

One-piece compound lens



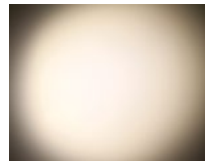
LED output power has increased to the point where a single LED can be used to produce enough light to meet the needs of many applications. This gives designers the ability to miniaturize the light source package, provided the light can be appropriately shaped. At the same time, they don't want to have to customize the board or package for each pattern variation.

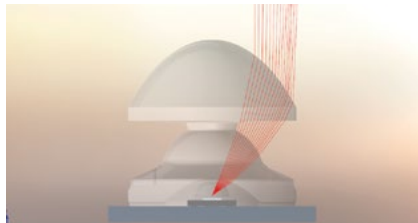
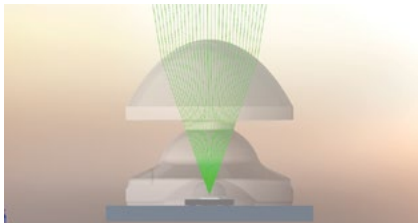
This small compound lens was designed as one way to produce a variety of output patterns from a given source. The part consists of two lenses joined along the center by a light pipe. Narrow angle output from the source along the center of the optic is effectively shaped by a single lens (two surfaces), wide angle output is shaped by two lenses (four surfaces).

While these multiple surfaces are each distinct lenses, they were injection molded in a single shot and are one piece – making the otherwise very small lenses much easier to handle. Unlike other multiple lens systems, they require no additional lens mount, alignment, or holding fixture to assemble them. This eliminates significant assembly costs.

By varying the curve of the lens surfaces and the finish in the mold, different output angles and patterns can be achieved. A series of lenses can be designed to fit a given package with identical mounting features and varying output patterns.

Two examples of these one-piece compound lens parts are shown here. While these have grooves on the mounting rim for spring clip attachment to the LED board, alternatively they could be adhesively mounted or held in place with a mounting ring. These are designed to fit onto the same light engine, but produce very different outputs. The taller example part with the clear output surface provides a 10 degree output that projects the image of the LED die similar to the three-lens long throw collimator assembly. The shorter example shown here has a fine talc finish on the output surface and projects a 25 degree round spot of very even intensity across the pattern.





Points to note:

- This is a complex, compound lens, molded as a single piece.
- There is good replication of the fine talc finish on the shorter part.
- Moving a laser pointer beam at varying angles to the input surface, you can see the beam at the edge being directed back into the pattern.
- These are designed for clip mounting, but could be mounted using a retaining ring or adhesive.
- No individual lens holders or alignment fixtures are required for use.

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