

# Specification for Approval

Date: 2012/5/8

Customer : 天河

TAI-TECH P/N: HCI1005F-Series-M8

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

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

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

REMARK:

Customer Approval Feedback

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# High Frequency Chip Inductor (Lead Free)

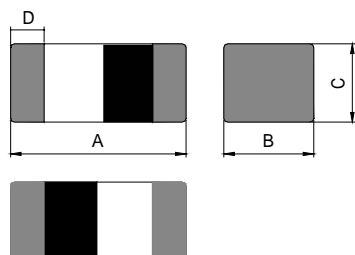
HCI1005F-Series-M8

## 1. Features

1. Monolithic inorganic material construction.
2. Closed magnetic circuit avoids crosstalk.
3. S.M.T. type.
4. Suitable for reflow soldering.
5. Shapes and dimensions follow E.I.A. spec.
6. Available in various sizes.
7. Excellent solder ability and heat resistance.
8. High SRF up to 6GHz and above.
9. 100% Lead(Pb) & Halogen-Free and RoHS compliant.



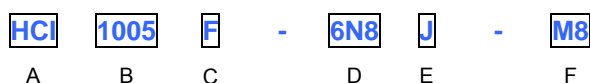
## 2. Dimensions



Chip Size	
A	1.00±0.05
B	0.50±0.05
C	0.50±0.05
D	0.25±0.10

Units: mm

## 3. Part Numbering



A: Series

B: Dimension

C: Material

D: Inductance

E: Inductance Tolerance

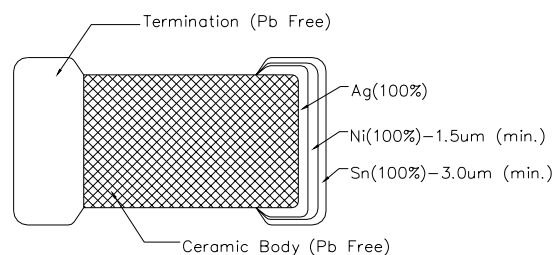
F: MARKING

L x W

Lead Free Material

6N8=6.8 nH

J=±5% , K=±10%



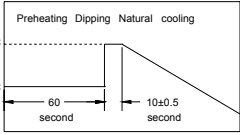
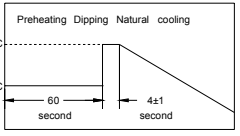
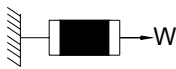
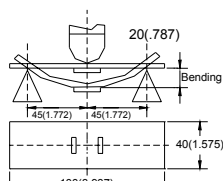
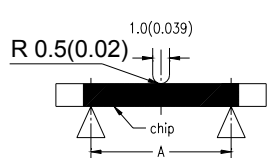
## 4. Specification

Tai-Tech Part Number	Inductance (nH)	Test Frequency (MHz)	Q min.	Q (Typ.) Frequency(MHz)					Rated Current (mA) max	DCR ( )		SRF (MHz)	
				100	300	500	800	1000		max.	typ.	min.	typ.
HCI1005F-1N0S-M8	1.0	100	8	11	25	34	43	52	300	0.08	0.04	10000	>13000
HCI1005F-1N2S-M8	1.2	100	8	11	25	35	44	52	300	0.09	0.04	10000	>13000
HCI1005F-1N5S-M8	1.5	100	8	11	24	33	44	48	300	0.10	0.05	6000	>13000
HCI1005F-1N8S-M8	1.8	100	8	11	23	30	36	42	300	0.12	0.06	6000	11000
HCI1005F-2N0S-M8	2.0	100	8	11	21	27	34	39	300	0.12	0.06	6000	10500
HCI1005F-2N2S-M8	2.2	100	8	10	18	25	31	36	300	0.13	0.07	6000	10000
HCI1005F-2N4S-M8	2.4	100	8	10	18	24	31	35	300	0.13	0.07	6000	9500
HCI1005F-2N7S-M8	2.7	100	8	10	18	24	31	34	300	0.13	0.08	6000	9000
HCI1005F-3N0S-M8	3.0	100	8	10	18	24	31	35	300	0.16	0.09	6000	8500

Tai-Tech Part Number	Inductance (nH)	Test Frequency (MHz)	Q	Q (Typ.) Frequency(MHz)					Rated Current (mA) max	DCR ( )		SRF (MHz)	
			min.	100	300	500	800	1000		max.	typ.	min.	typ.
HCI1005F-3N3S-M8	3.3	100	8	10	18	24	31	35	300	0.16	0.10	6000	8000
HCI1005F-3N6S-M8	3.6	100	8	10	18	24	31	35	300	0.20	0.11	5000	7500
HCI1005F-3N9S-M8	3.9	100	8	10	18	24	31	35	300	0.21	0.12	4000	7000
HCI1005F-4N3S-M8	4.3	100	8	10	18	24	31	35	300	0.20	0.12	4000	6500
HCI1005F-4N7S-M8	4.7	100	8	10	18	24	31	34	300	0.21	0.12	4000	6000
HCI1005F-5N1S-M8	5.1	100	8	10	18	24	31	34	300	0.21	0.13	4000	5800
HCI1005F-5N6S-M8	5.6	100	8	10	18	24	30	35	300	0.23	0.15	4000	5700
HCI1005F-6N2S-M8	6.2	100	8	10	18	24	30	34	300	0.25	0.16	3900	5600
HCI1005F-6N8 -M8	6.8	100	8	10	18	23	29	32	300	0.25	0.17	3900	5500
HCI1005F-7N5 -M8	7.5	100	8	10	18	23	29	32	300	0.25	0.18	3700	5200
HCI1005F-8N2 -M8	8.2	100	8	10	18	23	29	31	300	0.28	0.21	3600	4900
HCI1005F-9N1 -M8	9.1	100	8	10	18	23	29	31	300	0.30	0.22	3400	4500
HCI1005F-10N -M8	10	100	8	10	18	23	29	31	300	0.31	0.23	3200	4300
HCI1005F-12N -M8	12	100	8	11	18	23	29	31	300	0.40	0.28	2700	3900
HCI1005F-15N -M8	15	100	8	11	18	23	28	30	300	0.46	0.31	2300	3500
HCI1005F-18N -M8	18	100	8	11	18	23	28	30	300	0.55	0.35	2100	3100
HCI1005F-22N -M8	22	100	8	11	17	22	26	27	300	0.60	0.42	1900	2800
HCI1005F-27N -M8	27	100	8	11	17	21	25	26	300	0.70	0.47	1600	2300
HCI1005F-33N -M8	33	100	8	11	16	20	23	22	200	0.80	0.50	1300	1900
HCI1005F-39N -M8	39	100	8	11	16	20	23	21	200	0.90	0.52	1200	1700
HCI1005F-47N -M8	47	100	8	11	16	19	21	18	200	1.00	0.58	1000	1500
HCI1005F-56N -M8	56	100	8	11	16	18	18	16	200	1.00	0.61	750	1300
HCI1005F-68N -M8	68	100	8	11	15	17	18	11	180	1.20	0.70	750	1200
HCI1005F-82N -M8	82	100	8	10	14	16	15	6	150	1.30	0.81	600	1100
HCI1005F-R10 -M8	100	100	8	10	14	14	12	-	150	1.50	0.94	600	1000
HCI1005F-R12 -M8	120	100	8	10	12	10	-	-	150	1.60	1.10	600	800
HCI1005F-R15 -M8	150	100	8	12	17	17	-	-	140	3.20	2.57	550	920
HCI1005F-R18 -M8	180	100	8	12	16	-	-	-	130	3.70	2.97	500	810
HCI1005F-R22 -M8	220	100	8	12	16	-	-	-	120	4.20	3.29	450	700
HCI1005F-R27 -M8	270	100	8	12	14	-	-	-	110	4.80	3.92	400	600

: J=±5% , K=±10%

### 5. Reliability and Test Condition

Item	Performance											Test Condition					
	FCB	FCM	HCB	GHB	FCA	FCI	FHI	FCH	HCI	MGI	--						
Series No.												--					
Operating Temperature	-40~+125 (Including self-temperature rise)					-40~+105 (Including self-temperature rise)					--						
Transportation Storage Temperature	-40~+125					-40~+105					For long storage conditions, please see the Application Notice						
Impedance (Z)	Refer to standard electrical characteristics list											Agilent4291					
Inductance (Ls)												Agilent E4991					
Q Factor												Agilent4287					
DC Resistance												Agilent16192					
Rated Current												Agilent 4338					
Temperature Rise Test	Rated Current < 1A ΔT 20 Max Rated Current 1A ΔT 40 Max											1. Applied the allowed DC current. 2. Temperature measured by digital surface thermometer.					
Solder heat Resistance	Appearance: No significant abnormality. Impedance change: Within ± 30%. Inductance change: : within±10%					No mechanical damage. Remaining terminal electrode:75% min.					Preheat: 150 ,60sec. Solder: Sn-Cu0.5 Solder temperature: 260±5 Flux for lead free: ROL0 Dip time: 10±0.5sec. 						
Solderability	More than 95% of the terminal electrode should be covered with solder.										Preheat: 150 ,60sec. Solder: Sn-Cu0.5 Solder temperature: 245±5 Flux for lead free: ROL0 Dip time: 4±1sec.						
Terminal strength	The terminal electrode and the dielectric must not be damaged by the forces applied on the right conditions.										For FCB FCM HCB GHB FCI FHI FCH HCI MGI: Size Force (Kgf) Time(sec) 1005 0.2 >30 1608 0.5						
Flexture strength	The terminal electrode and the dielectric must not be damaged by the forces applied on the right conditions.										Solder a chip on a test substrate, bend the substrate by 2mm (0.079in)and return. The duration of the applied forces shall be 60 (+ 5) Sec.						
Bending Strength	The ferrite should not be damaged by Forces applied on the right condition.										<table border="1"> <thead> <tr> <th>Size</th> <th>mm(inches)</th> <th>P-Kgf</th> </tr> </thead> <tbody> <tr> <td>1608</td> <td>0.80(0.033)</td> <td>0.3</td> </tr> </tbody> </table>	Size	mm(inches)	P-Kgf	1608	0.80(0.033)	0.3
Size	mm(inches)	P-Kgf															
1608	0.80(0.033)	0.3															
Random Vibration Test	Appearance: Cracking, chipping and any other defects harmful to the characteristics should not be allowed. Impedance: within±30% Inductance change: : within±10%.					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).											

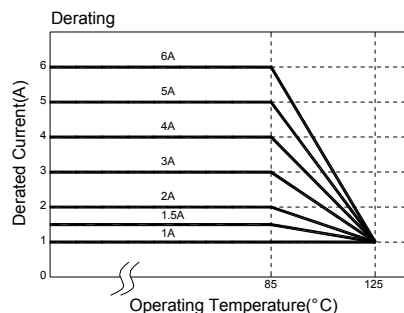
Item	Performance	Test Condition
Life testing at High Temperature	Appearance: no damage.	Temperature: 125±2 (bead), 85±2 (inductor) Applied current: rated current. Duration: 1000±12hrs. Measured at room temperature after placing for 2 to 3hrs.
Humidity	Impedance: within±30%of initial value. Inductance: within±10%of initial value. Q: within±30%of initial value. (FCI FHI FCH) Q: within±20%of initial value. (HCI MGI)	Humidity: 90~95%RH. Temperature: 40±2 . Temperature: 60±2 .(HCI MGI) Duration: 504±8hrs. Measured at room temperature after placing for 2 to 3hrs.
Thermal shock	Appearance: no damage. Impedance: within±30%of initial value. Inductance: within±10%of initial value. Q: within±30%of initial value. (FCI FHI FCH) Q: within±20%of initial value. (HCI MGI)	Condition for 1 cycle Step1: -40±2 30±5 min. Step2: +105±2 30±5min. Number of cycles: 500 Measured at room temperature after placing for 2 to 3 hrs.
Low temperature storage test	Q: within±20%of initial value. (HCI MGI)	Temperature: -40±2 . Duration: 500±8hrs. Measured at room temperature after placing for 2 to 3hrs.
Drop	No mechanical damage Impedance change: ±30% Inductance change: : within±10%	Drop 10 times on a concrete floor from a height of 75cm

Phase	Temperature( )	Time(min.)
1	-40±2	30±5
2	room temp.	0.5
3	+105±2	30±5

Measured: 500 times

**\*\*Derating Curve**

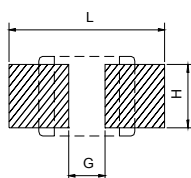
For the ferrite chip bead which withstanding current over 1.5A, as the operating temperature over 85 , the derating current information is necessary to consider with. For the detail derating of current, please refer to the Derated Current vs. Operating Temperature curve.



**6.Soldering and Mounting**

**6-1. Recommended PC Board Pattern**

Chip Size						Land Patterns For Reflow Soldering		
Series	Type	A(mm)	B(mm)	C(mm)	D(mm)	L(mm)	G(mm)	H(mm)
HCI	0603	0.6±0.03	0.30±0.03	0.30±0.03	0.15±0.05	0.80	0.20~0.30	0.25~0.40
	1005	1.0±0.05	0.50±0.05	0.50±0.05	0.25±0.10	1.50	0.45~0.55	0.45~0.55



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 against the mechanical stress to prevent failure.

**6-2. Soldering**

Mildly activated rosin fluxes are preferred. The 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.

Note.

If wave soldering is used, there will be some risk.

Re-flow soldering temperatures below 240 degrees, there will be non-wetting risk

**6-2.1 Lead Free Solder re-flow:**

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

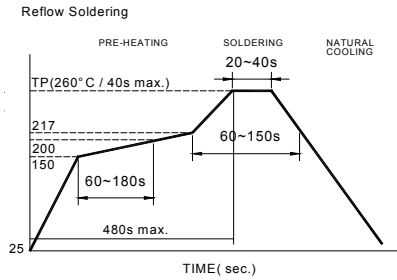
**6-2.2 Soldering Iron:**

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. for Iron Soldering in Figure 2.

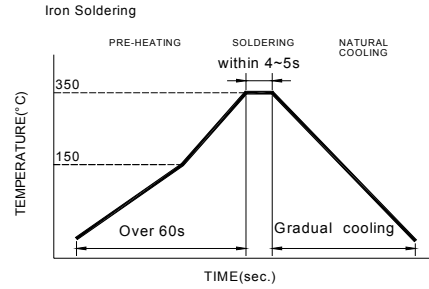
Preheat circuit and products to 150  
350 tip temperature (max)

Never contact the ceramic with the iron tip  
1.0mm tip diameter (max)

Use a 20 watt soldering iron with tip diameter of 1.0mm  
Limit soldering time to 4-5sec.



Reflow times: 3 times max  
Fig.1

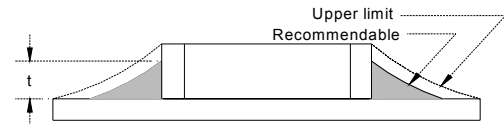


Iron Soldering times : 1 times max  
Fig.2

**6-2.3 Solder Volume:**

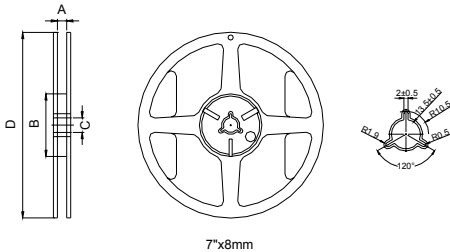
Accordingly increasing the solder volume, the mechanical stress to product is also increased. Exceeding solder volume may cause the failure of mechanical or electrical performance. Solder shall be used not to be exceed as shown in right side:

Minimum fillet height = soldering thickness + 25% product height



**7. Packaging Information**

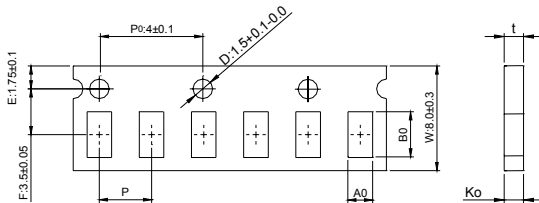
**7-1. Reel Dimension**



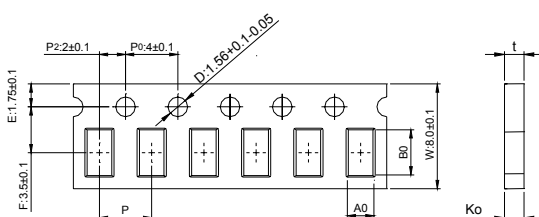
Type	A(mm)	B(mm)	C(mm)	D(mm)
7"x8mm	9.0±0.5	60±2	13.5±0.5	178±2

**7-2 Tape Dimension / 8mm**

Material of taping is paper



Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
060303	0.70±0.06	0.40±0.06	0.45max	2.0±0.05	0.45max

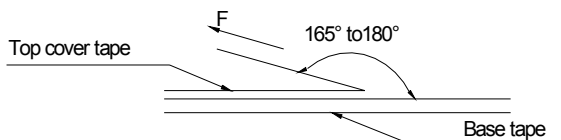


Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
100505	1.15±0.10	0.65±0.10	0.80max	2.0±0.05	0.80max

7-3. Packaging Quantity

Chip Size	100505	060303
Chip / Reel	10000	15000
Inner box	50000	75000
Middle box	250000	375000
Carton	500000	750000

7-4. Tearing Off Force



The force for tearing off cover tape is 15 to 60 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 solder ability of terminal electrodes:

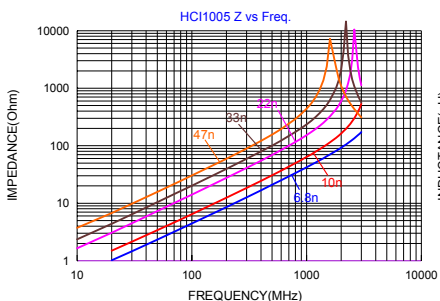
1. TAI-TECH products meet IPC/JEDEC J-STD-020D standard-MSL, level 1.
2. Temperature and humidity conditions: -10~ 40 and 30~70% RH.
3. Recommended products should be used within 6 months from the time of delivery.
4. The packaging material should be kept where no chlorine or sulfur exists in the air.

Transportation

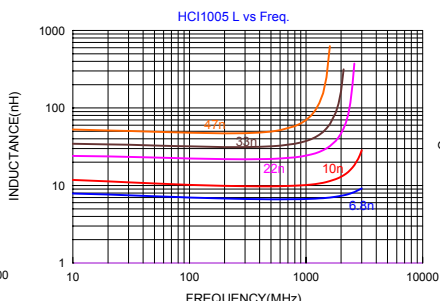
1. Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
2. The use of tweezers or vacuum pick up is strongly recommended for individual components.
3. Bulk handling should ensure that abrasion and mechanical shock are minimized.

**Impedance, Inductance, Q v.s Frequency Characteristics(Typical)**

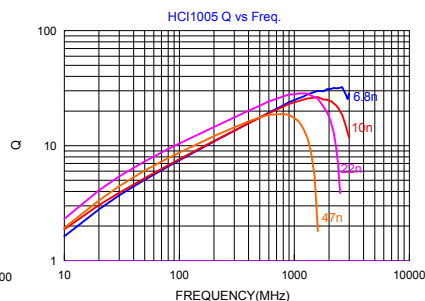
Impedance v.s. Frequency Characteristics



Inductance v.s. Frequency Characteristics



Q v.s. Frequency Characteristics



## 測試報告 Test Report


號碼(No.) : CE/2012/24508 日期(Date) : 2012/02/29 頁數(Page) : 1 of 7

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

以下測試樣品係由客戶送樣，且由客戶聲稱並經客戶確認如下 (The following samples was/were submitted and identified by/on behalf of the client as) :

樣品名稱(Sample Description) : HCI, MGI, UHI, THI, HCI-M, THI-M, TCI SERIES  
樣品型號(Style/Item No.) : HCI, MGI, UHI, THI, HCI-M, THI-M, TCI SERIES  
收件日期(Sample Receiving Date) : 2012/02/21  
測試期間(Testing Period) : 2012/02/21 TO 2012/02/29

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

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

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# 測試報告

## Test Report

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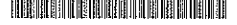
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### 測試結果(Test Results)

測試部位(PART NAME) No.1 : 整體混測 (3款) (MIXED ALL PARTS (3 KINDS))

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	方法偵測 極限值 (MDL)	結果 (Result)
				No.1
鎘 / Cadmium (Cd)	mg/kg	參考IEC 62321: 2008方法, 以感應耦合電漿原子發射光譜儀檢測。 / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
鉛 / Lead (Pb)	mg/kg	參考IEC 62321: 2008方法, 以感應耦合電漿原子發射光譜儀檢測。 / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
汞 / Mercury (Hg)	mg/kg	參考IEC 62321: 2008方法, 以感應耦合電漿原子發射光譜儀檢測。 / With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
六價鉻 / Hexavalent Chromium Cr(VI)	mg/kg	參考IEC 62321: 2008方法, 以UV-VIS檢測。 / With reference to IEC 62321: 2008 and performed by UV-VIS.	2	n.d.
鹵素 / Halogen				
鹵素(氟) / Halogen-Fluorine (F) (CAS No.: 14762-94-8)	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.

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# 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	結果 (Result)
			(MDL)	No.1
多溴聯苯總和 / Sum of PBBs	mg/kg	參考IEC 62321: 2008方法, 以氣相層析儀/質譜儀檢測. / With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
一溴聯苯 / Monobromobiphenyl			5	n.d.
二溴聯苯 / Dibromobiphenyl			5	n.d.
三溴聯苯 / Tribromobiphenyl			5	n.d.
四溴聯苯 / Tetrabromobiphenyl			5	n.d.
五溴聯苯 / Pentabromobiphenyl			5	n.d.
六溴聯苯 / Hexabromobiphenyl			5	n.d.
七溴聯苯 / Heptabromobiphenyl			5	n.d.
八溴聯苯 / Octabromobiphenyl			5	n.d.
九溴聯苯 / Nonabromobiphenyl			5	n.d.
十溴聯苯 / Decabromobiphenyl			5	n.d.
多溴聯苯醚總和 / Sum of PBDEs			-	n.d.
一溴聯苯醚 / Monobromodiphenyl ether			5	n.d.
二溴聯苯醚 / Dibromodiphenyl ether			5	n.d.
三溴聯苯醚 / Tribromodiphenyl ether			5	n.d.
四溴聯苯醚 / Tetrabromodiphenyl ether			5	n.d.
五溴聯苯醚 / Pentabromodiphenyl ether			5	n.d.
六溴聯苯醚 / Hexabromodiphenyl ether			5	n.d.
七溴聯苯醚 / Heptabromodiphenyl ether			5	n.d.
八溴聯苯醚 / Octabromodiphenyl ether			5	n.d.
九溴聯苯醚 / Nonabromodiphenyl ether	5	n.d.		
十溴聯苯醚 / Decabromodiphenyl ether	5	n.d.		

### 備註(Note):

1. mg/kg = ppm; 0.1wt% = 1000ppm
2. n.d. = Not Detected (未檢出)
3. MDL = Method Detection Limit (方法偵測極限值)
4. "-" = Not Regulated (無規格值)
5. 樣品的測試是基於申請人要求混合測試, 報告中的混合測試結果不代表其中個別單一材質的含量. (The samples was/were analyzed on behalf of the applicant as mixing sample in one testing. The above results was/were only given as the informality value.)

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## 測試報告

## Test Report

號碼(No.): CE/2012/24508 日期(Date): 2012/02/29 頁數(Page): 4 of 7

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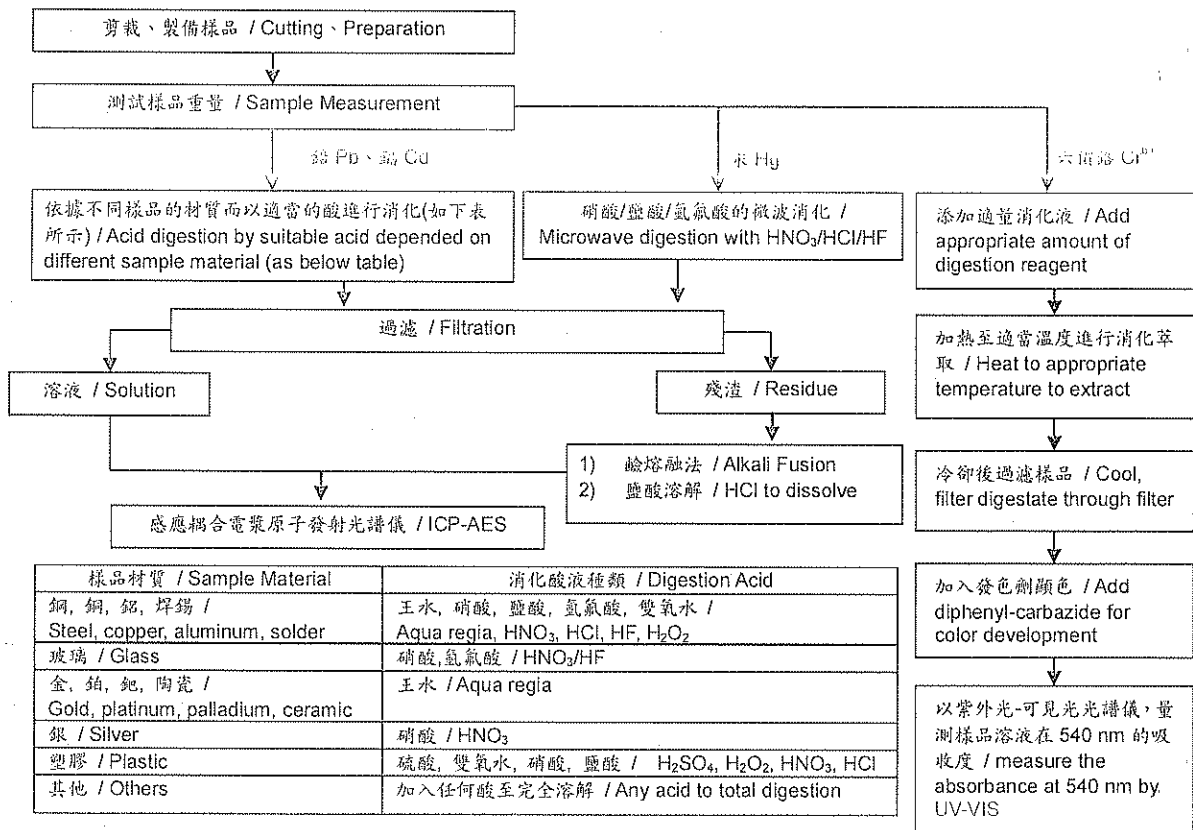
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- 1) 根據以下的流程圖之條件，樣品已完全溶解。(六價鉻測試方法除外) / These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr<sup>6+</sup> test method excluded)
- 2) 測試人員：楊登偉 / Name of the person who made measurement: Climbgreat Yang
- 3) 測試負責人：張啓興 / Name of the person in charge of measurement: Troy Chang



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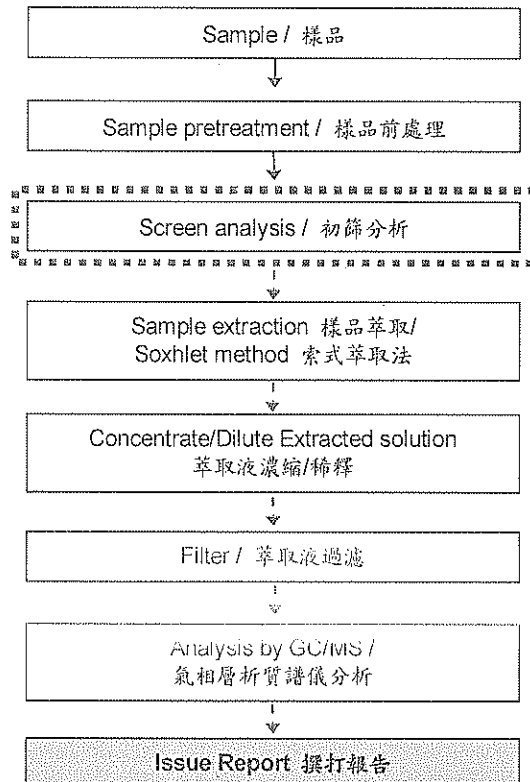
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### 多溴聯苯/多溴聯苯醚分析流程圖 / PBB/PBDE analytical FLOW CHART

- 測試人員：翁賜彬 / Name of the person who made measurement: Roman Wong
- 測試負責人：張啓典 / Name of the person in charge of measurement: Troy Chang
- 初次測試程序 / First testing process →
- 選擇性篩檢程序 / Optional screen process .....
- 確認程序 / Confirmation process - - - →



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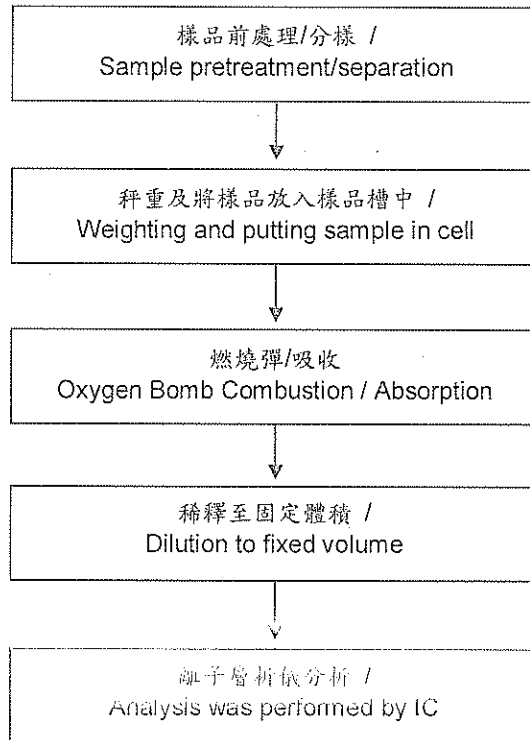
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### 鹵素分析流程圖 / Analytical flow chart of halogen content

- ☐ 測試人員：陳恩臻 / Name of the person who made measurement: Rita Chen
- ☐ 測試負責人：張啓典 / Name of the person in charge of measurement: Troy Chang



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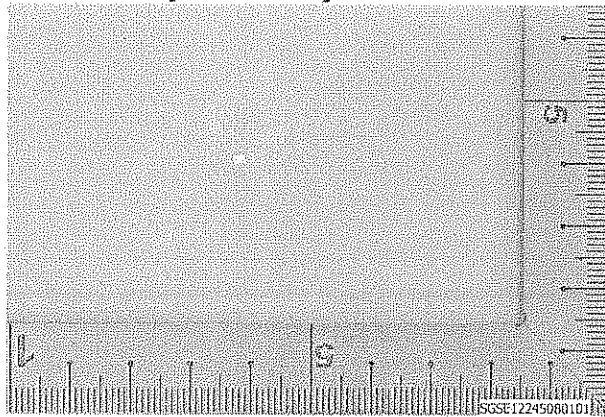
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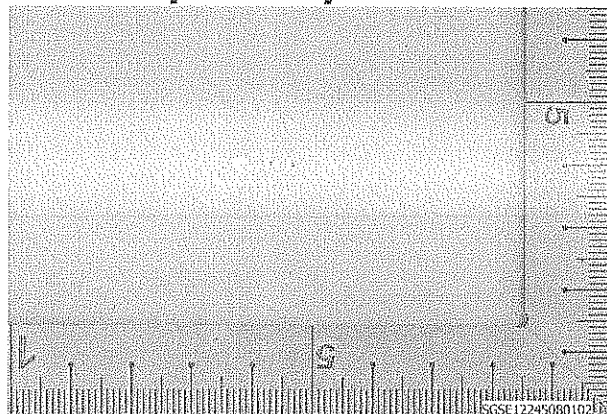
\* 照片中如有箭頭標示，則表示為實際檢測之樣品/部位。\*

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

CE/2012/24508



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