



# TEST REPORT

REPORT No.: R2BJ181212F0829E

Date: March 1, 2019

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BEIJING EPSOLAR TECHNOLOGY CO.,LTD.  
NO.228, BLOCK A, 2ND FLOOR, BLDG 1, NO.3 STREET, SHANGDI XINXI CHANYE JIDI, HAIDIAN DISTRICT,  
BEIJING, CHINA

Report on the submitted samples said to be:

Sample Name : MPPT Solar Charge Controller  
 Tested Style/ Items No.<sup>①</sup> : Tracer7810BP  
 Additional Styles/ Items No.<sup>②</sup> : Tracer2606BP, Tracer3906BP, Tracer5206BP, Tracer2610BP, Tracer3910BP, Tracer5210BP  
 Sample Receiving Date : December 12, 2018  
 Testing Period : From December 12, 2018 to March 1, 2019  
 Results : Please refer to next page(s).  
 Remark : ①The tested Style/ Item No. is tested by the lab. ②The Additional Styles/ Items No. declared in the applicant's declaration are not tested, their materials are the same as the tested parts and the result of the test report is only responsible for the test sample.

\*\*\*\*\*  
**Summary of Test Results:**

**TEST REQUEST**

**CONCLUSION**

A	RoHS Directive 2011/65/EU and its amendment directives	
	XRF screening test and Wet Chemical Testing (Lead, Cadmium, Mercury, Hexavalent Chromium, PBBs & PBDEs content)	Pass
	Phthalates(DBP、BBP、DEHP、DIBP)content	Pass

\*\*\*\*\*  
Signed for and on behalf of BACL

Checked by: Jane Xu  
Jane Xu  
Technical Supervisor

Approved by: Bensen Huang  
Bensen Huang  
Laboratory Manager

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**Results:**

**A. RoHS Directive 2011/65/EU and its amendment directives**

**XRF screening test**

Test method: With reference to IEC62321-3-1:2013 screening by X-ray Fluorescence Spectroscopy (XRF)

Seq. No.	Tested Part(s)	Results				
		Pb	Cd	Hg	Cr	Br
1	Silvery metal with black/white coating(shell, Charge Controller)	BL	BL	BL	BL	---
2	Lt green soft silicone(radiator, Charge Controller)	BL	BL	BL	BL	BL
3*	Silvery metal with black coating(screw, Charge Controller)	BL	BL	BL	IN	---
4	Black soft plastic with white printing(wire jacket, PCB, Charge Controller)	BL	BL	BL	BL	BL
5	Red soft plastic with black printing(wire jacket, PCB, Charge Controller)	BL	BL	BL	BL	BL
6	Coppery metal with silvery plating(wire, PCB, Charge Controller)	BL	BL	BL	BL	---
7	Translucent soft glue(cover, PCB, Charge Controller)	BL	BL	BL	BL	BL
8	Black plastic(fixer, inner, Charge Controller)	BL	BL	BL	BL	BL
9	Black soft plastic(cable jacket, PCB)	BL	BL	BL	BL	BL
10	Black soft plastic(wire jacket, cable, PCB)	BL	BL	BL	BL	BL
11	Red soft plastic(wire jacket, cable, PCB)	BL	BL	BL	BL	BL
12	Yellow soft plastic(wire jacket, cable, PCB)	BL	BL	BL	BL	BL
13	White soft plastic(wire jacket, cable, PCB)	BL	BL	BL	BL	BL
14	Coppery metal(wire, cable, PCB)	BL	BL	BL	BL	---
15	Black soft plastic( waterproof cap, waterproof port, cable, PCB)	BL	BL	BL	BL	BL
16*	Black plastic(shell, waterproof port, cable)	BL	BL	BL	BL	IN
17*	Black plastic(nut, waterproof port, cable)	BL	BL	BL	BL	IN
18	Red soft silicone(gasket, waterproof port, cable)	BL	BL	BL	BL	BL
19*	Black plastic(connector holder, waterproof port, cable)	BL	BL	BL	BL	IN
20* <sup>2</sup>	Golden metal(connector, waterproof port, cable))	OL	BL	BL	BL	---

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Seq. No.	Tested Part(s)	Results				
		Pb	Cd	Hg	Cr	Br
21	Silvery solder(connector, waterproof port, cable))	BL	BL	BL	BL	---
22*	Black soft plastic(wire jacket, temperature sensor, PCB)	BL	BL	BL	BL	IN
23	Coppery metal with silvery plating(wire, temperature sensor, PCB)	BL	BL	BL	BL	---
24	Black body(temperature sensor, PCB)	BL	BL	BL	BL	BL
25	Yellow adhesive plastic(tape, inductor"L11", PCB)	BL	BL	BL	BL	BL
26	Transparent adhesive plastic(tape, inductor"L11", PCB)	BL	BL	BL	BL	BL
27	White adhesive paper with black printing(label, inductor"L11", PCB)	BL	BL	BL	BL	BL
28	Black soft plastic(sleeve, inductor"L11", PCB)	BL	BL	BL	BL	BL
29	Coppery metal with red coating(coil, inductor"L11", PCB)	BL	BL	BL	BL	---
30	Black magnet(core, inductor"L11", PCB)	BL	BL	BL	BL	BL
31	Black body(triode"Q5", PCB)	BL	BL	BL	BL	BL
32*	Green body(LED"D25", PCB)	BL	BL	BL	BL	IN
33*	Translucent body(LED"D26", PCB)	BL	BL	BL	BL	IN
34	Blue plastic with white printing(sleeve, capacitor"E3", PCB)	BL	BL	BL	BL	BL
35	Silvery metal(shell, capacitor"E3")	BL	BL	BL	BL	---
36	Black rubber(base, capacitor"E3")	BL	BL	BL	BL	BL
37	Transparent soft plastic(film, capacitor"E3")	BL	BL	BL	BL	BL
38	Brown paper with liquid(film, capacitor"E3")	BL	BL	BL	BL	BL
39	Silvery metal(foil, capacitor"E3")	BL	BL	BL	BL	---
40	Dull silvery metal(foil, capacitor"E3")	BL	BL	BL	BL	---
41	Silvery metal(connector, capacitor"E3")	BL	BL	BL	BL	---
42	Silvery metal(pin, capacitor"E3")	BL	BL	BL	BL	---
43* <sup>1</sup>	Red body(diode"D35", PCB)	OL	BL	BL	BL	BL
44	Black body with grey printing(diode"D21", PCB)	BL	BL	BL	BL	BL
45	Black body(diode"D24", PCB)	BL	BL	BL	BL	BL

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Seq. No.	Tested Part(s)	Results				
		Pb	Cd	Hg	Cr	Br
46	Brown body(capacitor"C61", PCB)	BL	BL	BL	BL	BL
47	Black body with white printing(resistor"28", PCB)	BL	BL	BL	BL	BL
48	Black body(IC"U5", PCB)	BL	BL	BL	BL	BL
49	Black body(triode"Q15", PCB)	BL	BL	BL	BL	BL
50	Silvery body(crystal"Y1", PCB)	BL	BL	BL	BL	BL
51	Dull grey body(inductor"L1", PCB)	BL	BL	BL	BL	BL
52*	Green PCB(Charge Controller)	BL	BL	BL	BL	IN
53	Silvery solder(PCB, Charge Controller)	BL	BL	BL	BL	---
54	Black glue(sealing, Charge Controller)	BL	BL	BL	BL	BL

- The test results of samples (15), (18), (21) are shown retest result, and the retest samples were provided by client January 2, 2019.
- The test result of sample (4) is shown retest result, and the retest sample was provided by client on February 27, 2019.

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Remark:

(1)

--- = Not Conducted

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 IEC62321-3-1:2013.

Element	Unit	Polymers	Metal	Composite Material
Cd	mg/kg	BL≤70-3σ< X <130+3σ≤OL	BL≤70-3σ< X <130+3σ≤OL	LOD < X <150+3σ≤OL
Pb	mg/kg	BL≤700-3σ< X <1300+3σ≤OL	BL≤700-3σ< X <1300+3σ≤OL	BL≤500-3σ< X <1500+3σ≤OL
Hg	mg/kg	BL≤700-3σ< X <1300+3σ≤OL	BL≤700-3σ< X <1300+3σ≤OL	BL≤500-3σ< X <1500+3σ≤OL
Cr	mg/kg	BL≤700-3σ< X	BL≤700-3σ< X	BL≤500-3σ< X
Br	mg/kg	BL≤300-3σ< X	---	BL≤250-3σ< X

BL = Below Limit

OL = Over Limit

IN = Inconclusive

LOD = Limit of Detection

\*1 = As claimed by the material declaration submitted by the client, the materials of the sample No.43 is glass. And according to RoHS directive 2011/65/EU and its amendments, Lead is exempted in glass of cathode ray tubes, electronic components and fluorescent tubes.

\*2 = As claimed by the material declaration submitted by the client, the material of the sample No. 20 is copper alloy. And 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.

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(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 RoHS directive 2011/65/EU:

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
Polybrominate ddiphenylethers (PBDEs)	1000

(4) As requested by applicant, only components shown in this report were screened by XRF spectroscopy for 2011/65/EU and its amendment directives, other components were not screened included in this report.

(5) Photo appendix is included.

### 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.

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**Wet Chemical Testing:**

Test method:

Lead Content:

With reference to IEC62321-5:2013, by acid digestion and analysis was performed by Inductively Coupled Plasma-Optical Emission Spectrometer (ICP-OES) or Atomic Absorption Spectrometry (AAS).

Hexavalent Chromium Content (For metal material):

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

PBBs & PBDEs Content:

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

**1) The test results of Pb**

Item	Unit	MDL	Results
			20
Lead (Pb) Content	mg/kg	10	24890

**2) The test results of Cr (VI)**

Item	Unit	MDL	Results	Limit
			3	
Hexavalent Chromium (Cr(VI))	µg/cm <sup>2</sup>	0.10	N.D.	**
<b>Conclusion</b>	<b>/</b>	<b>/</b>	<b>Pass</b>	<b>/</b>

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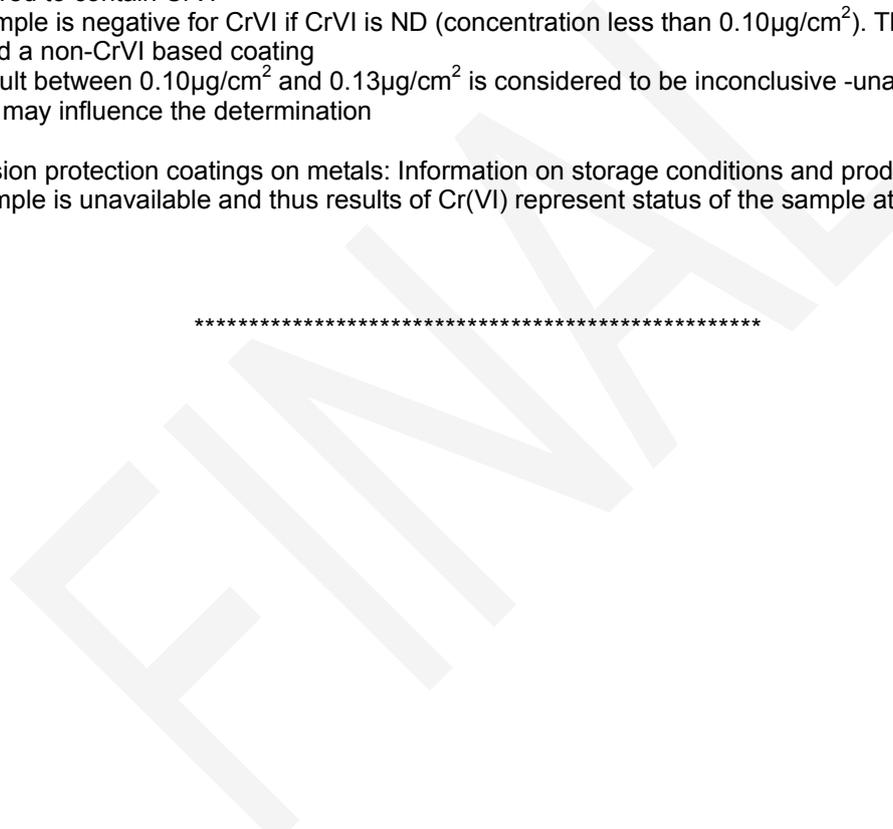
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Note:

- N.D. = Not Detected or less than MDL
- MDL = Method Detection Limit
- mg/kg = ppm
- \*\* =
  - a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13µg/cm<sup>2</sup>. The sample coating is considered to contain CrVI
  - b. The sample is negative for CrVI if CrVI is ND (concentration less than 0.10µg/cm<sup>2</sup>). The coating is considered a non-CrVI based coating
  - c. The result between 0.10µg/cm<sup>2</sup> and 0.13µg/cm<sup>2</sup> is considered to be inconclusive -unavoidable coating variations may influence the determination

For corrosion protection coatings on metals: Information on storage conditions and production date of the tested sample is unavailable and thus results of Cr(VI) represent status of the sample at the time of testing.

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### 3) The test results of PBBs & PBDEs

Item	Unit	MDL	Results				Limit
			16	17	19	22	
<b>Polybrominated Biphenyls</b>							
Monobromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Dibromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Tribromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Tetrabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Pentabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Hexabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Heptabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Octabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Nonabromodiphenyl	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Decabromodiphenyl	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Total content	mg/kg	/	N.D.	N.D.	N.D.	N.D.	1000
<b>Polybrominated Diphenylethers</b>							
Monobromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Dibromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Tribromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Tetrabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Pentabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Hexabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Heptabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Octabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Nonabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Decabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	N.D.	
Total content	mg/kg	/	N.D.	N.D.	N.D.	N.D.	1000
<b>Conclusion</b>	/	/	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	/

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Item	Unit	MDL	Results			Limit
			32	33	52	
<b>Polybrominated Biphenyls</b>						
Monobromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Dibromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Tribromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Tetrabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Pentabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Hexabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Heptabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Octabromobiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Nonabromodiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Decabromodiphenyl	mg/kg	5	N.D.	N.D.	N.D.	
Total content	mg/kg	/	N.D.	N.D.	N.D.	1000
<b>Polybrominated Diphenylethers</b>						
Monobromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Dibromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Tribromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Tetrabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Pentabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Hexabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Heptabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Octabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Nonabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Decabromodiphenyl ether	mg/kg	5	N.D.	N.D.	N.D.	
Total content	mg/kg	/	N.D.	N.D.	N.D.	1000
<b>Conclusion</b>	/	/	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	/

Note:

- N.D. = Not Detected or less than MDL
- MDL = Method Detection Limit
- The results less than MDL are not taken into account while calculating the sum contents.
- mg/kg = ppm
- Photo is included.

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**Phthalates(DBP、BBP、DEHP、DIBP)content**

Test method: With reference to IEC 62321-8:2017, by gas chromatographic-mass spectrometer (GC-MS)

Item	Unit	MDL	Results				Limit
			2+7	4	5	8+9+16	
Dibutyl Phthalate (DBP)	%	0.003	N.D.	0.077	0.054	N.D.	0.1
Benzylbutyl Phthalate (BBP)	%	0.003	N.D.	N.D.	N.D.	N.D.	0.1
Bis-(2-ethylhexyl) Phthalate (DEHP)	%	0.003	N.D.	0.006	0.013	N.D.	0.1
Diisobutyl Phthalate(DIBP)	%	0.003	N.D.	0.017	0.014	N.D.	0.1
<b>Conclusion</b>	<b>/</b>	<b>/</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>/</b>

Item	Unit	MDL	Results				Limit
			10+11	12+13	15	17+19	
Dibutyl Phthalate (DBP)	%	0.003	0.029	0.038	N.D.	N.D.	0.1
Benzylbutyl Phthalate (BBP)	%	0.003	N.D.	N.D.	N.D.	N.D.	0.1
Bis-(2-ethylhexyl) Phthalate (DEHP)	%	0.003	0.006	N.D.	N.D.	N.D.	0.1
Diisobutyl Phthalate(DIBP)	%	0.003	N.D.	N.D.	N.D.	N.D.	0.1
<b>Conclusion</b>	<b>/</b>	<b>/</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>/</b>

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Item	Unit	MDL	Results				Limit
			18	22	24+31+32	25	
Dibutyl Phthalate (DBP)	%	0.003	0.014	N.D.	N.D.	0.005	0.1
Benzylbutyl Phthalate (BBP)	%	0.003	N.D.	N.D.	N.D.	N.D.	0.1
Bis-(2-ethylhexyl) Phthalate (DEHP)	%	0.003	N.D.	N.D.	N.D.	N.D.	0.1
Diisobutyl Phthalate(DIBP)	%	0.003	N.D.	N.D.	N.D.	N.D.	0.1
<b>Conclusion</b>	<b>/</b>	<b>/</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>/</b>

Item	Unit	MDL	Results				Limit
			26+34	27+38	28	30	
Dibutyl Phthalate (DBP)	%	0.003	N.D.	N.D.	N.D.	N.D.	0.1
Benzylbutyl Phthalate (BBP)	%	0.003	N.D.	N.D.	N.D.	N.D.	0.1
Bis-(2-ethylhexyl) Phthalate (DEHP)	%	0.003	N.D.	N.D.	0.005	N.D.	0.1
Diisobutyl Phthalate(DIBP)	%	0.003	N.D.	N.D.	N.D.	N.D.	0.1
<b>Conclusion</b>	<b>/</b>	<b>/</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>/</b>

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Item	Unit	MDL	Results				Limit
			33+43+44	36+37	45+46+47	48+49+50	
Dibutyl Phthalate (DBP)	%	0.003	N.D.	N.D.	N.D.	N.D.	0.1
Benzylbutyl Phthalate (BBP)	%	0.003	N.D.	N.D.	N.D.	N.D.	0.1
Bis-(2-ethylhexyl) Phthalate (DEHP)	%	0.003	N.D.	N.D.	N.D.	N.D.	0.1
Diisobutyl Phthalate(DIBP)	%	0.003	N.D.	N.D.	N.D.	N.D.	0.1
<b>Conclusion</b>	<b>/</b>	<b>/</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>/</b>

Item	Unit	MDL	Results			Limit
			51	52	54	
Dibutyl Phthalate (DBP)	%	0.003	N.D.	N.D.	N.D.	0.1
Benzylbutyl Phthalate (BBP)	%	0.003	N.D.	N.D.	N.D.	0.1
Bis-(2-ethylhexyl) Phthalate (DEHP)	%	0.003	N.D.	N.D.	N.D.	0.1
Diisobutyl Phthalate(DIBP)	%	0.003	N.D.	N.D.	N.D.	0.1
<b>Conclusion</b>	<b>/</b>	<b>/</b>	<b>Pass</b>	<b>Pass</b>	<b>Pass</b>	<b>/</b>

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Note:

- The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
- N.D. = Not Detected or less than MDL
- MDL = Method Detection Limit
- mg/kg = ppm
- The test results of samples (15), (18) are shown retest result, and the retest samples were provided by client January 2, 2019.
- The test result of sample (4) is shown retest result, and the retest sample was provided by client on February 27, 2019.
- "+"= Mixed, The admixture of specimen is tested as a whole(part) which according to the applicant's request, the result of report as average value because of the whole specimen is regarded as constituting from the homogeneous material. If the testing of specimen may have the obvious difference, and the result may exceed the number in this report. The applicant will undertake all differences and risk.
- Photo is included.

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Photograph of Sample



BACL authenticate the photo on original report only

\*\*\* End of Report \*\*\*

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