

Company name:

ICP Test Report Certification Packet

Littelfuse, Inc.

Product Series:	Ceramic Chip Fuse 0603		
Product #:	438 Series (0.25-1.75 Amp – Gold)		
	. ,		
Issue Date:	October 2, 2012		
It is hereby certified by Littelfuse, Inc. that there is neither RoHS (2011/65/EU – recast of 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. 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: KRISTEEN BACILA		
	<global ehs="" engineer=""></global>		
(1) Parts, sub-materials a This document co- manufactured by Li	vers the Ceramic Chip Fuse 0603 RoHS-Compliant series products		
< Raw Materials Used Please see Table 1			
ricase see Tab			
(2) The ICP data on all measurable substances Please see appropriate pages as identifed in Table 1			
Remarks :			



Table 1: List of Raw Materials covered by this report

Total Parts	Raw Material Part Number	Raw Material Description	Page(s)
1	039642	Body – Ceramic Substrate	3-8
2	011005	Element - Sintered Resinate Paste	9-17
3	011003	Cover Glass – Overglaze Paste	18-26
4	011004	Underglaze – Dielectric Paste	27-35
5	011001	Silver - End Termination Paste	36-44
6	010118	Plating – Nickel Anode 45-49	
7	010119	Plating – Sn Anode	50-54



Test Report Number: TWNC00233549

Applicant: Littelfuse Philippines Inc.

LIMA Technology Center, Lipa City,

Malvar, Batangas

Sample Description:

One (1) group of submitted samples said to be :
Part Description : Ceramic Substrate

Part Number : 039642

Date Sample Received : Nov 21, 2011
Date Test Started : Nov 22, 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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Date : Nov 25, 2011

Page 1 of 6



Test Conducted

(I) Test Result Summary :

	RACILLI INNMI
Test Item	Result (ppm)
	White Ceramic
Heavy Metal	
Cadmium (Cd) content	ND
Lead (Pb) content	ND
Mercury (Hg) content	ND
Chromium VI (Cr ⁶⁺) content	ND
Polybrominated Biphenyls (PBBs)	
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
Polybrominated Diphenyl Ethers (PBDEs)	
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
Halogen Content	
Fluorine (F)	ND
Chlorine (Cl)	ND
Bromine (Br)	ND
Iodine (I)	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 21, 2011

Test Period : Nov 22, 2011 To Nov 25, 2011



Test Conducted

(${ m II}$) RoHS Requirement:

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

(Ⅲ) Test Method:

<u>Test Method:</u>		
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
Chromium VI (Cr ⁶⁺) 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

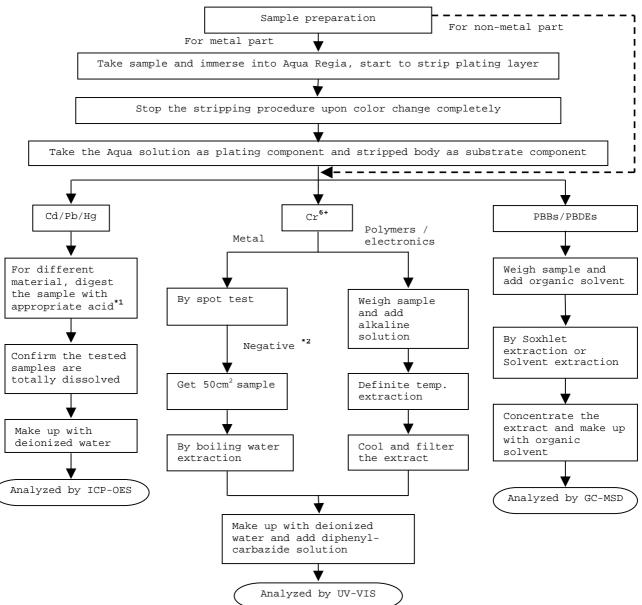
Remark: Reporting limit = Quantitation limit of analyte in sample



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:

disc of Appropriace Acid:	
Material	Acid Added for Digestion
	HNO_3 , $HC1$, HF , H_2O_2 , H_3BO_3
Metals	HNO _{3,} HCl,HF
Electronics	HNO ₃ ,HCl,H ₂ O ₂ ,HBF ₄

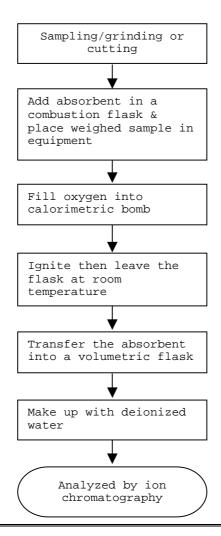
*2: If the result of spot test is positive, Chromium VI would be determined as detected.



Test Conducted

(IV) Measurement Flowchart:

Test for Halogen Content Reference Standard: EN 14582



End of Report



Test Conducted

Number: TWNC00233549

Photo





Test Report Number: TWNC00270124

Applicant: Littelfuse Philippines Inc. Date : Aug 10, 2012

LIMA Technology Center, Lipa City,

Malvar, Batangas

Sample Description:

One (1) group of submitted samples said to be :

Part Description : Sintered Resinate Paste

Part Number : 011005

Date Sample Received : Aug 06, 2012 Date Test Started : Aug 07, 2012

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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Test Conducted

(I) Test Result Summary :

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



Test Conducted

(I) Test Result Summary :

Mark Than	Result (ppm)	
Test Item	Submitted Samples	
Phthalates		
Di(2-ethylhexyl) Phthalate (DEHP)	ND	
Dibutyl Phthalate (DBP)	ND	
Benzyl Butyl Phthalate (BBP)	ND	
Others		
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 : Aug 06, 2012

Test Period : Aug 07, 2012 To Aug 09, 2012

(Ⅱ) RoHS Limits:

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

The above limits were quoted from Annex II of 2011/65/EU for homogeneous material.



Test Conducted

(Ⅲ) Test Method:

<u> Test Method:</u>		
<u>Test Item</u>	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
Chromium VI (Cr ⁶⁺) 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-MS and further HPLC-DAD 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-MS and further HPLC-DAD confirmation when necessary.	5 ppm
Halogen Content	With reference to EN 14582:2007 by calorimetric bomb with oxygen and determined by Ion Chromatograph.	50 ppm
Phthalates	With reference to EN 14372: 2004, by solvent extraction and determined by GC-MS.	50 ppm
Hexabromocyclododecane (HBCDD)	With reference to USEPA 3540C, by solvent extraction and determined by GC-MSD.	10 ppm

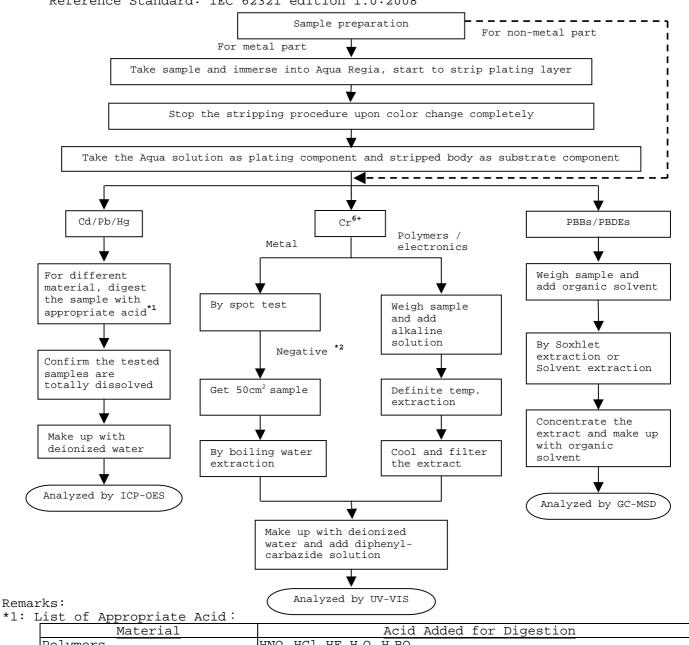
Remark: Reporting limit = Quantitation limit of analyte in sample



Test Conducted

(IV) Measurement Flowchart:

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



Material	Acid Added for Digestion
Polymers	HNO ₃ ,HCl,HF,H ₂ O ₂ ,H ₃ BO ₃
Metals	HNO ₃ ,HCl,HF
Electronics	HNO _{3,} HCl,H ₂ O _{2,} HBF ₄

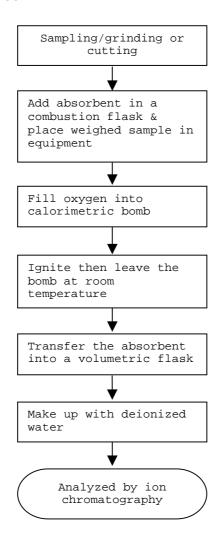
*2: If the result of spot test is positive, Chromium VI would be determined as detected.



Test Conducted

(IV) Measurement Flowchart:

Test for Halogen Content Reference Standard: EN 14582

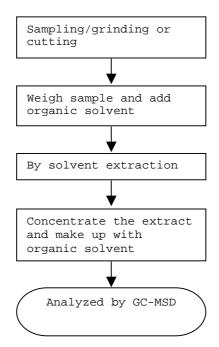




Test Conducted

$(\mathrm{\,IV}\,)$ Measurement Flowchart:

Test For Phthalates Contents Reference Method: EN 14372: 2004

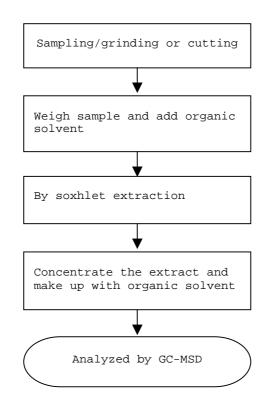




Test Conducted

(IV) Measurement Flowchart:

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



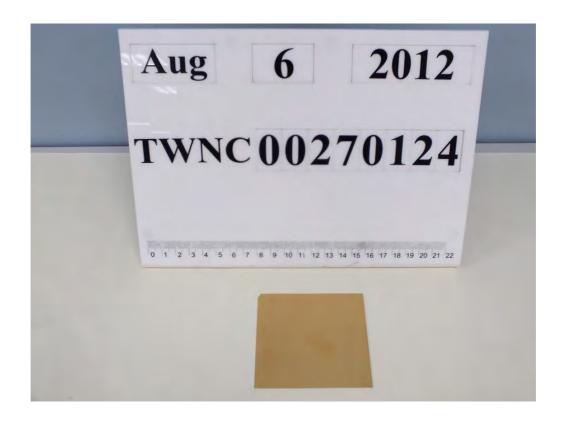
End of Report

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Test Conducted

Photo





Test Report Number : TWNC00233536

Applicant: Littelfuse Philippines Inc.

LIMA Technology Center, Lipa City,

Malvar, Batangas

Sample Description:

One (1) group of submitted samples said to be :

Part Description : Overglaze (Coverglass) Paste (Sintered)

Part Number : 011003

Date Sample Received : Nov 21, 2011
Date Test Started : Nov 22, 2011

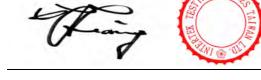
Test Conducted :

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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Date : Nov 25, 2011

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Test Conducted

(I) Test Result Summary:

Cadmium (Cd) content Lead (Pb) content Mercury (Hg) content Mercury (Hg) content Chromium VI (Cr ⁵⁺) content ND Polybrominated Biphenyls (PBBs) Monobrominated Biphenyls (MonoBB) Dibrominated Biphenyls (DiBB) Tribrominated Biphenyls (TriBB) ND Tetrabrominated Biphenyls (TetraBB) Pentabrominated Biphenyls (PentaBB) ND Hexabrominated Biphenyls (HexaBB) ND Heptabrominated Biphenyls (HexaBB) ND Octabrominated Biphenyls (OctaBB) ND Octabrominated Biphenyls (NonaBB) ND Decabrominated Biphenyls (NonaBB) ND Nonabrominated Biphenyls (NonaBB) ND Decabrominated Diphenyl (DecaBB) ND Tribrominated Diphenyl Ethers (PBDEs) Monobrominated Diphenyl Ethers (MonoBDE) Dibrominated Diphenyl Ethers (TriBDE) Tribrominated Diphenyl Ethers (TetraBDE) ND Tetrabrominated Diphenyl Ethers (PentaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Heckabrominated Diphenyl Ethers (HexaBDE) ND Heckabrominated Diphenyl Ethers (HexaBDE) ND Heckabrominated Diphenyl Ethers (NonaBDE) ND Decabrominated Diphenyl Ethers (NonaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) ND Decabrominated Diphenyl Ethers (NonaBDE) ND Decabrominated Diphenyl Ethers (NonaBDE) ND Decabrominated Diphenyl Ether (DecaBDE) ND ND Decabrominated Diphenyl Ethers (NonaBDE) ND Decabrominated Diphenyl) Test Result Summary :	
Green Glass Heavy Metal	Togt Itom	Result (ppm)
Cadmium (Cd) content Lead (Pb) content Mercury (Hg) content ND Chromium VI (Cr ⁵⁺) content Polybrominated Biphenyls (PBBs) Monobrominated Biphenyls (MonoBB) Dibrominated Biphenyls (DBB) Tribrominated Biphenyls (TriBB) ND Pentabrominated Biphenyls (TriBB) Pentabrominated Biphenyls (PentaBB) Pentabrominated Biphenyls (PentaBB) ND Hexabrominated Biphenyls (HexaBB) ND Hexabrominated Biphenyls (HexaBB) Octabrominated Biphenyls (MonaBB) ND Octabrominated Biphenyls (MonaBB) ND Polybrominated Biphenyls (MonaBB) ND Polybrominated Diphenyl Ethers (PBDES) Monobrominated Diphenyl Ethers (MonoBDE) Tribrominated Diphenyl Ethers (TriBDE) Tribrominated Diphenyl Ethers (TriBDE) ND Tetrabrominated Diphenyl Ethers (HexaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Heptabrominated Diphenyl Ethers (OctaBDE) ND Heptabrominated Diphenyl Ethers (NonaBDE) ND ND ND ND Heptabrominated Diphenyl Ethers (NonaBDE) ND ND ND Heptabrominated Diphenyl Ethers (NonaBDE) ND ND ND ND ND ND ND ND ND N	<u>lest item</u>	Green Glass
Lead (Pb) content ND	Heavy Metal	
Mercury (Hg) content Chromium VI (Cr ⁵⁺) content Polybrominated Biphenyls (PBBs) Monobrominated Biphenyls (MonoBB) Dibrominated Biphenyls (MonoBB) ND Tribrominated Biphenyls (TriBB) Tribrominated Biphenyls (TriBB) ND Tetrabrominated Biphenyls (PentaBB) ND Pentabrominated Biphenyls (PentaBB) ND Hexabrominated Biphenyls (HexaBB) ND Hexabrominated Biphenyls (HexaBB) ND Octabrominated Biphenyls (MonaBB) ND Octabrominated Biphenyls (NonaBB) ND Decabrominated Biphenyls (NonaBB) ND Nonabrominated Biphenyl (DecaBB) Polybrominated Diphenyl Ethers (PBDEs) Monobrominated Diphenyl Ethers (MonoBDE) Dibrominated Diphenyl Ethers (TriBDE) Tribrominated Diphenyl Ethers (TriBDE) ND Tetrabrominated Diphenyl Ethers (TetraBDE) ND Tetrabrominated Diphenyl Ethers (HexaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Doctabrominated Diphenyl Ethers (NonaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) ND Decabrominated Diphenyl Ethers (NonaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) ND Decabrominated Diphenyl Ethers (NonaBDE) ND Docabrominated Diphenyl Ethers (NonaBDE) ND Doc	Cadmium (Cd) content	ND
Chromium VI (Cr ⁵⁺) content Polybrominated Biphenyls (PBBs) Monobrominated Biphenyls (MonoBB) Dibrominated Biphenyls (DiBB) Tribrominated Biphenyls (TriBB) Tetrabrominated Biphenyls (TriBB) Pentabrominated Biphenyls (TetraBB) Pentabrominated Biphenyls (PentaBB) Heptabrominated Biphenyls (HexaBB) Heptabrominated Biphenyls (HexaBB) ND ND Nonabrominated Biphenyls (NonaBB) ND ND Nonabrominated Biphenyls (NonaBB) Polybrominated Biphenyl (HocaBB) ND Polybrominated Diphenyl Ethers (PBDEs) Monobrominated Diphenyl Ethers (FiBDE) Monobrominated Diphenyl Ethers (TriBDE) ND Tribrominated Diphenyl Ethers (TriBDE) ND Tetrabrominated Diphenyl Ethers (TetraBDE) ND Tetrabrominated Diphenyl Ethers (HexaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Heptabrominated Diphenyl Ethers (NonaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) ND ND Halogen Content Fluorine (F) Chlorine (Cl) ND Bromine (Br) Indine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) ND Benzyl Butyl Phthalate (BBP)	Lead (Pb) content	ND
Polybrominated Biphenyls (PBBs) ND		ND
Monobrominated Biphenyls (MonoBB) Dibrominated Biphenyls (DiBB) Tribrominated Biphenyls (TriBB) ND Tetrabrominated Biphenyls (TetraBB) Pentabrominated Biphenyls (PentaBB) ND Hexabrominated Biphenyls (PentaBB) Hexabrominated Biphenyls (HexaBB) ND Heptabrominated Biphenyls (HexaBB) ND Octabrominated Biphenyls (OctaBB) ND Nonabrominated Biphenyls (NonaBB) ND Polybrominated Biphenyl (DecaBB) ND Polybrominated Diphenyl Ethers (PBDES) Monobrominated Diphenyl Ethers (MonoBDE) Dibrominated Diphenyl Ethers (TriBDE) Tetrabrominated Diphenyl Ethers (TriBDE) ND Tetrabrominated Diphenyl Ethers (PentaBDE) ND Pentabrominated Diphenyl Ethers (PentaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Heptabrominated Diphenyl Ethers (HexaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) ND Decabrominated Diphenyl Ethers (NonaBDE) ND Dhotabrominated Dhotabromin	Chromium VI (Cr ⁶⁺) content	ND
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Tribrominated Biphenyls (TriBB) Tetrabrominated Biphenyls (TetraBB) Pentabrominated Biphenyls (PentaBB) ND Hexabrominated Biphenyls (PentaBB) ND Hexabrominated Biphenyls (HexaBB) ND Octabrominated Biphenyls (OctaBB) ND Octabrominated Biphenyls (OctaBB) ND Nonabrominated Biphenyls (NonaBB) ND Nonabrominated Biphenyls (NonaBB) ND Polybrominated Biphenyl (DecaBB) ND Polybrominated Diphenyl Ethers (PBDES) Monobrominated Diphenyl Ethers (MonoBDE) Dibrominated Diphenyl Ethers (TriBDE) ND Tribrominated Diphenyl Ethers (TriBDE) ND Tetrabrominated Diphenyl Ethers (TetraBDE) Pentabrominated Diphenyl Ethers (PentaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Heptabrominated Diphenyl Ethers (HeptaBDE) ND Octabrominated Diphenyl Ethers (OctaBDE) ND Decabrominated Diphenyl Ethers (NonaBDE) ND Decabrominated Diphenyl Ethers (NonaBDE) ND Decabrominated Diphenyl Ether (DecaBDE) ND Decabrominated Diphenyl Ether (NonaBDE) ND Decabrominated Diphenyl Ether (DecaBDE) ND Dhonabrominated Diphe	Monobrominated Biphenyls (MonoBB)	ND
Tetrabrominated Biphenyls (TetraBB) ND Pentabrominated Biphenyls (PentaBB) ND Hexabrominated Biphenyls (HexaBB) ND Heptabrominated Biphenyls (HexaBB) ND Octabrominated Biphenyls (OctaBB) ND Octabrominated Biphenyls (OctaBB) ND Nonabrominated Biphenyls (NonaBB) ND Decabrominated Biphenyl (DecaBB) ND Polybrominated Diphenyl Ethers (PBDES) 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 (PentaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Octabrominated Diphenyl Ethers (OctaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) ND Decabrominated Diphenyl Ether (DecaBDE) ND Halogen Content Fluorine (F) ND Chlorine (C1) ND Bromine (Br) ND Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) ND Benzyl Butyl Phthalate (BBP)	Dibrominated Biphenyls (DiBB)	ND
Pentabrominated Biphenyls (PentaBB) Hexabrominated Biphenyls (HexaBB) ND Heptabrominated Biphenyls (HeptaBB) ND Octabrominated Biphenyls (OctaBB) ND Nonabrominated Biphenyls (NonaBB) Decabrominated Biphenyls (NonaBB) Decabrominated Biphenyl (DecaBB) Polybrominated Diphenyl Ethers (PBDES) Monobrominated Diphenyl Ethers (MonoBDE) Dibrominated Diphenyl Ethers (DiBDE) Tribrominated Diphenyl Ethers (TriBDE) Tetrabrominated Diphenyl Ethers (TetraBDE) Pentabrominated Diphenyl Ethers (PentaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Heptabrominated Diphenyl Ethers (HexaBDE) ND Octabrominated Diphenyl Ethers (OctaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) ND Decabrominated Diphenyl Ether (DecaBDE) ND Halogen Content Fluorine (F) Chlorine (C1) Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) ND Debaryl Butyl Phthalate (BBP) ND Others	Tribrominated Biphenyls (TriBB)	ND
Hexabrominated Biphenyls (HexaBB) Heptabrominated Biphenyls (HeptaBB) Octabrominated Biphenyls (OctaBB) ND Nonabrominated Biphenyls (NonaBB) Decabrominated Biphenyl (NonaBB) ND Decabrominated Biphenyl (DecaBB) ND Polybrominated Diphenyl Ethers (PBDES) Monobrominated Diphenyl Ethers (MonoBDE) Dibrominated Diphenyl Ethers (Tibbe) ND Tribrominated Diphenyl Ethers (TriBDE) Tribrominated Diphenyl Ethers (TetraBDE) ND Tetrabrominated Diphenyl Ethers (PentaBDE) ND Pentabrominated Diphenyl Ethers (PentaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Heptabrominated Diphenyl Ethers (OctaBDE) ND Octabrominated Diphenyl Ethers (OctaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ether (DecaBDE) ND Decabrominated Diphenyl Ether (DecaBDE) ND Decabrominated Diphenyl Ether (DecaBDE) ND Halogen Content Fluorine (F) Chlorine (Cl) Bromine (Br) Iodine (I) ND Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) ND Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) ND Others	Tetrabrominated Biphenyls (TetraBB)	ND
Heptabrominated Biphenyls (HeptaBB) Octabrominated Biphenyls (OctaBB) ND Nonabrominated Biphenyls (NonaBB) Decabrominated Biphenyl (DecaBB) Polybrominated Biphenyl (DecaBB) Monobrominated Diphenyl Ethers (PBDES) Monobrominated Diphenyl Ethers (MonoBDE) Dibrominated Diphenyl Ethers (DiBDE) Tribrominated Diphenyl Ethers (TriBDE) Tetrabrominated Diphenyl Ethers (TetraBDE) Pentabrominated Diphenyl Ethers (FentaBDE) Hexabrominated Diphenyl Ethers (HexaBDE) Heptabrominated Diphenyl Ethers (HexaBDE) ND Heptabrominated Diphenyl Ethers (OctaBDE) Octabrominated Diphenyl Ethers (NonaBDE) Docabrominated Diphenyl Ethers (NonaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) ND Halogen Content Fluorine (F) Chlorine (Cl) Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) ND Others	Pentabrominated Biphenyls (PentaBB)	ND
Octabrominated Biphenyls (OctaBB) Nonabrominated Biphenyls (NonaBB) Decabrominated Biphenyl (DecaBB) ND Polybrominated Diphenyl Ethers (PBDES) Monobrominated Diphenyl Ethers (MonoBDE) Dibrominated Diphenyl Ethers (DiBDE) ND Tribrominated Diphenyl Ethers (TriBDE) Tribrominated Diphenyl Ethers (TetraBDE) ND Tetrabrominated Diphenyl Ethers (TetraBDE) Pentabrominated Diphenyl Ethers (PentaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) Heptabrominated Diphenyl Ethers (HeyaBDE) ND Octabrominated Diphenyl Ethers (OctaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ether (DecaBDE) ND Dibutyle Phthalate (DBP) ND Dibutyl Phthalate (DBP) ND Dothers	Hexabrominated Biphenyls (HexaBB)	ND
Nonabrominated Biphenyls (NonaBB) Decabrominated Biphenyl (DecaBB) Polybrominated Diphenyl Ethers (PBDEs) Monobrominated Diphenyl Ethers (MonoBDE) Dibrominated Diphenyl Ethers (DiBDE) ND Dibrominated Diphenyl Ethers (TriBDE) Tribrominated Diphenyl Ethers (TriBDE) ND Tetrabrominated Diphenyl Ethers (TetraBDE) Pentabrominated Diphenyl Ethers (PentaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) Heptabrominated Diphenyl Ethers (HeytaBDE) Octabrominated Diphenyl Ethers (OctaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ether (DecaBDE) ND Halogen Content Fluorine (F) Chlorine (C1) Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) ND Others	Heptabrominated Biphenyls (HeptaBB)	ND
Decabrominated Biphenyl (DecaBB) Polybrominated Diphenyl Ethers (PBDEs) Monobrominated Diphenyl Ethers (MonoBDE) Dibrominated Diphenyl Ethers (DiBDE) Tribrominated Diphenyl Ethers (TriBDE) Tetrabrominated Diphenyl Ethers (TetraBDE) Pentabrominated Diphenyl Ethers (PentaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) Hexabrominated Diphenyl Ethers (HexaBDE) Octabrominated Diphenyl Ethers (HeptaBDE) ND Nonabrominated Diphenyl Ethers (OctaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ether (DecaBDE) ND Halogen Content Fluorine (F) Chlorine (C1) Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Denzyl Butyl Phthalate (BBP) ND Others	Octabrominated Biphenyls (OctaBB)	ND
Polybrominated Diphenyl Ethers (PBDEs) Monobrominated Diphenyl Ethers (MonoBDE) Dibrominated Diphenyl Ethers (DiBDE) Tribrominated Diphenyl Ethers (TriBDE) Tetrabrominated Diphenyl Ethers (TetraBDE) Pentabrominated Diphenyl Ethers (PentaBDE) Hexabrominated Diphenyl Ethers (PentaBDE) Heyabrominated Diphenyl Ethers (HexaBDE) Heptabrominated Diphenyl Ethers (HeptaBDE) Octabrominated Diphenyl Ethers (OctaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ethers (NonaBDE) ND Halogen Content Fluorine (F) Chlorine (Cl) Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) ND Others	Nonabrominated Biphenyls (NonaBB)	ND
Monobrominated Diphenyl Ethers (MonoBDE) Dibrominated Diphenyl Ethers (DiBDE) Tribrominated Diphenyl Ethers (TriBDE) Tetrabrominated Diphenyl Ethers (TetraBDE) Pentabrominated Diphenyl Ethers (PentaBDE) Hexabrominated Diphenyl Ethers (HexaBDE) Heptabrominated Diphenyl Ethers (HeytaBDE) ND Heptabrominated Diphenyl Ethers (OctaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ether (DecaBDE) ND Halogen Content Fluorine (F) Chlorine (C1) Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) ND Others	Decabrominated Biphenyl (DecaBB)	ND
Dibrominated Diphenyl Ethers (DiBDE) Tribrominated Diphenyl Ethers (TriBDE) ND Tetrabrominated Diphenyl Ethers (TetraBDE) Pentabrominated Diphenyl Ethers (PentaBDE) Hexabrominated Diphenyl Ethers (HexaBDE) Heptabrominated Diphenyl Ethers (HeptaBDE) Octabrominated Diphenyl Ethers (OctaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) ND Decabrominated Diphenyl Ether (DecaBDE) ND Halogen Content Fluorine (F) Chlorine (Cl) Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) ND ND ND Others	Polybrominated Diphenyl Ethers (PBDEs)	
Tribrominated Diphenyl Ethers (TriBDE) Tetrabrominated Diphenyl Ethers (TetraBDE) Pentabrominated Diphenyl Ethers (PentaBDE) Hexabrominated Diphenyl Ethers (HexaBDE) Heptabrominated Diphenyl Ethers (HeptaBDE) Octabrominated Diphenyl Ethers (OctaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ether (DecaBDE) Halogen Content Fluorine (F) Chlorine (Cl) Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) ND Others	Monobrominated Diphenyl Ethers (MonoBDE)	ND
Tetrabrominated Diphenyl Ethers (TetraBDE) Pentabrominated Diphenyl Ethers (PentaBDE) ND Hexabrominated Diphenyl Ethers (HexaBDE) ND Heptabrominated Diphenyl Ethers (HeptaBDE) Octabrominated Diphenyl Ethers (OctaBDE) NO Nonabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ether (DecaBDE) ND Halogen Content Fluorine (F) Chlorine (Cl) Bromine (Br) Iodine (I) ND Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) ND Others	Dibrominated Diphenyl Ethers (DiBDE)	ND
Pentabrominated Diphenyl Ethers (PentaBDE) Hexabrominated Diphenyl Ethers (HexaBDE) ND Heptabrominated Diphenyl Ethers (HeptaBDE) Octabrominated Diphenyl Ethers (OctaBDE) ND Nonabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ether (DecaBDE) ND Halogen Content Fluorine (F) Chlorine (Cl) Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) Others	Tribrominated Diphenyl Ethers (TriBDE)	ND
Hexabrominated Diphenyl Ethers (HexaBDE) Heptabrominated Diphenyl Ethers (HeptaBDE) Octabrominated Diphenyl Ethers (OctaBDE) Nonabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ether (DecaBDE) ND Halogen Content Fluorine (F) Chlorine (Cl) Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) Others	Tetrabrominated Diphenyl Ethers (TetraBDE)	ND
Heptabrominated Diphenyl Ethers (HeptaBDE) Octabrominated Diphenyl Ethers (OctaBDE) Nonabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ether (DecaBDE) ND Halogen Content Fluorine (F) Chlorine (Cl) Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) Others	Pentabrominated Diphenyl Ethers (PentaBDE)	ND
Octabrominated Diphenyl Ethers (OctaBDE) Nonabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ether (DecaBDE) ND Halogen Content Fluorine (F) Chlorine (Cl) Bromine (Br) Iodine (I) ND Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) Others		ND
Nonabrominated Diphenyl Ethers (NonaBDE) Decabrominated Diphenyl Ether (DecaBDE) Halogen Content Fluorine (F) Chlorine (Cl) Bromine (Br) Iodine (I) ND Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) Others		ND
Decabrominated Diphenyl Ether (DecaBDE) Halogen Content Fluorine (F) Chlorine (Cl) Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) Others	Octabrominated Diphenyl Ethers (OctaBDE)	ND
Halogen Content Fluorine (F) ND Chlorine (Cl) ND Bromine (Br) ND Iodine (I) ND Phthalates Di(2-ethylhexyl) Phthalate (DEHP) ND Dibutyl Phthalate (DBP) ND Benzyl Butyl Phthalate (BBP) ND Others		ND
Fluorine (F) Chlorine (Cl) Bromine (Br) Iodine (I) ND Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) Others	Decabrominated Diphenyl Ether (DecaBDE)	ND
Chlorine (Cl) Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) Others	Halogen Content	
Bromine (Br) Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) Others	Fluorine (F)	ND
Iodine (I) Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) Others	Chlorine (Cl)	ND
Phthalates Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) Others	Bromine (Br)	ND
Di(2-ethylhexyl) Phthalate (DEHP) Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) Others	Iodine (I)	ND
Dibutyl Phthalate (DBP) Benzyl Butyl Phthalate (BBP) Others ND	Phthalates	
Benzyl Butyl Phthalate (BBP) ND Others		ND
Others		ND
	Benzyl Butyl Phthalate (BBP)	ND
Hexabromocyclododecane (HBCDD) ND		
	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 21, 2011
Test Period : Nov 22, 2011 To Nov 25, 2011



Test Conducted

(${\rm II}$) RoHS Requirement:

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



Test Conducted (Ⅲ) Test Method:

Test Item	Test Method	Reporting Limit
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

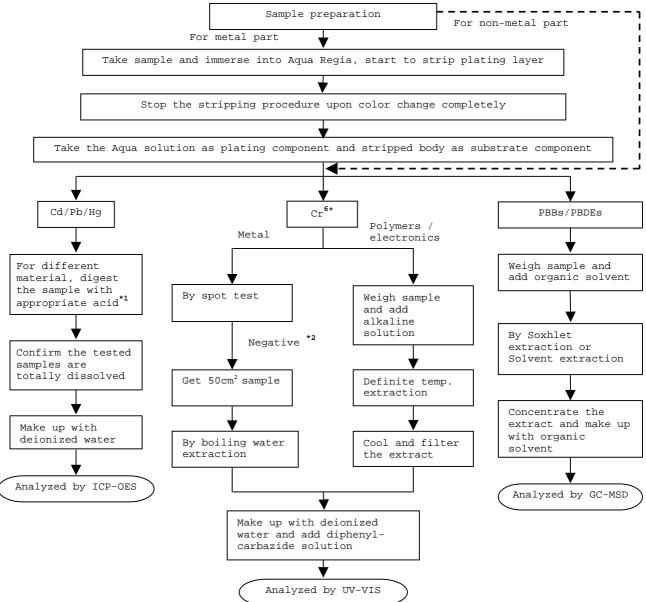
Remark: Reporting limit = Quantitation limit of analyte in sample



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:

<u>-120 01 11PP10P11400 11014</u>	
Material	Acid Added for Digestion
Polymers	HNO ₃ , HCl, HF, H ₂ O ₂ , H ₃ BO ₃
	HNO _{3,} HCl,HF
Electronics	HNO ₃ ,HCl,H ₂ O ₂ ,HBF ₄

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



Test Conducted (IV) Measurement Flowchart:

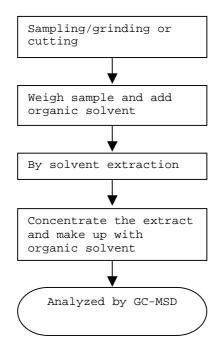
Test for Halogen Content Reference Standard: EN 14582

> Sampling/grinding or cutting Add absorbent in a combustion flask & place weighed sample in equipment Fill oxygen into calorimetric bomb Ignite then leave the flask at room temperature Transfer the absorbent into a volumetric flask Make up with deionized water Analyzed by ion chromatography



Test Conducted ($\overline{\mathrm{IV}}$) Measurement Flowchart:

Test For Phthalates Contents
Reference Method: EN 14372: 2004



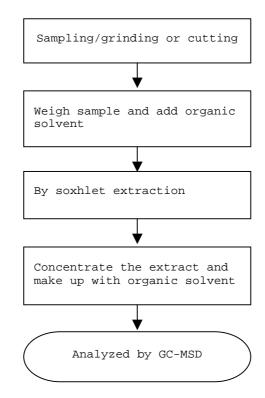


Test Conducted

(IV) Measurement Flowchart:

Test For Hexabromocyclododecane (HBCDD)

Reference Standard: USEPA 3540C



End of Report



Test Conducted

Number: TWNC00233536

Photo





Test Report Number: TWNC00238109

Applicant: Littelfuse Philippines Inc. Date : Dec 29, 2011

LIMA Technology Center, Lipa City,

Malvar, Batangas

Sample Description:

One (1) group of submitted samples said to be :

Part Description : Underglaze(Dielectric) Paste-Sintered

Part Number : 011004

Date Sample Received : Dec 22, 2011
Date Test Started : Dec 23, 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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Page 1 of 9



Test Conducted

(I) Test Result Summary :

	Result (ppm)
Test Item	Submitted Samples
	(Mixed All Parts)
Heavy Metal	
Cadmium (Cd) content	ND
Lead (Pb) content	ND
Mercury (Hg) content	ND
Chromium VI (Cr ⁶⁺) content	ND
Polybrominated Biphenyls (PBBs)	
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
Polybrominated Diphenyl Ethers (PBDEs)	
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
Halogen Content	·
Fluorine (F)	ND
Chlorine (Cl)	ND
Bromine (Br)	ND
Iodine (I)	ND



Test Conducted

(I) Test Result Summary :

	Result (ppm)
Test Item	Submitted Samples
	(Mixed All Parts)
Phthalates	·
Di(2-ethylhexyl) Phthalate (DEHP)	ND
Dibutyl Phthalate (DBP)	ND
Benzyl Butyl Phthalate (BBP)	ND
Others	
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 : Dec 22, 2011

Test Period : Dec 23, 2011 To Dec 29, 2011

(Ⅱ) RoHS Requirement:

- ,	
Restricted Substances	<u>Limits</u>
Cadmium (Cd) Content	0.01% (100ppm)
Lead (Pb) Content	0.1% (1000ppm)
Mercury (Hg) Content	0.1% (1000ppm)
Chromium VI (Cr ⁶⁺) 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 (\coprod) 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
Chromium VI (Cr ⁶⁺) 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-MS and further HPLC-DAD 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-MS and further HPLC-DAD confirmation when necessary.	5 ppm
Halogen Content	With reference to EN 14582:2007 by calorimetric bomb with oxygen and determined by Ion Chromatograph.	50 ppm
Phthalates	With reference to ASTM D3421-75, by solvent extraction and determined by GC-MSD or GC-FID	10 ppm
Hexabromocyclododecane (HBCDD)	With reference to USEPA 3540C, by solvent extraction and determined by GC-MSD	10 ppm

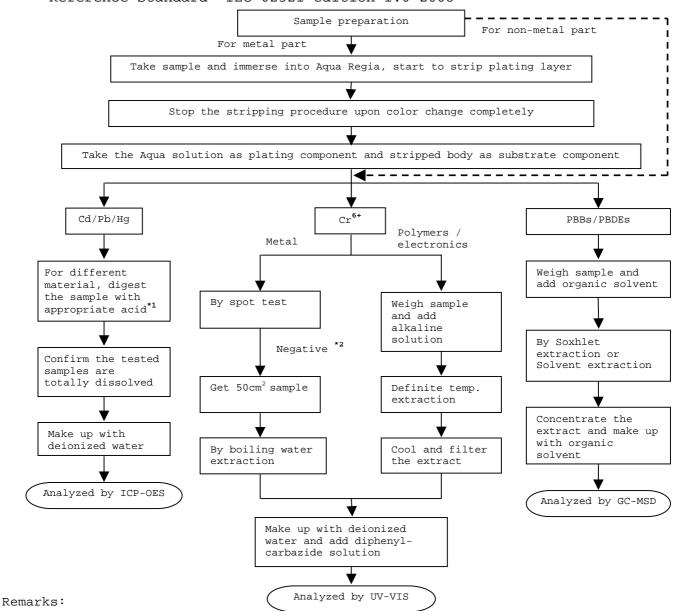
Remark: Reporting limit = Quantitation limit of analyte in sample



Test Conducted

(IV) Measurement Flowchart:

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



*1: List of Appropriate Acid:

dibe of hppropriace hera	
<u>Material</u>	Acid Added for Digestion
Polymers	HNO_{3} , $HC1$, HF , $H_{2}O_{2}$, $H_{3}BO_{3}$
Metals	HNO _{3,} HCl,HF
Electronics	HNO _{3,} HCl,H ₂ O _{2,} HBF ₄

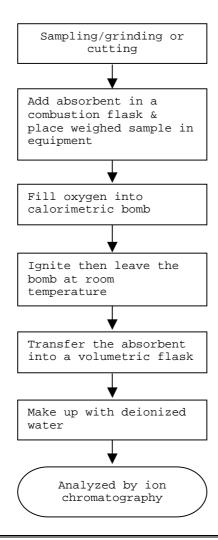
*2: If the result of spot test is positive, Chromium VI would be determined as detected.



Test Conducted

(IV) Measurement Flowchart:

Test for Halogen Content Reference Standard: EN 14582

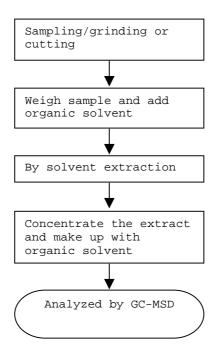




Test Conducted

 (IV) Measurement Flowchart:

Test For Phthalates Contents Reference Method: EN 14372: 2004

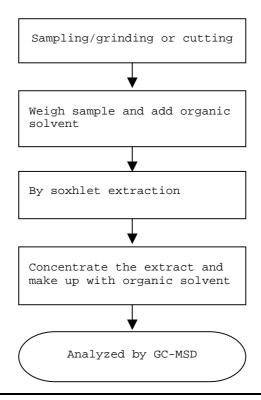




Test Conducted

(IV) Measurement Flowchart:

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



End of Report



Test Conducted

Number : TWNC00238109

Photo





Test Report Number: TWNC00233535

Applicant: Littelfuse Philippines Inc.

Date : Nov 25, 2011

LIMA Technology Center, Lipa City,

Malvar, Batangas

Sample Description:

One (1) group of submitted samples said to be :

Part Description : End Termination Paste (Sintered)

Part Number : 011001

Date Sample Received : Nov 21, 2011
Date Test Started : Nov 23, 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.

Page 1 of 9



Test Conducted

(I) Test Result Summary :

) lest Result Summary .	
Test Item	Result (ppm)
TCSC TCCIII	Silvery Material
Heavy Metal	
Cadmium (Cd) content	ND
Lead (Pb) content	ND
Mercury (Hg) content	ND
Chromium VI (Cr ⁶⁺) content	ND
Polybrominated Biphenyls (PBBs)	
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
Polybrominated Diphenyl Ethers (PBDEs)	
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
Halogen Content	
Fluorine (F)	ND
Chlorine (Cl)	ND
Bromine (Br)	ND
Iodine (I)	ND



Test Conducted

(I) Test Result Summary :

Test Item	Result (ppm) Silvery Material	
Phthalates	•	
Di(2-ethylhexyl) Phthalate (DEHP)	ND	
Dibutyl Phthalate (DBP)	ND	
Benzyl Butyl Phthalate (BBP)	ND	
Others		
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 21, 2011

Test Period : Nov 23, 2011 To Nov 25, 2011

(II) RoHS Requirement:

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

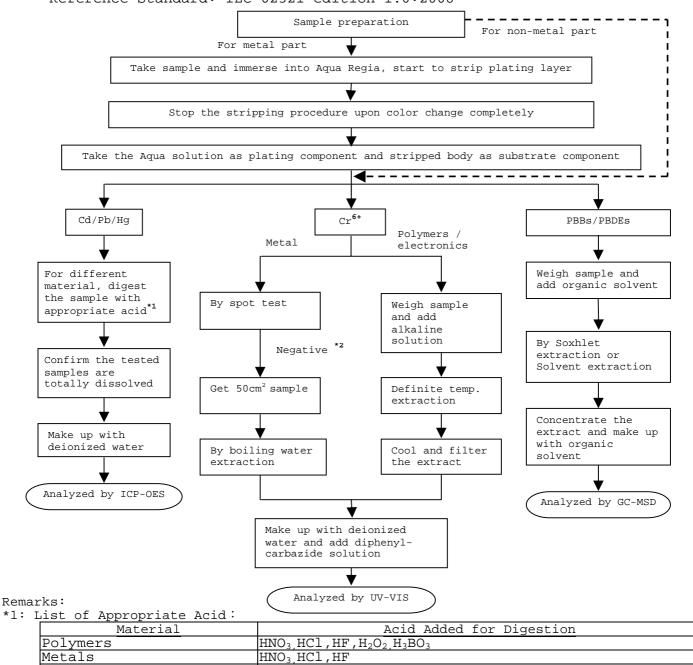


Test Conducted

(IV) Measurement Flowchart:

Electronics

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



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

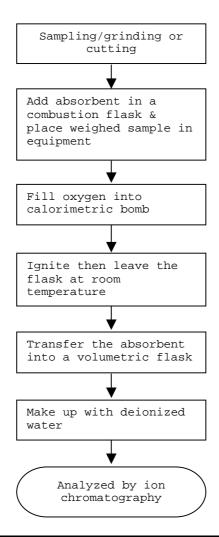
HNO3 HCl, H2O2 HBF4



Test Conducted

(${
m IV}$) Measurement Flowchart:

Test for Halogen Content Reference Standard: EN 14582

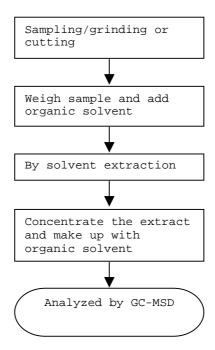




Test Conducted

 (IV) Measurement Flowchart:

Test For Phthalates Contents Reference Method: EN 14372: 2004

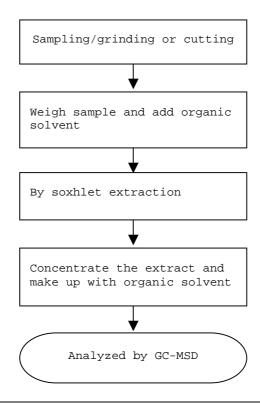




Test Conducted

(IV) Measurement Flowchart:

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



End of Report



Test Conducted

Photo





Test Report Number: TWNC00233562S1

Applicant: Littelfuse Philippines Inc.

LIMA Technology Center, Lipa City,

Malvar, Batangas

Date : Jul 11, 2012
This is to supersede
report NO. TWNC00233562

dated Nov 24, 2011

Sample Description:

One (1) group of submitted samples said to be :

Part Description : Nickel Anode
Part Number : 0101118/010118
Date Sample Received : Nov 21, 2011
Date Test Started : Nov 22, 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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Page 1 of 5



Number : TWNC00233562S1

Test Conducted

(I) Test Result Summary :

·		
Togt Itom	Result (ppm)	
Test Item	Silvery Metal	
Heavy Metal		
Cadmium (Cd) content	ND	
Lead (Pb) content	ND	
Mercury (Hg) content	ND	
Chromium VI (Cr ⁶⁺) content (mg/kg with 50cm ²)	Negative	
Chromitam vi (Cr / Content (mg/kg with 50cm)	(< 0.02)(#)	

Remarks: ppm = Parts per million based on weight of tested sample = mg/kg

ND = Not detected
< = Less than</pre>

mg/kg with 50cm² = 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 cm² was used and the dilution factor was adjusted accordingly.

Responsibility of Chemist : Irene Chiou / Kevin Liu

Date Sample Received : Nov 21, 2011

Test Period : Nov 22, 2011 To Nov 24, 2011

(Π) RoHS Requirement:

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

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



Number : TWNC00233562S1

Test Conducted (Ⅲ) Test Method:

Test Method Reporting Limit Test Item With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by Cadmium (Cd) microwave digestion until the tested 2 ppm content samples are totally dissolved and determined by ICP-OES. With reference to IEC 62321 edition 1.0:2008 in clause 8/9/10, by microwave digestion until the tested Lead (Pb) content 2 ppm samples are totally dissolved and determined by ICP-OES. With reference to IEC 62321 edition 1.0:2008 in clause 7, by microwave Mercury (Hg) digestion until the tested samples are 2 ppm content totally dissolved and determined by ICP-OES. With reference to IEC 62321 edition Chromium VI (Cr⁶⁺) 1.0:2008 in annex B, by boiling water 0.02 mg/kg with 50cm² content extraction and determined by UV-Vis spectrophotometer.

Remark: Reporting limit = Quantitation limit of analyte in sample



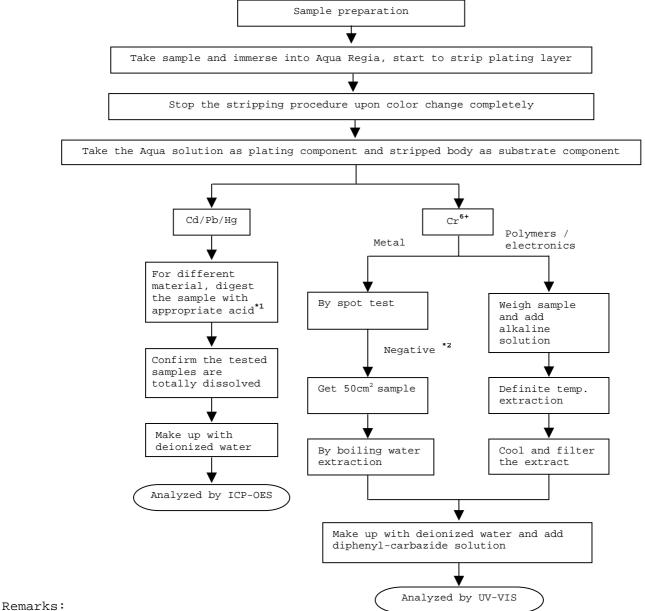
Number: TWNC00233562S1

Test Conducted

(IV) Measurement Flowchart:

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

Reference Standard: IEC 62321 edition 1.0:2008



*1: List of Appropriate Acid:

TIDE OF IMPLOPITACE HOLA	
Material	Acid Added for Digestion
Polymers	HNO_3 , $HC1$, HF , H_2O_2 , H_3BO_3
Metals	HNO _{3,} HCl,HF
Electronics	HNO ₃ ,HCl,H ₂ O ₂ ,HBF ₄

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

End of Report

Page 4 of 5



Number : TWNC00233562S1

Test Conducted

Photo





Test Report Number: TWNC00236188S1

Applicant: Littelfuse, Philippines Inc. Date : Jul 11, 2012

LIMA Technology Center, Lipa City, This is to supersede Malvar, Batangas report NO. TWNC00236188

dated Dec 13, 2011

Sample Description:

One (1) group of submitted samples said to be :

Part Description : Tin Anode
Part Number : 0101119/010119

Date Sample Received : Dec 08, 2011
Date Test Started : Dec 09, 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



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Director

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Page 1 of 5



Number : TWNC00236188S1

Test Conducted

(I) Test Result Summary:

Test Item	Result (ppm) Silvery Metal
Heavy Metal	
Cadmium (Cd) content	ND
Lead (Pb) content	54
Mercury (Hg) content	ND
Chromium VI (Cr^{6+}) content (mg/kg with $50cm^2$)	Negative (< 0.02)

Remarks: ppm = Parts per million based on weight of tested sample = mg/kg

ND = Not detected
< = Less than</pre>

mg/kg with 50cm² = 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 : Dec 08, 2011

Test Period : Dec 09, 2011 To Dec 13, 2011

(Π) RoHS Requirement:

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

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



Number : TWNC00236188S1

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
Chromium VI (Cr ⁶⁺) 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 ²

Remark: Reporting limit = Quantitation limit of analyte in sample

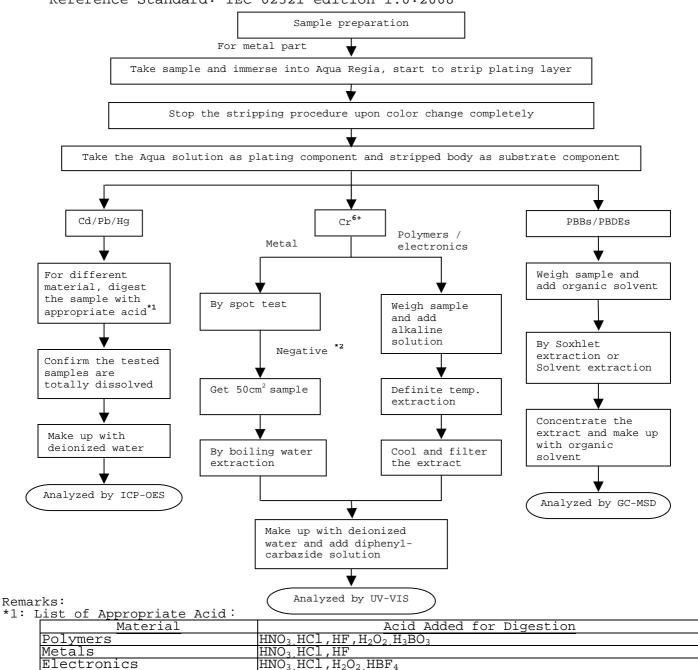


Number : TWNC00236188S1

Test Conducted

(IV) Measurement Flowchart:

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



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

End of Report



Test Conducted

Number : TWNC00236188S1

Photo

