

# Specification for Approval

**Date:** 2014/07/29

**Customer :** 東莞台慶

**TAI-TECH P/N:** HPC3010TF-SERIES

**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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R&D Center

APPROVED	CHECKED	DRAWN
楊祥忠 Mikey Yang	詹偉特 Jack Chan	林宜瀟 Beryl Lin

<b>Power Inductor</b>	<b>HPC3010TF-SERIES</b>
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<b>ECN HISTORY LIST</b>					
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REV	DATE	DESCRIPTION	APPROVED	CHECKED	DRAWN
1.0	14/07/29	新發行	楊祥忠	詹偉特	林宜蒞
備 註					

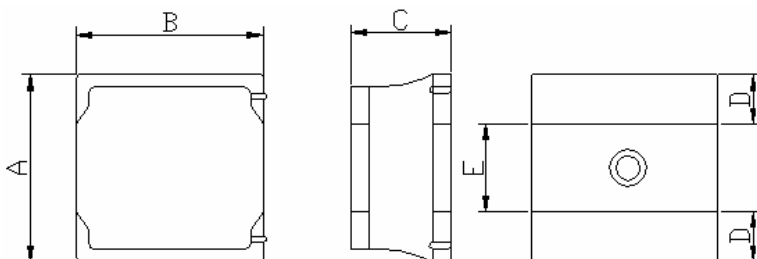
**Power Inductor** **HPC3010TF-SERIES**

**1. Features**

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



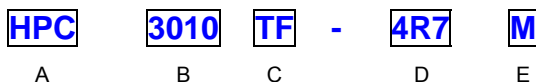
**2. Dimension**



Series	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)
HPC3010TF	3.0±0.2	3.0±0.2	1.0max.	1.0 ref.	1.0 ref.

Units: mm

**3. Part Numbering**



- A: Series
- B: Dimension
- C: Lead Free
- D: Inductance                      4R7=4.7uH
- E: Inductance Tolerance        M=±20% ; Y=±30%

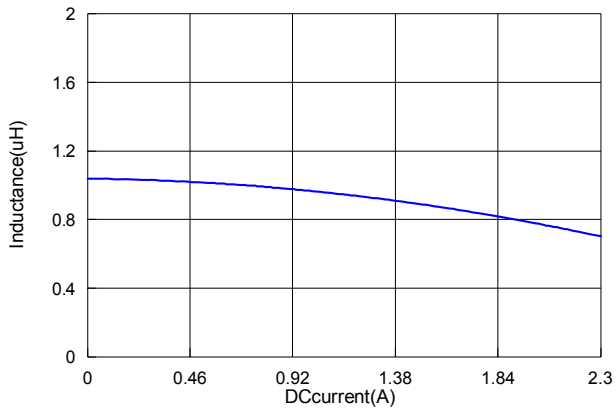
**4. Specification**

TAI-TECH Part Number	Inductance (uH)	Tolerance (%)	Test Frequency (Hz)	DCR (Ω) ±20%	I sat (A) typ.	I rms (A) typ.
HPC3010TF-1R0Y	1.0	±30%	0.1V/1M	0.055	1.80	2.10
HPC3010 TF -1R5Y	1.5	±30%	0.1V/1M	0.070	1.50	1.90
HPC3010 TF -2R2M	2.2	±20%	0.1V/1M	0.090	1.30	1.70
HPC3010 TF -3R3M	3.3	±20%	0.1V/1M	0.130	1.10	1.50
HPC3010 TF -4R7M	4.7	±20%	0.1V/1M	0.170	0.90	1.30
HPC3010 TF -6R8M	6.8	±20%	0.1V/1M	0.260	0.77	1.00
HPC3010 TF -100M	10	±20%	0.1V/1M	0.350	0.63	0.80
HPC3010 TF -150M	15	±20%	0.1V/1M	0.510	0.54	0.70
HPC3010 TF -220M	22	±20%	0.1V/1M	0.750	0.43	0.60

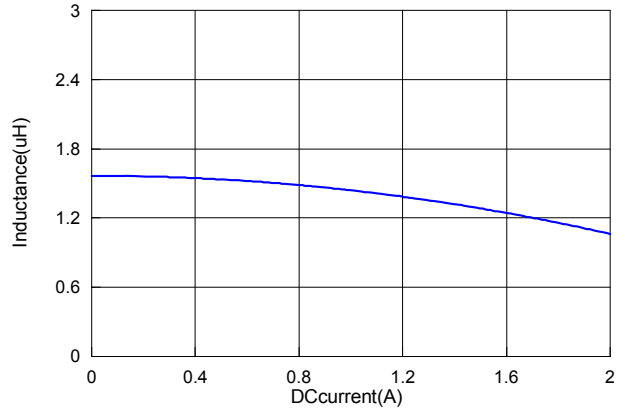
Note:

- Isat : Based on inductance change (ΔL/L0 : ≤-30%) @ ambient temp. 25°C
- Irms : Based on temperature rise (ΔT : 40°C.) Max

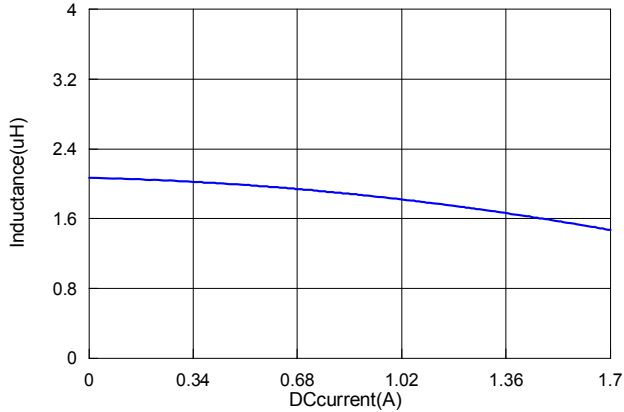
HPC3010TF-1R0



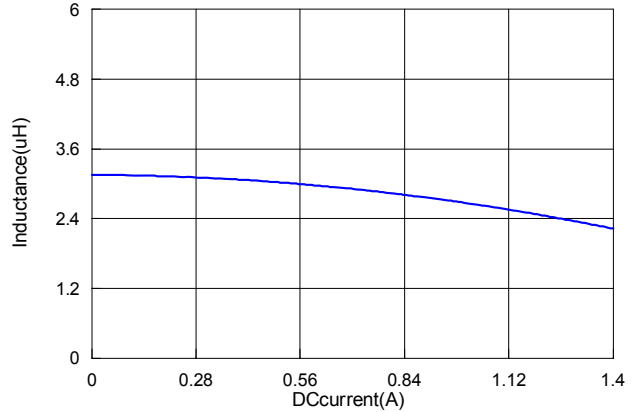
HPC3010TF-1R5



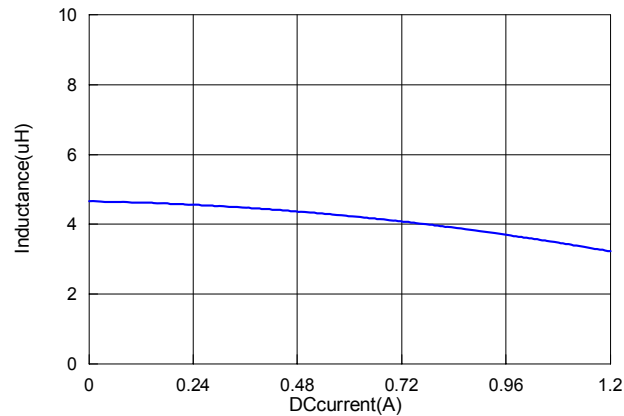
HPC3010TF-2R2



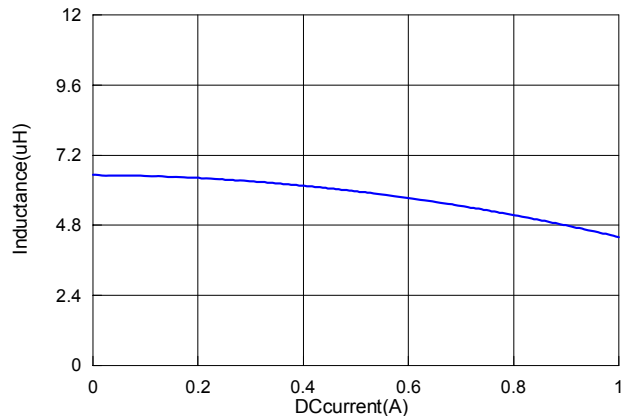
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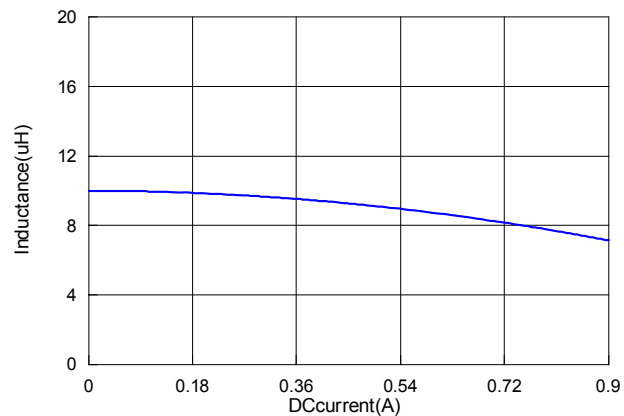
HPC3010TF-4R7



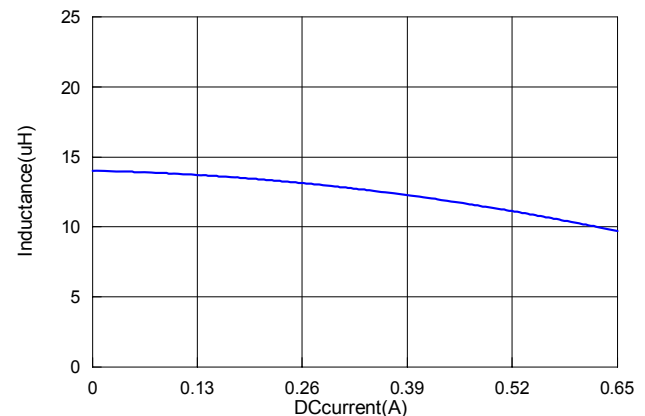
HPC3010TF-6R8



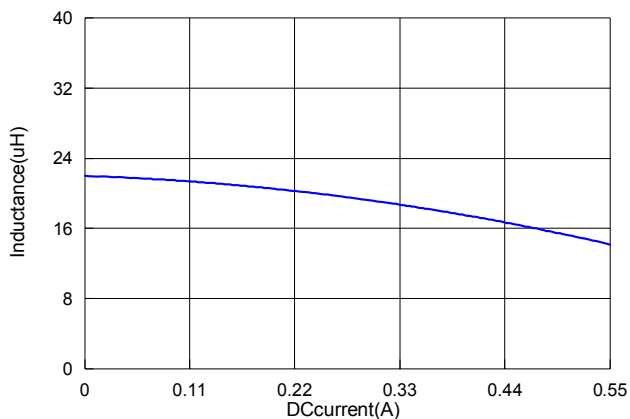
HPC3010TF-100



HPC3010TF-150

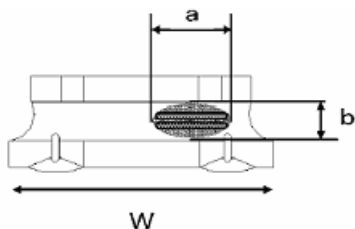


HPC3010TF-220



Void appearance tolerance Limit

Size of voids occurring to coating resin is specified below.



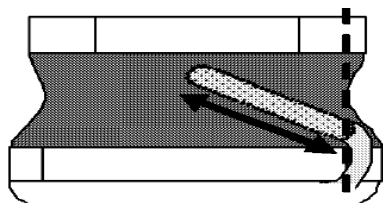
Exposed wire tolerance limit of coating resin part on product side.

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. The total area of exposed wire occurring to each sides is not greater than 50% of coating resin area, and is acceptable.

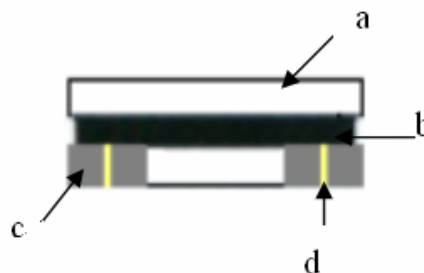
External appearance criterion for exposed wire

Exposed end of the winding wire at the secondary side should be 2mm and below.



5. Material

No.	Description	Specification
a.	Core	Ferrite Core
b.	Coating	Epoxy with magnetic powder
c.	Termination	Tin (Pb Free)
d.	Wire	Enameled Copper Wire



## 6. Reliability and Test Condition

Item	Performance	Test Condition								
Operating Temperature	-40~+125°C									
Storage Temperature (on board)										
<b>Electrical Performance Test</b>										
Inductance L	Refer to standard electrical characteristic list	Agilent-4291, Agilent-4287								
DC Resistance		Agilent-4338								
Rated Current	Base on temp. rise & $\Delta L/L0A \leq 30\%$ .	Saturation DC Current (Isat) will cause L0 to drop approximately $\Delta L(\%)$ .								
Temperature Rise Test	$\Delta T$ 40°C Max	Heat Rated Current (Irms) will cause the coil temperature rise approximately $\Delta T(^{\circ}C)$ without core loss. 1. Applied the allowed DC current. 2. Temperature measured by digital surface thermometer								
<b>Mechanical Performance Test</b>										
Solder Heat Resistance	Appearance : No damage. Inductance : within $\pm 10\%$ of initial value RDC : within $\pm 15\%$ of initial value and shall not exceed the specification value	<table border="1"> <thead> <tr> <th>Temperature (°C)</th> <th>Time (s)</th> <th>Temperature ramp/immersion and emersion rate</th> <th>Number of heat cycles</th> </tr> </thead> <tbody> <tr> <td>260 <math>\pm 5</math> (solder temp)</td> <td>10 <math>\pm 1</math></td> <td>25mm/s <math>\pm 6</math> mm/s</td> <td>1</td> </tr> </tbody> </table> <p>Depth: completely cover the termination</p>	Temperature (°C)	Time (s)	Temperature ramp/immersion and emersion rate	Number of heat cycles	260 $\pm 5$ (solder temp)	10 $\pm 1$	25mm/s $\pm 6$ mm/s	1
Temperature (°C)	Time (s)	Temperature ramp/immersion and emersion rate	Number of heat cycles							
260 $\pm 5$ (solder temp)	10 $\pm 1$	25mm/s $\pm 6$ mm/s	1							
Solderability Test	More than 95% of terminal electrode should be covered with solder.	Preheat: 150°C.60sec. ◦ Solder: Sn99.5%-Cu0. 5% ◦ Temperature: 245 $\pm 5^{\circ}C$ ◦ Flux for lead free: Rosin. 9.5% ◦ Dip time: 4 $\pm 1$ sec ◦ Depth: completely cover the termination								
<b>Reliability Test</b>										
Life Test	Appearance : No damage. Inductance : within $\pm 10\%$ of initial value 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-020D Classification Reflow Profiles Temperature : 125 $\pm 2^{\circ}C$ (Bead) Temperature : 85 $\pm 2^{\circ}C$ (Inductor) Applied current : rated current Duration : 1000 $\pm 12$ hrs Measured at room temperature after placing for 24 $\pm 2$ hrs								
Thermal shock		Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles Step1 : -40 $\pm 2^{\circ}C$ 30 $\pm 5$ min Step2 : 25 $\pm 2^{\circ}C$ $\leq 0.5$ min Step3 : 105 $\pm 2^{\circ}C$ 30 $\pm 5$ min Number of cycles : 500 Measured at room temperature after placing for 24 $\pm 2$ hrs								
Humidity Resistance Test		Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles Humidity : 85 $\pm 2\%$ R.H, Temperature : 85 $\pm 2^{\circ}C$ Duration : 1000hrs Min. with 100% rated current Measured at room temperature after placing for 24 $\pm 2$ hrs								
Vibration Test		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 $\pm 10\%$ Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations) ◦								

## 7. Soldering and Mounting

### 7-1. Soldering

PC board should be designed so that products can prevent damage from mechanical stress when warping the board. Products shall be positioned in the sideways direction against the mechanical stress to prevent failure.

#### 7-1.1 Solder re-flow:

Recommended temperature profiles for re-flow soldering in Figure 1.

#### 7-1.2 Soldering Iron(Figure 2):

Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended.

- Preheat circuit and products to 150°C
- Never contact the ceramic with the iron tip
- Use a 20 watt soldering iron with tip diameter of 1.0mm
- 355°C tip temperature (max)
- 1.0mm tip diameter (max)
- Limit soldering time to 4~5 sec.

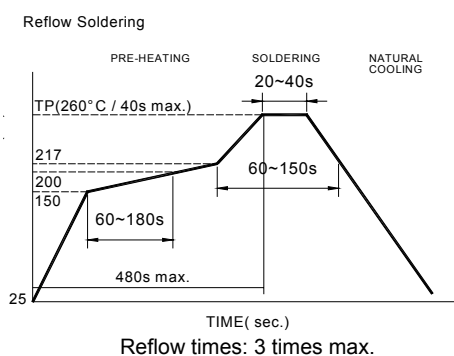


Fig.1

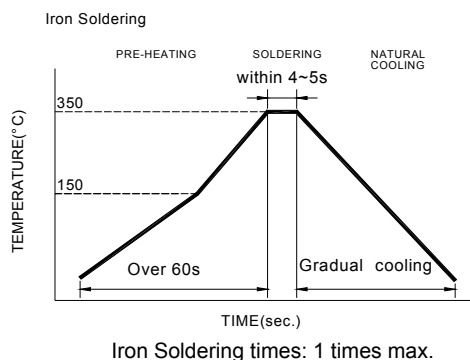
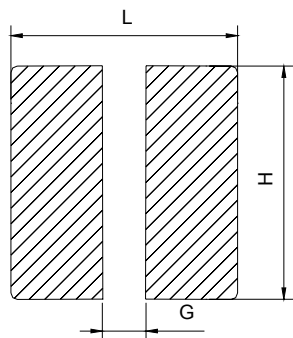


Fig.2

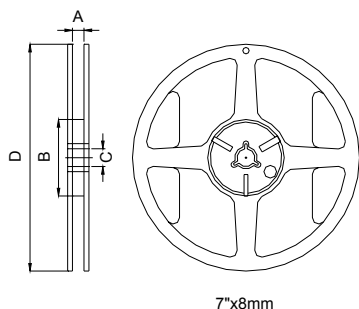
### 7-2. Recommended PC Board Pattern



L(mm)	G(mm)	H(mm)
3.2	1.0	3.2

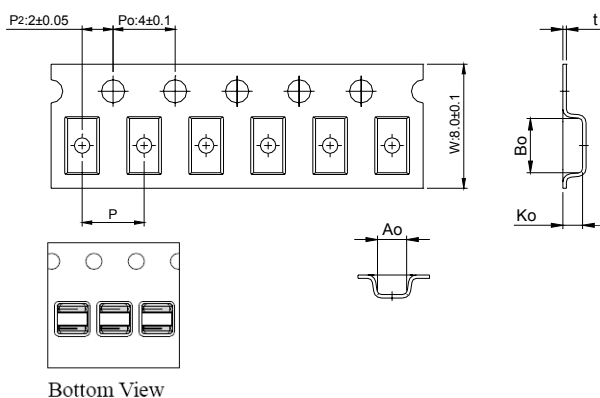
## 8. Packaging Information

### 8-1. Reel Dimension



Type	A(mm)	B(mm)	C(mm)	D(mm)
7"x8mm	8.4±1.0	50 min.	13±0.8	178±2

### 8-2. Tape Dimension / 8mm

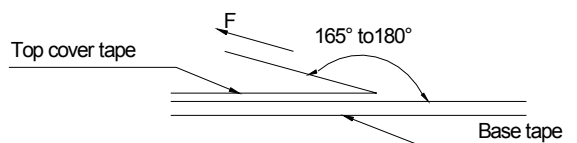


Series	Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
HPC	3010	3.2±0.05	3.2±0.05	1.20±0.2	4.0±0.05	0.23±0.05

### 8-3. Packaging Quantity

Chip size	3010
Chip / Reel	2000

### 8-4. Tearing Off Force



The force for tearing off cover tape is 15 to 80 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 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/2013/C5949 日期(Date) : 2014/01/07 頁數(Page) : 1 of 12

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



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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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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) : SMD POWER INDUCTOR

樣品型號(Style/Item No.) : HPC, MDC, FPC, FWP, SPC, SPI, UHP, DFP, TLPC, TLPH, TLI SERIES

收件日期(Sample Receiving Date) : 2013/12/30

測試期間(Testing Period) : 2013/12/30 TO 2014/01/07

=====  
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/2013/C5949 日期(Date) : 2014/01/07 頁數(Page) : 2 of 12

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### 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
鎘 / Cadmium (Cd)	mg/kg	參考IEC 62321-5: 2013方法, 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方法, 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方法, 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方法, 以UV-VIS檢測. / With reference to IEC 62321: 2008 and performed by UV-VIS.	2	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
鄰苯二甲酸甲苯基丁酯 / BBP (Benzyl butyl phthalate) (CAS No.: 85-68-7)	%	參考EN 14372, 以氣相層析/質譜儀檢測之。 / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二(2-乙基己基)酯 / DEHP (Di-(2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	%	參考EN 14372, 以氣相層析/質譜儀檢測之。 / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二異癸酯 / DIDP (Di- isodecyl phthalate) (CAS No.: 26761-40-0; 68515-49-1)	%	參考EN 14372, 以氣相層析/質譜儀檢測之。 / With reference to EN 14372. Analysis was performed by GC/MS.	0.01	n.d.
鄰苯二甲酸二異壬酯 / DINP (Di- isononyl phthalate) (CAS No.: 28553-12-0; 68515-48-0)	%	參考EN 14372, 以氣相層析/質譜儀檢測之。 / With reference to EN 14372. Analysis was performed by GC/MS.	0.01	n.d.
鄰苯二甲酸二正辛酯 / DNOP (Di-n- octyl phthalate) (CAS No.: 117- 84-0)	%	參考EN 14372, 以氣相層析/質譜儀檢測之。 / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	%	參考EN 14372, 以氣相層析/質譜儀檢測之。 / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.
鄰苯二甲酸二異丁酯 / DIBP (Di- isobutyl phthalate) (CAS No.: 84- 69-5)	%	參考EN 14372, 以氣相層析/質譜儀檢測之。 / With reference to EN 14372. Analysis was performed by GC/MS.	0.003	n.d.

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# 測試報告

## Test Report

號碼(No.) : CE/2013/C5949 日期(Date) : 2014/01/07 頁數(Page) : 4 of 12



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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
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方法, 以氣相層析/質譜儀檢測。 / With reference to IEC 62321: 2008 method. Analysis was performed by GC/MS.	5	n.d.
多溴聯苯總和 / Sum of PBBs	mg/kg	參考IEC 62321: 2008方法, 以氣相層析/質譜儀檢測。 / With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
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.	


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# 測試報告

## Test Report

號碼(No.) : CE/2013/C5949 日期(Date) : 2014/01/07 頁數(Page) : 5 of 12

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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
多溴聯苯醚總和 / Sum of PBDEs	mg/kg	參考IEC 62321: 2008方法, 以氣相層析/質譜儀檢測. / With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
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.	
鹵素 / Halogen				
鹵素 (氟) / Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	參考BS EN 14582:2007, 以離子層析儀分析. / With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.
鹵素 (氯) / Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg		50	n.d.
鹵素 (溴) / Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg		50	n.d.
鹵素 (碘) / Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg		50	n.d.

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## 測試報告

# Test Report

號碼(No.) : CE/2013/C5949 日期(Date) : 2014/01/07 頁數(Page) : 6 of 12

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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. 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.)

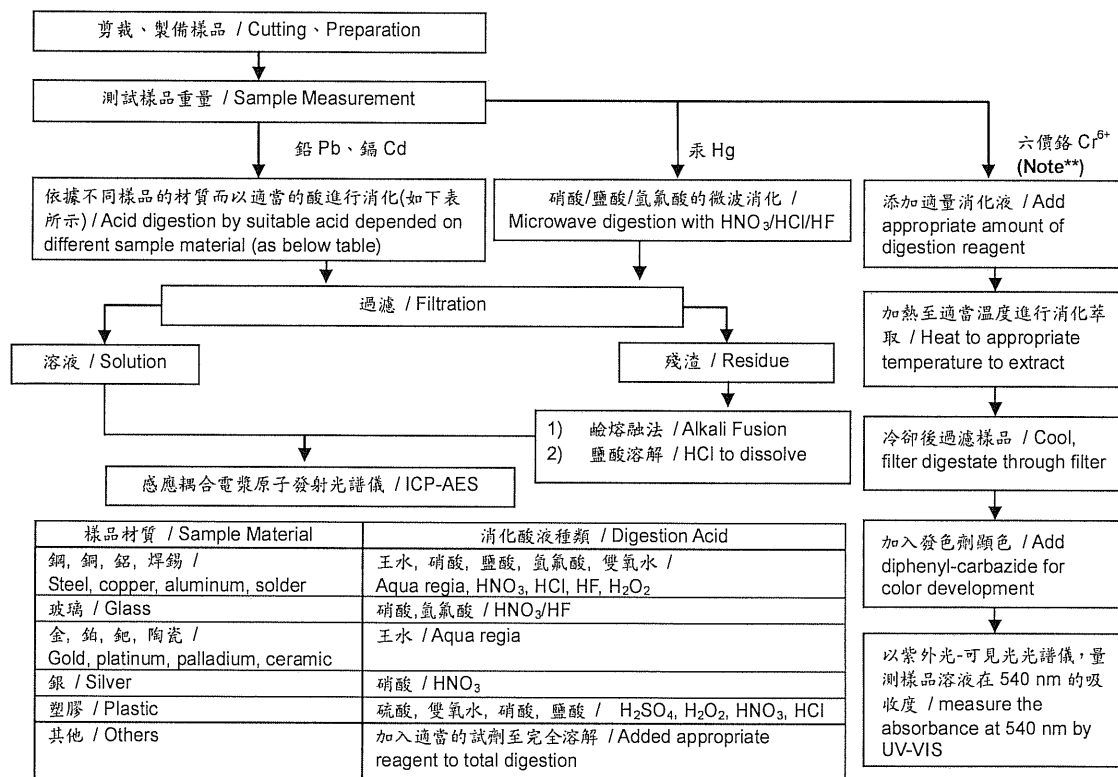
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## 測試報告 Test Report

號碼(No.) : CE/2013/C5949 日期(Date) : 2014/01/07 頁數(Page) : 7 of 12

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- 1) 根據以下的流程圖之條件, 樣品已完全溶解。(六價鉻測試方法除外) / These samples were dissolved totally by pre-conditioning method according to below flow chart. (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



**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.



# 測試報告

## Test Report

號碼(No.) : CE/2013/C5949 日期(Date) : 2014/01/07 頁數(Page) : 8 of 12

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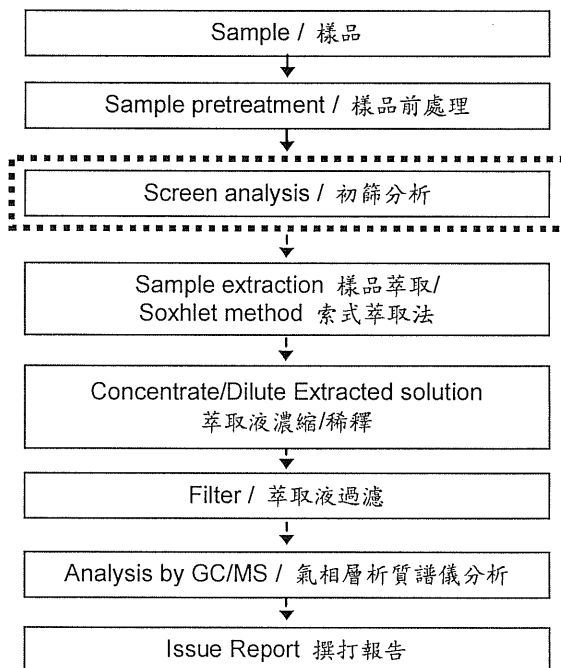
### 多溴聯苯/多溴聯苯醚分析流程圖 / PBB/PBDE analytical FLOW CHART

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

初次測試程序 / First testing process ———>

選擇性篩檢程序 / Optional screen process .....>

確認程序 / Confirmation process - - ->



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## 測試報告

## Test Report

號碼(No.) : CE/2013/C5949 日期(Date) : 2014/01/07 頁數(Page) : 9 of 12

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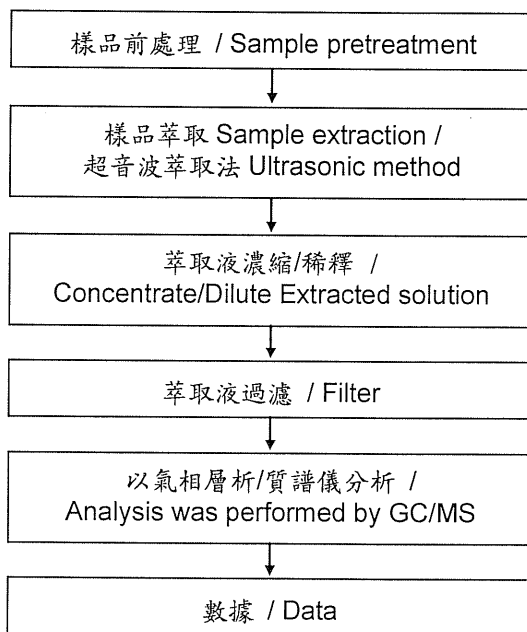
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### 六溴環十二烷分析流程圖 / HBCDD analytical flow chart

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



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## Test Report

號碼(No.): CE/2013/C5949 日期(Date): 2014/01/07 頁數(Page): 10 of 12

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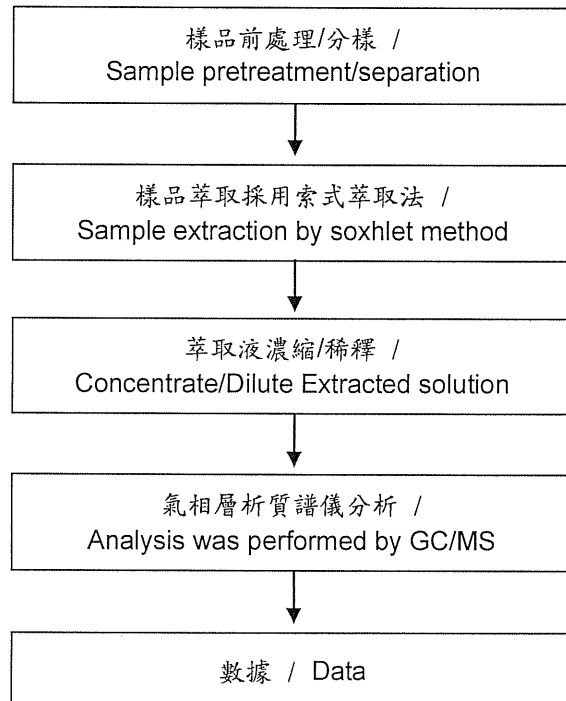
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### 可塑劑分析流程圖 / Analytical flow chart of phthalate content

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





# 測試報告

## Test Report

號碼(No.) : CE/2013/C5949 日期(Date) : 2014/01/07 頁數(Page) : 11 of 12

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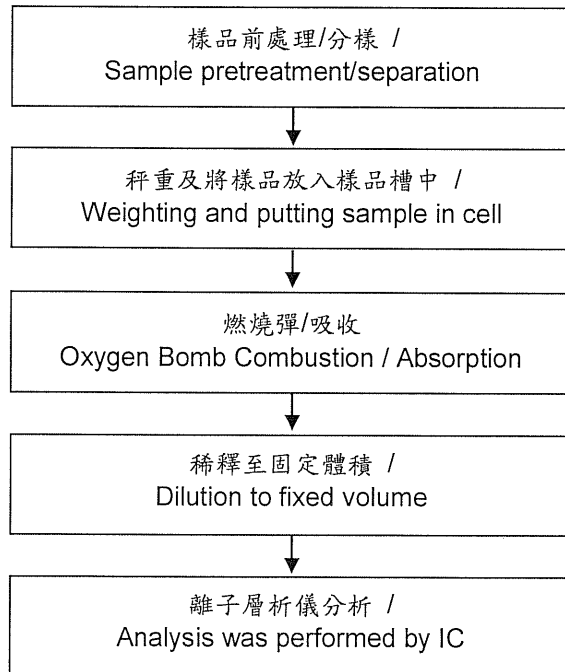
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### 鹵素分析流程圖 / Analytical flow chart of halogen content

- 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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號碼(No.) : CE/2013/C5949 日期(Date) : 2014/01/07 頁數(Page) : 12 of 12

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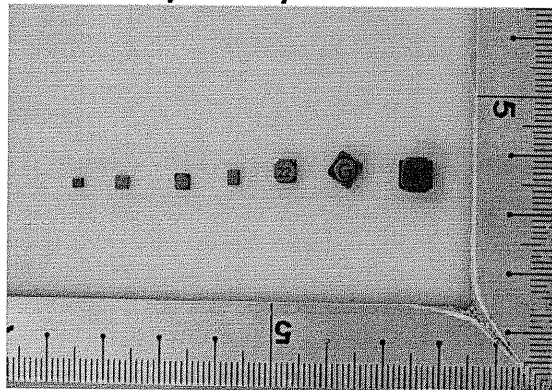
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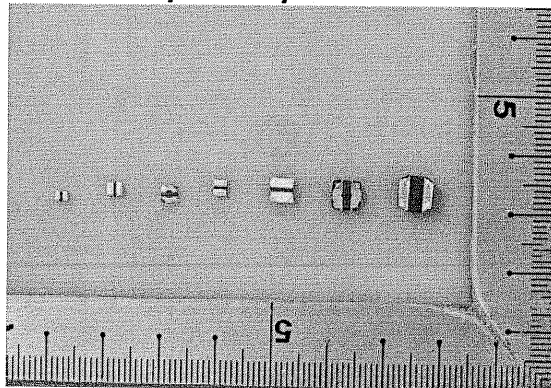
\* 照片中如有箭頭標示，則表示為實際檢測之樣品/部位。\*

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

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