

Specification for Approval

Date: 2024/09/11

Customer: Blume

TAI-TECH P/N: WCM3216F2SV-900T04

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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APPROVED	CHECKED	DRAWN
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Wire Wound Type Common Mode Filter

WCM3216F2SV-900T04

ECN HISTORY LIST

REV	DATE	DESCRIPTION	APPROVED	CHECKED	DRAWN
1.0	24/09/11	新 發 行	鄒俊德	林志鴻	林靜婷
備 註					

Wire Wound Type Common Mode Filter

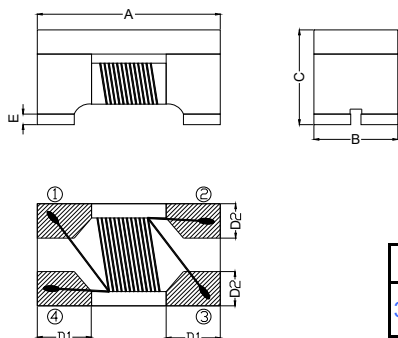
WCM3216F2SV-900T04

1. Features

1. High common mode impedance at high frequency cause excellent noise suppression performance.
2. WCM3216F2SV series realizes small size and low profile. 3.2x1.6x2.0 mm.
3. 100% Lead(Pb) & Halogen-Free and RoHS compliant.
4. High reliability -Reliability tests comply with AEC-Q200.
5. Operating temperature-55~+125℃ (Including self - temperature rise).



2. Dimension



Series	A(mm)	B(mm)	C(mm)	D1(mm)	D2(mm)	E(mm)
3216F2SV	3.2±0.2	1.6±0.2	2.0±0.2	0.5±0.1	0.5±0.1	0.15±0.1

Units: mm

3. Part Numbering

WCM	3216	F	2	S	V	-	900	T	04
A	B	C	D	E	F		G	H	I

A: Series
 B: Dimension
 C: Material Ferrite Core
 D: Number of Lines 2=2 lines
 E: Type S=Shielded , N=Unshielded
 F: Category Code V=Vehicle
 G: Impedance 900=90Ω
 H: Packaging T=Taping and Reel
 I: Rated Current 04=400mA

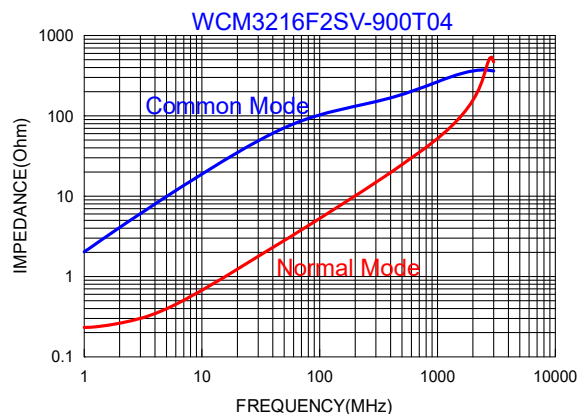
4. Specification

TAI-TECH Part Number	Common mode Impedance (Ω)	Test Frequency (MHz)	DCR (Ω) max.	Rated Current (mA)max.	Rated Volt. (Vdc)max.	Withstand Volt. (Vdc) Max.	Insulation Resistance (Ω) min.
WCM3216F2SV-900T04	90±25%	100	0.30	400	50	125	10M

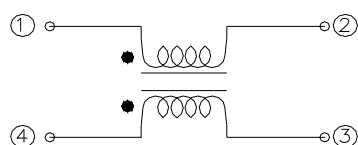
Note:

- All test data referenced to 25℃ ambient.

Typical Impedance v.s. Frequency Curve

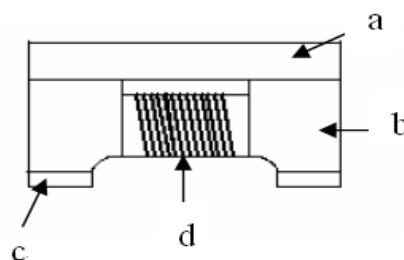


5. Schematic Diagram



6. Materials

No.	Description	Specification
a.	Upper Plate	Ferrite
b.	Core	Ferrite Core
c.	Termination	Ag/Ni/Sn
d.	Wire	Enameled Copper Wire



Note:

Conformal coating:

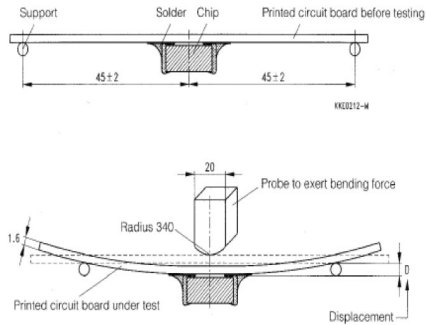
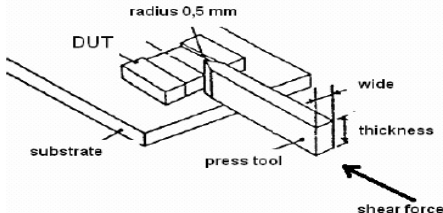
- The inductance value may change due to high cure-stress of resin to be used for coating/molding products.
- An open circuit issue may occur by mechanical stress caused by the resin, amount/cured shape of resin, or operating condition etc. Please pay careful attention when selecting resin in case of coating/molding process. Prior to use the coating resin, please make sure no reliability issue is observed.

7. Reliability and Test Condition

Item	Performance	Test Condition
Operating temperature	-55~+125℃ (Including self - temperature rise)	
Storage temperature	-55~+125℃ (on board)	
Electrical Performance Test		
Impedance	Refer to standard electrical characteristics list.	Keysight E4991B + Keysight 16197A
DCR		Agilent-34420A Agilent-4338B
Insulation Resistance	Test Voltage : Rated Voltage Time : 1 minute max.	Chroma 19073
Withstand Volt	Test Voltage : Rated Voltage*2.5 times. Time : 1 ~ 5 s. Charge Current : 1 mA max.	Chroma 19073
Temperature Rise Test	Rated Current ΔT 40℃ Max	1. Applied the allowed DC current. 2. Temperature measured by digital surface thermometer

Reliability Test																														
High Temperature Exposure(Storage) AEC-Q200		Preconditioning: Run through reflow for 3 times. (IPC/JEDECJ-STD-020F Classification Reflow Profiles) Unpowered Temperature : 125±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 AEC-Q200	Appearance : No damage. Impedance : within±15% of initial value DCR : within±15% of initial value and shall not exceed the specification value	Preconditioning: Run through reflow for 3 times. (IPC/JEDECJ-STD-020F 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 and shall not exceed 125℃ Condition for 1 cycle Step1 : -40±2℃ 30min Min. Step2 : 125±2℃ transition time 1min MAX. Step3 : 125±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.																												
Humidity Bias (AEC-Q200)		Preconditioning: Run through reflow for 3 times. (IPC/JEDEC J-STD-020F 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: 1000hrs Min. Measured at room temperature after placing for 24±4hrs.																												
High Temperature Operating Life (AEC-Q200)		Preconditioning: Run through reflow for 3 times. (IPC/JEDECJ-STD-020F Classification Reflow Profiles) Temperature : 125±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 IL 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 DCR : within±15% of initial value and shall not exceed the specification value	Test THT component lead integrity only. Test Condition A (pull test) <table><tr><th>Nominal cross-sectional area (mm²)</th><th>Force (N)</th></tr><tr><td>≤ 0.05</td><td>1</td></tr><tr><td>0.06 to 0.10</td><td>2.5</td></tr><tr><td>0.11 to 0.20</td><td>5</td></tr><tr><td>0.21 to 0.50</td><td>10</td></tr><tr><td>0.51 to 1.20</td><td>20</td></tr><tr><td>> 1.20</td><td>40</td></tr></table> Test Condition C (wire-lead bend test): <table><tr><th>Section Modulus (Zx) (mm³)</th><th>Force (N)</th></tr><tr><td>≤ 1.5x10⁻³</td><td>0.5</td></tr><tr><td>1.6x10⁻³ to 4.2x10⁻³</td><td>1.25</td></tr><tr><td>4.3x10⁻³ to 1.2x10⁻²</td><td>2.5</td></tr><tr><td>1.3x10⁻² to 0.5x10⁻¹</td><td>5</td></tr><tr><td>0.6x10⁻¹ to 1.9x10⁻¹</td><td>10</td></tr><tr><td>> 1.9x10⁻¹</td><td>20</td></tr></table> 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.	Nominal cross-sectional area (mm²)	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	Section Modulus (Zx) (mm³)	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
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≤ 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																													

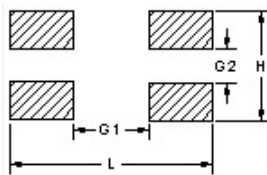
Item	Performance	Test Condition																																																										
Resistance to Solvents	Appearance : No damage. Impedance : within±15% of initial value DCR : within±15% of initial value and shall not exceed the specification value	Add an Aqueous wash chemical and follow chemical manufacturer's recommended parameters (i.e. solution temperature and immersion time). Applicable to ink marked components and not laser marked components																																																										
Mechanical Shock		<table><tr><th>Type</th><th>Peak value (g's)</th><th>Normal duration (D) (ms)</th><th>Wave form</th><th>Velocity change (Vi)ft/sec</th></tr><tr><td>SMD</td><td>100</td><td>6</td><td>Half-sine</td><td>12.3</td></tr><tr><td>THT</td><td>100</td><td>6</td><td>Half-sine</td><td>12.3</td></tr></table> 3 shocks in each direction along 3 perpendicular axes. (18 shocks).	Type	Peak value (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																																											
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SMD		100	6	Half-sine	12.3																																																							
THT	100	6	Half-sine	12.3																																																								
Vibration	Preconditioning: Run through reflow for 3 times. (IPC/JEDEC J-STD-020F Classification Reflow Profiles) Oscillation Frequency : 10Hz~2kHz~10Hz for 20 minutes Equipment : Vibration checker Total Amplitude : 5g Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations)																																																											
Resistance to Soldering Heat		Test condition : THT: Conditions B or C <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><th>Number of heat cycles</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><td>1</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><td>1</td></tr></table> Depth: completely cover the termination SMD: Condition K, time above 217 °C, 60s-150s , Number of heat cycles:3 Continental <table><tr><th>Component Size</th><th>Ramp up to 150°C</th><th>T_{min}</th><th>t_s</th><th>T_{max}</th><th>T_L</th><th>t_L</th><th>T_{peak}*</th><th>t_p**</th><th>Ramp down</th></tr><tr><td>Thickness < 1.5mm or Thickness 1.5mm-2.5mm and volume < 350 mm³</td><td>3.0s/1°C/s</td><td></td><td></td><td></td><td></td><td></td><td>≥260°C</td><td>≥40s</td><td>6.0s/1°C/s (The component shall be specified for usage in serial production with up to 3.0°C/s)</td></tr><tr><td>Thickness 1.5mm-2.5mm and volume 350-2000 mm³ or Thickness > 2.5mm and volume < 350 mm³</td><td></td><td>≥150°C</td><td>≥110s</td><td>≥200°C</td><td>≥217°C</td><td>≥90s</td><td>≥220°C</td><td>≥30s</td><td>6.0s/1°C/s (The component shall be specified for usage in serial production with up to 3.0°C/s)</td></tr><tr><td>Thickness 1.5mm-2.5mm and volume > 2000 mm³ or Thickness > 2.5mm and volume > 350 mm³</td><td></td><td></td><td></td><td></td><td></td><td></td><td>≥245°C</td><td></td><td></td></tr></table> Table 1: Minimum requirements for lead-free soldering *peak temperature is measured on the centre top of the component package ** t_p measured @ T_{peak}-5 °C	Solder technique simulation	Test condition	Temperature (°C)	Time(s)	Temperature ramp/immersion and emersion rate	Number of heat cycles	Dip	B	260 ±5 (solder temp)	10±1	25mm/s ±6mm/s	1	Wave: Topside board-mount product	C	260 ±5 (solder temp)	20±1		1	Component Size	Ramp up to 150°C	T _{min}	t _s	T _{max}	T _L	t _L	T _{peak} *	t _p **	Ramp down	Thickness < 1.5mm or Thickness 1.5mm-2.5mm and volume < 350 mm³	3.0s/1°C/s						≥260°C	≥40s	6.0s/1°C/s (The component shall be specified for usage in serial production with up to 3.0°C/s)	Thickness 1.5mm-2.5mm and volume 350-2000 mm³ or Thickness > 2.5mm and volume < 350 mm³		≥150°C	≥110s	≥200°C	≥217°C	≥90s	≥220°C	≥30s	6.0s/1°C/s (The component shall be specified for usage in serial production with up to 3.0°C/s)	Thickness 1.5mm-2.5mm and volume > 2000 mm³ or Thickness > 2.5mm and volume > 350 mm³							≥245°C		
Solder technique simulation	Test condition	Temperature (°C)	Time(s)	Temperature ramp/immersion and emersion rate	Number of heat cycles																																																							
Dip	B	260 ±5 (solder temp)	10±1	25mm/s ±6mm/s	1																																																							
Wave: Topside board-mount product	C	260 ±5 (solder temp)	20±1		1																																																							
Component Size	Ramp up to 150°C	T _{min}	t _s	T _{max}	T _L	t _L	T _{peak} *	t _p **	Ramp down																																																			
Thickness < 1.5mm or Thickness 1.5mm-2.5mm and volume < 350 mm³	3.0s/1°C/s						≥260°C	≥40s	6.0s/1°C/s (The component shall be specified for usage in serial production with up to 3.0°C/s)																																																			
Thickness 1.5mm-2.5mm and volume 350-2000 mm³ or Thickness > 2.5mm and volume < 350 mm³		≥150°C	≥110s	≥200°C	≥217°C	≥90s	≥220°C	≥30s	6.0s/1°C/s (The component shall be specified for usage in serial production with up to 3.0°C/s)																																																			
Thickness 1.5mm-2.5mm and volume > 2000 mm³ or Thickness > 2.5mm and volume > 350 mm³							≥245°C																																																					
ESD		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)																																																										

Item	Performance	Test Condition																																
Solderability	More than 95% of the terminal electrode should be covered with solder	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>其他器件的再流焊</td><td>無鉛焊接</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>浸入助焊劑時</td><td>5-10s</td><td>5-10s</td><td>5-10s</td></tr><tr><td>浸入錫爐角度</td><td>20°~45°</td><td>20°~45°</td><td>20°~45°</td></tr><tr><td>焊料溫度</td><td>245±5°C</td><td>245±5°C</td><td>260±5°C</td></tr><tr><td>浸入焊料時間</td><td>5+0/-0.5s</td><td>5+0/-0.5s</td><td>30+5/-0s</td></tr><tr><td>浸入和提出速</td><td>25±6mm/s</td><td>25±6mm/s</td><td>25±6mm/s</td></tr></table>	參照	Method A1	Method B1	Method D	焊接工藝	再流焊	其他器件的再流焊	無鉛焊接	焊接類型	錫銀銅焊料	錫銀銅焊料	錫銀銅焊料	浸入助焊劑時	5-10s	5-10s	5-10s	浸入錫爐角度	20°~45°	20°~45°	20°~45°	焊料溫度	245±5°C	245±5°C	260±5°C	浸入焊料時間	5+0/-0.5s	5+0/-0.5s	30+5/-0s	浸入和提出速	25±6mm/s	25±6mm/s	25±6mm/s
參照	Method A1	Method B1	Method D																															
焊接工藝	再流焊	其他器件的再流焊	無鉛焊接																															
焊接類型	錫銀銅焊料	錫銀銅焊料	錫銀銅焊料																															
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浸入焊料時間	5+0/-0.5s	5+0/-0.5s	30+5/-0s																															
浸入和提出速	25±6mm/s	25±6mm/s	25±6mm/s																															
Electrical Characterization	Refer Specification for Approval	Parametrically test per lot and sample size requirements, summary to show Min, Max, Mean and Standard deviation at room as well as Min and Max operating temperatures. Pre and Post Electrical Test not required																																
Flammability	In accordance with Referenced Standards	UL-94 or IEC 60695-11-5																																
Board Flex (SMD)	Appearance : No damage. Impedance : within±15% of initial value 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) 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. 																																
Terminal Strength(SMD)		AEC-Q200, TAI-TECH SPEC 10N / 30 Seconds. 																																

8. Soldering and Mounting

8-1. Recommended PC Board Pattern

	WCM3216F2S
L(mm)	3.70
H(mm)	1.60
G1(mm)	1.90
G2(mm)	0.40



8-2. 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.

8-2.1 Soldering Reflow:

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

8-2.2 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

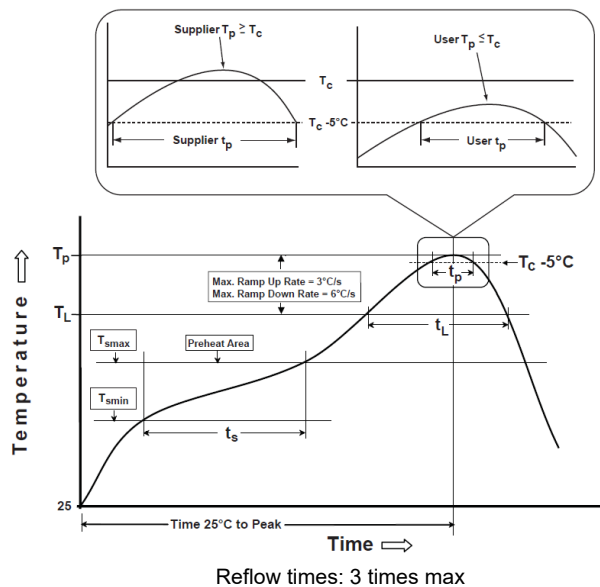


Fig.2 Iron soldering temperature profiles

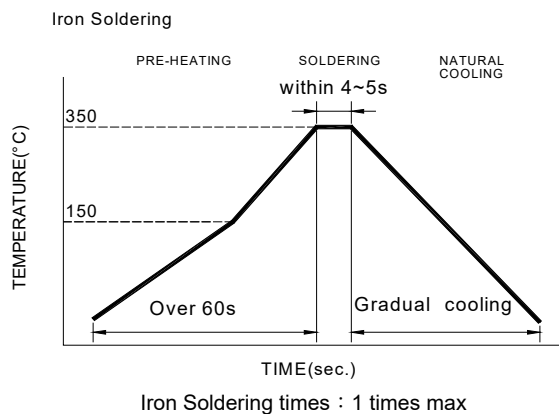


Table (1.1): Reflow Profiles

Profile Type:	Pb-Free Assembly
Preheat -Temperature Min(T_{smin}) -Temperature Max(T_{smax}) -Time(t_s)from(T_{smin} to T_{smax})	150°C 200°C 60-120seconds
Ramp-up rate(T_L to T_p)	3°C/second max.
Liquidus temperature(T_L) Time(t_L)maintained above T_L	217°C 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_p: maximum peak package body temperature, **T_c**: the classification temperature.

For user (customer) **T_p** should be equal to or less than **T_c**.

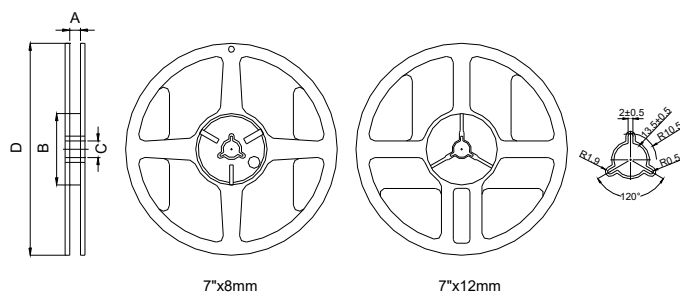
Table (1.2) Package Thickness/Volume and Classification Temperature (T_c)

	Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
PB-Free Assembly	<1.6mm	260°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

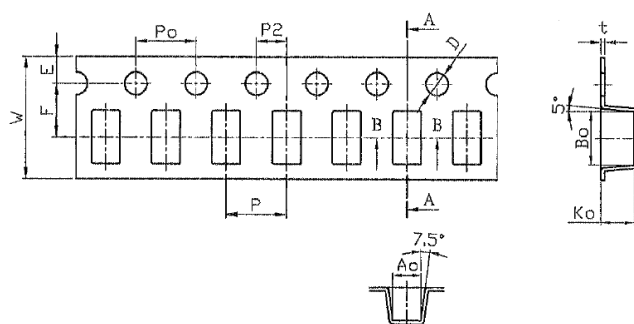
9. Packaging Information

9-1. Reel Dimension



Type	A(mm)	B(mm)	C(mm)	D(mm)
7"x8mm	9.0±0.5	60.0±2.0	13.5±0.5	178.0±2.0

9-2. Tape Dimension / 8mm

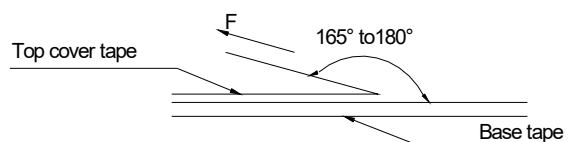


Series	P(mm)	P0(mm)	P2(mm)	B0(mm)	A0(mm)	K0(mm)	W(mm)	t(mm)	E(mm)	F(mm)	D(mm)
WCM3216F2S	4.00±0.10	4.00±0.10	2.00±0.05	3.50±0.10	1.88±0.10	2.20±0.10	8.00±0.10	0.26±0.05	1.75±0.10	3.50±0.05	1.50±0.10/-0.00

9-3. Packaging Quantity

Chip size	Chip/Reel	Inner Box	Middle Box	Carton
WCM3216F2S	2000	10000	50000	100000

9-4. Tearing Off Force



The force for tearing off cover tape is 15 to 80 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 solderability of terminal electrodes:
 - TAI-TECH products meet IPC/JEDEC J-STD-020F standard-MSL, level 1.
 - Temperature and humidity conditions: Less than 40°C and 60% RH.
 - Recommended products should be used within 12 months from 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.



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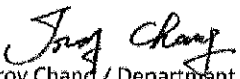
以下測試樣品係由申請廠商所提供及確認 (The following sample(s) was/were submitted and identified by the applicant as) :

樣品名稱(Sample Name) : WIREWOUND SERIES
樣品型號(Style/Item No.) : WCM(YCW · FWCM · SWCM) · WCL · HSF · HDMI · DVI · BCM · PCM · TCM · LCM · LPF · TXF · ACM(FACM · SACM) · DCM(YLW · SDCM) · WIH · BPH · TNH · YCM · STF · APO · QLL · FGO · APOC · TLAN · SIF · DWC · DWCD · WCMD · DCMD SERIES

=====
收件日(Sample Receiving Date) : 08-Mar-2024
測試期間(Testing Period) : 08-Mar-2024 to 15-Mar-2024

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: FFFDCD41

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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.

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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
聚氯乙稀 (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
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.

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/未檢出); Positive = Detectable 陽性(已偵測到/檢出)
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.))

群組名稱 (Group Name)	物質名稱 (Substance Name)	CAS No.
PFOS, 及其鹽&衍生物 (PFOS, its salts & derivatives)	全氟辛烷磺酸 (Perfluorooctane sulfonates) (PFOS)	1763-23-1
	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 ₂ H ₅) ₄) Perfluorooctanesulfonic acid, tetraethylammonium salt (PFOS-N(C ₂ H ₅) ₄)	56773-42-3
	全氟辛基磺酸二癸二甲基銨 (PFOS-DDA) N-decyl-N,N-dimethyldodecan-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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群組名稱 (Group Name)	物質名稱 (Substance Name)	CAS No.
PFOS, 及其鹽&衍生物 (PFOS, its salts & derivatives)	全氟辛基磺酰氟 (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
	全氟辛基磺酸哌啶 Piperidine 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptafluorooctanesulfonate	71463-74-6
PFOA, 及其鹽&衍生物 (PFOA, its salts & derivatives)	全氟辛酸 (Perfluorooctanoic acid) (PFOA)	335-67-1
	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 perfluorooctanoate (PFOA-Ag)	335-93-3
	全氟辛基氟 (PFOA-F) Perfluorooctanoyl fluoride (PFOA-F)	335-66-0
	全氟辛酸鋁 (APFO) Ammonium pentafluorooctanoate (APFO)	3825-26-1
	全氟辛酸鋰 (PFOA-Li) Lithium perfluorooctanoate (PFOA-Li)	17125-58-5

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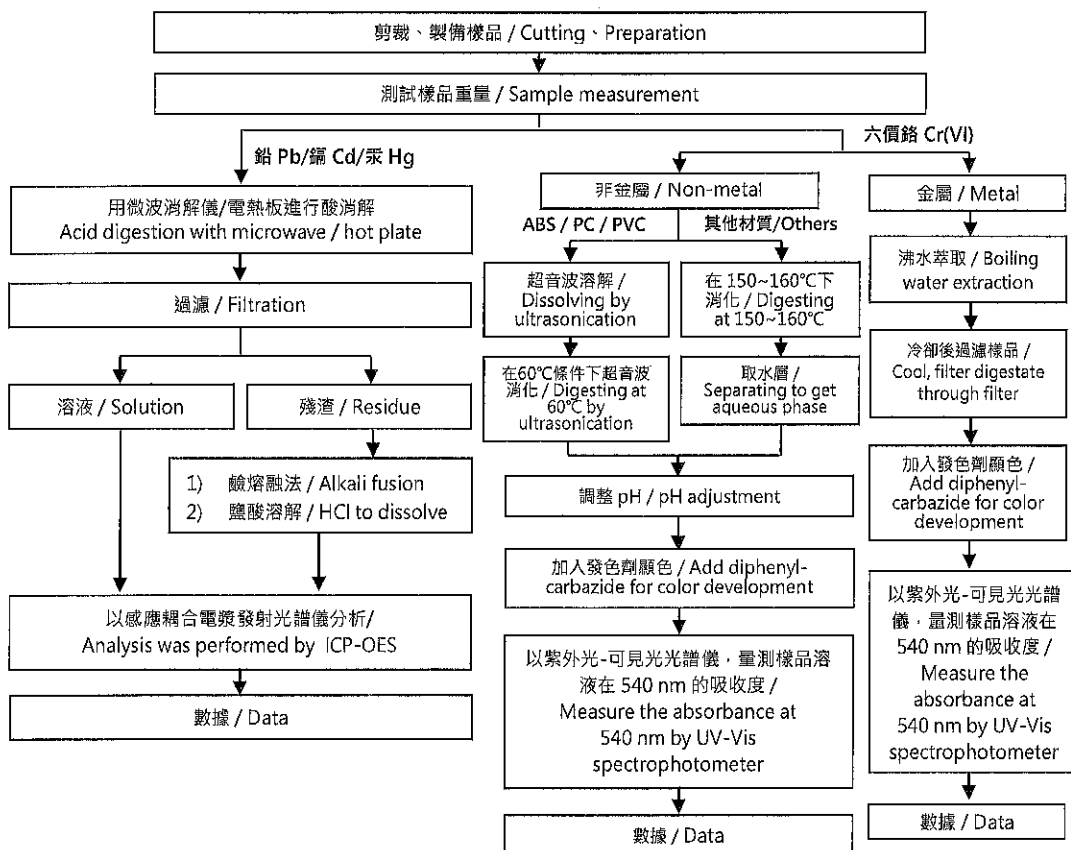
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重金屬流程圖 / Analytical flow chart of heavy metal

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.

(Cr⁶⁺ test method excluded)



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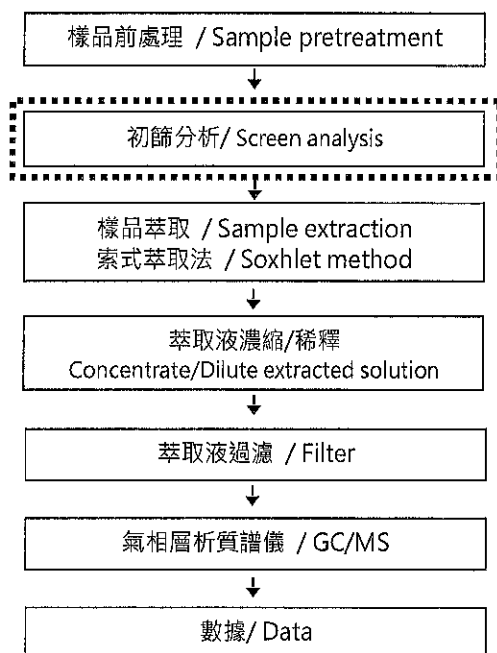
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多溴聯苯/多溴聯苯醚分析流程圖 / Analytical flow chart - PBBs/PBDEs

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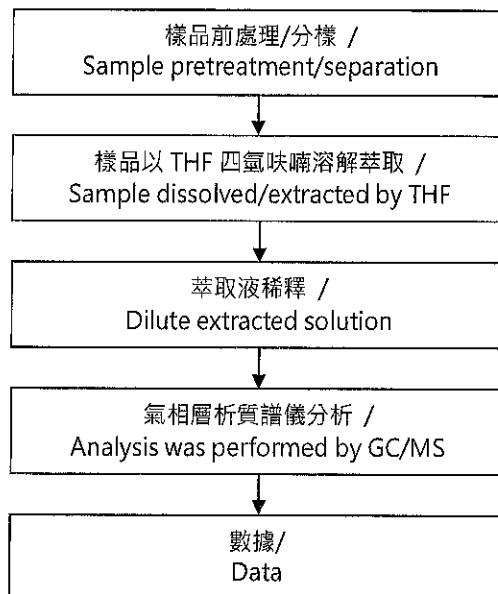
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可塑劑分析流程圖 / Analytical flow chart - Phthalate

【測試方法/Test method: IEC 62321-8】



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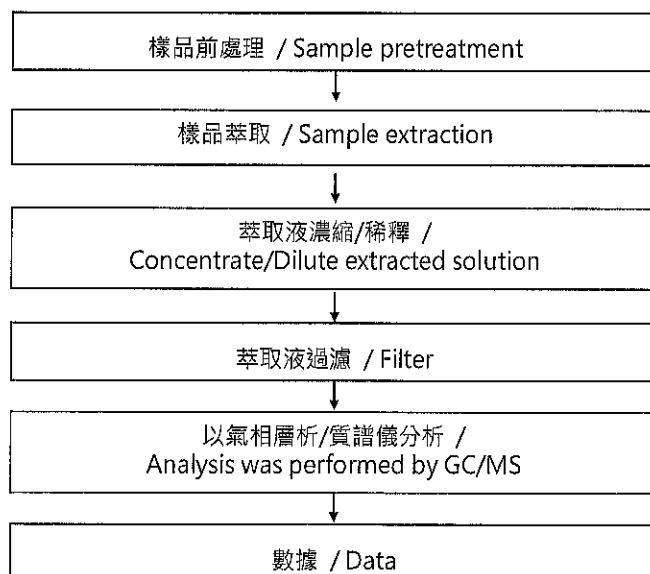
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六溴環十二烷分析流程圖 / Analytical flow chart - HBCDD



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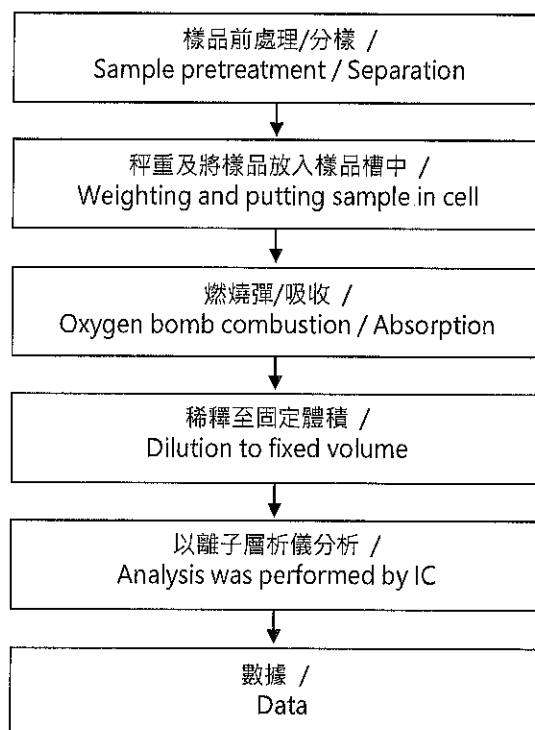
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鹵素分析流程圖 / Analytical flow chart - Halogen



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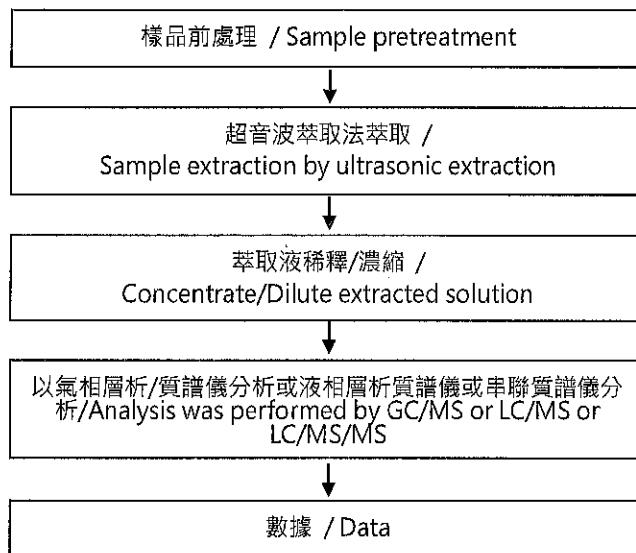
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全氟化合物(包含全氟辛酸/全氟辛烷磺酸/其相關化合物等等)分析流程圖 / Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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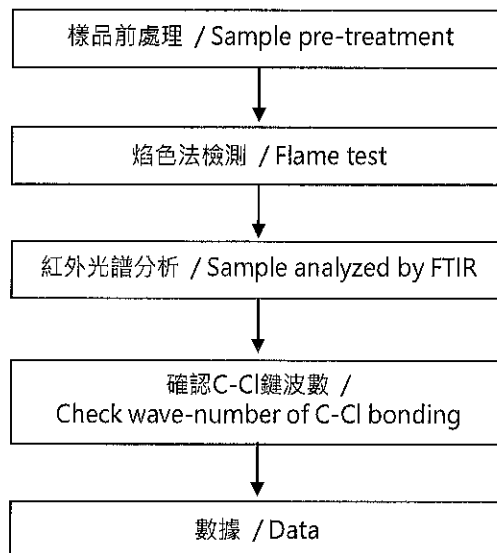
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中國·江蘇省·宿遷市·泗洪縣·經濟開發區杭州路南側·建設北路東側 (THE SOUTH HANGZHOU ROAD AND THE EAST JIANSHE ROAD · ECONOMIC DEVELOPMENT ZONE · SIHONG COUNTY · SUQIANCITY · JIANGSU PROVINCE · P.R. CHINA)

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.): ETR24301725

日期(Date): 15-Mar-2024

頁數(Page): 15 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.)

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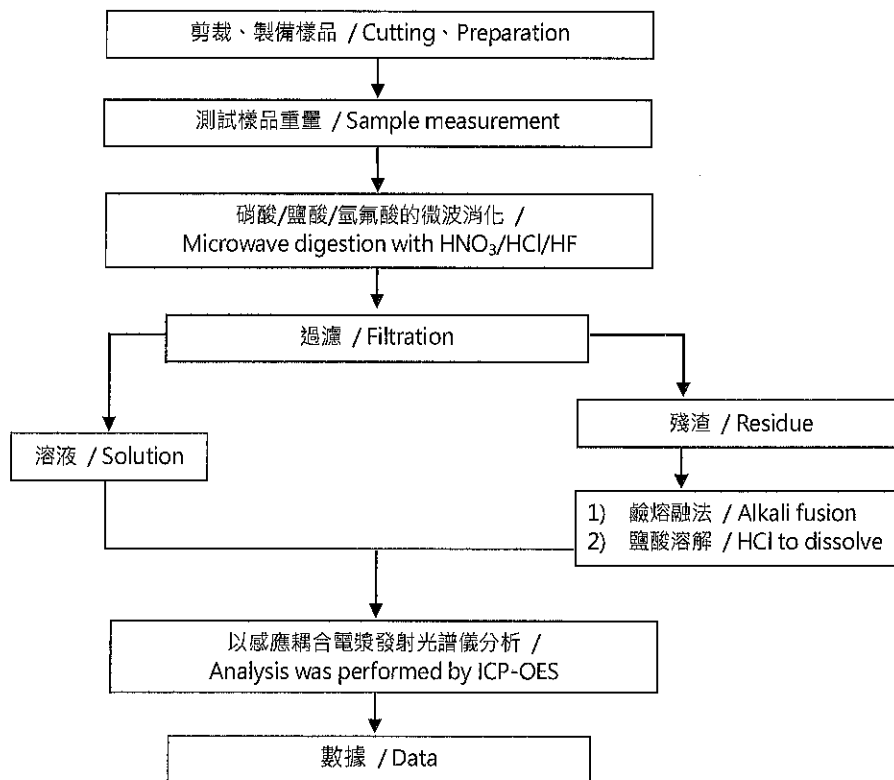
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元素(含重金屬)分析流程圖 / Analytical flow chart of elements (Heavy metal included)

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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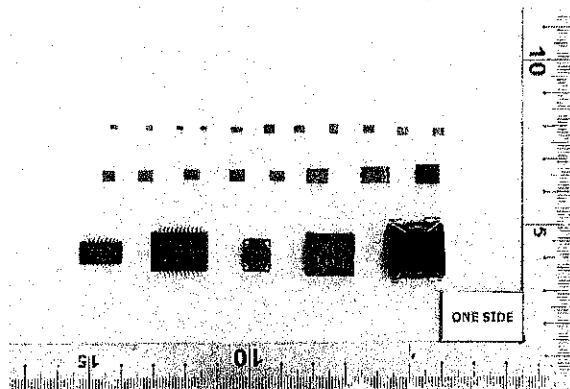
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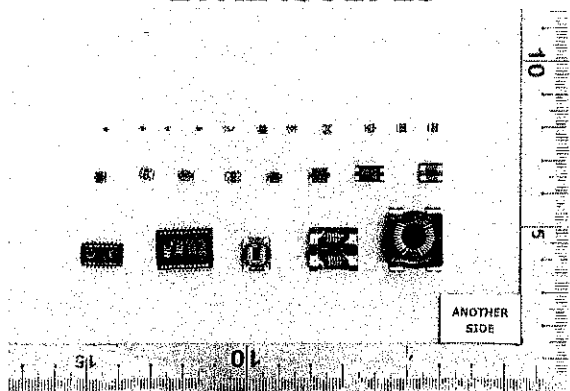
* 照片中如有箭頭標示·則表示為實際檢測之樣品/部位.*

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

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** 報告結尾 (End of Report) **

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