

# Specification for Approval

Date: 2017/12/11


 Certificate  
of  
Green Partner

Customer : 深圳台慶

TAI-TECH P/N: HCB2012KF-220T60

CUSTOMER P/N:

DESCRIPTION:

QUANTITY: pcs

REMARK:

Customer Approval Feedback

 西北臺慶科技股份有限公司  
TAI-TECH Advanced Electronics Co., Ltd

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## High Current Ferrite Chip Bead(Lead Free)

HCB2012KF-220T60

## ECN HISTORY LIST

# High Current Ferrite Chip Bead(Lead Free)

HCB2012KF-220T60

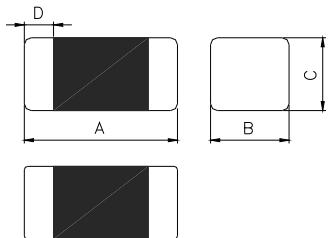
## 1. Features

1. Monolithic inorganic material construction.
2. Closed magnetic circuit avoids crosstalk.
3. Suitable for reflow soldering.
4. Shapes and dimensions follow E.I.A. spec.
5. Available in various sizes.
6. Excellent solder ability and heat resistance.
7. High reliability.
8. 100% Lead(Pb) & Halogen-Free and RoHS compliant.
9. Low DC resistance structure of electrode to prevent wasteful electric power consumption.



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## 2. Dimensions



Chip Size	
A	2.00±0.20
B	1.25±0.20
C	0.85±0.20
D	0.50±0.30

Units: mm

## 3. Part Numbering

HCB 2012 KF - 220 T 60

A

B

C

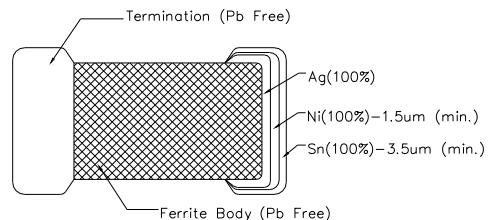
- 220

T

60

A: Series  
B: Dimension  
C: Material  
D: Impedance  
E: Packaging  
F: Rated Current

L x W  
Lead Free Material  
220=22Ω  
T=Taping and Reel, B=Bulk(Bags)  
60=6000mA

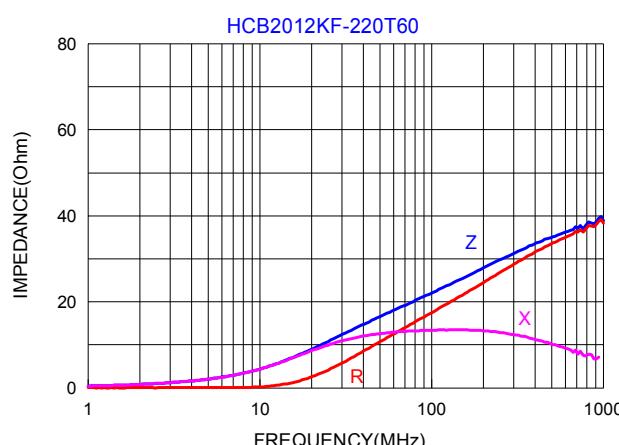


## 4. Specification

Tai-Tech Part Number	Impedance (Ω)	Test Frequency (Hz)	DC Resistance (Ω) max.	Rated Current (mA) max.
HCB2012KF-220T60	22±25%	60mV/100M	0.01	6000

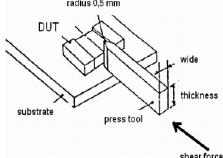
- Rated current: based on temperature rise test
- In compliance with EIA 595

### ■ Impedance-Frequency Characteristics



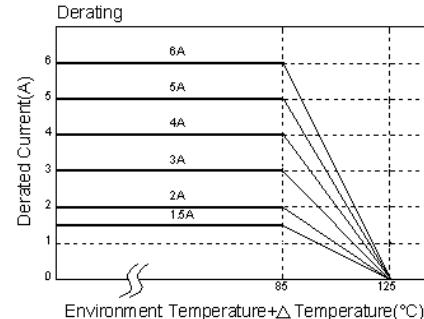
## 5. Reliability and Test Condition

Item	Performance					Test Condition															
Series No.	FCB	FCM	HCB	GHB	FCA	--															
Operating Temperature	-40~+125°C (Including self-temperature rise)					--															
Transportation Storage Temperature	-40~+125°C (on board)					For long storage conditions, please see the Application Notice															
Impedance (Z)	Refer to standard electrical characteristics list					Agilent4291 Agilent E4991 Agilent4287 Agilent16192															
DC Resistance						Agilent 4338															
Rated Current						DC Power Supply Over Rated Current requirements, there will be some risk															
Temperature Rise Test	Rated Current < 1A ΔT 20°C Max Rated Current ≥ 1A ΔT 40°C Max					1. Applied the allowed DC current. 2. Temperature measured by digital surface thermometer.															
Life test	Appearance: no damage.  Impedance: within±15% of initial value. Inductance: within±10% of initial value. Q : Shall not exceed the specification value.  RDC : within ±15% of initial value and shall not exceed the specification value					Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) Temperature: 125±2°C Applied current: rated current. Duration: 1000±12hrs. Measured at room temperature after placing for 24±2 hrs.															
Load Humidity						Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) Humidity: 85±2%R.H. Temperature: 85±2°C. Duration: 1000hrs Min. with 100% rated current. Measured at room temperature after placing for 24±2 hrs.															
Thermal shock	Appearance: no damage.  Impedance: within±15% of initial value. Inductance: within±10% of initial value. Q : Shall not exceed the specification value.  RDC : within ±15% of initial value and shall not exceed the specification value					Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) Condition for 1 cycle Step1: -40±2°C 30±5 min. Step2: 25±2°C ≥0.5min Step3: +125±2°C 30±5min. Number of cycles: 500 Measured at room temperature after placing for 24±2 hrs.															
Vibration	Appearance : No damage. Impedance : within±15% of initial value Inductance : within±10% of initial value Q : Shall not exceed the specification value. RDC : within ±15% of initial value and shall not exceed the specification value					Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles) Oscillation Frequency: 10~2K~10Hz for 20 minutes Equipment : Vibration checker Total Amplitude:1.52mm±10% Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations) .															
Bending	Appearance : No damage. Impedance : within±10% of initial value Inductance : within±10% of initial value Q : Shall not exceed the specification value. RDC : within ±15% of initial value and shall not exceed the specification value					Shall be mounted on a FR4 substrate of the following dimensions: >=0805inch(2012mm):40x100x1.2mm <0805inch(2012mm):40x100x0.8mm Bending depth: >=0805inch(2012mm):1.2mm <0805inch(2012mm):0.8mm Duration of 10 sec for a min.															
Shock	Appearance : No damage. Impedance : within±10% of initial value Inductance : within±10% of initial value Q : Shall not exceed the specification value. RDC : within ±15% of initial value and shall not exceed the specification value					Test condition: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Type</th><th>Peak Value (g's)</th><th>Normal duration (D) (ms)</th><th>Wave form</th><th>Velocity change (V)ft/sec</th></tr> </thead> <tbody> <tr> <td>SMD</td><td>50</td><td>11</td><td>Half-sine</td><td>11.3</td></tr> <tr> <td>Lead</td><td>50</td><td>11</td><td>Half-sine</td><td>11.3</td></tr> </tbody> </table>	Type	Peak Value (g's)	Normal duration (D) (ms)	Wave form	Velocity change (V)ft/sec	SMD	50	11	Half-sine	11.3	Lead	50	11	Half-sine	11.3
Type	Peak Value (g's)	Normal duration (D) (ms)	Wave form	Velocity change (V)ft/sec																	
SMD	50	11	Half-sine	11.3																	
Lead	50	11	Half-sine	11.3																	
Solderability	More than 95% of the terminal electrode should be covered with solder.					Preheat: 150°C,60sec. Solder: Sn96.5%-Ag3%-Cu0.5% Solder temperature: 245±5°C Flux for lead free: Rosin. 9.5% Depth: completely cover the termination. Dip time: 4±1sec.															

Item	Performance	Test Condition		
		Temperature (°C)	Time (s)	Temperature ramp/immersion and emersion rate
Resistance to Soldering Heat	<p>Appearance : No damage.            Impedance : within<math>\pm 15\%</math> of initial value            Inductance : within<math>\pm 10\%</math> of initial value            Q : Shall not exceed the specification value.            RDC : within <math>\pm 15\%</math> of initial value and shall not exceed the specification value</p>	260 $\pm 5$ (solder temp)	10 $\pm 1$	25mm/s $\pm 6$ mm/s
Depth: completely cover the termination				
Terminal strength	<p>Appearance : No damage.            Impedance : within<math>\pm 15\%</math> of initial value            Inductance : within<math>\pm 10\%</math> of initial value            Q : Shall not exceed the specification value.            RDC : within <math>\pm 15\%</math> of initial value and shall not exceed the specification value</p>	 <p>Preconditioning: Run through IR reflow for 2 times. ( IPC/JEDEC J-STD-020D Classification Reflow Profiles)            Component mounted on a PCB apply a force &gt;0.805inch(20.12mm):1kg  <math>\leq 0.805inch(20.12mm):0.5kg</math>            to the side of a device being tested. This force shall be applied for 60 + 1 seconds. Also the force shall be applied gradually as not to shock the component being tested.</p>		

### \*\*Derating Curve

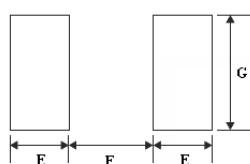
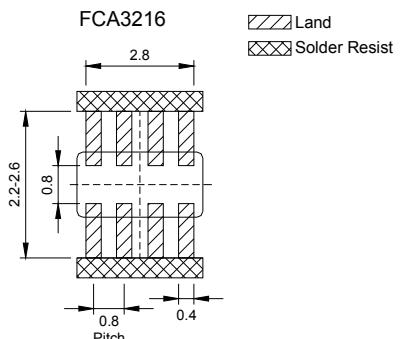
For the ferrite chip bead which withstanding current over 1.5A, as the operating temperature over 85°C, the derating current information is necessary to consider with. For the detail derating of current, please refer to the Derated Current vs. Operating Temperature curve.



## 6. Soldering and Mounting

### 6-1. Recommended PC Board Pattern

Series	Type	Chip Size				Land Patterns For Reflow Soldering		
		A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	G(mm)
FCB	0603	0.6 $\pm 0.03$	0.30 $\pm 0.03$	0.30 $\pm 0.03$	0.15 $\pm 0.05$	0.35	0.30	0.40
FCM	1005	1.0 $\pm 0.10$	0.50 $\pm 0.10$	0.50 $\pm 0.10$	0.25 $\pm 0.10$	0.50	0.40	0.60
HCB	1608	1.6 $\pm 0.15$	0.80 $\pm 0.15$	0.80 $\pm 0.15$	0.30 $\pm 0.20$	0.80	0.85	0.95
GHB	2012	2.0 $\pm 0.20$	1.25 $\pm 0.20$	0.85 $\pm 0.20$	0.50 $\pm 0.30$	1.05	1.00	1.45
FCI		2.0 $\pm 0.20$	1.25 $\pm 0.20$	1.25 $\pm 0.20$	0.50 $\pm 0.30$			
FHI	3216	3.2 $\pm 0.20$	1.60 $\pm 0.20$	1.10 $\pm 0.20$	0.50 $\pm 0.30$	1.05	2.20	1.80
FCH	3225	3.2 $\pm 0.20$	2.50 $\pm 0.20$	1.30 $\pm 0.20$	0.50 $\pm 0.30$	1.05	2.20	2.70
HCI	4516	4.5 $\pm 0.20$	1.60 $\pm 0.20$	1.60 $\pm 0.20$	0.50 $\pm 0.30$	1.05	3.30	1.80
	4532	4.5 $\pm 0.20$	3.20 $\pm 0.20$	1.50 $\pm 0.20$	0.50 $\pm 0.30$	1.05	3.30	3.40



PC board should be designed so that products can prevent damage from mechanical stress when warping the board.

### 6-2. Soldering

Mildly activated rosin fluxes are preferred. The terminations are suitable for re-flow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

Note.

If wave soldering is used, there will be some risk.

Re-flow soldering temperatures below 240 degrees, there will be non-wetting risk

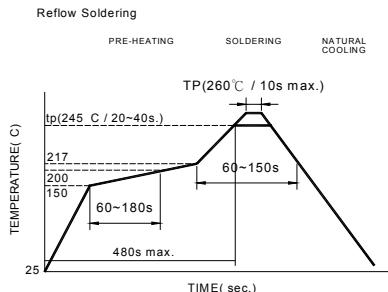
**6-2.1 Lead Free Solder re-flow:**

Recommended temperature profiles for lead free re-flow soldering in Figure 1. (Refered to J-STD-020C)

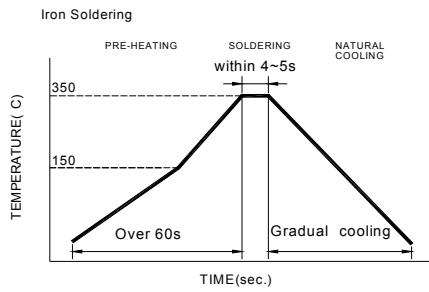
**6-2.2 Soldering Iron:**

Products attachment with a soldering iron is discouraged due to the inherent process control limitations. If a soldering iron must be employed the following precautions are recommended. for Iron Soldering in Figure 2.

- Preheat circuit and products to 150°C
- 350°C tip temperature (max)
- Never contact the ceramic with the iron tip
- 1.0mm tip diameter (max)
- Use a 20 watt soldering iron with tip diameter of 1.0mm
- Limit soldering time to 4~5sec.



Reflow times: 3 times max  
Fig.1

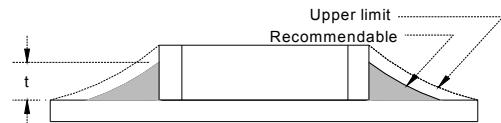


Iron Soldering times : 1 times max  
Fig.2

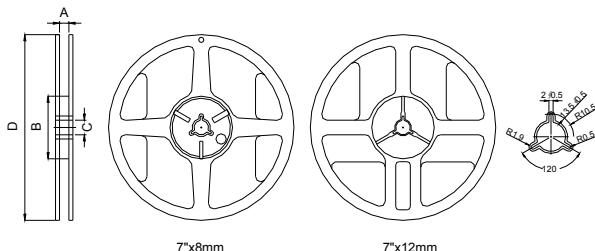
**6-2.3 Solder Volume:**

Accordingly increasing the solder volume, the mechanical stress to product is also increased. Exceeding solder volume may cause the failure of mechanical or electrical performance. Solder shall be used not to be exceed as shown in right side:

Minimum fillet height = soldering thickness + 25% product height



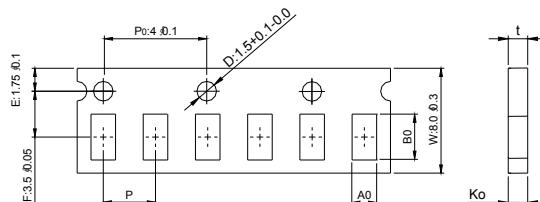
## 7. Packaging Information

**7-1. Reel Dimension**

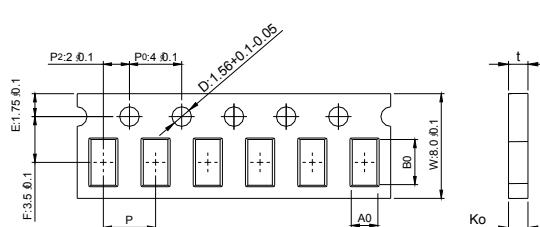
Type	A(mm)	B(mm)	C(mm)	D(mm)
7"x8mm	9.0±0.5	60±2	13.5±0.5	178±2
7"x12mm	13.5±0.5	60±2	13.5±0.5	178±2

**7-2.1 Tape Dimension / 8mm**

Material of taping is paper

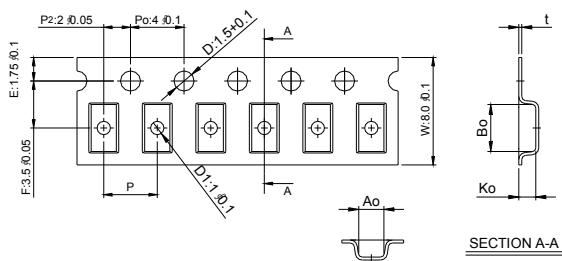


Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
060303	0.70±0.06	0.40±0.06	0.45max	2.0±0.05	0.45max
100505	1.12±0.03	0.62±0.03	0.60±0.03	2.0±0.05	0.60±0.03



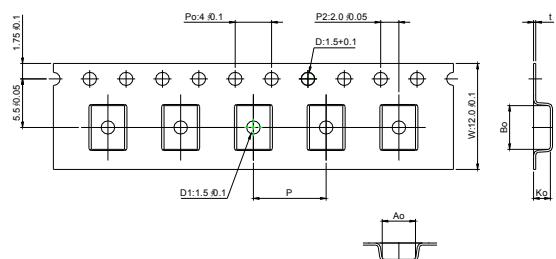
Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
160808	1.80±0.05	0.96±0.05/-0.03	0.95±0.05	4.0±0.10	0.95±0.05
201209	2.10±0.05	1.30±0.05	0.95±0.05	4.0±0.10	0.95±0.05

■ Material of taping is plastic



Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)	D1(mm)
201212	2.10±0.10	1.28±0.10	1.28±0.10	4.0±0.10	0.22±0.05	1.0±0.10
321611	3.35±0.10	1.75±0.10	1.25±0.10	4.0±0.10	0.23±0.05	1.0±0.10
322513	3.42±0.10	2.77±0.10	1.55±0.10	4.0±0.10	0.22±0.05	1.0±0.10
321609	3.40±0.10	1.77±0.10	1.04±0.10	4.0±0.10	0.22±0.05	1.0±0.10

### 7-2.2 Tape Dimension / 12mm

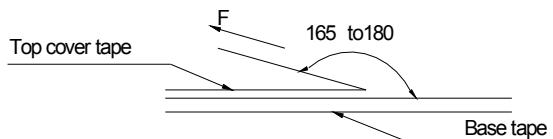


Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)	D1(mm)
451616	4.70±0.10	1.75±0.10	1.75±0.10	4.0±0.10	0.24±0.05	1.5±0.10
453215	4.70±0.10	3.45±0.10	1.60±0.10	8.0±0.10	0.24±0.05	1.5±0.10

### 7-3. Packaging Quantity

Chip Size	453215	451616	322513	321611	321609	201212	201209	160808	100505	060303
Chip / Reel	1000	2000	2500	3000	3000	2000	4000	4000	10000	15000
Inner box	4000	8000	12500	15000	15000	10000	20000	20000	50000	75000
Middle box	20000	40000	62500	75000	75000	50000	100000	100000	250000	375000
Carton	40000	80000	125000	150000	150000	100000	200000	200000	500000	750000

### 7-4. Tearing Off Force



The force for tearing off cover tape is 15 to 60 grams in the arrow direction under the following conditions.

Room Temp. (°C)	Room Humidity (%)	Room atm (hPa)	Tearing Speed mm/min
5~35	45~85	860~1060	300

#### Application Notice

- Storage Conditions(component level)
  - To maintain the solder ability of terminal electrodes:
  - 1. TAI-TECH products meet IPC/JEDEC J-STD-020D standard-MSL, level 1.
  - 2. Temperature and humidity conditions: Less than 40°C and 60% RH.
  - 3. Recommended products should be used within 12 months from the time of delivery.
  - 4. The packaging material should be kept where no chlorine or sulfur exists in the air.
- Transportation
  - 1. Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
  - 2. The use of tweezers or vacuum pick up is strongly recommended for individual components.
  - 3. Bulk handling should ensure that abrasion and mechanical shock are minimized.

**測試報告****Test Report**

西北臺慶科技股份有限公司 /TAI-TECH ADVANCED ELECTRONICS CO., LTD.

(臺慶精密電子(昆山)有限公司 / TAI-TECH ADVANCED ELECTRONICS (KUN-SHAN) CO. LTD.)

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(中國, 江蘇省, 宿遷市, 泗洪縣, 經濟開發區杭州路南側, 建設北路東側 / THE SOUTH HANGZHOU ROAD AND THE EAST JIANSHE ROAD, ECONOMIC DEVELOPMENT ZONE, SIHONG COUNTY, JIANGSU PROVINCE, P.R. CHINA)

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):

樣品名稱(Sample Description) : FERRITE CHIP BEAD INDUCTOR ARRAY MCF MCM YMV SERIES

樣品型號(Style/Item No.) : FERRITE CHIP BEAD INDUCTOR ARRAY MCF MCM YMV SERIES

收件日期(Sample Receiving Date) : 2016/12/06

測試期間(Testing Period) : 2016/12/06 TO 2016/12/12

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

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

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**測試報告****Test Report**

號碼(No.) : CE/2016/C0807 日期(Date) : 2016/12/12 頁數(Page): 2 of 15

西北臺慶科技股份有限公司 / TAI-TECH ADVANCED ELECTRONICS CO., LTD.  
 (臺慶精密電子(昆山)有限公司 / TAI-TECH ADVANCED ELECTRONICS (KUN-SHAN) CO. LTD.)  
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 (中國, 江蘇省, 宿遷市, 泗洪縣, 經濟開發區杭州路南側, 建設北路東側 / THE SOUTH HANGZHOU ROAD AND THE EAST JIANSHE ROAD, ECONOMIC DEVELOPMENT ZONE, SIHONG COUNTY, JIANGSU PROVINCE, P, R, CHINA)

**測試結果(Test Results)**

測試部位(PART NAME)No. 1 : 整體混測 (MIXED ALL PARTS)

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
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 (2008), 以UV-VIS檢測. / With reference to IEC 62321 (2008) and performed by UV-VIS.	2	n. d.
銻 / Antimony (Sb)	mg/kg	參考 US EPA 3052 (1996), 以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), 以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.
鍍 / Beryllium (Be)	mg/kg	參考 US EPA 3052 (1996), 以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.

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# 測試報告

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西北臺慶科技股份有限公司 / TAI-TECH ADVANCED ELECTRONICS CO., LTD.

(臺慶精密電子(昆山)有限公司 / TAI-TECH ADVANCED ELECTRONICS (KUN-SHAN) CO. LTD.)

(慶邦電子元器件(泗洪)有限公司 / TAIPAQ ELECTRONICS (SI-HONG) CO., LTD.)

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(中國, 江蘇省, 宿遷市, 泗洪縣, 經濟開發區杭州路南側, 建設北路東側 / THE SOUTH HANGZHOU ROAD AND THE EAST JIANSHE ROAD, ECONOMIC DEVELOPMENT ZONE, SIHONG COUNTY, JIANGSU PROVINCE, P.R. CHINA)

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
多溴聯苯總和 / Sum of PBBs	mg/kg		-	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 62321-6 (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.
鄰苯二甲酸丁苯甲酯 / BBP (Butyl Benzyl phthalate) (CAS No. : 85-68-7)	mg/kg	參考 IEC 62321-8/CD (2013), 以氣相層析儀/質譜儀檢測. / With reference to IEC 62321-8/CD (2013). 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.

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(中國, 江蘇省, 宿遷市, 泗洪縣, 經濟開發區杭州路南側, 建設北路東側 / THE SOUTH HANGZHOU ROAD AND THE EAST JIANSHE ROAD, ECONOMIC DEVELOPMENT ZONE, SIHONG COUNTY, JIANGSU PROVINCE, P, R, CHINA)

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
鄰苯二甲酸二(2-乙基己基)酯 / DEHP (Di-(2-ethylhexyl) phthalate) (CAS No. : 117-81-7)	mg/kg	參考 IEC 62321-8/CD (2013), 以氣相層析儀/質譜儀檢測。/ With reference to IEC 62321-8/CD (2013). Analysis was performed by GC/MS.	50	n. d.
鄰苯二甲酸二異丁酯 / DIBP (Di-isobutyl phthalate) (CAS No. : 84-69-5)	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		50	n. d.
鄰苯二甲酸二異壬酯 / DINP (Di-isobutyl phthalate) (CAS No. : 28553-12-0; 68515-48-0)	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.
鄰苯二甲酸二正己酯 / DNHP (Di-n-hexyl phthalate) (CAS No. : 84-75-3)	mg/kg		50	n. d.
鄰苯二甲酸二戊酯 / DNPP (Di-n-pentyl phthalate) (CAS No. : 131-18-0)	mg/kg		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	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.	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		50	n. d.
鹵素 (氯) / Halogen-Chlorine (Cl) (CAS No. : 22537-15-1)	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 (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.
全氟辛烷磺酸 / Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	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.
全氟辛酸 / 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.
聚氯乙烯 / PVC	**	以紅外光譜分析及焰色法檢測。/ Analysis was performed by FTIR and FLAME Test.	-	Negative

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### 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. Negative = Undetectable 陰性(未偵測到); Positive = Detectable 陽性(已偵測到)
7. 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1 $\mu$ g/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 1 $\mu$ g/m<sup>2</sup>.)

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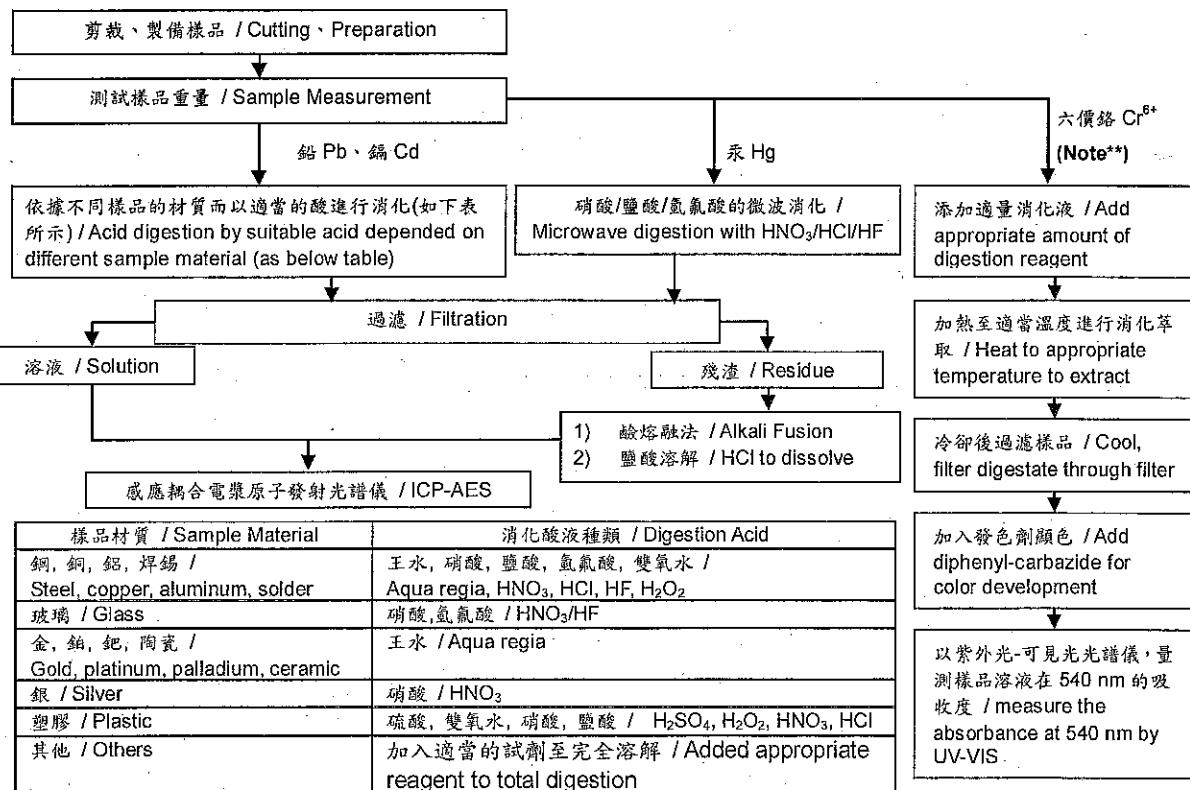
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重金屬流程圖 / Analytical flow chart of Heavy Metal (IEC 62321)

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: 王志瑋 / Technician: JR Wang
- 測試負責人: 張啟興 / Supervisor: 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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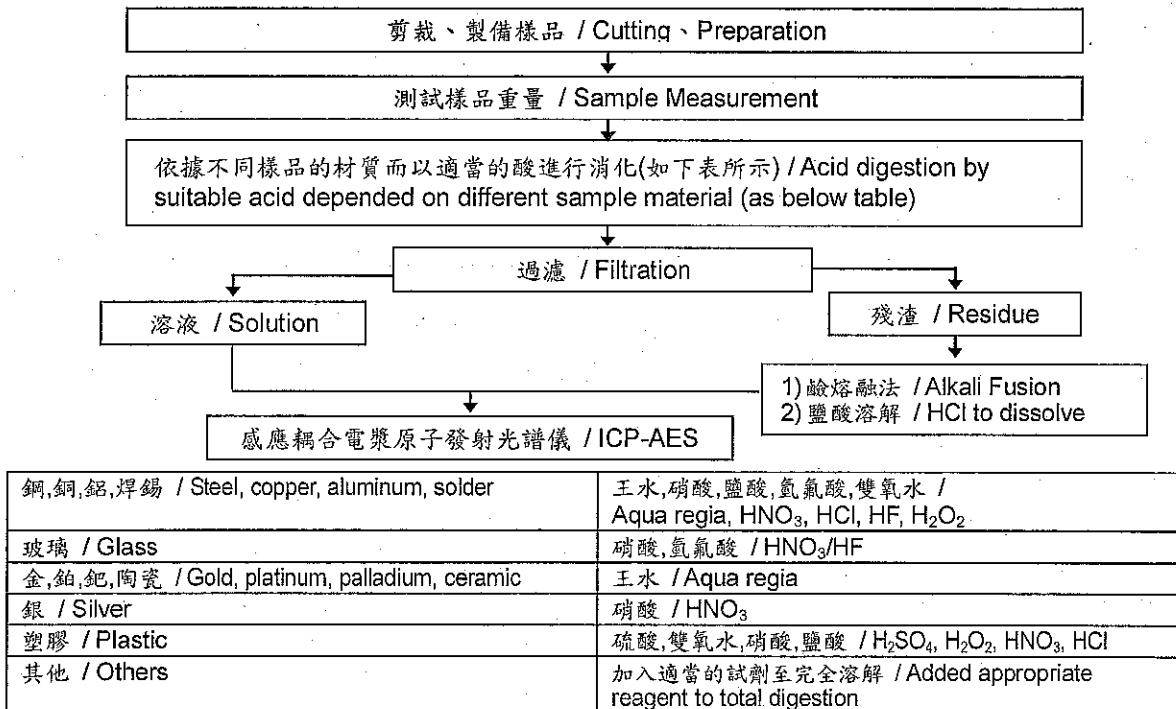
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根據以下的流程圖之條件, 樣品已完全溶解。 / These samples were dissolved totally by pre-conditioning method according to below flow chart.

- 測試人員: 王志璋 / Technician: JR Wang
- 測試負責人: 張啟興 / Supervisor: Troy 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)



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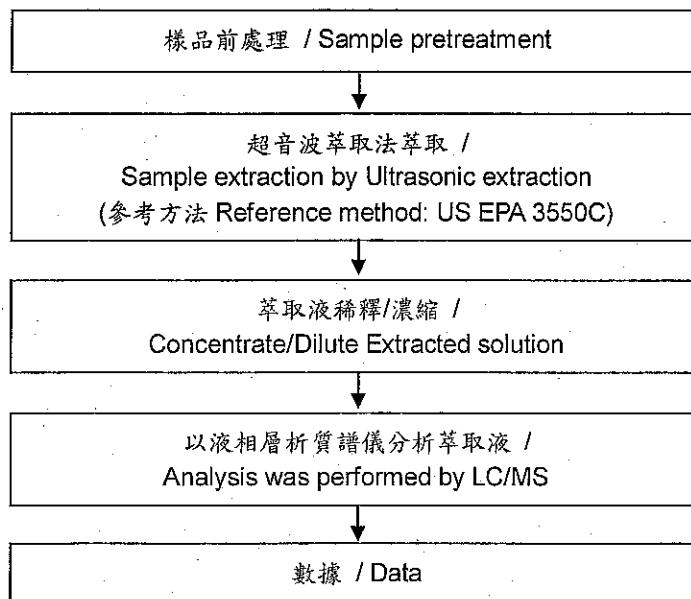
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**全氟辛酸/全氟辛烷磺酸分析流程圖 / Analytical flow chart - PFOA/PFOS**

- 測試人員: 涂雅苓 / Technician: Yaling Tu
- 測試負責人: 張啟興 / Supervisor: Troy Chang



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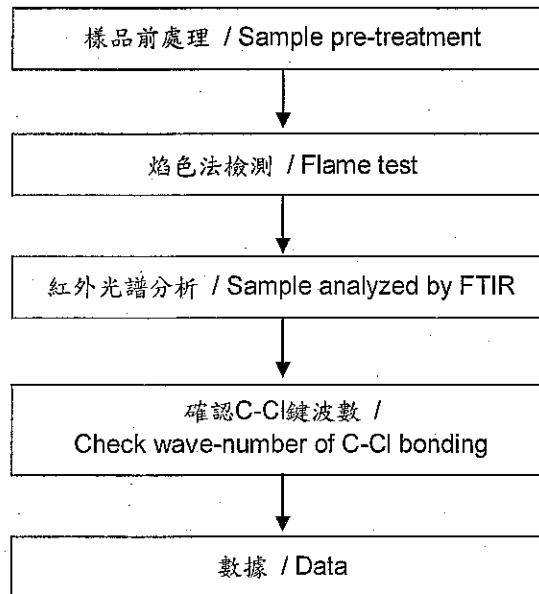
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**聚氯乙烯物質判定分析流程圖 / Analysis flow chart - PVC**

- 測試人員 : 涂雅苓 / Technician: Yaling Tu
- 測試負責人 : 張啟興 / Supervisor: Troy Chang



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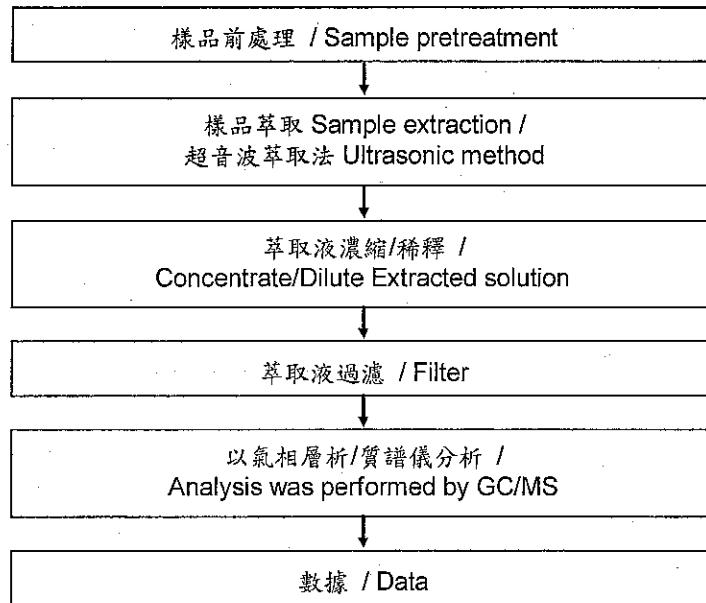
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**六溴環十二烷分析流程圖 / Analytical flow chart - HBCDD**

- 測試人員: 涂雅苓 / Technician: Yaling Tu
- 測試負責人: 張啟興 / Supervisor: Troy Chang



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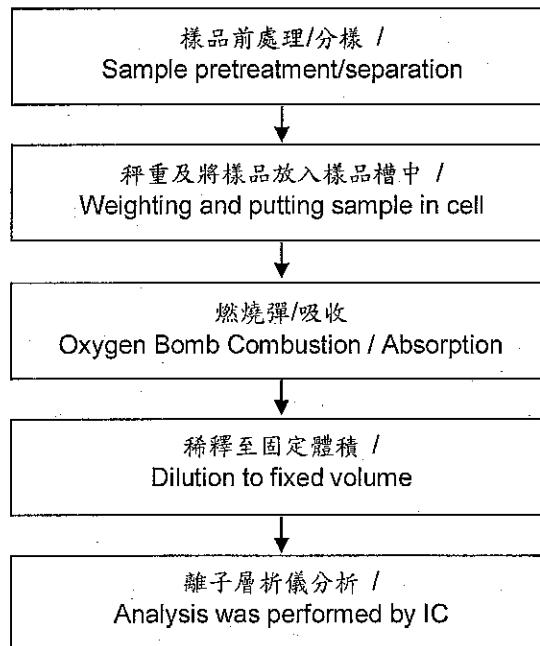
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**鹵素分析流程圖 / Analytical flow chart - Halogen**

- 測試人員: 陳恩臻 / Technician: Rita Chen
- 測試負責人: 張啟興 / Supervisor: Troy Chang



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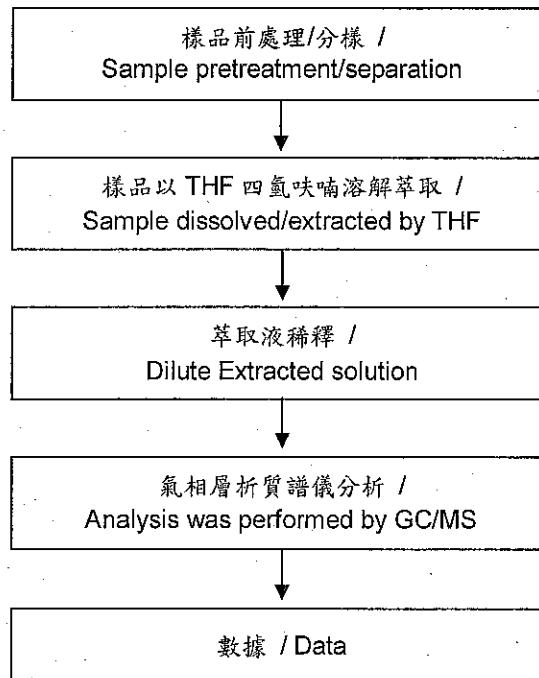
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**可塑劑分析流程圖 / Analytical flow chart - Phthalate**

- 測試人員 : 徐毓明 / Technician: Andy Shu
- 測試負責人 : 張啟興 / Supervisor : Troy Chang

**【測試方法/Test method: IEC 62321-8】**

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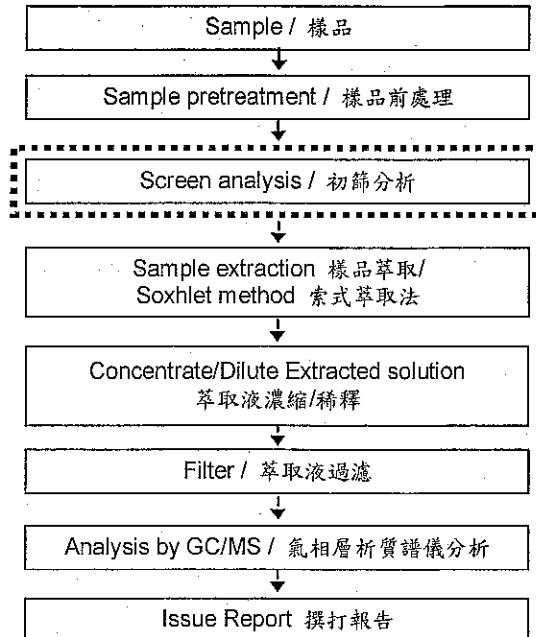
**多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBB/PBDE**

- 測試人員: 余雅苓 / Technician: Yaling Tu
- 測試負責人: 張啟興 / Supervisor: 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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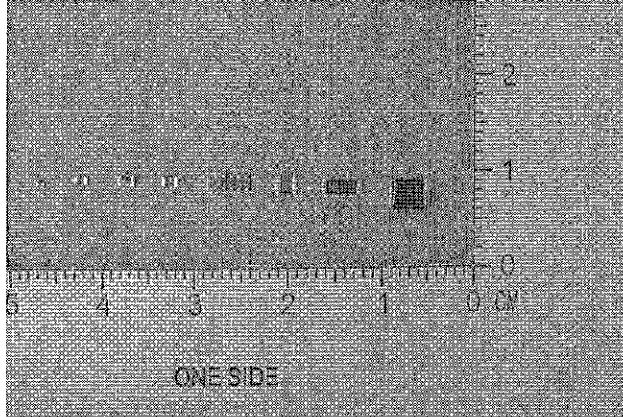
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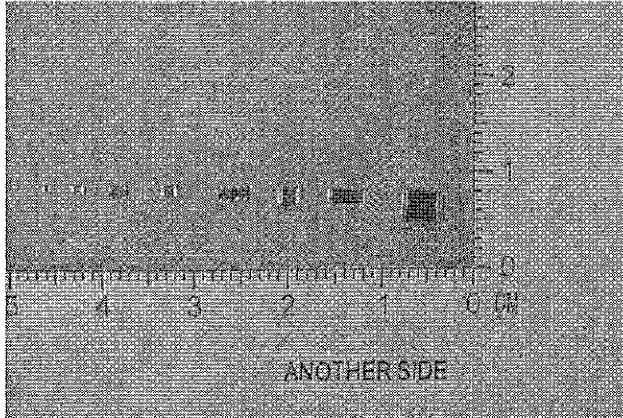
\* 照片中如有箭頭標示, 則表示為實際檢測之樣品/部位. \*

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

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