

**SMD Type Power Inductor**

**ECN HISTORY LIST**

| REV    | DATE     | DESCRIPTION | APPROVED | CHECKED | DRAWN |
|--------|----------|-------------|----------|---------|-------|
| 1.0    | 17/01/20 | 新發行         | 楊祥忠      | 詹偉特     | 何秦芝   |
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| 備<br>註 |          |             |          |         |       |

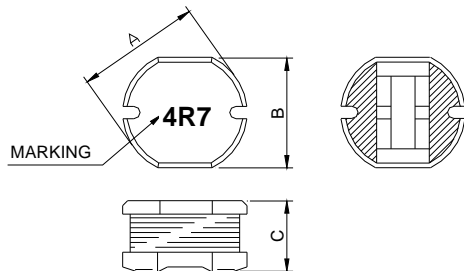
# SMD Type Power Inductor

## 1. Features

1. Excellent solderability and high heat resistance.
2. Excellent terminal strength construction.
3. Packed in embossed carrier tape and can be used by automatic mounting machine.
4. 100% Lead(Pb) & Halogen-Free and RoHS compliant.

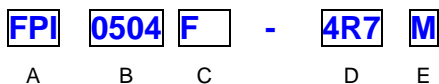


## 2. Dimension



| Size     | A(mm)    | B(mm)    | C(mm)    |
|----------|----------|----------|----------|
| FPI 0504 | 5.80±0.3 | 5.20±0.3 | 4.50±0.3 |

## 3. Part Numbering



- A: Series
  - B: Dimension
  - C: Lead free type
  - D: Inductance
  - E: Inductance Tolerance
- Black marking  
 4R7=4.7uH  
 K=±10%, M=±20%

## 4. Specification

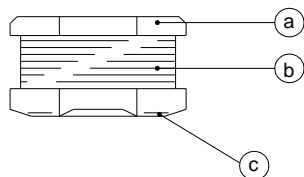
| TAI-TECH<br>Part Number | Inductance<br>( $\mu$ H) | Tolerance<br>(%) | Test<br>Frequency<br>(Hz) | DCR<br>( $\Omega$ ) max. | IDC<br>(A) max. |
|-------------------------|--------------------------|------------------|---------------------------|--------------------------|-----------------|
| FPI 0504F-1R0M          | 1.0                      | $\pm 20\%$       | 1V/7.96M                  | 0.018                    | 3.50            |
| FPI 0504F-1R4M          | 1.4                      | $\pm 20\%$       | 1V/7.96M                  | 0.020                    | 3.50            |
| FPI 0504F-1R8M          | 1.8                      | $\pm 20\%$       | 1V/7.96M                  | 0.025                    | 3.00            |
| FPI 0504F-2R2M          | 2.2                      | $\pm 20\%$       | 1V/7.96M                  | 0.030                    | 2.80            |
| FPI 0504F-2R7M          | 2.7                      | $\pm 20\%$       | 1V/7.96M                  | 0.035                    | 2.60            |
| FPI 0504F-3R3M          | 3.3                      | $\pm 20\%$       | 1V/7.96M                  | 0.040                    | 2.50            |
| FPI 0504F-3R9M          | 3.9                      | $\pm 20\%$       | 1V/7.96M                  | 0.050                    | 2.30            |
| FPI 0504F-4R7M          | 4.7                      | $\pm 20\%$       | 1V/7.96M                  | 0.060                    | 2.60            |
| FPI 0504F-5R6M          | 5.6                      | $\pm 20\%$       | 1V/7.96M                  | 0.070                    | 2.40            |
| FPI 0504F-6R8M          | 6.8                      | $\pm 20\%$       | 1V/7.96M                  | 0.080                    | 2.20            |
| FPI 0504F-8R2M          | 8.2                      | $\pm 20\%$       | 1V/7.96M                  | 0.080                    | 2.00            |
| FPI 0504F-100M          | 10                       | $\pm 20\%$       | 1V/2.52M                  | 0.090                    | 1.80            |
| FPI 0504F-120M          | 12                       | $\pm 20\%$       | 1V/2.52M                  | 0.100                    | 1.60            |
| FPI 0504F-150M          | 15                       | $\pm 20\%$       | 1V/2.52M                  | 0.120                    | 1.50            |
| FPI 0504F-180M          | 18                       | $\pm 20\%$       | 1V/2.52M                  | 0.150                    | 1.40            |
| FPI 0504F-220M          | 22                       | $\pm 20\%$       | 1V/2.52M                  | 0.180                    | 1.30            |
| FPI 0504F-270M          | 27                       | $\pm 20\%$       | 1V/2.52M                  | 0.220                    | 1.20            |
| FPI 0504F-330M          | 33                       | $\pm 20\%$       | 1V/2.52M                  | 0.260                    | 1.00            |
| FPI 0504F-390M          | 39                       | $\pm 20\%$       | 1V/2.52M                  | 0.300                    | 0.90            |
| FPI 0504F-470M          | 47                       | $\pm 20\%$       | 1V/2.52M                  | 0.350                    | 0.85            |
| FPI 0504F-560M          | 56                       | $\pm 20\%$       | 1V/2.52M                  | 0.400                    | 0.80            |
| FPI 0504F-680M          | 68                       | $\pm 20\%$       | 1V/2.52M                  | 0.450                    | 0.70            |
| FPI 0504F-820M          | 82                       | $\pm 20\%$       | 1V/2.52M                  | 0.500                    | 0.70            |
| FPI 0504F-101M          | 100                      | $\pm 20\%$       | 1V/1K                     | 0.700                    | 0.60            |
| FPI 0504F-121M          | 120                      | $\pm 20\%$       | 1V/1K                     | 0.750                    | 0.60            |
| FPI 0504F-151M          | 150                      | $\pm 20\%$       | 1V/1K                     | 0.900                    | 0.55            |
| FPI 0504F-181M          | 180                      | $\pm 20\%$       | 1V/1K                     | 1.100                    | 0.50            |
| FPI 0504F-221M          | 220                      | $\pm 20\%$       | 1V/1K                     | 1.200                    | 0.40            |
| FPI 0504F-271M          | 270                      | $\pm 20\%$       | 1V/1K                     | 1.500                    | 0.25            |
| FPI 0504F-331M          | 330                      | $\pm 20\%$       | 1V/1K                     | 3.000                    | 0.22            |
| FPI 0504F-391M          | 390                      | $\pm 20\%$       | 1V/1K                     | 3.500                    | 0.20            |
| FPI 0504F-471M          | 470                      | $\pm 20\%$       | 1V/1K                     | 4.000                    | 0.19            |
| FPI 0504F-561M          | 560                      | $\pm 20\%$       | 1V/1K                     | 4.000                    | 0.18            |
| FPI 0504F-681M          | 680                      | $\pm 20\%$       | 1V/1K                     | 4.500                    | 0.15            |

\* IDC Test

Isat : Based on inductance change ( $\Delta L/L0 : \leq -35\%$ ) @ ambient temp. 25°C

For all FPI series ,when a IDC current is applied, the temperature rised of the parts is less than 40 degree C

## 5. Material List



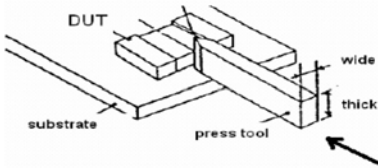
| No. | Item     | Material              |
|-----|----------|-----------------------|
| 1   | Core     | Ferrite DR Core       |
| 2   | Wire     | Enamelled Copper wire |
| 3   | Terminal | Ag+Ni+Sn              |

## 6. Schematic Diagram

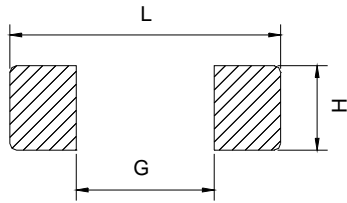


## 7. Reliability and Test Condition

| Item                               | Performance  | Test Condition  |
|------------------------------------|--|---|
| Operating temperature              | -40~+125°C (Including self - temperature rise)   |   |
| Storage temperature                | -40~+125°C (on board)  |   |
| <b>Electrical Performance Test</b> |  |   |
| Inductance                         | Refer to standard electrical characteristics list.   | HP4284A, CH11025, CH3302, CH1320, CH1320S<br>LCR Meter.   |
| DCR                                |  | CH16502, Agilent33420A Micro-Ohm Meter.   |
| Saturation Current (Isat)          | $\Delta L \leq 35\%$   | Saturation DC Current (Isat) will cause L0 to drop $\Delta L(\%)$ .   |
| Heat Rated Current (Irms)          | Approximately $\Delta T 40^\circ\text{C}$  | Heat Rated Current (Irms) will cause the coil temperature rise $\Delta T(^\circ\text{C})$<br>1. Applied the allowed DC current<br>2. Temperature measured by digital surface thermometer  |
| <b>Reliability Test</b>            |  |   |
| Life Test                          | Appearance : No damage.<br>Inductance : within $\pm 10\%$ of initial value<br>Q : Shall not exceed the specification value.<br>RDC : within $\pm 15\%$ of initial value and shall not exceed the specification value | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DC Classification Reflow Profiles)<br>Temperature : $125 \pm 2^\circ\text{C}$ (Inductor)<br>Applied current : rated current<br>Duration : 1000 $\pm$ 12hrs<br>Measured at room temperature after placing for 24 $\pm$ 2 hrs   |
| Load Humidity                      |  | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DC Classification Reflow Profiles)<br>Humidity : 85 $\pm$ 2%R.H,<br>Temperature : $85^\circ\text{C} \pm 2^\circ\text{C}$<br>Duration : 1000hrs Min. with 100% rated current<br>Measured at room temperature after placing for 24 $\pm$ 2 hrs  |
| Moisture Resistance                |  | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DC Classification Reflow Profiles)<br>1. Baked at $50^\circ\text{C}$ for 25hrs, measured at room temperature after placing for 4 hrs.<br>2. Raise temperature to $65 \pm 2^\circ\text{C}$ 90-100%RH in 2.5hrs, and keep 3 hours, cool down to $25^\circ\text{C}$ in 2.5hrs.<br>3. Raise temperature to $65 \pm 2^\circ\text{C}$ 90-100%RH in 2.5hrs, and keep 3 hours, cool down to $25^\circ\text{C}$ in 2.5hrs, keep at $25^\circ\text{C}$ for 2 hrs then keep at $-10^\circ\text{C}$ for 3 hrs<br>4. Keep at $25^\circ\text{C}$ 80-100%RH for 15min and vibrate at the frequency of 10 to 55 Hz to 10 Hz, measure at room temperature after placing for 1~2 hrs. |
| Thermal shock                      |  | Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DC Classification Reflow Profiles)<br>Condition for 1 cycle<br>Step1 : $-40 \pm 2^\circ\text{C}$ 30 $\pm$ 5min<br>Step2 : $25 \pm 2^\circ\text{C}$ $\leq$ 0.5min<br>Step3 : $125 \pm 2^\circ\text{C}$ 30 $\pm$ 5min<br>Number of cycles : 500<br>Measured at room temperature after placing for 24 $\pm$ 2 hrs  |

| Item                         | Performance   | Test Condition   |                  |                            |  |                     |                            |                |    |    |           |      |      |    |    |           |      |
|------------------------------|---|--|------------------|----------------------------|--|---------------------|----------------------------|----------------|----|----|-----------|------|------|----|----|-----------|------|
| Vibration                    |   | Oscillation Frequency: 10 ~ 2K ~ 10Hz for 20 minutes<br>Equipment : Vibration checker<br>Total Amplitude:1.52mm±10%<br>Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations).  |                  |                            |  |                     |                            |                |    |    |           |      |      |    |    |           |      |
| Shock                        | Appearance : No damage.<br>Inductance : within±10% of initial value<br>Q : Shall not exceed the specification value.<br>RDC : within ±15% of initial value and shall not exceed the specification value | <table border="1"> <thead> <tr> <th>Type</th> <th>Peak value (g's)</th> <th>Normal duration (ms)</th> <th>Wave form</th> <th>Velocity change (Vi)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 (ms)                         | Wave form           | Velocity change (Vi)ft/sec | SMD            | 50 | 11 | Half-sine | 11.3 | Lead | 50 | 11 | Half-sine | 11.3 |
| Type                         | Peak value (g's)  | Normal duration (ms)   | Wave form        | Velocity change (Vi)ft/sec |  |                     |                            |                |    |    |           |      |      |    |    |           |      |
| SMD                          | 50  | 11   | Half-sine        | 11.3                       |  |                     |                            |                |    |    |           |      |      |    |    |           |      |
| Lead                         | 50  | 11   | Half-sine        | 11.3                       |  |                     |                            |                |    |    |           |      |      |    |    |           |      |
| Bending                      |   | Shall be mounted on a FR4 substrate of the following dimensions: >=0805 inch(2012mm):40x100x1.2mm <0805 inch(2012mm):40x100x0.8mm<br>Bending depth: >=0805 inch(2012mm):1.2mm <0805 inch(2012mm):0.8mm<br>duration of 10 sec.  |                  |                            |  |                     |                            |                |    |    |           |      |      |    |    |           |      |
| Solderability                | More than 95% of the terminal electrode should be covered with solder.  | Preheat: 150°C,60sec.<br>Solder: Sn96.5% Ag3% Cu0.5%<br>Temperature: 245±5°C.<br>Flux for lead free: Rosin. 9.5%.<br>Dip time: 4±1sec.<br>Depth: completely cover the termination  |                  |                            |  |                     |                            |                |    |    |           |      |      |    |    |           |      |
| Resistance to Soldering Heat |   | Number of heat cycles: 1<br><table border="1"> <thead> <tr> <th>Temperature (°C)</th> <th>Time(s)</th> <th>Temperature ramp/immersion and emersion rate</th> </tr> </thead> <tbody> <tr> <td>260 ±5(solder temp)</td> <td>10 ±1</td> <td>25mm/s ±6 mm/s</td> </tr> </tbody> </table>   | Temperature (°C) | Time(s)                    | Temperature ramp/immersion and emersion rate | 260 ±5(solder temp) | 10 ±1                      | 25mm/s ±6 mm/s |    |    |           |      |      |    |    |           |      |
| Temperature (°C)             | Time(s)   | Temperature ramp/immersion and emersion rate   |                  |                            |  |                     |                            |                |    |    |           |      |      |    |    |           |      |
| 260 ±5(solder temp)          | 10 ±1   | 25mm/s ±6 mm/s   |                  |                            |  |                     |                            |                |    |    |           |      |      |    |    |           |      |
| Terminal Strength            | Appearance : No damage.<br>Inductance : within±10% of initial value<br>Q : Shall not exceed the specification value.<br>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-020DClassification Reflow Profiles<br>With the component mounted on a PCB with the device to be tested, apply a force (>0805 inch(2012mm):1kg , <=0805 inch(2012mm):0.5kg)to the side of a device being tested.<br>This force shall be applied for 60 +1 seconds. Also the force shall be applied gradually as not to apply a shock to the component being tested.<br> |                  |                            |  |                     |                            |                |    |    |           |      |      |    |    |           |      |

### 8. Recommended PC Board Pattern



| Chip size | Land Patterns For Reflow Soldering |       |       |
|-----------|------------------------------------|-------|-------|
|           | L(mm)                              | G(mm) | H(mm) |
| FPI0504   | 6                                  | 1.7   | 5.5   |

### 9. Soldering

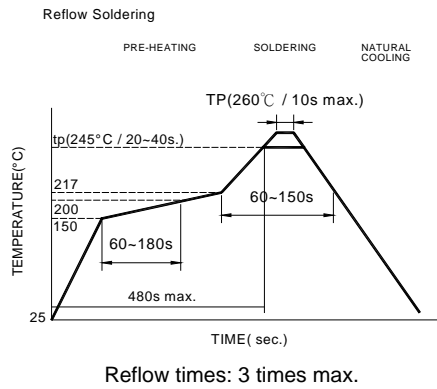


Fig.1

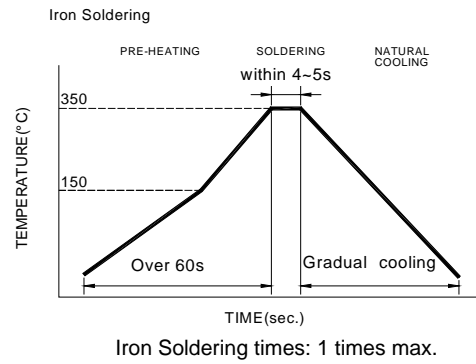
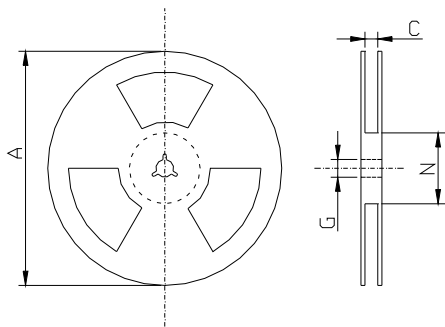
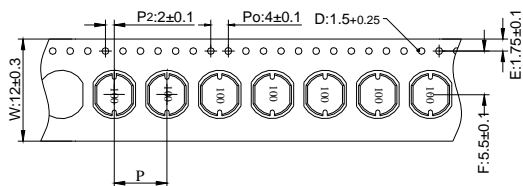


Fig.2

### 10. Packaging Information



| Style    | A(mm) | C(mm)            | G(mm)    | N(mm)           |
|----------|-------|------------------|----------|-----------------|
| 13"X12mm | 330   | 14 <sup>+0</sup> | 13.5±0.5 | 50 <sup>0</sup> |



| Size | W(mm)  | P(mm) | D(mm)    | Packaging Qty(pcs) |
|------|--------|-------|----------|--------------------|
| 0504 | 12±0.3 | 8±0.1 | 1.5±0.25 | 1,500              |

**Application Notice**

- Storage Conditions(component level)  
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 40°C and 60% RH.
  3. Recommended products should be used within 12 months form 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/2016/65905

日期(Date) : 2016/07/06

頁數(Page): 1 of 12

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.)  
(耀鑽科技股份有限公司 / YOSONIC TECHNOLOGY CO., LTD.)  
(慶邦電子元器件(泗洪)有限公司 / TAIPAQ ELECTRONICS (SI-HONG) CO., LTD.)  
桃園市楊梅區幼獅工業區幼四路1號 / NO. 1, YOU 4TH ROAD, YOUTH INDUSTRIAL DISTRICT, YANG-MEI, TAO-YUAN CITY, TAIWAN, R. O. C.  
(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)  
(桃園市中壢區中壢工業區長春六路15號 / NO. 15, CHANGCHUN 6TH RD., JHONGLI DISTRICT, TAOYUAN CITY 320, TAIWAN)  
(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, SUQIANCITY, JIANGSU PROVINCE, P, R, CHINA)

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

樣品名稱(Sample Description) : WINDING POWER INDUCTOR / SMD POWER INDUCTOR  
樣品型號(Style/Item No.) : LQC、LQN、FPI、FPIP SERIES  
收件日期(Sample Receiving Date) : 2016/06/29  
測試期間(Testing Period) : 2016/06/29 TO 2016/07/06

測試結果(Test Results) : 請見下一頁 (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/2016/65905

日期(Date) : 2016/07/06

頁數(Page): 2 of 12



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

桃園市楊梅區幼獅工業區幼四路1號 / NO. 1, YOU 4TH ROAD, YOUTH INDUSTRIAL DISTRICT, YANG-MEI, TAO-YUAN CITY, TAIWAN, R. O. C.

(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)

(桃園市中壢區中壢工業區長春六路15號 / NO. 15, CHANGCHUN 6TH RD., JHONGLI DISTRICT, TAOYUAN CITY 320, TAIWAN)

(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, SUQIANCITY, 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<br>(Test Items)  | 單位<br>(Unit) | 測試方法<br>(Method)  | 方法偵測<br>極限值<br>(MDL) | 結果<br>(Result) |
|---|--------------|---|----------------------|----------------|
|   |              |   |                      | No. 1          |
| 鎘 / Cadmium (Cd)  | mg/kg        | 參考 IEC 62321-5 (2013), 以感應耦合<br>電漿原子發射光譜儀檢測. / With<br>reference to IEC 62321-5 (2013)<br>and performed by ICP-AES. | 2                    | n. d.          |
| 鉛 / Lead (Pb)   | mg/kg        |   | 2                    | n. d.          |
| 汞 / Mercury (Hg)  | mg/kg        | 參考 IEC 62321-4 (2013), 以感應耦合<br>電漿原子發射光譜儀檢測. / With<br>reference to IEC 62321-4 (2013)<br>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<br>測. / With reference to IEC 62321<br>(2008) and performed by UV-VIS.              | 2                    | n. d.          |
| 六溴環十二烷及所有主要被辨別出的異構<br>物 / Hexabromocyclododecane (HBCDD)<br>and all major diastereoisomers<br>identified ( $\alpha$ -HBCDD, $\beta$ -HBCDD,<br>$\gamma$ -HBCDD) (CAS No.: 25637-99-4 and<br>3194-55-6 (134237-51-7, 134237-50-6,<br>134237-52-8)) | mg/kg        | 參考 IEC 62321 (2008), 以氣相層析/<br>質譜儀檢測. / With reference to<br>IEC 62321 (2008). Analysis was<br>performed by GC/MS.  | 5                    | n. d.          |

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# 測試報告

## Test Report

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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, SUQIANCITY, JIANGSU PROVINCE, P, R, CHINA)



| 測試項目<br>(Test Items)             | 單位<br>(Unit) | 測試方法<br>(Method)  | 方法偵測<br>極限值<br>(MDL) | 結果<br>(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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| 測試項目<br>(Test Items)  | 單位<br>(Unit) | 測試方法<br>(Method)   | 方法偵測<br>極限值<br>(MDL) | 結果<br>(Result) |
|---|--------------|--|----------------------|----------------|
|   |              |  |                      | No. 1          |
| 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.          |
| 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-isononyl 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 / Di-n-pentyl phthalate (CAS No. : 131-18-0)                       | mg/kg        |  | 50                   | n. d.          |

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| 測試項目<br>(Test Items)                                    | 單位<br>(Unit) | 測試方法<br>(Method)   | 方法偵測<br>極限值<br>(MDL) | 結果<br>(Result) |
|---|--------------|--|----------------------|----------------|
|   |              |  |                      | No. 1          |
| 鹵素 / Halogen  |              |  |                      |                |
| 鹵素(氟) / Halogen-Fluorine (F)<br>(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)<br>(CAS No. : 22537-15-1) | mg/kg        |  | 50                   | n. d.          |
| 鹵素(溴) / Halogen-Bromine (Br)<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.          |
| 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.          |
| 鈹 / Beryllium (Be)                                      | mg/kg        |  | 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.)

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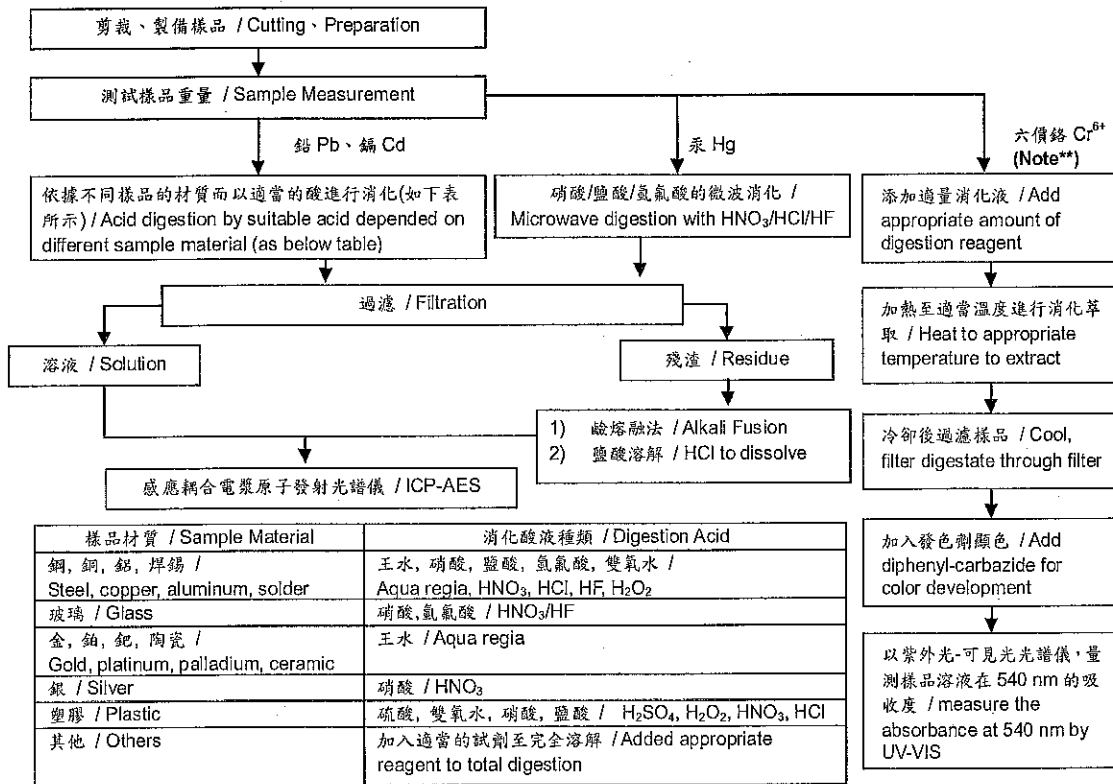
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根據以下的流程圖之條件, 樣品已完全溶解。(六價鉻測試方法除外)

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



### Note\*\* (For IEC 62321)

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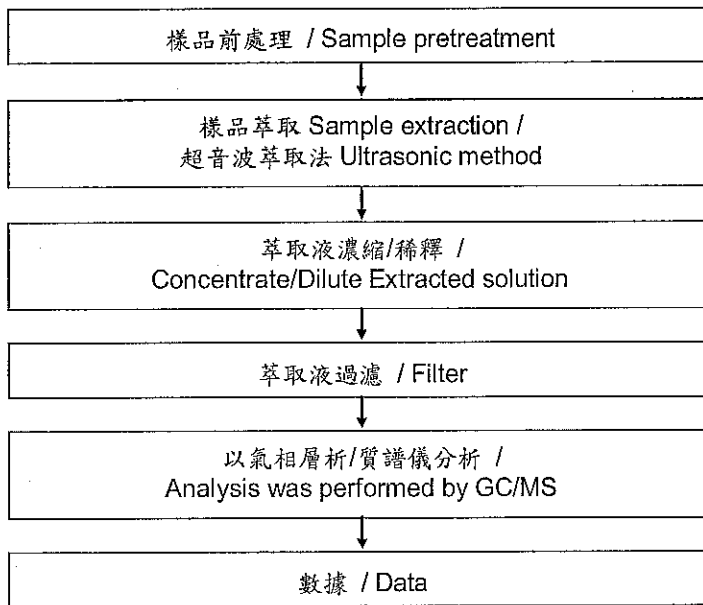
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## 六溴環十二烷分析流程圖 / Analytical flow chart - HBCDD

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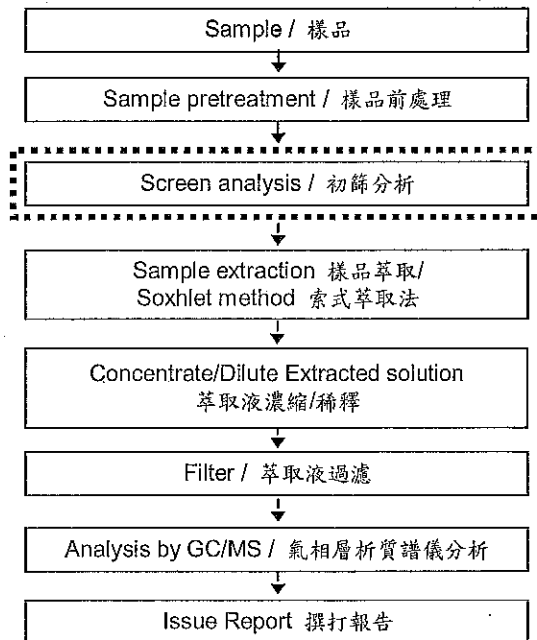
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### 多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBB/PBDE

- 測試人員: 涂雅苓 / 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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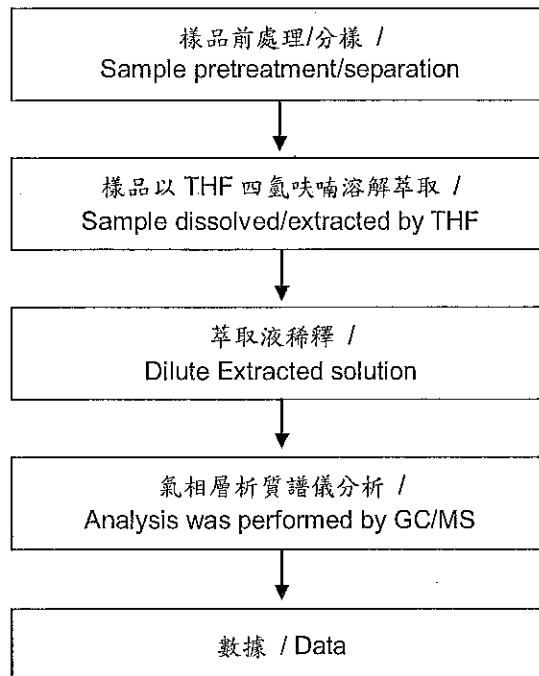
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## 可塑劑分析流程圖 / Analytical flow chart - Phthalate

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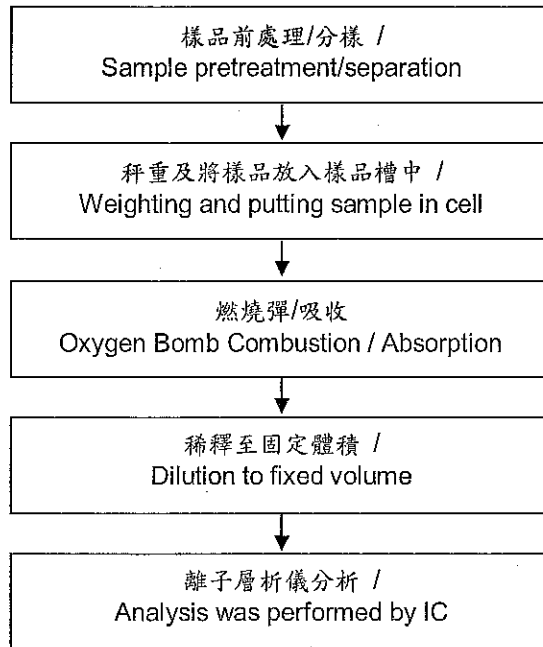
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## 鹵素分析流程圖 / Analytical flow chart - Halogen

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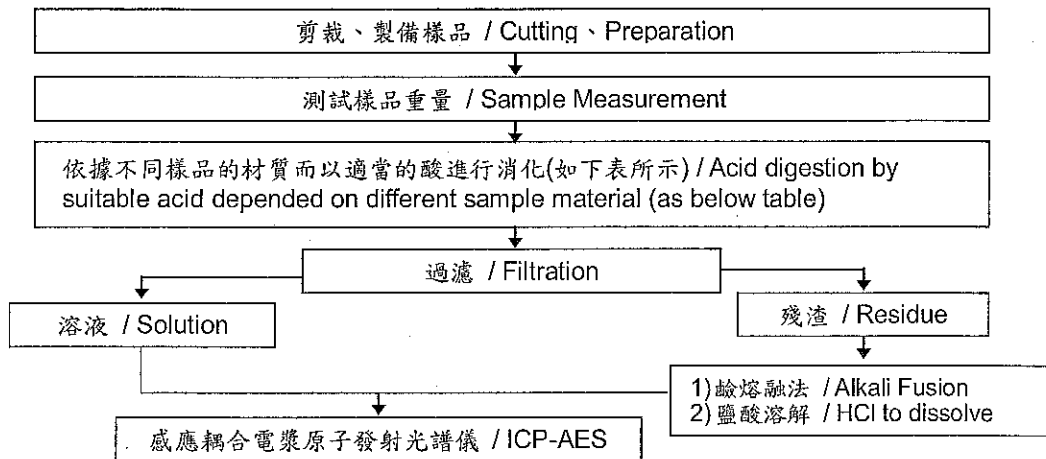
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根據以下的流程圖之條件, 樣品已完全溶解。 / These samples were dissolved totally by pre-conditioning method according to below flow chart.

- 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)



|  |   |
|--|---|
| 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                                      | 加入適當的試劑至完全溶解 / Added appropriate reagent to total digestion   |

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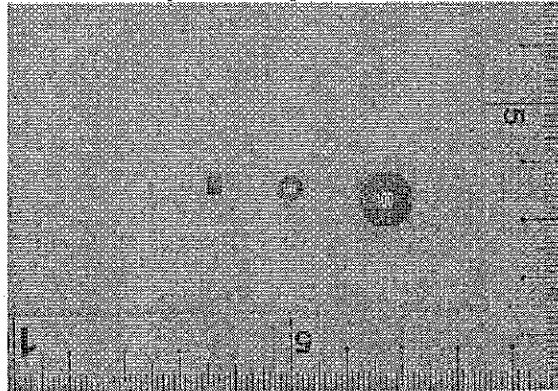
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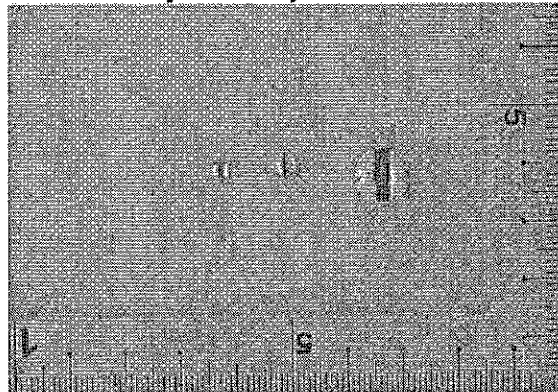
\* 照片中如有箭頭標示, 則表示為實際檢測之樣品/部位. \*

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

### CE/2016/65905



### CE/2016/65905



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