High Frequency Winding Type Chip Inductor SWI0603F-SERIES

ECN HISTORY LIST

REV	DATE	DESCRIPTION	APPROVED	CHECKED	DRAWN
1.0	11/12/30	新 發 行	楊祥忠	徐鋒強	卓秀美
1.1	12/10/16	修改包裝帶規格	楊祥忠	徐鋒強	卓秀美
備 註					

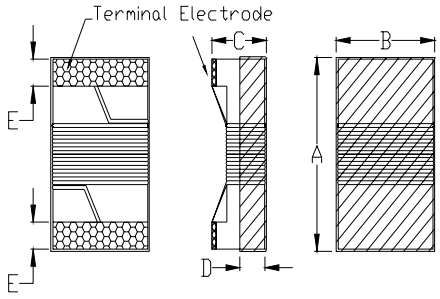
High Frequency Winding Type Chip Inductor SWI0603F-SERIES

1. Features

1.Ceramic core wire wound construction.
2.No batch to batch variations in inductance
3.High Reliability due to ceramic wire wound construction.
4.High frequency application.
5.Small footprint as well as low profile.
6.100% Lead(Pb) & Halogen-Free and RoHS compliant.

Halogen-free Pb-free

2. Dimensions



Size	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)
SWI0603	1.80 max.	1.20 max.	1.20 max.	0.38 ref.	0.35±0.1

Unit:mm

3. Part Numbering

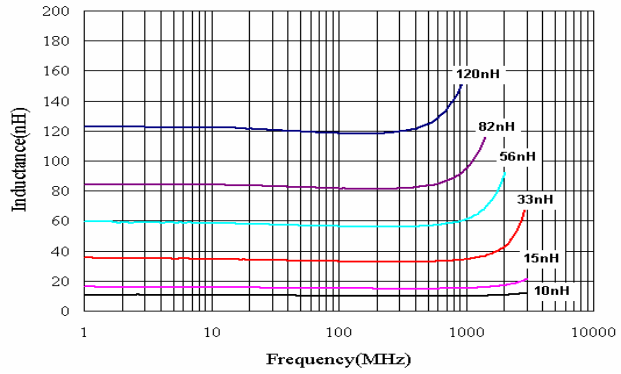
SWI	0603	F	-	2N0	S
A	B	C		D	E

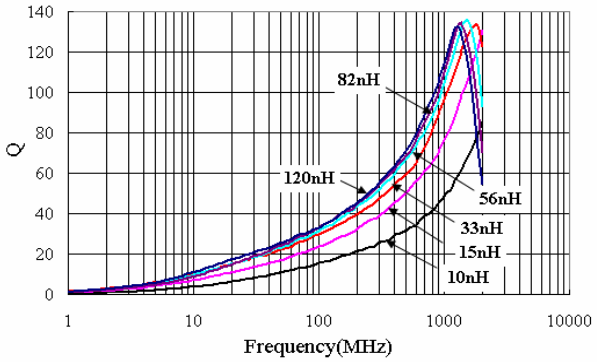
A: Series
B: Dimension LxW
C: Lead free type
D: Inductance 2N0=2.0nH
E: Inductance Tolerance C=±0.2nH , S=±0.3nH , J=±5% , K=±10%

4. Specification

Part Number	Inductance (nH)	Tolerance	Test Frequency (Hz)	Q @ 250MHz min.	Rated Current (mA) max.	DCR (Ω) max.	SRF (MHz) min.
SWI0603F-2N0□	2.0	C,S	0.1V/250M	13	700	0.07	8000
SWI0603F-3N9□	3.9	C,S	0.1V/250M	22	700	0.07	6900
SWI0603F-4N7□	4.7	C,S	0.1V/250M	20	700	0.12	5800
SWI0603F-6N8□	6.8	C,J,K	0.1V/250M	27	700	0.08	5800
SWI0603F-8N2□	8.2	C,J,K	0.1V/250M	30	700	0.13	4200
SWI0603F-10N□	10	J,K	0.1V/250M	31	700	0.13	4800
SWI0603F-12N□	12	J,K	0.1V/250M	35	700	0.13	4000
SWI0603F-15N□	15	J,K	0.1V/250M	35	700	0.13	4000
SWI0603F-18N□	18	J,K	0.1V/250M	35	700	0.16	3100

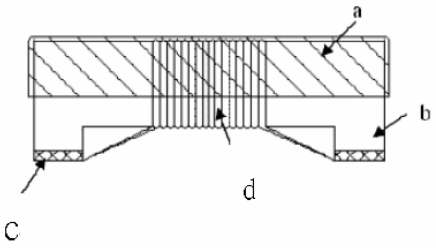
Part Number	Inductance (nH)	Tolerance	Test Frequency (Hz)	Q @ 250MHz min.	Rated Current (mA) max.	DCR (Ω) max.	SRF (MHz) min.
SWI0603F-22N□	22	J,K	0.1V/250M	38	700	0.23	3000
SWI0603F-24N□	24	J,K	0.1V/250M	38	700	0.13	2800
SWI0603F-27N□	27	J,K	0.1V/250M	40	600	0.14	2800
SWI0603F-33N□	33	J,K	0.1V/250M	40	600	0.22	2300
SWI0603F-39N□	39	J,K	0.1V/250M	40	600	0.30	2200
SWI0603F-47N□	47	J,K	0.1V/200M	38	600	0.35	2000
SWI0603F-56N□	56	J,K	0.1V/200M	38	600	0.37	1900
SWI0603F-68N□	68	J,K	0.1V/200M	37	600	0.43	1700
SWI0603F-72N□	72	J,K	0.1V/150M	34	400	0.42	1700
SWI0603F-82N□	82	J,K	0.1V/150M	34	400	0.71	1700
SWI0603F-R10□	100	J,K	0.1V/150M	34	400	0.78	1400
SWI0603F-R12□	120	J,K	0.1V/150M	32	300	0.84	1300
SWI0603F-R15□	150	J,K	0.1V/150M	28	280	0.96	990
SWI0603F-R18□	180	J,K	0.1V/100M	25	240	1.52	990
SWI0603F-R22□	220	J,K	0.1V/100M	25	200	2.02	900
SWI0603F-R27□	270	J,K	0.1V/100M	24	170	2.36	900
SWI0603F-R33□	330	J,K	0.1V/100M	24	185	3.40	700
SWI0603F-R39□	390	J,K	0.1V/100M	24	100	3.60	900



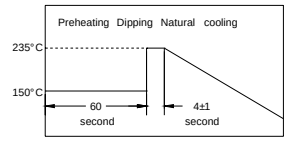


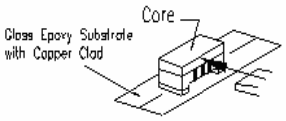
5. Materials

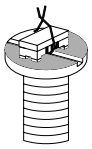
No.	Description	Specification
a.	Type	UV Glue
b.	Core	Ceramics Core
c	Termination	Tin Pb Free
d	Wire	Enameled Copper Wire



6. Reliability and Test Condition

<table>
<tr><th>Item</th><th>Performance</th><th>Test Condition</th></tr>
<tr><td>Operating Temperature</td><td>-40~+85℃(For products in unopened tape package, less than 40℃)</td><td></td></tr>
<tr><td colspan="3">Electrical Performance Test</td></tr>
<tr><td>Inductance L</td><td rowspan="5">Refer to standard electrical characteristic list</td><td rowspan="2">Agilent-4291, Agilent-4287</td></tr>
<tr><td>Q</td></tr>
<tr><td>SRF</td><td>Agilent-4291</td></tr>
<tr><td>DC Resistance</td><td>Agilent-4338</td></tr>
<tr><td>Rated Current</td><td>Applied the current to coils, the inductance change shall be less than 20% to initial value.</td></tr>
<tr><td colspan="3">Mechanical Performance Test</td></tr>
<tr><td>Resistance to Soldering Heat
MIL-STD-202
METHOD 210</td><td>1. Inductors shall be no evidence of electrical and mechanical damage.
2. Inductance : within ±0.3nH of initial value for ≦3.9nH.
3. Inductance : within ±10% of initial value for ≧5.2nH.
4. Q shall not change more than ± 20%.</td><td>Temp.: 260±5℃
Time: 10±1.0 Sec</td></tr>
<tr><td>Solderability Test
ANSI/J-STD-002</td><td>More than 95% of terminal electrode should be covered with solder.</td><td> 

After fluxing,component shall be dipped in a melted solder bath at 235±5℃ for 4±1seconds.</td></tr>
<tr><td>Component Adhesion
(Pull test)</td><td><table><tr><th>Series No.</th><th>F(Kg)</th></tr><tr><td>SWI0402</td><td>0.3(min.)</td></tr><tr><td>SWI0603</td><td>0.5(min.)</td></tr><tr><td>SWI0805</td><td>0.5(min.)</td></tr><tr><td>SWI1008</td><td>1.0(min.)</td></tr></table></td><td>The device should be reflow soldered(255±5℃ for 10sec.)to a tinned copper substrate.A dynometer force gauge should be applied the side of the component.The device must with-ST-F Kg without ailure of the termination attached to component.
 

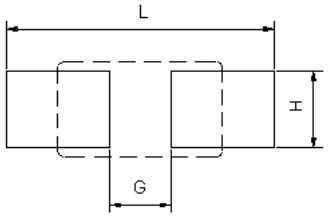
1.Insert 10cm wire into the remaining open eye bend ,the ends of even wire lengths upward and wind together.
2.Terminal shall not be remarkably damaged.
  </td></tr>
</table>

<table>
<tr><th>Item</th><th>Performance</th><th>Test Condition</th></tr>
<tr><td colspan="3">Reliability Test</td></tr>
<tr><td>Humidity Test
MIL-STD-202
METHOD 103</td><td rowspan="5">1.Visual examination：No mechanical damage
2.Inductance：within±10% of initial value
3.Q：within±20%of initial value</td><td>1.Temperature：40±2℃
2.Humidity：90 ~ 95%
3.Time：500 ±8hrs
4.Measured at room temperature after placing for 2 to 3 hrs</td></tr>
<tr><td>Thermal Shock Test
MIL-STD-202
METHOD 107</td><td>Conditions for 1 cycle
<table><tr><th>Step</th><th>Temperature(℃)</th><th>Times(min.)</th></tr><tr><td>1</td><td>-55±2</td><td>30±3</td></tr><tr><td>2</td><td>Room Temperature</td><td>Within5</td></tr><tr><td>2</td><td>85±5</td><td>30±3</td></tr></table>Total:100 cycles
Measured at room temperature after placing for 2 to 3 hrs</td></tr>
<tr><td>High Temperature Life Test
MIL-STD-202
METHOD 108</td><td>1.Temperature：85±2℃
2.Time：500±8hrs
3.Measured at room temperature after placing for 2to3 hrs</td></tr>
<tr><td>Humidity Resistance Test
MIL-STD-202
METHOD 103</td><td>1.Temperature:40±2℃
2.Humidity:90~ 95%
3.Time:500±8hr.
4.Recovery:2 to 3hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
<tr><td>Low temperature
Storage Test
JESD22-A119</td><td>1.Temperature：-40±2℃
2.Time：500±8hrs
3.Measured at room temperature after placing for 2to3 hrs</td></tr>
<tr><td>Random Vibration Test
MIL-STD-202
Method 204</td><td>Appearance: Cracking, shipping and any other defects harmful to the characteristics should not be allowed.
Impedance: within±30%</td><td>Frequency: 10-55-10Hz for 15 min.
Amplitude: 1.52mm
Directions and times:
X, Y, Z directions for 15 min.
This cycle shall be performed 12 times in each of three mutually perpendicular directions (Total 9hours).</td></tr>
</table>

7. Soldering and Mounting

7-1. Recommended PC Board Pattern

Chip size							Land Patterns For Reflow Soldering		
Series	Type	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	L(mm)	G(mm)	H(mm)
SWI	0603	1.80max.	1.20max.	1.20max	0.38 ref	0.35±0.1	1.92	0.64	1.02



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

7-2. Soldering

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

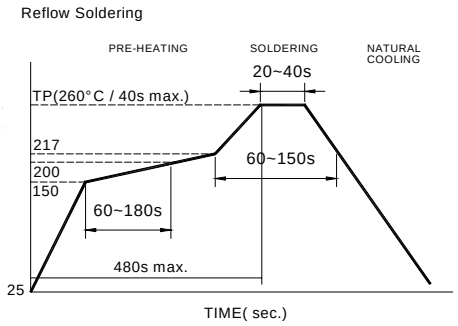
7-2.1 Solder re-flow:

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

7-2.2 Soldering Iron(Figure 2):

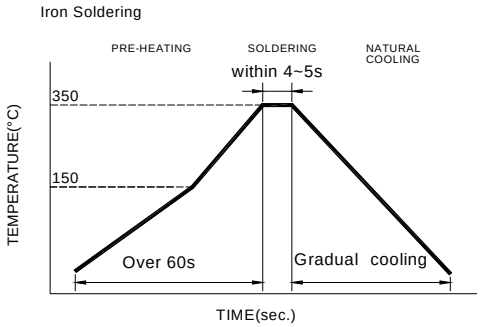
Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended.

Note： • Preheat circuit and products to 150℃ • Never contact the ceramic with the iron tip • Use a 20 watt soldering iron with tip diameter of 1.0mm
• 280℃ tip temperature (max) • 1.0mm tip diameter (max) • Limit soldering time to 3 sec.



Reflow times: 3 times max.

Fig.1

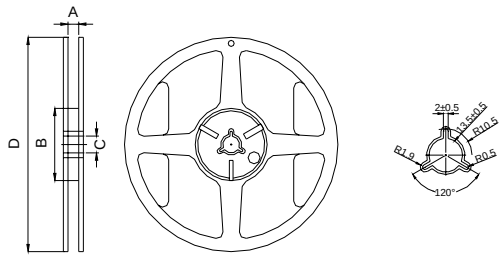


Iron Soldering times: 1 times max.

Fig.2

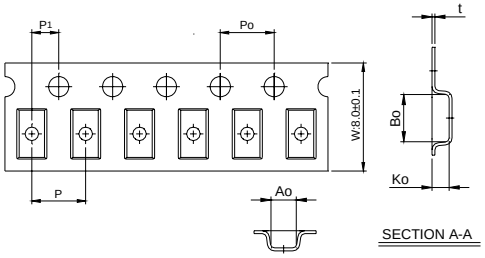
8. Packaging Information

8-1. Reel Dimension



Type	A(mm)	B(mm)	C(mm)	D(mm)
7”x8mm	8.4±0.5	60±2	13.5±0.5	178±2

8-2.1 Tape Dimension / 8mm(black anti-static electricity carrier tape)

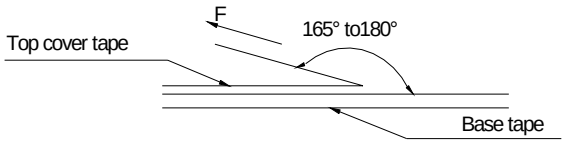


Series	Size	P(mm)	Po(mm)	P1(mm)	Bo(mm)	Ao(mm)	Ko(mm)	t(mm)
SWI	0603	4.0±0.1	4.0±0.1	2.0±0.05	1.88±0.05	1.30±0.05	1.10±0.05	0.20±0.02

8-3. Packaging Quantity

Chip size	**0603**
Reel	3000
Reel Size	7”x8mm

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

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 40℃ 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/2012/37271 日期(Date) : 2012/04/03 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.)
桃園縣楊梅市幼獅工業區幼四路1之1號 / NO. 1, YOU 4TH ROAD, YOUTH INDUSTRIAL DISTRICT, YANG-MEI CITY, TAO-YUAN HSIEN. TAIWAN R. O. C.
(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)
(江蘇省昆山市筵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户送樣，且由客户聲稱並經客户確認如下 (The following samples was/were submitted and identified by/on behalf of the client as)：

樣品名稱(Sample Description)	:	SMD WIRE INDUCTOR
樣品型號(Style/Item No.)	:	SWI, SWC_I SERIES
收件日期(Sample Receiving Date)	:	2012/03/28
測試期間(Testing Period)	:	2012/03/28 TO 2012/04/03

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

SGS TAIWAN LTD
Chenyu Kung / Operation Manager
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory – Taipei

測試報告
Test Report

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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: 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)	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)			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.

測試報告
Test Report

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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.

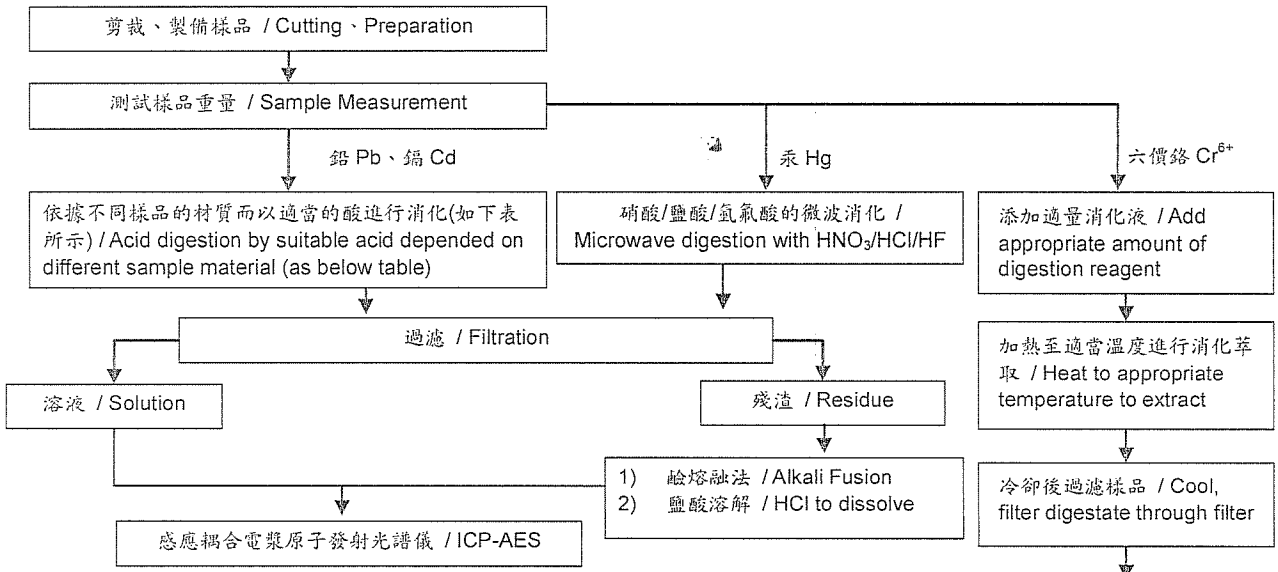
備註(Note):

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.)

測試報告
Test Report

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.)
桃園縣楊梅市幼獅工業區幼四路1之1號 / NO. 1, YOU 4TH ROAD, YOUTH INDUSTRIAL DISTRICT, YANG-MEI CITY, TAO-YUAN HSIEN. TAIWAN R. O. C.
(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)
(江蘇省昆山市蓬朗昆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^{6+} 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



樣品材質 / Sample Material	消化酸液種類 / Digestion Acid
鋼, 銅, 鋁, 焊錫 / Steel, copper, aluminum, solder	王水, 硝酸, 鹽酸, 氫氟酸, 雙氧水 / Aqua regia, HNO_3, HCl, HF, H_2O_2
玻璃 / Glass	硝酸,氫氟酸 / HNO_3/HF
金, 鉑, 鈀, 陶瓷 / Gold, platinum, palladium, ceramic	王水 / Aqua regia
銀 / Silver	硝酸 / HNO_3
塑膠 / Plastic	硫酸, 雙氧水, 硝酸, 鹽酸 / H_2SO_4, H_2O_2, HNO_3, HCl
其他 / Others	加入任何酸至完全溶解 / Any acid to total digestion

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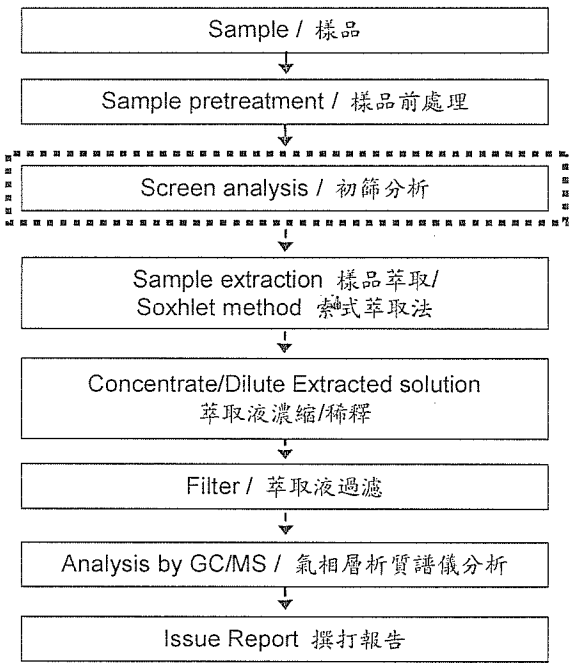
多溴聯苯/多溴聯苯醚分析流程圖 / PBB/PBDE analytical FLOW CHART

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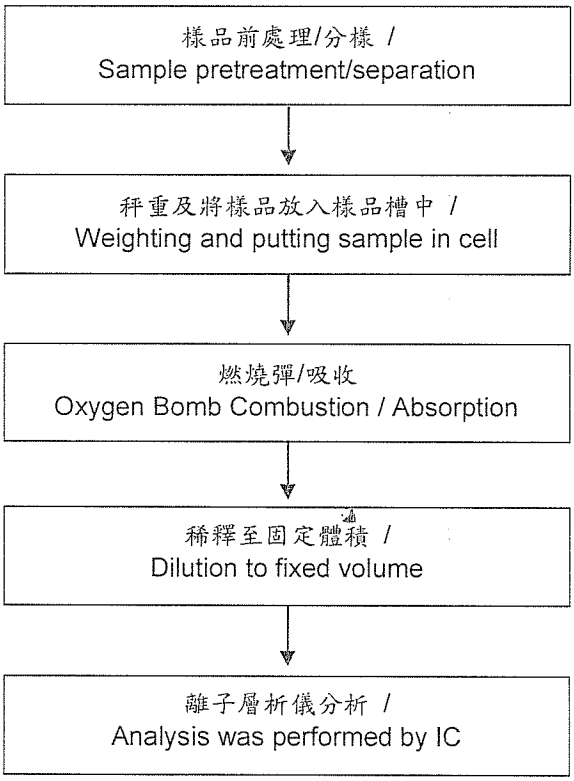
鹵素分析流程圖 / Analytical flow chart of halogen content

1) 測試人員：陳立倫 / Name of the person who made measurement: Alan Chen
2) 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang



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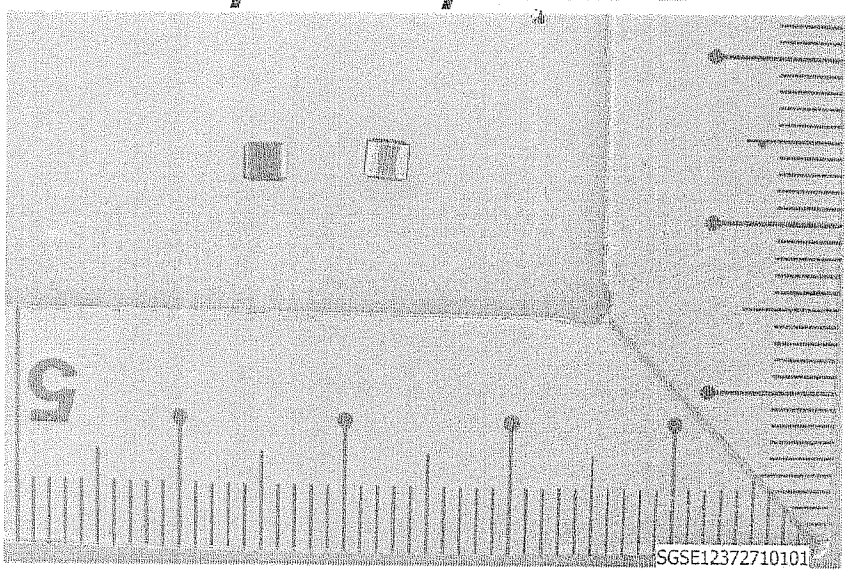
* 照片中如有箭頭標示，則表示爲實際檢測之樣品/部位. *
(The tested sample / part is marked by an arrow if it's shown on the photo.)

CE/2012/37271



** 報告結尾(End of Report) **