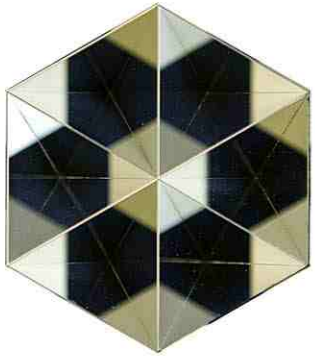
APPLICATIONS

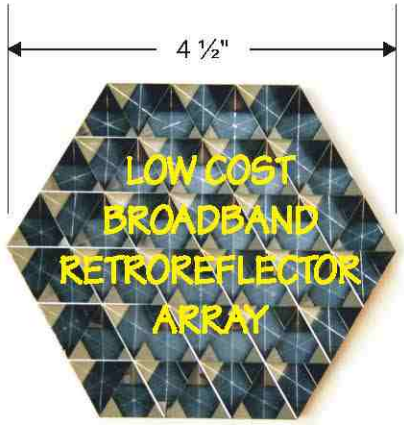
- Low-cost optical data links.
- Remote sensing.
- Open-path spectroscopy.
- Long-range intruder monitoring.
- Navigation aids.
- Long-range laser distance measurements.
- Covert & secure passive long-range communication links.
- Economical multiple-point measurements.



ADVANTAGES

- Economical; costs much less than glass or metal retroreflectors.
- Optimized trade-off between diffraction losses and geometrical losses.
- Better than 60% net efficiency.
- Modular structure allows convenient construction of large arrays.

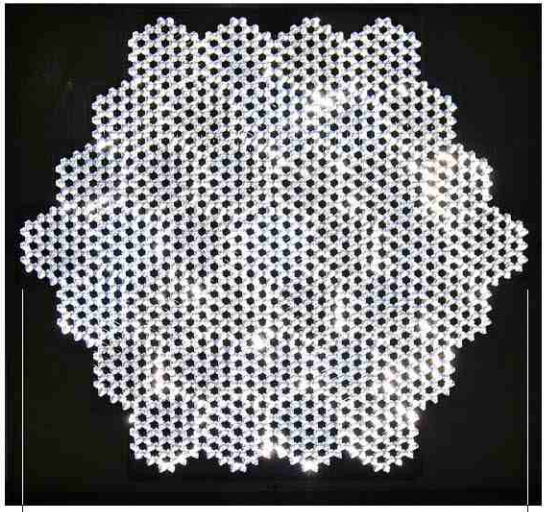
OPTRA Inc.
461 Boston Street
Topsfield, MA 01983



Single Retroreflector tile

OPTRA

OPTRA Inc.
461 Boston Street, Topsfield, MA 01983
978-887-6600 www.optra.com



Array of 37 Retroreflector tiles

Low-Cost, Accurate, & Efficient Retroreflectors

- Each hexagonal plastic retroreflector tile is comprised of 54 triangular retroreflector elements.
- The reflecting facets of each retroflector are coated with either aluminum or gold, plus a protective layer.
- The net optical efficiency (fraction of light returned towards the source) of each tile is better than 60%.

SPECIFICATIONS

Reflective coating.....Protected Gold or Protected Aluminum
Aperture size..... Equilateral triangle, 3/4" on a side
Tile size (54 apertures)... Hexagon, 2.25" side
Tile thickness..... 0.36"
Angle accuracies..... better than 0.1°
Net fill factor.....greater than 60%
Weight of single tile..... 0.5 oz.(~15 gm)

For further information please contact OPTRA, Inc. at info@optra.com

OPTRA

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RADIOMETRIC LOSS FACTORS

There are a number of factors that determine the radiometric efficiency of an array of retroreflectors. The major factors are:

- Geometric Loss,
- Diffraction Loss,
- Angle-error loss,
- Reflectivity, and
- Fill factor

The first three factors in this list are illustrated to the right. Geometric losses are minimized by reducing the size of the individual retroreflector elements, and diffraction losses are minimized by increasing the size of the retroreflectors. The optimum retroreflector size depends on the diameter of the transmit/receive aperture, the operating range, and the wavelength. OPTRA's design is optimized for a range of 200 meters, a transmit/receive aperture diameter of 15cm, and a wavelength of 10 microns--resulting in an individual retreoreflector diameter of 1.2cm. For retroreflectors of this diameter, we can keep the angle-error losses less than the diffraction losses, while achieving a design that can be manufactured inexpensively.

The net radiometric efficiency of our retroreflector arrays is better than 60%, and compares very favorably with far more expensive designs using 2-inch diameter glass retroreflecting elements (see data plotted to right).