

FCC TEST REPORT

FCC ID : S87BB-56
Applicant : Multiway Electrical Ind (Shenzhen) Co., Ltd.
Address : #609 Jinbi Road, Biling Village, Pingshan Town, Shenzhen, Guangdong
518118, China.
Manufacturer : The same as above
Address : The same as above

Equipment Under Test (EUT) :

Product Name : Surge protected strip
Model No. : BB-56

Rule : FCC CFR47 Part 15 Section 15.209:2010

Date of Test : March 30, 2013

Date of Issue : April 09, 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: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China

Tel :+86-755-83551033

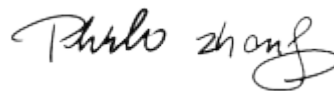
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Compiled by:



Zero Zhou / Project Engineer

Approved by:



Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Test Method	Result
Radiated Emissions	Part 15.209	ANSI C63.4: 2003	PASS
Conducted Emissions	Part 15.207	ANSI C63.4:2003	PASS

Remark:

PASS

Test item meets the requirement

FAIL

Test item does not meet the requirement

N/A

Test case does not apply to the test object

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4 General Information

4.1 General Description of E.U.T.

Product Name	: Surge protected strip
Model No.	: BB-56
Model Difference	: N/A
Operation Frequency	: 435.72MHz
Oscillator	:Crystal 435.72 MHz

4.2 Details of E.U.T.

Technical Data:	: AC 120V, 60Hz
Adapter model:	: N/A
Adapter manufacturer:	: N/A

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 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 the tests were performed at:
Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District, Shenzhen, China

5 Equipment Used during Test

5.1 Equipments List

Conducted Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMI Test Receiver	R&S	ESCI	100947	Aug. 13,2012	Aug. 13,2013
2.	LISN	R&S	ENV216	101215	Aug. 13,2012	Aug. 13,2013
3.	Cable	Top	TYPE16(3.5M)	-	Aug.14,2012	Aug. 14,2013
3m Semi-anechoic Chamber for Radiation Emissions						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer	Agilent	E7405A	MY45114943	Aug. 13,2012	Aug. 13,2013
2.	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Aug. 13,2012	Aug. 13,2013
3.	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Aug. 13,2012	Aug. 13,2013
4.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Aug. 13,2012	Aug. 13,2013
5.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	399	Aug. 13,2012	Aug. 13,2013
6.	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Feb .14,2013	Feb .14,2014
7.	Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-148	Aug. 13,2012	Aug. 13,2013
8.	10m Coaxial Cable with N- plug	SCHWARZBECK	AK 9515 H	-	Aug. 13,2012	Aug. 13,2013
9.	10m 50 Ohm Coaxial Cable with N-plug	Top	TYPE16(13M)	-	Aug. 13,2012	Aug. 13,2013

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)
	± 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 Emissions

Test Requirement:	FCC CFR47 Part 15 Section 15.207
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
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: 51 % RH

Atmospheric Pressure: 1012 mbar

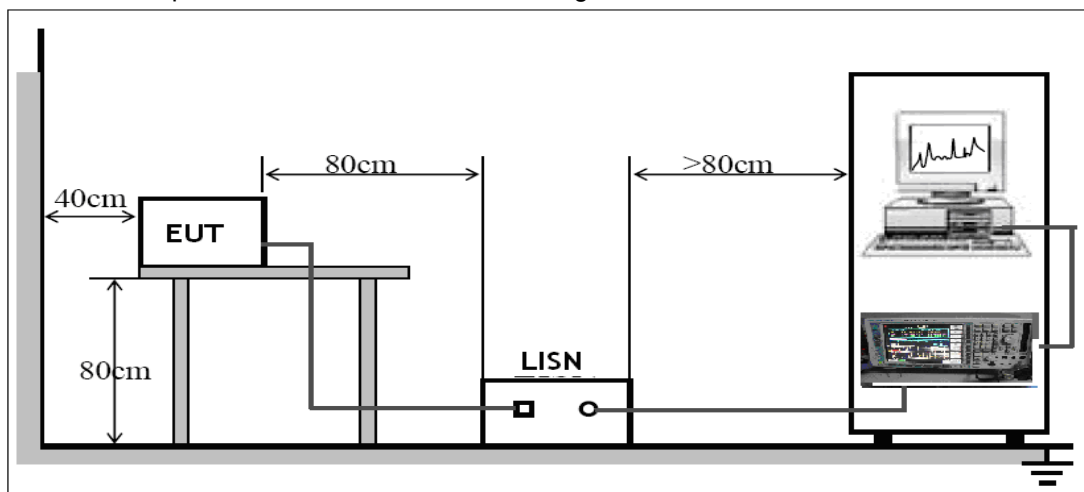
6.2 Test Procedure

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.

6.3 Test Setup

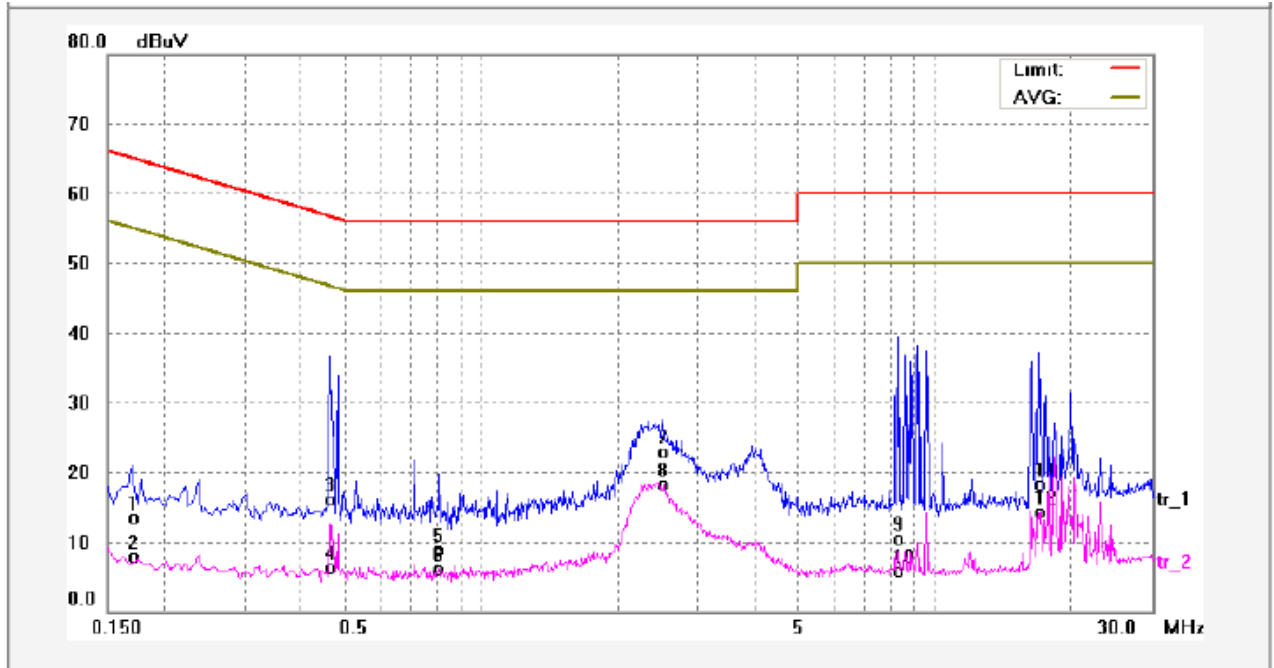
The EUT was placed on the test table in shielding room



6.4 Test Result

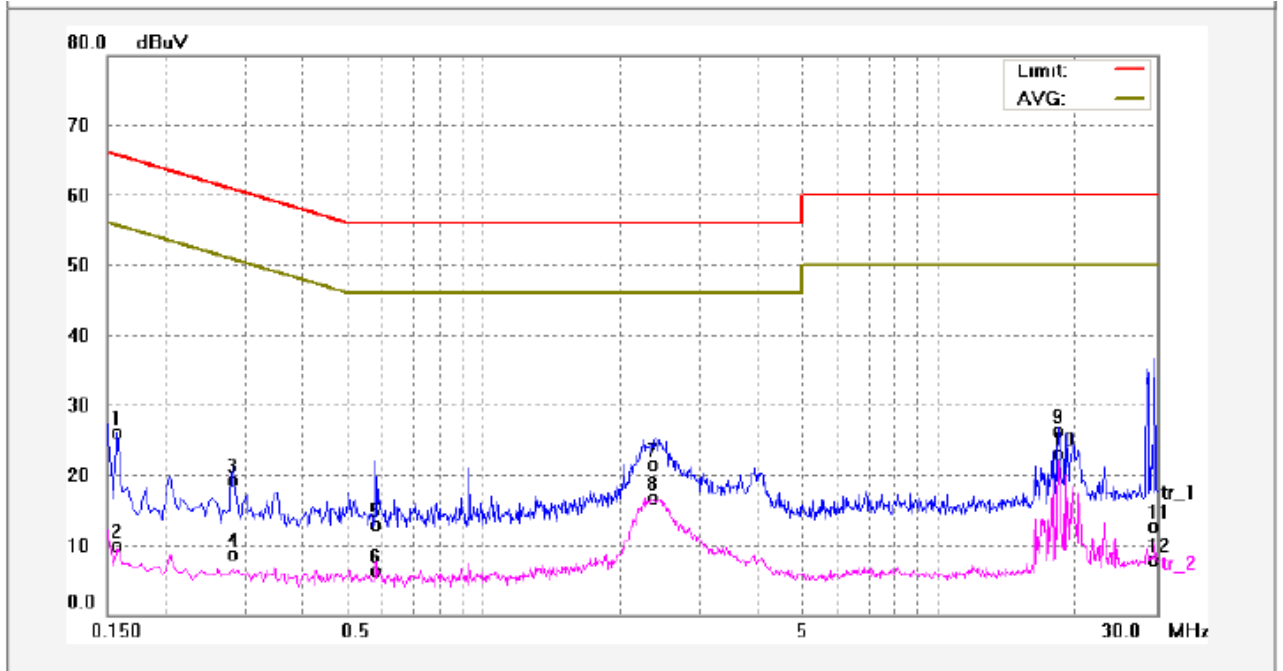
Test Mode: Normal Working

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1700	2.83	9.82	12.65	64.96	-52.31	QP	
2	0.1700	-2.71	9.82	7.11	54.96	-47.85	AVG	
3	0.4620	5.42	9.92	15.34	56.66	-41.32	QP	
4	0.4620	-4.50	9.92	5.42	46.66	-41.24	AVG	
5	0.8059	-1.86	9.97	8.11	56.00	-47.89	QP	
6	0.8059	-4.67	9.97	5.30	46.00	-40.70	AVG	
7	2.5020	12.15	10.02	22.17	56.00	-33.83	QP	
8	2.5020	7.53	10.02	17.55	46.00	-28.45	AVG	
9	8.3220	-0.65	10.39	9.74	60.00	-50.26	QP	
10	8.3220	-5.26	10.39	5.13	50.00	-44.87	AVG	
11	16.8980	6.52	11.01	17.53	60.00	-42.47	QP	
12	16.8980	2.55	11.01	13.56	50.00	-36.44	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1580	15.42	9.81	25.23	65.56	-40.33	QP	
2	0.1580	-0.65	9.81	9.16	55.56	-46.40	AVG	
3	0.2819	8.68	9.86	18.54	60.76	-42.22	QP	
4	0.2819	-1.94	9.86	7.92	50.76	-42.84	AVG	
5	0.5820	2.22	9.94	12.16	56.00	-43.84	QP	
6	0.5820	-4.48	9.94	5.46	46.00	-40.54	AVG	
7	2.3860	10.70	10.01	20.71	56.00	-35.29	QP	
8	2.3860	5.96	10.01	15.97	46.00	-30.03	AVG	
9	18.2420	14.49	11.09	25.58	60.00	-34.42	QP	
10	18.2420	11.12	11.09	22.21	50.00	-27.79	AVG	
11	29.8060	-0.46	12.28	11.82	60.00	-48.18	QP	
12	29.8060	-5.08	12.28	7.20	50.00	-42.80	AVG	

7 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209

Test Method: ANSI C63.4:2003

Test Result: PASS

Measurement Distance: 3m

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:

- a) The tighter limit applies at the band edges.

For example: F.S limit at 88MHz is 100uV/m

- b) If measurement is made at 3m distance, then F.S Limit at 3m distance is adjusted by using the formula of $L_{d1} = L_{d2} * (d2/d1)^2$.

For example:

F.S Limit at 30m(d2) distance is 30uV/m(L_{d2}), then F.S Limit at 3m(d1) distance is

$$L_{d1} = 30\text{uV/m} * (30/3)^2 = 100 * 30\text{uV/m}$$

7.1 EUT Operation

Operating Environment:

Temperature: 25°C

Humidity: 52 % RH

Atmospheric Pressure: 1016 mbar

7.2 Test Procedure

a) Test Procedure (below 30MHz)

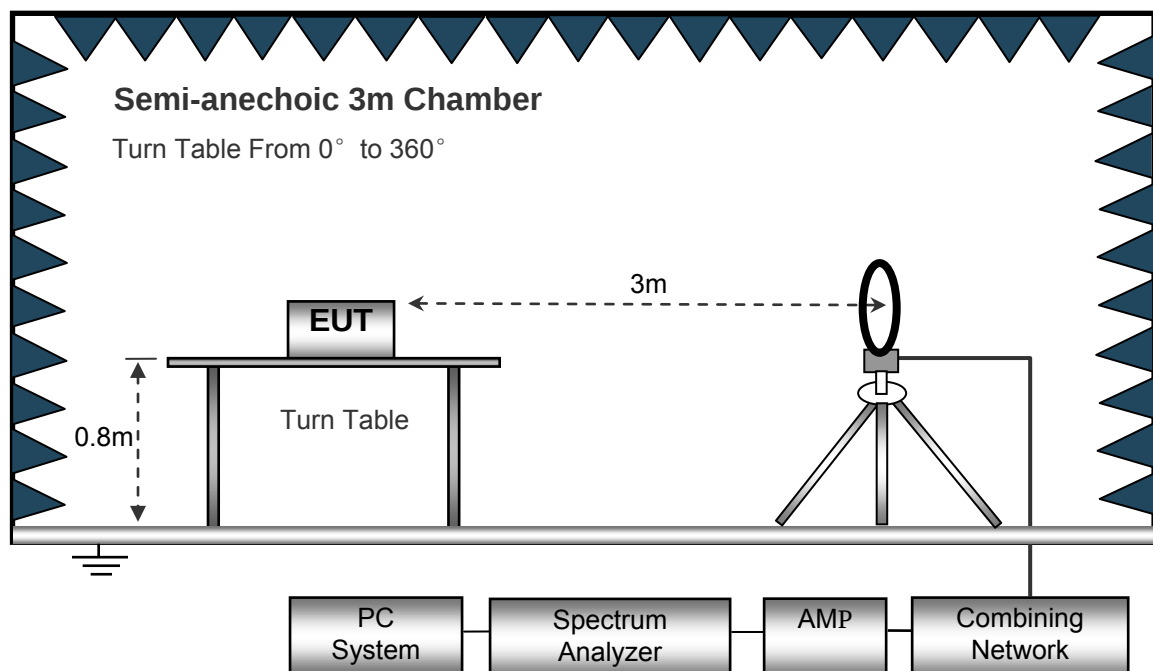
1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Repeat above procedures until the measurements for all frequencies are complete.
6. AC source used during test.

b) Test Procedure (above 30MHz)

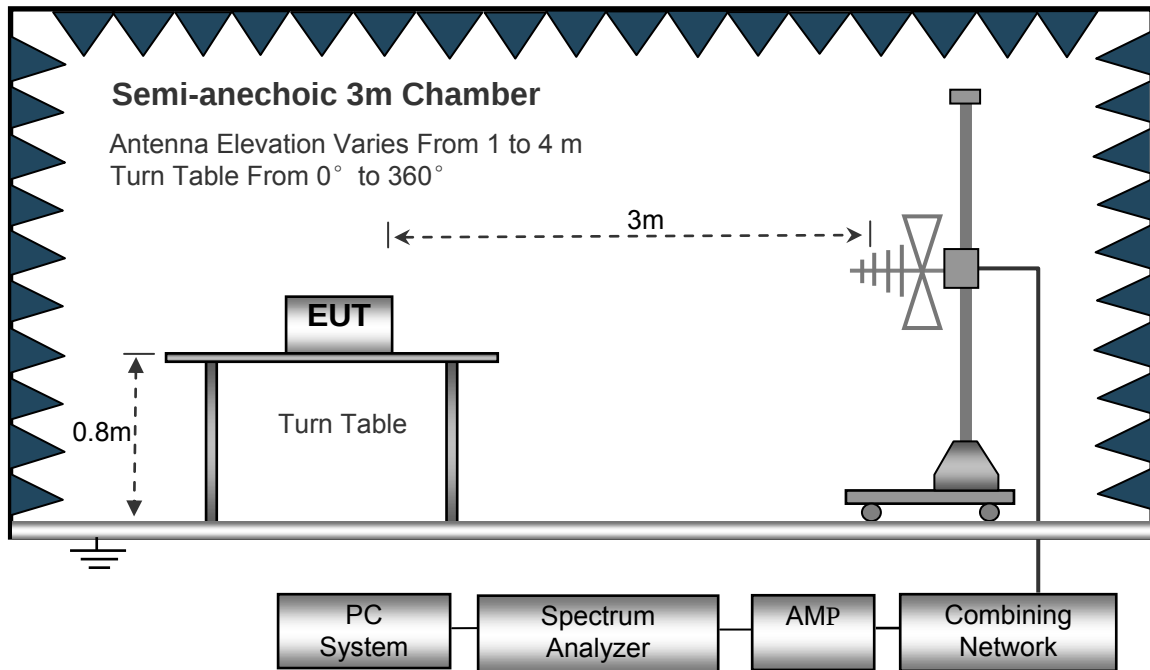
1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure 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 performed in X,Y,Z axes position, the worst is X position.
8. New battery used during test.
9. All the modes were tested. Only the worst case is shown in the report.

7.3 Test Setup

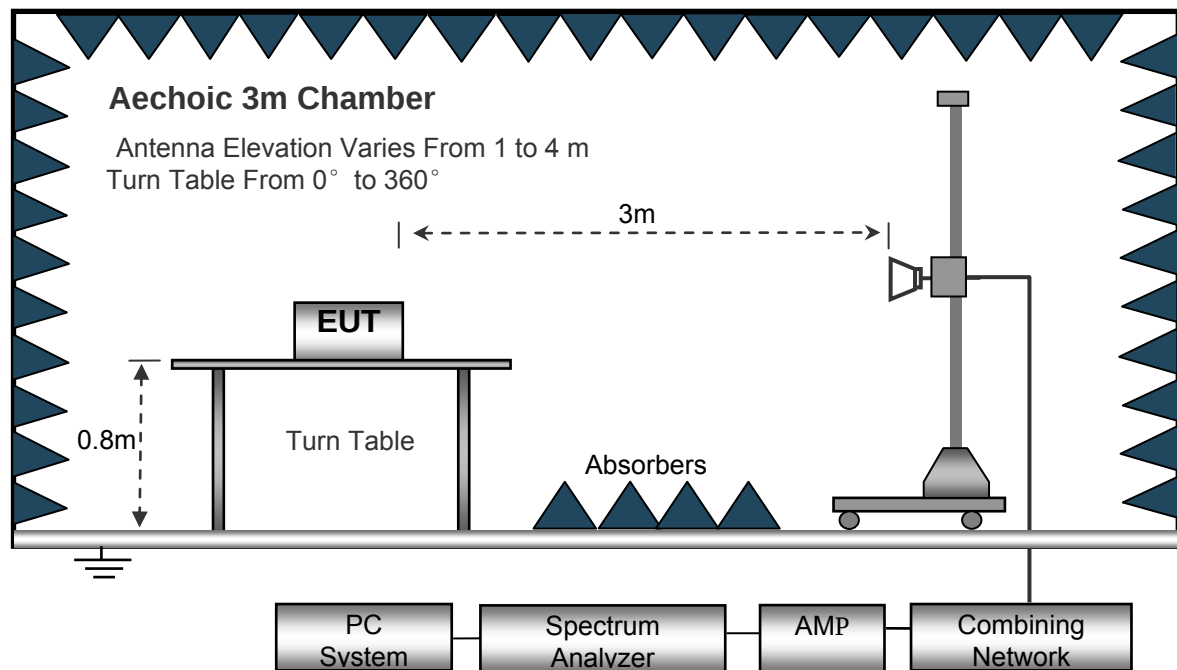
The radiated emission tests were performed in the follow 3m Anechoic Chamber test site. The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1 GHz.



7.4 Spectrum Analyzer Setup

According to FCC Part15 Rules, the system was tested 13.226MHzMHz to 2GHz.

Below 30MHz

Sweep SpeedAuto
 IF Bandwidth10KHz
 Video Bandwidth10KHz
 Resolution Bandwidth10KHz

30MHz ~ 1GHz

Sweep SpeedAuto
 IF Bandwidth120 KHz
 Video Bandwidth100KHz
 Quasi-Peak Adapter Bandwidth120 KHz
 Quasi-Peak Adapter ModeNormal
 Resolution Bandwidth.....100KHz

Above 1GHz

Sweep SpeedAuto
 IF Bandwidth120 KHz
 Video Bandwidth3MHz
 Quasi-Peak Adapter Bandwidth120 KHz
 Quasi-Peak Adapter ModeNormal
 Resolution Bandwidth.....1MHz

7.5 Corrected Amplitude & Margin Calculation

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/m) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stored 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

7.6 Test Results

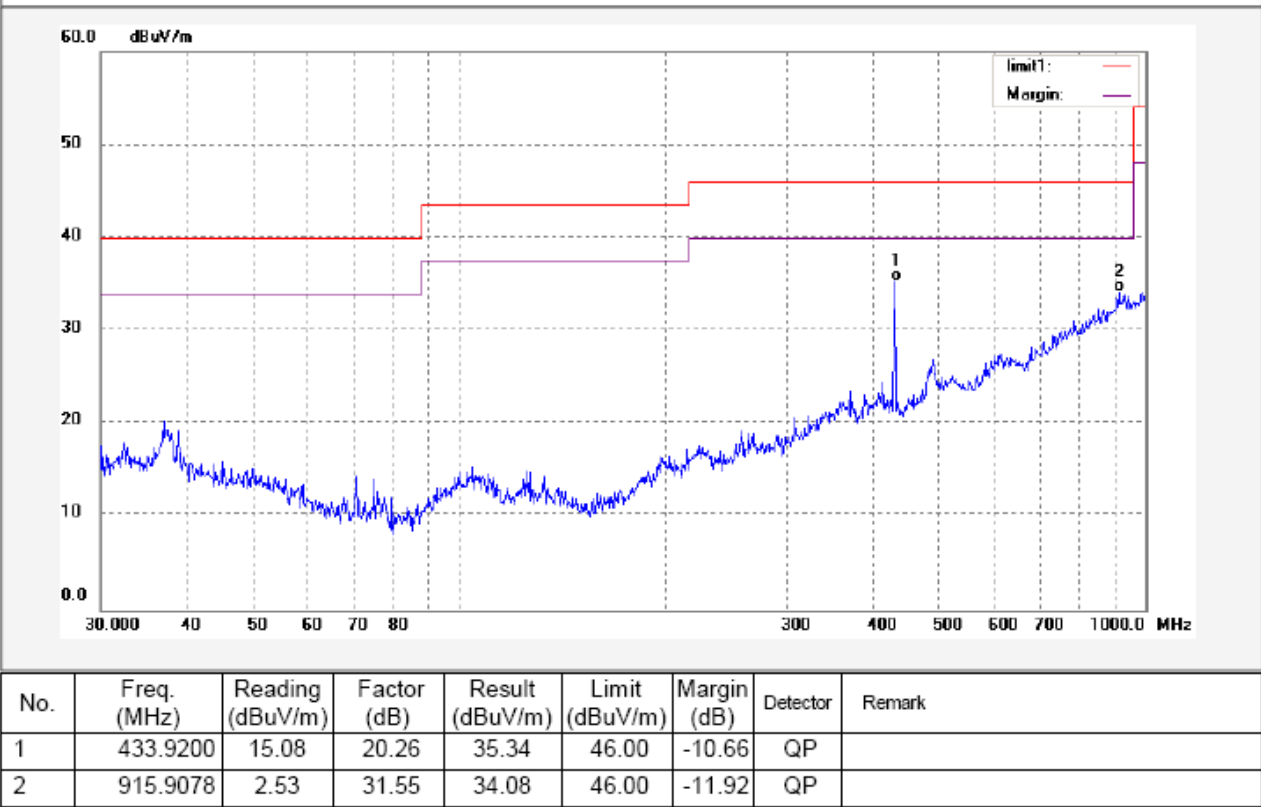
Test frequency :below 30MHz

All emissions were more than 20 dB below the limit and therefore not reported.

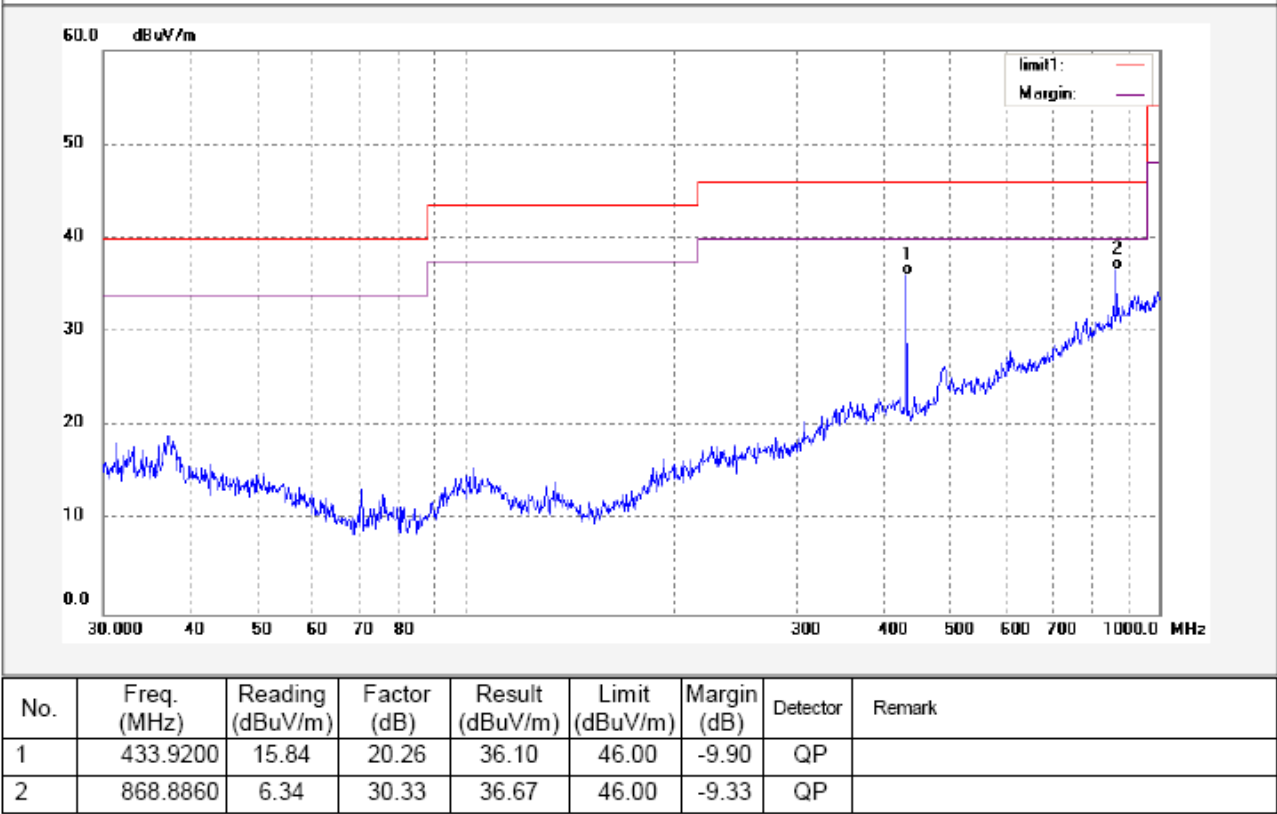
Test frequency : 30MHz~1GHz

Test Mode:Normal Working

Antenna Porlarization: Vertical



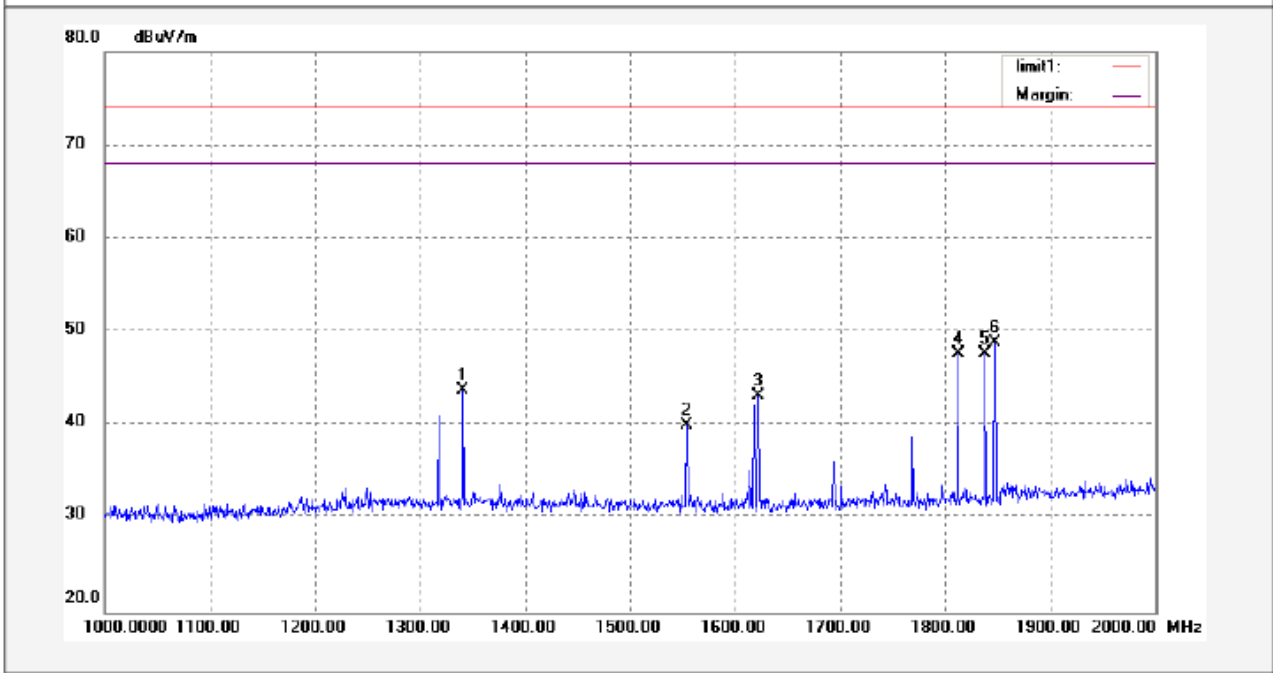
Antenna Porlarization: Horizontal



Test frequency above 1GHz

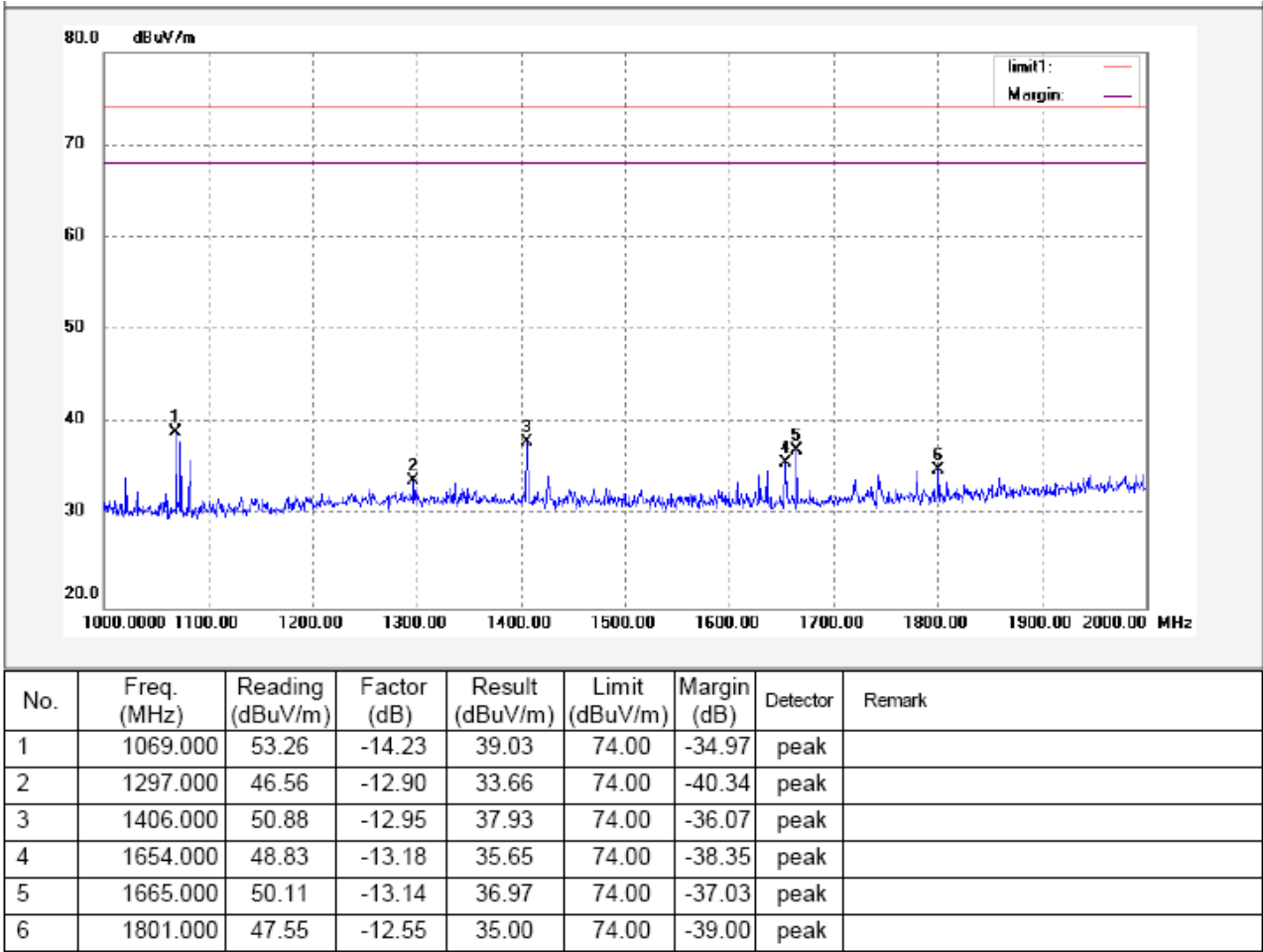
Mode:Normal Working

Antenna Porlarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	1341.000	56.44	-12.72	43.72	74.00	-30.28	peak	
2	1554.000	53.14	-13.11	40.03	74.00	-33.97	peak	
3	1622.000	56.35	-13.18	43.17	74.00	-30.83	peak	
4	1812.000	60.18	-12.47	47.71	74.00	-26.29	peak	
5	1838.000	59.99	-12.30	47.69	74.00	-26.31	peak	
6	1847.000	61.12	-12.25	48.87	74.00	-25.13	peak	

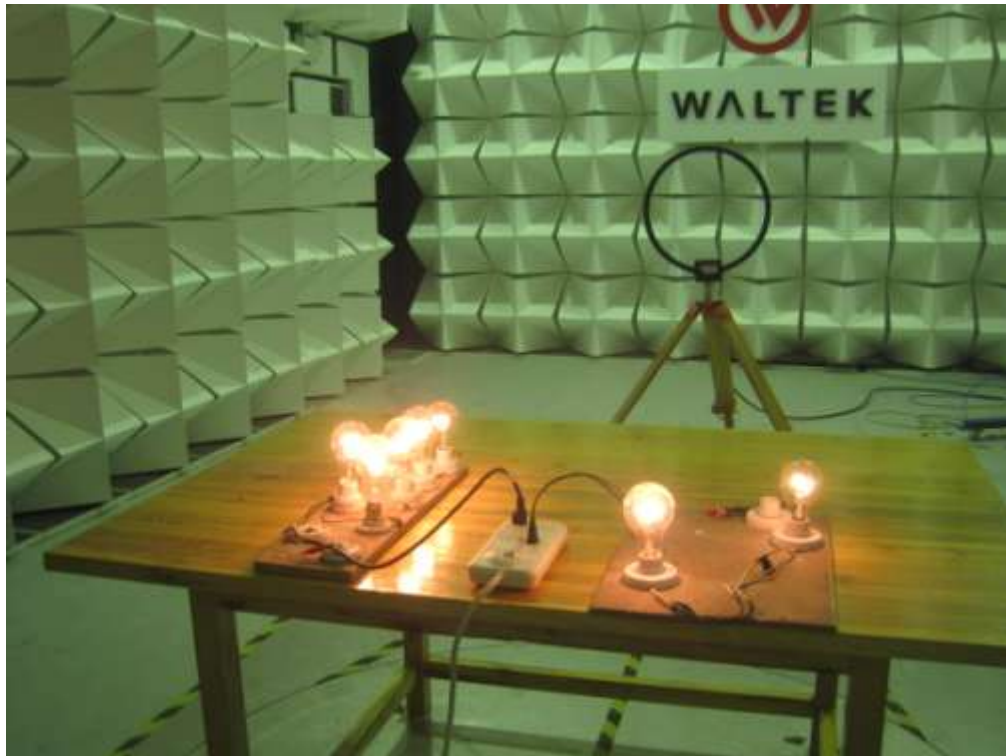
Antenna Porlarization: Horizontal



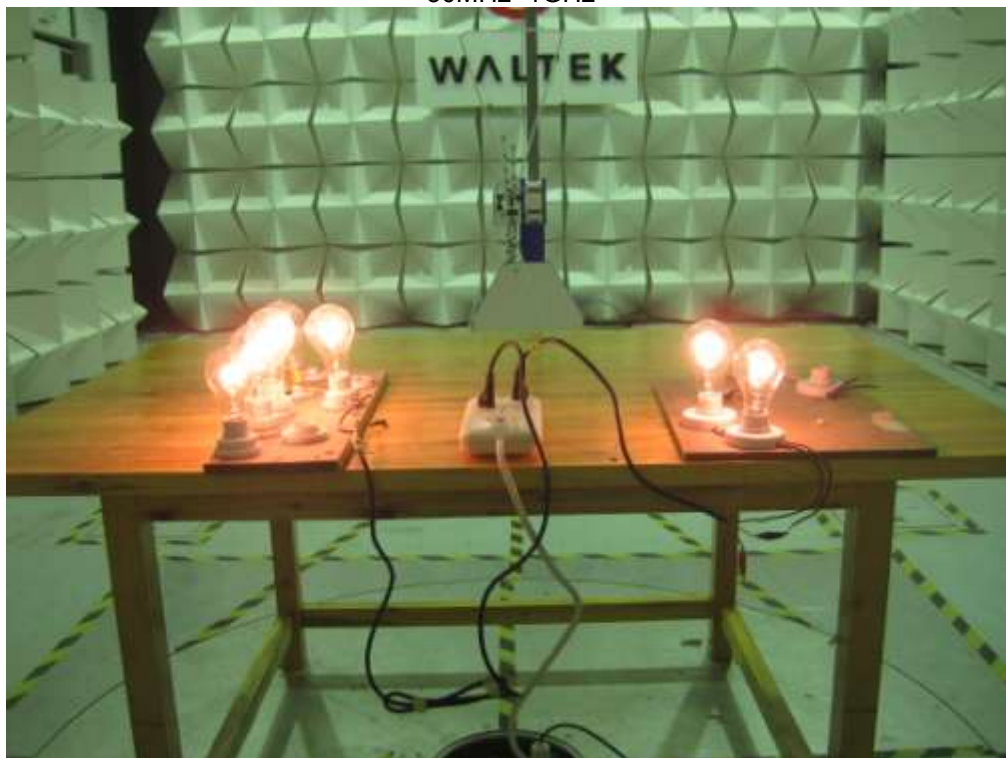
8 Photographs –Test Setup

8.1 Photograph – Radiation Emission Test Setup

Below 30MHz



30MHz~1GHz



Above 1GHz



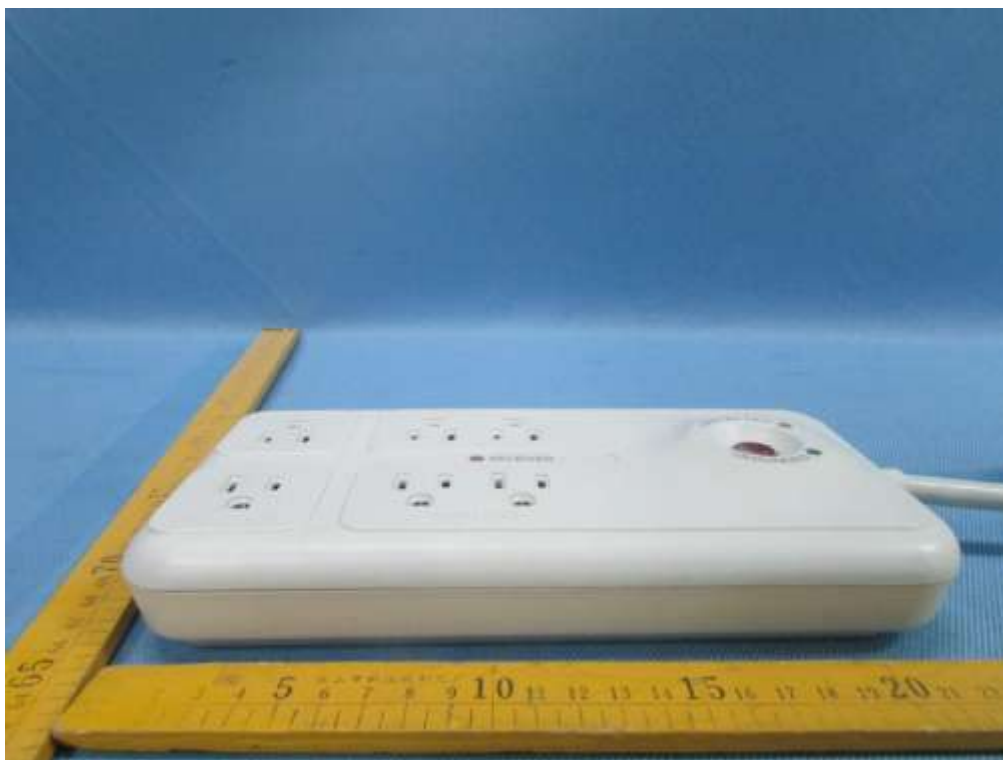
8.2 Photograph – Conduction Emission Test Setup



9 Photographs - Constructional Details

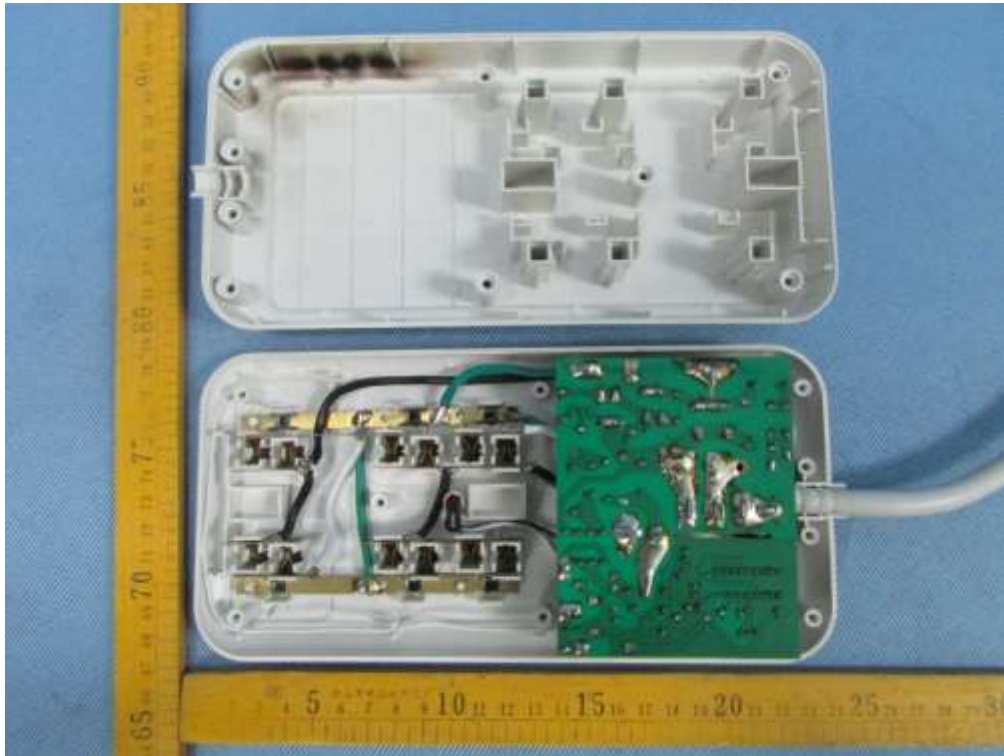
9.1 EUT – Appearance View



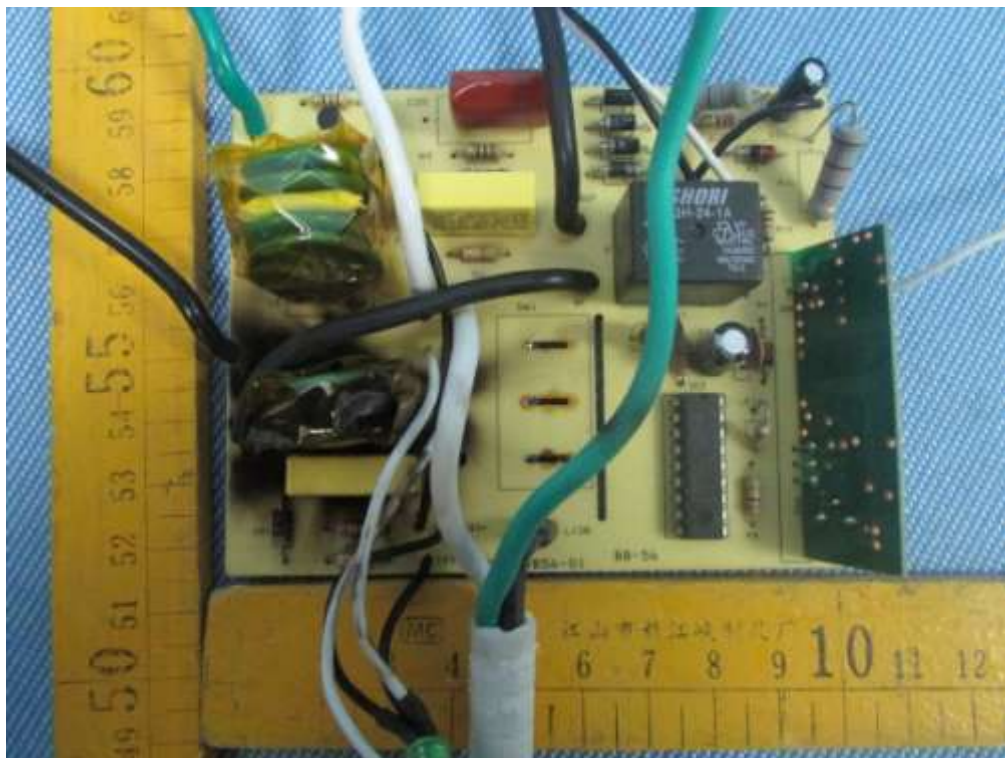


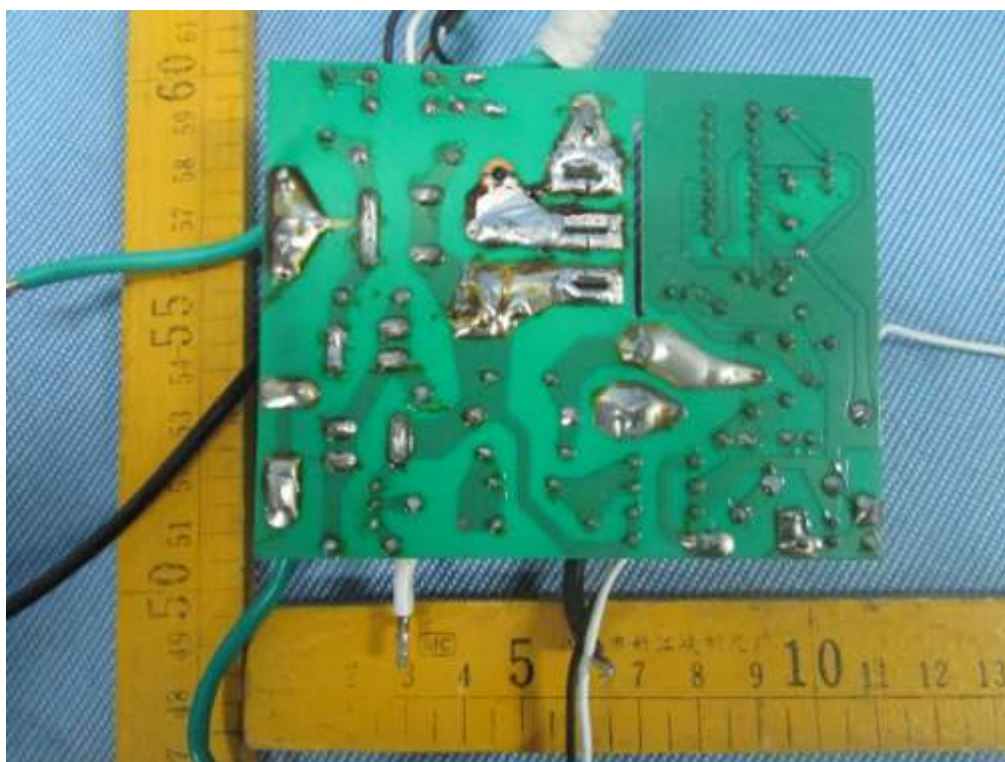


9.2 EUT – Open View



9.3 EUT – PCB View





=End of test report=