

**XRF Screening and chemical confirmation test report**

**Number: 181001047SHA-001**

Applicant: LithiumWerks China Manufacturing Co.,Ltd  
BeiHai Road No.8, Integrated Free Trade Zone, New Strict,  
Changzhou, China

Date: Dec. 6, 2018

Sample Description:

One (1) submitted sample said to be:

Item Name : APR18650M1B  
Brand Name : LithiumWerks  
Manufacturer : LithiumWerks China Manufacturing Co.,Ltd  
BeiHai Road No.8, Integrated Free Trade Zone, New Strict, Changzhou, China

Tests conducted:

As requested by the applicant, for details refer to attached page(s).

Conclusion:

<u>Tested sample</u>	<u>Standard</u>	<u>Result</u>
Submitted sample	Screening by XRF spectroscopy and chemical confirmation test for RoHS Directive 2011/65/EU and (EU)2015/863	Pass

To be continued

Authorized by:  
For Intertek testing services Ltd., Shanghai



Jonny Jing  
Operation Manager



Tests Conducted

Cadmium (Cd), Lead (Pb), Mercury (Hg), Chromium (Cr) and Bromine (Br) content were measured with reference to IEC 62321-3-1 Edition 1.0: 2013 by XRF spectroscopy and chemical confirmation test for RoHS restricted substances. And Phthalates content were determined by Gas Chromatographic-Mass Spectrometric (GC-MS).

(A) Results:

Part No.	Tested Components	Refer information	Restricted Substance	XRF Result	Screened Results (BLphthalates)	Chemical Confirmation Result	Conclusion on RoHS
1	COVER (BLACK NONMETAL)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	NA		/	
			DEHP	NA	NA	/	
			BBP	NA	NA	/	
			DBP	NA	NA	/	
2	SLEEVE (GREY NONMETAL)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	NA		/	
			DEHP	NA	NA	/	
			BBP	NA	NA	/	
			DBP	NA	NA	/	
3	COVER (WHITE NONMETAL)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	P		/	
			DEHP	NA	BL	/	
			BBP	NA	BL	/	
			DBP	NA	BL	/	
DIBP	NA	BL	/				

To be continued



Tests Conducted

Part No.	Tested Components	Refer information	Restricted Substance	XRF Result	Screened Results (BLphthalates)	Chemical Confirmation Result	Conclusion on RoHS
4	CONTACTED SHEET (COPPER METAL)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	NA		/	
			DEHP	NA	NA	/	
			BBP	NA	NA	/	
			DBP	NA	NA	/	
			DIBP	NA	NA	/	
5	CONTACTED SHEET (SILVER METAL)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	NA		/	
			DEHP	NA	NA	/	
			BBP	NA	NA	/	
			DBP	NA	NA	/	
			DIBP	NA	NA	/	
6	AXIS (SILVER METAL)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	X		Cr <sup>6+</sup> : Negative	
			Br	NA		/	
			DEHP	NA	NA	/	
			BBP	NA	NA	/	
			DBP	NA	NA	/	
			DIBP	NA	NA	/	

To be continued



Tests Conducted

Part No.	Tested Components	Refer information	Restricted Substance	XRF Result	Screened Results (BLphthalates)	Chemical Confirmation Result	Conclusion on RoHS
7	TAPE (GREEN NONMETAL)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	P		/	
			DEHP	NA	BL	/	
			BBP	NA	BL	/	
			DBP	NA	BL	/	
			DIBP	NA	BL	/	
8	COVER						
8-1	RING (BLACK PLASTIC)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	P		/	
			DEHP	NA	BL	/	
			BBP	NA	BL	/	
			DBP	NA	BL	/	
			DIBP	NA	BL	/	
8-2	RING (WHITE PLASTIC)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	P		/	
			DEHP	NA	BL	/	
			BBP	NA	BL	/	
			DBP	NA	BL	/	
			DIBP	NA	BL	/	

To be continued



Tests Conducted

Part No.	Tested Components	Refer information	Restricted Substance	XRF Result	Screened Results (BLphthalates)	Chemical Confirmation Result	Conclusion on RoHS
8-3	COVER (SILVER METAL)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	NA		/	
			DEHP	NA	NA	/	
			BBP	NA	NA	/	
			DBP	NA	NA	/	
			DIBP	NA	NA	/	
9	CAP (YELLOW PLASTIC)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	P		/	
			DEHP	NA	BL	/	
			BBP	NA	BL	/	
			DBP	NA	BL	/	
			DIBP	NA	BL	/	
10	AXIS (SILVER METAL)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	NA		/	
			DEHP	NA	NA	/	
			BBP	NA	NA	/	
			DBP	NA	NA	/	
			DIBP	NA	NA	/	

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To be continued



Tests Conducted

Part No.	Tested Components	Refer information	Restricted Substance	XRF Result	Screened Results (BLphthalates)	Chemical Confirmation Result	Conclusion on RoHS
11	WASHER (GREY PLASTIC)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	P		/	
			DEHP	NA	BL	/	
			BBP	NA	BL	/	
			DBP	NA	BL	/	
			DIBP	NA	BL	/	
12	FILM (WHITE PLASTIC)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	P		/	
			DEHP	NA	BL	/	
			BBP	NA	BL	/	
			DBP	NA	BL	/	
			DIBP	NA	BL	/	
13	TAPE (YELLOW NONMETAL)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	P		/	
			DEHP	NA	BL	/	
			BBP	NA	BL	/	
			DBP	NA	BL	/	
			DIBP	NA	BL	/	

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To be continued



Tests Conducted

Part No.	Tested Components	Refer information	Restricted Substance	XRF Result	Screened Results (BLphthalates)	Chemical Confirmation Result	Conclusion on RoHS
14	ELECTROLYTE (TRANSPARENT NONMETAL)	/	Cd	P	NA	/	PASS
			Pb	P		/	
			Hg	P		/	
			Cr	P		/	
			Br	P		/	
			DEHP	NA	BL	/	
			BBP	NA	BL	/	
			DBP	NA	BL	/	
			DIBP	NA	BL	/	

Remark: P = pass (Below the lower screening limit of table (B))  
 X = inconclusive result (Further chemical test was suggested (see table (B).)  
 NA = not applicable  
 ND = not detected  
 ppm = Parts per million = mg/kg

Negative = A negative test result indicated the absorbance value of testing sample solution for Cr(VI) testing is less than the absorbance value of the 0.10µg/cm<sup>2</sup> equivalent comparison standard solution, the Cr(VI) concentration is below the limit of quantification, then the sample is considered to be negative for Cr(VI).

(B)  
 (B1) XRF Screening Limits in mg/kg for Regulated Elements in Various Matrices.

Element	Polymer materials	Metallic materials	Composite materials
Cd	P ≤ 70 < X < 130 ≤ F	P ≤ 70 < X < 130 ≤ F	P ≤ 70 < X < 150 ≤ F
Pb	P ≤ 700 < X < 1300 ≤ F	P ≤ 700 < X < 1300 ≤ F	P ≤ 500 < X < 1500 ≤ F
Hg	P ≤ 700 < X < 1300 ≤ F	P ≤ 700 < X < 1300 ≤ F	P ≤ 500 < X < 1500 ≤ F
Cr	P ≤ 700 < X	P ≤ 700 < F	P ≤ 500 < X
Br	P ≤ 300 < X	Not applicable	P ≤ 250 < X

(B2) Preliminary screening test will be used for phthalates, if the results exceed the warning area in the following table, further chemical methods will be conducted to confirm the exact content by GC/MS.

Phthalates	Polymer
Bis(2-ethylhexyl)phthalate(DEHP)	BL ≤ 600 < X
Butyl benzyl phthalate(BBP)	BL ≤ 600 < X
Dibutyl phthalate(DBP)	BL ≤ 600 < X
Diisobutyl phthalate(DIBP)	BL ≤ 600 < X

To be continued



Tests Conducted

(C) Estimated detection limits in mg/kg for regulated elements in various matrices.

Element	Polymer materials	Metallic materials	Composite materials
Cd	50	70	70
Pb	100	200	200
Hg	100	200	200
Cr	100	200	200
Br	200	Not applicable	200

**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 results 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 is required to obtain quantitative data.

(D) Chemical confirmation test methods:

Testing Item	Testing Method	Reporting Limit
Chromium (VI) (Cr <sup>6+</sup> ) content (for metal)	With reference to IEC 62321-7-1 Edition 1.0: 2015, by boiling water extraction and determined by UV-VIS Spectrophotometer.	Positive(>0.13 µg/m <sup>2</sup> )/ Negative(<0.10 µg/m <sup>2</sup> ) Inconclusive(0.10--0.13 µg/m <sup>2</sup> )
Polybrominated Biphenyls (PBBs) & Polybrominated Diphenyl Ethers (PBDEs) Content	With reference to IEC 62321-6 edition 1.0:2015, by solvent extraction and determined by GC/MS and further HPLC confirmation when necessary	5 mg/kg

(E) RoHS requirement

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr <sup>6+</sup> )	0.1% (1000 mg/kg)
Polybrominated Biphenyls (PBBs)	0.1% (1000 mg/kg)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000 mg/kg)
Phthalates (DEHP, BBP, DBP, DIBP)	0.1% (1000 mg/kg)

The above limits were quoted from 2011/65/EU and (EU) 2015/863 for homogeneous material.

Date sample received: Nov. 08, 2018 & Nov. 28, 2018

Testing period: Nov. 08, 2018 To Dec. 06, 2018

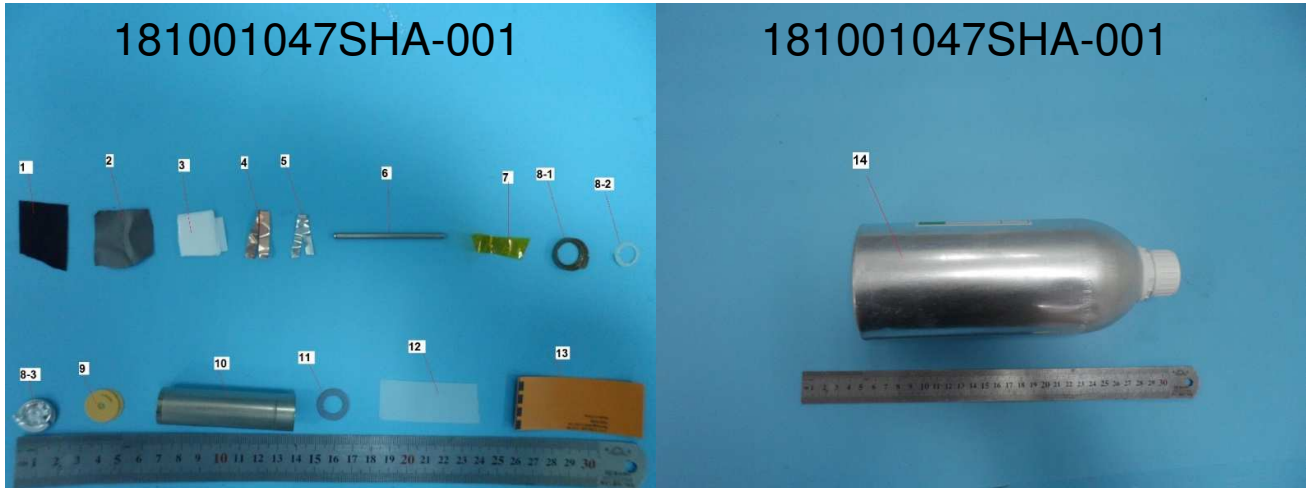
To be continued





Tests Conducted

Photo



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**End of report**

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