

Survey Report

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FORMOSA MICROSEMI CO., LTD.
5F, NO. 208, SEC. 3, CHUNG-YANG ROAD, TUCHENG CITY, TAIPEI HSIEN,
TAIWAN



The following test reports/information were submitted and identified by the client as :

Sample Description : BRIDGE RECTIFIERS PRODUCTS (POWER)
Style/Item No. : MP / KBPC-P / KBPC-M / GBPC / MT-35
Testing Period : 2010/07/21 TO 2010/07/28

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

Conclusion : 1. Based upon the test reports/information submitted by client, the 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.

2. Base upon the performed tests by submitted samples, the test results of PAHs comply with the PAHs requirement according to (Category 1) of ZEK 01.2-08 of German ZLS and its amendments.

* This report is combined with 5 copies of test reports which provided by client. *



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

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Test Result(s)

PART NAME No.1	:	BLACK PLASTIC (EIGHT TYPES) (CE/2010/74137)
PART NAME No.2	:	GRAY METAL (CE/2010/74138)
PART NAME No.3	:	PLATING LAYER OF SILVER COLORED METAL (CE/2010/74139 NO.1)
PART NAME No.4	:	BASE MATERIAL OF SILVER COLORED METAL (CE/2010/74139 NO.2)
PART NAME No.5	:	PLATING LAYER OF SILVER COLORED METAL (CE/2010/74140 NO.1)
PART NAME No.6	:	BASE MATERIAL OF SILVER COLORED METAL (CE/2010/74140 NO.2)
PART NAME No.7	:	BLACK EPOXY (CE/2010/74141)

Test Item(s):	Unit	Method	MDL	Result					Limit
				No.1	No.2	No.3	No.4	No.5	
Cadmium (Cd)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	n.d.	---	n.d.	---	100
	mg/kg	IEC 62321: 2008 application of modified digestion by surface etching and performed by ICP-AES.	2	---	---	n.d.	---	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	10	---	n.d.	---	1000
	mg/kg	IEC 62321: 2008 application of modified digestion by surface etching and performed by ICP-AES.	2	---	---	n.d.	---	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	n.d.	---	n.d.	---	1000
	mg/kg	IEC 62321: 2008 application of modified digestion by surface etching and performed by ICP-AES.	2	---	---	n.d.	---	n.d.	1000

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Test Item(s):	Unit	Method	MDL	Result					Limit
				No.1	No.2	No.3	No.4	No.5	
Hexavalent Chromium Cr(VI) by alkaline extraction	mg/kg	With reference to IEC 62321: 2008 and performed by UV-VIS.	2	n.d.	---	---	---	---	1000
Hexavalent Chromium Cr(VI) by Spot test / boiling water extraction	**	With reference to IEC 62321: 2008 and performed by Spot test / boiling water extraction Method. (See Note 6)	0.02mg/kg with 50 cm ² surface area	---	Negative	Negative	Negative	Negative	#
Perfluorooctane sulfonates (PFOS) PFOS – Acid PFOS – Metal Salt PFOS – Amide	mg/kg	With reference to US EPA 3540C: 1996 method for PFOS Content. Analysis was performed by LC/MS.	10	n.d.	---	---	---	---	-
	µg/m ²	With reference to US EPA 3540C: 1996 method for PFOS Content. Analysis was performed by LC/MS.	1	---	---	n.d.	---	n.d.	-
PFOA (CAS No.: 000335-67-1)	mg/kg	With reference to US EPA 3540C: 1996 method for PFOA Content. Analysis was performed by LC/MS.	10	n.d.	---	---	---	---	-
	µg/m ²	With reference to US EPA 3540C: 1996 method for PFOA Content. Analysis was performed by LC/MS.	1	---	---	n.d.	---	n.d.	-

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Test Item(s):	Unit	Method	MDL	Result					Limit		
				No.1	No.2	No.3	No.4	No.5			
Sum of PBBs	mg/kg	With reference to IEC 62321: 2008 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.	---	---	---	---	---	-			

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Test Item(s):	Unit	Method	MDL	Result					Limit
				No.1	No.2	No.3	No.4	No.5	
Polynuclear Aromatic Hydrocarbons (PAHs)									
Acenaphthene (CAS No.: 000083-32-9)	mg/kg	With reference to ZLS standard ZEK 01.2-08 method. Analysis was performed by GC/MS.	0.2	n.d.	---	---	---	---	-
Acenaphthylene (CAS No.: 000208-96-8)			0.2	n.d.	---	---	---	---	-
Anthracene (CAS No.: 000120-12-7)			0.2	n.d.	---	---	---	---	-
Benzo[a]anthracene (CAS No.: 000056-55-3)			0.2	n.d.	---	---	---	---	-
Benzo[a]pyrene (CAS No.: 000050-32-8)			0.2	n.d.	---	---	---	---	-
Benzo[b]fluoranthene (CAS No.: 000205-99-2)			0.2	n.d.	---	---	---	---	-
Benzo[g,h,i]perylene (CAS No.: 000191-24-2)			0.2	n.d.	---	---	---	---	-
Benzo[k]fluoranthene (CAS No.: 000207-08-9)			0.2	n.d.	---	---	---	---	-
Chrysene (CAS No.: 000218-01-9)			0.2	n.d.	---	---	---	---	-
Dibenzo[a,h]anthracene (CAS No.: 000053-70-3)			0.2	n.d.	---	---	---	---	-
Fluoranthene (CAS No.: 000206-44-0)			0.2	n.d.	---	---	---	---	-
Fluorene (CAS No.: 000086-73-7)			0.2	n.d.	---	---	---	---	-
Indeno[1,2,3-c,d] pyrene (CAS No.: 000193-39-5)			0.2	n.d.	---	---	---	---	-
Naphthalene (CAS No.: 000091-20-3)			0.2	n.d.	---	---	---	---	-
Phenanthrene (CAS No.: 000085-01-8)			0.2	n.d.	---	---	---	---	-
Pyrene (CAS No.: 000129-00-0)			0.2	n.d.	---	---	---	---	-
Sum of 16 PAHs			-	n.d.	---	---	---	---	-

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Test Item(s):	Unit	Method	MDL	Result		Limit
				No.6	No.7	
Cadmium (Cd)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	47	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	n.d.	1000
Hexavalent Chromium Cr(VI) by alkaline extraction	mg/kg	With reference to IEC 62321: 2008 and performed by UV-VIS.	2	---	n.d.	1000
Hexavalent Chromium Cr(VI) by Spot test / boiling water extraction	**	With reference to IEC 62321: 2008 and performed by Spot test / boiling water extraction Method. (See Note 6)	0.02mg/kg with 50 cm ² surface area	Negative	---	#
Perfluorooctane sulfonates (PFOS) PFOS – Acid PFOS – Metal Salt PFOS – Amide	mg/kg	With reference to US EPA 3540C: 1996 method for PFOS Content. Analysis was performed by LC/MS.	10	---	n.d.	-
PFOA (CAS No.: 000335-67-1)	mg/kg	With reference to US EPA 3540C: 1996 method for PFOA Content. Analysis was performed by LC/MS.	10	---	n.d.	-

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Test Item(s):	Unit	Method	MDL	Result		Limit		
				No.6	No.7			
Sum of PBBs	mg/kg	With reference to IEC 62321: 2008 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.	-

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Test Item(s):	Unit	Method	MDL	Result		Limit
				No.6	No.7	
Polynuclear Aromatic Hydrocarbons (PAHs)						
Acenaphthene (CAS No.: 000083-32-9)	mg/kg	With reference to ZLS standard ZEK 01.2-08 method. Analysis was performed by GC/MS.	0.2	---	n.d.	-
Acenaphthylene (CAS No.: 000208-96-8)			0.2	---	n.d.	-
Anthracene (CAS No.: 000120-12-7)			0.2	---	n.d.	-
Benzo[a]anthracene (CAS No.: 000056-55-3)			0.2	---	n.d.	-
Benzo[a]pyrene (CAS No.: 000050-32-8)			0.2	---	n.d.	-
Benzo[b]fluoranthene (CAS No.: 000205-99-2)			0.2	---	n.d.	-
Benzo[g,h,i]perylene (CAS No.: 000191-24-2)			0.2	---	n.d.	-
Benzo[k]fluoranthene (CAS No.: 000207-08-9)			0.2	---	n.d.	-
Chrysene (CAS No.: 000218-01-9)			0.2	---	n.d.	-
Dibenzo[a,h]anthracene (CAS No.: 000053-70-3)			0.2	---	n.d.	-
Fluoranthene (CAS No.: 000206-44-0)			0.2	---	n.d.	-
Fluorene (CAS No.: 000086-73-7)			0.2	---	n.d.	-
Indeno[1,2,3-c,d] pyrene (CAS No.: 000193-39-5)			0.2	---	n.d.	-
Naphthalene (CAS No.: 000091-20-3)			0.2	---	n.d.	-
Phenanthrene (CAS No.: 000085-01-8)			0.2	---	n.d.	-
Pyrene (CAS No.: 000129-00-0)			0.2	---	n.d.	-
Sum of 16 PAHs			-	---	n.d.	-

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Note : 1. mg/kg = ppm, 0.1% = 1000 ppm(mg/kg), 0.0005% = 5 ppm(mg/kg)

2. n.d. = Not Detected

3. MDL = Method Detection Limit

4. Spot-test:

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

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

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

Boiling-water-extraction:

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

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

the detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² sample surface area.

5. # = Positive indicates the presence of Cr(VI) on the tested areas

and result be regarded as not comply with RoHS requirement.

Negative indicates the absence of Cr(VI) on the tested areas and result be regarded as comply with RoHS requirement.

6. "----" = Not Conducted

7. " - " = Not Regulated

8. ** = Qualitative analysis (No Unit)

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/m² of the coated material.

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Reference information for PAHs:

Requirement of ZEK 01.2-08 : Restraining maximum values for products

Parameter	Category 1	Category 2	Category 3
	Materials in contact with foodstuff or materials which are meant to put in the mouth as well as toys for children <36 months.	Materials with foreseeable skin contact >30 s (prolonged skin contact) and toys not covered by category 1.	Materials with foreseeable skin contact <30 s (short time skin contact) or without skin contact.
Benzo[a]pyrene (mg/kg)	<MDL (<0.2)**	1	20
Sum of 16 EPA-PAH (mg/kg)*	<MDL (<0.2)**	10	200

Remark :

* = Only PAH substances >0.2 mg/kg are taken into account while calculating the sum of PAHs

** = In case that the maximum values exceed the limits of category 1, but are within the limits of category 2, one may confirm the suitability of the tested material for contact with foodstuff or oral mucosa by additional specific migration tests of PAH components based on DIN EN 1186ff and §64 LFGB 80.30-1. The conclusion of the migration test results must be made based on food law criteria.

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Survey Report

No. : CS/2010/80046 Date : 2010/09/01

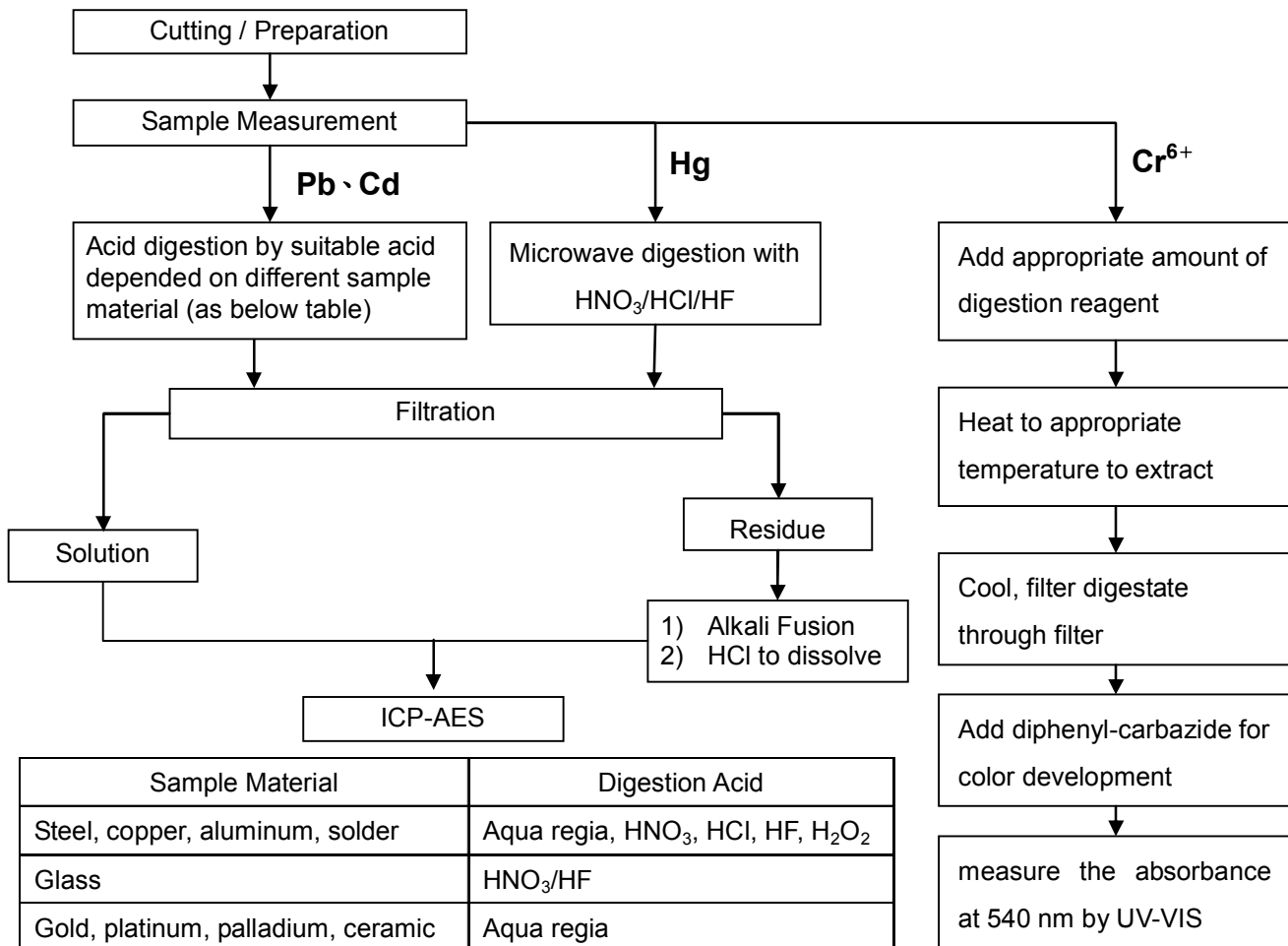
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FORMOSA MICROSEMI CO., LTD.
5F, NO. 208, SEC. 3, CHUNG-YANG ROAD, TUCHENG CITY, TAIPEI HSIEN,
TAIWAN



NO.1,2,4,6,7

- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
(Cr⁶⁺ test method excluded)
- 2) Name of the person who made measurement: 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 ₂ O ₂
Glass	HNO ₃ /HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO ₃
Plastic	H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCl
Others	Any acid to total digestion

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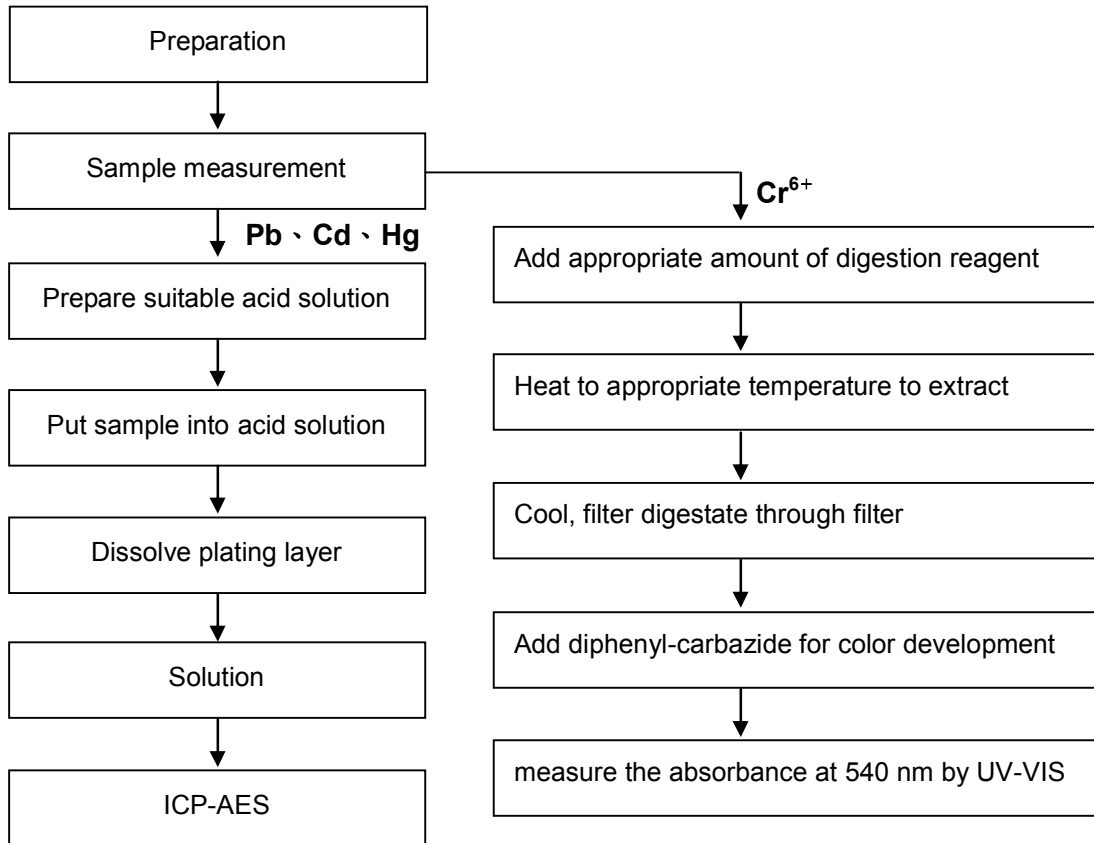
5F, NO. 208, SEC. 3, CHUNG-YANG ROAD, TUCHENG CITY, TAIPEI HSIEN, TAIWAN



NO.3,5

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

Flow Chart of Stripping method for metal analysis



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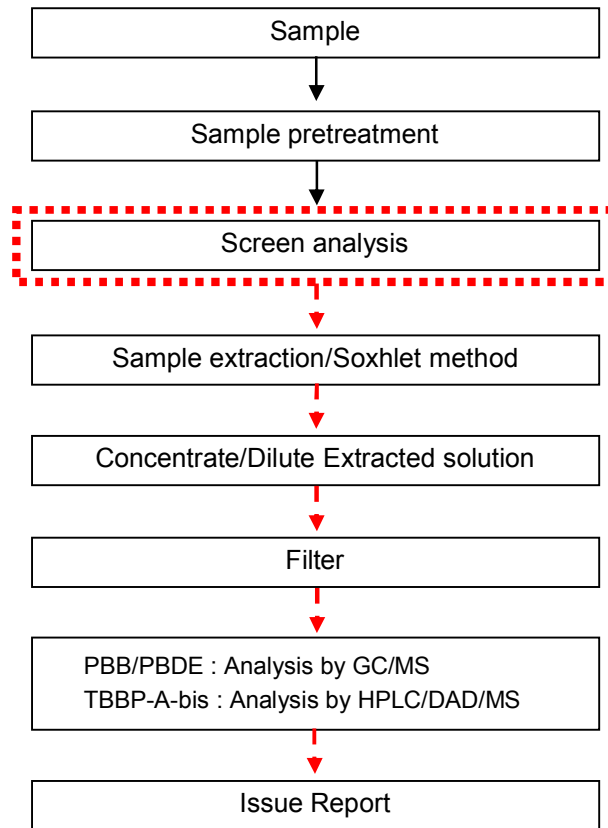
Analytical flow chart

1) Name of the person who made measurement: Roman Wong

2) 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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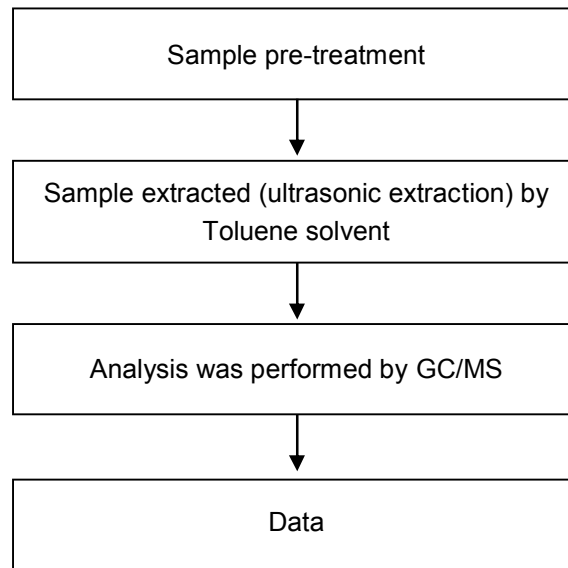
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PAHs (Polynuclear Aromatic Hydrocarbons) analytical flow chart

- 1) Name of the person who made measurement: Andy Shu
- 2) Name of the person in charge of measurement: Shinjyh Chen



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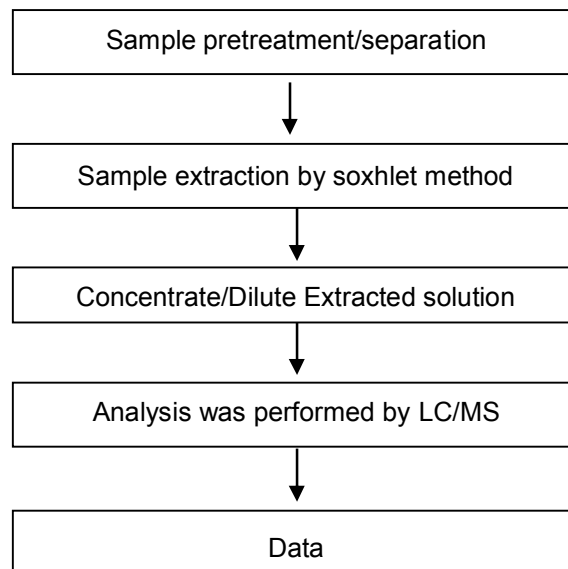
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Analytical flow chart of Soxhlet extraction (LC/MS) procedure

- 1) Name of the person who made measurement: Lydia Fu
- 2) Name of the person in charge of measurement: Shinjyh Chen

■ Test Items: PFOS/PFOA、Benzotriazole



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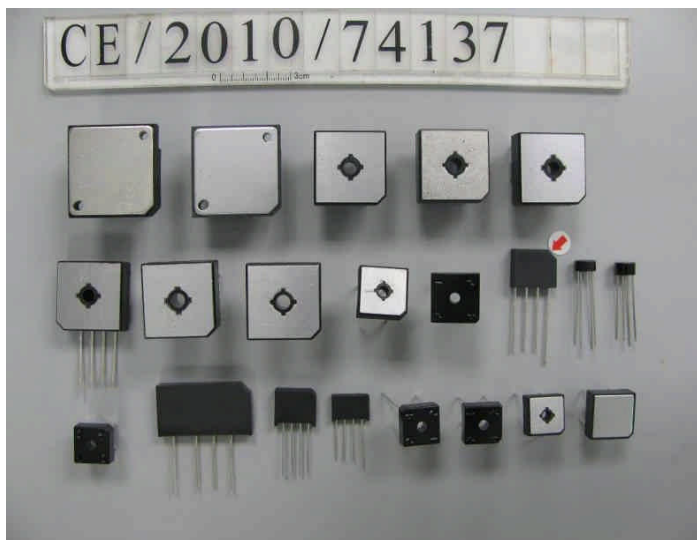
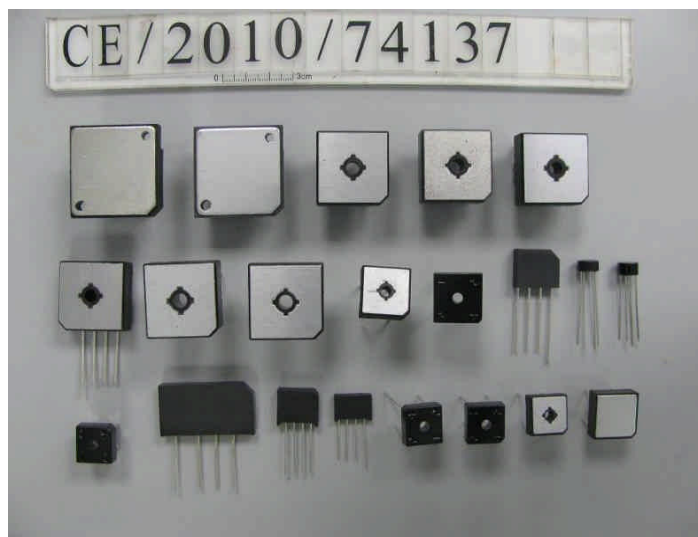
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PART NAME No.1



PART NAME No.2



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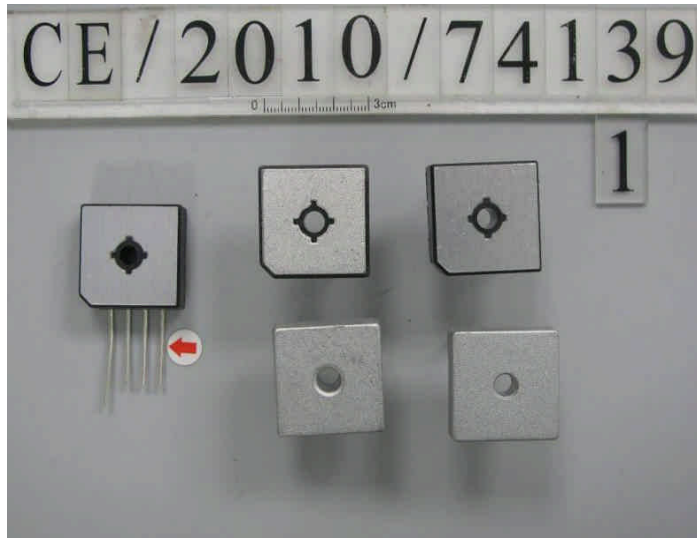
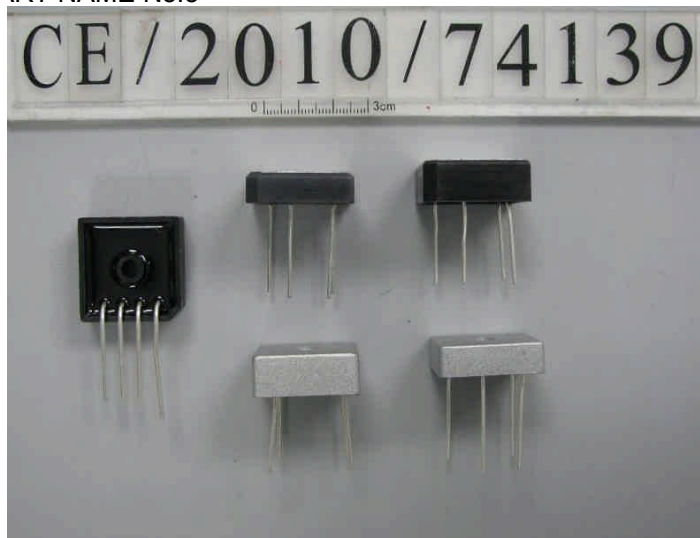
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PART NAME No.3



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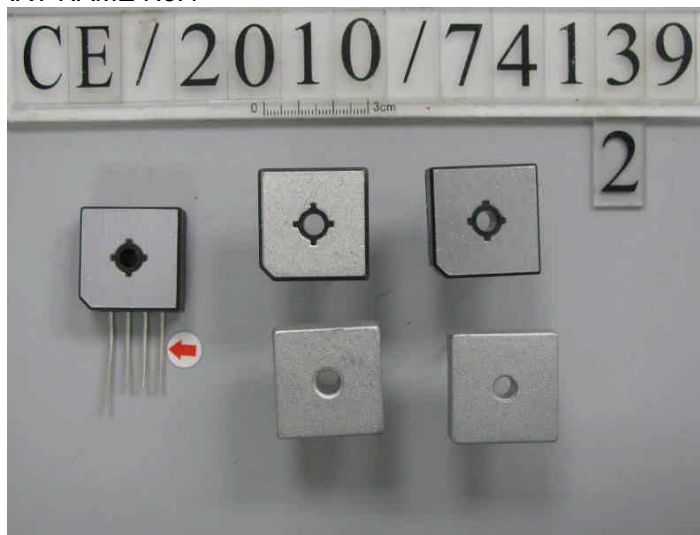
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PART NAME No.4



PART NAME No.5



PART NAME No.6



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PART NAME No.7



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