



**BUREAU  
VERITAS**

# TEST REPORT

Lab No. : (6220)062-0234  
Date : March 10, 2020  
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**APPLICANT**  
申請人 : Macronix International Co., Ltd  
No. 16, Lixing Rd., Hsinchu Science Park, Hsinchu City 300, Taiwan  
(R.O.C.)  
旺宏電子股份有限公司  
300 新竹科學園區力行路十六號

**CONTACT PERSON**  
聯絡人 : —

**DATE OF SUBMISSION**  
送樣日期 : March 02, 2020 & March 04, 2020  
2020 年 03 月 02 日與 2020 年 03 月 04 日

**PERFORMANCE PERIOD**  
測試日期 : March 02, 2020 to March 10, 2020  
2020 年 03 月 02 日至 2020 年 03 月 10 日

**SAMPLE DESCRIPTION**  
樣品描述 : IC

**ITEM NO.**  
產品型號 : 48TSOP

## SUMMARY OF TEST RESULTS 測試結果摘要

TEST REQUESTED 測試要求	CONCLUSION 結論	REMARK 備註
Heavy Metals and Flame Retardants Content – European Parliament and Council Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) 重金屬和阻燃劑含量 - 有關歐盟委員會針對電子產品的指令(電子電氣禁用某些有害物質指令), 2011/65/EU	PASS 通過	—
Phthalates Test – Directive (EU)2015/863 Amendment of European Parliament and Council Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) (Note: The amendment will be effective on 22 July 2019. For medical devices, monitoring and control instruments, effective date will be 22 July 2021.) 鄰苯二甲酸鹽測試- 指令 2011/65/EU 歐洲議會和理事會關於電子電氣設備中限制使用某些有害物質 (RoHS)的修正案指令(EU)2015/863. (注釋:修正案將於 2019 年 7 月 22 日起生效。對於醫療設備及監測和控制設備生效日期為 2021 年 7 月 22 日)	PASS 通過	—
Phthalates Test 鄰苯二甲酸鹽測試	DATA 數據	Test result in page 4 測試結果請見第 4 頁
Halogenated compounds – F, Cl, Br & I 含鹵素物質檢測 – 氟, 氯, 溴 和 碘	DATA 數據	Test result in page 4 測試結果請見第 4 頁

C/N /TC/JK

Bureau Veritas  
Consumer Product Service (H.K.) Ltd.  
Taiwan Branch  
37, Zhongyang S Rd., Sec. 2, Beitou,  
Taipei 112, Taiwan, R.O.C.

Tel : 886-2-2895-3666  
Fax: 886-2-2895-6999  
<http://www.cps.bureauveritas.com>

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**REMARK**

If there are questions or concerns on this report, please contact:  
若有任何疑問或諮詢，請以 email 與我們聯絡

chemical.inquiry@tw.bureauveritas.com/  
vico.lin@bureauveritas.com

BUREAU VERITAS CONSUMER PRODUCTS SERVICES  
(H.K.) LIMITED, TAIWAN BRANCH

PREPARED BY : Tiffany Chin

VICO LIN  
MANAGER  
ANALYTICAL DEPARTMENT

C/N /TC/JK



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**TEST RESULT 測試結果**

Tested item 測試部件	
1.	Black mixed material / 黑色混合材料
2.	Silvery metal / 銀色金屬

**Heavy Metals and Flame Retardants Content – European Parliament and Council Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)  
重金屬和阻燃劑含量 - 有關歐盟委員會針對電子產品的指令(電子電氣禁用某些有害物質指令), 2011/65/EU**

Compounds 化合物	Unit 單位	Tested item 測試部件		RoHS' Limits 限用有害物質指令限值	
		1	2		
Lead [Pb] / 鉛	mg/kg	N.D.	N.D.	1000	
Cadmium [Cd] / 鎘	mg/kg	N.D.	N.D.	100	
Mercury [Hg] / 汞	mg/kg	N.D.	N.D.	1000	
Chromium (VI) [Cr(VI)] / 六價鉻	mg/kg	N.D.	—	1000	
Chromium (VI) [Cr(VI)] / 六價鉻	µg/cm <sup>2</sup>	—	N.D.	1000	
Polybrominated Biphenyls[PBBs] / 多溴聯苯					
Bromobiphenyls / 一溴聯苯	mg/kg	N.D.	N.D.		
Dibromobiphenyls / 二溴聯苯	mg/kg	N.D.	N.D.		
Tribromobiphenyls / 三溴聯苯	mg/kg	N.D.	N.D.		
Tetrabromobiphenyls / 四溴聯苯	mg/kg	N.D.	N.D.		
Pentabromobiphenyls / 五溴聯苯	mg/kg	N.D.	N.D.		
Hexabromobiphenyls / 六溴聯苯	mg/kg	N.D.	N.D.		
Heptabromobiphenyls / 七溴聯苯	mg/kg	N.D.	N.D.		
Octabromobiphenyls / 八溴聯苯	mg/kg	N.D.	N.D.		
Nonabromobiphenyls / 九溴聯苯	mg/kg	N.D.	N.D.		
Decabromobiphenyl / 十溴聯苯	mg/kg	N.D.	N.D.		
Sum of PBBs / 多溴聯苯總和	mg/kg	N.D.	N.D.		1000
Polybrominated Diphenyl Ethers[PBDEs] / 多溴聯苯醚					
Bromodiphenyl ethers / 一溴聯苯醚	mg/kg	N.D.	N.D.		
Dibromodiphenyl ethers / 二溴聯苯醚	mg/kg	N.D.	N.D.		
Tribromodiphenyl ethers / 三溴聯苯醚	mg/kg	N.D.	N.D.		
Tetrabromodiphenyl ethers / 四溴聯苯醚	mg/kg	N.D.	N.D.		
Pentabromodiphenyl ethers / 五溴聯苯醚	mg/kg	N.D.	N.D.		
Hexabromodiphenyl ethers / 六溴聯苯醚	mg/kg	N.D.	N.D.		
Heptabromodiphenyl ethers / 七溴聯苯醚	mg/kg	N.D.	N.D.		
Octabromodiphenyl ethers / 八溴聯苯醚	mg/kg	N.D.	N.D.		
Nonabromodiphenyl ethers / 九溴聯苯醚	mg/kg	N.D.	N.D.		
Decabromodiphenyl ether / 十溴聯苯醚	mg/kg	N.D.	N.D.		
Sum of PBDEs / 多溴聯苯醚總和	mg/kg	N.D.	N.D.		1000
Conclusion 結論	—	PASS 通過	PASS 通過		—



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### TEST RESULT 測試結果

#### Phthalates Test – Directive (EU)2015/863 Amendment of European Parliament and Council Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)

鄰苯二甲酸鹽測試- 指令 2011/65/EU 歐洲議會和理事會關於電子電氣設備中限制使用某些有害物質 (RoHS) 的修正案指令(EU)2015/863.

Test Parameter 測試項目	CAS No. CAS 編號	Unit 單位	Tested item 測試部件		Maximum Allowable Limit: 最大允許限值:
			1	2	
Dibutyl phthalate (DBP) 鄰苯二甲酸二丁酯	84-74-2	%	N.D.	N.D.	0.1
Butyl benzyl phthalate (BBP) 鄰苯二甲酸丁苄酯	85-68-7	%	N.D.	N.D.	0.1
Bis(2-ethylhexyl) phthalate (DEHP) 鄰苯二甲酸二異辛酯	117-81-7	%	N.D.	N.D.	0.1
Diisobutyl phthalate (DIBP) 鄰苯二甲酸二異丁酯	84-69-5	%	N.D.	N.D.	0.1
Conclusion 結論	—	—	PASS 通過	PASS 通過	—

#### Phthalates Test

鄰苯二甲酸鹽測試

Test Item 測試項目	CAS No. CAS 編號	Unit 單位	Tested item 測試部件
			1
Di-n-hexyl phthalate (DNHP) 鄰苯二甲酸二己酯 (DNHP)	84-75-3	%	N.D.
Di-n-octyl phthalate (DNOP) 鄰苯二甲酸二正辛酯 (DNOP)	117-84-0	%	N.D.
Di-isodecyl phthalate (DIDP) 鄰苯二甲酸二異癸酯 (DIDP)	26761-40-0	%	N.D.
Di-isononyl phthalate (DINP) 鄰苯二甲酸二異壬酯 (DINP)	28553-12-0	%	N.D.
Sum of Phthalates / 鄰苯二甲酸鹽總和	—	%	N.D.



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### TEST RESULT 測試結果

#### Halogen Content - Fluorine, Chlorine, Bromine and Iodine

#### 鹵素含量 - 氟、氯、溴和碘

Compounds 化合物	Unit 單位	Tested item 測試部件
		1
Halogenated Compounds / 鹵素:		
Fluorine [F] / 氟	mg/kg	N.D.
Chlorine [Cl] / 氯	mg/kg	N.D.
Bromine [Br] / 溴	mg/kg	N.D.
Iodine [I] / 碘	mg/kg	N.D.
Sum of Halogenated Compounds / 鹵素總和	mg/kg	N.D.

#### **Note 註解:**

N.D. = Not Detected (低於偵測極限) — = Empty (空白)

Negative = (陰性)

Positive = (陽性)

mg/kg = milligram per kilogram = ppm (毫克/公斤, 百萬分之一)

Detection Limit / 偵測極限:

Pb, Cd, Hg: 2 mg/kg

Cr(VI) (非金屬, Non-metal): 8 mg/kg

Cr(VI) (金屬, Metal): 0.1  $\mu\text{g}/\text{cm}^2$

Metal 金屬

Cr(VI): 0.1  $\mu\text{g}/\text{cm}^2$

#The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13  $\mu\text{g}/\text{cm}^2$ . The coating is considered to contain Cr(VI).

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 negative for Cr(VI) if the Cr(VI) concentration is less than 0.10  $\mu\text{g}/\text{cm}^2$ . The coating is considered a non-Cr(VI) based coating.

當六價鉻結果小於 0.10  $\mu\text{g}/\text{cm}^2$ , 表示樣品表層不含六價鉻。

#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.

當六價鉻結果介於 0.10  $\mu\text{g}/\text{cm}^2$  和 0.13  $\mu\text{g}/\text{cm}^2$  之間, 表示樣品表層不確定含有六價鉻 – 不可避免塗料的變化性可能影響結果判定。

PBBs & PBDEs: Each 5 mg/kg

Phthalates Content: Each 0.005%

F, I: 100 mg/kg

Cl, Br: 50 mg/kg



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Test Parameter 測試項目	Test Method 測試方法
Lead [Pb] / 鉛	With reference to IEC 62321-5: 2014. 參照 IEC 62321-5: 2014.
Cadmium [Cd] / 鎘	
Mercury [Hg] / 汞	With reference to IEC 62321-4: 2013+AMD 1:2017 CSV. 參照 IEC 62321-4: 2013+AMD 1:2017 CSV.
Chromium (VI) [Cr(VI)] / 六價鉻	Metal 金屬: With reference to IEC 62321-7-1:2015. <sup>[a]</sup> 參照 IEC 62321-7-1:2015. <sup>[a]</sup> Polymers & Electronics 聚合物及電子: With reference to IEC 62321-7-2:2017. 參照 IEC 62321-7-2:2017.
Polybrominated Biphenyls[PBBs] and Polybrominated Diphenyl Ethers [PBDEs] / 多溴聯苯和多溴聯苯醚:	With reference to IEC 62321-6: 2015. 參照 IEC 62321-6: 2015.
Phthalates Test 鄰苯二甲酸鹽測試	With reference to IEC 62321-8: 2017. 參照 IEC 62321-8: 2017.
Halogenated Compounds: F, Cl, Br, I / 鹵素: 氟, 氯, 溴, 碘:	With reference to EN14582:2016(E). 參照 EN14582:2016(E).

**Remark 備註:**

1. The result only relates to the tested item. The report shall not be reproduced except full without the written approval of the testing laboratory. Parameters which are not covered by the lab's testing scope are subcontracted to laboratories with government approval. The accreditation relates to competences given in the accreditation certificate.  
測試結果僅代表經測試部件。本報告未經測試實驗室認可不得複製。未在本實驗室測試範疇之測試均委外至經官方核可之實驗室。委外實驗室之能力經認證許可。
2. Samples test were conducted as per applicant's request.  
樣品測試進行為依照申請人的要求。

- End 結束 -



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**Photo of the Submitted Sample**  
委送样品照片



Sample





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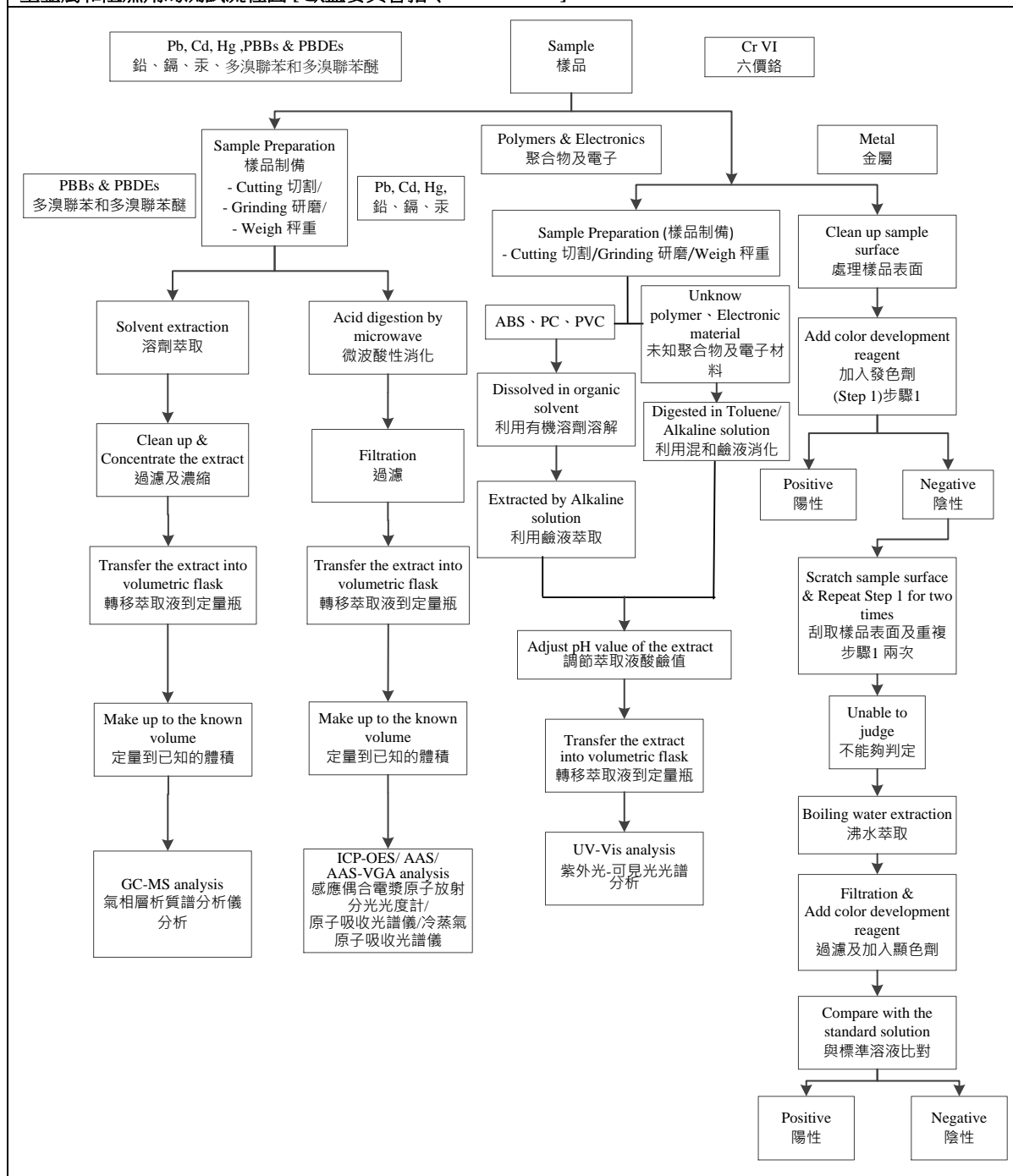
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## APPENDIX(附錄)

**Test Flowchart of Heavy Metals and Flame Retardants Content [ European Council Directive 2011/65/EU ]:  
重金屬和阻燃劑的測試流程圖 [ 歐盟委員會指令 2011/65/EU ]:**





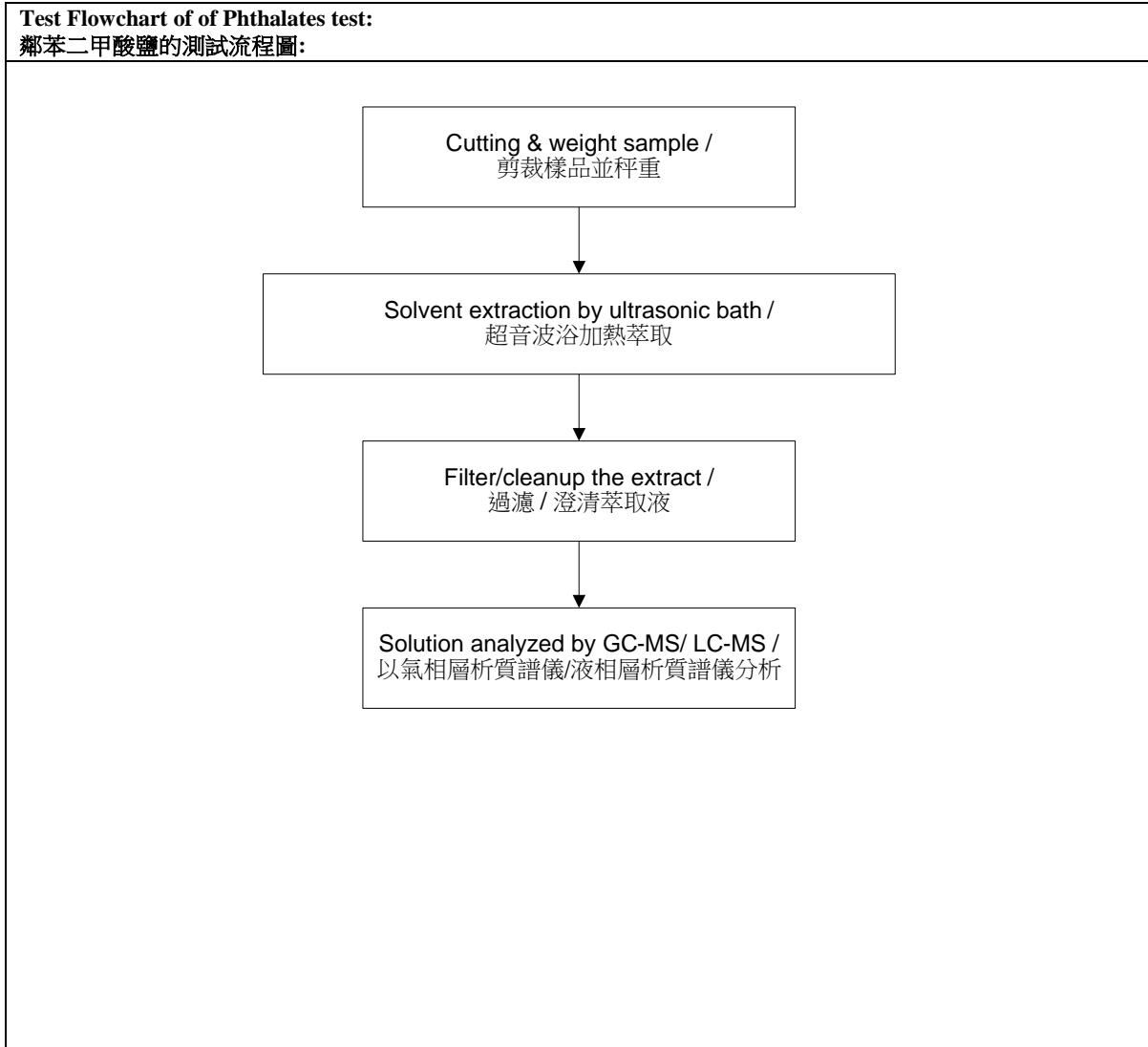


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## APPENDIX(附錄)

Test Flowchart of of Phthalates test:  
鄰苯二甲酸鹽的測試流程圖:





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## APPENDIX(附錄)

### Test Flowchart of Halogenated Compounds-F, Cl, Br, I:

鹵素: 氟, 氯, 溴, 碘的測試流程圖:

