

TEST REPORT

Reference No...... : WTS13S1108747E
FCC ID : XBADSC11
Applicant..... : Aeon Labs LLC.
Address..... : 1228 NORVELL ST.EL CERRITO, CA 94530 USA
Manufacturer : The same as above
Address..... : The same as above
Product Name..... : Smart Strip
Model No...... : DSC11-ZWUS
Standards..... : FCC CFR47 Part 15 Section 15.249: 2012
Date of Receipt sample ... : Nov. 03, 2013
Date of Test..... : Nov .04~08,2013
Date of Issue..... : Dec. 17, 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.

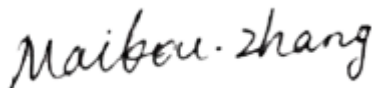
Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China

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

Tel :+86-755-83551033

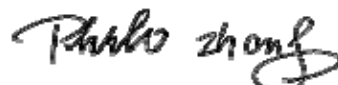
Fax:+86-755-83552400

Compiled by:



Maikou Zhang / Project Engineer

Approved by:



Philo Zhong / Manager

2 Test Summary

Test Items	Test Requirement	Result
Out-of-band Emissions	15.249(d)	PASS
20dB Bandwidth	15:215(c)	PASS
Conducted Emissions	15.249 &15.207	PASS
Radiated Emission	15.249(a) &15.209 &15.205(a)	PASS
Antenna Requirement	15.249 &15.203	PASS

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4 General Information

4.1 General Description of E.U.T.

Product Name	: Smart Strip
Model No.	: DSC11-ZWUS
Type of Modulation	: FSK
Frequency Range	: 908.40~908.42MHz, 2 channels in total
Oscillator	: 4.096MHz
Antenna installation	: Monopole Antenna

4.2 Details of E.U.T.

Technical Data	: AC 125V 60Hz
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4.3 Frequency Table

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	908.40	2	908.42

4.4 Test Facility

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

- **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.

- **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.

4.5 Test Location

All Emissions tests were performed at:-

1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District, Shenzhen 518105, Guangdong, 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	Sep.21,2013	Sep.20,2014
2.	LISN	R&S	ENV216	101215	Sep.21,2013	Sep.20,2014
3.	Cable	Top	TYPE16(3.5M)	-	Sep.21,2013	Sep.20,2014
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	Sep.21,2013	Sep.20,2014
2.	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.21,2013	Sep.20,2014
3.	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Sep.21,2013	Sep.20,2014
4.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Sep.21,2013	Sep.20,2014
5.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	399	Sep.21,2013	Sep.20,2014
6.	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Sep.21,2013	Sep.20,2014
7.	Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-148	Sep.21,2013	Sep.20,2014
8.	Cable	Top	EWO2014-7	-	Sep.21,2013	Sep.20,2014
9.	Cable	Top	TYPE16(13M)	-	Sep.21,2013	Sep.20,2014
10.	DC POWER SUPPLY	LWDQGS	PS-303D		Sep.21,2013	Sep.20,2014
11.	Humidity Chamber	GTH-225-40-1P	IAA061213		Sep.21,2013	Sep.20,2014
12.	Spectrum Analyzer	ROHDE & SCHWARZ	FSL6	100959	Sep.21,2013	Sep.20,2014

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)
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	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
Test Result:	Pass
Remark:	Due to the EUT powered by DC 12V, the power need not attend connecting to AC mains, this section is not applicable.

6.1 EUT Operation:

Operating Environment:

Temperature:	25.5 °C
Humidity:	50 % RH
Atmospheric Pressure:	1011 mbar

EUT Operation:

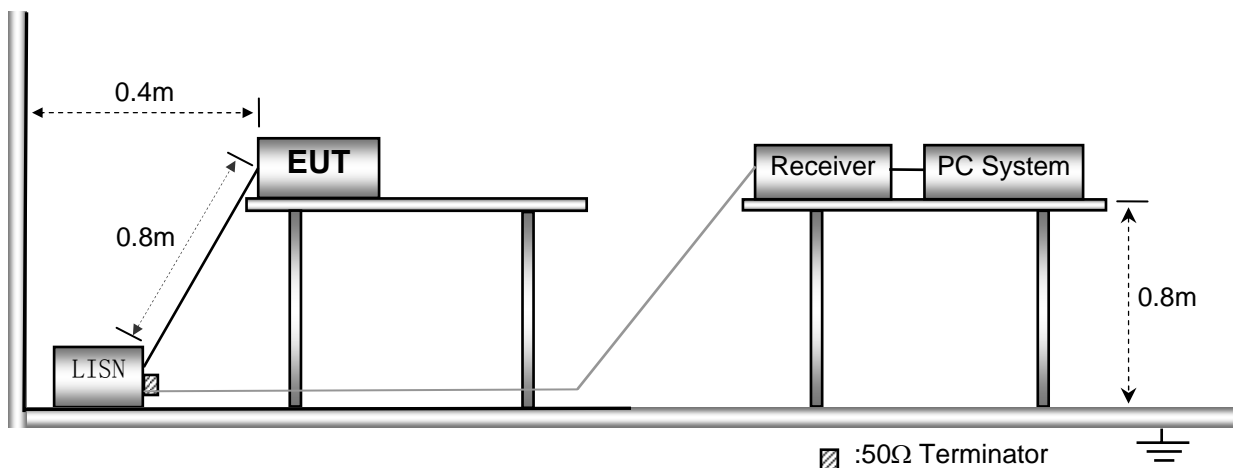
The pre-test was performed in continuously transmitting mode, and the test data were shown as follow.

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 Test Setup:

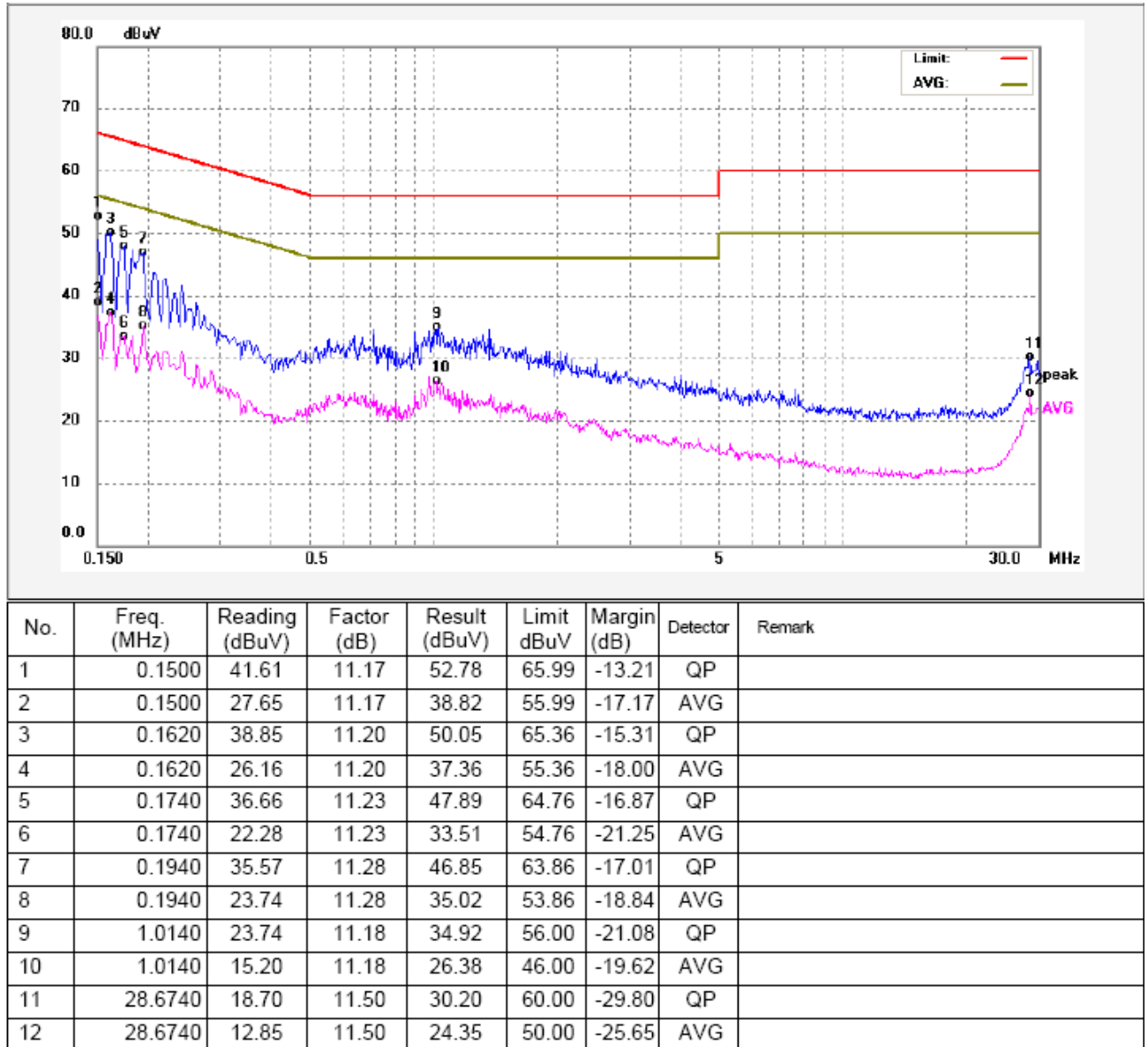
The conducted emission tests were performed using the setup accordance with the ANSI C63.4:2003.



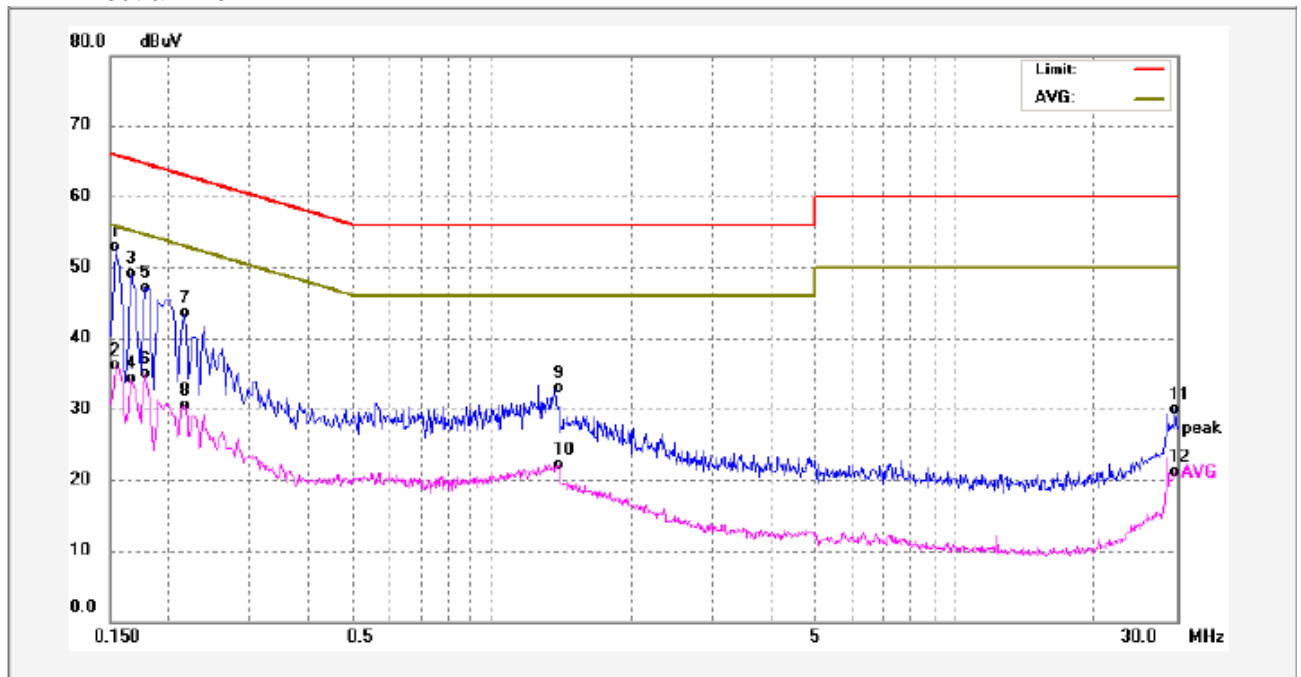
6.3 Conducted Emission Test Result

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

Live line:



Neutral Line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1539	41.65	11.18	52.83	65.78	-12.95	QP	
2	0.1539	24.89	11.18	36.07	55.78	-19.71	AVG	
3	0.1660	37.98	11.21	49.19	65.15	-15.96	QP	
4	0.1660	23.03	11.21	34.24	55.15	-20.91	AVG	
5	0.1780	35.80	11.24	47.04	64.57	-17.53	QP	
6	0.1780	23.74	11.24	34.98	54.57	-19.59	AVG	
7	0.2180	32.18	11.30	43.48	62.89	-19.41	QP	
8	0.2180	19.14	11.30	30.44	52.89	-22.45	AVG	
9	1.3900	21.77	11.19	32.96	56.00	-23.04	QP	
10	1.3900	10.90	11.19	22.09	46.00	-23.91	AVG	
11	29.7460	18.41	11.48	29.89	60.00	-30.11	QP	
12	29.7460	9.72	11.48	21.20	50.00	-28.80	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 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: 25.5 °C
 Humidity: 51 % RH
 Atmospheric Pressure: 1012 mbar

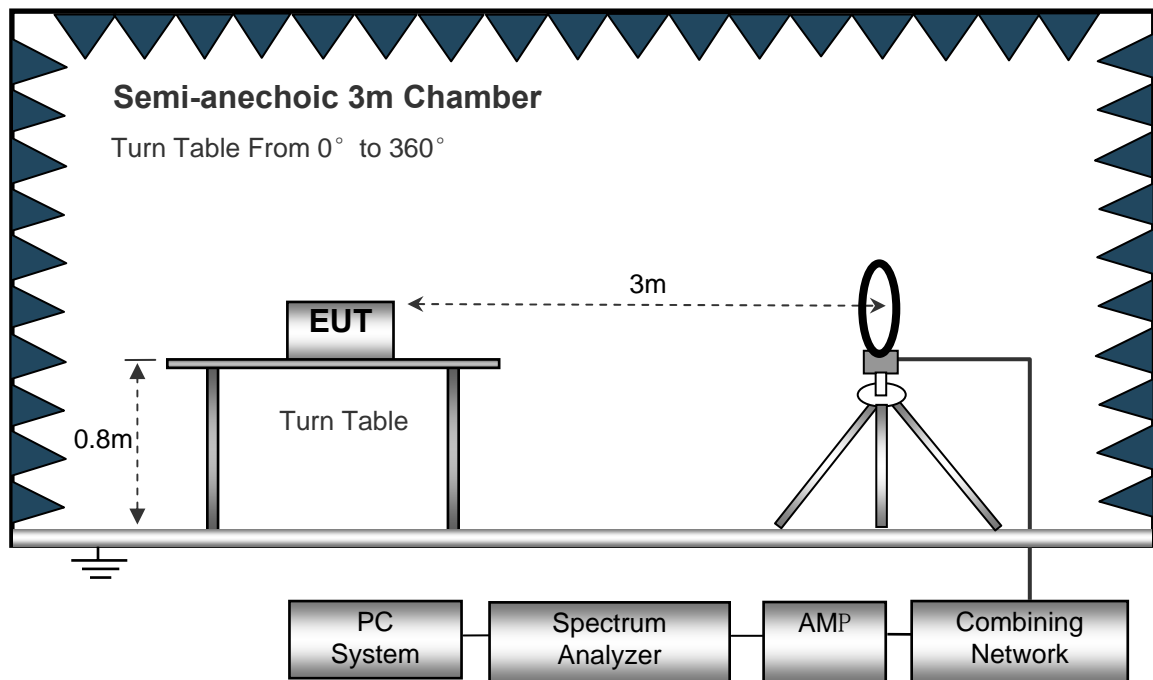
Operation Mode:

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

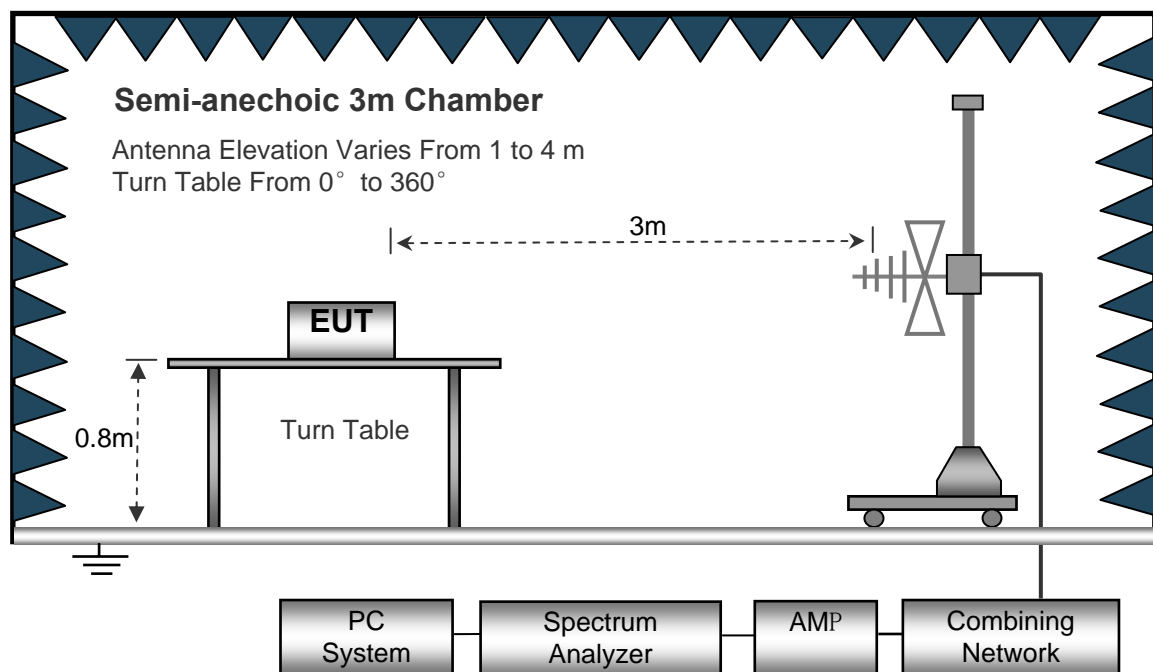
7.2 Test Setup

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

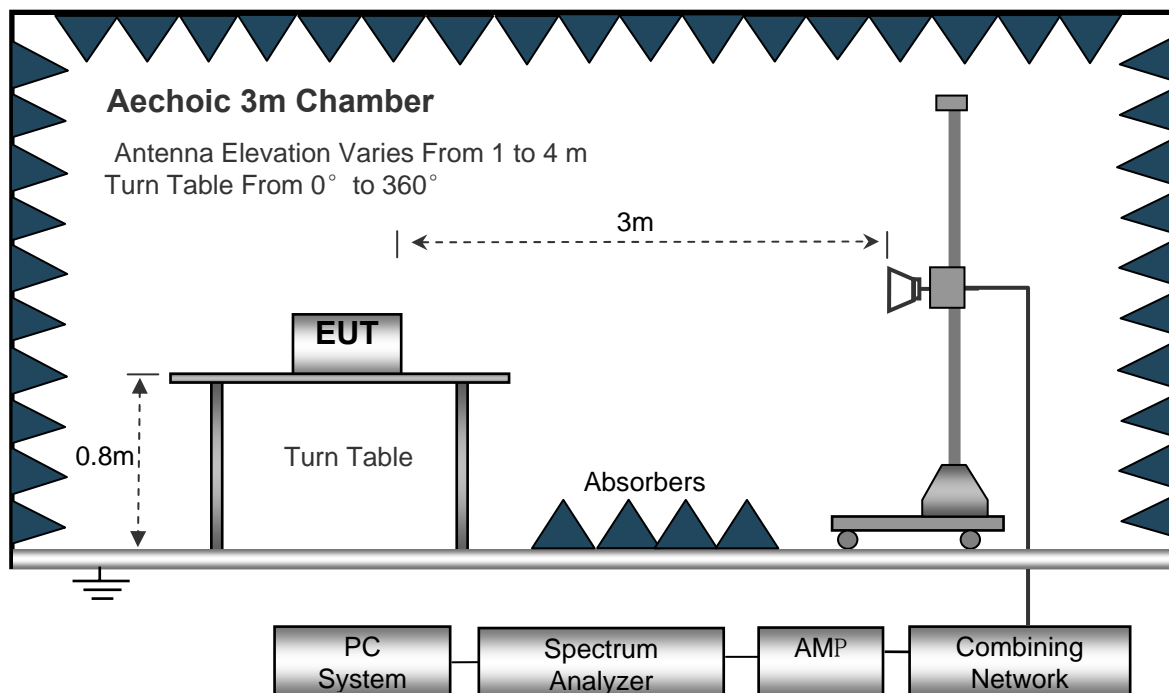
The test setup for emission measurement below 30MHz.



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 4.096MHz to 9.085GHz.

Below 30MHz

Sweep Speed	Auto
IF Bandwidth	10 KHz
Video Bandwidth	10KHz
Resolution Bandwidth	10 KHz

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
IF Bandwidth	120 KHz
Video Bandwidth	3MHz
Quasi-Peak Adapter Bandwidth	120 KHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	1MHz

7.4 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.

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

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

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

7.7 Radiated Emission Data

Test Frequency: Below 30MHz

Remark: For emissions below 30MHz, no emission higher than background level, so the data does not show in the report.

Test Frequency: 30MHz ~ 9.085GHz

Test Mode: Continuously Transmitting

Test result plots shown as follows:

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)
Lower Channel 908.40MHz									
908.40	62.39	PK	167	1.4	H	30.98	93.37	114.00	-20.63
908.40	51.24	Ave	167	1.4	V	30.98	82.22	94.00	-11.78
33.33	15.66	QP	357	1.7	V	20.43	36.09	40.00	-3.91
184.51	16.41	QP	167	1.3	V	18.00	34.41	43.50	-9.09
1816.80	52.33	PK	302	1.1	V	-16.38	35.95	74.00	-38.05
1816.80	43.61	Ave	302	1.1	V	-16.38	27.23	54.00	-26.77
2725.20	49.67	PK	74	1.5	V	-14.87	34.80	74.00	-39.20
2725.20	39.88	Ave	74	1.5	V	-14.87	25.01	54.00	-28.99
5225.40	44.76	PK	320	1.9	H	-11.77	32.99	74.00	-41.01
5225.40	39.54	Ave	320	1.9	H	-11.77	27.77	54.00	-26.23
5920.80	44.57	PK	91	1.3	H	-10.74	33.83	74.00	-40.17
5920.80	39.62	Ave	91	1.3	H	-10.74	28.88	54.00	-25.12

8 Out of band emission

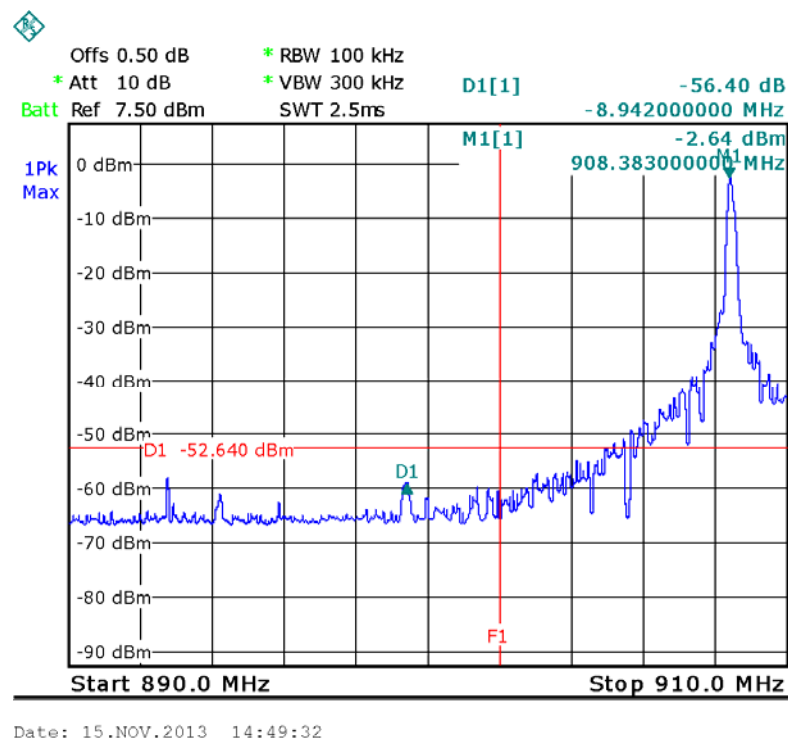
Test Requirement: FCC Part15 Paragraph 15.249(d)
Test Method: ANSI C63.4: 2003
Test Result: Pass

8.1 Requirments:

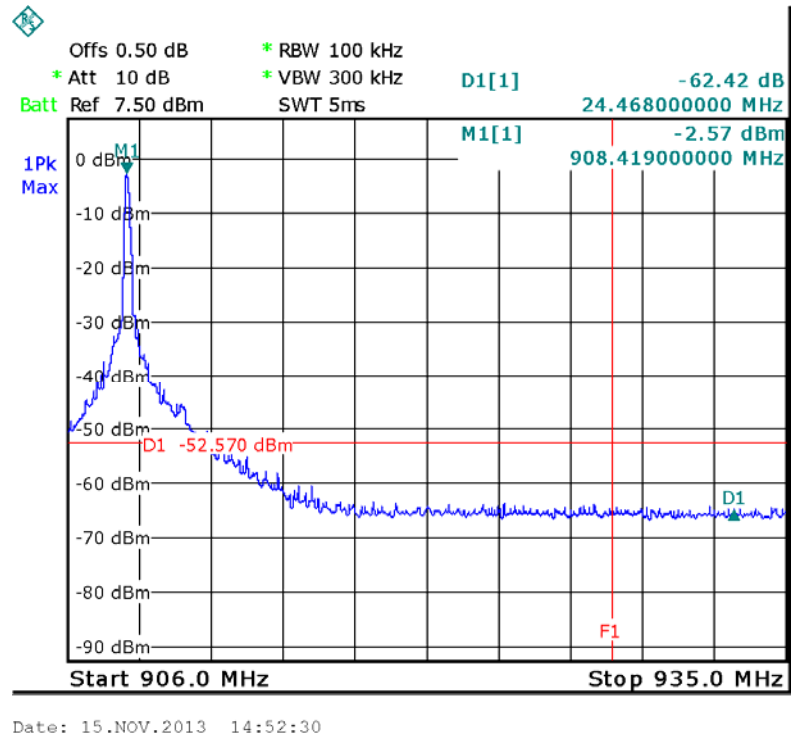
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

8.2 Test Result

Mode:transmitting at lower channel:



Mode:transmitting at upper channel



9 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(permanently attached antenna), fulfil the requirement of this section.

10 20dB Bandwidth

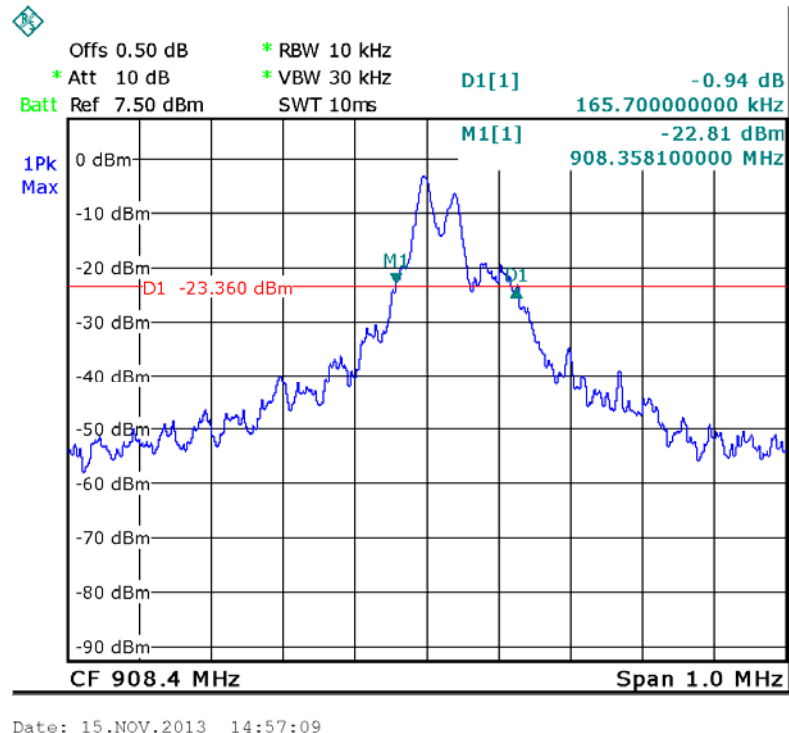
Test Requirement:	FCC Part15 Paragraph 15.215(c)
Test Method:	ANSI C63.4: 2003
Test Result:	Pass

10.1 Requirments:

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.

10.2 Test Result

20 dB bandwidth : 165.7KHz

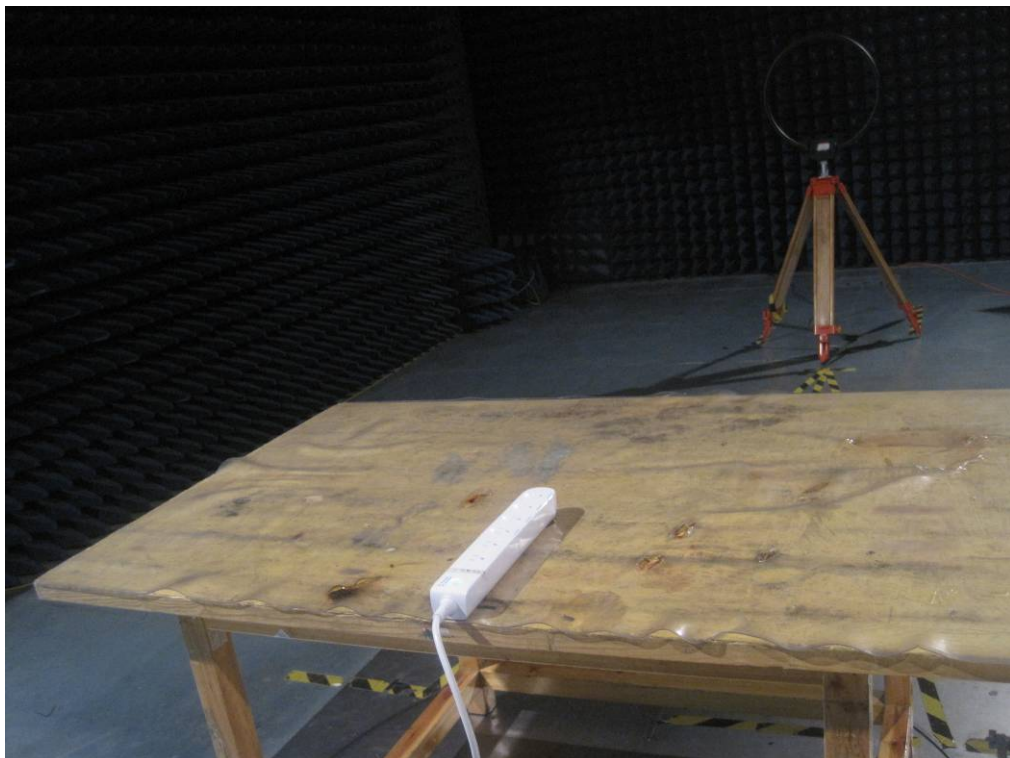


11 Photographs of Testing

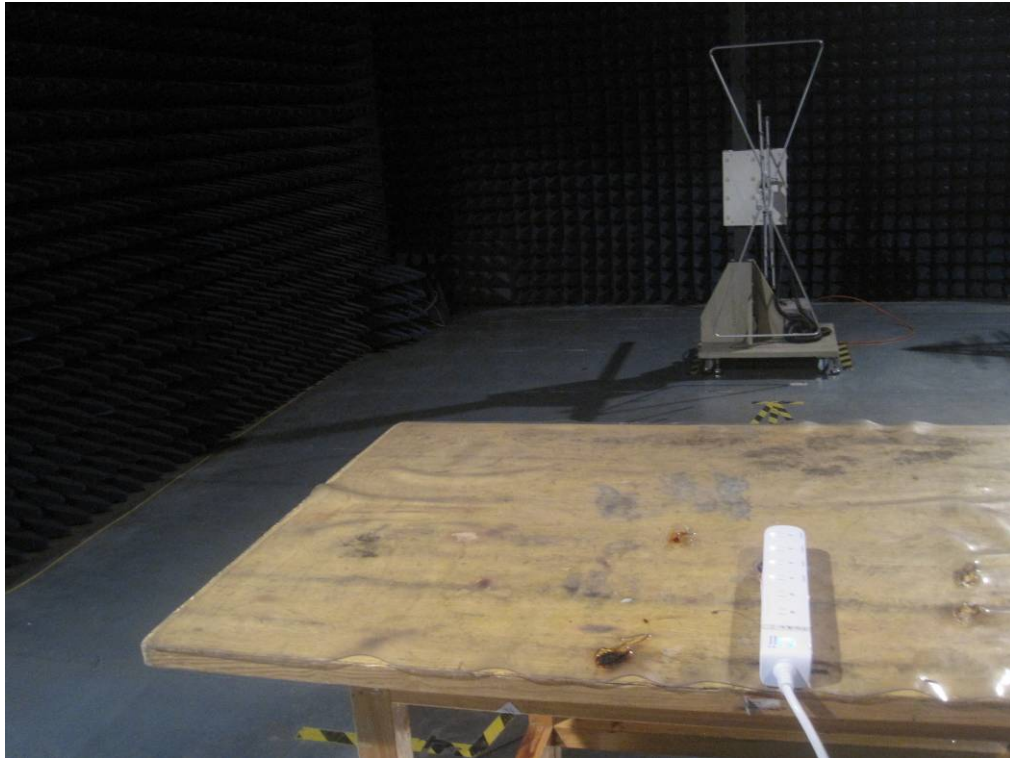
11.1 Conducted Emissions Test View



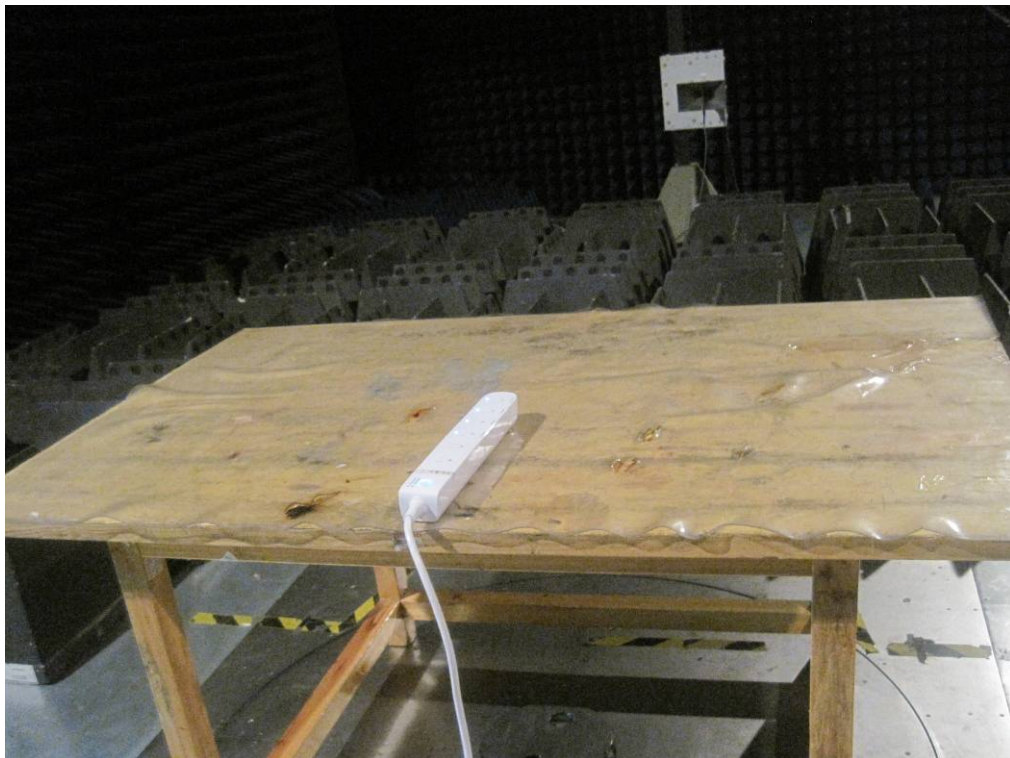
11.2 Radiation Emission From Below 30MHz



11.3 Radiation Emission From 30MHz-1GHz

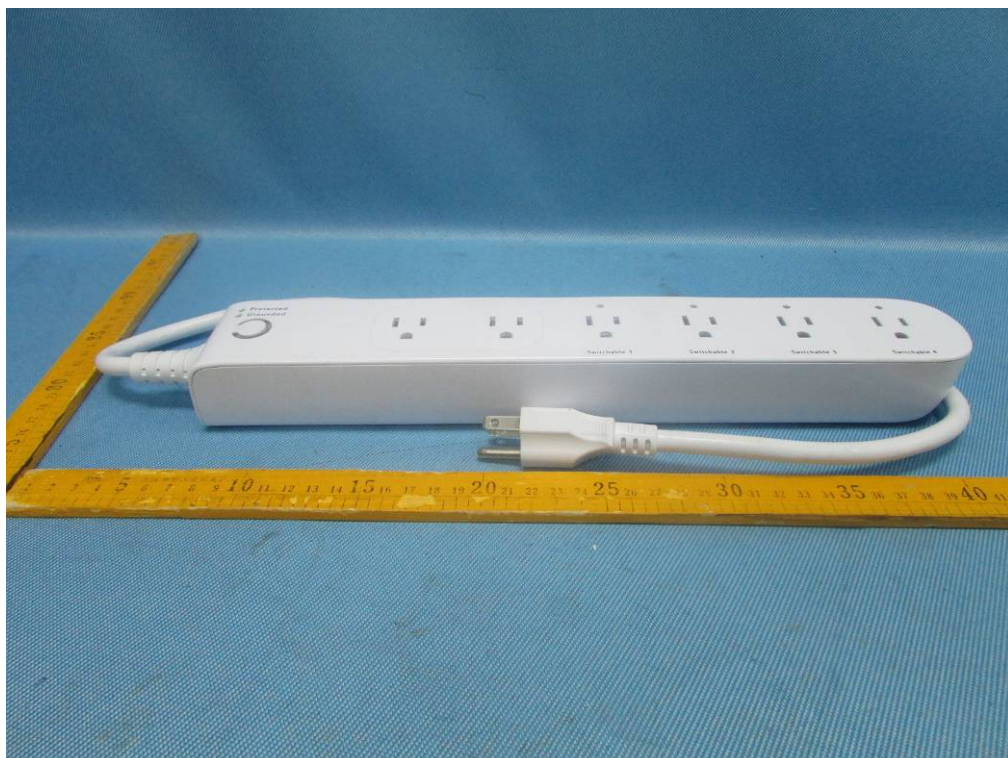


11.4 Radiation Emission Above 1GHz



12 Photographs - Constructional Details

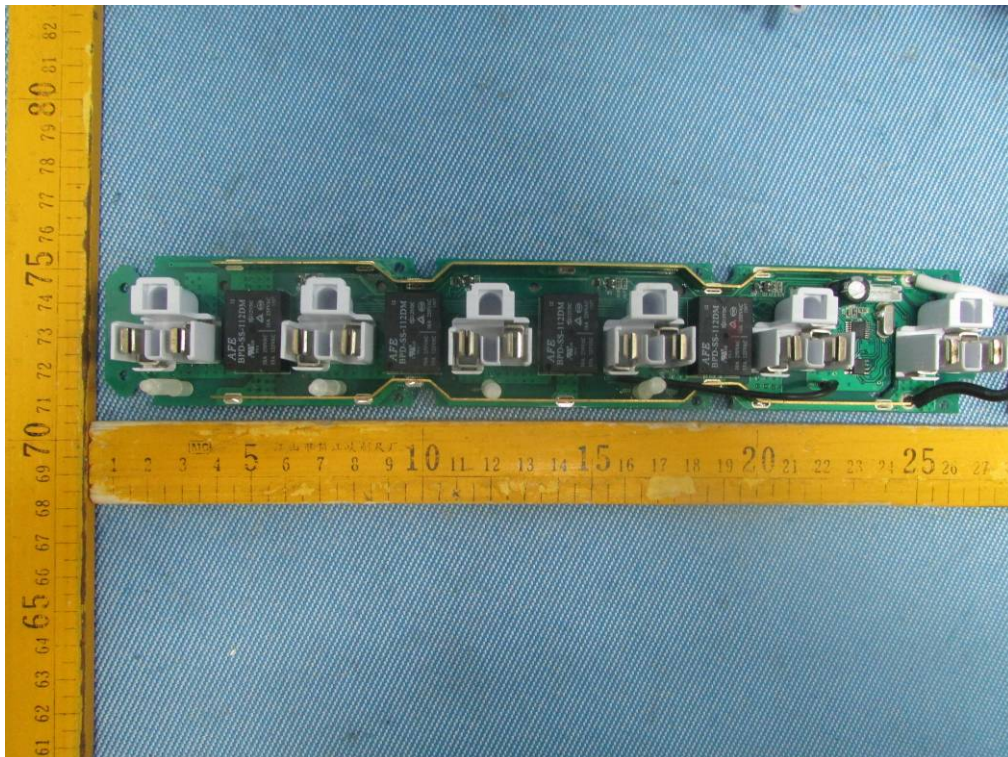
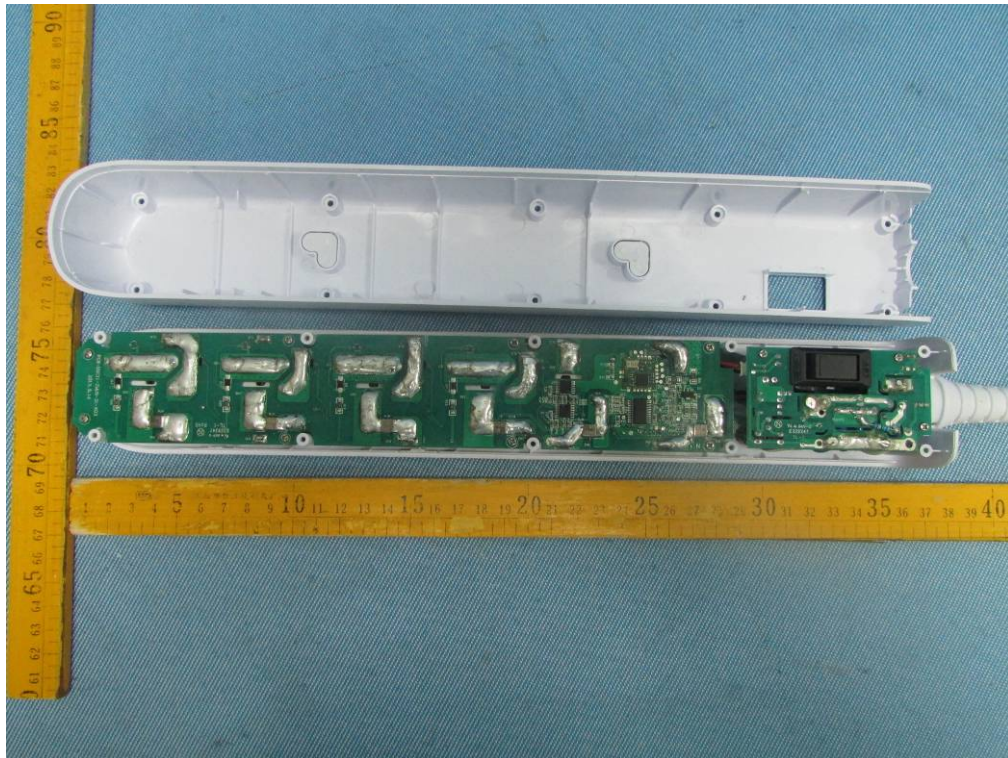
12.1 EUT - Appearance View

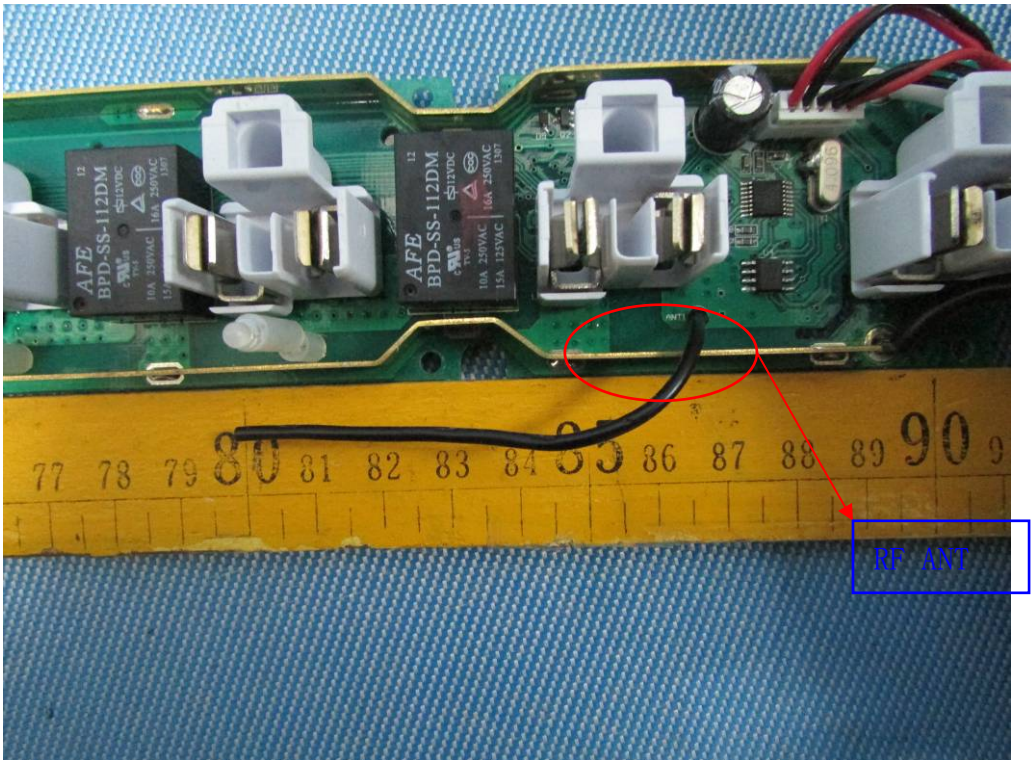
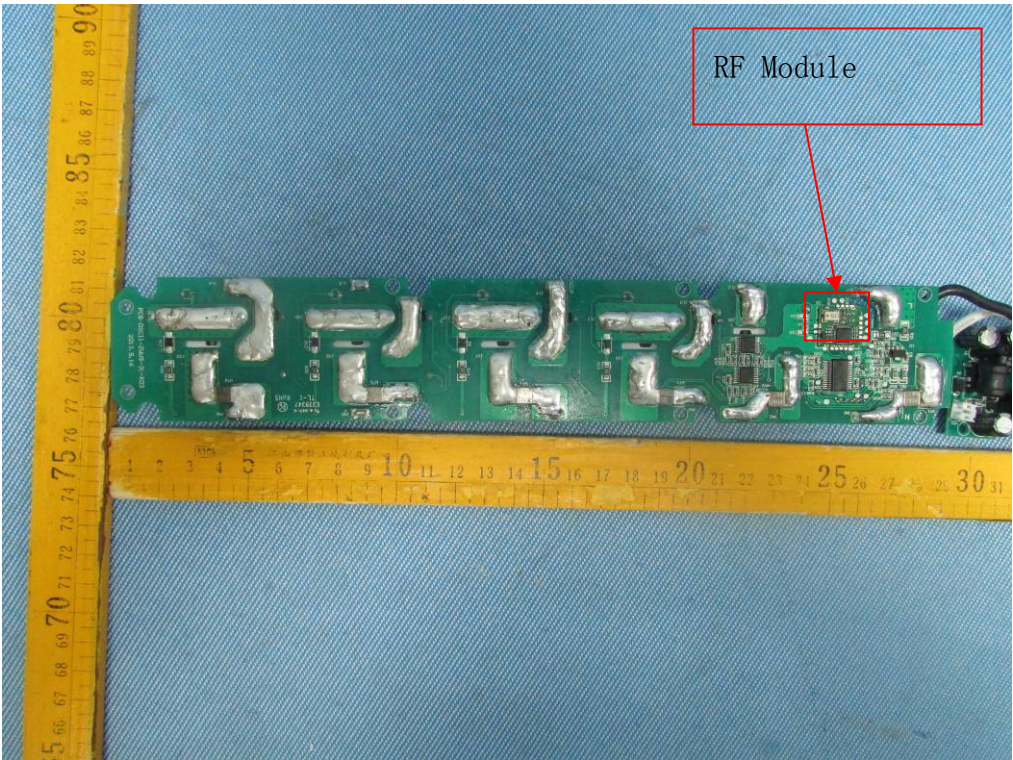


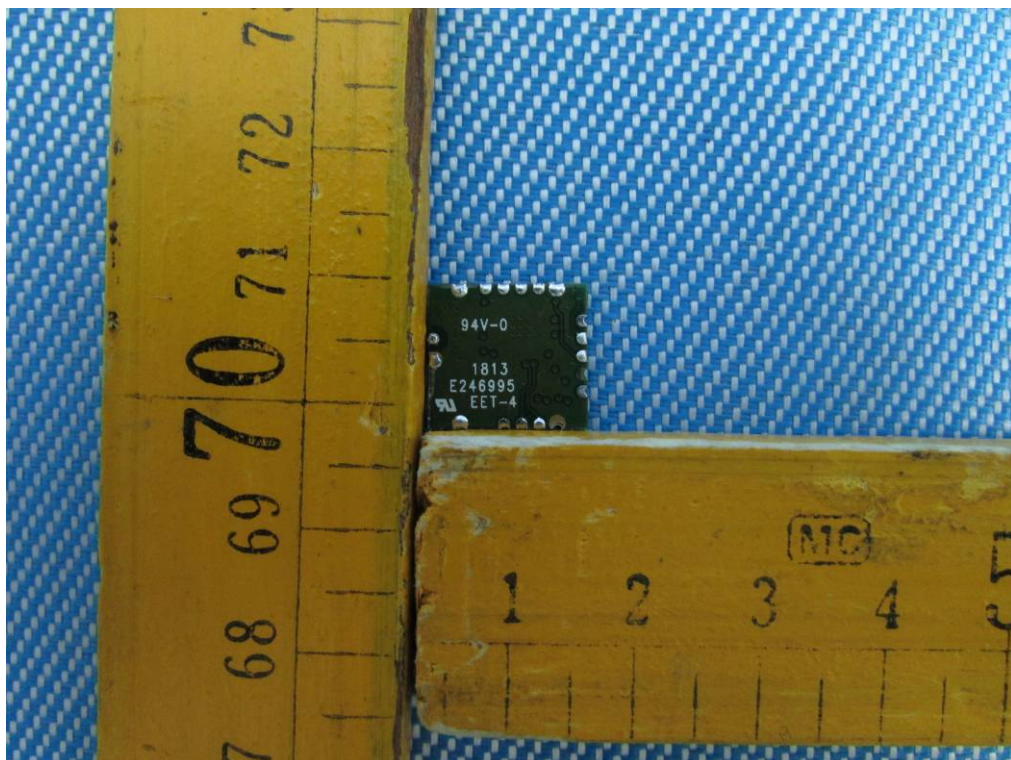
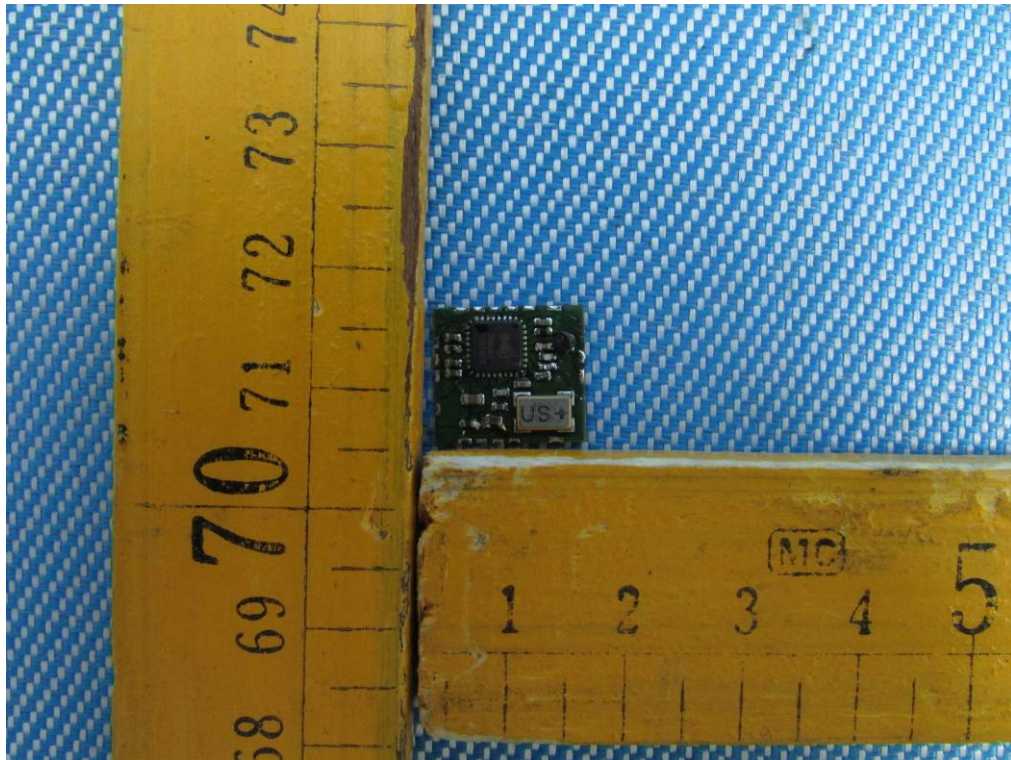




12.2 EUT - Open View







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