

## 測試報告 Test Report

號碼(No.) : CE/2017/24023A

日期(Date) : 2017/03/03

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美麗微半導體股份有限公司 / FORMOSA MICROSEMI CO., LTD.



(杭州美麗微電子有限公司 / HANGZHOU FORMOSA MICRO-ELECTRONIC CO., LTD.)

新北市土城區中央路三段208號5樓 /

5F., NO. 208, SEC. 3, ZHONGYANG RD., TUCHENG DIST., NEW TAIPEI CITY 23680, TAIWAN

(杭州市濱江區明德路6號1幢三層 / FLOOR 3, BLOCK 1, NO. 6, MINGDE ROAD, BINJIANG DISTRICT, HANGZHOU, CHINA)

以下測試樣品係由申請廠商所提供及確認 (The following sample(s) was/were submitted and identified by/on behalf of the applicant as):

樣品名稱(Sample Description) : SMALL SIGNAL SURFACE MOUNT PLASTIC MOLDED PRODUCTS (各項小訊號貼片型塑封裝產品)

樣品型號(Style/Item No.) : SOD-923FL / SOD-723FL / SOD-523FL / SOD-323FL / SOD-323F / SOD-123FL / SOD-123F / SC-76 / SOT-923 / SOT-723 / SOT-563 / SOT-553 / SOT-523 / SOT-363 / SOT-353 / SOT-323 / SOT-23-6 (SOT-26) / SOT-23-5 / SOT-223 / SOT-23 / SOT-143 / SC-59 / SOT-89 / SOP8 (SOP-08) / TSOP-6/SC-89/ SOT-1123

收件日期(Sample Receiving Date) : 2016/12/09 AND 2017/02/16

測試期間(Testing Period) : 2016/12/09 TO 2016/12/16 AND 2017/02/16 TO 2017/02/22 AND 2017/0216/ TO 2017/02/22

=====  
測試結果(Test Results) : 請見下一頁 (Please refer to next pages).

\* 此份報告為合併CE/2016/C2087D, CE/2017/24022及CE/2017/24023之報告 \*

( This report is combined with reports of CE/2016/C2087D, CE/2017/24022 and CE/2017/24023. )

  
Troy Chang, Manager - Tech  
Signed for and on behalf of  
SGS TAIWAN LTD.  
Chemical Laboratory - Taipei



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### 測試結果(Test Results)

- 測試部位(PART NAME)No. 1 : 整體混測 (MIXED ALL PARTS (CE/2016/C2086))
- 測試部位(PART NAME)No. 2 : 整體混測 (MIXED ALL PARTS (CE/2016/C2087))
- 測試部位(PART NAME)No. 3 : 銀色金屬鍍層 (PLATING LAYER OF SILVER COLORED METAL (CE/2017/24022 No. 1))
- 測試部位(PART NAME)No. 4 : 銅色金屬底材 (BASE MATERIAL OF COPPER COLORED METAL (CE/2017/24022 No. 2))
- 測試部位(PART NAME)No. 5 : 整體混測 (MIXED ALL PARTS (CE/2017/24023))

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測 極限值 (MDL)	結果 (Result)		
				No. 1	No. 2	No. 3
鎘 / Cadmium (Cd)	mg/kg	參考IEC 62321-5 (2013), 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n. d.	---	---
	mg/kg	酸洗脫鍍層, 參考IEC 62321-5 (2013), 以感應耦合電漿原子發射光譜儀檢測. / IEC 62321-5 (2013) application of modified digestion by surface etching and performed by ICP-AES.	2	---	---	n. d.
鉛 / Lead (Pb)	mg/kg	參考IEC 62321-5 (2013), 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n. d.	---	---
	mg/kg	酸洗脫鍍層, 參考IEC 62321-5 (2013), 以感應耦合電漿原子發射光譜儀檢測. / IEC 62321-5 (2013) application of modified digestion by surface etching and performed by ICP-AES.	2	---	---	19.4

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測 極限值 (MDL)	結果 (Result)		
				No. 1	No. 2	No. 3
汞 / Mercury (Hg)	mg/kg	參考IEC 62321-4 (2013), 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-4 (2013) and performed by ICP-AES.	2	n. d.	---	---
	mg/kg	酸洗脫鍍層, 參考IEC 62321-4 (2013), 以感應耦合電漿原子發射光譜儀檢測. / IEC 62321-4 (2013) application of modified digestion by surface etching and performed by ICP-AES.	2	---	---	n. d.
六價鉻 / Hexavalent Chromium Cr(VI)	mg/kg	參考IEC 62321 (2008), 以UV-VIS 檢測. / With reference to IEC 62321 (2008) and performed by UV-VIS.	2	n. d.	---	---
六價鉻 / Hexavalent Chromium Cr(VI)(#2)	µg/cm <sup>2</sup>	參考IEC 62321-7-1 (2015), 以UV-VIS 檢測. / With reference to IEC 62321-7-1 (2015) and performed by UV-VIS.	0.10	---	---	n. d.
鄰苯二甲酸丁苯甲酯 / BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	%	參考EN 14372 (2004), 以氣相層析 / 質譜儀檢測. / With reference to EN 14372 (2004). Analysis was performed by GC/MS.	0.003	n. d.	---	---
鄰苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	%	參考EN 14372 (2004), 以氣相層析 / 質譜儀檢測. / With reference to EN 14372 (2004). Analysis was performed by GC/MS.	0.003	n. d.	---	---
鄰苯二甲酸二(2-乙基己基)酯 / DEHP (Di-(2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	%	參考EN 14372 (2004), 以氣相層析 / 質譜儀檢測. / With reference to EN 14372 (2004). Analysis was performed by GC/MS.	0.003	n. d.	---	---

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測 極限值 (MDL)	結果 (Result)		
				No. 1	No. 2	No. 3
鄰苯二甲酸二異癸酯 / DIDP (Di-isodecyl phthalate) (CAS No. : 26761-40-0; 68515-49-1)	%	參考EN 14372 (2004), 以氣相層析 / 質譜儀檢測. / With reference to EN 14372 (2004). Analysis was performed by GC/MS.	0.01	n. d.	---	---
鄰苯二甲酸二異壬酯 / DINP (Di-isononyl phthalate) (CAS No. : 28553-12-0; 68515-48-0)	%	參考EN 14372 (2004), 以氣相層析 / 質譜儀檢測. / With reference to EN 14372 (2004). Analysis was performed by GC/MS.	0.01	n. d.	---	---
鄰苯二甲酸二正辛酯 / DNOP (Di-n-octyl phthalate) (CAS No. : 117-84-0)	%	參考EN 14372 (2004), 以氣相層析 / 質譜儀檢測. / With reference to EN 14372 (2004). Analysis was performed by GC/MS.	0.003	n. d.	---	---
鄰苯二甲酸二異丁酯 / DIBP (Di-isobutyl phthalate) (CAS No. : 84-69-5)	%	參考EN 14372 (2004), 以氣相層析 / 質譜儀檢測. / With reference to EN 14372 (2004). Analysis was performed by GC/MS.	0.003	n. d.	---	---
鄰苯二甲酸二正己酯 / DNHP (Di-n-hexyl phthalate) (CAS No. : 84-75-3)	%	參考EN 14372 (2004), 以氣相層析 / 質譜儀檢測. / With reference to EN 14372 (2004). Analysis was performed by GC/MS.	0.003	n. d.	---	---
鄰苯二甲酸二(2-甲氧基乙基)酯 / DMEP (Bis(2-methoxyethyl) phthalate) (CAS No. : 117-82-8)	%	參考EN 14372 (2004), 以氣相層析 / 質譜儀檢測. / With reference to EN 14372 (2004). Analysis was performed by GC/MS.	0.003	n. d.	---	---

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				No. 1	No. 2	No. 3
鄰苯二甲酸二戊酯 / DNPP (Di-n-pentyl phthalate) (CAS No. : 131-18-0)	%	參考EN 14372 (2004), 以氣相層析/質譜儀檢測. / With reference to EN 14372 (2004). Analysis was performed by GC/MS.	0.003	n. d.	---	---
六溴環十二烷及所有主要被辨別出的異構物 / Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified ( $\alpha$ -HBCDD, $\beta$ -HBCDD, $\gamma$ -HBCDD) (CAS No. : 25637-99-4 and 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	mg/kg	參考IEC 62321 (2008), 以氣相層析/質譜儀檢測. / With reference to IEC 62321 (2008). Analysis was performed by GC/MS.	5	n. d.	---	---
全氟辛烷磺酸 / Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	$\mu\text{g}/\text{m}^2$	參考US EPA 3550C (2007), 以液相層析/質譜儀檢測. / With reference to US EPA 3550C (2007). Analysis was performed by LC/MS.	1	---	---	n. d.
全氟辛酸 / PFOA (CAS No. : 335-67-1)	$\mu\text{g}/\text{m}^2$	參考US EPA 3550C (2007), 以液相層析/質譜儀檢測. / With reference to US EPA 3550C (2007). Analysis was performed by LC/MS.	1	---	---	n. d.
<b>鹵素 / Halogen</b>						
鹵素 (氟) / Halogen-Fluorine (F) (CAS No. : 14762-94-8)	mg/kg	參考BS EN 14582 (2007), 以離子層析儀分析. / With reference to BS EN 14582 (2007). Analysis was performed by IC.	50	---	n. d.	---
鹵素 (氯) / Halogen-Chlorine (Cl) (CAS No. : 22537-15-1)	mg/kg		50	---	56.0	---
鹵素 (溴) / Halogen-Bromine (Br) (CAS No. : 10097-32-2)	mg/kg		50	---	n. d.	---
鹵素 (碘) / Halogen-Iodine (I) (CAS No. : 14362-44-8)	mg/kg		50	---	n. d.	---

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				No. 1	No. 2	No. 3
多溴聯苯總和 / Sum of PBBs	mg/kg	參考IEC 62321-6 (2015), 以氣相層析/質譜儀檢測. / With reference to IEC 62321-6 (2015) and performed by GC/MS.	-	n. d.	---	---
一溴聯苯 / Monobromobiphenyl	mg/kg		5	n. d.	---	---
二溴聯苯 / Dibromobiphenyl	mg/kg		5	n. d.	---	---
三溴聯苯 / Tribromobiphenyl	mg/kg		5	n. d.	---	---
四溴聯苯 / Tetrabromobiphenyl	mg/kg		5	n. d.	---	---
五溴聯苯 / Pentabromobiphenyl	mg/kg		5	n. d.	---	---
六溴聯苯 / Hexabromobiphenyl	mg/kg		5	n. d.	---	---
七溴聯苯 / Heptabromobiphenyl	mg/kg		5	n. d.	---	---
八溴聯苯 / Octabromobiphenyl	mg/kg		5	n. d.	---	---
九溴聯苯 / Nonabromobiphenyl	mg/kg		5	n. d.	---	---
十溴聯苯 / Decabromobiphenyl	mg/kg		5	n. d.	---	---
多溴聯苯醚總和 / Sum of PBDEs	mg/kg		-	n. d.	---	---
一溴聯苯醚 / Monobromodiphenyl ether	mg/kg		5	n. d.	---	---
二溴聯苯醚 / Dibromodiphenyl ether	mg/kg		5	n. d.	---	---
三溴聯苯醚 / Tribromodiphenyl ether	mg/kg		5	n. d.	---	---
四溴聯苯醚 / Tetrabromodiphenyl ether	mg/kg		5	n. d.	---	---
五溴聯苯醚 / Pentabromodiphenyl ether	mg/kg		5	n. d.	---	---
六溴聯苯醚 / Hexabromodiphenyl ether	mg/kg		5	n. d.	---	---
七溴聯苯醚 / Heptabromodiphenyl ether	mg/kg		5	n. d.	---	---
八溴聯苯醚 / Octabromodiphenyl ether	mg/kg		5	n. d.	---	---
九溴聯苯醚 / Nonabromodiphenyl ether	mg/kg	5	n. d.	---	---	
十溴聯苯醚 / Decabromodiphenyl ether	mg/kg	5	n. d.	---	---	

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測 極限值 (MDL)	結果 (Result)	
				No. 4	No. 5
鎘 / Cadmium (Cd)	mg/kg	參考IEC 62321-5 (2013), 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n. d.	---
鉛 / Lead (Pb)	mg/kg	參考IEC 62321-5 (2013), 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n. d.	---
汞 / Mercury (Hg)	mg/kg	參考IEC 62321-4 (2013), 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-4 (2013) and performed by ICP-AES.	2	n. d.	---
六價鉻 / Hexavalent Chromium Cr(VI)(#2)	µg/cm <sup>2</sup>	參考IEC 62321-7-1 (2015), 以UV-VIS檢測. / With reference to IEC 62321-7-1 (2015) and performed by UV-VIS.	0.10	n. d.	---
銻 / Antimony (Sb)	mg/kg	參考US EPA 3052 (1996), 以感應耦合電漿原子發射光譜儀檢測. / With reference to US EPA 3052 (1996). Analysis was performed by ICP-AES.	2	---	16.7
砷 / Arsenic (As)	mg/kg		2	---	n. d.
鈹 / Beryllium (Be)	mg/kg		2	---	n. d.

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## 測試報告 Test Report

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美麗微半導體股份有限公司 / FORMOSA MICROSEMI CO., LTD.



(杭州美麗微電子有限公司 / HANGZHOU FORMOSA MICRO-ELECTRONIC CO., LTD.)

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5F., NO. 208, SEC. 3, ZHONGYANG RD., TUCHENG DIST., NEW TAIPEI CITY 23680, TAIWAN

(杭州市濱江區明德路6號1幢三層 / FLOOR 3, BLOCK 1, NO. 6, MINGDE ROAD, BINJIANG DISTRICT, HANGZHOU, CHINA)

### 備註(Note) :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n.d. = Not Detected (未檢出)
3. MDL = Method Detection Limit (方法偵測極限值)
4. "-" = Not Regulated (無規格值)
5. "---" = Not Conducted (未測項目)
6. (#2) =
  - a. 當六價鉻結果大於0.13  $\mu\text{g}/\text{cm}^2$  , 表示樣品表層含有六價鉻. / The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13  $\mu\text{g}/\text{cm}^2$ . The sample coating is considered to contain Cr(VI).
  - b. 當六價鉻結果為n.d. (濃度小於0.10  $\mu\text{g}/\text{cm}^2$ ) , 表示表層不含六價鉻. / The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10  $\mu\text{g}/\text{cm}^2$ ). The coating is considered a non-Cr(VI) based coating
  - c. 當六價鉻結果介於 0.10 及 0.13  $\mu\text{g}/\text{cm}^2$  時, 無法確定塗層是否含有六價鉻. / The result between 0.10  $\mu\text{g}/\text{cm}^2$  and 0.13  $\mu\text{g}/\text{cm}^2$  is considered to be inconclusive - unavoidable coating variations may influence the determination.
7. 樣品的測試是基於申請人要求混合測試, 報告中的混合測試結果不代表其中個別單一材質的含量. (The samples was/were analyzed on behalf of the applicant as mixing sample in one testing. The above results was/were only given as the informality value.)

### PFOS參考資訊(Reference Information) : 持久性有機污染物 POPs - (EU) 757/2010

PFOS濃度在物質或製備中不得超過0.001%(10ppm), 在半成品、成品或零部件中不得超過0.1%(1000ppm), 在紡織品或塗層材料中不得超過 $1\mu\text{g}/\text{m}^2$ 。

(Outlawing PFOS as substances or preparations in concentrations above 0.001% (10ppm), in semi-finished products or articles or parts at a level above 0.1%(1000ppm), in textiles or other coated materials above  $1\mu\text{g}/\text{m}^2$ .)



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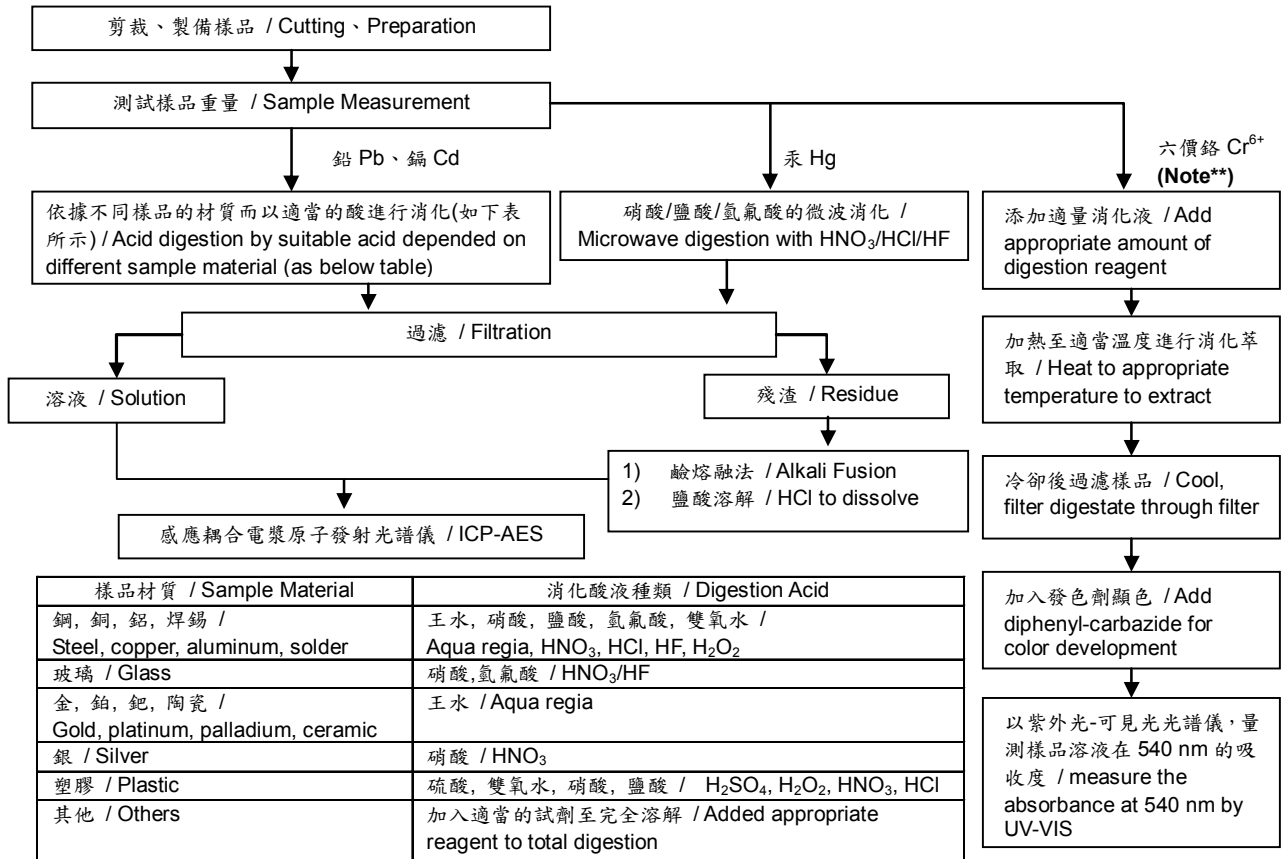
No. 1, 4:

### 重金屬流程圖 / Analytical flow chart of Heavy Metal

根據以下的流程圖之條件，樣品已完全溶解。(六價鉻測試方法除外)

These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr<sup>6+</sup> test method excluded)

- 測試人員：王志瑋 / Technician : JR Wang
- 測試負責人：張啟興 / Supervisor: Troy Chang



#### Note\*\* (For IEC 62321)

- (1) 針對非金屬材料加入鹼性消化液，加熱至 90~95°C 萃取。 / For non-metallic material, add alkaline digestion reagent and heat to 90~95°C.
- (2) 針對金屬材料加入純水，加熱至沸騰萃取。 / For metallic material, add pure water and heat to boiling.

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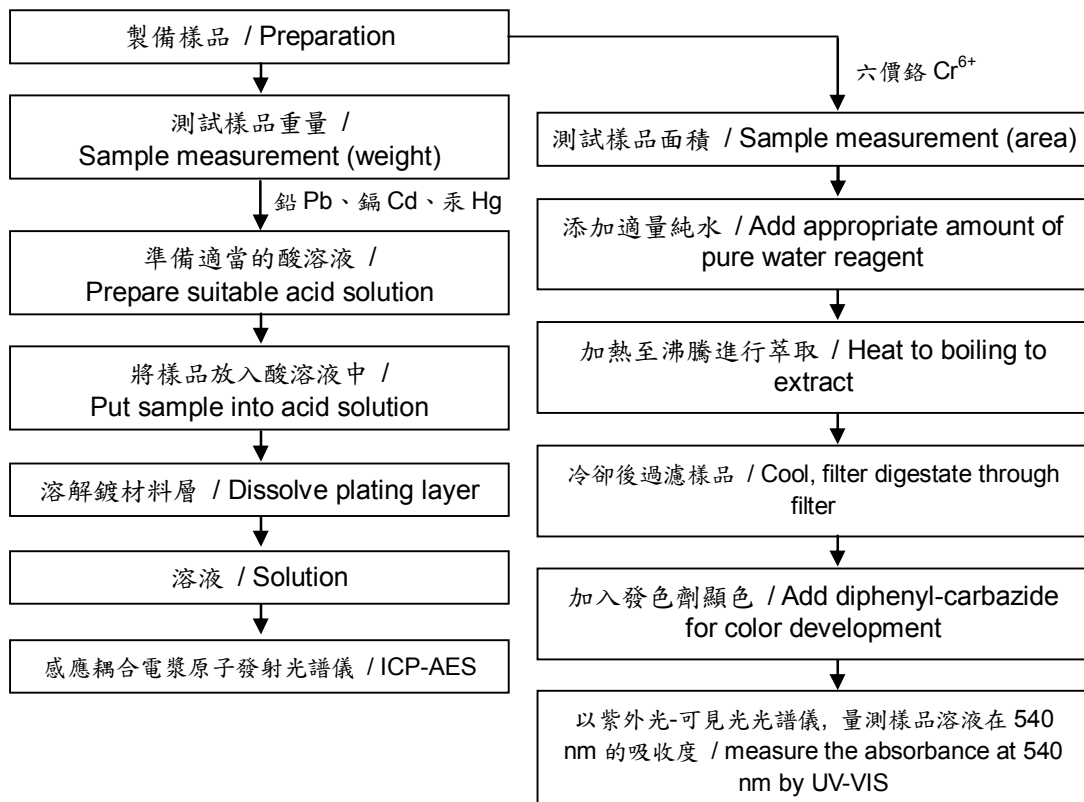
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No. 3

根據以下的流程圖之條件，樣品之外部鍍層已完全溶解。(六價鉻測試方法除外) / The plating layer of samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr<sup>6+</sup> test method excluded)

- 測試人員：王志瑋 / Technician : JR Wang
- 測試負責人：張啟興 / Supervisor: Troy Chang

### 鍍層重金屬測試流程圖 / Flow Chart of Stripping method for metal analysis



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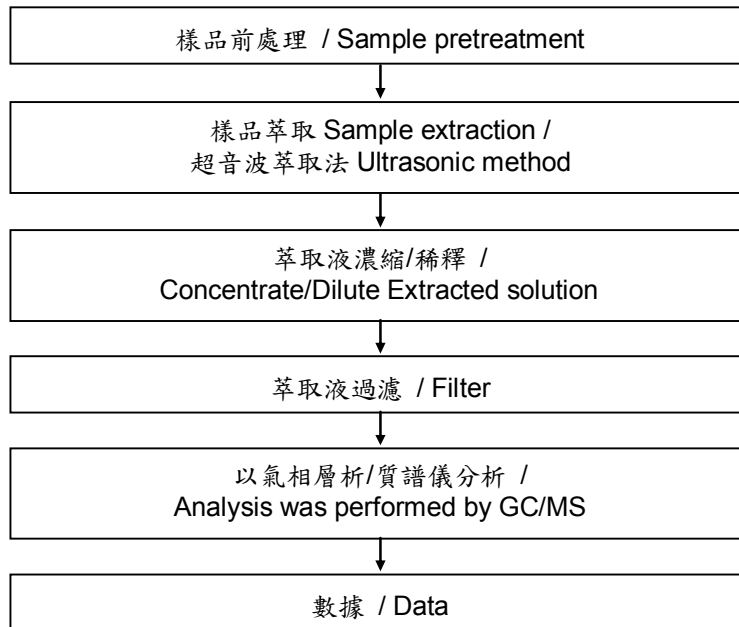
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### 六溴環十二烷分析流程圖 / Analytical flow chart - HBCDD

- 測試人員：涂雅苓 / Technician: Yaling Tu
- 測試負責人：張啟興 / Supervisor: Troy Chang



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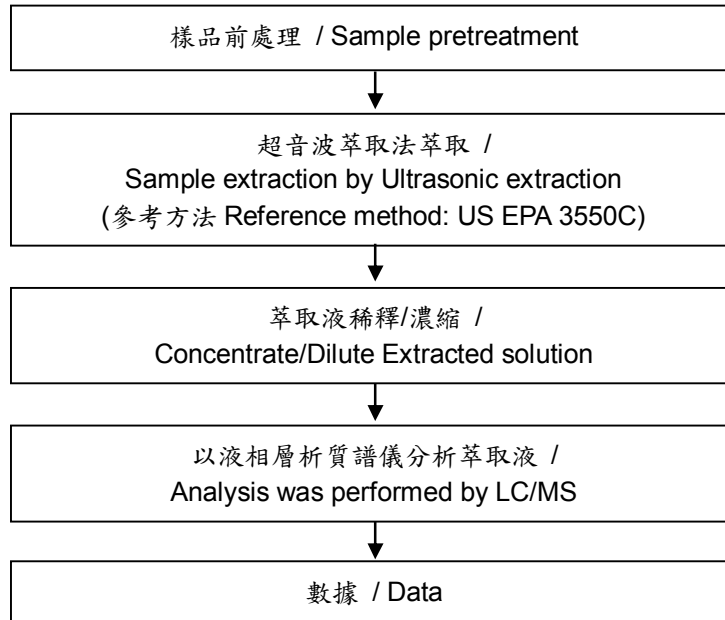
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### 全氟辛酸/全氟辛烷磺酸分析流程圖 / Analytical flow chart - PFOA/PFOS

- 測試人員：涂雅苓 / Technician: Yaling Tu
- 測試負責人：張啟興 / Supervisor: Troy Chang



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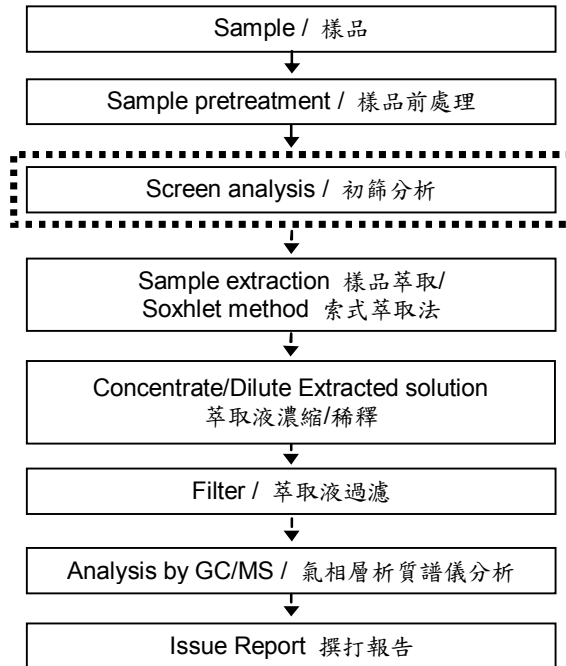
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### 多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBB/PBDE

- 測試人員：涂雅苓 / Technician: Yaling Tu
- 測試負責人：張啟興 / Supervisor: Troy Chang

初次測試程序 / First testing process —————>  
 選擇性篩檢程序 / Optional screen process .....>  
 確認程序 / Confirmation process - - - >



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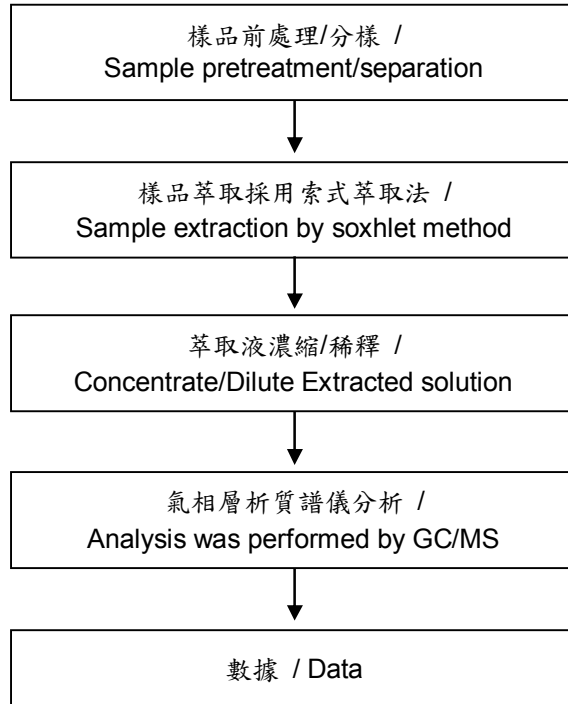
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### 可塑劑分析流程圖 / Analytical flow chart - Phthalate

- 測試人員：涂雅苓 / Technician: Yaling Tu
- 測試負責人：張啟興 / Supervisor: Troy Chang





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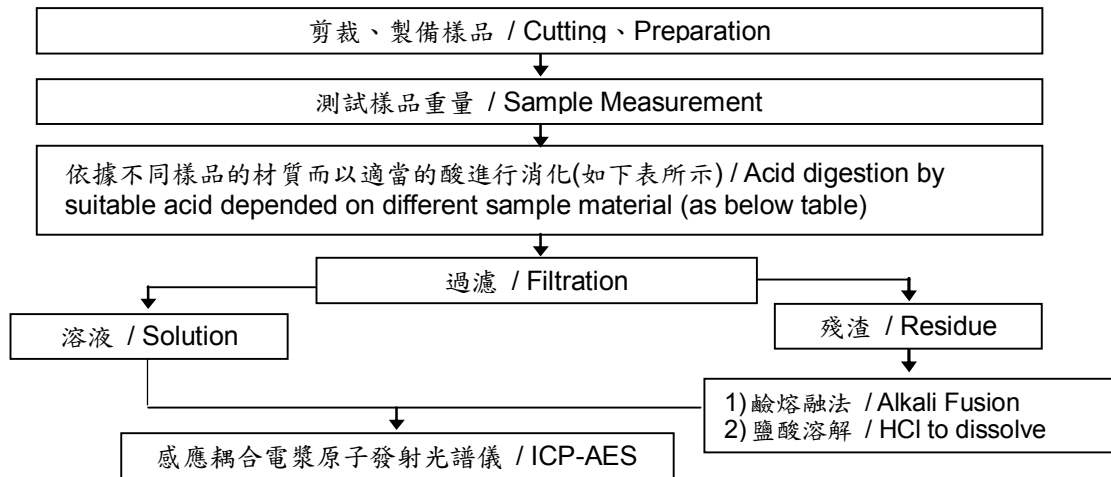
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根據以下的流程圖之條件，樣品已完全溶解。 / These samples were dissolved totally by pre-conditioning method according to below flow chart.

- 測試人員：王志瑋 / Technician: JR Wang
- 測試負責人：張啟興 / Supervisor: Troy Chang

### 元素以 ICP-AES 分析的消化流程圖 (Flow Chart of digestion for the elements analysis performed by ICP-AES)



鋼,銅,鋁,焊錫 / Steel, copper, aluminum, solder	王水,硝酸,鹽酸,氫氟酸,雙氧水 / Aqua regia, HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub>
玻璃 / Glass	硝酸,氫氟酸 / HNO <sub>3</sub> /HF
金,鉑,鈀,陶瓷 / Gold, platinum, palladium, ceramic	王水 / Aqua regia
銀 / Silver	硝酸 / HNO <sub>3</sub>
塑膠 / Plastic	硫酸,雙氧水,硝酸,鹽酸 / H <sub>2</sub> SO <sub>4</sub> , H <sub>2</sub> O <sub>2</sub> , HNO <sub>3</sub> , HCl
其他 / Others	加入適當的試劑至完全溶解 / Added appropriate reagent to total digestion

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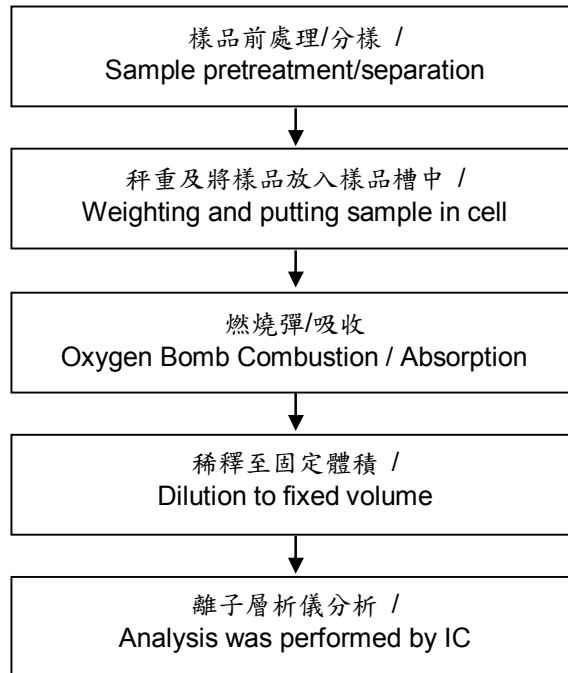
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### 鹵素分析流程圖 / Analytical flow chart - Halogen

- 測試人員：陳恩臻 / Technician: Rita Chen
- 測試負責人：張啟興 / Supervisor: Troy Chang



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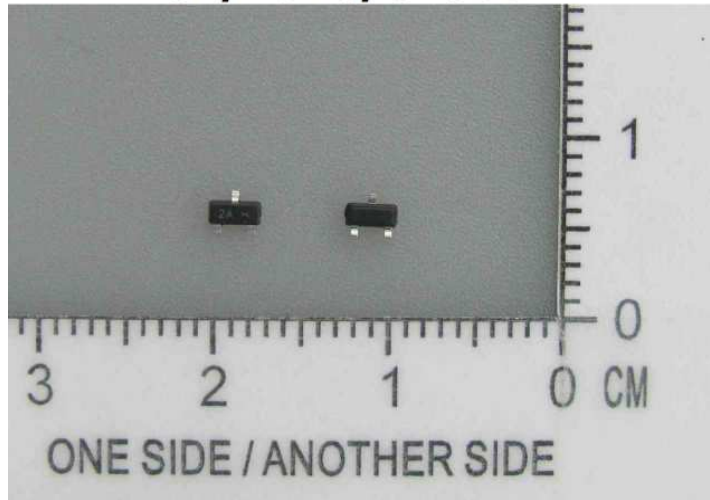
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\* 照片中如有箭頭標示，則表示為實際檢測之樣品/部位。\*

(The tested sample / part is marked by an arrow if it's shown on the photo.)

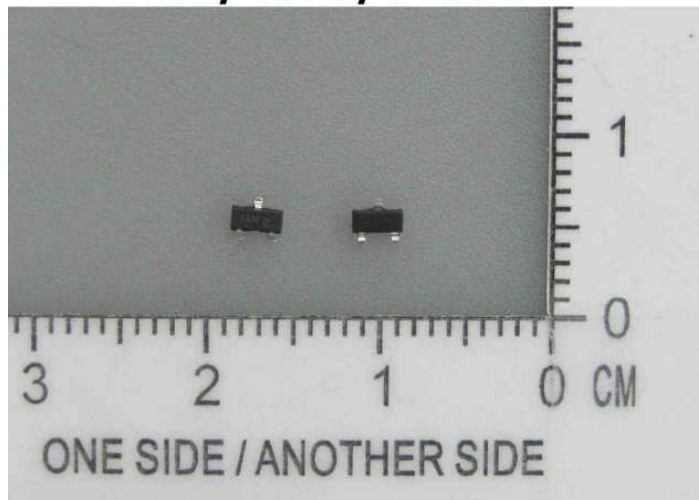
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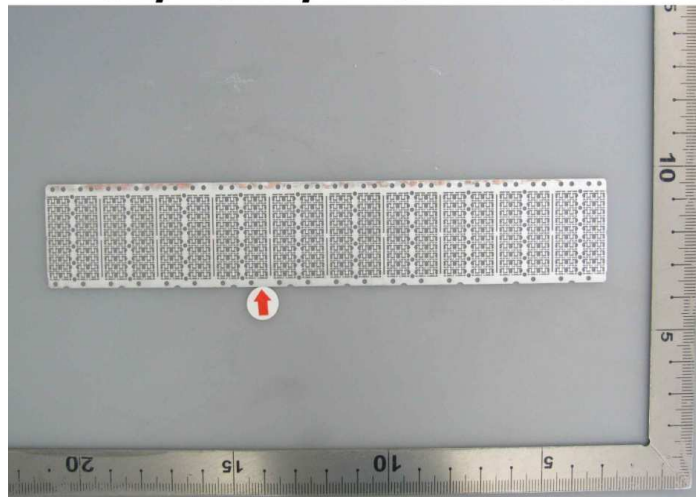
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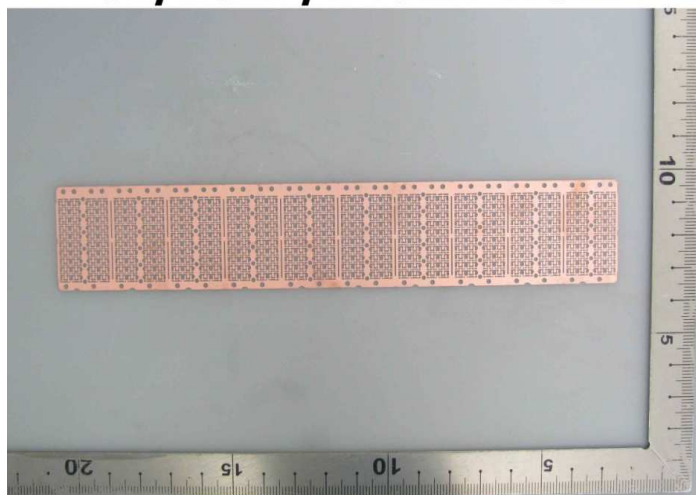
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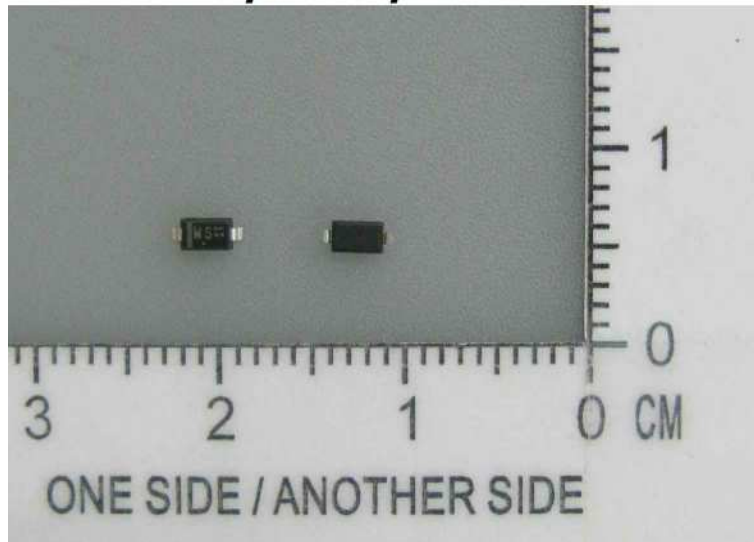
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