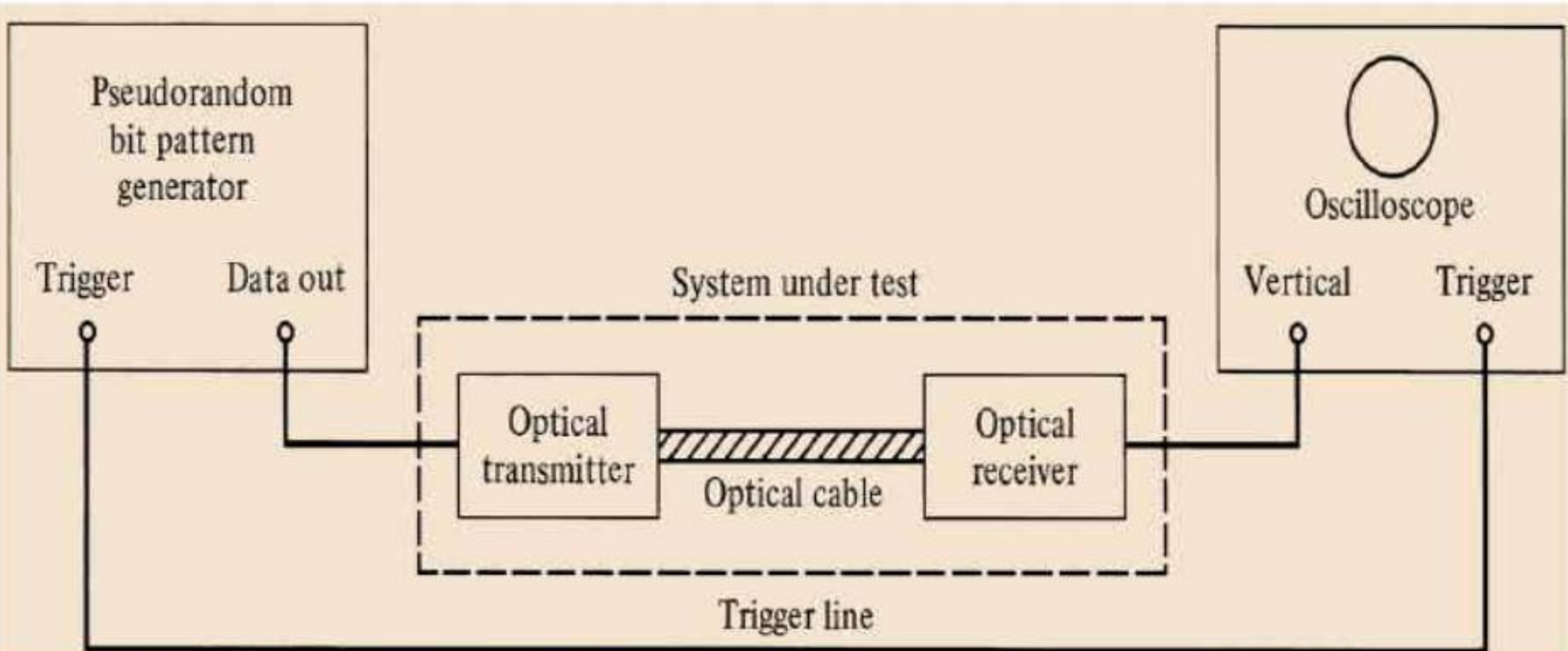


INTRODUCTION

- ▶ Eye diagram is an operation tool for evaluating the effects of inter symbol interference (ISI) in an insightful manner.
- ▶ It carries lot of information about the quality of the incoming pulse and state of the channel which is useful for the detection of the digital input.
- ▶ The eye diagram is defined as the synchronized superposition of all possible realizations of the signal of interest (e.g. received signal, receiver output) viewed within a particular signalling interval.
- ▶ The eye pattern/diagram derives its name from the fact that it resembles the human eye for binary waves.

EYE Diagram Test setup

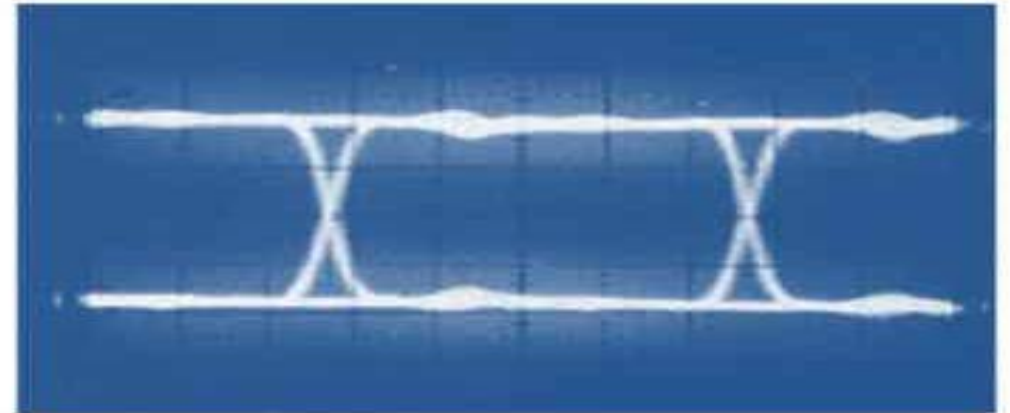
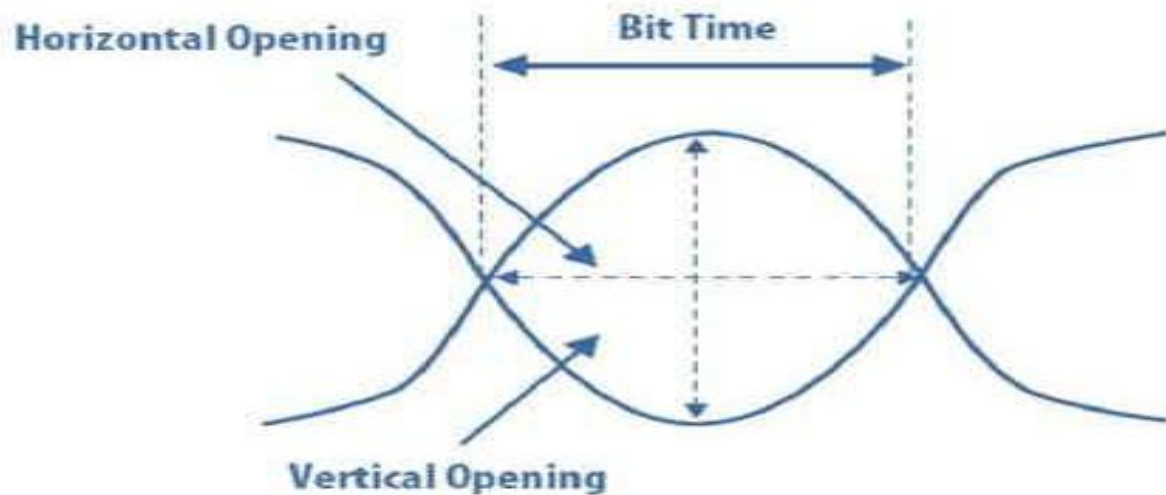
3



EYE Pattern

An oscilloscope display that allows several system performances measurements. The "openness" of the eye relates to the BER that can be achieved.

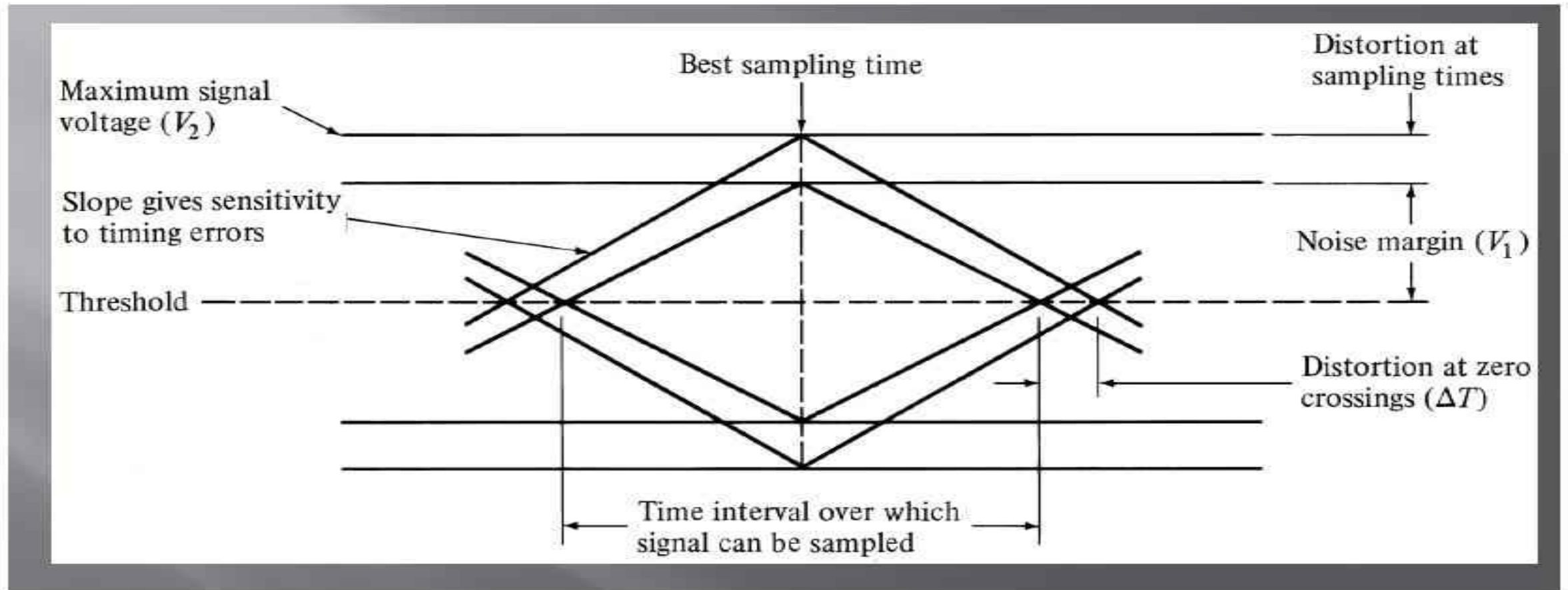
The vertical eye opening indicates the noise level in the system: the more it is opened the less noise level. The horizontal eye opening is related to the amount of jitter in the signal: the wider the opening, the less jitter.



Simplified EYE Diagram

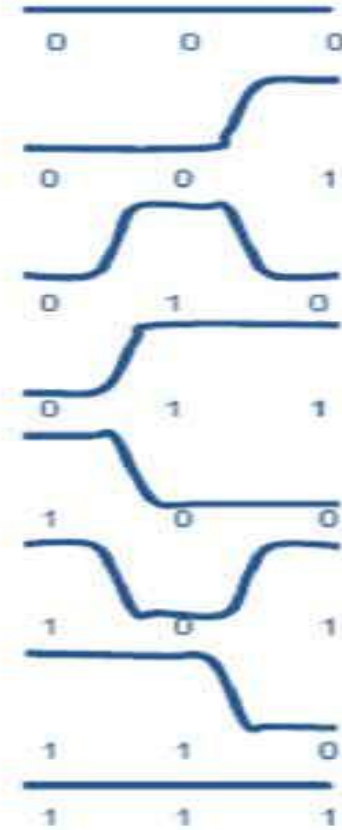
5

SIMPLIFIED EYE DIAGRAM



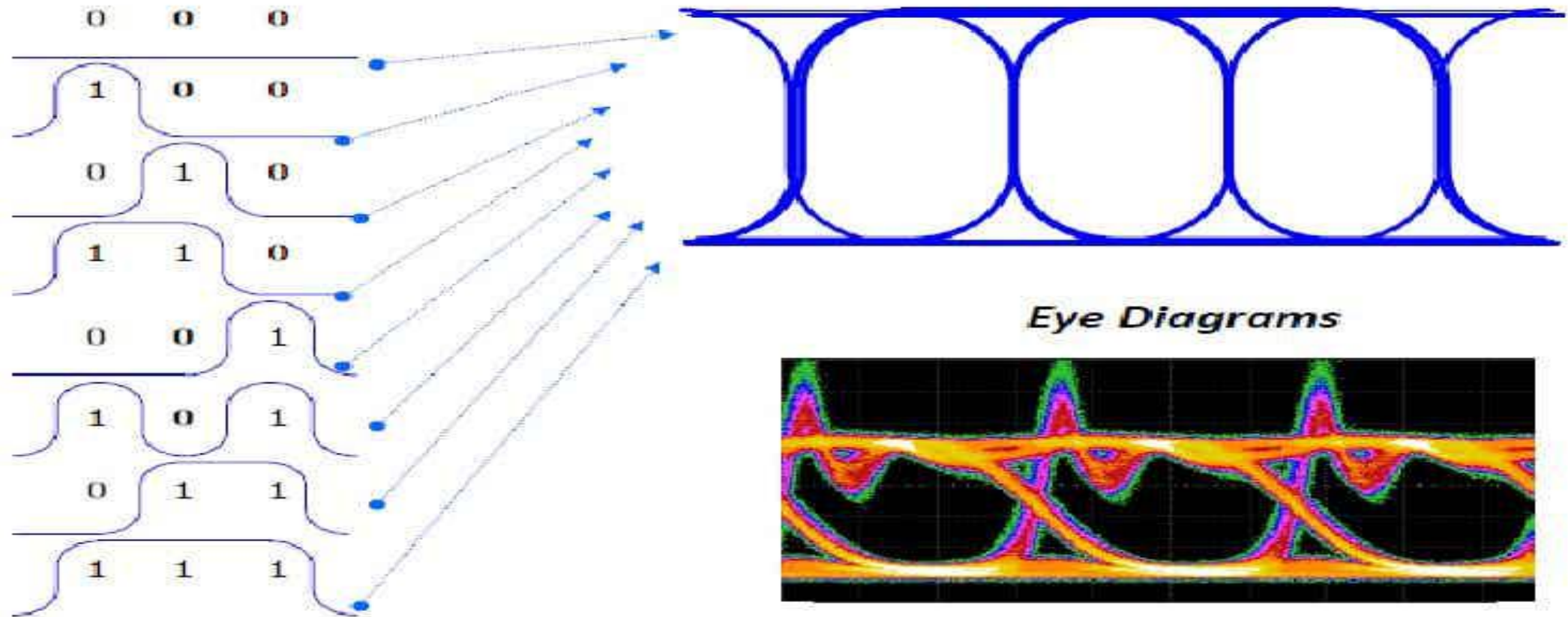
EYE Diagram

- The eye diagram is a composite view of a very long data stream.
- It allows you to see all data patterns and combinations in a single display.
- It is achieved by using a clock signal to trigger the oscilloscope.



EYE Diagram is a statistical representation

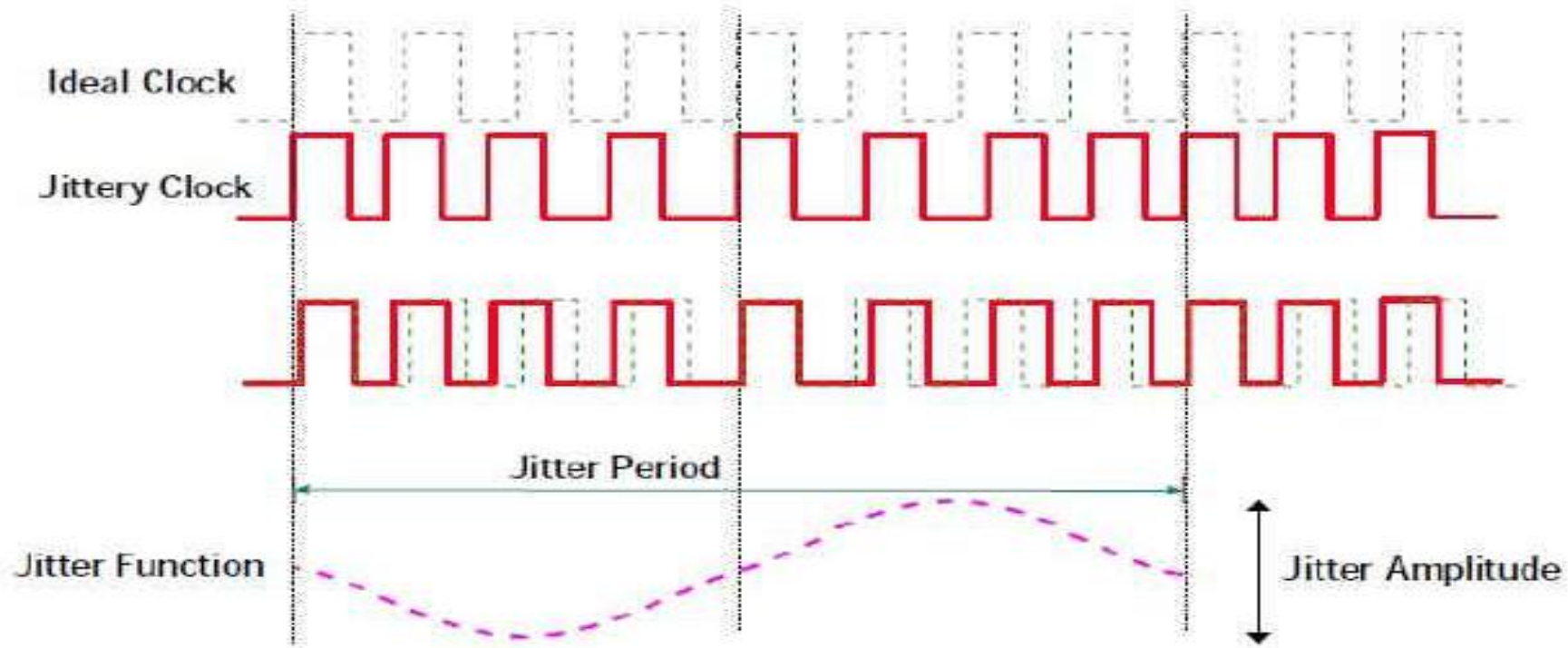
7



An eye diagram is a statistical representation of a bit stream, based on the contribution of randomly selected bits

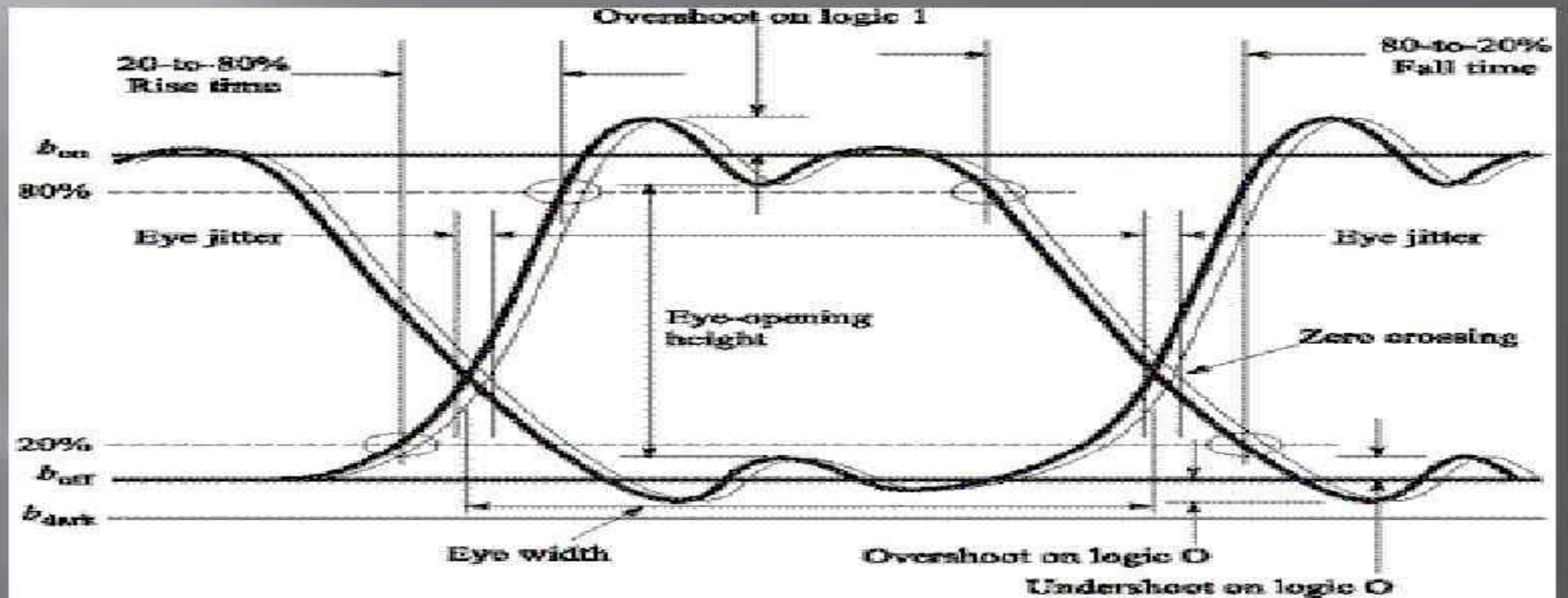
Jitter

The short-term, ($>10\text{Hz}$), variations in the time base of a signal



EYE Diagram with JITTER

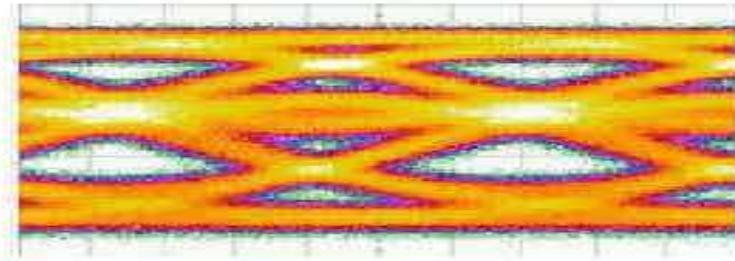
EYE DIAGRAM



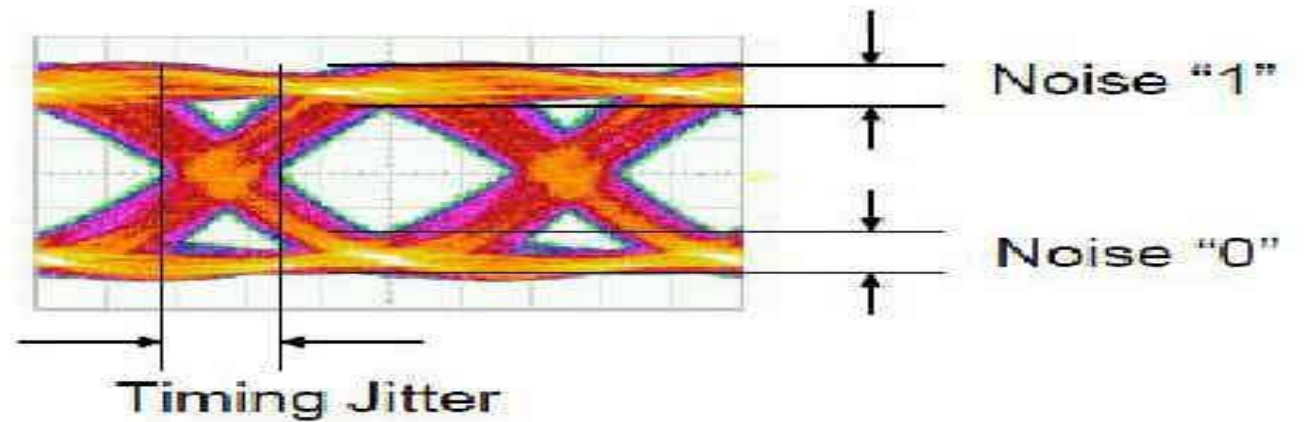
Comparison

EYE DIAGRAM

A bad eye with a lot of distortion due to dispersion



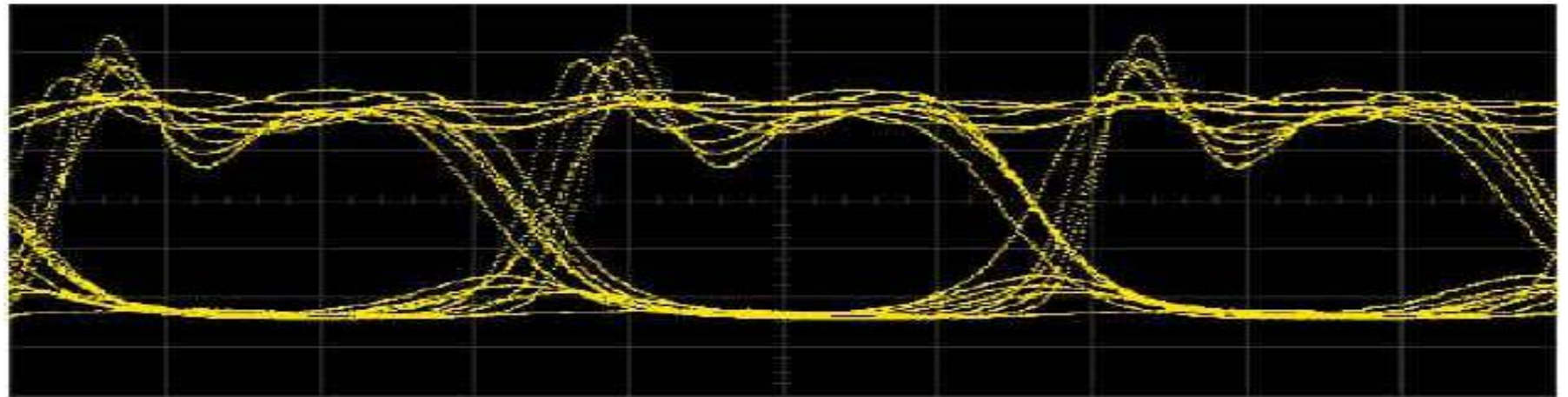
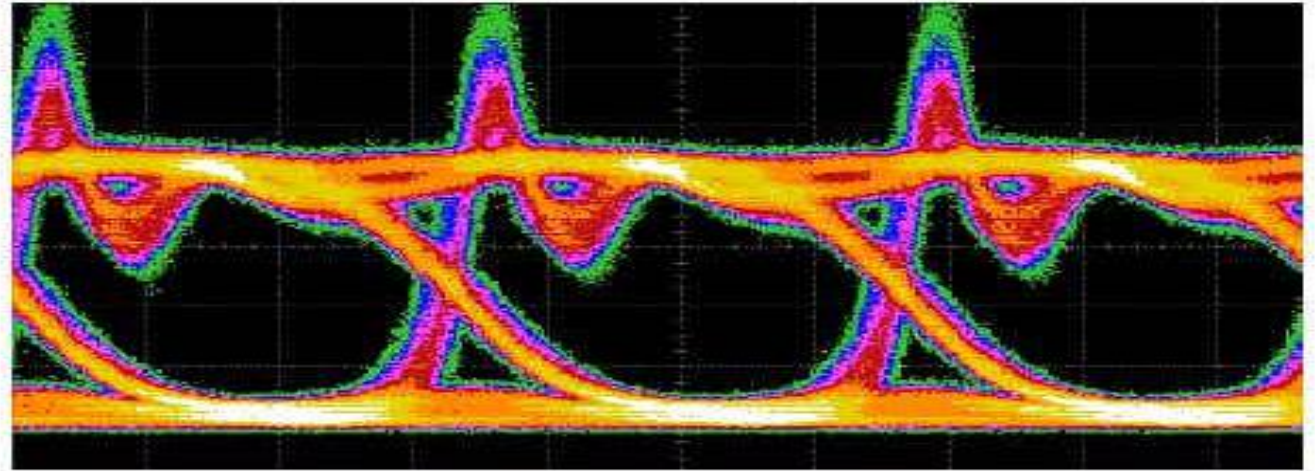
An OK eye



Unfiltered EYE

11

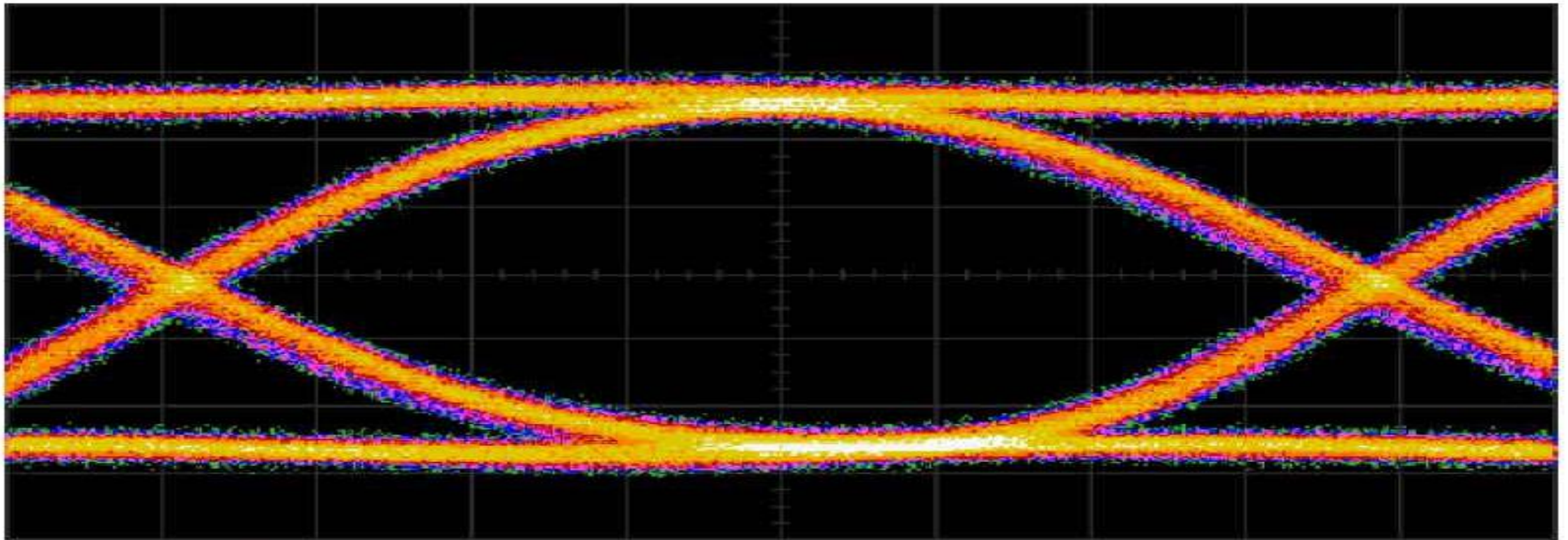
Higher Order Effects –
The bandwidth of the
oscilloscope captures
fast transients and
harmonics



Filtered EYE

12

The filter limits higher order effects for compliance measurements.



4th-order Bessel Thompson low-pass filter bandwidth = $0.75 * \text{bit rate}$

THANK YOU