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Test Report

Client	:	Shenzhen RAKwireless Technology Co.,Ltd.
Address	:	Room 506, Building B, New Compark, Pingshan First Road, Taoyuan Street, Nanshan District, Shenzhen, Guangdong, China

The following sample(s) and sample information was/were submitted and identified by/on the behalf of the client

Sample Name	:	Solar Battery Lite
Model/P.O. No.	:	RAK9154
Manufacturer	:	Ganzhou EPi Energy Co., Ltd.
Received Date	:	Jul 24, 2023
Test Period	:	Jul 24, 2023~Aug 01, 2023
Test Requested	:	EU RoHS 2011/65/EU and 2015/863/EU

Conclusion		
-	Lead(Pb), Cadmium(Cd), Mercury(Hg), Hexavalent Chromium(Cr^{6+})	PASS
-	Polybromobiphenyls (PBBs) & Polybromodiphenyl ethers (PBDEs)	PASS
-	DBP, BBP, DEHP, DIBP	PASS

For Further Details, Please Refer To the Following Page(s)

Approved by: Jane. Liu

Date: Aug 03, 2023

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Test Method

Test Item(s)	Test Method	Equipment	MDL
Pb, Cd, Hg, Cr, Br	IEC 62321-3-1:2013	XRF	5mg/kg
Pb, Cd	IEC 62321-5:2013	ICP-OES	5mg/kg
Hg	IEC 62321-4:2013+AMD1:2017	ICP-OES	5mg/kg
Cr^{6+}	IEC 62321-7-2:2017	UV-Vis	5mg/kg
	IEC 62321-7-1:2015		0.10μg/cm^2
PBBs & PBDEs	IEC 62321-6:2015	GC-MS	5mg/kg
DBP, BBP, DEHP, DIBP	IEC 62321-8:2017	GC-MS	30mg/kg

Test Result(s)

- Screening test results

Test items	1	2	3	4	5	6	7	8	9
Pb	P	P	D	P	P	P	P	P	P
Cd	P	P	P	P	P	P	P	P	P
Hg	P	P	P	P	P	P	P	P	P
Cr	P	P	P	P	P	P	P	P	P
Br	D	/	/	D	D	D	D	D	D
Conclusion	D	P	D	D	D	D	D	D	D

Test items	10	11	12	13	14	15	16	17	18
Pb	D	P	P	P	P	P	P	P	P
Cd	D	P	P	P	P	P	P	P	P
Hg	P	P	P	P	P	P	P	P	P
Cr	P	P	P	D	P	P	P	P	P
Br	/	/	D	/	D	P	/	D	P
Conclusion	D	P	D	D	D	P	P	D	P

Test items	19	20	21	22	23	24	25	26	27	28
Pb	P	P	P	P	P	P	P	P	P	P
Cd	P	P	P	P	P	P	P	P	P	P
Hg	P	P	P	P	P	P	P	P	P	P
Cr	P	P	P	P	P	P	P	P	P	P
Br	P	P	P	P	P	P	P	P	P	P
Conclusion	P	P	P	P	P	P	P	P	P	P

Test items	29	30	31	32	33	34	35	36	37	38
Pb	D	P	P	P	P	P	P	P	P	P
Cd	P	P	P	P	P	P	P	P	P	P
Hg	P	P	P	P	P	P	P	P	P	P
Cr	P	P	P	P	P	P	P	P	P	P
Br	/	P	P	P	P	P	P	P	/	D
Conclusion	D	P	P	P	P	P	P	P	P	D

Test items	39	40	41	42	43	44	45	46	47	48
Pb	P	P	P	P	P	P	P	D	D	P
Cd	P	P	P	P	P	P	P	P	D	P
Hg	P	P	P	P	P	P	P	P	P	P
Cr	P	P	P	P	P	P	P	P	P	P
Br	P	P	P	/	P	P	/	/	/	P
Conclusion	P	P	P	P	P	P	P	D	D	P

Test items	49	50	51	52	53	54	55	56	57	58
Pb	P	P	P	D	P	P	P	P	P	P
Cd	P	P	P	P	P	P	P	P	P	P
Hg	P	P	P	P	P	P	P	P	P	P
Cr	P	P	P	D	P	P	P	P	P	P
Br	P	P	P	/	/	P	/	P	/	P
Conclusion	P	P	P	D	P	P	P	P	P	P

Note:

- It is the result on total Br while testing PBBs and PBDEs by XRF. It is the result on total Cr while testing Hexavalent Chromium by XRF.
- Results are obtained by XRF for primary screening, and chemical testing by ICP (for Cd, Pb, Hg), UV-Vis (for Cr(VI)) and GCMS (for PBBs, PBDEs) is recommended to be performed, if the concentration exceeds the below warning value according to IEC 62321-3-1:2013 (unit: mg/kg)

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Element	Polymer	Metal	Composite Materials
Cd	P≤70-3σ＜D＜130+3σ≤F	P≤70-3σ＜D＜130+3σ≤F	P≤50-3σ＜D＜150+3σ≤F
Pb	P≤700-3σ＜D＜1300+3σ≤F	P≤700-3σ＜D＜1300+3σ≤F	P≤500-3σ＜D＜1500+3σ≤F
Hg	P≤700-3σ＜D＜1300+3σ≤F	P≤700-3σ＜D＜1300+3σ≤F	P≤500-3σ＜D＜1500+3σ≤F
Br	P≤300-3σ＜D	----	P≤250-3σ＜F
Cr	P≤700-3σ＜D	P≤700-3σ＜D	P≤500-3σ＜F

- P=PASS, F=FAIL, D=DETECTED
- mg/kg = ppm = 0.0001%, /= Not Available

- Chemical test results:

Test results of Pb, Cd, Hg and Cr^{6+}

Test Item(s)	MDL	Result(s) (mg/kg)			Limit (mg/kg)
		3	10	13	
Lead(Pb)	5mg/kg	28385	8796	N.D.	1000
Cadmium(Cd)	5mg/kg	N.D.	N.D.	N.D.	100
Mercury(Hg)	5mg/kg	N.D.	N.D.	N.D.	1000
Hexavalent Chromium(Cr^{6+})#1	5mg/kg	/	/	/	1000
Hexavalent Chromium(Cr^{6+})#2	0.10μg/cm^2	N.D.	N.D.	N.D.	/

Test Item(s)	MDL	Result(s) (mg/kg)				Limit (mg/kg)
		29	46	47	52	
Lead(Pb)	5mg/kg	N.D.	N.D.	N.D.	N.D.	1000
Cadmium(Cd)	5mg/kg	N.D.	N.D.	N.D.	N.D.	100
Mercury(Hg)	5mg/kg	N.D.	N.D.	N.D.	N.D.	1000
Hexavalent Chromium(Cr^{6+})#1	5mg/kg	/	/	/	/	1000
Hexavalent Chromium(Cr^{6+})#2	0.10μg/cm^2	N.D.	N.D.	N.D.	N.D.	/

Note:

- mg/kg=ppm=parts per million;
- N.D.=Not Detected (<MDL); MDL=method detection limit;
- #1: For non-metal materials test.
- #2: For metal materials test:
  "Positive" indicates Cr^{6+} in a sample is detected above 0.13μg/cm^2;
  "Negative" indicates Cr^{6+} in a sample is detected below 0.10μg/cm^2;
- According to EU RoHS 2011/65/EU Annex III, the following components were exempt

No.	Exempted substances	Exempted items	Exempted value
3	Copper alloy	Lead(Pb)	4.0%
10	Copper alloy	Lead(Pb)	4.0%

Test results of PBBs and PBDEs

Test Item(s)	MDL	Result(s) (mg/kg)						Limit (mg/kg)
		1	4	5	6	7	8	
Monobromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Dibromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Tribromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Tetrabromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Pentabromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Hexabromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Heptabromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Octabromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Nonabromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Decabromodiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Polybromobiphenyl(PBBs)	/	**N.D.**	**N.D.**	**N.D.**	**N.D.**	**N.D.**	**N.D.**	**1000**
Monobromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Bibromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Tribromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Tetrabromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Pentabromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Hexabromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Heptabromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Octabromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Nonabromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Decabromodiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Polybromodiphenyl ether(PBDEs)	/	**N.D.**	**N.D.**	**N.D.**	**N.D.**	**N.D.**	**N.D.**	**1000**

Test Item(s)	MDL	Result(s) (mg/kg)						Limit (mg/kg)
		9	12	14	15	17	38	
Monobromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Dibromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Tribromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Tetrabromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Pentabromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Hexabromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Heptabromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Octabromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Nonabromobiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Decabromodiphenyl	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Polybromobiphenyl(PBBs)	/	**N.D.**	**N.D.**	**N.D.**	**N.D.**	**N.D.**	**N.D.**	**1000**
Monobromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Bibromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Tribromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Tetrabromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Pentabromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Hexabromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Heptabromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Octabromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Nonabromobiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Decabromodiphenyl ether	5mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	/
Polybromodiphenyl ether(PBDEs)	/	**N.D.**	**N.D.**	**N.D.**	**N.D.**	**N.D.**	**N.D.**	**1000**

Note:

- mg/kg=ppm=parts per million;
- N.D.=Not Detected (<MDL);
- MDL=method detection limit.

Test results of Phthalates

Test Item(s)	MDL	Result(s) (mg/kg)					Limit (mg/kg)
		1	4	5	6	7	
Dibutyl phthalate(DBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Butyl benzyl phthalate(BBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Di (2-ethylhexyl) phthalate(DEHP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Diisobutyl phthalate (DIBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000

Test Item(s)	MDL	Result(s) (mg/kg)					Limit (mg/kg)
		8	9	12	14	15	
Dibutyl phthalate(DBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Butyl benzyl phthalate(BBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Di (2-ethylhexyl) phthalate(DEHP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Diisobutyl phthalate (DIBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000

Test Item(s)	MDL	Result(s) (mg/kg)					Limit (mg/kg)
		17	18	19	20	21	
Dibutyl phthalate(DBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Butyl benzyl phthalate(BBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Di (2-ethylhexyl) phthalate(DEHP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Diisobutyl phthalate (DIBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000

Test Item(s)	MDL	Result(s) (mg/kg)					Limit (mg/kg)
		22	23	24	25	26	
Dibutyl phthalate(DBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Butyl benzyl phthalate(BBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Di (2-ethylhexyl) phthalate(DEHP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Diisobutyl phthalate (DIBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000

Test Item(s)	MDL	Result(s) (mg/kg)					Limit (mg/kg)
		27	28	30	31	32	
Dibutyl phthalate(DBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Butyl benzyl phthalate(BBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Di (2-ethylhexyl) phthalate(DEHP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Diisobutyl phthalate (DIBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000

Test Item(s)	MDL	Result(s) (mg/kg)					Limit (mg/kg)
		33	34	35	36	38	
Dibutyl phthalate(DBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Butyl benzyl phthalate(BBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Di (2-ethylhexyl) phthalate(DEHP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Diisobutyl phthalate (DIBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000

Test Item(s)	MDL	Result(s) (mg/kg)					Limit (mg/kg)
		39	40	41	43	44	
Dibutyl phthalate(DBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Butyl benzyl phthalate(BBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Di (2-ethylhexyl) phthalate(DEHP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Diisobutyl phthalate (DIBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000

Test Item(s)	MDL	Result(s) (mg/kg)					Limit (mg/kg)
		48	49	50	51	54	
Dibutyl phthalate(DBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Butyl benzyl phthalate(BBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Di (2-ethylhexyl) phthalate(DEHP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000
Diisobutyl phthalate (DIBP)	30mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	1000

Note:

- mg/kg=ppm=parts per million;
- N.D.=Not Detected (<MDL);
- MDL=method detection limit.

Test components:

1	White plastic case	2	Silver screw
3	Gold nut	4	Black plastic
5	Chip capacitance	6	Beige plastic wire
7	Patch resistance	8	Triode
9	IC	10	IC pin
11	Silver metal	12	Diode
13	Inductance	14	Green PCB
15	Black plastic cable trough	16	Gold metal pin
17	Blue plastic cover	18	Black plastic nut
19	Red plastic ring	20	Black plastic
21	White plastic troughs	22	Red plastic wire (thick)
23	Red plastic wire	24	Dark blue plastic wire
25	Black plastic wire	26	Yellow plastic wire
27	Grey plastic wire	28	White plastic wire
29	Silver metal core	30	White latex
31	White tape	32	Yellow plastic separator
33	Blue plastic cover	34	Red plastic
35	Orange plastic	36	Black sponge
37	Silver metal connector	38	Black plastic
39	Green sticker	40	Grey plastic
41	White plastic sheet	42	Silver metal case
43	Blue plastic sheet	44	Brown plastic ring
45	Silver metal cap	46	Silver metal
47	Silver sheet	48	White plastic ring
49	Black plastic sheet	50	Green tape
51	Yellow-green tape	52	Positive lug
53	Negative lug	54	White diaphragm
55	Aluminum foil	56	Positive toner
57	Copper foil	58	Negative toner

Chemical Test Process

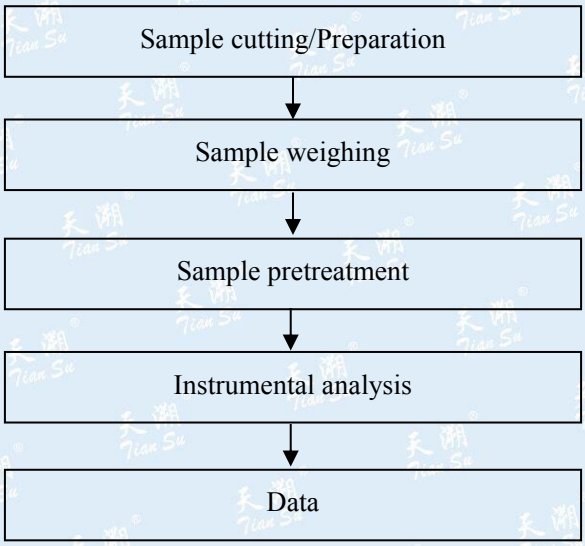
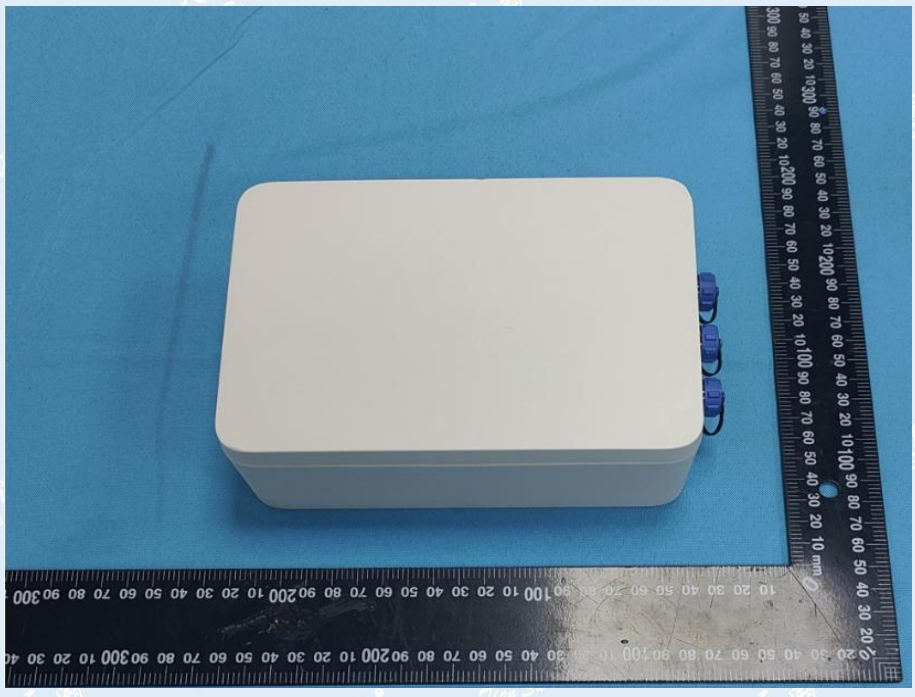
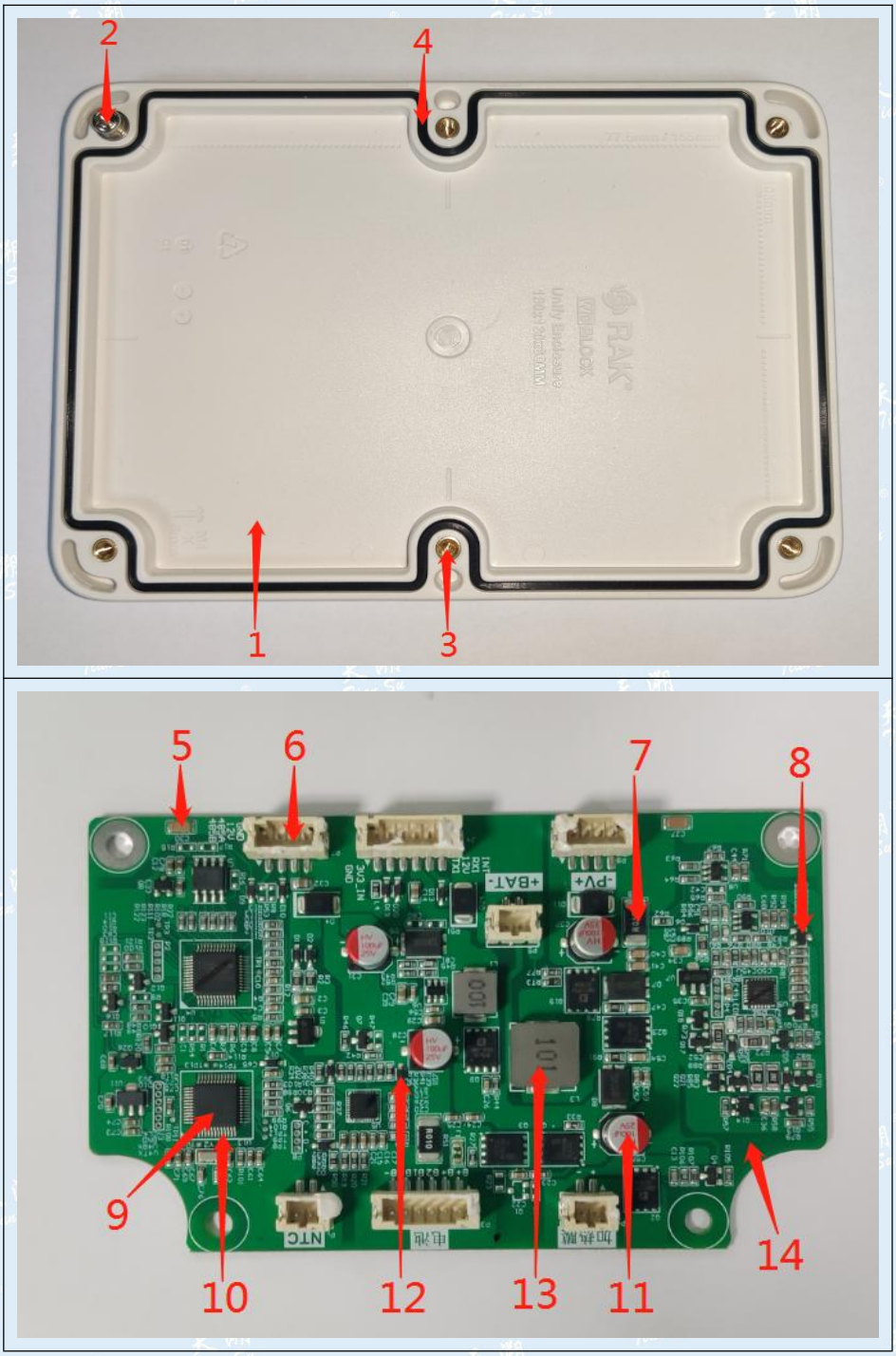


Photo of the sample



Sample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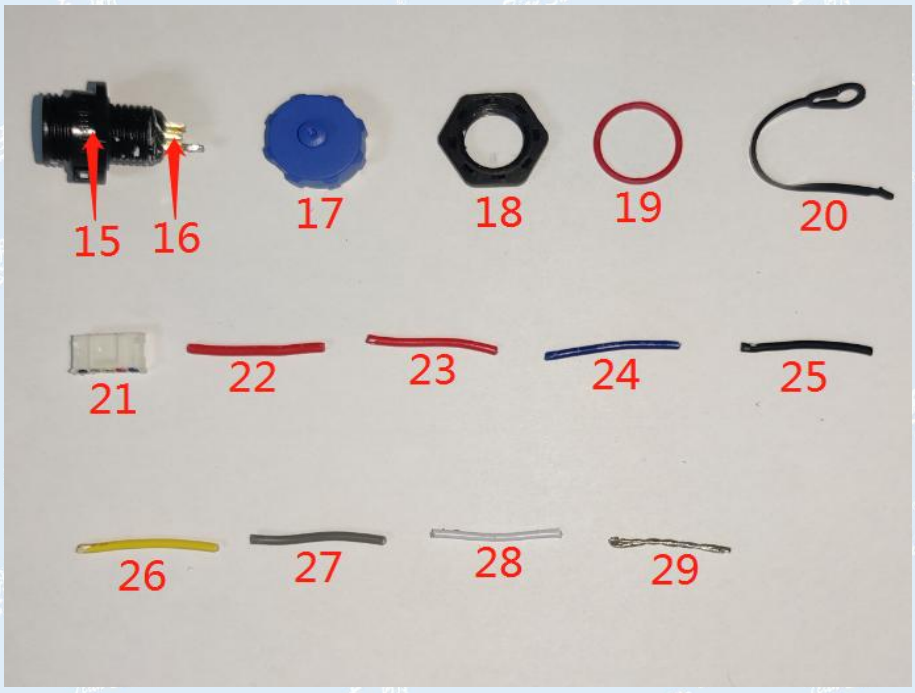
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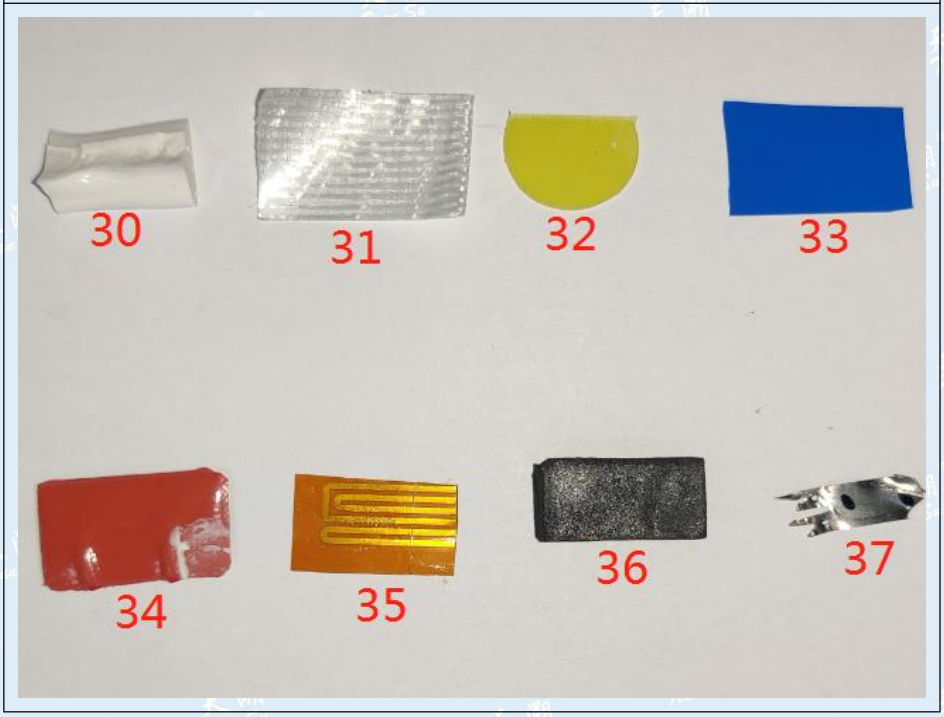
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********** End of report **********

This report is invalid without the Special Seal of Tiansu. This report shall not be altered, increased or deleted. The results shown in this report refer only to the sample(s) tested.

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