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Noise analysis of a transimpedance amplifier for short-distance free-space optical interconnects

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Abstract: We consider the design of a metal-oxide semiconductor field effect transistor-based transimpedance amplifier that represents the front end of an optical receiver for optimum noise performance in a lensless, free-space optical interconnects system. The optical diffraction noise and the electrical front-end circuitry noise are considered as the two main noise sources for the design optimization. We show that the capacitance of the photodetector diode as well as the input capacitance of the transimpedance amplifier can be used as design parameters to minimize the total noise.