


TEST REPORT


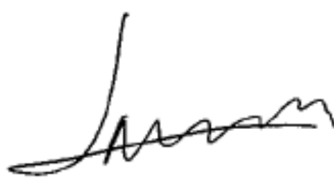
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Manufacturer	SHENZHEN HUBSAN TECHNOLOGY CO., LTD	
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Product	Hubsan Zino	
Brand Name	Hubsan	
Model	Zino	
Additional Model & Model Difference	N/A	
Date of tests	Dec. 19, 2018 ~ Jan. 07, 2019	

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

- ☒ EN 55032:2015+AC:2016, 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 301 489-17 V3.2.0 (2017-03)

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

Tested by Andy Zhu Project Engineer / EMC Department	Approved by Madison Luo Supervisor / EMC Department
	 Date: Jan. 22, 2019

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RELEASE CONTROL RECORD

Issue No.	Description	Date Issued
CE181219N054-2	Original release	Jan. 22, 2019



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

EMISSION			
Standard	Test Item	Result	Remark
EN 55032:2015+ AC:2016, Class B	Conducted emission from the AC mains power port	PASS	Minimum passing Class B margin is -6.16dB at 0.498MHz
	Radiated emission 30MHz-1000MHz	PASS	Minimum passing Class B margin is -4.23dB at 747.48MHz
	Radiated emission 1GHz -6GHz	PASS	Minimum passing Class B margin is -21.77 dB at 5800MHz.
EN 61000-3-2:2014	Harmonic current emissions	PASS	Meets the requirements.
EN 61000-3-3:2013	Voltage fluctuations & flicker	PASS	Meets the requirements.

Note: EN55032:2015+AC:2016 version is required by client and it will also remark in report that it comply with previous standard EN 55032:2012 + AC:2013.

IMMUNITY (EN 55035:2017)			
Standard	Test Type	Result	Remark
IEC 61000-4-2:2008 ED. 2.0	Electrostatic discharge immunity test	PASS	Electrostatic Discharge – ESD: 8kV Air discharge, 4kV Contact discharge, Performance Criterion A
IEC 61000-4-3:2010 ED. 3.2	Radiated, radio- frequency, electromagnetic field immunity test	PASS	Meets the requirements
IEC 61000-4-4:2012 ED. 3.0	Electrical fast transient / burst immunity test.	PASS	Electrical Fast Transient/Burst - EFT AC Power line: 1kV, Performance Criterion A
IEC 61000-4-5:2014 ED. 2.0	Surge immunity test	PASS	Surge Immunity Test: 1.2/50 us Open Circuit Voltage, 8 /20 us Short Circuit Current, Power line: line to line 1 kV, 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	Power Frequency Magnetic Field Test, 50 Hz, 1A/m, Performance Criterion A
IEC 61000-4-11:2004 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

IMMUNITY (Draft EN 301 489-1 V2.2.0, Draft EN 301489-17 V3.2.0)			
Standard	Test Type	Result	Remark
EN 61000-4-2:2009	Electrostatic discharge immunity test	PASS	Electrostatic Discharge – ESD: 8kV Air discharge, 4kV Contact discharge, Performance Criterion A
EN 61000-4-3:2006 A1:2008 + A2:2010	Radiated, radio- frequency, electromagnetic field immunity test	PASS	Radio-Frequency Electromagnetic Field Susceptibility Test – RS: 80-6000 MHz, 3V/m, 80% AM (1kHz), Performance Criterion A

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:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

MEASUREMENT	FREQUENCY	UNCERTAINTY
Mains Terminal Disturbance Voltage Test	0.15MHz ~ 30MHz	+ /-2.70 dB
Radiated Disturbance Test	30MHz ~ 1000MHz	+/- 4.03 dB
	1GHz ~ 6GHz	+/- 4.72 dB
Disturbance Voltage at the Antenna Terminals Emission	30MHz ~ 2150 MHz	+ /-2.34 dB



2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Hubsan Zino
BRAND	Hubsan
TEST MODEL	Zino
ADDITIONAL MODEL	N/A
POWER SUPPLY	DC 11.4V from battery or DC 15V from adapter (Charging from adapter)
CABLE SUPPLIED	Refer to user's manual
OPERATION FREQUENCY	5745MHz ~ 5825MHz

Note:

1. For the test results, the EUT had been tested with all conditions. But only the worst case was showed in test report.
2. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
3. Please refer to the EUT photo document (Reference No.: 181219N054-2) for detailed product photo.
4. The battery was charging from the following adapter:

Adapter	
BRAND:	N/A
MODEL:	P150W1000U
INPUT:	AC 100-240V, 50/60Hz 0.25A
OUTPUT:	DC 15V, 1000mA
DC LINE:	Unshielded, Non-detachable, 1.2m

5. The EUT have SISO function, provides 1 completed transmitter and 1 receiver.

MODULATION MODE	FUNCTION
802.11a	2TX/2RX
802.11n (HT20) 802.1ac (VHT20)	2TX/2RX
802.11n (HT40) 802.1ac (VHT40)	2TX/2RX

Only support SISO mode



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.

◆ MAINS TERMINAL DISTURBANCE VOLTAGE TEST

Test Mode	Test Standard	Test Voltage
Charging	EN55032	AC 230V/ 50Hz

◆ FOR RADIATED EMISSIONS TEST(Below 1GHz):

Test Mode	Test Standard	Test Voltage
Charging	EN55032	AC 230V/ 50Hz
Camera recording with TF		DC11.4V
TX/RX Playing + Camera recording with WIFI	EN301489	

◆ FOR RADIATED EMISSIONS TEST(Above 1GHz):

Test Mode	Test Standard	Test Voltage
TX/RX Playing + Camera recording with WIFI	EN301489	DC11.4V

◆ FOR HARMONIC, FLICKERED TESTS

Test Mode	Test Standard	Test Voltage
Charging	EN61000-3-2, EN61000-3-3	AC 230V 50Hz

◆ FOR OTHER IMMUNITY TESTS

Test Mode	Test Standard	Test Voltage
Charging	EN55035	AC 230V 50Hz

◆ FOR ESD, RS IMMUNITY TESTS

Test Mode	Test Standard	Test Voltage
Charging	EN55035	AC 230V/ 50Hz
Camera recording with TF		DC11.4V
TX/RX Playing + Camera recording with WIFI	EN301489	

Remark: Test AC 230V/50Hz only which required by client.



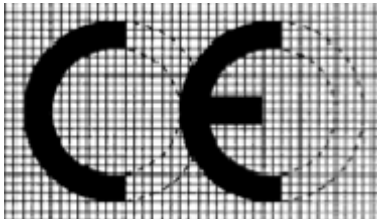
2.3 TEST PROGRAM USED AND OPERATION DESCRIPTIONS

- 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+AC:2016, 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

IEC 61000-4-4:2012 ED. 3.0

IEC 61000-4-5:2014 ED. 2.0

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 301 489-17 V3.2.0 (2017-03)

EN 61000-4-2:2009

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

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	Mobile Phone	HUAWEI	Honor9	N/A	N/A
2	Mobile Phone	APPLE	iPhone 8P	N/A	N/A
3	Mobile Phone	APPLE	A1332	CP7P0NTT79X9TN1	N/A
4	Remote Control	Hubsan	HT016	N/A	N/A

NO.	DESCRIPTION OF THE ABOVE SUPPORT UNITS
1,2,3,4	N/A

**CONDUCTED EMISSION FROM THE AC MAINS POWER PORT****3.1 LIMITS**

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 linearly with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

3.2 TEST INSTRUMENT

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMI Receiver	R&S	ESPI3	CQA-005	2018/9/26	2019/9/25
LISN	R&S	ENV216	CQA-003	2018/11/5	2019/11/4
ISN	R&S	ENY41	CQA-007	2018/9/26	2019/9/25
Coaxial cable (9KHz~300MHz)	CQA	N/A	C009	2018/9/26	2019/9/25

NOTE: 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

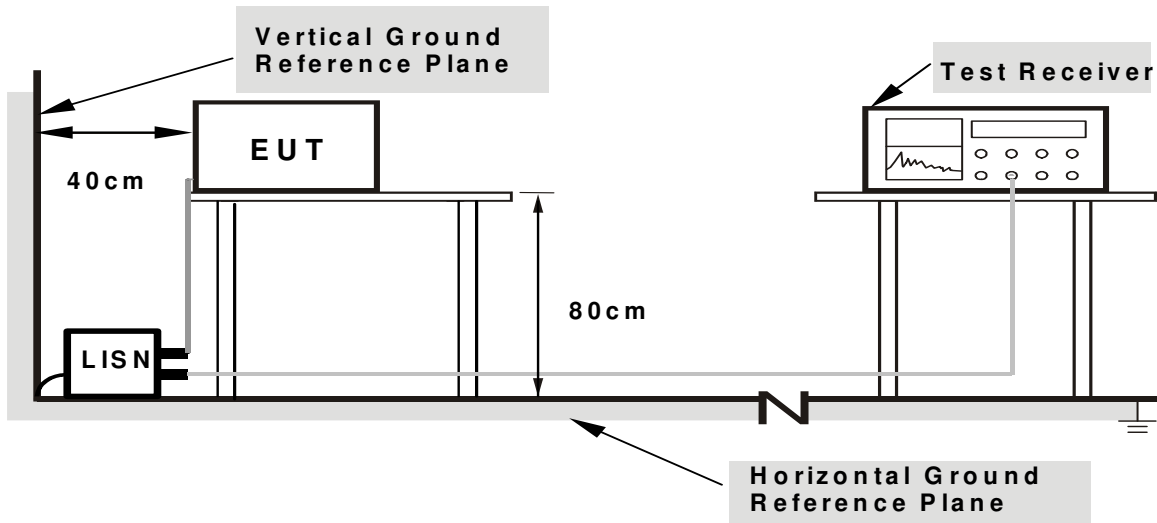
2. The test was performed in Shenzhen Huaxia Testing Technology Co., Ltd

3.3 TEST ARRANGEMENT

- 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 (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The test results of conducted emissions at mains ports are recorded of six worst margins for quasi-peak (mandatory) [and average (if necessary)] values against the limits at frequencies of interest unless the margin is 20 dB or greater.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

3.4 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.

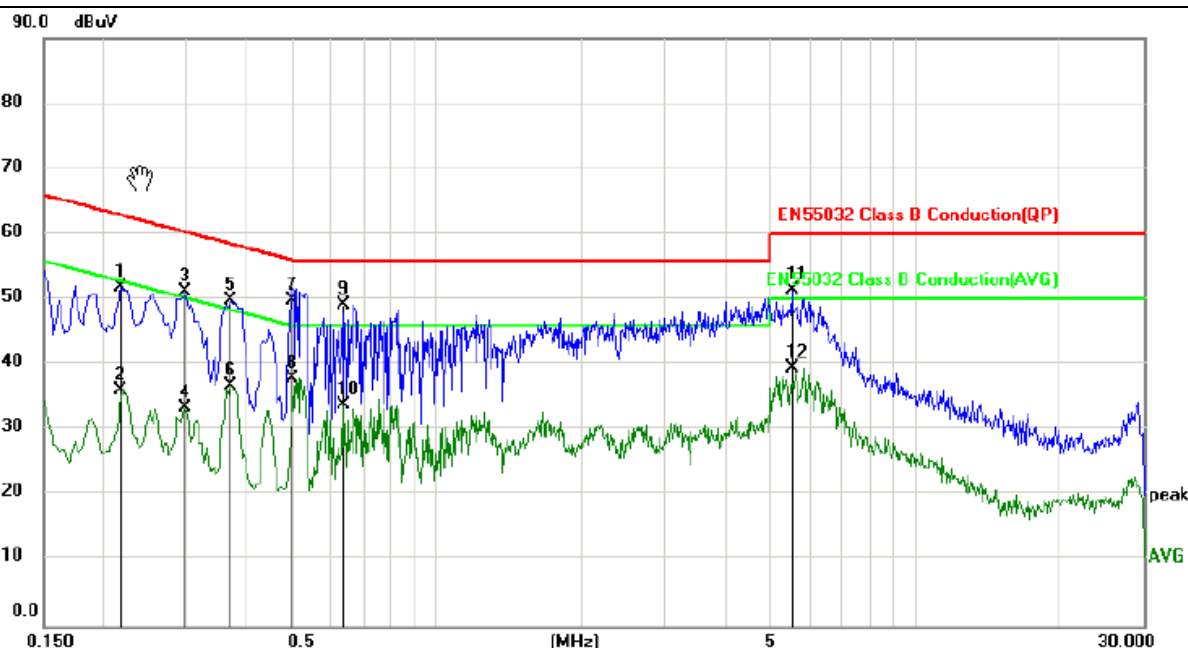
3.5 SUPPLEMENTARY INFORMATION

N/A



3.6 TEST RESULTS

TEST MODE	See section 2.2		
TEST VOLTAGE	DC 15V from Adapter Input AC 230V 50Hz	6dB BANDWIDTH	9 kHz



Site: Phase: **L1** Temperature: 25
 Limit: EN55032 Class B Conduction(QP) Power: AC 230V/50Hz Humidity: 54 %

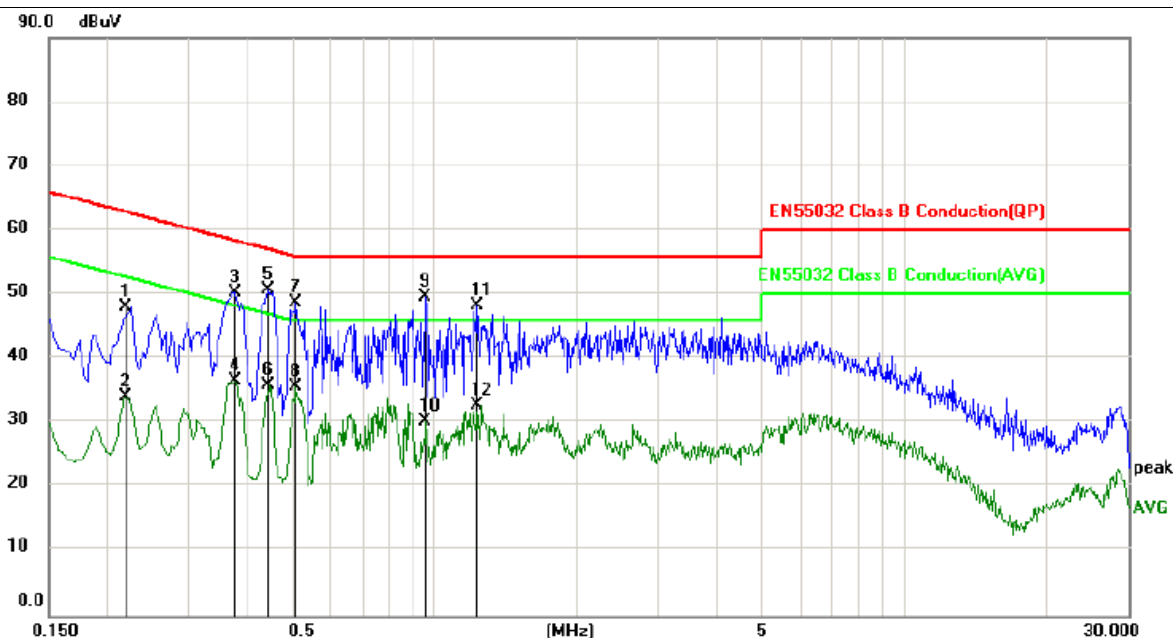
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.2180	42.13	9.74	51.87	62.89	-11.02	QP	
2		0.2180	26.45	9.74	36.19	52.89	-16.70	AVG	
3		0.2980	41.44	9.74	51.18	60.30	-9.12	QP	
4		0.2980	23.70	9.74	33.44	50.30	-16.86	AVG	
5		0.3700	40.18	9.74	49.92	58.50	-8.58	QP	
6		0.3700	26.98	9.74	36.72	48.50	-11.78	AVG	
7	*	0.4980	40.13	9.74	49.87	56.03	-6.16	QP	
8		0.4980	28.08	9.74	37.82	46.03	-8.21	AVG	
9		0.6340	39.50	9.74	49.24	56.00	-6.76	QP	
10		0.6340	24.03	9.74	33.77	46.00	-12.23	AVG	
11		5.5220	41.66	9.79	51.45	60.00	-8.55	QP	
12		5.5220	29.65	9.79	39.44	50.00	-10.56	AVG	



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TEST MODE	See section 2.2		
TEST VOLTAGE	DC 15V from Adapter Input AC 230V 50Hz	6dB BANDWIDTH	9 kHz



Site	Phase: <i>N</i>	Temperature: 25
Limit: EN55032 Class B Conduction(QP)	Power: AC 230V/50Hz	Humidity: 54 %

No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over		
		MHz	Level	Factor	ment			Detector	Comment
			dBuV	dB	dBuV	dBuV	dB		
1		0.2180	38.21	9.80	48.01	62.89	-14.88	QP	
2		0.2180	24.26	9.80	34.06	52.89	-18.83	AVG	
3		0.3740	40.42	9.80	50.22	58.41	-8.19	QP	
4		0.3740	26.83	9.80	36.63	48.41	-11.78	AVG	
5		0.4420	40.84	9.80	50.64	57.02	-6.38	QP	
6		0.4420	26.10	9.80	35.90	47.02	-11.12	AVG	
7		0.5060	38.91	9.80	48.71	56.00	-7.29	QP	
8		0.5060	25.89	9.80	35.69	46.00	-10.31	AVG	
9	*	0.9540	39.85	9.81	49.66	56.00	-6.34	QP	
10		0.9540	20.45	9.81	30.26	46.00	-15.74	AVG	
11		1.2340	38.44	9.83	48.27	56.00	-7.73	QP	
12		1.2349	23.01	9.83	32.84	46.00	-13.16	AVG	

**4 RADIATED EMISSION MEASUREMENT****4.1 LIMITS OF RADIATED EMISSION MEASUREMENT****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

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.



4.2 TEST INSTRUMENTS

Radiated Emissions					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Loop antenna	SCHWARZBECK	FMZB 1516	CQA-060	2018/10/28	2019/10/27
Horn Antenna	R&S	HF906	CQA-012	2018/9/26	2019/9/25
Bilog Antenna	R&S	HL562	CQA-011	2018/9/26	2019/9/25
EMI Test Receiver	R&S	ESR7	CQA-005	2018/10/28	2019/10/27
Spectrum analyzer	R&S	FSU26	CQA-038	2018/10/28	2019/10/27
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2018/9/26	2019/9/25
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2018/11/2	2019/11/1
Coaxial cable (1GHz~40GHz)	CQA	N/A	C019	2018/9/26	2019/9/25
Coaxial cable (9KHz~1GHz)	CQA	N/A	C020	2018/9/26	2019/9/25

NOTE: 1. The test was performed in Shenzhen Huaxia Testing Technology Co., Ltd
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.



4.3 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 meter 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 1 meter to 4 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 rotatable 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 1GHz.

NOTE:

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

**<Frequency Range above 1GHz>**

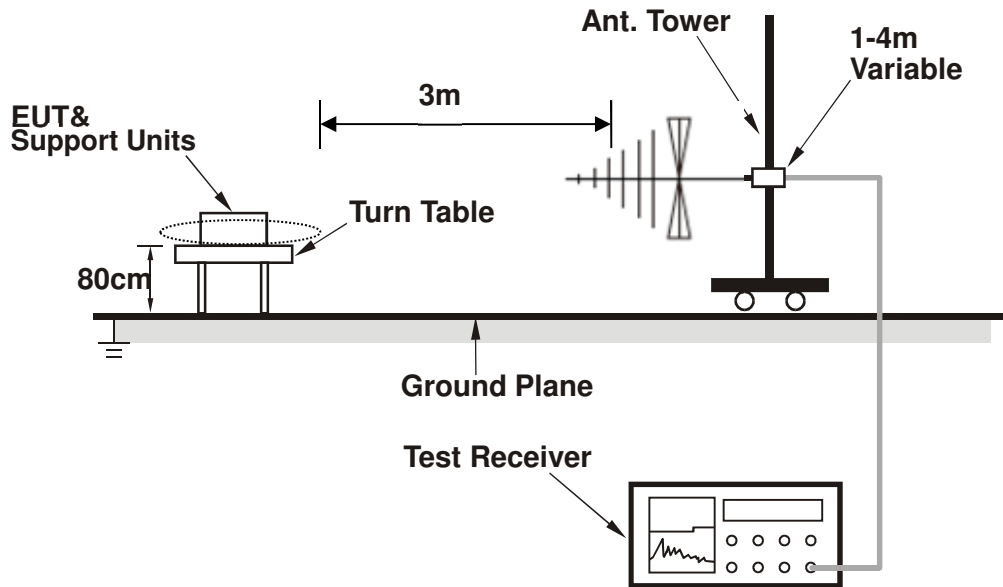
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top 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.
- 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:

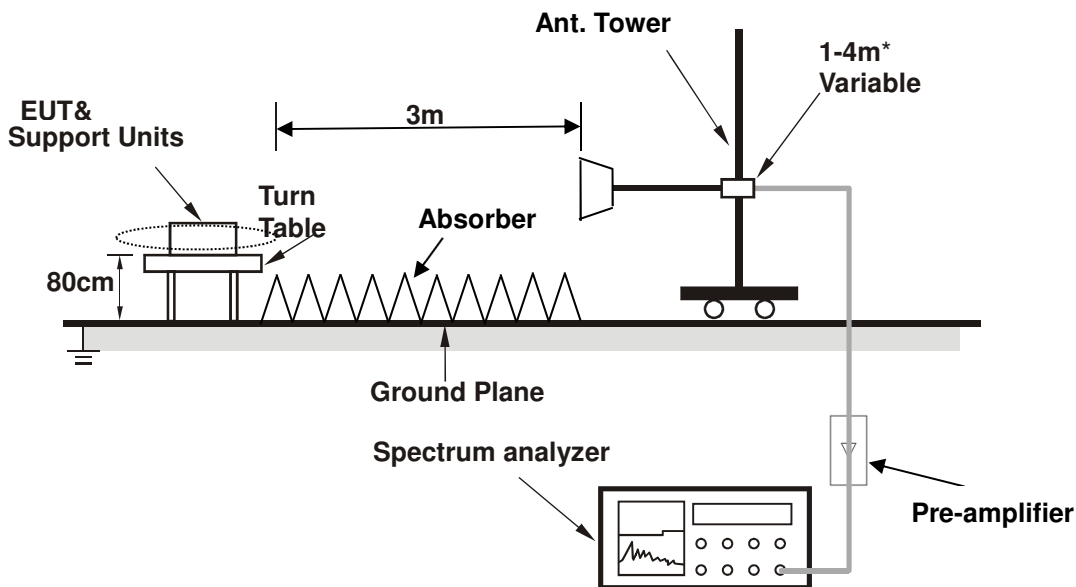
1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 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.

4.4 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

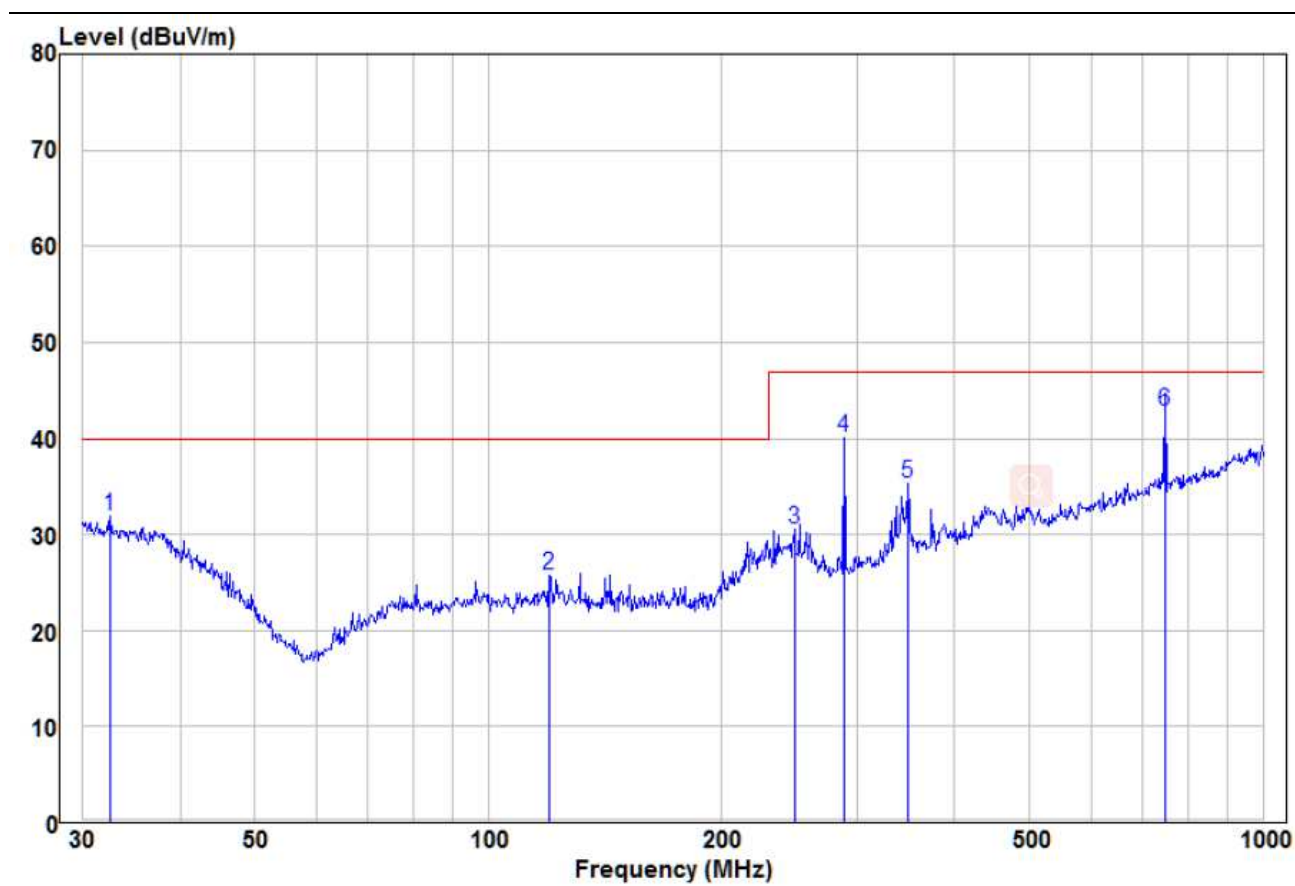
4.5 SUPPLEMENTARY INFORMATION

The more stringent measurement method of paragraph 8.3.2 in ANSI C63.4:2014 was applied for the test.



4.6 TEST RESULTS (BELOW 1GHz)

TEST MODE	TX/RX Playing + Camera recording with WIFI	FREQUENCY RANGE	30-1000MHz
TEST VOLTAGE	DC 11.4V from battery	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Quasi-Peak, 120kHz

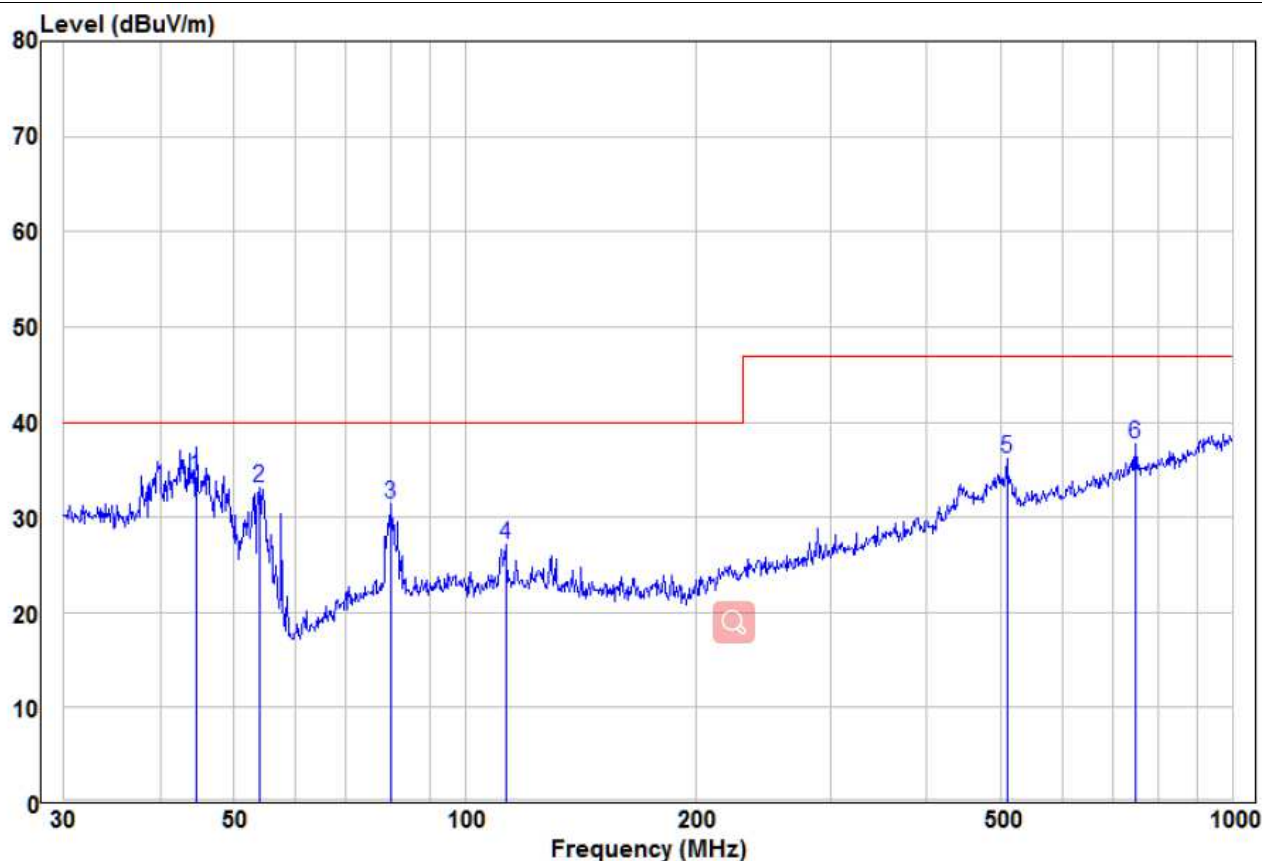


	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	32.52	14.43	17.53	31.96	40.00	-8.04	QP	HORIZONTAL
2	119.86	14.79	11.01	25.80	40.00	-14.20	QP	HORIZONTAL
3	248.55	18.88	11.70	30.58	47.00	-16.42	QP	HORIZONTAL
4	287.99	27.12	13.01	40.13	47.00	-6.87	QP	HORIZONTAL
5	348.03	20.68	14.66	35.34	47.00	-11.66	QP	HORIZONTAL
6 pp	747.48	21.35	21.42	42.77	47.00	-4.23	QP	HORIZONTAL

REMARK: The emission levels of other frequencies were very low against the limit.



TEST MODE	TX/RX Playing + Camera recording with WIFI	FREQUENCY RANGE	30-1000MHz
TEST VOLTAGE	DC 11.4V from battery	DETECTOR FUNCTION & RESOLUTION BANDWIDTH	Quasi-Peak, 120kHz



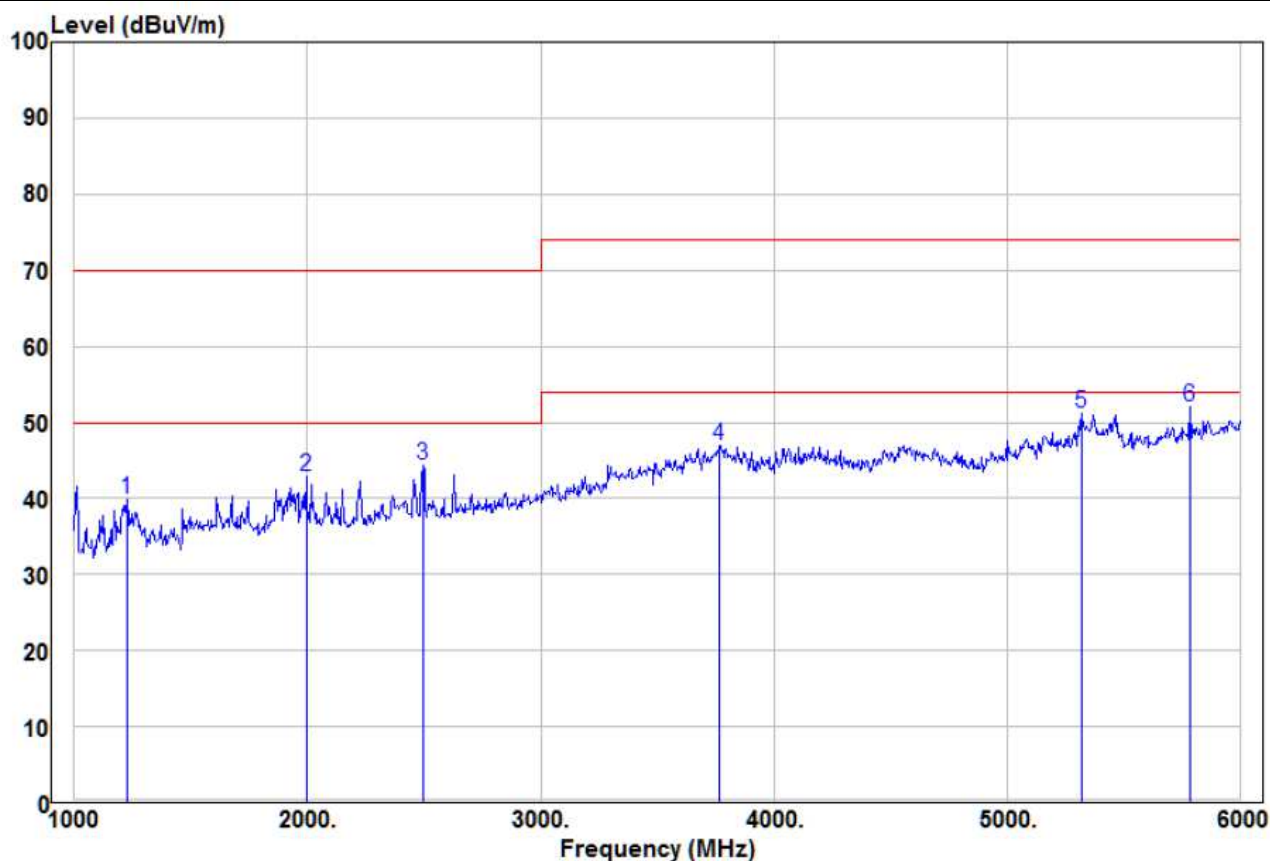
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1 pp	44.59	21.46	12.87	34.33	40.00	-5.67	QP	VERTICAL
2	53.88	26.58	6.47	33.05	40.00	-6.95	QP	VERTICAL
3	80.08	21.73	9.68	31.41	40.00	-8.59	QP	VERTICAL
4	112.92	16.31	10.87	27.18	40.00	-12.82	QP	VERTICAL
5	508.26	18.25	17.89	36.14	47.00	-10.86	QP	VERTICAL
6	747.48	16.26	21.42	37.68	47.00	-9.32	QP	VERTICAL

REMARK: The emission levels of other frequencies were very low against the limit.



4.7 TEST RESULTS (ABOVE 1GHz)

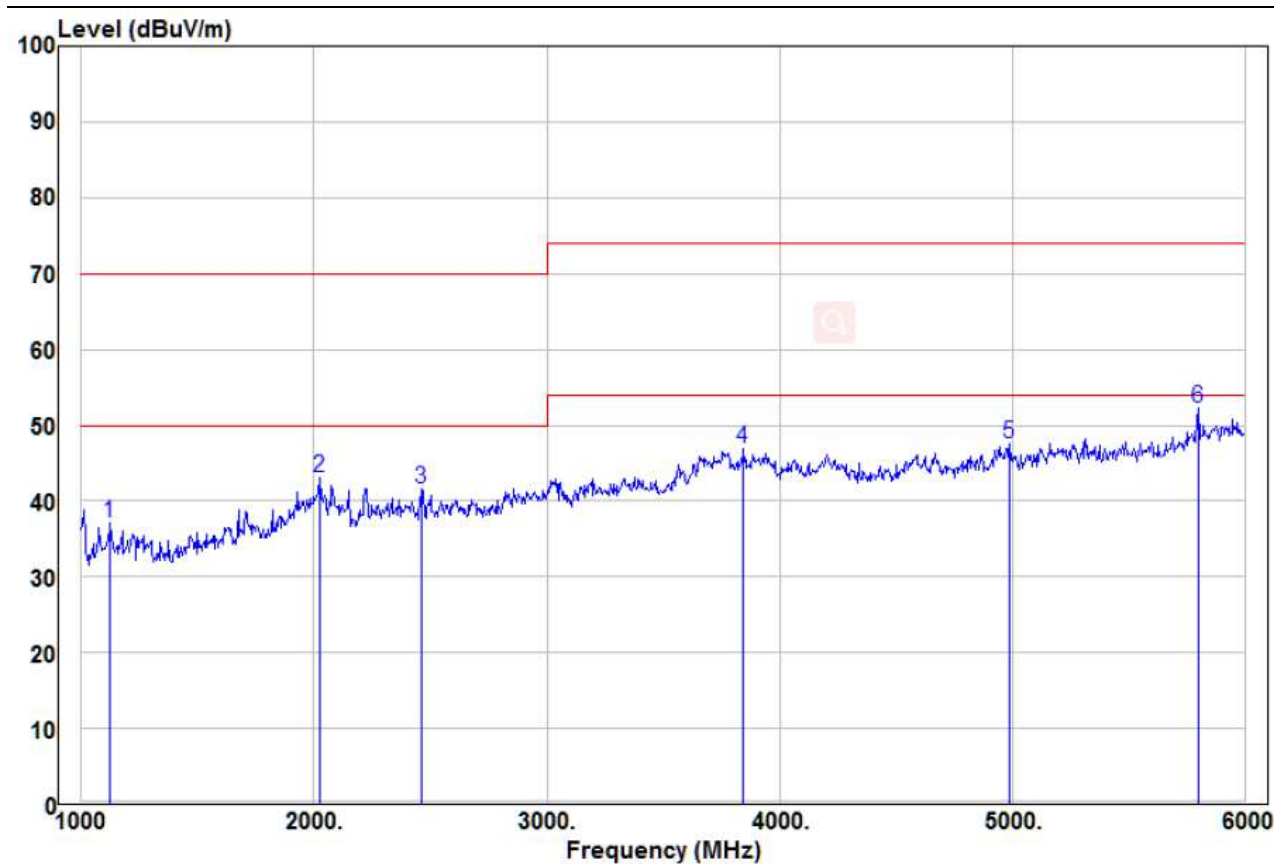
TEST MODE	TX/RX Playing + Camera recording with WIFI		
TEST VOLTAGE	DC 11.4V from battery	FREQUENCY RANGE	1-6 GHz



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	1225.00	55.13	-15.23	39.90	70.00	-30.10	Peak	HORIZONTAL
2	1995.00	50.26	-7.45	42.81	70.00	-27.19	Peak	HORIZONTAL
3	2495.00	52.77	-8.49	44.28	70.00	-25.72	Peak	HORIZONTAL
4	3770.00	49.45	-2.58	46.87	74.00	-27.13	Peak	HORIZONTAL
5	5320.00	49.88	1.22	51.10	74.00	-22.90	Peak	HORIZONTAL
6 pp	5785.00	48.96	3.15	52.11	74.00	-21.89	Peak	HORIZONTAL



TEST MODE	TX/RX Playing + Camera recording with WIFI		
TEST VOLTAGE	DC 11.4V from battery	FREQUENCY RANGE	1-6 GHz



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	1125.00	52.95	-15.83	37.12	70.00	-32.88	Peak	VERTICAL
2	2025.00	50.72	-7.73	42.99	70.00	-27.01	Peak	VERTICAL
3	2465.00	50.29	-8.69	41.60	70.00	-28.40	Peak	VERTICAL
4	3845.00	49.14	-2.31	46.83	74.00	-27.17	Peak	VERTICAL
5	4990.00	47.95	-0.34	47.61	74.00	-26.39	Peak	VERTICAL
6 pp	5800.00	48.96	3.27	52.23	74.00	-21.77	Peak	VERTICAL



5 HARMONICS CURRENT MEASUREMENT

5.1 LIMITS

Limits for Class A equipment		Limits for Class D equipment		
Harmonic Order n	Max. permissible harmonics current A	Harmonic 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
$15 \leq n \leq 39$	$0.15 \times 15/n$	$15 \leq n \leq 39$	$3.85/n$	$0.15 \times 15/n$
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
$8 \leq n \leq 40$	$0.23 \times 8/n$			

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 having an active input power > 75 W and no limits apply for equipment with an active input power up to and including 75 W.

Classification of Equipment

The EUT is Class A in accordance with EN 61000-3-2 as follows:

Class A	Class B	Class C	Class D
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.	Portable tools; Arc welding equipment which is not professional equipment.	Lighting equipment.	Equipment having a specified power less than or equal to 600 W of the following types: Personal computers and personal computer monitors; Television receivers; Refrigerators and freezers having one or more variable-speed drives to control compressor motor(s).



5.2 TEST INSTRUMENTS

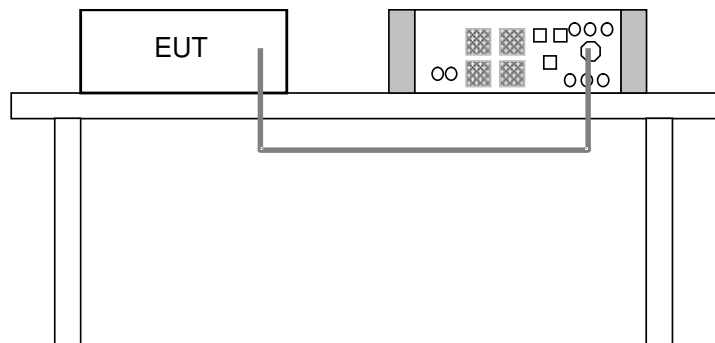
Harmonic Current & Voltage Fluctuation and Flicker					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Harmonic And Flicker Analyzer	CI	PACS-3	CQA-021	2018/9/26	2019/9/25
AC Power Supply	CI	5001 ix	CQA-073	2018/9/26	2019/9/25

NOTE: 1. The test was performed in Shenzhen Huaxia Testing Technology Co., Ltd.
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.

5.3 TEST ARRANGEMENT

- 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.
- 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.

5.4 TEST SETUP





5.5 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.



6 VOLTAGE FLUCTUATIONS AND FLICKER MEASUREMENT

6.1 LIMITS

Test item	Limit	Note
P_{st}	1.0	P_{st} : short-term flicker severity.
P_{lt}	0.65	P_{lt} : long-term flicker severity.
T_{max} (ms)	500	T_{max} : maximum time duration during the observation period that the voltage deviation $d(t)$ exceeds the limit for d_c .
d_{max} (%)	4	d_{max} : maximum absolute voltage change during an observation period.
d_c (%)	3.3	d_c : maximum steady state voltage change during an observation period.

6.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
5kVA AC Power Source	California Instruments	5001ix-400	55194	Apr. 01,17	Mar. 31,18
Harmonic/Flicker Test System	California Instruments	PACS-1	72134	Apr. 01,17	Mar. 31,18
Test Software	California Instruments	CTS 3.0 - V3.2.0.35	N/A	N/A	N/A

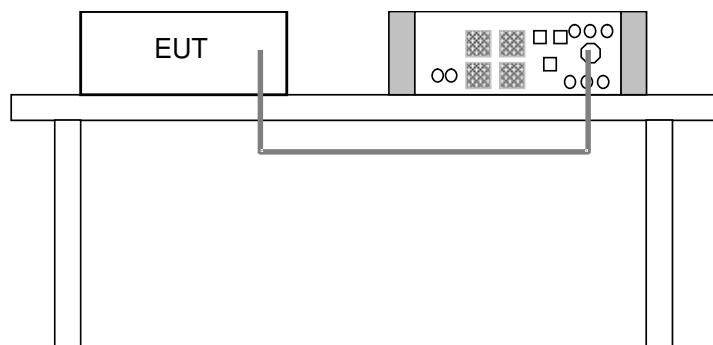
NOTE: 1. The test was performed in EMS Room.

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.

6.3 TEST ARRANGEMENT

- 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.

6.4 TEST SETUP



**6.5 TEST RESULTS**

Observation (T _p)	10 min.	Test Date	2018/12/26
Fundamental Voltage/Ampere	229.91 Vrms	Power Frequency	50.00Hz
Environmental Conditions	25.3deg. C, 52.4% RH	Tested by	Tiny You
Test Mode	See section 2.2		

Test Parameter	Measurement Value	Limit	Remark
P _{st}	0.064	1.00	Pass
P _{lt}	0.028	0.65	Pass
T _{max} (ms)	0.0	500	Pass
d _{max} (%)	0.00	4	Pass
d _c (%)	0.00	3.3	Pass

- Note: (1) P_{st} means short-term flicker indicator.
(2) P_{lt} means long-term flicker indicator.
(3) T_{max} means accumulated time value of d(t) with a deviation exceeding 3.3 %.
(4) d_{max} means maximum relative voltage change.
(5) d_c means maximum relative steady-state voltage change.



7 IMMUNITY TEST

7.1 GENERAL DESCRIPTION

7.1.1 GENERAL DESCRIPTION OF EN 55035

Product Standard	EN 55035:2017	
Basic Standard, specification requirement, and Performance Criteria:	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, 4kV 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 301 489-17 V3.2.0 (2017-03)	
Basic Standard, Specification, and Performance Criterion required	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

**7.1.2 PERFORMANCE CRITERIA**

According to Clause 8.2, 8.3, 8.4 of EN 55035:2017 standard, the following describes the general performance criteria.

CRITERION A	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.
CRITERION B	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. 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. 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.
CRITERION C	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. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

FOR EN301489-17

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).
<p>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.</p> <p>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..</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p>		

7.1.3 EUT OPERATING CONDITION

Same as item 2.3



7.2 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD) (EN55035)

7.2.1 TEST SPECIFICATION

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

7.2.2 TEST INSTRUMENTS

Electrostatic Discharge					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
ESD Simulator	EM TEST	DITO	CQA-001	2018/9/25	2019/9/24

NOTE: 1. The test was performed in Shenzhen Huaxia Testing Technology Co., Ltd
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.



7.2.3 TEST PROCEDURE

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

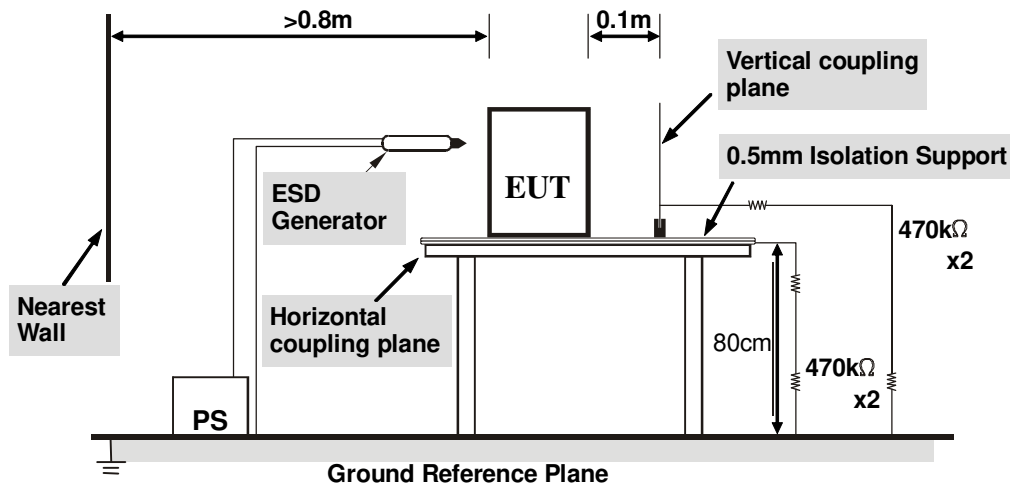
- a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- c. The time interval between two successive single discharges was at least 1 second.
- d. 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
- e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- f. 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.



7.2.4 DEVIATION FROM TEST STANDARD

No deviation.

7.2.5 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.

**7.2.6 TEST RESULTS**

TEST VOLTAGE	See section 2.2	ENVIRONMENTAL CONDITIONS	24.2deg. C, 53.0% RH, 101.0kPa
TESTED BY	Tiny You		

Direct Discharge Application				
Test Level (kV)	Polarity	Test Point	Test Result of Contact Discharge	Test Result of Air Discharge
4	+ /-	All metal part	A	N/A
8	+ /-	All non-metal Part	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.



7.3 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD) (EN301 489)

7.3.1 TEST SPECIFICATION

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

7.3.2 TEST INSTRUMENT

Electrostatic Discharge					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
ESD Simulator	EM TEST	DITO	CQA-001	2018/9/25	2019/9/24

NOTE: 1. The test was performed in Shenzhen Huaxia Testing Technology Co., Ltd
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.



7.3.3 TEST PROCEDURE

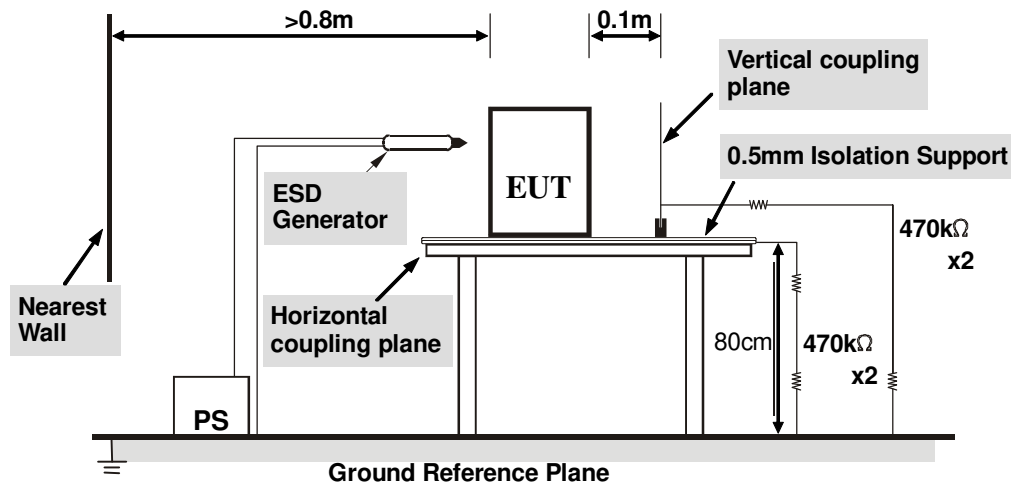
- a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation.
- b. The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- c. The time interval between two successive single discharges was at least 1 second.
- d. 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.
- e. Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- f. 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.

7.3.4 DEVIATION FROM TEST STANDARD

No deviation.



7.3.5 TEST SETUP



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

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 EN 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 minimum was provided between the EUT and the walls of the laboratory and any other metallic structure.

**7.3.6 TEST RESULTS**

TEST VOLTAGE	See section 2.2	ENVIRONMENTAL CONDITIONS	24.2deg. C, 53.0% RH, 101.0kPa
TESTED BY	Tiny You		

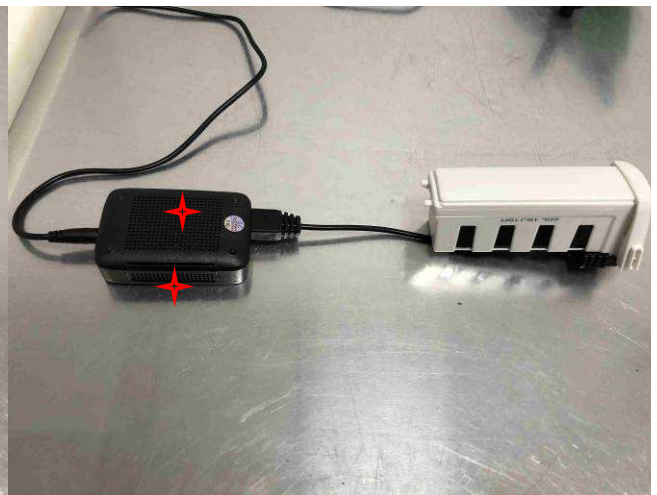
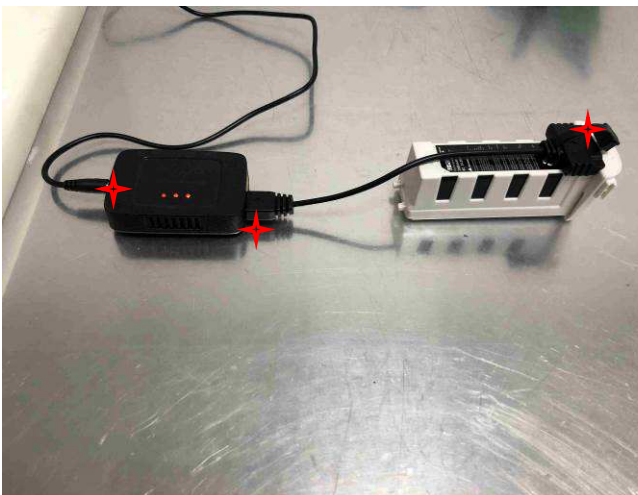
Direct Discharge Application				
Test Level (kV)	Polarity	Test Point	Test Result of Contact Discharge	Test Result of Air Discharge
4	+ /-	All metal part	A	N/A
8	+ /-	All non-metal Part	N/A	A

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.

ESD TEST POINT

(○ - Direct Contact Discharge; ★ - Air Discharge)





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

7.4.1 TEST SPECIFICATION

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

7.4.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Generator	Agilent	N5181A	MY50142530	Oct. 17,18	Oct. 16,19
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	Dec. 07,18	Dec. 06,19
Power Sensor	ESE	51011EMC	35716	Dec. 07,18	Dec. 06,19
Power Sensor	ESE	51011EMC	35715	Dec. 07,18	Dec. 06,19
E-Field probe	Narda	NBM-520	2403/01B	Sep. 25,18	Sep. 24,19
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. 09,18	Nov. 08,19
Dual Directional Coupler	TESEQ	C6187	95175	Nov. 09,18	Nov. 08,19
Dual Directional Coupler	TESEQ	CPH-274F	M251304-01	Nov. 09,18	Nov. 08,19
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 BVDG_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.



7.4.3 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.

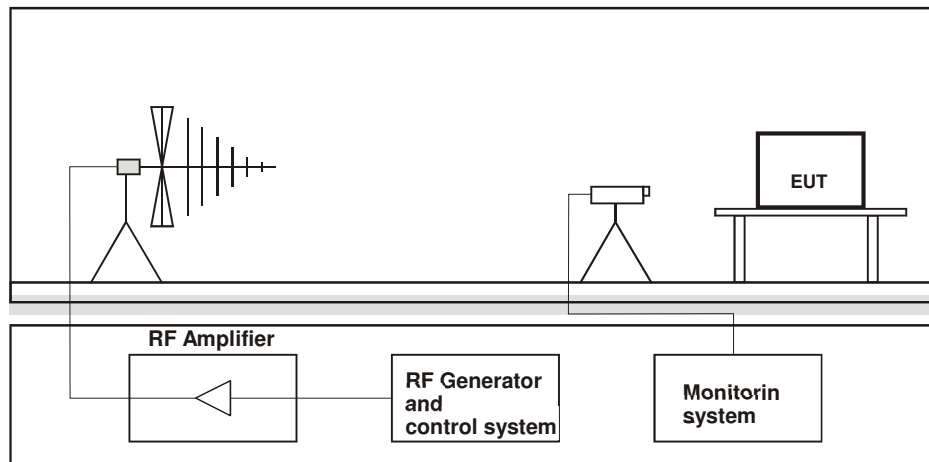
7.4.4 DEVIATION FROM TEST STANDARD

No deviation.

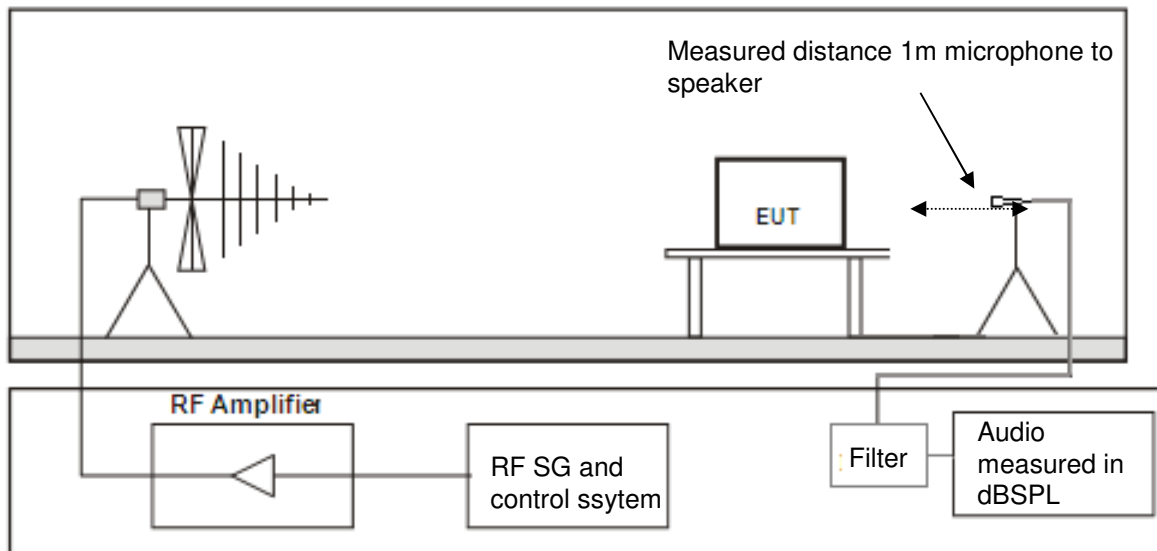


7.4.5 TEST SETUP

For Picture monitoring:

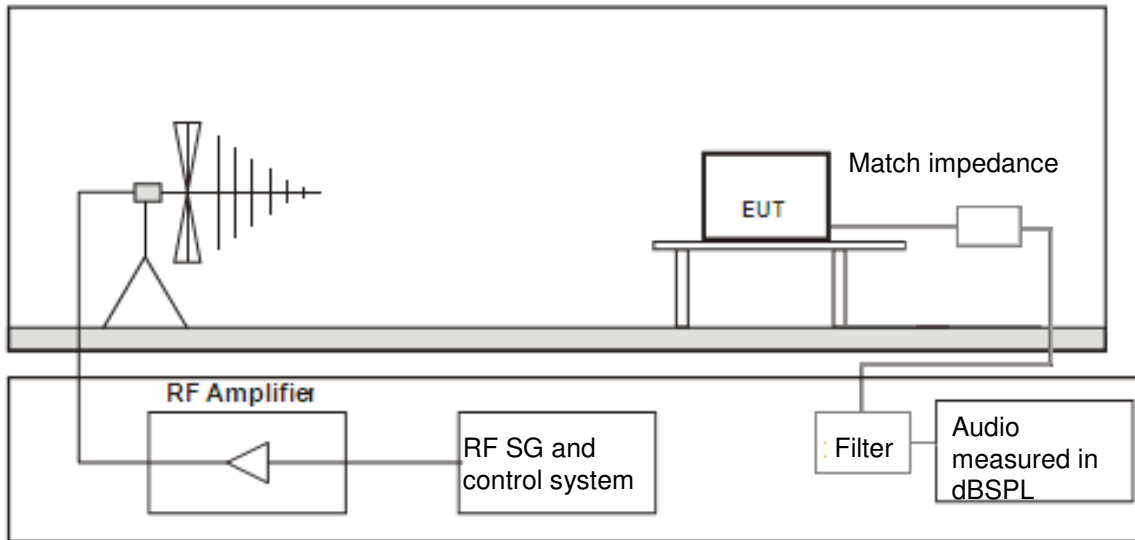


For Acoustic mode:





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.

**7.4.6 TEST RESULTS**

TEST MODE	See section 2.2	TEST VOLTAGE	AC 230V/50Hz
ENVIRONMENTAL CONDITIONS	23.5deg.C, 50.1% RH	TESTED BY: Wang	

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



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

7.5.1 TEST SPECIFICATION

Basic Standard: EN 61000-4-3

Frequency Range: 80 MHz ~ 6000 MHz

Field Strength: 3 V/m

Modulation: 1 kHz Sine Wave, 80%, AM Modulation

Frequency Step: 1% of preceding frequency value

Polarity of Antenna: Horizontal and Vertical

Antenna Height: 1.5 m

Dwell Time: 3 seconds

7.5.2 TEST INSTRUMENT

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Signal Generator	Agilent	N5181A	MY50142530	Oct. 17,18	Oct. 16,19
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	Dec. 07,18	Dec. 06,19
Power Sensor	ESE	51011EMC	35716	Dec. 07,18	Dec. 06,19
Power Sensor	ESE	51011EMC	35715	Dec. 07,18	Dec. 06,19
E-Field probe	Narda	NBM-520	2403/01B	Sep. 25,18	Sep. 24,19
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. 09,18	Nov. 08,19
Dual Directional Coupler	TESEQ	C6187	95175	Nov. 09,18	Nov. 08,19
Dual Directional Coupler	TESEQ	CPH-274F	M251304-01	Nov. 09,18	Nov. 08,19
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 BVDG_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.



7.5.3 TEST PROCEDURE

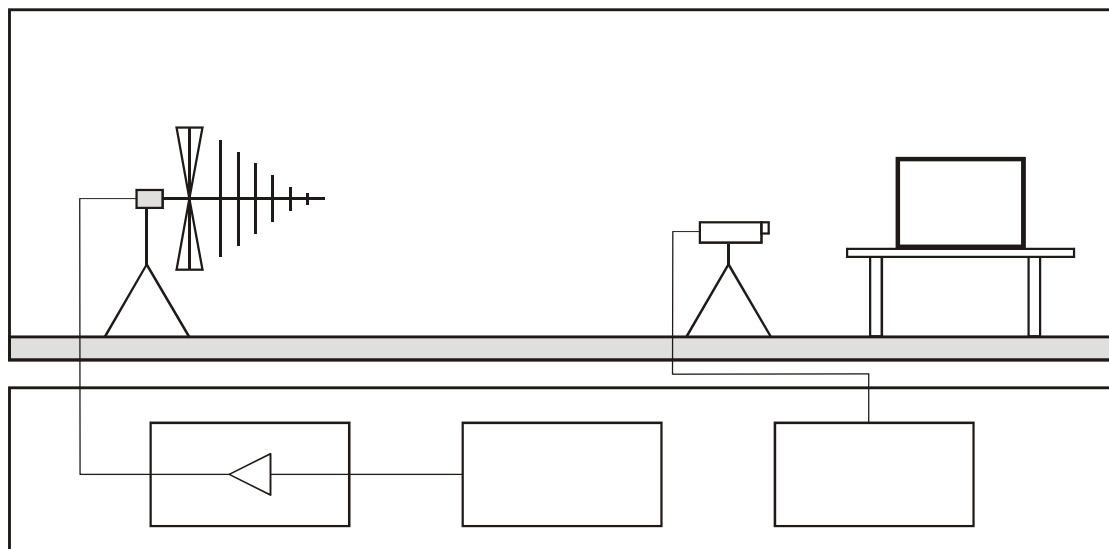
The test procedure was in accordance with EN 61000-4-3.

- The testing was performed in a fully-anechoic chamber.
- 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 3 V/m.
- The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

7.5.4 DEVIATION FROM TEST STANDARD

No deviation.

7.5.5 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.



7.5.6 TEST RESULTS

TEST MODE	See section 2.2	TEST VOLTAGE	DC 11.4V from battery
ENVIRONMENTAL CONDITIONS	23.5deg.C, 50.1% RH	TESTED BY: Wang	

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

Note^{#1}: Tested Israel SII Frequencies 89,100,107,144,163,196,244,315,434,460,600,825,845,880 MHz

Note 1: A: There was no change compared with initial operation during the test.



7.6 ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST (EFT) (EN55035)

7.6.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-4
Test Voltage:	Power Line: 1kV Signal/Control Line: 0.5kV
Polarity:	Positive & Negative
Impulse Frequency:	CPE or xDSL: 100kHz Other: 5 kHz
Impulse Waveshape :	5/50 ns
Burst Duration:	CPE or xDSL: 0.75ms Other: 15 ms
Burst Period:	300 ms
Test Duration:	1 min.

7.6.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMS test system	HTEC	ECOMPACT 7	CQA-002	2018/9/26	2019/9/25
Capacitive Coupling Clamp	HTC	H3C	CQA-018	2018/11/2	2019/11/1

NOTE: 1. The test was performed in Shenzhen Huaxia Testing Technology Co., Ltd
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.

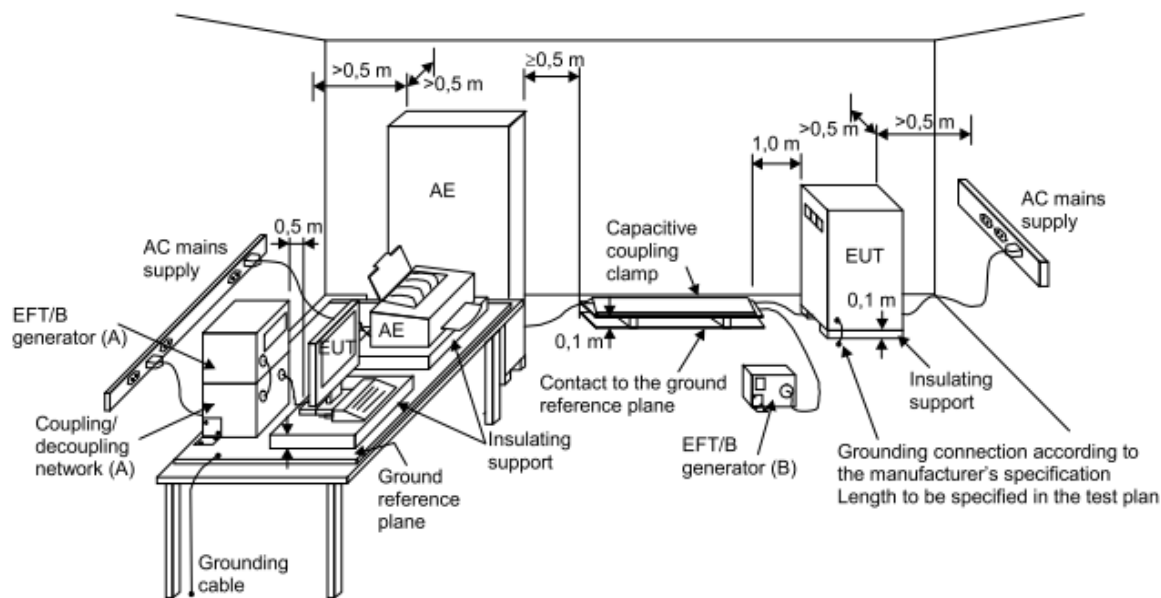
7.6.3 TEST PROCEDURE

- 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 minute.
- The transient/burst waveform was in accordance with IEC 61000-4-4, 5/50ns.

7.6.4 DEVIATION FROM TEST STANDARD

No Deviation.

7.6.5 TEST SETUP



IEC 645/12

- (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.

**7.6.6 TEST RESULTS**

TEST MODE	See section 2.2	TEST VOLTAGE	AC 230V/50Hz
ENVIRONMENTAL CONDITIONS	24.2deg. C, 53% RH	TESTED BY: Tiny You	

Pulse Voltage	1 kV		kV		kV		kV	
Pulse Polarity	+	-	+	-	+	-	+	-
L	A	A	/	/	/	/	/	/
N	A	A	/	/	/	/	/	/
L+N	A	A	/	/	/	/	/	/

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



7.7 SURGE IMMUNITY TEST (EN55035)

7.7.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-5
Wave-Shape:	Combination Wave 1.2/50 us Open Circuit Voltage 8/20 us Short Circuit Current
Test Voltage:	Power Line :1kV
Surge Input/Output:	L-N
Generator Source Impedance:	2 ohm between networks
Polarity:	Positive/Negative
Phase Angle:	90°/270° for EN55035,
Pulse Repetition Rate:	1 time / 60 sec.
Number of Tests:	5 positive and 5 negative at selected points

7.7.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMS test system	HTEC	ECOMPACT 7	CQA-002	2018/9/26	2019/9/25
Communications surge generator	HTEC	HTSG 70	CQA-063	2018/9/26	2019/9/25

NOTE: 1. The test was performed in Shenzhen Huaxia Testing Technology Co., Ltd
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.

7.7.3 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).

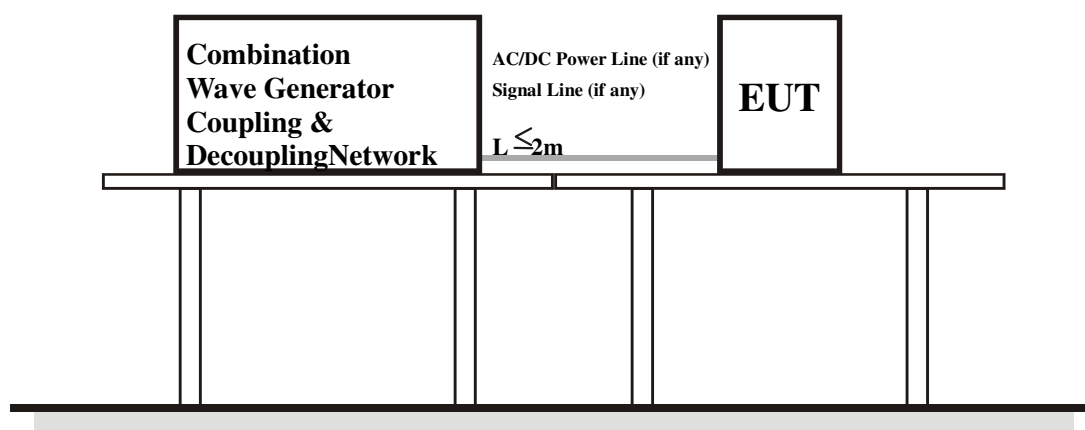
c. For test applied to unshielded symmetrically operated interconnection / telecommunication lines of EUT:

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).

7.7.4 DEVIATION FROM TEST STANDARD

No deviation.

7.7.5 TEST SETUP



**7.7.6 TEST RESULTS**

TEST MODE	See Section 2.2	TEST VOLTAGE	AC 230V/50Hz
ENVIRONMENTAL CONDITIONS	24.2deg. C, 53% RH	TESTED BY: Tiny You	

\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

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

**7.8 IMMUNITY TO CONDUCTED DISTURBANCES INDUCED BY RF FIELDS (CS)
(EN55035)****7.8.1 TEST SPECIFICATION**

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

7.8.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
RF-Generator	EM TEST	CWS 500	CQA-016	2018/10/28	2019/10/27
6db Attenuator	EM TEST	ATT6/75	CQA-049	2018/9/26	2019/9/25
CDN	SCHWARZBECK	CDN M2/M3PE	CQA-050	2018/11/5	2019/11/4

- NOTE:** 1. The test was performed in Shenzhen Huaxia Testing Technology Co., Ltd
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GREGT/CHINA and NIM/CHINA.



7.8.3 TEST PROCEDURE

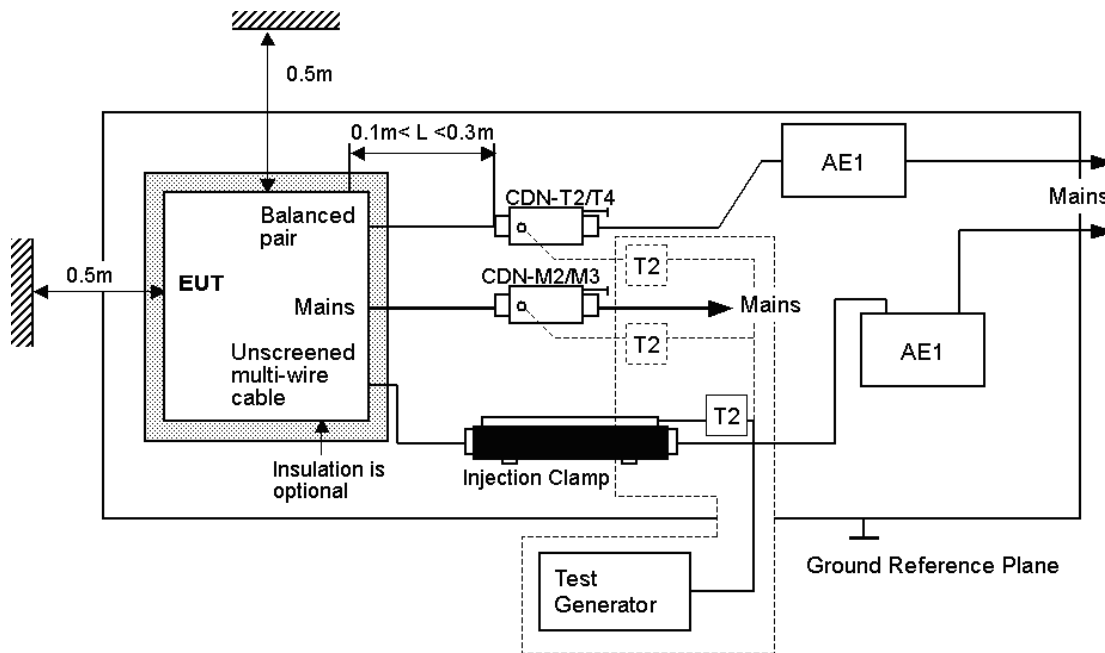
- a. The EUT shall be tested within its intended operating and climatic conditions.
- b. An artificial hand was placed on the hand-held accessory and connected to the ground reference plane.
- c. The test shall be performed with the test generator connected to each of the coupling and decoupling devices 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.
- g. For Broadcast reception function: **Group 2** not apply in this test.

7.8.4 DEVIATION FROM TEST STANDARD

No deviation.



7.8.5 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.

- Note:** 1. The EUT is setup 0.1 m above Ground Reference Plane.
2. The CDNs and / or EM clamp used for real test depends on ports and cables configuration of EUT.

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

NOTE:

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.

**7.8.6 TEST RESULTS**

TEST MODE	See section 2.2	TEST VOLTAGE	AC 230V/50Hz
ENVIRONMENTAL CONDITIONS	24.2deg. C, 53% RH	TESTED BY: Tiny You	

Voltage (V)	Test Frequency Note#1 (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

Note#1: 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.



7.9 POWER FREQUENCY MAGNETIC FIELD IMMUNITY TEST (EN55035)

7.9.1 TEST SPECIFICATION

Basic Standard:	IEC 61000-4-8
Frequency Range:	50Hz
Field Strength:	1A/m,
Observation Time:	1 minute
Inductance Coil:	Rectangular type, 1mx1m

7.9.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Magnetic Field Tester	HAEFELY	MAG100.1	150579	Oct. 12,18	Oct. 11,19
Test Software	N/A	N/A	N/A	N/A	N/A

NOTE: 1. The test was performed in EMS Room 843.
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.

7.9.3 TEST PROCEDURE

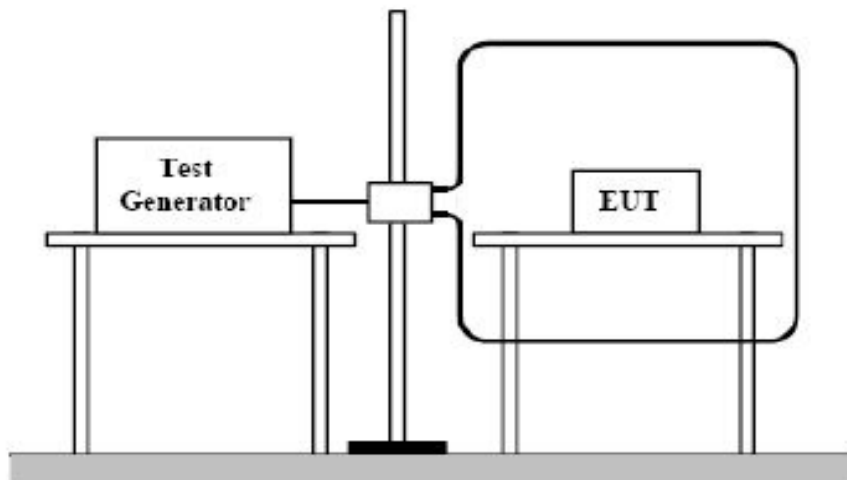
- The equipment is configured and connected to satisfy its functional requirements.
- The power supply, input and output circuits shall be connected to the sources of power supply, control and signal.
- The cables supplied or recommended by the equipment manufacturer shall be used. 1 meter of all cables used shall be exposed to the magnetic field.

7.9.4 DEVIATION FROM TEST STANDARD

No deviation.



7.9.5 TEST SETUP



NOTE:

TABLETOP EQUIPMENT

The equipment shall be subjected to the test magnetic field by using the induction coil of standard dimension (1 m x 1 m). The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

FLOOR-STANDING EQUIPMENT

The equipment shall be subjected to the test magnetic field by using induction coils of suitable dimensions. The test shall be repeated by moving and shifting the induction coils, in order to test the whole volume of the EUT for each orthogonal direction. The test shall be repeated with the coil shifted to different positions along the side of the EUT, in steps corresponding to 50 % of the shortest side of the coil. The induction coil shall then be rotated by 90 degrees in order to expose the EUT to the test field with different orientations.

**7.9.6 TEST RESULTS**

TEST MODE	See section 2.2	TEST VOLTAGE	AC 230V/50Hz
ENVIRONMENTAL CONDITIONS	20.6deg. C, 51.2% RH	TESTED BY: Xin Peng	

Magnetic field direction	Testing result	Remark
X - Axis	A	1A/m
Y - Axis	A	1A/m
Z - Axis	A	1A/m

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



7.10 VOLTAGE DIP/SHORT INTERRUPTIONS/VOLTAGE VARIATIONS (DIP) IMMUNITY TEST (EN55035)

7.10.1 TEST SPECIFICATION

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

7.10.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EMS test system	HTEC	ECOMPACT 7	CQA-002	2018/9/26	2019/9/25

NOTE: 1. The test was performed in Shenzhen Huaxia Testing Technology Co., Ltd
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.

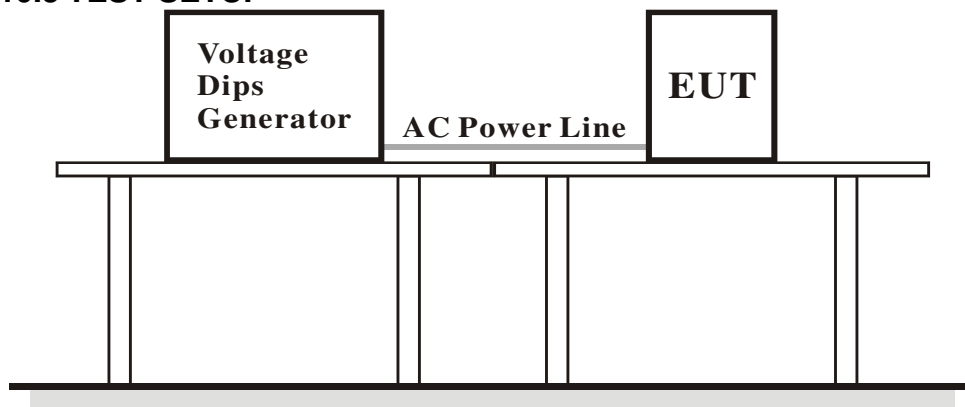
7.10.3 TEST PROCEDURE

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.

7.10.4 DEVIATION FROM TEST STANDARD

No deviation.

7.10.5 TEST SETUP



**7.10.6 TEST RESULTS**

TEST VOLTAGE	AC 230V 50Hz	ENVIRONMENTAL CONDITIONS	24.2deg. C, 53% RH
TESTED BY	Tiny You		

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

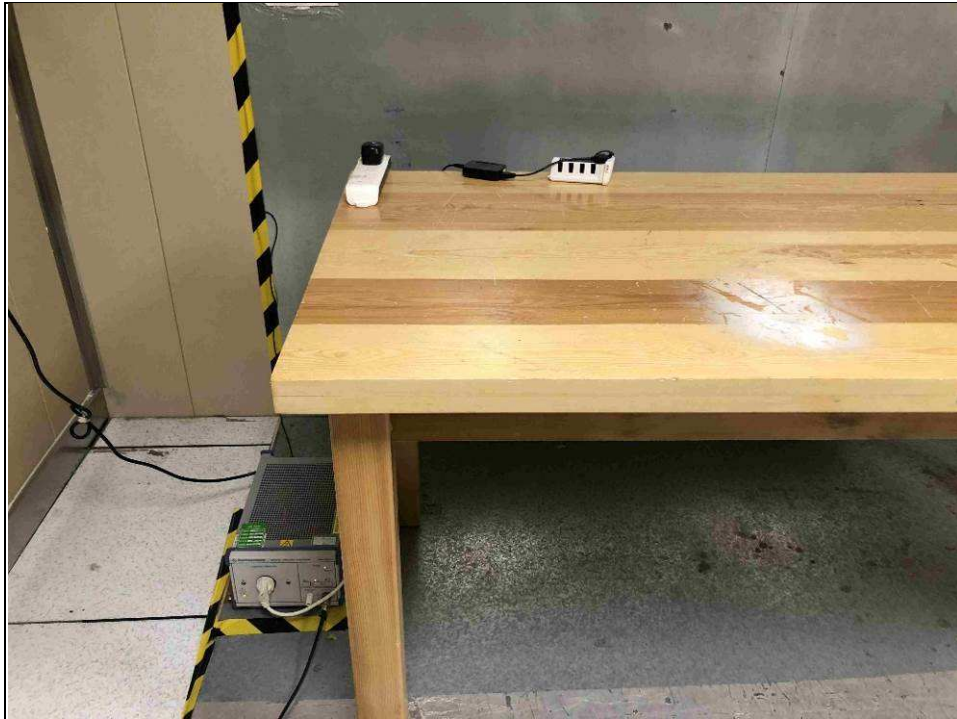
NOTE: A: There was no change compared with initial operation during the test.

C: The EUT stopped operation when at the 100% voltage interruption, and could be reset by user.

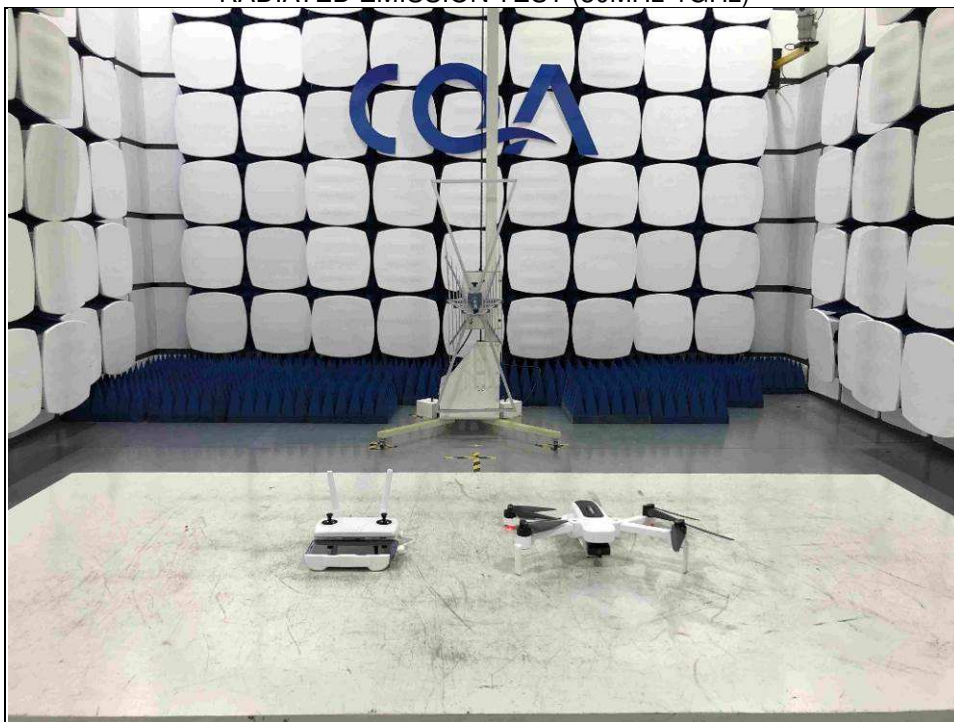


8 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST



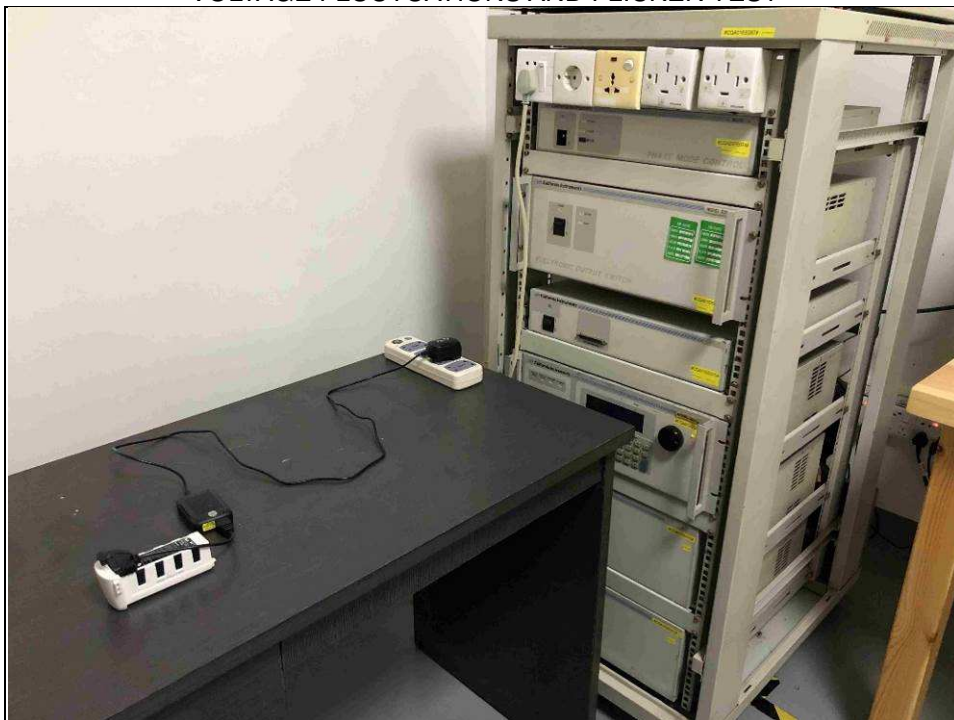
RADIATED EMISSION TEST (30MHz-1GHz)



RADIATED EMISSION TEST (1GHz-6GHz)



HARMONICS EMISSION TEST &
VOLTAGE FLUCTUATIONS AND FLICKER TEST



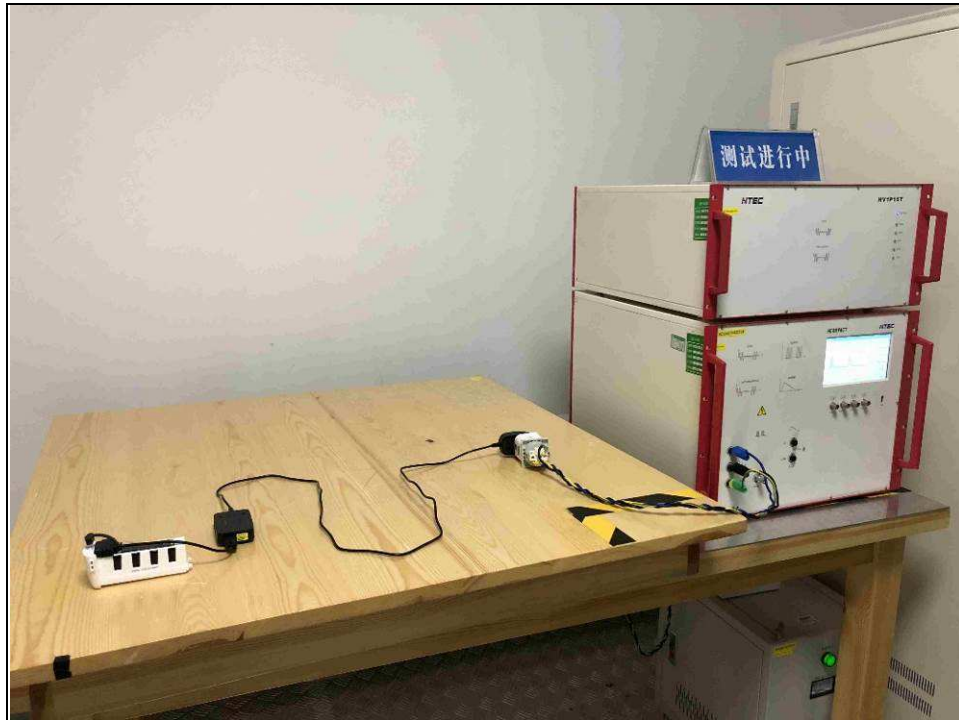
ESD TEST



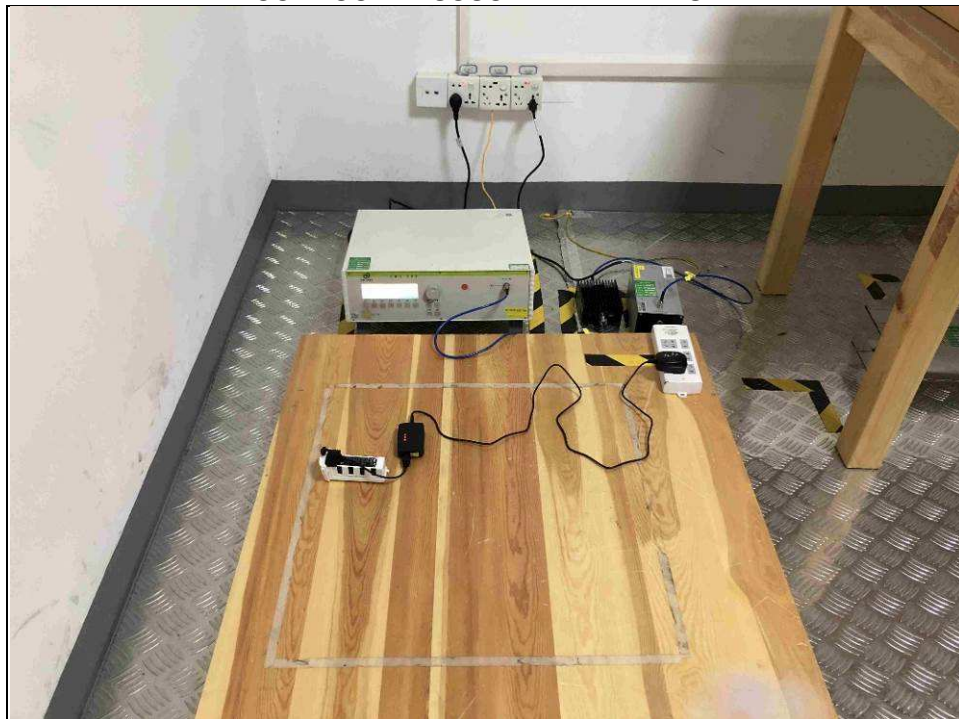
RS TEST



EFT/ SURGE/ DIPS TEST



CONDUCTED SUSCEPTIBILITY TEST



POWER-FREQUENCY MAGNETIC FIELDS TEST





9 APPENDIX A – 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.

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