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Test Report

LAIRD TECHNOLOGIES
4707 DETROIT AVENUE, CLEVELAND, OHIO, U.S.A. 44102-2216

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

Sample Description	:	IMPCB™ LAMINATE THE MATERIAL FOR SINGLE-SIDED METAL-BASED PRINTED CIRCUIT BOARDS
Style/Item No.	:	TLAM IMPCB 1KA
Sample Receiving Date	:	2011/06/17
Testing Period	:	2011/06/17 TO 2011/06/23

==========

Test Result(s)	:	Please refer to next page(s).
Conclusion	:	Based upon the performed tests by submitted samples, the test results of Cadmium, Lead, Mercury, Hexavalent Chromium Cr(VI), PBBs and PBDEs comply with the limits of RoHS Directive 2002/95/EC and its subsequent amendments.

SGS TAIWAN LTD

Nicole Chien / Supervisor
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

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Test Result(s)

PART NAME No.1 : ONE SIDE COPPER COLORED ANOTHER SIDE SILVER COLORED METAL

Test Item (s):	Unit	Method	MDL	Result No.1	Limit
Cadmium (Cd)	mg/kg	With reference to IEC 62321: 2008 - Clause 9 and performed by ICP-AES.	2	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321: 2008 - Clause 9 and performed by ICP-AES.	2	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321: 2008 - Clause 7 and performed by ICP-AES.	2	n.d.	1000
Hexavalent Chromium Cr(VI) by Boiling water extraction	**	With reference to IEC 62321: 2008 - Annex B and performed by Boiling water extraction Method.#	#	Negative	#
Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	mg/kg	With reference to US EPA 3540C: 1996 method for PFOS Content. Analysis was performed by LC/MS.	10	n.d.	-
PFOA (CAS No.: 335-67-1)	mg/kg	With reference to US EPA 3540C: 1996 method for PFOA Content. Analysis was performed by LC/MS.	10	n.d.	-
Hexabromocyclododecane (HBCDD) (CAS No.: 25637-99-4)	mg/kg	With reference to US EPA 3540C method. Analysis was performed by GC/MS.	5	n.d.	-
Dimethyl Fumarate (CAS No.: 624-49-7)	mg/kg	With reference to US EPA 3550C method. Analysis was performed by GC/MS.	0.1	n.d.	-
Halogen					
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.	-
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)			50	n.d.	-
Halogen-Bromine (Br) (CAS No.: 10097-32-2)			50	n.d.	-
Halogen-Iodine (I) (CAS No.: 14362-44-8)			50	n.d.	-

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Test Item (s):	Unit	Method	MDL	Result No.1	Limit
Sum of PBBs	mg/kg	With reference to IEC 62321: 2008 - Annex A and performed by GC/MS.	-	n.d.	1000
Monobromobiphenyl			5	n.d.	-
Dibromobiphenyl			5	n.d.	-
Tribromobiphenyl			5	n.d.	-
Tetrabromobiphenyl			5	n.d.	-
Pentabromobiphenyl			5	n.d.	-
Hexabromobiphenyl			5	n.d.	-
Heptabromobiphenyl			5	n.d.	-
Octabromobiphenyl			5	n.d.	-
Nonabromobiphenyl			5	n.d.	-
Decabromobiphenyl			5	n.d.	-
Sum of PBDEs			-	n.d.	1000
Monobromodiphenyl ether			5	n.d.	-
Dibromodiphenyl ether			5	n.d.	-
Tribromodiphenyl ether			5	n.d.	-
Tetrabromodiphenyl ether			5	n.d.	-
Pentabromodiphenyl ether			5	n.d.	-
Hexabromodiphenyl ether			5	n.d.	-
Heptabromodiphenyl ether			5	n.d.	-
Octabromodiphenyl ether			5	n.d.	-
Nonabromodiphenyl ether			5	n.d.	-
Decabromodiphenyl ether			5	n.d.	-
Phthalates					
BBP (Benzyl butyl phthalate) (CAS No.: 85-68-7)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.	-
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)			0.003	n.d.	-
DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0)			0.01	n.d.	-
DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0)			0.01	n.d.	-
DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)			0.003	n.d.	-
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)			0.003	n.d.	-

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Note：

1. mg/kg = ppm；0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. " - " = Not Regulated
5. ** = Qualitative analysis (No Unit)
6. # = a. Positive means the presence of CrVI on the tested areas
   b. Negative means the absence of CrVI on the tested areas
   The detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² tested areas.
7. This report supersedes the previous document bearing the test report number CE/2011/65583 which signed by Chenyu Kung.

PFOS Reference Information : Directive 2006/122/EC

(1) May not be placed on the market or used as a substance or constituent of preparations in a concentration equal to or higher than 0.005 % by mass.

(2) May not be placed on the market in semi-finished products or articles, or parts thereof, if the concentration of PFOS is equal to or higher than 0.1 % by mass calculated with reference to the mass of structurally or microstructurally distinct parts that contain PFOS or, for textiles or other coated materials, if the amount of PFOS is equal to or higher than 1μg/m^2 of the coated material.

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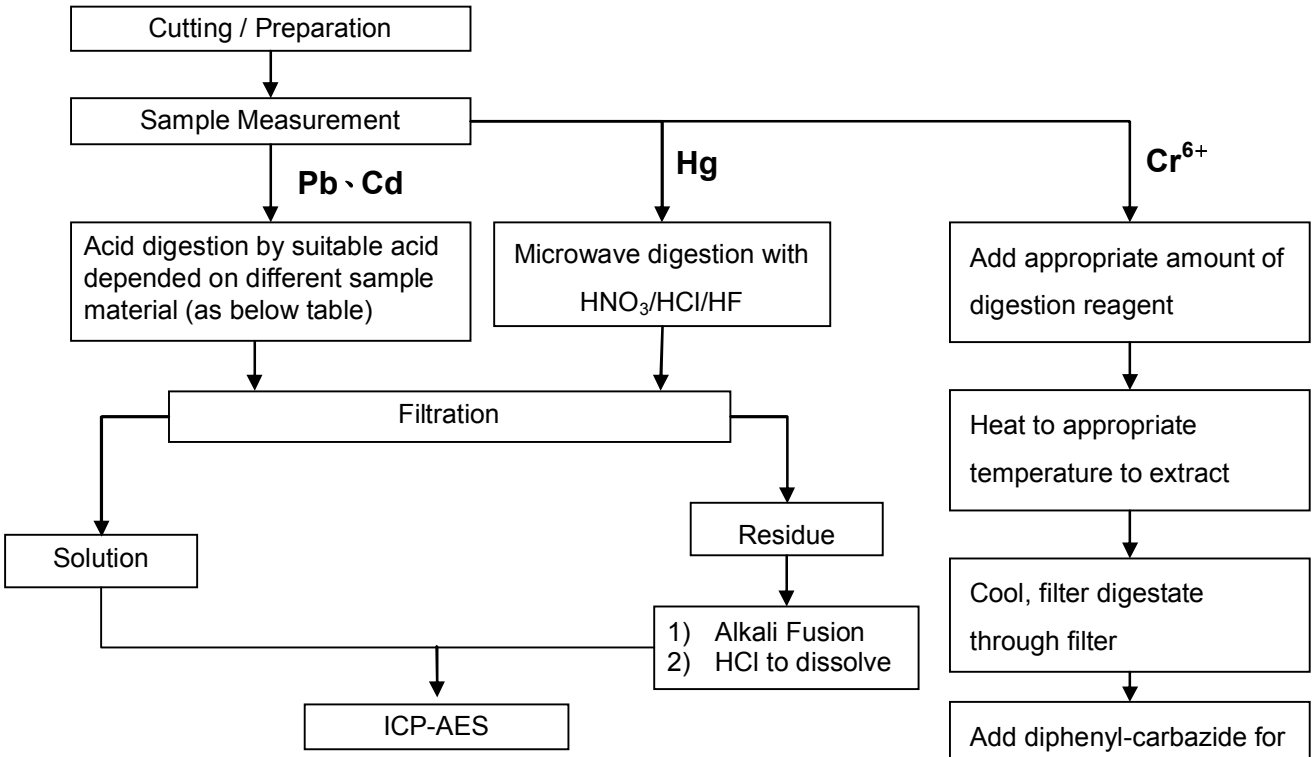
1) These samples were dissolved totally by pre-conditioning method according to below flow chart. （Cr^{6+} test method excluded）
2) Name of the person who made measurement: Climbgreat Yang
3) Name of the person in charge of measurement: Troy Chang



Sample Material	Digestion Acid
Steel, copper, aluminum, solder	Aqua regia, HNO_3, HCl, HF, H_2O_2
Glass	HNO_3/HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO_3
Plastic	H_2SO_4, H_2O_2, HNO_3, HCl
Others	Any acid to total digestion

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Analytical flow chart of Soxhlet extraction (LC/MS) procedure

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

【Test Items: PFOS/PFOA、Benzotriazole】

Sample pretreatment/separation

↓

Sample extraction by soxhlet method

↓

Concentrate/Dilute Extracted solution

↓

Analysis was performed by LC/MS

↓

Data

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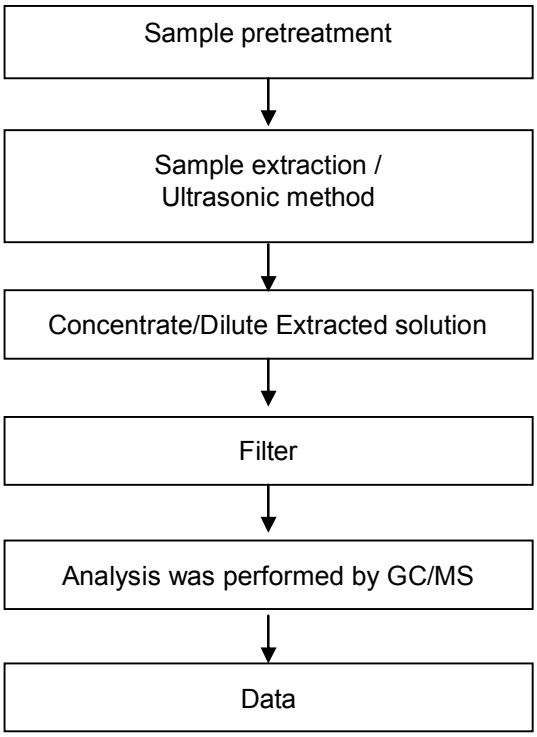
Analytical flow chart of Ultrasonic extraction (GC/MS) procedure

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

【Test Items: HBCDD、Dimethyl Fumarate、PAHs、AP、Ethylene glycol ether、1-methyl-2-pyrrolidone】



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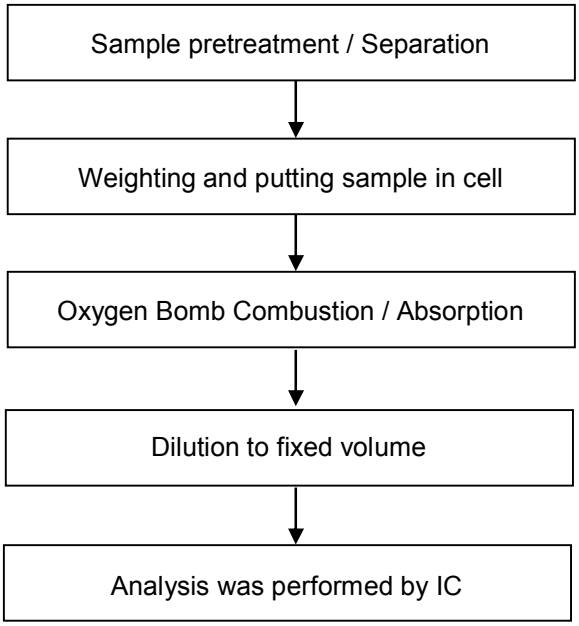
Analytical flow chart of halogen content

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



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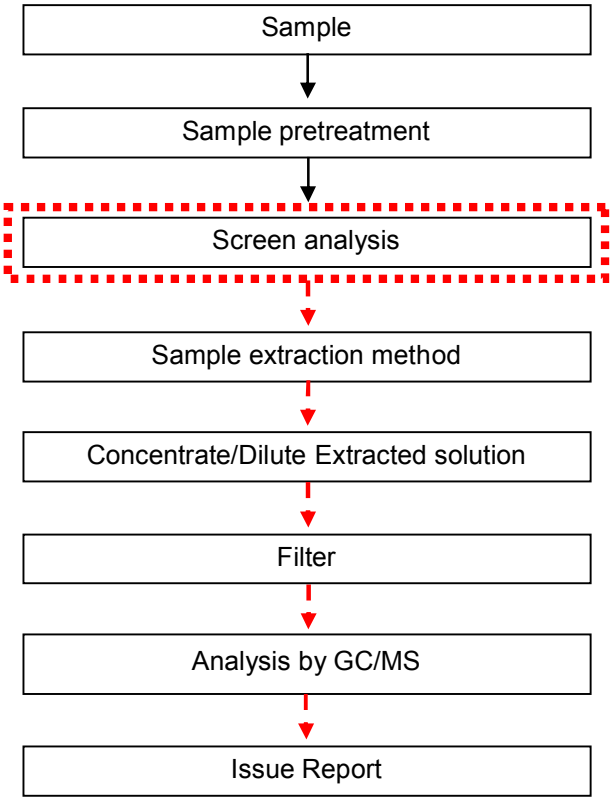
Analytical flow chart

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

【Test Items: PBB/PBDE, TBBP-A-bis】

First testing process ⟶ Optional screen process ····· Confirmation process – ·▶



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Analytical flow chart of Soxhlet extraction (GC/MS) procedure

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

【Test Items: Phthalate、Benzotriazole、HBCDD、NP、DBBT、Organic phosphorus compounds】

Sample pretreatment/separation
↓
Sample extraction by soxhlet method
↓
Concentrate/Dilute Extracted solution
↓
Analysis was performed by GC/MS
↓
Data

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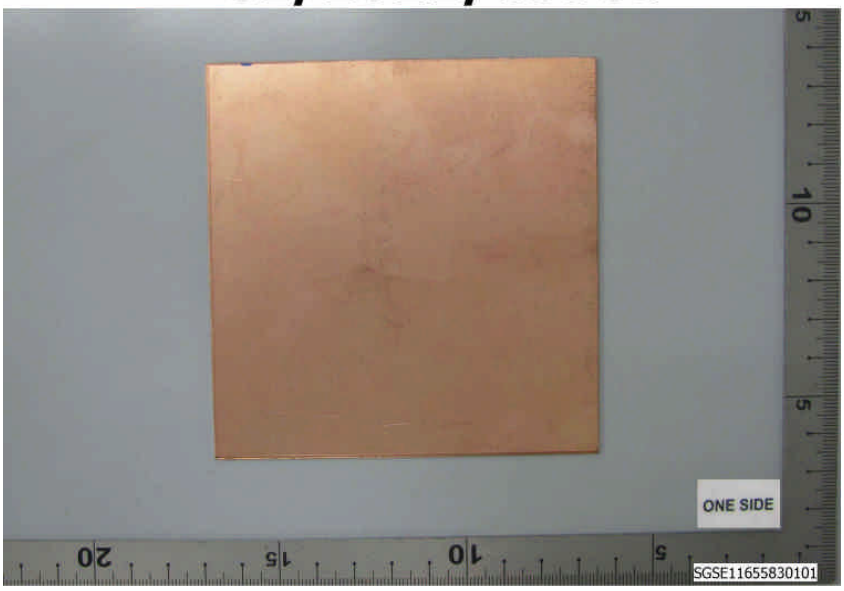

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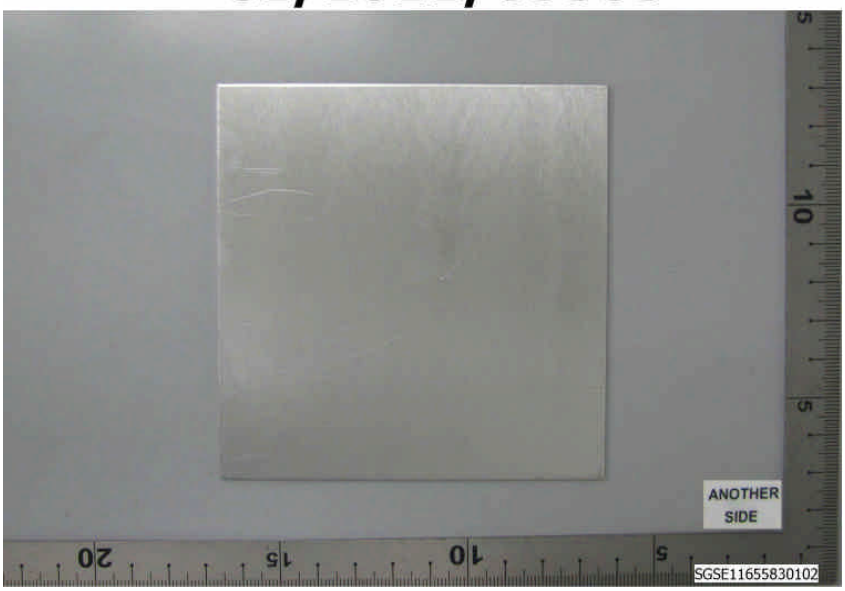

** End of Report **

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