A simple bright LED source

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The first commercially available visible light emitting diodes were ever so versatile: they could produce any wavelength so long as it was red and their lifetime was... well, they could last up to a few months if you did not run them too hard. Over the years they improved but were 'stuck' with the common 5 mm plastic package with limited heatsinking ability. More recently, very high power sources have become available, the high optical powers being made possible through the use of a radically modified package that permits efficient removal of heat from the chip.

The range of devices from Luxeon, e.g. white emitter Luxeon LXHL-BW01, available from RS components as part number #449-1551, is particularly well suited for a range of imaging applications. Similar devices are available in a range of wavelengths and could be equally well used in the assembly described below.

We use a simple housing 30 mm diameter by 57 mm long, made out in 3 sections. The middle section (Figure 1) holds a circular printed circuit board (Figure 2) into which is soldered a machined copper stud, that provides a flat surface to mate to the LED package metal flange. The LED connections from the surface-mount package are soldered to the pcb. Some zinc-oxide heatsink compound is inserted between the stud and the LED, which is pushed down onto the stud while soldering the surface-mount lugs.

Heat from the LED is thus removed through the stud and through an M3 countersunk screw to the midlle section housing.

A connector, 3-pin 19 mini-DIN type, is fitted to the end housing and leadout wires are soldered to the pcb, before attaching this housing to the LED housing.

The 'output' end is fitted with a male 'C'- mount to allow coupling of different optical elements.

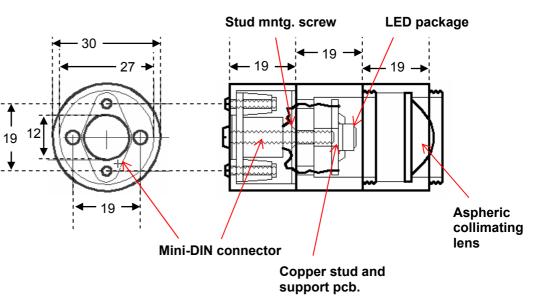


Figure 1: Overall assembly of a collimated high-power LED source.

The most common application is to produce a collimated output. This is achieved by using a small 16 mm focal length aspheric lens (Comar type 16AF25), mounted in a female-male C-mount housing. This is screwed into the LED housing.

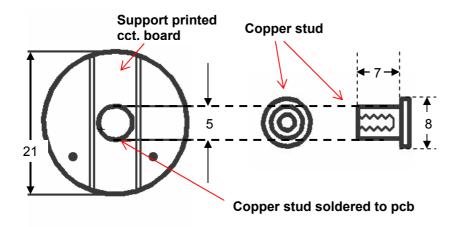


Figure 2: Details of the printed circuit board and the LED copper stud.



Figure 3: The collimated LED source in practice. The left image shows the LED soldered to the printed circuit board, with the aspheric lens holder to the side. The right image shows copper stud mounting screw and connections to the mini-DIN socket

Suppliers:

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Useful link: http://ledmuseum.home.att.net/museum.htm