

LeCroy Digital Oscilloscopes

Get the Complete Picture

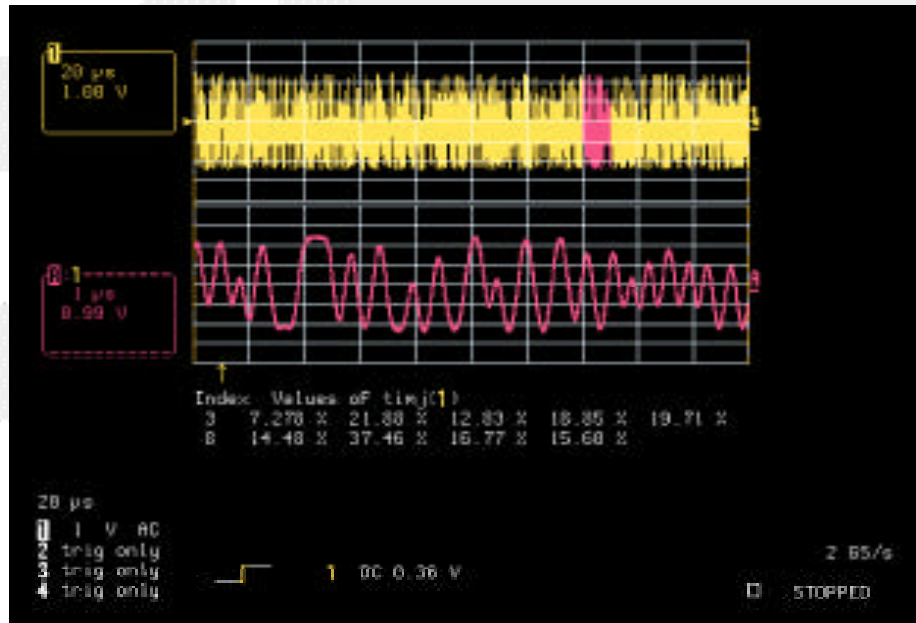
AORM ORM Datasheet

LEADING SPECIFICATIONS

- **Applications:**
CD-ROM - DVD - MO
- **ORM Measurements:**
17 optical recording
timing, and amplitude
measurements
- **List by nT display mode:**
Display a list of
measurements indexed by
each (nT) pulse width
- **Histograms of
measurements:**
Generate histogram bar
charts for analysis of
parameter value
distributions
- **Trend analysis of
measurements:**
Generate trend lines of
parameter measurement
values to study modulation
and other time-ordered
dependencies

Advanced features in AORM:

- **Five new parameter
measurements for
evaluating jitter due to
intersymbol interface**
- **OR parameter support for
CAV & ZCLV through
automatic period
determination**
- **Setup & View wizard for
simplified operation**
- **Modeling of DVD drive
functionality (i.e., equalizer,
 slicer, and PLL)**



List by nT display of Timing Jitter (timj) measurement of CD-ROM Data Waveform with separate values displayed for each "nT" mark/space width (3T-11T).

LeCroy's Optical Recording Measurement packages let you perform automated measurements of optically recorded data waveforms. The combination of these measurements — DVD Channel Modeling (AORM), long DSO memory, advanced triggering features, and a large-screen waveform display — provides previously unavailable optical recording analysis capabilities.

Up to five parameter values can be displayed simultaneously with statistics such as average, maximum, minimum, and sigma.

Also provided is a unique "List by nT" display mode, which simultaneously provides, for each group of "nT" width pits/spaces, the measurement values such as edge shift, timing jitter, etc.

Histograms of parameter measurements can be selected to discover statistical

anomalies not always identifiable from simple statistics, such as the average or standard deviation.

Trend graphs of parameter measurements can also be selected to observe the variation of successive parameter measurements.

In addition to ORM's capabilities, the advanced package, AORM, provides emulation of DVD equalizer, slicer, and PLL processing. This functionality helps you perform clock and jitter measurements independent of a specific integrated circuit, allowing you to concentrate only on optical head or media performance.

AORM also gives you a new Setup and View wizard, which simplifies the setup process and lets you see the waveforms and measurements, with a histogram, trend, or XY plot of the measurements at the press of a button.

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To support advanced optical recording drives that have constant angular velocity (CAV) or zone constant linear velocity (ZCLV), the parameter measurements provide automatic determination of the clock period.

These new capabilities are made available by adding the optical recording measurement packages to either the **Waverunner** or LC DSO series.

Optical Recording Parameters

Optical recording measurement package parameters directly support the pit/space width-based, data-encoding mechanism used in optical recording, by pre-screening waveform pits and spaces into width ranges from 1T to 25T, where "T" is the clock period.

User options include the ability to:

- calculate parameter values for pits, spaces, or both,
- calculate parameter values for pits and/or spaces of a specific "nT" value or range of "nT" values,
- set the voltage threshold level used to determine pit/space widths,

- automatic determination of the clock period (AORM),
- and much more.

Optical Recording "List by nT" Display Mode

Often, it is desirable to view a measurement value for each "n" value for all possible "nT" width ranges simultaneously. The "List by nT" display is provided to accommodate this need. Up to 25 nT values can be displayed simultaneously in this mode.

Advanced Parameters

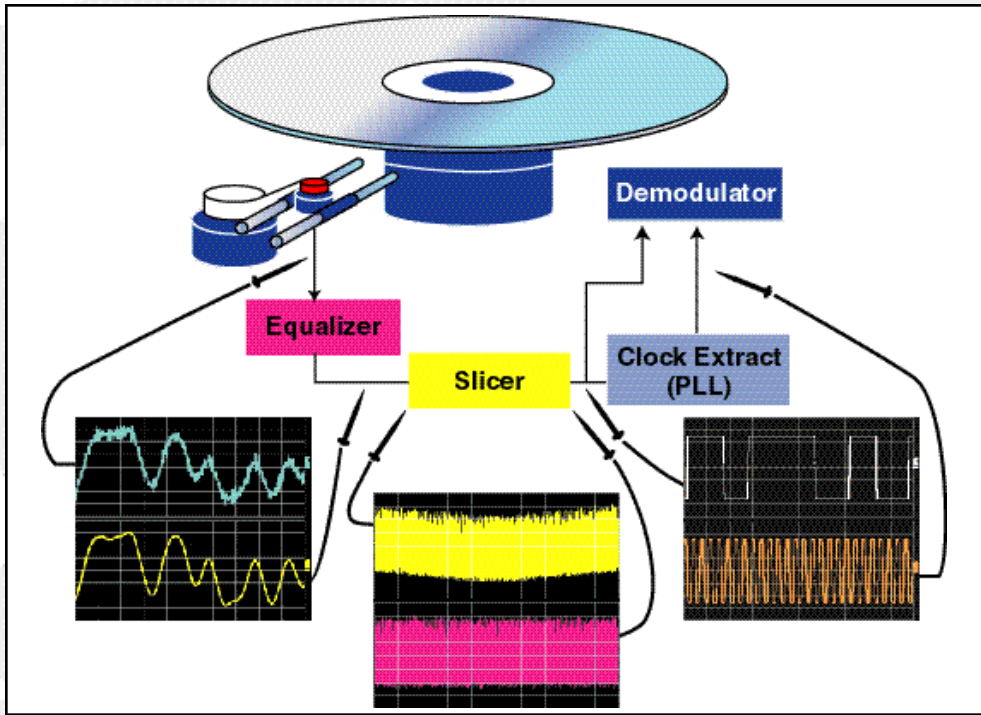
When writing to a disk, the length of neighboring spaces or pits affects the position and length of a pit or space. This intersymbol interference is due to thermal effects on the media. These AORM parameters enable an engineer to measure and view the beginning and ending edge shift (and sigma) for all the combinations of neighboring pits and spaces simultaneously. A table display is available that cross-tabulates edge shifts vs. preceding and following pit/space widths.

ORM Parameters:

p2c	Delta Pit to Clock — time between the leading pit or space edges and the next clock edge. The measurement can be displayed as time or normalized by the period of the clock signal.
p2cs	Sigma of times from pit edge to nearest clock edge.
edgsh	Edge Shift — the mean value of the difference between pit or space widths and their ideal widths.
lper	Period of each cycle of a signal.
paa	Pit Average Amplitude — average amplitude of pits in a waveform.
pasym	Pit Asymmetry — ratio of the difference between the middle voltage of the largest "nT" width pits and the smallest "nT" width pits to the amplitude of the largest "nT" width pits.
pbase	Pit Base — the value for the base level of a space.
pmidl	Pit Middle — the midpoint between the top and base of pits.
pmax	Pit Max — the maximum value of a pit.
pmin	Pit Min — the minimum value of a space.
pmoda	Pit Modulation Amplitude — ratio of the amplitude of pits of the smallest "nT" width to the top of pits of the largest "nT" width.
pnum	Pit Number — the total number of pits and/or spaces in a waveform.
pres	Pit Resolution — ratio of the amplitude of pits of the smallest "nT" width to pits of the largest "nT" width.
ptop	Pit Top — the value for the top level of a pit space.
pwid	Pit Width — the width of pits and/or spaces measured at a user-defined threshold.
t@pit	Time from trigger to leading pit edge. Useful for trending with another parameter.
timj	Timing Jitter — the standard deviation of the difference between pit and/or space widths and their ideal widths.

AORM package adds the following parameters to the above list:

bes	Beginning Edge Shift — measures the leading edge shift of a pit when its preceded by a specified space.
bess	Beginning Edge Shift Sigma — sigma of times of beginning edge shift.
ees	Ending Edge Shift — measures the trailing edge shift of a pit when it's followed by a specified space.
eess	Ending Edge Shift Sigma — sigma of times of ending edge shift.
bees	Beginning and Ending Edge Shift — measures both BES and EES for the sequence of pits (xT nT xT).



AORM lets you view and analyze the equalized data, sliced data and recovered clock using its emulation of the filter, slicer and PLL.

Model of DVD Processing

In many applications, it is important to make timing and jitter measurements directly from the RF signal, independent of a specific DVD chip. The OR processing function, available in AORM, can perform this processing and lets you view the equalized data, sliced data, threshold, and/or the recovered clock.

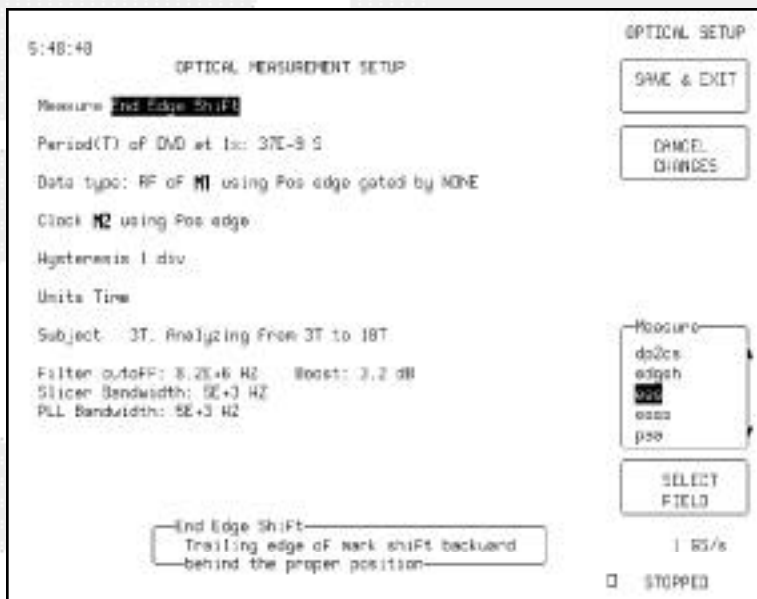
You can control the cutoff frequency and boost of the equalizing filter, the closed-loop bandwidth of the first-order integrating slicer, and the bandwidth of the phase-lock loop (PLL).

Simple to Use

In AORM, a full-page setup menu lets you specify information about your signal and the measurements to be made, and sets up the scope accordingly. The view wizard allows easy selection of data, a histogram, a trend, or an XY plot of the selected measurements.

Histogram Function

A histogram of any waveform parameter measurement can be displayed. The histogram function produces a bar graph with the vertical axis in units of "Events" and



AORM simplifies the configuration of your measurements with its setup and view wizard.

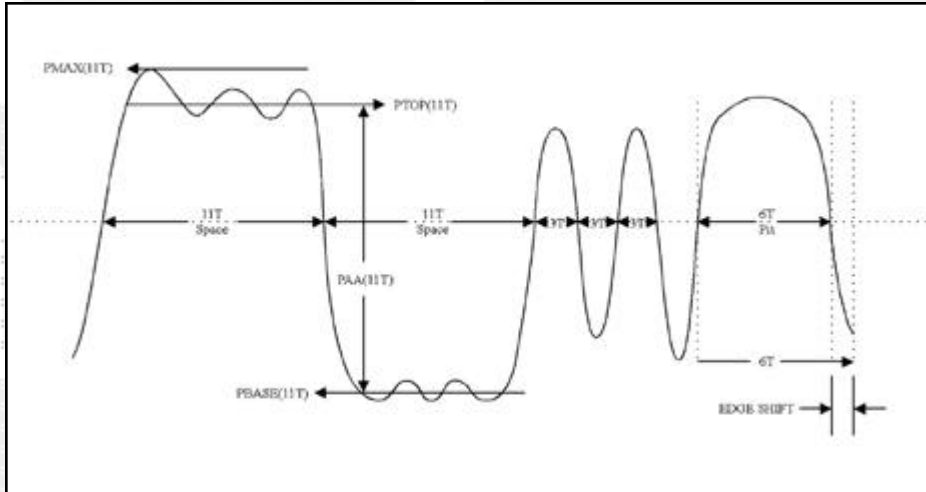
the horizontal axis in the unit of the parameter being histogrammed (i.e., volts, nanoseconds, etc.). Histograms graphically represent the distribution of parameter measurements, providing insights often not available through standard statistical measurements such as the average and standard deviation, which can be directly measured.

Trend Function

This function provides valuable information regarding the change in measurement results of a parameter over time, or an even more important aspect, the correlation

in the shift of two parameters over exactly the same period of time. The effectiveness of the result is not in the displayed value, but in the larger perspective look.

A graph of successive values of any waveform parameter measurement can be generated through the Trend function. The Trend function produces a line graph with the vertical axis representing the values of parameter measurements and the horizontal axis the rank order number (i.e., first parameter measurement calculated, second parameter..) in which each parameter value displayed was calculated.



A few of the measurements available with the ORM package.

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ORDERING INFORMATION

Optical Recording Measurements
Advanced Optical Recording Measurements

ORM
AORM*

**Available only on LT364 and LC series oscilloscopes.*

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