

Certificate of non-use of The Controlled Substances

Company name Littelfuse, Inc.

Product Covered Thyristor, TO-92 Package
 SIDAC, TO-92 Package
 SIDACtor® TO-92 Package

Issue Date August 05, 2013

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 following components.

Issued by


JENNY DINGLASAN

< Global EHS Specialist >

Parts, sub-materials and unit parts

This document covers TO-92 RoHS-Compliant products series supplied by Littelfuse, Inc. Please see page 2-4 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.

Remarks :

1. Pb (lead) contained in die bonding solder (item 7 on page 5) and passivation glass (item 6) to be categorized as exempt in RoHS Annex III 7(a) and 7(c)-I.

Please refer to page 56 of this report for the extract of the applicable exemptions of RoHS (EU Directive 2011/65/EU)

Littelfuse Part Number covered by this report

TO-92 products supplied by Littelfuse are categorized into two groups, 3-leaded TO-92 and 2-leaded TO-92.

All products use the same raw materials and all products listed in this report meet RoHS requirement by using lead (Pb) exemptions, as well as Halogen-free requirement,.

Please follow table below to locate specific part number.

| Group # | Package | Generic Description | P/N table |
|---------|---------------------|--|------------|
| 1 | TO-92 (3-leaded) | Thyristor 2Nxxxx EC103xx LxxxEx QxxxEx SxxxEx TCR22-xx | See page 3 |
| 2 | TO-92 (2-leaded) | SIDAC KxxxxE70 SIDACtor PxxxxEAL PxxxxEBL PxxxxECL | See page 4 |

GROUP 1: TO-92 Three-leaded

| Standard (Catalog) Part Number | | | | SPECIAL DEVICE P/N |
|--------------------------------|---------|--------|---------|--|
| 2N5060 | EC103D | L401E3 | Q4X8E3 | Any Special P/N that has base standard P/N listed in this table |
| 2N5061 | EC103D1 | L401E5 | Q4X8E4 | |
| 2N5062 | EC103D2 | L401E6 | Q501E3 | |
| 2N5063 | EC103D3 | L401E8 | Q501E4 | |
| 2N5064 | EC103E | L4X8E3 | Q601E3 | |
| 2N6504 | EC103E1 | L4X8E5 | Q601E4 | |
| 2N6505 | EC103E2 | L4X8E6 | Q6X8E3 | |
| 2N6506 | EC103E3 | L4X8E8 | Q6X8E4 | |
| 2N6507 | EC103M | L501E3 | | |
| 2N6508 | EC103M1 | L501E5 | S031E | |
| 2N6564 | EC103M2 | L601E3 | S051E | OPTIONAL SUFFIX |
| 2N6565 | EC103M3 | L601E5 | S101E | |
| | EC103Y | L601E6 | S201E | Any Part Number listed here may be followed by suffix for packing options, such as "RP" or "AP", or lead form options such as "73", "75", etc. |
| EC103A | EC103Y1 | L601E8 | S401E | |
| EC103A1 | EC103Y2 | L6X8E3 | S601E | |
| EC103A2 | EC103Y3 | L6X8E5 | | |
| EC103A3 | | L6X8E6 | TCR22-2 | |
| EC103B | L201E3 | L6X8E8 | TCR22-3 | |
| EC103B1 | L201E5 | | TCR22-4 | |
| EC103B2 | L201E6 | Q201E3 | TCR22-6 | |
| EC103B3 | L201E8 | Q201E4 | TCR22-8 | |
| EC103C | L2X8E3 | Q2X8E3 | | |
| EC103C1 | L2X8E5 | Q2X8E4 | | |
| EC103C2 | L2X8E6 | Q401E3 | | |
| EC103C3 | L2X8E8 | Q401E4 | | |

GROUP 2: TO-92 Two-leaded

| Standard (Catalog) Part Number | | SPECIAL DEVICE P/N |
|--------------------------------|------------|--|
| K0900E70 | P0900ECL | Any Special P/N which has base standard P/N listed in this table. |
| K1050E70 | P0900ECMCL | |
| K1100E70 | P1100EAL | |
| K1200E70 | P1100EBL | P637P2600EB |
| K1300E70 | P1100ECL | P693P3100EC |
| K1400E70 | P1100ECMCL | P694P3100EC |
| K1500E70 | P1300EAL | |
| K2000E70 | P1300EBL | |
| K2000EH70 | P1300ECL | |
| K2200E70 | P1300ECMCL | |
| K2200EH70 | P1500EAL | |
| K2400E70 | P1500EBL | |
| K2400EH70 | P1500ECL | |
| K2500E70 | P1500ECMCL | |
| K2500EH70 | P1800EAL | |
| | P1800EBL | |
| P0080EAL | P1800ECL | |
| P0080EAMCL | P1800ECMCL | |
| P0080EBL | P2300EAL | |
| P0080EBMCL | P2300EBL | |
| P0080ECL | P2300ECL | |
| P0080ECMCL | P2300ECMCL | |
| P0300EAL | P2600EAL | |
| P0300EAMCL | P2600EBL | |
| P0300EBL | P2600ECL | |
| P0300EBMCL | P2600ECMCL | |
| P0300ECL | P3100EAL | |
| P0300ECMCL | P3100EBL | |
| P0640EAL | P3100ECL | |
| P0640EBL | P3100ECMCL | |
| P0640ECL | P3500EAL | |
| P0640ECMCL | P3500EBL | |
| P0720EAL | P3500ECL | |
| P0720EBL | P3500ECMCL | |
| P0720ECMCL | | |
| P0720EC | | Any Standard Part Number listed here may be followed by suffix for packing options, such as RP, RP1, RP2, RP3 or AP. |
| P0900EAL | | |
| P0900EBL | | |

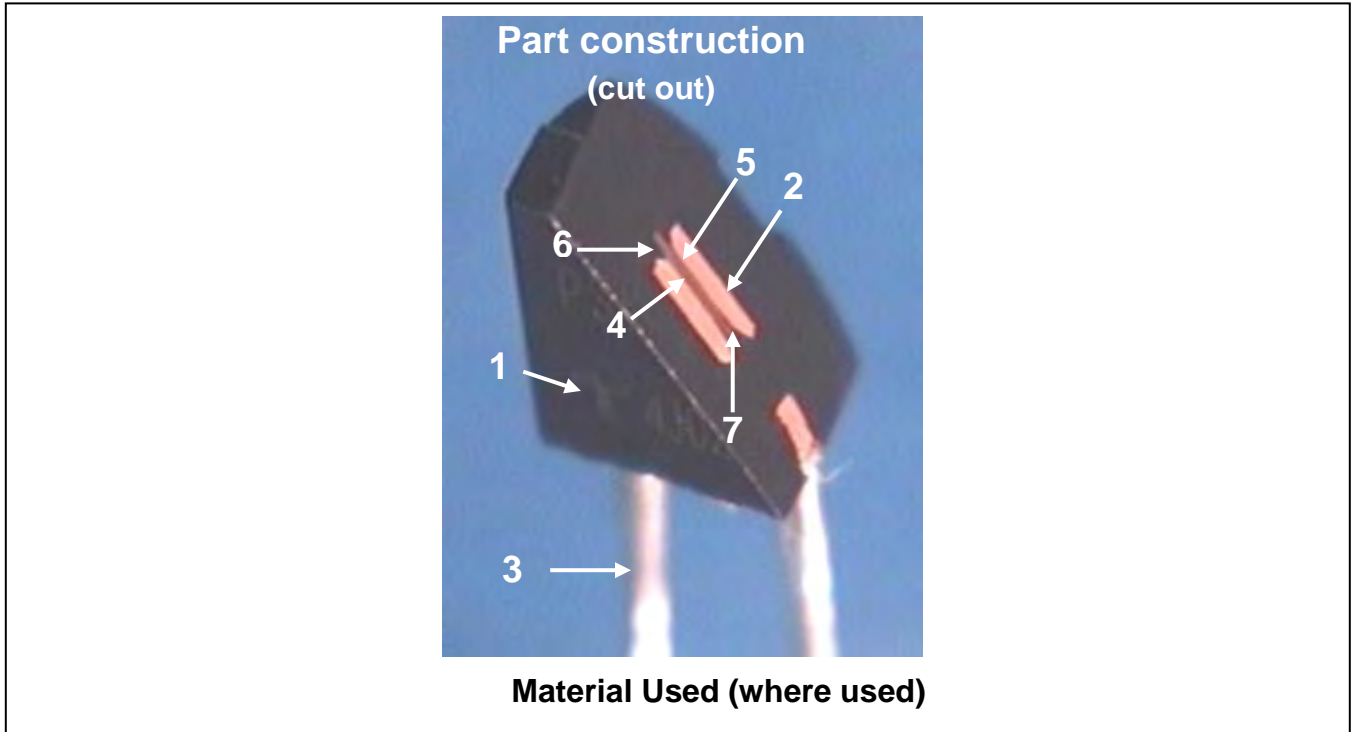


Table 1: Homogeneous Material Used

| # | Description | Name of Material | Type | Analysis data |
|---|--------------------|------------------|---------|--|
| 1 | Molding compound | epoxy resin | plastic | Pages 6-14 |
| 2 | Lead frame | copper alloy | metal | Pages 15-28 (two materials used) |
| 3 | Lead finish | tin alloy | metal | Pages 29-35 |
| 4 | Silicon die | silicon | metal | Pages 36-40 |
| 5 | Nickel electrode | nickel | metal | |
| 6 | Passivation glass | glass | glass | Pages 41-47 Pb in this glass is exempted by RoHS Annex III 7(c)-I. |
| 7 | Die bonding solder | solder | metal | Pages 48-52 Pb in this solder is exempted by RoHS Annex III 7(a). |

Test Report

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SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

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

Sample Description : EPOXY MOLDING COMPOUND
Style/Item No. : EME-G600 TYPE
Sample Receiving Date : 2013/04/09
Testing Period : 2013/04/09 TO 2013/04/15
Sample Submitted By : SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.

Test Result(s) : Please refer to next page(s).


Ray Chang / Asst. Manager
Signed for and on behalf of
SGS Taiwan Limited



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Member of the SGS Group

Test Report

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SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Test Result(s)

PART NAME NO.1 : BLACK EPOXY MOLDING COMPOUND

| Test Item (s): | Unit | Method | MDL | Result No.1 |
|---|-------|---|-----|-------------|
| Cadmium (Cd) | mg/kg | With reference to IEC 62321: 2008 and performed by ICP-AES. | 2 | n.d. |
| Lead (Pb) | mg/kg | With reference to IEC 62321: 2008 and performed by ICP-AES. | 2 | n.d. |
| Mercury (Hg) | mg/kg | With reference to IEC 62321: 2008 and performed by ICP-AES. | 2 | n.d. |
| Hexavalent Chromium Cr(VI) by alkaline extraction | mg/kg | With reference to IEC 62321: 2008 and performed by UV-VIS. | 2 | n.d. |
| Sum of PBBs | | | - | n.d. |
| Monobromobiphenyl | mg/kg | With reference to IEC 62321: 2008 and performed by GC/MS. | 5 | n.d. |
| Dibromobiphenyl | | | 5 | n.d. |
| Tribromobiphenyl | | | 5 | n.d. |
| Tetrabromobiphenyl | | | 5 | n.d. |
| Pentabromobiphenyl | | | 5 | n.d. |
| Hexabromobiphenyl | | | 5 | n.d. |
| Heptabromobiphenyl | | | 5 | n.d. |
| Octabromobiphenyl | | | 5 | n.d. |
| Nonabromobiphenyl | | | 5 | n.d. |
| Decabromobiphenyl | | | 5 | n.d. |
| Sum of PBDEs | | | - | n.d. |
| Monobromodiphenyl ether | mg/kg | With reference to IEC 62321: 2008 and performed by GC/MS. | 5 | n.d. |
| Dibromodiphenyl ether | | | 5 | n.d. |
| Tribromodiphenyl ether | | | 5 | n.d. |
| Tetrabromodiphenyl ether | | | 5 | n.d. |
| Pentabromodiphenyl ether | | | 5 | n.d. |
| Hexabromodiphenyl ether | | | 5 | n.d. |
| Heptabromodiphenyl ether | | | 5 | n.d. |
| Octabromodiphenyl ether | | | 5 | n.d. |
| Nonabromodiphenyl ether | | | 5 | n.d. |
| Decabromodiphenyl ether | | | 5 | n.d. |

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SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

| Test Item (s): | Unit | Method | MDL | Result |
|---|-------|---|-----|--------|
| | | | | No.1 |
| Antimony (Sb) | mg/kg | With reference to US EPA Method 3052 for Antimony Content. Analysis was performed by ICP-AES. | 2 | n.d. |
| Perfluorooctane sulfonates (PFOS - Acid, Metal Salt, Amide) | mg/kg | With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS. | 10 | n.d. |
| PFOA (CAS No.: 335-67-1) | mg/kg | With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS. | 10 | n.d. |
| Halogen | | | | |
| Halogen-Fluorine (F) (CAS No.: 014762-94-8) | mg/kg | With reference to BS EN 14582:2007. Analysis was performed by IC. | 50 | n.d. |
| Halogen-Chlorine (Cl) (CAS No.: 022537-15-1) | mg/kg | With reference to BS EN 14582:2007. Analysis was performed by IC. | 50 | n.d. |
| Halogen-Bromine (Br) (CAS No.: 010097-32-2) | mg/kg | With reference to BS EN 14582:2007. Analysis was performed by IC. | 50 | n.d. |
| Halogen-Iodine (I) (CAS No.: 014362-44-8) | mg/kg | With reference to BS EN 14582:2007. Analysis was performed by IC. | 50 | n.d. |

- Note : 1. mg/kg = ppm ; 0.1wt% = 1000ppm
 2. n.d. = Not Detected
 3. MDL = Method Detection Limit
 4. "-" = Not Regulated

PFOS Reference Information : POPs - (EU) 757/2010

Outlawing PFOS as substances or preparations in concentrations above 0.001% (10ppm), in semi-finished products or articles or parts at a level above 0.1%(1000ppm), in textiles or other coated materials above 1µg/m².

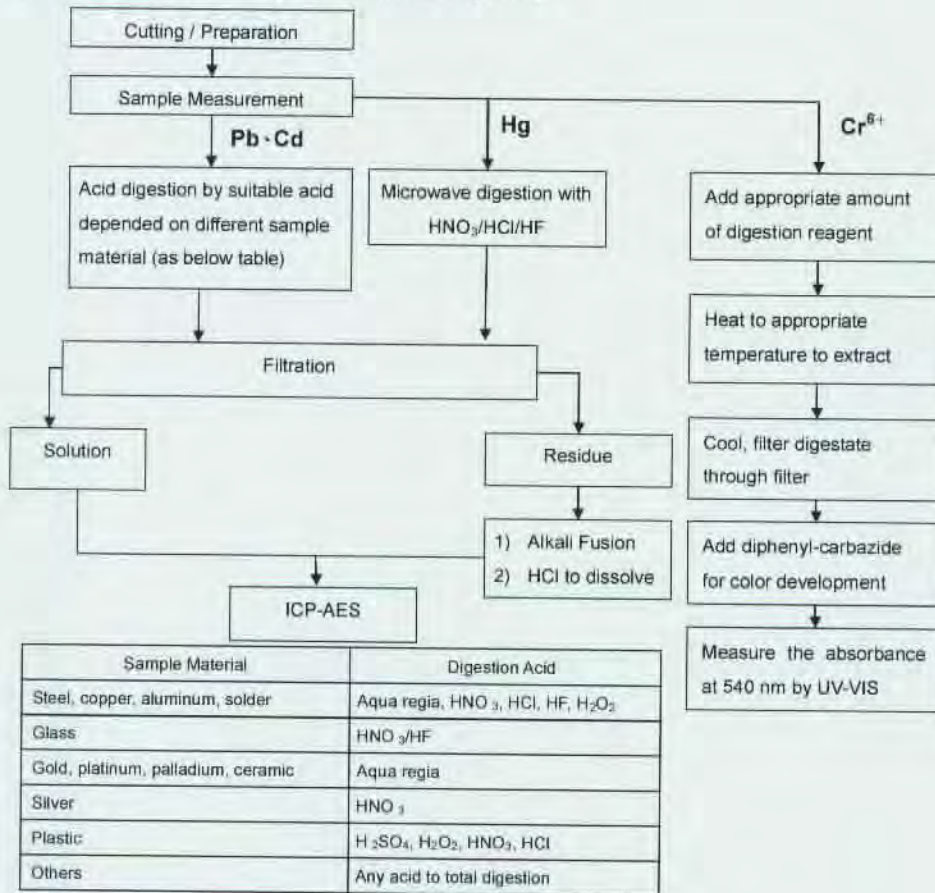
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SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)
- 2) Name of the person who made measurement: Alex Chang
- 3) Name of the person in charge of measurement: Ray Chang



Note :** (1) For non-metallic material, add alkaline digestion reagent and heat to 90~95 °C.
(2) For metallic material, add pure water and heat to boiling.

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Test Report

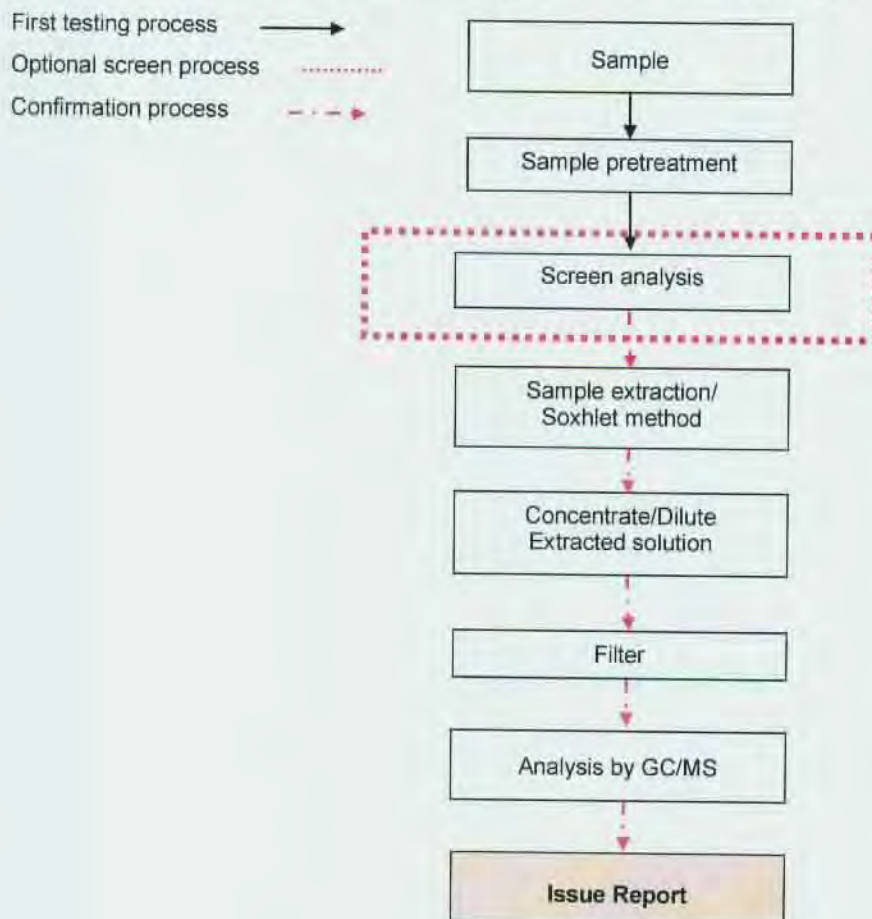
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SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

PBB/PBDE analytical FLOW CHART

1) Name of the person who made measurement: Anson Tsao

2) Name of the person in charge of measurement: Ray Chang



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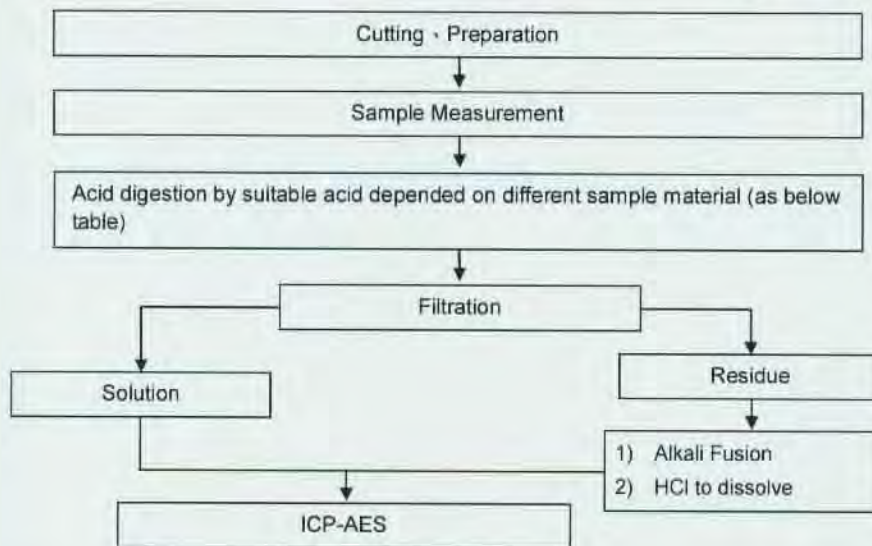
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SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
- 2) Name of the person who made measurement: Alex Chang
- 3) Name of the person in charge of measurement: Ray Chang

Flow Chart of digestion for the elements analysis performed by ICP-AES



| | |
|------------------------------------|---|
| Steel, copper, aluminum, solder | Aqua regia, HNO ₃ , HCl, HF, H ₂ O ₂ |
| Glass | HNO ₃ /HF |
| Gold, platinum, palladium, ceramic | Aqua regia |
| Silver | HNO ₃ |
| Plastic | H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCl |
| Others | Any acid to total digestion |

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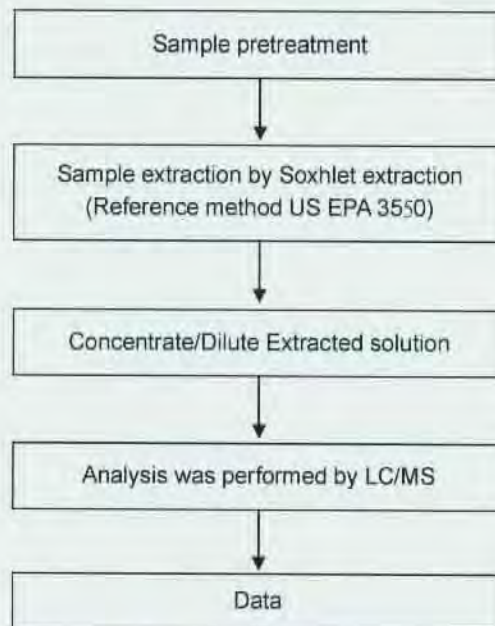
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SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Analytical flow chart of PFOA/PFOS content

- 1) Name of the person who made measurement: Anson Tsao
- 2) Name of the person in charge of measurement: Ray Chang



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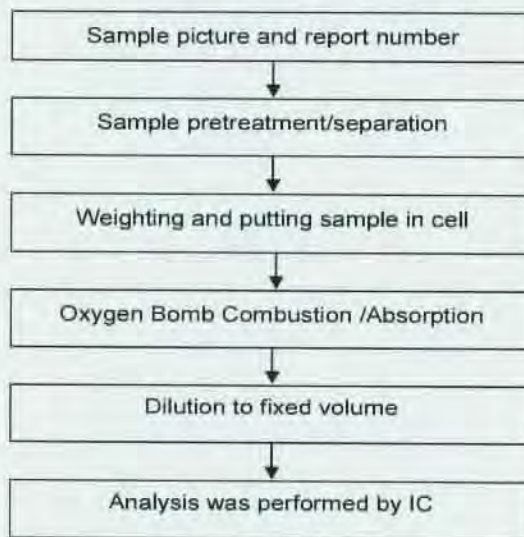
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SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Analytical flow chart of halogen content

- 1) Name of the person who made measurement: Jean Hung
- 2) Name of the person in charge of measurement: Ray Chang



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SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

* The tested sample / part is marked by an arrow if it's shown on the photo. *

KA/2013/40559



** End of Report **

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Test Report

No. SHAEC1222849721

Date: 04 Jan 2013

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NINGBO KANGQIANG ELECTRONICS CO.,LTD

NO.988 JINYUAN ROAD YINZHOU INVESTMENT & BUSINESS INCUBATION.NINGBO.CHINA

The following sample(s) was/were submitted and identified on behalf of the clients as : Lead
FrameKFC (GFC、TFe0.1、C19210)

SGS Job No. : SP12-037446 - SH
Model No. : TO-126
Sample May Cover : TO-92、TO-94、TO-220、TO-247、TO-251、TO-252、TO-263、SOT-54、SO
T-89、SOT-223、TO-3P Lead Frame
Date of Sample Received : 26 Dec 2012
Testing Period : 26 Dec 2012 - 31 Dec 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.



JJ Fan

Approved Signatory

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Test Results :

Test Part Description :

| Specimen No. | SGS Sample ID | Description |
|--------------|------------------|----------------------|
| 1 | SHA12-228497.006 | Copper/silvery metal |

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

| Test Item(s) | Limit | Unit | MDL | 006 |
|------------------------------|-------|-------|-----|----------|
| Cadmium (Cd) | 100 | mg/kg | 2 | ND |
| Lead (Pb) | 1000 | mg/kg | 2 | 17 |
| Mercury (Hg) | 1000 | mg/kg | 2 | ND |
| Hexavalent Chromium (Cr(VI)) | - | - | ◇ | Negative |
| 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 |
| Decabromobiphenyl | - | mg/kg | 5 | ND |
| Sum of PBDEs | 1000 | mg/kg | - | ND |
| Monobromodiphenyl ether | - | mg/kg | 5 | ND |

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Test Report

No. SHAEC1222849721

Date: 04 Jan 2013

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| <u>Test Item(s)</u> | <u>Limit</u> | <u>Unit</u> | <u>MDL</u> | <u>006</u> |
|--------------------------|--------------|-------------|------------|------------|
| 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) ◊Spot-test:

Negative = Absence of Cr(VI) coating, Positive = Presence of Cr(VI) 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 Cr(VI) coating

Positive = Presence of Cr(VI) 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.

Halogen

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

| <u>Test Item(s)</u> | <u>Unit</u> | <u>MDL</u> | <u>006</u> |
|---------------------|-------------|------------|------------|
| Fluorine (F) | mg/kg | 50 | ND |
| Chlorine (Cl) | mg/kg | 50 | ND |
| Bromine (Br) | mg/kg | 50 | ND |
| Iodine (I) | mg/kg | 50 | ND |

Element(s)

Test Method : With reference to US EPA Method 3050B:1996, analysis was performed by ICP-OES.

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Test Report

No. SHAEC1222849721

Date: 04 Jan 2013

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| <u>Test Item(s)</u> | <u>Unit</u> | <u>MDL</u> | <u>006</u> |
|---------------------|-------------|------------|------------|
| Arsenic (As) | mg/kg | 10 | ND |
| Antimony (Sb) | mg/kg | 10 | ND |
| Beryllium (Be) | mg/kg | 5 | ND |
| Phosphorus (P) | mg/kg | 20 | 329 |

Notes :

- (1) Arsenic Reference Information: Entry 19 of Regulation (EC) No 552/2009 amending Annex XVII of REACH Regulation (EC) No 1907/2006 (previously restricted under Directive 2006/139/EC):
- (i) Shall not be placed on the market, or used, as substances or in mixtures where the substance or mixture is intended for use to prevent the fouling by micro-organisms, plants or animals of:
 - the hulls of boats,
 - cages, floats, nets and any other appliances or equipment used for fish or shellfish farming,
 - any totally or partly submerged appliances or equipment.
 - (ii) Shall not be placed on the market, or used, as substances or in mixtures where the substance or mixture is intended for use in the treatment of industrial waters, irrespective of their use.
 - (iii) Shall not be used in the preservation of wood. Furthermore, wood so treated shall not be placed on the market.

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

Phthalates

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

| <u>Test Item(s)</u> | <u>Unit</u> | <u>MDL</u> | <u>006</u> |
|-------------------------------------|-------------|------------|------------|
| Dibutyl Phthalate (DBP) | % | 0.003 | ND |
| Benzylbutyl Phthalate (BBP) | % | 0.003 | ND |
| Bis-(2-ethylhexyl) Phthalate (DEHP) | % | 0.003 | ND |
| Diisononyl Phthalate (DINP) | % | 0.010 | ND |
| Di-n-octyl Phthalate (DNOP) | % | 0.003 | ND |
| Diisodecyl Phthalate (DIDP) | % | 0.010 | ND |
| Diisobutyl Phthalate (DIBP) | % | 0.003 | ND |

Notes :

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- (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):
- i) 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

DINP, DNOP, DIDP Reference information: Entry 52 of Regulation (EC) No 552/2009 amending Annex XVII of REACH Regulation (EC) No 1907/2006 (previously restricted under Directive 2005/84/EC).

- i) 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 which can be placed in the mouth by children.
- ii) Such 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

Tetrabromobisphenol A (TBBP-A)

Test Method : With reference to US EPA 3540C: 1996, analysis was performed by GC-MS.

| Test Item(s) | Unit | MDL | 006 |
|--------------------------------|-------|-----|-----|
| Tetrabromobisphenol A (TBBP-A) | mg/kg | 10 | ND |

PFOS (Perfluorooctane Sulfonates) and PFOA (Perfluorooctanoic Acid)

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

| Test Item(s) | Limit | Unit | MDL | 006 |
|--|-------|-------|-----|-----|
| Perfluorooctane Sulfonates (PFOS) and related Acid, Metal Salt and Amide | 1000 | mg/kg | 10 | ND |
| Perfluorooctanoic Acid (PFOA) | - | mg/kg | 10 | ND |

Notes :

Max. limit specified by commission regulation (EU) No. 757/2010 amending regulation (EC) No 850/2004.

Polynuclear aromatic hydrocarbons (PAH)

Test Method : With reference to ZEK 01.4-08 of German ZLS and its amendments, analysis was performed by GC-MS.

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| Test Item(s) | Unit | MDL | 006 |
|--|-------|-----|-----|
| Sum of 18 PAHs | mg/kg | - | ND |
| Naphthalene(NAP) | mg/kg | 0.2 | ND |
| 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 |
| Chrysene(CHR) | mg/kg | 0.2 | ND |
| Benzo(b)fluoranthene(BbF) and Benzo(j)fluoranthene(BjF) | mg/kg | 0.4 | ND |
| Benzo(k)fluoranthene(BkF) | mg/kg | 0.2 | ND |
| Benzo(a)pyrene(BaP) | mg/kg | 0.2 | ND |
| Benzo(e)pyrene(BeP) | 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,i)perylene(BPE) | mg/kg | 0.2 | ND |

ZEK 01.4-08: Restraining maximum values for products

| Parameter | Category 1 | Category 2 | Category 3 |
|------------------------|---|--|--|
| | Material indented to be put in the mouth or material for toys with normal skin contact for children aged <36 months | Materials those are not included in Category 1, with predictable contact with the skin longer than 30 s. (long-term skin contact). | Materials those are not included in Category 1 or 2, with predictable skin contact up to 30 s (short-term skin contact). |
| Benzo(a)pyrene (mg/kg) | <0.2** | 1 | 20 |
| Sum of 18 PAH (mg/kg)* | <0.2** | 10 | 200 |

Notes:

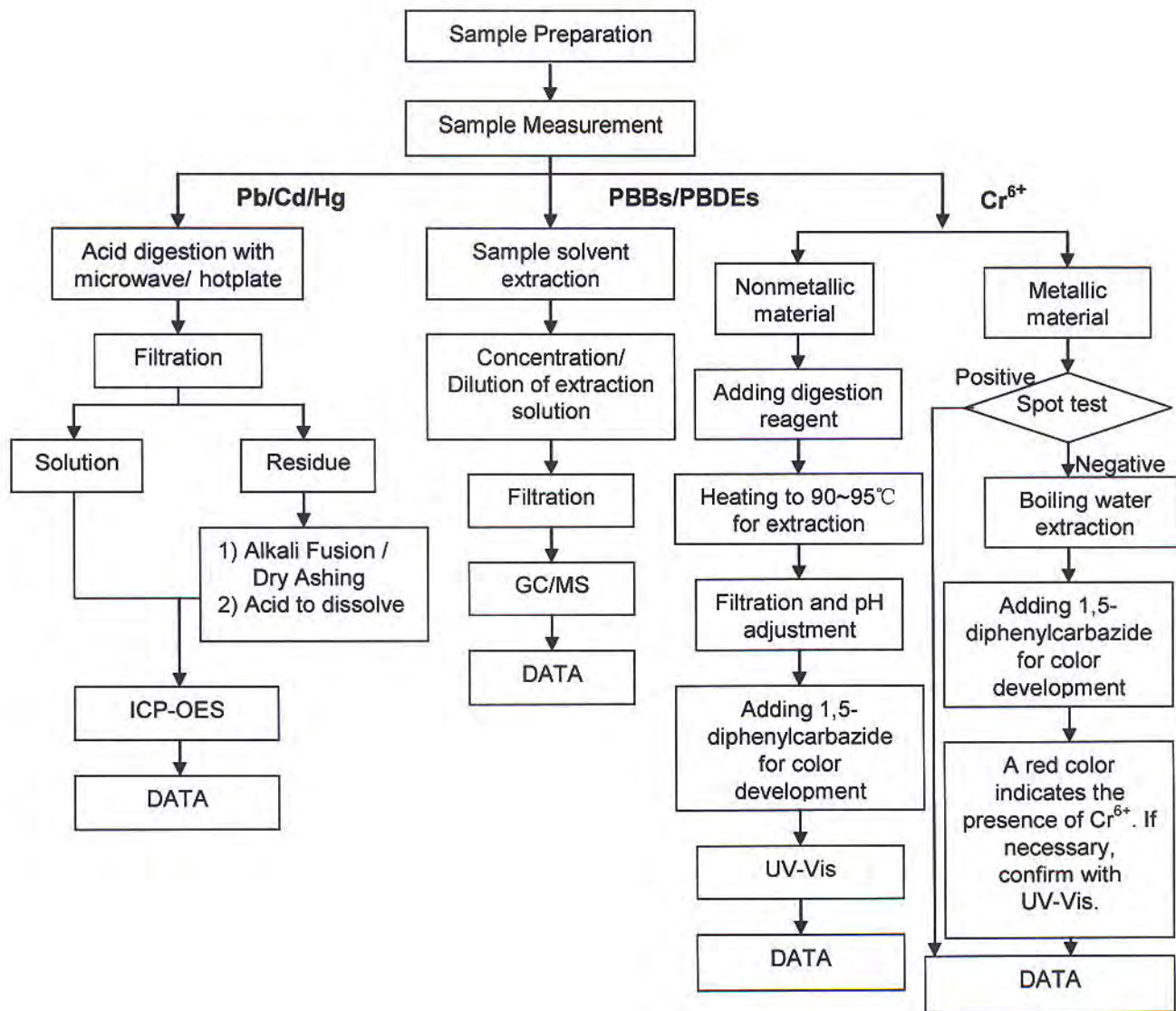
- * = Only PAH substances >0.2 mg/kg are taken into account while calculating the sum of PAHs
- ** = In case that the maximum values exceed the limits of category 1, but are within the limits of category 2, one may confirm the suitability of the tested material which is indented to be put in the mouth by additional specific migration tests of PAH components based on DIN EN 1186ff/EN13130 and §64 LFGB 80.30-1. The conclusion of the migration test results must be made based on food law criteria.

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ATTACHMENTS

RoHS Testing Flow Chart

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

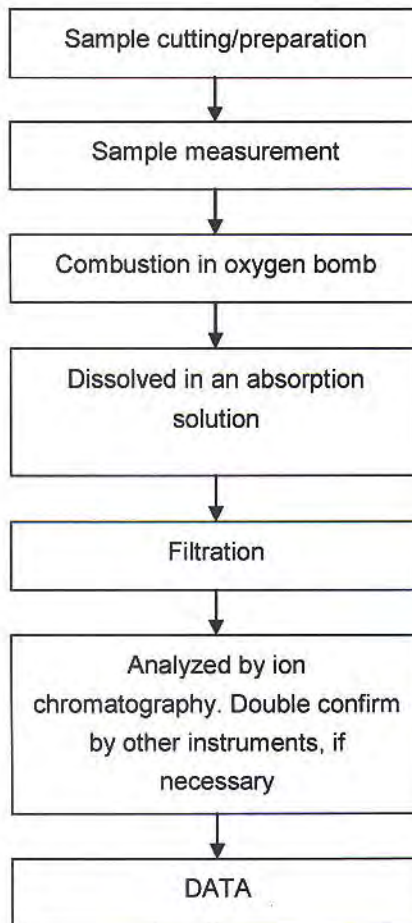


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Halogen Testing Flow Chart

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

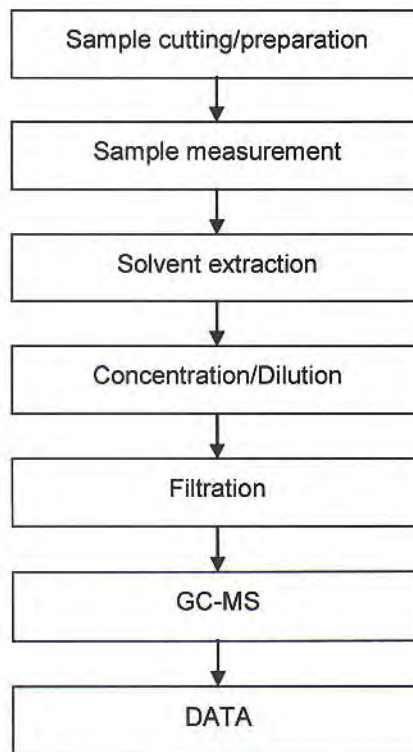


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Phthalates Testing Flow Chart

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

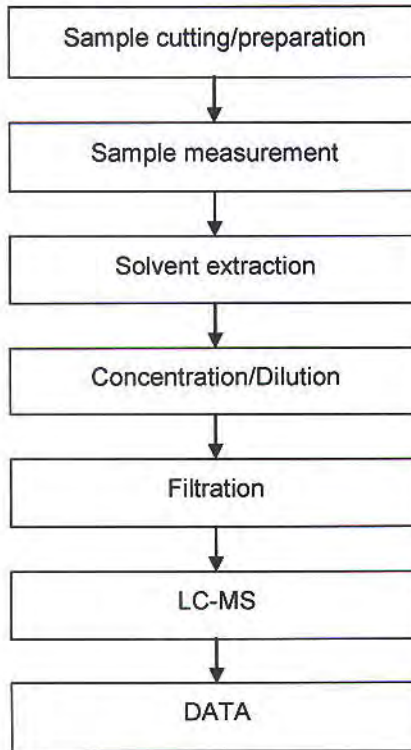


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PFOS/PFOA Testing Flow Chart

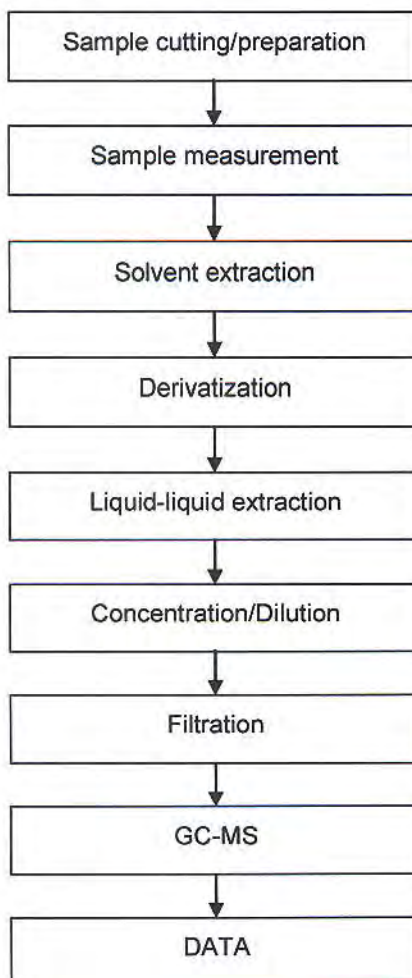
- 1) Name of the person who made testing: Judy Li
- 2) Name of the person in charge of testing: Myra Ma



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TBBP-A Testing Flow Chart

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

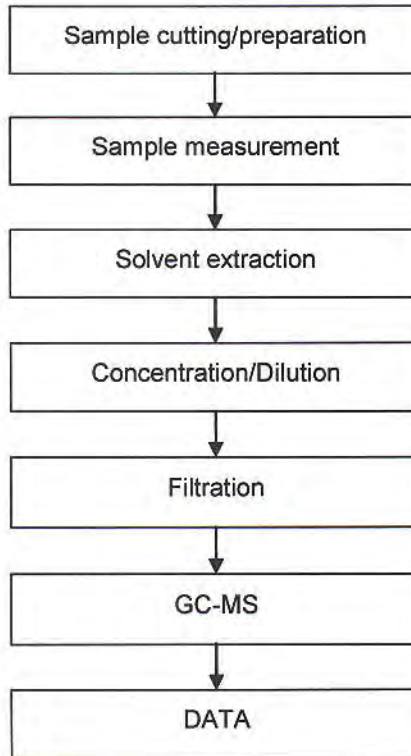


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PAHs Testing Flow Chart

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

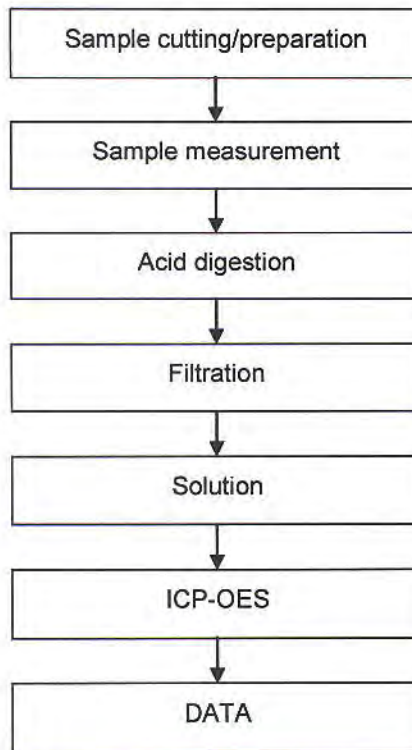


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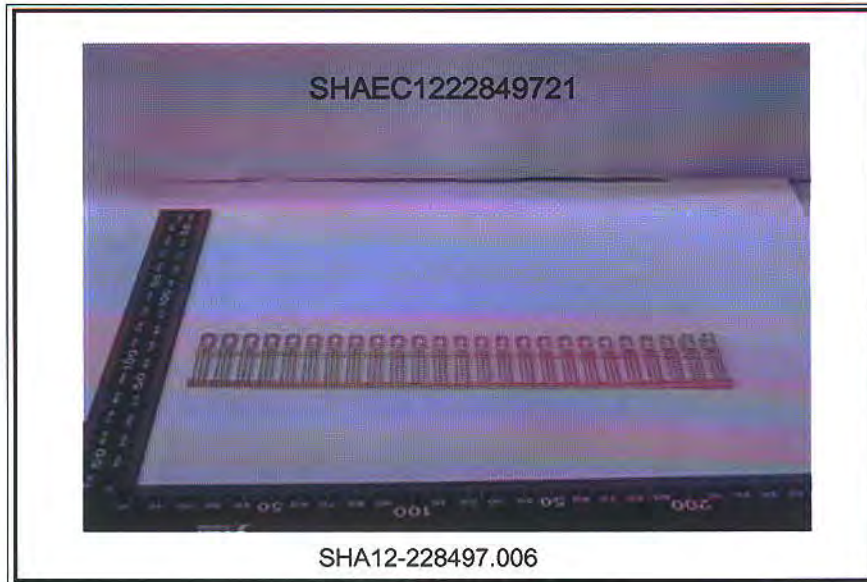
Elements Testing Flow Chart

- 1) Name of the person who made testing: Yoyo Wang/ Jan Shi
- 2) Name of the person in charge of testing: Jeff Zhang



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Sample photo:



SGS authenticate the photo on original report only

*** End of Report ***

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Test Report

No. CTSSA/27277(AD)/12

Date : 20/12/2012

Page: 1 of 7

CTS Ref. CTSSA/12/4439/Redring

The following merchandise was (were) submitted and identified by the client as:

Sample Description : Pure Tin Solder
Sample Receiving Date : 14/12/2012
Testing Date : 14/12/2012 to 20/12/2012

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).
Analysts : Ng Jing Wei, Cho Kar Yen, Tay Siam Pine & Teh Pui Sean

SGS LABORATORY SERVICES (M) SDN. BHD.

CHONG KIEN LEN
B.Sc.(HONS) AMIC
SENIOR LAB MANAGER

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Test Report

No. CTSSA/27277(AD)/12
CTS Ref. CTSSA/12/4439/Redring

Date : 20/12/2012

Page: 2 of 7

Test results:

Test Part Description :

Sample Description : Pure Tin Solder

RoHS Directive 2011/65/EU Annex II

| Test Item(s): | Unit | Test Method | Results | MDL |
|---|-------|--|----------|---|
| Cadmium(Cd) | mg/kg | With reference to IEC 62321:2008, and performed by ICP-OES | N.D. | 2 |
| Lead (Pb) | mg/kg | With reference to IEC 62321:2008, and performed by ICP-OES | 17 | 2 |
| Mercury (Hg) | mg/kg | With reference to IEC 62321:2008, and performed by ICP-OES | N.D. | 2 |
| Hexavalent Chromium (CrVI) by Spot test / boiling water extraction (optional) # | --- | With reference to IEC 62321:2008 | Negative | 0.02mg/kg per 50cm ² sample in 50mL solution |
| Sum of PBBs | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | - |
| Monobromobiphenyl | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Dibromobiphenyl | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Tribromobiphenyl | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Tetrabromobiphenyl | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Pentabromobiphenyl | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Hexabromobiphenyl | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Heptabromobiphenyl | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Octabromobiphenyl | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Nonabromobiphenyl | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Decabromobiphenyl | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |

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Test Report

No. CTSSA/27277(AD)/12

Date : 20/12/2012

Page: 3 of 7

CTS Ref. CTSSA/12/4439/Redring

| Sum of PBDEs | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | - |
|--------------------------|-------|--|------|---|
| Monobromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Dibromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Tribromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Tetrabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Pentabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Hexabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Heptabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Octabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Nonabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |
| Decabromodiphenyl ether | mg/kg | With reference to IEC 62321:2008, and performed by GC-MS | N.D. | 5 |

Note : (a) mg/kg = ppm ; (0.1wt% = 1000ppm)

(b) N.D. = Not Detected

(c) MDL = Method Detection Limit

(d) # = **Spot-Test:**

a. Negative means the absence of Cr(VI) on the tested areas

b. Positive means the presence of Cr(VI) on the tested areas

(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:

a. Negative means the absence of Cr(VI) on the tested areas

b. Positive means the presence of Cr(VI) on the tested areas;

The detected concentration in 50 mL 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.

(e) - = Not regulated

(f) This report supersedes report no. CTSSA/27277/12

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Test Report

No. CTSSA/27277(AD)/12

Date : 20/12/2012

Page: 4 of 7

CTS Ref. CTSSA/12/4439/Redring

Test results by chemical method:

| Test Item (s): | Unit | Method | Result | MDL |
|-----------------------|-------|--|--------|-----|
| Antimony (Sb) | mg/kg | With reference EPA Method 3051A, and performed by ICP-OES | N.D. | 2 |
| Halogen | --- | --- | --- | --- |
| Halogen-Fluorine (F) | mg/kg | With reference to BS EN 14582. Analysis was performed by IC method for Fluorine content. | N.D. | 50 |
| Halogen-Chlorine (Cl) | mg/kg | With reference to BS EN 14582. Analysis was performed by IC method for Chlorine content. | N.D. | 50 |
| Halogen-Bromine (Br) | mg/kg | With reference to BS EN 14582. Analysis was performed by IC method for Bromine content. | N.D. | 50 |
| Halogen-Iodine (I) | mg/kg | With reference to BS EN 14582. Analysis was performed by IC method for Iodine content. | N.D. | 50 |

Test Part Description:

Sample Description : Pure Tin Solder

- Note :
- (a) mg/kg = ppm
 - (b) N.D. = Not Detected
 - (c) MDL = Method Detection Limit
 - (d) --- = Not Conducted
 - (e) This report supersedes report no. CTSSA/27277/12

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Test Report

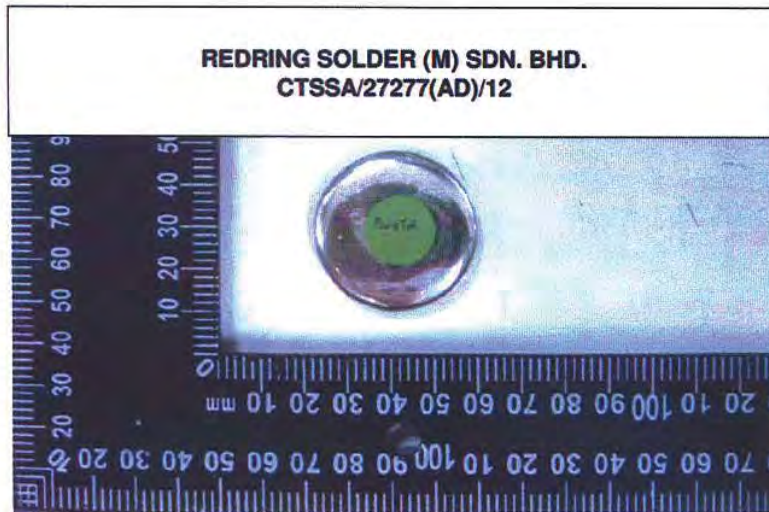
No. CTSSA/27277(AD)/12
CTS Ref. CTSSA/12/4439/Redring

Date : 20/12/2012

Page: 5 of 7

Test Part Description :

Sample Description : Pure Tin Solder

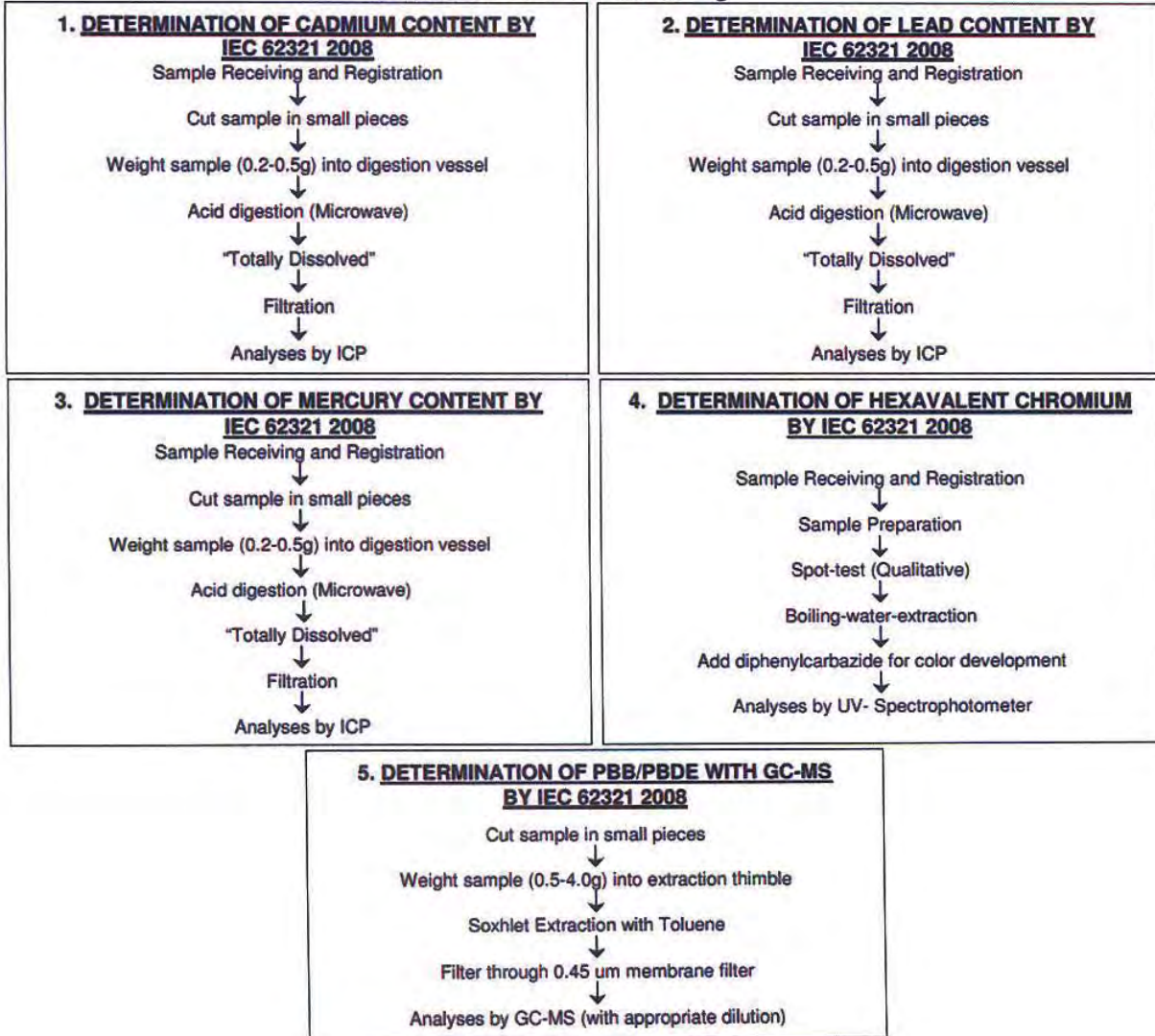


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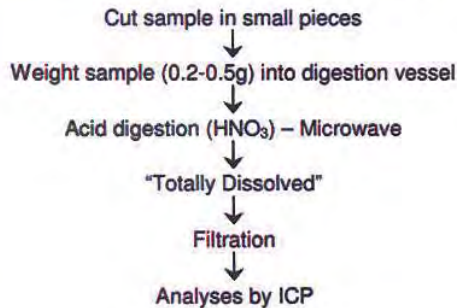
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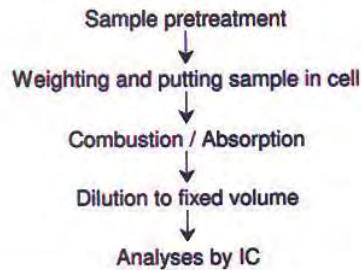
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6. MICROWAVE ASSISTED ACID DIGESTION OF ORGANICALLY BASED METRICES (US EPA 3051A)



7. DETERMINATION OF HALOGEN CONTENT



**** End of Report ****

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Number : WUXH00016496

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 XIAOPENG

Date : Aug 01, 2013

Sample Description As Declared:

One (1) Piece Of Submitted Sample Said To Be : **Silvery Grey Metal.**
Item Name : Silicon Wafer With Nickel Plating.
Vendor : Littelfuse.
Component Or Part No. : Silicon+Nickel.
Test Item : Cd,Pb,Hg,CrVI,PBBs,PBDEs.
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
General Manager



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) | 25 |
| Mercury (Hg) Content (mg/kg) | ND |
| Chromium (VI)(Cr ⁶⁺) Result (By Boiling Water Extraction On Metal) (mg/kg With 50cm ²) | N |
| Polybrominated Biphenyls (PBBs)(mg/kg) | |
| 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 |
| Nonabrominated Biphenyls (NonaBB) | ND |
| Decabrominated Biphenyl (DecaBB) | ND |
| Sum Of PBBs | ND |
| Polybrominated Diphenyl Ethers (PBDEs)(mg/kg) | |
| 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 |
| Nonabrominated Diphenyl Ethers (NonaBDE) | ND |
| Decabrominated Diphenyl Ether (DecaBDE) | ND |
| Sum Of PBDEs | ND |

Remark:

mg/kg = Milligram Per Kilogram = ppm

mg/kg With 50cm² = Milligram Per Kilogram With 50 Square Centimeter

ND = Not Detected

N=Negative



Number : WUXH00016496

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 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 RoHS Directive 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 Until The Tested Sample Was Totally Dissolved, And Determined By ICP-OES. | 2 mg/kg |
| Lead (Pb) Content | With Reference To IEC 62321 Edition 1.0: 2008, By Acid Digestion Until The Tested Sample Was Totally Dissolved, And Determined By ICP-OES. | 2 mg/kg |
| Mercury (Hg) Content | With Reference To IEC 62321 Edition 1.0: 2008, By Acid Digestion Until The Tested Sample Was Totally Dissolved, And Determined By ICP-OES. | 2 mg/kg |
| Chromium (VI) (Cr ⁶⁺) 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 ² (In Testing Solution) |
| 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 |

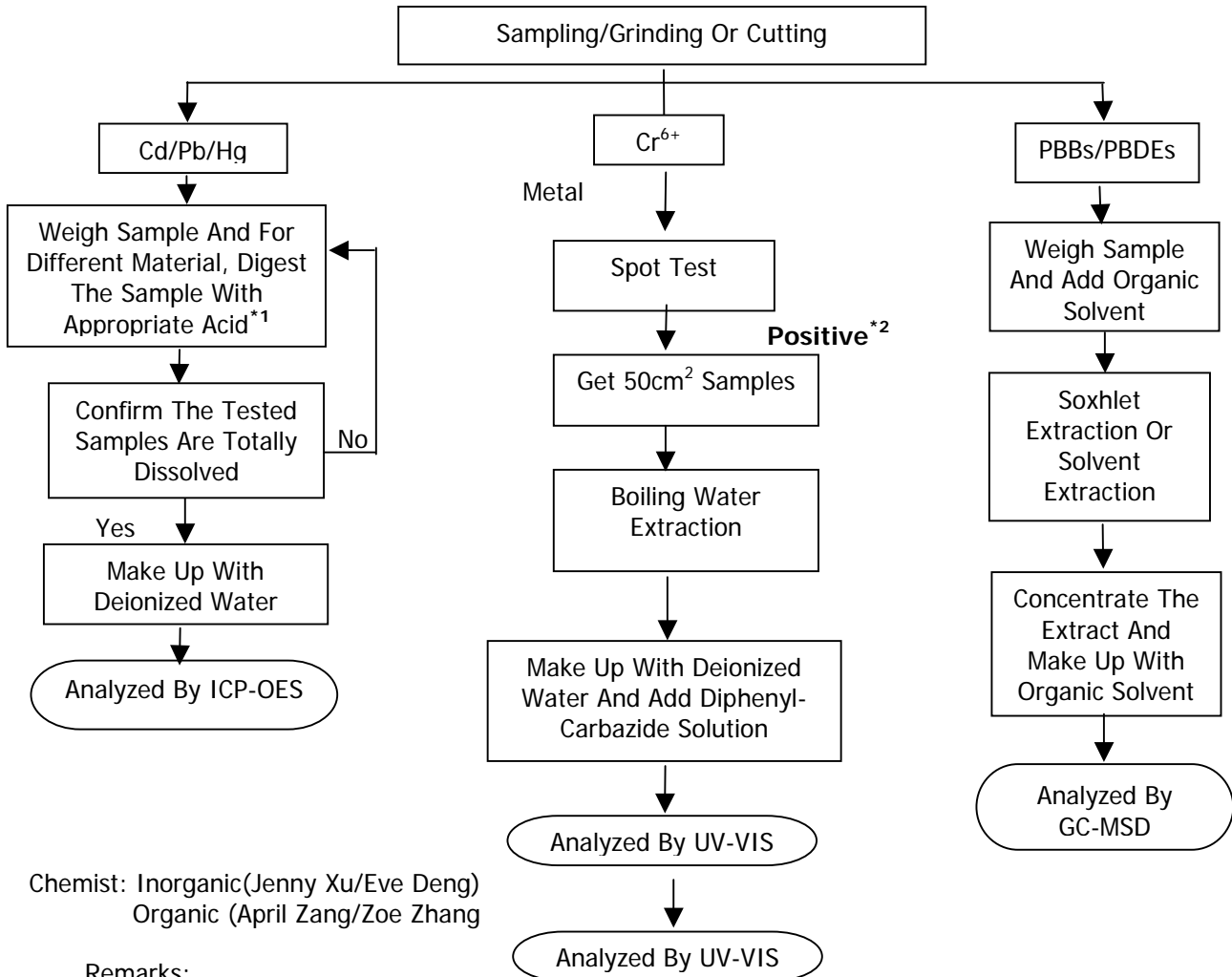
Date Sample Received: Jul 30, 2013

Testing Period: Jul 30, 2013 To Aug 01, 2013

Tests Conducted (As Requested By The Applicant)

(D) Measurement Flowchart:

Reference Standard: IEC 62321 Edition 1.0: 2008



Chemist: Inorganic(Jenny Xu/Eve Deng)
Organic (April Zang/Zoe Zhang)

Remarks:

*1: List Of Appropriate Acid:

| Material | Acid Added For Digestion |
|-------------|--|
| Polymers | HNO ₃ , HCl, HF, H ₂ O ₂ , H ₃ BO ₃ |
| Metals | HNO ₃ , HCl, HF |
| Electronics | HNO ₃ , HCl, H ₂ O ₂ , HBF ₄ |

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

Tests Conducted (As Requested By The Applicant)

Photo



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Number : WUXH00016497

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 XIAOPENG

Date : Aug 01, 2013

Sample Description As Declared:

One (1) Piece Of Submitted Sample Said To Be : **White Powder.**
Item Name : Wafer Passivation (Glass).
Vendor : Propriety.
Component Or Part No. : Propriety.
Test Item : Cd, Pb, Hg, CrVI, 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.

Jessica Lu
General Manager



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) | 312500 |
| Mercury (Hg) Content (mg/kg) | ND |
| Chromium (VI) (Cr ⁶⁺) Content (mg/kg)(For Non-Metal) | ND |
| Polybrominated Biphenyls (PBBs)(mg/kg) | |
| 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 |
| Nonabrominated Biphenyls (NonaBB) | ND |
| Decabrominated Biphenyl (DecaBB) | ND |
| Sum Of PBBs | ND |
| Polybrominated Diphenyl Ethers (PBDEs)(mg/kg) | |
| 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 |
| Nonabrominated Diphenyl Ethers (NonaBDE) | ND |
| Decabrominated Diphenyl Ether (DecaBDE) | ND |
| Sum Of PBDEs | ND |

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



Number : WUXH00016497

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 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 RoHS Directive 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 Until The Tested Sample Was Totally Dissolved, And Determined By ICP-OES. | 2 mg/kg |
| Lead (Pb)Content | With Reference To IEC 62321 Edition 1.0: 2008, By Acid Digestion Until The Tested Sample Was Totally Dissolved, And Determined By ICP-OES. | 2 mg/kg |
| Mercury (Hg)Content | With Reference To IEC 62321 Edition 1.0: 2008, By Acid Digestion Until The Tested Sample Was Totally Dissolved, And Determined By ICP-OES. | 2 mg/kg |
| Chromium (VI) (Cr ⁶⁺) 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/MS And Further HPLC Confirmation When Necessary. | 5 mg/kg |

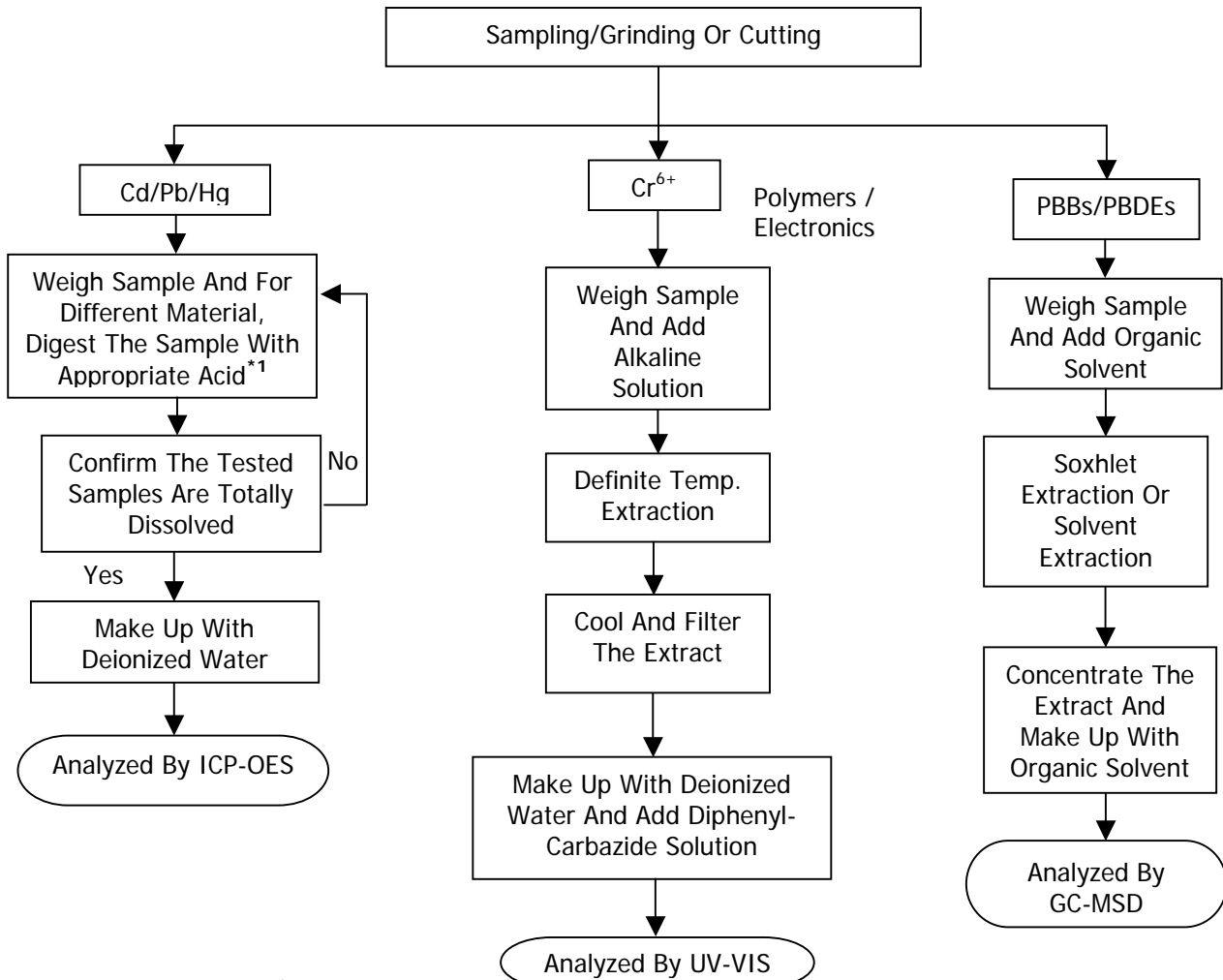
Date Sample Received: Jul 30, 2013

Testing Period: Jul 30 2013 To Jul 31, 2013

Tests Conducted (As Requested By The Applicant)

(D) Measurement Flowchart:

Reference Standard: IEC 62321 Edition 1.0: 2008



Chemist: Inorganic(Jenny Xu/Eve Deng)
Organic (April Zang/Zoe Zhang)

Remarks:

*1: List Of Appropriate Acid:

| Material | Acid Added For Digestion |
|-------------|--|
| Polymers | HNO ₃ , HCl, HF, H ₂ O ₂ , H ₃ BO ₃ |
| Metals | HNO ₃ , HCl, HF |
| Electronics | HNO ₃ , HCl, H ₂ O ₂ , HBF ₄ |



Number : WUXH00016497

Tests Conducted (As Requested By The Applicant)

2 Halogen Test

(I) Test Result Summary :

Halogen Content:

| <u>Testing Item</u> | <u>Result (ppm)</u> |
|----------------------|---------------------|
| 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 30, 2013

Testing Period: Jul 30 2013 To Jul 31, 2013

(II) Test Method :

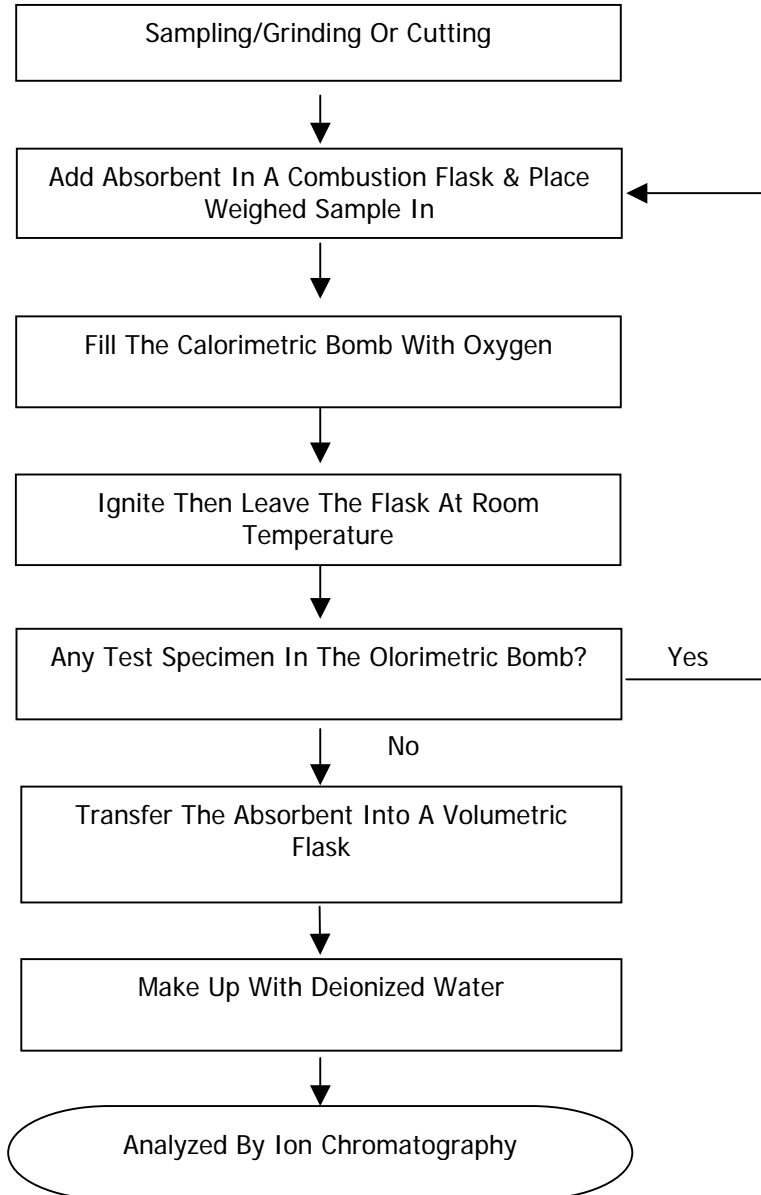
| <u>Testing Item</u> | <u>Testing Method</u> | <u>Reporting Limit</u> |
|------------------------------|---|------------------------|
| Halogen (F,Cl, Br,I) Content | With Reference To EN 14582:2007 By Combustion In A Calorimetric Bomb And Determined By Ion Chromatography | 50 ppm |

Remarks : Reporting Limit = Quantitation Limit Of Analyte In Sample

Tests Conducted (As Requested By The Applicant)

(III) Measurement Flowchart:

Test For Halogen Content Reference Method: EN 14582:2007



Chemist: Eve Deng

Tests Conducted (As Requested By The Applicant)

Photo



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

SGS Job No. : CP13-012901 - SZ
Model No. : ES500,ES510,ES520,ES530,ES540,ES550,ES610,ES620,ES630,ES640,
ES650,ES660,ES662,SERIES(Sn5Pb92.5Ag2.5,Sn5Pb95,Sn5Pb93.5Ag1.5,
Sn10Pb90,Sn10Pb88Ag2,Sn20Pb78Ag2,Sn1.5Pb97.5Ag1,Sn5Pb93Ag2,
Sn3Pb97)mixture
Date of Sample Received : 21 Mar 2013
Testing Period : 21 Mar 2013 - 28 Mar 2013
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.



Trophy Zhang
Approved Signatory

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Test Report

No. CANEC1303711402

Date: 28 Mar 2013

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Test Results :

Test Part Description :

| Specimen No. | SGS Sample ID | Description |
|--------------|------------------|-------------|
| 1 | CAN13-037114.002 | Grey 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 | Unit | MDL | 002 |
|----------------------------|-------|-------|-----|----------------------|
| Cadmium (Cd) | 100 | mg/kg | 2 | ND |
| Lead (Pb) | 1,000 | mg/kg | 2 | 905480 ¹² |
| Mercury (Hg) | 1,000 | mg/kg | 2 | ND |
| Hexavalent Chromium (CrVI) | 1,000 | mg/kg | 2 | ND |
| Sum of PBBs | 1,000 | 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 |
| Decabromobiphenyl | - | mg/kg | 5 | ND |
| Sum of PBDEs | 1,000 | mg/kg | - | ND |
| Monobromodiphenyl ether | - | mg/kg | 5 | ND |

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| <u>Test Item(s)</u> | <u>Limit</u> | <u>Unit</u> | <u>MDL</u> | <u>002</u> |
|--------------------------|--------------|-------------|------------|------------|
| 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 the directive 2011/65/EU, Annex II

Remark<1>: According to the declaration from the client, Lead (Pb) in specimen 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).

Remark<2>: The result(s) shown is/are of the total weight of wet sample.

Remark<3>: Result of Pb is only for reference

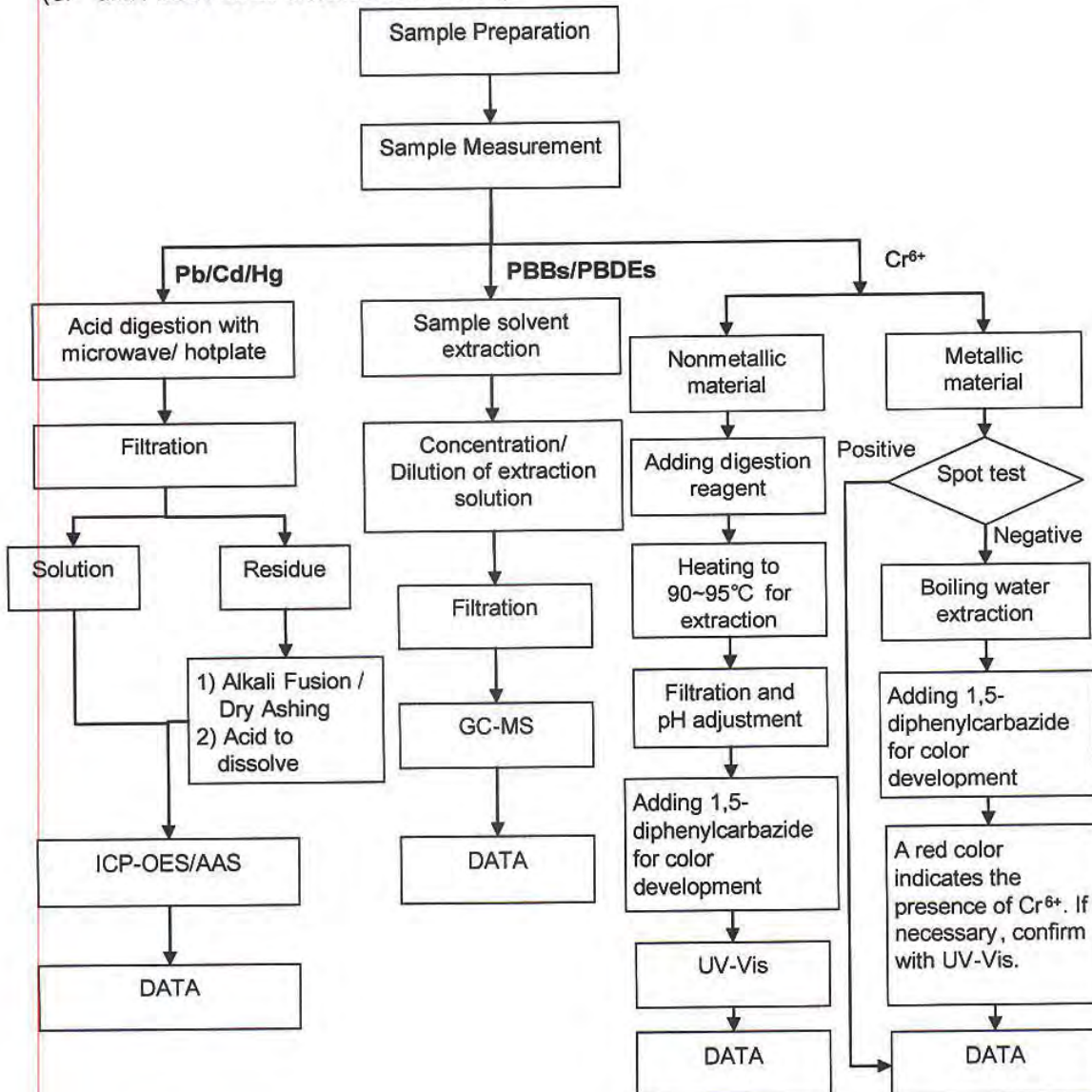
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ATTACHMENTS

RoHS Testing Flow Chart

- 1) Name of the person who made testing: Michael Tso / Cutey Yu
- 2) Name of the person in charge of testing: Adams Yu / Yolanda Wei
- 3) These samples were dissolved totally by pre-conditioning method according to below flow chart (Cr⁶⁺ and PBBs/PBDEs test method excluded).



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Sample photo:



SGS authenticate the photo on original report only

*** End of Report ***

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Annex 7: Applicable RoHS exemptions (2011/65/EU Annex III)

L 17488 **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 (7),

Having regard to the opinion of the Committee of Regions (8),

Acting in accordance with the ordinary legislative procedure (9),

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 2003 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 (28)(3) 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) 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 2003 on waste electrical and electronic equipment (WEEE) (4) are necessary to reduce the waste-management problems associated with the heavy metal and flame retardant contained in some of those materials. However, significant parts of waste EEE still continue to be found in the current disposal routes inside or outside the Union, when it waste EEE were collected separately and submitted to recycling processes, no 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 treated in less than optimal conditions.

(5) The Commission should be empowered to amend the list of restricted substances in Annex II to Directive 2002/95/EC in order to take account of scientific progress, in particular in order 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

(6) The Commission should be empowered to amend the list of restricted substances in Annex II to Directive 2002/95/EC in order to take account of scientific progress, in particular in order 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

(7) The Commission should be empowered to amend the list of restricted substances in Annex II to Directive 2002/95/EC in order to take account of scientific progress, in particular in order 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

(8) The Commission should be empowered to amend the list of restricted substances in Annex II to Directive 2002/95/EC in order to take account of scientific progress, in particular in order 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

(9) The Commission should be empowered to amend the list of restricted substances in Annex II to Directive 2002/95/EC in order to take account of scientific progress, in particular in order 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

L 17493 **EN** Official Journal of the European Union 1.7.2011

3. Paragraph 1 shall apply to medical devices and monitoring and control instruments which are placed on the market from 22 July 2014, up 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 functionality 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.

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

6. Paragraph 1 shall not apply to reused spare parts, recovered from EEE, placed on the market before 1 July 2009 and used in equipment placed on the market before 1 July 2016, provided that reuse takes place in a suitable closed-loop business-to-business return systems, and that the reuse of parts is notified to the reuser.

7. Paragraph 1 shall not apply to the applications listed in Annexes III and IV.

Article 5
Adaptation of the Annexes to scientific and technical progress

1. For the purpose 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 infeasible;
- the elimination or substitution is not ensured;
- the total negative environmental, health and consumer safety impacts caused by substances are likely to outweigh the total environmental, health and consumer safety benefits thereof.

(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.

(c) 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(b), 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(b), unless a shorter period is specified.

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

3. 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.

4. 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 1748100 **EN** Official Journal of the European Union 1.7.2011

ANNEX 9

Restricted substances referred to in Article 4(b) and maximum concentration values referred to by weight in heterogeneous materials

Lead (Pb) 1000

Cadmium (Cd) 100

Hexavalent chromium (Cr(VI)) 100

Polybrominated biphenyls (PBB) (0.1%)

Polybrominated diphenyl ethers (PBDE) (0.1%)

L 1749103 **EN** Official Journal of the European Union 1.7.2011

| Exemption | Scope and dates of applicability | |
|-----------|---|---|
| 604 | Lead as an alloying element in used for machining purposes and in polished steel containing up to 0.15 % lead by weight | |
| 605 | Lead as an alloying element in aluminium containing up to 0.4 % lead by weight | |
| 606 | Copper alloy containing up to 4 % lead by weight | |
| 704 | Lead in high melting temperature type solder (3) lead-based alloys containing 85 % by weight or more lead | |
| 705 | Lead in solder for surface mount and through hole systems, network infrastructure equipment for switching, signalling, automation and network management for mobile communications | |
| 706 | 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 embedded) | |
| 707 | Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher | |
| 708 | 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 |
| 804 | Cadmium and its compounds in one shot pellet type thermal anodes | 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 |
| 805 | Cadmium and its compounds in electrical contacts | |
| 9 | Hexavalent chromium as an accumulation agent of the carbon steel cooling system in absorption refrigerators up to 0.75 % by weight in the cooling system | |
| 901 | Lead in bearing shells and hubs for refrigeration-compressor for heating, ventilation, air conditioning and refrigeration (HVAC) applications | |
| 1101 | Lead used in Cyprus compliant pin connector systems | May be used in spare parts for EEE placed on the market before 24 September 2010 |
| 1102 | Lead used in other than Cyprus 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 conductor module Cring | May be used in spare parts for EEE placed on the market before 24 September 2010 |
| 1301 | Lead in white glazes used for electrical applications | |
| 1302 | Cadmium and lead in flow glazes and glazes used for reference standards | |
| 14 | Lead in cables consisting of more than two elements for the connection between the pins and the package of microprocessors with a lead content of more than 10 % 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 |