



# TEST REPORT

Report No.: T1881710 02REV1

Date: January 09, 2019

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**Applicant:** Shenzhen KEYES DIY Robot co., Ltd  
**Address:** Room9A Jingxing Building, Changyong Road, Long Hua Xin Qu District, Shenzhen, China.

The following sample(s) and sample information was/were submitted and identified by/on the behalf of the client:

Sample Name: 3D printer RAMPS 1.4 control board  
Model No.: HIM01009  
Trademark: HIMALAYA  
Supplier: Shenzhen KEYES DIY Robot co., Ltd  
Sample Received Date: November 14, 2018  
Testing Period: November 14 – 22, 2018  
Test Method & Test Result: Please refer to following pages.

### Test Requested

As specified by client, according to RoHS Directive 2011/65/EU with amendment (EU) 2015/863 to test Lead (Pb), Cadmium (Cd), Mercury (Hg), Hexavalent Chromium (Cr(VI)), Polybrominated Biphenyls (PBBs), Polybrominated Diphenyl Ethers (PBDEs), Phthalates (DBP, BBP, DEHP, DIBP) in the submitted sample(s).

### Result

Pass

Tested by:

*Shayan Zhang*

Approved by:

*Tong Geng*

Reviewed by:

*Anne Zhao*

Date of issue:

January 09, 2019





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## Test Method

(1) Screening limits for regulated elements according to IEC 62321-3-1:2013 (Unit: mg/kg)

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

(2) Screening limits for Phthalates

Test Item(s)	Screening limits(Unit: mg/kg)
Dibutyl phthalate(DBP)	$BL \leq 600 < X$
Benzylbutyl phthalate(BBP)	$BL \leq 600 < X$
Di-2-ethylhexyl phthalate(DEHP)	$BL \leq 600 < X$
Diisobutyl phthalate(DIBP)	$BL \leq 600 < X$

(3) Chemical Test

Test Item	Test Method	Test Instrument	MDL (mg/kg)	EU RoHS Limit (mg/kg)
Lead (Pb)	IEC 62321-5:2013	ICP-OES	2	1000
Cadmium (Cd)	IEC 62321-5:2013	ICP-OES	2	100
Mercury (Hg)	IEC 62321-4: 2013+AMD1:2017	ICP-OES	2	1000
Hexavalent Chromium (Cr(VI))	IEC 62321-7-2:2017 (non-metal)	UV-Vis	8	1000
	IEC 62321-7-1:2015 (metal)	UV-Vis	0.1( $\mu\text{g}/\text{cm}^2$ )	/
Polybrominated Biphenyls (PBBs)	IEC 62321-6:2015	GC-MS	5	1000
Polybrominated Diphenyl Ethers (PBDEs)	IEC 62321-6:2015	GC-MS	5	1000
Phthalates(DBP, BBP, DEHP, DIBP)	IEC 62321-8:2017	GC-MS	50	1000

Remark:

BL = Under the screening limit  
 OL = Above the screening limit  
 X = The range of needing to do further testing  
 $3\sigma$  = The reproducibility of analytical instruments  
 N/A = Not applicable  
 LOD = Detection limit

Shenzhen Alpha Product Testing Co., Ltd.

Building i, No.2, Lixin Road, Fuyong Street, Bao'an District, 518103, Shenzhen, Guangdong, China



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## Tested Sample/Part Description

No.	Component Description	No.	Component Description
1.	Green plastic connector	11.	Stabilivolt triode
2.	Blue plastic base	12.	Safety capacitor
3.	White plastic base	13.	Aluminum electrolytic capacitor
4.	Yellow plastic base	14.	Chip resistor
5.	Red plastic base	15.	Chip LED
6.	Black plastic base	16.	PCB
7.	Blue plastic base	17.	PCB tin solder
8.	Green plastic block	18.	Blue plastic connector
9.	Red plastic block	19.	Silvery metal of connector
10.	Yellow plastic block	20.	Silvery metal screw of connector

## Tested Result

### (1) Screening Result

Tested Item(s)	Screening Result									
	1	2	3	4	5	6	7	8	9	10
Lead (Pb)	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL
Cadmium (Cd)	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL
Mercury (Hg)	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL
Total Chromium (Cr(VI))	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL
Total Bromine (PBBs & PBDEs)	X*	X*	X*	X*	X*	X*	X*	X*	X*	X*
Dibutyl phthalate(DBP)	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL
Benzylbutyl phthalate(BBP)	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL
Di-2-ethylhexyl phthalate(DEHP)	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL
Diisobutyl phthalate(DIBP)	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL

Tested Item(s)	Screening Result									
	11	12	13	14	15	16	17	18	19	20
Lead (Pb)	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL
Cadmium (Cd)	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL
Mercury (Hg)	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL
Total Chromium (Cr(VI))	BL	BL	BL	BL	BL	BL	BL	BL	BL	BL
Total Bromine (PBBs & PBDEs)	BL	BL	N/A	BL	BL	X*	N/A	BL	N/A	N/A
Dibutyl phthalate(DBP)	BL	BL	N/A	BL	BL	BL	N/A	BL	N/A	N/A
Benzylbutyl phthalate(BBP)	BL	BL	N/A	BL	BL	BL	N/A	BL	N/A	N/A
Di-2-ethylhexyl phthalate(DEHP)	BL	BL	N/A	BL	BL	BL	N/A	BL	N/A	N/A
Diisobutyl phthalate(DIBP)	BL	BL	N/A	BL	BL	BL	N/A	BL	N/A	N/A

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## (2) Test result for Chemical Confirmation

(a) The test result of PBBs, PBDEs

Testing item	Result (mg/kg)					
	1.	2.	3.	4.	5.	6.
Monobromobiphenyl (MonoBB)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Dibromobiphenyl (DiBB)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Tribromobiphenyl (TriBB)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Tetrabromobiphenyl (TetraBB)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Pentabromobiphenyl (PentaBB)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Hexabromobiphenyl (HexaBB)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Heptabromobiphenyl (HeptaBB)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Octabromobiphenyl (OctaBB)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Nonabromobiphenyl (NonaBB)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Decabromobiphenyl (DecaBB)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Sum of polybrominated biphenyls (PBBs)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Monobromodiphenyl ether (MonoBDE)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Dibromodiphenyl ether (DiBDE)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Tribromodiphenyl ether (TriBDE)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Tetrabromodiphenyl ether (TetraBDE)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Pentabromodiphenyl ether (PentaBDE)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Hexabromodiphenyl ether (HexaBDE)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Heptabromodiphenyl ether (HeptaBDE)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Octabromodiphenyl ether (OctaBDE)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Nonabromodiphenyl ether (NonaBDE)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Decabromodiphenyl ether (DecaBDE)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Sum of polybrominated diphenyl ethers (PBDEs)	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.



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## (2) Test result for Chemical Confirmation

(a) The test result of PBBs, PBDEs

Testing item	Result (mg/kg)				
	7.	8.	9.	10.	16.
Monobromobiphenyl (MonoBB)	N.D.	N.D.	N.D.	N.D.	N.D.
Dibromobiphenyl (DiBB)	N.D.	N.D.	N.D.	N.D.	N.D.
Tribromobiphenyl (TriBB)	N.D.	N.D.	N.D.	N.D.	N.D.
Tetrabromobiphenyl (TetraBB)	N.D.	N.D.	N.D.	N.D.	N.D.
Pentabromobiphenyl (PentaBB)	N.D.	N.D.	N.D.	N.D.	N.D.
Hexabromobiphenyl (HexaBB)	N.D.	N.D.	N.D.	N.D.	N.D.
Heptabromobiphenyl (HeptaBB)	N.D.	N.D.	N.D.	N.D.	N.D.
Octabromobiphenyl (OctaBB)	N.D.	N.D.	N.D.	N.D.	N.D.
Nonabromobiphenyl (NonaBB)	N.D.	N.D.	N.D.	N.D.	N.D.
Decabromobiphenyl (DecaBB)	N.D.	N.D.	N.D.	N.D.	N.D.
Sum of polybrominated biphenyls (PBBs)	N.D.	N.D.	N.D.	N.D.	N.D.
Monobromodiphenyl ether (MonoBDE)	N.D.	N.D.	N.D.	N.D.	N.D.
Dibromodiphenyl ether (DiBDE)	N.D.	N.D.	N.D.	N.D.	N.D.
Tribromodiphenyl ether (TriBDE)	N.D.	N.D.	N.D.	N.D.	N.D.
Tetrabromodiphenyl ether (TetraBDE)	N.D.	N.D.	N.D.	N.D.	N.D.
Pentabromodiphenyl ether (PentaBDE)	N.D.	N.D.	N.D.	N.D.	N.D.
Hexabromodiphenyl ether (HexaBDE)	N.D.	N.D.	N.D.	N.D.	N.D.
Heptabromodiphenyl ether (HeptaBDE)	N.D.	N.D.	N.D.	N.D.	N.D.
Octabromodiphenyl ether (OctaBDE)	N.D.	N.D.	N.D.	N.D.	N.D.
Nonabromodiphenyl ether (NonaBDE)	N.D.	N.D.	N.D.	N.D.	N.D.
Decabromodiphenyl ether (DecaBDE)	N.D.	N.D.	N.D.	N.D.	N.D.
Sum of polybrominated diphenyl ethers (PBDEs)	N.D.	N.D.	N.D.	N.D.	N.D.

**Remark:** N.D. = Not Detected, MDL = Method Detection Limit  
mg/kg = ppm = parts per million, 1000 mg/kg = 0.1%  
IN= Uncertain, Further chemical test, X = The range of needing to do further testing  
N/A= Not applicable  
BL = Under the screening limit, OL =Above the screening limit.  
\* = The screened result was found by XRF and further chemical test was suggested  
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.

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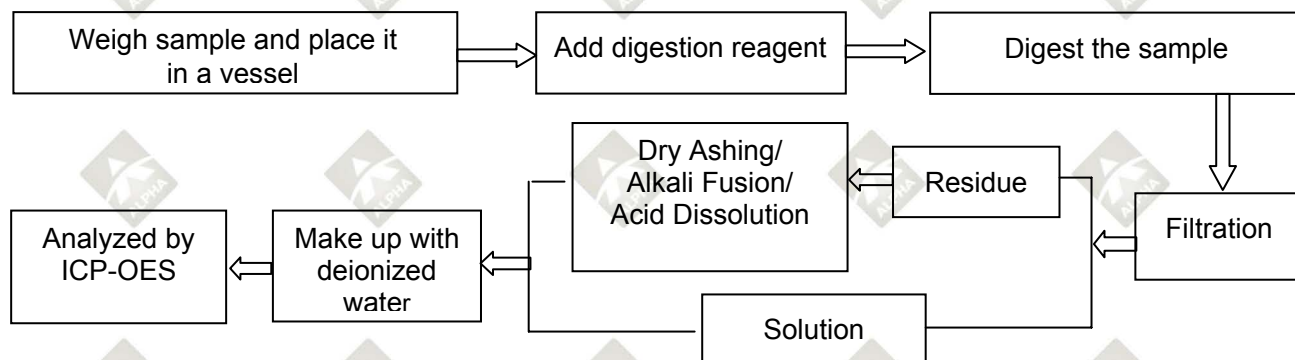
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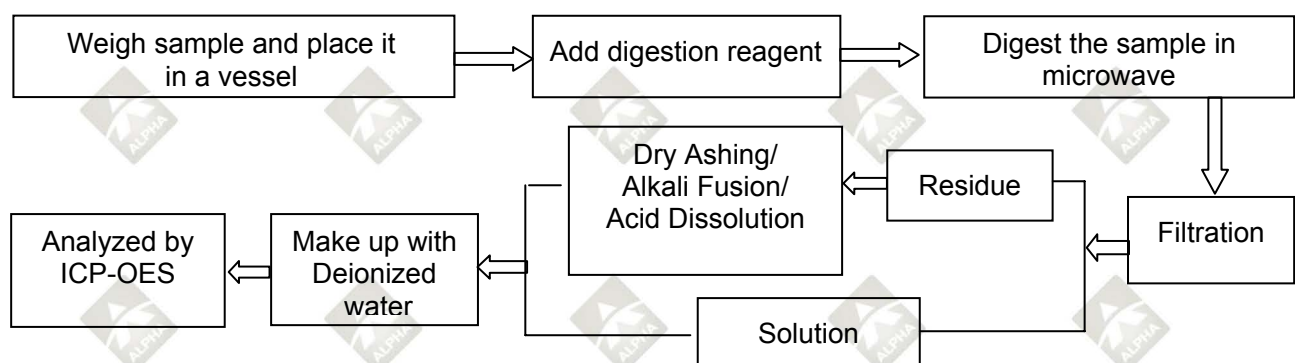
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## Test Process

### 1. Lead(Pb), Cadmium(Cd), Chromium(Cr)

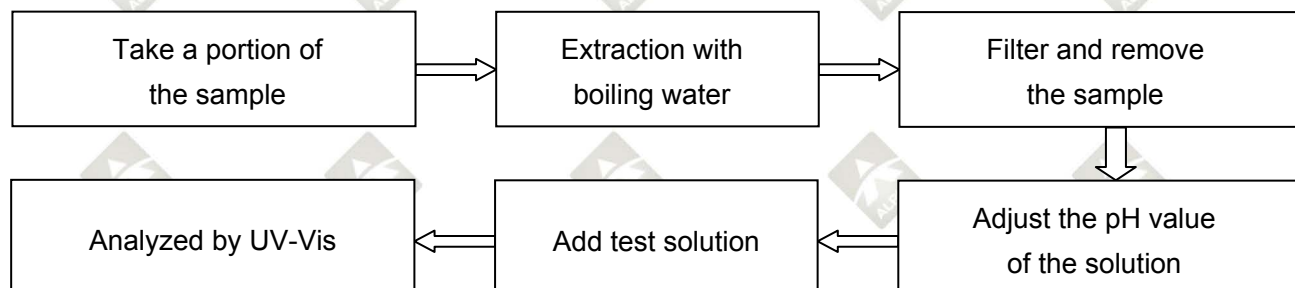


### 2. Mercury(Hg)



### 3. Hexavalent Chromium (Cr (VI))

#### (1) IEC 62321-7-1:2015 Plating/Metal sample(s)





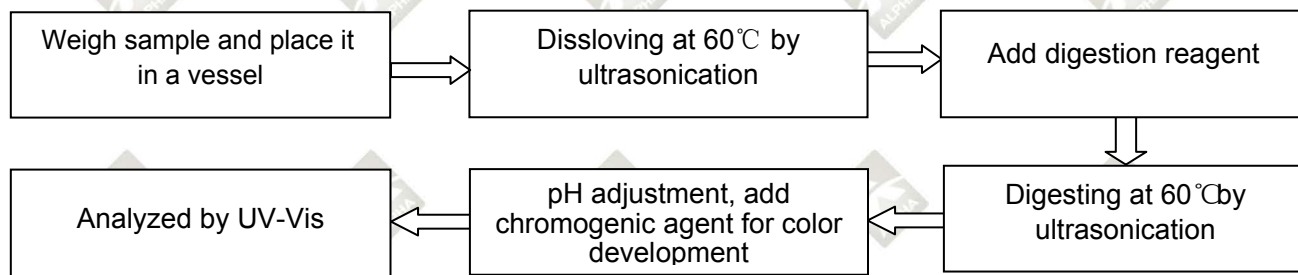
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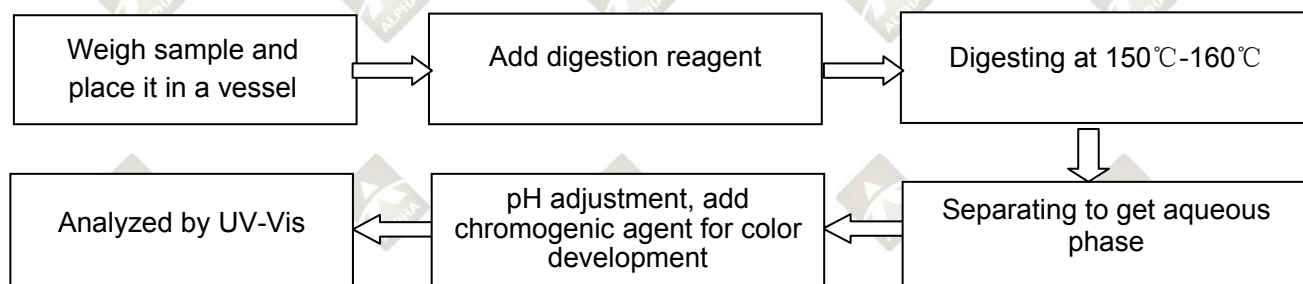
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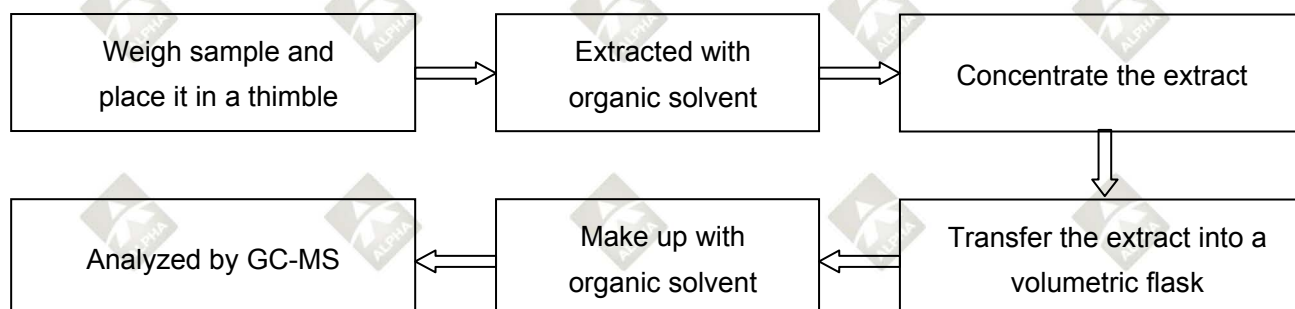
## (2) IEC 62321-7-2:2017 Non-metal sample(s) (Material ABS/PC/PVC)



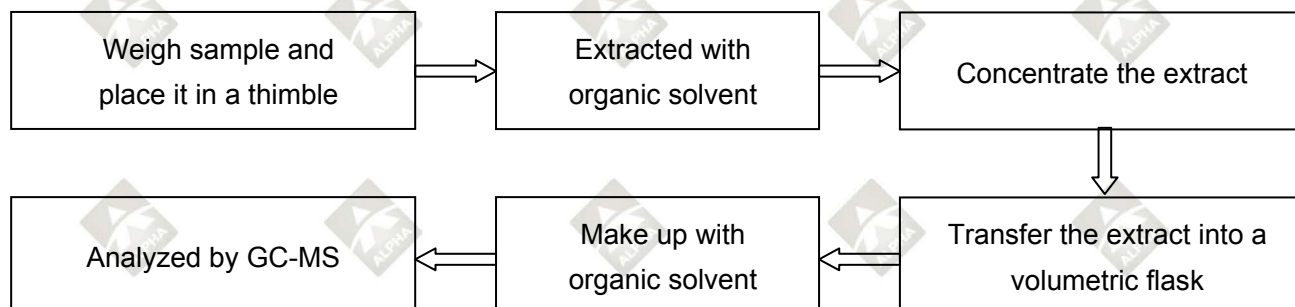
## (3) IEC 62321-7-2:2017 Non-metal sample(s) (Others)



## 4. Polybrominated Biphenyls (PBBs), Polybrominated Diphenyl Ethers (PBDEs)



## 5. Phthalates(DBP/BBP/DEHP/DIBP)



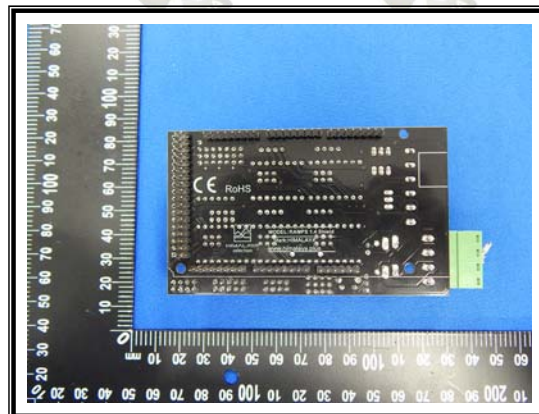
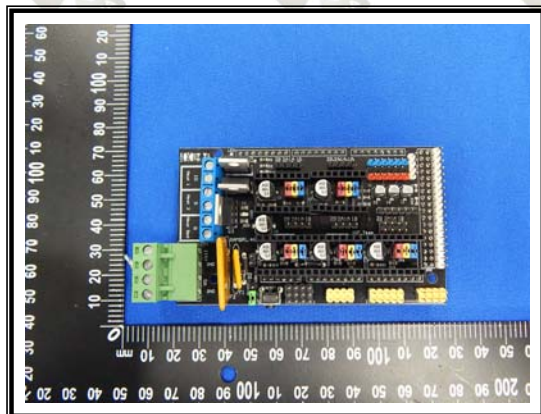
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## Tested sample photo(s)



--- End of report ---

### Statement:

1. The sample(s) and sample Information was/were provided by the client who should be responsible for the authenticity which ALPHA hasn't verified;
2. The result(s) shown in this report refer(s) only to the sample(s) tested;
3. Without written approval of ALPHA, this report can't be reproduced except in full.
4. Modification Version Number to (REV1).

The original Test Report No.T1881710 02(REV0) dated November 22, 2018 was modified on January 09, 2019 due to include the following changes and/or additions

modifications:

-Change Model No. to"HIM01009"..