

Company Name: Littelfuse, Inc.

ICP Test Report Certification Packet

Surface Mount Varistors Product Type: Product Series: SM7&SM20 Series Issue Date: August 20, 2012 It is hereby certified by Littelfuse, Inc. that there is neither RoHS (EU Directive 2002/95/EC)-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. And it is certified by Littelfuse, Inc. that the series products listed above are compliant with LF Halogen Free Standard (Cl≤800ppm, Br≤800ppm, Cl+Br≤ 1000ppm). In addition, it is hereby reported to you that the parts and sub-materials, the materials to be used for unit parts, the additives and the like in the manufacturing processes, are all composed of the following components. David Huang Issued by: < DGLF Environmental, Health & Safety Engineer > (1) Parts, sub-materials and unit parts This document covers SM7&SM20 Surface Mount Varistors RoHS-Compliant series products 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:



Table 1: List of Raw Materials covered by this report

Parts	P/N	Raw Material Description	Page
1	N/A	Black disc, type including DD,DM,DP and DV	3-22
2	N/A	Silver Paste	23-34
3	N/A	Solder Paste	35-46
4	N/A	Lead Frame	47-51
5	N/A	Encapsulation	52-59



Date:

Jun 19, 2012

Applicant: LITTELFUSE, INC

8755 WEST HIGGINS ROAD SUITE

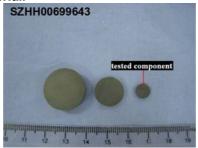
500CHICAGO IL 60631 USA

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 ⁶⁺) 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 ⁶⁺)	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:

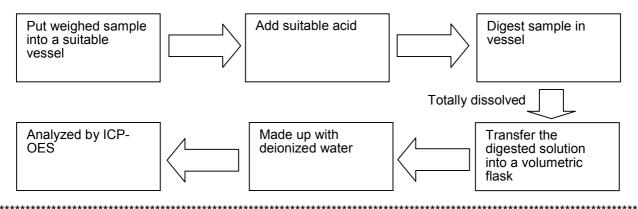
Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI)(Cr ⁶⁺) 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:

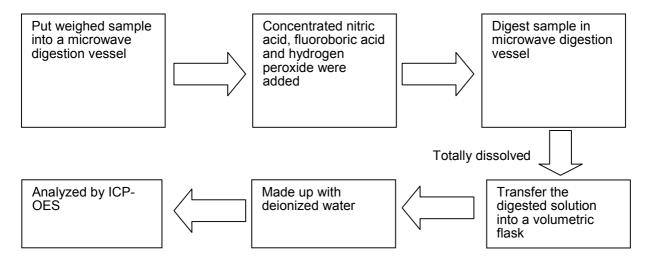
1. Test for Cd/Pb Contents



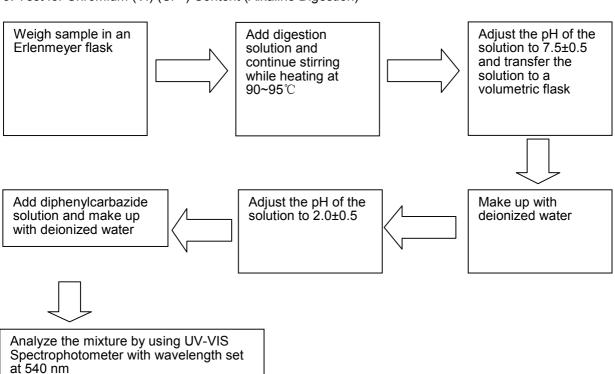


Tests Conducted

2. Test for Hg Content



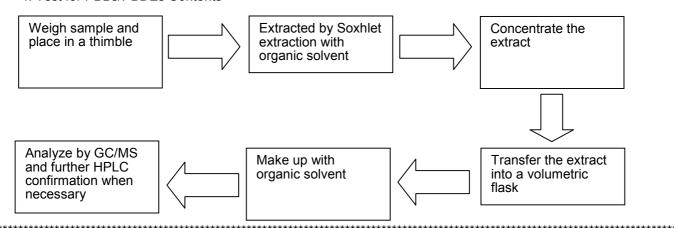
3. Test for Chromium (VI) (Cr⁶⁺) Content (Alkaline Digestion)





Tests Conducted

4. Test for PBBs/PBDEs Contents



End of report



Date:

Jun 19, 2012

Applicant: LITTELFUSE, INC

8755 WEST HIGGINS ROAD SUITE

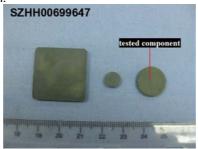
500CHICAGO IL 60631 USA

KRISTEEN BACILA/ARSENIO CESISTA JR. Attn:

Sample Description:

One (1) submitted sample said to be **DM 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



Test Report SZHH00699647 Number:

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 ⁶⁺) 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 ⁶⁺)	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:

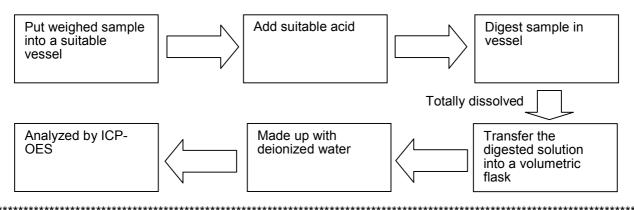
Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI)(Cr ⁶⁺) 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:

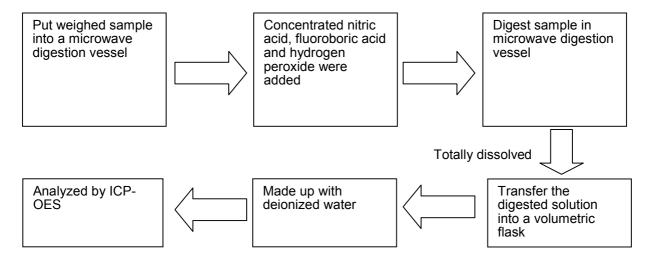
1. Test for Cd/Pb Contents



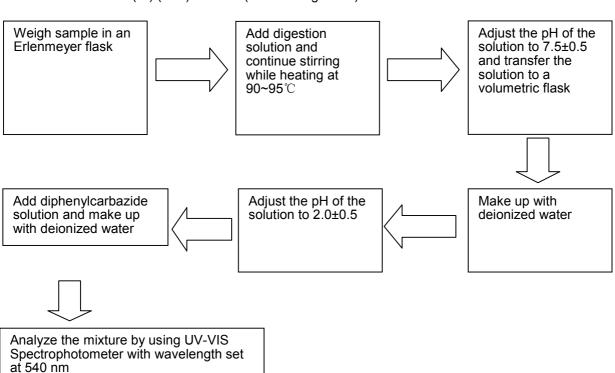


Tests Conducted

2. Test for Hg Content



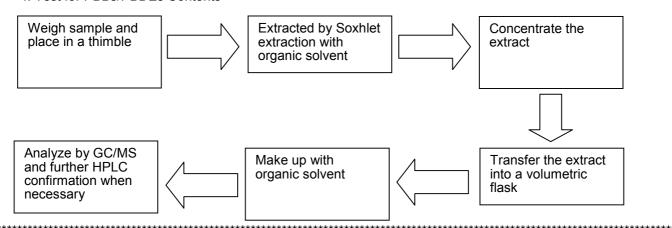
3. Test for Chromium (VI) (Cr⁶⁺) Content (Alkaline Digestion)





Tests Conducted

4. Test for PBBs/PBDEs Contents



End of report



Date:

Jun 19, 2012

Applicant: LITTELFUSE, INC

8755 WEST HIGGINS ROAD SUITE

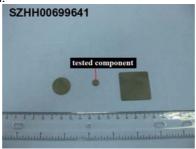
500CHICAGO IL 60631 USA

KRISTEEN BACILA/ARSENIO CESISTA JR. Attn:

Sample Description:

One (1) submitted sample said to be DP 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)

Authorized by:

For Intertek Testing Services

Shenzhen Ltd.

Ben N.L. Lin General Manager Result

Pass



Test Report SZHH00699641 Number:

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 ⁶⁺) Content (mg/kg)	26
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 ⁶⁺)	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:

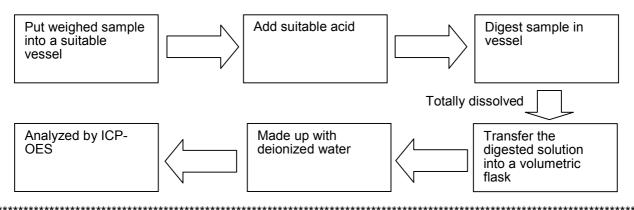
Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI)(Cr ⁶⁺) 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:

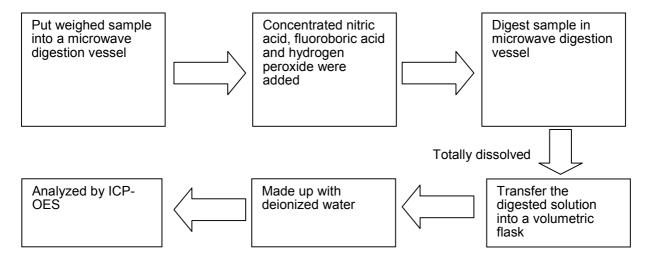
1. Test for Cd/Pb Contents



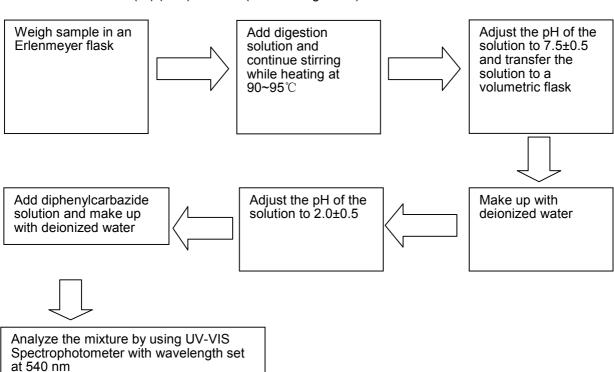


Tests Conducted

2. Test for Hg Content



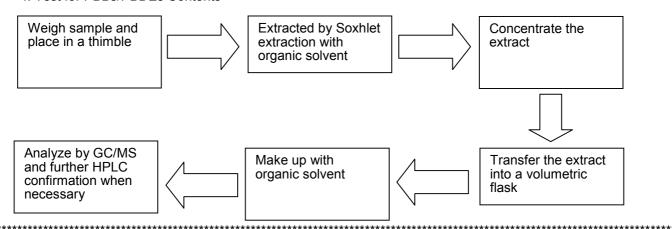
3. Test for Chromium (VI) (Cr⁶⁺) Content (Alkaline Digestion)





Tests Conducted

4. Test for PBBs/PBDEs Contents



End of report



Date:

Jun 18, 2012

Result

Pass

Applicant: LITTELFUSE, INC

8755 WEST HIGGINS ROAD SUITE

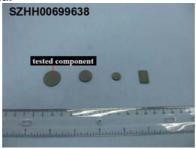
500CHICAGO IL 60631 USA

KRISTEEN BACILA/ARSENIO CESISTA JR. Attn:

Sample Description:

One (1) submitted sample said to be **DV 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)

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 ⁶⁺) 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 ⁶⁺)	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:

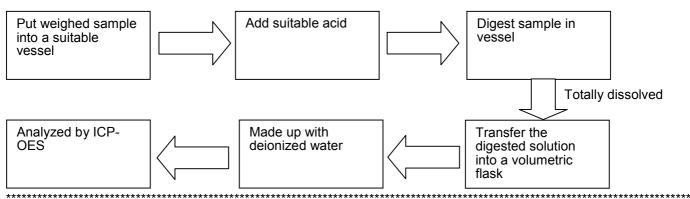
Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Chromium (VI)(Cr ⁶⁺) 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 14, 2012

(D) Measurement Flowchart:

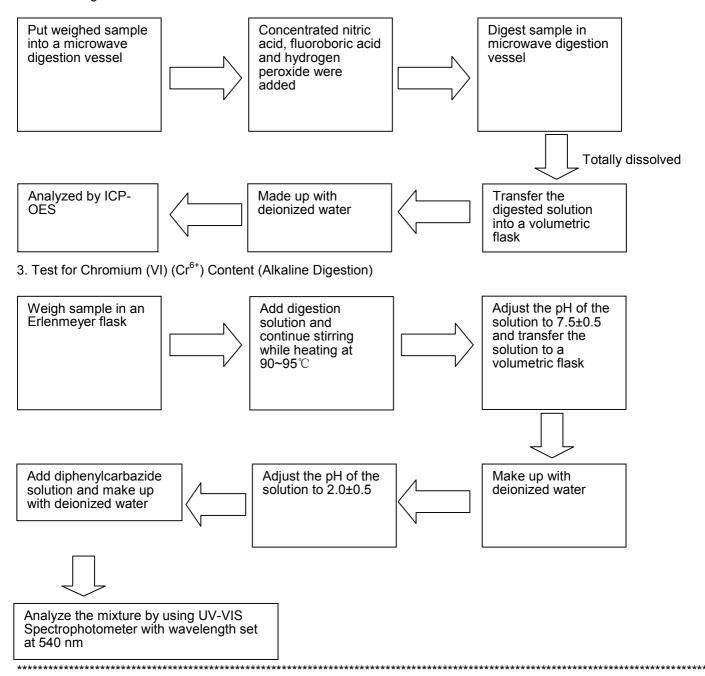
1. Test for Cd/Pb Contents





Tests Conducted

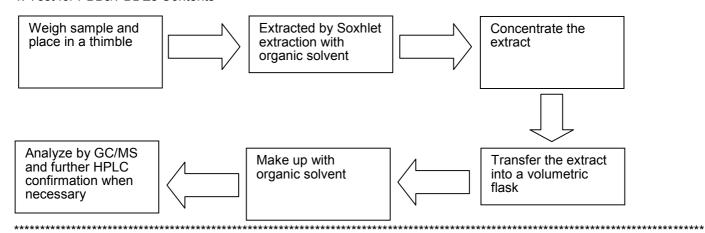
2. Test for Hg Content





Tests Conducted

4. Test for PBBs/PBDEs Contents



End of report



No. SHAEC1201680106

Date: 21 Feb 2012

Page 1 of 6

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]



No. SHAEC1201680106

Date: 21 Feb 2012

Page 2 of 6

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)	<u>Limit</u>	<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	20	ND
Monobromobiphenyl	8	mg/kg	5	ND
Dibromobiphenyl	9	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	-	mg/kg	5	ND	
Hexabromodiphenyl ether	-	mg/kg	5	ND	
Heptabromodiphenyl ether	-	mg/kg	5	ND	
Octabromodiphenyl ether	(C 2)	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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No. SHAEC1201680106

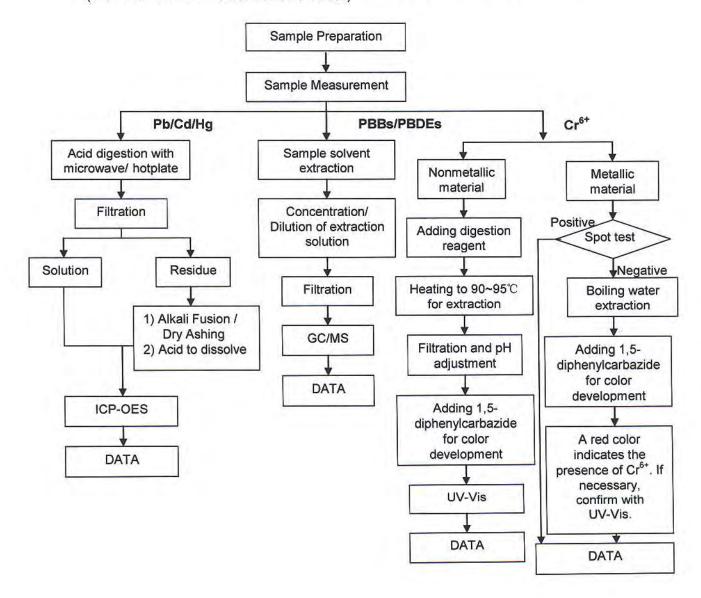
Date: 21 Feb 2012

Page 4 of 6

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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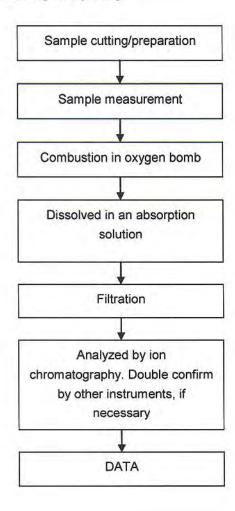
No. SHAEC1201680106

Date: 21 Feb 2012

Page 5 of 6

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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No. SHAEC1201680106

Date: 21 Feb 2012

Page 6 of 6

Sample photo:



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No. SHAEC1203840702

Date: 09 Apr 2012

Page 1 of 6

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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No. SHAEC1203840702

Date: 09 Apr 2012

Page 2 of 6

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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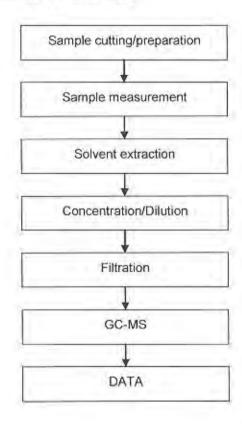
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Page 4 of 6

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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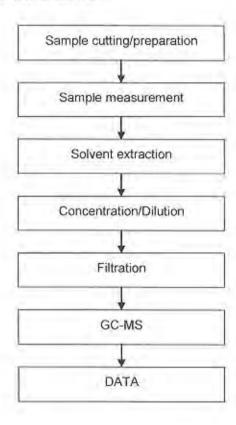
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Page 5 of 6

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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No. SHAEC1203840702

Date: 09 Apr 2012

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Sample photo:



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Report No. RLSZE001191100004

Page 1 of 4

Applicant

DONGGUAN QIHANG XIYE MANUFACTURING CO.,LTD

Address

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

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:

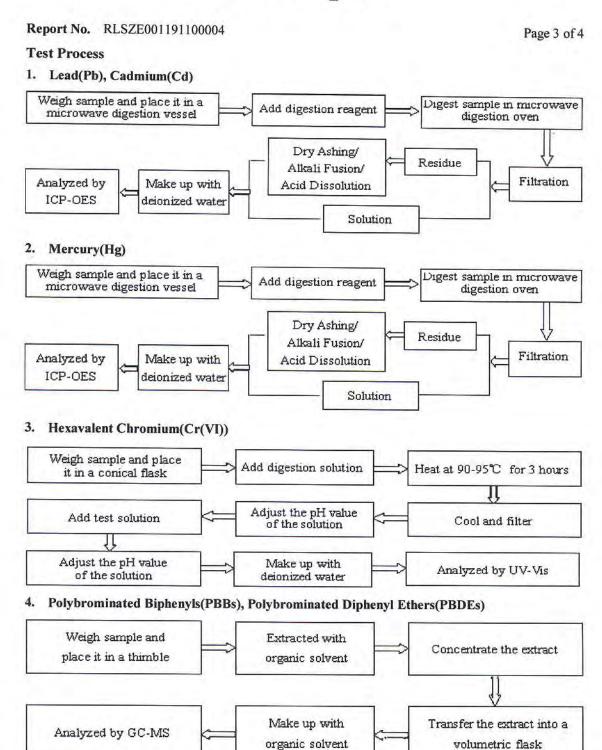
The sample had been dissolved totally tested for Lead, Cadmium, Mercury.

-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	1C	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

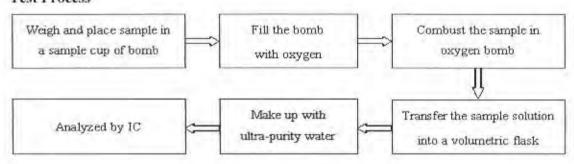
Note:

-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 ***

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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

10

001

Hexabromocyclododecane (HBCDD)

mg/kg

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

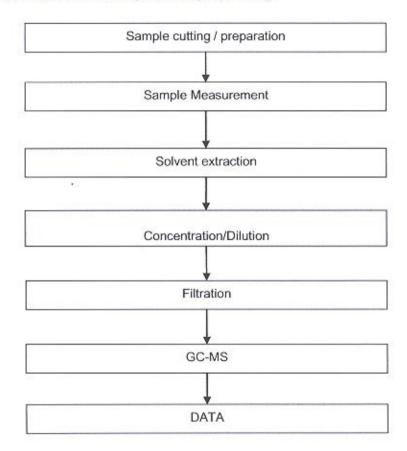
Date: 27 Apr 2012

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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

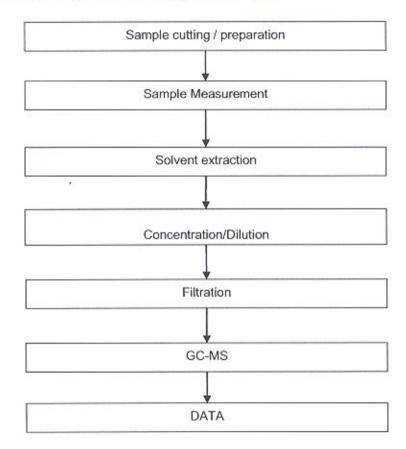
Date: 27 Apr 2012

Page 4 of 5

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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Date: 27 Apr 2012

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Sample photo:



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Date:

Aug 15, 2012

Applicant: LITTELFUSE, INC

8755 WEST HIGGINS ROAD SUITE

500 CHICAGO IL 60631 USA

KRISTEEN BACILA/ARSENIO CESISTA JR. Attn:

Sample Description:

One (1) submitted sample said to be silver-grey plated metal (lead frame).



Tests conducted:

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

Conclusion:

Tested Samples Standard Result Submitted sample Pass

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 ⁶⁺) Result (By Boiling Water Extraction on Metal)(mg/kg with 50cm ²)	Negative (<0.02)

Chemist: Wang Haijun

mg/kg = milligram per kilogram = ppm mg/kg with 50cm² = 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 ⁶⁺)	0.1% (1000 mg/kg)

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



Test Report SZHH0071861301 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 ⁶⁺) 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)

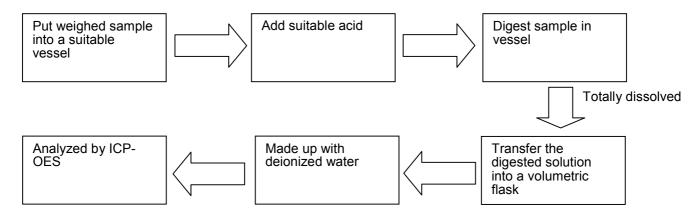
Date sample received: Aug 10, 2012
Testing period: Aug 10, 2012 to Aug 13, 2012



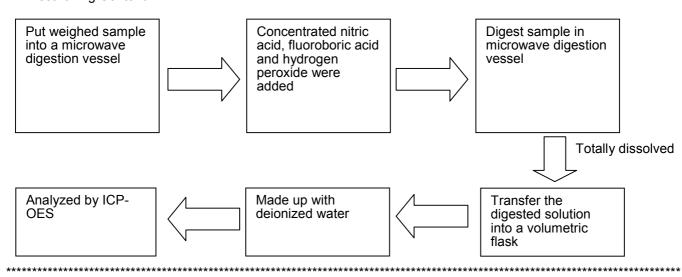
Tests Conducted

(D) Measurement Flowchart:

1. Test for Cd/Pb Contents



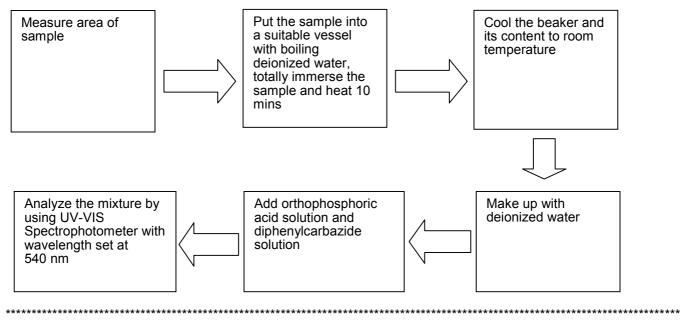
2. Test for Hg Content





Tests Conducted

3. Test for Chromium (VI) (Cr⁶⁺) Content (Boiling Water Extraction)



End of Report

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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 **black plastic (encapsulation)**.



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 See test conducted

electrical and electronic equipment (RoHS Directive

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

Phthalates content requirement in Annex XVII Items Pass 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



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 ⁶⁺) 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 ⁶⁺)	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 ⁶⁺) 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

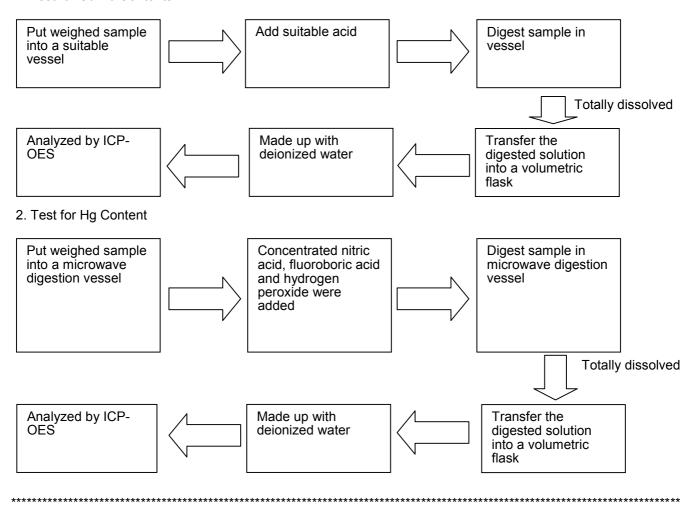


SZHH0071859102 **Test Report** Number:

Tests Conducted

(D) Measurement Flowchart:

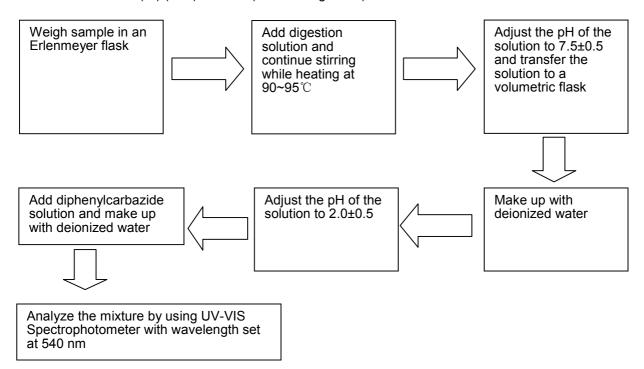
1. Test for Cd/Pb Contents



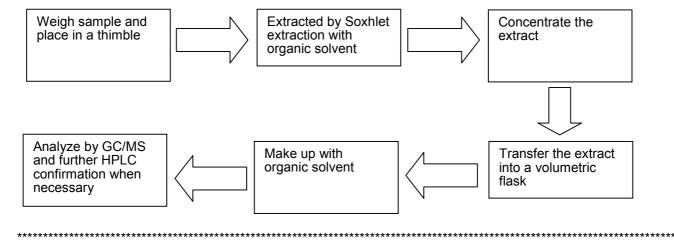


Tests Conducted

3. Test for Chromium (VI) (Cr⁶⁺) 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 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: 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
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

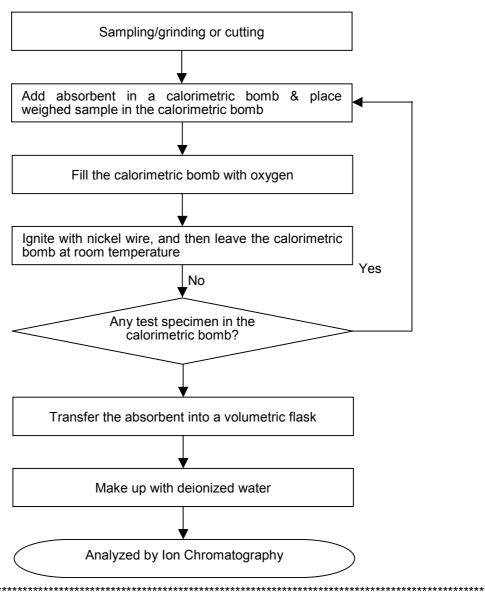
Date sample received :Aug 10, 2012 Testing period :Aug 10, 2012 to Aug 14, 2012



Tests Conducted

(III) Measurement Flowchart:

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



End of report

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