

Laser-Induced Damage Threshold (LIDT) Measurement Report

ISO21254-2: S-on-1 Test Procedure

Sample: 2-CPW-ZO-L/2-0800

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Tester/date: M. Sciuka / 2015-01-09

Specimen

Name of sample: 2-CPW-ZO-L/2-0800

Type of specimen: Crystal, AR Coating

Storage, cleaning: Plastic box, dust blow off by compressed air

Test specification

Fundamental harmonic of Coherent Libra one-box Ti:Sapphire-based amplifier with integrated oscillator and pump laser; attenuator consist of $\lambda/2$ plate and polarizer pair, online energy monitor and scattered light based damage detection, offline inspection of damage detection using Nomarski microscopy.

Laser parameters used for testing

Central wavelength: 800 nm
Angle of incidence: 0 deg.
Polarization state: linear
Pulse repetition frequency: 1000 Hz
Spatial beam profile in target plane: TEM₀₀
Longitudinal beam profile: Gaussian: Kerr lens mode locked
Beam diameter in target plane ($1/e^2$): 105.2 μm (average from 64 pulses)
Pulse duration: 52 fs

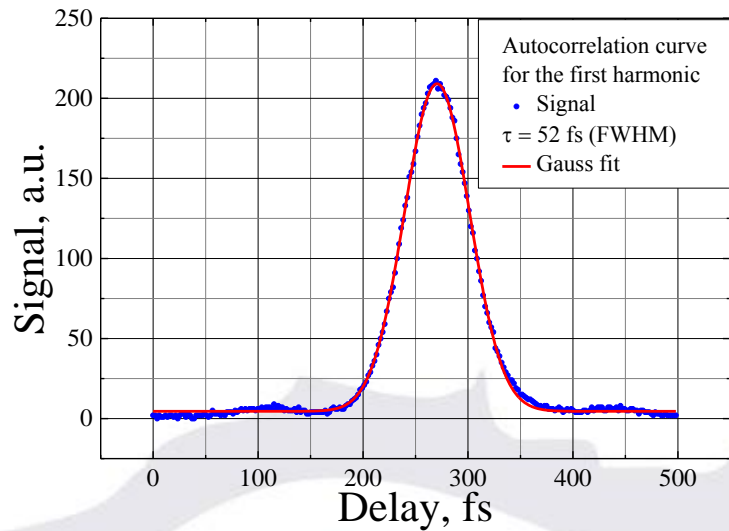
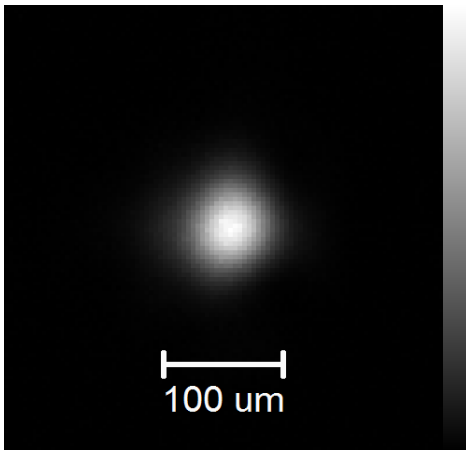


Fig. 1. Spatial beam profile in target plane (left) and pulse autocorrelation curve (right)

Test procedure:

Number of irradiated sites:
Arrangement of test sites:
Minimum distance between sites:
Damage detection:
Test environment:
Storage of the specimen:
Cleaning:
Definition of LIDT:

S-on-1 test

192
Hexagon close packing: equally spaced
450 μm
Scattered light diode/Nomarski microscopy
Industrial environment
Plastic box, normal laboratory conditions
Compressed air
LIDT is defined as a middle fluency point between highest zero and lowest nonzero damage probability points. (See Fig. 2 for details)

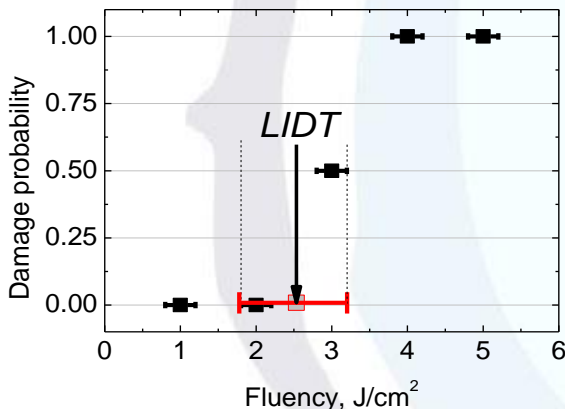


Fig. 2. Definition of LIDT estimated in case of deterministic (fs) damage probability data.

Test result:

Table1. LIDT Results of sample 2-CPW-ZO-L/2-0800

Test mode	Threshold, J/cm ²
1-on-1	0.143 ± 0.006
1000-on-1	0.122 ± 0.008

Measured at LIDARIS 2015-01-09

www.lidarisis.com

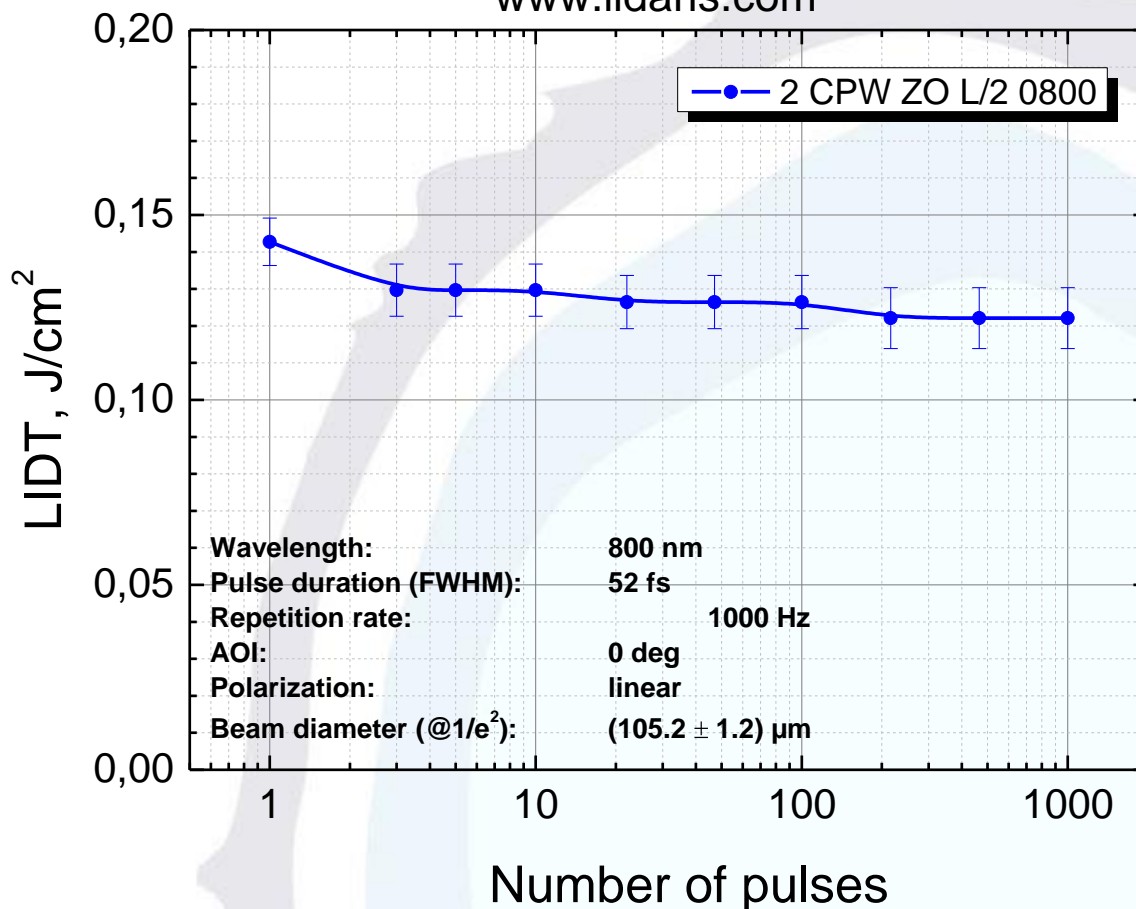


Fig. 3. Characteristic damage curve.

Typical damage morphology:

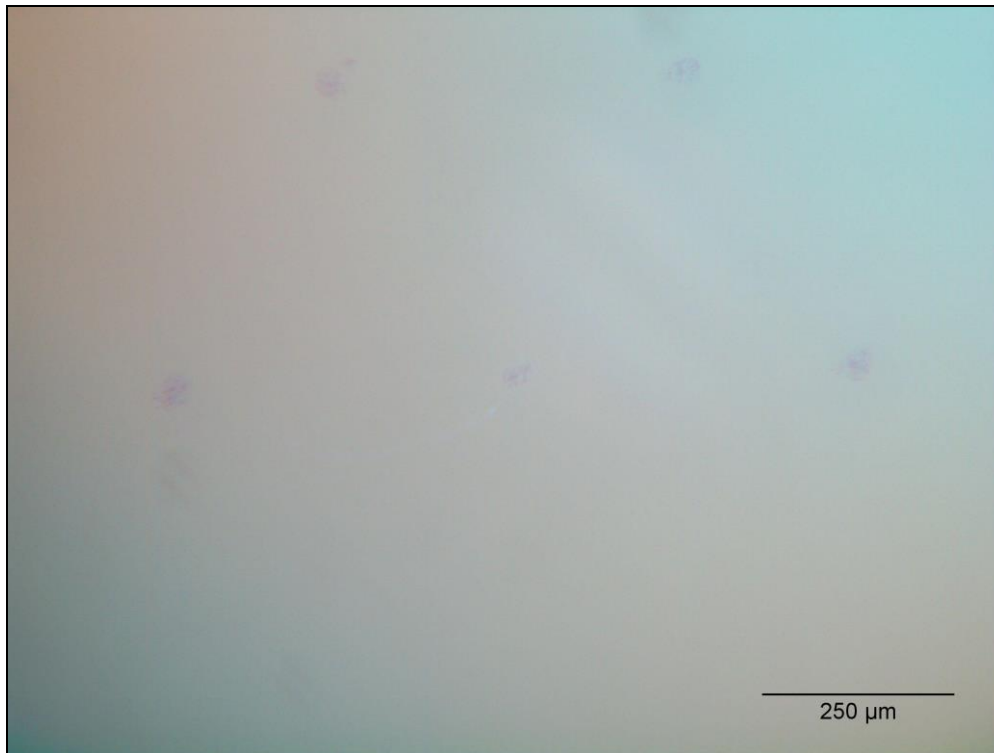


Fig. 4. Typical front surface damage morphology
(Energy density 0.30 J/cm^2 , damage after 1 pulse)



Fig. 5. Typical front surface damage morphology
(Energy density 0.12 J/cm^2 , damage after 1000 pulses)