

Simultaneous Bidirectional Data-Transmitter for Future HEP Experiments

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This work presents a design and implementation of an I/O circuit block capable of simultaneous bidirectional-transmission in CMOS integrated circuits. In High Energy Experiments at high luminosity, reducing material of silicon trackers in the inner vertex layers is of major importance to suppress multiple-scattering and to achieve good overall detector performance. Merging data-transmitter and receiver into common bonding pad is feasible not only to reduce the number of transmission lines from a considerable number of chips. The circuit block presented here is designed on the basis of current subtractor and conventional current-mode logic (CML) drivers. Its principle is also applicable to widely-used low-voltage differential signal (LVDS) drivers. The prototype chip was fabricated in TSMC 65-nm CMOS technology. Working principle has been demonstrated in preliminary laboratory testing.

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