



Verification Report

Applicant : Focalcrest Limited
Address : Haisong Building Tower B Suite 1101, Tairan 9th Road, Futian District, Shenzhen 518040

Report on the submitted samples said to be:

Sample Name(s) : Single Board Computer
Trade Mark : N/A
Part No. : IEC-EDGE2-0432, IEC-EDGE2-0216
Sample Received Date : March 10, 2022
Testing Period : March 10, 2022 ~ March 30, 2022
Date of Report : March 30, 2022
Results : Please refer to next page(s).

TEST REQUEST	CONCLUSION
As specified by client, 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), Butylbenzyl Phthalate(BBP), Di-2-ethylhexyl Phthalate(DEHP) and Diisobutyl phthalate(DIBP) content comply with the limits set by RoHS Directive 2011/65/EU.	PASS

Signed for and on behalf of LCS

Young/Laboratory Manager



**Results:****A. EU RoHS Directive 2011/65/EU**

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

Sample No.	Sample Description	Results						Date of sample submission/ Resubmission
		Cd	Pb	Hg	Cr▼	Br▼		
						PBBs	PBDEs	
1	Ferrous metal shell	OL	OL	BL	X	/	/	2022-03-10
2	Ferrous metal screw	BL	BL	BL	BL	/	/	2022-03-10
3	Black plastic pad	BL	BL	BL	BL	BL	BL	2022-03-10
4	Silver sheet metal	BL	BL	BL	X	/	/	2022-03-10
5	Black plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
6	Silver sheet metal	BL	BL	BL	X	/	/	2022-03-10
7	Blue plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
8	Silver sheet metal	OL	BL	BL	BL	/	/	2022-03-10
9	Black plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
10	Green plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
11	Silver sheet metal	BL	BL	BL	BL	/	/	2022-03-10
12	Black plastic sheet	BL	BL	BL	BL	X	X	2022-03-10
13	Gold sheet metal	X	OL	BL	BL	/	/	2022-03-10
14	Black plastic sticker	BL	BL	BL	BL	BL	BL	2022-03-10
15	Black plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
16	Black plastic wire cover	BL	BL	BL	BL	BL	BL	2022-03-10
17	Black plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
18	Silver sheet metal	BL	BL	BL	X	/	/	2022-03-10
19	White dry glue	BL	BL	BL	BL	BL	BL	2022-03-10
20	Silver metal needle	BL	BL	BL	BL	/	/	2022-03-10
21	Black plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
22	Red plastic thread cover	BL	BL	BL	BL	BL	BL	2022-03-10
23	Black plastic wire cover	BL	BL	BL	BL	BL	BL	2022-03-10
24	White plastic wire skin	BL	BL	BL	BL	BL	BL	2022-03-10
25	Yellow plastic thread cover	BL	BL	BL	BL	BL	BL	2022-03-10
26	Green plastic wire cover	BL	BL	BL	BL	BL	BL	2022-03-10
27	Red wire	BL	BL	BL	BL	/	/	2022-03-10
28	Silver sheet metal	OL	OL	BL	BL	/	/	2022-03-10
29	Blue gel	BL	BL	BL	BL	BL	BL	2022-03-10





Sample No.	Sample Description	Results						Date of sample submission/ Resubmission
		Cd	Pb	Hg	Cr▼	Br▼		
						PBBs	PBDEs	
30	Silver sheet metal	BL	BL	BL	X	/	/	2022-03-10
31	White plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
32	Black heat shrinkable tube	BL	BL	BL	BL	BL	BL	2022-03-10
33	Black plastic wire cover	BL	BL	BL	BL	BL	BL	2022-03-10
34	Silver wire	OL	OL	BL	BL	/	/	2022-03-10
35	Silver metal screw	OL	BL	BL	BL	/	/	2022-03-10
36	Silver metal spring	OL	BL	BL	BL	/	/	2022-03-10
37	Silver metal screw	OL	BL	BL	BL	/	/	2022-03-10
38	Black plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
39	Silver metal needle	BL	BL	BL	BL	/	/	2022-03-10
40	Silver metal needle	BL	BL	BL	BL	/	/	2022-03-10
41	Silver metal needle	BL	BL	BL	BL	/	/	2022-03-10
42	Silver metal needle	BL	BL	BL	BL	/	/	2022-03-10
43	Silver metal needle	BL	BL	BL	BL	/	/	2022-03-10
44	Silver sheet metal	BL	BL	BL	BL	/	/	2022-03-10
45	Black plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
46	Black ceramic	BL	BL	BL	BL	BL	BL	2022-03-10
47	Red wire	BL	BL	BL	X	/	/	2022-03-10
48	Black plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
49	Silver metal needle	OL	BL	BL	BL	/	/	2022-03-10
50	White plastic sheet	BL	BL	BL	BL	X	X	2022-03-10
51	Silver metal needle	OL	BL	BL	BL	/	/	2022-03-10
52	Black IC	BL	BL	BL	BL	BL	BL	2022-03-10
53	Silver sheet metal	BL	BL	BL	BL	/	/	2022-03-10
54	Black plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
55	Silver metal shrapnel	BL	BL	BL	BL	/	/	2022-03-10
56	Black plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
57	Green diode	BL	BL	BL	BL	BL	BL	2022-03-10
58	Black plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
59	Silver sheet metal	BL	BL	BL	BL	/	/	2022-03-10
60	Brown plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
61	PCB board	BL	BL	BL	BL	X	X	2022-03-10
62	Silver sheet metal	BL	BL	BL	X	/	/	2022-03-10
63	Black plastic sheet	BL	BL	BL	BL	BL	BL	2022-03-10
64	Silver metal needle	BL	BL	BL	BL	/	/	2022-03-10



Shenzhen LCS Compliance Testing Laboratory Ltd.

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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(Unit: mg/kg).

Element	Polymers	Metals	Composite material
Cd	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$LOD < X < (150+3\sigma) \leq OL$
Pb	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$
Hg	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$
Cr	$BL \leq (700-3\sigma) < X$	$BL \leq (700-3\sigma) < X$	$BL \leq (500-3\sigma) < X$
Br	$BL \leq (300-3\sigma) < X$	N/A	$BL \leq (250-3\sigma) < X$

Remark:

- BL= Below Limit
 - OL= Over Limit
 - X= The range of needing to do further testing
 - 3σ = The reproducibility of analytical instruments
 - N/A= Not applicable
 - LOD= Detection limit
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 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.





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
Butylbenzyl 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.



**B. EU RoHS Directive 2011/65/EU on Lead(Pb), Cadmium(Cd), Hexavalent Chromium(Cr(VI)), 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) or Atomic absorption spectrometer (AAS).

Hexavalent Chromium(Cr(VI)) Content:

With reference to IEC 62321-7-1:2015, 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).

Phthalates(DBP, BBP, 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 Lead(Pb) & Cadmium(Cd)

Tested Items	MDL (mg/kg)	Results (mg/kg)				Limit (mg/kg)
		(1)	(13)	(28)	(34)	
Lead(Pb) Content	5	N.D.	23361 ^{#1}	N.D.	456	1000

Tested Items	MDL (mg/kg)	Results (mg/kg)				Limit (mg/kg)
		(1)	(8)	(13)	(28)	
Cadmium(Cd) Content	5	N.D.	N.D.	15	N.D.	100

Tested Items	MDL (mg/kg)	Results (mg/kg)				Limit (mg/kg)
		(34)	(35)	(36)	(37)	
Cadmium(Cd) Content	5	N.D.	N.D.	N.D.	N.D.	100

Tested Items	MDL (mg/kg)	Results (mg/kg)		Limit (mg/kg)
		(49)	(51)	
Cadmium(Cd) Content	5	N.D.	N.D.	100

2) The test results of Hexavalent Chromium(Cr(VI))(for coating on metal)

Tested Items	MDL (μg/cm ²)	Results (μg/cm ²)			Limit (μg/cm ²)
		(1)	(4)	(6)	
Hexavalent Chromium(Cr(VI)) Content★	0.10 (LOQ)	N.D.	N.D.	N.D.	1000



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Tested Items	MDL ($\mu\text{g}/\text{cm}^2$)	Results ($\mu\text{g}/\text{cm}^2$)			Limit ($\mu\text{g}/\text{cm}^2$)
		(18)	(30)	(47)	
Hexavalent Chromium(Cr(VI)) Content★	0.10 (LOQ)	N.D.	N.D.	N.D.	1000

Tested Items	MDL ($\mu\text{g}/\text{cm}^2$)	Results ($\mu\text{g}/\text{cm}^2$)	Limit ($\mu\text{g}/\text{cm}^2$)
		(62)	
Hexavalent Chromium(Cr(VI)) Content★	0.10 (LOQ)	N.D.	1000

3) The test results of Phthalates(DBP, BBP, DEHP & DIBP)

Tested Items	MDL (mg/kg)	Results (mg/kg)	Limit (mg/kg)
		3+5+7+9+10+12	
Dibutyl Phthalate(DBP) Content	600	N.D.	1000
Butylbenzyl Phthalate(BBP) Content	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP) Content	600	N.D.	1000
Diisobutyl phthalate(DIBP) Content	600	N.D.	1000

Tested Items	MDL (mg/kg)	Results (mg/kg)	Limit (mg/kg)
		14+15+16+17+19+21	
Dibutyl Phthalate(DBP) Content	600	N.D.	1000
Butylbenzyl Phthalate(BBP) Content	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP) Content	600	N.D.	1000
Diisobutyl phthalate(DIBP) Content	600	N.D.	1000

Tested Items	MDL (mg/kg)	Results (mg/kg)	Limit (mg/kg)
		22+23+24+25+26+29	
Dibutyl Phthalate(DBP) Content	600	N.D.	1000
Butylbenzyl Phthalate(BBP) Content	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP) Content	600	N.D.	1000
Diisobutyl phthalate(DIBP) Content	600	N.D.	1000





Tested Items	MDL (mg/kg)	Results (mg/kg)	Limit (mg/kg)
		31+32+33+38+45+46	
Dibutyl Phthalate(DBP) Content	600	N.D.	1000
Butylbenzyl Phthalate(BBP) Content	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP) Content	600	N.D.	1000
Diisobutyl phthalate(DIBP) Content	600	N.D.	1000

Tested Items	MDL (mg/kg)	Results (mg/kg)	Limit (mg/kg)
		48+50+52+54+56+57	
Dibutyl Phthalate(DBP) Content	600	N.D.	1000
Butylbenzyl Phthalate(BBP) Content	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP) Content	600	N.D.	1000
Diisobutyl phthalate(DIBP) Content	600	N.D.	1000

Tested Items	MDL (mg/kg)	Results (mg/kg)	Limit (mg/kg)
		58+60+61+63	
Dibutyl Phthalate(DBP) Content	600	N.D.	1000
Butylbenzyl Phthalate(BBP) Content	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP) Content	600	N.D.	1000
Diisobutyl phthalate(DIBP) Content	600	N.D.	1000



**4) The test results of PBBs & PBDEs**

Tested Items	MDL (mg/kg)	Results (mg/kg)			Limit (mg/kg)
		(12)	(50)	(61)	
Polybrominated Biphenyls(PBBs) Content					
Monobromobiphenyl	5	N.D.	N.D.	N.D.	/
Dibromobiphenyl	5	N.D.	N.D.	N.D.	/
Tribromobiphenyl	5	N.D.	N.D.	N.D.	/
Tetrabromobiphenyl	5	N.D.	N.D.	N.D.	/
Pentabromobiphenyl	5	N.D.	N.D.	N.D.	/
Hexabromobiphenyl	5	N.D.	N.D.	N.D.	/
Heptabromobiphenyl	5	N.D.	N.D.	N.D.	/
Octabromobiphenyl	5	N.D.	N.D.	N.D.	/
Nonabromodiphenyl	5	N.D.	N.D.	N.D.	/
Decabromodiphenyl	5	N.D.	N.D.	N.D.	/
Total content	/	N.D.	N.D.	N.D.	1000
Polybrominated Diphenylethers(PBDEs) Content					
Monobromodiphenyl ether	5	N.D.	N.D.	N.D.	/
Dibromodiphenyl ether	5	N.D.	N.D.	N.D.	/
Tribromodiphenyl ether	5	N.D.	N.D.	N.D.	/
Tetrabromodiphenyl ether	5	N.D.	N.D.	N.D.	/
Pentabromodiphenyl ether	5	N.D.	N.D.	N.D.	/
Hexabromodiphenyl ether	5	N.D.	N.D.	N.D.	/
Heptabromodiphenyl ether	5	N.D.	N.D.	N.D.	/
Octabromodiphenyl ether	5	N.D.	N.D.	N.D.	/
Nonabromodiphenyl ether	5	N.D.	N.D.	N.D.	/
Decabromodiphenyl ether	5	N.D.	N.D.	N.D.	/
Total content	/	N.D.	N.D.	N.D.	1000



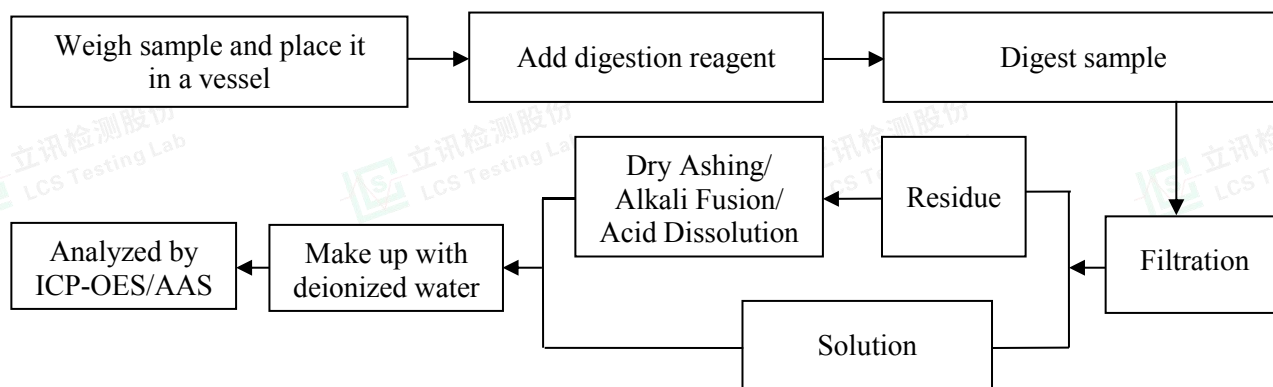


Note:

- MDL = Method Detection Limit
- N.D.=Not Detected(<MDL or LOQ)
- mg/kg = ppm=parts per million
- 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.
- According to customer's requirement, only the appointed materials have been tested.
- #1 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.

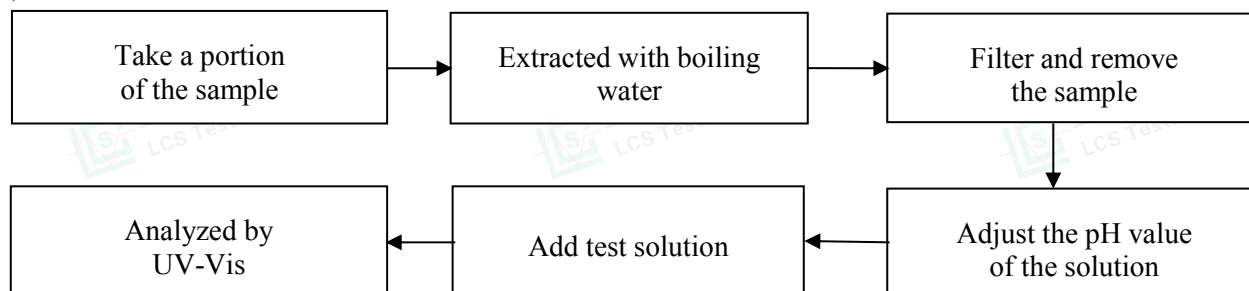
Test Process

1. Lead(Pb) & Cadmium(Cd): IEC 62321-5:2013



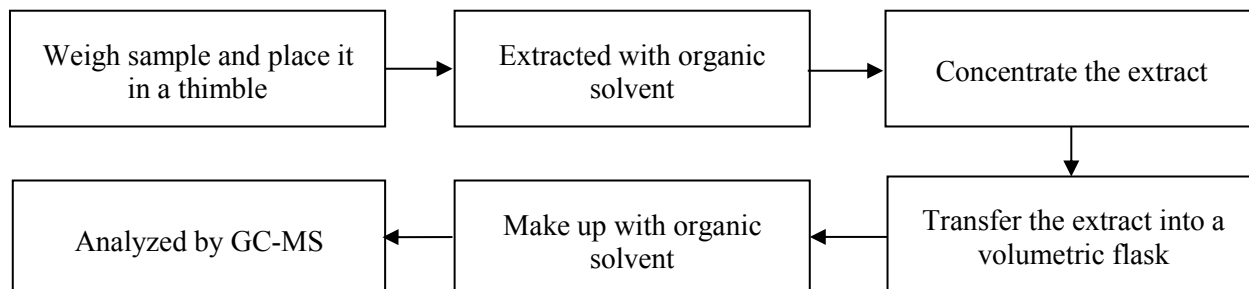
2. Hexavalent Chromium(Cr(VI))

1) IEC 62321-7-1:2015

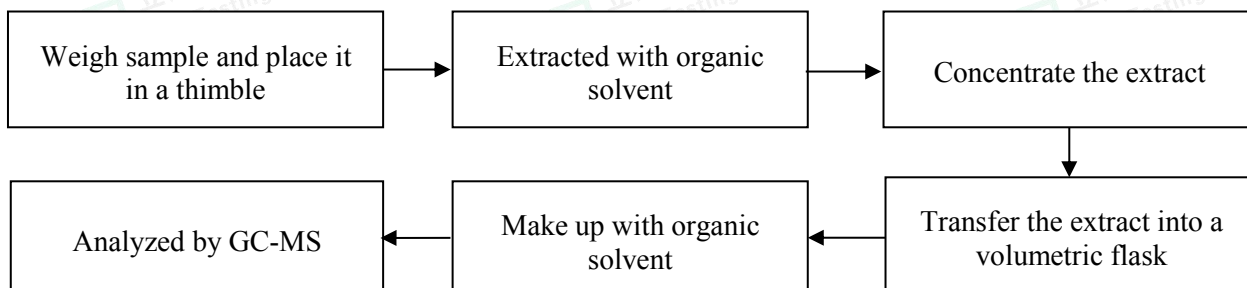




3. Polybrominated Biphenyls(PBBs) & Polybrominated Diphenyl Ethers(PBDEs) : IEC 62321-6:2015

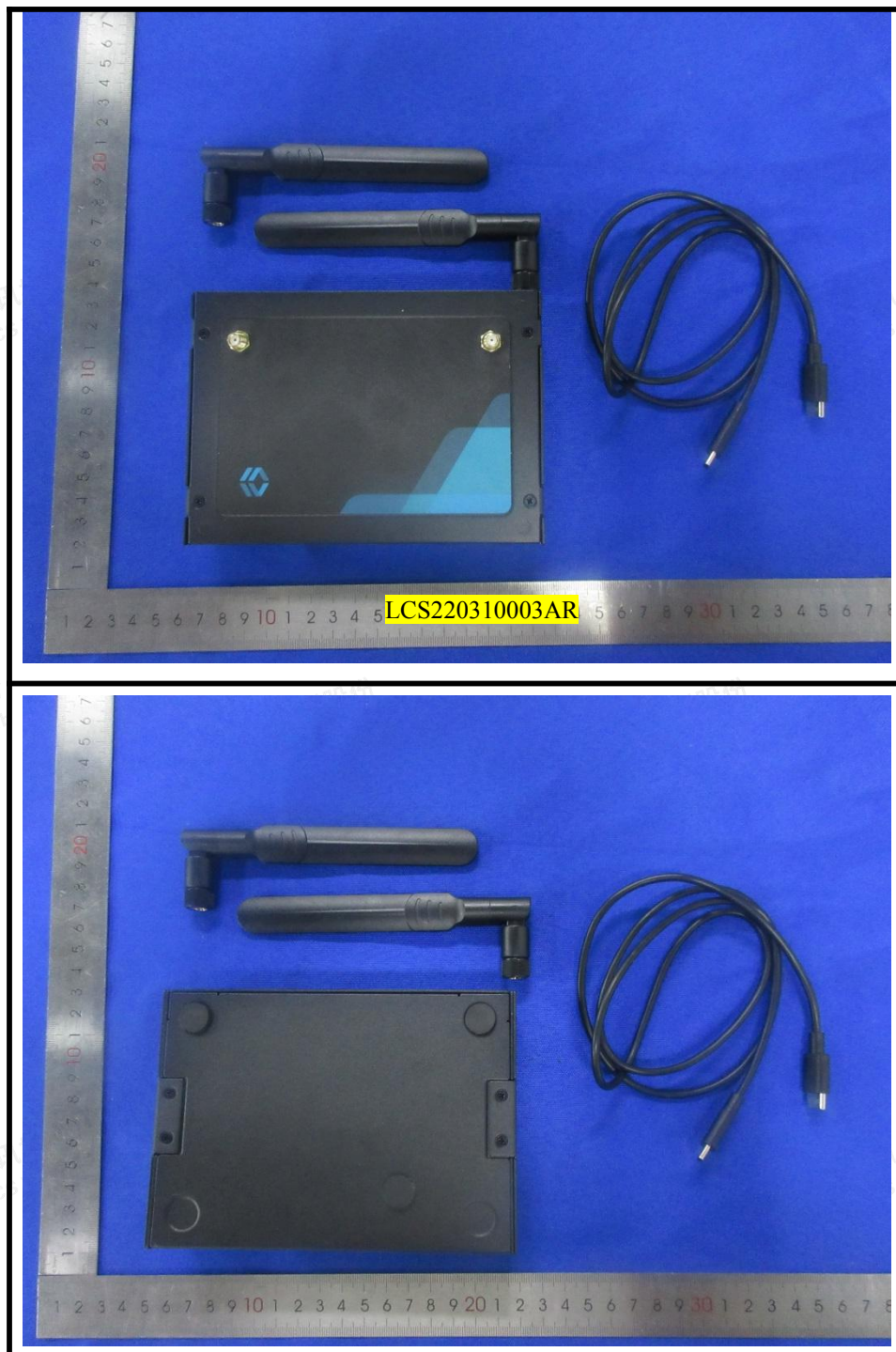


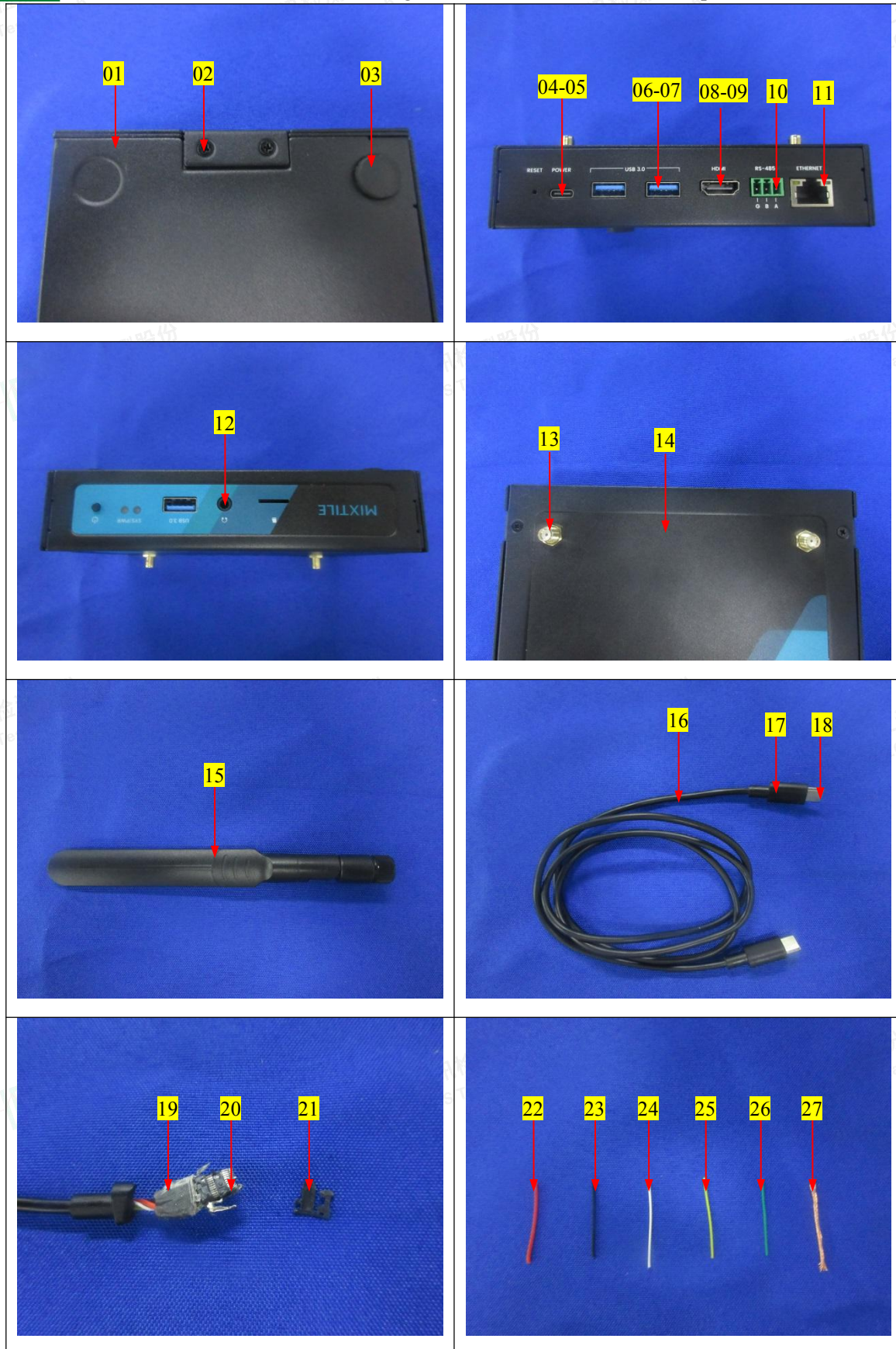
4. Phthalates(DBP, BBP, DEHP & DIBP) : IEC 62321-8:2017

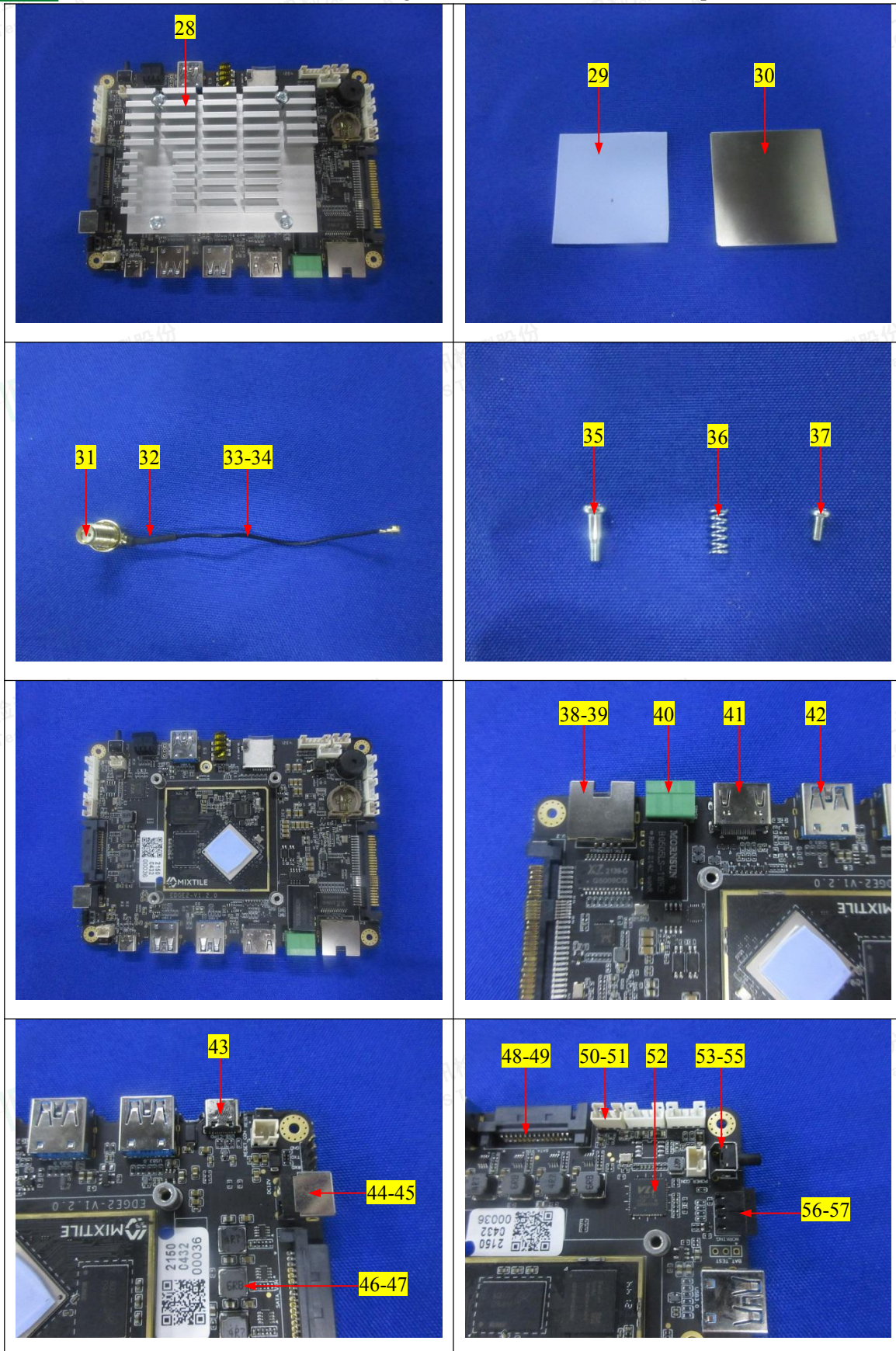


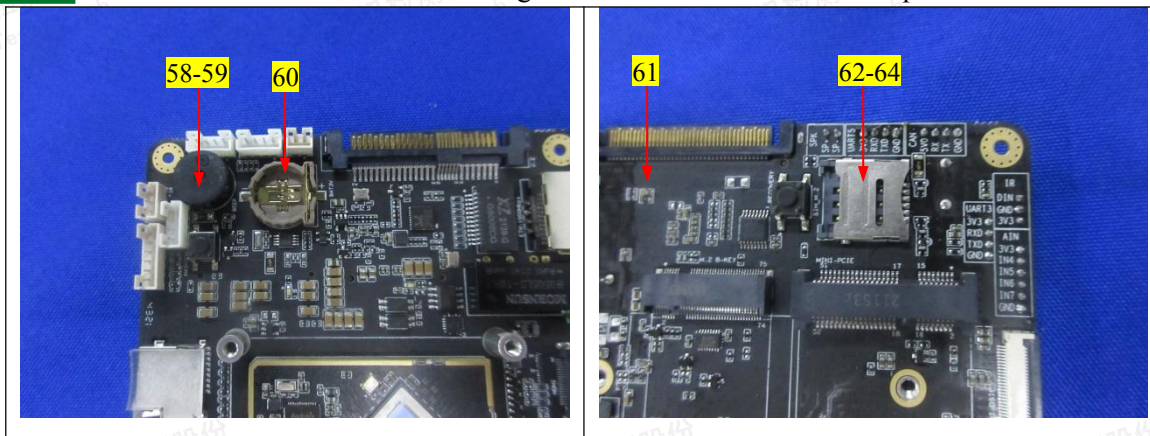


The photo(s) of the sample







**Statement:**

1. The test report is invalid without the signature of the approver and the special seal for the company's report;
2. The company name, address and sample information shown on the report were provided by the applicant who should be responsible for the authenticity which are not verified by LCS;
3. The test results in this report are only responsible for the tested samples;
4. Without written approval of LCS, this report can't be reproduced except in full;
5. In case of any discrepancy between the corresponding Chinese and English contents in the test report, the English version shall prevail.

*** End of Report ***

