

EMC TEST REPORT

The device described below is tested by Shenzhen Nore Testing Center Co.,Ltd. to determine the maximum emission levels emanating from the device, the severe levels which the device can endure and E.U.T.'s performance criterion. The test results are contained in this test report. Shenzhen Nore Testing Center Co.,Ltd. is assumed of full responsibility for the accuracy and completeness of these tests.

Applicant : VOLTRONIC POWER TECHNOLOGY (SHENZHEN) CORP.
Address : 1-5F, Building 5 & 1F Building7 & 1F Building9,RunDongSheng Industrial Park, No.467, Section Xixiang, National Highway 107,LongZhu Community, Xixiang, Bao An District, Shenzhen, China
Manufacturer /Factory : VOLTRONIC POWER TECHNOLOGY (SHENZHEN) CORP.
Address : 1-5F, Building 5 & 1F Building7 & 1F Building9,RunDongSheng Industrial Park, No.467, Section Xixiang, National Highway 107,LongZhu Community, Xixiang, Bao An District, Shenzhen, China
E.U.T. : MPPT SOLAR INVERTER
Brand Name : N/A
Model No. : Inverter MKS III 5KW
Measurement Standard : EN 61000-6-4: 2007+A1: 2011 / IEC 61000-6-4: 2018
EN IEC 61000-6-2: 2019 / IEC 61000-6-2: 2016
EN 61000-3-11: 2000 / IEC 61000-3-11: 2000
EN 61000-3-12: 2011/ IEC 61000-3-12: 2011
Date of Receiver : November 24, 2020
Date of Test : November 24, 2020 to December 09, 2020
Date of Report : December 09, 2020

This Test Report is Issued Under the Authority of :

Prepared by



BoBo Ye / Engineer

Approved & Authorized Signer



Han Song / Authorized Signator

This report shows that the E.U.T. is technically compliant with the EN 61000-6-4, EN IEC 61000-6-2, EN 61000-3-11 and EN 61000-3-12. This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Nore Testing Center Co.,Ltd.

TABLE OF CONTENTS

1. SUMMARY OF TEST RESULTS.....	5
2. GENERAL INFORMATION.....	6
2.1 Details of E.U.T.....	6
2.2 Description of Support Device.....	7
2.3 Block Diagram of Test Setup.....	7
2.4 Test Facility.....	8
2.5 Abnormalities from Standard Conditions.....	8
3. MEASURING DEVICES AND TEST EQUIPMENT.....	9
3.1 For Mains terminals Disturbance voltage Test.....	9
3.2 For Radiated Emission Measurement.....	9
3.3 For Harmonic / Flicker Measurement.....	9
3.4 For Electrostatic Discharge Immunity Test.....	10
3.5 For RF Electromagnetic Field Immunity Test.....	10
3.6 For Electrical Fast Transient /Burst Immunity Test.....	10
3.7 For Surge Immunity Test.....	11
3.8 For Injected Currents Immunity Measurement.....	11
3.9 For Voltage Dips and Interruptions Measurement.....	11
3.10 For Magnetic Field Immunity Measurement.....	11
4. MAINS TERMINAL DISTURBANCE VOLTAGE MEASUREMENT.....	12
4.1 Block Diagram of Test Setup.....	12
4.2 Limit of Mains Terminal Disturbance voltage measurement.....	12
4.3 Test Procedure.....	13
4.4 Mains Terminal Disturbance Voltage Test Results.....	13
5. RADIATED EMISSION MEASUREMENT.....	18
5.1 Block Diagram of Test.....	18
5.2 Limit of Radiated Emission Measurement.....	18
5.3 Test Procedure.....	19
5.4 Operating Condition of E.U.T.....	19
5.5 Radiated Emission Measurement Result.....	19
6. HARMONIC CURRENT EMISSION TEST.....	24
6.1 Block Diagram of Test Setup.....	24
6.2 Limits of Harmonics current measurement.....	24
6.3 Test Procedure.....	25
6.4 Operating Condition of E.U.T.....	25
6.5 Test Results.....	25
7. VOLTAGE FLUCTUATIONS & FLICKER TEST.....	31
7.1 Block Diagram of Test Setup.....	31
7.2 Limits of Voltage Fluctuations & Flicker Measurement.....	31
7.3 Test Procedure.....	31
7.4 Operating Condition of E.U.T.....	31
7.5 Test Results.....	32
8. PERFORMANCE CRITERIA FOR IMMUNITY.....	34
9. ELECTROSTATIC DISCHARGE TEST.....	35
9.1 Block Diagram of Test Setup.....	35

9.2 Test Standard and Severity Levels.....	35
9.3 Test Procedure.....	36
9.4 Test Results.....	36
10. RF FIELD STRENGTH SUSCEPTIBILITY TEST.....	38
10.1 Block Diagram of Test Setup.....	38
10.2 Test Standard and Severity Levels.....	38
10.3 Test Procedure.....	39
10.4 Test Results.....	39
11. ELECTRICAL FAST TRANSIENT/BURST TEST.....	41
11.1 Block Diagram of Test Setup.....	41
11.2 Test Standard and Severity Levels.....	41
11.3 Test Procedure.....	42
11.4 Test Result.....	42
12. SURGE IMMUNITY TEST.....	44
12.1 Block Diagram of Test Setup.....	44
12.2 Test Standard and Severity Levels.....	44
12.3 Test Procedure.....	44
12.4 Test Result.....	45
13. INJECTED CURRENTS SUSCEPTIBILITY TEST.....	47
13.1 Block Diagram of Test Setup.....	47
13.2 Test Standard and Severity Levels.....	47
13.3 Test Procedure.....	48
13.4 Test Result.....	48
14. VOLTAGE DIPS AND INTERRUPTIONS TEST.....	50
14.1 Block Diagram of Test Setup.....	50
14.2 Test Standard and Severity Levels.....	50
14.3 Test Procedure.....	50
14.4 Test Result.....	50
15. MAGNETIC FIELD IMMUNITY TEST.....	52
15.1 Block Diagram of Test Setup.....	52
15.2 Test Standard and Severity Levels.....	52
15.3 Test Procedure.....	52
15.4 Test Result.....	53
16. PHOTOGRAPH.....	55
16.1 Photo of Conducted Emission Measurement.....	55
16.2 Photo of Radiation Emission Measurement.....	55
16.3 Photo of Harmonic/Flicker Measurement.....	56
16.4 Photo of Electrostatic Discharge Test.....	56
16.5 Photo of Electrical Fast Transient /Surge /Voltage Dips Test.....	57
16.7 Photo of RF Field Strength Susceptibility Test.....	58
16.8 Photo of Injected Currents Susceptibility Test.....	58
APPENDIX I.....	59
(Photos of E.U.T.).....	59

1. SUMMARY OF TEST RESULTS

The E.U.T. has been tested according to the following specifications:

EMISSION			
Standard	Test Type	Result	Remarks
EN 61000-6-4: 2007+A1: 2011/ IEC 61000-6-4: 2018	Mains Terminal Disturbance Voltage Test	PASS	Uncertainty: 2.7dB
	Radiated Emission Test	PASS	Uncertainty: 3.4dB
EN 61000-3-11: 2000/ IEC 61000-3-11: 2000	Harmonic current emission	PASS	Meets the requirements.
EN 61000-3-12: 2011/ IEC 61000-3-12: 2011	Voltage fluctuations & flicker	PASS	Meets the requirements.

IMMUNITY(EN IEC 61000-6-2: 2019 / IEC 61000-6-2: 2016)			
Standard	Test Type	Result	Remarks
EN 61000-4-2: 2009	Electrostatic discharge immunity test	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-3: 2006+A2: 2010	Radio-frequency, electromagnetic field immunity test	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-4: 2012	Electrical fast transient/ burst immunity test	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-5: 2014	Surge immunity test	PASS	Meets the requirements of Performance Criterion B
EN 61000-4-6: 2014	Injected Currents immunity test	PASS	Meets the requirements of Performance Criterion A
EN 61000-4-11: 2004	Voltage Dips and Interruptions	PASS	Meets the requirements of Performance Criterion B&C
EN 61000-4-8: 2010	Magnetic Field immunity test	PASS	Meets the requirements of Performance Criterion A

2. GENERAL INFORMATION

2.1 Details of E.U.T.

E.U.T.	: MPPT SOLAR INVERTER
Model No.	: Inverter MKS III 5KW
Brand Name	: N/A
Operation Frequency	: Below 108MHz(Declaration by applicant)
Rating	: MPPT SOLAR INVERTER Mode: Rated Power:5000VA/5000W DC Input:48VDC,117A AC Output: 230VAC,50/60Hz,22A,1 Φ AC Charger Mode: AC Input:230VAC,50/60Hz,40A,1 Φ DC Output: 54VDC, Max.80A,Default 30A AC Output:230VAC,50/60Hz,22A,1 Φ Solar Charger Mode: Max. PV Array Power: 5000W Min. Solar Voltage: 120VDC Max. Solar Voltage (VOC) : 450VDC MPPT voltage range: 120V~450V Max. Input Current: 18A
Test Voltage	: AC 230V/50Hz, External battery 48V
Cable	: None
Description of model difference	: None
Remark	: None
Sample No.	: NTC2011655EV00-001

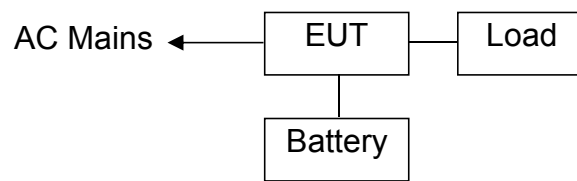
2.2 Description of Support Device

None

2.3 Block Diagram of Test Setup

Block diagram of connection between the E.U.T. and simulators

(1) Test mode: Normal Operation Mode



(2) Test mode: Stored Energy Operation Mode



2.4 Test Facility

Site Description

- EMC Lab : Listed by CNAS,May 18, 2018
The certificate is valid until May 17, 2024
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01
The Certificate Registration Number is L11038.
- Name of Firm : Shenzhen Nore Testing Center Co.,Ltd.
- Site Location : South, No. 1, Building 10, Maqueling Industrial Zone, Nanshan Shenzhen, Guangdong, 518057, China
- Subcontractor 1 : Dongguan Nore Testing Center Co.,Ltd.
(Dongguan NTC Co.,Ltd.)
- Site Location 1 : Building D,Gaosheng Science&Technology Park, Zhouxi Longxi Road,Nancheng District,Dongguan City,Guangdong Province,China
- Subcontracted Items : RF Field Strength Susceptibility Test
Injected Currents Immunity Test
- Subcontractor 2 : CCIC Southern Testing Co., Ltd.
- Site Location 2 : Electronic Testing Building, No. 43 Shahe Road, Xili Jiedao, Nanshan District, 518055 Shenzhen, Guangdong, China
- Subcontracted Items : Harmonic Current Emission
Voltage fluctuations & flicker

2.5 Abnormalities from Standard Conditions

None

3. MEASURING DEVICES AND TEST EQUIPMENT

3.1 For Mains terminals Disturbance voltage Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI-3	100120	Mar. 29,2020	1 Year
2.	L.I.S.N	Rohde & Schwarz	ESH2-Z5	893606-014	Apr. 24, 2020	1 Year
3.	L.I.S.N	SCHWARZBECK	NNLK8129	8129-212	Apr. 24, 2020	1 Year
4.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	RSUM2009	Apr. 24, 2020	1 Year
5.	Cable	N/A	1M	N/A	Apr. 24, 2020	1 Year
6.	Cable	N/A	2M	N/A	Apr. 24, 2020	1 Year
7.	Test Software	EZ	EZ-EMC (Ver.CT3A11)	N/A	N/A	N/A

3.2 For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESPI-7	100006	Apr. 24, 2020	1 Year
2.	Loop Antenna	ZHINAN	ZN30900C	16036	Apr. 30, 2020	1 Year
3.	Composite logarithmic antenna	SCHAFFNER	CBL6112B	2625	May 17, 2020	2 Year
4.	Horn Antenna	SCHWARZBECK	BBHA 9120D	01884	Apr. 29, 2020	1 Year
5.	Power Amplifier	HP	HP 8447D	2443A04646	Mar. 29, 2020	1 Year
6.	Power Amplifier	KSYET	PAM-118	443007	Apr. 24, 2020	1 Year
7.	Cable	N/A	1M	N/A	Apr. 24, 2020	1 Year
8.	Cable	N/A	5M	N/A	Apr. 24, 2020	1 Year
9.	Cable	N/A	9M	N/A	Apr. 24, 2020	1 Year
10.	Test Software	EZ	EZ-EMC (Ver. CT3A11)	N/A	N/A	N/A

3.3 For Harmonic / Flicker Measurement

(CCIC Southern Testing Co., Ltd.)

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal. Interval
1.	Three-phase Harmonic & Flicker Analyzer	EM TEST	DPA 503N	A150202183	Nov. 20, 2020
2.	Three-phase 75A Flicker Impedance	EM TEST	AIF 503N75	A150202184	Nov. 20, 2020

3.4 For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	HAEFELY	ONYX16	1811981	Apr. 28, 2020	1 Year
2.	ESD Gun-1	HAEFELY	N/A	4700500/01	Apr. 28, 2020	1 Year
3.	ESD Gun-2	HAEFELY	N/A	4700525/00	Apr. 28, 2020	1 Year

3.5 For RF Electromagnetic Field Immunity Test

(Dongguan Nore Testing Center Co., Ltd.)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	Agilent	N5181A	MY47070160	Mar. 13, 2020	1 Year
2.	RF Switch	SKET	N/A	N/A	N/A	N/A
3.	Power Amplifier	SKET	HAP801000M_250W	201804008	N/A	N/A
4.	Power Amplifier	SKET	HAP0103G_75W	201804009	N/A	N/A
5.	Power Amplifier	SKET	HAP0306G_50W	201804010	N/A	N/A
6.	Power Meter	Agilent	E4419B	GB40201469	Mar. 13, 2020	1 Year
7.	Power Sensor	Agilent	E9300A	MY41498919	Mar. 13, 2020	1 Year
8.	Power Sensor	Agilent	E9300A	US39211259	Mar. 13, 2020	1 Year
9.	E-Field Probe	Narda	EP-601	N/A	Mar. 23, 2020	1 Year
10.	Antenna	Schwarzbeck	STLP 9129	9129071	N/A	N/A
11.	Audio Analyzer	Rohde & Schwarz	UPV	100894	Mar. 13, 2020	1 Year
12.	Chamber	Chengyu	7*5*3.5m	N/A	Mar. 26, 2018	3 Year
13.	Test Software	EZ	EZ_RS	N/A	N/A	N/A

3.6 For Electrical Fast Transient /Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Burst Tester	HAEFELY	AXOS5	177723	Jan. 15, 2020	1 Year
2.	Coupling Clamp	HAEFELY	N/A	N/A	Apr. 24, 2020	1 Year
3.	Test Soft	VNC	VNC Viewer 5.0.5	N/A	N/A	N/A

3.7 For Surge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Surge Tester	HAEFELY	AXOS5	177723	Jan. 15, 2020	1 Year
2.	Test Soft	VNC	VNC Viewer 5.0.5	N/A	N/A	N/A

3.8 For Injected Currents Immunity Measurement

(Dongguan Nore Testing Center Co., Ltd.)

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal generator	IFR	2023A	2023051280	Mar. 13, 2020	1 Year
2.	Power Amplifier	SCHAFFNER	CBA9425	1022	Mar. 13, 2020	1 Year
3.	6dB 50Watt Attenuator	SCHAFFNER	ATN6025	N/A	Mar. 13, 2020	1 Year
4.	CDN	Lioncel	CDN-M3-16	0170703	Mar. 13, 2020	1 Year
5.	CDN	Lioncel	CDN-M2-16	0170708	Mar. 13, 2020	1 Year
6.	CDN	CDSI	ADN-M5/AF5	8105001	Mar. 13, 2020	1 Year
7.	EM Clamp	CDSI	EMCL-22	8192007	Mar. 13, 2020	1 Year
8.	Directional Coupler	SCHAFFNER	255	19184	Mar. 13, 2020	1 Year
9.	Audio Analyzer	Rohde & Schwarz	UPV	100894	Mar. 13, 2020	1 Year
10.	Test Software	EZ	EZ_CS	N/A	N/A	N/A

3.9 For Voltage Dips and Interruptions Measurement

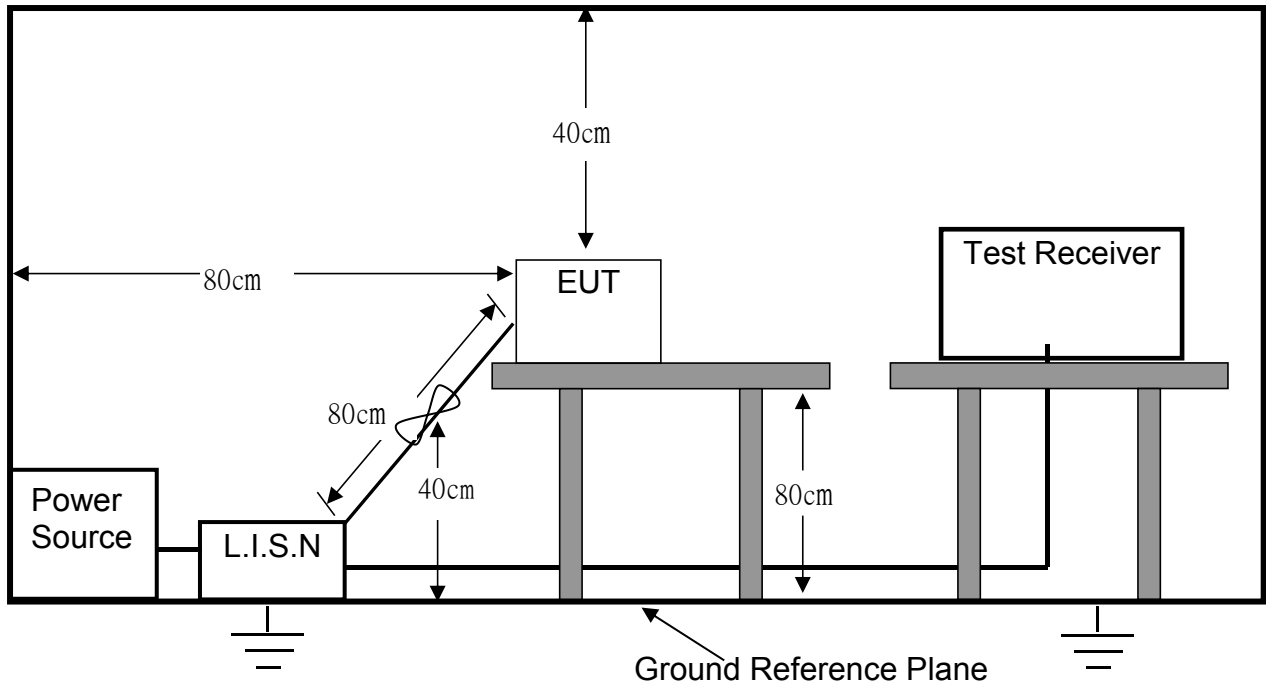
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Dips Tester	HAEFELY	AXOS5	177723	Jan. 15, 2020	1 Year
2.	Test Soft	VNC	VNC Viewer 5.0.5	N/A	N/A	N/A
3.	Dips Modulator	N/A	N/A	N/A	N/A	N/A

3.10 For Magnetic Field Immunity Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Magnetic Field Tester	N/A	MS-8000	N/A	Mar. 29, 2020	1 Year
2.	Test Software	N/A	N/A	N/A	N/A	N/A

4. MAINS TERMINAL DISTURBANCE VOLTAGE MEASUREMENT

4.1 Block Diagram of Test Setup



4.2 Limit of Mains Terminal Disturbance voltage measurement

Test Standard: EN 61000-6-4

Limits for conducted disturbance at the mains port.

Frequency range (MHz)	Limits (dB(uV))	
	Quasi-peak	Average
0.15 to 0.5	79	66
0.5 to 30	73	60

*Decreasing linearly with the logarithm of the frequency.

- Note:
1. If the limits for the average detector are met when using the quasi-peak detector, then the limits for the measurements with the average detector are considered to be met.
 2. The higher value measured with and without the outer conductor screen of the antenna terminal connected to earth is considered.
 3. Television receivers with teletext facilities should be tested in teletext mode with teletext picture.

4.3 Test Procedure

The E.U.T. is put on the 0.8 m high table and connected to the AC mains through a Artificial Mains Network (AMN). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are checked to find out the maximum conducted emission levels according to the EN 61000-6-4 regulations during conducted emission test.

The bandwidth of the test receiver (R&S Test Receiver ESCI) is set at 9 KHz.
Sample of data calculate:

Level=Reading + Factor

Margin= Level-Limit

Factor=LF+CF+SWF

Where LF= L.I.S.N attenuation factor in dB
(L.I.S.N contain 10dB attenuator)

CF= Cable attenuation factor in dB

SWF= RF Switching Unit attenuation factor in dB

4.4.1 Setup the E.U.T. and simulators as shown in Section 4.3.

4.4.2 Turn on the power of all equipments.

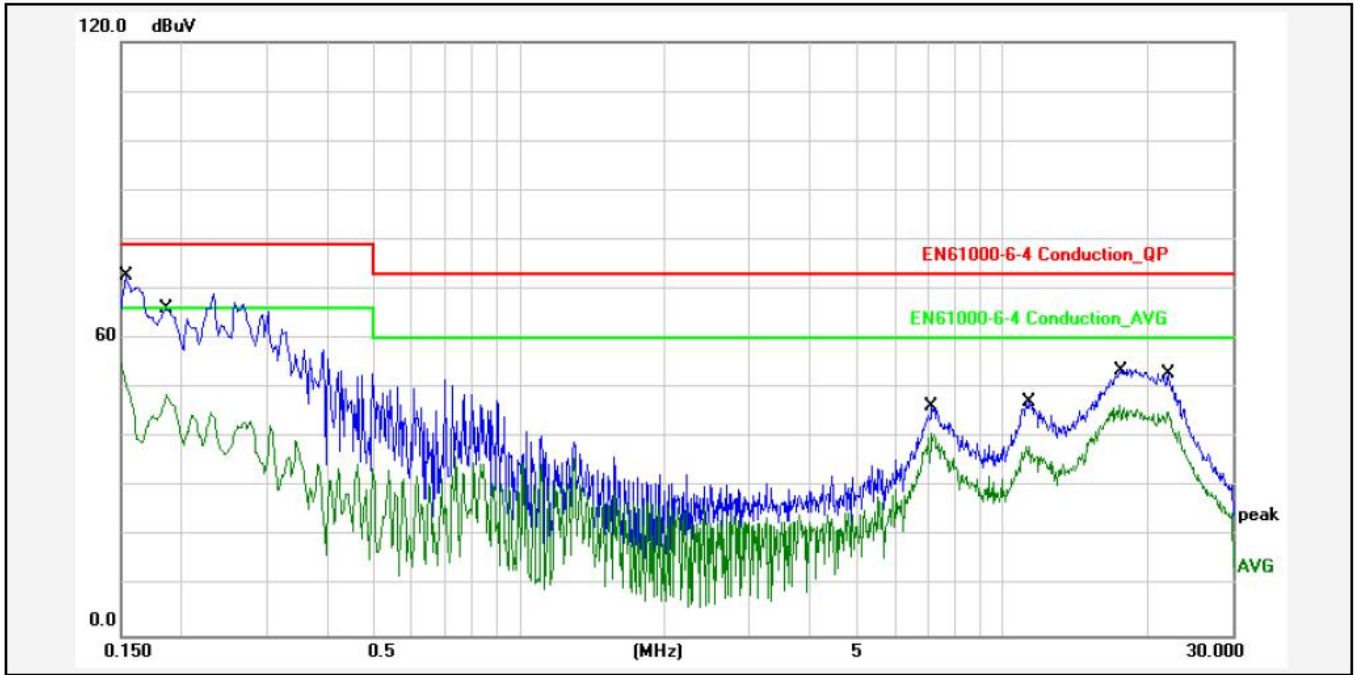
4.4.3 Let the E.U.T. work in test modes (Charginh mode, Inverter mode) and test it.

4.4 Mains Terminal Disturbance Voltage Test Results

PASS.

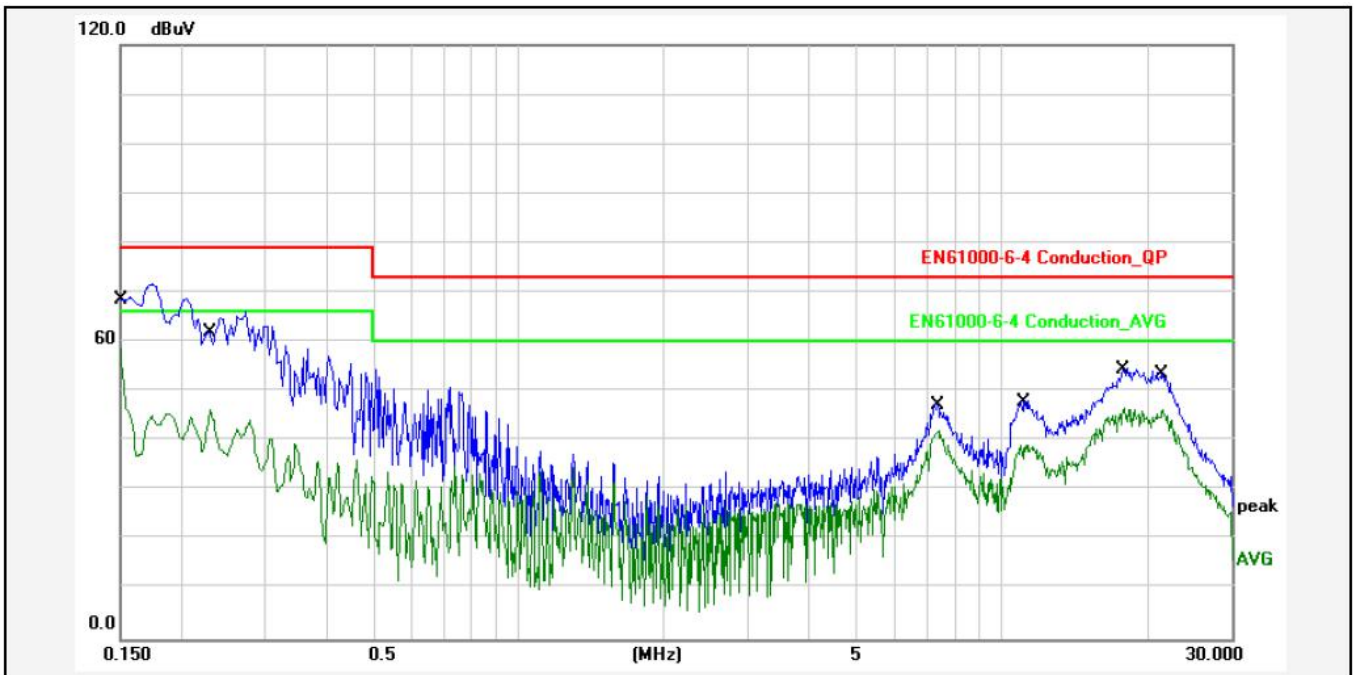
Please refer to the following pages.

E.U.T:	MPPT SOLAR INVERTER	Model Name:	Inverter MKS III 5KW
Temperature:	26° C	Relative Humidity:	60%
Pressure:	1006 hPa	Test Voltage:	AC 230V/50Hz
Test Mode:	Charging mode	Phase:	Line



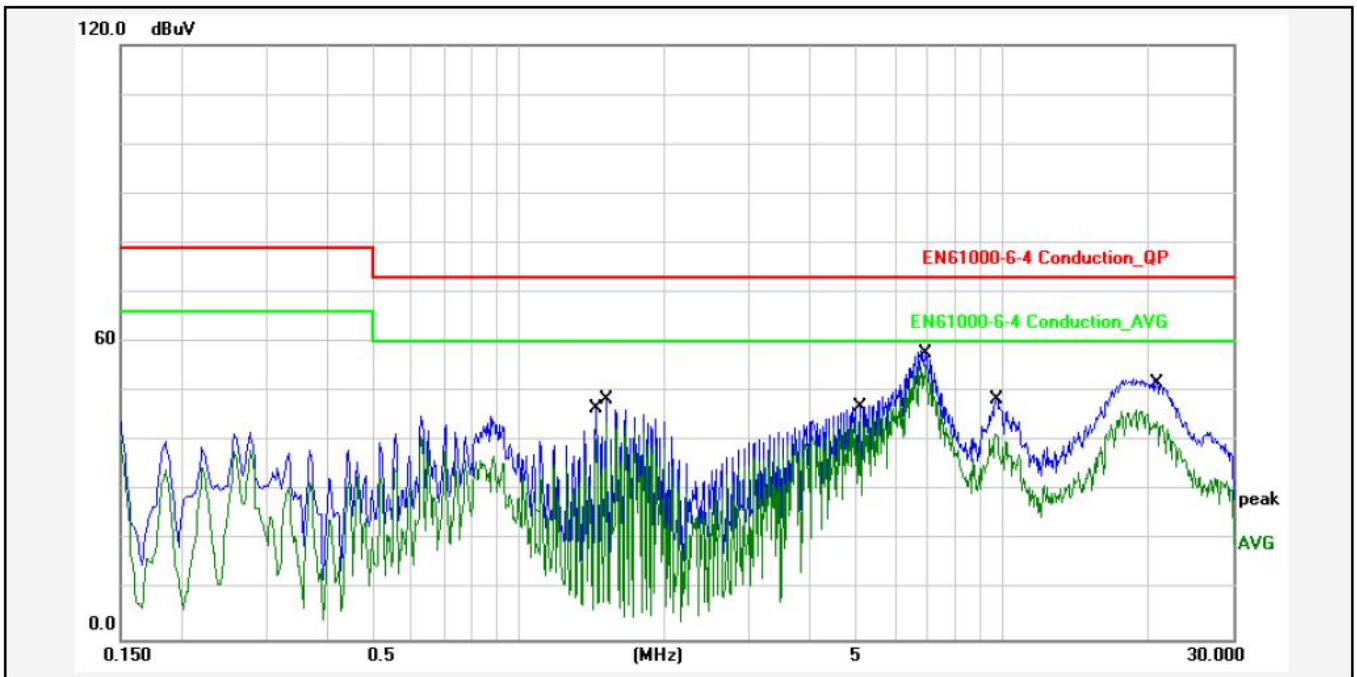
No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1539	6.59	66.07	72.66	79.00	-6.34	QP	P	
2	0.1539	6.59	48.54	55.13	66.00	-10.87	AVG	P	
3	0.1860	6.54	59.64	66.18	79.00	-12.82	QP	P	
4	0.1860	6.54	42.14	48.68	66.00	-17.32	AVG	P	
5	7.1379	6.34	40.07	46.41	73.00	-26.59	QP	P	
6	7.1379	6.34	34.66	41.00	60.00	-19.00	AVG	P	
7	11.2059	6.35	40.96	47.31	73.00	-25.69	QP	P	
8	11.2059	6.35	31.89	38.24	60.00	-21.76	AVG	P	
9	17.5379	6.37	47.05	53.42	73.00	-19.58	QP	P	
10	17.5379	6.37	40.34	46.71	60.00	-13.29	AVG	P	
11	22.0660	6.39	46.47	52.86	73.00	-20.14	QP	P	
12	22.0660	6.39	38.89	45.28	60.00	-14.72	AVG	P	

E.U.T:	MPPT SOLAR INVERTER	Model Name:	Inverter MKS III 5KW
Temperature:	26° C	Relative Humidity:	60%
Pressure:	1006 hPa	Test Voltage:	AC 230V/50Hz
Test Mode:	Charging mode	Phase:	Neutral



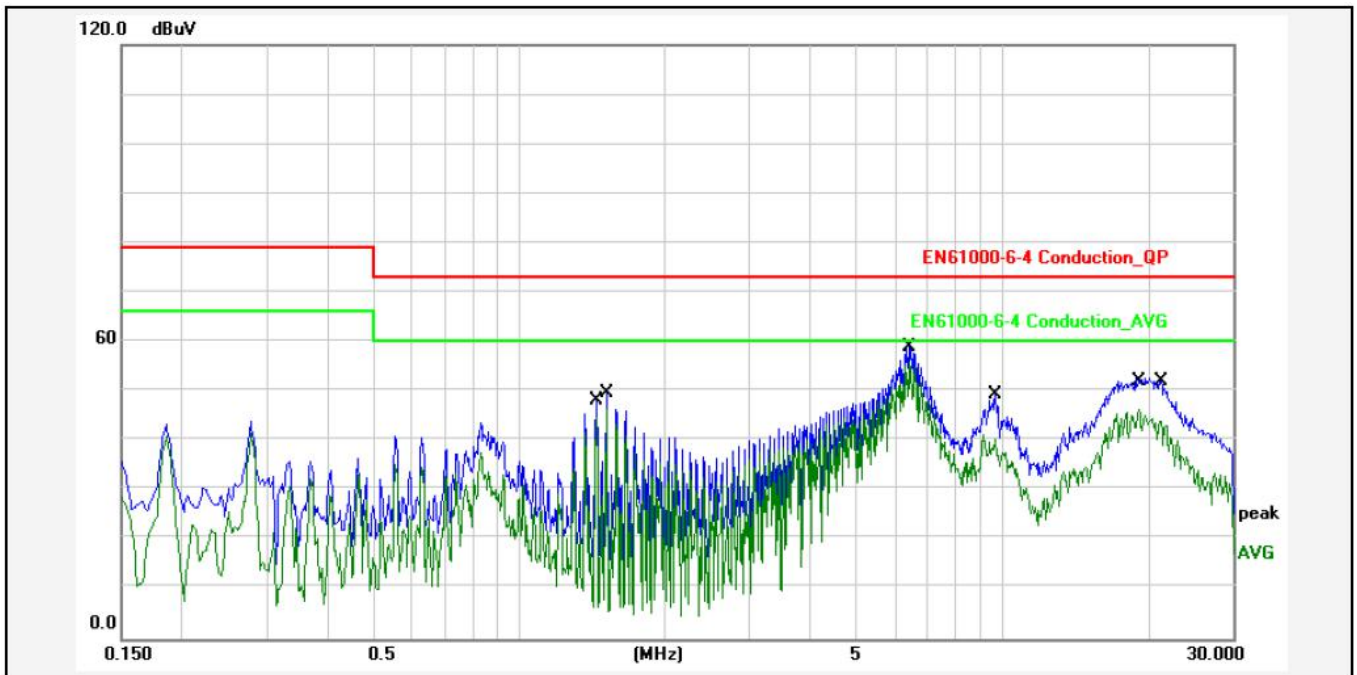
No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1500	6.60	62.01	68.61	79.00	-10.39	QP	P	
2	0.1500	6.60	52.17	58.77	66.00	-7.23	AVG	P	
3	0.2300	6.52	55.47	61.99	79.00	-17.01	QP	P	
4	0.2300	6.52	39.91	46.43	66.00	-19.57	AVG	P	
5	7.4099	6.34	41.36	47.70	73.00	-25.30	QP	P	
6	7.4099	6.34	35.71	42.05	60.00	-17.95	AVG	P	
7	11.0179	6.35	41.90	48.25	73.00	-24.75	QP	P	
8	11.0179	6.35	32.90	39.25	60.00	-20.75	AVG	P	
9	18.0379	6.37	48.48	54.85	73.00	-18.15	QP	P	
10	18.0379	6.37	40.19	46.56	60.00	-13.44	AVG	P	
11	21.6020	6.39	47.27	53.66	73.00	-19.34	QP	P	
12	21.6020	6.39	39.85	46.24	60.00	-13.76	AVG	P	

E.U.T:	MPPT SOLAR INVERTER	Model Name:	Inverter MKS III 5KW
Temperature:	26° C	Relative Humidity:	55%
Pressure:	1006 hPa	Test Voltage:	External battery 48V
Test Mode:	Inverter mode	Phase:	Neutral



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	1.4420	6.28	40.27	46.55	73.00	-26.45	QP	P	
2	1.4420	6.28	33.93	40.21	60.00	-19.79	AVG	P	
3	1.5180	6.27	42.30	48.57	73.00	-24.43	QP	P	
4	1.5180	6.27	37.49	43.76	60.00	-16.24	AVG	P	
5	5.0699	6.28	40.58	46.86	73.00	-26.14	QP	P	
6	5.0699	6.28	38.29	44.57	60.00	-15.43	AVG	P	
7	6.9220	6.34	51.86	58.20	73.00	-14.80	QP	P	
8	6.9220	6.34	47.66	54.00	60.00	-6.00	AVG	P	
9	9.6979	6.35	42.11	48.46	73.00	-24.54	QP	P	
10	9.6979	6.35	35.19	41.54	60.00	-18.46	AVG	P	
11	20.8740	6.39	46.23	52.62	73.00	-20.38	QP	P	
12	20.8740	6.39	37.69	44.08	60.00	-15.92	AVG	P	

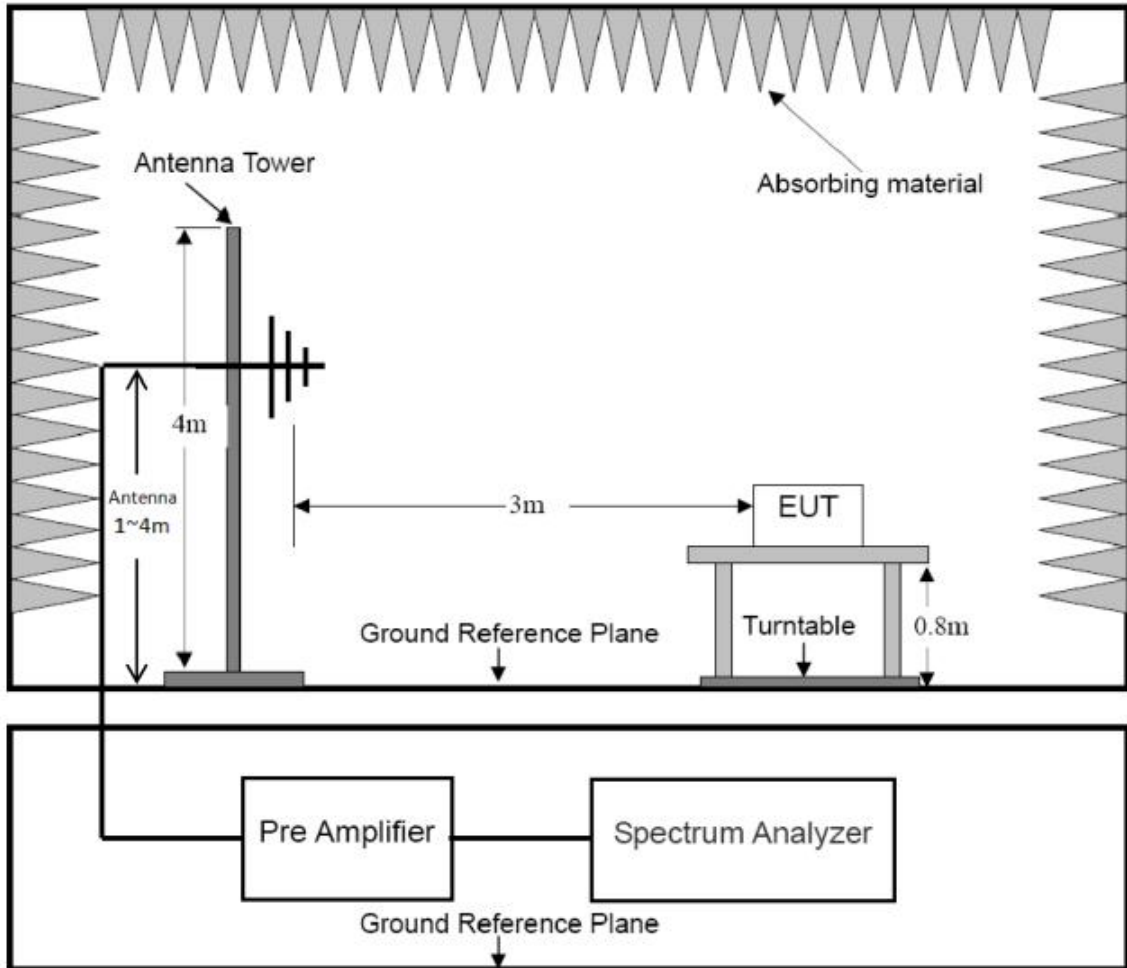
E.U.T:	MPPT SOLAR INVERTER	Model Name:	Inverter MKS III 5KW
Temperature:	26° C	Relative Humidity:	55%
Pressure:	1006 hPa	Test Voltage:	External battery 48V
Test Mode:	Inverter mode	Phase:	Line



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	1.4420	6.32	41.98	48.30	73.00	-24.70	QP	P	
2	1.4420	6.32	38.29	44.61	60.00	-15.39	AVG	P	
3	1.5180	6.32	43.20	49.52	73.00	-23.48	QP	P	
4	1.5180	6.32	39.91	46.23	60.00	-13.77	AVG	P	
5	6.4020	6.34	51.46	57.80	73.00	-15.20	QP	P	
6	6.4020	6.34	46.46	52.80	60.00	-7.20	AVG	P	
7	9.6979	6.35	42.89	49.24	73.00	-23.76	QP	P	
8	9.6979	6.35	33.99	40.34	60.00	-19.66	AVG	P	
9	19.2099	6.55	46.15	52.70	73.00	-20.30	QP	P	
10	19.2099	6.55	39.71	46.26	60.00	-13.74	AVG	P	
11	21.3180	6.59	43.30	49.89	73.00	-23.11	QP	P	
12	21.3180	6.59	37.50	44.09	60.00	-15.91	AVG	P	

5. RADIATED EMISSION MEASUREMENT

5.1 Block Diagram of Test



5.2 Limit of Radiated Emission Measurement

Test Standard: EN 61000-6-4

Limits for radiated disturbance at a measuring distance of 3m

Frequency range MHz	Quasi-peak limits dB(uV/m)
30 to 230	50
230 to 1000	57

Note 1 The lower limit shall apply at the transition frequency.

Note 2 Additional provisions may be required for cases where interference occurs.

5.3 Test Procedure

E.U.T. and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. E.U.T. is set 3.0 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to EN 61000-6-4 on radiated emission measurement.

Below 1GHz, the bandwidth of the EMI test receiver (R&S ESCI-7) is set at 120 KHz.

Above 1GHz, the bandwidth of the EMI test is set at 1MHz.

The frequency range from 30 MHz to 1GHz is checked.

Sample of data calculate:

Level=Reading + Factor; Margin= Level-Limit

Factor=CF+AF+AG

Where CF=Cable attenuation factor in dB

AF= Antenna factor in dB

AG=Amplifier Gain in dB

5.4 Operating Condition of E.U.T.

5.4.1 Setup the E.U.T. and simulators as shown in Section 5.3.

5.4.2 Turn on the power of all equipments.

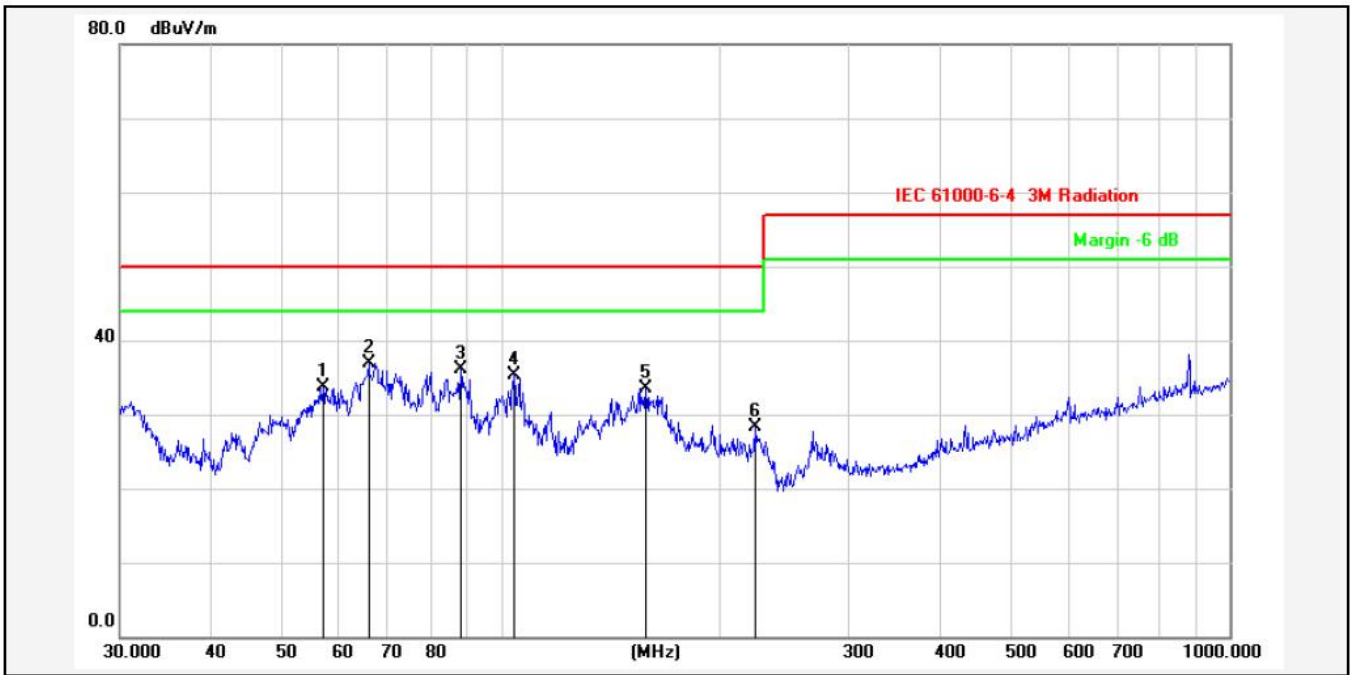
5.4.3 Let the E.U.T. work in test modes (Charging mode, Inverter mode) and test it.

5.5 Radiated Emission Measurement Result

PASS.

Please refer to the following pages.

E.U.T:	MPPT SOLAR INVERTER	Model Name:	Inverter MKS III 5KW
Temperature:	26.7° C	Relative Humidity:	56%
Pressure:	1006 hPa	Test Voltage:	External battery 48V
Test Mode:	Inverter mode	Polarization:	Horizontal



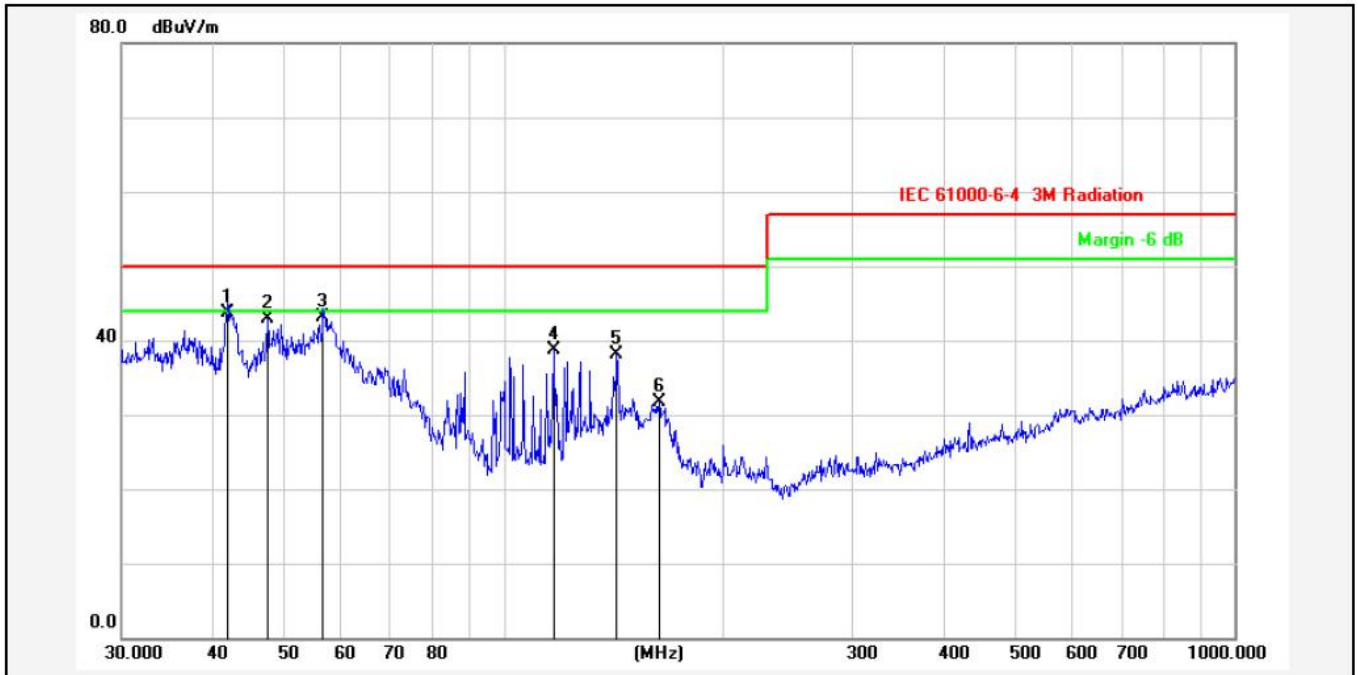
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	56.9912	-17.50	51.13	33.63	50.00	-16.37	QP			P	
2	65.8030	-17.51	54.39	36.88	50.00	-13.12	QP			P	
3	88.0329	-14.29	50.32	36.03	50.00	-13.97	QP			P	
4	104.1701	-11.11	46.51	35.40	50.00	-14.60	QP			P	
5	158.1123	-11.40	44.99	33.59	50.00	-16.41	QP			P	
6	222.9502	-13.27	41.63	28.36	50.00	-21.64	QP			P	

E.U.T:	MPPT SOLAR INVERTER	Model Name:	Inverter MKS III 5KW
Temperature:	26.7° C	Relative Humidity:	56%
Pressure:	1006 hPa	Test Voltage:	External battery 48V
Test Mode:	Inverter mode	Polarization:	Vertical



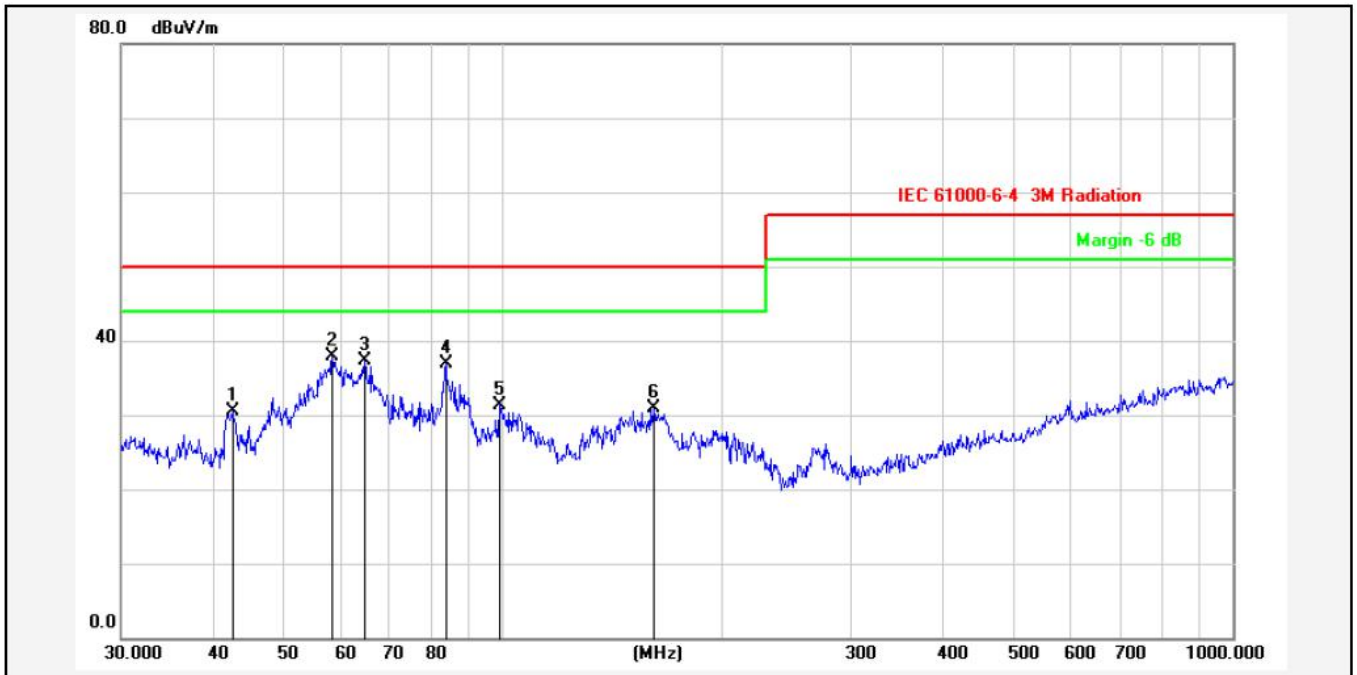
No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	31.9546	-9.61	52.11	42.50	50.00	-7.50	QP			P	
2	56.7917	-17.47	56.99	39.52	50.00	-10.48	QP			P	
3	71.3300	-16.91	53.36	36.45	50.00	-13.55	QP			P	
4	117.7725	-10.02	40.97	30.95	50.00	-19.05	QP			P	
5	148.4410	-11.21	47.18	35.97	50.00	-14.03	QP			P	
6	212.2694	-13.44	38.10	24.66	50.00	-25.34	QP			P	

E.U.T:	MPPT SOLAR INVERTER	Model Name:	Inverter MKS III 5KW
Temperature:	26.7° C	Relative Humidity:	56%
Pressure:	1006 hPa	Test Voltage:	AC 230V/50Hz
Test Mode:	Charging mode	Polarization:	Vertical



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	41.8595	-13.44	57.24	43.80	50.00	-6.20	QP			P	
2	47.4917	-15.10	58.01	42.91	50.00	-7.09	QP			P	
3	56.5929	-17.43	60.63	43.20	50.00	-6.80	QP			P	
4	116.9494	-10.11	48.77	38.66	50.00	-11.34	QP			P	
5	142.8243	-10.69	48.76	38.07	50.00	-11.93	QP			P	
6	163.1817	-11.80	43.55	31.75	50.00	-18.25	QP			P	

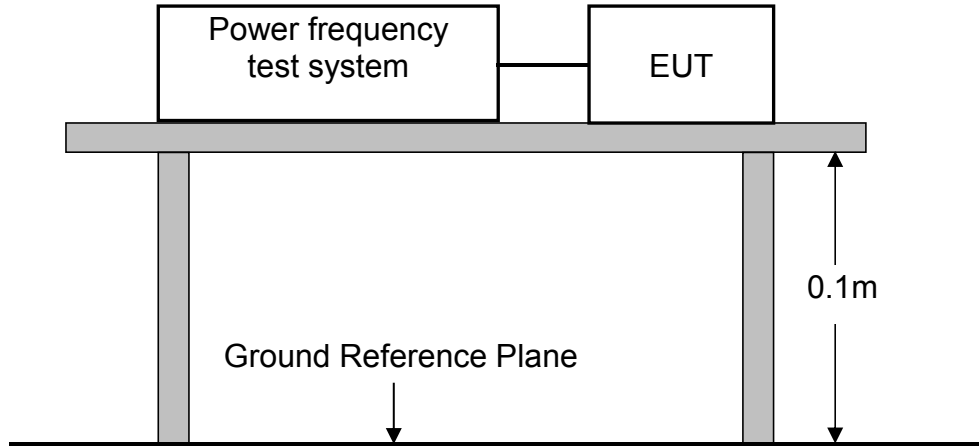
E.U.T:	MPPT SOLAR INVERTER	Model Name:	Inverter MKS III 5KW
Temperature:	26.7° C	Relative Humidity:	56%
Pressure:	1006 hPa	Test Voltage:	AC 230V/50Hz
Test Mode:	Charging mode	Polarization:	Horizontal



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	42.6000	-13.41	44.00	30.59	50.00	-19.41	QP			P	
2	58.4074	-17.85	55.71	37.86	50.00	-12.14	QP			P	
3	64.6594	-17.65	54.90	37.25	50.00	-12.75	QP			P	
4	83.5222	-14.95	51.85	36.90	50.00	-13.10	QP			P	
5	98.8326	-11.81	43.21	31.40	50.00	-18.60	QP			P	
6	160.9089	-11.54	42.49	30.95	50.00	-19.05	QP			P	

6. HARMONIC CURRENT EMISSION TEST

6.1 Block Diagram of Test Setup



6.2 Limits of Harmonics current measurement

Test Standard: EN 61000-3-12

Limits for Class A equipment		Limits for Class D equipment		
Harmonics Order n	Max. permissible harmonics current A	Harmonics Order n	Max. permissible harmonics current per watt mA/W	Max. permissible harmonics current A
Odd harmonics				
3	2.30	3	3.4	2.30
5	1.14	5	1.9	1.14
7	0.77	7	1.0	0.77
9	0.40	9	0.5	0.40
11	0.33	11	0.35	0.33
13	0.21	13	0.30	0.21
15 ≤ n ≤ 39	0.15 × 15/n	15 ≤ n ≤ 39	3.85/n	0.15 × 15/n
Even harmonics				
2	1.08			
4	0.43			
6	0.30			
8 ≤ n ≤ 40	0.23 × 8/n			

For the following categories of equipment limits are not specified in this edition of the standard.

Note 1: Equipment with a rated power of 75W or less, other than lighting equipment.

6.3 Test Procedure

The E.U.T. was put on the top of a wooden table 0.8m above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.

The E.U.T. is classified as follows:

Class A:

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

Class B:

Portable tools; Arc welding equipment which is not professional equipment.

Class C:

Lighting equipment.

Class D:

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

6.4 Operating Condition of E.U.T.

6.4.1 Setup the E.U.T. and simulators as shown in Section 6.3.

6.4.2 Turn on the power of all equipments.

6.4.3 Let the E.U.T. work in test mode (Charging mode) and test it.

6.5 Test Results

PASS.

Please refer to the following pages.

Harmonics –Per EN61000-3-12(Run time)

Reference fundamental current I1 (Average value)	22.907 A
---	----------

Test Result	
E. U. T.:	PASS
Power Source:	PASS

E. U. T. Result

Harmonic(s) > 150%:	
Order (n):	None
Harmonic(s) with average > 100%:	
Order (n):	None
All THD values below limit.	
All PWHD values below limit.	

Power Source Result

First <u>dataset</u> out of limit:	
DS (time):	None
Harmonic(s) out of limit:	
Order (n):	None

Average harmonic current results

Hn	I _{eff} [A]	I _{eff} [%]	Limit [%]	Result
1	22.907	100.000		
2	8.784E-3	0.038	8.00	PASS
3	371.094E-3	1.620	21.60	PASS
4	8.882E-3	0.039	4.00	PASS
5	166.450E-3	0.727	10.70	PASS
6	11.372E-3	0.050	2.67	PASS
7	16.292E-3	0.071	7.20	PASS
8	12.875E-3	0.056	2.00	PASS
9	67.040E-3	0.293	3.80	PASS
10	14.780E-3	0.065	1.60	PASS
11	96.729E-3	0.422	3.10	PASS
12	15.667E-3	0.068	1.33	PASS
13	129.119E-3	0.564	2.00	PASS
14	17.734E-3	0.077		PASS
15	129.408E-3	0.565		PASS
16	19.785E-3	0.086		PASS
17	127.407E-3	0.556		PASS
18	16.220E-3	0.071		PASS
19	113.840E-3	0.497		PASS
20	18.802E-3	0.082		PASS
21	93.956E-3	0.410		PASS
22	15.215E-3	0.066		PASS
23	73.219E-3	0.320		PASS
24	14.869E-3	0.065		PASS
25	48.737E-3	0.213		PASS
26	15.479E-3	0.068		PASS
27	35.099E-3	0.153		PASS
28	28.410E-3	0.124		PASS
29	17.841E-3	0.078		PASS
30	13.852E-3	0.060		PASS
31	16.293E-3	0.071		PASS
32	13.202E-3	0.058		PASS
33	22.307E-3	0.097		PASS
34	13.481E-3	0.059		PASS
35	25.964E-3	0.113		PASS
36	13.203E-3	0.058		PASS
37	30.449E-3	0.133		PASS
38	13.490E-3	0.059		PASS
39	30.417E-3	0.133		PASS
40	14.004E-3	0.061		PASS

Harmonic current results - DS: 1

Hn	I _{eff} [A]	I _{eff} [%]	Limit [%]	Result
1	22.932	100.110		
2	9.544E-3	0.042	8.00	PASS
3	371.267E-3	1.621	21.60	PASS
4	9.395E-3	0.041	4.00	PASS
5	164.384E-3	0.718	10.70	PASS
6	10.742E-3	0.047	2.67	PASS
7	14.610E-3	0.064	7.20	PASS
8	11.995E-3	0.052	2.00	PASS
9	70.738E-3	0.309	3.80	PASS
10	12.432E-3	0.054	1.60	PASS
11	98.745E-3	0.431	3.10	PASS
12	13.123E-3	0.057	1.33	PASS
13	131.617E-3	0.575	2.00	PASS
14	14.841E-3	0.065		PASS
15	132.139E-3	0.577		PASS
16	17.732E-3	0.077		PASS
17	128.382E-3	0.560		PASS
18	13.918E-3	0.061		PASS
19	113.479E-3	0.495		PASS
20	16.874E-3	0.074		PASS
21	92.848E-3	0.405		PASS
22	14.352E-3	0.063		PASS
23	71.665E-3	0.313		PASS
24	13.264E-3	0.058		PASS
25	47.613E-3	0.208		PASS
26	14.474E-3	0.063		PASS
27	33.543E-3	0.146		PASS
28	24.536E-3	0.107		PASS
29	17.434E-3	0.076		PASS
30	12.979E-3	0.057		PASS
31	15.788E-3	0.069		PASS
32	14.608E-3	0.064		PASS
33	23.790E-3	0.104		PASS
34	13.686E-3	0.060		PASS
35	26.813E-3	0.117		PASS
36	12.896E-3	0.056		PASS
37	29.900E-3	0.131		PASS
38	13.866E-3	0.061		PASS
39	30.476E-3	0.133		PASS
40	14.237E-3	0.062		PASS

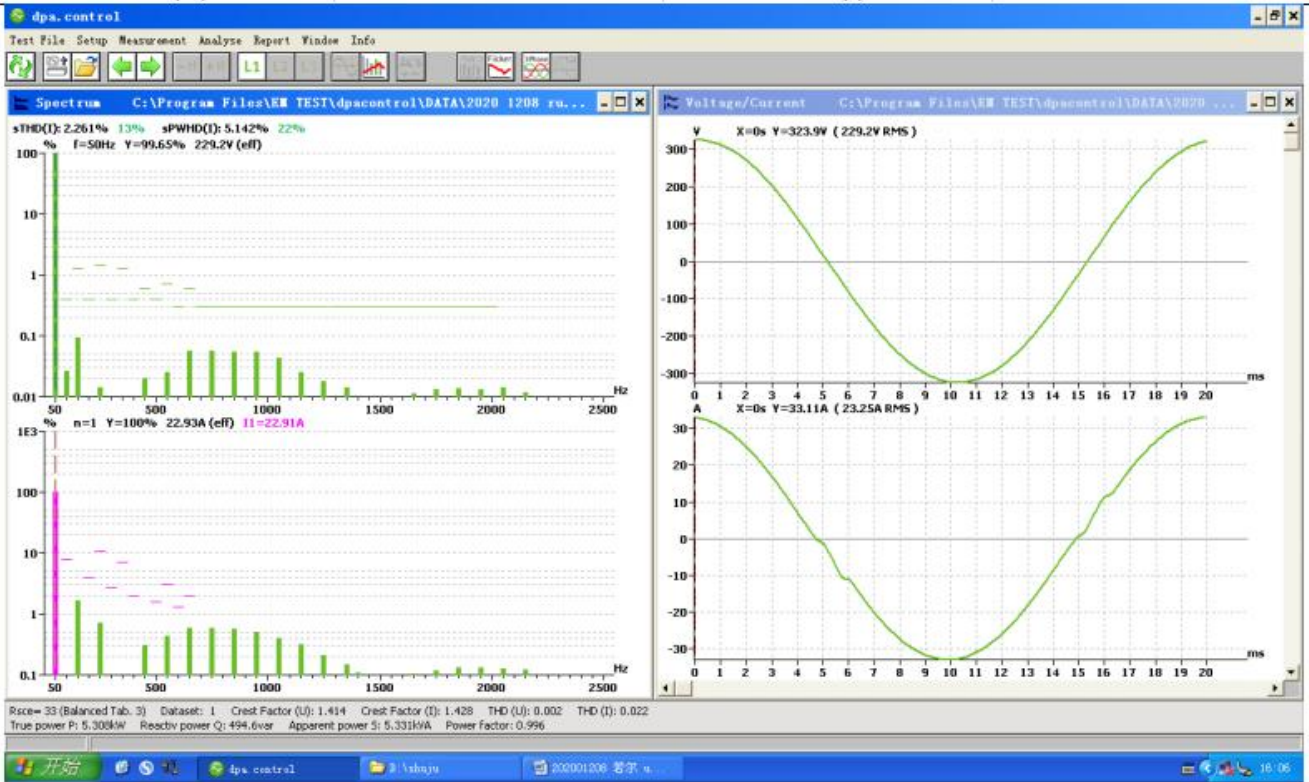
Caution: Results related to the 100% limit values

Harmonic voltage results - DS: 1

Hn	Ueff [V]	Ueff [%]	Limit [%]	Result
1	229.20	99.650		
2	61.17E-3	0.027	0.4	PASS
3	217.02E-3	0.094	1.3	PASS
4	9.50E-3	0.004	0.4	PASS
5	32.36E-3	0.014	1.5	PASS
6	7.14E-3	0.003	0.4	PASS
7	20.77E-3	0.009	1.3	PASS
8	4.48E-3	0.002	0.4	PASS
9	46.76E-3	0.020	0.6	PASS
10	8.10E-3	0.004	0.4	PASS
11	58.21E-3	0.025	0.7	PASS
12	11.42E-3	0.005	0.3	PASS
13	127.74E-3	0.056	0.6	PASS
14	8.98E-3	0.004	0.3	PASS
15	127.28E-3	0.055	0.3	PASS
16	10.33E-3	0.004	0.3	PASS
17	124.54E-3	0.054	0.3	PASS
18	15.15E-3	0.007	0.3	PASS
19	122.60E-3	0.053	0.3	PASS
20	6.49E-3	0.003	0.3	PASS
21	99.10E-3	0.043	0.3	PASS
22	10.70E-3	0.005	0.3	PASS
23	57.78E-3	0.025	0.3	PASS
24	10.90E-3	0.005	0.3	PASS
25	41.35E-3	0.018	0.3	PASS
26	9.54E-3	0.004	0.3	PASS
27	32.57E-3	0.014	0.3	PASS
28	3.62E-3	0.002	0.3	PASS
29	9.31E-3	0.004	0.3	PASS
30	8.19E-3	0.004	0.3	PASS
31	16.21E-3	0.007	0.3	PASS
32	12.79E-3	0.006	0.3	PASS
33	25.72E-3	0.011	0.3	PASS
34	10.54E-3	0.005	0.3	PASS
35	29.77E-3	0.013	0.3	PASS
36	11.10E-3	0.005	0.3	PASS
37	31.66E-3	0.014	0.3	PASS
38	16.05E-3	0.007	0.3	PASS
39	29.96E-3	0.013	0.3	PASS
40	14.07E-3	0.006	0.3	PASS

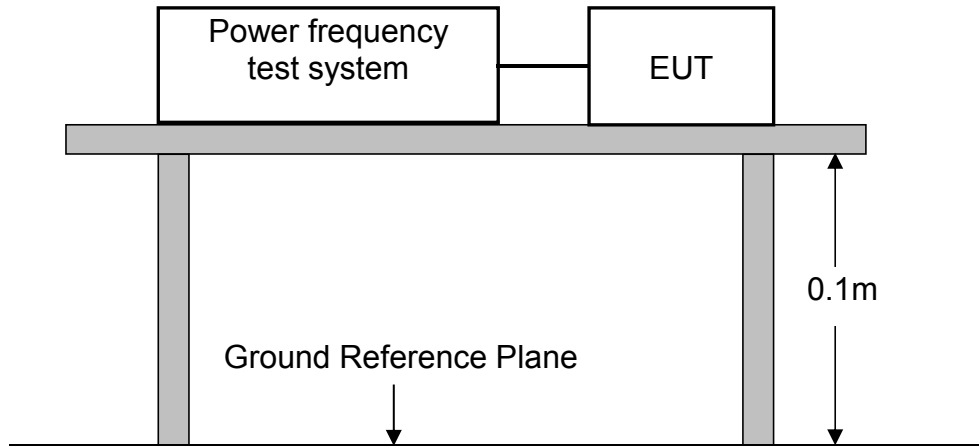
Power and THD results - DS: 1

True power P:	5.308kW	Apparent power S:	5.331kVA
Reactiv power Q:	494.6var	Power factor:	0.996
THD (U):	0.002	THD (I):	0.022
Crest Factor (U):	1.414	Crest Factor (I):	1.428



7. VOLTAGE FLUCTUATIONS & FLICKER TEST

7.1 Block Diagram of Test Setup



7.2 Limits of Voltage Fluctuations & Flicker Measurement

Test Standard: EN 61000-3-11

Test Item	Limit
P_{st} (Short-term flicker indicator.)	1.0
P_{ft} (Long-term flicker indicator.)	0.65
$T_{d(t)}$ (ms) (Maximum time that $d(t)$ exceeds 3.3%)	500
d_{max} (%) (Maximum relative voltage change.)	4
d_c (%) (Relative steady-state voltage change)	3.3

7.3 Test Procedure

The E.U.T. was put on the top of a wooden table 0.8m above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.

7.4 Operating Condition of E.U.T.

7.4.1 Setup the E.U.T. and simulators as shown in Section 7.3.

7.4.2 Turn on the power of all equipments.

7.4.3 Let the E.U.T. work in test mode (Normal operation mode) and test it.

7.5 Test Results

PASS.

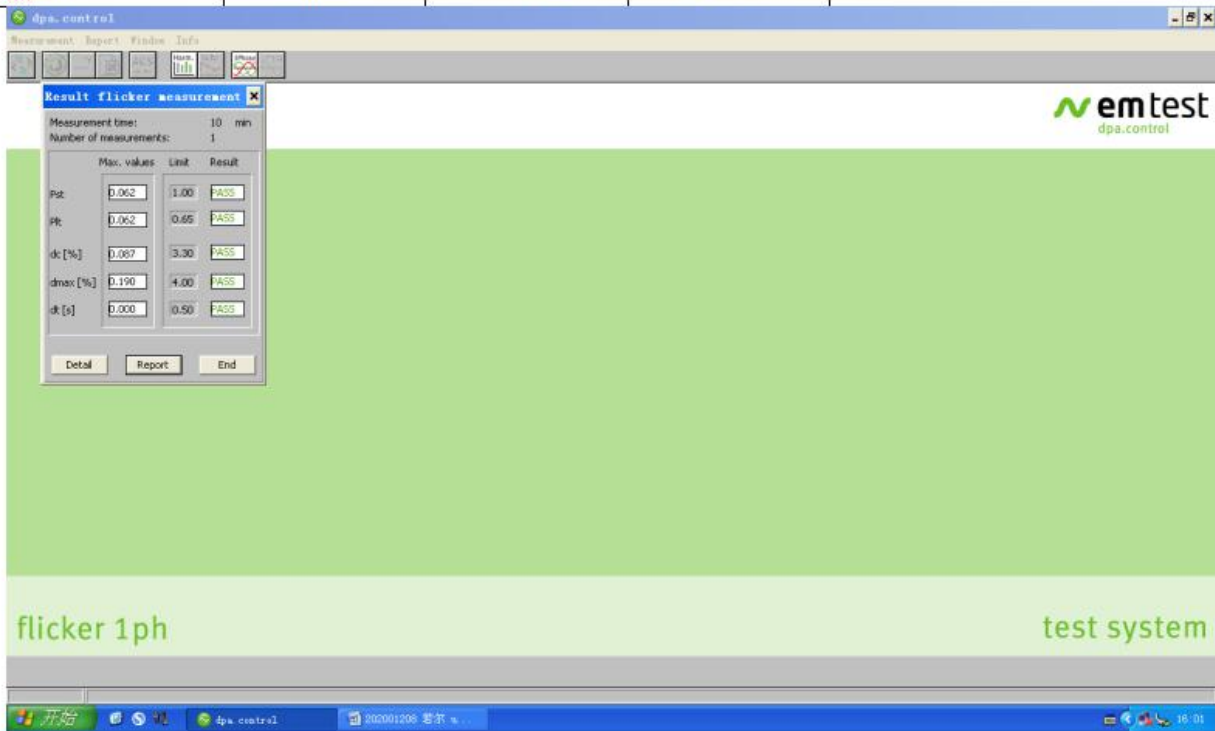
Please refer to the following page.

Flicker Test Summary per EN 61000-3-11 (Run time)

Test Result	PASS
-------------	------

Maximum Flicker results

	EUT values	Limit	Result
Pst	0.062	1.00	PASS
Plt	0.062	0.65	PASS
dc [%]	0.087	3.30	PASS
dmax [%]	0.190	4.00	PASS
dt [s]	0.000	0.50	PASS



8. PERFORMANCE CRITERIA FOR IMMUNITY

The performance criteria are referred to the test standard:
EN IEC 61000-6-2/IEC 61000-6-2

The variety and the diversity of the apparatus within the scope of this standard makes it difficult to define precise criteria for the evaluation of the immunity test results. If, as a result of the application of the tests defined in this standard, the apparatus becomes dangerous or unsafe, the apparatus shall be deemed to have failed the test. A functional description and a definition of performance criteria, during or as a consequence of the EMC testing, shall be provided by the manufacturer and noted in the test report.

Performance Criterion A:

The apparatus shall continue to operate as intended during and after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonable expect from the apparatus if used as intended.

Performance Criterion B:

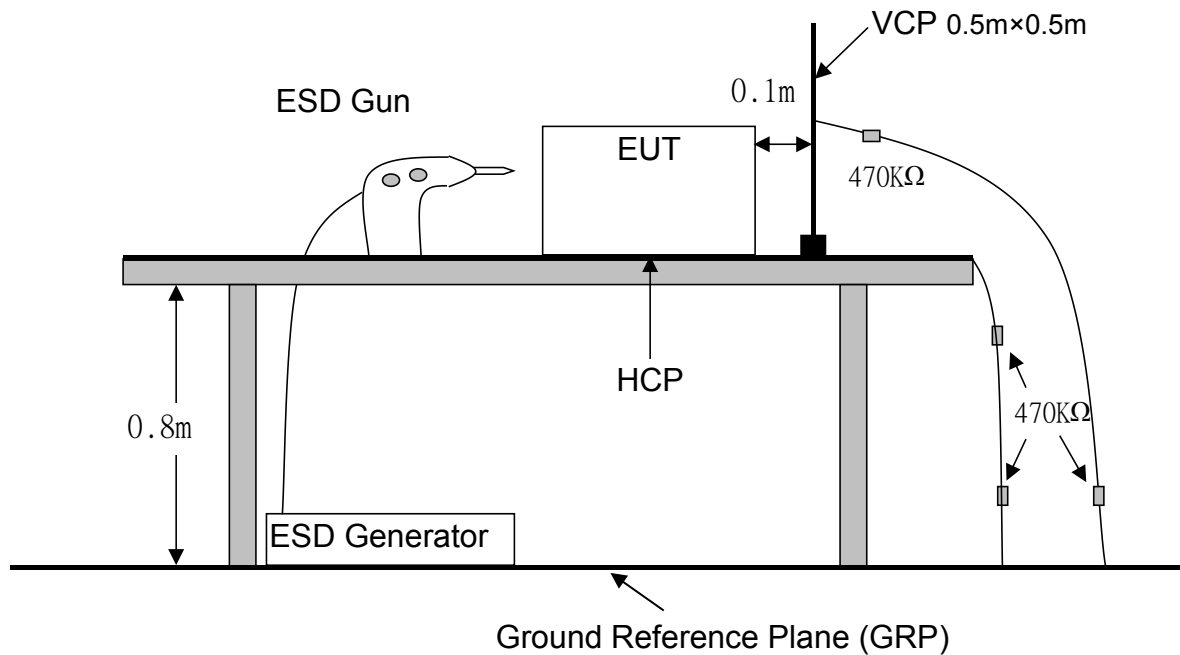
The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. The performance level may be replaced by a permissible loss of performance. During the test, degradation of performance is however allowed. No change of actual operation state or stored data is allowed. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, either of these may be derived from the product description and documentation and what the user may reasonably expect from the apparatus if used as intended.

Performance Criteria C

Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls.

9. ELECTROSTATIC DISCHARGE TEST

9.1 Block Diagram of Test Setup



9.2 Test Standard and Severity Levels

9.2.1 Test Standard:

EN 61000-6-2

(EN 61000-4-2, Air Discharge: Severity Level: 3, ± 8 KV;

Contact Discharge: Level: 2, ± 4 KV)

9.2.2 Severity Levels:

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

9.3 Test Procedure

9.3.1 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 E.U.T.. After each discharge, the discharge electrode shall be removed from the E.U.T.. The generator is then re-triggered for a new single discharge and repeated 25 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

9.3.2 Contact Discharge:

All the procedure shall be same as Section 9.3.1. except that the tip of the discharge electrode shall touch the E.U.T..

9.3.3 Indirect discharge for horizontal coupling plane

At least 10 single discharges(in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit(if applicable) of the E.U.T. and 0.1m from the front of the E.U.T.. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

9.3.4 Indirect discharge for vertical coupling plane

At least 10 single discharge (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the E.U.T.. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the E.U.T. are completely illuminated.

9.4 Test Results

PASS.

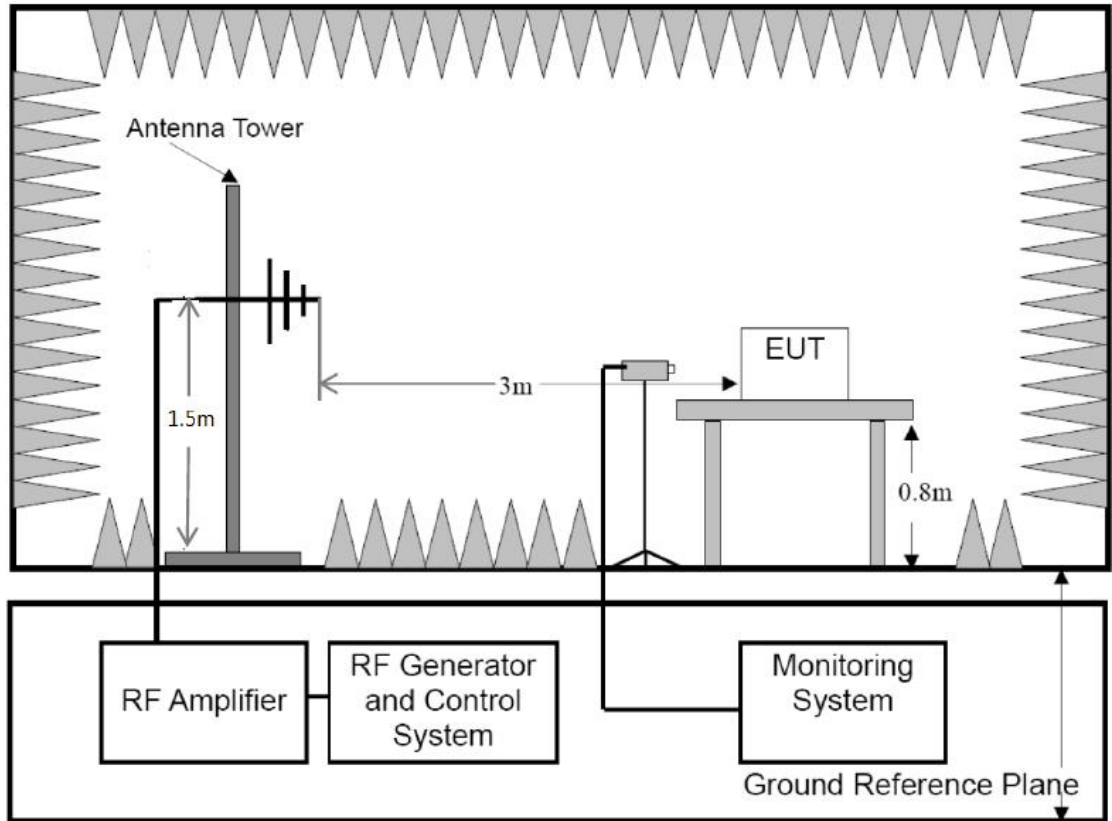
Please refer to the following page.

Electrostatic Discharge Test Results

Ambient Condition:	Temp.: 24 °C	R.H.: 45%	Air Pressure: 101.3 kPa
Power Supply:	AC 230V/50Hz, External battery 48V	Required Performance Criterion: B	
Test Specifications:	±2, 4 kV Contact Discharge; For each point positive 25 times and negative 25 times ±2, 4, 8 kV Air Discharge For each point positive 10 times and negative 10 times		
Tested mode:	Inverter mode, Charging mode		
Test Point	Kind A-Air Discharge C-Contact Discharge	Result (Performance Criterion)	
Metal	C	A	
Screws	C	A	
Screen	A	A	
Button	A	A	
Slot of EUT	A	A	
LED	A	A	
Port	C	A	
Indirect Discharge (HCP)	C	A	
Indirect Discharge (VCP)	C	A	
Note: The test showed no abnormal phenomena.			
Test Equipment : ESD Tester (HAEFELY, ONYX16)		Test Engineer : Neal	

10. RF FIELD STRENGTH SUSCEPTIBILITY TEST

10.1 Block Diagram of Test Setup



10.2 Test Standard and Severity Levels

10.2.1 Test Standard

EN 61000-6-2

(EN 61000-4-3, 80 to 1000MHz Severity Level: 3, 10V/m;)

10.2.2 Severity Levels

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

10.3 Test Procedure

The E.U.T. and its simulators are placed on a turn table which is 0.8 meter above ground. E.U.T. is set 3 meter away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the four sides of E.U.T. must be faced this transmitting antenna and measured individually.

All the scanning conditions are as follows :

Condition of Test	Remarks
1. Fielded Strength	10 V/m (Severity Level 3)
2. Radiated Signal	Modulated
3. Scanning Frequency	80 - 1000 MHz
4. Dwell time of radiated	0.0015 decade/s
5. Waiting Time	1 Sec.

10.4 Test Results

PASS.

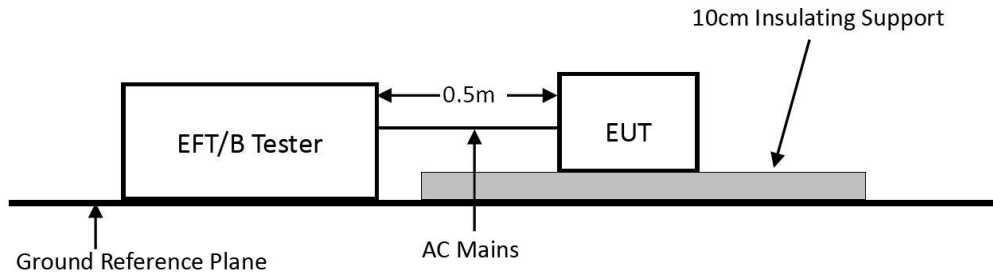
Please refer to the following page.

RF Field Strength Susceptibility Test Results

Ambient Condition:	Temp.: 26 °C	R.H.: 50 %	Air Pressure: 101 kPa	
Power Supply:	AC 230V/50Hz, External battery 48V	Required Performance Criterion: A		
Test Specifications:	Modulation: 1kHz, 80%AM; Step Size: 1%; Dwell Time: 3s			
Tested mode:	Charging mode, Inverter mode			
Frequency (MHz)	Level (V/m)	Antenna polarity	Side	Result (Performance Criterion)
80-1000	10	Horizontal/ Vertical	Front/ Left/ Right/ Back	A
1400-6000	3			A
Note: The test showed no abnormal phenomena.				
<p>Test Equipment :</p> <ol style="list-style-type: none"> 1. Signal Generator : N5181A (Agilent) 2. Power Amplifier : HAP801000M_250W (SKET) 3. Antenna: STLP 9129 (Schwarzbeck) 4. RF Power Meter. Dual Channel : E4419B (Agilent) 5. Power Sensor: E9300A (Agilent) <p style="text-align: right;">Test Engineer : Rick</p>				

11.ELECTRICAL FAST TRANSIENT/BURST TEST

11.1 Block Diagram of Test Setup



11.2 Test Standard and Severity Levels

11.2.1 Test Standard

EN 61000-6-2

(EN 61000-4-4, Severity Level, Level 3: 2KV)

11.2.2 Severity level

Open circuit output test voltage and repetition rate of the impulses				
Level	On power port, PE		On I/O (Input/Output) Signal data and control ports	
	Voltage peak KV	Repetition rate KHz	Voltage peak KV	Repetition rate KHz
1.	0.5	5 or 100	0.25	5 or 100
2.	1.0	5 or 100	0.5	5 or 100
3.	2.0	5 or 100	1.0	5 or 100
4.	4.0	5 or 100	2.0	5 or 100
X	Special	Special	Special	Special

Note 1 Use of 5 KHz repetition rates is traditional; however, 100 KHz is closer to reality. Product committees should determine which frequencies are relevant for specific products or product types.

Note 2 With some products, there may be no clear distinction, between power ports and I/O ports, in which case it is up to product committees to make this determination for test purposes.

Note 3 "X" is an open level. The level has to be specified in the dedicated equipment specification.

11.3 Test Procedure

The E.U.T. is put on the table which is 0.8 meter high above the ground. This reference ground plane shall project beyond the E.U.T. by at least 0.1m on all sides and the minimum distance between E.U.T. and all other conductive structure, except the ground plane beneath the E.U.T., shall be more than 0.5m.

11.3.1 For input and output AC power ports:

The E.U.T. 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 minutes.

11.3.2 For signal lines ports:

It's unnecessary to test.

11.3.3 For DC ports:

It's unnecessary to test.

11.4 Test Result

PASS.

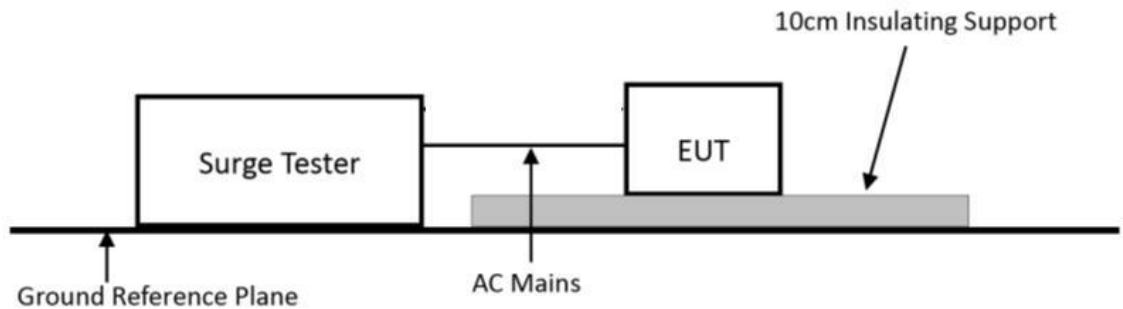
Please refer to the following page.

Electrical Fast Transient/Burst Test Results

Ambient Condition:	Temp.: 24 °C	R.H.: 45 %	Air Pressure:101.3 kPa
Power Supply:	AC 230V/50Hz	Required Performance Criterion: B	
Test Specifications:	Repetition Frequency: 5kHz; Duration: 15ms; Period: 300ms		
Test mode:	Charging mode		
Line :	<input checked="" type="checkbox"/> AC Mains	<input type="checkbox"/> Signal line	<input type="checkbox"/> DC line
Coupling :	<input checked="" type="checkbox"/> Direct	<input type="checkbox"/> Capacitive	
Line	Test Voltage	Result (Performance Criterion)	
L	±2KV	A	
N	±2KV	A	
PE	±2KV	A	
L、N	±2KV	A	
L、PE	±2KV	A	
N、PE	±2KV	A	
L、N、PE	±2KV	A	
Signal line			
DC line			
Note : The test showed no abnormal phenomena.			
Test Equipment : Burst Tester(HAEFELY, AXOS5)		Test Engineer : Neal	

12. SURGE IMMUNITY TEST

12.1 Block Diagram of Test Setup



12.2 Test Standard and Severity Levels

12.2.1 Test Standard

EN 61000-6-2

(EN 61000-4-5, Severity Level: Line To Line, Level 2: 1.0KV;
 Line To Earth, Level 3: 2.0KV)

12.2.2 Severity level

Severity Level	Open-Circuit Test Voltage KV
1	0.5
2	1.0
3	2.0
4	4.0
*	Special

12.3 Test Procedure

1. Set up the E.U.T. and test generator as shown on Section 12.1.
2. For line to line coupling mode, provide a 1KV 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to E.U.T. selected points.
3. At least 5 positive and 5 negative (polarity) tests with a maximum 1/min repetition rate are conducted during test.
4. Different phase angles are done individually.
5. Record the E.U.T. operating situation during compliance test and decide the E.U.T. immunity criterion for above each test.

12.4 Test Result

PASS.

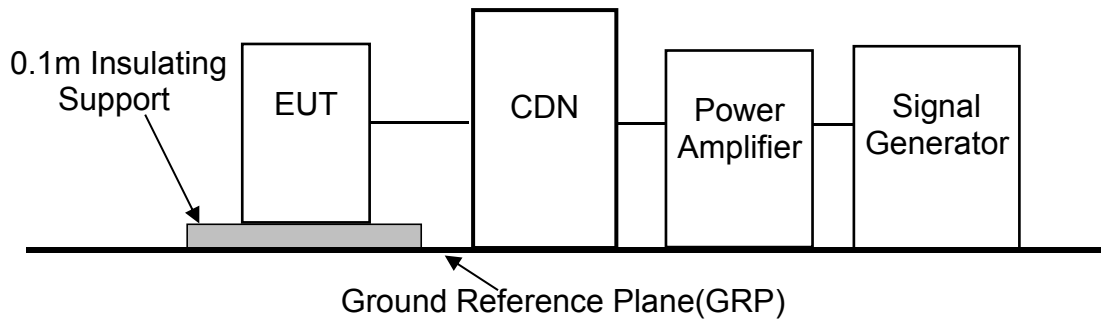
Please refer to the following page.

Surge Immunity Test Results

Ambient Condition:	Temp.: 24 °C	R.H.: 50 %	Air Pressure: 101 kPa
Power Supply:	AC 230V/50Hz	Required Performance Criterion: B	
Test Specifications:	Voltage surge 1.2/50 us ; Current surge 8/20 us ; Five positive and five negative pulses each at 0°, 90°, 180° and 270°.		
Test mode:	Charging mode		
Line	Phase Angle	Test Voltage	Result (Performance Criterion)
L-N	0°, 90°, 180°, 270°	±1KV	A
L-PE	0°, 90°, 180°, 270°	±2KV	A
N-PE	0°, 90°, 180°, 270°	±2KV	A
Signal line			
DC line			
Note : The test showed no abnormal phenomena.			
Test Equipment :Burst Tester(HAEFELY, AXOS5)		Test Engineer : Neal	

13. INJECTED CURRENTS SUSCEPTIBILITY TEST

13.1 Block Diagram of Test Setup



13.2 Test Standard and Severity Levels

13.2.1 Test Standard

EN 61000-6-2

(EN 61000-4-6, Severity Level 3: 10V (rms), 0.15MHz ~ 80MHz)

13.2.2 Severity level

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

13.3 Test Procedure

1. Set up the E.U.T., CDN and test generators as shown on Section 13.1.
2. Let the E.U.T. work in test mode and measure it.
3. The E.U.T. 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 E.U.T.. Cables between CDN and E.U.T. 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 E.U.T. through CDN.
5. The E.U.T. operates within its operational mode(s) under intended climatic conditions after power on.
6. The frequency range is swept from 150 KHz to 80 MHz using 3V 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 E.U.T. operating situation during compliance testing and decide the E.U.T. immunity criterion.

13.4 Test Result

PASS.

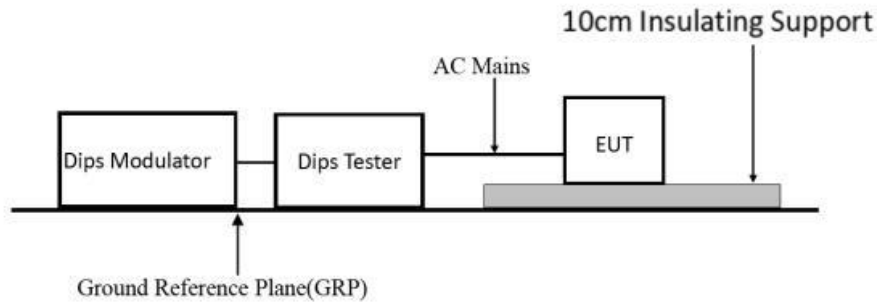
Please refer to the following page.

Injected Currents Susceptibility Test Results

Ambient Condition:	Temp.: 25 °C	R.H.: 50 %	Air Pressure: 101 kPa
Power Supply:	AC 230V/50Hz	Required Performance Criterion: A	
Test Specifications:	Modulation : 1KHz, 80%AM, Step Size : 1%, Dwell Time : 1s		
Test mode:	Charging mode		
Test Port	Frequency (MHz)	Level(V)	Result (Performance Criterion)
AC Mains	0.15~80	10	A
Note : The test showed no abnormal phenomena.			
Test Equipment : Signal Generator :2023A(IFR) CDN: CDN-M3-16(Lioncel)		Test Engineer : Rick	

14.VOLTAGE DIPS AND INTERRUPTIONS TEST

14.1 Block Diagram of Test Setup



14.2 Test Standard and Severity Levels

14.2.1 Test Standard
 EN 61000-6-2
 (EN 61000-4-11)

14.2.2 Severity level

Test Level %U _T	Voltage dip and short interruptions %U _T	Duration (in period)
0	100	0.5
		1
40	60	5
		10
70	30	25
		50
		*

14.3 Test Procedure

1. Set up the E.U.T. and test generator as shown on Section 14.1.
2. The interruptions is introduced at selected phase angles with specified duration.
3. Record any degradation of performance.

14.4 Test Result

PASS.

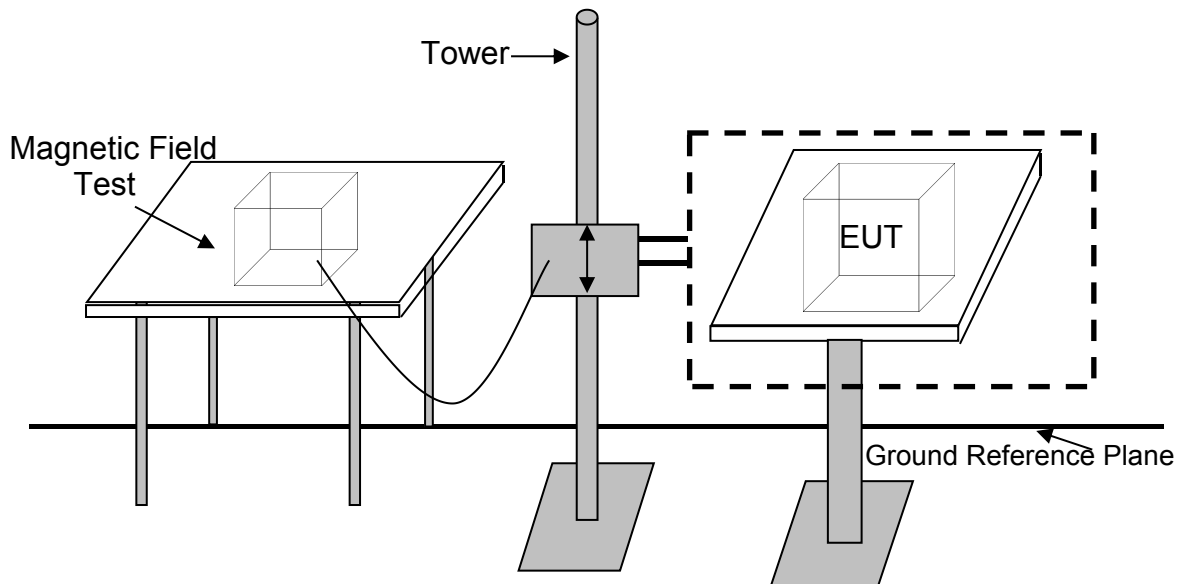
Please refer to the following page.

Voltage Dips And Interruptions Test Results

Ambient Condition:	Temp.: 24 °C	R.H.: 45 %	Air Pressure: 101.3 kPa
Power Supply:	AC 230V/50Hz	Required Performance Criterion: B & C	
Test Specifications:	0%U _T , 0.5Cycle; 40%U _T , 10Cycle; 70%U _T , 25Cycle; 0%U _T ,250Cycle		
Test mode:	Charging mode		
Test Level % UT	Duration (in period)	Result (Performance Criterion)	
0	0.5P	B	
40	10P	B	
70	25P	B	
0	250P	B	
Note :During the test, the EUT will change from the mains to the battery mode, and will return to normal after the test.			
Test Equipment : Dips Tester: (HAEFELY, AXOS5)		Test Engineer : Neal	

15.MAGNETIC FIELD IMMUNITY TEST

15.1 Block Diagram of Test Setup



15.2 Test Standard and Severity Levels

15.2.1 Test Standard

EN 61000-6-2

(EN 61000-4-8, Severity Level 4: 30A/m)

15.2.2 Severity level

Level	Magnetic Field Strength A/m
1.	1
2.	3
3.	10
4.	30
5.	100
X	Special

Performance Criterion : **A**

15.3 Test Procedure

The E.U.T. is placed in the middle of a induction coil (1*1m), under which is a 0.8m (high)table. X, Y and Z polarization of the induction coil are set on test, so that each side of the E.U.T. is affected by the magnetic field.Also can reach the same aim by change the position of the E.U.T..

15.4 Test Result

PASS.

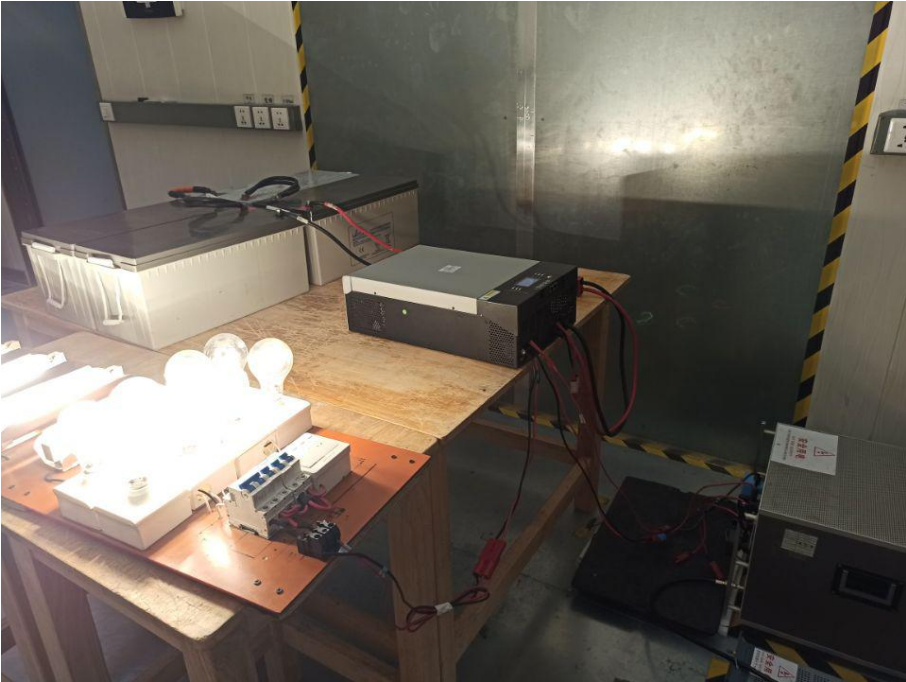
Please refer to the following page

Magnetic Field Immunity Test Results

Ambient Condition:	Temp.: 24°C	R.H.: 45%	Air Pressure: 101.3 kPa
Power Supply:	AC 230V/50Hz, External battery 48V	Required Performance Criterion: A	
Test Specifications:	30A/m		
Test mode:	Charging mode		
Test Level	Testing Duration	Coil Orientation	Result (Performance Criterion)
30A/m	5 mins	X	A
30A/m	5 mins	Y	A
30A/m	5 mins	Z	A
Note : The test showed no abnormal phenomena.			
Test Equipment :Dips Tester: (MS-8000)		Test Engineer : Neal	

16.PHOTOGRAPH

16.1 Photo of Conducted Emission Measurement



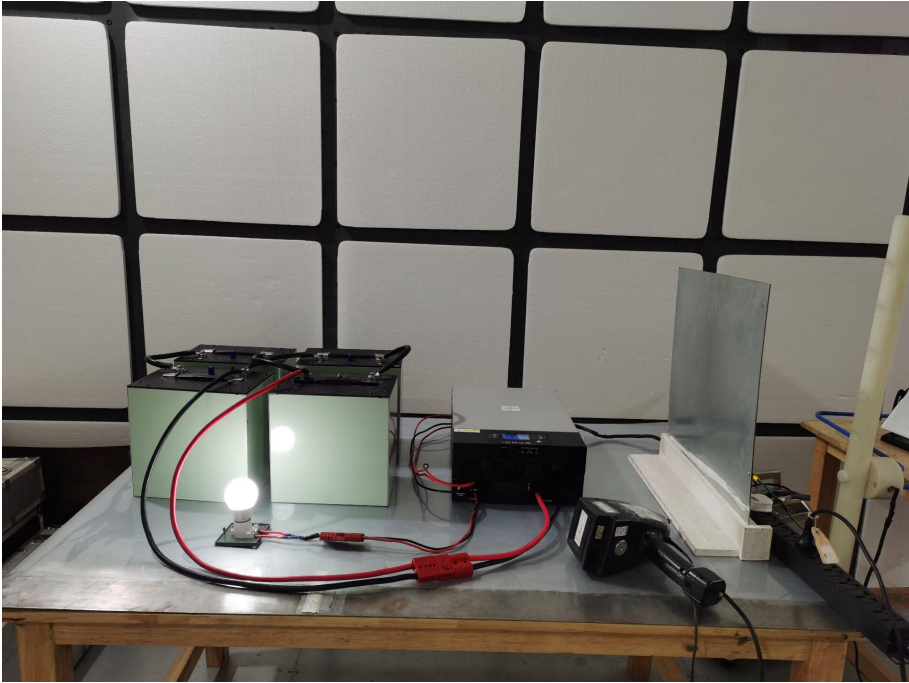
16.2 Photo of Radiation Emission Measurement



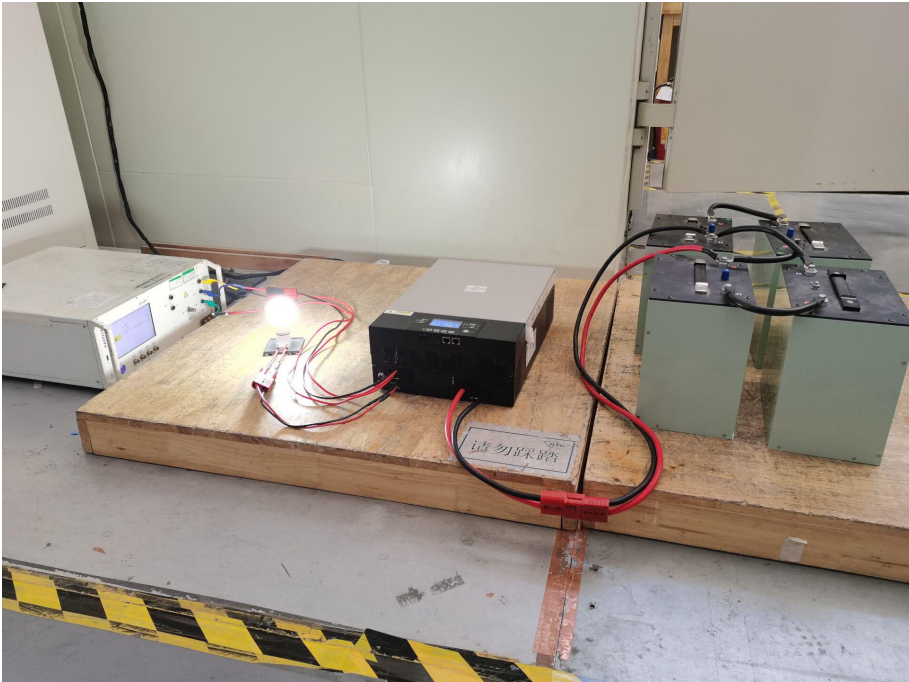
16.3 Photo of Harmonic/Flicker Measurement



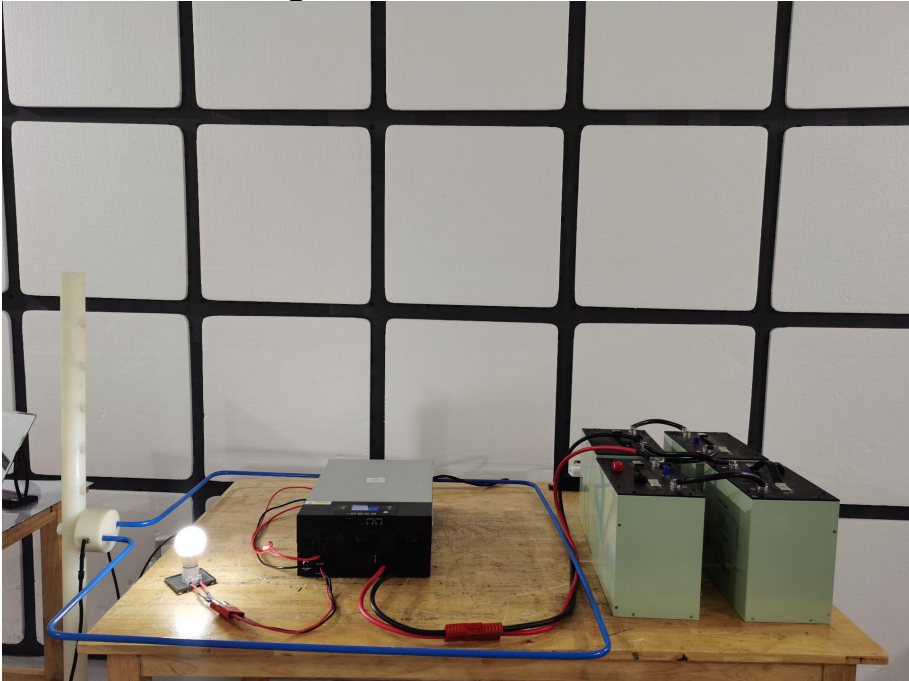
16.4 Photo of Electrostatic Discharge Test



16.5 Photo of Electrical Fast Transient /Surge /Voltage Dips Test



16.6 Photo of Magnetic Field Test



16.7 Photo of RF Field Strength Susceptibility Test

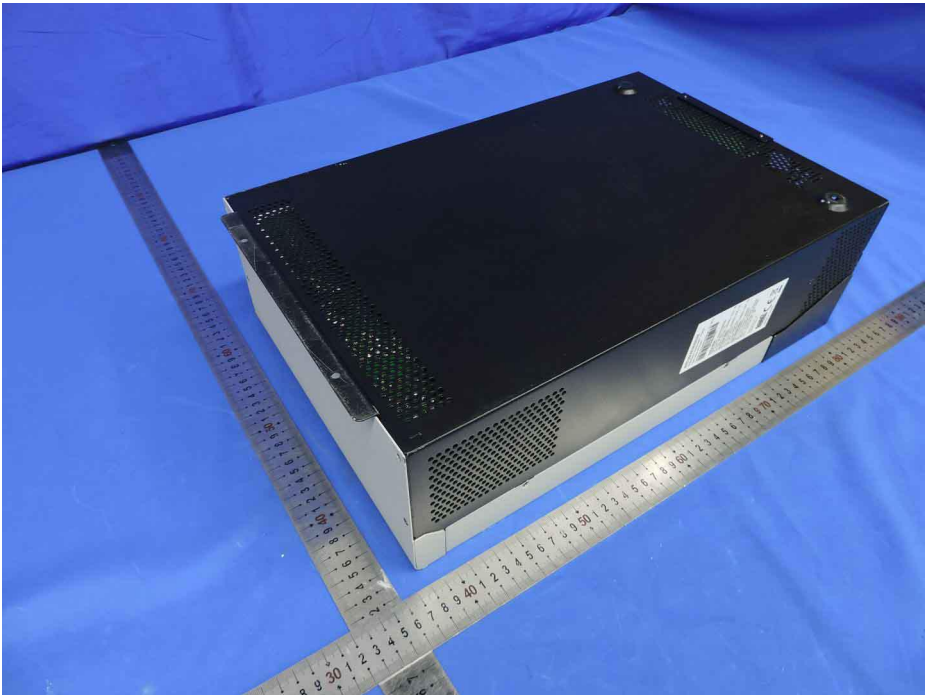


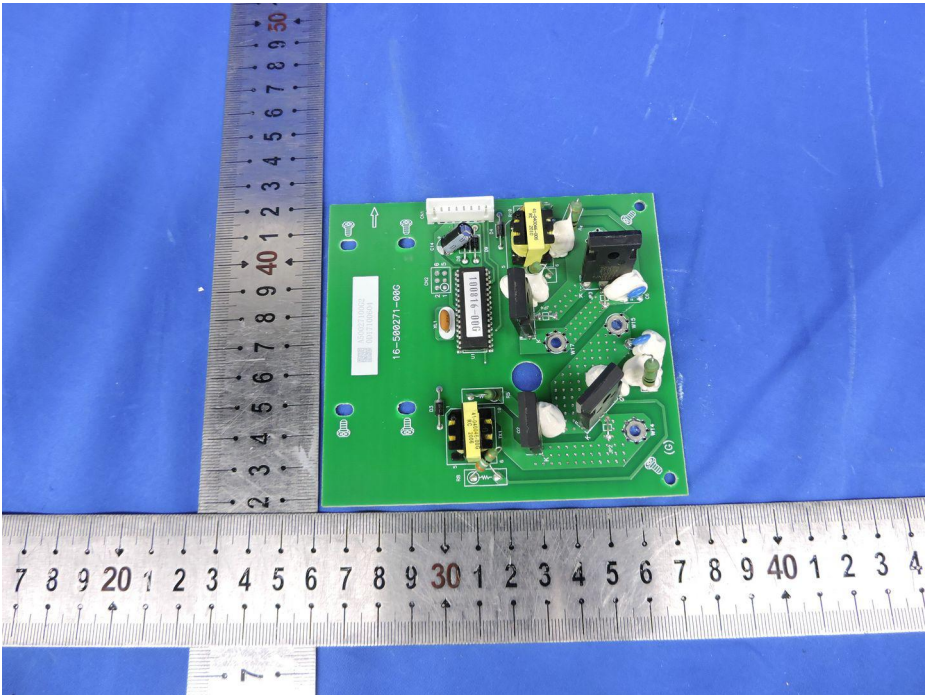
16.8 Photo of Injected Currents Susceptibility Test

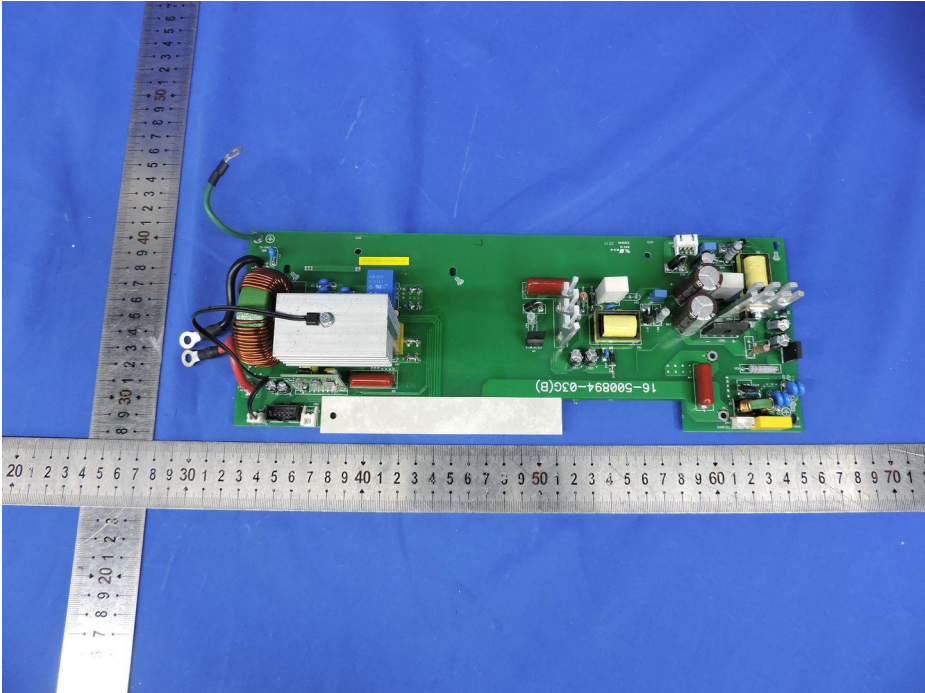
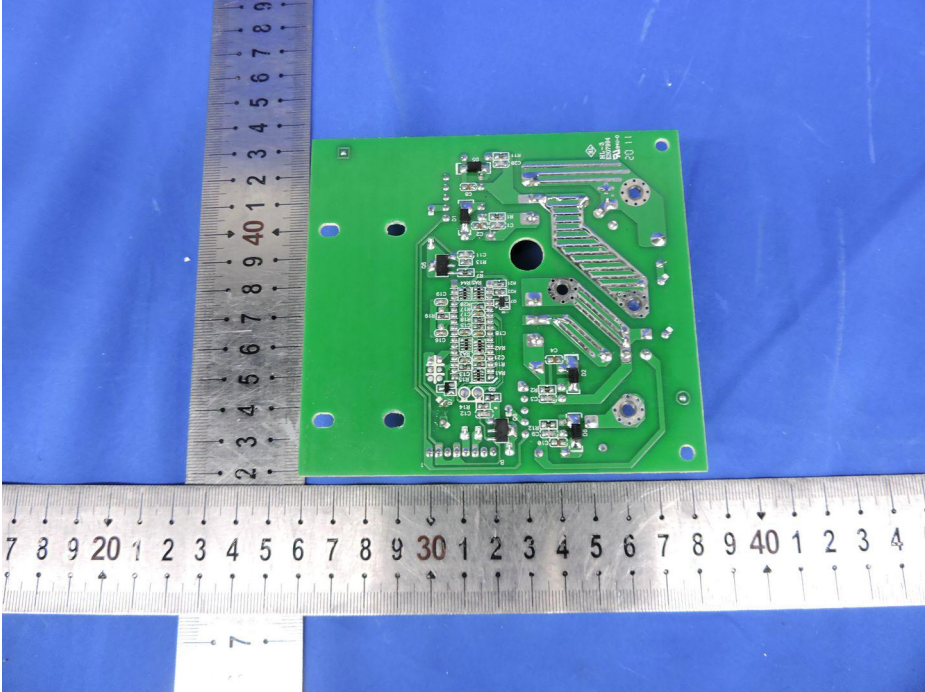


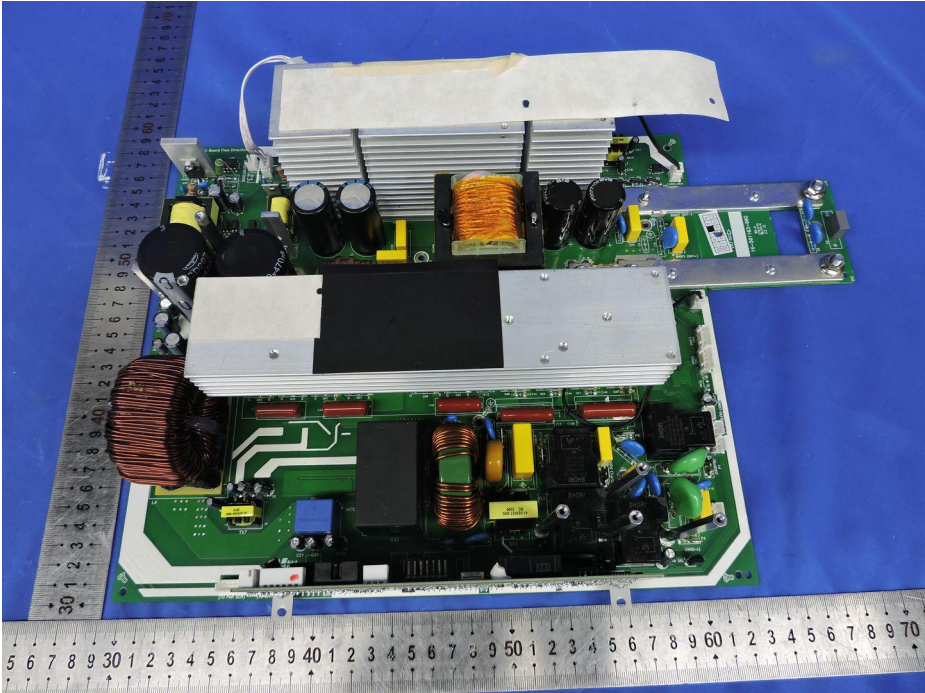
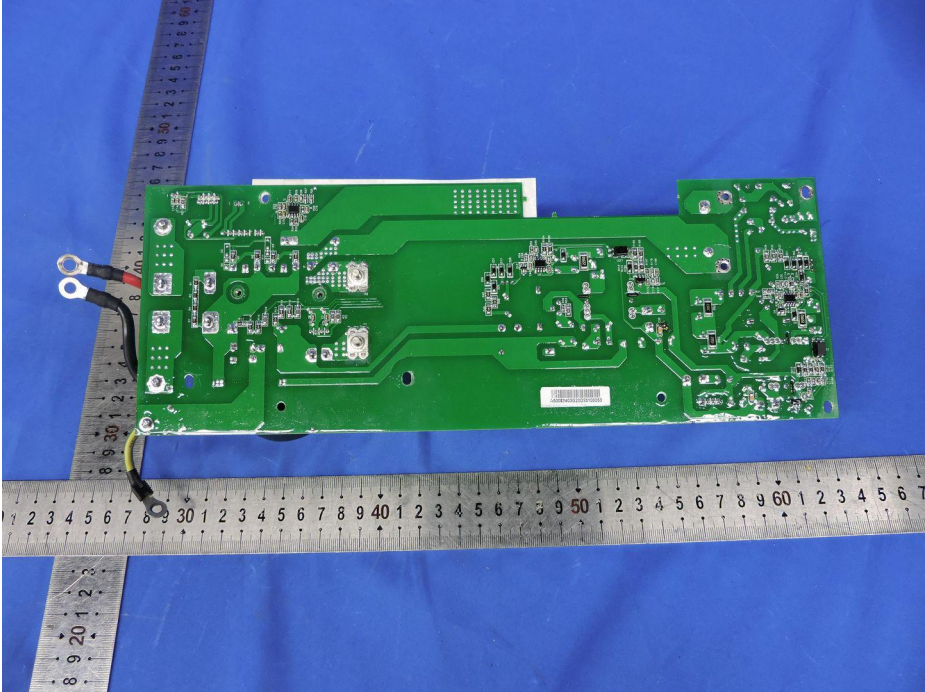
APPENDIX I

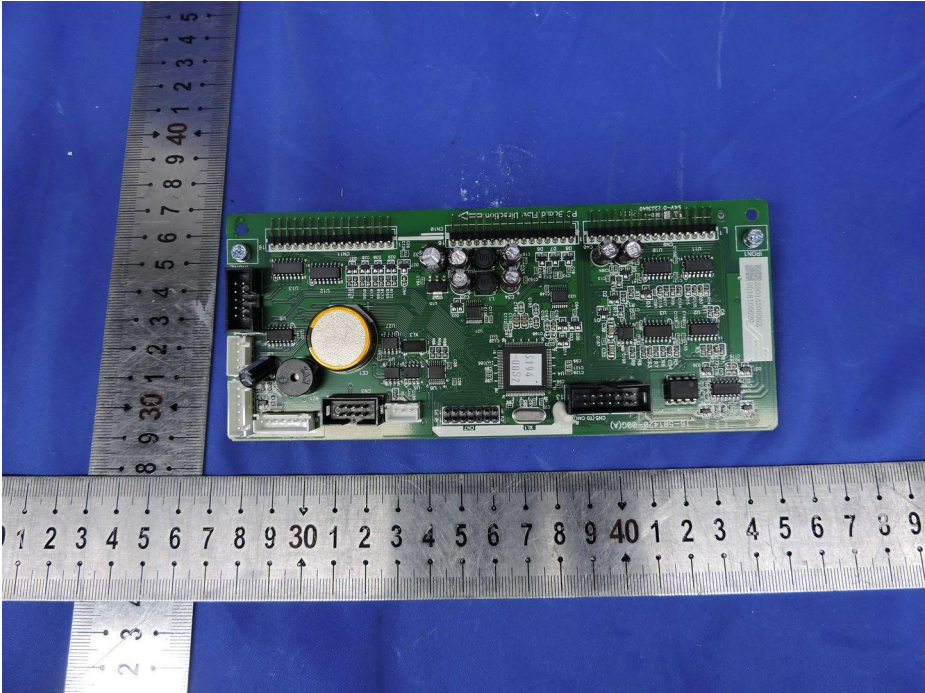
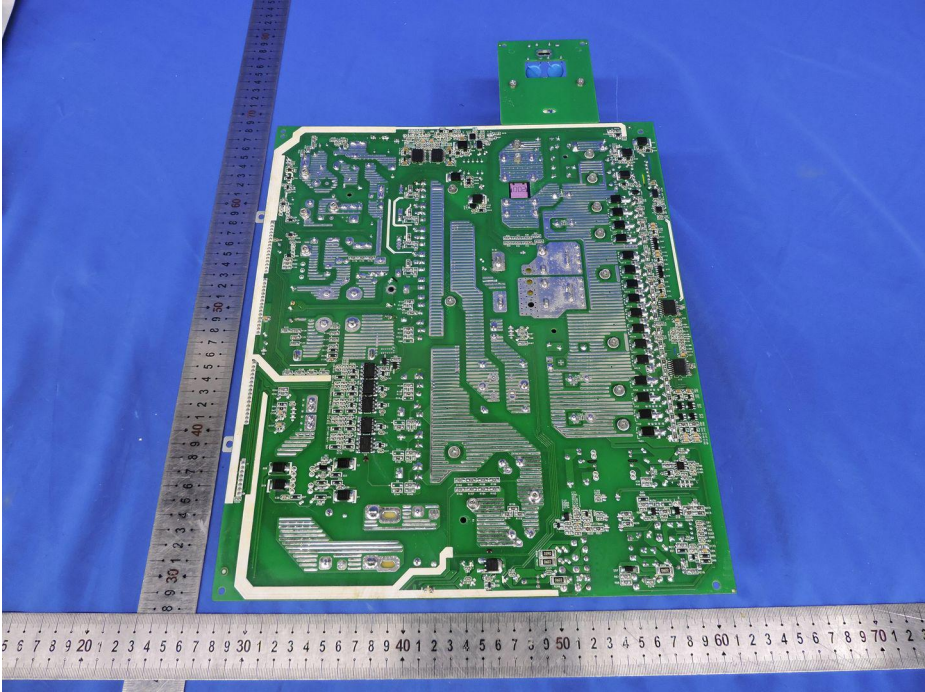
(Photos of E.U.T.)

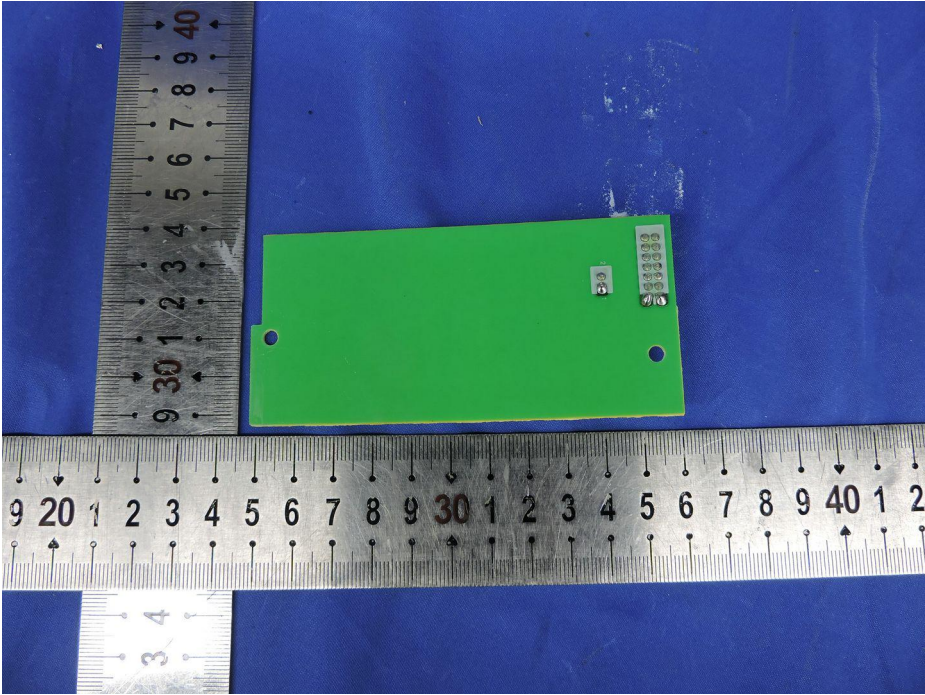
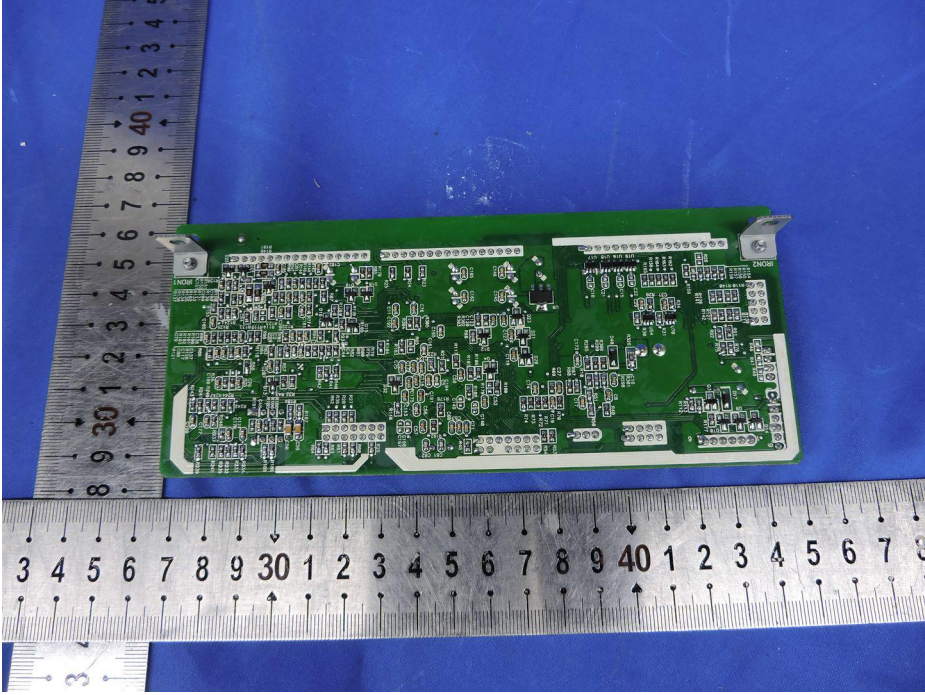


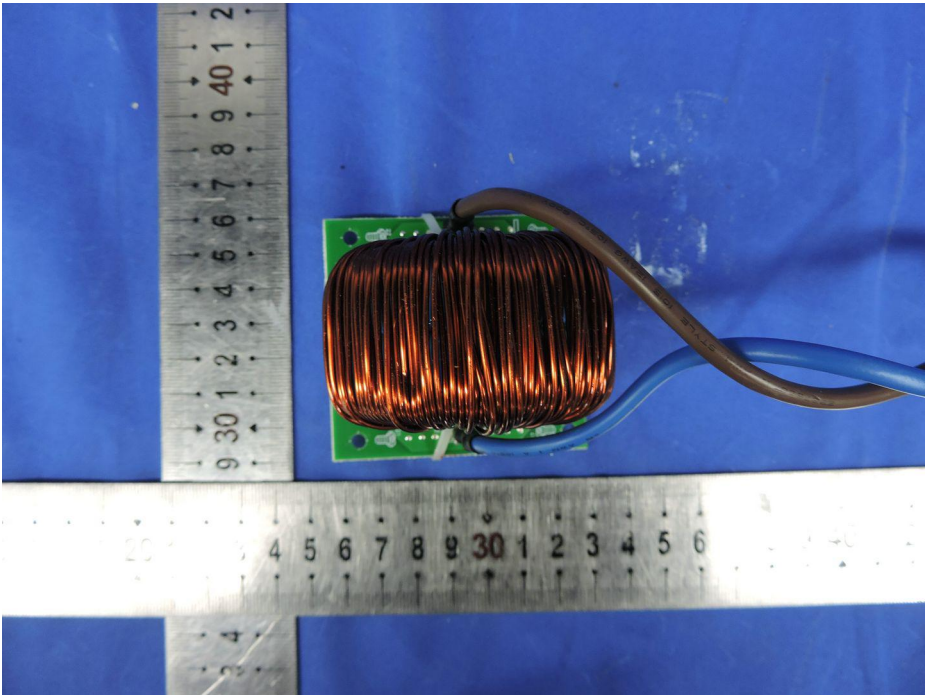
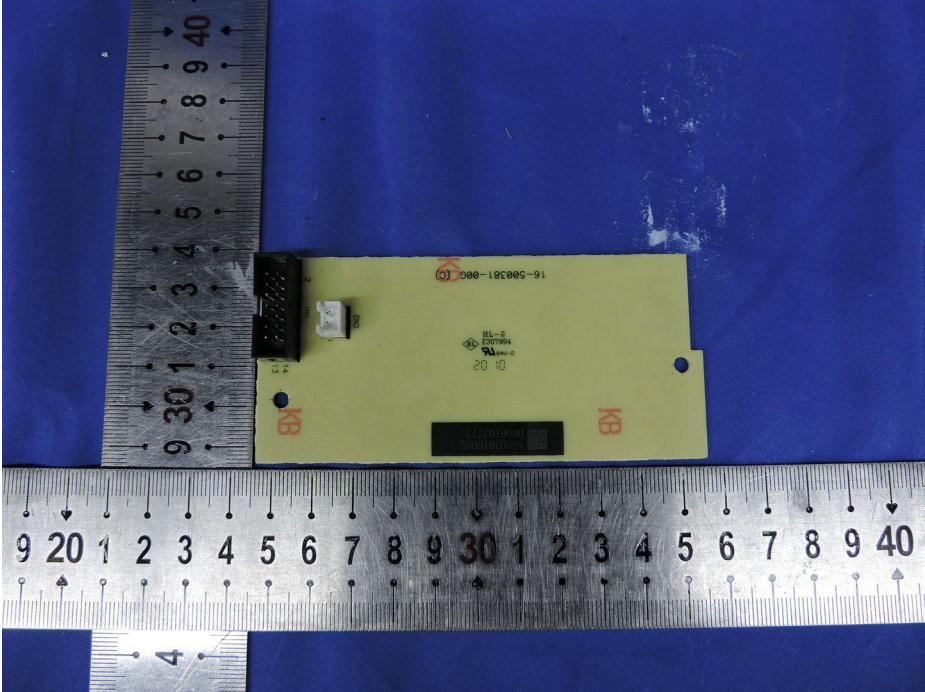


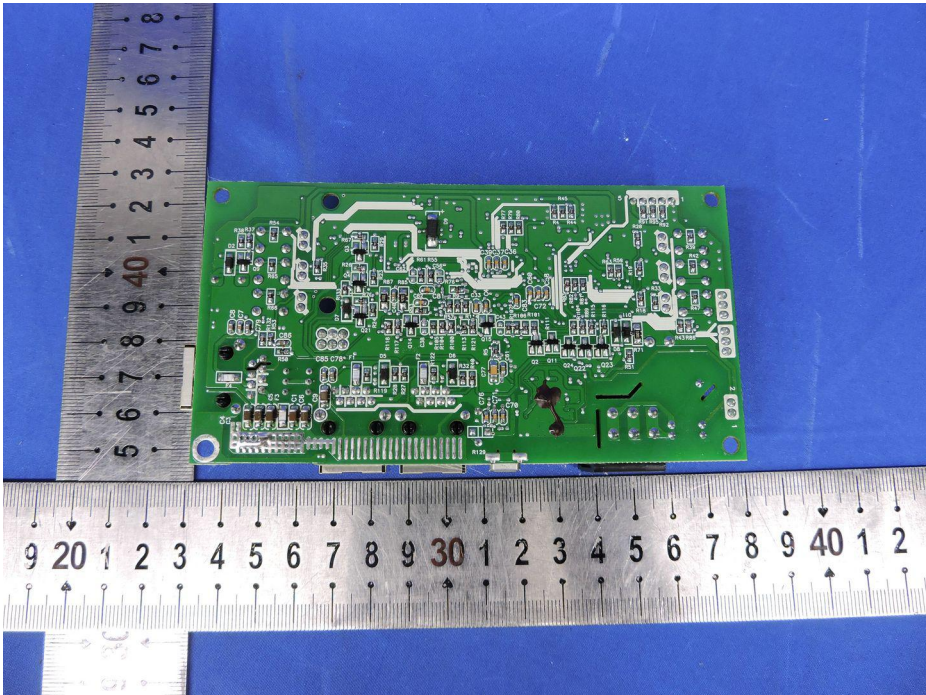
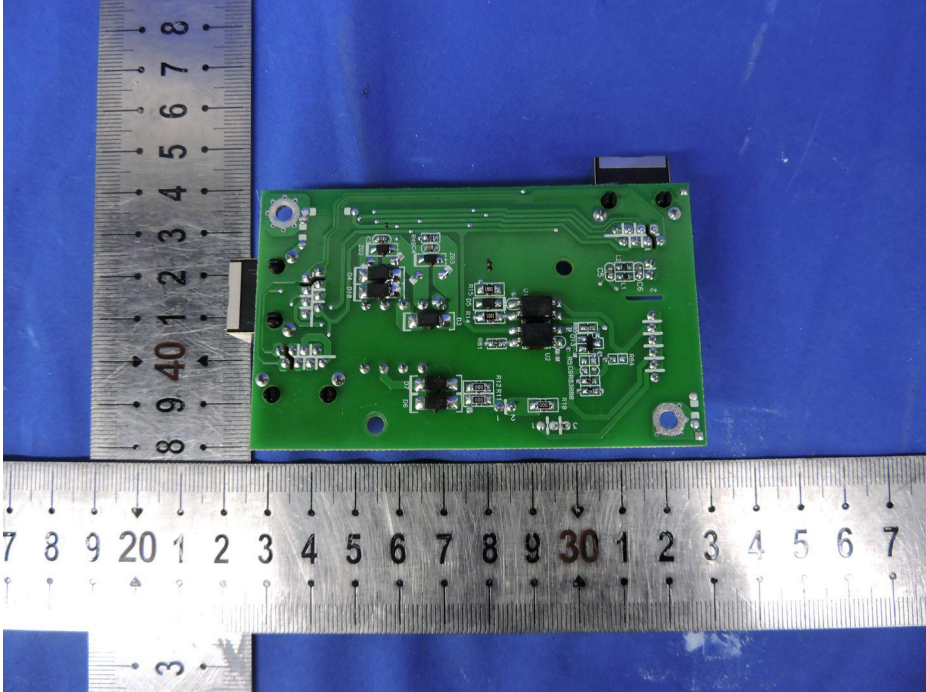


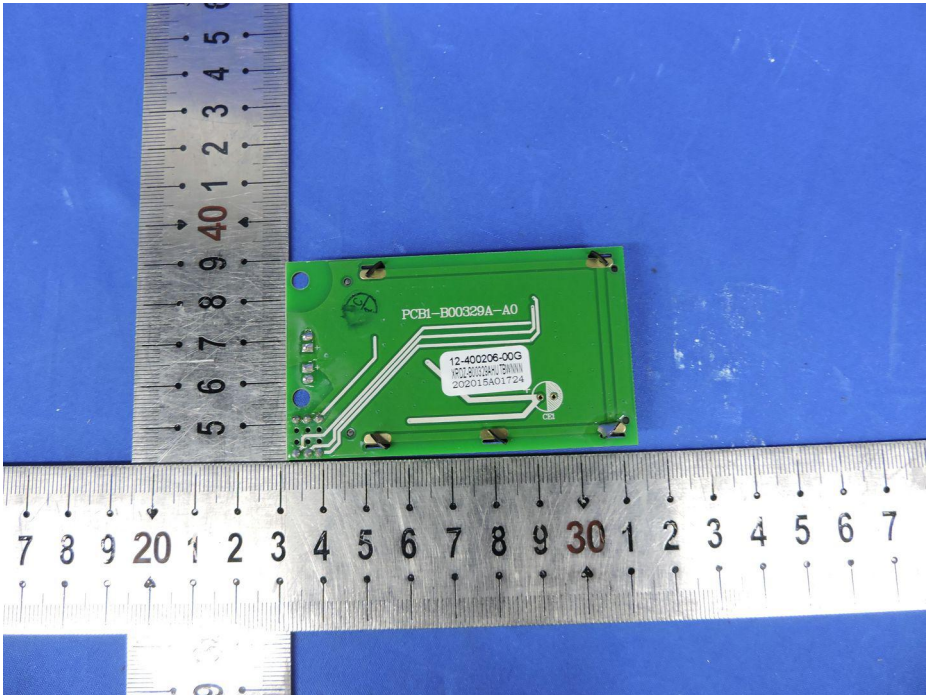
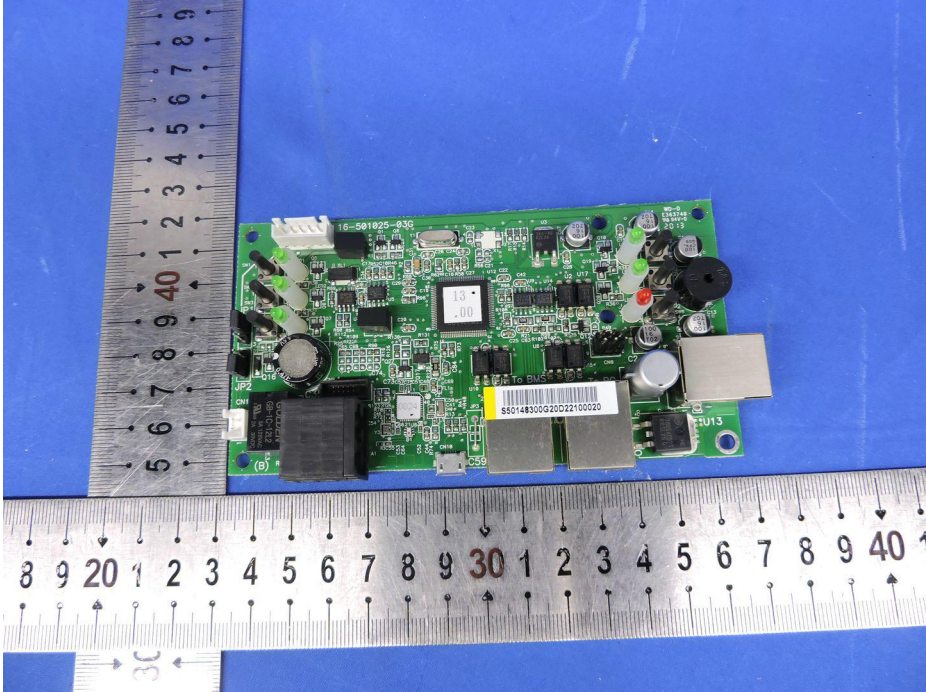


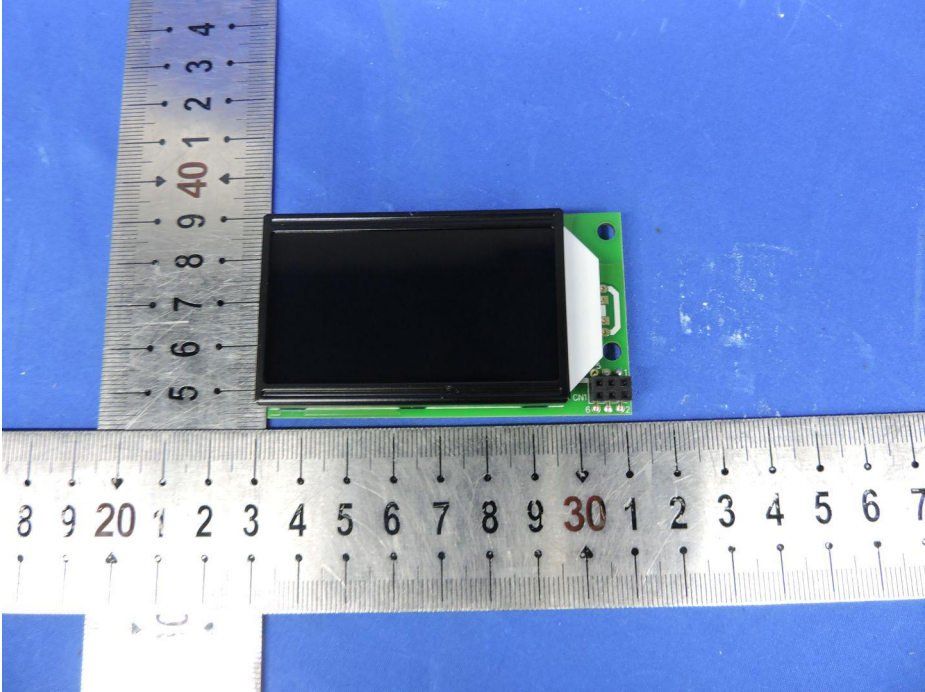












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