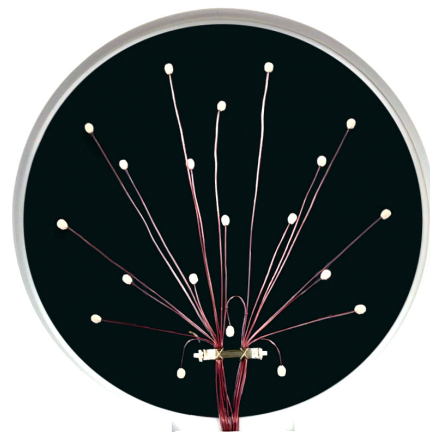




version  
2024

晶圓溫度感測器與溫度監控系統

# **Wafer Temperature Sensor & Temperature Monitoring System**

**Thermocouple Wafer**

**RTD Wafer**

**Temperature Monitoring System**

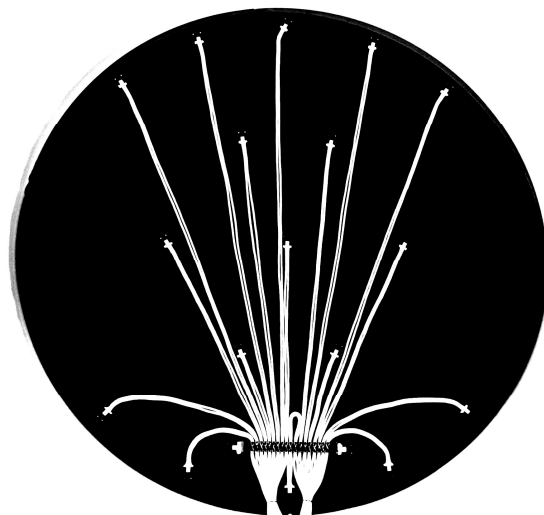
**Thermoway Industrial Co., Ltd.**

[www.thermoway.com](http://www.thermoway.com)

# Thermocouple Wafer

**THERMOWAY** TC Wafer 應用於半導體製程，提供即時製程監控，以及各階段製程環境溫度控制，例如：蝕刻，微影製程，CVD，PVD，測試，前後端封裝等。我們提供高度的客製化規格生產，透過精密純熟的技術及完整的客戶支援服務，因此能符合用戶端各種需求。

- ☑ 使用溫度範圍：-100°C~1300°C
- ☑ 高階精確度以及重複使用性
- ☑ 高階的熱衝擊承受度
- ☑ 高強度的溫接點
- ☑ 提供專業認證的校正報告
- ☑ 提供專業的校正服務及維修諮詢
- ☑ 依照客戶的需求提供客製化服務



## ▶ 產品應用

- 量測溫度的穩定時間和溫度的均勻性
- 校準溫度設定值的準確度
- 評估負載大小的影響
- 測量晶片的溫度分佈
- 檢查晶圓中心到邊緣的熱應力

## ▶ 產品規格

|                     |                                                             |
|---------------------|-------------------------------------------------------------|
| Wafer Material      | Silicon, Sapphire, SiC                                      |
| Wafer Size          | 2" to 12", and customized dimension                         |
| Sensor Type         | K,R,S,T, PL II                                              |
| Insulation Material | PFA, Teflon, Glass Fiber, Ceramics Fiber, Quartz Micro Tube |

## ▶ 使用溫度

\*R-TYPE & K-TYPE 另提供高精度芯線

| Type  | Wire Diameter | Working Temperature | Accuracy     |
|-------|---------------|---------------------|--------------|
| *R/S  | 0.127mm       | 0 to 1200°C         | ±0.6 or 0.1% |
|       | 0.254mm       | 0 to 1300°C         | ±0.6 or 0.1% |
| *K    | 0.127mm       | -40 to 700°C        | ±1.1 or 0.4% |
|       | 0.254mm       | -40 to 700°C        | ±1.1 or 0.4% |
| T     | 0.127mm       | -100 to 400°C       | ±0.5 or 0.1% |
|       | 0.254mm       | -100 to 400°C       | ±0.5 or 0.1% |
| PL II | 0.254mm       | 0 to 1200°C         | ±1.1 or 0.4% |

# 1/2 Special 超高精度芯線：K-Type & R-Type

準不準，您說了算。

- 更精準的溫度：

Tolerance/standard: ASTM E230 1/2 Special

- 實際檢測數據：

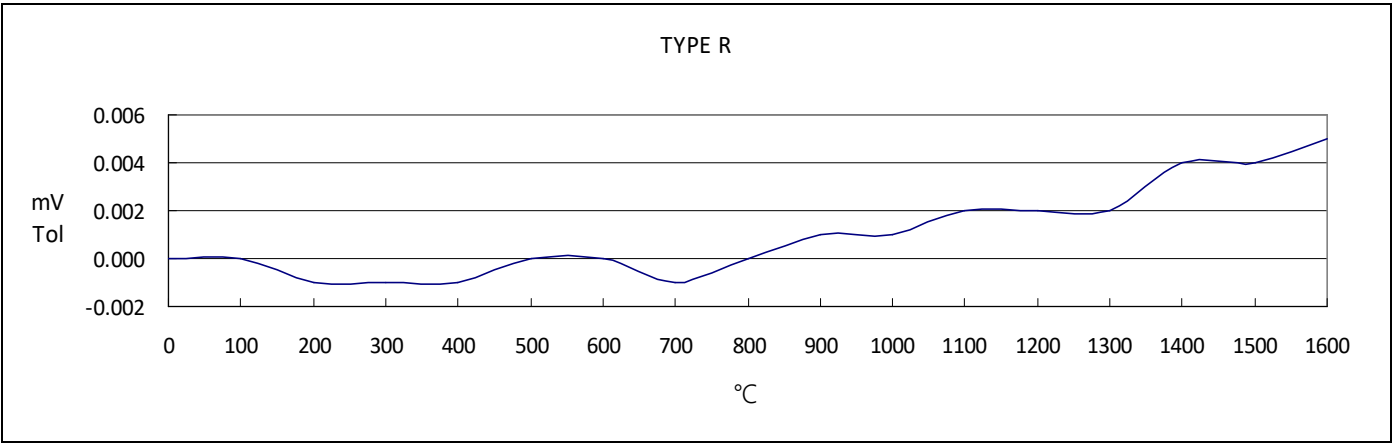
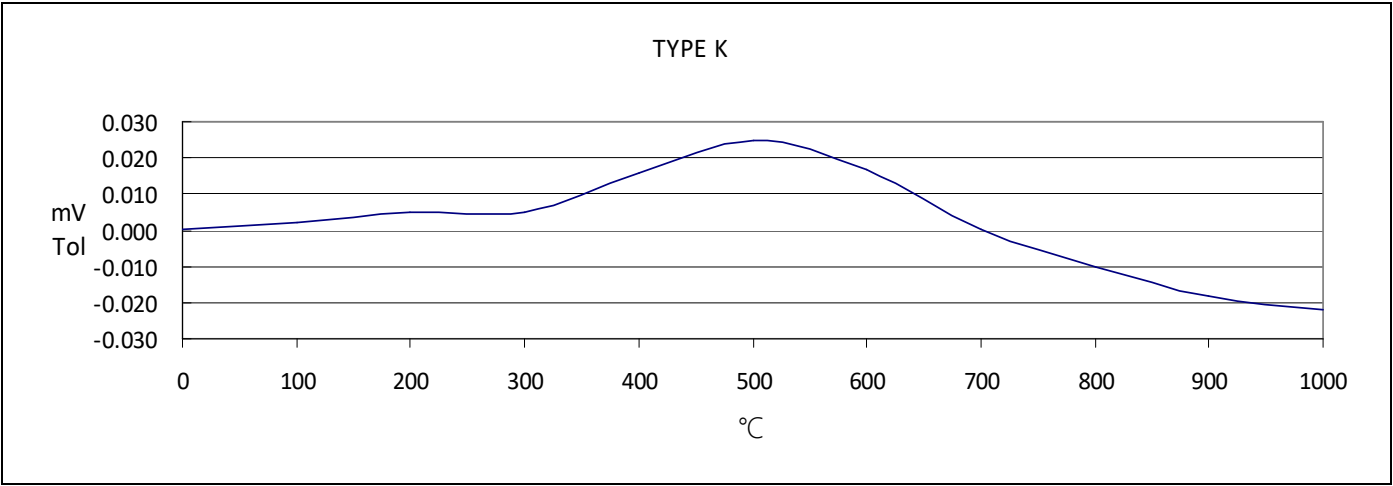


| K-Type | Temperature °C |       |        |        |        |        |        |        |        |        |
|--------|----------------|-------|--------|--------|--------|--------|--------|--------|--------|--------|
|        | 100            | 200   | 300    | 400    | 500    | 600    | 700    | 800    | 900    | 1000   |
| (A)    | 4.098          | 8.143 | 12.214 | 16.413 | 20.669 | 24.922 | 29.129 | 33.265 | 37.308 | 41.254 |
| (B)    | 0.05           | 0.13  | 0.12   | 0.38   | 0.59   | 0.40   | 0.00   | -0.24  | -0.45  | -0.56  |

(A) thermal EMF of type K [mV] ; (B) deviation of thermal EMF[°C]

| R-Type | Temperature °C |       |      |       |      |      |       |      |      |       |       |       |       |       |       |       |
|--------|----------------|-------|------|-------|------|------|-------|------|------|-------|-------|-------|-------|-------|-------|-------|
|        | 100            | 200   | 300  | 400   | 500  | 600  | 700   | 800  | 900  | 1000  | 1100  | 1200  | 1300  | 1400  | 1500  | 1600  |
| (C)    | 647            | 1468  | 2400 | 3407  | 4471 | 5583 | 6742  | 7950 | 9206 | 10507 | 11852 | 13231 | 14632 | 16045 | 17457 | 18856 |
| (D)    | 0.00           | -0.10 | 0.10 | -0.10 | 0.00 | 0.00 | -0.10 | 0.00 | 0.10 | 0.10  | 0.20  | 0.20  | 0.20  | 0.40  | 0.40  | 0.50  |

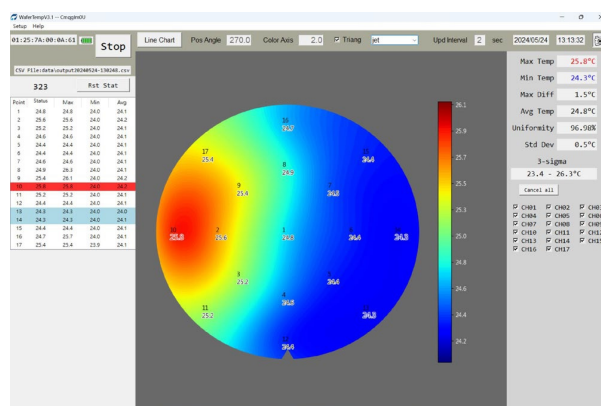
(C) thermal EMF of type R [mV] ; (D) deviation of thermal EMF[°C]



# Temperature Monitoring System

如果您需要一套完整的溫度監控系統，我們可以為您解決這個問題。

**THERMOWAY** 的溫度監控系統 **WaferBLE** 是透過藍牙無線通訊技術連接數據採集器 **TW-DC2301** 將即時溫度數據傳送至系統中，能夠立即顯示、即時儲存記錄，並且提供各種數據，協助用戶端分析統計。



## I. High Accuracy Data Collector

透過數據採集器 **TW-DC2301** 即時傳送資料至系統，提供 0.01°C 的最小讀取值和最小精度 0.01°C。除了溫度之外，它還可以用於測量電阻和電壓。**TW-DC2301** 由內置可充電鋰電池供電，可實現純粹的獨立性能，並封裝在小型外殼中。



### Specifications:

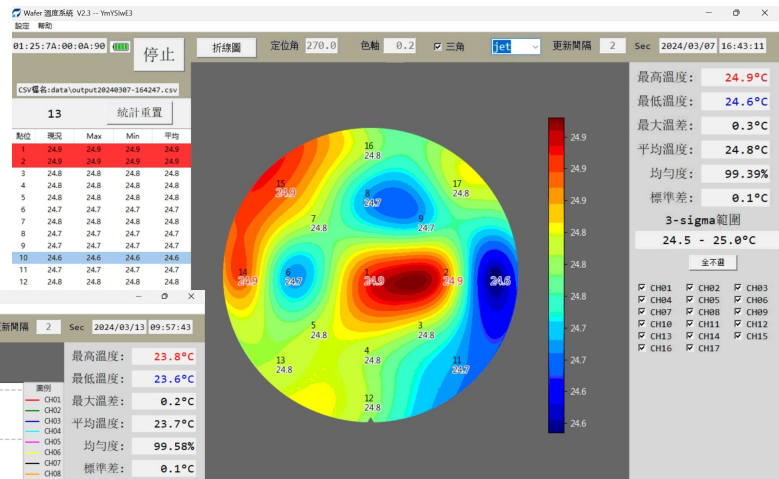
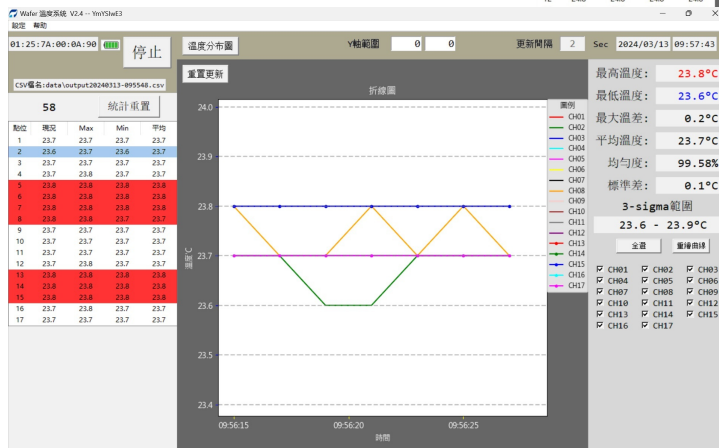
|                          |                                     |
|--------------------------|-------------------------------------|
| Model for TC Wafer:      | TW-DC2301-TR                        |
| RTD Wafer:               | TW-DC2301-RR                        |
| Number of Channels:      | 1 ~ 34 CH                           |
| Measurement of Accuracy: | ±0.01°C                             |
| Temperature Range:       | -200°C ~ 1700°C (Full Range 0.01°C) |
| Fastest Sampling Rate:   | ≤10HZ/CH                            |
| Communication:           | modBus -RTU, Bluetooth              |
| Sensor Connection:       | THD0518-68CL                        |
| Digital Output:          | 4-20mA                              |
| Power Connection:        | Mini USB Connector                  |
| Power Supply:            | 90~250VAC 50/60HZ                   |
| Operation Temperature:   | -40°C ~70°C, Humidity ≤95%RH        |
| Dimensions:              | L: 106 x W: 35 x H: 84mm            |
| Safety Standard:         | ROHS / REACH / CE                   |

## II. Temperature Monitoring and Analysis

溫度監控系統 **WaferBLE** 可以做到：

- ☑ 檢索、報告、分析和可視化數據。
- ☑ 用於實時分析和報告的嵌入式結果。
- ☑ 支持數據探索和協作，使各種技能水平的人員能夠從多個角度快速查看數據。
- ☑ 幫助用戶提高芯片工廠生產效率、芯片產出良率的理想工具。
- ☑ 借助熱圖、折線圖等圖形分析工具，可以幫助用戶輕鬆了解流程的當前狀態。

- 快速啟動運作
- 人性化操作介面
- 數據即時分析、儲存



- 多種表現形式
- 輸出圖檔跟數據紀錄檔
- 支援多種語言

## III. Tablet

我們提供完整配置的平板電腦，為用戶預先設定好系統參數，開機後便可直接運作。

**Microsoft Surface Pro 9 配載 WINDOW 11**

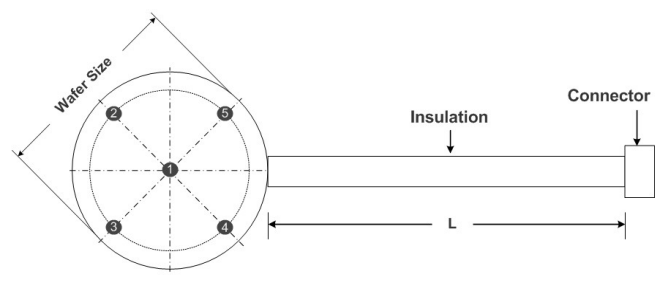
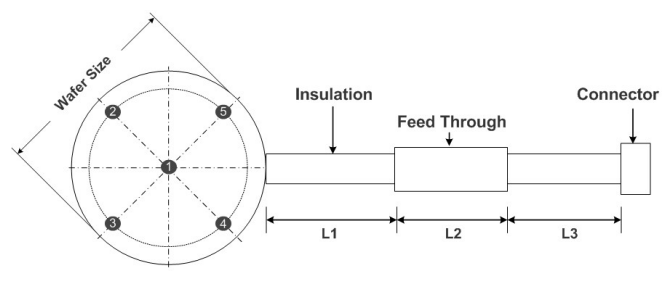
- Display: Screen: 13" PixelSense™ Flow Display  
Resolution : 2880 X 1920 (267 PPI)
- Battery: Surface Pro 9 (Intel/Wifi): Up to 15.5 hours of typical device usage
- Dimensions: L\*W\*H: 287\*209\*9.3mm, 879g
- Network and connectivity: Surface Pro 9 (Intel/Wifi):  
Wi-Fi 6E: 802.11ax compatible  
Bluetooth® Wireless 5.1 technology

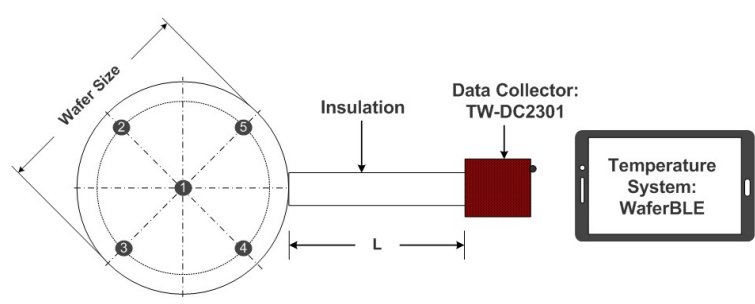


完全可視用戶端需求搭配。



## 選購您的 TC WAFER

| Model: SX-41                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Model: SX-51                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Order your wafer:</b> <ol style="list-style-type: none"><li>1. Wafer material and size (specify from 2" to 12")</li><li>2. Working temperature range</li><li>3. Thermocouple type (choose K, T, R, S, PL II)</li><li>4. Number of measuring points</li><li>5. Length of L</li><li>6. Thermocouple wire diameter</li><li>7. Insulation material</li><li>8. Connector type (choose Miniature connector, U-Shape or D-Sub)</li><li>9. Calibration requirement</li></ol> | <b>Order your wafer:</b> <ol style="list-style-type: none"><li>1. Wafer material and size (specify from 2" to 12")</li><li>2. Working temperature range</li><li>3. Thermocouple type (choose K, T, R, S, PL II)</li><li>4. Number of measuring points</li><li>5. Length of L1, L2 and L3</li><li>6. Thermocouple wire diameter</li><li>7. Insulation material of L1 and L3</li><li>8. Connector type (choose Miniature connector, U-Shape or D-Sub)</li><li>9. Calibration requirement</li></ol> |

| Model: SX-41-BLE                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                      |
| <b>Order your wafer:</b> <ol style="list-style-type: none"><li>1. Wafer material and size (specify from 2" to 12")</li><li>2. Working temperature range</li><li>3. Thermocouple type (choose K, T, R, S, PL II)</li><li>4. Number of measuring points</li><li>5. Length of L</li><li>6. Thermocouple wire diameter</li><li>7. Insulation material: Polyimide coated copper</li><li>8. Calibration requirement</li></ol> |

# High Accuracy RTD Wafer

**THERMOWAY** RTD WAFER 專為需要高精度溫度測量的製程所設計，例如半導體光阻劑處理系統、晶圓探测器和許多其他類型的半導體製造設備。WAFER 上的 RTD 傳感器，黏合及封裝材料，四線式電阻測量方式是關鍵的集成元件，透過研發團隊精心整合設計帶來高量測精度和結果穩定性。

## ► 產品應用

- 測量和記錄製程週期的晶圓溫度：裝載、升溫、穩定狀態、冷卻和卸載。
- 提升對溫度的控制及一致性。
- 管理具有嚴格熱性能規格的生產流程或為 SPC 系統提供數據。
- 在硬體或製程研發期間優化晶圓工藝。
- 在最終鑑定、晶圓廠啟動以及修復或升級系統的重新鑑定過程中對晶圓廠設備進行測試和基準測試。

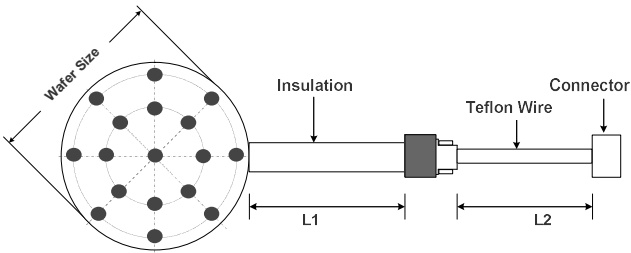
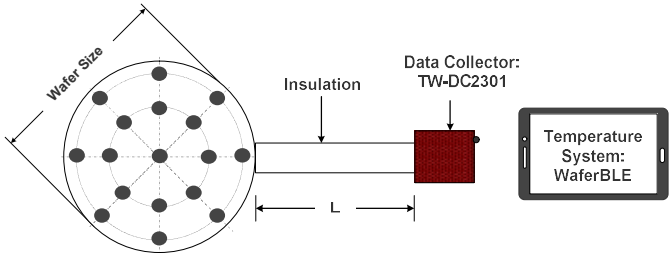


## ► 產品規格

|                                       |                                                                                                                          |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Temperature Range:                    | -80°C to 260°C                                                                                                           |
| Wafer Size:                           | 6", 8", 12"                                                                                                              |
| Element Type:                         | Thin Film Platinum                                                                                                       |
| Element Resistance:                   | 100Ω, 1000 Ω nominal at 0°C                                                                                              |
| Resistance Alpha Value:               | 0.00385                                                                                                                  |
| Max. Measurement Current:             | 200 μA                                                                                                                   |
| Accuracy with Calibration Correction: | ±0.1°C absolute accuracy, ±0.03°C sensor to sensor accuracy<br>Also available in customized high accuracy ±0.05°C at 0°C |
| Resolution:                           | 0.01°C                                                                                                                   |
| Type of Connection:                   | 4-wire resistance measurement with common current source return                                                          |
| Lead Materials:                       | Polyimide coated copper                                                                                                  |
| Cable Construction:                   | Polyimide film flat cable section transitioning to a silicon rubber round flex cable.                                    |
| Connection:                           | Bare wire, Miniature connector, U-Shape, or D-Sub                                                                        |



## 選購您的 RTD WAFER

| Model: SX-42                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Model: SX-42-BLE                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                      |
| <p>Order your wafer:</p> <ol style="list-style-type: none"> <li>1. Wafer size (choose: 6" 8" 12")</li> <li>2. Working Temperature Range</li> <li>3. Element Resistance: (PT100, PT1000)</li> <li>4. Number of Measuring Points</li> <li>5. Type of Connection Wire: 4-wire</li> <li>6. Length of L1: basic length: 500mm; customizable</li> <li>7. Length of L2: 500~1000mm; customizable</li> <li>8. Connector Type: Bare wire, Miniature connector, U-Shape or D-Sub</li> <li>9. Calibration Requirement</li> </ol> | <p>Order your wafer:</p> <ol style="list-style-type: none"> <li>1. Wafer size (choose: 6" 8" 12")</li> <li>2. Working Temperature Range</li> <li>3. Element Resistance: (PT100, PT1000)</li> <li>4. Number of Measuring Points: (1 to 17 points)</li> <li>5. Type of Connection Wire: 4-wire</li> <li>6. Length of L: basic length: 500mm; customizable</li> <li>7. Calibration Requirement</li> </ol> |

### 聯絡我們

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