

## TEST REPORT



Applicant	Guangdong Changhong Electronics Co.,Ltd
Address	No.1 North Xingye Rd, Nantou Town, Zhongshan city ,Guangdong Province, China

Manufacturer or Supplier	Guangdong Changhong Electronics Co.,Ltd
Address	No.1 North Xingye Rd, Nantou Town, Zhongshan city ,Guangdong Province, China
Product	LED (backlighting) TV
Brand Name	changhong
Model	UGV40F6000(S1)-ESi
Additional Model & Model Difference	N/A
Date of tests	Jul. 13, 2018 ~ Aug. 01, 2018

The submitted sample of the above equipment has been tested for according to the requirements of the following standards:

- ☒ EN 55032:2015, Class B
- ☒ EN 61000-3-2:2014
- ☒ EN 61000-3-3:2013
- ☒ EN 55035:2017
- ☒ Draft EN 301 489-1 V2.2.0 (2017-03)
- ☒ Draft EN 301489-17 V3.2.0(2017-03)

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

Tested by Madison Luo Supervisor / EMC Department	Approved by Chris Chen Manager / EMC Department
	  Date: Aug. 14, 2018

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Test Report No.: CE180713N042-1

## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
CE180713N042-1	Original release	Aug. 14, 2018



## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	Test Item	Result	Remarks
EN 55032:2015, Class B	Conducted emission from the AC mains power port	PASS	Minimum passing margin is -10.05 dB at 0.54150 MHz
	Conducted Test (Telecom port)	PASS	Minimum passing margin is -8.77 dB at 23.12925 MHz
	Radiated emission 30MHz-6GHz	PASS	Minimum passing margin is -3.03 dB at 31.55 MHz
	Conducted differential voltage emission	PASS	Meets the requirements.
EN 61000-3-2:2014	Harmonic current emissions	PASS	Meets the requirements.
EN 61000-3-3:2013	Voltage fluctuations & flicker	PASS	Meets the requirements.

Remarks: EN55032:2015 versions is required by client and it will also remark in report that it comply with previous standard EN 55032:2012 + AC:2013.

<b>IMMUNITY (EN 55035:2017)</b>			
<b>Standard</b>	<b>Test Type</b>	<b>Result</b>	<b>Remarks</b>
IEC 61000-4-2:2008 ED. 2.0	Electrostatic discharge immunity test	PASS	Meets the requirements of Performance Criterion B
IEC 61000-4-3:2010 ED. 3.2	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Meets the requirements
EC 61000-4-4:2012 ED. 3.0	Electrical fast transient / burst immunity test.	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-5:2014 ED. 3.0	Surge immunity test	PASS	Meets the requirements of Performance Criterion A
IEC 61000-4-6:2013 ED. 4.0	Immunity to conducted disturbances, induced by radio-frequency fields	PASS	Meets the requirements
IEC 61000-4-8:2009 ED. 2.0	Power frequency magnetic field immunity test.	PASS	Meets the requirements of Performance Criterion A
IEC61000-4-11:2004 ED. 2.0	Voltage dips, short interruptions and voltage variations immunity tests	PASS	Meets the requirements of Voltage Dips: i) >95% residual - Performance Criterion A ii) 30% residual – Performance Criterion A iii) >95% residual – Performance Criterion C



<b>IMMUNITY(Draft EN 301 489-1 V2.2.0 (2017-03), Draft EN 301489-17 V3.2.0(2017-03))</b>			
<b>Standard</b>	<b>Test Type</b>	<b>Result</b>	<b>Remarks</b>
EN 61000-4-2:2009	Electrostatic discharge immunity test	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-3:2006 + A1:2008 + A2:2010	Radiated, radio-frequency, electromagnetic field immunity test	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-4:2012	Electrical fast transient / burst immunity test.	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-5:2014	Surge immunity test	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-6:2014	Immunity to conducted disturbances, induced by radio-frequency fields	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-11:2004	Voltage dips, short interruptions and voltage variations immunity tests	PASS	Meets the requirements of Voltage Dips: 1.0% residual – Performance Criterion A 2.0% residual – Performance Criterion A 3.70% residual – Performance Criterion A Voltage Interruptions: 1.0% residual – Performance Criterion C

## 1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Mains Terminal Disturbance Voltage Test	0.15MHz ~ 30MHz	+ /-2.70 dB
Asymmetric mode conducted emission at Antenna ports	0.15MHz ~ 30MHz	+ /-4.70 dB
Radiated Disturbance Test	30MHz ~ 1000MHz	+ /-3.76 dB
	1GHz ~ 6GHz	+ /-4.84 dB
Disturbance Voltage at the Antenna Terminals Emission	30MHz ~ 2150 MHz	+ /-1.56 dB

“This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.”



## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT OF EUT</b>	LED (backlighting) TV
<b>MODEL NO.</b>	UGV40F6000(S1)-ESi
<b>ADDITIONAL MODEL</b>	N/A
<b>POWER SUPPLY</b>	AC 100-240V 50/60Hz
<b>DATA CABLE SUPPLIED</b>	AC Line: Unshielded, Non-detachable 1.5m
<b>HIGHEST OPERATION FREQUENCY</b>	Above 108MHz
<b>BROADCAST RECEPTION EQUIPMENT TYPE</b>	Group 1

#### NOTE:

1. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.
2. For the test results, the EUT had been tested with all conditions, but only the worst case was shown in test report.
3. Please refer to the EUT photo document (Reference No.: 180713N042) for detailed product photo.

## 2.2 DESCRIPTION OF TEST MODES

The EUT was pre-tested all audio and video input sources as table below, the final worst mode were marked in boldface and recorded in this report.

### ◆ FOR CONDUCTED EMISSION TEST FOR AC MAINS POWER PORT (SEE CE180713N042-2 REPORT ITEM 1)

Test Mode	Test Voltage	Test Mode	Test Voltage
DVB-T 205.5MHz	AC 230V 50Hz	DVB-T 205.5MHz + GND	AC 230V 50Hz
AV In		AV In+ GND	
Scart In		Scart In+ GND	
HDMI 1 In(2k)		HDMI 1 In(2k) + GND	
HDMI 2 In(2k)		HDMI 2 In(2k) + GND	
HDMI 3 In(2k)		HDMI 3 In(2k) + GND	
HDMI 1 In(4k)		HDMI 1 In(4k) + GND	
HDMI 2 In(4k)		HDMI 2 In(4k) + GND	
HDMI 3 In(4k)		HDMI 3 In(4k) + GND	
USB 1 Playing		USB 1 Playing+ GND	
USB 2 Playing		USB 2 Playing+ GND	
Standby		Standby+ GND	
DVB-C 380MHz		DVB-C 380MHz+ GND	
DVB-S 1295MHz		DVB-S 1295MHz+ GND	
Networking Playing		Networking Playing+ GND	
WIFI Link Normal Working		DVB-S 1295MHz+ GND + Earphone	
DVB-S 1295MHz+ GND	AC 110V 60Hz		

### ◆ FOR CONDUCTED EMISSION MEASUREMENT AT TELECOMMUNICATION PORTS AND ASYMMETRIC MODE CONDUCTED EMISSION AT ANTENNA PORTS (SEE CE180713N042-2 REPORT ITEM 2)

Test Mode	Test Voltage
DVB-T 205.5MHz	AC 230V 50Hz
DVB-C 380MHz	
Networking Playing	
DVB-S 1295MHz	

Standby	
Networking Playing	AC 110V 60Hz

◆ FOR RADIATED EMISSION TEST(BELOW 1GHZ) (SEE CE180713N042-2 REPORT ITEM 3)

Test Mode	Test Voltage	Test Mode	Test Voltage
DVB-T 205.5MHz	AC 230V 50Hz	HDMI 1 In(2k)	AC 230V 50Hz
DVB-T 506MHz		HDMI 2 In(2k)	
DVB-T 746MHz		HDMI 3 In(2k)	
DVB-C 380MHz		HDMI 1 In(4k)	
DVB-S 1295MHz		HDMI 2 In(4k)	
DVB-S 1550MHz		HDMI 3 In(4k)	
DVB-S 2010MHz		Scart In	
AV In		Standby	
USB 1 Playing		WIFI Link Normal Working	
USB 2 Playing			
DVB-C 380MHz + Earphone		DVB-C 380MHz	AC 110V 60Hz

◆ FOR RADIATED EMISSION TEST(ABOVE 1GHZ) (SEE CE180713N042-2 REPORT ITEM 3)

Test Mode	Test Voltage	Test Mode	Test Voltage
USB 1 Playing	AC 230V 50Hz	DVB-S 2010MHz	AC 230V 50Hz
DVB-T 746MHz		HDMI 1 In(4k)	
DVB-C 380MHz		WIFI Link Normal Working	
Networking Playing		DVB-T 746MHz	AC 110V 60Hz

◆ **DISTURBANCE VOLTAGE AT THE ANTENNA TERMINALS MEASUREMENT(SEE CE180713N042-2 REPORT ITEM 4)**

Test Mode	Test Voltage	Test Mode	Test Voltage
DVB-T 205.5MHz	AC 230V 50Hz	AV In	AC 230V 50Hz
DVB-T 506MHz		Scart In	
DVB-T 746MHz		HDMI 1 In	
DVB-C 380MHz		HDMI 2 In	
DVB-S 1295MHz		HDMI 3 In	
DVB-S 1550MHz		USB 1 Playing	
DVB-S 2010MHz		USB 2 Playing	
Networking Playing		WIFI Link Normal Working	

◆ **FOR HARMONICIS, FLICKERS TESTS(PAGE38, PAGE41)**

HDMI 1 In Playing
USB 1 Playing
DVB-T 205.5MHz
Networking Playing

For EN55035

◆ **FOR ESD&EFT & Surge &DIP IMMUNITY TESTS (PAGE 49, 64, 67, 78)**

Test Mode	Test Voltage	Test Mode	Test Voltage
HDMI 1 In	AC 230V 50Hz	DVB-S 1295MHz	AC 230V 50Hz
USB 1 Playing		AV IN	
DVB-T 205.5MHz	AC 110V 60Hz	Networking Playing	AC 110V 60Hz
ATV 55.25MHz			

◆ **FOR RS, CS IMMUNITY TESTS(PAGE 57-58, 71-72)**

Test Mode	Test Voltage	Test Mode	Test Voltage
DVB-T 205.5MHz	AC 230V 50Hz AC 110V 60Hz	USB 1 Playing	AC 230V 50Hz AC 110V 60Hz
DVB-C 380MHz		DVB-S 1295MHz	
AV IN		USB 2 Playing	
ATV 55.25MHz		HDMI 2 IN	
Scart In		HDMI 3 IN	
HDMI 1 IN		Networking Playing	

For EN 301489:

◆ **FOR ESD & RS& EFT & Surge & CS &DIP TESTS (PAGE 49, 61, 64, 67, 76, 80)**

WIFI Link Normal Working

## 2.3 TEST PROGRAM USED AND OPERATION DESCRIPTIONS

- a. Turned on the power of all equipment.
- b. EUT was operated according to the type described in manufacturer's specifications or the user's manual.

## 2.4 MISCELLANEOUS

### ➤ Affix CE marking

The marking must be placed visibly and legibly on the product or, if not possible due to the nature of the product, be affixed to the packaging and the accompanying document. The CE marking shall consist of the initials 'CE' taking the following form:



The various components of the CE marking must have the same vertical dimension, and may not be smaller than 5 mm. If the CE marking is reduced or enlarged, the proportions given in the graduated drawing above must be respected.

When the product is subject to other Directives covering other aspects and which also provide for the 'CE' marking, the accompanying documents must indicate that the product also conforms to those other Directives.

However, when one or more of those Directives allow the manufacturer, during a transitional period, to choose which arrangements to apply, the 'CE' marking has to indicate conformity only with the Directives applied by the manufacturer. In this case, the particularities of the Directives applied, as published in the Official Journal of the European Union, must be given in the documents, notices or instructions required by the Directives and accompanying such products.





## 2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to the specifications of the manufacturers, the EUT must comply with the requirements of the following standards:

**EN 55032:2015, CLASS B**

**EN 61000-3-2:2014**

**EN 61000-3-3:2013**

**EN 55035:2017**

IEC 61000-4-2:2008 ED. 2.0

IEC 61000-4-3:2010 ED. 3.2

EC 61000-4-4:2012 ED. 3.0

IEC 61000-4-5:2014 ED. 3.0

IEC 61000-4-6:2013 ED. 4.0

IEC 61000-4-8:2009 ED. 2.0

IEC 61000-4-11:2004 ED. 2.0

**Draft EN 301 489-1 V2.2.0 (2017-03)**

**Draft EN 301489-17 V3.2.0(2017-03)**

EN 61000-4-2:2009

EN 61000-4-3:2006 + A1:2008 + A2:2010

EN 61000-4-4:2012

EN 61000-4-5:2014

EN 61000-4-6:2014

EN 61000-4-11:2004

All applicable tests have been performed and recorded as per the above standards.

## 2.6 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	PC	DELL	VOSTRO230	357PV2X	N/A
2	Mouse	DELL	MOC5UO	H0K00K92	N/A
3	Keyboard	DELL	L100	CN-ORH656	N/A
4	Printer	Lenovo	LJ2200J	LP02857415	N/A
5	PC	HP	A6608CN	3CR83825X3	N/A
6	DVD	Pioneer	DV-420V-G	JAKD014992CN	N/A
7	U Disk 2.0	QingHuaZi Guang	Q24Z150C	JAS00121	N/A
8	Earphone	Logitech	UE3600	1238CP529108	N/A
9	Modem	ACEEX	MODEM 1414	980020541	N/A
10	Mouse	Lenovo	MSU1175	12L12701085DN	N/A
11	Notebook	DELL	Inspiron 14-3442	4Q3WB12	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	AC Line: Unshielded, Detachable 1.5m, HDMI Line: Unshielded, Detachable 1.5m or 1.8m or 2.6m.
2	USB Line: Unshielded, Detachable 1.8m
3	USB Line: Unshielded, Detachable 1.8m
4	AC Line: Unshielded, Detachable. 1.5m; USB Line: Unshielded, Detachable. 1.5m
5	AC Line: Unshielded, Detachable 1.5m, HDMI Line: Unshielded, Detachable 1.5m With two cord
6	AC Line: Unshielded, Non-detachable. 1.5m, HDMI Line: Unshielded, Detachable 1.8m, AV Line: Unshielded, Detachable 1.5m
7	N/A
8	Earphone Line: Unshielded, Non-detachable. 1.5m,
9	RS232 Line: Unshielded, Detachable. 1.0m
10	USB Line: Unshielded, Detachable 1.8m
11	AC Line: Unshielded, Detachable 1.5m, RJ45 Line: Unshielded, Detachable 3m or 6m or 10m.

### 3 EMISSION TEST

#### 3.1 CONDUCTED EMISSION MEASUREMENT

##### 3.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

###### TEST STANDARD: EN 55032

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 – 0.5	79	66	66 – 56	56 – 46
0.50 – 5.0	73	60	56	46
5.0 – 30.0	73	60	60	50

- NOTE:**
- (1) The lower limit shall apply at the transition frequencies.
  - (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
  - (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

##### 3.1.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR7	101494	Mar. 21,18	Mar. 20,19
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	Mar. 03,18	Mar. 02,19
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	Apr. 11,18	Apr. 10,19
Voltage probe	SCHWARZBEC K	TK 9421	TK 9421-176	Jan. 17,18	Jan. 16,19
Test software	ADT	ADT_Cond_V 7.3.7	N/A	N/A	N/A

- NOTE:**
1. The test was performed at Shielded Room 553.
  2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.



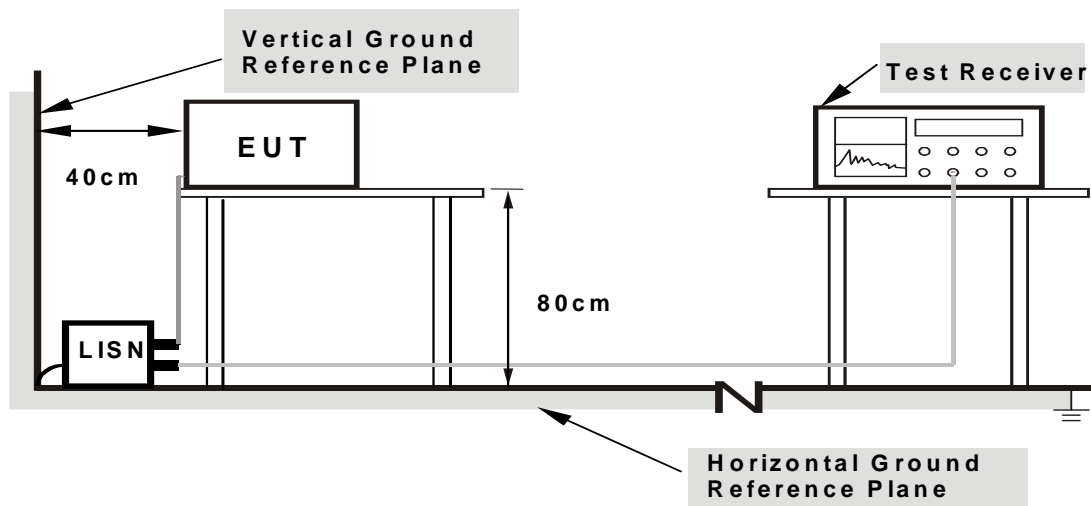
### 3.1.3 TEST PROCEDURE

- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (AMN). Other support units were connected to the power mains through another AMN. The two LISNs provide 50 Ohm/ 50U<sub>H</sub> of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20Db) were not recorded.

### 3.1.4 DEVIATION FROM TEST STANDARD

No deviation.

### 3.1.5 TEST SETUP



**Note:** 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

### 3.1.6 EUT OPERATING CONDITIONS

See section 2.3.

### 3.1.7 TEST RESULTS

The actual test results are contained in the CE180713N042-2 report item 1.

### 3.2 CONDUCTED EMISSION MEASUREMENT AT TELECOMMUNICATION PORTS AND ASYMMETRIC MODE CONDUCTED EMISSION AT ANTENNA PORTS

#### 3.2.1 LIMIT OF CONDUCTED COMMON MODE DISTURBANCE AT TELECOMMUNICATION PORTS AND ASYMMETRIC MODE CONDUCTED EMISSION AT ANTENNA PORTS FOR CLASS A EQUIPMENT

FREQUENCY (MHz)	Voltage Limit (dBuV)		Current Limit (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 – 0.5	97 – 87	84 – 74	53 – 43	40 – 30
0.5 – 30.0	87	74	43	30

#### FOR CLASS B EQUIPMENT

FREQUENCY (MHz)	Voltage Limit (dBuV)		Current Limit (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 – 0.5	84 – 74	74 – 64	40 – 30	30 – 20
0.5 – 30.0	74	64	30	20

**NOTE:** (1) The limits decrease linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

#### 3.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Impedance Stabilization Network	TESEQ	ISN T800	27957	Nov. 15,17	Nov. 14,18
Impedance Stabilization Network	TESEQ	ISN T400A	30448	Jul. 18, 18	Jul. 17, 19
Coupling Decoupling Network	TESEQ	CDN ST08A	32256	Apr. 11,18	Apr. 10,19
RF Current Probe	FCC	F-51	120418	Apr. 11,18	Apr. 10,19
Capacitive Voltage Probe	TESEQ	CVP 2200A	42032	Jul. 06, 18	Jul. 05, 19
EMI Test Receiver	Rohde&Schwarz	ESR7	101494	Mar. 21,18	Mar. 20,19
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	Mar. 03,18	Mar. 02,19
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	Apr. 11,18	Apr. 10,19
Test software	ADT	ADT_Cond_V7 .3.7	N/A	N/A	N/A

**NOTE:** 1. The test was performed at Shielded Room 553.  
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

### 3.2.3 TEST PROCEDURE

#### For using ISN:

- a. The EUT is placed 0.4 meters from the conducting wall of the shielded room and connected to ISN directly to reference ground plane.
- b. If voltage measurement is used, measure voltage at the measurement port of the ISN, correct the reading by adding the ISN voltage division factor, and compare to the voltage limit.
- c. If current measurement is used, measure current with the current probe and compare to the current limit.
- d. It is not necessary to apply the voltage and the current limit if the ISN is used. A 50  $\Omega$  load has to be connected to the measurement port of the ISN during the current measurement.
- e. The disturbance levels and the frequencies of at least six highest disturbances are recorded from be measured each telecommunication port, which comprises the EUT.

#### For using a 150 $\Omega$ load to the outside surface of the shield cable:

- a. Break the insulation and connect a 150  $\Omega$  resistor from the outside surface of the shield cable to ground, and apply a ferrite tube or clamp between 150 $\Omega$  connection and AE.
- b. The EUT is placed 0.4 meters from the conducting wall of the shielded room and connected to AE with the shield cable.
- c. Measure current with a current probe and compare to the current limit. The common mode impedance towards the right of the 150 $\Omega$  resistor.
- d. The disturbance levels and the frequencies of at least six highest disturbances are recorded from be measured each telecommunication port, which comprises the EUT.

**For using a combination of current probe and capacitive voltage probe:**

- a. The EUT is placed 0.4 meters from the conducting wall of the shielded room and connected to AE with a cable. The cable contains more than four balanced pairs or to unbalanced cable.
- b. Measure current with a current probe and compare to the current limit.
- c. Measure voltage with a capacitive probe and adjust the measured voltage as follows:
- d. – current margin  $\leq 6$  dB – subtract the actual current margin from measured voltage;
- e. – current margin  $> 6$  dB – subtract 6 Db from measured voltage.
- f. Compare adjusted voltage with the applicable voltage limit.
- g. Both the measured current and the adjusted voltage shall be below the applicable current and voltage limits.
- h. The disturbance levels and the frequencies of at least six highest disturbances are recorded from be measured each telecommunication port, which comprises the EUT.

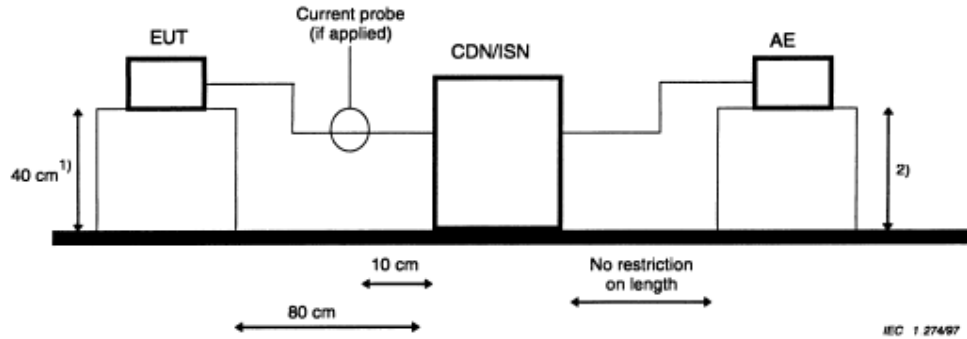
**3.2.4 DEVIATION FROM TEST STANDARD**

No deviation.



### 3.2.5 TEST SETUP

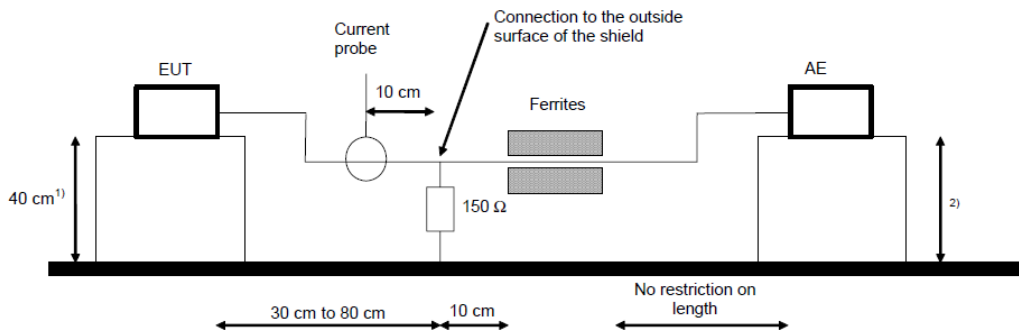
For using ISN:



AE = Associated equipment  
EUT = Equipment under test

- 1) Distance to the reference groundplane (vertical or horizontal).  
2) Distance to the reference groundplane is not critical.

For using a 150  $\Omega$  load to the outside surface of the shield cable:

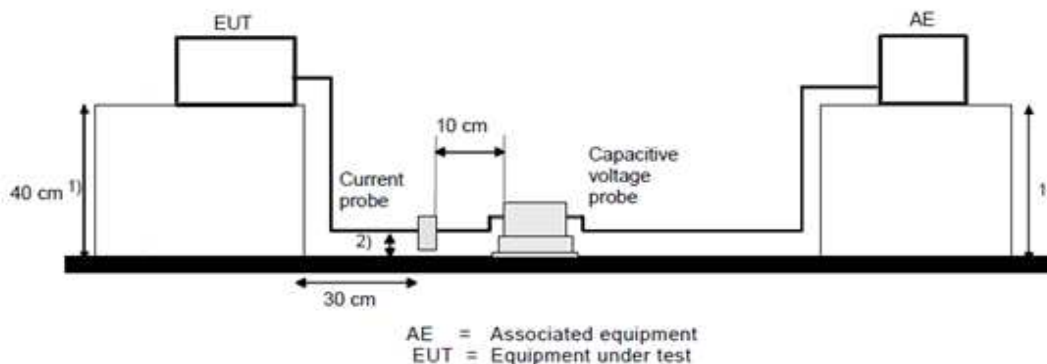


AE = Associated equipment  
EUT = Equipment under test

- 1) Distance to the reference groundplane (vertical or horizontal).  
2) Distance to the reference groundplane is not critical.



**For using a combination of current probe and capacitive voltage probe:**



<sup>1)</sup> Distance to the reference groundplane (vertical or horizontal)

<sup>2)</sup> Distance  $4 \pm 1$  cm from the reference groundplane.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration

### 3.2.6 EUT OPERATING CONDITIONS

See Item 2.3

### 3.2.7 TEST RESULTS

The actual test results are contained in the CE180713N042-2 report item 2.

### 3.3 RADIATED EMISSION MEASUREMENT

#### 3.3.1 LIMITS OF RADIATED DISTURBANCE MEASUREMENT

**TEST STANDARD: EN 55032**

**FOR FREQUENCY BELOW 1000 MHz**

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 10m)
	Quasi-Peak dBuV/m	Quasi-Peak dBuV/m
30 – 230	40	30
230 – 1000	47	37

FREQUENCY (MHz)	Class A (at 3m)	Class B (at 3m)
	Quasi-Peak dBuV/m	Quasi-Peak dBuV/m
30 – 230	50	40
230 – 1000	57	47

**For FM receivers**

Distance (m)	Source	Frequency Range (MHz)	Limits dB (uV/m)	
			Quasi-peak	
10	Local oscillator	≤1000	Fundamental	50
		30 to 300	Harmonics	42
		300 to 1000	Harmonics	46
	Other	30 to 230		30
		230 to 1000		37
3	Local oscillator	≤1000	Fundamental	60
		30 to 300	Harmonics	52
		300 to 1000	Harmonics	56
	Other	30 to 230		40
		230 to 1000		47

## FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	Up to 5 times of the highest frequency or 6 GHz, whichever is less

## TEST STANDARD: EN 55032 FOR FREQUENCY ABOVE 1000 MHz

FREQUENCY (GHz)	Class A (dBuV/m) (at 3m)		Class B (dBuV/m) (at 3m)	
	PEAK	AVERAGE	PEAK	AVERAGE
1 to 3	76	56	70	50
3 to 6	80	60	74	54

- NOTE:** 1. The lower limit shall apply at the transition frequencies.  
 2. Emission level (dBuV/m) = 20 log Emission level (Uv/m).  
 3. All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.



### 3.3.2 TEST INSTRUMENTS

#### FREQUENCY RANGE BELOW 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU40	100449	Mar. 21,18	Mar. 20,19
Bilog Antenna	Teseq	CBL 6111D	30643	Jul. 28, 18	Jul. 27, 19
Amplifier	Burgeon	BPA-530	100220	Apr. 18,18	Apr. 18,19
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	Feb. 10,18	Feb. 09,19
Test software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A

- NOTES:** 1. The test was performed in 966 Chamber (a 3m Semi-anechoic chamber).  
 2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

#### FREQUENCY RANGE ABOVE 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Horn Antenna	ETS-Lindgren	3117	00062558	Jul. 21, 18	Jul. 20, 19
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1247	May 05, 18	May 04, 19
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170242	May 05,18	Mar. 04,19
EMI Test Receiver	Rohde&Schwarz	ESU40	100449	Mar. 21,18	Mar. 20,19
Broadband Preamplifier	SCHWARZBECK	BBV9718	305	Apr. 18,18	Apr. 18,19
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 08,17	Nov. 07,18
Test Software	ADT	ADT_Radiated_V7.6.15.9.2	N/A	N/A	N/A

- NOTES:** 1. The test was performed in 966 Chamber (a 3m Semi-anechoic chamber).  
 2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

### 3.3.3 TEST PROCEDURE

#### <Frequency Range below 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters Semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

#### NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(Db/m)
3. Correction Factor(Db/m) = Antenna Factor (Db/m) + Cable Factor (Db) (if the raw value not contains the amplifier)
4. Correction Factor (Db/m) = Antenna Factor (Db/m) + Cable Factor (Db) – Amplifier Gain(Db) (if the raw value contains the amplifier)
5. Margin value = Emission level – Limit value.

### <Frequency Range above 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna can be varied from one meter-to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. The bore sight should be used during the test above 1GHz.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

#### NOTE:

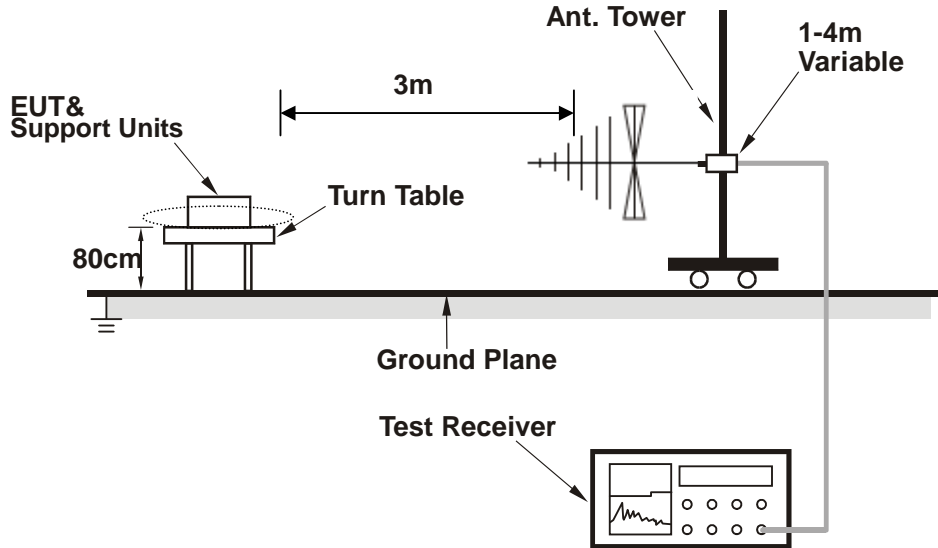
1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.
3. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(Db/m)
4. Correction Factor(Db/m) = Antenna Factor (Db/m) + Cable Factor (Db) (if the raw value not contains the amplifier)
5. Correction Factor (Db/m) = Antenna Factor (Db/m) + Cable Factor (Db) – Amplifier Gain(Db) (if the raw value contains the amplifier)
6. Margin value = Emission level – Limit value.

### 3.3.4 DEVIATION FROM TEST STANDARD

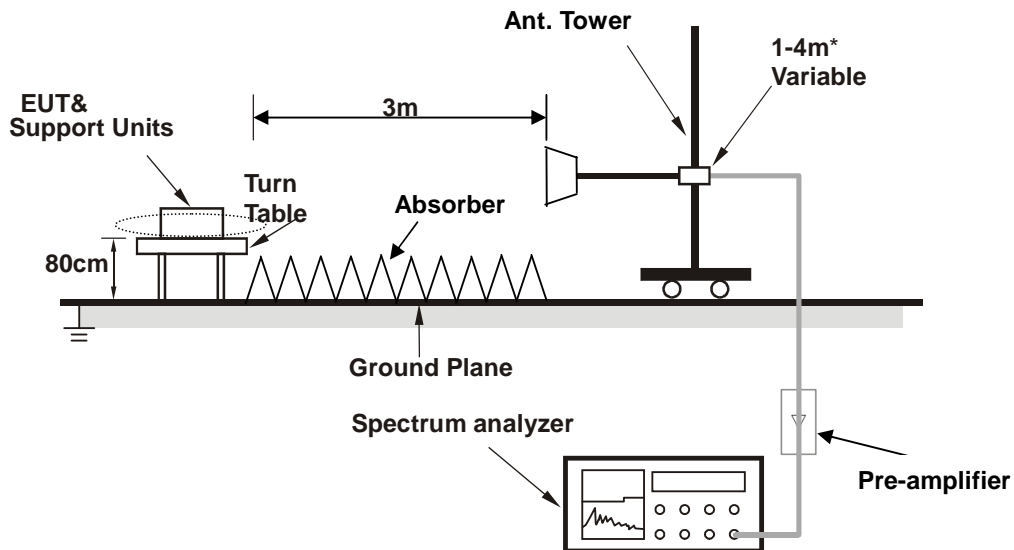
No deviation.

### 3.3.5 TEST SETUP

#### <Frequency Range below 1GHz>



#### <Frequency Range above 1GHz>



\* : depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3



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### 3.3.6 EUT OPERATING CONDITIONS

Same as section 2.3.

### 3.3.7 TEST RESULTS

The actual test results are contained in the CE180713N042-2 report item 3.





### 3.4 DISTURBANCE VOLTAGE AT THE ANTENNA TERMINALS MEASUREMENT(FOR EN55032)

#### 3.4.1 LIMITS OF DISTURBANCE VOLTAGE AT THE ANTENNA TERMINALS MEASUREMENT

TEST STANDARD: EN 55032

EQUIPMENT TYPE	SOURCE	FREQUENCY RANGE (MHz)	LIMITS VALUES dB(uV) 75 ohm	
			Quasi-peak *	
Television Receivers and video recorders working in channels below 30 MHz and 1GHz	Local oscillator	≤1000	Fundamental	46
		30 to 950	Harmonics	46
		950 to 2150	Harmonics	54
	Other	30 to 2150		46
* At frequencies above 1 GHz the peak detector is used.				

#### 3.4.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer	Rohde&Schwarz	FSL3	101507	Apr. 13,18	Apr. 12,19
Signal Generator	Rohde&Schwarz	SMB100A	102382	Apr. 13,18	Apr. 12,19
Signal Generator	Rohde&Schwarz	SMB100A	102383	Apr. 13,18	Apr. 12,19
TV Generator PAL	Rohde&Schwarz	SGPF	100200	Apr. 13,18	Apr. 12,19
Power Divider	Agilent	11636A	10046	Apr. 13,18	Apr. 12,19
Test Software	Rohde&Schwarz	T80-K1	N/A	N/A	N/A

**NOTE:** 1. The test was performed at TV EMS Room.  
2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

### 3.4.3 TEST PROCEDURE

- a. The antenna terminals of the EUT and the auxiliary signal generator are connected to the measuring receiver by means of coaxial cables and a resistive combining network having a minimum attenuation of 6dB.
- b. The output level of the auxiliary signal generator would be set to give 70dB ( $\mu$ V) at the antenna input of the EUT on 75 $\Omega$  impedance. **(For Analog signal in)**
- c. The output level of the auxiliary signal generator would be set to give VHF 50 dB ( $\mu$ V) and UHF 54 dB ( $\mu$ V) at the antenna input of the EUT on 75 $\Omega$  impedance. **(For Digital signal in)**
- d. The measuring receiver is tuned to the test frequency and the disturbance level is measured, taking into account the attenuation between the receiver antenna terminal and the measuring receiver input.
- e. The test shall then be repeated with EUT switched off, to check that the measured disturbance voltage is not due to the auxiliary generator.
- f. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to EN 55013 on antenna input terminal emission measurement.
- g. Conducted emissions were investigated over the frequency range from 30MHz to 1000MHz using a receiver bandwidth of 120kHz and 1000MHz to 2150MHz using a receiver bandwidth of 1MHz.

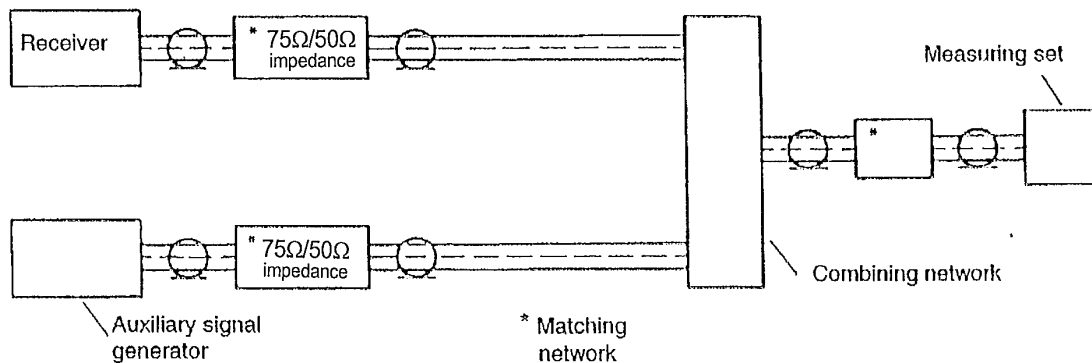
**Note:**

1. Emission level = Reading + Correction Factor
2. Correction factor = Insertion loss + Cable loss – amplifier gain
3. Margin value = Emission level – Limit value

### 3.4.4 DEVIATION FROM TEST STANDARD

No deviation.

### 3.4.5 TEST SETUP



### 3.4.6 EUT OPERATING CONDITIONS

Same as item 2.3.

### 3.4.7 TEST RESULTS

The actual test results are contained in the CE180713N042-2 report item 4.

### 3.5 HARMONICS CURRENT MEASUREMENT

#### 3.5.1 LIMITS OF HARMONICS CURRENT MEASUREMENT

TEST STANDARD: EN 61000-3-2

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		Odd Harmonics only		
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	0.15x15/n	15<=n<=39	3.85/n	0.15x15/n
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
8<=n<=40	0.23x8/n			

**NOTE:** 1. Class A and Class D are classified according to section 5 of EN 61000-3-2.

2. According to section 7 of EN 61000-3-2, the above limits for all equipment except for lighting equipment are for all applications having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

#### 3.5.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
5kVA AC Power Source	California Instruments	5001ix-400	55194	Apr. 23,18	Apr. 22,19
Harmonic/Flicker Test System	California Instruments	PACS-1	72134	Apr. 23,18	Apr. 22,19
Test Software	California Instruments	CTS 4 – V4.9.0	N/A	N/A	N/A

**NOTE:** 1. The test was performed in EMS Room.

2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

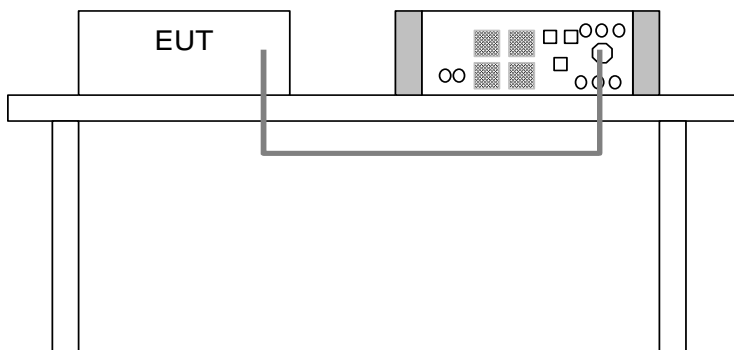
### 3.5.3 TEST PROCEDURE

- a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- b. The classification of EUT is according to section 5 of EN 61000-3-2.  
The EUT 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 600 W of the following types: Personal computers and personal computer monitors and television receivers.
- c. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

### 3.5.4 DEVIATION FROM TEST STANDARD

No deviation.

### 3.5.5 TEST SETUP



### 3.5.6 EUT OPERATING CONDITIONS

Same as item 2.3.

### 3.5.7 TEST RESULTS

The limits are not specified for equipment with a rated power of 75W or less (other than lighting equipment). The EUT is not required to meet this test item as its power consumption is lower than 75W.

For further details, please refer to Clause 7 of EN 61000-3-2:2014

### 3.6 VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

#### 3.6.1 LIMITS OF VOLTAGE FLUCTUATION AND FLICKS MEASUREMENT

TEST STANDARD: EN 61000-3-3

TEST ITEM	LIMIT	NOTE
$P_{st}$	1.0	$P_{st}$ means short-term flicker indicator.
$P_{lt}$	0.65	$P_{lt}$ means long-term flicker indicator.
$T_{d(t)}$ (ms)	500	$T_{d(t)}$ means maximum time that $d(t)$ exceeds 3.3%.
$d_{max}$ (%)	4	$d_{max}$ means maximum relative voltage change.
Dc (%)	3.3	dc means relative steady-state voltage change

#### 3.6.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
5kVA AC Power Source	California Instruments	5001ix-400	55194	Apr. 23,18	Apr. 22,19
Harmonic/Flicker Test System	California Instruments	PACS-1	72134	Apr. 23,18	Apr. 22,19
Test Software	California Instruments	CTS 4 – V4.9.0	N/A	N/A	N/A

**NOTE:** 1. The test was performed in EMS Room.  
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

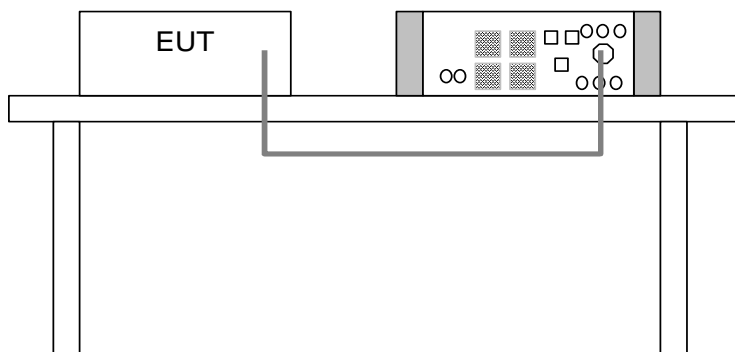
#### 3.6.3 TEST PROCEDURE

- The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
- During the flick measurement, the measure time shall include that part of whole operation cycle in which the EUT produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

### 3.6.4 DEVIATION FROM TEST STANDARD

No deviation.

### 3.6.5 TEST SETUP



### 3.6.6 EUT OPERATING CONDITIONS

Same as section 2.3.



### 3.6.7 TEST RESULTS

<b>TEST MODE</b>	See Item 2.2		
<b>FUNDAMENTAL VOLTAGE/AMPERE</b>	229.89Vrms	<b>OBSERVATION PERIOD (Tp)</b>	10 mins
<b>ENVIRONMENTAL CONDITIONS</b>	24 deg. C, 57% RH	<b>TESTED BY:</b> Cheng zhong	

TEST PARAMETER	MEASUREMENT VALUE	LIMIT	REMARKS
P <sub>st</sub>	0.242	1.0	Pass
P <sub>lt</sub>	0.106	0.65	Pass
T <sub>d(t)</sub> (ms)	0	500	Pass
d <sub>max</sub> (%)	0.06	4	Pass
dc (%)	0	3.3	Pass

- NOTE:**
- (1) P<sub>st</sub> means short-term flicker indicator.
  - (2) P<sub>lt</sub> means long-term flicker indicator.
  - (3) T<sub>d(t)</sub> means maximum time that d(t) exceeds 3.3%.
  - (4) d<sub>max</sub> means maximum relative voltage change.
  - (5) dc means relative steady-state voltage change.

## 4 IMMUNITY TEST

### 4.1 GENERAL DESCRIPTION

<b>Product Standard:</b>	<b>EN 55035:2017</b>	
<b>Basic Standard, Specification, and Performance Criteria:</b>	IEC 61000-4-2	Electrostatic Discharge – ESD: 8kV air discharge, 4kV Contact discharge, Performance Criterion B
	IEC 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-1000 MHz, 3V/m, 80% AM (1kHz), 1800 MHz,3V/m, 80% AM (1kHz), 2600 MHz,3V/m, 80% AM (1kHz), 3500 MHz,3V/m, 80% AM (1kHz), 5000 MHz,3V/m, 80% AM (1kHz)
	IEC 61000-4-4	Electrical Fast Transient/Burst - EFT AC Power line: 1kV, DC Power line: 0.5kV Signal line: 0.5kV Performance Criterion B
	IEC 61000-4-5	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current, 10/700 us Open Circuit Voltage, 5 /320 us Short Circuit Current, AC Power Line: line to line 1 kV, line to earth 2kV Signal line: 1kV, Shielded line and DC line:0.5kV Performance Criterion B
	IEC 61000-4-6	Conducted Radio Frequency Disturbances Test – CS: 0.15-10 MHz, 3Vrms, 10MHz-30MHz, 3Vrms-1Vrms, 30MHz-80MHz, 1Vrms 80% AM, 1kHz
	IEC 61000-4-8	Power Frequency Magnetic Field Test, 50 Hz, 1A/m, Performance Criterion A

	IEC 61000-4-11	Meets the requirements of Voltage Dips: i) reduction for >95% Performance Criterion B ii) reduction for 30% Performance Criterion C iii) reduction for >95% Performance Criterion C
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Product Standard	Draft EN 301 489-1 V2.2.0 (2017-03) Draft EN 301489-17 V3.2.0(2017-03)	
<b>Basic Standard, Specification, and Performance Criterion required</b>	EN 61000-4-2	Electrostatic Discharge – ESD: 8 kV air discharge, 4 kV contact discharge, Performance Criterion B
	EN 61000-4-3	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80 ~ 6000 MHz, 3 V/m, 80% AM (1 kHz), Performance Criterion A
	EN 61000-4-4	Electrical Fast Transient/Burst - EFT, AC power line: 1 kV Signal Line:0.5 kV Performance Criterion B
	EN 61000-4-5	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current, Power line: line to line 1 kV, line to ground 2 kV Performance Criterion B
	EN 61000-4-6	Conducted Radio Frequency Disturbances Test – CS: 0.15 ~ 80 MHz, 3 Vrms, 80% AM, 1 kHz, Performance Criterion A
	EN 61000-4-11	Voltage Dips: i) 0% residual for 0.5 cycle, Performance Criterion B ii) 0% residual for 1 cycle, Performance Criterion B iii) 70% residual for 25 cycle, Performance Criterion C Voltage Interruptions: i) 0% residual for 250 cycle, Performance Criterion C

## 4.2 GENERAL PERFORMANCE CRITERIA DESCRIPTION

According to Clause 8.2, 8.3, 8.4 of EN55035:2017 standard, the following describes the general performance criteria.

<b>CRITERION A</b>	<p>The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment 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, and by what the user may reasonably expect from the equipment if used as intended.</p> <p>For audio output device: The measured acoustic interference ratio and/or the measured electrical interference during the test shall be -20dB or better(see note1)</p>
<b>CRITERION B</b>	<p>During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test.</p> <p>After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance.</p> <p>If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.</p>
<b>CRITERION C</b>	<p>Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed.</p> <p>Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.</p>

**Note 1:** This performance criterion only using for Continuous inducted RF disturbances and Continuous RF electromagnetic field disturbances item.

**FOR EN301489-17**

The phenomena allowed during and after test in each criterion are clearly stated in the following table.

The Requirement of Performance Criteria		
1	Performance criteria for continuous phenomena applied to transmitters (CT)	Criterion A of the applicable class shall apply
2	Performance criteria for transient phenomena applied to transmitters (TT)	Criterion B of the applicable class shall apply
3	Performance criteria for continuous phenomena applied to receivers (CR)	Criterion A of the applicable class shall apply
4	Performance criteria for transient phenomena applied to receivers (TR)	Criterion B of the applicable class shall apply



**For EN 301 489-17**

The phenomena allowed during and after test in each criterion are clearly stated in the following table.

Performance criteria		
Criteria	During test	After test
A	Shall operate as intended. (see note1). Shall be no loss of function. Shall be no unintentional transmissions.	Shall operate as intended. Shall be no degradation of performance (see note 3). Shall be no loss of function. Shall be no loss of stored data or user programmable functions.
B	May show loss of function (one or more). May show degradation of performance (see note 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	May be loss of function (one or more).	Functions shall be recoverable by the operator. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3).

**NOTE 1:** Operate as intended during the test allows a level of degradation not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.

If the minimum performance level or the permissible performance degradation 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..

**NOTE 2:** Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance.

If the minimum performance level or the permissible performance degradation 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.

**NOTE 3:** No degradation of performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed.

If the minimum performance level or the permissible performance degradation 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.

### 4.3 EUT OPERATING CONDITION

Same as section 2.3.



## 4.4 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)(EN55035, EN301489)

### 4.4.1 TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-2
<b>Discharge Impedance:</b>	330 ohm / 150 pF
<b>Discharge Voltage:</b>	Air Discharge: 8 kV (Direct) Contact Discharge: 4 kV (Indirect & Direct)
<b>Polarity:</b>	Positive / Negative
<b>Number of Discharge:</b>	20 times at each test point
<b>Discharge Mode:</b>	Single Discharge
<b>Discharge Period:</b>	1-second

### 4.4.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
ESD Generator	TESEQ	NSG 437	279	Mar. 31,18	Mar. 30,19
Test Software	TESEQ	V03.03	N/A	N/A	N/A
ESD Generator	EM TEST	Dito	V1211112265	Jan. 16,18	Jan. 15,19
Test Software	EM TEST	V 2.31	N/A	N/A	N/A

**NOTE:** 1. The test was performed in ESD Room.  
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

### 4.4.3 TEST PROCEDURE

The basic test procedure was in accordance with IEC 61000-4-2:

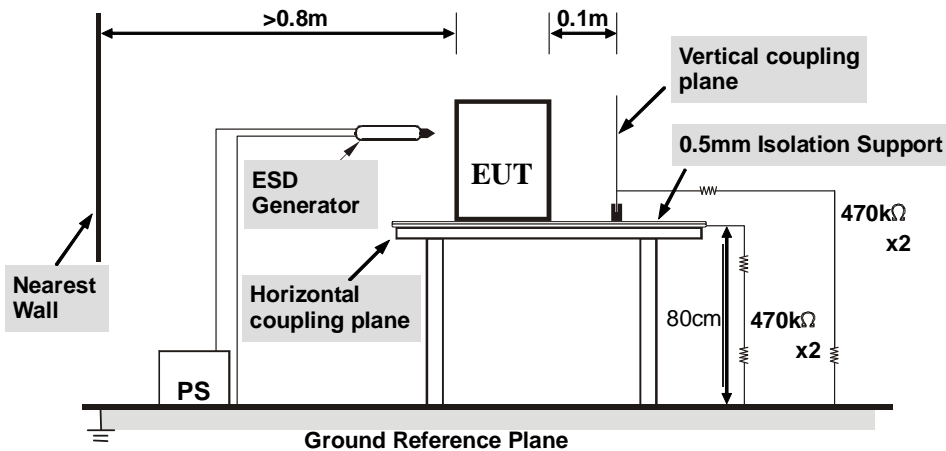
- Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- The time interval between two successive single discharges was at least 1 second.
- The discharge return cable of the generator shall be kept at a distance of at least 0.2 m from the EUT whilst the discharge is being applied and should not be held by the operator.
- Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.

- g. At least ten single discharges (in the most sensitive polarity) were applied to the Horizontal Coupling Plane at points on each side of the EUT. The ESD generator was positioned horizontally at a distance of 0.1 meters from the EUT with the discharge electrode touching the HCP.
- h. At least ten single discharges (in the most sensitive polarity) were applied to the center of one vertical edge of the Vertical Coupling Plane in sufficiently different positions that the four faces of the EUT were completely illuminated. The VCP (dimensions 0.5m x 0.5m) was placed vertically to and 0.1 meters from the EUT.

#### 4.4.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.4.5 TEST SETUP



#### NOTE:

##### TABLE-TOP EQUIPMENT

The configuration consisted of a wooden table 0.8 meters high standing on the Ground Reference Plane. The GRP consisted of a sheet of aluminum at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system. A Horizontal Coupling Plane (1.6m x 0.8m) was placed on the table and attached to the GRP by means of a cable with 940kΩ total impedance. The equipment under test, was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of 0.8-meter minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

##### FLOOR-STANDING EQUIPMENT

The equipment under test was installed in a representative system as described in section 7 of IEC 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1-meter thickness. The GRP consisted of a sheet of aluminum that is at least 0.25mm thick, and 2.5 meters square connected to the protective grounding system and extended at least 0.5 meters from the EUT on all sides.





#### 4.4.6 TEST RESULTS

TEST VOLTAGE	AC 230V/50Hz AC 110V/60Hz	ENVIRONMENTAL CONDITIONS	24.3deg. C, 48.1% RH, 101.1kPa
TESTED BY	Hu		

Direct Discharge Application				
Test Level (kV)	Polarity	Test Point	Test Result of Contact Discharge	Test Result of Air Discharge
4	+/-	Network/USB/HDMI/ Ant Port Shell	B	N/A
4	+/-	Other metal parts	A	N/A
8	+/-	Headphone Plug Port	N/A	B
8	+ /-	Other non-metal parts	N/A	A

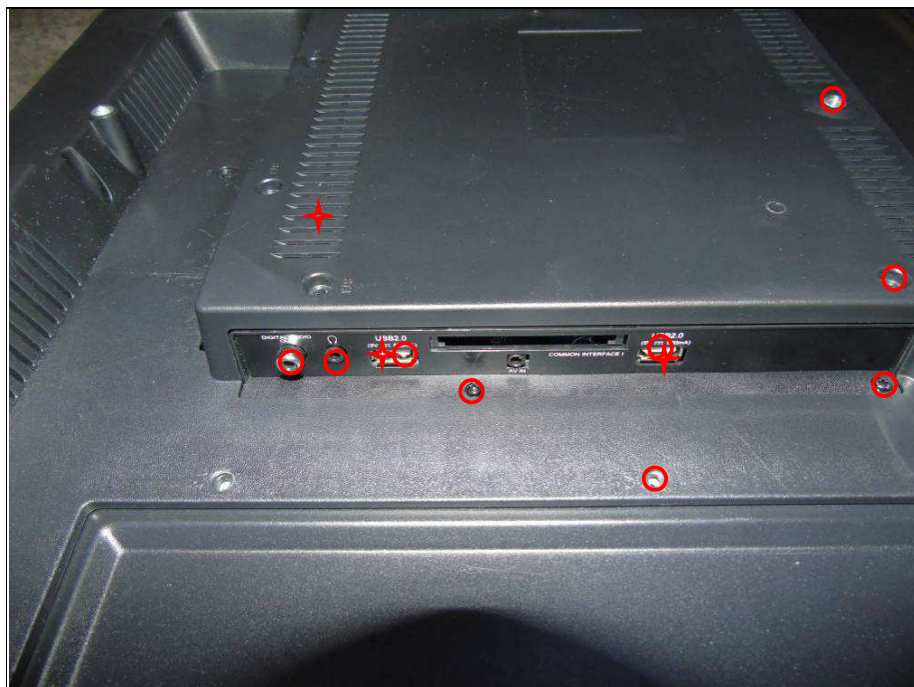
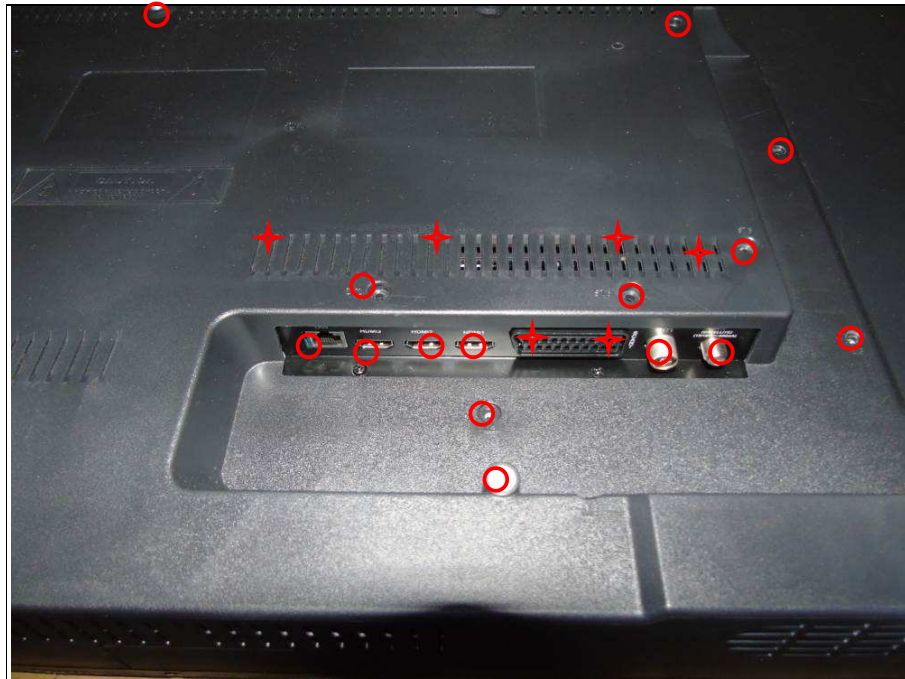
Indirect Discharge Application				
Discharge Level (kV)	Polarity	Test Point	Test Result of HCP	Test Result of VCP
4	+/-	HCP	A	N/A
4	+/-	VCP	N/A	A

**NOTE:** A: There was no change compared with initial operation during the test.

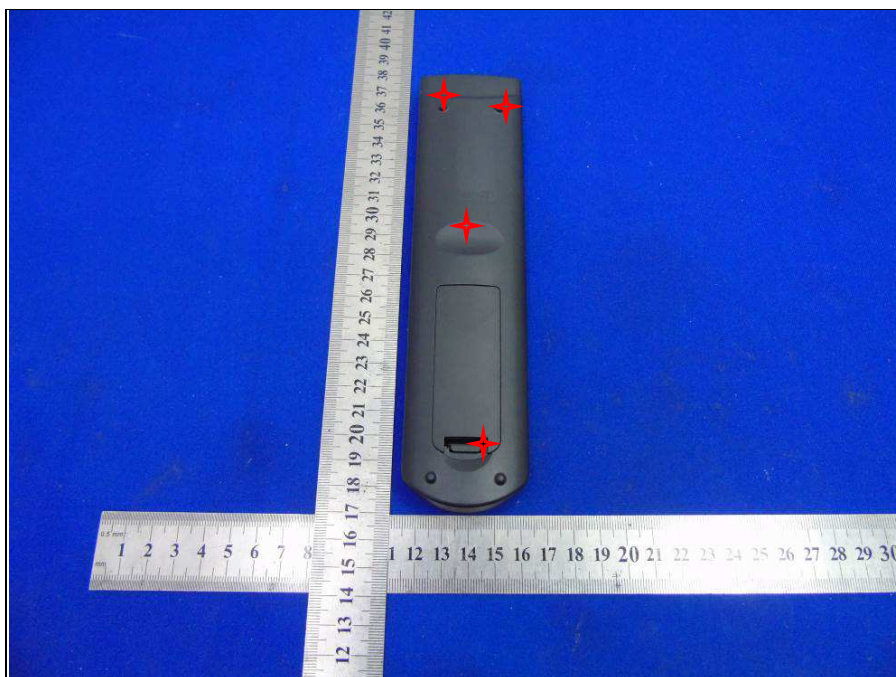
B: During the test, when  $\pm 4\text{kV}$  contact discharged in the Network/USB/HDMI/  
Ant Port Shell and  $\pm 8\text{kV}$  air discharged in Headphone Plug Port, the display  
would flash but it could return to normal after test.

ESD TEST POINT  
(○ Direct Contact Discharge, ✦ Air Discharge)









## 4.5 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)(EN55035)

### 4.5.1 TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-3
<b>Frequency Range:</b>	80-1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz
<b>Field Strength:</b>	3 V/m
<b>Modulation:</b>	1kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1 % of fundamental
<b>Polarity of Antenna:</b>	Horizontal and Vertical
<b>Antenna Height:</b>	1.5m
<b>Dwell Time:</b>	at least 3 seconds

### 4.5.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Generator	Agilent	N5181A	MY50142530	Oct. 20,17	Oct. 19,18
Antenna Log-Periodic	AR	ATR80M6G	0337307	N/A	N/A
Antenna Log-Periodic	AR	ATS700M11G	0336821	N/A	N/A
Switch Controller	AR	SC1000	0337343	N/A	N/A
RF Power Meter	ESE	4242	13984	Jan. 02,18	Jan. 01,19
Power Sensor	ESE	51011EMC	35716	Jan. 02,18	Jan. 01,19
Power Sensor	ESE	51011EMC	35715	Jan. 02,18	Jan. 01,19
E-Field probe	Narda	NBM-520	2403/01B	Sep. 28,17	Sep. 27,18
Power Amplifier	TESEQ	CBA 1G-150	T44029	N/A	N/A
Power Amplifier	TESEQ	CBA 3G-100	T44030	N/A	N/A
Power Amplifier	TESEQ	CBA 6G-050	1041204	N/A	N/A
Dual Directional Coupler	TESEQ	C5982	95208	Nov. 08,17	Nov. 07,18
Dual Directional Coupler	TESEQ	C6187	95175	Nov. 08,17	Nov. 07,18
Dual Directional Coupler	TESEQ	CPH-274F	M251304-01	Nov. 08,17	Nov. 07,18
Test Software	Tonscend	TS+	2.5.0.0	N/A	N/A
Test Software	ADT	BVADT_RS_V 7.6.4-DG	N/A	N/A	N/A
Audio analyzer	Rohde&Schwarz	UPV	101397	Oct. 13,17	Oct. 12,18
EAR SIMULATOR	B&K	4192	2764719	Oct. 13,17	Oct. 12,18
Sound Calibrator	B&K	Type 4231	2463874	Oct. 13,17	Oct. 12,18
Conditioning Amplifier	Rohde&Schwarz	2690A0S2	2437856	Oct. 13,17	Oct. 12,18

**NOTE:** 1. The test was performed in RS chamber.  
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

### 4.5.3 TEST PROCEDURE

The test procedure was in accordance with IEC 61000-4-3

- a. The testing was performed in a fully-anechoic chamber.
- b. The frequency range is swept from 80 MHz to 1000 MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz, with the signal 80% amplitude modulated with a 1kHz sine wave.
- c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5s.
- d. The field strength levels were 3V/m.
- e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

For Broadcast reception function:

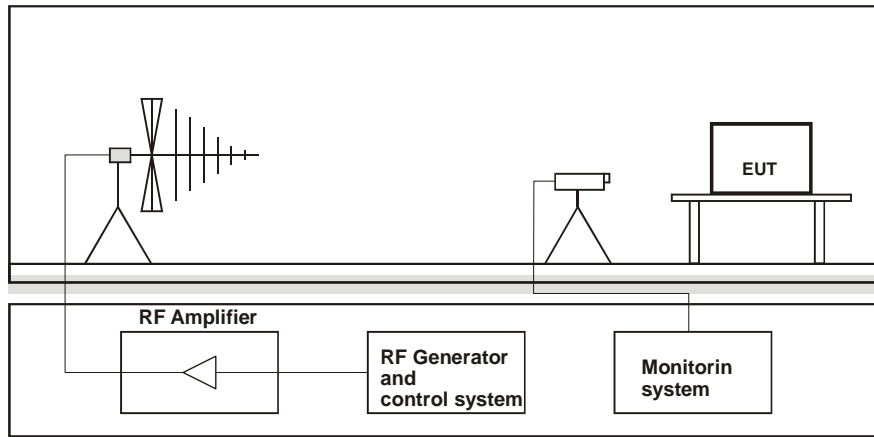
- f. **Group1:** Equipment in which the desired RF broadcast signal enters the equipment through a coaxial broadcast receiver tuner port. These coaxial ports are intended to be connected via a coaxial cable to an antenna or a cable distribution system.
- g. **Group 2:** Broadcast reception equipment which is not included in Group 1.
- h. AM/FM/DAB equipment with a coaxial broadcast receiver tuner port is classified as Group 2 equipment if the manufacturer declares that the equipment is not intended to be connected to a CATV or other cable distribution network.
- i. The broadcast reception function shall be tested in each reception mode for which the receiver is designed, for example analogue reception, DVB-T, DVB-T2, DVB-C, DVB-C2, DVB-S, DVB-S2. The receiver shall be tuned to one channel and provided with an appropriate wanted signal on that channel or other input typical of normal use.

### 4.5.4 DEVIATION FROM TEST STANDARD

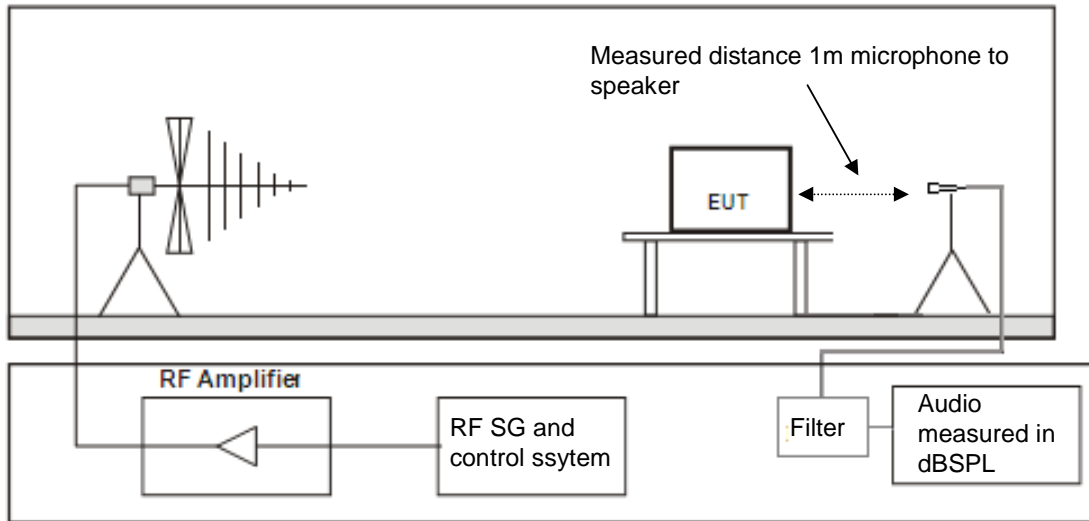
No deviation.



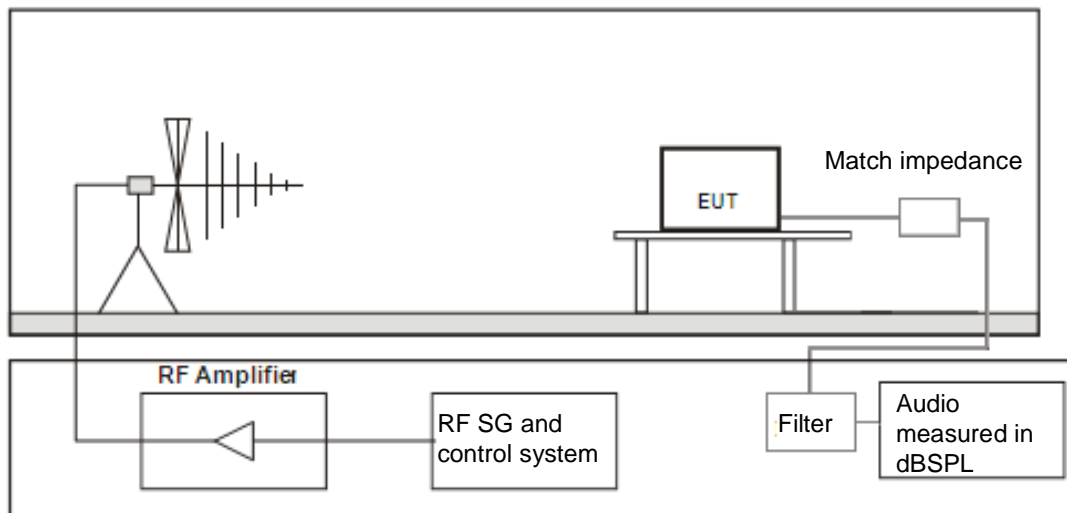
## 4.5.5 TEST SETUP



For Acoustic mode:



**For Electrical mode:**



**NOTE:**

1. The EUT installed in a representative system as described in section 7 of IEC 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.
2. Filter: 1kHz 3dB band pass filter.
3. The measurement distance: EUT to interference antenna was 3m.

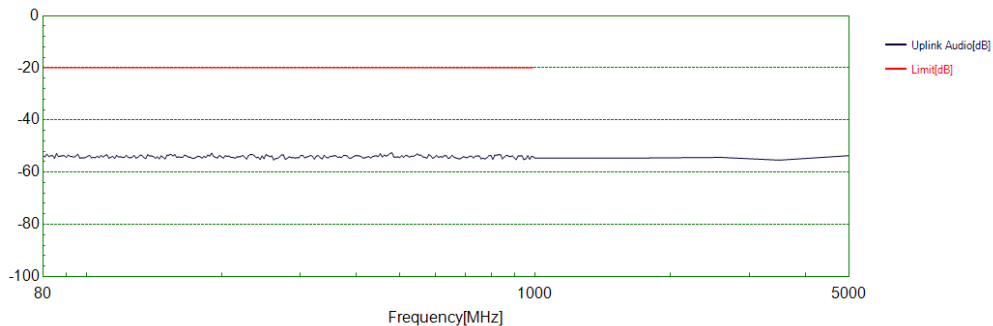




#### 4.5.6 TEST RESULTS

<b>TEST MODE</b>	See Section 2.2	<b>TEST VOLTAGE</b>	AC 230V /50Hz AC 110V/60Hz
<b>ENVIRONMENTAL CONDITIONS</b>	25deg., 51% RH	<b>TESTED BY:</b> Andy	

Field Strength (V/m)	Test Frequency (MHz)	Polarization of antenna (Horizontal / Vertical)	Test mode	Test method	Reference Level	Audio output	Interference Ratio
3	80-1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz	H&V	ATV	Acoustic	11.06dBV	Integral speaker	-52.5741
			AV	Acoustic	11.72dBV	Integral speaker	-56.0851
			DVB-C	Acoustic	10.83dBV	Integral speaker	-64.6960
			DVB-S	Acoustic	9.93dBV	Integral speaker	-62.5522
			DVB-T	Acoustic	11.33dBV	Integral speaker	-65.3897
			HDMI In	Acoustic	12.61dBV	Integral speaker	-56.5244
			Scart In	Acoustic	11.12dBV	Integral speaker	-55.1506
			USB	Acoustic	9.96dBV	Integral speaker	-71.3521
			USB	Electrical	-0.13dBV	Earphone out port	-76.6148
Limit		≤ -20					
Test Result		Pass					

**Worst case mode: ATV****Note:** The value of the reference level was reduce 20dB as the limit.

<b>TEST MODE</b>	Networking Playing	<b>TEST VOLTAGE</b>	AC 230V/50Hz AC 110V/60Hz
<b>ENVIRONMENTAL CONDITIONS</b>	27.1deg., 65.7% RH	<b>TESTED BY:</b> Andy	

Field Strength (V/m)	Test Frequency Note (MHz)	Polarization of antenna (Horizontal / Vertical)	Test Distance (m)	Test Result	Remark
3	80-1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz	H&V	3	A	Pass

**Note:** 1. In-band is defined as the entire tuneable operating range of the selected broadcast reception function.

2. The tuned channel  $\pm 0,5$  MHz (lower edge frequency – 0,5 MHz up to the upper edge frequency + 0,5 MHz of the tuned channel) is excluded from testing.

**NOTE:** A: There was no change compared with initial operation during the test

## 4.6 RADIATED, RADIO-FREQUENCY, ELECTROMAGNETIC FIELD IMMUNITY TEST (RS)(EN301489)

### 4.6.1 TEST SPECIFICATION

<b>Basic Standard:</b>	EN 61000-4-3
<b>Frequency Range:</b>	80 MHz ~ 6000 MHz
<b>Field Strength:</b>	3 V/m
<b>Modulation:</b>	1 kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1 % of preceding frequency value
<b>Polarity of Antenna:</b>	Horizontal and Vertical
<b>Antenna Height:</b>	1.5 m
<b>Dwell Time:</b>	3 seconds

### 4.6.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Generator	Agilent	N5181A	MY50142530	Oct. 20,17	Oct. 19,18
Antenna Log-Periodic	AR	ATR80M6G	0337307	N/A	N/A
Antenna Log-Periodic	AR	ATS700M11G	0336821	N/A	N/A
Switch Controller	AR	SC1000	0337343	N/A	N/A
RF Power Meter	ESE	4242	13984	Jan. 02,18	Jan. 01,19
Power Sensor	ESE	51011EMC	35716	Jan. 02,18	Jan. 01,19
Power Sensor	ESE	51011EMC	35715	Jan. 02,18	Jan. 01,19
E-Field probe	Narda	NBM-520	2403/01B	Sep. 28,17	Sep. 27,18
Power Amplifier	TESEQ	CBA 1G-150	T44029	N/A	N/A
Power Amplifier	TESEQ	CBA 3G-100	T44030	N/A	N/A
Power Amplifier	TESEQ	CBA 6G-050	1041204	N/A	N/A
Dual Directional Coupler	TESEQ	C5982	95208	Nov. 08,17	Nov. 07,18
Dual Directional Coupler	TESEQ	C6187	95175	Nov. 08,17	Nov. 07,18
Dual Directional Coupler	TESEQ	CPH-274F	M251304-01	Nov. 08,17	Nov. 07,18
Test Software	Tonscend	TS+	2.5.0.0	N/A	N/A
Test Software	ADT	BVADT_RS_V7.6 .4-DG	N/A	N/A	N/A

- NOTE:**
1. The test was performed in RS chamber.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

### 4.6.3 TEST PROCEDURE

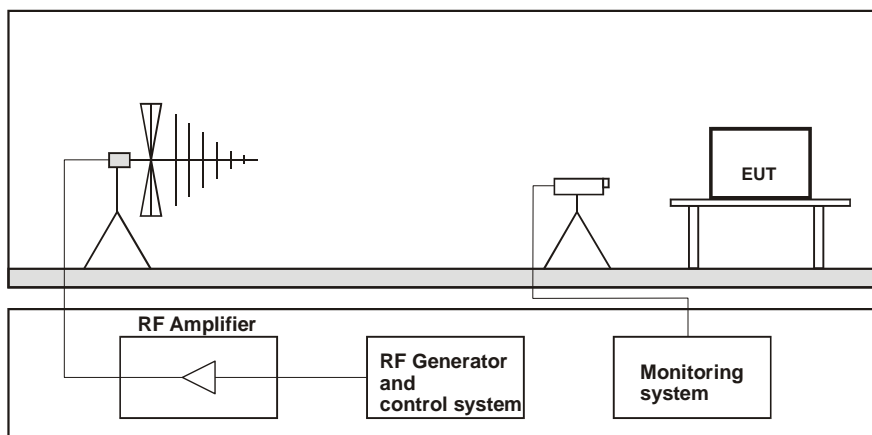
The test procedure was in accordance with IEC 61000-4-3

- The testing was performed in a fully-anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.
- The frequency range is swept from 80 MHz to 6000 MHz with the signal 80% amplitude modulated with a 1 kHz sine wave.
- The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5s.
- The field strength level was 3V/m.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.6.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### NOTE:

##### TABLETOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of EN 61000-4-3 was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.



#### 4.6.6 TEST RESULTS

<b>TEST MODE</b>	See Section 2.2	<b>TEST VOLTAGE</b>	AC 230V/50Hz
<b>ENVIRONMENTAL CONDITIONS</b>	27.1deg., 65.7% RH	<b>TESTED BY:</b> Andy	

Field Strength (V/m)	Test Frequency Note #1 (MHz)	Polarization of antenna (Horizontal / Vertical)	Test Distance (m)	Test Result	Remark
3	80-6000	H	3	A	N/A

**NOTE:** A: There was no change compared with initial operation during the test.

## 4.7 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT)(EN55035, EN301489)

### 4.7.1 TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-4
<b>Test Voltage:</b>	Power Line – 1 kV Signal Line – 0.5kV
<b>Polarity:</b>	Positive & Negative
<b>Impulse Frequency:</b>	100 kHz : only for single lines of Xdsl equipment 5 kHz : other
<b>Impulse Waveshape :</b>	5/50 ns
<b>Burst Duration:</b>	15 ms
<b>Burst Period:</b>	300 ms
<b>Test Duration:</b>	1 min.

### 4.7.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Combination wave Module	TESEQ	CDN 3061	1361	May 02,18	May 01,19
Telecom Surge Module	TESEQ	NSG 3060 Mainframe	1404	May 02,18	May 01,19
Automated 3- Phase Coupling/ Decoupling Network	TESEQ	CDN 3063	2131	May 02,18	May 01,19
CDN	TESEQ	CDN HSS-2	34275	May 02,18	May 01,19
CDN	TESEQ	CDN 118	30741	May 02,18	May 01,19
Test Software	TESEQ	CDM 3061_0002.30	1361	N/A	N/A
Test Software	TESEQ	HVM 3060_0002.30	293	N/A	N/A

**NOTE:** 1. The test was performed in EMS Room.  
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

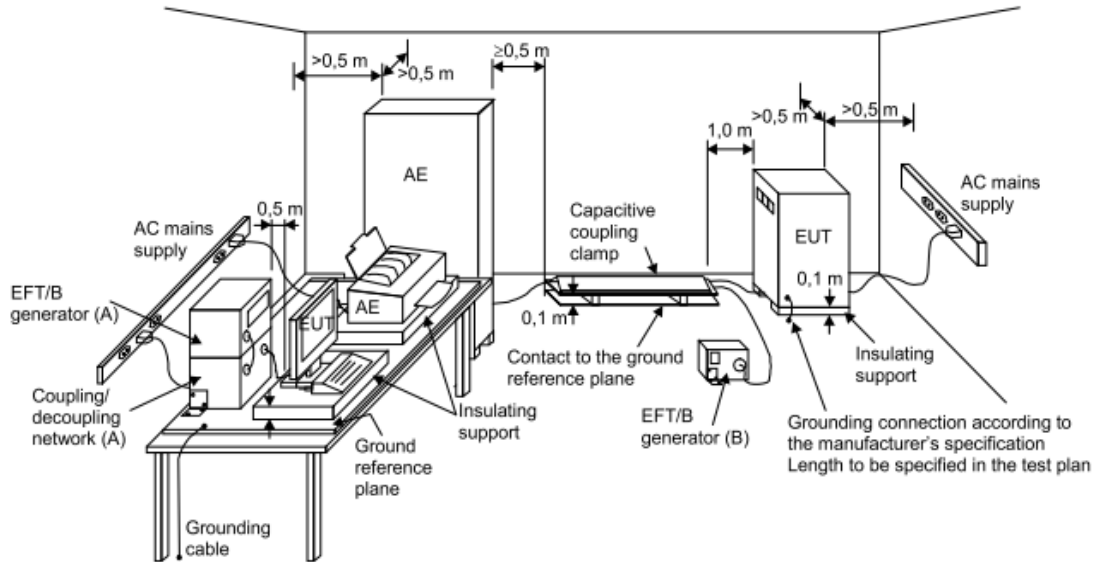
### 4.7.3 TEST PROCEDURE

- Both positive and negative polarity discharges were applied.
- The distance between any coupling devices and the EUT should be (0.5 – 0/+0.1) m for table-top equipment testing, and (1.0 ± 0.1) m for floor standing equipment.
- The duration time of each test sequential was 1 minutes.
- The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

#### 4.7.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.7.5 TEST SETUP



IEC 645/12

#### NOTE:

- (A) location for supply line coupling
- (B) location for signal lines coupling

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

**4.7.6 TEST RESULTS**

TEST VOLTAGE	AC 230V/50Hz AC 110V/60Hz	ENVIRONMENTAL CONDITIONS	22.7deg. C, 54.7% RH
TESTED BY	Xue Wang		

Pulse Voltage	1 kV		0.5 kV		kV		kV	
Pulse Polarity	+	—	+	—	+	—	+	—
L	A	A	/	/	/	/	/	/
N	A	A	/	/	/	/	/	/
L+N	A	A	/	/	/	/	/	/
RJ 45	/	/	A	A	/	/	/	/

**NOTE:** A: There was no change compared with initial operation during the test.



## 4.8 SURGE IMMUNITY TEST(EN55035, EN301489)

### 4.8.1 TEST SPECIFICATION

<b>Basic Standard:</b>	EN61000-4-5
<b>Wave-Shape:</b>	Combination Wave 1.2/50 us Open Circuit Voltage 8 /20 us Short Circuit Current
<b>Test Voltage:</b>	Power Line: 1kV Antenna Port: 0.5kV for EN55035
<b>Surge Input/Output:</b>	L – N, Antenna port
<b>Generator Source</b>	2 ohm between networks
<b>Impedance:</b>	12 ohm between network and ground
<b>Polarity:</b>	Positive/Negative
<b>Phase Angle:</b>	90°/270° For EN 55035, 0°/90°/180°/270° For EN 301489
<b>Pulse Repetition Rate:</b>	1 time / 60 sec.
<b>Number of Tests:</b>	5 positive and 5 negative at selected points

### 4.8.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Combination wave Module	TESEQ	CDN 3061	1361	May 02,18	May 01,19
Telecom Surge Module	TESEQ	NSG 3060 Mainframe	1404	May 02,18	May 01,19
Automated 3- Phase Coupling/ Decoupling Network	TESEQ	CDN 3063	2131	May 02,18	May 01,19
CDN	TESEQ	CDN HSS-2	34275	May 02,18	May 01,19
CDN	TESEQ	CDN 118	30741	May 02,18	May 01,19
Test Software	TESEQ	CDM 3061_0002.30	1361	N/A	N/A
Test Software	TESEQ	HVM 3060_0002.30	293	N/A	N/A

**NOTE:** 1. The test was performed in EMS Room.  
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

### 4.8.3 TEST PROCEDURE

a. For EUT power supply:

The surge is to be applied to the EUT power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave. The power cord between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

b. For test applied to unshielded unsymmetrically operated interconnection lines of EUT:

The surge is applied to the lines via the capacitive coupling. The coupling / decoupling networks shall not influence the specified functional conditions of the EUT. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

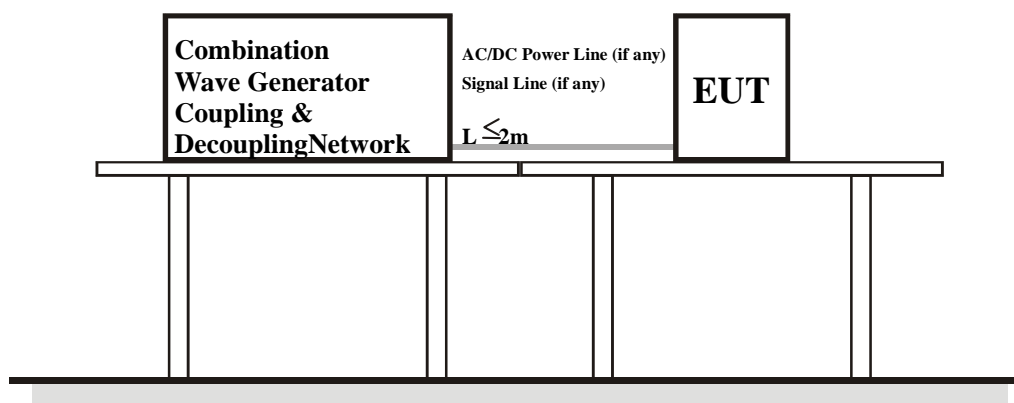
c. For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:

The surge is applied to the lines via gas arrestors coupling. Test levels below the ignition point of the coupling arrestor cannot be specified. The interconnection line between the EUT and the coupling/decoupling networks shall be 2 meters in length (or shorter).

### 4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.8.5 TEST SETUP



## 4.8.6 TEST RESULTS

For EN 301 489:

<b>TEST VOLTAGE</b>	AC 230V/50Hz	<b>ENVIRONMENTAL CONDITIONS</b>	21.7deg. C 49.7% RH
<b>TESTED BY</b>	Xue Wang		

AC/DC Power port:

\Phase angle \ Test result \Voltage (kV) \ Test point\ Polarity		0°	90°	180°	270°	/	DC Power Port
1.0	L-N	+	A	A	A	/	N/A
		—	A	A	A	/	N/A

**NOTE:** A: There was no change compared with the initial operation during the test.

For EN 55035:

<b>TEST VOLTAGE</b>	AC 230V/50Hz AC 110V/60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	21.7deg. C 49.7% RH
<b>TESTED BY</b>	Xue Wang		

AC/DC Power port:

\Phase angle \ Test result \Voltage (kV) \ Test point\ Polarity			0°	90°	180°	270°	/	DC Power Port
1.0	L-N	+	/	A	/	A	/	N/A
		—	/	A	/	A	/	N/A

Analogue/ digital data ports:

Voltage (kV)	Test Point	Polarity	Test result	Voltage (kV)	Test Point	Polarity	Test result
0.5	Antenna	+	A	/	/	+	/
		—	A			—	/

**NOTE:** A: There was no change compared with the initial operation during the test.

## 4.9 IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS (CS)(EN55035)

### 4.9.1 TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-6
<b>Frequency Range:</b>	0.15 MHz - 10 MHz, 10 MHz – 30 MHz, 30 MHz – 80MHz
<b>Field Strength:</b>	3 V <sub>r.m.s.</sub> , 3 V <sub>r.m.s.</sub> - 1V <sub>r.m.s.</sub> , 1V <sub>r.m.s.</sub> ,
<b>Modulation:</b>	1kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1 % of fundamental
<b>Coupled Cable:</b>	Power Mains, Unshielded
<b>Coupling Device:</b>	CDN-M2(2 wires), CDN-T4

### 4.9.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Generator	Rohde&Schwarz	SME06	829498/006	Oct. 20,17	Oct. 19,18
CDN	Luthi	L-801M2/M3	2015	Sep.27,17	Sep. 26,18
CDN(AUX)	TESEQ	CDN M016	27452	Nov. 15,17	Nov. 14,18
CDN	TESEQ	T200A	26944	Apr. 05,18	Apr. 04,19
CDN	TESEQ	T400A	26536	Apr. 05,18	Apr. 04,19
CDN	TESEQ	ST08A	32256	Apr. 04,18	Apr. 03,19
6dB 50Watt Attenuator	HUBER+SUHNER	5906.17.0005	303688	Oct. 20,17	Oct. 19,18
Power Amplifier	PRANA	DR 220	1512-1788	NA	NA
Electromagnetic Injection Clamp	Luthi	EM101	35640	Sep.14,17	Sep. 13,18
C/S Test System	HAEFELY	WinPAMP	NSEMC002	N/A	N/A
Test Software	ADT	BVADT_CS_V 7.6.2	N/A	N/A	N/A
Audio analyzer	Rohde&Schwarz	UPV	101397	Oct. 13,17	Oct. 12,18
EAR SIMULATOR	B&K	4192	2764719	Oct. 13,17	Oct. 12,18
Sound Calibrator	B&K	Type 4231	2463874	Oct. 13,17	Oct. 12,18
Conditioning Amplifier	Rohde&Schwarz	2690A0S2	2437856	Oct. 13,17	Oct. 12,18

- NOTE:** 1. The test was performed in CS test room.  
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

### 4.9.3 TEST PROCEDURE

- a. The EUT shall be tested within its intended operating and climatic conditions.
- b. An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.
- c. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.
- d. The frequency range is swept from 0.15 MHz - 10 MHz, 10 MHz – 30 MHz and 30 MHz – 80MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value.
- e. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5 s. The sensitive frequencies (e.g. clock frequencies) shall be analyzed separately.
- f. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

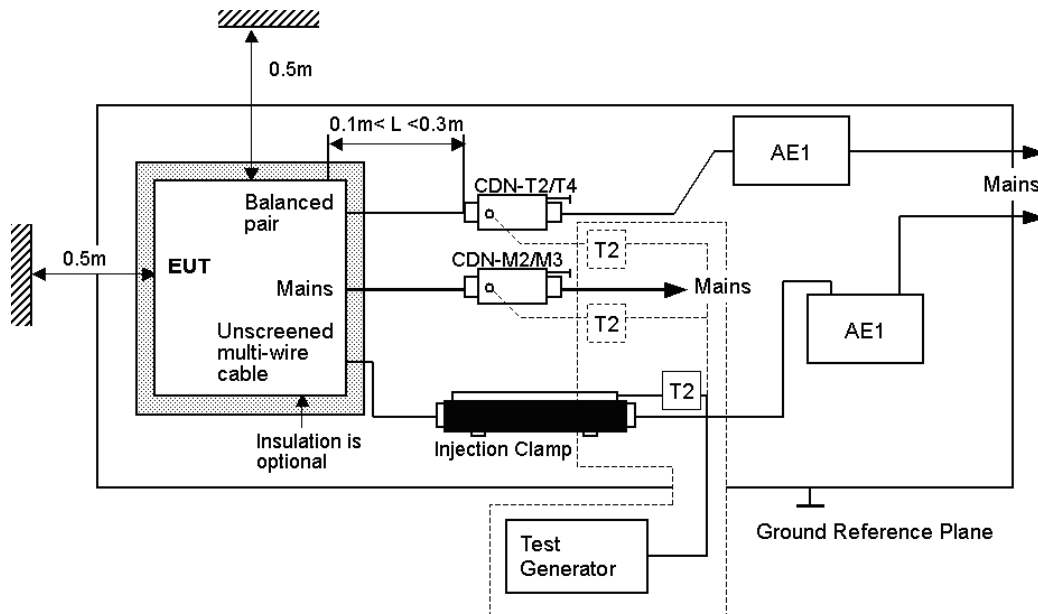
For Broadcast reception function:

- a. **Group1:** Equipment in which the desired RF broadcast signal enters the equipment through a coaxial broadcast receiver tuner port. These coaxial ports are intended to be connected via a coaxial cable to an antenna or a cable distribution system.
- b. **Group 2:** Broadcast reception equipment which is not included in Group 1.
- c. AM/FM/DAB equipment with a coaxial broadcast receiver tuner port is classified as Group 2 equipment if the manufacturer declares that the equipment is not intended to be connected to a CATV or other cable distribution network.
- g. The broadcast reception function shall be tested in each reception mode for which the receiver is designed, for example analogue reception, DVB-T, DVB-T2, DVB-C, DVB-C2, DVB-S, DVB-S2. The receiver shall be tuned to one channel and provided with an appropriate wanted signal on that channel or other input typical of normal use.

### 4.9.4 DEVIATION FROM TEST STANDARD

No deviation.

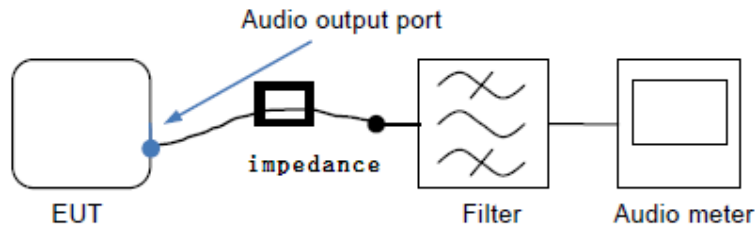
## 4.9.5 TEST SETUP



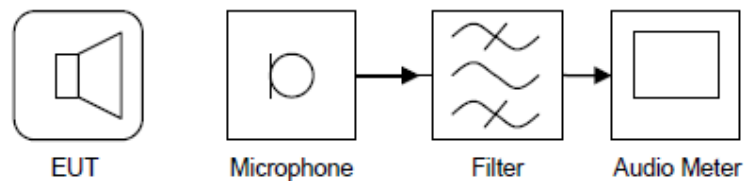
NOTE: The EUT clearance from any metallic obstacles shall be at least 0.5m.

All non-excited input ports of the CDNs shall be terminated by 50Ω loads.

For Electrical measurements setup:



For Acoustic measurements setup:



NOTE:

1. The EUT installed in a representative system was placed on a non-conductive table 0.8 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.
2. Filter: 1kHz 3dB band pass filter.

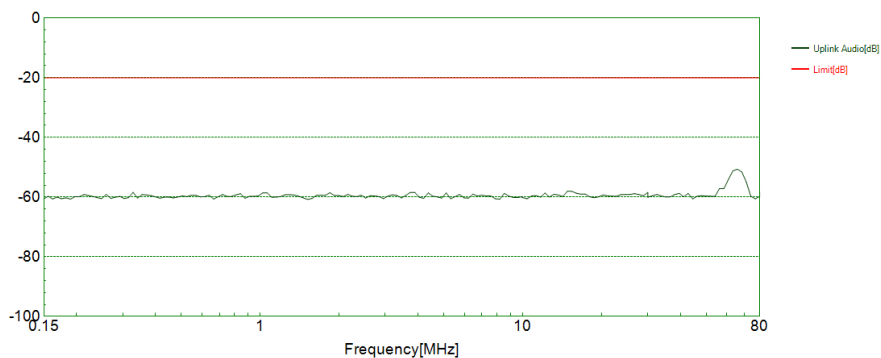
## 4.9.6 TEST RESULTS

<b>TEST VOLTAGE</b>	AC 230V/50Hz AC 110V/60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	17.3deg. C, 56.7% RH
<b>TESTED BY</b>	Andy		

Voltage (V)	Test Frequency Note <sup>#1</sup> (MHz)	Tested Line	Injection Method.	Test mode	Reference Level	Test method	Audio output	Interference Ratio
3 3 -1 1	0.15–10 MHz 10–30 MHz 30–80 MHz	AC Line	CDN-M2	ATV	6.10dBV	Acoustic	Integral speaker	-50.64
		AC Line	CDN-M2	AV In	4.99dBV	Acoustic	Integral speaker	-59.48
		AC Line	CDN-M2	DVB-C	3.43dBV	Acoustic	Integral speaker	-61.34
		AC Line	CDN-M2	DVB-S	2.33dBV	Acoustic	Integral speaker	-52.66
		AC Line	CDN-M2	DVB-T	3.63dBV	Acoustic	Integral speaker	-61.80
		AC Line	CDN-M2	HDMI In	4.19dBV	Acoustic	Integral speaker	-62.82
		AC Line	CDN-M2	Scart in	4.79dBV	Acoustic	Integral speaker	-65.35
		AC Line	CDN-M2	USB	1.37dBV	Acoustic	Integral speaker	-56.35
		AC Line	CDN-M2	USB	-4.80dBV	Electrical	Earphone out port	-76.61
Limit		≤ -20						
Test Result		Pass						

**Worst case mode: ATV**

**Note:** The value of the reference level was reduce 20dB as the limit.



<b>TEST MODE</b>	Networking Playing	<b>TEST VOLTAGE</b>	AC 230V/50Hz AC 110V/60Hz
<b>ENVIRONMENTAL CONDITIONS</b>	17.3deg. C, 56.7% RH	<b>TESTED BY:</b> Andy	

Voltage (V)	Test Frequency Note <sup>#1</sup> (MHz)	Tested Line	Injection Method.	Test Result	Remark
3	0.15–10 MHz	AC Line	CDN-M2	A	Pass
3 -1	10–30 MHz	AC Line	CDN-M2	A	Pass
1	30–80 MHz	AC Line	CDN-M2	A	Pass
3	0.15–10 MHz	RJ 45 Line	CDN-T4	A	Pass
3 -1	10–30 MHz	RJ 45 Line	CDN-T4	A	Pass
1	30–80 MHz	RJ 45 Line	CDN-T4	A	Pass

Note<sup>#1</sup>: Tested Israel SII Frequencies 0.2,0.53,1,1.5,7.1,13.56,21,27.12,40.68,65,68 MHz

**NOTE:** A: There was no change compared with initial operation during the test



## 4.10 IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS (CS) (EN301489)

### 4.10.1 TEST SPECIFICATION

<b>Basic Standard:</b>	EN 61000-4-6
<b>Frequency Range:</b>	0.15 MHz - 80 MHz
<b>Field Strength:</b>	3 V <sub>r.m.s.</sub>
<b>Modulation:</b>	1kHz Sine Wave, 80%, AM Modulation
<b>Frequency Step:</b>	1 % of fundamental
<b>Coupled Cable:</b>	Power Mains, Signal Line
<b>Coupling Device:</b>	CDN-M2 (2 wires)

### 4.10.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Generator	Rohde&Schwarz	SME06	829498/006	Oct. 20,17	Oct. 19,18
CDN	Luthi	L-801M2/M3	2015	Sep.27,17	Sep. 26,18
CDN(AUX)	TESEQ	CDN M016	27452	Nov. 15,17	Nov. 14,18
CDN	TESEQ	T200A	26944	Apr. 11,18	Apr. 10,19
CDN	TESEQ	T400A	26536	Apr. 11,18	Apr. 10,19
CDN	TESEQ	ST08A	32256	Apr. 11,18	Apr. 10,19
6dB 50Watt Attenuator	HUBER+SUHNER	5906.17.0005	303688	Oct. 20,17	Oct. 19,18
Power Amplifier	PRANA	DR 220	1512-1788	NA	NA
Electromagnetic Injection Clamp	Luthi	EM101	35640	Sep.14,17	Sep. 13,18
Test Software	Tonscend	TS+	2.5.0.0	N/A	N/A
Test Software	ADT	BVADT_CS_V 7.6.2	N/A	N/A	N/A

**NOTE:** 1. The test was performed in CS test room.  
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

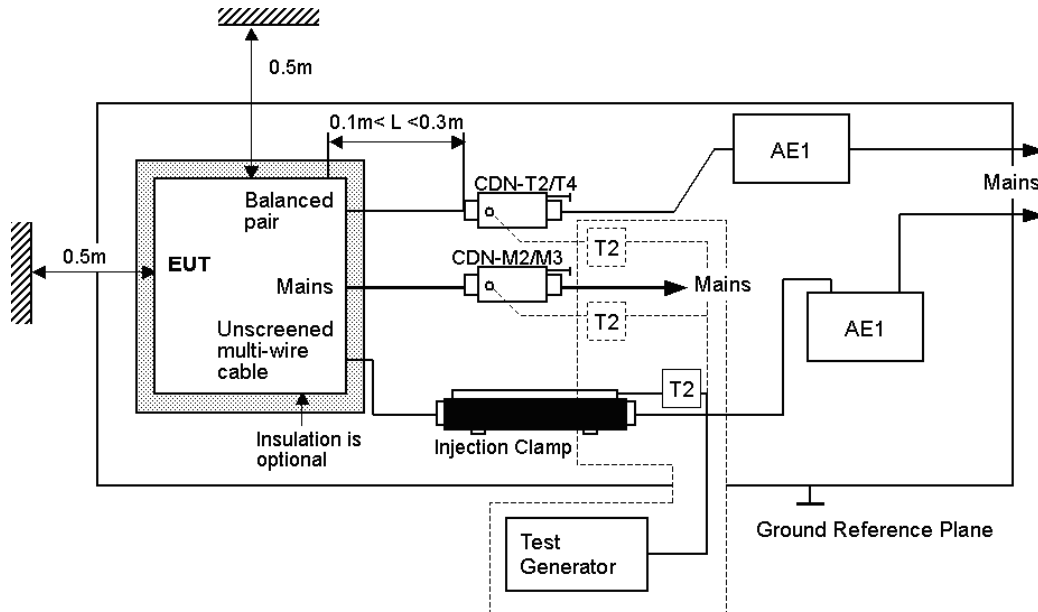
### 4.10.3 TEST PROCEDURE

- a. The EUT shall be tested within its intended operating and climatic conditions.
- b. An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.
- c. The test shall be performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.
- d. The frequency range is swept from 150 kHz to 80 MHz, using the signal level established during the setting process and with a disturbance signal of 80 % amplitude. The signal is modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. Where the frequency is swept incrementally, the step size shall not exceed 1 % of the preceding frequency value.
- e. The dwell time of the amplitude modulated carrier at each frequency shall not be less than the time necessary for the EUT to be exercised and to respond, but shall in no case be less than 0,5 s. The sensitive frequencies (e.g. clock frequencies) shall be analyzed separately.
- f. Attempts should be made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

### 4.10.4 DEVIATION FROM TEST STANDARD

No deviation.

#### 4.10.5 TEST SETUP



NOTE: The EUT clearance from any metallic obstacles shall be at least 0.5m.

All non-excited input ports of the CDNs shall be terminated by  $50\Omega$  loads.

#### NOTE:

##### FLOOR-STANDING EQUIPMENT

The equipment to be tested is placed on an insulating support of 0.1 meters height above a ground reference plane. All relevant cables shall be provided with the appropriate coupling and decoupling devices at a distance between 0.1 meters and 0.3 meters from the projected geometry of the EUT on the ground reference plane.

**4.10.6 TEST RESULTS**

<b>TEST VOLTAGE</b>	AC 230V/50Hz	<b>ENVIRONMENTAL CONDITIONS</b>	17.3deg. C, 56.7% RH
<b>TESTED BY</b>	Andy		

<b>Voltage (V)</b>	<b>Test Frequency Note #1 (MHz)</b>	<b>Tested Line</b>	<b>Injection Method.</b>	<b>Test Result</b>	<b>Remark</b>
3	0.15 –80 MHz	AC Line	CDN-M2	A	N/A

**NOTE:** A: There was no change compared with the initial operation during the test.

## 4.11 VOLTAGE DIP/SHORT INTERRUPTIONS/VOLTAGE VARIATIONS (DIP) IMMUNITY TEST(EN55035)

### 4.11.1 TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-11
<b>Test Duration Time:</b>	Minimum three test events in sequence
<b>Interval between Event:</b>	Minimum ten seconds
<b>Phase Angle:</b>	0° / 180°
<b>Test Cycle:</b>	3 times

### 4.11.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
DIPS Tester	HAEFELY	PLINE 1610	150370	Apr. 11,18	Apr. 10,19
Test Software	HAEFELY	SWPL1610 1.43	N/A	N/A	N/A

**NOTE:** 1. The test was performed in EMS Room.  
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

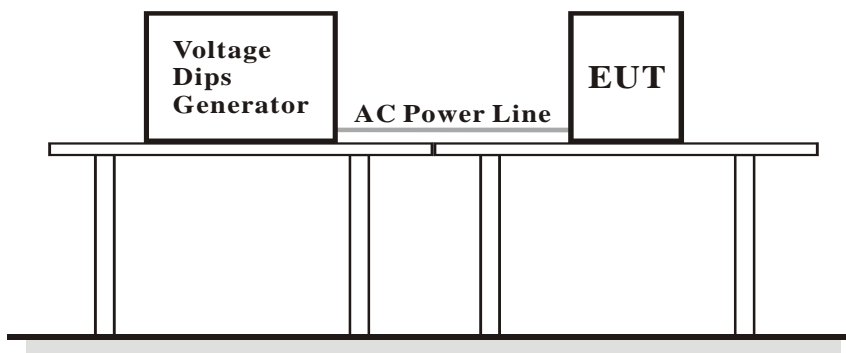
### 4.11.3 TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

### 4.11.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.11.5 TEST SETUP



#### 4.11.6 TEST RESULTS

<b>TEST VOLTAGE</b>	AC 100-240V 50/60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	21.7deg. C, 53.7% RH
<b>TESTED BY</b>	Xue Wang		

Ut : <u>100</u> Vac <u>60</u> Hz	Durations		Event interval (sec)	Total events (time)	Test result
Voltage dips (%)	(period)	(ms)			
>95	0.5	8.33	10	3	A
30	30	500	10	3	A
>95	300	5000	10	3	C

Ut : <u>230</u> Vac <u>50</u> Hz	Durations		Event interval (sec)	Total events (time)	Test result
Voltage dips (%)	(period)	(ms)			
>95	0.5	10	10	3	A
30	25	500	10	3	A
>95	250	5000	10	3	C

Ut : <u>240</u> Vac <u>50</u> Hz	Durations		Event interval (sec)	Total events (time)	Test result
Voltage dips (%)	(period)	(ms)			
>95	0.5	10	10	3	A
30	25	500	10	3	A
>95	250	5000	10	3	C

**NOTE:** A: There was no change compared with initial operation during the test.

C: The EUT stopped operation when at the 100% voltage interruption, but it can recover by itself.

## 4.12 VOLTAGE DIP/SHORT INTERRUPTIONS/VOLTAGE VARIATIONS (DIP) IMMUNITY TEST(EN 301 489)

### 4.12.1 TEST SPECIFICATION

<b>Basic Standard:</b>	IEC 61000-4-11
<b>Test Duration Time:</b>	Minimum three test events in sequence
<b>Interval between Event:</b>	Minimum ten seconds
<b>Phase Angle:</b>	0° / 180°
<b>Test Cycle:</b>	3 times

### 4.12.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
DIPS Tester	HAEFELY	PLINE 1610	150370	Apr. 11,18	Apr. 10,19
Test Software	HAEFELY	SWPL1610 1.43	N/A	N/A	N/A

**NOTE:** 1. The test was performed in EMS Room.  
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

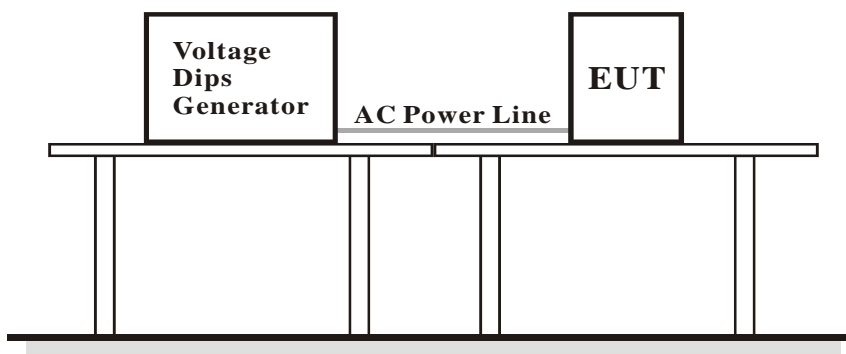
### 4.12.3 TEST PROCEDURE

The EUT shall be tested for each selected combination of test levels and duration with a sequence of three dips/interruptions with intervals of 10 s minimum (between each test event). Each representative mode of operation shall be tested. Abrupt changes in supply voltage shall occur at zero crossings of the voltage waveform.

### 4.12.4 DEVIATION FROM TEST STANDARD

No deviation.

### 4.12.5 TEST SETUP



## 4.12.6 TEST RESULTS

<b>TEST VOLTAGE</b>	AC 100-240V 50/60Hz	<b>ENVIRONMENTAL CONDITIONS</b>	21.7deg. C, 53.7% RH
<b>TESTED BY</b>	Xue Wang		

Ut : <u>230</u> Vac <u>50</u> Hz	Durations		Event interval (sec)	Total events (time)	Test result
Voltage dips (%)	(period)	(ms)			
0	0.5	10	10	3	A
0	1	20	10	3	A
70	25	500	10	3	A
0	250	5000	10	3	C

Ut : <u>240</u> Vac <u>50</u> Hz	Durations		Event interval (sec)	Total events (time)	Test result
Voltage dips (%)	(period)	(ms)			
0	0.5	10	10	3	A
0	1	20	10	3	A
70	25	500	10	3	A
0	250	5000	10	3	C

Ut : <u>100</u> Vac <u>50</u> Hz	Durations		Event interval (sec)	Total events (time)	Test result
Voltage dips (%)	(period)	(ms)			
0	0.5	10	10	3	A
0	1	20	10	3	A
70	25	500	10	3	A
0	250	5000	10	3	C

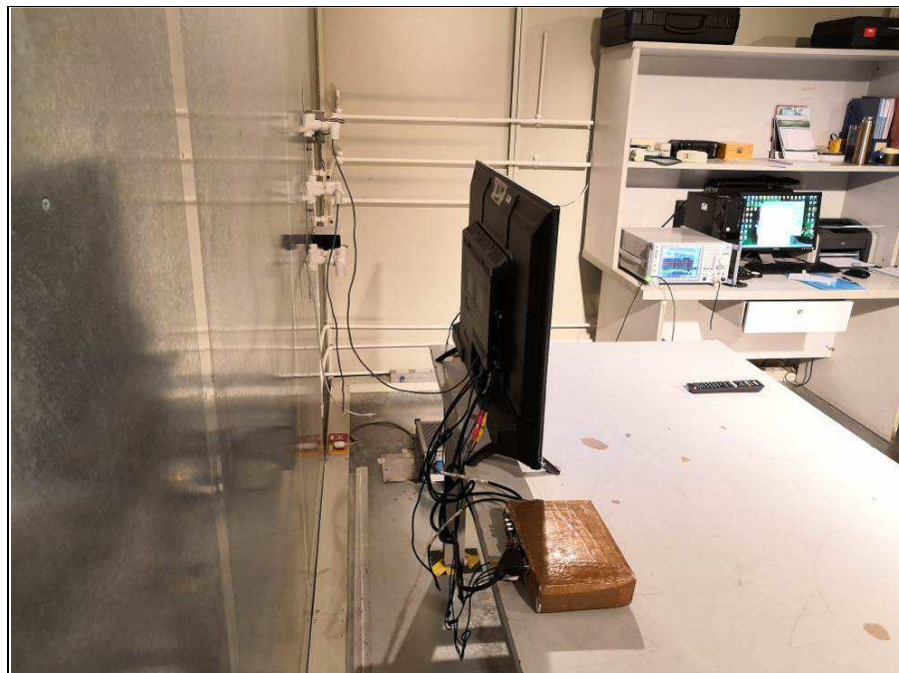
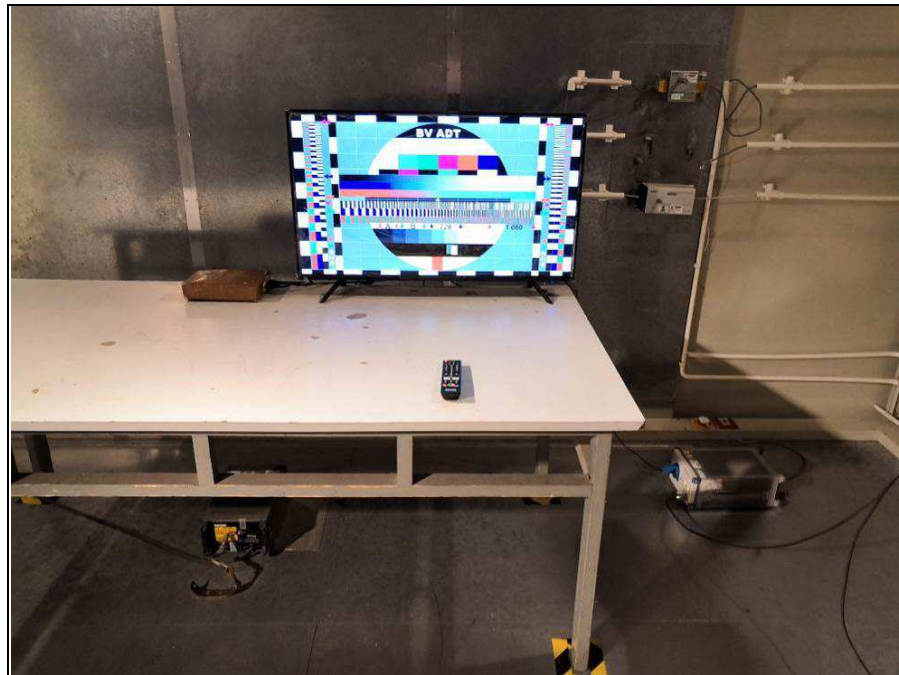
**NOTE:** A: There was no change compared with initial operation during the test.

C: The EUT stopped operation when at the 100% voltage interruption, but it can recover by itself.

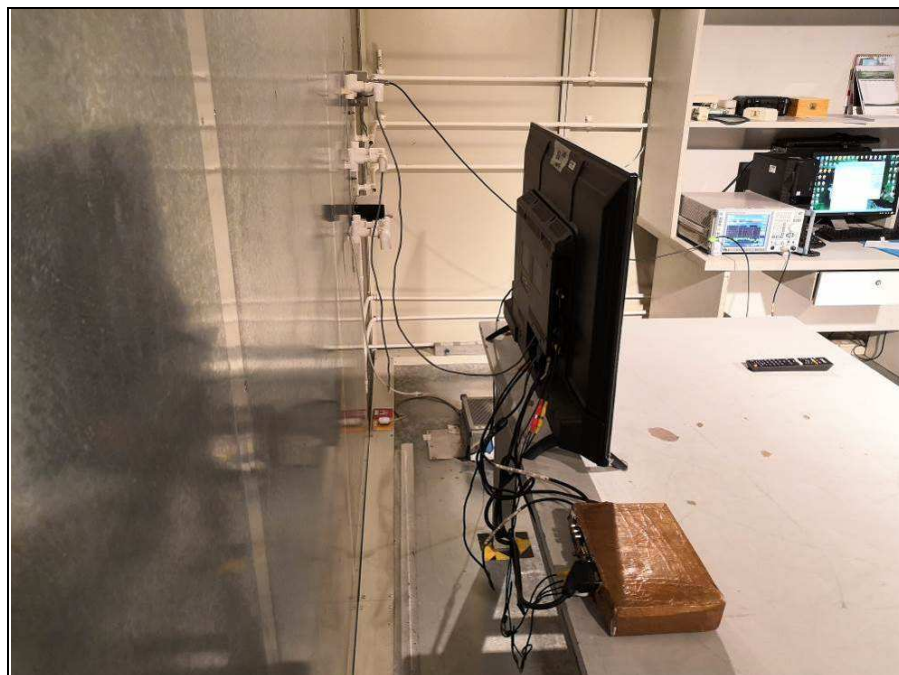
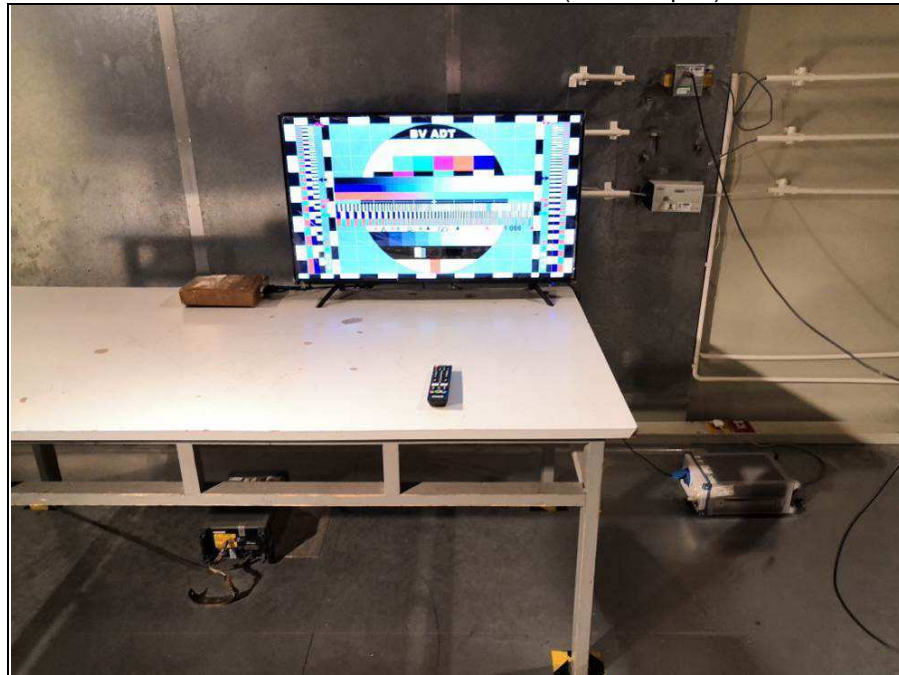


## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST



CONDUCTED EMISSION TEST (Telecom port)

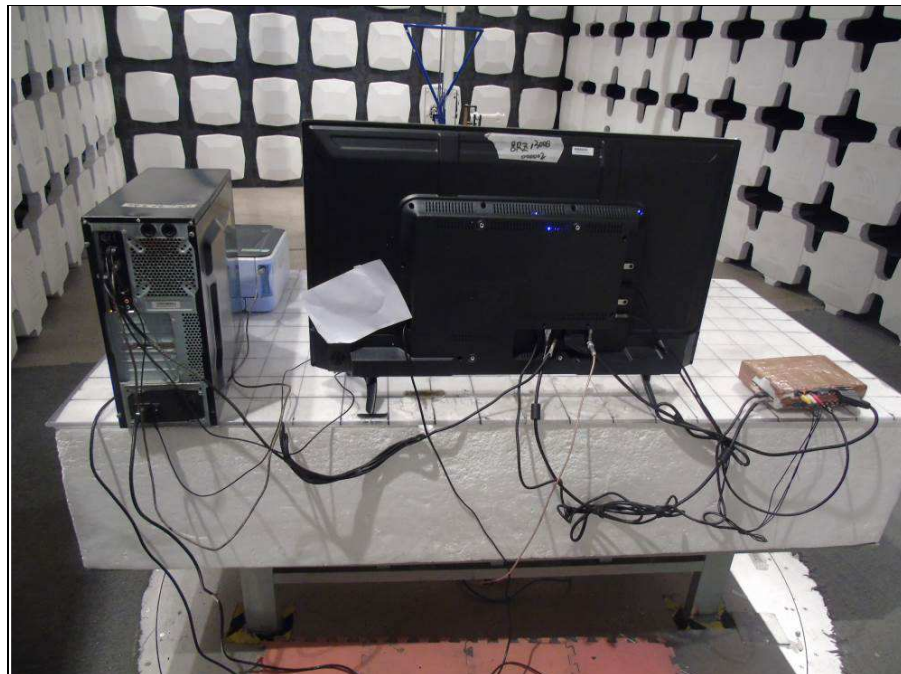


CONDUCTED EMISSION TEST (Ant. port)





RADIATED EMISSION TEST (30MHz ~ 1000MHz)



RADIATED EMISSION TEST (Above 1GHz)



HARMONICS EMISSION TEST &  
VOLTAGE FLUCTUATIONS AND FLICKER TEST

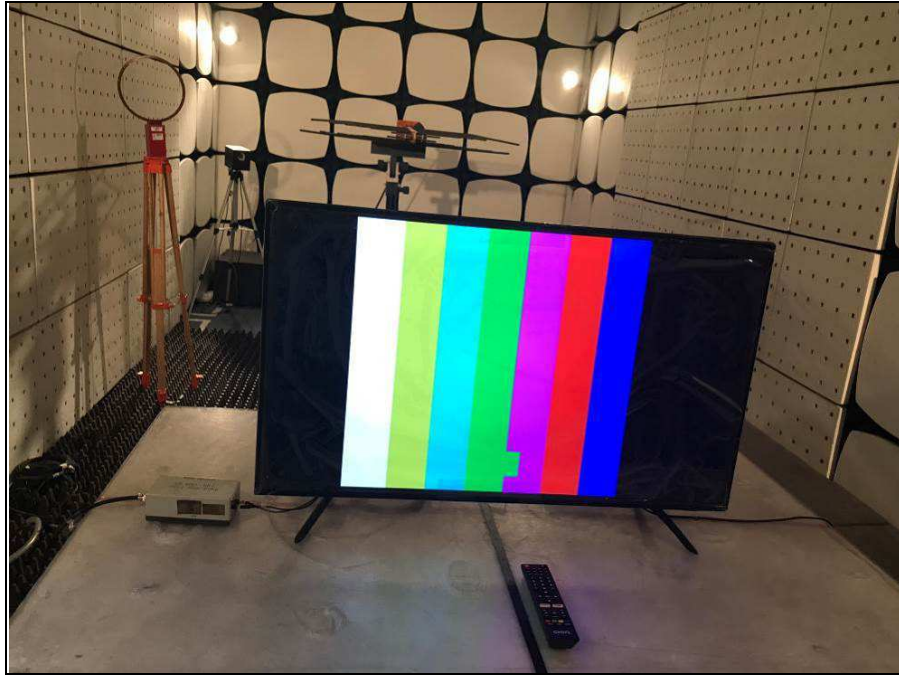


ESD TEST





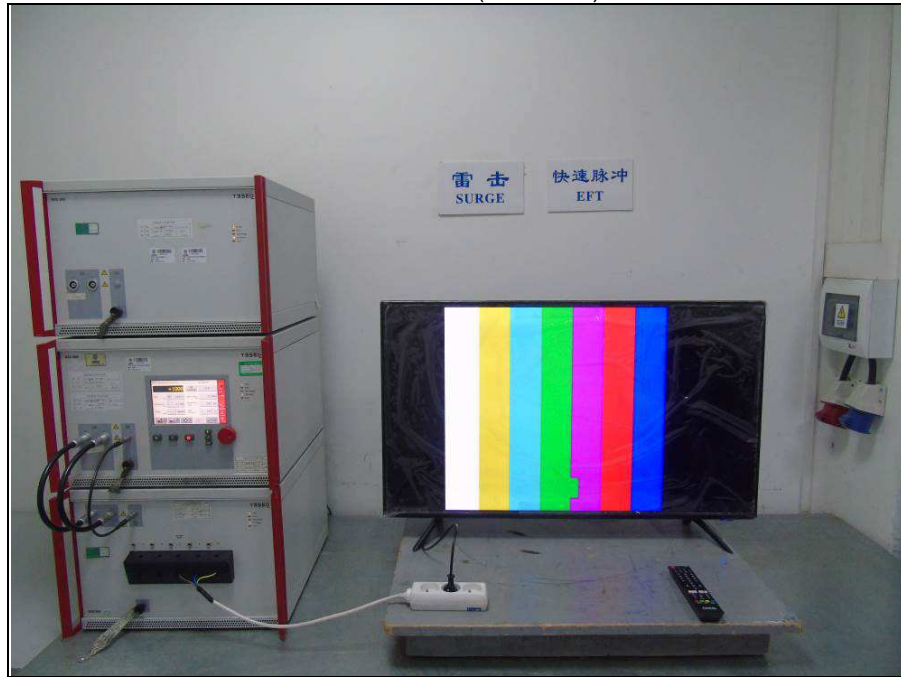
### RS TEST



### EFT TESTS



SURGE TEST(AC Mains)



SURGE TEST (Ant. Port)





### CONDUCTED SUSCEPTIBILITY TEST



### VOLTAGE DIPS AND INTERRUPTIONS TEST





BUREAU  
VERITAS

Test Report No.: CE180713N042-1

## 6 PHOTOGRAPHS OF THE EUT





Test Report No.: CE180713N042-1

## **7 MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications were made to the EUT by the lab during the test.

**----END**