

# Specification for Approval

**Date:** 2012/04/24

**Customer :** 協裕

**TAI-TECH P/N:** HPC6045 Series

**CUSTOMER P/N:** \_\_\_\_\_

**DESCRIPTION:** \_\_\_\_\_

**QUANTITY:** \_\_\_\_\_ pcs

<b>REMARK:</b>		
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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# Power Inductor

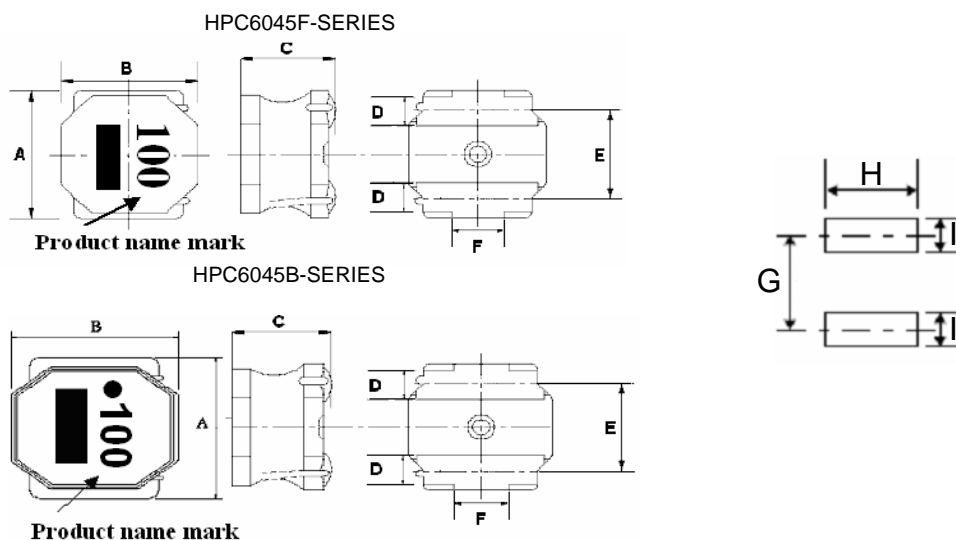
HPC6045 Series

## 1. Features

1. This specification applies Low Profile Power Inductors.
2. 100% Lead(Pb) & Halogen-Free and RoHS compliant.



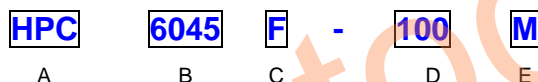
## 2. Dimension



Series	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	G(mm)	H(mm)	I(mm)
HPC6045F/B	6.0±0.2	6.0±0.2	4.5max.	1.35±0.2	4.0±0.2	2.3 typ.	4.7 ref.	5.7 ref.	1.6 ref.

Units: mm

## 3. Part Numbering



- A: Series  
 B: Dimension  
 C: Control S/N  
 D: Inductance 100=10.0uH  
 E: Inductance Tolerance M=±20% ; Y=±30%

## 4. Specification

TAI-TECH Part Number	Inductance (uH)	Tolerance (%)	Test Frequency (Hz)	SRF (MHz) min.	DCR (Ω) ±20%	I sat (A)	I rms (A)
HPC6045F-1R0Y	1.0	±30%	1V100K	110	0.014	8.50	4.20
HPC6045F-1R3Y	1.3	±30%	1V100K	95	0.016	8.00	4.00
HPC6045F-1R8Y	1.8	±30%	1V100K	80	0.018	7.00	3.70
HPC6045F-2R3Y	2.3	±30%	1V100K	60	0.021	6.00	3.50
HPC6045F-3R0Y	3.0	±30%	1V100K	45	0.024	5.00	3.20
HPC6045F-4R5M	4.5	±20%	1V100K	25	0.031	4.00	3.00
HPC6045F-6R3M	6.3	±20%	1V100K	15	0.038	3.80	2.80
HPC6045F-100M	10	±20%	1V100K	12	0.047	3.00	2.50
HPC6045F-150M	15	±20%	1V100K	10	0.077	2.30	1.90
HPC6045F-220M	22	±20%	1V100K	7	0.115	1.90	1.50
HPC6045F-330M	33	±20%	1V100K	6	0.145	1.50	1.40
HPC6045F-470M	47	±20%	1V100K	5	0.220	1.30	1.10
HPC6045F-680M	68	±20%	1V100K	4	0.330	1.00	0.90
HPC6045F-101M	100	±20%	1V100K	3	0.500	0.80	0.70

TAI-TECH Part Number	Inductance (uH)	Tolerance (%)	Test Frequency (Hz)	SRF (MHz) min.	DCR (Ω) ±20%	I sat (A)	I rms (A)
HPC6045B-1R0Y	1.0	±30%	1V100K	110	0.014	9.80	4.50
HPC6045B-1R3Y	1.3	±30%	1V100K	95	0.016	8.20	4.20
HPC6045B-1R8Y	1.8	±30%	1V100K	80	0.019	7.20	3.90
HPC6045B-2R3Y	2.3	±30%	1V100K	60	0.022	6.40	3.60
HPC6045B-3R0Y	3.0	±30%	1V100K	45	0.024	5.60	3.30
HPC6045B-4R5M	4.5	±20%	1V100K	25	0.030	4.40	3.10
HPC6045B-6R3M	6.3	±20%	1V100K	15	0.036	3.60	3.00
HPC6045B-100M	10	±20%	1V100K	12	0.046	3.10	2.40
HPC6045B-150M	15	±20%	1V100K	10	0.070	2.50	1.90
HPC6045B-220M	22	±20%	1V100K	7	0.107	2.00	1.60
HPC6045B-330M	33	±20%	1V100K	6	0.141	1.65	1.40
HPC6045B-470M	47	±20%	1V100K	5	0.211	1.40	1.15
HPC6045B-680M	68	±20%	1V100K	4	0.304	1.10	0.95
HPC6045B-101M	100	±20%	1V100K	3	0.466	0.90	0.75

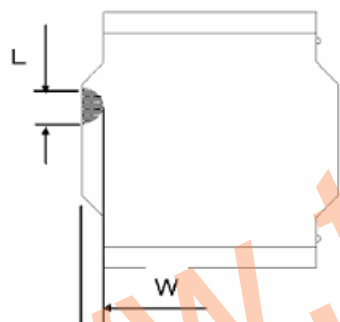
Note:

I<sub>sat</sub> : Based on inductance change ( $\Delta L/L_0 : \leq -30\%$ ) @ ambient temp. 25°C

I<sub>rms</sub> : Based on temperature rise ( $\Delta T : 40^\circ\text{C}$  typ.)

Core chipping

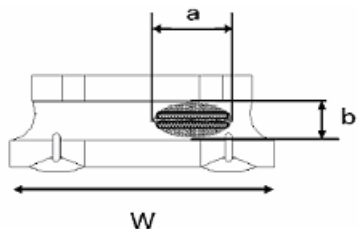
The appearance standard of the chipping size in top side, of bottom side ferrite core is following dimension.



Type	L	W
HPC6045F/B	1.5mm Max.	1.5mm Max.

Void appearance tolerance Limit

Size of voids occurring to coating resin is specified below.



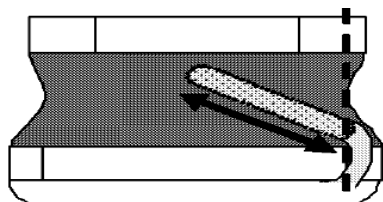
Exposed wire tolerance limit of coating resin part on product side.

Size of exposed wire occurring to coating resin is specified below.

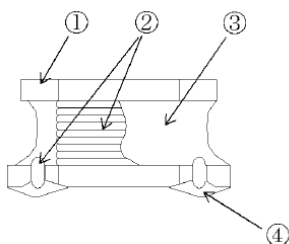
1. Width direction ( dimension a ) : Acceptable when  $a \leq w/2$   
Nonconforming when  $a > w/2$
2. Length direction ( dimension b ) : Dimension b is not specified.
3. When total area of exposed wire occurring to each sides is not greater than 50% of coating resin area, that is acceptable.

External appearance criterion for exposed wire

Exposed end of the winding wire at the secondary side should be 3mm and below.



## 5. Material List



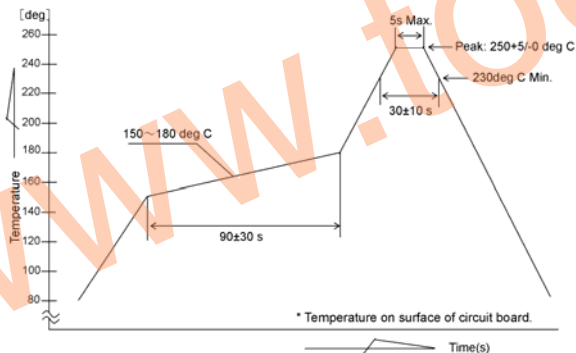
No.	Item	Material
1	Core	Ni-Zn ferrite
2	Wire	Copper Wire
3	Coating	Epoxy
4	Solder	Lead free

## 6. Reliability and Test Condition

Item	Performance	Test Method and Remarks
Operating Temperature	F Type: -25 ~ +120°C. B Type: -25 ~ +125°C.	Including self-generated heat
Storage Temperature	-40 ~ +85°C. -5 to 40°C for the product with taping.	
Rated current		
Inductance (L)	Within the specified tolerance	LCR Meter: HP 4285A or equivalent, 100kHz, 1V
DC Resistance		DC Ohmmeter: HIOKI3227 or equivalent
Temperature characteristics	Inductance change : Within±20%	Measurement of inductance shall be taken at temperature rang within-25°C to +85°C. With reference to inductance value at+20 °C,change rate shall be calculated. Measurement of inductance shall be taken at temperature rang within-40°C to +125°C. With reference to inductance value at+20 °C,change rate shall be calculated.
Resistance to flexure substrate	No damage.	The test samples shall be soldered to the testing board by the reflow. As illustrated below, apply force in the direction of the arrow indicating until deflection of the test board reaches to 2mm.  Substrate size : 100x40x1.0 Substrate material : glass epoxy-resin Solder cream thickness : 0.15
Adhesion of Terminal electrode	Shall not come off PC board.	The test samples shall be soldered to the testing board and by the reflow.  Applied force : 10 N to X and Y directions. Duration : 5s Solder cream thickness : 0.15
Resistance to Vibration	Inductance change : Within±10% No abnormality observed in appearance.	The test samples shall be soldered to the test board by the reflow. Then it shall be submitted to below test conditions. Frequency: 10-55Hz Total Amplitude: 1.5mm (May not exceed acceleration 196m/S <sup>2</sup> ) Sweeping Method:10Hz to 55Hz to 10Hz for 1min. Time : 2 hours each in X,Y, and Z Direction. Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.
Solderability	At least 90% of surface of terminal electrode is covered by new solder.	The test samples shall be dipped in flux, and then immersed in molten solder as shown in below. Flux : methanol solution containing rosin 25% Solder temperature: 245±5°C Time: 5±1.0 sec. Immersion depth: All sides of mounting terminal shall be immersed.
Resistance to soldering	Inductance change : Within±10% No abnormality observed in appearance.	The test sample shall be exposed to reflow oven at 230±5°C for 40 seconds, with peak temperature at 260±5°C for 5 seconds,2 times. Test board thickness: 1.0mm Test board material: glass epoxy-resin

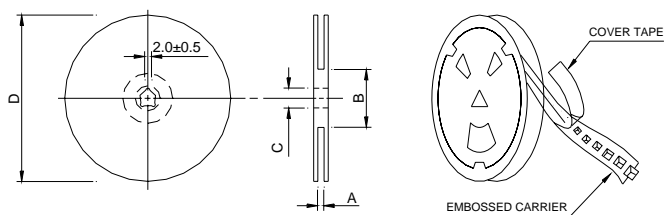
Item	Performance	Test Method and Remarks															
Thermal shock		The test samples shall be soldered to the test board by the reflow. The test samples shall be placed at specified temperature for specified time by step 1 to step 4 as shown below in sequence. The temperature cycles shall be repeated 100 cycles . <table border="1" data-bbox="991 309 1374 427"> <thead> <tr> <th>Phase</th> <th>Temperature(°C)</th> <th>Time(min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40±3°C</td> <td>30±3</td> </tr> <tr> <td>2</td> <td>Room Temp</td> <td>Within 3</td> </tr> <tr> <td>3</td> <td>85±2°C</td> <td>30±3</td> </tr> <tr> <td>4</td> <td>Room Temp</td> <td>Within 3</td> </tr> </tbody> </table>	Phase	Temperature(°C)	Time(min.)	1	-40±3°C	30±3	2	Room Temp	Within 3	3	85±2°C	30±3	4	Room Temp	Within 3
Phase	Temperature(°C)	Time(min.)															
1	-40±3°C	30±3															
2	Room Temp	Within 3															
3	85±2°C	30±3															
4	Room Temp	Within 3															
Damp heat life test		Test Method and Remarks The test samples shall be soldered to the test board by the reflow. The test samples shall be placed in thermostatic oven set at specified temperature and humidity as shown in below. Temperature: 60±2°C Humidity: 90~95%RH Time: 500+24/-0 hrs															
Loading under damp heat life test	Inductance change : Within±10% No abnormality observed in appearance.	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed in thermostatic oven set at specified temperature and humidity and applied the rated current continuously as shown in below. Temperature: 60±2°C Humidity: 90~95%RH Applied current: Rated current Time: 500+24/-0 hrs															
Low temperature life test		The test samples shall be soldered to the test board by the reflow. After that, the test samples shall be placed at test conditions as shown in below. Temperature: -40±2°C Time: 500+24/-0 hrs															
Loading at high temperature life test		The test samples shall be soldered to the test board by the reflow. Temperature: 85±2°C. Applied current: Rated current Time: 500+24/-0 hrs.															

### 7. Soldering



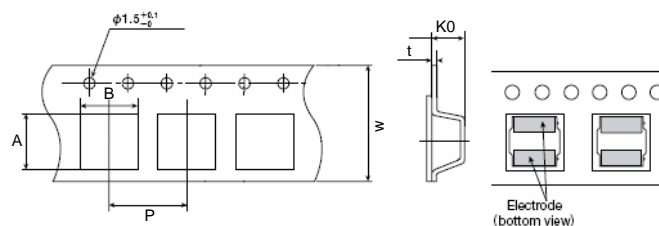
## 8. Packaging Information

### (1) Reel Dimension



Type	A(mm)	B(mm)	C(mm)	D(mm)
HPC6045F/B	13.5±1.0	80±2.0	13±0.5	330±3.0

### (2) Tape Dimension



Type	A(mm)	B(mm)	Ko(mm)	P(mm)	W(mm)	t(mm)
HPC6045F/B	6.3±0.1	6.3±0.1	4.7±0.1	8.0±0.1	12±0.3	0.4±0.1

### (3) Packaging Quantity

Type	Chip / Reel
HPC6045F/B	1500

#### Application Notice

- Storage Conditions
  - To maintain the solderability of terminal electrodes:
    1. TAI-TECH products meet IPC/JEDEC J-STD-020D standard-MSL, level 1.
    2. Temperature and humidity conditions: Less than 30°C and 70% RH.
    3. Recommended products should be used within 6 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


號碼(No.) : CE/2012/24506 日期(Date) : 2012/02/29 頁數(Page) : 1 of 7

西北臺慶科技股份有限公司 / TAI-TECH ADVANCED ELECTRONICS CO., LTD.  
(東莞臺慶精密電子有限公司 / TAI-TECH ADVANCED ELECTRONICS (DONGGUAN) 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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(江蘇省昆山市蓬朗昆嘉高科技工業區郭澤路 / GUO-ZE ROAD, KUNJIA HI-TECH INDUSTRIAL PARK, KUN-SHAN, JIANG-SU,  
CHINA)

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) : TLP, HPC, TLPC, SPC, TLPH, SPI SERIES  
樣品型號(Style/Item No.) : TLP, HPC, TLPC, SPC, TLPH, SPI SERIES  
收件日期(Sample Receiving Date) : 2012/02/21  
測試期間(Testing Period) : 2012/02/21 TO 2012/02/29

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

  
Chenyu Kung / Operation Manager  
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/2012/24506 日期(Date) : 2012/02/29 頁數(Page) : 2 of 7

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 (江蘇省昆山市蓬朗昆嘉高科技工業區郭澤路 / GUO-ZE ROAD, KUNJIA HI-TECH INDUSTRIAL PARK, KUN-SHAN, JIANG-SU, CHINA)

### 測試結果(Test Results)

測試部位(PART NAME) No.1 : 整體混測 (6款) (MIXED ALL PARTS (6 KINDS))

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	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.
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.
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.
鹵素 / Halogen				
鹵素(氟) / Halogen-Fluorine (F) (CAS No.: 14762-94-8)			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)			50	n.d.
鹵素(碘) / Halogen-Iodine (I) (CAS No.: 14362-44-8)			50	n.d.

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## 測試報告

## Test Report

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 (臺慶精密電子(昆山)有限公司 / TAI-TECH ADVANCED ELECTRONICS (KUN-SHAN) CO., LTD.)  
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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	結果 (Result)
			(MDL)	No. 1
多溴聯苯總和 / Sum of PBBs	mg/kg	參考IEC 62321: 2008方法, 以氣相層析儀/質譜儀檢測. / With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
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.
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% = 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.)

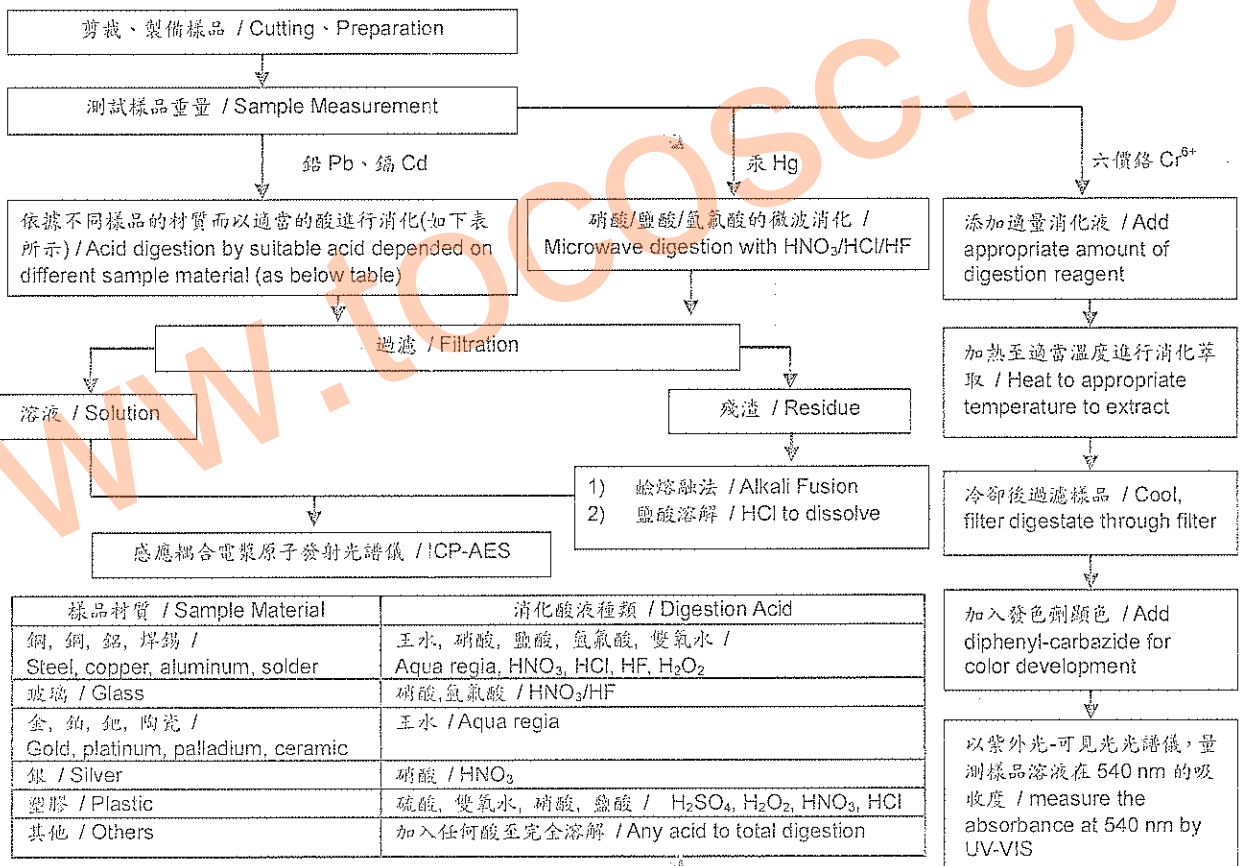
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## 測試報告 Test Report

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 (廣東省東莞市黃江鎮黃牛埔福祥街2號 / NO. 2, FUXIANG STREET, HUANGNIUPU, HUANGJIANG TOWN, DONGGUAN, GUANGDONG)  
 (江蘇省昆山市蓬朗區嘉高科技工業區郭澤路 / GUO-ZE ROAD, KUNJIA HI-TECH INDUSTRIAL PARK, KUN-SHAN, JIANG-SU, CHINA)

- 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. (Cr<sup>6+</sup> 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



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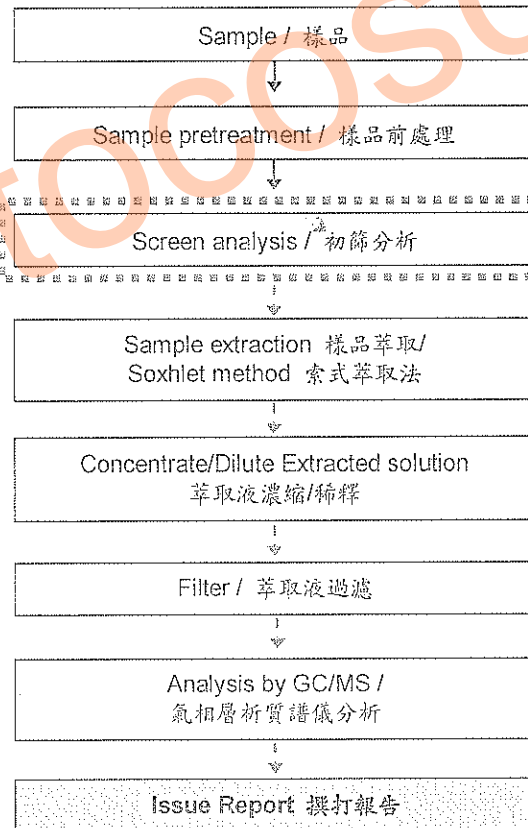
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### 多溴聯苯/多溴聯苯醚分析流程圖 / PBB/PBDE analytical FLOW CHART

圖 測試人員：翁賜彬 / Name of the person who made measurement: Roman Wong  
 圖 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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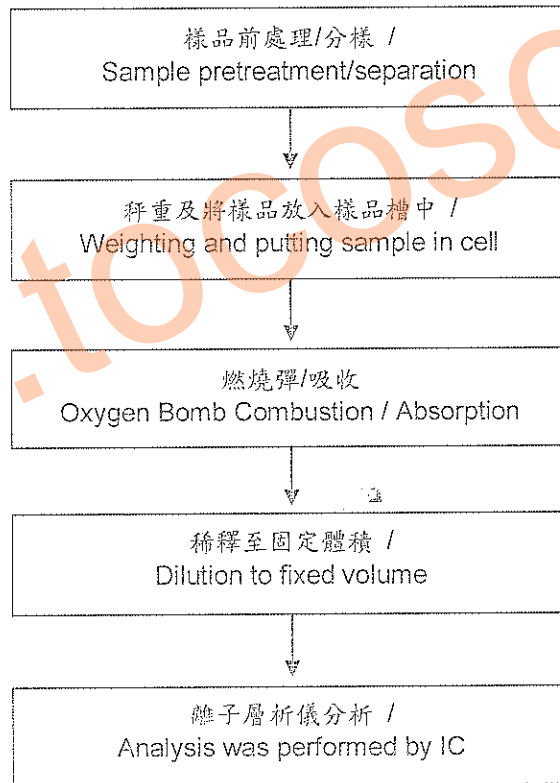
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### 鹵素分析流程圖 / Analytical flow chart of halogen content

- 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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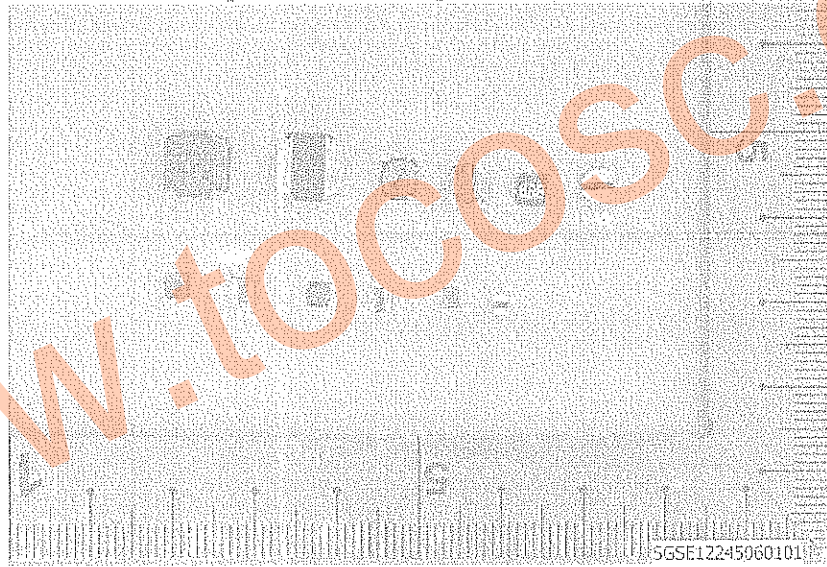
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\* 照片中如有箭頭標示，則表示為實際檢測之樣品/部位。\*

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

### CE/2012/24506



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