EMC TEST REPORT
for
SHENZHEN MUST ENERGY TECHNOLOGY CO., LTD

MPPT Solar Charge Controller
Model No.: PC16-2015A, PC16-3015A, PC16-4015A, PC16-6015A, PC16-4515A

Prepared for	:	SHENZHEN MUST ENERGY TECHNOLOGY CO., LTD
Address	:	4-5F, Building A11, Yusheng Industrial Park, NO.467, Section XiXiang, National Highwaw 107, XiXiang, Baoan District, Shenzhen, China
Prepared By	:	Shenzhen Anbotek Compliance Laboratory Limited
Address	:	1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China Tel: (86) 755-26066544 Fax: (86) 755-26014772

Report Number	:	R011601099E
Date of Test	:	Jan. 07~29, 2016
Date of Report	:	Mar. 25, 2016

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APPENDIX I (Photos of EUT) (5 Pages)

TEST REPORT VERIFICATION

Applicant	:	SHENZHEN MUST ENERGY TECHNOLOGY CO., LTD
Manufacturer	:	SHENZHEN MUST ENERGY TECHNOLOGY CO., LTD
EUT	:	MPPT Solar Charge Controller
Model No.	:	PC16-2015A, PC16-3015A, PC16-4015A, PC16-6015A, PC16-4515A
Serial No.	:	N.A.
Trade Mark	:	MUST
Rating	:	Rating Current: 20A-60A Battery Voltage: 12V/24V/36A/48A Min. Solar Voltage:16V for 12V battery system 36V for 24V battery system 48V for 36V battery system 64V for 48V battery system Max. Solar Voltage: 145V Operation Temperature Range: -25℃-55℃

Measurement Procedure Used:
EN 61000-6-4: 2007+A1: 2011
EN 61000-6-2: 2005
(IEC 61000-4-2; IEC 61000-4-3; IEC 61000-4-4;
IEC 61000-4-5; IEC 61000-4-8; IEC 61000-4-6; IEC)

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT to be technically compliant with the EN 61000-6-4, EN 61000-3-2, EN6100-3-3 and EN 61000-6-2 requirements. The Project in IEC 61000-4-3 was tested in Shenzhen EMTEK Co., Ltd.

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

Date of Test : Jan. 07~29, 2016

Prepared by : Kebo Zhang
(Engineer/Kebo Zhang)

Reviewer : Angel Deng
(Project Manager/ Angel Deng)

Approved & Authorized Signer : Tom Chen
(Manager/Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	MPPT Solar Charge Controller
Model Number	:	PC16-2015A, PC16-3015A, PC16-4015A, PC16-6015A, PC16-4515A (Note: All samples are the same except the model number & output of appliances, so we prepare "PC16-2015A" for EMC test only.)
Test Power Supply	:	DC 24V
Applicant	:	SHENZHEN MUST ENERGY TECHNOLOGY CO., LTD
Address	:	4-5F, Building A11, Yusheng Industrial Park, NO.467, Section XiXiang, National Highwaw 107, XiXiang, Baoan District, Shenzhen, China
Manufacturer	:	SHENZHEN MUST ENERGY TECHNOLOGY CO., LTD
Address	:	4-5F, Building A11, Yusheng Industrial Park, NO.467, Section XiXiang, National Highwaw 107, XiXiang, Baoan District, Shenzhen, China
Factory	:	SHENZHEN MUST ENERGY TECHNOLOGY CO., LTD
Address	:	4-5F, Building A11, Yusheng Industrial Park, NO.467, Section XiXiang, National Highwaw 107, XiXiang, Baoan District, Shenzhen, China
Date of receipt	:	Jan. 07, 2016
Date of Test	:	Jan. 07~29, 2016

1.2.escription of Test Facility

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

FCC-Registration No.: 752021
Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 752021, July 10, 2013.

IC-Registration No.: 8058A-1
Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A-1, Feb. 22, 2013.

CNAS - LAB Code: L3503
Shenzhen Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

Test Location
All Emissions tests were performed
Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

1.3.Measurement Uncertainty

Radiation Uncertainty	:	Ur = 4.1dB (Horizontal) Ur = 4.3dB (Vertical)
Conduction Uncertainty	:	Uc = 3.4dB

1.4. Test Summary

For the EUT described above. The standards used were EN 61000-6-4 for Emissions & EN 61000-6-2 Immunity.

Table 1: Tests Carried Out Under EN 61000-6-4: 2007+A1: 2011

Standard	Test Items	Status
EN 61000-6-4: 2007+A1: 2011	Power Line Conducted Emission Test (150kHz To 30MHz)	√
EN 61000-6-4: 2007+A1: 2011	Radiated Emission Test (30MHz To 1000MHz)	√

Table 2 : Tests Carried Out Under EN 61000-3-2: 2014 / EN 61000-3-3: 2013

Standard	Test Items	Status
EN 61000-3-2: 2014	Harmonic Current Test	x
EN 61000-3-3: 2013	Voltage Fluctuations and Flicker Test	x

In this case there is no need to test the Harmonics, Flicker, these two items

Table 3: Tests Carried Out Under EN 61000-6-2: 2005

Standard	Test Items	Status
EN 61000-6-2: 2005	Electrostatic Discharge immunity Test	√
EN 61000-6-2: 2005	RF Field Strength susceptibility Test	√
EN 61000-6-2: 2005	Electrical Fast Transient/Burst Immunity Test	√
EN 61000-6-2: 2005	Surge Immunity Test	√
EN 61000-6-2: 2005	Injected Currents Susceptibility Test	√
EN 61000-6-2: 2005	Magnetic Field Susceptibility Test	√
EN 61000-6-2: 2005	Voltage dips and interruptions Test	x

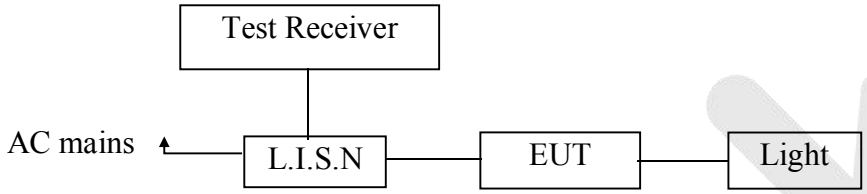
√ Indicates that the test is applicable
x Indicates that the test is not applicable

1.5. EMS Performance Criteria

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

2. POWER LINE CONDUCTED EMISSION TEST

2.1. Block Diagram of Test Setup



2.2. Measuring Standard

EN 61000-6-4: 2007+A1: 2011
Power Line Conducted Emission Limits

Frequency (MHz)	Limit (dBμV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	79	66
0.50 ~ 30.00	73	60
NOTE1-The lower limit shall apply at the transition frequencies. NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.		

2.3. EUT Configuration on Test

The following equipments are installed on Conducted Emission Measurement to meet EN 61000-6-4 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

2.4. Operating Condition of EUT

2.4.1. Setup the EUT as shown on Section 2.1.

2.4.2. Turn on the power of all equipments.

2.4.3. Let the EUT work in measuring mode (On) measure it.

2.5. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided a 50ohm coupling impedance for the tested equipments. Both sides of AC line are investigated to find out the maximum conducted emission according to the EN 61000-6-4 regulations during conducted emission measurement.

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

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

The test results are listed in Section 2.6.

2.6. Test Equipment

The following test equipments are used during the power line conducted measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Two-Line V-network	Rohde & Schwarz	ENV216	100055	Apr. 17, 2015	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 17, 2015	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 17, 2015	1 Year

2.7. Measuring Results

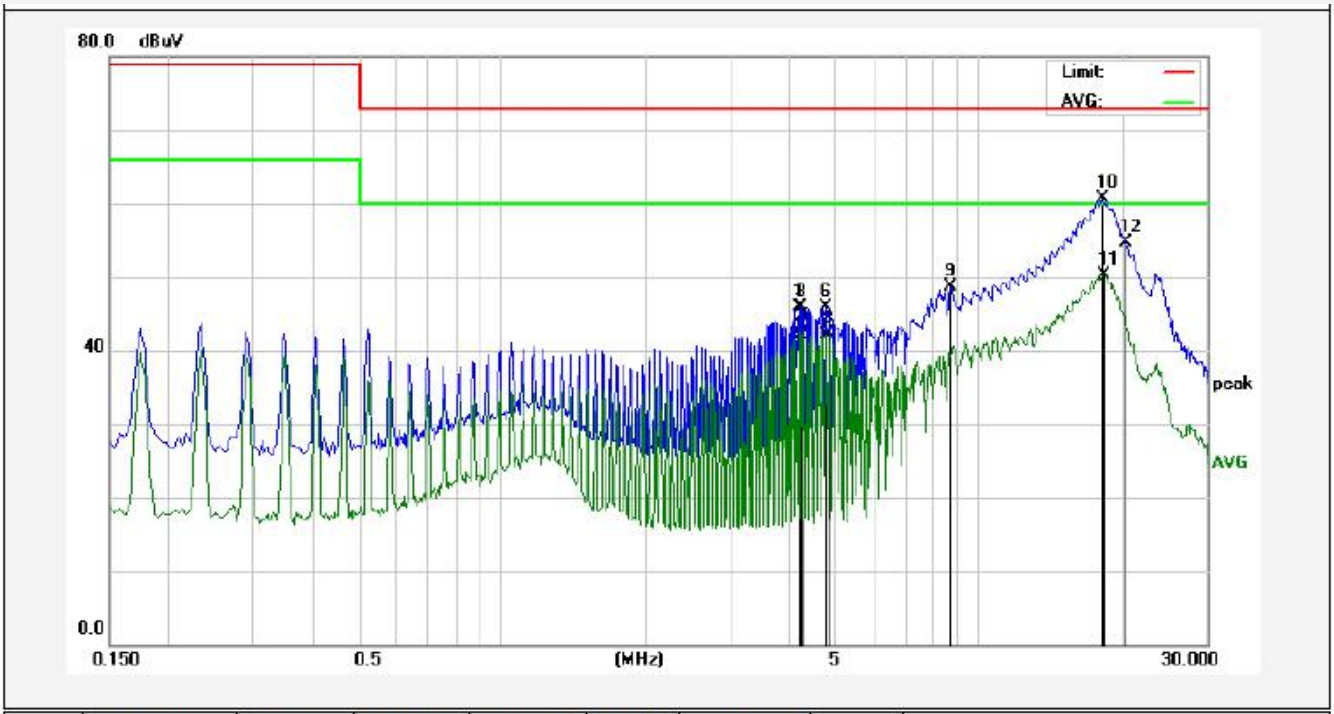
PASS.

The frequency range 150kHz to 30MHz is investigated.

Test data see the following pages.

CONDUCTED EMISSION TEST DATA

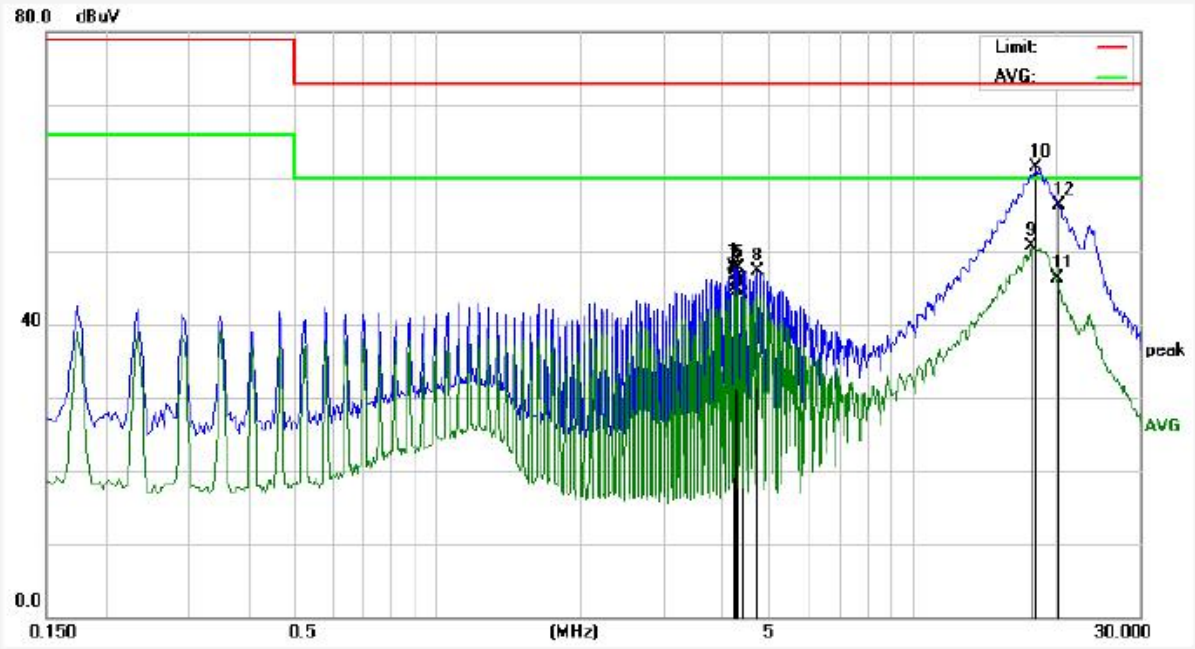
Test Site: 1# Shielded Room
Operating Condition: On
Test Specification: DC 24V
Comment: +
Temp.: 22.2℃ Hum.: 60%



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	4.1900	25.99	20.00	45.99	73.00	-27.01	QP	
2	4.1900	22.47	20.00	42.47	60.00	-17.53	AVG	
3	4.2460	25.98	20.00	45.98	73.00	-27.02	QP	
4	4.2460	22.17	20.00	42.17	60.00	-17.83	AVG	
5	4.3060	22.76	20.00	42.76	60.00	-17.24	AVG	
6	4.7700	25.92	20.00	45.92	73.00	-27.08	QP	
7	4.7700	22.05	20.00	42.05	60.00	-17.95	AVG	
8	4.8300	22.22	20.00	42.22	60.00	-17.78	AVG	
9	8.7260	28.69	20.00	48.69	73.00	-24.31	QP	
10	18.0900	40.68	20.00	60.68	73.00	-12.32	QP	
11	18.2660	30.38	20.00	50.38	60.00	-9.62	AVG	
12	20.3620	34.70	20.00	54.70	73.00	-18.30	QP	

CONDUCTED EMISSION TEST DATA

Test Site:	1# Shielded Room
Operating Condition:	On
Test Specification:	DC 24V
Comment:	-
	Temp.: 22.2℃ Hum.: 60%



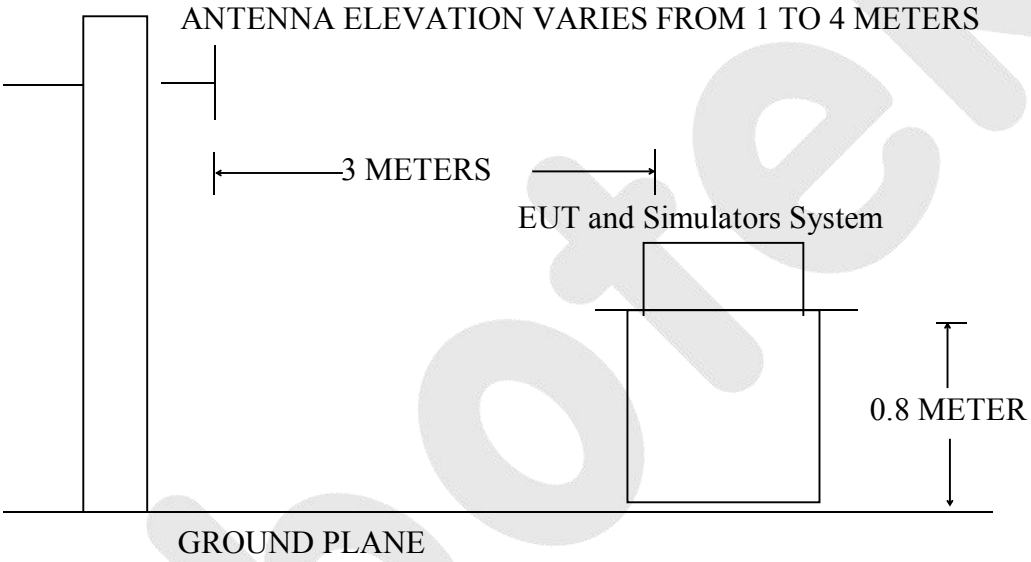
No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Over Limit (dB)	Detector	Remark
1	4.1900	27.82	20.00	47.82	73.00	-25.18	QP	
2	4.1900	24.64	20.00	44.64	60.00	-15.36	AVG	
3	4.2460	27.48	20.00	47.48	73.00	-25.52	QP	
4	4.2500	24.51	20.00	44.51	60.00	-15.49	AVG	
5	4.3060	27.72	20.00	47.72	73.00	-25.28	QP	
6	4.3060	24.69	20.00	44.69	60.00	-15.31	AVG	
7	4.3659	24.09	20.00	44.09	60.00	-15.91	AVG	
8	4.7140	27.23	20.00	47.23	73.00	-25.77	QP	
9	17.6980	30.65	20.00	50.65	60.00	-9.35	AVG	
10	18.1620	41.48	20.00	61.48	73.00	-11.52	QP	
11	20.0820	26.24	20.00	46.24	60.00	-13.76	AVG	
12	20.3740	36.38	20.00	56.38	73.00	-16.62	QP	

3. RADIATED EMISSION TEST

3.1. Block Diagram of Test

3.1.1. Block diagram of connection between the EUT and simulators

3.1.2. Block diagram of test setup (In chamber)



3.2. Measuring Standard

EN 61000-6-4: 2007+A1: 2011

3.3. Radiated Emission Limits

All emanations from a device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified below:

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dBμV/m)
30 ~ 230	3	50
230 ~ 1000	3	57

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

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

3.4. EUT Configuration on Test

The EN 61000-6-4 regulations test method must be used to find the maximum emission during radiated emission measurement.

3.5. Operating Condition of EUT

3.5.1. Setup the EUT as shown on Section 3.1.

3.5.2. Turn on the power of all equipments.

3.5.3. After that, let the EUT work in test mode (On) measure it.

3.6. Test Procedure

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

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

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

The test results are listed in Section 3.8.

3.7. Test Equipment

The following test equipments are used during radiated emission measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	Apr. 17, 2015	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Jun. 08, 2015	1 Year
3.	Pre-amplifier	SONOMA	310N	186860	Apr. 17, 2015	1 Year

3.8. Measuring Results

PASS.

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

Test data see the following pages.

Job No.:	**AT011601099E**	**Polarization:**	**Vertical**
Standard:	**(RE)EN61000-6-4 _3m**	**Power Source:**	**DC 24V**
Test item:	**Radiation Test**	**Temp.(℃)/Hum.(%RH):**	**24.3(℃)/55%RH**
Note:	**On**	**Distance:**	**3m**

No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	39.8542	54.14	-10.49	43.65	50.00	-6.35	QP	100	0	
2	133.1511	57.45	-18.02	39.43	50.00	-10.57	QP	100	360	
3	151.0666	62.19	-18.30	43.89	50.00	-6.11	QP	100	0	
4	176.8878	59.70	-17.06	42.64	50.00	-7.36	peak			
5	204.9551	50.90	-15.68	35.22	50.00	-14.78	peak			
6	276.1235	46.62	-14.99	31.63	57.00	-25.37	peak			

Job No.:	**AT011601099E**	**Polarization:**	**Horizontal**
Standard:	**(RE)EN61000-6-4_3m**	**Power Source:**	**DC 24V**
Test item:	**Radiation Test**	**Temp.(℃)/Hum.(%RH):**	**24.3(℃)/55%RH**
Note:	**On**	**Distance:**	**3m**

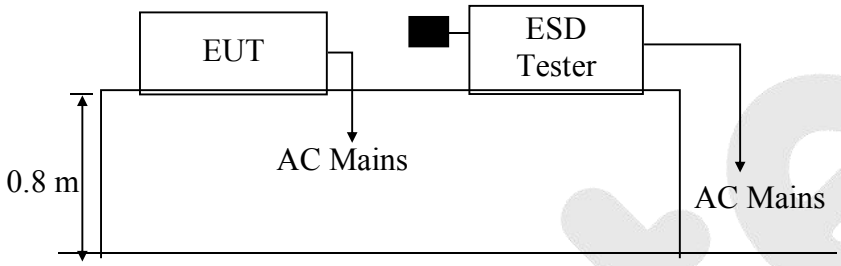
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/	Over Limit (dB)	Detector	Height (cm)	degree (deg)	Remark
1	62.2128	50.93	-16.32	34.61	50.00	-15.39	peak			
2	86.5029	55.05	-21.10	33.95	50.00	-16.05	peak			
3	129.6069	60.91	-22.75	38.16	50.00	-11.84	QP	100	0	
4	176.2686	62.10	-22.12	39.98	50.00	-10.02	peak			
5	244.2321	43.57	-18.28	25.29	57.00	-31.71	peak			
6	277.0935	43.58	-18.33	25.25	57.00	-31.75	peak			

4. ELECTROSTATIC DISCHARGE IMMUNITY TEST

4.1. Block Diagram of Test Setup

4.1.1. Block diagram of connection between the EUT

4.1.2. Block diagram of RS test setup



4.2. Measuring Standard

EN 61000-6-2: 2005
IEC 61000-4-2
Severity Level: 3 / Air Discharge: ±8kV; Level: 2 / Contact Discharge: ±4kV

4.3. Severity Levels and Performance Criterion

6.3.1. Severity level

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

6.3.2. Performance criterion**: B**

4.4. EUT Configuration

The following equipments are installed on Electrostatic Discharge immunity Measurement to meet EN 61000-6-2 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

4.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section2.4, except the test set up replaced by Section 4.1.

4.6. Test Procedure

4.6.1. Air Discharge:

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 100 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

4.6.2. Contact Discharge:

All the procedure shall be same as Section 4.6.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

4.6.3. Indirect discharge for horizontal coupling plane

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

4.6.4. Indirect discharge for vertical coupling plane

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

4.7. Test Equipment

The following test equipments are used during the Electrostatic Discharge measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Simulators	3ctest	ESD-30T	ES0131505	Jun. 20, 2015	1 Year

4.8. Measuring Results

PASS

Please refer to the following pages.

Electrostatic Discharge Test Results

Shenzhen Anbotek Compliance Laboratory Limited

Test Mode :	On	Temperature :	25℃
Air discharge :	±8.0kV	Humidity :	54%
Contact discharge:	±4.0kV	Criterion required :	B
Power Supply **:**	DC 24V	Number of discharge :	10

Test Result: ☒ Pass ☐ Fail

Location		**Kind** A-Air Discharge C-Contact Discharge	**Result**
Slot of the EUT	14 points	A	☑ A ☐ B ☐ C ☐ D
Others	14 points	A	☑ A ☐ B ☐ C ☐ D
Metal surface of EUT	12 points	C	☑ A ☐ B ☐ C ☐ D
Screws	10 points	C	☑ A ☐ B ☐ C ☐ D
HCP	4 points	C	☑ A ☐ B ☐ C ☐ D
VCP of front	4 points	C	☑ A ☐ B ☐ C ☐ D
VCP of rear	4 points	C	☑ A ☐ B ☐ C ☐ D
VCP of left	4 points	C	☑ A ☐ B ☐ C ☐ D
VCP of right	4 points	C	☑ A ☐ B ☐ C ☐ D

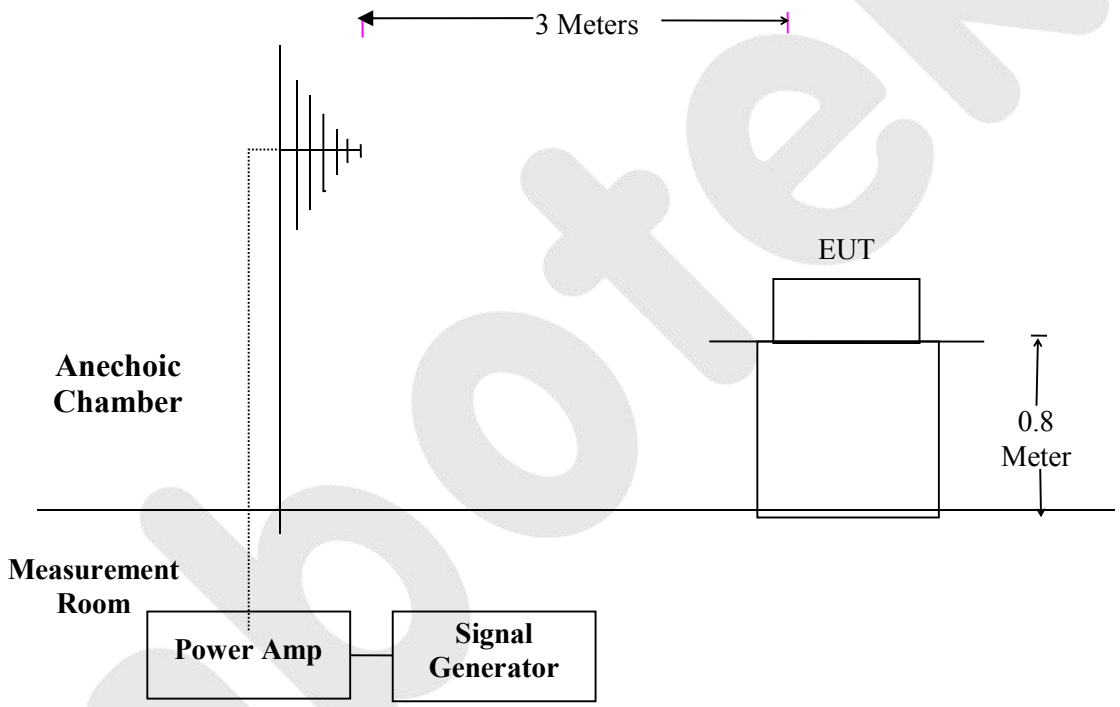
Note:

5. RF FIELD STRENGTH SUSCEPTIBILITY TEST

5.1. Block Diagram of Test

5.1.1. Block diagram of connection between the EUT

5.1.2. Block diagram of RS test setup



5.2. Measuring Standard

EN 61000-6-2: 2005
IEC61000-4-3
Severity Level: 3, 10V / m

5.3. Severity Levels and Performance Criterion

7.3.1. Severity Levels

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

5.3.2. Performance Criterion: **A**

5.4. EUT Configuration on Test

The following equipments are installed on RF Field Strength susceptibility Measurement to meet EN 61000-6-2 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

5.5. Operating Condition of EUT

Same as radiated emission measurement which is listed in Section 2.4, except the test setup replaced as Section 5.1.

5.6. Test Procedure

The EUT are placed on a table which is 0.8 meter high above the ground. The EUT is set 3 meters 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 the EUT must be faced this transmitting antenna and measured individually.
In order to judge the EUT performance, a CCD camera is used to monitor its screen .
All the scanning conditions are as following:

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

5.7. Test Equipment

The following test equipments are used during the R/S (Shenzhen EMTEK) measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Power Meter. Dual Channel	BOONTON	4232A	10539	May 29, 2015	1 year
2.	50ohm Diode Power Sensor	BOONTON	51011EMC	34236/34238	May 29, 2015	1 year
3.	Broad-Band Horn Antenna	SCHWARZBECK	BBHA9120 L3F	332	May 29, 2015	1 year
4.	Power Amplifier	PRANA	AP32MT215	N/A	May 29, 2015	1 year
5.	Power Amplifier	MILMEGA	AS0102-55	N/A	May 29, 2015	1 year
6.	Signal Generator	AEROFLEX	2023B	N/A	May 29, 2015	1 year
7.	Field Strength Meter	HOLADAY	HI-6005	N/A	May 29, 2015	1 year
8.	RS232 Fiber Optic Modem	HOLADAY	HI-4413P	N/A	May 29, 2015	1 year
9.	Log.-Per. Antenna	SCHWARZBECK	VULP 9118E	N/A	May 29, 2015	1 year

5.8. Measuring Results

PASS.
Please refer to the following page.

RF Field Strength Susceptibility Test Results

Shenzhen Anbotek Compliance Laboratory Limited

Test Mode :	On	Temperature :	25℃
Field Strength:	10 V/m	Humidity :	54%
Criterion required :	A	Frequency Range:	80 MHz to 1000 MHz
Power Supply :	DC 24V	Test Result :	☒ Pass ☐ Fail

Modulation: ☐None ☐ Pulse ☑AM 1KHz 80%

	Frequency Rang : 80~ 1000MHz		Result
Steps	# / %		
	Horizontal	Vertical	
Front	10 V/m	10 V/m	☑ A ☐ B ☐ C ☐ D
Right	10 V/m	10 V/m	☑ A ☐ B ☐ C ☐ D
Rear	10 V/m	10 V/m	☑ A ☐ B ☐ C ☐ D
Left	10 V/m	10 V/m	☑ A ☐ B ☐ C ☐ D

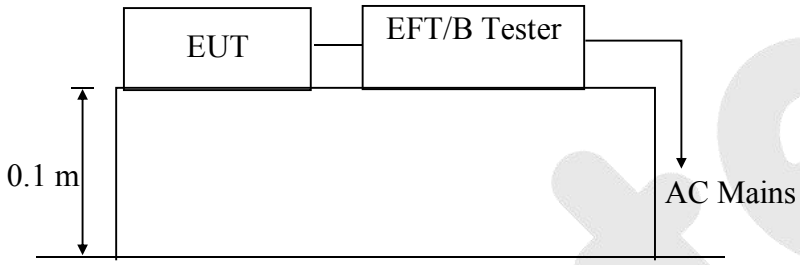
Note: The Project was tested in Shenzhen EMTEK Co., Ltd.

6. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

6.1. Block Diagram of Test Setup

6.1.1. Block Diagram of the EUT

6.1.2. EFT Test Setup



6.2. Measuring Standard

EN 61000-6-2: 2005
IEC 61000-4-4
Severity Level, Level 3**:** 2kV

6.3. Severity Levels and Performance Criterion

6.3.1. Severity level

Open Circuit Output Test Voltage ±10%		
Level	On Power Supply Lines	On I/O (Input/Output) Signal data and control lines
1.	0.5 kV	0.25 kV
2.	1 kV	0.5 kV
3.	2 kV	1 kV
4.	4 kV	2 kV
X	Special	Special

6.3.2. Performance criterion**: B**

6.4. EUT Configuration

The following equipments are installed on Electrical Fast Transient/Burst Immunity Measurement to meet EN 61000-6-2 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

6.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 2.4, except the test set up replaced by Section 6.1.

6.6. Test Procedure

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

6.6.1. For input and output AC power ports**:**

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

6.6.2. For signal lines and control lines ports**:**

No I/O ports. It's unnecessary to test.

6.6.3. For DC output line ports**:**

It's unnecessary to test.

6.7. Test Equipment

The following test equipments are used during the Electrical Fast Transient /Burst Immunity measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EFT Burst Simulator	PRIMA	EFT61004B	PR10114282	Apr. 17, 2015	1 Year

6.8. Measuring Results

PASS.

Please refer to the following page.

Electrical Fast Transient/Burst Test Results

Shenzhen Anbotek Compliance Laboratory Limited

Operation Mode: On		Criterion required **: B**	
Power Supply : DC 24V		Test Result : ☒ Pass ☐ Fail	
Ambient Condition :	24℃	55% RH	
Inject Line : AC Mains	Inject Method: Direct	Inject Time(s): 120	

Line	Polarity	Test Voltage	Result
+	±	2kV	☑ A ☐ B ☐ C ☐ D
-	±	2kV	☑ A ☐ B ☐ C ☐ D
PE			
+、-	±	2kV	☑ A ☐B ☐ C ☐ D
+、PE			
-、PE			
+、-、PE			
Signal Line			
DC Line			

Note :

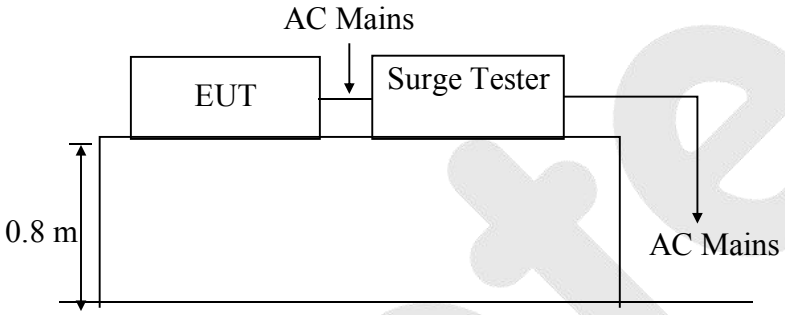
Remark:

7. SURGE IMMUNITY TEST

7.1. Block Diagram of Test Setup

7.1.1. Block Diagram of the EUT

7.1.2. Surge Test Setup



7.2. Measuring Standard

EN 61000-6-2: 2005
IEC 61000-4-5
Severity Level**:** Level 2, Line to Line: 1.0kV

7.3. Severity Levels and Performance Criterion

7.3.1. Severity level

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

7.3.2. Performance criterion**: B**

7.4. EUT Configuration

The following equipments are installed on Surge immunity Measurement to meet EN 61000-6-2 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

7.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 2.4, except the test set up replaced by Section 7.1.1.

7.6. Test Procedure

7.6.1. Set up the EUT and test generator as shown on Section 7.1.2.

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

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

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

7.6.5. Different phase angles are done individually.

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

7.7. Test Equipment

The following test equipments are used during the Surge Immunity measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	6kV Surge Generator	EMPEK	LSG-5060G	06010017N	Apr. 17, 2015	1 Year
2.	CDN	EMPEK	CDN-5110G	06110005N	Apr. 17, 2015	1 Year

7.8. Measuring Results

PASS.

Please refer to the following page.

Surge Immunity Test Results

Shenzhen Anbotek Compliance Laboratory Limited

Test Mode: On	Temperature: 24℃
Humidity: 55%	Criterion required: B
Power Supply : DC 24V	Test Result : ☒ Pass ☐ Fail

Location	Polarity	Phase Angle	Number of Pulse	Pulse Voltage (kV)	Result
+--	±	☒ 0° ☒ 90° ☒ 180° ☒ 270°	5	1.0	☑ A ☐ B ☐ C ☐ D
+-PE					
--PE					

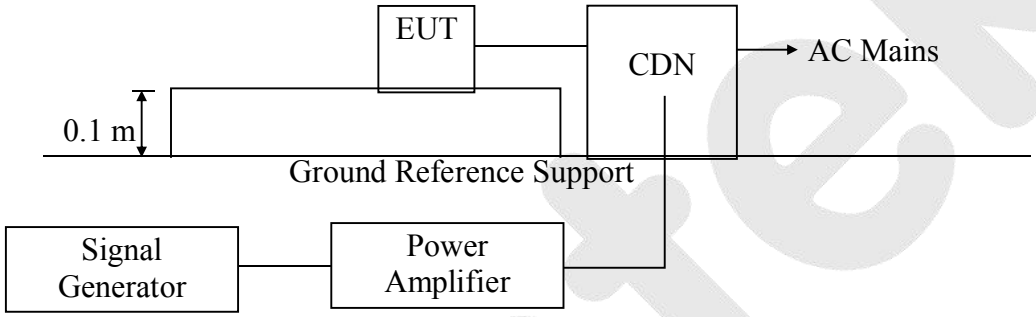
Remark:

8. INJECTED CURRENTS SUSCEPTIBILITY TEST

8.1. Block Diagram of Test Setup

8.1.1. Block Diagram of the EUT

8.1.2. Block Diagram of Test Setup



8.2. Measuring Standard

EN 61000-6-2: 2005
IEC 61000-4-6
Severity Level 3: 10V (rms), (0.15MHz ~ 80MHz)

8.3. Severity Levels and Performance Criterion

8.3.1. Severity level

Level	Field Strength V(rms)
1.	1
2.	3
3.	10
X	Special

8.3.2. Performance criterion: A

8.4. EUT Configuration

The following equipments are installed on currents susceptibility Measurement to meet EN 61000-6-2 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

8.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section 2.4, except the test set up replaced by Section 8.1.1.

8.6. Test Procedure

8.6.1. For AC Mains

8.6.1.1. Set up the EUT, CDN and test generators as shown on Section 8.1.2.

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

8.6.1.3. The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).

8.6.1.4. The disturbance signal described below is injected to EUT through CDN.

8.6.1.5. The EUT operates within its operational mode(s) under intended climatic conditions after power on.

8.6.1.6. The frequency range is swept from 150kHz to 80MHz using 10V signal level, and with the disturbance signal 80% amplitude modulated with a 1kHz sine wave.

8.6.1.7. 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.

8.6.1.8. Recording the EUT operating situation during compliance testing and decide the EUT immunity criterion.

8.6.2. For signal lines and control lines ports**:**

No I/O ports. It's unnecessary to test.

8.6.3. For DC output line ports**:**

It's unnecessary to test.

8.7. Test Equipment

The following test equipments are used during the Injected Current Susceptibility measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	C/S Conducted Immunity Test System	FRANKONIA	CIT-10	126A1196/2012	Apr. 17, 2015	1 Year
2.	CDN	FRANKONIA	CDN - M2+ M3	A2210178/2012	Apr. 17, 2015	1 Year
3.	6dB attenuator	FRANKONIA	DAM 26W	1172202	Apr. 17, 2015	1 Year

8.8. Measuring Results

PASS.

Please refer to the following page.

Injected Currents Susceptibility Test Results

Shenzhen Anbotek Compliance Laboratory Limited

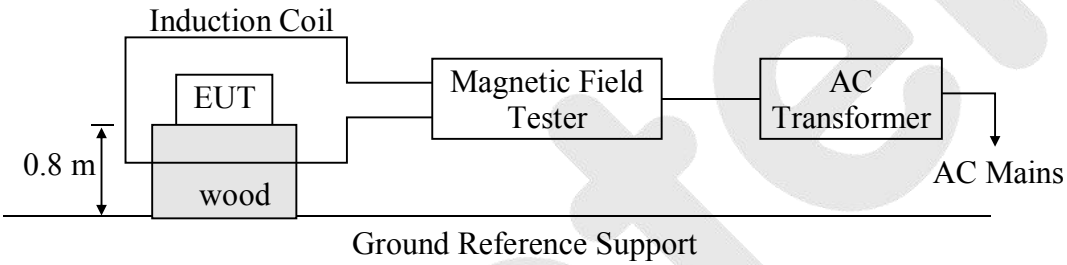
Test Mode : On		Temperature : 24℃	
Power Supply : DC 24V		Humidity : 53%	
Criterion required: A		Test Result : ☒ Pass ☐ Fail	
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Result
0.15 ~ 80	AC Mains	10V	☑ A ☐ B ☐ C ☐ D
Test Mode :			
Frequency Range (MHz)	Injected Position	Strength (Unmodulated)	Result
Remark :		Note:	

9. MAGNETIC FIELD SUSCEPTIBILITY TEST

9.1. Block Diagram of Test

9.1.1. Block diagram of test setup

9.1.2. Magnetic field test setup



9.2. Measuring Standard

EN 61000-6-2: 2005
IEC 61000-4-8
Severity Level: Level 4, 30A / m

9.3. Severity Levels and Performance Criterion

9.3.1. Severity Levels

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

9.3.2. Performance Criterion : A

9.4. EUT Configuration on Test

The following equipments are installed on Magnetic Field Susceptibility Measurement to meet EN 61326 requirements and operating in a manner which

tends to maximize its emission characteristics in a normal application.

9.5. Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section2.5, except the test set up replaced by Section 9.1.

9.6. Test Procedure

The EUT is placed in the middle of a induction coil (1*1m), under which is a 1*1*0.1m (high)table, this small table is also placed on a larger table,0.8 m above the ground. Both horizontal and vertical polarization of the induction coil are set on test, so that each side of the EUT is affected by the magnetic field. Also can reach the same aim by change the position of the EUT.

9.7. Test Equipment

The following test equipments are used during the magnetic field susceptibility measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1	Power Frequency Magnetic Field Generator	EVERFINE	EMS61000-8K	906002	Apr. 17, 2015	1 Year

9.8. Measuring Results

PASS.

Please refer to the following page.

Magnetic Field Immunity Test Results

Shenzhen Anbotek Compliance Laboratory Limited

Input Voltage : DC 24V

Ambient Condition : Temp : 20℃ Humid: 45%

Criterion required : A

Operation Mode : On		Test Result : ☒ Pass ☐ Fail	
Test Level (A/M)	Testing Duration	Coil Orientation	Result
30	5 mins	X	☑ A ☐ B ☐ C ☐ D
30	5 mins	Y	☑ A ☐ B ☐ C ☐ D
30	5 mins	Z	☑ A ☐ B ☐ C ☐ D

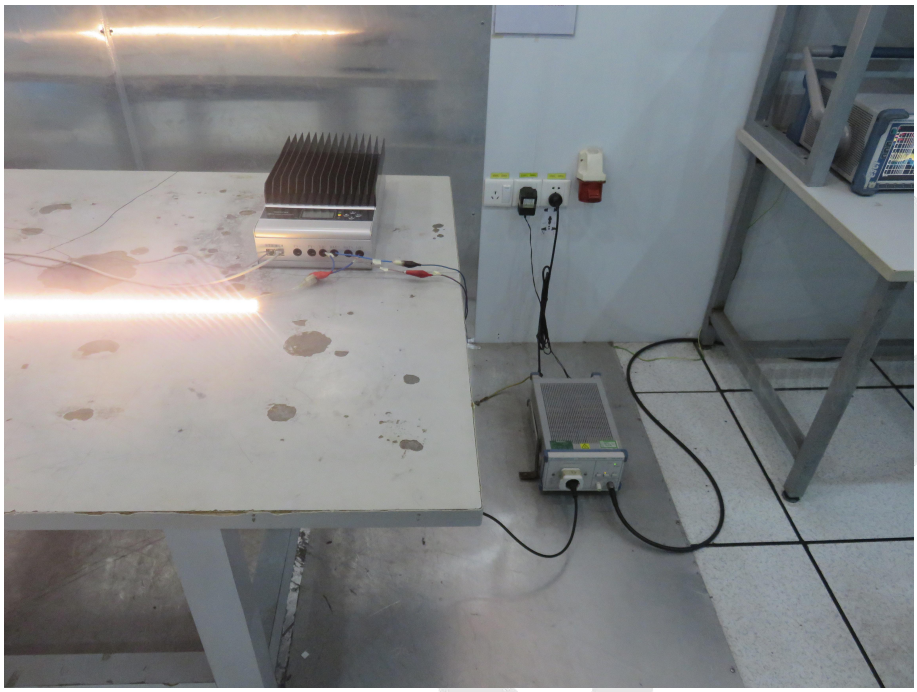
Operation Mode :

Test Level (A/M)	Testing Duration	Coil Orientation	Criterion	Result

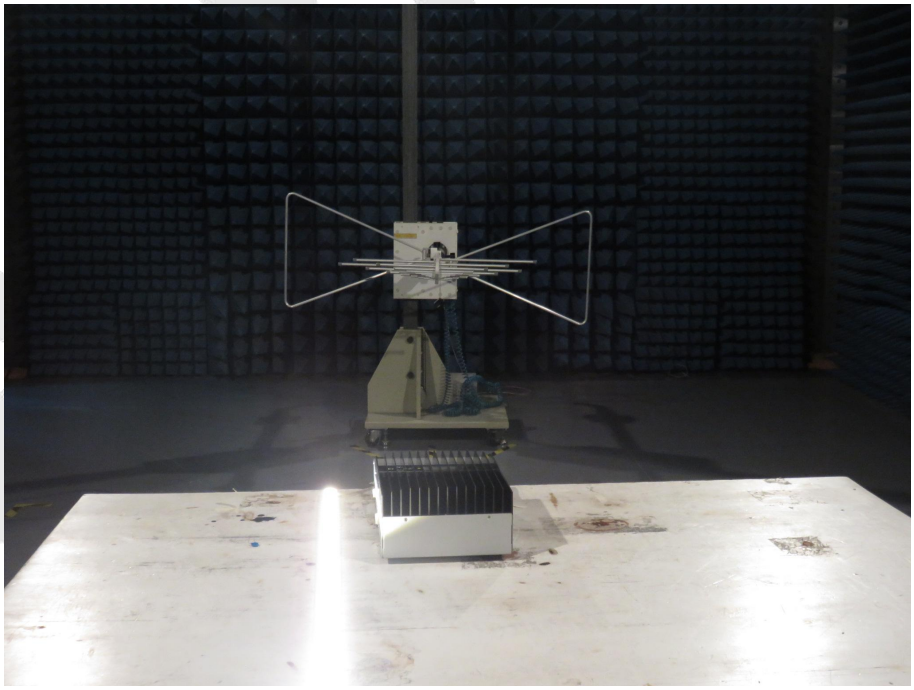
Note:

10. PHOTOGRAPHS

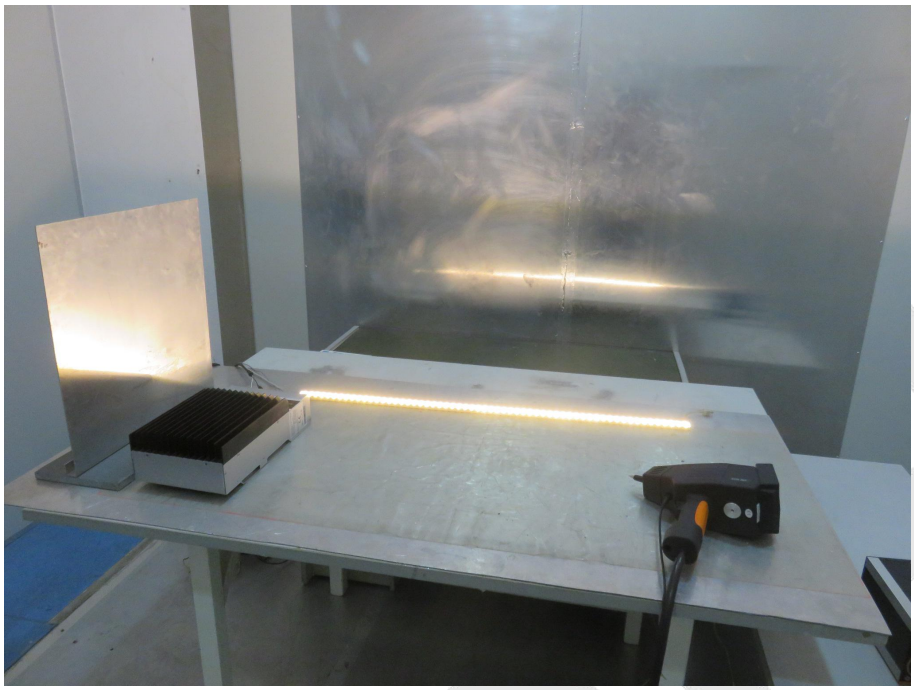
10.1. Photo of Power Line Conducted Emission Test



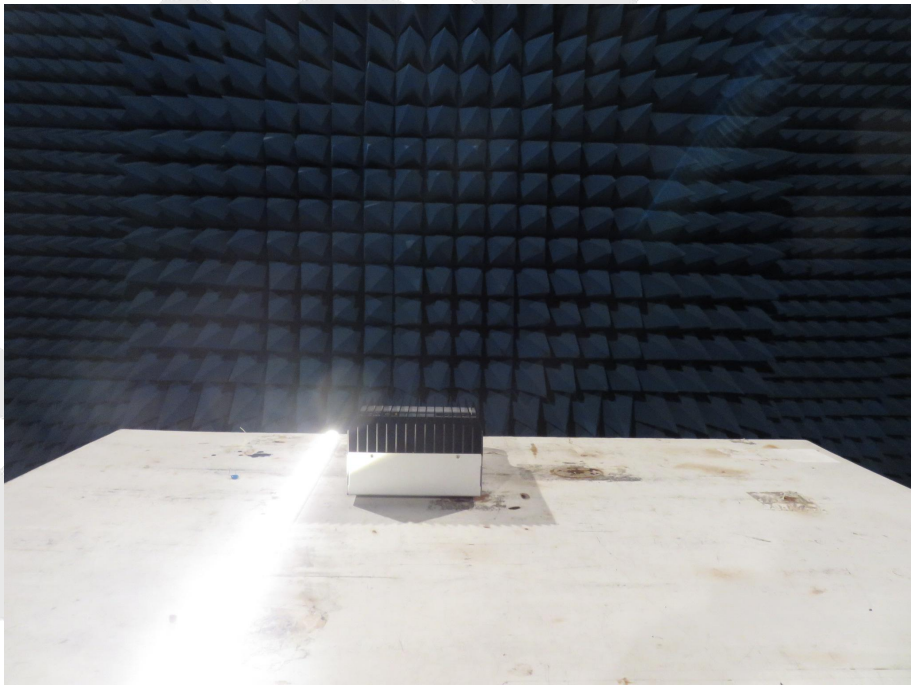
10.2. Photo of Radiated Emission Test



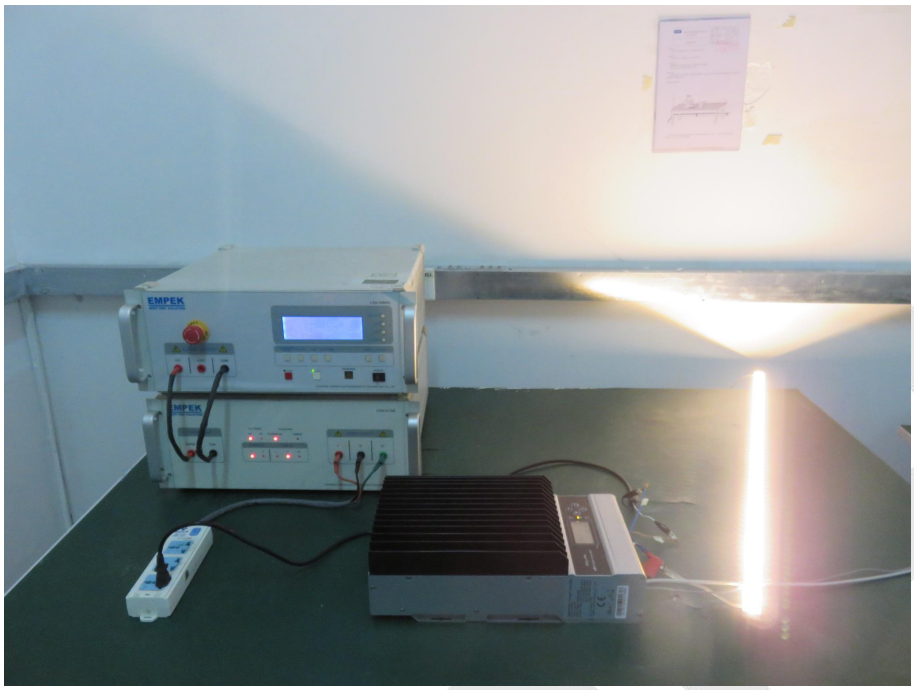
10.3. Photo of Electrostatic Discharge Immunity Test



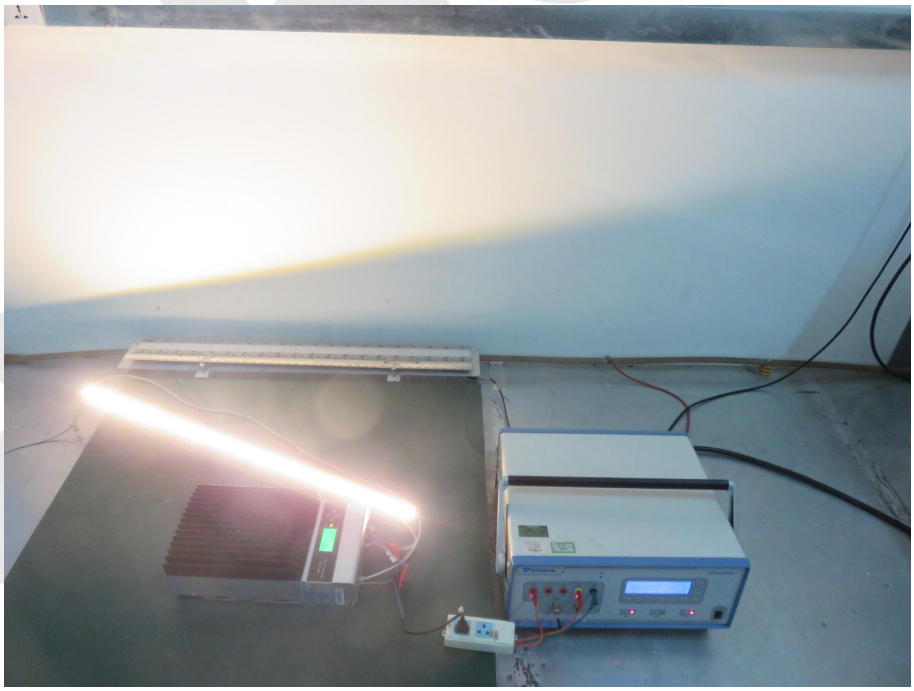
10.4. Photo of RF Field Strength susceptibility Test



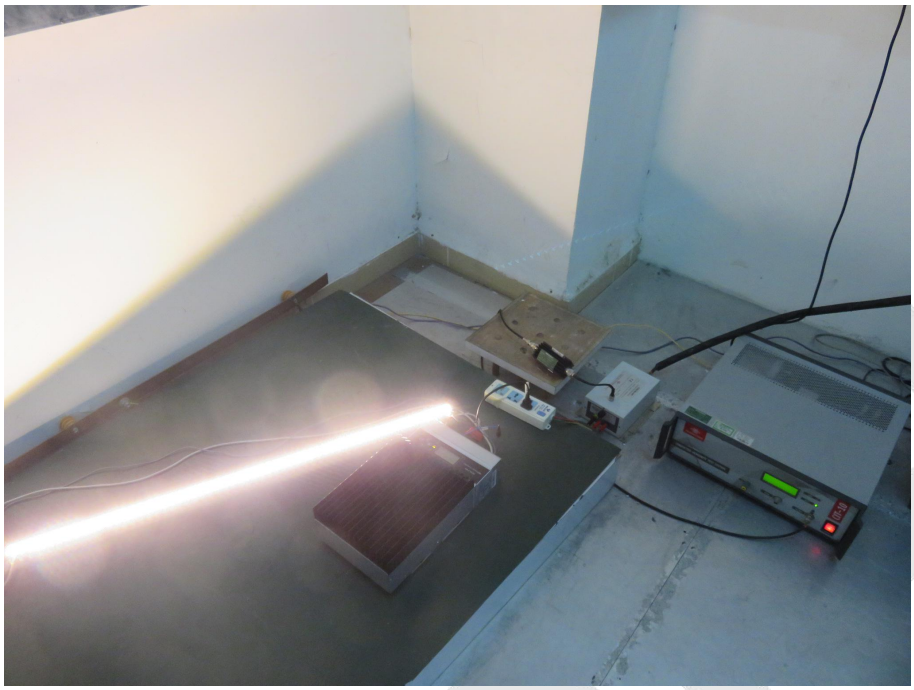
10.5. Photo of Surge Immunity Test



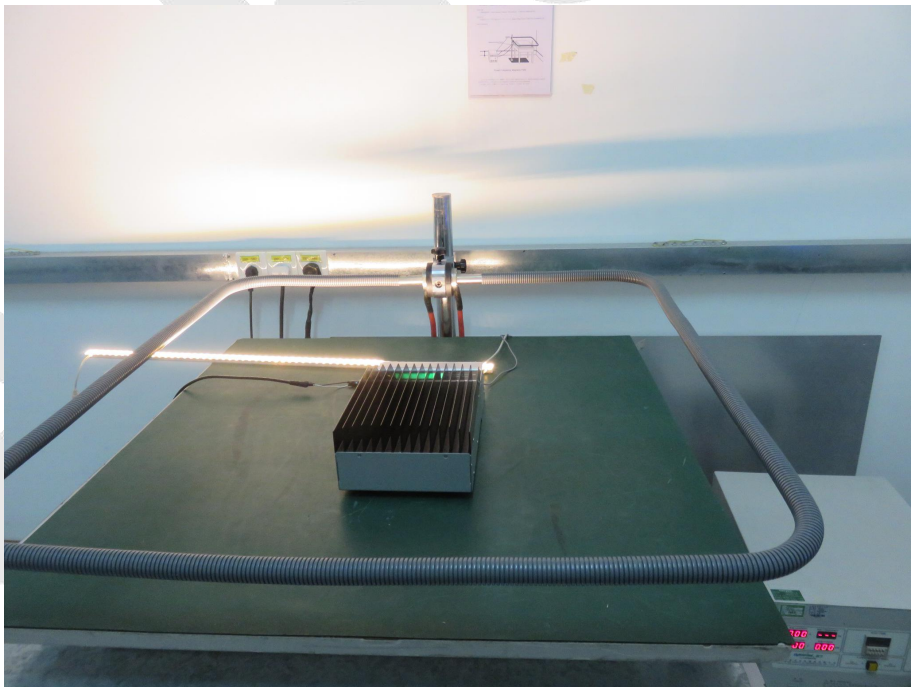
10.6. Photo of Electrical Fast Transient/Burst Test charger



10.7. Photo of Injected Currents Susceptibility Test



10.8. Photo of Magnetic Field Susceptibility test



APPENDIX I
(PHOTOS OF EUT)

Figure 1
The EUT- Overall View

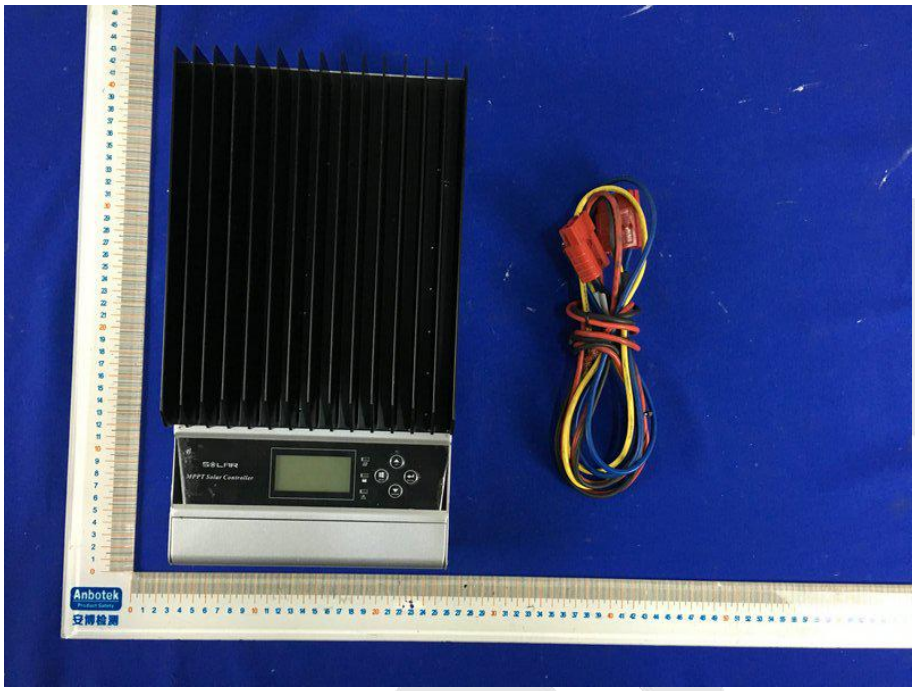


Figure 2
The EUT-Front View

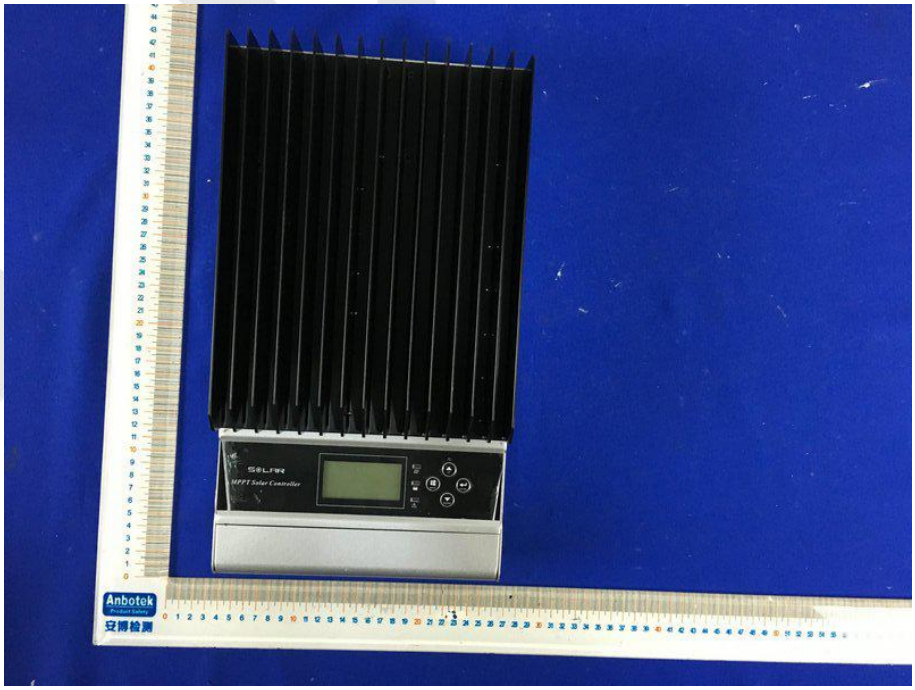


Figure 3
The EUT-Side View

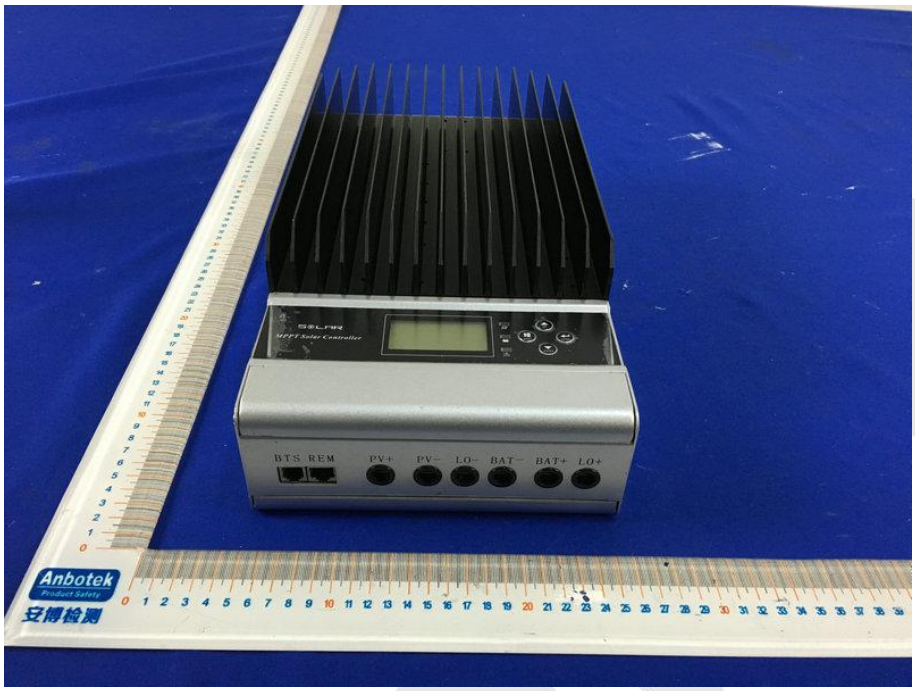


Figure 4
The EUT-Side View

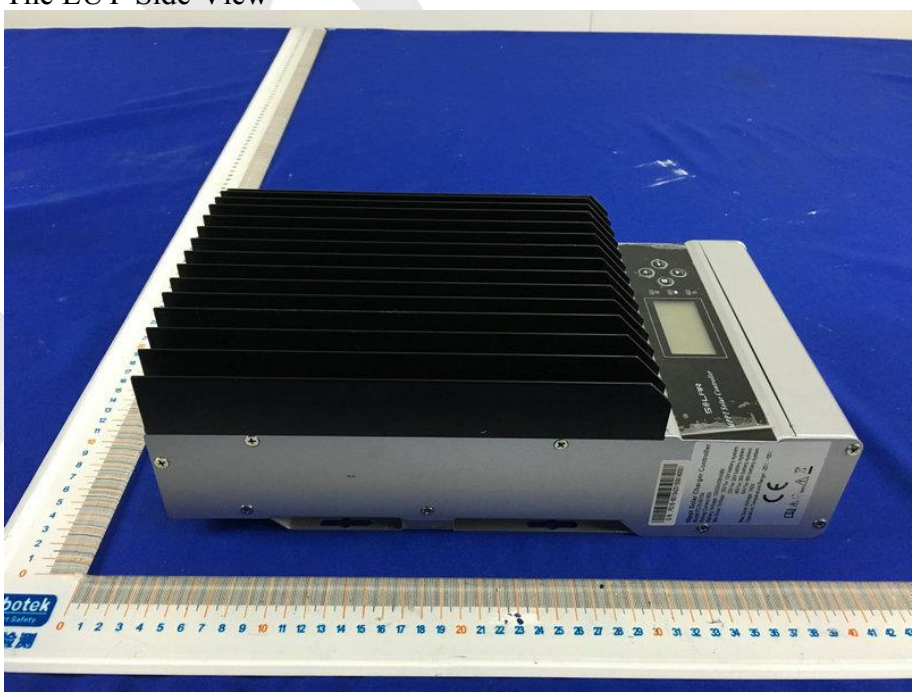


Figure 5
The EUT-Side View

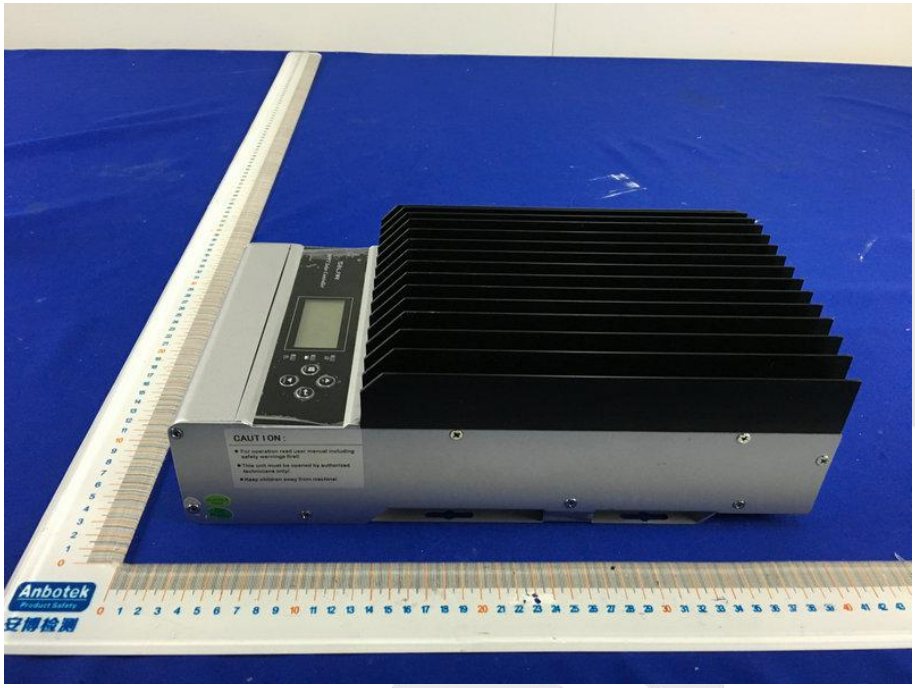


Figure 6
PCB Of The EUT-Front View

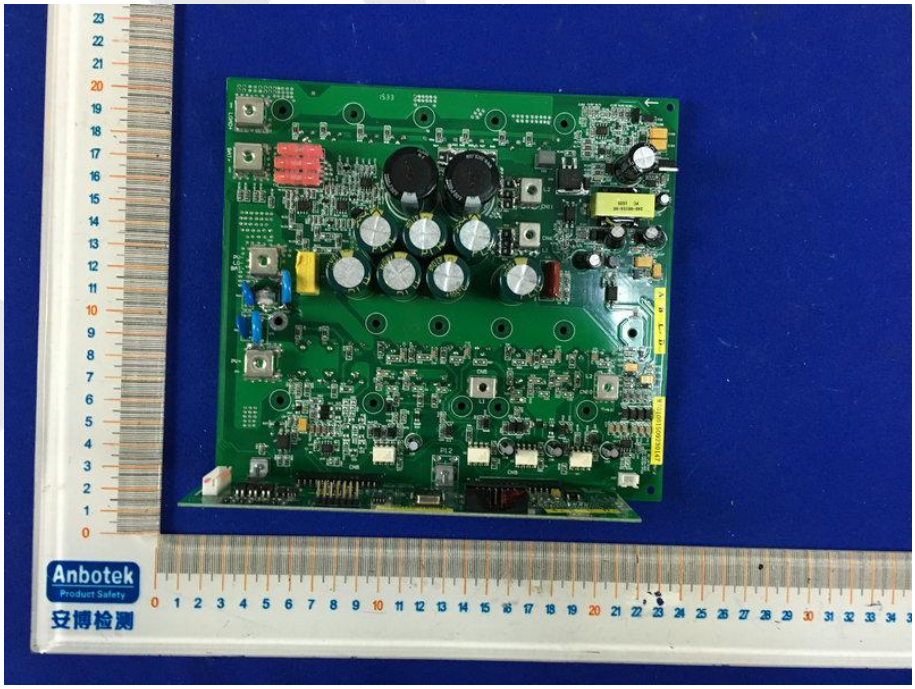


Figure 7
PCB Of The EUT-Back View

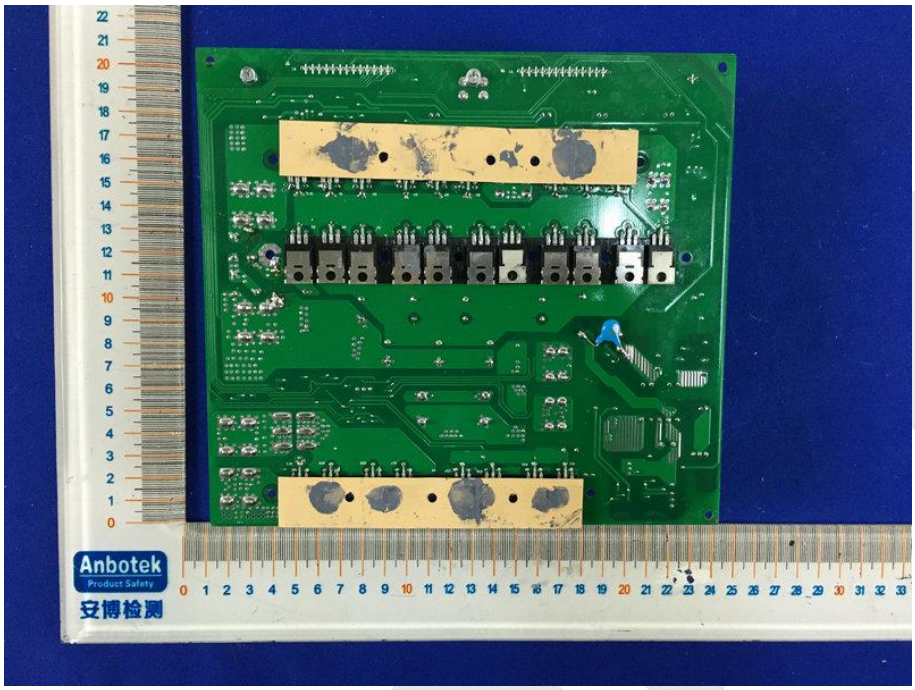


Figure 8
PCB Of The EUT View

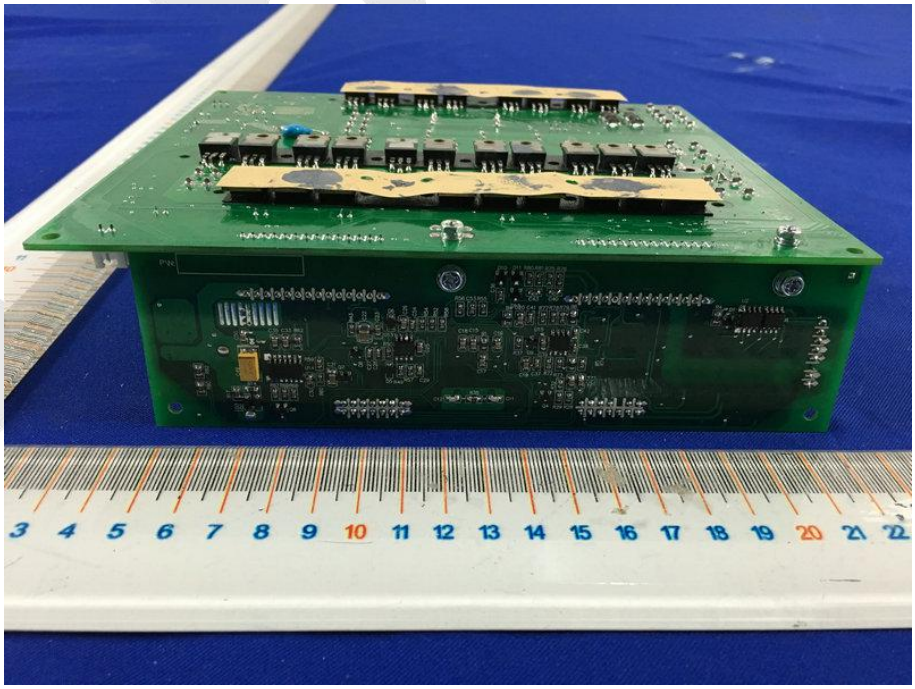
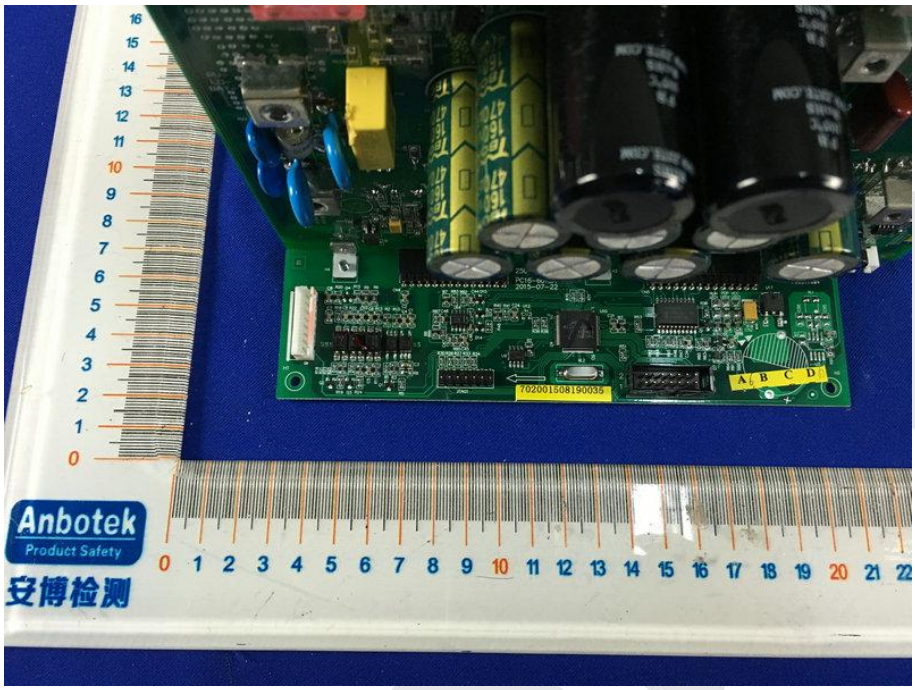


Figure 9
PCB Of The EUT View



CE Label

1. The CE conformity marking must consist of the initials ‘CE’ taking the following form:
   If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected.
2. The CE marking must have a height of at least 5 mm except where this is not possible on account of the nature of the apparatus.
3. The CE marking must be affixed to the product or to its data plate. Additionally it must be affixed to the packaging, if any, and to the accompanying documents.
4. The CE marking must be affixed visibly, legibly and indelibly.
   It must have the same height as the initials ‘CE’.