

## Certificate of non-use of The Controlled Substances

Company name           Littelfuse, Inc

Product Covered        Thyristor SOT-223 Package

Issue Date              April 27, 2011

It is hereby certified by Littelfuse, Inc., that there is neither RoHS (EU Directive 2002/95/EC)-restricted substance, nor such use, for materials to be used for unit parts, for packing/packaging materials, and for additives and the like in the manufacturing processes.

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 \_\_\_\_\_

< Koichiro Yoshimoto, Senior Product Engineer, Littelfuse, Inc.>

(1) Parts, sub-materials and unit parts

This document covers Thyristor SOT-223 Package, supplied by Littelfuse, LP. Please see page 2 for the list of products covered.

< Materials used >

Please see table 1 on page 3 and table 2 on page 4 of this document.

(2) The analysis result on all measurable substances

Please see annex 1 through 8 attached to this document.

Remarks :

**1. Pb (lead) contained in die attach (item 3) and passivation glass in wafer (item 6) are categorized as exempt in RoHS Annex 5 & 7.**

**Please refer to Annex 7 of this report for the extract of the applicable exemptions of RoHS (EU Directive 2002/95/EC)**

**Table 1: Littelfuse Part Number covered by this report**

| Standard (Catalog) Part Number |            |           | SPECIAL DEVICE P/N  |
|--------------------------------|------------|-----------|---|
| L0103DTRP                      | L0109DTRP  | S4X8TSRP  | Any Special P/N which has base standard P/N listed in this table. |
| L0103DTRP4                     | L0109DTRP4 | S4X8TS1RP |   |
| L0103MTRP                      | L0109MTRP  | S4X8TS2RP |   |
| L0103MTRP4                     | L0109MTRP4 | S402TSRP  | S940S6X8TSRP  |
| L0103NTRP                      | L0109NTRP  | S6X8TSRP  |   |
| L0103NTRP4                     | L0109NTRP4 | S6X8TS1RP |   |
| L0107DTRP                      |            | S6X8TS2RP |   |
| L0107DTRP4                     | LX803DTRP  | S602TSRP  |   |
| L0107MTRP                      | LX803MTRP  | S8X8TSRP  |   |
| L0107MTRP4                     | LX807DTRP  | S8X8TS1RP |   |
| L0107NTRP                      | LX807MTRP  | S8X8TS2RP |   |
| L0107NTRP4                     |            |           |   |
|                                |            |           |   |
|                                |            |           |   |
|                                |            |           |   |

**Table 2: Homogeneous Material Used**

| # | Description      | Name of Material | Type    | Analysis data   |
|---|------------------|------------------|---------|---|
| 1 | Lead finish      | Matte-Tin        | metal   | annex 1   |
| 2 | Molding compound | Epoxy resin      | plastic | annex 2   |
| 3 | Die attach       | solder           | metal   | annex 3<br>Pb for this solder application is exempted by RoHS Annex 7. Please refer to Annex 7 of this report for the RoHS exemption.                 |
| 4 | Die bonding wire | Gold             | metal   | annex 4   |
| 5 | Lead frame       | copper alloy     | metal   | annex 5   |
| 6 | Silicon die      | silicon          | metal   | annex 6<br>Pb in the report is from passivation glass and is exempted by RoHS Annex 5. Please refer to Annex 7 of this report for the RoHS exemption. |
|   |                  | aluminum         | metal   |   |
|   |                  | glass            | glass   |   |

**Table 3: RoHS-regulated substance in raw materials**

| Components  | Analysis Result |                |               |  |         |         |                  |
|---|-----------------|----------------|---------------|--|---------|---------|------------------|
|   | Cd<br>Cadmium   | Cr<br>Chromium | Hg<br>Mercury | Pb<br>Lead                                   | PBB     | PBDE    | TOTAL<br>HALOGEN |
| <b>As Component Total</b><br>(Typical Values)   | < 2ppm          | < 2ppm         | < 2ppm        | <2 ppm* <sup>1</sup><br>(0.3% <sup>2</sup> ) | < 5 ppm | < 5 ppm | < 112 ppm        |
| <b>Outside lead finish</b><br>(Matte-Tin plating)<br><br>See Annex 1 for the detail.                            | < 2ppm          | < 2ppm         | < 2ppm        | 49ppm  | < 5ppm  | < 5ppm  | ---              |
| <b>Epoxy Resin compound</b><br>(mixture of resin, filler and fire retardant)<br><br>See Annex 2 for the detail. | < 2ppm          | < 2ppm         | < 2ppm        | < 2ppm                                       | < 5ppm  | < 5ppm  | 112ppm           |
| <b>Die Attach Solder</b><br>(Solder)<br><br>See Annex 3 for the detail.   | < 2ppm          | < 2ppm         | < 2ppm        | 92.5% <sup>3</sup>                           | < 5ppm  | < 5ppm  | ---              |
| <b>Die-bonding Wire</b><br>(Gold wire)<br><br>See Annex 4 for the detail.                                       | < 2ppm          | < 2ppm         | < 2ppm        | < 2ppm                                       | < 5ppm  | < 5ppm  | < 50ppm          |
| <b>Lead frame</b><br>(Copper Alloy C194)<br><br>See Annex 5 for the detail.                                     | < 2ppm          | < 2ppm         | < 2ppm        | 16ppm  | < 5ppm  | < 5ppm  | ---              |
| <b>Silicon Die</b><br>(Silicon + Metal electrode + passivation)<br><br>See Annex 6 for the detail.              | < 2ppm          | < 2ppm         | < 2ppm        | 1.9 % <sup>3</sup>                           | < 5ppm  | < 5ppm  | < 50ppm          |

\*1 Less than 2 ppm Pb content overall, excluding Pb from the wafer passivation glass on silicon die.

\*2 Up to 0.4% of Pb (lead) content overall, including the RoHS-exempted use of Pb

\*3 Pb (lead) contained in die-attach solder and passivation glass are exempted from restriction by RoHS Annex 5 & 7.

Please refer to Annex 7 of this report for the applicable exemptions of RoHS (EU Directive 2002/95/EC)

# Annex 1: Analysis Result of Outside Lead Plating Material (Page 1 of 5)



## Test Report

No. LPCI/00919/11  
CTS Ref. CTS/11/0153/Success-Crown

Date: 18/01/2011

Page: 1 of 5


CROWN EMPEROR LTD  
ROOM 2101, HONG KONG TRADE CENTRE  
161-7 DES VOEUX ROAD CENTRAL, HONG KONG

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

Sample Description : SNTITE 24, 99.95% PURE TIN ANODE  
Sample Receiving Date : 12/01/2011  
Testing Period : 12/01/2011 to 16/01/2011

Test Requested : In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.  
Test Method : Please refer to next page(s).  
Test Results : Please refer to next page(s).  
Analysts : Ng Mei Kheng & Loi Woon Yee

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B.Sc. (HONS) AMIC  
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# Annex 1: Analysis Result of Outside Lead Plating Material (Page 3 of 5)



## Test Report

No. LPCI/00919/11  
CTS Ref. CTS/11/0153/Success-Crown


Date: 18/01/2011

Page: 3 of 5

| Test Item(s):              | Unit  | Test Method   | Results | MDL |
|----------------------------|-------|---|---------|-----|
| <b>Sum of PBDEs</b>        | mg/kg | With reference to EPA Method 3540C/3550C, and performed by GC-MS. | N.D.    | -   |
| Monobromodiphenyl ether    | mg/kg | With reference to EPA Method 3540C/3550C, and performed by GC-MS. | N.D.    | 5   |
| Dibromodiphenyl ether      | mg/kg | With reference to EPA Method 3540C/3550C, and performed by GC-MS. | N.D.    | 5   |
| Tri bromodiphenyl ether    | mg/kg | With reference to EPA Method 3540C/3550C, and performed by GC-MS. | N.D.    | 5   |
| Tetrabromodiphenyl ether   | mg/kg | With reference to EPA Method 3540C/3550C, and performed by GC-MS. | N.D.    | 5   |
| Pentabromodiphenyl ether   | mg/kg | With reference to EPA Method 3540C/3550C, and performed by GC-MS. | N.D.    | 5   |
| Hexabromodiphenyl ether    | mg/kg | With reference to EPA Method 3540C/3550C, and performed by GC-MS. | N.D.    | 5   |
| Heptabromodiphenyl ether   | mg/kg | With reference to EPA Method 3540C/3550C, and performed by GC-MS. | N.D.    | 5   |
| Octabromodiphenyl ether    | mg/kg | With reference to EPA Method 3540C/3550C, and performed by GC-MS. | N.D.    | 5   |
| Nonabromodiphenyl ether    | mg/kg | With reference to EPA Method 3540C/3550C, and performed by GC-MS. | N.D.    | 5   |
| Decabromodiphenyl ether ## | mg/kg | With reference to EPA Method 3540C/3550C, 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) ## = The exemption of DecaBDE in polymeric application according 2005/717/EC was overruled by the European Court of Justice by its decision of 01.04.2008. Subsequently DecaBDE is included in the sum of PBDE after 01.07.2008  
 (e) - = Not regulated

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# Annex 1: Analysis Result of Outside Lead Plating Material (Page 4 of 5)



### Test Report

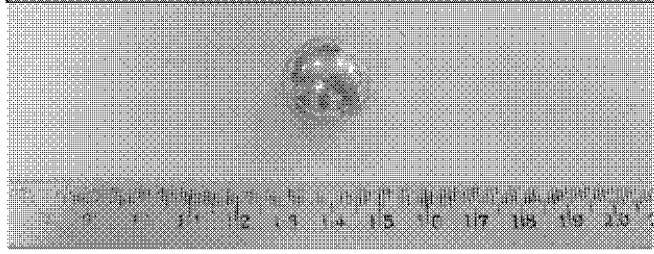
No. LPCI/00919/11      Date: 18/01/2011  
CTS Ref. CTS/11/0153/Success-Crown

Page: 4 of 5

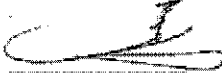
Test Part Description :

Sample Description :      SNTITE-24, 99.95% PURE TIN ANODE

CROWN EMPEROR LTD  
LPCI/00919/11



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# Annex 1: Analysis Result of Outside Lead Plating Material (Page 5 of 5)



## Test Report

No. LPCI/00919/11  
CTS Ref. CTS/11/0153/Success-Crown

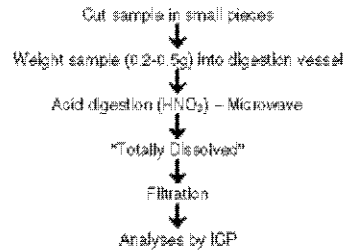
Date: 18/01/2011

Page: 5 of 5

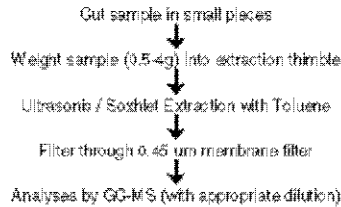
### 1. DETERMINATION OF HEXAVALENT CHROMIUM BY METHOD US EPA 3060A/7196A



### 2. MICROWAVE ASSISTED ACID DIGESTION OF ORGANICALLY BASED METRICS (US EPA 3051A)

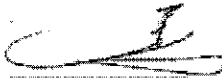


### 3. DETERMINATION OF PBB/PBDE WITH GC-MS



\*\*\*\* End of Report \*\*\*\*

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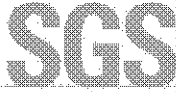
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## Annex 2: Analysis Result of Molding Compound (Page 2 of 7)



### Test Report

No. CANEC1100147901

Date: 17 Jan 2011

Page 2 of 7

#### Test Results:

ID for specimen 1 : CAN11-001479.001

Description for specimen 1 : Dk-grey material

#### A:RoHS Directive 2002/95/EC

| Test Item(s)                                      | Unit  | Test Method (Reference) | Result | MDL | Limit |
|---|-------|-------------------------|--------|-----|-------|
| Cadmium (Cd)                                      | mg/kg | IEC 62321:2008, ICP-OES | N.D.   | 2   | 100   |
| Lead (Pb)   | mg/kg | IEC 62321:2008, ICP-OES | N.D.   | 2   | 1000  |
| Mercury (Hg)                                      | mg/kg | IEC 62321:2008, ICP-OES | N.D.   | 2   | 1000  |
| Hexavalent Chromium (CrVI) by alkaline extraction | mg/kg | IEC 62321:2008, UV-Vis  | N.D.   | 2   | 1000  |
| Sum of PBBs                                       | mg/kg | -                       | N.D.   | -   | 1000  |
| Monobromobiphenyl                                 | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Dibromobiphenyl                                   | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Tribromobiphenyl                                  | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Tetrabromobiphenyl                                | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Pentabromobiphenyl                                | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Hexabromobiphenyl                                 | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Heptabromobiphenyl                                | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Octabromobiphenyl                                 | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Nonabromobiphenyl                                 | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Decabromobiphenyl                                 | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Sum of PBDEs                                      | mg/kg | -                       | N.D.   | -   | 1000  |
| Monobromodiphenyl ether                           | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Dibromodiphenyl ether                             | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Tribromodiphenyl ether                            | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Tetrabromodiphenyl ether                          | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Pentabromodiphenyl ether                          | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Hexabromodiphenyl ether                           | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Heptabromodiphenyl ether                          | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Octabromodiphenyl ether                           | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Nonabromodiphenyl ether                           | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |
| Decabromodiphenyl ether                           | mg/kg | IEC 62321:2008, GC-MS   | N.D.   | 5   |       |

#### Note:

1. mg/kg = ppm
2. N.D. = Not Detected (< MDL)
3. MDL = Method Detection Limit
4. "-" = Not regulated

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## Annex 2: Analysis Result of Molding Compound (Page 4 of 7)



### Test Report

No. CANEC1100147901

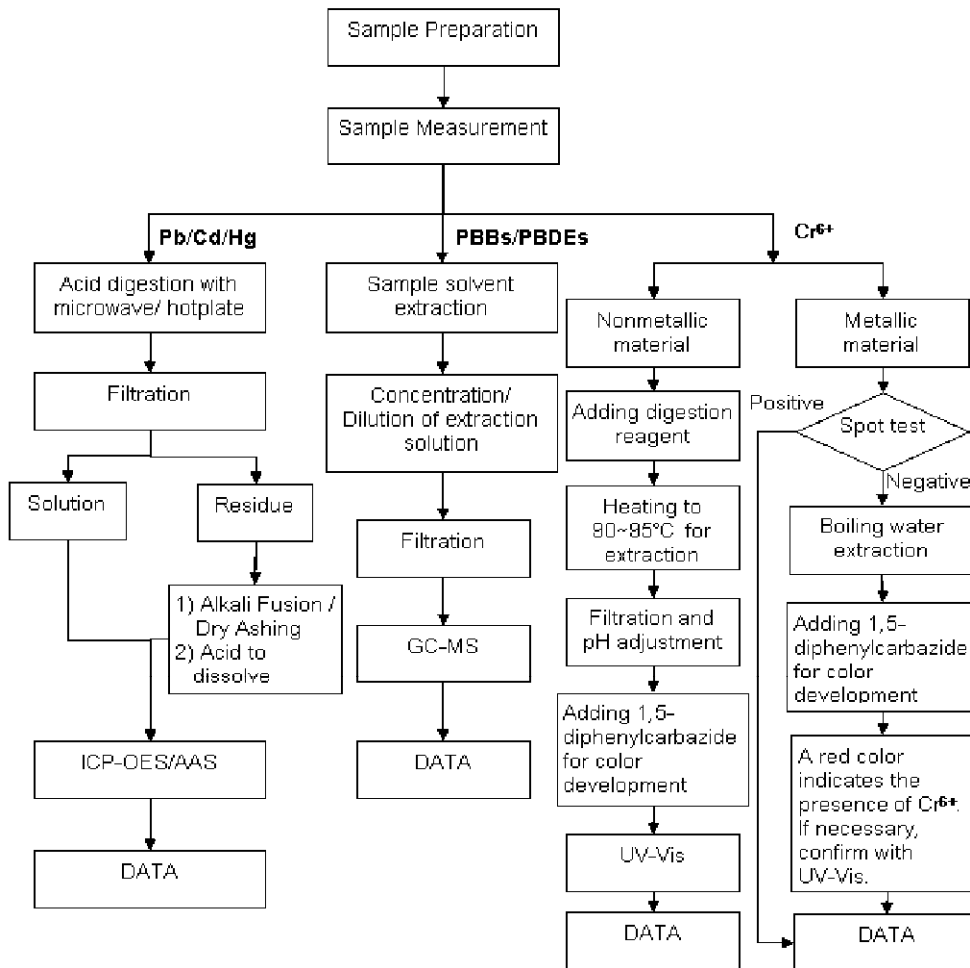
Date: 17 Jan 2011

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### ATTACHMENTS

#### RoHS Testing Flow Chart

- 1) Name of the person who made testing: Bella Wang / Cutey Yu / Ross Zhan
- 2) Name of the person in charge of testing: Adams Yu / Ryan Yang
- 3) These samples were dissolved totally by pre-conditioning method according to below flow chart (Cr<sup>6+</sup> and PBBs/PBDEs test method excluded).



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## Annex 2: Analysis Result of Molding Compound (Page 6 of 7)



**Test Report**

No. CANEC1100147901

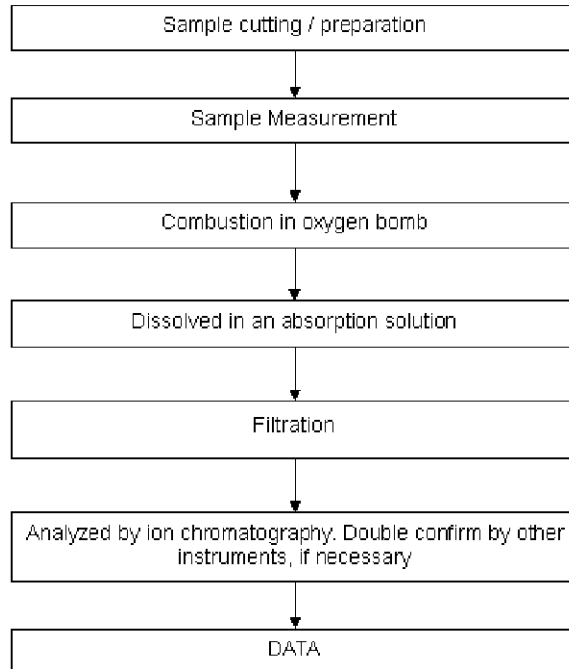
Date: 17 Jan 2011

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**ATTACHMENTS**

**Halogen Testing Flow Chart**

- 1) Name of the person who made testing: Liang Wang
- 2) Name of the person in charge of testing: Michelle Song



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 中國·廣東·經濟技術開發區黃埔街100號 | 0086-21-5032020 | 0086-21-5032020

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## Annex 2: Analysis Result of Molding Compound (Page 7 of 7)



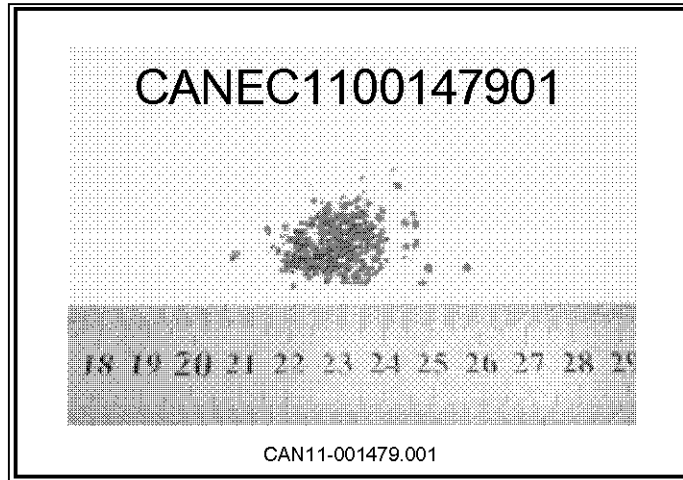
**Test Report**

No. CANEC1100147901

Date: 17 Jan 2011

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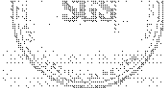
Sample photo:



SGS authenticate the photo on original report only

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**Annex 3: Analysis Result of Die-Attach Solder (Page 1 of 6)****Test Report**

No: 10211878(8)

Date: 14-Oct-10

Page 1 of 6

Heraeus Materials Singapore Pte Ltd  
No. 2 Corporation Road, #06-15/16/17 Corporation Place, Singapore 618494

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

Sample Description : PbSn2Ag2.5 Solder Wire

Sample Receiving Date : 05-Oct-10  
Testing Period : 07-Oct-10 to 13-Oct-10


Test Requested : In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.

---

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

Conclusion : Based on the performed tests on submitted sample(s), the results **comply with** the RoHS Directive 2002/95/EC and its subsequent amendments.

Signed for and on behalf of  
SGS Testing & Control Services Singapore Pte Ltd



---

Y.C. Tham  
Laboratory Manager

Test Location: 26 Ayer Rajah Crescent, #07-08, Singapore 139944

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## Annex 3: Analysis Result of Die-Attach Solder (Page 2 of 6)



### Test Report

No: 10211878(8)

Date: 14-Oct-10

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#### Test Result(s):

Sample Description : PbSn2Ag2.5 Solder Wire

| Test Item(s):   | Unit  | Method  | Results  | MDL   | RoHS Limit |
|---|-------|---|----------|---|------------|
| Cadmium(Cd)   | mg/kg | With reference to IEC62321, Ed1:2008. Analysis was performed by ICP/AES   | n.d.     | 2   | 100        |
| Lead (Pb)   | mg/kg | With reference to IEC62321, Ed1:2008. Analysis was performed by ICP/AES   | 661360.7 | 2   | 1000       |
| Mercury (Hg)  | mg/kg | With reference to IEC62321, Ed1:2008. Analysis was performed by ICP/AES   | n.d.     | 2   | 1000       |
| Hexavalent Chromium (CrVI)<br>(By spot test / boiling water extraction) | ---   | With reference to IEC62321, Ed1:2008 and performed by Spot test / boiling water extraction method. (see Note 9) | Negative | 0.02 mg/kg with 50 cm <sup>2</sup> surface area | #          |
| <b>Sum of PBBs</b>  | mg/kg | With reference to IEC62321, Ed1:2008. Analysis was performed by GC/MS   | n.d.     | -   | 1000       |
| Monobromobiphenyl   | mg/kg |   | n.d.     | 5   | -          |
| Dibromobiphenyl   | mg/kg |   | n.d.     | 5   | -          |
| Tribromobiphenyl  | mg/kg |   | n.d.     | 5   | -          |
| Tetrabromobiphenyl  | mg/kg |   | n.d.     | 5   | -          |
| Hexabromobiphenyl   | mg/kg |   | n.d.     | 5   | -          |
| Pentabromobiphenyl  | mg/kg |   | n.d.     | 5   | -          |
| Heptabromobiphenyl  | mg/kg |   | n.d.     | 5   | -          |
| Octabromobiphenyl   | mg/kg |   | n.d.     | 5   | -          |
| Nonabromobiphenyl   | mg/kg |   | n.d.     | 5   | -          |
| Decabromobiphenyl   | mg/kg |   | n.d.     | 5   | -          |
| <b>Sum of PBDEs</b>   | mg/kg |   | n.d.     | -   | 1000       |
| Monobromodiphenyl ether   | mg/kg |   | n.d.     | 5   | -          |
| Dibromodiphenyl ether   | mg/kg |   | n.d.     | 5   | -          |
| Tribromodiphenyl ether  | mg/kg |   | n.d.     | 5   | -          |
| Tetrabromodiphenyl ether  | mg/kg |   | n.d.     | 5   | -          |
| Pentabromodiphenyl ether  | mg/kg |   | n.d.     | 5   | -          |
| Hexabromodiphenyl ether   | mg/kg | n.d.  | 5        | -   |            |
| Heptabromodiphenyl ether  | mg/kg | n.d.  | 5        | -   |            |
| Octabromodiphenyl ether   | mg/kg | n.d.  | 5        | -   |            |
| Nonabromodiphenyl ether   | mg/kg | n.d.  | 5        | -   |            |
| Decabromodiphenyl ether ##  | mg/kg | n.d.  | 5        | -   |            |

Test Location: 26 Ayer Rajah Crescent, #07-08, Singapore 139944

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**Annex 3: Analysis Result of Die-Attach Solder (Page 3 of 6)****SGS****Test Report**

No: 10211878(8)

Date: 14-Oct-10

Page 3 of 6

Note:

- (1) mg/kg = ppm ; 0.1wt% = 1000ppm
- (2) n.d.= Not Detected
- (3) MDL = Method Detection Limit
- (4) ## = The exemption of DecaBDE in polymeric application according 2005/717/EC was overruled by the European Court of Justice by its decision of 01.04.2008. Subsequently DecaBDE will be included in the sum of PBDE after 01.07.2008.
- (5) “-“ = Not regulated
- (6) “---“: No unit (Qualitative Test)
- (7) \* : Exceeds limit
- (8) # : Positive means the presence of Cr(VI) on the tested areas.  
Negative means the absence of Cr(VI) on the tested areas.
- (9) Spot-test:  
Negative = Absence of Cr(VI) coating / surface layer  
Positive = Presence of Cr(VI) coating / surface layer  
The tested sample should be further verified by boiling-water-extraction method if the spot test result cannot be confirmed.  
Boiling-water extraction:  
Negative = Absence of Cr(VI) coating / surface layer  
Positive = Presence of Cr(VI) coating / surface layer  
the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area.

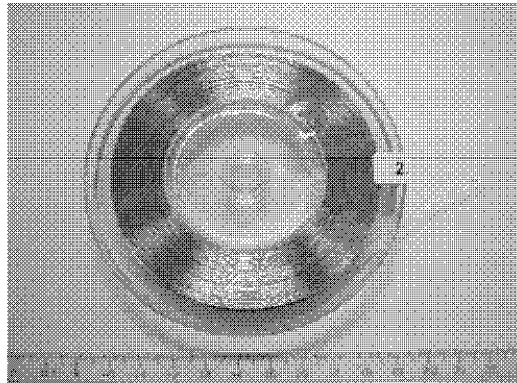
Lab Analyst(s): Jojo and Eileen

Remarks: Sample received was totally dissolved by preconditioning method.

**Sample photo:**

Sample Description : PbSn2Ag2.5 Solder Wire

SGS authenticate the photo on original report only



Test Location: 26 Ayer Rajah Crescent, #07-08, Singapore 139944

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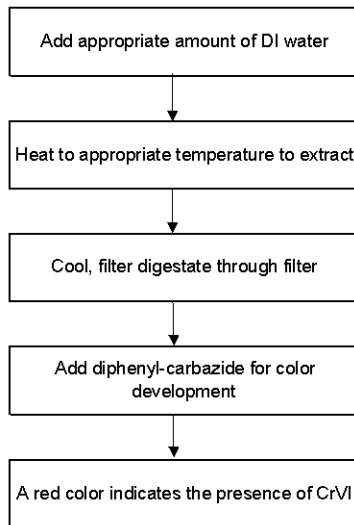
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**Annex 3: Analysis Result Die-Attach Solder (Page 4 of 6)****Test Report**

No: 10211878(8)

Date: 14-Oct-10

Page 5 of 6

**Process Flow of Cr(VI) by Boiling Water Extraction (IEC62321)**

Test Location: 26 Ayer Rajah Crescent, #07-08, Singapore 139944

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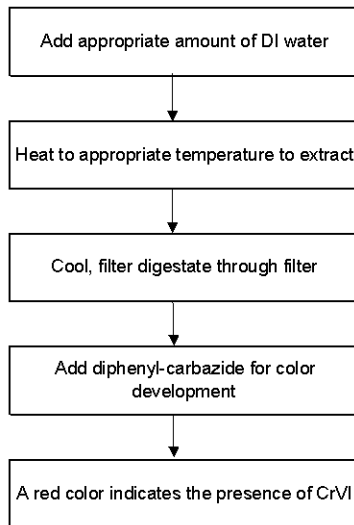
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**Annex 3: Analysis Result Die-Attach Solder (Page 5 of 6)****Test Report**

No: 10211878(8)

Date: 14-Oct-10

Page 5 of 6

**Process Flow of Cr(VI) by Boiling Water Extraction (IEC62321)**

Test Location: 26 Ayer Rajah Crescent, #07-08, Singapore 139944

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**Annex 3: Analysis Result Die-Attach Solder (Page 6 of 6)****SGS****Test Report**

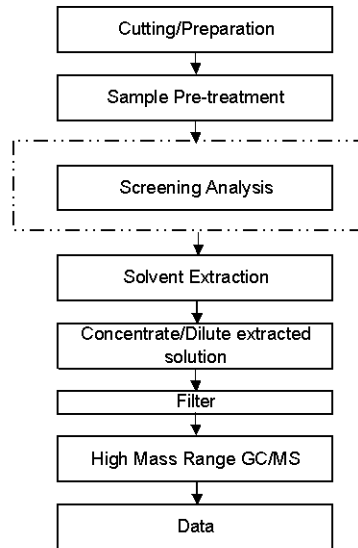
No: 10211878(8)

Date: 14-Oct-10

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**Process Flow of PBBs and PBDEs by GC/MS (IEC 62321)**

First Testing Process → Optional screen process ..... Confirmation process ...→



\*\*\*End of Report\*\*\*

Test Location: 26 Ayer Rajah Crescent, #07-08, Singapore 139944

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# Annex 4: Analysis Result of Die-bonding Wire (Page 1 of 12)



Validity unknown

For Question  
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## Test Report

No. : KA/2010/80978A-04 Date : 2010/08/31 Page : 1 of 12

HERAEUS MATERIALS SINGAPORE PTE LTD  
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871



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

|                       |   |  |
|-----------------------|---|--|
| Sample Description    | : | Au BONDING WIRE  |
| Style/Item No.        | : | AW1, AW6, AW7, AW8, AW9, AW13, AW14, AW21, AW22, AW23,<br>AW24, AW25, AW28, AW29, AW66/66i/66X, AW99/99i/99X, Formax,<br>FP2, RADIX, RADIXplus, RelMax |
| Color                 | : | GOLD   |
| Sample Receiving Date | : | 2010/08/13   |
| Testing Period        | : | 2010/08/13 TO 2010/08/31   |

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

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



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## Annex 4: Analysis Result of Die-bonding Wire (Page 2 of 12)



### Test Report

No. : KA/2010/80978A-04 Date : 2010/08/31 Page : 2 of 12

HERAEUS MATERIALS SINGAPORE PTE LTD  
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871



#### Test Result(s)

PART NAME NO.1 : Au BONDING WIRE

| 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 Spot test / boiling water extraction                    | **    | With reference to IEC 62321: 2008 and performed by Spot test / boiling water extraction Method. (See Note 5)          | 0.02mg/kg with 50 cm <sup>2</sup> surface area | Negative |
| Hexavalent Chromium Cr(VI)  | mg/kg | With reference to US EPA Method 3060A & 7196A for Hexavalent Chromium. Analysis was performed by UV-Vis Spectrometry. | 2  | n.d.     |
| 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)<br>PFOS – Acid<br>PFOS – Metal Salt<br>PFOS – Amide | mg/kg | With reference to US EPA 3540C: 1996 method for PFOS Content. Analysis was performed by LC/MS.                        | 10   | n.d.     |
| PFOA (CAS No.: 000335-67-1)   | mg/kg | With reference to US EPA 3540C: 1996 method for PFOA Content. Analysis was performed by LC/MS.                        | 10   | n.d.     |

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# Annex 4: Analysis Result of Die-bonding Wire (Page 3 of 12)



## Test Report

No. : KA/2010/80978A-04 Date : 2010/08/31 Page : 3 of 12

HERAEUS MATERIALS SINGAPORE PTE LTD  
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871



| Test Item (s):                               | Unit  | Method  | MDL   | Result  |    |      |
|--|-------|---|-------|---|----|------|
|  |       |   |       | No.1  |    |      |
| <b>Sum of PBBs</b>                           |       |   | -     | 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.  |    |      |
| <b>Sum of PBDEs</b>                          |       |   |       |   | -  | 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.  |       |   |    |      |
| <b>Halogen</b>                               |       |   |       |   |    |      |
| 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.  |    |      |

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# Annex 4: Analysis Result of Die-bonding Wire (Page 4 of 12)



## Test Report

No. : KA/2010/80978A-04 Date : 2010/08/31 Page : 4 of 12

HERAEUS MATERIALS SINGAPORE PTE LTD  
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871



| Test Item (s):   | Unit | Method   | MDL   | Result No.1 |
|--|------|--|-------|-------------|
| <b>Phthalates</b>  |      |  |       |             |
| BBP (Benzyl butyl phthalate) (CAS No.: 000085-68-7)          | %    | With reference to EN 14372. Analysis was performed by GC/MS. | 0.003 | n.d.        |
| DBP (Dibutyl phthalate) (CAS No.: 000084-74-2)               | %    | With reference to EN 14372. Analysis was performed by GC/MS. | 0.003 | n.d.        |
| DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 000117-81-7)   | %    | With reference to EN 14372. Analysis was performed by GC/MS. | 0.003 | n.d.        |
| DIDP (Di-isodecyl phthalate) (CAS No.: 026761-40-0)          | %    | With reference to EN 14372. Analysis was performed by GC/MS. | 0.01  | n.d.        |
| DINP (Di-isononyl phthalate) (CAS No.: 028553-12-0)          | %    | With reference to EN 14372. Analysis was performed by GC/MS. | 0.01  | n.d.        |
| DNOP (Di-n-octyl phthalate) (CAS No.: 000117-84-0)           | %    | With reference to EN 14372. Analysis was performed by GC/MS. | 0.003 | n.d.        |
| DNHP (Di-n-hexyl phthalate) (CAS No.: 000084-75-3)           | %    | With reference to EN 14372. Analysis was performed by GC/MS. | 0.003 | n.d.        |
| DMEP (Bis (2-methoxyethyl) phthalate) (CAS No.: 000117-82-8) | %    | With reference to EN 14372. Analysis was performed by GC/MS. | 0.003 | n.d.        |

Note : 1. mg/kg = ppm : 0.1wt% = 1000ppm

2. n.d. = Not Detected

3. MDL = Method Detection Limit

4. " - " = Not Regulated

5. Spot-test:

Negative = Absence of Cr(VI) coating / surface layer,

Positive = Presence of Cr(VI) coating / surface layer;

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

Boiling-water-extraction:

Negative = Absence of Cr(VI) coating / surface layer.

Positive = Presence of Cr(VI) coating / surface layer;

the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area.

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**Annex 4: Analysis Result of Die-bonding Wire (Page 5 of 12)****Test Report**

No. : KA/2010/80978A-04 Date : 2010/08/31 Page : 5 of 12

HERAEUS MATERIALS SINGAPORE PTE LTD



6. \*\* = Qualitative analysis (No Unit)

7. This is the additional test report of KA/2010/80978 which was issued on 2010/08/31.

Please refer to KA/2010/80978 for original information.

**PFOS Reference Information : Directive 2006/122/EC**

- (1) May not be placed on the market or used as a substance or constituent of preparations in a concentration equal to or higher than 0.005 % by mass.
- (2) May not be placed on the market in semi-finished products or articles, or parts thereof, if the concentration of PFOS is equal to or higher than 0.1 % by mass calculated with reference to the mass of structurally or microstructurally distinct parts that contain PFOS or, for textiles or other coated materials, if the amount of PFOS is equal to or higher than  $1\mu\text{g}/\text{m}^2$  of the coated material.

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# Annex 4: Analysis Result of Die-bonding Wire (Page 6 of 12)



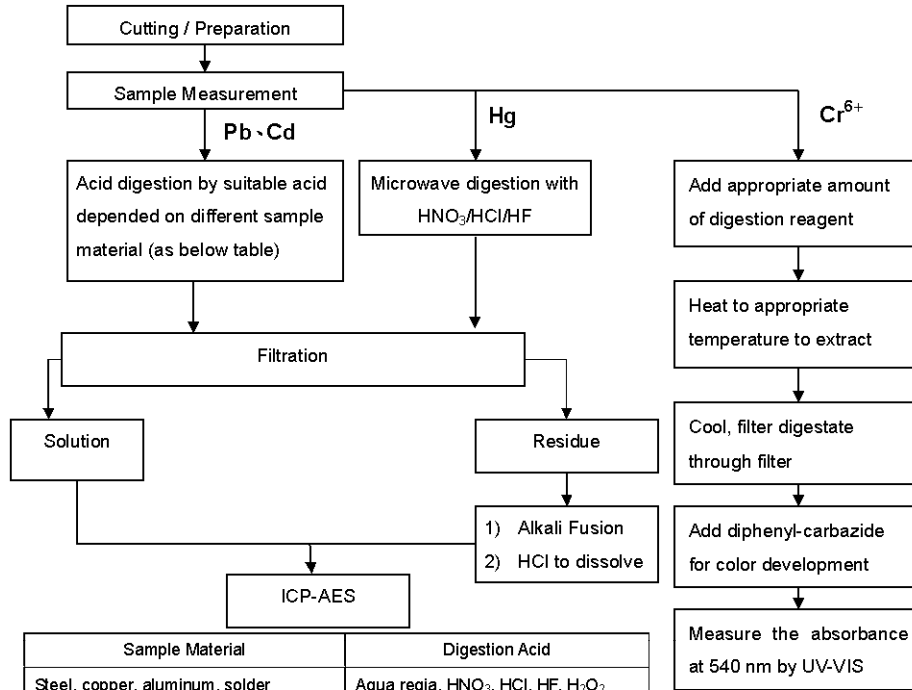
## Test Report

No. : KA/2010/80978A-04 Date : 2010/08/31 Page : 6 of 12

HERAEUS MATERIALS SINGAPORE PTE LTD  
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871



- 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



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

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# Annex 4: Analysis Result of Die-bonding Wire (Page 7 of 12)



## Test Report

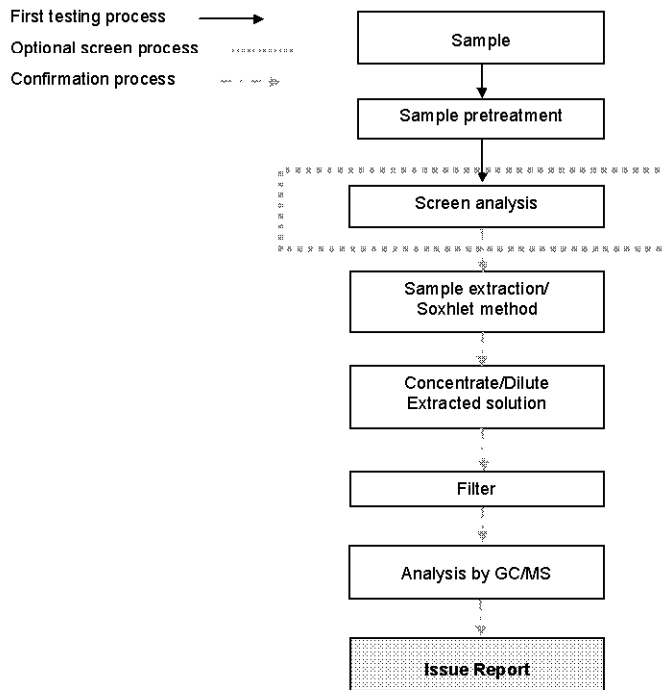
No. : KA/2010/80978A-04 Date : 2010/08/31 Page : 7 of 12

HERAEUS MATERIALS SINGAPORE PTE LTD  
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871



### 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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## Annex 4: Analysis Result of Die-bonding Wire (Page 8 of 12)



### Test Report

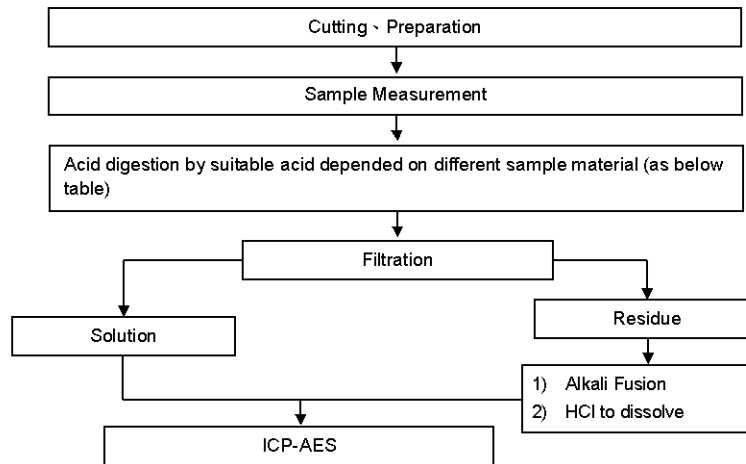
No. : KA/2010/80978A-04 Date : 2010/08/31 Page : 8 of 12

HERAEUS MATERIALS SINGAPORE PTE LTD  
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871



- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
- 2) Name of the person who made measurement: Alex Changi
- 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 <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub>                   |
| Glass                              | HNO <sub>3</sub> /HF  |
| Gold, platinum, palladium, ceramic | Aqua regia  |
| Silver                             | HNO <sub>3</sub>  |
| Plastic                            | H <sub>2</sub> SO <sub>4</sub> , H <sub>2</sub> O <sub>2</sub> , HNO <sub>3</sub> , HCl |
| Others                             | Any acid to total digestion   |

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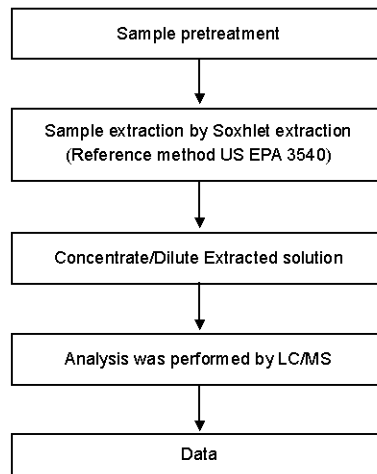
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**Annex 4: Analysis Result of Die-bonding Wire (Page 9 of 12)****Test Report**

No. : KA/2010/80978A-04 Date : 2010/08/31 Page : 9 of 12

HERAEUS MATERIALS SINGAPORE PTE LTD  
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871**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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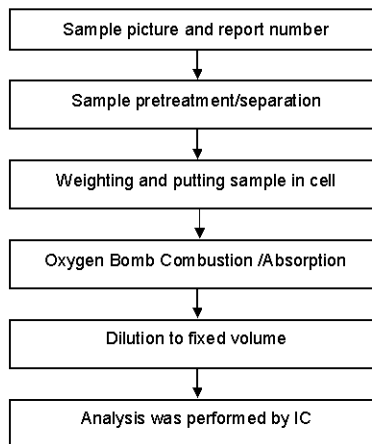
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**Annex 4: Analysis Result of Die-bonding Wire (Page 10 of 12)****Test Report**

No. : KA/2010/80978A-04    Date : 2010/08/31    Page : 10 of 12

HERAEUS MATERIALS SINGAPORE PTE LTD  
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871**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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# Annex 4: Analysis Result of Die-bonding Wire (Page 11 of 12)



## Test Report

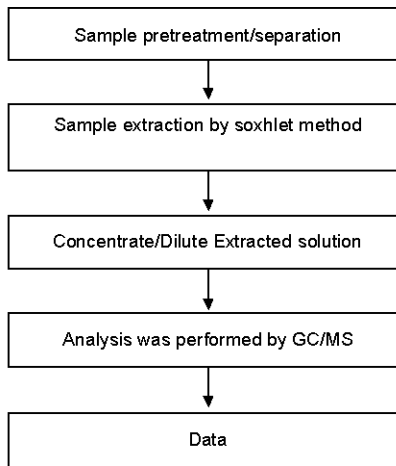
No. : KA/2010/80978A-04    Date : 2010/08/31    Page : 11 of 12

HERAEUS MATERIALS SINGAPORE PTE LTD  
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871



### Analytical flow chart of phthalate 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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# Annex 4: Analysis Result of Die-bonding Wire (Page 12 of 12)



## Test Report

No. : KA/2010/80978A-04    Date : 2010/08/31    Page : 12 of 12

HERAEUS MATERIALS SINGAPORE PTE LTD  
BLK 5002 ANG MO KIO AVE 5, #04-05 TECHPLACE II, SINGAPORE 569871



\*\* End of Report \*\*

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**Annex 5: Analysis Result of Lead Frame (page 1 of 11)****Test Report**

No. 2107721/EC

Date : Jan 25 2011

Page 1 of 11

LEADFRAME TECHNOLOGY LIMITED  
UNIT 04, G/F., LAI SUN YUEN LONG CENTRE  
21 - 35 WANG YIP STREET EAST  
YUEN LONG  
N.T., HONG KONG

The following sample was submitted and identified on behalf of the applicant as:  
LEADFRAME MADE OF COPPER ALLOY A194

SGS Job No. : 1436618  
Lot No. : 110113  
Manufacturer : LEADFRAME TECHNOLOGY LIMITED  
Country of Origin : HONG KONG  
Sample Receiving Date : JAN 14 2011  
Testing Period : JAN 14 – 25 2011

Test Requested : Selected test (s) as requested by client.

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

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

Conclusion : 1) Based on the performed tests on submitted sample, the results comply with the RoHS Directive 2002/95/EC and its subsequent amendments.  
  
4) When tested as specified, the submitted sample complies with the phthalate requirements under entries 51 and 52 of the Regulation (EC) No. 552/2009 amending Annex XVII of REACH Regulation (EC) No. 1907/2006 (previously restricted under Directive 2005/84/EC).

Signed for and on behalf of  
SGS Hong Kong Ltd



Thu Hung Yat, Rodney  
Section Manager

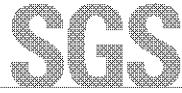
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## Annex 5: Analysis Result of Lead Frame (page 2 of 11)



### Test Report

No. 2107721/EC

Date : Jan 25 2011

Page 2 of 11

Test result:

1)

ID for sample 1 : 4120954002

Description for sample 1 : Metal w/ Silvery Plating (Base: Coppery Metal)

#### RoHS Directive 2002/95/EC

| Test Item(s) :   | Unit  | Test Method   | Results     | MDL | Limit       |
|--|-------|---|-------------|-----|-------------|
| Cadmium(Cd)  | mg/kg | With reference to IEC 62321:2008 and performed by ICP-OES | n.d.        | 2   | 100         |
| Lead (Pb)  | mg/kg | With reference to IEC 62321:2008 and performed by ICP-OES | 16          | 5   | 1000        |
| Mercury (Hg)   | mg/kg | With reference to IEC 62321:2008 and performed by ICP-OES | n.d.        | 2   | 1000        |
| Hexavalent Chromium (CrVI)<br>by spot-test/ boiling-water-extraction | -     | With reference to IEC 62321:2008                          | Negative    | -   | #           |
| <b>Sum of PBBs</b>   | mg/kg | With reference to IEC 62321:2008 and performed by GC-MS   | <b>n.d.</b> | -   | <b>1000</b> |
| 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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## Annex 5: Analysis Result of Lead Frame (page 3 of 11)



### Test Report

No. 2107721/EC

Date : Jan 25 2011

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| Sum of PBDEs               | mg/kg | With reference to IEC 62321:2008 and performed by GC-MS | n.d. | - | 1000 |
|----------------------------|-------|---|------|---|------|
| 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 :

- (1) mg/kg = ppm; 0.1 wt% = 1000 ppm
- (2) n.d. = not detected
- (3) MDL = Method Detection Limit
- (4) ## = The exemption of DecaBDE in polymeric application according 2005/717/EC was overruled by the European Court of Justice by its decision of 01.04.2008. Subsequently DecaBDE will be included in the sum of PBDE after 01.07.2008
- (5) # = Negative means the absence of CrVI on the tested areas;  
Positive means the presence of CrVI on the tested areas. The detected concentration in boiling water extraction solution is equal to or greater than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area
- (6) “ - “ = Not regulated

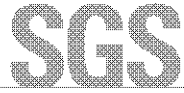
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## Annex 5: Analysis Result of Lead Frame (page 4 of 11)



### Test Report

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Test result:

2)

ID for sample 1 : 4120954002

Description for sample 1 : Metal w/ Silvery Plating (Base: Coppery Metal)

#### PFOS (Perfluorooctane sulfonates)

| <u>Test Item(s)</u>                | <u>Unit</u> | <u>Test Method (Reference)</u>                                 | <u>1</u> | <u>MDL</u> |
|------------------------------------|-------------|--|----------|------------|
| Perfluorooctane sulphonates (PFOS) |             |  |          |            |
| PFOS – Acid                        |             | With reference to SGS in-house method and performed by HPLC-MS | n.d.     | 10         |
| PFOS – Metal Salt                  | mg/kg       |  |          |            |
| PFOS – Amide                       |             |  |          |            |

#### PFOA (Perfluorooctyl Acid)

| <u>Test Item(s)</u>        | <u>Unit</u> | <u>Test Method (Reference)</u>                                 | <u>1</u> | <u>MDL</u> |
|----------------------------|-------------|--|----------|------------|
| Perfluorooctyl Acid (PFOA) | mg/kg       | With reference to SGS in-house method and performed by HPLC-MS | n.d.     | 10         |

Note :

- (1) mg/kg = ppm
- (2) n.d. = Not Detected (< MDL)
- (3) MDL = Method Detection Limit

Reference information: Entry 53 of the Regulation (EC) No. 552/2009 amending Annex XVII of REACH Regulation (EC) No. 1907/2006 (Formerly Directive 2006/122/EC).

- (1) Shall not be placed on the market, or used, as a substance or in mixtures in concentrations equal to or higher than 0,005% by mass.
- (2) Shall not be placed on the market in semi-finished products or articles, or parts thereof, if the concentration of PFOS is equal to or higher than 0,1% by mass calculated with reference to the mass of structurally or microstructurally distinct parts that contain PFOS or, for textiles or other coated materials, if the amount of PFOS is equal to or higher than 1µg/m<sup>2</sup> of the coated material.

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**Annex 5: Analysis Result of Lead Frame (page 5 of 11)****Test Report**

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Test result:

3)

ID for sample 1 : 4120954002

Description for sample 1 : Metal w/ Silvery Plating (Base: Coppery Metal)

HBCDD

| Test Item(s) : | Unit  | Test Method  | Results | MDL |
|----------------|-------|--|---------|-----|
| HBCDD          | mg/kg | With reference to US EPA3550C:2007, and performed by GC-MS | n.d.    | 5   |

Note :

- (1) mg/kg = ppm; 0.1 wt% = 1000 ppm
- (2) n.d. = not detected
- (3) MDL = Method Detection Limit

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## Annex 5: Analysis Result of Lead Frame (page 6 of 11)



### Test Report

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Test results:

4)

ID for sample 1 : 4120954002

Description for sample 1 : Metal w/ Silvery Plating (Base: Coppery Metal)

#### Phthalate

| Test item                           | Test Method                             | 1      | DL     | Limit |
|-------------------------------------|---|--------|--------|-------|
| Dibutyl Phthalate (DBP)             | ASTM Method Designation D3421-75, GC-MS | n.d.   | 0.003% | -     |
| Benzylbutyl Phthalate (BBP)         | ASTM Method Designation D3421-75, GC-MS | n.d.   | 0.003% | -     |
| Bis-(2-ethylhexyl) Phthalate (DEHP) | ASTM Method Designation D3421-75, GC-MS | n.d.   | 0.003% | -     |
| Total (DBP + BBP + DEHP)            |   | <0.01% | --     | 0.1%  |

Note :

- (1) mg/kg = ppm; 0.1% = 1000 ppm
- (2) DL = Detection Limit
- (3) n.d. = Not Detected (Less than DL)
- (4) < = less than
- (5) % = percentage by weight
- (6) - = Not Regulated

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# Annex 5: Analysis Result of Lead Frame (page 7 of 11)

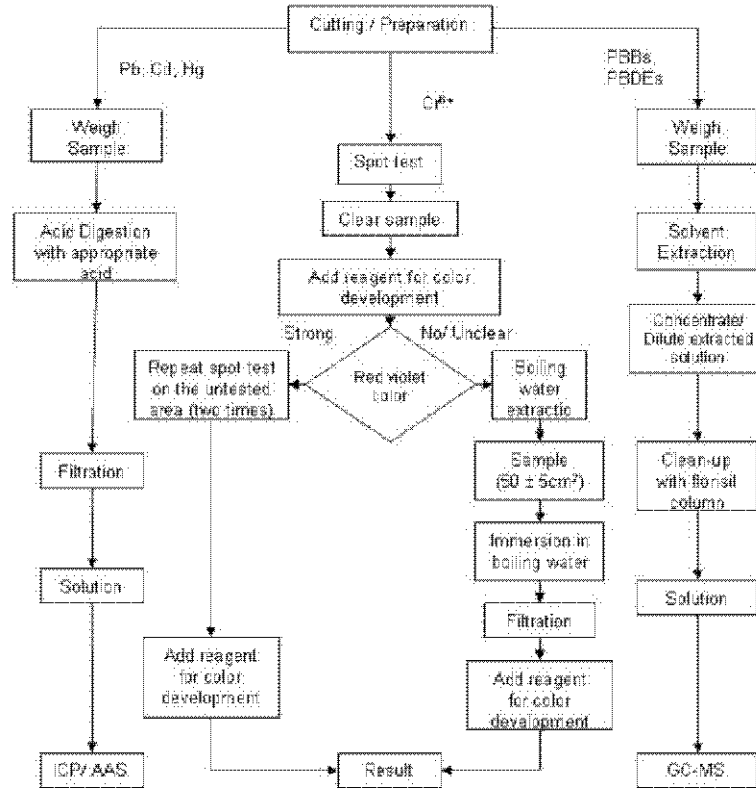


Test Report

No. 2107721/EC

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Operator : Chiu Kan Yuen/ Tang Koon Fung (Acid digestion)  
Chiu Kan Yuen (Dry Ashing)  
Cheng Chi Yuen, Vincent (Hexavalent Chromium)  
Lau Chung Yin, Eric (PBBs and PBDEs)

Section Chief : Thu Hung Yai, Rodney

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**Annex 5: Analysis Result of Lead Frame (page 8 of 11)****SGS****Test Report**

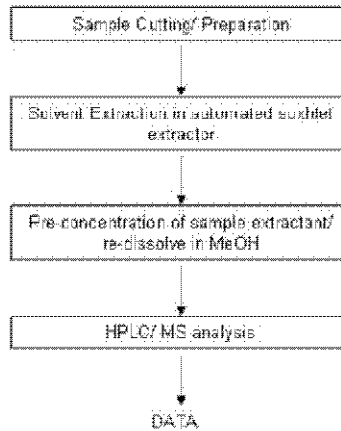
No. 2107721/EC

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**Flowchart for PFQS/ PFOA measurement**

Method: In-House method

Operator: Candy LukChief Supervisor: Yu Ka Lai

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**Annex 5: Analysis Result of Lead Frame (page 9 of 11)****SGS****Test Report**

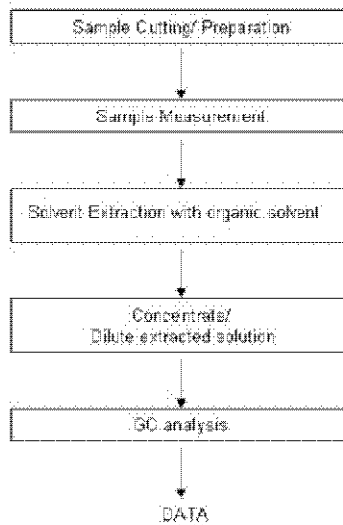
No. 2107721/EC

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**Flowchart for HBCDD measurement**

Method: US EPA3550C-2007

Operator: Zinna ChowChief Supervisor: Dicky Chan

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**Annex 5: Analysis Result of Lead Frame (page 10 of 11)****SGS****Test Report**

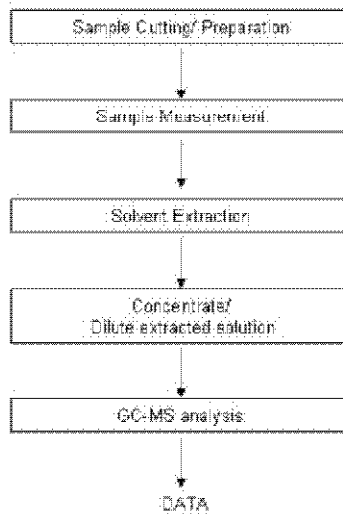
No. 2107721/EC

Date : Jan 25 2011

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**Flowchart for Phthalates measurement**

Method: EN 14372



Tested by : Tang Sze Hon, Gary  
Checked by : Chiu Chun Pong, Kevin

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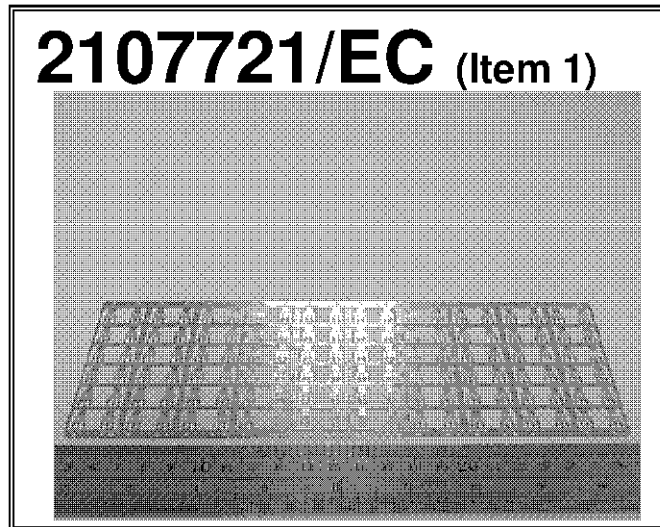
**Annex 5: Analysis Result of Lead Frame (page 11 of 11)****SGS****Test Report**

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Sample photo :



SGS authenticate the photo on original report only

\*\*\* End of Report \*\*\*

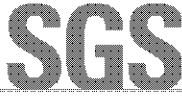
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# Annex 6: Analysis Result of Silicon Wafer (Page 1 of 7)



Validity unknown  
For Question  
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## Test Report

No. : CE/2010/B2372 Date : 2010/11/18 Page : 1 of 7


LITE-ON SEMICONDUCTOR CORP.  
28-1, WU SHIN STREET, TA WU LUNG, KEELUNG, TAIWAN



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

Sample Description : WAFER  
Style/Item No. : THYRISTOR  
Sample Receiving Date : 2010/11/11  
Testing Period : 2010/11/11 TO 2010/11/18

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



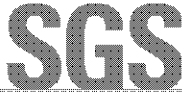
Chenyu Kung, Operation Manager  
Signed for and on behalf of  
SGS TAIWAN LTD.  
Chemical Laboratory -- Taipei

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## Annex 6: Analysis Result of Silicon Wafer (Page 2 of 7)



### Test Report

No. : CE/2010/B2372 Date : 2010/11/18 Page : 2 of 7

 LITE-ON SEMICONDUCTOR CORP.  
 28-1, WU SHIN STREET, TA WU LUNG, KEELUNG, TAIWAN


#### Test Result(s)

PART NAME No.1 : WAFER

| 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   | 19200       |
| 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.        |
| <b>Sum of PBBs</b>                                |       |   | -   | n.d.        |
| Monobromobiphenyl                                 |       |   | 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.        |
| <b>Sum of PBDEs</b>                               |       |   | -   | n.d.        |
| Monobromodiphenyl ether                           |       |   | 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.        |

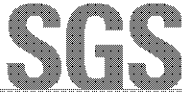
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## Annex 6: Analysis Result of Silicon Wafer (Page 3 of 7)



### Test Report

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LITE-ON SEMICONDUCTOR CORP.  
28-1, WU SHIN STREET, TA WU LUNG, KEELUNG, TAIWAN



| Test Item (s):                                  | Unit  | Method   | MDL | Result |
|---|-------|--|-----|--------|
|   |       |  |     | No.1   |
| <b>Halogen</b>                                  |       |  |     |        |
| Halogen-Fluorine (F)<br>(CAS No.: 014762-94-8)  | mg/kg | With reference to BS EN 14582:2007.<br>Analysis was performed by IC. | 50  | n.d.   |
| Halogen-Chlorine (Cl)<br>(CAS No.: 022537-15-1) |       |  | 50  | n.d.   |
| Halogen-Bromine (Br)<br>(CAS No.: 010097-32-2)  |       |  | 50  | n.d.   |
| Halogen-Iodine (I)<br>(CAS No.: 014362-44-8)    |       |  | 50  | n.d.   |

**Note :**

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

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## Annex 6: Analysis Result of Silicon Wafer (Page 4 of 7)

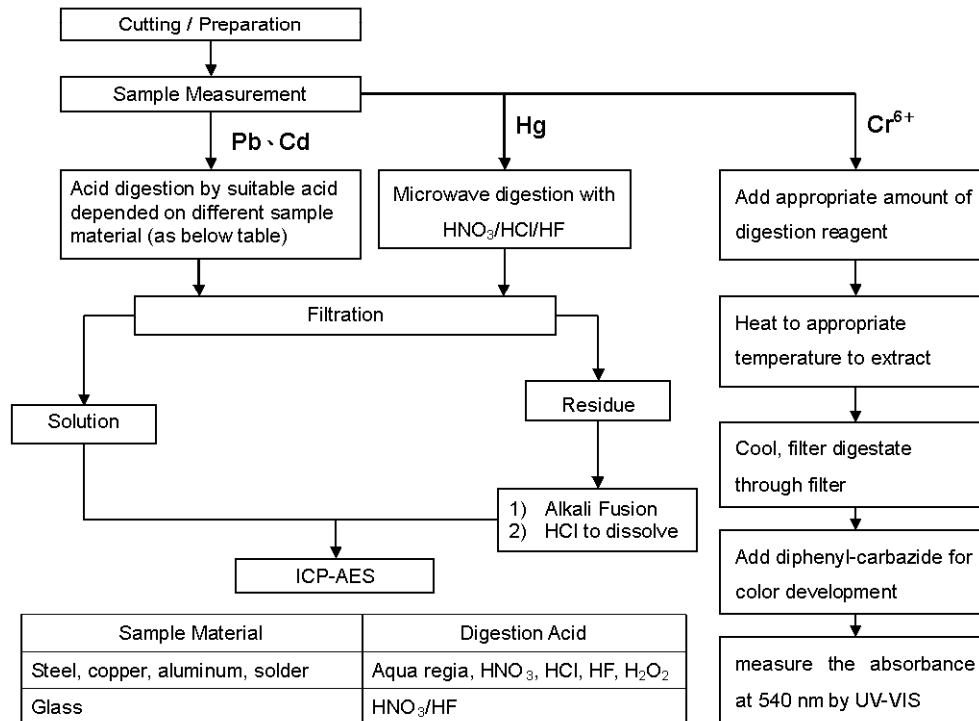
# SGS

### Test Report

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 LITE-ON SEMICONDUCTOR CORP.  
 28-1, WU SHIN STREET, TA WU LUNG, KEELUNG, TAIWAN


- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.  
(Cr<sup>6+</sup> test method excluded)
- 2) Name of the person who made measurement: Climbgreat Yang
- 3) Name of the person in charge of measurement: Troy Chang



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

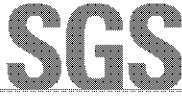
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## Annex 6: Analysis Result of Silicon Wafer (Page 5 of 7)



### Test Report

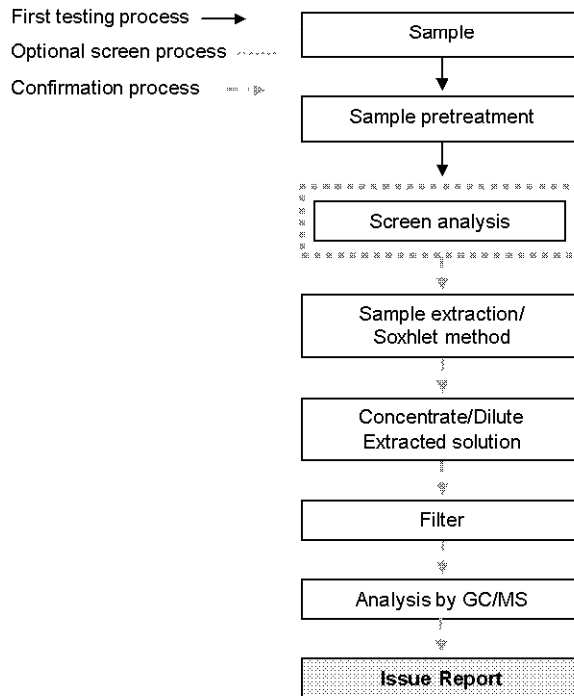
No. : CE/2010/B2372 Date : 2010/11/18 Page : 5 of 7

LITE-ON SEMICONDUCTOR CORP.  
28-1, WU SHIN STREET, TA WU LUNG, KEELUNG, TAIWAN



#### PBB/PBDE analytical FLOW CHART

- 1) Name of the person who made measurement: Roman Wong
- 2) Name of the person in charge of measurement: Troy Chang



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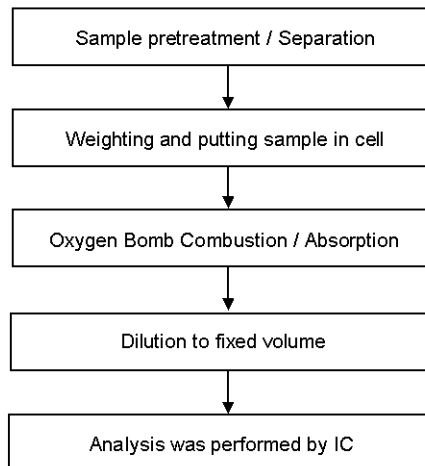
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**Annex 6: Analysis Result of Silicon Wafer (Page 6 of 7)****SGS****Test Report**

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LITE-ON SEMICONDUCTOR CORP.  
28-1, WU SHIN STREET, TA WU LUNG, KEELUNG, TAIWAN**Analytical flow chart of halogen content**

- 1) Name of the person who made measurement: Rita Chen
- 2) Name of the person in charge of measurement: Troy Chang



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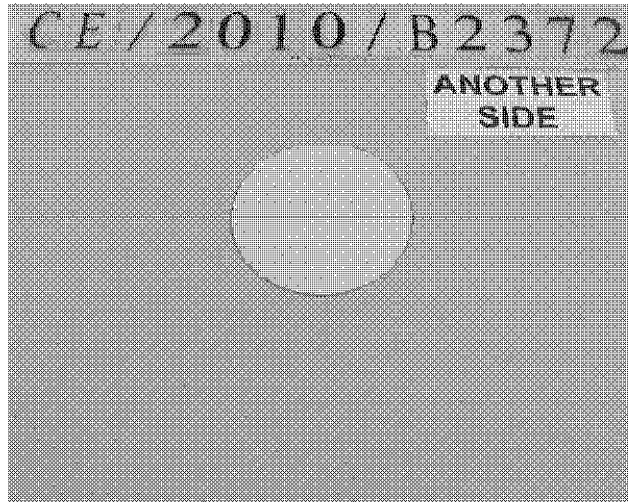
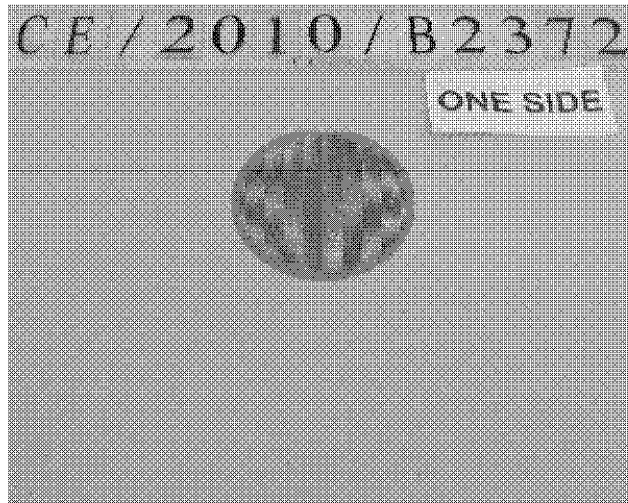
## Annex 6: Analysis Result of Silicon Wafer (Page 7 of 7)

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### Test Report

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LITE-ON SEMICONDUCTOR CORP.  
28-1, WU SHIN STREET, TA WU LUNG, KEELUNG, TAIWAN



**\*\* End of Report \*\***

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## Annex 7: Applicable RoHS exemptions

13.2.2003 EN Official Journal of the European Union L 37/19

**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**

13.2.2003 EN Official Journal of

Article 4

**Prevention**

1. Member States shall ensure that, from 1 July 2006, new electrical and electronic equipment put on the market does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE). National measures restricting or prohibiting the use of these substances in electrical and electronic equipment which were adopted in line with Community legislation before the adoption of this Directive may be maintained until 1 July 2006.

2. Paragraph 1 shall not apply to the applications listed in the Annex.

to be protected and an overall strategy that in particular restricts the use of cadmium and stimulates research into substitutes should therefore be implemented. The Reso-

13.2.2 EN of the European Union L 37/23

ANNEX

**Applications of lead, mercury, cadmium and hexavalent chromium, which are exempted from the requirements of Article 4(1)**

1. Mercury in compact fluorescent lamps not exceeding 5 mg per lamp.
2. Mercury in straight fluorescent lamps for general purposes not exceeding:
 

|                                     |       |
|-------------------------------------|-------|
| — halophosphate                     | 10 mg |
| — triphosphate with normal lifetime | 5 mg  |
| — triphosphate with long lifetime   | 8 mg. |
3. Mercury in straight fluorescent lamps for special purposes.
4. Mercury in other lamps not specifically mentioned in this Annex.
5. Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.
6. Lead as an alloying element in steel containing up to 0,35 % lead by weight, aluminium containing up to 0,4 % lead by weight and as a copper alloy containing up to 4 % lead by weight.
7. — Lead in high melting temperature type solders (i.e. tin-lead solder alloys containing more than 85 % lead),
  - lead in solders for servers, storage and storage array systems (exemption granted until 2010),
  - lead in solders for network infrastructure equipment for switching, signalling, transmission as well as network management for telecommunication,
  - lead in electronic ceramic parts (e.g. piezoelectronic devices).
8. Cadmium plating except for applications banned under Directive 91/338/EEC (\*) amending Directive 76/769/EEC (2) relating to restrictions on the marketing and use of certain dangerous substances and preparations.