

# APPROVAL SHEET

友晶創新股份有限公司

**Item :** TCXO

**Spec. no :** SO3225T-050000-F1A-BWK-TA

**Freq :** 50.000 MHz

Customer Approved	Checked By	Issued By
		

請自發行日起2週內簽回此份規格書，若未簽回，則視為同意此規格。

**友桂電子股份有限公司**

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**RoHS Compliant**



[illegible]

# SPECIFICATION OF TCXO

YOKETAN CORP.

Customer : 友晶

SPEC NO : SO3225T-050000-F1A-BWK-TA

Date : 28-Sep-17

1. 型名 (Type)	<u>SO3225T (TCXO)</u>
2. 周波數(Frequency)	<u>50.000 MHz</u>
3. 電源電壓 (Power supply voltage)	<u>3.3V <math>\pm</math>5%</u>
4. 周波數誤差(Frequency tolerance)	<u><math>\pm</math>1.0ppm at 25 <math>\pm</math> 3<math>^{\circ}</math>C</u>
5. 周波數安定度(Frequency stability)	
5.1 溫度變動 (Temperature Ref.25 $^{\circ}$ C)	<u><math>\pm</math>1.0ppm (-30~+85<math>^{\circ}</math>C)</u>
5.2 電源變動 (Supply voltage stability)	<u><math>\pm</math>0.5ppm (Vdd <math>\pm</math>5%)</u>
5.3.負載變動 (Load change)	<u><math>\pm</math>0.3ppm (Load varies <math>\pm</math>5%)</u>
6. 溫度範圍(Temperature range)	
6.1 動作溫度範圍(Operating temp. range)	<u>-30 to +85<math>^{\circ}</math>C</u>
6.2 儲存溫度(Storage temp.)	<u>-40 to +85<math>^{\circ}</math>C</u>
7. 驅動能力(Driving ability)	<u>15pF</u>
8. 波形對稱性(Symmetry)	<u>40% to 60%</u>
9. 立上/立下時間(Rise,fall time)	<u>5nS Max.</u>
10. 出力電壓(Output voltage)	
10.1 High Output Voltage	<u>Voh : 0.9Vdd Min.</u>
10.2 Low Output Voltage	<u>Vol : 0.1Vdd Max.</u>
11. 消費電流(Current consumption)	<u>15mA Max.</u>
12. 老化值(Aging)	<u><math>\pm</math>1ppm/year Max.</u>
13. Phase jitter RMS(12K~5MHz)	<u>1pS Max.</u>
14. 相位雜音(Phase noise)	<u>-83dBc/Hz Typ. at 10Hz Offset</u> <u>-107dBc/Hz Typ. at 100Hz Offset</u> <u>-129dBc/Hz Typ. at 1KHz Offset</u> <u>-148dBc/Hz Typ. at 10KHz Offset</u> <u>-154dBc/Hz Typ. at 100KHz Offset</u> <u>-154dBc/Hz Typ. at 1MHz Offset</u>

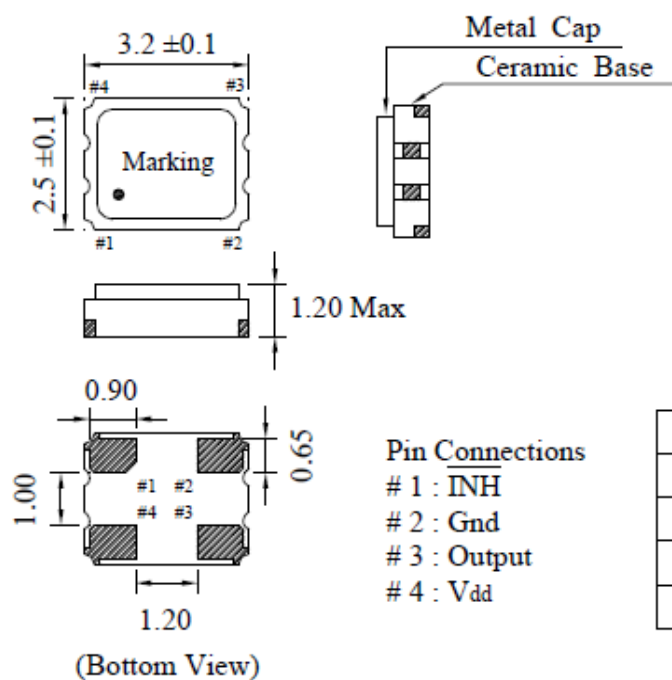
Marking

C50.000 *YOKE
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# SPECIFICATION OF TCXO

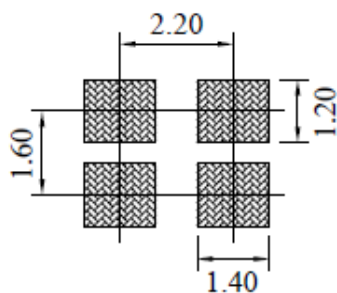
YOKETAN CORP.

## Dimensions



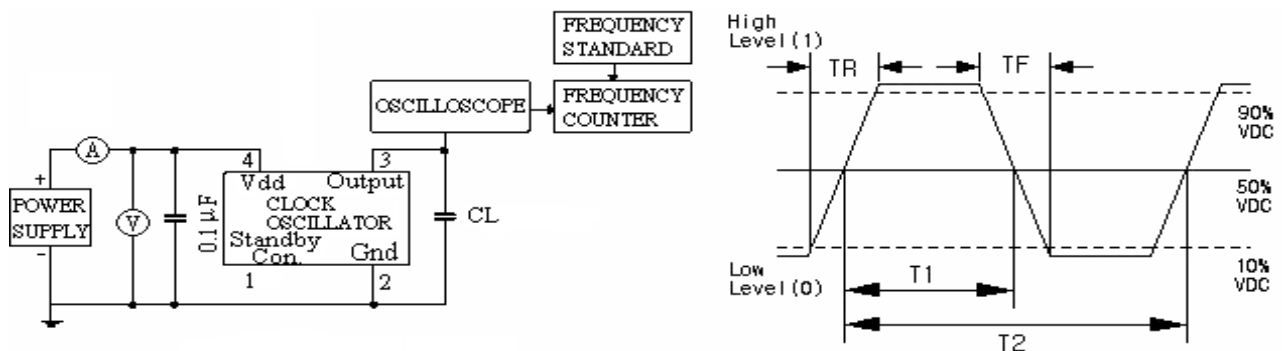
INH Function	
#1	#3(Output)
Open	Active
"H"Level	Active
"L"Level	High Z(Oscillation Stopped)

## Recommended Soldering Pattern

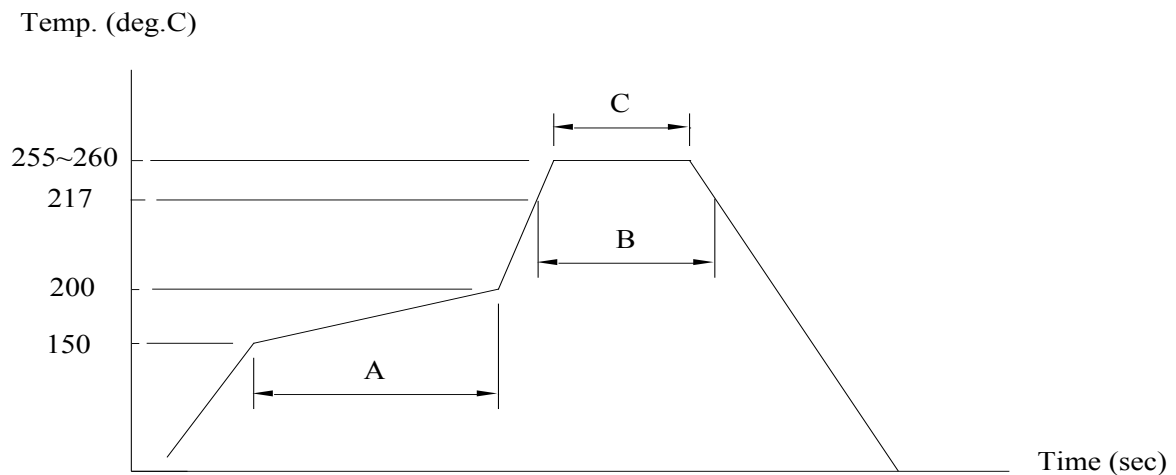


	Date	Name	Unit : mm	
Drawn	20.Jun.2014	Leo	Title	Drawing No.
Checked	20.Jun.2014	Iris	Dimension of External	PKO-322512-0620
Approved	20.Jun.2014	Wan		

## Test Circuit



## Soldering Reflow



(A)→Preheating area : 150~200°C, 60~120sec.

(B)→Heating area : 217°C, 60~150sec.

(C)→Peak temperature : 255~260°C, 30sec. Max.

Ramp-up rate (217→260°C) : 3°C/sec. Max.

Ramp-down rate (260→217°C) : 6°C/sec. Max.

Time 25°C→260°C : 480sec. Max.

\*Reference JEDEC J-STD-020

# SPECIFICATION OF CRYSTAL & OSC UNITS

YOKETAN CORP.

## Reliability Test ( applicable to SMD type OSC and X'tal )

Condition B.2

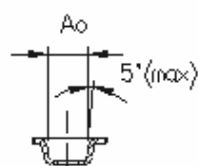
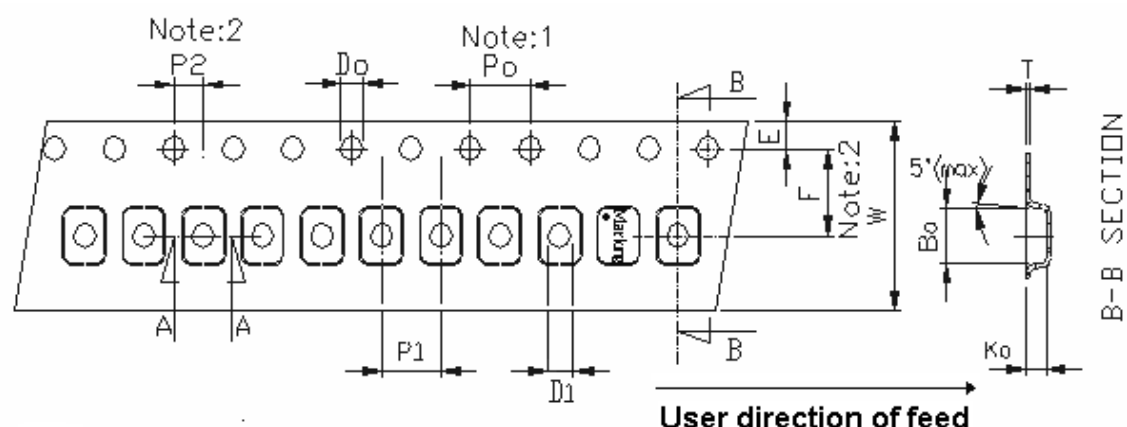
Test Items	Test Condition	Specification	
		General OSC (Note:1)(Note:3)	General X'tal (Note:2)
1. Gross Leak Test	Electronic test fluid 125°C/30sec	No continuous bubble	
2. Fine Leak Test	Bombing of He 4.5kg/cm <sup>2</sup> for 1.5 hours	Less than 1*10 <sup>-8</sup> atm.c.c./sec, Helium	
3. Drop Test	a ~19.999MHz(Fund.) →75 cm height b. 20~29.999MHz(Fund.) →50 cm height c. 30~ MHz(Fund.) →20 cm height on hard wooden surface / 3 times ( thickness more than 30 mm)	$\Delta F \leq \pm 10\text{PPM}$ , Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$ , $\Delta C.I. \leq \pm 10\text{ohms}$
4. Vibration Test	Freq. range: 10~55Hz Peak to peak amplitude:1.5mm 3 direction(X,Y,Z) , each 60min.	$\Delta F \leq \pm 10\text{PPM}$ , Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$ , $\Delta C.I. \leq \pm 10\text{ohms}$
5. Shearing Test	Weight : 5N, Test duration : 10±1 sec	$\Delta F \leq \pm 10\text{PPM}$ , Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$ , $\Delta C.I. \leq \pm 10\text{ohms}$
6. Substrate Bending Test	Test duration : 5±1 sec Amount of substrate : 3mm	$\Delta F \leq \pm 10\text{PPM}$ , Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$ , $\Delta C.I. \leq \pm 10\text{ohms}$
7. Resistance to Soldering Test	IR Reflow furnace with the condition 2 times. Peak temp.260±3°C , 10sec(Min.)	$\Delta F \leq \pm 10\text{PPM}$ , Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$ , $\Delta C.I. \leq \pm 10\text{ohms}$
8. Low Temp. Exposure Test	-40±3°C , 240±12 hrs	$\Delta F \leq \pm 10\text{PPM}$ , Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$ , $\Delta C.I. \leq \pm 10\text{ohms}$
9. Aging Test	125±3°C , 240±12hrs	$\Delta F \leq \pm 10\text{PPM}$ , Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$ , $\Delta C.I. \leq \pm 10\text{ohms}$
10. High Temp. & Humidity Test	+85°C±5°C & 85%±5% R.H. , 240±12 hrs	$\Delta F \leq \pm 10\text{PPM}$ , Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$ , $\Delta C.I. \leq \pm 10\text{ohms}$
11. Temperature Cycling Test	-40±3°C/15±3min ~ +85±3°C/15±3min 15cycles	$\Delta F \leq \pm 10\text{PPM}$ , Duty within spec.	$\Delta F \leq \pm 10\text{PPM}$ , $\Delta C.I. \leq \pm 10\text{ohms}$

**Note:1** → For communication application the spec. demanded " $\Delta F \leq \pm 5\text{PPM}$ , Duty within spec." °

**Note:2** → For communication application the spec. demanded " $\Delta F \leq \pm 5\text{PPM}$ ,  $\Delta C.I. \leq \pm 5\text{ohms}$ " °

**Note:3** → For TCXO series products demanded " $\Delta F \leq \pm 2\text{PPM}$ , Duty(Vpp) within spec." °

## Taping



A-A SECTION

$$A_o = \underline{2.70 \pm 0.10} \text{ mm}$$

$$B_o = \underline{3.40 \pm 0.10} \text{ mm}$$

$$K_o = \underline{1.40 \pm 0.10} \text{ mm}$$

Unit: mm

Symbol	Spec.
K1	-
Po	4.0±0.10
P1	4.0±0.10
P2	2.0±0.10
Do	1.50 <sup>+0.1</sup> <sub>+0</sub>
D1	1.0 (MIN)
E	1.75±0.10
F	3.50±0.10
10Po	40.0±0.10
W	8.0±0.20
T	0.25±0.05

Notice:

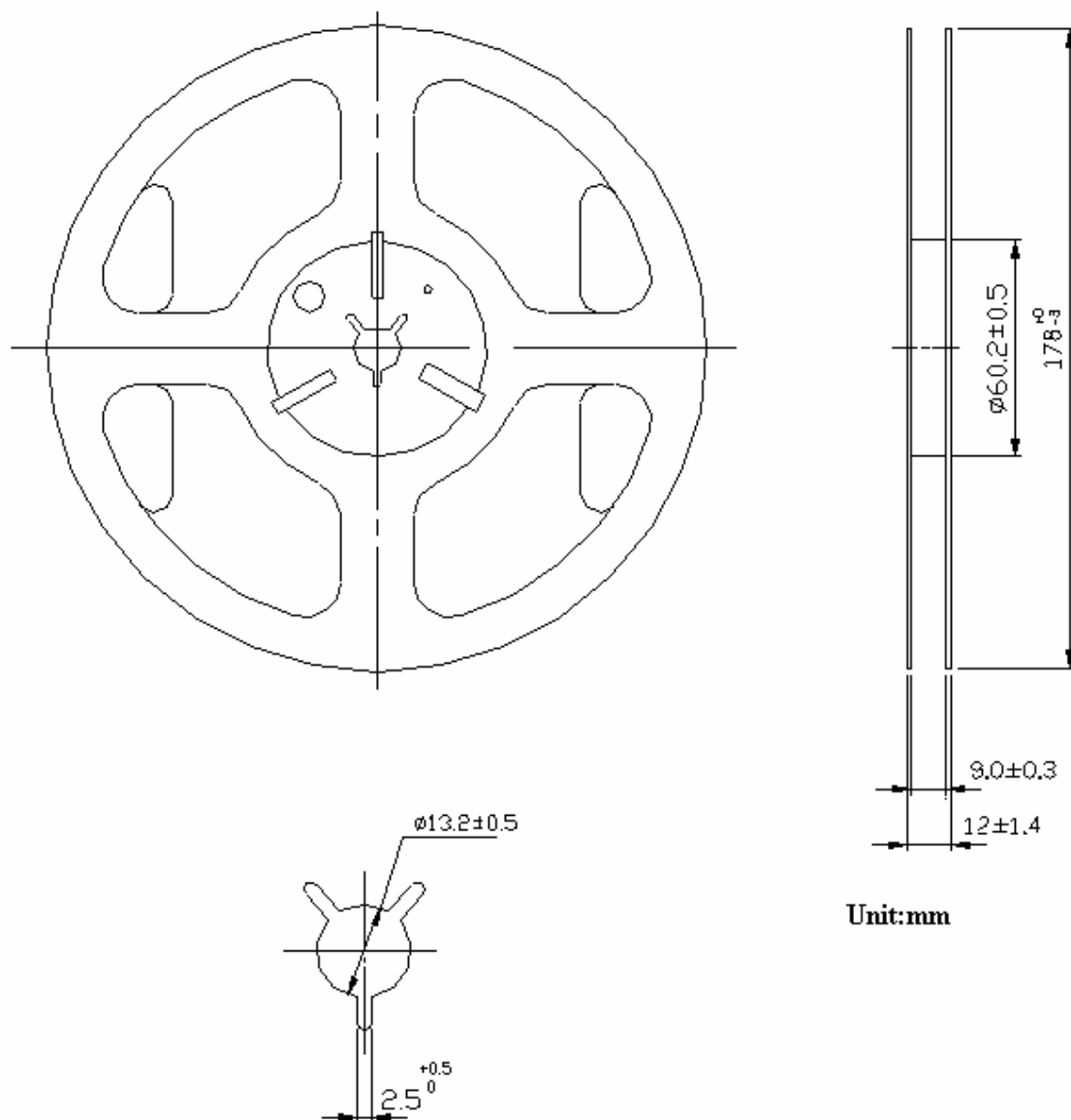
1. 10 Sprocket hole pitch cumulative tolerance is ±0.1mm
2. Pocket position relative to sprocket hole measured as true position of pocket not pocket hole.
3. Ao & Bo measured on a place 0.3mm above the bottom of the pocket to top surface of the carrier.
4. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
5. Carrier camber shall be not than 1mm per 100mm through a length of 250mm.

	Date	Name	Unit : mm	
Drawn	4.Jun.2013	Leo	Title	Drawing No.
Checked	4.Jun.2013	Iris	Tape & Reel Dimension	C009-020314-O-1106
Approved	4.Jun.2013	Wan		

# SPECIFICATION OF TAPE & REEL

YOKETAN CORP.

## Reel



Unit:mm

Q'ty:3000pcs/reel

	Date	Name	Unit : mm	
Drawn	22.Jan.2007	Leo	Title	Drawing No.
Checked	22.Jan.2007	Iris	Tape & Reel Dimension	C009-0709-A-1001
Approved	22.Jan.2007	Wan		





簽名有效

For Question  
Please Contact with SGS  
www.tw.sgs.com

## 測試報告

## Test Report

號碼(No.) : CE/2016/C0558

日期(Date) : 2016/12/09

頁數(Page): 1 of 11

友桂電子股份有限公司

YOKETAN CORPORATION

台中市潭子區台中加工出口區南二路28號之2

28-2, NAN 2ND ROAD, T. E. P. Z, TANTZU DISTRICT, TAICHUNG CITY (427), TAIWAN.



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) :

送樣廠商(Sample Submitted By) : 友桂電子股份有限公司 (YOKETAN CORPORATION)  
樣品名稱(Sample Description) : OSCILLATOR UNIT  
收件日期(Sample Receiving Date) : 2016/12/05  
測試期間(Testing Period) : 2016/12/05 TO 2016/12/09

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

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友桂電子股份有限公司

YOKETAN CORPORATION

台中市潭子區台中加工出口區南二路28號之2

28-2, NAN 2ND ROAD, T.E.P.Z, TANTZU DISTRICT, TAICHUNG CITY (427), TAIWAN.



### 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.
鄰苯二甲酸丁苯甲酯 / BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	%	參考EN 14372 (2004), 以氣相層析/質 譜儀檢測. / With reference to EN 14372 (2004). 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)	%		0.003	n. d.
鄰苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	%		0.003	n. d.
鄰苯二甲酸二異丁酯 / DIBP (Di- isobutyl phthalate) (CAS No.: 84-69- 5)	%		0.003	n. d.

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友桂電子股份有限公司

YOKETAN CORPORATION

台中市潭子區台中加工出口區南二路28號之2

28-2, NAN 2ND ROAD, T.E.P.Z, TANTZU DISTRICT, TAICHUNG CITY (427), TAIWAN.



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 62321-6 (2015), 以氣相層析 / 質譜儀檢測. / With reference to IEC 62321-6 (2015) and performed by GC/MS.	-	n. d.
一溴聯苯 / Monobromobiphenyl	mg/kg		5	n. d.
二溴聯苯 / Dibromobiphenyl	mg/kg		5	n. d.
三溴聯苯 / Tribromobiphenyl	mg/kg		5	n. d.
四溴聯苯 / Tetrabromobiphenyl	mg/kg		5	n. d.
五溴聯苯 / Pentabromobiphenyl	mg/kg		5	n. d.
六溴聯苯 / Hexabromobiphenyl	mg/kg		5	n. d.
七溴聯苯 / Heptabromobiphenyl	mg/kg		5	n. d.
八溴聯苯 / Octabromobiphenyl	mg/kg		5	n. d.
九溴聯苯 / Nonabromobiphenyl	mg/kg		5	n. d.
十溴聯苯 / Decabromobiphenyl	mg/kg		5	n. d.
多溴聯苯醚總和 / Sum of PBDEs	mg/kg		-	n. d.
一溴聯苯醚 / Monobromodiphenyl ether	mg/kg		5	n. d.
二溴聯苯醚 / Dibromodiphenyl ether	mg/kg		5	n. d.
三溴聯苯醚 / Tribromodiphenyl ether	mg/kg		5	n. d.
四溴聯苯醚 / Tetrabromodiphenyl ether	mg/kg		5	n. d.
五溴聯苯醚 / Pentabromodiphenyl ether	mg/kg		5	n. d.
六溴聯苯醚 / Hexabromodiphenyl ether	mg/kg		5	n. d.
七溴聯苯醚 / Heptabromodiphenyl ether	mg/kg		5	n. d.
八溴聯苯醚 / Octabromodiphenyl ether	mg/kg		5	n. d.
九溴聯苯醚 / Nonabromodiphenyl ether	mg/kg		5	n. d.
十溴聯苯醚 / Decabromodiphenyl ether	mg/kg		5	n. d.
全氟辛烷磺酸 / Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	mg/kg	參考US EPA 3550C (2007), 以液相層析 / 質譜儀檢測. / With reference to US EPA 3550C (2007). Analysis was performed by LC/MS.	10	n. d.
全氟辛酸 / PFOA (CAS No.: 335-67-1)	mg/kg	參考US EPA 3550C (2007), 以液相層析 / 質譜儀檢測. / With reference to US EPA 3550C (2007). Analysis was performed by LC/MS.	10	n. d.

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友桂電子股份有限公司

YOKETAN CORPORATION

台中市潭子區台中加工出口區南二路28號之2

28-2, NAN 2ND ROAD, T. E. P. Z, TANTZU DISTRICT, TAICHUNG CITY (427), TAIWAN.



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
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.
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.

## 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.)

## PFOS參考資訊(Reference Information): 持久性有機污染物 POPs - (EU) 757/2010

PFOS濃度在物質或製備中不得超過0.001%(10ppm), 在半成品、成品或零部件中不得超過0.1%(1000ppm), 在紡織品或塗層材料中不得超過1µg/m<sup>2</sup>。

(Outlawing PFOS as substances or preparations in concentrations above 0.001% (10ppm), in semi-finished products or articles or parts at a level above 0.1%(1000ppm), in textiles or other coated materials above 1µg/m<sup>2</sup>.)

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## 測試報告 Test Report

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日期(Date) : 2016/12/09

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友桂電子股份有限公司

YOKETAN CORPORATION

台中市潭子區台中加工出口區南二路28號之2

28-2, NAN 2ND ROAD, T. E. P. Z, TANTZU DISTRICT, TAICHUNG CITY (427), TAIWAN.

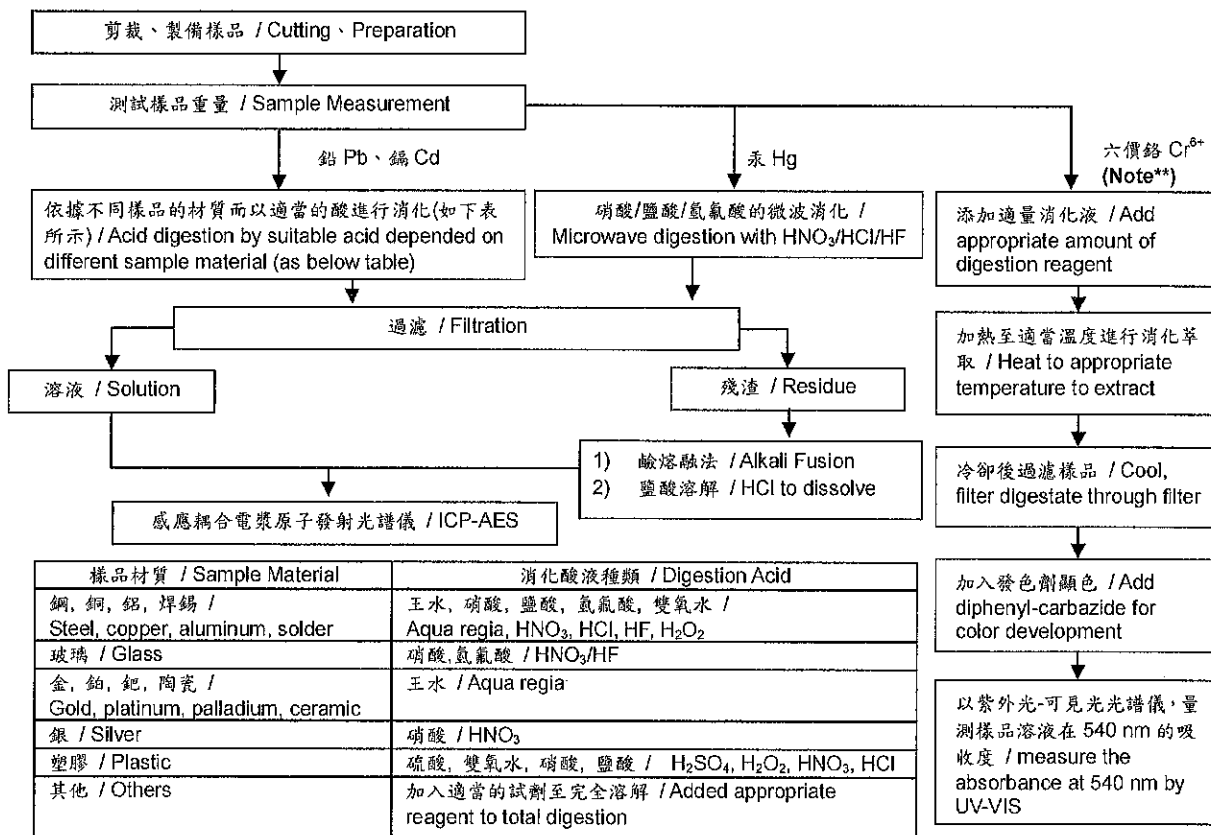


### 重金屬流程圖 / Analytical flow chart of Heavy Metal

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



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

- (1) 針對非金屬材料加入鹼性消化液，加熱至 90~95°C 萃取。 / For non-metallic material, add alkaline digestion reagent and heat to 90~95°C.
- (2) 針對金屬材料加入純水，加熱至沸騰萃取。 / For metallic material, add pure water and heat to boiling.

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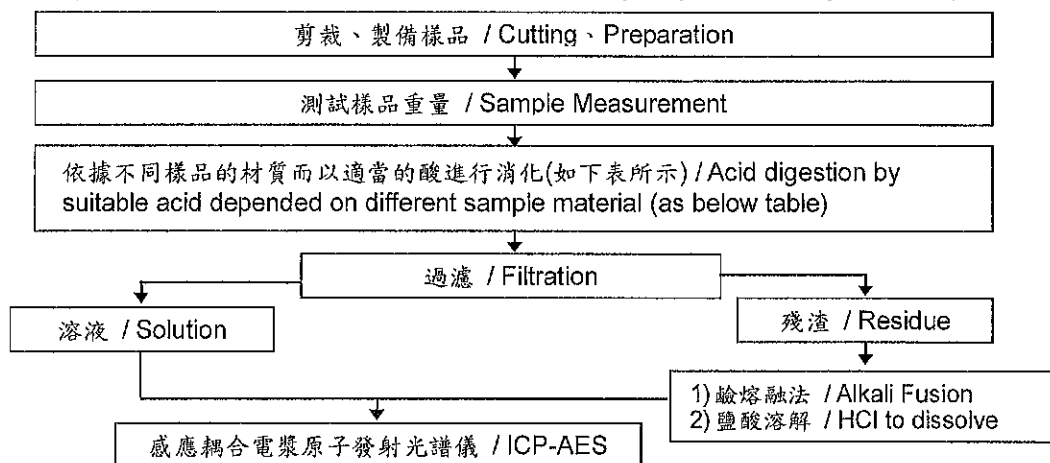
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根據以下的流程圖之條件，樣品已完全溶解。 / These samples were dissolved totally by pre-conditioning method according to below flow chart.

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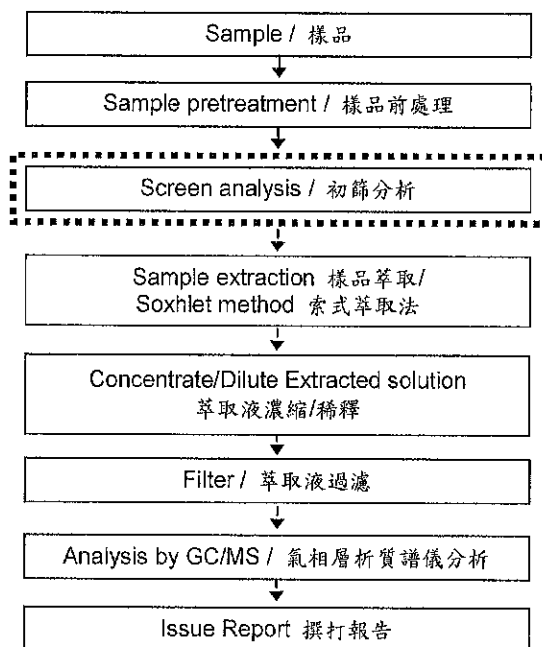
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### 多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBB/PBDE

- 測試人員：涂雅苓 / Technician: Yaling Tu
- 測試負責人：張啟興 / Supervisor: Troy Chang

初次測試程序 / First testing process —————→  
選擇性篩檢程序 / Optional screen process .....  
確認程序 / Confirmation process - - - ->



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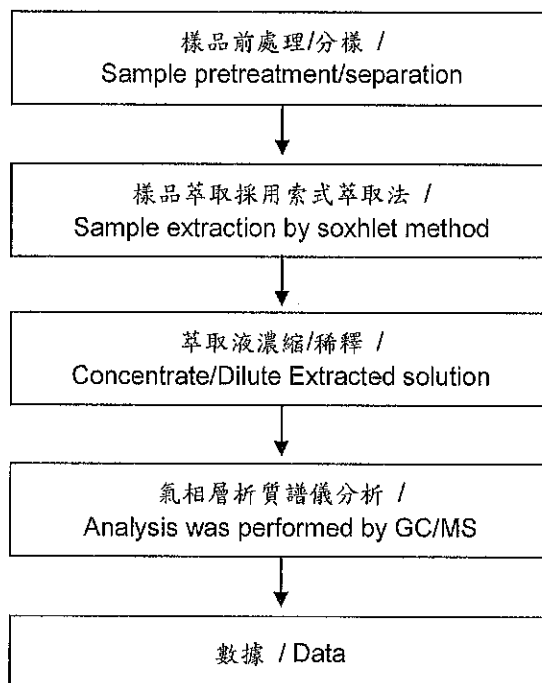
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### 可塑劑分析流程圖 / Analytical flow chart - Phthalate

- 測試人員：涂雅苓 / Technician: Yaling Tu
- 測試負責人：張啟興 / Supervisor: Troy Chang



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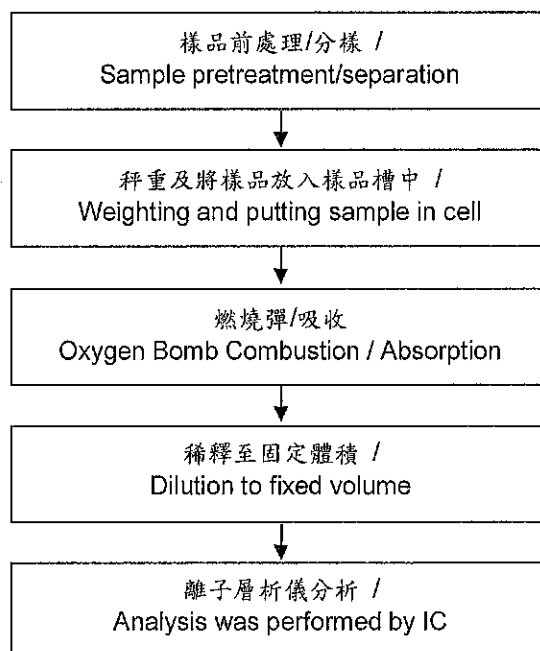
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## 鹵素分析流程圖 / Analytical flow chart - Halogen

- 測試人員：陳思臻 / Technician: Rita Chen
- 測試負責人：張啟興 / Supervisor: Troy Chang



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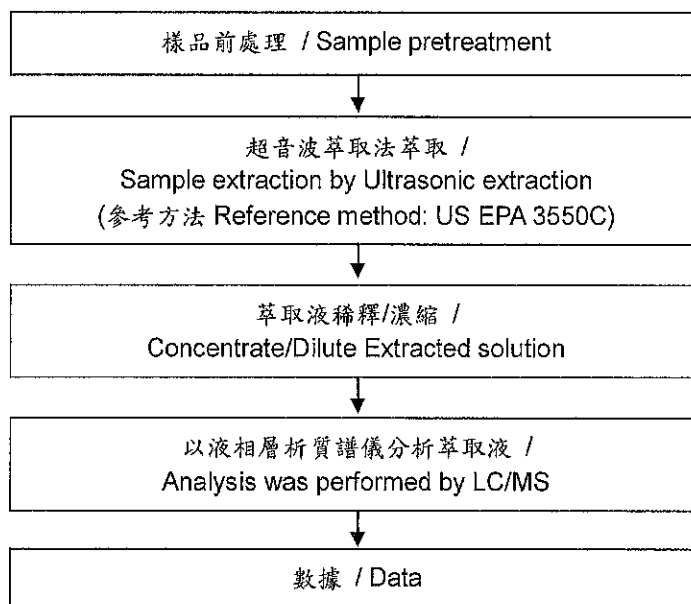
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## 全氟辛酸/全氟辛烷磺酸分析流程圖 / Analytical flow chart - PFOA/PFOS

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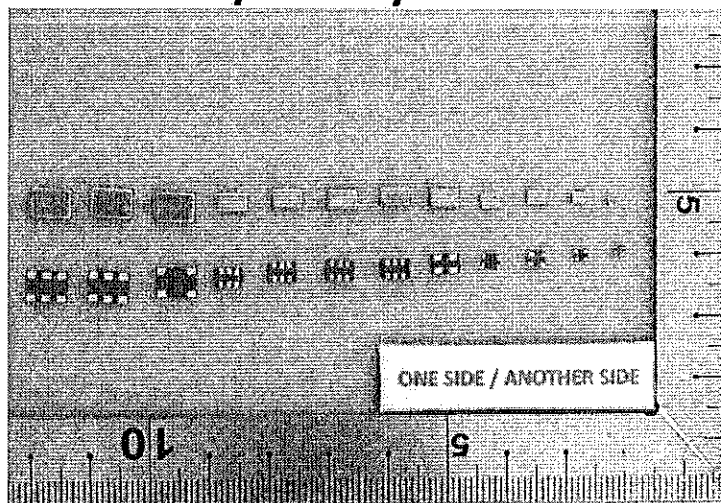
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\* 照片中如有箭頭標示，則表示為實際檢測之樣品/部位。\*  
(The tested sample / part is marked by an arrow if it's shown on the photo.)

### CE/2016/C0558



\*\* 報告結尾 (End of Report) \*\*

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