Specification for Approval

Date: 2024/02/20

Halogen-free RoHS

Customer :

TAI-TECH P/N: HFZ1608PV-121T30A

CUSTOMER P/N:

DESCRIPTION:

QUANTITY: pcs

REMARK:
Customer Approval Feedback

西 北 臺 慶 科 技 股 份 有 限 公 司
TAI-TECH Advanced Electronics Co., Ltd

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High Current Ferrite Chip Bead(Lead Free) HFZ1608PV-121T30A

ECN HISTORY LIST

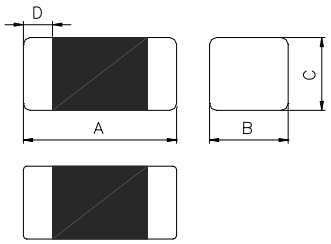
REV	DATE	DESCRIPTION	APPROVED	CHECKED	DRAWN
1.0	21/12/15	初版發行	鄧福興	浦冬生	王俞琴
2.0	22/12/05	更新可靠度及更正 Reflow 敘述	鄧福興	浦冬生	王俞琴
3.0	23/12/01	可靠度全面修訂為 REV E 版本	鄧福興	浦冬生	王俞琴
備註					

High Current Ferrite Chip Bead(Lead Free) HFZ1608PV-121T30A

1.Features

1. Monolithic inorganic material construction.
2. Closed magnetic circuit avoids crosstalk.
3. Suitable for reflow soldering.
4. Shapes and dimensions follow E.I.A. spec.
5. High Current Bead Low RDC
6. Excellent solder ability and heat resistance.
7. High reliability. Reliability test meet AEC-Q200.
8. 100% Lead(Pb) & Halogen-Free and RoHS compliant.
9. Low DC resistance structure of electrode to prevent wasteful electric power consumption.
10. Operating Temperature: -55~+150℃(Including self-temperature rise)

2.Dimensions



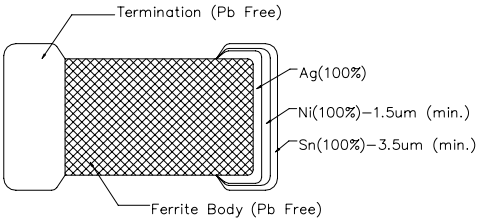
Chip Size	
A	1.60±0.15
B	0.80±0.15
C	0.80±0.15
D	0.30±0.20

Units: mm

3.Part Numbering

HFZ	1608	P	V	-	121	T	30	A
A	B	C	D		E	F	G	H

A: Series
B: Dimension L x W
C: Material Lead Free Material
D: Category Code V=Vehicle
E: Impedance 121=120Ω
F: Packaging T=Taping and Reel, B=Bulk(Bags)
G: Rated Current 30=3000mA
H:Category Code



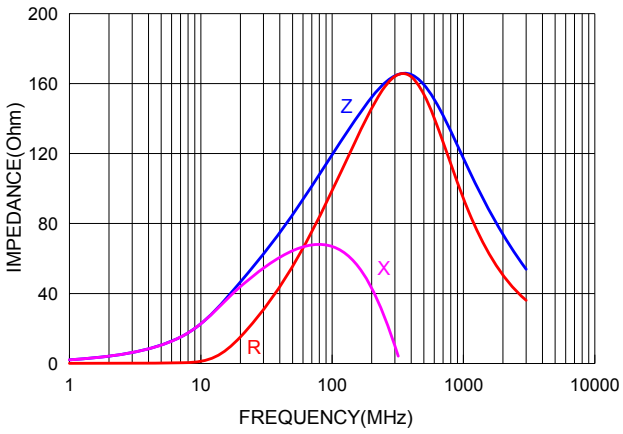
4.Specification

Tai-Tech Part Number	Impedance (Ω)	Test Frequency (MHz)	DC Resistance (Ω) max.	Rated Current (mA) max.
HFZ1608PV-121T30A	120±25%	100	0.035	3000

- Rated current: based on temperature rise test
- In compliance with EIA 595

■ Impedance-Frequency Characteristics

HFZ1608PV-121T30A

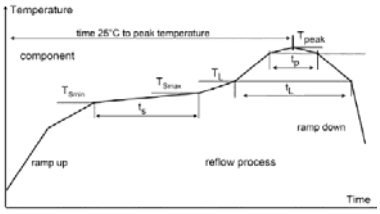
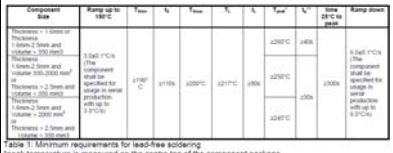
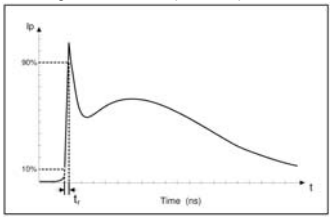


5. Reliability and Test Condition

Item	Performance	Test Condition
Series No.	HFZ	--
Operating Temperature	-55~+150℃ (Including self-temperature rise)	--
Transportation Storage Temperature	-55~+150℃ (on board)	For long storage conditions, please see the Application Notice
Impedance (Z)	Refer to standard electrical characteristics list	Agilent4291 Agilent E4991 Agilent4287 Agilent16192
DC Resistance		Agilent 4338
Rated Current		DC Power Supply Over Rated Current requirements, there will be some risk
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.
High Temperature Exposure(Storage)	Appearance：No damage. Impedance：within±15% of initial value RDC：Within ±15% of initial value and shall not exceed the specification value	Preconditioning:Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles) Unpowered Temperature：150±2℃ Upper Temperature: maximum specified operating temperature or maximum specified storage temperature (whichever is higher). Minimum test temperature shall be 85℃ (For ferrite EMI suppressors/filters only) Duration ：1000hrs Min. Measured at room temperature after placing for 24±4 hrs
Temperature Cycling		Preconditioning:Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles Unpowered Lower Temperature of the Chamber： -40℃(For Inductors/Transformers) -55℃(For ferrite EMI suppressors/filters) Upper Temperature of the Chamber: maximum specified operating temperature (temperature and shall not exceed 125℃) Condition for 1 cycle Step1：-55±2℃ 30min Min Step2：150±2℃ transition time 1min MAX Step3：150±2℃ 30min Min. Step4：Dwell Time (Soak Time) 15 minutes minimum, 30 minutes minimum if component weighs above 28g Transition Time: 1 minute maximum Number of cycles： 1000 Measured at room temperature at least 24 hours after test conclusion.
Destructive Physical Analysis	According to design guide standards	For ferrite EMI suppressors/filters only Pre and Post Electrical Test not required.
Humidity Bias	Appearance：No damage. Impedance：within±15% of initial value RDC：Within ±15% of initial value and shall not exceed the specification value	Preconditioning:Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles Unpowered(For Inductors/Transformers) Apply 10% of maximum rated power.(For ferrite EMI suppressors/filters) Humidity :85±3%RH. Temperature :85±2℃. Duration :1000 hrs Min. Measured at room temperature after placing for 24±4

Item	Performance	Test Condition
High Temperature Operational Life	Appearance：No damage. Impedance：within±15% of initial value RDC：Within ±15% of initial value and shall not exceed the specification value	Preconditioning: Run through Reflow for 3 times. (IPC/JEDEC J-STD-020E Classification Reflow Profiles) Temperature：150±2℃ Upper Temperature of the Chamber: maximum specified operating temperature (not including heat rise) at maximum rated power and shall not exceed 125℃.(For Inductors/Transformers) Temperature of the Chamber: maximum specified operating temperature up to 150℃. .(For ferrite EMI suppressors/filters) Duration：1000hrs Min. with 100% rated current. Measured at room temperature after placing for 24±4 hrs Rated I_r applied.(For ferrite EMI suppressors/filters)
External Visual	Appearance：No damage.	Inspect device construction, marking and workmanship. Pre and Post Electrical Test not required.
Physical Dimension	According to the product specification size measurement	Verify physical dimensions to the applicable component detail specification. Pre and Post Electrical Test not required.
Terminal Strength (for axial and radial THT components)	Appearance：No damage. Impedance：within±15% of initial value RDC：Within ±15% of initial value and shall not exceed the specification value	Test THT component lead integrity only. Test Condition A (pull test) Nominal cross- sectional area (mm^2) / Force (N) ≤ 0.05 / 1 0.06 to 0.10 / 2.5 0.11 to 0.20 / 5 0.21 to 0.50 / 10 0.51 to 1.20 / 20 > 1.20 / 40 Test Condition C (wire-lead bend test) Section Modulus (Z_X) (mm^3) / Force (N) ≤ $1.5x10^{-3}$ / 0.5 $1.6x10^{-3}$ to $4.2x10^{-3}$ / 1.25 $4.3x10^{-3}$ to $1.2x10^{-2}$ / 2.5 $1.3x10^{-2}$ to $0.5x10^{-1}$ / 5 $0.6x10^{-1}$ to $1.9x10^{-1}$ / 10 > $1.9x10^{-1}$ / 20 For round terminations: ZX = (πd3)/32 where d is the lead diameter. For strip terminations: ZX = (ba2)/6 where a is the thickness of the rectangular strip perpendicular to the bending axis, b is the other dimension of the rectangular strip.
Resistance to Solvents		Add an Aqueous wash chemical and follow chemical manufacturer's recommended parameters (i.e.,solution temperature and immersion time). Applicable to ink marked components and not laser marked components
Mechanical Shock		Preconditioning:Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles Test condition: Type / Peak alue (g's) / Normal duration (D) (ms) / Wave form / Velocity change (Vi)ft/sec SMD / 100 / 6 / Half-sine / 12.3 THT / 100 / 6 / Half-sine / 12.3 3 shocks in each direction along 3 perpendicular axes (18shocks).
Vibration		Preconditioning:Run through reflow for 3 times.(IPC/JEDEC J-STD-020E Classification Reflow Profiles Oscillation Frequency: 10Hz～2KHz～10Hz for 20 minute Equipment：Vibration checker Total Amplitude:5g Testing Time：12 hours(20 minutes, 12 cycles each of 3 orientations)。

<table>
<tr><th>Item</th><th>Performance</th><th>Test Condition</th></tr>
<tr><td>Resistance to Soldering Heat</td><td>Appearance：No damage.
Impedance：within±15% of initial value
RDC：Within ±15% of initial value and shall not exceed the specification value</td><td>Test condition ：
THT: Conditions B or C
Number of heat cycles: 1
<table><tr><th>Solder technique simulation</th><th>Test condition</th><th>Temperature (°C)</th><th>Time (s)</th><th>Temperature ramp/immersion and emersion rate</th></tr><tr><td>Dip</td><td>B</td><td>260 ±5 (solder temp)</td><td>10±1</td><td>25mm/s±6mm /s</td></tr><tr><td>Wave: Topside board-mount product</td><td>C</td><td>260 ±5 (solder temp)</td><td>20±1</td><td></td></tr></table>
Depth: completely cover the termination

SMD: Condition K, time above 217℃, 60s －150s，
Number of heat cycles:3
 
Continental
  </td></tr>
<tr><td>ESD</td><td>Appearance：No damage.
Impedance：within±15% of initial value
RDC：Within ±15% of initial value and shall not exceed the specification value</td><td>Direct Contact and Air Discharge PASSIVE COMPONENT HBM ESD Discharge Waveform to a Coaxial Target
Test method: AEC-Q200-002
Test mode：Contact Discharge
Discharge level：4 KV (Level: 2)
  </td></tr>
<tr><td>Solder ability</td><td>More than 95% of the terminal electrode should be covered with solder.</td><td>▪ Through-hole Technology (THT)
Method A1, Coating Durability Category 2
▪ SMD:
Method B1, Coating Durability Category 2
Method D, Coating Durability Category 2
▪ Magnification 50x
▪ Pre and Post Electrical Test not required.
▪ Non-soldered type mounting/attach are not applicable.
<table><tr><td>參照</td><td>Method A1</td><td>Method B1</td><td>Method D</td></tr><tr><td>焊接工藝</td><td>再流焊</td><td>其他器件的再流</td><td>無鉛錫接</td></tr><tr><td>焊接類型</td><td>錫銀銅焊料</td><td>錫銀銅焊料</td><td>錫銀銅焊料</td></tr><tr><td>浸入助焊劑</td><td>5-10s</td><td>5-10s</td><td>5-10s</td></tr><tr><td>浸入錫爐角</td><td>20°~45°</td><td>20°~45°</td><td>20°~45</td></tr><tr><td>焊料溫度</td><td>245 ±5℃</td><td>245 ±5℃</td><td>260 ±5℃</td></tr><tr><td>浸入焊料時</td><td>5+0/-0.5s</td><td>5+0/-0.5s</td><td>30+5/-0s</td></tr><tr><td>浸入和提出</td><td>25 ±6mm/s</td><td>25 ±6mm/s</td><td>25 ±6mm/s</td></tr></table></td></tr>
</table>

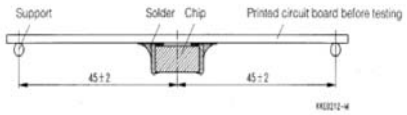
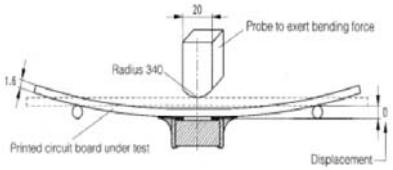
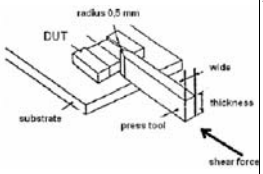
<table>
<tr><th>Item</th><th>Performance</th><th>Test Condition</th></tr>
<tr><td>Electrical Characterization</td><td>Refer Specification for Approval</td><td>Parametrically test per lot and sample size requirements,(inductance only unless otherwise agreed upon)
Summary to show minimum, maximum, mean and standard deviation at room, minimum and maximum operating temperatures.
Pre and Post Electrical Test not required</td></tr>
<tr><td>Flammability</td><td>In accordance with Referenced Standards</td><td>UL-94 or IEC 60695-11-5</td></tr>
<tr><td>Board Flex
(SMD)</td><td>Appearance：No damage.
Impedance：within±15% of initial value
RDC：Within ±15% of initial value and shall not exceed the specification value
 
  </td><td>Preconditioning: Run through Reflow for 3 times.
(IPC/JEDEC J-STD-020E Classification Reflow Profiles)
Place the 100mm X 40mm board into a fixture similar to the one shown in below Figure with the component facing down. The apparatus shall consist of mechanical means to apply a force which will bend the board (D) x = 2 mm minimum. The duration of the applied forces shall be 60 (+ 5) sec. The force is to be applied only once to the board.</td></tr>
<tr><td>Terminal strength
(SMD)</td><td>Appearance：No damage.
Impedance：within±15% of initial value
RDC：Within ±15% of initial value and shall not exceed the specification value
  </td><td>AEC-Q200,TAI-TECH SPEC.10N</td></tr>
<tr><td>Electrical Transient Conduction</td><td>ethod: AEC-Q200-002
Test mode：Contact Discharge
Discharge level：4 KV (Level: 2)

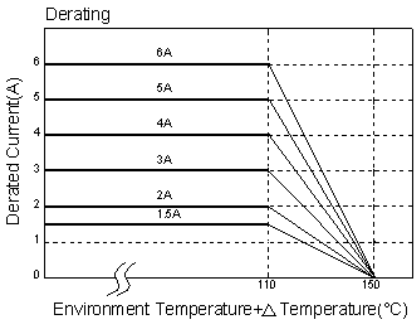
Table A.1 — Examples of test pulse severity levels for nominal 12 V system
<table><tr><th rowspan="2">Test pulse[a]</th><th rowspan="2">Selected test level[b]</th><th colspan="3">Test pulse severity level, U_s^{cd} V</th><th rowspan="2">Min. number of pulses or test time</th><th colspan="2">Burst cycle/ pulse repetition time</th></tr><tr><th>IV</th><th>III</th><th>I / II</th><th>min.</th><th>max.</th></tr><tr><td>1</td><td></td><td>−150</td><td>−112</td><td>−75</td><td>500 pulses</td><td>0,5 s</td><td>e</td></tr><tr><td>2a</td><td></td><td>+112</td><td>+55</td><td>+37</td><td>500 pulses</td><td>0,2 s</td><td>5 s</td></tr><tr><td>2b</td><td></td><td>+10</td><td>+10</td><td>+10</td><td>10 pulses</td><td>0,5 s</td><td>5 s</td></tr><tr><td>3a</td><td></td><td>−220</td><td>−165</td><td>−112</td><td>1 h</td><td>90 ms</td><td>100 ms</td></tr><tr><td>3b</td><td></td><td>+150</td><td>+112</td><td>+75</td><td>1 h</td><td>90 ms</td><td>100 ms</td></tr></table>[a] Test pulses as in 5.6.
[b] Values agreed between vehicle manufacturer and equipment supplier.
[c] The amplitudes are the values of U_s as defined for each test pulse in 5.6.
[d] The former levels I and II are revised because they did not ensure sufficient immunity in subsequent road vehicles' design.
[e] The maximum pulse repetition time shall be chosen such that it is the minimum time for the DUT to be correctly initialized before the application of the next pulse and shall be ≥0,5 s.

Table A.2 — Suggested test pulse severity levels for nominal 24 V system
<table><tr><th rowspan="2">Test pulse[a]</th><th rowspan="2">Selected test level[b]</th><th colspan="3">Test pulse severity level, U_s^{cd} V</th><th rowspan="2">Min. number of pulses or test time</th><th colspan="2">Burst cycle/ pulse repetition time</th></tr><tr><th>IV</th><th>III</th><th>I / II</th><th>min.</th><th>max.</th></tr><tr><td>1</td><td></td><td>−600</td><td>−450</td><td>−300</td><td>500 pulses</td><td>0,5 s</td><td>e</td></tr><tr><td>2a</td><td></td><td>+112</td><td>+55</td><td>+37</td><td>500 pulses</td><td>0,2 s</td><td>5 s</td></tr><tr><td>2b</td><td></td><td>+20</td><td>+20</td><td>+20</td><td>10 pulses</td><td>0,5 s</td><td>5 s</td></tr><tr><td>3a</td><td></td><td>−300</td><td>−220</td><td>−150</td><td>1 h</td><td>90 ms</td><td>100 ms</td></tr><tr><td>3b</td><td></td><td>+300</td><td>+220</td><td>+150</td><td>1 h</td><td>90 ms</td><td>100 ms</td></tr></table>[a] Test pulses as in 5.6.
[b] Values agreed between vehicle manufacturer and equipment supplier.
[c] The amplitudes are the values of U_s as defined for each test pulse in 5.6.
[d] The former levels I and II are revised because they did not ensure sufficient immunity in subsequent road vehicles' design.
[e] The maximum pulse repetition time shall be chosen such that it is the minimum time for the DUT to be correctly initialized before the application of the next pulse and shall be ≥0,5 s.</td><td>A selected level and test time for testing at or in between these values may be chosen according to the agreement between vehicle manufacturer and supplier. In cases where no specific values are defined, it is recommended to use
Test pulsea:2b
Test pulse severity level: III

Supply voltages
<table><tr><td>Supply voltage</td><td>Nominal 12 V system V</td><td>Nominal 24 V system V</td></tr><tr><td>UA</td><td>13,5 ± 0,5</td><td>27 ± 1</td></tr></table></td></tr>
</table>

**Derating Curve

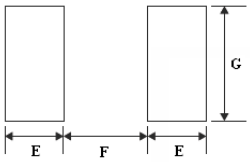
For the ferrite chip bead which withstanding current over 1.5A, as the operating temperature over 110℃, the derating current information is necessary to consider with. For the detail derating of current, please refer to the Derated Current vs. Operating Temperature curve.



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)
HFZ	1005	1.0±0.10	0.50±0.10	0.50±0.10	0.25±0.10	0.50	0.40	0.60
	1608	1.6±0.15	0.80±0.15	0.80±0.15	0.30±0.20	0.80	0.85	0.95



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:

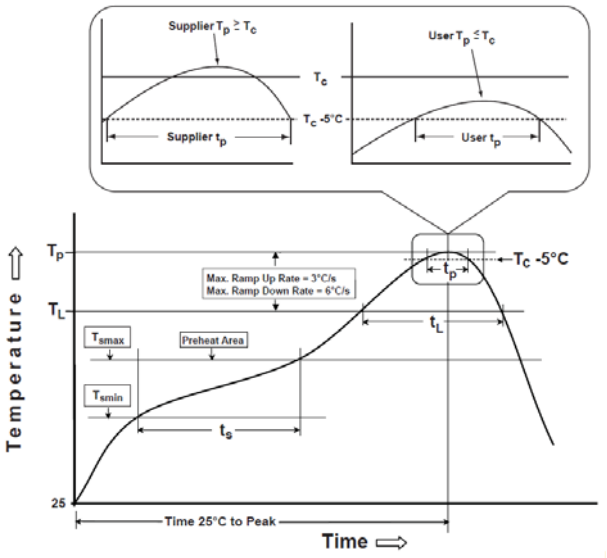
Recommended temperature profiles for lead free re-flow soldering in Figure 1. Table 1.1&1.2 (J-STD-020E)

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.)

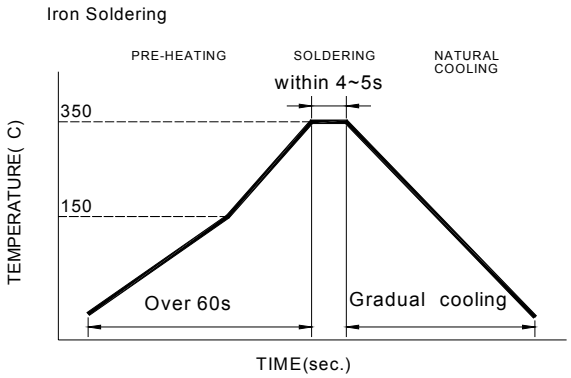
- Preheat circuit and products to 150℃
- 350℃ tip temperature (max)
- Never contact the ceramic with the iron tip
- 1.0mm tip diameter (max)
- Use a 20 watt soldering iron with tip diameter of 1.0mm
- Limit soldering time to 4~5sec.

Fig.1 Soldering Reflow



Reflow times: 3 times max

Fig.2 Iron soldering temperature profiles



Iron Soldering times：1 times max

Table (1.1): Reflow Profiles

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

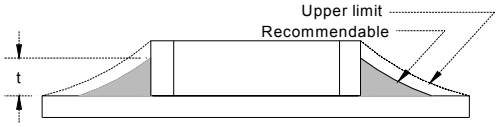
	Package Thickness	Volume mm^3 <350	Volume mm^3 350-2000	Volume mm^3 >2000
PB-Free Assembly	<1.6mm	260℃	260℃	260℃
	1.6-2.5mm	260℃	250℃	245℃
	≥2.5mm	250℃	245℃	245℃

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

6-2.3 Solder Volume:

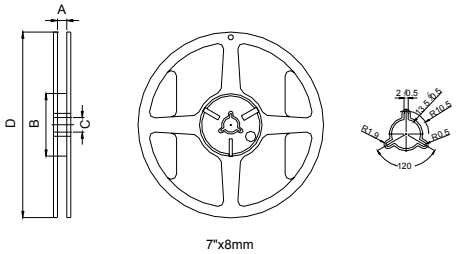
Accordingly increasing the solder volume, the mechanical stress to product is also increased. Exceeding solder volume may cause the failure of mechanical or electrical performance. Solder shall be used not to be exceed as shown in right side:

Minimum fillet height = soldering thickness + 25% product height



7. Packaging Information

7-1. Reel Dimension

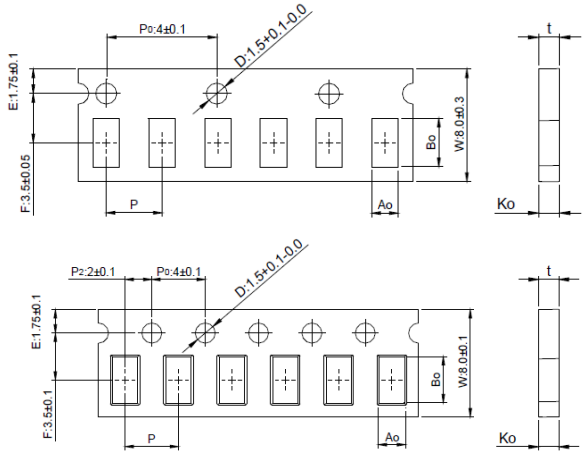


7"x8mm

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

7-2.1 Tape Dimension / 8mm

■Material of taping is paper



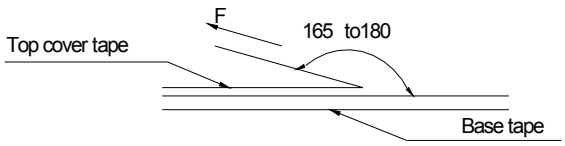
Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
100505	1.12±0.03	0.62±0.03	0.60±0.03	2.0±0.05	0.60±0.03

Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
160808	1.90±0.05	1.10±0.05	0.95±0.05	4.0±0.10	0.95±0.05

7-3. Packaging Quantity

Chip Size	160808	100505
Chip / Reel	4000	10000
Inner box	20000	50000
Middle box	100000	250000
Carton	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. (℃)	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-020E standard-MSL, level 1.
2. Temperature and humidity conditions: Less than 40℃ 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　　

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)	:	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

測試報告
Test Report

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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))		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.

測試報告
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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 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (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 (Test Items)	測試方法 (Method)	單位 (Unit)	MDL	結果 (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 (Classification of Substance Concentration)	物質名稱 (Substance Name)	CAS No.
全氟辛烷磺酸及其鹽類 Perfluorooctane sulfonates and its salts (PFOS and its salts) (CAS No.: 1763-23-1 and its salts)	全氟辛基磺酸鉀 (PFOS-K) Potassium perfluorooctanesulfonate (PFOS-K)	2795-39-3
	全氟辛基磺酸鋰 (PFOS-Li) Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)	29457-72-5
	全氟辛基磺酸銨 (PFOS-NH_4) Perfluorooctanesulfonic acid, ammonium salt (PFOS-NH_4)	29081-56-9
	全氟辛基磺酸二乙醇銨 (PFOS-$NH(OH)_2$) Perfluorooctane sulfonate diethanolamine salt (PFOS-$NH(OH)_2$)	70225-14-8
	全氟辛基磺酸四乙基銨 (PFOS-$N(C_2H_5)_4$) Perfluorooctanesulfonic acid,tetraethylammonium salt (PFOS-$N(C_2H_5)_4$)	56773-42-3
	全氟辛基磺酸二癸二甲基銨 (PFOS-DDA) N-decyl-N,N-dimethyldecan-1-aminium 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctane-1-sulfonate (PFOS-DDA)	251099-16-8

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

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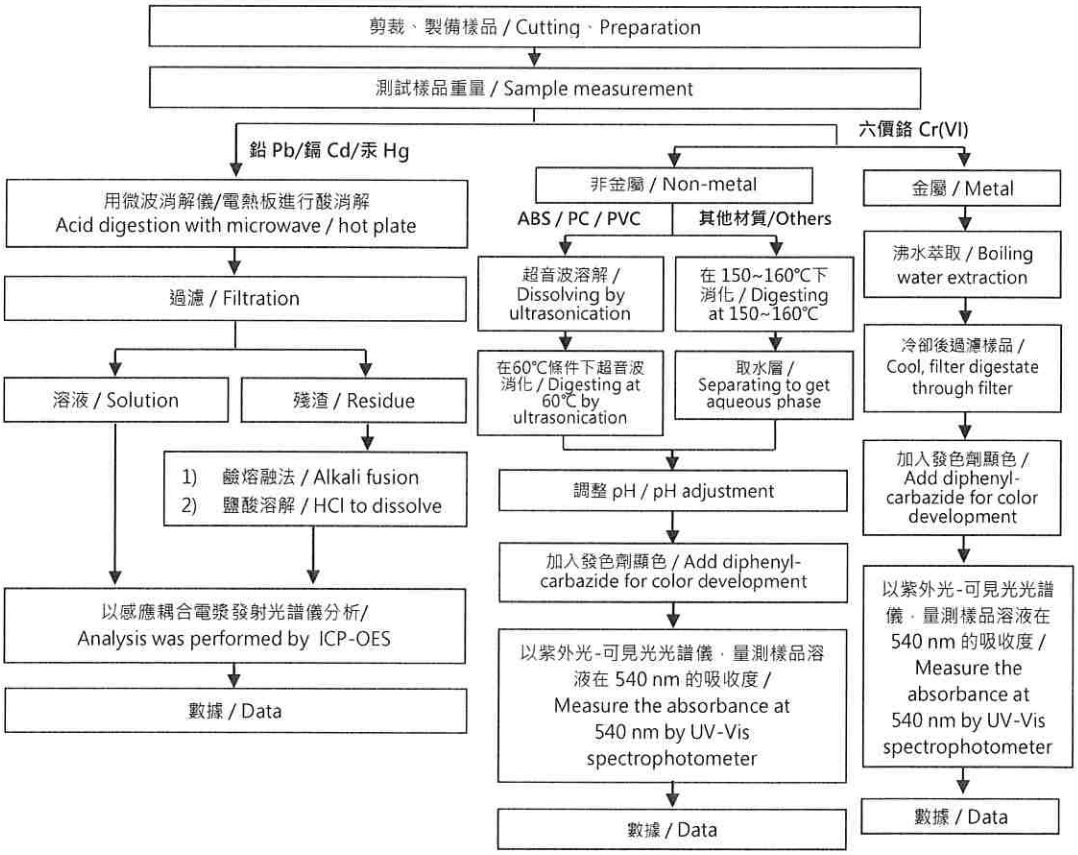
重金屬流程圖 / Analytical flow chart of heavy metal

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^{6+} test method excluded）



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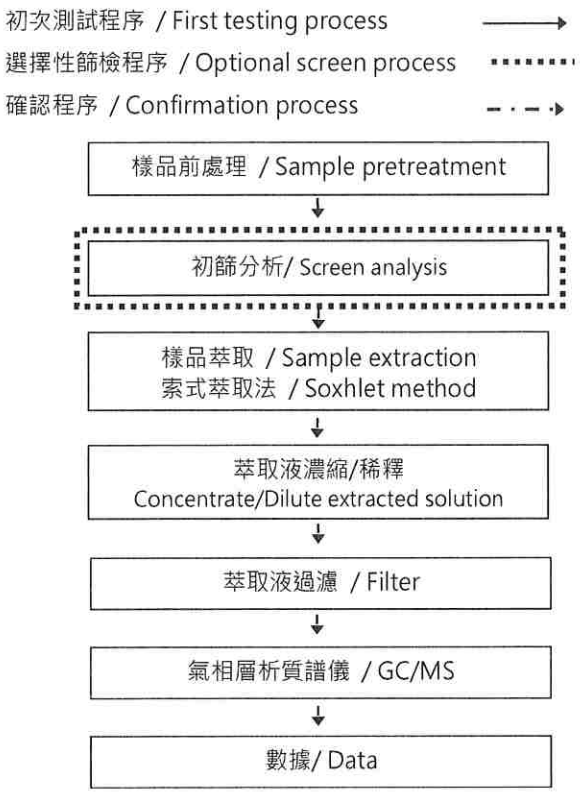
多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBBs/PBDEs



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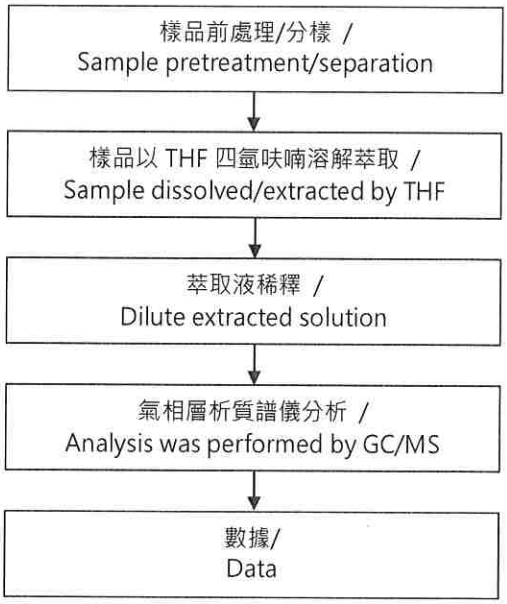
可塑劑分析流程圖 / Analytical flow chart - Phthalate

【測試方法/Test method: IEC 62321-8】



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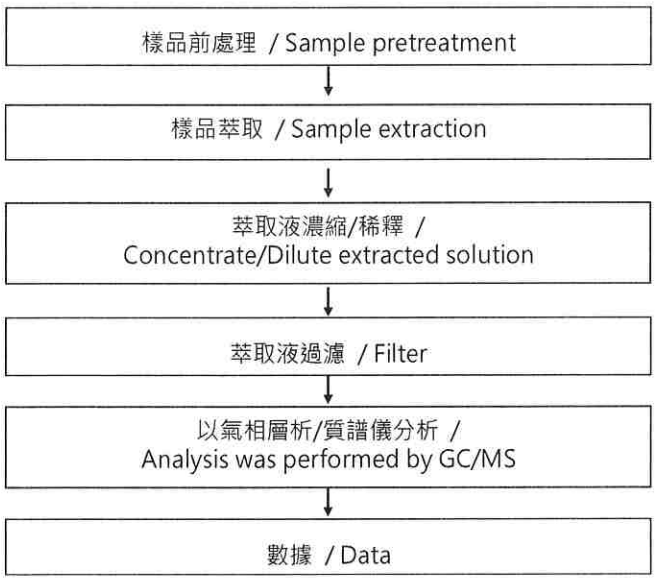
六溴環十二烷分析流程圖 / Analytical flow chart - HBCDD



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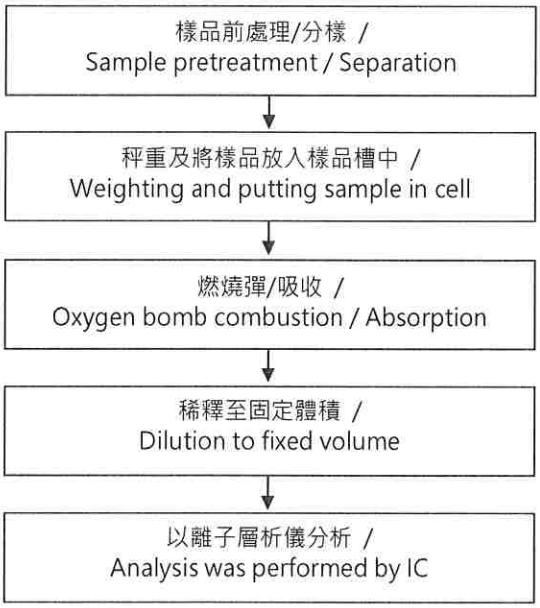
鹵素分析流程圖 / Analytical flow chart - Halogen



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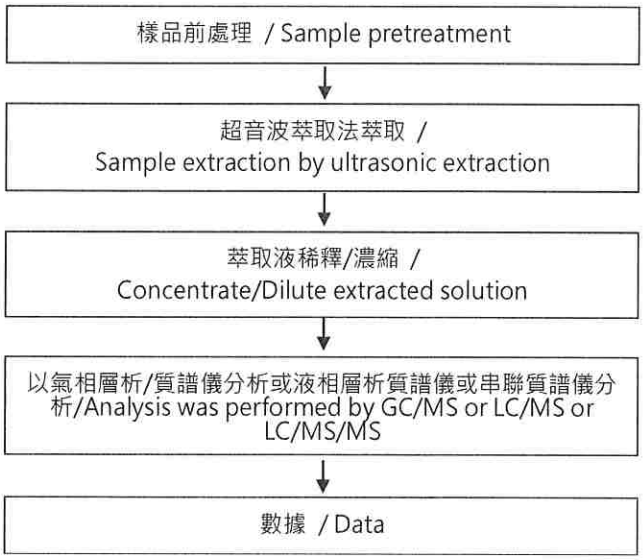
全氟化合物(包含全氟辛酸/全氟辛烷磺酸/其相關化合物等等)分析流程圖 / Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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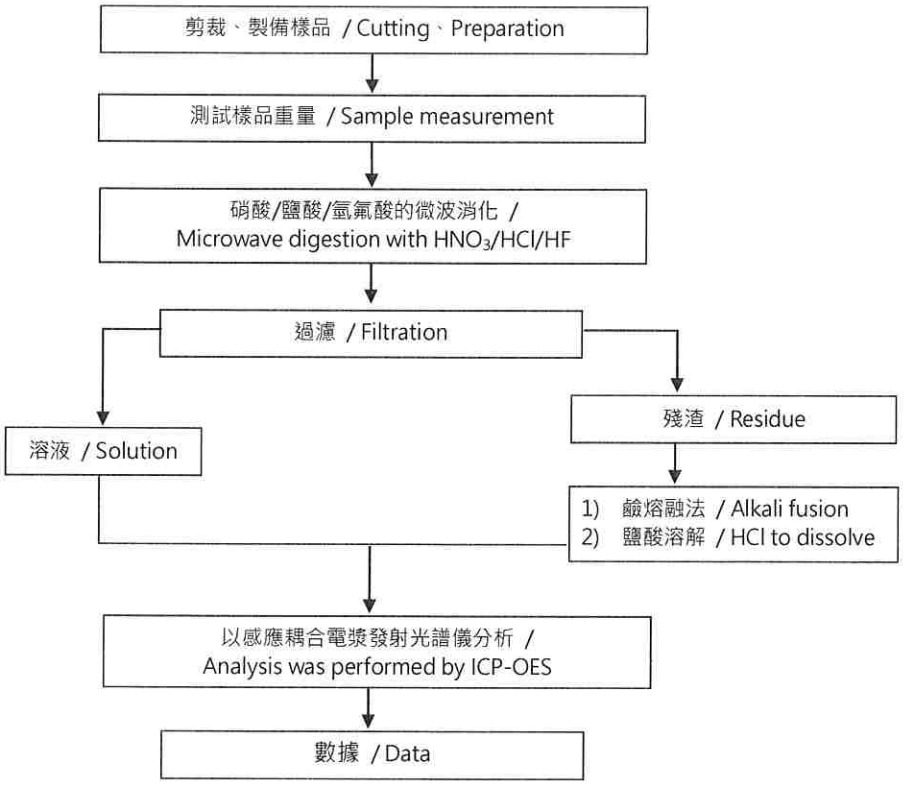
元素(含重金屬)分析流程圖 / Analytical flow chart of elements (Heavy metal included)

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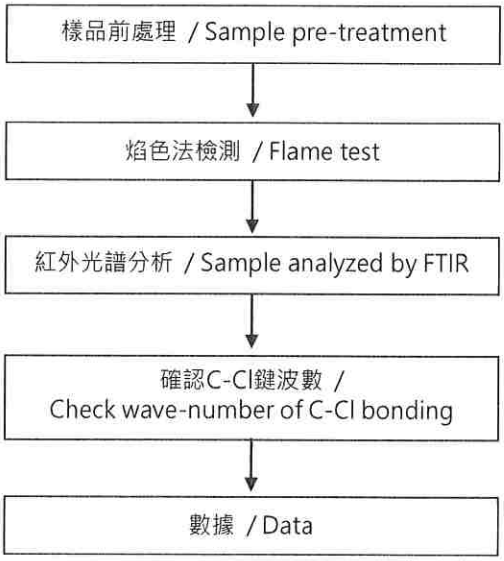
聚氯乙烯物質判定分析流程圖 / Analysis flow chart - PVC



測試報告
Test Report

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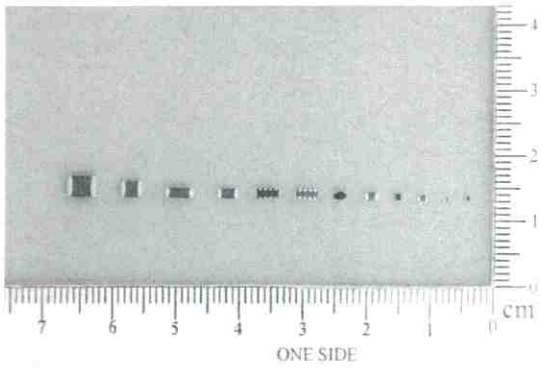
* 照片中如有箭頭標示，則表示為實際檢測之樣品/部位. *
(The tested sample / part is marked by an arrow if it's shown on the photo.)

ETR23B04850



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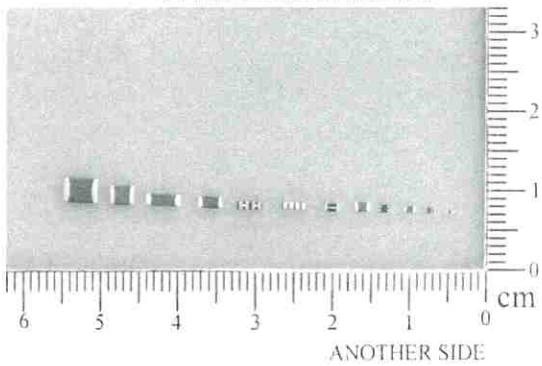

** 報告結尾 (End of Report) **

单击下面可查看定价，库存，交付和生命周期等信息

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