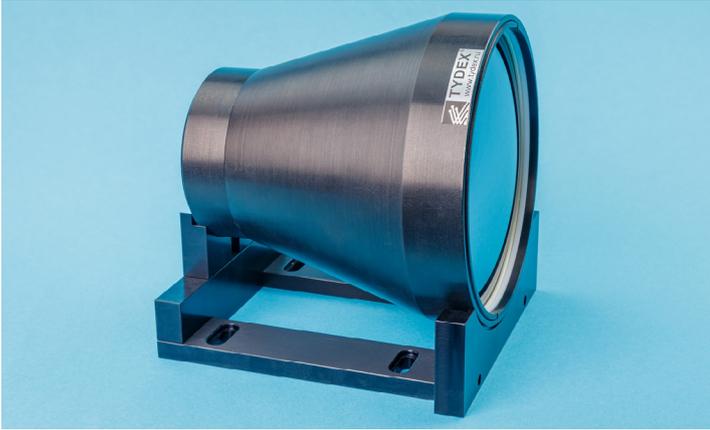


# THz Beam Expanders



THz beam expanders are meant to expand or converge parallel THz beams. Two-lens Galilean THz expanders provide low level of aberrations. They are diffraction-limited systems that decrease the influence of beam divergence. Beam expansion allows focusing THz radiation into a diffraction-limited focal spot. Thus maximum radiation power density can be achieved.

THz beam expanders can be used with both continuous and pulsed radiation sources. Due to large entrance and exit apertures our expanders can be used with various input beam diameters.

THz antireflection coating can be applied to the lenses of the expander per the required operation wavelength range.

We supply beam expanders with expansion (convergence) ratios of x2, x5 and x10. Key parameters of the expanders are listed in the following table:

Expansion (convergence) ratios	x2	x5	x10
Lens material	HRFZ-Si		
Operating range, $\mu\text{m}$	50 - 8000 (6 THz - 37 GHz)		
Maximum input beam diameter, mm	72	28,8	14,4
Overall transmittance	65%*		
Wavefront distortion @50 $\mu\text{m}$	0,03 $\lambda$	0,06 $\lambda$	0,04 $\lambda$
Dimensions, mm	156x156x186	166x154x203	166x154x257

\* - with two-side antireflection coating on both lenses. Without the coating, overall transmittance is 30%.

Figure 1 shows the experimental setup for testing the THz expanders. THz radiation is produced by a ferrite circulator radiating at 100 GHz ( $\lambda = 3 \text{ mm}$ ). The receiver of the radiation is a THz camera MICROXCAM-384I-THZ manufactured by INO with an objective lens by Tydex ( $f/0.7$ ). The source generates a 10mm diameter parallel beam (see fig. 2a). The diameter is measured by level  $1/e^2$ . The camera registers the picture produced with and without the expander. Testing results for the x2 beam expander are shown in fig. 2b. It can be seen that the expander increases beam diameter by a factor of two.

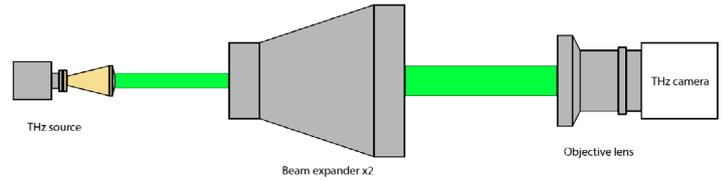


Fig. 1. Experimental setup for testing the THz expanders.

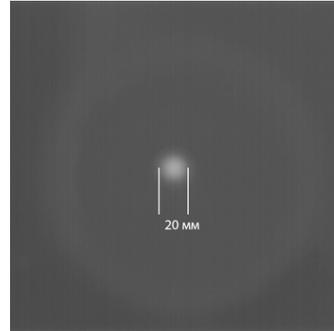


Fig. 2a.

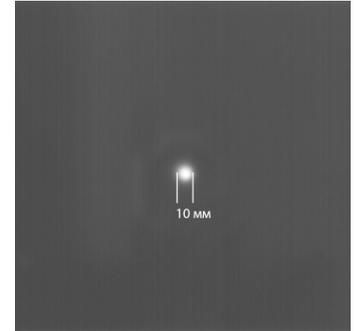


Fig. 2b.

Custom sizes, expansion ratios, dimensions, entrance and exit apertures are manufactured upon request. The expanders can be equipped with lenses made of other materials transparent in the THz range.

Please fill in our request form at the web site to get a quote.