



**SPORTON LAB.**

Certificate No: EB031623-19

# CERTIFICATE

- **EQUIPMENT: Set Top Box**  
**MODEL NO. : STBX-CSC-rY(X=A~Z, Y=0~9) / IST6XY2 (X=0-2, Y=0-2)**  
**Applicant : Cisco Systems**  
5030 Sugarloaf Parkway Lawrenceville,  
GA 30044-2869, USA



**I HEREBY**

**CERTIFY THAT:**

THE MEASUREMENTS SHOWN IN THIS TEST REPORT WERE MADE IN ACCORDANCE WITH THE PROCEDURES GIVEN IN **EUROPEAN COUNCIL DIRECTIVE 2004/108/EC**. THE EQUIPMENT WAS **PASSED** THE TEST PERFORMED ACCORDING TO **European Standard EN 55013:2001/A1:2003/A2:2006, EN 61000-3-2:2006/A1:2009/A2:2009, EN 61000-3-3:2008 and EN 55020:2007.** THE TEST WAS CARRIED OUT ON **Jul. 27, 2012** AT **SPORTON INTERNATIONAL INC. LAB.**

Alex Chen  
Q.A Dept. Director

# CE EMC TEST REPORT

according to

**European Standard EN 55013:2001/A1:2003/A2:2006,  
EN 61000-3-2:2006/A1:2009/A2:2009, EN 61000-3-3:2008 and  
EN 55020:2007**

Equipment : Set Top Box

Model No. : STBX-CSC-rY(X=A~Z,Y=0~9) /  
IST6XY2 (X=0-2, Y=0-2)

Applicant : **Cisco Systems**  
5030 Sugarloaf Parkway Lawrenceville,  
GA 30044-2869, USA

## Statement

- The test result refers exclusively to the test presented test model / sample.
- Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.
- This test report is only applicable to European Community.

***SPORTON International Inc.***

*6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.*

## Table of Contents

History of this test report.....	iii
<b>CERTIFICATE OF COMPLIANCE.....</b>	<b>1</b>
<b>1. General Description of Equipment under Test.....</b>	<b>2</b>
1.1. Applicant.....	2
1.2. Manufacturer .....	2
1.3. Basic Description of Equipment under Test .....	3
1.4. Feature of Equipment under Test .....	3
<b>2. Test Configuration of Equipment under Test .....</b>	<b>4</b>
2.1. Test Manner .....	4
2.2. Description of Test System .....	5
<b>3. Test Software .....</b>	<b>6</b>
<b>4. General Information of Test.....</b>	<b>7</b>
4.1. Test Facility .....	7
4.2. Test Voltage .....	7
4.3. Standard for Methods of Measurement.....	7
4.4. Test in Compliance with .....	7
4.5. Frequency Range Investigated .....	7
4.6. Test Distance .....	7
<b>5. Test of Conducted Powerline for Broadcast Receivers and Associated Equipment.....</b>	<b>8</b>
5.1. Description of Major Test Instruments .....	8
5.2. Test Procedures.....	8
5.3. Typical Test Setup Layout of Conducted Powerline for Broadcast Receivers and Associated Equipment .....	9
5.4. Test Result of AC Powerline Conducted Emission .....	10
5.5. Photographs of Conducted Powerline Test Configuration .....	12
<b>6. Test of Radiated Emission for Broadcast Receivers and Associated Equipment .....</b>	<b>13</b>
6.1. Description of Major Test Instruments .....	13
6.2. Test Procedures.....	14
6.3. Typical Test Setup Layout of Radiated Emission for Broadcast Receivers and Associated Equipment .....	14
6.4. Test Result of Radiated Emission .....	15
6.5. Photographs of Radiated Emission Test Configuration .....	19
<b>7. Test of disturbance voltage at the antenna terminals .....</b>	<b>20</b>
<b>8. Harmonics Test.....</b>	<b>21</b>
8.1. Standard.....	21
8.2. Test Procedure.....	21
8.3. Test Equipment Settings .....	21
8.4. Test Setup .....	21
8.5. Current Harmonics Test.....	22
<b>9. Voltage Fluctuations Test.....</b>	<b>23</b>
9.1. Standard.....	23
9.2. Test Procedure.....	23
9.3. Test Equipment Settings .....	23
9.4. Test Setup .....	23

9.5. Test Result of Voltage Fluctuation and Flicker Test.....24

9.6. Photographs of Harmonics Test, Voltage Fluctuation and Flicker Test .....25

**10. Input Immunity Test .....26**

**11. Input to RF Voltage (common mode) at Antenna Terminal Test .....27**

**12. Screening Effectiveness Test .....28**

**13. Electrical Fast Transient/Burst Immunity Test (EFT/BURST) .....29**

13.1. Test Setup.....29

13.2. Test Procedure .....30

13.3. Test Severity Levels.....30

13.4. Photographs of Electrical Fast Transient/BURST Immunity Test .....31

**14. Immunity to Induced Voltage Test.....32**

14.1. Test Setup.....32

14.2. Limits.....33

14.3. Wanted Signal Parameters .....34

14.4. Input Signal Abbreviations .....34

14.5. Test Procedure .....35

14.6. Test Record .....36

14.7. Photographs of Immunity to Induced Voltage Test.....38

**15. Immunity from Radiated Fields (RF e.m. field AM modulated carrier).....39**

15.1. Test Setup.....39

15.2. Limits.....40

15.3. Wanted Signal Parameter Table.....41

15.4. Test Procedure .....41

15.5. Test Record .....42

15.6. Photographs of Immunity from Radiated Fields (RF e.m. field AM modulated carrier).....44

**16. Immunity from Radiated Fields Test (RF e.m. field keyed carrier).....45**

16.1. Test Setup.....45

16.2. Test Procedure .....46

16.3. Test Record .....47

16.4. Photographs of Immunity from Radiated Fields Test (RF e.m. field keyed carrier) .....49

**17. Electrostatic Discharge Immunity Test (ESD) .....50**

17.1. Test Setup.....50

17.2. Test Setup for Tests Performed in Laboratory.....51

17.3. ESD Test Procedure .....52

17.4. Test Severity Levels.....53

17.5. Test Conditions .....54

17.6. Photographs of Electrostatic Discharge Immunity Test .....55

**18. List of Measuring Equipment Used .....56**

**Appendix A. Photographs of EUT..... A1 ~ A16**



# CERTIFICATE OF COMPLIANCE

according to

**European Standard EN 55013:2001/A1:2003/A2:2006,  
EN 61000-3-2:2006/A1:2009/A2:2009, EN 61000-3-3:2008 and  
EN 55020:2007**

Equipment : Set Top Box

Model No. : STBX-CSC-rY(X=A~Z,Y=0~9) /  
IST6XY2 (X=0-2, Y=0-2)

Applicant : **Cisco Systems**  
5030 Sugarloaf Parkway Lawrenceville,  
GA 30044-2869, USA

## I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **EUROPEAN COUNCIL DIRECTIVE 2004/108/EC**. The equipment was **passed** the test performed according to **European Standard EN 55013:2001/A1:2003/A2:2006, EN 61000-3-2:2006/A1:2009/A2:2009, EN 61000-3-3:2008 and EN 55020:2007**.

The test was carried out on **Jul. 27, 2012** at **SPORTON International Inc. LAB**.

Reviewed by:

Approved by:

  
\_\_\_\_\_  
Jack Deng  
Engineer Dept. Manager

  
\_\_\_\_\_  
Alex Chen  
Q.A Dept. Director

## **SPORTON International Inc.**

6F, No. 106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.

## 1. General Description of Equipment under Test

### 1.1. Applicant

Cisco Systems

5030 Sugarloaf Parkway Lawrenceville, GA 30044-2869, USA

### 1.2. Manufacturer

1. Pegatron Corporation

No.150, Lide Rd., Beitou, Taipei 112, Taiwan

2. PEGATRON MEXICO S.A. DE C.V

MIGUEL DE LA MADRID # 9650 COL. PUENTE ALTO CD. JUAREZ, CHIH. 32695

3. Maintek Computer (Suzhou) Co., Ltd.

No. 233 JingFeng Road, Suzhou New District, Suzhou, Jiansu Province 215011

### 1.3. Basic Description of Equipment under Test

Equipment : Set Top Box  
Model No. : STBX-CSC-rY(X=A~Z,Y=0~9) / IST6XY2 (X=0-2, Y=0-2)  
Trade Name : Cisco  
RJ45 Cable x2 : Non-Shielded, 1.0 m  
SCART Cable x2 : D-Shielded, 1.0 m  
HDMI Cable : D-Shielded, 1.2 m  
COAXIAL Cable : D-Shielded, 20 m  
COAXIAL Cable : D-Shielded, 1.5 m  
RJ45 Cable : Non-Shielded, 2.0 m  
RJ45 Cable x2 : Non-Shielded, 20 m  
Data Cable Type : Please see section 2.2 of this test report for details  
Power Supply Type : From Switching Adapter  
AC Power Input : Wall-mount, 2 pin  
DC Power Cable : B-Shielded, 1.5 m, 2 pin

### 1.4. Feature of Equipment under Test

DDR : Micron

Adapter : MCK / MC28-12V2.4A

INPUT : 220V-240V ~ 50Hz, 0.2A

OUTPUT : 12V / 2.4A

RC : REMOTE CONTROL FOR SFR PHILIPS/ RC2662401/01B

SCART CABLE 21P TO 21P L:1.2M NBBROAD/HS0022

HDMI cable : HDMI CABLE OD:6mm; L:1.2M ASAP/104-0001-HD1

LAN CABLE CAT5E WHITE+BLUE 2.0 NBBROAD/HS0033

Please refer to user manual for others.



## 2. Test Configuration of Equipment under Test

### 2.1. Test Manner

- a. During testing, the interface cables and equipment positions were varied according to European Standard EN 55013 and EN 55020.
- b. The complete test system included remote workstation, LCD Monitor, TV, USB 2.0 Flash Disk, Speaker, Decoder, Memory Card and EUT for Conducted and Radiated below 1GHz test.  
The remote workstation included PC, LCD Monitor, USB Keyboard, USB Mouse and Signal Generator.
- c. The following test modes were performed for AC Conducted Emission test:  
Mode 1. DVB-T CH09  
Mode 2. DVB-T CH25  
Mode 3. DVB-T CH55  
Mode 4. DVB-T CH09+ GND  
cause "mode 1" generated the worst test result; it was reported as final data.
- d. The following test modes were performed for Radiated Emissions test:  
Mode 1. DVB-T CH09  
Mode 2. DVB-T CH25  
Mode 3. DVB-T CH55  
cause "mode 1" generated the worst test result; it was reported as final data.
- e. The complete test system included TV and EUT for EN 55020 test.
- f. Frequency range investigated: Conduction 150 kHz to 30 MHz, radiation 30 MHz to 1,000 MHz.

## 2.2. Description of Test System

### < EMI >

No.	Peripheral	Manufacturer	Model Number	FCC ID	Cable / Spec. Description	Placed
1	LCD Monitor	DELL	2408WFPb	DoC	HDMI Cable, D-Shielded, 1.2m	Local
2	TV	Hanns.G	JT261	N/A	SCART Cable, D-Shielded, 1m	Local
3	USB2.0 Flash Disk x3	ADATA	PD4	DoC	N/A	Local
4	Decoder	YAMADA	RM-201	N/A	Fiber Cable, Non-Shielded, 1m	Local
5	Speaker(AV)	YAMADA	LSPK0239079	DoC	RCA Cable, Non-Shielded, 1.2m	Local
6	Memory Card	SANDISK	SD-2G	DoC	N/A	Local
7	Personal Computer	DELL	DCTA	DoC	N/A	Remote
8	LCD Monitor	DELL	E198WFPf	DoC	D-SUB Cable, D-Shielded, 1.8m	Remote
9	USB Keyboard	DELL	SK-8175	DoC	USB Cable, AL-F-Shielded, 1.8m	Remote
10	USB Mouse	DELL	MOC5UO	DoC	USB Cable, AL-F-Shielded, 1.8m	Remote
11	Signal Generator	BSK	DTV	N/A	Coaxial Cable, D-Shielded, 20m	Remote

### < EMS >

No.	Peripheral	Manufacturer	Model Number	FCC ID	Cable / Spec. Description	Placed
1	TV	HANNSPREE	ST19AMBB	N/A	AV Cable, Non-Shielded, 1.8m	Local

### 3. Test Software

During testing, the EUT kept displaying the color bar signal and play 1kHz audio signal.

## 4. General Information of Test

### 4.1. Test Facility

#### <EMI>

Test Site : SPORTON INTERNATIONAL INC.  
Test Site Location : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang,  
Tao Yuan Hsien, Taiwan, R.O.C.  
TEL : 886-3-327-3456  
FAX : 886-3-318-0055

Test Site No. : CO03-HY  
Test Site Location : No. 3, Lane 238, Kang Lo Street, Nei Hwu District, Taipei 11424,  
Taiwan, R.O.C.  
TEL : 886-2-2631-4739  
FAX : 886-2-2631-9740

Test Site No. : OS02-NH

#### <EMS>

Test Site Location : 3F, No.587, Tanmeu St., Neihu District, Taipei, Taiwan, R.O.C.  
TEL : 886-2-2794-8886  
FAX : 886-2-2794-9777

### 4.2. Test Voltage

AC 230V / 50Hz

### 4.3. Standard for Methods of Measurement

EMI Test (conduction and radiation) : European Standard EN 55013  
Harmonics Test : European Standard EN 61000-3-2  
Voltage Fluctuations Test : European Standard EN 61000-3-3  
EMS Test : European Standard EN 55020

### 4.4. Test in Compliance with

EMI Test (conduction and radiation) : European Standard EN 55013  
Harmonics Test : European Standard EN 61000-3-2  
Voltage Fluctuations Test : European Standard EN 61000-3-3  
EMS Test : European Standard EN 55020

### 4.5. Frequency Range Investigated

- a. Conducted emission test: from 150 kHz to 30 MHz
- b. Radiated emission test: from 30 MHz to 1,000 MHz
- c. Test of disturbance voltage at the antenna terminals: from 30MHz to 2,150MHz

### 4.6. Test Distance

The test distance of radiated emission test from antenna to EUT is 3 M.

## 5. Test of Conducted Powerline for Broadcast Receivers and Associated Equipment

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 kHz and return leads of the EUT according to the methods defined in European Standard EN 55013. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 5.3. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position producing maximum conducted emissions.

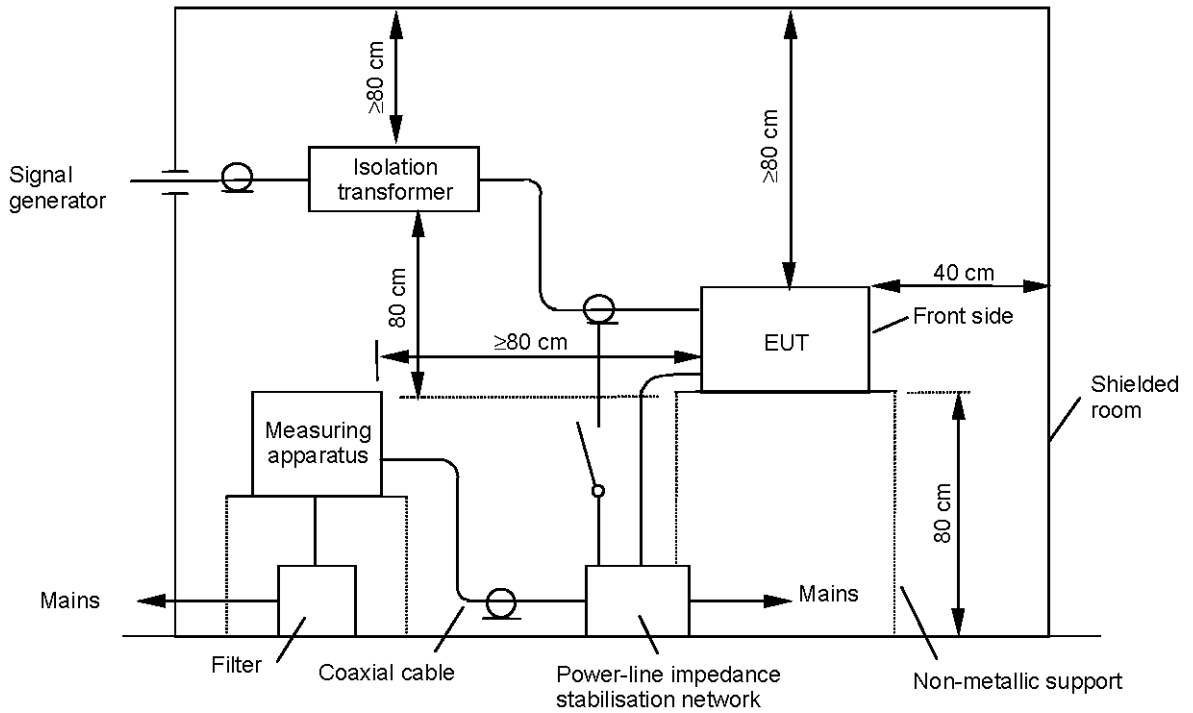
### 5.1. Description of Major Test Instruments

Test Receiver Parameters	Setting
Test Receiver	R&S ESCS 30
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz
Signal Input	9 kHz - 2.75 GHz

### 5.2. Test Procedures

- a. The EUT was placed on a desk 0.8 meter height from the metal ground plane and 0.4 meter from the conducting wall of the shielding room and it was kept at least 0.8 meter from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connect to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The CISPR states that a 50 ohm, 50 microhenry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 150 kHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

**5.3. Typical Test Setup Layout of Conducted Powerline for Broadcast Receivers and Associated Equipment**



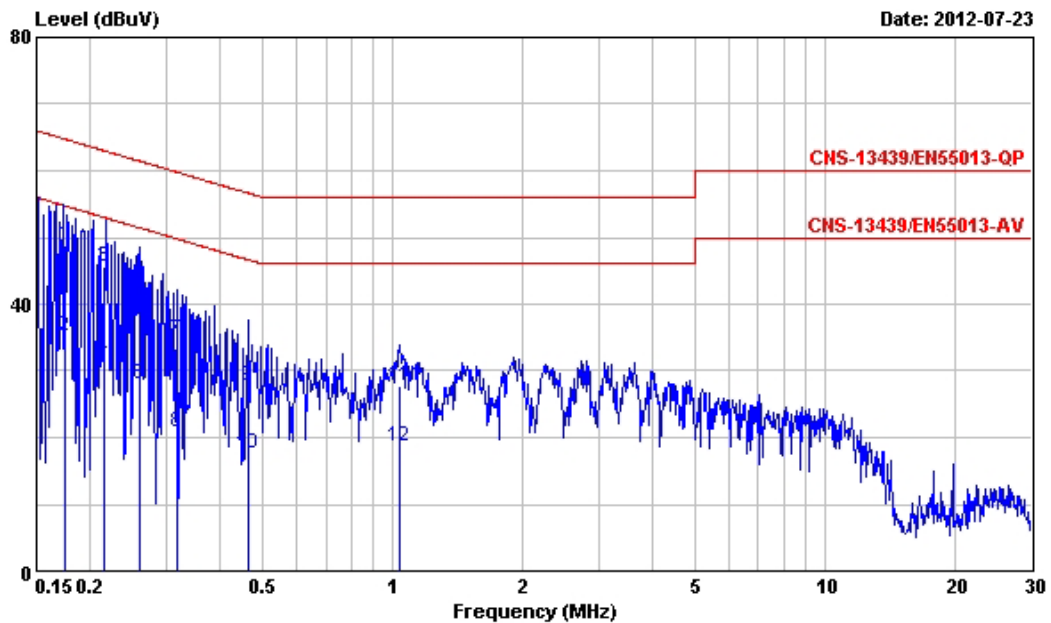
**5.4. Test Result of AC Powerline Conducted Emission**

Test Mode	Mode 1		
Test Frequency	0.15 MHz ~ 30 MHz	Test Site No.	CO03-HY
Test Voltage	AC 230V / 50Hz	Test Engineer	Kevin
Temperature	22 °C	Relative Humidity	48 %

Note: 1. Corrected Reading (dBμV) = LISN Factor + Cable Loss + Read Level = Level  
 2. All emissions not reported here are more than 10 dB below the prescribed limit.

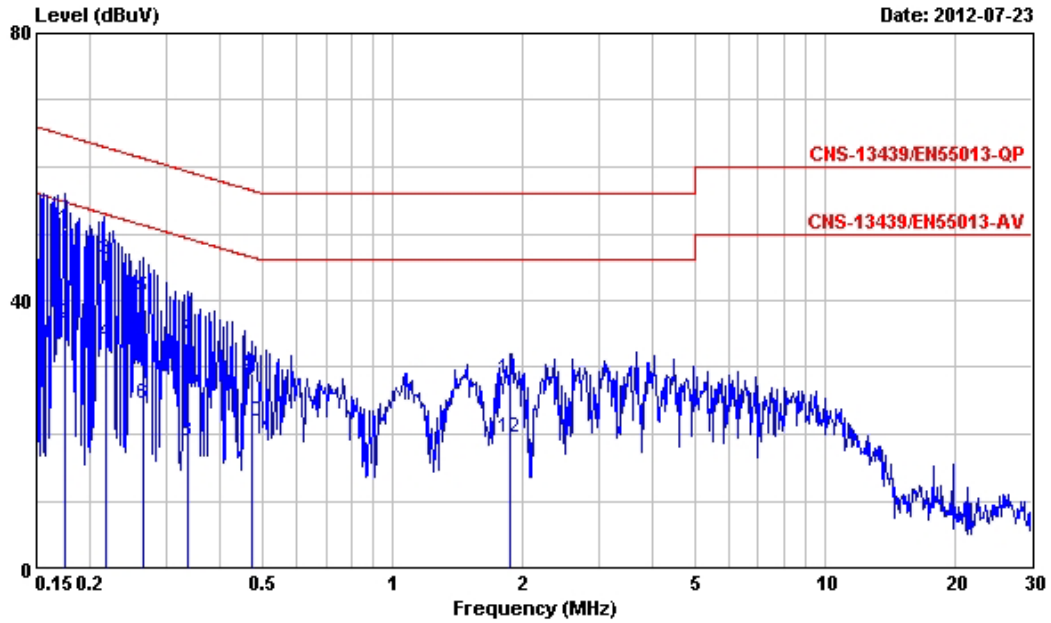
■ The test was passed at the minimum margin that marked by the frame in the following data

Line



	Freq	Level	Over Limit	Limit Line	Read Level	Cable Loss	LISN Factor	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.174	48.84	-15.91	64.75	48.10	0.23	0.51	QP
2	0.174	35.18	-19.57	54.75	34.44	0.23	0.51	Average
3	0.216	45.48	-17.49	62.97	44.74	0.26	0.48	QP
4	0.216	32.02	-20.95	52.97	31.28	0.26	0.48	Average
5	0.260	41.06	-20.37	61.43	40.32	0.27	0.47	QP
6	0.260	28.13	-23.30	51.43	27.39	0.27	0.47	Average
7	0.317	34.63	-25.16	59.79	33.90	0.27	0.46	QP
8	0.317	20.80	-28.99	49.79	20.07	0.27	0.46	Average
9	0.464	27.63	-28.99	56.62	26.91	0.27	0.45	QP
10	0.464	17.68	-28.94	46.62	16.96	0.27	0.45	Average
11	1.040	27.62	-28.38	56.00	26.90	0.26	0.46	QP
12	1.040	18.67	-27.33	46.00	17.95	0.26	0.46	Average

Neutral



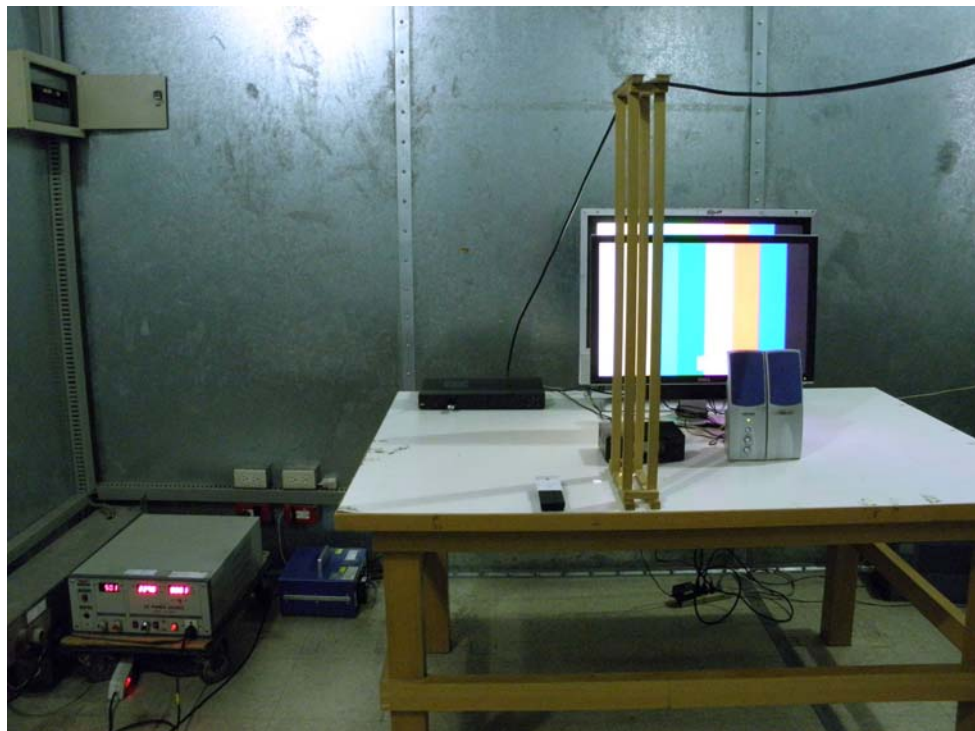
	Freq	Level	Over Limit	Limit Line	Read Level	Cable Loss	LISN Factor	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.174	50.71	-14.04	64.75	49.68	0.23	0.80	QP
2	0.174	36.44	-18.31	54.75	35.41	0.23	0.80	Average
3	0.216	46.17	-16.79	62.96	45.14	0.26	0.77	QP
4	0.216	33.54	-19.42	52.96	32.51	0.26	0.77	Average
5	0.266	40.64	-20.60	61.24	39.62	0.27	0.75	QP
6	0.266	24.53	-26.71	51.24	23.51	0.27	0.75	Average
7	0.336	34.18	-25.12	59.30	33.19	0.27	0.72	QP
8	0.336	18.82	-30.48	49.30	17.83	0.27	0.72	Average
9	0.474	28.99	-27.45	56.44	28.02	0.27	0.70	QP
10	0.474	21.90	-24.54	46.44	20.93	0.27	0.70	Average
11	1.870	28.21	-27.79	56.00	27.14	0.36	0.71	QP
12	1.870	19.59	-26.41	46.00	18.52	0.36	0.71	Average



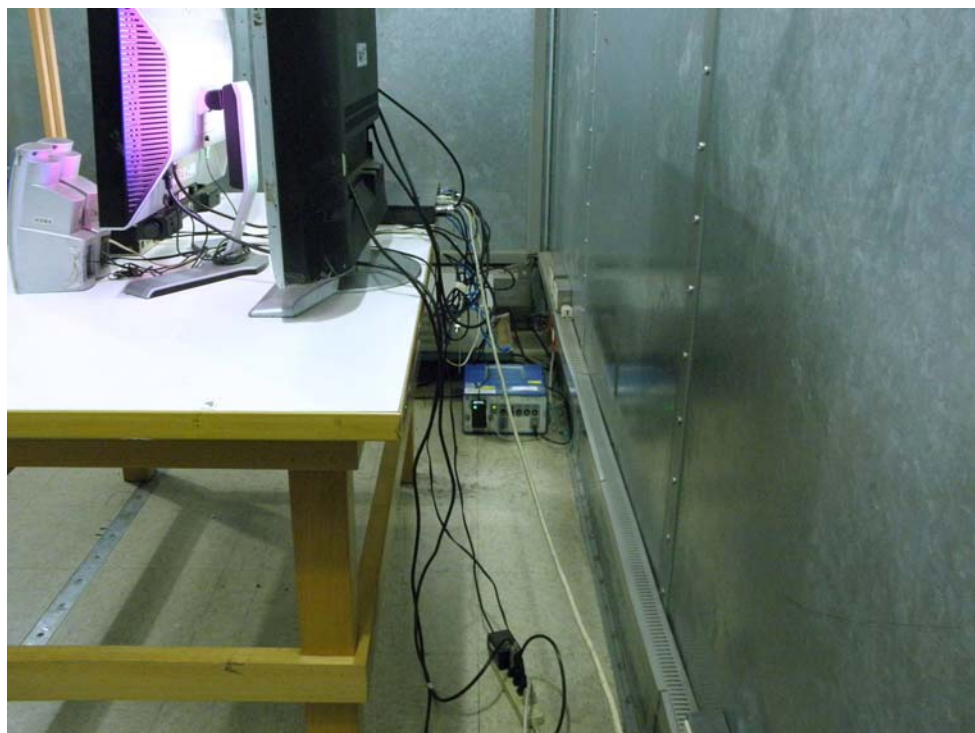
### 5.5. Photographs of Conducted Powerline Test Configuration

- The photographs show the configuration that generates the maximum emission.

FRONT VIEW



REAR VIEW



## 6. Test of Radiated Emission for Broadcast Receivers and Associated Equipment

Radiated emissions from 30 MHz to 1,000 MHz were measured with a bandwidth of 120 kHz according to the methods defines in European Standard EN 55013. The EUT was placed on a nonmetallic stand, 0.8 meter above the ground plane, as shown in section 6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

### 6.1. Description of Major Test Instruments

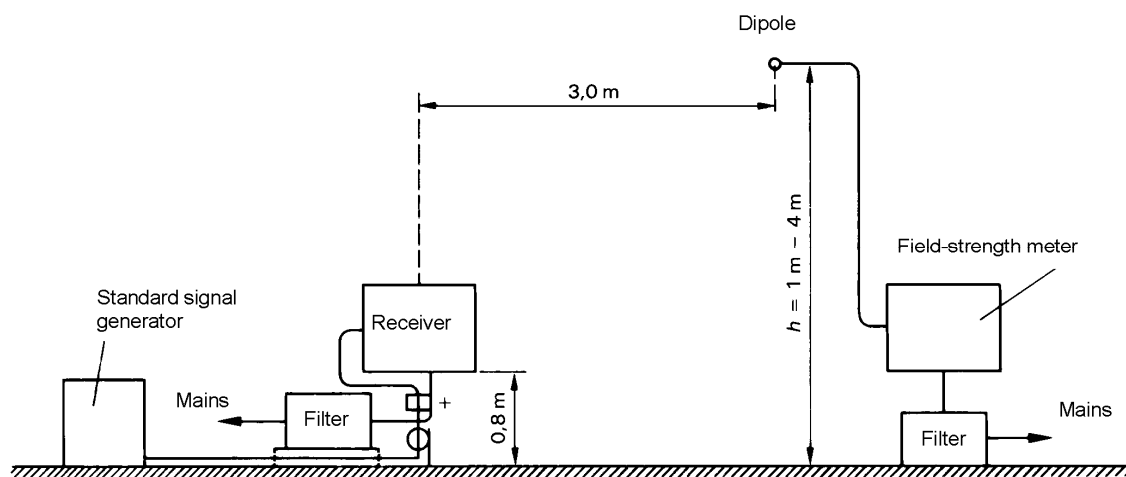
Amplifier Parameters	Setting
Amplifier	BURGEON BPA-530
RF Gain	30 dB
Signal Input	0.01 MHz - 3 GHz

Test Receiver Parameters	Setting
Test Receiver	R&S ESCI
Resolution Bandwidth	120 kHz
Frequency Band	9 kHz - 3 GHz
Quasi-Peak Detector	ON for Quasi-Peak Mode
	OFF for Peak Mode

### 6.2. Test Procedures

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 meters from the interference-receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

### 6.3. Typical Test Setup Layout of Radiated Emission for Broadcast Receivers and Associated Equipment



**6.4. Test Result of Radiated Emission**

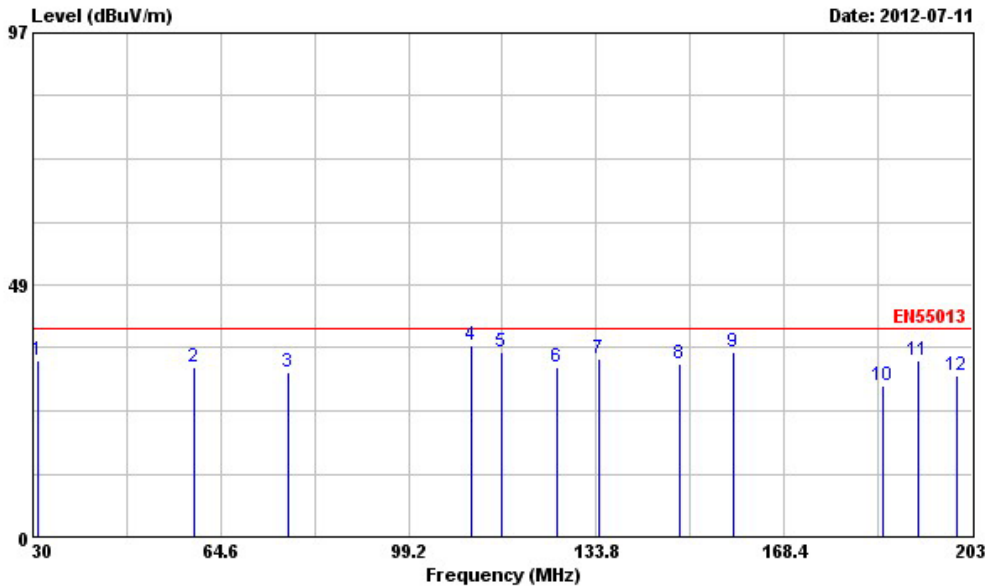
Test mode	Mode 1	Test Site No.	OS02-NH
Test frequency	30 MHz ~ 1000 MHz	Test Engineer	Chas
Antenna distance	3 meter	Test Voltage	AC 230V / 50Hz
Temperature	30 °C	Relative Humidity	46 %

Note: 1. Emission level (dB $\mu$ V/m) = 20 log Emission level ( $\mu$ V/m)

2. Corrected Reading : Antenna Factor + Cable Loss + Read Level – Preamp Factor = Level

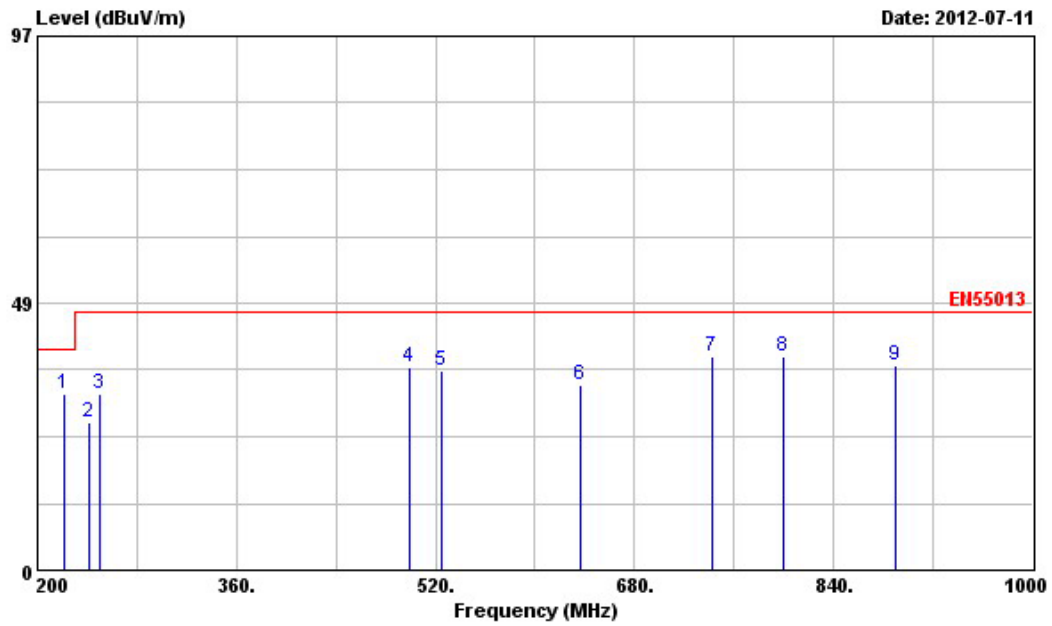
■ The test was passed at the minimum margin that marked by the frame in the following data

**Vertical**



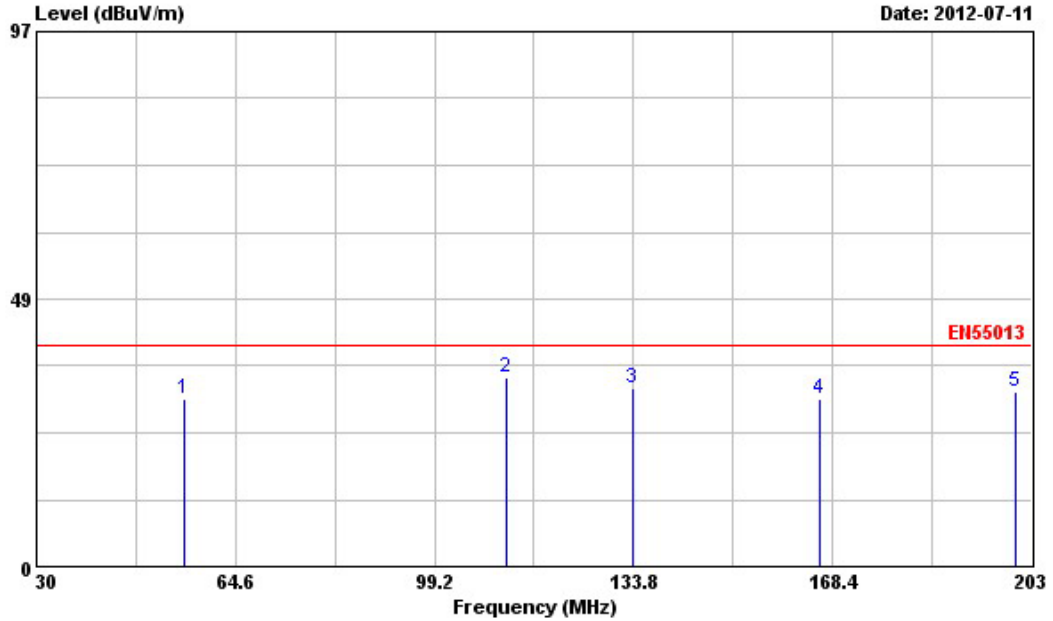
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	30.870	34.06	-5.94	40.00	46.17	18.50	1.13	31.74	Peak	---	---
2	59.760	32.72	-7.28	40.00	56.75	6.44	1.33	31.80	Peak	---	---
3	77.060	31.66	-8.34	40.00	54.94	6.97	1.50	31.75	Peak	---	---
<b>4</b>	<b>110.790</b>	<b>36.84</b>	<b>-3.16</b>	<b>40.00</b>	<b>55.31</b>	<b>11.54</b>	<b>1.64</b>	<b>31.65</b>	<b>Peak</b>	<b>100</b>	<b>180</b>
5	116.330	35.69	-4.31	40.00	53.54	12.12	1.66	31.63	Peak	---	---
6	126.530	32.77	-7.23	40.00	50.51	12.16	1.71	31.61	Peak	---	---
7	134.320	34.42	-5.58	40.00	52.91	11.36	1.74	31.59	Peak	---	---
8	149.200	33.41	-6.59	40.00	52.81	10.37	1.78	31.55	Peak	---	---
9	159.060	35.48	-4.52	40.00	54.98	10.21	1.82	31.53	Peak	---	---
10	186.570	28.96	-11.04	40.00	49.39	9.13	1.90	31.46	Peak	---	---
11	193.140	33.81	-6.19	40.00	54.09	9.23	1.93	31.44	Peak	---	---
12	200.060	30.91	-9.09	40.00	51.06	9.32	1.95	31.42	Peak	---	---

Vertical



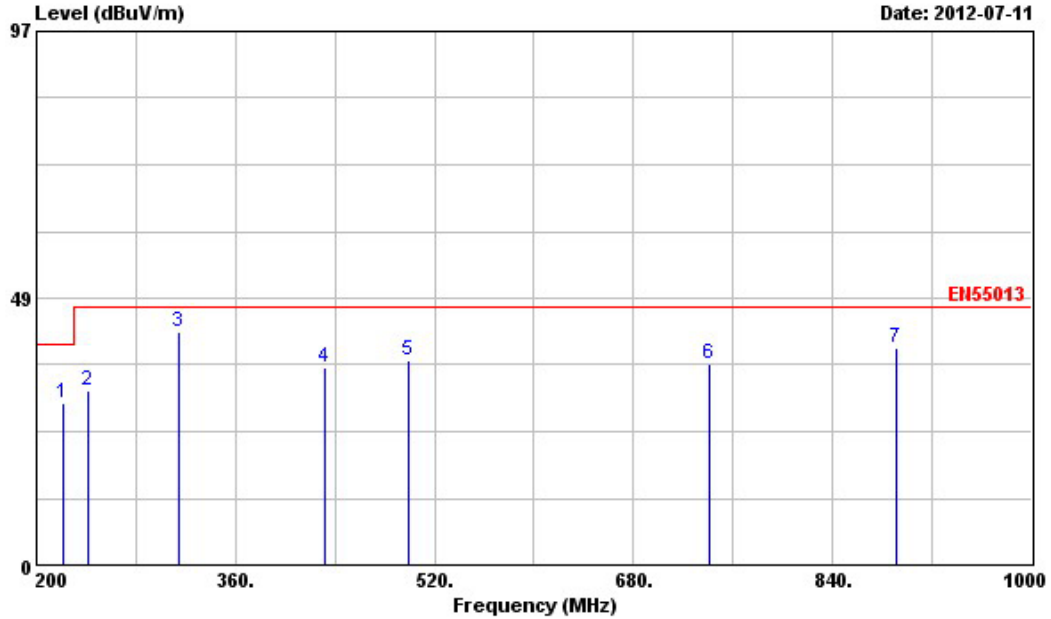
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	220.800	32.17	-7.83	40.00	50.98	10.60	2.00	31.41	Peak	---	---
2	241.670	26.89	-20.11	47.00	44.35	11.83	2.10	31.39	Peak	---	---
3	249.600	32.16	-14.84	47.00	49.15	12.29	2.11	31.39	Peak	---	---
4	499.200	36.82	-10.18	47.00	47.72	17.55	2.87	31.32	Peak	---	---
5	524.800	36.13	-10.87	47.00	46.49	17.94	3.01	31.31	Peak	---	---
6	636.800	33.50	-13.50	47.00	42.20	19.18	3.38	31.26	Peak	---	---
7	742.400	38.75	-8.25	47.00	46.43	19.88	3.73	31.29	Peak	---	---
8	800.000	38.87	-8.13	47.00	45.78	20.63	3.80	31.34	Peak	---	---
9	890.400	37.10	-9.90	47.00	42.98	21.52	3.81	31.21	Peak	---	---

Horizontal



	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Remark	Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Pos	Pos
			dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	55.600	30.53	-9.47	40.00	53.74	7.28	1.32	31.81	Peak	---
2	111.660	34.20	-5.80	40.00	52.57	11.64	1.64	31.65	Peak	---
3	133.630	32.19	-7.81	40.00	50.58	11.46	1.74	31.59	Peak	---
4	166.150	30.29	-9.71	40.00	50.12	9.83	1.85	31.51	Peak	---
5	200.060	31.61	-8.39	40.00	51.76	9.32	1.95	31.42	Peak	---

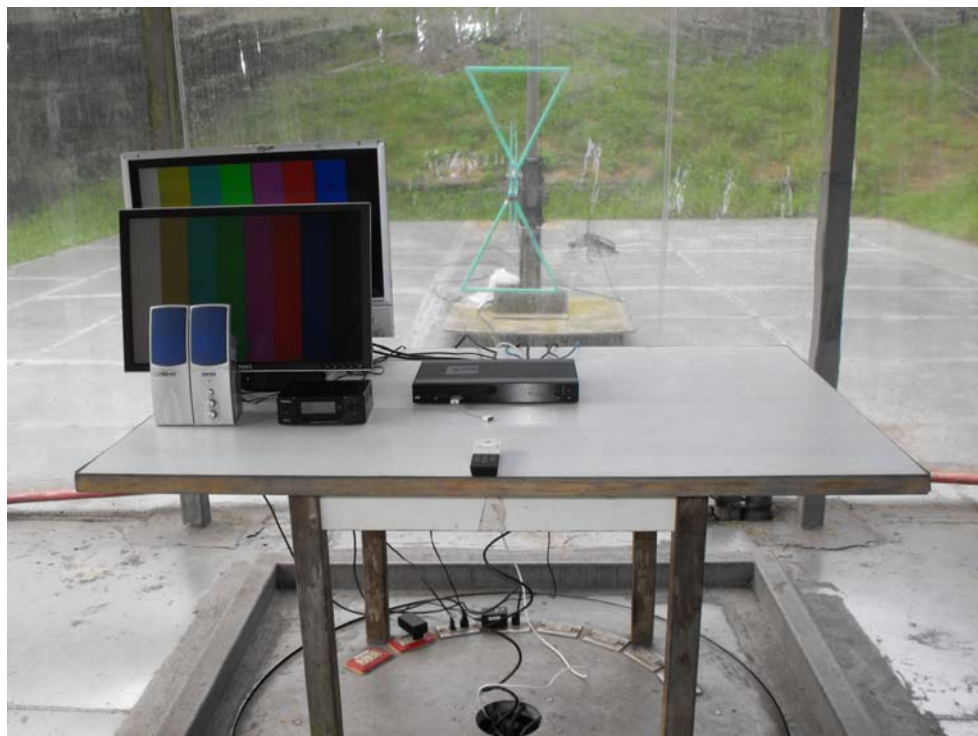
**Horizontal**



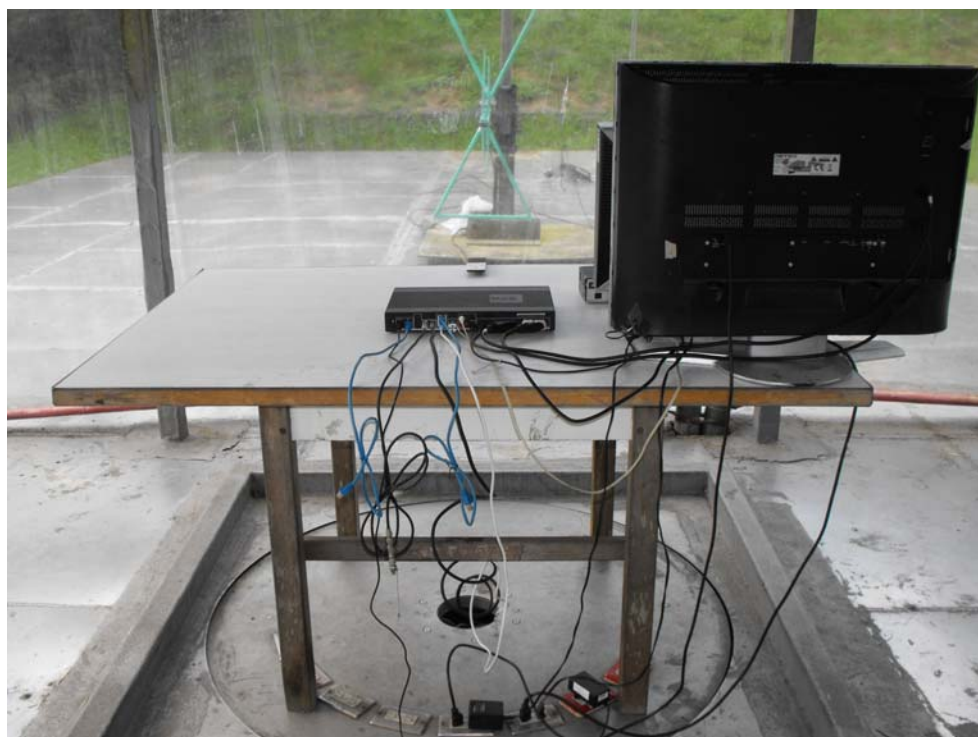
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	221.600	29.39	-10.61	40.00	48.13	10.66	2.01	31.41	Peak	---	---
2	241.670	31.74	-15.26	47.00	49.20	11.83	2.10	31.39	Peak	---	---
3	314.400	42.28	-4.72	47.00	57.72	13.62	2.30	31.36	Peak	---	---
4	432.000	36.02	-10.98	47.00	48.23	16.35	2.77	31.33	Peak	---	---
5	499.200	37.30	-9.70	47.00	48.20	17.55	2.87	31.32	Peak	---	---
6	741.600	36.42	-10.58	47.00	44.10	19.88	3.73	31.29	Peak	---	---
7	891.200	39.60	-7.40	47.00	45.47	21.53	3.81	31.21	Peak	---	---

**6.5. Photographs of Radiated Emission Test Configuration**

FRONT VIEW



REAR VIEW





## **7. Test of disturbance voltage at the antenna terminals**

The equipment of this report is almost same as the original report, the only difference is the Change to adapter and DDR. So no assessment of the tests.

## 8. Harmonics Test

### 8.1. Standard

- Standard : EN 61000-3-2:2006/A1:2009/A2:2009

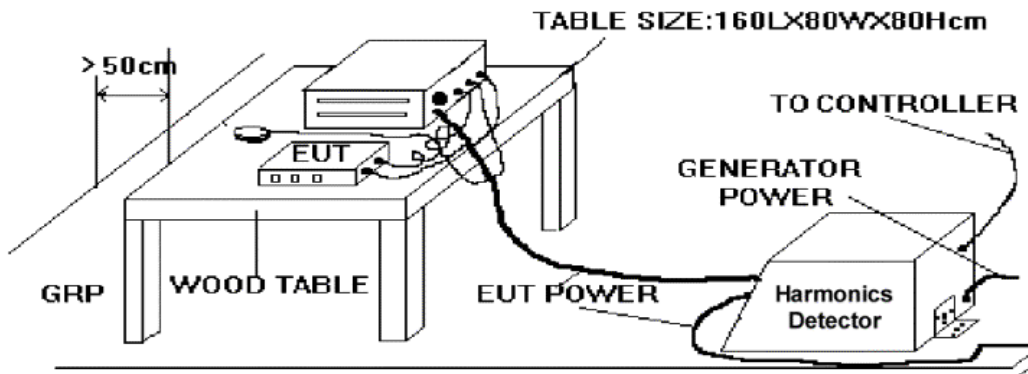
### 8.2. Test Procedure

The measured values of the harmonics components of the input current, including line current and neutral current, shall be compared with the limits given in Clause 7 of EN 61000-3-2.

### 8.3. Test Equipment Settings

Line Voltage	:	230 V
Line Frequency	:	50 Hz
Device Class	:	A
Current Measurement Range	:	High
Measurement Delay	:	10.0 seconds
Test Duration	:	10.0 minutes
Class determination Pre-test Duration	:	10.0 seconds

### 8.4. Test Setup



**8.5. Current Harmonics Test**

Final Test Result : **PASS**  
 Temperature : 24 °C  
 Relative Humidity : 47 %  
 Atmospheric Pressure : 102.1 kPa  
 Test Date : Jul. 25, 2012  
 Test Engineer : Chuck Lu

Urms = 230.1V      Freq = 49.987      Range: 1 A  
 Irms = 0.127A      Ipk = 0.603A      cf = 4.750  
 P = 11.98W      S = 29.21VA      pf = 0.410  
 THDu = 0.10 %      Class A

Test - Time : 10min ( 100 % )

Test completed, Result: PASSED

Order	Freq. [Hz]	Iavg [A]	Iavg% [%]	I <sub>max</sub> [A]	I <sub>max</sub> % [%]	Limit [A]	Limits in Ampere			
							90%	100%	150%	200%
1	50	0.0535	42.153	0.0536	42.212					
2	100	0.0000	0.0000	0.0015	1.1538	1.0800				
3	150	0.0514	40.510	0.0515	40.577	2.3000				
4	200	0.0000	0.0000	0.0015	1.1538	0.4300	0.3870	0.4300	0.6450	0.8600
5	250	0.0496	39.073	0.0497	39.135	1.1400				
6	300	0.0000	0.0000	0.0015	1.1538	0.3000	0.2700	0.3000	0.4500	0.6000
7	350	0.0468	36.885	0.0469	36.923	0.7700	0.6930	0.7700	1.1550	1.5400
8	400	0.0000	0.0000	0.0015	1.1538	0.2300	0.2070	0.2300	0.3450	0.4600
9	450	0.0432	34.064	0.0433	34.087	0.4000	0.3600	0.4000	0.6000	0.8000
10	500	0.0000	0.0000	0.0015	1.1538	0.1840	0.1656	0.1840	0.2760	0.3680
11	550	0.0390	30.743	0.0391	30.769	0.3300	0.2970	0.3300	0.4950	0.6600
12	600	0.0000	0.0000	0.0014	1.1058	0.1533	0.1380	0.1533	0.2300	0.3066
13	650	0.0344	27.090	0.0345	27.163	0.2100	0.1890	0.2100	0.3150	0.4200
14	700	0.0000	0.0000	0.0013	1.0577	0.1314	0.1183	0.1314	0.1971	0.2628
15	750	0.0295	23.265	0.0296	23.317	0.1500	0.1350	0.1500	0.2250	0.3000
16	800	0.0000	0.0000	0.0012	0.9615	0.1150	0.1035	0.1150	0.1725	0.2300
17	850	0.0247	19.433	0.0248	19.519	0.1324	0.1191	0.1323	0.1985	0.2646
18	900	0.0000	0.0000	0.0012	0.9135	0.1022	0.0920	0.1022	0.1534	0.2045
19	950	0.0200	15.753	0.0201	15.817	0.1184	0.1066	0.1184	0.1776	0.2368
20	1000	0.0000	0.0000	0.0010	0.8173	0.0920	0.0828	0.0920	0.1380	0.1840
21	1050	0.0157	12.370	0.0158	12.452	0.1071	0.0964	0.1071	0.1607	0.2142
22	1100	0.0000	0.0000	0.0009	0.7212	0.0836	0.0753	0.0836	0.1254	0.1672
23	1150	0.0120	9.4290	0.0121	9.5192	0.0978	0.0881	0.0978	0.1468	0.1957
24	1200	0.0000	0.0000	0.0008	0.6250	0.0767	0.0690	0.0767	0.1150	0.1533
25	1250	0.0090	7.0557	0.0090	7.1154	0.0900	0.0810	0.0900	0.1350	0.1801
26	1300	0.0000	0.0000	0.0007	0.5288	0.0708	0.0637	0.0707	0.1061	0.1415
27	1350	0.0068	5.3689	0.0069	5.4327	0.0833	0.0750	0.0833	0.1250	0.1666
28	1400	0.0000	0.0000	0.0006	0.4808	0.0657	0.0592	0.0657	0.0986	0.1315
29	1450	0.0056	4.4164	0.0057	4.4712	0.0776	0.0698	0.0776	0.1164	0.1552
30	1500	0.0000	0.0000	0.0005	0.3846	0.0613	0.0552	0.0613	0.0920	0.1227
31	1550	0.0051	4.0404	0.0052	4.0865	0.0726	0.0653	0.0726	0.1089	0.1451
32	1600	0.0000	0.0000	0.0005	0.3846	0.0575	0.0517	0.0575	0.0862	0.1150
33	1650	0.0032	2.5133	0.0031	3.9904	0.0682	0.0614	0.0682	0.1023	0.1364
34	1700	0.0000	0.0000	0.0004	0.3365	0.0541	0.0487	0.0541	0.0812	0.1083
35	1750	0.0000	0.0000	0.0049	3.8942	0.0643	0.0578	0.0643	0.0964	0.1285
36	1800	0.0000	0.0000	0.0004	0.3365	0.0511	0.0460	0.0511	0.0766	0.1022
37	1850	0.0000	0.0000	0.0046	3.6538	0.0608	0.0547	0.0608	0.0912	0.1216
38	1900	0.0000	0.0000	0.0004	0.2885	0.0484	0.0436	0.0484	0.0726	0.0968
39	1950	0.0000	0.0000	0.0042	3.2692	0.0577	0.0519	0.0577	0.0865	0.1154
40	2000	0.0000	0.0000	0.0003	0.2404	0.0460	0.0414	0.0460	0.0690	0.0920

## 9. Voltage Fluctuations Test

### 9.1. Standard

- Product Standard : EN 61000-3-3:2008

### 9.2. Test Procedure

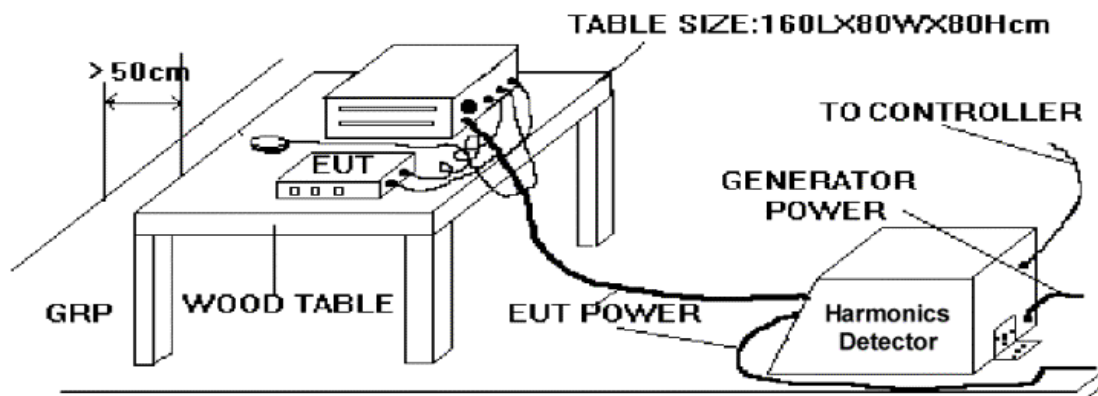
The equipment shall be tested under the conditions of **Clause 5**.

The total impedance of the test circuit, excluding the appliance under test, but including the internal impedance of the supply source, shall be equal to the reference impedance. The stability and tolerance of the reference impedance shall be adequate to ensure that the overall accuracy of  $\pm 8\%$  is achieved during the whole assessment procedure.

### 9.3. Test Equipment Settings

Line Voltage	:	230 V
Line Frequency	:	50 Hz
Measurement Delay	:	10.0 seconds
Pst Integration Time	:	10.0 minutes
Pst Integration Periods	:	1
Test Duration	:	10.0 minutes

### 9.4. Test Setup



**9.5. Test Result of Voltage Fluctuation and Flicker Test**

Final Test Result : **PASS**  
Temperature : 24 °C  
Relative Humidity : 47 %  
Atmospheric Pressure : 102.1 kPa  
Test Date : Jul. 25, 2012  
Test Engineer : Chuck Lu

Urms = 230.1V Freq = 49.987 Range: 1 A  
Irms = 0.127A Ipk = 0.607A cf = 4.762  
P = 12.00W S = 29.33VA pf = 0.409

Test - Time : 1 x 10min = 10min ( 100 %)

LIN (Line Impedance Network) : SLIN 0.24ohm +j0.15ohm N:0.16ohm +j0.10ohm

Limits : Plt : 0.65 Pst : 1.00  
dmax : 4.00 % dc : 3.30 %  
dtLim: 3.30 % dt>Lim: 500ms

Test completed, Result: PASSED

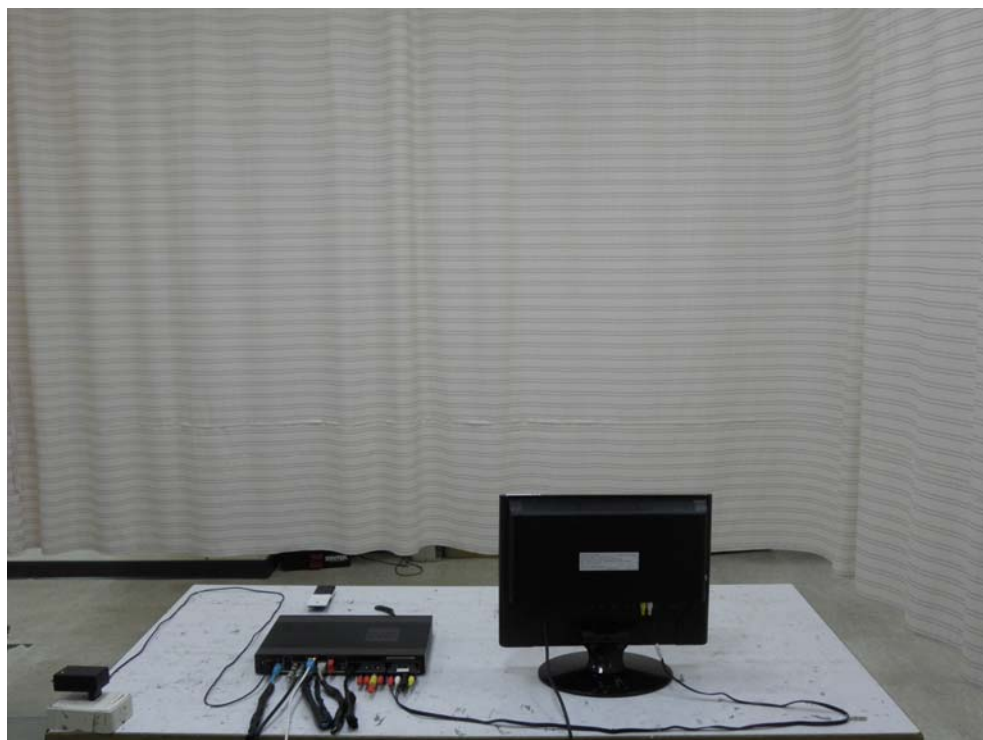
	Pst	P50s	P10s	P3s	P1s	P0.1s	dmax	dc	dt>Lim
1	0.072	0.010	0.010	0.010	0.010	0.010	0.000	0.000	0.000

**9.6. Photographs of Harmonics Test, Voltage Fluctuation and Flicker Test**

FRONT VIEW



REAR VIEW



## 10. Input Immunity Test

The equipment of this report is almost same as the original report, the only difference is the Change to adapter and DDR. So no assessment of the tests.

## **11. Input to RF Voltage (common mode) at Antenna Terminal Test**

The equipment of this report is almost same as the original report, the only difference is the Change to adapter and DDR. So no assessment of the tests.



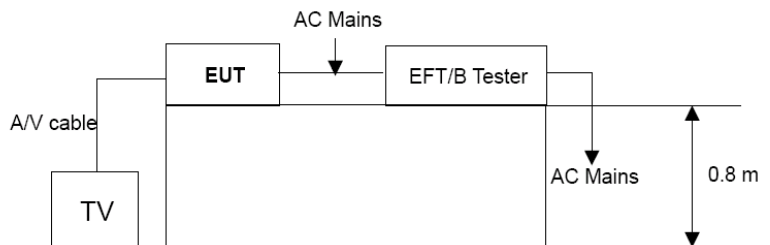
## 12. Screening Effectiveness Test

The equipment of this report is almost same as the original report, the only difference is the Change to adapter and DDR. So no assessment of the tests.

### 13. Electrical Fast Transient/Burst Immunity Test (EFT/BURST)

- Final Test Result : **PASS**
- Pass Performance Criteria : **B**
- Required Performance Criteria : B
- Basic Standard : IEC 61000-4-4:2004
- Product Standard : EN 55020:2007
- Level : on Input power ports -- 2
- Test Voltage : on Input power ports --  $\pm 0.5 / \pm 1.0$  kV
- Temperature : 24 °C
- Relative Humidity : 47 %
- Atmospheric Pressure : 102.1 kPa
- Test Date : Jul. 27, 2012
- Test Engineer : Chuck Lu
- Observation : When testing at  $\pm 1$ kV on the L1 and L2, the image shown on the screen paused caused by interference. After the test, the equipment continued to operate as intended without operator intervention.

#### 13.1. Test Setup



The EUT was placed on a ground reference plane and was insulated from it by an insulating support about 0.1m thick. If the EUT is table-top equipment, it was located approximately 0.8m above the G.R.P. The G.R.P. was a metallic sheet (copper or aluminum) of 0.25 mm minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. It shall project beyond the EUT by at least 0.1m on all sides and connected to the protective earth. In the SPORTON EMC LAB., We provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system. The EUT was arranged and connected according to its functional requirements. The minimum distance between the EUT and other conductive structures, except the G.R.P. Beneath the EUT, was more than 0.5 m. using the coupling clamp, the minimum distance between the coupling plates and all other conductive structures, except the G.R.P. Beneath the EUT, was more than 0.5 m. The length of the signal and power lines between the coupling device and the EUT was 1m or less.

**13.2. Test Procedure**

- a. In order to minimize the effect of environmental parameters on test results, the climatic conditions when test is carrying out shall comply with the following requirements:
  - ambient temperature: 15°C to 35°C;
  - relative humidity : 45% to 75%;
  - atmospheric pressure : 86 kPa (860 mbar) to 106 kPa (1060 mbar).
- b. In order to minimize the effect of environmental parameters on test results, the electromagnetic environment of the laboratory shall not influence the test results.
- c. The variety and diversity of equipment and systems to be tested make it difficult to establish general criteria for the evaluation of the effects of fast transients/bursts on equipment and systems.
- d. The test results may be classified on the basic of the operating conditions and the functional specification of the equipment under test, according to the following performance criteria :
  - Normal performance within the specification limits.
  - Temporary degradation or loss of function or performance which is self-recoverable.
  - Temporary degradation or loss of function or performance which requires operator intervention or system reset.
  - Degradation or loss of function which is not recoverable due to damage of equipment (components).

**13.3. Test Severity Levels**

The following test severity levels are recommended for the fast transient/burst test :

Open circuit output test voltage $\pm 10\%$		
Level	On Input power ports	On signal port and telecommunication ports
1	0.5 KV	0.25 KV
2	1.0 KV	0.50 KV
3	2.0 KV	1.00 KV
4	4.0 KV	2.00 KV
X	Specified	Specified

Remark : " X " is an open level.  
The level is subject to negotiation between the user and the manufacturer or is specified by the manufacturer.

**13.4. Photographs of Electrical Fast Transient/BURST Immunity Test**

FRONT VIEW



REAR VIEW

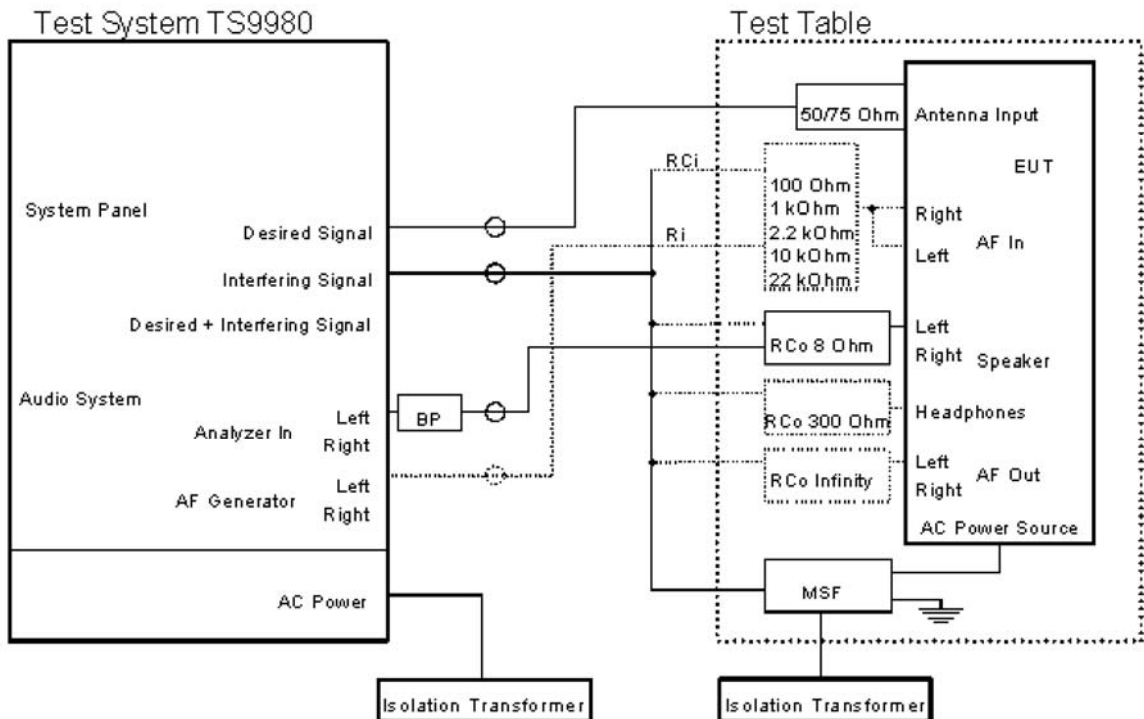


### 14. Immunity to Induced Voltage Test

- Final Test Result : **PASS**
- Product Standard : EN 55020:2007
- Temperature : 23 °C
- Relative Humidity : 48 %
- Atmospheric Pressure : 102.1 kPa
- Test Date : Jul. 26, 2012
- Test Engineer : Chuck Lu

#### 14.1. Test Setup

The measuring set-up is shown in figure. The EUT was placed 0.1 m above the center of a metal ground plane of dimension 2 m by 1 m. The mains lead shall be bundled to a length of 0.3 m and connected in the shortest possible way to the mains stop filter MSF. The cable supplying the RF voltage to the audio input and output terminals of the EUT shall be of coaxial type with a transfer impedance of maximally 50mΩ/m at 30 MHz.



**14.2.Limits**

Immunity from unwanted signal voltages present at the AC main, audio input and audio output.  
Performance criteria is the criteria A.

14.2.1. Limits of immunity to RF voltages of mains, loudspeaker and headphone terminals

Frequency (MHz)	Level dB(uV)
0.15 ~ 30	130
30 ~ 100	120
100 ~ 150	120 ~ 110*
* Decreasing linearly with the logarithm of the frequency	

14.2.2. Limits of immunity to RF voltages of audio input and output terminals

Frequency (MHz)	Level dB(uV)
0.15 ~ 1.6	80 ~ 90*
1.6 ~ 20	90 ~ 120*
20 ~ 100	120
100 ~ 150	120 ~ 110*
* Decreasing linearly with the logarithm of the frequency	

### 14.3.Wanted Signal Parameters

<b>Wanted signal for adjustment of reference output power/reference picture</b>
70 dB( $\mu$ V) at 75 $\Omega$ at the frequency of the middle channel of the lowest band available in the EUT (the lowest of the available channels for system L: 04, 08, 25 or 55) and ITU-R BT.471-1 standard color bar and frequency modulated at 1 kHz with 30 kHz deviation (or 54 % amplitude modulation for system L)

### 14.4.Input Signal Abbreviations

A	1 kHz (G1) at the audio inputs
V	video signal (G2) at the video input
S	modulated wanted signal for sound receivers (G3 and G1) at the antenna input
T	modulated wanted signal for television receivers and video tape equipment (G4 and G2 and G1) at the antenna input
Ai	unwanted signal at the audio inputs
M	unwanted signal at the mains lead
Ao	unwanted signal at the audio outputs Lo: at the left channel Ro: at the right channel
L	adjustment or measurement of channel L
R	adjustment or measurement of channel R

## 14.5. Test Procedure

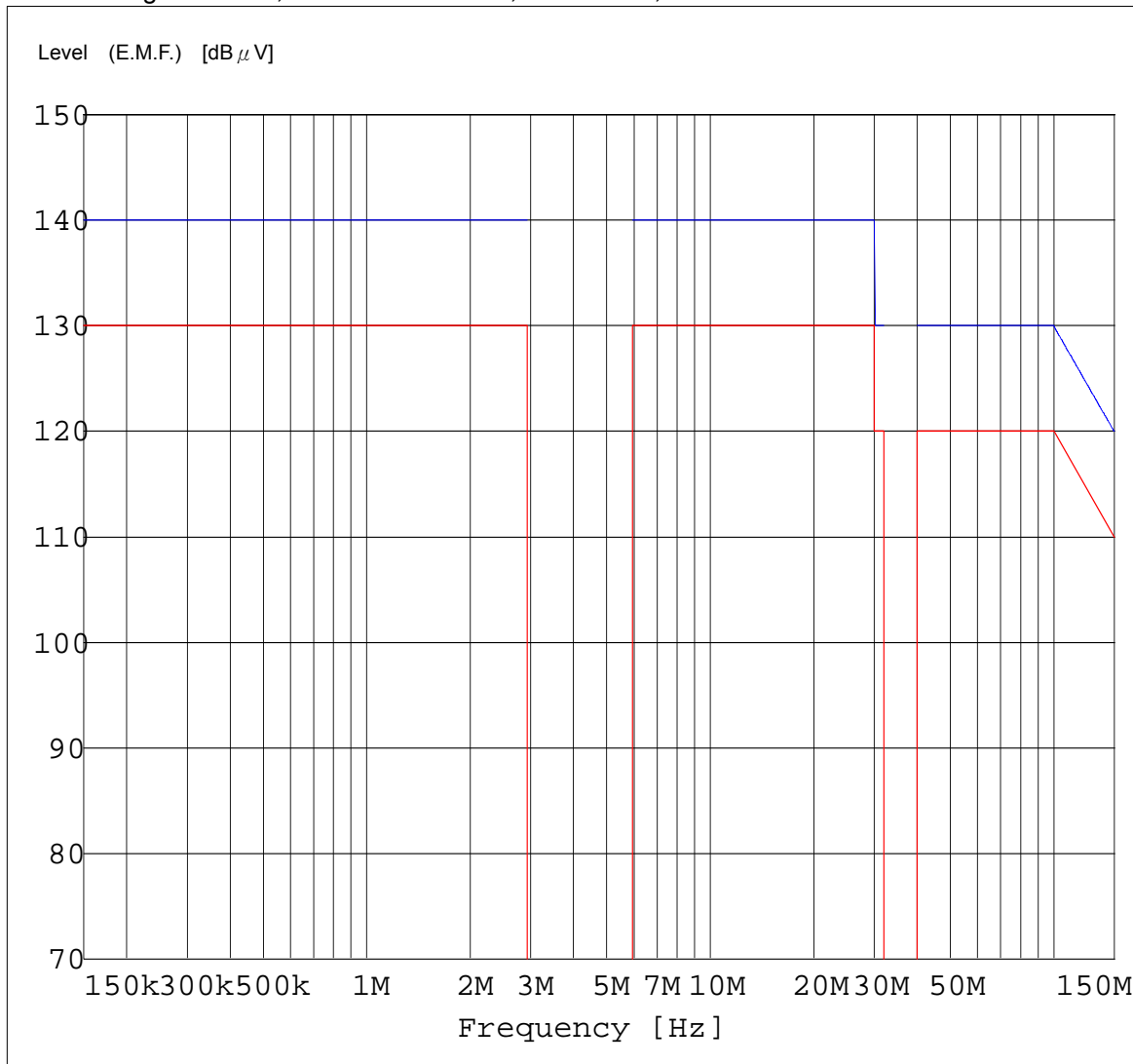
- a. The wanted test signal is supplied via the respective connections A or V or S or T (see section 14.1) by generators G1, G2, G3 and G4 (see section 14.2). The unwanted signal is supplied by generator G5. Network  $RC_i$  matches the RF disturbance source to the input impedance of the relevant audio terminal and a similar network  $RC_o$  is used to match the output terminals. A mains stopfilter MSF is used to inject the unwanted signal at the mains terminal and acts as a stopfilter for unwanted signals from the mains network.
- b. The equipment under test is placed 0,1 m above the centre of a metal ground plane of dimensions 2 m by 1 m. The mains lead shall be bundled to a length less than 0,3 m and connected in the shortest possible way to the mains stop filter MSF.
- c. The cable supplying the RF voltage to the audio input and output terminals of the equipment under test shall be of a coaxial type with a transfer impedance of 50 m $\Omega$ /m at a maximum at
- d. The unused input terminals and the loudspeaker and/or headphone or any other audio output terminals are terminated with appropriate load resistors as specified by the manufacturer or in the relevant standard.
- e. For stereo or two channel sound television equipment respectively the unwanted signal is simultaneously fed to the two audio input channels. The output terminals of the channels are fed as well as measured separately.
- f. Prior to measurements a check shall be carried out to see that no interference signal penetrates directly into the measuring equipment.
- g. The audio output power levels are measured according to section 14.2.
- h. In section 14.2 and section 14.3, the conditions for the measurement are given for receivers, video tape and audio equipment. The wanted signals are specified according to the operating mode of the equipment under test and provided by generators G3 and G1, or G4 and G2 and G1 or G1 or G2.
- i. The unwanted signal shall be amplitude modulated with 1 kHz at 80 % depth, supplied by generator G5.
- j. For adjusting, the wanted signals are set, dependent on the type of equipment under test and its operating mode, by making the connections as follows:  
A for audio terminals,  
V for video terminals (simultaneously audio signal at audio terminals),  
S for antenna terminals (sound broadcast signal) and  
T for antenna terminals (television broadcast signal).
- k. The audio controls of the equipment under test, other than the volume control, are set at normal position. The volume control is adjusted to obtain an audio output power of 50 mW (or 500 mW).
- l. For stereo equipment the balance control shall be adjusted to obtain 50 mW (or 500 mW) from both channels. The video controls of the equipment under test are set to obtain a picture luminance as described in following as:
- m. Black part of the test pattern 2 cd/m<sup>2</sup>, magenta part of the test pattern 30 cd/m<sup>2</sup>, white part of the test pattern 80 cd/m<sup>2</sup>
- n. For the measurement the unwanted signal is applied to the terminal under test by making the connections as follows:  
Ai for audio input terminals,  
M for the mains lead and  
Ao for audio output terminals.
- o. The connections L, R, respectively Lo, Ro, are for adjusting and/or measurement of the adequate output channels.
- p. For television receivers and video tape equipment in the RF recording mode, measurements are carried out with the wanted signal at the frequency of the middle channel of the lowest band available in the equipment under test (or the lowest of the available channels 04, 08, 25 or 55 for system L).
- q. During any immunity tests, we checked the audio and the video performances on criteria A.



**14.6. Test Record**

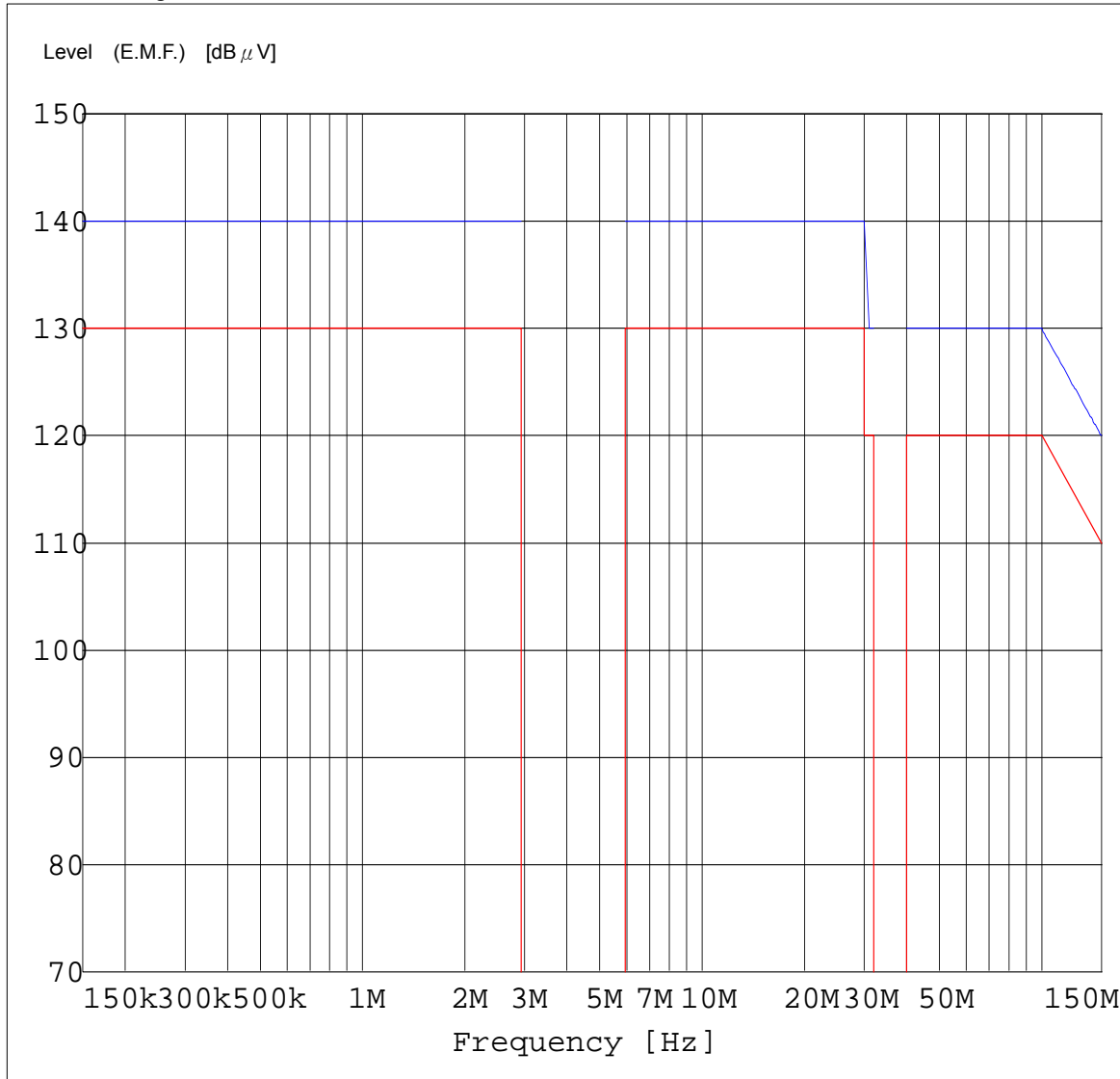
Test Mode:	DVB-T – Sound	Monitor:	SCART Audio Out
Channel:	9 (205.50 MHz)	S/N:	94.6 dB
Country:	Germany (IF 36.00 MHz)	AF Level:	1038 mV

Interf. Signal: Mains, 260712-00004-001, 2012/07/26, 02:45:07PM



Test Mode: DVB-T – Picture                      Monitor: Video Out  
Channel: 9 (205.50 MHz)  
Country: Germany (IF 36.00 MHz)

Interf. Signal: Mains, 260712-00004-002, 2012/07/26, 02:45:44PM



**14.7. Photographs of Immunity to Induced Voltage Test**

FRONT VIEW



REAR VIEW

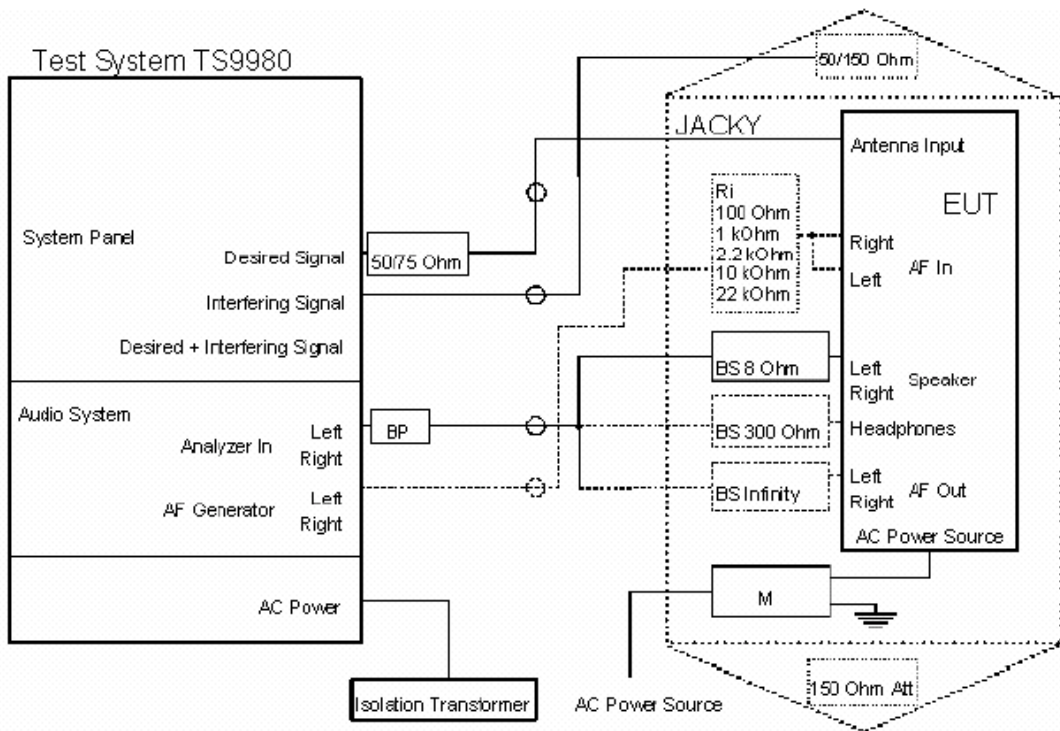


### 15. Immunity from Radiated Fields (RF e.m. field AM modulated carrier)

- Final Test Result : **PASS**
- Pass Performance Criteria : **A**
- Product Standard : EN 55020:2007
- Temperature : 23 °C
- Relative Humidity : 48 %
- Atmospheric Pressure : 102.1 kPa
- Test Date : Jul. 25, 2012
- Test Engineer : Chuck Lu
- Observation : Normal.

#### 15.1. Test Setup

The measuring set-up is shown in figure 6. The EUT was placed on a non-metallic support, 0.1 m high, in the center of the strip line in the same position as for normal home usage. Connecting leads to the EUT were inserted through holes in the base conductor plate of the strip line, the lengths of the leads inside the strip line shall be as short as possible and completed surrounded by ferrite rings to attenuate induced currents. The transfer impedance of coaxial cables used shall be no higher than 50 mΩ/m at 30 MHz.



**15.2. Limits**

Most electronic equipment is in some manner affected by electromagnetic radiation. RF immunity test entails subjecting the equipment under test to a uniform field of radiated electromagnetic energy of a specified electromagnetic field strength and frequency and monitoring the functionality of the device as the frequency is swept over a specified frequency range. Performance criteria is the A.

15.2.1. Immunity Level on TV on Receiver Mode

Frequency MHz	Level dB( $\mu$ V/m)
0.15 - 47	125
47 - 87	109
87 - 108	125
108 - 144	109
144 - 150	125
Except frequency bands	
$(f_c - 1.5)$ to $(f_c + 1.5)$	101
$(f_s - 1.5)$ to $(f_s + 1.5)$	101
$(f_i - 2.0)$ to $(f_i + 2.0)$ <sup>a</sup>	101
$(f_v - 2.0)$ to $(f_v + 2.0)$ <sup>b</sup>	101
87.5 to 108 <sup>a</sup>	
Except the tuned channel $\pm 0.5$	
Note: $f_i$ is the sound intermediate frequency $f_v$ is the vision intermediate frequency $f_s$ is the inter carrier sound frequency $f_c$ is the color sub carrier frequency <sup>a</sup> For systems B, D, G, K, I, L, M. <sup>b</sup> For systems L.	

15.2.2. Immunity Level on TV and Multifunction Equipment Monitor Mode

Frequency MHz	Level dB( $\mu$ V/m)
0.15 - 150	125
$(f_c - 1.5)$ to $(f_c + 1.5)$	101
Note: $f_c$ is the color sub carrier frequency	

### 15.3. Wanted Signal Parameter Table

Wanted Signal Setting
70 dB( $\mu$ V) at 75 $\Omega$ at the frequency of the middle channel of the lowest band (the lowest of the available channels for system L: 04, 08, 25 or 55) and ITU-R BT.471-1 standard color bar and frequency modulated at 1 kHz with 30 kHz deviation (or 54 % amplitude modulation for system L)

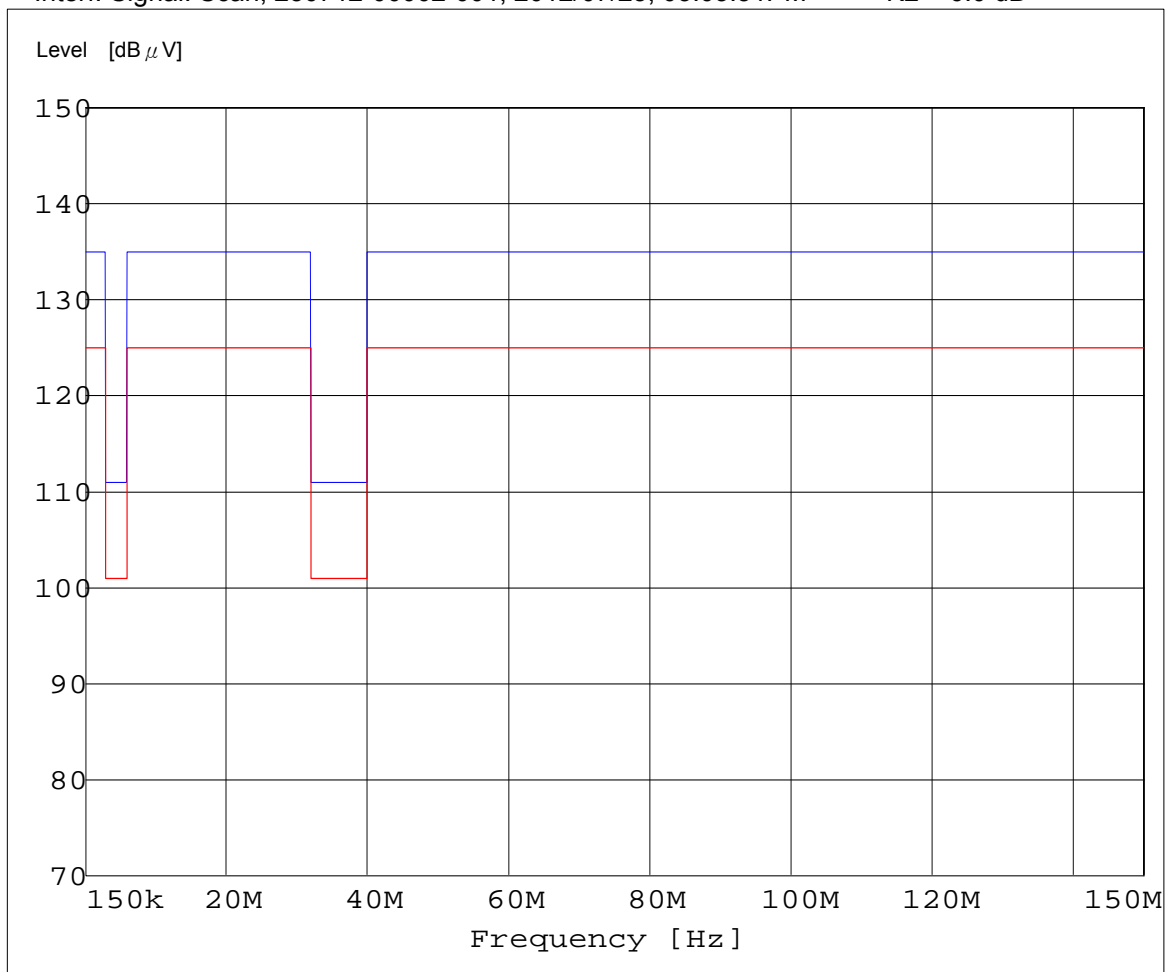
### 15.4. Test Procedure

- a. During the adjustment procedure the unwanted signal (generator G2) is switched off. The wanted signals specified in section 15.3.
- b. For the measurement, the unwanted signal is supplied by generators G1 and G2 which is connected through wide-band amplifier Am, and low-pass filter F to matching network MN of the stripline. The wide-band amplifier Am may be required to provide the necessary field strength. The stripline is loaded with a terminating impedance TI (150 $\Omega$ )
- c. Care shall be taken with respect to the harmonic level of the RF output of the generator G2 and in particular the output of the wide-band amplifier Am. Harmonics may influence the measurement if they coincide with the tuned channel or the IF channel of the equipment under test. In some cases provisions shall be made to reduce the harmonic level adequately by inserting a suitable low-pass filter F.

**15.5. Test Record**

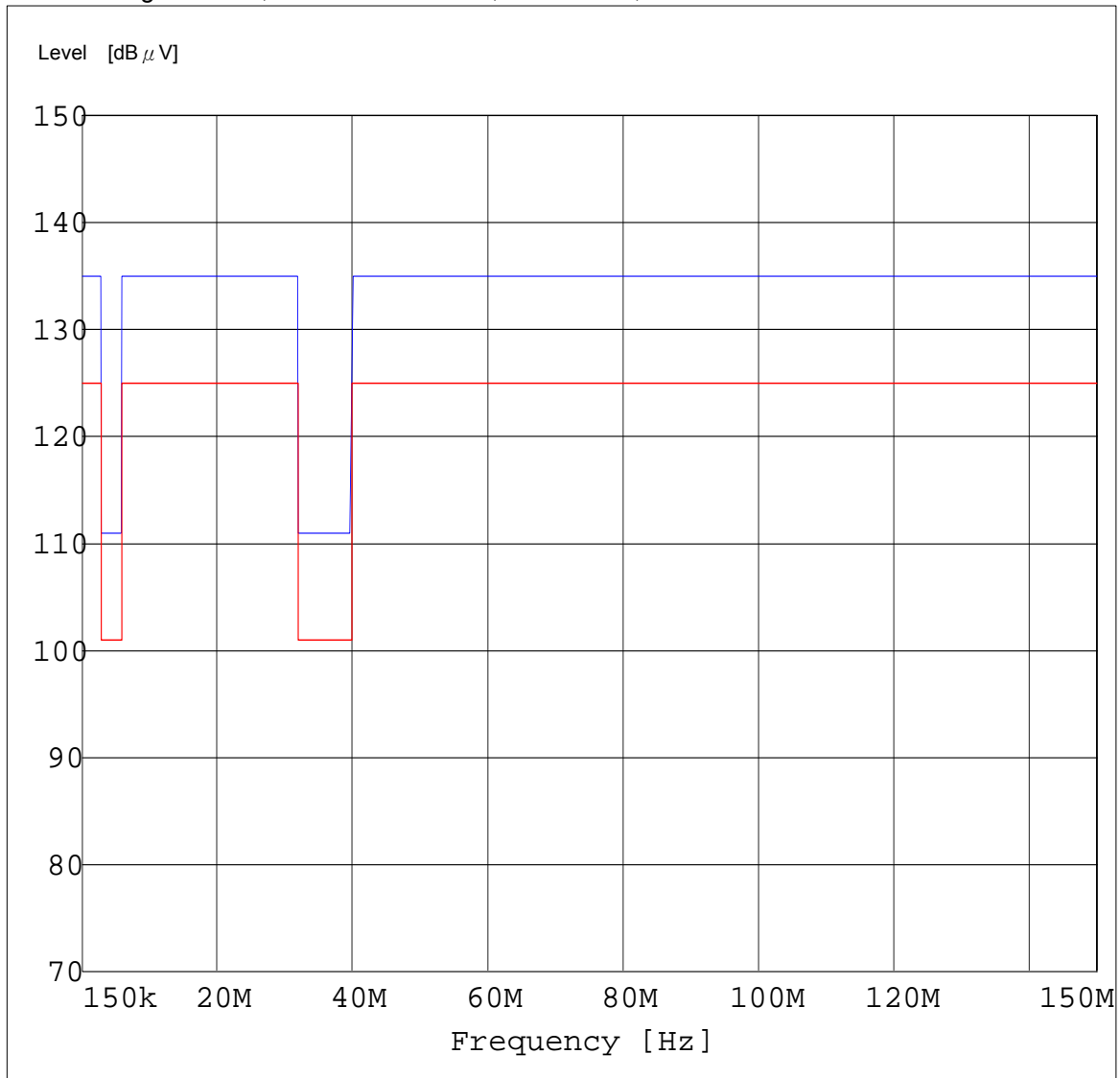
Test Mode:	DVB-T – Sound	Monitor:	SCART Audio Out
Channel:	9 (205.50 MHz)	S/N:	94.7 dB
Country:	Germany (IF 36.00 MHz)	AF Level:	915 mV

Interf. Signal: Scan, 250712-00002-001, 2012/07/25, 03:03:51PM K2 = 6.0 dB



Test Mode: DVB-T – Picture                      Monitor: Video Out  
Channel: 9 (205.50 MHz)  
Country: Germany (IF 36.00 MHz)

Interf. Signal: Scan, 250712-00002-002, 2012/07/25, 03:06:55PM                      K2 = 6.0 dB





**15.6. Photographs of Immunity from Radiated Fields (RF e.m. field AM modulated carrier)**

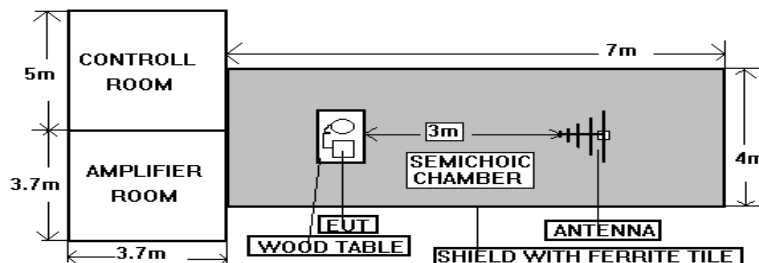
FRONT VIEW



## 16. Immunity from Radiated Fields Test (RF e.m. field keyed carrier)

- Final Test Result : **PASS**
- Pass Performance Criteria : **A**
- Product Standard : EN 55020:2007
- Level : 2
- Frequency Range : 900 MHz (1/8 duty cycle, 217Hz repetition frequency)
- Field Strength : 3 V/m
- Temperature : 23 °C
- Relative Humidity : 48 %
- Atmospheric Pressure : 102.1 kPa
- Test Date : Jul. 25, 2011
- Test Engineer : Chuck Lu
- Observation : Normal.

### 16.1. Test Setup



**NOTE : The SPORTON 7m x 4m x 4m semi-anechoic chamber is compliance with the sixteen points uniform field requirement as stated in IEC 61000-4-3 Section 6.2.**

The procedure defined in this part requires the generation of electromagnetic fields within which the test sample is placed and its operation observed. To generate fields that are useful for simulation of actual (field) conditions may require significant antenna drive power and the resultant high field strength levels. To comply with local regulations and to prevent biological hazards to the testing personnel, it is recommended that these tests be carried out in a shielded enclosure or semi-anechoic chamber.

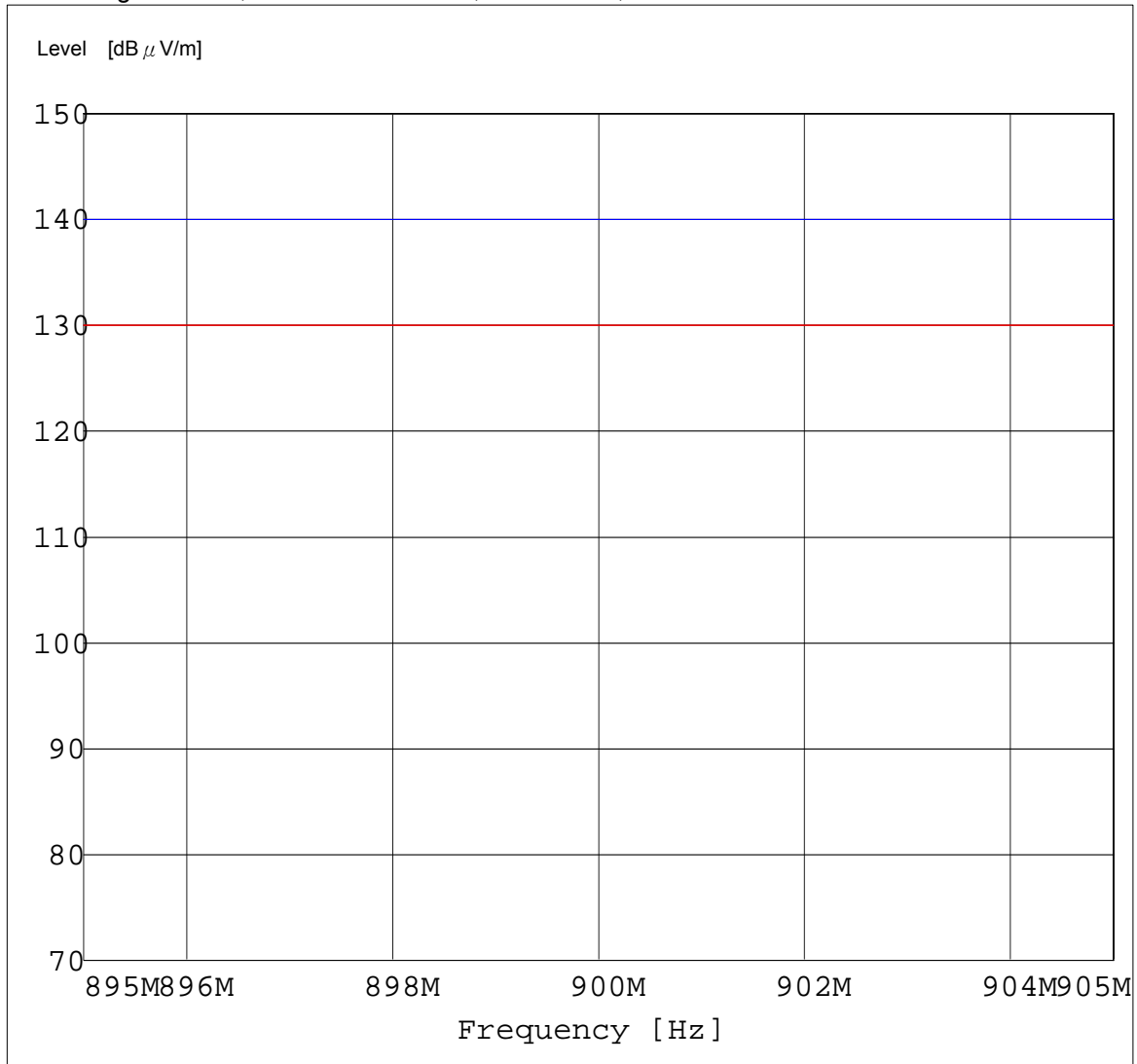
**16.2. Test Procedure**

- a. The equipment to be tested is placed in the center of the enclosure on a wooden table. The equipment is then connected to power and signal leads according to pertinent installation instructions.
- b. The bi-log antenna which is enabling the complete frequency 900 MHz is placed 3m away from the equipment. The required field strength is determined by placing the field strength meter(s) on top of or directly alongside the equipment under test and monitoring the field strength meter via a remote field strength indicator outside the enclosure while adjusting the continuous-wave to the applicable antennae.
- c. The test is normally performed with the generating antenna facing left or right side of the EUT. Vertical polarization of the field generated by the broadband (bilog) antenna.

**16.3. Test Record**

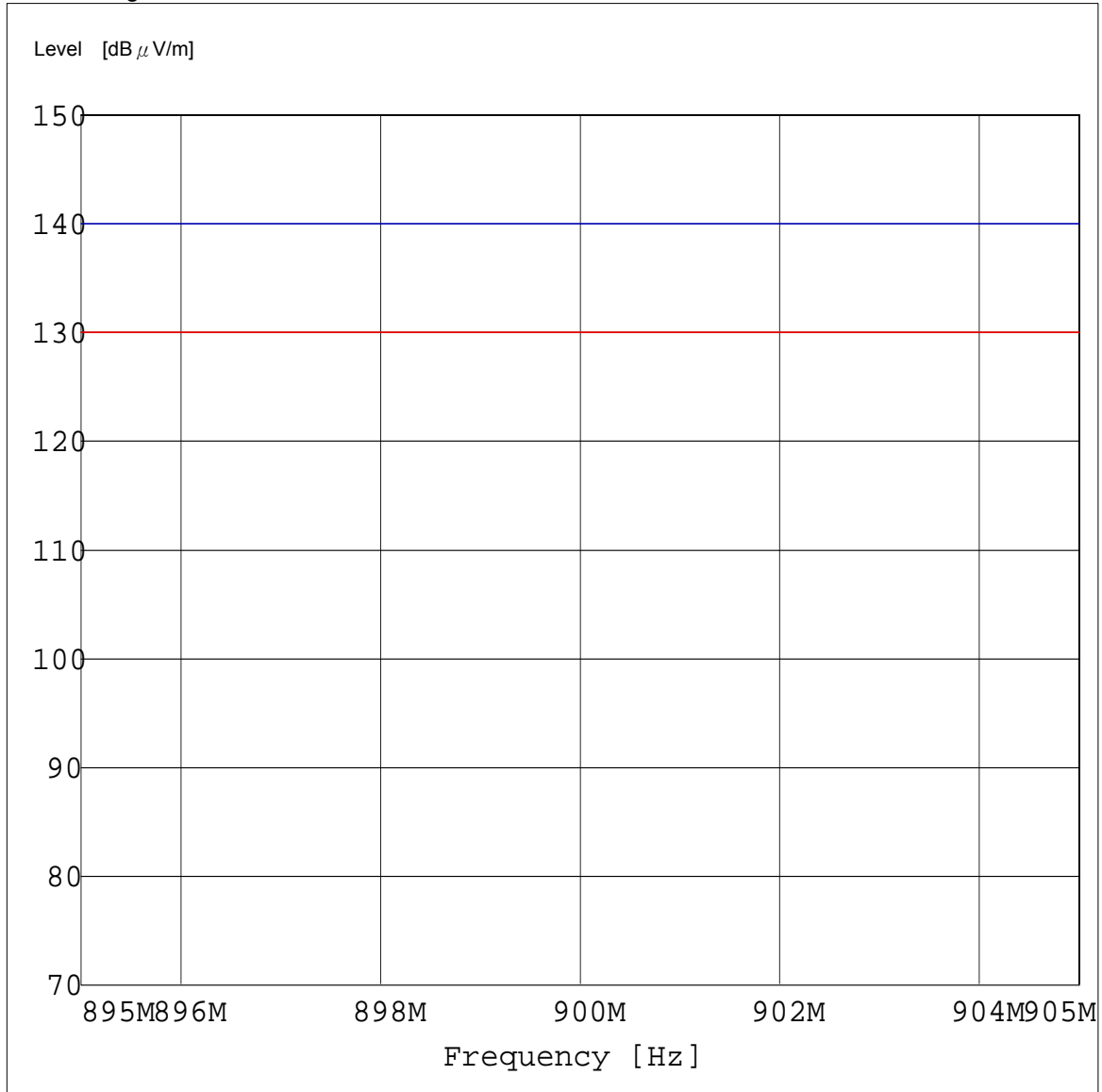
Test Mode:	DVB-T – Sound	Monitor:	SCART Audio Out
Channel:	9 (205.50 MHz)	S/N:	48.6 dB
Country:	Germany (IF 36.00 MHz)	AF Level:	924 mV

Interf. Signal: Scan, 250712-00003-001, 2012/07/25, 03:59:38PM



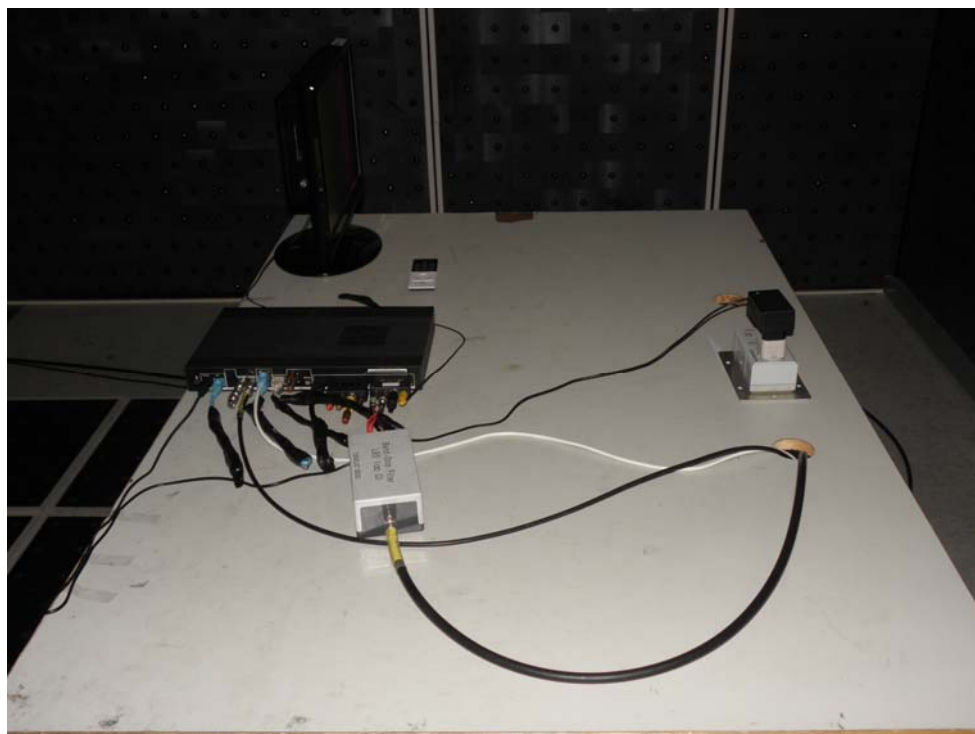
Test Mode: DVB-T – Picture                      Monitor: Video Out  
Channel: 9 (205.50 MHz)  
Country: Germany (IF 36.00 MHz)

Interf. Signal: Scan, 250712-00003-002, 2012/07/25, 04:01:04PM

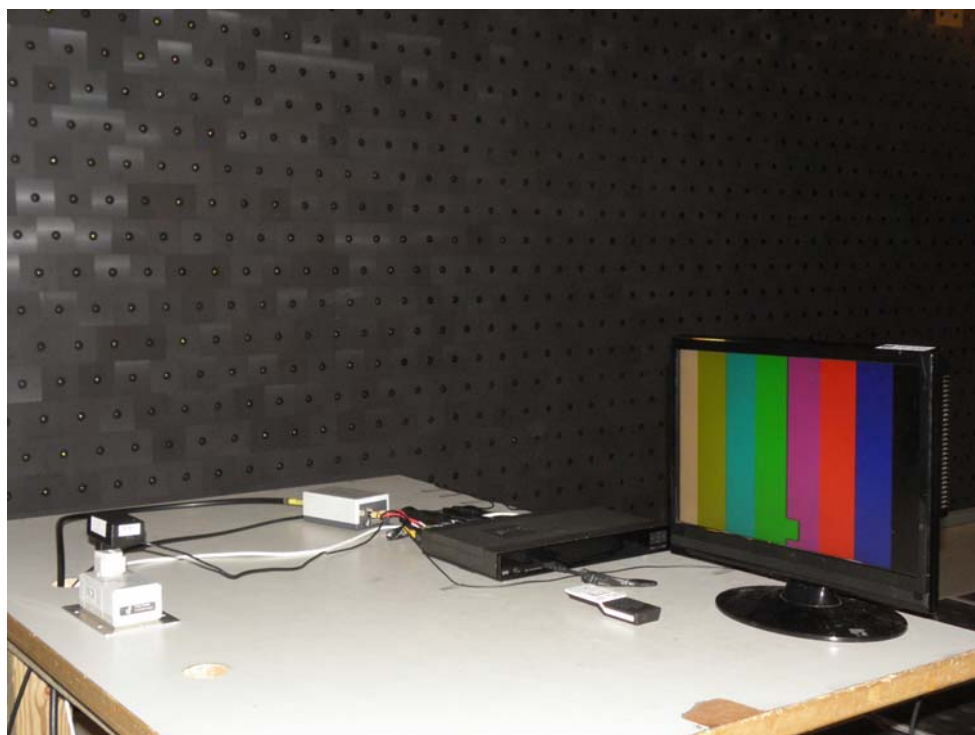


**16.4. Photographs of Immunity from Radiated Fields Test (RF e.m. field keyed carrier)**

FRONT VIEW



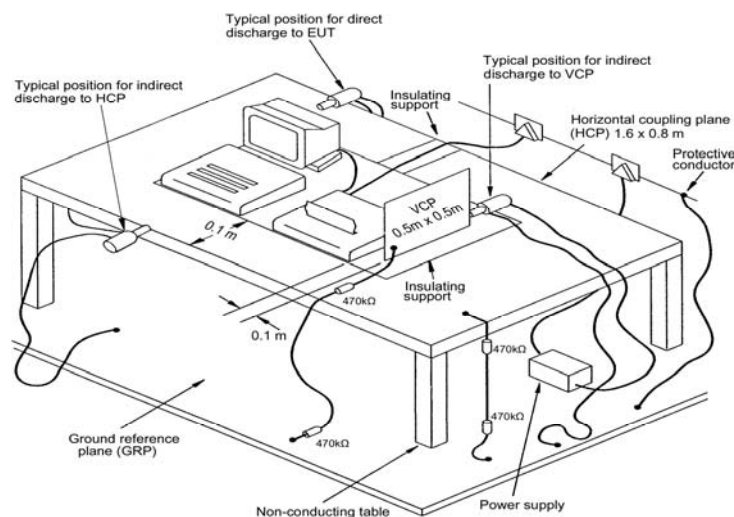
REAR VIEW



## 17. Electrostatic Discharge Immunity Test (ESD)

- Final Test Result : **PASS**
- Pass Performance Criteria : **B**
- Required Performance Criteria : B
- Basic Standard : IEC 61000-4-2:2008
- Product Standard : EN 55020:2007
- Level : 3 for air discharge  
: 2 for contact discharge
- Test Voltage :  $\pm 2 / \pm 4 / \pm 8$  kV for air discharge  
:  $\pm 2 / \pm 4$  kV for contact discharge
- Temperature : 23 °C
- Relative Humidity : 46 %
- Atmospheric Pressure : 102.1 kPa
- Test Date : Jul. 27, 2012
- Test Engineer : Chunk Lu
- Observation : During the test at air discharge  $\pm 8$  kV on Box port, the image shown on the screen paused caused by interference. After the test, the equipment continued to operate as intended without operator intervention.

### 17.1. Test Setup



The test setup consists of the test generator, EUT and auxiliary instrumentation necessary to perform DIRECT and INDIRECT application of discharges to the EUT as applicable, in the follow manner:

- a. CONTACT DISCHARGE to the conductive surfaces and to coupling plane;
- b. AIR DISCHARGE at insulating surfaces.

The preferred test method is that of type tests performed in laboratories and the only accepted method of demonstrating conformance with this standard. The EUT was arranged as closely as possible to arrangement in final installed conditions.

## 17.2. Test Setup for Tests Performed in Laboratory

A ground reference plane was provided on the floor of the test site. It was a metallic sheet (copper or aluminum) of 0.25 mm, minimum thickness; other metallic may be used but they shall have at least 0.65 mm thickness. In the SPORTON EMC LAB., we provided 1 mm thickness aluminum ground reference plane or 1 mm thickness stainless steel ground reference plane. The minimum size of the ground reference plane is 1 m x 1 m, the exact size depending on the dimensions of the EUT. It was connected to the protective grounding system.

The EUT was arranged and connected according to its functional requirements. A distance of 1 m minimum was provided between the EUT and the wall of the lab., and any other metallic structure. In cases where this length exceeds the length necessary to apply the discharges to the selected points, the excess length shall, where possible, be placed non-inductively off the ground reference plane and shall not come closer than 0.2 m to other conductive parts in the test setup.

Where the EUT is installed on a metal table, the table was connected to the reference plane via a cable with a 470k ohm resistor located at each end, to prevent a build-up of charge. The test setup was consist a wooden table, 0.8 m high, standing on the ground reference plane. A HCP, 1.6 m x 0.8 m, was placed on the table. The EUT and cables was isolated from the HCP by an insulating support 0.5 mm thick. The VCP size, 0.5 m x 0.5 m.



### 17.3. ESD Test Procedure

- a. In the case of air discharge testing the climatic conditions shall be within the following ranges:
  - ambient temperature: 15°C to 35°C;
  - relative humidity : 30% to 60%;
  - atmospheric pressure : 86 kPa (860 mbar) to 106 kPa (1060 mbar).
- b. Test programs and software shall be chosen so as to exercise all normal modes of operation of the EUT. The use of special exercising software is encouraged, but permitted only where it can be shown that the EUT is being comprehensively exercised.
- c. The test voltage shall be increased from the minimum to the selected test severity level, in order to determine any threshold of failure. The final severity level should not exceed the product specification value in order to avoid damage to the equipment.
- d. The test shall be performed with single discharges. On preselected points at least ten single discharges (in the most sensitive polarity) shall be applied.
- e. For the time interval between successive single discharges an initial value of one second is recommended. Longer intervals may be necessary to determine whether a system failure has occurred.
- f. In the case of contact discharges, the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.
- g. In the case of painted surface covering a conducting substrate, the following procedure shall be adopted :
  - If the coating is not declared to be an insulating coating by the equipment manufacturer, then the pointed tip of the generator shall penetrate the coating so as to make contact with the conducting substrate.
  - Coating declared as insulating by the manufacturer shall only be submitted to the air discharge.
  - The contact discharge test shall not be applied to such surfaces.
- h. In the case of air discharges, the round discharge tip of the discharge electrode shall be approached as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator (discharge electrode) shall be removed from the EUT. The generator is then retriggered for a new single discharge. This procedure shall be repeated until the discharges are completed. In the case of an air discharge test, the discharge switch, which is used for contact discharge, shall be closed.

## 17.4. Test Severity Levels

### 17.4.1. Contact Discharge

Level	Test Voltage (KV) of Contact discharge
1	±2
2	±4
3	±6
4	±8
X	Specified
Remark : "X" is an open level.	

### 17.4.2. Air Discharge

Level	Test Voltage (KV) of Air Discharge
1	±2
2	±4
3	±8
4	±15
X	Specified
Remark : "X" is an open level.	

## 17.5. Test Conditions

### 17.5.1. Test Result of Air Discharge

Test Point	Voltage	Tested No.	Test Result
CASE*	$\pm 2 / \pm 4 / \pm 8$ kV	BY 10	<u>PASS</u>
POWER SW	$\pm 2 / \pm 4 / \pm 8$ kV	BY 10	<u>PASS</u>
USB PORT	$\pm 2 / \pm 4 / \pm 8$ kV	BY 10	<u>PASS</u>
DC INPUT JACK	$\pm 2 / \pm 4 / \pm 8$ kV	BY 10	<u>PASS</u>
CONTROL BUTTON*	$\pm 2 / \pm 4 / \pm 8$ kV	BY 10	<u>PASS</u>
BOX PORT	$\pm 2 / \pm 4 / \pm 8$ kV	BY 10	<u>PASS</u>
HDD BOX	$\pm 2 / \pm 4 / \pm 8$ kV	BY 10	<u>PASS</u>
SCART PORT	$\pm 2 / \pm 4 / \pm 8$ kV	BY 10	<u>PASS</u>
HDMI PORT	$\pm 2 / \pm 4 / \pm 8$ kV	BY 10	<u>PASS</u>

\* During the test at air discharge, electrostatic discharges straight into the Metallic Shell.

### 17.5.2. Test Result of Contact Discharge

Test Point	Voltage	Tested No.	Test Result
SCREW	$\pm 2 / \pm 4$ kV	BY 25	<u>PASS</u>
RJ45 PORT	$\pm 2 / \pm 4$ kV	BY 25	<u>PASS</u>
AV PORT	$\pm 2 / \pm 4$ kV	BY 25	<u>PASS</u>
TUNER PORT	$\pm 2 / \pm 4$ kV	BY 25	<u>PASS</u>
HCP (At Front)	$\pm 2 / \pm 4$ kV	BY 25	<u>PASS</u>
HCP (At Left)	$\pm 2 / \pm 4$ kV	BY 25	<u>PASS</u>
HCP (At Right)	$\pm 2 / \pm 4$ kV	BY 25	<u>PASS</u>
HCP (At Rear)	$\pm 2 / \pm 4$ kV	BY 25	<u>PASS</u>
VCP (At Front)	$\pm 2 / \pm 4$ kV	BY 25	<u>PASS</u>
VCP (At Left)	$\pm 2 / \pm 4$ kV	BY 25	<u>PASS</u>
VCP (At Right)	$\pm 2 / \pm 4$ kV	BY 25	<u>PASS</u>
VCP (At Rear)	$\pm 2 / \pm 4$ kV	BY 25	<u>PASS</u>

**17.6. Photographs of Electrostatic Discharge Immunity Test**

FRONT VIEW



REAR VIEW



## 18. List of Measuring Equipment Used

### <EMI>

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Test Receiver	R&S	ESCS 30	100132	9 kHz ~ 2.75 GHz	Sep. 16, 2011	Conduction (CO03-HY)
LISN	AFJ	NNB-2/16Z	99079	9kHz ~ 30MHz	Feb. 09, 2012	Conduction (CO03-HY)
RF Cable-CON	Suhner Switzerland	RG223/U	CB034	9kHz ~ 30MHz	Oct. 28, 2011	Conduction (CO03-HY)
Open Area Test Site	SPORTON	OATS-10	OS02-NH	30 MHz - 1 GHz 10m, 3m	Jan. 02, 2012	Radiation (OS02-NH)
Amplifier	BURGEON	BPA-530	100203	0.01 MHz - 3 GHz	Jun. 01, 2012	Radiation (OS02-NH)
Receiver	R&S	ESCI	100497	9 kHz - 3 GHz	Apr. 17, 2012	Radiation (OS02-NH)
Bilog Antenna	CHASE	CBL6122B	2884	30 MHz - 2 GHz	Feb. 11, 2012	Radiation (OS02-NH)
Turn Table	EMCO	2080	9508-1805	0 - 360 degree	N/A	Radiation (OS02-NH)
Antenna Mast	ETS	2075-2	2385	1 m - 4 m	N/A	Radiation (OS02-NH)
RF Cable-R03m	MIYAZAKI	5DFB	CB002	30 MHz - 1 GHz	Sep. 16, 2011	Radiation (OS02-NH)

※ Calibration Interval of instruments listed above is one year.

### <EMS>

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
ESD Generator	TESEQ AG	NSG 437	192	Air: 0 ~ 30 KV Contact: 0 ~15KV	Oct. 07, 2011	ESD
EMCPRO System	KEYTEK	EMCPRO	0609221	0 KV - 4.4 KV	Oct. 17, 2011	EFT
Harmonic/Flicker Test System	EMC PARTNER	Harmonics -1000	088	4000VA 16A PEAK	Sep. 15, 2011	Harmonics, Flicker

※ Calibration Interval of instruments listed above is one year.

**<EMS> TS9980**

Instrument	Manufacturer	Model No.	Serial No.	Calibration Date
Audio analyzer	ROHDE&SCHWARZ	UPL 16	101235	Aug. 01, 2011
Power Meter	ROHDE&SCHWARZ	NRVS	101216	Aug. 01, 2011
SIGNAL GENERATOR	ROHDE&SCHWARZ	SML02	101424	Aug. 01, 2011
SIGNAL GENERATOR	ROHDE&SCHWARZ	SML01	103723	Aug. 01, 2011
MPEG2 MEASUREMENT GENERAT	ROHDE&SCHWARZ	DVG	100368	Aug. 01, 2011
TV-Test Transmitter	ROHDE&SCHWARZ	SFQ	100551	Aug. 01, 2011
TV TEST TRANSM	ROHDE&SCHWARZ	SFM	100171	Aug. 01, 2011
TV-GENERATOR NTSC	ROHDE&SCHWARZ	SGMF	100039	Aug. 01, 2011
TV-GENERATOR NTSC	ROHDE&SCHWARZ	SGPF	100152	Aug. 01, 2011
TV-GENERATOR NTSC	ROHDE&SCHWARZ	SGSF	100059	Aug. 01, 2011
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESPI3	101208	Aug. 01, 2011
RF PROB.	ROHDE&SCHWARZ	URV5-Z7	100426	Aug. 01, 2011
RF level meter display unit	ROHDE&SCHWARZ	URV35	100257	Aug. 01, 2011
Power Sensor	ROHDE&SCHWARZ	URV5-Z4	100117	Aug. 01, 2011
MATCHING PAD	ROHDE&SCHWARZ	RAM	100631	Aug. 01, 2011
MATCHING PAD	ROHDE&SCHWARZ	RAM	100632	Aug. 01, 2011
MATCHING PAD	ROHDE&SCHWARZ	RAM	100628	Aug. 01, 2011
Absorbing Clamp	Absorptions- Messwandler-Zange	MDS21	100224	Aug. 01, 2011
AMPLIFIER	ROHDE&SCHWARZ	BSA 1515-25	055966-3	N/A
AMPLIFIER	A.R	250W100A	325368	Aug. 01, 2011

※ Calibration Interval of instruments listed above is two year.

**APPENDIX A. Photographs of EUT**











