


# SPECIFICATIONS

CUSTOMER : 安瀚科技股份有限公司

PRODUCT : ANTENNA RFANT5220110A2T

PART NO : RFANT5220110A2T 廠牌: WALSIN

<p>公司承認章</p> 	<p>客戶承認章</p>
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# APPROVAL SHEET

**RFANT Series – RoHS Compliance**

**MULTILAYER CERAMIC ANTENNA**

**Halogens Free Product**

**2.4 GHz ISM Band Working Frequency**

**P/N: RFANT5220110A2T**

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



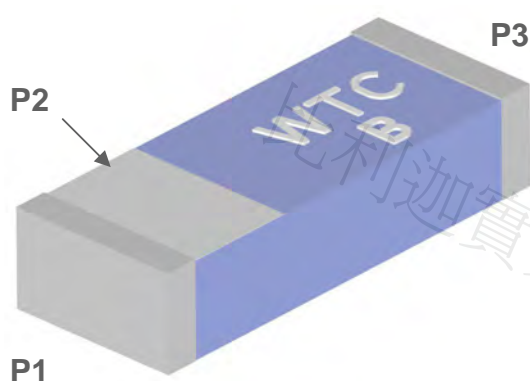
## FEATURES

1. Surface Mounted Devices with a small dimension of  $5.2 \times 2.0 \times 1.1 \text{ mm}^3$  meet future miniaturization trend.
2. Embedded and LTCC (Low Temperature Co-fired Ceramic) technology is able to future integrate with system design as well as beautifying the housing of final product.
3. High Stability in Temperature / Humidity Change

## APPLICATIONS

1. Bluetooth
2. Wireless LAN
3. HormRF
4. ISM band 2.4GHz wireless applications

## CONSTRUCTION



PIN	Connection
1	Feeding
2	Identification Mark
3	Soldering terminal

Figure	Symbol	Dimension (mm)
	L	$5.20 \pm 0.20$
	W	$2.00 \pm 0.20$
	T	$1.15 \pm 0.10$
	A	$0.40 \pm 0.25$

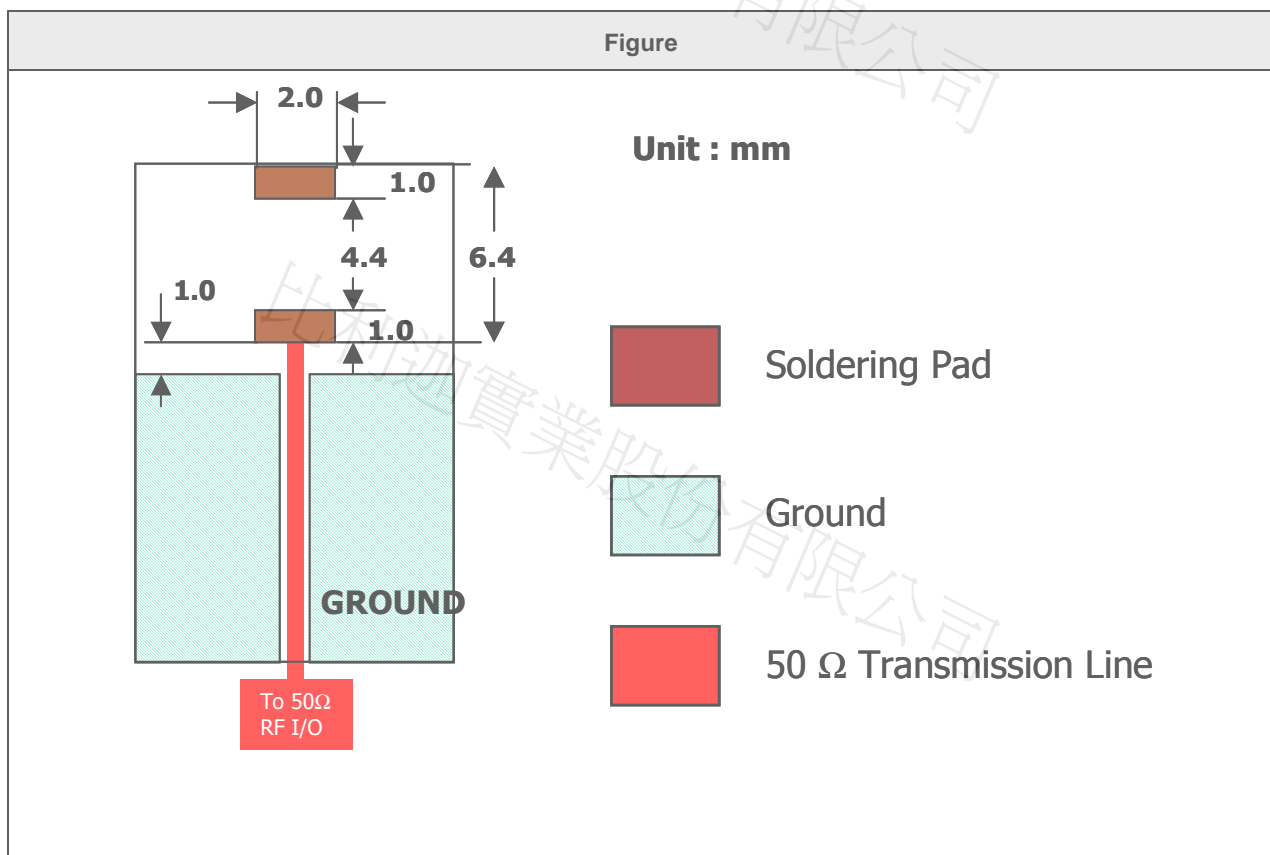


## ELECTRICAL CHARACTERISTICS

RFANT5220110A2T	Specification
Working Frequency Range	2.4 GHz ~ 2.5GHz
Gain	2 dBi (Typical)
VSWR	2 max.
Polarization	Linear
Azimuth Beamwidth	Omni-directional
Impedance	50Ω
Rated Power (max.)	3 Watts
Maximum Input Power	5 Watts for 5 minutes
Operation Temperature	-40°C ~ +85°C

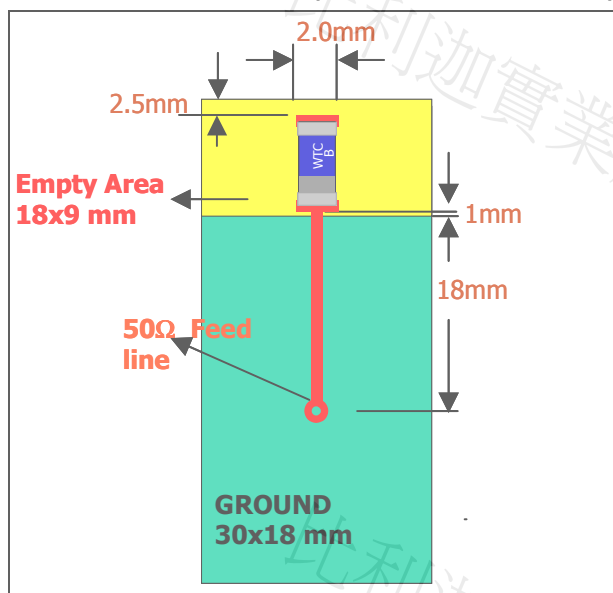
Remark: The specification is defined based on the test board dimension as in below

## SOLDER LAND PATTERN DESIGN

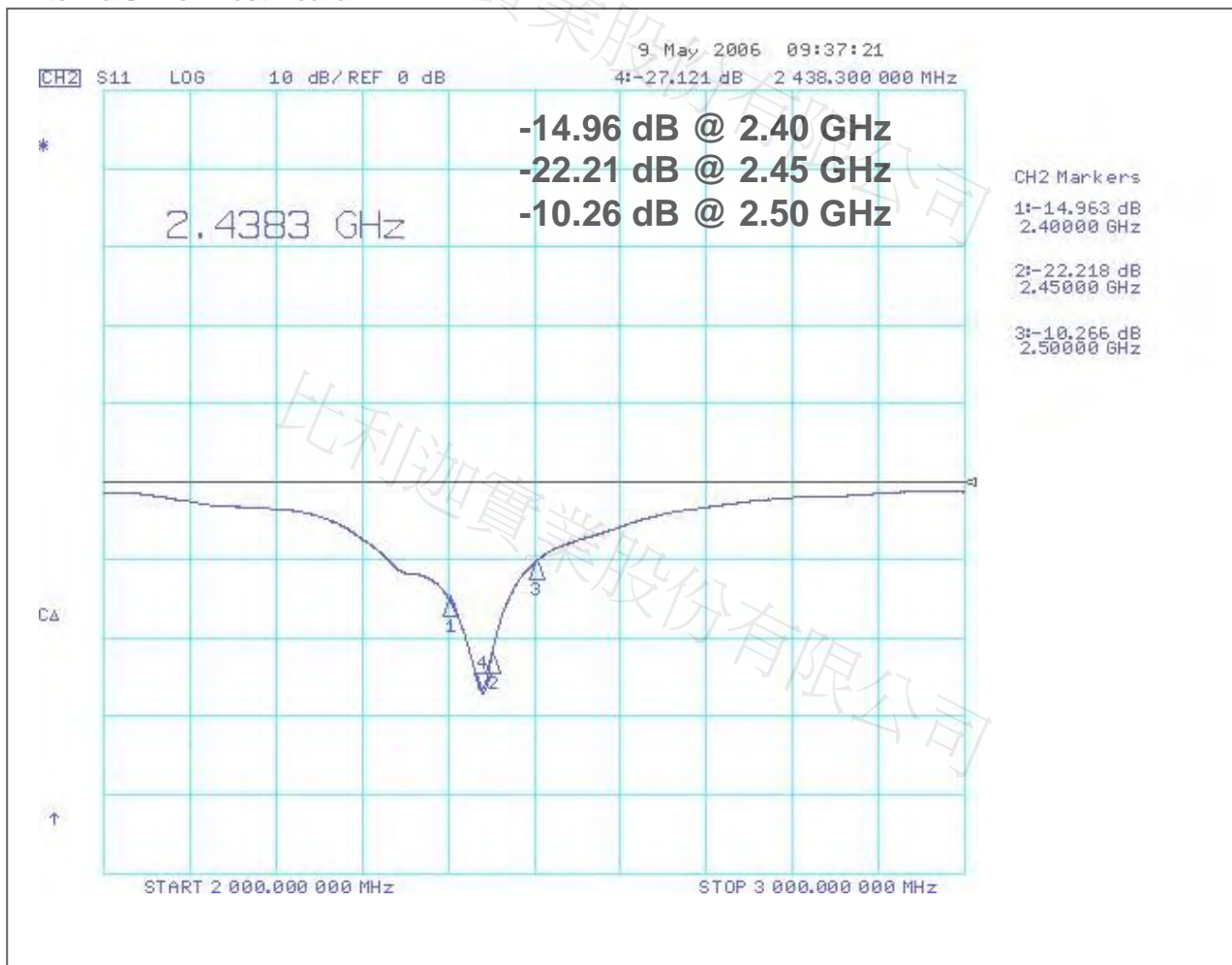




Antenna on Test Board (FR4 Thickness 0.8mm)



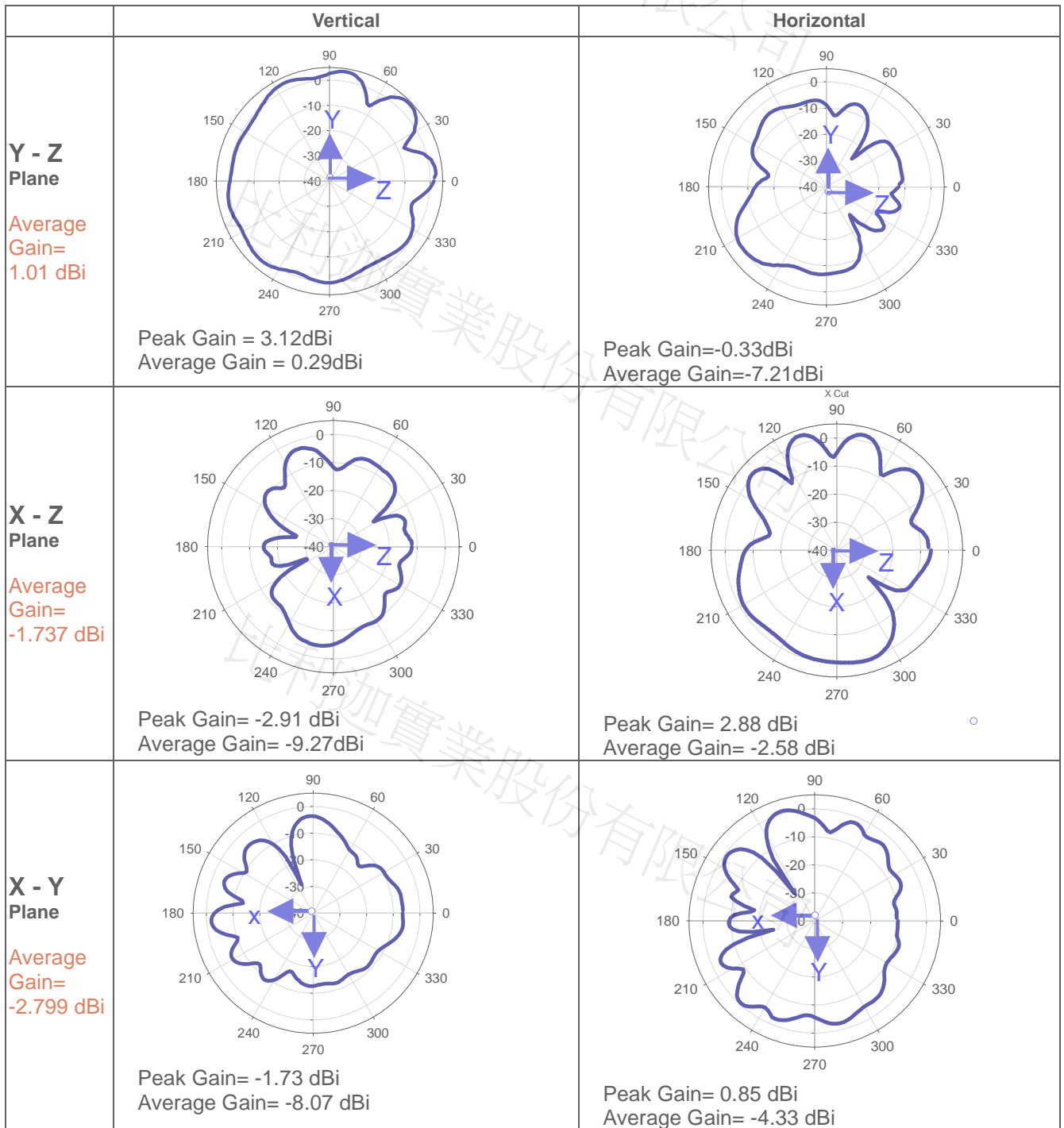
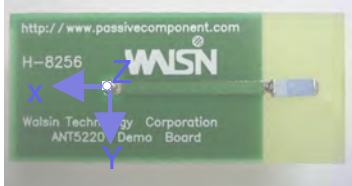
Antenna S11 on Test Board





## RADIATION PATTERN

Radiation Pattern and Gain were dependent on measurement board design. The specification of RFANT5220110A2T 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 : $235 \pm 5^{\circ}\text{C}$ *Immersion time : $2 \pm 0.5$ 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 : $260 \pm 5^{\circ}\text{C}$ *Leaching immersion time : $30 \pm 0.5$ 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 : $120 \sim 150^{\circ}\text{C}$ , 1 minute. *Solder temperature : $270 \pm 5^{\circ}\text{C}$ *Immersion time : $10 \pm 1$ sec Solder : Sn3Ag0.5Cu for lead-free Measurement to be made after keeping at room temperature for $24 \pm 2$ hrs	No mechanical damage. Electrical specification shall satisfy the descriptions in electrical characteristics under the operational temperature range within $-40 \sim 85^{\circ}\text{C}$ . 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 $-40 \sim 85^{\circ}\text{C}$ .
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 $-40 \sim 85^{\circ}\text{C}$ .
Adhesive Strength of Termination JIS C 0051- 7.4.3	*Pressurizing force : 5N( $\leq 0603$ ) ; 10N(>0603) *Test time : $10 \pm 1$ 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

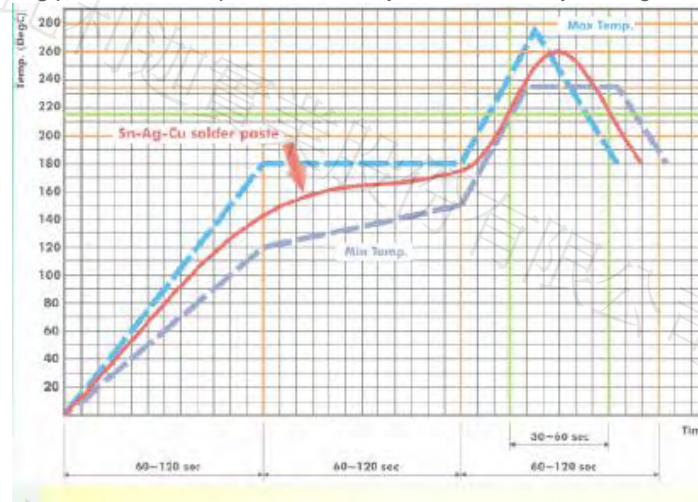


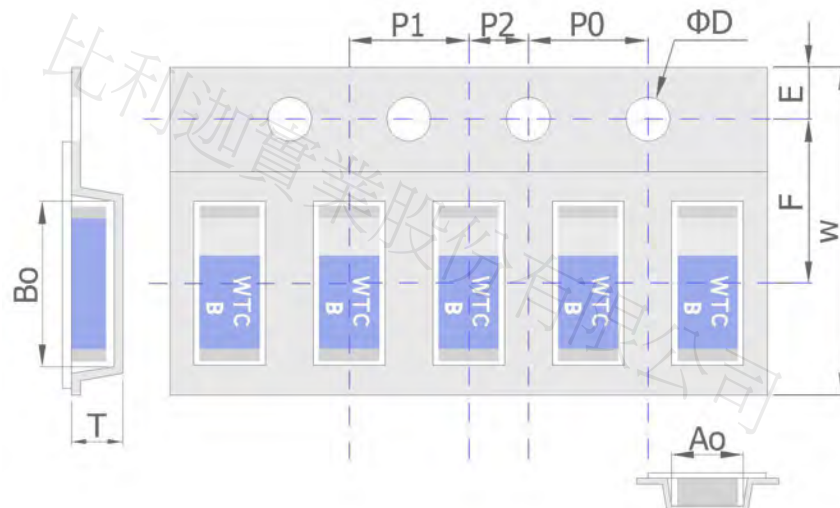
Fig 2. Infrared soldering profile

## ORDERING CODE

RF	ANT	522011	0	A	2	T
<b>Walsin</b> RF device	<b>Product code</b> ANT : Antenna	<b>Dimension code</b> Per 2 digits of Length, Width, Thickness : e.g. : 522011 = Length 52, Width 20, Thickness 11	<b>Unit of dimension</b> 0 : 0.1 mm 1 : 1.0 mm	<b>Application</b> A : 2.4GHz ISM Band	<b>Specification</b> Design Code	<b>Packing</b> T : 7" Reeled

Minimum Ordering Quantity: 2000 pcs per reel.

## PACKAGING

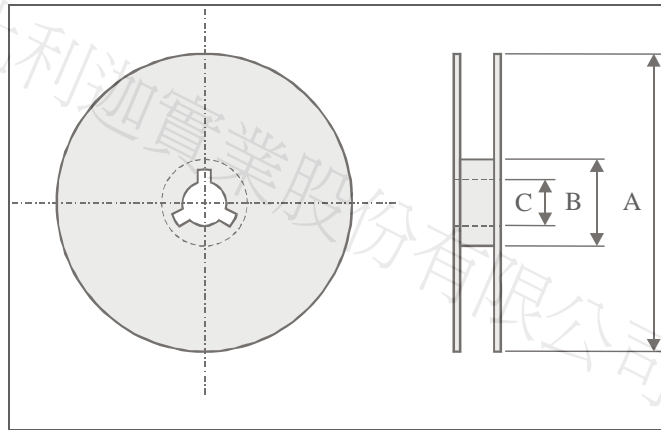


Plastic Tape specifications (unit :mm)

Index	Ao	Bo	ΦD	T	W
Dimension (mm)	2.40 ± 0.10	5.50 ± 0.10	1.55 ± 0.05	1.20 ± 0.10	12.0 ± 0.10
Index	E	F	Po	P1	P2
Dimension (mm)	1.75 ± 0.10	5.50 ± 0.10	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.10



## Reel dimensions



Index	A	B	C
Dimension (mm)	Φ178	Φ60.0	Φ13.5

Typing 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.

5. Aircraft equipment
6. Aerospace equipment
7. Undersea equipment
8. Medical equipment
9. Disaster prevention / crime prevention equipment
10. Traffic signal equipment
11. Transportation equipment (vehicles, trains, ships, etc.)
12. 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.

化學實驗室-高雄 Chemical Laboratory - Kao., SGS Taiwan Ltd.

## 試驗報告 Test Report

號碼(No.) : KA/2018/60690 日期(Date) : 2018/06/14 頁數(Page): 1 of 13

華新科技股份有限公司高雄分公司  
WALSIN TECHNOLOGY CORPORATION  
高雄市高雄前鎮加工出口區南四路7號  
NO. 7, SOUTH 4TH STREET, K. E. P. Z. KAOHSIUNG, TAIWAN, 806

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)	:	ANTENNA PRODUCT
樣品型號(Style/Item No)	:	RFANT SERIES
收件日期(Sample Receiving Date)	:	2018/06/08
測試期間(Testing Period)	:	2018/06/08 TO 2018/06/14
送樣廠商(Sample Submitted By)	:	華新科技股份有限公司高雄分公司 (WALSIN TECHNOLOGY CORPORATION)

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

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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試驗報告  
Test Report

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華新科技股份有限公司高雄分公司

WALSIN TECHNOLOGY CORPORATION

高雄市高雄前鎮加工出口區南四路7號

NO. 7, SOUTH 4TH STREET, K. E. P. Z. KAOHSIUNG, TAIWAN, 806

## 測試結果(Test Results)

測試部位(PART NAME) NO.1 : 整體混測電子零件 (MIXED ALL PARTS ELECTRONIC COMPONENT)

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 62321-5: 2013, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-5: 2013 and performed by ICP-AES.	2	n. d.
鉛 / Lead (Pb)	mg/kg	參考IEC 62321-5: 2013, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-5: 2013 and performed by ICP-AES.	2	n. d.
汞 / Mercury (Hg)	mg/kg	參考IEC 62321-4: 2013, 以感應耦合電漿原子發射光譜儀檢測. / With reference to IEC 62321-4: 2013 and performed by ICP-AES.	2	n. d.
六價鉻 / Hexavalent Chromium Cr(VI)	mg/kg	參考IEC 62321-7-2:2017, 以UV-VIS檢測. / With reference to IEC 62321-7-2:2017 and performed by UV-VIS.	8	n. d.
全氟辛酸(鉍) / PFOA (CAS No.: 335-67-1)	mg/kg	參考US EPA 3550C: 2007, 以液相層析/質譜儀檢測. / With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n. d.
全氟辛烷磺酸 / Perfluorooctane sulfonates (PFOS)	mg/kg		10	n. d.

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# 試驗報告

## Test Report

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華新科技股份有限公司高雄分公司

WALSIN TECHNOLOGY CORPORATION

高雄市高雄前鎮加工出口區南四路7號

NO. 7, SOUTH 4TH STREET, K. E. P. Z. KAOHSIUNG, TAIWAN, 806

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
多溴聯苯總和 / Sum of PBBs	mg/kg	參考 IEC 62321-6:2015, 以氣相層析/質譜儀檢測。 / With reference to IEC 62321-6:2015 and performed by GC/MS.	-	n. d.
一溴聯苯 / Monobromobiphenyl	mg/kg		5	n. d.
二溴聯苯 / Dibromobiphenyl	mg/kg		5	n. d.
三溴聯苯 / Tribromobiphenyl	mg/kg		5	n. d.
四溴聯苯 / Tetrabromobiphenyl	mg/kg		5	n. d.
五溴聯苯 / Pentabromobiphenyl	mg/kg		5	n. d.
六溴聯苯 / Hexabromobiphenyl	mg/kg		5	n. d.
七溴聯苯 / Heptabromobiphenyl	mg/kg		5	n. d.
八溴聯苯 / Octabromobiphenyl	mg/kg		5	n. d.
九溴聯苯 / Nonabromobiphenyl	mg/kg		5	n. d.
十溴聯苯 / Decabromobiphenyl	mg/kg		5	n. d.
多溴聯苯醚總和 / Sum of PBDEs	mg/kg		-	n. d.
一溴聯苯醚 / Monobromodiphenyl ether	mg/kg		5	n. d.
二溴聯苯醚 / Dibromodiphenyl ether	mg/kg		5	n. d.
三溴聯苯醚 / Tribromodiphenyl ether	mg/kg		5	n. d.
四溴聯苯醚 / Tetrabromodiphenyl ether	mg/kg		5	n. d.
五溴聯苯醚 / Pentabromodiphenyl ether	mg/kg		5	n. d.
六溴聯苯醚 / Hexabromodiphenyl ether	mg/kg		5	n. d.
七溴聯苯醚 / Heptabromodiphenyl ether	mg/kg		5	n. d.
八溴聯苯醚 / Octabromodiphenyl ether	mg/kg		5	n. d.
九溴聯苯醚 / Nonabromodiphenyl ether	mg/kg		5	n. d.
十溴聯苯醚 / Decabromodiphenyl ether	mg/kg		5	n. d.

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# 試驗報告

## Test Report

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華新科技股份有限公司高雄分公司

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高雄市高雄前鎮加工出口區南四路7號

NO. 7, SOUTH 4TH STREET, K. E. P. Z. KAOHSIUNG, TAIWAN, 806

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
鄰苯二甲酸二異丁酯 / DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg	參考IEC 62321-8:2017, 以氣相層析儀/質譜儀檢測. / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n. d.
鄰苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg		50	n. d.
鄰苯二甲酸丁苄甲酯 / BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg		50	n. d.
鄰苯二甲酸二(2-乙基己基)酯 / DEHP (Di-(2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg		50	n. d.
鄰苯二甲酸二正辛酯 / DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	mg/kg		50	n. d.
鄰苯二甲酸二異壬酯 / DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0, 68515-48-0)	mg/kg		50	n. d.
鄰苯二甲酸二異癸酯 / DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0, 68515-49-1)	mg/kg	參考IEC 62321: 2008, 以氣相層析/質譜儀檢測. / With reference to IEC 62321: 2008. Analysis was performed by GC/MS.	50	n. d.
六溴環十二烷及所有主要被辨別出的異構物 / Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified ( $\alpha$ -HBCDD, $\beta$ -HBCDD, $\gamma$ -HBCDD) (CAS No.: 25637-99-4 and 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	mg/kg		5	n. d.
鹵素(溴) / Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg		50	n. d.
鹵素(氯) / Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg	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.	50	n. d.

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# 試驗報告 Test Report

號碼(No.): KA/2018/60690 日期(Date): 2018/06/14 頁數(Page): 5 of 13

華新科技股份有限公司高雄分公司

WALSIN TECHNOLOGY CORPORATION

高雄市高雄前鎮加工出口區南四路7號

NO. 7, SOUTH 4TH STREET, K. E. P. Z. KAOHSIUNG, TAIWAN, 806

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
銻 / Antimony (Sb)	mg/kg	參考US EPA 3052: 1996, 用感應耦合電漿原子發射光譜儀檢測。 / With reference to US EPA 3052: 1996. Analysis was performed by ICP-AES.	2	n. d.
砷 / Arsenic (As)	mg/kg	參考US EPA 3052: 1996, 用感應耦合電漿原子發射光譜儀檢測。 / With reference to US EPA 3052: 1996. Analysis was performed by ICP-AES.	2	n. d.
鈹 / Beryllium (Be)	mg/kg	參考US EPA 3052: 1996, 用感應耦合電漿原子發射光譜儀檢測。 / With reference to US EPA 3052: 1996. Analysis was performed by ICP-AES.	2	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. 樣品的測試是基於申請人要求混合測試, 報告中的混合測試結果不代表其中個別單一材質的含量。(The samples was/were analyzed on behalf of the applicant as mixing sample in one testing. The above results was/were only given as the informality value.)

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

PFOS濃度在物質或製備中不得超過0.001%(10ppm), 在半成品、成品或零部件中不得超過0.1%(1000ppm), 在紡織品或塗層材料中不得超過1µg/m<sup>2</sup>。

(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 1µg/m<sup>2</sup>.)

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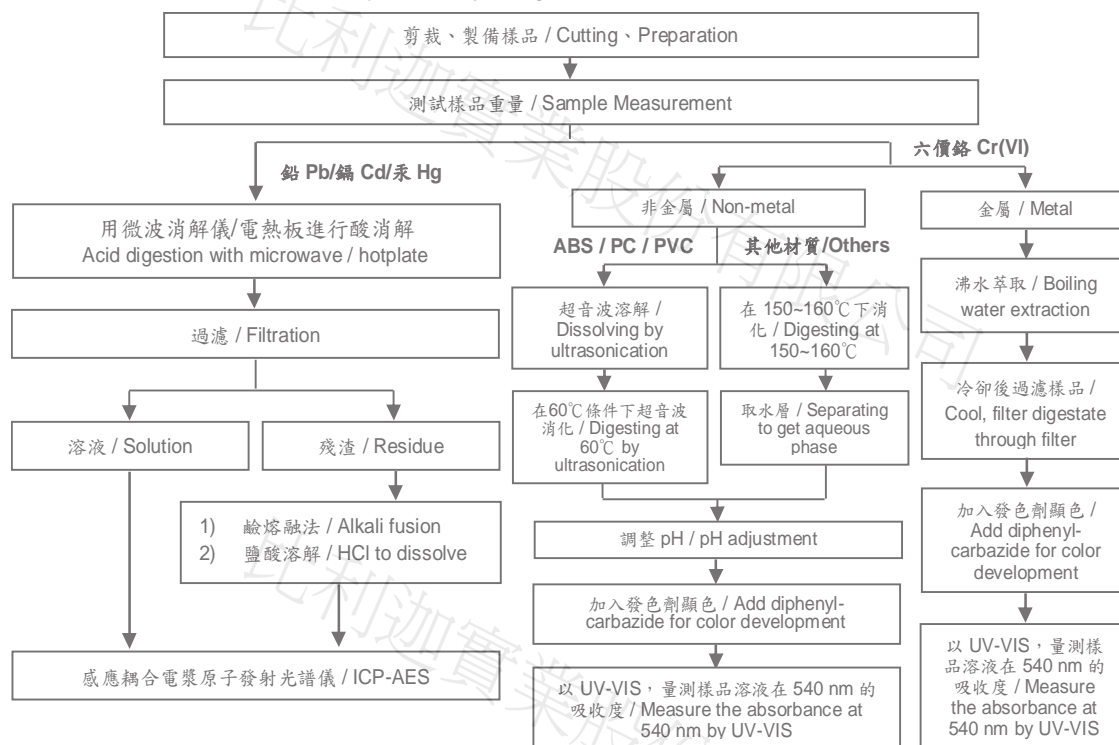
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### 重金屬流程圖 / Analytical flow chart of Heavy Metal

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. (Cr<sup>6+</sup> test method excluded)

- 測試人員：劉俊宏 / Technician : Jony Liu
- 測試負責人：張伯睿 / Supervisor: Ray Chang



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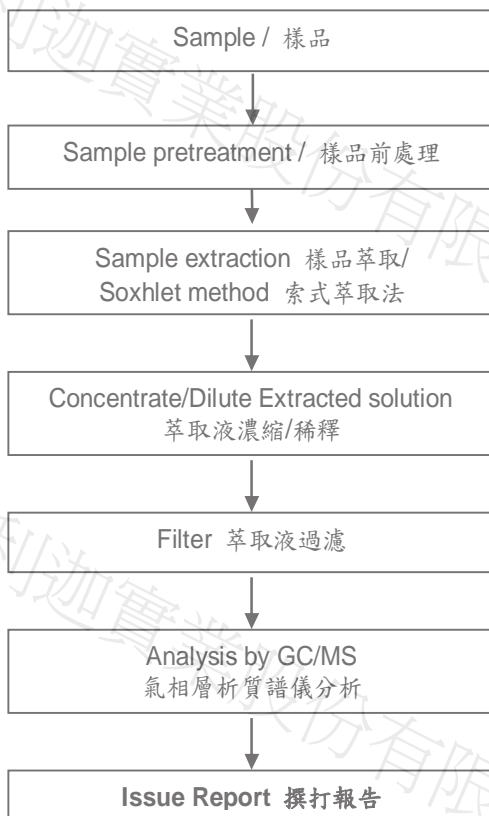
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### 多溴聯苯/多溴聯苯醚 分析流程圖 / PBB/PBDE analytical FLOW CHART

- 測試人員：陳威錚 / Technician : Dorothy Chen
- 測試負責人：張伯睿 / Supervisor: Ray Chang



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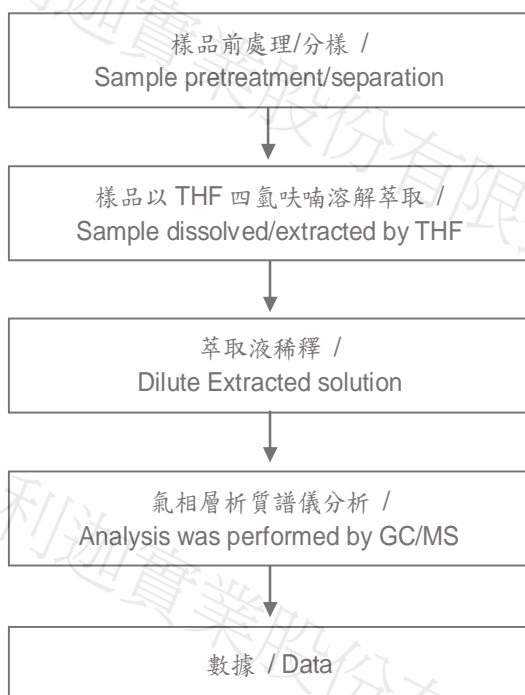
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### 可塑劑分析流程圖 / Analytical flow chart of phthalate content

- 測試人員：陳威錚 / Technician : Dorothy Chen
- 測試負責人：張伯睿 / Supervisor: Ray Chang

#### 【測試方法/Test method: IEC 62321-8】



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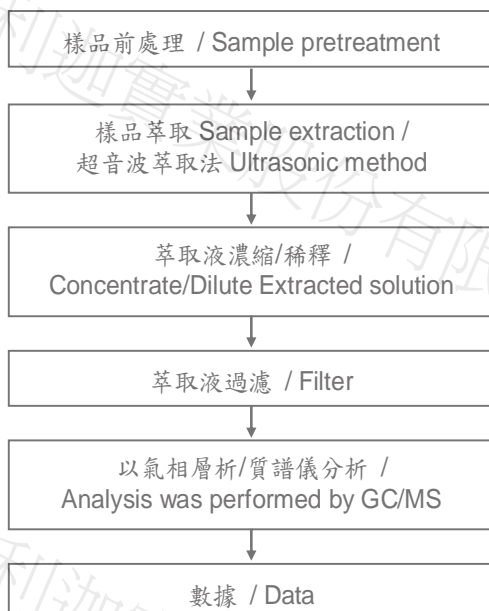
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## 六溴環十二烷分析流程圖 / HBCDD analytical flow chart

- 測試人員: 陳威錚 / Technician: Dorothy Chen
- 測試負責人: 張伯睿 / Supervisor: Ray Chang



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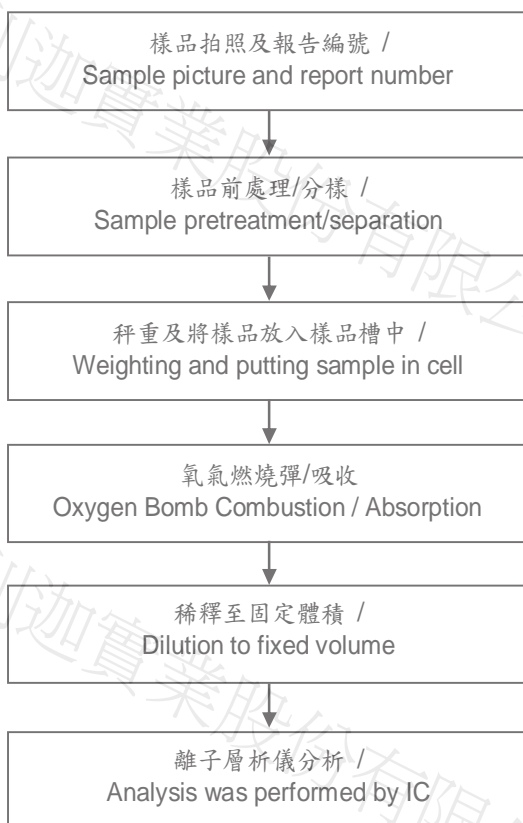
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### 鹵素分析流程圖 / Analytical flow chart of halogen content

- 測試人員: 洪秀真 / Technician: Jean Hung
- 測試負責人: 張伯睿 / Supervisor: Ray Chang



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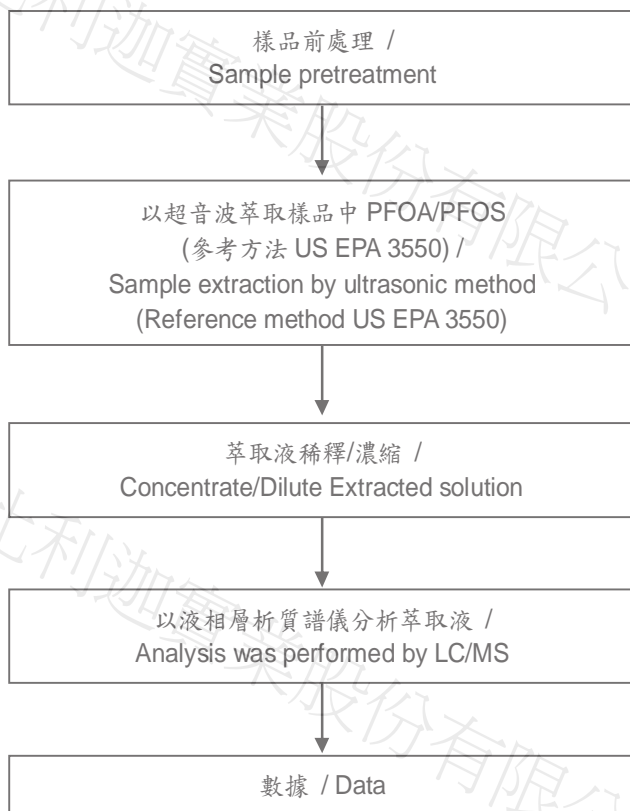
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### 全氟辛酸(鉍)/ 全氟辛酸磺酸分析流程圖 / Analytical flow chart of PFOA/PFOS content

- 測試人員：黃璟瓊 / Technician : Ginny Huang
- 測試負責人：張伯睿 / Supervisor: Ray Chang



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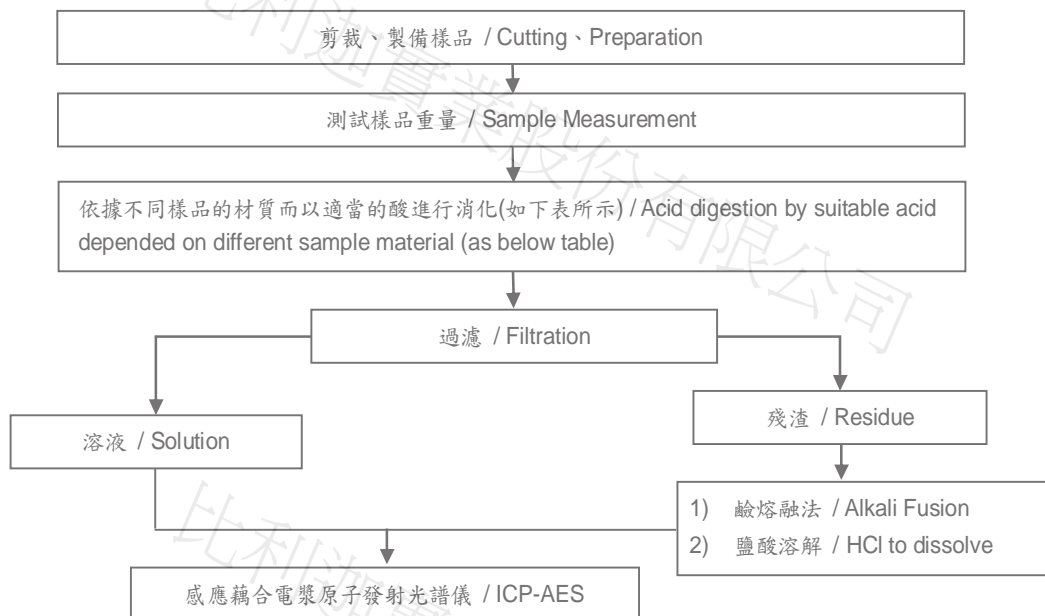
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根據以下的流程圖之條件，樣品已完全溶解。 / These samples were dissolved totally by pre-conditioning method according to below flow chart.

■ 測試人員：劉俊宏 / Technician : Jony Liu

■ 測試負責人：張伯睿 / Supervisor: 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 <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub>
玻璃 / Glass	硝酸,氫氟酸 / HNO <sub>3</sub> /HF
金,鉑,鈀,陶瓷 / Gold, platinum, palladium, ceramic	王水 / Aqua regia
銀 / Silver	硝酸 / HNO <sub>3</sub>
塑膠 / Plastic	硫酸,雙氧水,硝酸,鹽酸 / H <sub>2</sub> SO <sub>4</sub> , H <sub>2</sub> O <sub>2</sub> , HNO <sub>3</sub> , HCl
其他 / Others	加入任何酸至完全溶解 / Any acid to total digestion

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

# KA/2018/60690



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