

EMC TEST REPORT

The device described below is tested by Dongguan NTC 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 NTC Co., Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

Applicant : Ashdown Design & Marketing Ltd.
Address : Stevens Farm (The Stables), Mashbury Road, Chignal St. James,
Chelmsford, Essex CM1 4TX, U.K.
Manufacturer/ Factory : Wuhan Eleca Electronics Co., Ltd.
Address : No.12, the 5th Jiang Jun Road, Dong-xi Lake District, Wuhan, China
E.U.T. : Bass Amp Combo
Brand Name : Ashdown
Model No. : Tour Bus 15
Measurement Standard : EN 55103-1: 2009
EN 61000-3-2: 2006+A1: 2009+A2: 2009, EN 61000-3-3: 2008
EN 55103-2: 2009
(EN 61000-4-2: 2009, EN 61000-4-3: 2006+A2: 2010,
EN 61000-4-4: 2004+A1: 2010, EN 61000-4-5: 2006,
EN 61000-4-6: 2009, EN 61000-4-11: 2004)
Date of Receiver : February 20, 2013
Date of Test : February 20, 2013 to March 25, 2013
Date of Report : March 25, 2013

This Test Report is Issued Under the Authority of :

Prepared by

Approved & Authorized Signer



Chris / Engineer



This report shows that the E.U.T. is technically compliant with the EN 55103-1, EN 61000-3-2, EN 61000-3-3, and EN 55103-2. This report applies to above tested sample only and shall not be reproduced in part without written approval of Dongguan NTC Co., Ltd.

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Appendix I (Photos of E.U.T.) (7 pages)

1. SUMMARY OF TEST RESULTS

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

EMISSION			
Standard	Test Type	Result	Remarks
EN 55103-1: 2009	Mains Terminal Disturbance Voltage Test	PASS	Uncertainty: 2.7dB
	Radiated Emission Test	PASS	Uncertainty: 3.4dB
	Radiated Magnetic Field	PASS	Meets the requirements.
EN 61000-3-2: 2006+A1: 2009+A2: 2009	Harmonic current emission	N/A	Not Applicable
EN 61000-3-3: 2008	Voltage fluctuations & flicker	PASS	Meets the requirements.

IMMUNITY(EN 55103-2: 2009)			
Standard	Test Type	Result	Remarks
EN 61000-4-2: 2009	Electrostatic discharge immunity test	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-3: 2006+A2: 2010	Radio-frequency, electromagnetic field immunity test	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-4: 2004+A1: 2010	Electrical fast transient/ burst immunity test	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-5: 2006	Surge immunity test	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-6: 2009	Injected Currents immunity test	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-11: 2004	Voltage Dips and Interruptions	PASS	Meets the requirements of Performance Criterion B&C
EN 55103-2: 2009 Annex A	For Magnetic Field Immunity	PASS	Meets the requirements of Performance Criterion A

2. GENERAL INFORMATION

2.1 Details of E.U.T.

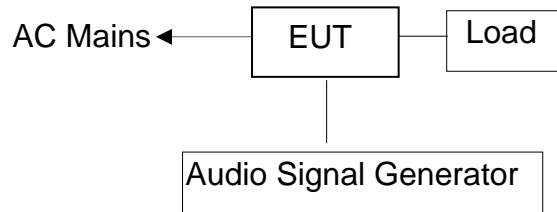
E.U.T.	: Bass Amp Combo
Model No.	: Tour Bus 15
Environment for Use	: E1 residential
E.U.T. Type	: Non Rack-mounted
Brand Name	: Ashdown
Rating	: AC 220-240V 50/60Hz, 20W
Test Voltage	: AC 230V 50Hz
Cable	: AC Line: 2.0m Audio Line: Below 2.0m (Declaration by applicant)
Description of model difference	: None
Remark	: None

2.2 Description of Support Device

Audio Signal Generator	: Manufacturer: TRONSON ELECTRONICS COMPANY LIMITED M/N: TAG-101 S/N: N/A CE
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2.3 Block Diagram of Test Setup

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



2.4 Test Facility

Site Description

EMC Lab

: Listed by CNAS, August 16, 2012
The certificate is valid until August 15, 2015
The Laboratory has been assessed and proved to
be in compliance with CNAS/CL01
The Certificate Registration Number is L5795.

Listed by FCC, August. 02, 2011
The Certificate Number is 665078.

Listed by Industry Canada, July 01, 2011
The Certificate Registration Number. Is 46405-9743

Name of Firm

: Dongguan NTC Co., Ltd.

Site Location

: Building D, Gaosheng Science and Technology
Park, Hongtu 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	Nov. 25, 2012	1 Year
2.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Nov. 09, 2012	1 Year
3.	L.I.S.N	Schwarzbeck	NNLK8129	8129-212	Nov. 09, 2012	1 Year
4.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Nov. 09, 2012	1 Year
5.	Pulse Limiter	MTS-systemtechnik	MTS-IMP-136	261115-01 0-0022	Nov. 09, 2012	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	Nov. 25, 2012	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Nov. 28, 2012	1 Year
3.	Positioning Controller	UC	UC 3000	N/A	N/A	N/A
4.	Color Monitor	SUNSP0	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	CBL2-NN-9M	22390001	Nov. 09, 2012	1 Year
9.	Cable	Huber+Suhner	CIL02	N/A	Nov. 09, 2012	1 Year
10.	Power Amplifier	HP	HP 8447D	1145A00203	Nov. 09, 2012	1 Year

3.3 For Radiated Magnetic Field

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal.Interval
1.	Audio Analyser	Audio Precision	SYS2222	N/A	Jun 22, 2012	1 Year
2.	Loop Sensor	GZ WEIBO	D13.3cm	N/A	Jun 22, 2012	1 Year
3	Shielded Room	ETS-Lindgren	3.0*6.0*3.5m	N/A	Jun 22, 2012	1 Year

3.4 For Harmonic / Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Power Frequency Test System	California Instruments	CTS	72846	Dec. 12, 2012	1 Year
2.	Software	California Instruments	CTS30	N/A	N/A	N/A

3.5 For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	TESEQ	NSG 437	432	Nov. 10, 2012	1 Year

3.6 For RF Electromagnetic Field Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Power Meter	ESE	4242	13984	Sep.1, 2012	1 Year
2.	Power Amplifier	TESEQ	CBA 1G-150	T44029	Sep.1, 2012	1 Year
3.	Signal Generator	Agilent	N5181A	MY50142530	Sep.1, 2012	1 Year
4.	Power Sensor	ESE	51011EMC	35716	Sep.1, 2012	1 Year
5.	Antenna Log-Periodic	CORAD	ATR80M6G	0337307	Sep.1, 2012	1 Year

3.7 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	Nov. 09, 2012	1 Year
2.	Coupling Clamp	EM TEST	HFK	0311-94	Nov. 09, 2012	1 Year
3.	Test Soft	EM TEST	lec. control	N/A	N/A	N/A

3.8 For Surge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Surge Tester	EM TEST	UCS 500N	V1104108683	Nov. 09, 2012	1 Year
2.	Test Soft	EM TEST	lec. control	N/A	N/A	N/A

3.9 For Injected Currents Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	CS Test System	FRANNOKIA	CIT-10	126A1163	Mar. 22, 2013	1 Year
2.	CDN	FRANNOKIA	CDN-M2+M3	A2210150	Mar. 22, 2013	1 Year

3.10 For Voltage Dips and Interruptions Measurement

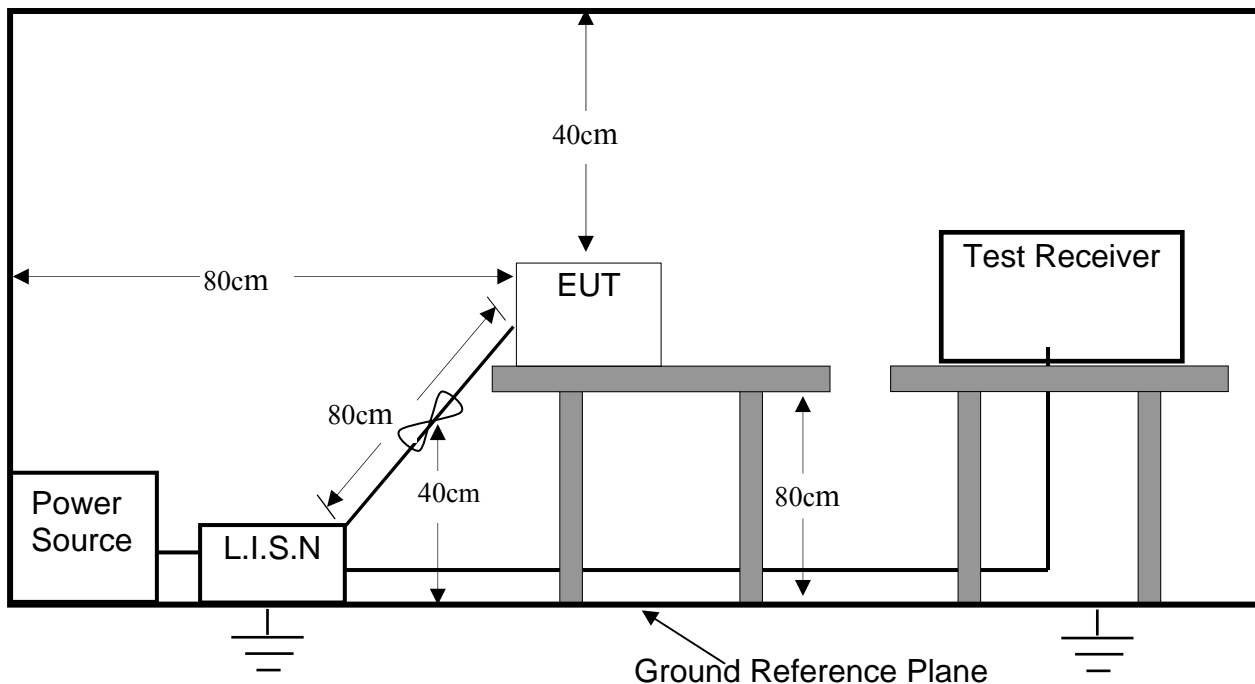
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Dips Tester	EM TEST	UCS500N	V1104108683	Nov. 09, 2012	1 Year
2.	Test Soft	EM TEST	lec.control	N/A	N/A	N/A
3.	Dips Modulator	EM TEST	V4780S2	0111-11	Nov. 09, 2012	1 Year

3.11 For Magnetic Field Immunity

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Anechoic Chamber	ETS	RFD-F/A-100	N/A	Nov 25,2012	1 Year
2.	Biconilog Antenna	ETS	3142C	N/A	Jan 15,2013	1 Year
3	Signal Generator	R&S	SML03	N/A	Mar 08,2013	1 Year
4	Amplifier	PRANA	AP32 MT215	N/A	Dec 03,2012	1 Year

4. MAINS TERMINAL DISTURBANCE VOLTAGE MEASUREMENT

4.1 Block Diagram of Test Setup



4.2 Limit of Mains Terminal Disturbance voltage measurement

Test Standard: EN 55103-1

Limits for conducted disturbance at the mains ports of E1.

Frequency range (MHz)	Limits (dB(uV))	
	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. The lower limit shall apply at the transition frequencies.
 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

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 55103-1 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 mode (AUX IN, MP3 IN) and test it.

4.5 Mains Terminal Disturbance Voltage Test Results

PASS.

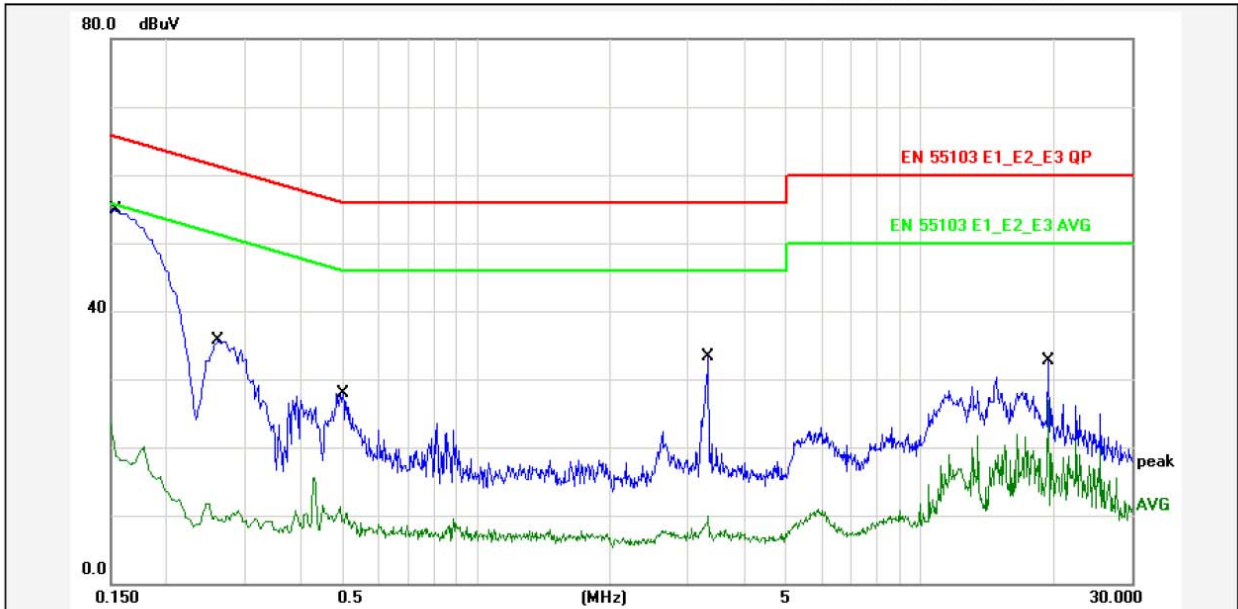
Please refer to the following pages of the worst case (MP3 IN).



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: 2013-3-16 10:15:58



Report No.: Tour Bus 15

Test Standard: EN 55103 E1_E2_E3 QP

Test item: Conducted Emission

Phase: L1

Applicant: Ashdown

Temp.()/Hum.(%): 22(C) / 53 %

Product: Bass Amp Combo

Power Rating: AC 230V/50Hz

Model No.: Tour Bus 15

Test Engineer: Infen

Test Mode: MP3 IN

Remark:

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1539	10.80	36.00	46.80	65.78	-18.98	QP	P	
2	0.1539	10.80	12.49	23.29	55.78	-32.49	AVG	P	
3	0.2620	10.80	24.84	35.64	61.36	-25.72	QP	P	
4	0.2620	10.80	0.99	11.79	51.36	-39.57	AVG	P	
5	0.5020	10.80	17.08	27.88	56.00	-28.12	QP	P	
6	0.5020	10.80	0.72	11.52	46.00	-34.48	AVG	P	
7	3.3300	10.80	22.54	33.34	56.00	-22.66	QP	P	
8	3.3300	10.80	-0.80	10.00	46.00	-36.00	AVG	P	
9	19.4979	10.80	21.91	32.71	60.00	-27.29	QP	P	
10	19.4979	10.80	16.14	26.94	50.00	-23.06	AVG	P	

Note: Level=Reading+Factor.

Margin=Limit-Level.

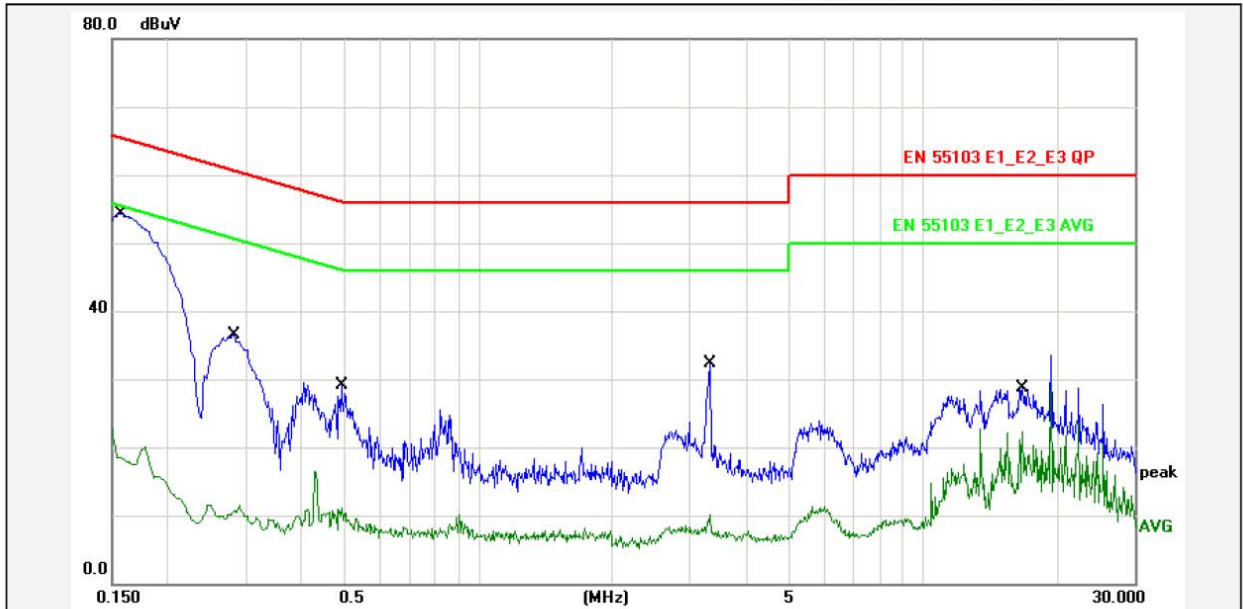
Note: The margin of the other emissions are larger than 10dB.



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: 2013-3-16 10:14:14



Report No.: Tour Bus 15

Test Standard: EN 55103 E1_E2_E3 QP

Test item: Conducted Emission

Phase: N

Applicant: Ashdown

Temp.()/Hum.(%): 22(C) / 53 %

Product: Bass Amp Combo

Power Rating: AC 230V/50Hz

Model No.: Tour Bus 15

Test Engineer: Infen

Test Mode: MP3 IN

Remark:

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1580	10.80	37.00	47.80	65.56	-17.76	QP	P	
2	0.1580	10.80	11.83	22.63	55.56	-32.93	AVG	P	
3	0.2819	10.80	25.79	36.59	60.76	-24.17	QP	P	
4	0.2819	10.80	0.76	11.56	50.76	-39.20	AVG	P	
5	0.4940	10.80	18.20	29.00	56.10	-27.10	QP	P	
6	0.4940	10.80	5.64	16.44	46.10	-29.66	AVG	P	
7	3.3260	10.80	21.59	32.39	56.00	-23.61	QP	P	
8	3.3260	10.80	-0.65	10.15	46.00	-35.85	AVG	P	
9	16.7698	10.80	17.97	28.77	60.00	-31.23	QP	P	
10	16.7698	10.80	11.51	22.31	50.00	-27.69	AVG	P	

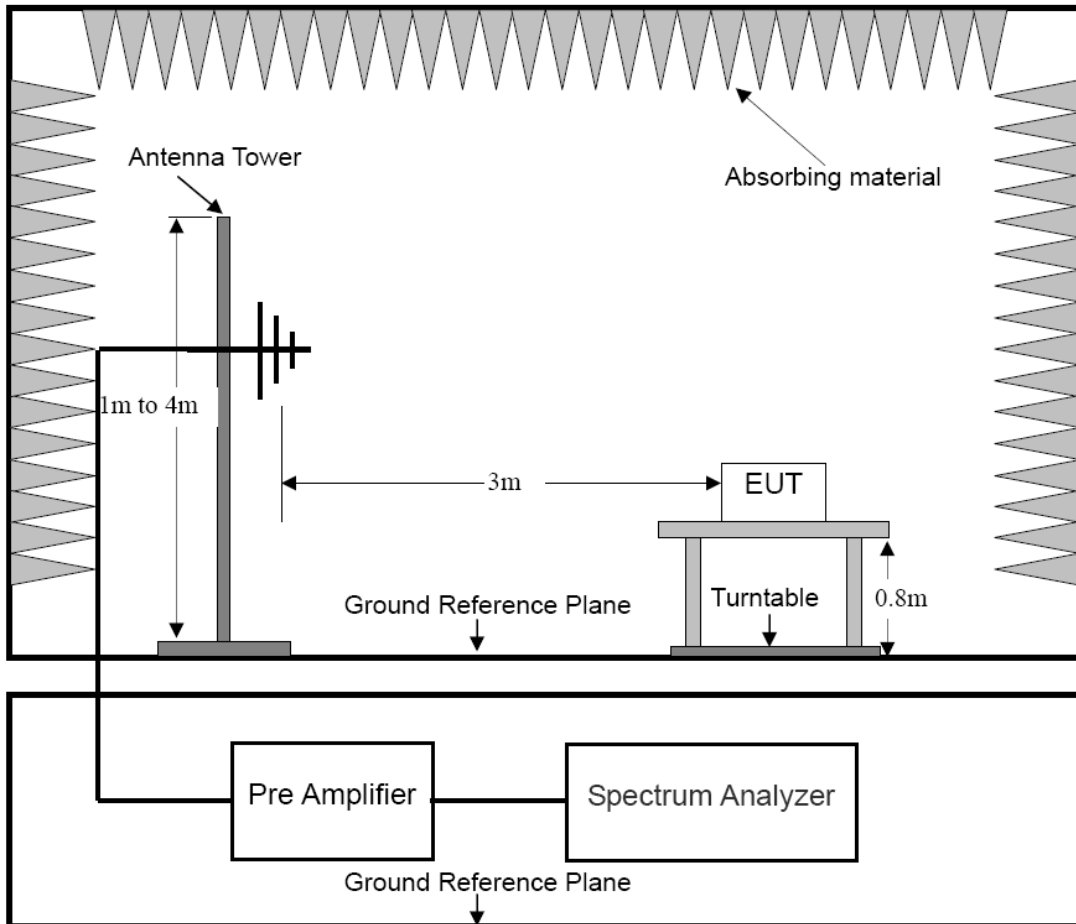
Note: Level=Reading+Factor.

Margin=Limit-Level.

Note: The margin of the other emissions are larger than 10dB.

5. RADIATED EMISSION MEASUREMENT

5.1 Block Diagram of Test



5.2 Limit of Radiated Emission Measurement

Test Standard: EN 55103-1

Limits for radiated disturbance of E1 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 55103-1 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 test mode (AUX IN, MP3 IN) and test it.

5.5 Radiated Emission Measurement Result

PASS.

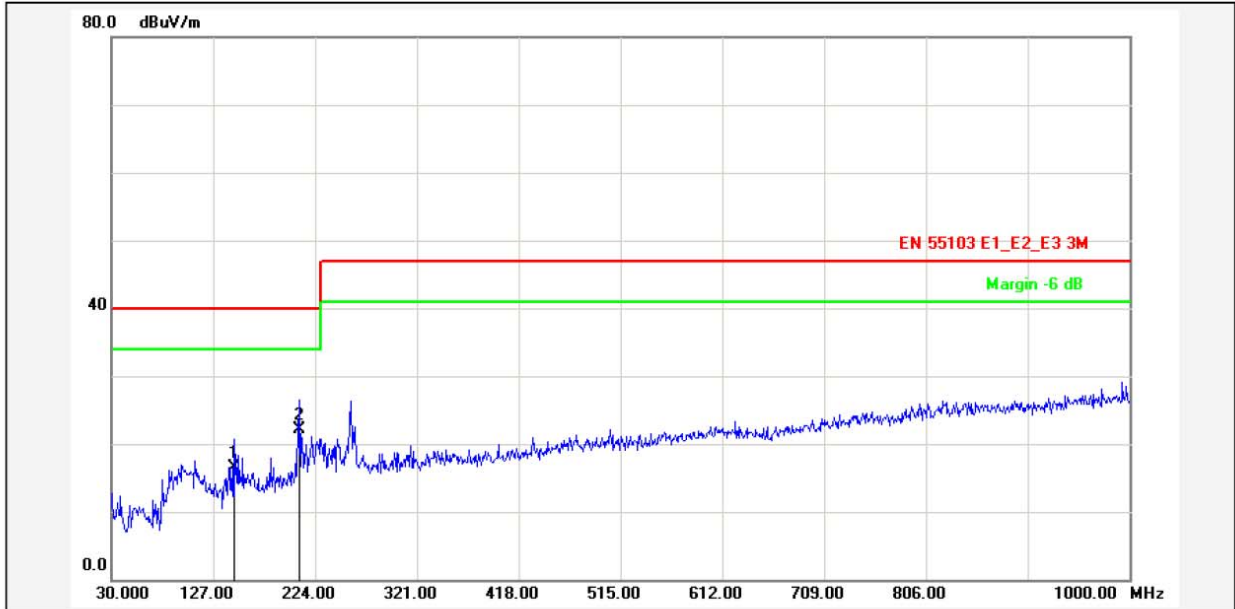
Please refer to the following pages of the worst case (MP3 IN).



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

Site: Radiation

Test Time: 2013-3-15 17:09:20



Report No.: Tour Bus 15	Test Standard: EN 55103 E1_E2_E3 3M	Test Distance: 3m
Test item: Radiation Emission	Applicant: Ashdown	Ant. Polarization: Horizontal
Product: Bass Amp Combo	Model No.: Tour Bus 15	Temp.()/Hum.(%): 24(C) / 56 %
Test Mode: MP3 IN	Remark:	Power Rating: AC 230V/50Hz
		Test Engineer: Infen

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth ()	P/F	Remark
1	146.4000	-15.58	32.08	16.50	40.00	-23.50	QP			P	
2	209.4499	-13.26	35.36	22.10	40.00	-17.90	QP			P	

Note: Level=Reading+Factor.
Margin=Limit-Level.

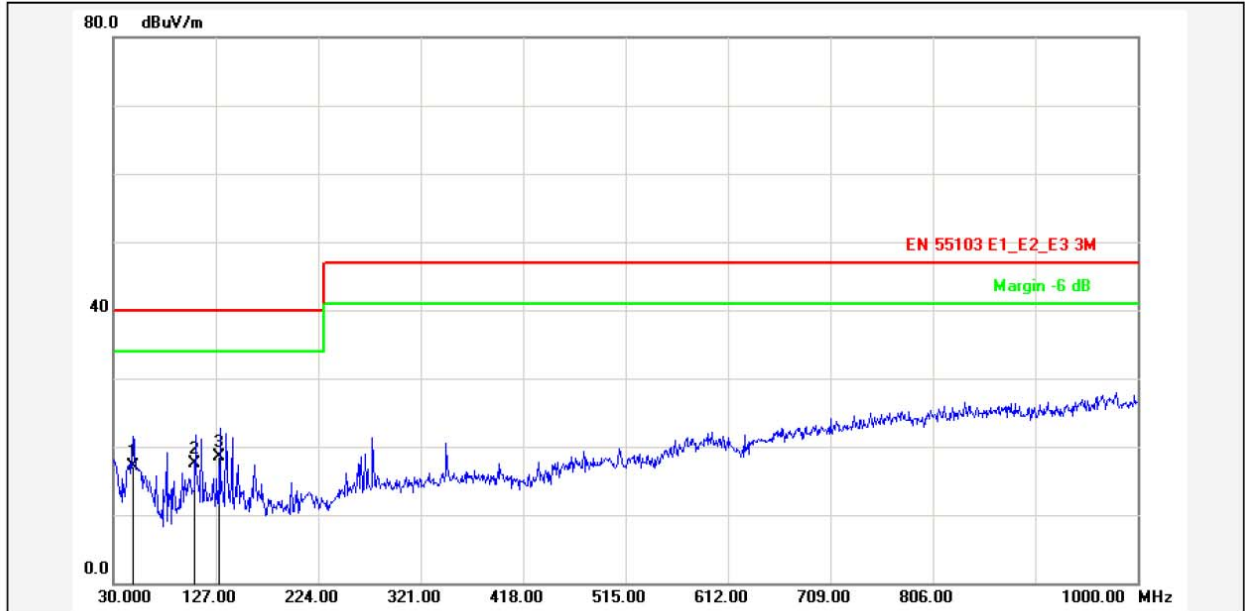
Note: The margin of the other emissions are larger than 10dB.



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

Site: Radiation

Test Time: 2013-3-15 17:12:57



Report No.: Tour Bus 15
Test Standard: EN 55103 E1_E2_E3 3M
Test item: Radiation Emission
Applicant: Ashdown
Product: Bass Amp Combo
Model No.: Tour Bus 15
Test Mode: MP3 IN
Remark:

Test Distance: 3m
Ant. Polarization: Vertical
Temp.()/Hum.(%): 24(C) / 56 %
Power Rating: AC 230V/50Hz
Test Engineer: Infen

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth ()	P/F	Remark
1	48.4299	-13.42	30.62	17.20	40.00	-22.80	QP			P	
2	107.5999	-16.06	33.56	17.50	40.00	-22.50	QP			P	
3	130.8798	-18.20	36.70	18.50	40.00	-21.50	QP			P	

Note: Level=Reading+Factor.

Margin=Limit-Level.

Note: The margin of the other emissions are larger than 10dB.

6. RADIATED MAGNETIC FIELD

6.1. Block Diagram of Test Setup

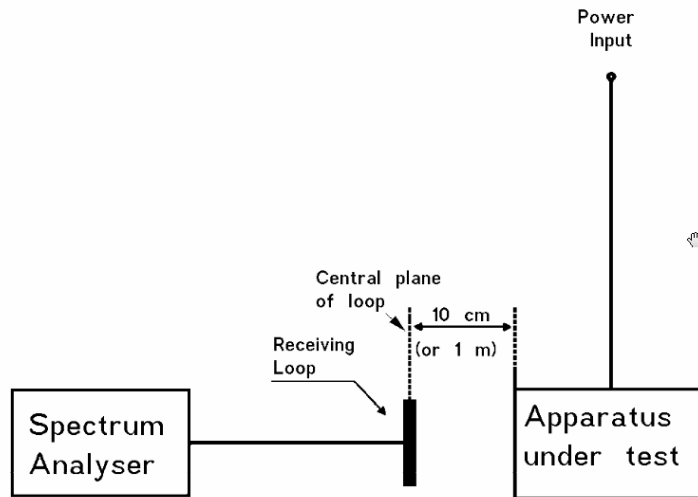


Figure A.2 - Typical test setup for radiated emissions, magnetic field, 50 Hz to 50 kHz

6.2. Limits of Radiated Magnetic Field measurement

Test Standard: EN 55103-1

Phenomenon	Frequency range MHz	limits A/m
Magnetic field at 100 mm	50Hz to 500Hz	4~0.4
	500Hz to 50KHz	0.4
Magnetic field at 1m	50Hz to 5KHz	1~0.01
	5KHz to 50KHz	0.01

6.3. Test Procedure

Audio apparatus shall be fed from a ping noise source; video apparatus shall be fed from a source of 100.0.75.0 colour bars. Verify that the environmental fields do not exceed one quarter of the limits shown in 6.2.

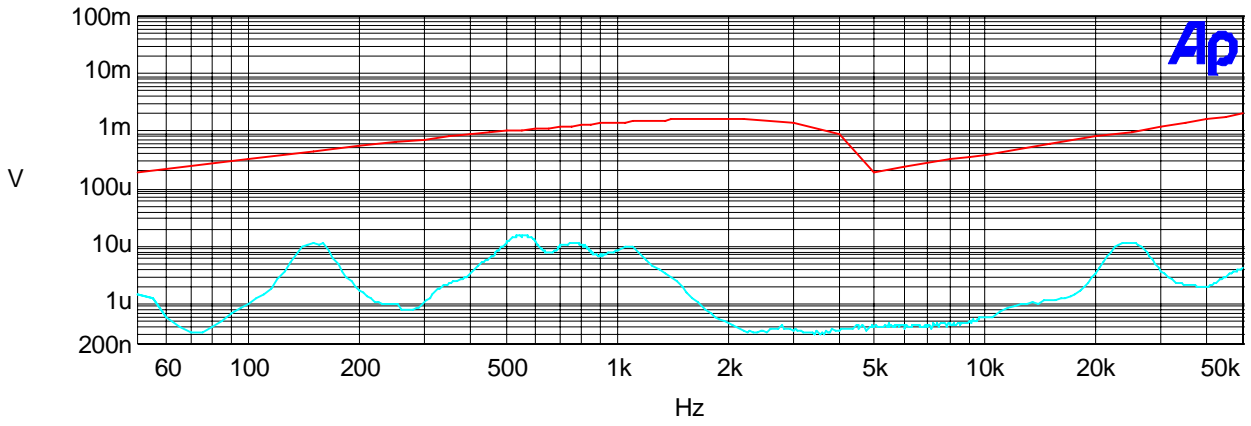
6.4. Radiated Magnetic Field Measurement Result

PASS.

Please refer to the following page of the worst case (Left).

Audio Precision

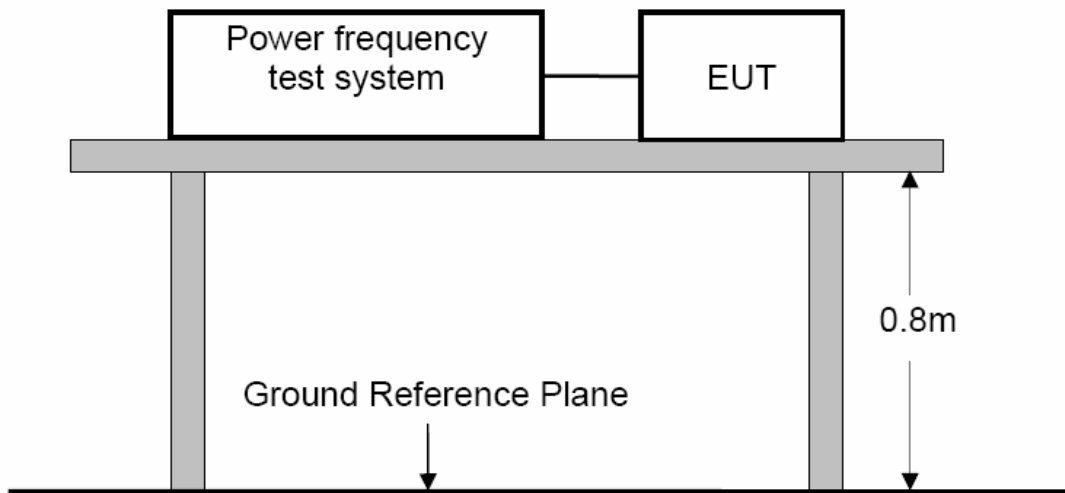
03/22/13 15:17:18



Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Anlr.Bandpass	Left	
Limit		Red	Solid	1	Data 1 upperlimit	Left	

7. HARMONIC CURRENT EMISSION TEST

7.1 Block Diagram of Test Setup



7.2 Limits of Harmonics current measurement

Test Standard: EN 61000-3-2: 2006+A1: 2009+A2: 2009

Limits for Class A equipment		Limits for Class D equipment		
Harmonics Order n	Max. permissible harmonics current A	Harmonics Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd harmonics				
3	2.30	3	3.4	2.30
5	1.14	5	1.9	1.14
7	0.77	7	1.0	0.77
9	0.40	9	0.5	0.40
11	0.33	11	0.35	0.33
13	0.21	13	0.30	0.21
15 ≤ n ≤ 39	0.15 × 15/n	15 ≤ n ≤ 39	3.85/n	0.15 × 15/n
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
8 ≤ n ≤ 40	0.23 × 8/n			

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

Note 1: Equipment with a rated power of 75W or less, other than lighting equipment.

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 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.

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.

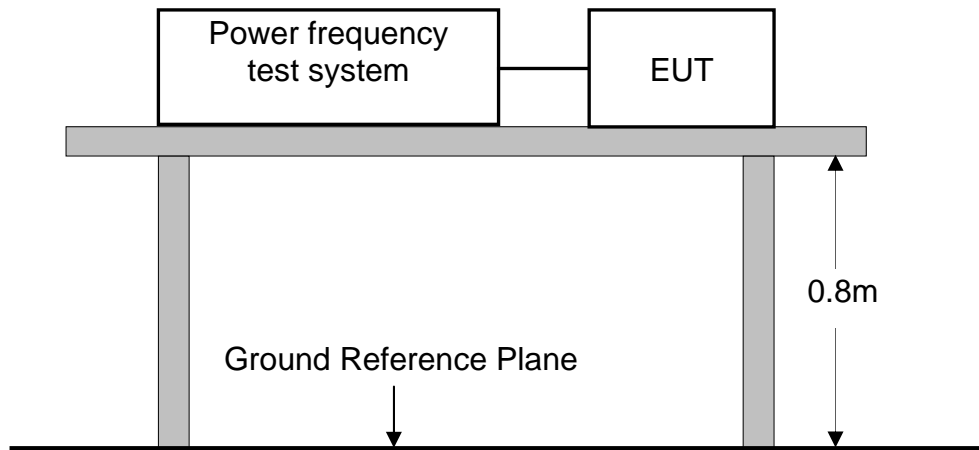
7.4.3 Let the E.U.T. work in test mode (AUX IN) and test it.

7.5 Test Results

The E.U.T. is not required to meet this test item as its power consumption is lower than 75W.

8. VOLTAGE FLUCTUATIONS & FLICKER TEST

8.1 Block Diagram of Test Setup



8.2 Limits of Voltage Fluctuations & Flicker Measurement

Test Standard: EN 61000-3-3: 2008

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

8.3 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.

8.4 Operating Condition of E.U.T.

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

8.4.2 Turn on the power of all equipments.

8.4.3 Let the E.U.T. work in test mode (AUX IN) and test it.

8.5 Test Results

PASS.

Please refer to the following page.

Flicker Test Summary per EN/IEC61000-3-3 (Run time)

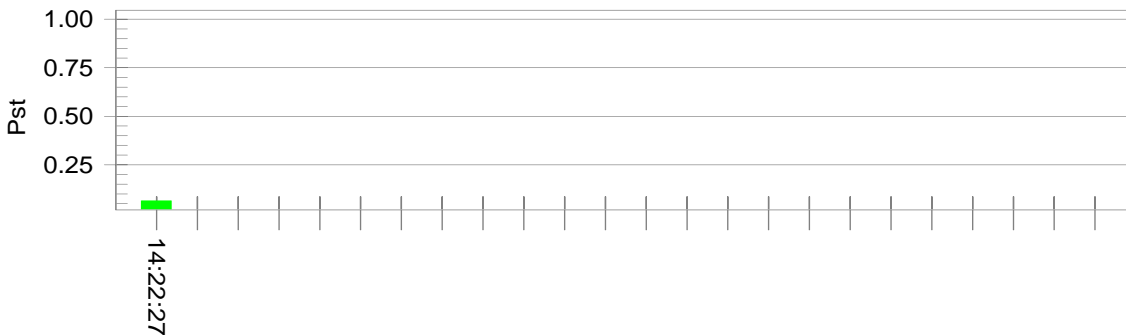
EUT: Bass Amp Combo
 Test category: All parameters (European limits)
 Test date: 2013-3-16
 Test duration (min): 10
 Comment: AUX IN
 Customer: Ashdown
 Model: Tour Bus 15
 Test Result: Pass

Tested by: Think
 Test Margin: 100
 End time: 14:22:28
 Start time: 14:12:07
 Data file name: F-000517.cts_data

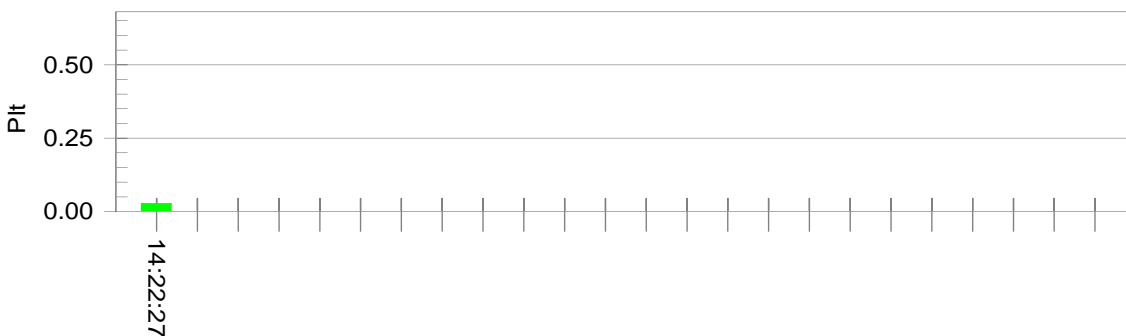
Status: Test Completed

Pst and limit line

European Limits



Plt and limit line



Parameter values recorded during the test:

Vrms at the end of test (Volt):	230.12		
Highest dt (%):	0.00	Test limit (%):	3.30 Pass
Time(mS) > dt:	0.0	Test limit (mS):	500.0 Pass
Highest dc (%):	0.00	Test limit (%):	3.30 Pass
Highest dmax (%):	0.00	Test limit (%):	4.00 Pass
Highest Pst (10 min. period):	0.064	Test limit:	1.000 Pass
Highest Plt (2 hr. period):	0.028	Test limit:	0.650 Pass

9. PERFORMANCE CRITERIA FOR IMMUNITY

The performance criteria are referred to the test standard: EN 55103-2

Performance Criteria A

The apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

Performance Criteria B

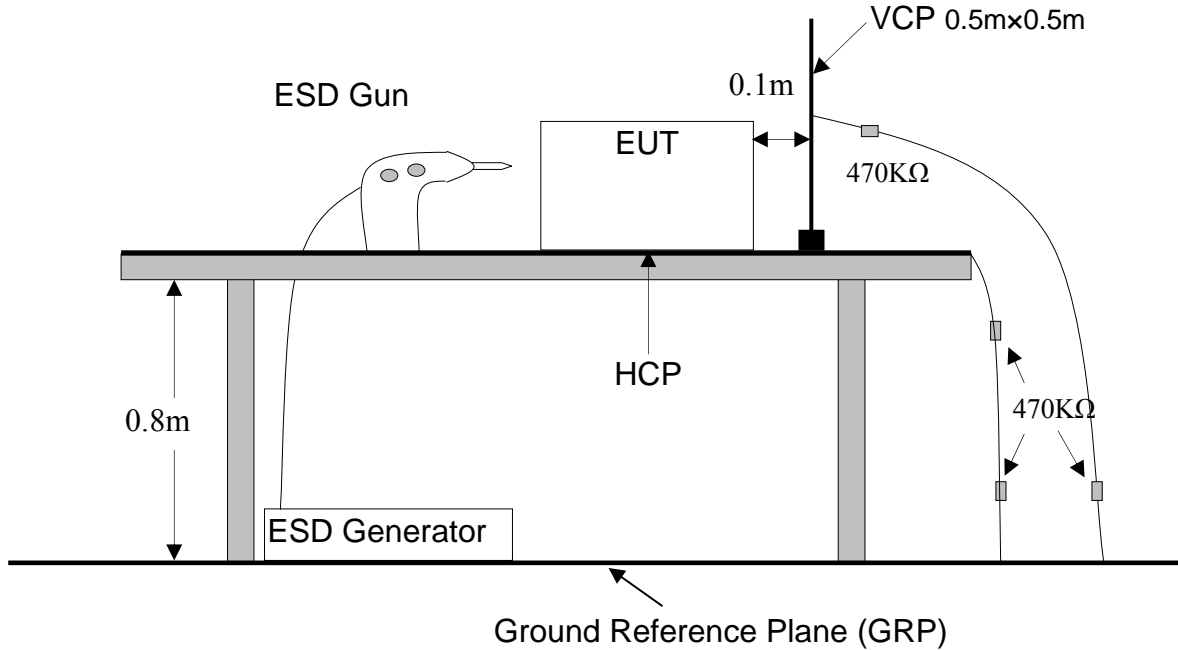
The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is, however, allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

Performance Criteria C

Temporary loss of function is allowed, provided that normal function is automatically restored when the test stimulus is removed, or can be restored by operation of the controls.

10.ELECTROSTATIC DISCHARGE TEST

10.1 Block Diagram of Test Setup



10.2 Test Standard and Severity Levels

10.2.1 Test Standard:

EN 55103-2

(EN 61000-4-2: 2009 Air Discharge: Severity Level: 3, ± 8KV;

Contact Discharge: Level: 2, ± 4KV)

10.2.2 Severity Levels:

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

10.3 Test Procedure

10.3.1 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

10.3.2 Contact Discharge:

All the procedure shall be same as Section 10.3.1. except that the tip of the discharge electrode shall touch the E.U.T..

10.3.3 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.

10.3.4 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.

10.4 Test Results

PASS.

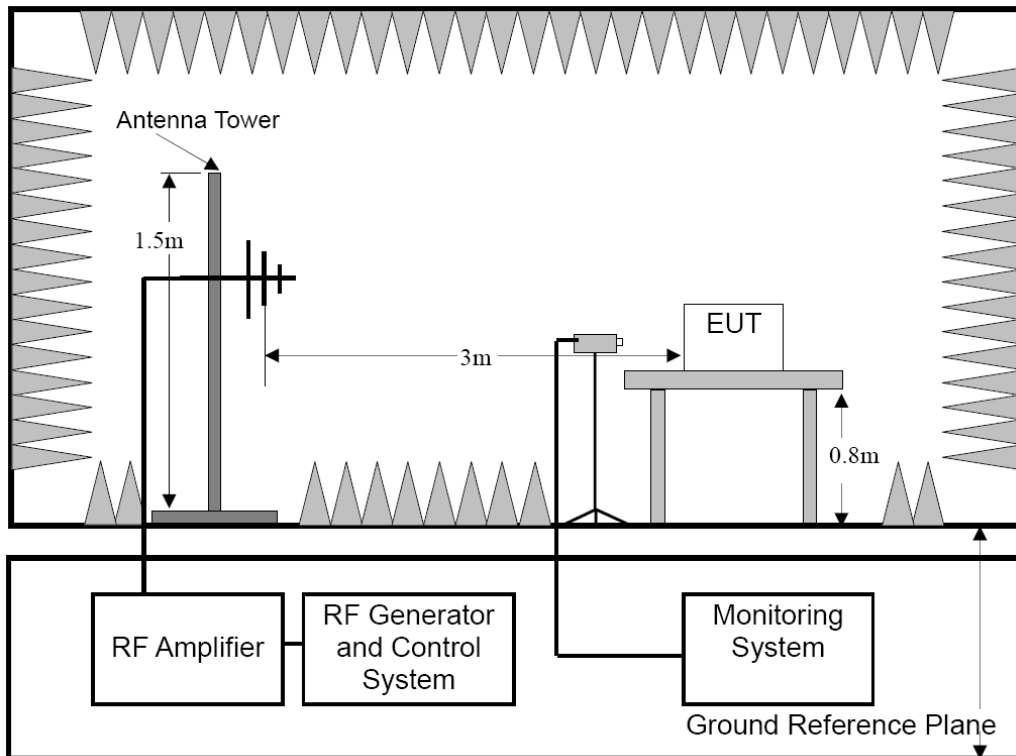
Please refer to the following page.

Electrostatic Discharge Test Results

Ambient Condition:	Temp.: 24 °C	R.H.: 50 %	Air Pressure: 101 kPa
Power Supply:	AC 230V 50Hz	Required Performance Criterion: B	
Test Specifications:	±4 kV Contact Discharge; ±8 kV Air Discharge For each point positive 10 times and negative 10 times.		
Tested mode:	AUX IN, MP3 IN		
Test Point	Kind A-Air Discharge C-Contact Discharge	Result (Performance Criterion)	
Slot of the E.U.T. 10 points	A	B	
I/O Port 8 points	A, C	B	
Metal 8 points	A	B	
Indirect Discharge (HCP)	C	A	
Indirect Discharge (VCP)	C	A	
Note: The EUT has noise phenomenon during the test, but it can be restored by itself.			
Test Equipment : ESD Tester (TESEQ, NSG 437)		Test Engineer : Infen	

11. RF FIELD STRENGTH SUSCEPTIBILITY TEST

11.1 Block Diagram of Test Setup



11.2 Test Standard and Severity Levels

11.2.1 Test Standard

EN 55103-2

(EN 61000-4-3: 2006+A2: 2010,

For 80MHz to 1GHz, Severity Level: 2, 3V/m;

For 1.4GHz to 2GHz, Severity Level: 2, 3V/m;

For 2GHz to 2.7GHz, Severity Level: 3, 1V/m)

11.2.2 Severity Levels

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

11.3 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, 1V/m
2. Radiated Signal	Modulated
3. Scanning Frequency	80MHz-1GHz,1.4-2.0GHz,2.0-2.7GHz
4. Dwell time of radiated	0.0015 decade/s
5. Waiting Time	1 Sec.

11.4 Test Results

PASS.

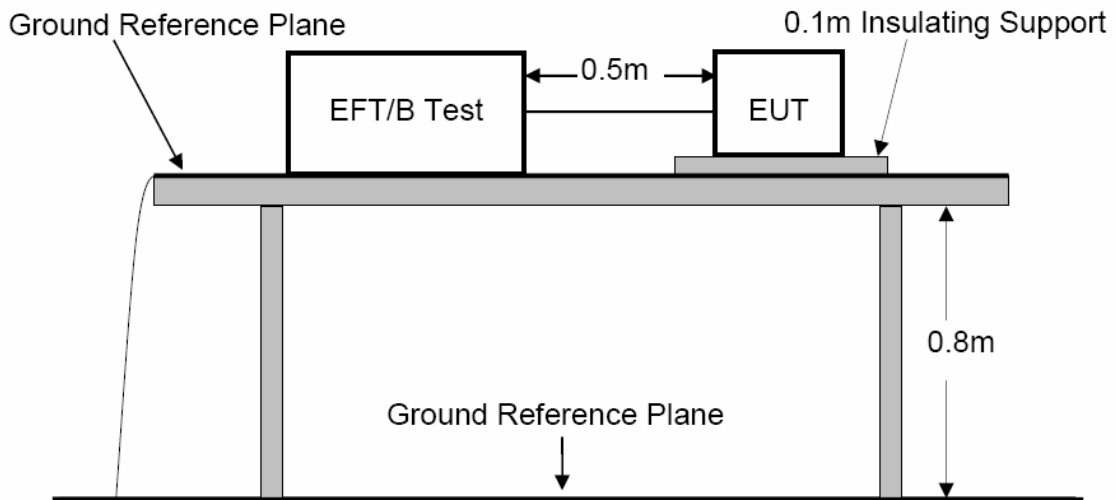
Please refer to the following page.

RF Field Strength Susceptibility Test Results

Ambient Condition:	Temp.: 24 °C	R.H.: 50 %	Air Pressure: 101 kPa	
Power Supply:	AC 230V 50Hz	Required Performance Criterion: A		
Test Specifications:	Modulation: 1kHz, 80%AM; Step Size: 1%; Dwell Time: 1s			
Tested mode:	AUX IN, MP3 IN			
Frequency	Level (V/m)	Antenna polarity	Side	Result (Performance Criterion)
80MHz-1GHz	3	Horizontal	Front	A
			Left	A
			Right	A
1.4GHz-2.0GHz	3	Vertical	Back	A
			Front	A
			Left	A
2.0GHz-2.7GHz	1	Vertical	Right	A
			Back	A
Note:				
<p>Test Equipment :</p> <ol style="list-style-type: none"> 1. Signal Generator : N5181A (Agilent) 2. Power Amplifier : CBA 1G-150 (TESEQ) 3. Log.-Per. Antenna: ATR80M6G (CORAD) 4. RF Power Meter. Dual Channel : 4242 (ESE) 5. Power Sensor: 51011EMC (ESE) <div style="text-align: right; margin-top: 10px;">Test Engineer : Infen</div>				

12. ELECTRICAL FAST TRANSIENT/BURST TEST

12.1 Block Diagram of Test Setup



12.2 Test Standard and Severity Levels

12.2.1 Test Standard

EN 55103-2

(EN 61000-4-4: 2004+A1: 2010, Severity Level, Level 2: 1KV)

12.2.2 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	5 or 100	0.25	5 or 100
2.	1.0	5 or 100	0.5	5 or 100
3.	2.0	5 or 100	1.0	5 or 100
4.	4.0	5 or 100	2.0	5 or 100
X	Special	Special	Special	Special

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.

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.

Note 3 "X" is an open level. The level has to be specified in the dedicated equipment specification.

12.3 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.

12.3.1 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.

12.3.2 For signal lines ports:

It's unnecessary to test.

12.3.3 For DC ports:

It's unnecessary to test.

12.4 Test Result

PASS.

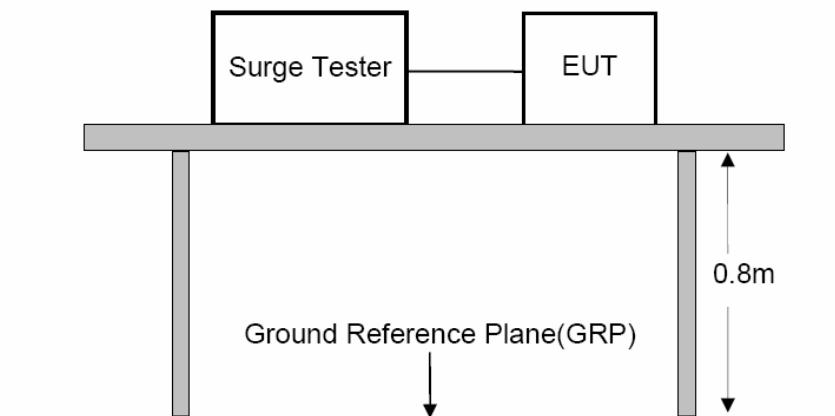
Please refer to the following page.

Electrical Fast Transient/Burst Test Results

Ambient Condition:	Temp.: 24 °C	R.H.: 50 %	Air Pressure: 101 kPa
Power Supply:	AC 230V 50Hz	Required Performance Criterion: B	
Test Specifications:	Repetition Frequency: 5kHz; Duration: 15ms; Period: 300ms		
Test mode:	AUX IN, MP3 IN		
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	
Line	Test Voltage	Result (Performance Criterion)	
L	±1KV	A	
N	±1KV	A	
PE	±1KV	A	
L ∙ N	±1KV	A	
L ∙ PE	±1KV	A	
N ∙ PE	±1KV	A	
L ∙ N ∙ PE	±1KV	A	
Signal line			
DC line			
Note :			
Test Equipment : Burst Tester(EM TEST, UCS500N)		Test Engineer : Infen	

13. SURGE IMMUNITY TEST

13.1 Block Diagram of Test Setup



13.2 Test Standard and Severity Levels

13.2.1 Test Standard

EN 55103-2

(EN 61000-4-5: 2006, Severity Level: Line To Line, Level 1: 0.5KV; Line To Earth, Level 2: 1.0KV)

13.2.2 Severity level

Severity Level	Open-Circuit Test Voltage KV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

13.3 Test Procedure

1. Set up the E.U.T. and test generator as shown on Section 13.1.
2. For line to line coupling mode, provide a 0.5KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to E.U.T. selected points.
3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
4. Different phase angles are done individually.
5. Record the E.U.T. operating situation during compliance test and decide the E.U.T. immunity criterion for above each test.

13.4 Test Result

PASS.

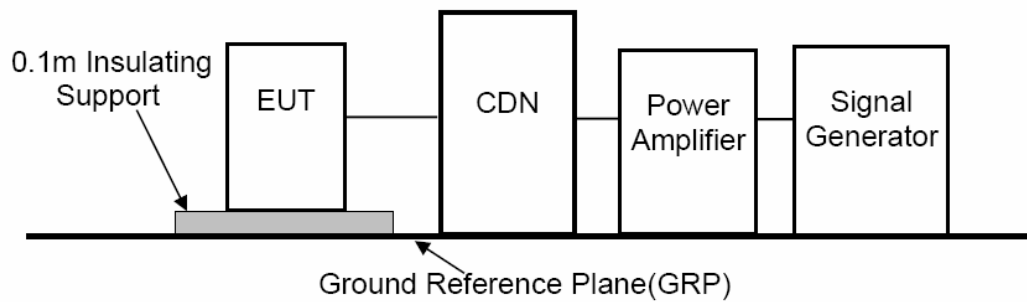
Please refer to the following page.

Surge Immunity Test Results

Ambient Condition:	Temp.: 24 °C	R.H.: 50 %	Air Pressure: 101 kPa
Power Supply:	AC 230V 50Hz	Required Performance Criterion: B	
Test Specifications:	Voltage surge 1.2/50 us ; Current surge 8/20 us ; Five positive and five negative pulses each at 90° and 270°.		
Test mode:	AUX IN, MP3 IN		
Line	Phase Angle	Test Voltage	Result (Performance Criterion)
L-N	+90°, -270°	±1.0KV	A
L-PE	+90°, -270°	±0.5KV	A
N-PE	+90°, -270°	±0.5KV	A
Signal line			
DC line			
Note :			
Test Equipment : Burst Tester(EM TEST, UCS500N)		Test Engineer : Infen	

14. INJECTED CURRENTS SUSCEPTIBILITY TEST

14.1 Block Diagram of Test Setup



14.2 Test Standard and Severity Levels

14.2.1 Test Standard

EN 55103-2

(EN 61000-4-6: 2009, Severity Level: 3V (rms), 0.15MHz ~ 80MHz)

14.2.2 Severity level

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

14.3 Test Procedure

1. Set up the E.U.T., CDN and test generators as shown on Section 14.1.
2. Let the E.U.T. work in test mode and measure it.
3. The E.U.T. are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from E.U.T.. Cables between CDN and E.U.T. are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
4. The disturbance signal described below is injected to E.U.T. through CDN.
5. The E.U.T. operates within its operational mode(s) under intended climatic conditions after power on.
6. The frequency range is swept from 150 KHz to 80 MHz using 3V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
7. The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
8. Recording the E.U.T. operating situation during compliance testing and decide the E.U.T. immunity criterion.

14.4 Test Result

PASS.

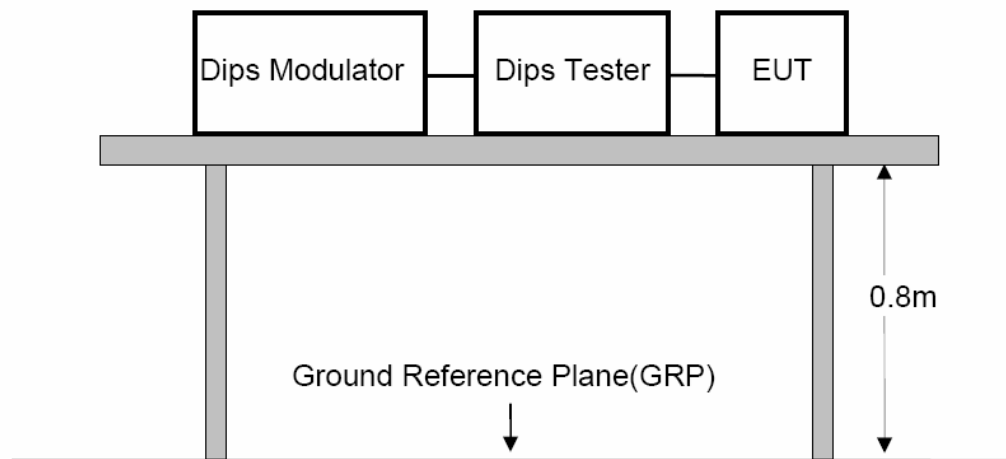
Please refer to the following page.

Injected Currents Susceptibility Test Results

Ambient Condition:	Temp.: 24 °C	R.H.: 50 %	Air Pressure: 101 kPa
Power Supply:	AC 230V 50Hz	Required Performance Criterion: A	
Test Specifications:	Modulation : 1KHz, 80%AM, Step Size : 1%, Dwell Time : 1s		
Test mode:	AUX IN, MP3 IN		
Test Port	Frequency (MHz)	Level(V)	Result (Performance Criterion)
AC Mains	0.15~80	3	A
Signal Port	0.15~80	3	A
Note :			
Test Equipment : FRANNOKIA, CIT-10		Test Engineer : Infen	

15.VOLTAGE DIPS AND INTERRUPTIONS TEST

15.1 Block Diagram of Test Setup



15.2 Test Standard and Severity Levels

15.2.1 Test Standard

EN 55103-2
 (EN 61000-4-11: 2004)

15.2.2 Severity level

Test Level %U _T	Voltage dip and short interruptions %U _T	Duration (in period)
0	100	0.5 1
40	60	5 10
70	30	25 50 *

15.3 Test Procedure

1. Set up the E.U.T. and test generator as shown on Section 15.1.
2. The interruptions is introduced at selected phase angles with specified duration.
3. Record any degradation of performance.

15.4 Test Result

PASS.

Please refer to the following page.

Voltage Dips And Interruptions Test Results

Ambient Condition:	Temp.: 24 °C	R.H.: 50 %	Air Pressure: 101 kPa
Power Supply:	AC 230V 50Hz	Required Performance Criterion: B & C	
Test Specifications:	70%U _T , 0.5Cycle; 40%U _T , 5Cycle; 0%U _T ,250Cycle		
Test mode:	AUX IN, MP3 IN		
Test Level % UT	Duration (in period)	Result (Performance Criterion)	
70	0.5P	B	
40	5P	B	
0	250P	B	
Note : During the test, the voice of EUT occurs abnormal phenomenon, but it could be restored by itself after test.			
Test Equipment : Dips Tester: EM TEST, UCS 500N		Test Engineer : Infen	

16. MAGNETIC FIELD IMMUNITY

16.1. Test Setup

Place the centroid of the apparatus under test at the mid-point of the line joining the centres of the two coils.

16.2. Test Procedure

The test procedure shall be as follows:

a) apparatus shall be fed with real life signals (not simplified test signals) chosen with regard to the phenomenon being investigated (see 7.1 and EN61000-3-2);

b) testing of apparatus under test:

1) select test frequencies and move the coil as follows:

a) position the radiating coil $0.1\text{m} \pm 0.005\text{ m}$ from one face of the apparatus under test. The plane of the coil shall be parallel to plane of the surfaces of the apparatus under test. The plane of the coil shall be parallel to plane of the surfaces of the apparatus under test;

b) supply the coil with sufficient current to produce magnetic field strengths of the levels specified in Table 1;

c) scan the applicable frequency range in an appropriate way using about three frequencies per decade, or a continuous scan, and paying particular regard to the working principles of the apparatus under test (for example, apparatus using the EBU time code should be tested at 3kHz). Note any frequencies at which performance degradation is found;

d) reposition the coil successively over each face of the apparatus under test, and repeat A4.3.b)1)c) to determine locations and frequencies of at which performance degradation is found.

2) at each frequency and location determined in A4.3.b)1)d), verify that such performance degradation as is noted is consistent with the manufacturer's list of degraded performance levels (see 7.1).

16.3. Magnetic Field Immunity Measurement Result

PASS.

Please refer to the following page.

Magnetic Field Immunity Test Results

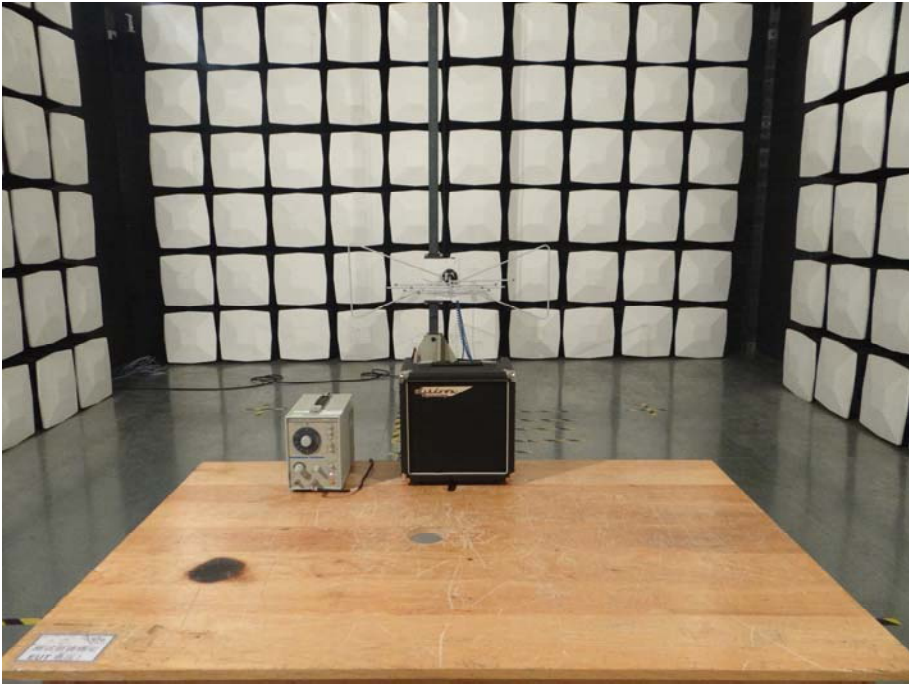
Ambient Condition:	Temp.: 24 °C	R.H.: 50 %	Air Pressure: 101 kPa
Power Supply:	AC 230V 50Hz	Required Performance Criterion: A	
Test Specifications:	Frequency: 50 Hz to 10 KHz; Frequency Step: Continuous Scan		
Test mode:	Left		
Installation Type	Frequency (kHz)	Field Strength(A/m)	Result (Performance Criterion)
Non Rack-mounted	0.05 to 5	1.0-0.01	A
	5 to 10	0.01	A
Note :			
Test Equipment : Anechoic Chamber : RFD-F/A-100(ETS) Biconilog Antenna: 3142C(ETS)			Test Engineer : Infen

17. PHOTOGRAPH

17.1 Photo of Conducted Emission Measurement



17.2 Photo of Radiation Emission Measurement



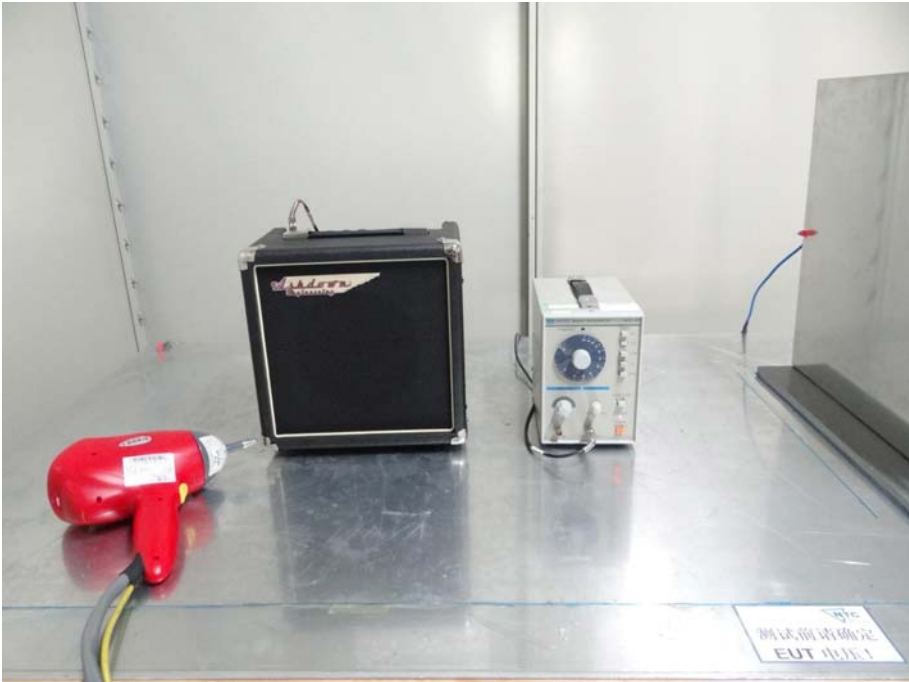
17.3 Photo of Radiated Magnetic Field



17.4 Photo of Harmonic/Flicker Measurement



17.5 Photo of Electrostatic Discharge Test



17.6 Photo of Electrical Fast Transient /Surge /Voltage Dips Test



17.7 Photo of Magnetic Field Immunity



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.

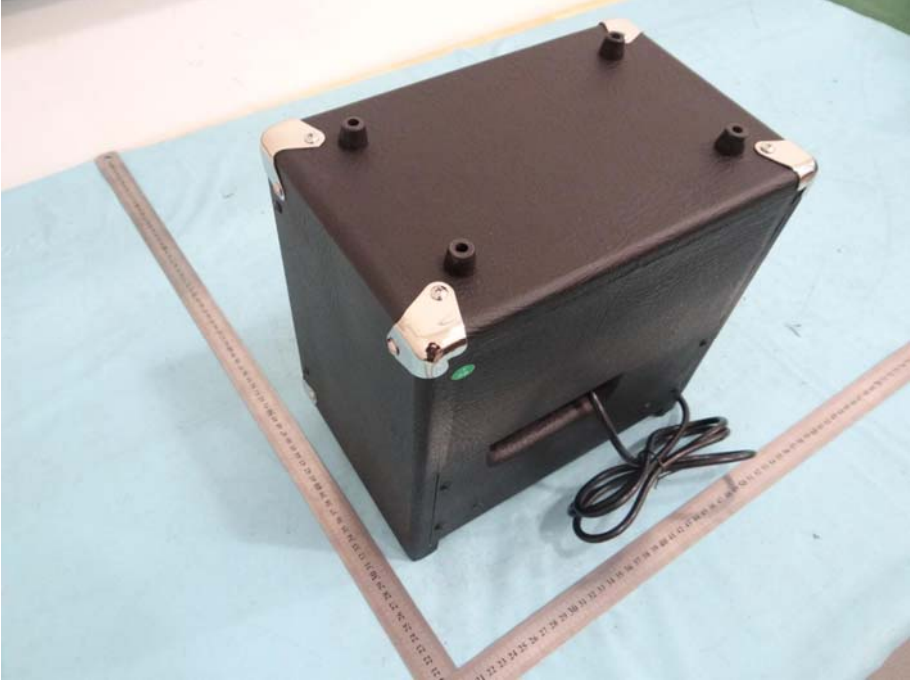


Figure 3
General Internal of the E.U.T.

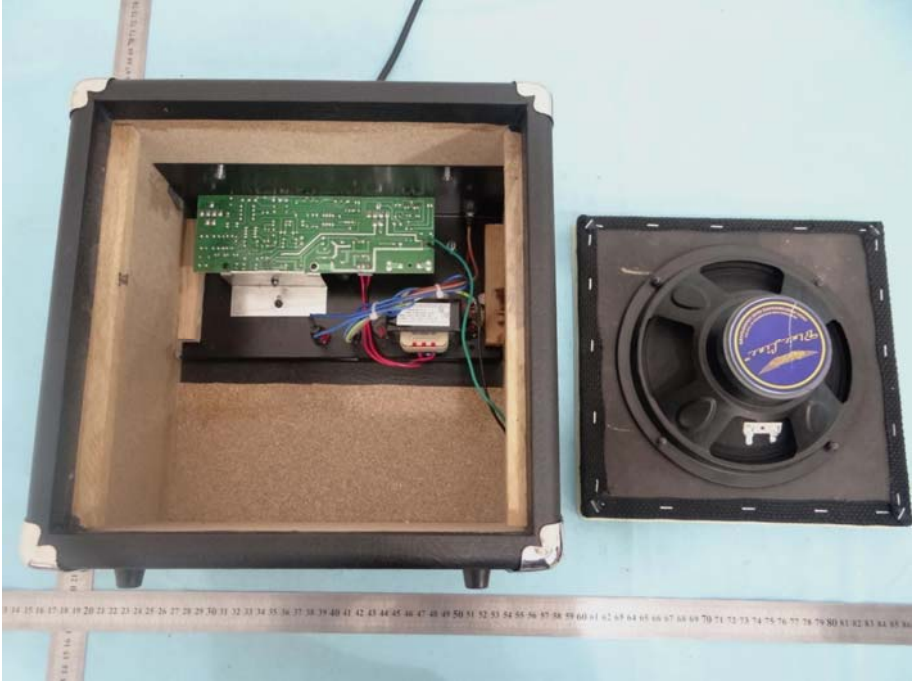


Figure 4
General Appearance of the PCB

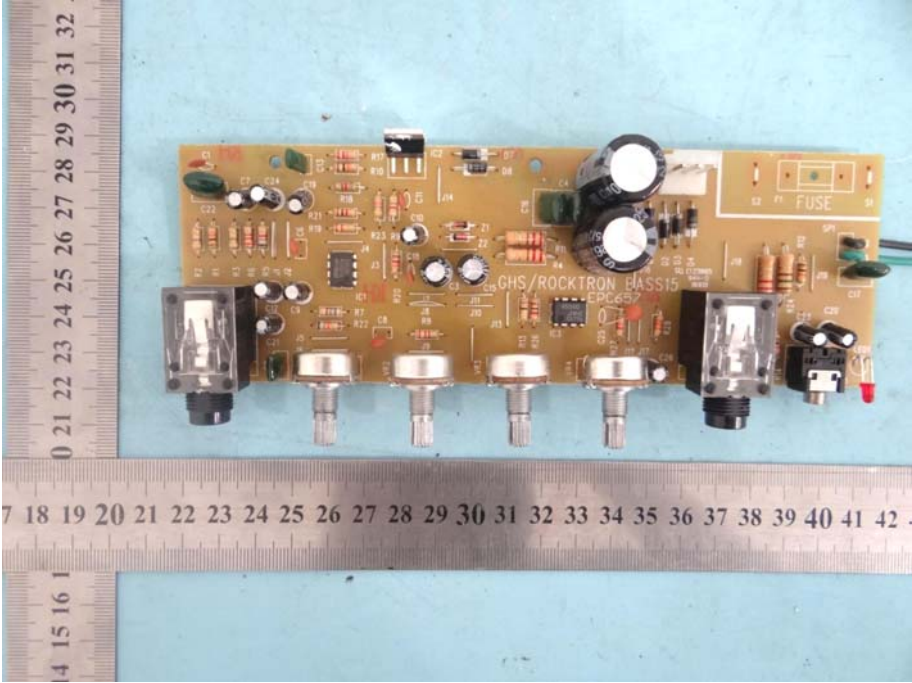
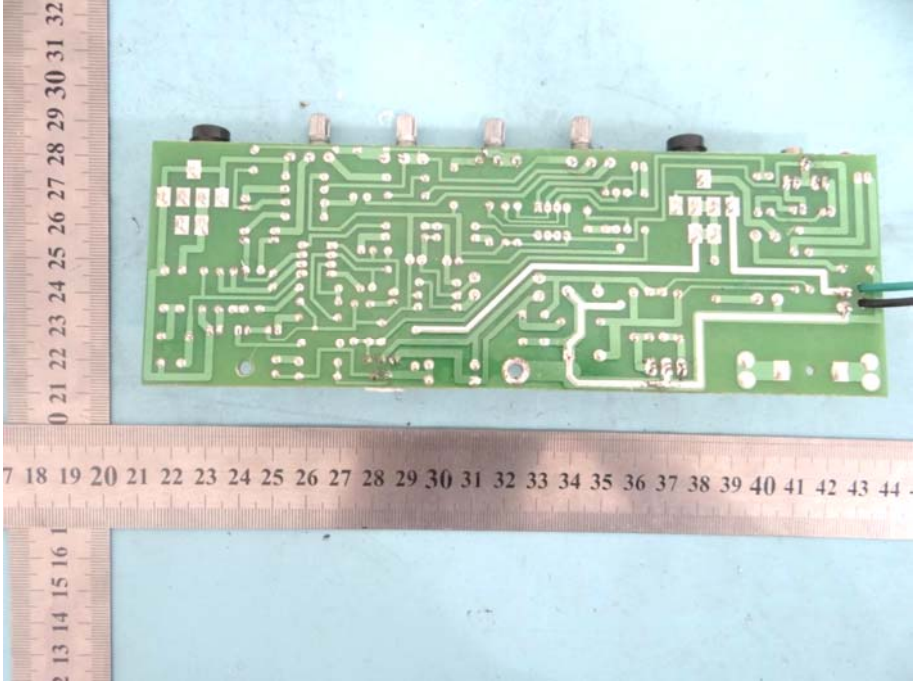


Figure 5
General Appearance of the PCB



--- End of report ---