TEST REPORT

Applicant :

Address :

Report on the submitted samples said to be:

Sample Name : Free Flow TWS earbuds in case

Trade Mark : N/A

Style No. :

Testing Period : January 14, 2020 ~ March 19, 2020

Results : Please refer to next page(s).

TEST REQUEST	CONCLUSION
According to the customer's request, based on the performed tests on submitted sample, the result of Lead(Pb), Cadmium(Cd), Mercury(Hg), Hexavalent Chromium(Cr(VI)), PBBs, PBDEs, Dibuyl Phthalate(DBP), Benzylbutyl Phthalate(BBP), Bis(2-ethylhexyl) Phthalate(DEHP), Diispbutyl phthalate(DIBP) content comply with the limit requirement as set of RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.	Pass

Signed for and on behalf of LCS

Center of Testing Service * APPROVED *

Daniel

TEST REPORT

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▼	Br▼		
						PBBs	PBDEs	
1	Black plastic with transparent elastic paint (shell)	BL	BL	BL	BL	BL	BL	2020-01-14
2	Black plastic (headphone slot)	BL	BL	BL	BL	BL	BL	2020-01-14
3	Silver metal magnet	BL	BL	BL	BL	/	/	2020-01-14
4	Silver metal screw	BL	BL	BL	BL	/	/	2020-01-14
5	Black foam with adhesive (battery)	BL	BL	BL	BL	BL	BL	2020-01-14
6	Black plastic thread	BL	BL	BL	BL	BL	BL	2020-01-14 2020-03-16
7	Red plastic thread	BL	BL	BL	BL	BL	BL	2020-01-14
8	Silver metal wire	BL	BL	BL	BL	/	/	2020-01-14
9	Silver metal case (USB interface)	BL	BL	BL	BL	/	/	2020-01-14
10	Black plastic (USB interface)	BL	BL	BL	BL	BL	BL	2020-01-14
11	Silver metal pin (USB interface)	BL	BL	BL	BL	/	/	2020-01-14
12	Black body IC (U2)	BL	BL	BL	BL	BL	BL	2020-01-14
13	Brown chip capacitor (C3)	BL	BL	BL	BL	BL	BL	2020-01-14
14	Black chip resistor (R3)	BL	BL	BL	BL	BL	BL	2020-01-14
15	Black ceramic case (L1)	BL	BL	BL	BL	BL	BL	2020-01-14
16	Copper wire (L1)	X	BL	BL	BL	/	/	2020-01-14
17	Solder joint	BL	X	BL	BL	/	/	2020-01-14
18	Golden metal pin	BL	OL	BL	BL	/	/	2020-01-14
19	Green PCB	BL	BL	BL	BL	BL	BL	2020-01-14
20	Black soft plastic cap (headphone)	BL	BL	BL	BL	BL	BL	2020-01-14
21	Black plastic case (headphone)	BL	BL	BL	BL	BL	BL	2020-01-14
22	Silver metal case (horn)	BL	BL	BL	BL	/	/	2020-01-14
23	Black foam with viscose (horn)	BL	BL	BL	BL	BL	BL	2020-01-14
24	White dry glue (horn)	BL	BL	BL	BL	BL	BL	2020-01-14
25	Green PCB (horn)	BL	BL	BL	BL	X	X	2020-01-14

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TEST REPORT

Seq. No.	Tested Part(s)	Results						Date of sample submission/resubmission
		Cd	Pb	Hg	Cr▼	Br▼		
						PBBs	PBDEs	
26	Solder joint (horn)	BL	BL	BL	BL	/	/	2020-01-14/ 2020-03-04
27	Black body IC (headphone)	BL	BL	BL	BL	BL	BL	2020-01-14
28	Silver metal body (headphone)	OL	BL	BL	BL	/	/	2020-01-14
29	Gold metal rod (headphone)	X	OL	BL	BL	/	/	2020-01-14
30	Green PCB (headphone)	BL	BL	BL	BL	X	X	2020-01-14
31	Solder joint (headphone)	BL	OL	BL	BL	/	/	2020-01-14
32	White plastic case	BL	BL	BL	BL	BL	BL	2020-01-14
33	White plastic case (headphone)	BL	BL	BL	BL	BL	BL	2020-01-14
34	White soft plastic cap (headphone)	BL	BL	BL	BL	BL	BL	2020-01-14
35	Black soft plastic case (data cable)	BL	BL	BL	BL	BL	BL	2020-01-14
36	Silver metal inner case (data cable)	BL	BL	BL	BL	/	/	2020-01-14
37	Internal black plastic (data cable)	BL	BL	BL	BL	BL	BL	2020-01-14
38	Internal white plastic gasket (data cable)	BL	BL	BL	BL	BL	BL	2020-01-14
39	Black plastic wire cover (data cable)	BL	BL	BL	BL	BL	BL	2020-01-14 2020-03-16
40	White plastic wire cover (data cable)	BL	BL	BL	BL	BL	BL	2020-01-14
41	Red plastic wire cover (data cable)	BL	BL	BL	BL	BL	BL	2020-01-14
42	Copper wire (data line)	BL	BL	BL	BL	/	/	2020-01-14
43	White soft plastic case (data cable)	BL	BL	BL	BL	BL	BL	2020-01-14
44	White plastic wire cover (data cable)	BL	BL	BL	BL	BL	BL	2020-01-14

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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.

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
Dibuyl Phthalate(DBP)	1000
Benzylbutyl Phthalate(BBP)	1000
Bis(2-ethylhexyl) Phthalate(DEHP)	1000
Diispbutyl 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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TEST REPORT

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(Cr(VI)) 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 Lead (Pb) and Cadmium (Cd)

Item	Unit	MDL	Results		Limit
			(17)	(18)	
Lead Content (Pb)	mg/kg	5	N.D.	22568#3	1000

Item	Unit	MDL	Results		Limit
			(29)	(31)	
Lead Content (Pb)	mg/kg	5	27219#3	3007#5	1000

Item	Unit	MDL	Results			Limit
			(16)	(28)	(29)	
Cadmium Content (Cd)	mg/kg	5	N.D.	N.D.	17	100

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TEST REPORT

Note:

- MDL = Method Detection Limit
- /= Not apply
- LOQ = Limit of Quantification, The LOQ of Hexavalent chromium is 0.10 μg/cm^2
- ▼ = a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13ug/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 0.10ug/cm^2). The sample coating is considered a non- Cr(VI) based coating
  c. The result between 0.10μg/cm^2 and 0.13μg/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
- mg/kg = ppm=parts per million
- N.D.=Not Detected(<MDL or LOQ)

#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).

#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.

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

Item	Unit	MDL	Results	Limit
			1+2+10+12+13+14	
Dibuyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Bis(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diispbutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

Item	Unit	MDL	Results	Limit
			15+19+21	
Dibuyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Bis(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diispbutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

Item	Unit	MDL	Results	Limit
			30+32+33+38+37	
Dibuyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Bis(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diispbutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

Item	Unit	MDL	Results	Limit
			24+25+27	
Dibuyl Phthalate(DBP)	mg/kg	600	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	600	N.D.	1000
Bis(2-ethylhexyl) Phthalate(DEHP)	mg/kg	600	N.D.	1000
Diispbutyl phthalate(DIBP)	mg/kg	600	N.D.	1000

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Item	Unit	MDL	Results				Limit
			5	6	7	20	
Dibuyl Phthalate(DBP)	mg/kg	100	N.D.	N.D.	133	188	1000
Benzylbutyl Phthalate(BBP)	mg/kg	100	N.D.	N.D.	N.D.	N.D.	1000
Bis(2-ethylhexyl) Phthalate(DEHP)	mg/kg	100	N.D.	N.D.	120	307	1000
Diispbutyl phthalate(DIBP)	mg/kg	100	N.D.	N.D.	N.D.	N.D.	1000

Item	Unit	MDL	Results				Limit
			23	34	35	39	
Dibuyl Phthalate(DBP)	mg/kg	100	N.D.	N.D.	N.D.	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	100	N.D.	N.D.	N.D.	N.D.	1000
Bis(2-ethylhexyl) Phthalate(DEHP)	mg/kg	100	177	263	N.D.	N.D.	1000
Diispbutyl phthalate(DIBP)	mg/kg	100	N.D.	N.D.	N.D.	N.D.	1000

Item	Unit	MDL	Results				Limit
			40	41	43	44	
Dibuyl Phthalate(DBP)	mg/kg	100	N.D.	N.D.	N.D.	N.D.	1000
Benzylbutyl Phthalate(BBP)	mg/kg	100	N.D.	N.D.	N.D.	N.D.	1000
Bis(2-ethylhexyl) Phthalate(DEHP)	mg/kg	100	N.D.	351	N.D.	N.D.	1000
Diispbutyl phthalate(DIBP)	mg/kg	100	N.D.	N.D.	N.D.	N.D.	1000

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TEST REPORT

3) The test results of PBBs & PBDEs

Item	Unit	MDL	Results		Limit
			(25)	(30)	
Polybrominated Biphenyls (PBBs)					
Monobromobiphenyl	mg/kg	5	N.D.	N.D.	
Dibromobiphenyl	mg/kg	5	N.D.	N.D.	
Tribromobiphenyl	mg/kg	5	N.D.	N.D.	
Tetrabromobiphenyl	mg/kg	5	N.D.	N.D.	
Pentabromobiphenyl	mg/kg	5	N.D.	N.D.	
Hexabromobiphenyl	mg/kg	5	N.D.	N.D.	
Heptabromobiphenyl	mg/kg	5	N.D.	N.D.	
Octabromobiphenyl	mg/kg	5	N.D.	N.D.	
Nonabromodiphenyl	mg/kg	5	N.D.	N.D.	
Decabromodiphenyl	mg/kg	5	N.D.	N.D.	
Total content	mg/kg	/	N.D.	N.D.	1000
Polybrominated Diphenylethers (PBDEs)(Mon-Deca)					
Monobromodiphenyl ether	mg/kg	5	N.D.	N.D.	
Dibromodiphenyl ether	mg/kg	5	N.D.	N.D.	
Tribromodiphenyl ether	mg/kg	5	N.D.	N.D.	
Tetrabromodiphenyl ether	mg/kg	5	N.D.	N.D.	
Pentabromodiphenyl ether	mg/kg	5	N.D.	N.D.	
Hexabromodiphenyl ether	mg/kg	5	N.D.	N.D.	
Heptabromodiphenyl ether	mg/kg	5	N.D.	N.D.	
Octabromodiphenyl ether	mg/kg	5	N.D.	N.D.	
Nonabromodiphenyl ether	mg/kg	5	N.D.	N.D.	
Decabromodiphenyl ether	mg/kg	5	N.D.	N.D.	
Total content	mg/kg	/	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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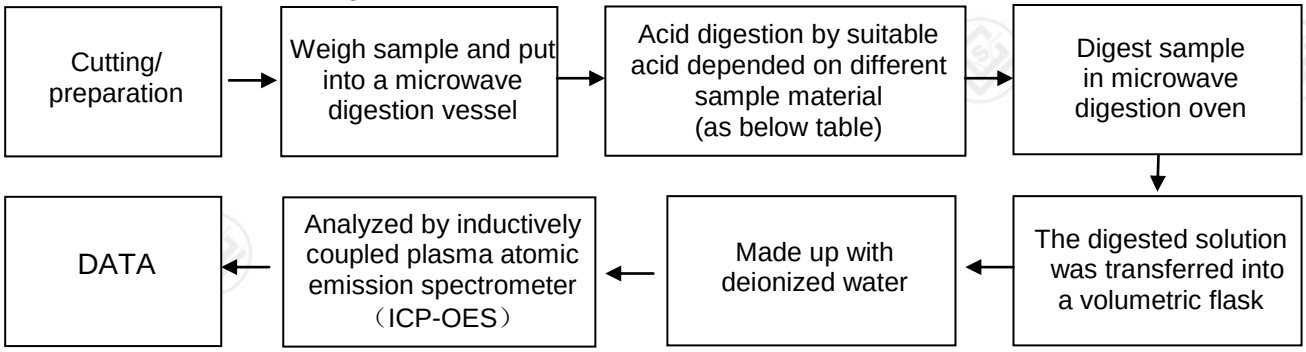
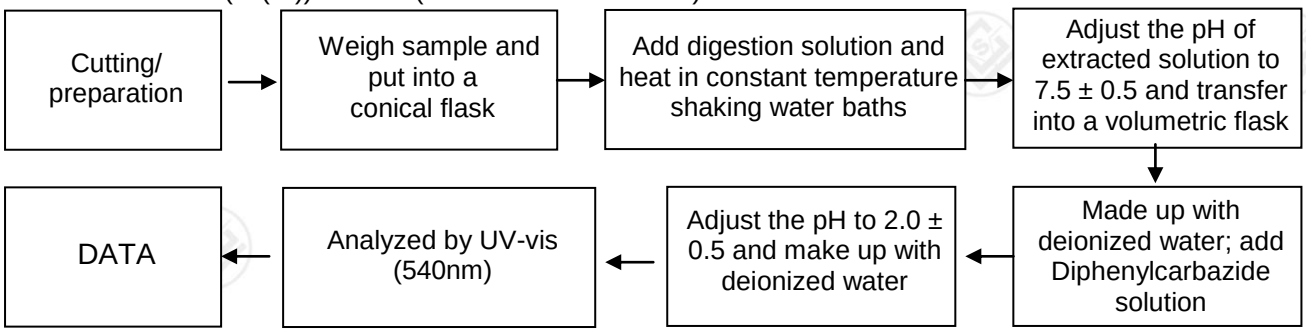
TEST REPORT

Appendix

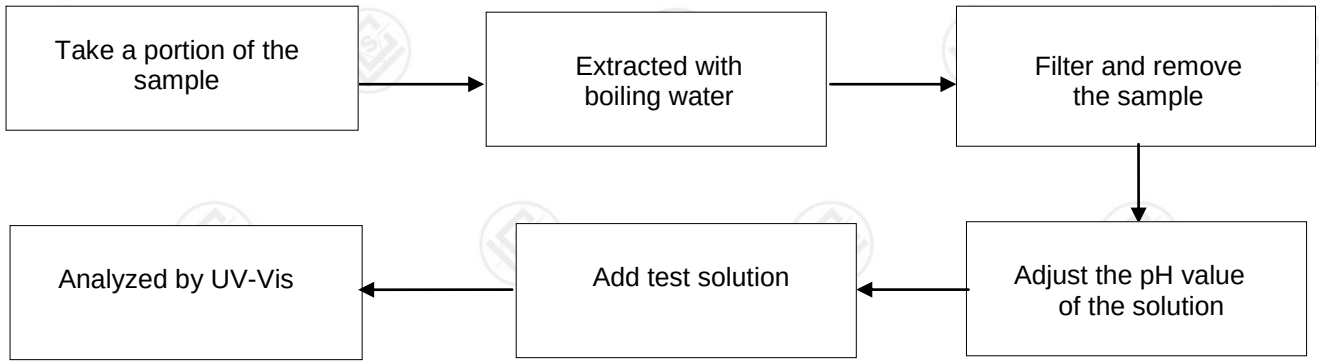
1. Test Flow chart for Cd/Pb /Hg content



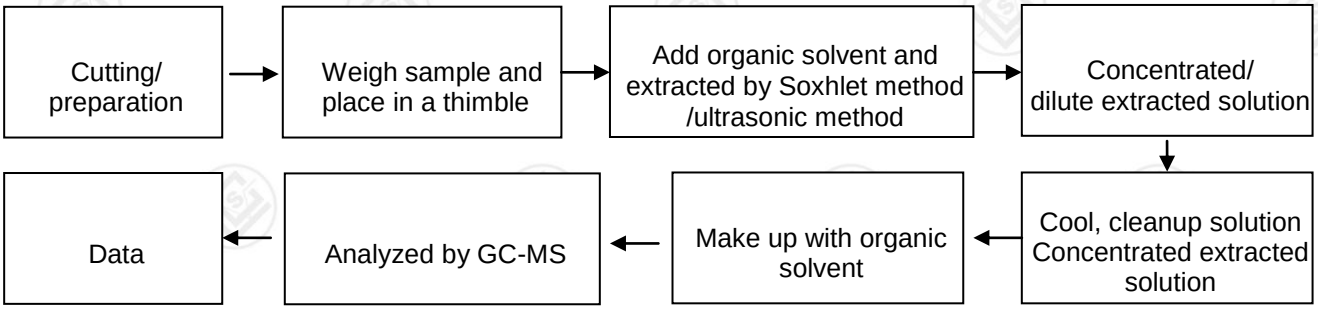
2. Test Flowchart for(Cr(VI)) content (For non-metal material)



Test Flowchart for (Cr(VI)) content (For metal material)



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



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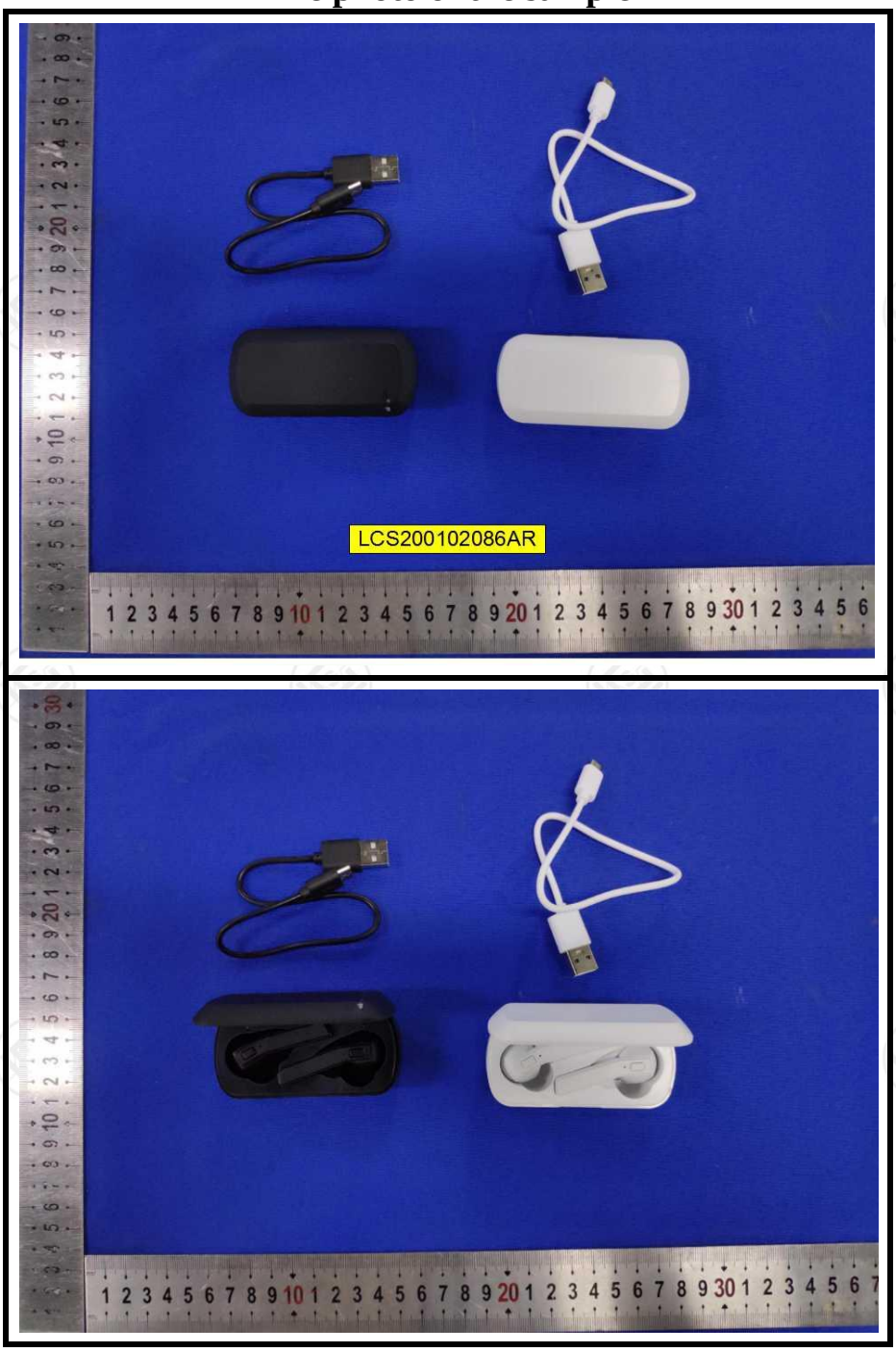
The photo of the sample



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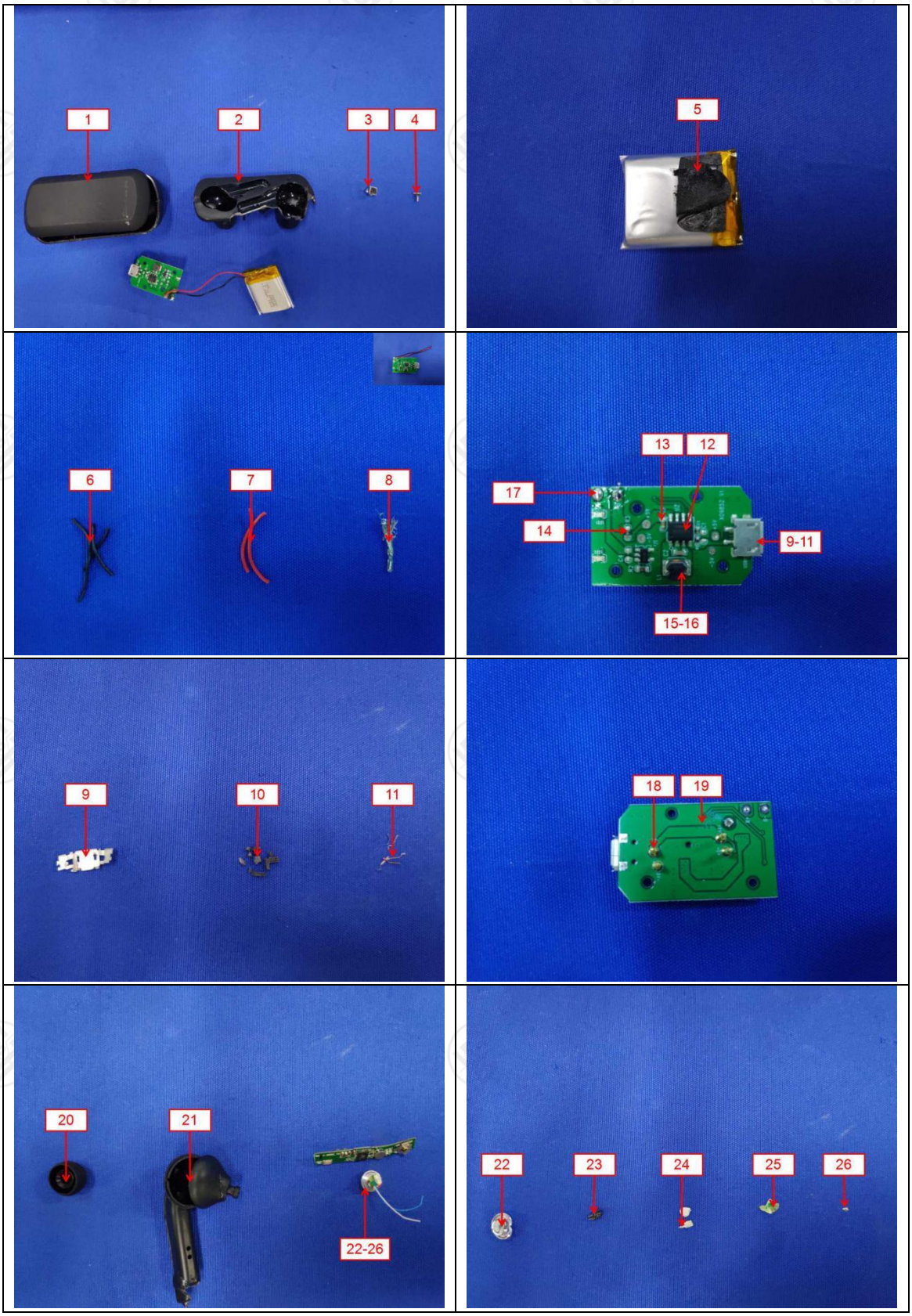

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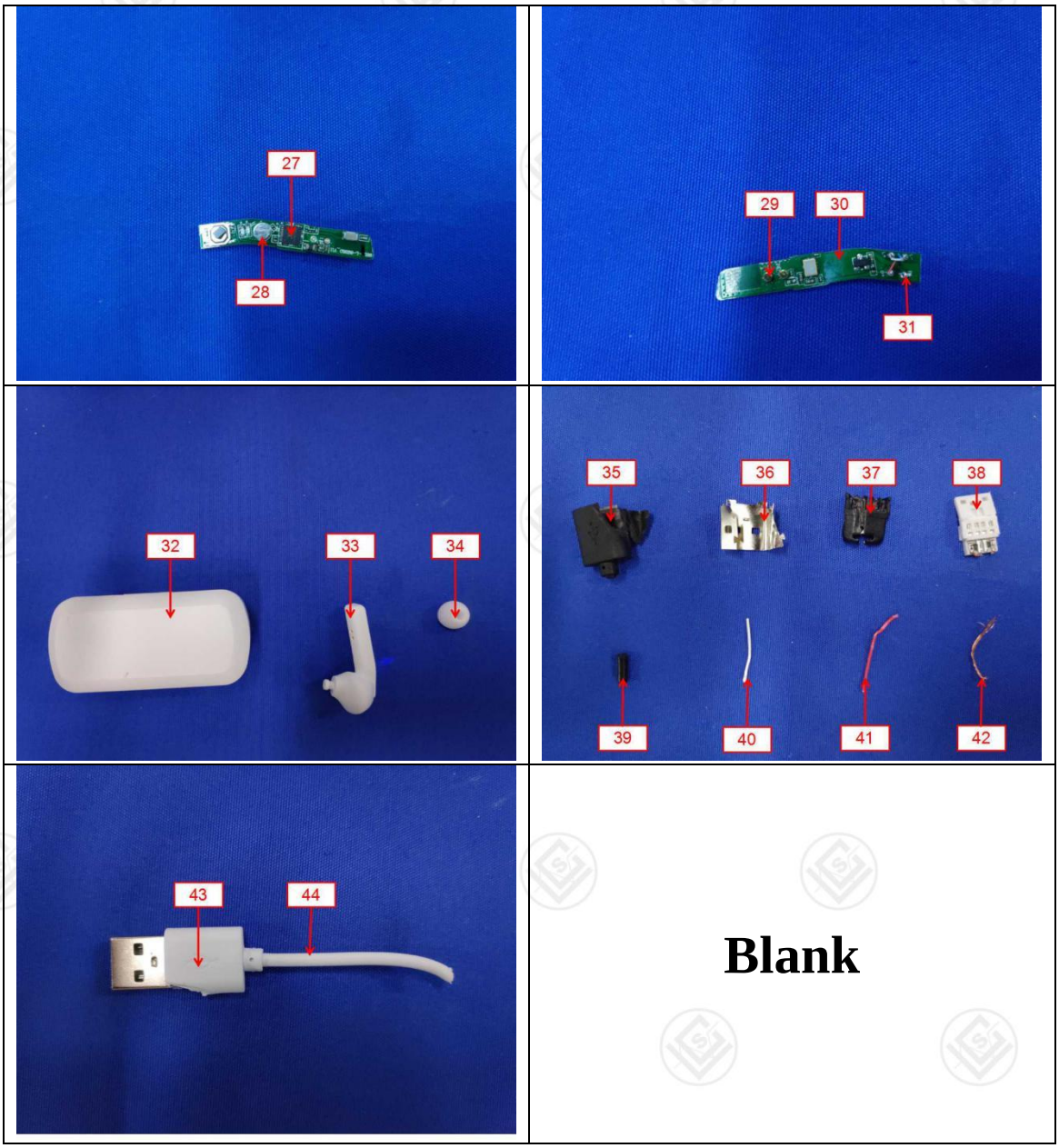

********** End of Report **********

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.