



FCC 47 CFR PART 15 SUBPART B

TEST REPORT

For

Applicant : Atom Industrial Limited

**Address : Room 609, 6F, Kwong Sang Hong Centre, No.151-153
Hoi Bun Road, Kwun Tong, Kowloon, Hong Kong**

Product Name : 900 MHz Outdoor Speakers AW828

Model Name : AW828RX

Brand Name : N/A

FCC ID : NOY-AW828RX

Report No. : MOST100204F1

Date of Issue : Mar. 15, 2010

Issued by : Most Technology Service Co., Ltd.

**Address : No.5, 2nd Langshan Road, North District, Hi-tech Industrial
Park, Nanshan, Shenzhen, Guangdong, China**

Tel : 86-755-8617 0306

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1. VERIFICATION OF CONFORMITY

Equipment Under Test: 900 MHz Outdoor Speakers AW828

Brand Name: N/A

Model Number: AW828RX

FCC ID: NOY-AW828RX

Applicant: Atom Industrial Limited
Room 609, 6/F, Kwong Sang Hong Centre, No.151-153 Hoi Bun Road,
Kwun Tong, Kowloon, Hong Kong

Manufacturer: Atom Industrial Limited
Room 609, 6/F, Kwong Sang Hong Centre, No.151-153 Hoi Bun Road,
Kwun Tong, Kowloon, Hong Kong

Technical Standards: FCC Part 15 B

File Number: MOST100204F1

Date of test: Feb. 25 ~ Mar. 15, 2010

Deviation: None

Condition of Test Sample: Normal

Test Result: PASS

The above equipment was tested by MOST for compliance with the requirements set forth in FCC Part 15 and the Technical Standards mentioned above. This said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment and the level of the immunity endurance of the equipment are within the compliance requirements.

The test results of this report relate only to the tested sample identified in this report.

Tested by (+ signature):

Petter Ping

Petter Ping Mar. 15, 2010

Review by (+ signature):

July Wen

July Wen Mar. 15, 2010

Approved by (+ signature):

Terry Yang

Terry Yang Mar. 15, 2010



2. GENERAL INFORMATION

2.1 PRODUCT INFORMATION

Housing Type:	Plastic
EUT Rating Voltage:	AC 120V/60Hz/ DC7.2V by Battery(6×1.2V)
Voltage During Test:	AC 120V/60Hz
I/O Type of EUT:	DC Input
I/O Q'TY:	1
Model Number:	AW828RX
Series Number:	N/A
Description of Differences:	N/A
Frequency Range:	Receiver: 912.4 MHz-913.6 MHz
Modulate Type:	FM
Antenna Type:	Internal

NOTE:

1. Please refer to Appendix 2 for the photographs of the EUT. For a more detailed features description about the EUT, please refer to User's Manual.

2.2 OBJECTIVE

Perform FCC Part 15 tests for FCC Marking.

2.3 TEST STANDARDS AND RESULTS

Test items and the results are as bellow:

EMISSION			
Standard	Item	Result	Remarks
FCC Part 15B	Conducted	PASS	Meet Class B limit
	Radiated	PASS	Meet Class B limit

- Note:
1. The test result judgment is decided by the limit of measurement standard
 2. The information of measurement uncertainty is available upon the customer's request.

2.4 ENVIRONMENTAL CONDITIONS

During the measurement the environmental conditions were within the listed ranges:

- Temperature: 15-35°C
- Humidity: 30-60 %
- Atmospheric pressure: 86-106 kPa

2.5 MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in Measurement” (GUM) published by ISO.

- Uncertainty of Conducted Emission, $U_c = \pm 1.8\text{dB}$
- Uncertainty of Radiated Emission, $U_c = \pm 3.2\text{dB}$

3. TEST METHODOLOGY

3.1 TEST FACILITY

Test Site:	Most Technology Service Co.,ltd
Location:	No.5, Langshan 2nd Rd, North Hi-Tech Industrial park, Nanshan, Shenzhen, Guangdong, China
Description:	<p>There is one 3m semi-anechoic an area test sites and two line conducted labs for final test. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2003 and CISPR 16 requirements.</p> <p>The FCC Registration Number is 490827.</p> <p>The IC Registration Number is 46405-7103.</p> <p>The CNAS Registration Number is CNAS L3573.</p>
Site Filing:	The site description is on file with the Federal Communications Commission, 7435 Oakland Mills Road, Columbia, MD 21046.
Instrument Tolerance:	All measuring equipment is in accord with ANSI C63.4:2003 and CISPR 16 requirements that meet industry regulatory agency and accreditation agency requirement.
Ground Plane:	Two conductive reference ground planes were used during the Line Conducted Emission, one in vertical and the other in horizontal. The dimensions of these ground planes are as below. The vertical ground plane was placed distancing 40 cm to the rear of the wooden test table on where the EUT and the support equipment were placed during test. The horizontal ground plane projected 50 cm beyond the footprint of the EUT system and distanced 80 cm to the wooden test table. For Radiated Emission Test, one horizontal conductive ground plane extended at least 1m beyond the periphery of the EUT and the largest measuring antenna, and covered the entire area between the EUT and the antenna.

3.2 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4:2003,Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4:2003.

4 SETUP OF EQUIPMENT UNDER TEST

4.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

4.2 SUPPORT EQUIPMENT

Device Type	Brand	Model	FCC ID	Series No.	Audio Cable	Power Cord
MP3	TECLAST DIGITAL	TX-21+	---	2217W093503 266	N/A	N/A
Transmitter	N/A	RAC822C	NOY-RCA82 2CTX	N/A	1.85m Un-shielded	1.80m Un-shielded

Remark:

All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4. 3 TEST EQUIPMENT LIST

Instrumentation: The following list contains equipment used at MOST for testing. The equipment conforms to the CISPR 16-1 / ANSI C63.2 Specifications for Electromagnetic Interference and Field Strength Instrumentation from 10 kHz to 1.0 GHz or above.

No.	Equipment	Manufacturer	Model No.	S/N	Calculator due date
1	Test Receiver	Rohde & Schwarz	ESCI	100492	2011/03/14
2	L.I.S.N.	Rohde & Schwarz	ENV216	100093	2011/03/14
3	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2011/03/14
4	Terminator	Hubersuhner	50Ω	No.1	2011/03/14
5	RF Cable	SchwarzBeck	N/A	No.1	2011/03/14
6	Test Receiver	Rohde & Schwarz	ESPI	101202	2011/03/14
7	Bilog Antenna	Sunol	JB3	A121206	2011/03/14
8	Test Antenna - Horn	Schwarzbeck	BBHA 9120C	--	2011/03/14
9	Test Antenna - Bi-Log	Schwarzbeck	VULB 9163	--	2011/03/14
10	Cable	Resenberger	N/A	NO.1	2011/03/14
11	Cable	SchwarzBeck	N/A	NO.2	2011/03/14
12	Cable	SchwarzBeck	N/A	NO.3	2011/03/14
13	DC Power Filter	DuoJi	DL2×30B	N/A	2011/03/14
14	Single Phase Power Line Filter	DuoJi	FNF 202B30	N/A	2011/03/14
15	3 Phase Power Line Filter	DuoJi	FNF 402B30	N/A	2011/03/14
16	Test Receiver	Rohde & Schwarz	ESCI	100492	2011/03/14
17	Absorbing Clamp	Luthi	MDS21	3635	2011/03/14
18	Coaxial Switch	Anritsu Corp	MP59B	6200283933	2011/03/14
19	AC Power Source	Kikusui	AC40MA	LM003232	2011/03/14
20	Test Analyzer	Kikusui	KHA1000	LM003720	2011/03/14
21	Line Impedence Network	Kikusui	LIN40MA-PCR-L	LM002352	2011/03/14
22	ESD Tester	Kikusui	KES4021	LM003537	2011/03/14
23	EMC PRO System	EM Test	UCS-500-M4	V0648102026	2011/03/14
24	Signal Generator	IFR	2032	203002/100	2011/03/14
25	Amplifier	A&R	150W1000	301584	2011/03/14
26	CDN	FCC	FCC-801-M2-25	47	2011/03/14
27	CDN	FCC	FCC-801-M3-25	107	2011/03/14
28	EM Injection Clamp	FCC	F-203I-23mm	403	2011/03/14
29	RF Cable	MIYAZAKI	N/A	No.1/No.2	2011/03/14
30	Universal Radio Communication Tester	ROHDE&SCHWARZ	CMU200	0304789	2011/03/14
31	Telecommunication Antenna	European Antennas	PSA 75301R/170	0304213	2011/03/14

NOTE: Equipments listed above have been calibrated and are in the period of validation.

5. FCC 47 CFR PART 15B REQUIREMENTS

5.1 GENERAL INFORMATION

EUT Function and Test Mode

The EUT has been tested under normal operating (TX) and standby (RX) condition.

The field strength of radiation emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis).

The following data show only with the worst case setup.

The worst case of Y axis was reported.

Based on client request, all normal using modes of the receiving audio signal function were tested but only the worst test data of the worst mode is reported by this report.

6. LINE CONDUCTED EMISSION TEST

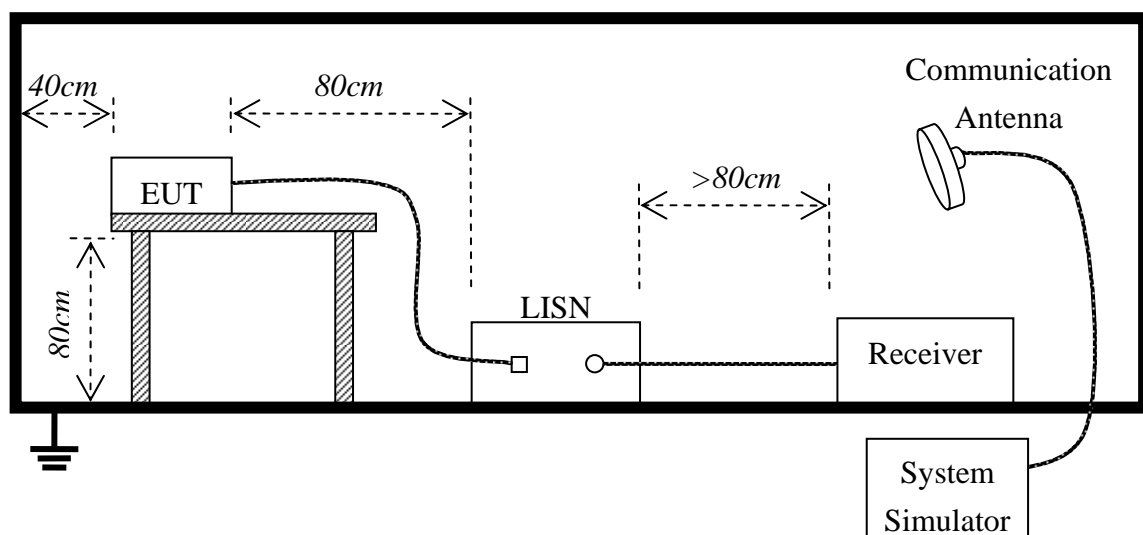
6.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz-500kHz	66-56	56-46
500kHz-5MHz	56	46
5MHz-30MHz	60	50

****Note:** 1. the lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

6.2. BLOCK DIAGRAM OF TEST SETUP



6.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

- 1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per FCC Part 15 (see Test Facility for the dimensions of the ground plane used). When the EUT is floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2) Support equipment, if needed, was placed as per FCC Part 15.
- 3) All I/O cables were positioned to simulate typical actual usage as per FCC Part 15.
- 4) The EUT received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5) All support equipments received power from a second LISN supplying power of AC 120V/60Hz, if any.
- 6) The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7) Analyzer / Receiver scanned from 150 kHz to 30 MHz for emissions in each of the test modes.
- 8) During the above scans, the emissions were maximized by cable manipulation.
- 9) The following test mode(s) were scanned during the preliminary test:

Preliminary Conducted Emission Test				
Frequency Range Investigated		150KHz TO 30 MHz		
Mode of operation	Date	Report No.	Data#	Worst Mode
Standby	2010-03-01	MOST100204F1	AW828RX_0_(L, N)	<input type="checkbox"/>
Normal Working	2010-03-01	MOST100204F1	AW828RX_1_(L, N)	<input checked="" type="checkbox"/>

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

6.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

EUT and support equipment was set up on the test bench as per step 9 of the preliminary test.

A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.

The test data of the worst case condition(s) was reported on the Summary Data page.

6.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

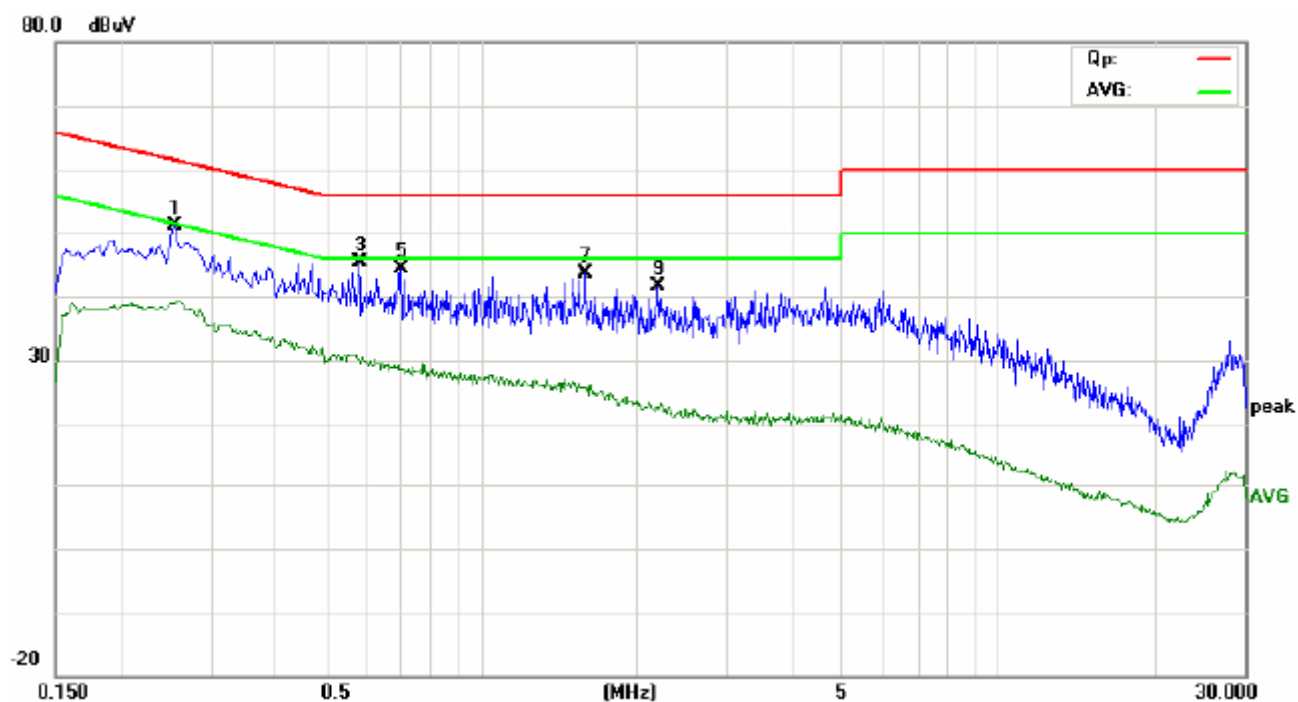
EUT : Outdoor Speaker
M/N : AW828RX
Mode : Normal Working

Power : AC 120V/60Hz
Temperature : 27 °C
Humidity : 60%

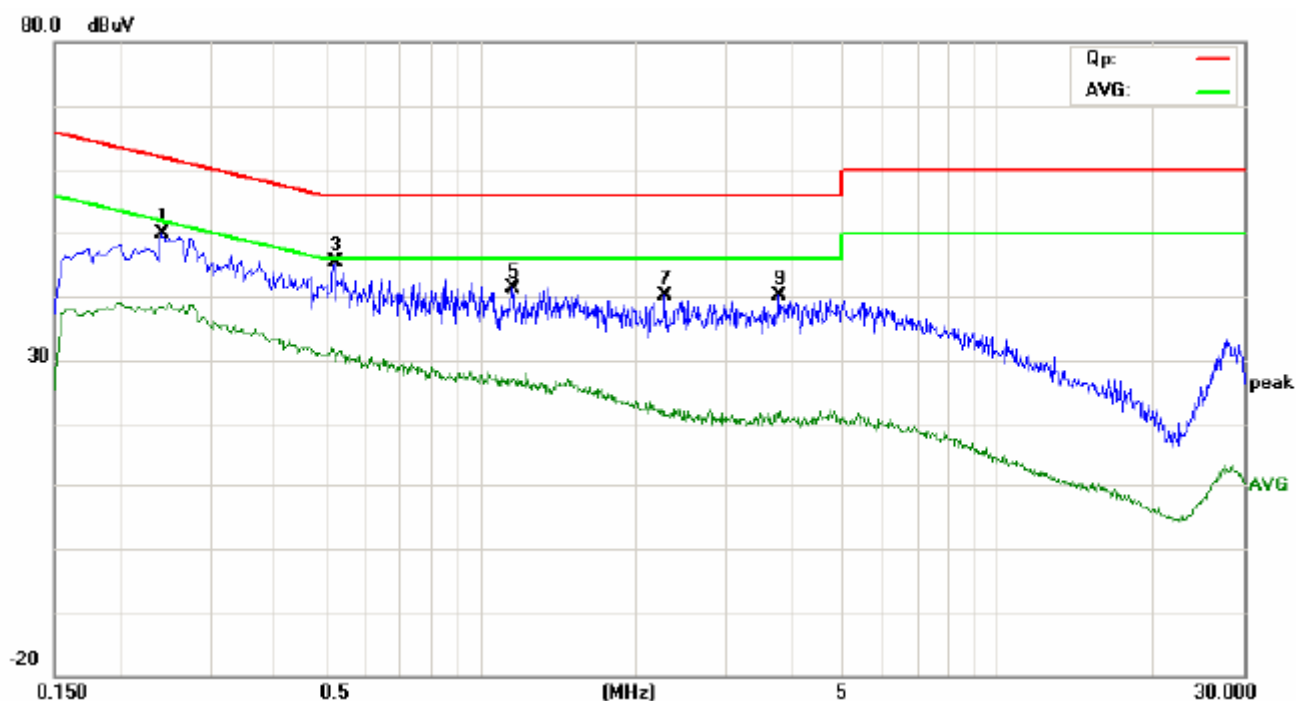
FREQ (MHz)	Emission Level		Limit Level(dBuV)		Margin		Line
	QP	AV	QP	AV	QP	AVG	
0.254	51.07	38.82	61.63	51.63	-10.56	-12.81	L
0.582	45.26	30.02	56.00	46.00	-10.74	-15.98	L
0.698	44.36	28.54	56.00	46.00	-11.64	-17.46	L
1.590	43.64	25.59	56.00	46.00	-12.36	-20.41	L
2.194	41.59	22.54	56.00	46.00	-14.41	-23.46	L
0.242	49.77	38.35	62.03	52.03	-12.26	-13.68	N
0.522	45.29	31.06	56.00	46.00	-10.71	-14.94	N
1.158	41.03	26.83	56.00	46.00	-14.97	-19.17	N
2.274	40.19	21.89	56.00	46.00	-15.81	-24.11	N
3.798	40.21	21.53	56.00	46.00	-15.79	-24.47	N

Freq. = Emission frequency in MHz
 Reading level = Uncorrected Analyzer/Receiver reading
 Factor = Cable loss + LISN inserting loss
 Emission level = Reading level + Factor
 Limit = Limit stated in standard
 Margin = Reading in reference to limit
 “---” = The emission level complied with the Average limits, with at least 2 dB margin, so no further recheck.

1 · Mains terminal disturbance voltage, L phase



2 · Mains terminal disturbance voltage, N phase



7. RADIATED EMISSION TEST

7.1. LIMITS OF RADIATED DISTURBANCES AT 3M DISTANCES FOR CLASS B

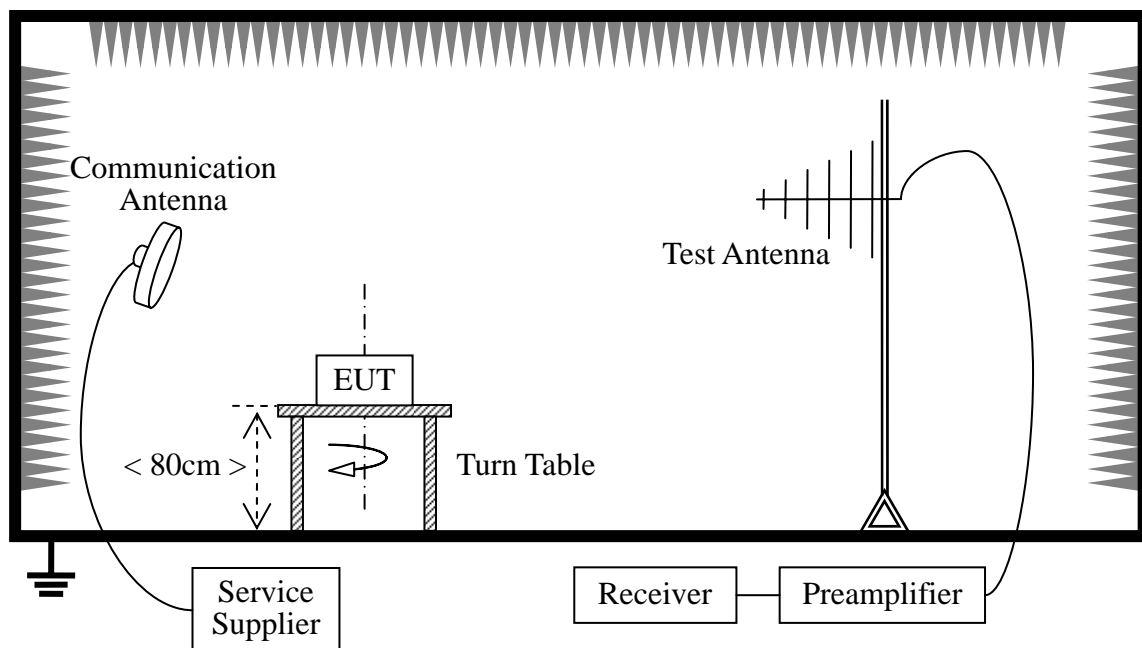
According to FCC section 15.109 (b), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

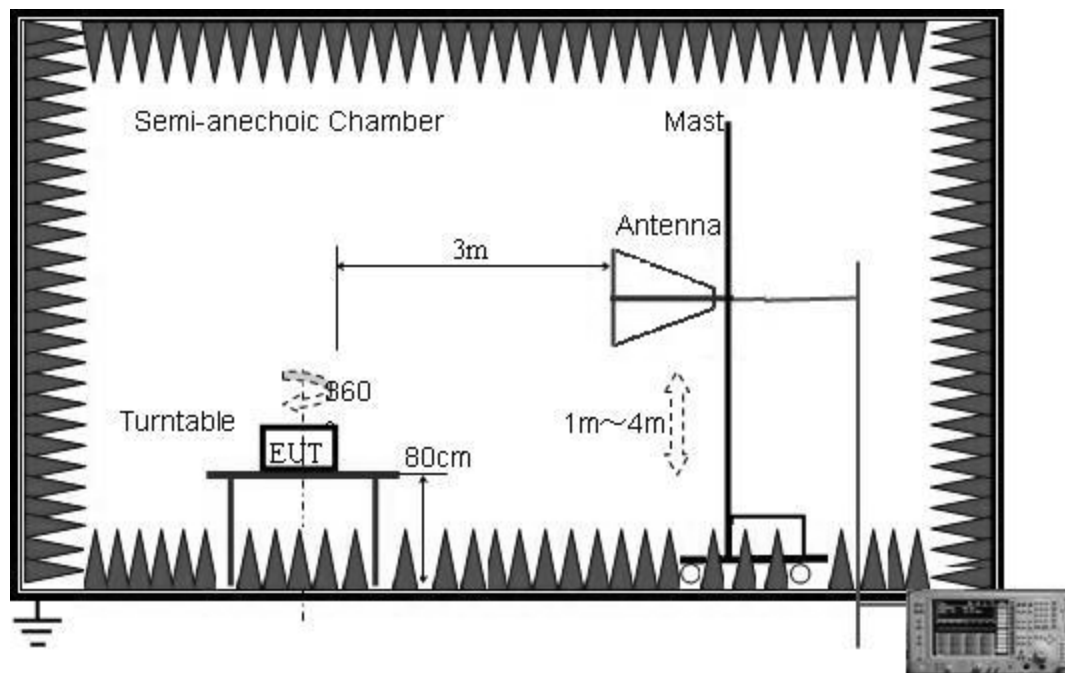
Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Measurement Distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

7.2 TEST DESCRIPTION

Test Setup:

Below 1GHz:



Above 1GHz:

The Module is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading. During the measurement, the EUT is activated and transmitting with the other device (Supply by the Applicant) during the test.

For the Test Antenna:

- (a) In the frequency range of 9 kHz to 30MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- (b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

Preliminary Radiated Emission Test				
Frequency Range Investigated			30 MHz TO 1000 MHz	
Mode of operation	Date	Report No.	Data#	Worst Mode
Normal Working	2010-03-01	MOST100204F1	AW828RX_(H, V)	<input checked="" type="checkbox"/>

7.3 TEST RESULT

EUT : Outdoor Speakers
M/N : AW828RX
Mode : Normal Working

Power : AC 120V/60Hz
Temperature : 27 °C
Humidity : 60%

Frequency Range Investigated (30 MHz TO 1000 MHz)							
Freq. (MHz)	Reading(RA) (dBuV)	Corr.Factor(CF) (dB)	Measured(FS) (dBuV/m)	Limits(QP) (dBuV/m)	Safe Margins (dBuV/m)	Ant. H/V	Mark
70.740	7.86	11.69	19.55	40.00	-20.45	H	Q
298.690	3.75	19.30	23.05	46.00	-22.95	H	Q
508.210	9.02	21.46	30.48	46.00	-15.52	H	Q
670.200	4.79	24.50	29.29	46.00	-16.71	H	Q
841.890	9.32	27.12	36.44	46.00	-9.56	H	Q
41.640	21.08	15.75	36.83	40.00	-3.17	V	Q
56.190	15.43	10.72	26.15	40.00	-13.85	V	Q
267.650	4.71	18.60	23.31	46.00	-22.69	V	Q
504.330	16.20	21.40	37.60	46.00	-8.40	V	Q
841.890	8.31	27.12	35.43	46.00	-10.57	V	Q

Note:

The maximum radiated emission is searched using PK, QP and AV detectors; the emission levels more than the limits, and that have narrow margins from the limits will be re-measured with AV and QP detectors.

Above 1GHz:



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86170306 Fax: 0755-86170310

Radiated Emission Measurement

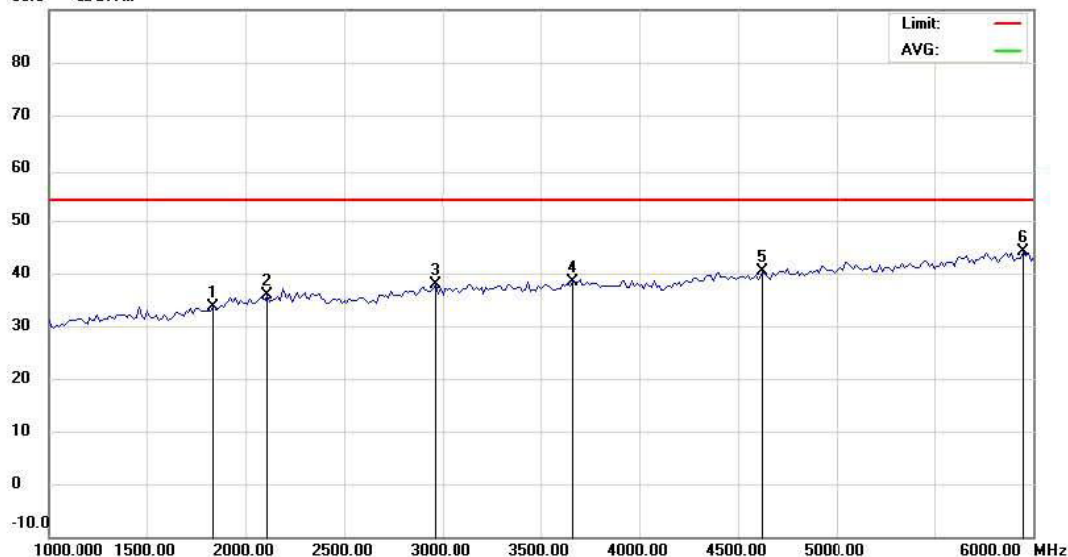
File :0225

Data :#24

Date: 2010-02-25

Time: 17:35:42

90.0 dBuV/m



Site: site MOST 3M

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Part 15B 3M(1G-3G)

Power: AC 120V/60Hz

Humidity: 60 %

EUT: 900M Outdoor Speakers AW828

Distance:

M/N: AW828RX

Mode: Normal Working

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		1837.500	45.43	-11.77	33.66	54.00	-20.34	peak		
2		2112.500	45.25	-9.36	35.89	54.00	-18.11	peak		
3		2962.500	45.22	-7.34	37.88	54.00	-16.12	peak		
4		3662.500	44.24	-5.75	38.49			peak		
5		4625.000	43.90	-3.58	40.32			peak		
6	*	5950.000	44.15	0.02	44.17			peak		

*:Maximum data x:Over limit l:over margin



Address: No.5, Langshan 2nd Rd., North Hi-Tech Industrial park
Guangdong, China
Tel: 0755-86170306 Fax: 0755-86170310

Radiated Emission Measurement

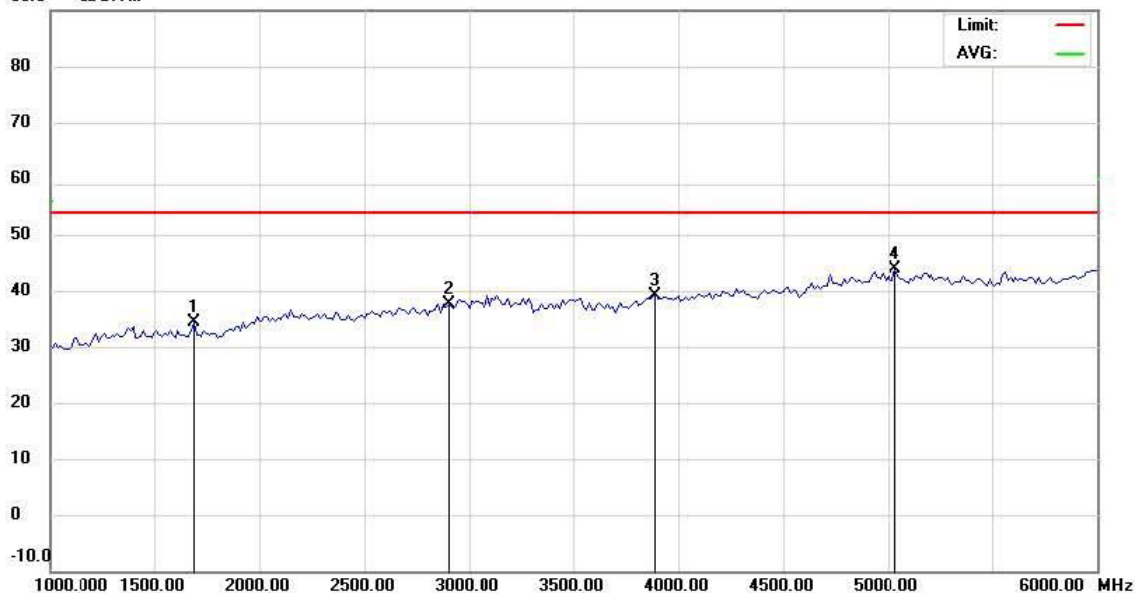
File : 0225

Data : #25

Date: 2010-02-25

Time: 17:37:26

90.0 dBuV/m



Site: site MOST 3M

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part 15B 3M(1G-3G)

Power: AC 120V/60Hz

Humidity: 60 %

EUT: 900M Outdoor Speakers AW828

Distance:

M/N: AW828RX

Mode: Normal Working

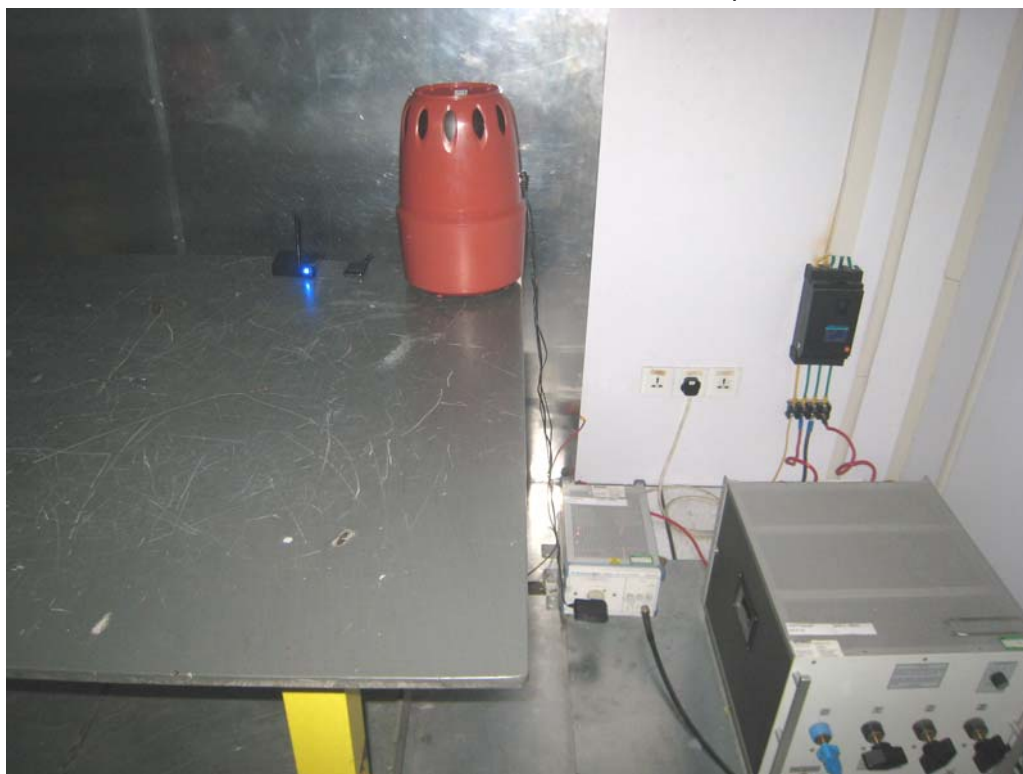
Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		1687.500	47.10	-12.60	34.50	54.00	-19.50	peak		
2		2900.000	45.42	-7.71	37.71	54.00	-16.29	peak		
3		3887.500	44.60	-5.36	39.24			peak		
4	*	5037.500	45.78	-2.01	43.77			peak		

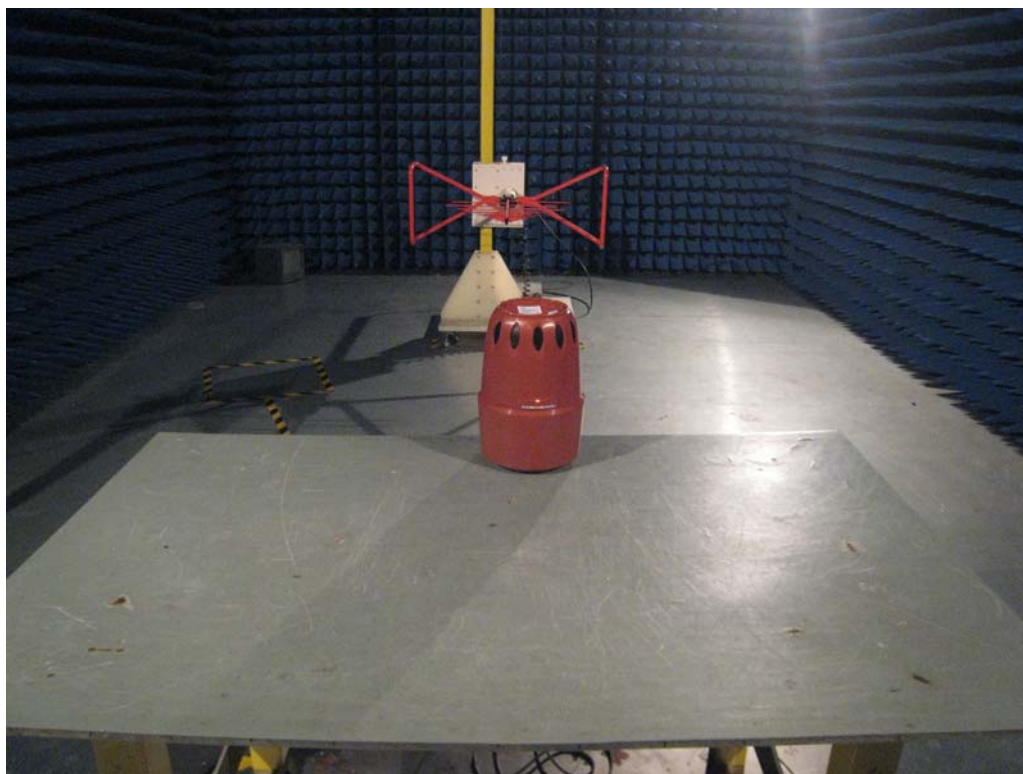
*:Maximum data x:Over limit |:over margin

APPENDIX 1
PHOTOGRAPHS OF TEST SETUP

Line Conducted Emission Test Setup



Radiated Emission Test Setup



APPENDIX 2

PHOTOGRAPHS OF EUT

TOP VIEW OF SAMPLE



BOTTOM VIEW OF SAMPLE



VIEW OF SAMPLE



VIEW OF SAMPLE



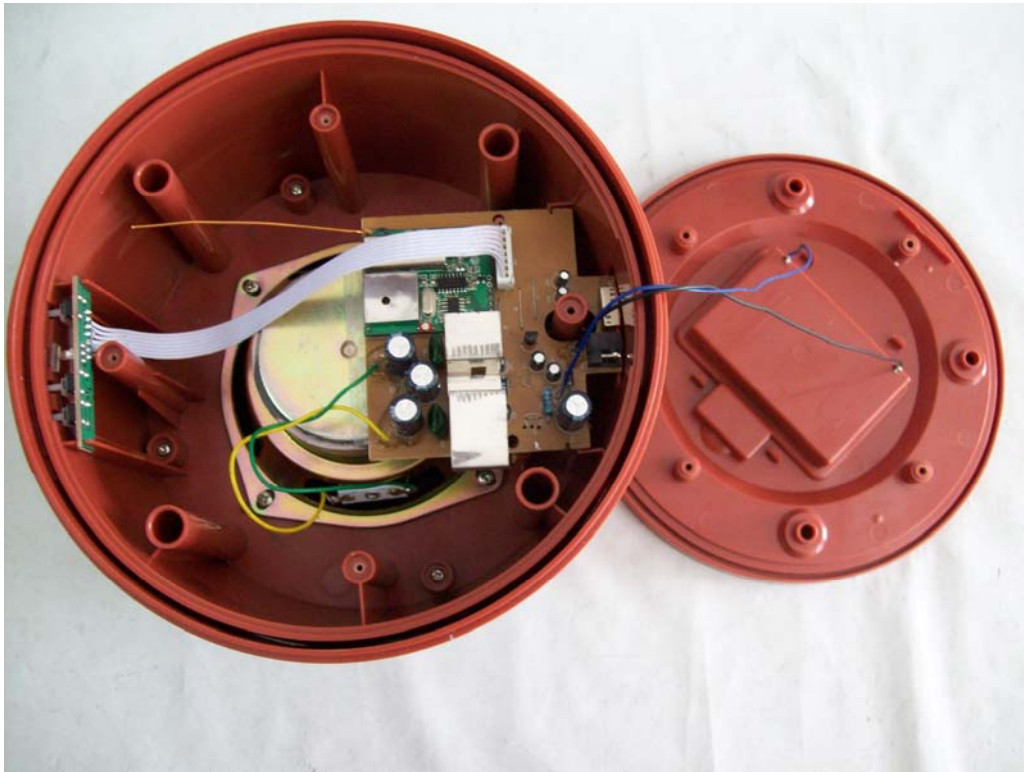
PHOTO OF THE ADAPTER



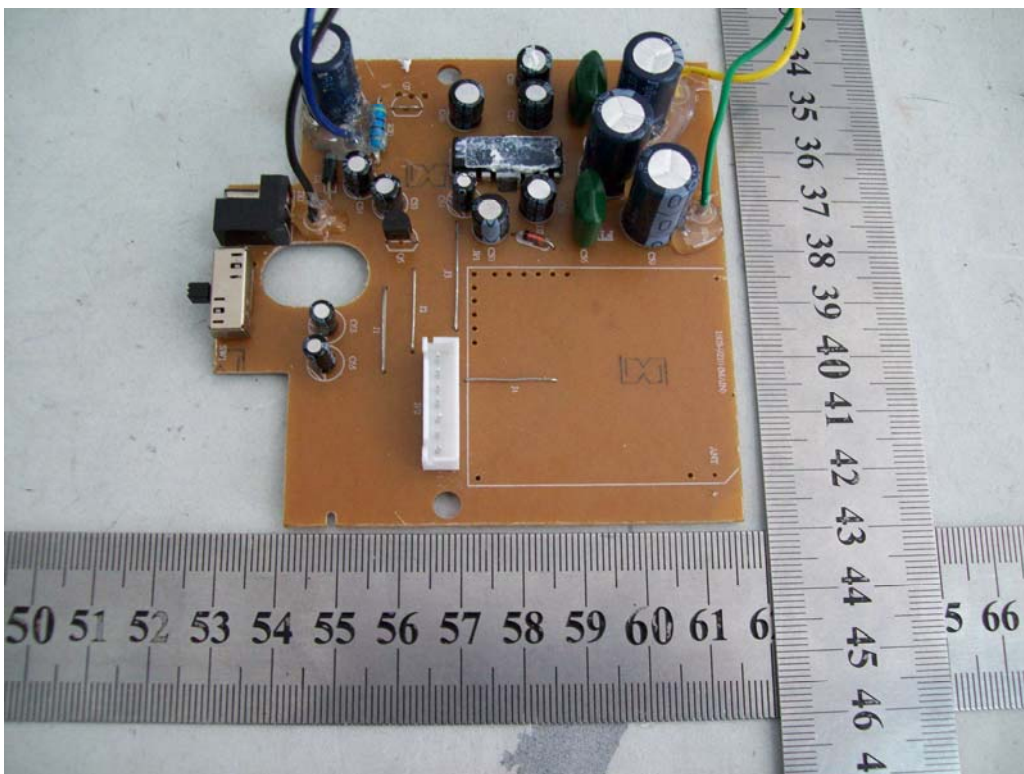
PHOTO OF THE ENTIRE SAMPLE



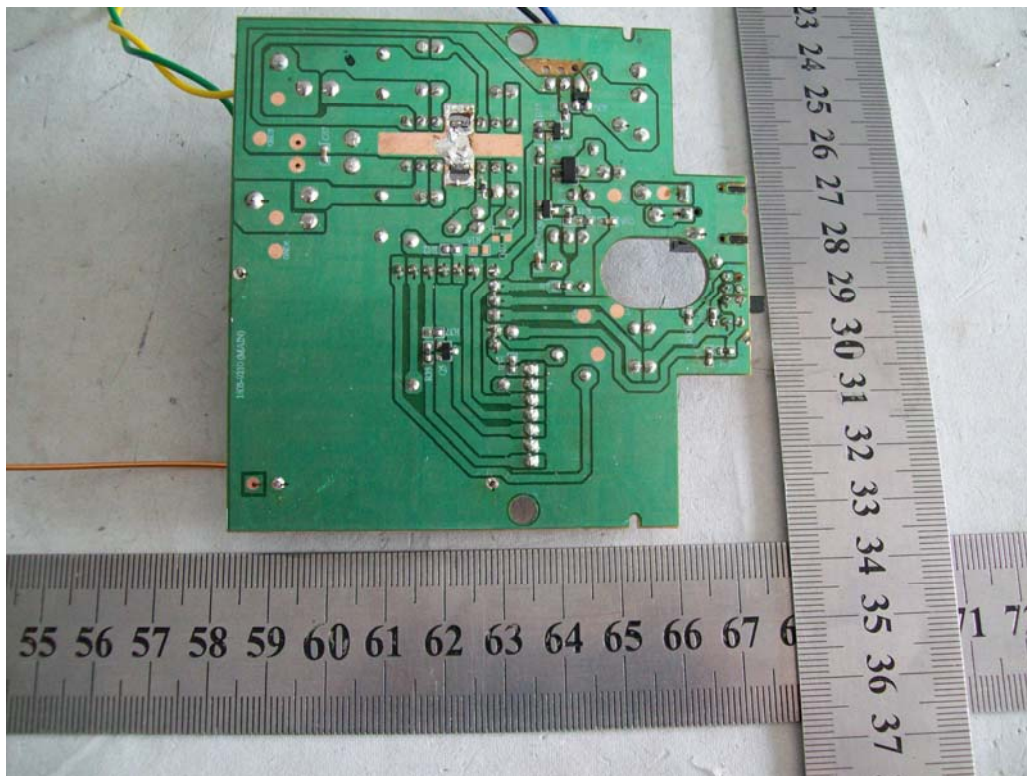
INTERNAL PHOTO OF SAMPLE -1



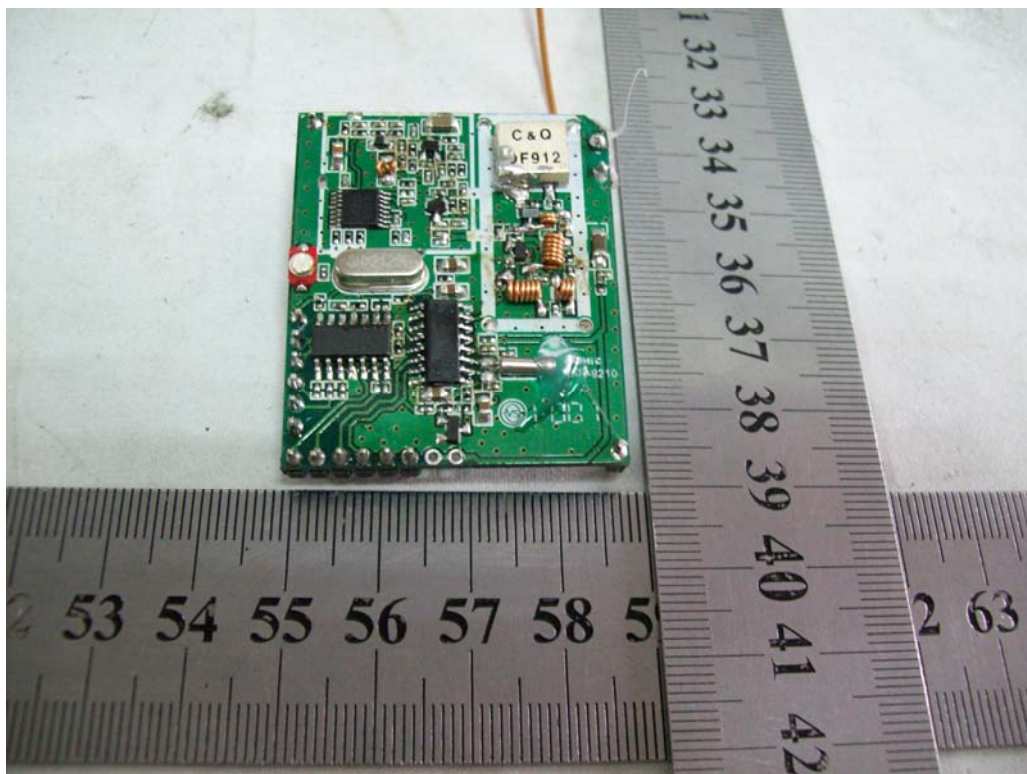
INTERNAL PHOTO OF SAMPLE -2



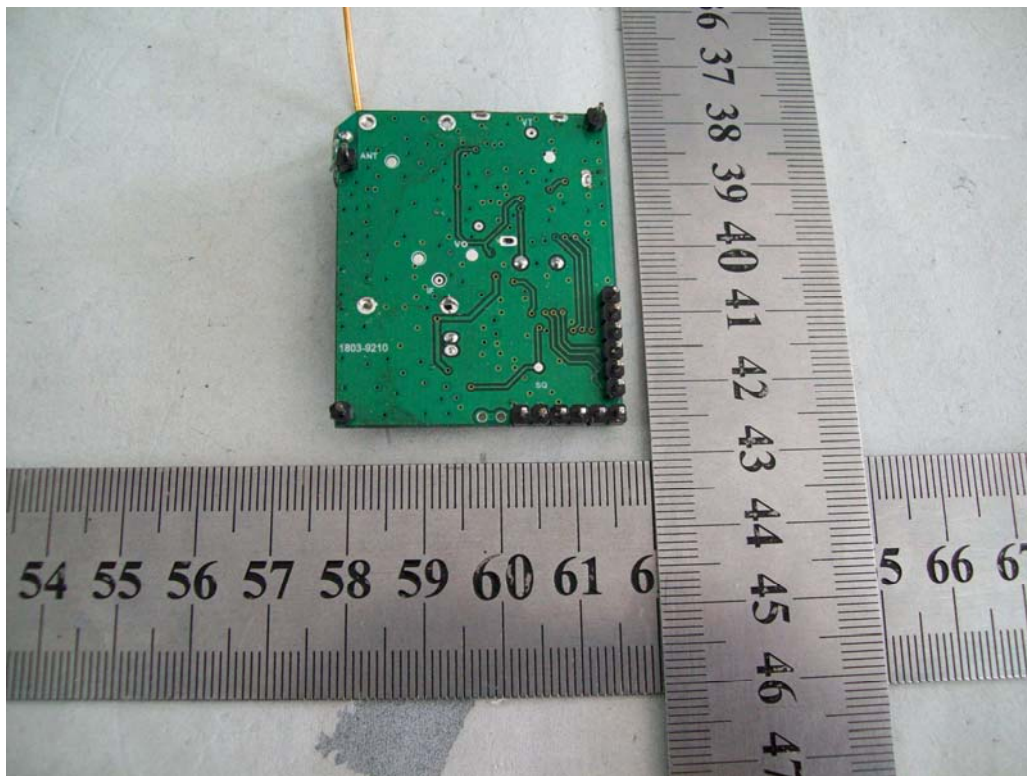
INTERNAL PHOTO OF SAMPLE -3



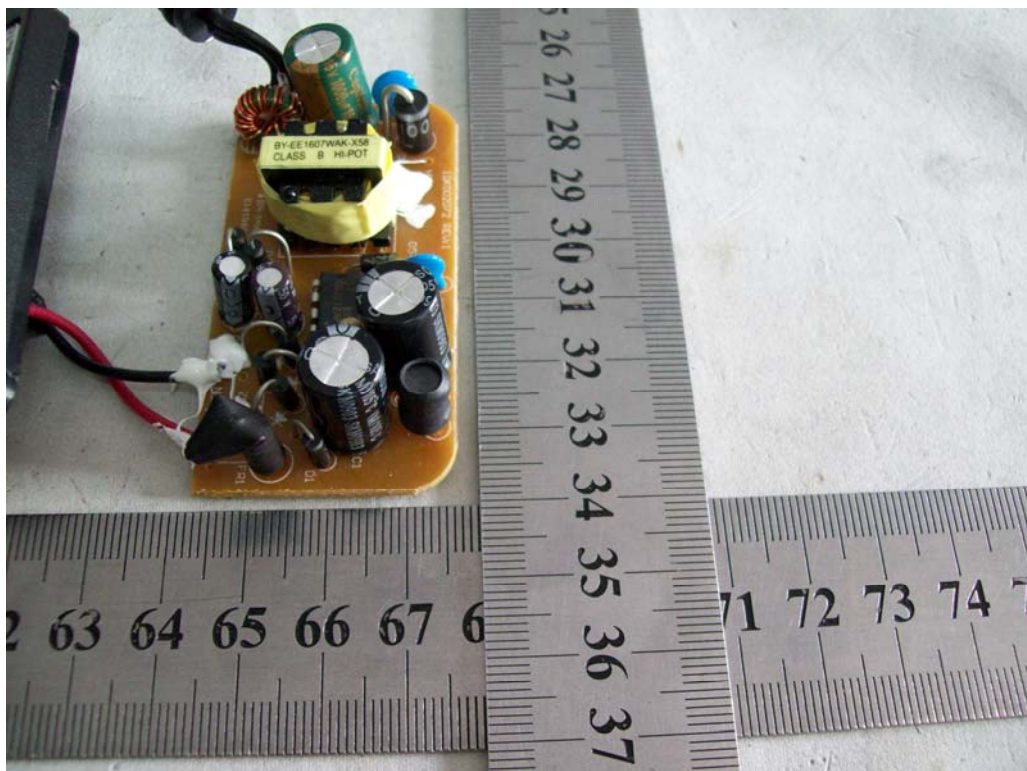
INTERNAL PHOTO OF SAMPLE -4



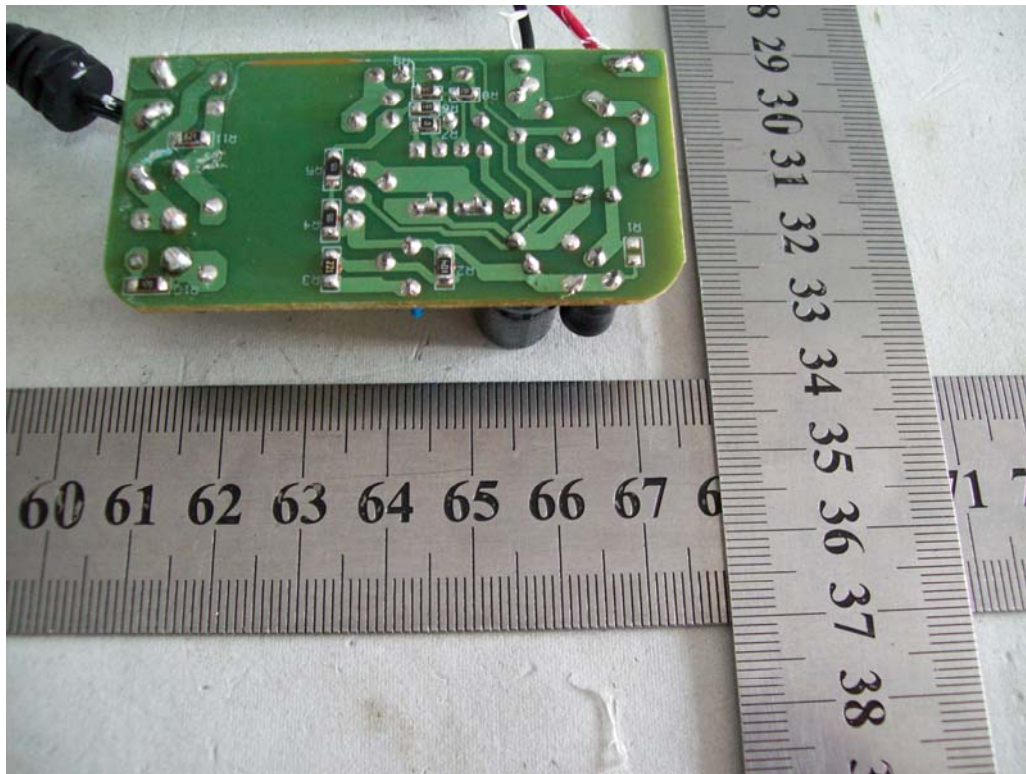
INTERNAL PHOTO OF SAMPLE - 5



INTERNAL PHOTO OF THE ADAPTER -1



INTERNAL PHOTO OF THE ADAPTER-2



-----END OF REPORT-----