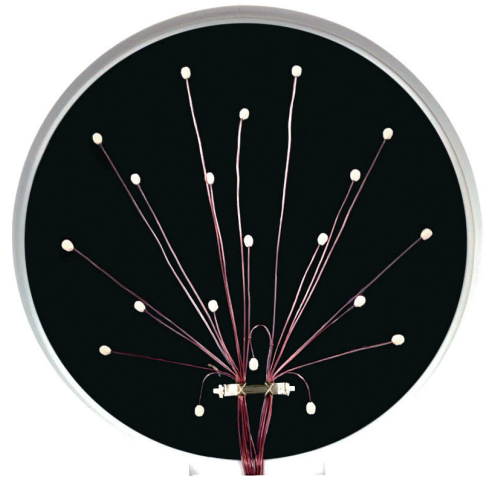




version
2026

Wafer Temperature Sensor & Temperature Monitoring System

Thermocouple Wafer

RTD Wafer

Temperature Monitoring System

Thermoway Industrial Co., Ltd.

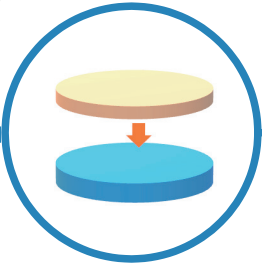
www.thermoway.com

WHERE ACCURACY MEETS EVERY STAGE

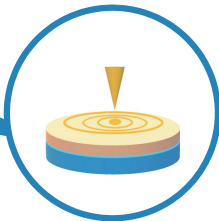
FOEL

Front End
of Line Applications

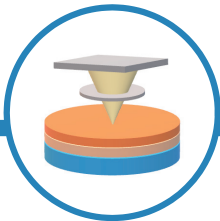
In the front end of line, wafer sensors are used for *in-situ* process monitoring to measure real-time temperature.



Film: ALD, CVD, PVD



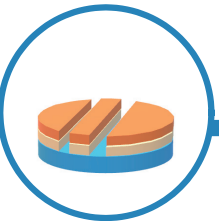
Lithography: Coating



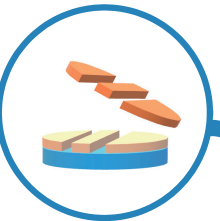
Exposure



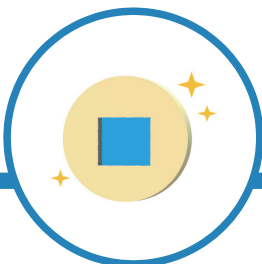
Development



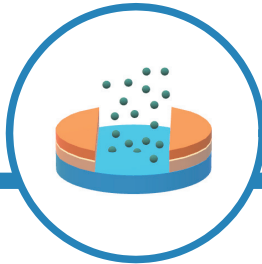
Etching



Stripping



Polishing and Cleaning

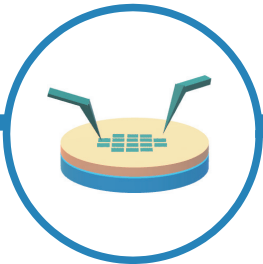


Doping

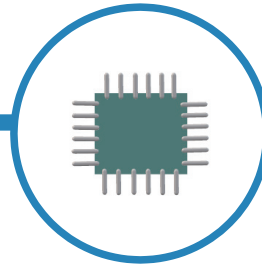
BOEL

Back End
of Line Applications

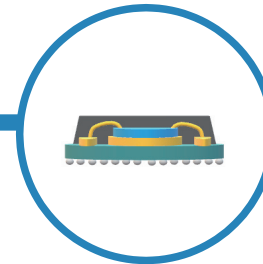
In the Back End of Line, probing, packaging, and testing processes rely on wafer sensors for monitoring of the process environment.



Wafer probing



Packing and Testing



CONTENT

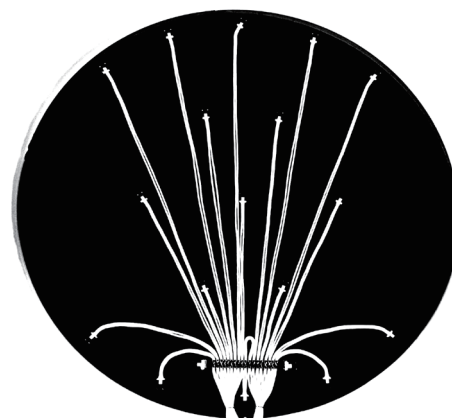
Thermocouple Wafer	03
Temperature Monitoring System	05
RTD Wafer	07
Calibration Service	08
How to order	09

Thermocouple Wafer

TC Wafer is used in semiconductor manufacturing processes to provide real-time process monitoring and environmental temperature control at each stage of the process, including film, lithography, packing and testing, supporting process such as photoresist track systems, temperature controlled wafer chuck systems.

We offer highly customized products supported by advanced technology and comprehensive customer services, enabling us to meet the diverse needs of our users.

- ☑ Temperature range : -100°C~1300°C
- ☑ High-level accuracy and reusability
- ☑ Strong thermal shock resistance
- ☑ Sturdy junction
- ☑ Certified calibration report
- ☑ Calibration service and maintenance consultation



► Application

- Measure the temperature stable time and temperature uniformity
- Calibrate the accuracy of temperature setting
- Assess the impact of load capacity
- Measure the temperature distribution of wafer
- Inspect the thermal stress from the center to the edge of the wafer

► Specification

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

► Operating Temperature

* We provide extra high accuracy wire

Type	Wire Diameter	Operating Temperature Range	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

Extra High Accuracy Wire K-Type & R-Type



More accurate measurement:

Tolerance/standard: ASTM E230 1/2 Special

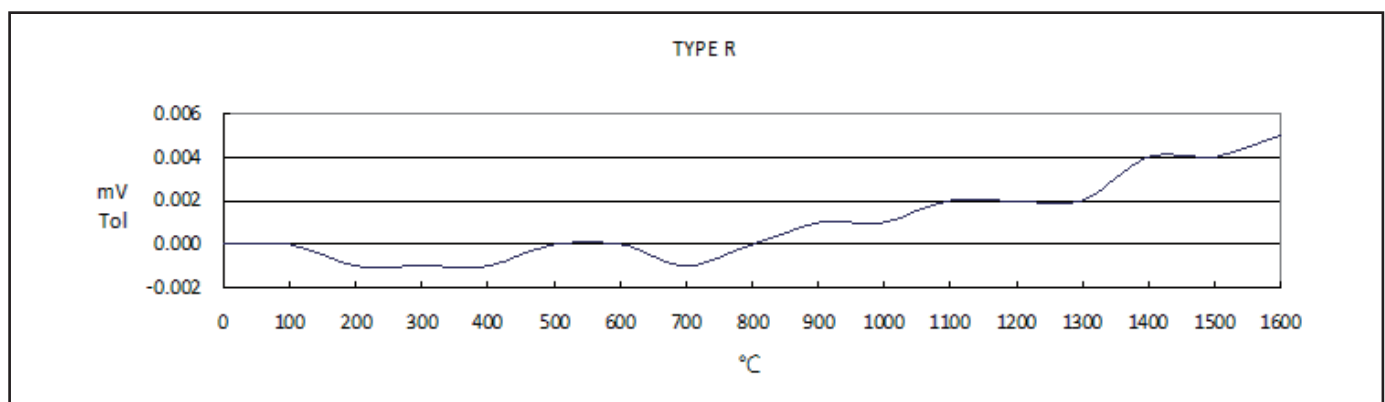
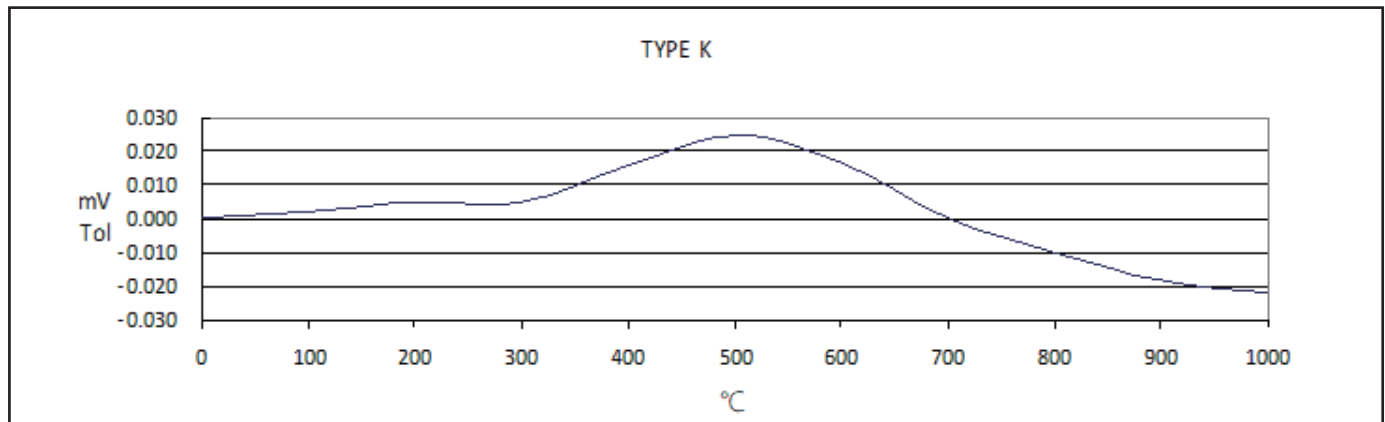
Inspection data:

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]

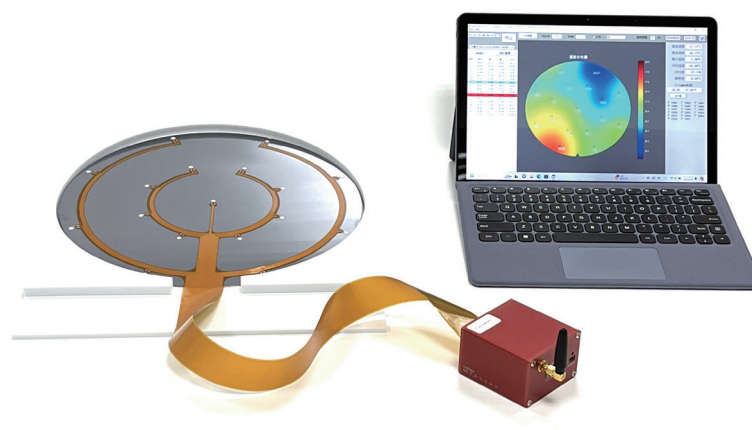
R-Type	Temperature °C															
	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600
(C)	647	1468	2400	3407	4471	5583	6742	7950	9206	10507	11852	13231	14632	16045	17457	18856
(D)	0.00	-0.10	0.10	-0.10	0.00	0.00	-0.10	0.00	0.10	0.10	0.20	0.20	0.20	0.40	0.40	0.50

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



Temperature Monitoring System

WaferBLE provides real-time temperature monitoring for semiconductor wafer processes. The system connects to the data collector **TW-DC2301** via Bluetooth, enabling real-time data transmission, display, recording, and analysis.



I. High Accuracy Data Collector

Data Collector **TW-DC2301** can instantly transfer the data to the system, offering the ultimate in resolution (0.01°C) and accuracy (0.01°C). Along with temperature it can also be used to measure resistance and voltage.



► Specification

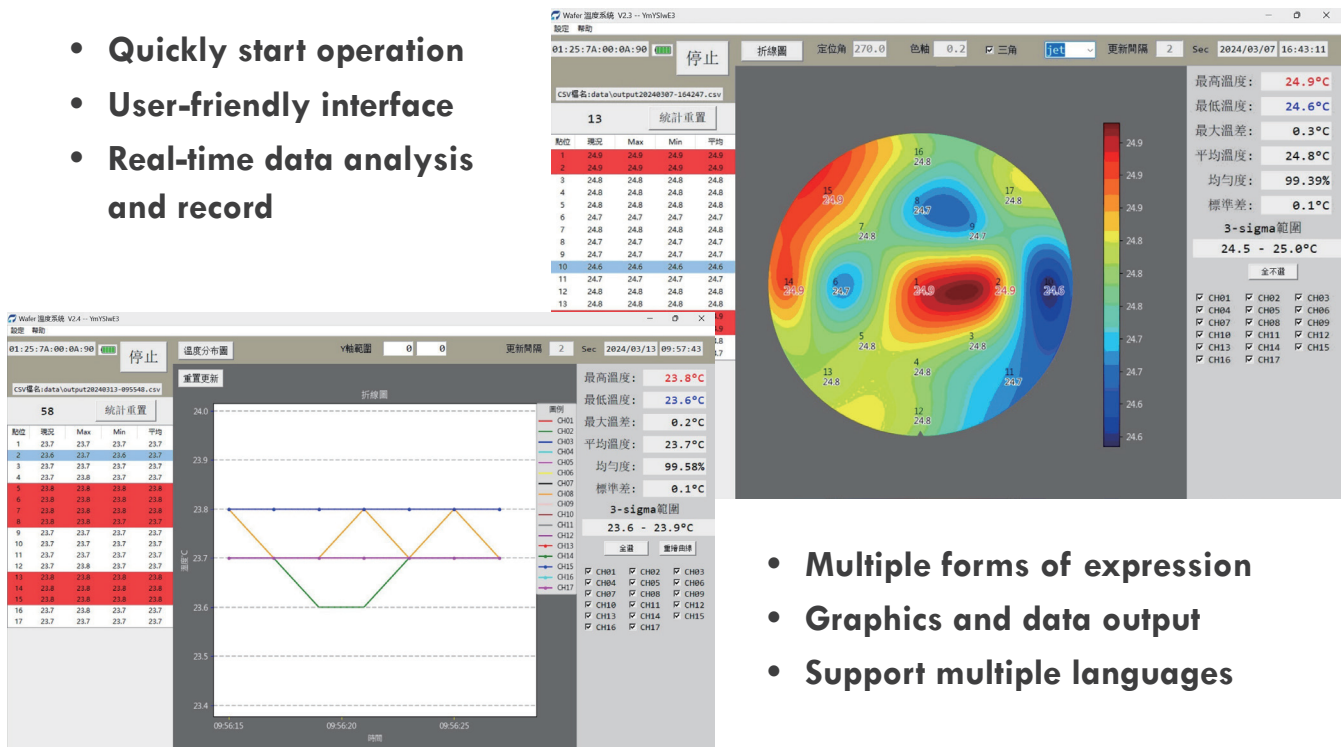
Model for TC Wafer:	TW-DC2301-TR
RTD Wafer:	TW-DC2301-RR
Number of Channels:	1 ~ 17 CH
Measurement of Accuracy:	$\pm 0.01^{\circ}\text{C}$
Temperature Range:	$-200^{\circ}\text{C} \sim 1700^{\circ}\text{C}$ (Full Range 0.01°C)
Fastest Sampling Rate:	$< 10\text{HZ/CH}$
Communication:	modBus -RTU, Bluetooth
Digital Output:	USB
Power Connection:	Aviation Connector
Power Supply:	90~250VAC 50/60HZ
Operation Temperature:	$-40^{\circ}\text{C} \sim 70^{\circ}\text{C}$, Humidity $\leq 95\%\text{RH}$
Dimensions:	L: 70 x W: 69 x H: 47mm
Safety Standard:	ROHS / REACH / CE

II. Temperature Monitoring and Analysis

WaferBLE can help you:

- ☑ Retrieve, report, analyze, and visualize data
- ☑ Embeddable results for real-time analytics and reporting
- ☑ Support data exploration and collaboration, enabling people of all skill levels to look rapidly at data from multiple perspectives
- ☑ Ideal tool for helping users improve the production efficiency of chip factories, and the yield rate of chip output
- ☑ With graphical analysis tools such as heat map and line chart, can help users easily understand the current status of process

- Quickly start operation
- User-friendly interface
- Real-time data analysis and record



- Multiple forms of expression
- Graphics and data output
- Support multiple languages

II. Tablet

THERMOWAY provide configured tablet computer with pre-set system parameters for users, and they can operate directly after booting.

Microsoft Surface Pro 12th, preloaded with Windows 11

- Display: 13-inch PixelSense™ Touchscreen OLED or LCD
Resolution : 2880 X 1920
- Battery: Up to 15.5 hours of typical device usage
- Dimensions: L*W*H: 287*209*9.3mm, 895g
- Network and connectivity: Wi-Fi 7;
Bluetooth® Core 5.4 technology



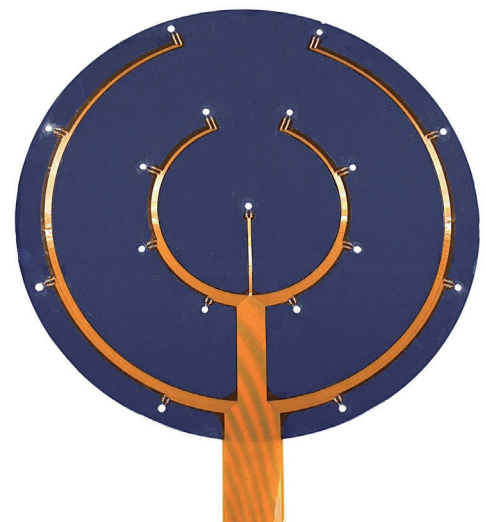
High Accuracy RTD Wafer

RTD Wafer is designed for semiconductor processes that require highly precise temperature measurements, such as photolithography, photoresist track system, wafer probers, and various other types of fabrication equipment.

Through THERMOWAY's sophisticated integrated design, the wafer sensors deliver exceptional accuracy and long-term stability.

► Application

- Measuring and recording wafer temperature of the process cycle: loading, heat-up, steady state, cool-down, and unloading.
- Improving wafer temperature control and uniformity, maintaining narrower process temperature windows.
- Managing production processes that have tight thermal performance specifications or providing inputs to SPC systems.
- Optimizing wafer processes during hardware or process development.
- Testing and benchmarking wafer fab equipment during final qualification, fab start-up, and requalification of repaired or upgraded systems.



► Specification

Temperature Range:	-100°C to 300°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 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:	D-Sub, Miniature connector

Calibration Service

THERMOWAY's Calibration Laboratory was built to meet the calibration requirements of our clients. Over the past 30 years, we have continuously accumulated experience, improved capabilities, and expanded the scope of our calibration services.

- We provide fast service, high quality, and formal documentation
- Traceability to national calibration institutes: NIST, JEMIC, NML
- Fully compliant with ISO 9001, ISO 14001, and ISO/IEC 17025 standards
- All calibrations are performed by certified and professionally trained technicians



► Calibration Certificate



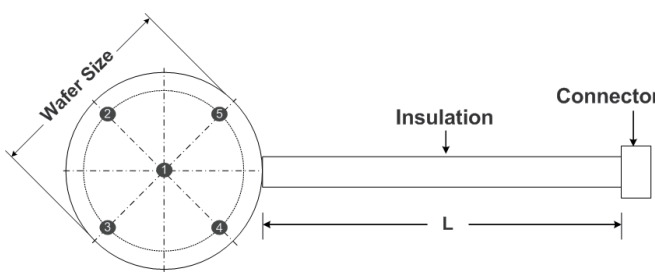
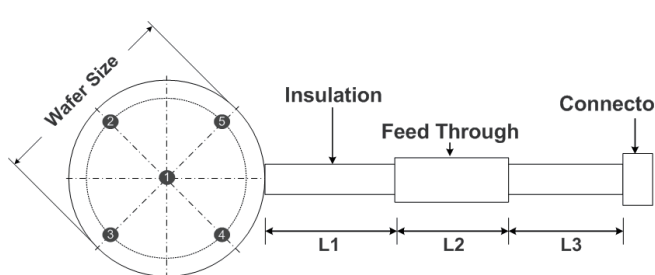
► Calibration Scope

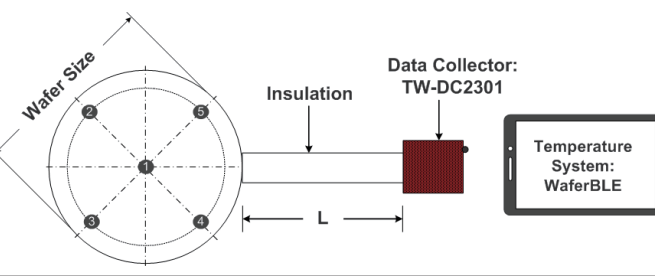
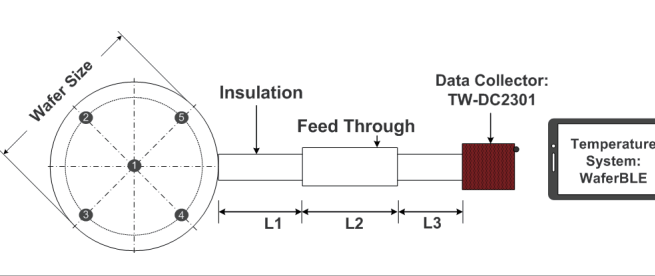
Calibration Item	IECQ Accredited Calibration Range
Platinum Resistance Thermometer	-100 ~ 400°C
Thermocouple(R, S, B, K, E, J, T, N, C, M, P, L, U, temperature range depends on each TYPE)	-100 ~ 1554°C
Various Temperature Instruments(Controller, Calibrator, Indicator, Recorder; temperature range depends on each TYPE)	-200 ~ 1750°C
Temperature Calibration On-site(Temperature Uniformity Survey, System Accuracy Test, Temperature Instruments; temperature range depends on each TYPE)	-150 ~ 1750°C
Pressure transducers	0~250 psi
Thermal Hygrometer	10 ~ 30°C ; 30 ~ 80%
Infrared Thermometer	35 ~ 500°C

Calibration Item	TAF Accredited Calibration Range
Platinum Resistance Thermometer	-100 ~ 400°C
Thermocouple(R, S, B, K, E, J, T, N, temperature range depends on each TYPE)	-100 ~ 1554°C
Thermocouple with instrument(R, S, B, K, E, J, T, N, temperature range depends on each TYPE)	-100 ~ 1554°C
Various Temperature Instruments(Controller, Calibrator, Indicator, Recorder; temperature range depends on each TYPE)	-100 ~ 1750°C
Temperature Calibration On-site(Temperature Uniformity Survey, System Accuracy Test, Temperature Instruments; temperature range depends on each TYPE)	-80 ~ 1200°C

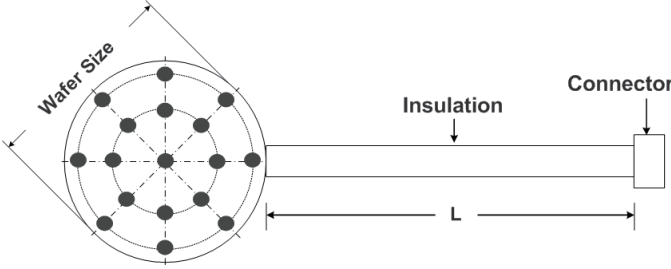
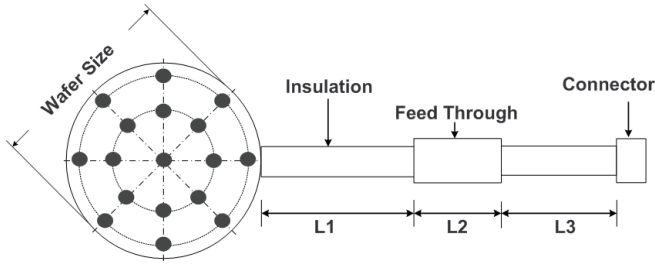
How to order

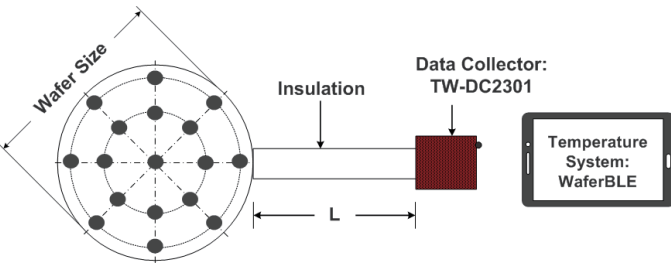
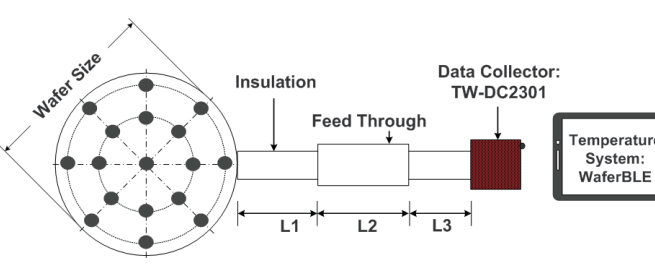
► Order your TC Wafer

MODEL: SX-41	MODEL: SX-51
	
1. Wafer Size: specify from 2" to 12" 2. Operating Temperature Range 3. Thermocouple Type: K, R, S, T, PL II 4. Number of Measuring Points 5. Length of L 6. Thermocouple Wire Diameter 7. Insulation Material 8. Connector Type: Miniature Connector, U-Shape, D-Sub 9. Calibration Requirement	1. Wafer Size: specify from 2" to 12" 2. Operating Temperature Range 3. Thermocouple Type: K, R, S, T, PL II 4. Number of Measuring Points 5. Length of L1, L2 and L3 6. Thermocouple Wire Diameter 7. Insulation Material for L1, L3 8. Connector Type: Miniature Connector, U-Shape, D-Sub 9. Calibration Requirement

MODEL: SX-41-BLE	MODEL: SX-51-BLE
	
1. Wafer Size: specify from 2" to 12" 2. Operating Temperature Range 3. Thermocouple Type: K, R, S, T, PL II 4. Number of Measuring Points 5. Length of L 6. Thermocouple Wire Diameter 7. Insulation Material 8. Calibration Requirement	1. Wafer size: specify from 2" to 12" 2. Operating Temperature Range 3. Thermocouple Type: K, R, S, T, PL II 4. Number of Measuring Points 5. Length of L1, L2 and L3 6. Thermocouple Wire Diameter 7. Insulation for L1, L3 8. Calibration Requirement

► Order your RTD Wafer

MODEL: SX-42	MODEL: SX-52
	
1. Wafer Size: 6", 8", 12" 2. Operating Temperature Range 3. Sensor Element Resistance: PT100, PT1000 4. Measuring Points: 1-17 5. Type of Connection Wire: 4-wire 6. Standard Length of L: 300mm / 500mm 7. Connector Type: D-Sub 8. Calibration Requirement	1. Wafer Size: 6", 8", 12" 2. Operating Temperature Range 3. Sensor Element Resistance: PT100, PT1000 4. Measuring Points: 1-17 5. Type of Connection Wire: 4-wire 6. Length of L1, L2 and L3; 7. Connector Type: Miniature Connector, U-Shape or D-Sub 8. Calibration Requirement

MODEL: SX-42-BLE	MODEL: SX-52-BLE
	
1. Wafer Size: 6", 8", 12" 2. Operating Temperature Range 3. Sensor Element Resistance: PT100, PT1000 4. Measuring Points: 1-17 5. Type of Connection Wire: 4-wire 6. Standard Length of L: 300mm / 500mm 7. Tablet or Laptop Specification Requirement 8. Calibration Requirement	1. Wafer Size: 6", 8", 12" 2. Operating Temperature Range 3. Sensor Element Resistance: PT100, PT1000 4. Measuring Points: 1-17 5. Type of Connection Wire: 4-wire 6. Length of L1, L2 and L3 7. Tablet or Laptop Specification Requirement 8. Calibration Requirement



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