

SO05926



LASER-INDUCED DAMAGE THRESHOLD (LIDT) MEASUREMENT REPORT

LIDT ISO S-ON-1 TEST PROCEDURE

SAMPLE: CAM364 A1

Request from

Address	Optoman Ukmergės pl. 427 LT-14183 Vilnius Lithuania
Contact person	Vaida Grašytė
Inquiry date	2025-07-31
Purchase order	PO12638

Testing institute

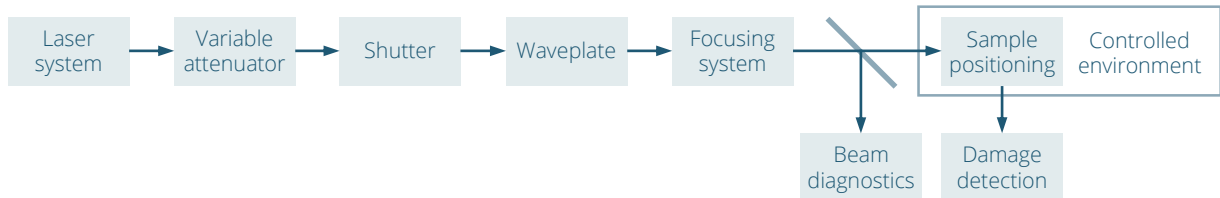
Address	UAB Lidaris Saulėtekio al. 10 LT-10223 Vilnius Lithuania
Tester	Dovile Pamedytyte
Test date	2025-08-06
Sale order	SO05926
Test ID	EN3Z3L

Specimen

Name	CAM364 A1
Front surface (S1)	AR Coating (AR@355)
Rear surface (S2)	Uncoated
Dimensions	Ø25.4 x 6.4 mm
Packaging	Plastic box

TEST EQUIPMENT

Test setup



Laser and its parameters

Type	Q-switched, seeded Nd:YAG
Manufacturer	InnoLas Laser II
Model	SpitLight Hybrid
Central wavelength	355.0 nm
Angle of incidence	0.0 Deg
Polarization state	Linear (Aol = 0)
Pulse repetition frequency	100 Hz
Spatial beam profile in target plane	TEM00
Beam diameter in target plane (1/e ²)	(225.5 ± 3.9) μm
Longitudinal pulse profile	Single longitudinal mode
Pulse duration (FWHM)	(5.3 ± 0.3) ns
Pulse to pulse energy stability (SD)	1.1 %

Energy/power meter

Manufacturer	Ophir
Model	PE50-DIF-C
Calibration due date	2025-10-31

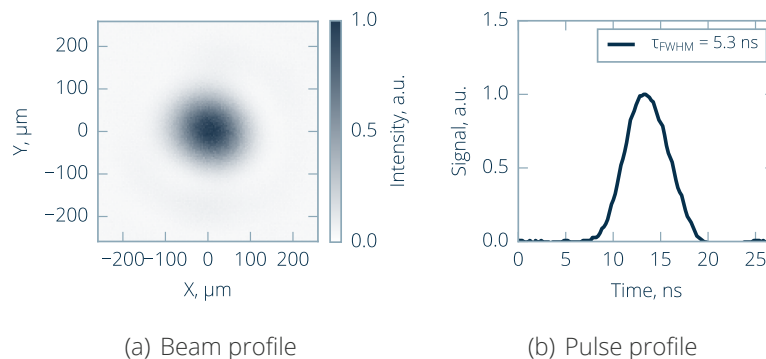


Figure 1. Laser parameters used for measurements.

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

LID of the sample is investigated by performing a standardized S-on-1 test procedure.² LIDT value is determined by fitting experimental damage probability data with a model derived for a Poisson damage process assuming degenerate defect ensemble.³

Test sites

Number of sites	419
Arrangement of sites	Hexagonal
Minimum distance between sites	900 µm
Maximum pulses per site	1000

Analysis information

Online detection	Scattered light diode
Offline detection	Nomarski microscope
Software version	3432eeb7

Test environment

Environment	Air
Cleanroom class (ISO 14644-1)	ISO7
Pressure	1 bar
Temperature	22.1 - 22.5 C
Humidity	55.4 - 59.7 %

Sample preparation

Storage before test	Normal laboratory conditions
Dust blow-off	None
Cleaning	None

¹ISO 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)

²ISO 21254-2:2011: Lasers and laser-related equipment - Test methods for laser-induced damage threshold - Part 2: Threshold determination, International Organization for Standardization, Geneva, Switzerland (2011)

³J. Porteus and S. Seitel, Absolute onset of optical surface damage using distributed defect ensembles, Applied Optics, 23(21), 3796-3805 (1984)

LIDT TEST RESULTS

LIDT VALUE

10^3 -on-1	$15.907^{+0.094}_{-0.367} \text{ J/cm}^2$
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CHARACTERISTIC DAMAGE CURVE

Table 1: Estimated LIDTs from fitting model for sample CAM364 A1.

Test mode	Threshold (Offline detection - microscopy)	Threshold (Online detection - scattering)
1-on-1	$19.925^{+0.187}_{-0.807} \text{ J/cm}^2$	$21.84^{+0.26}_{-0.84} \text{ J/cm}^2$
10-on-1	-	$21.84^{+0.20}_{-0.84} \text{ J/cm}^2$
10^2 -on-1	-	$17.79^{+0.21}_{-0.51} \text{ J/cm}^2$
10^3 -on-1	$15.907^{+0.094}_{-0.367} \text{ J/cm}^2$	$17.69^{+0.31}_{-0.64} \text{ J/cm}^2$

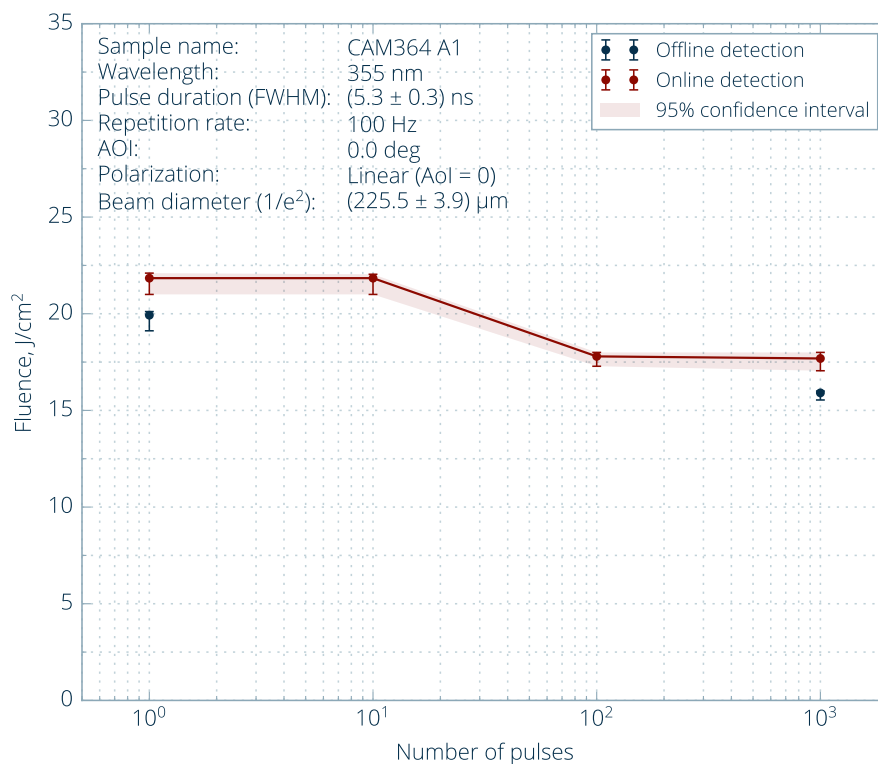
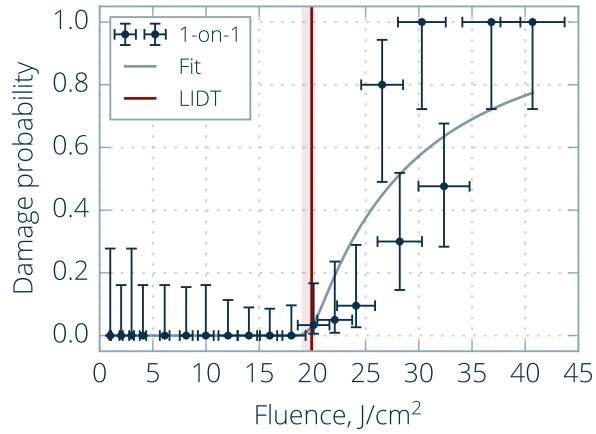
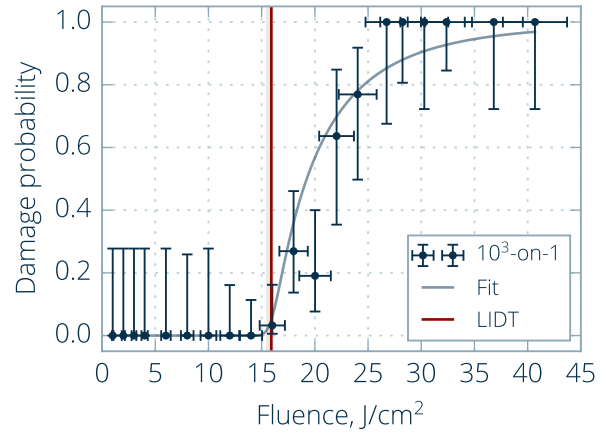


Figure 2. Characteristic damage curve.

DAMAGE PROBABILITY (OFFLINE DETECTION)



(a) 1-on-1



(b) 10³-on-1

Figure 3. Damage probability plots.

TYPICAL DAMAGE MORPHOLOGY (OFFLINE DETECTION)

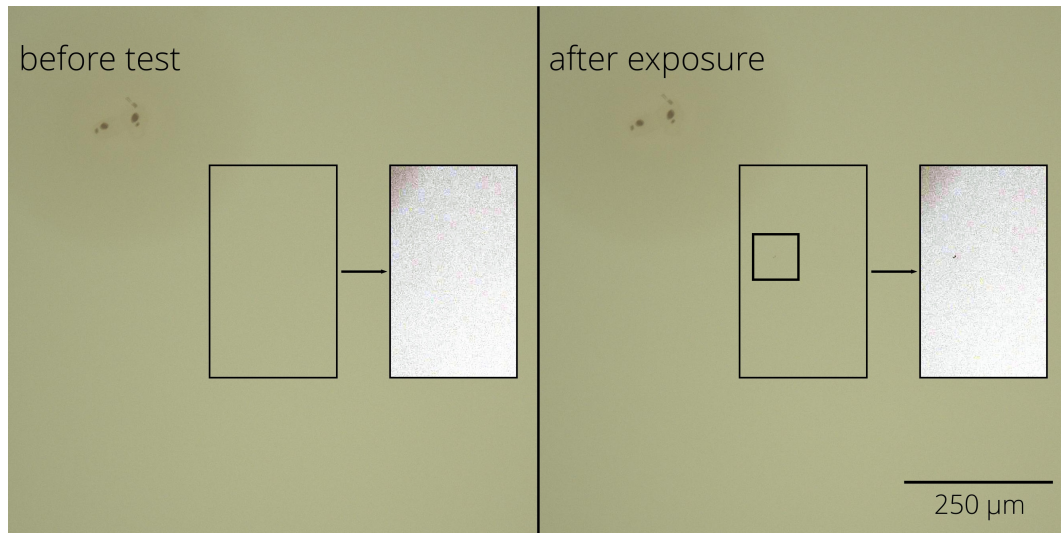


Figure 4. Typical damage morphology: fluence 16.0 J/cm^2 , damage after 1000 pulse(s). High contrast image.

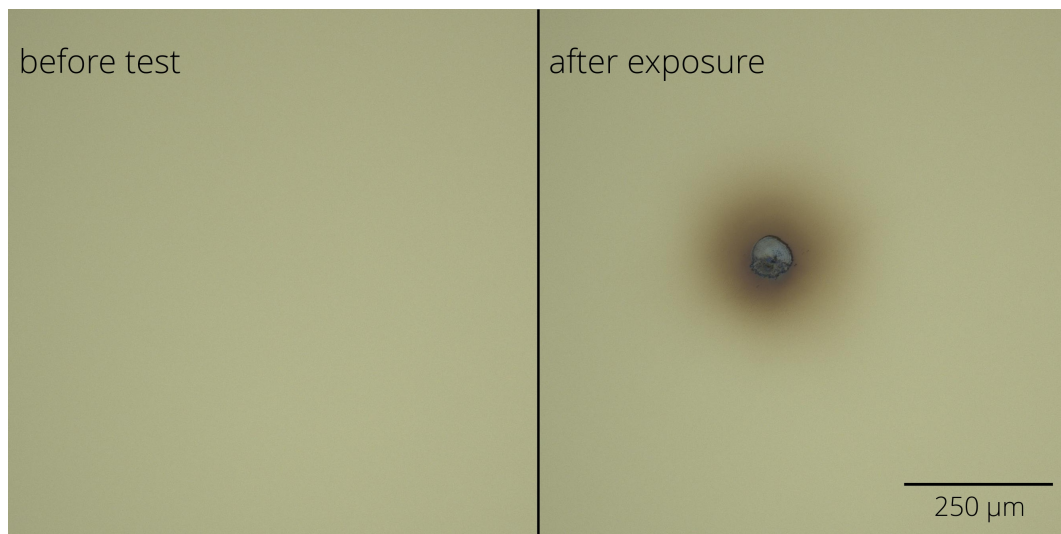
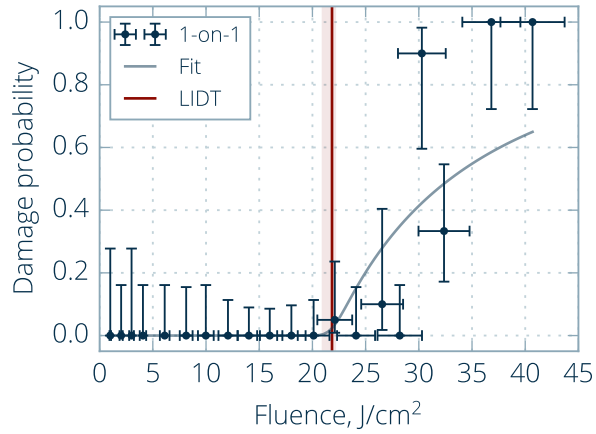
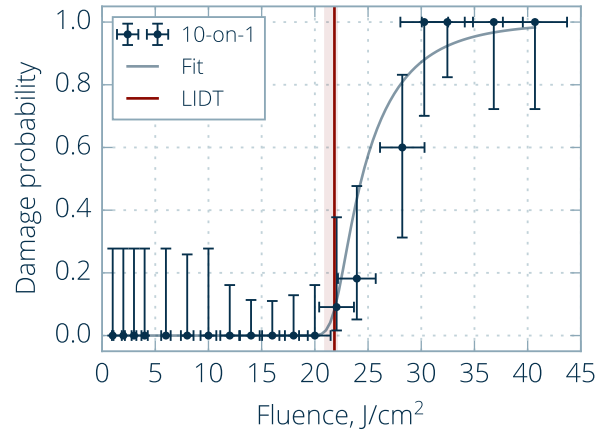


Figure 5. Typical damage morphology: fluence 23.8 J/cm^2 , damage after 154 pulse(s).

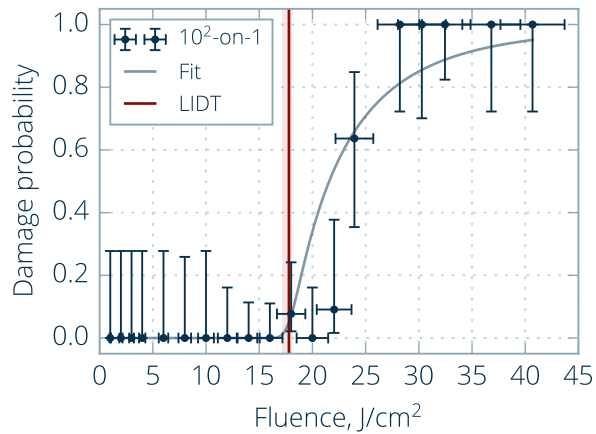
DAMAGE PROBABILITY (ONLINE DETECTION)



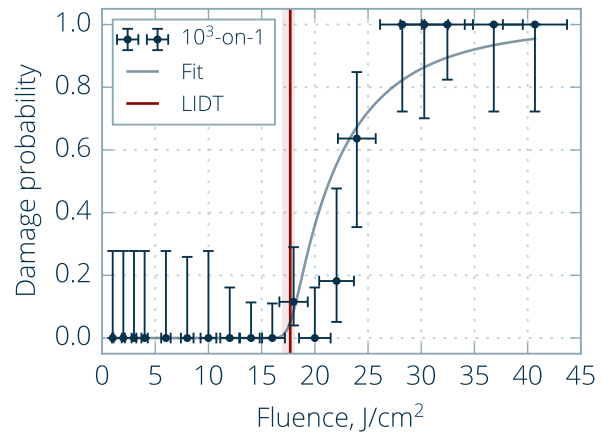
(a) 1-on-1



(b) 10-on-1



(c) 10²-on-1



(d) 10³-on-1

Figure 6. Damage probability plots.