

Instrumented Glass Tiles for Temperature Measurement in Large Flat Panel Display Applications



IN SITU PROCESS MONITORING

Process Probe 2070



The SensArray® Process Probe® 2070 instrumented glass tiles offer a cost-effective and flexible solution for reliable in situ characterization of glass temperature profiles for CVD, PVD, anneal, and other flat panel processing applications. Employing a number of small, instrumented glass tiles rather than a single, large panel of glass, the Process Probe 2070 allows the thermocouple (TC) sensors to be easily placed at desired locations on the susceptor within the process chamber. This flexible product design makes temperature measurements for LCD and other large-generation glass panel applications easy and field repair of the product possible. In addition, handling and shipping of the Process Probe 2070 is significantly more manageable and cost-effective than for unwieldy instrumented 5th generation and larger glass panels.

The TC-instrumented glass tiles of the Process Probe 2070 perform with the same high accuracy and reliability as other SensArray instrumented substrates. You custom-order your product, letting us know the number of sensors – up to 34, and the length of the cables. The sensors can be bundled together with a flat cable or used individually. Leads for each sensor can be clamped onto the glass tile to minimize stress at the sensing point. And a variety of insulating materials can be used for the leads inside the chamber, depending on the temperature range of your application. Polyimide coating is used for temperatures under 450°C, while braided silica or quartz microtubing can be selected for higher temperature applications.

The Process Probe 2070 may be used in most atmospheric and low pressure process equipment without hardware modification. A flat cable feedthrough allows sensor leads to pass under the process chamber end cap or O-ring seal, maintaining chamber atmosphere purity and vacuum integrity.

You can measure glass temperature directly in real time during each critical step in your process cycle, including loading, temperature ramping, steady-state, cool-down, and unloading, allowing you to determine temperature uniformity and to optimize cycle time by directly measuring thermal stabilization time of panels within the load. Temperature measurements are acquired using a SensArray hand-held Thermal TRACK™ metrology system or Thermal MAP® Acquisition software, and can later be analyzed using Thermal MAP Analysis software.

Process Probe 2070 instrumented glass tiles address the temperature measurement challenges presented by the new generations of large panel glass. Using SensArray solutions, you can efficiently and cost-effectively fine-tune your process conditions, improving equipment performance, panel quality, and output.

BENEFITS

COST-EFFECTIVE, FLEXIBLE SOLUTION FOR GLASS PANEL TEMPERATURE MEASUREMENT.

Offers real-time, in situ process monitoring from 0° to 600+°C.

Allows easy placement of TC sensors within the chamber at desired locations.

Small glass tiles make handling and transport trouble-free.

Ideally suited for 5th generation glass panels and larger.

Sensor assembly can be configured for field replacement, reducing cost and extending product life.

Offers high measurement reliability in CVD, PVD, anneal, and other flat panel processing systems.

Process Probe 2070



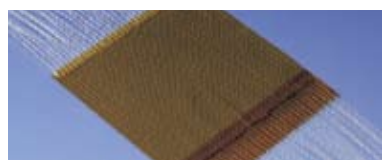
SIMPLE TEMPLATE INSTALLATION

Application of the Process Probe 2050 to your glass panel is simple and can be accomplished in less than 30 minutes by someone familiar with the process.



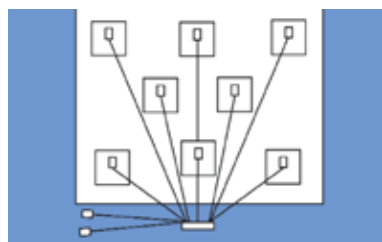
PROTECTIVE BONDING METHOD

Each thermocouple sensor of the Process Probe 2070 is embedded in one side of a glass chip. The TC side of the glass chip is then securely bonded to a glass tile. The leads are positioned underneath the glass chips, providing protection for the leads and added durability for the product. The advanced ceramic bonding material used improves heat transfer, maintains its strength, and is extremely tolerant of thermal shock.



SIMPLE TO INSTALL AND USE

With a flat cable feedthrough, Process Probe 2070 glass tiles are ready to go in minutes. Just position the tiles and leads in the chamber. Then, place the flat cable under the end cap, O-ring, or flange seal and close the chamber. Integrity of the chamber vacuum or atmosphere is maintained and no vacuum feedthrough is required. And, in most cases, no equipment modification is needed.



EASY FIELD REPAIRS

Due to the flexible nature of the Process Probe 2070, field repairs are possible. Extra, bonded or un-bonded sensors can be bundled in with the instrumented glass tiles. If a tile should break, one of the extra sensors or tiles can be used, extending the usefulness of the product with minimal expense and labor.

PRODUCT SPECIFICATIONS

GLASS

Typical tile size	4" x 4" – can vary depending on panel size and number of sensors
Thickness	Standard glass panel thickness of $\leq 0.7\text{ mm}$

THERMOCOUPLE SENSORS

Accuracy	$\pm 1.1^\circ\text{C}$ or $\pm 0.4\%$ of reading, whichever is greatest, in isothermal chamber environment
Number of sensors	Specified by customer – up to 34
Sensor type	Type K thermocouple embedded in glass chip (4 mm x 8 mm x 0.7 mm)

INSTRUMENTED GLASS PANEL

Temperature range	0° to 600°C
Sensor-to-sensor precision	$\pm 0.1^\circ\text{C}$ (in isothermal chamber)
Temperature measurement offset in cold wall chamber	$\pm 2.0^\circ\text{C}$ (near 400°C with 200°C vertical gradient)

LEADS AND CONNECTORS

Sensor leads	0.005" diameter (0.127 mm/5 mil)
Sensor lead insulation	0° to 450°C – polyimide coated; > 450°C – braided silica, or quartz microtubing
Lead length	Specified by customer – up to 120"
Flat cable length	Specified by customer – up to 12"
Wire clamp type	Y-shaped stainless steel
Feedthrough option	Polyimide flat cable. Seal is made under chamber O-ring. Base pressure down to 10 ⁻⁹ Torr is possible in systems with flat cable feedthrough installed.
Connector options	80-pin Hirose HDS, 37-pin D-type, or 2-pin sub-miniature plugs

DATA ACQUISITION AND ANALYSIS OPTIONS

Thermal MAP Metrology System:
Laptop-based acquisition and analysis

Thermal TRACK Measurement System:
PDA-based acquisition and monitoring

KLA-TENCOR SERVICE/SUPPORT

Customer service is an integral part of KLA-Tencor's portfolio that enables our customers to accelerate yield. Our vast customer service organization collaborates with worldwide customers to achieve the required productivity and performance at the lowest overall cost. K-T Services includes comprehensive contracts, time and materials, spares, asset management, customer training, and yield consulting.

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