TEST REPORT

Reference No.	:	WTS13S1109470E
FCC ID	:	QCVS0911011
Applicant	:	Budderfly LLC
Address	:	2 Trap Falls Road, Suite 507 Shelton, CT 06484 USA
Manufacturer	:	CME Electronics Technology Co., LTD
Address	:	Suite B, 18th Floor, Jingwangem No. 303, Qinglv Road South，Gongbei, Zhuhai 519020,Guangdong Province, China
Product Name	:	Budderfly RF Multi-Way Switch
Model No.	:	S0911011
Standards	:	FCC CFR47 Part 15 Section 15.249: 2012
Date of Receipt sample	:	Dec.01,2013
Date of Test	:	Dec.02~06,2013
Date of Issue	:	Dec.23,2013
Test Result	:	**Pass ***

*Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.
The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:
Waltek Services (Shenzhen) Co., Ltd.
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Testing location: The same as above
Tel :+86-755-83551033
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Compiled by: Tiger Ye

Approved by: Philo Zhong

Tiger Ye / Project Engineer

Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Result
Outside of Band Emission	15.249 15.209 15.205	PASS
20dB Bandwidth	15:215(c)	PASS
Conducted Emissions	15.207	PASS
Radiated Emission	15.249(a) 15.209 15.205(a)	PASS
Antenna Requirement	15.203	PASS

3 Contents

4 General Information

4.1 General Description of E.U.T.

Product Name	: Budderfly RF Multi-Way Switch
Model No.	: S0911011
Type of Modulation	: 2FSK
Frequency Range	: 915.40~921.00MHz
Oscillator	: 32.768kHz
Antenna installation	: Monopole Antenna

4.2 Details of E.U.T.

Technical Data	: DC 3V power supply by battery
Adapter	: N/A

4.3 Test Facility

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

- **IC – Registration No.:7760A**

  Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory 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 number 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 testswere performed at:-
1/F, Fukangtai Building,West Baima Rd.,Songgang Street, Baoan District, Shenzhen 518105, Guangdong,China.

4.5 General condition

Ambient Condition: 25 ℃ 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	915.40MHz	MHz	921.00MHz

5 Equipment Used during Test

5.1 Equipments List

Conducted Emissions at Mains Terminals Disturbance Voltage (Conducted Emission)						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMI Test Receiver	R&S	ESCI	101155	Sep.18,2013	Sep.17,2014
2.	LISN	SCHWARZBECK	NSLK 8128	8128-289	Sep.18,2013	Sep.17,2014
3.	Limiter	York	MTS-IMP-136	261115-001-0024	Sep.18,2013	Sep.17,2014
4.	Cable	LARGE	RF300	-	Sep.18,2013	Sep.17,2014
3m Semi-anechoic Chamber for Radiation						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.18,2013	Sep.17,2014
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.18,2013	Sep.17,2014
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Apr.20,2013	Apr.19,2014
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.18,2013	Sep.17,2014
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Apr.20,2013	Apr.19,2014
6	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Apr.07,2013	Apr.06,2014
7	Coaxial Cable (above 1GHz)	Top	25MHz-18GHz	EW02014-7	Apr.20,2013	Apr.19,2014

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-6}
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (Bilog antenna 30M~1000MHz)
	± 4.74 dB (Horn antenna 1000M~25000MHz)
Conducted Spurious Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

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

Test Requirement:	FCC Part15 Paragraph 15.207
Test Method:	ANSI C63.4: 2003
Frequency Range:	150kHz to 30MHz
Class:	Class B
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth)
	Quasi-Peak & Average if maximised peak within 6dB of Average Limit

6.1 E.U.T. Test Condition

Operating Environment:

Temperature:	24 °C
Humidity:	52% RH
Atmospheric Pressure:	101.1 kPa

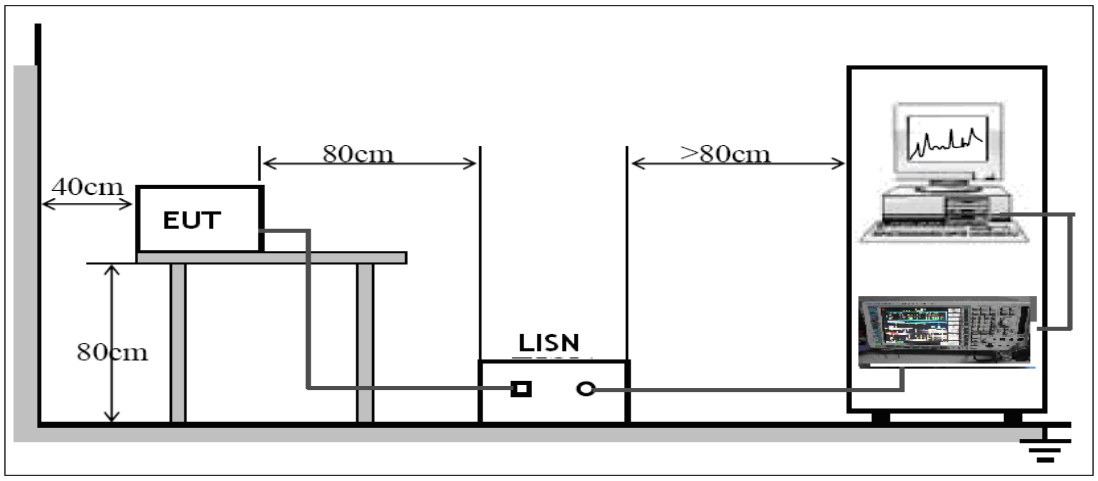
EUT Operation :

The pre-test was performance in normal working mode, and the test data were shown as follow.

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.



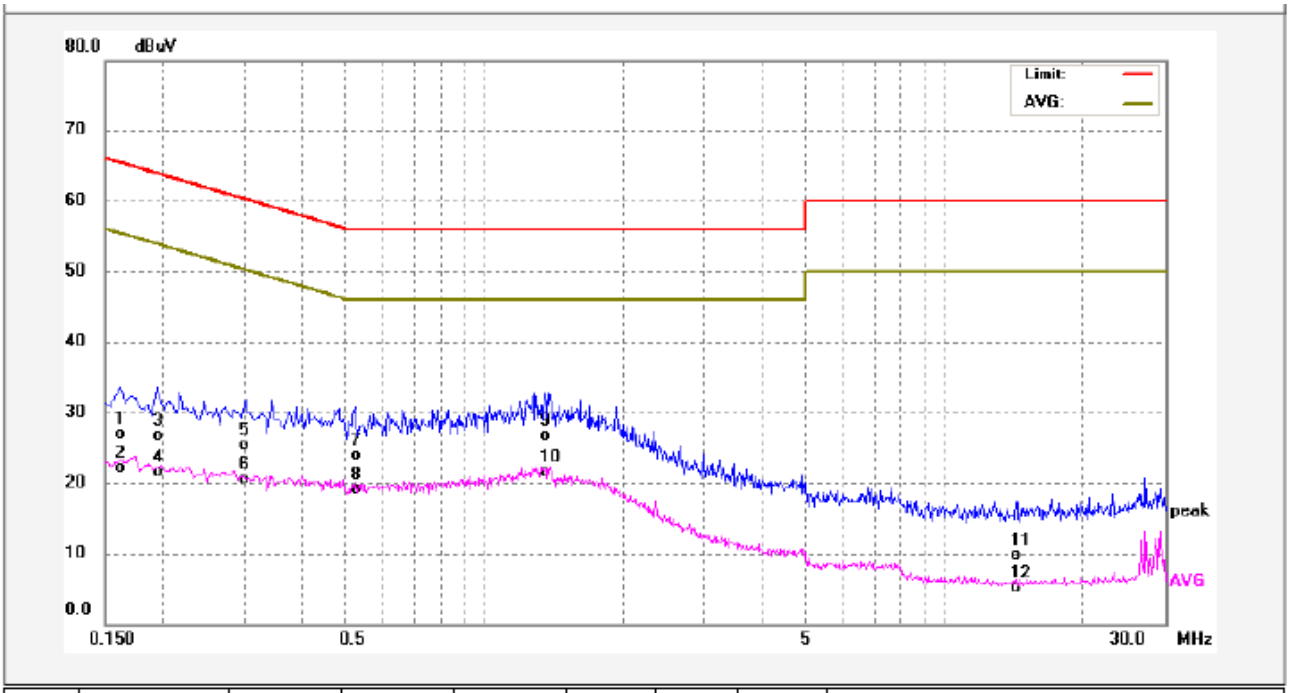
The EUT was placed on the test table in shielding room

6.3 Conducted Emission Test Result

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.

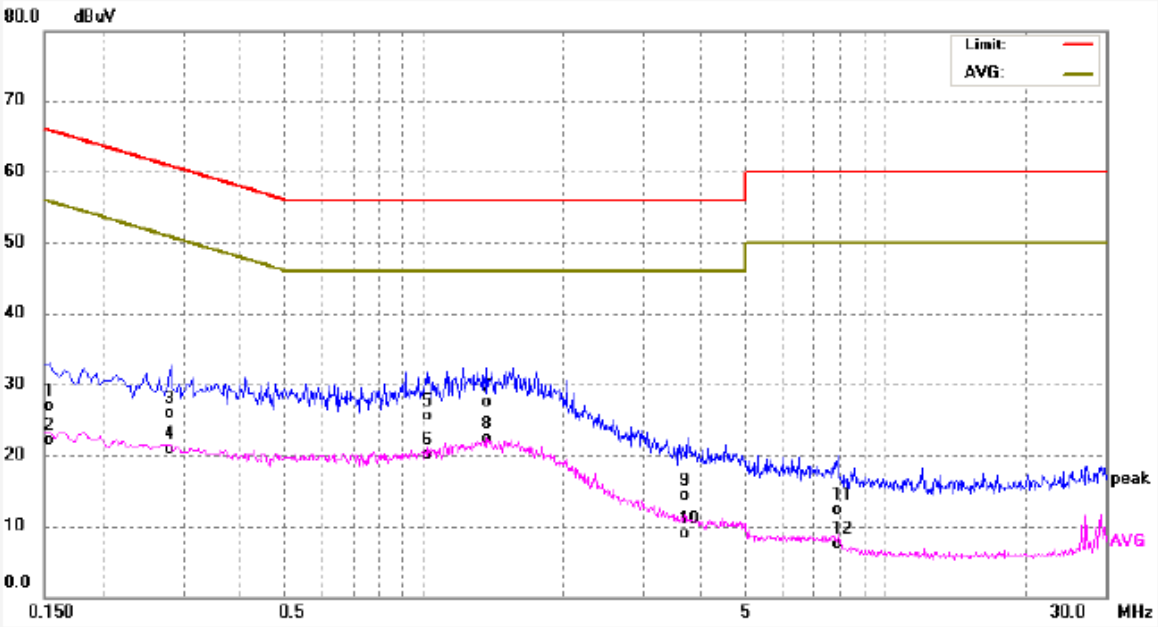
Test Mode:Normal working

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1620	15.79	11.20	26.99	65.36	-38.37	QP	
2	0.1620	10.82	11.20	22.02	55.36	-33.34	AVG	
3	0.1940	15.34	11.28	26.62	63.86	-37.24	QP	
4	0.1940	10.30	11.28	21.58	53.86	-32.28	AVG	
5	0.3020	14.10	11.30	25.40	60.19	-34.79	QP	
6	0.3020	9.17	11.30	20.47	50.19	-29.72	AVG	
7	0.5260	12.51	11.31	23.82	56.00	-32.18	QP	
8	0.5260	7.76	11.31	19.07	46.00	-26.93	AVG	
9	1.3540	15.55	11.19	26.74	56.00	-29.26	QP	
10	1.3540	10.35	11.19	21.54	46.00	-24.46	AVG	
11	14.2180	-1.69	11.44	9.75	60.00	-50.25	QP	
12	14.2180	-6.31	11.44	5.13	50.00	-44.87	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1539	15.67	11.18	26.85	65.78	-38.93	QP	
2	0.1539	10.86	11.18	22.04	55.78	-33.74	AVG	
3	0.2819	14.51	11.30	25.81	60.76	-34.95	QP	
4	0.2819	9.54	11.30	20.84	50.76	-29.92	AVG	
5	1.0180	14.33	11.18	25.51	56.00	-30.49	QP	
6	1.0180	9.02	11.18	20.20	46.00	-25.80	AVG	
7	1.3660	16.39	11.19	27.58	56.00	-28.42	QP	
8	1.3660	11.16	11.19	22.35	46.00	-23.65	AVG	
9	3.7220	2.99	11.22	14.21	56.00	-41.79	QP	
10	3.7220	-2.29	11.22	8.93	46.00	-37.07	AVG	
11	7.8900	0.95	11.27	12.22	60.00	-47.78	QP	
12	7.8900	-3.80	11.27	7.47	50.00	-42.53	AVG	

7 Radiation Emission Test

Test Requirement: FCC Part15 Paragraph 15.249

Test Method: ANSI 63.4: 2003

Measurement Distance: 3m

Detector: Peak for pre-scan (120kHz resolution bandwidth)

Quasi-Peak if maximised peak within 6dB of limit

Test Result: PASS

15.249(a)Limit:

Fundamental frequency	Field strength of fundamental		Field strength of harmonics	
	mV/m	dBuV/m	uV/m	dBuV/m
902-928 MHz	50	94	500	54
2400-2483.5 MHz	50	94	500	54
5725-5875 MHz	50	94	500	54
24.0-24.25 GHz	250	108	2500	68

15.209 Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

Note: RF Voltage(dBuV)=20 $\log_{10}$ RF Voltage(uV)

7.1 EUT Operation:

Operating Environment:

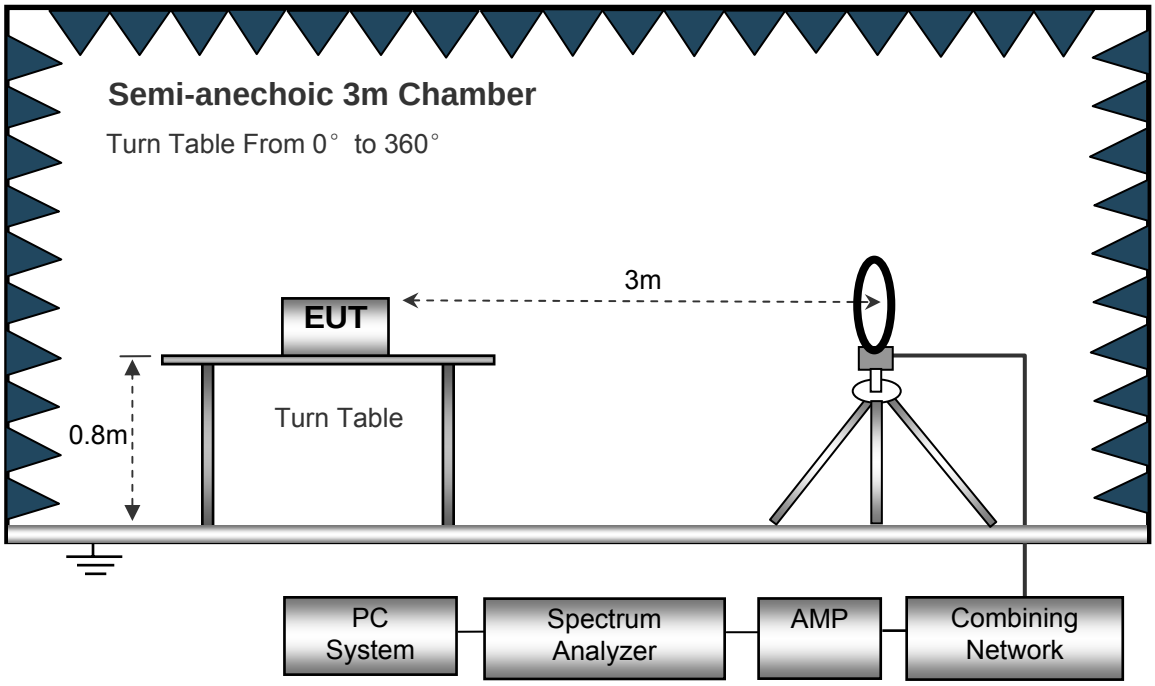
Temperature: 25.5 °C
Humidity: 51 % RH
Atmospheric Pressure: 101.0 kPa

Operation Mode:

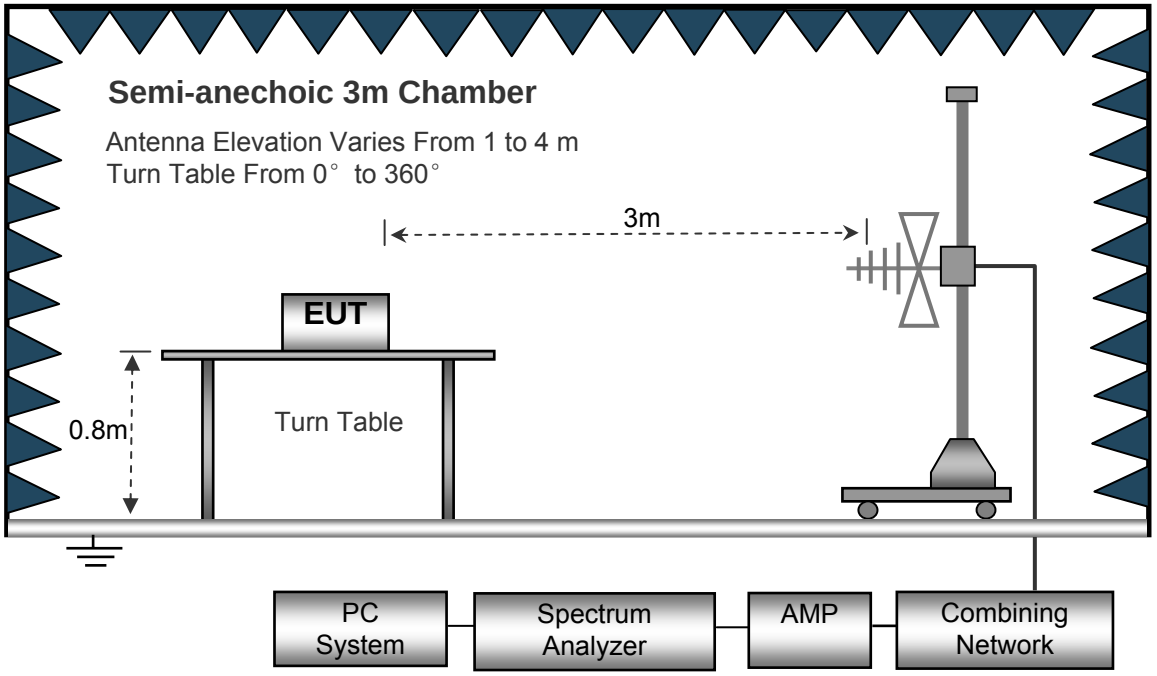
The EUT was tested in continuous transmitting mode, and the test data were shown as follow.

7.2 Test Setup

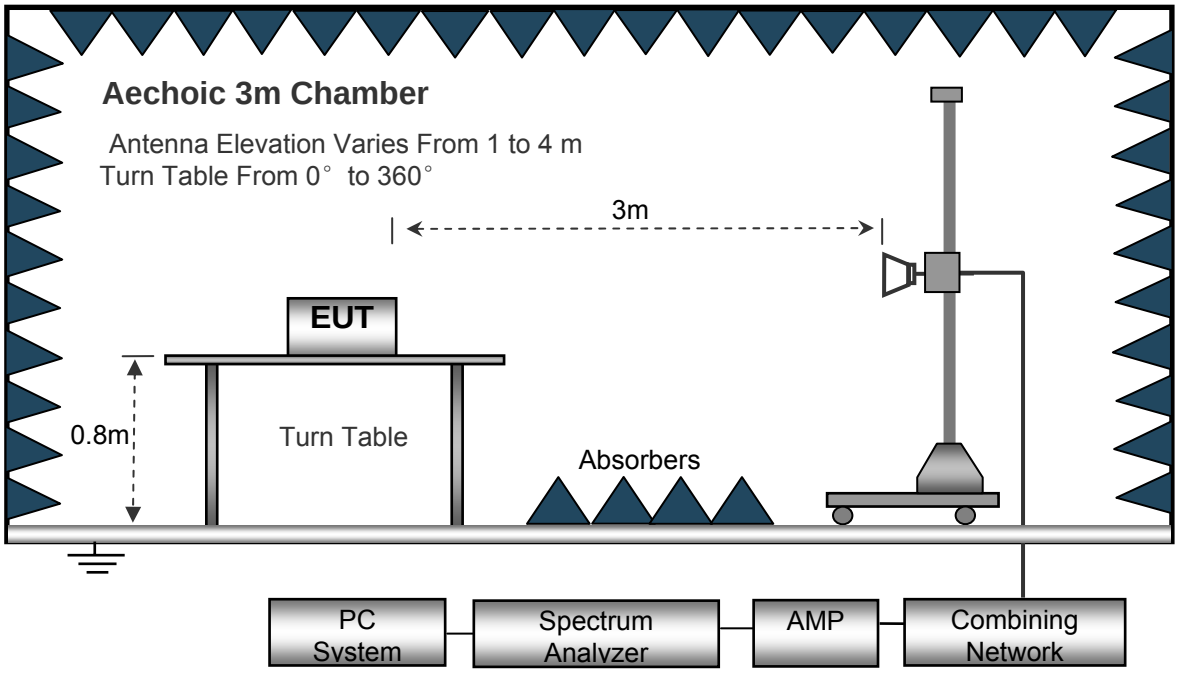
The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4: 2003.
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



7.3 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested from 32.768kHz to 10GHz.

Below 30MHz

Sweep Speed .....Auto
IF Bandwidth.....10kHz
Video Bandwidth.....10kHz

Resolution Bandwidth.....10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto
IF Bandwidth.....120 KHz
Video Bandwidth.....100KHz
Quasi-Peak Adapter Bandwidth .....120 KHz
Quasi-Peak Adapter Mode .....Normal
Resolution Bandwidth.....100KHz

Above 1GHz

Sweep Speed .....Auto
Detector .....PK
Resolution Bandwidth.....1MHz
Video Bandwidth.....3MHz
Detector .....Ave.
Resolution Bandwidth.....1MHz
Video Bandwidth.....10Hz

7.4 Test Procedure

1.This is a handhold device,The radiation emission should be 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.

2. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.

3. All data was recorded in the peak and average detection mode.

4. The EUT was under working mode during the final qualification test and the configuration was used to represent the worst case results.

7.5 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 -7dBμV means the emission is 7dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Class B Limit

7.6 Radiated Emissions Test Result

Formula of conversion factors:the field strength at 3m was egtablished by adding
The meter reading of the spectrum analyzer (which is set to read in units of dBuV/m)
To the antenna correction factor supplied by the antenna manufacturer. The antenna
Correction factors are stared in terms of dB.The gain of the pressletor was accounted
For in the spectrum analyser meter reading.

Example:

Freq(MHz) Meter Reading +ACF=FS

33 20dBuV+10.36dB=30.36dBuV/m @3m

7.7 Radiated Emission Data

Test Frequency: Below 30MHz

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

Test Frequency: 30MHz ~ 18GHz

Test mode: Transmitting mode

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.249/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
Low Channel 915.40MHz									
915.40	47.65	PK	115	1.3	H	30.98	78.63	114.00	-35.37
915.40	44.36	Ave	115	1.3	H	30.98	75.34	94.00	-18.66
915.40	50.50	PK	104	1.8	V	30.98	81.48	114.00	-32.52
915.40	46.88	Ave	104	1.8	V	30.98	77.86	94.00	-16.14
900.33	30.69	QP	153	1.6	V	11.98	42.67	46.00	-3.33
900.33	29.77	QP	70	1.5	V	11.98	41.75	46.00	-4.25
1830.80	67.32	PK	113	1.9	V	-14.34	52.98	74.00	-21.02
1830.80	59.46	Ave	113	1.9	V	-14.34	45.12	54.00	-8.88
2746.20	50.31	PK	302	1.4	H	-12.87	37.44	74.00	-36.56
2746.20	45.37	Ave	302	1.4	H	-12.87	32.50	54.00	-21.50
5198.30	45.22	PK	241	1.8	H	-11.77	33.45	74.00	-40.55
5198.30	42.33	Ave	241	1.8	H	-11.77	30.56	54.00	-23.44
6003.10	46.13	PK	141	1.8	V	-10.74	35.39	74.00	-38.61
6003.10	39.87	Ave	141	1.8	V	-10.74	29.13	54.00	-24.87

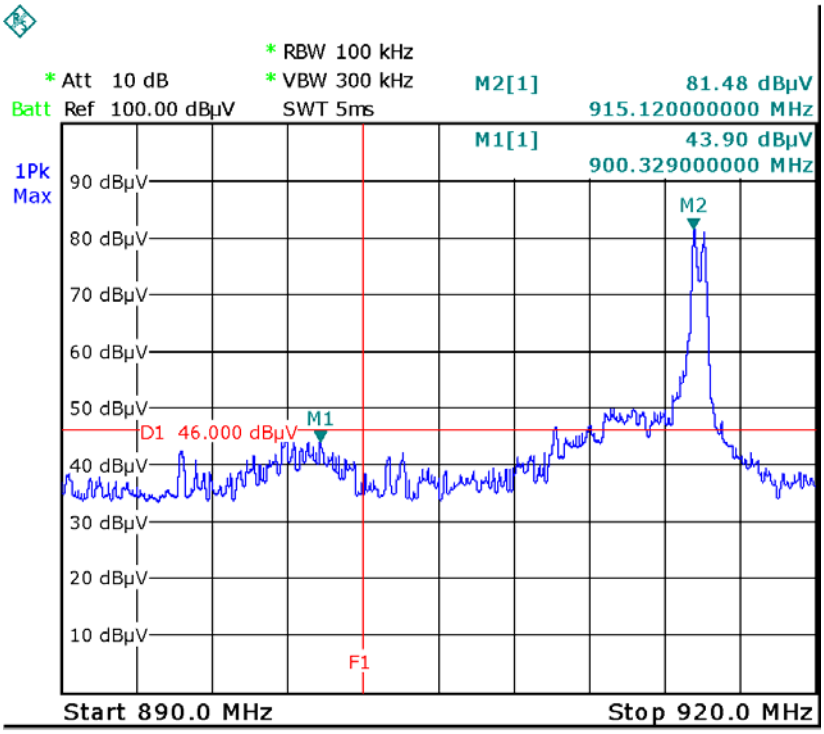
Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.249/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
High Channel 921.00MHz									
921.00	48.58	PK	65	1.6	H	30.98	79.56	114.00	-34.44
921.00	52.33	Ave	65	1.6	H	30.98	76.54	94.00	-17.46
921.00	62.39	PK	183	1.7	V	30.98	81.48	114.00	-32.52
921.00	51.24	Ave	183	1.7	V	30.98	77.64	94.00	-16.36
928.12	29.83	QP	306	1.8	V	12.03	41.86	46.00	-4.14
928.12	28.53	QP	230	1.4	V	12.03	40.56	46.00	-5.44
1842.00	68.47	PK	273	1.1	V	-14.34	54.13	74.00	-19.87
1842.00	60.43	Ave	273	1.1	V	-14.34	46.09	54.00	-7.91
2763.00	50.31	PK	49	1.4	H	-12.87	37.44	74.00	-36.56
2763.00	42.53	Ave	49	1.4	H	-12.87	29.66	54.00	-24.34
5204.70	46.21	PK	284	1.6	H	-11.77	34.44	74.00	-39.56
5204.70	40.57	Ave	284	1.6	H	-11.77	28.80	54.00	-25.20
5998.60	47.32	PK	21	1.1	V	-10.74	36.58	74.00	-37.42
5998.60	39.61	Ave	21	1.1	V	-10.74	28.87	54.00	-25.13

8 Outside of Band Emission

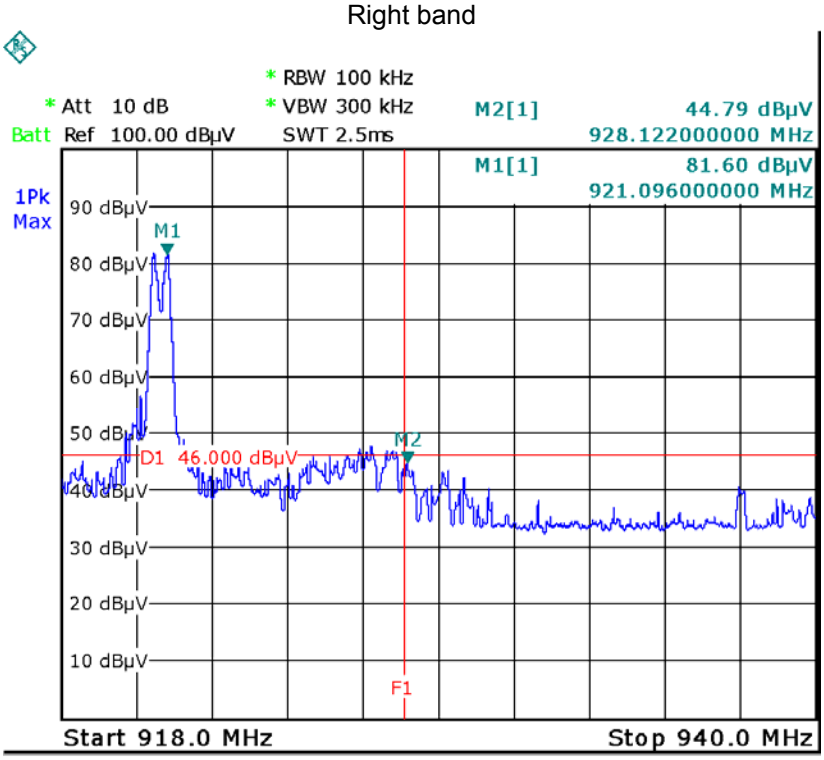
Test Requirement:	15.249(d):Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.
Test Method:	ANSI C63.4:2003
Test Result:	PASS

Test result plots shown as follows:

Left band



Right band


* RBW 100 kHz
* Att 10 dB
* VBW 300 kHz
M2[1] 44.79 dBµV
928.122000000 MHz
Batt Ref 100.00 dBµV
SWT 2.5ms
M1[1] 81.60 dBµV
921.096000000 MHz
1Pk
Max
90 dBµV
80 dBµV
70 dBµV
60 dBµV
50 dBµV
40 dBµV
30 dBµV
20 dBµV
10 dBµV
M1
M2
D1 46.000 dBµV
F1
Start 918.0 MHz
Stop 940.0 MHz

9 20 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.215(c)

Test Method: ANSI C63.4:2003

Test Mode: Transmitting

9.1 Test Procedure:

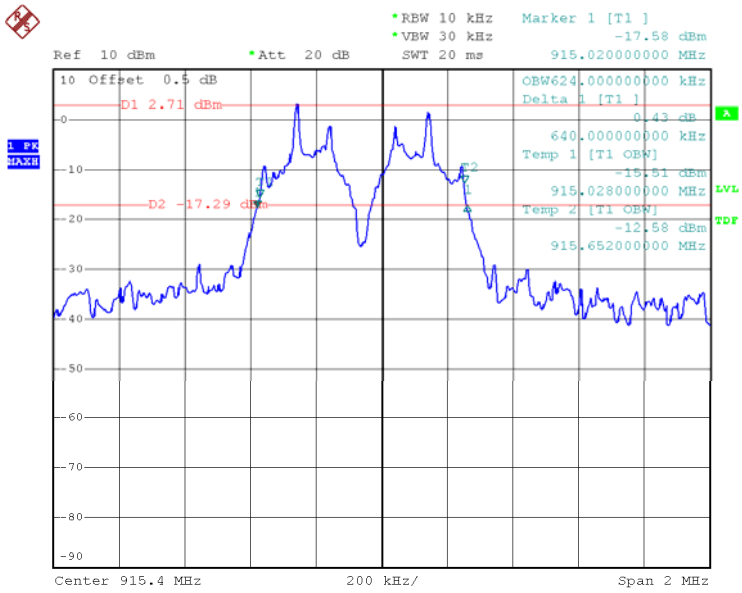
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 10kHz, VBW = 30kHz

9.2 Test Result:

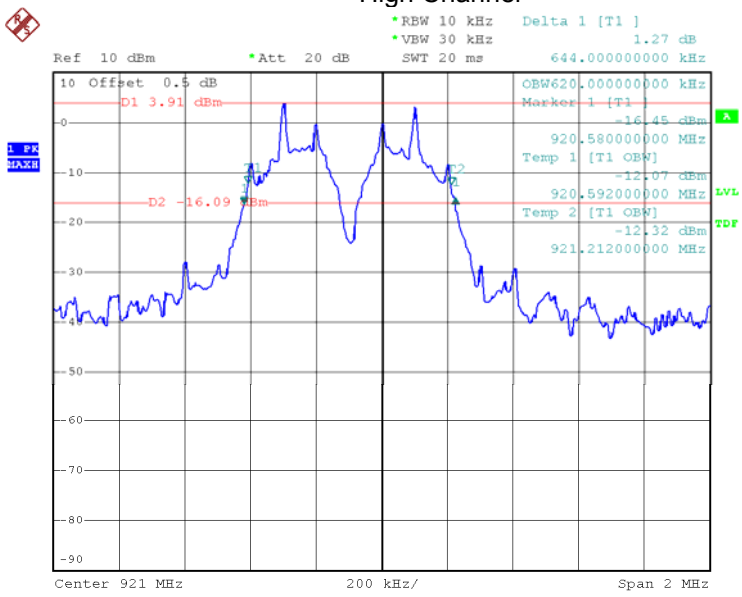
Test Channel	Bandwidth
Low	640kHz
High	644kHz

Test result plot as follows:

Low Channel



High Channel



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Date: 14.DEC.2013 09:15:00

10 Antenna Requirement

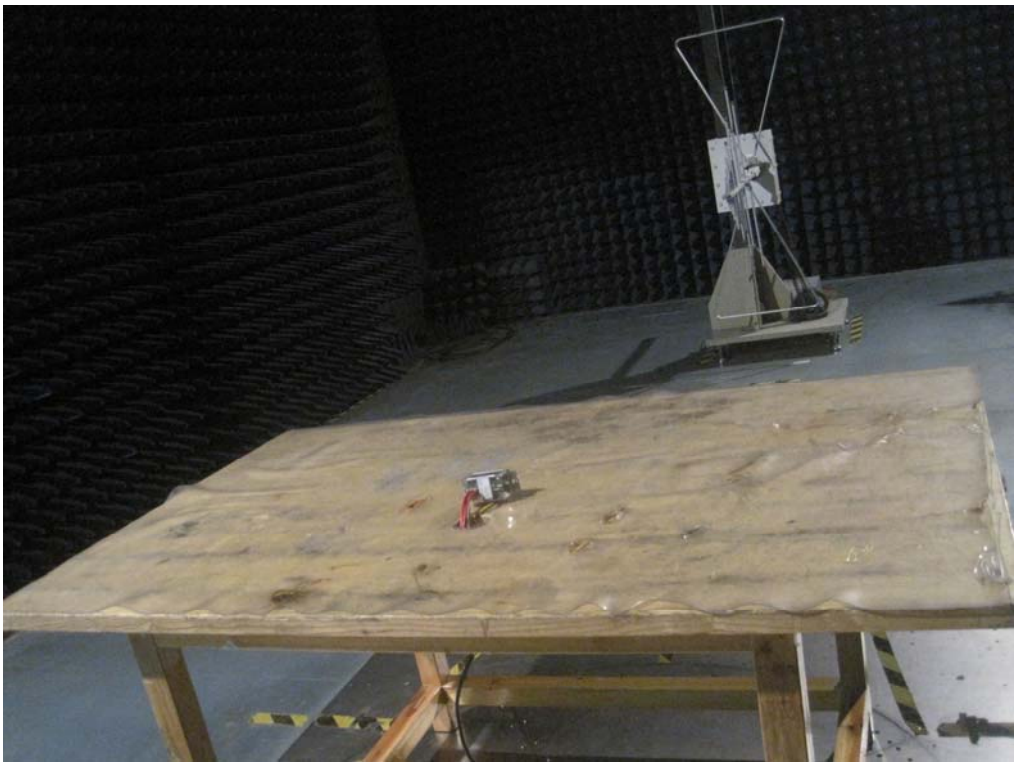
According to the FCC Part 15 Paragraph 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. This product has a Monopole Antenna antenna, fulfil the requirement of this section.

11 Photographs of Testing

11.1 Conducted Emissions Test View

11.2 Radiation Emission From 30MHz-1GHz

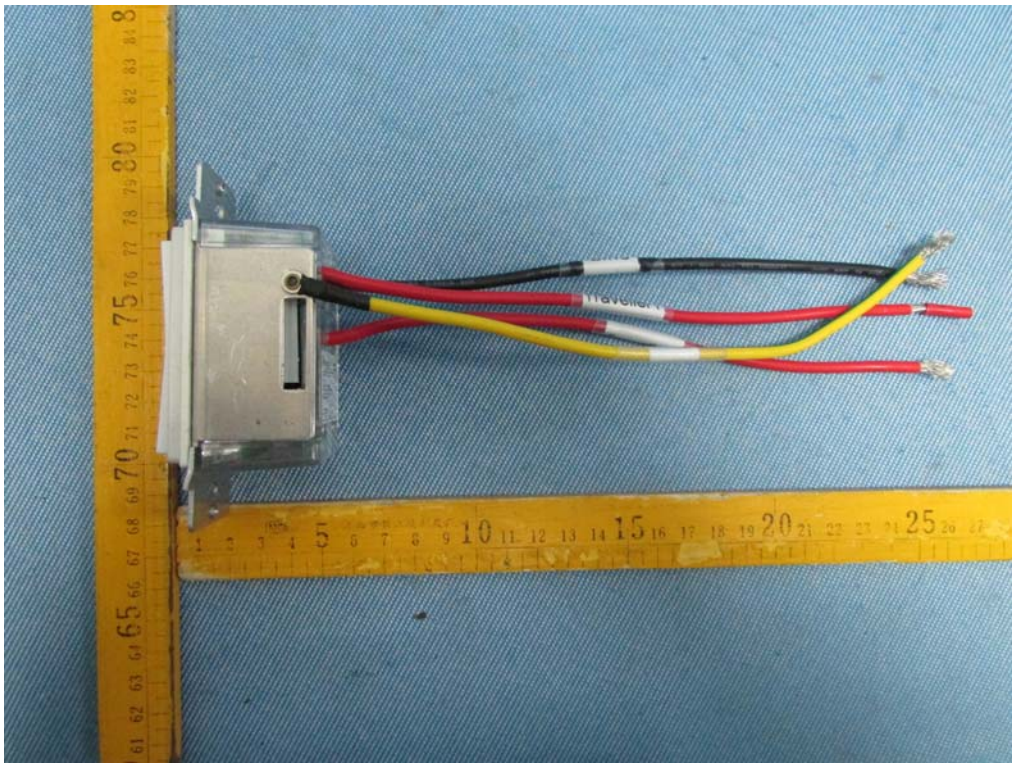
11.3 Radiation Emission From 30MHz-1GHz

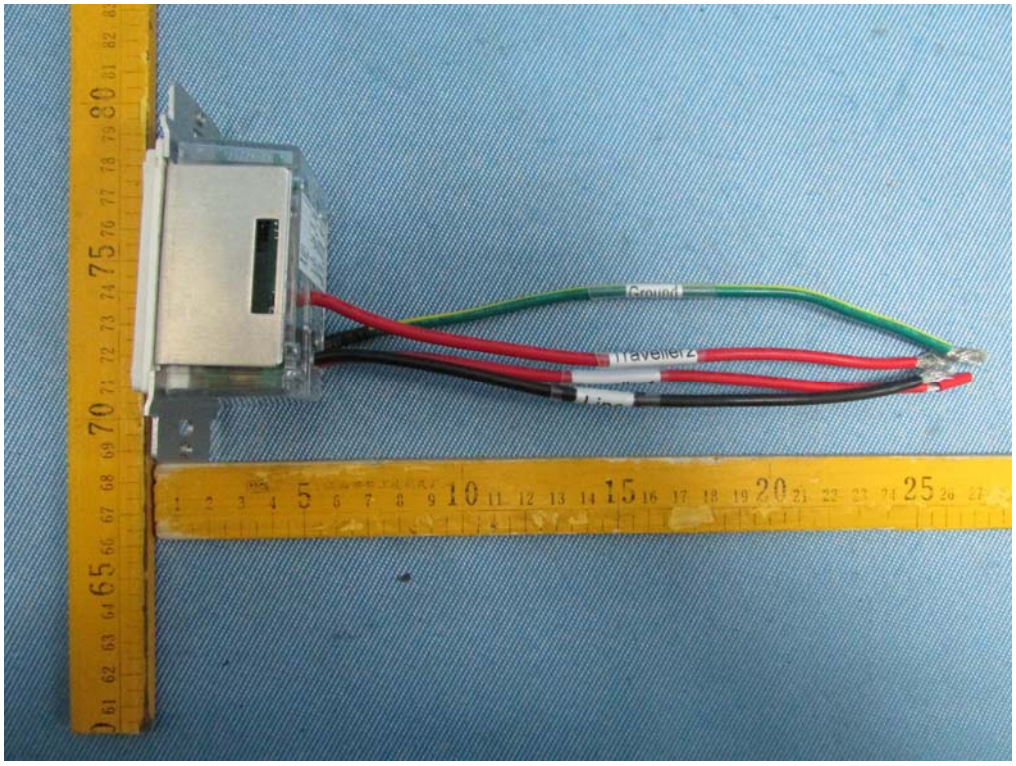


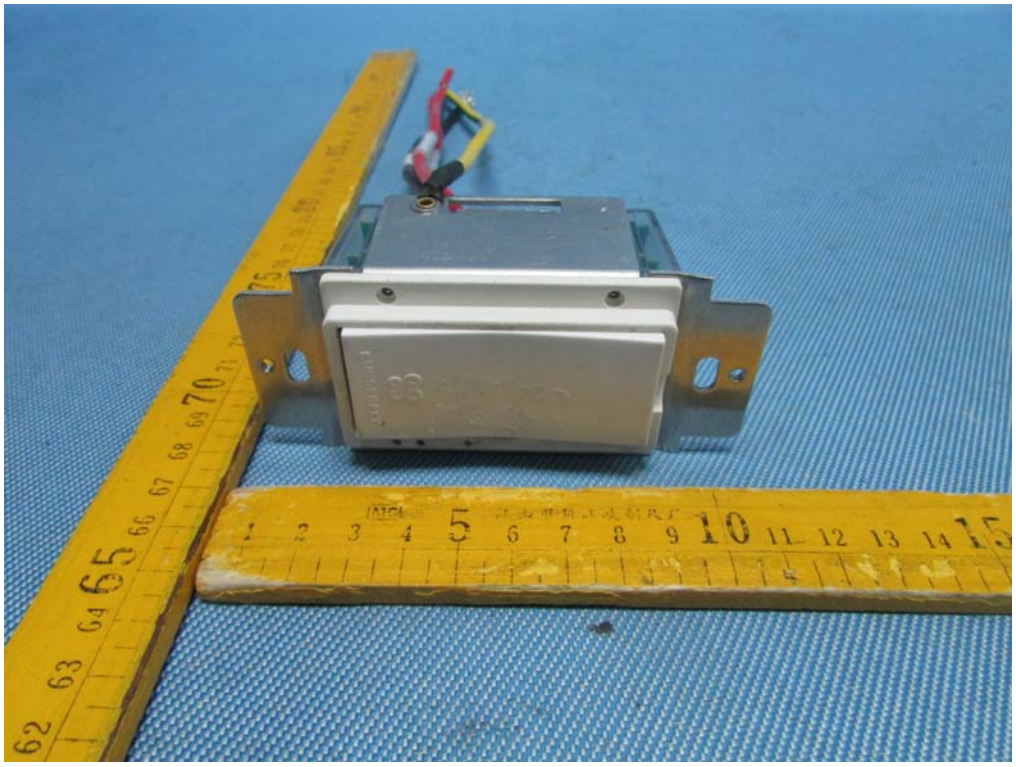
11.4 Radiation Emission Above 1GHz

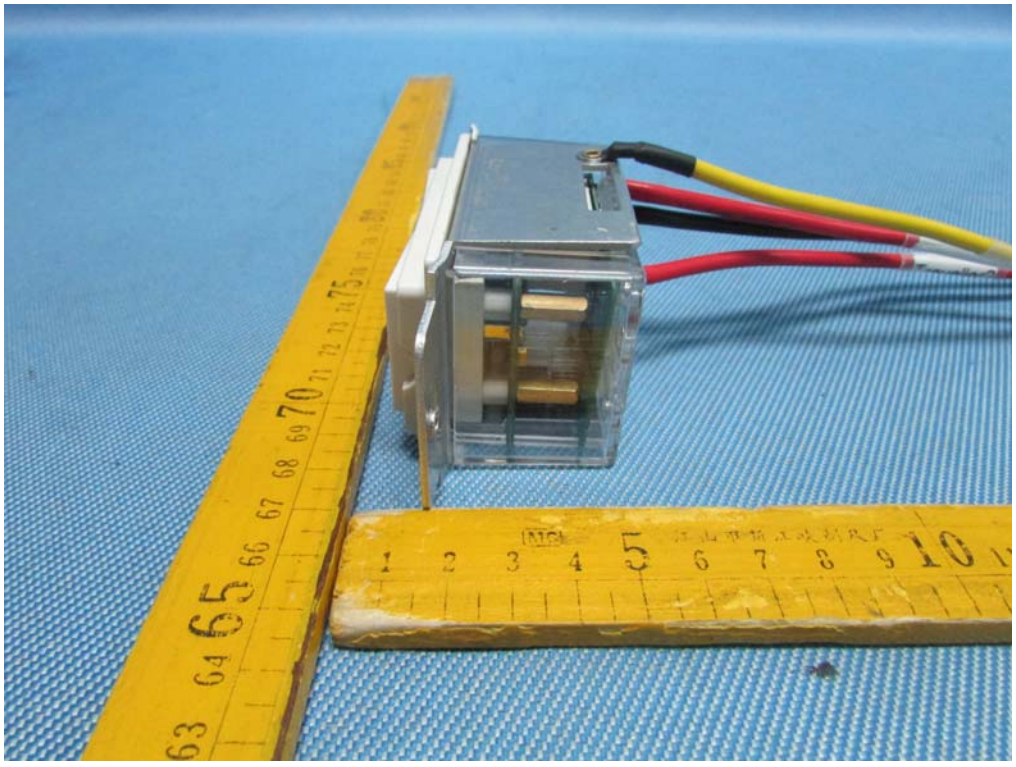
12 Photographs - Constructional Details

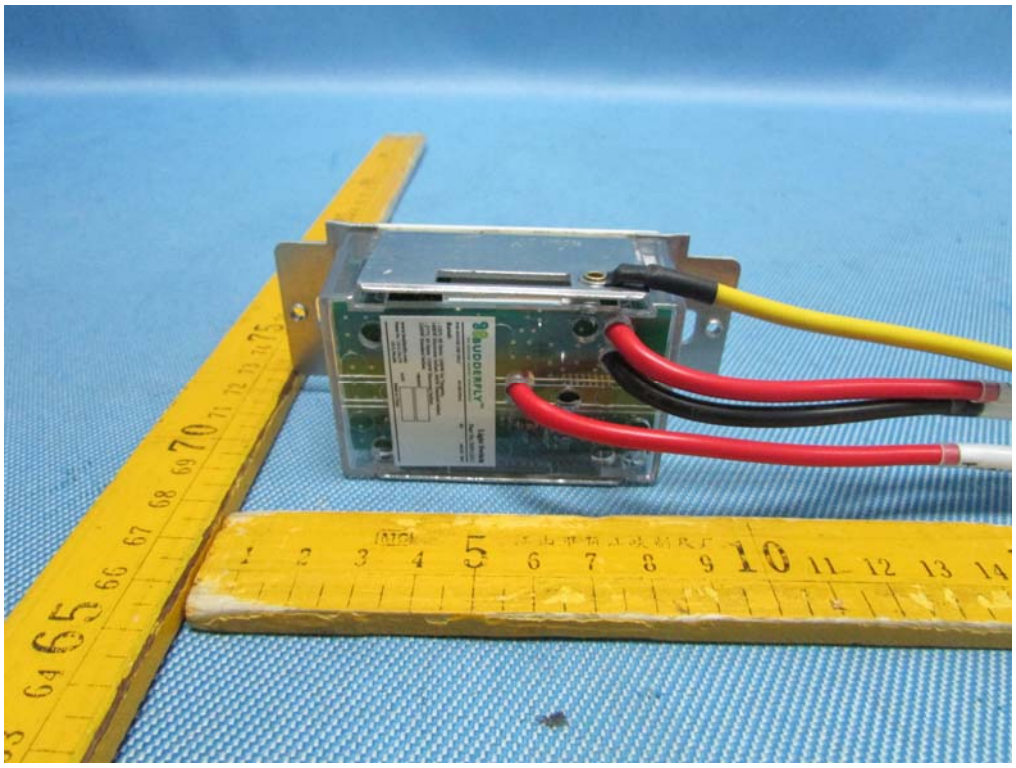
12.1 EUT - Appearance View

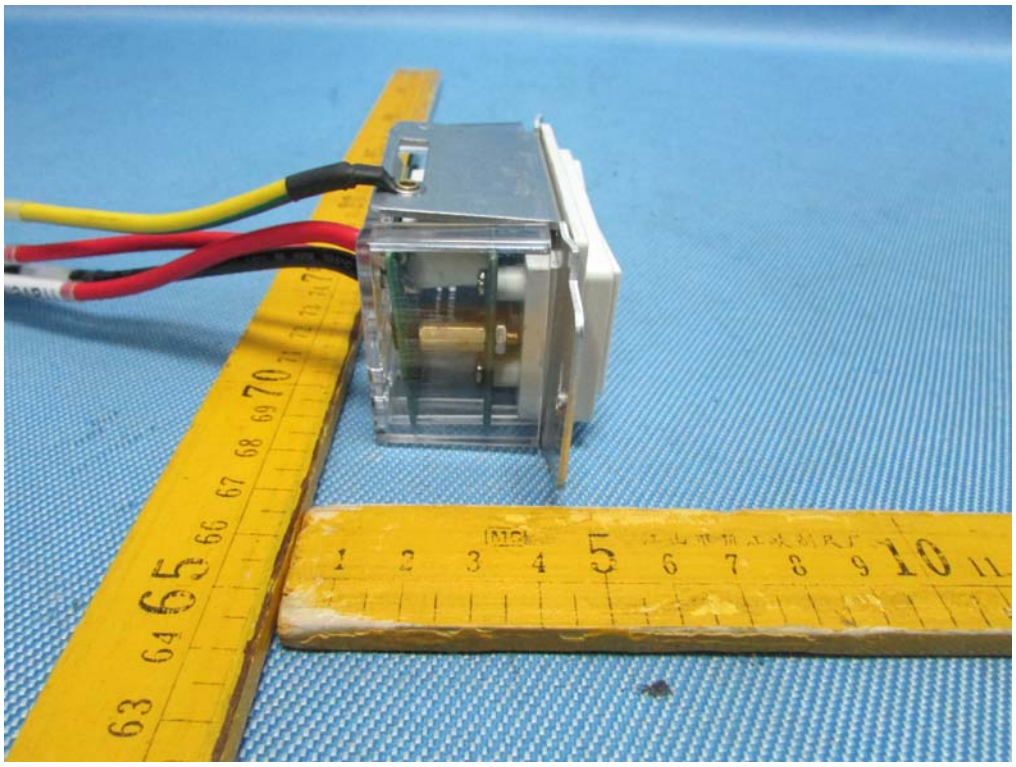




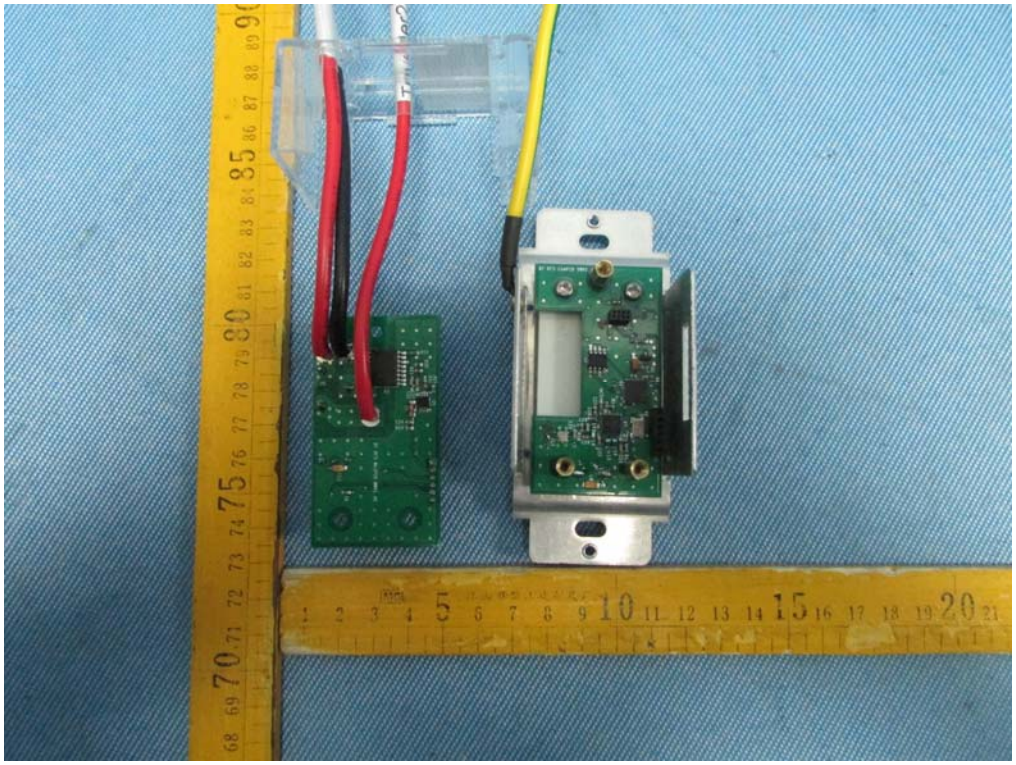


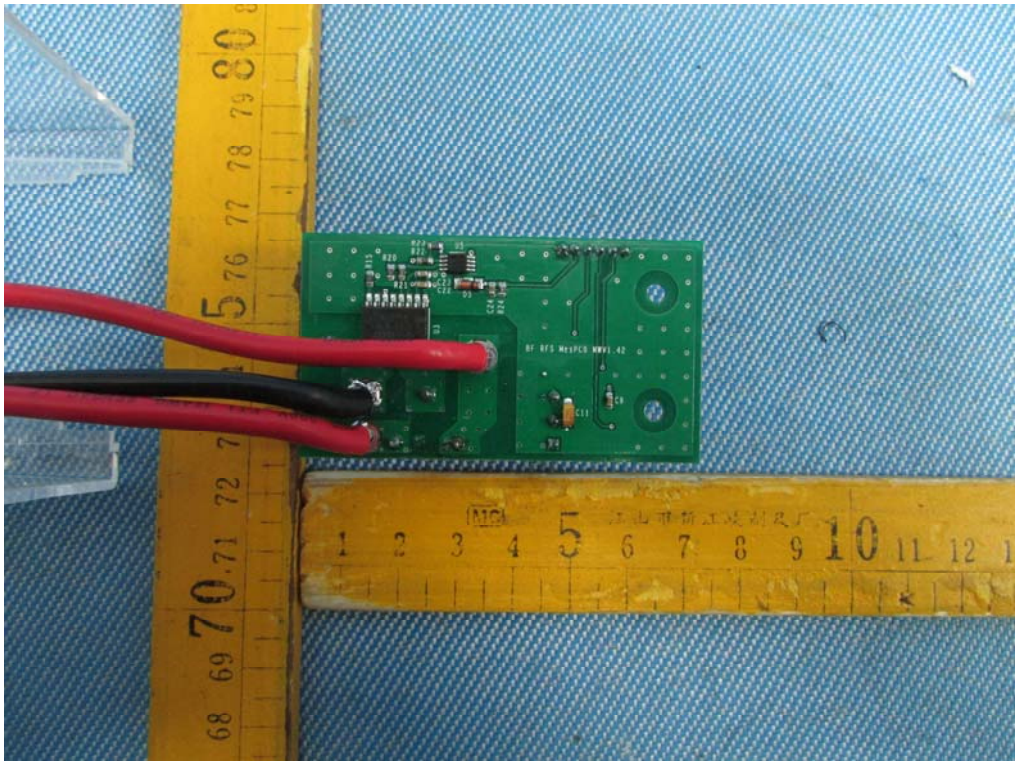


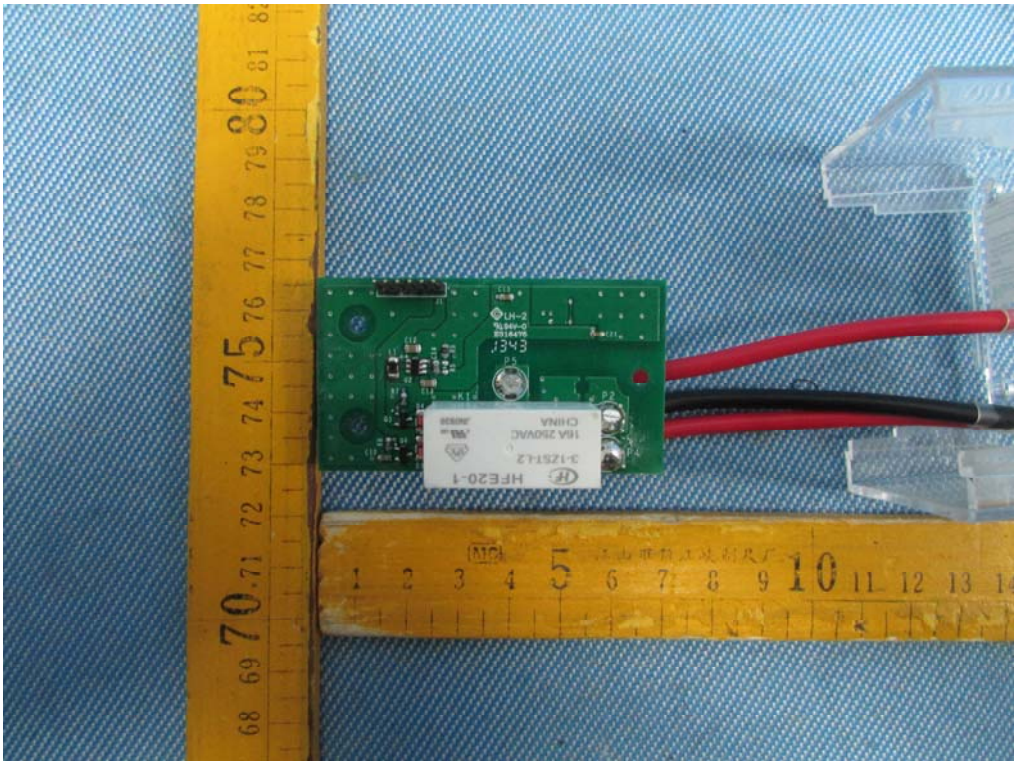


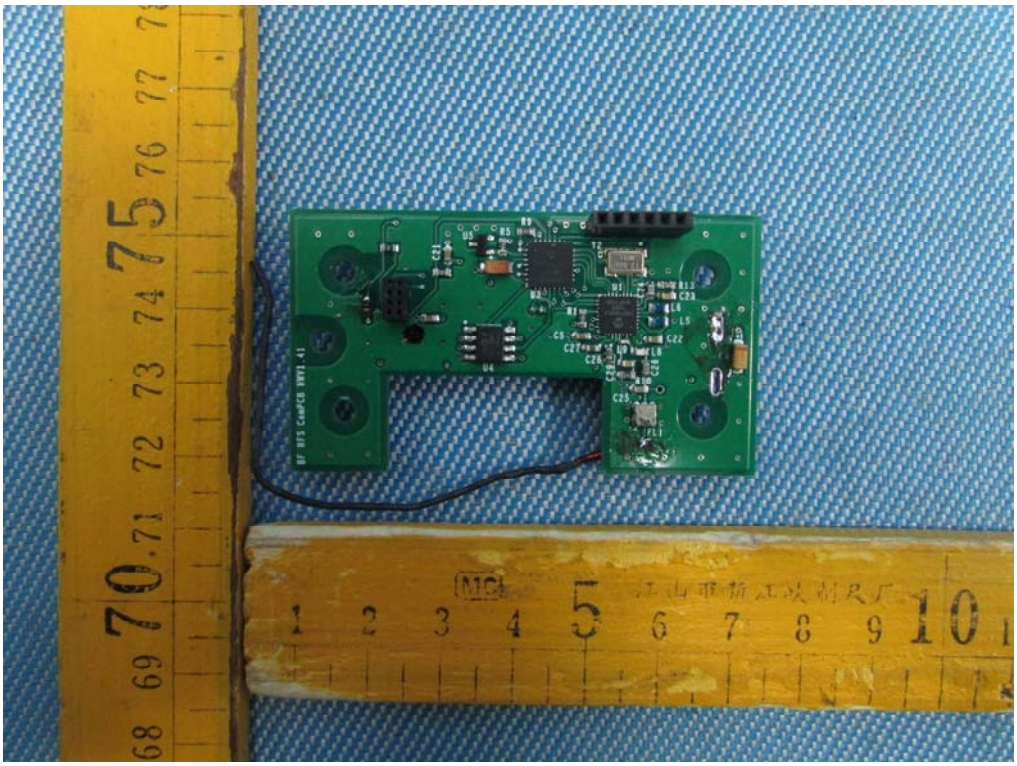


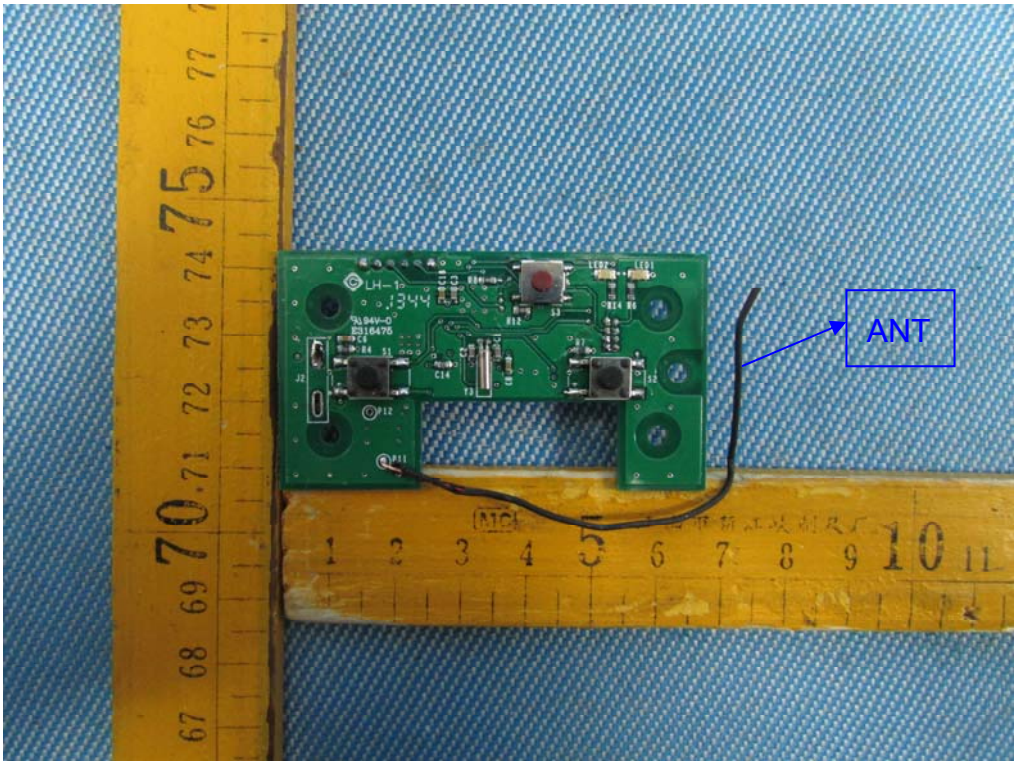
12.2 EUT - Open View











==End of Test Report==