

測試報告

Test Report

號碼(No.): ETR25204152

日期(Date): 24-Feb-2025

頁數(Page): 1 of 10

旺宏電子股份有限公司 (MACRONIX INTERNATIONAL CO., LTD.)

新竹科學園區新竹市東區研新四路8號 (NO. 8, CREATION ROAD IV, SCIENCE PARK, HSINCHU CITY 30093, 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 the applicant as) :

送樣廠商(Sample Submitted By) : 旺宏電子股份有限公司 (MACRONIX INTERNATIONAL CO., LTD.)

樣品名稱(Sample Name) : 電子產品 (IC)

樣品型號(Style/Item No.) : 64 CSP

收件日(Sample Receiving Date) : 14-Feb-2025

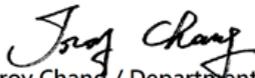
測試期間(Testing Period) : 14-Feb-2025 to 21-Feb-2025

測試需求(Test Requested) : (1) 依據客戶指定·參考RoHS 2011/65/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(s).)

(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) : 請參閱下一頁 (Please refer to following 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 2011/65/EU Annex II暨其修訂指令(EU) 2015/863之限值要求。(Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.)


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



PIN CODE: 885B9C1D

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測試部位敘述 (Test Part Description)

No.1 : 黑色本體 (BLACK BODY)

No.2 : 銀色金屬球 (SILVER COLORED METAL BALL)

測試結果 (Test Results)

測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result)		限值 (Limit)
				No.1	No.2	
鎘 (Cd) (Cadmium (Cd))	參考IEC 62321-5: 2013 · 以感應耦合電漿發射光譜儀分析。(With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.)	mg/kg	2	n.d.	n.d.	100
鉛 (Pb) (Lead (Pb))		mg/kg	2	n.d.	37.5	1000
汞 (Hg) (Mercury (Hg))	參考IEC 62321-4: 2013+ AMD1: 2017 · 以感應耦合電漿發射光譜儀分析。(With reference to IEC 62321-4: 2013+ AMD1: 2017, analysis was performed by ICP-OES.)	mg/kg	2	n.d.	n.d.	1000
六價鉻 Cr(VI) (Hexavalent Chromium Cr(VI))	參考IEC 62321-7-2: 2017 · 以紫外光-可見光分光光度計分析。(With reference to IEC 62321-7-2: 2017, analysis was performed by UV-VIS.)	mg/kg	8	n.d.	---	1000
六價鉻 (Hexavalent Chromium) Cr(VI) (#2)	參考IEC 62321-7-1: 2015 · 以紫外光-可見光分光光度計分析。(With reference to IEC 62321-7-1: 2015, analysis was performed by UV-VIS.)	µg/cm ²	0.1	---	n.d.	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result)		限值 (Limit)
				No.1	No.2	
一溴聯苯 (Monobromobiphenyl)	參考IEC 62321-6: 2015 · 以氣相層析儀/質譜儀分析。(With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.)	mg/kg	5	n.d.	n.d.	-
二溴聯苯 (Dibromobiphenyl)		mg/kg	5	n.d.	n.d.	-
三溴聯苯 (Tribromobiphenyl)		mg/kg	5	n.d.	n.d.	-
四溴聯苯 (Tetrabromobiphenyl)		mg/kg	5	n.d.	n.d.	-
五溴聯苯 (Pentabromobiphenyl)		mg/kg	5	n.d.	n.d.	-
六溴聯苯 (Hexabromobiphenyl)		mg/kg	5	n.d.	n.d.	-
七溴聯苯 (Heptabromobiphenyl)		mg/kg	5	n.d.	n.d.	-
八溴聯苯 (Octabromobiphenyl)		mg/kg	5	n.d.	n.d.	-
九溴聯苯 (Nonabromobiphenyl)		mg/kg	5	n.d.	n.d.	-
十溴聯苯 (Decabromobiphenyl)		mg/kg	5	n.d.	n.d.	-
多溴聯苯總和 (Sum of PBBs)		mg/kg	-	n.d.	n.d.	1000
一溴聯苯醚 (Monobromodiphenyl ether)		mg/kg	5	n.d.	n.d.	-
二溴聯苯醚 (Dibromodiphenyl ether)		mg/kg	5	n.d.	n.d.	-
三溴聯苯醚 (Tribromodiphenyl ether)		mg/kg	5	n.d.	n.d.	-
四溴聯苯醚 (Tetrabromodiphenyl ether)		mg/kg	5	n.d.	n.d.	-
五溴聯苯醚 (Pentabromodiphenyl ether)		mg/kg	5	n.d.	n.d.	-
六溴聯苯醚 (Hexabromodiphenyl ether)		mg/kg	5	n.d.	n.d.	-
七溴聯苯醚 (Heptabromodiphenyl ether)		mg/kg	5	n.d.	n.d.	-
八溴聯苯醚 (Octabromodiphenyl ether)		mg/kg	5	n.d.	n.d.	-
九溴聯苯醚 (Nonabromodiphenyl ether)		mg/kg	5	n.d.	n.d.	-
十溴聯苯醚 (Decabromodiphenyl ether)	mg/kg	5	n.d.	n.d.	-	
多溴聯苯醚總和 (Sum of PBDEs)	mg/kg	-	n.d.	n.d.	1000	
鄰苯二甲酸丁苯甲酯 (BBP) (Butyl benzyl phthalate (BBP))	參考IEC 62321-8: 2017 · 以氣相層析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	n.d.	1000
鄰苯二甲酸二丁酯 (DBP) (Dibutyl phthalate (DBP))		mg/kg	50	n.d.	n.d.	1000
鄰苯二甲酸二(2-乙基己基)酯 (DEHP) (Di-(2-ethylhexyl) phthalate (DEHP))		mg/kg	50	n.d.	n.d.	1000
鄰苯二甲酸二異丁酯 (DIBP) (Diisobutyl phthalate (DIBP))		mg/kg	50	n.d.	n.d.	1000
鄰苯二甲酸二異癸酯 (DIDP) (Diisodecyl phthalate (DIDP)) (CAS No.: 26761-40-0, 68515-49-1)		mg/kg	50	n.d.	---	-

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result)		限值 (Limit)
				No.1	No.2	
鄰苯二甲酸二異壬酯 (DINP) (Diisononyl phthalate (DINP)) (CAS No.: 28553-12-0, 68515-48-0)	參考IEC 62321-8: 2017 · 以氣相層 析儀/質譜儀分析。(With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.	---	-
鄰苯二甲酸二正辛酯 (DNOP) (Di-n- octyl phthalate (DNOP)) (CAS No.: 117-84-0)		mg/kg	50	n.d.	---	-
鄰苯二甲酸二正己酯 (DNHP) (Di-n- hexyl phthalate (DNHP)) (CAS No.: 84-75-3)		mg/kg	50	n.d.	---	-
氟 (F) (Fluorine (F)) (CAS No.: 14762- 94-8)	參考BS EN 14582: 2016 · 以離子 層析儀分析。(With reference to BS EN 14582: 2016, analysis was performed by IC.)	mg/kg	50	160	---	-
氯 (Cl) (Chlorine (Cl)) (CAS No.: 22537-15-1)		mg/kg	50	n.d.	---	-
溴 (Br) (Bromine (Br)) (CAS No.: 10097-32-2)		mg/kg	50	n.d.	---	-
碘 (I) (Iodine (I)) (CAS No.: 14362-44- 8)		mg/kg	50	n.d.	---	-

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備註(Note) :

1. mg/kg = ppm ; 0.1wt% = 0.1% = 1000ppm
2. MDL = Method Detection Limit (方法偵測極限值)
3. n.d. = Not Detected (未檢出) ; 小於MDL / Less than MDL
4. "-" = Not Regulated (無規格值)
5. "---" = Not Conducted (未測試項目)
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. 除非另有說明，參照ILAC-G8:09/2019決定規則，採用簡單允收規則之二分法($w=0$)進行符合性判定；根據此規則，符合性結果之判定係以測試結果與限值做比較。(Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule ($w=0$) stated in ILAC-G8:09/2019. According to this rule, the judgement of conformity is based on the comparing test results with limits.)

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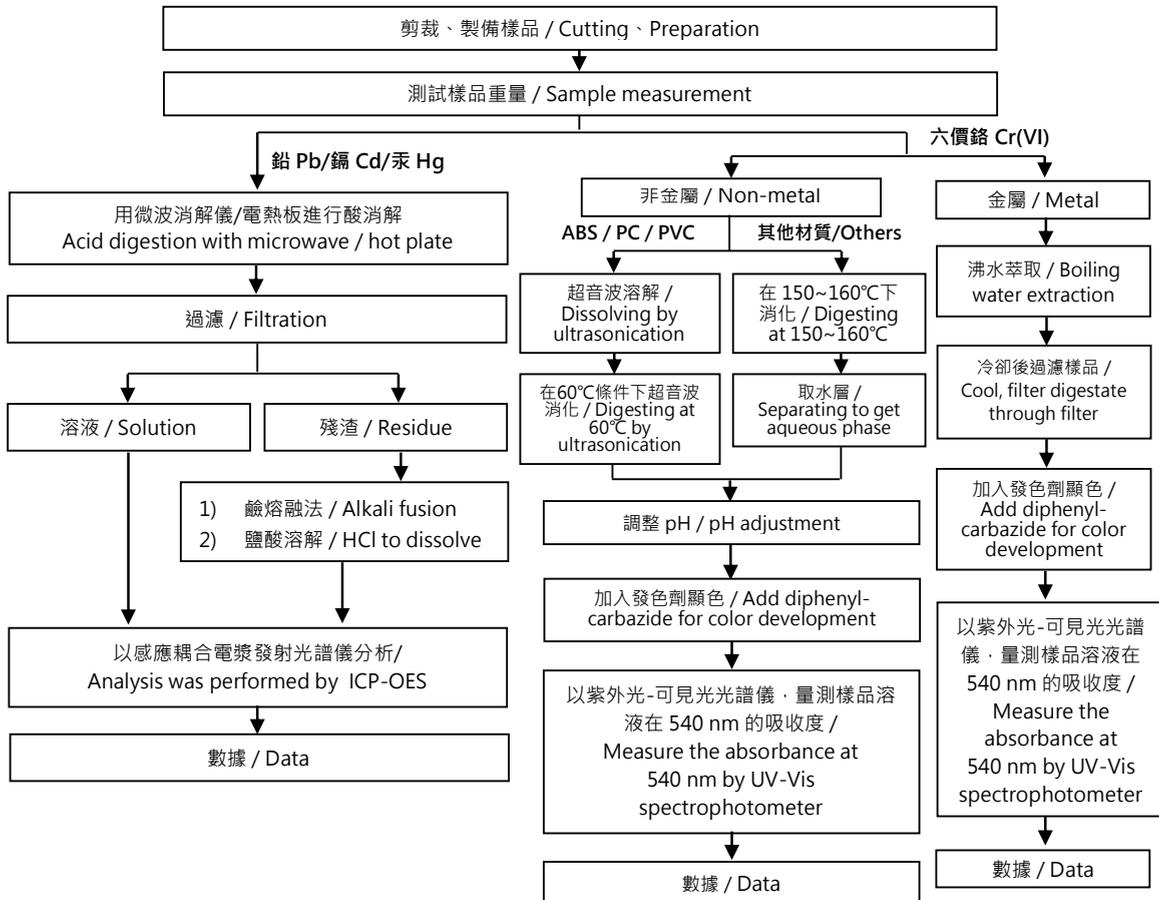
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重金屬流程圖 / Analytical flow chart of heavy metal

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. (Cr⁶⁺ test method excluded)



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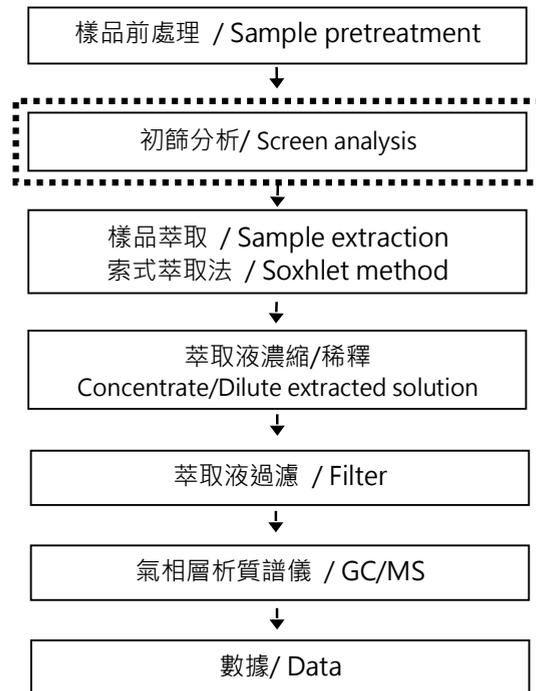
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多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBBs/PBDEs

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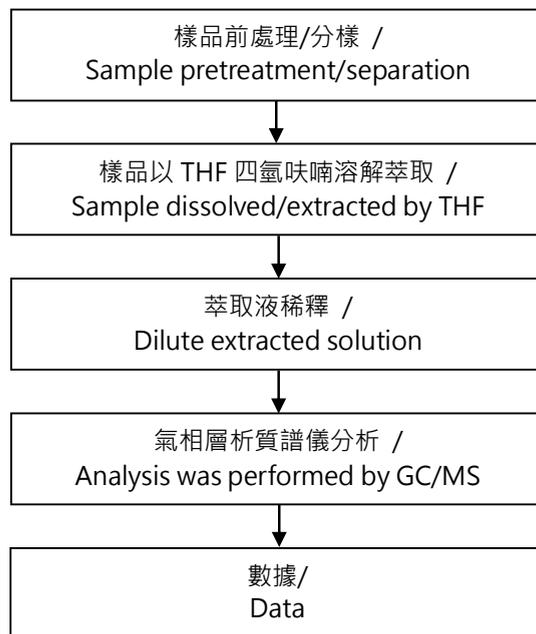
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可塑劑分析流程圖 / Analytical flow chart - Phthalate

【測試方法/Test method: IEC 62321-8】



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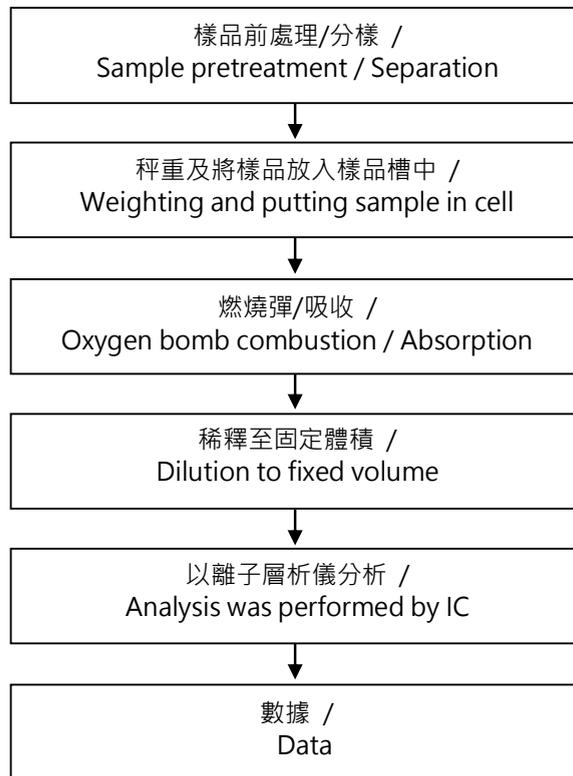
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鹵素分析流程圖 / Analytical flow chart - Halogen



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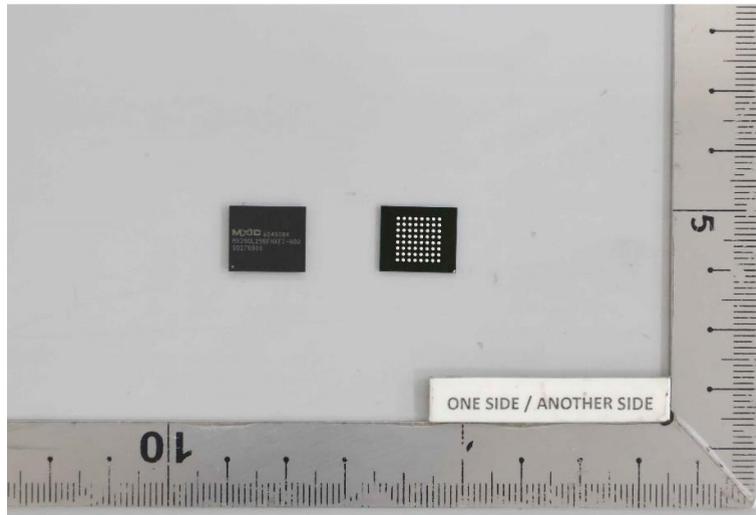
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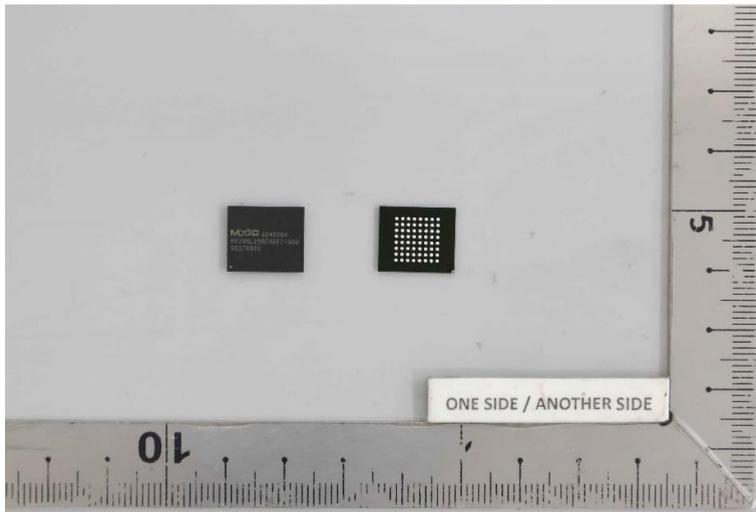
* 照片中如有箭頭標示，則表示為實際檢測之樣品/部位。*

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

ETR25204152 NO.1



ETR25204152 NO.2



** 報告結尾 (End of Report) **

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