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Design principles and realization of electro-optical circuit boards

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abstract

The manufacturing of electro-optical circuit boards (EOCB) is based to a large extent on established technologies. First products with embedded polymer waveguides are currently produced in series. The range of applications within the sensor and data communication markets is growing with the increasing maturity level. EOCBs require design flows, processes and techniques similar to existing printed circuit board (PCB) manufacturing and appropriate for optical signal transmission. A key aspect is the precise and automated assembly of active and passive optical components to the optical waveguides which has to be supported by the technology. The design flow is described after a short introduction into the build-up of EOCBs and the motivation for the usage of this technology within the different application fields. Basis for the design of EOCBs are the required optical signal transmission properties. Thereafter, the devices for the electro-optical conversion are chosen and the optical coupling approach is defined. Then, the planar optical elements (waveguides, splitters, couplers) are designed and simulated. This phase already requires co-design of the optical and electrical domain using novel design flows. The actual integration of an optical system into a PCB is shown in the last part. The optical layer is thereby laminated to the purely electrical PCB using a conventional PCB-lamination process to form the EOCB. The precise alignment of the various electrical and optical layers is thereby essential. Electrical vias are then generated, penetrating also the optical layer, to connect the individual electrical layers. Finally, the board has to be tested electrically and optically. © (2013) COPYRIGHT Society of Photo-Optical Instrumentation Engineers (SPIE). Downloading of the abstract is permitted for personal use only.

Topics

Data communications ; Manufacturing ; Optical components ; Optical systems ; [Polymers](#) ; Sensors ; Waveguides

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