

# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 1 of 19

**Applicant** : Shandong USR IOT Technology Limited

**Address** : 1105, Building 1, Aosheng Building, No. 1166 Xinluo Street, Gaoxin  
Qu, Jinan, Shandong, 250101, China

**The submitted sample and sample information was/were submitted and identified by/on the behalf of the client**

**Sample name** : Serial to Ethernet Module

**Type /model** : USR-TCP232-410s(Main test). USR-TCP232-ED2,  
USR-TCP232-410s-pcba, USR-N510, USR-N520, USR-N511,  
USR-N512, USR-N509, USR-N540, USR-N580

**Manufacturer** : /

**Sample received date** : Jun. 01, 2016

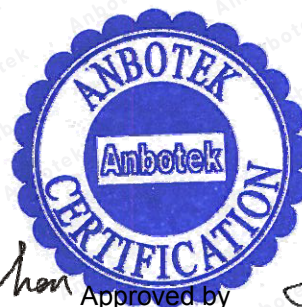
**Testing period** : Jun. 01, 2016 to Oct. 21, 2016

**Test requested** : 1. As specified by client, to screen Lead(Pb), Cadmium(Cd),  
Mercury(Hg), Chromium(Cr) and Bromine(Br) in the submitted  
sample(s) by XRF.  
2. As specified by client, when screening results exceed the XRF  
screening limit in IEC 62321-3-1:2013, further use of chemical  
methods are required to test the Lead(Pb), Cadmium(Cd),  
Mercury(Hg), Hexavalent Chromium(Cr(VI)), Polybrominated  
Biphenyls(PBBs), Polybrominated Diphenyl Ethers(PBDEs) in the  
submitted samples.

**According to the RoHS Directive 2011/65/EU**

**Test Method:** Please refer to the following page(s).

**Test Result(s):** Please refer to the following page(s).



Tested by Wang . Liu

Inspected by Sahon Chen

Approved by Jia Li

# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 2 of 19

## Test Method:

### A. Screening test by XRF spectroscopy

XRF screening limits in mg/kg for regulated elements according to IEC 62321-3-1:2013.

Element	Limit of IEC 62321-3-1:2013. Unit (mg/kg)		MDL	
	Polymers and metals	Composite material	Polymers	Other material
Pb	$BL \leq (700-3\sigma) < X < (1300+3\sigma)$ $\leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma)$ $\leq OL$	10 mg/kg	50 mg/kg
Cd	$BL \leq (70-3\sigma) < X < (130+3\sigma)$ $\leq OL$	$LOD \leq (50-3\sigma) < X < (150+3\sigma)$ $\leq OL$	10 mg/kg	50 mg/kg
Hg	$BL \leq (700-3\sigma) < X < (1300+3\sigma)$ $\leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma)$ $\leq OL$	10 mg/kg	50 mg/kg
Cr	$BL \leq (700-3\sigma) < X$	$BL \leq (500-3\sigma) < X$	10 mg/kg	50 mg/kg
Br	$BL \leq (300-3\sigma) < X$	$BL \leq (250-3\sigma) < X$	10 mg/kg	50 mg/kg

## Note:

- BL = Under the XRF screening limit
- OL = Further chemical test will be conducted while result is above the screening limit
- X= The symbol "X" marks the region where further investigation is necessary
- 3σ= The reproducibility of analytical instruments
- LOD= Detection limit


### B. Chemical Test

Test Item(s)	Test Method	Measured Equipment(s)	MDL	Limit
Lead (Pb)	IEC 62321-5:2013 Ed.1.0	ICP-OES	2 mg/kg	1000 mg/kg
Cadmium (Cd)	IEC 62321-5:2013 Ed.1.0	ICP-OES	2 mg/kg	100 mg/kg
Mercury (Hg)	IEC 62321-4:2013 Ed.1.0	ICP-OES	2 mg/kg	1000 mg/kg
Hexavalent Chromium Cr(VI)	IEC 62321-7-1:2015 Ed.1.0	UV-VIS	/	1000 mg/kg
	IEC 62321:2008 Ed.1 Annex C	UV-VIS	2 mg/kg	1000 mg/kg
Polybrominated Biphenyls (PBBs)	IEC 62321-6:2015 Ed.1.0	GC-MS	5 mg/kg	1000 mg/kg
Polybrominated Diphenyl Ethers (PBDEs)	IEC 62321-6:2015 Ed.1.0	GC-MS	5 mg/kg	1000 mg/kg

## Shenzhen Anbotek Compliance Laboratory Limited

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# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 3 of 19

## Test Results:

Sample No.	Sample Description	Tested Items	XRF Screening Test Unit (mg/kg)	Chemical Test Unit (mg/kg)	Conclusion
1	Metal shell with black coating	Pb	OL	44	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
2	Blue label	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
3	Silvery label	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
4	Green terminal	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
5	Silvery white metal	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
6	Silvery metal	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	

# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 4 of 19

Sample No.	Sample Description	Tested Items	XRF Screening Test Unit (mg/kg)	Chemical Test Unit (mg/kg)	Conclusion
7	Silvery white screw	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
8	Connector silvery metal	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
9	Connector black plastic	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	X	N.D.	
10	Connector inner black plastic	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	X	N.D.	
11	Pin	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
12	Silvery screw	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	



# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 5 of 19

Sample No.	Sample Description	Tested Items	XRF Screening Test Unit (mg/kg)	Chemical Test Unit (mg/kg)	Conclusion
13	Connector inner pin	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
14	Switch key silvery metal	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
15	Black plastic pedestal	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
16	Silvery shrapnel	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	X	Negative	
		Br(PBBs&PBDEs)	/	/	
17	Key black plastic	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
18	Network cable connector silvery metal	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	

# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 6 of 19

Sample No.	Sample Description	Tested Items	XRF Screening Test Unit (mg/kg)	Chemical Test Unit (mg/kg)	Conclusion
19	Black plastic	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	X	N.D.	
20	Inner black plastic	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	X	N.D.	
21	Inner pin	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
22	Yellow LED	Pb	BL	/	PASS
		Cd	LOD	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
23	Green LED	Pb	BL	/	PASS
		Cd	LOD	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
24	Plug black plastic	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	X	N.D.	

# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 7 of 19

Sample No.	Sample Description	Tested Items	XRF Screening Test Unit (mg/kg)	Chemical Test Unit (mg/kg)	Conclusion
25	Plug metal	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
26	Plug inner pin	Pb	BL	/	PASS
		Cd	OL	N.D.	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
27	Electrolytic capacitor black scarfskin	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
28	Silvery metal shell	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
29	Black plastic plug	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
30	Silvery grey foil paper	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	

# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 8 of 19

Sample No.	Sample Description	Tested Items	XRF Screening Test Unit (mg/kg)	Chemical Test Unit (mg/kg)	Conclusion
31	Silvery foil paper	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
32	Pin	Pb	X	225	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
33	Chip diode	Pb	BL	/	PASS
		Cd	LOD	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	X	N.D.	
34	Chip coil inductor	Pb	BL	/	PASS
		Cd	LOD	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
35	IC	Pb	BL	/	PASS
		Cd	LOD	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
36	Quadrate IC	Pb	BL	/	PASS
		Cd	LOD	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	



# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 9 of 19

Sample No.	Sample Description	Tested Items	XRF Screening Test Unit (mg/kg)	Chemical Test Unit (mg/kg)	Conclusion
37	Crystal oscillator	Pb	BL	/	PASS
		Cd	LOD	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
38	Glass diode	Pb	OL	191700*	PASS
		Cd	LOD	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
39	Big chip capacitor	Pb	BL	/	PASS
		Cd	LOD	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
40	Chip resistor	Pb	X	860	PASS
		Cd	LOD	/	
		Hg	BL	/	
		Cr(Cr(VI) )	X	N.D.	
		Br(PBBs&PBDEs)	BL	/	
41	Chip capacitor	Pb	X	10120*	PASS
		Cd	LOD	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
42	Green fuse	Pb	X	582	PASS
		Cd	LOD	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	

# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 10 of 19

Sample No.	Sample Description	Tested Items	XRF Screening Test Unit (mg/kg)	Chemical Test Unit (mg/kg)	Conclusion
43	Terminal black plastic	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	
44	Contact pin	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
45	Terminal green plastic	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	X	N.D.	
46	Contact pin	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
47	Silvery metal	Pb	OL	910	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	/	/	
48	Blue ceramic	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI) )	BL	/	
		Br(PBBs&PBDEs)	BL	/	

# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 11 of 19

## Note:

-MDL = Method Detection Limit

-N.D. = Not Detected (<MDL)

-mg/kg = ppm = parts per million

-Negative = Absence of Cr(VI), the detected Cr(VI) concentration in the boiling water extraction solution is less than 0.02 mg/kg with 50cm<sup>2</sup> sample surface area used.

-Positive = Presence of Cr(VI), the detected Cr(VI) concentration in the boiling water extraction solution is equal to or greater than 0.02 mg/kg with 50cm<sup>2</sup> sample surface area used.

-\* = According to the customer statement, samples to the EU RoHS directive 2011/65/EU and 2011/534/EU exemption No. 7(c)-I: Containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound.

## Remark:

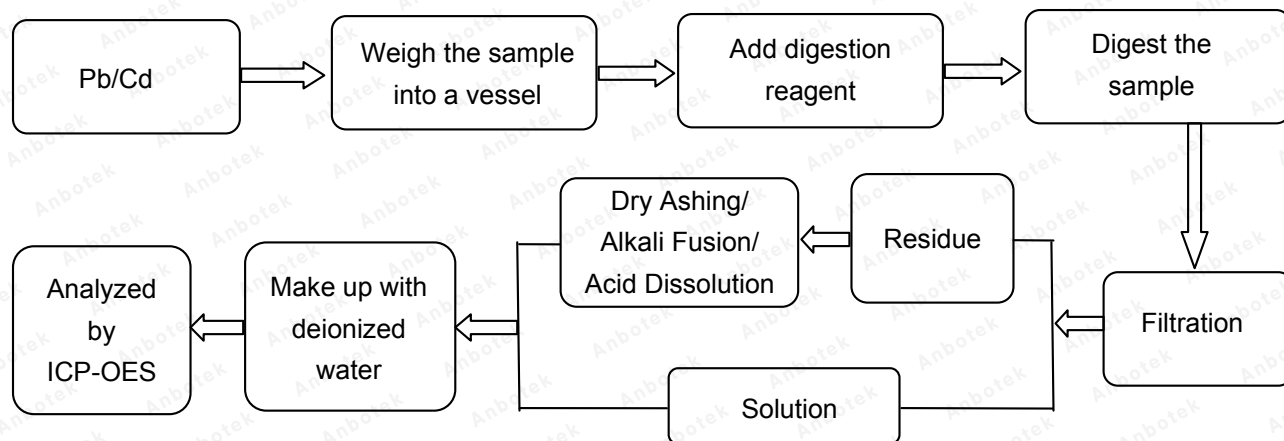
- The screening results are only used for reference.

- When conducting the test for PBBs&PBDEs, XRF was introduced to screen Br Exclusively; When conducting the test for Hexavalent Chromium, XRF was introduced to screen Chromium exclusively.

## Test Process:

The sample(s) had been dissolved totally tested for Lead, Cadmium, Mercury.

◆ IEC 62321-5:2013 Ed.1.0



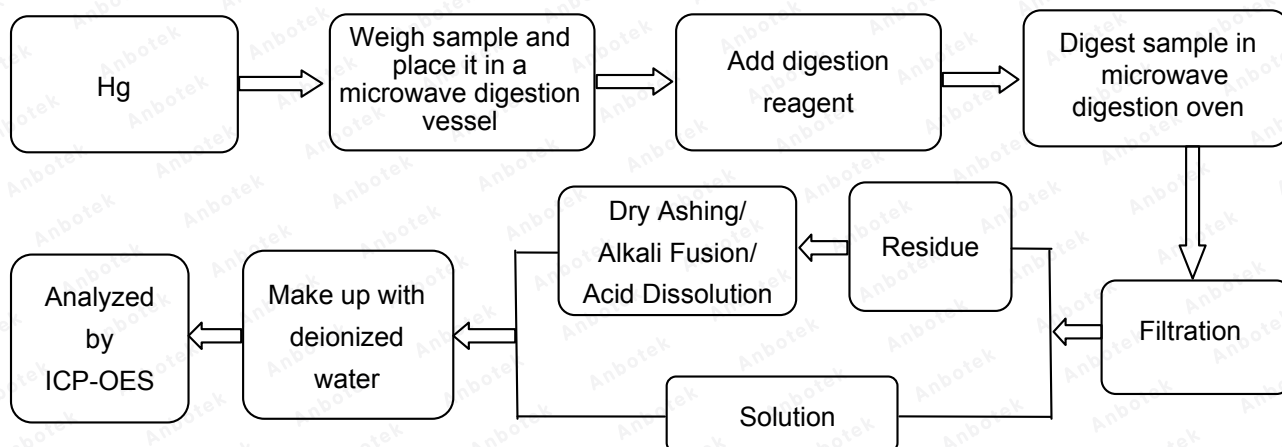
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No. SZR160601003003-1

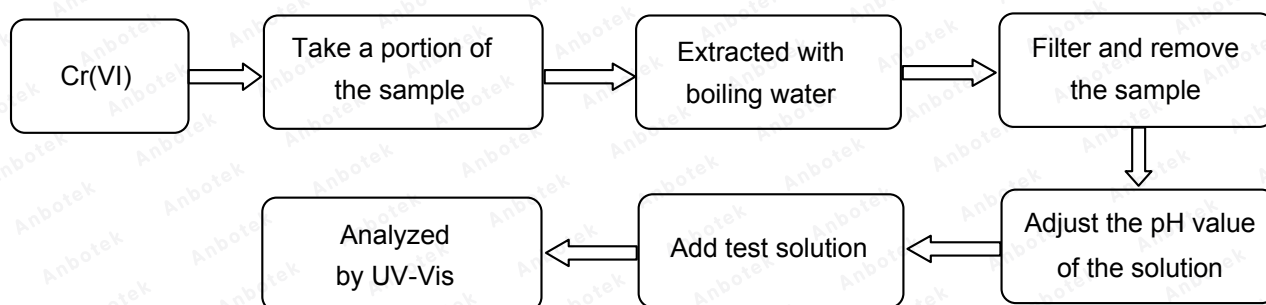
Date: Oct. 21, 2016

Page 12 of 19

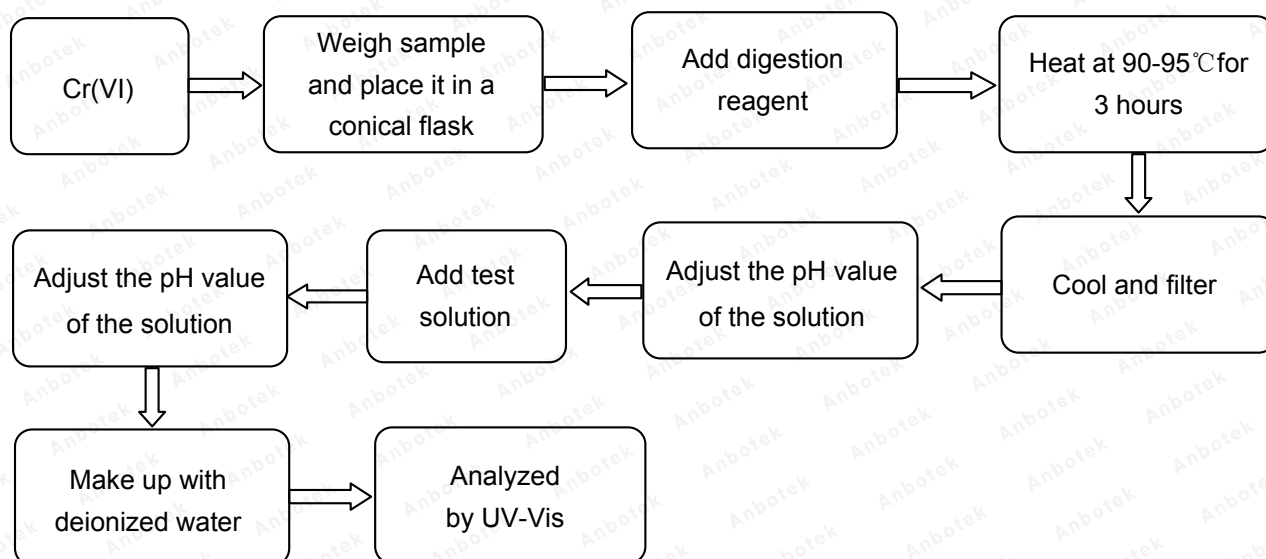
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◆ IEC 62321-7-1:2015 Ed.1.0



◆ IEC 62321:2008 Ed.1 Annex C





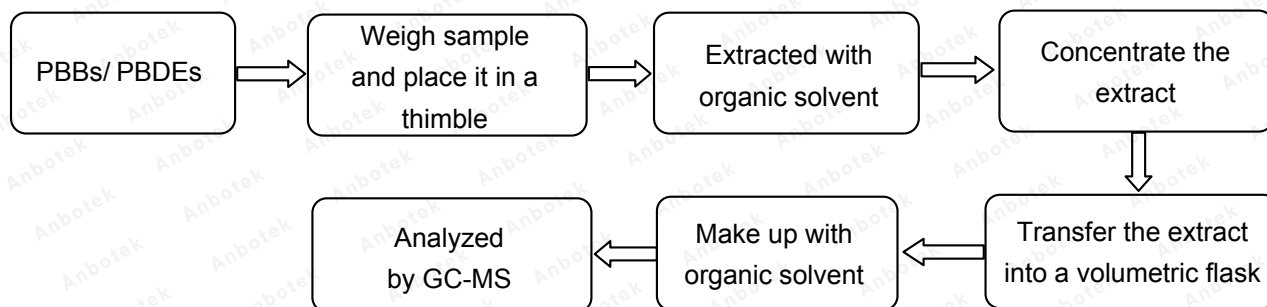
# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 13 of 19

◆ IEC 62321-6:2015 Ed.1.0



Photograph of Sample



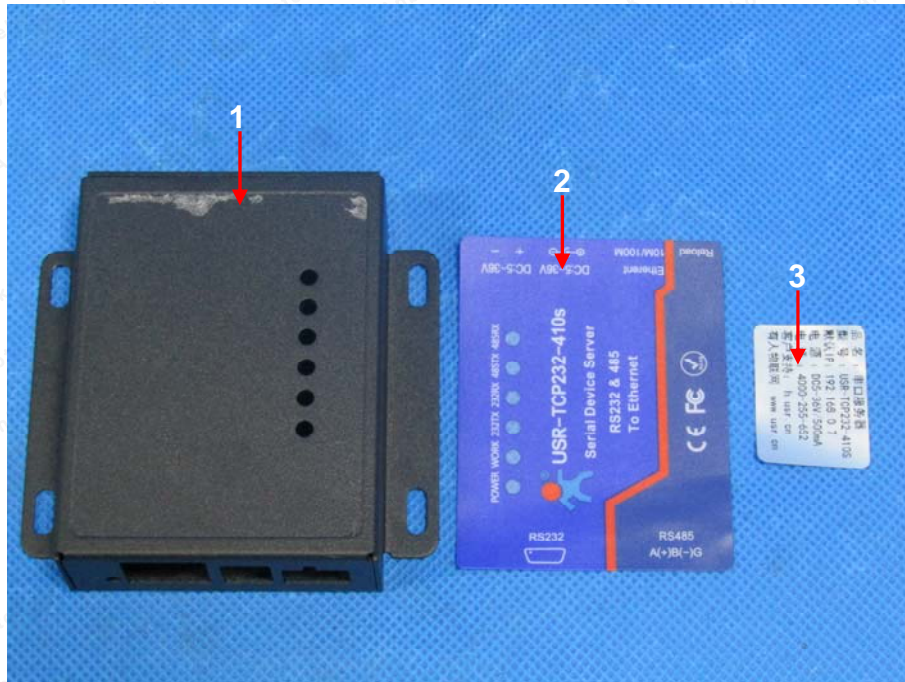
# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 14 of 19

Photo(s) of the tested component(s)



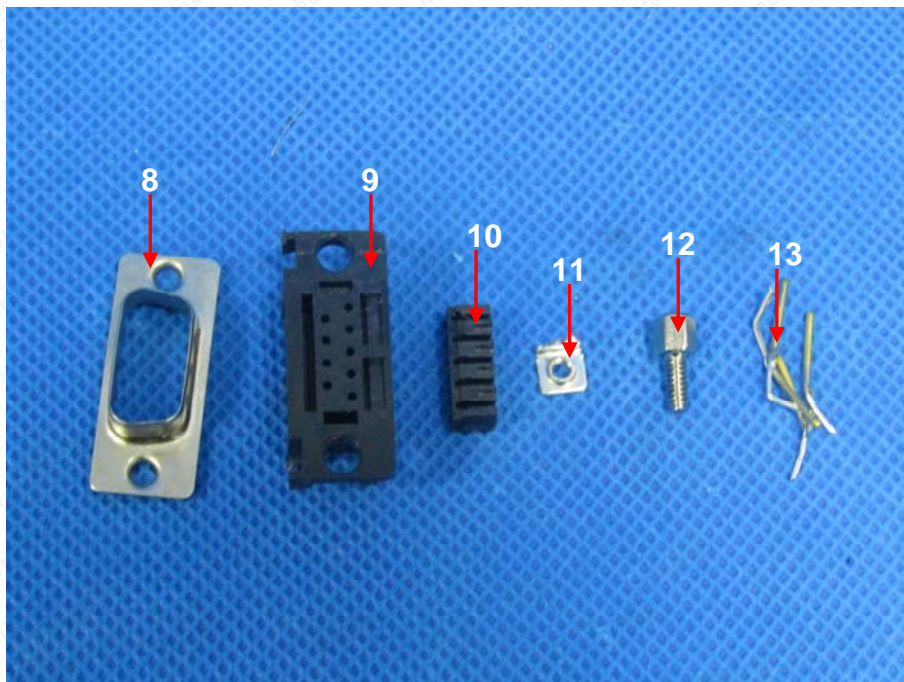
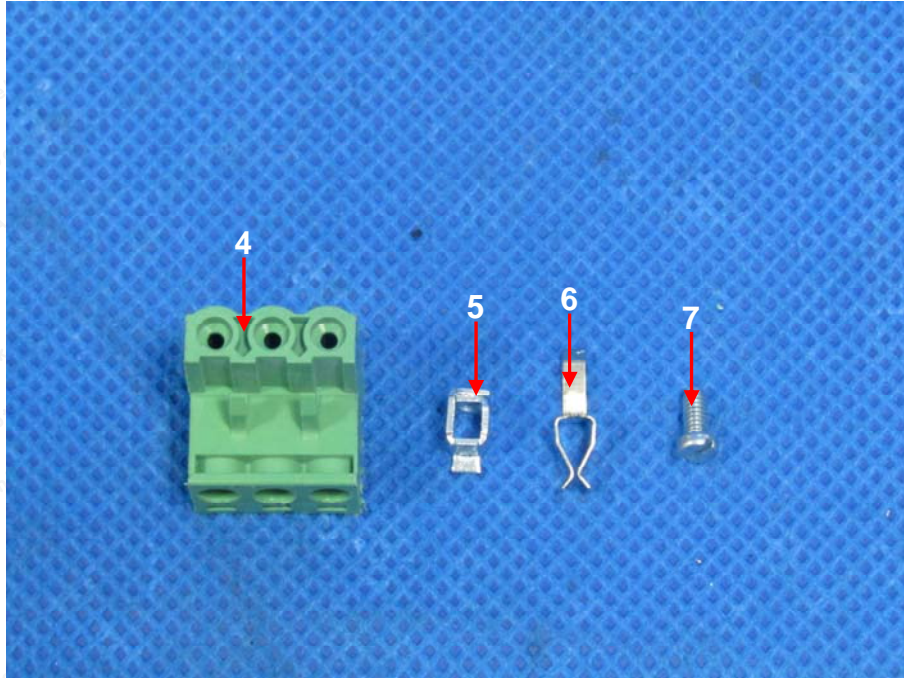


# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 15 of 19



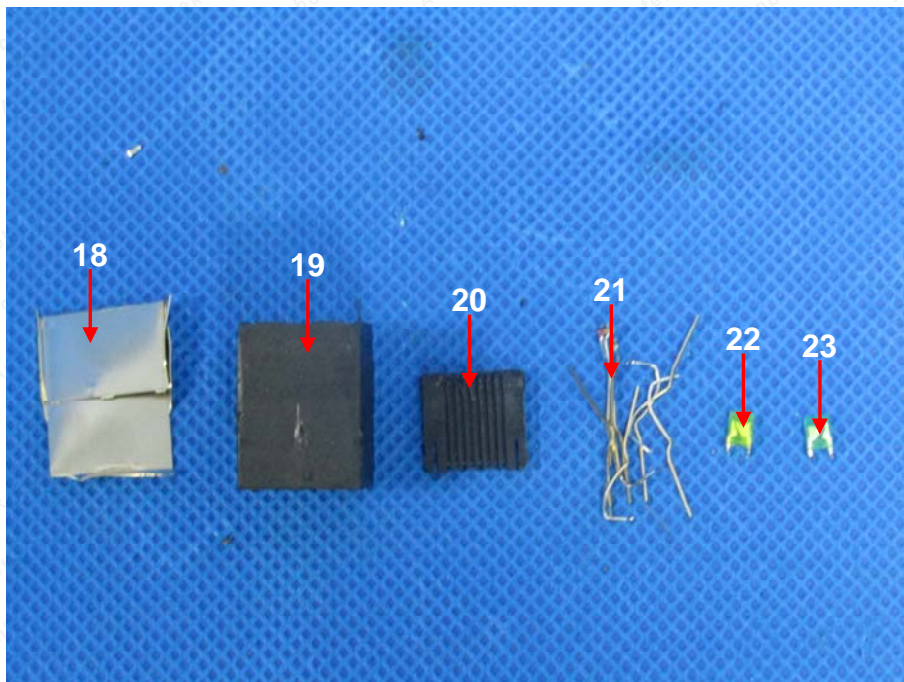
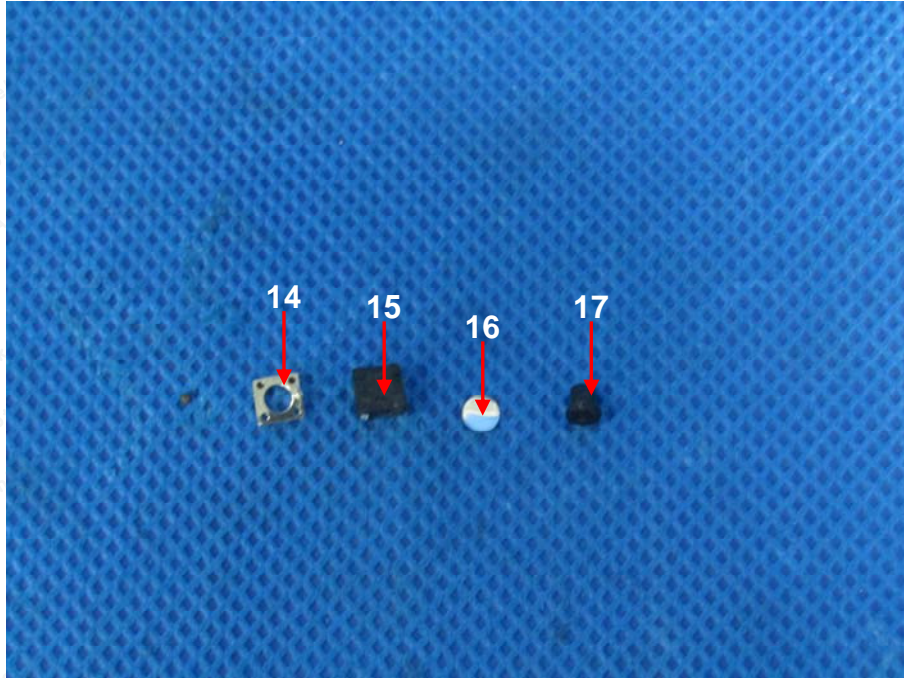


# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 16 of 19



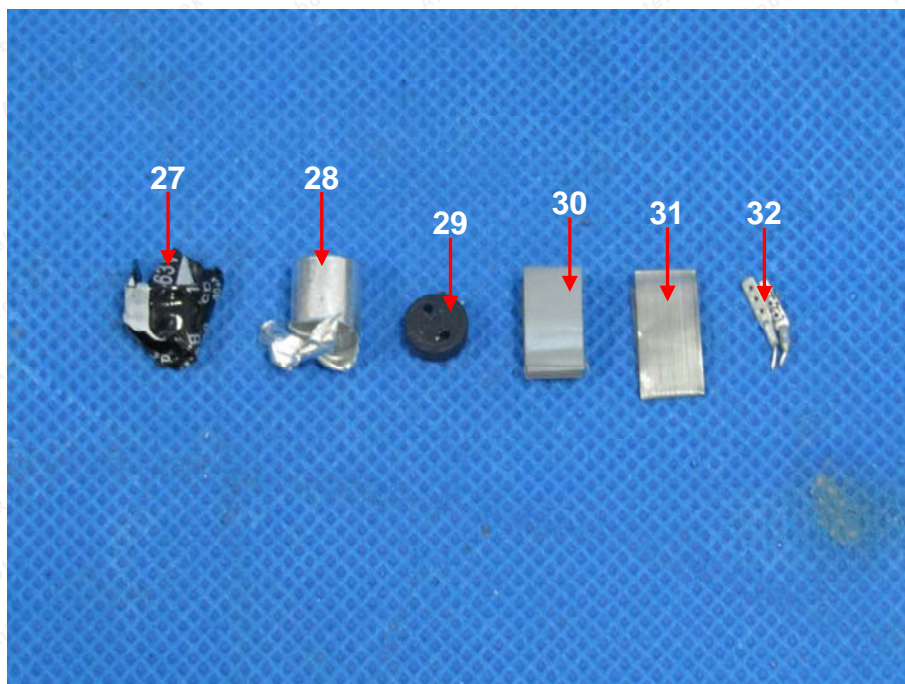
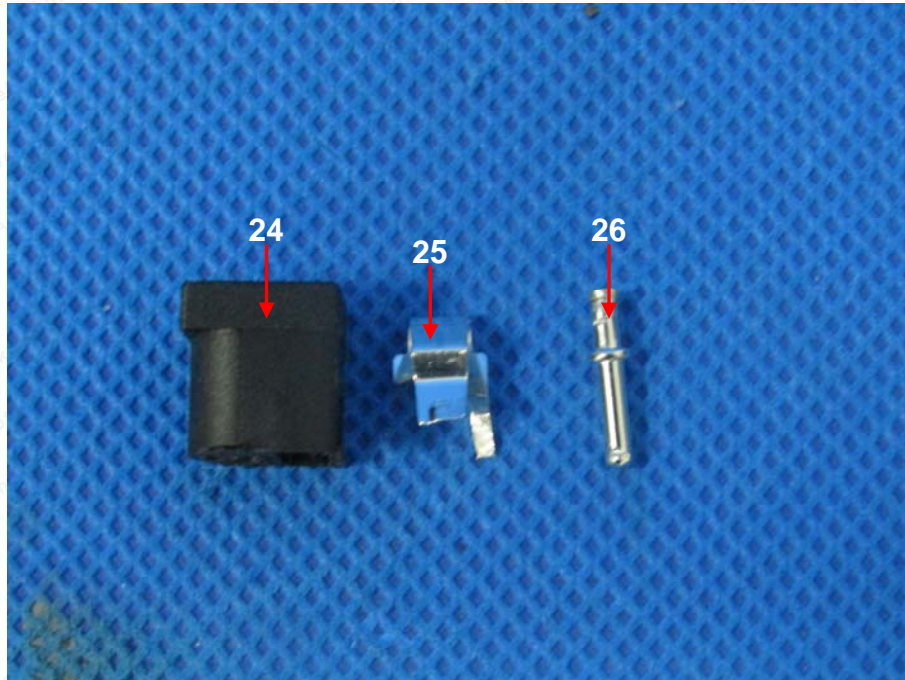


# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 17 of 19



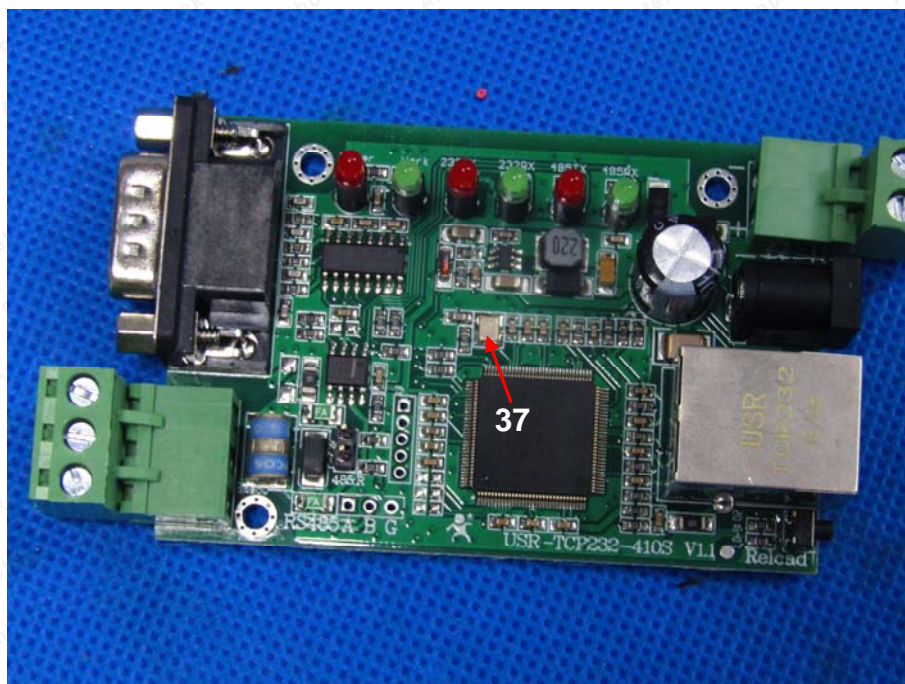
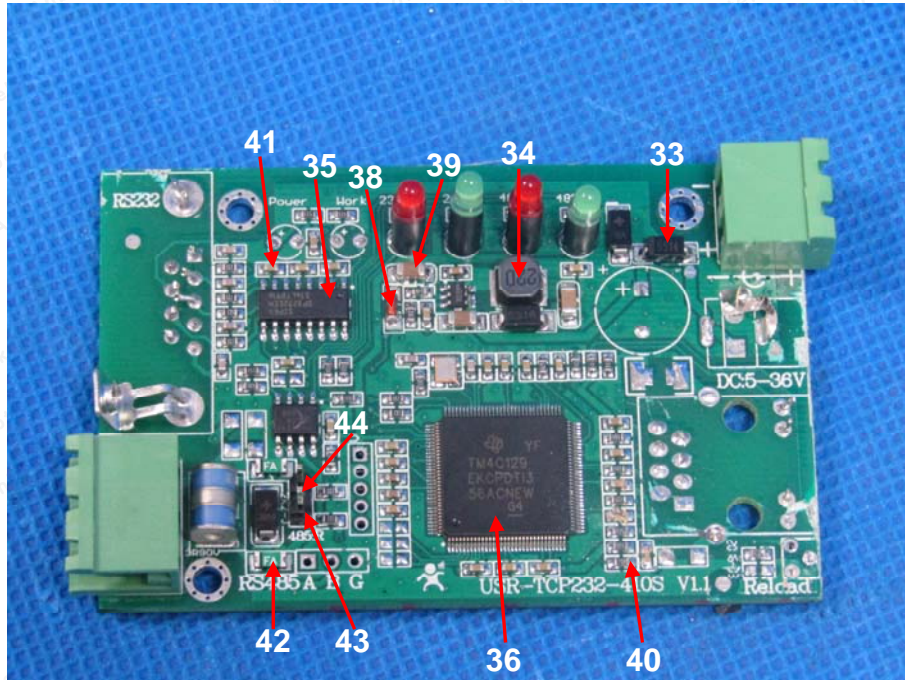


# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 18 of 19



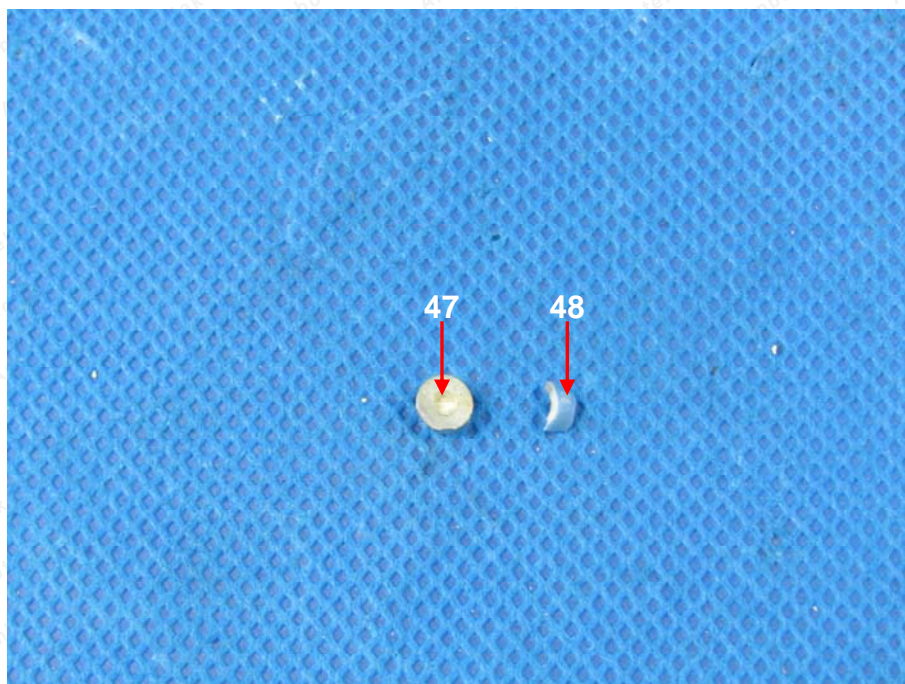
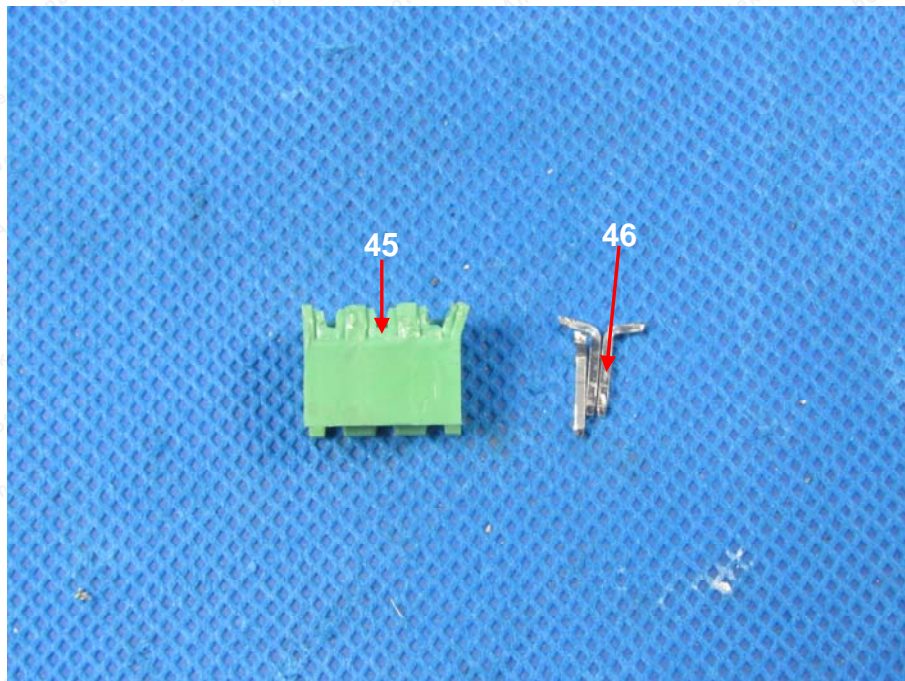


# Test Report

No. SZR160601003003-1

Date: Oct. 21, 2016

Page 19 of 19



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

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