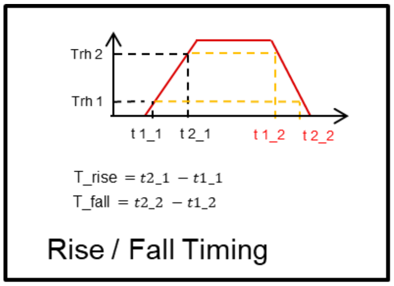
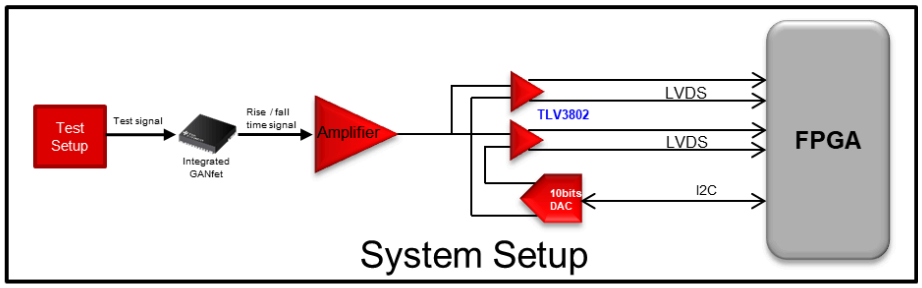
Product Overview

Measuring Rise and Fall Times in Automated Test Equipment With High-Speed Comparators





Background

Comparators in Automated Test Equipment can measure rise and fall times by triggering on two separate thresholds, T_{rh1} at the low end of the pulse, and T_{rh2} at the high end of the pulse. By triggering on the rising and falling side of each threshold, the complete rise and fall time data can be extracted with simple calculations.

Design Challenges

- Measuring high-speed signals requires very high accuracy to minimize added delay from response time, and the greater the response time, the greater the possibility for variation.
- Maintaining accurate measurement of rise and fall times requires an extremely precise timing window from start T_{rh1} to stop T_{rh2} signal, as any error in measurement directly affects the result.
- When high-speed signals need to span large trace lengths or cables, common mode noise can become a concern along with additional added delay in the transmission of the data.

How High-Speed Comparators Benefit Systems

- Faster propagation delay introduces less error to measurements. Therefore, a fast propagation delay is needed to increase measurement accuracy. A faster comparator, such as TLV3802, is also less affected by any possible changes in the input overdrive voltage due to the low overdrive dispersion.
- Measuring a value that relies on two separate measurements can best be optimized by using a dual channel device with a very low channel-to-channel skew. The lower the skew, the lower the added timing error from T_{rh1} to T_{rh2}.
- Propagation of high-speed signals can be optimized by using fast signaling LVDS protocol, which eliminates common mode noise by nature of the differential lines, maintaining quick transmission and high signal integrity.

Specifications	Channel Count	Power Supply Range	Propagation Delay	T_{PD} Overdrive Dispersion	Min Pulse Width	Skew	Output Structure
TLV3602	2	2.4V-5.5V	2.5ns	600ps	1.25ns	**24ps**	Push-pull
TLV3606/7	2	2.4V-5.5V	800ps	350ps	600ps	**10ps**	LVDS
TLV3802	2	2.7-5.25V	225ps	5ps	240ps	**5ps**	LVDS