




**ICP Test Report Certification Packet**

Company name: Littelfuse, Inc.  
Product Series: PTC Device  
Product #: RLD Series – 16R, 30R, 60R, 72R, 250R, 600R  
Issue Date: March 26, 2012

It is hereby certified by Littelfuse, Inc. that there is neither RoHS (EU Directive 2002/95/EC)-restricted substance nor such use, for materials to be used for unit parts, for packing/package materials, and for additives and the like in the manufacturing processes. In addition, it is hereby reported to you that the parts and sub-materials, the materials to be used for unit parts, the packing/package materials, and the additives and the like in the manufacturing processes, are all composed of the following components.

Issued by:   
KRISTEEN BACILA  
\_\_\_\_\_  
<Global EHS Engineer >

(1) Parts, sub-materials and unit parts

This document covers the PTC RoHS-Compliant series products manufactured by Littelfuse, Inc.

< Raw Materials Used  
Please see Table 1

(2) The ICP data on all measurable substances

Please see appropriate pages as identified in Table 1

|           |
|-----------|
| Remarks : |
|-----------|



**Table 1: List of Raw Materials covered by this report**

| <b>Total Parts</b> | <b>Raw Material Part Number</b> | <b>Raw Material Description</b> | <b>Page(s)</b> |
|--------------------|---------------------------------|---------------------------------|----------------|
| 1                  | NA                              | Polyethylene Chip               | 3-11           |
| 2                  | NA                              | Carbon Black Chip               | 12-20          |
| 3                  | NA                              | Nickel /Copper Foil             | 21-25          |
| 4                  | NA                              | Wire Lead - CuSTP-S             | 26-30          |
| 5                  | NA                              | Solder-F38A                     | 31-35          |
| 6                  | NA                              | Epoxy Coating                   | 36-44          |



Test Report

Applicant: Littelfuse, Inc.  
800 E. NORTHWEST HWY  
DESPLAINES IL 60016

Number : TWNC00234519S2

Date : Dec 30, 2011  
This is to supersede  
report NO. TWNC00234519S1  
dated Dec 19, 2011

Sample Description:

One (1) group of submitted samples said to be :  
Part Description : Polyethylene  
Part Number : HDPE/LR5900  
Date Sample Received : Nov 25, 2011  
Date Test Started : Nov 28, 2011

Test Conducted :

As requested by the applicant, for details please refer to attached pages.

Authorized By:  
On Behalf Of Intertek Testing Services  
Taiwan Limited



K. Y. Liang  
Director

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except in full, without the written  
approval of the laboratory.



Number : TWNC00234519S2

Test Conducted

( I ) Test Result Summary :

| <u>Test Item</u>                              | <u>Result (ppm)</u> |
|---|---------------------|
|   | <u>White Powder</u> |
| <b>Heavy Metal</b>                            |                     |
| Cadmium (Cd) content                          | ND                  |
| Lead (Pb) content                             | ND                  |
| Mercury (Hg) content                          | ND                  |
| Antimony (Sb) content                         | ND                  |
| Chromium VI (Cr <sup>6+</sup> ) content       | ND                  |
| <b>Polybrominated Biphenyls (PBBs)</b>        |                     |
| 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                  |
| <b>Polybrominated Diphenyl Ethers (PBDEs)</b> |                     |
| 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                  |
| <b>Halogen Content</b>                        |                     |
| Fluorine (F)                                  | ND                  |
| Chlorine (Cl)                                 | ND                  |
| Bromine (Br)                                  | ND                  |
| Iodine (I)                                    | ND                  |



Number : TWNC00234519S2

Test Conducted

( I ) Test Result Summary :

| <u>Test Item</u>                  | <u>Result (ppm)</u> |
|-----------------------------------|---------------------|
|                                   | <u>White Powder</u> |
| <b>Phthalates</b>                 |                     |
| Di(2-ethylhexyl) Phthalate (DEHP) | ND                  |
| Dibutyl Phthalate (DBP)           | ND                  |
| Benzyl Butyl Phthalate (BBP)      | ND                  |
| <b>Others</b>                     |                     |
| Hexabromocyclododecane (HBCDD)    | ND                  |

Remarks: ppm = Parts per million based on weight of tested sample = mg/kg  
ND = Not detected

Responsibility of Chemist : Irene Chiou / Kevin Liu / Cathy Chen

Date Sample Received : Nov 25, 2011

Test Period : Nov 28, 2011 To Nov 30, 2011

( II ) RoHS Requirement:

| <u>Restricted Substances</u>            | <u>Limits</u>  |
|---|----------------|
| Cadmium (Cd) Content                    | 0.01% (100ppm) |
| Lead (Pb) Content                       | 0.1% (1000ppm) |
| Mercury (Hg) Content                    | 0.1% (1000ppm) |
| Chromium VI (Cr <sup>6+</sup> ) Content | 0.1% (1000ppm) |
| Polybrominated Biphenyls (PBBs)         | 0.1% (1000ppm) |
| Polybrominated Diphenyl Ehters (PBDEs)  | 0.1% (1000ppm) |

The above limits were quoted from 2002/95/EC and amendment 2005/618/EC for homogeneous material.

## Test Conducted

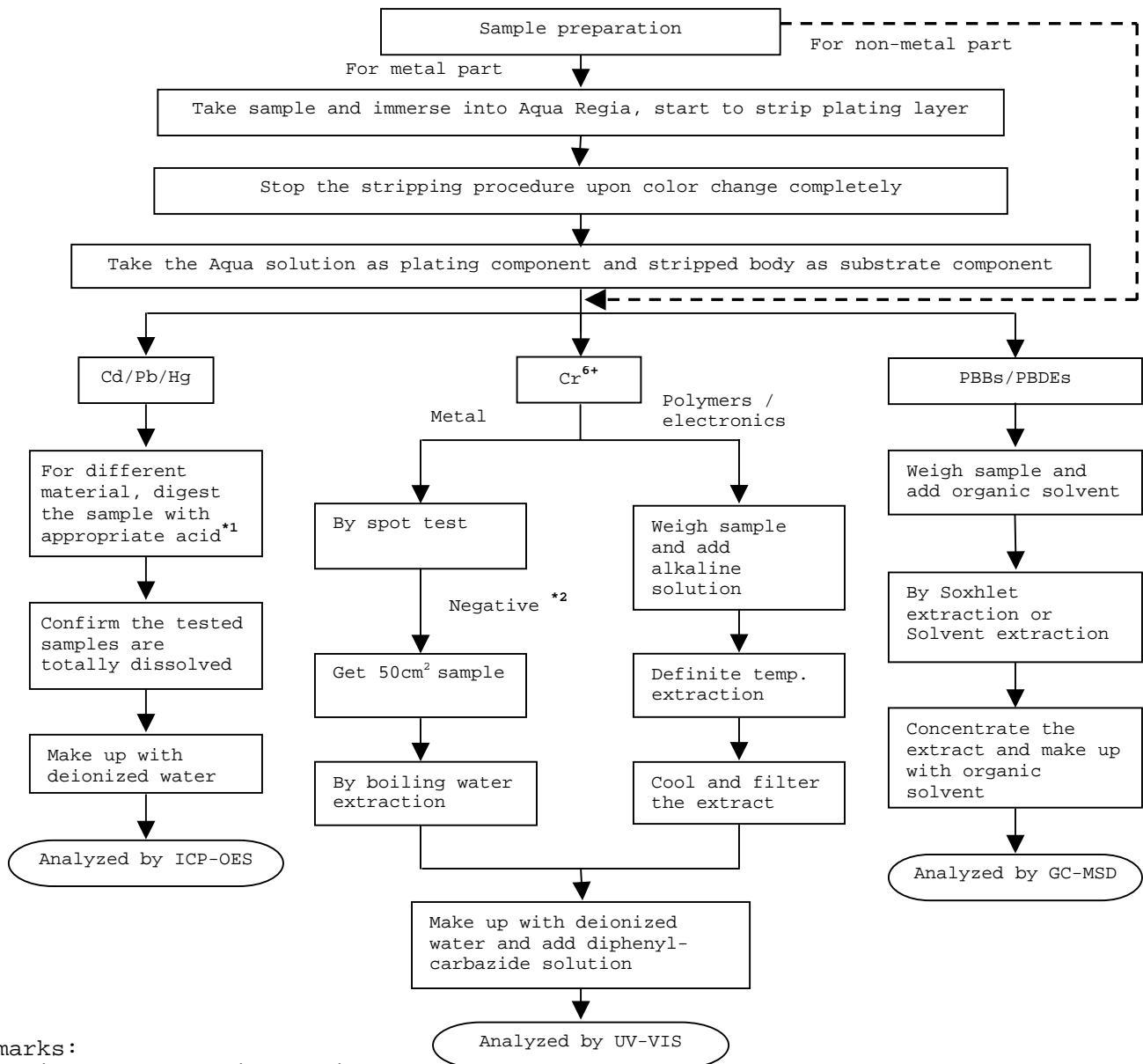
## ( III ) Test Method:

| Test Item                               | Test Method   | Reporting Limit |
|---|---|-----------------|
| Cadmium (Cd) content                    | With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES. | 2 ppm           |
| Lead (Pb) content                       | With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES. | 2 ppm           |
| Mercury (Hg) content                    | With reference to IEC 62321 edition 1.0:2008 in clause 7, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.      | 2 ppm           |
| Antimony (Sb) content                   | With reference to USEPA 3052, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.                                  | 2 ppm           |
| Chromium VI (Cr <sup>6+</sup> ) content | With reference to IEC 62321 edition 1.0:2008 in annex C, by alkaline digestion and determined by UV-Vis spectrophotometer.                                      | 1 ppm           |
| Polybrominated Biphenyls (PBBs)         | With reference to IEC 62321 edition 1.0:2008 in annex A, by solvent extraction and determined by GC-MSD and further HPLC confirmation when necessary.           | 5 ppm           |
| Polybrominated Diphenyl Ethers (PBDEs)  | With reference to IEC 62321 edition 1.0:2008 in annex A, by solvent extraction and determined by GC-MSD and further HPLC confirmation when necessary.           | 5 ppm           |
| Halogen Content                         | With reference to EN 14582:2007 by calorimetric bomb with oxygen and determined by ion chromatography   | 50 ppm          |
| Phthalates                              | With reference to EN 14372: 2004, by solvent extraction and determined by GC-MSD  | 50 ppm          |
| Hexabromocyclododecane (HBCDD)          | With reference to USEPA 3540C, by solvent extraction and determined by GC-MSD   | 10 ppm          |

Remark: Reporting limit = Quantitation limit of analyte in sample

Test Conducted

(IV) Measurement Flowchart:  
 Test for Cd/Pb/Hg/Chromium (VI)/PBBS/PBDES Contents  
 Reference Standard: IEC 62321 edition 1.0:2008



Remarks:

\*1: List of Appropriate Acid:

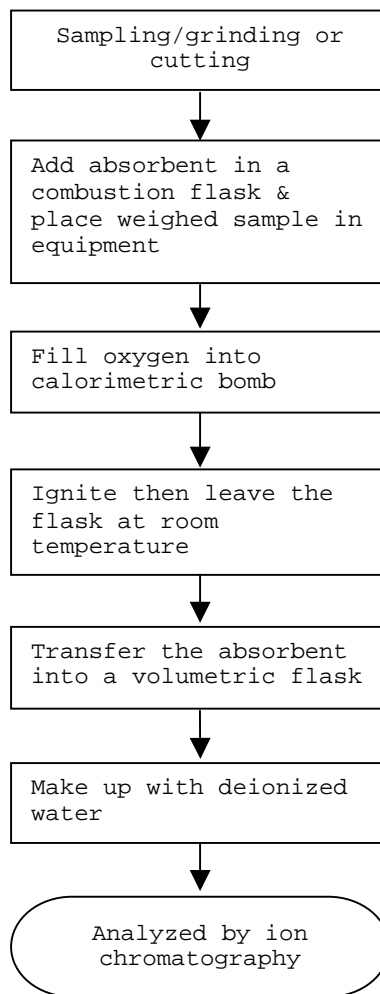
| Material    | Acid Added for Digestion   |
|-------------|--|
| Polymers    | HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub> , H <sub>3</sub> BO <sub>3</sub> |
| Metals      | HNO <sub>3</sub> , HCl, HF   |
| Electronics | HNO <sub>3</sub> , HCl, H <sub>2</sub> O <sub>2</sub> , HBF <sub>4</sub>                   |

\*2: If the result of spot test is positive, Chromium VI would be determined as detected.

Test Conducted

(IV) Measurement Flowchart:

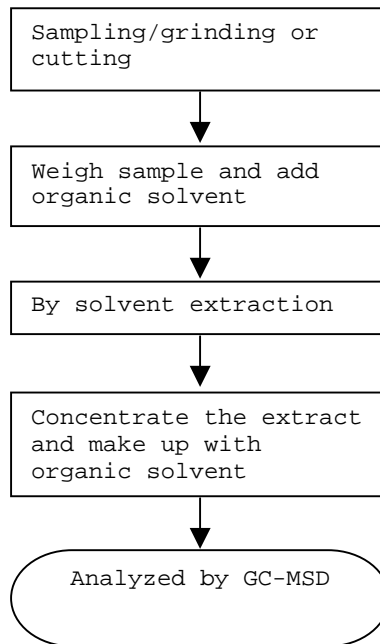
Test for Halogen Content  
Reference Standard : EN 14582



Test Conducted

(IV) Measurement Flowchart:

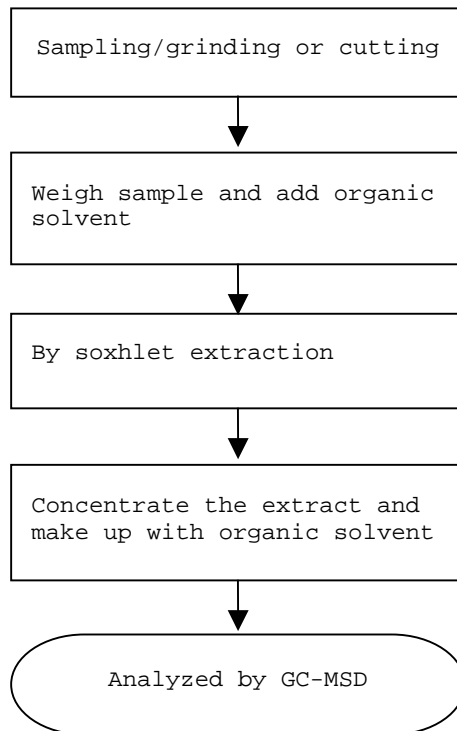
Test For Phthalates Contents  
Reference Method: EN 14372: 2004



Test Conducted

(IV) Measurement Flowchart:

Test For Hexabromocyclododecane (HBCDD)  
Reference Standard : USEPA 3540C

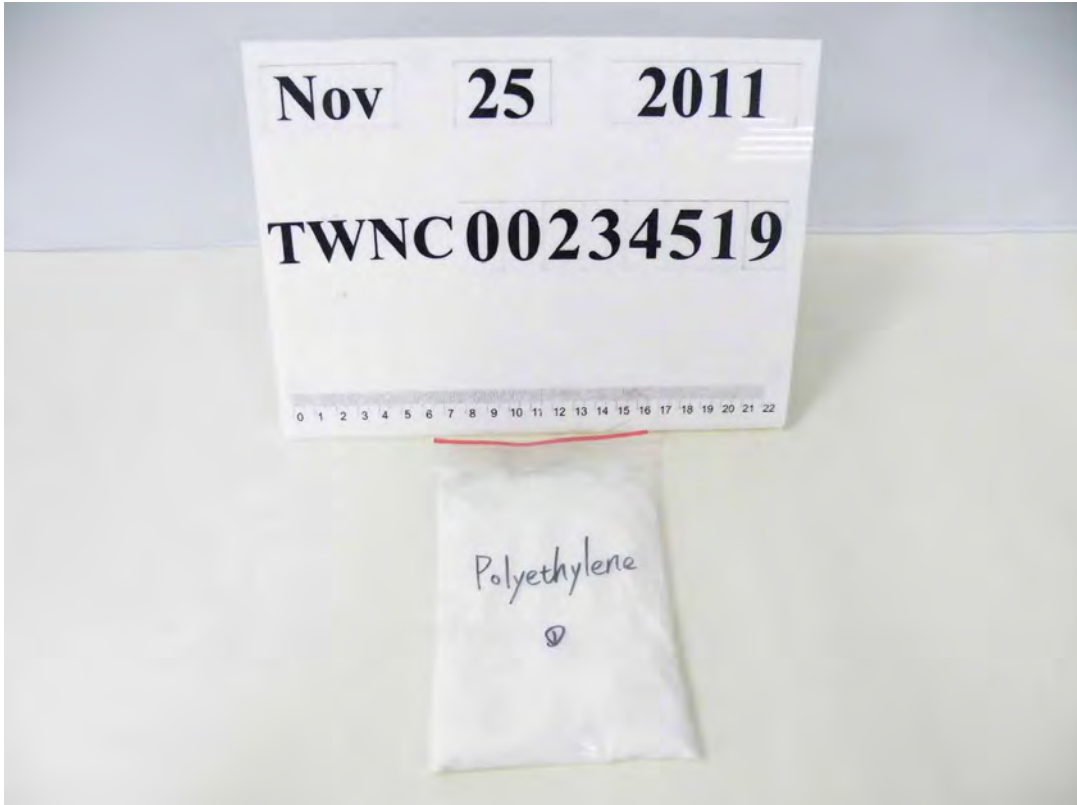


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End of Report

Test Conducted

Photo





Test Report

Applicant: Littelfuse, Inc.  
800 E. NORTHWEST HWY  
DESPLAINES IL 60016

Number : TWNC00234520S2  
Date : Dec 30, 2011  
This is to supersede  
report NO. TWNC00234520S1  
dated Dec 19, 2011

Sample Description:

One (1) group of submitted samples said to be :  
Part Description : Carbon Black  
Part Number : Raven 430UB  
Date Sample Received : Nov 25, 2011  
Date Test Started : Nov 28, 2011

Test Conducted :

As requested by the applicant, for details please refer to attached pages.

Authorized By:  
On Behalf Of Intertek Testing Services  
Taiwan Limited



K. Y. Liang  
Director

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Number : TWNC00234520S2

Test Conducted

( I ) Test Result Summary :

| <u>Test Item</u>                              | <u>Result (ppm)</u> |
|---|---------------------|
|   | <u>Black Powder</u> |
| <b>Heavy Metal</b>                            |                     |
| Cadmium (Cd) content                          | ND                  |
| Lead (Pb) content                             | ND                  |
| Mercury (Hg) content                          | ND                  |
| Antimony (Sb) content                         | ND                  |
| Chromium VI (Cr <sup>6+</sup> ) content       | ND                  |
| <b>Polybrominated Biphenyls (PBBs)</b>        |                     |
| 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                  |
| <b>Polybrominated Diphenyl Ethers (PBDEs)</b> |                     |
| 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                  |
| <b>Halogen Content</b>                        |                     |
| Fluorine (F)                                  | ND                  |
| Chlorine (Cl)                                 | ND                  |
| Bromine (Br)                                  | ND                  |
| Iodine (I)                                    | ND                  |



Number : TWNC00234520S2

Test Conducted

( I ) Test Result Summary :

| <u>Test Item</u>                  | <u>Result (ppm)</u> |
|-----------------------------------|---------------------|
|                                   | <u>Black Powder</u> |
| <b>Phthalates</b>                 |                     |
| Di(2-ethylhexyl) Phthalate (DEHP) | ND                  |
| Dibutyl Phthalate (DBP)           | ND                  |
| Benzyl Butyl Phthalate (BBP)      | ND                  |
| <b>Others</b>                     |                     |
| Hexabromocyclododecane (HBCDD)    | ND                  |

Remarks: ppm = Parts per million based on weight of tested sample = mg/kg  
ND = Not detected

Responsibility of Chemist : Irene Chiou / Kevin Liu / Cathy Chen

Date Sample Received : Nov 25, 2011

Test Period : Nov 28, 2011 To Nov 30, 2011

( II ) RoHS Requirement:

| <u>Restricted Substances</u>            | <u>Limits</u>  |
|---|----------------|
| Cadmium (Cd) Content                    | 0.01% (100ppm) |
| Lead (Pb) Content                       | 0.1% (1000ppm) |
| Mercury (Hg) Content                    | 0.1% (1000ppm) |
| Chromium VI (Cr <sup>6+</sup> ) Content | 0.1% (1000ppm) |
| Polybrominated Biphenyls (PBBs)         | 0.1% (1000ppm) |
| Polybrominated Diphenyl Ehters (PBDEs)  | 0.1% (1000ppm) |

The above limits were quoted from 2002/95/EC and amendment 2005/618/EC for homogeneous material.

## Test Conducted

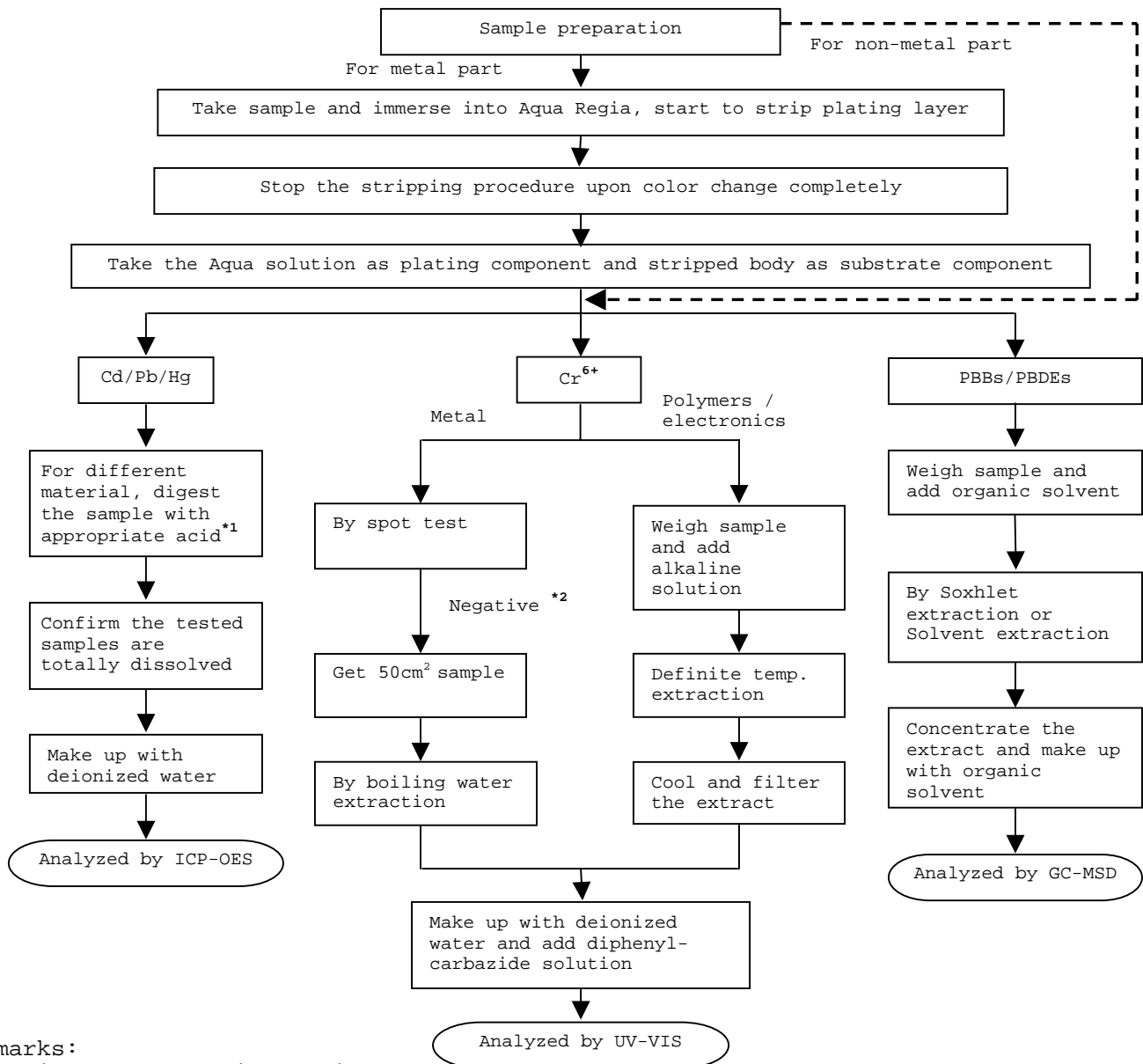
## (III) Test Method:

| Test Item                               | Test Method   | Reporting Limit |
|---|---|-----------------|
| Cadmium (Cd) content                    | With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES. | 2 ppm           |
| Lead (Pb) content                       | With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES. | 2 ppm           |
| Mercury (Hg) content                    | With reference to IEC 62321 edition 1.0:2008 in clause 7, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.      | 2 ppm           |
| Antimony (Sb) content                   | With reference to USEPA 3052, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.                                  | 2 ppm           |
| Chromium VI (Cr <sup>6+</sup> ) content | With reference to IEC 62321 edition 1.0:2008 in annex C, by alkaline digestion and determined by UV-Vis spectrophotometer.                                      | 1 ppm           |
| Polybrominated Biphenyls (PBBs)         | With reference to IEC 62321 edition 1.0:2008 in annex A, by solvent extraction and determined by GC-MSD and further HPLC confirmation when necessary.           | 5 ppm           |
| Polybrominated Diphenyl Ethers (PBDEs)  | With reference to IEC 62321 edition 1.0:2008 in annex A, by solvent extraction and determined by GC-MSD and further HPLC confirmation when necessary.           | 5 ppm           |
| Halogen Content                         | With reference to EN 14582:2007 by calorimetric bomb with oxygen and determined by ion chromatography   | 50 ppm          |
| Phthalates                              | With reference to EN 14372: 2004, by solvent extraction and determined by GC-MSD  | 50 ppm          |
| Hexabromocyclododecane (HBCDD)          | With reference to USEPA 3540C, by solvent extraction and determined by GC-MSD   | 10 ppm          |

Remark: Reporting limit = Quantitation limit of analyte in sample

Test Conducted

(IV) Measurement Flowchart:  
 Test for Cd/Pb/Hg/Chromium (VI)/PBBS/PBDES Contents  
 Reference Standard: IEC 62321 edition 1.0:2008



Remarks:

\*1: List of Appropriate Acid:

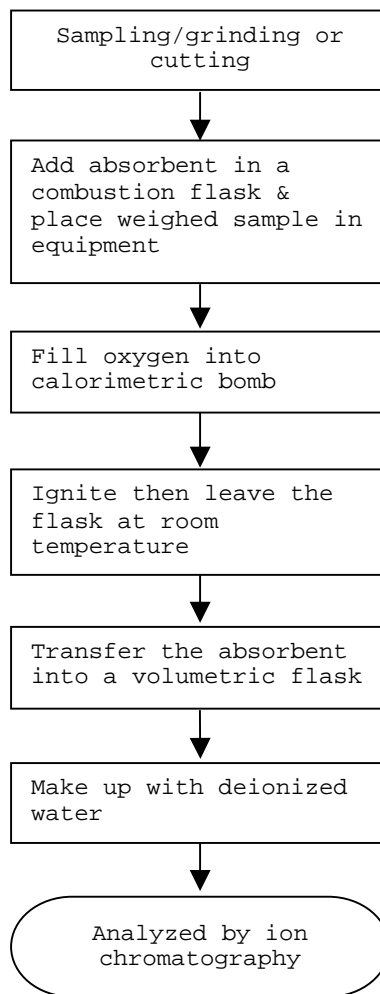
| Material    | Acid Added for Digestion   |
|-------------|--|
| Polymers    | HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub> , H <sub>3</sub> BO <sub>3</sub> |
| Metals      | HNO <sub>3</sub> , HCl, HF   |
| Electronics | HNO <sub>3</sub> , HCl, H <sub>2</sub> O <sub>2</sub> , HBF <sub>4</sub>                   |

\*2: If the result of spot test is positive, Chromium VI would be determined as detected.

Test Conducted

(IV) Measurement Flowchart:

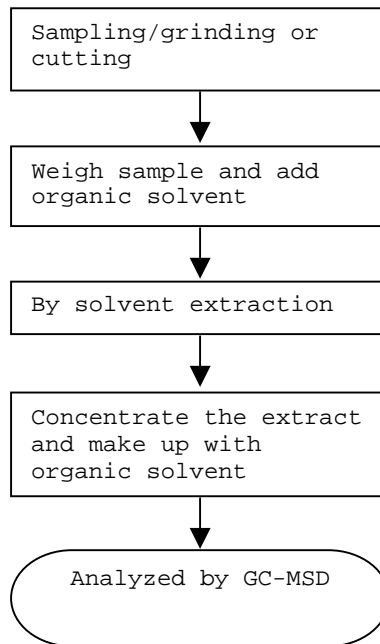
Test for Halogen Content  
Reference Standard : EN 14582



Test Conducted

(IV) Measurement Flowchart:

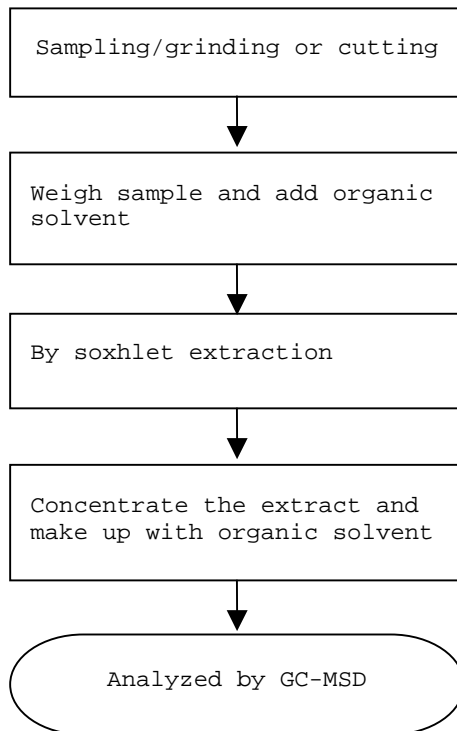
Test For Phthalates Contents  
Reference Method: EN 14372: 2004



Test Conducted

(IV) Measurement Flowchart:

Test For Hexabromocyclododecane (HBCDD)  
Reference Standard : USEPA 3540C



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End of Report

Test Conducted

Photo





**Test Report**

Applicant: Littelfuse, Inc.  
800 E. NORTHWEST HWY  
DESPLAINES IL 60016

Number : TWNC00234522S2  
Date : Dec 30, 2011  
This is to supersede  
report NO. TWNC00234522S1  
dated Dec 19, 2011

**Sample Description:**

One (1) group of submitted samples said to be :  
Part Description : Nickel/Cu Foil  
Part Number : Cu/Ni 10Z 13"  
(NIMI-CF-HR-35)  
Date Sample Received : Nov 25, 2011  
Date Test Started : Nov 28, 2011

**Test Conducted :**

As requested by the applicant, for details please refer to attached pages.

Authorized By:  
On Behalf Of Intertek Testing Services  
Taiwan Limited



K. Y. Liang  
Director

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Number : TWNC00234522S2

Test Conducted

( I ) Test Result Summary :

| <u>Test Item</u>  | <u>Result (ppm)</u>        |
|---|----------------------------|
|   | <u>Silvery / Dark Grey</u> |
|   | <u>Foil</u>                |
| <b>Heavy Metal</b>  |                            |
| Cadmium (Cd) content  | ND                         |
| Lead (Pb) content   | ND                         |
| Mercury (Hg) content  | ND                         |
| Antimony (Sb) content   | ND                         |
| Chromium VI (Cr <sup>6+</sup> ) content (mg/kg with 50cm <sup>2</sup> ) | Negative (< 0.02)          |

Remarks: ppm = Parts per million based on weight of tested sample = mg/kg  
 ND = Not detected  
 < = Less than  
 mg/kg with 50cm<sup>2</sup> = milligram per kilogram with 50 square centimetre  
 Negative = A negative test result indicated positive observation was not found at the time of Test.

Responsibility of Chemist : Irene Chiou / Kevin Liu

Date Sample Received : Nov 25, 2011

Test Period : Nov 28, 2011 To Nov 30, 2011

( II ) RoHS Requirement:

| <u>Restricted Substances</u>            | <u>Limits</u>  |
|---|----------------|
| Cadmium (Cd) Content                    | 0.01% (100ppm) |
| Lead (Pb) Content                       | 0.1% (1000ppm) |
| Mercury (Hg) Content                    | 0.1% (1000ppm) |
| Chromium VI (Cr <sup>6+</sup> ) Content | 0.1% (1000ppm) |

The above limits were quoted from 2002/95/EC and amendment 2005/618/EC for homogeneous material.



Number : TWNC00234522S2

Test Conducted

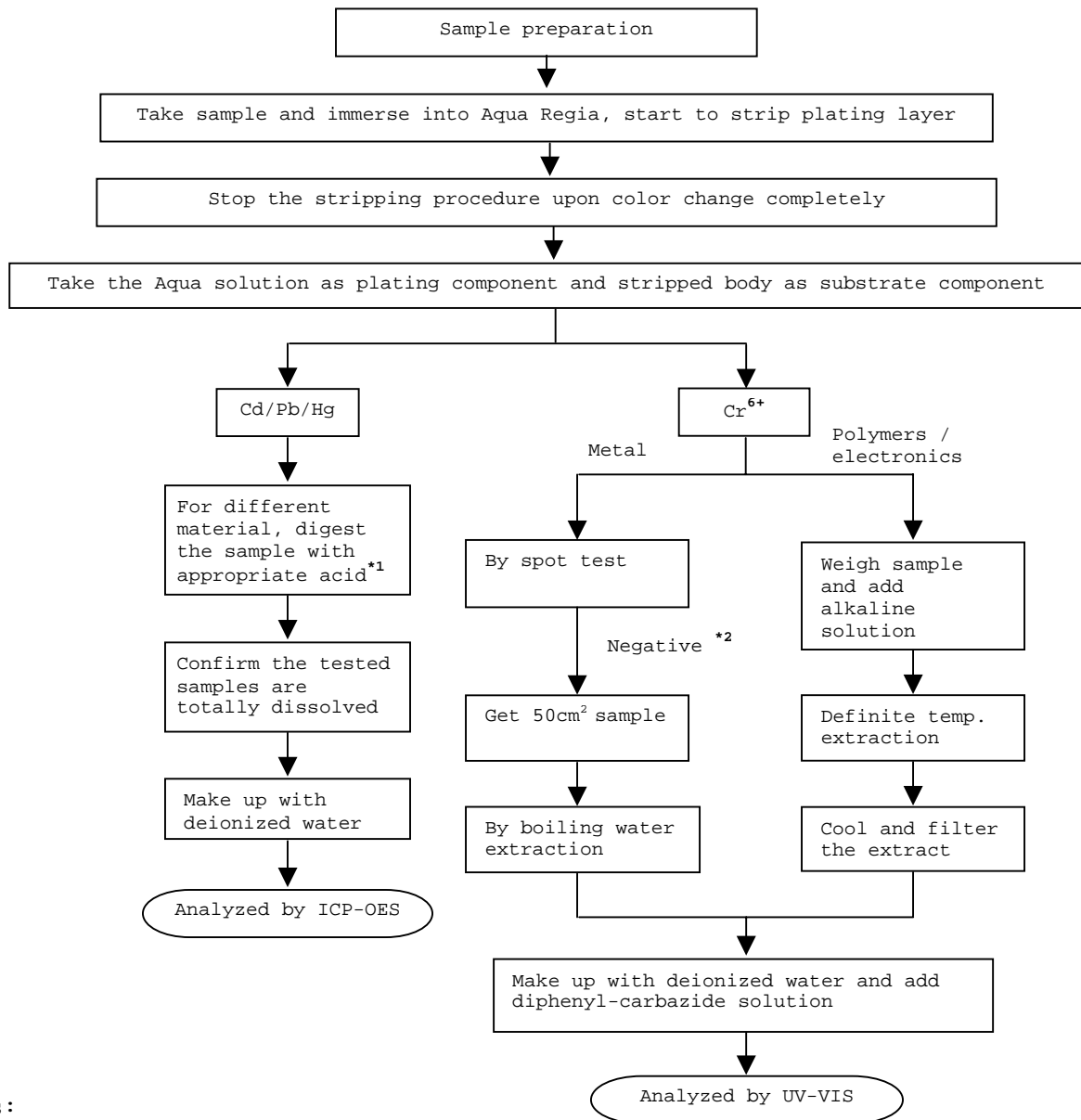
( III ) Test Method:

| <u>Test Item</u>                        | <u>Test Method</u>  | <u>Reporting Limit</u>            |
|---|---|-----------------------------------|
| Cadmium (Cd) content                    | With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES. | 2 ppm                             |
| Lead (Pb) content                       | With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES. | 2 ppm                             |
| Mercury (Hg) content                    | With reference to IEC 62321 edition 1.0:2008 in clause 7, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.      | 2 ppm                             |
| Antimony (Sb) content                   | With reference to USEPA 3052, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.                                  | 2 ppm                             |
| Chromium VI (Cr <sup>6+</sup> ) content | With reference to IEC 62321 edition 1.0:2008 in annex B, by boiling water extraction and determined by UV-Vis spectrophotometer.                                | 0.02 mg/kg with 50cm <sup>2</sup> |

Remark: Reporting limit = Quantitation limit of analyte in sample

Test Conducted

(IV) Measurement Flowchart:  
 Test for Cd/Pb/Hg/Chromium (VI)  
 Reference Standard : IEC 62321 edition 1.0:2008



Remarks:

\*1: List of Appropriate Acid:

| Material    | Acid Added for Digestion   |
|-------------|--|
| Polymers    | HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub> , H <sub>3</sub> BO <sub>3</sub> |
| Metals      | HNO <sub>3</sub> , HCl, HF   |
| Electronics | HNO <sub>3</sub> , HCl, H <sub>2</sub> O <sub>2</sub> , HBF <sub>4</sub>                   |

\*2: If the result of spot test is positive, Chromium VI would be determined as detected.

End of Report

Test Conducted

Photo





Test Report

Applicant: Littelfuse, Inc.  
800 E. NORTHWEST HWY  
DESPLAINES IL 60016

Number : TWNC00234527S2  
Date : Dec 30, 2011  
This is to supersede  
report NO. TWNC00234527S1  
dated Dec 19, 2011

Sample Description:

One (1) group of submitted samples said to be :  
Part Description : Copper plated with tin  
Part Number : Cu STP-S  
Date Sample Received : Nov 25, 2011  
Date Test Started : Nov 28, 2011

Test Conducted :

As requested by the applicant, for details please refer to attached pages.

Authorized By:  
On Behalf Of Intertek Testing Services  
Taiwan Limited



K. Y. Liang  
Director

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approval of the laboratory.



Number : TWNC00234527S2

Test Conducted

( I ) Test Result Summary :

| <u>Test Item</u>  | <u>Result (ppm)</u>    |                        |
|---|------------------------|------------------------|
|   | <u>(1)</u>             | <u>(2)</u>             |
| <b>Heavy Metal</b>  |                        |                        |
| Cadmium (Cd) content  | ND                     | ND                     |
| Lead (Pb) content   | ND                     | ND                     |
| Mercury (Hg) content  | ND                     | ND                     |
| Antimony (Sb) content   | ND                     | ND                     |
| Chromium VI (Cr <sup>6+</sup> ) content (mg/kg with 50cm <sup>2</sup> ) | Negative<br>( < 0.02 ) | Negative<br>( < 0.02 ) |

Remarks: ppm = Parts per million based on weight of tested sample = mg/kg  
ND = Not detected  
< = Less than  
mg/kg with 50cm<sup>2</sup> = milligram per kilogram with 50 square centimetre  
Negative = A negative test result indicated positive observation  
was not found at the time of Test.

Tested Components

- (1) Coppery Metal Base Material
- (2) Silvery Plating Layer

Responsibility of Chemist : Irene Chiou / Kevin Liu

Date Sample Received : Nov 25, 2011  
Test Period : Nov 28, 2011 To Nov 30, 2011

( II ) RoHS Requirement:

| <u>Restricted Substances</u>            | <u>Limits</u>  |
|---|----------------|
| Cadmium (Cd) Content                    | 0.01% (100ppm) |
| Lead (Pb) Content                       | 0.1% (1000ppm) |
| Mercury (Hg) Content                    | 0.1% (1000ppm) |
| Chromium VI (Cr <sup>6+</sup> ) Content | 0.1% (1000ppm) |

The above limits were quoted from 2002/95/EC and amendment 2005/618/EC for homogeneous material.



Number : TWNC00234527S2

Test Conducted

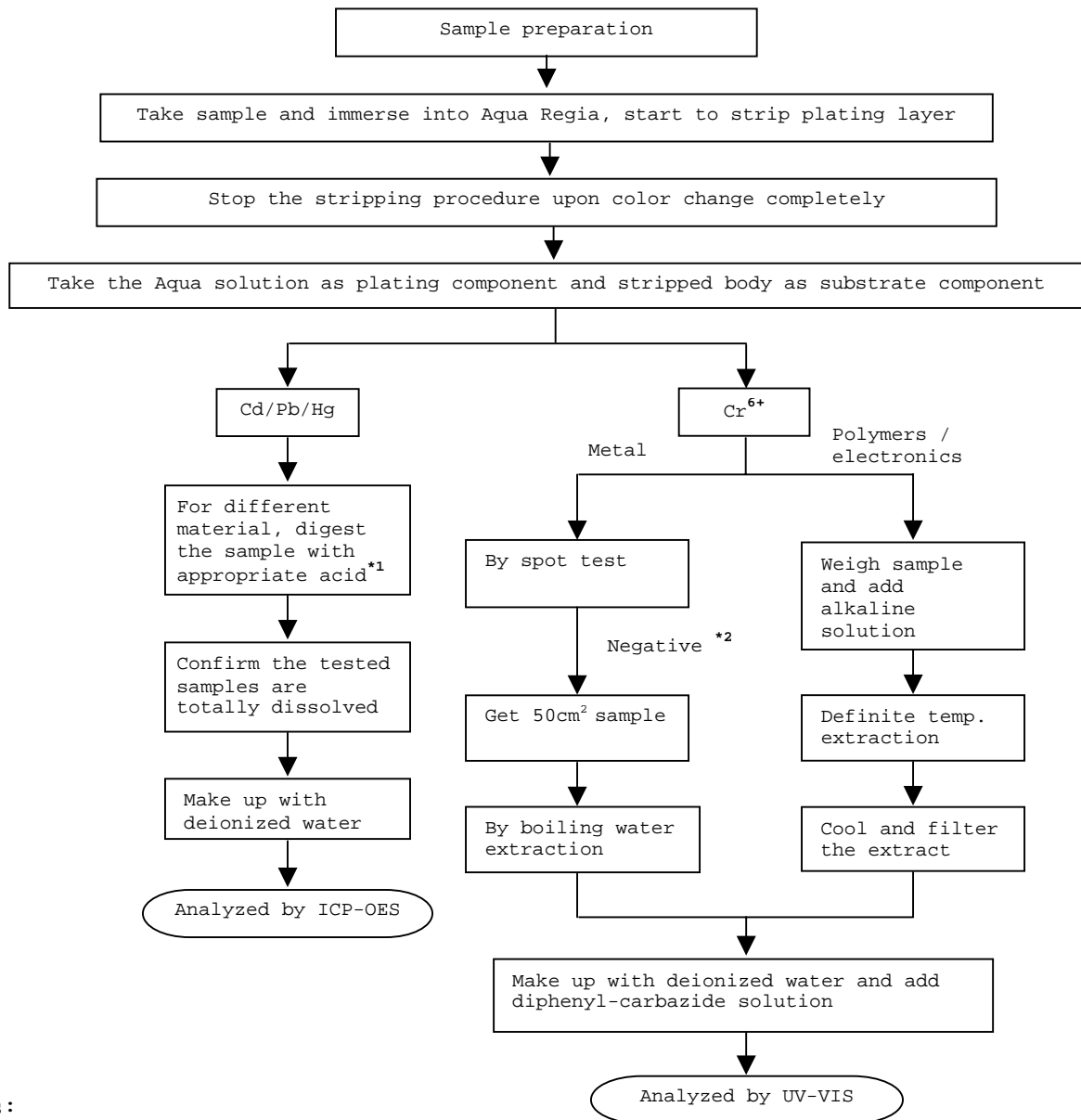
( III ) Test Method:

| <u>Test Item</u>                        | <u>Test Method</u>  | <u>Reporting Limit</u>            |
|---|---|-----------------------------------|
| Cadmium (Cd) content                    | With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES. | 2 ppm                             |
| Lead (Pb) content                       | With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES. | 2 ppm                             |
| Mercury (Hg) content                    | With reference to IEC 62321 edition 1.0:2008 in clause 7, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.      | 2 ppm                             |
| Antimony (Sb) content                   | With reference to USEPA 3052, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.                                  | 2 ppm                             |
| Chromium VI (Cr <sup>6+</sup> ) content | With reference to IEC 62321 edition 1.0:2008 in annex B, by boiling water extraction and determined by UV-Vis spectrophotometer.                                | 0.02 mg/kg with 50cm <sup>2</sup> |

Remark: Reporting limit = Quantitation limit of analyte in sample

Test Conducted

(IV) Measurement Flowchart:  
 Test for Cd/Pb/Hg/Chromium (VI)  
 Reference Standard : IEC 62321 edition 1.0:2008



Remarks:

\*1: List of Appropriate Acid:

| Material    | Acid Added for Digestion   |
|-------------|--|
| Polymers    | HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub> , H <sub>3</sub> BO <sub>3</sub> |
| Metals      | HNO <sub>3</sub> , HCl, HF   |
| Electronics | HNO <sub>3</sub> , HCl, H <sub>2</sub> O <sub>2</sub> , HBF <sub>4</sub>                   |

\*2: If the result of spot test is positive, Chromium VI would be determined as detected.

End of Report

Test Conducted

Photo





Test Report

Applicant: Littelfuse, Inc.  
800 E. NORTHWEST HWY  
DESPLAINES IL 60016

Number : TWNC00234528S1

Date : Dec 19, 2011  
This is to supersede  
report NO. TWNC00234528  
dated Dec 02, 2011

Sample Description:

One (1) group of submitted samples said to be :  
Part Description : Solder  
Part Number : F38A-B20  
Date Sample Received : Nov 25, 2011  
Date Test Started : Nov 28, 2011

Test Conducted :

As requested by the applicant, for details please refer to attached pages.

Authorized By:  
On Behalf Of Intertek Testing Services  
Taiwan Limited



K. Y. Liang  
Director

This report shall not be reproduced  
except in full, without the written  
approval of the laboratory.



Number : TWNC00234528S1

Test Conducted

( I ) Test Result Summary :

| <u>Test Item</u>   | <u>Result (ppm)</u>        |
|--|----------------------------|
|  | <u>Silvery Metal</u>       |
| <b>Heavy Metal</b>   |                            |
| Cadmium (Cd) content                                       | ND                         |
| Lead (Pb) content  | 199                        |
| Mercury (Hg) content                                       | ND                         |
| Chromium VI (Cr6+) content (mg/kg with 50cm <sup>2</sup> ) | Negative<br>( < 0.02 ) (#) |

Remarks: ppm = Parts per million based on weight of tested sample = mg/kg  
ND = Not detected  
< = Less than  
mg/kg with 50cm<sup>2</sup> = milligram per kilogram with 50 square centimetre  
Negative = A negative test result indicated positive observation was not found at the time of Test.  
# = Due to the insufficient sample area, reduced total sample surface of 10 cm<sup>2</sup> was used and the dilution factor was adjusted accordingly.

Responsibility of Chemist : Irene Chiou / Kevin Liu

Date Sample Received : Nov 25, 2011

Test Period : Nov 28, 2011 To Dec 02, 2011

( II ) RoHS Requirement:

| <u>Restricted Substances</u>            | <u>Limits</u>  |
|---|----------------|
| Cadmium (Cd) Content                    | 0.01% (100ppm) |
| Lead (Pb) Content                       | 0.1% (1000ppm) |
| Mercury (Hg) Content                    | 0.1% (1000ppm) |
| Chromium VI (Cr <sup>6+</sup> ) Content | 0.1% (1000ppm) |

The above limits were quoted from 2002/95/EC and amendment 2005/618/EC for homogeneous material.



Number : TWNC00234528S1

Test Conducted

( III ) Test Method:

| <u>Test Item</u>                        | <u>Test Method</u>  | <u>Reporting Limit</u>            |
|---|---|-----------------------------------|
| Cadmium (Cd) content                    | With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES. | 2 ppm                             |
| Lead (Pb) content                       | With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES. | 2 ppm                             |
| Mercury (Hg) content                    | With reference to IEC 62321 edition 1.0:2008 in clause 7, by microwave digestion until the tested samples are totally dissolved and determined by ICP-OES.      | 2 ppm                             |
| Chromium VI (Cr <sup>6+</sup> ) content | With reference to IEC 62321 edition 1.0:2008 in annex B, by boiling water extraction and determined by UV-Vis spectrophotometer.                                | 0.02 mg/kg with 50cm <sup>2</sup> |

Remark: Reporting limit = Quantitation limit of analyte in sample

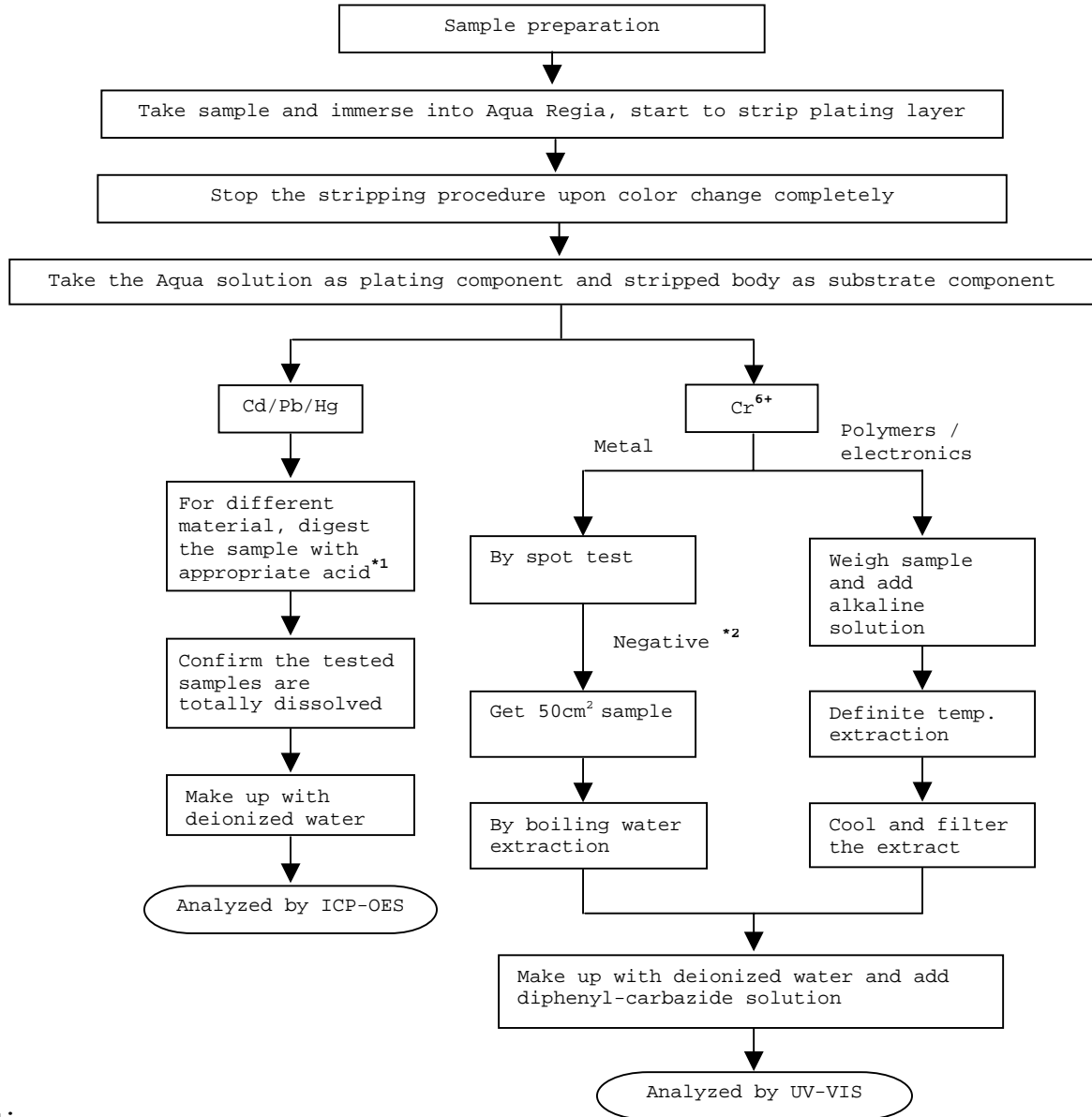
---

Test Conducted

(IV) Measurement Flowchart:

Test for Cd/Pb/Hg/Chromium (VI)

Reference Standard : IEC 62321 edition 1.0:2008



Remarks:

\*1: List of Appropriate Acid:

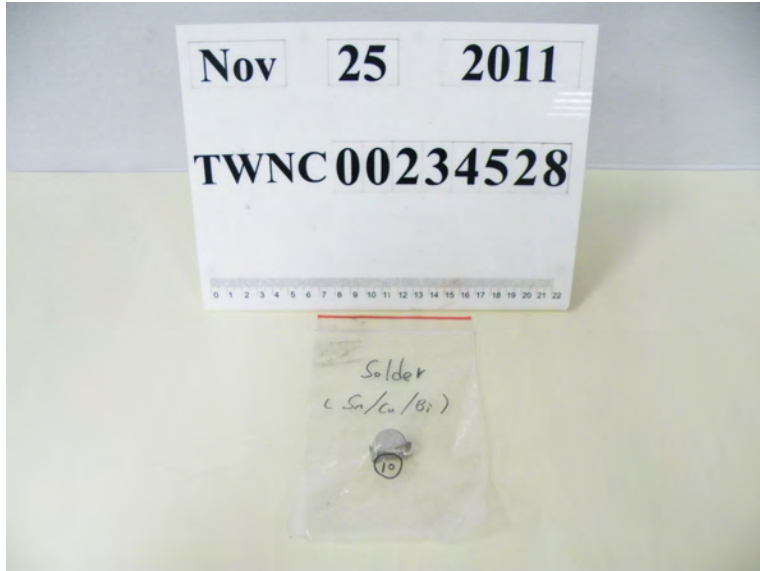
| Material    | Acid Added for Digestion   |
|-------------|--|
| Polymers    | HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub> , H <sub>3</sub> BO <sub>3</sub> |
| Metals      | HNO <sub>3</sub> , HCl, HF   |
| Electronics | HNO <sub>3</sub> , HCl, H <sub>2</sub> O <sub>2</sub> , HBF <sub>4</sub>                   |

\*2: If the result of spot test is positive, Chromium VI would be determined as detected.

End of Report

Test Conducted

Photo



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

SGS Job No. : SP12-002392 - SH  
Date of Sample Received : 09 Feb 2012  
Testing Period : 09 Feb 2012 - 13 Feb 2012  
Test Requested : Selected test(s) as requested by client.  
Test Method : Please refer to next page(s).  
Test Results : Please refer to next page(s).  
Conclusion : Based on the performed tests on submitted samples, the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBB), Polybrominated diphenyl ethers (PBDE) comply with the limits as set by RoHS Directive 2011/65/EU Annex II; recasting 2002/95/EC.

Signed for and on behalf of  
SGS-CSTC Ltd.

Fan Jingjie, JJ  
Approved Signatory

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# Test Report

No. SHAEC1201236001

Date: 13 Feb 2012

Page 2 of 5

Test Results :

## Test Part Description :

| Specimen No. | SGS Sample ID    | Description   |
|--------------|------------------|---------------|
| 1            | SHA12-012360.001 | Yellow powder |

Remarks :

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected ( < MDL )
- (4) "-" = Not Regulated

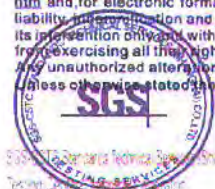
## RoHS Directive 2011/65/EU

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 | 001 |
|------------------------------|-------|-------|-----|-----|
| Cadmium (Cd)                 | 100   | mg/kg | 2   | ND  |
| Lead (Pb)                    | 1,000 | mg/kg | 2   | ND  |
| Mercury (Hg)                 | 1,000 | mg/kg | 2   | ND  |
| Hexavalent Chromium (Cr(VI)) | 1,000 | mg/kg | 2   | ND  |
| Sum of PBBs                  | 1,000 | mg/kg | -   | ND  |
| Monobromobiphenyl            | -     | mg/kg | 5   | ND  |
| Dibromobiphenyl              | -     | 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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# Test Report

No. SHAEC1201236001

Date: 13 Feb 2012

Page 3 of 5

| <u>Test Item(s)</u>      | <u>Limit</u> | <u>Unit</u> | <u>MDL</u> | <u>001</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 :

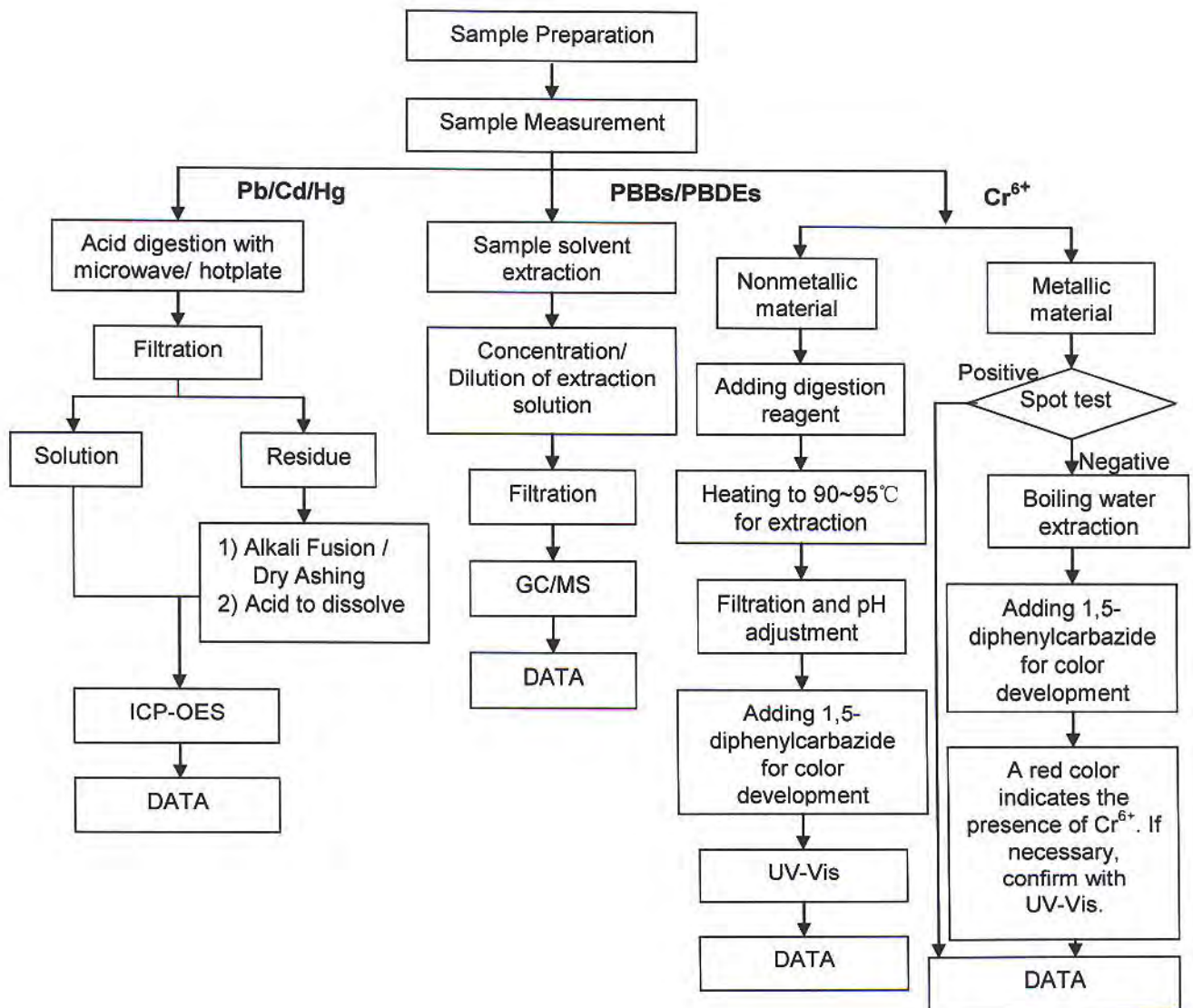
- (1) The maximum permissible limit is quoted from directive 2011/65/EU, Annex II

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ATTACHMENTS

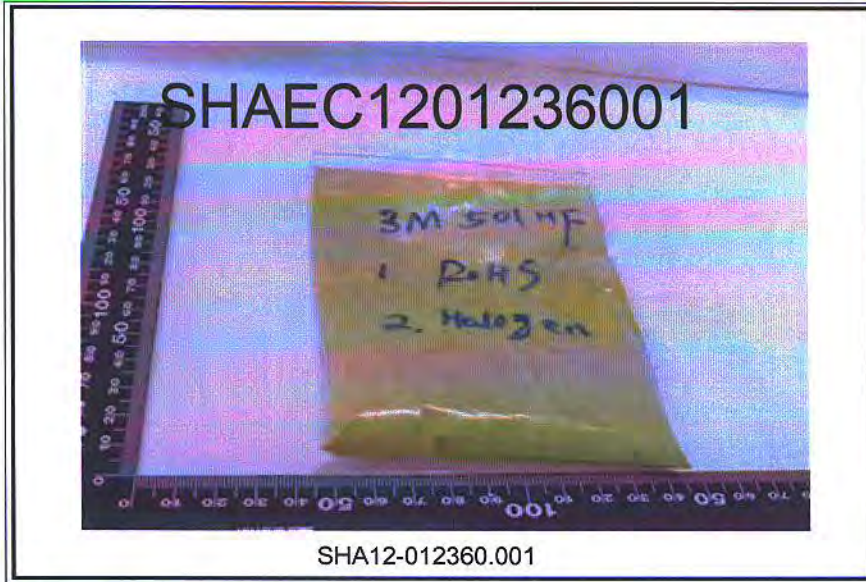
RoHS Testing Flow Chart

- 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/ Elim Lin
- 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:



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

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## Test Report

No. SHAEC1201236002

Date: 13 Feb 2012

Page 1 of 4

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

SGS Job No. : SP12-002392 - SH  
Date of Sample Received : 09 Feb 2012  
Testing Period : 09 Feb 2012 - 13 Feb 2012  
Test Requested : Selected test(s) as requested by client.  
Test Method : Please refer to next page(s).  
Test Results : Please refer to next page(s).

Signed for and on behalf of  
SGS-CSTC Ltd.



Fan Jingjie, JJ  
Approved Signatory

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.





# Test Report

No. SHAEC1201236002

Date: 13 Feb 2012

Page 2 of 4

Test Results :

## Test Part Description :

| Specimen No. | SGS Sample ID    | Description          |
|--------------|------------------|----------------------|
| 1            | SHA12-012360.001 | Yellow powder(Epoxy) |

Remarks :

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected ( < MDL )
- (4) "-" = Not Regulated

## Halogen

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

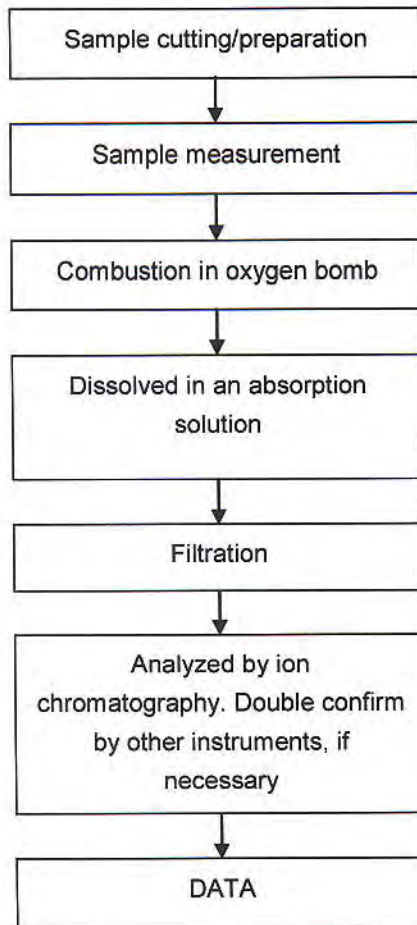
| Test Item(s)  | Unit  | MDL | 001 |
|---------------|-------|-----|-----|
| Fluorine (F)  | mg/kg | 50  | ND  |
| Chlorine (Cl) | mg/kg | 50  | 509 |
| Bromine (Br)  | mg/kg | 50  | ND  |
| Iodine (I)    | mg/kg | 50  | ND  |

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## ATTACHMENTS

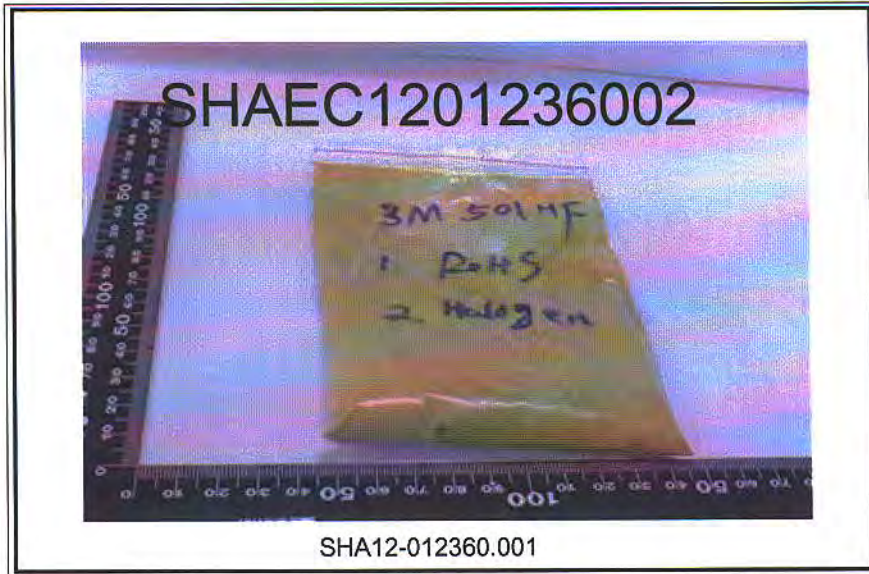
### Halogen Testing Flow Chart

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



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Sample photo:



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

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