

# Specification for Approval

**Date:** 2024/10/30

**Customer :** \_\_\_\_\_

**TAI-TECH P/N:** FCM1608HF-202T04
**CUSTOMER P/N:** \_\_\_\_\_

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

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

|                            |  |  |
|----------------------------|--|--|
| <b>REMARK:</b>             |  |  |
| Customer Approval Feedback |  |  |
|                            |  |  |

**西北臺慶科技股份有限公司**  
**TAI-TECH Advanced Electronics Co., Ltd**

西北臺慶科技股份有限公司  
 TAI-TECH Advanced Electronics Co., Ltd  
**Headquarter:**  
 NO.1 YOU 4TH ROAD, YOUTH INDUSTRIAL DISTRICT, YANG-MEI,  
 TAO-YUAN HSIEN, TAIWAN, R.O.C.  
 TEL: +886-3-4641148 FAX: +886-3-4643565  
 http://www.tai-tech.com.tw  
 E-mail: sales@tai-tech.com.tw

Office:  
 深圳辦公室  
 11BC, Building B Fortune Plaza, NO.7002, Shennan Avenue, Futian  
 District Shenzhen  
 TEL: +86-755-23972371 FAX: +86-755-23972340

臺慶精密電子(昆山)有限公司  
 TAI-TECH ADVANCED ELECTRONICS(KUNSHAN) CO., LTD  
 SHINWHA ROAD, KUNJIA HI-TECH INDUSTRIAL PARK, KUN-SHAN,  
 JIANG-SU, CHINA  
 TEL: +86-512-57619396 FAX: +86-512-57619688  
 E-mail: sales@tai-tech.cn

慶邦電子元器件(泗洪)有限公司  
 TAIPAQ ELECTRONICS (SIHONG) CO., LTD  
 The South HangZhou Road and The East JianSheBei Road, Economic  
 Development Zone, SiHong County, JiangSu Province, P.R. China.  
 TEL: +86-527-88601191 FAX: +86-527-88601190  
 E-mail: sales@taipaq.cn

**Sales Dep.**

|                  |         |
|------------------|---------|
| APPROVED         | CHECKED |
| 管哲頌<br>Eric Guan | 蒯青榮     |

**R&D Center**

|          |         |       |
|----------|---------|-------|
| APPROVED | CHECKED | DRAWN |
| 鄧福興      | 浦冬生     | 王俞琴   |



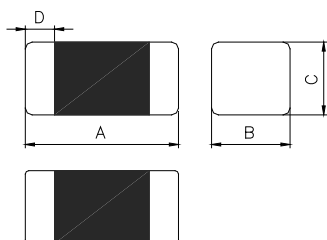
# Ferrite Chip Bead(Lead Free) FCM1608HF-202T04

## 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 reliability.
9. 100% Lead(Pb) & Halogen-Free and RoHS compliant.
10. Operating Temperature : -55~+125°C (Including self-temperature rise)



## 2.Dimensions



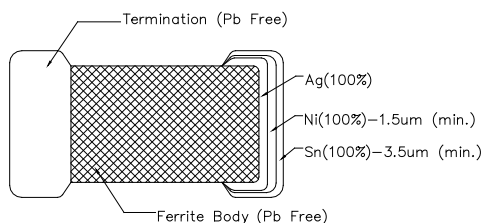
| Chip Size |           |
|-----------|-----------|
| <b>A</b>  | 1.60±0.15 |
| <b>B</b>  | 0.80±0.15 |
| <b>C</b>  | 0.80±0.15 |
| <b>D</b>  | 0.30±0.20 |

Units: mm

## 3.Part Numbering



- A: Series
- B: Dimension L x W
- C: Material Lead Free Material
- D: Impedance 202=2000Ω
- E: Packaging T=Taping and Reel, B=Bulk(Bags)
- F: Rated Current 04=400mA

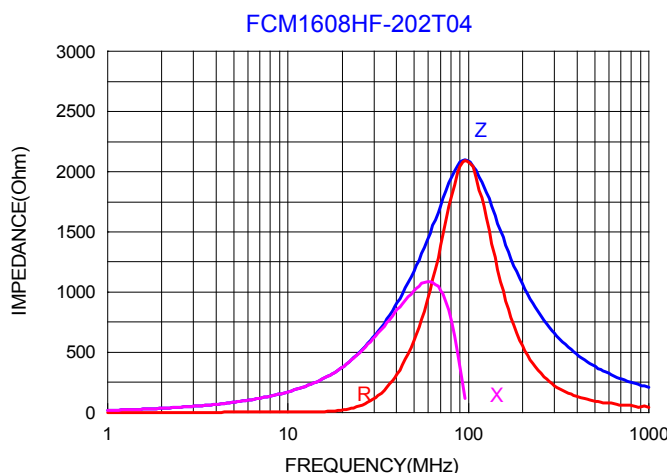


## 4.Specification

| Tai-Tech Part Number | Impedance (Ω) | Test Frequency (Hz) | DC Resistance (Ω) max. | Rated Current (mA) max. |
|----------------------|---------------|---------------------|------------------------|-------------------------|
| FCM1608HF-202T04     | 2000±25%      | 60mV/100M           | 1.20                   | 400                     |

- Rated current: based on temperature rise test
- In compliance with EIA 595
- All test data referenced to 25°C ambient

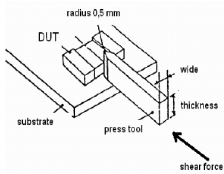
### ■ Impedance-Frequency Characteristics



[www.tai-tech.com.tw](http://www.tai-tech.com.tw)

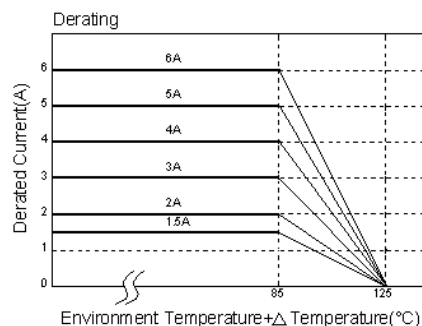
## 5. Reliability and Test Condition

| Item                               | Performance   |                          |           |                            |     | Test Condition  |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
|------------------------------------|---|--------------------------|-----------|----------------------------|-----|---|------|------------------|--------------------------|-----------|----------------------------|-----|----|----|-----------|------|------|----|----|-----------|------|
|                                    | FCB   | FCM                      | HCB       | GHB                        | FCA |   |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Series No.                         | FCB   | FCM                      | HCB       | GHB                        | FCA | --  |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Operating Temperature              | -55~+125°C<br>(Including self-temperature rise)   |                          |           |                            |     | --  |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Transportation Storage Temperature | -55~+125°C<br>(on board)  |                          |           |                            |     | For long storage conditions, please see the Application Notice  |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Impedance (Z)                      | Refer to standard electrical characteristics list   |                          |           |                            |     | Agilent4291<br>Agilent E4991<br>Agilent4287<br>Agilent16192   |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| DC Resistance                      |   |                          |           |                            |     | Agilent 4338  |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Rated Current                      |   |                          |           |                            |     | DC Power Supply<br>Over Rated Current requirements, there will be some risk   |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Temperature Rise Test              | Rated Current < 1A ΔT 20°CMax<br>Rated Current ≥ 1A ΔT 40°CMax  |                          |           |                            |     | 1. Applied the allowed DC current.<br>2. Temperature measured by digital surface thermometer.   |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Life test                          | Appearance: no damage.  |                          |           |                            |     | Preconditioning: Run through reflow for 3 times.( IPC/JEDEC J-STD-020F Classification Reflow Profiles)<br>Temperature: 125±2°C<br>Applied current: rated current.<br>Duration: 1000±12hrs.<br>Measured at room temperature after placing for 24±2 hrs.  |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Load Humidity                      | Impedance: within±15%of initial value.<br>DCR : within ±15% of initial value and shall not exceed the specification value                             |                          |           |                            |     | Preconditioning: Run through reflow for 3 times.( IPC/JEDEC J-STD-020F Classification Reflow Profiles)<br>Humidity: 85±3%R.H.<br>Temperature: 85±2°C.<br>Duration:1000hrsMin.Bead:with100%ratedcurrent<br>Inductance: with 10% rated current<br>Measured at room temperature after placing for 24±2 hrs.  |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Thermal shock                      | Appearance: no damage.<br>Impedance: within±15%of initial value.<br>DCR : within ±15% of initial value and shall not exceed the specification value   |                          |           |                            |     | Preconditioning: Run through reflow for 3 times.( IPC/JEDEC J-STD-020F Classification Reflow Profiles)<br>Condition for 1 cycle<br>Step1: -55±2°C 30±5 min.<br>Step2: 125±2°C ≤ 0.5min<br>Step3: 125±2°C 30±5min.<br>Number of cycles: 500<br>Measured at room temperature after placing for 24±2 hrs.  |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Vibration                          | Appearance : No damage.<br>Impedance : within±15% of initial value<br>DCR : within ±15% of initial value and shall not exceed the specification value |                          |           |                            |     | Preconditioning: Run through reflow for 3 times.( IPC/JEDEC J-STD-020F Classification Reflow Profiles)<br>Oscillation Frequency: 10Hz ~ 2KHz ~ 10Hz for 20 minutes<br>Equipment : Vibration checker<br>Total Amplitude:10g<br>Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations) .   |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Bending                            | Appearance : No damage.<br>Impedance : within±10% of initial value<br>DCR : within ±15% of initial value and shall not exceed the specification value |                          |           |                            |     | Shall be mounted on a FR4 substrate of the following dimensions:<br>>=0805inch(2012mm):40x100x1.2mm<br><0805inch(2012mm):40x100x0.8mm<br>Bending depth:<br>>=0805inch(2012mm):1.2mm<br><0805inch(2012mm):0.8mm<br>Duration of 10 sec for a min.   |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Shock                              | Appearance : No damage.<br>Impedance : within±10% of initial value<br>DCR : within ±15% of initial value and shall not exceed the specification value |                          |           |                            |     | Test condition:<br><table border="1"> <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>50</td> <td>11</td> <td>Half-sine</td> <td>11.3</td> </tr> <tr> <td>Lead</td> <td>50</td> <td>11</td> <td>Half-sine</td> <td>11.3</td> </tr> </tbody> </table> | Type | Peak Value (g's) | Normal duration (D) (ms) | Wave form | Velocity change (V)/ft/sec | SMD | 50 | 11 | Half-sine | 11.3 | Lead | 50 | 11 | Half-sine | 11.3 |
| Type                               | Peak Value (g's)  | Normal duration (D) (ms) | Wave form | Velocity change (V)/ft/sec |     |   |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| SMD                                | 50  | 11                       | Half-sine | 11.3                       |     |   |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Lead                               | 50  | 11                       | Half-sine | 11.3                       |     |   |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |
| Solderability                      | More than 95% of the 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.<br>b. Method D category 3. (steam aging 8hours ± 15 min)@ 260°C±5°C Test time: 30 +0/-0.5 seconds.  |      |                  |                          |           |                            |     |    |    |           |      |      |    |    |           |      |

| Item                            | Performance   | Test Condition   |                  |          |  |                      |
|---------------------------------|---|--|------------------|----------|--|----------------------|
| Resistance to Soldering<br>Heat | Appearance : No damage.<br>Impedance : within±15% of initial value<br>DCR : within ±15% of initial value and shall not exceed the specification value | Number of heat cycles: 1   |                  |          |  |                      |
|                                 |   | <table border="1"> <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) |
| Temperature (°C)                | Time (s)  | Temperature ramp/immersion and emersion rate   |                  |          |  |                      |
| 260 ±5 (solder temp)            | 10 ±1   | 25mm/s ±6 mm/s   |                  |          |  |                      |
|                                 |   | Depth: completely cover the termination  |                  |          |  |                      |
| Terminal strength               | Appearance : No damage.<br>Impedance : within±15% of initial value<br>DCR : within ±15% of initial value and shall not exceed the specification value |  <p>Preconditioning: Run through reflow for 3 times.( IPC/JEDEC J-STD-020F Classification Reflow Profiles)<br/>                     Component mounted on a PCB apply a force &gt;0805inch(2012mm):1kg<br/>                     &lt;=0805inch(2012mm):0.5kg<br/>                     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 shock the component being tested.</p> |                  |          |  |                      |

**\*\*Derating Curve**

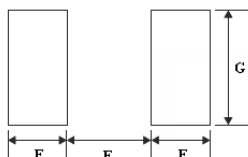
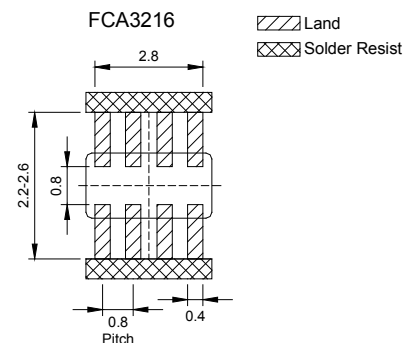
For the ferrite chip bead which withstanding current over 1.5A, as the operating temperature over 85°C, the derating current information is necessary to consider with. For the detail derating of current, please refer to the Derated Current vs. Operating Temperature curve.



**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)     | E(mm)                              | F(mm) | G(mm) |
| FCB       | 1005 | 1.0±0.10 | 0.50±0.10 | 0.50±0.10 | 0.25±0.10 | 0.50                               | 0.40  | 0.60  |
| FCM       | 1608 | 1.6±0.15 | 0.80±0.15 | 0.80±0.15 | 0.30±0.20 | 0.80                               | 0.85  | 0.95  |
| HCB       | 2012 | 2.0±0.20 | 1.25±0.20 | 0.85±0.20 | 0.50±0.30 | 1.05                               | 1.00  | 1.45  |
| GHB       |      | 2.0±0.20 | 1.25±0.20 | 1.25±0.20 | 0.50±0.30 |                                    |       |       |
| FCI       | 3216 | 3.2±0.20 | 1.60±0.20 | 1.10±0.20 | 0.50±0.30 | 1.05                               | 2.20  | 1.80  |
| FHI       | 3225 | 3.2±0.20 | 2.50±0.20 | 1.30±0.20 | 0.50±0.30 | 1.05                               | 2.20  | 2.70  |
| FCH       | 4516 | 4.5±0.20 | 1.60±0.20 | 1.60±0.20 | 0.50±0.30 | 1.05                               | 3.30  | 1.80  |
| HCI       | 4532 | 4.5±0.20 | 3.20±0.20 | 1.50±0.20 | 0.50±0.30 | 1.05                               | 3.30  | 3.40  |



PC board should be designed so that products can prevent damage from mechanical stress when warping the board.

**6-2. 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.

**6-2.1 Soldering Reflow:**

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

**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. (Figure 2.)

- 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
- 350°C tip temperature (max)
- 1.0mm tip diameter (max)
- Limit soldering time to 4~5sec.

Fig.1 Soldering Reflow

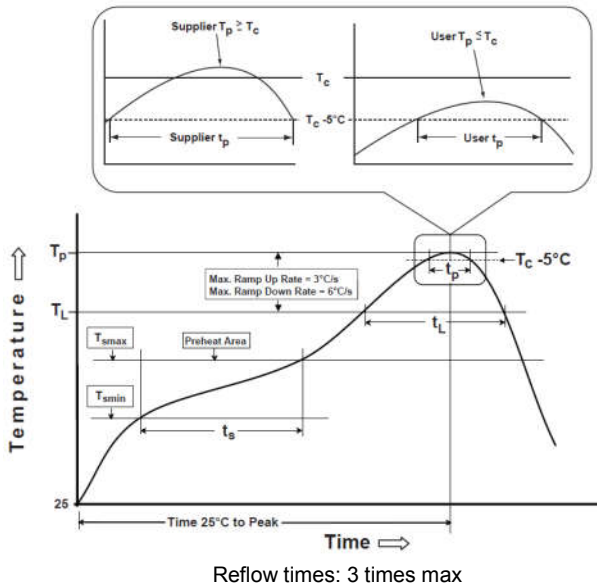
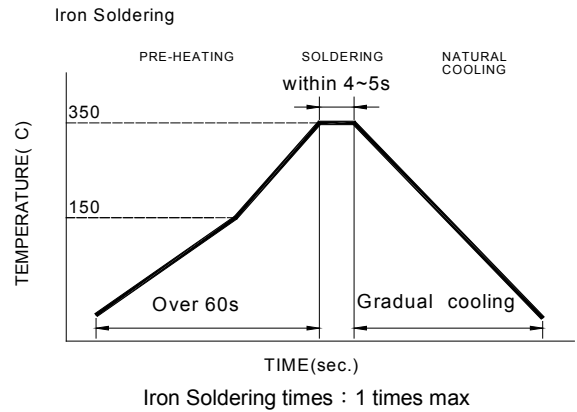


Fig.2 Iron soldering temperature profiles



**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.   |

**T<sub>p</sub>**: maximum peak package body temperature, **T<sub>c</sub>**: the classification temperature.  
 For user (customer) **T<sub>p</sub>** should be equal to or less than **T<sub>c</sub>**.

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

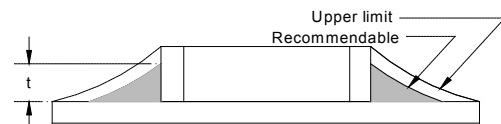
|                  | Package Thickness | Volume mm <sup>3</sup> <350 | Volume mm <sup>3</sup> 350-2000 | Volume mm <sup>3</sup> >2000 |
|------------------|-------------------|-----------------------------|---------------------------------|------------------------------|
| PB-Free Assembly | <1.6mm            | 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-020F ◦

**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

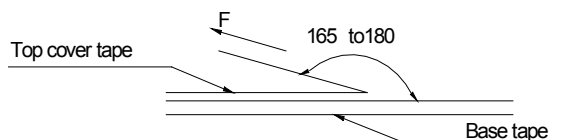




7-3. Packaging Quantity

| Chip Size   | 453215 | 451616 | 322513 | 321611 | 321609 | 201212 | 201209 | 160808 | 100505 |
|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Chip / Reel | 1000   | 2000   | 2500   | 3000   | 3000   | 2000   | 4000   | 4000   | 10000  |
| Inner box   | 4000   | 8000   | 12500  | 15000  | 15000  | 10000  | 20000  | 20000  | 50000  |
| Middle box  | 20000  | 40000  | 62500  | 75000  | 75000  | 50000  | 100000 | 100000 | 250000 |
| Carton      | 40000  | 80000  | 125000 | 150000 | 150000 | 100000 | 200000 | 200000 | 500000 |

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. (°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 solder ability of terminal electrodes:
    1. TAI-TECH products meet IPC/JEDEC J-STD-020F 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 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.





# 測試報告 Test Report

號碼(No.): ETR23B04850

日期(Date): 05-Dec-2023

頁數(Page): 1 of 16

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.)

江蘇省昆山市鐘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)

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) : FERRITE CHIP BEAD、FERRITE CHIP INDUCTOR、ARRAY、MCF、MCM、YMV、APM SERIES

樣品型號(Style/Item No.) : FERRITE CHIP BEAD、FERRITE CHIP INDUCTOR、ARRAY、MCF、MCM、YMV、APM SERIES

收件日(Sample Receiving Date) : 28-Nov-2023

測試期間(Testing Period) : 28-Nov-2023 to 05-Dec-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: E94C4B9A

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新北市五股區新北產業園區五權七路 25 號 t+886(02)2299 3939 f+886(02)2299 3237  
25, Wu Chyuan 7th Road, New Taipei Industrial Park, Wu Ku District, New Taipei City, Taiwan

Member of the SGS Group

# 測試報告

## Test Report

號碼(No.): ETR23B04850

日期(Date): 05-Dec-2023

頁數(Page): 2 of 16

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

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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<br>(Test Items)                    | 測試方法<br>(Method)   | 單位<br>(Unit) | MDL | 結果<br>(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))                      |  | 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.           |
| 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.           |

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| 測試項目<br>(Test Items)   | 測試方法<br>(Method)   | 單位<br>(Unit) | MDL | 結果<br>(Result) |
|--|--|--------------|-----|----------------|
|  |  |              |     | No.1           |
| 一溴聯苯醚 (Monobromodiphenyl ether)  | 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.           |
| 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.           |

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| 測試項目<br>(Test Items)   | 測試方法<br>(Method)  | 單位<br>(Unit) | MDL  | 結果<br>(Result) |
|--|---|--------------|------|----------------|
|  |   |              |      | No.1           |
| 鄰苯二甲酸二正辛酯 (DNOP) (Di-n-octyl phthalate (DNOP)) (CAS No.: 117-84-0)   | 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.           |
| 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   | n.d.           |
| 氯 (Cl) (Chlorine (Cl)) (CAS No.: 22537-15-1)   |   | mg/kg        | 50   | n.d.           |
| 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.           |

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| 測試項目<br>(Test Items)                         | 測試方法<br>(Method)  | 單位<br>(Unit) | MDL | 結果<br>(Result) |
|--|---|--------------|-----|----------------|
|  |   |              |     | No.1           |
| 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.           |
| 鈹 (Be) (Beryllium (Be)) (CAS No.: 7440-41-7) |   | mg/kg        | 2   | n.d.           |
| 砷 (As) (Arsenic (As)) (CAS No.: 7440-38-2)   |   | mg/kg        | 2   | n.d.           |
| 聚氯乙烯 (Polyvinyl chloride) (PVC)              | 參考ASTM E1252: 2021 · 以傅立葉轉換紅外線光譜儀及焰色法分析。(With reference to ASTM E1252: 2021, analysis was performed by FT-IR and Flame Test.) | **           | -   | Negative       |

### 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. \*\* = Qualitative analysis (No Unit) 定性分析(無單位)
6. Negative = Undetectable 陰性(未偵測到); Positive = Detectable 陽性(已偵測到)
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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### PFAS Remark :

現有PFAS定量技術是分析PFAS物質的特定結構，但同碳數族群之PFAS酸及鹽類物質，其可被辨識的特定結構相同，因此無法區別所分析的特定結構是來自酸或者鹽類，故測試結果為同碳數族群之PFAS之酸及鹽類物質的濃度總合。下表PFAS物質濃度皆已包含在測試結果中，相關資訊請參見下表：(下表列舉PFAS物質僅為範例，並不包含所有同碳數族群之PFAS鹽類。)

(The quantitative technology of PFAS is to analyze the specific structure of PFAS substances. However, PFAS acid and its salts with the same carbon number group have the same specific structure that can be identified. The tested results of the analyzed specific structure cannot be distinguished to identify the contribution from PFAS acid or its salts. Therefore, the tested results display the sum of concentrations of PFAS acids and its salts with the same carbon number group. The concentration of PFAS substances in the below table have been included in the tested results, please refer to the table for relevant information: (The listed PFAS substances are examples only, it do not include all PFAS salts with the same carbon number group.))

| 物質濃度分類<br>(Classification of Substance Concentration)   | 物質名稱<br>(Substance Name)  | CAS No.     |
|---|---|-------------|
| 全氟辛烷磺酸及其鹽類<br>Perfluorooctane sulfonates and its salts (PFOS and its salts)<br>(CAS No.: 1763-23-1 and its salts) | 全氟辛基磺酸鉀 (PFOS-K)<br>Potassium perfluorooctanesulfonate (PFOS-K)   | 2795-39-3   |
|   | 全氟辛基磺酸鋰 (PFOS-Li)<br>Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)   | 29457-72-5  |
|   | 全氟辛基磺酸銨 (PFOS-NH <sub>4</sub> )<br>Perfluorooctanesulfonic acid, ammonium salt (PFOS-NH <sub>4</sub> )  | 29081-56-9  |
|   | 全氟辛基磺酸二乙醇銨 (PFOS-NH(OH) <sub>2</sub> )<br>Perfluorooctane sulfonate diethanolamine salt (PFOS-NH(OH) <sub>2</sub> )   | 70225-14-8  |
|   | 全氟辛基磺酸四乙基銨 (PFOS-N(C <sub>2</sub> H <sub>5</sub> ) <sub>4</sub> )<br>Perfluorooctanesulfonic acid, tetraethylammonium salt (PFOS-N(C <sub>2</sub> H <sub>5</sub> ) <sub>4</sub> ) | 56773-42-3  |
|   | 全氟辛基磺酸二癸二甲基銨 (PFOS-DDA)<br>N-decyl-N,N-dimethyldecyl-1-aminium 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptafluorooctane-1-sulfonate (PFOS-DDA)   | 251099-16-8 |

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# 測試報告

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| 物質濃度分類<br>(Classification of Substance Concentration)   | 物質名稱<br>(Substance Name)  | CAS No.    |
|---|---|------------|
| 全氟辛烷磺酸及其鹽類<br>Perfluorooctane sulfonates and its salts (PFOS and its salts)<br>(CAS No.: 1763-23-1 and its salts) | 全氟辛基磺酰氟 (POSF)<br>Perfluorooctane sulfonyl fluoride (POSF)                  | 307-35-7   |
|   | 全氟辛基磺酸鎂 (PFOS-Mg)<br>Perfluorooctanesulfonic acid, magnesium salt (PFOS-Mg) | 91036-71-4 |
|   | 全氟辛基磺酸鈉 (PFOS-Na)<br>Perfluorooctanesulfonic acid, sodium salt (PFOS-Na)    | 4021-47-0  |
| 全氟辛酸及其鹽類<br>Perfluorooctanoic acid and its salts (PFOA and its salts)<br>(CAS No.: 335-67-1 and its salts)        | 全氟辛酸鈉 (PFOA-Na)<br>Sodium perfluorooctanoate (PFOA-Na)                      | 335-95-5   |
|   | 全氟辛酸鉀 (PFOA-K)<br>Potassium perfluorooctanoate (PFOA-K)                     | 2395-00-8  |
|   | 全氟辛酸銀 (PFOA-Ag)<br>Silver perfluorooctanoate (PFOA-Ag)                      | 335-93-3   |
|   | 全氟辛氟 (PFOA-F)<br>Perfluorooctanoyl fluoride (PFOA-F)                        | 335-66-0   |
|   | 全氟辛酸銨 (APFO)<br>Ammonium pentadecafluorooctanoate (APFO)                    | 3825-26-1  |
|   | 全氟辛酸鋰 (PFOA-Li)<br>Lithium perfluorooctanoate (PFOA-Li)                     | 17125-58-5 |
|   |   |            |

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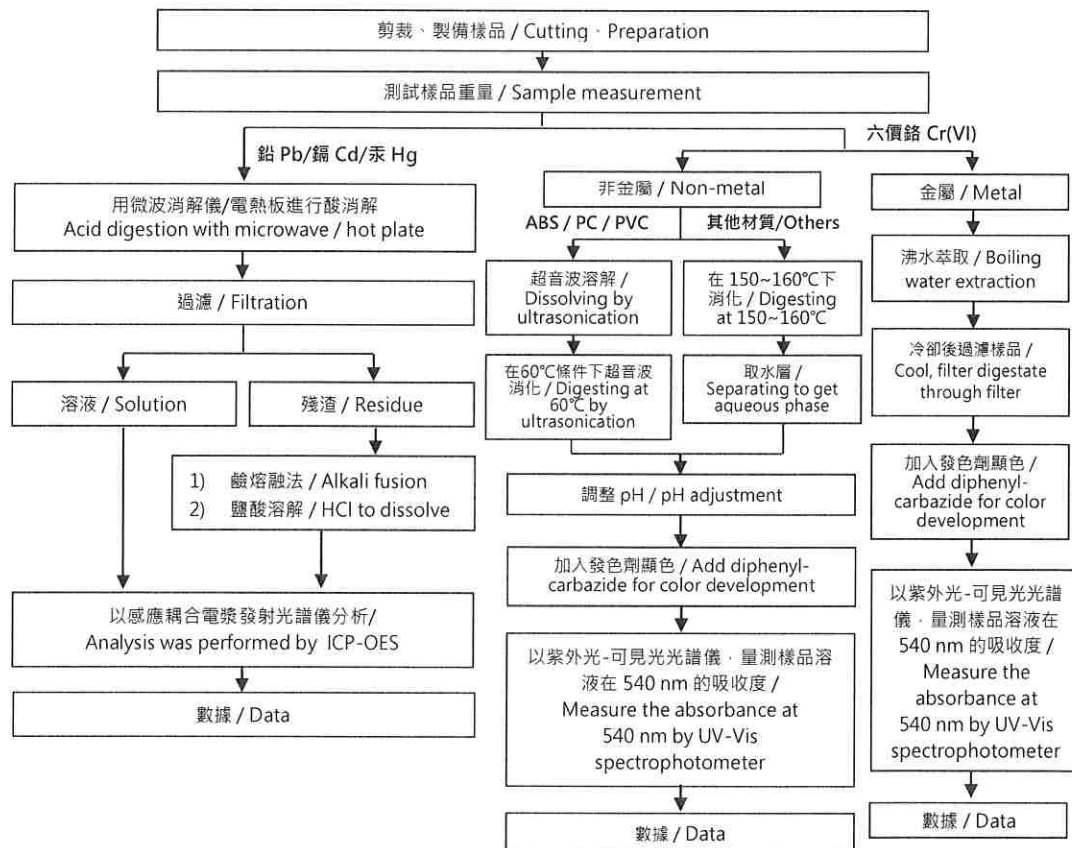
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### 重金屬流程圖 / Analytical flow chart of heavy metal

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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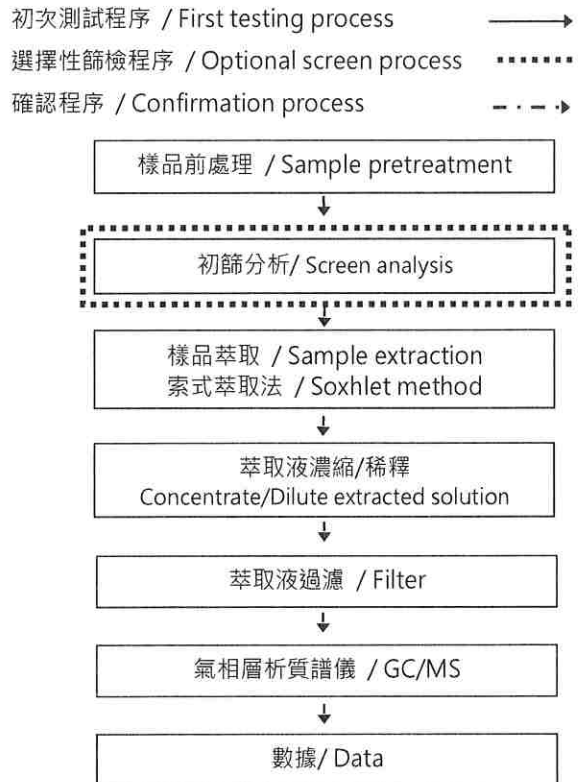
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### 多溴聯苯/多溴聯苯醌分析流程圖 / Analytical flow chart - PBBs/PBDEs



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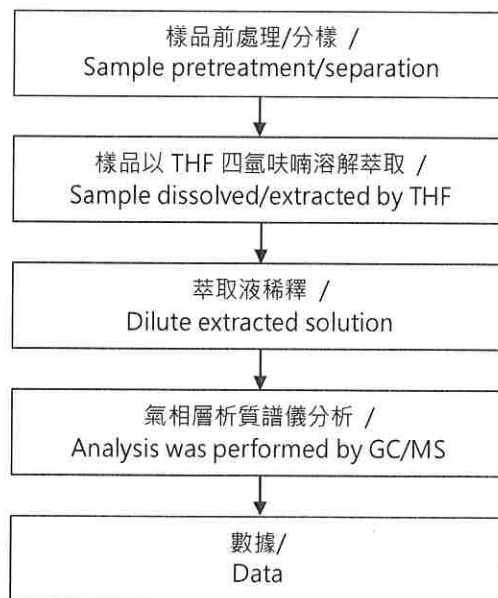
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### 可塑劑分析流程圖 / Analytical flow chart - Phthalate

【測試方法/Test method: IEC 62321-8】



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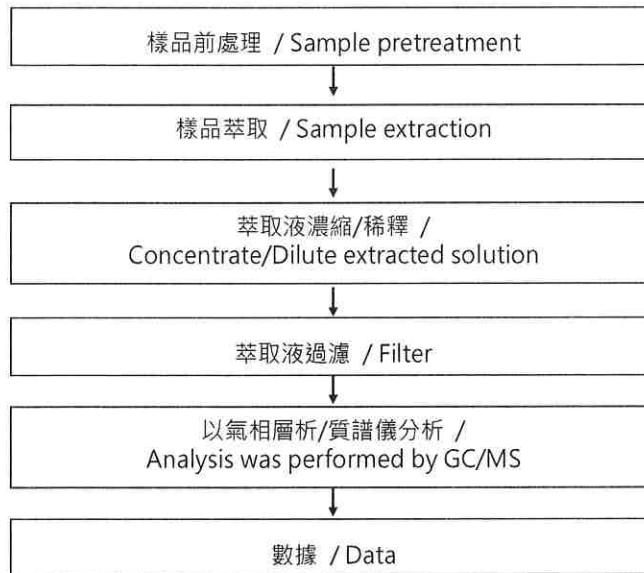
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### 六溴環十二烷分析流程圖 / Analytical flow chart - HBCDD



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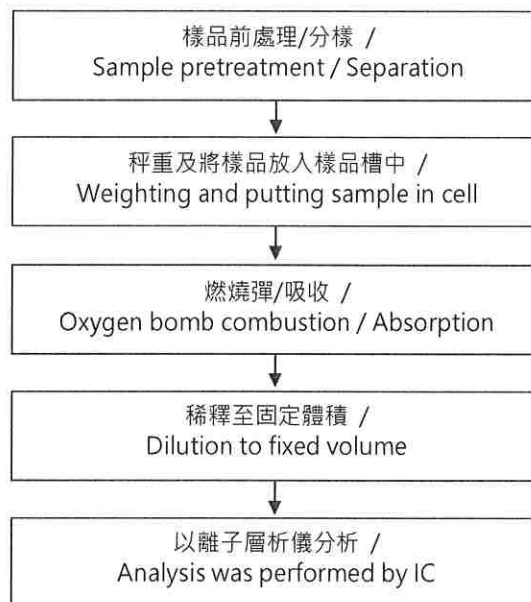
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### 鹵素分析流程圖 / Analytical flow chart - Halogen



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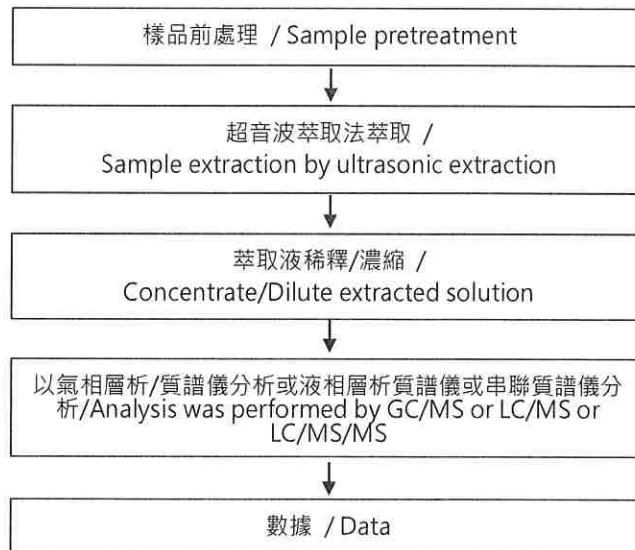
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全氟化合物(包含全氟辛酸/全氟辛烷磺酸/其相關化合物等等)分析流程圖 / Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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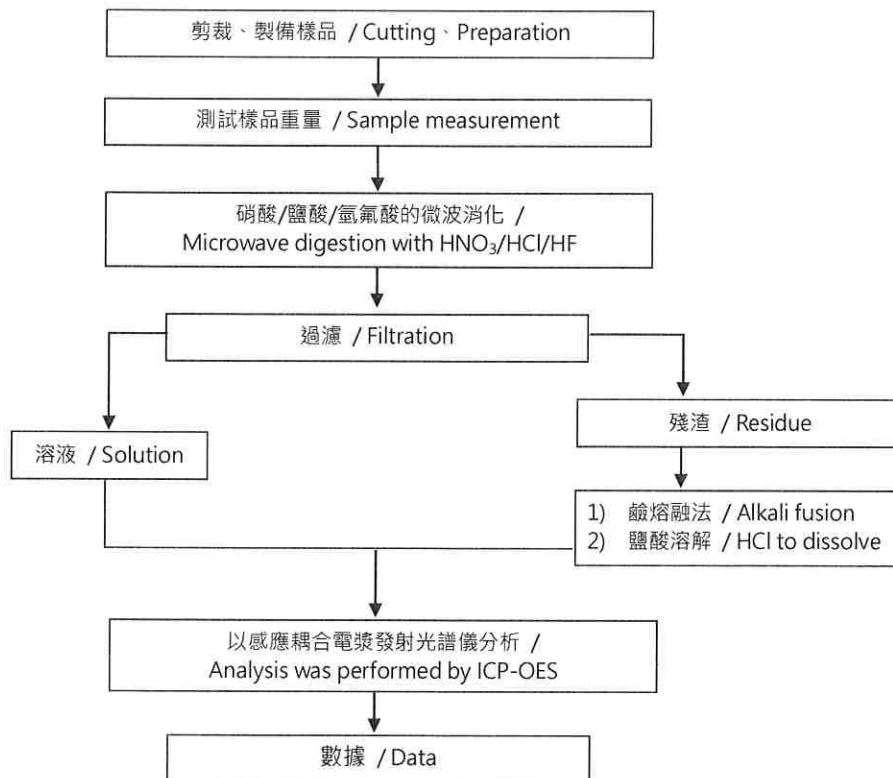
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### 元素(含重金屬)分析流程圖 / Analytical flow chart of elements (Heavy metal included)

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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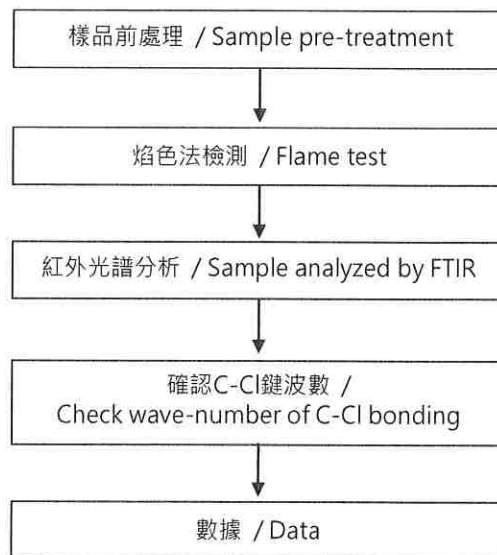
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江蘇省昆山市鐘朗昆嘉高科技工業區郭澤路 (GUO-ZE ROAD, KUNJIA HI-TECH INDUSTRIAL PARK, KUN-SHAN, JIANG-SU, CHINA)

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)

### 聚氯乙烯物質判定分析流程圖 / Analysis flow chart - PVC



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# 測試報告

## Test Report

號碼(No.): ETR23B04850

日期(Date): 05-Dec-2023

頁數(Page): 16 of 16

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.)

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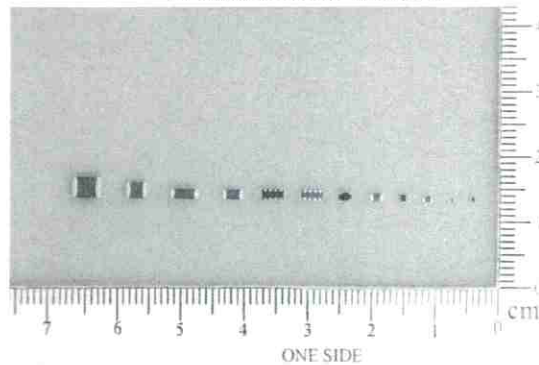
江蘇省昆山市鐘朗昆嘉高科技工業區郭澤路 (GUO-ZE ROAD, KUNJIA HI-TECH INDUSTRIAL PARK, KUN-SHAN, JIANG-SU, CHINA)

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)

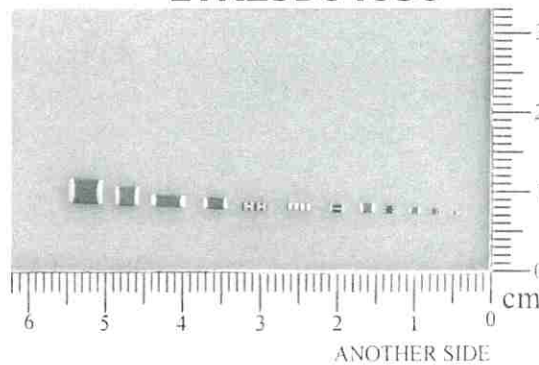
\* 照片中如有箭頭標示，則表示為實際檢測之樣品/部位。\*

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

### ETR23B04850



### ETR23B04850



\*\* 報告結尾 (End of Report) \*\*

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