

TEST REPORT

Report No.: LCS190806071AR

Date:2019.08.30

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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 : All-in-one solar charge inverter

Trade Mark : N/A

Client's information : N/A

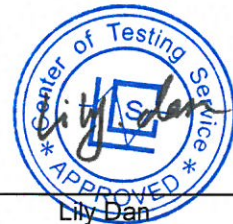
Style No. : HF4850S80, HF4840S60, HF4830S60, HF4840S80, HF4830S80, HF4835U80, HF4830U60, HF4825U60, HF4830U80, HF4825U80

Testing Period : August 09, 2019 ~ August 30, 2019

Results : Please refer to next page(s).

TEST REQUEST	CONCLUSION
<p>According to the customer's request, based on the performed tests on submitted sample, the result of Lead, Cadmium, Mercury, Hexavalent Chromium, PBBs, PBDEs, Dibutyl Phthalate(DBP), Benzylbutyl Phthalate(BBP), Bis(2-ethylhexyl) Phthalate(DEHP), Diisobutyl phthalate(DIBP) content comply with the limit as set of RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.</p>	<p style="text-align: center; color: blue;">Pass</p>

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 ^v	Br ^v		
						PBBs	PBDEs	
1	Blue printed plastic case (PCB, C8)	BL	BL	BL	BL	BL	BL	2019-08-09
2	Silver metal case (PCB, C8)	BL	BL	BL	BL	/	/	2019-08-09
3	Black plastic plug (PCB, C8)	BL	BL	BL	BL	BL	BL	2019-08-09
4	White wet paper (PCB, C8)	BL	BL	BL	BL	BL	BL	2019-08-09
5	Bright silver metal film (PCB, C8)	BL	BL	BL	BL	/	/	2019-08-09
6	Silver gray metal film (PCB, C8)	BL	BL	BL	BL	/	/	2019-08-09
7	Silver metal pin (PCB, C8)	OL	BL	BL	X	/	/	2019-08-09
8	Silver metal plate (PCB, C8)	BL	BL	BL	BL	/	/	2019-08-09
9	White soft plastic film (PCB, ES1)	BL	BL	BL	BL	BL	BL	2019-08-09
10	Yellow tape (PCB, ES1)	BL	BL	BL	BL	BL	BL	2019-08-09
11	Silver printed plastic sheet with adhesive (PCB, ES1)	BL	BL	BL	BL	BL	BL	2019-08-09
12	Yellow hard plastic fixture (PCB, ES1)	BL	BL	BL	BL	X	X	2019-08-09
13	Yellow sealant (PCB, ES1)	BL	BL	BL	BL	X	X	2019-08-09
14	Black ceramic (PCB, ES1)	BL	BL	BL	BL	BL	BL	2019-08-09
15	Yellow adhesive (PCB, ES1)	BL	BL	BL	BL	BL	BL	2019-08-09
16	Black soft plastic wire (PCB, ES1)	BL	BL	BL	BL	BL	BL	2019-08-09
17	Copper metal wire (PCB, ES1)	BL	BL	BL	BL	/	/	2019-08-09
18	Transparent soft plastic wire tube (PCB, ES1)	BL	BL	BL	BL	BL	BL	2019-08-09
19	Silver metal pin (PCB, ES1)	BL	BL	BL	BL	/	/	2019-08-09
20	Black dry glue (PCB, ES1)	BL	BL	BL	BL	BL	BL	2019-08-09

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Seq. No.	Tested Part(s)	Results						Date of sample submission/resubmission
		Cd	Pb	Hg	Cr [▼]	Br [▼]		
						PBBs	PBDEs	
21	Yellow hard plastic plate (PCB, ES1)	BL	BL	BL	BL	X	X	2019-08-09
22	Black IC (small PCB, U15)	BL	BL	BL	BL	BL	BL	2019-08-09
23	Brown chip capacitor (small PCB, C42)	BL	BL	BL	BL	BL	BL	2019-08-09
24	Black printed white chip resistor (small PCB, R336)	BL	BL	BL	BL	BL	BL	2019-08-09

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≤70-3σ<X <130+3σ≤OL	BL≤70-3σ<X <130+3σ≤OL	BL≤50-3σ<X <150+3σ≤OL
Pb	mg/kg	BL≤700-3σ<X <1300+3σ≤OL	BL≤700-3σ<X <1300+3σ≤OL	BL≤500-3σ<X <1500+3σ≤OL
Hg	mg/kg	BL≤700-3σ<X <1300+3σ≤OL	BL≤700-3σ<X <1300+3σ≤OL	BL≤500-3σ<X <1500+3σ≤OL
Cr	mg/kg	BL≤700-3σ<X	BL≤700-3σ<X	BL≤500-3σ<X
Br	mg/kg	BL≤300-3σ<X	--	BL≤250-3σ<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
Bis(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(Cr⁶⁺) 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)

1) The test results of Cadmium (Cd)

Item	Unit	MDL	Results	Limit
			(7)	
Cadmium Content (Cd)	mg/kg	2	N.D.	100

2) The test results of Hexavalent Chromium (Cr⁶⁺)(metal)

Item	Unit	MDL	Results	Limit
			(7)	
Hexavalent Chromium (Cr ⁶⁺)	ug/cm ²	0.10	N.D.	1000

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Note:

- MDL = Method Detection Limit
- /= Not apply
- LOQ = Limit of Quantification, The LOQ of Hexavalent chromium is 0.10 $\mu\text{g}/\text{cm}^2$
- mg/kg = ppm=parts per million
- N.D.=Not Detected(<MDL or LOQ)
- *The sample is negative for Cr(VI)-The Cr(VI) concentration is below 0.10 $\mu\text{g}/\text{cm}^2$
The coating is considered a non-Cr(VI) based coating.
- #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% (4000ppm) 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.

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3) The test results of DBP、BBP、DEHP & DIBP

Item	Unit	MDL	Results			Limit
			12+13+14+20+21+22			
Dibuytl Phthalate(DBP)	mg/kg	50	N.D.			1000
Benzylbutyl Phthalate(BBP)	mg/kg	50	N.D.			1000
Bis(2-ethylhexyl) Phthalate(DEHP)	mg/kg	50	N.D.			1000
Diispbutyl phthalate(DIBP)	mg/kg	50	N.D.			1000

Item	Unit	MDL	Results			Limit
			24+25	23	1	
Dibuytl Phthalate(DBP)	mg/kg	50	N.D.	N.D.	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	50	N.D.	N.D.	N.D.	1000
Bis(2-ethylhexyl) Phthalate(DEHP)	mg/kg	50	N.D.	N.D.	64	1000
Diispbutyl phthalate(DIBP)	mg/kg	50	N.D.	N.D.	N.D.	1000

Item	Unit	MDL	Results				Limit
			3	4	9	10	
Dibuytl Phthalate(DBP)	mg/kg	50	N.D.	N.D.	N.D.	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	50	N.D.	N.D.	N.D.	N.D.	1000
Bis(2-ethylhexyl) Phthalate(DEHP)	mg/kg	50	N.D.	N.D.	N.D.	N.D.	1000
Diispbutyl phthalate(DIBP)	mg/kg	50	N.D.	N.D.	N.D.	N.D.	1000

Item	Unit	MDL	Results				Limit
			11	15	16	18	
Dibuytl Phthalate(DBP)	mg/kg	50	97	N.D.	N.D.	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	50	N.D.	N.D.	N.D.	N.D.	1000
Bis(2-ethylhexyl) Phthalate(DEHP)	mg/kg	50	340	N.D.	N.D.	N.D.	1000
Diispbutyl phthalate(DIBP)	mg/kg	50	N.D.	N.D.	N.D.	N.D.	1000

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4) The test results of PBBs & PBDEs

Item	Unit	MDL	Results			Limit
			(12)	(13)	(21)	
Polybrominated Biphenyls (PBBs)						
Monobromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Dibromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Tribromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Tetrabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Pentabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Hexabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Heptabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Octabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Nonabromodiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Decabromodiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Total content	mg/kg	/	N.D.	N.D.	N.D.	1000
Polybrominated Diphenylethers (PBDEs)(Mon-Deca)						
Monobromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Dibromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Tribromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Tetrabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Pentabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Hexabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Heptabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Octabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Nonabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Decabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Total content	mg/kg	/	N.D.	N.D.	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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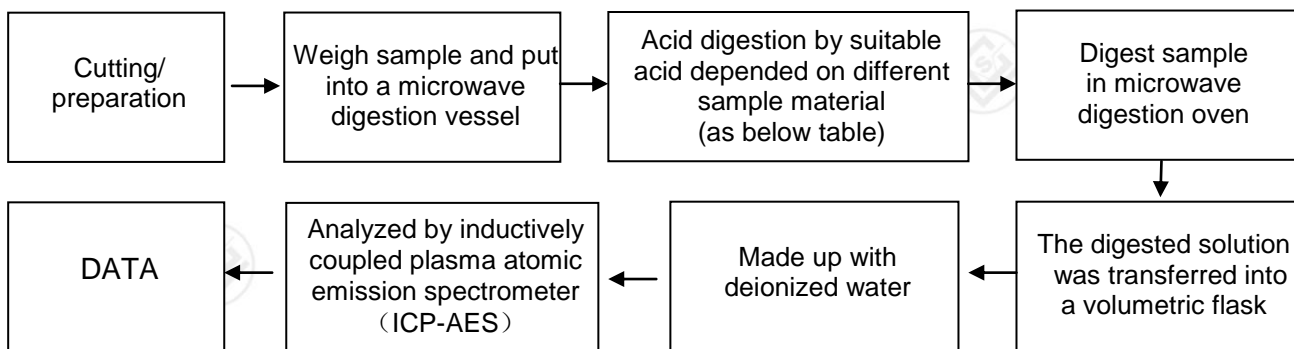
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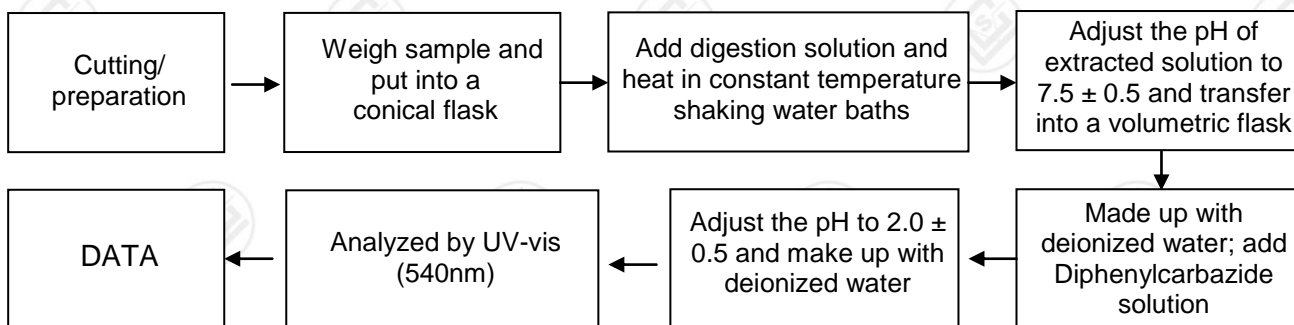
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Appendix

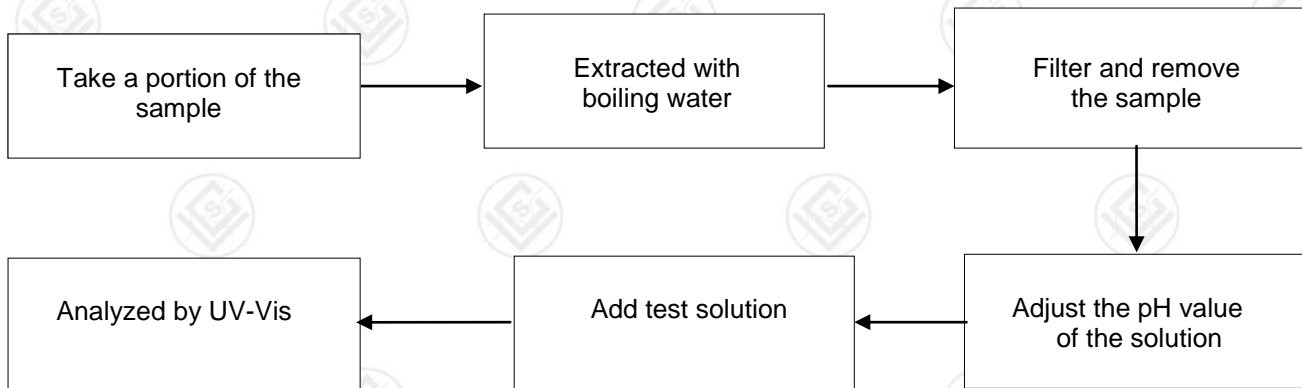
1. Test Flow chart for Cd/Pb /Hg content



2. Test Flowchart for Cr⁶⁺ content (For non-metal material)



Test Flowchart for Cr⁶⁺ content (For metal material)



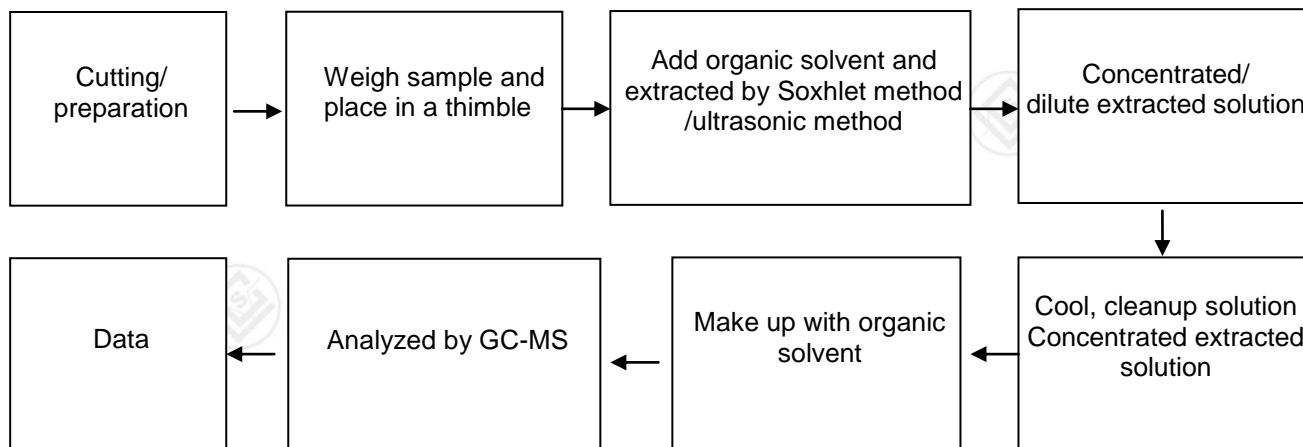
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3. Test Flow chart for PBBs & PBDEs & DBP & BBP & DEHP & DIBP content



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The photo of the sample

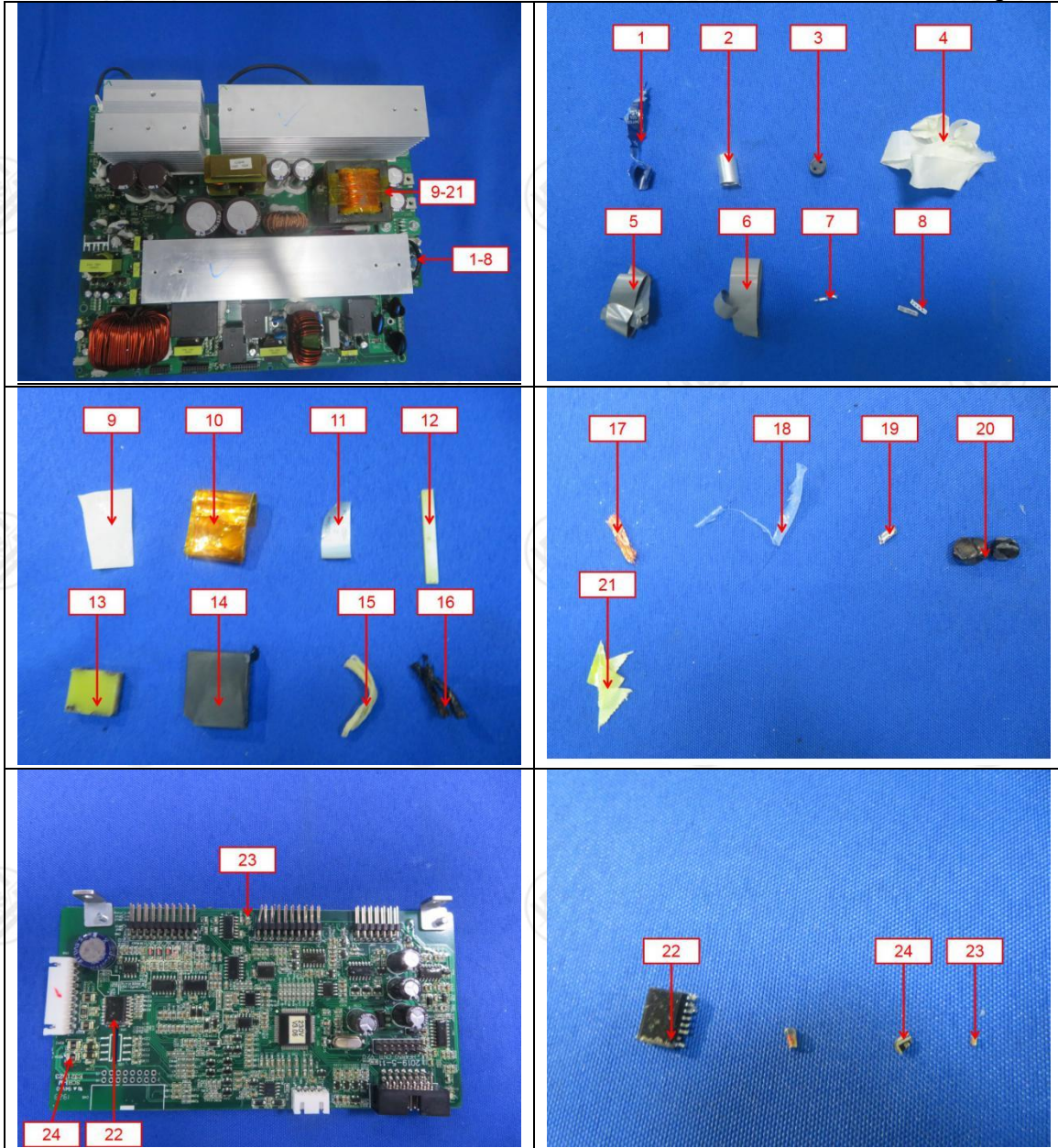


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***** End of Report *****

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.