LIDARIS
LIDT Service

LASER-INDUCED DAMAGE THRESHOLD (LIDT) MEASUREMENT REPORT

R-ON-1 (CONDITIONING) TEST PROCEDURE

SAMPLE: SAMPLE

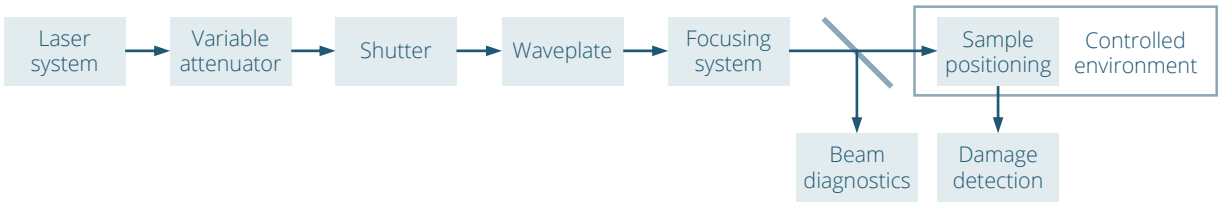
Request from	
Address	Company Address Line 1 Address Line 2 Country
Contact person	Name Surname
Inquiry ID	Inquiry ID: 0001
Purchase order	-

Testing institute	
Address	UAB Lidaris Saulėtekio al. 10 10223 Vilnius Lithuania
Tester	Name Surname
Test date	01/01/2025
Sale order	SO0001
Test ID	–

Specimen	
Name	Sample
Type	AR Coating (AR @ 1053 nm, AOI = 0 deg)
Dimensions	Ø25.4 x 6.0 mm
Packaging	Paper

TEST EQUIPMENT

Test setup

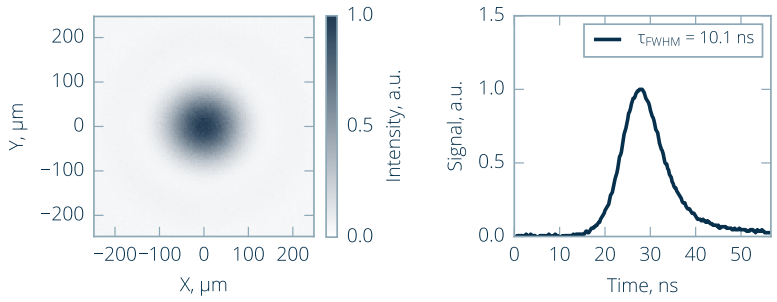


Laser and its parameters

Type	Q-switched, seeded Nd:YAG
Manufacturer	InnoLas Laser II
Model	SpitLight Hybrid
Central wavelength	1064.0 nm
Angle of incidence	0.0 deg
Polarization state	Linear
Pulse repetition frequency	100 Hz
Spatial beam profile in target plane	TEM00
Beam diameter in target plane ($1/e^2$)	(222.1 ± 3.5) µm
Longitudinal pulse profile	Single longitudinal mode
Pulse duration (FWHM)	(10.1 ± 0.3) ns
Pulse to pulse energy stability (SD)	0.7 %

Energy/power meter

Manufacturer	Ophir
Model	PE50-DIF-C
Calibration due date	2027-12-31



(a) Beam profile (b) Pulse profile

Figure 1. Laser parameters used for measurements.

TEST SPECIFICATION

Definitions and test description

Laser-induced damage (LID) is defined as any permanent laser radiation induced change in the characteristics of the surface/bulk of the specimen which can be observed by an inspection technique and at a sensitivity related to the intended operation of the product concerned. Laser-induced damage threshold (LIDT) is defined as the highest quantity of laser radiation incident upon the optical component for which the extrapolated probability of damage is zero. [1]

R-on-1 test uses multiple pulses when irradiating single site of the sample. Starting from very low values fluence is constantly increased step by step until damage is reached.

Test sites

Number of sites	4
Arrangement of sites	Hexagonal
Minimum distance between sites	900 µm
Start fluence	4.0
Fluence step	4.0
Pulses per fluence level	100

Analysis information

Online detection	Scattered light diode
Offline detection	Nomarski microscope
Software version	9418cf45

Test environment

Environment	Air
Cleanroom class (ISO 14644-1)	ISO7
Pressure	1 bar
Temperature	22.5 C
Humidity	33.0 - 33.1 %

Sample preparation

Storage before test	Normal laboratory conditions
Dust blow-off	Compressed air
Cleaning	Butyl Acetate

[1] ISO 21254-1:2011: Lasers and laser-related equipment - Test methods for laser-induced damage threshold - Part 1: Definitions and general principles, International Organization for Standardization, Geneva, Switzerland (2011)

LIDT TEST RESULTS

R-ON-1 LIDT

Table 1: Evaluated R-on-1 LIDT for sample Sample.

Test mode	Threshold
R(100)-on-1	$42.4\ ^{+5.0}_{-4.7}$ J/cm^2

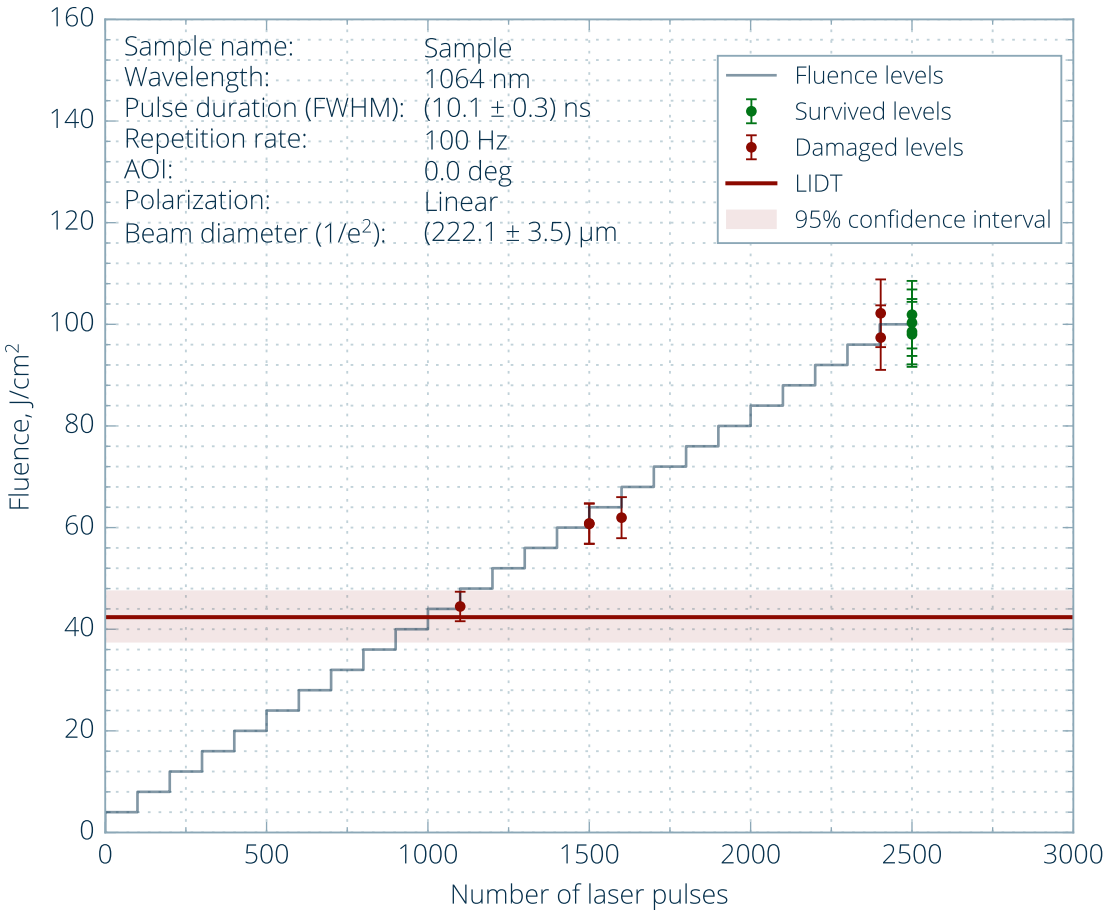


Figure 2. R-on-1 test results.

TEST POINTS

Table 2: R-on-1 damaged test points for sample Sample.

Test mode	Damaging level	Mean fluence	Number of pulses
R(100)-on-1	11	$44.5\ ^{+2.9}_{-2.9}$ J/cm^2	100
R(100)-on-1	15	$60.7\ ^{+4.0}_{-4.0}$ J/cm^2	100
R(100)-on-1	15	$60.8\ ^{+4.0}_{-4.0}$ J/cm^2	100
R(100)-on-1	16	$62.0\ ^{+4.0}_{-4.0}$ J/cm^2	100
R(100)-on-1	25	$97.4\ ^{+6.4}_{-6.4}$ J/cm^2	3
R(100)-on-1	survived	$98.0\ ^{+6.4}_{-6.4}$ J/cm^2	-
R(100)-on-1	survived	$98.6\ ^{+6.4}_{-6.4}$ J/cm^2	-
R(100)-on-1	survived	$100.3\ ^{+6.5}_{-6.5}$ J/cm^2	-
R(100)-on-1	survived	$101.9\ ^{+6.6}_{-6.6}$ J/cm^2	-
R(100)-on-1	25	$102.2\ ^{+6.7}_{-6.7}$ J/cm^2	3

- ”Survived” label for the test points represents that no damages were found on the test surface in the exposition area. Exposition of survived test point could be stopped by the Online detection before the maximum fluence was reached in R-on-1 test procedure. Premature termination of exposition could be caused by damages in the Bulk or the Rear surface, radiation scattering from the boundaries of the sample or other technical issues.

TYPICAL DAMAGE MORPHOLOGY

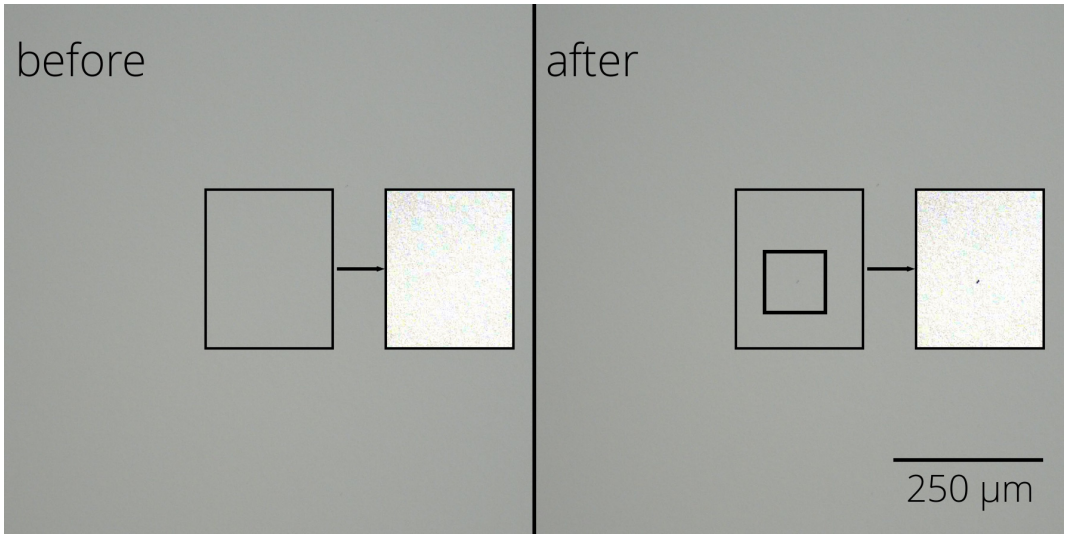


Figure 3. Typical damage morphology: fluence 44.5 J/cm^2, damage after 100 pulse(s) in fluence level. High contrast image.

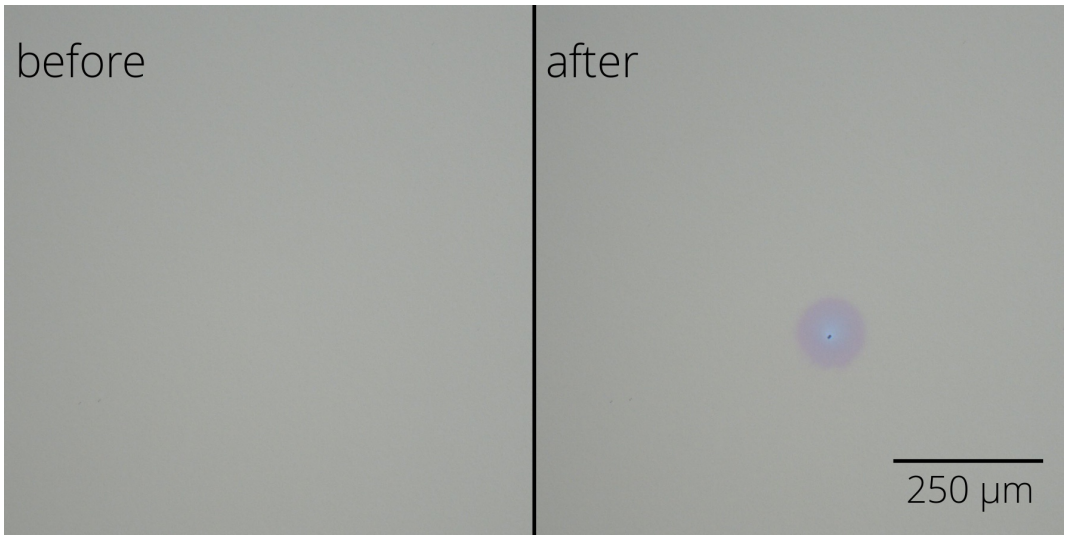


Figure 4. Typical damage morphology: fluence 60.7 J/cm^2, damage after 100 pulse(s) in fluence level.

Figure 5. Typical damage morphology: fluence 60.8 J/cm^2, damage after 100 pulse(s) in fluence level.

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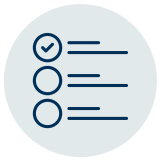

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