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APPLICATION NOTE 6009

DETECT A DIFFERENTIAL SIGNAL EVEN WHEN THE INPUTS ARE STUCK

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Abstract: It is desirable to know if the incoming differential signal is present to notify a monitoring device of the loss of signal. This app notes describes a simple circuit for monitoring for these conditions and reporting failures.

It is advantageous to know if there is a valid signal on a differential signal bus. This design idea detects differential data transmission and notifies a monitoring microcontroller about any loss of signal (LOS).

The circuit of **Figure 1** detects a continuous differential signal from -7V to +12V with a minimum amplitude difference of 200mV. The circuit detects open inputs, shorted inputs, and inputs stuck at high or low. Only a single 5V supply is needed. The circuit's output is low when any one of these conditions occurs; the circuit is high when there is a pulse train of the differential signal.

U1 ([MAX3280E](#)), an RS-485 receiver, accepts differential signals of 200mV minimum at A and B, where the voltage can be from -7V to +12V. RO of U1 is high in the absence of input signals, because U1 is a true fail-safe device that provides a high output when the inputs are open or shorted. RO of U1 can also be high or low when one of the inputs is stuck in high and the other is stuck in low. R1 and C1 form a lowpass filter to rectify the output at U1 into a DC voltage when the output at RO is a pulse train.

U2 ([MAX992](#)), a dual open-drain comparator, is configured as a window comparator with R2, R3, and R4 setting the input voltage thresholds to 0.5V and 4.5V. The filtered voltage of a pulse train falls between the two thresholds rendering OUT as high.

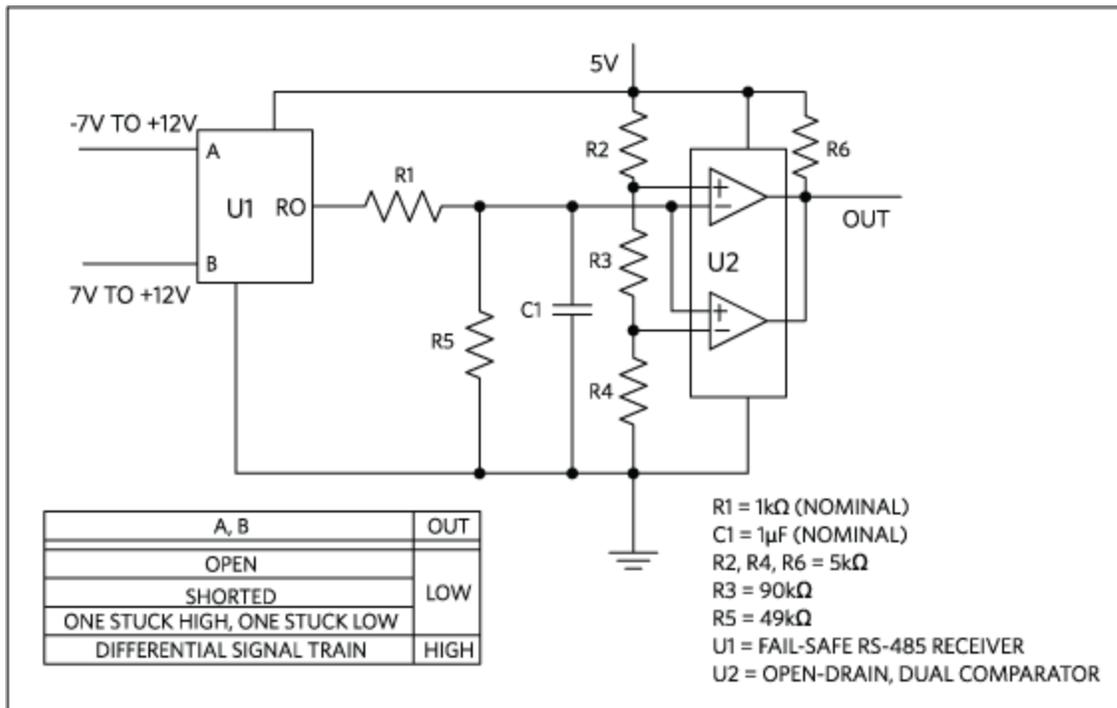


Figure 1. Circuit detects a continuous differential signal.

A similar version of the article appeared February 9, 2015 in [EDN](#).

Related Parts

MAX3280E	±15kV ESD-Protected 52Mbps, 3V to 5.5V, SOT23 RS-485/RS-422 True Fail-Safe Receivers	Free Samples
MAX992	High-Speed, Micropower, Low-Voltage, SOT23, Rail-to-Rail I/O Comparators	Free Samples

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