

## TOPOGRAPHY AND DEFORMATION MEASUREMENT

The **TDM-Compact** is a versatile instrument for a wide array of applications in the areas of process development, failure analysis, reliability, and quality control.

### ABSOLUTE 3D CARTOGRAPHY

TDM is a patented tool for warpage analysis under a temperature profile. TDM uses the fringe projection technology (also called projection moiré) for non-contact, full-field acquisition of 3D topographies with a resolution as low as 1.5µm. TDM-Compact acquires a full, absolute 3D cartography of devices with dimensions up to 200 mm x 200 mm (field of view up to 150 mm x 150 mm). Simultaneously, its powerful heating and cooling capabilities allow for virtually any temperature profile on the sample under test. The integrated software package provides tools for representation of the results as 3D plots, vectors diagrams, isometrics views, and 2D profiles following user-defined profile lines (e.g., diagonal plots).



### LARGE SAMPLE SIZE CAPABILITY :

- ◆ Component qualification for reflow profile compatibility
- ◆ Component curing process optimization
- ◆ Component and PCB characterization following JEITA-ED-7306 IPC-9641 JEDEC 22B112A and IPC/ JEDEC J-STD-020D standards
- ◆ Fast aging test profiles, ON/OFF cycles, etc.

### ADVANTAGES :

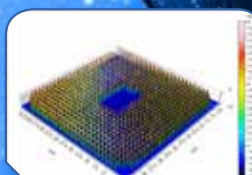
- ◆ Independently controlled top/bottom heater banks for superior temperature uniformity
- ◆ Fast heating and cooling ramp
- ◆ Ultra high resolution camera for fine feature analysis (e.g., measurement of solder balls/ bumps, leads, pins, etc.) and more accurate warpage measurements
- ◆ Sample drawer for easy sample loading

TDM-Compact's integrated zoom optics allow the user focus on virtually any sample area of interest. The sub-room temperature package gives access to temperature cycling down to -60° C, allowing for test or reliability inspection by temperature cycling as proposed by the MIL-STD-883G standard.

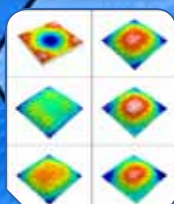
Bare die



PoP



BGA reflow



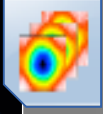
Connector



Complex Surface



▲ **TDM Control** :  
Adjusting and setting up the 3D measurements and thermal conditions



▲ **TDM Parts Finder** :  
To calculate the warpage variations of samples during a batch measurement and to automatically generate a report (pdf, excel, ect)



▲ **TDM Warpage** :  
3D software for advanced application (more than 135 advanced features)

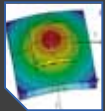
## TOPOGRAPHY AND DEFORMATION MEASUREMENT

### TDM COMPACT

Imaging :	Direct sample illumination, non-contact measurement
Maximum samples size :	310 mm x 230 mm
Oven size :	150 mm x 150 mm
Field of view (x,y) :	Continuous Zoom from 30 x 30 to 150 x 150 mm
Depth of view (z) :	Up to 25 mm
CCD camera resolution :	5 megapixel
Capabilities :	Out-of-plane topography analysis : z(x,y)
Accuracy :	+/-1.5 micron or 3% of measured value, whichever is greater
In plane measurement :	5x10 <sup>-5</sup> of length of sample
Temperature range :	Room temperature to 300° C continuous
Heating method :	IR lamps - top and bottom
Heating rate :	Up to +5° C/s (sample dependent)
Cooling method :	Regulated flow of pulsed air
Cooling rate :	Up to -5° C/s above 120° C
Footprint :	140 cm x 120 cm x 245 cm
Weight approx :	330 kg
Utilities :	Electricity : 230 VAC, 50 Hz, single phase, Compressed air : 6 bar.

## OPTIONS

### CTE quantification



TDM Strain : To evaluate the strain and CTE variation of samples during a thermal cycle  
In-plane deformation analysis :  $(\Delta x, \Delta y)(x, y)$   
CTE resolution : +/- 1.5 ppm/deg C over a 100 degree interval

### Sub-zero capability

A controlled flow of nitrogen is blown into the chamber to adjust the temperature of the samples from -60°C to 300°C.

Temperature range	-60°C to 260°C continuously
Heating ramp	0.5°C.s <sup>-1</sup> (sample dependent)
Cooling ramp	-15 ° C.s <sup>-1</sup> (sample dependent)
Sample size	220x170 mm
Oven size	80x80
Z Range/ Resolution	1.5µm
Lateral Resolution	40 µm

### XS FOV

The extra small FOV consist in a additional set of optics to obtain a FOV of 10 x10 mm

Field of View	10x10 mm
Z Range/ Resolution	<1 µm (0.5µm on standard flat)
Lateral Resolution	5 µm

All specifications are subject to change without any notice. TDM is a registered trademark of Insidix. TDM is protected by international patents.

## TOPOGRAPHY AND DEFORMATION MEASUREMENT

The TDM-LS is a versatile instrument for a wide array of applications in the areas of process development, failure analysis, reliability, and quality control. In order to present a complete product solution to the existing demand for warpage measurements the TDM Large Scale complements the TDM Compact. The first generation of TDM was designed for surface analysis of relatively small area (up to 150x150 mm) while the TDM Large Scale offers surface inspection of areas up to 400x400 mm. Therefore the thermo-mechanical analysis of boards, wafers, and other large object becomes possible.

### ABSOLUTE 3D CARTOGRAPHY

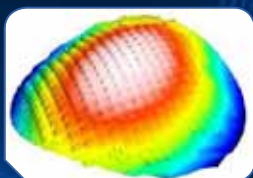
TDM is a patented tool for warpage analysis under a temperature profile. TDM uses the fringe projection technology (also called projection moiré) for non-contact, full-field acquisition of 3D topographies with a resolution as low as 1.5µm. TDM-Compact acquires a full, absolute 3D cartography of devices with dimensions up to 400 mm x 400 mm. Simultaneously, its powerful heating and cooling capabilities allow for virtually any temperature profile on the sample under test. The integrated software package provides tools for representation of the results as 3D plots, vectors diagrams, isometrics views, and 2D profiles following user-defined profile lines (e.g., diagonal plots).



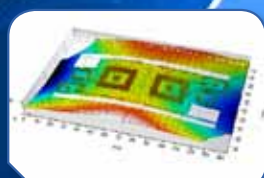
### LARGE SAMPLE SIZE CAPABILITY :

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- ▲ Component curing process optimization
- ▲ Component and PCB characterization following JEITA-ED-7306 IPC-9641 JEDEC 22B112A and IPC/JEDEC J-STD-020D standards
- ▲ Fast aging test profiles, ON/OFF cycles, etc.

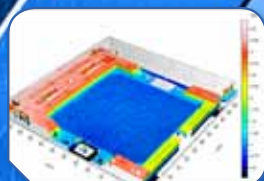
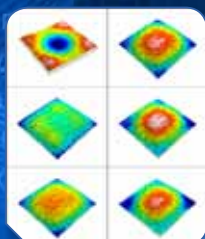
Wafer



PCB



Sockets

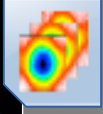


### ADVANTAGES :

- ▲ Independently controlled top/bottom heater banks for superior temperature uniformity
- ▲ Fast heating and cooling ramp
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- ▲ Sample drawer for easy sample loading



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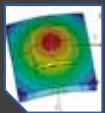
## TOPOGRAPHY AND DEFORMATION MEASUREMENT

### TDM COMPACT

Imaging :	Direct sample illumination, non-contact measurement
Maximum samples size :	500 mm x 400 mm
Oven size :	400 mm x 400 mm
Field of view (x,y) :	Continuous Zoom from 30 x 30 to 400 x 400 mm
Depth of view (z) :	Up to 25 mm
CCD camera resolution :	5 megapixel
Capabilities :	Out-of-plane topography analysis: z(x,y)
Accuracy :	+/- 1.5 micron or 3% of measured value, whichever is greater
In plane measurement :	5x10 <sup>-5</sup> of length of sample
Temperature range :	Room temperature to 300° C continuous
Heating method :	IR lamps - top and bottom
Heating rate :	Up to +3° C/s (sample dependent)
Cooling method :	Regulated flow of pulsed air
Cooling rate :	Up to -3° C/s above 120° C
Footprint :	200 cm x 150 cm x 250 cm
Weight approx :	500 kg
Utilities :	Electricity: Electricity: 380 VAC, 50 Hz, 3 phases, Fumes extraction 2000m <sup>3</sup> /h.

## OPTIONS

### CTE quantification



TDM Strain: To evaluate the strain and CTE variation of samples during a thermal cycle  
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