



We are supporting global environment protection of an enterprise through quality improvement of thermophysical property measurement.



We wish to contribute to technological innovation and to create a better future through our thermal measurement technology.

■ Specifications

		TS12
Basic	Measuring object	Defect of sample, Inhomogeneity, Luminance, Simple temperature, Thermal characteristic
	Output data	Frequency, Distance, Amplitude, Phase, Luminance, Image data
	Analysis mode	Point/Area analysis, Phase analysis
Accessories		Temperature modulation heater, Analysis software, PC
Measurement temperature	Temperature	Room temperature~250 [°C]
	Measurement frequency	0.1-10 [Hz]
IR camera	Element count	336×256
	Element type	VOx Microbolometer
	Pixel size	17 [μm]
	Observed wavelength	7.5-13.5 [μm]
	Frame rate	30 [Hz]
	Resolution	Approx. 30 [μm]
Semiconductor (constantly)	Wavelength	808 [nm]
	Output max	5 [W]
	Sine wave modulation	0.1-30 [Hz]
Stage displacement	In-plane	± 15 [mm]
	Out-of-plane	+ 50 [mm]
Power supply		100 - 240 [V AC]、10-5 [A]、50/60 [Hz]
Usage environment	Temperature	20-30 [°C]
	Humidity	20-80 [%]
Storage environment	Temperature	0-50 [°C]
	Humidity	20-80 [%]
Requirements	Sample	Solid material (Resin, Glass, Ceramics, Metal, etc)
	Shape	Any shape
	Size	MAX 100×100×30 [mm]
	Coating	Blacking processing is required
	Reference sample	Not necessary
Main body	Dimensions	W552×D602×H657 [mm]
	Weight	76.5 [kg]
Laser safety standards		CLASS1, IEC/EN 60825-1:2007

SCENE

It is inflected in such a scene.



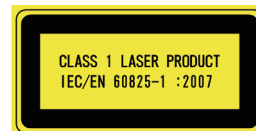
- Performance evaluation of heat dissipation sheet and heat insulating sheet
- Thermal diffusion observation of anisotropic materials
- The thermal conduction path observation in printed wiring board
- Line analysis of disconnected part on printed wiring board
- Simple temperature measurement and area analysis for LED heating
- Observation of the adhesion and crack of various coating
- Evaluating void of carbon molding
- The thermal conduction path observation of building materials including heat insulating materials

- The numbers shown in this catalog are results from our examination. The same results are not guaranteed in different circumstances.
- The performance and appearance may be changed for improvement without notice.
- Optional accessories such as High-Speed cameras and evaluation software are under development. Please contact us for details.



Caution for Safety

Before using, please read manual and operate correctly for the safety.



For Product Inquiry :

<https://hrd-thermal.jp/en/contact/>

<Manufactured and Distributed>

BETHEL Co.,Ltd. Hudson Laboratory

4-3-18, Tsuchiura brick Bld. 1F, Sakura-machi, Tsuchiura-shi, Ibaraki, 300-0037, Japan

E-mail: info@btl-hrd.jp

<https://hrd-thermal.jp/en/>

<Agent>

BETHEL search

the thermal movement by IR camera.
Detection of abnormal point/Check for inhomogeneity of material.

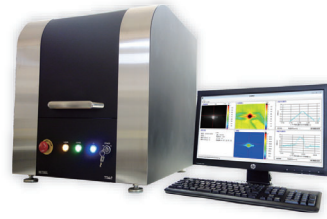
TS12

open price

BETHEL Co., Ltd.



Thermal Spread Inspection equipment



FEATURES

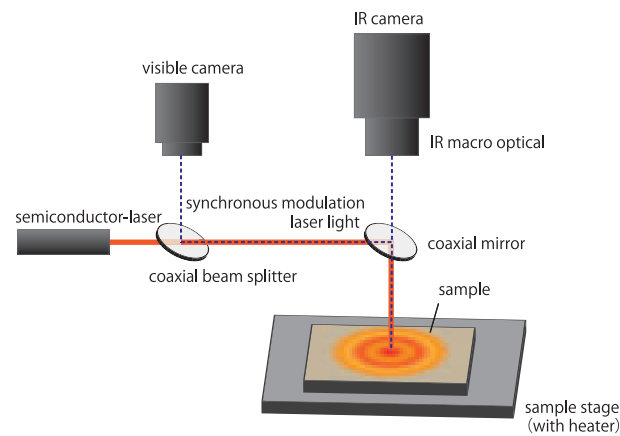
Visualization and quantification of the thermal characteristics of the device internal are possible in order to improve the energy efficiency.

For saving energy, improving the efficiency of the energy is the key issue. This device focused on the thermal problem of electronic devices and it is possible to evaluate the material of thermal effusivity by visualization and quantification the thermal characteristics of the devices.

- Laser heating function
- Macro photographing optical system (resolution: about 30 μm)
- High performance infrared camera (observed wavelength bands: 7.5~13.5 μm)
- Our own noise-reduction technology

SUMMARY

Visualized the thermal conduction path by the infrared camera and laser



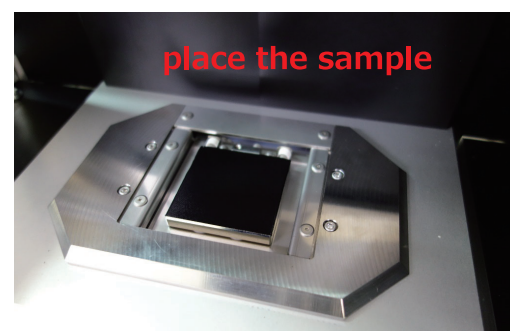
This device has allowed to detect abnormal parts in the sample and visualize the thermal properties of inhomogeneity by detecting the change in the infrared radiation amount with the infrared camera while applying the modulation cycle heating by laser to the sample.

Even without laser irradiation, we can observe the infrared luminance and measure the sample temperature.

The high-magnification observation is possible by IR macro optical system. Also, the thermal spread inspection that using sample heater and simple temperature measuring is possible.

OPERATION

Easy operation of only opening the cover and placing the sample on the stage.

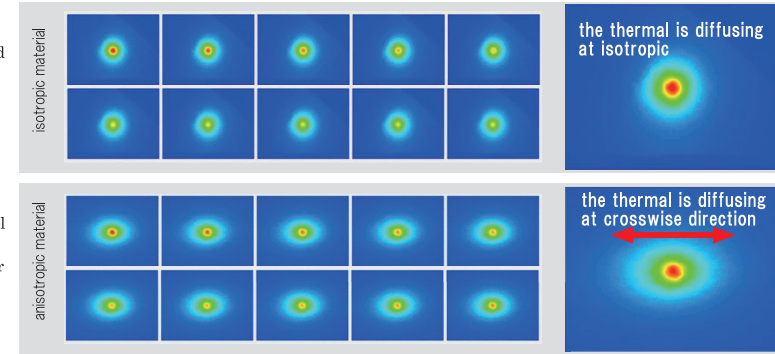


Then, the whole operation from the observation to the video recording are conducted on the PC screen.

Visualization of inhomogeneity

Evaluate thermal diffusivity of anisotropic materials such as CFRP.

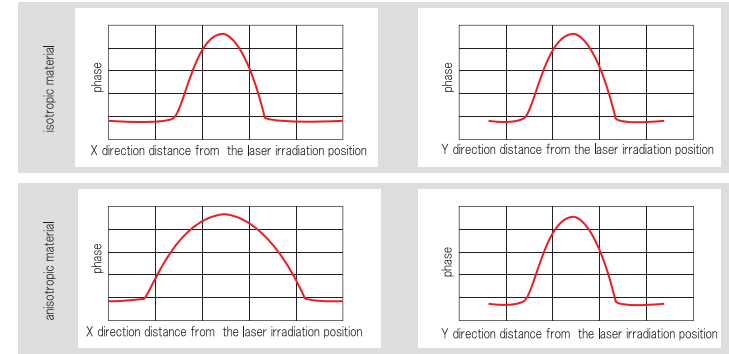
We have observed how thermal diffusivity develops in anisotropic and isotropic materials by the direction of X and Y axes. The results taken by the IR camera: the thermal diffusion on isotropic material is in a circle shape while on anisotropic material it's in an elliptical shape. It's a perfect equipment for the evaluation of the thermal diffusivity in anisotropic materials such as CFRP.



<phase analysis graph>

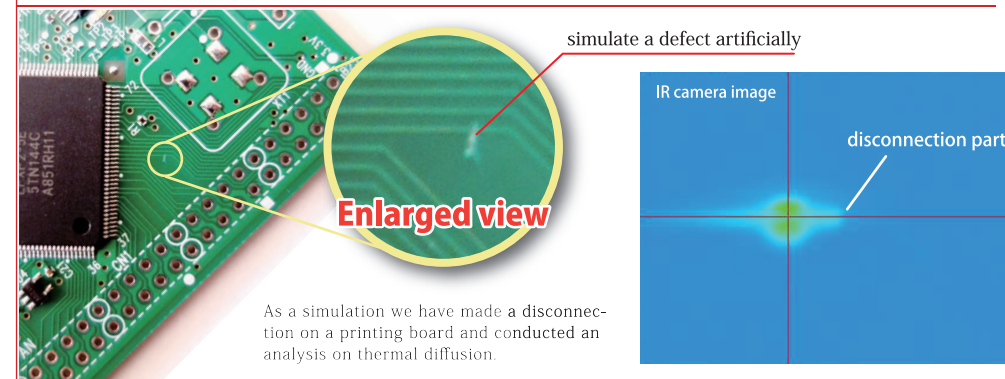
■ X direction

■ Y direction

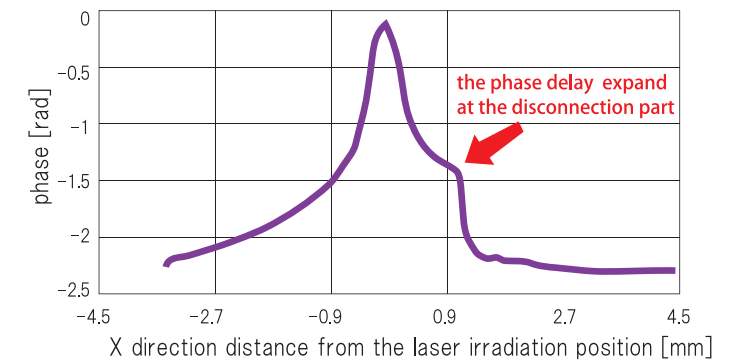


Detection of abnormal point

Evaluate the abnormal point such as disconnection product by the thermal conductivity.

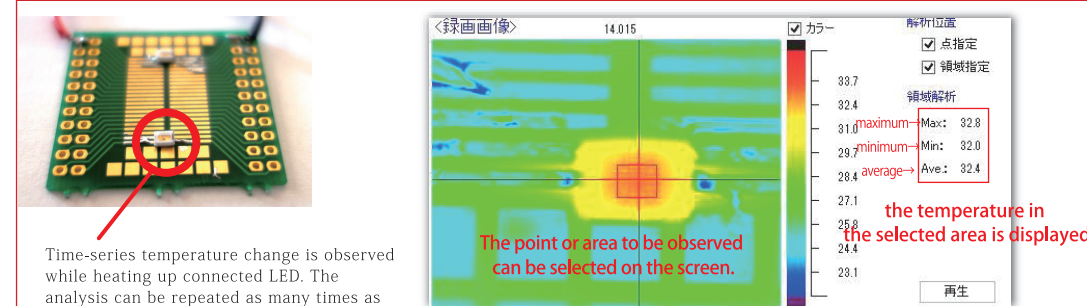


As a simulation we have made a disconnection on a printing board and conducted an analysis on thermal diffusion.



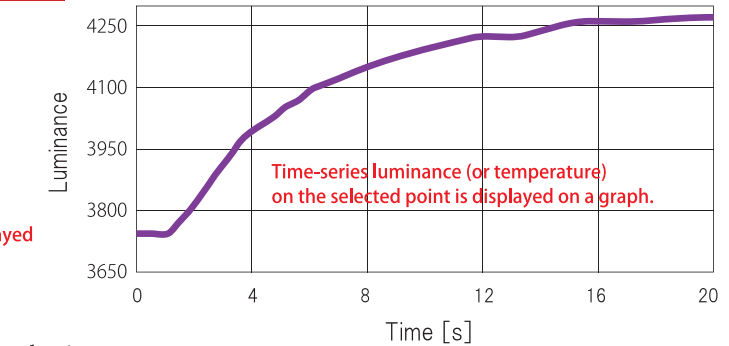
Observation of temperature rise on heating material

Observe the time-series change in the temperature rising of the LED.



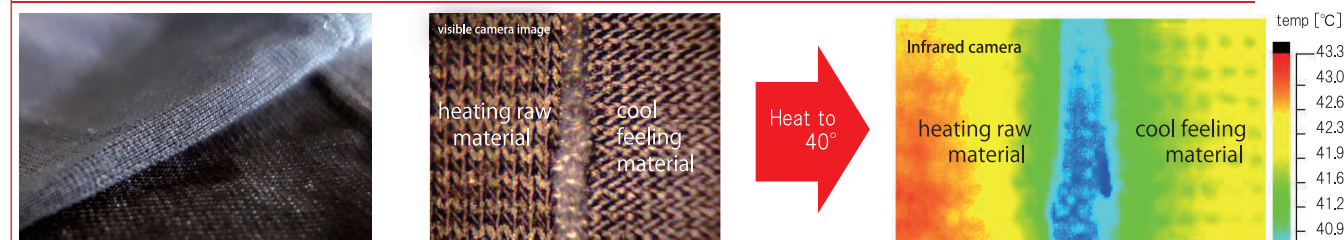
Time-series temperature change is observed while heating up connected LED. The analysis can be repeated as many times as desired with newly designated points and areas.

- ◇ With automatic calibration function which converts luminance value into temperature
- ◇ Once the time-series variation of temperature rise is recorded, it can be analyzed as many times as desired with any observational point.



Thermal radiation observation of different materials

Observe the difference of the thermal radiation between materials.



The sample temperature is risen to 40°C by the sample stage heater to be observed and compared by the infrared camera. The images show that the surface temperatures of the self-heating material and the cool-feeling material are very different.

Difference in thermal radiation was detected by IR camera between "heating raw material" and "cool feeling material" which is used for bed-clothes and clothing. The right side "cool feeling material" is low temperature at the whole. On the other hand, the heating raw material of left side is high temperature. Therefore, the cool feeling material is superior in heat dissipation, the heating raw material is superior in moisture retaining property. The heating observation by IR camera can apply to various fields, for example, fabric materials, thermal insulation materials, building materials and metals, heat dissipation coating, and so on.