

Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China

Tel: (86)755-82591330

Fax: (86)755-82591332

Internet: Http://www.LCS-cert.com

Report No.: LCS171127033AR

TEST REPORT

Client company : Shenzhen Wesion Technology Co., Ltd.
Client address : Room 511, A Building, Mingyou Purchasing Center, Baoyuan Road, Xixiang Street, Bao'an District, Shenzhen, China. 518102
Manufacturer : Shenzhen Wesion Technology Co., Ltd.
Address : Room 511, A Building, Mingyou Purchasing Center, Baoyuan Road, Xixiang Street, Bao'an District, Shenzhen, China. 518102

Report on the submitted samples said to be:

Sample Name : Single Board Computer
Trade Mark : Khadas
Style/ Item No. : VIM2 Max, VIM2 Pro, VIM2 Basic
Sample Receiving Date : December 07 , 2017
Testing Period : December 07 , 2017~ December 15, 2017
Results : Please refer to next page(s).

Summary of Test Results:

TEST REQUEST

CONCLUSION

A EU RoHS Directive 2011/65/EU and its amendment directives

PASS

Signed for and on behalf of LCS

Written By: Linda Ning

Linda Ning

Checked by: Suez Su

Suez Su

Approved by: Fung Xiao

Fung Xiao



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				
		Pb	Cd	Hg	Cr	Br
A	Single Board Computer					
1	Transparent plastic	BL	BL	BL	BL	BL
2	Transparent plastic	BL	BL	BL	BL	BL
3	Transparent plastic	BL	BL	BL	BL	BL
4	Transparent plastic	BL	BL	BL	BL	BL
5	Black plastic	BL	BL	BL	BL	BL
6	Black plastic	BL	BL	BL	BL	BL
7	Black plastic	BL	BL	BL	BL	BL
8	Gold metal	X	BL	BL	BL	BL
9	Black metal screw	BL	BL	BL	X	BL
10	Silver metal shell	BL	BL	BL	BL	BL
11	Black plastic	BL	BL	BL	BL	BL
12	Silver metal needle	BL	BL	BL	BL	BL
13	Silver metal shell	BL	BL	BL	X	BL
14	Gold metal needle	BL	BL	BL	BL	BL
15	Black plastic	BL	BL	BL	BL	BL
16	Silver metal needle	BL	BL	BL	BL	BL
17	Black plastic	BL	BL	BL	BL	BL
18	Gold metal needle	BL	BL	BL	BL	BL
19	Silver metal needle	BL	BL	BL	BL	BL
20	Black plastic	BL	BL	BL	BL	BL
21	Gold metal needle	BL	BL	BL	BL	BL
22	Yellow tape	BL	BL	BL	BL	BL
23	White plastic	BL	BL	BL	BL	X
24	Silver metal needle	BL	BL	BL	BL	BL
25	Silver metal needle	BL	BL	BL	BL	BL

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Seq. No.	Tested Part(s)	Results				
		Pb	Cd	Hg	Cr	Br
26	Black plastic	BL	BL	BL	BL	BL
27	Silver metal sheet	BL	BL	BL	BL	BL
28	Black ceramics	BL	BL	BL	BL	X
29	Gold metal wire	BL	BL	BL	BL	BL
30	Black IC	BL	BL	BL	BL	BL
31	White plastic	BL	BL	BL	BL	BL
32	Silver metal sheet	BL	BL	BL	BL	BL
33	Black plastic	BL	BL	BL	BL	BL
34	Black IC	BL	BL	BL	BL	BL
35	Black IC	BL	BL	BL	BL	BL
36	Black IC	BL	BL	BL	BL	BL
37	Black plastic	BL	BL	BL	BL	BL
38	Silver metal needle	BL	BL	BL	BL	BL
39	Black IC	BL	BL	BL	BL	BL
40	Silver metal needle	BL	BL	BL	X	BL
41	Silver metal needle	BL	BL	BL	BL	BL
42	Silver metal spring	BL	BL	BL	BL	BL
43	Black plastic	BL	BL	BL	BL	BL
44	Gold metal needle	BL	BL	BL	BL	BL
45	White label	BL	BL	BL	BL	BL
46	Patch capacitance	BL	BL	BL	BL	BL
47	Black IC	BL	BL	BL	BL	BL
48	Patch resistance	BL	BL	BL	BL	BL
49	PCB board	BL	BL	BL	BL	X
50	Blue plastic outer skin(Data line -1)	BL	BL	BL	BL	BL

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Seq. No.	Tested Part(s)	Results				
		Pb	Cd	Hg	Cr	Br
51	Silver metal shell(Data line -1)	BL	BL	BL	BL	BL
52	Transparent plastic(Data line -1)	BL	BL	BL	BL	BL
53	Black plastic(Data line -1)	BL	BL	BL	BL	BL
54	Silver metal needle(Data line -1)	BL	BL	BL	BL	BL
55	Black plastic wire(Data line -1)	BL	BL	BL	BL	BL
56	Silver plastic film(Data line -1)	BL	BL	BL	BL	BL
57	Red plastic film(Data line -1)	BL	BL	BL	BL	BL
58	Blue plastic film(Data line -1)	BL	BL	BL	BL	BL
59	Green plastic film(Data line -1)	BL	BL	BL	BL	BL
60	Golden plastic film(Data line -1)	BL	BL	BL	BL	BL
61	Red plastic wire (data line -1)	BL	BL	BL	BL	BL
62	Green plastic wire (data line -1)	BL	BL	BL	BL	BL
63	White plastic wire (data line -1)	BL	BL	BL	BL	BL
64	Yellow plastic wire (data line -1)	BL	BL	BL	BL	BL
65	Blue plastic wire (data line -1)	BL	BL	BL	BL	BL
66	Purple plastic wire (data line -1)	BL	BL	BL	BL	BL
67	Transparent plastic wire (data line -1)	BL	BL	BL	BL	BL
68	Gold wire (data line -1)	BL	BL	BL	BL	BL
69	Red metal shell (data line -2)	X	BL	BL	X	BL
70	Red plastic skin (data line -2)	BL	BL	BL	BL	BL
71	Silver metal shell (data line -2)	BL	BL	BL	BL	BL
72	White plastic sheet (data line -2)	BL	BL	BL	BL	BL
73	Gold metal needle (data line -2)	BL	BL	BL	BL	BL
74	Red netting (data line -2)	BL	BL	BL	BL	BL
75	White plastic outer skin (data line -2)	BL	BL	BL	BL	BL

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Seq. No.	Tested Part(s)	Results				
		Pb	Cd	Hg	Cr	Br
76	Red plastic wire (data line -2)	BL	BL	BL	BL	BL
77	White plastic wire (data line -2)	BL	BL	BL	BL	BL
78	Green plastic wire (data line -2)	BL	BL	BL	BL	BL
79	Black plastic wire (data line -2)	BL	BL	BL	BL	BL
80	Gold wire (data line -2)	BL	BL	BL	BL	BL
81	Silver metal shell (data line -2)	BL	BL	BL	X	BL
82	Black plastic outer skin (data line -3)	BL	BL	BL	BL	BL
83	Black plastic film (data line -3)	BL	BL	BL	BL	BL
84	Gold metal shell (data line -3)	BL	BL	BL	BL	BL
85	Black plastic (data line -3)	BL	BL	BL	BL	BL
86	Transparent plastic (data line -3)	BL	BL	BL	BL	BL
87	Silver metal needle (data line -3)	BL	BL	BL	BL	BL
88	Black plastic sleeve (data line -3)	BL	BL	BL	BL	BL
89	Solder	BL	BL	BL	BL	BL

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Note:

- = Not Conducted
- * = Screening by XRF and detected by chemical method. The test results of chemical method please refer to next pages.

i 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	$BL \leq 300 - 3\sigma < X$	--	$BL \leq 250 - 3\sigma < X$

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Note:

- BL = Below Limit
- OL = Over Limit
- X = Inconclusive

- ii The XRF screening test for RoHS elements – The reading may be different to the actual content in the sample be of non-uniformity composition.
- iii The maximum permissible limit is quoted from the document 2005/618/EC amending RoHS directive 2011/65/EU:

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

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. The Test Results of Chemical Method:

Test method:

Lead & Cadmium Content:

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

Mercury Content:

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

Hexavalent Chromium Content:

With reference to IEC 62321:2008 and IEC 62321-7-1:2013, 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)

1) The test results of Lead (Pb) 、 Cadmium (Cd) and Hexavalent Chromium(Cr⁶⁺)(non-metal)

Item	Unit	MDL	Results		Limit
			(8)	(69)	
Lead Content (Pb)	mg/kg	2	N.D.	N.D.	1000 mg/kg
Conclusion	/	/	Pass	Pass	/

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

Item	Unit	MDL	Results		Limit
			(9)	(13)	
Hexavalent Chromium (Cr ⁶⁺)	mg/kg	**	N.D	N.D	1000 mg/kg
Conclusion	/	/	Negative	Negative	/

Item	Unit	MDL	Results			Limit
			(40)	(69)	(81)	
Hexavalent Chromium (Cr ⁶⁺)	mg/kg	**	N.D	N.D	N.D	1000 mg/kg
Conclusion	/	/	Negative	Negative	Negative	/

Note:

- Negative = Absence of Cr(VI) on the tested areas
- MDL = Method Detection Limit
- mg/kg = ppm
- ** = Spot-test:
 Negative = Absence of Cr(VI) coating/ surface layer, Positive = Presence of Cr(VI) coating/ surface layer;
 (The tested sample should be further verified by boiling-water-extraction method if the spot test result cannot be confirmed)
 Boiling-water-extraction:
 Negative = Absence of Cr(VI) coating/ surface layer, Positive = Presence of Cr(VI) coating/ surface layer;
 (The detected concentration in boiling- water-extraction solution is equal or greater than 0.02 mg/kg with 50cm² sample surface areas.)
- # =
 Positive indicates the presence of Cr(VI) on the tested areas and result be regarded as conflict with RoHS requirement.
 Negative indicates the absence of Cr(VI) on the tested areas and result be regarded as no conflict with RoHS requirement.
- #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).

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3) The test results of PBBs & PBDEs

Item	Unit	MDL	Results			Limit
			(23)	(28)	(49)	
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 mg/kg
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 mg/kg
Conclusion	/	/	Pass	Pass	Pass	/

Note:

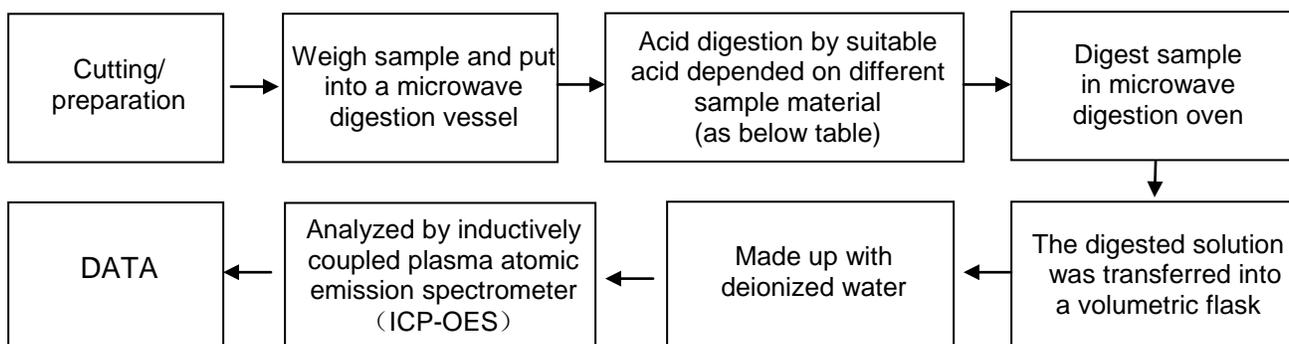
- N.D. = Not Detected or less than MDL
- mg/kg = ppm
- MDL = Method Detection Limit
- Photo appendix is included.

Appendix I

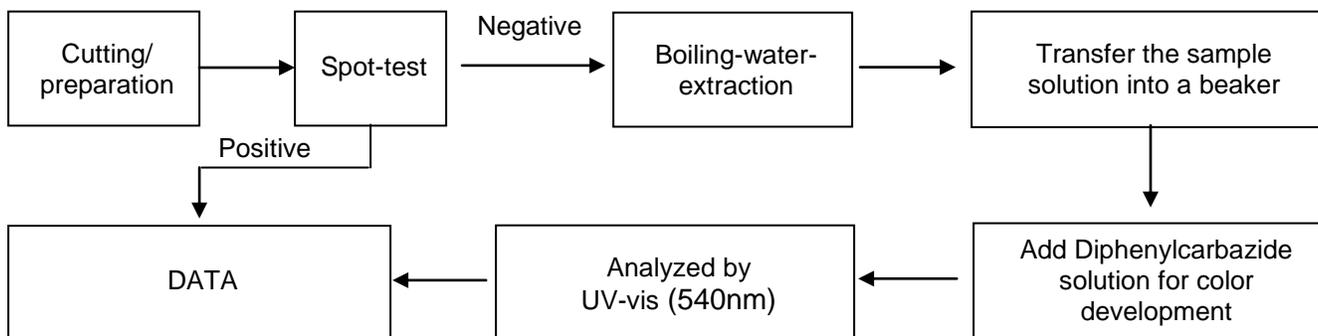
Test Flow chart

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

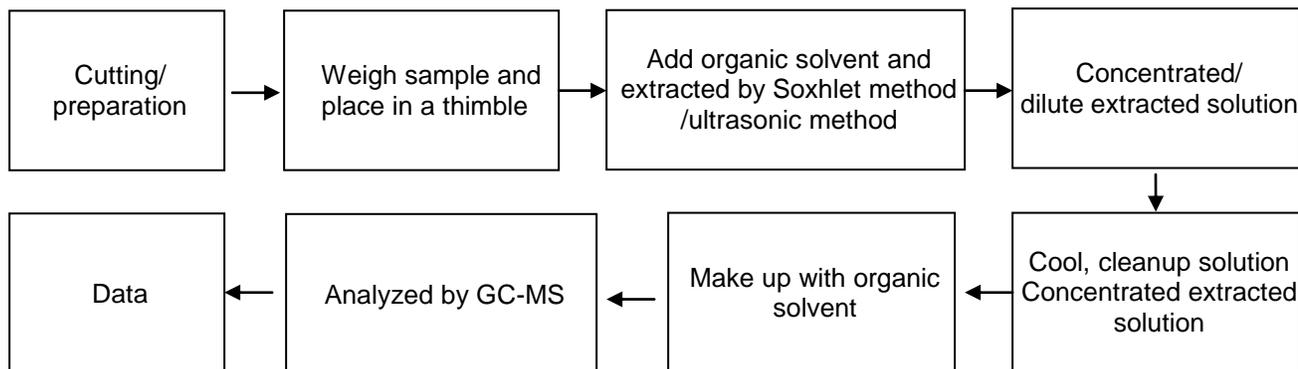
These samples were dissolved totally by pre-conditioning method according to below flow chart.



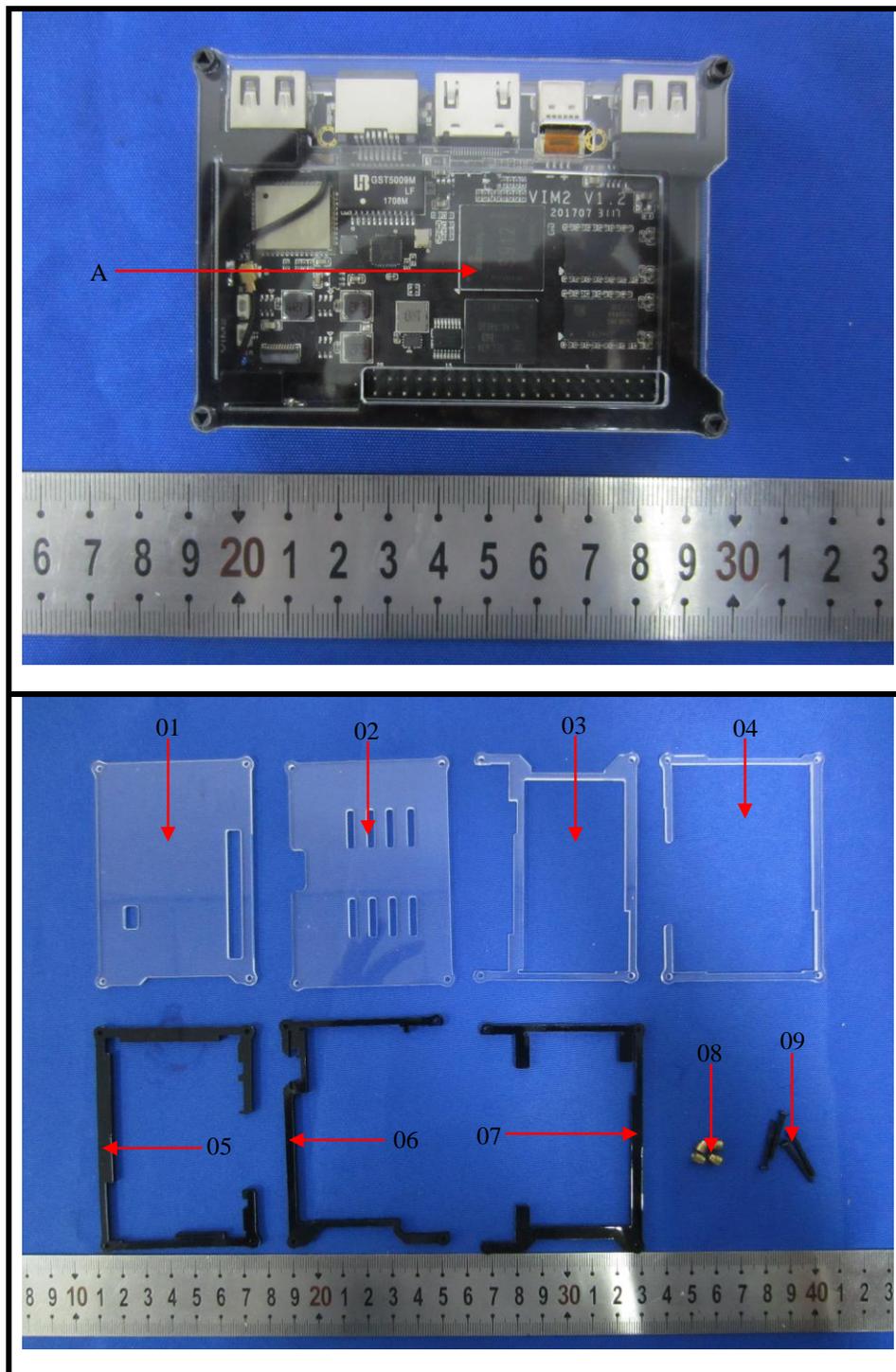
2. Test Flowchart for Cr⁶⁺ content (For metal material)



3. Test Flowchart for PBBs & PBDEs content



Appendix II Photograph of Sample



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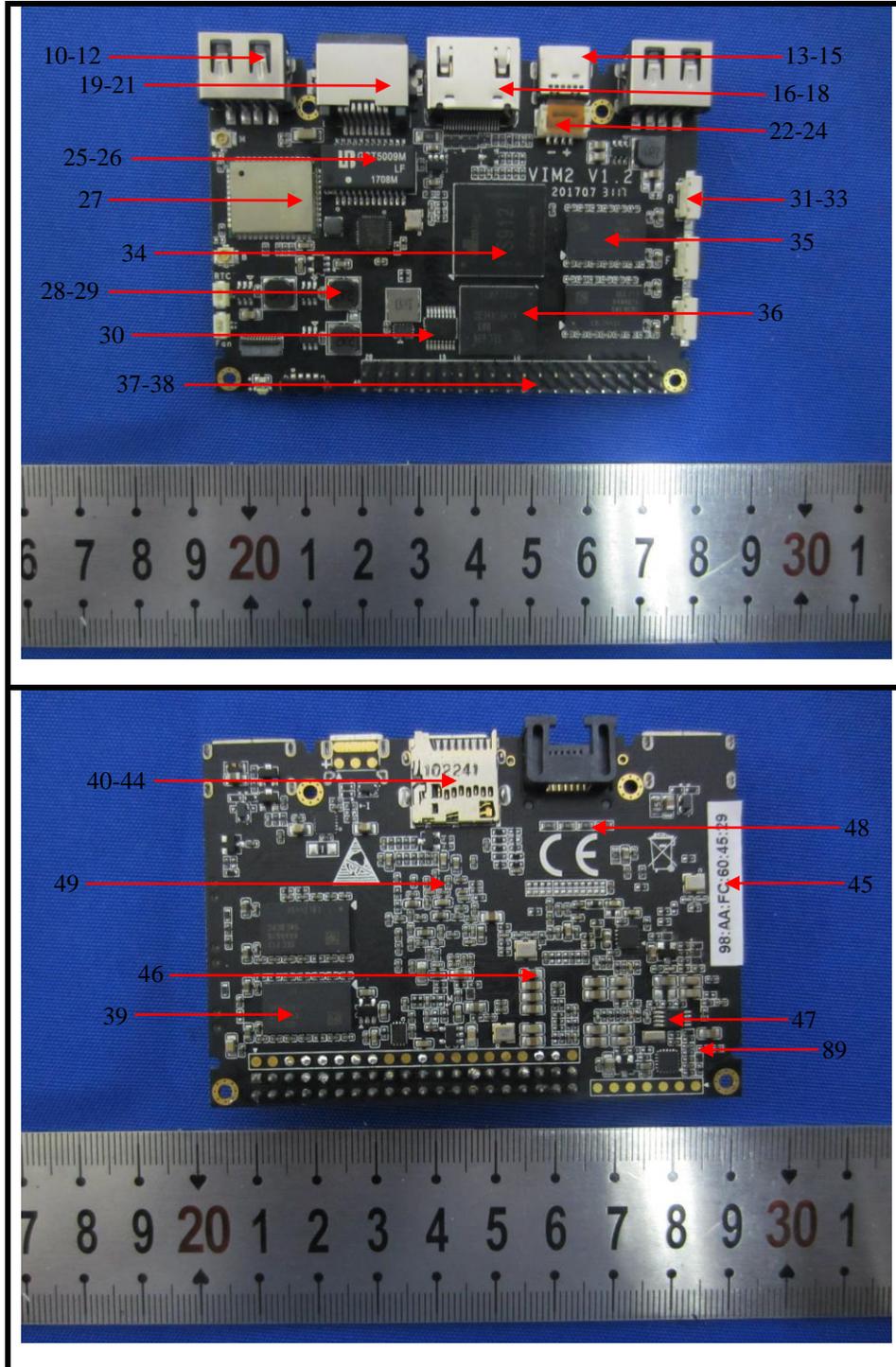
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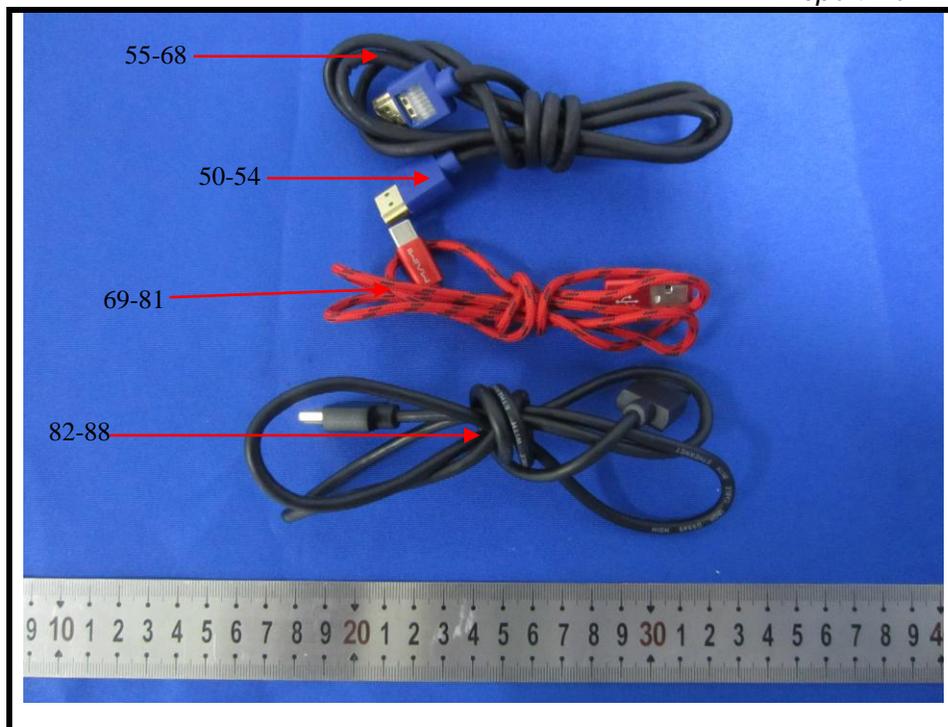
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***** End of Report *****

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