

FLX 2320-S

THERMAL STRESS
Measurement

Toho FLX-2320-S Thin Film Stress Measurement Systems offer industry standard capabilities for mass production and research facilities that demand accurate stress measurements on various films and substrates up to 200mm in diameter. Incorporating KLA-Tencor's patented "Dual Wavelength" technology, Toho FLX Series tools determine and analyze surface stress caused by deposited thin films. The Toho FLX systems offer outstanding value in a variety of comprehensive Stress Measurement Solutions that utilize advanced measurement principles.



Standard Features

Comprehensive Data Analysis

Intuitive Windows 10 based analysis software displays any combination of stress, time, surface deflection, or reflected light intensity measurements.

- Calculation of biaxial modulus of elasticity, linear expansion coefficient, stress uniformity, and file subtraction
- Trend plotting for Statistical Process Control (SPC)
- Calculation of water diffusion coefficient in dielectric films
- Automatic recalculation of stress when film or substrate thickness is corrected
- 2-D and 3-D views of wafer topography
- Plotting of the measured stress-temperature curve

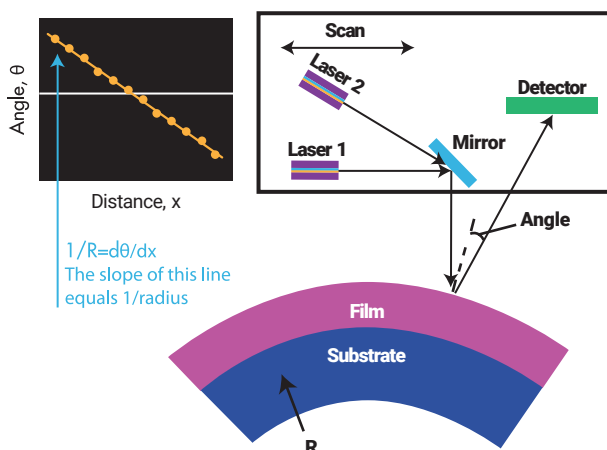
Advanced Laser Technology

The FLX series feature KLA-Tencor's patented dual wavelength technology, which enables the system to select the wavelength most suitable for challenging films such as silicon nitride. In addition only one moving element in the optical component ensures low vibration and high accuracy.

Applications

In general, stress is induced when materials of dissimilar coefficients of thermal expansion are bonded together. Films may behave similarly at high temperatures but as films are cooled, materials may contract/expand differently, thus causing stress in the film. With a stressed film, defects such as dislocations, voids, and cracking may occur. The FLX stress measurement system helps troubleshoot applications listed below:

- Aluminum stress-induced void
- Passivation cracking (nitride oxide)
- Stress-induced dislocations in Si
- Tungsten Silicide cracking
- Stress increase in oxides during temperature cycling
- Matching metallization expansion on GaAs
- Si cracking due to high film stress



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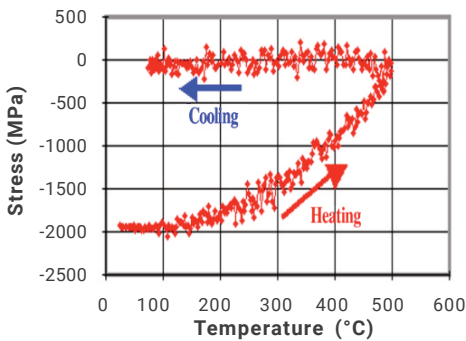
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Temperature measurements are essential for characterizing material properties such as stress relaxation, moisture evolution, and phase changes. Specifically designed for thermal stress applications, the 2320-S is ideal for stress temperature correlations.

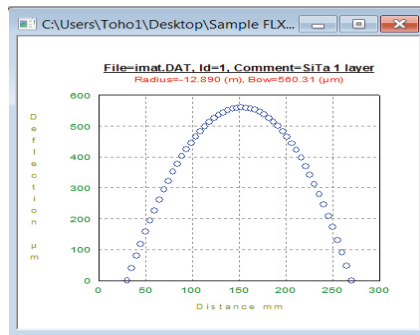
Capable of In-situ stress measurements from Room Temperature to -65°C and from Room Temperature to 500°C with heating rates up to 30°C per minute. The cooling unit which uses LN2 to -65°C is optional.

Data files		Temp	Time	Time	Read	Ramp	Relay	
		°C	Hrs	Min	ing	°C/Min		
id:	1	3	50	00	2	0	0.0	OFF
	4	100	00	2	0	0.0	OFF	
Orientation:	0	5	150	00	2	0	0.0	OFF
	6	200	00	2	0	0.0	OFF	
Comment:	test	7	250	00	30	0	0.0	OFF
	8	300	00	20	0	0.0	OFF	
Film:	10,000 A	9	400	00	10	0	0.0	OFF
		10	500	00	20	0	0.0	OFF
		11	0	00	00	0	0.0	OFF

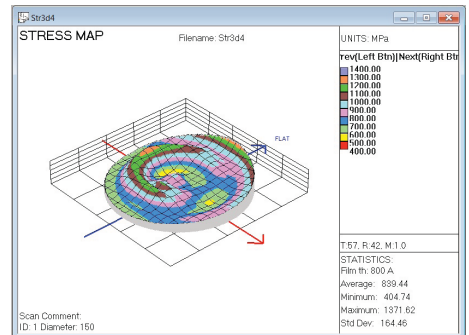
Fully Programmable Temperature Steps



StressTemperature Graph



Deflection over Distance Graph



3-D Stress Map

Specifications

Performance

Scan Range	Programmable up to 200mm
Measurement Range	1 to 4,000MPa ¹
Repeatability	1.3MPa ²
Accuracy	Less than 2.5% or 1 MPa (whichever is larger)
Minimum Radius	2.0m
Maximum Radius	33km
Wafer Sizes (mm)	25, 50, 75, 100, 150, 200mm
Minimum Scan Step	0.02mm
Compliance	Class IIIa 670nm and Class IIIb 780nm 4mW lasers compliant with 21 CFR, Chapter 1 Subchapter J

Notes:

- ¹ 725μm wafer thickness for 10,000Å thin film
- ² (1s): 1 x 10⁷ dyne/cm²

U.S. Patent No.'s 5134303 and 5248889

Options

- 3D Analysis Software
- Calibration Mirror Standards
- Calibration Wafer Standards
- SubAmbient (-65°C) capability
- Substrate Adaptor Rings
25mm to 150mm
- Gas Panel with all flow meters and pressure gauges
- Offline Software