

TEST REPORT

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Applicant : ACREL CO., LTD.
Address : NO.253, YULV ROAD, JIADING, SHANGHAI, CHINA

Below information submitted by the applicant:

Product Name : CONVERSION MODULE
Model : AWT100-Lora868,
Model may cover : AWT100, AWT100-lora, AWT100-LRHW, AWT100-lorawan, AWT100-LWHW, AWT100-LW868, AWT100-LW923, AWT100-WIFIHW, AWT100-WFHW, AWT100-WiFi, AWT100-4GHW, AWT100-4G, AWT100-FGHW
Reference info. : /
Trade Mark : Acrel
Rating(s) : Input: DC 12V-24V or AC 220V-230V, 50Hz
Manufacturer info. : JIANGSU ACREL ELECTRICAL MANUFACTURING. CO., LTD. NO.5, DONGMENG ROAD, NANZHA, JIANGYIN, JIANGSU, CHINA
Supplier info. : /
Buyer info. : /
Country of Destination : /
Country of Origin : China

Sample Received : 12.17, 2021
Test Period : 12.17, 2021 - 01.12, 2022
Test Requirement : Refer to next pages
Test Method : CISPR 32: 2015+A1:2019;
IEC 61000-3-2: 2018;
IEC 61000-3-3: 2013+A1:2017;
CISPR 35: 2016;
(IEC 61000-4-2; IEC 61000-4-3; IEC 61000-4-4;
IEC 61000-4-5; IEC 61000-4-6; IEC 61000-4-11)
Test Result : Refer to next pages
Test Conclusion : PASS

Signed for and on behalf of
Jordan Wang, General Manager
BU Chemical Compliance
TUV THURINGEN (SHANGHAI) CO., LTD.
Location: Shanghai

TÜV THÜRINGEN CHINA

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VERSION: 2022.01.01

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1. General Information

1.1. Client Information

Applicant	:	Acrel Co., Ltd.
Address	:	No.253, Yulv Road, Jiading, Shanghai, China
Manufacturer	:	Jiangsu Acrel Electrical Manufacturing. Co., Ltd.
Address	:	No.5, Dongmeng Road, Nanzha, Jiangyin, Jiangsu, China
Factory	:	Jiangsu Acrel Electrical Manufacturing. Co., Ltd.
Address	:	No.5, Dongmeng Road, Nanzha, Jiangyin, Jiangsu, China

1.2. Description of Device (EUT)

Product Name	:	Conversion module
Model No.	:	AWT100-Lora868, AWT100, AWT100-lora, AWT100-LRHW, AWT100-lorawan, AWT100-LWHW, AWT100-LW868, AWT100-LW923, AWT100-WIFIHW, AWT100-WFHW, AWT100-WiFi, AWT100-4GHW, AWT100-4G, AWT100-FGHW (Note: All samples are the same except the model number, appearance and size, so we prepare "AWT100-Lora868" for test only)
Trade Mark	:	Acrel
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

N/A

1.4. Description of Test Mode

Pretest Mode	Description
Mode 1	On

For Mode 1 Block Diagram of Test Setup

AC mains



1.5. Test Summary

Test Items	Test Mode	Status
Power Line Conducted Emission Test (150KHz To 30MHz)	Mode 1	P
Radiated Emission Test (30MHz To 1000MHz)	Mode 1	P
Harmonic Current Test	/	N
Voltage Fluctuations and Flicker Test	Mode 1	P

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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

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.	Pre-amplifier	SONOMA	310N	186860	Oct. 22, 2021	1 Year
3.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Oct. 22, 2021	2 Year
4.	Software Name EZ-EMC	Ferrari Technology	ANB-03A	N/A	N/A	N/A

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

Electrostatic Discharge Measurement

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Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Simulators	emtest	ESD NX30.1	11936	Mar. 25, 2021	1 Year

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

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

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	FRANKONIA	CIT-10	126A1196/201 2	Oct. 22, 2021	1 Year

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	System					
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

TUV Thuringen (Shanghai) Co., Ltd., EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission.

ISED-Registration No.: 8058A

TUV Thuringen (Shanghai) Co., Ltd., 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

TUV Thuringen (Shanghai) Co., Ltd..

Room C6, Floor 16th , Jiangju Building, No.526 Laoshan Road, Shanghai 200122, P.R.China

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

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2. Power Line Conducted Emission Test

2.1. Test Standard and Limit

Test Standard	CISPR 32
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Limits for conducted emissions

Test Limit	Frequency (MHz)	At mains terminals (dB μ V)	
		Quasi-peak Level	Average Level
	0.15 ~ 0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
	0.50 ~ 5.00	56.0	46.0
	5.00 ~ 30.00	60.0	50.0

Remark: (1) The lower limit shall apply at the transition frequencies.

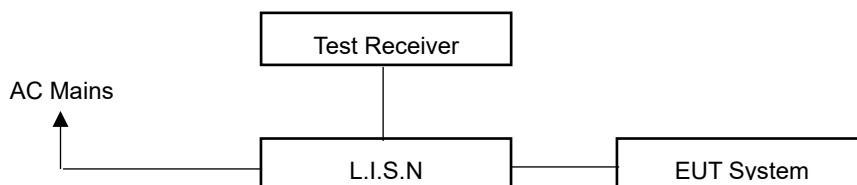
(2) The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0 50MHz

Immunity (EN 55014-2:2015)

Electrostatic discharge Immunity	IEC 61000-4-2:2008	P
RF Electromagnetic Field Immunity	IEC 61000-4-3:2006+A1:2007+A2:2010	P
Electrical Fast Transient/Burst Immunity	IEC 61000-4-4:2012	P
Surge Immunity	IEC 61000-4-5:2014	P
Injected Current	IEC 61000-4-6:2013+Cor 1:2015	P
Voltage Dips	IEC 61000-4-11:2004	P

Note: P means pass, F means failure, N/A means not applicable

2.2. Test Setup



2.3. EUT Configuration on Measurement

The following equipments are installed on conducted emission measurement to meet CISPR 32 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.

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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 CISPR 32 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.

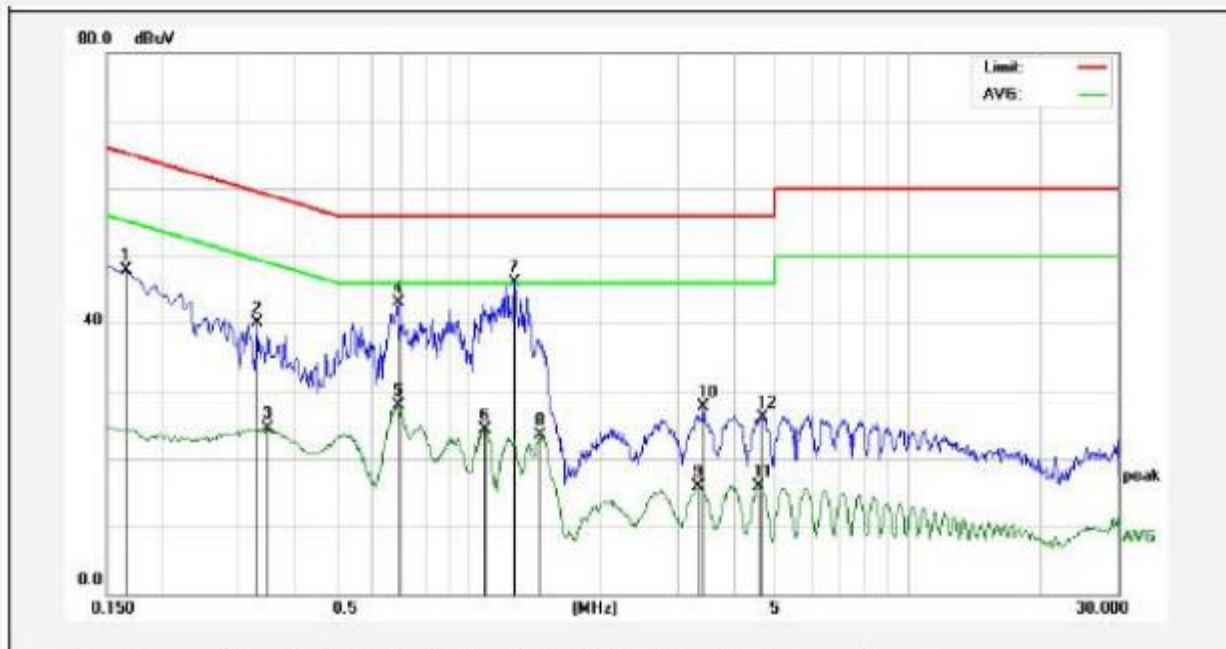


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Conducted Emission Test Data

Test Site: 1# Shielded Room
Test Specification: AC 230V, 50Hz
Comment: Live Line
Temp.: 22.4°C Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1660	47.79	0.12	47.91	65.15	-17.24	QP	
2	0.3300	39.95	0.12	40.07	59.45	-19.38	QP	
3	0.3500	24.29	0.12	24.41	48.96	-24.55	AVG	
4	0.6900	42.93	0.15	43.08	56.00	-12.92	QP	
5	0.6940	27.78	0.15	27.93	46.00	-18.07	AVG	
6	1.0900	24.22	0.15	24.37	46.00	-21.63	AVG	
7	1.2740	45.92	0.14	46.06	56.00	-9.94	QP	
8	1.4540	23.40	0.14	23.54	46.00	-22.46	AVG	
9	3.3220	15.80	0.12	15.92	46.00	-30.08	AVG	
10	3.4180	27.57	0.12	27.69	56.00	-28.31	QP	
11	4.5939	15.83	0.11	15.94	46.00	-30.06	AVG	
12	4.6740	26.02	0.11	26.13	56.00	-29.87	QP	

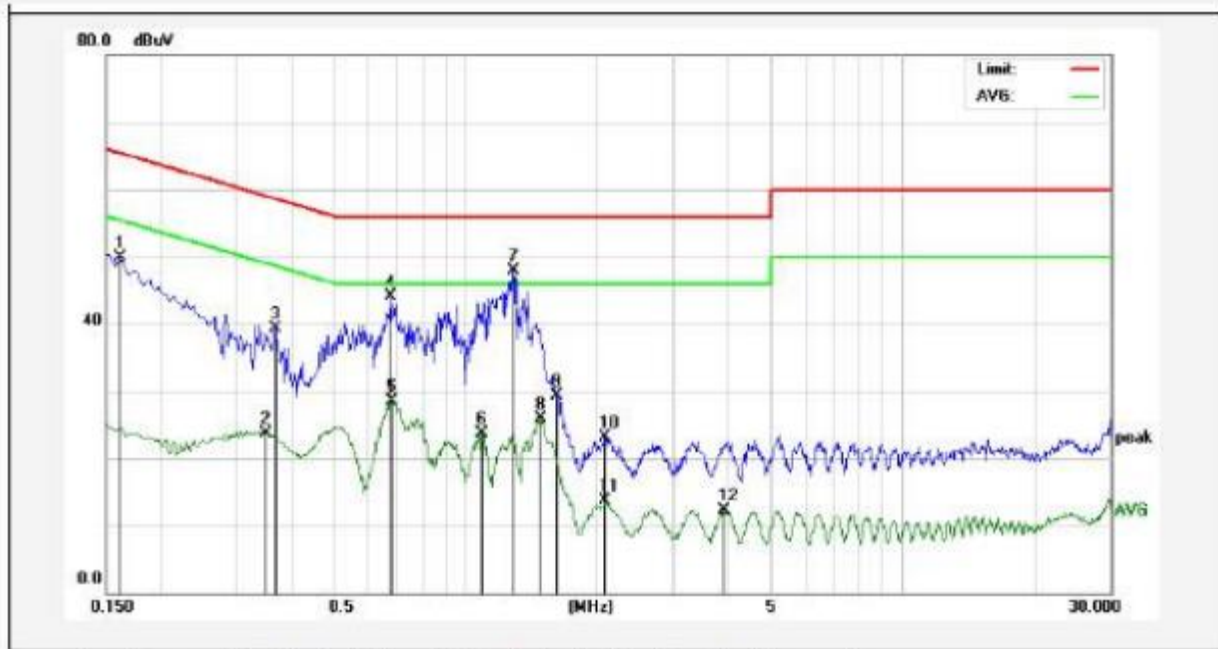
Note: Result=Reading+Factor Over Limit=Result-Limit

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Conducted Emission Test Data

Test Site: 1# Shielded Room
Test Specification: AC 230V, 50Hz
Comment: Neutral Line
Temp.: 22.4°C Hum.: 47%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit (dBuV)	Over Limit (dB)	Detector	Remark
1	0.1620	49.73	0.12	49.85	65.36	-15.51	QP	
2	0.3500	23.66	0.12	23.78	48.96	-25.18	AVG	
3	0.3660	39.12	0.12	39.24	58.59	-19.35	QP	
4	0.6740	44.01	0.15	44.16	56.00	-11.84	QP	
5	0.6780	28.42	0.15	28.57	46.00	-17.43	AVG	
6	1.0900	23.56	0.15	23.71	46.00	-22.29	AVG	
7	1.2940	47.86	0.14	48.00	56.00	-8.00	QP	
8	1.4860	25.73	0.14	25.87	46.00	-20.13	AVG	
9	1.6220	29.19	0.13	29.32	56.00	-26.68	QP	
10	2.0940	23.05	0.12	23.17	56.00	-32.83	QP	
11	2.1099	13.57	0.12	13.69	46.00	-32.31	AVG	
12	3.9220	12.22	0.12	12.34	46.00	-33.66	AVG	

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

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3. Radiated Emission Test

3.1. Test Standard and Limit

Test Standard	CISPR 32
---------------	----------

Radiated Emission Test Limit

Test Limit	Frequency (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dB μ V/m)
	30 ~ 230	3	40
	230 ~ 1000	3	47

Remark:

(1) The smaller limit shall apply at the combination point between two frequency bands.

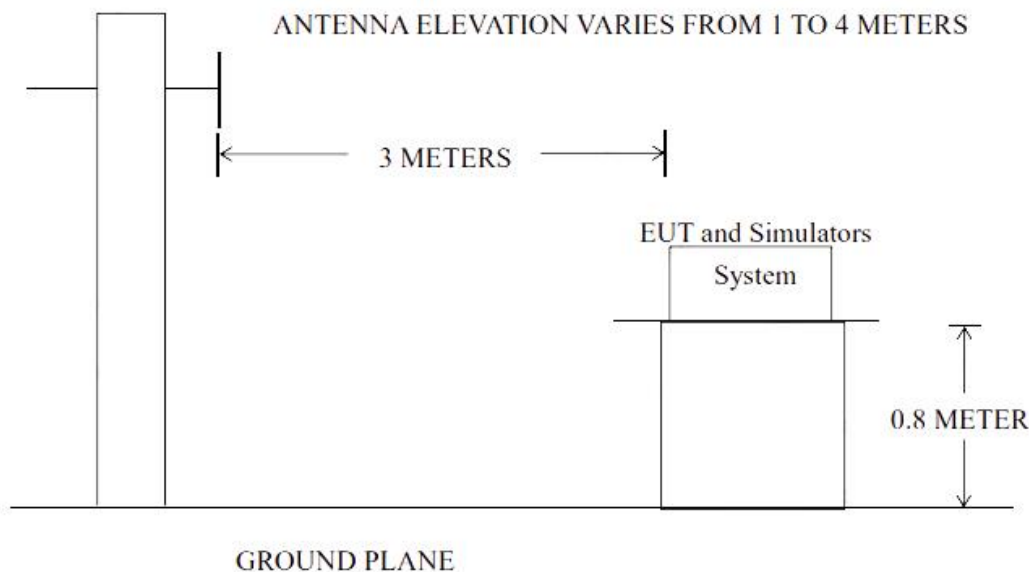
(2) Distancer refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

(3) 3M Limit=10M Limit+k $k=20\log(D1/D2)=10$

3M Limit=10M Limit +10

(D1= 10M D2=3M)

3.2. Test Setup



3.3. EUT Configuration on Measurement

The CISPR 32 regulations test method must be used to find the maximum emission during radiated emission measurement.

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.

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3.5. 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 bandwidth of the Receiver (ESCI) is set at 120kHz.

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

The test results are listed in Section 3.6.

3.6. Test Results

PASS

The frequency range from 30MHz to 1000MHz is investigated.

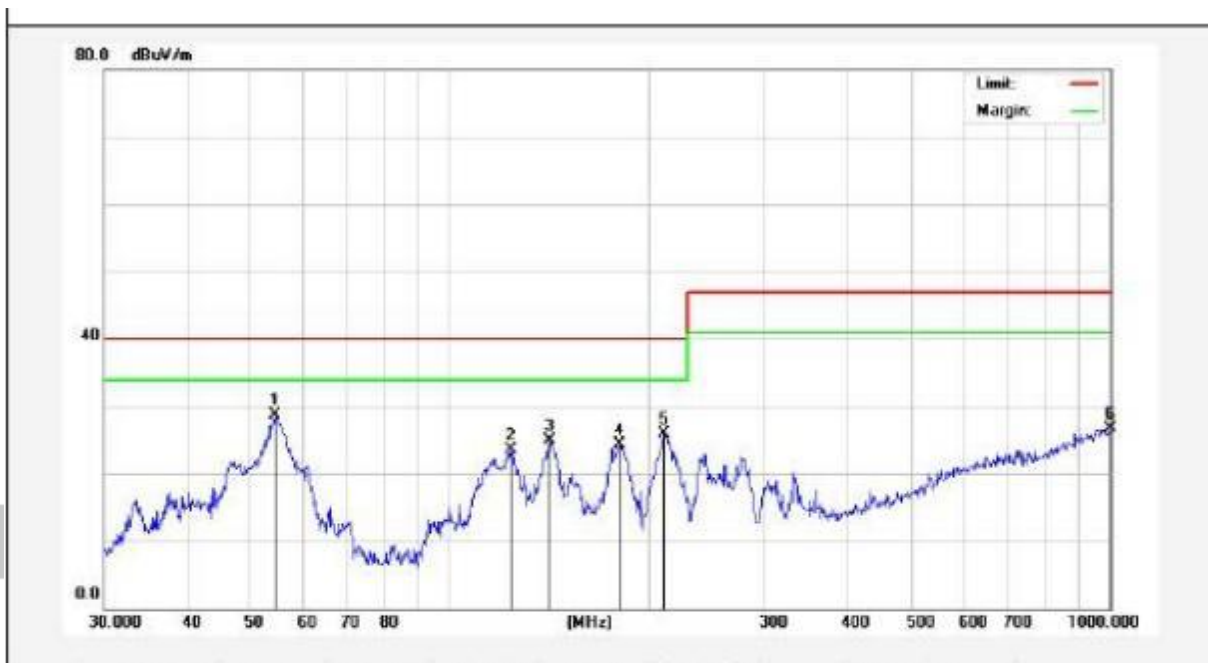
The test curves are shown in the following pages.



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Test item: **Radiation Test** Polarization: **Horizontal**
Standard: **(RE)CISPR 32** Power Source: **AC 230V, 50Hz**
Distance: **3m** Temp.(°C)/Hum.(%RH): **23.8(°C)/47%RH**



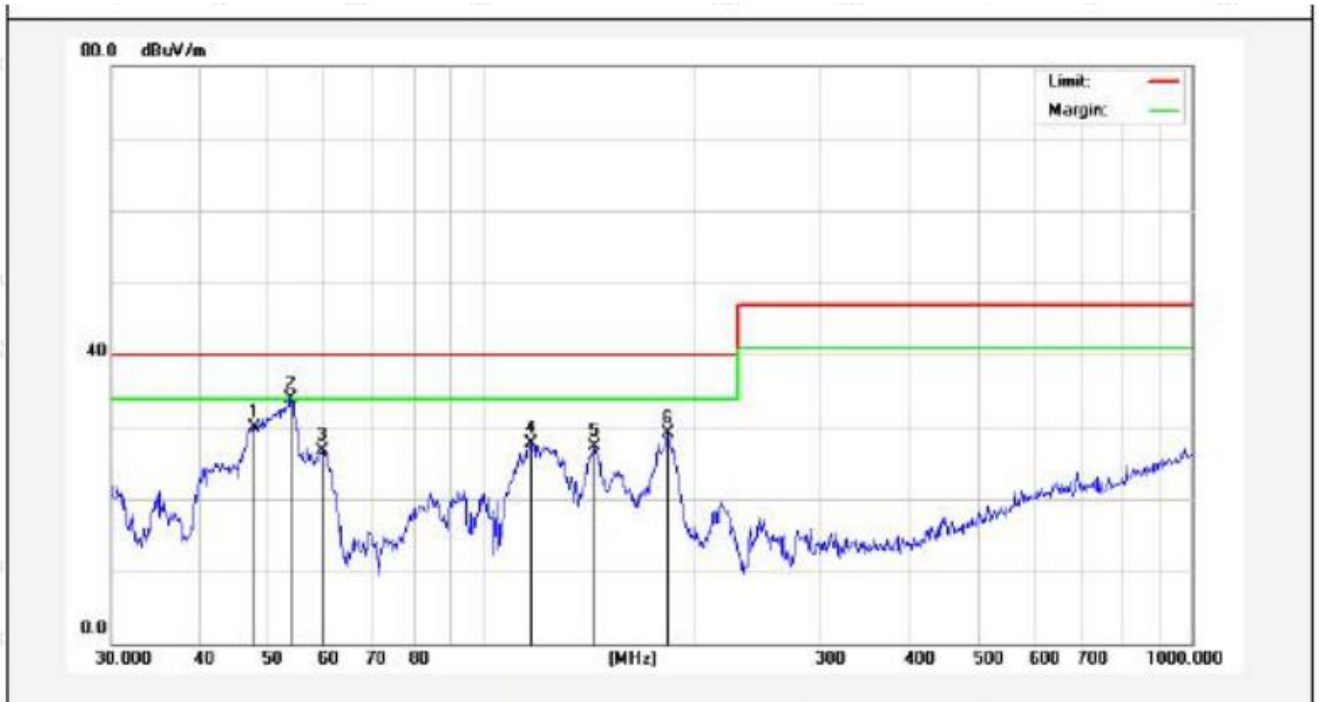
No.	Freq. (MHz)	Reading (dBuV)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	54.4516	46.03	-17.42	28.61	40.00	-11.39	QP			
2	123.6985	46.99	-23.42	23.57	40.00	-16.43	QP			
3	141.8262	47.93	-23.03	24.90	40.00	-15.10	QP			
4	180.6488	47.52	-23.15	24.37	40.00	-15.63	QP			
5	211.5265	48.03	-22.13	25.90	40.00	-14.10	QP			
6	1000.0000	31.39	-4.77	26.62	47.00	-20.38	QP			

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

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Test item: **Radiation Test** Polarization: **Vertical**
Standard: **(RE)CISPR 32** Power Source: **AC 230V, 50Hz**
Distance: **3m** Temp.(°C)/Hum.(%RH): **23.8(°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	47.8260	45.36	-15.45	29.91	40.00	-10.09	QP			
2	53.6932	51.10	-17.15	33.95	40.00	-6.05	QP			
3	59.4405	44.15	-17.50	26.65	40.00	-13.35	QP			
4	117.3603	47.26	-19.47	27.79	40.00	-12.21	QP			
5	143.8295	49.36	-22.15	27.21	40.00	-12.79	QP			
6	182.5592	49.56	-20.48	29.08	40.00	-10.92	QP			

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

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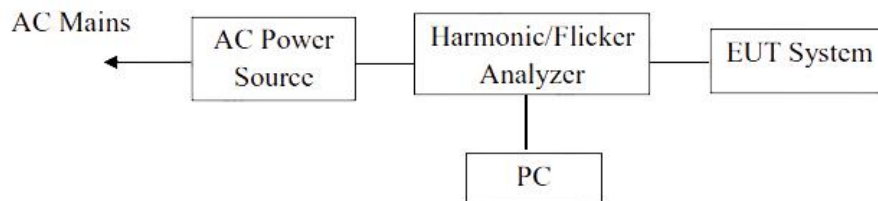
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4. Harmonic Current Emission Test

4.1. Test Standard

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

4.2. Test Setup



4.3. Operating Condition of EUT

4.3.1. Setup the EUT as shown on Section 4.2.

4.3.2. Turn on the power of all equipments.

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

4.4. Test Results

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

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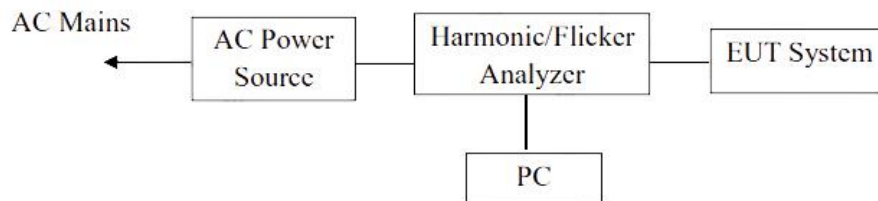
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5. Voltage Fluctuations & Flicker Test

5.1. Test Standard

Test Standard	IEC 61000-3-3
---------------	---------------

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

PASS

The test curves are shown in the following pages

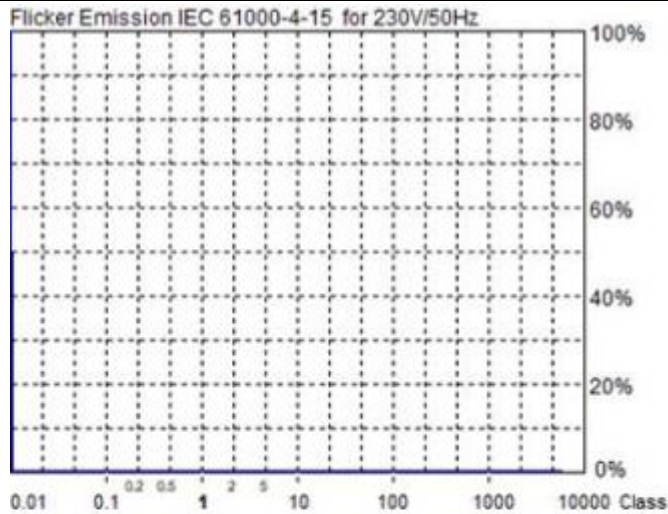
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Flicker Test Summary (Run time)



Actual Flicker (Fli): 0.00
 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): 0.00%
 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 = 229.7 V P = 1.043 W
 Irms = 0.013 A pf = 0.354

Range: 0.25 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 = 229.7V Freq = 50.000 Range : 0.25 A
 Irms = 0.013A Ipk = 0.058A cf = 4.533
 P = 1.043W S = 2.944VA Pf = 0.354

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



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6. Electrostatic Discharge Immunity Test

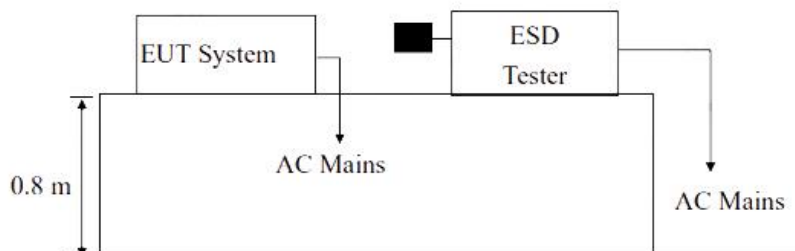
6.1. Test Standard and Level

Test Standard	CISPR 35 (IEC 61000-4-2)
Performance Criterion:	B
Severity Level: 3 / Air Discharge: ± 8 kV, Level: 2 / Contact Discharge: ± 4 kV	

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
5.	Special	Special

6.2. Test Setup



6.3. EUT Configuration on Measurement

The following equipments are installed on electrostatic discharge immunity measurement to meet CISPR 35 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

6.4. Operating Condition of EUT

6.4.1. Setup the EUT as shown on Section 6.2.

6.4.2. Turn on the power of all equipments.

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

6.5. Test Procedure

6.5.1 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

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6.5.2. 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.

6.5.3. 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.

6.5.4. 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.

6.6. Test Results

PASS

Please refer to the following page



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Electrostatic Discharge Test Results

Air discharge :	±8.0kV	Temperature :	23.7°C
Contact discharge :	±4.0kV	Humidity :	54%
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
Slot	4 points	A	☒ 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).

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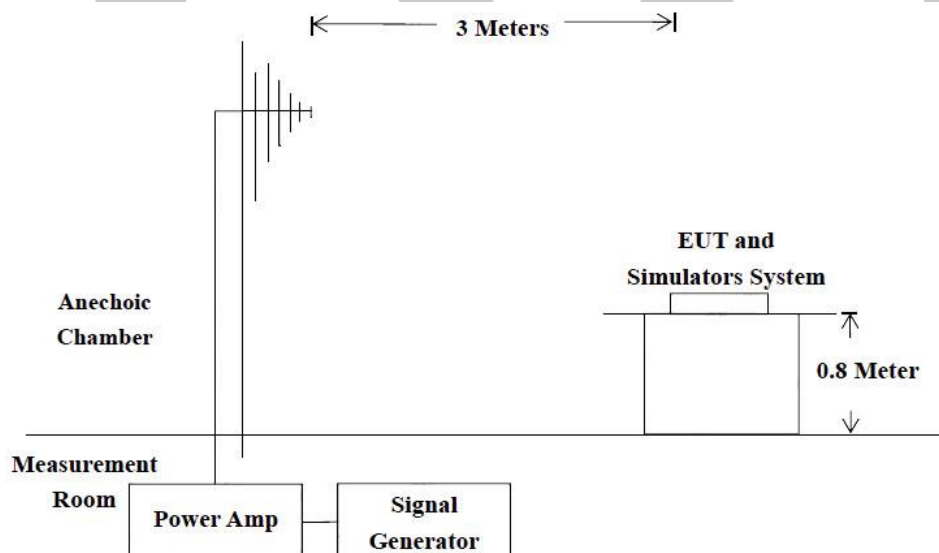
7. RF Field Strength Susceptibility Test

7.1. Test Standard and Level

Test Standard:	CISPR 35 (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

7.2. Test Setup



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7.3. EUT Configuration on Measurement

The following equipments are installed on RF Field Strength susceptibility Measurement to meet CISPR 35 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

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.

7.6. Test Results

PASS

Please refer to the following page

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RF Field Strength Susceptibility Test Results

Field Strength :	3V/m	Temperature :	23.7°C
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	

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8. RF Field Strength Susceptibility Test

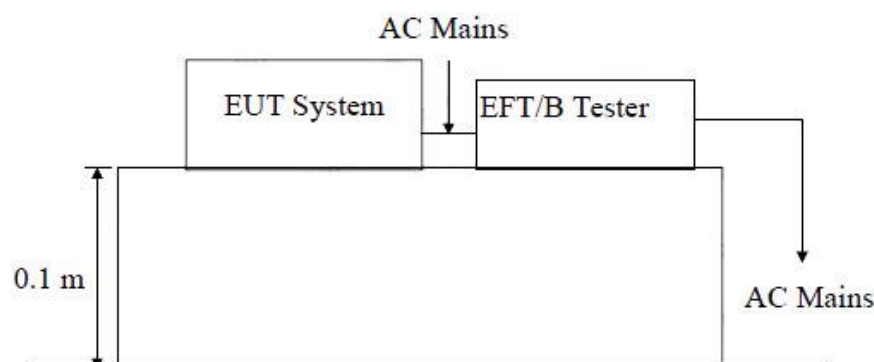
8.1. Test Standard and Level

Test Standard:	CISPR 35 (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

8.2. Test Setup



8.3. EUT Configuration on Measurement

The following equipments are installed on electrical fast transient/burst immunity measurement to meet CISPR 35 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 in Section 8.2.

8.4.2. Turn on the power of all equipments.

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

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8.5. 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.

8.5.1. 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.

8.5.2. For signal lines and control lines ports:

Select tests based on product characteristics.

8.5.3. For DC output line ports:

Select tests based on product characteristics.

8.6. Test Results

PASS

Please refer to the following page

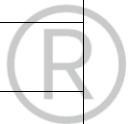


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Electrical Fast Transient/Burst Test Results

Ambient Condition : 23.7°C / 54% 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			



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9. RF Field Strength Susceptibility Test

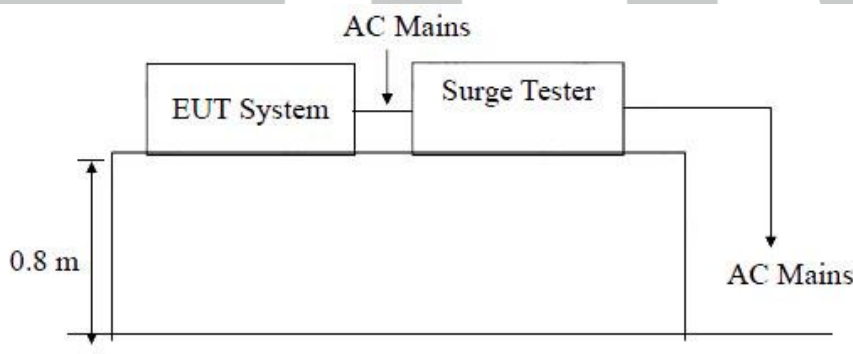
9.1. Test Standard and Level

Test Standard:	CISPR 35 (IEC 61000-4-5)
Performance criterion:	B
Severity Level 2, Line to Line: 1.0kV	

Test Level

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

9.2. Test Setup



9.3. EUT Configuration on Measurement

The following equipments are installed on surge immunity measurement to meet CISPR 35 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

9.5.1. Set up the EUT and test generator as shown on Section 9.2.

9.5.2. 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.

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

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9.5.4. Different phase angles are done individually.

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

9.6. Test Results

PASS

Please refer to the following page

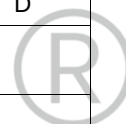


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Surge Immunity Test Results

Humidity :		54%		Temperature :		23.7℃	
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							
L-GND							
N-GND							
N-GND							



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10. Injected Currents Susceptibility Test

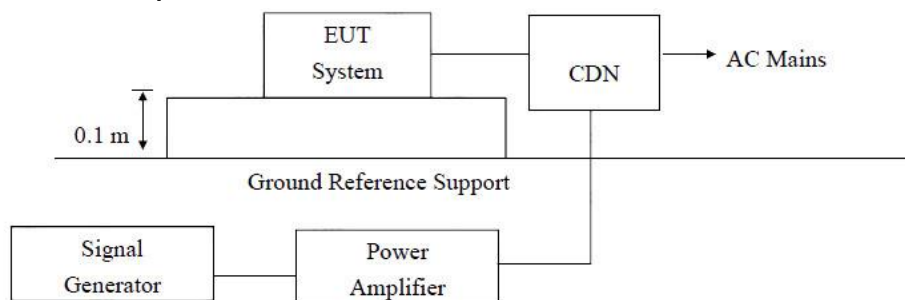
10.1. Test Standard and Level

Test Standard:	CISPR 35 (IEC 61000-4-6)
Performance criterion:	A

Test Level

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

10.2. Test Setup



10.3. EUT Configuration

The following equipments are installed on currents susceptibility measurement to meet CISPR 35 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

1) Set up the EUT, CDN and test generators as shown on Section 10.2.

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.

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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 $1.5 \cdot 10^{-3}$ 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.

10.5.1. For signal lines and control lines ports:

Select tests based on product characteristics.

10.5.2. For DC output line ports:

Select tests based on product characteristics.

10.6. Test Results

PASS

Please refer to the following page



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Injected Currents Susceptibility Test Results

Humidity : 54%		Temperature : 23.7°C	
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			

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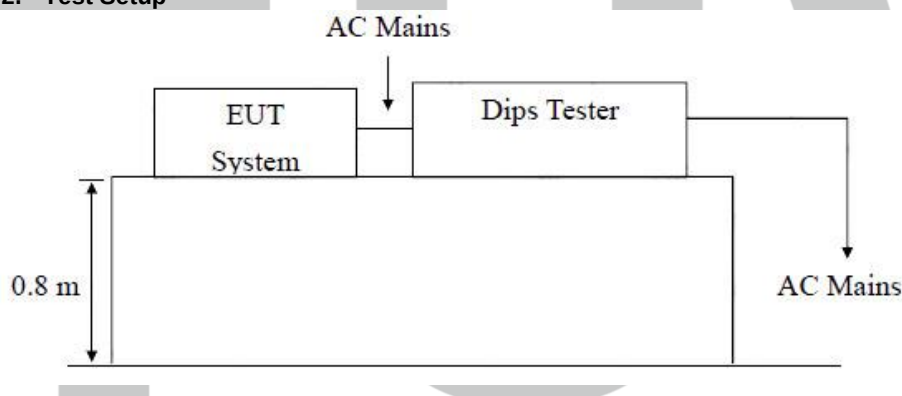
11. Voltage Dips and Interruptions Test

11.1. Test Standard and Level

Test Standard:	CISPR 35 (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
/	/	*

11.2. Test Setup



11.3. EUT Configuration on Measurement

The following equipments are installed on voltage dips and interruptions measurement to meet CISPR 35 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 and test generator as shown on Section 11.2.

2) The interruptions is introduced at selected phase angles with specified duration.

3) Record any degradation of performance.

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11.6. Test Results

PASS

Please refer to the following page



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Voltage Dips and Interruptions Test Results

Temperature : 23.7°C		Humidity : 54%	
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

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ANNEX I -- TEST SETUP PHOTOGRAPH

Photo of Power Line
Conducted Emission Test



Photo of Radiated Emission Test



Photo of Flicker/ Harmonic Test



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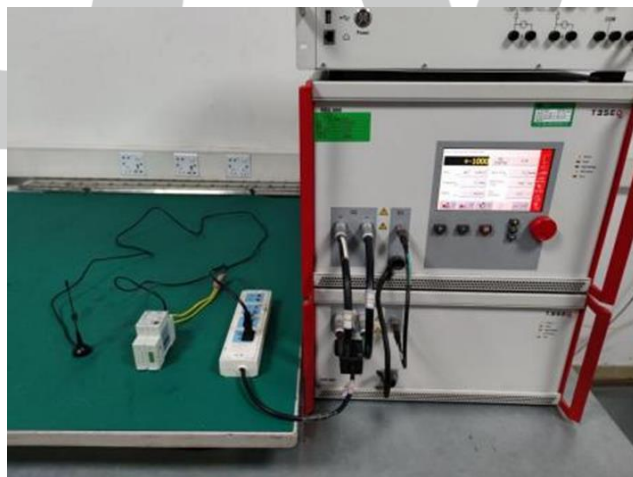
Photo of Electrostatic Discharge Immunity Test



Photo of RF Field Strength susceptibility Test



Photo of Electrical Fast Transient/Burst Immunity Test



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Photo of Surge Immunity Test



Photo of Injected currents susceptibility Test

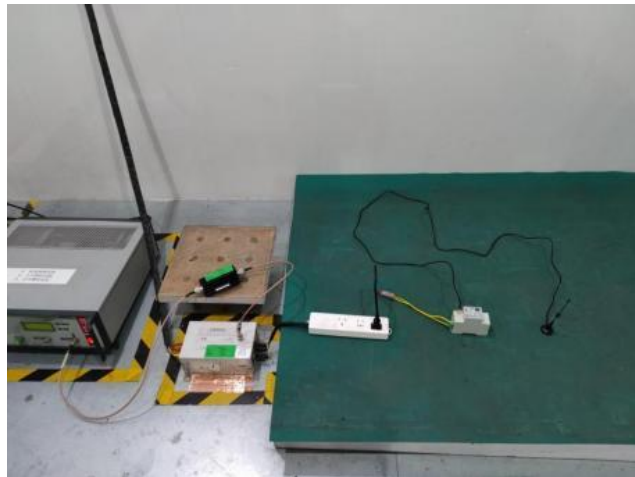
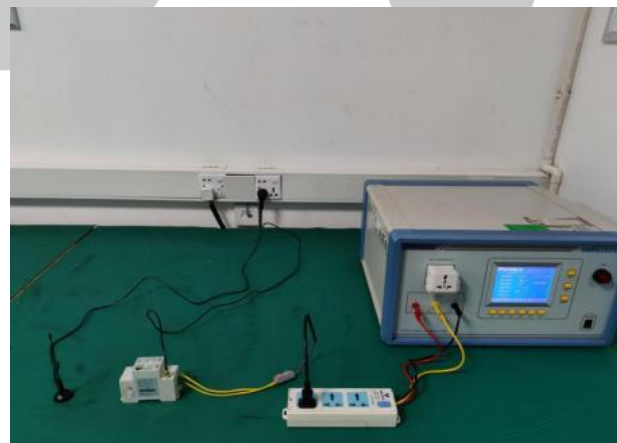


Photo of Voltage Dips and Interruptions Test



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ANNEX II -- PHOTO DOCUMENTATION

Photo 1



Photo 2



Photo 3



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Photo 4



Photo 5



Photo 6



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Photo 7

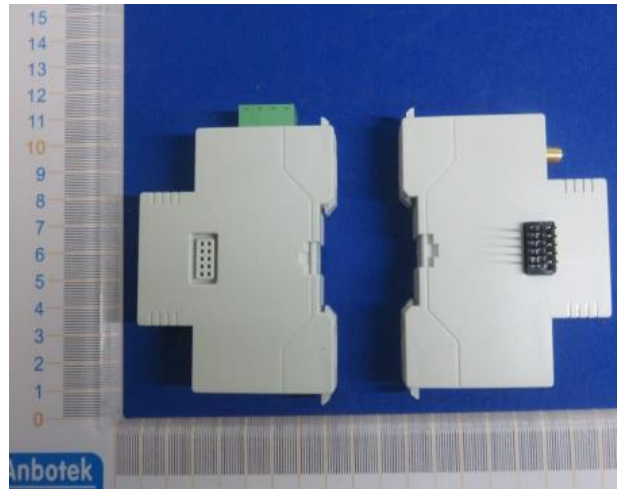


Photo 8



Photo 9



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Photo 10

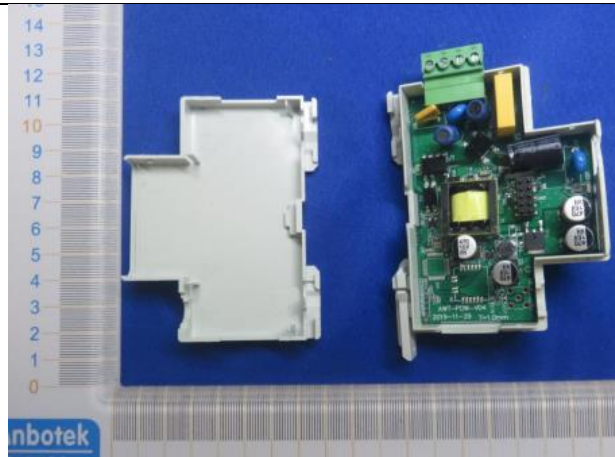


Photo 11

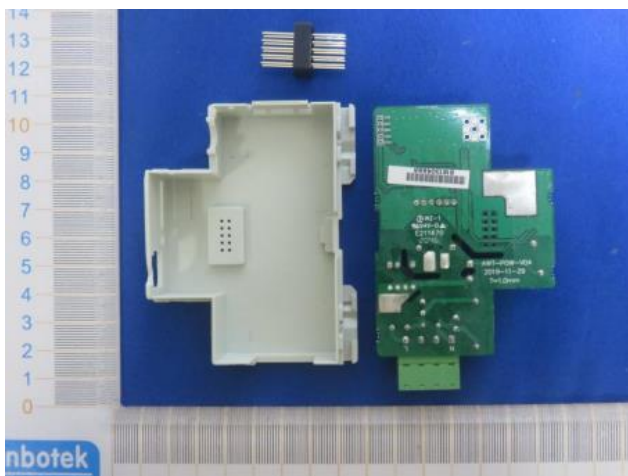


Photo 12



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Photo 13



Photo 14



Photo 15



***** END OF REPORT *****