



TTF-100

Thermal Test Frame

FLEXIBLE PRECISION FIXTURE IS EASILY ADAPTABLE FOR WIDE VARIETY OF THERMAL MEASUREMENTS

DESCRIPTION

The TTF-100 is a test fixture platform designed to accommodate a variety of different test sections for various thermal measurements. The basic unit when equipped with the appropriate accessories is specifically designed for validating detailed thermal models according to the four DCP modes outlined by European DELPHI/SEED/PROFIT projects. Optional test sections and instrumentation provide capability for EIA/JEDEC JESD51-8 Junction-to-Board (θ_{JB}), Junction-to-Case (θ_{JC}), and Thermal Interface Material (TIM) thermal conductivity measurements. Also available is a System Cart that provides a convenient mounting surface for the fixture, storage for various fixture accessories, built-in air compressor, recalculating cold-plate coolant instrumentation, and a master power mains control.

The basic TTF-100 unit provides top and bottom mounting plates with precision alignment/mounting pins, as shown in the figure above. The bottom mounting plates is gimbaled to insure parallel mating to accessories attached to the top mounting plate. Cold Plates can be mounted to either or both of these plates to facilitate a wide variety of thermal measurement environmental conditions. The 12.7cm (5") square Cold Plate is specifically designed to minimize thermal gradients across the interface surface and is available with without an integrated temperature sensor, with an embedded temperature sensor - Type-T thermocouple embedded 25.4 μ m (0.010") below the center (see figure to the right), or with a center protruding temperature sensor – spring-loaded, bullet-shaped, 1.4mm (0.055") diameter, protruding 12.7 μ m (0.005").

The frames left front panel flow meter is used to monitor and control the externally supplied liquid coolant flow rate. The right front panel contains a digital air pressure indicator, an air regulator for controlling the air pressure applied to the system's pneumatic cylinder, a toggle switch for moving the air cylinder position up and down, and a power mains switch for the system



Standard air cylinder has 40mm diameter piston; optional 100mm diameter version is shown.



TTF-100-02B Cold Plate shown.

Thermal Engineering Associates, Inc.
3287 Kifer Road, Santa Clara, 95051 USA
Phone: 650-961-5900 Email: info@thermengr.com

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Printed in USA 111025

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The test frame can easily accommodate custom designed and implemented modules that provide test fixturing for new or special electronic components. These modules can either be supplied by TEA or developed by the user according to mounting plate instructions provided in the test frame manual.

FEATURES

- Self-contained for easy setup and operation
- Gimballed bottom mounting plate insures parallel mating
- Alignment pins simplify positioning of interchangeable parts
- Flexible design easily adapted to alternative applications
- Optional test sections for θ_{JB} , θ_{JC} and TIM testing
- Digital display for air pressure allows for precise force application
- Integral Flow Meter aids liquid coolant flow monitoring and control

SPECIFICATIONS

| | | |
|--|--|--|
| Compressed Air: | Input Pressure Connectors | 60 psi nominal (80 psi max) CDA 1/4" OD, Quick Connect |
| Pneumatic Cylinder: | Bore Diameter Stroke | 40mm (standard; other sizes available) 50mm (standard; other sizes available) |
| Coolant: | Liquid Flow Rate Connectors | Mineral-free water or glycol solution 45.5 lph (12 gph) 1/4" OD, Quick Connect |
| Controls: (mounted on front panels) | AC Mains Switch Air Pressure Display Air Pressure Regulator Cylinder Up/Down Switch Coolant Flow Control | |
| Size: (approximate) | Height Width Depth | 53.3 cm (21") 43.2 cm (17") 25.4 cm (10") |
| Weight (basic unit, approximate) | Laboratory Shipping | 7.5Kg (16.5 lbs) 12Kg (26.4 lbs) |
| Power: | Voltage Frequency Current | 100 - 240 VAC 50/60 Hz 0.5 A |

ORDERING INFORMATION

| Model Number | Description |
|--------------|--|
| TTF-100-00 | Base Unit (Frame only, no Cold Plate) |
| TTF-100-00A | Base Unit with Cold Plate, no temperature sensor |
| TTF-100-00B | Base Unit with Cold Plate with embedded temperature sensor (Type-T Thermocouple) ¹ |
| TTF-100-00C | Base Unit with Cold Plate with protruding temperature sensor (Type-T Thermocouple) ¹ |
| TTF-100-01A | Optional top Cold Plate, no temperature sensor |
| TTF-100-01B | Optional top Cold Plate with embedded temperature sensor (Type-T Thermocouple) ¹ |
| TTF-100-01C | Optional top Cold Plate with protruding temperature sensor (Type-T Thermocouple) ¹ |
| TTF-100-02 | DCP4 Mode Pressure Pins and Insulated Plate Includes 6 magnetized pressure pins |
| TTF-100-03A | θ_{JB} Test Section Provides interchangeable parts for making measurements in accordance with JESD51-8; supplied with appropriate thermocouples; accepts up to 30 mm square packages |

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ORDERING INFORMATION (continued)

| Model Number | Description |
|---------------------|--|
| TTF-100-03B | θ_{JB} Test Section Provides interchangeable parts for making measurements in accordance with JESD51-8 standard; supplied with appropriate thermocouples; accepts up to 52 mm square packages |
| TTF-100-04 | TIM Tester Section Provides interchangeable parts for making measurements in accordance with generally accepted industry practices; includes two instrumented heat flux columns (one above and one below the TIM test sample) |
| TTF-100-05 | θ_{JC} Test Section Provides interchangeable parts for making measurements in accordance with proposed JESD51-13 standard; supplied with one instrumented Heat Flux Column – HFC1 (0.25 to 3.75W, add “-1” to model number), HFC2 (1 to 15W, add “-2” to model number), or HFC3 (10 to 160W, add “-3” to model number), two heat collectors (one with embedded thermocouple and one with protruding thermocouple), and calibration heater. |
| TTF -100-08 | Conductive Package Posts Custom designed for specific package style; includes thermocouple mounted under package interface surface (Consult Factory for details) |
| TTF -100-09 | Insulating Package Posts Custom designed for specific package style (Consult Factory for details) |
| TTF -100-84 | TIM Tester Instrumentation A USB-driven instrument with software that operates off the customer’s computer to provide drive, control and measurements of the TIM Tester Section internal heater and temperature sensors with a graphical user interface for collecting, displaying and saving all measurement data. |
| TTF -100-85 | θ_{JC} Test Instrumentation A USB-driven instrument with software that operates off the customer’s computer to provide drive, control and measurements of the θ_{JC} Test Section internal heater, calibration heater and temperature sensors with a graphical user interface for collecting, displaying and saving all measurement data. |
| TTF -100-99 | System Cart Self-contained wheeled unit for mounting TTF-100 on top with integrated thermoelectric chiller, air compressor, and master Power Main switch below; has drawer for storing optional components. |