

**SMD Power Inductor**

TMPA0603SV-Series(N)-D

**ECN HISTORY LIST**

REV	DATE	DESCRIPTION	APPROVED	CHECKED	DRAWN
1.0	17/03/16	新發行	楊祥忠	詹偉特	何秦芝
備 注					

# SMD Power Inductor

TMPA0603SV-Series(N)-D

## 1. Features

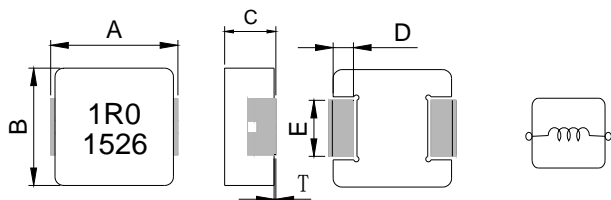
1. Shielded construction.
2. Capable of corresponding high frequency (5MHz).
3. Low loss realized with low DCR.
4. High performance (Isat) realized by metal dust core.
5. Ultra low buzz noise, due to composite construction.
6. 100% Lead(Pb)-Free and RoHS compliant.
7. High reliability -Reliability test complied to AEC-Q200



## 2. Applications

1. DC/DC converters in distributed power systems.
2. DC/DC converter for Field Programmable Gate Array(FPGA).
3. Battery powered devices.
4. Thin type on-board power supply module for exchanger.
5. VRM for server.
6. High current, low profile POL converters.
7. PDA/notebook/desktop/server and battery powered devices.

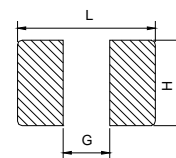
## 3. Dimensions



Series	A	B	C	D	E	T
TMPA0603	7.1±0.3	6.6±0.2	2.8±0.2	1.6±0.3	3.0±0.2	0~0.15

Unit:mm

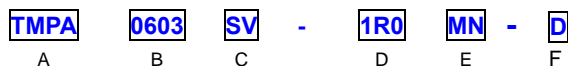
### Recommend PC Board Pattern



L(mm)	G(mm)	H(mm)
8.0	3.7	3.4

Note: 1. The above PCB layout reference only.  
 2. Recommend solder paste thickness at 0.15mm and above.

## 4. Part Numbering



- A: Series
  - B: Dimension
  - C: Type
  - D: Inductance
  - E: Inductance Tolerance
  - F: Code
- BxC
  - Standard. V:Vehicle
  - R10=0.1uh, 1R0=1.0uh, 100=10uh, 101=100uh, 102=1000uh.
  - K=±10%, L=±15%, M=±20%, N=±25%, Y=±30%
  - Marking: Black.1R0 and 1526(15 YY, 26 WW, follow production date).

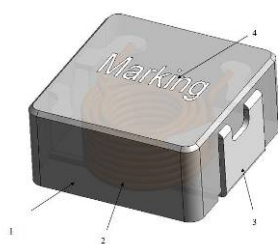
## 5. Specification

Part Number	Inductance L0 A(uH) ±20%	Heat Rating Current DC Typ ( A ) Irms.	Saturation Current DC Typ (A)I sat	DCR (mΩ)Typ	DCR (mΩ)Max
TMPA0603SV-R15YN-D	0.15±30%	30	40	1.7	2.1
TMPA0603SV-R22MN-D	0.22	23	34	2	2.5
TMPA0603SV-R33MN-D	0.33	21	25	2.8	3.4
TMPA0603SV-R36MN-D	0.36	20	24	3.3	3.9
TMPA0603SV-R47MN-D	0.47	18	20	3.4	4
TMPA0603SV-R56MN-D	0.56	16.5	18	3.9	4.5
TMPA0603SV-R68MN-D	0.68	16	17	4.7	5.3
TMPA0603SV-R82MN-D	0.82	14	16	5.4	6
TMPA0603SV-1R0MN-D	1.00	12	15	6.7	7.4
TMPA0603SV-1R2MN-D	1.20	10	14	7.7	9.5
TMPA0603SV-1R5MN-D	1.50	10	14	10.2	12.1
TMPA0603SV-2R2MN-D	2.20	8	10	13.5	15
TMPA0603SV-2R7MN-D	2.70	7.2	9.8	17.3	20
TMPA0603SV-3R3MN-D	3.30	6.5	9.5	19	22
TMPA0603SV-4R7MN-D	4.70	5.5	6.5	28	33
TMPA0603SV-5R6MN-D	5.60	5.5	6	39	42
TMPA0603SV-6R8MN-D	6.80	4.5	6	43	50
TMPA0603SV-8R2MN-D	8.20	4.5	6	54	60
TMPA0603SV-100MN-D	10.0	4	5.5	62	68
TMPA0603SV-150MN-D	15.0	3	4.5	110	140
TMPA0603SV-220MN-D	22.0	2.5	3	150	190

Note:

1. Test frequency : Ls : 100KHz /1.0V.
2. All test data referenced to 25°C ambient.
3. Testing Instrument(or equ) : L: HP4284A,CH11025,CH3302,CH1320,CH1320S LCR METER / Rdc:CH16502,Agilent33420A MICRO OHMMETER.
4. Heat Rated Current (Irms) will cause the coil temperature rise approximately ΔT of 40°C
5. Saturation Current (Isat) will cause L0 to drop approximately 30%.
6. The part temperature (ambient + temp rise) should not exceed 155°C under worst case operating conditions.Circuit design,component,PCB trace size and thickness,airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
7. Special inquiries besides the above common used types can be met on your requirement.

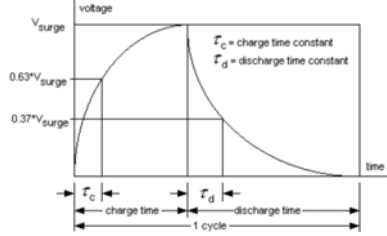
### 6. Material List

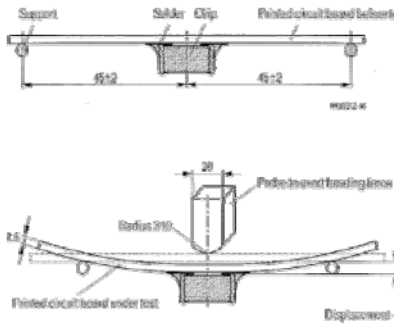
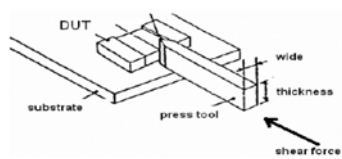


NO	Items	Materials
1	Core	Alloy Powder .
2	Wire	Polyester Wire or equivalent.
3	Clip	100% Pb free solder(Ni+Sn---Plating)
4	Ink	Halogen-free ketone

### 7. Reliability and Test Condition

Item	Performance	Test Condition
Operating temperature	-55--+155°C(Including self - temperature rise)	
Storage temperature and Humidity range	1. -10--+40°C,50~60%RH (Product without taping) 2. -55--+155°C (on board)	
<b>Electrical Performance Test</b>		
Inductance	Refer to standard electrical characteristics list.	HP4284A,CH11025,CH3302,CH1320,CH1320S LCR Meter.
DCR		CH16502,Agilent33420A Micro-Ohm Meter.
Saturation Current (Isat)	Approximately $\Delta$ L30%	Saturation DC Current (Isat) will cause L0 to drop $\Delta$ L(%)
Heat Rated Current (Irms)	Approximately $\Delta$ T40°C	Heat Rated Current (Irms) will cause the coil temperature rise $\Delta$ T(°C). 1.Applied the allowed DC current 2.Temperature measured by digital surface thermometer
<b>Reliability Test</b>		
High Temperature Exposure(Storage)	Appearance : No damage. Inductance : within $\pm$ 10% of initial value Q : Shall not exceed the specification 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-020DClassification Reflow Profiles Temperature : 155 $\pm$ 2°C(Inductor) Duration : 1000hrs Min. Measured at room temperature after placing for 24 $\pm$ 2 hrs
Temperature Cycling		Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles Condition for 1 cycle Step1 : -55 $\pm$ 2°C 30min Min.(Inductor) Step2 : 155 $\pm$ 2°C transition time 1min MAX. Step3 : 155 $\pm$ 2°C 30min Min. Step4 : Low temp. transition time 1min MAX. Number of cycles : 1000 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-020DClassification Reflow Profiles 1. Baked at50°C for 25hrs, measured at room temperature after placing for 4 hrs. 2. Raise temperature to 65 $\pm$ 2°C 90-100%RH in 2.5hrs, and keep 3 hours, cool down to 25°C in 2.5hrs. 3. Raise temperature to 65 $\pm$ 2°C 90-100%RH in 2.5hrs, and keep 3 hours, cool down to 25°C in 2.5hrs,keep at 25°C for 2 hrs then keep at -10°C for 3 hrs 4. Keep at 25°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.
Biased Humidity (AEC-Q200)		Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles Humidity : 85 $\pm$ 3% R.H, Temperature : 85°C $\pm$ 2°C Duration : 1000hrs Min with 100% rated current. Measured at room temperature after placing for24 $\pm$ 2 hrs
High Temperature Operational Life (AEC-Q200)		Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles Temperature : 155 $\pm$ 2°C(Inductor) Duration : 1000hrs Min. with 100% rated current. Measured at room temperature after placing for24 $\pm$ 2 hrs
Vibration		Oscillation Frequency: 10 ~ 2K ~ 10Hz for 20 minute Equipment : Vibration checker Total Amplitude:1.52mm $\pm$ 10% Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations).

Item	Performance	Test Condition															
Mechanical Shock		<table border="1" data-bbox="976 237 1414 371"> <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>100</td> <td>6</td> <td>Half-sine</td> <td>12.3</td> </tr> <tr> <td>Lead</td> <td>100</td> <td>6</td> <td>Half-sine</td> <td>12.3</td> </tr> </tbody> </table> <p>shocks in each direction along 3 perpendicular axes.</p>	Type	Peak value (g's)	Normal duration (D) (ms)	Wave form	Velocity change (V)ft/sec	SMD	100	6	Half-sine	12.3	Lead	100	6	Half-sine	12.3
Type	Peak value (g's)	Normal duration (D) (ms)	Wave form	Velocity change (V)ft/sec													
SMD	100	6	Half-sine	12.3													
Lead	100	6	Half-sine	12.3													
Resistance to Soldering Heat	Appearance : No damage. Impedance : within±15% of initial value Inductance : within±10% of initial value Q : Shall not exceed the specification value.	Number of heat cycles: 1 <table border="1" data-bbox="991 454 1390 533"> <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															
Thermal shock	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 Condition for 1 cycle Step1 : -55±2°C 15±1min(Inductor) Step2 : 155±2°C within 20Sec. Step3 : 155±2°C 15±1min Number of cycles : 300 Measured at room temperature after placing fo24±2hrs															
Resistance to Solvents	Appearance : No damage.	Add aqueous wash chemical - OKEM clean or equivalent.															
ESD		 <p>The diagram shows a voltage surge waveform. The y-axis is labeled 'voltage' and has markers for <math>V_{surge}</math>, <math>0.63V_{surge}</math>, and <math>0.37V_{surge}</math>. The x-axis is labeled 'time' and shows a 'charge time' interval <math>t_c</math> and a 'discharge time' interval <math>t_d</math>. The total duration is labeled '1 cycle'. The charge curve is an exponential rise, and the discharge curve is an exponential decay. Labels indicate <math>t_c</math> = charge time constant and <math>t_d</math> = discharge time constant.</p>															
Solderability	More than 95% of the terminal electrode should be covered with solder.	Steam Aging: 8 hours ± 15 min Preheat: 150°C,60sec. Solder: Sn96.5% Ag3% Cu0.5% Temperature: 245±5°C. Flux for lead free: Rosin. 9.5%. Dip time: 4±1sec. Depth: completely cover the termination															
Flammability	Electrical Test not required	V-0 or V-1 are acceptable															
	epoxy	V-0 or V-1 are acceptable															

Item	Performance	Test Condition
Board Flex	Appearance : No damage.	<p>Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles                      Place the 100mm X 40mm board into a fixture similar to the one shown in below Figure with the component facing down. The apparatus shall consist of mechanical means to apply a force which will bend the board (D) x = 2 mm minimum. The duration of the applied forces shall be 60 (+ 5) sec. The force is to be applied only once to the board.</p> 
Terminal Strength ( SMD )		<p>Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020D Classification Reflow Profiles                      With the component mounted on a PCB with the device to be tested, apply a 17.7 N (1.8 Kg) force 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 apply a shock to the component being tested.</p> 

Note : When there are questions concerning measurement result : measurement shall be made after 48 ± 2 hours of recovery under the standard condition.

## 8. Soldering and Mounting

### (1) Soldering

Mildly activated rosin fluxes are preferred. The minimum amount of solder can lead to damage from the stresses caused by the difference in coefficients of expansion between solder, chip and substrate. TAI-TECH 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.

### (2) Solder re-flow:

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

### (3) Soldering Iron:

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 4~5sec.

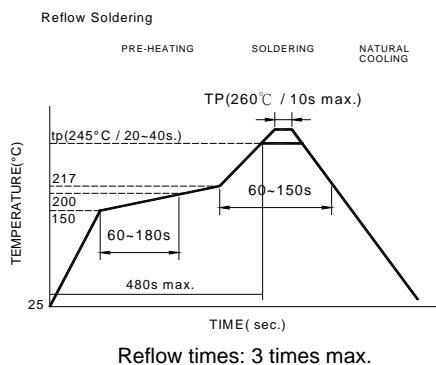


Fig.1

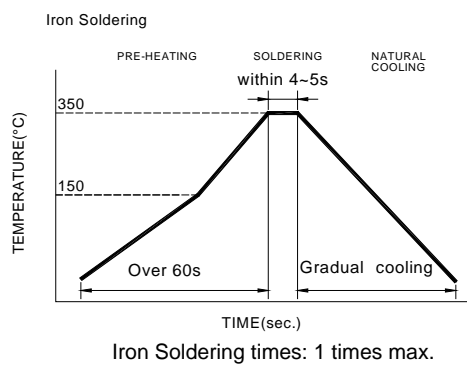


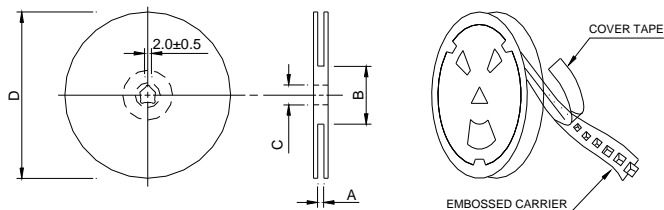
Fig.2

## 9. Friendly reminder

- (1) When there are questions concerning measurement result : measurement shall be made after  $48 \pm 2$  hours of recovery under the standard condition
- (2) This power choke coil itself does not have any protective function in abnormal condition such as overload, short-circuit and open-circuit conditions, etc. Therefore, it shall be confirmed as the end product that there is no risk of smoking, fire, dielectric withstand voltage, insulation resistance, etc. in abnormal conditions to provide protective devices and/or protection circuit in the end product.
- (3) When this power choke coil was used in a similar or new product to the original one, sometimes it might not be able to satisfy the specifications due to different condition of use.
- (4) Dielectric withstanding test with higher voltage than specific value will damage insulating material and shorten its life.
- (5) This power choke coil must not be used in wet condition by water, coffee or any liquid because insulation strength becomes very low in this condition.
- (6) Please consult our company to confirm the reliability of the process required to wash or use or exposure to a chemical solvent used in this product.

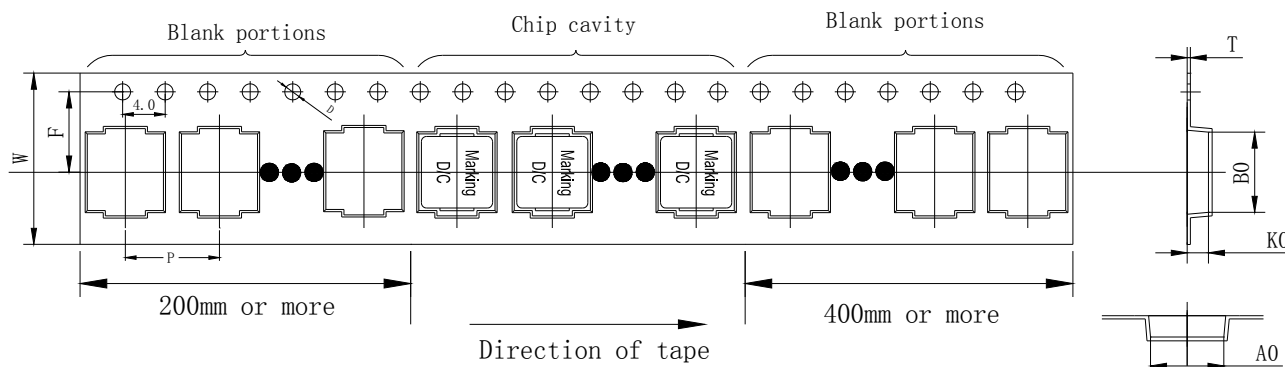
## 10. Packaging Information

### (1) Reel Dimension



Type	A(mm)	B(mm)	C(mm)	D(mm)
13"x16mm	16.4+2/-0	100±2	13+0.5/-0.2	330

### (2) Tape Dimension

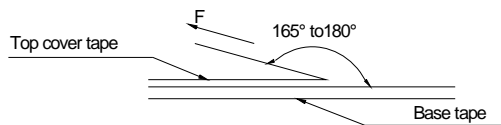


Series	Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	W(mm)	F(mm)	t(mm)	D(mm)
TMPA	0603	7.7±0.1	7.0±0.1	3.3±0.1	12.0±0.1	16±0.3	7.5±0.1	0.35±0.05	1.5±0.1

### (3) Packaging Quantity

TMPA	0603
Chip / Reel	1000
Inner box	2000
Carton	8000

### (4) Tearing Off Force



The force for tearing off cover tape is 10 to 130 grams in the arrow direction under the following conditions(referenced ANSI/EIA-481-C-2003 of 4.11 standard).

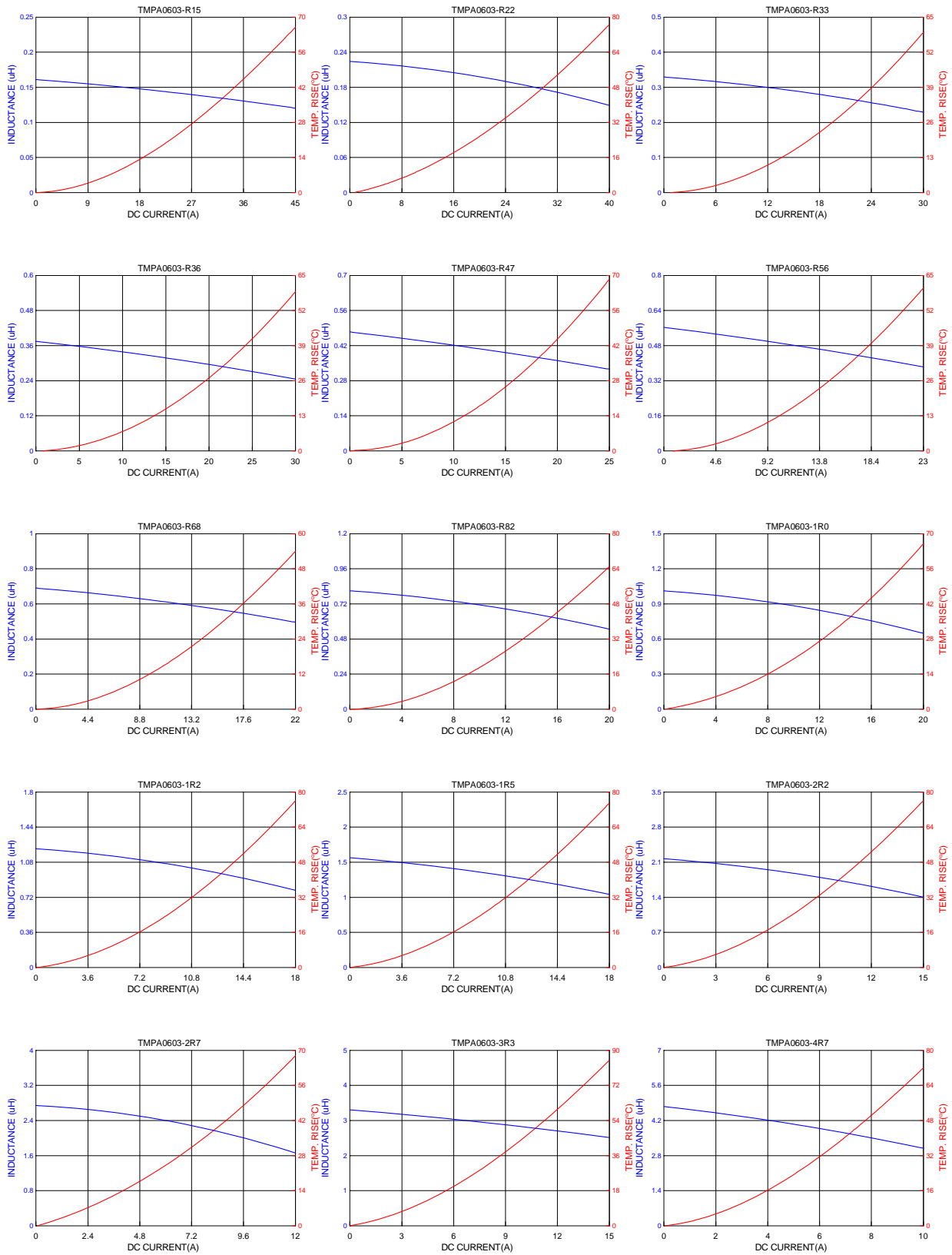
Room Temp. (°C)	Room Humidity (%)	Room atm (hPa)	Tearing Speed mm/min
5~35	45~85	860~1060	300

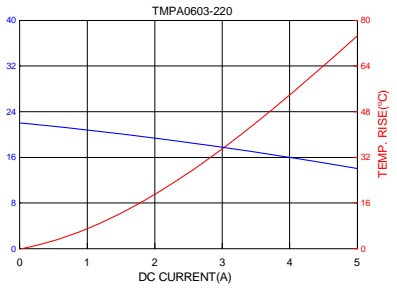
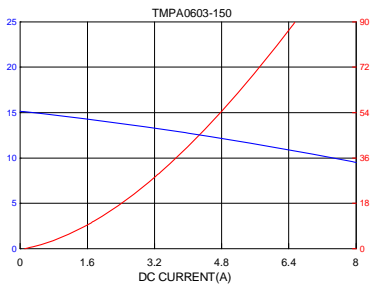
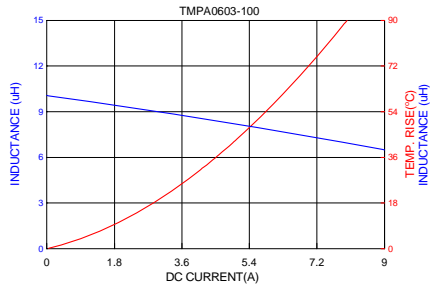
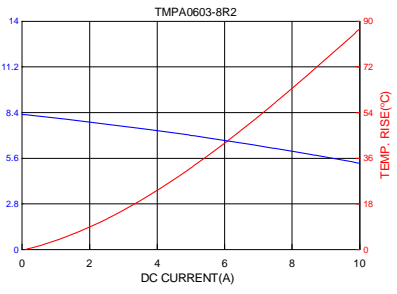
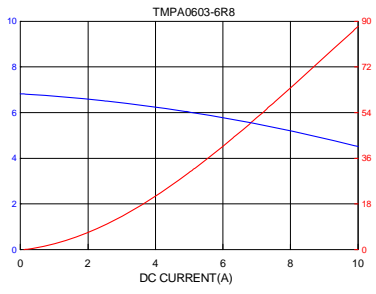
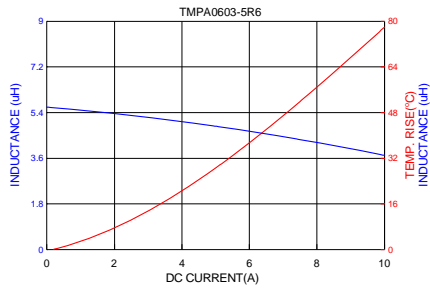
#### Application Notice

- 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.



### 11. Typical Performance Curves





## 測試報告 Test Report

號碼(No.) : CE/2016/A0549

日期(Date) : 2016/10/13

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 CITY, TAOYUAN COUNTY 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) : SMD POWER INDUCTOR  
 樣品型號(Style/Item No.) : TMPB、TMPC、TMPA、TMPF、SLPI、SMPI、EPI(ePI)、VMPI、MLPI SERIES  
 收件日期(Sample Receiving Date) : 2016/10/05  
 測試期間(Testing Period) : 2016/10/05 TO 2016/10/13

### 測試需求(Test Requested):

- (1) 依據客戶指定, 參考RoHS2011/65/EU Annex II及其修訂指令(EU) 2015/863測試鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚, DBP, BBP, DEHP, DIBP. (As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample.)
- (2) 其他測試項目請見下一頁. (Please refer to next pages for the other item(s).)

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





# 測試報告

## Test Report

號碼(No.) : CE/2016/A0549

日期(Date) : 2016/10/13

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.)

(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.)

(江蘇省昆山市蓬明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 CITY, TAOYUAN COUNTY 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 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測 極限值 (MDL)	結果 (Result)
				No. 1
鎘 / Cadmium (Cd)	mg/kg	參考IEC 62321-5 (2013), 以感應耦合電漿原子發射光譜儀檢測。 / With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n. d.
鉛 / Lead (Pb)	mg/kg	參考IEC 62321-5 (2013), 以感應耦合電漿原子發射光譜儀檢測。 / With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n. d.
汞 / Mercury (Hg)	mg/kg	參考IEC 62321-4 (2013), 以感應耦合電漿原子發射光譜儀檢測。 / With reference to IEC 62321-4 (2013) and performed by ICP-AES.	2	n. d.
六價鉻 / Hexavalent Chromium Cr(VI)	mg/kg	參考IEC 62321 (2008), 以UV-VIS檢測。 / With reference to IEC 62321 (2008) and performed by UV-VIS.	2	n. d.
鈹 / 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.
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.

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# 測試報告

## Test Report

號碼(No.): CE/2016/A0549      日期(Date): 2016/10/13      頁數(Page): 3 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.)  
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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), 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.
<b>鹵素 / Halogen</b>				
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.
鄰苯二甲酸丁苄酯 / 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.

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# 測試報告 Test Report

號碼(No.) : CE/2016/A0549

日期(Date) : 2016/10/13

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
鄰苯二甲酸二異丁酯 / DIBP (Di-isobutyl phthalate) (CAS No. : 84-69-5)	mg/kg	參考 IEC 62321-8/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.
多溴聯苯總和 / Sum of PBBs	mg/kg	參考 IEC 62321-6 (2015), 以氣相層析儀/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.	

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# 測試報告 Test Report

號碼(No.): CE/2016/A0549

日期(Date): 2016/10/13

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 62321-6 (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.	

### 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)

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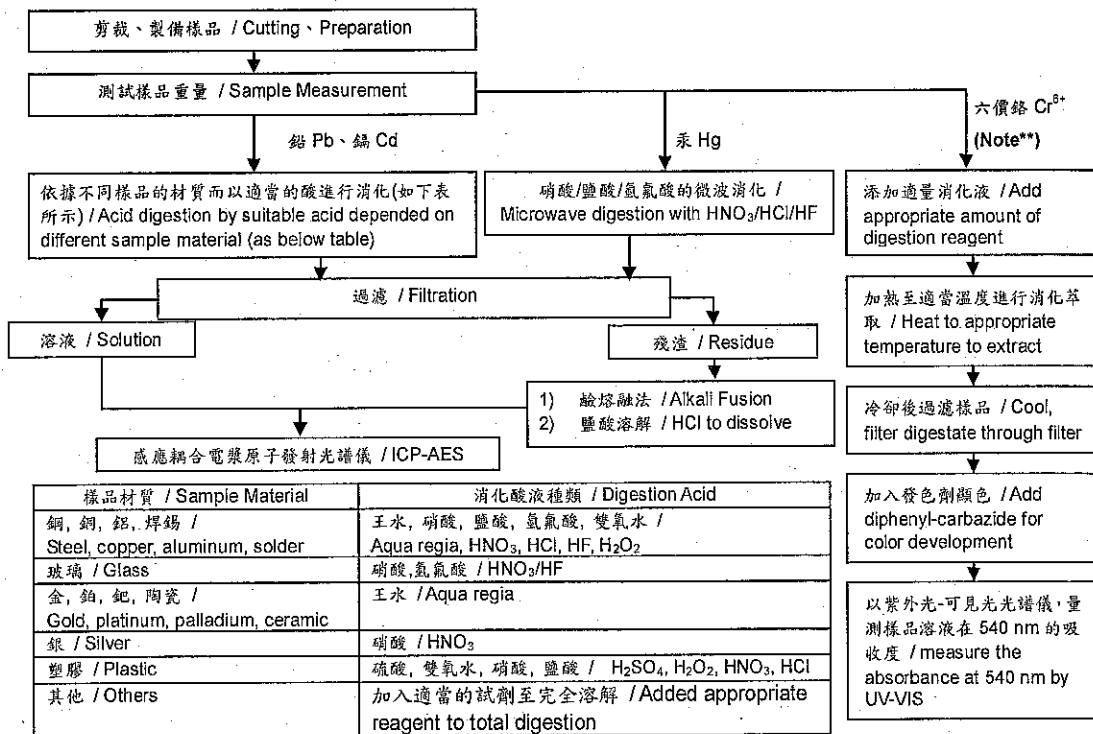
## 測試報告 Test Report

號碼(No.) : CE/2016/A0549    日期(Date) : 2016/10/13    頁數(Page): 6 of 12

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



Notes: (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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## Test Report

號碼(No.) : CE/2016/A0549

日期(Date) : 2016/10/13

頁數(Page): 7 of 12

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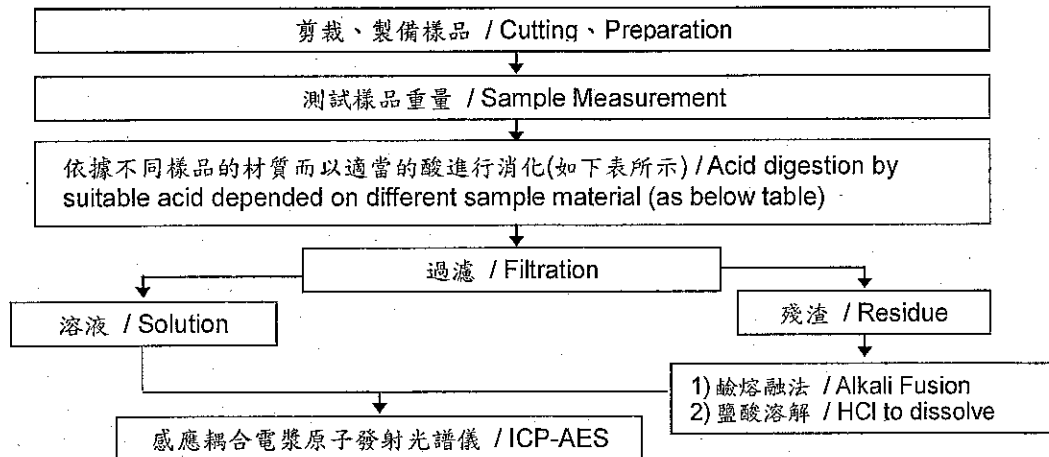
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根據以下的流程圖之條件，樣品已完全溶解。 / These samples were dissolved totally by pre-conditioning method according to below flow chart.

- 測試人員：王志瑋 / 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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# 測試報告 Test Report

號碼(No.) : CE/2016/A0549      日期(Date) : 2016/10/13      頁數(Page): 8 of 12

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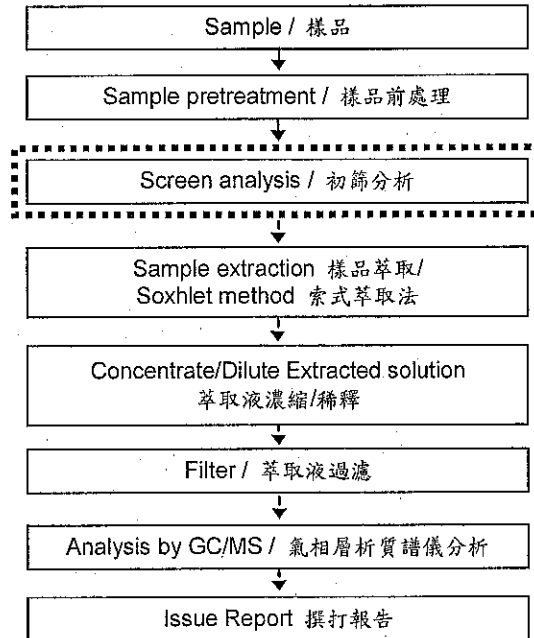
## 多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBB/PBDE

- 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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號碼(No.) : CE/2016/A0549

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頁數(Page): 9 of 12

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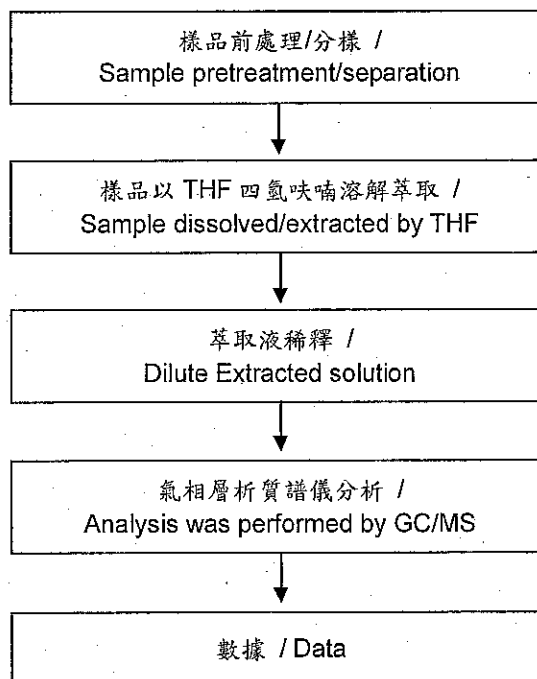
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### 可塑劑分析流程圖 / Analytical flow chart - Phthalate

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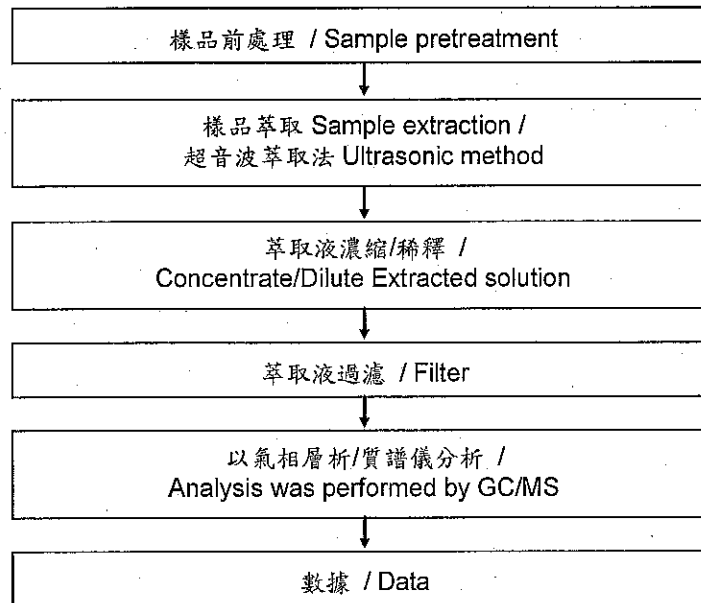
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## 六溴環十二烷分析流程圖 / Analytical flow chart - HBCDD

- 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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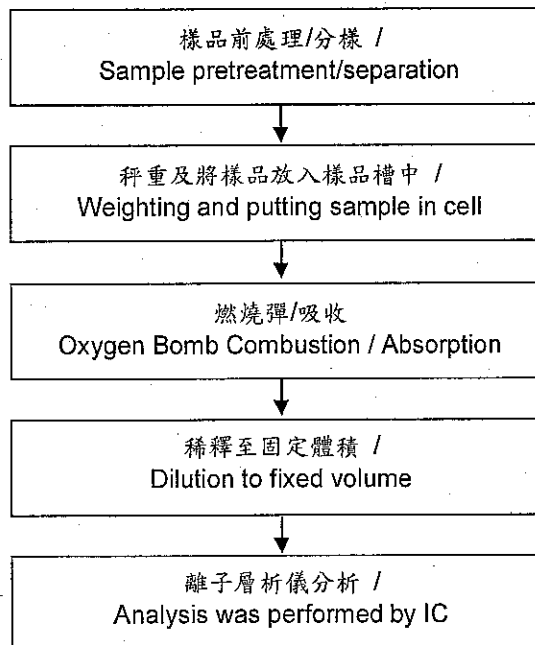
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號碼(No.) : CE/2016/A0549      日期(Date) : 2016/10/13      頁數(Page): 11 of 12

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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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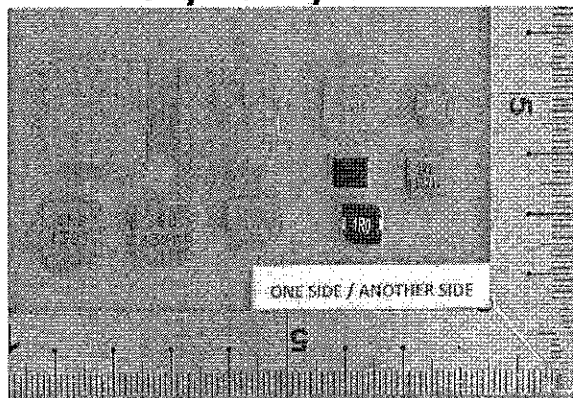
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號碼(No.) : CE/2016/A0549      日期(Date) : 2016/10/13      頁數(Page): 12 of 12

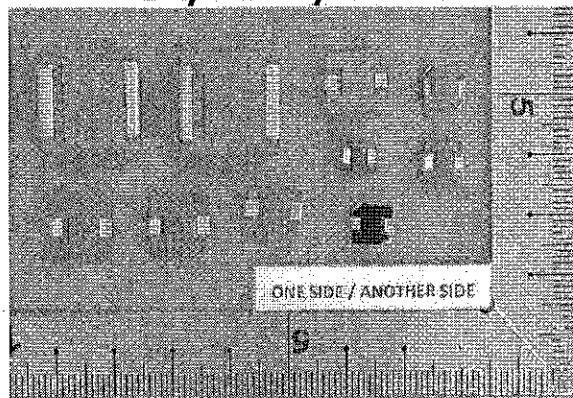
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\* 照片中如有箭頭標示，則表示為實際檢測之樣品/部位。 \*  
(The tested sample / part is marked by an arrow if it's shown on the photo.)

### CE/2016/A0549



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