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OSCILLOSCOPE

Eye diagram for CAN FD

Teledyne LeCroy is expanding the serial data analysis capabilities for its oscilloscopes with eye diagram capabilities. The eye diagram option is available for CAN and CAN FD.

Teledyne LeCroy offers a range of trigger, decode, measure/graph, and eye diagram and physical layer options. These options are available across the company's oscilloscope product line. The user can isolate events using the serial bus trigger and view color-coded protocol information on top of analog or digital waveforms. Timing and bus measurements allow characterization of a serial data system. Measurement data can be graphed to monitor system performance over time. Physical layer anomalies can be identified with eye diagram mask testing and mask failure locator. Eye diagram is available for CAN, CAN FD, I^2C, SPI, EIA-232, Flexray, LIN, Arinc 429, and many other protocols.

Teledyne LeCroy claims to be the first company to offer eye diagrams for serial buses (Photo: Teledyne LeCroy)

Eye diagram and physical layer testing

An eye diagram of a packetized low-speed serial data signal can be displayed without additional setup time. Eye parameters can be used to quantify system performance and apply a standard or custom mask to identify anomalies. Mask failures can be indicated and can force the scope into Stop mode.

Up to four serial data signals can be decoded and displayed as eye diagrams at the same time. These can be different protocols, or the same protocol measured at different points (e.g., transmits and receive, different nodes, or different standard-defined test points). A user-defined filter can be applied to each eye diagram to only display specific signals in the eye.

The signal quality of physical layer can be qualified in the eye by applying parameters for eye height, eye width, and number of mask failures. Some packages go a step further and include additional measurements defined in the standard.

A user-defined or pre-defined mask may be added to the eye diagram so as to objectively evaluate if the physical layer signal intrudes too far into the eye opening. A filter can be applied to include or exclude specific messages from the eye so as to determine failure source (e.g., messages from a specific node or with a specific ID). Mask failures are indicated with a red circle and can be displayed in a table.

Some standards, due to their speed or nodal complexity, provide specific guidance on what eye diagrams or measurements should be made and exactly how they should be performed. Flexray and MIPI DPHY are examples. In these cases, the eye diagram (E) capability is augmented with additional specialized P capability (for physical layer measurements).

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