

試驗報告

號碼(No.) : KA/2017/11047 日期(Date) : 2017/01/20

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Test Report

天二科技股份有限公司
EVER OHMS TECHNOLOGY CO.,LTD.

高雄市前鎮區高雄加工出口區南四路3號
NO.3, SOUTH 4TH ROAD, K.E.P.Z. KAOHSIUNG CITY, 80681 TAIWAN R.O.C.

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) : LEAD FREE CHIP RESISTORS & CHIP ARRAYS
樣品型號(Style/Item No.) : CR SERIES/CRA SERIES/QR SERIES/QRA SERIES/ST SERIES/STA SERIES/
HR SERIES/TCR SERIES
收件日期(Sample Receiving Date) : 2017/01/16
測試期間(Testing Period) : 2017/01/16 TO 2017/01/20
送樣廠商(Sample Submitted By) : 天二科技股份有限公司 (EVER OHMS TECHNOLOGY CO.,LTD.)

測試需求(Test Requested) :

- (1) 依據客戶指定，參考RoHS2011/65/EU Annex II及其修訂指令(EU) 2015/863測試鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚，DBP, BBP, DEHP, DIBP. (As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample.)
- (2) 其他測試項目請見下一頁 . (Please refer to next pages for the other item(s).)

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

結論(Conclusion) :

- (1) 根據客戶所提供的樣品，其鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚，DBP, BBP, DEHP, DIBP的測試結果符合RoHS指令暨(EU) 2015/863之限值要求. (Based on the performed tests on submitted samples, the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS and amending Directive (EU) 2015/863.)

Ray Chang

報告簽署人/Ray Chang, Ph.D./Manager -Tech

Signed for and on behalf of

SGS Taiwan Limited



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測試結果(Test Results)

測試部位(PART NAME)No.1 : 黑色/銀色/白色 LEAD FREE CHIP RESISTORS & CHIP ARRAYS
(BLAKC/SILVER/WHITE LEAD FREE CHIP RESISTORS & CHIP ARRAYS)

| 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) | 限值 (Limit) |
|----------------------------------|--------------|--|----------------------|----------------|---------------|
| | | | | No.1 | |
| 鎘 / Cadmium (Cd) | mg/kg | 參考IEC 62321-5: 2013方法, 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. | 100 |
| 鉛 / Lead (Pb) | mg/kg | 參考IEC 62321-5: 2013方法, 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 | 171 | 1000 |
| 汞 / Mercury (Hg) | mg/kg | 參考IEC 62321-4: 2013方法, 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. | 1000 |
| 六價鉻 / Hexavalent Chromium Cr(VI) | mg/kg | 參考IEC 62321: 2008方法, 以UV-VIS檢測. / With reference to IEC 62321: 2008 and performed by UV-VIS. | 2 | n.d. | 1000 |
| 多溴聯苯總和 / Sum of PBBs | mg/kg | 參考IEC 62321-6: 2015方法, 以氣相層析/質譜儀檢測. / With reference to IEC 62321-6: 2015 and performed by GC/MS. | - | n.d. | 1000 |
| 一溴聯苯 / Monobromobiphenyl | | | 5 | n.d. | - |
| 二溴聯苯 / Dibromobiphenyl | | | 5 | n.d. | - |
| 三溴聯苯 / Tribromobiphenyl | | | 5 | n.d. | - |
| 四溴聯苯 / Tetrabromobiphenyl | | | 5 | n.d. | - |
| 五溴聯苯 / Pentabromobiphenyl | | | 5 | n.d. | - |
| 六溴聯苯 / Hexabromobiphenyl | | | 5 | n.d. | - |
| 七溴聯苯 / Heptabromobiphenyl | | | 5 | n.d. | - |
| 八溴聯苯 / Octabromobiphenyl | | | 5 | n.d. | - |
| 九溴聯苯 / Nonabromobiphenyl | | | 5 | n.d. | - |
| 十溴聯苯 / Decabromobiphenyl | 5 | n.d. | - | | |

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 EVER OHMS TECHNOLOGY CO.,LTD.
 高雄市前鎮區高雄加工出口區南四路3號
 NO.3, SOUTH 4TH ROAD, K.E.P.Z. KAOHSIUNG CITY, 80681 TAIWAN R.O.C.

| 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 | 限值 (Limit) |
|--|--------------|---|----------------------|------------------------|---------------|
| | | | | | |
| 多溴聯苯醚總和 / Sum of PBDEs | mg/kg | 參考IEC 62321-6: 2015方法, 以氣相層析/質譜儀檢測. / With reference to IEC 62321-6: 2015 and performed by GC/MS. | - | n.d. | 1000 |
| 一溴聯苯醚 / Monobromodiphenyl ether | | | 5 | n.d. | - |
| 二溴聯苯醚 / Dibromodiphenyl ether | | | 5 | n.d. | - |
| 三溴聯苯醚 / Tribromodiphenyl ether | | | 5 | n.d. | - |
| 四溴聯苯醚 / Tetrabromodiphenyl ether | | | 5 | n.d. | - |
| 五溴聯苯醚 / Pentabromodiphenyl ether | | | 5 | n.d. | - |
| 六溴聯苯醚 / Hexabromodiphenyl ether | | | 5 | n.d. | - |
| 七溴聯苯醚 / Heptabromodiphenyl ether | | | 5 | n.d. | - |
| 八溴聯苯醚 / Octabromodiphenyl ether | | | 5 | n.d. | - |
| 九溴聯苯醚 / Nonabromodiphenyl ether | | | 5 | n.d. | - |
| 十溴聯苯醚 / Decabromodiphenyl ether | | | 5 | n.d. | - |
| 鄰苯二甲酸二異丁酯 / DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5) | mg/kg | 參考IEC 62321-8 (111/321/CD), 以氣相層析儀/質譜儀檢測之. / With reference to IEC 62321-8 (111/321/CD). Analysis was performed by GC/MS. | 50 | n.d. | 1000 |
| 鄰苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2) | | | 50 | n.d. | 1000 |
| 鄰苯二甲酸丁苯甲酯 / BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7) | | | 50 | n.d. | 1000 |
| 鄰苯二甲酸二(2-乙基己基)酯 / DEHP (Di-(2-ethylhexyl) phthalate) (CAS No.: 117-81-7) | | | 50 | n.d. | 1000 |
| 鄰苯二甲酸二正辛酯 / DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0) | | | 50 | n.d. | - |
| 鄰苯二甲酸二異壬酯 / DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0; 68515-48-0) | | | 50 | n.d. | - |
| 鄰苯二甲酸二異癸酯 / DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0; 68515-49-1) | | | 50 | 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) | 限值 (Limit) |
|---|--------------|---|----------------------|----------------|---------------|
| | | | | No.1 | |
| 鄰苯二甲酸二 (C7-11支鏈與直鏈)烷基酯 / DHNUP (1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters) (CAS No.: 68515-42-4) | mg/kg | 參考IEC 62321-8 (111/321/CD), 以氣相層析儀/質譜儀檢測之. / With reference to IEC 62321-8 (111/321/CD). Analysis was performed by GC/MS. | 50 | n.d. | - |
| 鄰苯二甲酸二己酯 / DNHP (Di-n-hexyl phthalate) (CAS No.: 84-75-3) | | | 50 | n.d. | - |
| 鄰苯二甲酸二 (C6-8支鏈與直鏈)烷基酯, 富C7 / DIHP (1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich) (CAS No.: 71888-89-6) | | | 50 | n.d. | - |
| 銻 / Antimony (Sb) | mg/kg | 參考US EPA 3052方法, 用感應藕合電漿原子發射光譜儀檢測銻含量. / With reference to US EPA Method 3052 for Antimony Content. Analysis was performed by ICP-AES. | 2 | n.d. | - |
| 三氧化二銻 / Antimony trioxide (Sb2O3)*** (CAS No.: 1309-64-4) | mg/kg | | - | 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 (α - HBCDD, β - HBCDD, γ - 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方法, 以氣相層析/質譜儀檢測. / With reference to IEC 62321: 2008 method. Analysis was performed by GC/MS. | 5 | n.d. | - |
| 富馬酸二甲酯 / Dimethyl Fumarate (CAS No.: 624-49-7) | mg/kg | 參考US EPA 3550C方法, 以氣相層析質譜儀(GC/MS)檢測. / With reference to US EPA 3550C method. Analysis was performed by GC/MS. | 0.1 | n.d. | - |

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|---|--------------|---|----------------------|----------------|---------------|
| | | | | No.1 | |
| 紅磷 / Red phosphorus | ** | 本測試以熱裂解儀分析。 / Analysis was performed by Pyrolyzer-GC/MS. | - | Negative | - |
| 全氟辛酸(銨) / PFOA (CAS No.: 335-67-1) | mg/kg | 參考US EPA 3550C: 2007方法, 以液相層析/質譜儀檢測。 / With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS. | 10 | n.d. | - |
| 全氟辛烷磺酸 / Perfluorooctane sulfonates (PFOS) | mg/kg | | 10 | n.d. | - |
| 鹵素 / Halogen | | | | | |
| 鹵素(氟) / Halogen-Fluorine (F) (CAS No.: 014762-94-8) | 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.: 022537-15-1) | | | 50 | n.d. | - |
| 鹵素(溴) / Halogen-Bromine (Br) (CAS No.: 010097-32-2) | | | 50 | n.d. | - |
| 鹵素(碘) / Halogen-Iodine (I) (CAS No.: 014362-44-8) | | | 50 | n.d. | - |

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|---|--------------|--|----------------------|------------------------|---------------|
| | | | | | |
| 多環芳香烴 / Polynuclear Aromatic Hydrocarbons (PAHs) | | | | | |
| 芘 / Acenaphthene (CAS No.: 83-32-9) | mg/kg | 參考AfPS GS 2014:01 PAK方法, 以氣相層析/質譜儀檢測。 / With reference to AfPS GS 2014:01 PAK method. Analysis was performed by GC/MS. | 0.2 | n.d. | - |
| 芘烯 / Acenaphthylene (CAS No.: 208-96-8) | | | 0.2 | n.d. | - |
| 蔥 / Anthracene (CAS No.: 120-12-7) | | | 0.2 | n.d. | - |
| 苯駢蔥 / Benzo[a]anthracene (CAS No.: 56-55-3) | | | 0.2 | n.d. | - |
| 苯駢(a)芘 / Benzo[a]pyrene (CAS No.: 50-32-8) | | | 0.2 | n.d. | - |
| 苯(b)苯駢芘 / Benzo[b]fluoranthene (CAS No.: 205-99-2) | | | 0.2 | n.d. | - |
| 苯駢芘 / Benzo[g,h,i]perylene (CAS No.: 191-24-2) | | | 0.2 | n.d. | - |
| 苯(k)苯駢芘 / Benzo[k]fluoranthene (CAS No.: 207-08-9) | | | 0.2 | n.d. | - |
| Chrysene (CAS No.: 218-01-9) | | | 0.2 | n.d. | - |
| 二苯駢蔥 / Dibenzo[a,h]anthracene (CAS No.: 53-70-3) | | | 0.2 | n.d. | - |
| 苯駢芘 / Fluoranthene (CAS No.: 206-44-0) | | | 0.2 | n.d. | - |
| 芘 / Fluorene (CAS No.: 86-73-7) | | | 0.2 | n.d. | - |
| 茚酮芘 / Indeno[1,2,3-c,d] pyrene (CAS No.: 193-39-5) | | | 0.2 | n.d. | - |
| 萘 / Naphthalene (CAS No.: 91-20-3) | | | 0.2 | n.d. | - |
| 菲 / Phenanthrene (CAS No.: 85-01-8) | | | 0.2 | n.d. | - |
| 芘 / Pyrene (CAS No.: 129-00-0) | | | 0.2 | n.d. | - |
| 苯(j)苯駢芘 / Benzo[j]fluoranthene (CAS No.: 205-82-3) | | | 0.2 | n.d. | - |
| 苯駢(e)芘 / Benzo[e]pyrene (CAS No.: 192-97-2) | 0.2 | n.d. | - | | |
| 多環芳香烴18項總和 / Sum of 18 PAHs | mg/kg | - | - | n.d. | - |

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NO.3, SOUTH 4TH ROAD, K.E.P.Z. KAOHSIUNG CITY, 80681 TAIWAN R.O.C.

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. ***: 該物質是由"銻"之測試結果計算得知. 其MDL是針對"銻"之評估. (The substance was calculated by the test results of Antimony. The MDL is evaluated for Antimony.)
6. ** = Qualitative analysis (No Unit) 定性分析(無單位)
7. 紅磷(Red Phosphorus): Negative = Undetectable 陰性(未偵測到); Positive = Detectable 陽性(已偵測到)
8. 紅磷測試由SGS其他實驗室執行 (The Red Phosphorus test was subcontracted to other SGS Laboratory.)

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 $1\mu\text{g}/\text{m}^2$.)

全氟辛烷磺酸指全氟辛烷磺酸和它的衍生物包括全氟辛烷磺酸, 全氟辛基磺醯胺, N-甲基全氟辛烷磺醯胺, N-乙基全氟辛烷磺醯胺, N-甲基全氟辛基磺醯基氨基乙醇, N-乙基全氟辛基磺醯基氨基乙醇。(PFOS refer to Perfluorooctanesulfonic acid and its derivatives including Perfluorooctanesulfonic acid, Perfluorooctane sulfonamide, N-Methylperfluorooctane sulfonamide, N-Ethylperfluorooctane sulfonamide, N-Methylperfluorooctane sulfonamidoethanol and N-Ethylperfluorooctane sulfonamidoethanol.)

試驗報告

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Test Report

天二科技股份有限公司

EVER OHMS TECHNOLOGY CO.,LTD.

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德國產品安全委員會(AfPS) GS PAHs 要求 /

AfPS (German commission for Product Safety): GS PAHs requirements

| 項目 (Parameter) | 第1類 (Category 1) | 第2類 (Category 2) | | 第3類 (Category 3) | |
|------------------------------|---|---|--|---|--|
| | 意圖放入嘴內的材料或玩具會與皮膚有所接觸(超過30秒). (Material indented to be put in the mouth or toys with intended skin contact (longer than 30 s).) | 不屬於第1類的材料並可預見與皮膚接觸逾30秒(長期或經常與皮膚接觸). (Materials not falling under category 1 with foreseeable contact to skin for longer than 30 seconds (long-term skin or frequent contact).) | | 可預見與皮膚接觸短於30秒(短期與皮膚接觸), 以及不屬於第1類或第2類的材料. (Materials not falling under category 1 or 2 with foreseeable contact to skin for less than 30 seconds (short-term skin contact).) | |
| | | 列於2009/48/EC之玩具 (Toy under 2009/48/EC) | 列於德國產品安全法之其他產品 (Other products under ProdSG) | 列於2009/48/EC之玩具 (Toy under 2009/48/EC) | 列於德國產品安全法之其他產品 (Other products under ProdSG) |
| Naphthalene | < 1 | < 2 | | < 10 | |
| Acenaphthylene | < 1 Sum | < 5 Sum | < 10 Sum | < 20 Sum | < 50 Sum |
| Acenaphthene | | | | | |
| Fluorene | | | | | |
| Phenanthrene | | | | | |
| Anthracene | | | | | |
| Fluoranthene | | | | | |
| Pyrene | | | | | |
| Benzo[a]anthracene | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 1 |
| Chrysene | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 1 |
| Benzo[b]fluoranthene | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 1 |
| Benzo[j]fluoranthene | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 1 |
| Benzo[k]fluoranthene | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 1 |
| Benzo[a]pyrene | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 1 |
| Benzo[e]pyrene | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 1 |
| Indeno[1,2,3-c,d] pyrene | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 1 |
| Dibenzo[a,h]anthracene | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 1 |
| Benzo[g,h,i]perylene | < 0.2 | < 0.2 | < 0.5 | < 0.5 | < 1 |
| 18項PAH總濃度 (Sum of 18 PAH) | < 1 | < 5 | < 10 | < 20 | < 50 |

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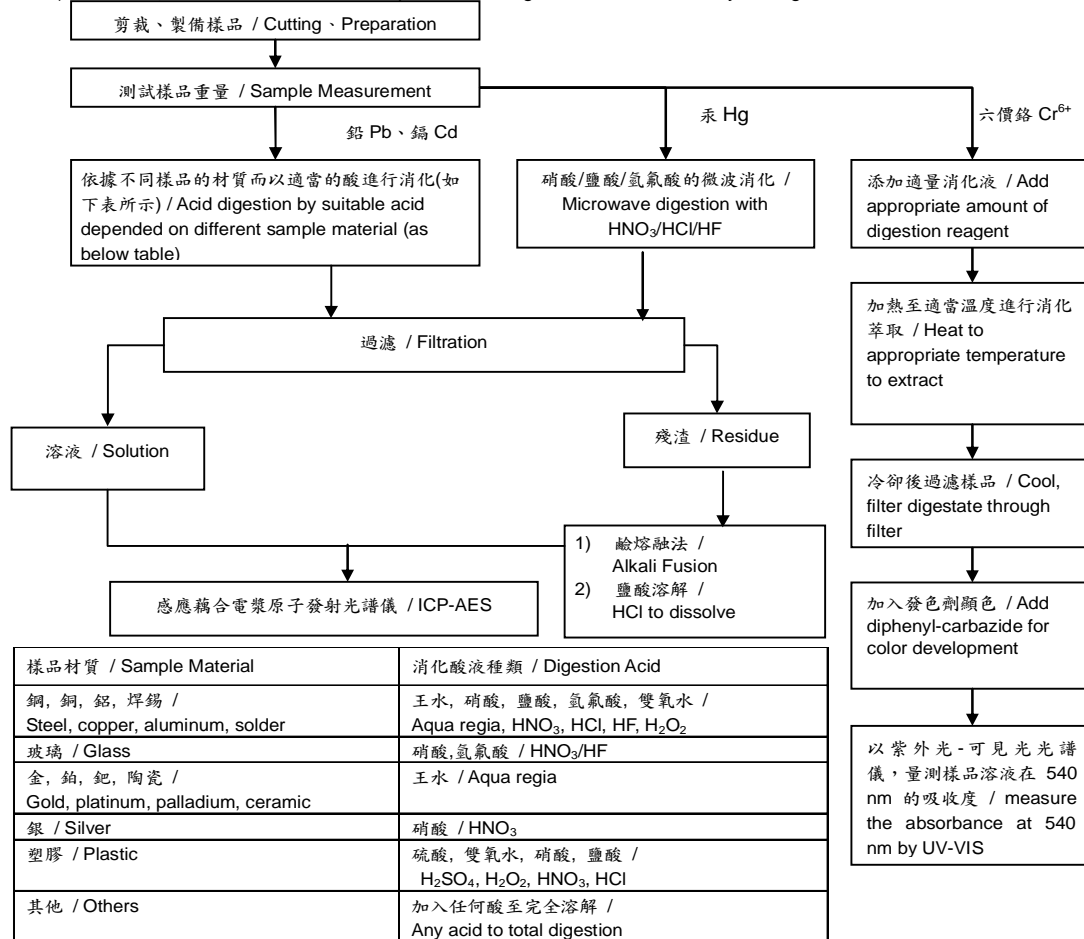
天二科技股份有限公司

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NO.3, SOUTH 4TH ROAD, K.E.P.Z. KAOHSIUNG CITY, 80681 TAIWAN R.O.C.

- 1) 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. (Cr⁶⁺ test method excluded)
- 2) 測試人員：劉俊宏 / Name of the person who made measurement: Jony Liu
- 3) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



Note:** (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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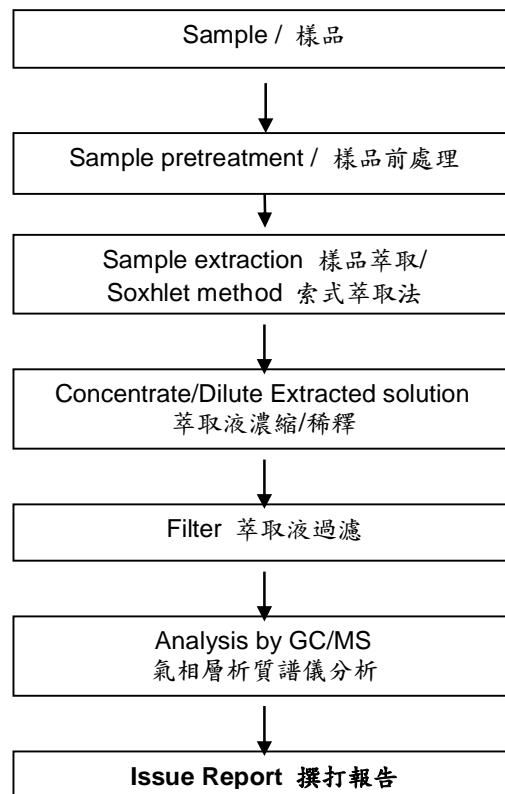
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多溴聯苯/多溴聯苯醚 分析流程圖 / PBB/PBDE analytical FLOW CHART

- 1)測試人員：陳威錚 / Name of the person who made measurement: Dorothy Chen
- 2)測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



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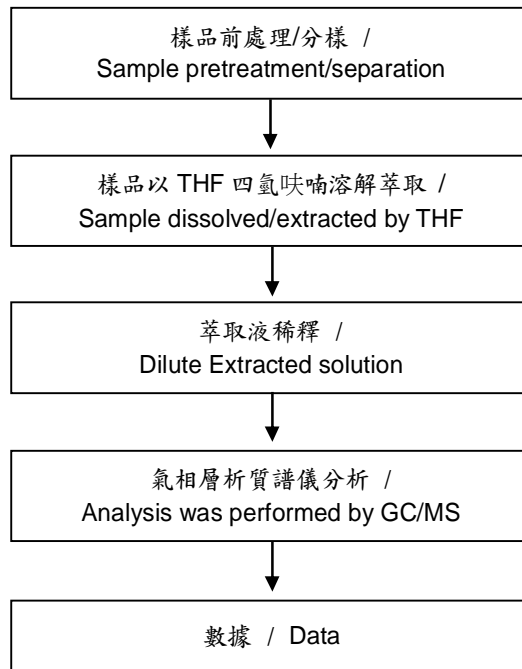
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可塑劑分析流程圖 / Analytical flow chart of phthalate content

- 測試人員：陳威錚 / Name of the person who made measurement: Dorothy Chen
- 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



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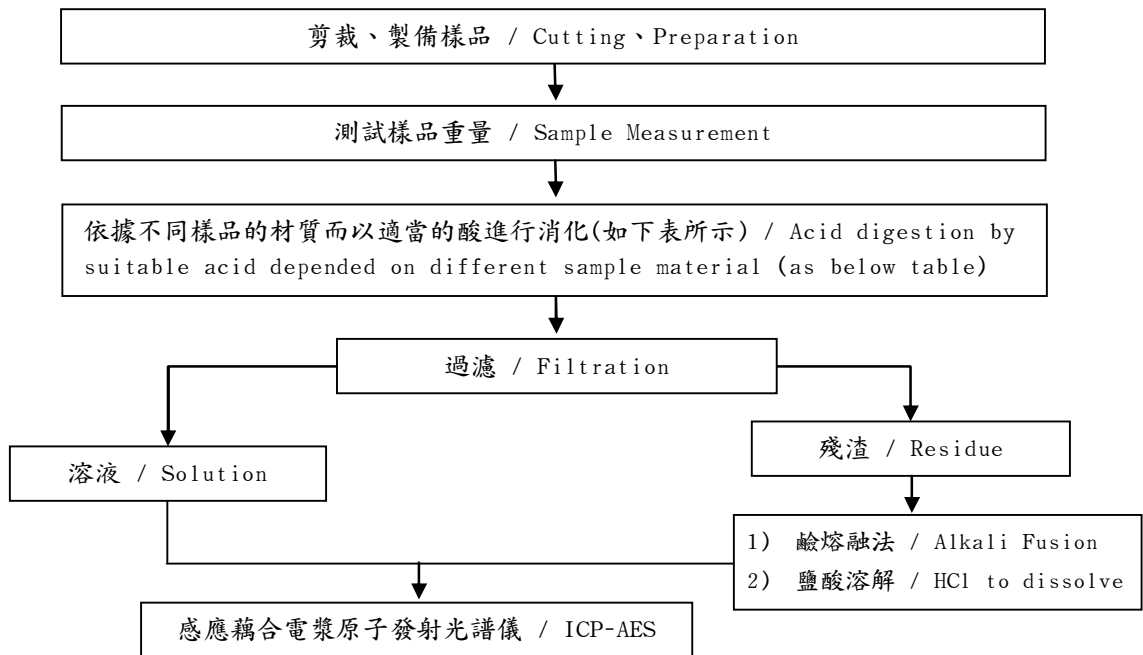
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- 1) 根據以下的流程圖之條件，樣品已完全溶解。 / These samples were dissolved totally by pre-conditioning method according to below flow chart.
- 2) 測試人員：劉俊宏 / Name of the person who made measurement: Jony Liu
- 3) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray 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 ₃ , HCl, HF, H ₂ O ₂ |
| 玻璃 / Glass | 硝酸,氫氟酸 / HNO ₃ /HF |
| 金,鉑,鈀,陶瓷 / Gold, platinum, palladium, ceramic | 王水 / Aqua regia |
| 銀 / Silver | 硝酸 / HNO ₃ |
| 塑膠 / Plastic | 硫酸,雙氧水,硝酸,鹽酸 / H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCl |
| 其他 / Others | 加入任何酸至完全溶解 / Any acid to total digestion |

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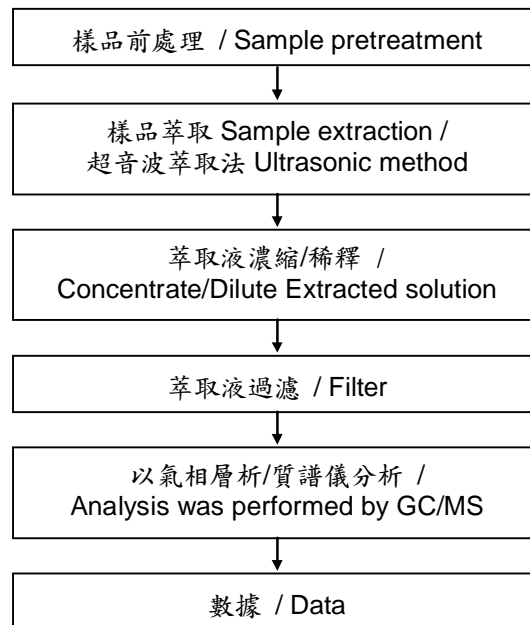
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六溴環十二烷分析流程圖 / HBCDD analytical flow chart

- 1) 測試人員：陳威錚 / Name of the person who made measurement: Dorothy Chen
- 2) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



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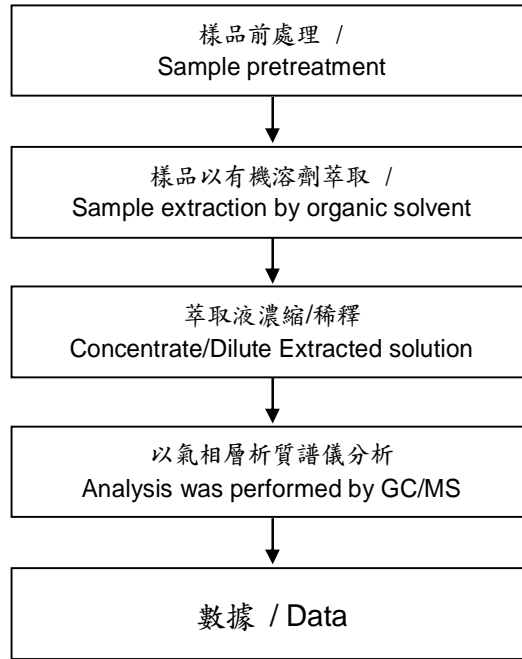
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富馬酸二甲酯分析流程圖 /

Analytical flow chart of Dimethyl Fumarate content

- 1) 測試人員：陳威錚 / Name of the person who made measurement: Dorothy Chen
- 2) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



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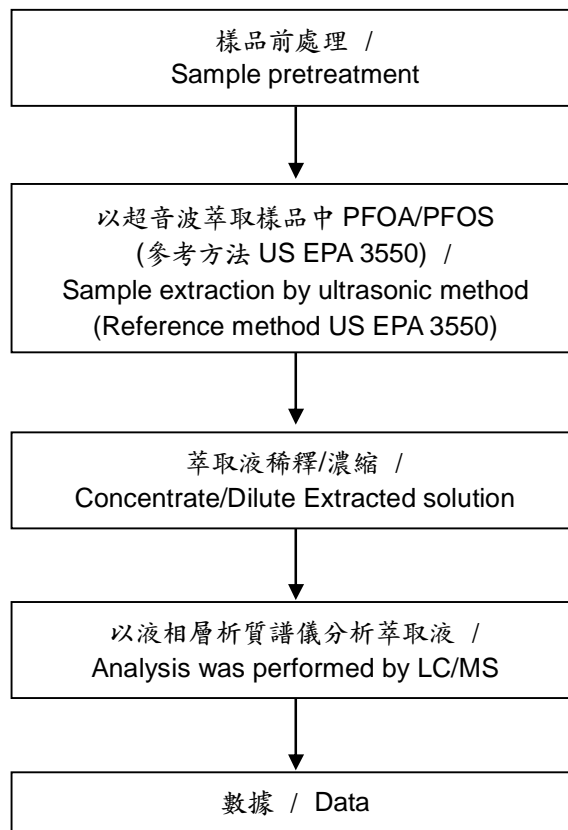
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全氟辛酸(銨)/ 全氟辛烷磺酸分析流程圖 / Analytical flow chart of PFOA/PFOS content

1)測試人員：黃璟璵 / Name of the person who made measurement: Ginny Huang

2)測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



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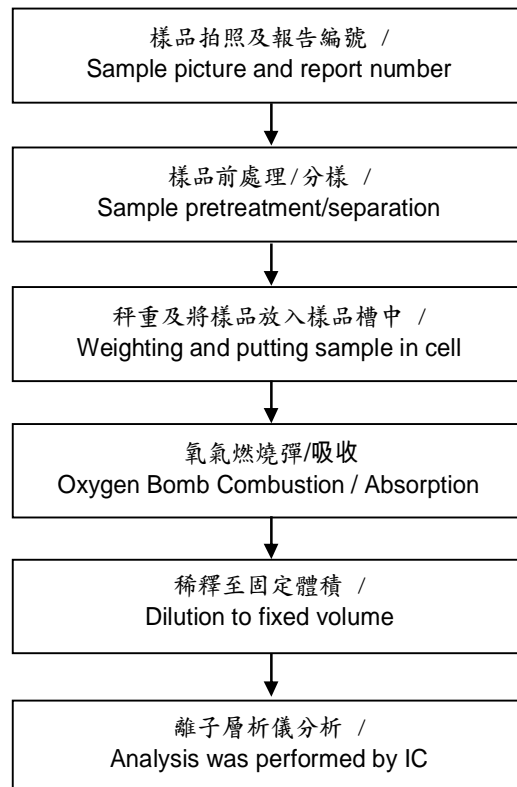
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鹵素分析流程圖 / Analytical flow chart of halogen content

- 1) 測試人員：洪秀真/ Name of the person who made measurement: Jean Hung
- 2) 測試負責人：張伯睿/ Name of the person in charge of measurement: Ray Chang



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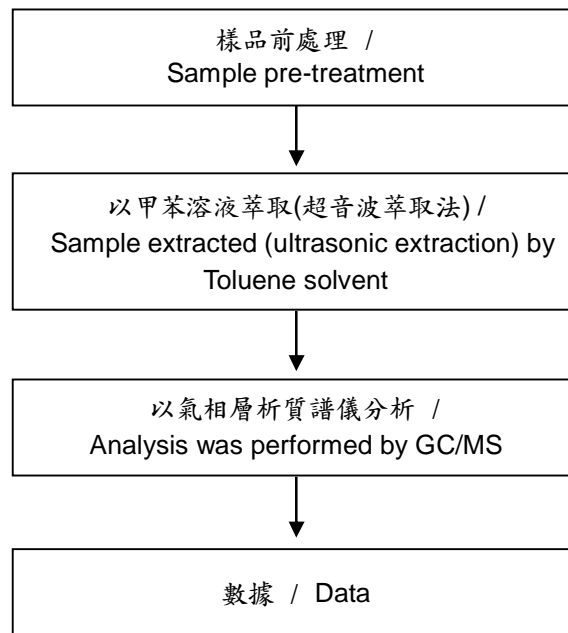
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多苯環芳香族化合物分析流程圖 /

PAHs (Poly Aromatic Hydrocarbons) analytical flow chart

1) 測試人員：陳威錚 / Name of the person who made measurement: Dorothy Chen

2) 測試負責人：張伯睿 / Name of the person in charge of measurement: Ray Chang



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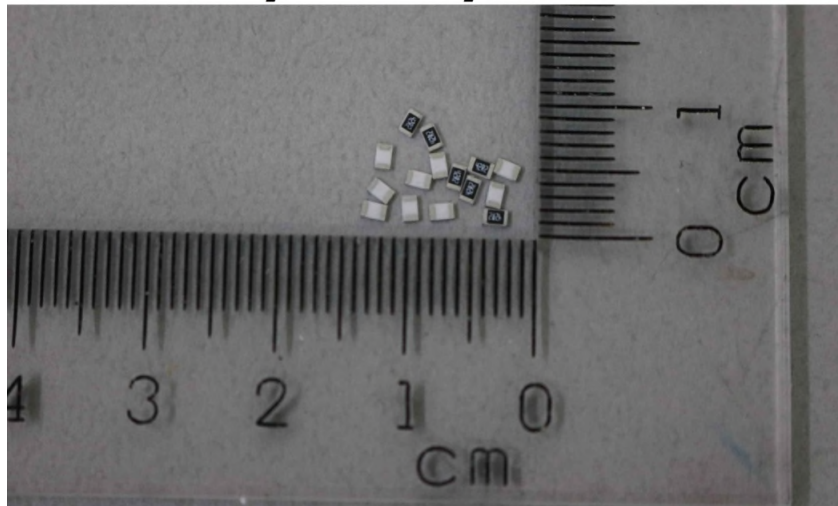
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(The tested sample / part is marked by an arrow if it's shown on the photo.)

KA/2017/11047



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