

Exhibit D



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(12) **United States Patent**
Aizar et al.

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(45) **Date of Patent:** **Apr. 28, 2009**

(54) **OPTICAL DEVICE**

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(73) Assignee: **Avago Technologies ECBU IP (Singapore) Pte. Ltd.**, Singapore (SG)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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Primary Examiner—Thomas M Sember

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(22) Filed: **Nov. 16, 2007**

(51) **Int. Cl.**
F21V 29/00 (2006.01)

(52) **U.S. Cl.** **362/267**; 362/310; 257/676; 257/684; 257/99; 257/100

(58) **Field of Classification Search** 362/267, 362/310, 800; 257/678, 684, 676, 81, 82, 257/98, 99, 100

See application file for complete search history.

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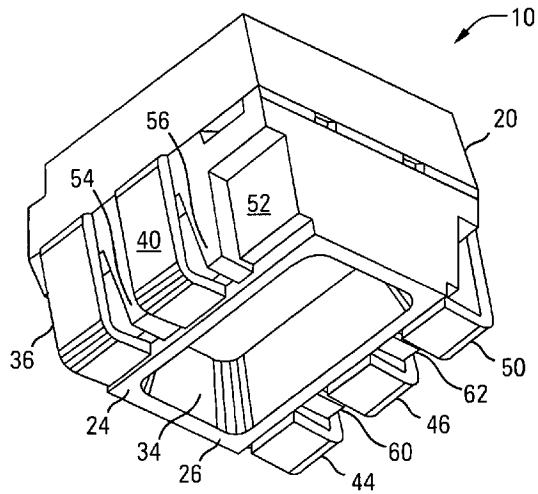
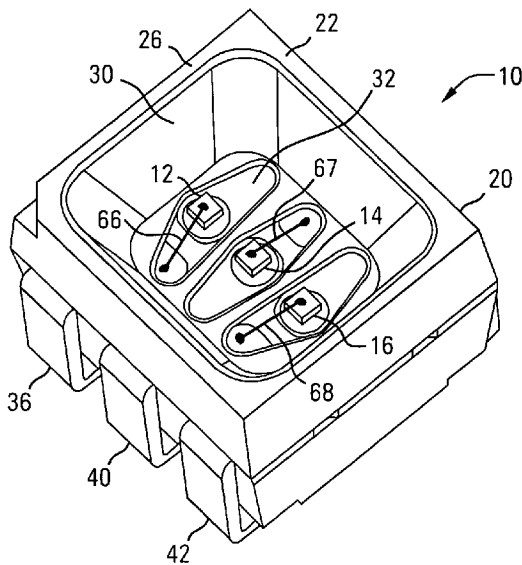
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(57) **ABSTRACT**

An exemplary embodiment of an optical device may include a lead frame with a plurality of leads and a reflector housing formed around the lead frame. The reflector housing includes a first end face and a second end face and a peripheral sidewall extending between the first end face and the second end face. The reflector housing includes a first pocket with a pocket opening in the first end face and a second pocket with a pocket opening in the second end face. At least one LED die is mounted in the first pocket of the reflector housing, and a light transmitting encapsulant is disposed in the first pocket and encapsulating the at least one LED die.

19 Claims, 6 Drawing Sheets



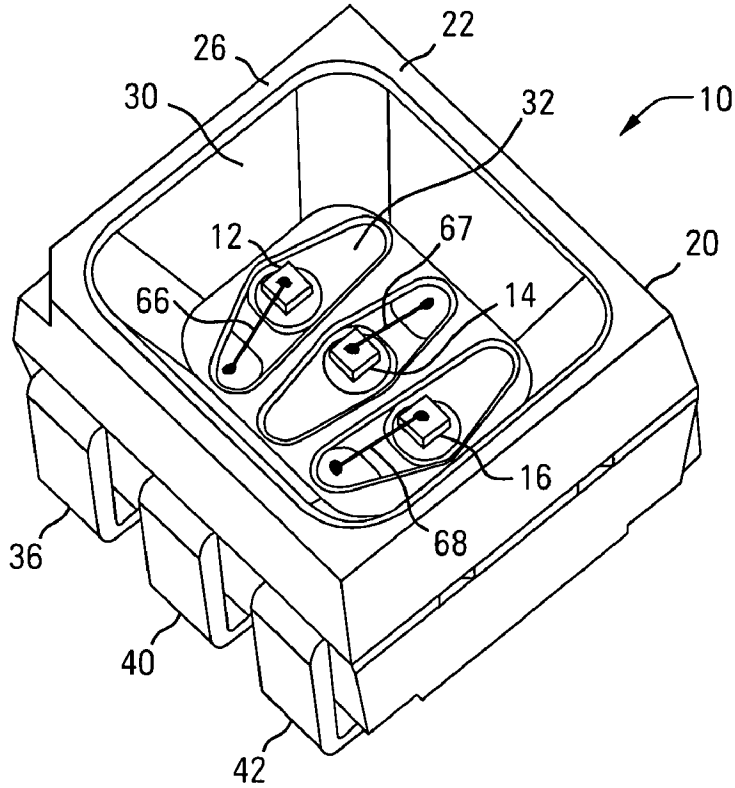


FIG. 1

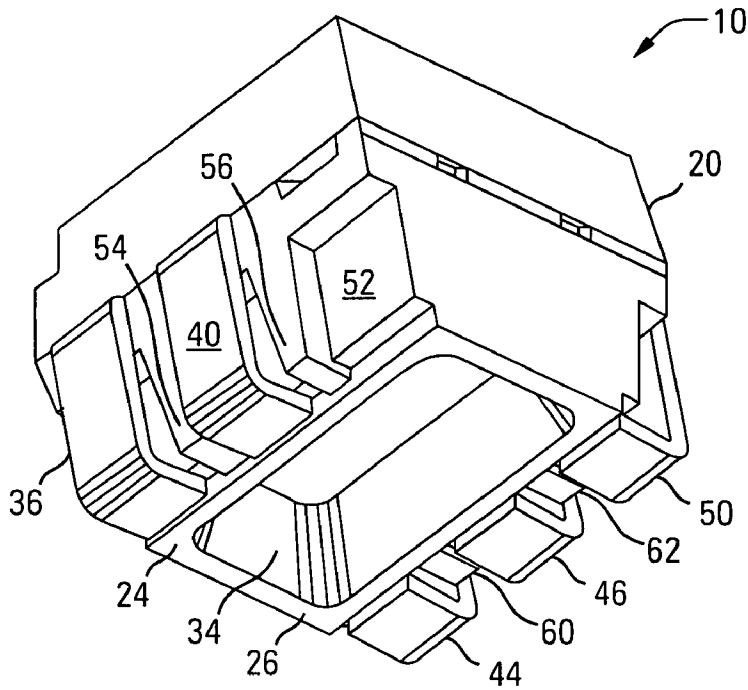


FIG. 2

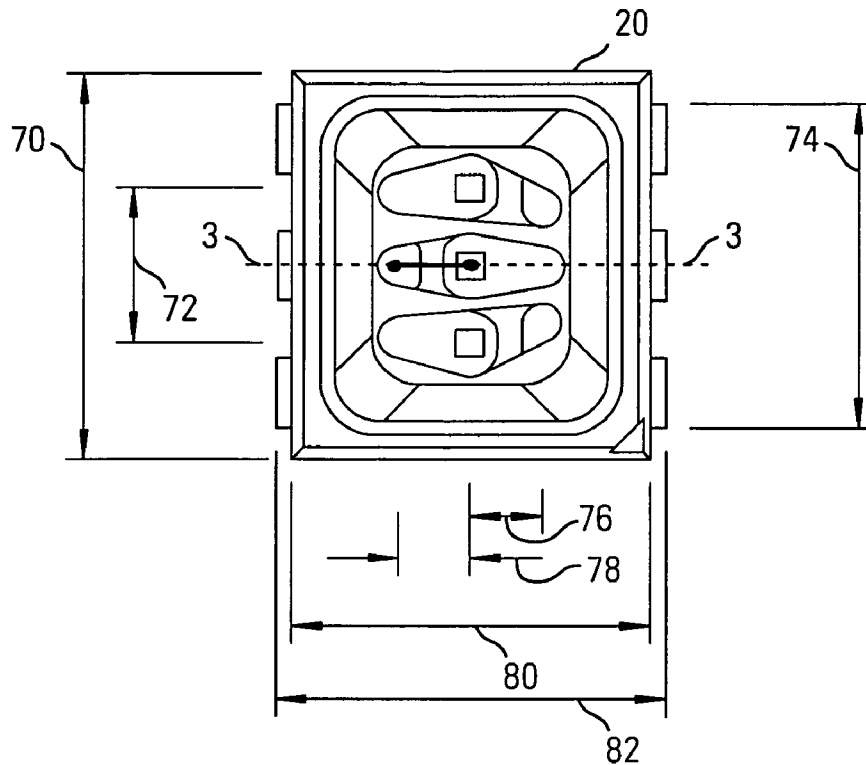


FIG. 3

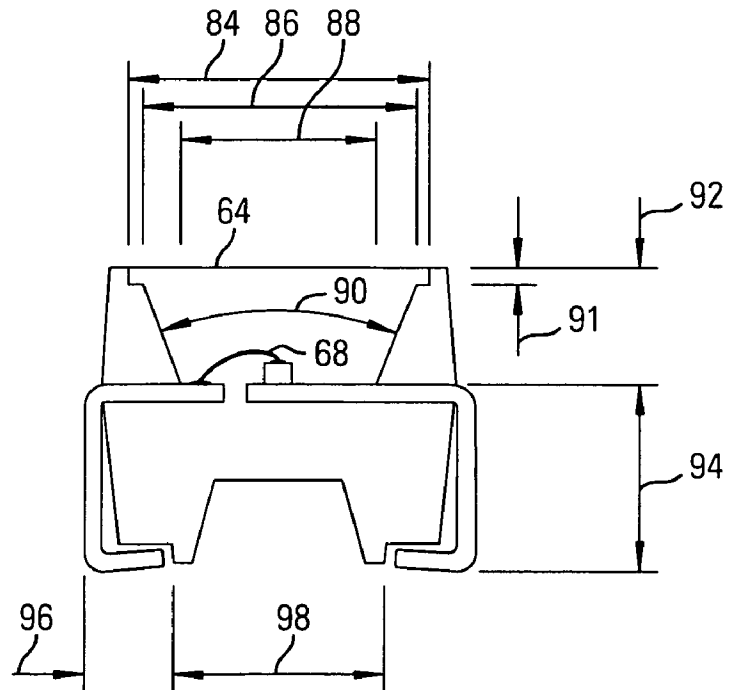


FIG. 4

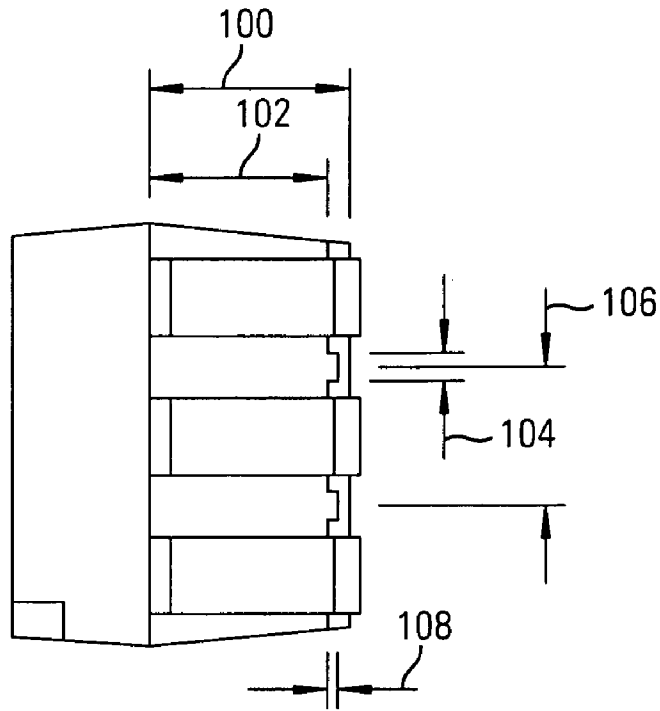


FIG. 5

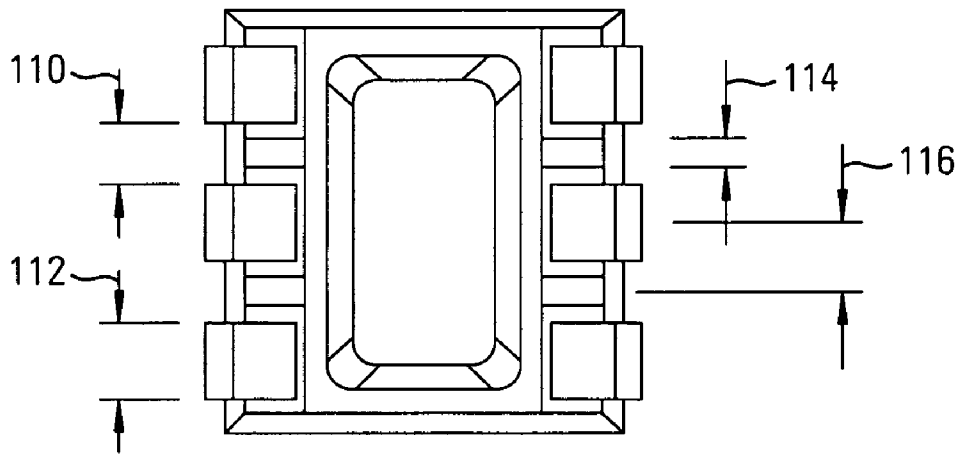


FIG. 6

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