

TEST REPORT

Reference No..... : WTS13S1210377E
FCC ID : QCVR1010021
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 DualBand Outlet
Model No. : R1010021
Standards..... : FCC CFR47 Part 15 Section 15.249: 2012
Date of Receipt sample : Dec.25,2013
Date of Test..... : Dec.26,2013~Jan.04, 2014
Date of Issue..... : Jan.13, 2014
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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Guangdong, China

Testing location: The same as above

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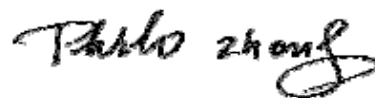
Fax:+86-755-83552400

Compiled by:

Approved by:



Zero Zhou / Project Engineer



Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Result
Outside of Band Emission	15.249	PASS
	15.205	
	15.209	
20dB Bandwidth	15.215(c)	PASS
Conducted Emissions	15.207	PASS
Radiated Emission	15.249(a)	PASS
	15.209	
	15.205(a)	
Antenna Requirement	15.203	PASS

3 Contents

	Page
1 COVER PAGE.....	1
2 TEST SUMMARY	2
3 CONTENTS	3
4 GENERAL INFORMATION	4
4.1 GENERAL DESCRIPTION OF E.U.T.	4
4.2 DETAILS OF E.U.T.....	4
4.3 TEST FACILITY.....	4
4.4 TEST LOCATION.....	4
4.5 GENERAL CONDITION	4
4.5.1 <i>Test Mode</i>	4
5 EQUIPMENT USED DURING TEST	5
5.1 EQUIPMENTS LIST	5
5.2 MEASUREMENT UNCERTAINTY	5
5.3 TEST EQUIPMENT CALIBRATION	5
6 CONDUCTED EMISSION TEST.....	6
6.1 E.U.T. TEST CONDITION.....	6
6.2 EUT SETUP	6
6.3 CONDUCTED EMISSION TEST RESULT.....	7
7 RADIATION EMISSION TEST	9
7.1 EUT OPERATION:	9
7.2 TEST SETUP	10
7.3 SPECTRUM ANALYZER SETUP	11
7.4 TEST PROCEDURE	12
7.5 CORRECTED AMPLITUDE & MARGIN CALCULATION	12
7.6 RADIATED EMISSIONS TEST RESULT.....	12
7.7 RADIATED EMISSION DATA	13
8 OUTSIDE OF BAND EMISSION.....	16
9 20 DB BANDWIDTH MEASUREMENT.....	19
9.1 TEST PROCEDURE:	19
9.2 TEST RESULT:	19
10 ANTENNA REQUIREMENT	21
11 PHOTOGRAPHS OF TESTING.....	22
11.1 CONDUCTED EMISSIONS TEST VIEW.....	22
11.2 RADIATION EMISSION FROM 32.768kHz-30MHz	22
11.3 RADIATION EMISSION FROM 30MHz-1GHz	23
11.4 RADIATION EMISSION ABOVE 1GHz.....	23
12 PHOTOGRAPHS - CONSTRUCTIONAL DETAILS.....	24
12.1 EUT - APPEARANCE VIEW.....	24
12.2 EUT - OPEN VIEW.....	28

4 General Information

4.1 General Description of E.U.T.

Product Name	: Budderfly RF DualBand Outlet
Model No.	: R1010021
Type of Modulation	: 2FSK
Frequency Range	: 915.00~921.00MHz
Oscillator	: 32.768kHz
Antenna installation	: Monopole Antenna*2

4.2 Details of E.U.T.

Technical Data	: 120V, 60Hz, 2400W
Adapter	: N/A

4.3 Test Facility

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

- **IC – Registration No.:7760A-1**

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

4.5 General condition

Ambient Condition: 22 53 %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.

Transmitter	Test mode	Lower channel	Middle channel	Upper channel
1	Transmitting	915.00MHz	/	921.00MHz
2	Transmitting	915.00MHz	/	/

5 Equipment Used during Test

5.1 Equipments List

Conducted Emissions at Mains Terminals Disturbance Voltage						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	100947	Sep.18,2013	Sep.17,2014
2.	LISN	R&S	ENV216	101215	Nov. 29,2013	Nov. 28,2014
3.	Cable	Top	TYPE16(3.5M)	-	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	MY4511494 3	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	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Apr.20,2013	Apr.19,2014
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Apr.07,2013	Apr.06,2014
8	Coaxial Cable (above 1GHz)	Top	25MHz-18GHz	EW02014-7	Apr.20,2013	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 (Bilog antenna 30M~1000MHz)
	± 5.47 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:	22.5 °C
Humidity:	51 % RH
Atmospheric Pressure:	101.1 kPa

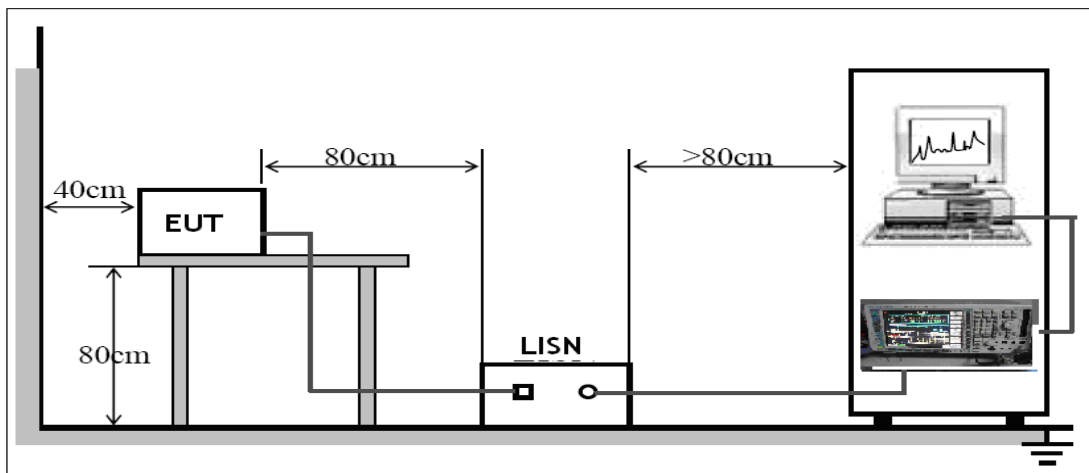
EUT Operation :

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.



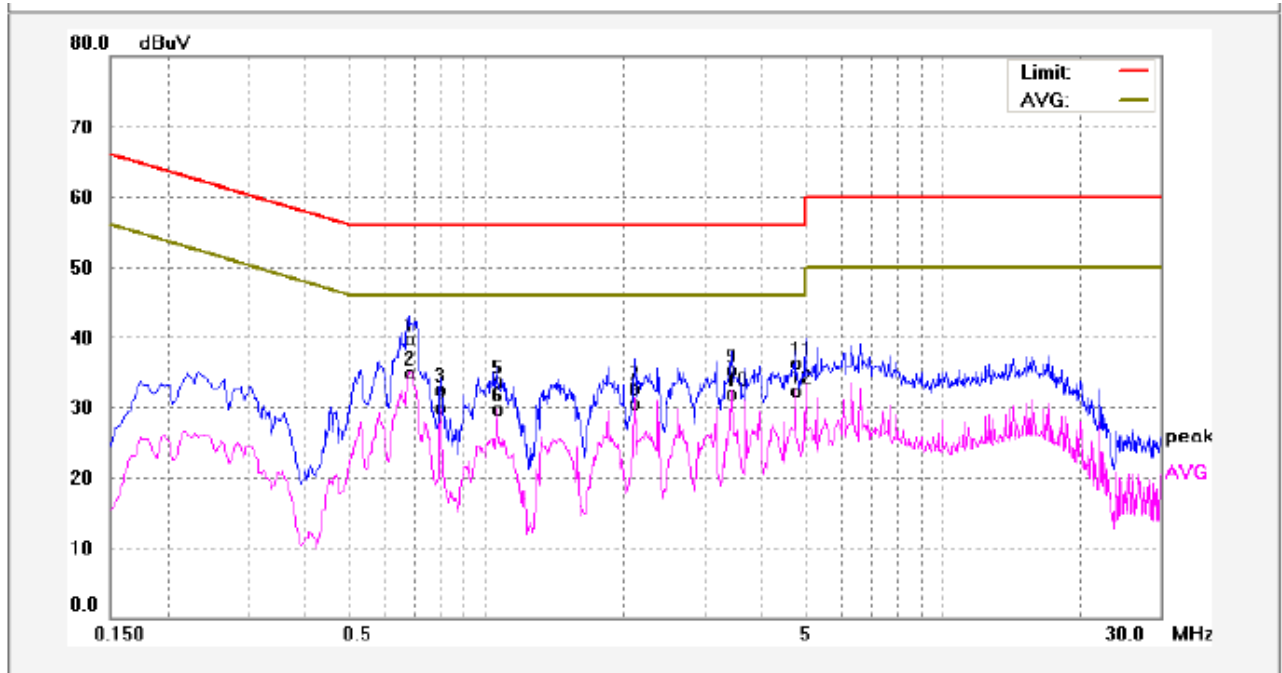
The EUT was placed on the test table in shielding room

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.

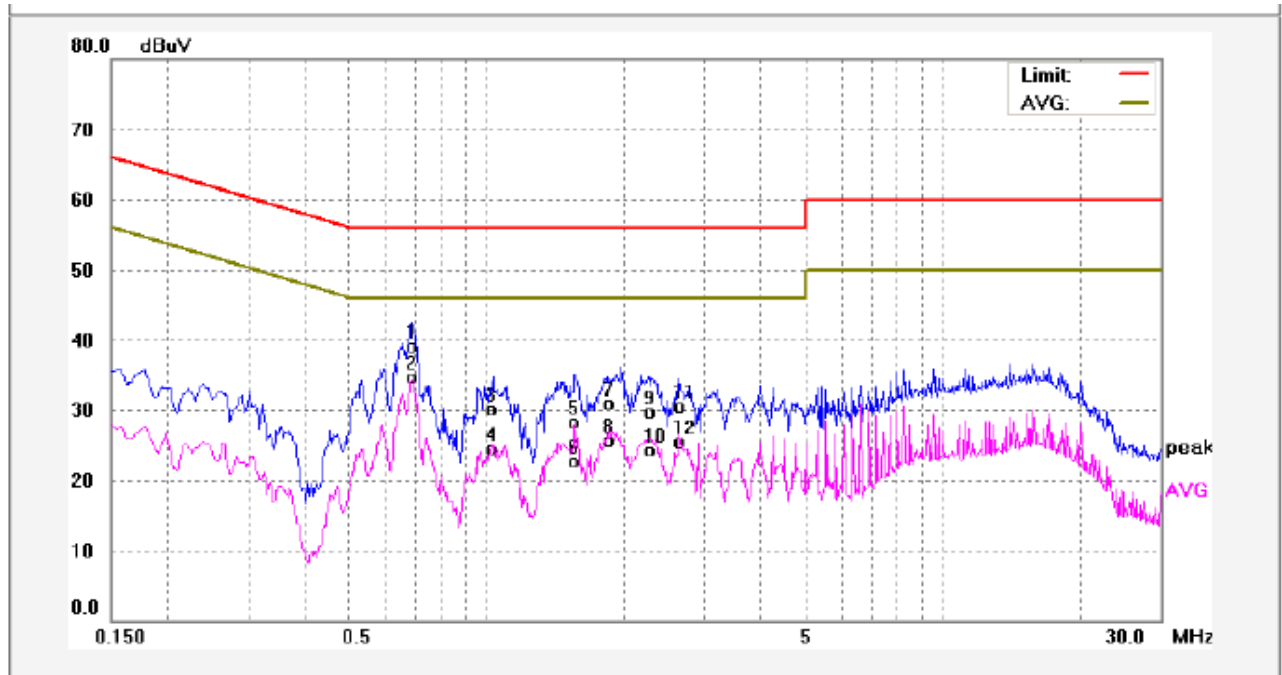
Test Mode: Normal working mode

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.6780	29.77	9.95	39.72	56.00	-16.28	QP	
2	0.6780	25.02	9.95	34.97	46.00	-11.03	AVG	
3	0.7940	22.56	9.97	32.53	56.00	-23.47	QP	
4	0.7940	20.03	9.97	30.00	46.00	-16.00	AVG	
5	1.0580	23.66	10.00	33.66	56.00	-22.34	QP	
6	1.0580	19.66	10.00	29.66	46.00	-16.34	AVG	
7	2.1180	22.72	10.00	32.72	56.00	-23.28	QP	
8	2.1180	20.49	10.00	30.49	46.00	-15.51	AVG	
9	3.4380	25.23	10.05	35.28	56.00	-20.72	QP	
10	3.4380	21.88	10.05	31.93	46.00	-14.07	AVG	
11	4.7619	26.23	10.09	36.32	56.00	-19.68	QP	
12	4.7619	22.31	10.09	32.40	46.00	-13.60	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector	Remark
1	0.6860	29.08	9.95	39.03	56.00	-16.97	QP	
2	0.6860	24.77	9.95	34.72	46.00	-11.28	AVG	
3	1.0260	20.03	10.00	30.03	56.00	-25.97	QP	
4	1.0260	14.41	10.00	24.41	46.00	-21.59	AVG	
5	1.5580	18.38	10.00	28.38	56.00	-27.62	QP	
6	1.5580	12.76	10.00	22.76	46.00	-23.24	AVG	
7	1.8540	21.00	10.00	31.00	56.00	-25.00	QP	
8	1.8540	15.71	10.00	25.71	46.00	-20.29	AVG	
9	2.2659	19.61	10.01	29.62	56.00	-26.38	QP	
10	2.2659	14.23	10.01	24.24	46.00	-21.76	AVG	
11	2.6460	20.51	10.02	30.53	56.00	-25.47	QP	
12	2.6460	15.41	10.02	25.43	46.00	-20.57	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	$2400/F(\text{kHz})$	300	$10000 * 2400/F(\text{kHz})$	$20\log^{(2400/F(\text{kHz}))} + 80$
0.490 ~ 1.705	$24000/F(\text{kHz})$	30	$100 * 24000/F(\text{kHz})$	$20\log^{(24000/F(\text{kHz}))} + 40$
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: 23 °C
 Humidity: 52% RH
 Atmospheric Pressure: 101.5 kPa

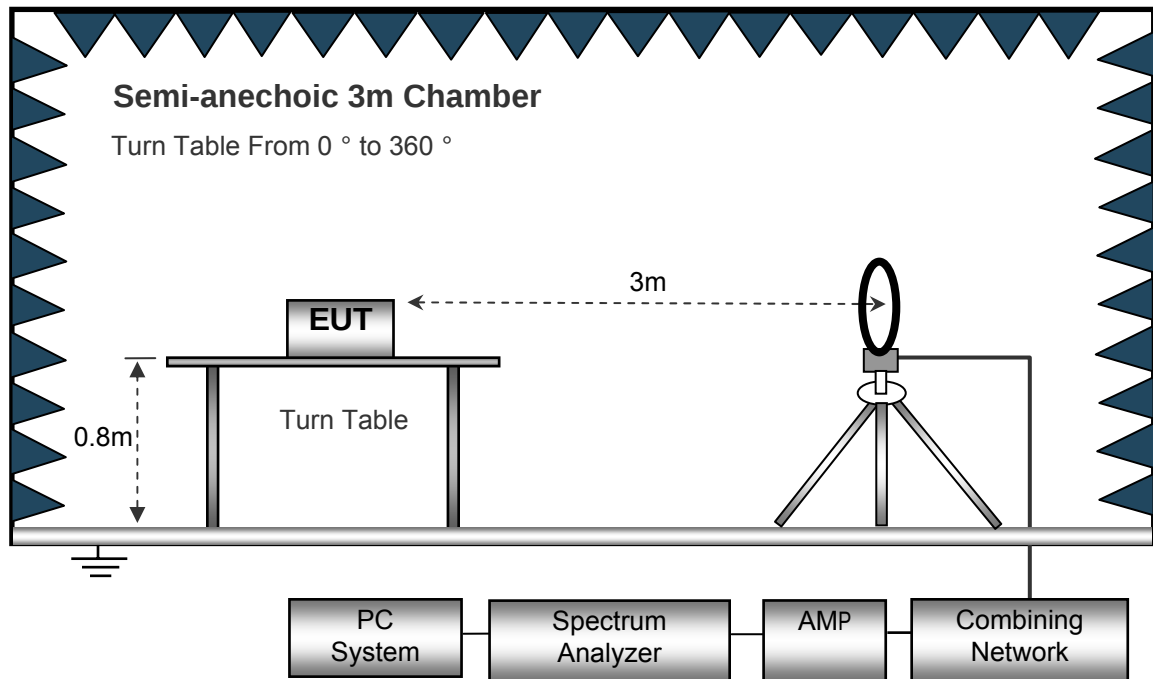
Operation Mode:

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

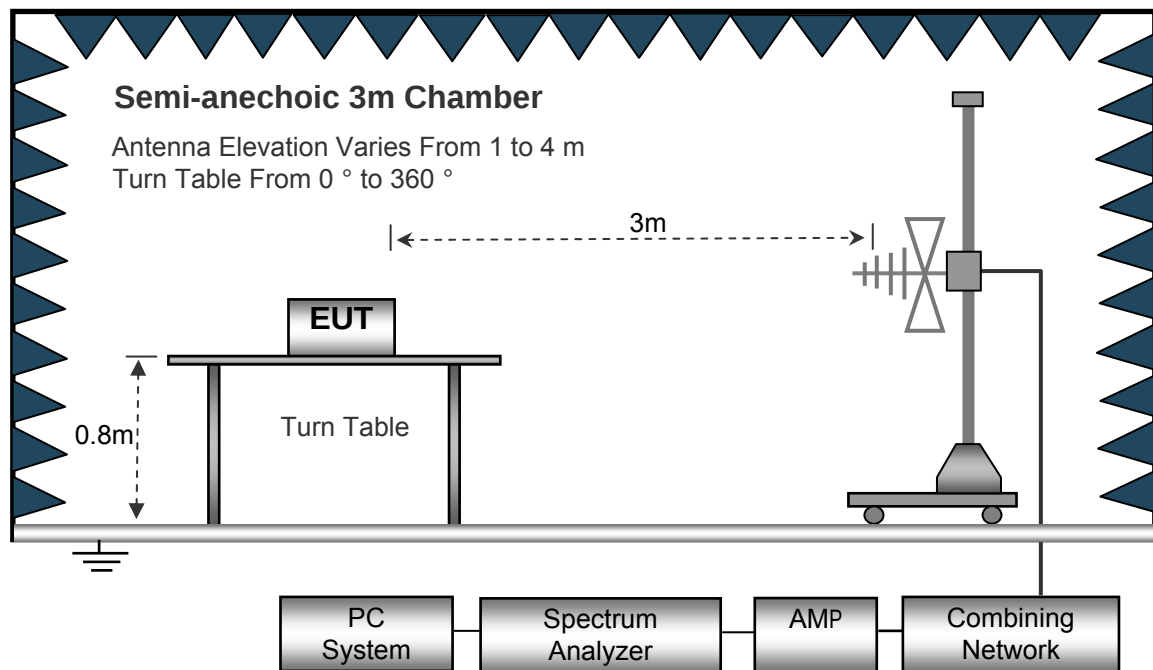
7.2 Test Setup

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

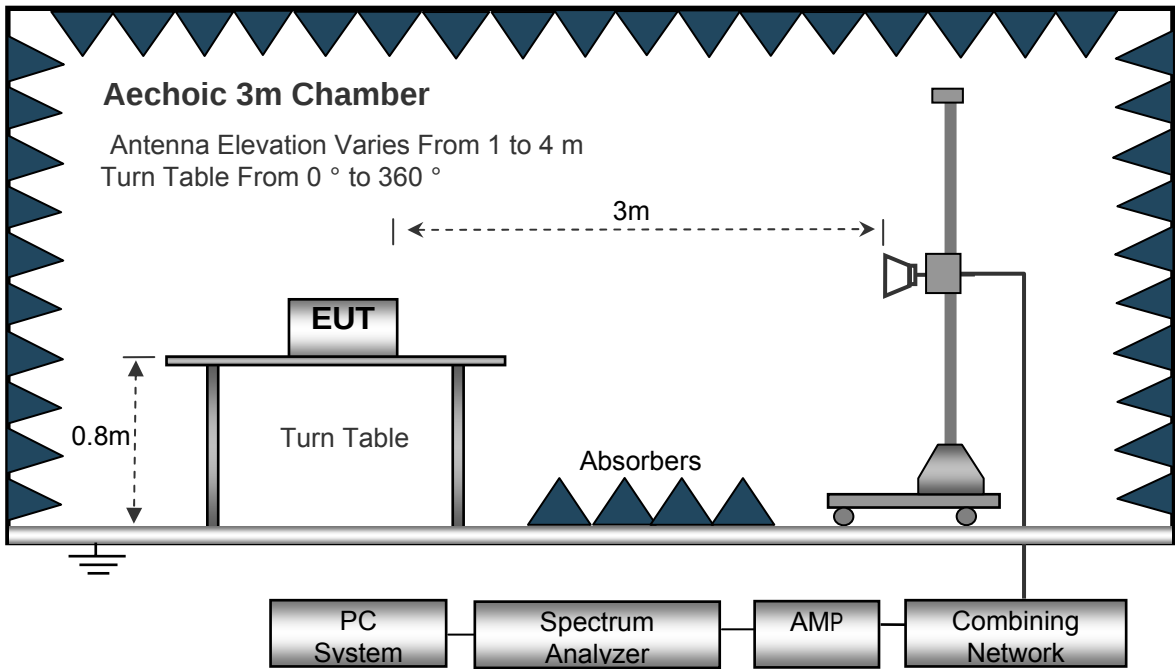
The test setup for emission measurement below 30MHz.



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



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 SpeedAuto
IF Bandwidth10kHz
Video Bandwidth10kHz
Resolution Bandwidth10kHz

30MHz ~ 1GHz

Sweep Speed Auto
IF Bandwidth120 KHz
Video Bandwidth100KHz
Quasi-Peak Adapter Bandwidth120 KHz
Quasi-Peak Adapter ModeNormal
Resolution Bandwidth100KHz

Above 1GHz

Sweep SpeedAuto
DetectorPK
Resolution Bandwidth1MHz
Video Bandwidth3MHz
DetectorAve.
Resolution Bandwidth1MHz
Video Bandwidth10Hz

7.4 Test Procedure

1. This is a handheld 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB μ V means the emission is 7dB μ V below the maximum limit for Class B. The equation for margin calculation is as follows:

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

7.6 Radiated Emissions Test Result

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 dB μ V/m)
To the antenna correction factor supplied by the antenna manufacturer. The antenna
Correction factors are stated 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 20dB μ V + 10.36dB = 30.36dB μ V/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 ~ 10GHz

Test Mode: Transmitting

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)
Transmitter 1									
Low Channel 915.00MHz									
915.00	51.33	PK	101	1.7	H	30.98	82.31	114.00	-31.69
915.00	47.71	Ave	101	1.7	H	30.98	78.69	94.00	-15.31
915.00	55.76	PK	248	1.8	V	30.98	86.74	114.00	-27.26
915.00	51.36	Ave	89	1.2	V	30.98	82.34	94.00	-11.66
900.76	24.96	QP	140	1.1	V	11.98	36.94	46.00	-9.06
900.76	25.39	QP	140	1.1	V	11.98	37.37	46.00	-8.63
1830.00	63.23	PK	178	1.5	V	-14.34	48.89	74.00	-25.11
1830.00	54.94	Ave	178	1.5	V	-14.34	40.60	54.00	-13.40
2745.00	46.42	PK	119	1.5	H	-12.87	33.55	74.00	-40.45
2745.00	43.22	Ave	119	1.5	H	-12.87	30.35	54.00	-23.65
5203.42	42.52	PK	82	1.6	H	-11.77	30.75	74.00	-43.25
5203.42	38.49	Ave	82	1.6	H	-11.77	26.72	54.00	-27.28
6087.53	44.12	PK	275	1.8	V	-10.74	33.38	74.00	-40.62
6087.53	36.11	Ave	275	1.8	V	-10.74	25.37	54.00	-28.63

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)
Transmitter 1									
High Channel 921.00MHz									
921.00	49.58	PK	35	1.5	H	30.98	80.56	114.00	-33.44
921.00	44.98	Ave	35	1.5	H	30.98	75.96	94.00	-18.04
921.00	51.61	PK	339	1.1	V	30.98	82.59	114.00	-31.41
921.00	46.86	Ave	339	1.1	V	30.98	77.84	94.00	-16.16
929.35	25.78	QP	17	1.7	V	12.03	37.81	46.00	-8.19
929.35	22.64	QP	17	1.7	V	12.03	34.67	46.00	-11.33
1842.00	63.45	PK	4	1.3	V	-14.34	49.11	74.00	-24.89
1842.00	54.76	Ave	4	1.3	V	-14.34	40.42	54.00	-13.58
2763.00	48.15	PK	223	1.9	H	-12.87	35.28	74.00	-38.72
2763.00	40.07	Ave	223	1.9	H	-12.87	27.20	54.00	-26.80
5188.30	44.00	PK	63	1.9	H	-11.77	32.23	74.00	-41.77
5188.30	37.92	Ave	63	1.9	H	-11.77	26.15	54.00	-27.85
5992.60	47.32	PK	21	1.1	V	-10.74	36.58	74.00	-37.42
5992.60	39.61	Ave	21	1.1	V	-10.74	28.87	54.00	-25.13

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)
Transmitter 2									
Channel 915.00MHz									
915.00	51.33	PK	352	1.9	H	30.98	82.31	114.00	-31.69
915.00	47.71	Ave	352	1.9	H	30.98	78.69	94.00	-15.31
915.00	55.67	PK	88	1.0	V	30.98	86.65	114.00	-27.35
915.00	51.36	Ave	88	1.0	V	30.98	82.34	94.00	-11.66
899.02	24.41	QP	182	1.1	V	11.98	36.39	46.00	-9.61
899.02	25.00	QP	182	1.1	V	11.98	36.98	46.00	-9.02
1830.00	63.14	PK	116	1.9	V	-14.34	48.80	74.00	-25.20
1830.00	54.84	Ave	116	1.9	V	-14.34	40.50	54.00	-13.50
2745.00	46.34	PK	16	1.4	H	-12.87	33.47	74.00	-40.53
2745.00	43.42	Ave	16	1.4	H	-12.87	30.55	54.00	-23.45
5173.09	42.12	PK	147	1.8	H	-11.77	30.35	74.00	-43.65
5173.09	38.25	Ave	147	1.8	H	-11.77	26.48	54.00	-27.52
6122.50	43.80	PK	357	1.4	V	-10.74	33.06	74.00	-40.94
6122.50	36.41	Ave	357	1.4	V	-10.74	25.67	54.00	-28.33

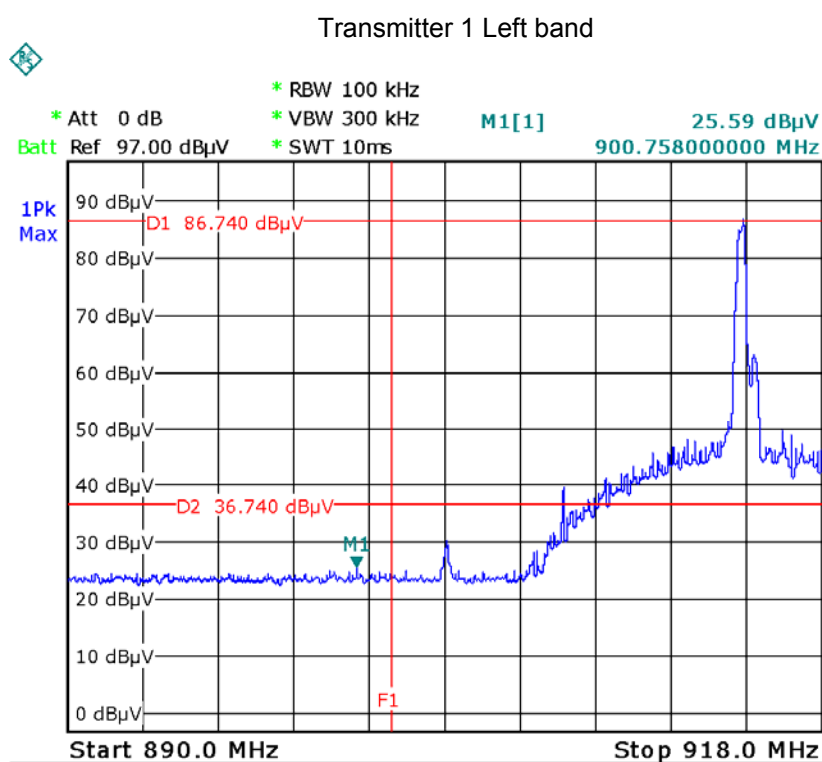
8 Outside of Band Emission

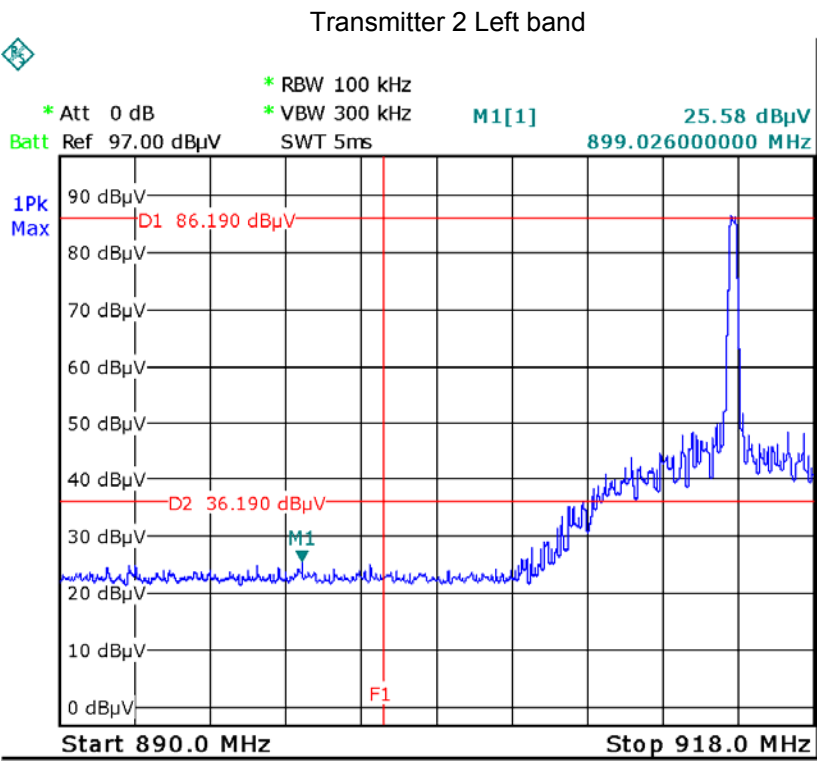
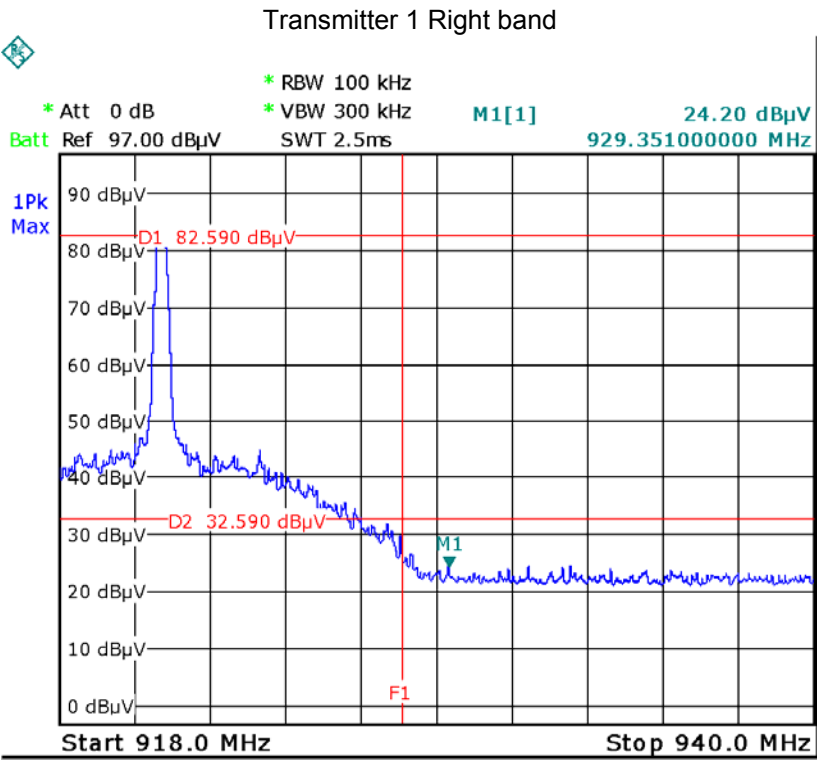
Test Requirement: 15.249(d):Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

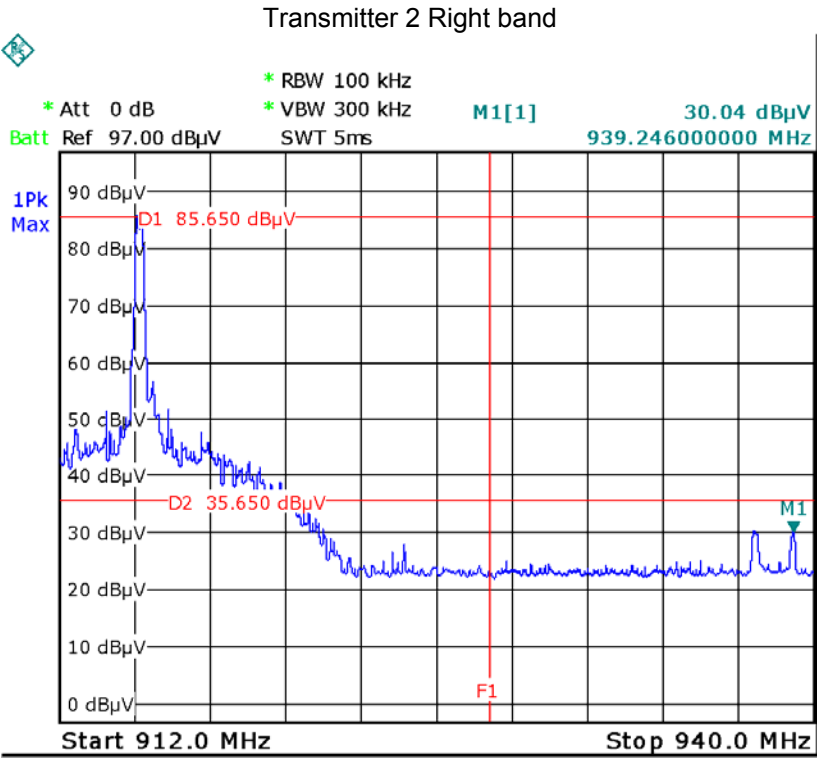
Test Method: ANSI C63.4:2003

Test Result: PASS

Test result plots shown as follows:







9 20 dB Bandwidth Measurement

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

Test Method: ANSI C63.4:2003

Test Mode: Transmitting

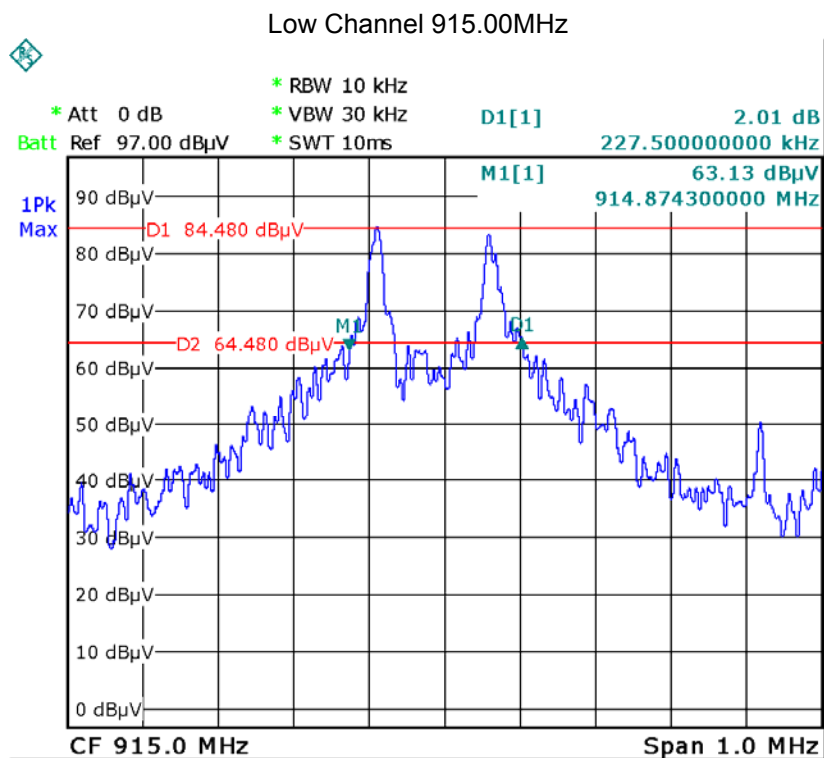
9.1 Test Procedure:

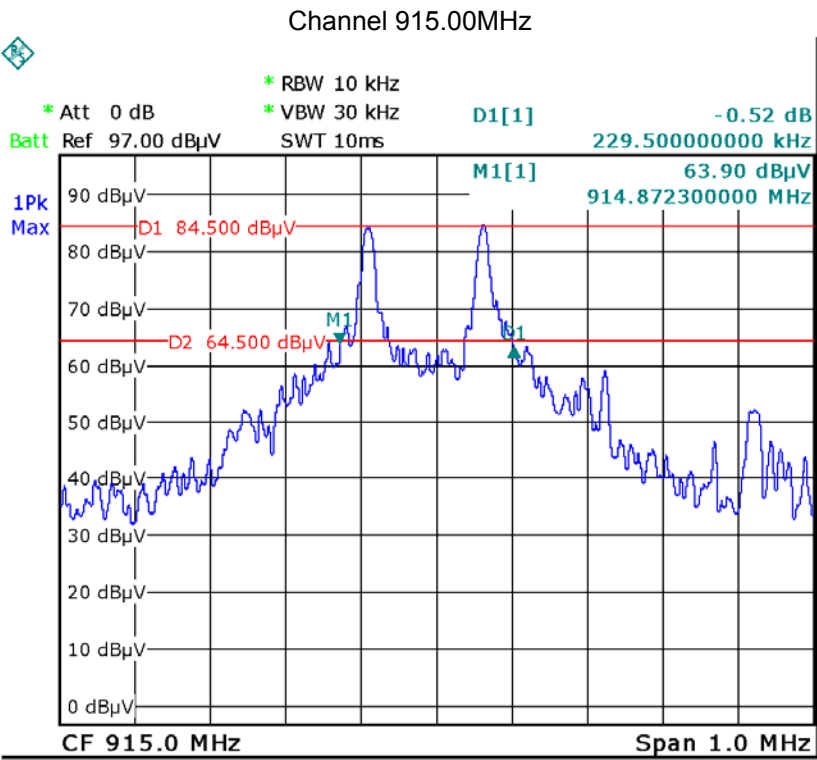
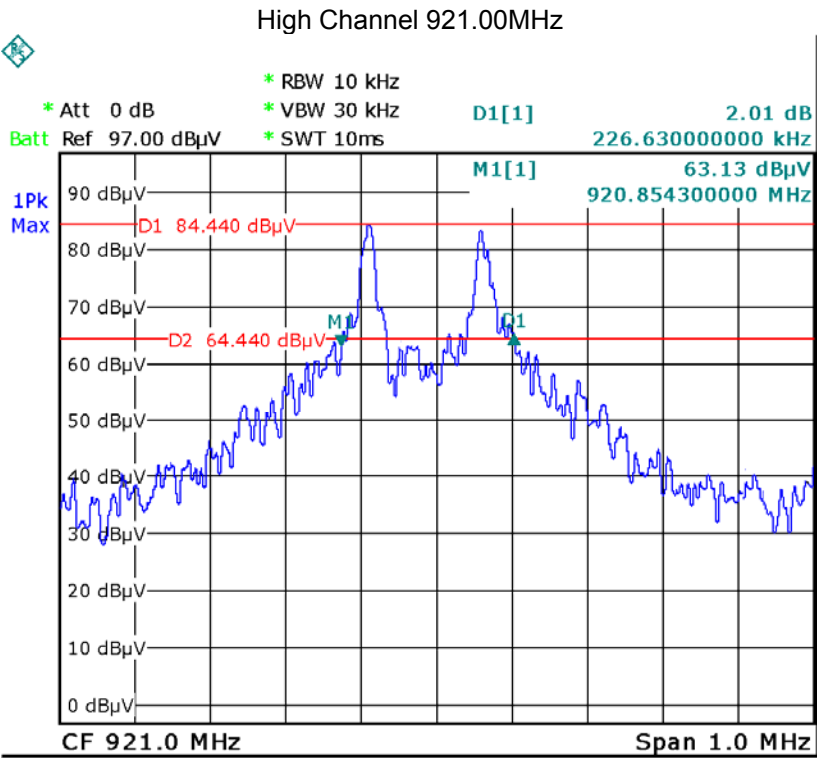
1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 10kHz, VBW = 30kHz

9.2 Test Result:

Transceiver	Test Channel	Bandwidth
Transmitter 1	915.00MHz	277.5kHz
Transmitter 1	921.00MHz	226.6kHz
Transmitter 2	915.00MHz	229.5 kHz

Test result plot as follows:





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 two Monopole Antenna, fulfil the requirement of this section.

11 Photographs of Testing

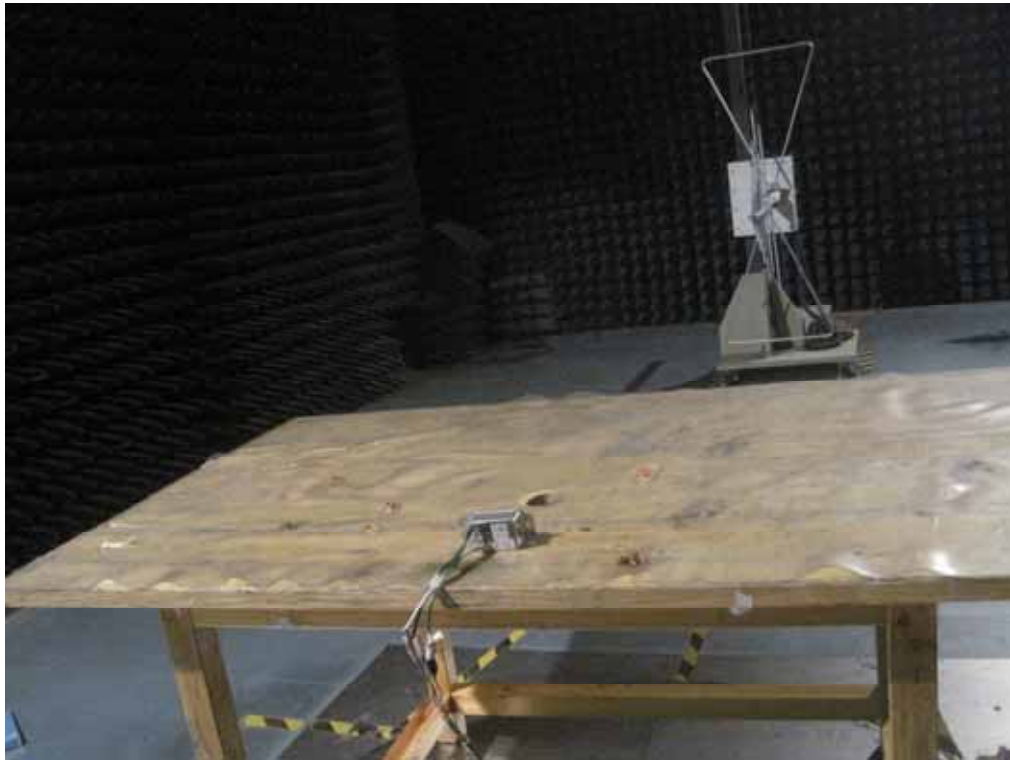
11.1 Conducted Emissions Test View



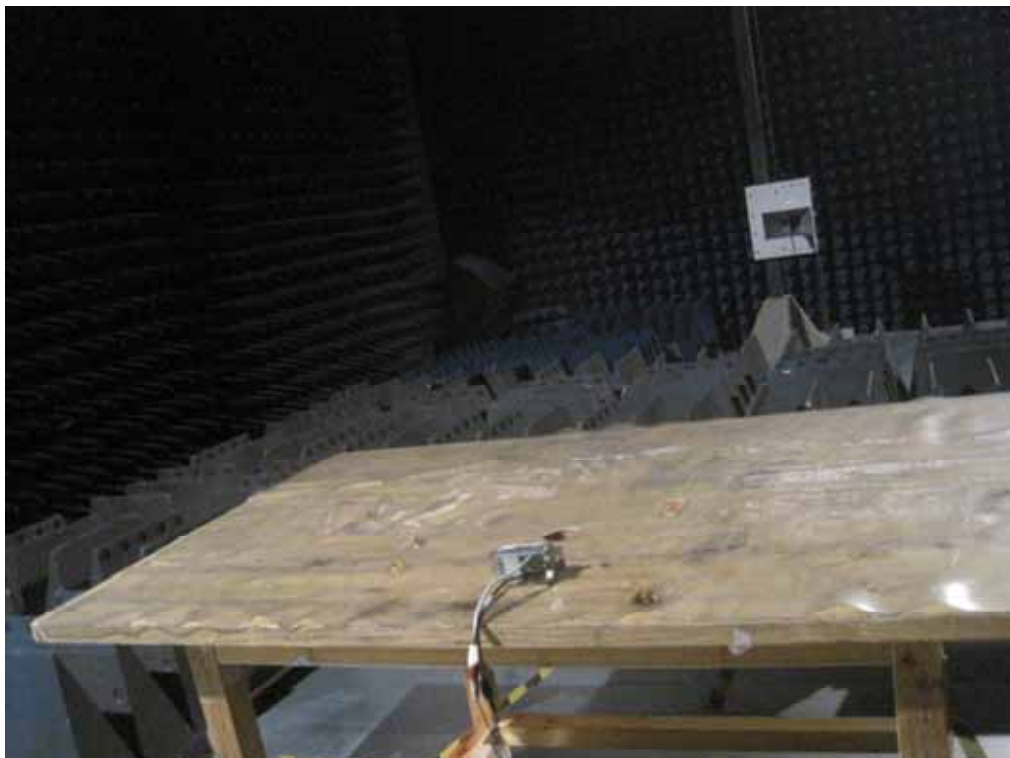
11.2 Radiation Emission From 32.768kHz-30MHz



11.3 Radiation Emission From 30MHz-1GHz



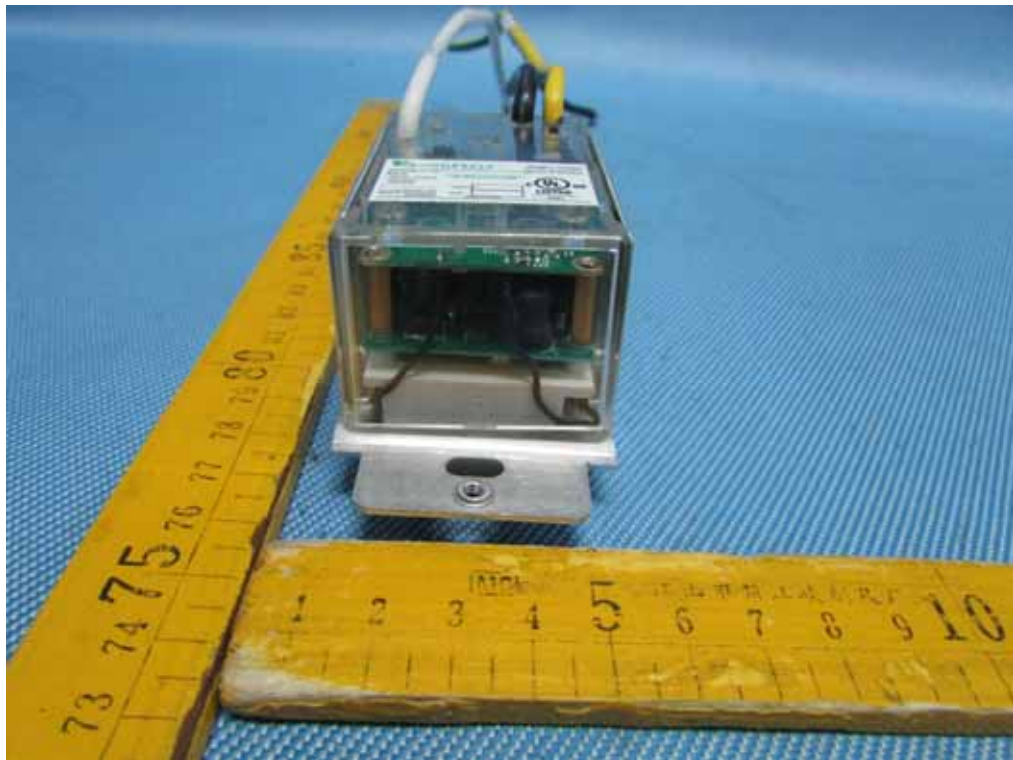
11.4 Radiation Emission Above 1GHz

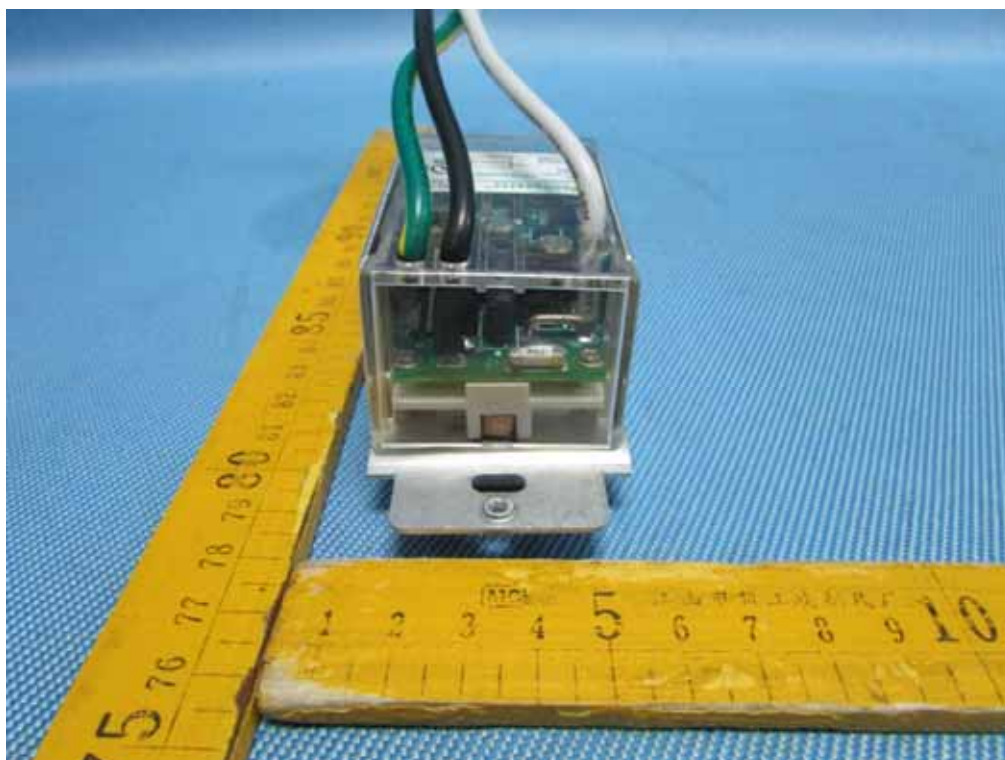


12 Photographs - Constructional Details

12.1 EUT - Appearance View

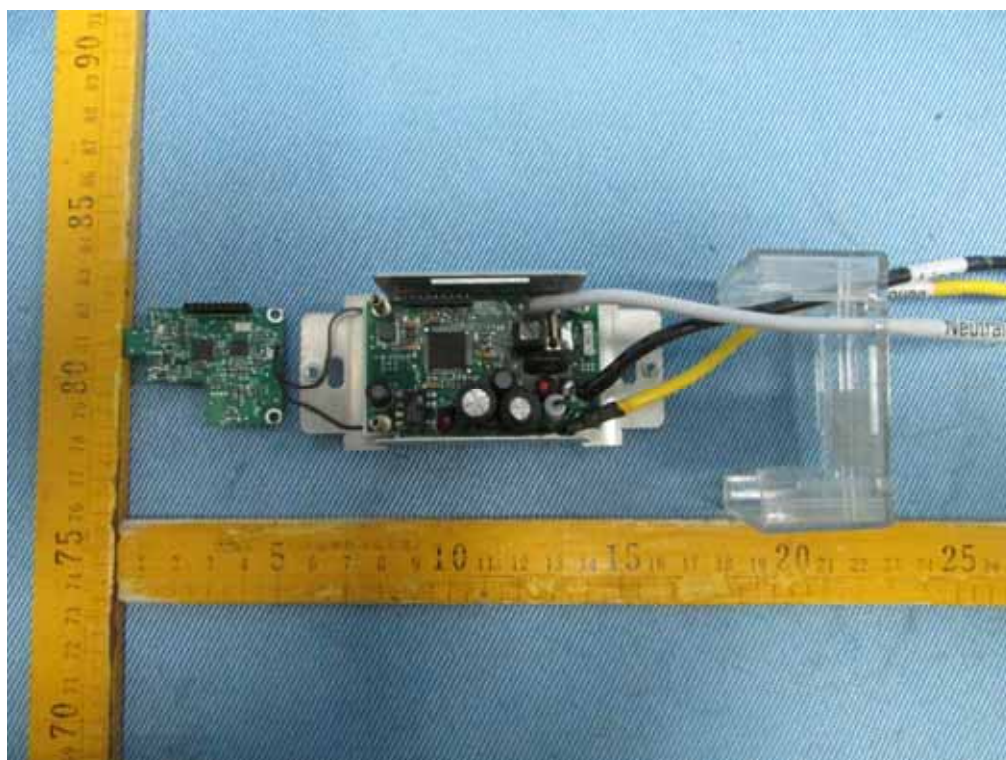
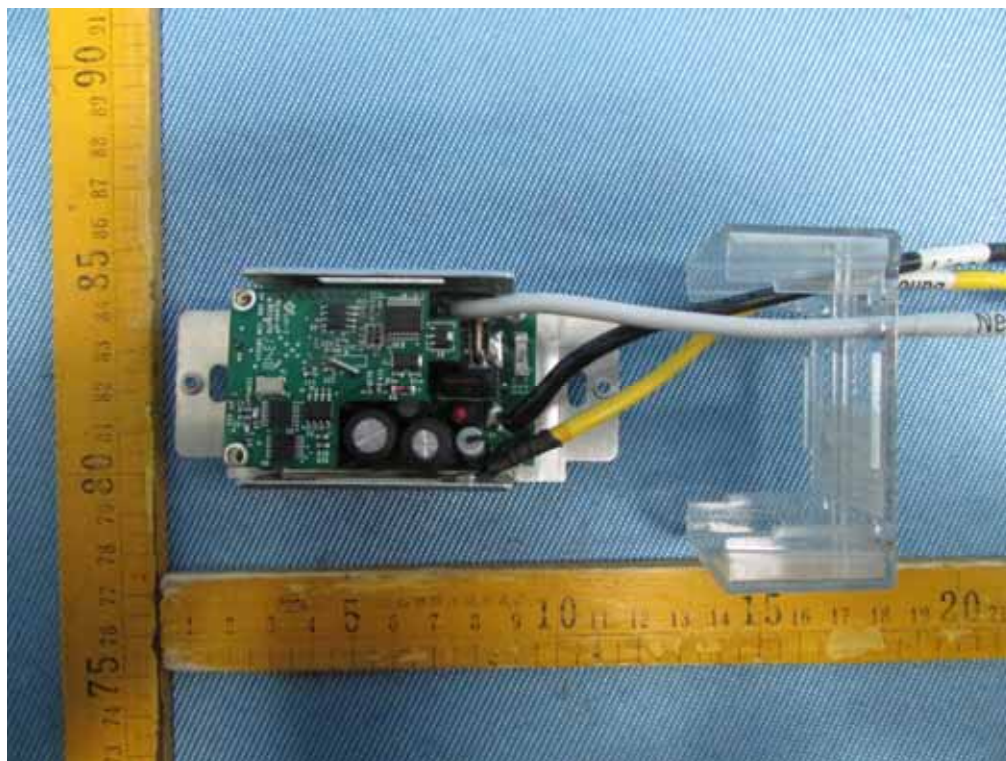


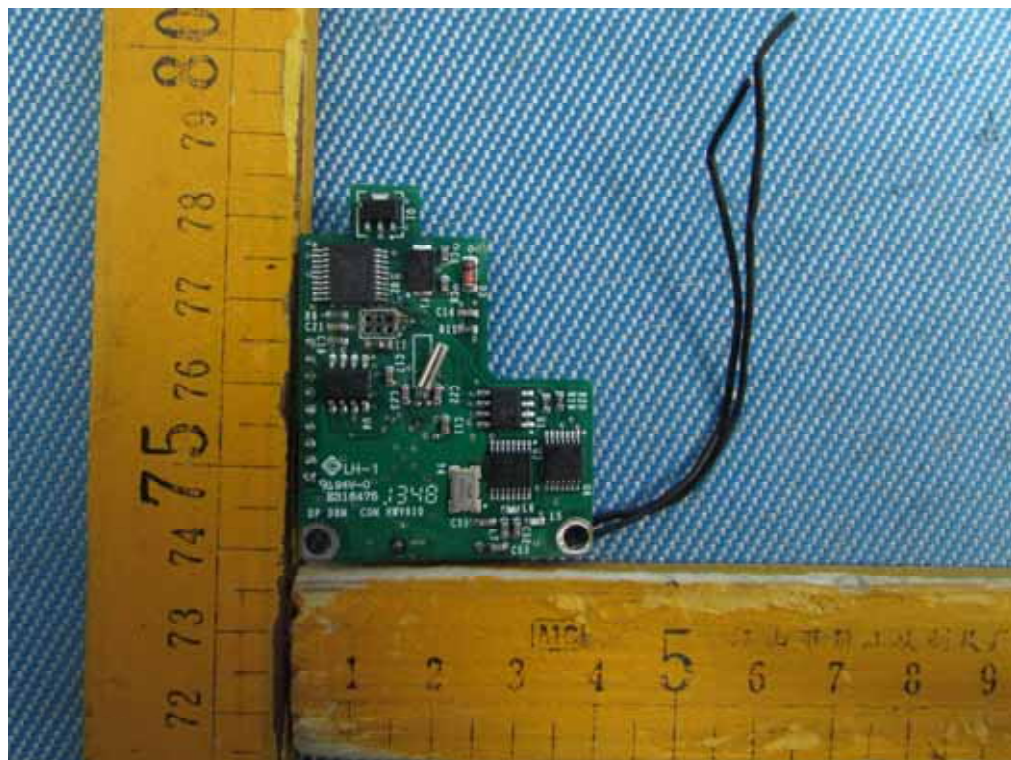
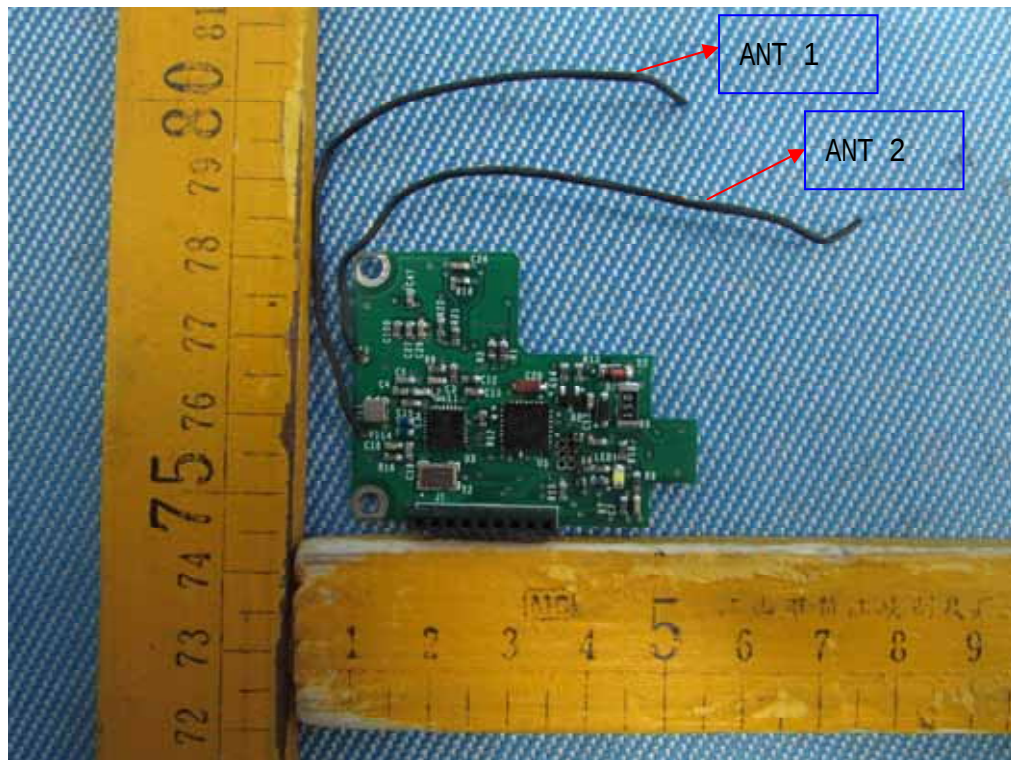


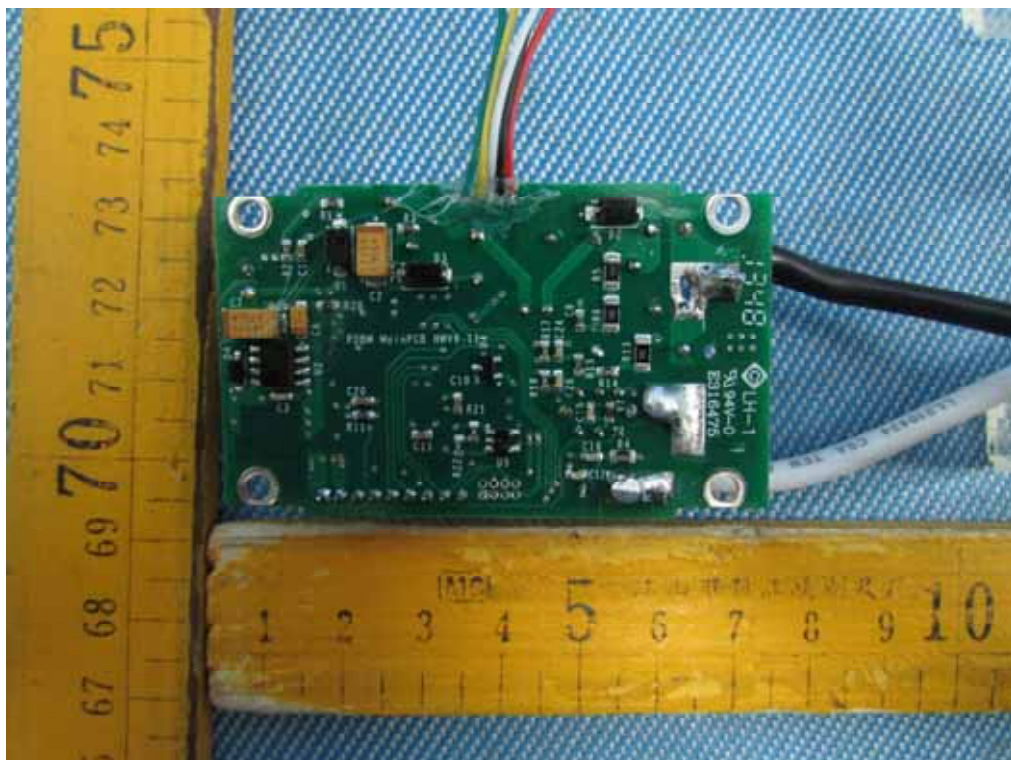
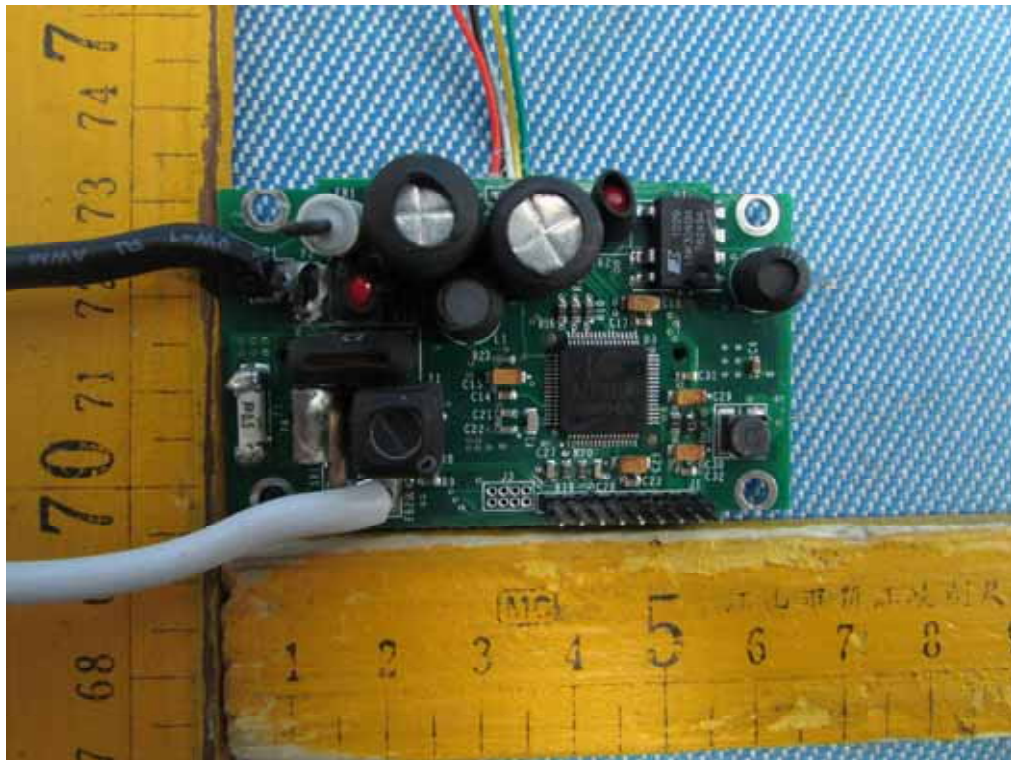


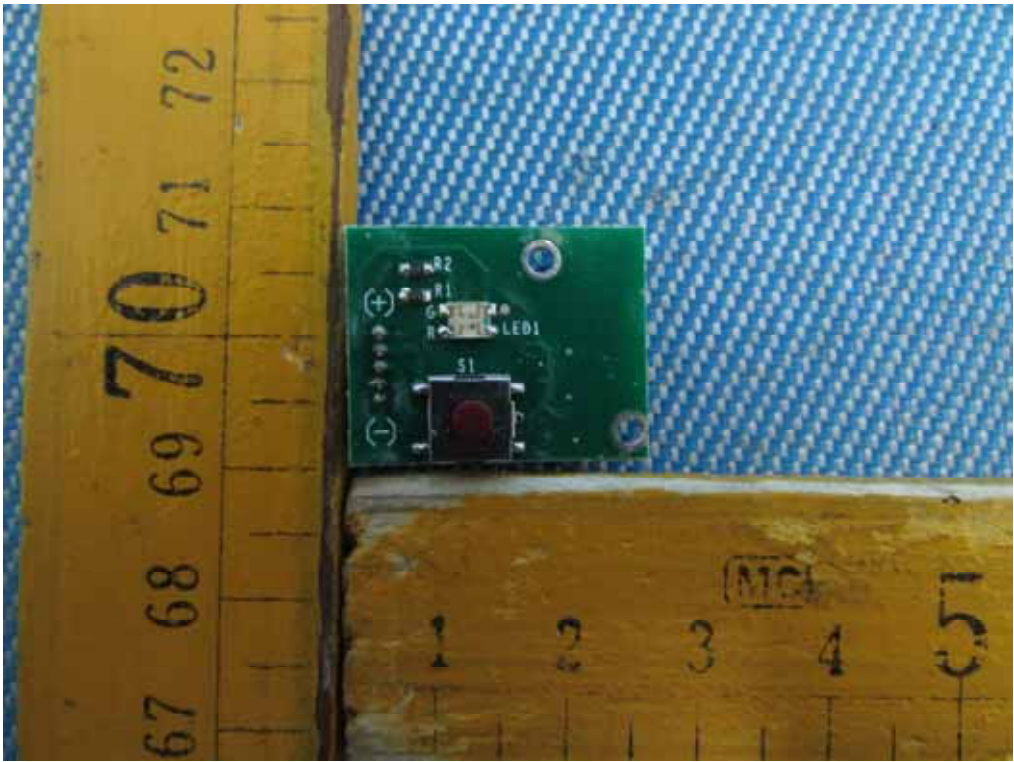
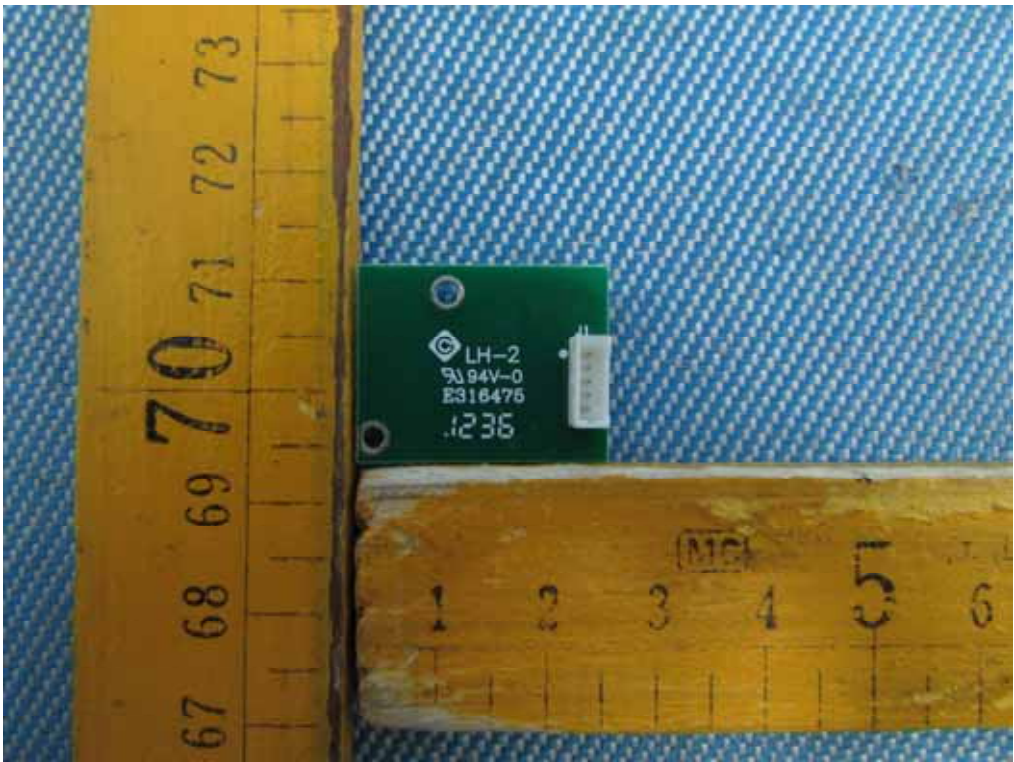


12.2 EUT - Open View









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