



# A Gigabit Fully Integrated Plastic Optical Fiber Receiver for a RCLED Source

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## Abstract:

The presented work describes a plastic optical fiber receiver for gigabit transmission using a resonant cavity light emitting diode (RC-LED). The integrated optical receiver is realized in 0.6 $\mu$ m BiCMOS technology. The main novelty of the presented design is the integration of the equalizer with the optical receiver. A large area Si photodiode is integrated with the optical receiver. The design combines a TIA, equalizer and post amplifier stage followed by a 50  $\Omega$  output driver. To minimize power supply noise and substrate noise, a fully differential design is used. A dummy TIA provides a symmetrical input signal reference and a control loop is used to compensate the offset levels. The total transimpedance of the complete receiver chain is in the range of 85dB $\Omega$ . The value of the DC gain and the corner frequency of the equalizer can be adapted via an external control voltage to adapt the design to different SI-POF lengths and RC-LED limited bandwidths. The optical receiver operates at a 3.3 V single power supply and the total current consumption is 31mA. The presented optical receiver succeeded to equalize the low-bandwidth transmission system (RC-LED and 50m POF). A data rate of 1Gbit/s can be transmitted over 50m SI-POF with a sensitivity of -13dBm at BER of 10<sup>-9</sup>

## Keywords:

Equalization , Integrated Optical Receiver , Plastic Optical Fiber

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