



# Verification Report

Report No.: LCS211011002AR

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**Applicant** : Open Vehicles Ltd  
**Address** : House 8 Hong Hay Villa Chuk Kok Road Sai Kung, Hong Kong

**Report on the submitted samples said to be:**

**Sample Name(s)** : OVMS  
**Trade Mark** : Open Vehicles  
**Part No.** : OVMS-33-7600G  
**Sample Received Date** : October 11, 2021  
**Testing Period** : October 11, 2021 ~ October 18, 2021  
**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 with amendment (EU) 2015/863.	<b>Pass</b>

Signed for and on behalf of LCS

Young/Laboratory Manager



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## Results:

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

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 <sup>v</sup>	Br <sup>v</sup>		
						PBBs	PBDEs	
1	Black plastic case	BL	BL	BL	BL	BL	BL	2021-10-11
2	Silver metal screws	BL	BL	BL	BL	/	/	2021-10-11
3	Black metal screws	BL	BL	BL	BL	/	/	2021-10-11
4	Brown body	BL	BL	BL	BL	BL	BL	2021-10-11
5	Black body	BL	BL	BL	BL	BL	BL	2021-10-11
6	Black body	BL	BL	BL	BL	BL	BL	2021-10-11
7	Black body	BL	BL	BL	BL	BL	BL	2021-10-11
8	Silver metal pins	BL	BL	BL	BL	/	/	2021-10-11
9	Black plastic board	BL	BL	BL	BL	BL	BL	2021-10-11
10	Silver metal solder	BL	BL	BL	BL	/	/	2021-10-11
11	Silver metal case	BL	BL	BL	BL	/	/	2021-10-11
12	Black plastic plug	BL	BL	BL	BL	BL	BL	2021-10-11
13	Silver metal pins	BL	BL	BL	BL	/	/	2021-10-11
14	White wet paper	BL	BL	BL	BL	BL	BL	2021-10-11
15	Bright silver metal film	BL	BL	BL	BL	/	/	2021-10-11
16	Silver gray plastic film	BL	BL	BL	BL	/	/	2021-10-11
17	Black plastic base	BL	BL	BL	BL	BL	BL	2021-10-11
18	Black body	BL	BL	BL	BL	BL	BL	2021-10-11
19	Silver metal case	BL	BL	BL	BL	/	/	2021-10-11
20	Black plastic bracket	BL	BL	BL	BL	BL	BL	2021-10-11
21	Silver metal pins	BL	BL	BL	BL	/	/	2021-10-11
22	Silver metal case	BL	BL	BL	BL	/	/	2021-10-11
23	Black plastic bracket	BL	BL	BL	BL	BL	BL	2021-10-11
24	Silver metal pins	BL	BL	BL	BL	/	/	2021-10-11
25	Black plastic	BL	BL	BL	BL	BL	BL	2021-10-11
26	Silver metal needle	BL	BL	BL	BL	/	/	2021-10-11
27	Silver metal case	BL	BL	BL	BL	/	/	2021-10-11
28	Blue PCB board	BL	BL	BL	BL	BL	BL	2021-10-11



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Sample No.	Sample Description	Results						Date of sample submission/ Resubmission
		Cd	Pb	Hg	Cr <sup>VI</sup>	Br <sup>▼</sup>		
						PBBs	PBDEs	
29	Copper-colored metal	BL	BL	BL	BL	/	/	2021-10-11
30	Silver perforated metal sheet	BL	BL	BL	BL	/	/	2021-10-11
31	White plastic button	BL	BL	BL	BL	BL	BL	2021-10-11
32	Copper-colored metal sheet	BL	BL	BL	BL	/	/	2021-10-11
33	Black plastic base	BL	BL	BL	BL	BL	BL	2021-10-11
34	Silver metal pins	BL	BL	BL	BL	/	/	2021-10-11
35	Silver metal screws	BL	BL	BL	BL	/	/	2021-10-11
36	Silver metal pins	BL	BL	BL	BL	/	/	2021-10-11
37	Silver metal case	BL	BL	BL	BL	/	/	2021-10-11
38	Black plastic	BL	BL	BL	BL	BL	BL	2021-10-11
39	Copper-colored metal	BL	BL	BL	BL	/	/	2021-10-11
40	Black body	BL	BL	BL	BL	BL	BL	2021-10-11
41	Gray body	BL	BL	BL	BL	BL	BL	2021-10-11
42	Black body	BL	BL	BL	BL	BL	BL	2021-10-11
43	Black body	BL	BL	BL	BL	BL	BL	2021-10-11
44	Black body	BL	BL	BL	BL	BL	BL	2021-10-11
45	Copper-colored metal	BL	BL	BL	BL	/	/	2021-10-11
46	Black body	BL	BL	BL	BL	BL	BL	2021-10-11
47	Black body	BL	BL	BL	BL	BL	BL	2021-10-11
48	Black body	BL	BL	BL	BL	BL	BL	2021-10-11
49	Copper-colored metal	BL	BL	BL	BL	/	/	2021-10-11
50	Black leather	BL	BL	BL	BL	BL	BL	2021-10-11
51	Copper-colored metal wire	BL	BL	BL	BL	/	/	2021-10-11
52	Black heat shrinkable tube	BL	BL	BL	BL	BL	BL	2021-10-11
53	Copper-colored metal	BL	BL	BL	BL	/	/	2021-10-11
54	White plastic bracket	BL	BL	BL	BL	BL	BL	2021-10-11



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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
  - $3\sigma$ = 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 with amendment (EU) 2015/863.
  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
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.



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## **B. EU RoHS Directive 2011/65/EU with amendment (EU) 2015/863 on DBP, BBP, DEHP & DIBP content**

Test method:

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 DBP, BBP, DEHP & DIBP**

Tested Items	Unit	MDL	Results	Limit
			1+4+5+6+7+9	
Dibutyl Phthalate(DBP) Content	mg/kg	600	N.D.	1000
Butylbenzyl Phthalate(BBP) Content	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP) Content	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP) Content	mg/kg	600	N.D.	1000

Tested Items	Unit	MDL	Results	Limit
			12+14+17+18+20+23	
Dibutyl Phthalate(DBP) Content	mg/kg	600	N.D.	1000
Butylbenzyl Phthalate(BBP) Content	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP) Content	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP) Content	mg/kg	600	N.D.	1000

Tested Items	Unit	MDL	Results	Limit
			25+28+31+33+38+40	
Dibutyl Phthalate(DBP) Content	mg/kg	600	N.D.	1000
Butylbenzyl Phthalate(BBP) Content	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP) Content	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP) Content	mg/kg	600	N.D.	1000



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Tested Items	Unit	MDL	Results	Limit
			41+42+43+44+46+47	
Dibutyl Phthalate(DBP) Content	mg/kg	600	N.D.	1000
Butylbenzyl Phthalate(BBP) Content	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP) Content	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP) Content	mg/kg	600	N.D.	1000

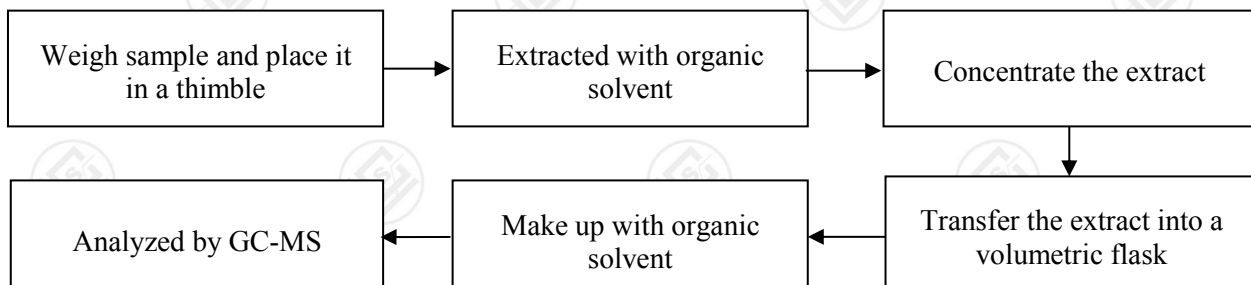
Tested Items	Unit	MDL	Results	Limit
			48+50+52+54	
Dibutyl Phthalate(DBP) Content	mg/kg	600	N.D.	1000
Butylbenzyl Phthalate(BBP) Content	mg/kg	600	N.D.	1000
Di-(2-ethylhexyl) Phthalate(DEHP) Content	mg/kg	600	N.D.	1000
Diisobutyl phthalate(DIBP) Content	mg/kg	600	N.D.	1000

Note:

- N.D.=Not Detected(<MDL or LOQ)
- MDL = Method Detection Limit
- mg/kg = ppm=parts per million
- LOQ = Limit of Quantification, The LOQ of Hexavalent chromium is 0.10  $\mu\text{g}/\text{cm}^2$

## Test Process

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



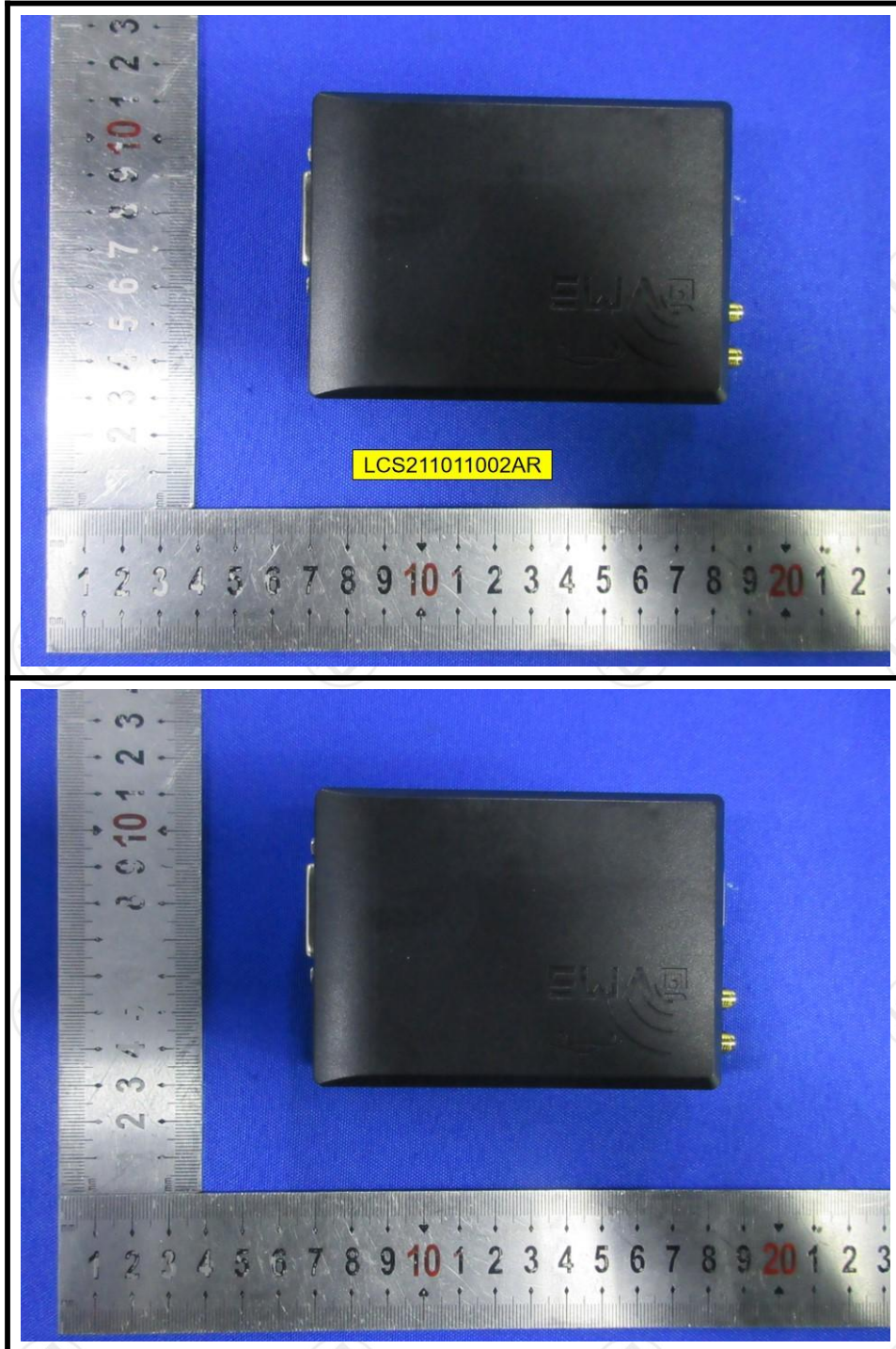


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## The photo(s) of the sample



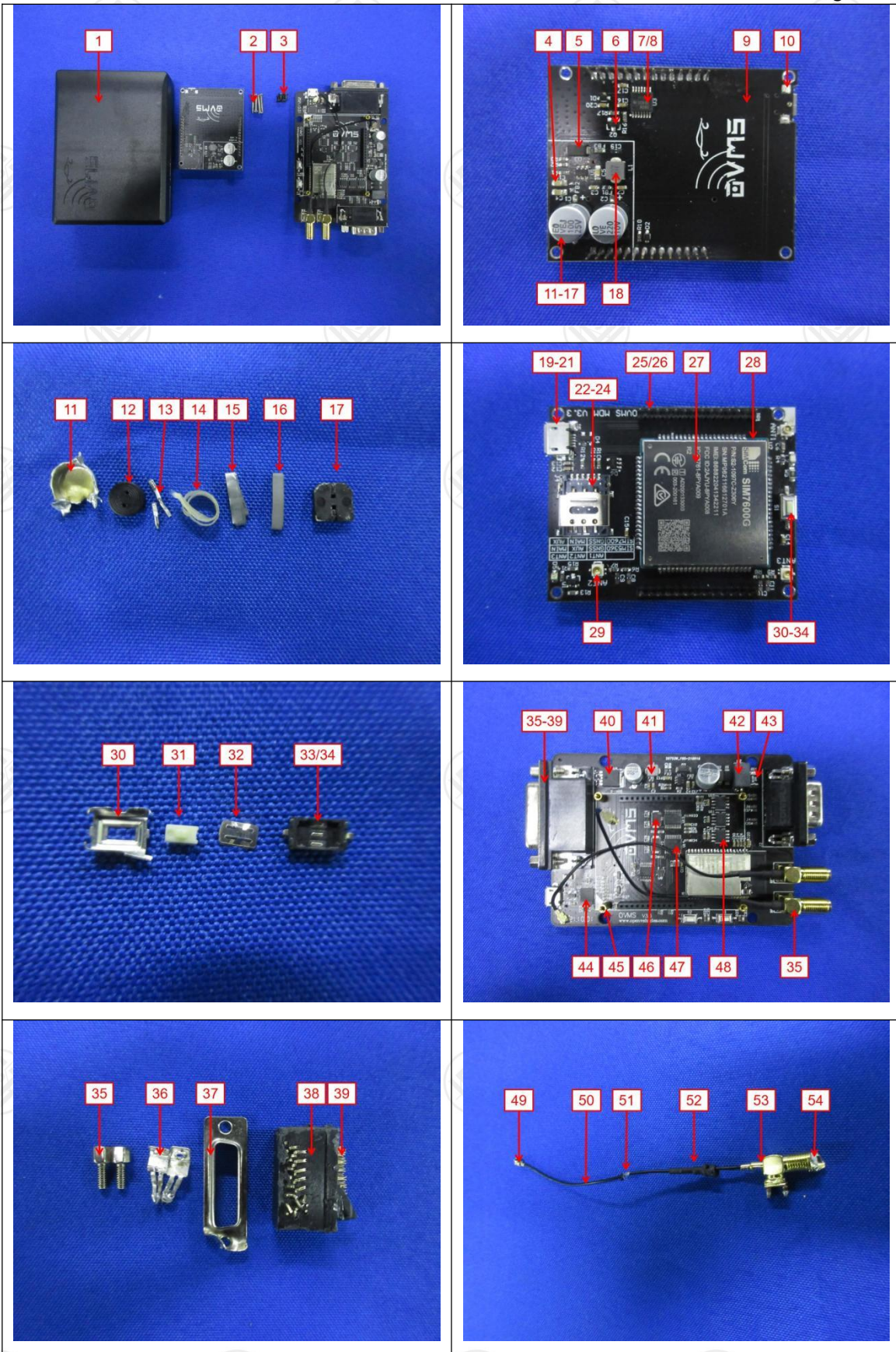


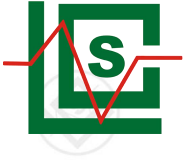


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## Statement:

1. The report is considered invalid without approved signature, special seal;
2. The Company Name shown on Report and Address, the sample(s) and sample information was/were provided by the applicant who should be responsible for the authenticity which LCS hasn't verified;
3. The result(s) shown in this report refer only to the sample(s) tested.;
4. Without written approval of LCS, this report can't be reproduced except in full;
5. In case of any discrepancy between the English version and Chinese version of the testing reports (if generated), the Chinese version shall prevail.

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