

**Analytical models for channel crosstalk in short-range free space optical interconnects**

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**Abstract:** Analytical models for optical channel crosstalk in short-range free space optical interconnect systems are proposed. The diffraction crosstalk noise is modeled as a function of many parameters of the interconnect system, including the interconnect distance, the interconnect spacing, and the photo-detector size. The dependence of crosstalk noise on different systems' parameters is discussed and evaluated using the proposed models. It is shown that optimum parameters for the optical system and the detectors array can be easily determined to optimize and improve the interconnect performance. The effect of high modes of vertical cavity surface emitting lasers (VCSELs), VCSEL aperture, and the incident angle of the VCSEL beam on crosstalk are also discussed.