TEMPTRONIC
an inTEST Company

Model TP04310 ThermoStream® System

Delivering Essential Solutions for the Semiconductor Test Floor

Model TP04310 ThermoStream® System

The ThermoStream® System is a high capacity thermal airstream system for fast, accurate thermal cycling, testing and characterization of components, hybrids, modules, MCMs, PCBs and other assemblies at precise temperature from -80° to +225°C[1,3]

User-Friendly Operation

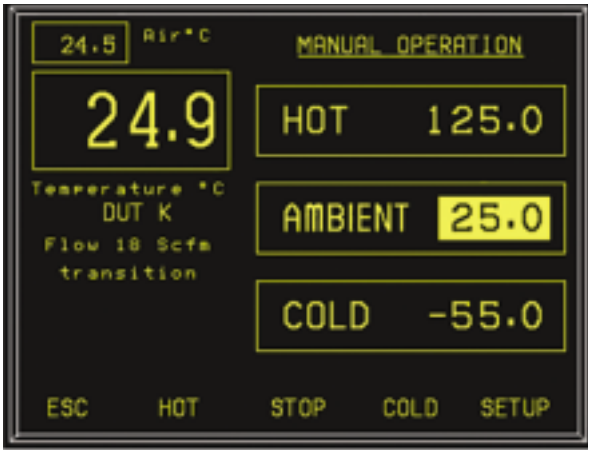
Operating the TP04310 System is simple and convenient at the front panel Operator Control Module (OCM), or via remote interface (IEEE-488, RS232 and SOT/EOT interfaces are included).

With MENU-DRIVEN control and five Function Buttons, a series of options are provided at the system's flat panel display. Using the Function Buttons to make menu selections and the Rotary Encoder Knob to set temperatures, soak times, cycles and other parameters, an operator can set up for thermal testing in seconds.

The hierarchy of intuitive menus provides control of all system functions. From the TOP MENU, the operator can access:

- "Manual Mode" (Setup and operation using Hot, Ambient, and Cold setpoints)
- "Program Mode" (Create and run up to 12 thermal cycling routines in sequence)
- "Set-up Options" (i.e. DUT Control Mode, DUT Self-Tuning, Thermal Constants, etc.)
- "System Configuration" (IEEE-488 address, etc.)

INSTANT AIRFLOW CONTROL: An Airflow Control Knob is located on the front panel of the System for increasing or decreasing the airflow rate (2.5 to 9 liters/second; 5 to 18 scfm) as needed.



Real time DUT and air temperatures are displayed in Manual Mode operation with DUT Temperature Control.

Two Modes of Control

Versatility for simple to advanced applications

The flexible TP04310 is ideal for 24 hour/7 day test and design/engineering requirements. Test at one to three temperatures (in Manual Mode), or test a DUT at a series of temperatures and ramp/soak/cycle settings (in full-featured Program Mode).

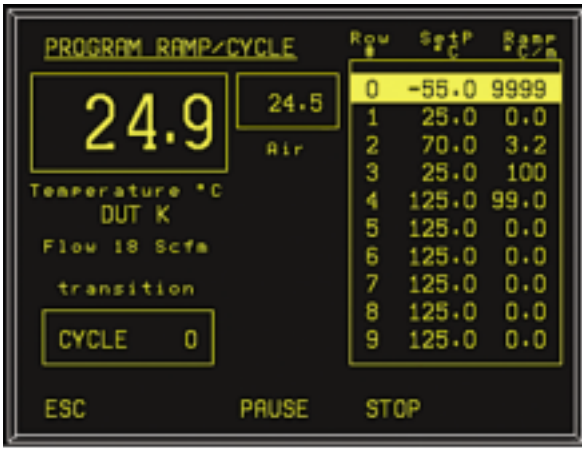
Mode 1: Manual Mode

Operate the system at the touch of a button! For high throughput, pre-set HOT, AMBIENT and COLD temperature setpoints and soak times. With high capacity airflow and rapid temperature transition, the system quickly brings the DUT to temperature under Air or DUT Temperature Control Mode.

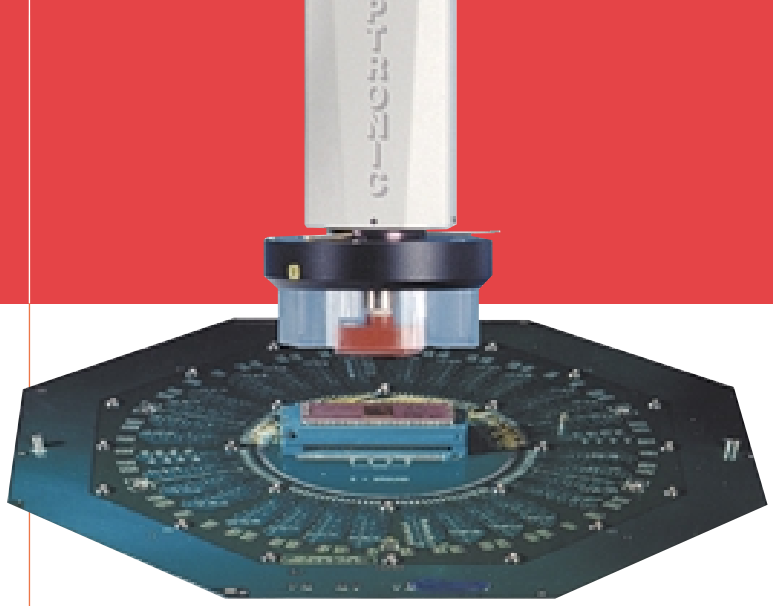
Mode 2: Program Mode

Utilize advanced thermal cycling and DUT Control features to customize thermal test profiles:

- Create 12 test sets, each consisting of 12 thermal cycling routines displayed in a table on-screen.
- For each thermal cycling routine, include a set-point temperature, ramp rate, soak time, number of cycles and "At Temperature" Window.
- Activate some or all of the 12 cycling routines, as your test requires.
- Thermal test sets can be saved to memory for quick recall.
- Real-time test status and parameters are displayed on-screen, including current and pre-set air and DUT temperatures, cycles, soak time, DUT sensor type, airflow rate, etc.



Set up to 12 temperature tests sets in Program Mode, while DUT Control monitors device temperature directly.



Outstanding TP04310A FEATURES

- -80° to +225°C Temperature Range[1,2,3]
- High capacity 18 scfm airflow brings small to large devices and assemblies to temperature with speed and accuracy
- User-Friendly Menu Control
- Convenient Front Panel Airflow Control
- Optimize test throughput with DUT Self-Tuning and "At Temperature" Window Features
- 1.0°C temperature accuracy and 0.1°C stability at the DUT with Patented DUT Dual Loop Control
- TYPICAL TEMPERATURE TRANSITION[1]:
  -55° to +125°C: <5 seconds approximately
  +125° to -55°C: <13 seconds approximately
- Repeatability at the test site with pneumatic lift control for raising and lowering the thermal head
- Two Modes of Operation:
  Manual: Test at Hot/Ambient/Cold Temperatures
  Program: Set up to 12 thermal cycling routines in sequence
- HCFC-free and CFC-free[4]
- Create test sets of 12 thermal cycling routines per set-up; save and recall
- ATE Compatibility: IEEE-488, RS232 and SOT/EOT/SFF remote interfaces
- High system reliability and long term dependability
- Technical support network is outstanding in the industry

Fast Temperature Transitions… High Test Throughput

For testing small to large ICs, hybrids, modules, PCBs and assemblies, the TP04310 system brings the DUT to the setpoint temperature with speed and precision. High capacity, 18 scfm continuous airflow ensures that even high power devices and larger DUTs achieve the setpoint temperature quickly.

Typical air temperature transition rates, (-55° to +125°C: <5 seconds approx.; +125° to -55°C: <13 seconds[1] approx.), may be achieved with the system's high volume thermal airflow.

"At Temperature" Windows enable the operator to specify a tolerance range about the setpoint temperature at which testing can begin, increasing test throughput. Once the TP04310 reaches a temperature within the window, testing is initiated and the TP04310 continues to bring the DUT as close as possible to the setpoint temperature.

ATE Compatibility

The TP04310 interfaces with any major tester, host computer or rack and stack test system to integrate temperature with an ATE test program. For remote operation, the system can be controlled from one of three standard interfaces: IEEE-488, RS232 or SOT/EOT. IEEE-488 and RS232 allow access to commands for remote control.

For moisture-free testing of standard to larger ICs, assemblies, PCBs, high frequency (RF to microwave) and high power devices at temperature, the TP04310 system and the **ThermoFixture**® thermal enclosure integrate seamlessly with any one of the major ATE testers for a turn-key thermal test system. ThermoFixture includes all tester interface hardware and electronics to ensure true and accurate signals in testing a DUT in a controlled thermal environment.
(See ThermoFixture Brochure)

1 Reduced performance may be encountered at operating conditions less than or greater than nominal. See data sheet.
2 Ultimate low temperature may vary under operating conditions less than or greater than nominal.
3 Due to Temptronic's use of HCFC-free refrigerants with 50 Hz systems, the ultimate low temperature of 50 Hz systems may be approximately 5°C less cold than the 60 Hz systems.
4 50 Hz configuration system is HCFC-free and CFC-free; 60 Hz system is CFC-free.

TP04310

Patented DUT Control... Thermal Precision at the Device Case

The TP04310A System cycles to temperature based on temperature sensed in either of two modes: Air Control (sensing the temperature of the air flow from the system) or Patented DUT Control Mode (sensing the device temperature directly).

For optimal accuracy at the DUT (Device Under Test), in Patented DUT Dual Loop Thermal Control[5] Mode, the system utilizes an external sensor (Type T or Type K thermocouple) placed in direct contact with the device case. Temperature is sensed once every 250 milliseconds to bring the DUT as close as possible to the setpoint temperature. Once at temperature, the TP04310A continues to monitor the temperature of the device and to maintain that device at the setpoint temperature for the assigned soak time.

In "Air Control" mode, the system cycles to the desired temperature based upon a measurement of the temperature of the airflow, sensed at the nozzle of the airstream thermal head.

[5]US Patent No. 4,734,872

"Define Parameters" for Finer Test Control

Special utilities in DUT Mode enable an operator to fine tune the TP04310 to a particular application.

The Thermal Constant parameter can be adjusted to adapt the system to the thermal time response of the user's specific device type, including its socket and/or enclosure. By adjusting the thermal constant, the user can direct the TP04310A to perform with greater thermal stability, minimal overshoot and a slower thermal transition rate to set point temperature - OR- a faster temperature transition rate to setpoint temperature, with moderate thermal overshoot and stability.

The system also provides special utilities for user-defined:
- Air to DUT Maximum Difference in ºC
- Maximum and minimum air temperatures
- Maximum test time
- Display resolution: 0.1ºC or whole degrees Celsius.

Select DUT Temperature Control, Self-Tuning and additional features as desired.

Real-time Thermal Test Status

Thermal test progress is easily monitored at all times, with temperature measurements and other test parameters displayed instantly for the operator at the system's flat panel screen.
In DUT Control mode, view the current status of the air temperature, DUT temperature, soak time, airflow rate, "At Temperature" seconds, and the table of up to 12 thermal test routines to be executed (highlighting the active thermal routine) on-screen.

CE

Environmentally Friendly and Engineered for Safety

HCFC-free[6] and CFC-free, the TP04310 system is an environmentally safe alternative to systems with chloroflourocarbons. The TP04310 is also CE approved and conforms to the SEMI S2-93A Safety Guideline for Semiconductor Manufacturing Equipment.

A "Power ON" indicator and a red Emergency Mains Off (EMO) switch are provided on the front panel of the system. The TP04310 has a compact footprint and is on wheels with a push bar on the back of the system for portability between test stations. Locking casters ensure system stability at the test site.

[6]50 Hz configuration only.

Smart DUT SELF-TUNING sets the Most Efficient Transition Rate

For quick DUT temperature transitions, the DUT SELF-TUNING feature can be switched "ON" in DUT Control Mode. Based on the mass of the DUT and the current DUT temperature, SELF-TUNING will automatically determine the system's optimal airflow rate for delivering the fastest transition time while keeping temperature overshoot to a minimum.

In Manual Mode, save up to 12 test set-ups, each containing hot, ambient and cold and cycling setpoints.

Save Test Set-up...Save TIME

For quick test set up and repeatability, up to 12 Program Mode test sets, 12 Manual Mode test sets and 12 sets of associated "Defined Parameters" can be saved for quick recall.

In Program Mode, save up to 12 test set-ups, each containing 12 temperature, ramp rate, soak time and cycling setpoints.

Pneumatic Lift Ensures Precision and Repeatability

Convenient Coupling to the Test Site

Repeatability and accuracy are ensured with a pneumatic lift for raising and lowering the TP04310 thermal head to and from the DUT site. Lift and lower the head at the front panel control, the thermal head switch or via remote interface.

For flexibility in aligning the thermal head precisely to the DUT site, the TP04310 arm can be manually pivoted, turned (over a 360º range around the system base), tilted and vertically swung. Four mechanical locks on the arm hold the thermal head precisely as positioned.

Switch for raising or lowering the ThermoStream head to the test site with pneumatics.

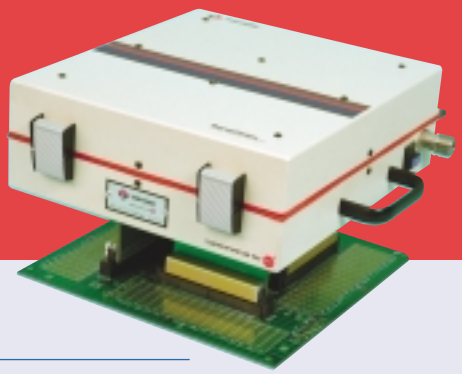
The thermal cap, available in 4.5 inch or 5.5 inch ID, either double-layer glass or non-transparent metal, surrounds the DUT to provide a moisture-free localized test environment and is easily installed or removed without tools.

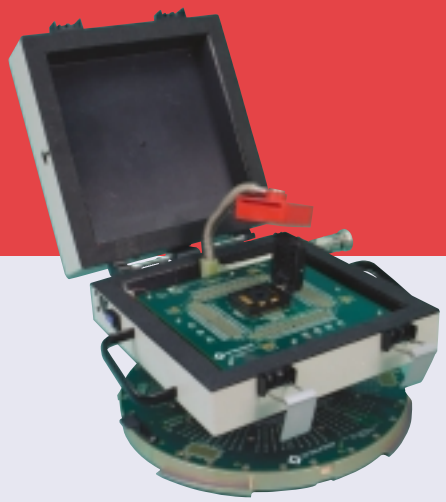
Insulation and Shroud Kits are included with the system to ensure proper coupling to the DUT at the test site for a moisture-free, localized thermal test environment. The Insulation Kit contains a sheet of non-conductive silicone rubber and instructions for proper application. The Shroud Kit contains several different sizes for coupling to several test fixtures. Optional conductive shrouds kits and sheets of conductive material are also available from Temptronic.

Temperature-controlled Purge Flow of 0.5 to 3 scfm air is supplied at the TP04310 thermal head to maintain the tester and test fixtures at temperatures close to room temperature for a moisture-free test site. An auxiliary Purge Flow air supply is also provided at the system's rear panel.

ESD Protection

The TP04310 has been designed to provide ionically balanced air free of electrostatic discharge (ESD), regardless of the test temperature.





Modular Design for 24/7 Dependability

The TP04310 is designed for high reliability in 24 hour/7 day test environments.

Included with every system are two manuals. The Operator's Manual is a simple guide to system operation, and the comprehensive Interface and Applications Manual provides easy to follow instructions for all system functions from set-up to advanced features and automated calibration.

The system's modular design ensures fast, easy system upgrades and service by the worldwide network of factory-trained service representatives.

Automated Calibration

To assure temperature accuracy and stability in bringing DUTs of all types and sizes to temperature, the Automated Calibration feature leads the operator through a fast and simple process of calibrating the temperature of the Air, Type T, and/or Type K thermocouple to a standard, with precise repeatable measurements. For thermal accuracy, the TP04310 is calibrated to the NIST Transfer standard.

About Temptronic Corporation

For thermally testing and cycling components, wafers, hybrids, PCBs or other assemblies, Temptronic systems provide precise temperature (–80º/+400ºC) conveniently at the tester site or probing station. As a pioneer and worldwide leader in thermal test and wafer probing technologies since 1970, Temptronic localized thermal control systems (ThermoStream®, ThermoFixture®, ThermoChuck® and ThermoSpot®) have become a standard in test facilities worldwide, providing Temperature on the Spot® with accuracy and reliability.

Extend TP04310 Capabilities!

Test devices to PCBs and assemblies of all types and sizes in the **ThermoFixture®** enclosure, improving test accuracy and enabling moisture-free thermal testing over longer time periods. The ThermoFixture thermal enclosure and turnkey ATE interface can be integrated with your tester for a complete thermal test system. (See ThermoFixture Brochure.)

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