




TEST REPORT

Applicant: Ajax Systems Inc
Address: 910 Foulk Rd., Wilmington, DE 19803, United States
The following sample(s) was/were submitted and identified on behalf of the client as:
Product name: Ajax FireProtect
Model: Ajax FireProtect
Trade mark: 

Manufacturer: Research and Production Enterprise "Ajax" LLC
Address: 04073, Ukraine, Kyiv, Sklyarenko, 5
Sample Received Date: Nov. 28, 2016
Sample Resubmitted Date: Mar. 07, 2017
Testing Period: Nov. 28, 2016~ Feb. 05, 2017 Mar. 07, 2017~ Apr.06, 2017

Test Requirement:

- As specified by client, to screen Lead(Pb), Cadmium(Cd), Mercury(Hg), Chromium(Cr) and Bromine(Br) in the submitted sample(s) by XRF. When screening results exceed the XRF screening limit in IEC62321-3-1: 2013, further use of chemical methods are required to test the Lead(Pb), Cadmium(Cd), Mercury(Hg), Hexavalent Chromium(Cr(VI)), Polybrominated Biphenyls(PBBs) and Polybrominated Diphenyl Ethers(PBDEs) in the submitted samples in accordance with ROHS directive 2011/65/EU.
- As specified by client, to test Lead(Pb), Cadmium(Cd), Mercury(Hg) in the submitted sample(s) according to the requirement with battery directive 2006/66/EC and amendment 2013/56/EU.

Conclusion:

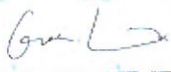
Pass

Refer to
The Battery

Test Result(s): Please refer to the following page(s);

Test Method: Please refer to the following page(s);

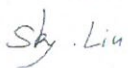
Tested by



Reviewed by:

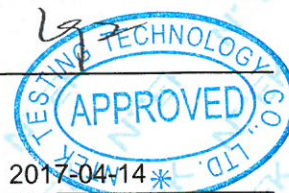


Approved by:



Date:

2017-04-14*



Test Result(s):

1. Shell

Sample No.	Sample Description	Tested Items	XRF Screening Test	Chemical Test (mg/kg)	Conclusion
1	White plastic shell	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
2	Transparent plastic of white plastic shell	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
3	Silvery metal mesh of white plastic shell	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	IN	Negative	
		Br(PBBs&PBDEs)	/	/	
4	Black plastic of white plastic shell	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
5	White label of white plastic shell	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
6	Silvery metal screw of white plastic shell	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	IN	Negative	
		Br(PBBs&PBDEs)	/	/	

2. PCB

Sample No.	Sample Description	Tested Items	XRF Screening Test	Chemical Test (mg/kg)	Conclusion
7	PCB	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	IN	N.D.	
8	Black plastic shell of buzzer	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	IN	N.D.	
9	Golden metal wafer of buzzer	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
10	White ceramic of buzzer	Pb	IN	434870 ^{#1}	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
11	White fiber of buzzer	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
12	Core of wire of buzzer	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
13**	Tin solder(Gold foil) of buzzer	Pb	IN	931	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	



14**	Tin solder(White coating) of buzzer	Pb	IN	582	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
15	PCB of buzzer	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	IN	N.D.	
16	PCB tin solder of buzzer	Pb	IN	115	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
17	Red metal spring	Pb	IN	7	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
18	Crystal oscillator	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
19	Black plastic lamp shade	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
20	Purple LDE lamp of black plastic lamp shade	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
21	Black LED lamp of black plastic lamp shade	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	

22	Metal pin of black plastic lamp shade	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
23	Yellow fuse head	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	IN	N.D.	
24	Black wire jacket of yellow fuse head	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
25	Core of wire of yellow fuse head	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
26	Silvery metal shell of Silvery button	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
27	Golden metal of Silvery button	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
28	Silvery elastic metal of Silvery button	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
29	metal pin of Silvery button	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	



30	Black plastic of Silvery button	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
31	Silvery metal shell of silvery contact switch	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	IN	Negative	
		Br(PBBs&PBDEs)	/	/	
32	Silvery metal shrapnel of silvery contact switch	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
33	Metal pin of silvery contact switch	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
34	Black plastic of silvery contact switch	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
35	Black plastic button of silvery contact switch	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
36	Magnetic core of inductor	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
37	Coil of inductor	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	



38	Chip	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
39	SMD resistor	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
40	SMD capacitor	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
41	SMD diode	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
42	SMD audion	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
43	SMD PCB	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
44	SMD resistor of SMD PCB	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
45	SMD capacitor of SMD PCB	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	



46	SMD inductor of SMD PCB	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
47	Chip 1 of SMD PCB	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
48	Crystal oscillator of SMD PCB	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	
49	Plug-in PCB	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
50	White paper sheet of plug-in PCB	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
51	LED lamp of plug-in PCB	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	
52	Black plastic of plug-in PCB	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	IN	N.D.	
53	Metal plug pin of plug-in PCB	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	



54	Silvery metal contact sheet of button battery	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	IN	Negative	
		Br(PBBs&PBDEs)	/	/	
55**	Tin solder	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	/	/	

3. Battery

Sample No.	Sample Description	Tested Items	XRF Screening Test	Chemical Test (mg/kg)	Conclusion
56	Red and black plastic jacket	Pb	BL	/	PASS
		Cd	BL	/	
		Hg	BL	/	
		Cr(Cr(VI))	BL	/	
		Br(PBBs&PBDEs)	BL	/	



- Note:
- N.D. = Not Detected (<MDL)
 - MDL = Method Detection Limit
 - mg/kg = ppm = parts per million
 - /=Not Regulated or Not Applicable
 - BL = Under the XRF screening limit
 - IN = Further chemical test will be conducted when the screening result inconclusive
 - OL = Further chemical test will be conducted while the result is above the screening limit.
 - Negative = Absence of Cr(VI) , the detected Cr(VI) concentration in the boiling water extraction solution is less than $0.10 \mu\text{g}/\text{cm}^2$ with 50cm^2 sample surface area used.
 - Positive = Presence of Cr(VI), the detected Cr(VI) concentration in the boiling water extraction solution is equal to or greater than $0.13 \mu\text{g}/\text{cm}^2$ with 50cm^2 sample surface area used.

- Remark:
- 1.The screening results are only used for reference.
 - 2.When conducting the test for PBBs&PBDEs, XRF was introduced to screen Br Exclusively; When conducting the test for Hexavalent Chromium, XRF was introduced to screen Chromium exclusively.
 - 3.According to directive 2011/65/EU and 2011/534/EU.
 - #1 Lead is exempted as Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound
 4. **Sample No.13, 14 resubmitted date:2017-04-01

The Battery (Test result)

Test Items	Sample concentration (mg/kg)		MDL (mg/kg)	Standard requirement,mg/kg
	1	2		
Lead(Pb)	15	N.D.	2	<40*
Cadmium(Cd)	N.D.	N.D.	2	<20
Mercury(Hg)	N.D.	N.D.	2	<5
Result (P/F)	P			

Sample Description:

1: Battery

2: Button battery

- Note:
- N.D. = (Not Detected) (<MDL)
 - MDL = (Method Detection Limit)
 - mg/kg = ppm = 0.0001%
 - /= Not Regulated or Not Applicable
 - P=Pass
 - F=Fail

Remark: According to EU Directive 2006/66/EC and amendment 2013/56/EU

1. Without prejudice to directive 2000/53/EC, Member States shall prohibit the placing on the market of:
 - (a) all batteries or accumulators, whether or not incorporated into appliances, that contain more than 0.0005% of mercury by weight.
 - (b) portable batteries or accumulators, including those incorporated into appliances, that contain more than 0.002% of cadmium by weight.
2. The prohibition set out in paragraph 1(b) shall not apply to portable batteries and accumulators intended for use in:
 - (a) emergency and alarm systems, including emergency lighting; or
 - (b) medical equipment.
3. Batteries, accumulators and button cells containing more than 0.004% of lead, shall be marked with the chemical symbol for the metal concerned: Pb.

Test Method:

1. Screening test by XRF spectroscopy

XRF screening limits in mg/kg for regulated elements according to IEC 62321-3-1:2013

Element	Limit of IEC 62321-3-1:2013 (unit:mg/kg)		MDL	
	Polymers and metals	Composite material	Polymers	Other material
Pb	$BL \leq (700-3\sigma) < X$ $< (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X$ $< (1500+3\sigma) \leq OL$	10 mg/kg	50 mg/kg
Cd	$BL \leq (70-3\sigma) < X$ $< (130+3\sigma) \leq OL$	LOD $< X < (150+3\sigma) \leq OL$	10 mg/kg	50 mg/kg
Hg	$BL \leq (700-3\sigma) < X$ $< (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X$ $< (1500+3\sigma) \leq OL$	10 mg/kg	50 mg/kg
Cr	$BL \leq (700-3\sigma) < X$	$BL \leq (500-3\sigma) < X$	10 mg/kg	50 mg/kg
Br	$BL \leq (300-3\sigma) < X$	$BL \leq (250-3\sigma) < X$	10 mg/kg	50 mg/kg

Note: -BL = Under the XRF screening limit

-OL = Further chemical test will be conducted while result is above the screening limit.

-X= The symbol "X" marks the region where further investigation is necessary.

-3σ= The reproducibility of analytical instruments

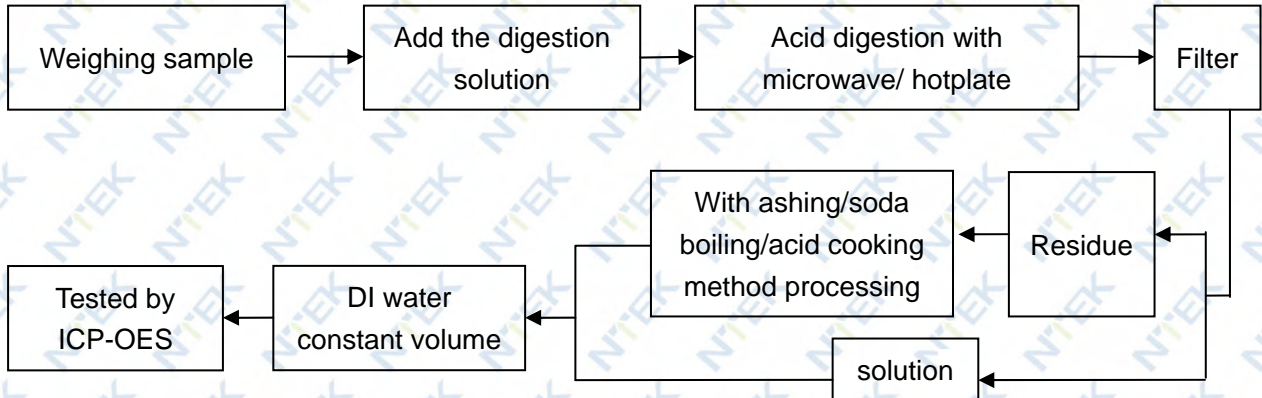
-LOD= Detection limit

2. Chemical Test

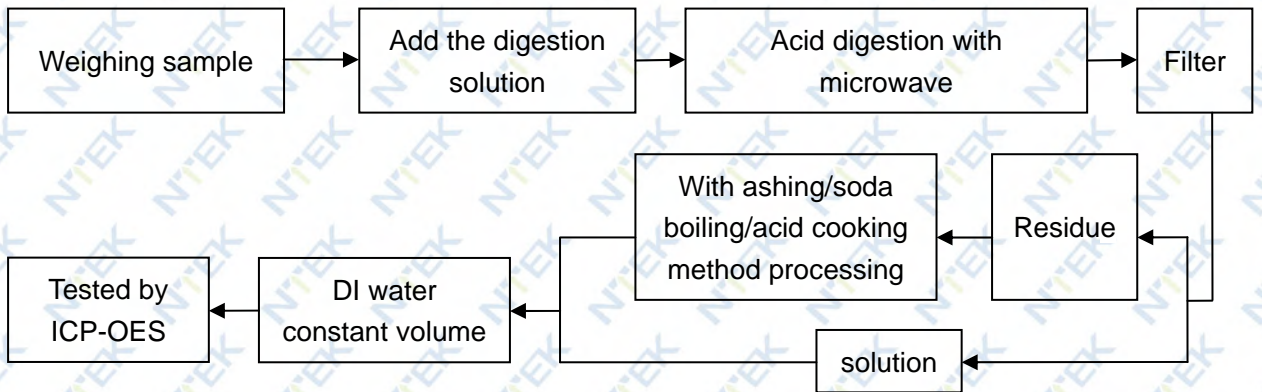
Test item	Pretreatment method	Test instrument	MDL	Limit
Lead(Pb)	IEC 62321-5:2013 Ed.1.0	ICP-OES	2 mg/kg	1000 mg/kg
Cadmium(Cd)	IEC 62321-5:2013 Ed.1.0	ICP-OES	2 mg/kg	100 mg/kg
Mercury(Hg)	IEC 62321-4:2013 Ed.1.0	ICP-OES	2 mg/kg	1000 mg/kg
Chromium VI (Cr VI)	IEC 62321:2008 Ed.1.0 & IEC 62321-7-1:2015 Ed.1.0	UV-Vis	2 mg/kg	1000 mg/kg
PBBs/ PBDEs	IEC 62321-6:2015 Ed.1.0	GC-MS	5 mg/kg	1000 mg/kg

Test Flow:

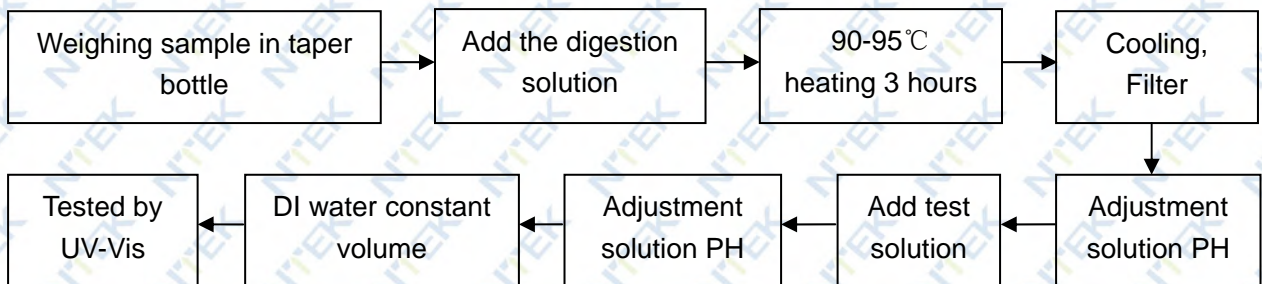
1. Lead(Pb), Cadmium(Cd)



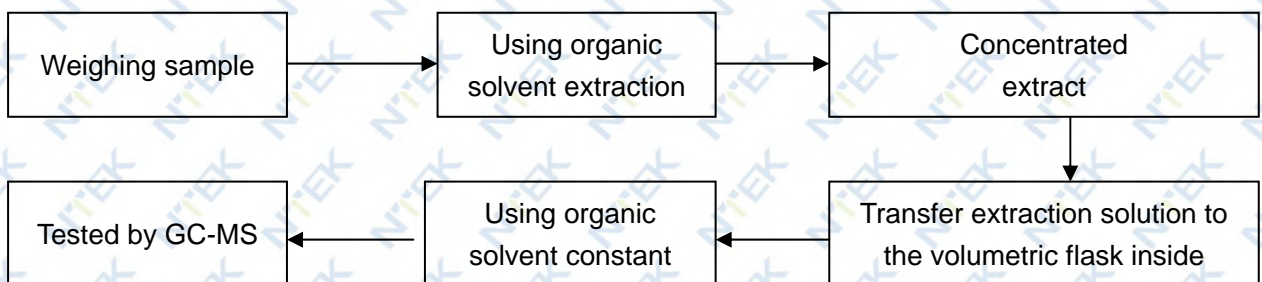
2. Mercury (Hg)



3. Chromium VI(Cr VI)



4. PBBs/ PBDEs



Sample photo(s):



Fig.1

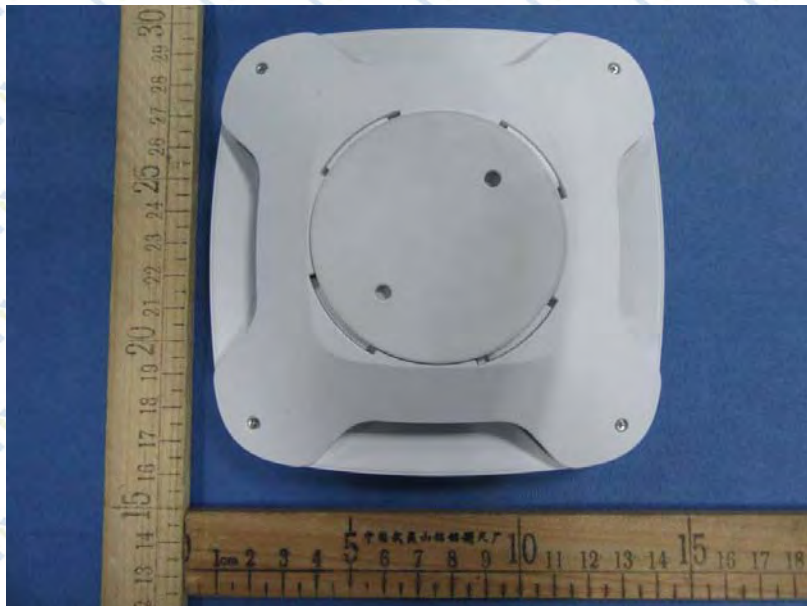


Fig.2

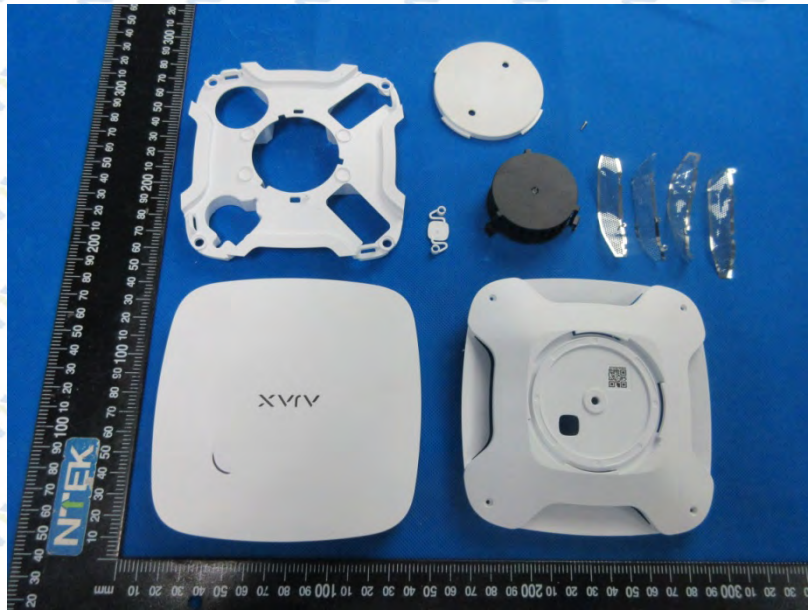


Fig.3



Fig.4

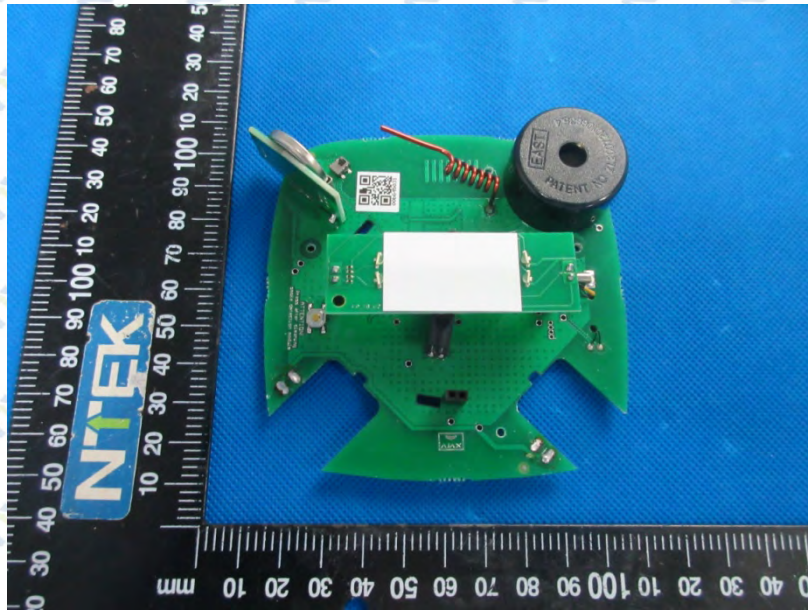


Fig.5

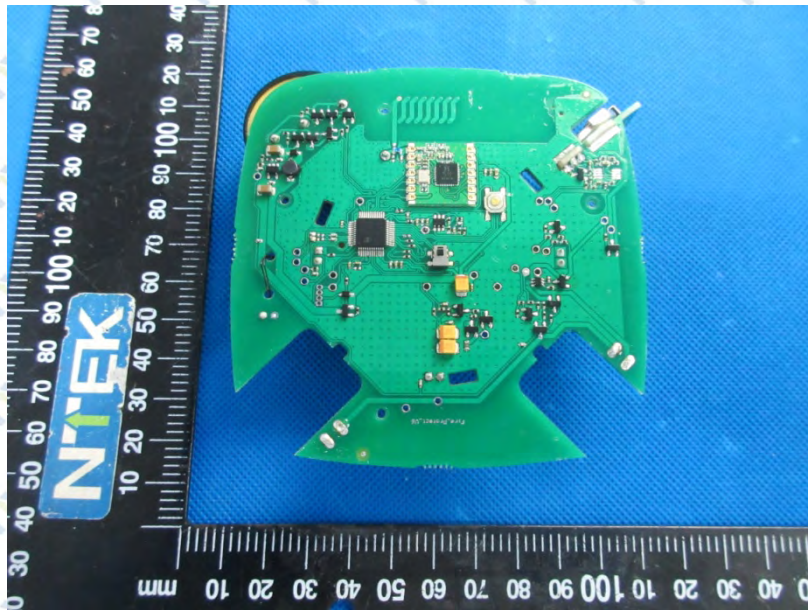


Fig.6



Fig.7

****End of Report****

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of NTEK, this report can't be reproduced except in full.