

## **ICP Test Report Certification Packet**

Company Name: Littelfuse, Inc.

Product Type: Metal Oxide Varistors

Product Series: DA&DB Series RoHS Compliant models

Issue Date: Sep. 18, 2012

It is hereby certified by Littelfuse, Inc. that there is neither RoHS (2011/65/EU)-restricted substance nor such use, for materials to be used for unit parts, for packing/packaging materials, and for additives and the like in the manufacturing processes.

In addition, it is hereby reported to you that the parts and sub-materials, the materials to be used for unit parts, the packing/packaging materials, and the additives and the like in the manufacturing processes, are all composed of the following components.

Issued by: David Huang

< DGLF Environmental, Health & Safety Engineer >

(1) Parts, sub-materials and unit parts

This document covers Metal Oxide Varistors LA series RoHS-Compliant models manufactured by Littelfuse, Inc.

Please see Table 1 for raw materials used.

(2) The ICP data on all measurable substances

Please see appropriate pages as identified in Table 1

## Remarks:

Pb (lead) contained in copper alloy containing up to 4% is categorized as exempt under section 6 of the RoHS Annex.



# Table 1: List of Raw Materials covered by this report

NO.	P/N	Raw Material Description	Page
1	N/A	DD Black Disc	3-7
2	N/A	Silver paste as internal electrodes	8-19
3	N/A	Solder paste	20-31
4	N/A	Terminals	32-36
5	N/A	Epoxy Resin PCE210 4A Red	37-45
6	N/A	Industrial Coating Resin	46-53
7	N/A	Base & Lid	54-61
8	N/A	Copper Screw, separating from Base & Lid	62-65
9	N/A	Screw & Washier	66-69



Date:

Jun 19, 2012

Applicant: LITTELFUSE, INC

8755 WEST HIGGINS ROAD SUITE

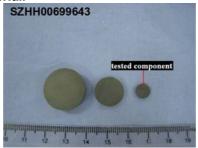
500CHICAGO IL 60631 USA

KRISTEEN BACILA/ARSENIO CESISTA JR. Attn:

Sample Description:

One (1) submitted sample said to be **DD black disc.** 

Tested component: black solid material.



Tests conducted:

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

Conclusion:

**Tested Samples** Tested component of submitted sample

Standard

Restriction of the use of certain hazardous substance in electrical electronic and equipment (RoHS Direction

2002/95/EC and supersedure 2011/65/EU)

Result Pass

Authorized by: For Intertek Testing Services Shenzhen Ltd.

Ben N.L. Lin General Manager



**Tests Conducted** 

## **RoHS Chemical Test**

## (A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND(<2)
Lead (Pb) Content (mg/kg)	ND(<2)
Mercury (Hg) Content (mg/kg)	ND(<2)
Chromium (VI)(Cr <sup>6+</sup> ) Content (mg/kg)	10
Polybrominated Biphenyls (PBBs)(mg/kg)	
Monobromobiphenyl (MonoBB)	ND(<5)
Dibromobiphenyl (DiBB)	ND(<5)
Tribromobiphenyl (TriBB)	ND(<5)
Tetrabromobiphenyl (TetraBB)	ND(<5)
Pentabromobiphenyl (PentaBB)	ND(<5)
Hexabromobiphenyl (HexaBB)	ND(<5)
Heptabromobiphenyl (HeptaBB)	ND(<5)
Octabromobiphenyl (OctaBB)	ND(<5)
Nonabromobiphenyl (NonaBB)	ND(<5)
Decabromobiphenyl (DecaBB)	ND(<5)
Polybrominated Diphenyl Ethers (PBDEs)(mg/kg)	
Monobromodiphenyl Ether (MonoBDE)	ND(<5)
Dibromodiphenyl Ether (DiBDE)	ND(<5)
Tribromodiphenyl Ether (TriBDE)	ND(<5)
Tetrabromodiphenyl Ether (TetraBDE)	ND(<5)
Pentabromodiphenyl Ether (PentaBDE)	ND(<5)
Hexabromodiphenyl Ether (HexaBDE)	ND(<5)
Heptabromodiphenyl Ether (HeptaBDE)	ND(<5)
Octabromodiphenyl Ether (OctaBDE)	ND(<5)
Nonabromodiphenyl Ether (NonaBDE)	ND(<5)
Decabromodiphenyl Ether (DecaBDE)	ND(<5)

Chemist: Wang Haijun/Zeng Guoliang

mg/kg = milligram per kilogram = ppm < = Less than

ND = Not detected



**Tests Conducted** 

#### (B) 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)

The above limits were quoted from 2002/95/EC and supersedure 2011/65/EU for homogeneous material.

## (C) Test Method:

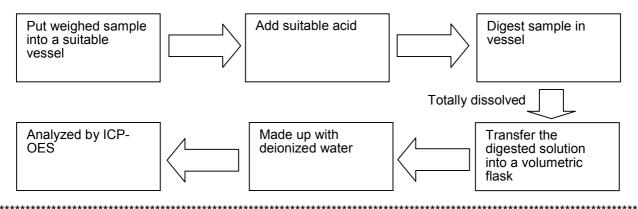
Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI)(Cr <sup>6+</sup> ) Content	With reference to IEC 62321 Edition 1.0:2008, by alkaline digestion and determined by UV-VIS Spectrophotometer	1 mg/kg
Polybrominated Biphenyls (PBBs)& Polybrominated Diphenyl Ethers (PBDEs)	With reference to IEC 62321 Edition 1.0:2008, by solvent extraction and determined by GC/MS and further HPLC confirmation when necessary	5 mg/kg

Date sample received: Jun 09, 2012

Testing period: Jun 09, 2012 to Jun 16, 2012

## (D) Measurement Flowchart:

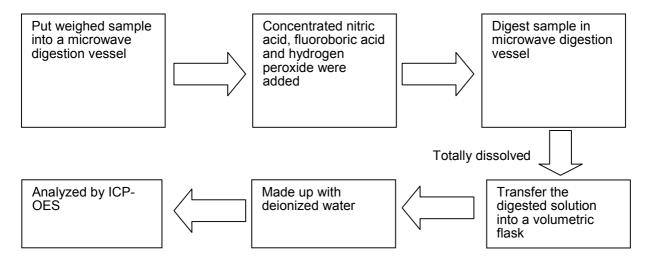
#### 1. Test for Cd/Pb Contents



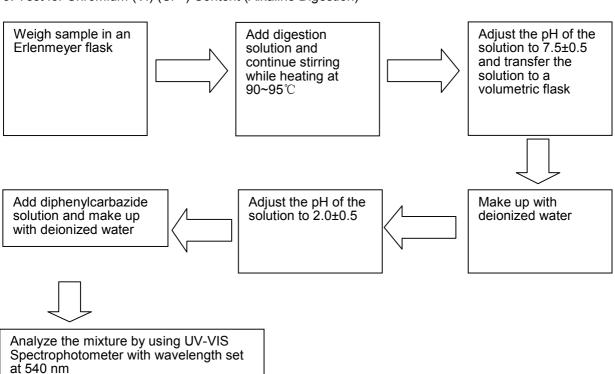


**Tests Conducted** 

#### 2. Test for Hg Content



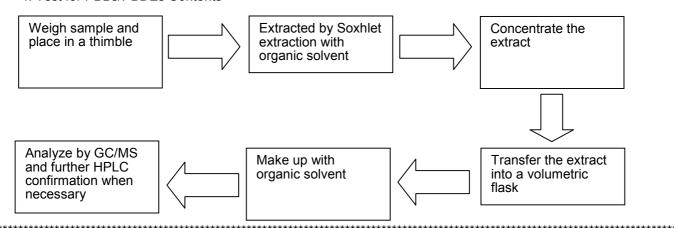
## 3. Test for Chromium (VI) (Cr<sup>6+</sup>) Content (Alkaline Digestion)





**Tests Conducted** 

#### 4. Test for PBBs/PBDEs Contents



End of report



No. SHAEC1201680106

Date: 21 Feb 2012

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SHIN-NIHON KAKIN CO.,LTD 1-6,MIYAMOTO,ITABASHI,TOKYO.JAPAN

The following sample(s) was/were submitted and identified on behalf of the clients as: SILVER PASTE

SGS Job No. :

SP12-003156 - SH

Model No.:

SP-A6PL

Date of Sample Received :

17 Feb 2012

Testing Period:

17 Feb 2012 - 21 Feb 2012

Test Requested:

Selected test(s) as requested by client.

Test Method:

Please refer to next page(s).

Test Results:

Please refer to next page(s).

Conclusion:

Based on the performed tests on submitted samples, the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE) comply with the limits as set by RoHS

Directive 2011/65/EU Annex II; recasting 2002/95/EC.

Signed for and on behalf of SGS-CSTC Ltd.

Fan Jingjie, JJ Approved Signatory

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[9]



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Date: 21 Feb 2012

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Test Results:

#### Test Part Description:

Specimen No. SGS Sample ID Description

SHA12-016801.006 Green paste

#### Remarks:

(1) 1 mg/kg = 1 ppm = 0.0001%

(2) MDL = Method Detection Limit

(3) ND = Not Detected ( < MDL)

(4) "-" = Not Regulated

#### RoHS Directive 2011/65/EU

Test Method: With reference to IEC 62321:2008

(1) Determination of Cadmium by ICP-OES.

(2) Determination of Lead by ICP-OES.

(3) Determination of Mercury by ICP-OES.

(4) Determination of Hexavalent Chromium by Colorimetric Method using UV-Vis.

(5) Determination of PBBs / PBDEs content by GC-MS.

Test Item(s)	Limit	<u>Unit</u>	MDL	006
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1,000	mg/kg	2	ND
Mercury (Hg)	1,000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1,000	mg/kg	2	ND
Sum of PBBs	1,000	mg/kg		ND
Monobromobiphenyl		mg/kg	5	ND
Dibromobiphenyl	9,1	mg/kg	5	ND
Tribromobiphenyl	1.4	mg/kg	5	ND
Tetrabromobiphenyl	(-)	mg/kg	5	ND
Pentabromobiphenyl		mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	12	mg/kg	5	ND
Octabromobiphenyl	4.4	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	÷	mg/kg	5	ND
Sum of PBDEs	1,000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND

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www.cn.sgs.com e sgs.china@sgs.com



Test Report	No. SHAEC12016801	06	Date: 21	Feb 2012	Page 3 of 6
Test Item(s)	<u>Limit</u>	<u>Unit</u>	MDL	<u>006</u>	
Dibromodiphenyl ether	-	mg/kg	5	ND	
Tribromodiphenyl ether	-	mg/kg	5	ND	
Tetrabromodiphenyl ether	5	mg/kg	5	ND	
Pentabromodiphenyl ether	<del>-</del>	mg/kg	5	ND	
Hexabromodiphenyl ether	-	mg/kg	5	ND	
Heptabromodiphenyl ether	-	mg/kg	5	ND	
Octabromodiphenyl ether	(C <del>2</del> )	mg/kg	5	ND	
Nonabromodiphenyl ether	-	mg/kg	5	ND	
Decabromodiphenyl ether	174	mg/kg	5	ND	

#### Notes:

- (1) The maximum permissible limit is quoted from directive 2011/65/EU, Annex II
- (2) Result shown is of the total weight of wet sample.

#### Halogen

Test Method: With reference to EN 14582: 2007, analysis was performed by Ion Chromatograph (IC).

Test Item(s)	<u>Unit</u>	MDL	006
Fluorine (F)	mg/kg	50	ND
Chlorine (CI)	mg/kg	50	ND
Bromine (Br)	mg/kg	50	ND
lodine (I)	mg/kg	50	ND

#### Notes:

(1) Result shown is of the total weight of wet sample.

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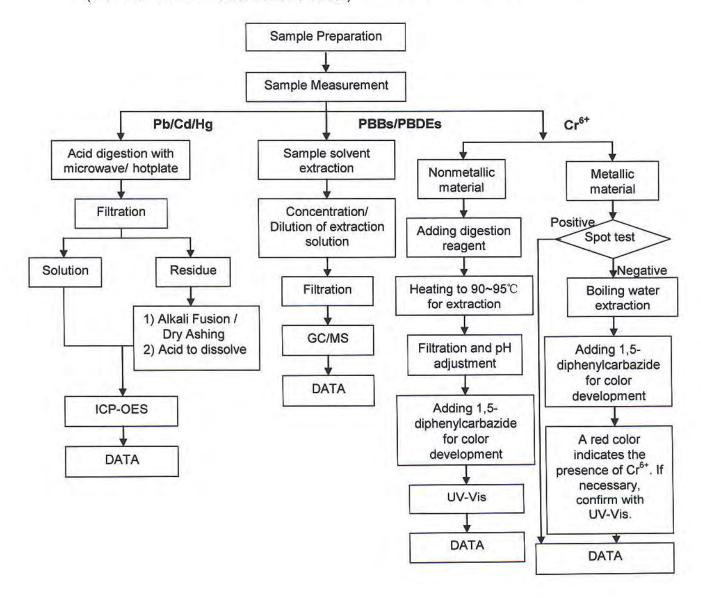
Date: 21 Feb 2012

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### **ATTACHMENTS**

## **RoHS Testing Flow Chart**

- 1) Name of the person who made testing: Jan Shi/Yoyo Wang/Allen Xiao/Gary Xu
- 2) Name of the person in charge of testing: Jeff Zhang/George Xu/ Elim Lin
- These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr6+ and PBBs/PBDEs test method excluded)



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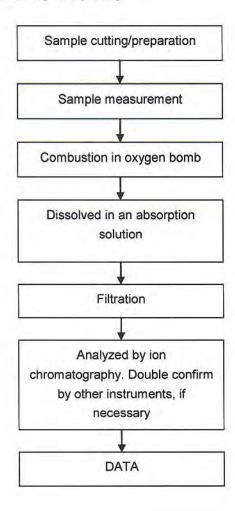
No. SHAEC1201680106

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## **Halogen Testing Flow Chart**

- 1) Name of the person who made testing: Sisily Yin
- 2) Name of the person in charge of testing: Daisy Gong



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Sample photo:



SGS authenticate the photo on original report only

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No. SHAEC1203840702

Date: 09 Apr 2012

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SHIN-NIHON KAKIN CO.,LTD. 1-6,MIYAMOTO, ITABASHI,TOKYO,JAPAN

The following sample(s) was/were submitted and identified on behalf of the clients as: SILVER PASTE.

SGS Job No. :

SP12-007978 - SH

Model No.:

SP-A6PL

Date of Sample Received:

05 Apr 2012

Testing Period:

05 Apr 2012 - 09 Apr 2012

Test Requested:

Selected test(s) as requested by client.

Test Method:

Please refer to next page(s).

Test Results:

Please refer to next page(s).

Signed for and on behalf of SGS-CSTC Ltd.

Fan Jingjie, JJ

Approved Signatory

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Date: 09 Apr 2012

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Test Results:

#### Test Part Description:

Specimen No.

SGS Sample ID

Description

1

SHA12-038407.002

Ink green mud

### Remarks:

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected ( < MDL )
- (4) "-" = Not Regulated

### **Phthalates**

Test Method: With reference to EN14372: 2004, analysis was performed by GC-MS.

Test Item(s)	Unit	MDL	002
Bis-(2-ethylhexyl) Phthalate (DEHP)	%	0.003	ND
Benzylbutyl Phthalate (BBP)	%	0.003	ND
Dibutyl Phthalate (DBP)	%.	0.003	ND

#### Notes:

- (1) DBP,BBP,DEHP Reference information: Entry 51 of Regulation (EC) No 552/2009 amending Annex XVII of REACH Regulation (EC) No 1907/2006 (previously restricted under Directive 2005/84/EC);
  - Shall not be used as substances or in mixtures, in concentrations greater than 0,1 % by weight of the plasticised material, in toys and childcare articles.
  - ii) Toys and childcare articles containing these phthalates in a concentration greater than 0.1 % by weight of the plasticised material shall not be placed on the market.

Please refer to Regulation (EC) No 552/2009 to get more detail information

### Hexabromocyclododecane (HBCDD)

Test Method: With reference to US EPA 3550C: 2007, analysis was performed by GC-MS.

Test Item(s)
Hexabromocyclododecane (HBCDD)

Unit.

MDL

mg/kg 10

ND

002

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Remark: Result shown is of the total weight of wet sample.

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[All ones a provided to feature shown in this test report refer only to the sample(s) lested.]



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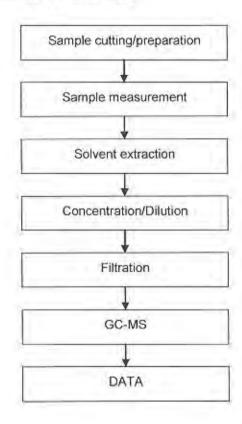
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## **ATTACHMENTS**

## **Phthalates Testing Flow Chart**

- 1) Name of the person who made testing: Elyn Yao
- 2) Name of the person in charge of testing: Rachel Zhang



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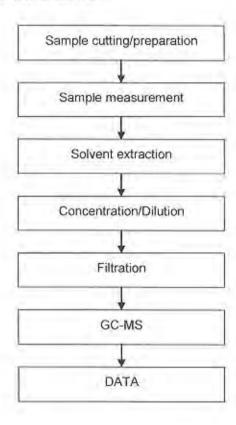
No. SHAEC1203840702

Date: 09 Apr 2012

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## **HBCDD Testing Flow Chart**

- 1) Name of the person who made testing: Gary Xu
- 2) Name of the person in charge of testing: Elim Lin



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Sample photo:



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Report No. RLSZE001191100004

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Applicant

DONGGUAN QIHANG XIYE MANUFACTURING CO.,LTD

Address

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Report on the submitted sample(s) said to be

Sample Name

LEAD-FREE SOLDER PASTE

Sample Description

Gray paste

Part No.

MIXTURE OF QH#LF96, QH#LF97, QH#LF98, QH#LF658, QH#LF601, QH#LT658, QH#LT601, QH#LT658C, QH#LF96H, QH#LF97H, QH#LF98H, QH#LF658H, QH#LF601H, QH#LT658H.

OH#LT601H, OH#LT658CH

Color

Silver

Sample Received Date

Mar. 3, 2012

Testing Period

Mar. 3, 2012 to Mar. 8, 2012

Test Requested

As specified by client, to test Lead(Pb), Cadmium(Cd), Mercury(Hg), Hexavalent Chromium(Cr(VI)), Polybrominated Biphenyls(PBBs), Polybrominated Diphenyl

Ethers(PBDEs) in the submitted sample(s).

#### Test Method

Test Item(s)	Test Method	Measured Equipment(s)	MDL
Lead(Pb)	IEC 62321:2008 Ed.1 Sec.10	ICP-OES	2 mg/kg
Cadmium(Cd)	IEC 62321:2008 Ed.1 Sec.10	ICP-OES	2 mg/kg
Mercury(Hg)	IEC 62321:2008 Ed.1 Sec.7	ICP-OES	2 mg/kg
Hexavalent Chromium(Cr(VI))	IEC 62321:2008 Ed.1 Annex C	UV-Vis	2 mg/kg
Polybrominated Biphenyls(PBBs)	IEC 62321:2008 Ed.1 Annex Λ	GC-MS	5 mg/kg
Polybrominated Diphenyl Ethers(PBDEs)	IEC 62321:2008 Ed.1 Annex A	GC-MS	5 mg/kg

Test Result(s)

Please refer to the following page(s).

Conclusion:

Tested Sample

According to directive

Result

Submitted Sample

2011/65/EU\*

Pass

\*=July 1, 2011, the EU Official Journal (OJ) released the directive 2011/65/EU which as a new version of RoHS Directive (2002/95/EC). The revised directive has entered into force on the twentieth day after its publication in the OJ.

Tested

by

Inspected by

Vourgas

Approved by

Duglin

Date

Mar. 8, 2012

Technical Manager

No. 11363955



## Report No. RLSZE001191100004

Page 2 of 4

Test Result(s)

Tested Item(s)	Content		
Lead(Pb)	55 mg/kg		
Cadmium (Cd)	N.D.		
Mercury(Hg)	N.D.		
Hexavalent Chromium(Cr(VI))	N.D.		

Tested Item(s)	Content
Polybrominated Biphenyls (PBBs)	
Monobromobiphenyl	N.D.
Dibromobiphenyl	N.D.
Tribromobiphenyl	N.D.
Tetrabromobiphenyl	N.D.
Pentabromobiphenyl	N.D.
Hexabromobiphenyl	N.D.
Heptabromobiphenyl	N.D.
Octabromobiphenyl	N.D.
Nonabromobiphenyl	N.D.
Decabromobiphenyl	N.D.

Tested Item(s)	Content		
Polybrominated Diphenyl Ethers (PBDEs)			
Monobromodiphenyl ether	N.D.		
Dibromodiphenyl ether	N.D.		
Tribromodiphenyl ether	N.D.		
Tetrabromodiphenyl ether	N.D.		
Pentabromodiphenyl ether	N.D.		
Hexabromodiphenyl ether	N.D.		
Heptabromodiphenyl ether	N.D.		
Octabromodiphenyl ether	N.D.		
Nonabromodiphenyl ether	N.D.		
Decabromodiphenyl ether	N.D.		

Note:

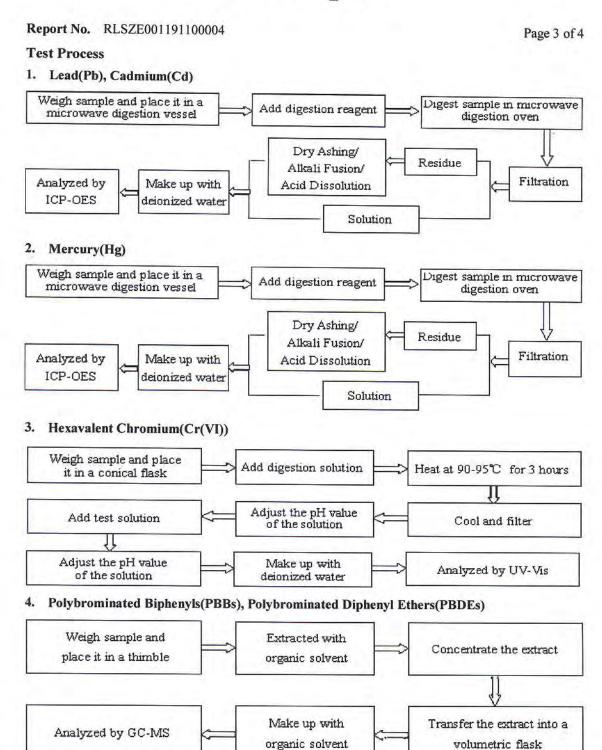
The sample had been dissolved totally tested for Lead, Cadmium, Mercury.

-MDL = Method Detection Limit -N.D. = Not Detected (<MDL)

-mg/kg = ppm = parts per million









Report No. RLSZE001191100004

Page 4 of 4

Photo(s) of the sample(s)



\*\*\* End of report \*\*\*

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Building C, Hongwei Industrial Zone, Baoan 70 District, Shenzhen





Report No. RLSZE001296390001

Page 1 of 3

DONGGUAN QIHANG XIYE MANUFACTURING CO.,LTD

Address

NO.1 INDUSTRIAL AREA XIAGANG, CHANG'AN TOWN, DONGGUAN CITY

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

Sample Name

LEAD-FREE SOLDER PASTE

COLOR

silver

Material

TIN

Sample Received Date

May. 25, 2012

Testing Period

May. 25, 2012 to May. 29, 2012

**Test Requested** 

As specified by client, to test Fluorine(F), Chlorine(Cl), Bromine(Br), Iodine(I)

in the submitted sample(s).

## Test Method

Test Item(s)	Test Method	Measured Equipment(s)	MDL
Fluorine(F)	Refer to BS EN 14582:2007	IC	10 mg/kg
Chlorine(Cl)	Refer to BS EN 14582;2007	IC	10 mg/kg
Bromine(Br)	Refer to BS EN 14582:2007	IC	10 mg/kg
Iodine(i)	Refer to BS EN 14582:2007	IC.	10 mg/kg

Test Result(s)

Please refer to the following page(s).

Tested by Rick Like

Reviewed by

Date

May. 29, 2012

Approved by

Danny Liu

Technical Manager

No. 38791053

Centre Testing International (Shenzhen) Co., Ltd. Hongwei Industrial Zone, Bao an 10 District, Shenzhen, Guangdong, China



## Report No. RLSZE001296390001

Page 2 of 3

Test Result(s)

Tested Item(s)	Content	
Halogen(s)		
Fluorine (F)	N.D.	
Chlorine (Cl)	N.D.	
Bromine (Br)	N.D.	
Iodine (1)	N.D.	

## Tested Sample/Part Description Gray paste

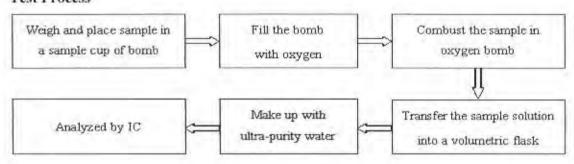
Note:

-MDL = Method Detection Limit

-N.D. = Not Detected (<MDL)

-mg/kg = ppm = parts per million

### **Test Process**



=OM/p



Report No. RLSZE001296390001

Page 3 of 3

# Photo(s) of the sample(s)



\*\*\* End of report \*\*\*

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.



No. CANEC1204755001

Date: 27 Apr 2012

Page 1 of 5

DONGGUAN QI HANG XI YE MANUFACTURING CO.,LTD
NO.1 INDUSTRUAL PARK,XIAGANG,CHANGAN TOWN,DONGGUAN CITY
CHINA

The following sample(s) was/were submitted and identified on behalf of the clients as: Lead Free Solder Paste

SGS Job No.:

CP12-017386 - GZ

Date of Sample Received :

23 Apr 2012

Testing Period:

23 Apr 2012 - 27 Apr 2012

Test Requested:

Selected test(s) as requested by client.

Test Method:

Please refer to next page(s).

Test Results:

Please refer to next page(s).

Signed for and on behalf of SGS-CSTC Ltd.

Silva Zhou

Approved Signatory

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No. CANEC1204755001

Date: 27 Apr 2012

Page 2 of 5

Test Results:

#### Test Part Description:

Specimen No.

SGS Sample ID

Description

1

CAN12-047550.001

Grey paste

#### Remarks:

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected ( < MDL )
- (4) "-" = Not Regulated

## Hexabromocyclododecane (HBCDD)

Test Method: Determination of HBCDD by GC-MS based on IEC 62321:2008.

Test Item(s)

Unit

MDL

001

Hexabromocyclododecane (HBCDD)

mg/kg

10

ND

#### Notes:

 Reference Information: Directive 2011/65/EU recasting RoHS directive 2002/95/EC: Hexabromocyclododecane (HBCDD) is considered as a priority for risk evaluation and substance restriction.

#### **Phthalates**

Test Method: Determination of phthalates by GC-MS based on EN 14372:2004.

Test Item(s)	Unit	MDL	001
Dibutyl Phthalate (DBP)	% (w/w)	0.003	ND
Benzylbutyl Phthalate (BBP)	% (w/w)	0.003	ND
Bis-(2-ethylhexyl) Phthalate (DEHP)	% (w/w)	0.003	ND

#### Notes:

(1) Reference Information: Directive 2011/65/EU recasting RoHS directive 2002/95/EC: Bis (2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP) and Dibutyl phthalate (DBP) are considered as a priority for risk evaluation and substance restriction.

Remark: The result(s) shown is/are of the total weight of wet sample.

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No. CANEC1204755001

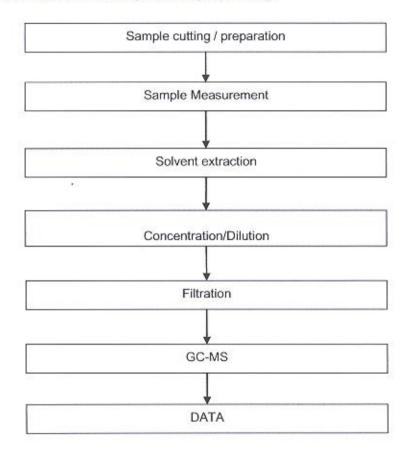
Date: 27 Apr 2012

Page 3 of 5

### **ATTACHMENTS**

## **HBCDD Testing Flow Chart**

- 1) Name of the person who made testing: Cutey Yu
- 2) Name of the person in charge of testing: Ryan Yang



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No. CANEC1204755001

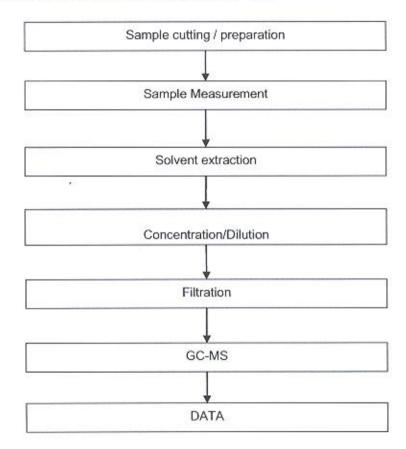
Date: 27 Apr 2012

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### **ATTACHMENTS**

## Phthalates Testing Flow Chart

- 1) Name of the person who made testing: Tina Zhao
- 2) Name of the person in charge of testing: Ryan Yang



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No. CANEC1204755001

Date: 27 Apr 2012

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Sample photo:



SGS authenticate the photo on original report only \*\*\* End of Report \*\*\*

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www.cn.sgs.com



Date:

Aug 15, 2012

Result

Pass

LITTELFUSE, INC Applicant:

8755 WEST HIGGINS ROAD SUITE

500CHICAGO IL 60631 USA

KRISTEEN BACILA/ARSENIO CESISTA JR. Attn:

Sample Description:

One (1) submitted sample said to be terminals. Tested component: silver-grey plated metal.



Tests conducted:

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

Conclusion:

**Tested Samples** Tested component of submitted sample

**Standard** 

Restriction of the use of certain hazardous substance

in electrical and electronic equipment (RoHS

Directive 2002/95/EC and superseding 2011/65/EU)

Authorized by:

For Intertek Testing Services

Shenzhen Ltd.

Ben N.L. Lin General Manager



**Tests Conducted** 

#### **RoHS Chemical Test**

#### (A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND(<2)
Lead (Pb) Content (mg/kg)	ND(<2)
Mercury (Hg) Content (mg/kg)	ND(<2)
Chromium (VI)(Cr <sup>6+</sup> ) Result (By Boiling Water Extraction on Metal)(mg/kg with 50cm <sup>2</sup> )	Negative (<0.02)

Chemist: Wang Haijun

mg/kg = milligram per kilogram = ppm mg/kg with 50cm<sup>2</sup> = milligram per kilogram with 50 square centimetre < = Less than ND = Not detected

Positive = A positive test result indicated the presence of Cr(VI) at the time of testing, equal to or greater than threshold of 1 mg/kg for spot test procedure or 0.02 mg/kg for boiling-water-extraction procedures with a sample surface area of 50cm2 used. However, it shall not be interpreted as the Cr(VI) concentration in the coating layer of the sample and should not be used as a method detection limit for this qualitative test.

Negative = A negative test result indicated above positive observation was not found at the time of testing. When the spot-test showed a negative result, the boiling-water-extraction procedure shall be used to verify the result.

#### (B) 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)

The above limits were quoted from 2002/95/EC and superseding 2011/65/EU for homogeneous material.



**Test Report** SZHH0071861302 Number:

**Tests Conducted** 

## (C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI) (Cr <sup>6+</sup> ) Content	With reference to IEC 62321 Edition 1.0:2008, by boiling water extraction and determined by UV-VIS Spectrophotometer	Positive/Negative (Threshold of 0.02mg/kg with 50cm²)

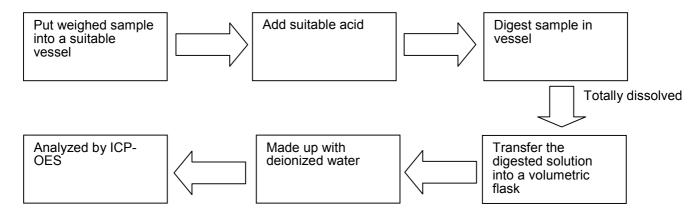
Date sample received: Aug 10, 2012
Testing period: Aug 10, 2012 to Aug 13, 2012



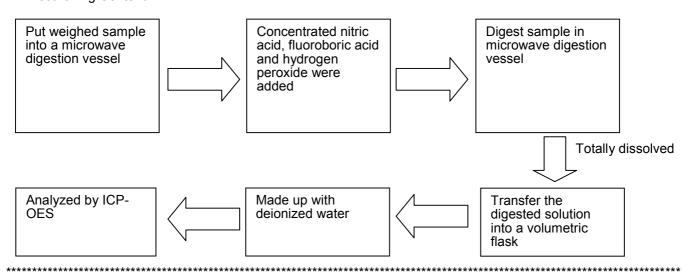
**Tests Conducted** 

#### (D) Measurement Flowchart:

#### 1. Test for Cd/Pb Contents



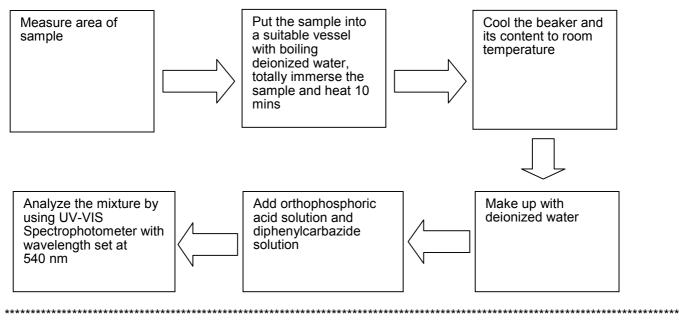
## 2. Test for Hg Content





**Tests Conducted** 

3. Test for Chromium (VI) (Cr<sup>6+</sup>) Content (Boiling Water Extraction)



End of Report

This report is made solely on the basis of your instructions and/or information and materials supplied by you. It is not intended to be a recommendation for any particular course of action. Intertek does not accept a duty of care or any other responsibility to any person other than the Client in respect of this report and only accepts liability to the Client insofar as is expressly contained in the terms and conditions governing Intertek's provision of services to you. Intertek makes no warranties or representations either express or implied with respect to this report save as provided for in those terms and conditions. We have aimed to conduct the Review on a diligent and careful basis and we do not accept any liability to you for any loss arising out of or in connection with this report, in contract, tort, by statute or otherwise, except in the event of our gross negligence or wilful misconduct.



Date:

Jun 20, 2012

Applicant: LITTELFUSE, INC

8755 WEST HIGGINS ROAD SUITE

500CHICAGO IL 60631 USA

KRISTEEN BACILA/ARSENIO CESISTA JR. Attn:

Sample Description:

One (1) submitted sample said to be red powder (epoxy resin PCE210 4A red).

Part No. : MS044.



Tests conducted:

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

To be continued

Authorized by:

For Intertek Testing Services

Shenzhen Ltd.

Ben N.L. Lin General Manager



Conclusion:

**Tested Samples** Submitted sample

<u>Standard</u> Restriction of the use of certain hazardous substance in electrical electronic and equipment (RoHS Direction

2002/95/EC and supersedure 2011/65/EU)

Phthalates content requirement in Annex XVII Items 51 & 52 of the REACH Regulation (EC) No. 1907/2006 &

Amendment No. 552/2009 (formerly known as Directive 2005/84/EC) (DEHP, DBP & BBP)

Hexabromocyclododecane Content

See test conducted

Result

Pass

**Pass** 

Halogen (F, Cl, Br, I) Content

See test conducted

Authorized by: For Intertek Testing Services Shenzhen Ltd.

Ben N.L. Lin General Manager



**Tests Conducted** 

#### 1 **RoHS Chemical Test**

## (A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND(<2)
Lead (Pb) Content (mg/kg)	ND(<2)
Mercury (Hg) Content (mg/kg)	ND(<2)
Chromium (VI)(Cr <sup>6+</sup> ) Content (mg/kg)	ND(<1)
Polybrominated Biphenyls (PBBs)(mg/kg)	
Monobromobiphenyl (MonoBB)	ND(<5)
Dibromobiphenyl (DiBB)	ND(<5)
Tribromobiphenyl (TriBB)	ND(<5)
Tetrabromobiphenyl (TetraBB)	ND(<5)
Pentabromobiphenyl (PentaBB)	ND(<5)
Hexabromobiphenyl (HexaBB)	ND(<5)
Heptabromobiphenyl (HeptaBB)	ND(<5)
Octabromobiphenyl (OctaBB)	ND(<5)
Nonabromobiphenyl (NonaBB)	ND(<5)
Decabromobiphenyl (DecaBB)	ND(<5)
Polybrominated Diphenyl Ethers (PBDEs)(mg/kg)	
Monobromodiphenyl Ether (MonoBDE)	ND(<5)
Dibromodiphenyl Ether (DiBDE)	ND(<5)
Tribromodiphenyl Ether (TriBDE)	ND(<5)
Tetrabromodiphenyl Ether (TetraBDE)	ND(<5)
Pentabromodiphenyl Ether (PentaBDE)	ND(<5)
Hexabromodiphenyl Ether (HexaBDE)	ND(<5)
Heptabromodiphenyl Ether (HeptaBDE)	ND(<5)
Octabromodiphenyl Ether (OctaBDE)	ND(<5)
Nonabromodiphenyl Ether (NonaBDE)	ND(<5)
Decabromodiphenyl Ether (DecaBDE)	ND(<5)

Chemist: Wang Haijun/Zeng Guoliang

mg/kg = milligram per kilogram = ppm < = Less than

ND = Not detected



**Tests Conducted** 

#### (B) 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)

The above limits were quoted from 2002/95/EC and supersedure 2011/65/EU for homogeneous material.

#### (C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI)(Cr <sup>6+</sup> ) Content	With reference to IEC 62321 Edition 1.0:2008, by alkaline digestion and determined by UV-VIS Spectrophotometer	1 mg/kg
Polybrominated Biphenyls (PBBs)& Polybrominated Diphenyl Ethers (PBDEs)	With reference to IEC 62321 Edition 1.0:2008, by solvent extraction and determined by GC/MS and further HPLC confirmation when necessary	5 mg/kg

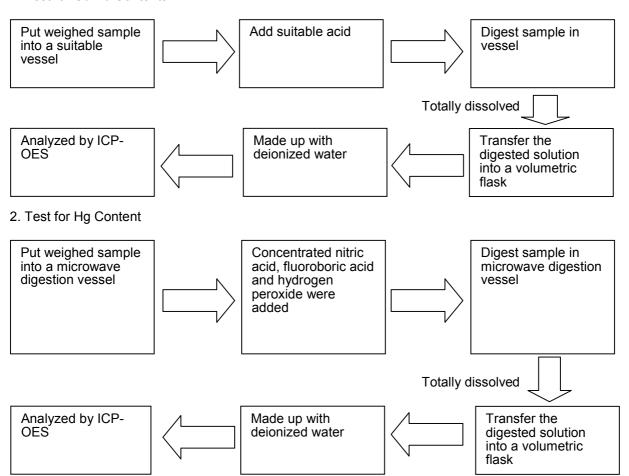
Date sample received: Jun 09, 2012 Testing period: Jun 09, 2012 to Jun 12, 2012



**Tests Conducted** 

#### (D) Measurement Flowchart:

#### 1. Test for Cd/Pb Contents

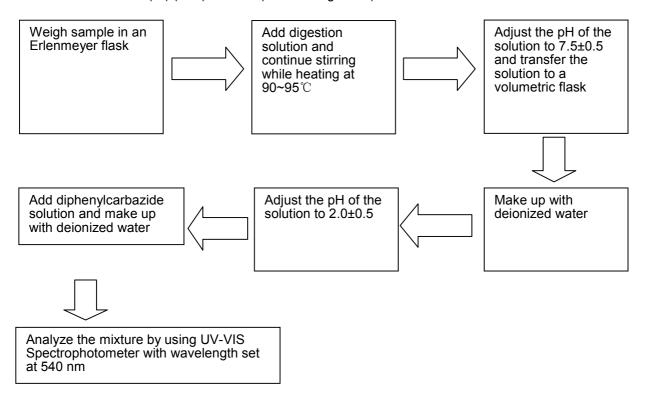




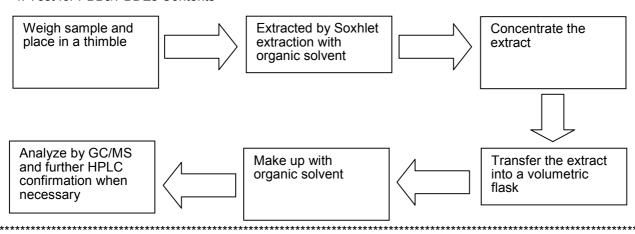
SZHH00699669 **Test Report** Number:

**Tests Conducted** 

## 3. Test for Chromium (VI) (Cr<sup>6+</sup>) Content (Alkaline Digestion)



#### 4. Test for PBBs/PBDEs Contents





**Tests Conducted** 

#### 2 Phthalate Content

With reference to EN14372, by Gas chromatographic-Mass Spectrometric (GC-MS) analysis.

Dibutyl phthalate (DBP) Di-(2-ethyl hexyl) phthalate (DEHP) Benzyl butyl phthalate (BBP)	Result (%) <0.01 <0.01 <0.01
Sum of three phthalates	<0.01
Limit	0.1 %

The above limit was quoted according to Annex XVII Items 51 & 52 of the REACH Regulation (EC) No. 1907/2006 & Amendment No. 552/2009(formerly known as Directive 2005/84/EC) for phthalate content in toys and children articles.

< = Less than

As per client's request, only DBP, DEHP and BBP were tested for submitted sample.

Date sample received : Jun 09, 2012

Testing period : Jun 09, 2012 to Jun 14, 2012

#### 3 Hexabromocyclododecane (HBCDD) Content:

By solvent extraction followed by Gas Chromatographic - Mass Spectrometric (GC-MS) analysis.

Result: Less than 10 mg/kg

mg/kg =milligram per kilogram

Date sample received: Jun 09, 2012

Testing period : Jun 09, 2012 to Jun 12, 2012



**Tests Conducted** 

#### 4 Halogen Content

#### (I) Test Result Summary:

Testing Item	Result (mg/kg)
Fluorine (F) Content	ND
Chlorine (CI) Content	ND
Bromine (Br) Content	4590
Iodine (I) Content	ND

mg/kg = milligram per kilogram = ppm ND = Not detected

#### (II) Test Method:

Testing Item	Testing Method	Reporting Limit
Halogen (F, Cl, Br, I) Content	With reference to BS EN 14582:2007, by calorimetric bomb and determined by Ion Chromatography	50 mg/kg

Reporting limit = Quantitation limit of analyte in sample

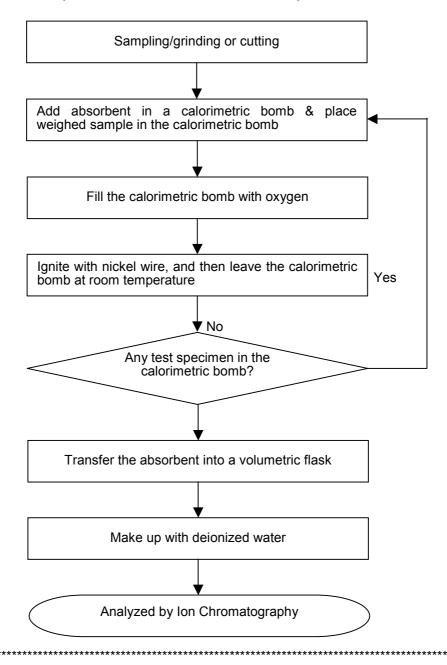
Date sample received : Jun 09, 2012 Testing period : Jun 09, 2012 to Jun 18, 2012



**Tests Conducted** 

#### (III) Measurement Flowchart:

Test for Halogen Content (Reference Method: BS EN 14582:2007)



End of report



Applicant: LITTELFUSE, INC

8755 WEST HIGGINS ROAD SUITE

500CHICAGO IL 60631 USA

KRISTEEN BACILA/ARSENIO CESISTA JR. Attn:

Sample Description:

One (1) submitted sample said to be dark grey resin coating (industrial coating resin).



Tests conducted:

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

Conclusion:

**Tested Sample** Standard

Restriction of the use of certain hazardous substance in Submitted sample

electrical and electronic equipment (RoHS Directive

2002/95/EC and superseding 2011/65/EU)

Phthalates content requirement in Annex XVII Items 51 & 52 of the REACH Regulation (EC) No. 1907/2006

& Amendment No. 552/2009 (formerly known as

Directive 2005/84/EC) (DEHP, DBP & BBP)

**Test Item** 

Hexabromocyclododecane Content See test conducted

Date:

Aug 16, 2012

Halogen (F, Cl, Br, I) Content See test conducted

Authorized by:

For Intertek Testing Services

Shenzhen Ltd.

Ben N.L. Lin General Manager See test conducted

Pass



**Tests Conducted** 

#### 1 RoHS Chemical Test

#### (A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND(<2)
Lead (Pb) Content (mg/kg)	ND(<2)
Mercury (Hg) Content (mg/kg)	ND(<2)
Chromium (VI)(Cr <sup>6+</sup> ) Content (mg/kg)	ND(<1)
Polybrominated Biphenyls (PBBs)(mg/kg)	
Monobromobiphenyl (MonoBB)	ND(<5)
Dibromobiphenyl (DiBB)	ND(<5)
Tribromobiphenyl (TriBB)	ND(<5)
Tetrabromobiphenyl (TetraBB)	ND(<5)
Pentabromobiphenyl (PentaBB)	ND(<5)
Hexabromobiphenyl (HexaBB)	ND(<5)
Heptabromobiphenyl (HeptaBB)	ND(<5)
Octabromobiphenyl (OctaBB)	ND(<5)
Nonabromobiphenyl (NonaBB)	ND(<5)
Decabromobiphenyl (DecaBB)	ND(<5)
Polybrominated Diphenyl Ethers (PBDEs)(mg/kg)	
Monobromodiphenyl Ether (MonoBDE)	ND(<5)
Dibromodiphenyl Ether (DiBDE)	ND(<5)
Tribromodiphenyl Ether (TriBDE)	ND(<5)
Tetrabromodiphenyl Ether (TetraBDE)	ND(<5)
Pentabromodiphenyl Ether (PentaBDE)	ND(<5)
Hexabromodiphenyl Ether (HexaBDE)	ND(<5)
Heptabromodiphenyl Ether (HeptaBDE)	ND(<5)
Octabromodiphenyl Ether (OctaBDE)	ND(<5)
Nonabromodiphenyl Ether (NonaBDE)	ND(<5)
Decabromodiphenyl Ether (DecaBDE)	ND(<5)

Chemist: Wang Haijun/Zeng Guoliang

mg/kg = milligram per kilogram = ppm

< = Less than

ND = Not detected



**Tests Conducted** 

#### (B) 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>5+</sup> )	0.1% (1000 mg/kg)
Polybrominated Biphenyls (PBBs)	0.1% (1000 mg/kg)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000 mg/kg)

The above limits were quoted from 2002/95/EC and superseding 2011/65/EU for homogeneous material.

#### (C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI)(Cr <sup>6+</sup> ) Content	With reference to IEC 62321 Edition 1.0:2008, by alkaline digestion and determined by UV-VIS Spectrophotometer	1 mg/kg
Polybrominated Biphenyls (PBBs)& Polybrominated Diphenyl Ethers (PBDEs)	With reference to IEC 62321 Edition 1.0:2008, by solvent extraction and determined by GC/MS and further HPLC confirmation when necessary	5 mg/kg

Date sample received: Aug 10, 2012 Testing period: Aug 10, 2012 to Aug 13, 2012

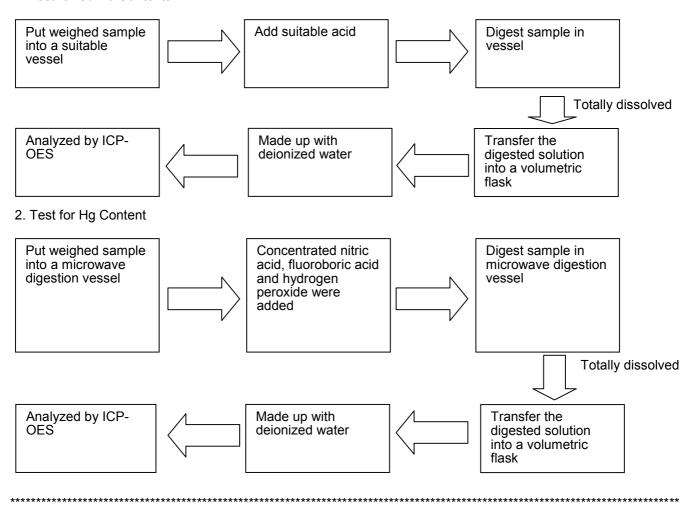


SZHH0071859101 **Test Report** Number:

**Tests Conducted** 

#### (D) Measurement Flowchart:

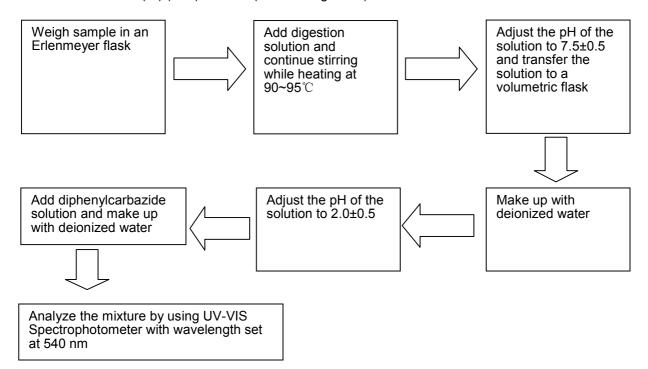
#### 1. Test for Cd/Pb Contents



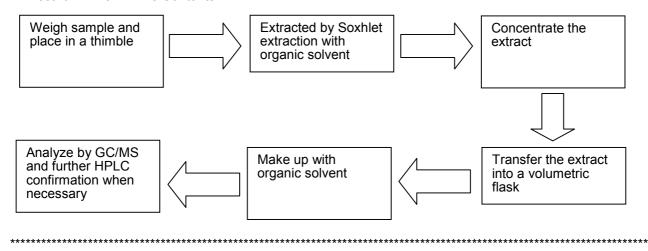


**Tests Conducted** 

## 3. Test for Chromium (VI) (Cr<sup>6+</sup>) Content (Alkaline Digestion)



#### 4. Test for PBBs/PBDEs Contents





**Tests Conducted** 

#### 2 Phthalate Content

With reference to EN14372, by Gas chromatographic-Mass Spectrometric (GC-MS) analysis.

Dibutyl phthalate (DBP) Di-(2-ethyl hexyl) phthalate (DEHP) Benzyl butyl phthalate (BBP)	Result (%) <0.01 <0.01 <0.01
Sum of three phthalates	<0.01
Limit	0.1 %

The above limit was quoted according to Annex XVII Items 51 & 52 of the REACH Regulation (EC) No. 1907/2006 & Amendment No. 552/2009(formerly known as Directive 2005/84/EC) for phthalate content in toys and children articles.

< = Less than

Date sample received :Aug 10, 2012 Testing period :Aug 10, 2012 to Aug 15, 2012

#### 3 <u>Hexabromocyclododecane (HBCDD) Content:</u>

By solvent extraction followed by Gas Chromatographic - Mass Spectrometric (GC-MS) analysis.

Result: Less than 10 mg/kg

mg/kg =milligram per kilogram

Date sample received: Aug 10, 2012 Testing period: Aug 10, 2012 to Aug 14, 2012



**Tests Conducted** 

#### 4 Halogen Content

#### ( I ) Test Result Summary:

Testing Item	Result (mg/kg)
Fluorine (F) Content	ND
Chlorine (CI) Content	ND
Bromine (Br) Content	ND
Iodine (I) Content	ND

mg/kg= milligram per kilogram = ppm ND= Not detected

#### (II) Test Method:

Testing Item	Testing Method	Reporting Limit	
	With reference to BS EN 14582:2007, by calorimetric bomb and determined by Ion Chromatography	50 mg/kg	

Reporting limit = Quantitation limit of analyte in sample

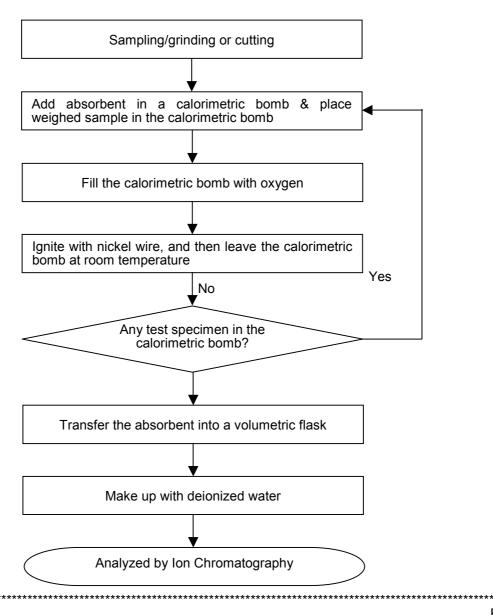
Date sample received :Aug 10, 2012 Testing period :Aug 10, 2012 to Aug 14, 2012



**Tests Conducted** 

#### (III) Measurement Flowchart:

Test for Halogen Content (Reference Method: BS EN 14582:2007)



End of report

This report is made solely on the basis of your instructions and/or information and materials supplied by you. It is not intended to be a recommendation for any particular course of action. Intertek does not accept a duty of care or any other responsibility to any person other than the Client in respect of this report and only accepts liability to the Client insofar as is expressly contained in the terms and conditions governing Intertek's provision of services to you. Intertek makes no warranties or representations either express or implied with respect to this report save as provided for in those terms and conditions. We have aimed to conduct the Review on a diligent and careful basis and we do not accept any liability to you for any loss arising out of or in connection with this report, in contract, tort, by statute or otherwise, except in the event of our gross negligence or wilful misconduct.



Date:

Dec 15, 2011

Applicant: LITTELFUSE, INC

8755 WEST HIGGINS ROAD SUITE

500CHICAGO IL 60631 USA

Attn: KRISTEEN BACILA/ARSENIO CESISTA JR.

Sample Description:

One (1) submitted sample said to be base & lid.

Tested components: (1) red plastic. (base) (2) red plastic. (lid)



Tests conducted:

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

To be continued

Authorized by:

For Intertek Testing Services

Shenzhen Ltd.

Ben N.L. Lin General Manager



Conclusion:

Tested Sample
Submitted sample
Phthalates content requirement in Annex XVII Items
Pass
Phthalates content requirement in Annex XVII Items
Pass

Phthalates content requirement in Annex XVII Items 51 & 52 of the REACH Regulation (EC) No. 1907/2006 & Amendment No. 552/2009 (formerly known as

Directive 2005/84/EC) (DEHP, DBP & BBP)

Test Item

Hexabromocyclododecane Content See Test Conducted

Halogen Content See Test Conducted

Restriction of the use of certain hazardous substance

in electrical electronic and equipment (RoHS Direction

2002/95/EC and amendment 2005/618/EC)

Remark As requested by the applicant, tested components (1) and (2) were tested together.

Authorized by: For Intertek Testing Services Shenzhen Ltd.

Ben N.L. Lin General Manager See Test Conducted



**Tests Conducted** 

#### 1 **RoHS Chemical Test**

#### (A) Test Result Summary:

Testing Item	Result	
resung item	(1/2)	
Cadmium (Cd) Content (mg/kg)	ND(<2)	
Lead (Pb) Content (mg/kg)	47	
Mercury (Hg) Content (mg/kg)	ND(<2)	
Chromium (VI)(Cr <sup>6+</sup> ) Content (mg/kg)	ND(<1)	
Polybrominated Biphenyls (PBBs)(mg/kg)		
Monobromobiphenyl (MonoBB)	ND(<5)	
Dibromobiphenyl (DiBB)	ND(<5)	
Tribromobiphenyl (TriBB)	ND(<5)	
Tetrabromobiphenyl (TetraBB)	ND(<5)	
Pentabromobiphenyl (PentaBB)	ND(<5)	
Hexabromobiphenyl (HexaBB)	ND(<5)	
Heptabromobiphenyl (HeptaBB)	ND(<5)	
Octabromobiphenyl (OctaBB)	ND(<5)	
Nonabromobiphenyl (NonaBB)	ND(<5)	
Decabromobiphenyl (DecaBB)	ND(<5)	
Polybrominated Diphenyl Ethers (PBDEs)(mg/kg)		
Monobromodiphenyl Ether (MonoBDE)	ND(<5)	
Dibromodiphenyl Ether (DiBDE)	ND(<5)	
Tribromodiphenyl Ether (TriBDE)	ND(<5)	
Tetrabromodiphenyl Ether (TetraBDE)	ND(<5)	
Pentabromodiphenyl Ether (PentaBDE)	ND(<5)	
Hexabromodiphenyl Ether (HexaBDE)	ND(<5)	
Heptabromodiphenyl Ether (HeptaBDE)	ND(<5)	
Octabromodiphenyl Ether (OctaBDE)	ND(<5)	
Nonabromodiphenyl Ether (NonaBDE)	ND(<5)	
Decabromodiphenyl Ether (DecaBDE)	ND(<5)	

Chemist: Wang Haijun/Zeng Guoliang

mg/kg = milligram per kilogram = ppm

< = Less than

ND = Not detected

Tested components:

(1) Red plastic (based of mark as #1).

(2) Red plastic (lid of mark as #1).



**Tests Conducted** 

#### (B) 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)

The above limits were quoted from 2002/95/EC and amendment 2005/618/EC for homogeneous material.

## (C)Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI)(Cr <sup>6+</sup> ) Content	With reference to IEC 62321 Edition 1.0:2008, by alkaline digestion and determined by UV-VIS Spectrophotometer	1 mg/kg
Polybrominated Biphenyls (PBBs)& Polybrominated Diphenyl Ethers (PBDEs)	With reference to IEC 62321 Edition 1.0:2008, by solvent extraction and determined by GC/MS and further HPLC confirmation when necessary	5 mg/kg

Date sample received: Dec 08, 2011 Testing period: Dec 08, 2011 to Dec 13, 2011

## (D) Measurement Flowchart:

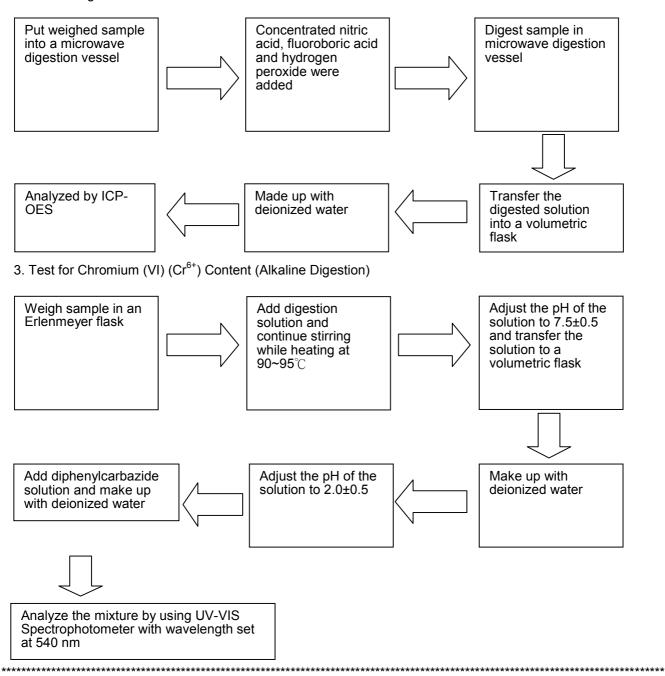
## 1. Test for Cd/Pb Contents

Add suitable acid Put weighed sample Digest sample in into a suitable vessel vessel Analyzed by ICP-Made up with Transfer the OES deionized water digested solution into a volumetric flask



**Tests Conducted** 

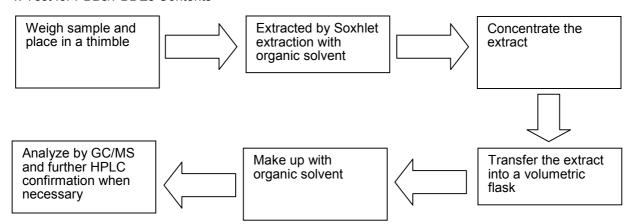
#### 2. Test for Hg Content





#### **Tests Conducted**

#### 4. Test for PBBs/PBDEs Contents



#### 2 **Halogen Content**

#### (I) Test Result Summary:

Testing Item	Result (mg/kg)
	<u>(1/2)</u>
Fluorine (F) Content	597
Chlorine (CI) Content	ND
Bromine (Br) Content	41600
Iodine (I) Content	ND

mg/kg= milligram per kilogram = ppm ND= Not detected

Remark: As requested by the applicant, tested components (1) and (2) were tested together.

#### ( II ) Test Method:

Testing Item	Testing Method	Reporting Limit
	With reference to BS EN 14582:2007, by calorimetric bomb and determined by Ion Chromatography	50 mg/kg

Reporting limit = Quantitation limit of analyte in sample

Date sample received: Dec 08, 2011

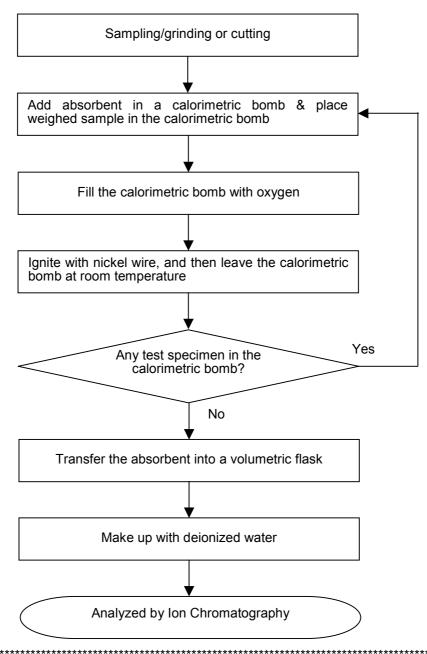
Testing period: Dec 08, 2011 to Dec 14, 2011



**Tests Conducted** 

#### (III) Measurement Flowchart:

Test for Halogen Content (Reference Method: BS EN 14582:2007)





**Tests Conducted** 

#### 3 Phthalate Content

With reference to EN14372, by Gas chromatographic-Mass Spectrometric (GC-MS) analysis.

Dibutyl phthalate (DBP)	Result (%) (1/2) <0.01
Di-(2-ethyl hexyl) phthalate (DEHP) Benzyl butyl phthalate (BBP)	<0.01 <0.01 <0.01
Sum of three phthalates	<0.01
Limit	0.1 %

The above limit was quoted according to Annex XVII Items 51 & 52 of the REACH Regulation (EC) No. 1907/2006 & Amendment No. 552/2009(formerly known as Directive 2005/84/EC) for phthalate content in toys and children articles.

< = Less than

As per client's request, only DBP, DEHP and BBP were tested for the components (1) to (2) of the submitted sample.

Tested components:

- Red plastic (based of mark as #1).
- Red plastic (lid of mark as #1). (2)

Date sample received: Dec 08, 2011

Testing period: Dec 08, 2011 to Dec 12, 2011

#### 4 <u>Hexabromocyclododecane (HBCDD) Content:</u>

By solvent extraction followed by Gas Chromatographic - Mass Spectrometric (GC-MS) analysis.

**Tested Sample** Result (mg/kg) (1/2)

< = Less than mg/kg =milligram per kilogram

Tested components:

- Red plastic (based of mark as #1).
- Red plastic (lid of mark as #1). (2)

Date sample received: Dec 08, 2011

Testing period: Dec 08, 2011 to Dec 10, 2011

End of report



Date:

Dec 13, 2011

Applicant: LITTELFUSE, INC

8755 WEST HIGGINS ROAD SUITE

500CHICAGO IL 60631 USA

KRISTEEN BACILA/ARSENIO CESISTA JR. Attn:

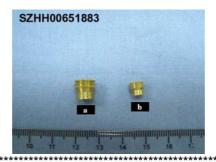
Sample Description:

One (1) submitted sample said to be **copper screw**.

Tested components:

(a) copper color metal. (big)

(b) copper color metal. (small)



Tests conducted:

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

Remark: As requested by the applicant, tested components (a) and (b) were tested together.

Authorized by:

For Intertek Testing Services

Shenzhen Ltd.

Ben N.L. Lin General Manager



**Tests Conducted** 

**RoHS Chemical Test** 

#### (A) Test Result Summary:

Testing Item	Result	
	<u>(a/b)</u>	
Cadmium (Cd) Content (mg/kg)	35	
Lead (Pb) Content (mg/kg)	27600	
Mercury (Hg) Content (mg/kg)	ND(<2)	
Chromium (VI)(Cr <sup>6+</sup> ) Result (By Boiling Water Extraction on Metal)(mg/kg with 50cm <sup>2</sup> )	Negative (<0.02)	

Chemist: Wang Haijun

mg/kg = milligram per kilogram = ppm mg/kg with 50cm<sup>2</sup> = milligram per kilogram with 50 square centimetre < = Less than ND = Not detected

Positive = A positive test result indicated the presence of Cr(VI) at the time of testing, equal to or greater than threshold of 1 mg/kg for spot test procedure or 0.02 mg/kg for boiling-water-extraction procedures with a sample surface area of 50cm² used. However, it shall not be interpreted as the Cr(VI) concentration in the coating layer of the sample and should not be used as a method detection limit for this qualitative test.

Negative = A negative test result indicated above positive observation was not found at the time of testing. When the spot-test showed a negative result, the boiling-water-extraction procedure shall be used to verify the result.

#### (B) 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)

The above limits were quoted from 2002/95/EC and amendment 2005/618/EC for homogeneous material.



#### **Tests Conducted**

#### (C) Test Method:

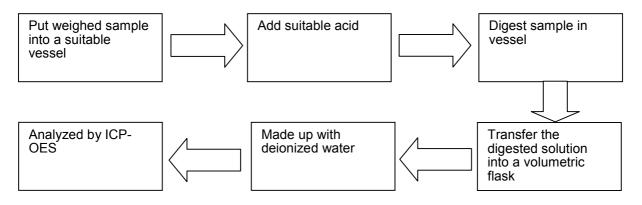
Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI) (Cr <sup>6+</sup> ) Content	With reference to IEC 62321 Edition 1.0:2008, by boiling water extraction and determined by UV-VIS Spectrophotometer	Positive/Negative (Threshold of 0.02mg/kg with 50cm <sup>2</sup> )

Date sample received : Dec 08, 2011

Testing period: Dec 08, 2011 to Dec 10, 2011

#### (D) Measurement Flowchart:

#### 1. Test for Cd/Pb Contents

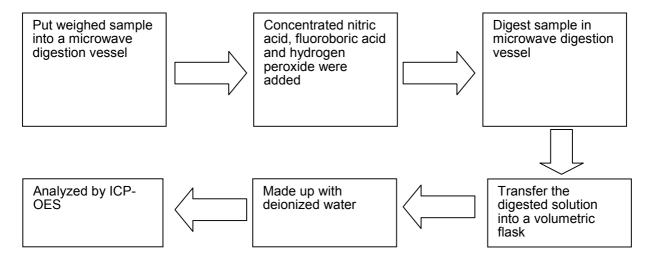




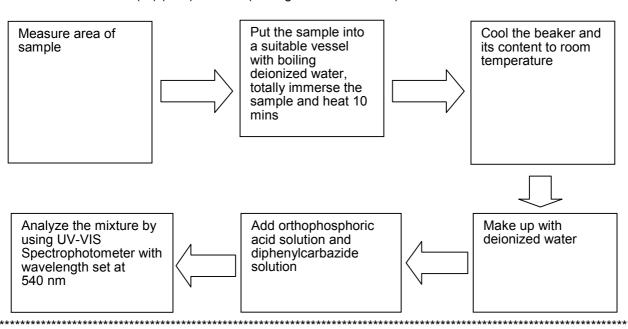
Number: SZHH00651883 **Test Report** 

**Tests Conducted** 

#### 2. Test for Hg Content



## 3. Test for Chromium (VI) (Cr<sup>6+</sup>) Content (Boiling Water Extraction)



End of report



Date:

Dec 13, 2011

LITTELFUSE, INC Applicant:

8755 WEST HIGGINS ROAD SUITE

500CHICAGO IL 60631 USA

KRISTEEN BACILA/ARSENIO CESISTA JR. Attn:

Sample Description:

One (1) submitted sample said to be **screw & washer**.

Tested components:

(a) silver color metal. (screw)
(b) silver color metal. (big washer)

(c) silver color metal. (small washer)



Tests conducted:

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

Remark: As requested by the applicant, tested components (a), (b) and (c)were tested together.

Authorized by:

For Intertek Testing Services

Shenzhen Ltd.

Ben N.L. Lin General Manager



**Tests Conducted** 

**RoHS Chemical Test** 

(A) Test Result Summary:

Testing Item	Result
	<u>(a/b/c)</u>
Cadmium (Cd) Content (mg/kg)	ND(<2)
Lead (Pb) Content (mg/kg)	ND(<2)
Mercury (Hg) Content (mg/kg)	ND(<2)
Chromium (VI)(Cr <sup>6+</sup> ) Result (By Boiling Water Extraction on Metal)(mg/kg with 50cm <sup>2</sup> )	Negative(<0.02)

Chemist: Wang Haijun

mg/kg = milligram per kilogram = ppm mg/kg with 50cm<sup>2</sup> = milligram per kilogram with 50 square centimetre < = Less than ND = Not detected

Positive = A positive test result indicated the presence of Cr(VI) at the time of testing, equal to or greater than threshold of 1 mg/kg for spot test procedure or 0.02 mg/kg for boiling-water-extraction procedures with a sample surface area of 50cm² used. However, it shall not be interpreted as the Cr(VI) concentration in the coating layer of the sample and should not be used as a method detection limit for this qualitative test.

Negative = A negative test result indicated above positive observation was not found at the time of testing. When the spot-test showed a negative result, the boiling-water-extraction procedure shall be used to verify the result.

#### (B) 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)

The above limits were quoted from 2002/95/EC and amendment 2005/618/EC for homogeneous material.



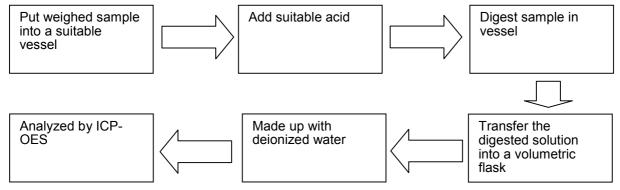
**Tests Conducted** 

#### (C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI) (Cr <sup>6+</sup> ) Content	With reference to IEC 62321 Edition 1.0:2008, by boiling water extraction and determined by UV-VIS Spectrophotometer	Positive/Negative (Threshold of 0.02mg/kg with 50cm²)

Date sample received: Dec 08, 2011 Testing period: Dec 08, 2011 to Dec 10, 2011

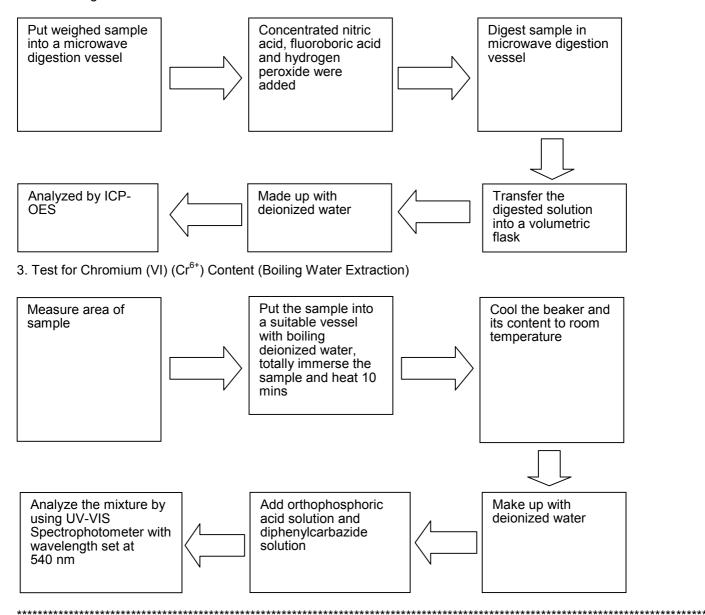
# (D) Measurement Flowchart: 1. Test for Cd/Pb Contents





**Tests Conducted** 

#### 2. Test for Hg Content



End of report