

Material Declaration

Name of Component	Total Component Mass (mg)	Material Name	Component Mass (mg)	Material Analysis (Element)	CAS Number	Material Mass (mg)	Material Analysis (Weight %)
08-6600	9.060	substrate	8.656	Aluminium oxide	1344-28-1	8.310	96%
				SiO ₂	14808-60-7	0.260	3%
				Magnesium oxide	1309-48-4	0.087	1%
		top side and back side printing	0.169	Silver	7440-22-4	0.169	100%
				Epoxy resin	25068-38-6	0.028	40%
				Silicon dioxide	60676-86-0	0.021	30%
				Titanium dioxide	13463-67-7	0.004	5%
				Talc	14807-96-6	0.004	5%
				Dibasic acid ester	1119-40-0	0.014	20%
		marking printing	0.034	Epoxy resin	25068-38-6	0.019	55%
				Barium sulfate	7727-43-7	0.005	15%
				Titanium dioxide	13463-67-7	0.010	30%
		end side sputtering	0.024	Nickel	7440-02-0	0.013	55%
				Chromium	7440-47-3	0.011	45%
		Under plating	0.030	Nickel	7440-02-0	0.030	100%
		Surface plating	0.077	Tin	7440-31-5	0.077	100%

Hazard Substance

Substance	Material	Limit(ppm)	Concentration	Contained Location	Exemptions	Remark
Lead (Pb) and its compounds	Homogeneous Material	<1000	41.000	Surface plating		
Halogen-Chlorine (Cl)	Halogen-free	<900	560.000	marking printing		
Halogen- Bromine+Chlorine (Br+Cl)	Halogen-free	<1500	560.000			

Material Composition Declaration

創見料號 Transcen d P/N	組成部件或零 件 Parts or Components	材料名稱或型 號 Style / Item No.	原材製造商名 稱 Raw Material Manufacturer Name	鉛 Pb	鎘 Cd	汞 Hg	六價 鉻 Cr6+	多溴 聯苯 PBB	多溴 聯苯 醚 PBDE	鄰苯 二甲 酸二 (2-乙 基己 基)酯 DEHP	鄰苯 二甲 酸丁 酯 BBP	鄰苯 二甲 酸二 丁酯 DBP	鄰苯 二甲 酸二 異丁 酯 DIBP	氯 Cl	溴 Br	測試報告 編號 1 Test Report No. 1	測試報告 日期 1 Report Date No. 1	測試報告 編號 2 Test Report No. 2	測試報告 日期 2 Report Date No. 2	測試報告 編號 3 Test Report No. 3	測試報告 日期 3 Report Date No. 3	適用RoHS 排外條 款 RoHS Exemptio n Applied
08-6600	substrate	A1203	LEATEC FINE	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	-	-	TWNC01144 722S1	2023/03/0 3					
	top side and back side printing	TAG307-4	Daiken	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	-	-	ETR236045 43	2023/07/0 3					
	overcoat printing	OHMCOAT 1021	Namics	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	-	-	EKR244011 76	2024/04/2 4					
	marking printing	ZSR-150	Chung Yu	4. 86	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	-	-	ETR23A008 62M01	2023/10/1 3					
	end side sputtering	Ni-Cr alloy (Metal)	UMAT	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	-	-	ETR235042 19	2023/05/3 1					
	Under plating	Nickel	Glencore Nikkelverk AS	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	-	-	ETR232022 68M01	2023/02/1 0					
	Surface plating	Sn100S	Redsun	41	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	N. D	-	-	A22306299 27101002E R1	2023/12/1 1					

APPROVAL SHEET

RFECA Series – RoHS Compliance
MULTILAYER CERAMIC ANTENNA
Halogens Free Product
2.4 GHz ISM Band Working Frequency
P/N: RFECA3216060A1T

Customer : Transcend 創見
Approval No : 08-6600
Issue Date :

Customer Approval :

WALSIN Technology Corp.

Authorised By : _____

*Contents in this sheet are subject to change without prior notice.

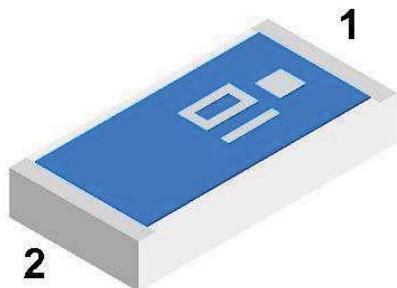
FEATURES

1. Surface Mounted Devices with a small dimension of $3.2 \times 1.6 \times 0.6 \text{ mm}^3$ meet future miniaturization trend.
2. LTCC process.
3. High stability in Temperature / Humidity Change.
4. Superb performance to place on the middle of PCB edge and excellent peak/ average gain observed by field test application.

APPLICATIONS

1. ISM Band 2.4GHz applications.
2. Bluetooth..

CONSTRUCTION



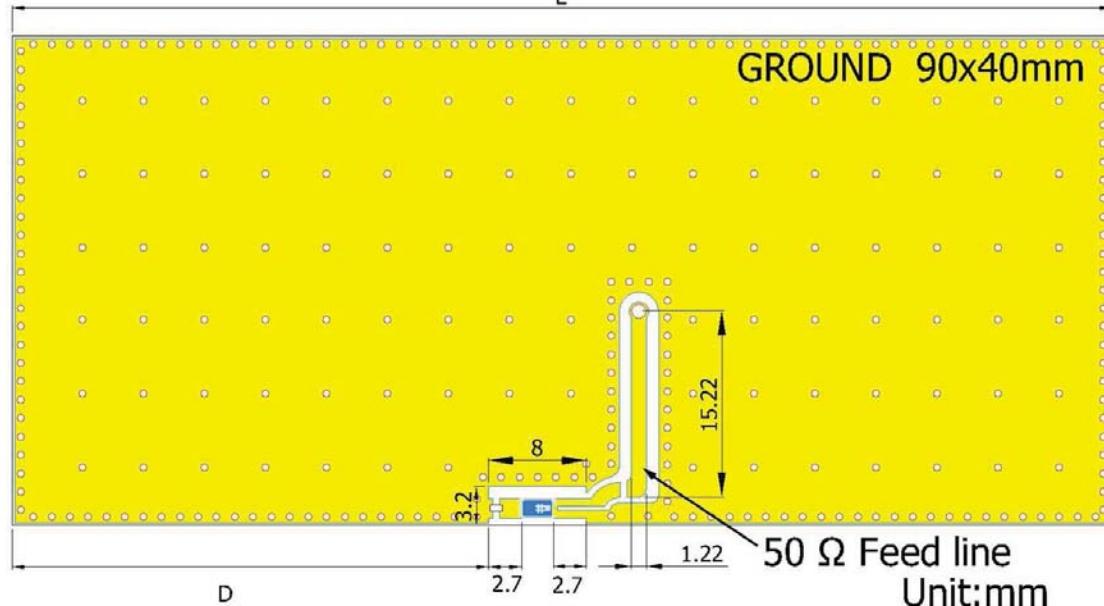
PIN	Connection
1	Feeding
2	Soldering terminal

DIMENSIONS

Figure	Symbol	Dimension (mm)
	L	3.10 ± 0.20
	W	1.60 ± 0.20
	T	0.60 ± 0.10
	A	0.25 ± 0.20

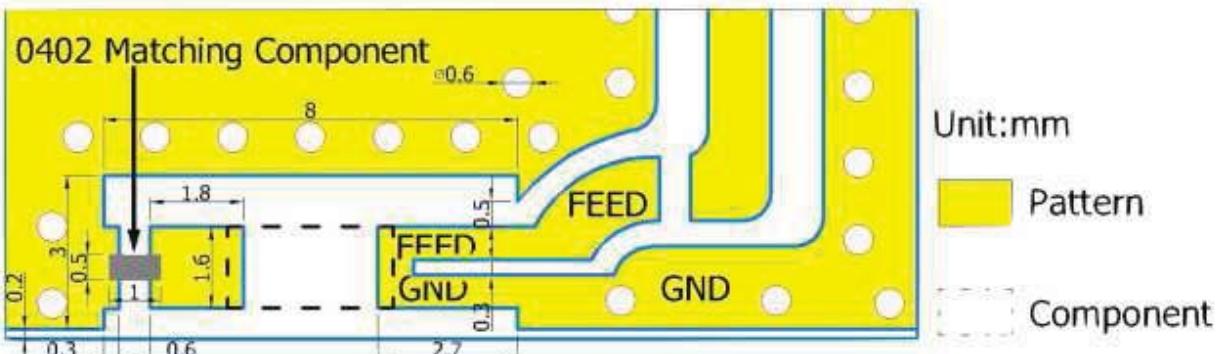
SOLDER LAND PATTERN DESIGN

Figure (Empty Space 8.0 mm x 3.0 mm)



The limited size for ECA3216 is **L>30mm and D>6mm**

Land Pattern

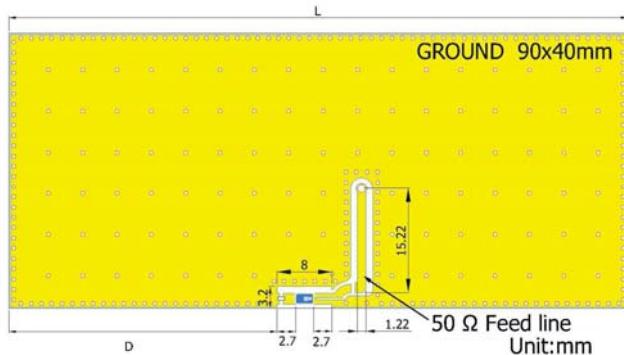


TYPE 1 ELECTRONIC CHARACTERISTICS

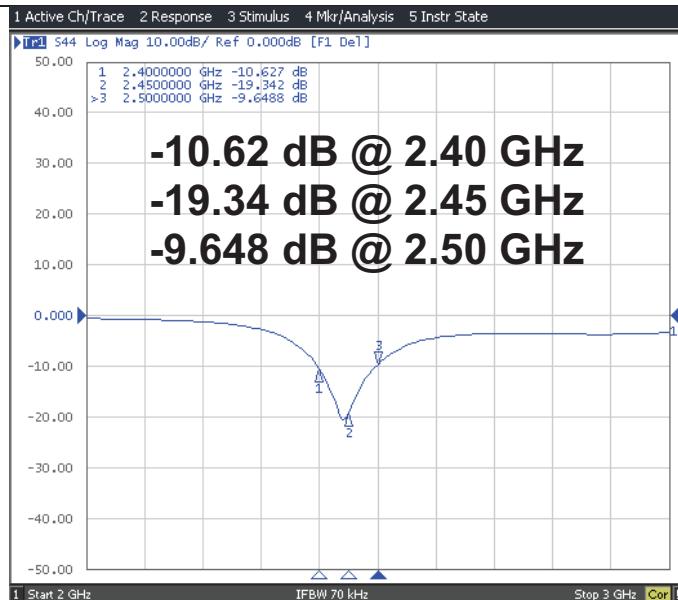
Item	Specification
Working Frequency Range	2.4GHz~2.4835GHz (Note-1)
Gain	2 dBi (Typical)
VSWR	2.1 max.
Polarization	Linear
Azimuth Beamwidth	Omni-directional
Impedance	50Ω

*Note 1. Central Frequency should be defined after customers' application approval.

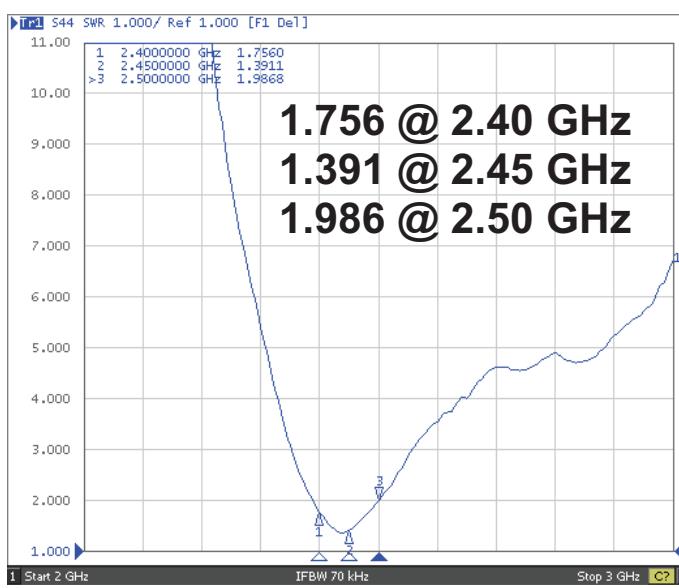
Antenna on Test Board (Thickness 0.8mm)



Antenna S11 on Test Board

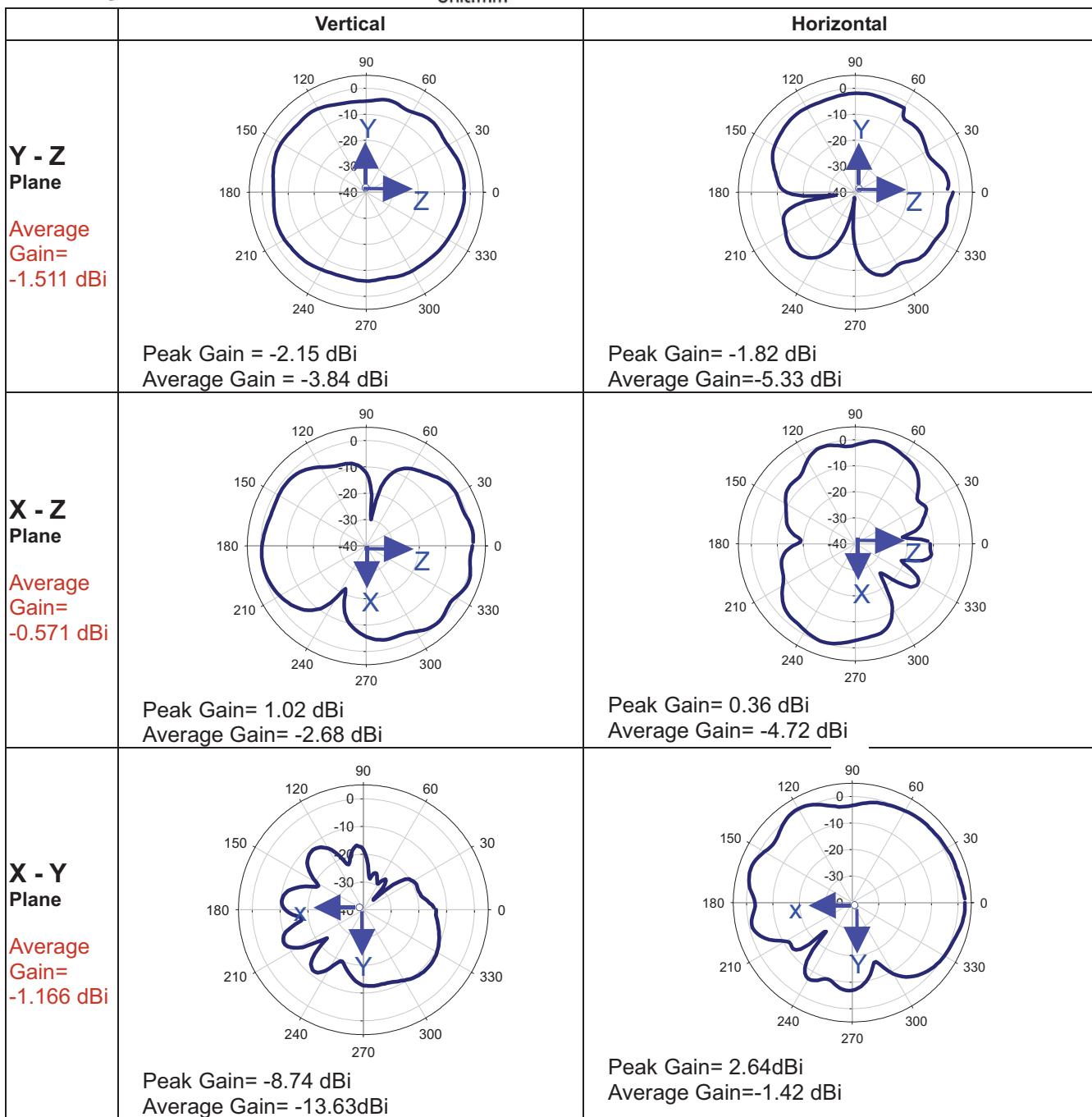
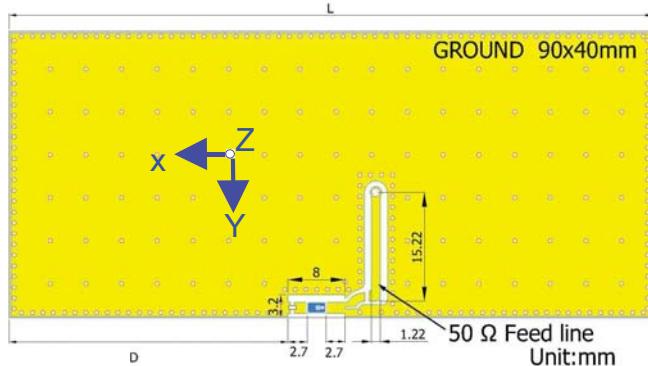


Antenna VSWR on Test Board



RADIATION PATTERN

Radiation Pattern and Gain were dependent on measurement board design. The specification of RFECA3216060A1T antenna was measured based on the PCB size and installation position as shown in the below figure Test Board.



RELIABILITY TEST

Test item	Test condition / Test method	Specification
Solderability JIS C 0050-4.6 JESD22-B102D	*Solder bath temperature : 235 ± 5°C *Immersion time : 2 ± 0.5 sec Solder : Sn3Ag0.5Cu for lead-free	At least 95% of a surface of each terminal electrode must be covered by fresh solder.
Leaching (Resistance to dissolution of metallization) IEC 60068-2-58	*Solder bath temperature : 260 ± 5°C *Leaching immersion time : 30 ± 0.5 sec Solder : SN63A	Loss of metallization on the edges of each electrode shall not exceed 25%.
Resistance to soldering heat JIS C 0050-5.4	*Preheating temperature : 120~150°C, 1 minute. *Solder temperature : 270±5°C *Immersion time : 10±1 sec Solder : Sn3Ag0.5Cu for lead-free Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -40 ~ 85°C. Loss of metallization on the edges of each electrode shall not exceed 25%.
Drop Test JIS C 0044 Customer's specification.	*Height : 75 cm *Test Surface : Rigid surface of concrete or steel. *Times : 6 surfaces for each units ; 2 times for each side.	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -40 ~ 85°C.
Vibration JIS C 0040	*Frequency : 10Hz~55Hz~10Hz(1min) *Total amplitude : 1.5mm *Test times : 6hrs.(Two hrs each in three mutually perpendicular directions)	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -40 ~ 85°C.
Adhesive Strength of Termination JIS C 0051- 7.4.3	*Pressurizing force : 5N(≤0603) ; 10N(>0603) *Test time : 10±1 sec	No remarkable damage or removal of the termination.

Bending test JIS C 0051- 7.4.1	The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm/s per second until the deflection becomes 1mm/s and then pressure shall be maintained for 5±1 sec. Measurement to be made after keeping at room temperature for 24±2 hours	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -40 ~ 85°C.
Temperature cycle JIS C 0025	1. 30±3 minutes at -40°C±3°C, 2. 10~15 minutes at room temperature, 3. 30±3 minutes at +85°C±3°C, 4. 10~15 minutes at room temperature, Total 100 continuous cycles Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -40 ~ 85°C.
High temperature JIS C 0021	*Temperature : 85°C±2°C *Test duration : 1000+24/-0 hours Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -40 ~ 85°C.
Humidity (steady conditions) JIS C 0022	*Humidity : 90% to 95% R.H. *Temperature : 40±2°C *Time : 1000+24/-0 hrs. Measurement to be made after keeping at room temperature for 24±2 hrs ※ 500hrs measuring the first data then 1000hrs data	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -40 ~ 85°C.
Low temperature JIS C 0020	*Temperature : -40°C±2°C *Test duration : 1000+24/-0 hours Measurement to be made after keeping at room temperature for 24±2 hrs	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within -40 ~ 85°C.

SOLDERING CONDITION

Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 2

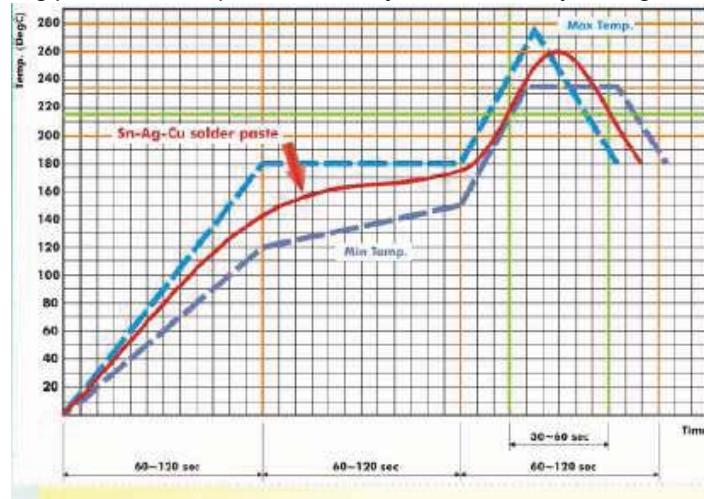


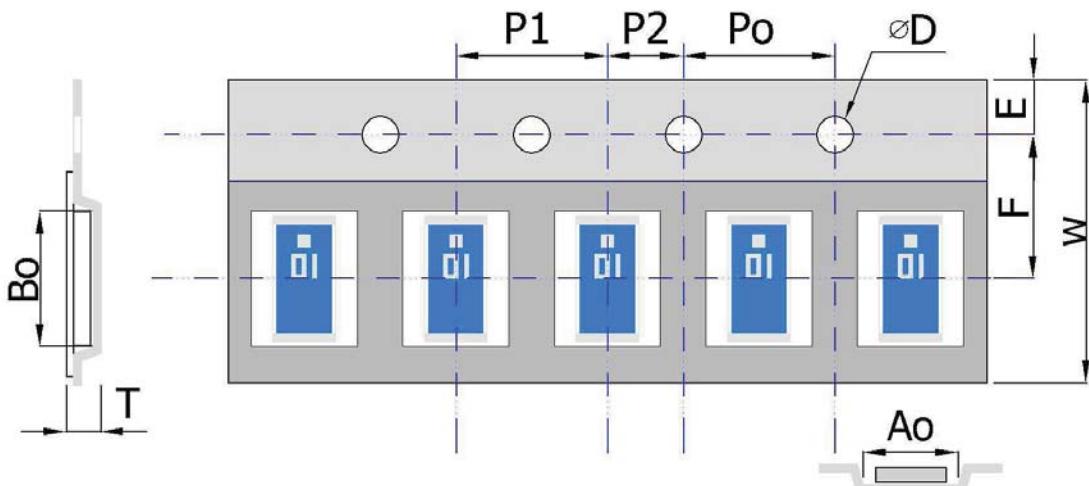
Fig 2. Infrared soldering profile

ORDERING CODE

RF	ECA	321606	0	A	1	T
Walsin RF device	Product code ANT : Antenna	Dimension code Per 2 digits of Length, Width, Thickness : e.g. : 321606 = Length 32, Width 16, Thickness 06	Unit of dimension 0 : 0.1 mm 1 : 1.0 mm	Application A : 2.4GHz ISM Band	Specification Design Code	Packing T : Reeled

Minimum Ordering Quantity: 2000 pcs per reel.

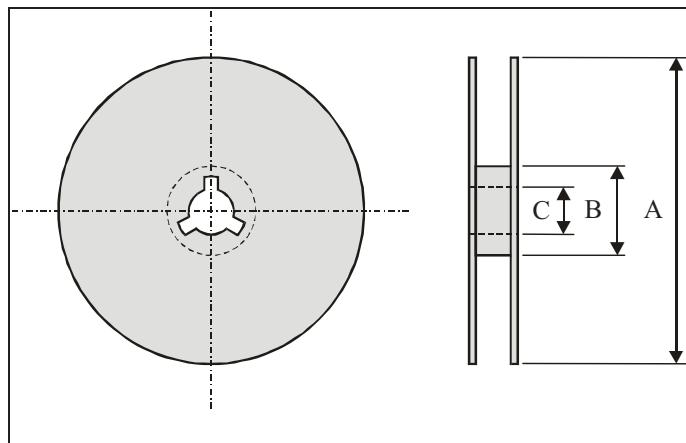
PACKAGING



Plastic Tape specifications (unit :mm)

Index	Ao	Bo	ΦD	T	W
Dimension (mm)	1.85 ± 0.10	3.45 ± 0.10	1.55 ± 0.05	0.75 ± 0.10	8.00 ± 0.30
Index	E	F	Po	P1	P2
Dimension (mm)	1.75 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.10

Reel dimensions



Index	A	B	C
Dimension (mm)	Φ178.0	Φ60.0	Φ13.0

Taping Quantity:2000 pieces per 7" reel

CAUTION OF HANDLING

Limitation of Applications

Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects, which might directly cause damage to the third party's life, body or property.

- (1) Aircraft equipment
- (2) Aerospace equipment
- (3) Undersea equipment
- (4) Medical equipment
- (5) Disaster prevention / crime prevention equipment
- (6) Traffic signal equipment
- (7) Transportation equipment (vehicles, trains, ships, etc.)
- (8) Applications of similar complexity and /or reliability requirements to the applications listed in the above.

Storage condition

- (1) Products should be used in 6 months from the day of WALSIN outgoing inspection, which can be confirmed.
- (2) Storage environment condition.
 - Products should be storage in the warehouse on the following conditions.
 - Temperature : -10 to +40°C
 - Humidity : 30 to 70% relative humidity
 - Don't keep products in corrosive gases such as sulfur. Chlorine gas or acid or it may cause oxidization of electrode, resulting in poor solderability.
 - Products should be storage on the palette for the prevention of the influence from humidity, dust and son on.
 - Products should be storage in the warehouse without heat shock, vibration, direct sunlight and so on.
 - Products should be storage under the airtight packaged condition.

測試報告 Test Report

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九豪精密陶瓷股份有限公司

LEATEC FINE CERAMICS CO., LTD.

桃園縣平鎮市平東路一段160號

NO. 160, SEC. 1, PING-TUNG RD., PING-JEN, TAO-YUAN, TAIWAN, R. O. C.



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

送樣廠商(Sample Submitted By) : 九豪精密陶瓷股份有限公司 (LEATEC FINE CERAMICS CO., LTD.)
樣品名稱(Sample Description) : Al2O3 SUBSTRATE (氧化鋁陶瓷基板)
樣品型號(Style/Item No.) : HE系列, HR系列, MCS系列, CR7910, CR5520, CR3080, CR1598, CR0874, CR2166, CR1102, CR0660, CR0360, CR0348, CR0198, CR0180, CR0126, CRM506, CRM312, CRM270, CRM264, CRM180, CA504A, CA429B, CA1276
收件日期(Sample Receiving Date) : 2013/04/12
測試期間(Testing Period) : 2013/04/12 TO 2013/04/19

測試需求(Test Requested) : (1) 依據客戶要求, 參考RoHS 2011/65/EU Annex II 指令進行鎘, 鉛, 汞, 六價鉻, 多溴聯苯, 多溴聯苯醚測試. (As specified by client, with reference to RoHS Directive 2011/65/EU Annex II to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs contents in the submitted sample.)
(2) 依據客戶指定, 進行鹵素-氟、氯、溴、碘測試. (As specified by client, to test Halogen-Fluorine, Chlorine, Bromine, Iodine contents in the submitted sample.)

測試方法(Test Method) : 請見下一页 (Please refer to next pages).

測試結果(Test Results) : 請見下一页 (Please refer to next pages).

結論(Conclusion) : 根據客戶所提供的樣品, 其鎘, 鉛, 汞, 六價鉻, 多溴聯苯, 多溴聯苯醚的測試結果符合RoHS指令2002/95/EC的更新指令2011/65/EU之要求 (Based on the performed tests on submitted samples, the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs comply with the limits as set by RoHS Directive 2011/65/EU Annex II; recasting 2002/95/EC.)



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九豪精密陶瓷股份有限公司

LEATEC FINE CERAMICS CO., LTD.

桃園縣平鎮市平東路一段160號

NO. 160, SEC. 1, PING-TUNG RD., PING-JEN, TAO-YUAN, TAIWAN, R. O. C.



測試結果(Test Results)

測試部位(PART NAME) No.1 : 白色陶瓷基板 (WHITE CERAMIC SUBSTRATE)

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)	法規 限值 (Limit)
				No.1	
鎘 / Cadmium (Cd)	mg/kg	參考IEC 62321: 2008方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	100
鉛 / Lead (Pb)	mg/kg	參考IEC 62321: 2008方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	1000
汞 / Mercury (Hg)	mg/kg	參考IEC 62321: 2008方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 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
鹵素 / Halogen					
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)			50	n.d.	-
鹵素 (溴) / Halogen-Bromine (Br) (CAS No.: 10097-32-2)			50	n.d.	-
鹵素 (碘) / Halogen-Iodine (I) (CAS No.: 14362-44-8)			50	n.d.	-

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NO. 160, SEC. 1, PING-TUNG RD., PING-JEN, TAO-YUAN, 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)	法規 限值 (Limit)
			No. 1	No. 1	
多溴聯苯總和 / Sum of PBBs			-	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.	-
多溴聯苯醚總和 / Sum of PBDEs			-	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.	-

參考IEC 62321: 2008方法，以氣相層析/質譜儀檢測。/ With reference to IEC 62321: 2008 and performed by GC/MS.

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)

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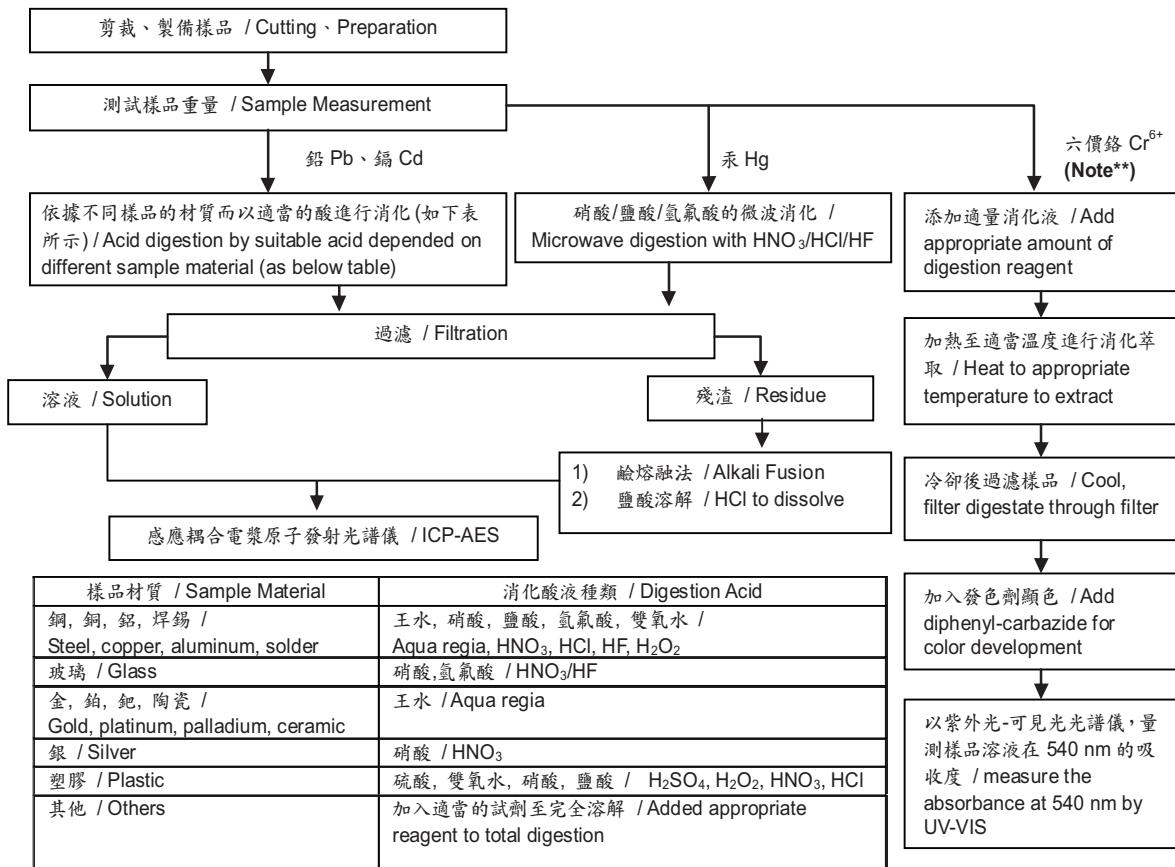
九豪精密陶瓷股份有限公司

LEATEC FINE CERAMICS CO., LTD.

桃園縣平鎮市平東路一段160號

NO. 160, SEC. 1, PING-TUNG RD., PING-JEN, TAO-YUAN, 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：楊登偉 / Name of the person who made measurement: Climbgreat Yang
- 3) 測試負責人：張啓興 / Name of the person in charge of measurement: Troy 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.

測試報告 Test Report

號碼(No.) : CE/2013/42603 日期(Date) : 2013/04/19 頁數(Page) : 5 of 7



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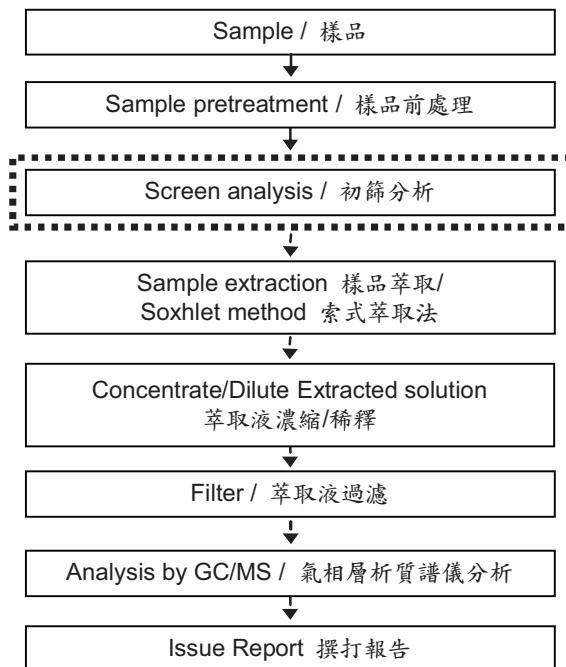
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NO. 160, SEC. 1, PING-TUNG RD., PING-JEN, TAO-YUAN, TAIWAN, R. O. C.

多溴聯苯/多溴聯苯醚分析流程圖 / PBB/PBDE analytical FLOW CHART

- 測試人員 : 翁賜彬 / Name of the person who made measurement: Roman Wong
 - 測試負責人 : 張啓興 / Name of the person in charge of measurement: 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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號碼(No.) : CE/2013/42603 日期(Date) : 2013/04/19 頁數(Page) : 6 of 7



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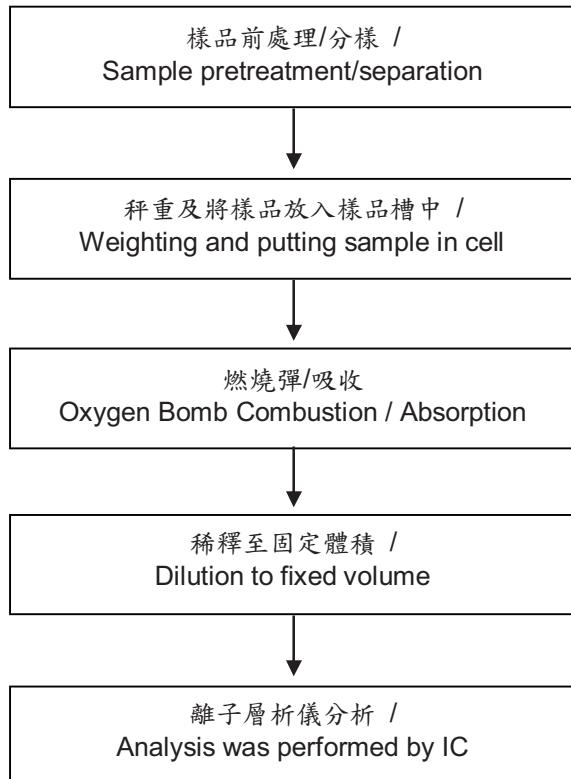
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鹵素分析流程圖 / Analytical flow chart of halogen content

- 測試人員：陳恩臻 / Name of the person who made measurement: Rita Chen
- 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang



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測試報告 Test Report

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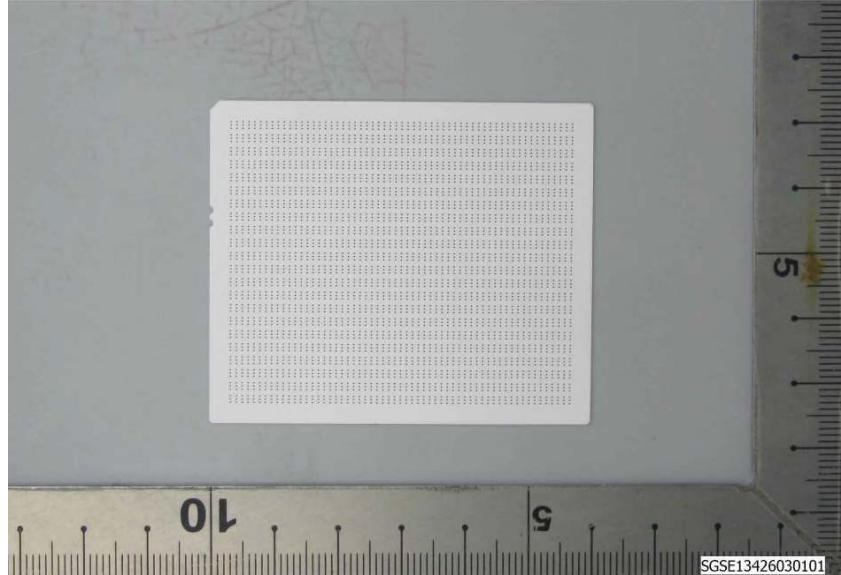
桃園縣平鎮市平東路一段160號

NO. 160, SEC. 1, PING-TUNG RD., PING-JEN, TAO-YUAN, TAIWAN, R. O. C.

* 照片中如有箭頭標示，則表示為實際檢測之樣品/部位。*

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CE/2013/42603



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測試報告 Test Report

號碼(No.) : CE/2012/71423

日期(Date) : 2012/07/13

頁數(Page): 1 of 4

邦杰材料科技股份有限公司

ULTIMATE MATERIALS TECHNOLOGY CO., LTD.

新竹縣竹北市中正西路848之1號

NO. 848-1, ZHONGZHENG W. RD., ZHUBEI CITY, HSINCHU COUNTY 30253



以下測試樣品係由客戶送樣，且由客戶聲稱並經客戶確認如下 (The following samples was/were submitted and identified by/on behalf of the client as) :

樣品名稱(Sample Description) : Ni/Cr METAL

收件日期(Sample Receiving Date) : 2012/07/06

測試期間(Testing Period) : 2012/07/06 TO 2012/07/13

=====

測試需求(Test Requested) : 依據客戶要求，參考RoHS 2011/65/EU Annex II 指令進行鎘，鉛，汞，六價鉻測試。
(As specified by client, with reference to RoHS Directive 2011/65/EU Annex II to determine Cadmium, Lead, Mercury, Cr(VI) contents in the submitted sample.)

測試方法(Test Method) : 參考IEC 62321: 2008方法 / With reference to IEC 62321: 2008.

測試結果(Test Results) : 請見下一页 (Please refer to next pages).



Unless otherwise stated the results shown in this test report refer only to the sample(s) tested. This test report cannot be reproduced, except in full, without prior written permission of the Company.除非另有說明，此報告結果僅對測試之樣品負責。本報告未經本公司書面許可，不可部分複製。
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號碼(No.) : CE/2012/71423

日期(Date) : 2012/07/13

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ULTIMATE MATERIALS TECHNOLOGY CO., LTD.

新竹縣竹北市中正西路848之1號

NO. 848-1, ZHONGZHENG W. RD., ZHUBEI CITY, HSINCHU COUNTY 30253



測試結果(Test Results)

測試部位(PART NAME)No.1 : 銀色金屬 (SILVER COLORED METAL)

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
鎘 / Cadmium (Cd)	mg/kg	參考IEC 62321: 2008方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
鉛 / Lead (Pb)	mg/kg		2	n.d.
汞 / Mercury (Hg)	mg/kg		2	n.d.
六價鉻 / Hexavalent Chromium Cr(VI)	**	參考IEC 62321: 2008方法, 以沸水萃取法檢測. / With reference to IEC 62321: 2008 and performed by Boiling water extraction Method.#	#	Negative

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. **= Qualitative analysis (No Unit) 定性分析(無單位)

5. # = a. Positive means the presence of CrVI on the tested areas
(Positive表示測試區域偵測到六價鉻)

b. Negative means the absence of CrVI on the tested areas
(Negative表示測試區域未偵測到六價鉻)

The detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² tested areas. / 該溶液濃度 \geq 0.02 mg/kg with 50 cm² (tested areas)

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測試報告

Test Report

號碼(No.) : CE/2012/71423

日期(Date) : 2012/07/13

頁數(Page): 3 of 4

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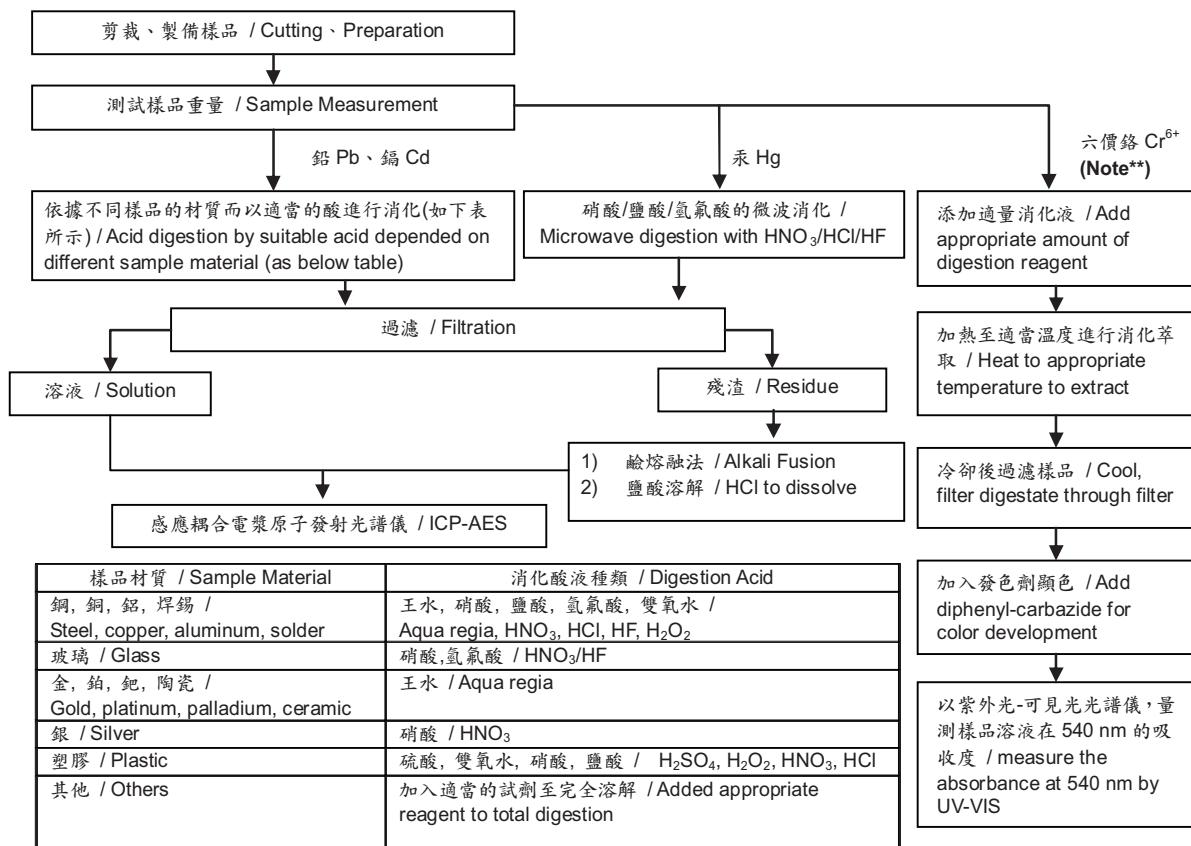
ULTIMATE MATERIALS TECHNOLOGY CO., LTD.

新竹縣竹北市中正西路848之1號

NO. 848-1, ZHONGZHEN W. RD., ZHUBEI CITY, HSINCHU COUNTY 30253



- 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：楊登偉 / Name of the person who made measurement: Climbgreat Yang
- 3) 測試負責人：張啓興 / Name of the person in charge of measurement: Troy 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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測試報告 Test Report

號碼(No.) : CE/2012/71423

日期(Date) : 2012/07/13

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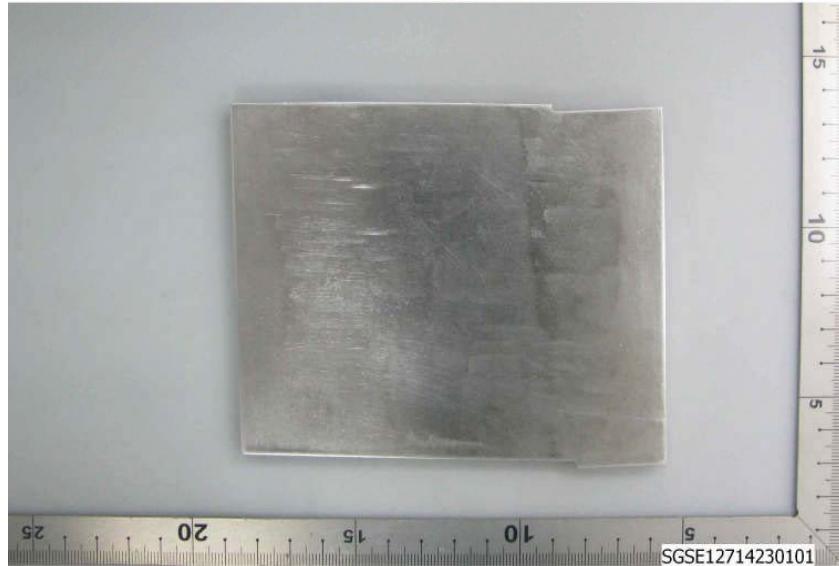
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* 照片中如有箭頭標示，則表示為實際檢測之樣品/部位。*

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

CE/2012/71423

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Vale Canada Limited

200 Bay Street, Royal Bank Plaza, Suite 1600, South Tower, P.O. Box 70, Toronto, Ontario, M5J 2K2, Canada

**The following sample(s) was/were submitted and identified by/on behalf of the client as:**

Sample Description : VALE Electrolytic Nickel S Rounds
Sample Receiving Date : 2013/01/02
Testing Period : 2013/01/02 TO 2013/01/09

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

Conclusion : Based on the performed tests on submitted samples, the test results of Cadmium, Lead, Mercury, Hexavalent Chromium Cr(VI), PBBs and PBDEs comply with the limits as set by RoHS Directive 2011/65/EU Annex II; recasting 2002/95/EC.



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Test Report

No. : CE/2013/10450 Date : 2013/01/09 Page : 2 of 13

Vale Canada Limited

200 Bay Street, Royal Bank Plaza, Suite 1600, South Tower, P.O. Box 70, Toronto, Ontario, M5J 2K2, Canada



Test Result(s)

PART NAME No.1 : SILVER COLORED METAL

Test Item(s)	Unit	Method	MDL	Result	Limit
				No.1	
Cadmium (Cd)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	1000
Hexavalent Chromium Cr(VI)	**	With reference to IEC 62321: 2008 and performed by Boiling water extraction (UV-VIS) Method.#	#	Negative	#
Antimony (Sb)	mg/kg	With reference to US EPA Method 3050B. Analysis was performed by ICP-AES.	2	n.d.	-
Hexabromocyclododecane (HBCDD) (CAS No.: 25637-99-4)	mg/kg	With reference to US EPA 3540C method. Analysis was performed by GC/MS.	5	n.d.	-
BBP (Benzyl butyl phthalate) (CAS No.: 85-68-7)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.	-
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.	-
DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.01	n.d.	-
DINP (Di-isonyl phthalate) (CAS No.: 28553-12-0)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.01	n.d.	-
DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.	-
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	%	With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.	-
Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.	-

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Test Report

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Vale Canada Limited

200 Bay Street, Royal Bank Plaza, Suite 1600, South Tower, P.O. Box 70, Toronto, Ontario, M5J 2K2, Canada



Test Item(s)	Unit	Method	MDL	Result	Limit
				No.1	
PFOA (CAS No.: 335-67-1)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.	-
PVC	**	Analysis was performed by FTIR and FLAME Test.	-	Negative	-
Sum of PBBs			-	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.	-
Halogen					
Halogen-Fluorine (F) (CAS No.: 14762-94-8)			50	n.d.	-
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)			50	n.d.	-
Halogen-Bromine (Br) (CAS No.: 10097-32-2)			50	n.d.	-
Halogen-Iodine (I) (CAS No.: 14362-44-8)			50	n.d.	-

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**Note :**

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. " - " = Not Regulated
5. ** = Qualitative analysis (No Unit)
6. Negative = Undetectable / Positive = Detectable
7. # =
 - a. Positive means the presence of CrVI on the tested areas
 - b. Negative means the absence of CrVI on the tested areas

The detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² tested areas.

PFOS Reference Information : POPs - (EU) 757/2010

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 μ g/m².

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Test Report

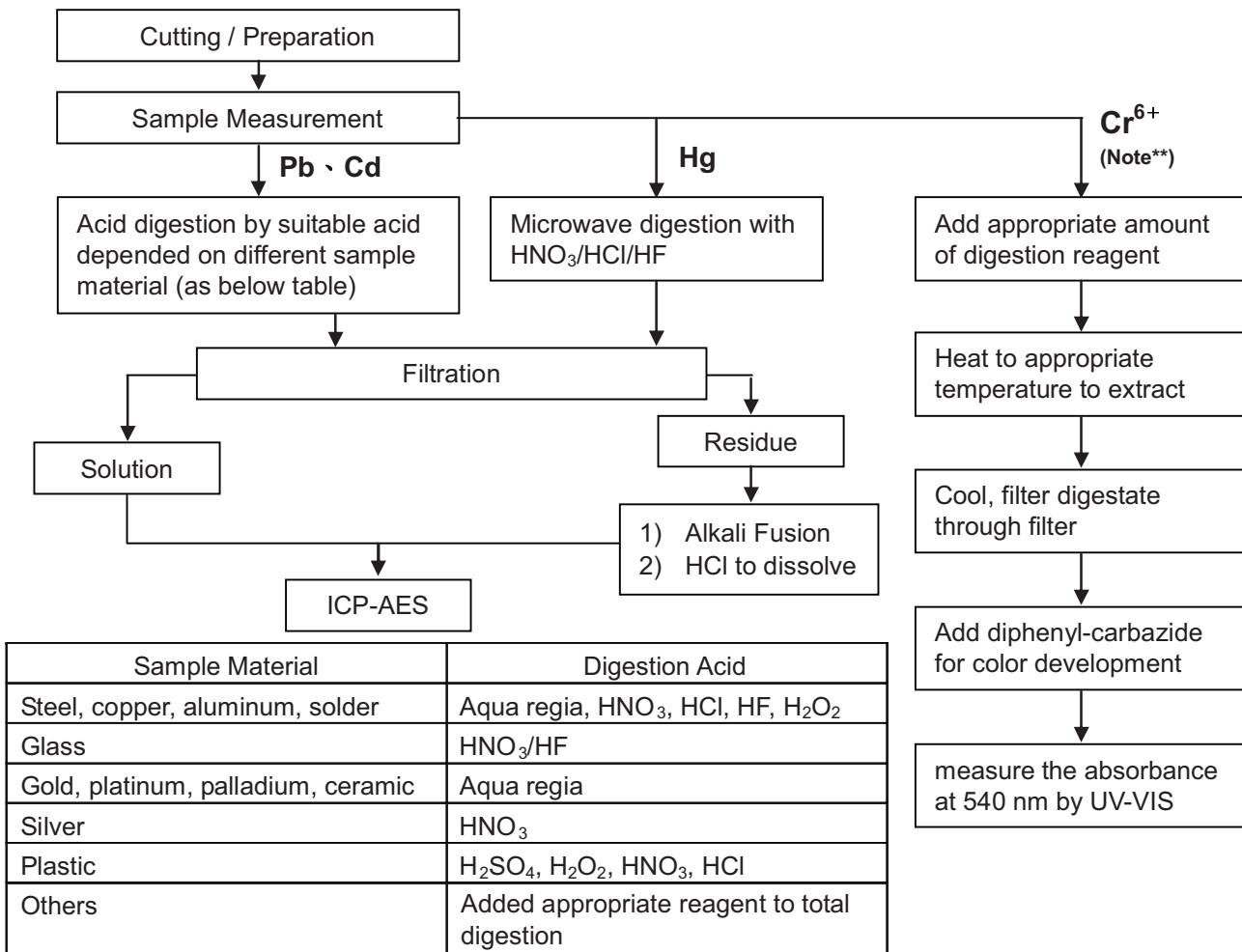
No. : CE/2013/10450 Date : 2013/01/09 Page : 5 of 13

Vale Canada Limited

200 Bay Street, Royal Bank Plaza, Suite 1600, South Tower, P.O. Box 70, Toronto, Ontario, M5J 2K2, Canada



- 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



Note :** (1) For non-metallic material, add alkaline digestion reagent and heat to 90~95°C.
(2) For metallic material, add pure water and heat to boiling.

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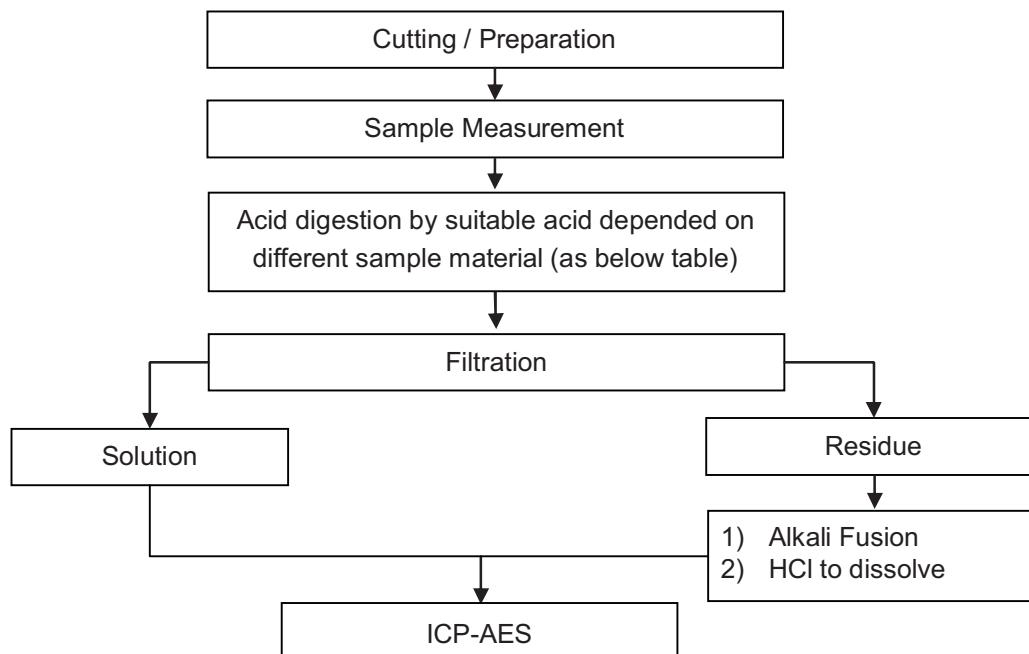
No. : CE/2013/10450 Date : 2013/01/09 Page : 6 of 13

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

Flow Chart of digestion for the elements analysis performed by ICP-AES



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	Added appropriate reagent to total digestion

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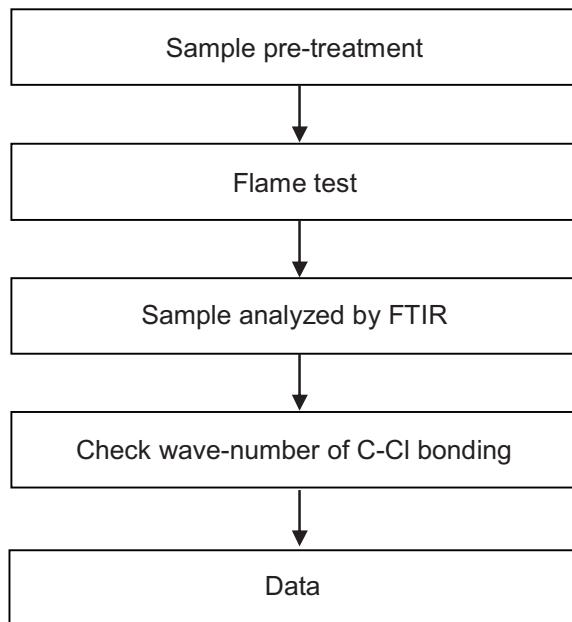
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Analysis flow chart for determination of PVC in material

- Name of the person who made measurement: Ginny Chen
- Name of the person in charge of measurement: Troy Chang



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Test Report

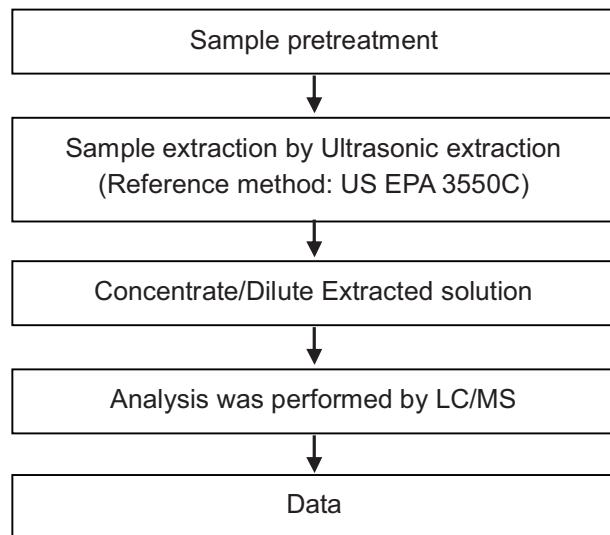
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PFOA/PFOS analytical flow chart of Ultrasonic extraction (LC/MS) procedure

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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Test Report

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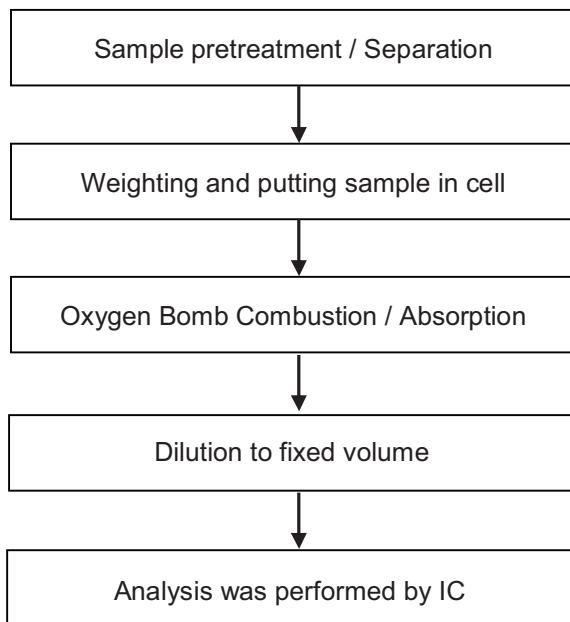
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Analytical flow chart of halogen content

- 1) Name of the person who made measurement: Rita Chen
- 2) Name of the person in charge of measurement: Troy Chang



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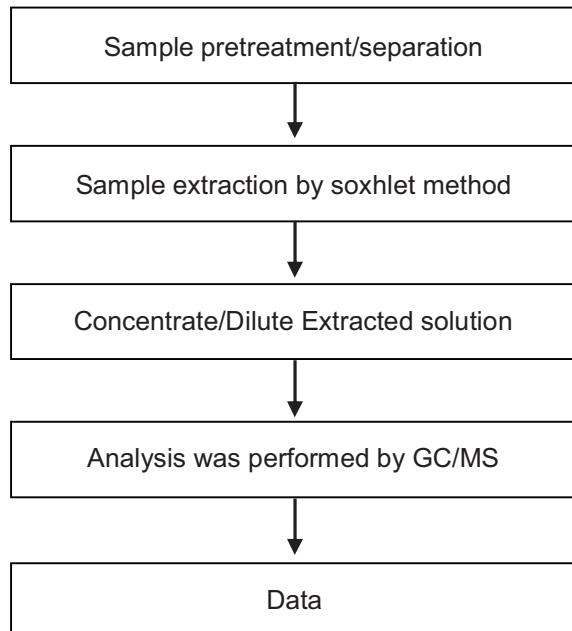
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Analytical flow chart of phthalate content

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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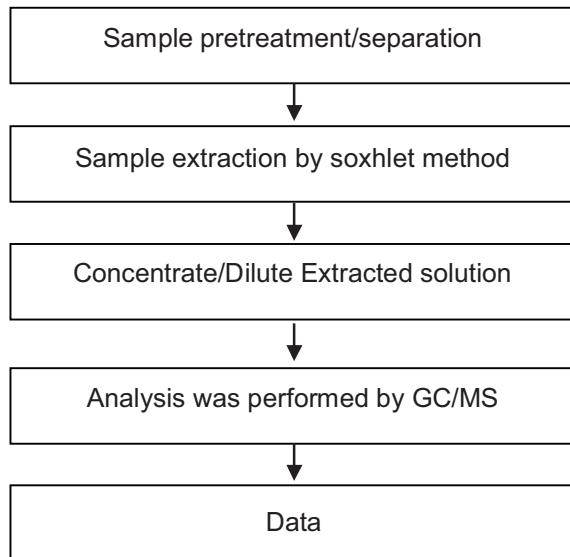
Vale Canada Limited

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HBCDD analytical flow chart

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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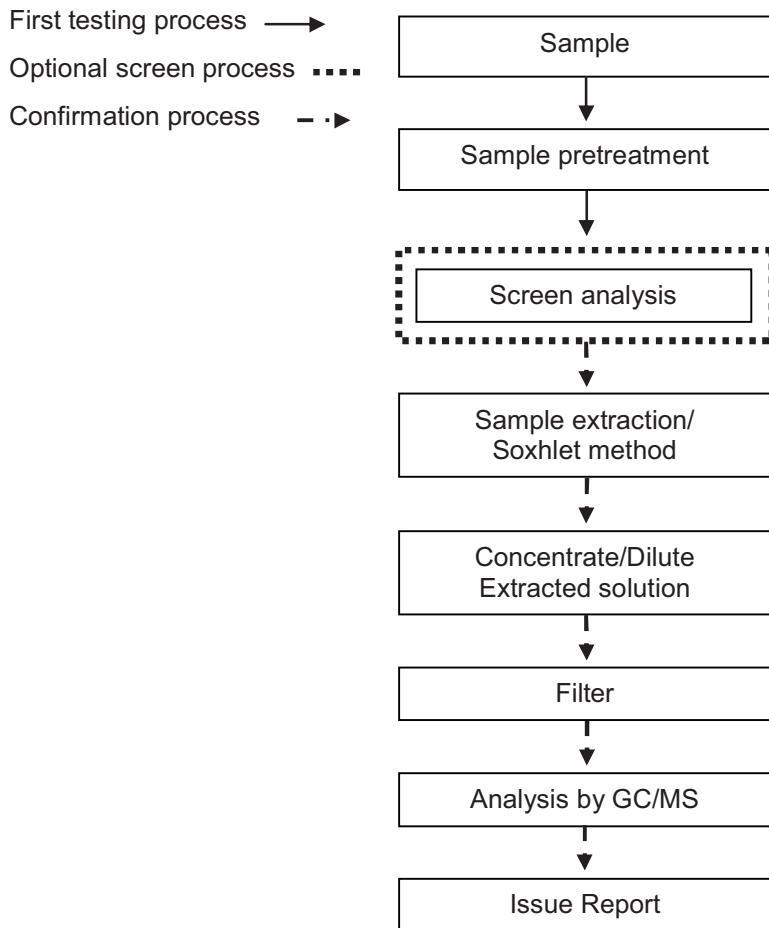
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PBB/PBDE analytical FLOW CHART

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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Test Report

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

CE/2013/10450



** End of Report **

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Test Report

No. : CE/2012/B5382

Date : 2012/12/04

Page: 1 of 6

NAMICS CORPORATION
3993 NIGORIKAWA, KITA-KU, NIIGATA-CITY 950-3131, JAPAN



The following sample(s) was/were submitted and identified by/on behalf of the client as:

Sample Description : OHMCOAT 1021
Sample Receiving Date : 2012/11/28
Testing Period : 2012/11/28 TO 2012/12/04

- Test Requested** : As specified by client, with reference to RoHS Directive 2011/65/EU Annex II to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs contents in the submitted sample.
- Test Method** : With reference to IEC 62321: 2008.
- Test Result(s)** : Please refer to next page(s).



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Test Report

No. : CE/2012/B5382

Date : 2012/12/04

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NAMICS CORPORATION
3993 NIGORIKAWA, KITA-KU, NIIGATA-CITY 950-3131, JAPAN



Test Result(s)

PART NAME No.1 : BLUE PASTE

Test Item(s)	Unit	Method	MDL	Result
				No.1
Cadmium (Cd)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Lead (Pb)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Mercury (Hg)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321: 2008 and performed by UV-VIS.	2	n.d.
Sum of PBBS			-	n.d.
Monobromobiphenyl	mg/kg	With reference to IEC 62321: 2008 and performed by GC/MS.	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.
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 Report

No. : CE/2012/B5382

Date : 2012/12/04

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NAMICS CORPORATION
3993 NIGORIKAWA, KITA-KU, NIIGATA-CITY 950-3131, JAPAN

**Note :**

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. " - " = Not Regulated

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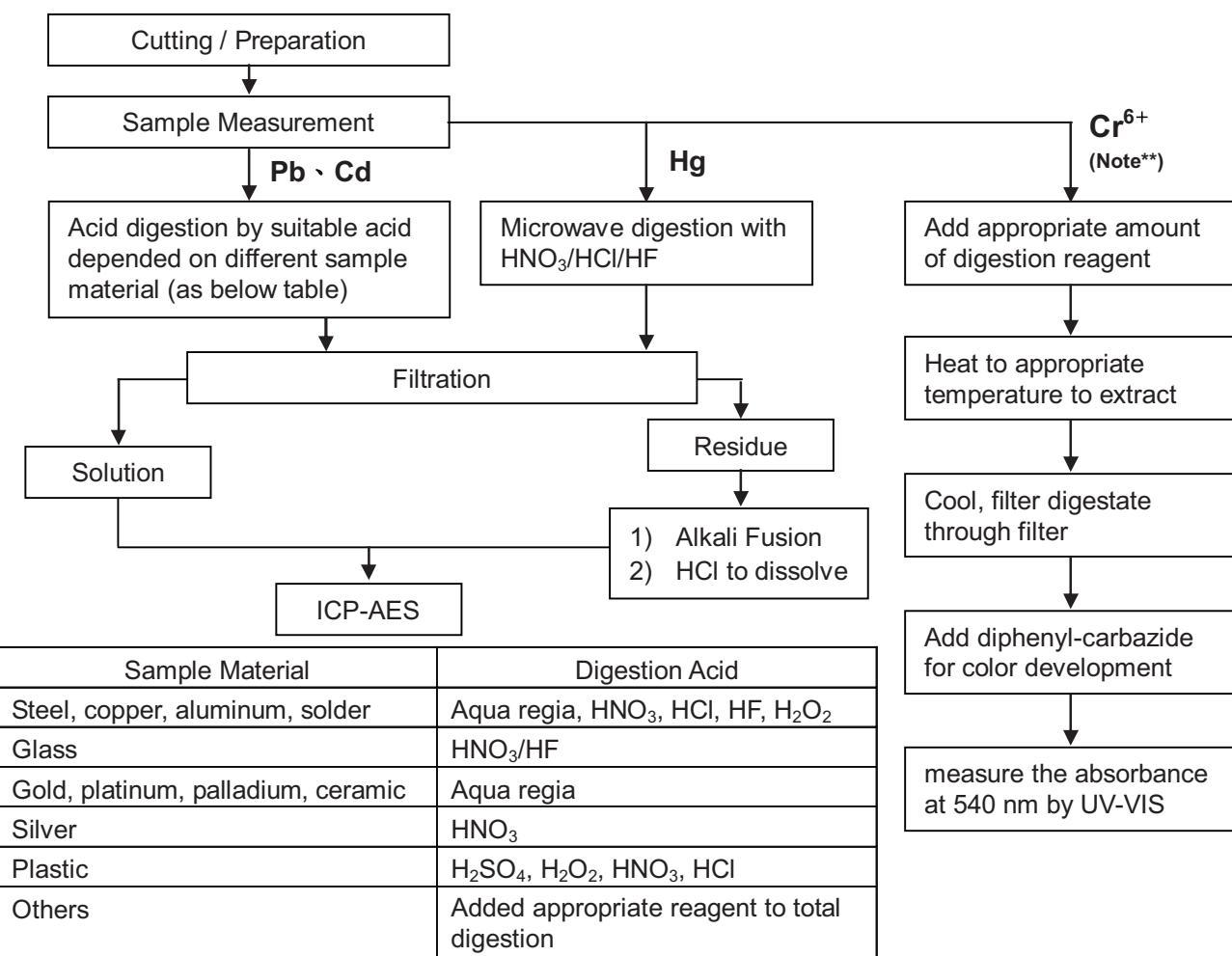
Date : 2012/12/04

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NAMICS CORPORATION
3993 NIGORIKAWA, KITA-KU, NIIGATA-CITY 950-3131, JAPAN



- 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



Note :** (1) For non-metallic material, add alkaline digestion reagent and heat to 90~95°C.
(2) For metallic material, add pure water and heat to boiling.

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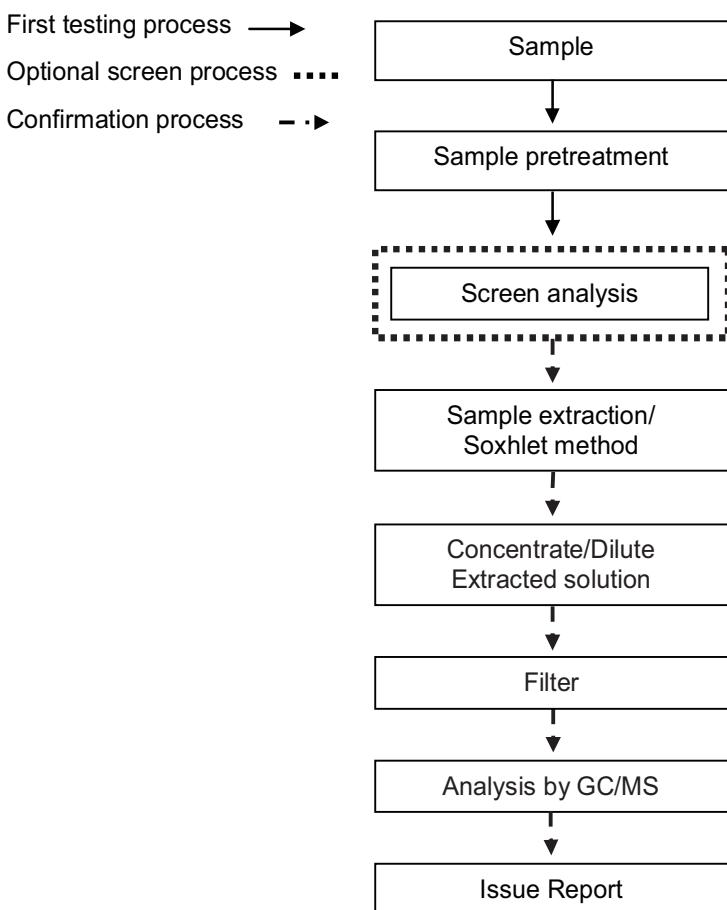
Page: 5 of 6

NAMICS CORPORATION
3993 NIGORIKAWA, KITA-KU, NIIGATA-CITY 950-3131, JAPAN



PBB/PBDE analytical FLOW CHART

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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Test Report

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Date : 2012/12/04

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NAMICS CORPORATION
3993 NIGORIKAWA, KITA-KU, NIIGATA-CITY 950-3131, JAPAN



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

CE/2012/B5382



** End of Report **

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NAMICS CORPORATION
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The following sample(s) was/were submitted and identified by/on behalf of the client as :

Sample Description : OHMCOAT 1021

Sample Receiving Date : 2012/11/28

Testing Period : 2012/11/28 TO 2012/12/04

Test Requested : As specified by client, to test Halogen-Fluorine, Chlorine, Bromine, Iodine in the submitted sample.

Test Method : With reference to BS EN 14582:2007.

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



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NAMICS CORPORATION
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Test Result(s)

PART NAME No.1 : BLUE PASTE

Test Item(s)	Unit	Method	MDL	Result	
				No.1	
Halogen		With reference to BS EN 14582:2007. Analysis was performed by IC.			
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg		50	295	
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)			50	386	
Halogen-Bromine (Br) (CAS No.: 10097-32-2)			50	n.d.	
Halogen-Iodine (I) (CAS No.: 14362-44-8)			50	n.d.	

Note :

1. mg/kg = ppm; 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit

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Date : 2012/12/04

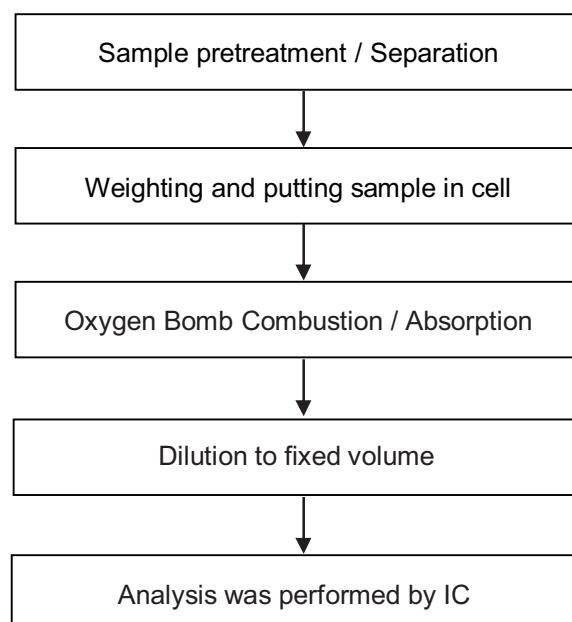
Page: 3 of 4

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Analytical flow chart of halogen content

- 1) Name of the person who made measurement: Rita Chen
- 2) Name of the person in charge of measurement: Troy Chang



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Test Report

昇貿科技股份有限公司

SHENMAO TECHNOLOGY INC.

桃園縣觀音工業區工業二路12-1號

NO. 12-1, GONGYE 2ND RD., GUANYIN INDUSTRIAL AREA, TAOYUAN COUNTY 328, TAIWAN



以下測試樣品係由客戶送樣，且由客戶聲稱並經客戶確認如下 (The following samples was/were submitted and identified by/on behalf of the client as) :

樣品名稱(Sample Description) : PURE TIN

樣品型號(Style/Item No.) : H99.95S

收件日期(Sample Receiving Date) : 2012/12/10

測試期間(Testing Period) : 2012/12/10 TO 2012/12/13

=====

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



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測試結果(Test Results)

測試部位(PART NAME)No.1 : 銀色金屬 (SILVER COLORED METAL)

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	
鎘 / Cadmium (Cd)	mg/kg	參考 IEC 62321: 2008 - Clause 9方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 - Clause 9 and performed by ICP-AES.	2	n.d.	
鉛 / Lead (Pb)	mg/kg	參考 IEC 62321: 2008 - Clause 9方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 - Clause 9 and performed by ICP-AES.	2	15	
汞 / Mercury (Hg)	mg/kg	參考 IEC 62321: 2008 - Clause 7方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 - Clause 7 and performed by ICP-AES.	2	n.d.	
六價鉻 / Hexavalent Chromium Cr(VI)	**	參考 IEC 62321: 2008 - Annex B方法, 以沸水萃取法檢測. / With reference to IEC 62321: 2008 - Annex B and performed by Boiling water extraction Method. #	#	Negative	
2- (3', 5'-二叔丁基-2'-羟基苯基) 苯並三氮唑 / 2- (3,5-di-tert-butyl-2-hydroxyphenyl)-2H-benzotriazole (CAS No.: 3846-71-7)	mg/kg	參考 US EPA 3540C方法, 以氣相層析/質譜儀檢測之. / With reference to US EPA 3540C method. Analysis was performed by GC/MS.	5	n.d.	
全氟辛烷磺酸 / Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	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.	

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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.1
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.
多溴聯苯總和 / Sum of PBBs	mg/kg	參考IEC 62321: 2008 - Annex A方法, 以氣相層析/質譜儀檢測. / With reference to IEC 62321: 2008 - Annex A 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	參考IEC 62321: 2008 - Annex A方法, 以氣相層析/質譜儀檢測. / With reference to IEC 62321: 2008 - Annex A and performed by GC/MS.	-	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.1	
鹵素 / Halogen				
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	n.d.
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.

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. **= Qualitative analysis (No Unit) 定性分析(無單位)
6. # = a. Positive means the presence of CrVI on the tested areas
(Positive表示測試區域偵測到六價鉻)
- b. Negative means the absence of CrVI on the tested areas
(Negative表示測試區域未偵測到六價鉻)

The detected concentration in boiling-water-extraction solution is equal or greater than 0.02 mg/kg with 50 cm² tested areas. / 該溶液濃度≥0.02 mg/kg with 50 cm² (tested areas)

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PFOS參考資訊(Reference Information)：持久性有機污染 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 μ g/m²。

(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 μ g/m².)

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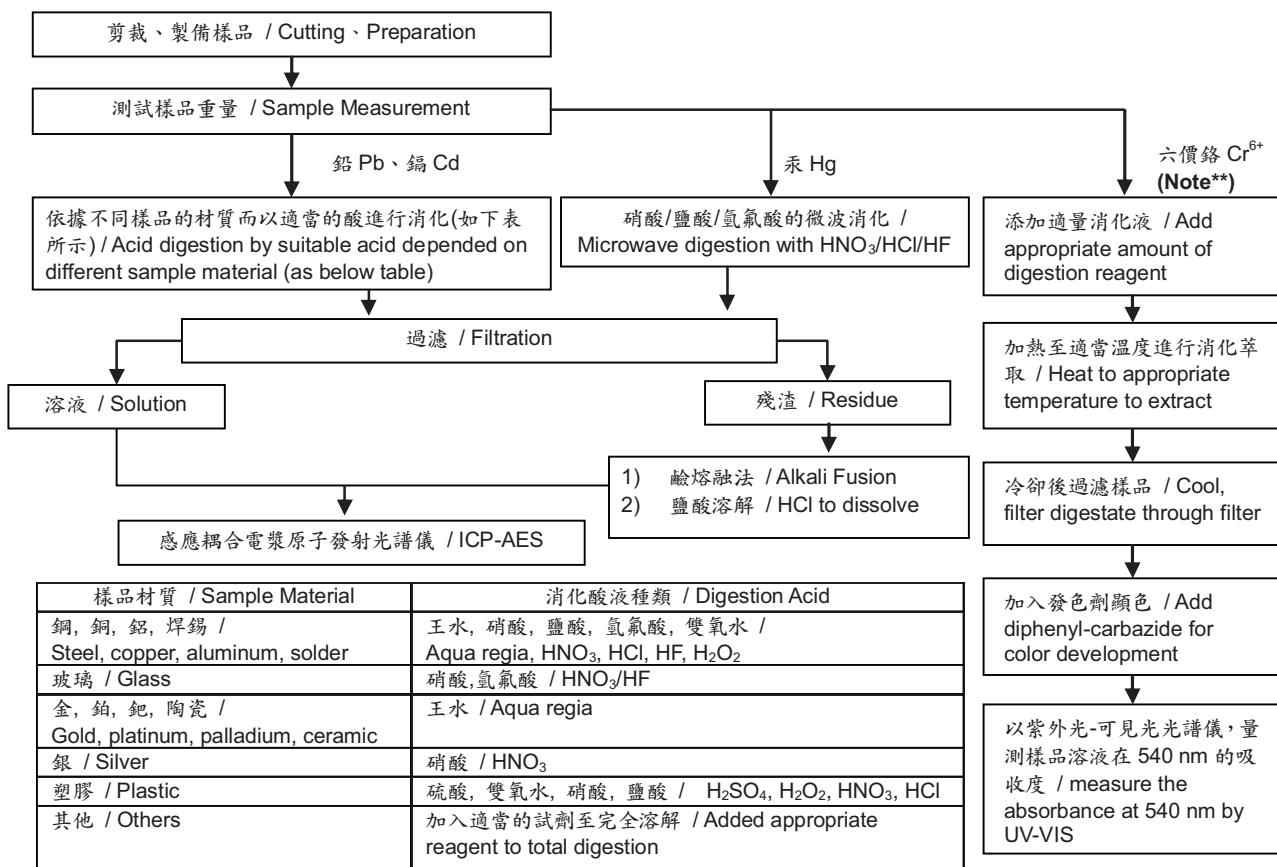
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- 1) 根據以下的流程圖之條件，樣品已完全溶解。(六價鉻測試方法除外) / These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)
- 2) 測試人員：楊登偉 / Name of the person who made measurement: Climbgreat Yang
- 3) 測試負責人：張啓興 / Name of the person in charge of measurement: Troy 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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測試報告

Test Report

昇貿科技股份有限公司

SHENMAO TECHNOLOGY INC.

桃園縣觀音工業區工業二路12-1號

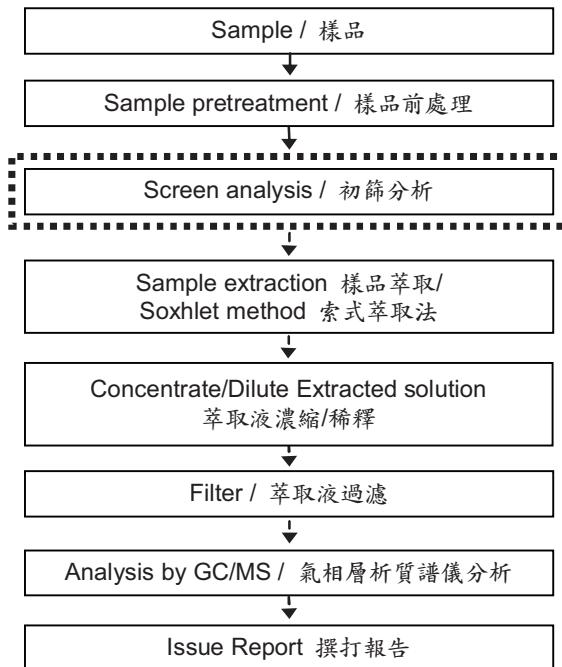
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號碼(No.) : CE/2012/C1333 日期(Date) : 2012/12/13 頁數(Page) : 7 of 11

多溴聯苯/多溴聯苯醚分析流程圖 / PBB/PBDE analytical FLOW CHART

- 測試人員 : 翁賜彬 / Name of the person who made measurement: Roman Wong
 - 測試負責人 : 張啓興 / Name of the person in charge of measurement: 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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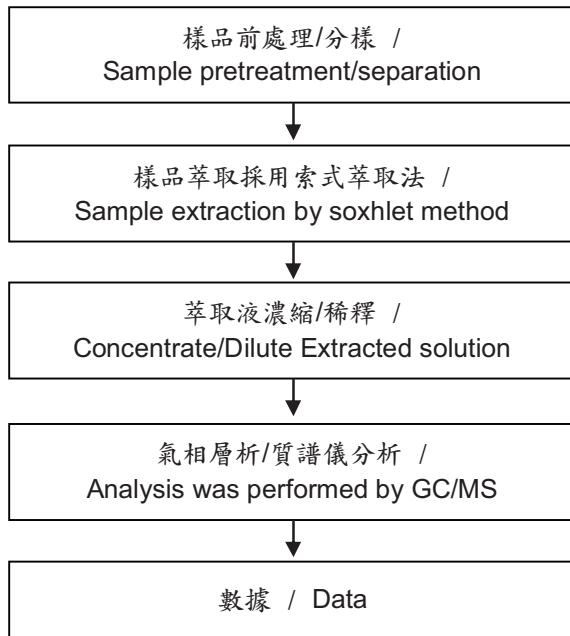
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苯並三唑類化合物分析流程圖 / Benzotriazole analytical flow chart

- 測試人員 : 翁賜彬 / Name of the person who made measurement: Roman Wong
- 測試負責人 : 張啓興 / Name of the person in charge of measurement: Troy Chang



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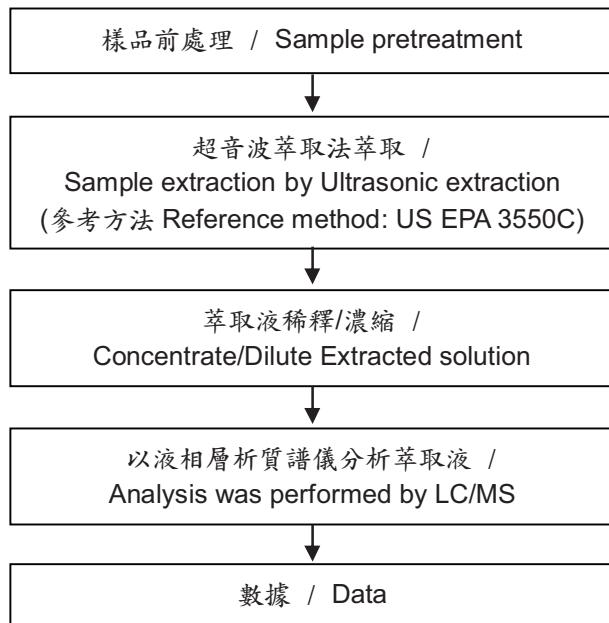
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全氟辛酸(銨)/全氟辛烷磺酸分析流程圖 / PFOA/PFOS analytical flow chart

- 測試人員 : 翁賜彬 / Name of the person who made measurement: Roman Wong
- 測試負責人 : 張啓興 / Name of the person in charge of measurement: Troy Chang



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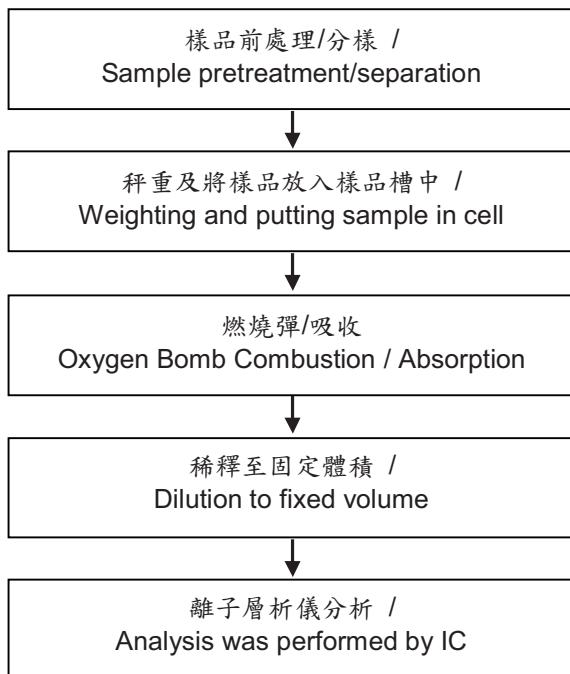
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鹵素分析流程圖 / Analytical flow chart of halogen content

- 1) 測試人員：陳恩臻 / Name of the person who made measurement: Rita Chen
- 2) 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang



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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.)

CE/2012/C1333

** 報告結尾 (End of Report) **

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Test Report

No. : CE/2012/95363

Date : 2012/10/05

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DAIKEN CHEMICAL SALES & MFG. CO., LTD.
2-7-19 HANATEN-NISHI, JOTO-KU, OSAKA-SHI, 536-0011, JAPAN

**The following sample(s) was/were submitted and identified by/on behalf of the client as :**

Sample Description : Ag PASTE
Style/Item No. : TAG307-4
Buyer/Order No. : 120901
Sample Receiving Date : 2012/09/28
Testing Period : 2012/09/28 TO 2012/10/05

- Test Requested** : (1) As specified by client, with reference to RoHS Directive 2011/65/EU Annex II to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs contents in the submitted sample.
(2) As specified by client, to test PFOA, PFOS, Halogen-Fluorine, Chlorine, Bromine, Iodine contents in the submitted sample.
- Test Method** : Please refer to next page(s).
- Test Result(s)** : Please refer to next page(s).
- Conclusion** : (1) Based on the performed tests on submitted samples, the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs comply with the limits as set by RoHS Directive 2011/65/EU Annex II; recasting 2002/95/EC.



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Test Result(s)

PART NAME No.1 : GRAY PASTE

Test Item(s)	Unit	Method	MDL	Result	Limit
				No.1	
Cadmium (Cd)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	1000
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321: 2008 and performed by UV-VIS.	2	n.d.	1000
Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.	-
PFOA (CAS No.: 335-67-1)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.	-
Halogen					
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.	-
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)			50	n.d.	-
Halogen-Bromine (Br) (CAS No.: 10097-32-2)			50	n.d.	-
Halogen-Iodine (I) (CAS No.: 14362-44-8)			50	n.d.	-

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DAIKEN CHEMICAL SALES & MFG. CO., LTD.
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Test Item(s)	Unit	Method	MDL	Result	Limit
				No.1	
Sum of PBBs			-	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		With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.	1000
Monobromodiphenyl ether	mg/kg		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.	-

Note :

1. mg/kg = ppm; 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. " - " = Not Regulated

PFOS Reference Information : POPs - (EU) 757/2010

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 μ g/m².

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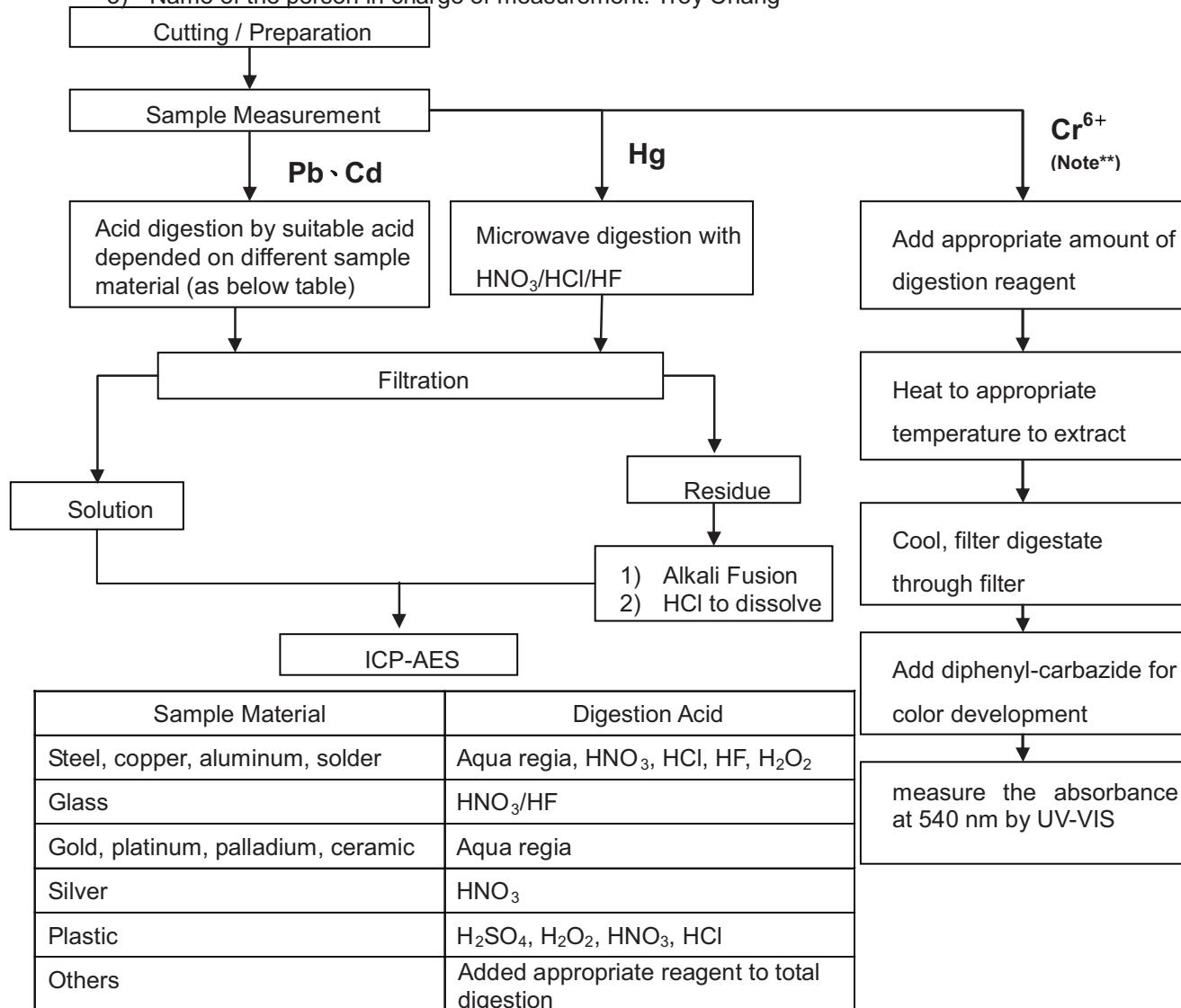
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DAIKEN CHEMICAL SALES & MFG. CO., LTD.
2-7-19 HANATEN-NISHI, JOTO-KU, OSAKA-SHI, 536-0011, JAPAN



- 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



Note :** (1) For non-metallic material, add alkaline digestion reagent and heat to 90~95 °C.
(2) For metallic material, add pure water and heat to boiling.

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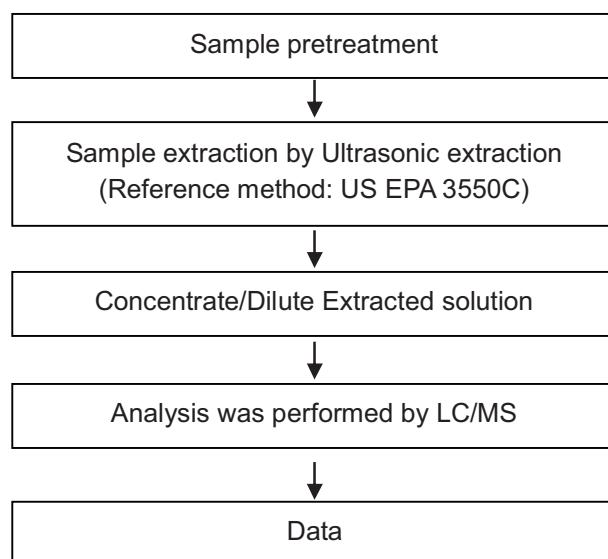
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PFOA/PFOS analytical flow chart of Ultrasonic extraction (LC/MS) procedure

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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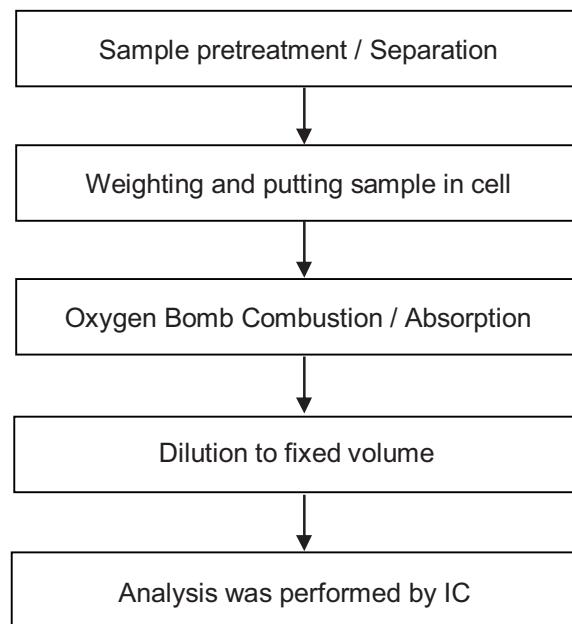
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Analytical flow chart of halogen content

- 1) Name of the person who made measurement: Rita Chen
- 2) Name of the person in charge of measurement: Troy Chang



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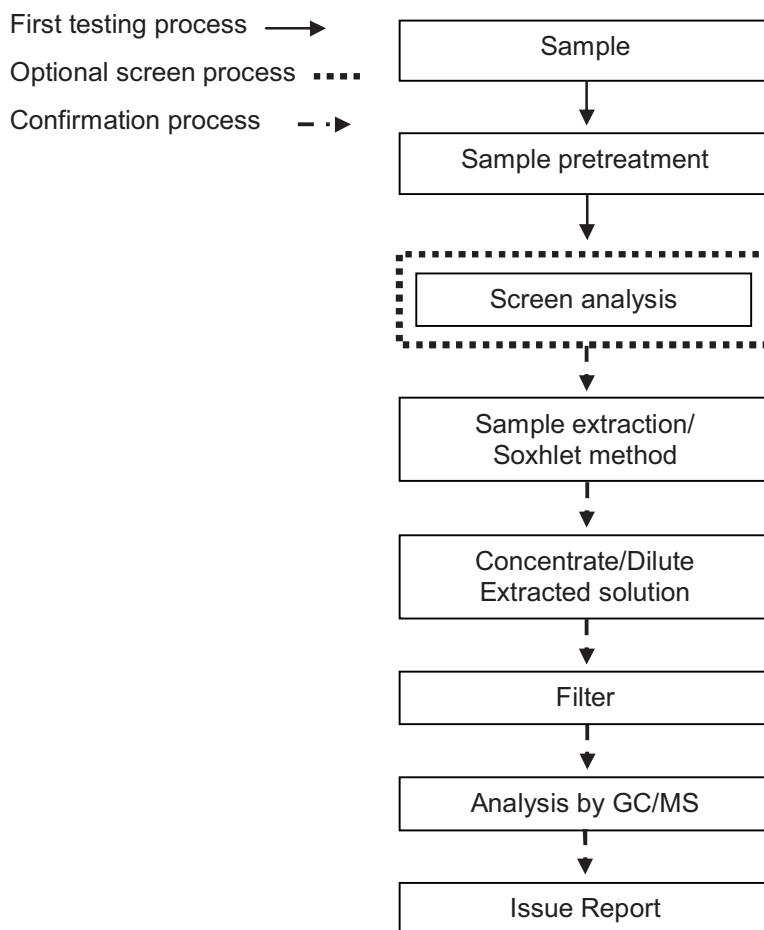
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PBB/PBDE analytical FLOW CHART

- Name of the person who made measurement: Roman Wong
- Name of the person in charge of measurement: Troy Chang



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No. : CE/2012/95363

Date : 2012/10/05

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DAIKEN CHEMICAL SALES & MFG. CO., LTD.
2-7-19 HANATEN-NISHI, JOTO-KU, OSAKA-SHI, 536-0011, JAPAN



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

CE/2012/95363



** End of Report **

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測試報告

Test Report

號碼(No.) : CE/2012/63540 日期(Date) : 2012/06/26 頁數(Page) : 1 of 4



川裕工業股份有限公司

CHUNG YU INDUSTRY CORPORATION

桃園縣平鎮市延平路三段618號

618, SEC. 3, YEN-PING RD., PING-JENG, TAO-YUAN, TAIWAN 324, R. O. C.

以下測試樣品係由客戶送樣，且由客戶聲稱並經客戶確認如下 (The following samples was/were submitted and identified by/on behalf of the client as):

樣品名稱(Sample Description) : INK(ZSR-150)W

樣品型號(Style/Item No.) : ZM-400WF, 400WF, ZM-400WF(HF), ZM-400WF-1, 400WF-1. ZM-400WF(N), ZM-400WB, WNY, WNA, WH, WM, WN, WL, WH(N), WH(H), 13A089, PC-W, PC-G, IC-W, 100W, 9W, SW

收件日期(Sample Receiving Date) : 2012/06/19

測試期間(Testing Period) : 2012/06/19 TO 2012/06/26

測試需求(Test Requested) : 依據客戶指定，於送測樣品中檢測鹵素-氟、氯、溴、碘含量. (As specified by client, to test Halogen-Fluorine, Chlorine, Bromine, Iodine in the submitted sample.)

測試方法(Test Method) : 參考BS EN 14582:2007. / With reference to BS EN 14582:2007.

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



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測試報告

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號碼(No.) : CE/2012/63540 日期(Date) : 2012/06/26 頁數(Page) : 2 of 4



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桃園縣平鎮市延平路三段618號
618, SEC. 3, YEN-PING RD., PING-JENG, TAO-YUAN, TAIWAN 324, R. O. C.

測試結果(Test Results)

測試部位(PART NAME) No.1 : 白色膏狀 (WHITE PASTE)

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.1
鹵素 / Halogen				
鹵素 (氟) / Halogen-Fluorine (F) (CAS No.: 14762-94-8)			50	92
鹵素 (氯) / Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)		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	629
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)			50	n.d.

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)

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號碼(No.) : CE/2012/63540 日期(Date) : 2012/06/26 頁數(Page) : 3 of 4



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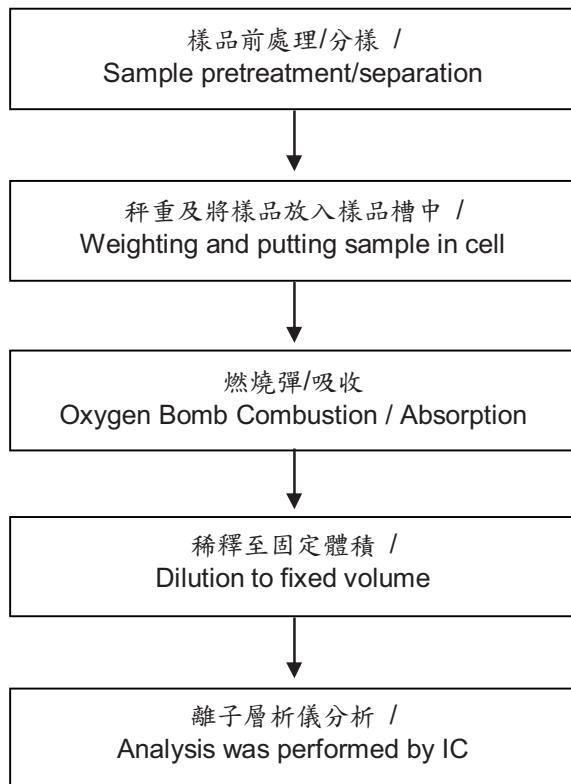
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618, SEC. 3, YEN-PING RD., PING-JENG, TAO-YUAN, TAIWAN 324, R. O. C.

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

- 測試人員：陳恩臻 / Name of the person who made measurement: Rita Chen
- 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang



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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.)

CE/2012/63540



** 報告結尾(End of Report) **

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測試報告

Test Report

川裕工業股份有限公司

CHUNG YU INDUSTRY CORPORATION

桃園縣平鎮市延平路三段618號

618, SEC. 3, YEN-PING RD., PING-JENG, TAO-YUAN, TAIWAN 324, R. O. C.



以下測試樣品係由客戶送樣，且由客戶聲稱並經客戶確認如下 (The following samples was/were submitted and identified by/on behalf of the client as) :

樣品名稱(Sample Description) : INK(ZSR-150)W

樣品型號(Style/Item No.) : ZM-400WF, 400WF, ZM-400WF(HF), ZM-400WF-1, 400WF-1, ZM-400WF(N), ZM-400WB, WNY, WNA, WH, WM, WN, WL, WH(N), WH(H), 13A089, PC-W, PC-G, IC-W, 100W, 9W, SW

收件日期(Sample Receiving Date) : 2012/08/20

測試期間(Testing Period) : 2012/08/20 TO 2012/08/27

測試結果(Test Results) : 請見下一页 (Please refer to next pages).

結論(Conclusion) : 根據客戶所提供的樣品，其鎘、鉛、汞、六價鉻、多溴聯苯及多溴聯苯醚的測試結果符合 RoHS 指令 2002/95/EC 的更新指令 2011/65/EU 之要求 (Based on the performed tests on submitted samples, the test results of Cadmium, Lead, Mercury, Hexavalent Chromium Cr(VI), PBBs and PBDEs comply with the limits as set by RoHS Directive 2011/65/EU Annex II; recasting 2002/95/EC.)



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618, SEC. 3, YEN-PING RD., PING-JENG, TAO-YUAN, TAIWAN 324, R. O. C.

**測試結果 (Test Results)**

測試部位 (PART NAME) No.1 : 白色油墨 (WHITE INK)

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	法規 限值 (Limit)
鎘 / Cadmium (Cd)	mg/kg	參考 IEC 62321: 2008方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	100
鉛 / Lead (Pb)	mg/kg	參考 IEC 62321: 2008方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.	1000
汞 / Mercury (Hg)	mg/kg	參考 IEC 62321: 2008方法, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321: 2008 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
六溴環十二烷 / Hexabromocyclododecane (HBCDD) (CAS No.: 25637-99-4)	mg/kg	參考 US EPA 3540C方法, 以氣相層析/質譜儀檢測. / With reference to US EPA 3540C method. Analysis was performed by GC/MS.	5	n.d.	-
鄰苯二甲酸甲苯基丁酯 / BBP (Benzyl butyl phthalate) (CAS No.: 85-68-7)	%	參考 EN 14372, 以氣相層析/質譜儀檢測之. / With reference to EN 14372. 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, 以氣相層析/質譜儀檢測之. / With reference to EN 14372. 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)	法規 限值 (Limit)
			No.1		
鄰苯二甲酸二異癸酯 / DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0)	%	參考EN 14372, 以氣相層析/質譜儀檢測之。 / With reference to EN 14372. 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)	%	參考EN 14372, 以氣相層析/質譜儀檢測之。 / With reference to EN 14372. 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, 以氣相層析/質譜儀檢測之。 / With reference to EN 14372. 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, 以氣相層析/質譜儀檢測之。 / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.	-
多溴聯苯總和 / Sum of PBBs	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 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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測試報告**Test Report**

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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)	法規 限值 (Limit)
			No.1	n.d.	
多溴聯苯醚總和 / Sum of PBDEs	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 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.	-

備註(Note) :

1. mg/kg = ppm ; 0.1wt% = 1000 ppm
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)

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測試報告

Test Report

川裕工業股份有限公司

CHUNG YU INDUSTRY CORPORATION

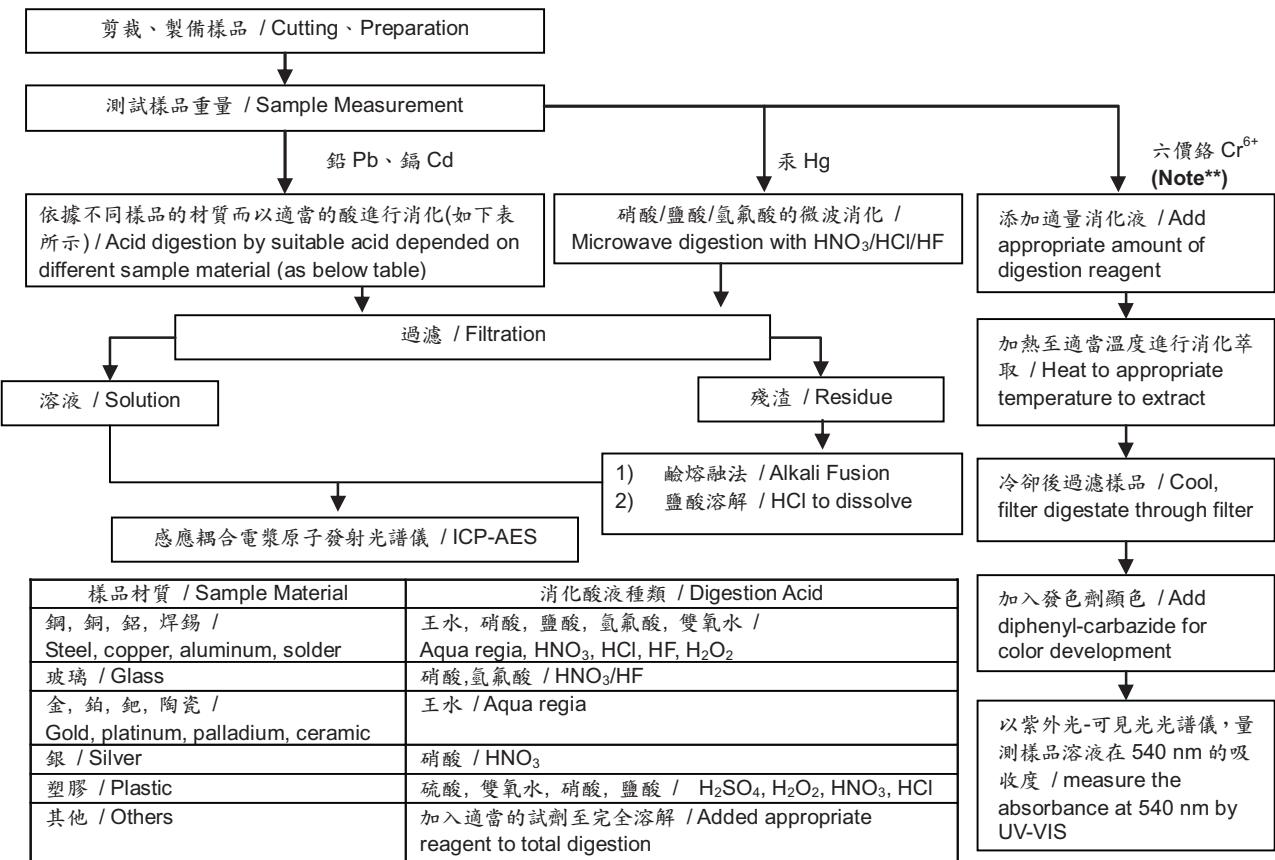
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- 1) 根據以下的流程圖之條件，樣品已完全溶解。(六價鉻測試方法除外) / These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)
- 2) 測試人員：楊登偉 / Name of the person who made measurement: Climbgreat Yang
- 3) 測試負責人：張啓興 / Name of the person in charge of measurement: Troy 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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測試報告

Test Report

川裕工業股份有限公司

CHUNG YU INDUSTRY CORPORATION

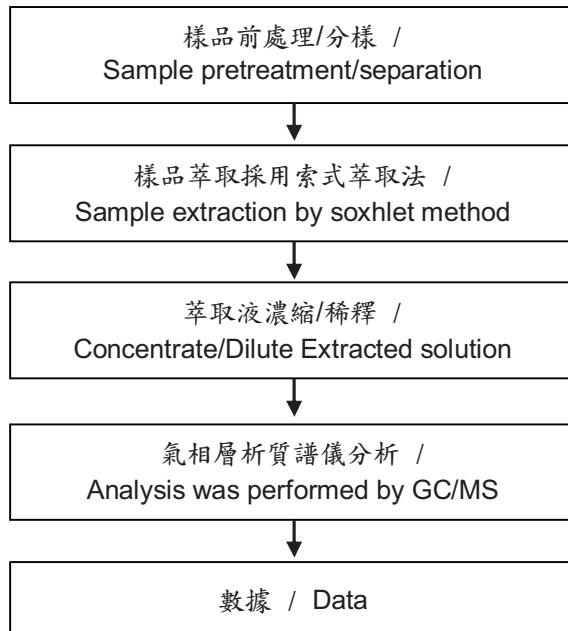
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六溴環十二烷分析流程圖 / HBCDD analytical flow chart

- 測試人員：翁賜彬 / Name of the person who made measurement: Roman Wong
- 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang



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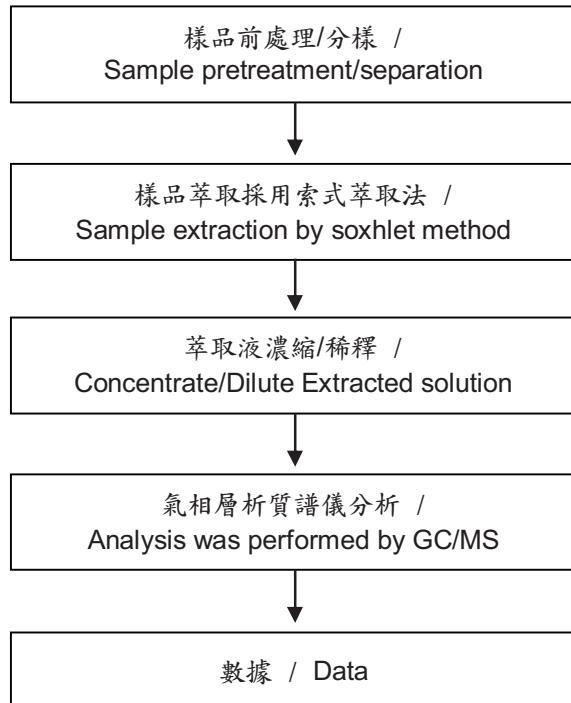
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可塑劑分析流程圖 / Analytical flow chart of phthalate content

- 測試人員：翁賜彬 / Name of the person who made measurement: Roman Wong
- 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang



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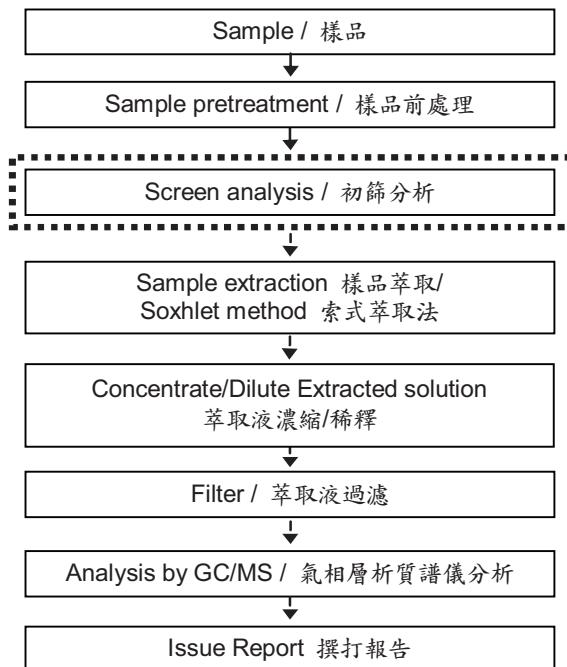
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多溴聯苯/多溴聯苯醚分析流程圖 / PBB/PBDE analytical FLOW CHART

- 測試人員：翁賜彬 / Name of the person who made measurement: Roman Wong
 - 測試負責人：張啓興 / Name of the person in charge of measurement: 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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* 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.)

CE/2012/83023



** 報告結尾 (End of Report) **

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