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Dragino Technology Co., Limited

Room 7009, Zi'An Commercial Building, Qian Jin 1 Road. Xin'An 6th District, Bao'an District; Shenzhen 518101, China

The following samples were submitted and identified on behalf of the clients as

Sample Name: Lora GPS HAT

CPST Internal Reference No.: C160907030

Sample Received Date: Sep 07, 2016

Test Period: Sep 07, 2016 to Sep 14, 2016

Test Method: Please refer to next pages

Test Result: Please refer to next pages

CONCLUSION:

TESTED SAMPLES TEST ITEM RESULT

1. Lead, Cadmium, Mercury, Hexavalent Chromium, PBBs and

Lora GPS HAT PBDEs Content — RoHS Directive 2011/65/EU Annex II

PASS

Signed for and on behalf of Eurones Consumer Products Testing Service Co., Ltd

TESTED BY:

REVIEWED BY:

APPROVED BY:

Wang Guang Yu, Anndy Project Leader

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Li Hui Lian, Cheryl Laboratory Supervisor

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Will Pan



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Test Item Description And Photo List

Sample No.	Description	Photograph
001	White plastic shell	
002	Silvery metal tube	001 002
003	Silvery metal spring	A Mair
004	Silvery metal	
005	Golden metal pin	003 004 005
006	White plastic	
007	Red rubber ring	006 007
008	Translucent plastic jacket	
009	Silvery metal solder	008 009
010	Silvery metal wire	
011	Transparent plastic jacket	010 011



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Sample No.	Description	Photograph
012	Copper metal	
013	Copper metal pin	
014	White plastic	012-014
015	Yellow plastic	
016	Silvery metal	015-016
017	Label	
018	Beige ceramic	
019	Silvery metal sheet	017-019
C. C. S. S. C.	CPST CPSST CP	
020	Brown viscose	020
021	Black chip resistor	021



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Sample No.	Description	Photograph
022	Brown chip resistor	
023	Silvery chip resistor	022 023
024	Silvery chip resistor	
025	Black ceramic	024 025
026	Black ceramic pieces	
027	Green PCB	026 027
028	Black plastic	
029	Silvery metal contact pin	028-029
030	Chip resistor(L1)	030



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Page 5 of 14 No. C160907030002 Date: Sep 14, 2016 Sample No. Description **Photograph** 031 Brown chip resistor(C1,C3) 032 Brown chip resistor(C4) 031 032 Black ceramic(T1,T2) 033 034 LED lamp 034 033 035 Black plastic 035 036 Red PCB 037 Silvery metal solder 038 036 037 038 Copper metal contact pin 039 Copper metal screw 040 Silvery metal nut

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041

Silvery metal screw

040

039

041



Test Results

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Screening test for the specified hazardous substances of RoHS for the selected materials of the submitted sample:

- Heavy Metal (Cadmium, Chromium, Mercury, Lead) Content Test
- Bromine Content Test

According to IEC 62321:2013, and Quantification analyzed with Energy Dispersive X-ray Fluorescence Spectrometers.

Sample No.	Total Cadmium	Total Lead	Total Mercury	Total Chromium	Total Bromine
Sample 001	BL	BL	BL	BL 9	BL
Sample 002	BL	S BL	BL	BLO	N.A.
Sample 003	BL	BL	BL	BL	N.A.
Sample 004	BL	BL	BL	BL	N.A.
Sample 005	BL	OL^	BL	BL	N.A.
Sample 006	BL	BL	BL	BL	BL
Sample 007	BL	BL	BL	BL	BL
Sample 008	BL	BL	BL C	BL	BL
Sample 009	BL	BL	BL	BL	N.A.
Sample 010	BL	BL	BL	BL	N.A.
Sample 011	BL	BL	BL	BL	BL
Sample 012	BL	OL^	BL	BL	N.A.
Sample 013	BL	OL^	BL	BL	N.A.
Sample 014	BL	BL	BL	BL C	BL
Sample 015	BL	BL	BL	BL	Inconclusive^
Sample 016	BL	BL	BL	BL	N.A.
Sample 017	BL	BL	BL	BL	BL
Sample 018	BL	BL	BL	BL	BL
Sample 019	BL O	BL	BL	BL	N.A.
Sample 020	BL	BL	BL	BL	BL O
Sample 021	BL	BL	BL	BL	BL
Sample 022	BL	BL	BL	BL	BL
Sample 023	BL	BL	BL	Inconclusive^	Inconclusive^
Sample 024	BL	BL	BL	SBL 0	BL





Sample No.	Total Cadmium	Total Lead	Total Mercury	Total Chromium	Total Bromine
Sample 025	BL	BL	BL	S BL	BL
Sample 026	BL	BL	BL	BL	Inconclusive^
Sample 027	BL	BL	BL	BL	Inconclusive^
Sample 028	BL	BL	BL	BL	Inconclusive^
Sample 029	BL	BL	BL	BL	N.A.
Sample 030	BL C	BL	BL	BL	BL
Sample 031	BL	BL	BL	BL	BL
Sample 032	BL	BL	BL	BL	BL
Sample 033	BL	BL	BL	BL	BL
Sample 034	BL	BL	BL	BL	BL
Sample 035	BL	BL	BL	BL	Inconclusive^
Sample 036	BL	BL O	BL	BL	Inconclusive^
Sample 037	BL	BL	BL	BL	N.A.
Sample 038	BL	BL	BL	BL	N.A.
Sample 039	BL	BL	BL	BL	N.A.
Sample 040	BL	BL	BL	Inconclusive^	N.A.
Sample 041	BL	BL	BL	BL	N.A.

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Note

- 1. All Concentrations express in "mg/kg" (milligram per kilogram), mg/kg ~ ppm
- 2. "OL" denotes "over limit"
- 3. "BL" denotes "below limit"
- 4. "N.A." denotes "Not Applicable"
- 5. "Inconclusive" denotes result is intermediate between "OL" and "BL"
- 6. "A"denotes the screening result was inconclusive(X) or over limit (OL), thus further confirmation test was conducted, results are listed in 3.2 and 3.3.
- 7. "φ" denotes as the information (the submitted sample is electronic ceramic part) provided by the client, when Lead in electronic ceramic parts is exempted from RoHS Directive 2011/65/EU Annex III.
 - XRF screening limits for different materials:



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Materials	Concentration (mg/kg)						
	Cd	Cr	Pb	Hg	Br		
Metal	BL≤(70-3σ) <x<< td=""><td>DL <!--700.2~\<V</td--><td>BL≤(700-3σ)<x<< td=""><td>BL≤(700-3σ)<x<< td=""><td colspan="2" rowspan="2">N.A.</td></x<<></td></x<<></td></td></x<<>	DL 700.2~\<V</td <td>BL≤(700-3σ)<x<< td=""><td>BL≤(700-3σ)<x<< td=""><td colspan="2" rowspan="2">N.A.</td></x<<></td></x<<></td>	BL≤(700-3σ) <x<< td=""><td>BL≤(700-3σ)<x<< td=""><td colspan="2" rowspan="2">N.A.</td></x<<></td></x<<>	BL≤(700-3σ) <x<< td=""><td colspan="2" rowspan="2">N.A.</td></x<<>	N.A.		
	(130+3σ)≤OL	BL≤(700-3σ) <x< td=""><td>(1300+3σ)≤OL</td><td>(1300+3σ)≤OL</td></x<>	(1300+3σ)≤OL	(1300+3σ)≤OL			
Delimone	BL≤(70-3σ) <x<< td=""><td>DI <!--700 2~)<V</td--><td>BL≤(700-3σ)<x<< td=""><td>BL≤(700-3σ)<x<< td=""><td>BL≤(300-3σ)<</td></x<<></td></x<<></td></td></x<<>	DI 700 2~)<V</td <td>BL≤(700-3σ)<x<< td=""><td>BL≤(700-3σ)<x<< td=""><td>BL≤(300-3σ)<</td></x<<></td></x<<></td>	BL≤(700-3σ) <x<< td=""><td>BL≤(700-3σ)<x<< td=""><td>BL≤(300-3σ)<</td></x<<></td></x<<>	BL≤(700-3σ) <x<< td=""><td>BL≤(300-3σ)<</td></x<<>	BL≤(300-3σ)<		
Polymers	(130+3σ)≤OL	BL≤(700-3σ) <x< td=""><td>(1300+3σ)≤OL</td><td>(1300+3σ)≤OL</td><td>X</td></x<>	(1300+3σ)≤OL	(1300+3σ)≤OL	X		
Composite	Composite BL≤(50-3σ) <x<< td=""><td>BL≤(500-3σ)<x<< td=""><td>BL≤(500-3σ)<x<< td=""><td>BL≤(250-3σ)<</td></x<<></td></x<<></td></x<<>		BL≤(500-3σ) <x<< td=""><td>BL≤(500-3σ)<x<< td=""><td>BL≤(250-3σ)<</td></x<<></td></x<<>	BL≤(500-3σ) <x<< td=""><td>BL≤(250-3σ)<</td></x<<>	BL≤(250-3σ)<		
material	(150+3σ)≤OL	BL≤(500-3σ) <x< td=""><td>(1500+3σ)≤OL</td><td>(1500+3σ)≤OL</td><td>X</td></x<>	(1500+3σ)≤OL	(1500+3σ)≤OL	X		

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3. 2 Test for Heavy Metals

Lead, Cadmium, Hexavalent Chromium and Mercury Tests according to IEC 62321-4:2013 &
 IEC 62321-5:2013 & IEC 62321-7-1:2015& IEC 62321:2008.

Element	Total Cadmium [mg/kg]	Total Lead [mg/kg]	Total Mercury [mg/kg]	Hexavalent Chromium [-]	Hexavalent Chromium [mg/kg]
Detection Limit	5	5	5	Δ	5
RoHS Requirements	100	1000	1000	#	1000
Sample 005	2 1 6	29481Ф	1	5 1 CX	1
Sample 012	10	39472Ф	091 C	1	201
Sample 013	1	37478Ф	1	-27	19
Sample 023	27/	t	cST x	155	N.D.
Sample 040	I.	CVI	100	Negative	1

Note:

- 1. All Concentrations express in "mg/kg" (milligram per kilogram), mg/kg ~ ppm.
- 2. "N.D." = "Not Detected".
- 3. Boiling-water-extraction:

Negative = Absence of Cr(VI) coating / surface layer: the detected concentration in boiling-water-extraction solution is less than 0.10µg with 1cm2 sample surface area. Positive = Presence of Cr(VI) coating / surface layer: the detected concentration in boiling-water-extraction solution is greater than 0.13µg with 1cm2 sample surface area. Inconclusive =the detected concentration in boiling-water-extraction solution is greater than 0.10µg and less than 0.13µg with 1cm2 sample surface area.

- 4. # =Positive indicates the presence of CrVI on the tested areas.
 - Negative indicates the absence of CrVI on the tested areas.
- 5. "-" =Not regulated
- 6. "Φ"=the sample 005, sample 012, sample 013 are copper alloy. The lead content which is under 4% is exempted from the requirement of directive 2011/65/EU (Rohs).





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3. 3 Test for Flame retardants

 Test Method: With reference to IEC 62321-6:2015, extracted by toluene and analyzed by Gas Chromatography and Mass Spectrometry (GC-MS). [Reporting Limit: 5mg/kg]

Test Item		Result [mg/kg]		RoHS	
		Sample 015	Sample 023	Requirement [mg/kg]	
	Monobromobiphenyl	< 5	< 5	3 7 7	
	Dibromobiphenyl	< 5	< 5		
	Tribromobiphenyl	< 5	< 5		
	Tetrabromobiphenyl	< 5	< 5		
	Pentabromobiphenyl	< 5	< 5		
PBBs	Hexabromobiphenyl	< 5	< 5	Sum of PBBs < 1000	
	Heptabromobiphenyl	< 5	< 5	1000	
	Octabromobiphenyl	< 5	< 5	5 (85)	
	Nonabromobiphenyl	< 5	< 5		
	Decabromobiphenyl	< 5	< 5		
	Sum of PBBs	< 5	< 5		
-8	Monobromodiphenyl Ether	< 5	< 5	182 C.	
	Dibromodiphenyl Ether	< 5	< 5		
	Tribromodiphenyl Ether	< 5	< 5	O A	
	Tetrabromodiphenyl Ether	< 5	< 5		
	Pentabromodiphenyl Ether	< 5	S < 5	0 (DDDE	
PBDEs	Hexabromodiphenyl Ether	< 5	< 5	Sum of PBDEs	
	Heptabromodiphenyl Ether	< 5	< 5	< 1000	
	Octabromodiphenyl Ether	< 5	< 5		
	Nonabromodiphenyl Ether	< 5	< 5		
	Decabromodiphenyl Ether	< 5	< 5		
	Sum of PBDEs	< 5	< 5		





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	Test Item	Result	[mg/kg]	RoHS
rest item		Sample 026	Sample 027	Requirement [mg/kg]
	Monobromobiphenyl	< 5	< 5	X
	Dibromobiphenyl	< 5	< 5	82
	Tribromobiphenyl	< 5	< 5	(SS)
	Tetrabromobiphenyl	< 5	< 5	
	Pentabromobiphenyl	< 5	< 5	
PBBs	Hexabromobiphenyl	< 5	< 5	Sum of PBBs < 1000
	Heptabromobiphenyl	< 5	< 5	1000
	Octabromobiphenyl	< 5	< 5	, 51 CP 51
	Nonabromobiphenyl	< 5	< 5	
	Decabromobiphenyl	< 5	< 5	
	Sum of PBBs	< 5	< 5	
C.Y	Monobromodiphenyl Ether	< 5	< 5	683 4
	Dibromodiphenyl Ether	< 5	< 5	00,
	Tribromodiphenyl Ether	< 5	< 5	0 25
	Tetrabromodiphenyl Ether	< 5	< 5	5)
	Pentabromodiphenyl Ether	< 5	< 5	6 (5555
PBDEs	Hexabromodiphenyl Ether	< 5	< 5	Sum of PBDEs < 1000
	Heptabromodiphenyl Ether	< 5	< 5	7 1000
	Octabromodiphenyl Ether	< 5	< 5	× 0, 22,
	Nonabromodiphenyl Ether	< 5	< 5	5) CX
	Decabromodiphenyl Ether	< 5	< 5	75 CP
	Sum of PBDEs	< 5	< 5	





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Hexabromodiphenyl Ether

Heptabromodiphenyl Ether

Octabromodiphenyl Ether
Nonabromodiphenyl Ether

Decabromodiphenyl Ether

Sum of PBDEs

Test Hom		Result	[mg/kg]	RoHS
25)	Test Item	Sample 028	Sample 035	Requirement [mg/kg]
3,45	Monobromobiphenyl	< 5	< 5	7
	Dibromobiphenyl	< 5	< 5	
	Tribromobiphenyl	< 5	< 5	
	Tetrabromobiphenyl	< 5	< 5	
	Pentabromobiphenyl	< 5	< 5	Compat DDDa
PBBs	Hexabromobiphenyl	< 5	< 5	Sum of PBBs < 1000
	Heptabromobiphenyl	< 5	< 5	1000
	Octabromobiphenyl	< 5	< 5	
	Nonabromobiphenyl	< 5	< 5	
	Decabromobiphenyl	< 5	< 5	
	Sum of PBBs	< 5	< 5	
C.Y	Monobromodiphenyl Ether	< 5	< 5	3 1
	Dibromodiphenyl Ether	< 5	< 5	
	Tribromodiphenyl Ether	< 5	< 5	
	Tetrabromodiphenyl Ether	< 5	< 5	
	Pentabromodiphenyl Ether	< 5	< 5	0 (000
DDDEs	Heyahromodinhenyl Ether	< 5	< 5	Sum of PBDEs

< 5

< 5

< 5

< 5

< 5

< 5

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PBDEs

< 5

< 5

< 5

< 5

< 5

< 5

< 1000

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RoHS Result [mg/kg] **Test Item** Requirement Sample 036 [mg/kg] Monobromobiphenyl < 5 Dibromobiphenyl < 5 < 5 Tribromobiphenyl < 5 Tetrabromobiphenyl Pentabromobiphenyl < 5 Sum of PBBs **PBBs** Hexabromobiphenyl < 5 < 1000 Heptabromobiphenyl < 5 Octabromobiphenyl < 5 Nonabromobiphenyl < 5 < 5 Decabromobiphenyl Sum of PBBs < 5 < 5 Monobromodiphenyl Ether Dibromodiphenyl Ether < 5 Tribromodiphenyl Ether < 5 Tetrabromodiphenyl Ether < 5 Pentabromodiphenyl Ether < 5 Sum of PBDEs **PBDEs** Hexabromodiphenyl Ether < 5 < 1000 Heptabromodiphenyl Ether < 5 Octabromodiphenyl Ether < 5

< 5

< 5

< 5

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Note:

1. All Concentrations express in "mg/kg" (milligram per kilogram), mg/kg ~ ppm.

Nonabromodiphenyl Ether

Decabromodiphenyl Ether

Sum of PBDEs

2. "<" denotes less than

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Photo of the Submitted Sample



*** End of Report ***