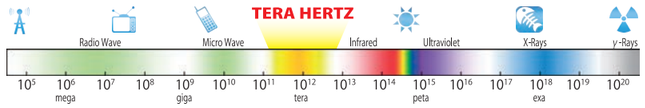
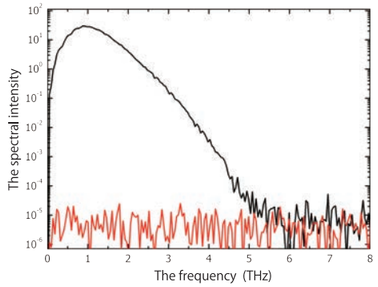
Tera Evaluator®
THz Time-Domain Ellipsometer

Terahertz spectroscopy is measured in the terahertz spectral region (THz) which is made up of frequencies located at the boundary region in the electromagnetic spectrum between light and radio waves.



Electric field strength and phase information can be measured simultaneously, by the measurement of time-domain waveforms of the electromagnetic pulse' s electric field strength.
By analyzing the difference in the time-domain waveform of the reference and sample, it is possible to obtain the frequency dependence of the complex dielectric constant and complex refractive index of the sample.



Typical spectral performance of a general-purpose Terahertz spectrometer, "TeraProspector" developed by PNP (using a femto- second laser: <100fs)

Product specifications

Tera Evaluator	
Measurement system	THz Time-Domain Ellipsometry
Measurement signal	Time waveform of the electric field strength
Output data	Ellipsometric parameter, complex refractive index/complex dielectric constant/ electric conductivity using analysis program
Sample arrangement	Horizontal configuration (measurement surface – upwards looking)
Measurement zone	(output range using standard reference material) above 1 - 3 THz
femto- second pulsed laser	Center wavelength near 780 - 810 nm and pulse width less than 120 fs (※ an external laser source can be used)
PC requirements	PC compatible with Windows OS (version 10) The PC (above) requires 1 wired LAN port and 2 USB ports for connection to the Tera Evaluator.
Software	Measurement Software and Analysis Software
Dimensions/Weight	732 (W) x 585(D) x 540 (H) mm, approximately 125 kg (※ excluding wiring and protrusions etc.)
Power source	AC100 V (50/60 Hz) 10 A (115 V, 200 V, or 230 V specifications available.)

※ For other requirements, please request us.

PNP®

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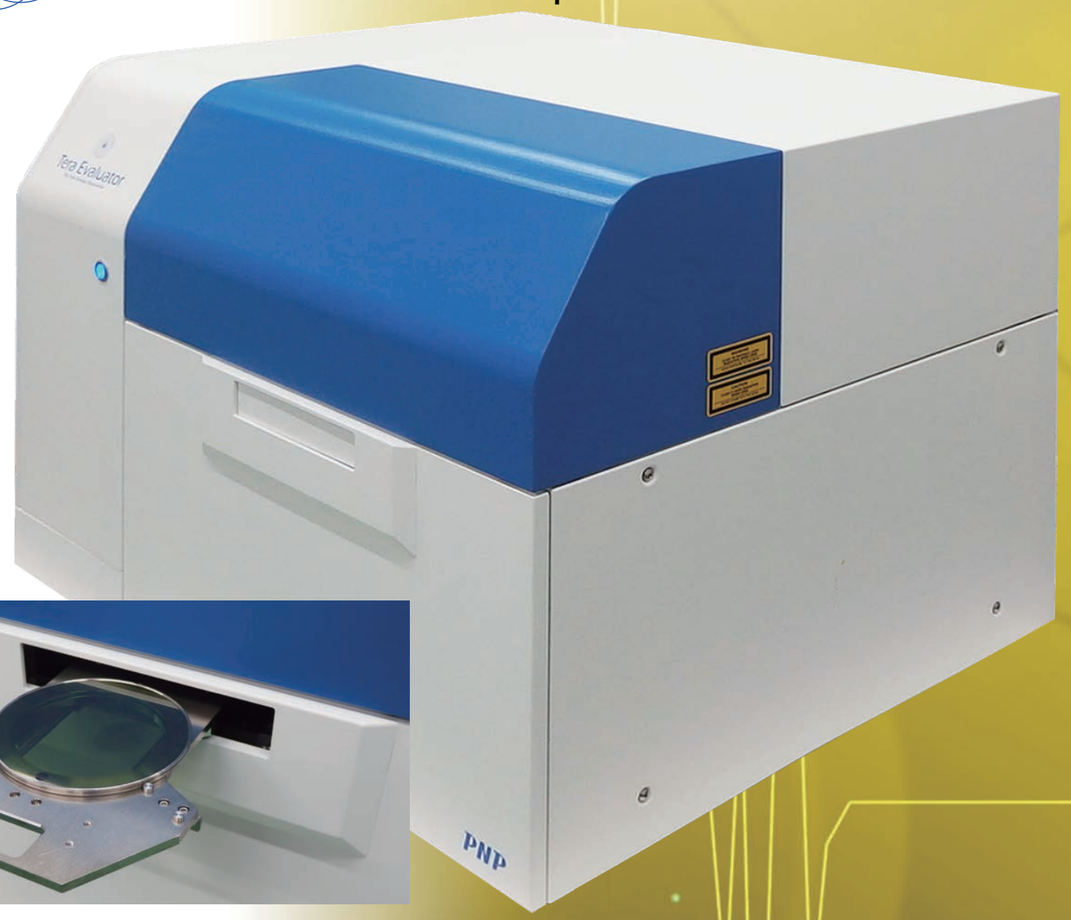

- Non-contact, non-destructive measurement of carrier density and mobility
- Measurement of the complex dielectric constant in the terahertz region
- Software for "THz analysis " is included as standard
- External laser source can be used

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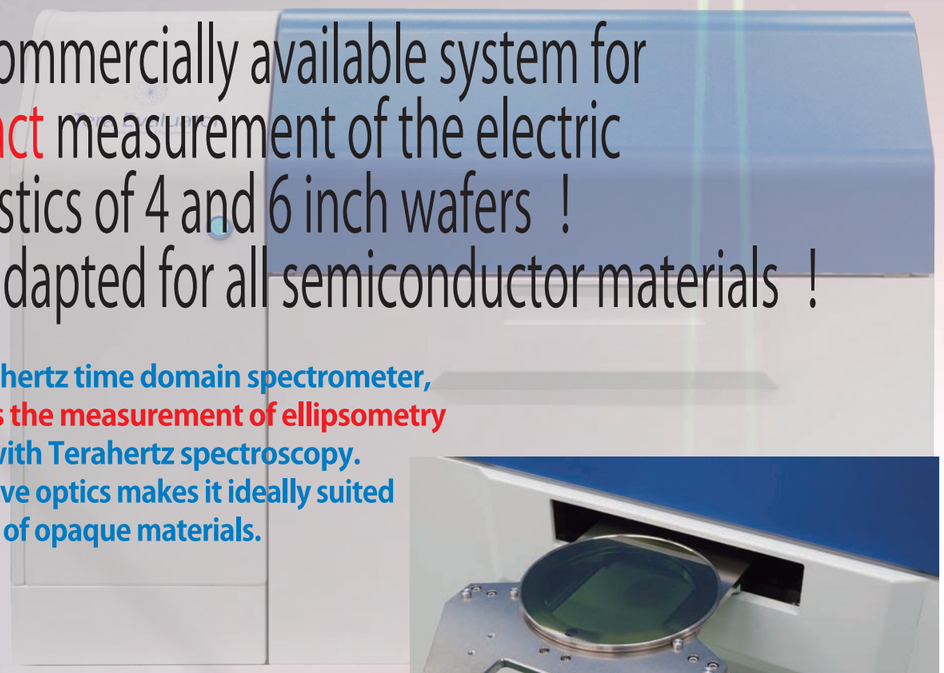
Tera Evaluator®

THz Time-Domain Ellipsometer

The first commercially available system for non-contact measurement of the electric characteristics of 4 and 6 inch wafers ! It can be adapted for all semiconductor materials !

This is a newTerahertz time domain spectrometer, which introduces the measurement of ellipsometry in combination with Terahertz spectroscopy. The use of reflective optics makes it ideally suited for measurement of opaque materials.

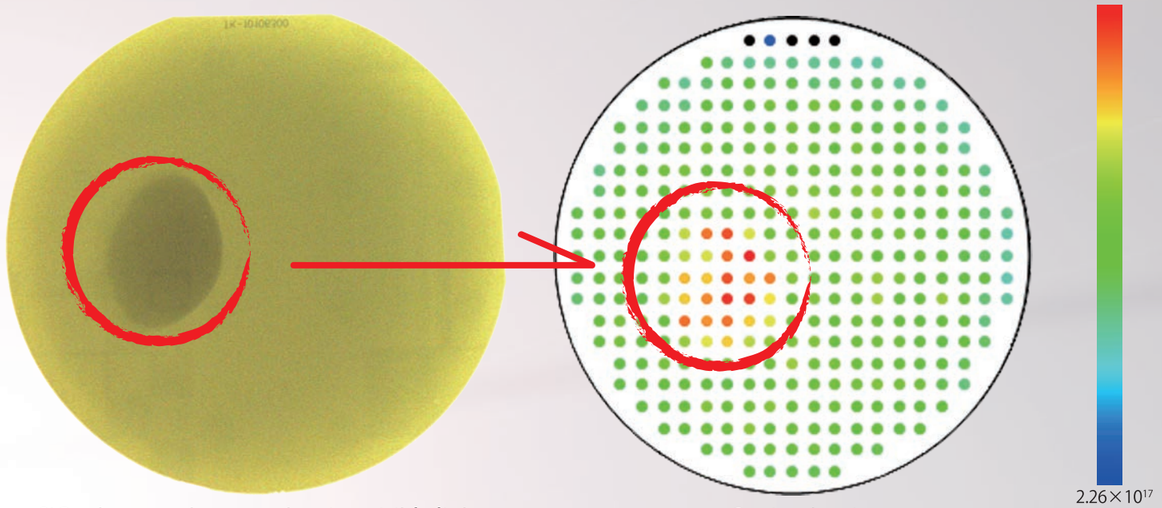


Standard instrument equipped with mapping stage for non-contact, non-destructive test measurement of 4 and 6 inch semiconductor wafers.

Examples of 4 inch wafer

Example of measurement of carrier density

Distribution measurement of SiC substrates

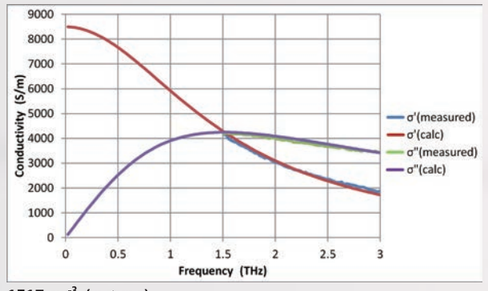


SiC substrate photograph using visible light

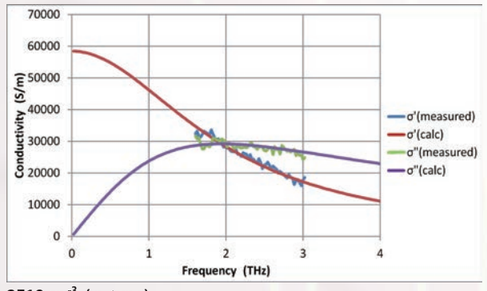
Carrier density

The dense color area has been detected as different carrier density.

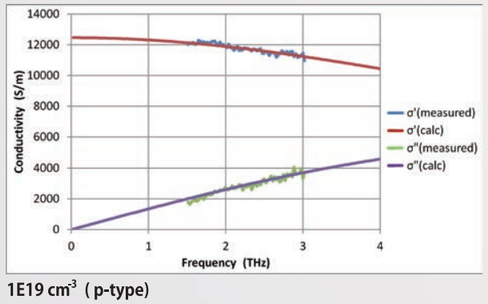
Measurement result for GaAs wafer



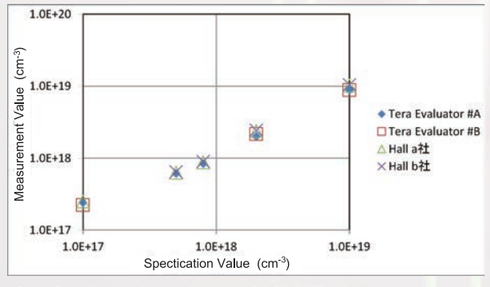
1E17 cm^{-3} (n-type)



2E18 cm^{-3} (n-type)



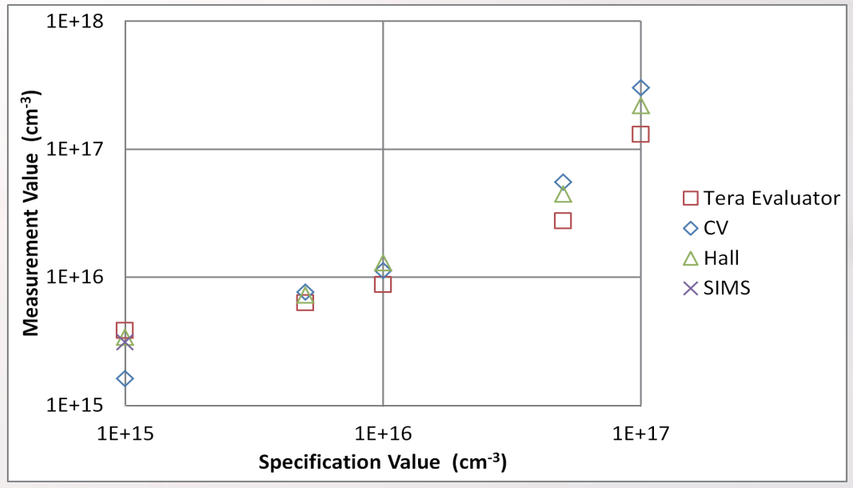
1E19 cm^{-3} (p-type)



Plot of carrier density to compare with Hall effective measurements

The obtained carrier densities agree with results using Hall measurements.

Measurement result for SiC on SiC



■ Sample
Size: □12 mm
Epi layer
10 μm (Thickness)
(specification)
Substrate
4° off 4H(0001)
n-type SiC
350 μm (Thickness)
Grown by AIST

■ Tera Evaluator, CV, SIMS
SiC on n-type SiC substrate

■ Hall measurement
SiC on SI-SiC substrate

*Good relations are obseved between 5E15 to 1E17 cm^{-3}.

Not only carrier density, mobility and resistivities, but also thickness are measured simultaneously.