

Seven Questions to Answer Before You Choose an Oscilloscope

As an engineer, your oscilloscope is probably the most useful and versatile tool on your bench. So when you buy or rent a new one, it's important to be confident that you're getting a scope that can meet most or all of your test and measurement needs. So before you choose your next best test-bench friend, make sure you know the answers to these questions.

1

What is the highest signal frequency you are likely to measure?

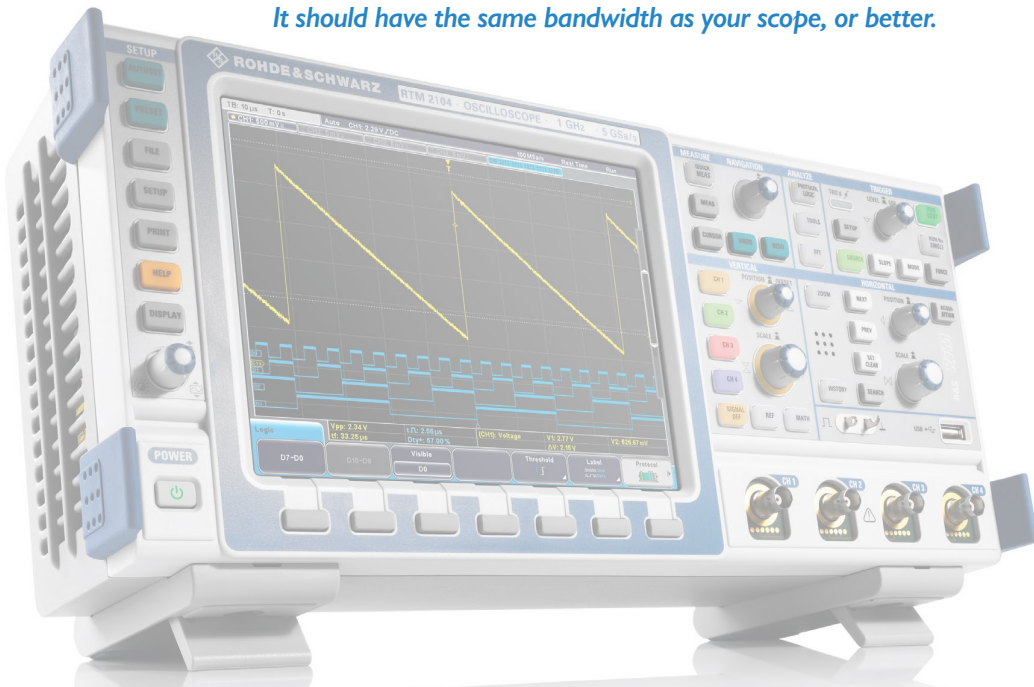
Obviously, your scope needs to be faster than the fastest signal you want to measure—in fact, at least five times faster. The main reason is your scope needs to capture the signal's fundamental, third and fifth harmonic to accurately display the digital signal. So if you are likely to need 100MHz bandwidth in the future, have a 500MHz scope at hand.

Don't forget that your scope's measurement is only as good as the probe you use as well. It should have the same bandwidth as your scope, or better.

Here's Where to Choose:

ConRes carries an impressive range of scopes from many top manufacturers.

[Browse our inventory here.](#)



Get a scope
5X
faster than
your signals

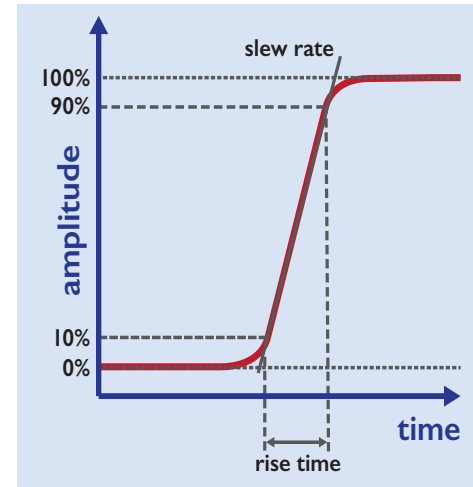
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What is the fastest rise time you are likely to measure?

For measuring digital signals, a lot of critical information lies in the signal rise time. Fast rise time is also needed for accurate timing measurements. The rise time for an oscilloscope can be calculated as $(k / \text{Bandwidth})$:

- For scopes under 1GHz, $k=0.35$
- For scopes over 1GHz, $k=0.40$ or 0.45

Now, use a 5X rule here too: an oscilloscope's rise time should be one-fifth the fastest rise time of your signals. For example, to measure a 4-ns rise time accurately, you need scope a rise time of 800 ps.



3

How many channels are you really going to need?

A scope with more channels gives you greater flexibility to view and debug your circuitry—and save you time. But channels have a direct impact on cost. So think carefully.

Two or four analog channels will allow you to view and compare signal timings of your multiple waveforms. Debugging a digital system with parallel data requires an additional eight or 16 digital channels (or more). A Mixed Signal Oscilloscope (MSO) adds digital timing channels, which indicate high or low states and can be displayed together as a bus waveform.

While having more channels than you need may feel extravagant, having fewer channels than you need will definitely cost you time.

4

Will you use your scope for a variety of applications?

The more types of circuits you are likely to face, the more important a variety of triggering modes becomes—to help you isolate specific signals faster. Most scopes have edge and pulse width triggering.

A more versatile scope will offer you a wider range of advanced triggering options:

- Video triggering on line/frame/HD signals, etc.
- Logic triggering: slew rate, glitch, pulse width, etc.
- Communications triggers: for serial and parallel buses

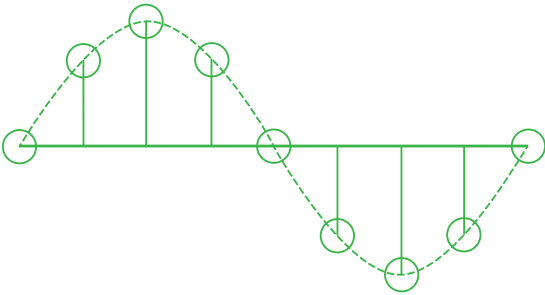
Advanced triggering gives you more ability to look for very targeted events, as well as more confidence that your circuit is working as you intend.



5

Are you likely to be looking for glitches or intermittent events?

It's hard to answer this question without just saying "yes". But if you say an "emphatic yes", then you also need to look at the scope's sample rate: how often an oscilloscope captures a sample of the signal. [Here the 5X rule applies again](#): get a sample rate at least five times your circuit's highest frequency component. If signal quality is extremely important to your circuit, then consider getting a higher sample rate.



Be advised, however, that sampling more frequently will fill up your scope's memory more quickly. A scope can store only a limited number of samples, so in general, the greater the memory record length the better. Once you feel certain the other scope specifications are sufficient, get as much memory length as you can afford.

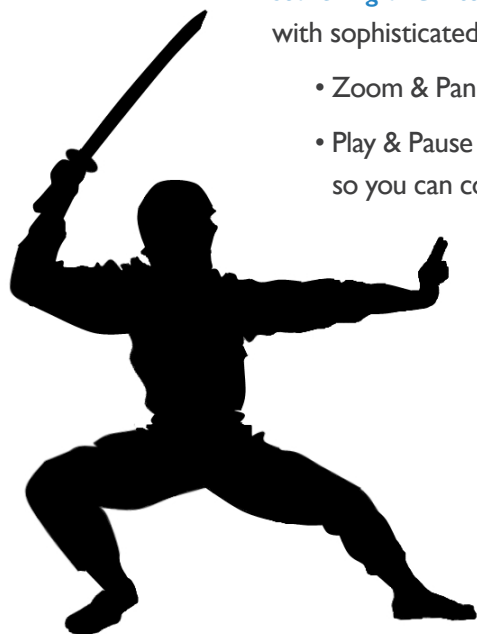


6

Are you an oscilloscope ninja?

Is your scope practically an extension of your brain, or just one tool of many tools you use during the day? If the latter, [let the scope do more of the searching and interpreting for you](#). You may save a lot of time by getting a scope with sophisticated waveform, analysis and measurement options like these:

- Zoom & Pan to focus on an event and pan backwards and forwards in time
- Play & Pause to automatically pan the zoom window across the waveform so you can concentrate on the waveform itself
- Search & Mark for searching through the entire acquisition and marking every occurrence of a specific event
- Mean and RMS calculations, duty cycle and other math operations
- Mathematics functions such as FFT, integrate, differentiate, logarithm, exponent, square root, etc.



Another question: New, Used or Rent-to-Own?

Once you know a scope can satisfy your technical needs, the next question is: can it meet my budget constraints? ConRes offers a huge range of new, used and rent-to-own T&M equipment to help you get the right scope at the right price.

[Learn more in these short case studies.](#)

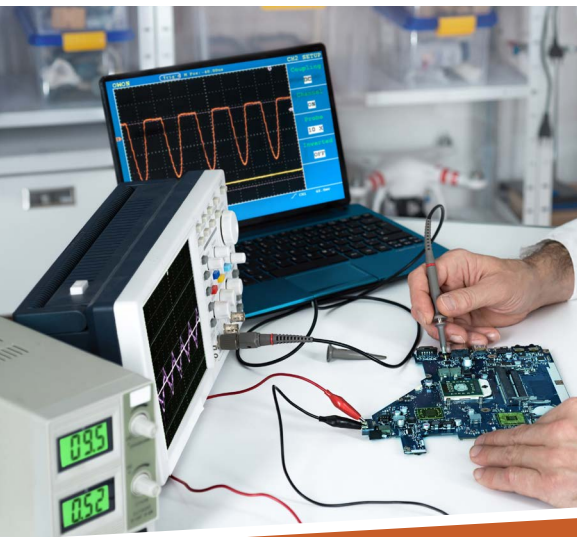
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Will you have to do advanced analysis on your waveforms?

In many cases, finding waveform anomalies and debugging functional problems is just the start. You may need to characterize circuit function, performance and signal integrity across multiple time and frequency domains. If so, look for a scope that can automate the kind of analysis you expect to perform, such as:

- Signal integrity and jitter measurement
- RF signals analysis with spectrograms, amplitude, frequency and phase versus time traces
- Embedded systems debug for mixed analog & digital, parallel & serial technologies
- Power measurement for quality, switching loss, harmonics, etc.

You may already do this kind of analysis on your PC. If so, ***make sure your new scope can connect easily to your computer over the network***, as well as interact with your analysis, documentation and productivity software.



Got Answers? We've Got Your Tools.

Knowing the answers to these seven questions will make it easier to choose the right oscilloscope for your needs, now and in the future. ConRes offers you an incredible range of new and refurbished oscilloscope sales and rentals, so contact us with your answers and we'll help you find the right scope, at the right price, for your testbench.

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