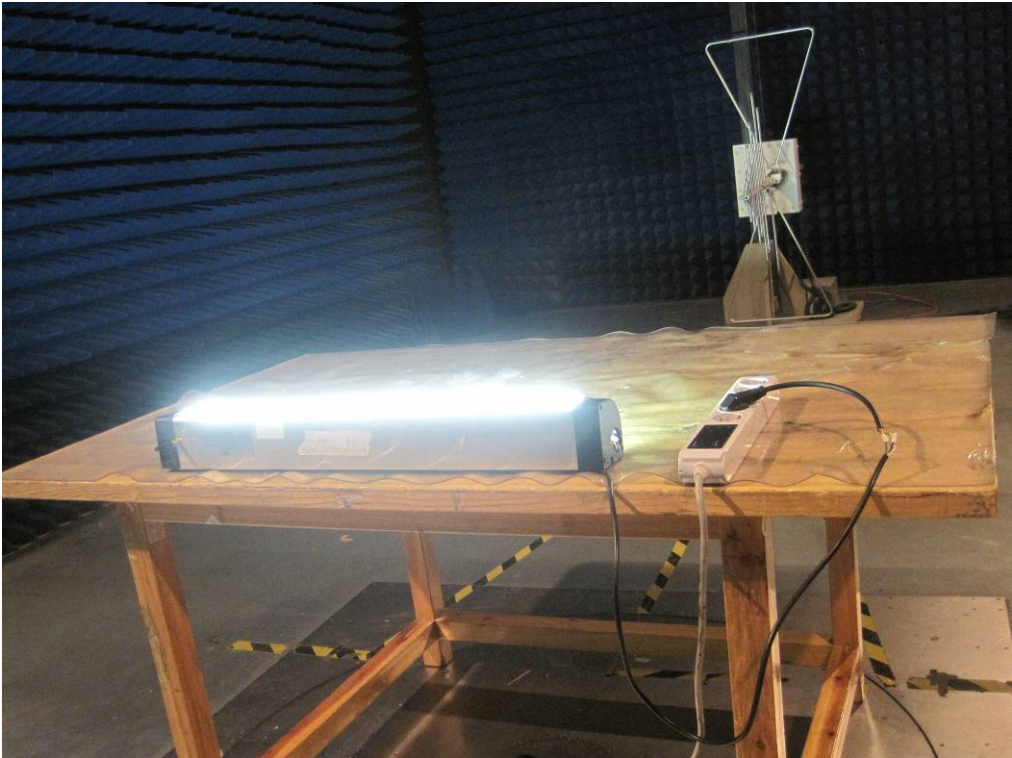


11.2 Radiation Emission Test View

Below 30MHz



From 30MHz to 1GHz



Above 1GHz

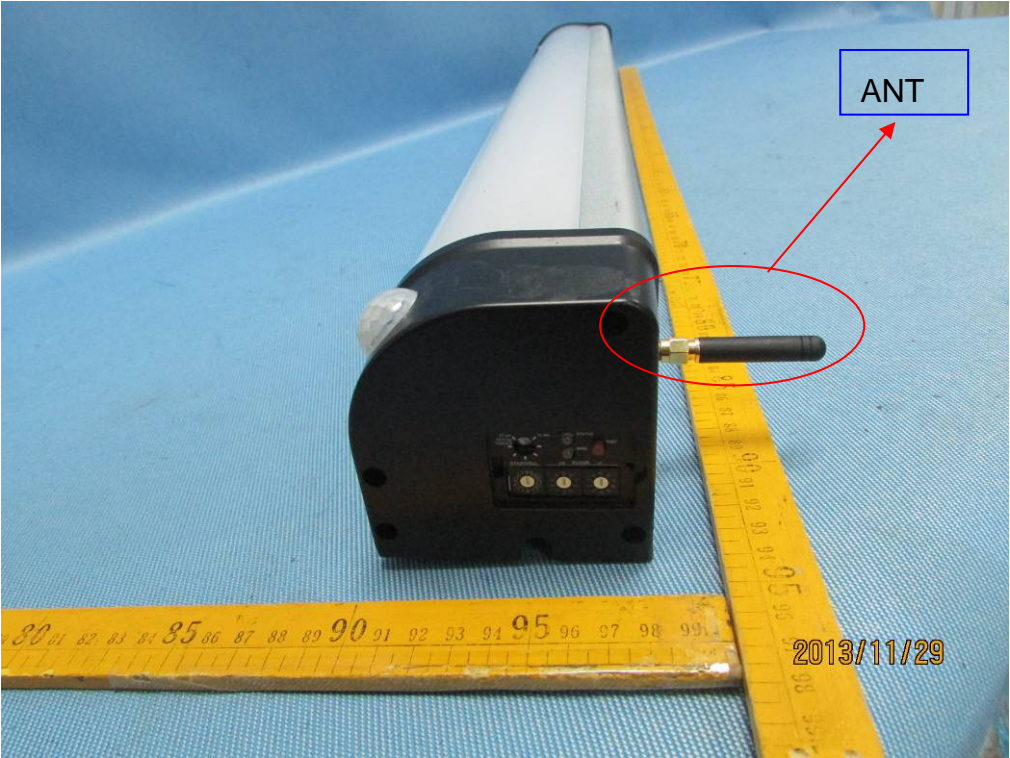
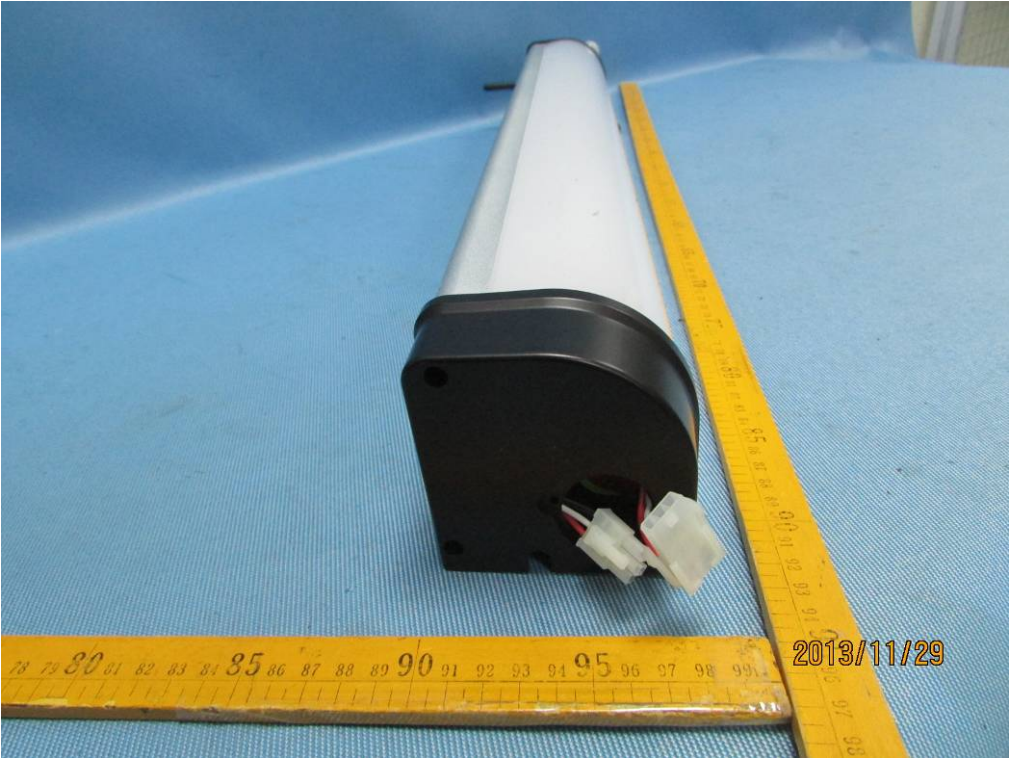


12 Photographs - Constructional Details

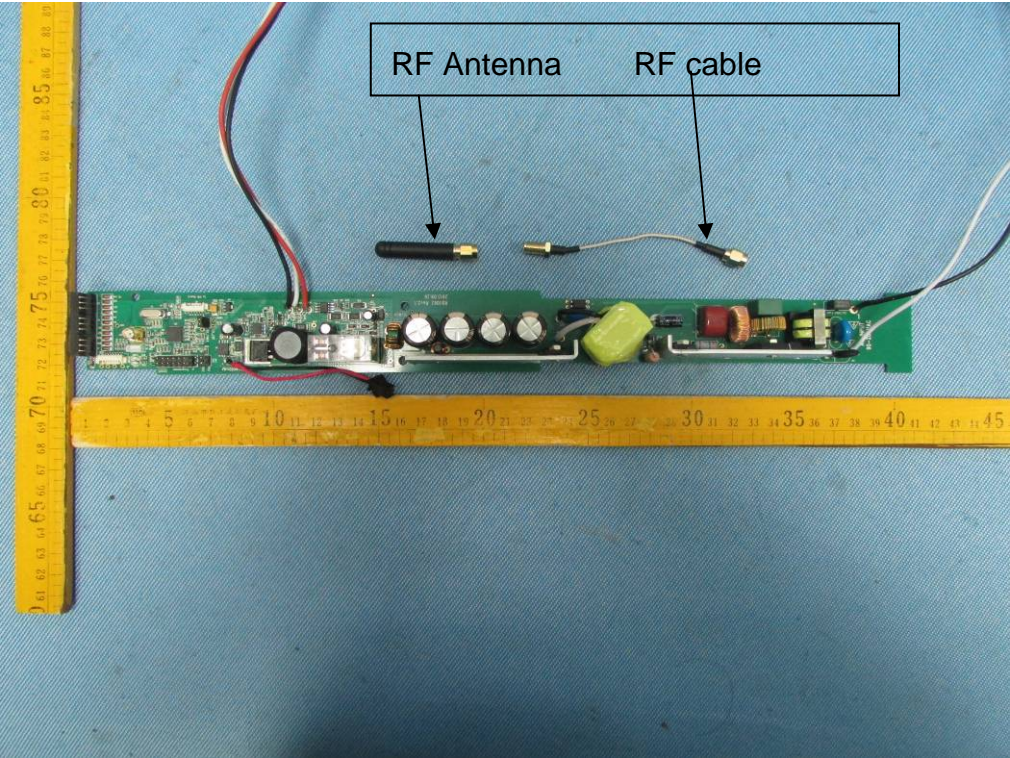
12.1 EUT - Appearance View

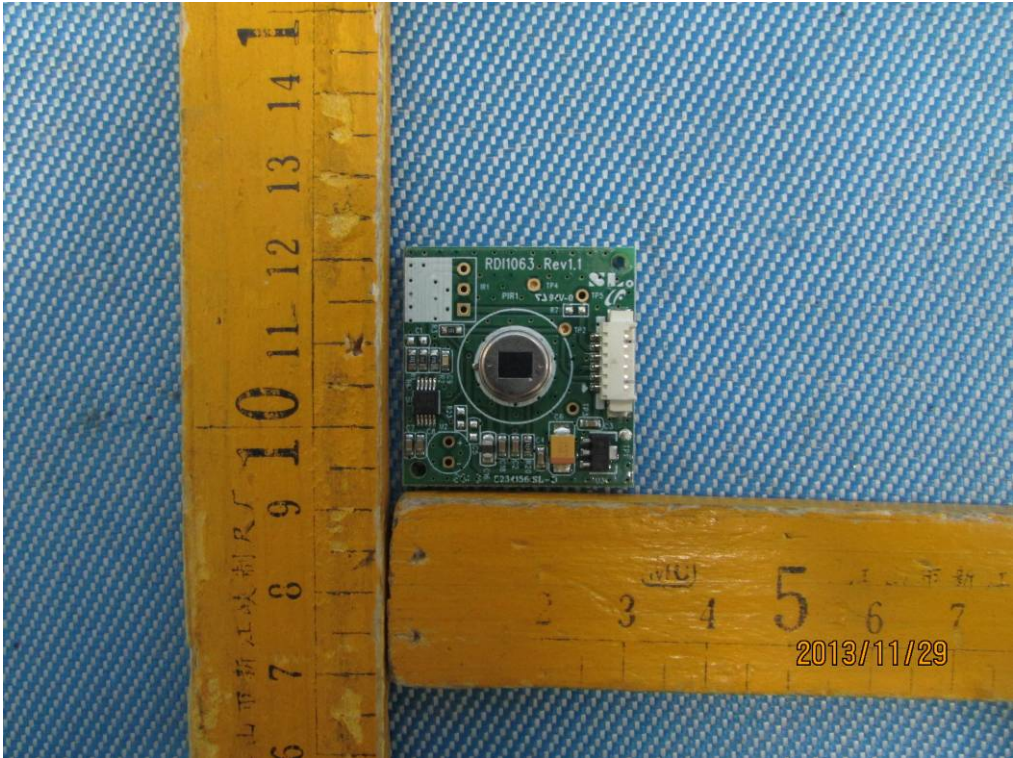
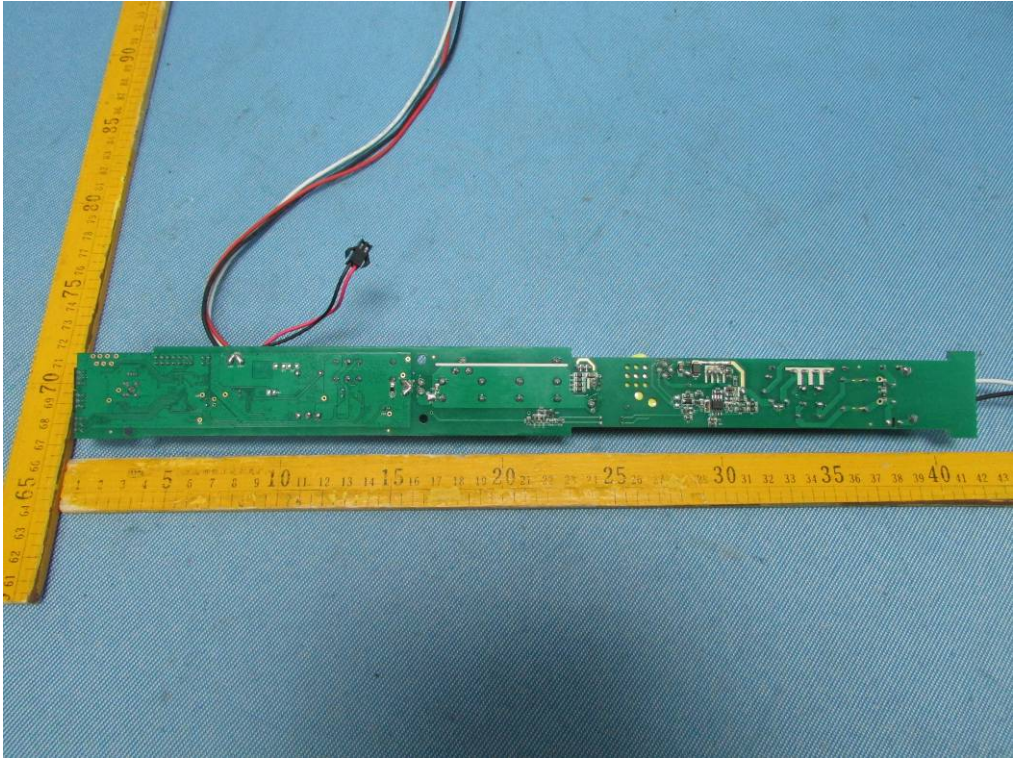


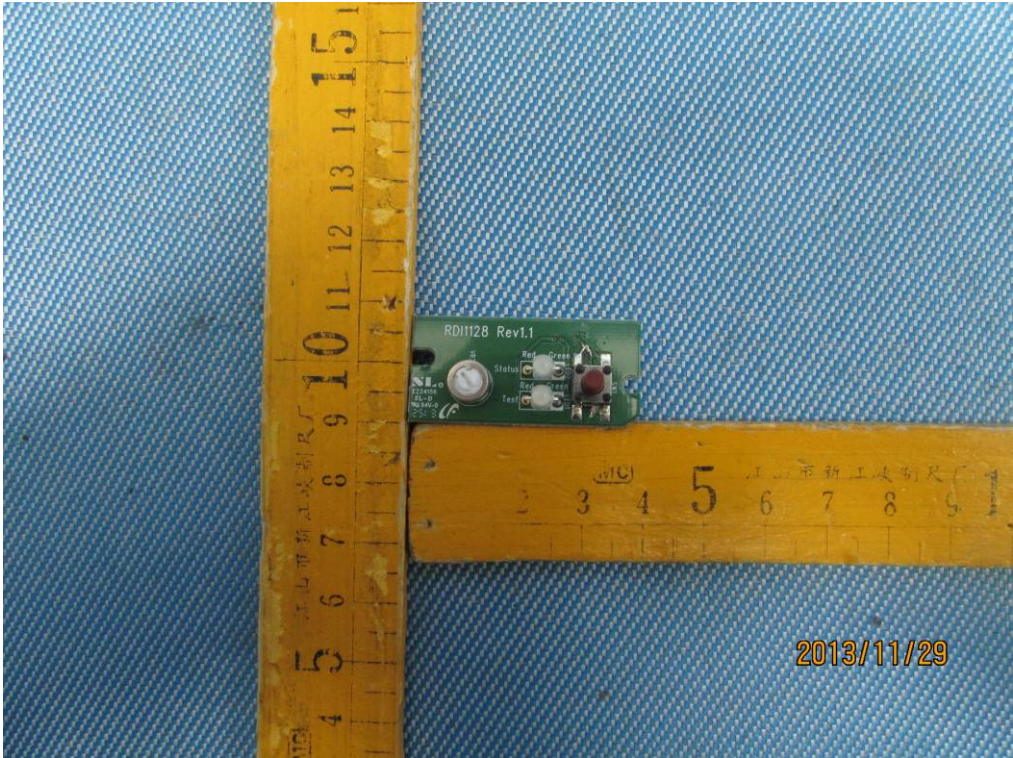
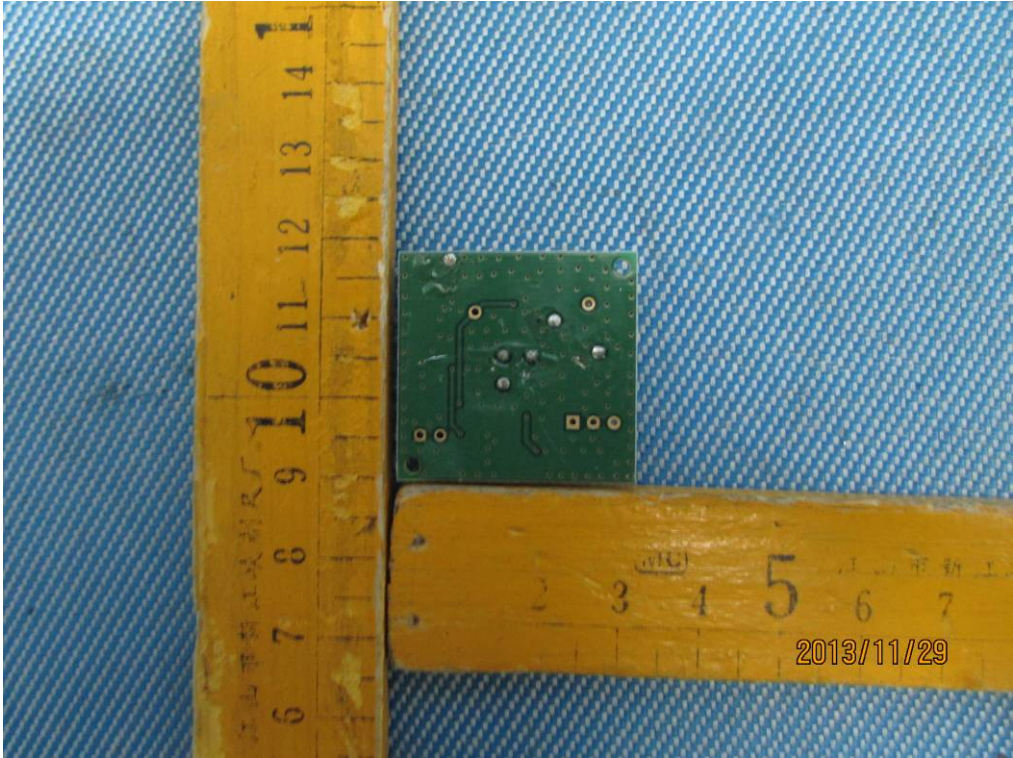


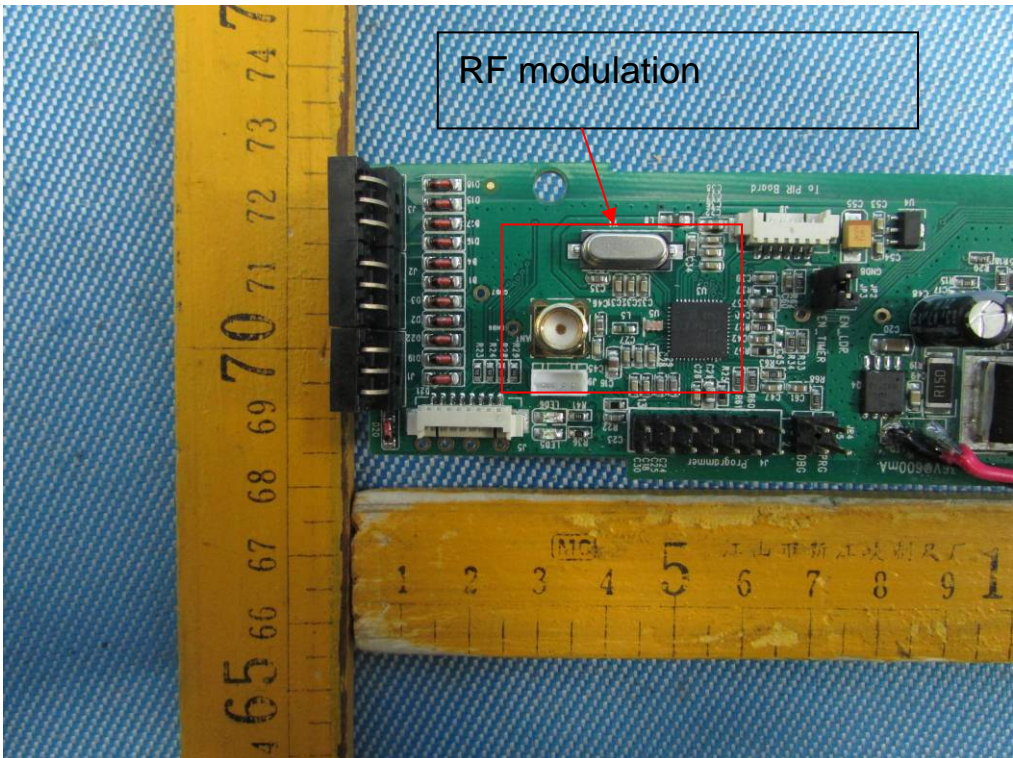
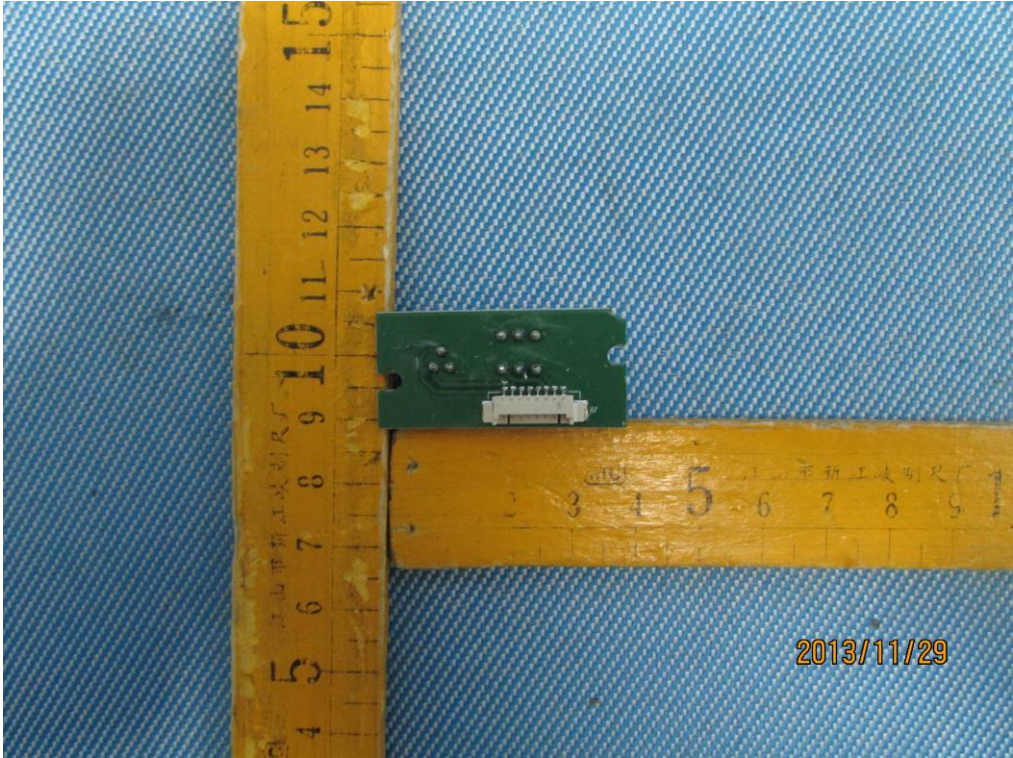


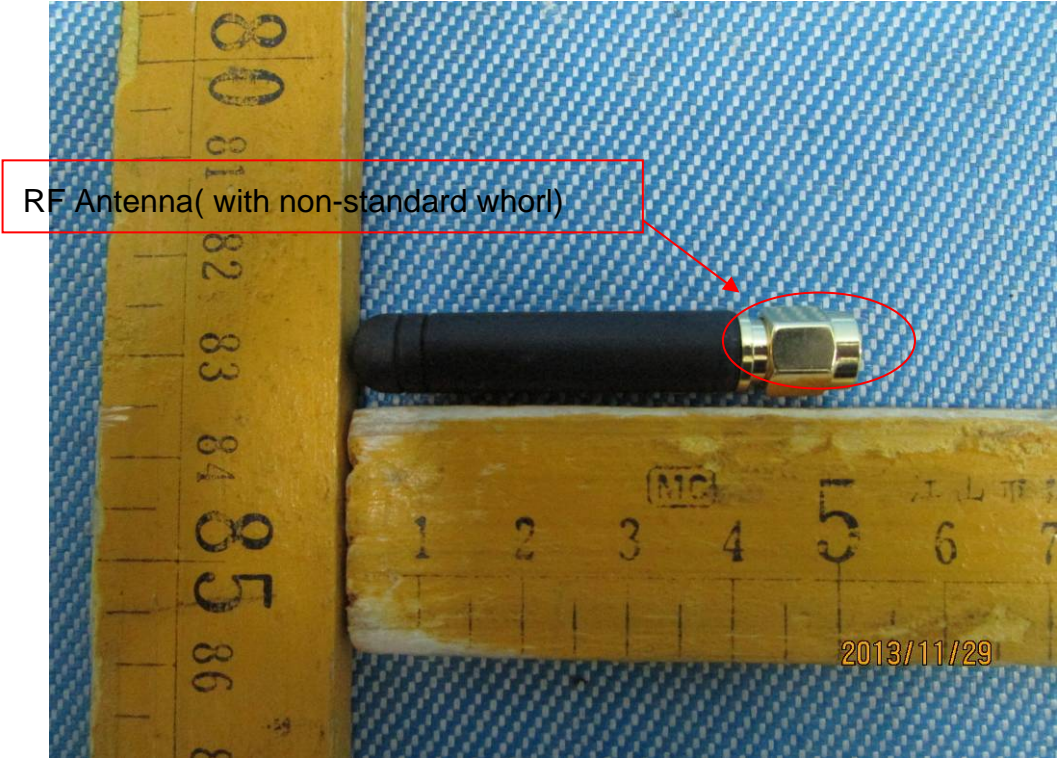
12.2 EUT- Internal View











===== End of Test Report =====