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Serial Powering for the Phase 2 upgrade of the CMS pixel detector

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A serially powered pixel detector is the baseline choice for the High Luminosity upgrade of the inner tracker of the CMS experiment. A serial power distribution scheme, compared to parallel powering, requires less cable mass, offers higher power efficiency and is less susceptible to voltage transients. A prototype pixel readout chip has been designed for serial powering in 65nm CMOS technology by the RD53 collaboration. Performance results from testing these prototype chips are shown. A comparison of the performance of the chips in conventional powering and operation in a chain consisting of four chips powered in series is presented. Additionally, the performance of the chips in the different operation modes is presented in a high hit rate environment. The results indicate that serial powering is a robust and reliable power distribution scheme.

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