

Applicant: Dragino Technology Co., Limited.

Applicant address: Room 202,BaoChengTai industrial park,No.8 CaiYun LongCheng Street,LongGang District, Shenzhen 518116, China

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

Sample Name: LoRaWAN Gateway
Model: LIG16
Trademark: Dragino
CPST Internal Reference No.: C211231077
Sample Received Date: Dec 31 , 2021
Test Period: Dec 31 , 2021 to Jan 12 , 2022
Test Method: Please refer to next page(s).
Test Result: Please refer to next page(s).

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



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CPST

Test Report

No. C211231077001-1

Date: Jan 12 , 2022

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CONCLUSION :

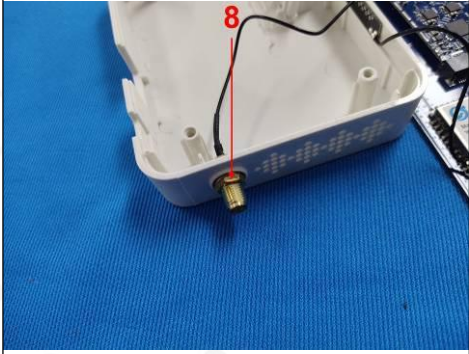

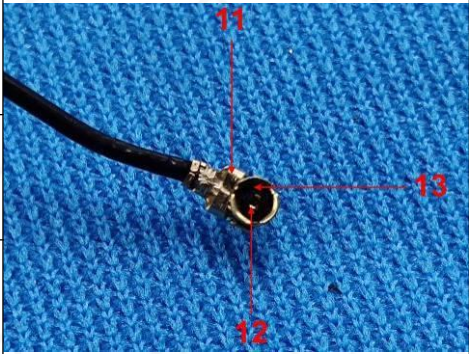
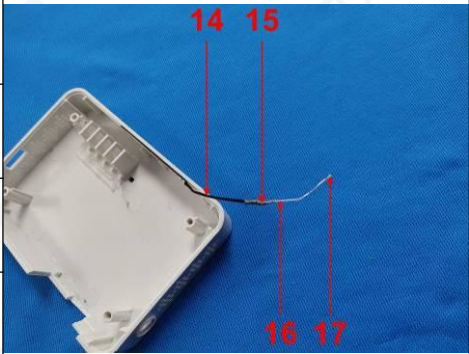
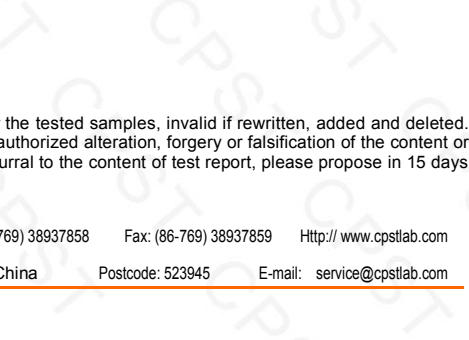
<u>TESTED SAMPLES</u>	<u>TEST ITEM</u>	<u>RESULT</u>
LoRaWAN Gateway	1.RoHS Directive 2011/65/EU Annex II amending Annex (EU)2015/863	
	— Lead, Cadmium, Mercury, Hexavalent Chromium, PBBs and PBDEs Content	PASS
	—Di-(2-ethylhexyl) phthalate(DEHP), Benzylbutyl phthalate(BBP), Dibutyl phthalate (DBP), Diisobutyl phthalate(DIBP) Content	PASS

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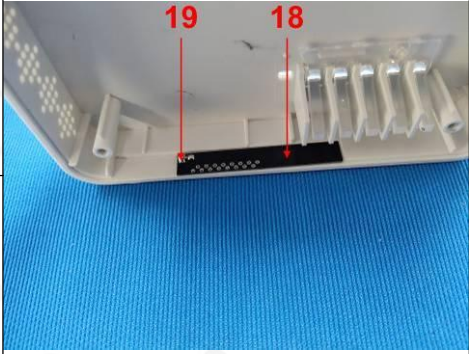
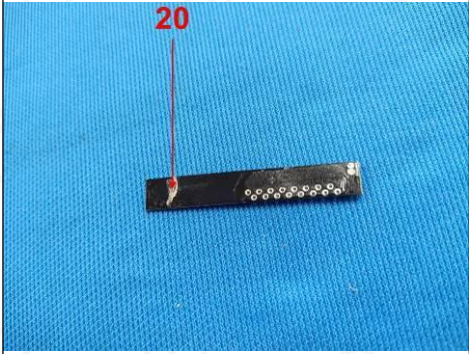
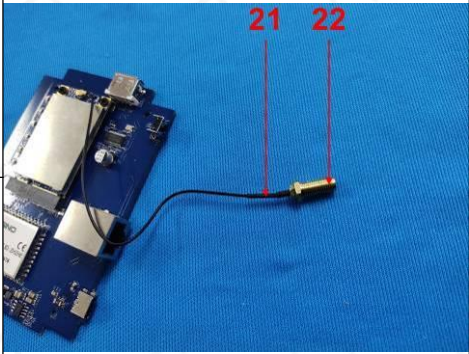
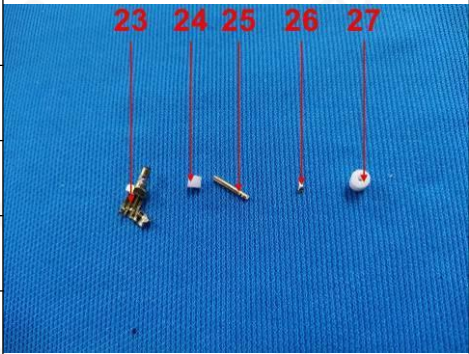
2. Test Item Description And Photo List

Sample No.	Description	Photograph
001	White plastic (shell)	
002	Transparent plastic	
003	Black soft plastic	
004	Silvery plastic band with black printing	
005	White double-sided tape	
006	Silvery metal (screw)	
007	White plastic (shell)	

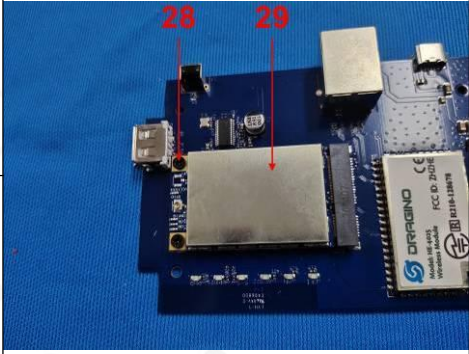
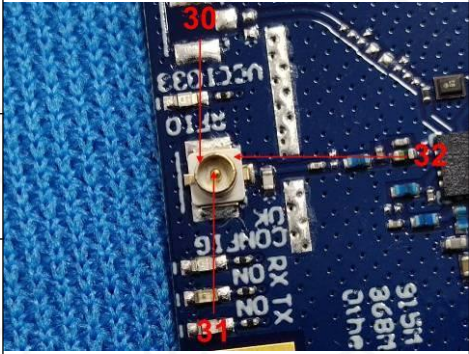
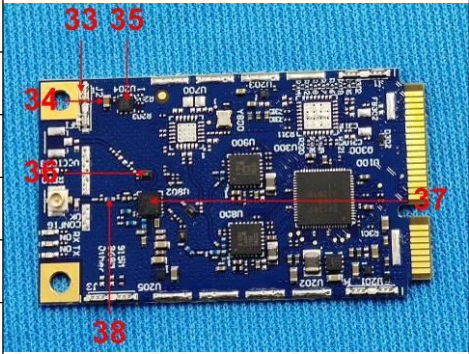
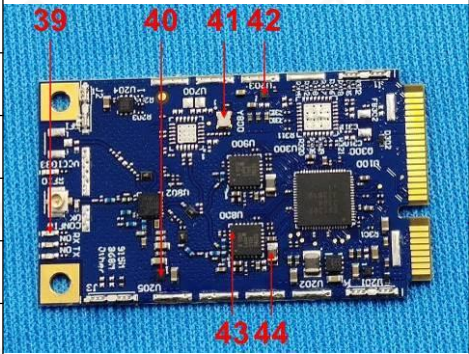
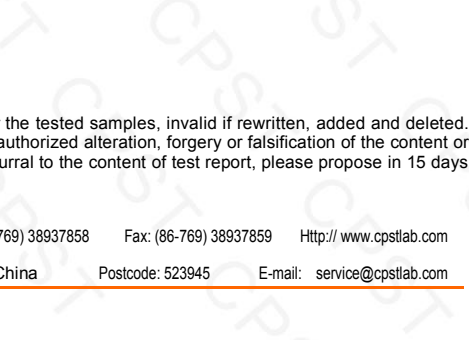
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Sample No.	Description	Photograph
008	Golden metal (nut)	
009	Golden metal (gasket)	
010	Golden metal (gasket)	
011	Golden metal	
012	Golden metal	
013	Black plastic	
014	Black soft plastic (wire jacket)	
015	Silvery metal	
016	Transparent soft plastic (wire jacket)	
017	Silvery metal (wire core)	

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Sample No.	Description	Photograph
018	Black PCB	
019	Silvery solder	
020	Transparent glue	
021	Black soft plastic (tube)	
022	Golden metal	
023	Golden metal	
024	White plastic	
025	Golden metal	
026	Silvery solder	
027	White plastic	

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Sample No.	Description	Photograph
028	Silvery metal with black plating (screw)	
029	Silvery metal	
030	Golden metal	
031	Golden metal	
032	Beige plastic	
033	Silvery metal	
034	Brown body (chip capacitor)	
035	Black body	
036	Black body	
037	Black body	
038	Blue body	
039	White body (LED)	
040	Black body	
041	Silvery body (crystal)	
042	Black body	
043	Black body	
044	Gray body	

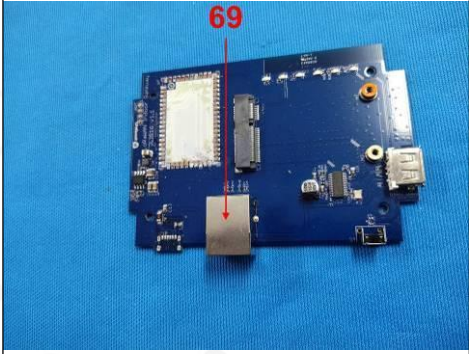
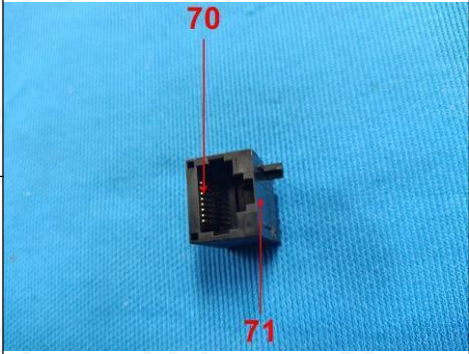
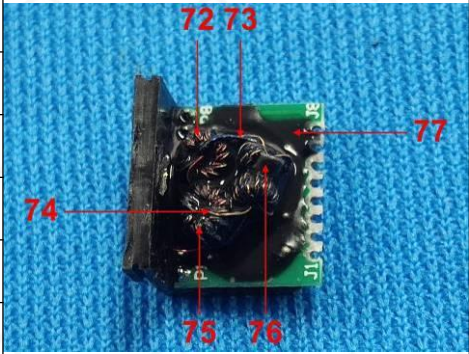
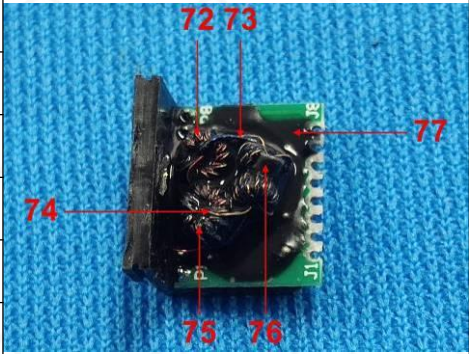
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Sample No.	Description	Photograph
045	Black body	
046	Black body	
047	Black body	
048	Blue PCB	
049	Silvery solder	
050	White plastic with color printing	
051	Silvery metal	
052	Silvery metal	
053	Black body with white printing	
054	Black body	
055	Black body (transistor)	
056	Silvery body (crystal)	
057	Black body	
058	Gray body with black printing	

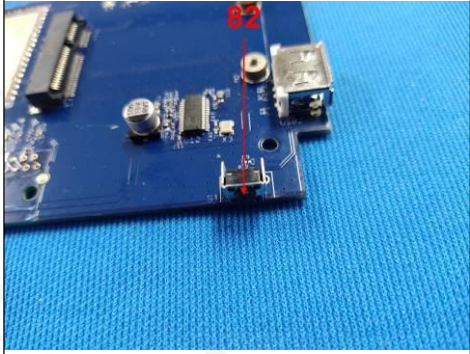
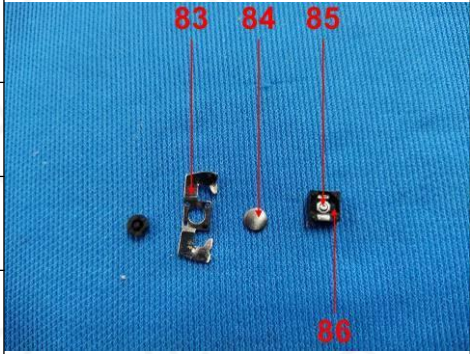
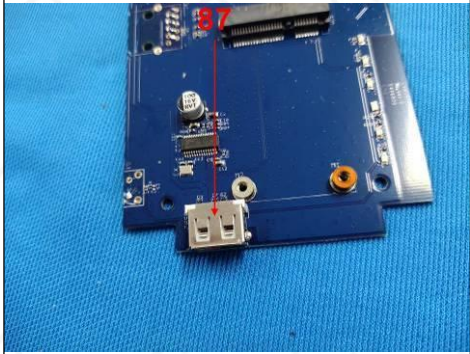
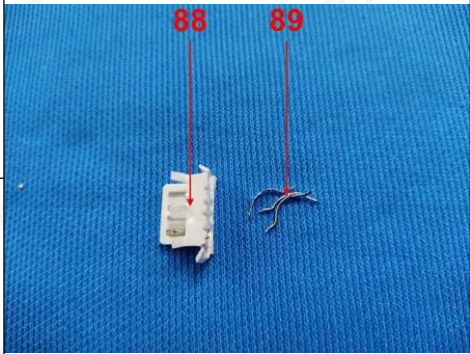
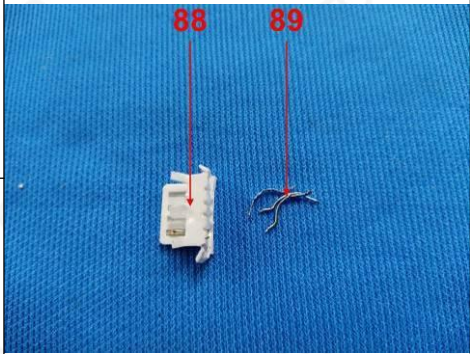
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Sample No.	Description	Photograph
059	Black body (chip resistor)	
060	Black body	
061	Silvery metal (pin)	
062	Blue PCB	
063	Silvery solder	
064	Golden metal	
065	Black plastic	
066	Silvery metal (Type-C socket)	
067	Golden metal	
068	Gray plastic	

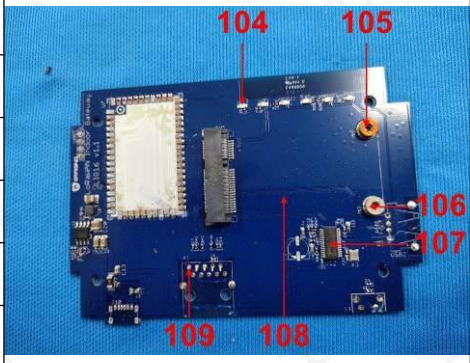
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Sample No.	Description	Photograph
069	Silvery metal	
070	Golden metal	
071	Gray plastic	
072	Red metal	
073	Blue metal	
074	Coppery metal	
075	Green metal	
076	Gray magnet	
077	Black glue	
078	Silvery metal	
079	Gray plastic	
080	Green PCB	
081	Silvery solder	

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Sample No.	Description	Photograph
082	Black plastic (switch)	
083	Silvery metal (switch)	
084	Silvery metal (switch)	
085	Silvery metal (switch)	
086	Black plastic (switch)	
087	Silvery metal (USB socket)	
088	White plastic (USB socket)	
089	Silvery metal (USB socket)	

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Sample No.	Description	Photograph
090	Silvery metal with black printing (capacitor)	
091	Black plastic	
092	Black rubber	
093	Silvery foil	
094	Grey foil	
095	Brown paper	
096	Silvery metal (connecting piece)	
097	Silvery metal (pin)	
098	Gray body	
099	Black body	
100	Black body with orange printing	
101	Gray body	
102	Silvery metal	
103	Gray plastic	
104	White body (LED)	
105	Orange plastic	
106	Silvery metal (nut)	
107	Black body	
108	Blue PCB	
109	Silvery solder	

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3. Test Results

3.1 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 62321-3-1:2013, 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	BL
Sample 002	BL	BL	BL	BL	BL
Sample 003	BL	BL	BL	BL	BL
Sample 004	BL	BL	BL	BL	BL
Sample 005	BL	BL	BL	BL	BL
Sample 006	BL	BL	BL	BL	N.A.
Sample 007	BL	BL	BL	BL	BL
Sample 008	BL	OL [^]	BL	BL	N.A.
Sample 009	BL	BL	BL	Inconclusive [^]	N.A.
Sample 010	BL	BL	BL	BL	N.A.
Sample 011	BL	BL	BL	BL	N.A.
Sample 012	BL	BL	BL	BL	N.A.
Sample 013	BL	BL	BL	BL	BL
Sample 014	BL	BL	BL	BL	BL
Sample 015	BL	BL	BL	BL	N.A.
Sample 016	BL	BL	BL	BL	BL
Sample 017	BL	BL	BL	BL	N.A.
Sample 018	BL	BL	BL	BL	Inconclusive [^]
Sample 019	BL	BL	BL	BL	N.A.
Sample 020	BL	BL	BL	BL	BL
Sample 021	BL	BL	BL	BL	BL
Sample 022	BL	OL [^]	BL	BL	N.A.
Sample 023	BL	OL [^]	BL	BL	N.A.
Sample 024	BL	BL	BL	BL	BL
Sample 025	BL	OL [^]	BL	BL	N.A.
Sample 026	BL	OL [^]	BL	BL	N.A.

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Sample No.	Total Cadmium	Total Lead	Total Mercury	Total Chromium	Total Bromine
Sample 027	BL	BL	BL	BL	BL
Sample 028	BL	BL	BL	BL	N.A.
Sample 029	BL	BL	BL	BL	N.A.
Sample 030	BL	BL	BL	BL	N.A.
Sample 031	BL	BL	BL	BL	N.A.
Sample 032	BL	BL	BL	BL	BL
Sample 033	BL	BL	BL	BL	N.A.
Sample 034	BL	BL	BL	BL	BL
Sample 035	BL	BL	BL	BL	BL
Sample 036	BL	BL	BL	BL	BL
Sample 037	BL	BL	BL	BL	BL
Sample 038	BL	BL	BL	BL	BL
Sample 039	BL	BL	BL	BL	BL
Sample 040	BL	BL	BL	BL	BL
Sample 041	BL	BL	BL	BL	BL
Sample 042	BL	BL	BL	BL	BL
Sample 043	BL	BL	BL	BL	BL
Sample 044	BL	BL	BL	BL	BL
Sample 045	BL	BL	BL	BL	BL
Sample 046	BL	BL	BL	BL	BL
Sample 047	BL	BL	BL	BL	BL
Sample 048	BL	BL	BL	BL	Inconclusive [^]
Sample 049	BL	BL	BL	BL	N.A.
Sample 050	BL	BL	BL	BL	BL
Sample 051	BL	BL	BL	BL	N.A.
Sample 052	BL	BL	BL	BL	N.A.
Sample 053	BL	BL	BL	BL	BL
Sample 054	BL	BL	BL	BL	BL
Sample 055	BL	BL	BL	BL	BL
Sample 056	BL	BL	BL	BL	BL
Sample 057	BL	BL	BL	BL	BL
Sample 058	BL	BL	BL	BL	BL
Sample 059	BL	BL	BL	BL	BL
Sample 060	BL	BL	BL	BL	BL
Sample 061	BL	BL	BL	BL	N.A.

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Sample No.	Total Cadmium	Total Lead	Total Mercury	Total Chromium	Total Bromine
Sample 062	BL	BL	BL	BL	Inconclusive [^]
Sample 063	BL	BL	BL	BL	N.A.
Sample 064	BL	BL	BL	BL	N.A.
Sample 065	BL	BL	BL	BL	BL
Sample 066	BL	BL	BL	Inconclusive [^]	N.A.
Sample 067	BL	BL	BL	BL	N.A.
Sample 068	BL	BL	BL	BL	BL
Sample 069	BL	BL	BL	BL	N.A.
Sample 070	BL	BL	BL	BL	N.A.
Sample 071	BL	BL	BL	BL	BL
Sample 072	BL	BL	BL	BL	N.A.
Sample 073	BL	BL	BL	BL	N.A.
Sample 074	BL	BL	BL	BL	N.A.
Sample 075	BL	BL	BL	BL	N.A.
Sample 076	BL	BL	BL	BL	BL
Sample 077	BL	BL	BL	BL	BL
Sample 078	BL	BL	BL	BL	BL
Sample 079	BL	BL	BL	BL	BL
Sample 080	BL	BL	BL	BL	BL
Sample 081	BL	BL	BL	BL	N.A.
Sample 082	BL	BL	BL	BL	BL
Sample 083	BL	BL	BL	BL	N.A.
Sample 084	BL	BL	BL	BL	N.A.
Sample 085	BL	BL	BL	BL	N.A.
Sample 086	BL	BL	BL	BL	BL
Sample 087	BL	BL	BL	BL	N.A.
Sample 088	BL	BL	BL	BL	BL
Sample 089	BL	BL	BL	BL	N.A.
Sample 090	BL	BL	BL	BL	N.A.
Sample 091	BL	BL	BL	BL	BL
Sample 092	BL	BL	BL	BL	BL
Sample 093	BL	BL	BL	BL	BL
Sample 094	BL	BL	BL	BL	BL
Sample 095	BL	BL	BL	BL	BL
Sample 096	BL	BL	BL	BL	N.A.

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Sample No.	Total Cadmium	Total Lead	Total Mercury	Total Chromium	Total Bromine
Sample 097	BL	BL	BL	BL	N.A.
Sample 098	BL	BL	BL	BL	BL
Sample 099	BL	BL	BL	BL	BL
Sample 100	BL	BL	BL	BL	BL
Sample 101	BL	BL	BL	BL	BL
Sample 102	BL	BL	BL	BL	N.A.
Sample 103	BL	BL	BL	BL	BL
Sample 104	BL	BL	BL	BL	BL
Sample 105	BL	BL	BL	BL	BL
Sample 106	BL	BL	BL	BL	N.A.
Sample 107	BL	BL	BL	BL	BL
Sample 108	BL	BL	BL	BL	Inconclusive [^]
Sample 109	BL	BL	BL	BL	N.A.

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. “^”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.

XRF screening limits for different materials:

Materials	Concentration (mg/kg)				
	Cd	Cr	Pb	Hg	Br
Metal	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	N.A.
Polymers	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (300-3\sigma) < X$
Composite material	$BL \leq (50-3\sigma) < X < (150+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$	$BL \leq (250-3\sigma) < X$

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3. 2 Test for Heavy Metals

– Lead, Cadmium, Hexavalent Chromium and Mercury Tests according to IEC 62321-4:2013+A1:2017 & IEC 62321-5:2013 & IEC 62321-7-1:2015 & IEC 62321-7-2:2017, Analysis was conducted by ICP-OES, UV-VIS.

Element	Total Cadmium [mg/kg]	Total Lead [mg/kg]	Total Mercury [mg/kg]	Hexavalent Chromium [$\mu\text{g}/\text{cm}^2$]	Hexavalent Chromium [mg/kg]
Detection Limit	5	5	5	0.10	5
Limit	100	1000	1000	0.10	1000
Sample 008	/	29227 Φ	/	/	/
Sample 009	/	/	/	N.D.	/
Sample 022	/	30821 Φ	/	/	/
Sample 023	/	25767 Φ	/	/	/
Sample 025	/	29314 Φ	/	/	/
Sample 026	/	N.D.*	/	/	/
Sample 066	/	/	/	N.D.	/

Note:

- All Concentrations express in "mg/kg"(milligram per kilogram), mg/kg ~ ppm.
- "N.D." = "Not Detected".
- Boiling-water-extraction:
 - Negative = Absence of Cr(VI) coating / surface layer: the detected concentration in boiling-water-extraction solution is less than 0.10 μg with 1 cm^2 sample surface area.
 - Positive = Presence of Cr(VI) coating / surface layer: the detected concentration in boiling-water-extraction solution is greater than 0.13 μg with 1 cm^2 sample surface area.
 - Inconclusive = the detected concentration in boiling-water-extraction solution is greater than 0.10 μg and less than 0.13 μg with 1 cm^2 sample surface area.
- Positive = result be regarded as not comply with RoHS requirement
Negative = result be regarded as comply with RoHS requirement
- "-" = Not regulated
- " Φ " = the sample 008, sample 022, sample 023, sample 025 are copper alloy. The lead content which is under 4% is exempted from the requirement of directive 2011/65/EU(RoHS)Annex III 6(c).
- "*" = The sample of test item was resubmitted by the customer on Jan 11, 2022.

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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 Requirement [mg/kg]
		Sample 018	Sample 048	
PBBs	Monobromobiphenyl	< 5	< 5	Sum of PBBs < 1000
	Dibromobiphenyl	< 5	< 5	
	Tribromobiphenyl	< 5	< 5	
	Tetrabromobiphenyl	< 5	< 5	
	Pentabromobiphenyl	< 5	< 5	
	Hexabromobiphenyl	< 5	< 5	
	Heptabromobiphenyl	< 5	< 5	
	Octabromobiphenyl	< 5	< 5	
	Nonabromobiphenyl	< 5	< 5	
	Decabromobiphenyl	< 5	< 5	
	Sum of PBBs	< 5	< 5	
PBDEs	Monobromodiphenyl Ether	< 5	< 5	Sum of PBDEs < 1000
	Dibromodiphenyl Ether	< 5	< 5	
	Tribromodiphenyl Ether	< 5	< 5	
	Tetrabromodiphenyl Ether	< 5	< 5	
	Pentabromodiphenyl Ether	< 5	< 5	
	Hexabromodiphenyl Ether	< 5	< 5	
	Heptabromodiphenyl Ether	< 5	< 5	
	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 Requirement [mg/kg]
		Sample 062	Sample 108	
PBBs	Monobromobiphenyl	< 5	< 5	Sum of PBBs < 1000
	Dibromobiphenyl	< 5	< 5	
	Tribromobiphenyl	< 5	< 5	
	Tetrabromobiphenyl	< 5	< 5	
	Pentabromobiphenyl	< 5	< 5	
	Hexabromobiphenyl	< 5	< 5	
	Heptabromobiphenyl	< 5	< 5	
	Octabromobiphenyl	< 5	< 5	
	Nonabromobiphenyl	< 5	< 5	
	Decabromobiphenyl	< 5	< 5	
	Sum of PBBs	< 5	< 5	
PBDEs	Monobromodiphenyl Ether	< 5	< 5	Sum of PBDEs < 1000
	Dibromodiphenyl Ether	< 5	< 5	
	Tribromodiphenyl Ether	< 5	< 5	
	Tetrabromodiphenyl Ether	< 5	< 5	
	Pentabromodiphenyl Ether	< 5	< 5	
	Hexabromodiphenyl Ether	< 5	< 5	
	Heptabromodiphenyl Ether	< 5	< 5	
	Octabromodiphenyl Ether	< 5	< 5	
	Nonabromodiphenyl Ether	< 5	< 5	
	Decabromodiphenyl Ether	< 5	< 5	
	Sum of PBDEs	< 5	< 5	

Note:

1. All Concentrations express in "mg/kg" (milligram per kilogram), mg/kg ~ ppm.
2. "<" denotes less than

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3.4 Di-(2-ethylhexyl) phthalate(DEHP), Benzylbutyl phthalate(BBP), Dibutyl phthalate (DBP), Diisobutyl phthalate (DIBP) Content—RoHS Directive 2011/65/EU Annex II amending Annex (EU)2017/2102

Test method: With reference to IEC 62321-8:2017; Analysis was conducted by GC-MS.

Element	Di-(2-ethylhexyl) phthalate (DEHP) [mg/kg]	Benzylbutyl phthalate (BBP) [mg/kg]	Dibutyl phthalate (DBP) [mg/kg]	Diisobutyl phthalate(DIBP) [mg/kg]
Detection Limit	50	50	50	50
Limit	1000	1000	1000	1000
Sample 001	N.D.	N.D.	N.D.	N.D.
Sample 002	N.D.	N.D.	N.D.	N.D.
Sample 003	N.D.	N.D.	130	N.D.
Sample 004	N.D.	N.D.	N.D.	N.D.
Sample 005	270	N.D.	720	N.D.
Sample 007	N.D.	N.D.	N.D.	N.D.
Sample 013	N.D.	N.D.	N.D.	N.D.
Sample 014	N.D.	N.D.	N.D.	N.D.
Sample 016	N.D.	N.D.	N.D.	N.D.
Sample 018	N.D.	N.D.	N.D.	N.D.
Sample 020	135	N.D.	N.D.	N.D.
Sample 021	170	N.D.	N.D.	N.D.
Sample 024	N.D.	N.D.	N.D.	N.D.
Sample 027	N.D.	N.D.	N.D.	N.D.
Sample 032	N.D.	N.D.	N.D.	N.D.
Sample 034	N.D.	N.D.	N.D.	N.D.
Sample 035	N.D.	N.D.	N.D.	N.D.
Sample 036	N.D.	N.D.	N.D.	N.D.
Sample 037	N.D.	N.D.	N.D.	N.D.
Sample 038	N.D.	N.D.	N.D.	N.D.
Sample 039	N.D.	N.D.	N.D.	N.D.
Sample 040	N.D.	N.D.	N.D.	N.D.
Sample 041	N.D.	N.D.	N.D.	N.D.
Sample 042	N.D.	N.D.	N.D.	N.D.
Sample 043	N.D.	N.D.	N.D.	N.D.
Sample 044	N.D.	N.D.	N.D.	N.D.
Sample 045	N.D.	N.D.	N.D.	N.D.
Sample 046	N.D.	N.D.	N.D.	N.D.
Sample 047	N.D.	N.D.	N.D.	N.D.

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Element	Di-(2-ethylhexyl) phthalate (DEHP) [mg/kg]	Benzylbutyl phthalate (BBP) [mg/kg]	Dibutyl phthalate (DBP) [mg/kg]	Diisobutyl phthalate(DIBP) [mg/kg]
Detection Limit	50	50	50	50
Limit	1000	1000	1000	1000
Sample 048	N.D.	N.D.	N.D.	N.D.
Sample 050	N.D.	N.D.	N.D.	N.D.
Sample 053	N.D.	N.D.	N.D.	N.D.
Sample 054	N.D.	N.D.	N.D.	N.D.
Sample 055	N.D.	N.D.	N.D.	N.D.
Sample 056	N.D.	N.D.	N.D.	N.D.
Sample 057	N.D.	N.D.	N.D.	N.D.
Sample 058	N.D.	N.D.	N.D.	N.D.
Sample 059	N.D.	N.D.	N.D.	N.D.
Sample 060	N.D.	N.D.	N.D.	N.D.
Sample 062	N.D.	N.D.	N.D.	N.D.
Sample 065	N.D.	N.D.	N.D.	N.D.
Sample 068	N.D.	N.D.	N.D.	N.D.
Sample 071	N.D.	N.D.	N.D.	N.D.
Sample 076	N.D.	N.D.	N.D.	N.D.
Sample 077	N.D.	N.D.	N.D.	N.D.
Sample 078	N.D.	N.D.	N.D.	N.D.
Sample 079	N.D.	N.D.	N.D.	N.D.
Sample 080	N.D.	N.D.	N.D.	N.D.
Sample 082	N.D.	N.D.	N.D.	N.D.
Sample 086	N.D.	N.D.	N.D.	N.D.
Sample 088	N.D.	N.D.	N.D.	N.D.
Sample 091	N.D.	N.D.	N.D.	N.D.
Sample 092	N.D.	N.D.	N.D.	N.D.
Sample 093	N.D.	N.D.	N.D.	N.D.
Sample 094	N.D.	N.D.	N.D.	N.D.
Sample 095	N.D.	N.D.	N.D.	N.D.
Sample 098	N.D.	N.D.	N.D.	N.D.
Sample 099	N.D.	N.D.	N.D.	N.D.
Sample 100	N.D.	N.D.	N.D.	N.D.
Sample 101	N.D.	N.D.	N.D.	N.D.
Sample 103	N.D.	N.D.	N.D.	N.D.
Sample 104	N.D.	N.D.	N.D.	N.D.

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Element	Di-(2-ethylhexyl) phthalate (DEHP) [mg/kg]	Benzylbutyl phthalate (BBP) [mg/kg]	Dibutyl phthalate (DBP) [mg/kg]	Diisobutyl phthalate(DIBP) [mg/kg]
Detection Limit	50	50	50	50
Limit	1000	1000	1000	1000
Sample 105	N.D.	N.D.	N.D.	N.D.
Sample 107	N.D.	N.D.	N.D.	N.D.
Sample 108	N.D.	N.D.	N.D.	N.D.

Note:

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

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Photo of the Submitted Sample



*** End of Report ***

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