

High Speed Low Power CMOS Current Comparator

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Abstract—This paper explains the CMOS Current Comparator circuit suitable for High Speed and Low Power applications. Current comparator's Speed and Power consumption had been simulated and measured in 28nm CMOS process. Transient response confirms the very high-speed operation of the reference Current Comparator. In addition to the above, the circuit has very low power of $1.855\mu\text{W}$ and operates at a frequency of 20MHz and with a minimal power supply of 0.9v.

Index Terms—Current Comparator; High Speed; Low Power; CMOS; 28nm.

I. CIRCUIT DETAILS

The comparator circuit compares the two analog inputs, with the circuit producing the output swing whenever the analog input crosses the reference input. This paper assumes the one input to the circuit as the difference between the input and the reference. The circuit will drive the output swing for the difference input. The circuit includes 3 parts Decision circuit, CMOS Inverter, Power supply. The size of transistor's is such that all nMOS have $100\text{n}/30\text{n}$ and pMOS have $250\text{n}/30\text{n}$. The transient analysis has been attached in the results section showing the output swing for input pulse -50nA to 50nA at the frequency of 20MHz and consumes average power of $1.855\mu\text{W}$.

The main advantage of this circuit is its high speed operation and relatively low power consumption than other conventional comparator's like Traff current comparator. It is well suited for High Speed applications such as Data converters and Digital switching circuits.

II. CIRCUIT DESIGN

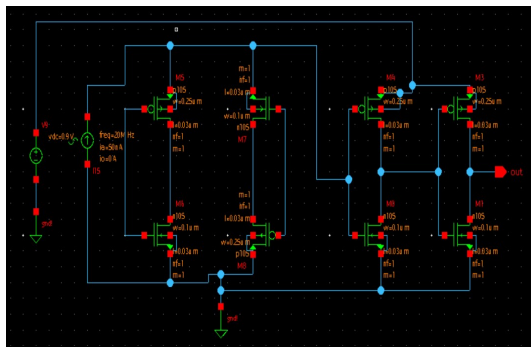


Fig. 1. High Speed Low Power Current Comparator

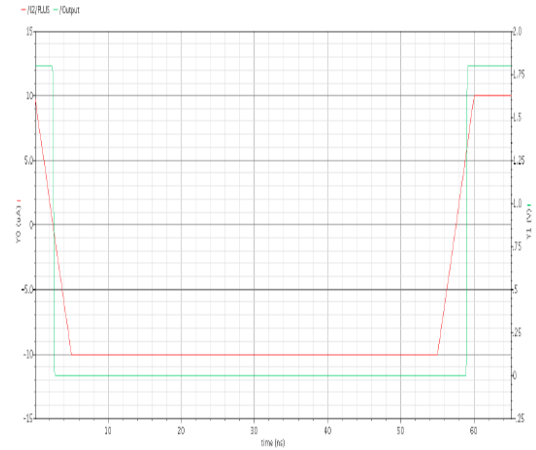


Fig. 2. Transient Response of Reference Current Comparator at $\pm 10 \mu\text{A}$.

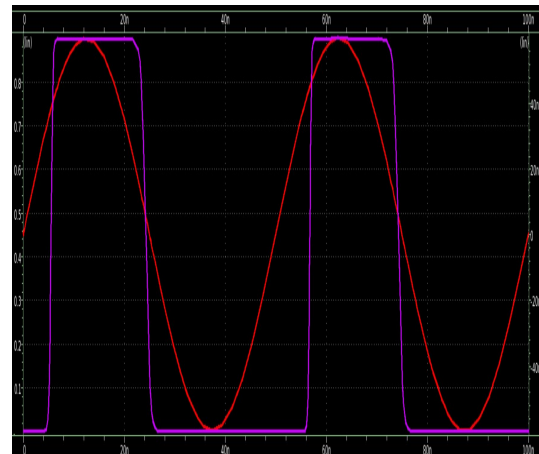


Fig. 3. Transient Response of designed Current Comparator at $\pm 50\text{nA}$.

III. REFERENCE PAPERS

1. Thrivikramaru V, Baghel RK. High speed low power CMOS current comparator. In 2012 International Conference on Communication Systems and Network Technologies 2012 May 11 (pp. 764-768). IEEE.