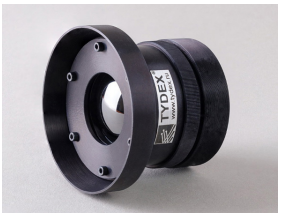
THz Objective Lenses



Objective lenses are necessary to acquire high-quality images. For the purposes of THz imaging, TYDEX has developed two types of objectives intended for use with a matrix of uncooled micro bolometers (matrix diagonal 10.4 mm, aspect ratio 4:3). Customer-specified objective lenses can be designed and manufactured on request.

The objective characteristics are given below:

Specifications	Objective type	
	44/0.95	44/0.7
Focal distance, mm	44	
Operating range, μm	50 - 8000 (6 THz - 37 GHz)	
Focal number	0.95	0.7
Distance to object, cm	≥90	≥60
Dimensions (aperture/diameter x length), mm	Ø57/Ø90 x 74.5	Ø71/Ø105 x 74.5

Objective lenses were tested using a matrix of micro bolometers (320x240 px, pixel size 23.5 μm) within 150-300 μm range using the set-up shown in fig. 1.

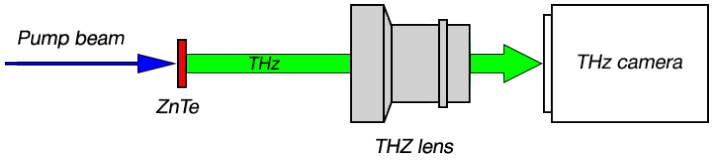


Fig. 1. Experimental setup

Wideband (150 – 3000 μm) THz radiation is produced in a 0.5 mm thick ZnTe crystal by means of optical rectification using a femtosecond laser with 780 nm wavelength and 25 fs pulse duration. Pumping beam is 6 mm wide (FWHM), THz radiation beam is narrower by a factor of √2, i. e. 4.2 mm. The THz objective lens is placed in line with the crystal at the distance L. The THz camera is placed further down the line at the distance f. The THz camera matrix is located 12.9 mm beyond the input end. The matrix sensitivity range is 30 to 300 μm.

Figures 2 and 3 show the THz beam constriction profile at L=200 mm, f=15 mm and k=0.95*. The constriction width was 260 μm.

** - focal number k is determined by k = f / D, where f is the back focal distance and D is the entrance pupil diameter.*

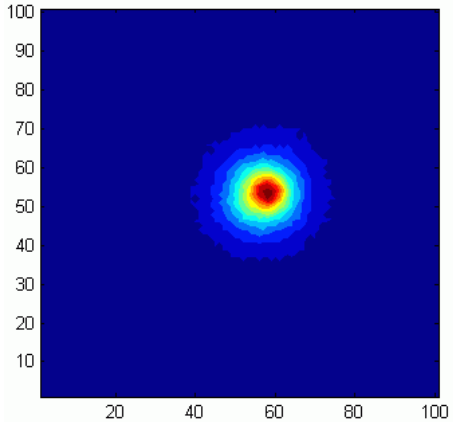


Fig. 2. Constriction of the THz beam

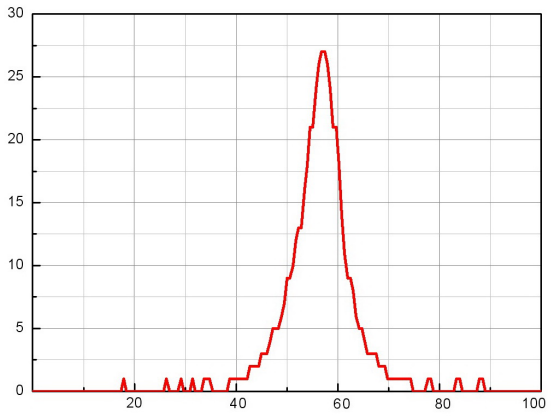


Fig. 3. Constriction of the THz beam

Figures 4 and 5 show the THz beam constriction profile at L=200 mm, f=12 mm and k=0.7. The constriction width was 310 μm.

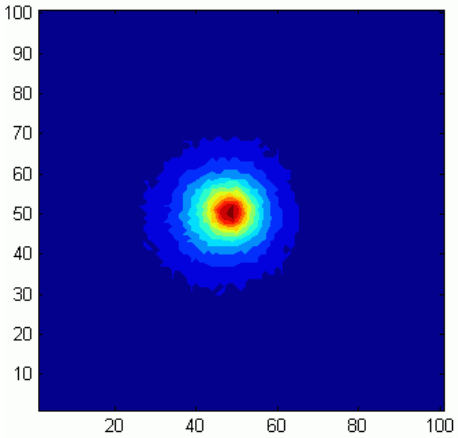


Fig. 4. Constriction of the THz beam

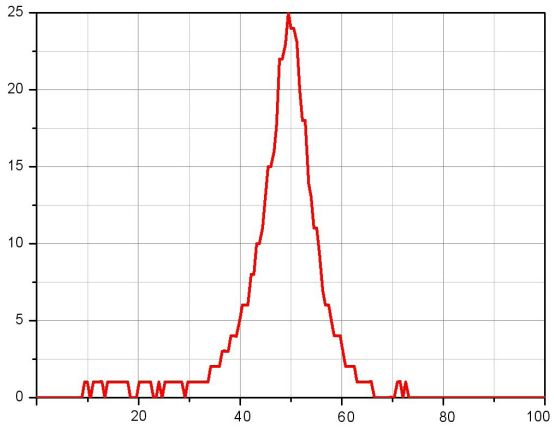


Fig. 5. Constriction of the THz beam

The testing results confirm that both objective lenses work as intended.**

The THz objective lenses described above are available from the stock. Please check our Optics stock. Please fill in our Request form to get a quote.

*** The objectives were tested in the Laboratory for Terahertz Science at the Lobachevsky State University of Nizhny Novgorod (http://elsalab.unn.ru/en).*

16 Domostroitelnaya str.
194292 St. Petersburg, Russia
www.tydex.ru

Phone: 7-812-3318702
Fax: 7-812-3092958
E-mail: optics@tydex.ru

TYDEX®