

Laser cutter ONPY-LC1

Extended resources for Failure Analysis (FA) in ONPY

Subject:

This document outlines analytical possibilities of the laser cutter system in ONPY2

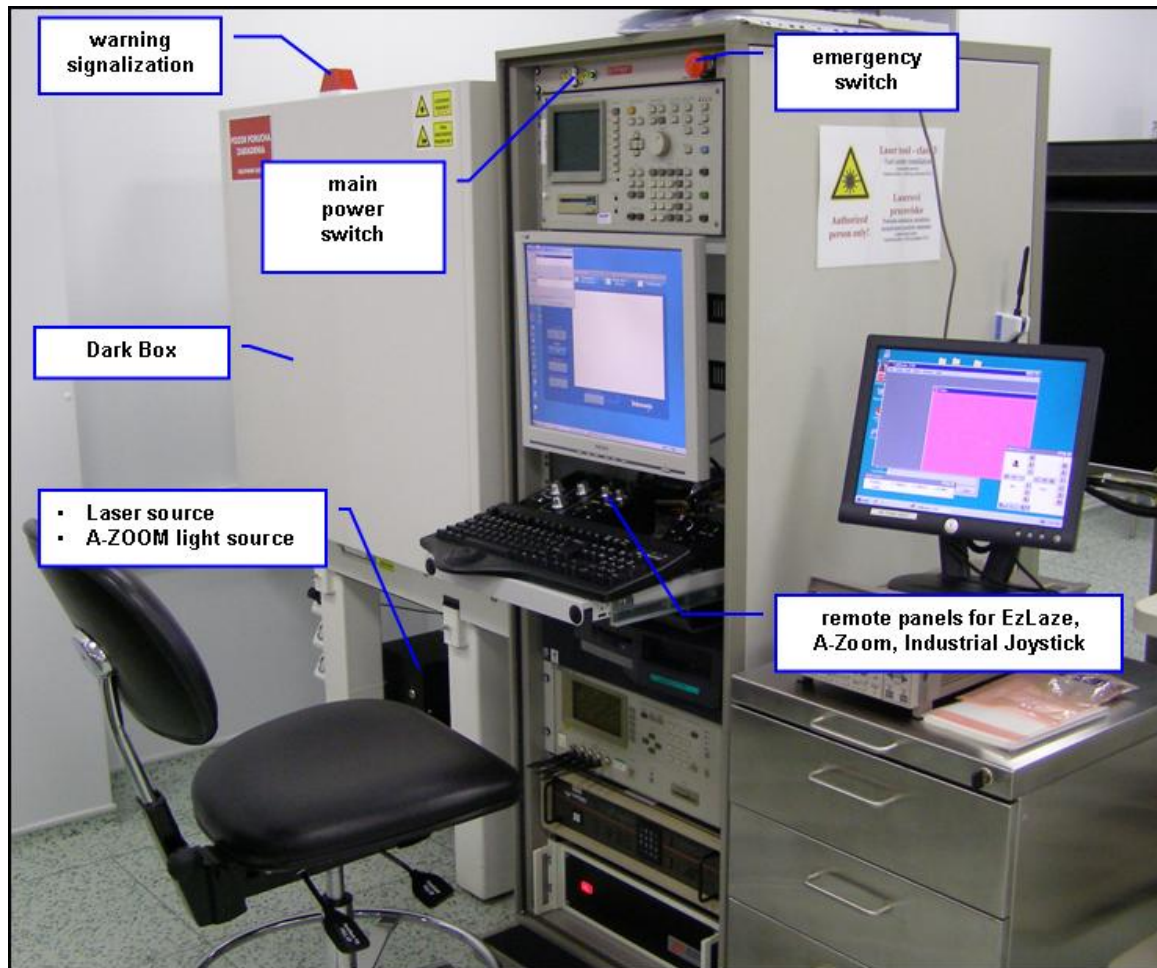
Content:

This system was completed in ONPY for electrical failure analysis. Components from various suppliers were used.

Reference documents

12MON23542D, 12MON22866D

Laser cutter (outline)



Detailed information can be found in 12MON23542D

Laser EzLaze II:

wavelengths:

355 nm (NUV)

533 nm (Green)

Attenuator setting: 0-999

Pulse continual: 1 Hz

Optical system:

A-ZOMM microscope

polarizer/analyzer filters

Magnifications: 20-1500

Objectives:

2x (Aperture=0.055, WD= 34 mm)

20x (Aperture=0.42, WD= 20 mm)

50x NUV * (0.42, WD= 20.5 mm)

100x NUV * (0.5, WD= 13 mm)

(* appropriate for laser cutting)

Prober Wentworth MP-2010

- Motorized X-Y-Z stage

Resolution 0.1 μ m

8" thermo chuck (gold plated)

Theta adjustment +/- 15°

Instrumentation:

HP 4145B semiconductor analyzer

HP4284A RLC meter

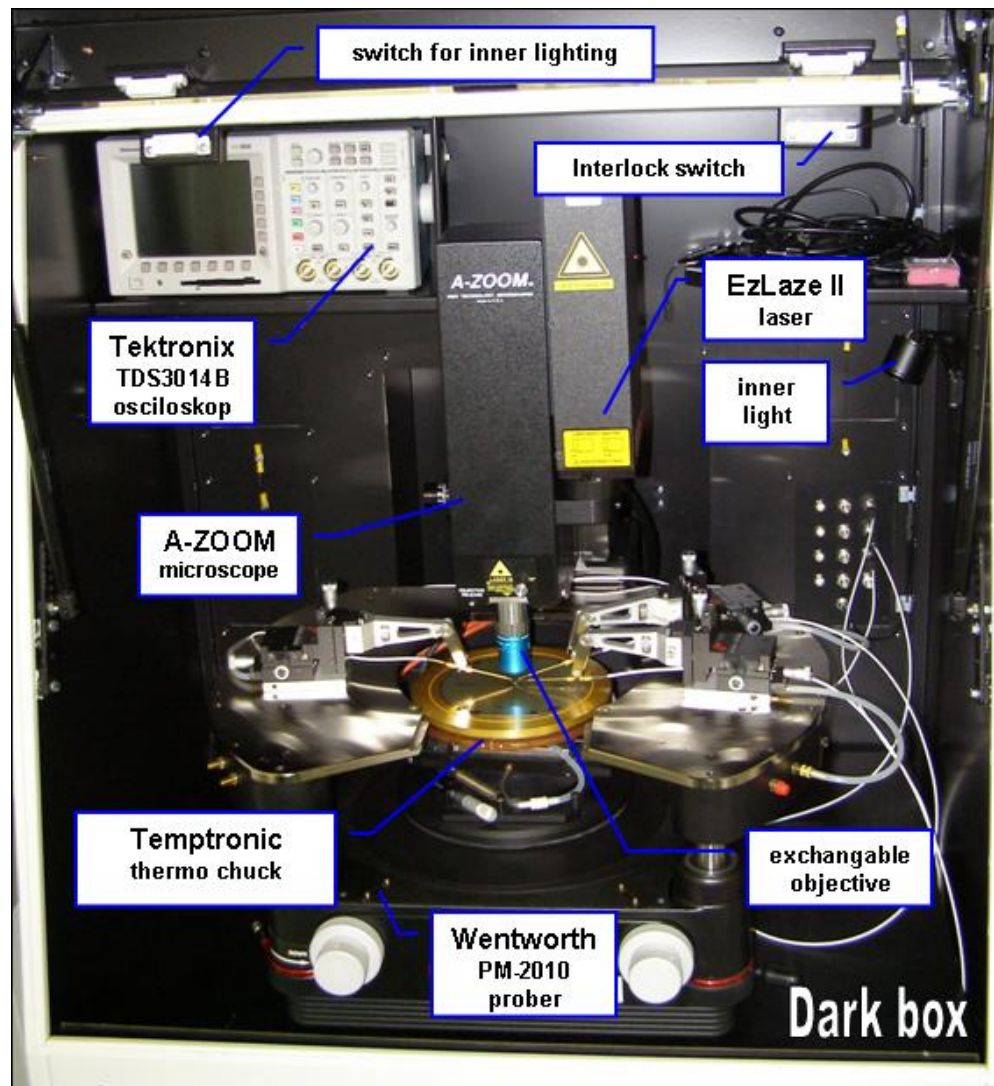
Temptronics TPO3010B thermocont.

Tektronix TDS3014B oscilloscope

Fluke 189 handheld multimeter

Fluke 62 mini IR thermometer

Dark box



Dark box

- EMC isolation
- Optical isolation
- Interlock Switch for safety operation
- Warning signalization

Connector panel with BNC

- 4 x SMU (100 mA max, HP41455B)
- 2 x VMU (Voltage Monitor Units)
- 2 x VSU (Voltage Source Units)
- 2 x RLC meter (HP4284A)
- 1 x Interlock connector
- 1 x 12V light power source connector

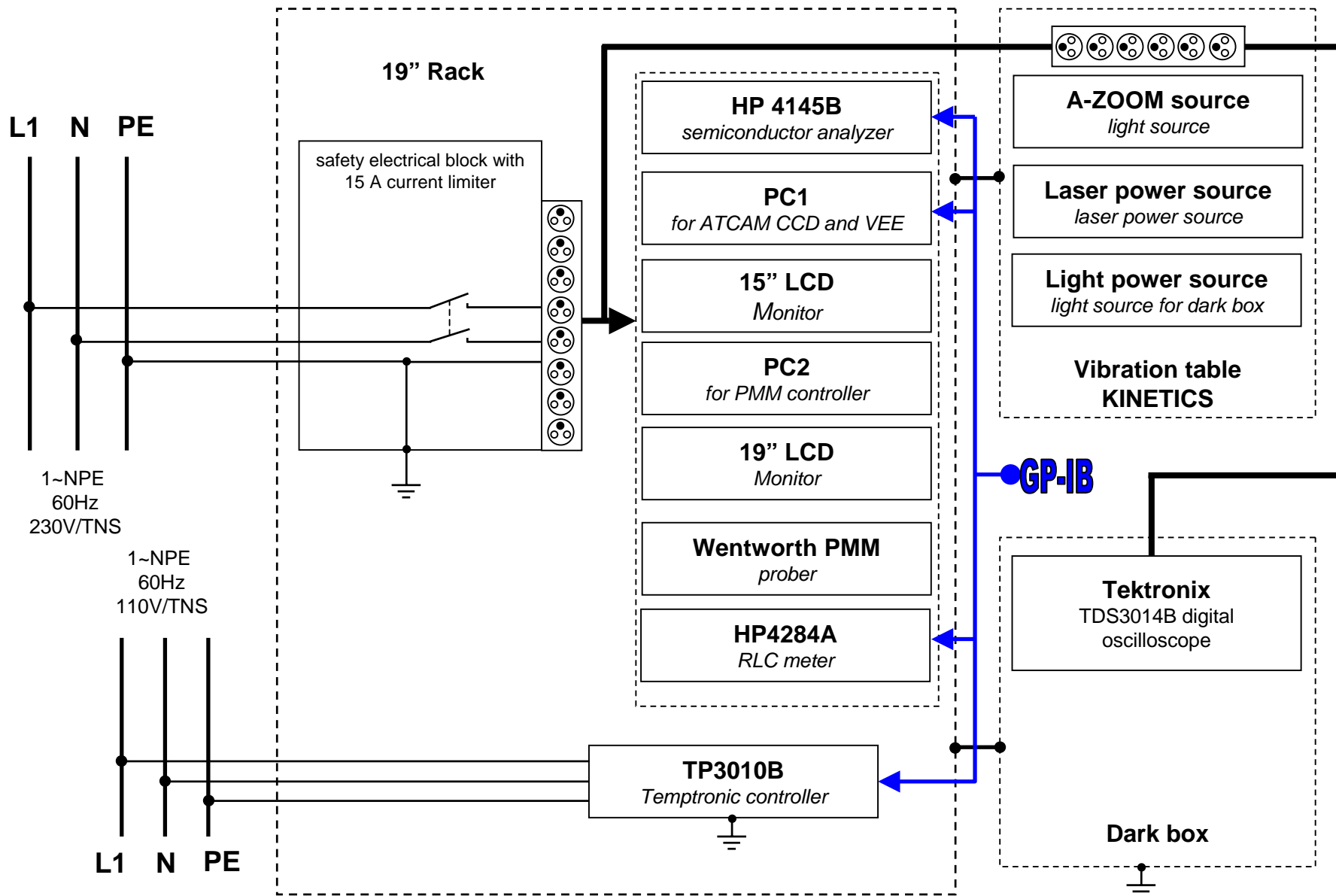
Tektronix TDS3014B

- 4-channel digital storage oscilloscope
- 100 MHz, TCP-IP, GP-IB
- 4 x voltage probe
- 1 x current probe (up to 15A)

Prober

- 4 x precise vacuum micromanipulators determined for micro-probing
- available probe needles with tip diameter 0.25 μm and 0.1 μm
- available probe needles with 1 μm (contact pads)

Electrical installation schematic



Laser cutter system resources

Laser cutting

- cutting SiO₂, SiN, Al, SOG, Poly Si, etc.
- minimum cut size 1 x 1 μm (using objective 100X)
- maximum cut size 50 x 50 μm (using 50X objective)

Thermal liquid crystal analysis

-hot spot analysis

available liquid crystals

LC1: NP4, clearing temperature: 76°C

LC2: ME6N, clearing temperature: 47.5°C

LC3: ME105, clearing temperature: 42,9°C

LC4: BN/R42C1W, clearing temperature: 53,3°C

LC5: K18 (MERK), clearing temperature: 29°C

DC characterization

available:

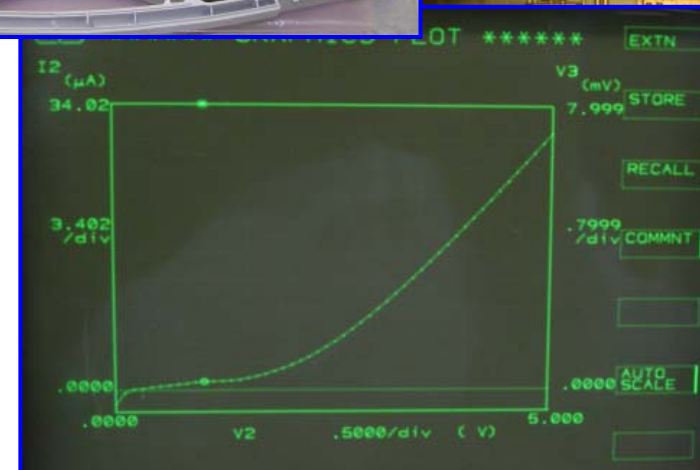
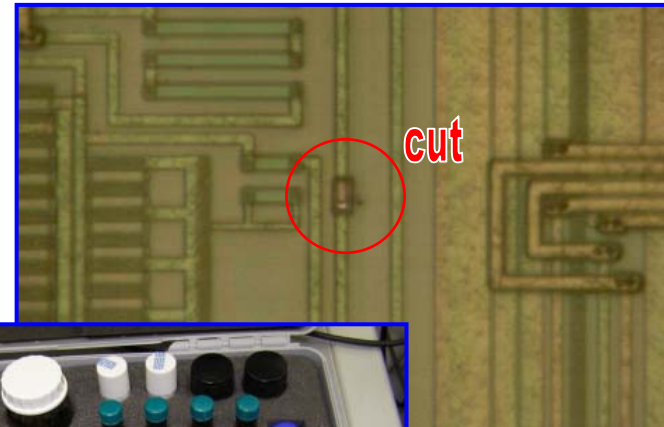
- 4 x SMU, 2 x VMU, 2 x VSU
- 5 x micro-manipulators + Probe card holder
- applicable temperature range from 10°C – 125 °C (see page 7)
- micro-probing

Impedance characterization

- characterization of capacitors, Rs, Rp, G, L, etc.
- applicable temperature range from 10°C – 125 °C
- micro-probing

Automation of measurement

- Agilent VEE 7.5 (Visual Engineering Environment)
- GP-IB, TCP-IP communication



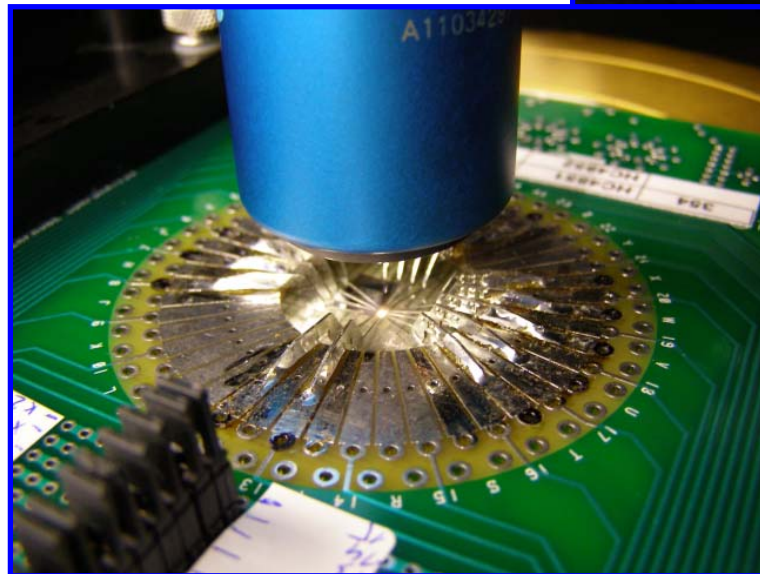
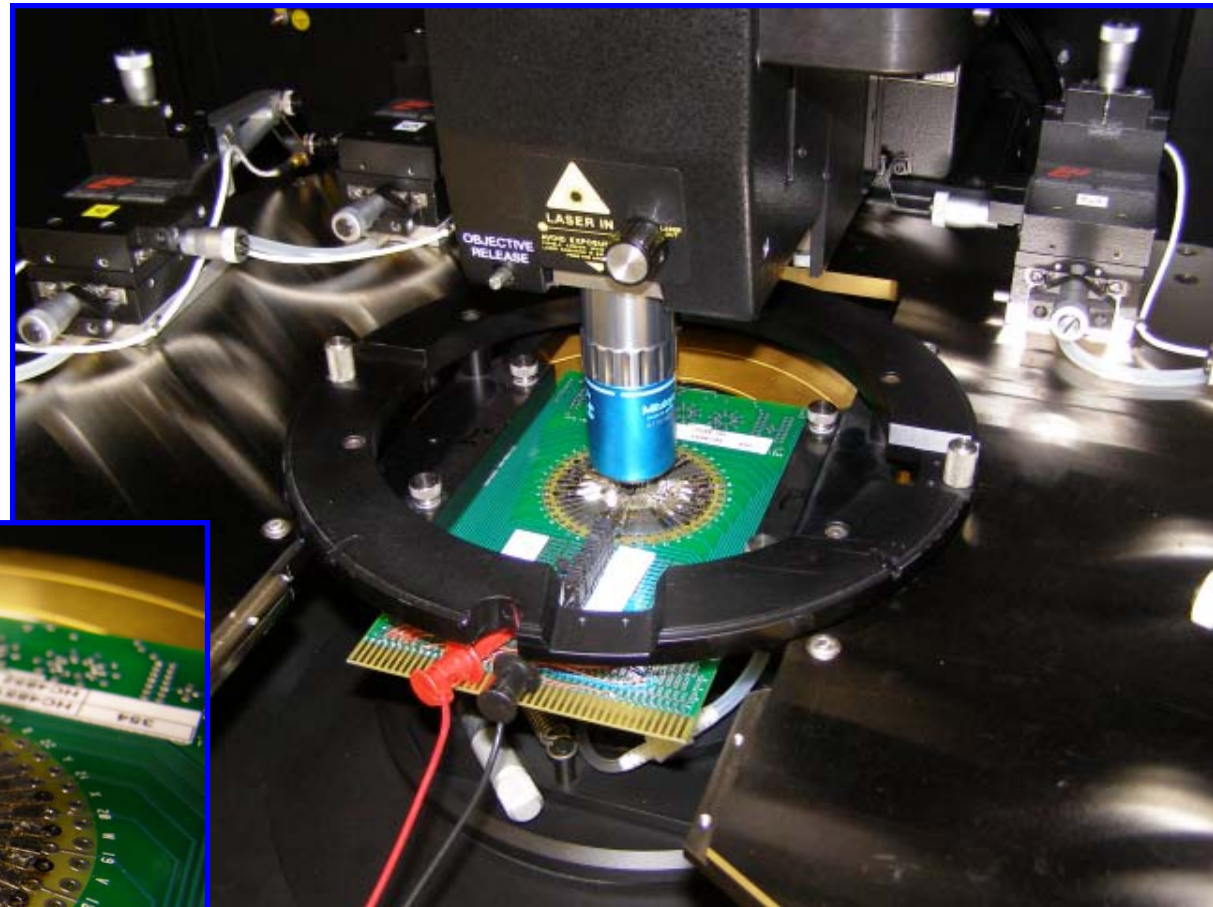
laser cutting with on-line IV monitoring by using probe card with holder

Probe card format:

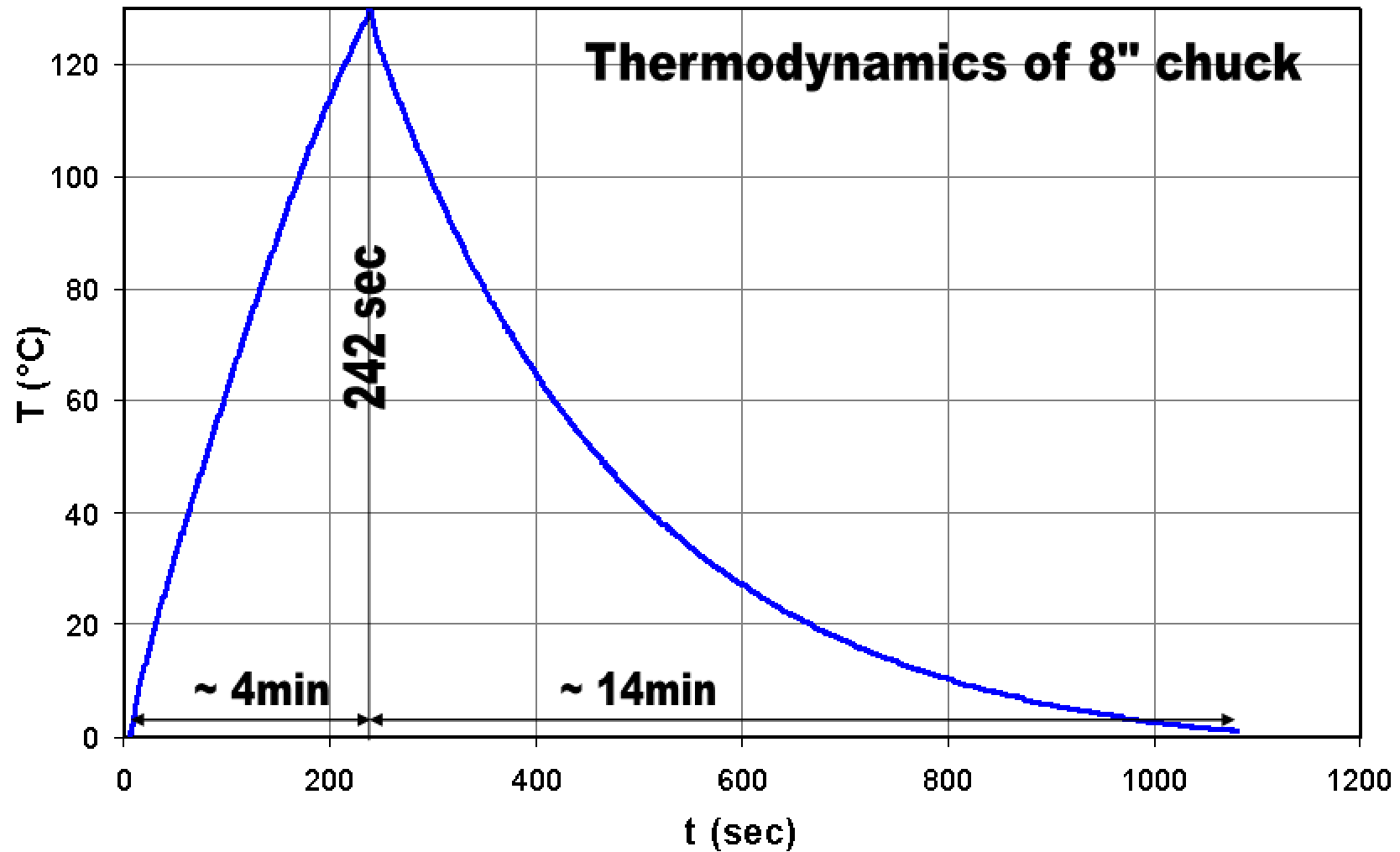
- Electroglas compatible

Available activities in parallel during probing with probe card :

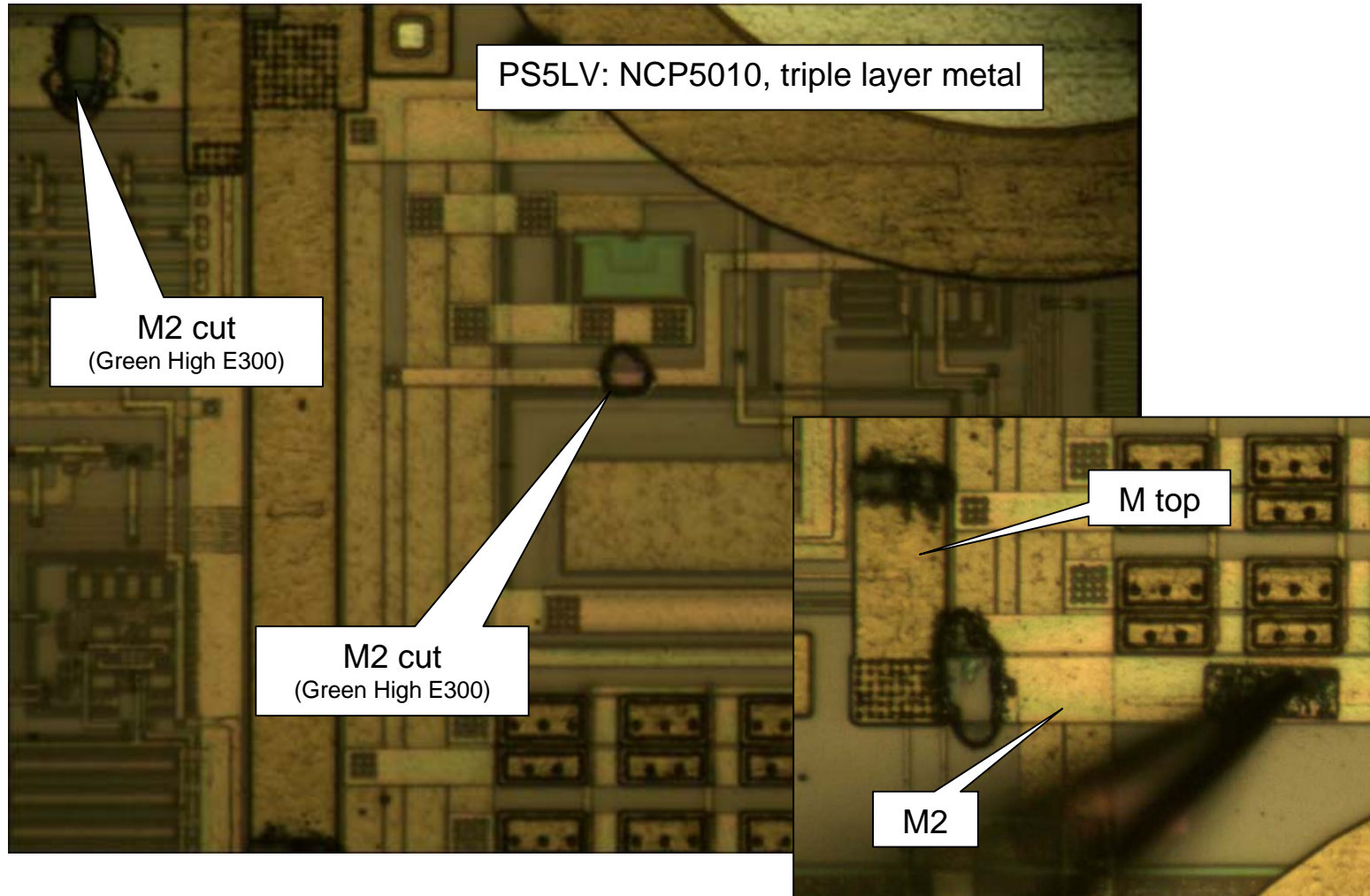
- Laser cutting (due to large working distance of objectives)
- Additional micro-probing
- Liquid crystal analysis
- Thermal conditioning



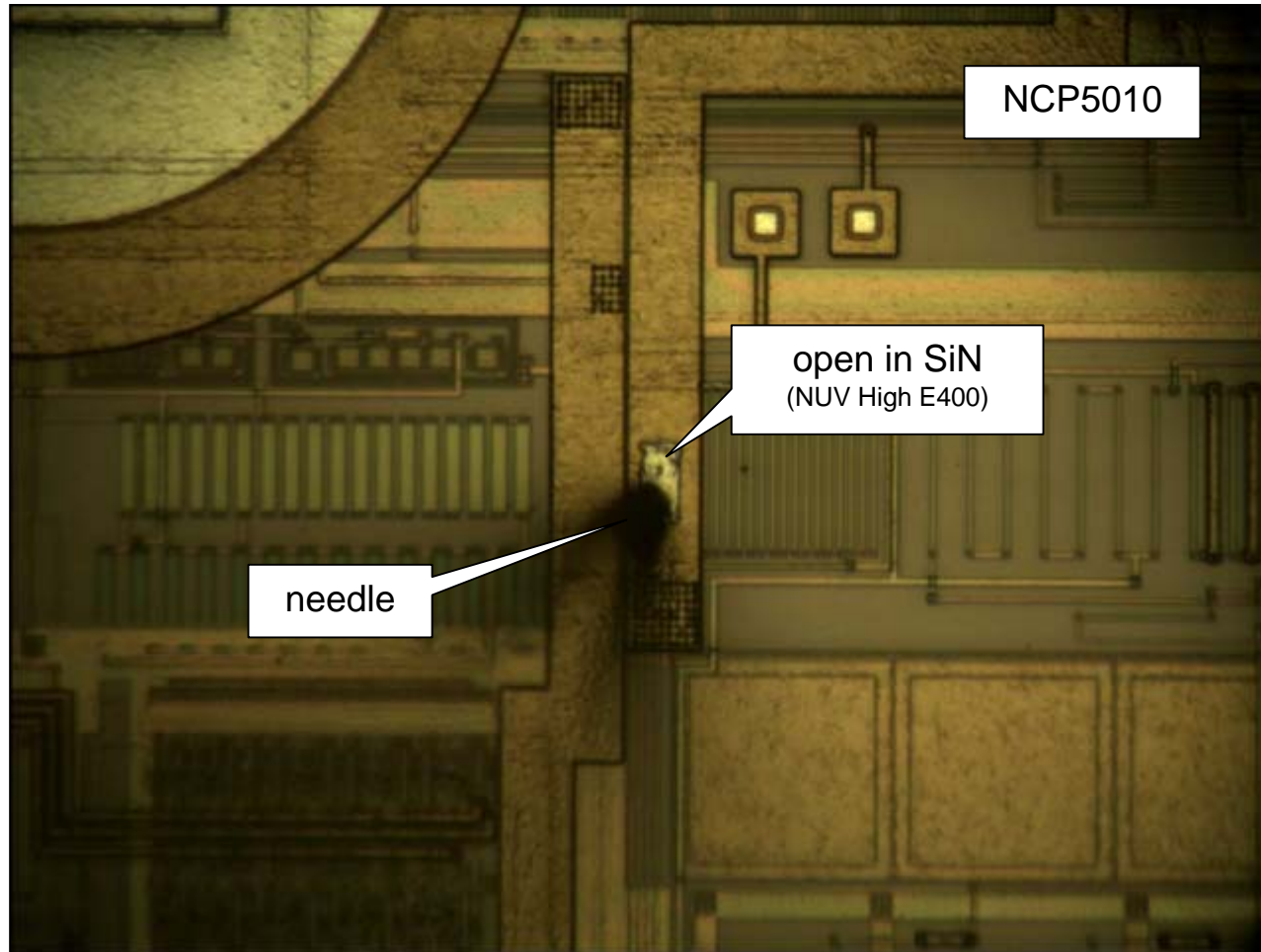
Thermo-chuck characterization *(measured involving Agilent VEE7.5)*



Example of Laser cutting *(Metal2 through SiN-ILD2-SOG-ILD1-AICu0.5 6000A)*



Example of Micro-probing *(to Metal top with opened window in passivation layer)*



Example of Micro-probing *(to Metal2 top with opened window in dielectric layers SiN-ILD2-SOG-ILD1)*

