

**LAN Transformer Module** **LAN-16E241P1B8**

**1. Features**

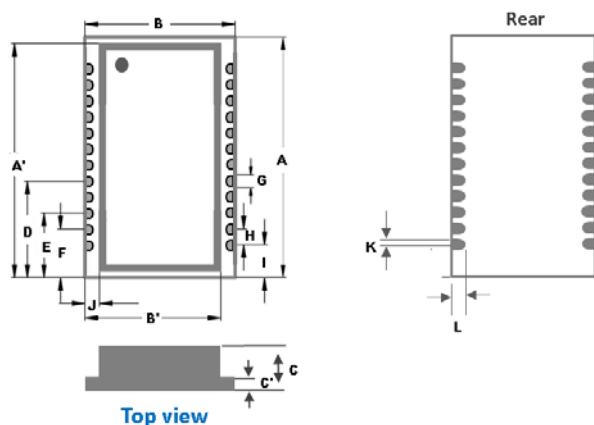
- 1. Low profile, small footprint saves board space and height
- 2. Pin to Pin compatibility with LAN transformer
- 3. Operating temperature range: -40°C to +85°C
- 4. Storage temperature range: -40°C to +85°C
- 5. 100% Lead (Pb)-Free and RoHS compliant.



**2. Applications**

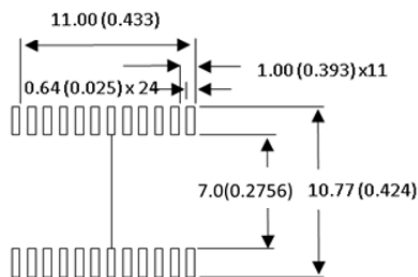
- 1. 2.5/5G Base-T, Single Port, Low profile Modules (24 Pin)
- 2. Notebook pc LAN Transformer Module
- 3. Hub switch, Ap router Multi-port LAN Transformer.

**3. Dimensions**



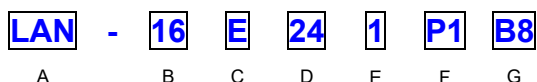
Size	A(mm)	A'(mm)	B(mm)	B'(mm)	C(mm)	C'(mm)
	16.5±0.25	16.0±0.25	10.3±0.25	9.65±0.25	4.1 max	0.8±0.25
	D(mm)	E(mm)	F(mm)	G(mm)	H(mm)	I(mm)
	6.75±0.25	4.75±0.25	3.75±0.25	0.4±0.15	1.0±0.15	2.75±0.25
	J(mm)	K(mm)	L(mm)			
0.65±0.15	0.2±0.075	1.0±0.15				

**Recommend PC Board Pattern**



Units: mm (inch) Tolerance: XX.X0 +/-0.25 (0.010)  
0.XX +/-0.05 (0.002)

**4. Part Numbering**



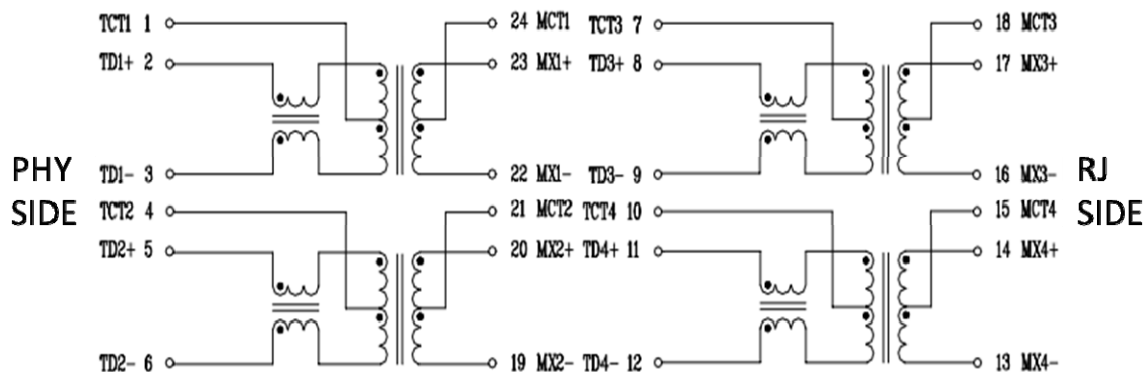
A: Series            C: Application            E: Center tab            G: Special  
B: Long            D: Pin            F: Pitch

### 5. Specification

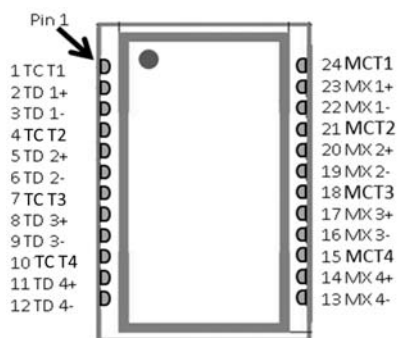
Part Number	OCL (uH Min) @100KHz/0.1V	Insertion Loss (dB Max)		Return Loss (dB min)		DCMR(dB Min)			Cross talk (dB Min)	
		1~100MHz	100~250MHz	1≤f≤40MHz	40< f≤250MHz	1~ 50MHz	50~150MHz	150~250MHz	1≤f≤100 MHz	100< f≤250MHz
LAN-16E241P1B8	180	-1	-2	-16	-(16-10 log10(f/40))	-35	-25	-15	-35	-30

- Note:
1. All test data referenced to 25°C ambient
  2. Hi-Pot resistance of 1500 VAC for 1 minute
  3. Recommended: modules should be surface- mounted on the second time(last time) of customer's double-sided PCB to prevent shift of parts.

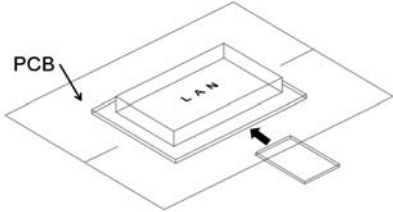
### 6. Schematic



### 7. Pin Define



### 8. Reliability and Test Condition

Item	Performance	Test Condition								
Insertion Loss	Refer to standard electrical characteristics list.	Agilent E5071C								
Return Loss										
Cross talk										
DCMR										
Operating Temperature	-40°C~+85°C (Including self - temperature rise)									
Storage Temperature	-40°C~+85°C (Product without taping)									
Life Test		Preconditioning: Run through Reflow for 3 times. ( IPC/JEDEC J-STD-020E Classification Reflow Profiles) Temperature : 85±2°C Duration : 1000±12hrs Measured at room temperature after placing for 24 hrs								
Humidity Resistance Test	Appearance : No damage. Insertion Loss : within spec. Return Loss : within spec.	Preconditioning: Run through Reflow for 3 times. ( IPC/JEDEC J-STD-020E Classification Reflow Profiles) Humidity : 85±3% R.H. Temperature : 85°C±2°C Duration : 1000hrs Min. Bead: with 100% rated current. Inductance: with 10% rated current. Measured at room temperature after placing for 24 hrs								
Thermal shock Test	Appearance : No damage. Insertion Loss : within spec. Return Loss : within spec.	Preconditioning: Run through Reflow for 3 times. ( IPC/JEDEC J-STD-020E Classification Reflow Profiles) Step1 : -40±2°C 30±5min Step2 : 85±2°C ≤0.5min Step3 : 85±2°C 30±5min Number of cycles : 500 Measured at room temperature after placing for 24 hrs								
Vibration Test		Preconditioning: Run through Reflow for 3 times. ( IPC/JEDEC J-STD-020E Classification Reflow Profiles) Oscillation Frequency: 10Hz~2KHz~10Hz for 20 minutes Equipment : Vibration checker Total Amplitude:10g Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations)								
Solderability Test	More than 95% of bottom terminal electrode should be covered with solder.	a. Method B, 4 hrs @155°C dry heat @235°C±5°C Test time:5 +0/-0.5 seconds. b. Method D category 3. (steam aging 8hours ± 15 min)@ 260°C±5°C Test time: 30 +0/-0.5 seconds.								
Resistance To Solder Heat Test	Appearance : No damage.	Depth: completely cover bottom the termination <table border="1"> <thead> <tr> <th>Temperature(°C)</th> <th>Time(s)</th> <th>Temperature ramp/immersion and emersion rate</th> <th>Number of heat cycles</th> </tr> </thead> <tbody> <tr> <td>260 ±5 (solder temp)</td> <td>10 ±1</td> <td>25mm/s ±6 mm/s</td> <td>1</td> </tr> </tbody> </table>	Temperature(°C)	Time(s)	Temperature ramp/immersion and emersion rate	Number of heat cycles	260 ±5 (solder temp)	10 ±1	25mm/s ±6 mm/s	1
Temperature(°C)	Time(s)	Temperature ramp/immersion and emersion rate	Number of heat cycles							
260 ±5 (solder temp)	10 ±1	25mm/s ±6 mm/s	1							
Terminal Strength Test	<table border="1"> <tbody> <tr> <td>Series No.</td> <td>2(Kg)</td> </tr> <tr> <td>LAN</td> <td>1.0(min.)</td> </tr> </tbody> </table>	Series No.	2(Kg)	LAN	1.0(min.)	<p>With the component mounted on a PCB with the device to be tested, apply a 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> 				
Series No.	2(Kg)									
LAN	1.0(min.)									

## 9. Soldering and Mounting

### 9-1. Soldering

Mildly activated rosin fluxes are preferred. 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.

#### 9-1.1 Soldering Reflow:

Recommended temperature profiles for lead free re-flow soldering in Figure 1. Table 1.1&1.2 (J-STD-020E)

#### 9-1.2 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. (Figure 2.)

- Preheat circuit and products to 150°C
- Use a 20 watt soldering iron with tip diameter of 1.0mm
- 350°C tip temperature (max)
- 1.0mm tip diameter (max)
- Limit soldering time to 4~5 sec.

Fig.1 Soldering Reflow

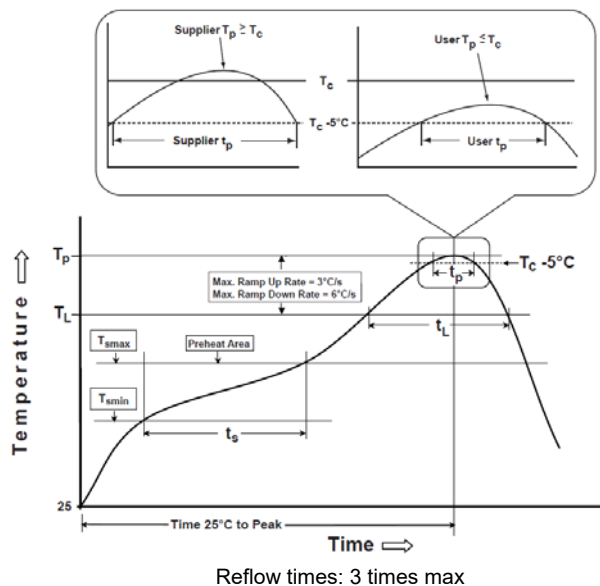


Fig.2 Iron soldering temperature profiles

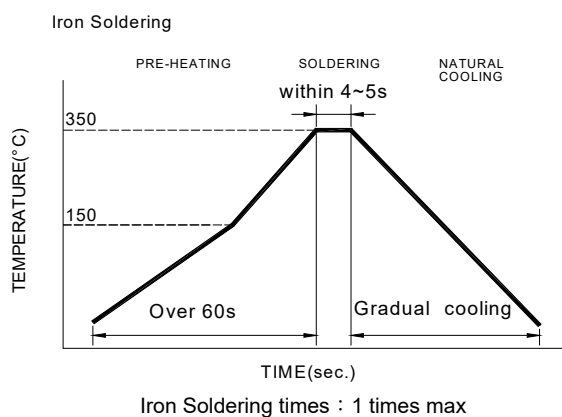


Table (1.1): Reflow Profiles

Profile Type:	Pb-Free Assembly
Preheat	
-Temperature Min( $T_{smin}$ )	150°C
-Temperature Max( $T_{smax}$ )	200°C
-Time( $t_s$ )from( $T_{smin}$ to $T_{smax}$ )	60-120seconds
Ramp-up rate( $T_L$ to $T_p$ )	3°C/second max.
Liquidus temperature( $T_L$ )	217°C
Time( $t_L$ )maintained above $T_L$	60-150 seconds
Classification temperature( $T_c$ )	See Table (1.2)
Time( $t_p$ ) at $T_c - 5^\circ\text{C}$ ( $T_p$ should be equal to or less than $T_c$ .)	< 30 seconds
Ramp-down rate( $T_p$ to $T_L$ )	6°C /second max.
Time 25°C to peak temperature	8 minutes max.

**Tp**: maximum peak package body temperature, **Tc**: the classification temperature.

For user (customer) **Tp** should be equal to or less than **Tc**.

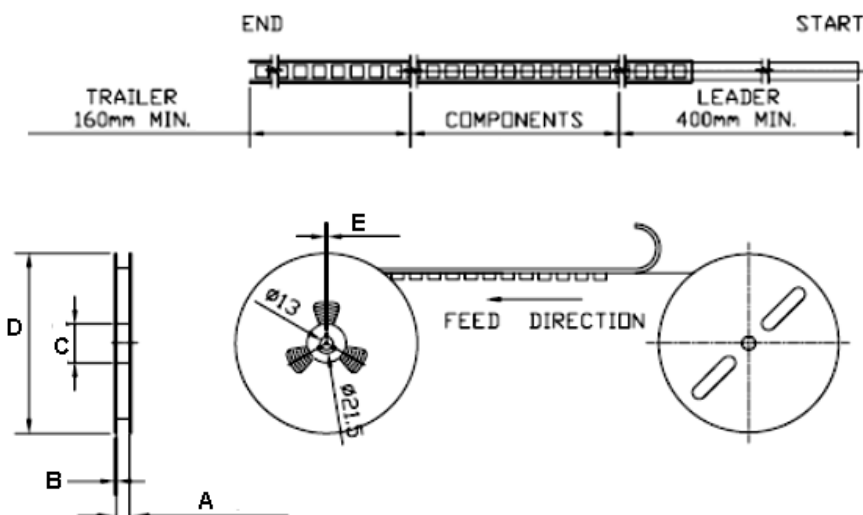
Table (1.2) Package Thickness/Volume and Classification Temperature ( $T_c$ )

	Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350-2000	Volume mm <sup>3</sup> >2000
PB-Free Assembly	<1.6mm	260°C	260°C	260°C
	1.6-2.5mm	260°C	250°C	245°C
	≥2.5mm	250°C	245°C	245°C

Reflow is referred to standard IPC/JEDEC J-STD-020E ◦

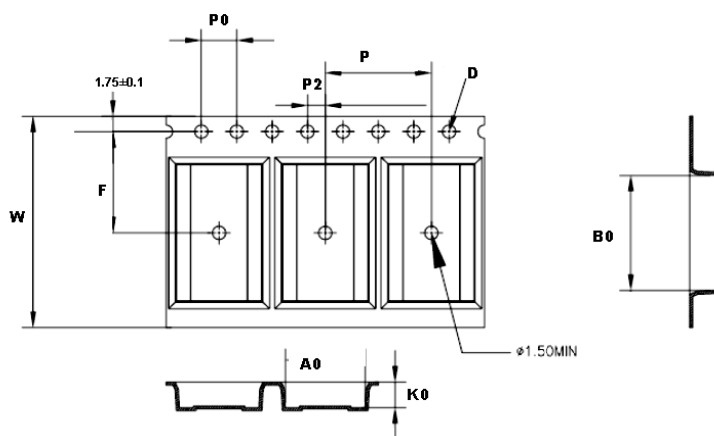
### 10. Packaging Information

(1) Reel Dimension



Type	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)
LAN-16E241P1B8	33.5±2.0	2.0±0.15	φ 100	φ 330±2	2.5

(2) Tape Dimension



Series	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	Po(mm)	P2(mm)	W(mm)	F(mm)	D(mm)
LAN-16E241P1B8	16.80±0.1	10.60±0.1	4.90±0.1	16.00±0.1	4.0±0.1	2.0±0.1	32±0.3	14.2±0.1	1.5±0.1

(3) Packaging Quantity

LAN	LAN-16E241P1B8
Chip / Reel	800

**Application Notice**

- Storage Conditions(component level)
  - To maintain the solderability of terminal electrodes:
    - TAI-TECH products meet IPC/JEDEC J-STD-020E standard-MSL, level 1.
    - Temperature and humidity conditions: Less than 40°C and 60% RH.
    - Recommended products should be used within 12 months form the time of delivery.
    - The packaging material should be kept where no chlorine or sulfur exists in the air.
- Transportation
  - Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
  - The use of tweezers or vacuum pick up is strongly recommended for individual components.
  - Bulk handling should ensure that abrasion and mechanical shock are minimized.



## 測試報告

## Test Report

號碼(No.): ETR23300844

日期(Date): 10-Mar-2023

頁數(Page): 1 of 14

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

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以下測試樣品係由申請廠商所提供及確認 (The following sample(s) was/were submitted and identified by the applicant as) :

樣品名稱(Sample Name) : AZ CHIP LAN TRANSFORMER


樣品型號(Style/Item No.) : LAN · LAP SERIES

=====  
收件日(Sample Receiving Date) : 03-Mar-2023

測試期間(Testing Period) : 03-Mar-2023 to 10-Mar-2023

測試需求(Test Requested) : 依據客戶要求進行測試·測試項目請參閱測試結果表格。(Testing item(s) is/are specified by client. Please refer to result table for testing item(s).)

測試結果(Test Results) : 請參閱下一頁 (Please refer to following pages.)

  
Troy Chang / Department Manager  
Signed for and on behalf of  
SGS TAIWAN LTD.  
Chemical Laboratory - Taipei



PIN CODE: 791725F9

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### 測試部位敘述 (Test Part Description)

No.1 : 整體混測 (MIXED ALL PARTS)

### 測試結果 (Test Results)

測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result)
				No.1
鎘 (Cd) (Cadmium (Cd))	參考IEC 62321-5: 2013 · 以感應耦合電漿發射光譜儀分析。(With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.)	mg/kg	2	n.d.
鉛 (Pb) (Lead (Pb))	參考IEC 62321-5: 2013 · 以感應耦合電漿發射光譜儀分析。(With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.)	mg/kg	2	n.d.
汞 (Hg) (Mercury (Hg))	參考IEC 62321-4: 2013+ AMD1: 2017 · 以感應耦合電漿發射光譜儀分析。(With reference to IEC 62321-4: 2013+ AMD1: 2017, analysis was performed by ICP-OES.)	mg/kg	2	n.d.
六價鉻 Cr(VI) (Hexavalent Chromium Cr(VI))	參考IEC 62321-7-2: 2017 · 以紫外光-可見光分光光度計分析。(With reference to IEC 62321-7-2: 2017, analysis was performed by UV-VIS.)	mg/kg	8	n.d.

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result)
				No.1
一溴聯苯 (Monobromobiphenyl)	參考IEC 62321-6: 2015 · 以氣相層析儀/質譜儀分析。(With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.)	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.
多溴聯苯總和 (Sum of PBBs)		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.
多溴聯苯醚總和 (Sum of PBDEs)	mg/kg	-	n.d.	

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (Result)
				No.1
鄰苯二甲酸丁苯甲酯 (BBP) (Butyl benzyl phthalate (BBP))	參考IEC 62321-8: 2017 · 以氣相層析儀/質譜儀分析 · (With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.)	mg/kg	50	n.d.
鄰苯二甲酸二丁酯 (DBP) (Dibutyl phthalate (DBP))		mg/kg	50	n.d.
鄰苯二甲酸二(2-乙基己基)酯 (DEHP) (Di-(2-ethylhexyl) phthalate (DEHP))		mg/kg	50	n.d.
鄰苯二甲酸二異丁酯 (DIBP) (Diisobutyl phthalate (DIBP))		mg/kg	50	n.d.
鄰苯二甲酸二異癸酯 (DIDP) (Diisodecyl phthalate (DIDP)) (CAS No.: 26761-40-0, 68515-49-1)		mg/kg	50	n.d.
鄰苯二甲酸二異壬酯 (DINP) (Diisononyl phthalate (DINP)) (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 (DNOP)) (CAS No.: 117-84-0)		mg/kg	50	n.d.
鄰苯二甲酸二正戊酯 (DNPP) (Di-n-pentyl phthalate (DNPP)) (CAS No.: 131-18-0)		mg/kg	50	n.d.
鄰苯二甲酸二正己酯 (DNHP) (Di-n-hexyl phthalate (DNHP)) (CAS No.: 84-75-3)		mg/kg	50	n.d.

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# 測試報告

## Test Report

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測試項目 (Test Items)	測試方法 (Method)	單位 (Unit)	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(HBCDD) (α- HBCDD, β- HBCDD, γ- HBCDD) (Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α- HBCDD, β- HBCDD, γ- HBCDD)) (CAS No.: 25637-99-4, 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	參考IEC 62321-9: 2021 · 以氣相層析儀/質譜儀分析。(With reference to IEC 62321-9: 2021, analysis was performed by GC/MS.)	mg/kg	20	n.d.
氟 (F) (Fluorine (F)) (CAS No.: 14762-94-8)	參考BS EN 14582: 2016 · 以離子層析儀分析。(With reference to BS EN 14582: 2016, analysis was performed by IC.)	mg/kg	50	271
氯 (Cl) (Chlorine (Cl)) (CAS No.: 22537-15-1)		mg/kg	50	96.4
溴 (Br) (Bromine (Br)) (CAS No.: 10097-32-2)		mg/kg	50	n.d.
碘 (I) (Iodine (I)) (CAS No.: 14362-44-8)		mg/kg	50	n.d.
全氟辛烷磺酸及其鹽類 (PFOS and its salts) (CAS No.: 1763-23-1 and its salts)	參考CEN/TS 15968: 2010 · 以液相層析串聯質譜儀分析。(With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.)	mg/kg	0.01	n.d.
全氟辛酸及其鹽類 (PFOA and its salts) (CAS No.: 335-67-1 and its salts)		mg/kg	0.01	n.d.
銻 (Sb) (Antimony (Sb)) (CAS No.: 7440-36-0)	參考US EPA 3052: 1996 · 以感應耦合電漿發射光譜儀分析。(With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.)	mg/kg	2	n.d.

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### 備註(Note) :

1. mg/kg = ppm ; 0.1wt% = 0.1% = 1000ppm
2. MDL = Method Detection Limit (方法偵測極限值)
3. n.d. = Not Detected (未檢出) ; 小於MDL / Less than MDL
4. "-" = Not Regulated (無規格值)
5. 全氟辛烷磺酸及其鹽類包含等物質 (PFOS and its salts including) :  
CAS No.: 1763-23-1, 2795-39-3, 29457-72-5, 29081-56-9, 70225-14-8, 56773-42-3, 251099-16-8, 307-35-7, 91036-71-4, 4021-47-0 and others.
6. 全氟辛酸及其鹽類包含等物質 (PFOA and its salts including) :  
CAS No.: 335-67-1, 335-95-5, 2395-00-8, 335-93-3, 335-66-0, 3825-26-1 and others.
7. 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 sample(s) was/were analyzed on behalf of the applicant as mixing sample in one testing. The above result(s) was/were only given as the informality value.

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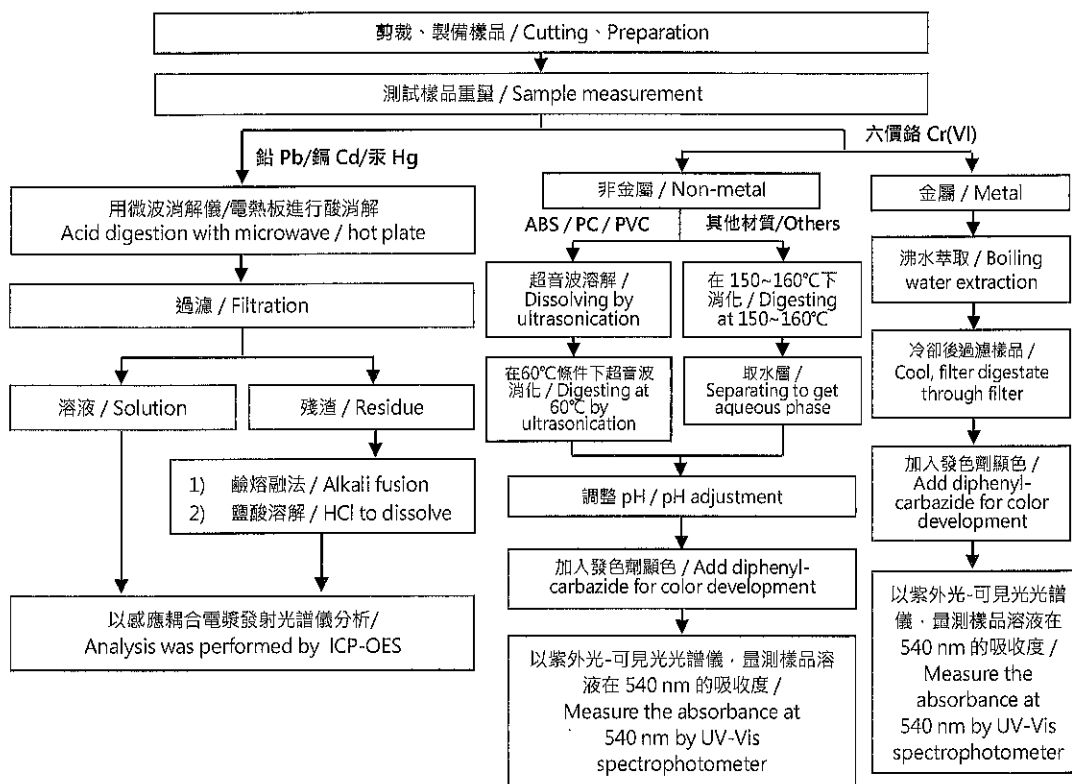
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### 重金屬流程圖 / Analytical flow chart of heavy metal

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)



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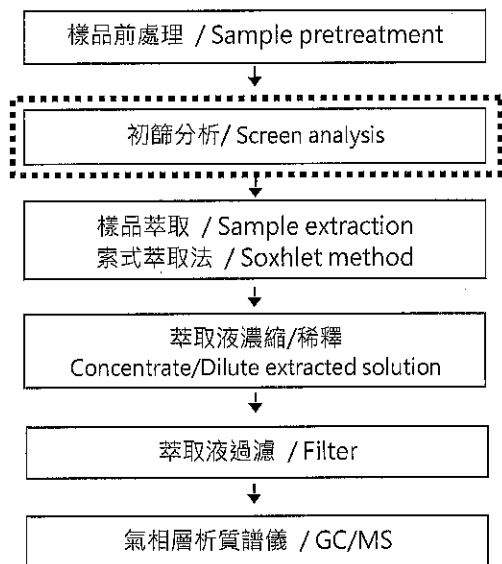
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### 多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBBs/PBDEs

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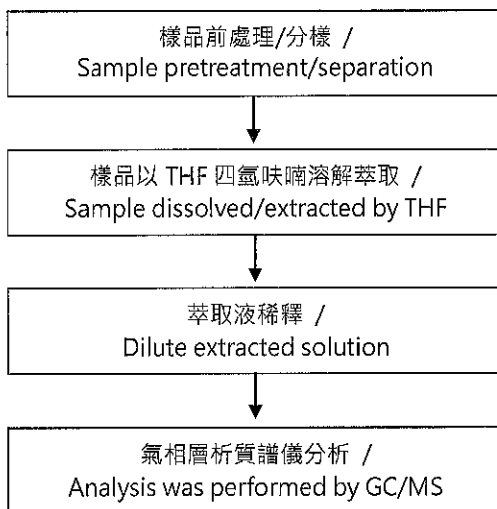
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### 可塑劑分析流程圖 / Analytical flow chart - Phthalate

#### 【測試方法/Test method: IEC 62321-8】



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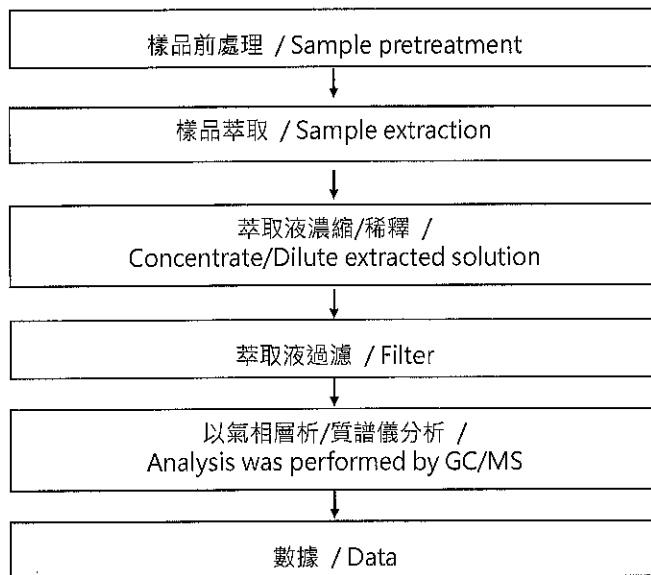
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### 六溴環十二烷分析流程圖 / Analytical flow chart - HBCDD



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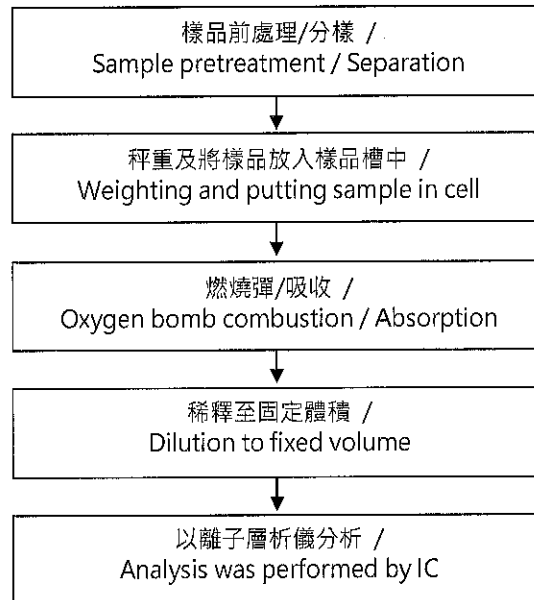
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### 鹵素分析流程圖 / Analytical flow chart - Halogen



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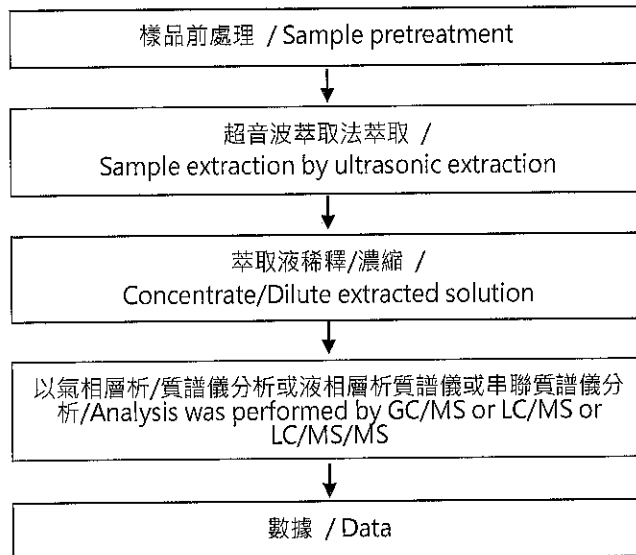
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### 全氟化合物(包含全氟辛酸/全氟辛烷磺酸/其相關化合物等等)分析流程圖 / Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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# 測試報告

## Test Report

號碼(No.): ETR23300844

日期(Date): 10-Mar-2023

頁數(Page): 13 of 14

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.)

慶邦電子元件(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)

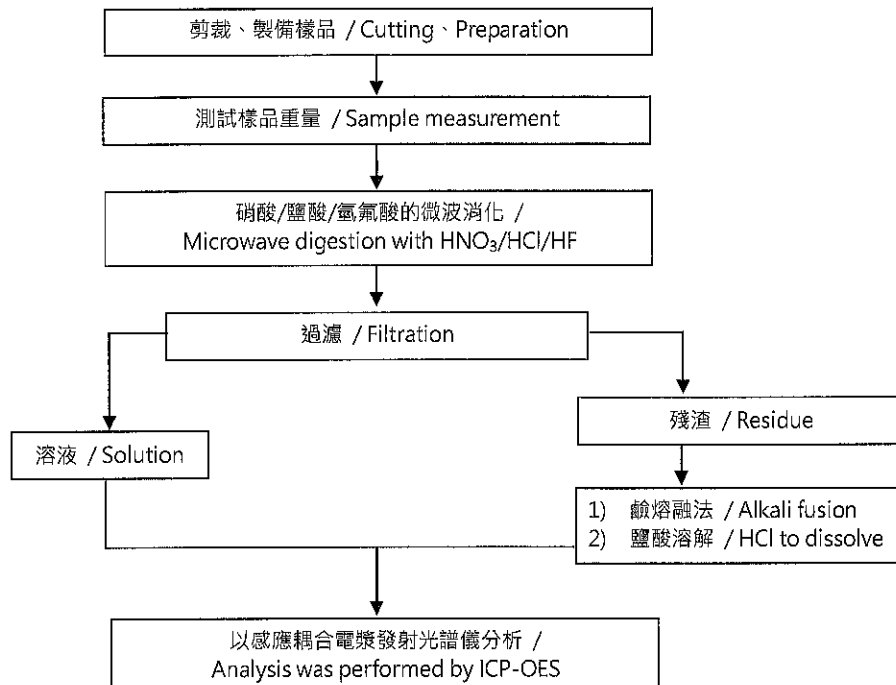
中國·江蘇省·宿遷市·泗洪縣·經濟開發區杭州路南側·建設北路東側 (THE SOUTH HANGZHOU ROAD AND THE EAST JIANSHE ROAD · ECONOMIC DEVELOPMENT ZONE · SIHONG COUNTY · SUQIANCITY · JIANGSU PROVINCE · P,R · CHINA)

### 元素(含重金屬)分析流程圖 / Analytical flow chart of elements (Heavy metal included)

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.

【參考方法/Reference method : US EPA 3051A · US EPA 3052】



\* US EPA 3051A 方法未添加氫氟酸 / US EPA 3051A method does not add HF.

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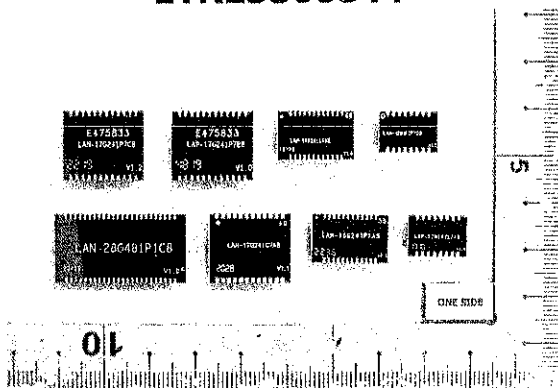
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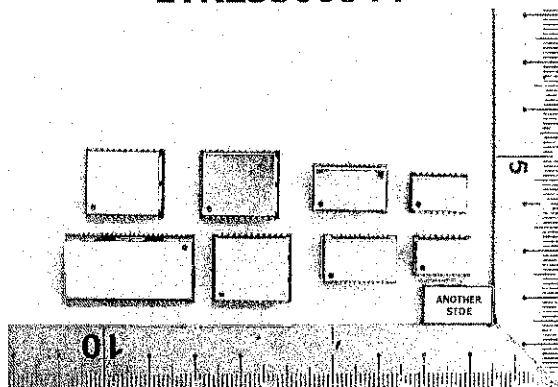
\* 照片中如有箭頭標示，則表示為實際檢測之樣品/部位。\*

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

### ETR23300844



### ETR23300844



\*\* 報告結尾 (End of Report) \*\*

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