

# AC Method Thermal Diffusivity Measurement System

## LaserPIT



### *Thermal conductivity evaluations in-plane direction of various kinds of films*

#### ◆ General Description

The LaserPIT measures the thermal diffusivity of thin sheet materials in plane direction by scanning laser heating AC method (Angstrom method).

For high thermal conductivity films, I can also measure sub-micron thin films.

#### ◆ Features

1. Accurate measurement of thermal diffusivity of a wide variety of sheet materials from diamond to polymer.
2. Applicable to a wide variety of materials, including stand-alone sheet, film and other materials from 3 to 500  $\mu\text{m}$ .
3. Measurement of the thermal conductivity of 100 to 1000 nm thick film deposited on a test substrate by the differential method.
4. Simple operation for measurement
5. Control, measurement and analysis with exclusive software
6. Houses all optical, control, measurement system in one compact bench-top module.

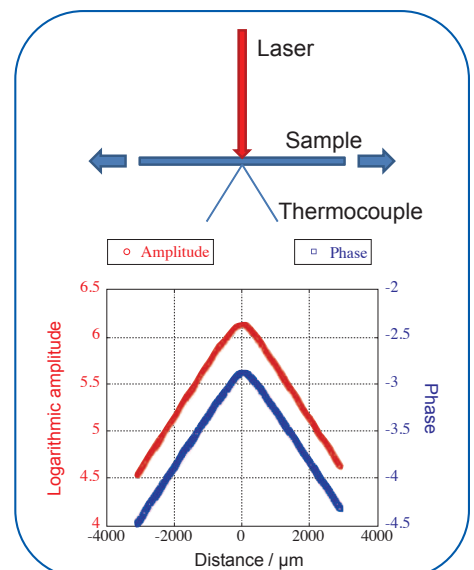


Figure of the principle

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## LaserPIT

### ◆ Constitution

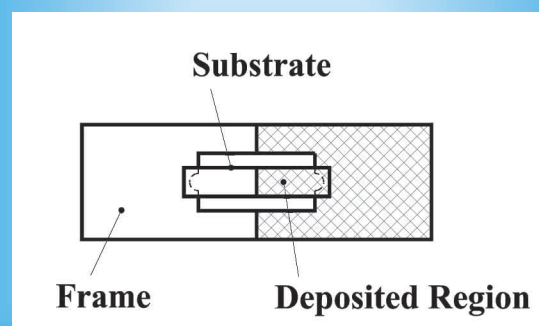
1. LaserPIT main unit
2. Turbo-molecular pump
3. Personal computer and exclusive software
4. Vacuum coating system(option)

### ◆ Specifications

1. AC power: Laser diode  
(wavelength 685 nm, output 30 mW)
2. Irradiating position:  $\pm 3000 \mu\text{m}$ , in steps of  $1 \mu\text{m}$
3. Frequency: 0.1 to 20 Hz
4. Thermal diffusivity measurement accuracy:  $\pm 5 \%$   
(thermal diffusivity of a stand-alone sheet sample)
5. Sample size: L 30 mm, W 2.5 to 5 mm  
t 3 to 500  $\mu\text{m}$  (stand-alone sheet sample)  
t 100 to 1000 nm (thin film on substrate)  
\* An optimum value of thickness depends  
on thermal conductivity of a sample.
6. Thermocouple: E type thermocouple (0.1 mm dia.)
7. Measurement atmosphere: In vacuum (below 0.02 Pa), In air
8. Temperature range: Room temperature (R type),  
Room temperature to 200°C (M2 type)
9. Interface: RS232C
10. Power requirement: AC 100 V, 15 A
11. External dimensions: W 350 x D 500 x H 330 (mm)  
\* main body, excluding projection portions

### Measurement method of thermal conductivity of thin film (differential method)

The thermal conductivity of a thin film deposited on a special glass test substrate can be found by measuring the thermal diffusivity of the deposited area and a non-deposited area on the same side of the test substrate. Thermal conductivity of the thin film is evaluated from "Measurement result in the two areas", "Thickness of the glass substrate and its volume specific capacity", and "Thickness of the thin film and its volume specific capacity".



### ◆ Applications

1. Measurement of thermal diffusivity of highly conductive thin sheet materials (thickness less than 500  $\mu\text{m}$ ), such as CVD diamond, aluminum nitride and others.
2. Measurement of thermal diffusivity of several kinds of metal thin sheet materials (thickness less than 5 $\mu\text{m}$ ), such as Copper, Nickel, and stainless.
3. Measurement of thermal diffusivity of materials with low thermal conductivity (thickness less than 500  $\mu\text{m}$ ), such as glass, resin material and others.
4. Measurement of thermal diffusivity of anisotropic highly conductive graphite sheet (thickness less than 100  $\mu\text{m}$ ), polyimide and polymer film like PET (thickness less than 5  $\mu\text{m}$ ).
5. Measurement of thermal conductivity of thin nitride aluminum film, thin oxide aluminum film deposited on a glass substrate.
6. Measurement of thermal conductivity of thin DLC film deposited on a glass substrate.
7. Measurement of thermal conductivity of thin organic pigment film deposited on a PET substrate.
8. Evaluation of a variety of sputtering target material.  
\* Measurement condition may change depending on material of a sample and its physical values.  
The conditions mentioned on the catalog are rough standard.

※ Specification and appearance are subject to change without notice for performance improvement.

Agent

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