TEST REPORT

Applicant Company	:	Heltec Automation Technology Co., Ltd
Address	:	1f, No.54,56,58, Zirui North Street,Gaoxin District, Chengdu,China
Manufacturer	:	Heltec Automation Technology Co., Ltd
Address	:	1f, No.54,56,58, Zirui North Street,Gaoxin District, Chengdu,China

Sample Information

Sample Name	:	Heltec WiFi Kit LoRa Node
Trade Mark	:	/
Basic Model No.	:	HTIT-WB32LAF
Series Model No.	:	HTIT-WB32, HTIT-WS, HTIT-WSL, HTIT-WSH, HTIT-TB, HTIT-LN151, HTIT-LK151, HTI-WB32LABR, HTIT-W8266, HTIT-WB32G, HT-M00, HT-M01S, HTCC-AB01, HTCC-AB01-S, HTCC-AB02, HTCC-AB02-S, HTCC-AB03, HTCC-AB03-S,HTCC-AC01, HCC-AC01-S, HTCC-AC02, HTCC-AC02-S, HTCC-AC03, HCC-AC03-S, HTCC-AM01, HTCC-AM01-S, HTCC-AM02, HTCC-AM02-S, HTCC-AM03, HTCC-AM03-S, HTIT-DIY0051N, HTIT-DIY0031
Sample Received Date	:	September 05, 2025
Testing Period	:	September 05, 2025~September 10, 2025
Date of issue	:	September 10, 2025
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.	**Pass**

Edited by: Wick Wu
Wick Wu

SHENZHEN TOBY LABORATORIES INC. TOBY

Approved by: Evan Wen
Evan Wen

Shenzhen Toby Laboratories Inc.
Rm.307-309, 311, Bldg.2, Huahan Sci-tech Industrial Park, No.19 Lanjin 4th Road, Heping Community, Pingshan St., Pingshan District, Shenzhen, Guangdong, China
Tel: (86) 0755-28681336 toby@tobylab.cn Http://www.tobylab.cn

TEST RESULTS:

1. Screening test

Test method: With reference to IEC 62321-3-1:2013 and IEC 62321-8:2017. For Heavy Metals and Flame Retardants, analyzed by Energy Dispersive X-ray Fluorescence Spectrometer (XRF); for phthalates, analyzed by Gas Chromatography and Mass Spectrometer (GC-MS).

Sample No.	Sample Description	Heavy Metals and Flame Retardants					Phthalates			
		Cd	Pb	Hg	Cr▼	Br▼	DIBP	DBP	BBP	DEHP
1	Silver metal shell	BL	BL	BL	X	N/A	N/A	N/A	N/A	N/A
2	Black plastic shell	BL	BL	BL	BL	BL	BL	BL	BL	BL
3	Black FPC	BL	BL	BL	BL	BL	BL	BL	BL	BL
4	Black transparent plastic shell	BL	BL	BL	BL	BL	BL	BL	BL	BL
5	Black LCD screen	BL	BL	BL	BL	BL	BL	BL	BL	BL
6	Yellow FPC	BL	BL	BL	BL	BL	BL	BL	BL	BL
7	Black PCB board	BL	BL	BL	BL	X	BL	BL	BL	BL
8	Black plastic shell	BL	BL	BL	BL	BL	BL	BL	BL	BL
9	White plastic screw	BL	BL	BL	BL	BL	BL	BL	BL	BL
10	Silver metal screw	BL	BL	BL	X	N/A	N/A	N/A	N/A	N/A
11	White plastic shell	BL	BL	BL	BL	BL	BL	BL	BL	BL
12	Silver sheet metal	OL	BL	BL	X	N/A	N/A	N/A	N/A	N/A
13	Silver sheet metal	BL	BL	BL	X	N/A	N/A	N/A	N/A	N/A
14	Transparent double-sided adhesive	BL	BL	BL	BL	BL	BL	BL	BL	BL
15	Black resistance	BL	BL	BL	BL	BL	BL	BL	BL	BL
16	Black plastic shell	BL	BL	BL	BL	BL	BL	BL	BL	BL
17	Silver metal nut post	BL	OL	BL	BL	N/A	N/A	N/A	N/A	N/A
18	Black resistance	BL	BL	BL	BL	BL	BL	BL	BL	BL
19	Black resistance	BL	BL	BL	BL	BL	BL	BL	BL	BL
20	Black resistance	BL	BL	BL	BL	BL	BL	BL	BL	BL
21	Black resistance	BL	BL	BL	BL	BL	BL	BL	BL	BL
22	White plastic shell	BL	BL	BL	BL	BL	BL	BL	BL	BL
23	Black IC	BL	BL	BL	BL	BL	BL	BL	BL	BL
24	White plastic shell	BL	BL	BL	BL	BL	BL	BL	BL	BL

Sample No.	Sample Description	Heavy Metals and Flame Retardants					Phthalates			
		Cd	Pb	Hg	Cr▼	Br▼	DIBP	DBP	BBP	DEHP
25	Black PCB board	BL	BL	BL	BL	X	BL	BL	BL	BL

NOTE :

- "BL" denotes below limit
- "OL" denotes over limit, further confirmation test was conducted
- "X" denotes inconclusive, further confirmation test was conducted
- "NA" denotes not applicable
- As requested by the applicant, only the selected components listed in this report were tested.

Remark :

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≤(70-3σ)<X<(130+3σ)≤OL	BL≤(70-3σ)<X<(130+3σ)≤OL	LOD<X<(150+3σ)≤OL
Pb	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(500-3σ)<X<(1500+3σ)≤OL
Hg	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(700-3σ)<X<(1300+3σ)≤OL	BL≤(500-3σ)<X<(1500+3σ)≤OL
Cr	BL≤(700-3σ)<X	BL≤(700-3σ)<X	BL≤(500-3σ)<X
Br	BL≤(300-3σ)<X	/	BL≤(250-3σ)<X

- 3σ= The reproducibility of analytical instruments
- "/ "= 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.

5) Screening results of phthalates are for primary screening, and further chemical testing by GC-MS (for DBP, BBP,DEHP and DIBP) are recommended to be performed if the concentration exceeds the below warning value(Unit: mg/kg).

Test item	Screening limit
Di-2-ethylhexyl phthalate(DEHP)	BL≤600<X
Dibutyl phthalate(DBP)	BL≤600<X
Benzylbutyl phthalate(BBP)	BL≤600<X
Diisobutyl phthalate(DIBP)	BL≤600<X

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.

2. Chemical test for further confirmation.

1) The test results of Lead (Pb) and Cadmium (Cd)

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

Tested Item	Unit	MDL	Results	Limit
			(17)	
Lead (Pb) Content	mg/kg	5	24562#1	1000

Tested Item	Unit	MDL	Results	Limit
			(12)	
Cadmium (Cd) Content	mg/kg	5	N.D.	100

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

Test method: With reference to IEC 62321-7-1:2015, extracted with boiling water and analysis was performed by UV-visible spectrophotometer (UV-Vis)

Tested Item	Unit	LOQ	Results		Limit
			(1)	(10)	
Hexavalent Chromium(Cr(VI)) Content★	μg/cm^2	0.10	Negative	Negative	0.13

Tested Item	Unit	LOQ	Results		Limit
			(12)	(13)	
Hexavalent Chromium(Cr(VI)) Content★	μg/cm^2	0.10	Negative	Negative	0.13

3) The test results of PBBs & PBDEs

Test method: With reference to IEC 62321-6:2015, by solvent extraction and analysis was performed by gas chromatographic-mass spectrometer (GC-MS)

Tested Items	Unit	MDL	Results	Limit
			(7,25)	
Polybrominated Biphenyls(PBBs) Content				
Monobromobiphenyl	mg/kg	50	N.D.	-
Dibromobiphenyl	mg/kg	50	N.D.	-
Tribromobiphenyl	mg/kg	50	N.D.	-
Tetrabromobiphenyl	mg/kg	50	N.D.	-
Pentabromobiphenyl	mg/kg	50	N.D.	-
Hexabromobiphenyl	mg/kg	50	N.D.	-
Heptabromobiphenyl	mg/kg	50	N.D.	-
Octabromobiphenyl	mg/kg	50	N.D.	-
Nonabromodiphenyl	mg/kg	50	N.D.	-
Decabromodiphenyl	mg/kg	50	N.D.	-
Total content	mg/kg	-	N.D.	1000
Polybrominated Diphenylethers(PBDEs) Content				
Monobromodiphenyl ether	mg/kg	50	N.D.	-
Dibromodiphenyl ether	mg/kg	50	N.D.	-
Tribromodiphenyl ether	mg/kg	50	N.D.	-
Tetrabromodiphenyl ether	mg/kg	50	N.D.	-
Pentabromodiphenyl ether	mg/kg	50	N.D.	-
Hexabromodiphenyl ether	mg/kg	50	N.D.	-
Heptabromodiphenyl ether	mg/kg	50	N.D.	-
Octabromodiphenyl ether	mg/kg	50	N.D.	-
Nonabromodiphenyl ether	mg/kg	50	N.D.	-
Decabromodiphenyl ether	mg/kg	50	N.D.	-
Total content	mg/kg	-	N.D.	1000

Remark :

- MDL = Method Detection Limit
- "- "= Not Regulated
- 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 μg/cm^2
- ★ = a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13μg/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 0.10μg/cm^2). The sample coating is considered a non- Cr(VI) based coating.

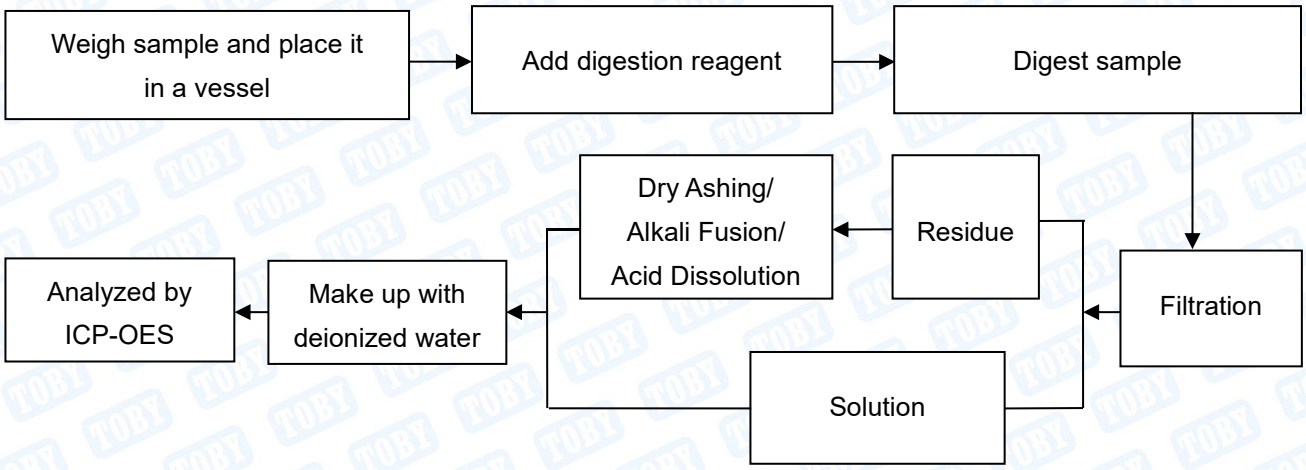
  c. The result between 0.10μg/cm^2 and 0.13μg/cm^2 is considered to be inconclusive, unavoidable coating variations may influence the determination.
- Information on storage conditions and production date of the tested samples is unavailable and thus Cr(VI) results represent status of the sample at the time of testing.

#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.

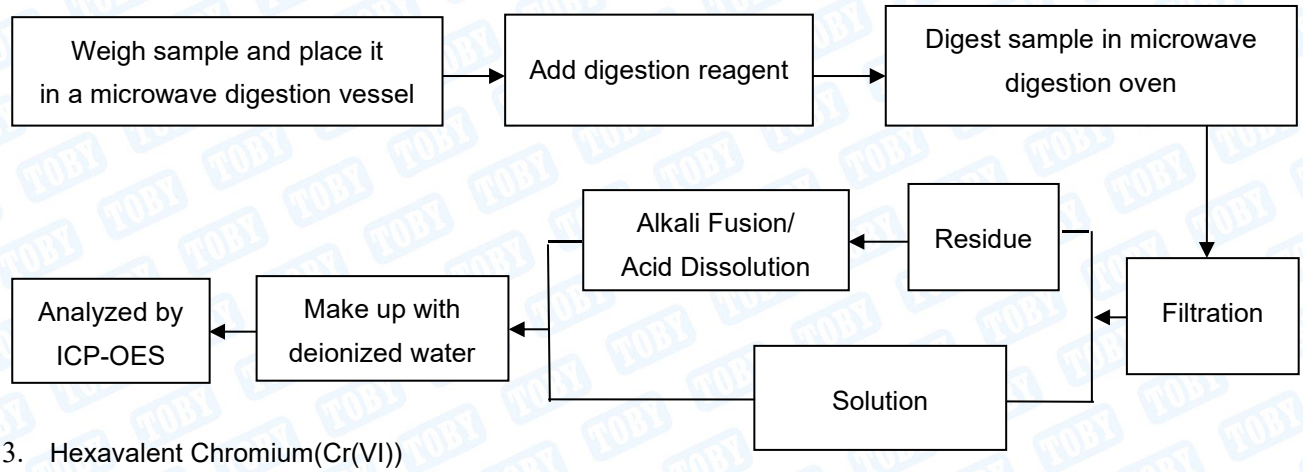
RoHS Restricted Substances	Maximum Concentration Value (mg/kg) (by weight in homogenous materials)
Cadmium(Cd)	100
Lead(Pb)	1000
Mercury(Hg)	1000
Hexavalent Chromium(Cr(VI))	1000
Polybrominated biphenyls(PBBs)	1000
Polybrominated diphenylethers(PBDEs)	1000
Dibutyl Phthalate(DBP)	1000
Butylbenzyl Phthalate(BBP)	1000
Di-(2-ethylhexyl) Phthalate(DEHP)	1000
Diisobutyl phthalate(DIBP)	1000

Test Process

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

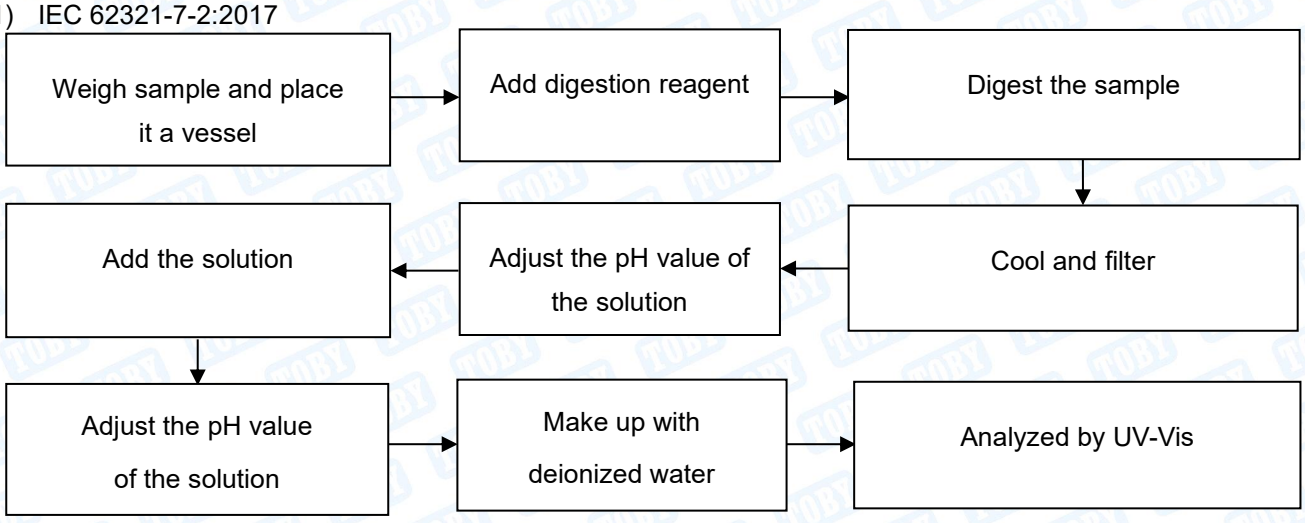


2. Mercury(Hg): IEC 62321-4:2013+AMD1:2017 CSV

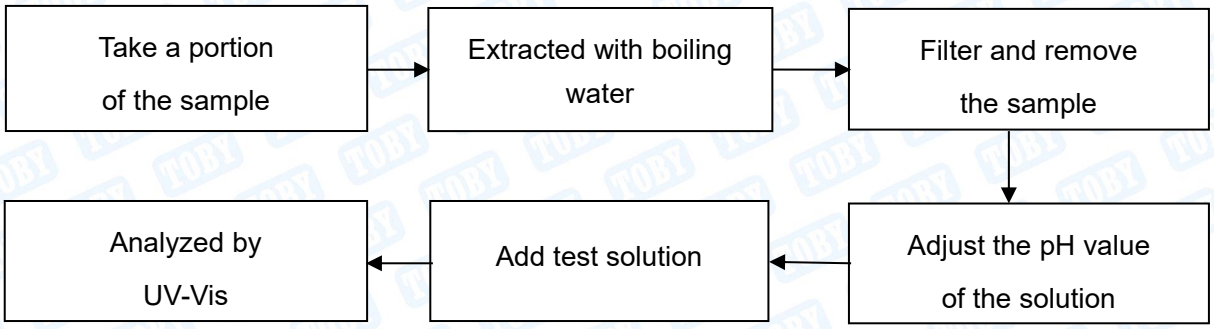


3. Hexavalent Chromium(Cr(VI))

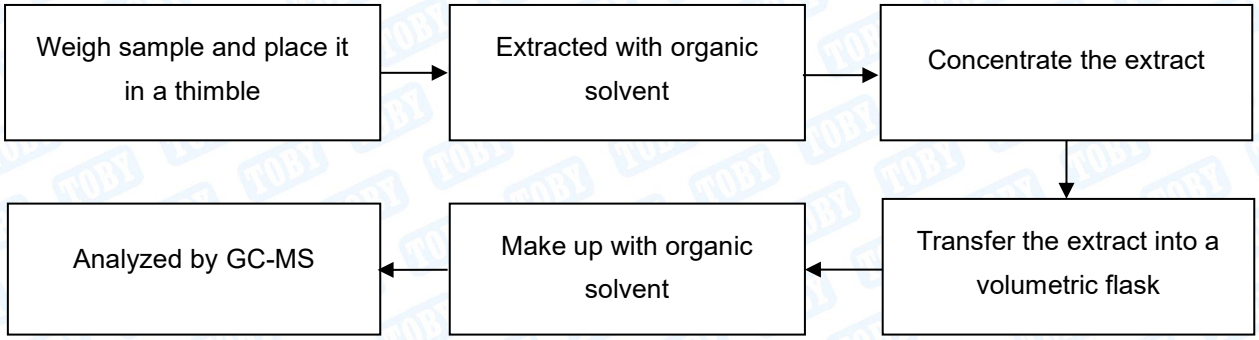
1) IEC 62321-7-2:2017



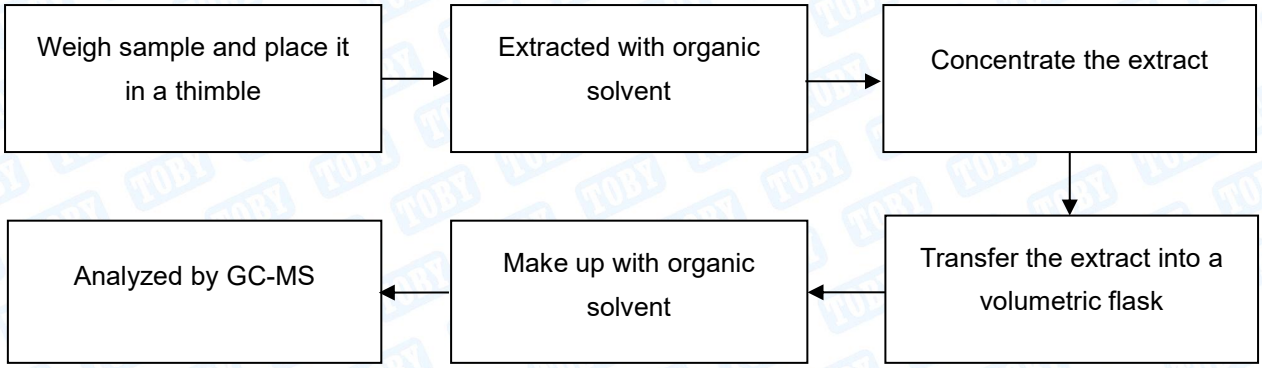
2) IEC 62321-7-1:2015



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

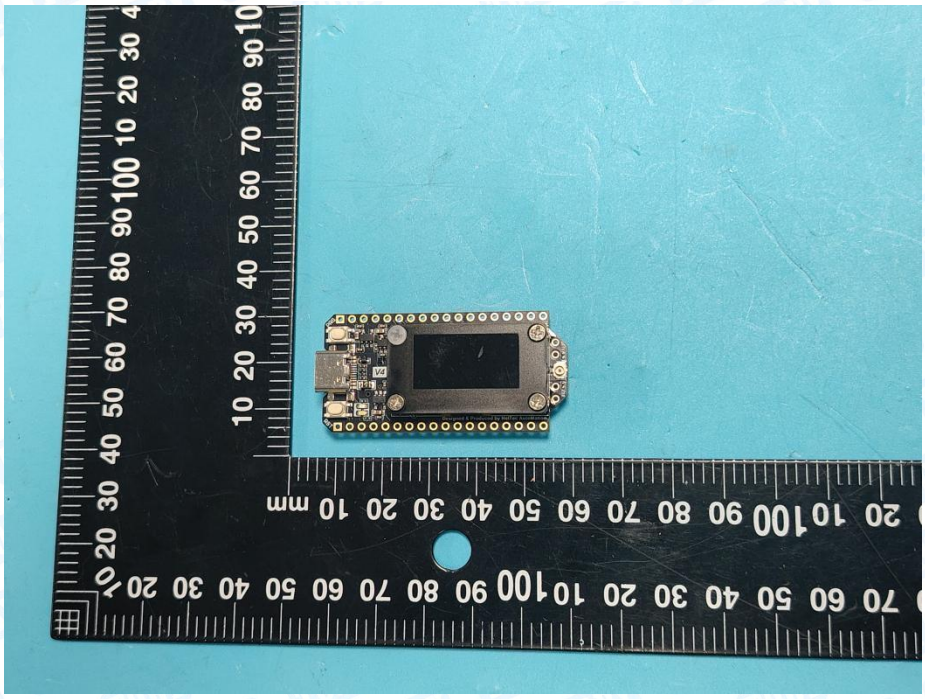


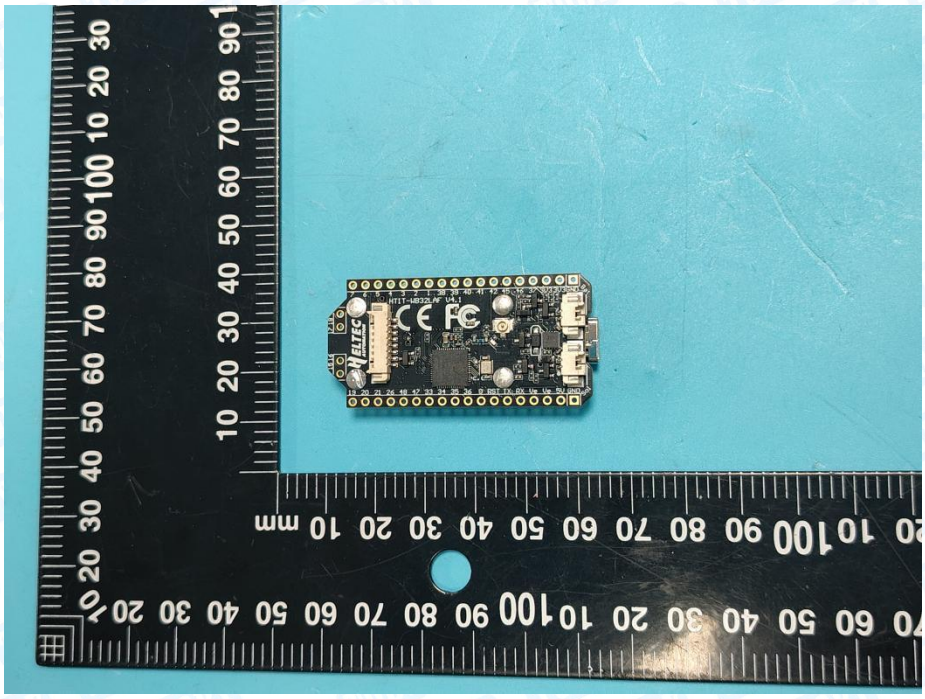
5. Phthalates(DBP, BBP, DEHP & DIBP) : IEC 62321-8:2017

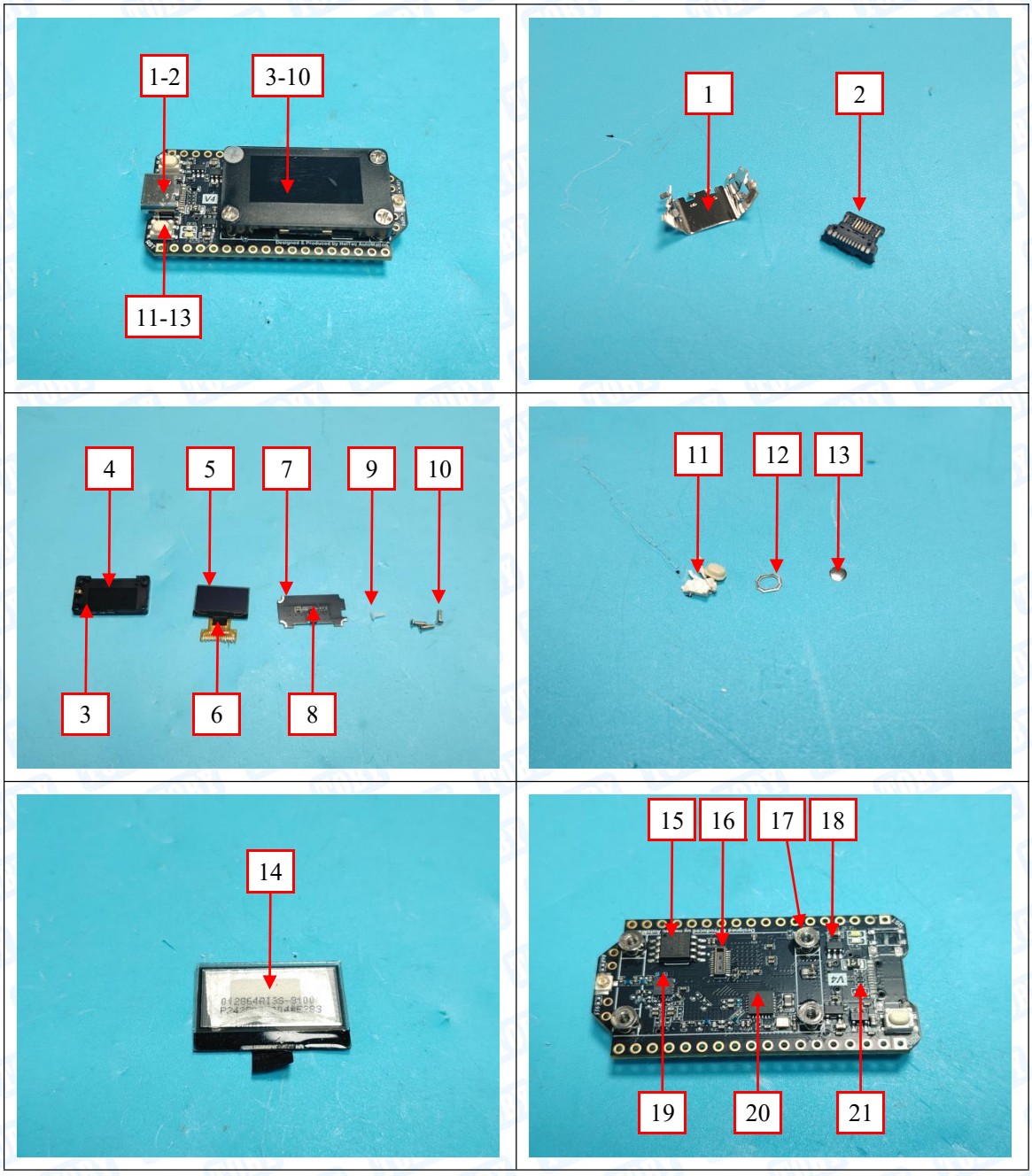


Sample Photo(s)

TBR-C-202509-0016-1



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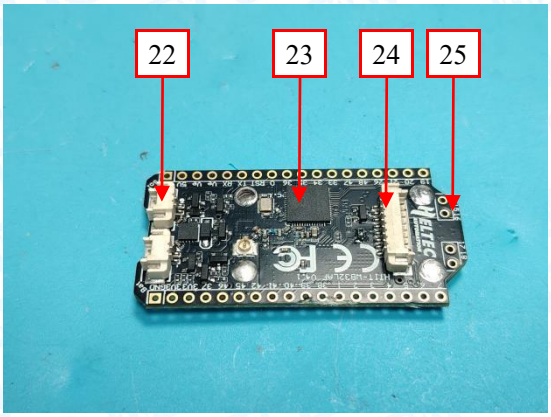	**Blank**

Statement:

1. The information as listed on the first page of this test report was all provided by the client except the sample from, date received, test period, test results and conclusion. The client shall be responsible for the representativeness of sample and authenticity of materials, for which TOBY shall bear no responsibilities.
2. This test data is only responsible for the tested sample. The judgment method of determining the conformity in this test report is according to the measured value without considering the risk caused by uncertainty, unless otherwise clearly stipulated in special agreement, standard or specification. The client shall assume the risk caused by the judgment method, and TOBY shall not bear related responsibilities.
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5. The marked with special symbols in CNAS logo report means that the test item(s) was(were) currently n ot applying for CNAS accreditation.

***** END OF REPORT *****