

## Certificate of non-use of The Controlled Substances

Company name            Littelfuse, Inc.

Product Covered        SIDACTor® Modified TO-220 Package (A-PAK)

Issue Date              August 8, 2012

It is hereby certified by Littelfuse, Inc., that there is neither RoHS (EU Directive 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.

It is also certified by Littelfuse, Inc., that the products listed in this report do not contain Halogens and their compounds judged per widely accepted industrial guidelines.

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 components defined in this document.

Issued by

\_\_\_\_\_  
< K. Yoshimoto, Senior Product Engineer, Littelfuse, Inc.>

(1) Parts, sub-materials and unit parts

This document covers modified TO-220 (A-PAK) RoHS-Compliant products series supplied by Littelfuse, Inc. Please see page 2 for the complete list of part number covered by this report.

< Homogeneous Materials used >

Please see figure and table 1 on page 5 of this document.

(2) The analytical data on all measurable substances

Please see annex 1 through 8, attached to this document

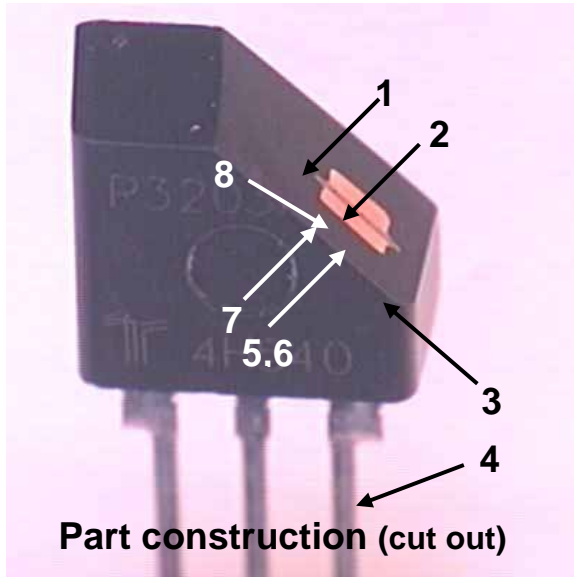
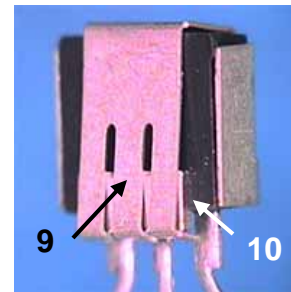
Remarks :

**Pb (lead) contained in die bonding solder (item 7 on page 3) and passivation glass (item 6) to be categorized as exempt in RoHS Annex III 7(a) and 7(c)-I.**

**Please refer to Annex 9 of this report for the extract of the applicable exemptions of RoHS (EU Directive 2011/65/EU)**

### Littelfuse Part Number covered by this report

Standard (Catalog) Part Number			SPECIAL DEVICE P/N
P2000AA61L	P1402ACL	P1553ACL	Any Special P/N which has base standard P/N listed in this table.
P2200AA61L	P1602ACL	P1803ACL	
P2400AA61L	P2202ACL	P2103ACL	
P2500AA61L	P2702ACL	P2353ACL	
P3000AA61L	P3002ACL	P2703ACL	CR2703AA
P3300AA61L	P3602ACL	P3203ACL	<b>Optional Suffix</b>
	P4202ACL	P3403ACL	
P0302AAL	P4802ACL	P5103ACL	Any P/N in this list, including special device P/N may be followed by "RP" or "TP" which denote packing options, or by "60", "61" or "69" which denote the lead-forming options.
P0302AAMCL	P6002ACL	P1553ACMCL	
P0602AAL			
P0602AAMCL	P0302ACMCL	P1803ACMCL	
P1402AAL	P0602ACMCL	P2103ACMCL	
P1602AAL	P1402ACMCL	P2353ACMCL	
P2202AAL	P1602ACMCL	P2703ACMCL	
P2702AAL	P2202ACMCL	P3203ACMCL	
P3002AAL	P2702ACMCL	P3403ACMCL	
P3602AAL	P3002ACMCL	P5103ACMCL	
P4202AAL	P3602ACMCL		<b>FS1 SERIES</b>
P4802AAL	P4202ACMCL	P1400ADL61	P2703AALFS1
P6002AAL	P4802ACMCL	P1800ADL61	P2703ACMCLFS1
	P6002ACMCL	P3100ADL61	P3203ACFS1
P0302ABL		P6002ADL	P6002ACFS1
P0302ABMCL	P1553AAL		
P0602ABL	P1803AAL		
P0602ABMCL	P2103AAL		
P1402ABL	P2353AAL		
P1602ABL	P2703AAL		
P2202ABL	P3203AAL		
P2702ABL	P3403AAL		
P3002ABL			
P3602ABL	P1553ABL		
P4202ABL	P1803ABL		
P4802ABL	P2103ABL		
P6002ABL	P2353ABL		
	P2703ABL		
P0302ACL	P3203ABL		
P0602ACL	P3403ABL		
	P5103ABL		


**Part construction (cut out)**
**Material Used (where used)**

**A-PAK Fail Safe (FS1 Series)**
**Table 1: Homogeneous Material Used**

#	Description	Name of Material	Type	Analysis data
1	Molding compound	epoxy resin	plastic	annex 1
2	Lead frame	copper alloy	metal	annex 2
3	Clip	copper alloy	metal	annex 2. Clip uses same copper material as lead frame
4	Lead finish	tin alloy	metal	annex 3
5	Silicon die	silicon	metal	annex 4, tested as Nickel-plated wafer.
6	Nickel electrode	nickel	metal	
7	Passivation glass	glass	glass	annex 5. Pb in this glass is exempted by RoHS Annex III 7(a).
8	Die bonding solder	solder	metal	annex 6. Pb in this solder is exempted by RoHS Annex III 7(c)-1.
9	Fail Safe Clip	copper alloy	metal	annex 7. Applicable to fail safe FS1 series only
10	Fail Safe Solder Preform	solder	metal	annex 8. Applicable to fail safe FS1 series only

**Table 2: RoHS-regulated substance in raw materials**

Components	Analysis Result							
	Cd Cadmium	Cr Chromium	Hg Mercury	Pb Lead	PBB & PBDE	Halogen (Total)	Phthalate	HBCD
<b>As Component Total</b> (Typical Value)	< 2ppm	< 2ppm	< 2ppm	< 10ppm <sup>*1</sup> (1.4% <sup>*2</sup> )	< 5ppm	< 50ppm	< 100ppm	< 10ppm
<b>Molding compound</b> (mixture of phenolix resin, epoxy resin, filler and non-Brominated fire retardant) See Annex 1 for the detail	< 2ppm	< 2ppm	< 2ppm	< 2ppm	< 5ppm	< 50ppm	<100ppm	< 10ppm
<b>Lead frame and Clip</b> (Copper Alloy C194) See Annex 2 for the detail	< 2ppm	< 2ppm	< 2ppm	18ppm <sup>*3</sup>	< 5ppm	---	---	---
<b>Outside lead finish</b> (Matte-Tin plating) See Annex 3 for the detail	< 2ppm	< 2ppm	< 2ppm	20ppm <sup>*3</sup>	< 5ppm	< 50ppm	---	---
<b>Silicon Die</b> (Silicon + Ni electrode) See Annex 4 for the detail	< 2ppm	< 1ppm	< 2ppm	31ppm <sup>*3</sup>	< 5ppm	---	---	---
<b>Passivation Glass</b>  See Annex 5 for the detail	< 2ppm	< 1ppm	< 2ppm	41wt% <sup>*4</sup>	< 5ppm	< 50ppm	---	---
<b>Die Bonding Solder</b> (Pb/Sn/Ag=88/10/2) See Annex 6 for the detail	< 2ppm	< 2ppm	< 2ppm	88wt% <sup>*5</sup>	< 5ppm	< 5ppm	< 30ppm	< 10ppm
<b>Fail safe clip</b> (Copper Alloy + Sn plating) See Annex 7 for the detail	< 2ppm	< 2ppm	< 2ppm	32ppm <sup>*3</sup>	---	---	---	---
<b>Fail safe solder preform</b> (Sn/Bi=60/40) See Annex 8 for the detail	< 2ppm	< 2ppm	< 2ppm	110ppm <sup>*3</sup>	---	---	---	---

- \*1** Less than 10ppm Pb content overall, excluding Pb from the die bonding solder and the passivation glass on the silicon die.
- \*2** 1.4wt% or 17mg of Pb (lead) content overall, including the RoHS-exempted use of Pb
- \*3** Pb (lead) contained in lead frame, outside finish, silicon die, fail safe clip and fail safe solder preform is not exempted from restriction by RoHS, but considered as process contamination or naturally-occurring impurity in raw materials. Littelfuse does not add Pb intentionally.
- \*4** Pb (lead) contained in passivation glass is exempted from restriction by RoHS Annex III 7(c)-I.
- \*5** Pb (lead) contained in die bonding solder is exempted from restriction by RoHS Annex III 7(a).

**Please refer to Annex 9 of this report for the applicable exemptions of RoHS (EU Directive 2011/65/EU)**

# Annex 1: Analysis Result of Molding Compound (Page 1-4 of 11)

**Intertek**

Number : WJH00009770

Applicant : CONCORD SEMICONDUCTOR(WUXI) CO., LTD.      Date : Jul 26, 2012  
 EAST 1# ZHENFA 6 ROAD, SHUO FANG  
 INDUSTRIAL PARK WUXI NATIONAL HIGH-TECH  
 DEVELOPMENT ZONE, WUXI,JIANGSU,CHINA  
 Attn : ZHANG XIAPENG

Sample Description As Declared:  
 One (1) Piece Of Submitted Sample Said To Be : **Grey Epoxy Molding Compound.**  
 Item Name : Epoxy Molding Compound.  
 Vendor :  
 Component Or Part No. : CQ-2000A/CQ-2000C  
 Test Item : Cd/Pb/Hg/Cr(VI)/PBBs/PBDEs,F,C,Br,J,Phthalate,HBCCD.

Tests Conducted:  
 As Requested By The Applicant, For Details Refer To Attached Pages

Tested Sample	Standard	Result
Submitted Sample	With Reference To Test Method Of IEC 62321 Edition 1.0: 2008 And Maximum Concentration Limits Quoted From RoHS Directives 2002/95/EC And Amendment 2005/618/EC	Pass

Prepared And Checked By:  
 For Intertek Testing Services Wuxi Ltd.

*Jessica Lu*  
 Jessica Lu  
 General Manager

**Intertek Testing Services Wuxi Ltd.**  
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**Intertek**

Number : WJH00009770

Tests Conducted (As Requested By The Applicant)  
 1. RoHS Directives Test  
 (A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND
Lead (Pb) Content (mg/kg)	ND
Mercury (Hg) Content (mg/kg)	ND
Chromium (VI) (Cr <sup>VI</sup> ) Content (mg/kg)(For Non-Metal)	ND
Polybrominated Biphenyls (PBBs)(mg/kg)	ND
Monobrominated Biphenyls (MonoBB)	ND
Dibrominated Biphenyls (DiBB)	ND
Tribrominated Biphenyls (TriBB)	ND
Tetrabrominated Biphenyls (TetraBB)	ND
Pentabrominated Biphenyls (PentaBB)	ND
Hexabrominated Biphenyls (HexaBB)	ND
Heptabrominated Biphenyls (HeptaBB)	ND
Octabrominated Biphenyls (OctaBB)	ND
Monobrominated Biphenyls (NonaBB)	ND
Decabrominated Biphenyl (DecaBB)	ND
Polybrominated Diphenyl Ethers (PBDEs)(mg/kg)	ND
Monobrominated Diphenyl Ethers (MonoBDE)	ND
Dibrominated Diphenyl Ethers (DiBDE)	ND
Tribrominated Diphenyl Ethers (TriBDE)	ND
Tetrabrominated Diphenyl Ethers (TetraBDE)	ND
Pentabrominated Diphenyl Ethers (PentaBDE)	ND
Hexabrominated Diphenyl Ethers (HexaBDE)	ND
Heptabrominated Diphenyl Ethers (HeptaBDE)	ND
Octabrominated Diphenyl Ethers (OctaBDE)	ND
Monobrominated Diphenyl Ethers (NonaBDE)	ND
Decabrominated Diphenyl Ether (DecaBDE)	ND

Remark:  
 mg/kg = Milligram Per Kilogram = ppm  
 ND = NOT Detected

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**Intertek**

Number : WJH00009770

Tests Conducted (As Requested By The Applicant)  
 (B)RoHS Requirement:

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr <sup>VI</sup> )	0.1% (1000 mg/kg)
Polybrominated Biphenyls (PBBs)	0.1% (1000 mg/kg)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000 mg/kg)

The Above Limits Were Quoted From 2002/95/EC And Amendment 2005/618/EC For Homogeneous Material.

(C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd)Content	With Reference To IEC 62321 Edition 1.0: 2008, By Add Digestion And Determined By ICP-OES	2 mg/kg
Lead (Pb)Content	With Reference To IEC 62321 Edition 1.0: 2008, By Add Digestion And Determined By ICP-OES	2 mg/kg
Mercury (Hg)Content	With Reference To IEC 62321 Edition 1.0: 2008, By Add Digestion And Determined By ICP-OES	2 mg/kg
Chromium (VI) (Cr <sup>VI</sup> ) Content(For Non-Metal)	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-MSD And Further HPLC Confirmation When Necessary.	5 mg/kg

Date Sample Received: Jul 23, 2012  
 Testing Period: Jul 23, 2012 To Jul 26, 2012

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**Intertek**

Number : WJH00009770

Tests Conducted (As Requested By The Applicant)  
 (D) Measurement Flowchart:  
 Reference Standard: IEC 62321 Edition 1.0: 2008

```

    graph TD
        Start[Sampling/Grinding Or Cutting] --> CdPbHg[Cd/Pb/Hg]
        Start --> CrVI[CrVI]
        Start --> PBBsPBDEs[PBBs/PBDEs]

        CdPbHg --> CdPbHgBox[For Different Material, Digest The Sample With Appropriate Acid*]
        CrVI --> CrVIBox[Weigh Sample And Add Alkaline Solution]
        PBBsPBDEs --> PBBsPBDEsBox[Weigh Sample And Add Organic Solvent]

        CdPbHgBox --> Confirm[Confirm The Tested Samples Are Totally Dissolved]
        Confirm -- No --> CdPbHgBox
        Confirm -- Yes --> MakeUp1[Make Up With Deionized Water]
        MakeUp1 --> Analyzed1[Analyzed By ICP-OES]

        CrVIBox --> DefiniteTemp[Definite Temp. Extraction]
        DefiniteTemp --> CoolFilter[Cool And Filter The Extract]
        CoolFilter --> MakeUp2[Make Up With Deionized Water And Add Diphenyl-Carbazide Solution]
        MakeUp2 --> Analyzed2[Analyzed By UV-VIS]

        PBBsPBDEsBox --> Soxhlet[Soxhlet Extraction Or Solvent Extraction]
        Soxhlet --> Concentrate[Concentrate The Extract And Make Up With Organic Solvent]
        Concentrate --> Analyzed3[Analyzed By GC-MSD]
    
```

Chemist: Inorganic (Ann Lu)/Fred Wang/Ally Wan  
 Organic (Jenny Xu/Cherry Sun)


Remarks:  
 \*1: List Of Appropriate Acid:

Material	Acid Added For Digestion
Polymers	HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub> , H <sub>2</sub> SO <sub>4</sub>
Metal	HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub> , HF
Electronics	HNO <sub>3</sub> , HCl, H <sub>2</sub> O <sub>2</sub> , HBF <sub>4</sub>

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# Annex 1: Analysis Result of Molding Compound (Page 5-8 of 11)



Number : WUXH0009770

Tests Conducted (As Requested By The Applicant)

2. Halogen Test

(1) Test Result Summary :

Halogen Content:

Testing Item	Result (ppm) Submitted Samples
Fluorine (F) Content	ND
Chlorine (Cl) Content	ND
Bromine (Br) Content	ND
Iodine (I) Content	ND


Remarks : ppm = Parts Per Million = mg/kg  
ND = Not Detected

Date Sample Received : Jul 23, 2012  
Testing Period : Jul 23, 2012 To Jul 26, 2012

(1) Test Method :


Testing Item	Testing Method	Reporting Limit
Halogen (F, Cl, Br, I) Content	With Reference To EN 14982:2007 By Combustion In A Calorimetric Bomb And Determined By Ion Chromatography	50 ppm

Remarks : Reporting Limit = Quantitation Limit Of Analyte In Sample



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Number : WUXH0009770

Tests Conducted (As Requested By The Applicant)


(1) Measurement Flowchart:

Test For Halogen Content Reference Method: EN 14982:2007

```


    graph TD
      A[Sampling/Grinding Or Cutting] --> B[Add Absorbent In A Combustion Flask & Place Weighed Sample In]
      B --> C[Fill The Calorimetric Bomb With Oxygen]
      C --> D[Ignite Then Leave The Flask At Room Temperature]
      D --> E{Any Test Specimen In The Calorimetric Bomb?}
      E -- No --> F[Transfer The Absorbent Into A Volumetric Flask]
      E -- Yes --> B
      F --> G[Make Up With Deionized Water]
      G --> H([Analyzed By Ion Chromatography])
    
```

Chemist: Fred Wang/ Ally Wan/Ally Wan



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Number : WUXH0009770

Tests Conducted (As Requested By The Applicant)

3. Phthalate Content Test

With Reference To EN14372, By Gas Chromatography-Mass Spectrometric (GC-MSD) Analysis.


Tested Compound	Result (% WW)	Limit (% WW) (Max)
Dibutyl Phthalate (DBP)	ND	---
Diethyl Hexyl Phthalate (DEHP)	ND	---
Benzyl Butyl Phthalate (BBP)	ND	---
Sum of Three Phthalates	ND	0.1
Di-Iso-Nonyl Phthalate (DINP)	ND	---
Di-N-Octyl Phthalate (DNOP)	ND	---
Di-Iso-Decyl Phthalate (DIDP)	ND	---
Sum of Three Phthalates	ND	0.1

Remark : The Above Limit Was Quoted According To Annex XVII Items 51.8, 52 Of The Reach Regulation (EC) No. 1907/2006 (Formerly Known As Directive 2005/84/EC) For Phthalate Content In Toys And Children Care Articles.

Detection Limit = 0.01% (WW)  
ND = Not Detected


Date Sample Received : Jul 23, 2012  
Testing Period : Jul 23, 2012 To Jul 26, 2012

Comment :  
The Phthalate Content Test Result Of Tested Sample Did Not Exceed The Limit Of 0.1% By Weight As Stated In Annex XVII Items 51.8, 52 Of The Reach Regulation (EC) No. 1907/2006 (Formerly Known As Directive 2005/84/EC) Relating To Restrictions On Phthalates In Toys And Children Care Articles.



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Number : WUXH0009770

Tests Conducted (As Requested By The Applicant)


Measurement Flowchart:

Test For Phthalates Contents

```

    graph TD
      A[Weigh Sample And Place In A Tumble] --> B[Extracted By Soxhlet Extraction With Organic Solvent]
      B --> C[Concentrate The Extract]
      C --> D[Transfer The Extract Into A Volumetric Flask]
      D --> E[Make Up With Organic Solvent]
      E --> F([Analyze By GC-MSD])
    
```


Chemist: Inorganic (Ann Lu)/Fred Wang/Ally Wan  
Organic (Jenny Xu)/Cherry Sun



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# Annex 1: Analysis Result of Molding Compound (Page 9-11 of 11)



Number : WUXH0009770

Tests Conducted (As Requested By The Applicant)  
4. HBCD (Hexabromocyclododecane)

(A) Test Result Summary:

Testing Item	Result(ppm)
HBCD (Hexabromocyclododecane)	ND

Remarks:  
ppm = Parts Per Million = mg/kg  
ND = Not Detected

(B) Test Method :


Testing Item	Testing Method	Recording Limit
HBCD (Hexabromocyclododecane)	With Reference To US EPA 3540C, By Solvent Extraction And Determined By GC-MSD	10 ppm

Date Sample Received : Jul 23, 2012  
Testing Period : Jul 23, 2012 To Jul 26, 2012

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Number : WUXH0009770

Tests Conducted (As Requested By The Applicant)  
Measurement Flowchart:  
Test For HBCD (Hexabromocyclododecane) Content

```


graph TD
    A[Weigh Sample And Place In A Thimble] --> B[Extracted By Soxhlet Extraction With Organic Solvent]
    B --> C[Concentrate The Extract]
    C --> D[Transfer The Extract Into A Volumetric Flask]
    D --> E[Make Up With Organic Solvent]
    E --> F[Analyze By GC-MSD]
  
```

Chemist: Inorganic (Anni Luo/Fred Wang/Ally Wan)  
Organic (Jimmy Xu/Cherry Sun)

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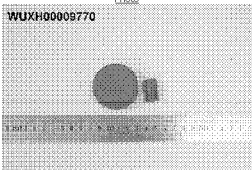
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Number : WUXH0009770

Tests Conducted (As Requested By The Applicant)

Photo



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The report is made solely on the basis of your instructions and/or information and materials supplied by you. It is not intended to be a recommendation for any particular course of action. Intertek does not accept a duty of care or any other responsibility to any person other than the Client in respect of the report and you accept liability to the Client insofar as it expressly or impliedly is the name and conditions of supply. Intertek's procedure is to give, where it is not possible to do so, a written report or to provide a verbal report or to provide a report in the form of a photograph or in the form of a video recording. We have agreed to conduct the test on a diligent and careful basis and we do not accept any liability for you for any loss arising out of or in connection with this report, or otherwise, save to the extent of the fees payable to us for our services in connection with this report.

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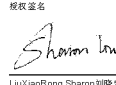
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## Annex 2: Analysis Result of Lead frame (Page 1-4 of 5)

**SGS**

**测试报告** No. NGBML1200946701 日期: 2012年06月15日 第1页,共5页

以下测试之样品是由申请者所提供及确认。引续框架  
 SGS工作编号: NBMLC120600059-NB  
 产品规格: C194  
 材质编号: 2012年06月08日  
 制造商: 2012年06月08日  
 样品接收日期: 2012年06月08日  
 测试日期: 2012年06月08日 - 2012年06月15日  
 测试要求: 根据客户要求测试  
 测试方法: 请参见下一页  
 测试结果: 请参见下一页

瑞标标准技术有限公司  
 授权签名  
  
 LiuXiaoFang, Sharon 刘晓芳  
 批准人

**SGS**

**测试报告** No. NGBML1200946701 日期: 2012年06月15日 第2页,共5页

测试样品描述:  
 样品编号: SGS样品ID: 描述:  
 1: NGB12-009467.001: 铜色/白色金属片

备注:  
 (1) 1 mg/kg = 1 ppm = 0.0001%  
 (2) MDL = 检测限浓度  
 (3) ND = 未检出 (< MDL)  
 (4) \* = 未规定

**RoHS指令2011/65/EU**

测试方法: 参考IEC 62321-2:2008  
 (1) 用ICP-OES测定锡的含量  
 (2) 用ICP-OES测定铅的含量  
 (3) 用ICP-OES测定铜的含量  
 (4) 用点测试法/紫外-可见分光光度计比色法测定六价铬的含量  
 (5) 用GC-MS测定PBB(多溴联苯)和PBDEs(多溴二苯醚)的含量

测试项目	限值	单位	MDL	2011
锡(Cd)	100	mg/kg	2	ND
铅(Pb)	1000	mg/kg	2	18
汞(Hg)	1000	mg/kg	2	ND
六价铬(Cr(VI))	-	mg/kg	-	阴性
多溴联苯之(PBBs)	1000	mg/kg	-	ND
一溴联苯	-	mg/kg	5	ND
二溴联苯	-	mg/kg	5	ND
三溴联苯	-	mg/kg	5	ND
四溴联苯	-	mg/kg	5	ND
五溴联苯	-	mg/kg	5	ND
六溴联苯	-	mg/kg	5	ND
七溴联苯	-	mg/kg	5	ND
八溴联苯	-	mg/kg	5	ND
九溴联苯	-	mg/kg	5	ND
十溴联苯	-	mg/kg	5	ND
多溴二苯醚之(PBDEs)	1000	mg/kg	-	ND
一溴二苯醚	-	mg/kg	5	ND

**SGS**

**测试报告** No. NGBML1200946701 日期: 2012年06月15日 第3页,共5页

测试项目	限值	单位	MDL	2011
二溴二苯醚	-	mg/kg	5	ND
三溴二苯醚	-	mg/kg	5	ND
四溴二苯醚	-	mg/kg	5	ND
五溴二苯醚	-	mg/kg	5	ND
六溴二苯醚	-	mg/kg	5	ND
七溴二苯醚	-	mg/kg	5	ND
八溴二苯醚	-	mg/kg	5	ND
九溴二苯醚	-	mg/kg	5	ND
十溴二苯醚	-	mg/kg	5	ND

备注:  
 (1) 最大允许限值引用自指令2011/65/EU 附录II  
 (2) \* 点测试法  
 阴性 = 检测中未检测到六价铬, 阳性 = 检测中检测到六价铬。  
 (当点测试结果与阴性或无法确定时,将采用沸水萃取法作进一步的验证)  
 \* 沸水萃取法  
 阴性 = 检测中未检测到六价铬  
 阳性 = 检测中检测到六价铬, 表明50 cm<sup>2</sup> 表面面积的被测试样品的沸水萃取液中六价铬的浓度等于或大于0.02 mg/kg  
 \* 针对金属表面的防腐涂层: 由于未获知样品的存储条件和生产日期,样品的六价铬测试结果仅代表测试时样品的状态

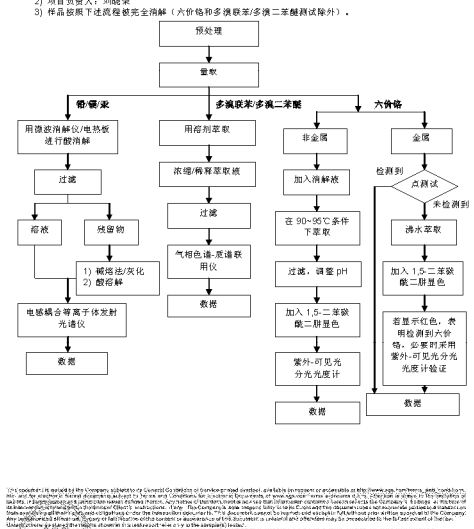
**SGS**

**测试报告** No. NGBML1200946701 日期: 2012年06月15日 第4页,共5页

**附件**

**RoHS 测试流程图**

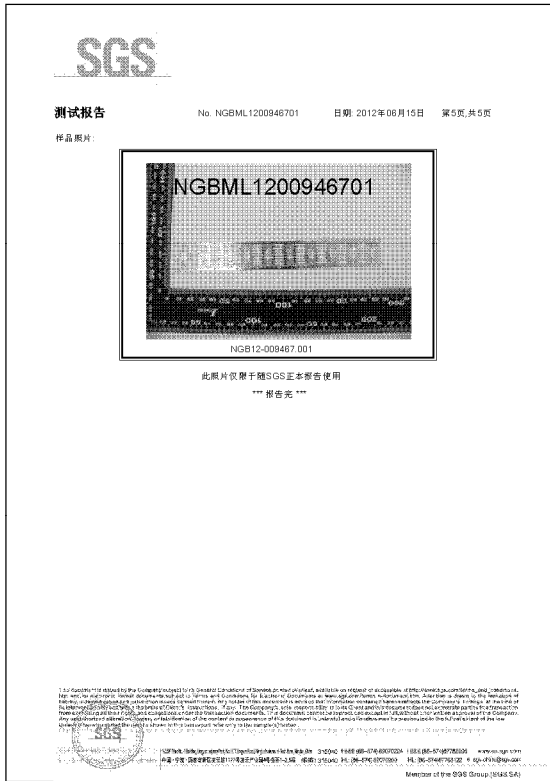
1) 分析人: 朱再峰/廖科雄/周平青  
 2) 项目负责人: 刘晓芳  
 3) 样品按照下述流程完成消解(六价铬和多溴联苯/多溴二苯醚测试除外)。



The flowchart details the analytical process for RoHS compliance. It starts with '取称' (weighing) and '预处理' (pre-treatment). The process then branches into three main paths: 
 1. \*\*Cd, Pb, Hg, PBBs, PBDEs path\*\*: 用微波消解仪/电热板进行酸消解 (microwave digestion/acid digestion on a hot plate) -> 过滤 (filtration) -> 电感耦合等离子体发射光谱仪 (ICP-OES) for Cd, Pb, Hg, PBBs, PBDEs.
 2. \*\*Cr(VI) path\*\*: 用溶剂萃取 (solvent extraction) -> 浓缩/挥发萃取 (concentration/volatile extraction) -> 过滤 (filtration) -> 气相色谱-质谱联用仪 (GC-MS) for Cr(VI).
 3. \*\*Non-metal and Gold path\*\*: 加入消解液 (addition of digestion liquid) -> 在 90-100°C 条件下萃取 (extraction at 90-100°C) -> 过滤, 调整 pH (filtration, adjust pH) -> 加入 1,5-二苯醚二肼显色剂 (addition of 1,5-diphenylpicrylhydrazyl reagent) -> 紫外-可见分光光度计 (UV-Vis) for Cr(VI).
 The process concludes with '数据' (data recording) for each branch.



## Annex 2: Analysis Result of Lead frame (Page 5 of 5)



# Annex 3: Analysis Result of Lead finish (page 1-4 of 6)

**SGS**

**Test Report** No. CANEC1200011806 Date: 05 Jan 2012 Page 1 of 6

The following sample(s) was/were submitted and identified on behalf of the clients as : Lead Free Solder Ball 99 98

SGS Job No.: CP11-014821 - 82  
 Date of Sample Received: 04 Jan 2012  
 Testing Period: 04 Jan 2012 - 05 Jan 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

*Almay Gao*

Almay Gao  
 Approved Signatory

**SGS**

**SGS**

**Test Report** No. CANEC1200011806 Date: 05 Jan 2012 Page 2 of 6

Test Results:

**Test Part Description:**

**Specimen No.** 1 **SGS Sample ID** CAN12-000118-005 **Description** Silvery metal ball

Remarks:  
 (1) 1 mg/kg = 1 ppm = 0.0001%  
 (2) MDL = Method Detection Limit  
 (3) ND = Not Detected (< MDL)  
 (4) \* = Not Regulated

**Elementary Analysis & Flame Retardants**

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 Spot test / Colorimetric Method using UV-Vis  
 (5) Determination of PBBs / PBDEs by GC-MS

Test Item(s)	Unit	MDL	Q/Q
Cadmium (Cd)	mg/kg	2	ND
Lead (Pb)	mg/kg	2	ND
Mercury (Hg)	mg/kg	2	ND
Hexavalent Chromium (CrVI)	mg/kg	0	Negative
Sum of PBBs	mg/kg	-	ND
Monobromobiphenyl	mg/kg	6	ND
Dibromobiphenyl	mg/kg	5	ND
Tribromobiphenyl	mg/kg	5	ND
Tetrabromobiphenyl	mg/kg	5	ND
Pentabromobiphenyl	mg/kg	5	ND
Hexabromobiphenyl	mg/kg	5	ND
Heptabromobiphenyl	mg/kg	5	ND
Octabromobiphenyl	mg/kg	5	ND
Nonabromobiphenyl	mg/kg	5	ND
Decabromobiphenyl	mg/kg	5	ND
Sum of PBDEs	mg/kg	-	ND
Monobromodiphenyl ether	mg/kg	5	ND

**SGS**

**SGS**

**Test Report** No. CANEC1200011806 Date: 05 Jan 2012 Page 3 of 6

Test Item(s)	Unit	MDL	Q/Q
Dibromodiphenyl ether	mg/kg	5	ND
Tribromodiphenyl ether	mg/kg	5	ND
Tetrabromodiphenyl ether	mg/kg	5	ND
Pentabromodiphenyl ether	mg/kg	5	ND
Hexabromodiphenyl ether	mg/kg	5	ND
Heptabromodiphenyl ether	mg/kg	5	ND
Octabromodiphenyl ether	mg/kg	5	ND
Nonabromodiphenyl ether	mg/kg	5	ND
Decabromodiphenyl ether	mg/kg	5	ND

Notes:  
 (1) \* = a. Negative means the absence of Cr(VI) on the tested areas;  
 b. Positive means the presence of Cr(VI) on the tested areas.  
 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.

**Hexogen**

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

Test Item(s)	Unit	MDL	Q/Q
Fluorine (F)	mg/kg	50	ND
Chlorine (Cl)	mg/kg	50	ND
Bromine (Br)	mg/kg	50	ND
Iodine (I)	mg/kg	50	ND

Remarks: Results & photo(s) of this report refer to test report CANEC1200011804

**SGS**

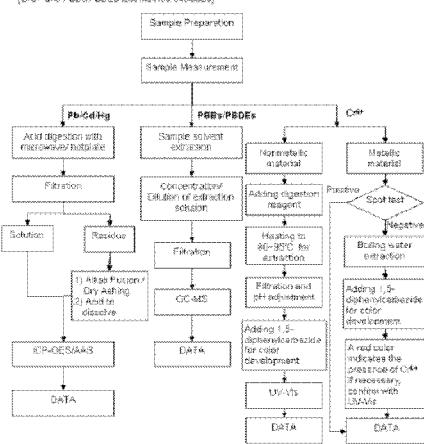
**SGS**

**Test Report** No. CANEC1200011806 Date: 05 Jan 2012 Page 4 of 6

**ATTACHMENTS**


**RoHS Testing Flow Chart**

1) Name of the product with model/lotting, SGSS, Part No./Quantity, Test Phase/Item  
 2) Name of the person in charge of testing, Address, Tel./Fax/Email  
 3) These samples were checked visually by pre-comparing method according to RoHS flow chart (Cr(VI) and PBBs/PBDEs test method excluded)



**SGS**

## Annex 3: Analysis Result of Lead finish (page 5-6 of 6)



**Test Report** No. CANEC1200011606 Date: 05 Jan 2012 Page 5 of 6

ATTACHMENTS


**Halogen Testing Flow Chart**


1) Name of the person who made testing: Bob Song  
2) Name of the person in charge of testing: Rain Qiao

```

graph TD
    A[Sample cutting / preparation] --> B[Sample Measurement]
    B --> C[Combustion in oxygen bomb]
    C --> D[Dissolved in an absorption solution]
    D --> E[Filtration]
    E --> F[Analyzed by ion chromatography. Double confirm by other instruments, if necessary.]
    F --> G[DATA]
  
```

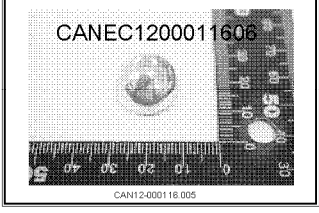
For the purpose of this report, the following information is provided: ...






**Test Report** No. CANEC1200011606 Date: 05 Jan 2012 Page 6 of 6

Sample photo



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

For the purpose of this report, the following information is provided: ...



# Annex 4: Analysis Result of Ni-plated Wafer (Page 1-4 of 5)

**Intertek**

Number : WJH00009738

Applicant : CONCORD SEMICONDUCTOR(WUXI) CO., LTD.  
 EAST 1# ZHENFA 6 ROAD, SHUO FANG  
 INDUSTRIAL PARK WUXI NATIONAL HIGH-TECH  
 DEVELOPMENT ZONE, WUXI,JIANGSU,CHINA  
 Attn : ZHANG XIOPENG

Date : Jul 26, 2012

Sample Description As Declared:  
 One (1) Piece Of Submitted Sample Said To Be : **Silvery Grey Metal.**  
 Item Name : Silicon Wafer With Nickel Plating.  
 Vendor :  
 Component Or Part No. : Silicon+Nickel  
 Test Item : Cd/Pb/Hg/Cr/VI PBBs/PDEs.  
 Remark : As Requested By The Applicant, Tested As A Whole And Sampled Randomly.

Tests Conducted:  
 As Requested By The Applicant, For Details Refer To Attached Pages

Prepared And Checked By:  
 For Intertek Testing Services Wuxi Ltd.

Page 1 of 5

Intertek Testing Services Wuxi Ltd.  
 No 8 Fubei Road, Xishu Economic Development Zone,  
 Wuxi 214001, Jiangsu, China  
 Tel: +86 510 8021 4867 Fax: +86 510 8020 0428 E-mail: consumer.products@intertek.com

**Intertek**

Number : WJH00009738

Tests Conducted (As Requested By The Applicant)

1. RoHS Directives Test

(A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND
Lead (Pb) Content (mg/kg)	31
Mercury (Hg) Content (mg/kg)	ND
Chromium (VI) (Cr <sup>VI</sup> ) Content (mg/kg)(For Non-Metal)	ND
Polybrominated Biphenyls (PBBs)(mg/kg)	ND
Monobrominated Biphenyls (MonoBB)	ND
Dibrominated Biphenyls (DiBB)	ND
Tribrominated Biphenyls (TriBB)	ND
Tetrabrominated Biphenyls (TetraBB)	ND
Pentabrominated Biphenyls (PentaBB)	ND
Hexabrominated Biphenyls (HexaBB)	ND
Heptabrominated Biphenyls (HeptaBB)	ND
Octabrominated Biphenyls (OctaBB)	ND
Monobrominated Biphenyls (NonaBB)	ND
Decabrominated Biphenyl (DecaBB)	ND
Polybrominated Diphenyl Ethers (PBDEs)(mg/kg)	ND
Monobrominated Diphenyl Ethers (MonoBDE)	ND
Dibrominated Diphenyl Ethers (DiBDE)	ND
Tribrominated Diphenyl Ethers (TriBDE)	ND
Tetrabrominated Diphenyl Ethers (TetraBDE)	ND
Pentabrominated Diphenyl Ethers (PentaBDE)	ND
Hexabrominated Diphenyl Ethers (HexaBDE)	ND
Heptabrominated Diphenyl Ethers (HeptaBDE)	ND
Octabrominated Diphenyl Ethers (OctaBDE)	ND
Monobrominated Diphenyl Ethers (NonaBDE)	ND
Decabrominated Diphenyl Ether (DecaBDE)	ND

Remark:  
 mg/kg = Milligram Per Kilogram = ppm  
 ND = NOT Detected

Page 2 of 5

Intertek Testing Services Wuxi Ltd.  
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 Tel: +86 510 8021 4867 Fax: +86 510 8020 0428 E-mail: consumer.products@intertek.com

**Intertek**

Number : WJH00009738

Tests Conducted (As Requested By The Applicant)

(B) RoHS Requirement

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr <sup>VI</sup> )	0.1% (1000 mg/kg)
Polybrominated Biphenyls (PBBs)	0.1% (1000 mg/kg)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000 mg/kg)

The Above Limits Were Quoted From 2002/95/EC And Amendment 2005/618/EC For Homogeneous Material.

(C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With Reference To IEC 62321 Edition 1.0: 2008, By Add Digestion And Determined By ICP-OES	2 mg/kg
Lead (Pb) Content	With Reference To IEC 62321 Edition 1.0: 2008, By Add Digestion And Determined By ICP-OES	2 mg/kg
Mercury (Hg) Content	With Reference To IEC 62321 Edition 1.0: 2008, By Add Digestion And Determined By ICP-OES	2 mg/kg
Chromium (VI) (Cr <sup>VI</sup> ) Content (For Non-Metal)	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-MSD And Further HPLC Confirmation When Necessary.	5 mg/kg

Date Sample Received: Jul 23, 2012  
 Testing Period: Jul 23, 2012 To Jul 26, 2012

Page 3 of 5

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**Intertek**

Number : WJH00009738

Tests Conducted (As Requested By The Applicant)

(D) Measurement Flowchart:  
 Reference Standard: IEC 62321 Edition 1.0: 2008

```

    graph TD
        Start[Sampling/Grinding Or Cutting] --> CdPbHg[Cd/Pb/Hg]
        Start --> CrVI[CrVI]
        Start --> PBBsPBDEs[PBBs/PBDEs]

        CdPbHg --> CdPbHgBox[For Different Material, Digest The Sample With Appropriate Acid*]
        CrVI --> CrVIBox[Polymers / Electronics]
        PBBsPBDEs --> PBBsPBDEsBox[Polymers / Electronics]

        CdPbHgBox --> Confirm[Confirm The Tested Samples Are Totally Dissolved]
        Confirm -- No --> CdPbHgBox
        Confirm -- Yes --> MakeUp1[Make Up With Deionized Water]
        MakeUp1 --> Analyzed1[Analyzed By ICP-OES]

        CrVIBox --> Weigh1[Weigh Sample And Add Alkaline Solution]
        Weigh1 --> Definite[Definite Temp. Extraction]
        Definite --> Cool[Cool And Filter The Extract]
        Cool --> MakeUp2[Make Up With Deionized Water And Add Diphenyl-Carbazide Solution]
        MakeUp2 --> Analyzed2[Analyzed By UV-VIS]

        PBBsPBDEsBox --> Weigh2[Weigh Sample And Add Organic Solvent]
        Weigh2 --> Soxhlet[Soxhlet Extraction Or Solvent Extraction]
        Soxhlet --> Concentrate[Concentrate The Extract And Make Up With Organic Solvent]
        Concentrate --> Analyzed3[Analyzed By GC-MSD]
    
```

Chemist: Inorganic (Ann Lu)/Fred Wang/Ally Wan  
 Organic (Jenny Xu/Cherry Sun)

Remarks:  
 \*1: List Of Appropriate Acid:

Material	Acid Added For Digestion
Polymers	HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub> , H <sub>2</sub> SO <sub>4</sub>
Metal	HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub> , HF
Electronics	HNO <sub>3</sub> , HCl, H <sub>2</sub> O <sub>2</sub> , HBF <sub>4</sub>

Page 4 of 5

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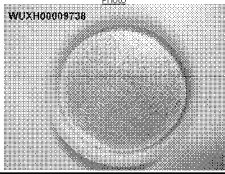
## Annex 4: Analysis Result of Ni-plated Wafer (Page 5 of 5)

**Intertek**

Number : WUXH0009738

Tests Conducted (As Requested By The Applicant)

Photo



The report is made solely on the basis of your instructions and/or information and materials supplied by you. It is not intended to be a recommendation for any particular course of action. Intertek shall not accept a duty of care or any other responsibility or any other other than the duty of care of the client and shall not accept liability to the client under any circumstances. Intertek is not liable for any loss or damage, including consequential loss or damage, arising from the use of the report or the materials supplied or from any other cause. Intertek is not liable for any loss or damage, including consequential loss or damage, arising from the use of the report or the materials supplied or from any other cause. Intertek is not liable for any loss or damage, including consequential loss or damage, arising from the use of the report or the materials supplied or from any other cause.

**Intertek Testing Services Wuxi Ltd.**  
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Tel: +86 510 88214867 Fax: +86 510 88202428 E-mail: consumer.products@intertek.com

Page 5 of 5

# Annex 5: Analysis Result of Passivation Glass (Page 1-4 of 7)

**Intertek**

Number : WUXH00009741

Applicant : CONCORD SEMICONDUCTOR (WUXI) CO., LTD.  
 EAST 1# ZHENFA 6 ROAD, SHUO FANG  
 INDUSTRIAL PARK WUXI NATIONAL HIGH-TECH  
 DEVELOPMENT ZONE, WUXI,JIANGSU,CHINA  
 Attn : ZHANG XIOPENG

Date : Jul 26, 2012

Sample Description As Declared:  
 One (1) Piece Of Submitted Sample Said To Be : **White Powder.**  
 Item Name : Water Passivation  
 Vendor :  
 Component Or Part No. : Propriety  
 Test Item : Cd,Pb,Hg,Cr(VI),PBBs,PBDEs,F,Cl,Br,I

Tests Conducted:  
 As Requested By The Applicant, For Details Refer To Attached Pages

Prepared And Checked By:  
 For Intertek Testing Services Wuxi Ltd.

Page 1 of 7

Intertek Testing Services Wuxi Ltd.  
 No 8 Fubei Road, Xishui Economic Development Zone,  
 Wuxi 214021, Jiangsu, China  
 Tel: +86 510 8821 4867 Fax: +86 510 8820 0428 E-mail: consumer.products@intertek.com

**Intertek**

Number : WUXH00009741

Tests Conducted (As Requested By The Applicant)  
 1. RoHS Directives Test  
 (A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND
Lead (Pb) Content (mg/kg)	142.300
Mercury (Hg) Content (mg/kg)	ND
Chromium (VI) (Cr <sup>VI</sup> ) Content (mg/kg)(For Non-Metal)	ND
Polybrominated Biphenyls (PBBs)(mg/kg)	ND
Monobrominated Biphenyls (MonoBB)	ND
Dibrominated Biphenyls (DiBB)	ND
Tri brominated Biphenyls (TriBB)	ND
Tetrabrominated Biphenyls (TetraBB)	ND
Pentabrominated Biphenyls (PentaBB)	ND
Hexabrominated Biphenyls (HexaBB)	ND
Heptabrominated Biphenyls (HeptaBB)	ND
Octabrominated Biphenyls (OctaBB)	ND
Monobrominated Biphenyls (NonBB)	ND
Dicabrominated Biphenyl (DecaBB)	ND
Polybrominated Diphenyl Ethers (PBDEs)(mg/kg)	ND
Monobrominated Diphenyl Ethers (MonoBDE)	ND
Dibrominated Diphenyl Ethers (DiBDE)	ND
Tri brominated Diphenyl Ethers (TriBDE)	ND
Tetrabrominated Diphenyl Ethers (TetraBDE)	ND
Pentabrominated Diphenyl Ethers (PentaBDE)	ND
Hexabrominated Diphenyl Ethers (HexaBDE)	ND
Heptabrominated Diphenyl Ethers (HeptaBDE)	ND
Octabrominated Diphenyl Ethers (OctaBDE)	ND
Monobrominated Diphenyl Ethers (NonBDE)	ND
Dicabrominated Diphenyl Ether (DecaBDE)	ND

Remark:  
 mg/kg = Milligram Per Kilogram = ppm  
 ND = NOT Detected

Page 2 of 7

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 Tel: +86 510 8821 4867 Fax: +86 510 8820 0428 E-mail: consumer.products@intertek.com

**Intertek**

Number : WUXH00009741

Tests Conducted (As Requested By The Applicant)  
 (B)RoHS Requirement:

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr <sup>VI</sup> )	0.1% (1000 mg/kg)
Polybrominated Biphenyls (PBBs)	0.1% (1000 mg/kg)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000 mg/kg)

The Above Limits Were Quoted From 2002/95/EC And Amendment 2005/618/EC For Homogeneous Material.

(C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd)Content	With Reference To IEC 62321 Edition 1.0: 2008, By Add Digestion And Determined By ICP-OES	2 mg/kg
Lead (Pb)Content	With Reference To IEC 62321 Edition 1.0: 2008, By Add Digestion And Determined By ICP-OES	2 mg/kg
Mercury (Hg)Content	With Reference To IEC 62321 Edition 1.0: 2008, By Add Digestion And Determined By ICP-OES	2 mg/kg
Chromium (VI) (Cr <sup>VI</sup> ) Content(For Non-Metal)	With Reference To IEC 62321 Edition 1.0: 2008, By Alkaline Digestion And Determined By UV-VIS Spectrophotometer	1 mg/kg
Polybrominated Biphenyls (PBBs)8, Polybrominated Diphenyl Ethers (PBDEs)	With Reference To IEC 62321 Edition 1.0: 2008, By Solvent Extraction And Determined By GC-HRSD And Further HPLC Confirmation When Necessary.	5 mg/kg

Date Sample Received: Jul 23, 2012  
 Testing Period: Jul 23, 2012 To Jul 26, 2012

Page 3 of 7

Intertek Testing Services Wuxi Ltd.  
 No 8 Fubei Road, Xishui Economic Development Zone,  
 Wuxi 214021, Jiangsu, China  
 Tel: +86 510 8821 4867 Fax: +86 510 8820 0428 E-mail: consumer.products@intertek.com

**Intertek**

Number : WUXH00009741

Tests Conducted (As Requested By The Applicant)  
 (D) Measurement Flowchart:  
 Reference Standard: IEC 62321 Edition 1.0: 2008

```

    graph TD
        Start[Sampling/Grinding Or Cutting] --> CdPbHg[Cd/Pb/Hg]
        Start --> CrVI[CrVI]
        Start --> PBBsPBDEs[PBBs/PBDEs]

        CdPbHg --> Digest[For Different Material, Digest The Sample With Appropriate Acid*]
        CrVI --> WeighSol[Weigh Sample And Add Alkaline Solution]
        PBBsPBDEs --> WeighOrg[Weigh Sample And Add Organic Solvent]

        Digest --> Confirm[Confirm The Tested Samples Are Totally Dissolved]
        Confirm -- No --> Digest
        Confirm -- Yes --> MakeUp1[Make Up With Deionized Water]
        MakeUp1 --> Analyzed1[Analyzed By ICP-OES]

        WeighSol --> Definite[Definite Temp. Extraction]
        Definite --> CoolFilter[Cool And Filter The Extract]
        CoolFilter --> MakeUp2[Make Up With Deionized Water And Add Diphenyl-Carbazide Solution]
        MakeUp2 --> Analyzed2[Analyzed By UV-VIS]

        WeighOrg --> Soxhlet[Soxhlet Extraction Or Solvent Extraction]
        Soxhlet --> Concentrate[Concentrate The Extract And Make Up With Organic Solvent]
        Concentrate --> Analyzed3[Analyzed By GC-MSD]
    
```

Chemist: Inorganic (Ann Luo/Fred Wang/Ally Wan)  
 Organic (Jenny Xu/Cherry Sun)


Remarks:  
 \*1: List Of Appropriate Acid:

Material	Acid Added For Digestion
Polymers	HNO <sub>3</sub> ,HCl, HF, H <sub>2</sub> O <sub>2</sub> ,H <sub>2</sub> SO <sub>4</sub>
Metal	HNO <sub>3</sub> ,HCl, HF
Electronics	HNO <sub>3</sub> ,HCl, H <sub>2</sub> O <sub>2</sub> , HBF <sub>4</sub>

Page 4 of 7

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 Tel: +86 510 8821 4867 Fax: +86 510 8820 0428 E-mail: consumer.products@intertek.com

## Annex 5: Analysis Result of Passivation Glass (Page 5-7 of 7)



Number : WUXH0009741

Tests Conducted (As Requested By The Applicant)

2. Halogen Test

(1) Test Result Summary :

Halogen Content:

Testing Item	Result (ppm) Submitted Samples
Fluorine (F) Content	ND
Chlorine (Cl) Content	ND
Bromine (Br) Content	ND
Iodine (I) Content	ND


Remarks : ppm = Parts Per Million = mg/kg  
ND = Not Detected

Date Sample Receive : Jul 23, 2012  
Test Period: Jul 23, 2012 To Jul 26, 2012

(1) Test Method :


Testing Item	Testing Method	Reporting Limit
Halogen (F, Cl, Br, I) Content	With Reference To EN 14982:2007 By Combustion In A Calorimetric Bomb And Determined By Ion Chromatography	50 ppm

Remarks : Reporting Limit = Quantitation Limit Of Analyte In Sample



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Page 5 of 7



Number : WUXH0009741

Tests Conducted (As Requested By The Applicant)


(1) Measurement Flowchart:

Test For Halogen Content Reference Method: EN 14982:2007

```


    graph TD
      A[Sampling/Grinding Or Cutting] --> B[Add Absorbent In A Combustion Flask & Place Weighed Sample In]
      B --> C[Fill The Calorimetric Bomb With Oxygen]
      C --> D[Ignite Then Leave The Flask At Room Temperature]
      D --> E{Any Test Specimen In The Calorimetric Bomb?}
      E -- Yes --> B
      E -- No --> F[Transfer The Absorbent Into A Volumetric Flask]
      F --> G[Make Up With Deionized Water]
      G --> H([Analyzed By Ion Chromatography])
    
```

Chemist: Fred Wang/ Ally Wan Ally Wan



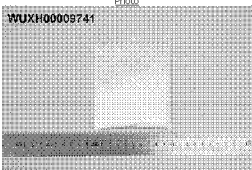
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Number : WUXH0009741

Tests Conducted (As Requested By The Applicant)



Photo

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Page 7 of 7

# Annex 6: Analysis Result of Die Bonding Solder (Page 1-4 of 12)

**SGS**

**Test Report** No. SHAEIC1207973001 Date: 24 May 2012 Page 1 of 12

The following sample(s) was/were submitted and identified on behalf of the client as : High-temperature Solder Paste

SGS Job No. : CP12023059 - SZ

Model No. : (ES-860, ES-810, ES-820, ES-830, ES-840, ES-850, ES-862, ES900, E S-910, ES-820, ES-830, ES-840, ES-850(SnPb92.5Ag2.5, SnPb95, Sn5 Pb85.5Ag1.5, Sn10Pb90, Sn10Pb89Ag2, Sn20Pb78Ag2, Sn15Pb85.5Ag1, Sn5Pb93Ag2)Mixture

Date of Sample Received : 21 May 2012

Testing Period : 21 May 2012 - 24 May 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

**SGS**

**Test Report** No. SHAEIC1207973001 Date: 24 May 2012 Page 2 of 12

Test Results :

**Test Part Description :**

**Specimen No. :** 938 **Sample ID :** Description  
1 SHA12-079730.001 grey solder 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 : (1) With reference to IEC 62321:2008 for Cadmium content Analysis was performed by ICP-OES.

(2) With reference to IEC 62321:2008 for Mercury content. Analysis was performed by ICP-OES.

(3) Titration method

(4) With reference to IEC 62321:2008 for Hexavalent Chromium by Colorimetric Method using UV-Vis.

(5) With reference to IEC 62321:2008 for PBBs / PBDEs content. Analysis was performed by GC-MS.

Test Item(s)	Limit	Unit	MDL	ZZT
Cadmium (Cd)	100	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Lead (Pb)	0.1	%	-	80.91*
Hexavalent Chromium (Cr(VI))	1000	mg/kg	2	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND

**SGS**

**Test Report** No. SHAEIC1207973001 Date: 24 May 2012 Page 3 of 12

Test Item(s)	Limit	Unit	MDL	ZZT
Dicabromodiphenyl ether	-	mg/kg	5	ND
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND

Notes :

(1) The maximum permissible limit is quoted from directive 2011/65/EU Annex II

(2) \* = According to the declaration from the client, Lead (Pb) in No.001 is exempted by EU RoHS Directive 2011/65/EU based on: Lead in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight or more lead).

**Halogen**

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

Test Item(s)	Unit	MDL	ZZT
Fluorine (F)	mg/kg	50	ND
Chlorine (Cl)	mg/kg	50	ND
Bromine (Br)	mg/kg	50	ND
Iodine (I)	mg/kg	50	ND

**Polynuclear Aromatic Hydrocarbons (PAH)**

Test Method : With reference to ZEK 01 2-08 of German ZLS and its amendments, analysis was performed by GC-MS.

Test Item(s)	Unit	MDL	ZZT
Total 18 PAHs	mg/kg	-	ND
Naphthalene (NAP)	mg/kg	0.2	ND

**SGS**

**Test Report** No. SHAEIC1207973001 Date: 24 May 2012 Page 4 of 12

Test Item(s)	Unit	MDL	ZZT
Acenaphthylene(ANY)	mg/kg	0.2	ND
Acenaphthene(ANA)	mg/kg	0.2	ND
Fluorene(FLU)	mg/kg	0.2	ND
Phenanthrene(PHE)	mg/kg	0.2	ND
Anthracene(ANT)	mg/kg	0.2	ND
Fluoranthene(FLT)	mg/kg	0.2	ND
Pyrene(PYR)	mg/kg	0.2	ND
Benzo(a)anthracene(BaA)	mg/kg	0.2	ND
Chrysenes(CHR)	mg/kg	0.2	ND
Benzo(b)fluoranthene(BbF)	mg/kg	0.4	ND
Benzo(k)fluoranthene(BkF)	mg/kg	0.2	ND
Benzo(a)pyrene(BaP)	mg/kg	0.2	ND
Indeno(1,2,3-c,d)pyrene(IPY)	mg/kg	0.2	ND
Dibenzo(a,h)anthracene(DBA)	mg/kg	0.2	ND
Benzo(g,h)perylene(BPE)	mg/kg	0.2	ND
Benzo(e)pyrene(BeP)	mg/kg	0.2	ND

**Hexabromocyclododecane (HBCDD)**

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

Test Item(s)	Unit	MDL	ZZT
Hexabromocyclododecane (HBCDD)	mg/kg	10	ND

Notes :



# Annex 6: Analysis Result of Die Bonding Solder (Page 5-8 of 12)

**SGS**

**Test Report** No. SHAEIC1207973001 Date: 24 May 2012 Page 5 of 12

(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	Det
Dibutyl Phthalate (DBP)	%	0.003	ND
Benzylbutyl Phthalate (BBP)	%	0.003	ND
Bis(2-ethylhexyl) Phthalate (DEHP)	%	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: Result shown is of the total weight of wet sample.

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**Test Report** No. SHAEIC1207973001 Date: 24 May 2012 Page 6 of 12

**ATTACHMENTS**

**RoHS Testing Flow Chart**

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

```

    graph TD
      A[Sample Preparation] --> B[Sample Measurement]
      B --> C[Cd/Hg]
      B --> D[PBBs/PBDEs]
      B --> E[Cr6+]
      C --> C1[Acid digestion with microwave/ hotplate]
      C --> C2[Filtration]
      C1 --> C3[Solution]
      C2 --> C4[Residue]
      C3 --> C5[ICP-OES]
      C4 --> C6["1) Alkali Fusion / Dry Ashing  
2) Acid to dissolve"]
      C6 --> C5
      C5 --> C7[DATA]
      D --> D1[Sample solvent extraction]
      D --> D2[Concentration/ Dilution of extraction solution]
      D1 --> D3[Filtration]
      D2 --> D3
      D3 --> D4[GC/MS]
      D4 --> D5[DATA]
      E --> E1[Nonmetallic material]
      E --> E2[Metallic material]
      E1 --> E3[Adding digestion reagent]
      E2 --> E4[Positive Spot test]
      E3 --> E5[Heating to 90-95°C for extraction]
      E4 --> E6[Boiling water extraction]
      E5 --> E7[Filtration and pH adjustment]
      E6 --> E8[Adding 1,5-diphenylcarbazide for color development]
      E7 --> E9[Adding 1,5-diphenylcarbazide for color development]
      E8 --> E10[A red color indicates the presence of Cr6+. If necessary, confirm with UV-Vis.]
      E9 --> E10
      E10 --> E11[DATA]
  
```

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**Test Report** No. SHAEIC1207973001 Date: 24 May 2012 Page 7 of 12

**Titration Testing Flow Chart**

- Name of the person who made testing: Hassan Xu
- Name of the person in charge of testing: George Xu

```

    graph TD
      A[Sample cutting/preparation] --> B[Sample measurement]
      B --> C[Solvent treatment]
      C --> D[Titration]
      D --> E[DATA]
  
```

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**Test Report** No. SHAEIC1207973001 Date: 24 May 2012 Page 8 of 12

**Phthalates Testing Flow Chart**

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

```

    graph TD
      A[Sample cutting/preparation] --> B[Sample measurement]
      B --> C[Solvent extraction]
      C --> D[Concentration/Dilution]
      D --> E[Filtration]
      E --> F[GC-MS]
      F --> G[DATA]
  
```

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# Annex 6: Analysis Result of Die Bonding Solder (Page 9-12 of 12)

**SGS**

**Test Report** No. SHAEIC1207973001 Date: 24 May 2012 Page 9 of 12

**HBCDD Testing Flow Chart**

1) Name of the person who made testing: Gary Xu  
2) Name of the person in charge of testing: Linda Li

```

    graph TD
      A[Sample cutting/preparation] --> B[Sample measurement]
      B --> C[Solvent extraction]
      C --> D[Concentration/Dilution]
      D --> E[Filtration]
      E --> F[GC-MS]
      F --> G[DATA]
    
```

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**Test Report** No. SHAEIC1207973001 Date: 24 May 2012 Page 10 of 12

**Halogen Testing Flow Chart**

1) Name of the person who made testing: Sisily Yin  
2) Name of the person in charge of testing: Zirco Yu

```

    graph TD
      A[Sample cutting/preparation] --> B[Sample measurement]
      B --> C[Combustion in oxygen bomb]
      C --> D[Dissolved in an absorption solution]
      D --> E[Filtration]
      E --> F[Analyzed by ion chromatography. Double confirm by other instruments, if necessary.]
      F --> G[DATA]
    
```

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**SGS**

**Test Report** No. SHAEIC1207973001 Date: 24 May 2012 Page 11 of 12

**PAHs Testing Flow Chart**

1) Name of the person who made testing: Lisa Duan  
2) Name of the person in charge of testing: Jessie Huang

```

    graph TD
      A[Sample cutting/preparation] --> B[Sample measurement]
      B --> C[Solvent extraction]
      C --> D[Concentration/Dilution]
      D --> E[Filtration]
      E --> F[GC-MS]
      F --> G[DATA]
    
```

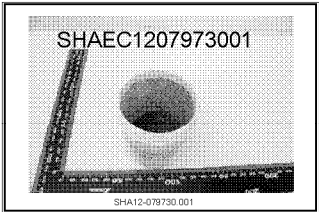
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**Test Report** No. SHAEIC1207973001 Date: 24 May 2012 Page 12 of 12

Sample photo:



SHA12-079730-001

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

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## Annex 7: Analysis Result of Fail Safe Clip (Page 1-4 of 4)

**Intertek**

TEST REPORT Number : WUXH00005954

Applicant : CONCORD SEMICONDUCTOR (WUXI) CO., LTD.  
 EAST 1# ZHENFA 6 ROAD, SHUO FANG  
 INDUSTRIAL PARK WUXI NATIONAL HIGH-TECH  
 DEVELOPMENT ZONE, WUXI, JIANGSU, CHINA  
 Attn : ZHANG XIOPENG Date : Sep 07, 2011

Sample Description As Declared:  
 One (1) Piece Of Submitted Sample Said To Be : **Silvery Grey Metal.**  
 Item Name : Fail Safe Clip.  
 Vendor :  
 Component Or Part No. : Copper With Tin Plating.  
 Test Item : Cd/Pb/Hg/Cr(VI)  
 Remark : As Requested By The Applicant, Tested As A Whole And Sampled Randomly.

Tests Conducted:  
 As Requested By The Applicant, For Details Refer To Attached Pages

Prepared And Checked By:  
 For Intertek Testing Services Wuxi Ltd.

*Jessica Lu*  
 Jessica Lu  
 General Manager

Page 1 of 4

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**Intertek**

TEST REPORT Number : WUXH00005954

Tests Conducted (As Requested By The Applicant)  
 1. RoHS Directives Test

(A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND
Lead (Pb) Content (mg/kg)	35
Mercury (Hg) Content (mg/kg)	ND
Chromium (VI)(Cr <sup>VI</sup> ) Result (By Boiling Water Extraction On Metal) (mg/kg With 50cm <sup>2</sup> )	N

Remark:  
 mg/kg = Milligram Per kilogram = ppm  
 mg/kg With 50cm<sup>2</sup> = Milligram Per kilogram With 50 Square Centimeter  
 ND = Not Detected  
 N = Negative

(B)RoHS Requirement:

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr <sup>VI</sup> )	0.1% (1000 mg/kg)

The Above Limits Were Quoted From: 2002/95/EC And Amendment 2006/618/EC For Homogeneous Material.

(C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With Reference To IEC 62321 Edition 1.0: 2008, By Add Digestion And Determined By ICP-OES	2 mg/kg
Lead (Pb) Content	With Reference To IEC 62321 Edition 1.0: 2008, By Add Digestion And Determined By ICP-OES	2 mg/kg
Mercury (Hg) Content	With Reference To IEC 62321 Edition 1.0: 2008, By Add Digestion And Determined By ICP-OES	2 mg/kg
Chromium (VI) (Cr <sup>VI</sup> ) Content (For Metal)	With Reference To IEC 62321 Edition 1.0: 2008, By Boiling Water Extraction And Determined By UV-VIS Spectrophotometer	0.02mg/kg With 50cm <sup>2</sup> (In Testing Solution)

Date Sample Received: Sep 01, 2011  
 Testing Period: Sep 01, 2011 To Sep 06, 2011

Page 2 of 4

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**Intertek**

TEST REPORT Number : WUXH00005954

Tests Conducted (As Requested By The Applicant)  
 (D) Measurement Flowchart  
 Reference Standard: IEC 62321 Edition 1.0: 2008

```

    graph TD
      A[Sampling/Grinding Or Cutting] --> B[Cd/Pb/Hg]
      A --> C[CrVI]
      B --> D[For Different Material, Digest The Sample With Appropriate Acid*1]
      D --> E[Confirm The Tested Samples Are Totally Dissolved]
      E -- No --> D
      E -- Yes --> F[Make Up With Deionized Water]
      F --> G[Analyzed By ICP-OES]
      C --> H[Metal]
      H --> I[Spot Test]
      I -- Positive** --> J[Get 50cm2 Samples]
      J --> K[Boiling Water Extraction]
      K --> L[Make Up With Deionized Water And Add Diphenyl-Carbazide Solution]
      L --> M[Analyzed By UV-VIS]
    
```

Chemist: Inorganic (Ann Luo/Fred Wang/Ally Wan)

Remarks:  
 \*1: List Of Appropriate Acid:

Material	Add Added For Digestion
Polymers	HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub> , H <sub>2</sub> SO <sub>4</sub>
Metals	HNO <sub>3</sub> , HCl, HF
Electronics	HNO <sub>3</sub> , HCl, H <sub>2</sub> O <sub>2</sub> , HBF <sub>4</sub>

\*2: If The Result Of Spot Test Is Positive, Chromium VI Would Be Determined As Detected.

Page 3 of 4

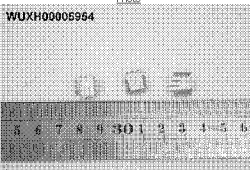
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**Intertek**

TEST REPORT Number : WUXH00005954

Tests Conducted (As Requested By The Applicant)

Photo



Page 4 of 4

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## Annex 8: Analysis Result of Fail Solder Preform (Page 1-4 of 4)

**Intertek**

TEST REPORT Number : WUXH00005955

Applicant : CONCORD SEMICONDUCTOR (WUXI) CO., LTD. Date : Sep 07, 2011  
 EAST 1# ZHENFA 6 ROAD, SHUO FANG INDUSTRIAL PARK WUXI NATIONAL HIGH-TECH DEVELOPMENT ZONE, WUXI,JIANGSU,CHINA  
 Attn : ZHANG XIOPENG

Sample Description As Declared:  
 One (1) Piece Of Submitted Sample Said To Be - **Silvery Grey Metal**.  
 Item Name : Fail Safe Solder Preform  
 Vendor :  
 Component Or Part No. : S950 B-40  
 Test Item : Cd/Pb/Hg/CrVI

Tests Conducted:  
 As Requested By The Applicant, For Details Refer To Attached Pages

Summary:

Tested Sample	Standard	Result
Submitted Sample	With Reference To Test Method Of IEC 62321 Edition 1.0: 2006 And Maximum Concentration Limits Quoted From RoHS Directives 2002/95/EC And Amendment 2005/618/EC	PASS

Prepared And Checked By:  
 For Intertek Testing Services Wuxi Ltd.

*Jessica Lu*  
 Jessica Lu  
 General Manager

Page 1 of 4

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**Intertek**

TEST REPORT Number : WUXH00005955

Tests Conducted (As Requested By The Applicant)  
 1. RoHS Directives Test

(A) Test Result Summary:

Testing Item	Result
Cadmium (Cd) Content (mg/kg)	ND
Lead (Pb) Content (mg/kg)	110
Mercury (Hg) Content (mg/kg)	ND
Chromium (VI) (Cr <sup>VI</sup> ) Result (By Boiling Water Extraction On Metal) (mg/kg With 50cm <sup>2</sup> )	N

Remark:  
 mg/kg = Milligram Per kilogram = ppm  
 mg/kg With 50cm<sup>2</sup> = Milligram Per kilogram With 50 Square Centimeter  
 ND = Not Detected  
 N = Negative

(B)RoHS Requirement:

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr <sup>VI</sup> )	0.1% (1000 mg/kg)

The Above Limits Were Quoted From: 2002/95/EC And Amendment 2006/618/EC For Homogeneous Material.

(C) Test Method:

Testing Item	Testing Method	Reporting Limit
Cadmium (Cd) Content	With Reference To IEC 62321 Edition 1.0: 2006, By Add Digestion And Determined By ICP-OES	2 mg/kg
Lead (Pb) Content	With Reference To IEC 62321 Edition 1.0: 2006, By Add Digestion And Determined By ICP-OES	2 mg/kg
Mercury (Hg) Content	With Reference To IEC 62321 Edition 1.0: 2006, By Add Digestion And Determined By ICP-OES	2 mg/kg
Chromium (VI) (Cr <sup>VI</sup> ) Content (For Metal)	With Reference To IEC 62321 Edition 1.0: 2006, By Boiling Water Extraction And Determined By UV-VIS Spectrophotometer	0.02mg/kg With 50cm <sup>2</sup> (In Testing Solution)

Date Sample Received: Sep 01, 2011  
 Testing Period: Sep 01, 2011 To Sep 06, 2011

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**Intertek**

TEST REPORT Number : WUXH00005955

Tests Conducted (As Requested By The Applicant)  
 (D) Measurement Flowchart  
 Reference Standard: IEC 62321 Edition 1.0: 2006

```

    graph TD
      A[Sampling/Grinding Or Cutting] --> B[Cd/Pb/Hg]
      A --> C[CrVI]
      B --> D[For Different Material, Digest The Sample With Appropriate Acid*1]
      D --> E{Confirm The Tested Samples Are Totally Dissolved}
      E -- No --> D
      E -- Yes --> F[Make Up With Deionized Water]
      F --> G[Analyzed By ICP-OES]
      C --> H[Metal]
      H --> I[Spot Test]
      I -- Positive** --> J[Get 50cm2 Samples]
      J --> K[Boiling Water Extraction]
      K --> L[Make Up With Deionized Water And Add Diphenyl-Carbazide Solution]
      L --> M[Analyzed By UV-VIS]
    
```

Chemist: Inorganic (Ann Luo/Fred Wang/Ally Wan)

Remarks:  
 \*1: List Of Appropriate Acid:

Material	Add Added For Digestion
Polymers	HNO <sub>3</sub> ,HCl, HF, H <sub>2</sub> O <sub>2</sub> ,H <sub>2</sub> SO <sub>4</sub>
Metals	HNO <sub>3</sub> ,HCl, HF
Electronics	HNO <sub>3</sub> ,HCl, H <sub>2</sub> O <sub>2</sub> ,HBF <sub>4</sub>

\*2: If The Result Of Spot Test Is Positive, Chromium VI Would Be Determined As Detected.

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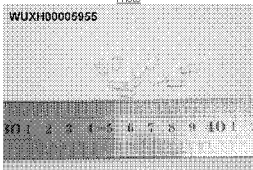
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TEST REPORT Number : WUXH00005955

Tests Conducted (As Requested By The Applicant)

Photo



Page 4 of 4

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# Annex 9: Applicable RoHS exemptions (2011/65/EU Annex III)

L 17493 EN Official Journal of the European Union 1.7.2011

**DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAM AND OF THE COUNCIL**  
of 8 June 2011  
on the restriction of the use of certain hazardous substances in electrical and electronic equipment  
(recast)  
(Text with EEA relevance)

THE EUROPEAN PARLIAM AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 114 thereof,

Having regard to the proposal from the European Commission,

Having regard to the opinion of the European Economic and Social Committee (1),

Having regard to the opinion of the Committee of Regions (2),

Acting in accordance with the ordinary legislative procedure (3),

Whereas:

(1) A number of substantial changes are to be made to Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2002 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (1). In the interest of clarity, that Directive should be recast.

(2) The disparities between the laws or administrative measures adopted by the Member States regarding the restriction of the use of hazardous substances in electrical and electronic equipment (EEE) could create barriers to trade and distort competition in the Union and may thereby have a direct impact on the establishment and functioning of the internal market. It therefore appears necessary to lay down rules in this field and to contribute to the protection of human health and the environmentally sound recovery and disposal of waste EEE.

(3) Directive 2002/95/EC provides that the Commission shall review the provisions of that Directive, in particular, in order to include in its scope equipment which falls within certain categories and to study the need to adapt the list of restricted substances on the basis of scientific progress, taking into account the precautionary principle, as endorsed by Council Resolution of 4 December 2000.

(4) Directive 2009/18/EC of the European Parliament and of the Council of 19 November 2009 on waste (7) gives first priority to prevention in waste legislation. Prevention is defined, inter alia, as measures that reduce the content of harmful substances in materials and products.

(5) Council Resolution of 25 January 1988 on a Community action programme to combat environmental pollution by cadmium (5) invited the Commission to pursue without delay the development of specific measures for such a programme. Human health also has to be protected and an overall strategy that in particular stresses the use of cadmium and stimulates research into substitutes should therefore be implemented. The Resolution stresses that the use of cadmium should be limited to cases where suitable alternatives do not exist.

(6) Regulation (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants (7) recalls that the objective of protecting the environment and human health from persistent organic pollutants cannot be sufficiently achieved by the Member States, owing to the transboundary effects of those pollutants, and it therefore be better achieved at Union level. Pursuant to that Regulation, releases of persistent organic pollutants, such as dioxins and furans, which are unintentional by-products of industrial processes, should be identified and reduced as soon as possible with the ultimate aim of elimination, where feasible.

(7) The available evidence indicates that measures on the collection, treatment, recycling and disposal of waste EEE as set out in Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2002 on waste electrical and electronic equipment (WEEE) (7) are necessary to reduce the waste management problems associated with the heavy metals and flame retardants concerned. In spite of those measures, however, significant parts of waste EEE will continue to be found in the current disposal routes inside or outside the Union. Even if waste EEE were collected separately and submitted to recycling processes, its content of mercury, cadmium, lead, chromium VI, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE) would be likely to pose risks to health or the environment, especially when mixed in less than optimal conditions.

(8) OJ L 112, 22.11.2004, p. 3.  
(9) OJ L 158, 30.4.2004, p. 7.  
(10) OJ L 27, 13.2.2003, p. 24.

(1) OJ C 106, 16.12.2009, p. 36.  
(2) OJ C 161, 29.12.2010, p. 55.  
(3) Position of the European Parliament of 24 November 2010 (not yet published in the Official Journal) and decision of the Council of 27 May 2011.  
(4) OJ L 37, 13.2.2003, p. 19.

1.7.2011 EN Official Journal of the European Union L 17493

3. Paragraph 1 shall apply to medical devices and monitoring and control instruments which are placed on the market from 22 July 2014, to in vitro diagnostic medical devices which are placed on the market from 22 July 2016 and to industrial monitoring and control instruments which are placed on the market from 22 July 2017.

4. Paragraph 1 shall not apply to cables or spare parts for the repair, the reuse, the updating of functionalities or upgrading of capacity of the following:

(a) EEE placed on the market before 1 July 2006;

(b) medical devices placed on the market before 22 July 2014;

(c) in vitro diagnostic medical devices placed on the market before 22 July 2016;

(d) monitoring and control instruments placed on the market before 22 July 2014;

(e) industrial monitoring and control instruments placed on the market before 22 July 2017.

(f) EEE which benefited from an exemption and which was placed on the market before that exemption expired as far as that specific exemption is concerned.

5. Paragraph 1 shall not apply to reused spare parts, recovered from EEE placed on the market before 1 July 2006 and used in equipment placed on the market before 1 July 2016, provided that reuse takes place in suitable closed-loop business-to-business return systems, and that the reuse of parts is notified to the consumer.

6. Paragraph 1 shall not apply to the applications listed in Annex III and IV.

Article 5  
Adaptation of the Annexes to scientific and technical progress

1. For the purposes of adapting Annexes III and IV to scientific and technical progress, and in order to achieve the objectives set out in Article 1, the Commission shall adopt by means of individual delegated acts in accordance with Article 20 and subject to the conditions laid down in Articles 21 and 22, the following measures:

(a) inclusion of materials and components of EEE for specific applications in the lists in Annexes III and IV, provided that such inclusion does not weaken the environmental and health protection afforded by Regulation (EC) No 1907/2006 and where any of the following conditions is fulfilled:

- their elimination or substitution via design changes or materials and components which do not require any of the materials or substances listed in Annex II is scientifically or technically impracticable;
- the reliability of substances is not ensured;
- the total negative environmental, health and consumer safety impacts caused by substitution are likely to outweigh the total environmental, health and consumer safety benefits thereof.

Decisions on the inclusion of materials and components of EEE in the lists in Annexes III and IV and on the duration of any exemptions shall take into account the availability of substitutes and the socioeconomic impact of substitution. Decisions on the duration of any exemptions shall take into account any potential adverse impacts on innovation. Lifecycle thinking on the overall impacts of the exemption shall apply, where relevant.

(b) deletion of materials and components of EEE from the lists in Annexes III and IV where the conditions set out in point (a) are no longer fulfilled.

2. Measures adopted in accordance with point (a) of paragraph 1 shall, for categories 1 to 7, 10 and 11 of Annex I, have a validity period of up to 5 years and, for categories 8 and 9 of Annex I, a validity period of up to 7 years. The validity periods are to be decided on a case-by-case basis and may be renewed.

For the exemptions listed in Annex III as at 21 July 2011, the maximum validity period, which may be renewed, shall, for categories 1 to 7 and 10 of Annex I, be 5 years from 21 July 2011 and for categories 8 and 9 of Annex I, 7 years from the relevant date laid down in Article 4(3), unless a shorter period is specified.

For the exemptions listed in Annex IV as at 21 July 2011, the maximum validity period, which may be renewed, shall be 7 years from the relevant date laid down in Article 4(3), unless a shorter period is specified.

3. An application for granting, renewing or revoking an exemption shall be made to the Commission in accordance with Annex V.

4. The Commission shall:

(a) acknowledge receipt of an application in writing within 15 days of its receipt. The acknowledgement shall state the date of receipt of the application;

(b) inform the Member States of the application without delay and make the application and any supplementary information supplied by the applicant available to them;

(c) make a summary of the application available to the public;

(d) evaluate the application and its justification;

5. An application for renewal of an exemption shall be made no later than 18 months before the exemption expires.

The Commission shall decide on an application for renewal of an exemption no later than 6 months before the expiry date of the existing exemption, unless specific circumstances justify other deadlines. The existing exemption shall remain valid until a decision on the renewal application is taken by the Commission.

L 174100 EN Official Journal of the European Union 1.7.2011

ANNEX II

Restricted substances referred to in Article 4(1) and maximum concentration values indicated by weight in homogeneous materials

Lead (0.1 %)

Mercury (0.1 %)

Cadmium (0.01 %)

Hexavalent chromium (0.1 %)

Polybrominated biphenyls (PBB) (0.1 %)

Polybrominated diphenyl ethers (PBDE) (0.1 %)

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Exemption	Scope and date of applicability
41a) Lead as an alloying element in steel for machining purposes and in galvanized steel containing up to 0.35 % lead by weight	
41b) Lead as an alloying element in aluminium containing up to 0.4 % lead by weight	
41c) Copper alloy containing up to 4 % lead by weight	
71a) Lead in high melting temperature type alloys (a lead-based alloy containing 85 % by weight or more lead)	
71b) Lead in solder for server, storage and storage area systems, network infrastructure equipment for switching, signalling, transmission, and network management for wide communications	
71c) Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectric devices, or in a glass or ceramic matrix compound	
71d) Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher	
71e) Lead in dielectric ceramic in capacitors for a rated voltage of less than 125 V AC or 250 V DC	Expires on 1 January 2013 and after that date may be used in spare parts for EEE placed on the market before 1 January 2013
81a) Cadmium and its compounds in one shot pellet type thermal contacts	Expires on 1 January 2012 and after that date may be used in spare parts for EEE placed on the market before 1 January 2012
81b) Cadmium and its compounds in electrical contacts	
9) Hexavalent chromium as an anticorrosion agent of the carbon steel cooling system in absorption refrigerators up to 0.75 % by weight in the cooling solution	
91a) Lead in bearing shells and bushes for refrigerant-containing compressors for heating, ventilation, air conditioning and refrigeration (HVACR) applications	
111a) Lead used in C-prep compliant pin connector systems	May be used in spare parts for EEE placed on the market before 24 September 2010
111b) Lead used in other than C-prep compliant pin connector systems	Expires on 1 January 2013 and after that date may be used in spare parts for EEE placed on the market before 1 January 2013
12) Lead as a coating material for the thermal conduction module Ciring	May be used in spare parts for EEE placed on the market before 24 September 2010
131a) Lead in white glasses used for optical applications	
131b) Cadmium and lead in filter glasses and glasses used for reflection standards	
14) Lead in solders consisting of more than two elements for the connection between the pins and the package of microprocessors with a lead content of more than 85 % and less than 85 % by weight	Expires on 1 January 2011 and after that date may be used in spare parts for EEE placed on the market before 1 January 2011