

ICP Test Report Certification Packet

Company Name: Littelfuse, Inc.

Product Type: High Energy Industrial Varistor

Product Series: HA, HB, HC, HF, HG, DHB Varistor Series RoHS Models

Issue Date: June 21, 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.

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 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 HA, HB, HC, HF, HG, DHB Varistor 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 :			



Table 1: List of Raw Materials covered by this report

Total Parts	P/N	Raw Material Description	Page
1	N/A	Black disc, type DD	3-7
2	N/A	Silver Paste	8-19
3	N/A	Pb-free Sold Paste	20-31
4	N/A	Terminal	32-35
5	N/A	Halogen Free Red Epoxy Resin	36-41



Date:

Jun 19, 2012

Result

Pass

Applicant: LITTELFUSE, INC

8755 WEST HIGGINS ROAD SUITE

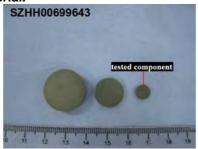
500CHICAGO IL 60631 USA

KRISTEEN BACILA/ARSENIO CESISTA JR. Attn:

Sample Description:

One (1) submitted sample said to be 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)

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:

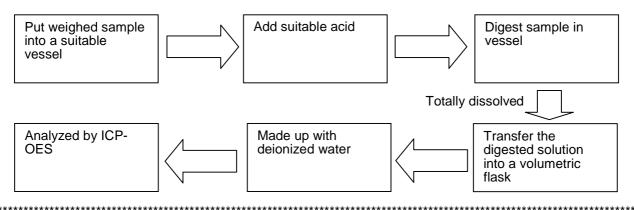
Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Lead (Pb) Content	With reference to IEC 62321 Edition 1.0:2008, by acid digestion and determined by ICP - OES	2 mg/kg
Mercury (Hg) Content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

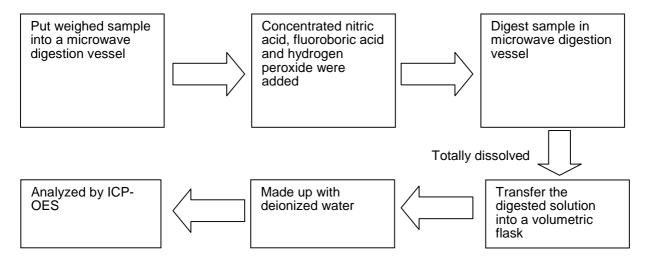
1. Test for Cd/Pb Contents



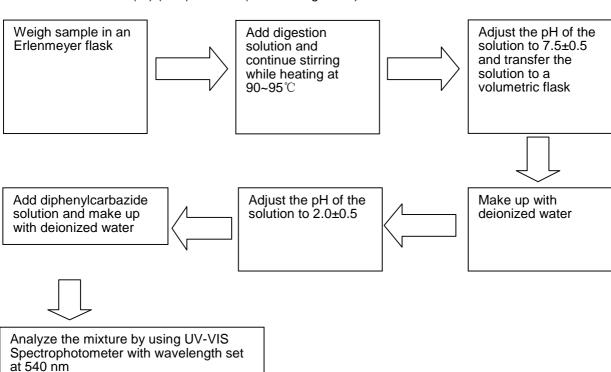


Tests Conducted

2. Test for Hg Content



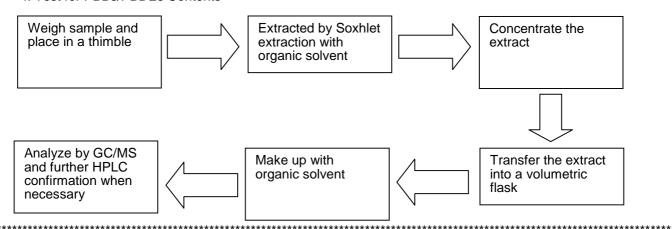
3. Test for Chromium (VI) (Cr⁶⁺) Content (Alkaline Digestion)





Tests Conducted

4. Test for PBBs/PBDEs Contents



End of report



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

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/terms_and_conditions. htm and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability information contained hereon reflects the Company's findings at the time of its observation only act within the limits of Client's instructions. If any, The Company's sole responsibility is to its Client and this document does not exponent experties to a transaction for prevencioning all the bylogists and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company, as a unauthorized alters un, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

[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)	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

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/terms_and_conditions. htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability of any fit such a subject to Terms and Conditions of the Company is findings at the time of its intersection of wards within the limits of Client's instructions. If any. The Company's sole responsibility is to its Client and this document does not exponent parties to a transaction for exercising all this limits of client's instructions. If any. The Company's sole responsibility is to its Client and this document does not exponent to a transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company, unauthorized alternation, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

3"Building,No.889 Yishan Road Xuhui District,Shanghai China 200233中國·上海·徐江区宜山路889号3号楼 邮编: 200233

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.

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/terms_and_conditions. htm and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms-e-document.htm. Attention is drawn to the limitation of isability in growing too and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its possention only any within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not accommand a transaction for processoric sing all the big hights and obligations under the transaction documents. This document cannot be responded except in full, without prior written approval of the Company, with unauthorized alternation, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

In the company of the company of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

3"Bullding,No.869 Yishan Road Xuhui District,Shanghai China 200233 中国·上海·徐汇区宜山路889号3号楼 邮编: 200233 

No. SHAEC1201680106

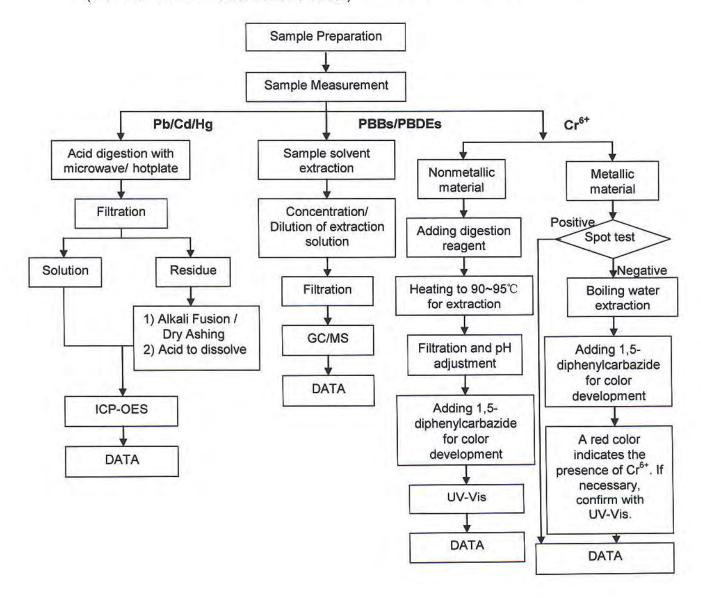
Date: 21 Feb 2012

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)



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/terms_and_conditions. htm and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability in amount to an invasion of the company is findings at the time of its invasion in the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exponent expose the exponent cannot be reproduced except in full, without prior written approval of the Company is unauthorized attendanced except in full, without prior written approval of the Company is unauthorized attendanced except in full, without prior written approval of the Company is unauthorized attendanced except in full, without prior written approval of the Company is considered attendanced except in full, without prior written approval of the Company is unauthorized attendanced except in full, without prior written approval of the Company is provided to the fullest extent of the law.

3 "Building,No.889 Yishan Road Xuhui District,Shanghai China 200233 中国 - 上海 · 徐汇区宜山路889号3号楼 邮编: 200233 www.cn.sgs.com e sgs.china@sgs.com



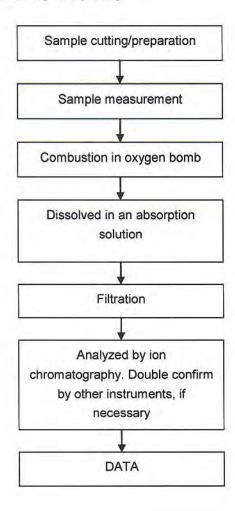
No. SHAEC1201680106

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



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/terms_and_conditions. htm. and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability the subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability the state of the Company's findings at the time of its presention only only within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exponerate parties to at transaction frost exercising all this hights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company, and under the transaction of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.



No. SHAEC1201680106

Date: 21 Feb 2012

Page 6 of 6

Sample photo:



SGS authenticate the photo on original report only

*** End of Report ***

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/terms_and_conditions. htm and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms-e-document.htm. Attention is drawn to the limitation of liability of entire the company of the compa



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

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request at accessible at http://www.sgs.commerns.and_conditions him and for disctonic format documents subject to Terms and Conditions for Electronic Documents at www.sgs.com/lefns_e-document.htm, Attention is drawn to the limitation of its presentation of least an arrangement of the company is not a subject that information contained hereon reflects the Company is lindings, at the time of its desired within the limits of Cliental instructions. If any. The Company is not responsibility is to its Cliental and this document does not accommend use not accommend on the content of the Company with an approval of the Company with instruction of the content of approval of the Company with instruction of the content of approval of the Company with instruction of the content of approval of the Company is allowed by the content of approval of the Company of the content of approval of the content of app



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

The document is issued by the Company subject to its General Conditions of Service printed avariest, excitable on request or accessible at http://www.sqs.com/terms_and_documents_subject to Terms and Conditions for Electronic Decuments at www.sqs.com/terms_e-occument.htm. Attention as drawn to the limitation of liability adjacent. Subject to Terms and Conditions for Electronic Decuments at www.sqs.com/terms_e-occument.htm. Attention as drawn to the limitation of liability adjacent. Subject to the Condition is subject to the Condition is drawn to the Company's softeness that information contained before an expension of the Company's softeness that is instructed this document document to the content document to a transaction of the company at the Company and the Application of the Company and the Company of the Company of

TB/brg/kb89 Yalan Reid XVIIII Dahrd, Sharghal Circa 200233 中国 - 上海 · 徐王 区 育 山路869 号 3 号 楼 邮網 200233 www.cn.ags.com e sgs.china@sgs.com



No. SHAEC1203840702

Date: 09 Apr 2012

Page 3 of 6

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

This opcument is issued by the Company subject to its General Conditions of Service printed overleaf, available on request of accessible at http://www.sgs.com/terms_and_conditions that and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of tability operations and jurisdiction iscues defined therein. Any holder of this document is possed that information contained hereon reflects the Company's the time of its possed within the familis of Ceprts, instructions, if any. The Company's sole responsibility is to its Client and this document does not expressed by the time of the provided of the transaction for printed of documents. This document cannot be reproduced accept in full, without prior written approved of the Company. They considered except in full, without prior written approved of the Company. They unsufficiently in the content or appearance of this document is unlawful and effected may be presented to the full of extent of the low.

(allows after the standard feature shown in this test report refer only to the sample(s) lested.



No. SHAEC1203840702

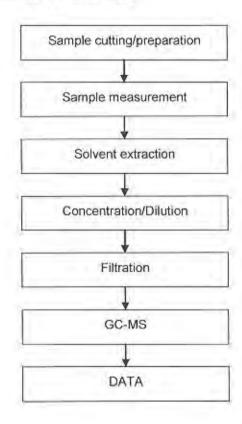
Date: 09 Apr 2012

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



This document is issued by the Company subject to its General Conditions of Service printed overload, available on request or accessible at http://www.sgs.com/terms_and_conditions for Electronic Documents at www.sgs.com/terms_edocuments.htm. Attention is drawn to the limitation of liability of and jurisdiction issues defined therein. Any holder of this document is dispersional to a contained hereon reflects the Company's findings_at the time of its description of the Company's sole responsibility is to its Chord and this document does not account a parties to a transaction lay findings, and of the transaction documents in cannot be reproduced except in full, without prior written approval of the Company by unauthorized alteration, forgery or fatsification of the content or appearance of this document is unlawful and effenders may be prosecuted to the fullest extent of the law unauthorized alteration, forgery or fatsification of the content or appearance of this document is unlawful and effenders may be prosecuted to the fullest extent of the law unlawful and effenders may be prosecuted to the fullest extent of the law unlawful and effenders may be prosecuted to the fullest extent of the law.



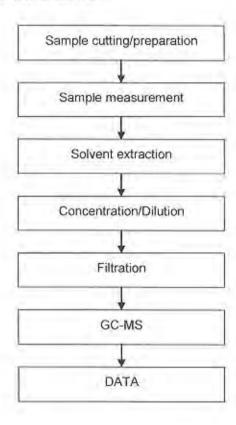
No. SHAEC1203840702

Date: 09 Apr 2012

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



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available or request or accessible at http://www.ags.com/terms_and_ponditions_tite_a

FBuilding No.RR9 Yahan Road Xuhui District, Shanghai China 200233 中国 - 上海 - 發江区宣山路889号3号楼 麒麟: 200233 I E&E (86-21) 61402553 FE&E (86-21)64953679 HL: (86-21) 61402594 HL: (86-21)54500353 www.cn.ags.com e.ags.chma@egs.com



No. SHAEC1203840702

Date: 09 Apr 2012

Page 6 of 6

Sample photo:



SGS authenticate the photo on original report only

*** End of Report ***

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/terms_and_conditions. htm. and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-document.htm. Attention is drawn to the limitation of liability and error produced a printed continuous production issued defined therein. Any holder of this document is advised that information contained hereon reflects the Company is Lindings_at the time of the person to the contained described the company is sole responsibility is to its Client and this document does not expected a transaction from the contained in the contained and obligations under the transaction documents. This document cannot be reproduced except in full without prior written approval of the Company and unauthorized alteration, largery or fatsification of the content or appearance of this document is unlawful and offenders may be prospected to the fullest extent of the law laters of the content or appearance of this document is unlawful and offenders may be prospected to the fullest extent of the law.

3"Building No.289 Yishan Road Xuhui Distrid, Shanghai China 200233 中国、上海、徐江区宣山路889号3号楼 邮網: 200233 www.ch.sgs.com e sgs.china@sgs.com



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:

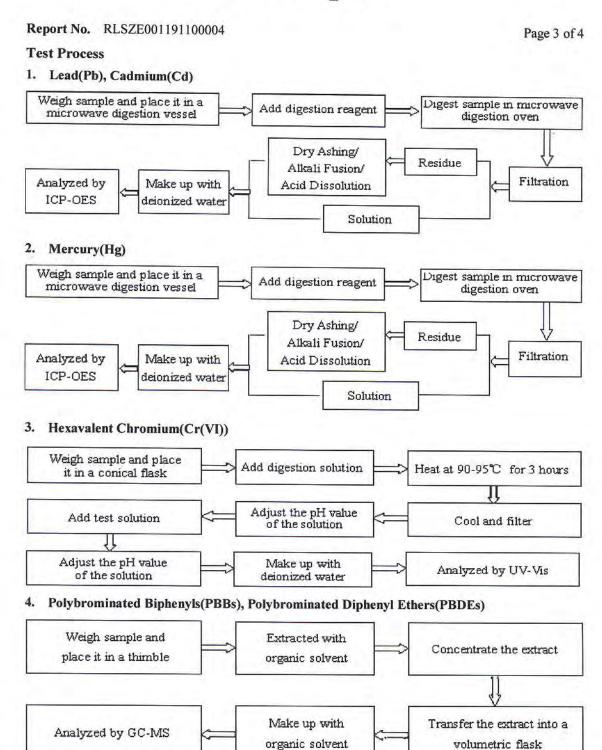
The sample had been dissolved totally tested for Lead, Cadmium, Mercury.

-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 ***

This report is considered invalidated without the Special Seal for Inspection of the CTI. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of CTI, this test report shall not be copied except in full and published as advertisement.

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

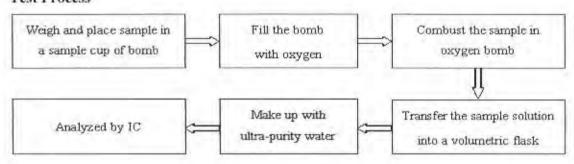
Note:

-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 ***

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

inspacement is besuched, the Company surject or the General Conditions of Service united analysis of Legislation of accession united and control of the Conditions of August and Indiana of August and Indiana of Service united analysis of Legislation of the Conditions of August and Indiana of India



No. CANEC1204755001

Date: 27 Apr 2012

Page 2 of 5

Test Results:

Test Part Description:

SGS Sample ID Specimen No. Description 1 Grey paste

CAN12-047550,001

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 001 MDL Hexabromocyclododecane (HBCDD) mg/kg 10 ND

Notes:

(1) 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.

(Home)は、(mag)。 (m 'とこここ コレコ 3 (6%) | (M-2))(2)((株計 | (M-3))(20()) (3 ()



No. CANEC1204755001

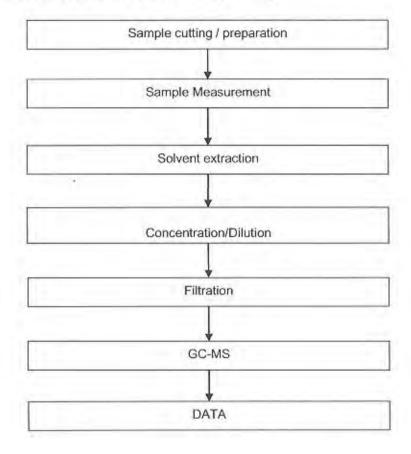
Date: 27 Apr 2012

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



the document is issued by the Company waged to its tenents Conditions for Electronic Decuments at very age complicing of conditions and conditions to electronic forms accuments subject to Terms and Conditions for Electronic Decuments at very age complicings of conditions and tensions are conditions and the forms of conditions are conditions and the forms of the conditions are conditions and the conditions are conditions of the conditions of



No. CANEC1204755001

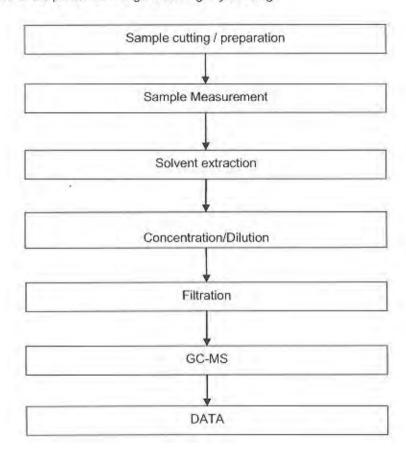
Date: 27 Apr 2012

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



This paperment is issued by the Company subject to 10 Perms of Conditions of Service priested evertear, available an request or excessit a clinity. New against time and conditions for Electronic Documents of years against the Attention is thewer to the limited on the selection of the perms of the second of the advanced on contained the execution from Attention is the work to the second of the advanced on contained the execution for the conditions of the execution of the executi



No. CANEC1204755001

Date: 27 Apr 2012

Page 5 of 5

Sample photo:



SGS authenticate the photo on original report only

*** End of Report ***

This occument is issued by the Company subject to its General Conditions for Electronic Portugues, available of request of accessible at this I www. sg. commonst and conditions for Electronic Documents at www.sgs.commonst purpose and the subject to Terms and Conditions for Electronic Documents at www.sgs.commonst purpose and common the subject to Terms and Conditions for Electronic Documents are subject to Terms of the Company's Tridings at the time of its presentation of the Company's Conditions and the time of its presentation of the Company's Conditions and the time of its presentation of the Company's conditions and obligations under the transaction documents. This occument cannot be reproduced except in full, without proof written approval of the Company, and unauthorized alternation, forgory or fallification of the company, and unauthorized alternation, forgory or fallification of the company of unauthorized alternation for the company of the sample(s) instead.

*※Next that Science Pak Burgaro Economic Recharge Consequent Data Gang Aus Data 510663 1 (86-20) 82155565 1 (86-20) 82075113 www.cn.sigs.com
中国・广州・经济技术开发区科学城科珠路198号 知郷: 510683 1 (86-20) 82155555 1 (86-20) 82075113 s sgs.china@sgs.com



No. CANML1110158204

Date: 14 Oct 2011

Page 1 of 4

DONGGUAN TONGXING COPPER CO., LTD NO.133 S358 SHENG DAO CHANG AN TOWN DONG GUAN CITY CHINA

The following sample(s) was/were submitted and identified on behalf of the clients as: C2800

SGS Job No. :

13416245 - GZ

Internal Reference No.:

GC111022062

Date of Sample Received :

11 Oct 2011

Testing Period:

11 Oct 2011 - 14 Oct 2011

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 selected part of submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium comply with the limits

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

Signed for and on behalf of SGS-CSTC Ltd.

Almay Gao

Approved Signatory

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/terms_and_conditions. htm and for electronic Documents at www.sgs.com/terms_e-document.ntm. Attention is drawn to the limitation of liability is cruding on and jurisdiction issues defined therein. Any holder of this document is advised that information contained horson reflects the Company's findings at the time of its into cashing all help, only any clinic that information contained horson reflects the Company's findings at the time of its into cashing all help, only any contained borrow and contained and accomments. The Company's sole responsibility is to its Client and this document does not expended except in full, without prior written approved of the Company. Any characteristic theory are contained before the contained before the contained before the contained before the contained and contained the contained before the contained and contained the contained before the contained befo

1後 Kezhu Road Stientech Part Guarganou Economic & Technology (See 1985 Sept. Guarganou China 510663 t (86-20) 82155555 f (86-20) 82075113 www.cn.sgs.com 中国・广州・経済技术开发区科学維科珠路198号 邮網: 510663 t (86-20) 82155555 f (88-20) 82075113 e sgs.china@sgs.com

SGS

Test Report

No. CANML1110158204

Date: 14 Oct 2011

Page 2 of 4

Test Results:

Test Part Description:

Spacimen No.

SGS Sample ID

Description

CAN11-101582,004

Brassy metal sheet

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 52321:2008

- (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 Spot test / Colorimetric Method using UV-Vis.

Test Item(s)	Limit	Unit	MDL	004
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1,000	mg/kg	2	35
Mercury (Hg)	1,000	rng/kg	2	ND
Hexavalent Chromium (CrVI)		-	0	Negative

Notes:

- (1) The maximum permissible limit is quoted from the directive 2011/65/EU. Annex it
- (2) Spot-test:

Negative = Absence of CrVI coating, Positive = Presence of CrVI coating;

The tested sample should be further verified by boiling-water-extraction method if the spot test result is Negative or cannot be confirmed.

Boiling-water-extraction:

Negative = Absence of CrVI coating; Positive = Presence of CrVI coating

The detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

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

This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/terms_and_conditions. html and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sgs.com/terms_e-occument.htm. Attention is drawn to the limitation of liability to the subject of the company's findings at the limit of contained hereon reflects the Company's findings at the limit of the limits of Client's Instructions, if any. The Company's sole responsibility is to its Client and this document does not expressed parties to a transaction from the contained hereon reflects the company's findings at the limit of the properties of the company's sole responsibility is to its Client and this document does not expressed parties to a transaction from the contained period code accept in full, without prior written approval of the Company. Any that the contained period code accept in full, without prior written approval of the Company. Unless other than the content of speakance of the document is unlawful and offenders may be prosecuted to the fullest extent of the law.

5563446

- 198 Moziu Poet Strengton Fort Guergaton Economic & Technology Depression Depression China 510863 : (86-20) 82155555 f (86-20) 82075113 - 中国・广州・経済技术开发区科学城科職勝198号 - 総統: 510863 : (86-20) 82155555 f (88-20) 82075113 蛤蟆: 510863 : (96-20) 82155555 f (86-20) 82075113 e ags.china@egs.com

SGS

Test Report

No. CANML1110158204

Date: 14 Oct 2011

Page 3 of 4

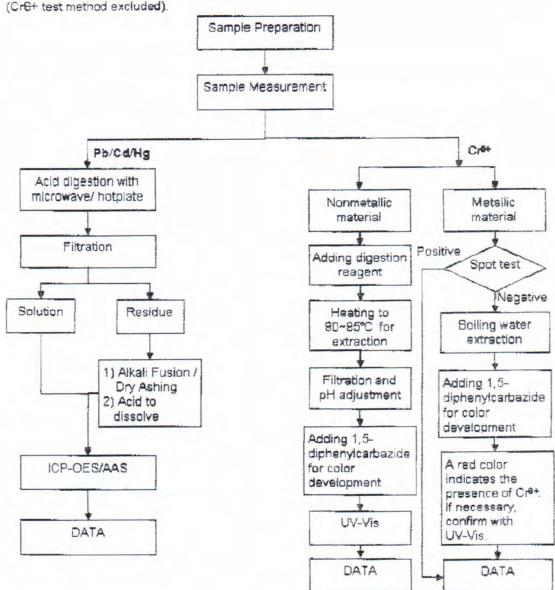
ATTACHMENTS

RoHS Testing Flow Chart

1) Name of the person who made testing: Beila Wang / Ross Zhan

2) Name of the person in charge of testing: Adams Yu

3) These samples were dissolved totally by pre-conditioning method according to below flow chart (Crest test method excluded).



This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at http://www.sgs.com/terms_end_conditions_bim_and_for electronic Documents at www.egs.com/terms_endcounterfiber. Attention is drawn to the limitation of liability is sufficient and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings_at the time of its integration only any, which the limits of Client's Instructions, if any. The Company's sole responsibility is to its Client and this document does not expected by a transaction from the reproduced except in full, without print written approval of the Company. As menutoble appropriate the company is a company and offenders may be prosecuted to the fullest extent of the law.

Unless other way attend the source the surface of the sample(s) tested.

121 4 5563447

SGS

Test Report

No. CANML1110158204

Date: 14 Oct 2011

Page 4 of 4

Sample photo:



SGS authenticate the photo on original report only

*** End of Report ***

This document is lesued by the Company subject to its General Conditions of Service printed overleef, available on request or accessible at https://www.ags.com/terms_and_conditions in Electronic Documents at www.ags.com/terms-a-document.htm. Attention is drawn to the limitation of liability the more accessible of a produced that information contained hereon militors that Company's findings at the time of liability that the produced in the first of the first time of liability that the first produced in the first time of time of the first time of time of the first time of time of time of time of time of the first time of time of

5563448



Report No. RLSZE001200320001

Page 1 of 6

Applicant DONGGUAN DAEJOO ELECTRONIC MATERIALS CO.,LTD.

Address XIANCONG INDUSTRIAL ZONE WANJIANG DIATRICT DONGGUAN

GUANGDONG CHINA

Report on the submitted sample(s) said to be

Sample Name CP-930-1 HF
Sample Description Red solid
Sample Received Date Mar. 9, 2012

Testing Period Mar. 9, 2012 to Mar. 13, 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),

Hexabromocyclododecane(HBCDD), Three Phthalates (DBP,BBP,DEHP), Fluorine(F), Chlorine(Cl), Bromine(Br), Iodine(I) in the submitted sample(s).

Test Method Please refer to the following page(s).

Test Result(s) Please refer to the following page(s).

Tested by

Approved by

Inspected by

Date

vo. g

Mar. 13, 2012

No. 11363070

Technical Manager



Report No. RLSZE001200320001

Page 2 of 6

Test Method

Test Item(s)	Test Method	Measured Equipment(s)	MDL	
Hexabromocyclododecane(HBCDD)	Refer to US EPA 3540C:1996	GC-MS	5 mg/kg	
Three Phthalates (DBP,BBP,DEHP)	Refer to EN 14372:2004	GC-MS	50 mg/kg	
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 A	GC-MS	5 mg/kg	
Polybrominated Diphenyl Ethers(PBDEs)	IEC 62321:2008 Ed.1 Annex A	GC-MS	5 mg/kg	
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)

Tested Item(s)	Content
Hexabromocyclododecane (HBCDD)	N.D.

Tested Item(s)	Content
Lead(Pb)	N.D.
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.



Report No. RLSZE001200320001

Page 3 of 6

Tested Item(s)	Content
Polybrominated Diphenyl Ethers(PBDEs)	Content
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.

Tested Item(s)	Content	
Halogen(s)		
Fluorine (F)	N.D.	
Chlorine (Cl)	195 mg/kg	
Bromine (Br)	N.D.	
Iodine (I)	N.D.	

Tested Item(s)	CAS No.	EC No.	Content
Three Phthalates			
Dibutyl phthalate(DBP)	84-74-2	201-557-4	N.D.
Benzylbutyl phthalate(BBP)	85-68-7	201-622-7	N.D.
Di-2-ethylhexyl phthalate(DEHP)	117-81-7	204-211-0	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

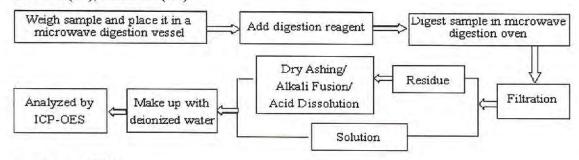


Report No. RLSZE001200320001

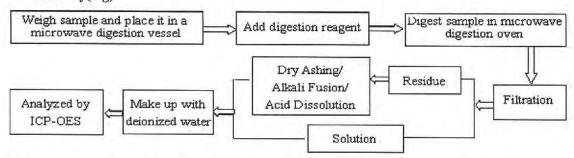
Page 4 of 6

Test Process

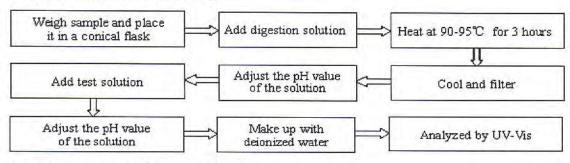
1. Lead(Pb), Cadmium(Cd)



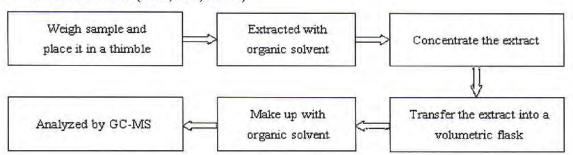
2. Mercury(Hg)



3. Hexavalent Chromium(Cr(VI))



4. Three Phthalates (DBP,BBP,DEHP)

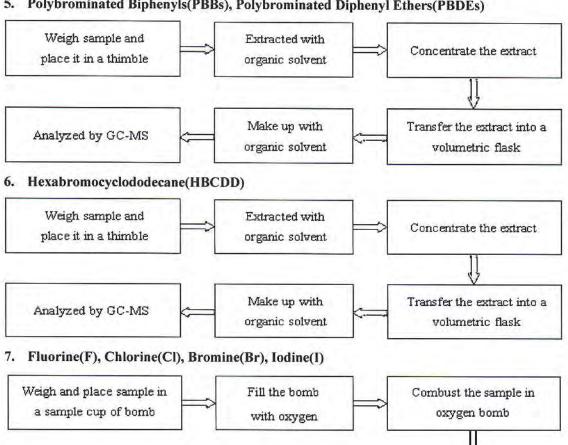


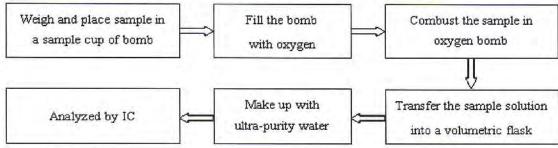


Report No. RLSZE001200320001

Page 5 of 6

5. Polybrominated Biphenyls(PBBs), Polybrominated Diphenyl Ethers(PBDEs)







Report No. RLSZE001200320001

Page 6 of 6

Photo(s) of the sample(s)



*** End of report ***

This report is considered invalidated without the Special Seal for Inspection of the CTI. This report shall not be altered, increased or deleted. The results shown in this test report refer only to the sample(s) tested. Without written approval of CTI, this test report shall not be copied except in full and published as advertisement.

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

