



PICO

series

Picosecond Laser Simulation System PICO-4

PICO-4 Laser Simulation System is intended for single event effects (SEEs) investigations in integrated circuits (ICs) and semiconductor devices (SDs). Picosecond laser source with tunable wavelength allows to simulate ionization tracks produced by particles with various penetration depths in SDs using semiconductor materials with various energy band gap.

PICO-4 includes picosecond diode-pumped solid state (DPSS) laser, optical parametric generator (OPG), high precision computer controlled XYZ translation stage and specialized industrial high-resolution microscope. It generates a train of pulses with wavelengths within 700...1000 and 1150...2200 nm tuning range. 1150...2200 nm range makes it possible to apply two-photon absorption technique for investigation SEEs. Laser source operates at max. 1000 Hz repetition rate or in a single-shot mode.

Laser pulses are focused through a microscope onto the device under test (DUT). A camera attached to the microscope shows the position of the laser beam. Various Mitutoyo® high resolution microobjectives with large working distance (having magnifications between 5× and 100×) can be used, and the spot size of the incident laser beam on DUT surface can be varied between approximately 2.5 and 200 microns.

Devices are scanned under the laser beam to locate sensitive nodes. High-speed digital oscilloscopes, transient digitizers and logic analyzers (not included in the system) capture the response of devices to charges generated in the semiconductor material by the incident laser pulse. The thresholds for SEE can be determined using local laser irradiation technique.

Features

- Modern and reliable DPSS laser+OPG source
- Wavelength ranges of 700...1000 nm and 1150...2200 nm
- Variable laser pulse repetition rate (from 1000 Hz to single-shot)
- High precision object scanning system
- High-resolution Mitutoyo® microobjectives with large working distances
- Accurate synchronization of scanning, irradiation and registration
- Compact design on 1200×1000 mm breadboard
- Fully controlled by PC software with user-friendly interface
- Low maintenance cost

Applications

- Investigation of SEEs:
 - single event upsets (SEU)
 - single event latchup (SEL)
 - single event transients (SET)
- Validating of radiation-hardening techniques
- Testing of radiation hardened designs
- Determination of the most radiation sensitive IC area and operation mode
- Investigation of destructive failures in ICs due to SEL
- Debugging technique for IC testing under ion beam
- On-PCB ICs testing
- Micromachining



Specifications

Parameter	Unit	Value
Laser source type	–	picosecond DPSS Nd ³⁺ :YAG + OPG
Wavelength tuning	nm	700...1000 and 1150...2200
Max. laser pulse energy on DUT ()	μJ	11.5
Laser pulse duration (FWHM)	ps	25
Laser pulse energy stability	%	± 5
Min. laser spot size at 900 nm (1/e ²) for 20×microobjective	μm	3
Attenuation coefficient	–	1 ... 5·10 ⁴ , PC controlled
Pulse repetition rate	Hz	0 ... 1000
Video camera:		
Type	–	Color CCD progressive
Resolution	pixels	1392 × 1040
Max frame rate at full resolution	Hz	17
Spatial resolution	μm/pix.	0.3 (typical for 20×microobjective)
Interface type	–	IEEE 1394a
Microobjectives (standard set):		
Type		Mitutoyo Plan APO NIR
Magnification:		
5×	pcs.	1
20×	pcs.	1
Device positioning system:		
XYZ stage	–	motorized, PC controlled
Min. step (horizontal; vertical)	μm	0.156; 0.125
Travel range (horizontal; vertical)	mm	100; 25
Max. linear speed	μm/s	500
Special mounting / alignment constraints:		
Max. device/PCB size	mm	400
Objective working distance	mm	20 (for 20× microobjective)
Cooling	–	Air convection
Total dimensions (excl. power supply)	mm	1200×1000×800
Power supply:		
Mains type	–	~ 220 V, 50 Hz
Max. power consumption (not incl. PC)	kW	< 1.2
Dimensions	mm	365×392×290
PC software interface	–	English

NOTE: All specifications are subject to change without notice