

# TEST REPORT

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Date: 2020.09.26

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Applicant : SRNE Solar Co.,Ltd

Address : 4-5F,13A Wutong Island ,Neihuan Rd, Xixiang, Bao'an, Shenzhen, Guangdong, China

Report on the submitted samples said to be:

Sample Name : Solar Charge Controller

Trade Mark : N/A

Style No. : MF4860N15

Testing Period : September 09, 2020 ~ September 26, 2020

Results : Please refer to next page(s).

TEST REQUEST	CONCLUSION
According to the customer's request, based on the performed tests on submitted sample, the result of Lead(Pb), Cadmium(Cd), Mercury(Hg), Hexavalent Chromium(Cr(VI)), PBBs, PBDEs, Dibutyl Phthalate(DBP), Benzylbutyl Phthalate(BBP), Bis(2-ethylhexyl) Phthalate(DEHP), Diisobutyl phthalate(DIBP) content comply with the limit requirement as set of RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.	Pass

Signed for and on behalf of LCS



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## Results:

### A.EU RoHS Directive 2011/65/EU and its amendment directives on XRF

Test method: With reference to IEC 62321-3-1:2013, Screening by X-ray Fluorescence Spectroscopy (XRF)

Seq. No.	Tested Part(s)	Results						Date of sample submission/resubmission
		Cd	Pb	Hg	Cr <sup>Ⅵ</sup>	Br <sup>Ⅱ</sup>		
						PBBs	PBDEs	
1	Copper color metal coil(L2)	BL	BL	BL	BL	/	/	2020-09-09
2	Black ceramic block(L2)	BL	BL	BL	BL	BL	BL	2020-09-09
3	Black soft plastic interface(CON9)	BL	BL	BL	BL	BL	BL	2020-09-09
4	Silver metal pins(CON9)	BL	BL	BL	BL	/	/	2020-09-09
5	Silver metal block	BL	BL	BL	BL	/	/	2020-09-09
6	Green soft plastic interface(CON6)	BL	BL	BL	BL	BL	BL	2020-09-09
7	Silver metal screws(CON6)	BL	BL	BL	BL	/	/	2020-09-09
8	Silver metal case(CON1)	BL	BL	BL	BL	/	/	2020-09-09
9	Black soft plastic fixture(CON1)	BL	BL	BL	BL	BL	BL	2020-09-09
10	Silver metal pins(CON1)	BL	BL	BL	BL	/	/	2020-09-09
11	Brown soft plastic shell(C70)	BL	BL	BL	BL	BL	BL	2020-09-09
12	Silver metal case(C70)	BL	BL	BL	BL	/	/	2020-09-09
13	Black soft plastic plug(C70)	BL	BL	BL	BL	BL	BL	2020-09-09
14	Brown wet paper(C70)	BL	BL	BL	BL	BL	BL	2020-09-09
15	Bright silver metal film(C70)	BL	BL	BL	BL	/	/	2020-09-09
16	Silver gray metal film(C70)	BL	BL	BL	BL	/	/	2020-09-09
17	Silver metal pins(C70)	BL	BL	BL	BL	/	/	2020-09-09
18	Yellow adhesive tape(TT1)	BL	BL	BL	BL	BL	BL	2020-09-09
19	Black plastic skeleton(TT1)	BL	BL	BL	BL	BL	BL	2020-09-09
20	Green PCB board	BL	BL	BL	BL	BL	BL	2020-09-09

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Seq. No.	Tested Part(s)	Results						Date of sample submission/resubmission
		Cd	Pb	Hg	Cr <sup>VI</sup>	Br <sup>VI</sup>		
						PBBs	PBDEs	
21	Black transistor (Q24)	BL	BL	BL	BL	BL	BL	2020-09-21
22	Black diode (D18)	BL	BL	BL	BL	BL	BL	2020-09-21
23	Black capacitor (U12)	BL	BL	BL	BL	BL	BL	2020-09-21
24	Red soft plastic lamp holder (DS1)	BL	BL	BL	BL	BL	BL	2020-09-21
25	Black chip IC (U2)	BL	BL	BL	BL	BL	BL	2020-09-21
26	Transparent glass (LCD1)	BL	BL	BL	BL	BL	BL	2020-09-21
27	Black soft plastic button (S1)	BL	BL	BL	BL	BL	BL	2020-09-21
28	Black soft plastic interface (P2)	BL	BL	BL	BL	BL	BL	2020-09-21
29	Brown chip capacitor (C3)	BL	BL	BL	BL	BL	BL	2020-09-21
30	White soft plastic interface (P1)	BL	BL	BL	BL	BL	BL	2020-09-21

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**Note:**

- (1) Results were obtained by XRF for primary screening, and further chemical testing by ICP (for Cd, Pb, Hg), UV-Vis (for Cr(VI)) and GC-MS (for PBBs, PBDEs) are recommended to be performed, if the concentration exceeds the below warning value according to IEC 62321-3-1:2013.

Element	Unit	Non-metal	Metal	Composite Material
Cd	mg/kg	$BL \leq 70 - 3\sigma < X < 130 + 3\sigma \leq OL$	$BL \leq 70 - 3\sigma < X < 130 + 3\sigma \leq OL$	$BL \leq 50 - 3\sigma < X < 150 + 3\sigma \leq OL$
Pb	mg/kg	$BL \leq 700 - 3\sigma < X < 1300 + 3\sigma \leq OL$	$BL \leq 700 - 3\sigma < X < 1300 + 3\sigma \leq OL$	$BL \leq 500 - 3\sigma < X < 1500 + 3\sigma \leq OL$
Hg	mg/kg	$BL \leq 700 - 3\sigma < X < 1300 + 3\sigma \leq OL$	$BL \leq 700 - 3\sigma < X < 1300 + 3\sigma \leq OL$	$BL \leq 500 - 3\sigma < X < 1500 + 3\sigma \leq OL$
Cr	mg/kg	$BL \leq 700 - 3\sigma < X$	$BL \leq 700 - 3\sigma < X$	$BL \leq 500 - 3\sigma < X$
Br	mg/kg	$BL \leq 300 - 3\sigma < X$	--	$BL \leq 250 - 3\sigma < X$

**Note:**

BL = Below Limit  
OL = Over Limit  
X = Inconclusive

- (2) The XRF screening test for RoHS elements – The reading may be different to the actual content in the sample be of non-uniformity composition.
- (3) The maximum permissible limit is quoted from the document 2015/863/EC amending RoHS directive 2011/65/EU:
- (4) ▼ = For restricted substances PBBs and PBDEs, the results show the total Br content; The restricted substance was Cr(VI), and the results showed the total Cr content

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RoHS Restricted Substances	Maximum Concentration Value (mg/kg) (by weight in homogenous materials)
Cadmium (Cd)	100
Lead (Pb)	1000
Mercury (Hg)	1000
Hexavalent Chromium (Cr(VI))	1000
Polybrominated biphenyls (PBBs)	1000
Polybrominated diphenylethers (PBDEs)	1000
Dibutyl Phthalate(DBP)	1000
Benzylbutyl Phthalate(BBP)	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	1000
Diisobutyl phthalate(DIBP)	1000

## Disclaimers:

This XRF Screening report is for reference purposes only. The applicant shall make its/his/her own judgment as to whether the information provided in this XRF screening report is sufficient for its/his/her purposes.

The result shown in this XRF screening report will differ based on various factors, including but not limited to, the sample size, thickness, area, surface flatness, equipment parameters and matrix effect (e.g. plastic, rubber, metal, glass, ceramic etc.). Further wet chemical pre-treatment with relevant chemical equipment analysis are required to obtain quantitative data.

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**B. EU RoHS Directive 2011/65/EU and its amendment Directives 2015/863/EU on Lead, Cadmium, Mercury, Hexavalent Chromium, PBBs, PBDEs, DBP, BBP, DEHP, DIBP content.**

Test method:

**Lead(Pb) & Cadmium(Cd) Content:**

With reference to IEC 62321-5:2013, by acid digestion and analysis was performed by inductively coupled plasma atomic emission spectrometer (ICP-OES)

**Mercury(Hg) Content:**

With reference to IEC 62321-4:2013+AMD1:2017 CSV, by acid digestion and analysis was performed by inductively coupled plasma atomic emission spectrometer (ICP-OES)

**Hexavalent Chromium(Cr(VI)) Content:**

With reference to IEC 62321-7-1:2015 or IEC 62321-7-2:2017, by alkaline digestion and analysis was performed by UV-visible spectrophotometer (UV-Vis)

**PBBs & PBDEs Content:**

With reference to IEC 62321-6:2015, by solvent extraction and analysis was performed by gas chromatographic-mass spectrometer (GC-MS)

**BBP DBP DEHP & DIBP Content:**

With reference to IEC 62321-8:2017, by solvent extraction and analysis was performed by gas chromatographic-mass spectrometer (GC-MS)

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Note:

- MDL = Method Detection Limit
  - /= Not apply
  - LOQ = Limit of Quantification, The LOQ of Hexavalent chromium is  $0.10 \mu\text{g}/\text{cm}^2$
  - ▼ = a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than  $0.13 \mu\text{g}/\text{cm}^2$ . The sample coating is considered to contain Cr(VI)  
b. The sample is negative for Cr(VI) if Cr(VI) is N.D.(concentration less than  $0.10 \mu\text{g}/\text{cm}^2$ ). The sample coating is considered a non- Cr(VI) based coating  
c. The result between  $0.10 \mu\text{g}/\text{cm}^2$  and  $0.13 \mu\text{g}/\text{cm}^2$  is considered to be inconclusive, unavoidable coating variations may influence the determination
  - Information on storage conditions and production date of the tested samples is unavailable and thus Cr(VI) results represent status of the sample at the time of testing
  - $\text{mg}/\text{kg} = \text{ppm} = \text{parts per million}$
  - N.D.=Not Detected(<MDL or LOQ)
- #1 According to RoHS directive 2011/65/EU and its amendments, Lead is exempted in glass of cathode ray tubes, electronic components and fluorescent tubes.
- #2 According to RoHS directive 2011/65/EU and its amendments, Lead is exempted in electronic ceramic parts (e.g. piezoelectronic devices).
- #3 According to RoHS directive 2011/65/EU and its amendments, Lead is exempted as an alloying element in Copper containing up to 4% (40000ppm) by weight.
- #4 According to RoHS directive 2011/65/EU and its amendments, Lead is exempted in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead).
- #5 According to the statement provided by the customer, according to RoHS directive 2011/65/EU and its amendments, Lead is exempted as an alloying element in Aluminum containing up to 0.4% (4000ppm) by weight.
- #6 According to the statement provided by the customer, according to RoHS directive 2011/65/EU and its amendments, Cadmium and its compounds in electrical contact is exempted.
- #7 According to the statement provided by the customer, according to RoHS directive 2011/65/EU and its Amendments, Lead is exempted in steel for machining purposes and in galvanised steel containing up to 0.35% (3500ppm) by weight.
- Flow chart appendix is included.
  - Photo appendix is included.
  - As specified by client, only test the designated sample.

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## 1) The test results of DBP、BBP、DEHP & DIBP

Item	Unit	MDL	Results	Limit
			2+3+6+9+11+13	
Dibutyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

Item	Unit	MDL	Results	Limit
			14+18+19+20	
Dibutyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

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Item	Unit	MDL	Results	Limit
			21+22+23+25+26	
Dibutyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

Item	Unit	MDL	Results	Limit
			27+28+29+30+24	
Dibutyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

**Remark:**

- mg/kg = ppm
- N.D. = Not detected
- MDL=Method detected limited
- Flow chart appendix is included
- Photo appendix is included.

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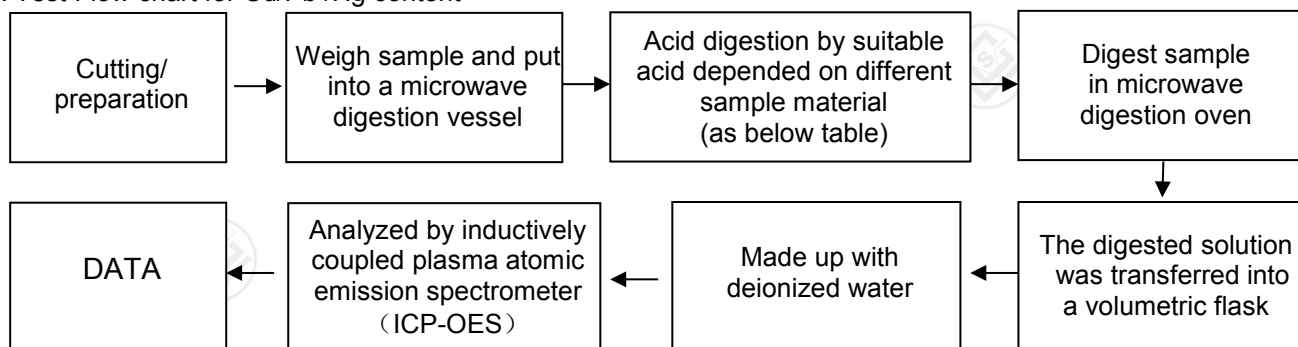
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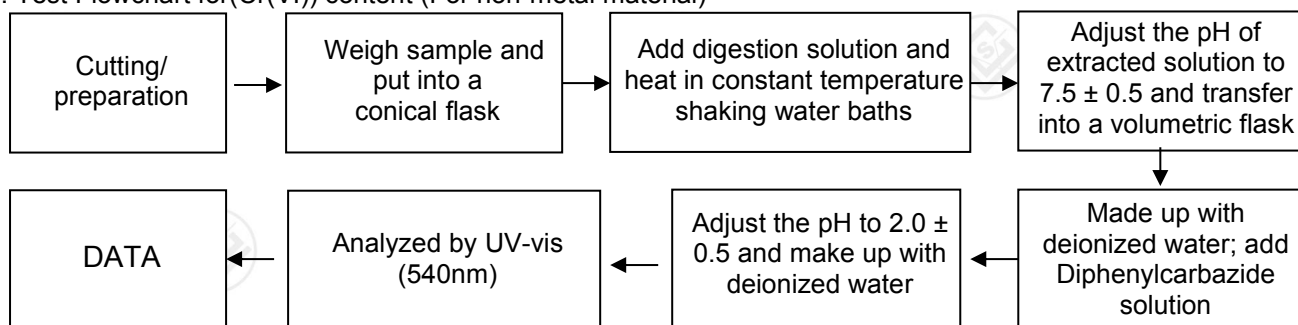
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## Appendix

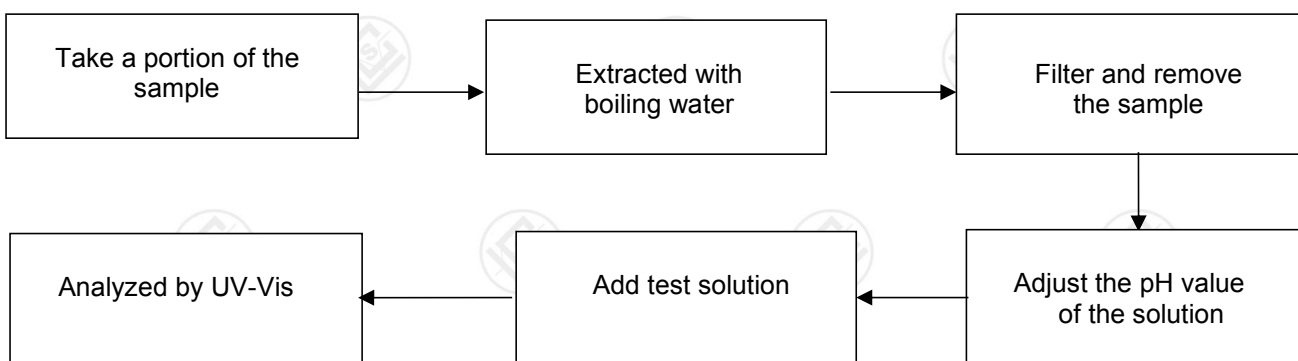
### 1. Test Flow chart for Cd/Pb /Hg content



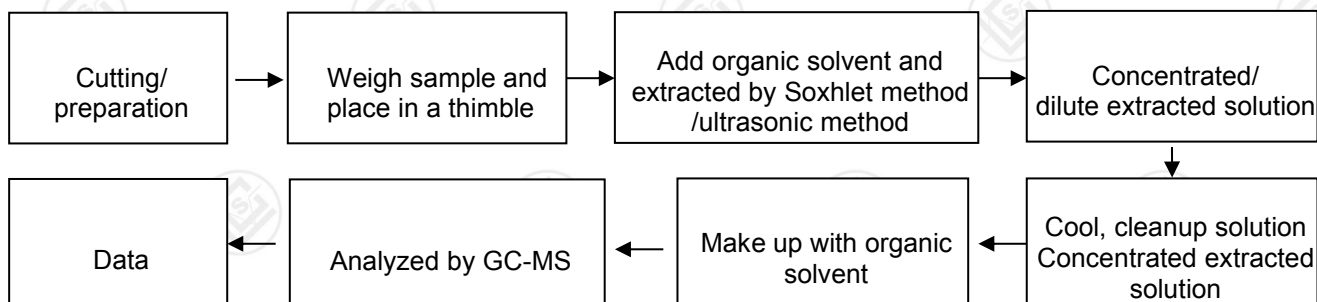
### 2. Test Flowchart for(Cr(VI)) content (For non-metal material)



### Test Flowchart for (Cr(VI)) content (For metal material)



### 3. Test Flow chart for PBBs & PBDEs & DBP & BBP & DEHP & DIBP content



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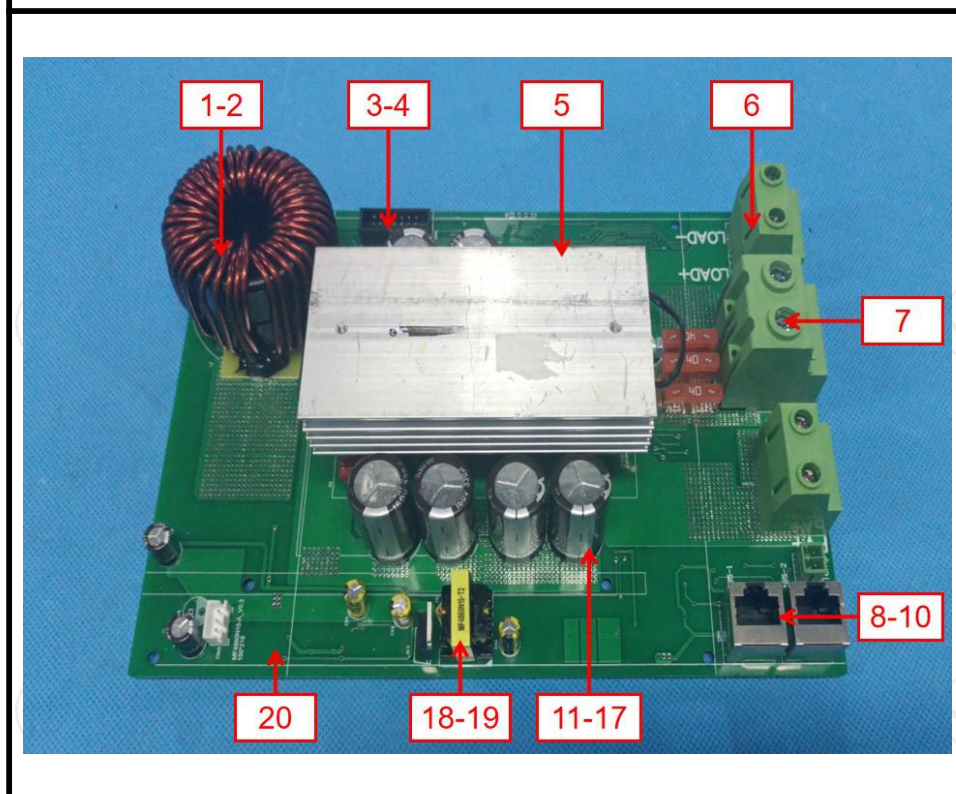
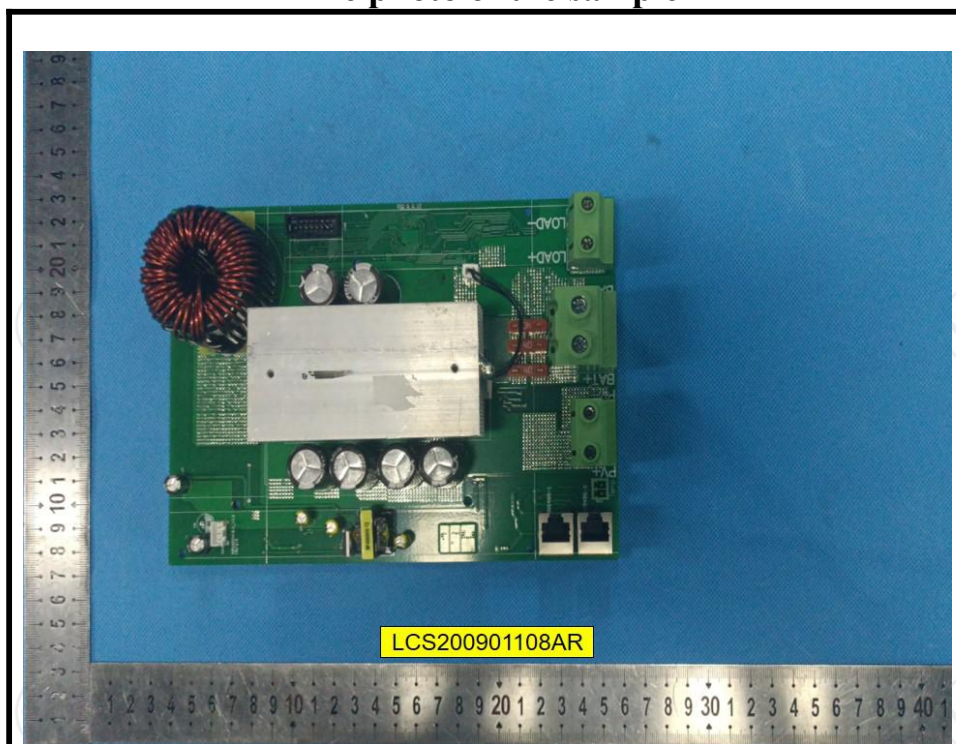
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The photo of the sample

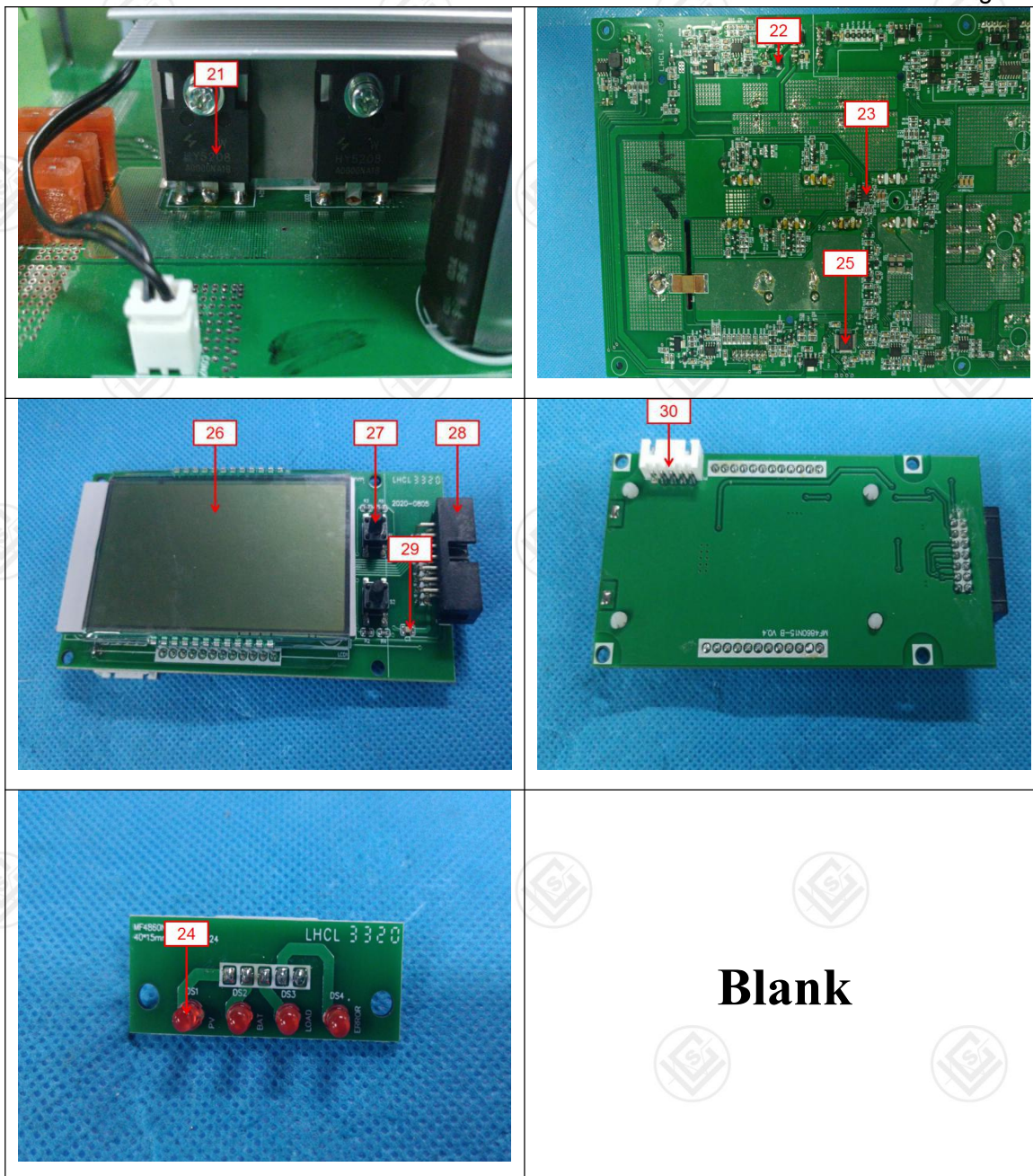


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\*\*\*\*\* End of Report \*\*\*\*\*

Statement:

1. The test report is considered invalidated without approval signature, special seal on the perforation.
2. The result(s) shown in this report refer only to the sample(s) tested.
3. Without written approval of LCS, this report can't be reproduced except in full.
4. The sample(s) and sample information was/were provided by the client who should be responsible for the authenticity which LCS hasn't verified.
5. In case of any discrepancy between the English version and Chinese version of the testing reports(if generated), the Chinese version shall prevail.