EMC TEST REPORT
For
MPP SOLAR INC

Inverter/ Charger

Model Number : PIP 4048MS

Prepared for	:	MPP SOLAR INC
Address	:	4F, NO. 50-1, SECTION 1, HSIN-SHENG S. RD. TAIPEI, TAIWAN
Prepared by	:	MPP SOLAR INC
Address	:	4F, NO. 50-1, SECTION 1, HSIN-SHENG S. RD. TAIPEI, TAIWAN

Report Number	:	EMC-E20130905E
Date of Test	:	Aug. 10, 2013 to Sept. 5, 2013
Date of Report	:	Sept. 5, 2013

TABLE OF CONTENT

Description

Page

TEST REPORT VERIFICATION

Applicant	:	MPP SOLAR INC
Manufacturer	:	MPP SOLAR INC
EUT	:	Inverter/ Charger
Trade Mark	:	--
Model Number	:	PIP 4048MS
Input Voltage	:	208-240V~, 50/60Hz

Measurement Procedure Used:

EN55022: 2010
EN55024:2010
(EN61000-4-2:2009, EN 61000-4-3: 2006+A2: 2010, EN61000-4-11:2004,
EN 61000-4-4:2004+A1:2010, EN61000-4-5:2006, EN61000-4-6:2009)

The device described above is tested by MPP SOLAR INC 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 MPP SOLAR INC is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 62040-2 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of MPP SOLAR INC.

Date of Test	:	Aug. 10, 2013 to Sept. 5, 2013
Prepared by	:	Fredricker
Reviewer	:	Kevin
Approved & Authorized signer	:	

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Inverter/ Charger
Model Number	:	PIP 4048MS
Test voltage	:	AC 230V/50Hz,
Rating	:	**Inverter Mode:** Rated Power: 5000VA/4000W DC Input: 48VDC, 93A AC Output: 230VAC, 50Hz, 22A, 1Φ **AC Charger Mode:** AC Input: 230VAC, 50Hz, 29A, 1Φ DC Output: 54VDC, 30/20A AC Output: 230VAC, 50Hz, 22A, 1Φ **Solar Charger Mode:** Rated Current: 60A System Voltage: 48VDC Min. Solar Voltage: 40VDC Max. Solar Voltage (VOC): 145VDC
Applicant	:	MPP SOLAR INC
Address	:	4F, NO. 50-1, SECTION 1, HSIN-SHENG S. RD. TAIPEI, TAIWAN
Manufacturer	:	MPP SOLAR INC
Address	:	4F, NO. 50-1, SECTION 1, HSIN-SHENG S. RD. TAIPEI, TAIWAN
Date of receiver	:	Sept. 5, 2013
Date of Test	:	Aug. 10, 2013 to Sept. 5, 2013

1.2.Description of Test Facility

Site Description

EMC Lab. : Listed by CNAS, August 16, 2012
The certificate is valid until August 15, 2015
The Laboratory has been assessed and proved to be in compliance with CNAS/CL01
The Certificate Registration Number is L5795.

Listed by FCC, August. 02, 2011
The Certificate Number is 665078.

Listed by Industry Canada, July 01, 2011
The Certificate Registration Number. Is 46405-9743

Name of Firm : Dongguan NTC Co., Ltd.

Site Location : Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng District, Dongguan City, Guangdong Province, China

1.3.Measurement Uncertainty

Radiation Uncertainty : Ur = ±2.7dB

Conduction Uncertainty : Uc = ±3.4dB

2. MEASURING DEVICE AND TEST EQUIPMENT

2.1.For Mains terminals Disturbance voltage Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI	101152	Nov. 25, 2012	1 Year
2.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Nov. 09, 2012	1 Year
3.	L.I.S.N	Schwarzbeck	NNLK8129	8129-212	Nov. 09, 2012	1 Year
4.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Nov. 09, 2012	1 Year
5.	Pulse Limiter	MTS-systemtechnik	MTS-IMP-136	261115-01 0-0022	Nov. 09, 2012	1 Year

2.2.For Radiated Emission Measurement

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI7	100837	Nov. 25, 2012	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Nov. 28, 2012	1 Year
3.	Positioning Controller	UC	UC 3000	N/A	N/A	N/A
4.	Color Monitor	SUNSPO	SP-140A	N/A	N/A	N/A
5.	Single Phase Power Line Filter	SAEMC	PF201A-32	110210	N/A	N/A
6.	3 Phase Power Line Filter	SAEMC	PF401A-200	110318	N/A	N/A
7.	DC Power Filter	SAEMC	PF301A-200	110245	N/A	N/A
8.	Cable	Huber+Suhner	CBL2-NN-9M	22390001	Nov. 09, 2012	1 Year
9.	Cable	Huber+Suhner	CIL02	N/A	Nov. 09, 2012	1 Year
10.	Power Amplifier	HP	HP 8447D	1145A00203	Nov. 09, 2012	1 Year

2.3.For Electrostatic Discharge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	ESD Tester	TESEQ	NSG 437	432	Nov. 10, 2012	1 Year

2.4.For RF Strength Susceptibility Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	RF Power Meter	ESE	4242	13984	Sep.1, 2012	1 Year
2.	Power Amplifier	TESEQ	CBA 1G-150	T44029	Sep.1, 2012	1 Year
3.	Signal Generator	Agilent	N5181A	MY50142530	Sep.1, 2012	1 Year
4.	Power Sensor	ESE	51011EMC	35716	Sep.1, 2012	1 Year
5.	Antenna Log-Periodic	CORAD	ATR80M6G	0337307	Sep.1, 2012	1 Year

2.5. For Electrical Fast Transient /Burst Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Burst Tester	EM TEST	UCS 500N	V1104108683	Nov. 09, 2012	1 Year
2.	Coupling Clamp	EM TEST	HFK	0311-94	Nov. 09, 2012	1 Year
3.	Test Soft	EM TEST	lec. control	N/A	N/A	N/A

2.6. For Surge Immunity Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Surge Tester	EM TEST	UCS 500N	V1104108683	Nov. 09, 2012	1 Year
2.	Test Soft	EM TEST	lec. control	N/A	N/A	N/A

2.7. For Injected Current Susceptibility Immunity Test

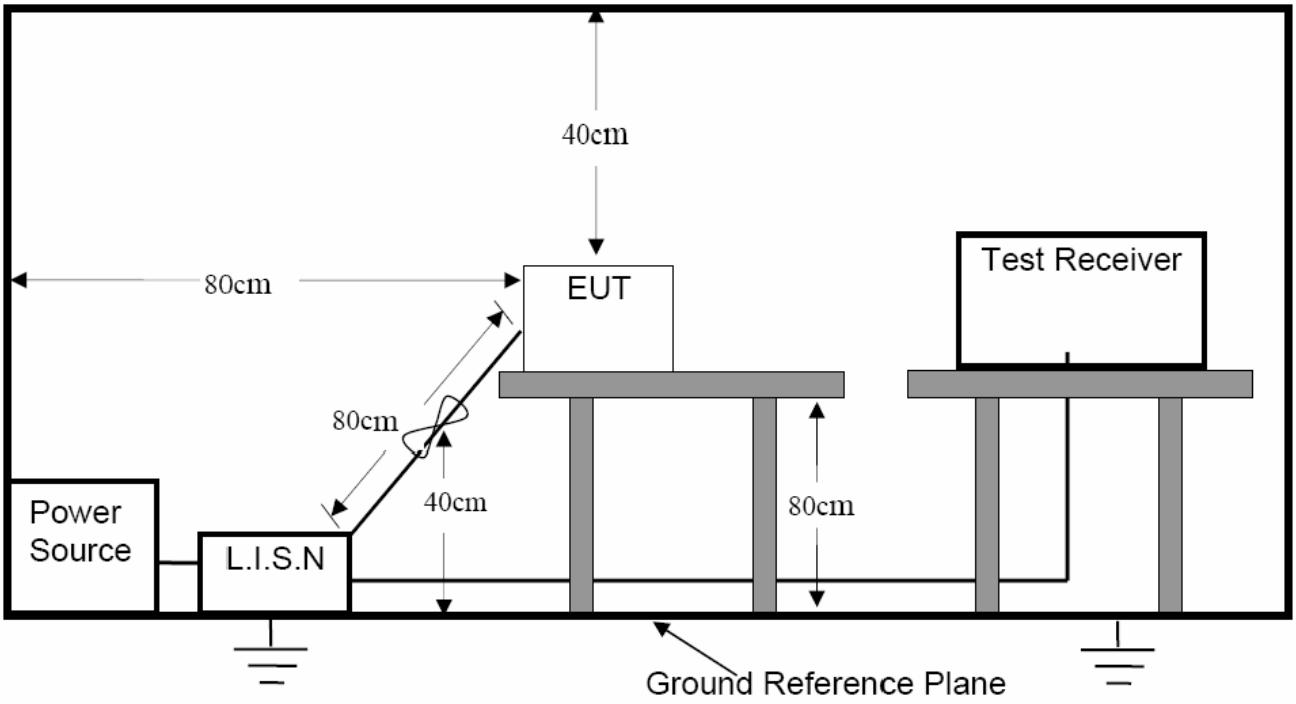
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Signal Generator	HP	8648A	3426A01263	May 25,2012	1 Year
2.	CDN	Luthi	L-801M2/M3	2015	Oct.19, 2012	1 Year
3.	CDN(AUX)	TESEQ	CDN M016	27452	Oct.19, 2012	1 Year
4.	6dB 50Watt Attenuator	Huber+Suhner	5906.17.0005	303688	Oct.19, 2012	1 Year
5.	Signal Amplifier	HAEFELY	PAMP250	149594	NA	1 Year
6.	Electromagnetic Injection Clamp	Luthi	EM101	35640	Oct.19, 2012	1 Year
7.	C/S Test System	HAEFELY	WinPAMP	NSEMC002	May 02, 2012	1 Year

2.8. For Voltage Dips and Interruptions Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Dips Tester	EM TEST	UCS500N	V1104108683	Nov. 09, 2012	1 Year
2.	Test Soft	EM TEST	Iec.control	N/A	N/A	N/A
3.	Dips Modulator	EM TEST	V4780S2	0111-11	Nov. 09, 2012	1 Year

3. POWER LINE CONDUCTED EMISSION MEASUREMENT

3.1.Block Diagram of Test Setup



3.2.Measuring Standard

Test Standard: EN 55022

Limits for conducted disturbance at the mains ports of class A ITE.

Frequency range	Limits (dB(uV))	
(MHz)	Quasi-peak	Average
0.15 to 0.50	79	66
0.5 0to 30	73	60

Note: The lower limit shall apply at the transition frequencies.

3.3.EUT Configuration on Measurement

The following equipments are installed on Conducted Emission Measurement to meet EN 55022 requirements and operating in a manner which tends to maximize its emission characteristics in a normal application.

Inverter/ Charger (EUT)

Model Number : PIP 4048MS

Serial Number : N/A

3.4.Operating Condition of EUT

3.4.1.Setup the EUT as shown on Section 3.1.

3.4.2.Turn on the power of all equipments.

3.4.3.Let the EUT work in measuring mode (Line mode/ Battery mode) and measure it.

3.5.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 62040-2 regulations during conducted emission measurement.
The bandwidth of the field strength meter is set at 9KHz in 150KHz~30MHz and 200Hz in 9KHz~150KHz.
The frequency range from 150kHz to 30MHz is investigated
All the scanning waveform is put in Appendix I.

3.6 Measuring Results

PASS.

Please reference to APPENDIX I

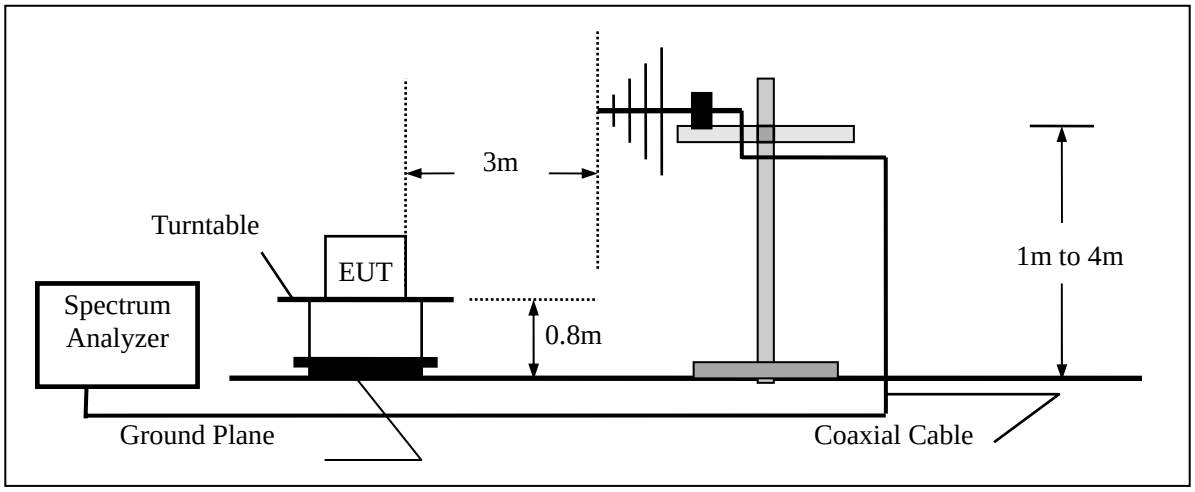
4. RADIATED EMISSION MEASUREMENT

4.1.Block Diagram of Test

4.1.1.Block diagram of connection between the EUT and simulators

(EUT: UPS)

4.1.2.Block diagram of test setup (In chamber)



(EUT: UPS)

4.2.Measuring Standard

EN55022 Class A

4.3.Radiated Emission Limits

All emanations from 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.

4.4.EUT Configuration on Test

The EN 55022 regulations test method must be used to find the maximum emission during radiated emission measurement.

4.5.Operating Condition of EUT

4.5.1.Turn on the power.

4.5.2.After that, let the EUT work in test mode (Line mode/Battery mode) and measure it.

4.6.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 is set at 120kHz.
All the scanning curves are attached in Appendix II.

4.7.Measuring Results

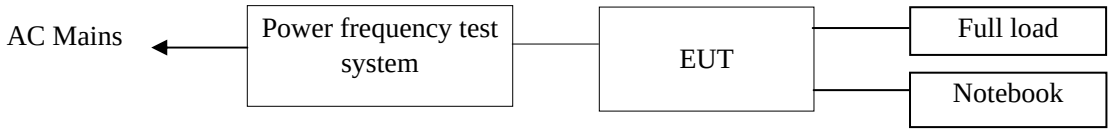
PASS.

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

Please reference to APPENDIX II

5. HARMONIC CURRENT EMISSION MEASUREMENT

5.1Block Diagram of Test Setup



(EUT: UPS)

5.2 Measuring Standard

EN61000-3-2: 2006+A1: 2009+A2:2009 CLASS A

5.3Operation Condition of EUT

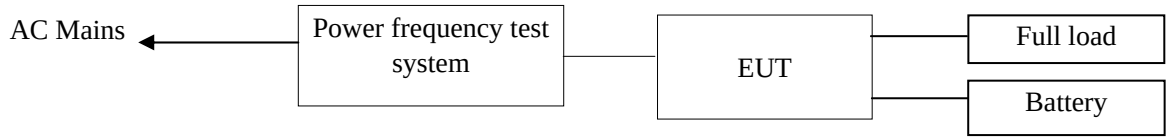
Same as Section 3.4, except the test setup replaced as Section 5.1.

5.4Measuring Results

N.A.

6. VOLTAGE FLUCTUATION AND FLICKER MEASUREMENT

6.1Block Diagram of Test Setup



(EUT: UPS)

6.2Measuring Standard

EN 61000-3-3: 2008

6.3Operation Condition of EUT

Same as Section 3.4, except the test setup replaced as Section 6.1.

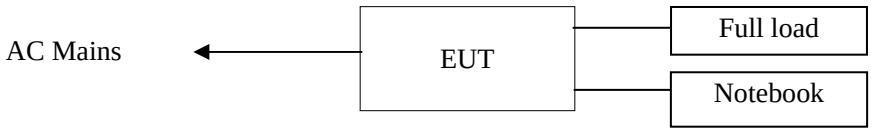
6.4Measuring Results

N.A.

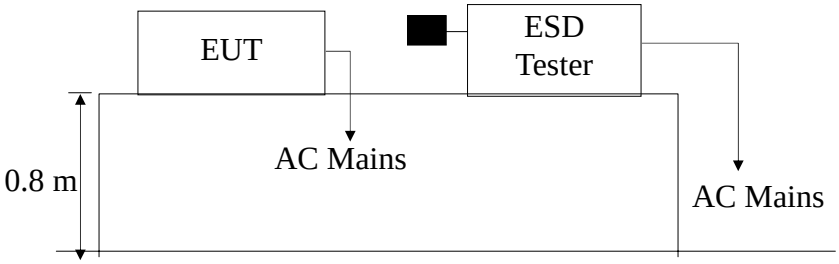
7. ELECTROSTATIC DISCHARGE IMMUNITY TEST

7.1 Block Diagram of Test Setup

7.1.1 Block diagram of connection between the EUT and simulators



7.1.2 Block diagram of ESD test setup



(EUT: UPS)

7.2 Test Standard

EN61000-4-2: 2009 (Air Discharge:±8KV, Contact Discharge:±4KV)

7.3 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

7.4 EUT Configuration

The configuration of EUT are listed in Section 3.4.

7.5 Operating Condition of EUT

Same as conducted emission measurement, which is listed in Section3.5. except the

test set up replaced by Section 7.1.

7.6 Test Procedure

7.6.1 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 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed

7.6.2 Contact Discharge**:**

All the procedure shall be same as Section 7.6.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

7.6.3 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 EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

7.6.4 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 EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

7.7 Test Results

PASS

Please refer to the following pages

Electrostatic Discharge Test Results

Ambient Condition:	Temp.: 24 ℃	R.H.: 51 %	Air Pressure: 101 kPa
Power Supply:	AC 230V 50Hz, DC 48V	Required Performance Criterion:	B
Test Specifications:	±2, 4 kV Contact Discharge; ±2, 4, 8 kV Air Discharge For each point positive 25 times and negative 25 times		
Tested mode:	Normal Operation Mode, Stored Energy Operation Mode		

Test Point			**Kind** A-Air Discharge C-Contact Discharge	**Result** (Performance Criterion)
Slot of EUT	20	points	A	A
Screen	10	points	A	B
I/O Port	15	points	C	A
Metal	10	points	C	A
Indirect Discharge (HCP)			C	A
Indirect Discharge (VCP)			C	A

Note: During the test, the screen of EUT has abnormal phenomenon, but it can be recovered by itself.

Test Equipment : ESD Tester (TESEQ, NSG 437) Test Engineer : Steven

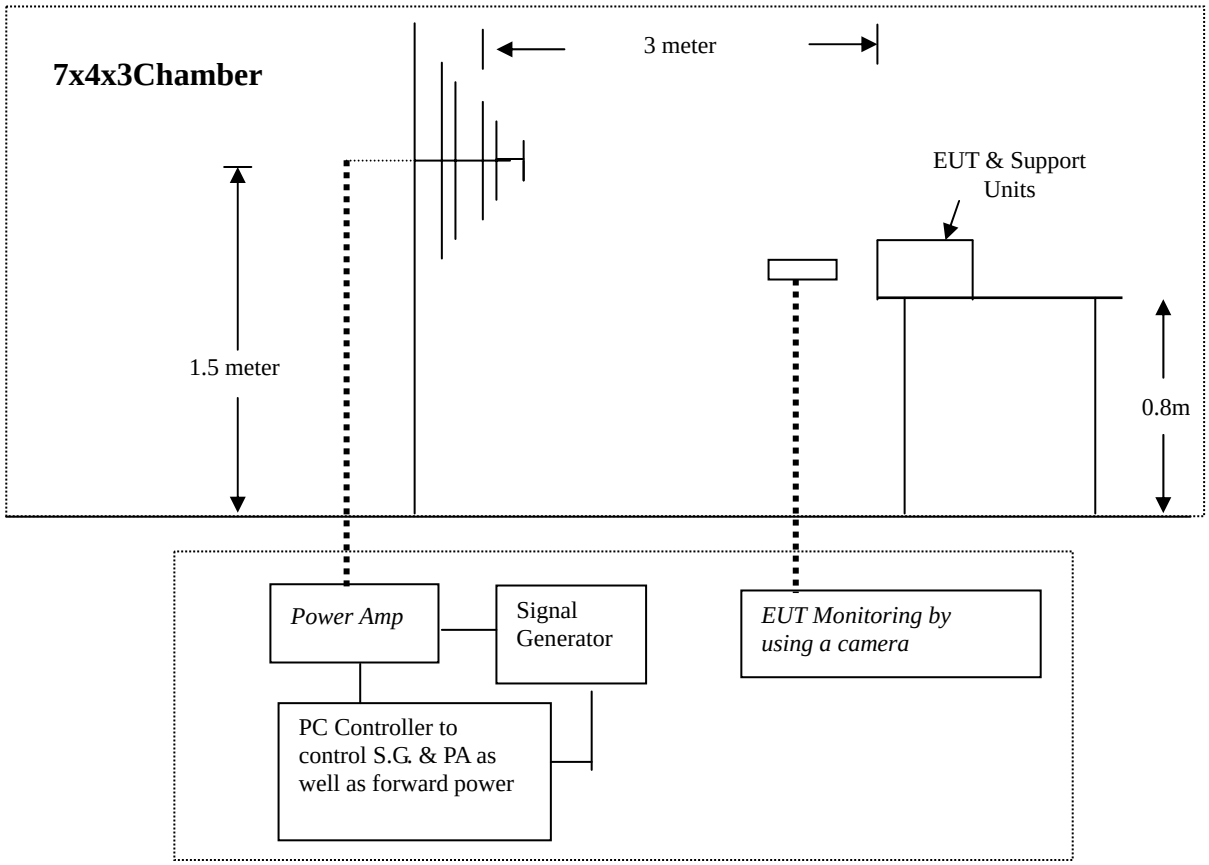
8. RF FIELD STRENGTH SUSCEPTIBILITY TEST

8.1 Block Diagram of Test

8.1.1 Block diagram of connection between the EUT and Load

(EUT: UPS)

8.1.2 Block diagram of RS test setup



(EUT: UPS)

8.2 Test Standard

EN61000-4-3: 2006+A1:2008+A2:2010 (3V / m)

8.3 Severity Levels

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

8.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.4.

8.5Operating Condition of EUT

Same as radiated emission measurement which is listed in Section 3.5, except the test setup replaced as Section 8.1.

8.6 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
2. Radiated Signal	Modulated
3. Scanning Frequency	80-1000MHz
4. Sweep time of radiated	0.0015 Decade/s
5. Dwell Time	1 Sec.

8.7 Test Results

PASS.

Please refer to the following page.

RF Field Strength Susceptibility Test Results

Ambient Condition:	Temp.: 24 ℃	R.H.: 51 %	Air Pressure: 101 kPa	
Power Supply:	AC 230V 50Hz, DC 48V	Required Performance Criterion: A		
Test Specifications:	Modulation: 1kHz, 80%AM;	Step Size: 1%;	Dwell Time: 1s	
Tested mode:	Normal Operation Mode, Stored energy Operation Mode			
Frequency (MHz)	Level (V/m)	Antenna polarity	Side	Result (Performance Criterion)
80-1000	3	Horizontal	Front	A
			Left	A
			Right	A
			Back	A
		Vertical	Front	A
			Left	A
			Right	A
			Back	A

Note:

Test Equipment :
1. Signal Generator : N5181A (Agilent)
2. Power Amplifier : CBA 1G-150 (TESEQ)
3. Log.-Per. Antenna: ATR80M6G (CORAD)
4. RF Power Meter. Dual Channel : 4242 (ESE)
5. Power Sensor: 51011EMC (ESE)

Test Engineer : Steven

9. ELECTRICAL FAST TRANSIENT/BURST IMMUNITY TEST

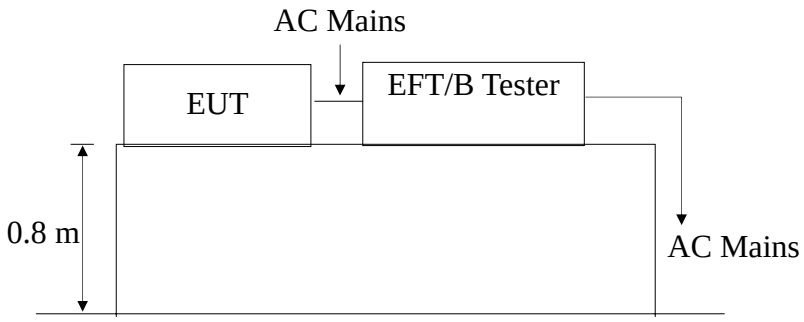
9.1 Block Diagram of Test Setup

9.1.1.Block Diagram of the EUT

(EUT: UPS)

9.1.2.EFT Test Setup

AC Port:



9.2 Test Standard

EN61000-4-4: 2004+A1:2010 (Level: 1KV/5KHz)

9.3 Severity Levels

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

9.4 EUT Configuration

The configuration of EUT are listed in Section 3.4.

9.5 Operating Condition of EUT

9.5.1 Setup the EUT as shown in Section 9.1.

9.5.2 Turn on the power of all equipments.

9.5.3 Let the EUT work in test mode (Line mode) and measure it.

9.6 Test Procedure

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

9.6.1 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.

9.6.2 For signal lines and control lines ports**:**

The capacitive coupling clamp shall be used for coupling the test voltage into the lines, put the signal lines into the coupling clamp, Grounding of the coaxial cable from the test generator shall be made in the vicinity of the coupling point. Both polarities of the test voltage should be applied during compliance test and the duration of the test is 2 mins.

9.6.3 For DC output line ports**:**

It’s unnecessary to test.

9.7 Test Result

PASS.

Please refer to the following page.

Electrical Fast Transient/Burst Test Results

Ambient Condition:	Temp.: 26 ℃	R.H.: 58 %	Air Pressure: 101 kPa
Power Supply:	AC 230V 50Hz	Required Performance Criterion: B	
Test Specifications:	Repetition Frequency: 5kHz; Duration: 15ms; Period: 300ms		
Test mode:	Normal Operation Mode		
Line : ☒ AC Mains ☐ Signal line ☐ DC line Coupling : ☒ Direct ☐ Capacitive			

Line	**Test Voltage**	**Result** (Performance Criterion)
L	±1KV	A
N	±1KV	A
PE	±1KV	A
L、N	±1KV	A
L、PE	±1KV	A
N、PE	±1KV	A
L、N、PE	±1KV	A
Signal line		
DC line		

Note :

Test Equipment : Burst Tester(EM TEST, UCS500N) Test Engineer : Steven

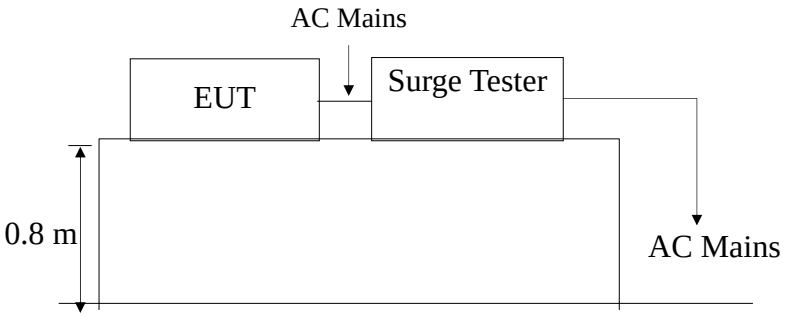
10. SURGE IMMUNITY TEST

10.1 Block Diagram of Test Setup

10.1.1 Block Diagram of the EUT

(EUT: UPS)

10.1.2. Surge Test Setup



10.2 Test Standard

EN61000-4-5: 2006 (Line to Line: Level, 1.0KV, Line to earth: 2.0KV)

10.3 Severity Levels

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

10.4 EUT Configuration

The configuration of EUT are listed in Section 3.4.

10.5 Operating Condition of EUT

10.5.1 Setup the EUT as shown in Section 10.1.

10.5.2.Turn on the power of all equipments.

10.5.3.Let the EUT work in test mode (Line mode) and measure it.

10.6 Test Procedure

1) Set up the EUT and test generator as shown on Section 10.1.2.
2) For line to line coupling mode, provide a 1.2/50us voltage surge (at open-circuit condition) and 8/20us current surge to EUT 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 EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

10.7 Test Result

PASS.

Please refer to the following page.

Surge Immunity Test Results

Ambient Condition:	Temp.: 26 ℃	R.H.: 58 %	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:	Normal Operation 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 :			
Test Equipment : Burst Tester(EM TEST, UCS500N)			Test Engineer : Steven

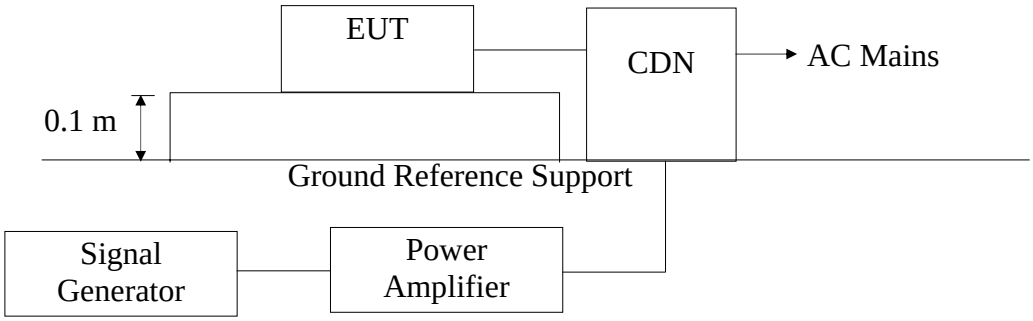
11. INJECTED CURRENTS SUSCEPTIBILITY TEST

11.1 Block Diagram of Test Setup

11.1.1 Block Diagram of the EUT

(EUT: UPS)

11.1.2 Block Diagram of Test Setup



11.2 Test Standard

EN61000-4-6: 2009 (Level2: 3V (rms), (0.15MHz ~ 80MHz))

11.3 Severity Levels

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

11.4 EUT Configuration

The configuration of EUT are listed in Section 3.4.

11.5 Operating Condition of EUT

11.5.1 Setup the EUT as shown in Section 11.1.

11.5.1 Turn on the power of all equipments.

11.5.1 Let the EUT work in test mode (Line mode) and measure it.

11.6 Test Procedure

1) Set up the EUT, CDN and test generators as shown on Section 11.1.2.
2) Let the EUT work in test mode and measure it.
3) The EUT are placed on an insulating support 0.1m high above a ground reference plane. CDN (coupling and decoupling device) is placed on the ground plane about 0.3m from EUT. Cables between CDN and EUT are as short as possible, and their height above the ground reference plane shall be between 30 and 50 mm (where possible).
4) The disturbance signal described below is injected to EUT through CDN.
5) The EUT operates within its operational mode(s) under intended climatic conditions after power on.
6) The frequency range is swept from 150KHz to80MHz 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 EUT operating situation during compliance testing and decide the EUT immunity criterion.

11.7 Test Results

PASS.

Please refer to the following page.

Injected Currents Susceptibility Test Results

Ambient Condition:	Temp.: 24 ℃	R.H.: 51 %	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:	Normal Operation Mode		
Test Port	Frequency (MHz)	Level(V)	Result (Performance Criterion)
AC Mains	0.15~80	3	A
Note :			
Test Equipment : FRANNOKIA, CIT-10		Test Engineer : Steven	

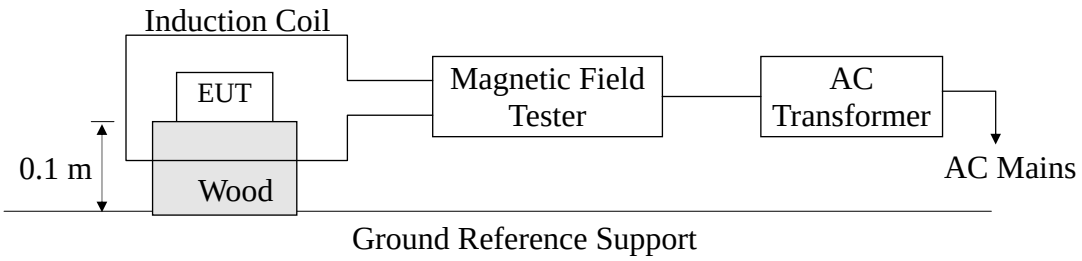
12. MAGNETIC FIELD SUSCEPTIBILITY TEST

12.1 Block Diagram of Test

12.1.1 Block diagram of test setup

(EUT: UPS)

12.1.2 Magnetic field test setup



(EUT: UPS)

12.2 Test Standard

EN61000-4-8: 2010, Severity Level: 10A / m

12.3 Severity Levels

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

12.4 EUT Configuration on Test

The configuration of the EUT is same as Section 3.3.

12.5 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 is 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.

12.6 Test Results

N.A.

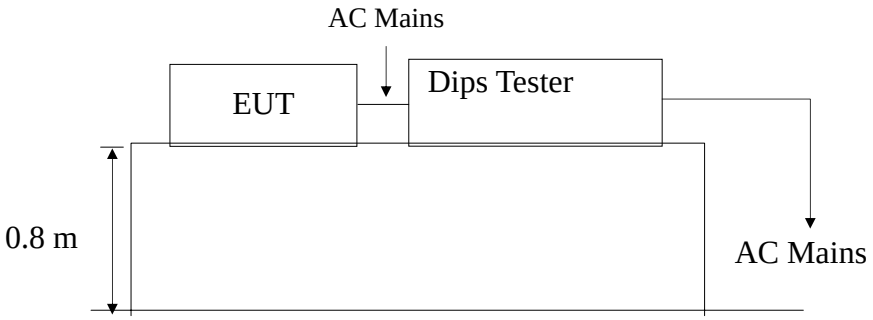
13. VOLTAGE DIPS AND INTERRUPTIONS TEST

13.1 Block Diagram of Test Setup

13.1.1 Block Diagram of the EUT

(EUT: UPS)

13.1.2 Dips Test Setup



13.2 Test Standard

EN61000-4-11: 2004

13.3 Severity Levels

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

13.4 EUT Configuration

The configuration of EUT is listed in Section 3.3.

13.5 Operating Condition of EUT

13.5.1 Setup the EUT as shown in Section 13.1.

13.5.2 Turn on the power of all equipments.

13.5.3 Let the EUT work in test mode (Line mode/Battery mode) and measure it.

13.6 Test Procedure

1) Set up the EUT and test generator as shown on Section 13.1.2.
2) The interruption is introduced at selected phase angles with specified duration.
3) Record any degradation of performance.

13.7 Test Result

PASS.

Please refer to the following page.

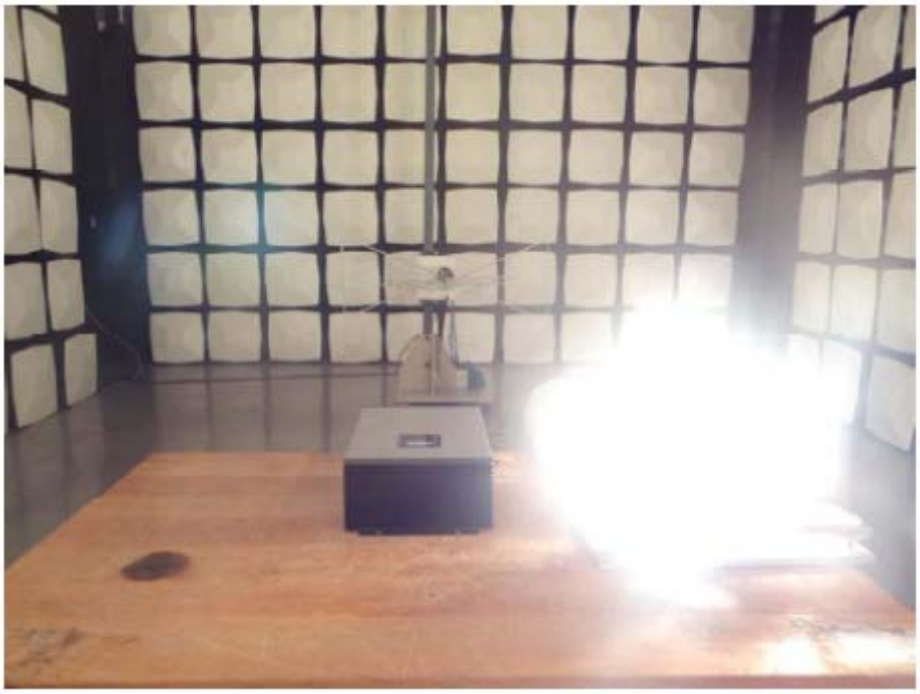
Voltage Dips And Interruptions Test Results

Ambient Condition:	Temp.: 26 ℃	R.H.: 58 %	Air Pressure: 101 kPa
Power Supply:	AC 230V 50Hz	Required Performance Criterion: B & C	
Test Specifications:	0%U_T, 0.5Cycle; 70%U_T, 25Cycle; 0%U_T,250Cycle		
Test mode:	Normal Operation Mode		
Test Level % UT	Duration (in period)	Result (Performance Criterion)	
0	0.5P	A	
70	25P	B	
0	250P	B	
Note : During the test, the EUT has changed operating mode, but it can be recovered by itself.			
Test Equipment : Dips Tester: EM TEST, UCS 500N		Test Engineer : Steven	

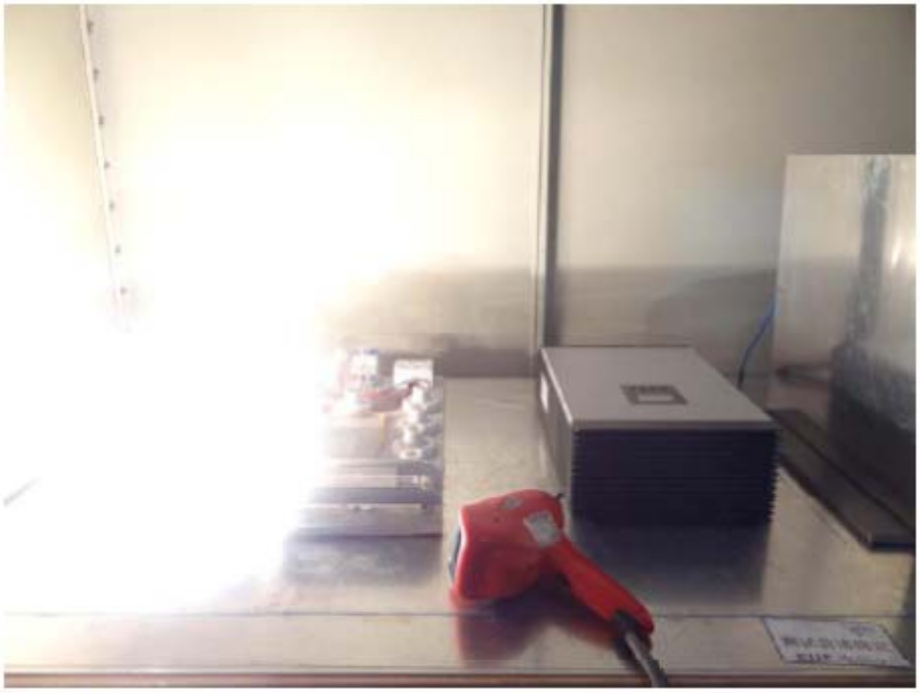
14. TEST PHOTOGRAPH

15.1 Photo of Conducted Emission Measurement

15.2 Photo of Radiation Emission Measurement



15.3 Photos of Electrostatic Discharge Test



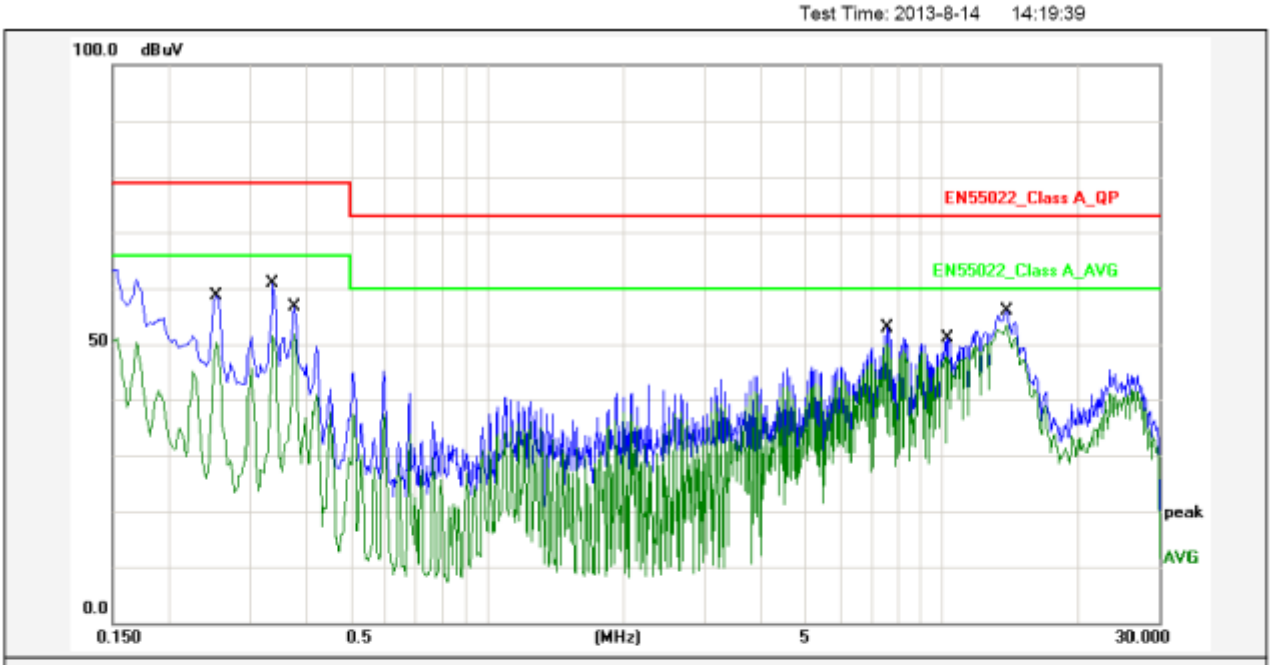
15.4 Photos of RF Field Strength susceptibility Test

15.5 Photo of Electrical Fast Transient /Burst Test

15.6 Photo of Surge Test

15.7 Photo of Voltage Dips and Interruption Immunity Test

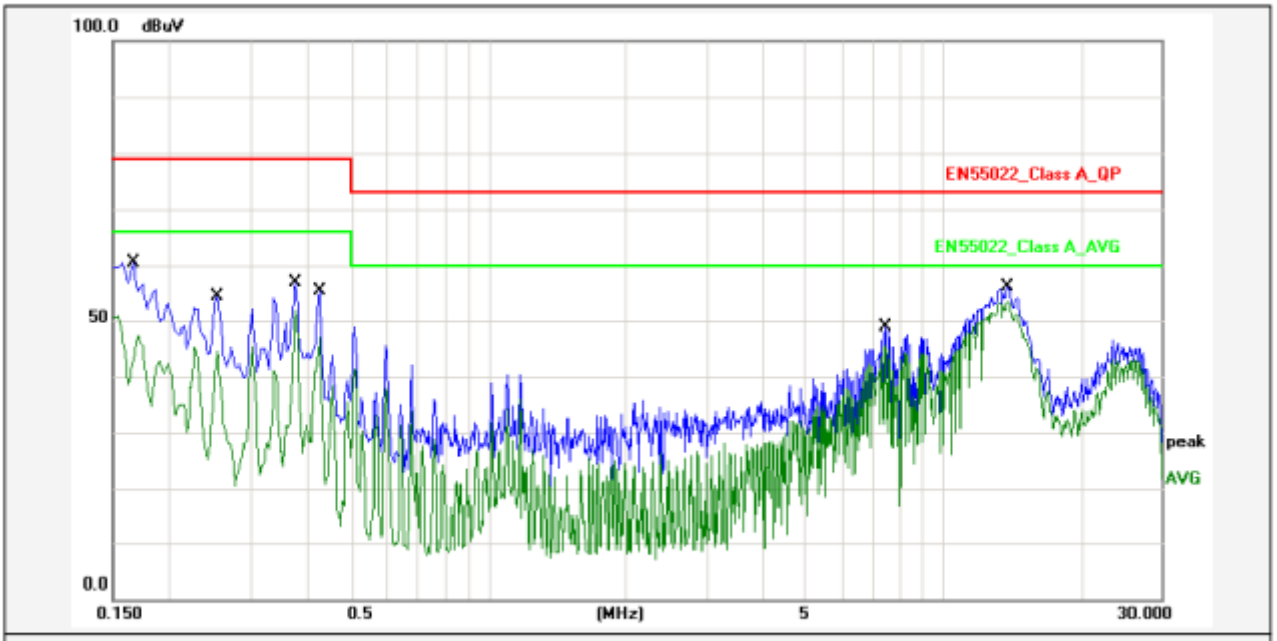
APPENDIX I



Report No.:	Axpert MKS-5000-48		
Test Standard:	EN55022_Class A_QP		
Test item:	Conducted Emission	Phase:	L1
Applicant:	VOLTRONIC POWER	Temp.( )/Hum.(%):	27(C) / 61 %
Product:	Inverter/Charger	Power Rating:	AC 230V/50Hz
Model No.:	Axpert MKS-5000-48	Test Engineer:	Steven
Test Mode:	Normal		
Remark:			

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.2540	10.80	45.80	56.60	79.00	-22.40	QP	P	
2	0.2540	10.80	38.40	49.20	66.00	-16.80	AVG	P	
3	0.3379	10.80	48.00	58.80	79.00	-20.20	QP	P	
4	0.3379	10.80	39.90	50.70	66.00	-15.30	AVG	P	
5	0.3780	10.80	43.80	54.60	79.00	-24.40	QP	P	
6	0.3780	10.80	39.90	50.70	66.00	-15.30	AVG	P	
7	7.5819	10.80	42.10	52.90	73.00	-20.10	QP	P	
8	7.5819	10.80	39.30	50.10	60.00	-9.90	AVG	P	
9	10.2979	10.80	40.90	51.70	73.00	-21.30	QP	P	
10	10.2979	10.80	37.00	47.80	60.00	-12.20	AVG	P	
11	13.9180	10.80	45.10	55.90	73.00	-17.10	QP	P	
12	13.9180	10.80	42.60	53.40	60.00	-6.60	AVG	P	

Test Time: 2013-8-14 14:17:54



Report No.: Axpert MKS-5000-48

Test Standard: EN55022_Class A_QP

Test item: Conducted Emission

Phase: N

Applicant: VOLTRONIC POWER

Temp.( )/Hum.(%): 27(C) / 61 %

Product: Inverter/Charger

Power Rating: AC 230V/50Hz

Model No.: Axpert MKS-5000-48

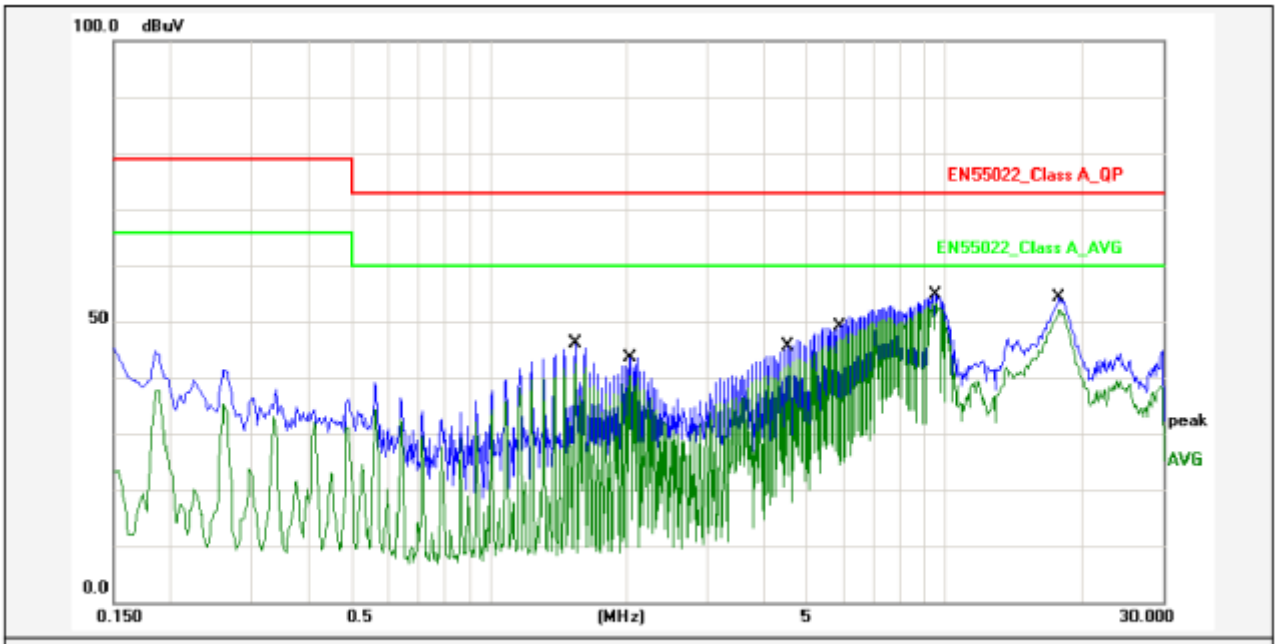
Test Engineer: Steven

Test Mode: Normal

Remark:

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1660	10.80	47.40	58.20	79.00	-20.80	QP	P	
2	0.1660	10.80	40.00	50.80	66.00	-15.20	AVG	P	
3	0.2540	10.80	41.50	52.30	79.00	-26.70	QP	P	
4	0.2540	10.80	33.80	44.60	66.00	-21.40	AVG	P	
5	0.3780	10.80	44.00	54.80	79.00	-24.20	QP	P	
6	0.3780	10.80	40.10	50.90	66.00	-15.10	AVG	P	
7	0.4260	10.80	42.50	53.30	79.00	-25.70	QP	P	
8	0.4260	10.80	35.40	46.20	66.00	-19.80	AVG	P	
9	7.5139	10.80	35.90	46.70	73.00	-26.30	QP	P	
10	7.5139	10.80	33.90	44.70	60.00	-15.30	AVG	P	
11	13.8540	10.80	45.20	56.00	73.00	-17.00	QP	P	
12	13.8540	10.80	41.60	52.40	60.00	-7.60	AVG	P	

Test Time: 2013-8-14 14:13:29



Report No.: Axpert MKS-5000-48

Test Standard: EN55022_Class A_QP

Test item: Conducted Emission

Phase: L1

Applicant: VOLTRONIC POWER

Temp.( )/Hum.(%): 27(C) / 61 %

Product: Inverter/Charger

Power Rating: DC 48V

Model No.: Axpert MKS-5000-48

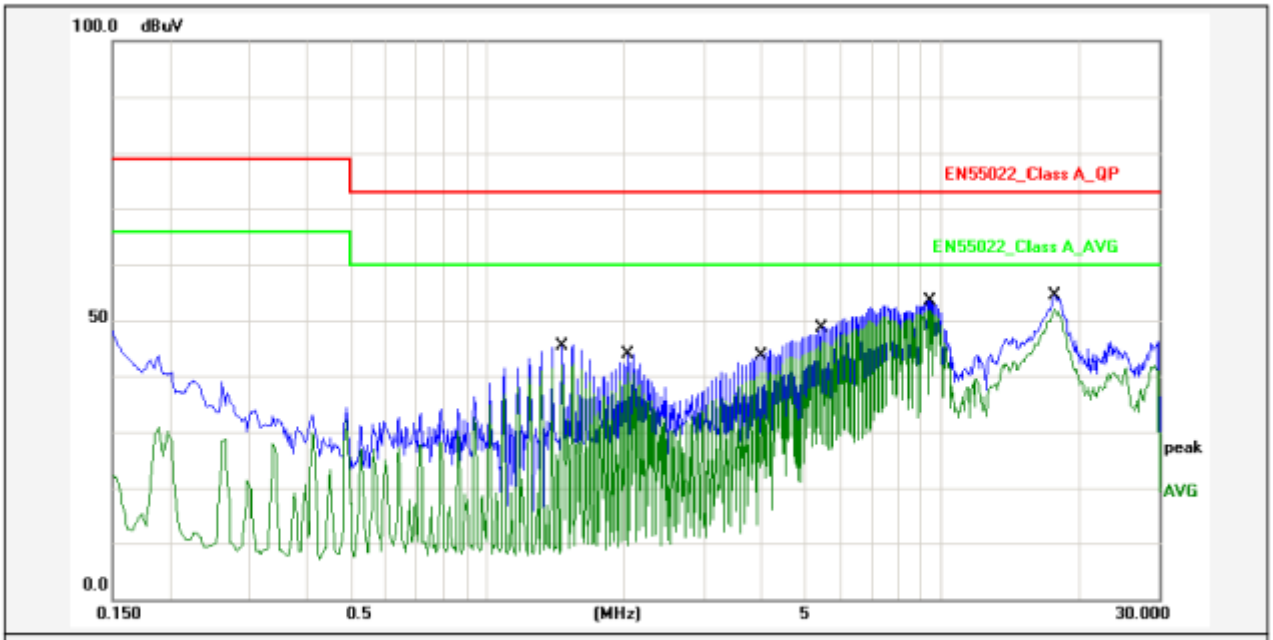
Test Engineer: Steven

Test Mode: Stored Energy

Remark:

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	1.5380	10.80	34.30	45.10	73.00	-27.90	QP	P	
2	1.5380	10.80	30.90	41.70	60.00	-18.30	AVG	P	
3	2.0260	10.80	31.80	42.60	73.00	-30.40	QP	P	
4	2.0260	10.80	28.60	39.40	60.00	-20.60	AVG	P	
5	4.5419	10.80	33.80	44.60	73.00	-28.40	QP	P	
6	4.5419	10.80	31.10	41.90	60.00	-18.10	AVG	P	
7	5.8939	10.80	37.40	48.20	73.00	-24.80	QP	P	
8	5.8939	10.80	36.10	46.90	60.00	-13.10	AVG	P	
9	9.5020	10.80	43.10	53.90	73.00	-19.10	QP	P	
10	9.5020	10.80	41.40	52.20	60.00	-7.80	AVG	P	
11	17.7820	10.80	42.40	53.20	73.00	-19.80	QP	P	
12	17.7820	10.80	40.30	51.10	60.00	-8.90	AVG	P	

Test Time: 2013-8-14 14:15:17



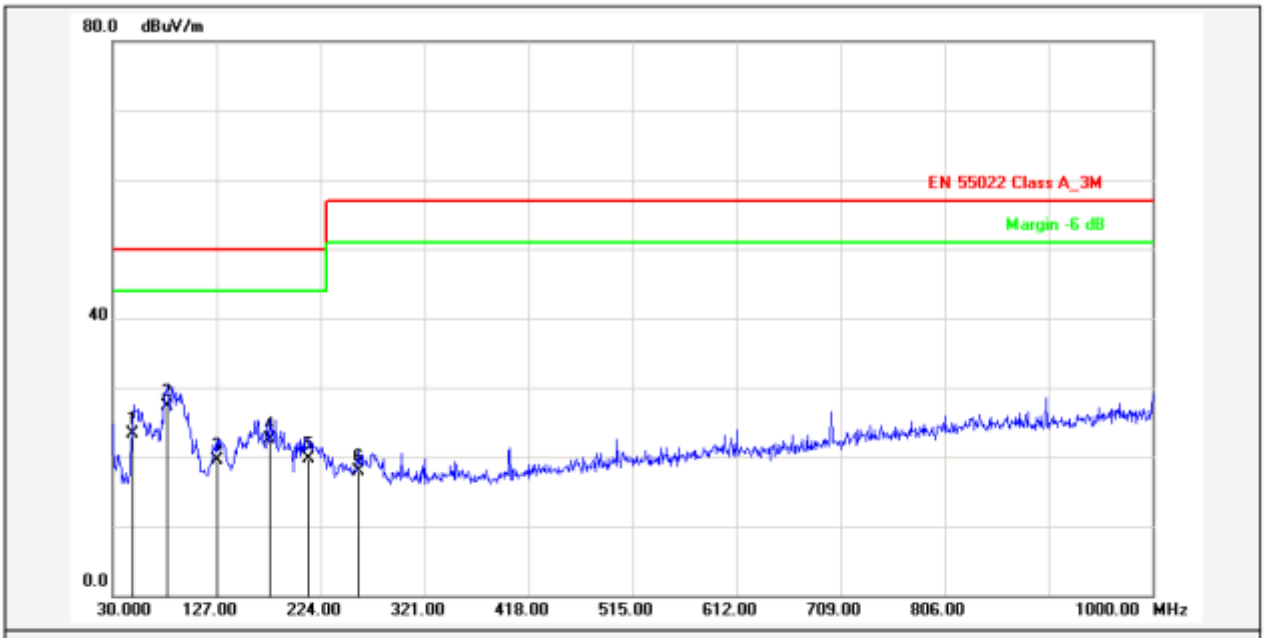
Report No.: Axpert MKS-5000-48
Test Standard: EN55022_Class A_QP
Test item: Conducted Emission
Phase: N
Applicant: VOLTRONIC POWER
Temp.( )/Hum.(%): 27(C) / 61 %
Product: Inverter/Charger
Power Rating: DC 48V
Model No.: Axpert MKS-5000-48
Test Engineer: Steven

Test Mode: Stored Energy
Remark:

No.	Frequency (MHz)	Factor (dBuV)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	1.4700	10.80	33.60	44.40	73.00	-28.60	QP	P	
2	1.4700	10.80	30.30	41.10	60.00	-18.90	AVG	P	
3	2.0340	10.80	32.00	42.80	73.00	-30.20	QP	P	
4	2.0340	10.80	28.80	39.60	60.00	-20.40	AVG	P	
5	4.0300	10.80	31.90	42.70	73.00	-30.30	QP	P	
6	4.0300	10.80	28.80	39.60	60.00	-20.40	AVG	P	
7	5.4618	10.80	36.80	47.60	73.00	-25.40	QP	P	
8	5.4618	10.80	34.40	45.20	60.00	-14.80	AVG	P	
9	9.4580	10.80	41.60	52.40	73.00	-20.60	QP	P	
10	9.4580	10.80	40.10	50.90	60.00	-9.10	AVG	P	
11	17.7540	10.80	42.70	53.50	73.00	-19.50	QP	P	
12	17.7540	10.80	40.40	51.20	60.00	-8.80	AVG	P	

APPENDIX II

Test Time: 2013-8-14 10:50:00



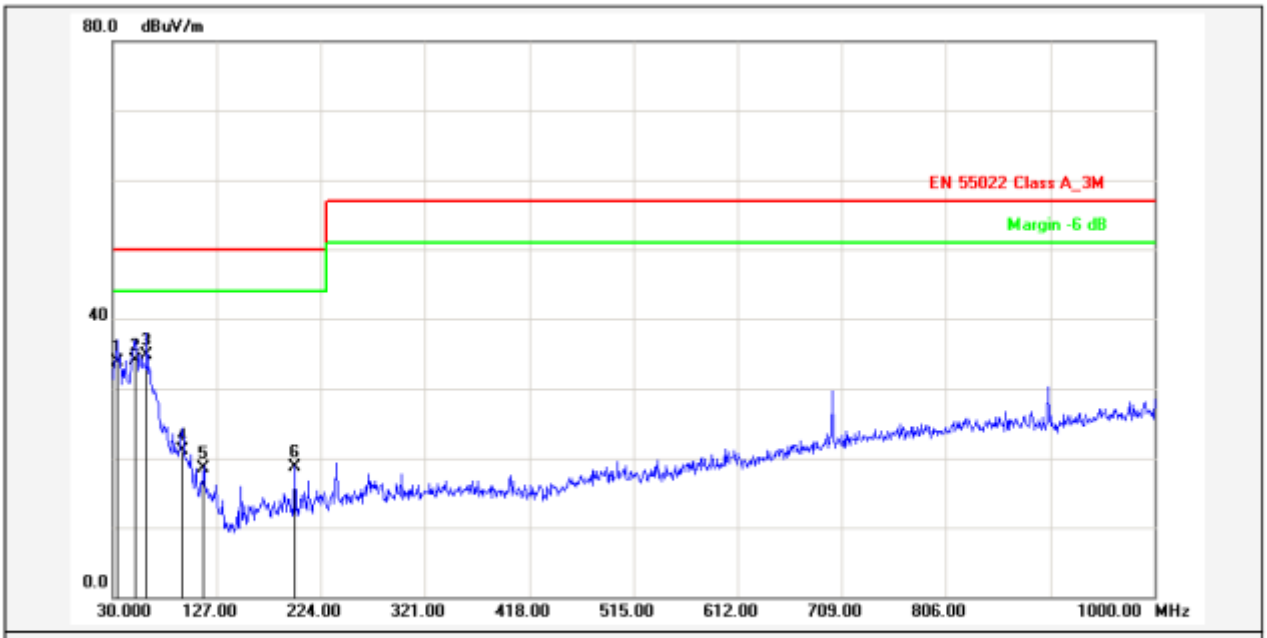
Report No.:	Axpert MKS-5000-48		
Test Standard:	EN 55022 Class A_3M	Test Distance:	3m
Test item:	Radiation Emission	Ant. Polarization:	Horizontal
Applicant:	VOLTRONIC POWER	Temp.( )/Hum.(%):	26(C) / 60 %
Product:	Inverter/Charger	Power Rating:	AC 230V/50Hz
Model No.:	Axpert MKS-5000-48	Test Engineer:	Steven

Test Mode: Normal

Remark:

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth ( )	P/F	Remark
1	49.3998	-17.99	41.39	23.40	50.00	-26.60	QP			P	
2	81.4100	-15.87	43.27	27.40	50.00	-22.60	QP			P	
3	127.0000	-14.83	34.33	19.50	50.00	-30.50	QP			P	
4	176.4698	-14.40	36.90	22.50	50.00	-27.50	QP			P	
5	213.3300	-13.16	32.86	19.70	50.00	-30.30	QP			P	
6	258.9200	-11.46	29.36	17.90	57.00	-39.10	QP			P	

Test Time: 2013-8-14 10:51:13



Report No.:	Axpert MKS-5000-48		
Test Standard:	EN 55022 Class A_3M	Test Distance:	3m
Test item:	Radiation Emission	Ant. Polarization:	Vertical
Applicant:	VOLTRONIC POWER	Temp.( )/Hum.(%):	26(C) / 60 %
Product:	Inverter/Charger	Power Rating:	AC 230V/50Hz
Model No.:	Axpert MKS-5000-48	Test Engineer:	Steven

Test Mode: Normal

Remark:

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth ( )	P/F	Remark
1	34.8500	-16.17	49.97	33.80	50.00	-16.20	QP			P	
2	51.3400	-13.46	47.36	33.90	50.00	-16.10	QP			P	
3	62.0100	-14.84	49.54	34.70	50.00	-15.30	QP			P	
4	94.9899	-15.77	36.97	21.20	50.00	-28.80	QP			P	
5	115.3599	-16.04	34.54	18.50	50.00	-31.50	QP			P	
6	199.7500	-16.43	35.23	18.80	50.00	-31.20	QP			P	

Test Time: 2013-8-14 10:45:13

Report No.:	Axpert MKS-5000-48		
Test Standard:	EN 55022 Class A_3M	Test Distance:	3m
Test item:	Radiation Emission	Ant. Polarization:	Horizontal
Applicant:	VOLTRONIC POWER	Temp.( )/Hum.(%):	26(C) / 60 %
Product:	Inverter/Charger	Power Rating:	DC 48V
Model No.:	Axpert MKS-5000-48	Test Engineer:	Steven

Test Mode: Stored Energy

Remark:

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth ( )	P/F	Remark
1	78.6800	-17.42	61.62	44.20	50.00	-5.80	QP			P	
2	150.2800	-15.50	53.20	37.70	50.00	-12.30	QP			P	
3	188.1100	-13.68	55.48	41.80	50.00	-8.20	QP			P	
4	234.6699	-12.26	56.46	44.20	57.00	-12.80	QP			P	
5	266.6800	-11.27	60.17	48.90	57.00	-8.10	QP			P	
6	299.6600	-10.47	51.77	41.30	57.00	-15.70	QP			P	

Test Time: 2013-8-14 10:42:49

Report No.: Axpert MKS-5000-48

Test Standard: EN 55022 Class A_3M

Test item: Radiation Emission

Applicant: VOLTRONIC POWER

Product: Inverter/Charger

Model No.: Axpert MKS-5000-48

Test Distance: 3m

Ant. Polarization: Vertical

Temp.( )/Hum.(%): 26(C) / 60 %

Power Rating: DC 48V

Test Engineer: Steven

Test Mode: Stored Energy

Remark:

No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth ( )	P/F	Remark
1	58.1300	-14.11	57.11	43.00	50.00	-7.00	QP			P	
2	71.7099	-17.95	60.25	42.30	50.00	-7.70	QP			P	
3	188.1100	-16.68	49.08	32.40	50.00	-17.60	QP			P	
4	222.0600	-15.86	53.86	38.00	50.00	-12.00	QP			P	
5	267.6500	-13.24	56.04	42.80	57.00	-14.20	QP			P	
6	295.7798	-12.59	49.79	37.20	57.00	-19.80	QP			P	

APPENDIX III

Photos of EUT

Figure 1
General Appearance of the E.U.T.

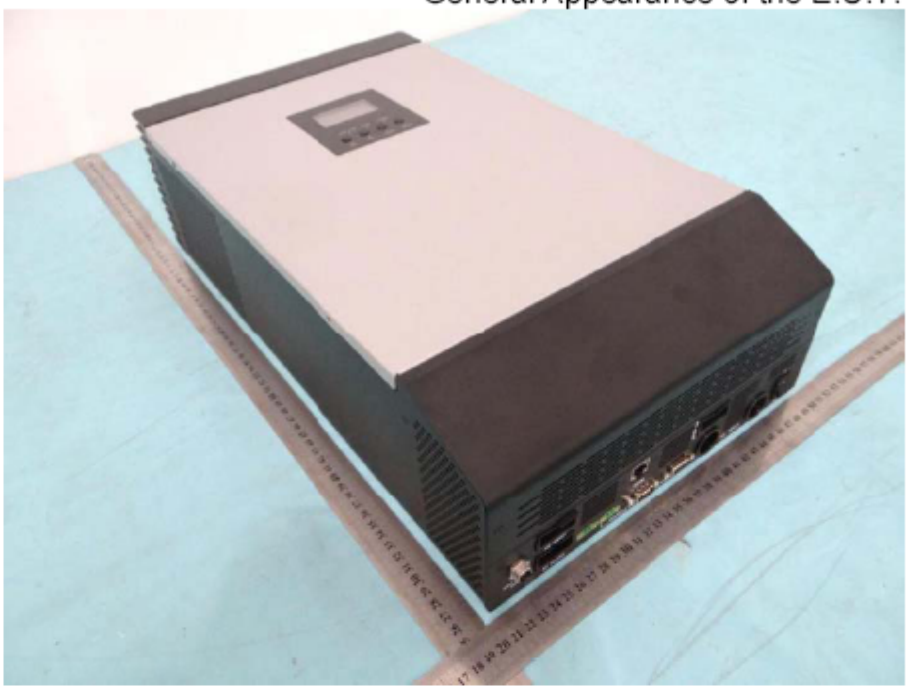


Figure 2
General Appearance of the E.U.T.

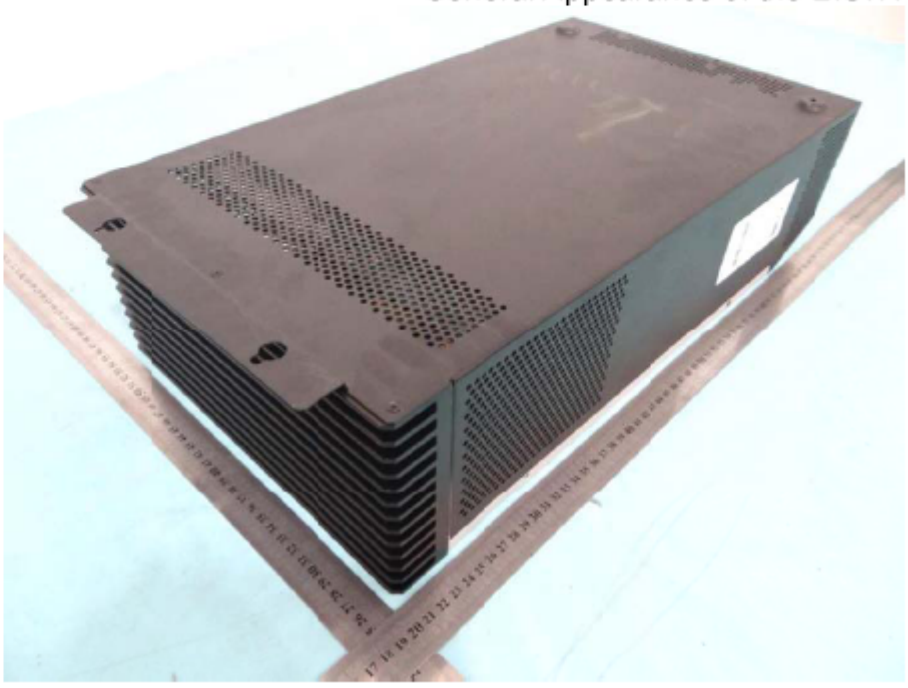


Figure 3
General Internal of the E.U.T.

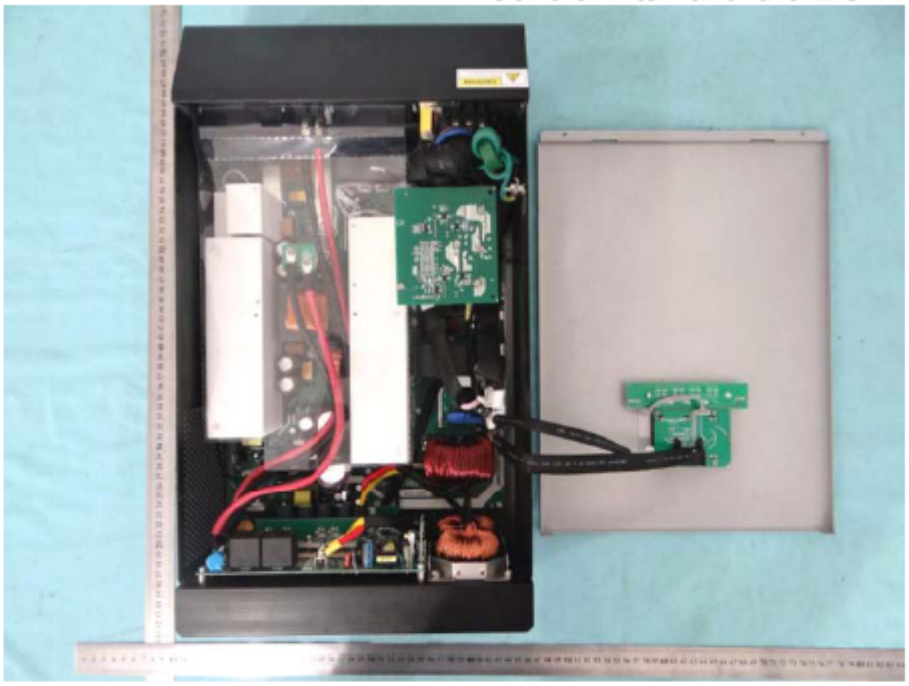


Figure 4
General Appearance of the PCB

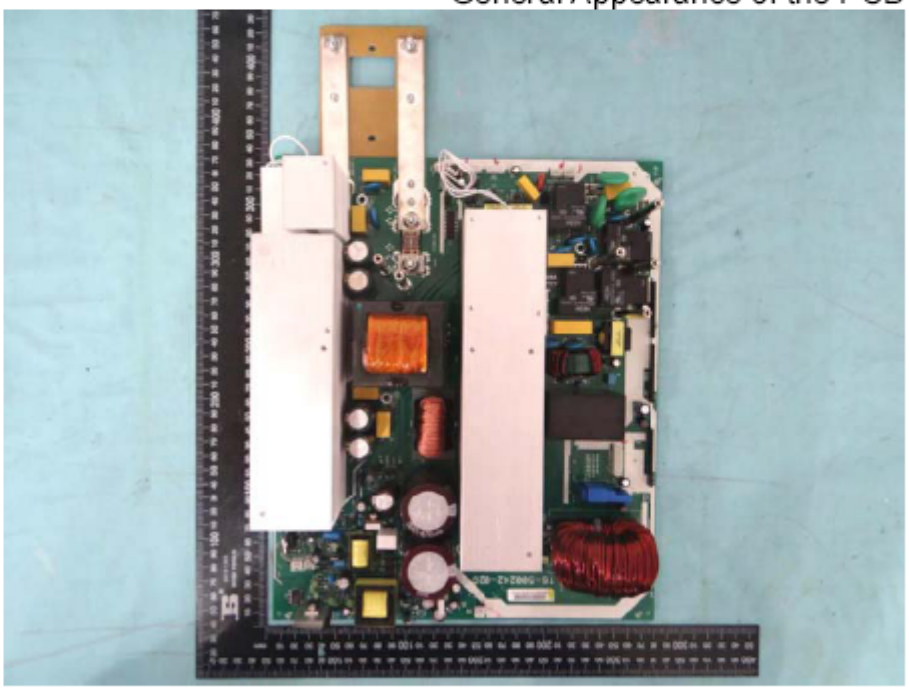


Figure 5
General Appearance of the PCB

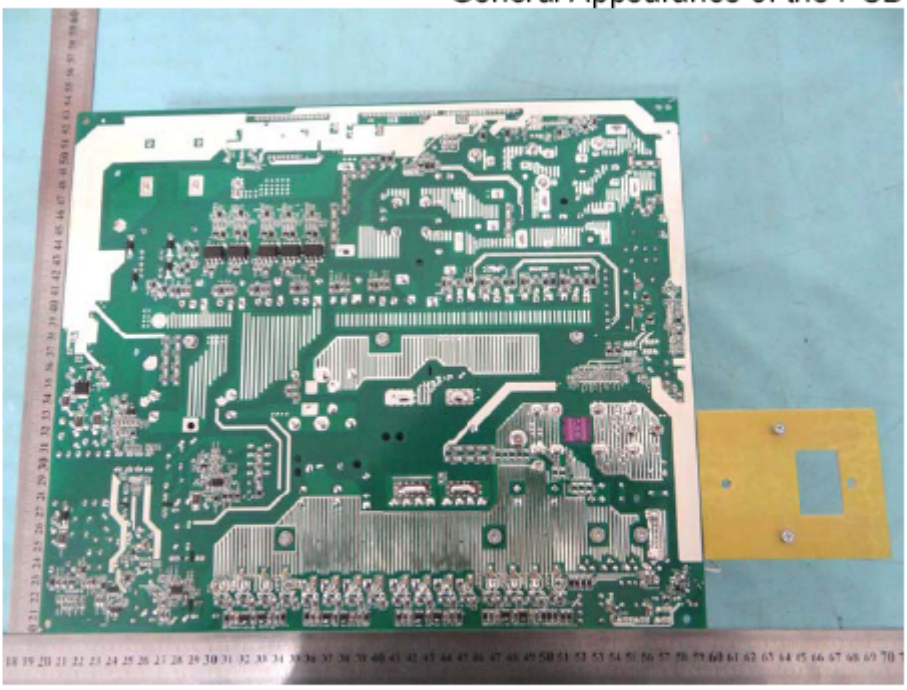


Figure 6
General Appearance of the PCB

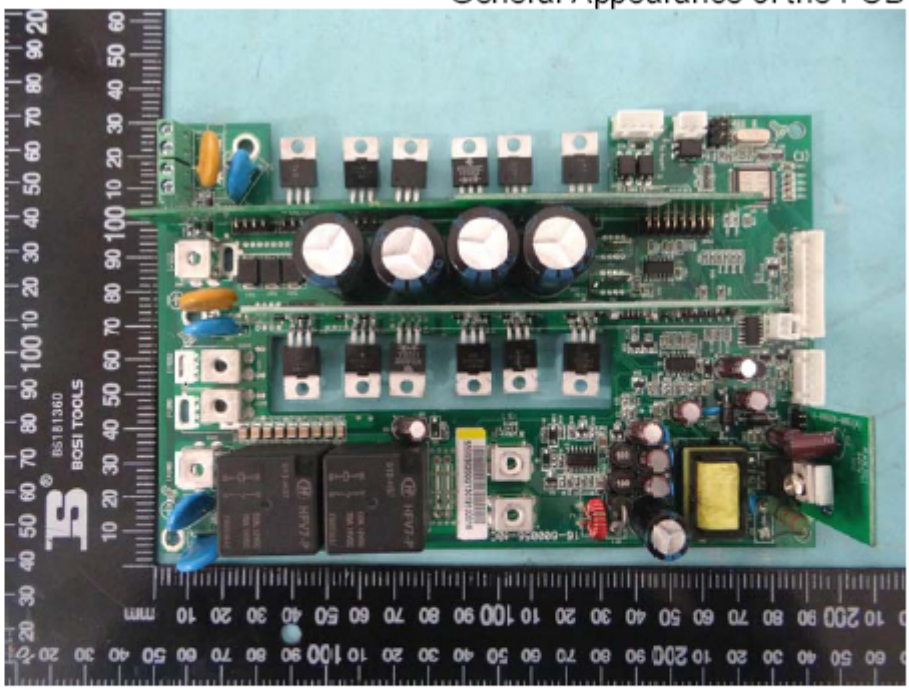


Figure 7
General Appearance of the PCB

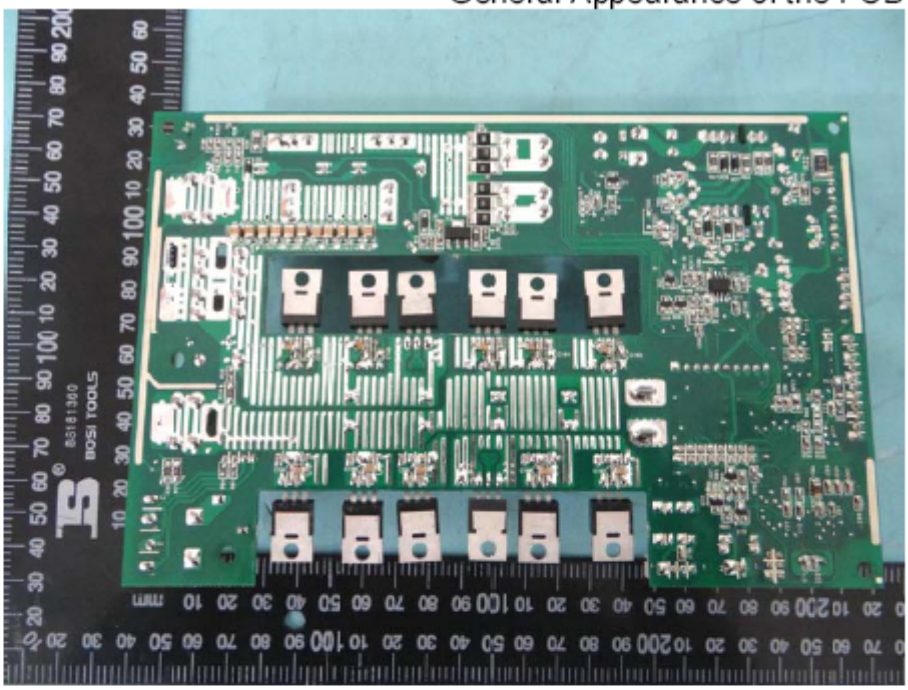


Figure 8
General Appearance of the PCB

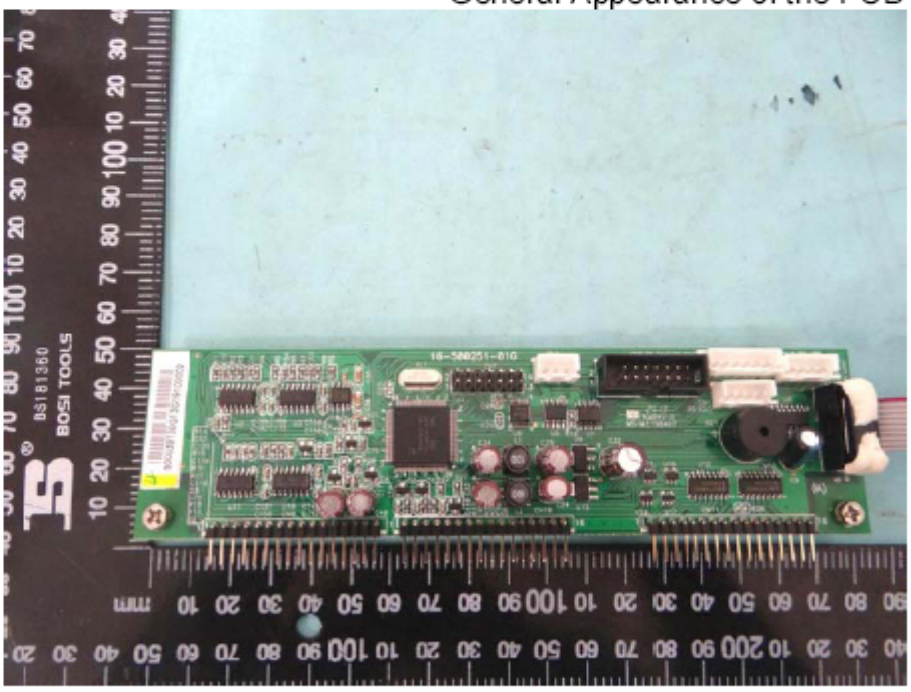


Figure 9
General Appearance of the PCB

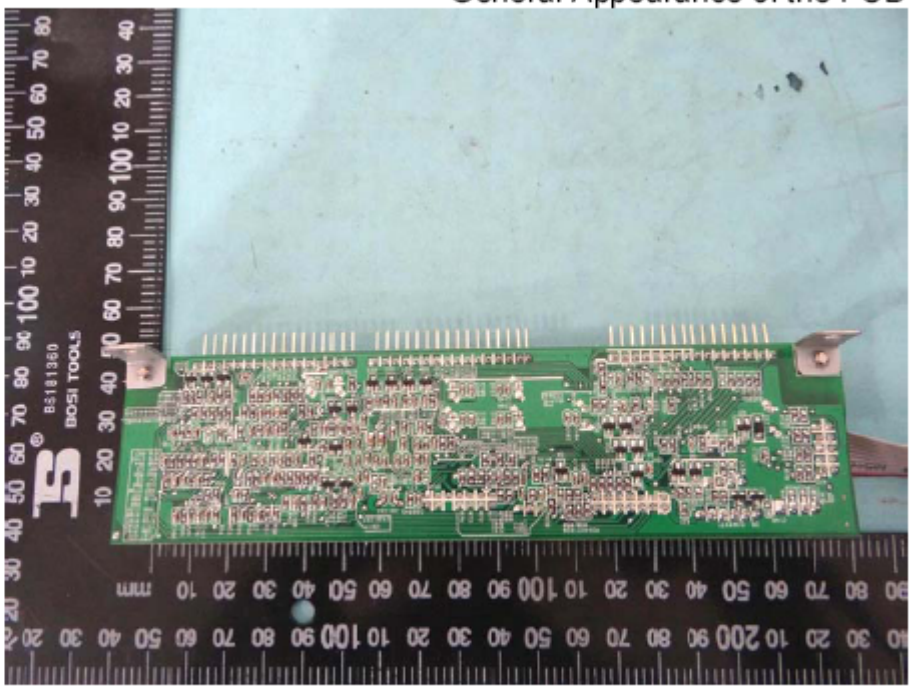


Figure 10
General Appearance of the PCB

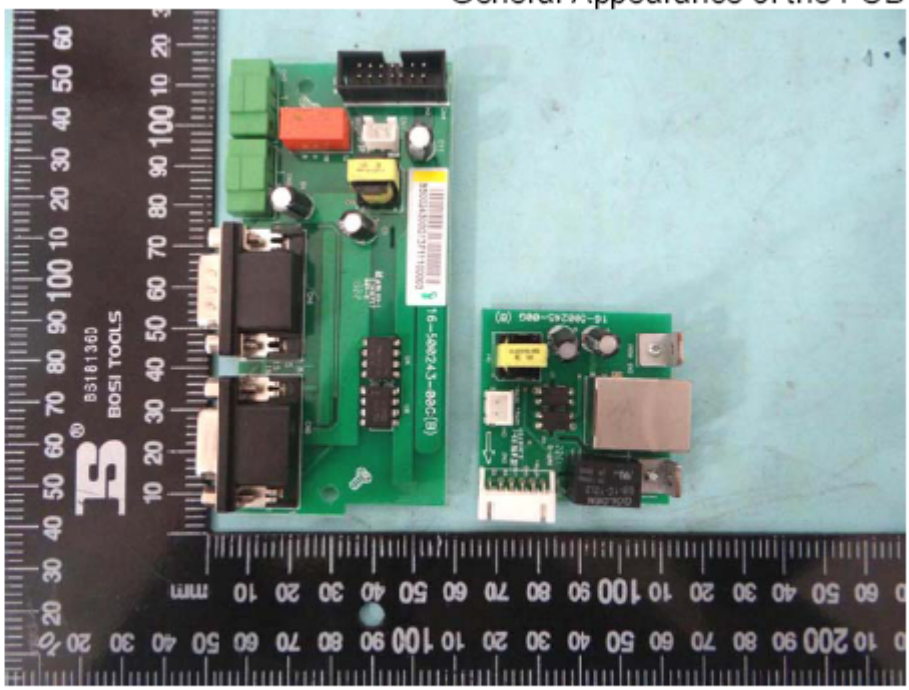


Figure 11
General Appearance of the PCB

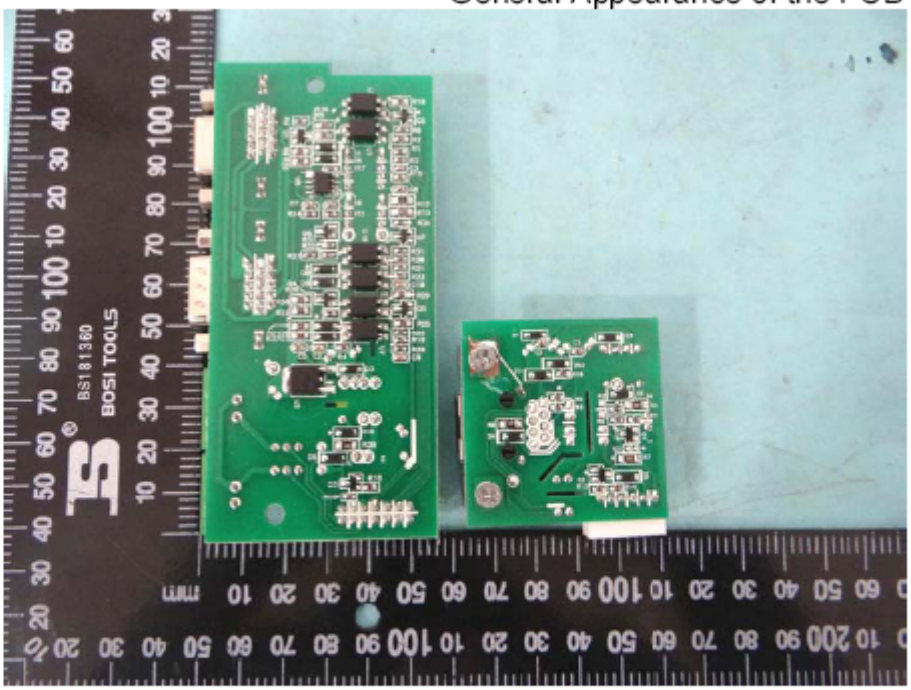


Figure 12
General Appearance of the PCB

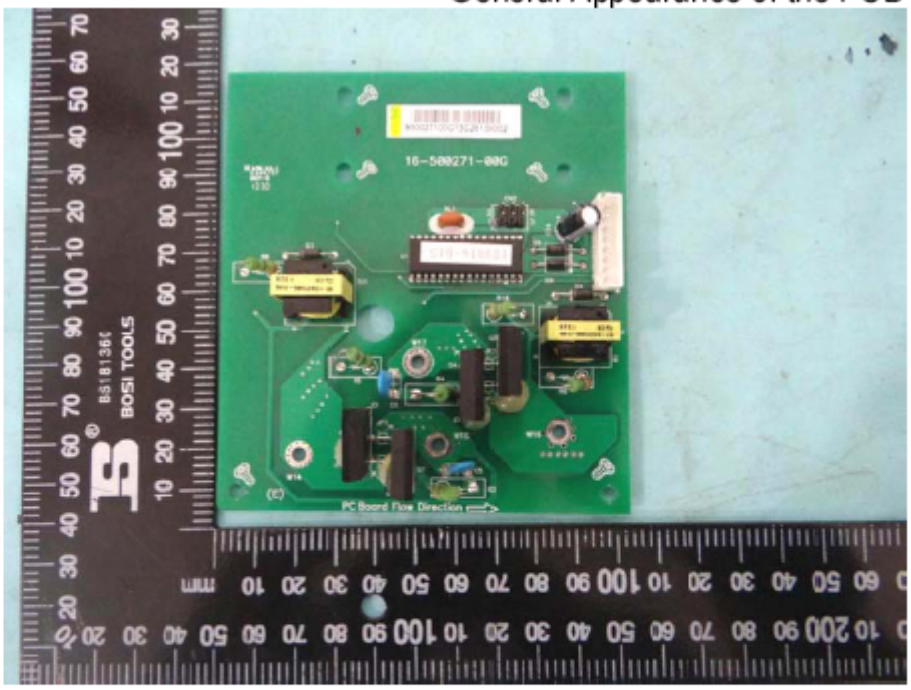


Figure 13
General Appearance of the PCB

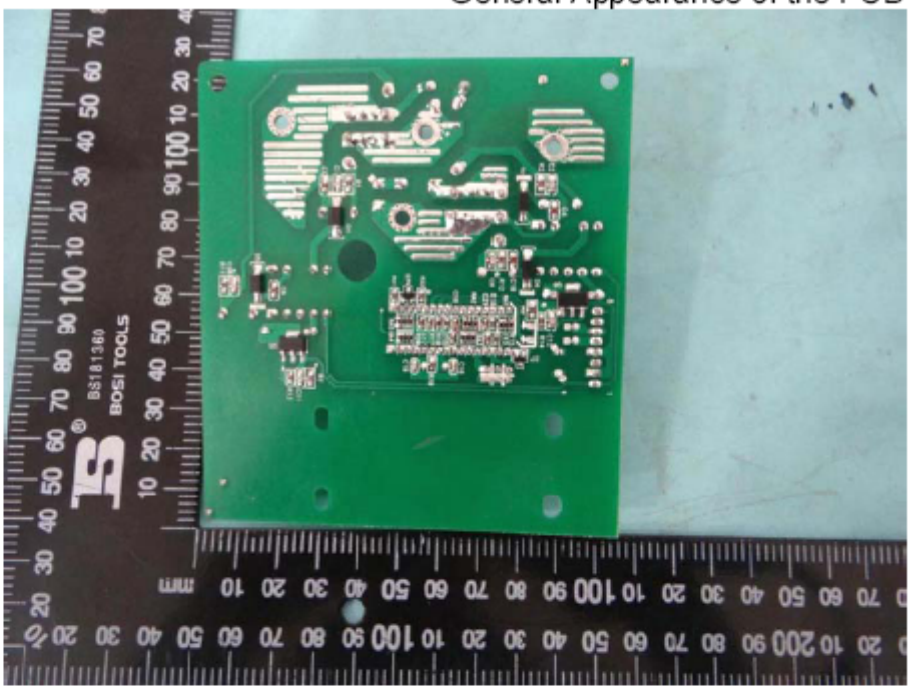


Figure 14
General Appearance of the PCB

Figure 15
General Appearance of the PCB

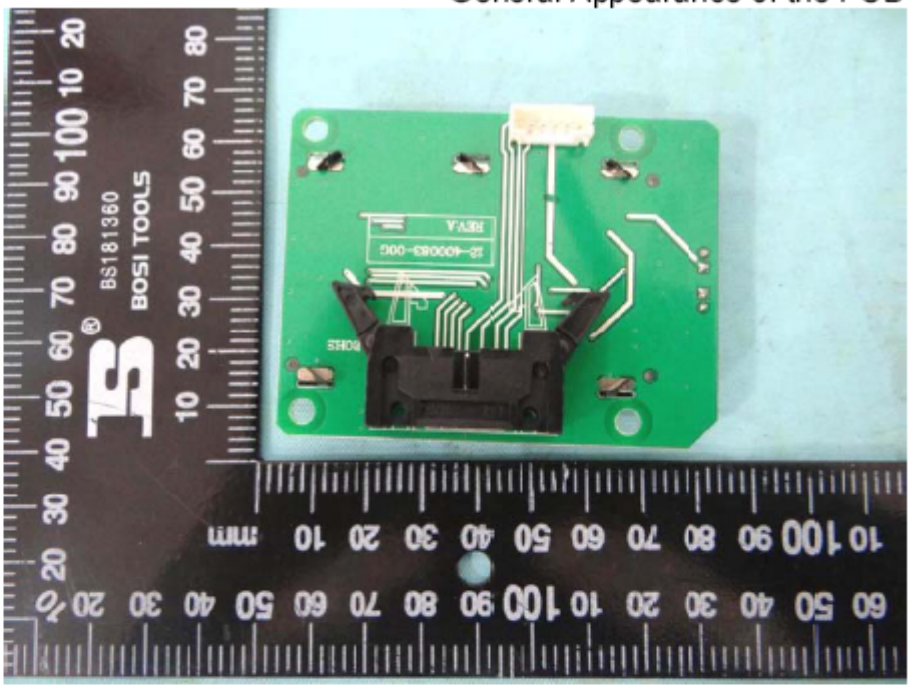


Figure 16
General Appearance of the PCB

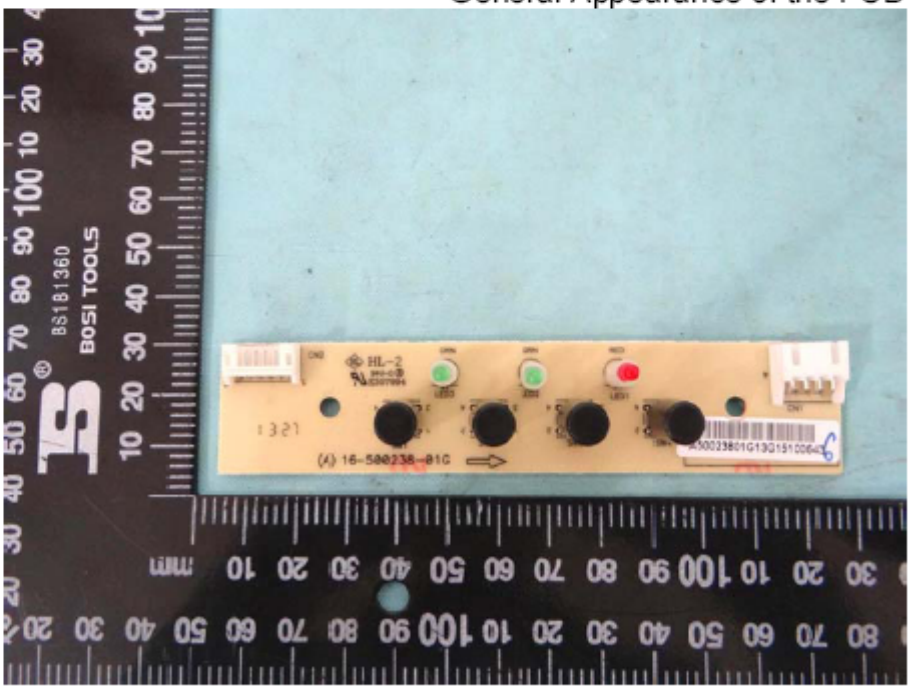


Figure 17
General Appearance of the PCB