



PICO

series

Picosecond Laser Simulation System PICO-3

PICO-3 Laser Simulation System is intended for single event effects (SEE) investigations in integrated circuits (ICs) and semiconductor devices (SDs). By varying pulse energy, picosecond laser allows to simulate ionization tracks produced by particles with various linear energy transfer (LET).

PICO-3 includes picosecond diode-pumped solid state (DPSS) laser source, high precision computer controlled XYZ translation stage and specialized industrial high-resolution microscope. It can produce a train of pulses with 1064/532 nm wavelengths at a max. 1000 Hz repetition rate or operate in a single-shot mode. These two wavelengths are generally used to simulate the effects produced by particles with different penetration depths.

Laser pulses are focused through a microscope onto the device under test (DUT). The microscope has two visualization channels equipped with two high resolution VIS and NIR cameras, showing the position of the laser beam for top-side and back-side DUT irradiation correspondingly.

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 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

- Compact, stable and reliable picosecond DPSS laser source
- 1064/532 nm wavelengths available
- 1000 Hz laser pulse repetition rate and single-shot mode
- High precision object scanning system
- High-resolution Mitutoyo® microobjectives with extra large working distances
- Two high-resolution VIS and NIR cameras for top-side and back-side visualization
- Accurate synchronization of scanning, irradiation and registration
- Compact design on 1500×700 mm breadboard
- Fully controlled by PC software with user-friendly interface
- Low maintenance cost

Applications

- Investigation of:
 - 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
- Debugging technique for IC testing under ion beam
- On-PCB ICs testing
- Investigation of destructive failures in ICs due to SEL
- Micromachining



Specifications

| Parameter | Unit | Value |
|---|---------|---|
| Laser type | – | DPSS Nd ³⁺ :YAG |
| Wavelengths | nm | 1064/532 |
| Max. laser pulse energy on DUT | μJ | 8/3 |
| Laser pulse duration (FWHM) | ps | 70 (30 is also available) |
| Laser pulse energy stability | % | ± 3 |
| Min. laser spot size (1/e ²) (for 20×microobjective) | μm | 2.4/1.4 |
| Attenuation coefficient | – | 1 ... 5·10 ⁴ , PC controlled |
| Pulse repetition rate | Hz | 0...1000 |
| Video camera VIS (NIR): | | |
| Type | – | Color CCD progressive (CMOS progressive) |
| Resolution | pixels | 1392×1040 (1280×1024) |
| Max frame rate at full resolution | Hz | 17 (25) |
| Spatial resolution (for 20×microobjective) | μm/pix. | 0.3 |
| Interface type | – | IEEE 1394a |
| Microobjectives: | | |
| 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 |
| 20× microobjective working distance | mm | 20 |
| Cooling | – | Air convection |
| Total dimensions (excl. power supply) | mm | 1500×600×870 |
| Power supply: | | |
| Mains type | – | ~ 220 V, 50 Hz |
| Max. power consumption (not incl. PC) | kW | < 1 |
| Dimensions | mm | 365×320×160 |
| PC software interface | – | English |

NOTE: All specifications are subject to change without notice

