Product Overview

Using High Voltage Comparators in Time Domain Reflectometry Systems

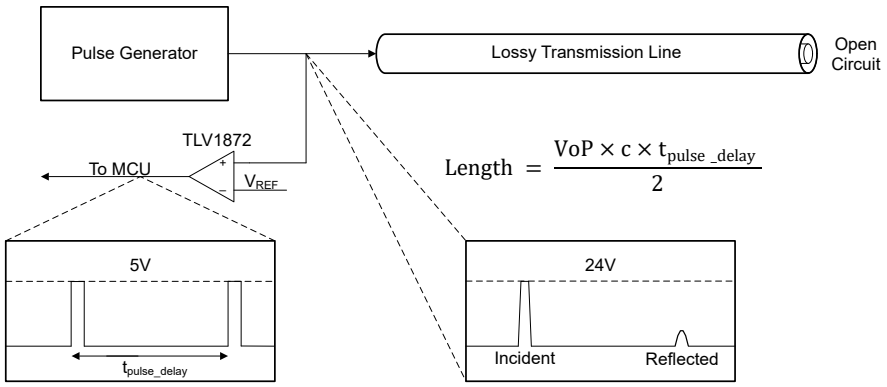

Figure 1. Time Domain Reflectometry System Using Comparator for Cable Length Measurement

Background

Time Domain Reflectometry (TDR) is an electrical diagnostic technique that transmits an incident pulse and analyzes the reflected pulse to determine the characteristics of a transmission line. Comparators can be used in TDR systems to detect the time difference between the incident pulse and the reflected pulse on transmission lines. With the knowledge of a cable's velocity of propagation (VoP) and the speed of light (c), use of comparators in TDR systems allow for applications such as cable length testing and cable fault detection.

Design Challenges

- TDR systems rely on precise time measurements of the incident and reflected pulse, so faster devices introduce less error to TDR measurements.
- A high input voltage range and a low output voltage swing are necessary for the device to be able to withstand the high voltage incident pulse and propagate lower voltage logic levels for downstream MCU.
- Portable, battery-powered TDR systems rely on low power devices to extend system lifetime.

How TLV1872 Benefits The System

- TLV1872 has a low propagation delay which results in lower additive error to TDR time measurements.
- A separate input and output supply allows for TLV1872 to withstand and detect the high voltage incident pulse, while still propagating appropriate logic levels through a low voltage push-pull output.
- TLV1872 has a low quiescent current which makes the device great for use in battery-powered systems.

TLV1872	
Input Supply Voltage: V_{CCI} - V_{EEI}	2.7V to 40V
Output Negative Supply Voltage: V_{EEO}	V_{EEI} to V_{EEI} + 18V
Output Positive Supply Voltage: V_{CCO}	V_{EEO} + 2.7V to V_{CCI}
Propagation Delay (typ.): T_{PHL}/T_{PLH}	65ns
Quiescent Current: I_Q	70uA per channel

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