Laser-Induced Damage Threshold (LIDT) Measurement Report

ISO 21254-2: S-on-1 Test Procedure

Sample: 2-HCBTFP-0355-2040

www.lidaris.com

LIDARIS
LIDT Service

LIDARIS
LIDT Service

Request from:

ALTECHNA Co.Ltd.
Mokslininku st. 6A
LT-08412 Vilnius
Lithuania

Contact person: Saulius Milkintas

Testing institute:

Lidaris Ltd.
Saulėtekio al. 10
LT-10223 Vilnius
Lithuania, EU

Tester/date: E. Pupka / 2016-10-06

Specimen

Name of sample: 2-HCBTFP-0355-2040

Type of specimen: Polarizer

Storage, cleaning: Plastic box

Test specification

Third harmonic of pulsed Nd:YAG InnoLas Laser: SpitLight Hybrid laser (λ = 355 nm, linear polarization, pulse duration 7.8 ns). $\lambda/2$ plate combined with additional polarizer attenuator, online scattered light damage detection, offline damage detection using Nomarski microscopy.

Laser parameters

Wavelength:	355 nm
Angle of incidence:	56 deg.
Polarization state:	linear S and P
Pulse repetition frequency:	100 Hz
Spatial beam profile in target plane:	TEM_{00}
Longitudinal beam profile:	Single mode (SLM)
Beam diameter in target plane $(1/e^2)$:	(175.7 ± 9.5) µm (average from 500 pulses)
Pulse duration:	(7.8 ± 0.4) ns

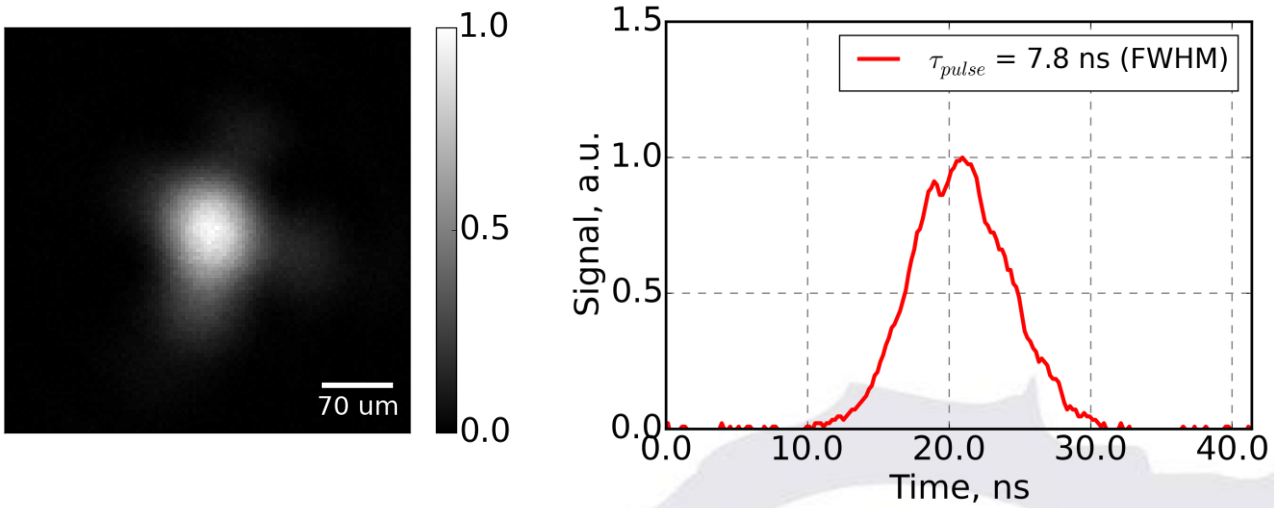

Fig. 1 Spatial beam profile in target plane (left) and temporal pulse profile (right)

Test procedure:	**S-on-1 test**
Number of sites per specimen:	416 (S pol.), 352 (P pol.)
Arrangement of test sites:	Equally spaced
Minimum distance between sites:	540 µm
Damage detection:	Online scattered light diode, offline Nomarski microscopy
Storage of the specimen:	Original packaging, normal laboratory conditions
Test environment:	Industrial environment
Cleaning:	Compressed air
Definition of LIDT:	Nonlinear fit to 0% of damage probability

Test result:

Table 1 Summarized LIDT's for sample 2-HCBTFP-0355-2040.

Test mode	Polarizing surface threshold (S pol.), J/cm2	Polarizing surface threshold (P pol.), J/cm2
10-on-1	2.68 ≤ 3.58 ≤ 4.23	3.96 ≤ 4.40 ≤ 4.72
100-on-1	2.07 ≤ 2.85 ≤ 3.48	3.26 ≤ 3.70 ≤ 4.05
1000-on-1	2.07 ≤ 2.85 ≤ 3.47	3.06 ≤ 3.46 ≤ 3.80

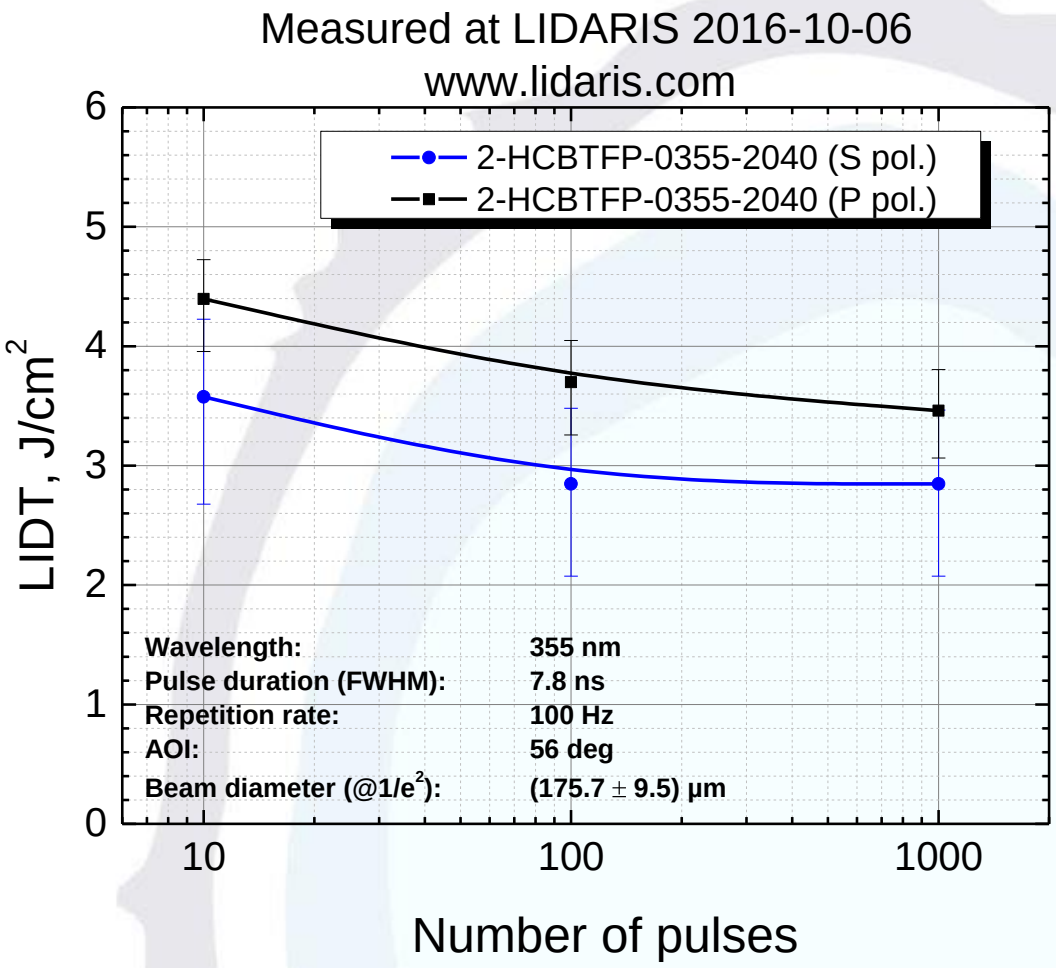

Fig. 2 Characteristic damage curve.

Typical damage morphology:

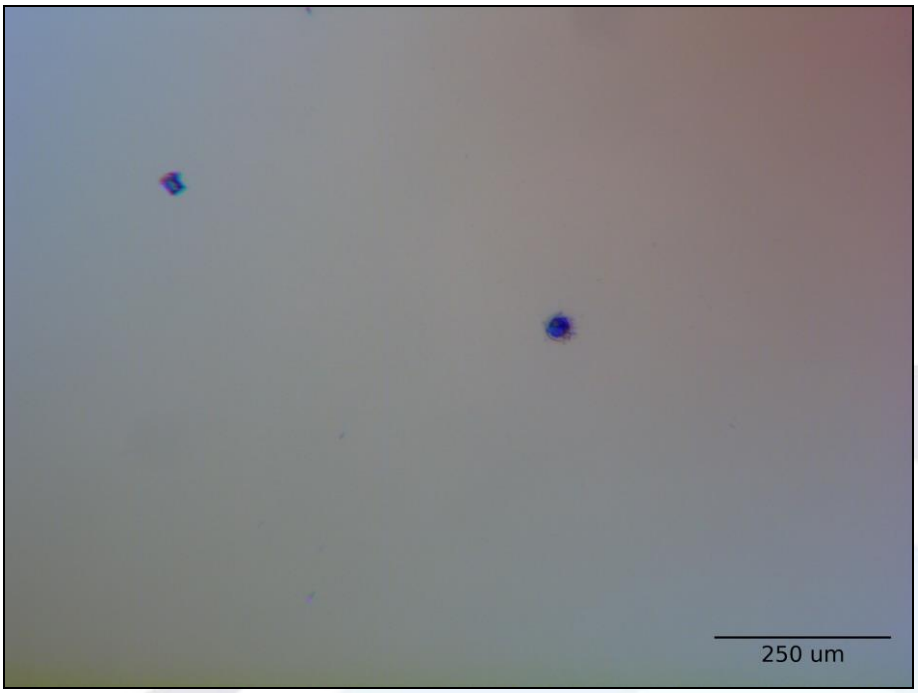

Fig. 3 Typical polarizing surface damage morphology (S pol.)
(Fluence 6.54 J/cm^2, damage after 754 pulses)

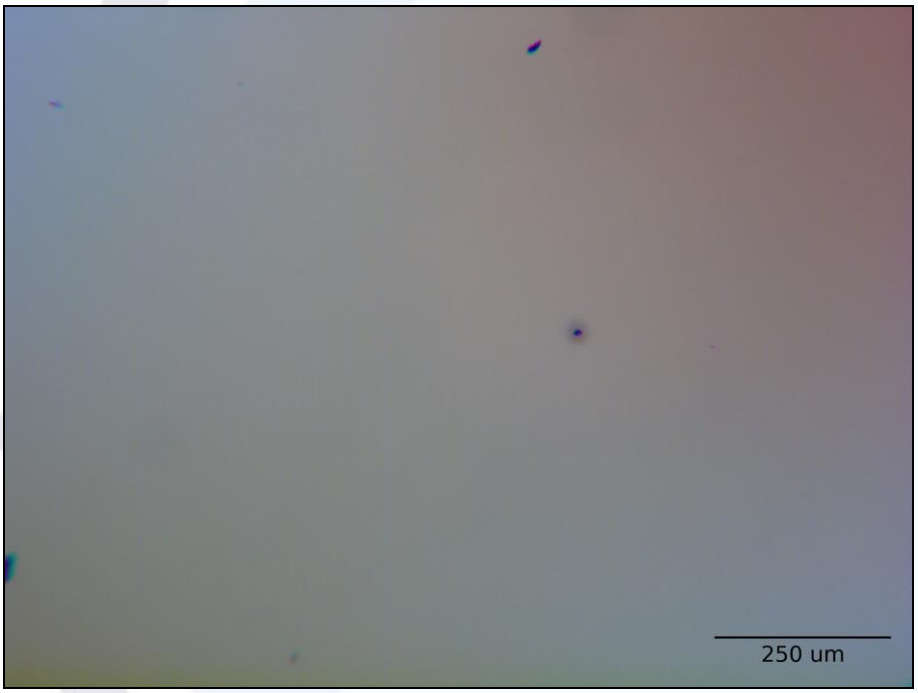

Fig. 4 Typical polarizing surface damage morphology (S pol.)
(Fluence 3.33 J/cm^2, damage after 135 pulses)

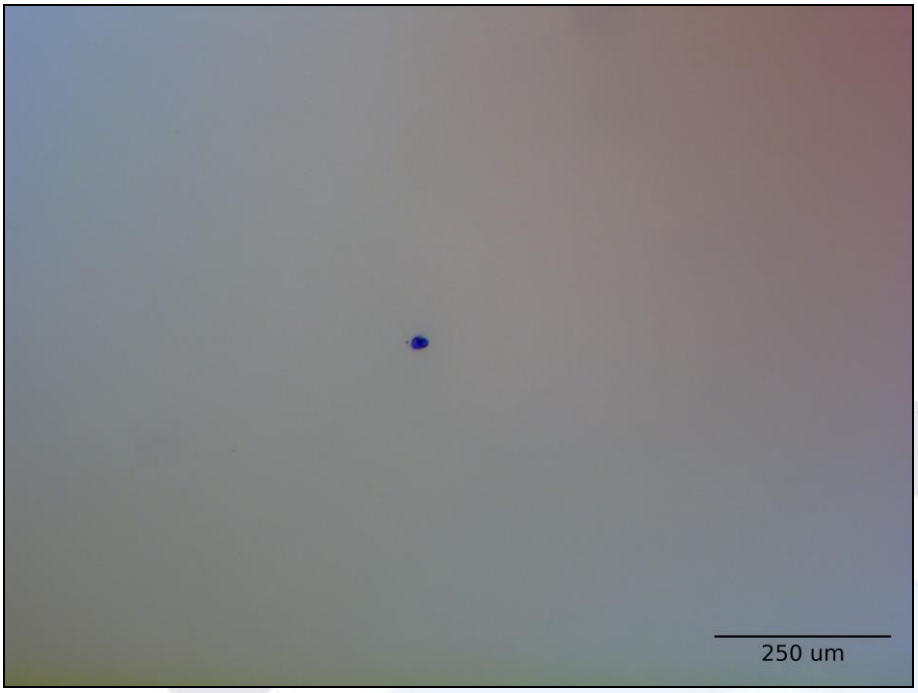

Fig. 5 Typical polarizing surface damage morphology (P pol.)
(Fluence 6.28 J/cm^2, damage after 60 pulses)

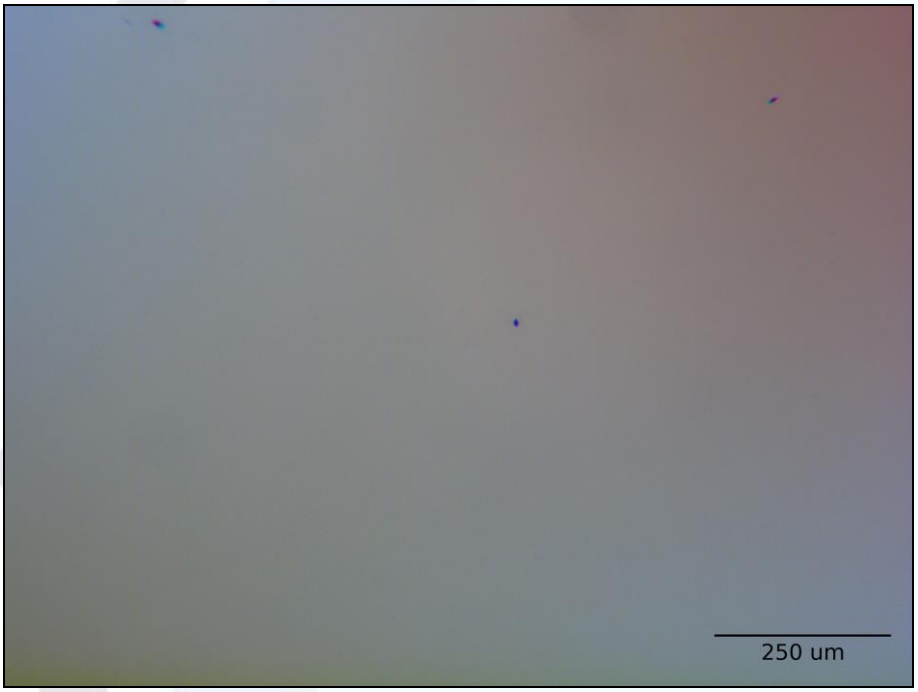

Fig. 6 Typical polarizing surface damage morphology (P pol.)
(Fluence 3.14 J/cm^2, damage after 69 pulses)

Technical Note

According to the ISO 21254-2 norm for spatial beam profiling perpendicular to the direction of beam propagation and angles of incidence differing from 0 degrees, the cosine of the angle of incidence has to be included in the calculation of the effective area. Therefore the beam diameter increase due to the angle of incidence (AOI) is taken into account when calculating the laser fluence.

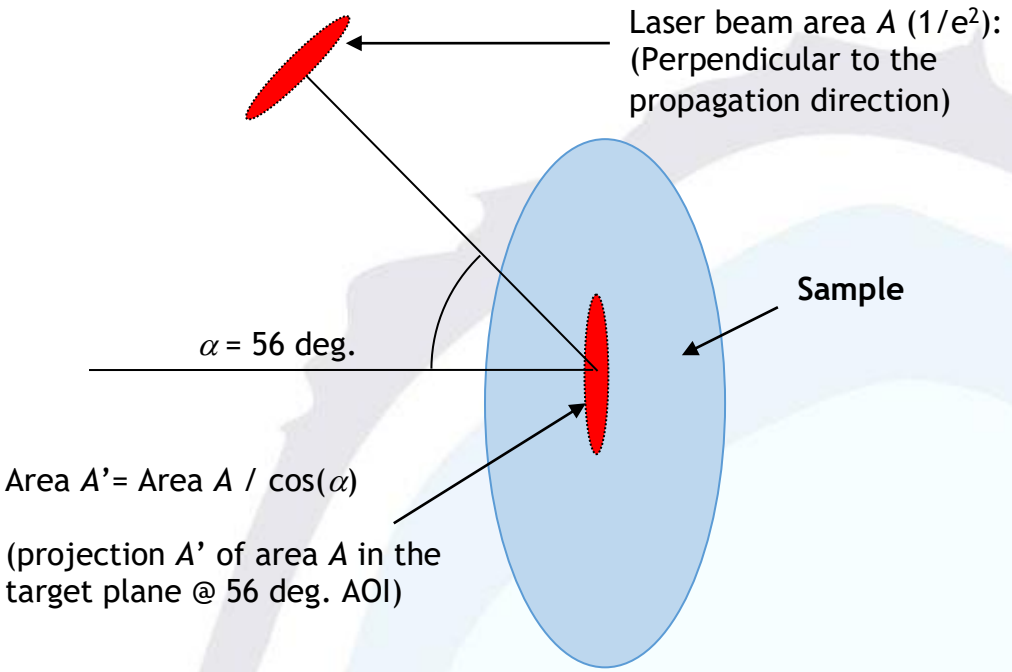

Fig. 7 Oblique incidence.