DaTARIUS

Quality control and process management systems

CD - Jitter

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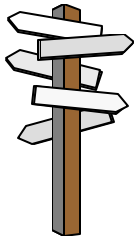
Research & Development

Contents

Time Base Analysis of CD



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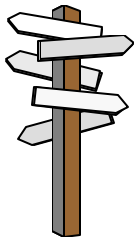


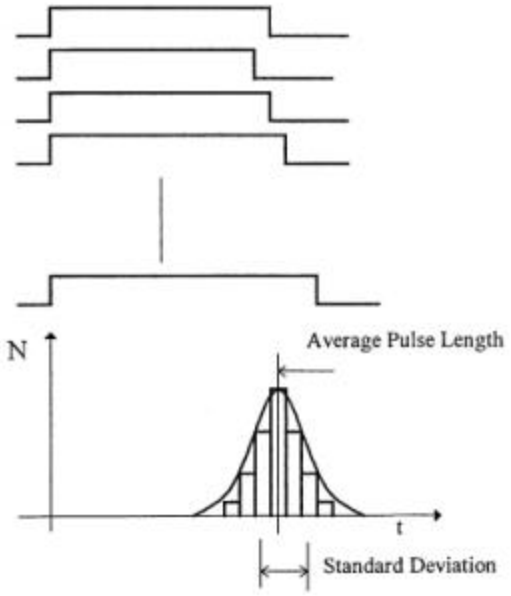
CD jitter analysis

When we measure the length of numerous digitized pits or lands, we will realize that they are **not exactly** of the **same length**.

Mathematically we can derive from these numbers two important parameters: a mean value and a standard deviation.

The **mean value μ** gives information about the **average length** of a pit or land. The **standard deviation s** give us an idea **how different the individual lengths** are.

To show this relationship graphically we use a so-called histogram. The results are shown in a so-called Gaussian distribution.



When we measure the data stream of a CD we will notice 9 different distributions for both pit and land. Theoretically the distances between the individual mean values of each histogram should be an integer of 231.4 ns. The standard deviation is called jitter.

To avoid detection errors, each of the intervals should be distinct from its neighbors.

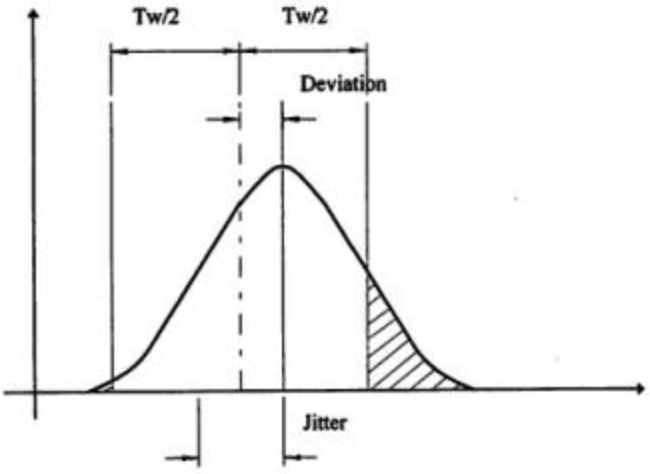
The data window TW defines when a pit or land edge should be encountered if it has been detected correctly. Errors will occur when the data window boundaries are exceeded.

The resulting error rate can be derived by using the Gaussian model:

$$P_e = 1 - erf\left(\frac{T_W/2}{\sigma}\right)$$

... Where erf(x) is the error function and
can be derived from a function table

... TW is the data window of 231.4 ns



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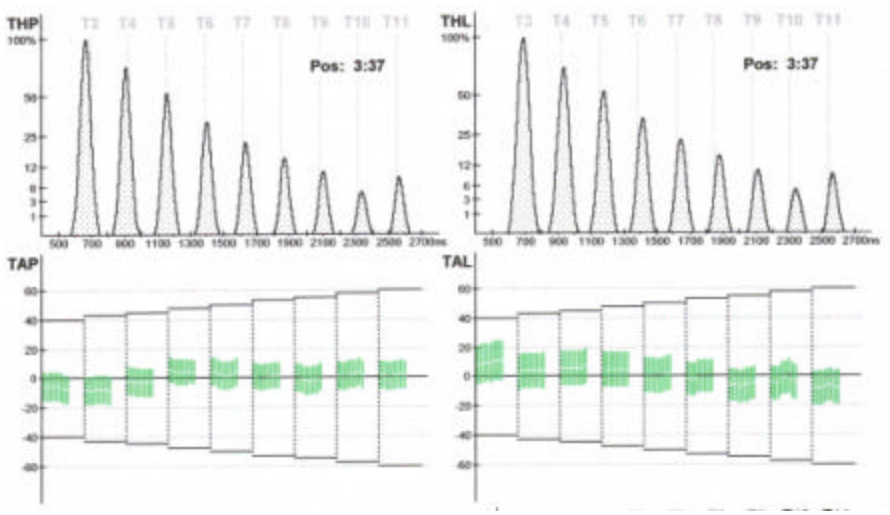
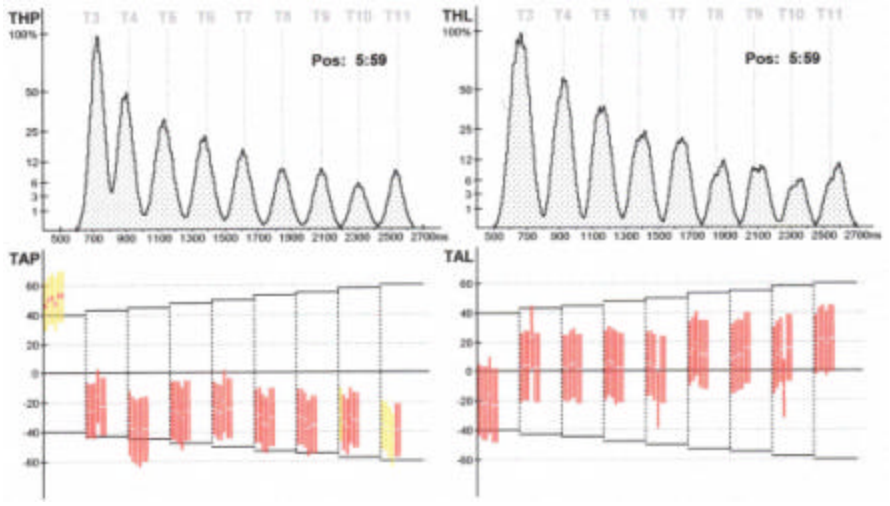
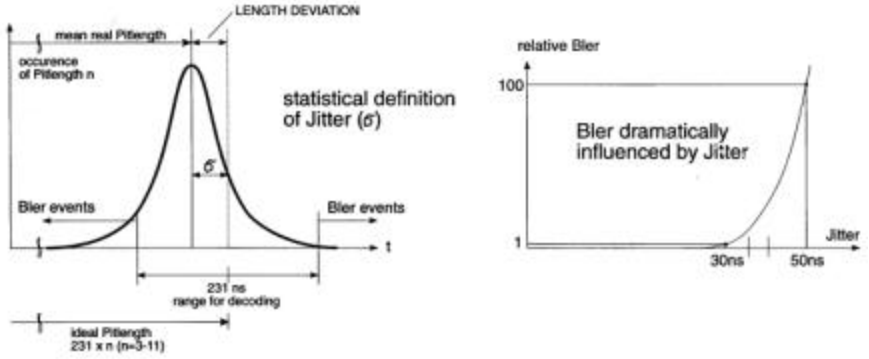


Jitter / deviation analyses from a “good” CD



Jitter / deviation analyses from a “bad” CD



Relation between Jitter and BLER