EMC TEST REPORT

Report No: FCS202608046E01

Issued for

Applicant:	Dongguan Onais Technology Co., Ltd.
Address:	Room 801, Building 2, No. 90, Fenghuang Road, Dalingshan Town, Dongguan City, Guangdong Province
Product Name:	Air Tightness Tester
Brand Name:	OUNAISI
Model Name:	BS0Z-01
Series Model:	BS0AR01, BS0AR02, BS0AR04, BS0BR01, BS0BR02, BS0BR04, BS0CR01, BS0CR02, BS0CR04, BS0ZR01, BS0ZR02, BS0ZR04, BS1AR01, BS1AR02, BS1AR04, BS1BR01, BS1BR02, BS1BR04, BS1CR01, BS1CR02, BS1CR04, BS1ZR01, BS1ZR02, BS1ZR04, BS0A-01, BS0A-02, BS0A-04, BS0B-01, BS0B-02, BS0B-04, BS0C-01, BS0C-02, BS0C-04, BS0Z-02, BS0Z-04, BS1A-01, BS1A-02, BS1A-04, BS1B-01, BS1B-02, BS1B-04, BS1C-01, BS1C-02, BS1C-04, BS1Z-01, BS1Z-02, BS1Z-04
Test Standard:	EN IEC 61326-1:2021

Issued By: Dongguan Funas Testing Technology Co.,Ltd
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TEST RESULT CERTIFICATION

Applicant's Name.....:	Dongguan Onais Technology Co., Ltd.
Address.....:	Room 801, Building 2, No. 90, Fenghuang Road, Dalingshan Town, Dongguan City, Guangdong Province
Manufacture's Name.....:	Dongguan Onais Technology Co., Ltd.
Address.....:	Room 801, Building 2, No. 90, Fenghuang Road, Dalingshan Town, Dongguan City, Guangdong Province

Product Description

Product Name.....:	Air Tightness Tester
Brand Name .....:	OUNAISI
Model Name.....:	BS0Z-01
Series Model.....:	Please refer to page 1 of the report.
Test Standards.....:	EN IEC 61326-1:2021

This device described above has been tested by FCS, and the test results show that the equipment under test (EUT) is in compliance with the EMC Directive : 2014/30/EU requirements. And it is applicable only to the tested sample identified in the report.
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Date of Test.....:	
Date (s) of performance of tests....:	Aug. 04, 2026~Aug. 10, 2026
Date of Issue.....:	Aug. 10, 2026
Test Result.....:	Pass

Tested by : Lingxin Peng
(Ling xin Peng)

Reviewed by : Lingxin Peng
(Ling xin Peng)

Approved by : Jack Wang
(Jack Wang)

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Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	Aug. 10, 2026	FCS202608046E01	N/A	Initial Issue
Note: Format version of the report -V00				

1. TEST SUMMARY

Test procedures according to the technical standards:

EMC Emission				
Standard	Test Item	Limit	Judgment	Remark
EN IEC 61326-1:2021	Conducted Emissions From The AC Mains Power Ports	Class B	PASS	
	Conducted Emissions From Asymmetric Mode	Class B	N/A	
	Conducted Differential Voltage Emissions	Class B	N/A	
	Radiated Emissions	Class B	PASS	
EN IEC 61000-3-2:2019/A2:2024	Harmonic Current Emission	Class A	PASS	
EN IEC 61000-3-3:2013/A2:2021/AC:2022-01	Voltage Fluctuations & Flicker	------	PASS	
EMC Immunity				
Section	Test Item	Performance Criteria	Judgment	Remark
EN IEC 61000-4-2:2025	Electrostatic Discharge	B	PASS	
EN IEC 61000-4-3:2020	RF Electromagnetic Field	A	PASS	
EN IEC 61000-4-4:2012	Fast Transients	B	PASS	
EN 61000-4-5:2014/A1:2017	Surges	B	PASS	
EN IEC 61000-4-6:2023	Radio-frequency Common Mode / Conducted Susceptibility	A	PASS	
EN IEC 61000-4-11:2021	Volt. Interruptions Volt. Dips	B / C / C	PASS	

1.1 TEST FACTORY

Company Name:	Dongguan Funas Testing Technology Co.,Ltd.
Address:	Room 105, 1/F., Baohao Technology Building 1, No.15, Gongye West Road, Songshan Lake Hi-Tech Industrial Area, Dongguan, Guangdong, China
Telephone:	+86-0769-27280901
Fax:	+86-0769-27280901
Laboratory Accreditations	
FCC Test Firm Registration Number: 514908 CNAS Number： L15566 Designation number：CN0127 A2LA accreditation number：5545.01 ISED Number：25801	

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**, where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**, providing a level of confidence of approximately**95** %.

A. Conducted Measurement:

Test Site	Method	Measurement Frequency Range	U，(dB)	NOTE
FCSC01	ANSI	9KHz ~ 150KHz	3.18	
		150 KHz ~ 30MHz	2.70	

B. Radiated Measurement:

Test Site	Method	Measurement Frequency Range	U，(dB)	NOTE
FCSC02	ANSI	9KHz ~ 30MHz	2.50	
		30MHz ~ 200MHz	3.43	
		200MHz ~ 1000MHz	3.57	
		1GHz ~ 6 GHz	4.13	

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Air Tightness Tester
Brand Name	OUNAISI
Model Name	BS0Z-01
Series Model	Please refer to page 1 of the report.
Product Differences	PCB board, structure and internal of these model(s) are the same, only differing in appearance and color. So no additional models were tested.
Power Supply	For Adapter: INPUT: 100-240VAC 50/60Hz 1.3-0.6A OUTPUT: 24V⎓ 3.75A, 90W MAX For EUT: 24V⎓ 3.75A, 90W MAX
Battery	N/A

2.2 DESCRIPTION OF THE TEST MODES

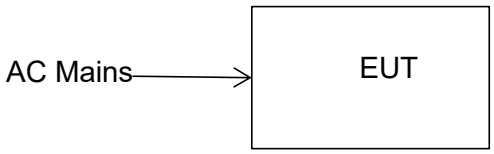
To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Working mode

Note: The test modes were carried out for all operation modes. Only worst case will be show in this report.

2.3 DESCRIPTION OF THE TEST SETUP

Mode 1:



2.4 DESCRIPTION TEST PERIPHERAL AND EUT PERIPHERAL

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.

Accessories equipment

Mode 1:

Item	Equipment	Mfr/Brand	Model/Type No.
01	Adapter	MEAN WELL ENTERPRISES CO., LTD.	G8M90A24

Auxiliary equipment

Mode 2:

Item	Equipment	Mfr/Brand	Model/Type No.

Cable

Mode 1:

Item	Type	Shielded Type	Ferrite Core	Length

Mode 2:

Item	Type	Shielded Type	Ferrite Core	Length

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

(3) “YES” means “shielded” “with core”; “NO” means “unshielded” “without core”.

2.5 MEASUREMENT INSTRUMENTS LIST

2.5.1 CONDUCTED TEST SITE

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
EMI Test Receiver	R&S	ESRP3	101947	2025/8/25	2026/8/24
LISN	R&S	ENV216	101147	2025/8/25	2026/8/24
Temperature & Humidity	victor	HTC-1	FCS-E008	2025/9/1	2026/8/31
Testing Software	EMC-COM 3A1.1				

2.5.2 RADIATED TEST SITE

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
EMI Test Receiver	R&S	ESCI	101122	2025/8/25	2026/8/24
Bi-log Antenna	SCHWARZBECK	VULB 9168	00943	2025/11/6	2026/11/5
Horn Antenna	SCHWARZBECK	BBHA 9120D	1343	2025/9/9	2026/9/8
Pre-amplifier(1G-18G)	Agilent	8449B	4035A00118	2025/8/25	2026/8/24
Pre-amplifier(0.1M-3GHz)	EMC INSTRUMENTS CORPORATION	EMC330N	980622	2025/8/25	2026/8/24
Spectrum Analyzer	Agilent	E4407B	MY41444320	2025/8/25	2026/8/24
Temperature & Humidity	Yuhuaze	N/A	FCS-E009	2025/9/1	2026/8/31
Testing Software	FA-03A2 RE+				

2.5.3 HARMONICS AND FLICKER

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Harmonic Voltage & Flicker	CNS	HFA-1-16	20210803	2025/8/25	2026/8/24
AC Power Source	CI	3001 ix	58372	2025/8/25	2026/8/24
Temperature & Humidity	N/A	N/A	FCS-E012	2025/9/1	2026/8/31
Testing Software	v1.0.1.5				

2.5.4 ESD

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Electrostatic Discharge Simulator	emtest	Dito	1070011337	2025/9/1	2026/8/31
Temperature & Humidity	victor	HTC-1	FCS-E006	2025/9/1	2026/8/31

2.5.5 SURGE, EFT/BURST, VOLTAGE INTERRUPTION/DIPS

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
EFT & Lightning Surge Tester	3ctest	CCS500	ES0851704	2025/8/26	2026/8/25
DIPS Voltage Dip Tester	3ctest	PFS 2216S	ES049001322005	2025/8/25	2026/8/24
Voltage Converter	Xinju	KM-2000	FCS-E051	2025/8/25	2026/8/24
Temperature & Humidity	N/A	N/A	FCS-E012	2025/9/1	2026/8/31

2.5.6 INJECTION CURRENT

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Signal Generator	TESEQ	NSG 4070	31455	2025/8/25	2026/8/24
CDN	TESEQ	CND M016	35818	2025/8/25	2026/8/24
Attenuator	GrenTech	6db	GR9202193	2025/8/25	2026/8/24
Temperature & Humidity	victor	HTC-1	FCS-E006	2025/9/1	2026/8/31

2.5.7 RS

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Power Meter	Agilent	E4419B	QB4331226	2025/8/25	2026/8/24
Power Sensor	Hp	E9300A	US39210170	2025/8/25	2026/8/24
Power Sensor	Hp	E9300A	US39210476	2025/8/25	2026/8/24
Signal Generator	Agilent	N5181A	MY56144718	2025/8/25	2026/8/24
Power Amplifier	MICOTOP	MPA-80-1000-250	MPA1711489	2025/8/25	2026/8/24
Power Amplifier	MICOTOP	MPA-1000-3000-75	MPA1711488	2025/8/25	2026/8/24
Power Amplifier	MICOTOP	MPA-3000-6000-50	MPA1711490	2025/8/25	2026/8/24
RS Test Antenna (80-1GHz)	SCHWARZBECK	VULP 9118E	000999	2025/8/25	2026/8/24
RS Test Antenna (1G-10GHz)	SCHWARZBECK	STLP 9149	000648	2025/8/25	2026/8/24
Universal Radio Communication Tester	R&S	CMU200	109200	2025/8/25	2026/8/24
Universal Radio Communication Tester	R&S	CMW500	117239	2025/8/25	2026/8/24
Audio Analyzer	R&S	UPL	100689	2025/8/25	2026/8/24
Audio Breakthrough Shielding Box	SKET	SB_ABT/C35	N/A	2025/8/25	2026/8/24
Ear Simulator	SKET	AE_ABT/C35	N/A	2025/8/25	2026/8/24
Mouth Simulator	SKET	AM_ABT/C35	N/A	2025/8/25	2026/8/24
1KHz Standard Source	SKET	MSC_ABT/C35	N/A	2025/8/25	2026/8/24
Field Probe	Narda	EP601	611WX80261	2025/8/25	2026/8/24
Temperature & Humidity	Mieo	HH660	N/A	2025/8/25	2026/8/24
Testing Software	EMC-S V1.2.0.90				

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 REQUIREMENTS FOR CONDUCTED EMISSIONS FROM THE AC MAINS POWER PORTS OF THE CLASS A EQUIPMENT

FREQUENCY (MHz)	Coupling device	Detector type / bandwidth	Class A limits dB(μV)
0.15 - 0.5	AMN	Quasi Peak / 9 kHz	79
0.50 - 30			73
0.15 - 0.5	AMN	Average / 9 kHz	66
0.50 - 30			60

3.1.2 REQUIREMENTS FOR CONDUCTED EMISSIONS FROM THE AC MAINS POWER PORTS OF THE CLASS B EQUIPMENT

FREQUENCY (MHz)	Coupling device	Detector type / bandwidth	Class B limits dB(μV)
0.15 - 0.5	AMN	Quasi Peak / 9 kHz	66 - 56*
0.50 - 5			56
5 - 30			60
0.15 - 0.5	AMN	Average / 9 kHz	56 - 46*
0.50 - 5			46
5 - 30			50

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

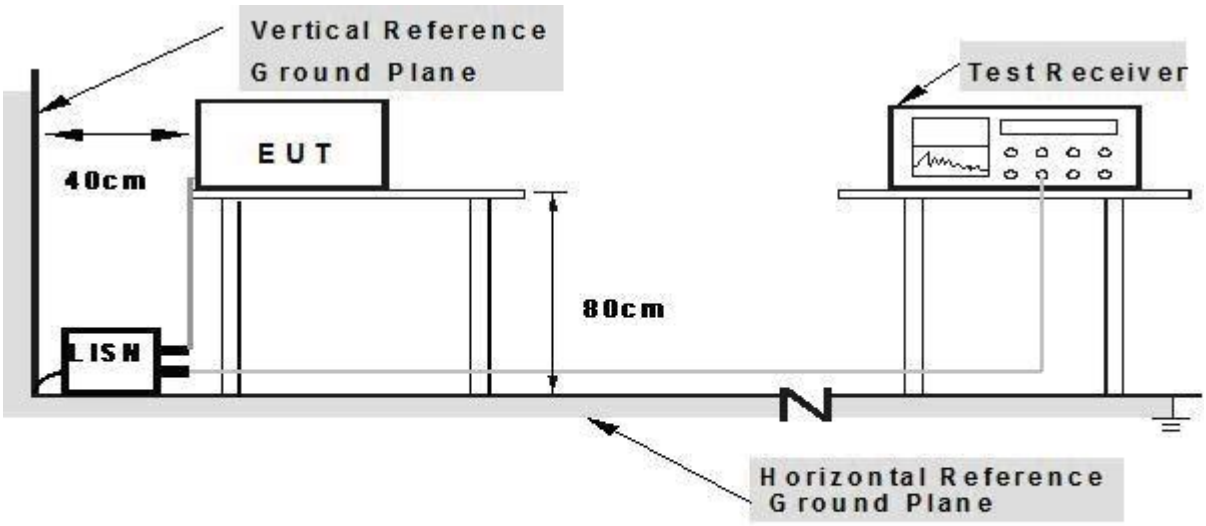
The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.1.3 TEST PROCEDURE

a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

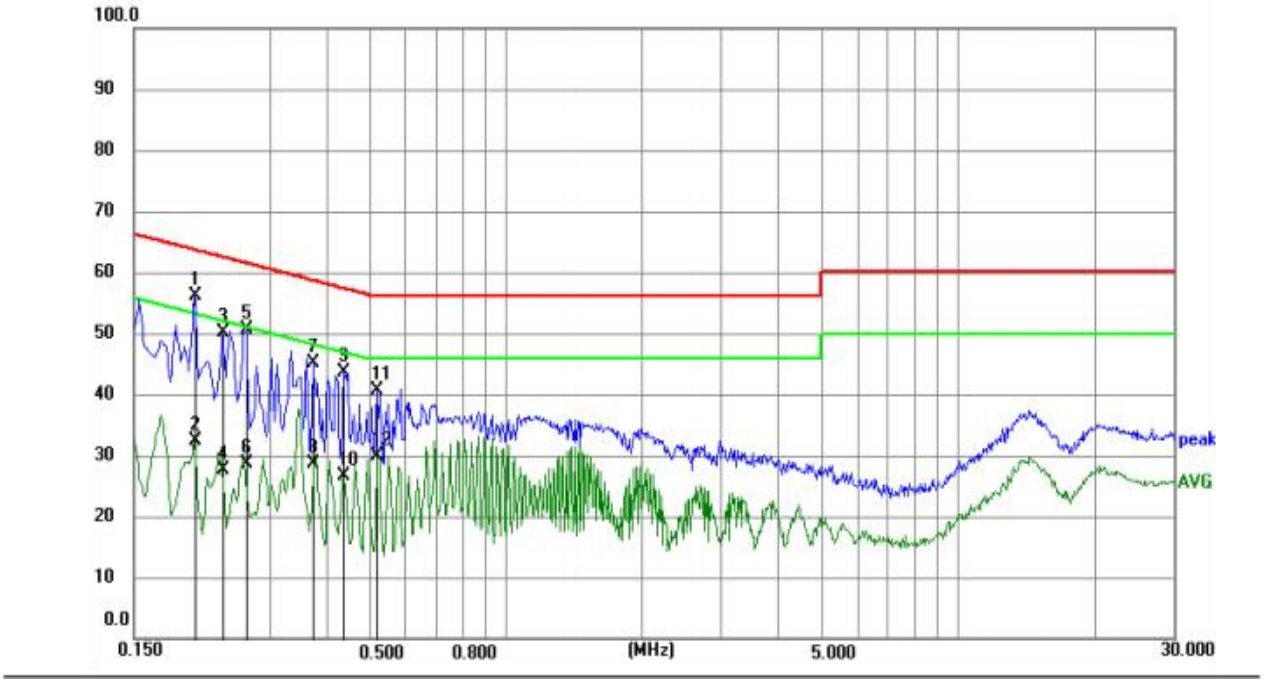
3.1.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the following during the testing.

3.1.6 TEST RESULTS

Temperature:	25.3℃	Relative Humidity:	57%
Phase:	L	Test Mode:	Mode 1
Test Voltage:	AC 230V/50Hz		

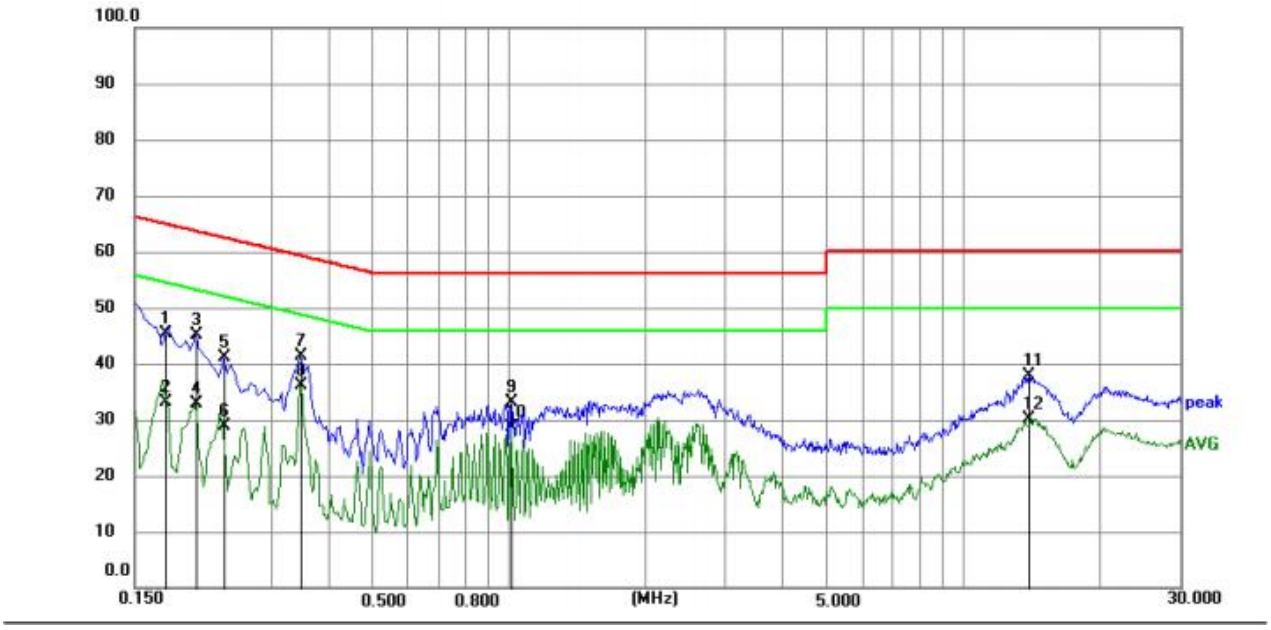
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.2040	45.84	10.39	56.23	63.45	7.22	QP
2	0.2040	21.88	10.39	32.27	53.45	21.18	AVG
3	0.2355	39.67	10.39	50.06	62.25	12.19	QP
4	0.2355	17.21	10.39	27.60	52.25	24.65	AVG
5	0.2670	40.18	10.40	50.58	61.21	10.63	QP
6	0.2670	18.29	10.40	28.69	51.21	22.52	AVG
7	0.3750	34.87	10.38	45.25	58.39	13.14	QP
8	0.3750	18.30	10.38	28.68	48.39	19.71	AVG
9	0.4380	33.33	10.37	43.70	57.10	13.40	QP
10	0.4380	16.16	10.37	26.53	47.10	20.57	AVG
11	0.5190	30.26	10.37	40.63	56.00	15.37	QP
12	0.5190	19.40	10.37	29.77	46.00	16.23	AVG



Remark:All readings are Quasi-Peak and Average values.

Temperature:	25.3℃	Relative Humidity:	57%
Phase:	N	Test Mode:	Mode 1
Test Voltage:	AC 230V/50Hz		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1749	35.14	10.22	45.36	64.72	19.36	QP
2	0.1749	23.02	10.22	33.24	54.72	21.48	AVG
3	0.2040	34.93	10.21	45.14	63.45	18.31	QP
4	0.2040	22.58	10.21	32.79	53.45	20.66	AVG
5	0.2355	30.96	10.19	41.15	62.25	21.10	QP
6	0.2355	18.70	10.19	28.89	52.25	23.36	AVG
7	0.3480	31.07	10.20	41.27	59.01	17.74	QP
8	0.3480	25.86	10.20	36.06	49.01	12.95	AVG
9	1.0139	23.06	10.14	33.20	56.00	22.80	QP
10	1.0139	18.55	10.14	28.69	46.00	17.31	AVG
11	13.9740	25.28	12.53	37.81	60.00	22.19	QP
12	13.9740	17.50	12.53	30.03	50.00	19.97	AVG



Remark:All readings are Quasi-Peak and Average values.

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 LIMITS OF THE RADIATED EMISSION MEASUREMENT

FREQUENCY (MHz)	Distance （m）	Detector type/ bandwidth	Class A	Class B
			dBμV/m	dBμV/m
30 - 230	3	Quasi peak/ 120 kHz	50	40
230 - 1000	3	Quasi peak/ 120 kHz	57	47
1000 - 3000	3	Peak /1 MHz	76	70
3000 - 6000	3	Peak /1 MHz	80	74
1000 - 3000	3	AV/1 MHz	56	50
3000 - 6000	3	AV/1 MHz	60	54

Notes:

(1) The tighter limit applies at the band edges.

(2) Emission level (dBuV/m) = 20log Emission level (uV/m).

3.2.3 TEST PROCEDURE

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.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.2.4 TEST SETUP

(A) Radiated Emission Test Set-Up Frequency Below 1 GHz

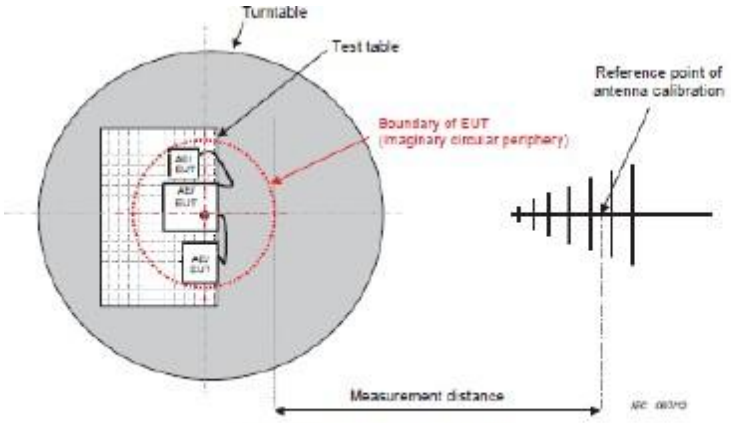


Figure C.1 – Measurement distance

(B) Radiated Emission Test Set-Up Frequency Above 1GHz

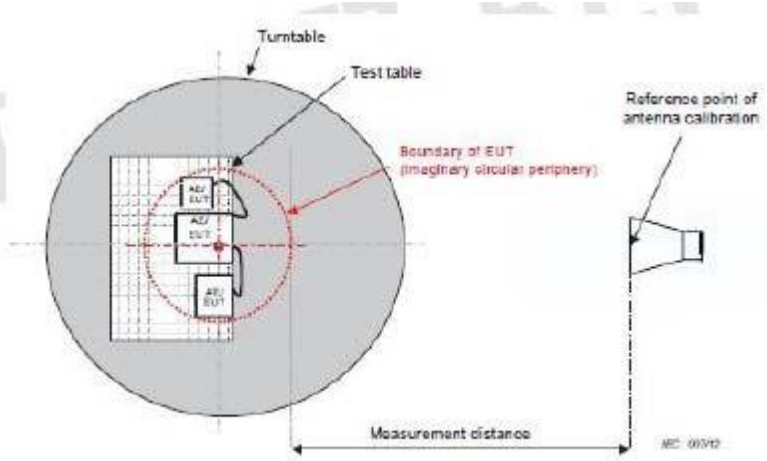


Figure C.1 – Measurement distance

3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the following during the testing.

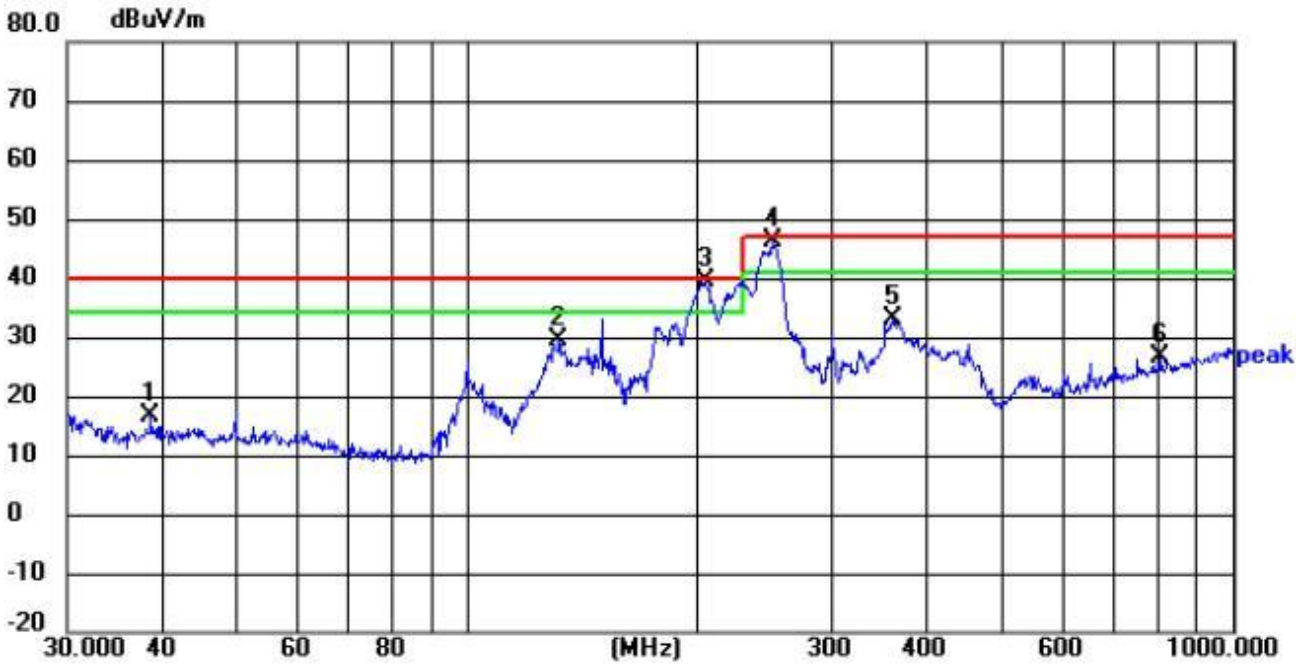
3.2.6 TEST RESULTS

Temperature:	24.4℃	Relative Humidity:	51%
Phase:	Horizontal	Test Mode:	Mode 1
Test Voltage:	AC 230V/50Hz		

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	38.6160	28.38	-11.71	16.67	40.00	-23.33	QP
2	131.7577	42.26	-12.91	29.35	40.00	-10.65	QP
3	204.2377	54.30	-14.95	39.35	40.00	-0.65	QP
4	250.3011	59.28	-13.12	46.16	47.00	-0.84	QP
5	360.4476	43.31	-10.21	33.10	47.00	-13.90	QP
6	801.7863	28.20	-1.45	26.75	47.00	-20.25	QP

Remark:

1. All readings are Quasi-Peak.
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor= Cable Loss +Antenna Factor-Amplifier Gain

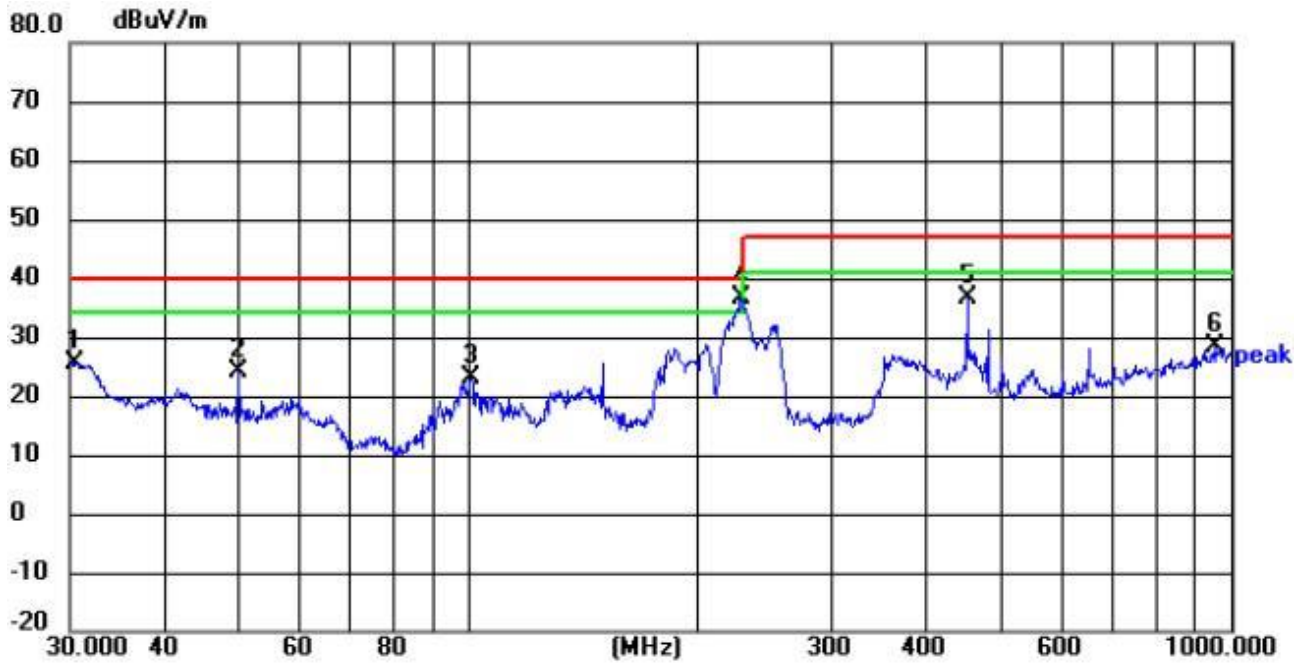


Temperature:	24.4℃	Relative Humidity:	51%
Phase:	Vertical	Test Mode:	Mode 1
Test Voltage:	AC 230V/50Hz		

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	30.5306	37.97	-12.30	25.67	40.00	-14.33	QP
2	49.8814	36.25	-12.22	24.03	40.00	-15.97	QP
3	100.5806	38.49	-15.63	22.86	40.00	-17.14	QP
4	227.6906	50.15	-13.68	36.47	40.00	-3.53	QP
5	451.1350	44.22	-7.61	36.61	47.00	-10.39	QP
6	952.0937	28.05	0.37	28.42	47.00	-18.58	QP

Remark:

1. All readings are Quasi-Peak.
2. Margin = Result (Result =Reading + Factor)–Limit
3. Factor= Cable Loss +Antenna Factor-Amplifier Gain



3.3 HARMONICS CURRENT

3.3.1 LIMITS OF THE HARMONICS CURRENT

IEC 555-2					
Table - I			Table - II		
Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in Ampers)	Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in Ampers)
Non Portable Tools or TV Receivers	Odd Harmonics		TV Receivers	Odd Harmonics	
	3	2.30		3	0.80
	5	1.14		5	0.60
	7	0.77		7	0.45
	9	0.40		9	0.30
	11	0.33		11	0.17
	13	0.21		13	0.12
	15≤n≤39	0.15 · 15/n		15≤n≤39	0.10 · 15/n
	Even Harmonics			Even Harmonics	
	2	1.08		2	0.30
	4	0.43		4	0.15
	8	0.30			
	8≤n≤40	0.23 · 8/n		DC	0.05

EN 61000-3-2/IEC 61000-3-2					
Equipment Category	Max. Permissible Harmonic Current (in Ampers)	Equipment Category	Harmonic Order n	Max. Permissible Harmonic Current (in A)	(mA/w)
Class A	Same as Limits Specified in 4-2.1, Table - I, but only odd harmonics required	Class D	3	2.30	3.4
			5	1.14	1.9
			7	0.77	1.0
			9	0.40	0.5
			11	0.33	0.35
			13≤n≤39	see Table I	3.85/n
			only odd harmonics required		

3.3.2 TEST PROCEDURE

a. The EUT was placed on the top of a wooden table 0.8 meters above the ground and operated to produce the maximum harmonic components under normal operating conditions.

b. The classification of EUT is according to section 5 of EN 61000-3-2. The EUT is classified as follows:

Class A: Balanced three-phase equipment, Household appliances excluding equipment as Class D, Tools excluding portable tools, Dimmers for incandescent lamps, audio equipment, equipment not specified in one of the three other classes.

Class B: Portable tools. Portable tools.; Arc welding equipment which is not professional equipment.

Class C: Lighting equipment.

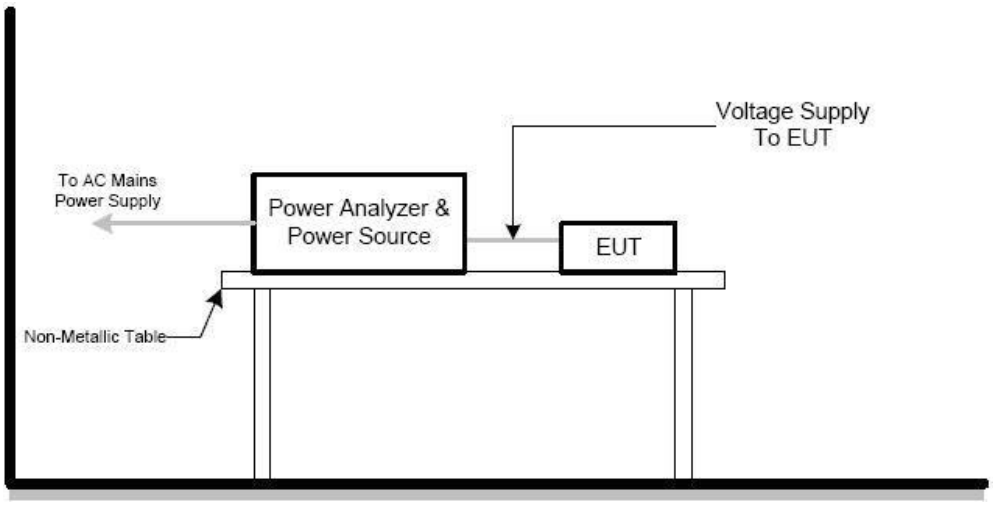
Class D: Equipment having a specified power less than or equal to 600W of the following types: Personal computers and personal computer monitors and television receivers.

c. The correspondent test program of test instrument to measure the current harmonics emanated from EUT is chosen. The measure time shall be not less than the time necessary for the EUT to be exercised.

3.3.3 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the following during the testing.

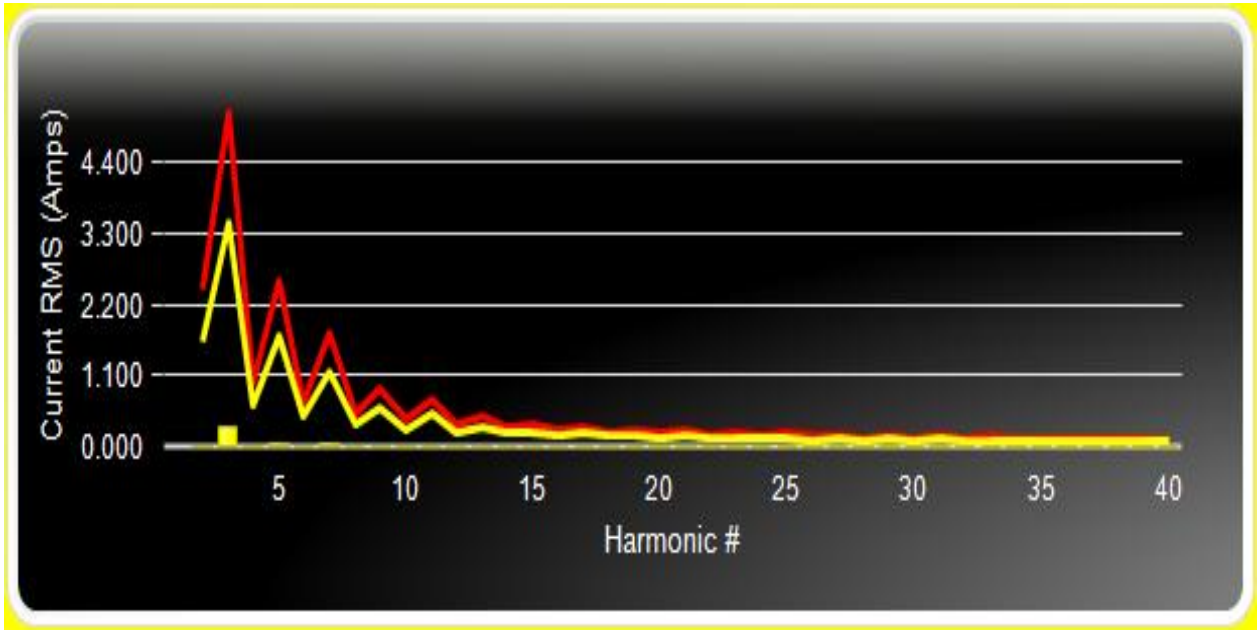
3.3.4 TEST SETUP



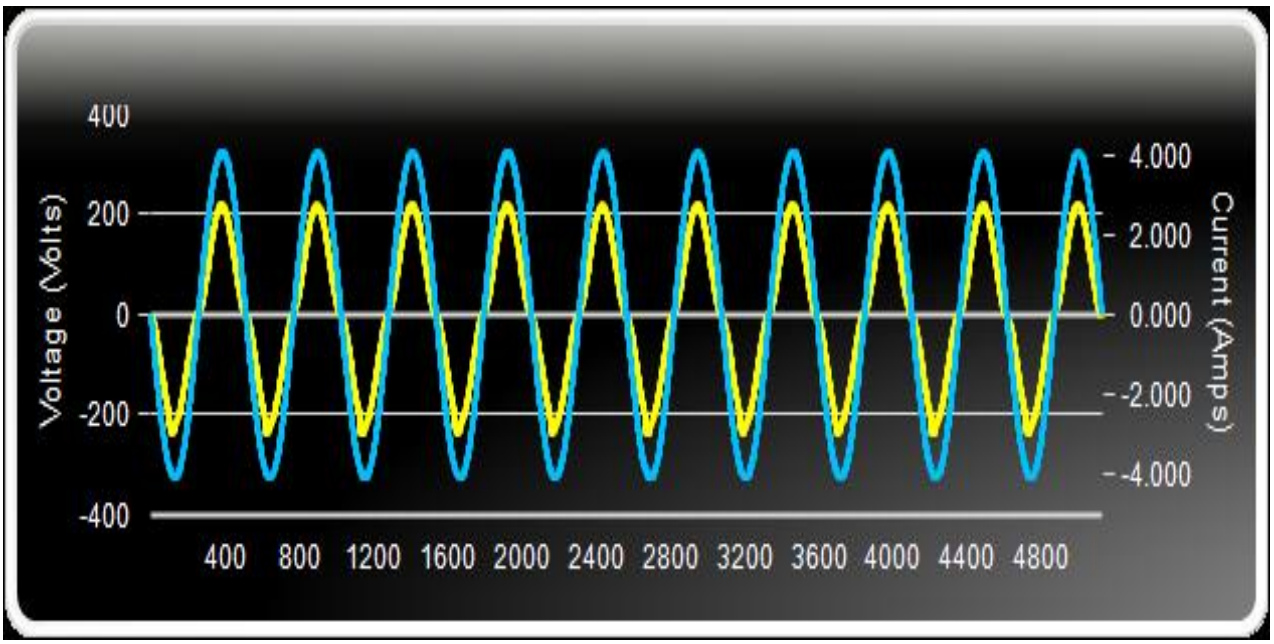
3.3.5 TEST RESULTS

Temperature:	26℃	Relative Humidity:	54%
Test Voltage:	AC 230V/50Hz		

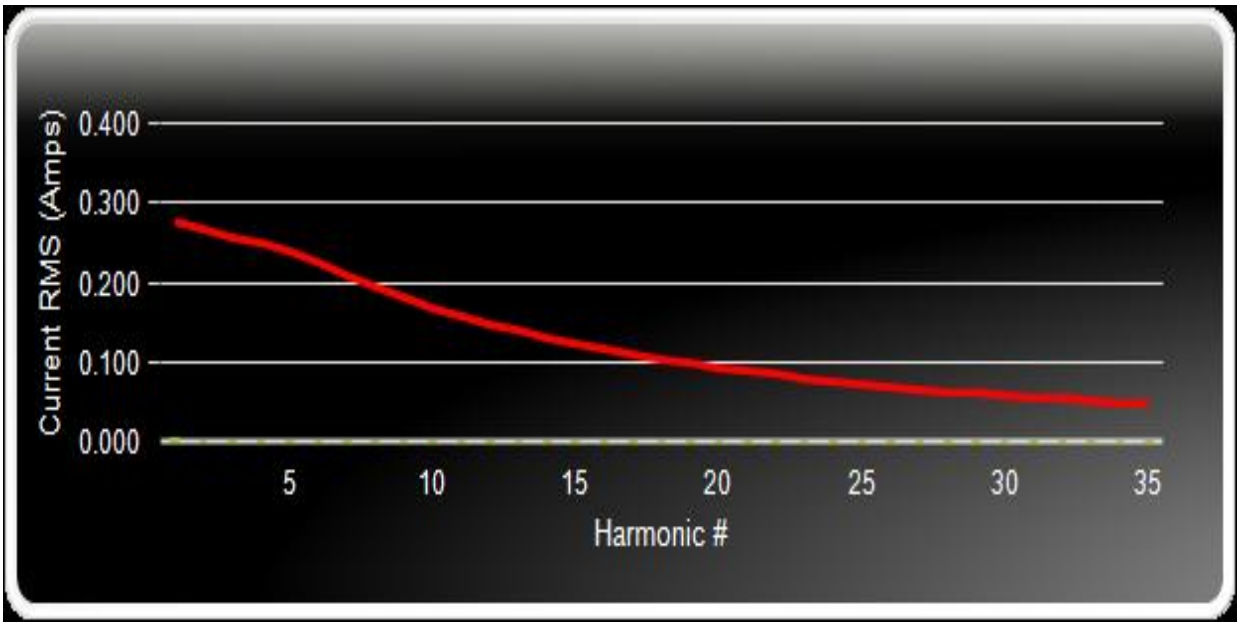
Harmonic Spectrum



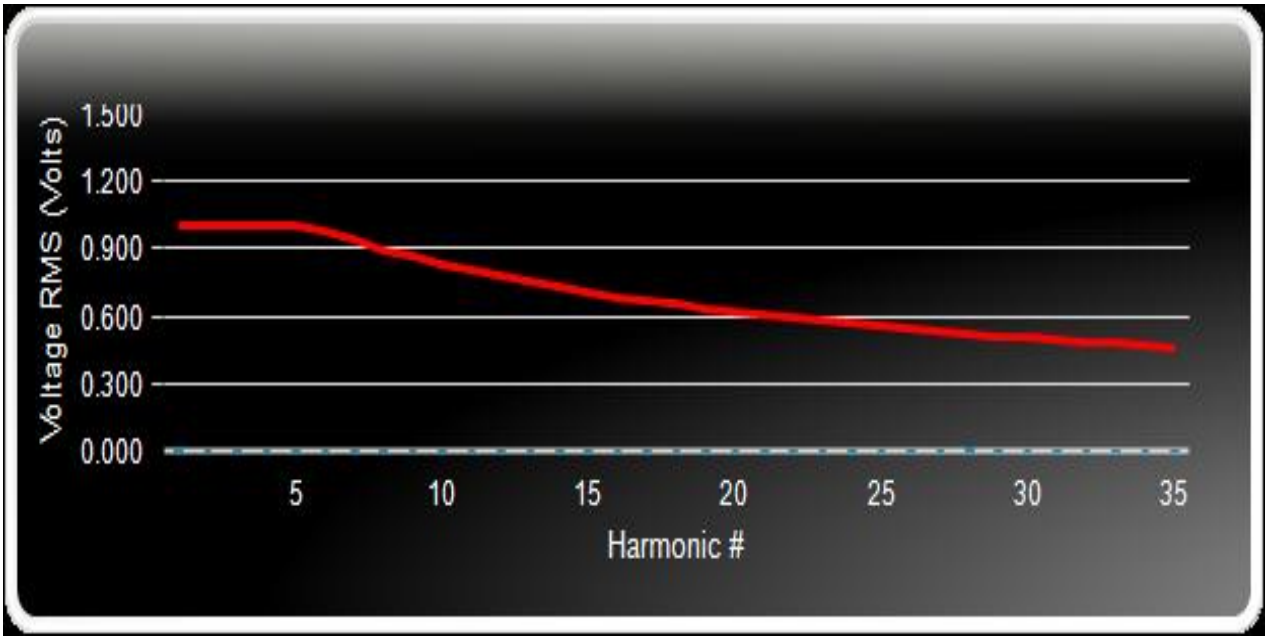
Voltage & Current Waveform



2-9kHz Current Harmonic Spectrum



2-9kHz Voltage Harmonic Spectrum



Note: 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 75W.

3.4 VOLTAGE FLUCTUATION AND FLICKERS

3.4.1 LIMITS OF THE VOLTAGE FLUCTUATION AND FLICKERS

Tests	Measurement Value	Limit	Descriptions
	IEC555-3	IEC/EN 61000-3-3	
P_{st}	≤ 1.0,Tp= 10 min.	≤ 1.0,Tp= 10 min.	Short Term Flicker Indicator
P_{lt}	N/A	≤0.65,Tp=2 hr.	Long Term Flicker Indicator
$T_{dt(s)}$	≤ 3%	≤ 3.3%	Relative Steady-State V-Chang
d_{max}(%)	≤ 4%	≤ 4%	Maximum Relative V-Chang
d_c(%)	N/A	≤ 3.3% for > 500ms	Relative V-change Characteristic

3.4.2 TEST PROCEDURE

a. Fluctuation and Flickers Test:

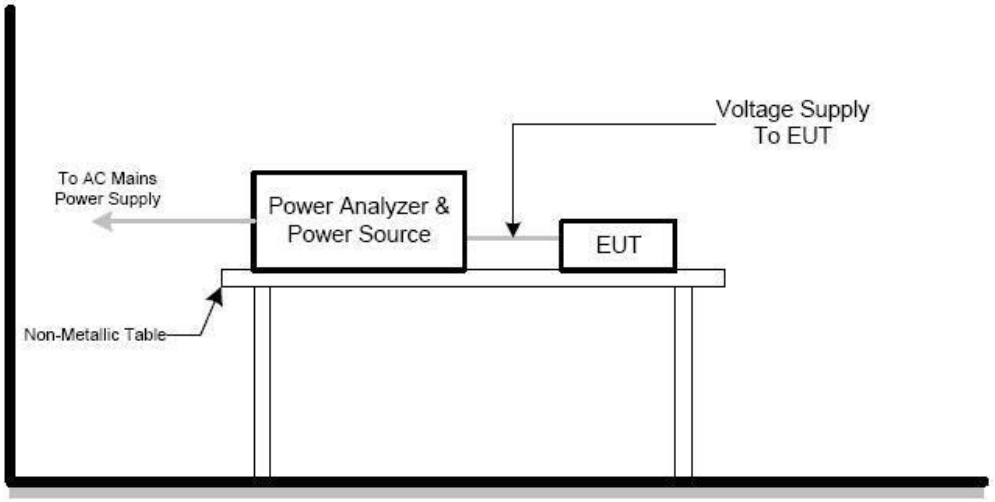
Tests was performed according to the Test Conditions/Assessment of Voltage Fluctuations specified in Clause 5.0/6.0 of IEC555-3 and/or Clause 6.0/4.0 of IEC/EN 61000-3-3 depend on which standard adopted for compliance measurement.

b. All types of voltage fluctuation in this report are assessed by direct measurement using flicker-meter.

3.4.3 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the following during the testing.

3.4.4 TEST SETUP



3.4.5 TEST RESULTS

Temperature:	23.9 ℃	Relative Humidity:	54%
Test Voltage:	AC 230V/50Hz		

Test Parameter	Measurement Value	Limit	Remarks
P_{st}	0.00	1.0	Pass
P_{lt}	--	0.65	--
$T_{dt(s)}$	0.00	0.5	Pass
d_{max}(%)	0.00%	4%	Pass
d_c(%)	0.00%	3.3%	Pass

4. EMC IMMUNITY TEST

4.1 STANDARD COMPLIANCE/SERVRITY LEVEL/CRITERIA

Tests Standard No.	TEST SPECIFICATION	Test Mode Test Ports	Perform. Criteria
1. ESD IEC/EN 61000-4-2	8KV air discharge 4KV contact discharge	Direct Mode	B
	4KV HCP discharge 4KV VCP discharge	Indirect Mode	B
2. RS IEC/EN 61000-4-3	80 MHz - 1000 MHz,1800MHz,2600MHz,3500MHz,5000MHz, 1000Hz, 80%, AM modulated	Enclosure	A
3. EFT/Burst IEC/EN 61000-4-4	5/50ns Tr/Th 5KHz Repetition Freq.	Power Supply Port	B
	5/50ns Tr/Th 5KHz Repetition Freq.	CTL/Signal Data Line Port	B
4. Surges IEC/EN 61000-4-5	1.2/50(8/20) Tr/Th us	L-N	B
	1.2/50(8/20) Tr/Th us	L-PE N-PE	B
5. Injected Current IEC/EN 61000-4-6	0.15 MHz to 80 MHz, 1000Hz 80%, AM Modulated 150Ω source impedance	CTL/Signal Port	A
	0.15 MHz to 80 MHz, 1000Hz 80%, AM Modulated 150Ω source impedance	AC Power Port	A
	0.15 MHz to 80 MHz, 1000Hz 80%, AM Modulated 150Ω source impedance	DC Power Port	A
6. Power Frequency Magnetic Field IEC/EN 61000-4-8	50 Hz,	Enclosure	A
7. Volt. Interruptions Volt. Dips IEC/EN 61000-4-11	Voltage dip 100% Voltage dip 30% Interruption 100%	AC Power Port	B C C

4.2 GENERAL PERFORMANCE CRITERIA

According to EN IEC 61326 standard, the general performance criteria as following:

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.

4.2.1 GENERAL PERFORMANCE CRITERIA TEST SETUP

The EUT tested system was configured as the statements of **2.3** Unless otherwise a special operating condition is specified in the following during the testing.

4.3 ELECTROSTATIC DISCHARGE IMMUNITY TEST (ESD)

4.3.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-2
Discharge Impedance:	330 ohm / 150 pF
Required Performance:	B
Discharge Voltage:	Air Discharge：2KV/4KV/8KV (Direct) Contact Discharge：2KV/4KV (Direct/Indirect)
Polarity:	Positive & Negative
Number of Discharge:	Air Discharge: min. 20 times at each test point Contact Discharge: min. 200 times in total 20 times at each test point
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum

4.3.2 TEST PROCEDURE

The test generator necessary to perform direct and indirect application of discharges to the EUT in the following manners:

a. Electrostatic discharges were applied only to those points and surfaces of the EUT that are accessible to users during normal operation
The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.

The time interval between two successive single discharges was at least 1 second.

The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the EUT.

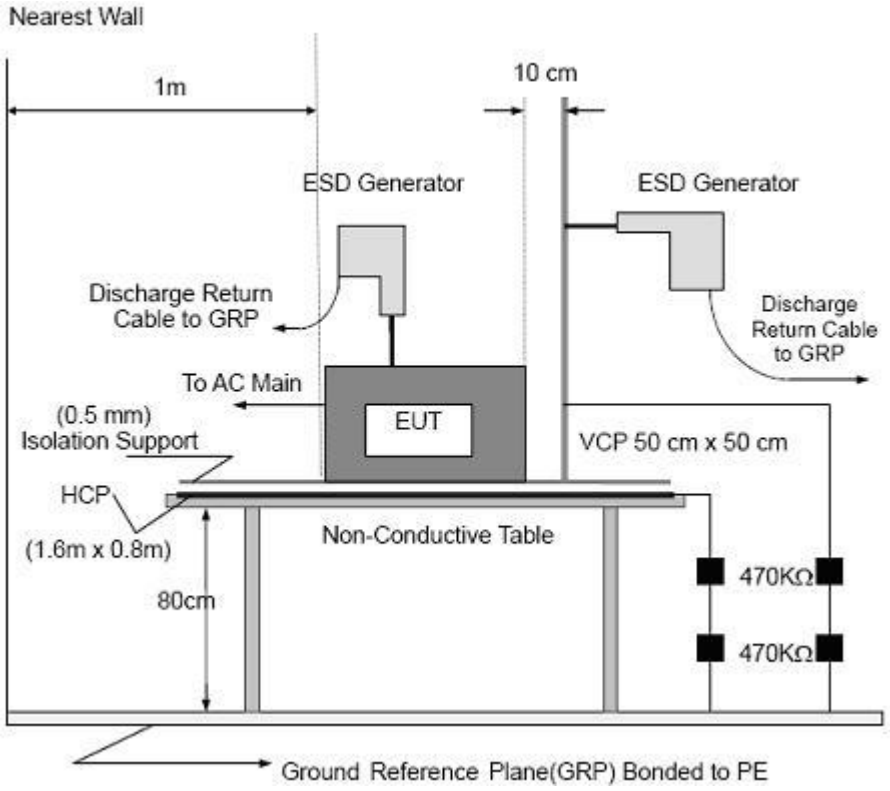
Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.

Air discharges were applied with the round discharge tip of the discharge electrode approaching the EUT as fast as possible (without causing mechanical damage) to touch the EUT. After each discharge, the ESD generator was removed from the EUT and re-triggered for a new single discharge. The test was repeated until all discharges were complete.

Vertical Coupling Plane (VCP):
The coupling plane, of dimensions 0.5m x 0.5m, is placed parallel to, and positioned at a distance 0.1m from, the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.
Horizontal Coupling Plane (HCP):
The coupling plane is placed under to the EUT. The generator shall be positioned vertically at a distance of 0.1m from the EUT, with the Discharge Electrode touching the coupling plane. The four faces of the EUT will be performed with electrostatic discharge.

b. Air discharges at insulation surfaces of the EUT.
It was at least ten single discharges with positive and negative at the same selected point.

4.3.3 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. 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 /EN 61000-4-2, and its cables were placed on the HCP and isolated by an insulating support of 0.5mm thickness. A distance of0.8-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/EN 61000-4-2, and its cables were isolated from the Ground Reference Plane by an insulating support of 0.1 meter thickness. The GRP was consisted of a sheet of aluminum that is at least 0.25mm thick, and extended at least 0.5 meters from the EUT on all sides.

4.3.4 TEST RESULTS

Temperature:	23.9℃	Relative Humidity:	54%
Pressure:	1020.1hPa	Test Voltage:	AC 230V/50Hz
Test Mode:	Mode 1		

Discharge Level	Polarity	Test Points	Contact Discharge	Air Discharge	Criterion	Test Result
4	+/-	VCP/HCP	NOTE	N/A	A	PASS
2,4	+/-	Green Dot	Note	N/A	B	PASS
2,4,8	+/-	Red Dot	N/A	NOTE	B	PASS

Note: The EUT function was correct during the test.
Red Dot —Air Discharged
Green Dot —Contact Discharged

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

4.4.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-3
Required Performance:	A
Frequency Range:	80 MHz - 6000 MHz
Field Strength:	3 V/m
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Polarity of Antenna:	Horizontal and Vertical
Test Distance:	3 m
Antenna Height:	1.5 m
Dwell Time:	1.5x 10^{-3} decade/s

4.4.2 TEST PROCEDURE

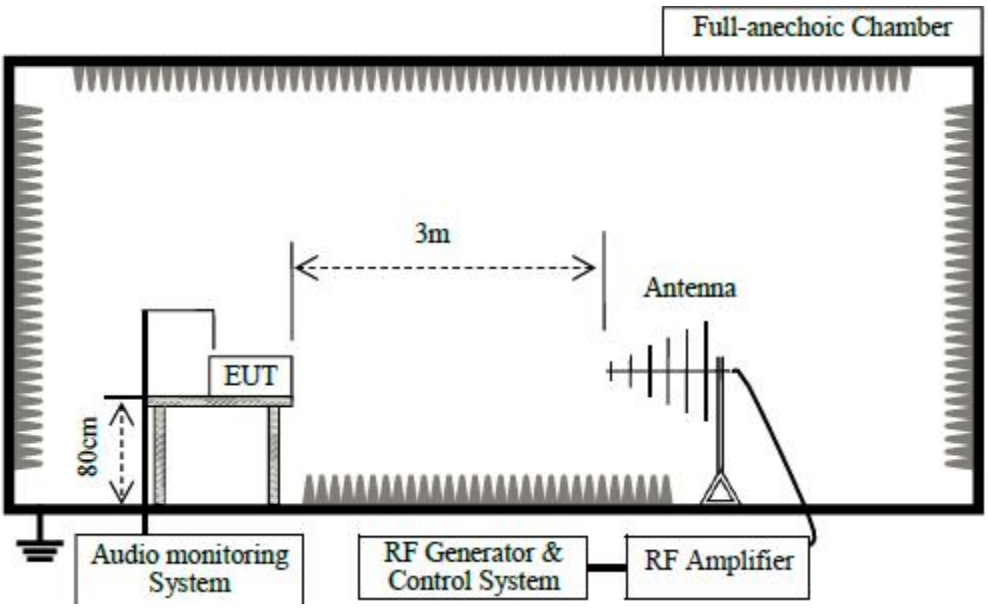
a. The testing was performed in a fully anechoic chamber. The transmit antenna was located at a distance of 3 meters from the EUT.

b. The frequency range is swept from 80 MHz to 1000 MHz, 1800 MHz, 2600 MHz, 3500 MHz, 5000 MHz, with the signal 80% amplitude modulated with a 1kHz sine-wave. The rate of sweep did not exceed 1.5 x 10 $^{-3}$ decade/s, where the frequency range is swept incrementally, the step size was 1% of preceding frequency value.

c. The dwell time at each frequency shall be not less than the time necessary for the EUT to be able to respond.

e. The test was performed with the EUT exposed to both vertically and horizontally polarized fields on each of the four sides.

4.4.3 TEST SETUP



Note:

TABLE-TOP EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/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.

FLOOR-STANDING EQUIPMENT

The EUT installed in a representative system as described in section 7 of IEC/EN 61000-4-3 was placed on a non-conductive wood support 0.1 meters in height. The system under test was connected to the power and signal wire according to relevant installation instructions.

4.4.4TEST RESULTS

Temperature:	23.9℃	Relative Humidity:	54%
Test Voltage:	AC 230V/50Hz	Test Mode:	Mode 1

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Perform. Criteria	Results	Judgment
80MHz - 6000MHz	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	A	A	PASS
			Rear			
			Left			
			Right			
			Rear			
			Left			
			Right			

4.5 ELECTRICAL FAST TRANSIENT (EFT)

4.5.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-4
Required Performance:	B
Test Voltage:	Power Line：1 KV Signal/Control Line：0.5 KV DC network power port:0.5KV
Polarity:	Positive & Negative
Impulse Frequency:	5 kHz
Impulse Wave shape :	5/50 ns
Burst Duration:	15ms
Burst Period:	300ms
Test Duration:	Not less than 1 min.

4.5.2 TEST PROCEDURE

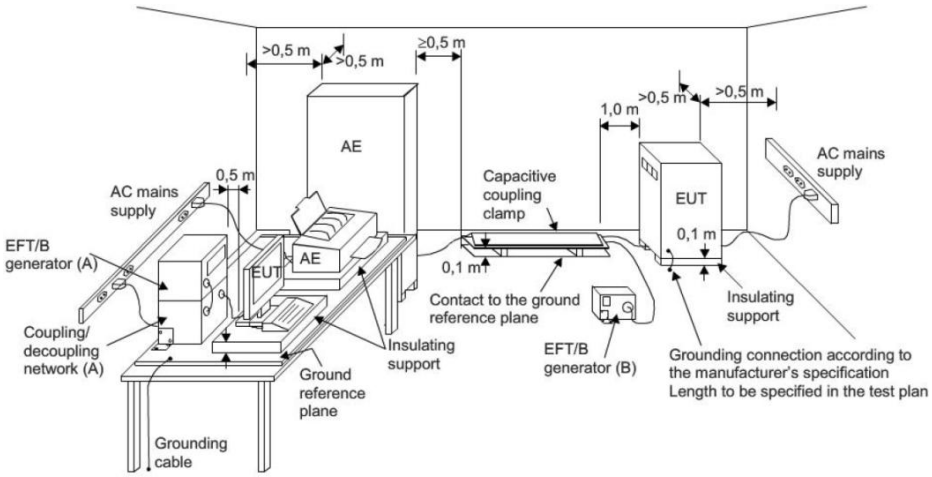
The EUT and support equipment, are placed on a table that is 0.8 meter&0.1 meter above a metal ground plane measured 1m*1m min .
The ground reference plane shall be a metallic sheet (copper or aluminum) of 0. 25 mm minimum thickness; other metallic materials may be used, but they shall have at least 0.65 mm minimum thickness.
The other condition need as following manners:

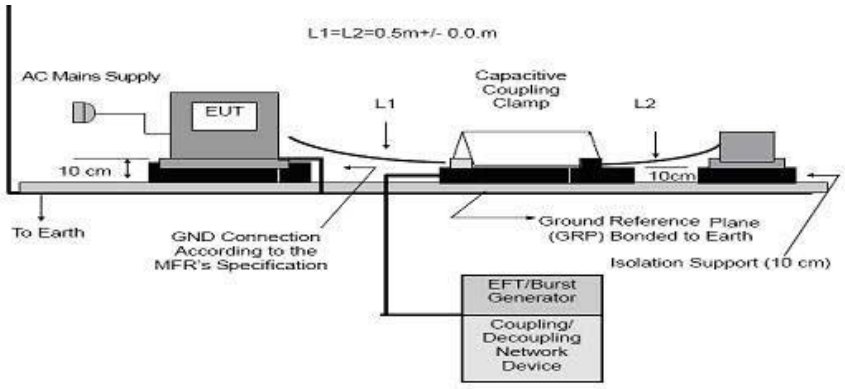
c. The length of power cord between the coupling device and the EUT should not exceed 1 meter.

d. Both positive and negative polarity discharges were applied.

e. The duration time of each test sequential was 1 minute

4.5.3 TEST SETUP





Note:

TABLE-TOP EQUIPMENT

Table-top equipment and equipment normally mounted on ceilings or walls as well as built-in equipment shall be tested with the EUT located (0.1 ± 0.01) m above the ground reference plane.
Testing of large table-top equipment or multiple systems can be performed on the floor; maintaining the same distances as for the test setup of table-top equipment.
The test generator and the coupling/decoupling network shall be bonded to the ground reference plane.
The ground reference plane shall be a metallic sheet (copper or aluminum) of 0. 25mm minimum thickness; other metallic materials may be used , but they shall have at least 0.65 mm minimum thickness.
The minimum size of the ground reference plane is 0.8m x 1m The actual size depends on the dimensions of the EUT.
The ground reference plane shall project beyond the EUT by at least 0.1m on all sides.
The ground reference plane shall be connected to the earth (PE) for safety reasons.
The EUT shall be arranged and connected to satisfy its functional requirements, according to the equipment installation specifications.
The minimum distance between the EUT and all other conductive structures (including the generator, AE and the walls of a shielded room), except the ground reference plane, shall be more than 0.5m.
AII cables to The EUT shall be placed on The insulation support 0.1m above The ground reference plane. Cables not subject to electrical fast transients shall be routed as far as possible from the cable under test to minimize the coupling between the cables.
The EUT shall be connected to the earth system in accordance with the manufacturer's installation specifications; no additional earth connections are allowed.
The connection impedance of the coupling/decoupling network earth cables to the ground reference plane and all connectors shall provide a low inductance
Either a direct coupling network or a capacitive clamp shall be used for the application of the test voltages. The test voltages shall be coupled to all of the EUT ports in turn including those between two units of equipment involved in the test, unless the length of the interconnecting cable makes it impossible to test.

FLOOR-STANDING EQUIPMENT

When using the coupling clamp, the minimum distance between the coupling plates and all other conductive surfaces (including the generator), except the ground reference plane beneath the coupling clamp and beneath the EUT, shall be at least 0.5m.
The distance between any coupling devices and the EUT shall be (0.5 - 0/+0.1) m for tabletop equipment testing, and (1.0 ± 0.1) m for floor standing equipment, unless otherwise specified in product standards. When it is not physically possible to apply the distances mentioned above, other distances can be used and shall be recorded in the test report.
The cable between the EUT and the coupling device, if detachable, shall be as short as possible to comply with the requirements of this clause. If the manufacturer provides a cable exceeding the distance between the coupling device and the point of only of the EUT, the excess length of this cable shall be bundled and situated at a distance of 0,1m above the ground reference plane. When a capacitive clamp is used as a coupling device, the excess cable length shall be bundled at the AE side.
Parts of the EUT with interconnecting cables of a length less than 3m, which are not tested, shall be placed on the insulating support. The parts of the EUT shall have a distance of 0,5m between them. Excess cable length shall be bundled.

4.5.4 TEST RESULTS

Temperature:	23.9℃	Relative Humidity:	54%
Test Voltage:	AC 230V/50Hz	Test Mode:	Mode 1

Coupling Line		Test level	Perform. Criteria	Results	Judgment
AC line	L	±1KV	B	A	PASS
	N	±1KV		A	PASS
	PE	±1KV		A	PASS
	L+N	±1KV		A	PASS
	L+PE	±1KV		A	PASS
	N+PE	±1KV		A	PASS
	L+N+PE	±1KV		A	PASS
DC network power port Line		N/A		N/A	N/A
Signal Line		N/A		N/A	N/A

Note: 1) N/A - denotes test is not applicable in this test report.

4.6 SURGE TESTING

4.6.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-5
Required Performance:	B
Wave-Shape:	Combination Wave 1.2/50us Open Circuit Voltage
Test Voltage:	Power line ~ line to line: 1 KV line to ground: 2KV Telecommunication line: 0.5KV DC network power port:0.5KV
Surge Input/Output:	L-N, L-PE, N-PE
Generator Source:	(L-N)2 ohm between networks
Impedance:	(L-PE, N-PE)12 ohm between network and ground
Polarity:	Positive/Negative
Phase Angle:	0°/90°/180°/270°
Pulse Repetition Rate:	1 time / min. (maximum)
Number of Tests:	5 positive and 5 negative at selected points

4.6.2 TEST PROCEDURE

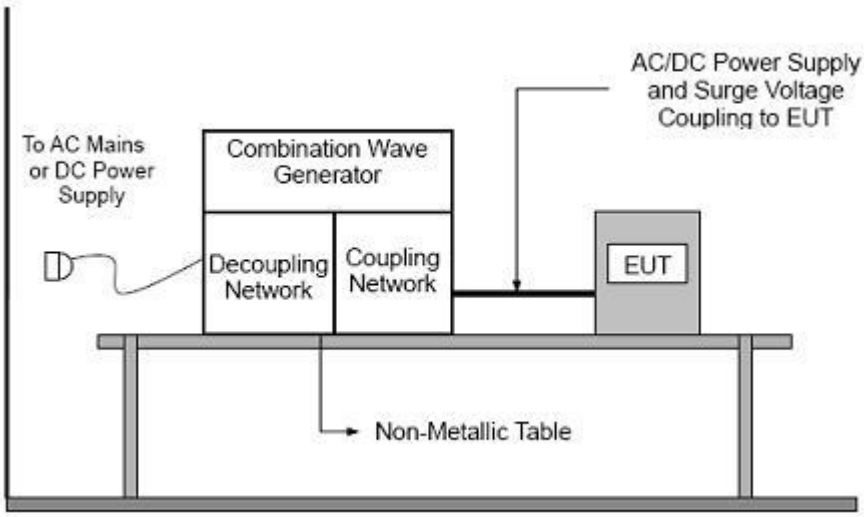
a. For EUT power supply:

b. 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 2meters in length (or shorter).

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

d. 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).

4.6.3 TEST SETUP



4.6.4 TEST RESULTS

Temperature:	23.9℃	Relative Humidity:	54%
Test Voltage:	AC 230V/50Hz	Test Mode:	Mode 1

Coupling Line		Test level	Perform. Criteria	Results	Judgment
AC line	L-N	±1KV	B	A	PASS
	L-PE	±2KV		A	PASS
	N-PE	±2KV		A	PASS
DC network power port		N/A		N/A	N/A
Signal Line		N/A		N/A	N/A

Note: 1) N/A - denotes test is not applicable in this test report.

4.7 CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

4.7.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-6
Required Performance:	A
Frequency Range:	0.15 MHz - 80 MHz
Field Strength:	0.15 MHz - 80 MHz, 3V.
Modulation:	1kHz Sine Wave, 80%, AM Modulation
Frequency Step:	1 % of fundamental
Dwell Time:	1.5x 10^{-3} decade/s

4.7.2 TEST PROCEDURE

The EUT shall be tested within its intended operating and climatic conditions.

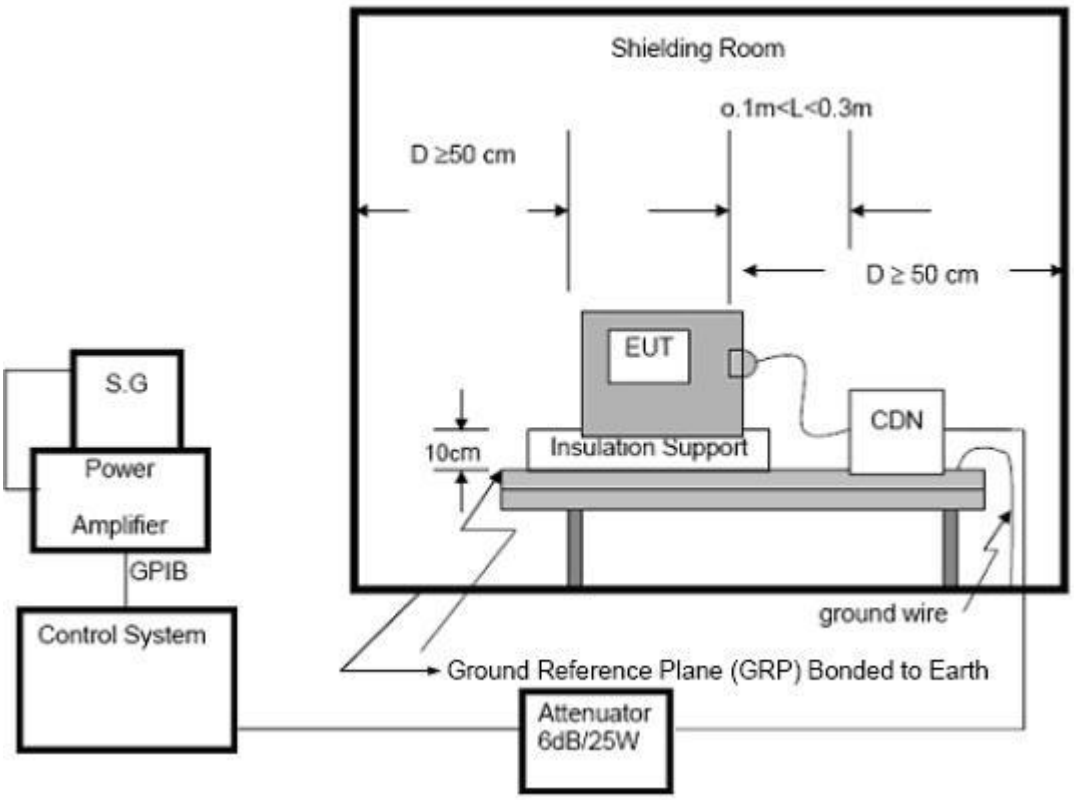
The test shell performed with the test generator connected to each of the coupling and decoupling devices in turn, while the other non-excited RF input ports of the coupling devices are terminated by a 50-ohm load resistor.

The frequency range was 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 was modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or the switch coupling devices as necessary. The sweep rate was 1.5 x 10^{-3} decades/s. Where the frequency range is swept incrementally, the step size was 1 % of preceding frequency value from 150 kHz to 80 MHz

The dwell time at each frequency was less than the time necessary for the EUT to be exercised, and able to respond. Sensitive frequencies such as clock frequency (ies) and harmonics or frequencies of dominant interest, was analyzed separately.

Attempts was made to fully exercise the EUT during testing, and to fully interrogate all exercise modes selected for susceptibility.

4.7.3 TEST SETUP



NOTE:
FLOOR-STANDING EQUIPMENT

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

4.7.4 TEST RESULTS

Temperature:	23.9℃	Relative Humidity:	54%
Test Voltage:	AC 230V/50Hz	Test Mode:	PASS

Test Ports (Mode)	Freq. Range MHz)	Field Strength	Perform. Criteria	Results	Judgment
Input/ Output AC. Power Port	0.15 –80 MHZ	3V(rms) AM Modulated 1000Hz, 80%	A	A	PASS
Input/ Output DC. Power Port	0.15 –80 MHZ	3V(rms) AM Modulated 1000Hz, 80%	N/A	N/A	N/A
Signal Line	0.15 –80 MHZ	3V(rms) AM Modulated 1000Hz, 80%	N/A	N/A	N/A

Note: 1) N/A - denotes test is not applicable in this test report.

4.8 VOLTAGE INTERRUPTION/DIPS TESTING (DIPS)

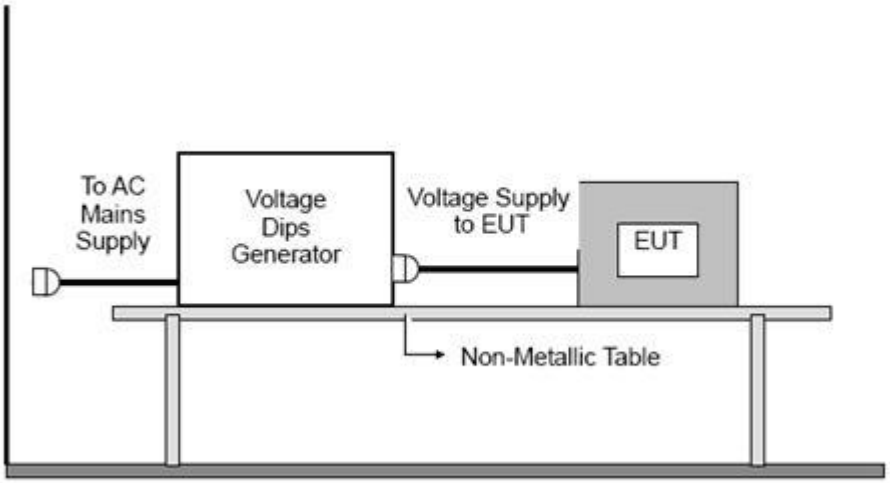
4.8.1 TEST SPECIFICATION

Basic Standard:	IEC/EN 61000-4-11
Required Performance:	B (For 100% Voltage Dips, 0.5 Cycle) B (For 100% Voltage Dips, 1 Cycle) C (For 30% Voltage Dips, 25 Cycles) C (For 100% Voltage Interruptions, 250 Cycles)
Test Duration Time:	Minimum three test events in sequence
Interval between Event:	Minimum ten seconds
Phase Angle:	0°/180°
Test Cycle:	3 times

4.8.2 TEST PROCEDURE

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

4.8.3 TEST SETUP



4.8.4 TEST RESULTS

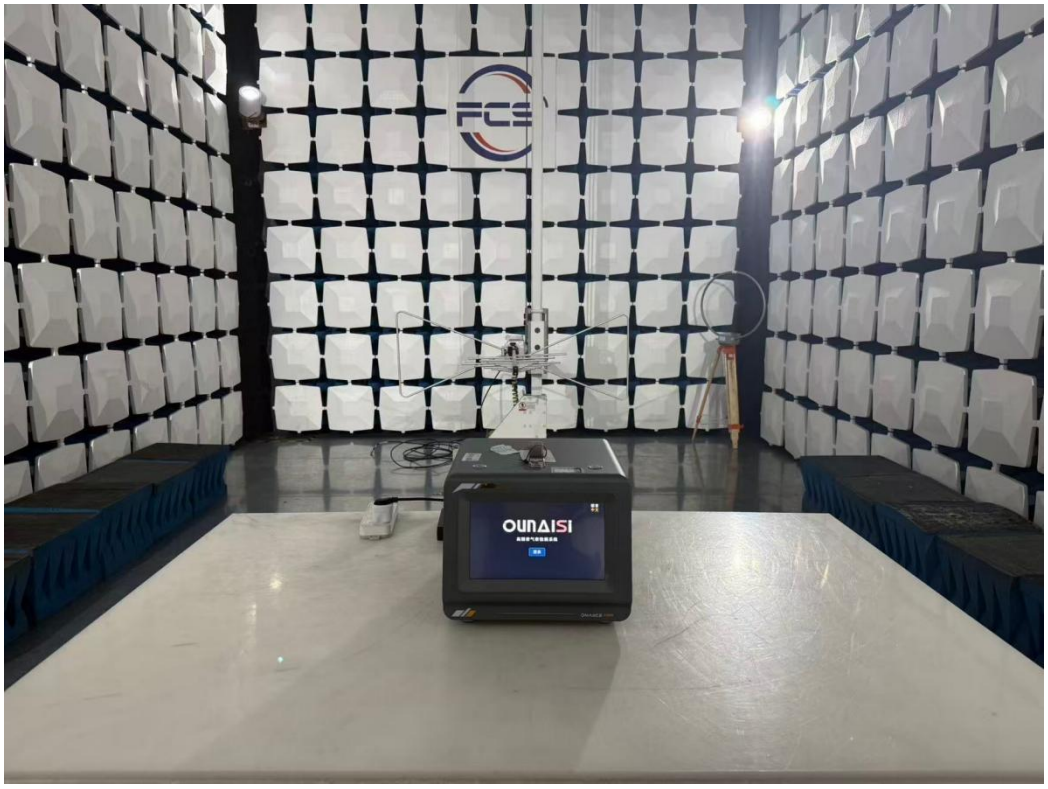
Temperature:	23.9℃	Relative Humidity:	54%
Test Voltage:	AC 110V/60Hz AC 230V/50Hz	Test Mode:	Mode 1

Voltage Reduction	Duration (cycle)	Perform Criteria	Results	Judgment
Voltage dip 100%	0.5	B	A	PASS
Voltage dip 100%	1	B	A	PASS
Voltage dip 30%	25	C	A	PASS
Voltage interruptions	250	C	B	PASS

Note: 1) N/A - denotes test is not applicable in this test report.

APPENDIX 1- TEST SETUP

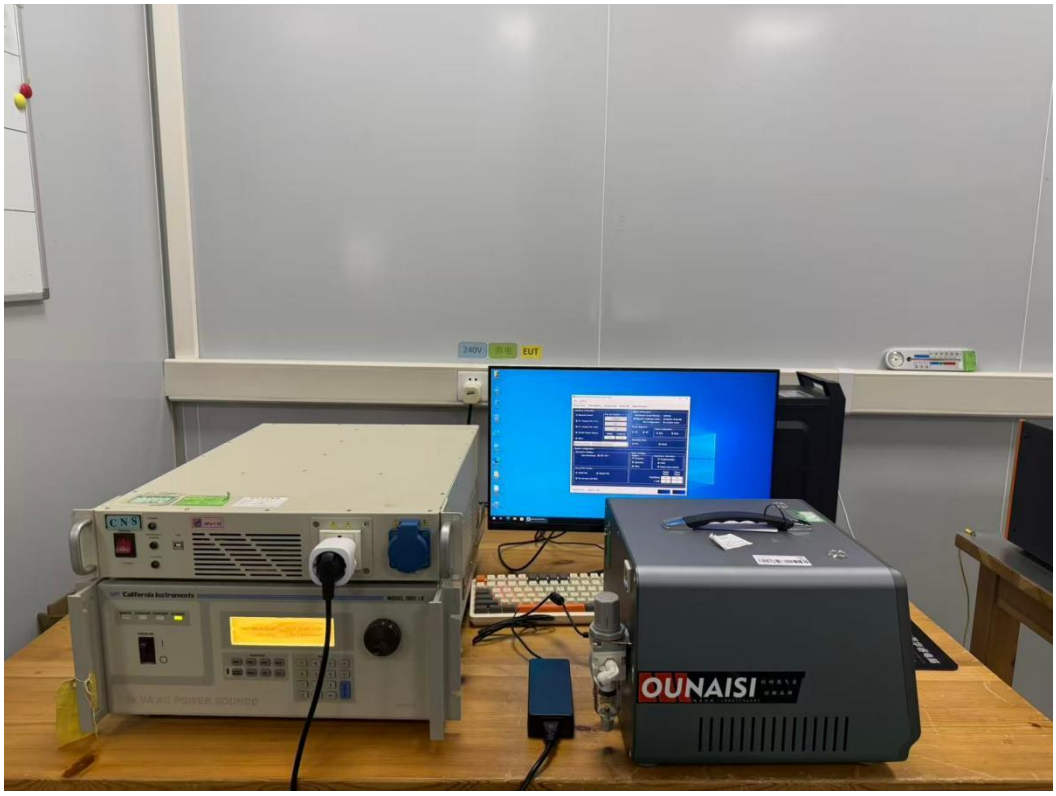
RE



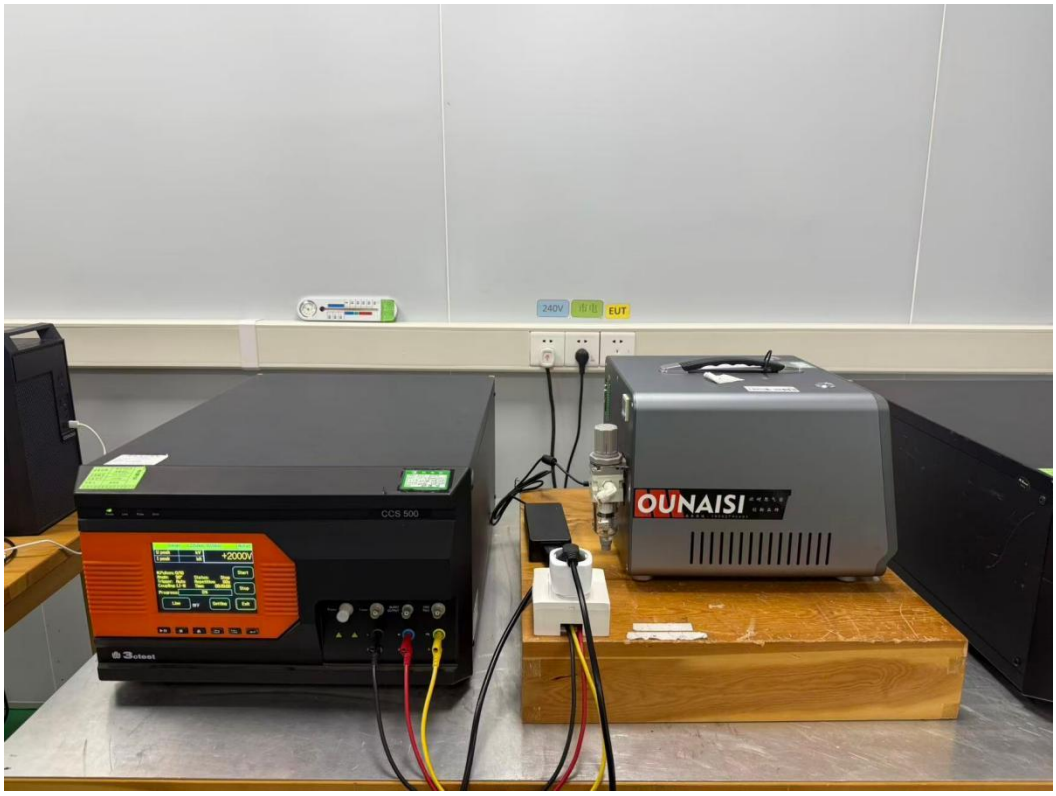
CE



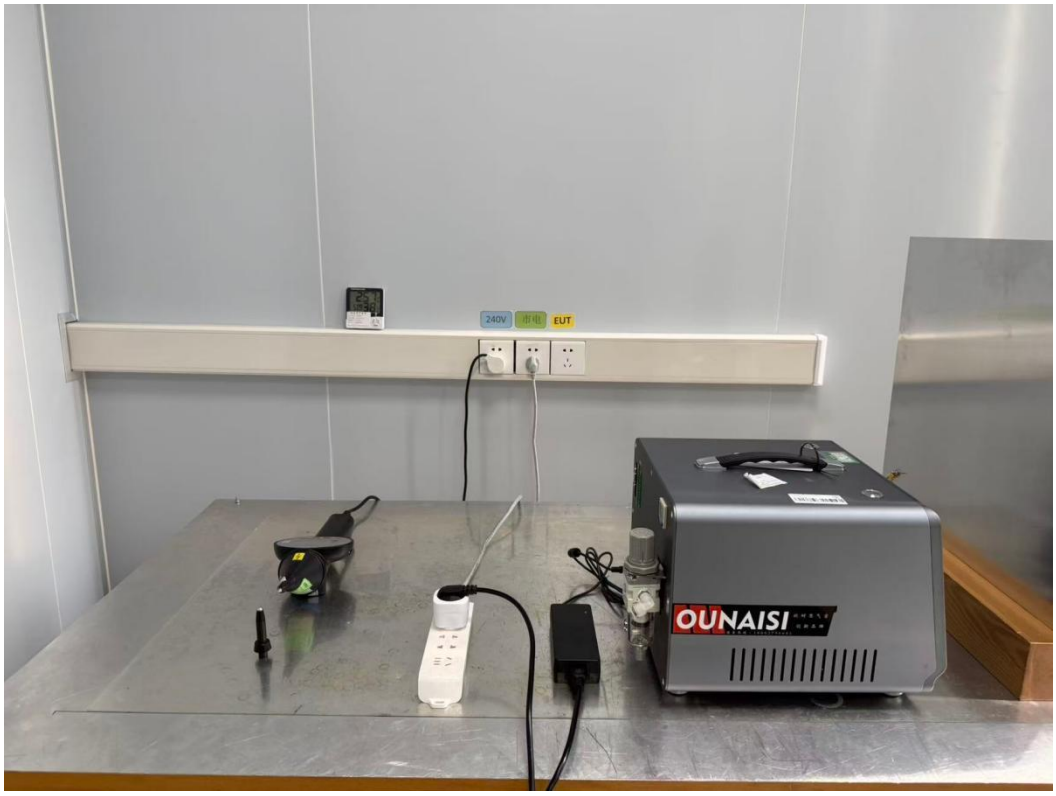
Harmonics/Flicker



EFT/Surge/Dips



ESD



CS

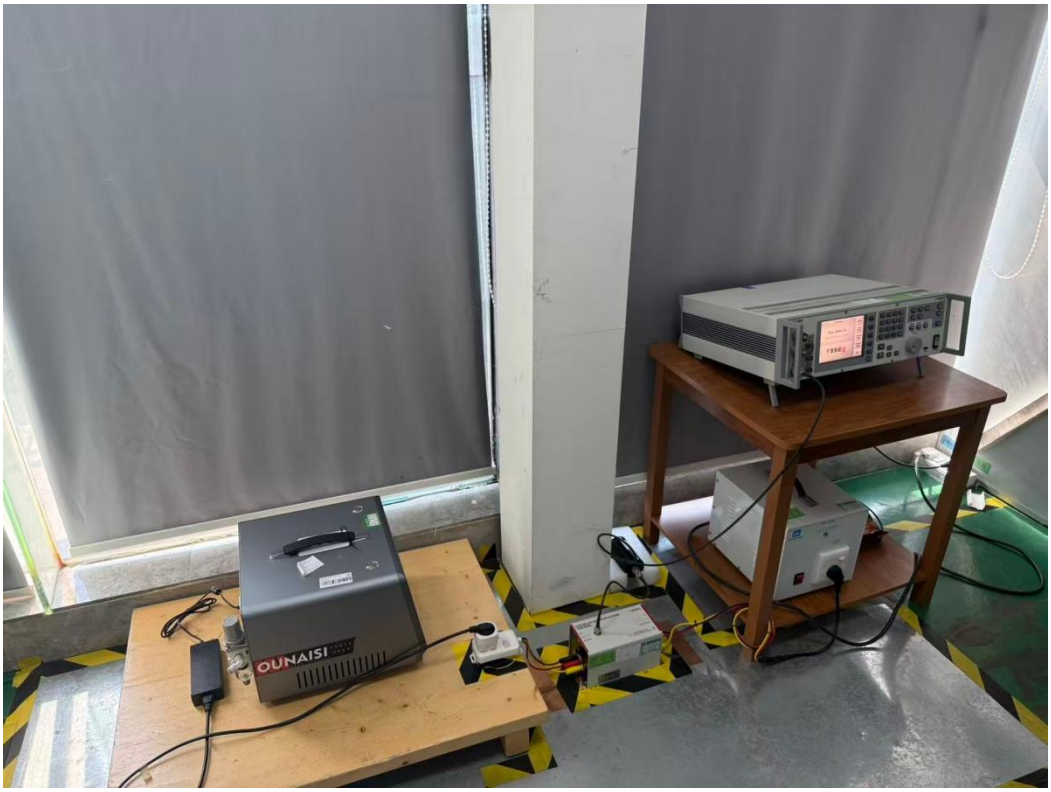


Photo 1

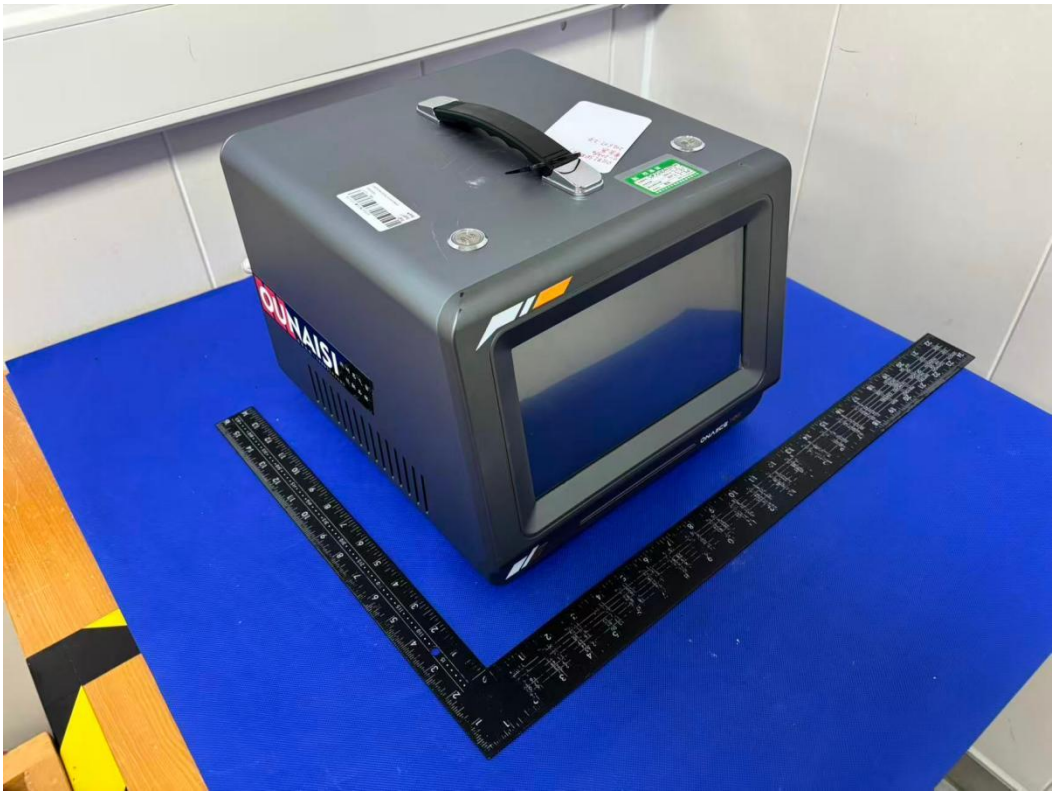


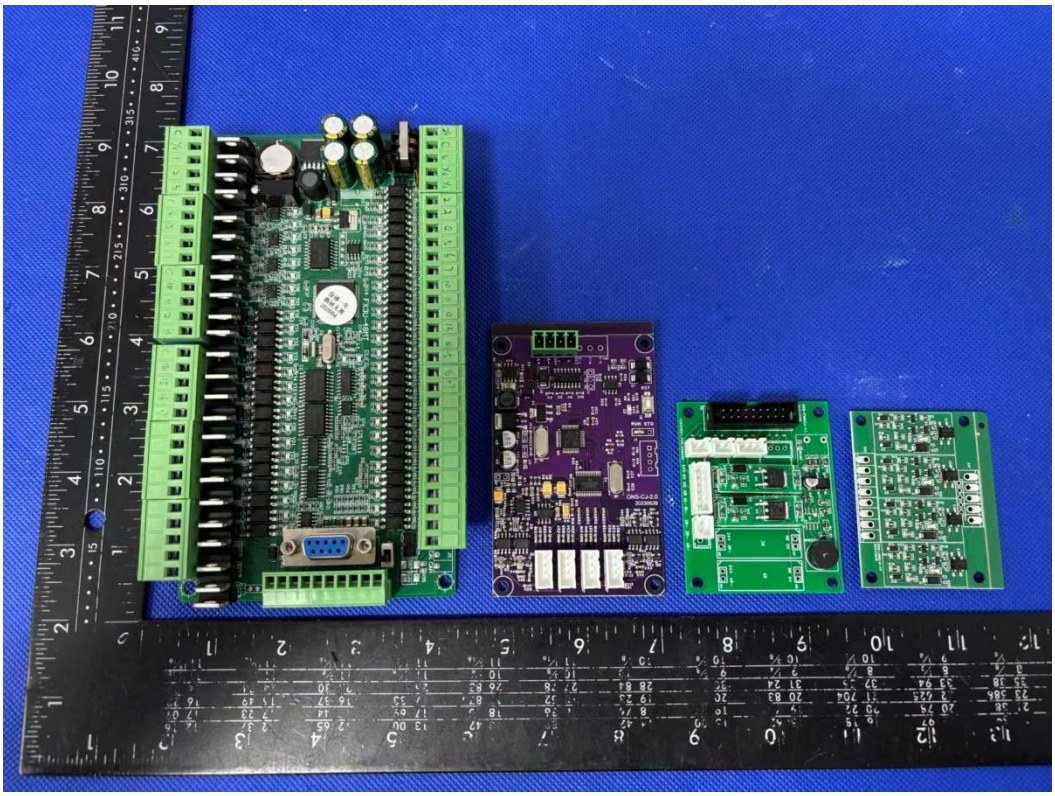
Photo 2



Photo 3



Photo 4



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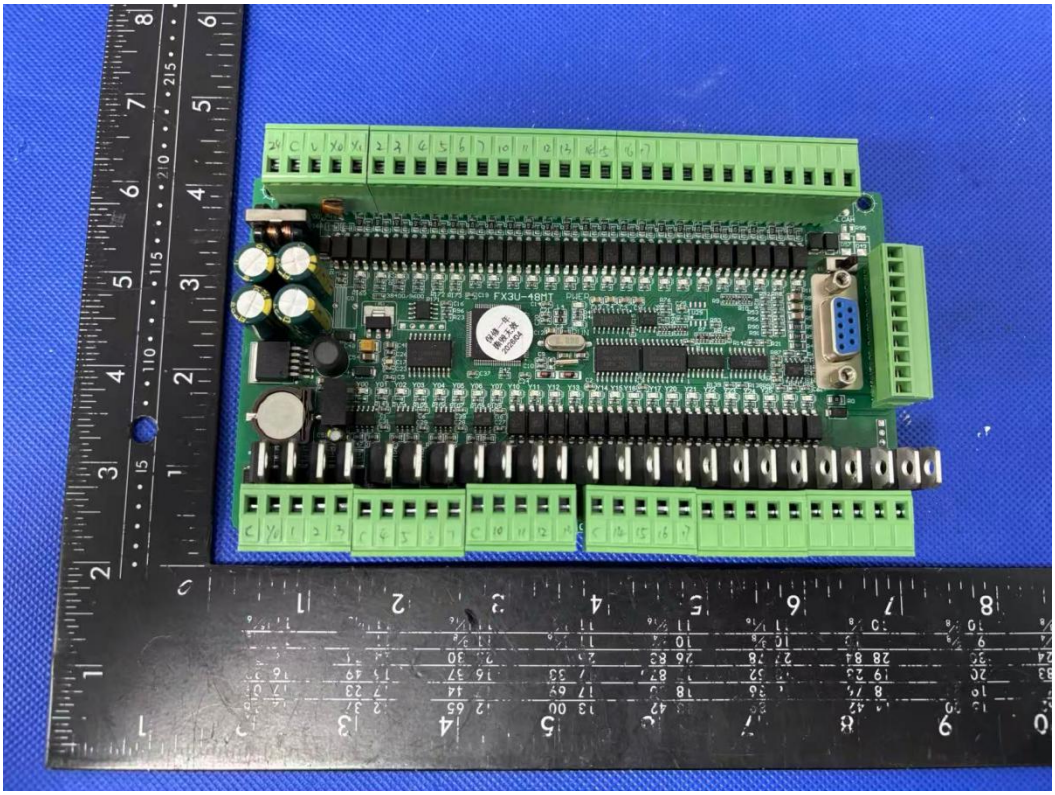

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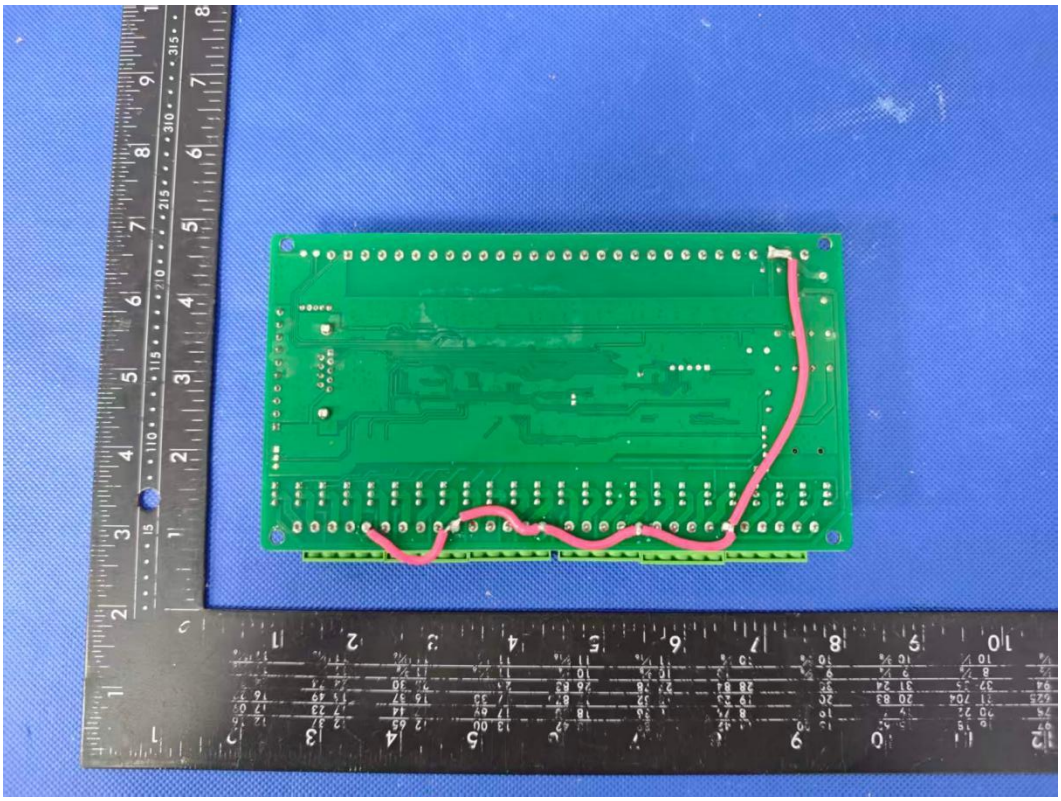
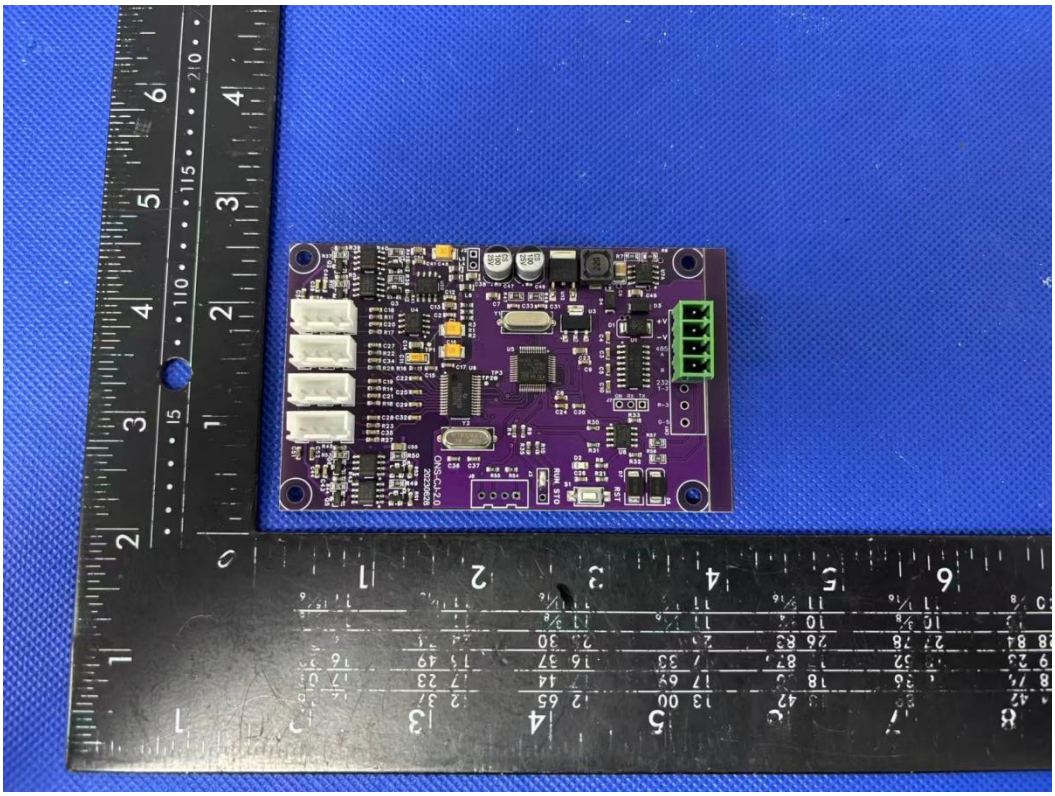


Photo 7



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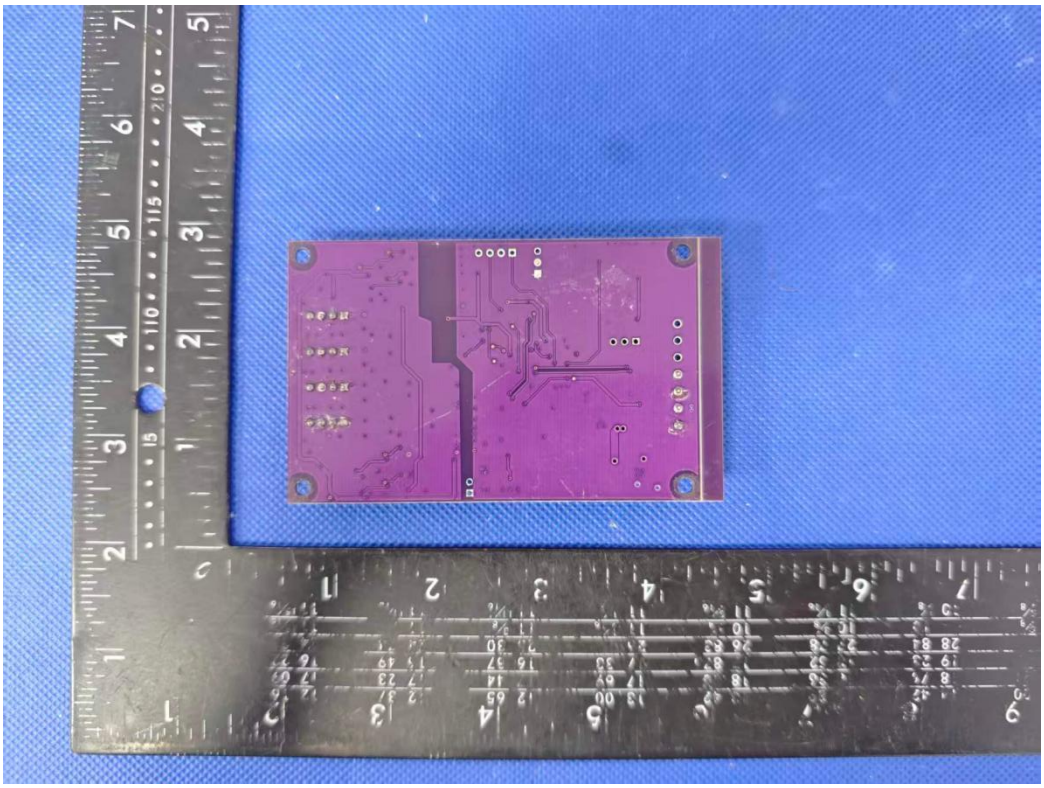

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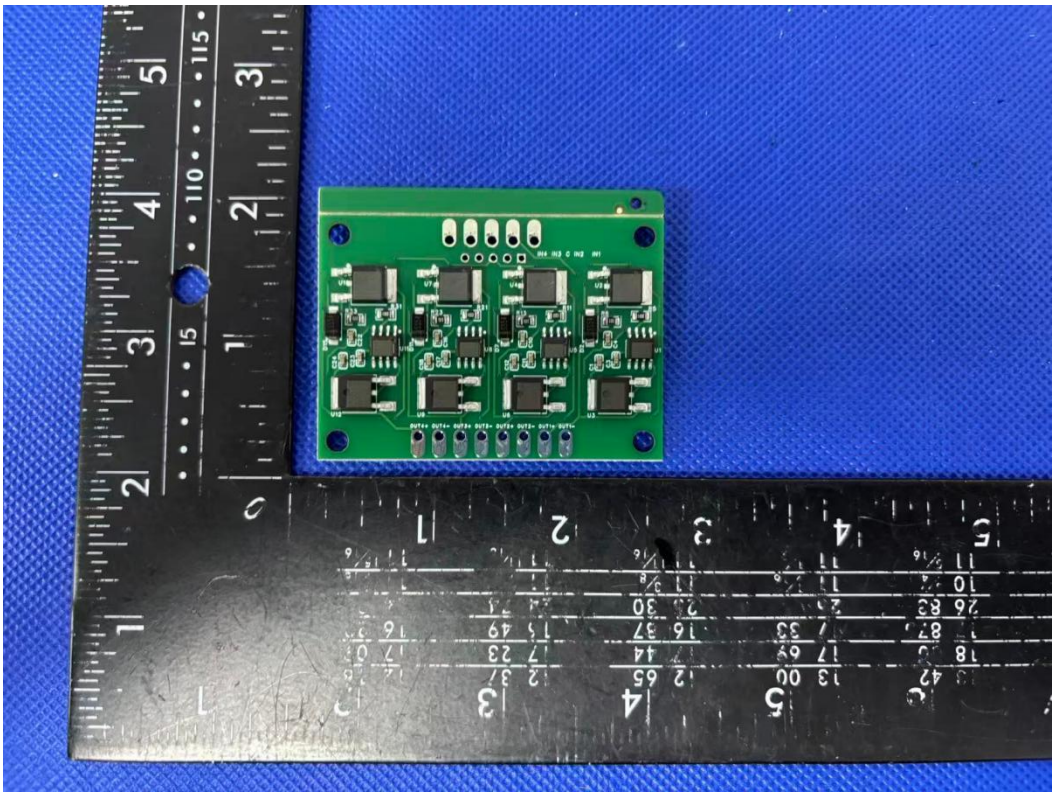

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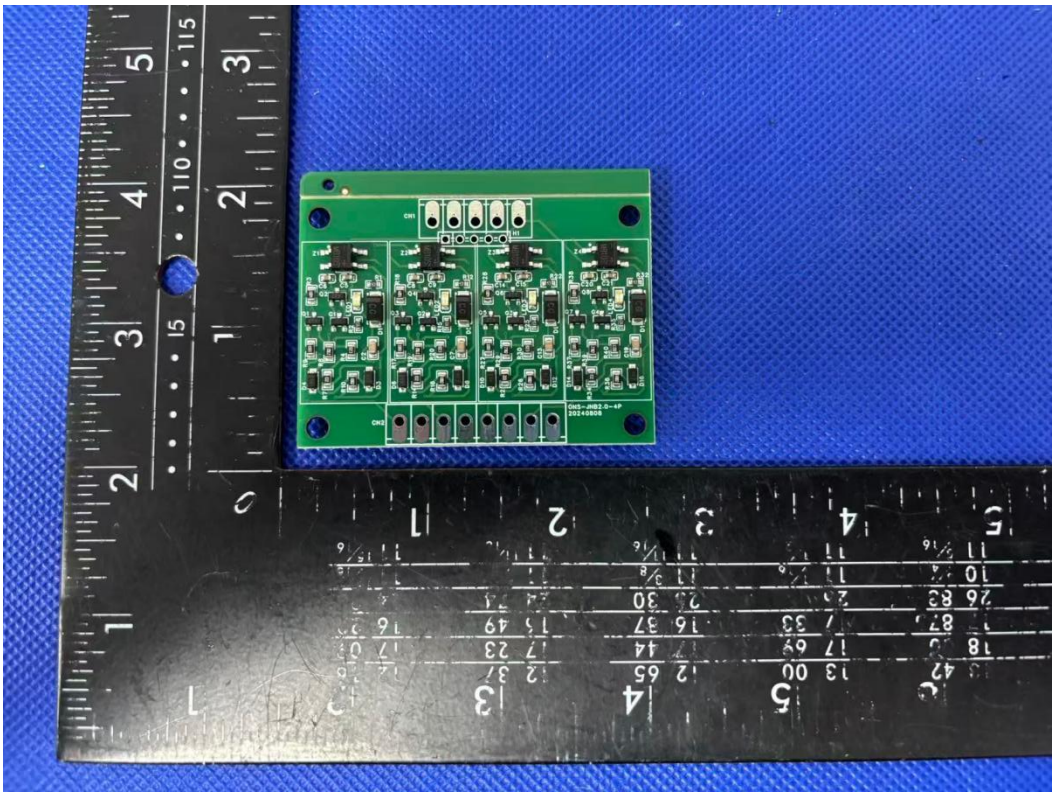


Photo 11

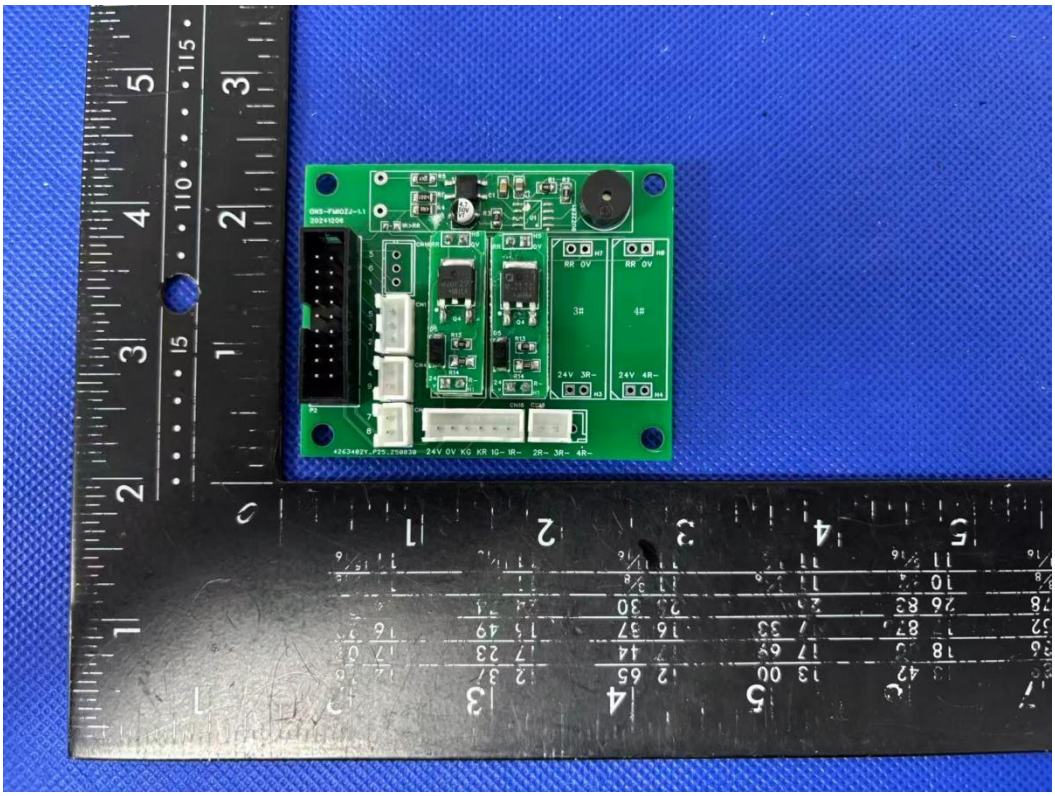
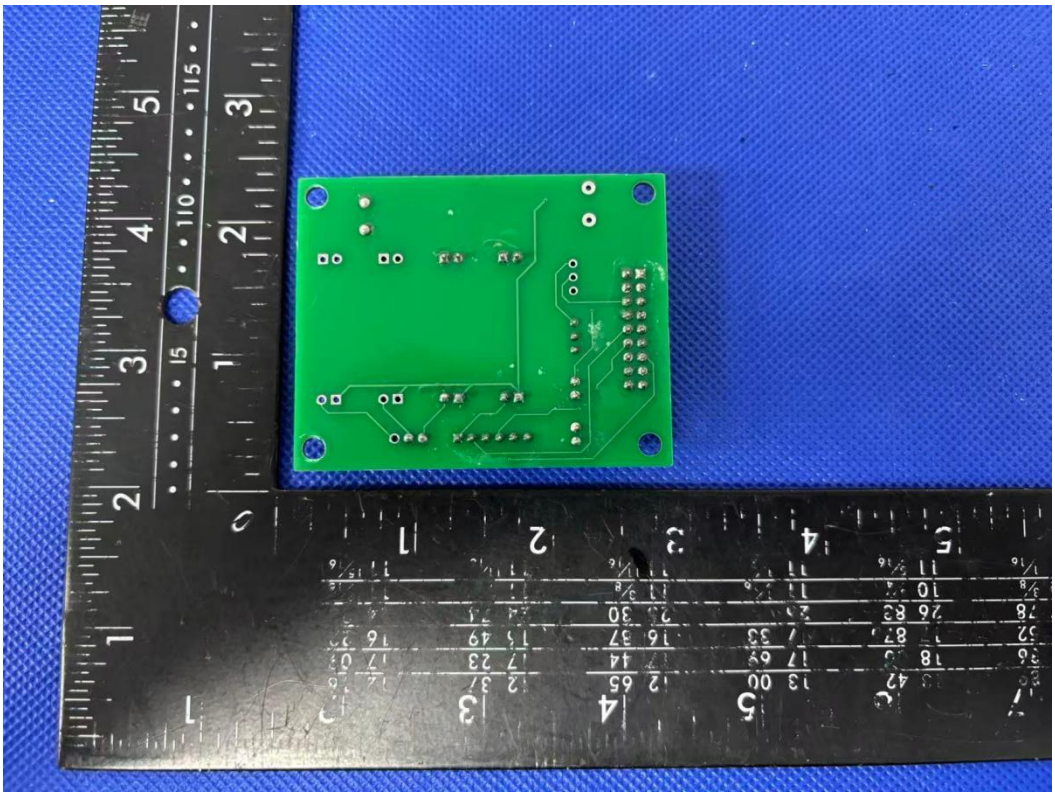


Photo 12



※※※※※END OF THE REPORT※※※※※