

# CE EMC TEST REPORT

for

Solar Charge Controller

Model:PYMS4840N (Other models please refer page 3)

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Report Number: HT21DR-0914032

Date of Issue: Sep. 17, 2021

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Alan Zhang



Reviewed By Brian Wong  
Brian Wong

*The results detailed in this test report relate only to the specific sample(s) tested. It is the Application's responsibility to ensure that all production units are manufactured with equivalent EMC characteristics. This report is not to be reproduced, except in full, without the written approval of The issuing Testing Technology.*

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## 1.0 General Details

### 1.1 Test Lab Details

Name : Honton Compliance Laboratories (Shenzhen) Co., Ltd.  
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### 1.2 Applicant Details

Applicant: SHENZHEN PUYANG SOLAR CO.,LTD  
Address: 6/F, 12th Factory of Shijie Cooperation, Gushu, Xixiang, Shenzhen 518100, China PR.  
  
Manufacturer: SHENZHEN PUYANG SOLAR CO.,LTD  
Address: 6/F, 12th Factory of Shijie Cooperation, Gushu, Xixiang, Shenzhen 518100, China PR.

### 1.3 Description of EUT

Product: Solar Charge Controller  
Model No.: PYMS4840N  
Additional Model No.: PYMS2420N, PYMS2430N, PYMS2440N, PYMS4820N, PYMS4830N  
  
Brand Name: N/A  
Additional Trade Name: N/A  
Rating: Input: DC12V, 600W; DC24V, 1200W; DC36V, 1800W; DC48V, 2400W  
  
Remark: All models are similar except for the model name and the color of the product enclosure. All tests were carried out on model MS4840N.

### 1.4 Submitted Sample

1 Sample

### 1.5 Test Duration

Sep. 13, 2021 to Sep. 17, 2021

<b>2.0 List Test Equipments</b>					
Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
<b>Conducted emission</b>					
EMI Test Receiver	ESCS30	100139	R&S	2021-05-13	2022-05-12
LISN	LS16C	16010222119	AFJ	2021-05-13	2022-05-12
<b>Radiated emission</b>					
EMI Test Receiver	ESCS30	100139	R&S	2021-05-13	2022-05-12
Spectrum Analyzer	FSEM	1079.8500.30	R&S	2021-05-13	2022-05-12
Amplifier	8447D	2727A05017	H.P.	2021-05-13	2022-05-12
Antenna	VULB9163	N/A	SCHWARZBECK	2021-05-13	2022-05-12
Amplifier	EM30265	07032613	EM Electronics Corporation	2021-05-13	2022-05-12
Positioning Controller	CC-C-1F	MF7802140	C & C LAB	2021-05-13	2022-05-12
<b>Harmonic &amp; Flicker</b>					
Harmonics Flicker Test System	PACS-1	72305	CI	2021-05-13	2022-05-12
5K VA AC Power source	5001iX	56060	CI	2021-05-13	2022-05-12
<b>Electrostatic Discharge</b>					
Electostatic Discharge Generator	ESD61002AG	PR12092502	Prima	2021-05-13	2022-05-12
<b>Continuous radiated disturbances</b>					
Signal Generator	2022D	119246/003	Maconi	2021-05-13	2022-05-12
Power Amplifier	A00181-1000	9801-112	M2S	2021-05-13	2022-05-12
Power Amplifier	AC8113/800-250A	9801-179	M2S	2021-05-13	2022-05-12
Power Antenna	CBL6140A	1204	SCHAFFNER	2021-05-13	2022-05-12
<b>EFT/Surge/Dip</b>					
Fast Transient Burst Simulator	EFT61004BG	PR12074375	Prima	2021-05-13	2022-05-12
Lightning Surge Generator	SUG61005BG	PR12125534	Prima	2021-05-13	2022-05-12
CYCLE SAG SIMULATOR	DRP61011AG	PR12106201	Prima	2021-05-13	2022-05-12
<b>Continuous conducted disturbances</b>					
Signal Generator	2022D	119246/003	Maconi	2021-05-13	2022-05-12
Power Amplifier	A00181-1000	9801-112	M2S	2021-05-13	2022-05-12

CDN	M3-8016	003683	MEB	2021-05-13	2022-05-12
Power-frequency Magnetic field					
Continuous Wave Simulator	UCS 500 M4	0304-42	EM TEST	2021-05-13	2022-05-12
Power Source Network	MV 2616	0104-14	EM TEST	2021-05-13	2022-05-12
Current Transformer	MC2630	--	EM TEST	2021-05-13	2022-05-12
Magnetic Coil	MS100	0304-42	EM TEST	2021-05-13	2022-05-12

N/A=not applicable

### 3.0 Technical Details

#### 3.1 Investigations Requested

Perform Electromagnetic Interference [EMI] & Electromagnetic Susceptibility [EMS] tests for CE Marking

#### 3.2 Test Standards

EN 61000-6-3: 2007+A1:2011	Electromagnetic compatibility (EMC) - Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
EN IEC 61000-6-1: 2019	Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity for residential, commercial and light-industrial environments
EN IEC 61000-3-2: 2019	Electromagnetic compatibility(EMC)- Part 3-2:Limits-Limits for harmonic current emissions(equipment input current $\leq 16A$ per phase)
EN 61000-3-3: 2013+A1:2019	Electromagnetic compatibility (EMC)- Part 3-3:Limits-Limitation of voltage changes, Voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current $\leq 16A$ per phase and not subject to conditional connection

#### 3.3 Performance Criteria

- Criterion A During and after the test the EUT shall continue to operate as intended without operator intervention. No degradation of performance or loss of function is allowed.
- Criterion B During the test, degradation of performance is allowed. However, no change of operating state or stored data is allowed to persist after the test.
- Criterion C During and after testing, temporary loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls or cycling of the power to the EUT by the user in accordance with the manufacturer' instructions.  
Functions, and/or information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

### 3.4 Test standards and Results Summary Tables

Test Condition	Test Requirement	Test Method	Test Result
<b>EMISSION Results Summary</b>			
Conducted Emission on AC Mains, 150KHz to 30MHz	EN 61000-6-3: 2007+A1:2011	EN 61000-6-3: 2007+A1:2011	N/A
Conducted Emission on at telecommunication ports, 150KHz to 30MHz	EN 61000-6-3: 2007+A1:2011	EN 61000-6-3: 2007+A1:2011	N/A
Radiated Emissions, 30MHz to 1GHz	EN 61000-6-3: 2007+A1:2011	EN 61000-6-3: 2007+A1:2011	Pass
Harmonic Current Emissions	EN IEC 61000-3-2: 2019	EN IEC 61000-3-2: 2019	N/A
Voltage fluctuations on AC supply	EN 61000-3-3:2013+A1:2019	EN 61000-3-3:2013+A1:2019	N/A
<b>IMMUNITY Results Summary</b>			
Electrostatic Discharge	EN IEC 61000-6-1: 2019	EN 61000-4-2: 2009	Pass
RF field strength susceptibility	EN IEC 61000-6-1: 2019	EN IEC 61000-4-3: 2020	Pass
Electrical Fast transients /Burst Immunity	EN IEC 61000-6-1: 2019	EN 61000-4-4:2012	N/A
Surge	EN IEC 61000-6-1: 2019	EN 61000-4-5: 2014+A1:2017	N/A
Conducted susceptibility	EN IEC 61000-6-1: 2019	EN 61000-4-6: 2014	Pass
Power-frequency Magnetic Field	EN IEC 61000-6-1: 2019	EN 61000-4-8:2010	N/A
Dips/Voltage Interruption Variation	EN IEC 61000-6-1: 2019	EN IEC 61000-4-11: 2020	N/A

Note: N/A=Not applicable

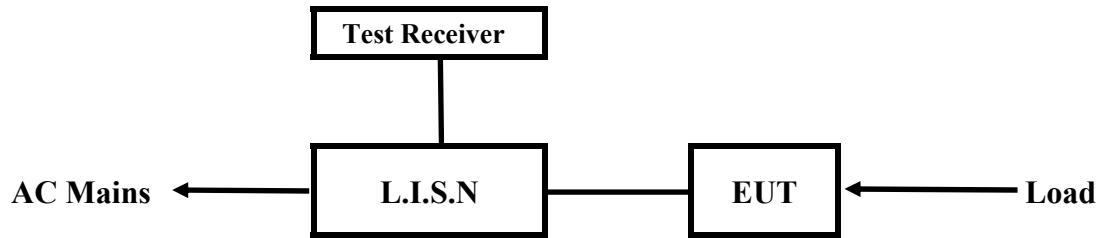
### 3.5 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	MU
1.	Temperature	±0.1°C
2.	Humidity	±1.0%
3.	Spurious emissions, conducted	±3.70dB
4.	All emissions, radiated	±4.50dB

#### 4.0 Electromagnetic Interference Test results

##### 4.1 Power Line Conducted Emission Test

###### 4.1.1 Schematics of the test



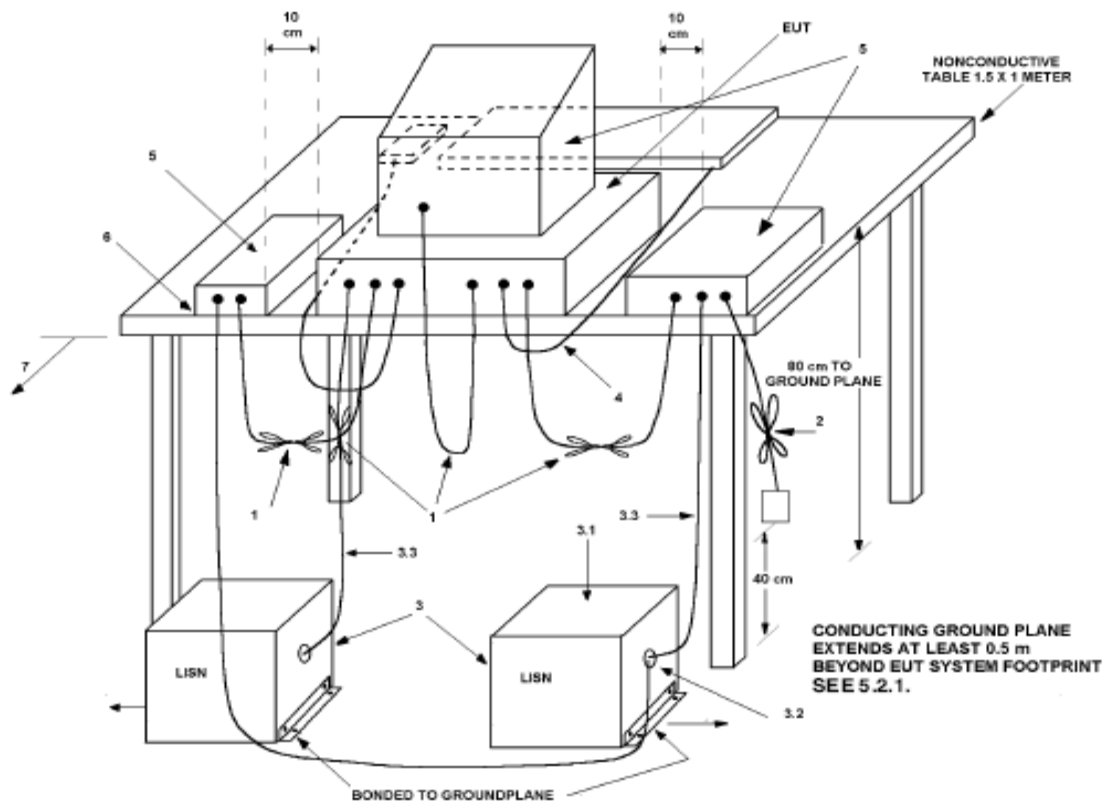
EUT: Equipment Under Test

###### 4.1.2 Test Method and test Procedure

The test was performed in accordance with EN 61000-6-3: 2007+A1:2011

Test Voltage: 230V~, 50Hz

Block diagram of Test setup



###### 4.1.3 EUT Operating Condition

Operating condition is according to EN 61000-6-3: 2007+A1:2011

Setup the EUT and simulators as shown on the following



#### 4.1.4 Test Equipment

Please refer to the Section 2

#### 4.1.5 Power line conducted Emission Limit

Frequency(MHz)	Class A Limits (dB $\mu$ V)		Class B Limits (dB $\mu$ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ~ 0.50	79.0	66.0	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	73.0	60.0	56.0	46.0
5.00 ~ 30.00	73.0	60.0	60.0	50.0

- Notes:
1. \*Decreasing linearly with logarithm of frequency.
  2. The tighter limit shall apply at the transition frequencies

#### 4.1.6 Photo documentation of the test set-up

Please refer to the Section 7

#### 4.1.7 Test specification:

Environmental conditions: Temperature: 23° C Humidity: 50% Atmospheric pressure: 103kPa

Frequency range: 0.15 MHz – 30 MHz

#### 4.1.8 Test result

N/A

Remarks: According to the EN 61000-6-3: 2007+A1:2011

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**A Conducted Emission on Live Terminal of the power line (150kHz to 30MHz)**

EUT Description:

Operation Mode: Normal operation mode

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s

**B Conducted Emission on Neutral Terminal of the power line (150kHz to 30MHz)**

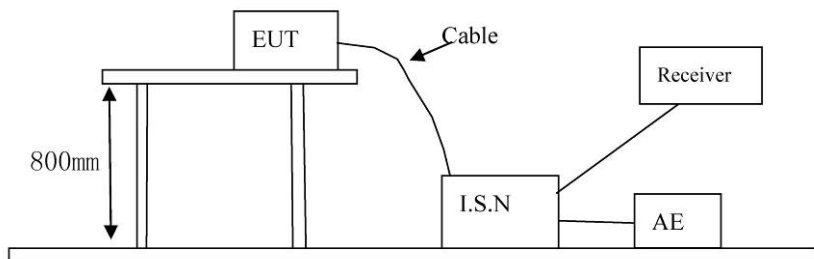
EUT Description: Solar Charge Controller

Operation Mode: Normal operation mode

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s

## 4.2 Telecommunication ports Conducted Emission Test

4.2.1 Test Method: The test was performed in accordance with EN 61000-6-3: 2007+A1:2011



### 4.2.2 EUT Operating Condition

Operating condition is according to EN 61000-6-3: 2007+A1:2011

### 4.2.3 Test Equipment

Please refer to the Section 2

### 4.2.4 Power line conducted Emission Limit

Frequency(MHz)	Class A Limits (dB $\mu$ V)		Class B Limits (dB $\mu$ V)	
	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level
0.15 ~ 0.50	97 to 87	84 to 74	84 to 74	74 to 64
0.50 ~ 30.00	87	74	74	64

- Notes:
- \*Decreasing linearly with logarithm of frequency.
  - The tighter limit shall apply at the transition frequencies

### 4.2.5 Test specification:

Environmental conditions: Temperature: 23° C Humidity: 50% Atmospheric pressure: 103kPa

Frequency range: 0.15 MHz – 30 MHz

### 4.2.6 Test result

N/A

Remarks: According to the EN 61000-6-3: 2007+A1:2011

**A Conducted Emission on Telecommunication port (150kHz to 30MHz)**

EUT Description: --

Operation Mode: --

Tested By: --

Test date: --

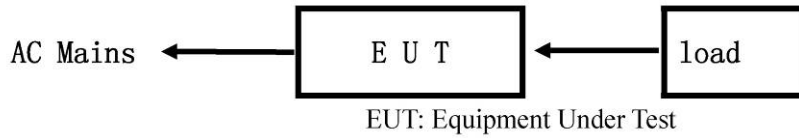
Result N/A

Start Frequency	Stop Frequency	Step	IF BW	Detector	Final M-Time
0.15MHz	30MHz	4.5KHz	10KHz	QP+AV	1s

Frequency (MHz)	Port	Reading(dBμA)		Limit(dBμA)	
		Quasi-peak	Average	Quasi-peak	Average

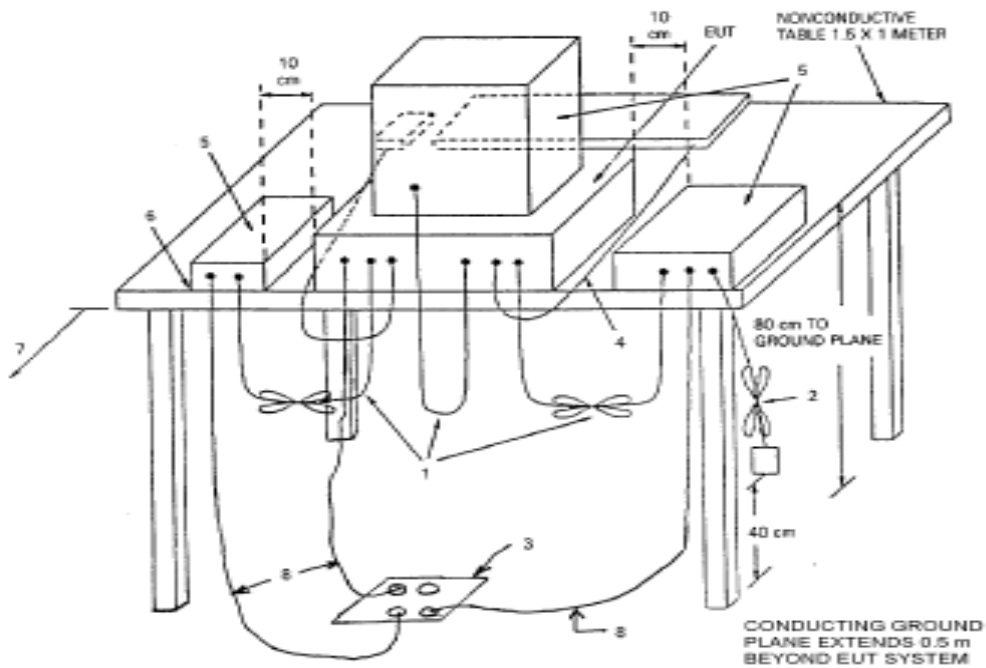
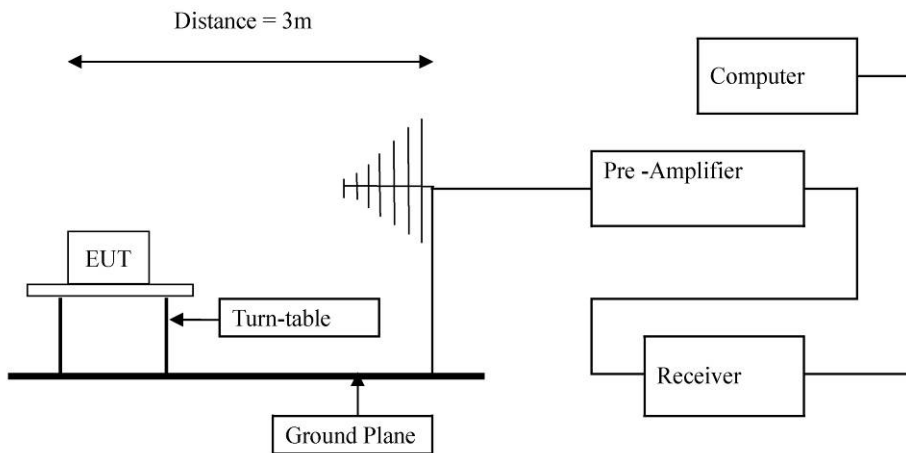
### 4.3 Radiated Emission Test

#### 4.3.1 Schematics of the test



#### 4.3.2 Test Method: The test was performed in accordance with EN 61000-6-3: 2007+A1:2011

##### Block diagram of Test setup



#### 4.3.3 EUT Operating Condition

Operating condition is according to EN 61000-6-3: 2007+A1:2011

#### 4.3.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

Frequency Range (MHz)	Distance (m)	Quasi-Peak limits (dB $\mu$ V/m)	
		Class A Limits	Class B Limits
30-230	3	50.00	40.00
230-1000	3	57.00	47.00

Note: 1) The lower limit shall apply at the transition frequencies

2) If measurement is not made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula  $Ld1 = Ld2 * (d2/d1)$

#### 4.3.5 Photo documentation of the test set-up

Please refer to the Section 7

#### 4.3.6 Test Equipment:

Please refer to the Section 2

#### 4.3.7 Test specification:

Environmental conditions: Temperature 24° C Humidity: 46% Atmospheric pressure: 103kPa

#### 4.3.8 Test result

Min. limit margin 7.53 dB at 47.66 MHz

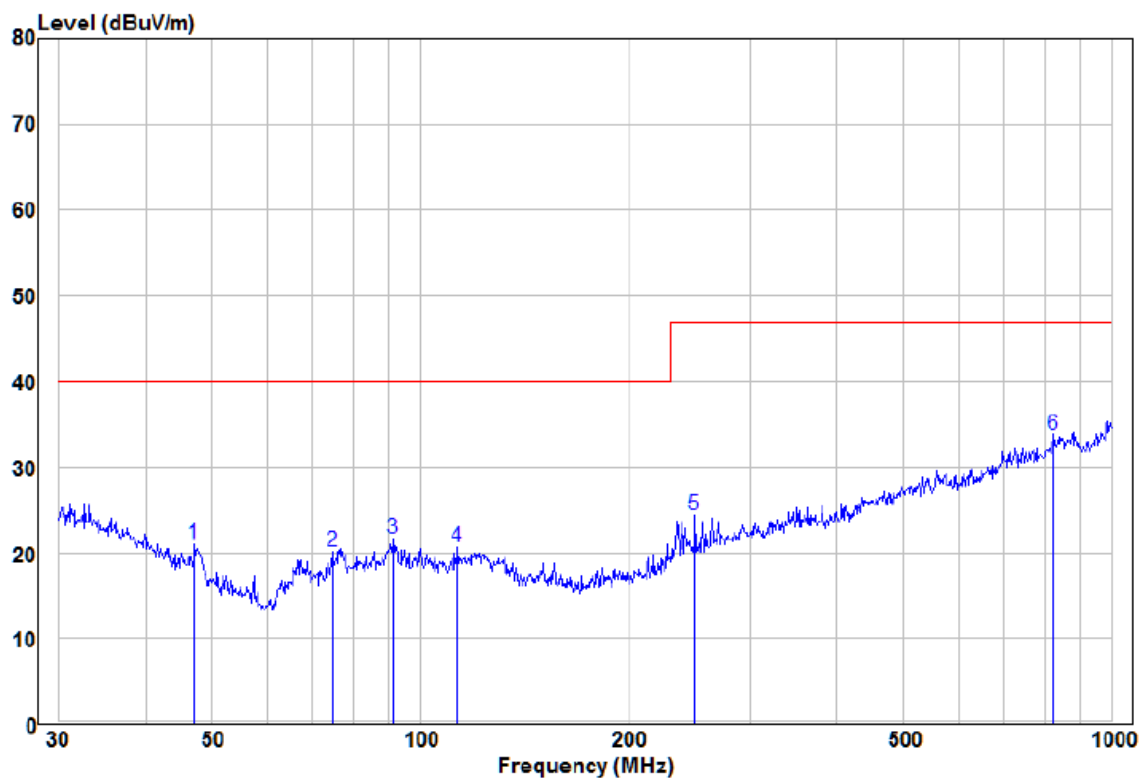
The requirements are FULFILLED

Remarks: According to the EN 61000-6-3: 2007+A1:2011

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**A. Radiated Emission In Horizontal (30MHz----1000MHz)**

EUT Description: Solar Charge Controller  
 Operation Mode: Normal operation mode  
 Chamber: 3 m

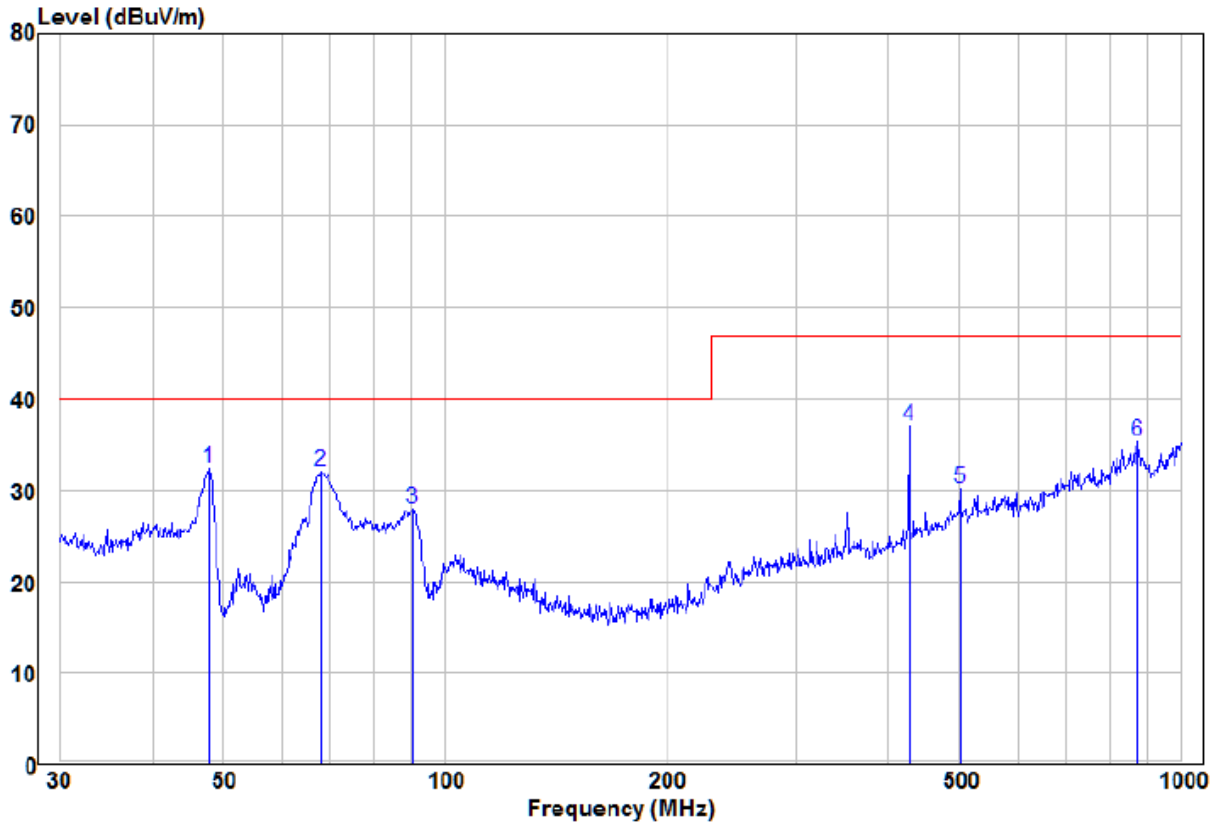


	Read Freq	Read Level	Read Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	47.16	11.55	9.43	20.98	40.00	-19.02	Peak	HORIZONTAL
2	74.66	11.27	8.92	20.19	40.00	-19.81	Peak	HORIZONTAL
3	91.49	11.63	10.11	21.74	40.00	-18.26	Peak	HORIZONTAL
4	113.32	10.27	10.35	20.62	40.00	-19.38	Peak	HORIZONTAL
5	249.43	12.41	12.06	24.47	47.00	-22.53	Peak	HORIZONTAL
6 pp	824.60	10.13	23.64	33.77	47.00	-13.23	Peak	HORIZONTAL



**B. Radiated Emission In Vertical (30MHz---1000MHz)**

EUT Description: Solar Charge Controller  
 Operation Mode: Normal operation mode  
 Chamber: 3 m



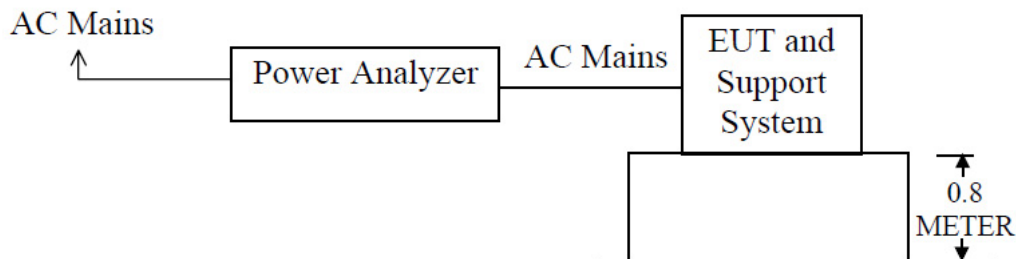
	Read Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase	
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB			
1	pp	47.66	23.28	9.19	32.47	40.00	-7.53	Peak	VERTICAL
2		67.91	24.60	7.50	32.10	40.00	-7.90	Peak	VERTICAL
3		90.54	17.87	10.05	27.92	40.00	-12.08	Peak	VERTICAL
4		426.52	21.05	15.99	37.04	47.00	-9.96	Peak	VERTICAL
5		501.18	11.86	18.29	30.15	47.00	-16.85	Peak	VERTICAL
6		872.18	11.43	23.96	35.39	47.00	-11.61	Peak	VERTICAL

#### 4.4 Harmonic Current Emissions

##### 4.4.1 EUT Operating Mode

Normal operation mode

##### 4.4.2 Block Diagram of Test Setup.



This test was performed as per EMC Basic Standard EN61000-3-2 Class A

##### 4.4.3 Test Equipment

Please refer to Section 2 this report.

##### 4.4.4 Test specification:

Environmental conditions: Temperature: 23° C Humidity: 54% Atmospheric pressure: 103kPa

##### 4.4.5 Results

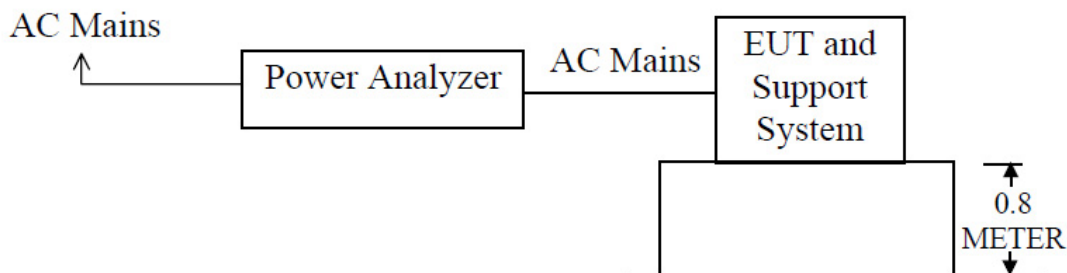
Port	EUT Operating mode	Result (Passed / Failed)
AC Input	Normal operation mode	N/A

Note: N/A=Not applicable

#### 4.5 Flicker and Voltage Fluctuation

##### 4.5.1 EUT Operating Mode --

##### 4.5.2 Block Diagram of Test Setup.



This test was performed as per EMC Basic Standard EN 61000-3-3

##### 4.5.3 Limits of Voltage Fluctuation and Flicks Measurement

Test Item	Limit	Note
$P_{st}$	1.0	Pst means short-term flicker indicator
$P_{lt}$	0.65	Plt means long-term flicker indicator
$T_{dt}$ (ms)	200	Tdt means maximum time that dt exceeds 3%.
$d_{max}$ (%)	4	Dmax means maximum relative voltage change.
dc (%)	3	Dc means relative steady-state voltage change.

##### 4.5.4 Test Equipment

Please refer to Section 2 this report.

##### 4.5.5 Test specification:

Environmental conditions: Temperature: 23° C Humidity: 54% Atmospheric pressure: 103kPa

##### 4.5.6 Results

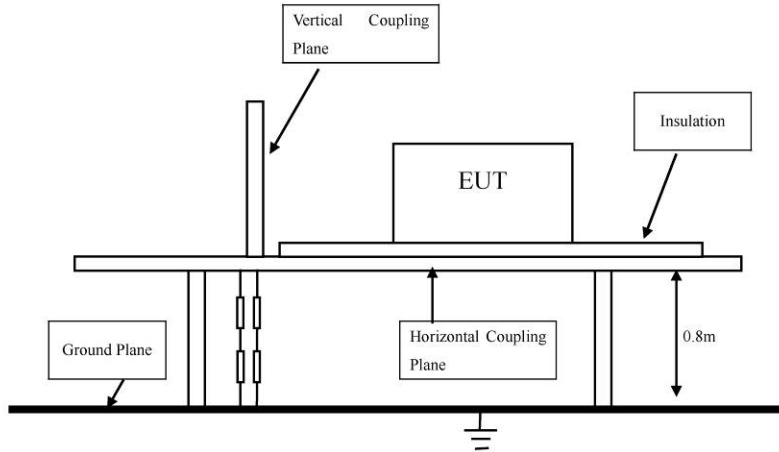
Port	EUT Operating mode or operating mode no.	Result (Passed / Failed)
AC Input	Normal operation mode	N/A

Note: N/A=Not applicable

## 5.0 Immunity Test

### 5.1 Electrostatic Discharge

#### 5.1.1 Schematic of the test



#### 5.1.2 Test method

The test was performed in accordance with EN 61000-4-2

#### 5.1.3 Test severity

±4kV for direct & in-direct Contact Discharge

±8kV for air Discharge

Performance Criterion Require: **A**

#### 5.1.4 Test Equipment

Please refer to Section 2 this report.

#### 5.1.5 Test specification:

Environmental conditions: Temperature: 23° C Humidity: 54% Atmospheric pressure: 103kPa

5.1.6 Operation mode: Normal operation mode

5.1.7 Discharge location

- HCP
- VCP
- Metal

5.1.8 Test Result Pass

5.2 RF field strength susceptibility (80MHz----- 1000MHz)

5.2.1 Test Method:

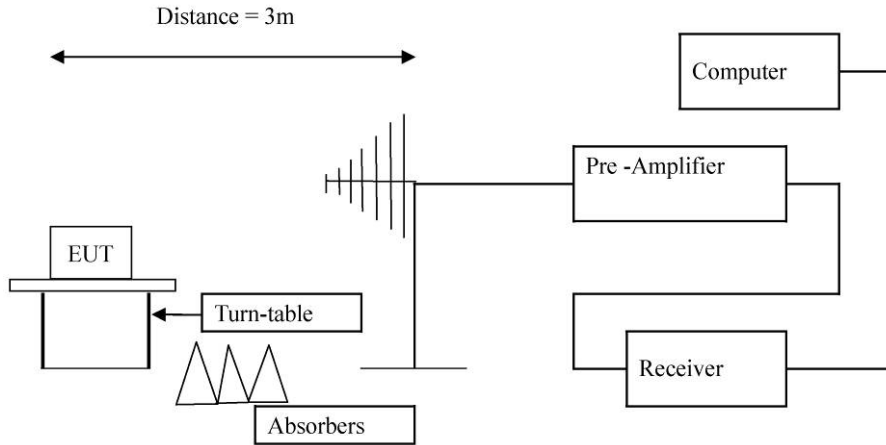
The test was performed in accordance with EN IEC 61000-4-3

Severity: Level 2 (3V/m)

Modulation: 1 KHz 80% AM

Performance Criterion Require: A

Block diagram of Test setup



5.2.2 Test Equipment

Please refer to Section 2 this report.

5.2.3 Test specification:

Environmental conditions: Temperature: 23° C Humidity: 54% Atmospheric pressure: 103kPa

5.2.4 Operation mode: Normal operation mode

5.2.5 Test Result:

Please refer to the following table for individual results.

Frequency (MHz)	Radiation to	Polarity	Level (V/m)	Dwell Time(s)	Sweep Rate (%)	Results
80-1000	Front	Horizontal	3	1	1	Pass
80-1000	Rear	Horizontal	3	1	1	Pass
80-1000	Left	Horizontal	3	1	1	Pass
80-1000	Right	Horizontal	3	1	1	Pass
80-1000	Front	Vertical	3	1	1	Pass
80-1000	Rear	Vertical	3	1	1	Pass
80-1000	Left	Vertical	3	1	1	Pass
80-1000	Right	Vertical	3	1	1	Pass

### 5.3 Electrical Fast Transient/Burst (EFT/B) immunity test

#### 5.3.1 Schematics of the test



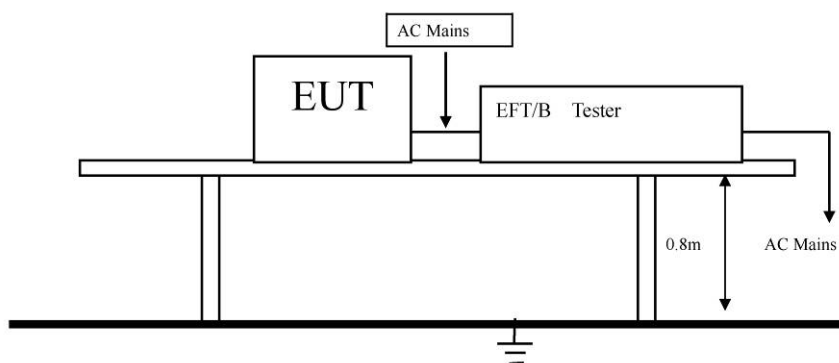
#### 5.3.2 Test Method

The test was performed in accordance with EN 61000-4-4

Severity: Level 2 (1kV)

Performance Criterion Require: **B**

Block diagram of Test setup



#### 5.3.3 Test Equipment

Please refer to Section 2 this report.

#### 5.3.4 Test specification:

Environmental conditions: Temperature: 23° C Humidity: 54% Atmospheric pressure: 103kPa

#### 5.3.5 Operation mode: ---

#### 5.3.6 Test Results

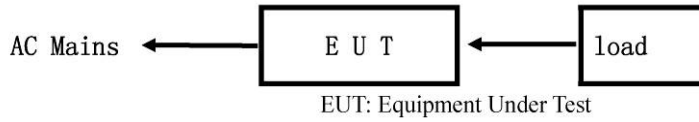
Inject location: AC mains

Inject Line	Voltage kV	Inject Times (s)	Method	Results
L	±1	120	Direct	N/A
N	±1	120	Direct	N/A
L、N	±1	120	Direct	N/A
E	±1	120	Direct	N/A
L、E	±1	120	Direct	N/A
N、E	±1	120	Direct	N/A
L、N、E	±1	120	Direct	N/A

Note: N/A=Not applicable

5.4 Surge test

5.4.1 Schematics of the test



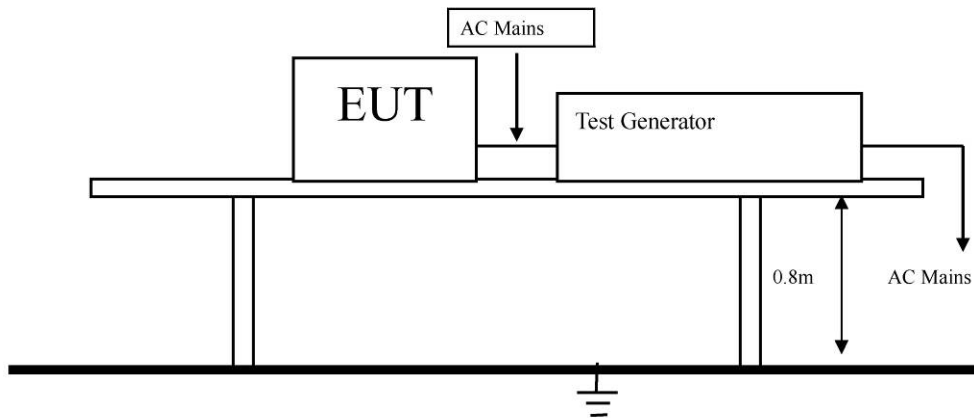
5.4.2 Test Method:

The test was performed in accordance with EN 61000-4-5

Severity: Level 2

Performance Criterion Require: B

Block diagram of Test setup



5.4.3 Test Equipment

Please refer to Section 2 this report.

5.4.4 Test specification:

Environmental conditions: Temperature: 23° C Humidity: 54% Atmospheric pressure: 103kPa

5.4.5 Operation mode: --

5.4.6 Test Results

5 pulses for each polarity and test voltage, and repetition rate is 1 per min.

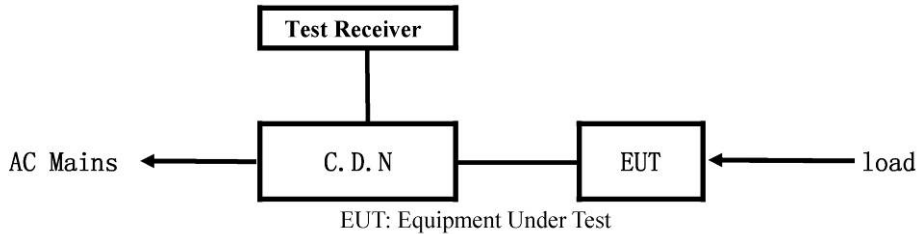
Location	Polarity	0o	90o	180o	270o	Results
L-N	± 1 KV	n.r.r.	n.r.r.	n.r.r.	n.r.r.	N/A
L-PE	± 2 KV	n.r.r.	n.r.r.	n.r.r.	n.r.r.	N/A
N-PE	± 2 KV	n.r.r.	n.r.r.	n.r.r.	n.r.r.	N/A

Remark: 1) n.r.r. = no reaction recognized, N/A = not applicable.

2) Performance Criteria A Observed.

5.5 Conducted Immunity test

5.5.1 Schematics of the test



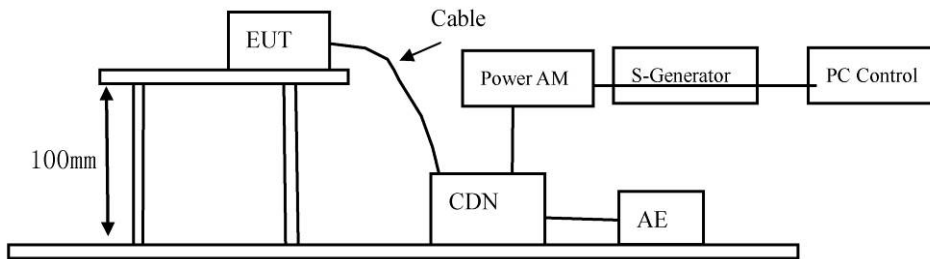
5.5.2 Test Method

The test was performed in accordance with EN 61000-4-6

Severity: Level 2 (3 V rms), 0.15MHz—80MHz

Performance Criterion Require: A

Block diagram of Test setup



5.5.3 Test Equipment

Please refer to Section 2 this report.

5.5.4 Test specification:

Environmental conditions: Temperature: 23° C Humidity: 54% Atmospheric pressure: 103kPa

5.5.5 Operation mode: Normal operation mode

5.5.4 Test Results:

Frequency Range (MHz)	Injected Position	Strength	Criterion	Result
0.15 - 80	AC Line	3V (rms) Unmodulated	A	Pass

Note: N/A=Not applicable



## 5.6 Power-Frequency magnetic field test

### 5.6.1 Schematics of the test



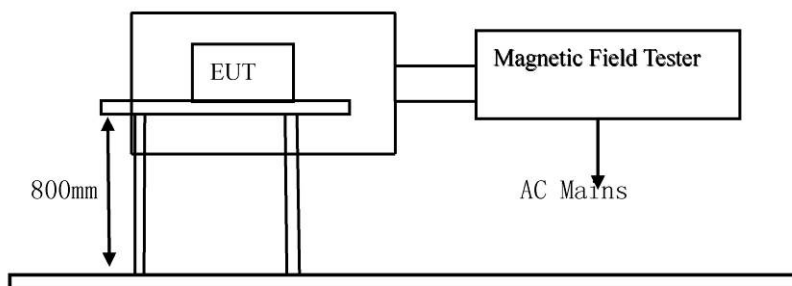
### 5.6.2 Test Method

The test was performed in accordance with EN 61000-4-8

Severity: Level 1 (1A/m),

Performance Criterion Require: A

Block diagram of Test setup



### 5.6.3 Test Equipment

Please refer to Section 2 this report.

### 5.6.4 Test specification:

Environmental conditions: Temperature: 23° C Humidity: 54% Atmospheric pressure: 103kPa

### 5.6.5 Operation mode:

--

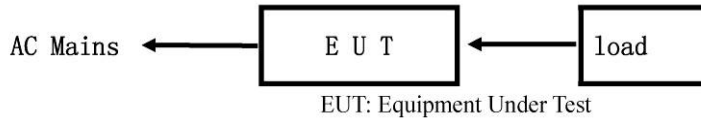
### 5.6.6 Test Results:

Test Level	Testing Duration	Coil Orientation	Criterion	Result
1A/m	5 Mins	X	A	N/A
1A/m	5 Mins	Y	A	N/A
1A/m	5 Mins	Z	A	N/A

Note: N/A=Not applicable

5.7 Voltage Dips/Interruptions immunity test

5.7.1 Schematics of the test

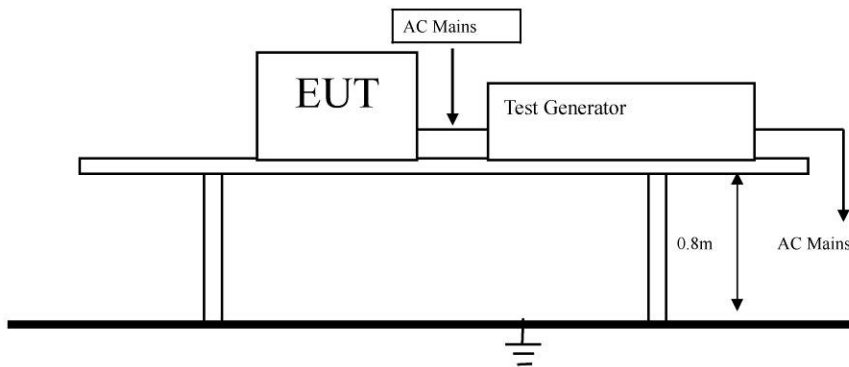


5.7.2 Test Method:

The test was performed in accordance with EN 61000-4-11

Performance Criterion Require: C&B

Block diagram of Test setup



5.7.3 Test Equipment

Please refer to Section 2 this report.

5.7.4 Test specification:

Environmental conditions: Temperature: 23° C Humidity: 54% Atmospheric pressure: 103kPa

5.7.5 Operation mode: --

5.7.4 Test Result:

Voltage Dip: Voltage Interceptions:

Test Level % Ut	Reduction	Duration (periods)	Phase Angle	Meet Criterion	Result
0	100	0.5	0° - 360°	B	N/A
70	30	25	0° - 360°	C	N/A

Test Level % Ut	Reduction	Duration (periods)	Phase Angle	Meet Criterion	Result
0	100	250	0° - 360°	C	N/A

Note: N/A=Not applicable

## 6.0 CE Label

### 6.1 label specification

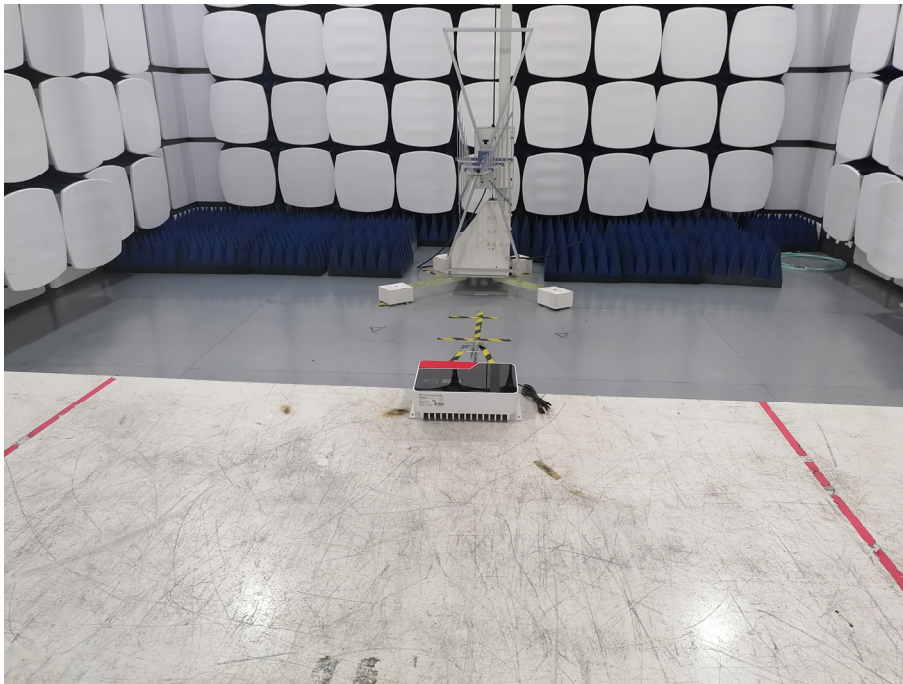
Text of the mark is black or white in color and is left justified. Labels are printed in indelible ink on permanent adhesive backing and shall be affixed at a conspicuous location on the EUT or silk-screened onto the EUT.



### 6.2 Mark Location: On the product body

## 7.0 Photos of testing

### 7.1 Radiated Emission Test View

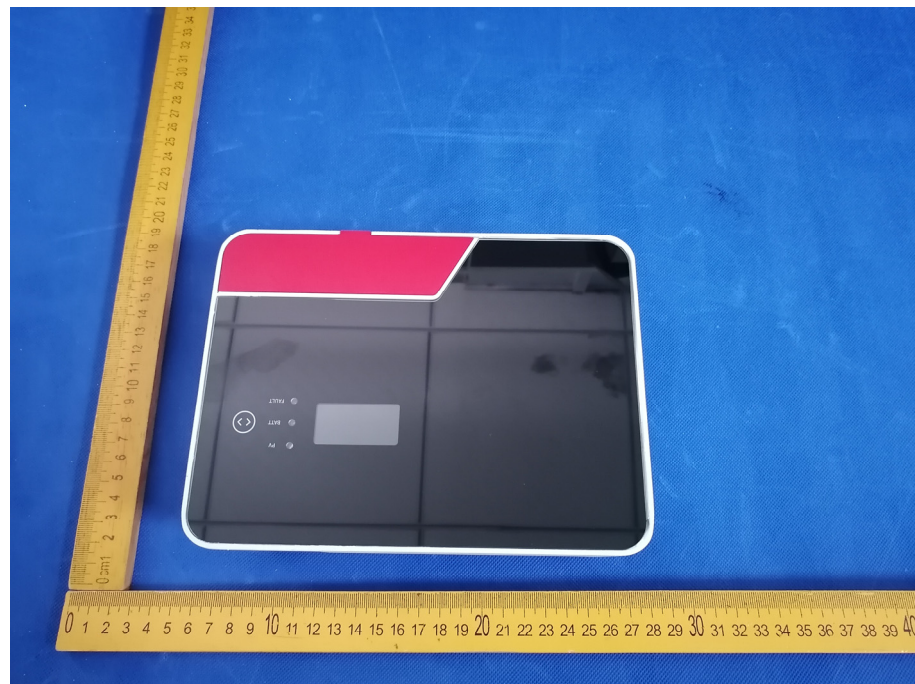


## 8.0 Photos of the EUT

Figure 1 General appearance of the sample (model: MS4840N)

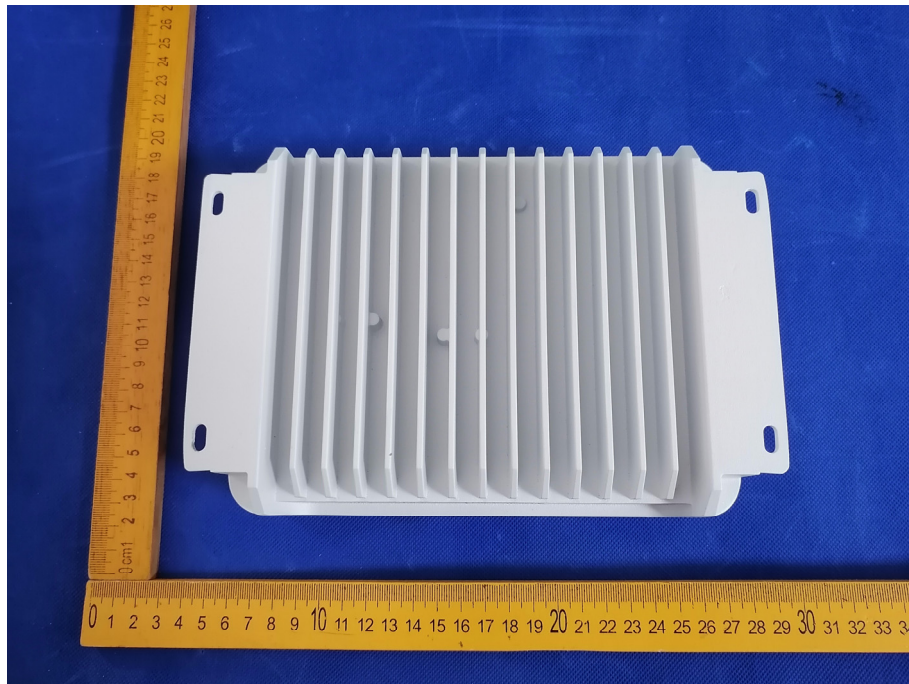


Figure 2 General appearance of the sample (model: MS4840N)





**Figure 3** Inside view of the sample(model: MS4840N)



**Figure 4** Inside view of the sample (model: MS4840N)



**--End of the report--**