

EMC Test Report

Client Name : Shenzhen JHC Technology Development Co., LTD

Address : B Area, 3rd floor, A Block Junxiangda Building, N0.9
Zhongshanyuan Road, Nanshan Distr., Shenzhen, China

Product Name : Edge Computing System

Date : May 06, 2022



Shenzhen Anbotech Compliance Laboratory Limited

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TEST REPORT

Applicant : Shenzhen JHC Technology Development Co., LTD
Manufacturer : Shenzhen JHC Technology Development Co., LTD
Product Name : Edge Computing System
Model No. : BRAV-7501-S001, BRAV-7501-S002, BRAV-7501-S003, BRAV-7501-S004,
BRAV-7501-T001, BRAV-7501-T002, BRAV-7501-T003, BRAV-7501-T004
Trade Mark : JHCTECH
Rating(s) : Input: AC 110V-240V, 0.477A, 105W
Test Standard(s) : EN 55032: 2015+A11: 2020;
EN IEC 61000-3-2: 2019;
EN 61000-3-3: 2013+A1:2019;
EN 55035: 2017+A11: 2020;
(IEC 61000-4-2; IEC 61000-4-3; IEC 61000-4-4;
IEC 61000-4-5; IEC 61000-4-6; IEC 61000-4-11)

The device described above is tested by Shenzhen Anbotech Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotech Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 55032, EN IEC 61000-3-2, EN 61000-3-3, EN 55035 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotech Compliance Laboratory Limited.

Date of Receipt: Apr. 15, 2022

Date of Test: Apr. 15~29, 2022

Prepared By:

Yee Huang

(Yee Huang)

Approved & Authorized Signer:

KingKong Jin

(KingKong Jin)

1. General Information

1.1. Client Information

Applicant	:	Shenzhen JHC Technology Development Co., LTD
Address	:	B Area, 3rd floor, A Block Junxiangda Building, No.9 Zhongshanyuan Road, Nanshan Distr., Shenzhen, China
Manufacturer	:	Shenzhen JHC Technology Development Co., LTD
Address	:	B Area, 3rd floor, A Block Junxiangda Building, No.9 Zhongshanyuan Road, Nanshan Distr., Shenzhen, China
Factory	:	Shenzhen JHC Technology Development Co., LTD
Address	:	B Area, 3rd floor, A Block Junxiangda Building, No.9 Zhongshanyuan Road, Nanshan Distr., Shenzhen, China

1.2. Description of Device (EUT)

Product Name	:	Edge Computing System
Model No.	:	BRAV-7501-S001, BRAV-7501-S002, BRAV-7501-S003, BRAV-7501-S004, BRAV-7501-T001, BRAV-7501-T002, BRAV-7501-T003, BRAV-7501-T004 (Note: All samples are the same except the model number & CPU models, so we prepare “BRAV-7501-S001” for test only.)
Trade Mark	:	JHCTECH
Test Power Supply	:	AC 230V, 50Hz
Test Sample No.	:	1-1-1
Product Description	:	Adapter: N/A
Remark: (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.		

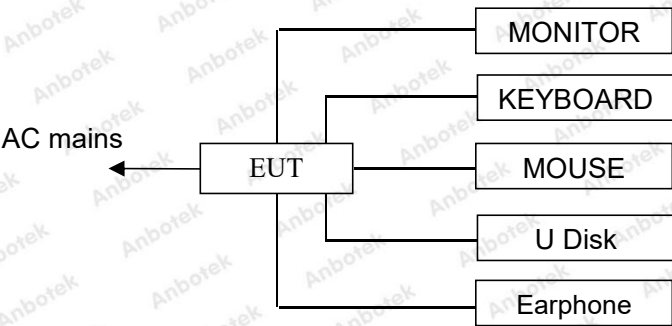
1.3. Auxiliary Equipment Used During Test

MONITOR	:	Manufacturer: DELL
		M/N: E1914Hf S/N: CN-034H2R-72872-419-AFJB Input:100V-240V, 1.5A, 50/60Hz TUV-GS, FCC, CE, KCC, VCCI
KEYBOARD	:	Manufacturer: DELL
		M/N: SK-8120 S/N: CN-0DJ365-71616-49J-0MVR-A00 Input Rating: DC 5V, 0.05A CE, FCC, VCCI, KCC, TUV-GS Cable: 1.8m, unshielded
MOUSE	:	Manufacturer: DELL
		M/N: MS111-T S/N: CN-0KW2YH-71616-488-1CBJ Input Rating: DC 5V, 0.1A Cable: 1.8m, unshielded CE, FCC, VCCI, KCC, TUV-GS

1.4. Description of Test Mode

Pretest Mode	Description
Mode 1	On

For Mode 1 Block Diagram of Test Setup



1.5. Test Summary

Test Items	Test Mode	Status
Power Line Conducted Emission Test (150KHz To 30MHz)	Mode 1	P
Asymmetric Mode Conducted Emissions Test(150KHz To 30MHz)	Mode 1	P
Radiated Emission Test (30MHz To 6GHz)	Mode 1	P
Harmonic Current Test	/	N
Voltage Fluctuations and Flicker Test	Mode 1	P
Electrostatic Discharge immunity Test	Mode 1	P
RF Field Strength susceptibility Test	Mode 1	P
Electrical Fast Transient/Burst Immunity Test	Mode 1	P
Surge Immunity Test	Mode 1	P
Injected Currents Susceptibility Test	Mode 1	P
Magnetic Field Susceptibility Test	/	N
Voltage Dips and Interruptions Test	Mode 1	P
P) Indicates “PASS”. N) Indicates “Not applicable”.		

1.6. Test Equipment List

Conducted Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	Oct. 22, 2021	1 Year
2.	Three Phase V-type Artificial Power Network	CYBERTEK	EM5040DT	E215040D T001	Jul 05, 2021	1 Year
3.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 22, 2021	1 Year
4.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 22, 2021	1 Year
5.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A

Asymmetric Mode Conducted Emissions Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ISN	Schwarzbeck	NTFM 8158	#172	Oct. 22, 2021	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Oct. 22, 2021	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Oct. 22, 2021	1 Year
4.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A
5.	Three Phase V-type Artificial Power Network	CYBERTEK	EM5040DT	E215040D T001	Jul 05, 2021	1 Year

Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESR26	101481	Oct. 22, 2021	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Oct. 22, 2021	2 Year
3.	Pre-amplifier	SONOMA	310N	186860	Oct. 22, 2021	1 Year
4.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A
5.	Preamplifier	SKET Electronic	BK1G18G30 D	KD17503	Oct. 22, 2021	1 Year
6.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Oct. 22, 2021	2 Year

Electrostatic Discharge Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Simulators	emtest	ESD NX30.1	11936	Mar. 25, 2022	1 Year

Harmonic and Flicker Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Programmable AC Power source	IVYTECH	APS-5005A	632734	Oct. 22, 2021	1 Year
2.	Harmonic and Flicker Analyzer	EMC-PARTNER	HMONICS 1000-1P	164	Oct. 22, 2021	1 Year
3.	Harmonics-1000	N/A	Ed.3.0+4.0	N.A	N/A	N/A

R/S Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	Agilent	N5182A	MY48180656	Oct. 22, 2021	1 Year
2.	Amplifier	Micotoop	MPA-80-100 0-250	MPA1903096	Oct. 22, 2021	1 Year
3.	Amplifier	Micotoop	MPA-1000-6 000-100	MPA1903122	Oct. 22, 2021	1 Year
4.	Log-Periodic Antenna	Schwarzbeck	VULP9118E	00992	N/A	N/A
5.	Horn Antenna	Instruments corporation	GTH-0118	351600	Oct. 22, 2021	2 Year
6.	Power Sensor	Agilent	E9301A	MY41498906	Oct. 22, 2021	1 Year
7.	Power Sensor	Agilent	E9301A	MY41498088	Oct. 22, 2021	1 Year
8.	Power Meter	Agilent	E4419B	GB40202909	Oct. 22, 2021	1 Year
9.	Electric field Probe	Narda	EP 601	811ZX10351	Oct. 22, 2021	1 Year
10.	RS Test software	EMtrace	EM 3	V1.1.7	N/A	N/A

Electrical Fast Transient/Burst Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Surge Generator	TESEQ	NSG 3060	1480	Oct. 22, 2021	1 Year
2.	CDN	TESEQ	CDN 3061	1408	Oct. 22, 2021	1 Year
3.	EFT-Clamp	PRIMA	EFT-Clamp	/	Oct. 22, 2021	1 Year

Surge Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Combined Wave Lightning Surge Simulator	3Ctest	CCS600	ES3771702	Jul. 05, 2021	1 Year
2.	Three Phase Power Coupling Network	3Ctest	SEPN69100 T	ES0801757	Jul. 05, 2021	1 Year
3.	Telecom port surge generator	PMI	TW101	190411	May 13, 2021	1 Year

Injected Currents Susceptibility Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	C/S Conducted Immunity Test System	FRANKONIA	CIT-10	126A1196/2012	Oct. 22, 2021	1 Year
2.	CDN	FRANKONIA	CDN - M2+ M3	A2210178/2012	Oct. 22, 2021	1 Year
3.	6dB Attenuator	FRANKONIA	DAM 26W	1172202	Oct. 22, 2021	1 Year
4.	CIT-10	FRANKONIA	Version1.1.7	N/A	N/A	N/A
5.	EM-Clamp	FRANKONIA	EMCL-20	18101728-0103	May 17,2021	1 Year

Voltage Dips and Interruptions Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	CYCLE SAG Simulator	PRIMA	DRP61011A G	PR12046234	Oct. 22, 2021	1 Year

1.7. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111.

ISED-Registration No.: 8058A

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A.

Test Location

Shenzhen Anbotek Compliance Laboratory Limited.

1/F, Building D, Sogood Science and Technology Park, Sanwei community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.518128

1.8. EMS Performance Criteria

- ✓ A: Normal performance within the specification limits
- ✓ B: Temporary degradation or loss of function or performance which is self-recoverable
- ✓ C: Temporary degradation or loss of function or performance which requires operator intervention or system reset
- ✓ D: Degradation or loss of function which is not recoverable due to damage of equipment (components) or software, or loss of data

Note: The manufacturer's specification may define effects on the EUT which may be considered insignificant, and therefore acceptable.

This classification may be used as a guide in formulating performance criteria, by committees responsible for generic, product and product-family standards, or as a framework for the agreement on performance criteria between the manufacturer and the purchaser, for example where no suitable generic, product or product-family standard exists.



2. Power Line Conducted Emission Test

2.1. Test Standard and Limit

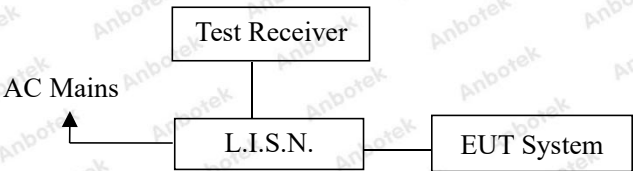
Test Standard	EN 55032
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Limits for conducted emissions

Test Limit	Frequency (MHz)	At mains terminals (dBμV)	
		Quasi-peak Level	Average Level
	0.15 ~ 0.50	79 *	66 *
	0.50 ~ 30.00	73	60

Remark: (1) The lower limit shall apply at the transition frequencies.
(2) The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

2.2. Test Setup



2.3. EUT Configuration on Measurement

The following equipments are installed on conducted emission measurement to meet EN 55032 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

2.4. Operating Condition of EUT

- 2.4.1. Setup the EUT as shown in Section 2.2.
- 2.4.2. Turn on the power of all equipments.
- 2.4.3. Let the EUT work in test mode and measure it.

2.5. Test Procedure

The EUT is put on the plane 0.8 m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network(L.I.S.N). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN55032 regulations during conducted emission measurement.

The bandwidth of the field strength meter (R&S Test Receiver ESCI) is set at 9kHz in 150kHz~30MHz.

The frequency range from 150kHz to 30MHz is investigated for AC mains.

All the test results are listed in Section 2.6.

2.6. Test Results

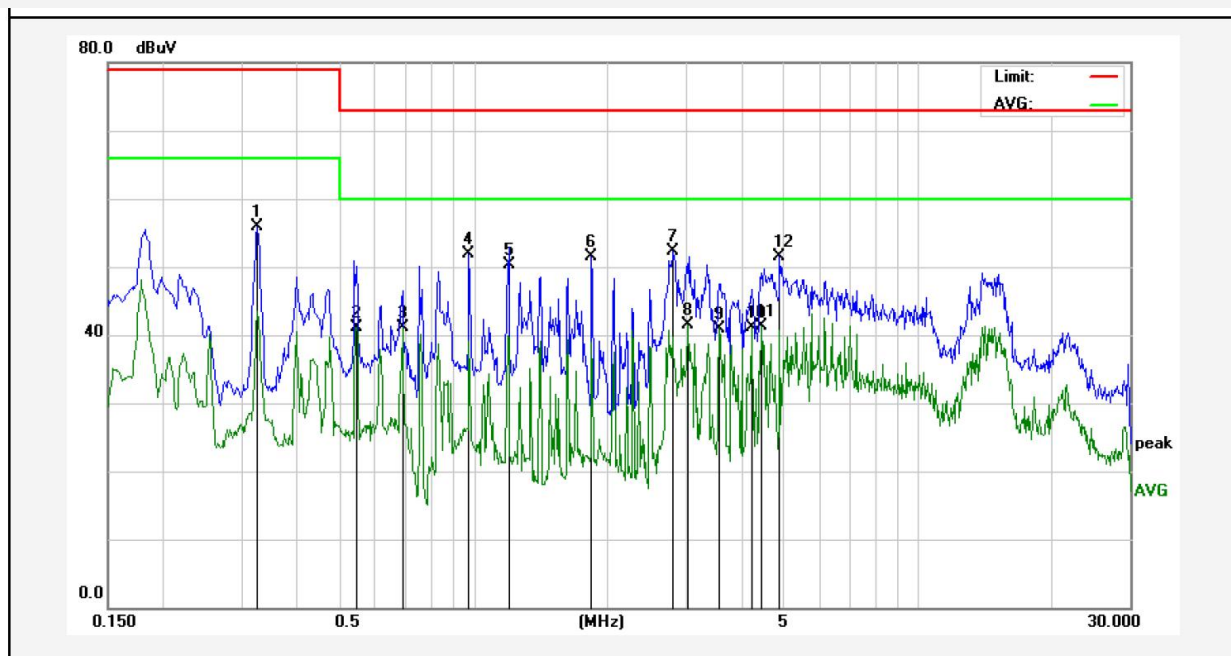
PASS

The test curves are shown in the following pages.



Conducted Emission Test Data

Test Site: 1# Shielded Room
Test Specification: AC 230V, 50Hz
Comment: Live Line
Temp.: 23.3°C Hum.: 47%

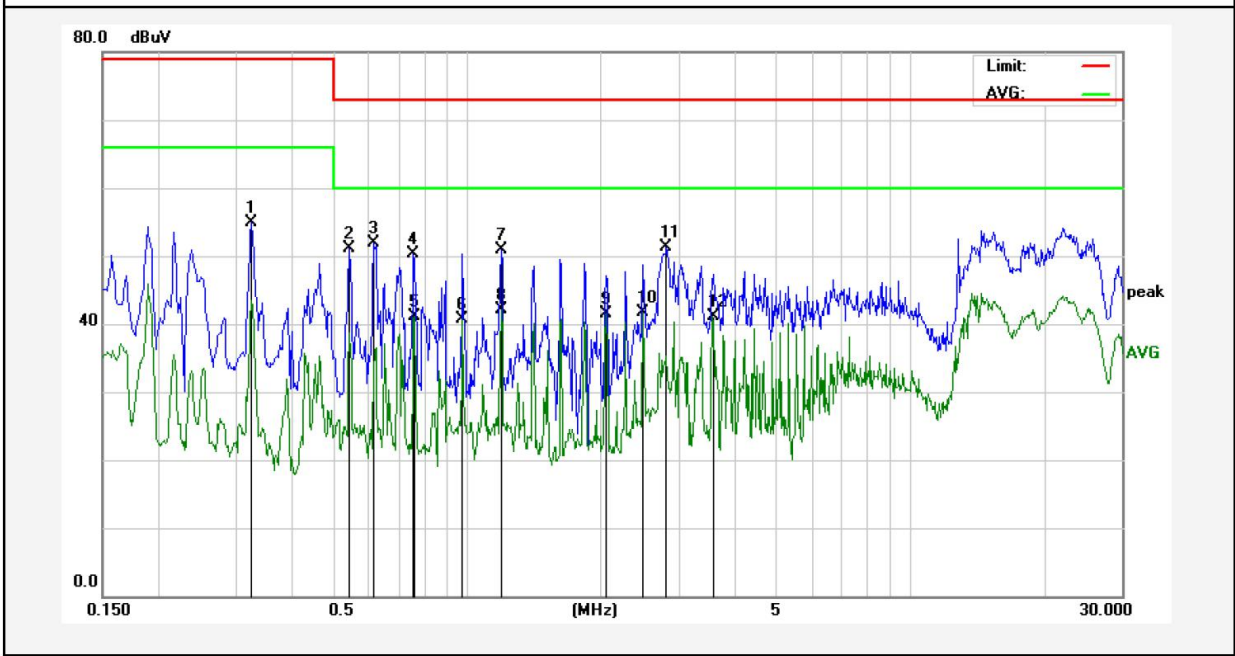


No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.3260	55.70	0.12	55.82	79.00	-23.18	QP	
2	0.5420	41.05	0.15	41.20	60.00	-18.80	AVG	
3	0.6899	41.02	0.15	41.17	60.00	-18.83	AVG	
4	0.9779	51.85	0.15	52.00	73.00	-21.00	QP	
5	1.1979	50.25	0.14	50.39	73.00	-22.61	QP	
6	1.8460	51.30	0.12	51.42	73.00	-21.58	QP	
7	2.8179	52.26	0.12	52.38	73.00	-20.62	QP	
8	3.0259	41.33	0.12	41.45	60.00	-18.55	AVG	
9	3.5779	40.88	0.12	41.00	60.00	-19.00	AVG	
10	4.2378	40.94	0.11	41.05	60.00	-18.95	AVG	
11	4.4458	41.14	0.11	41.25	60.00	-18.75	AVG	
12	4.8818	51.36	0.11	51.47	73.00	-21.53	QP	

Note: Result=Reading+Factor Over Limit=Result-Limit

Conducted Emission Test Data

Test Site: 1# Shielded Room
Test Specification: AC 230V, 50Hz
Comment: Neutral Line
Temp.: 23.3℃ Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.3260	54.69	0.12	54.81	79.00	-24.19	QP	
2	0.5420	50.93	0.15	51.08	73.00	-21.92	QP	
3	0.6139	51.78	0.15	51.93	73.00	-21.07	QP	
4	0.7580	50.25	0.15	50.40	73.00	-22.60	QP	
5	0.7620	40.92	0.15	41.07	60.00	-18.93	AVG	
6	0.9739	40.54	0.15	40.69	60.00	-19.31	AVG	
7	1.1939	50.83	0.14	50.97	73.00	-22.03	QP	
8	1.1939	41.91	0.14	42.05	60.00	-17.95	AVG	
9	2.0579	41.46	0.12	41.58	60.00	-18.42	AVG	
10	2.4980	41.64	0.12	41.76	60.00	-18.24	AVG	
11	2.8100	51.16	0.12	51.28	73.00	-21.72	QP	
12	3.5779	41.05	0.12	41.17	60.00	-18.83	AVG	

Note: Result=Reading+Factor Over Limit=Result-Limit

3. Asymmetric Mode Conducted Emission Test (Wired Network Ports)

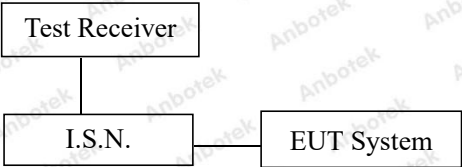
3.1. Test Standard and Limit

Test Standard	EN 55032
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Limits for conducted emissions

Test Limit	Frequency (MHz)	At mains terminals (dBμV)	
		Quasi-peak Level	Average Level
	0.15 ~ 0.50	97 ~ 87*	84 ~74*
	0.50 ~ 30.00	87	74
Remark: (1) The lower limit shall apply at the transition frequencies. (2) The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.			

3.2. Test Setup



3.3. EUT Configuration on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

3.4. Operating Condition of EUT

- 3.4.1. Setup the EUT as shown in Section 3.2.
- 3.4.2. Turn on the power of all equipments.
- 3.4.3. Let the EUT work in test mode and measure it.

3.5. Test Procedure

The EUT is put on the plane 0.8 m high above the ground by insulating support and connected to the wired network ports through Impedance Stabilization Network(ISN). and it is investigated to find out the maximum conducted emission according to the EN55032 regulations during conducted emission measurement.

The bandwidth of the field strength meter (R&S Test Receiver ESCI) is set at 9kHz in 150kHz~30MHz.

The frequency range from 150KHz to 30MHz is checked.

All the test results are listed in Section 3.6.

3.6. Test Results

PASS

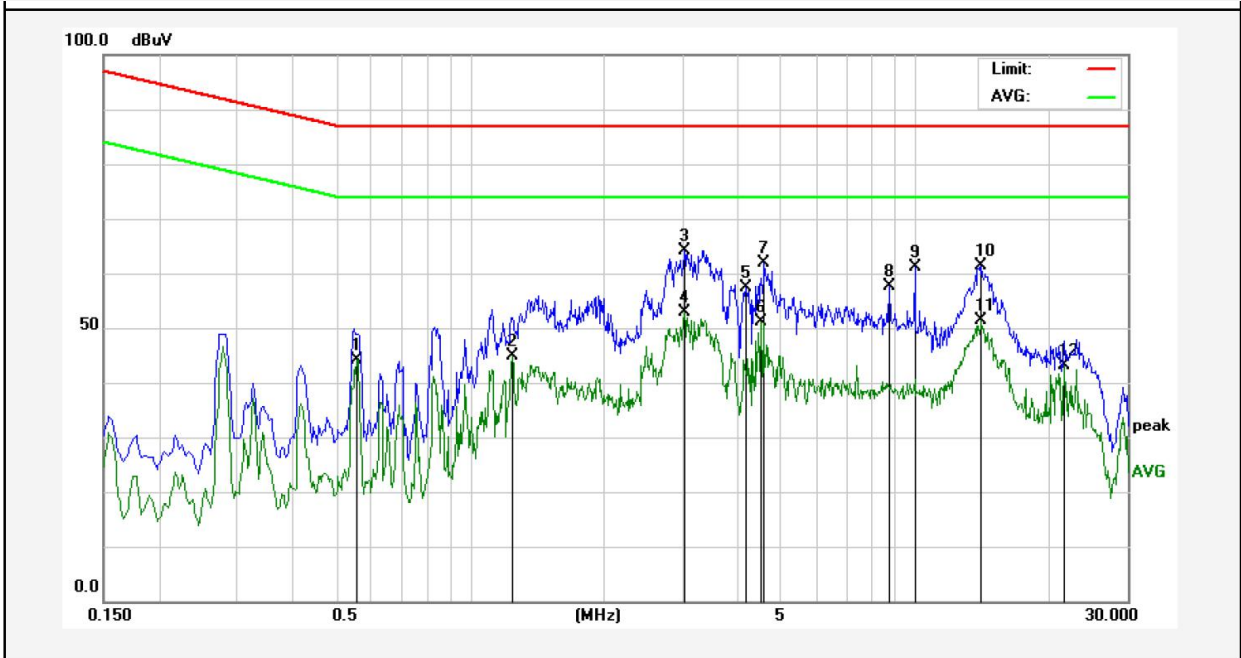
The frequency range 150kHz to 30MHz is investigated

The test curves are shown in the following pages.



Conducted Emission Test Data

Test Site: 1# Shielded Room
Test Specification: AC 230V, 50Hz
Comment: Signal Line
Temp.: 23.3℃ Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.5580	34.69	9.53	44.22	74.00	-29.78	AVG	
2	1.2460	35.40	9.52	44.92	74.00	-29.08	AVG	
3	3.0300	54.65	9.51	64.16	87.00	-22.84	QP	
4	3.0300	43.30	9.51	52.81	74.00	-21.19	AVG	
5	4.1660	47.78	9.52	57.30	87.00	-29.70	QP	
6	4.5100	41.67	9.52	51.19	74.00	-22.81	AVG	
7	4.5739	52.39	9.52	61.91	87.00	-25.09	QP	
8	8.7500	48.21	9.53	57.74	87.00	-29.26	QP	
9	9.9900	51.70	9.54	61.24	87.00	-25.76	QP	
10	14.0780	51.90	9.56	61.46	87.00	-25.54	QP	
11	14.0780	41.82	9.56	51.38	74.00	-22.62	AVG	
12	21.6620	33.46	9.64	43.10	74.00	-30.90	AVG	

Note: Result=Reading+Factor Over Limit=Result-Limit

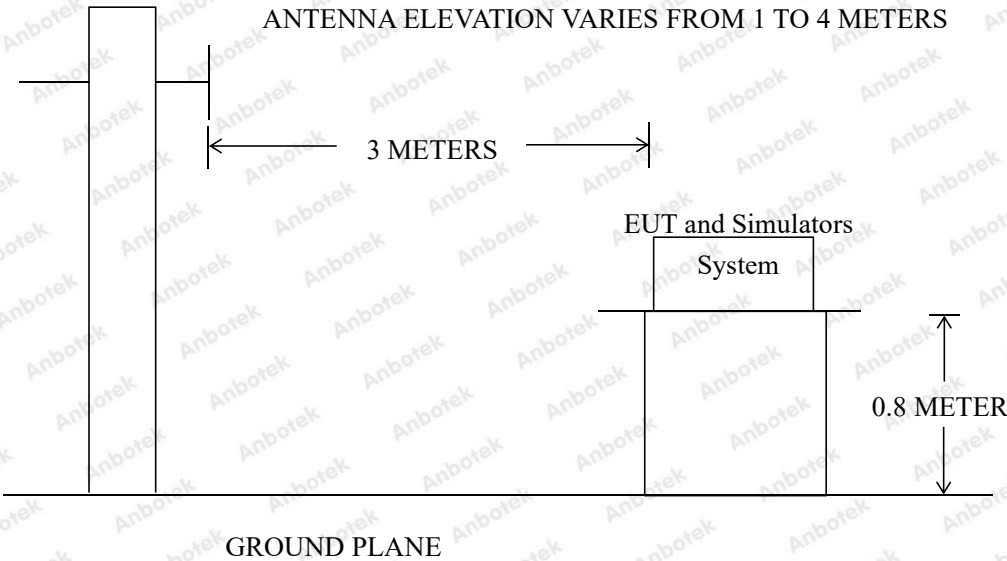
4. Radiated Emission Test

4.1. Test Standard and Limit

Test Standard	EN 55032
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Radiated Emission Test Limit				
30~1000MHz				
Test Limit	Frequency (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dBμV/m)	
	30 ~ 230	3	50	
	230 ~ 1000	3	57	
1~6GHz				
Test Limit	Frequency (GHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT	
			Average (dBμV/m)	Peak (dBμV/m)
	1 ~ 3	3	56	76
	3 ~ 6	3	60	80
Remark: (1)The smaller limit shall apply at the combination point between two frequency bands. (2) Distance r efers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT. (3) 3M Limit=10M Limit+k k=20log(D1/D2)=10 3M Limit=10M Limit +10 (D1= 10M D2=3M)				

4.2. Test Setup



4.3. EUT Configuration on Measurement

The EN 55032 regulations test method must be used to find the maximum emission during radiated emission measurement.

4.4. Operating Condition of EUT

4.4.1. Setup the EUT as shown in Section 4.2.

4.4.2. Turn on the power of all equipments.

4.4.3. Let the EUT work in test mode and measure it.

4.5. Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Bilog antenna is used as a receiving antenna. Both horizontal and vertical polarization of the antenna are set on test.

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.

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 1GHz.

Note:

The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

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

The EUT is tested in 9*6*6 Chamber.

The test results are listed in Section 4.6.

4.6. Test Results

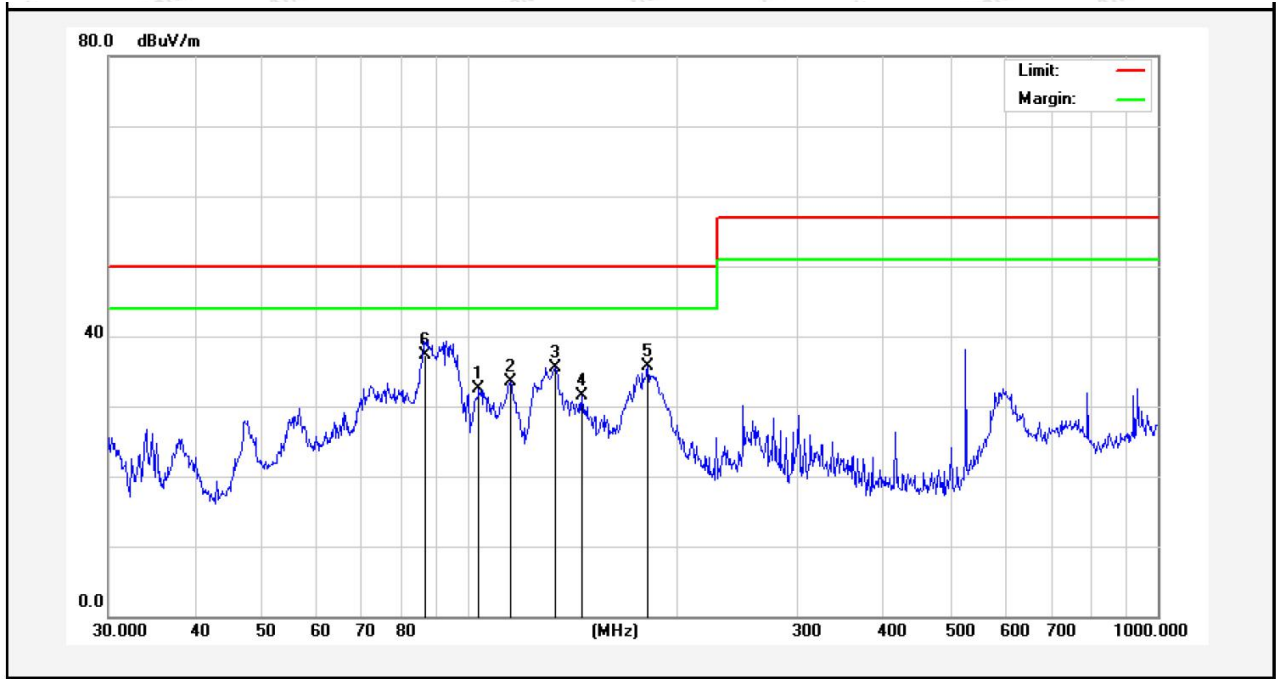
PASS

The frequency range from 30MHz to 6GHz is investigated.

The test curves are shown in the following pages.



Test item: Radiation Test Polarization: Horizontal
Standard: (RE)EN55032_Class A_30~1000MHz Power Source: AC 230V, 50Hz
Distance: 3m Temp.(°C)/Hum.(%RH): 23.6(°C)/47%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	103.4421	54.48	-21.93	32.55	50.00	-17.45	QP			
2	114.9169	57.03	-23.57	33.46	50.00	-16.54	QP			
3	133.6188	58.24	-22.71	35.53	50.00	-14.47	QP			
4	145.8611	54.46	-22.94	31.52	50.00	-18.48	QP			
5	181.9202	58.74	-23.09	35.65	50.00	-14.35	QP			
6	86.7917	59.38	-22.13	37.25	50.00	-12.75	QP			

Note: Result=Reading+Factor Over Limit=Result-Limit

Test item:

Radiation Test

Polarization:

Vertical

Standard:

(RE)EN55032_Class A_30~1000MHz

Power Source:

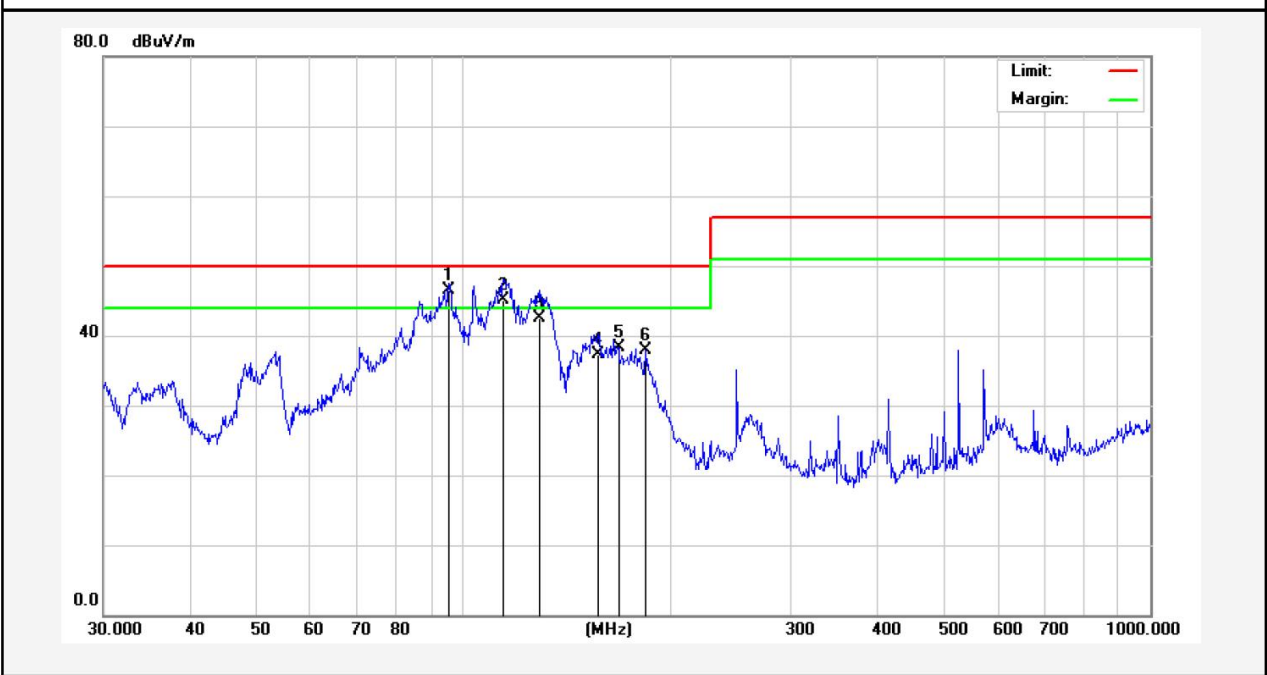
AC 230V, 50Hz

Distance:

3m

Temp.(℃)/Hum.(%RH):

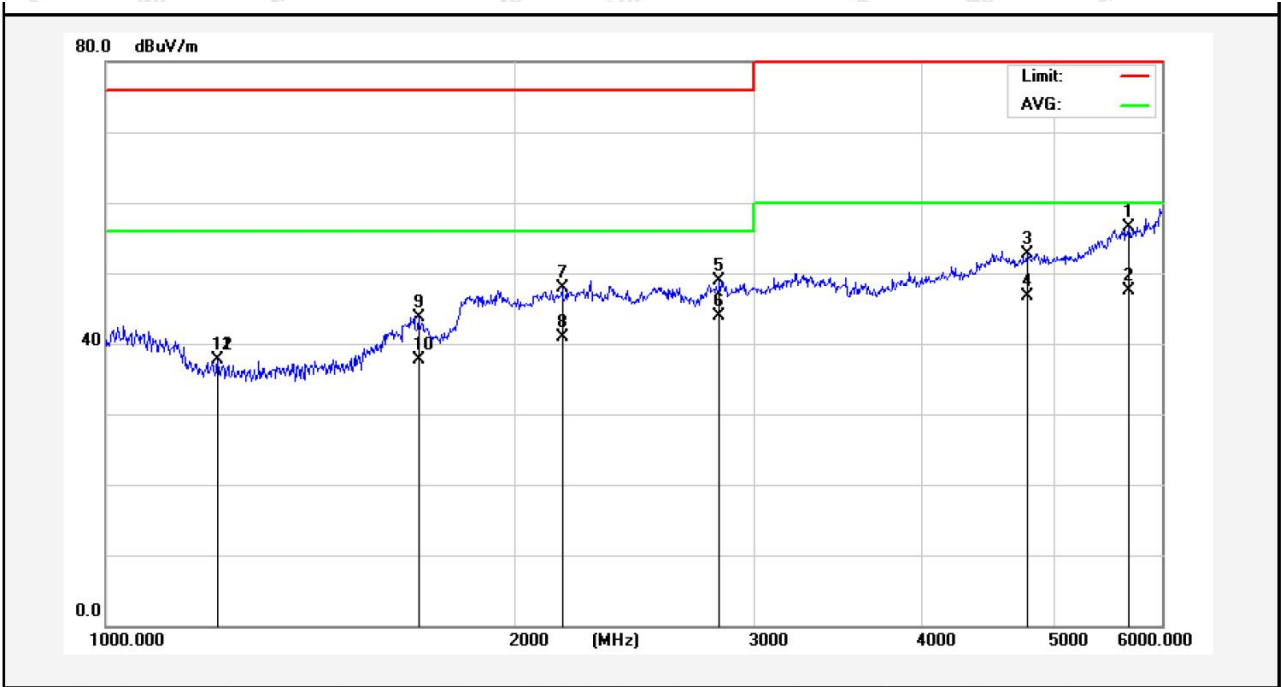
23.6(℃)/47%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	95.4270	63.74	-17.17	46.57	50.00	-3.43	QP			
2	114.5146	64.08	-18.98	45.10	50.00	-4.90	QP			
3	129.0146	63.82	-21.32	42.50	50.00	-7.50	QP			
4	157.0074	59.03	-21.78	37.25	50.00	-12.75	QP			
5	168.4138	59.54	-21.22	38.32	50.00	-11.68	QP			
6	184.4898	58.24	-20.38	37.86	50.00	-12.14	QP			

Note: Result=Reading+Factor Over Limit=Result-Limit

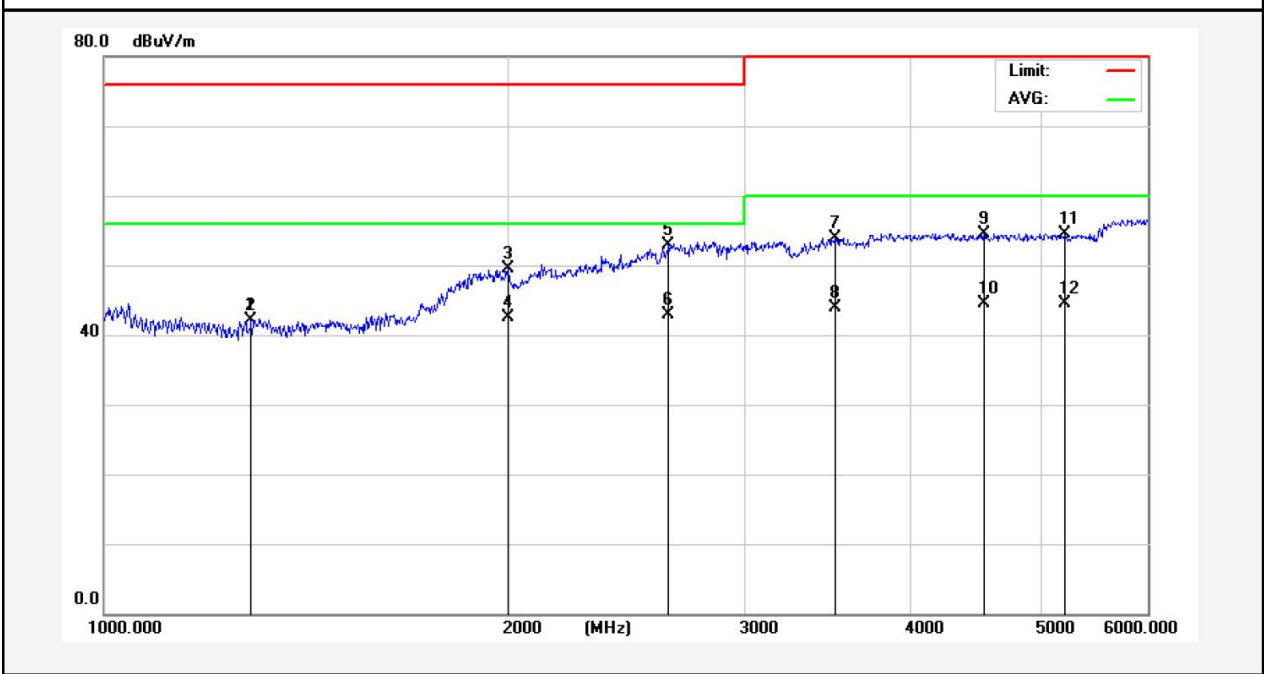
Test item: Radiation Test Polarization: Horizontal
Standard: (RE)EN 55032_Class A_1-6GHz Power Source: AC 230V, 50Hz
Distance: 3m Temp.(°C)/Hum.(%RH): 24.1(°C)/48%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	5665.659	39.61	16.98	56.59	80.00	-23.41	peak			
2	5665.659	30.61	16.98	47.59	60.00	-12.41	AVG			
3	4770.324	37.56	15.21	52.77	80.00	-27.23	peak			
4	4770.324	31.56	15.21	46.77	60.00	-13.23	AVG			
5	2832.082	37.71	11.17	48.88	76.00	-27.12	peak			
6	2832.082	32.71	11.17	43.88	56.00	-12.12	AVG			
7	2168.510	38.51	9.32	47.83	76.00	-28.17	peak			
8	2168.510	31.51	9.32	40.83	56.00	-15.17	AVG			
9	1699.545	37.32	6.40	43.72	76.00	-32.28	peak			
10	1699.545	31.32	6.40	37.72	56.00	-18.28	AVG			
11	1209.161	33.62	4.04	37.66	76.00	-38.34	peak			
12	1209.161	33.62	4.04	37.66	56.00	-18.34	AVG			

Note: Result=Reading+Factor Over Limit=Result-Limit

Test item: Radiation Test Polarization: Vertical
Standard: (RE)EN 55032_Class A_1-6GHz Power Source: AC 230V, 50Hz
Distance: 3m Temp.(°C)/Hum.(%RH): 24.1(°C)/48%RH



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	1287.417	37.95	4.20	42.15	76.00	-33.85	peak			
2	1287.417	37.95	4.20	42.15	56.00	-13.85	AVG			
3	2000.527	40.56	9.00	49.56	76.00	-26.44	peak			
4	2000.527	33.56	9.00	42.56	56.00	-13.44	AVG			
5	2636.209	42.43	10.45	52.88	76.00	-23.12	peak			
6	2636.209	32.43	10.45	42.88	56.00	-13.12	AVG			
7	3505.144	41.47	12.40	53.87	80.00	-26.13	peak			
8	3505.144	31.47	12.40	43.87	60.00	-16.13	AVG			
9	4528.783	39.73	14.72	54.45	80.00	-25.55	peak			
10	4528.783	29.73	14.72	44.45	60.00	-15.55	AVG			
11	5198.752	38.31	16.10	54.41	80.00	-25.59	peak			
12	5198.752	28.31	16.10	44.41	60.00	-15.59	AVG			

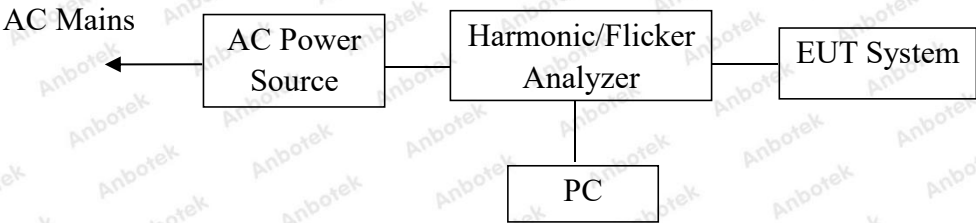
Note: Result=Reading+Factor Over Limit=Result-Limit

5. Harmonic Current Emission Test

5.1. Test Standard

Test Standard	EN IEC 61000-3-2
---------------	------------------

5.2. Test Setup



5.3. Operating Condition of EUT

- 5.3.1. Setup the EUT as shown on Section 5.2.
- 5.3.2. Turn on the power of all equipments.
- 5.3.3. After that, let the EUT work in test mode measure it.

5.4. Test Results

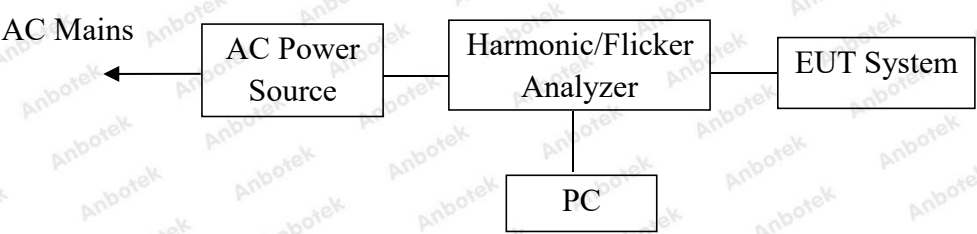
The active input power of the EUT is less than 75W. Therefore, according to EN IEC 61000-3-2, no limits are necessary.

6. Voltage Fluctuations & Flicker Test

6.1. Test Standard

Test Standard	EN 61000-3-3
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6.2. Test Setup



6.3. Operating Condition of EUT

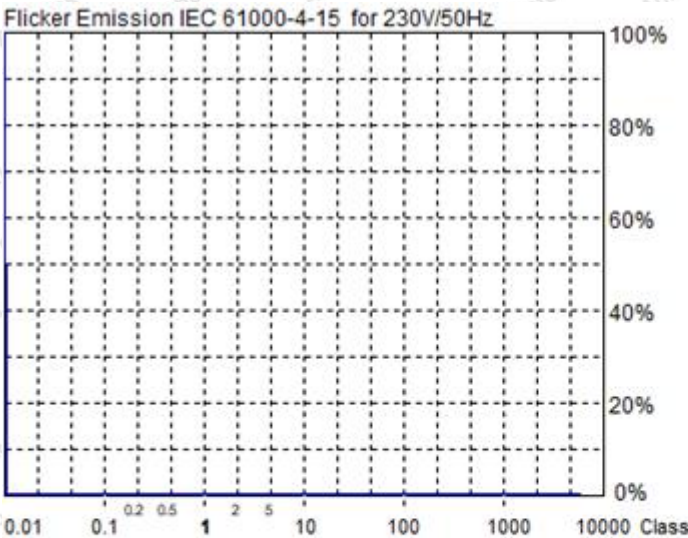
- 6.3.1. Setup the EUT as shown on Section 6.2.
- 6.3.2. Turn on the power of all equipments.
- 6.3.3. After that, let the EUT work in test mode measure it.

6.4. Test Results

PASS

The test curves are shown in the following pages.

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



Actual Flicker (Fli):	0.01
Short-term Flicker (Pst):	0.07
Limit (Pst):	1.00
Long-term Flicker (Plt):	0.00
Limit (Plt):	0.65
Maximum Relative Volt. Change (dmax):	0.00%
Limit (dmax):	4.00%
Relative Steady-state Voltage Change (dc):	0.01%
Limit (dc):	3.00%
Tmax 3.00% (dt):	0.00ms
Limit (dt>Lim):	200ms

Flicker Emission - IEC 61000-3-3 , EN 61000-3-3

Urms =	229.5 V	P =	43.05 W
Irms =	0.306 A	pf =	0.614

Range:	2 A
V-nom:	230 V

Test aborted, Result: PASSED

HAR-1000 EMC-Partner

- Full Bar : Actual Values
- Empty Bar : Maximum Values
- Circles : Average Values
- Blue : Current , Green : Voltage , Red : Failed

Urms =	229.5V	Freq =	50.000	Range:	2 A
Irms =	0.306A	Ipk =	0.623A	cf =	2.038
P =	43.05W	S =	70.16VA	pf =	0.614

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

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

Limits : Plt :	0.65	Pst :	1.00
dmax :	4.00 %	dc :	3.00 %
dtLim:	3.00 %	dt>Lim:	200ms

Test aborted, Result: PASSED

	dmax	dc	dt>Lim
	[%]	[%]	[ms]
1	0.000	0.000	0.000

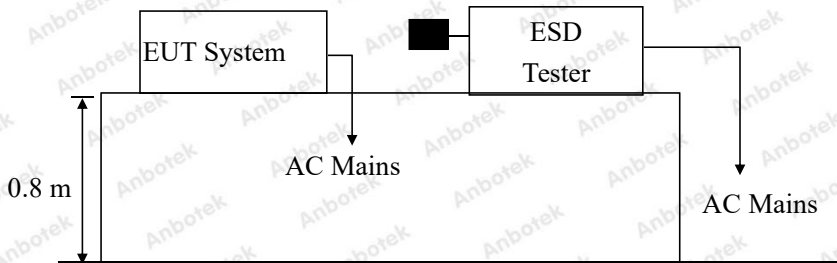
7. Electrostatic Discharge Immunity Test

7.1. Test Standard and Level

Test Standard:	EN 55035 (IEC 61000-4-2)
Performance Criterion:	B
Severity Level: 3 / Air Discharge: ±8kV, Level: 2 / Contact Discharge: ±4kV	

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

7.2. Test Setup



7.3. EUT Configuration on Measurement

The following equipments are installed on electrostatic discharge immunity measurement to meet EN 55035 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

7.4. Operating Condition of EUT

- 7.4.1. Setup the EUT as shown on Section 7.2.
- 7.4.2. Turn on the power of all equipments.
- 7.4.3. After that, let the EUT work in test mode measure it.

7.5. Test Procedure

7.5.1. Air Discharge:

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

7.5.2. Contact Discharge:

All the procedure shall be same as Section 7.5.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

7.5.3. Indirect discharge for horizontal coupling plane

At least 50 single discharges shall be applied to the horizontal coupling plane, at points on each side of the EUT. The discharge electrode positions vertically at a distance of 0.1m from the EUT and with the discharge electrode touching the coupling plane.

7.5.4. Indirect discharge for vertical coupling plane

At least 50 single discharge shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m × 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

7.6. Test Results

PASS

Please refer to the following page.



Electrostatic Discharge Test Results

Air discharge :	±8.0kV	Temperature :	23.6℃
Contact discharge :	±4.0kV	Humidity :	52%
Power Supply :	AC 230V, 50Hz	Expert conclusion :	A
Number of discharge :	10	Test Result:	☒ Pass ☐ Fail
Location		Kind A-Air Discharge C-Contact Discharge	Result
Switch	4 points	A	☒ A ☐ B ☐ C ☐ D
Slot	4 points	C	☒ A ☐ B ☐ C ☐ D
USB Port	4 points	C	☒ A ☐ B ☐ C ☐ D
HDMI Port	4 points	C	☒ A ☐ B ☐ C ☐ D
LAN Port	4 points	C	☒ A ☐ B ☐ C ☐ D
COM Port	4 points	C	☒ A ☐ B ☐ C ☐ D
Earphone Port	4 points	C	☒ A ☐ B ☐ C ☐ D
DP Port	4 points	C	☒ A ☐ B ☐ C ☐ D
Metal	4 points	C	☒ A ☐ B ☐ C ☐ D
Screw	4 points	C	☒ A ☐ B ☐ C ☐ D
HCP	4 points	C	☒ A ☐ B ☐ C ☐ D
VCP of the front	4 points	C	☒ A ☐ B ☐ C ☐ D
VCP of the rear	4 points	C	☒ A ☐ B ☐ C ☐ D
VCP of the left	4 points	C	☒ A ☐ B ☐ C ☐ D
VCP of the right	4 points	C	☒ A ☐ B ☐ C ☐ D
Remark: Discharge should be considered on Contact and Air and Horizontal Coupling Plane (HCP) and Vertical Coupling Plane (VCP).			

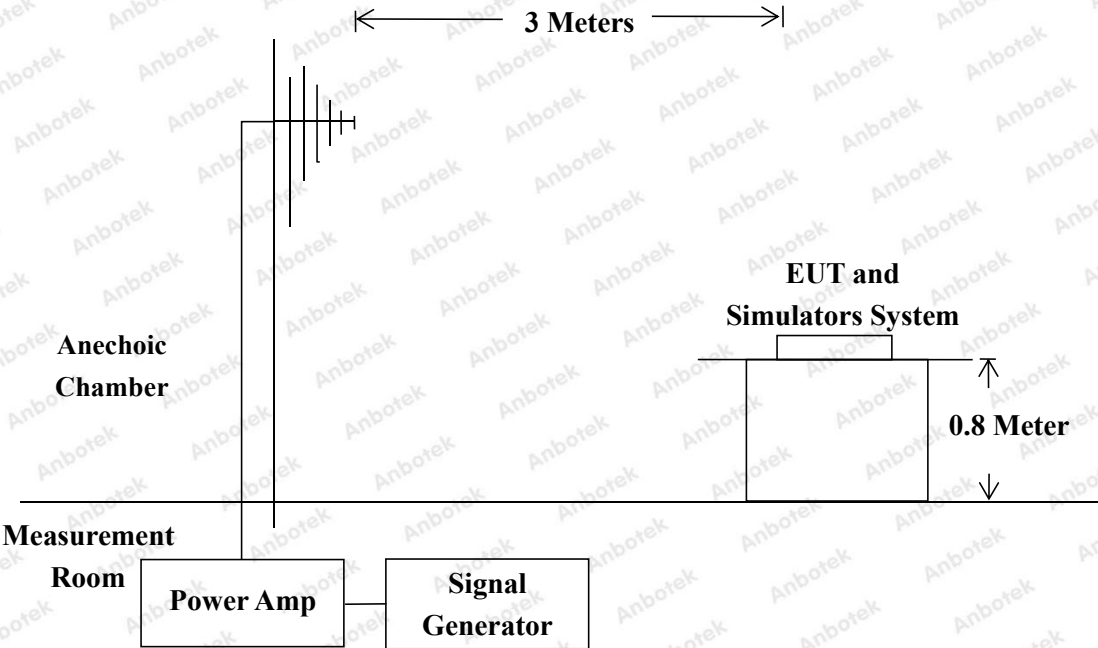
8. RF Field Strength Susceptibility Test

8.1. Test Standard and Level

Test Standard:	EN 55035 (IEC 61000-4-3)
Required Performance:	A
Frequency Range:	80MHz to 1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of preceding frequency value
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m
Dwell Time:	at least 0.5s

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

8.2. Test Setup



8.3. EUT Configuration on Measurement

The following equipments are installed on RF Field Strength susceptibility Measurement to meet EN 55035 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

8.4. Operating Condition of EUT

8.4.1. Setup the EUT as shown on Section 8.2.

8.4.2. Turn on the power of all equipments.

8.4.3. After that, let the EUT work in test mode measure it.

8.5. Test Procedure

The EUT and support equipment, which are placed on a table that is 0.8 meter above ground and the testing was performed in a fully-anechoic chamber. The testing distance from antenna to the EUT was 3 meters.

- 1) 80 MHz to 1000 MHz the field strength level was 3V/m, 1800MHz, 2600MHz, 3500MHz, 5000MHz the field strength level was 3V/m.
- 2) The frequency range is swept from 80 MHz to 1000 MHz with the signal 80% amplitude modulated with a 1kHz sine wave.
- 3) The frequency range is swept from 1800MHz, 2600MHz, 3500MHz, 5000MHz with the signal 80% amplitude modulated with a 1kHz sine wave.
- 4) The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond, but shall in no case be less than 0.5s.
- 5) The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

8.6. Measuring Results

PASS

Please refer to the following page.



RF Field Strength Susceptibility Test Results

Field Strength :	3V/m	Temperature :	23.9℃
Expert conclusion :	A	Humidity :	54%
Power Supply :	AC 230V, 50Hz	Test Result :	☒ Pass ☐ Fail
Dwell Time:	1s		

Frequency Range	Antenna Polarity	R.F. Field Strength	Azimuth	Result
80MHz~1000MHz	H / V	3 V/m (rms)	Front	☒ A ☐ B ☐ C ☐ D
			Rear	
			Left	
			Right	
1800MHz 2600MHz 3500MHz 5000MHz	H / V	3 V/m (rms)	Front	☒ A ☐ B ☐ C ☐ D
			Rear	
			Left	
			Right	

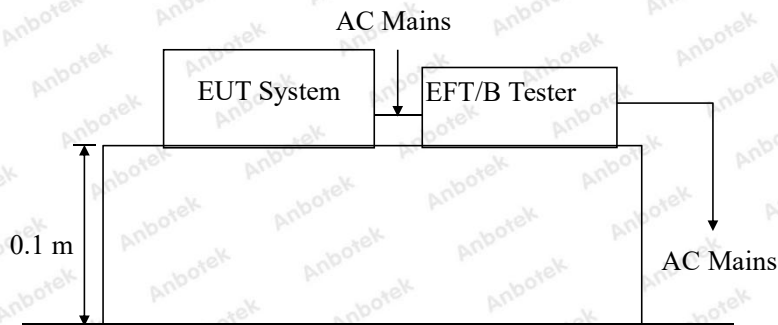
9. Electrical Fast Transient/Burst Immunity Test

9.1. Test Standard and Level

Test Standard:	EN 55035 (IEC 61000-4-4)
Performance criterion:	B
Severity Level 2: 1.00kV	

Test Level		
Open Circuit Output Test Voltage $\pm 10\%$		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1.	0.50 kV	0.25 kV
2.	1.00 kV	0.50 kV
3.	2.00 kV	1.00 kV
4.	4.00 kV	2.00 kV
X.	Special	Special

9.2. Test Setup



9.3. EUT Configuration on Measurement

The following equipments are installed on electrical fast transient/burst immunity measurement to meet EN 55035 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

9.4. Operating Condition of EUT

- 9.4.1. Setup the EUT as shown in Section 9.2.
- 9.4.2. Turn on the power of all equipments.
- 9.4.3. Let the EUT work in test mode and measure it.

9.5. Test Procedure

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

9.5.1. For input and output AC power ports:

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

9.5.2. For signal lines and control lines ports:

Select tests based on product characteristics.

9.5.3. For DC output line ports:

Select tests based on product characteristics.

9.6. Test Results

PASS

Please refer to the following page.



Electrical Fast Transient/Burst Test Results

Ambient Condition : 23.6℃ / 52% RH		Expert conclusion : A	
Power Supply .: AC 230V, 50Hz		Test Result : ☒ Pass ☐ Fail	
Inject Line : AC Mains		Inject Method: Direct	Inject Time(s): 120
Line	Polarity	Test Voltage (kV)	Result
AC Line	±	1.00kV	☒ A ☐ B ☐ C ☐ D
DC Line			
Signal Line			

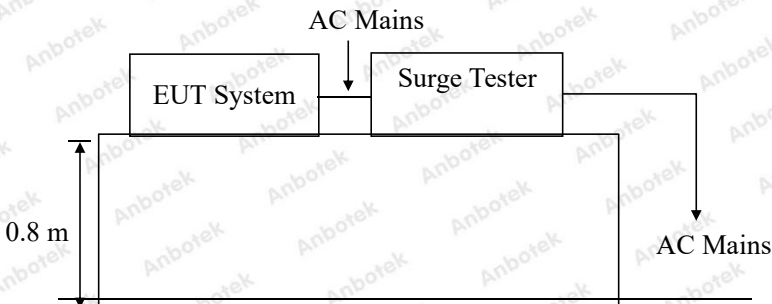
10. Surge Immunity Test

10.1. Test Standard and Level

Test Standard:	EN 55035 (IEC 61000-4-5)
Performance criterion:	B
Severity Level 2, Line to Line: 1.0kV; Severity Level 3, Line to Earth: 2.0kV	

Test Level	
Severity Level	Open-Circuit Test Voltage (kV)
1.	0.5
2.	1.0
3.	2.0
4.	4.0
X.	Special

10.2. Test Setup



10.3. EUT Configuration on Measurement

The following equipments are installed on surge immunity measurement to meet EN 55035 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

10.4. Operating Condition of EUT

- 10.4.1. Setup the EUT as shown in Section 10.2.
- 10.4.2. Turn on the power of all equipments.
- 10.4.3. Let the EUT work in test mode and measure it.

10.5. Test Procedure

10.5.1. Set up the EUT and test generator as shown on Section 10.2.

10.5.2. For line to line coupling mode, provide a 1.0 kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.

10.5.3. For line to earth coupling mode, provide a 2.0 kV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT selected points.

10.5.4. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.

10.5.5. Different phase angles are done individually.

10.5.6. Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

10.6. Test Results

PASS

Please refer to the following page.



Surge Immunity Test Results

Humidity :	52%	Temperature :	23.6℃		
Power Supply :	AC 230V, 50Hz	Expert conclusion:	A		
Test Result :	☒ Pass ☐ Fail				
Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (kV)	Result
L-N	+	☐ 0° ☒ 90° ☐ 180° ☐ 270°	5	1.0kV	☒ A ☐ B ☐ C ☐ D
L-N	-	☐ 0° ☐ 90° ☐ 180° ☒ 270°	5	1.0kV	☒ A ☐ B ☐ C ☐ D
L-GND	+	☐ 0° ☒ 90° ☐ 180° ☐ 270°	5	2.0kV	☒ A ☐ B ☐ C ☐ D
L-GND	-	☐ 0° ☐ 90° ☐ 180° ☒ 270°	5	2.0kV	☒ A ☐ B ☐ C ☐ D
N-GND	+	☐ 0° ☐ 90° ☐ 180° ☒ 270°	5	2.0kV	☒ A ☐ B ☐ C ☐ D
N-GND	-	☐ 0° ☒ 90° ☐ 180° ☐ 270°	5	2.0kV	☒ A ☐ B ☐ C ☐ D

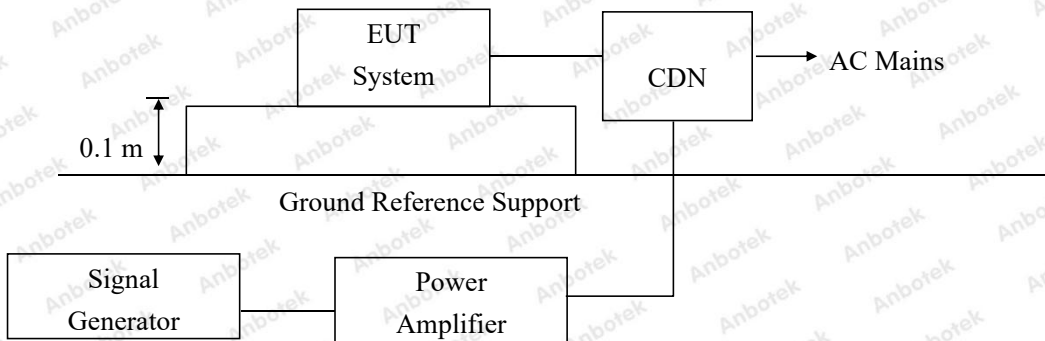
11. Injected Currents Susceptibility Test

11.1. Test Standard and Level

Test Standard	EN 55035 (IEC 61000-4-6)
Performance criterion	A

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

11.2. Test Setup



11.3. EUT Configuration

The following equipments are installed on currents susceptibility measurement to meet EN 55035 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

11.4. Operating Condition of EUT

- 11.4.1. Setup the EUT as shown in Section 11.2.
- 11.4.2. Turn on the power of all equipments.
- 11.4.3. Let the EUT work in test mode and measure it.

11.5. Test Procedure

- 1) Set up the EUT, CDN and test generators as shown on Section 11.2.
- 2) Let the EUT work in test mode and measure it.
- 3) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
- 4) The disturbance signal described below is injected to EUT through CDN.
- 5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
- 6) The frequency range is swept from 150KHz to 10MHz using 3V signal level, 10MHz to 30MHz using 3V to 1V signal level, 30MHz to 80MHz using 1V signal level, and with the disturbance signal 80% amplitude modulated with a 1KHz sine wave.
- 7) The rate of sweep shall not exceed 1.5×10^{-3} decades/s. Where the frequency is swept incrementally, the step size shall not exceed 1% of the start and thereafter 1% of the preceding frequency value.
- 8) Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

11.5.1. For signal lines and control lines ports:

Select tests based on product characteristics.

11.5.2. For DC output line ports:

Select tests based on product characteristics.

11.6. Test Results

PASS

Please refer to the following page.



Injected Currents Susceptibility Test Results

Humidity : 51%		Temperature : 23.7℃	
Power Supply : AC 230V, 50Hz		Expert conclusion: A	
Test Result : ☒ Pass ☐ Fail			
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Result
0.15 ~ 10	AC Mains	3V	☒ A ☐ B ☐ C ☐ D
10 ~ 30	AC Mains	3V to 1V	☒ A ☐ B ☐ C ☐ D
30 ~ 80	AC Mains	1V	☒ A ☐ B ☐ C ☐ D
Remark : 1. Modulation Signal:1KHz 80% AM			

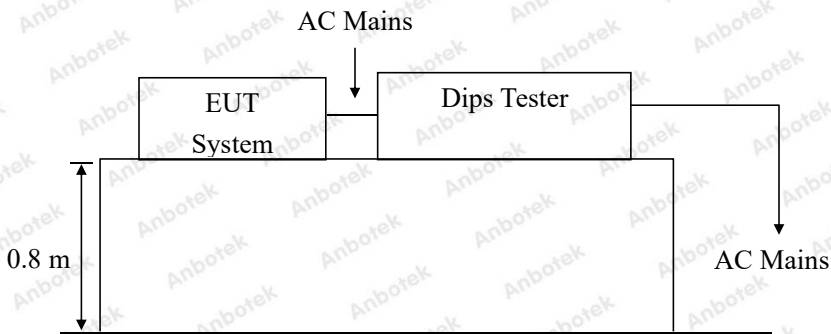
12. Voltage Dips And Interruptions Test

12.1. Test Standard and Level

Test Standard:	EN 55035 (IEC 61000-4-11)
Performance Criterion:	B&C

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

12.2. Test Setup



12.3. EUT Configuration on Measurement

The following equipments are installed on voltage dips and interruptions measurement to meet EN 55035 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

12.4. Operating Condition of EUT

- 12.4.1. Setup the EUT as shown in Section 12.2.
- 12.4.2. Turn on the power of all equipments.
- 12.4.3. Let the EUT work in test mode and measure it.

12.5. Test Procedure

- 1) Set up the EUT and test generator as shown on Section 12.2.
- 2) The interruptions is introduced at selected phase angles with specified duration.
- 3) Record any degradation of performance.

12.6. Test Results

PASS

Please refer to the following page.



Voltage Dips and Interruptions Test Results

Temperature : 23.6℃		Humidity : 52%	
Power Supply : AC 230V, 50Hz		Expert conclusion : B&C	
Test Result : ☒ Pass ☐ Fail			
Test Level % UT	Voltage Dips & Short Interruptions % UT	Duration (in periods)	Result
0	100	0.5P	☐ A ☒ B ☐ C ☐ D
70	30	25P	☐ A ☐ B ☒ C ☐ D
Test Level % UT	Voltage Dips & Short Interruptions % UT	Duration (in periods)	Performance Criterion
0	100	250P	☐ A ☐ B ☒ C ☐ D

APPENDIX I -- TEST SETUP PHOTOGRAPH

Photo of Power Line Conducted Emission Test



Photo of Radiated Emission Test



Photo of Flicker/ Harmonic Test

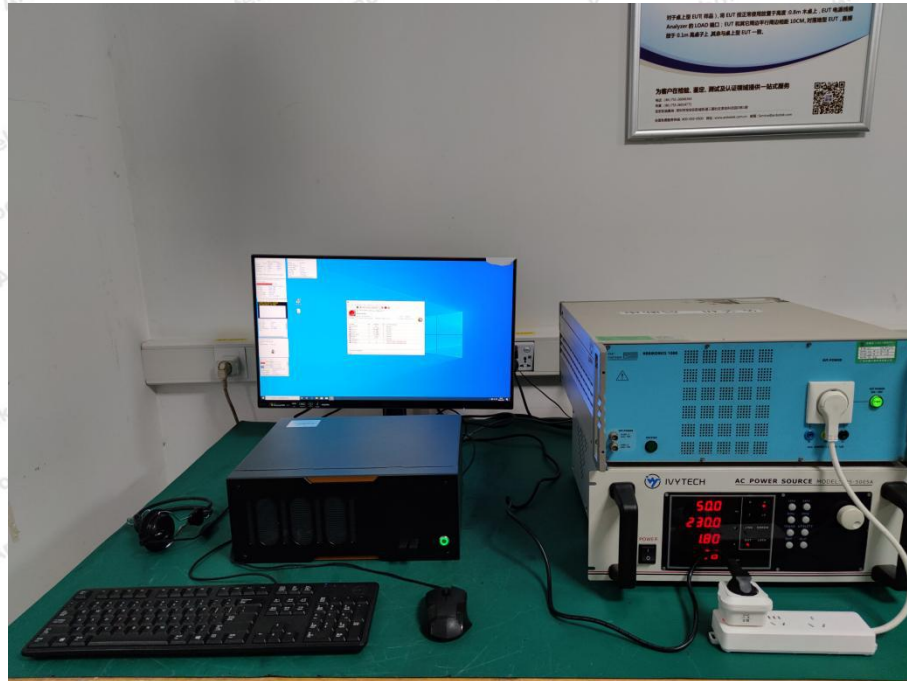


Photo of Electrostatic Discharge Immunity Test

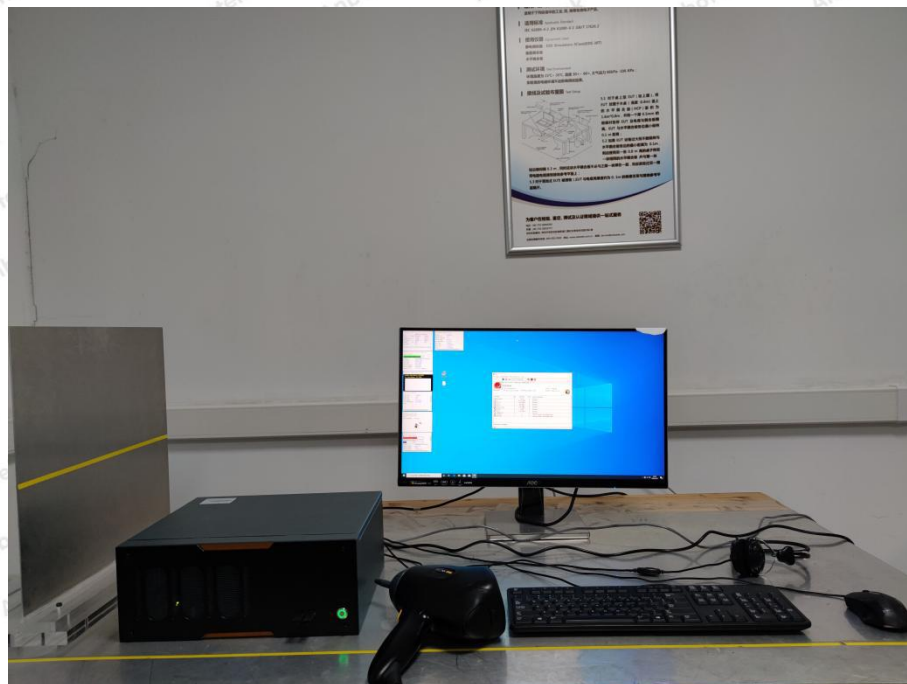


Photo of RF Field Strength susceptibility Test

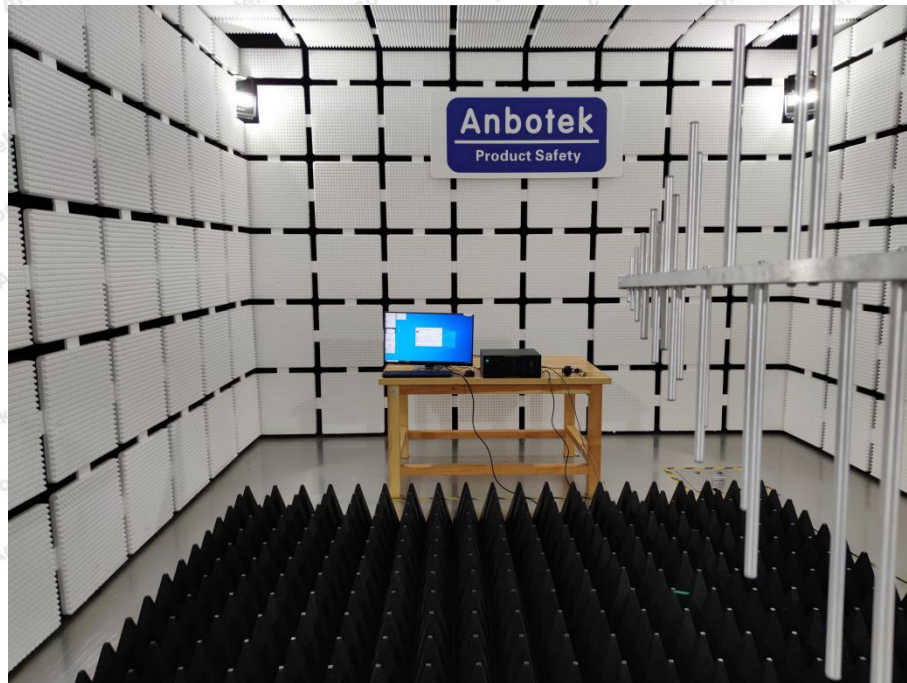


Photo of Electrical Fast Transient/Burst Immunity Test



Photo of Surge Immunity Test



Photo of Injected currents susceptibility Test

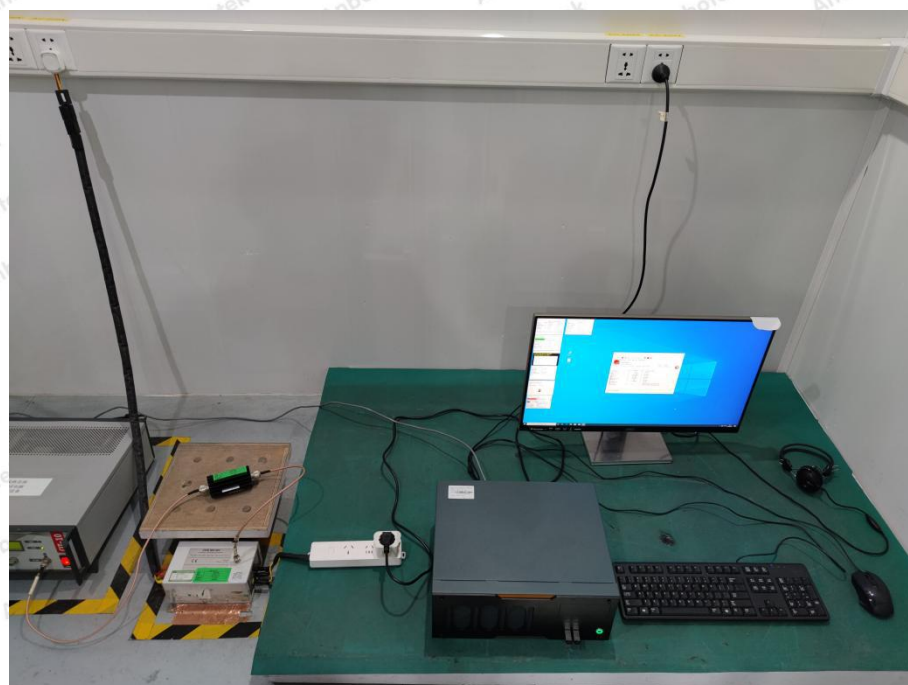
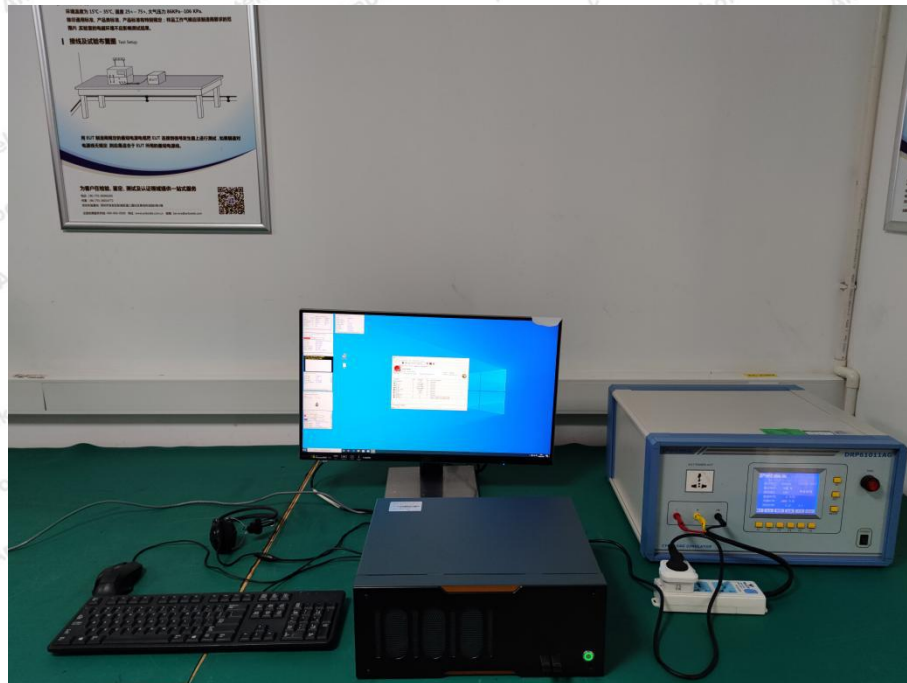


Photo of Voltage Dips and Interruptions Test



APPENDIX II -- Photo documentation

Photo 1**Photo 2**

Photo 3**Photo 4**

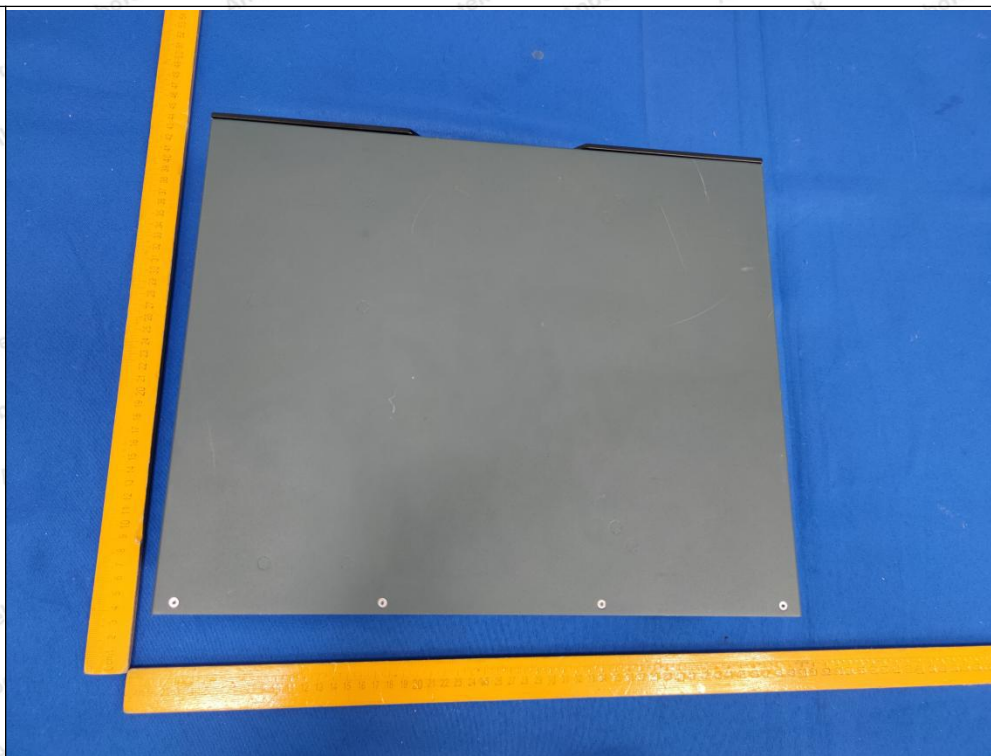
Photo 5**Photo 6**

Photo 7



CE Label

1. The CE conformity marking must consist of the initials 'CE' taking the following form:

If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected.

2. The CE marking must have a height of at least 5 mm except where this is not possible on account of the nature of the apparatus.

3. The CE marking must be affixed to the product or to its data plate. Additionally it must be affixed to the packaging, if any, and to the accompanying documents.

4. The CE marking must be affixed visibly, legibly and indelibly.

It must have the same height as the initials 'CE'.

----- End of Report -----

