



Technical note - TN30

Oscilloscope settings for pulse measurements

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1. Introduction

This document describes the correct oscilloscope settings for pulse parameter measurements. The most usual parameters are peak level, rise time and pulse duration.

2. Definitions

Table with 2 columns: Parameter and Definition. Rows include Peak level, Rise time, and Pulse duration or FDHM.

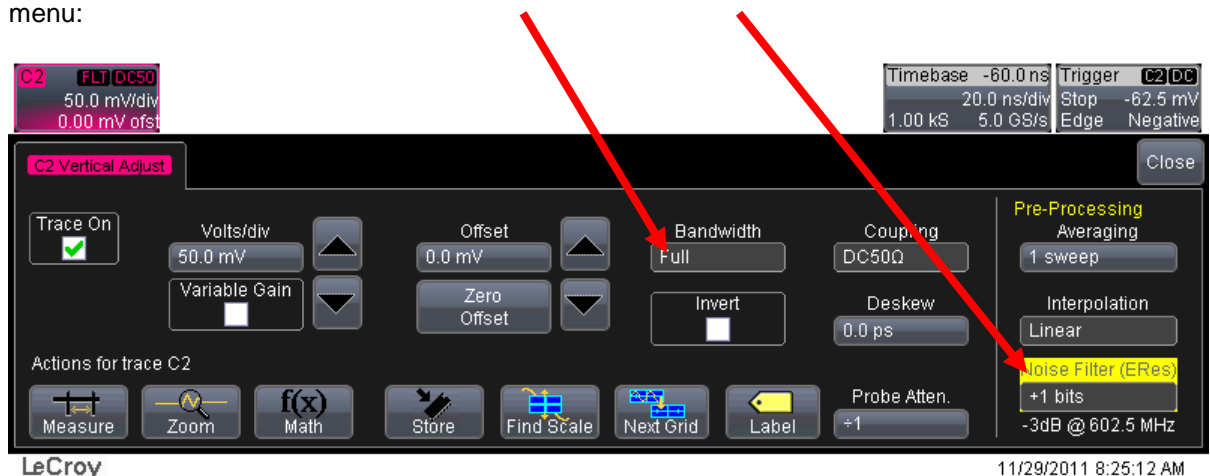
* Definition from IEC Electropedia

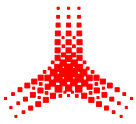
3. Settings for LeCroy oscilloscopes

3.1 Peak level

The peak level of fast pulses is influenced by the frequency bandwidth of the measurement chain. The bandwidth must be high enough to measure all relevant high frequency components of the pulse and low enough to reduce unwanted noise.

With LeCroy oscilloscopes, use the Bandwidth and Noise Filter (ERes) functionality in the "Vertical" menu:





The measurement parameter for the "Peak level" Maximum of input channel 2 → max(C2)

Measure value status: P1: max(C2) 956 µV ✓

Measure: P1: max(C2) P2: rise@lv(C2) P3: wid@lv(C2) P4: --- P5: --- P6: ---

Timebase: -60.0 ns Trigger: C2 DC

50.0 mV/div 20.0 ns/div Stop: -62.5 mV

0.00 mV ofst 1.00 kS 5.0 GS/s Edge: Negative

Measure P1 P2 P3 P4 P5 P6

On Type Source1 Measure

measure on waveforms C2 Maximum

math on parameters Summary

advanced web edit Actions for P1 max(C2)

Histogram Trend Track Help

Markers Always On Simple

Maximum Gate Close

Largest data value in the input signal

LeCroy 11/29/2011 8:25:40 AM

3.2 Rise time

The measurement parameter is "Rise@level" of input channel 2 → rise@lv(C2)

Measure value status: P1: max(C2) 956 µV ✓ P2: rise@lv(C2) ✗

Measure: P1: max(C2) P2: rise@lv(C2) P3: wid@lv(C2) P4: --- P5: --- P6: ---

Timebase: -60.0 ns Trigger: C2 DC

50.0 mV/div 20.0 ns/div Stop: -62.5 mV

0.00 mV ofst 1.00 kS 5.0 GS/s Edge: Negative

Measure P1 P2 P3 P4 P5 P6

On Type Source1 Measure

measure on waveforms C2 Rise@level

math on parameters Summary

advanced web edit Actions for P2 rise@lv(C2)

Histogram Trend Track Help

Markers Always On Simple

Rise at level Gate Close

Transition time for % or absolute levels of all rising edges

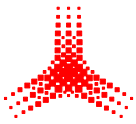
Levels are % 0-Max High percent 90%

Set Levels to 10% and 50% Set Levels to 20% and 80% Low percent 10%

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The method is important. Use levels between absolute 0 and the max value at 10% and 90%.

! Do **not** use the standard function "rise(C2)" as it is not possible to adjust how it is working.



3.3 Pulse duration FDHM

The measurement parameter is "Width@level" of input channel 2 → wid@lv(C2)

The screenshot shows the measurement configuration for 'Width@level' on channel C2. The 'Level is' dropdown is set to '% 0-Max' and the 'Percent level' dropdown is set to '50 %'. Red arrows point to these two settings. Other visible settings include 'Slope' set to 'Pos', 'Hyst. Type' set to 'Divisions', and 'Hysteresis' set to '500 mdiv'. The summary shows the measurement value as 'wid@lv(C2)'. The interface also shows various measurement parameters like P1: max(C2) = 956 µV and P3: wid@lv(C2).

The method is important. Use levels between absolute 0 and the max value at 50%.

! Do **not** use the standard function "width(C2)" as it is not possible to adjust its parameters.

As the FDHM measurement refers to the 100% peak value, a small difference in the measurement of the peak will have a big impact on the computed duration of the pulse.
Adjust the **Noise Filter (ERes)** according to §3.1 in case of difficulty to yield the expected value.

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