

## EMC TEST REPORT

The device described below is tested by Dongguan Nore Testing Center Co., Ltd. to determine the maximum emission levels emanating from the device, the severe levels which the device can endure and E.U.T.'s performance criterion. The test results are contained in this test report. Dongguan Nore Testing Center Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

Applicant : Shenzhen Fenda Technology Co., Ltd.  
Address : Fenda Hi-Tech Park, Zhoushi Road, Shiyan Town, Baoan District, Shenzhen City, Guangdong, China  
Manufacturer /Factory : Shenzhen Fenda Technology Co., Ltd.  
Address : Fenda Hi-Tech Park, Zhoushi Road, Shiyan Town, Baoan District, Shenzhen City, Guangdong, China  
E.U.T. : 2.1 Computer Multimedia Speaker  
Brand Name : F&D  
Model No. : A140X, A140U, A140BT, A140F, A160X, A160BT, A140XF  
(For model differences, refer to Section 2.1)  
Measurement Standard : EN 55032: 2015  
EN 61000-3-2: 2014, EN 61000-3-3: 2013  
EN 55020: 2007+A11: 2011  
(EN 61000-4-2: 2009, EN 61000-4-3: 2006+A2: 2010,  
EN 61000-4-4: 2012)  
Date of Receiver : August 31, 2016  
Date of Test : April 28, 2015 to May 13, 2015; August 31, 2016 to September 22, 2016  
Date of Report : September 22, 2016

This Test Report is Issued Under the Authority of :

Prepared by



Alina Guo / Engineer

Approved & Authorized Signer



Ion Fan / Authorized Signatory

This report shows that the E.U.T. is technically compliant with the EN 55032, EN 61000-3-2, EN 61000-3-3, and EN 55020. This report applies to above tested sample only and shall not be reproduced in part without written approval of Dongguan Nore Testing Center Co., Ltd.

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APPENDIX I (Photos of the E.U.T.) (7 pages)

## Revision History of This Test Report

Report Number	Description	Issued Date
NTC1504130E	Initial Issue	2015-05-13
NTC1504130E-1	Changed standard, model number and updated the edition of the EC Council Directive.	2016-09-22

## 1. SUMMARY OF TEST RESULTS

The E.U.T. has been tested according to the following specifications:

EMISSION			
Standard	Test Type	Result	Remarks
EN 55032: 2015	Mains Terminal Disturbance Voltage Test	PASS	Uncertainty: 2.7dB
	Antenna Terminal Disturbance Voltage Test	N/A	Not Applicable
	Radiated Emission Test	PASS	Uncertainty: 3.4dB
EN 61000-3-2: 2014	Harmonic current emission	PASS	Meets the requirements.
EN 61000-3-3: 2013	Voltage fluctuations & flicker	PASS	Meets the requirements.

IMMUNITY(EN 55020: 2007+A11: 2011)			
Standard	Test Type	Result	Remarks
EN 55020: 2007+A11: 2011	Input immunity (S1)	N/A	Not Applicable
	Immunity from conducted voltages (S2a)	PASS	Meets the requirements.
	Immunity from conducted currents (S2b)	N/A	Not Applicable
	Immunity from radiated fields (S3)	PASS	Meets the requirements.
	Screening effectiveness (S4)	N/A	Not Applicable
EN 61000-4-2: 2009	Electrostatic discharge immunity test	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-3: 2006+A2: 2010	Radiated, radio-frequency, electromagnetic field immunity test(S5)	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-4: 2012	Electrical fast transient/ burst immunity test	PASS	Meets the requirements of Performance Criterion B

## 2. GENERAL INFORMATION

### 2.1 Details of E.U.T.

E.U.T.	: 2.1 Computer Multimedia Speaker
Model No.	: A140X, A140U, A140BT, A140F, A160X, A160BT, A140XF (We prepare A140X for EMC test.)
Brand Name	: F&D
Rating	: AC 220-240V 50/60Hz, 0.3A
Test Voltage	: AC 230V 50Hz
Cable	: AC Mains: 1.45m Line IN Line: 1.45m unshielded AUX IN Line: 1.45m unshielded
Description of model difference	: All models have the same circuitry, PCB layout, electrical mechanical and physical construction. Their differences in model number due to trading purpose.
Remark	: 1. This report was an additional report based on original report NTC1504130E. 2. Both of reports are the same. But this report has changed standard, model number and updated the edition of the EC Council Directive. 3. The original model and new model are the same. Their difference in appearance. 4. According this change, we have retest items (CE, RE, Harmonic, Flicker, ESD, EFT), details refer to the test report.

## 2.2 Description of Support Device

iPod	: Manufacturer: Apple M/N: A1446 S/N: DCYNV5EMFOGQ
iPhone	: Manufacturer: Apple M/N: iPhone 4 S/N: 84133UUVA4S 5K152N41A4S
USB Flash disk	: Manufacturer: TOSHIBA M/N: 8GB
FM Signal Generator	: Manufacturer: LEADER M/N: 3214 S/N: 1100164

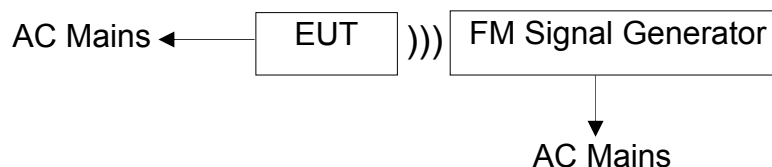
## 2.3 Block Diagram of Test Setup

Block diagram of connection between the E.U.T. and simulators

### (1) Audio IN



### (2) FM Mode



### (3) USB Playing





## 2.4 Test Facility

### Site Description

#### EMC Lab

: Listed by CNAS, August 14, 2015  
The certificate is valid until August 13, 2018  
The Laboratory has been assessed and proved to  
be in compliance with CNAS/CL01  
The Certificate Registration Number is L5795.

Listed by FCC, July 03, 2014  
The Certificate Number is 665078.

Listed by Industry Canada, June 18, 2014  
The Certificate Registration Number. Is 46405-9743

#### Name of Firm

: Dongguan Nore Testing Center Co., Ltd.  
(Dongguan NTC Co., Ltd.)

#### Site Location

: Building D, Gaosheng Science & Technology Park,  
Zhouxi Longxi Road, Nancheng District, Dongguan  
City, Guangdong Province, China

## 2.5 Abnormalities from Standard Conditions

None



### 3. MEASURING DEVICES AND TEST EQUIPMENT

#### 3.1 For Mains terminals Disturbance voltage test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	101152	Mar. 07, 2016	1 Year
2.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Mar. 07, 2016	1 Year
3.	L.I.S.N	Schwarzbeck	NNLK8129	8129-212	Mar. 07, 2016	1 Year
4.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Mar. 07, 2016	1 Year

#### 3.2 For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI7	100837	Mar. 07, 2016	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Apr. 25, 2016	1 Year
3.	Positioning Controller	UC	UC 3000	N/A	N/A	N/A
4.	Color Monitor	SUNSPO	SP-140A	N/A	N/A	N/A
5.	Single Phase Power Line Filter	SAEMC	PF201A-32	110210	N/A	N/A
6.	3 Phase Power Line Filter	SAEMC	PF401A-200	110318	N/A	N/A
7.	DC Power Filter	SAEMC	PF301A-200	110245	N/A	N/A
8.	Cable	Huber+Suhner	CBL3-NN-9M	21490001	Mar. 07, 2016	1 Year
9.	Cable	Huber+Suhner	RG223U	N/A	Mar. 07, 2016	1 Year
10.	Power Amplifier	HP	HP 8447D	1145A00203	Mar. 07, 2016	1 Year

#### 3.3 For Harmonic Current / Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Power Frequency Test System	California Instruments	CTS	72846	Apr. 25, 2016	1 Year
2.	Software	California Instruments	CTS30	N/A	N/A	N/A

#### 3.4 For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	TESEQ	NSG 437	432	Apr. 26, 2016	1 Year

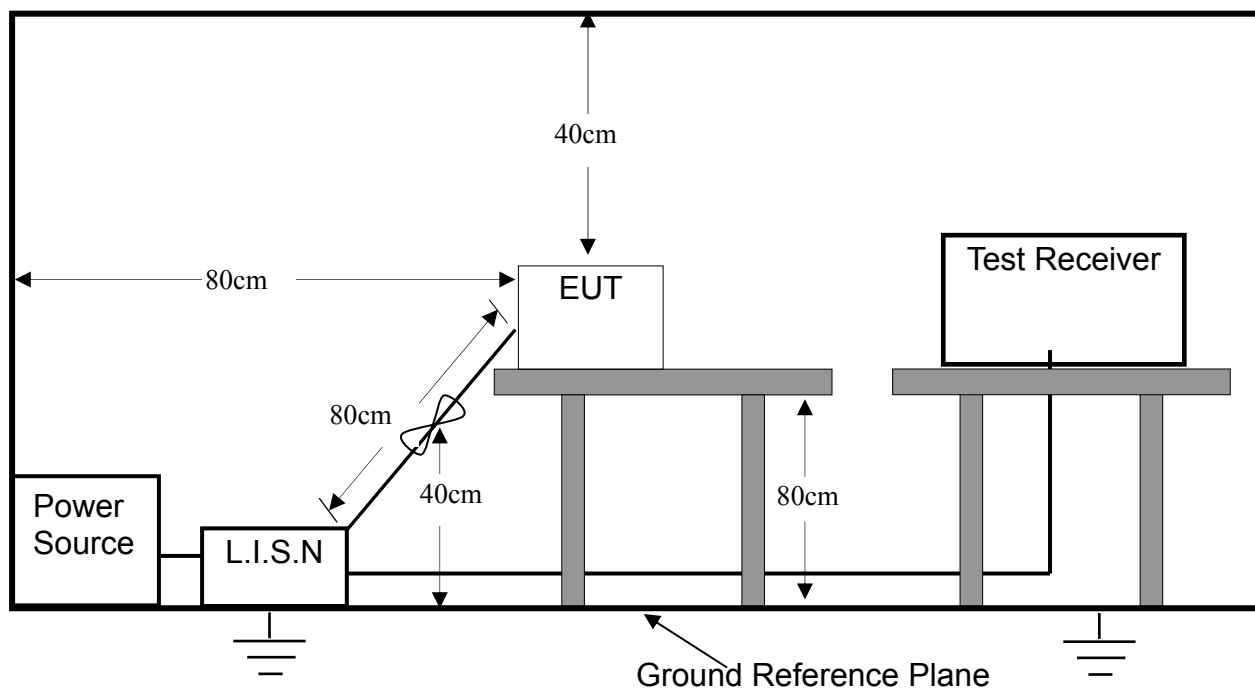
### 3.5 For Electrical Fast Transient /Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Burst Tester	EM TEST	UCS 500N	V1104108683	Mar. 07, 2016	1 Year
2.	Coupling Clamp	EM TEST	HFK	0311-94	Mar. 07, 2016	1 Year
3.	Test Soft	EM TEST	lec. control	N/A	N/A	N/A

### 3.6 For EN55020 Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Broadcast System Test	Rohde&Schwarz	SFU	101543	May 14, 2014	N/A
2.	TV Generator PAL	Rohde&Schwarz	SGPF	100200	May 14, 2014	1 Year
3.	Spectrum Analyzer	Rohde&Schwarz	FSL3	101507	May 14, 2014	1 Year
4.	Signal Generator	Rohde&Schwarz	SMB100A	102382	May 14, 2014	1 Year
5.	Signal Generator	Rohde&Schwarz	SMB100A	102383	May 14, 2014	1 Year
6.	Power Meter	Rohde&Schwarz	NRVS	101732	May 14, 2014	1 Year
7.	Audio Analyzer	Rohde&Schwarz	UPV	101346	May 14, 2014	N/A
8.	Level Meter	Rohde&Schwarz	URV35	100335	May 14, 2014	1 Year
9.	100V Insertion Unit 50Ω	Rohde&Schwarz	URV5-Z4	100207	May 14, 2014	1 Year
10.	RF Probe	Rohde&Schwarz	URV5-Z7	100657	May 14, 2014	1 Year
11.	Absorbing Clamp	Rohde&Schwarz	MDS-21	100352	May 15, 2014	1 Year

#### 4.1 Block Diagram of Test Setup



Test Standard: EN 55032

Frequency range	Limits (dB(μV))	
(MHz)	Quasi-peak	Average
0.15 to 0.5	66 to 56	56 to 46
0.5 to 5	56	46
5 to 30	60	50

- Note:
1. If the limits for the average detector are met when using the quasi-peak detector, then the limits for the measurements with the average detector are considered to be met.
  2. The higher value measured with and without the outer conductor screen of the antenna terminal connected to earth is considered.
  3. Television receivers with teletext facilities should be tested in teletext mode with teletext picture.

### 4.3 Test Procedure

The E.U.T. is put on the 0.8 m high table and connected to the AC mains through a Artificial Mains Network (AMN). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are checked to find out the maximum conducted emission levels according to the EN 55032 regulations during conducted emission test.

The bandwidth of the test receiver (R&S Test Receiver ESCI) is set at 9 KHz.

### 4.4 Operating Condition of E.U.T.

4.4.1 Setup the E.U.T. and simulators as shown in Section 2.3.

4.4.2 Turn on the power of all equipments.

4.4.3 Let the E.U.T. work in test modes (Audio IN, USB Playing, FM Mode) and test it.

### 4.5 Mains Terminal Disturbance Voltage Test Results

**PASS.**

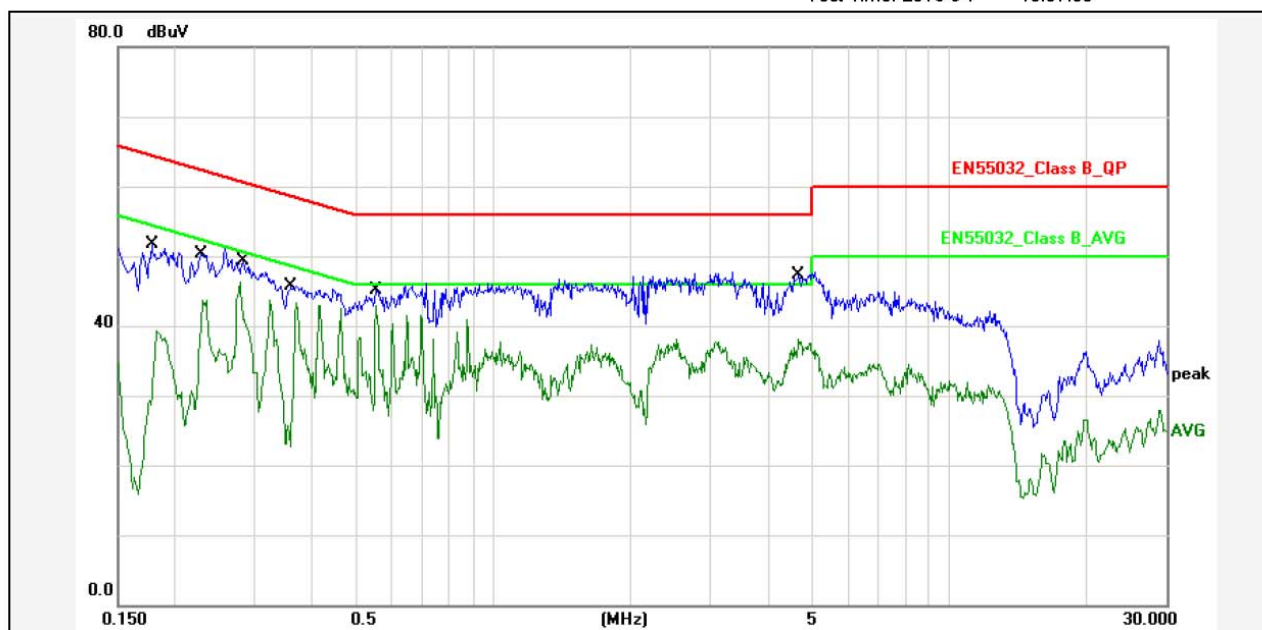
Please refer to the following pages of the worst case: FM Mode.



**Dongguan NTC Co., Ltd.**  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: <http://www.ntc-c.com>

Site: Conduction

Test Time: 2016-9-7 10:57:38



Report No.: A140X

Test Standard: EN55032\_Class B\_QP

Test item: Conducted Emission

Phase: L1

Applicant: FENDA

Temp.( )/Hum.(%): 22(C) / 52 %

Product: 2.1 Computer Multimedia Speaker

Power Rating: AC 230V/50Hz

Model No.: A140X

Test Engineer: Jerry

Test Mode: FM Mode

Remark:

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1780	10.80	38.40	49.20	64.57	-15.37	QP	P	
2	0.1780	10.80	25.90	36.70	54.57	-17.87	AVG	P	
3	0.2279	10.80	36.70	47.50	62.52	-15.02	QP	P	
4	0.2279	10.80	29.90	40.70	52.52	-11.82	AVG	P	
5	0.2819	10.80	35.60	46.40	60.76	-14.36	QP	P	
6	0.2819	10.80	32.50	43.30	50.76	-7.46	AVG	P	
7	0.3595	10.80	31.90	42.70	58.74	-16.04	QP	P	
8	0.3595	10.80	30.00	40.80	48.74	-7.94	AVG	P	
9	0.5540	10.80	31.30	42.10	56.00	-13.90	QP	P	
10	0.5540	10.80	29.00	39.80	46.00	-6.20	AVG	P	
11	4.6819	10.80	33.50	44.30	56.00	-11.70	QP	P	
12	4.6819	10.80	24.40	35.20	46.00	-10.80	AVG	P	

Note: Level=Reading+Factor.

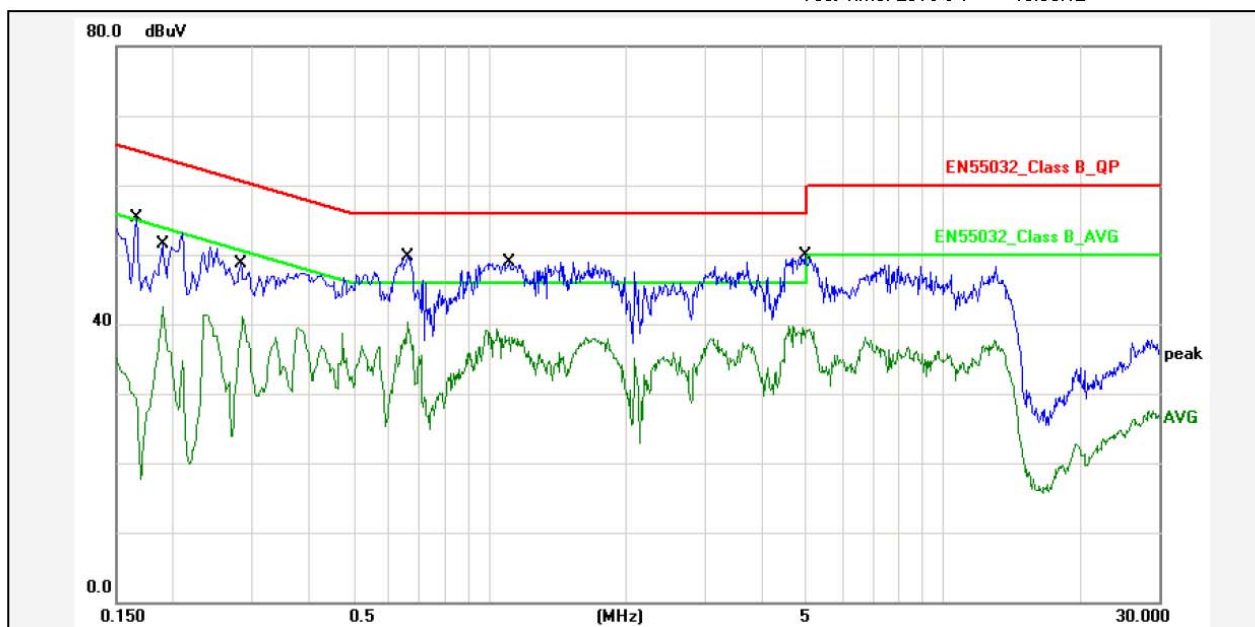
Margin=Limit-Level.



**Dongguan NTC Co., Ltd.**  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: [Http://www.ntc-c.com](http://www.ntc-c.com)

Site: Conduction

Test Time: 2016-9-7 10:50:12



Report No.: A140X

Test Standard: EN55032\_Class B\_QP

Test item: Conducted Emission

Phase: N

Applicant: FENDA

Temp.( )/Hum.(%): 22(C) / 52 %

Product: 2.1 Computer Multimedia Speaker

Power Rating: AC 230V/50Hz

Model No.: A140X

Test Engineer: Jerry

Test Mode: FM Mode

Remark:

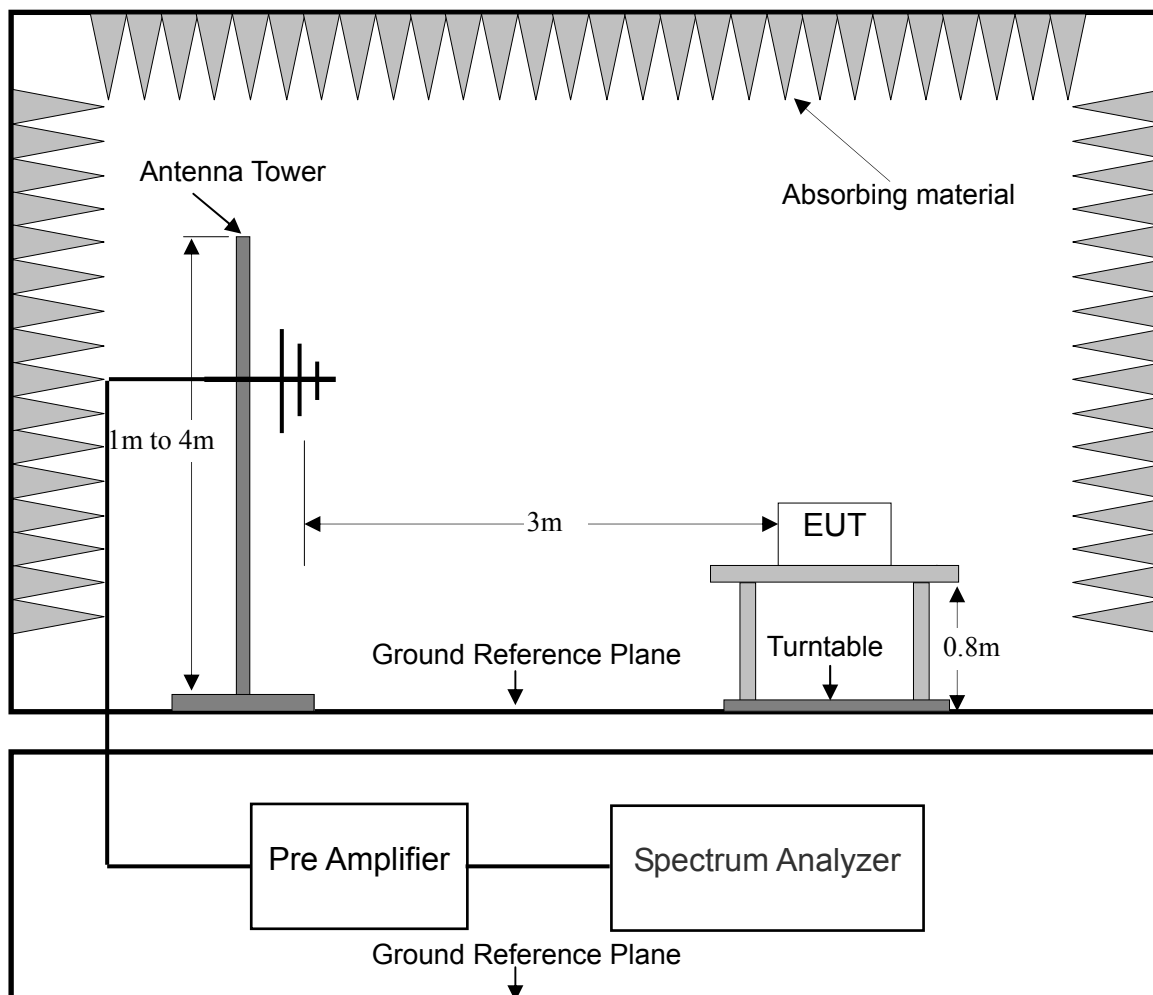
No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1660	10.80	41.50	52.30	65.15	-12.85	QP	P	
2	0.1660	10.80	15.90	26.70	55.15	-28.45	AVG	P	
3	0.1900	10.80	37.70	48.50	64.03	-15.53	QP	P	
4	0.1900	10.80	28.60	39.40	54.03	-14.63	AVG	P	
5	0.2819	10.80	34.90	45.70	60.76	-15.06	QP	P	
6	0.2819	10.80	27.30	38.10	50.76	-12.66	AVG	P	
7	0.6580	10.80	36.10	46.90	56.00	-9.10	QP	P	
8	0.6580	10.80	26.40	37.20	46.00	-8.80	AVG	P	
9	1.1060	10.80	35.00	45.80	56.00	-10.20	QP	P	
10	1.1060	10.80	25.50	36.30	46.00	-9.70	AVG	P	
11	4.9618	10.80	35.70	46.50	56.00	-9.50	QP	P	
12	4.9618	10.80	25.90	36.70	46.00	-9.30	AVG	P	

Note: Level=Reading+Factor.

Margin=Limit-Level.

## 5. RADIATED EMISSION MEASUREMENT

### 5.1 Block Diagram of Test



### 5.2 Limit of Radiated Emission Measurement

Test Standard: EN 55032

Limits for radiated disturbance of class B at a measuring distance of 3m

Frequency range MHz	Quasi-peak limits dB(uV/m)
30 to 230	40
230 to 1000	47
Note 1 The lower limit shall apply at the transition frequency. Note 2 Additional provisions may be required for cases where interference occurs.	



### 5.3 Test Procedure

E.U.T. and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. E.U.T. is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to EN 55032 on radiated emission measurement.

The bandwidth of the EMI test receiver (R&S ESCI7) is set at 120 KHz. The frequency range from 30 MHz to 1000 MHz is checked.

### 5.4 Operating Condition of E.U.T.

5.4.1 Setup the E.U.T. and simulators as shown in Section 2.3.

5.4.2 Turn on the power of all equipments.

5.4.3 Let the E.U.T. work in modes (Audio IN, USB Playing, FM Mode) and test it.

### 5.5 Radiated Emission Measurement Result

**PASS.**

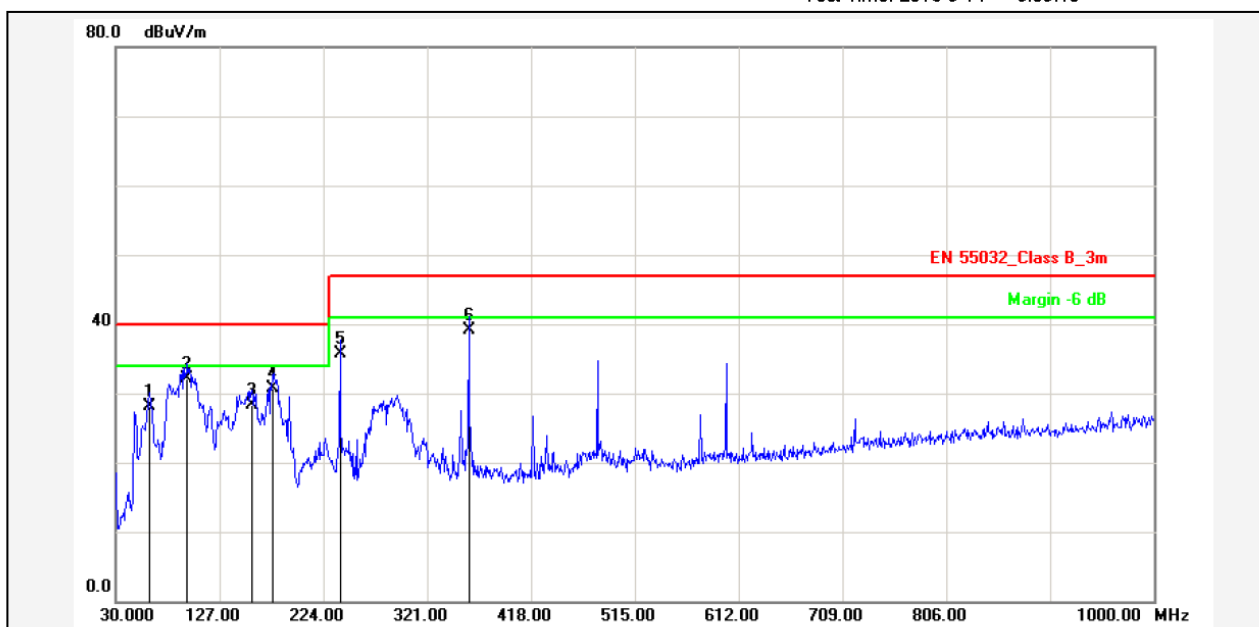
Please refer to the following page of the worst case: USB Playing.



**Dongguan NTC Co., Ltd.**  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: <http://www.ntc-c.com>

Site: Radiation

Test Time: 2016-9-14 9:59:18



Report No.: A140X

Test Standard: EN 55032\_Class B\_3m

Test Distance: 3m

Test item: Radiation Emission

Ant. Polarization: Horizontal

Applicant: FENDA

Temp.(C)/Hum.(%): 22(C) / 54 %

Product: 2.1 Computer Multimedia Speaker

Power Rating: AC 230V/50Hz

Model No.: A140X

Test Engineer: Anson

Test Mode: USB Playing

Remark:

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	62.0099	-18.84	47.04	28.20	40.00	-11.80	QP			P	
2	96.9300	-12.53	44.73	32.20	40.00	-7.80	QP			P	
3	157.0699	-15.27	43.67	28.40	40.00	-11.60	QP			P	
4	177.4399	-14.32	45.12	30.80	40.00	-9.20	QP			P	
5	239.5200	-12.06	47.76	35.70	47.00	-11.30	QP			P	
6	359.8000	-9.13	48.33	39.20	47.00	-7.80	QP			P	

Note: Level=Reading+Factor.

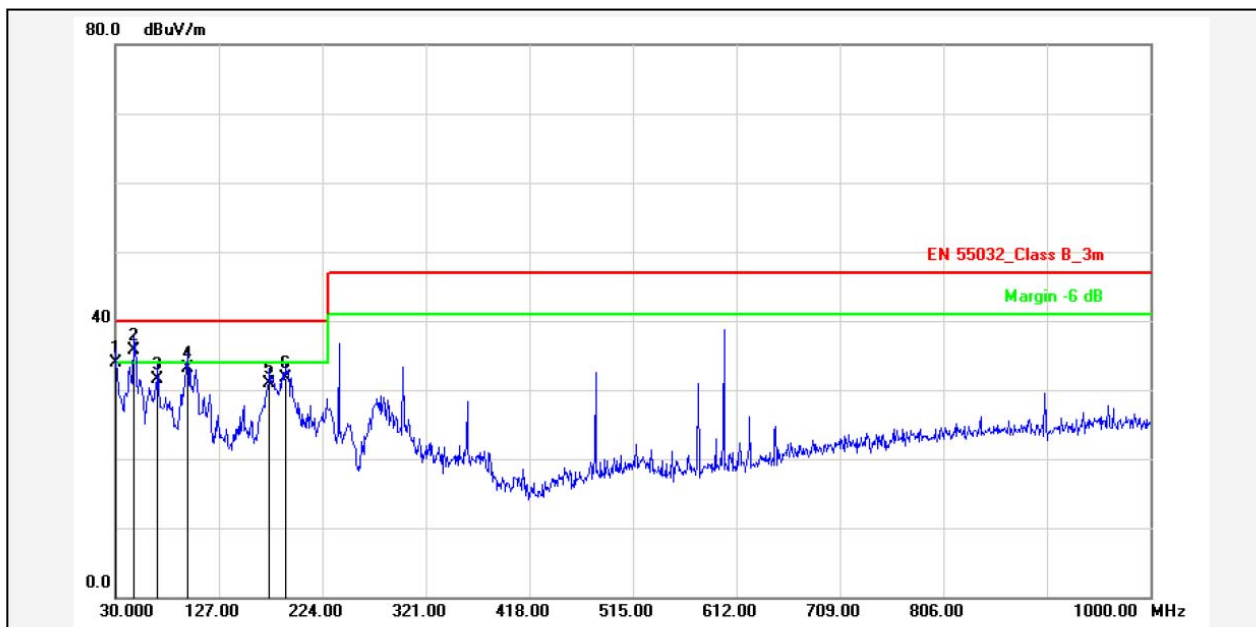
Margin=Limit-Level.



**Dongguan NTC Co., Ltd.**  
Tel: +86-769-22022444 Fax: +86-769-22022799  
Web: <http://www.ntc-c.com>

Site: Radiation

Test Time: 2016-9-14 9:53:56



Report No.: A140X

Test Standard: EN 55032\_Class B\_3m

Test Distance: 3m

Test item: Radiation Emission

Ant. Polarization: Vertical

Applicant: FENDA

Temp.(C)/Hum.(%): 22(C) / 54 %

Product: 2.1 Computer Multimedia Speaker

Power Rating: AC 230V/50Hz

Model No.: A140X

Test Engineer: Anson

Test Mode: USB Playing

Remark:

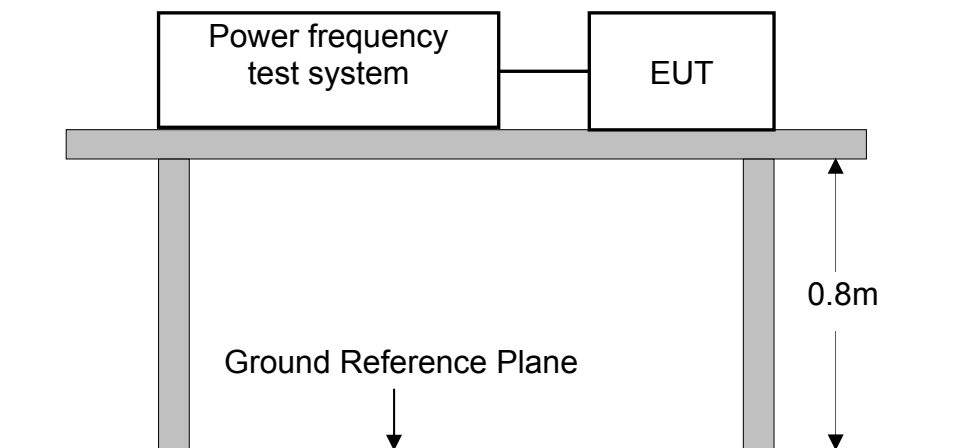
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	30.0000	-15.90	49.80	33.90	40.00	-6.10	QP			P	
2	47.4600	-13.50	49.20	35.70	40.00	-4.30	QP			P	
3	69.7699	-17.31	48.91	31.60	40.00	-8.40	QP			P	
4	97.9000	-15.98	49.18	33.20	40.00	-6.80	QP			P	
5	174.5300	-17.53	48.53	31.00	40.00	-9.00	QP			P	
6	189.0800	-16.63	48.33	31.70	40.00	-8.30	QP			P	

Note: Level=Reading+Factor.

Margin=Limit-Level.

## 6. HARMONIC CURRENT EMISSION TEST

### 6.1 Block Diagram of Test Setup



### 6.2 Limits of Harmonics current measurement

Test Standard: EN 61000-3-2

Limits for Class A equipment	
Harmonics Order n	Max. permissible harmonics current A
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
$15 \leq n \leq 39$	$0.15 \times 15/n$
Even harmonics	
2	1.08
4	0.43
6	0.30
$8 \leq n \leq 40$	$0.23 \times 8/n$

For the following categories of equipment limits are not specified in this edition of the standard.

Note: Equipment with a rated power of 75W or less, other than lighting equipment.

### 6.3 Test Procedure

The E.U.T. was put on the top of a wooden table 0.8m above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.

The E.U.T. is classified as follows:

**Class A:**

Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

**Class B:**

Portable tools; Arc welding equipment which is not professional equipment.

**Class C:**

Lighting equipment.

**Class D:**

Equipment having a specified power less than or equal to 600W of the following types: Personal computers and personal computer monitors and television receivers.

### 6.4 Operating Condition of E.U.T.

6.4.1 Setup the E.U.T. and simulators as shown in Section 2.3.

6.4.2 Turn on the power of all equipments.

6.4.3 Let the E.U.T. work in test modes (Audio IN, USB Playing, FM Mode) and test it.

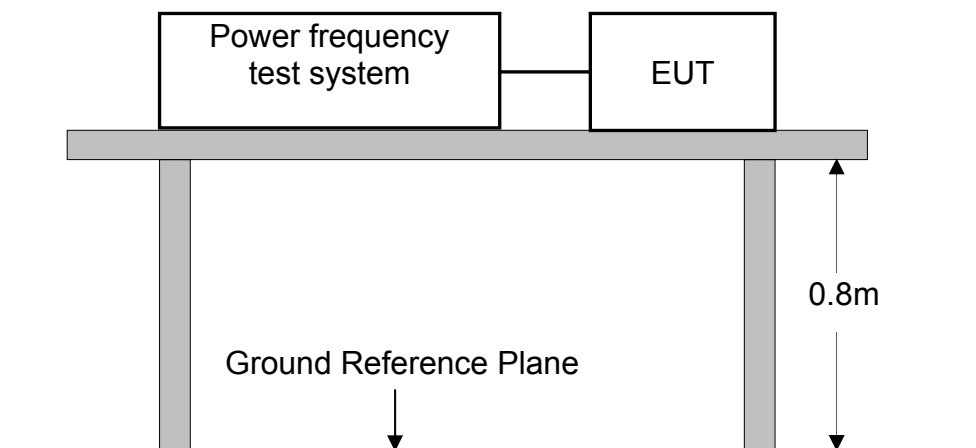
### 6.5 Test Results

**PASS.**

According to clause 7 of EN 61000-3-2, equipment with a rated power of 75W or less, no limits apply. It is considered to meet the requirements of the standard.

## 7. VOLTAGE FLUCTUATIONS & FLICKER TEST

### 7.1 Block Diagram of Test Setup



### 7.2 Limits of Voltage Fluctuations & Flicker Measurement

Test Standard: EN 61000-3-3

Test Item	Limit
$P_{st}$ (Short-term flicker indicator.)	1.0
$P_{lt}$ (Long-term flicker indicator.)	0.65
$T_{d(t)}$ (ms) ( Maximum time that $d(t)$ exceeds 3.3%)	500
$d_{max}(\%)$ (Maximum relative voltage change.)	4
$d_c(\%)$ (Relative steady-state voltage change)	3.3

### 7.3 Test Procedure

The E.U.T. was put on the top of a wooden table 0.8m above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.

### 7.4 Operating Condition of E.U.T.

7.4.1 Setup the E.U.T. and simulators as shown in Section 2.3.

7.4.2 Turn on the power of all equipments.

7.4.3 Let the E.U.T. work in test modes (Audio IN, USB Playing, FM Mode) and test it.

## 7.5 Test Results

**PASS.**

Please refer to the following page of the worst case: Audio IN.



### Flicker Test Summary per EN/IEC61000-3-3 Ed. 3.0 (2013) (Run time)

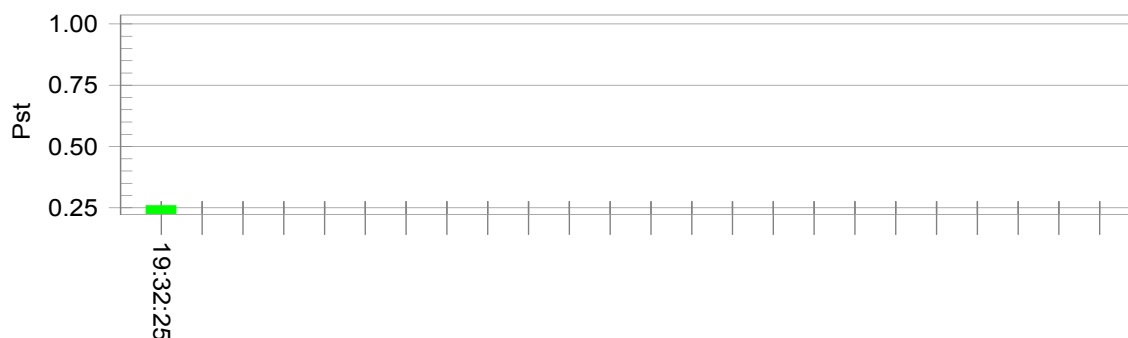
EUT: 2.1 Computer Multimedia Speaker  
Test category: All parameters (European limits)  
Test date: 2016-9-19  
Test duration (min): 10  
Comment: Audio IN  
Customer: Fenda  
M/N: A140X  
Test Result: Pass

Tested by: Ryan  
Test Margin: 100  
End time: 19:32:26  
Data file name: F-010694.cts\_data

Status: Test Completed

Pst<sub>i</sub> and limit line

European Limits



Plt and limit line



#### Parameter values recorded during the test:

Vrms at the end of test (Volt):	230.33		
Highest dt (%):	0.00	Test limit (%):	N/A
T-max (mS):	0	Test limit (mS):	500.0
Highest dc (%):	0.00	Test limit (%):	3.30
Highest dmax (%):	-0.08	Test limit (%):	4.00
Highest Pst (10 min. period):	0.259	Test limit:	1.000
Highest Plt (2 hr. period):	0.113	Test limit:	0.650

## 8. PERFORMANCE CRITERIA FOR IMMUNITY

The performance criteria are referred to the test standard: EN 55020

### Performance Criteria A

The equipment shall continue to operate as intended during the test. No change of actual operating state (for example change of channel) is allowed as a result of the application of the test. Multifunction equipment shall for each function meet the relevant requirements. Evaluation is carried out for audio and video functions.

### Evaluation of Audio Quality

The criterion of compliance with the requirement is a wanted to unwanted audio signal ratio of  $\geq 40\text{dB}$  at a wanted audio signal level of 50mW, or at another audio signal level specified by the manufacturer. If the S/N ratio is less than 43dB, the performance criterion for audio assessment is the actual S/N ratio minus 3dB. For AM sound receivers the criterion is  $\geq 26\text{dB}$  at 50mW; and is  $\geq 26\text{dB}$  at 500mW for the AM/FM car radios or broadcast receiver cards for computers.

### Evaluation of Video Quality

In the evaluation of picture interference the wanted test signal produces a standard picture (in the case of video tape equipment on the screen of the test-tv-set) and the unwanted signal produces a degradation of the picture. The degradation may be in a number of forms, such as a superposed pattern, disturbance of synchronization, geometrical distortion, loss of picture contrast, of colour, etc.

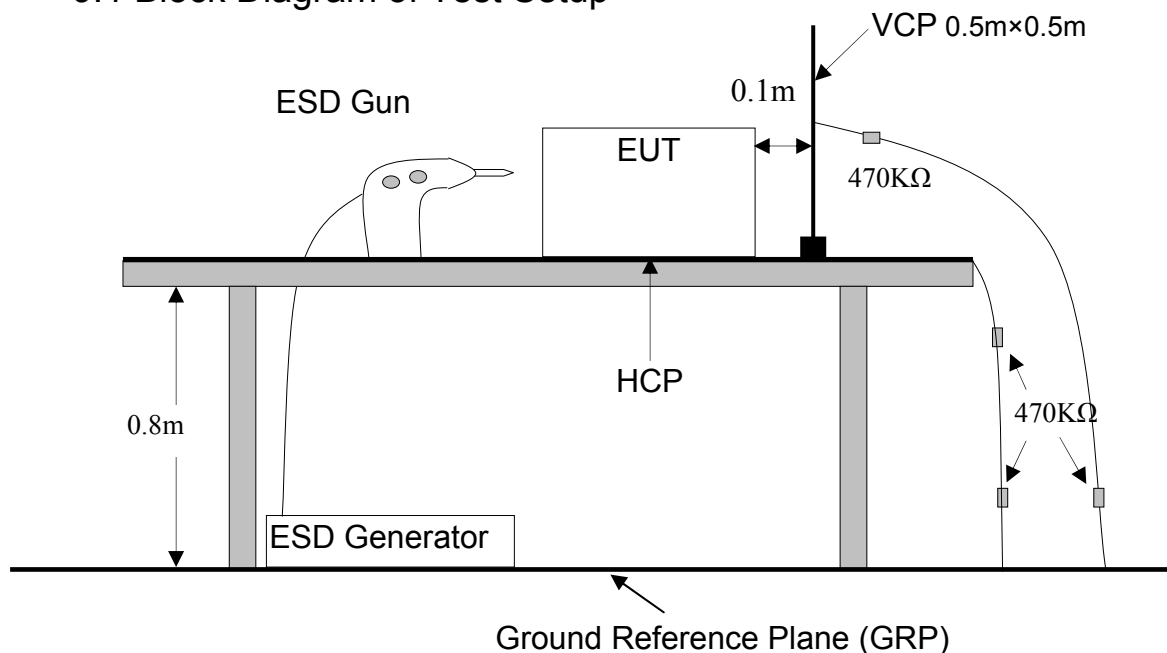
The criterion of compliance with the requirement is just perceptible degradation by observation of the picture. The screen shall be observed under normal viewing conditions (brightness 15 lx to 20 lx), at a viewing distance of six times the height of the screen.

### Performance criterion B

The equipment shall continue to operate as intended after the test. No loss of function is allowed after the test when the apparatus is used as intended, but failures which are recovered automatically but which cause temporary delay in processing, are permissible. No change of actual operating state for example change of channel or stored data and settings is allowed as a result of the application of the test. During the test, degradation of performance is allowed.

## 9. ELECTROSTATIC DISCHARGE IMMUNITY TEST

### 9.1 Block Diagram of Test Setup



### 9.2 Test Standard and Severity Levels

#### 9.2.1 Test Standard:

EN 55020

(EN 61000-4-2 Air Discharge: Severity Level: 3,  $\pm 8$ KV;  
Contact Discharge: Level: 2,  $\pm 4$ KV)

#### 9.2.2 Severity Levels:

Level	Test Voltage Contact Discharge (KV)	Test Voltage Air Discharge (KV)
1.	$\pm 2$	$\pm 2$
2.	$\pm 4$	$\pm 4$
3.	$\pm 6$	$\pm 8$
4.	$\pm 8$	$\pm 15$
X	Special	Special

## 9.3 Test Procedure

### 9.3.1 Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the E.U.T.. After each discharge, the discharge electrode shall be removed from the E.U.T.. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

### 9.3.2 Contact Discharge:

All the procedure shall be same as Section 9.3.1. except that the tip of the discharge electrode shall touch the E.U.T..

### 9.3.3 Indirect discharge for horizontal coupling plane

At least 10 single discharges(in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit(if applicable) of the E.U.T. and 0.1m from the front of the E.U.T.. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

### 9.3.4 Indirect discharge for vertical coupling plane

At least 10 single discharge (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the E.U.T.. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the E.U.T. are completely illuminated.

## 9.4 Test Results

**PASS.**

Please refer to the following page.

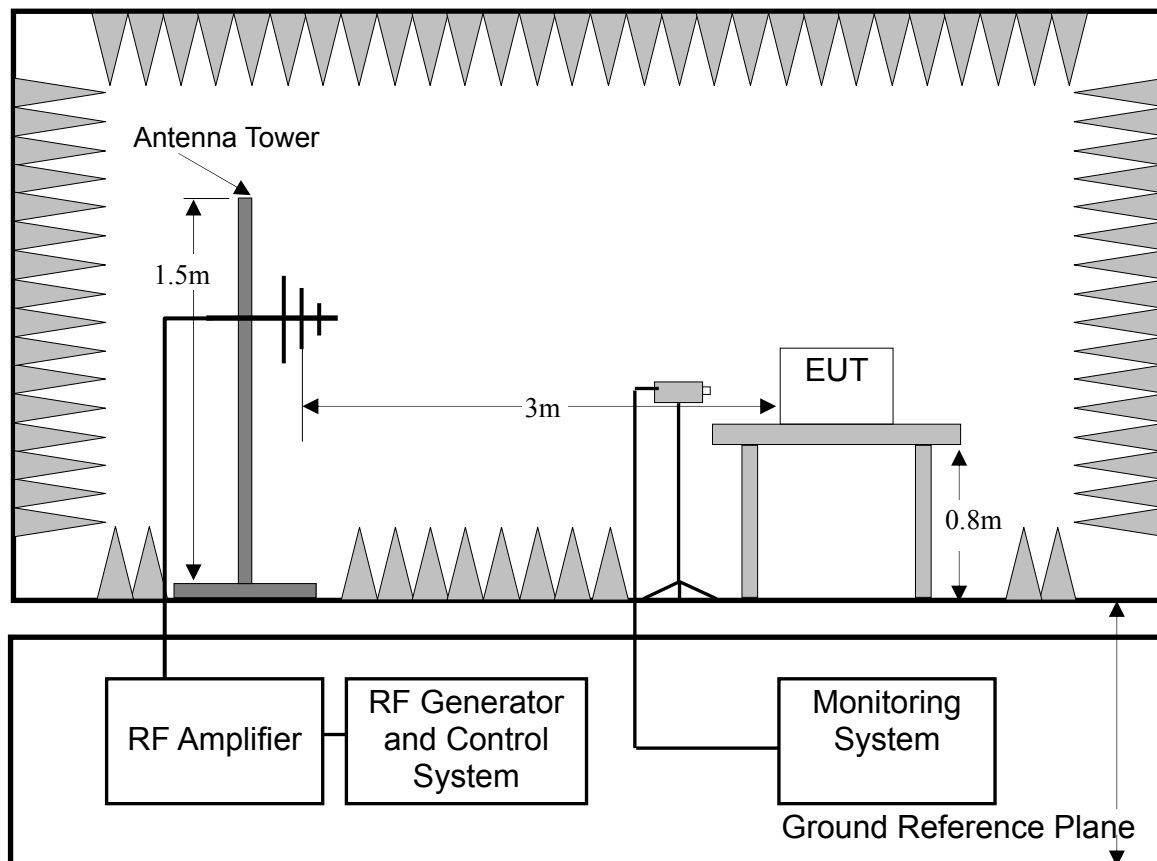
## Electrostatic Discharge Test Results

Ambient Condition:	Temp.: 26 °C	R.H.: 51%	Air Pressure: 101 kPa
Power Supply:	AC 230V 50Hz	Required Performance Criterion: B	
Test Level:	±2, 4 kV Contact Discharge; ±2, 4, 8 kV Air Discharge For each point positive 10 times and negative 10 times		
Tested mode:	Audio IN, USB Playing, FM Mode		
Test Point		Kind A-Air Discharge C-Contact Discharge	Result (Performance Criterion)
Slot of EUT		A	B
Port		C	B
Screw		C	B
Button		A	B
Indirect Discharge (HCP)		C	A
Indirect Discharge (VCP)		C	A
Note: The EUT stop working during the test, but it can be resumed to normal operation by user after test. After consider with client’s confirmation that relevant instruction will be mentioned in the manual, so the test result was considered to be passed.			
Test Equipment :		ESD Tester (TESEQ, NSG 437)	Test Engineer : Ryan

## 10. RF FIELD (KEYED CARRIER) STRENGTH SUSCEPTIBILITY

### TEST (S5)

#### 11.1 Block Diagram of Test Setup



#### 10.2 Test Standard and Severity Levels

##### 10.2.1 Test Standard

EN 55020  
(EN 61000-4-3, Severity Level: 2, 3V / m)

##### 10.2.2 Severity Levels

Level	Field Strength V/m
1.	1
2.	3
3.	10
X	Special

### 10.3 Test Procedure

The E.U.T. and its simulators are placed on a turn table which is 0.8 meter above ground. E.U.T. is set 3 meter away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the four sides of E.U.T. must be faced this transmitting antenna and measured individually. All the scanning conditions are as follows :

Condition of Test	Remarks
1. Fielded Strength	3 V/m (Severity Level 2)
2. Radiated Signal	Modulated
3. Scanning Frequency	895 - 905 MHz
4. Dwell time of radiated	0.0015 decade/s
5. Waiting Time	1 Sec.

### 10.4 Test Results

**PASS.**

Please refer to the following page of the worst case.

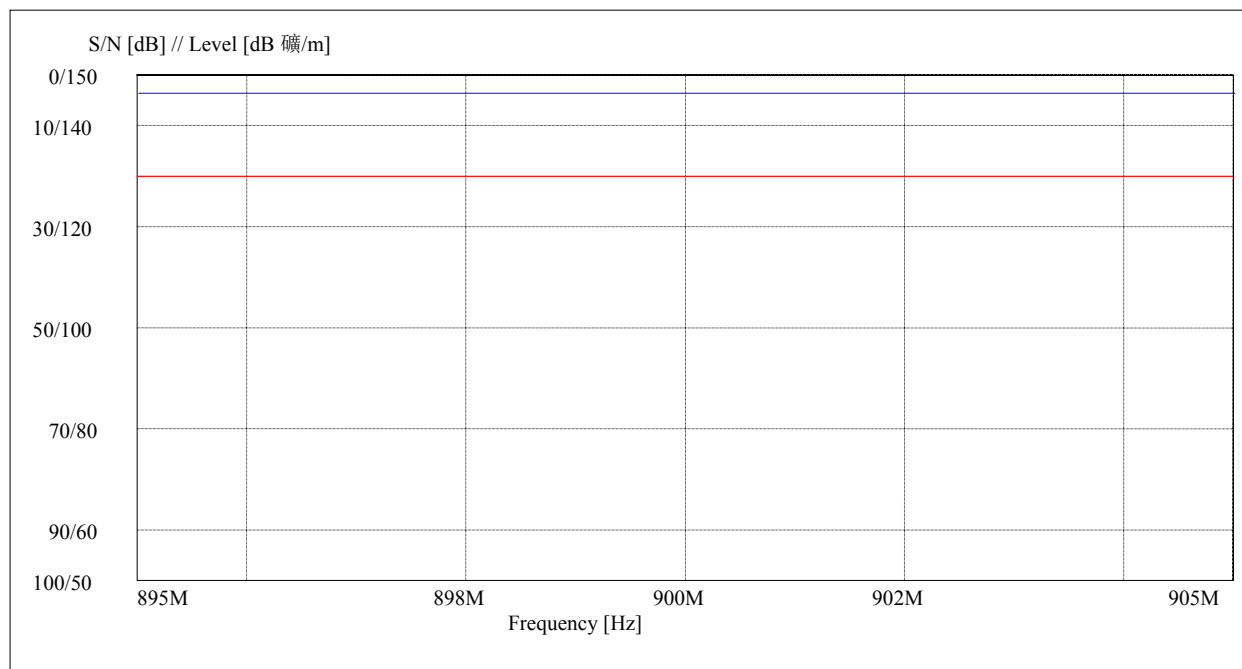


**Test: Keyed Carrier S5 <A140X>**

Test Mode: Receiver -  
Operating Mode: Audio  
Frequency: -

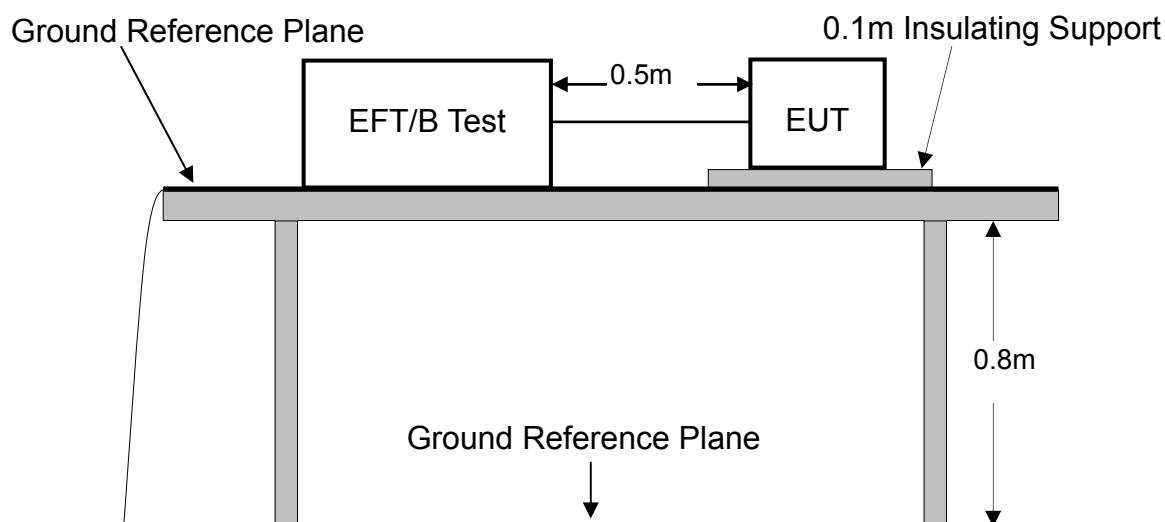
Monitor: Speaker  
S/N: 84.0 dB  
AF Level: 52.9 mW

Interf. Signal: Scan, 070515-00040-001, 5/7/2015, 1:30:56PM



## 11. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

### 11.1 Block Diagram of Test Setup



### 11.2 Test Standard and Severity Levels

#### 11.2.1 Test Standard

EN 55020

(EN 61000-4-4, Severity Level, Level 2: 1KV)

#### 11.2.2 Severity level

Open circuit output test voltage and repetition rate of the impulses				
Level	On power port, PE		On I/O (Input/Output) Signal data and control ports	
	Voltage peak KV	Repetition rate KHz	Voltage peak KV	Repetition rate KHz
1.	0.5 KV	5 or 100	0.25 KV	5 or 100
2.	1 KV	5 or 100	0.5 KV	5 or 100
3.	2 KV	5 or 100	1 KV	5 or 100
4.	4 KV	5 or 100	2 KV	5 or 100
X	Special	Special	Special	Special
<p>Note 1 Use of 5 KHz repetition rates is traditional; however, 100 KHz is closer to reality. Product committees should determine which frequencies are relevant for specific products or product types.</p> <p>Note 2 With some products, there may be no clear distinction, between power ports and I/O ports, in which case it is up to product committees to make this determination for test purposes.</p> <p>Note 3 "X" is an open level. The level has to be specified in the dedicated equipment specification.</p>				

### 11.3 Test Procedure

The E.U.T. is put on the table which is 0.8 meter high above the ground. This reference ground plane shall project beyond the E.U.T. by at least 0.1m on all sides and the minimum distance between E.U.T. and all other conductive structure, except the ground plane beneath the E.U.T., shall be more than 0.5m.

#### 11.3.1 For input and output AC power ports:

The E.U.T. is connected to the power mains by using a coupling device which couples the EFT interference signal to AC power lines. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 minutes.

#### 11.3.2 For signal lines ports:

It's unnecessary to test.

#### 11.3.3 For DC ports:

It's unnecessary to test.

### 11.4 Test Result

**PASS.**

Please refer to the following page.

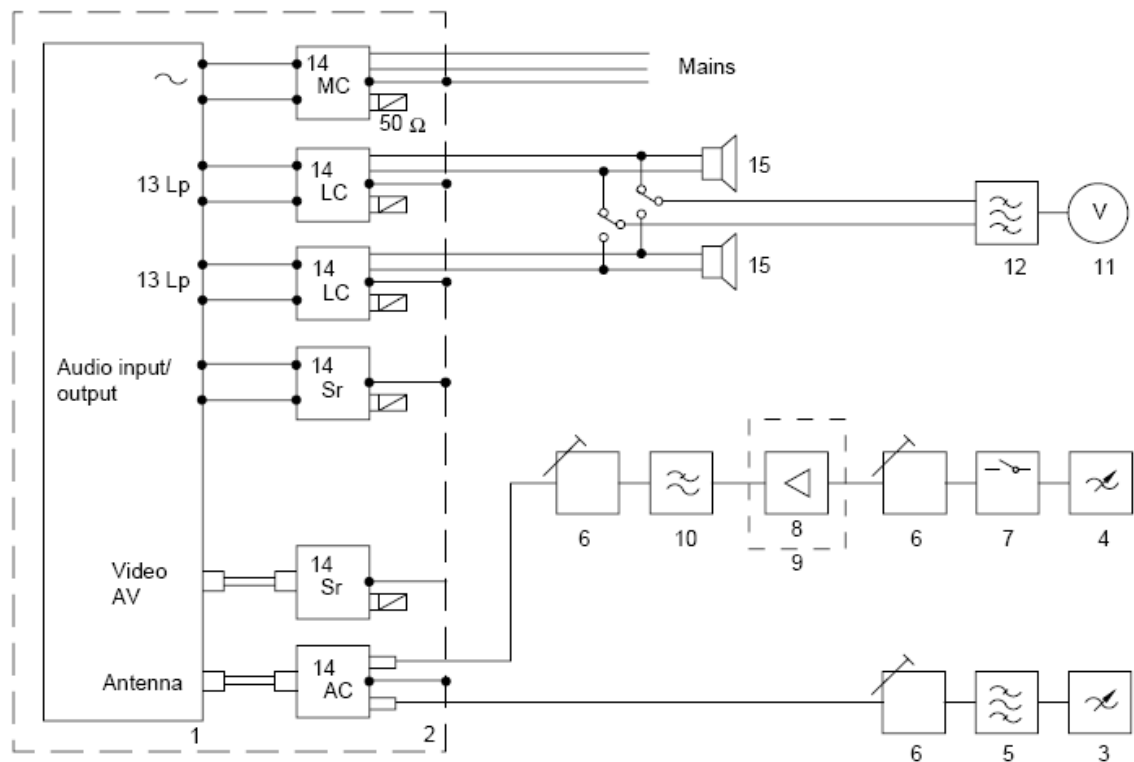
## Electrical Fast Transient/Burst Test Results

Ambient Condition:	Temp.: 26 °C	R.H.: 51 %	Air Pressure: 101 kPa
Power Supply:	AC 230V 50Hz	Required Performance Criterion: B	
Test Level:	Repetition Frequency: 5kHz; Duration: 15ms; Period: 300ms		
Test mode:	Audio IN, USB Playing, FM Mode		
Line : <input checked="" type="checkbox"/> AC Mains <input type="checkbox"/> Signal line <input type="checkbox"/> DC line Coupling : <input checked="" type="checkbox"/> Direct <input type="checkbox"/> Capacitive			
<b>Line</b>	<b>Test Voltage</b>	<b>Result</b> (Performance Criterion)	
L	±1KV	B	
N	±1KV	B	
PE			
L 、 N	±1KV	B	
L 、 PE			
N 、 PE			
L 、 N 、 PE			
Signal line			
DC line			
Note: In test modes, the sound of EUT muting occurs during test, but it can be resumed by itself after test.			
Test Equipment : Burst Tester(EM TEST, UCS500N)		Test Engineer : Ryan	

## 12. RF VOLTAGES IMMUNITY TEST(S2)

### 12.1 Test setup

Antenna terminals:

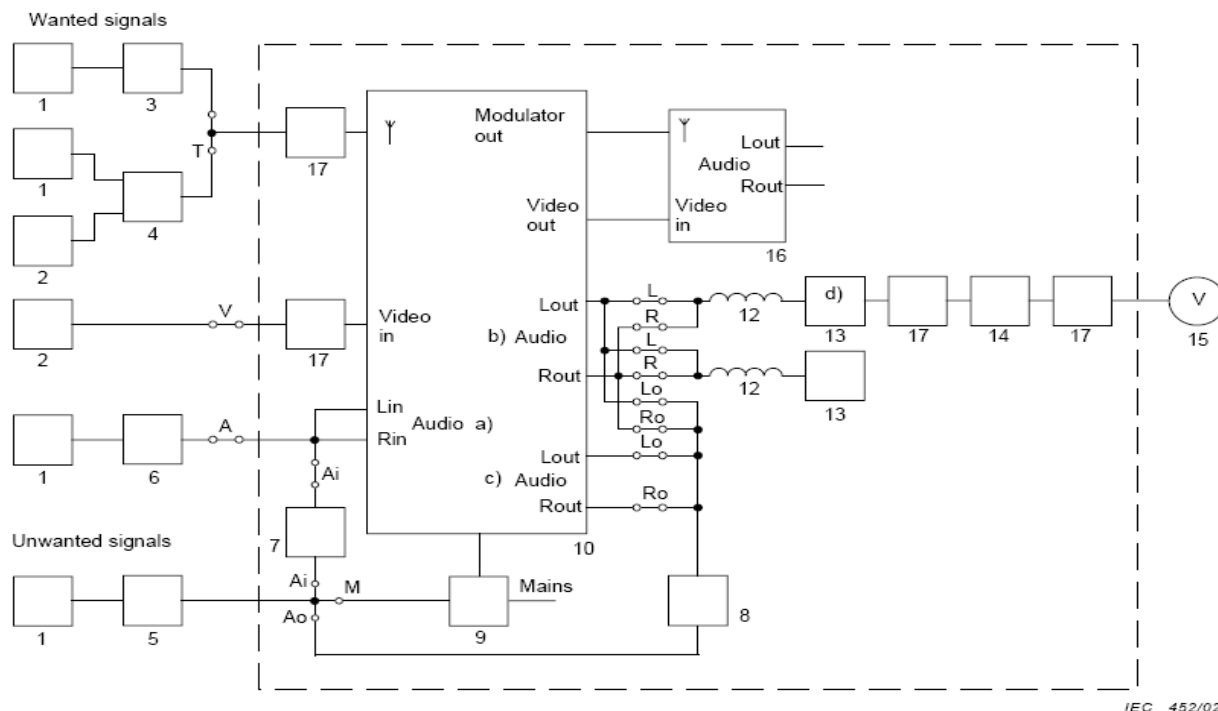


IEC 451/02

#### Key

- |  |   |
|--|---|
| 1 Equipment under test                             | 9 Shielded box Sh   |
| 2 Metal plate $P = 2 \text{ m} \times 1 \text{ m}$ | 10 Low-pass filter F  |
| 3 Generator of wanted signal G1                    | 11 Audio frequency voltmeter V                                    |
| 4 Generator of unwanted signal G2                  | 12 Band-pass filter 0,5 kHz to 3 kHz (see annex B)                |
| 5 Channel filter Fc                                | 13 Loudspeaker connectors Lp                                      |
| 6 Attenuators T1, T2, T3                           | 14 Coupling units MC, LC, Sr, AC (see annex C)                    |
| 7 Switch S1  | of the loudspeaker  |
| 8 Amplifier Am                                     | 15 Dummy load simulating the nominal impedance of the loudspeaker |

## Other terminals:



IEC 452/02

- a) Channels 1 and 2 in the case of two channel sound television equipment.  
b) Audio power output provided for adjusting and measurement.  
c) Other audio outputs.  
d) To be left out in case of high-resistance ( $>10 \text{ k}\Omega$ ) audio output impedance.

### Key

- |   |  |
|---|--|
| 1 AF generator 1 kHz G1                 | 10 Equipment under test  |
| 2 Video generator G2                    | 11 Metal plate $P = 2 \text{ m} \times 1 \text{ m}$            |
| 3 RF generator G3 for FM                | 12 RF choke $L = 100 \mu\text{H}$                              |
| 4 RF generator G4 for TV                | 13 Rated load impedance of the audio output $R_L$              |
| 5 RF generator G5 for unwanted signal   | 14 Band-pass filter BP (input impedance $10 \text{ k}\Omega$ ) |
| 6 Impedance ( $R_s$ to $R_{G1}$ )       | 15 Audio frequency voltmeter V                                 |
| 7 RC network for audio inputs $R_{Ci}$  | 16 Test-TV-set TTS   |
| 8 RC network for audio outputs $R_{Co}$ | 17 Sheath current choke Sh (ferrite cores)                     |
| 9 Mains stop filter MSF                 |  |

(12, 13, 14 and 15 may be replaced by figure 2b or 2c if appropriate.)

$R_s$  rated source impedance of the audio input ( $1 \text{ k}\Omega$  in the case of video tape equipment).

## 12.2 Test Standard and Limits

### 12.2.1 Test Standard EN 55020

### 12.2.2 Limits

Table 1 Limits of immunity of RF voltages of mains, loudspeaker and headphone terminals

Frequency MHz	Level dB( $\mu$ V)(e.m.f.)
0.15 to 30	130
30 to 100	120
100 to 150	120-110 <sup>a</sup>
<sup>a</sup> Decreasing linearly with the logarithm of frequency	

Table 2 Limits of immunity to RF voltages of audio input and output terminals (except loudspeaker and headphone terminals)(S2)

Frequency MHz	Level dB( $\mu$ V)(e.m.f.)
0.15 to 1.6	80-90 <sup>a</sup>
1.6 to 20	90-120 <sup>a</sup>
20 to 100	120
100 to 150	120-110 <sup>b</sup>
<sup>a</sup> Increasing linearly with the logarithm of frequency	
<sup>b</sup> Decreasing linearly with the logarithm of frequency	

## 12.3 Test Result

**PASS.**

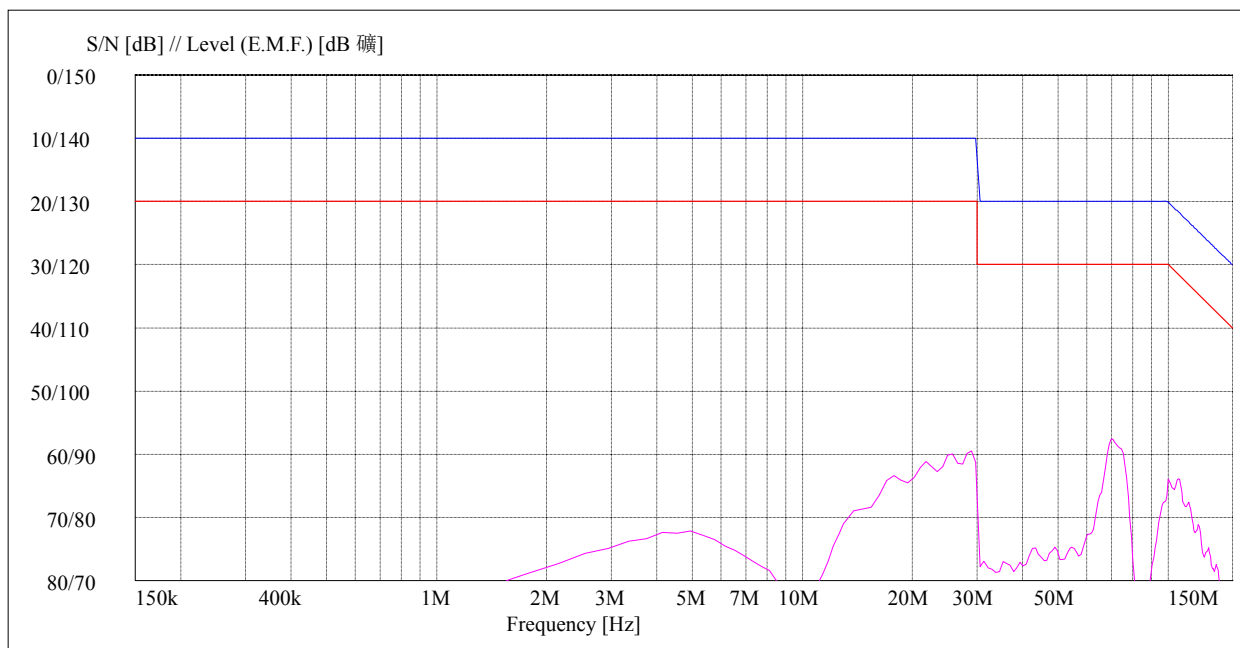
Please refer to the following page of the worst case.

**Test: Immunity Conducted Voltages S2a <A140X>**

Test Mode: Receiver -  
Operating Mode: Audio  
Frequency: -

Monitor: Speaker  
S/N: 83.6 dB  
AF Level: 53.3 mW

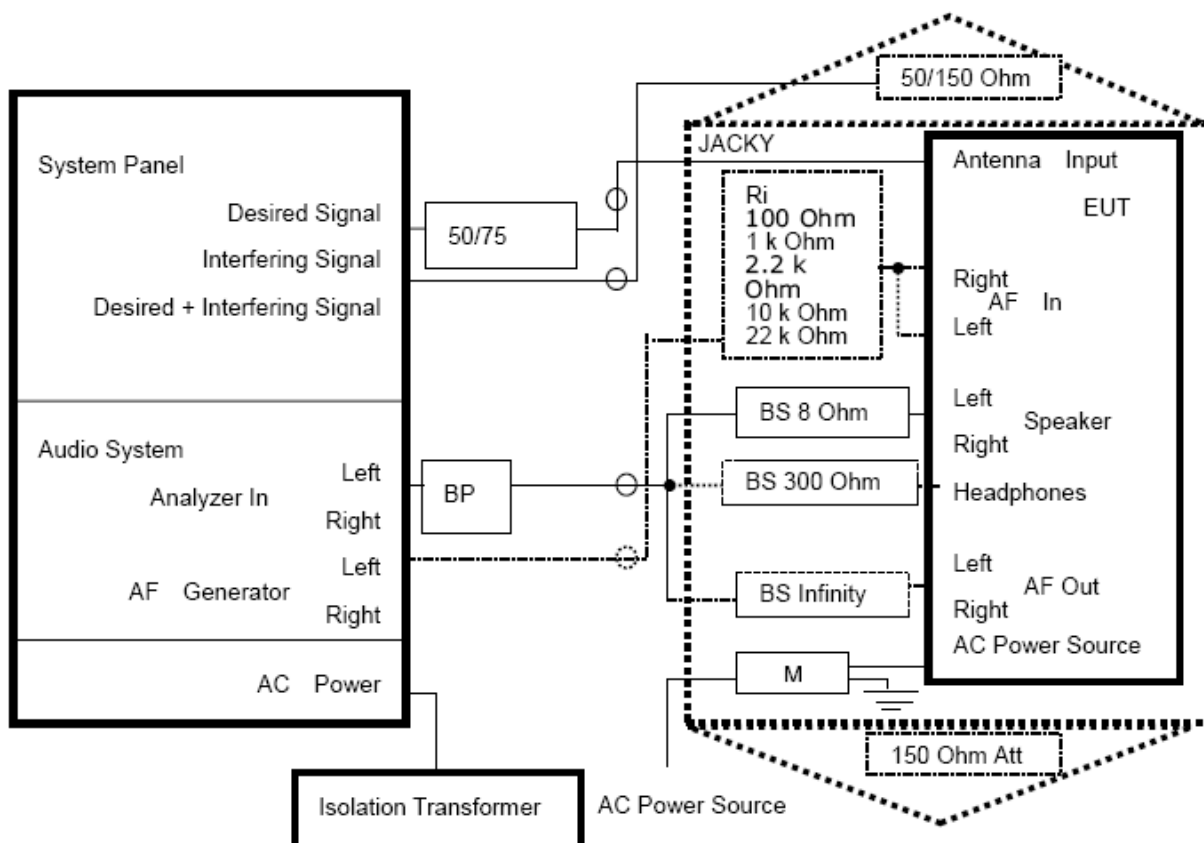
Interf. Signal: Speaker, 070515-00041-001, 5/07/2015, 1:34:09PM





## 13. AMBIENT ELECTROMAGNETIC FIELDS IMMUNITY TEST(S3)

### 13.1 Block Diagram of Test Setup



## 13.2 Test Standard and Limits

### 13.2.1 Test Standard EN 55020

### 13.2.2 Limits

Limits of immunity to ambient electromagnetic fields of Television reception functions of sound receivers

Frequency MHz	Level dB(μV/m)
0,15 to 47 Except frequency bands: $(f_c - 1,5)$ to $(f_c + 1,5)$ $(f_s - 0,5)$ to $(f_s + 0,5)$ $(f_i - 2)$ to $(f_v + 2)$ <sup>a</sup> $(f_v - 2)$ to $(f_i + 2)$ <sup>b</sup>	125  101 101 101 101
For non-European countries and Russia 47 to 150 <sup>c</sup> Except the tuned channel ± 0,5	109 <sup>d</sup>
For European countries 47 to 87 87 to 108 108 to 144 144 to 150 Except the tuned channel ± 0,5	109 125 109 125
NOTE $f_i$ is the sound intermediate frequency $f_v$ is the vision intermediate frequency $f_s$ is the intercarrier sound frequency $f_c$ is the colour subcarrier frequency	
<sup>a</sup> For systems B, D, G, K, I, L, M. <sup>b</sup> Only for system L'. <sup>c</sup> The frequency 47 MHz can be varied on a national basis depending on the use of this frequency range. <sup>d</sup> For television receivers with reception function in this frequency range. For television receivers without reception function in this frequency range a level of 125 dB(μV/m) shall apply.	

### 13.3 Test Result

**PASS.**

Please refer to the following page of the worst case.

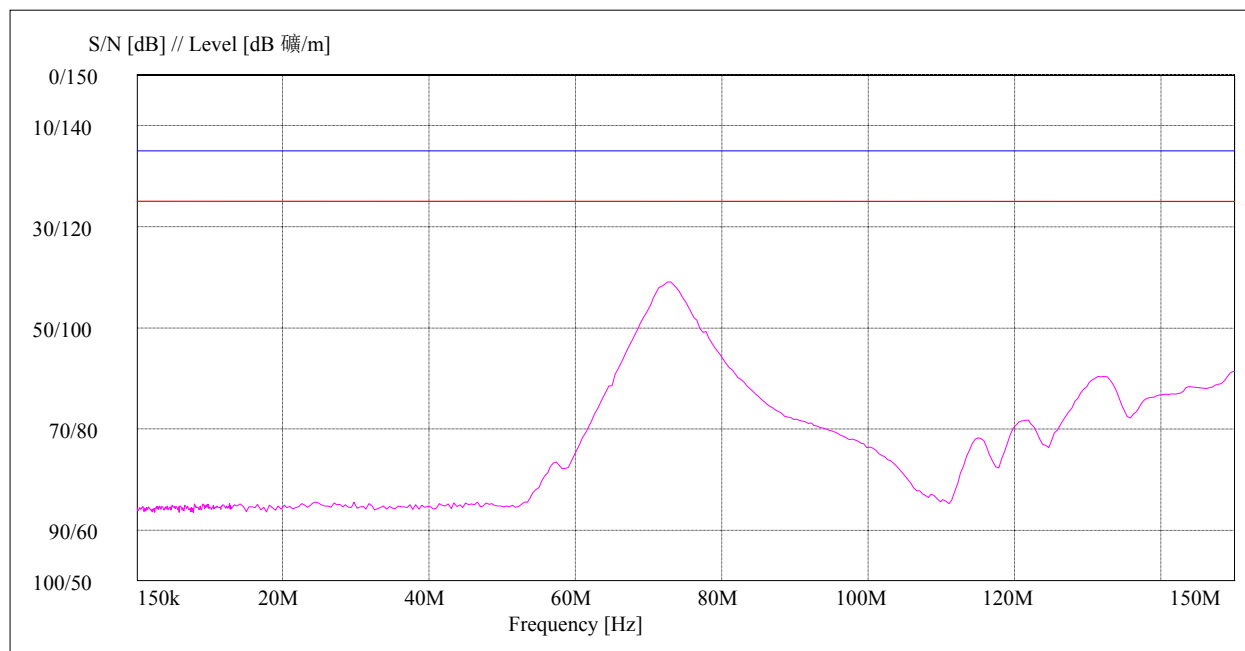
**Test: Immunity Radiated Fields S3 <A140X>**

**Test Mode:** Receiver -  
**Operating Mode:** Audio  
**Frequency:** -

**Monitor:**  
**S/N:** 85.7 dB  
**AF Level:** 53.9 mW

**Speaker**  
**85.7 dB**  
**53.9 mW**

**Interf. Signal: Scan, 070515-00025-001, 5/07/2015, 2:10:59PM**      **K2 = 1.6 dB**

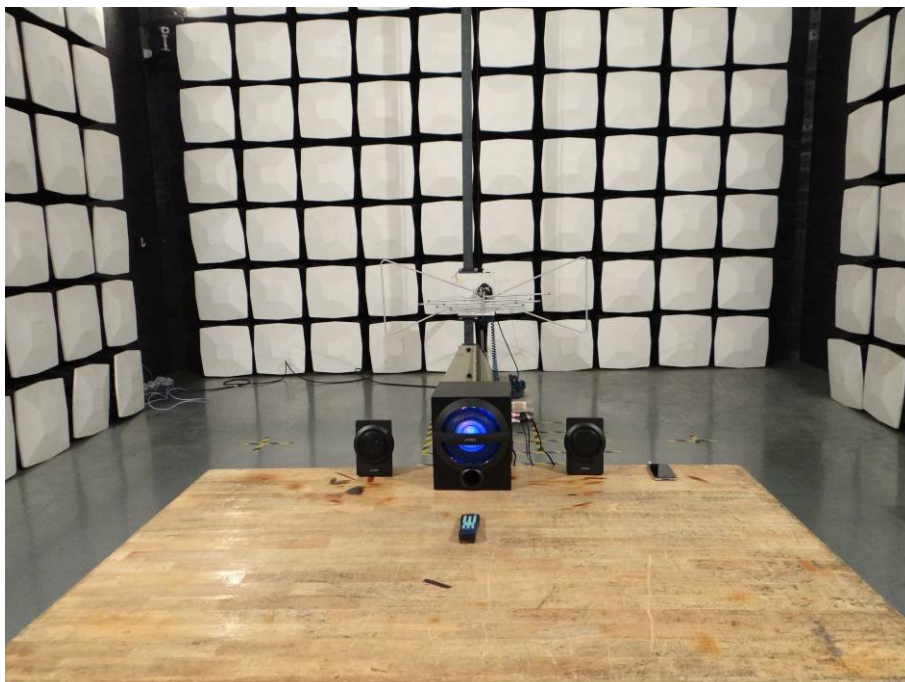


## 14. PHOTOGRAPHS

### 14.1 Photo of Power Line Conducted Emission Measurement



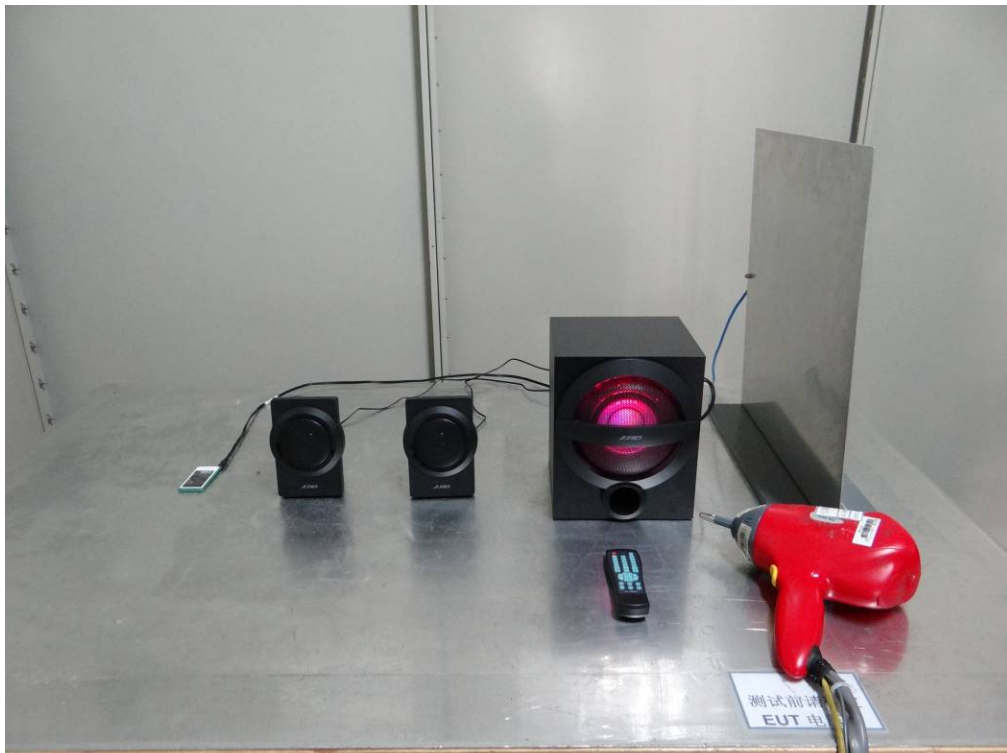
### 14.2 Photo of Radiated Emission Measurement



### 14.3 Photo of Harmonic Current / Flicker Measurement



### 14.4 Photo of Electrostatic Discharge Immunity Measurement





#### 14.5 Photo of Electrical Fast Transient /Burst Immunity Measurement



#### 14.6 Photo of S2 Measurement



#### 14.7 Photo of S3 Measurement





# APPENDIX I (PHOTOS OF E.U.T.)

**Figure 1**  
General Appearance of the E.U.T.



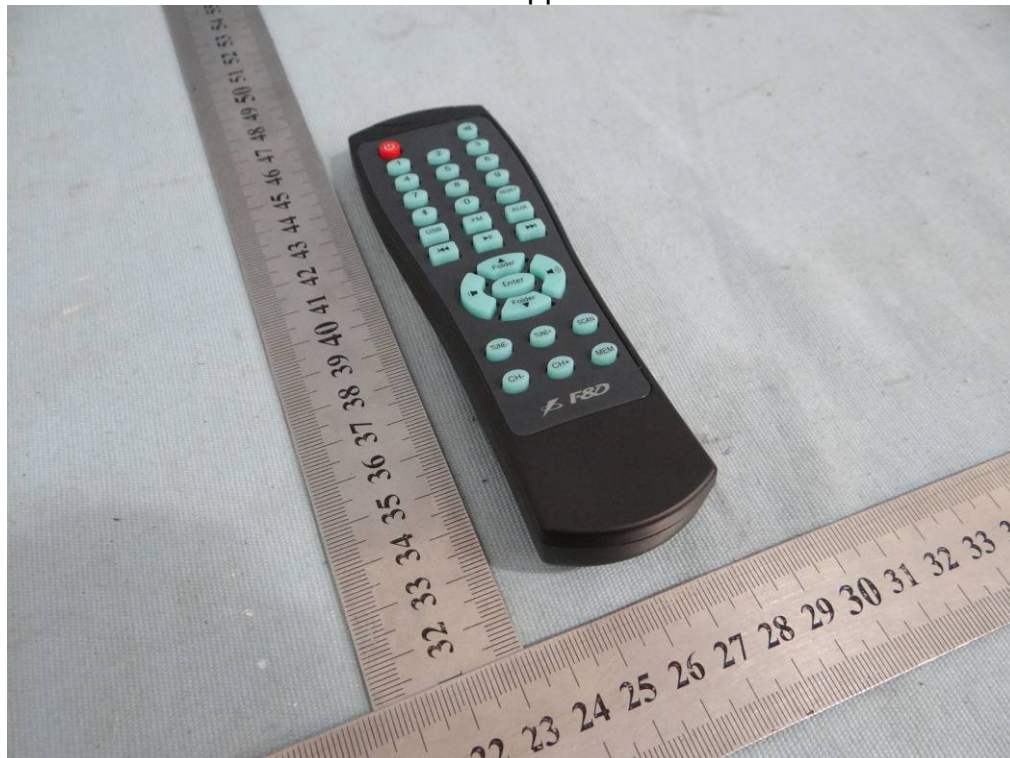
**Figure 2**  
General Appearance of the E.U.T.



**Figure 3**  
General Appearance of the E.U.T.

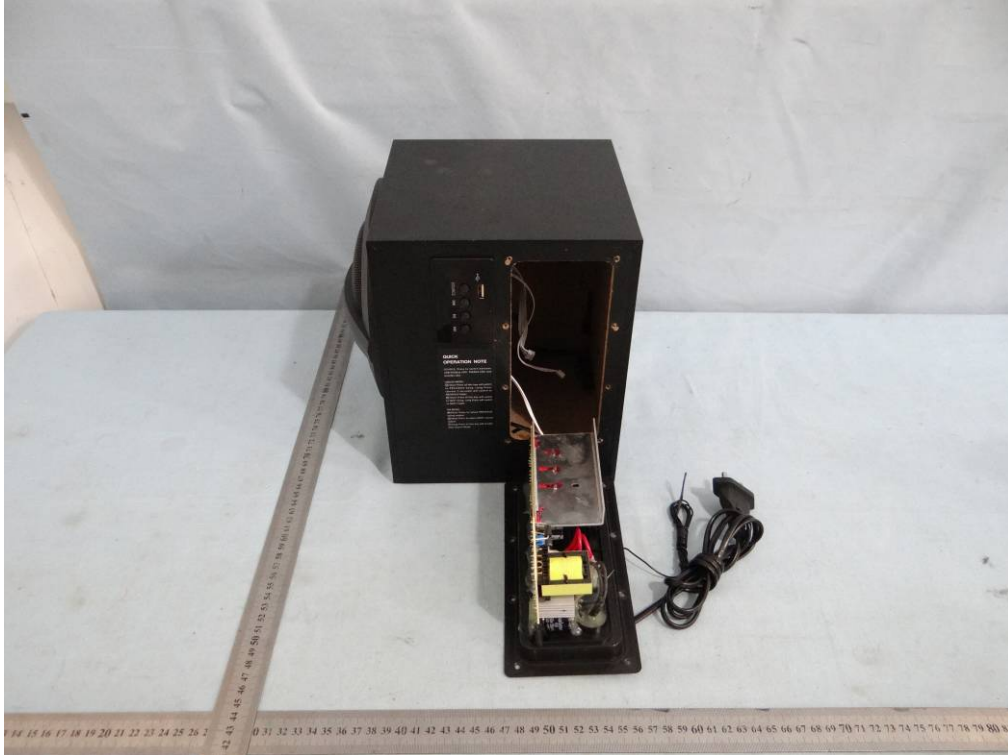


**Figure 4**  
General Appearance of the Remote Control

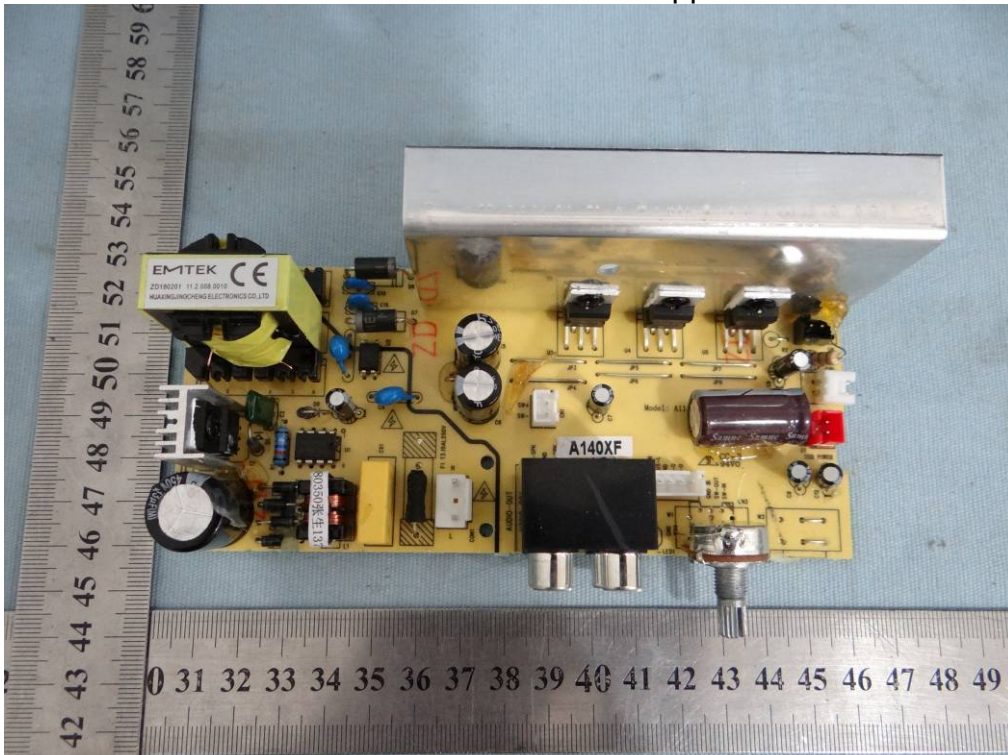




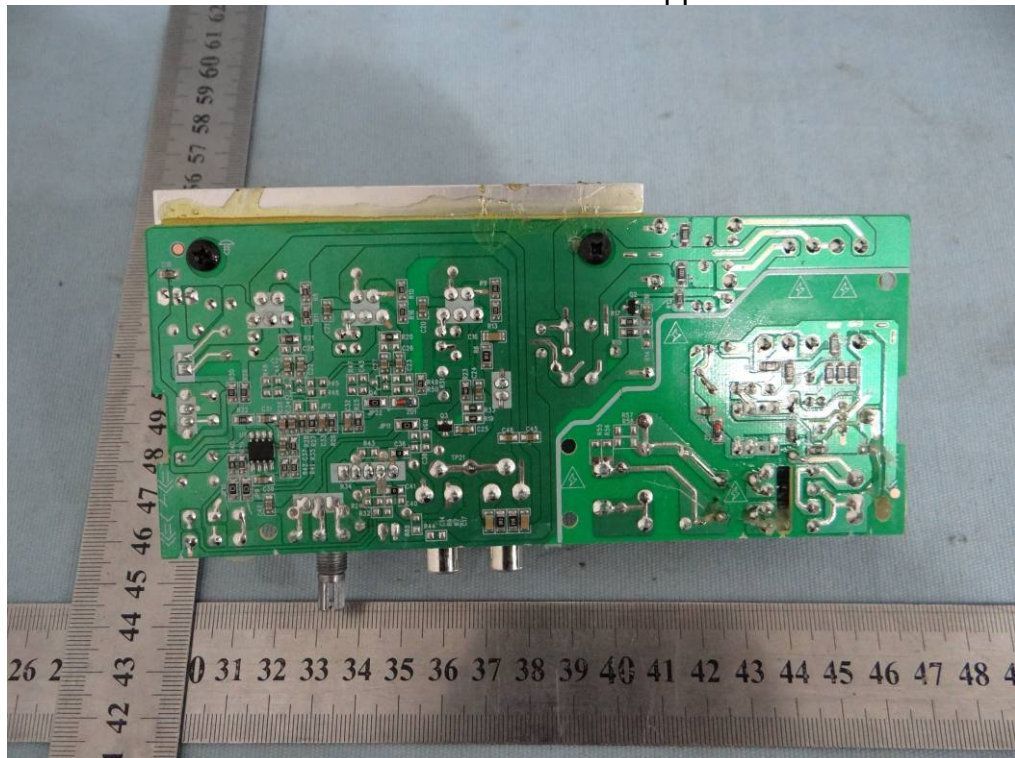
**Figure 5**  
General Internal of the E.U.T.



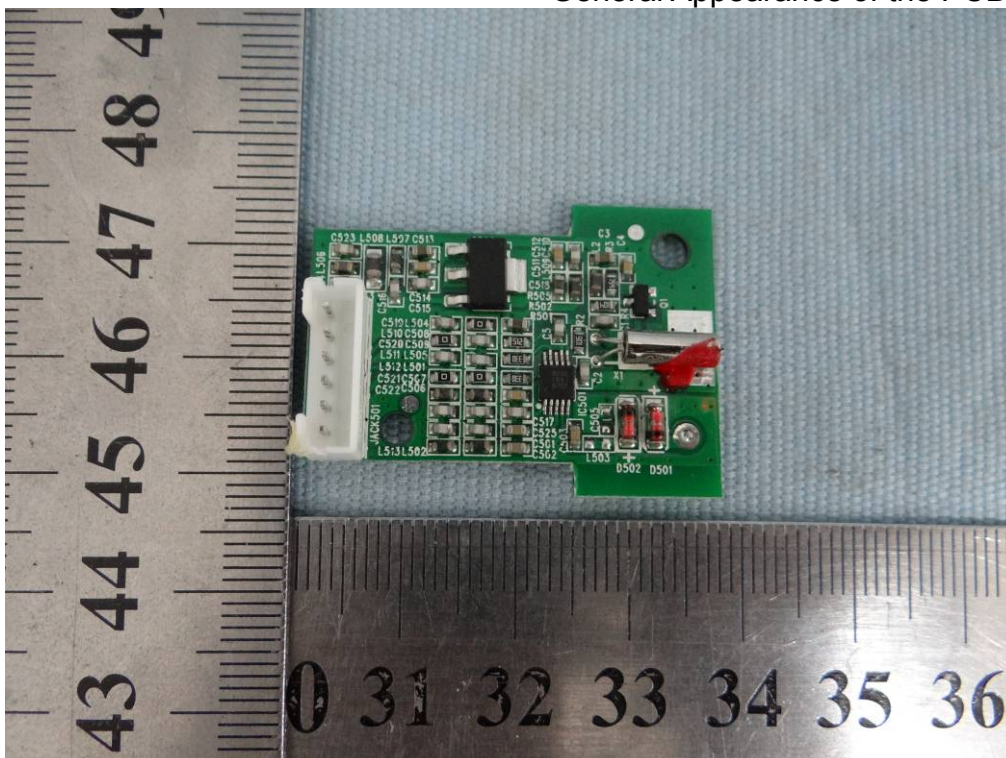
**Figure 6**  
General Appearance of the PCB



**Figure 7**  
General Appearance of the PCB

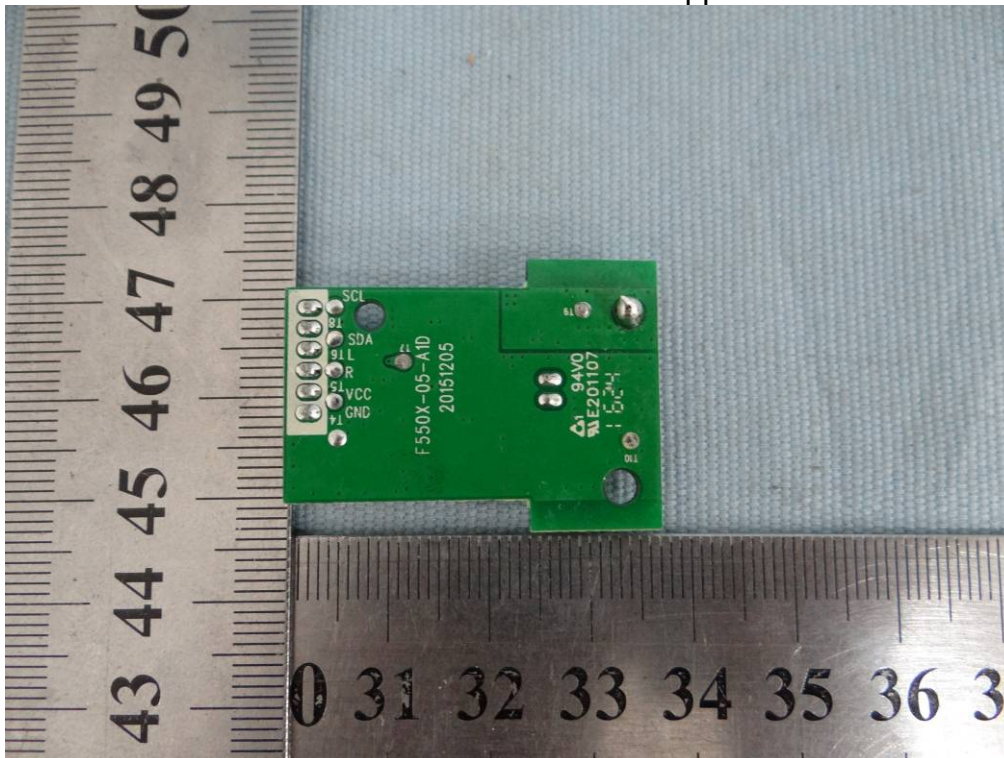


**Figure 8**  
General Appearance of the PCB

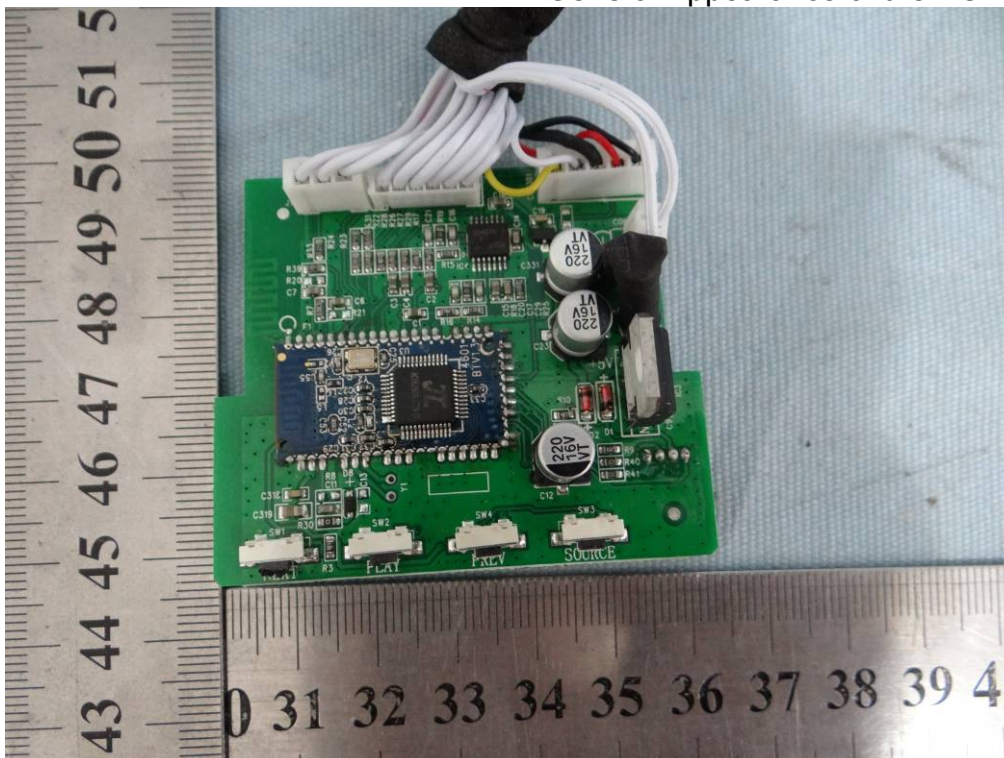




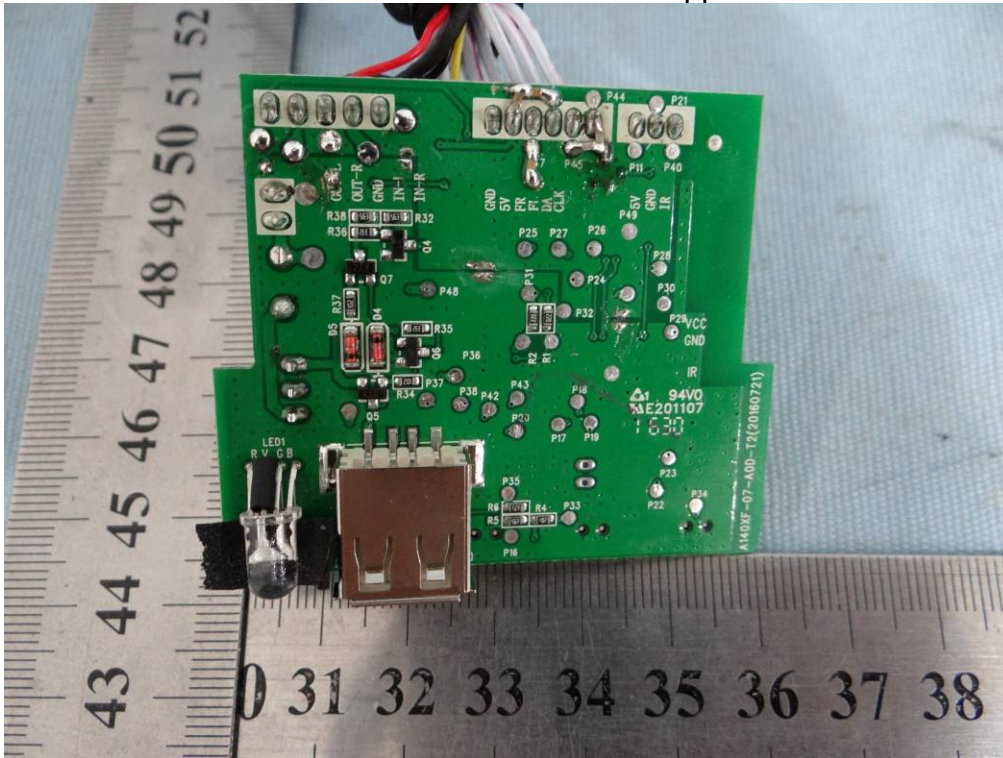
**Figure 9**  
General Appearance of the PCB



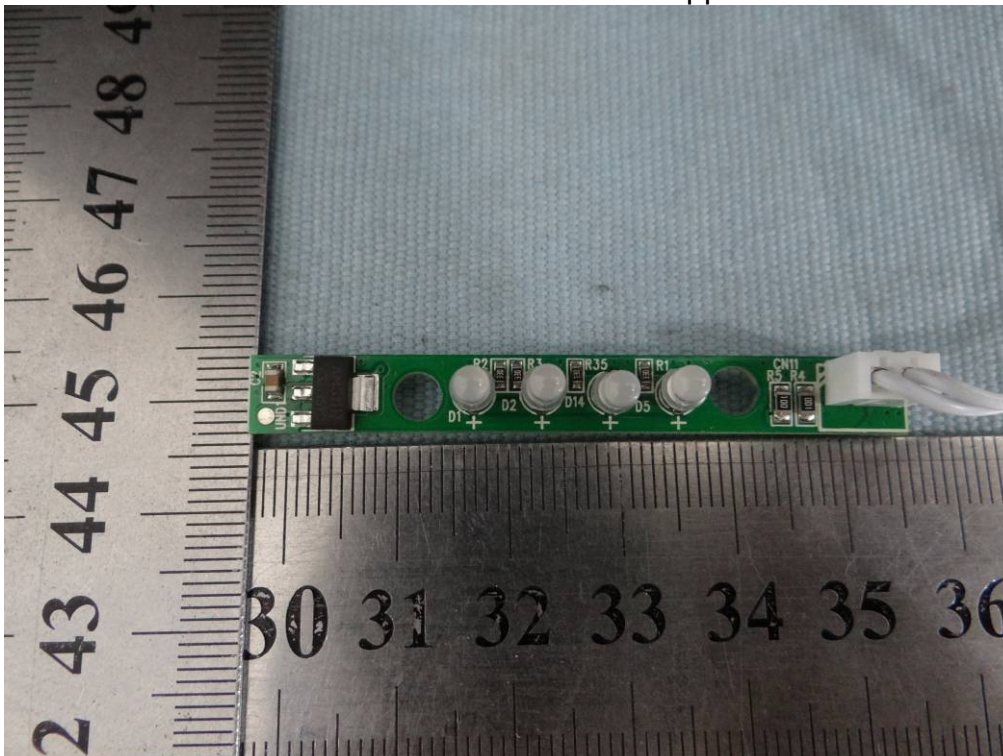
**Figure 10**  
General Appearance of the PCB



### Figure 11



### Figure 12





**Figure 13**  
General Appearance of the PCB

