

Oscilloscope Selection Tip 4: Number of Channels

Part 4 of a 12-part series

Tip 4 *Select a scope that has a sufficient number of channels of acquisition so that you can perform critical time-correlated measurements.*



Agilent invented the industry's first Mixed Signal Oscilloscope (MSO) to provide integrated analog and digital measurements. Agilent's InfiniiVision X-Series MSOs are the only MSOs that can maintain up to 1,000,000 waveforms per second to help you debug your mixed-signal designs faster.

The number of oscilloscope channels you require will depend upon how many signals you need to observe and compare in relationship to each other. At the heart of most of today's embedded designs is a microcontroller (MCU) as shown in the simplified schematic of Figure 1. Many MCUs are actually mixed-signal devices with multiple analog, digital, and serial I/O signals that interface to the real-world – which is always analog in nature.

As today's mixed-signal designs have become more complex, more channels of acquisition and display may be required. Two and four channel scopes are very common today. If more than four analog channels of acquisition are required, your choices become very limited, But there is another alternative; a Mixed Signal Oscilloscope... sometimes called an "MSO".

MSOs combine all of the measurement capabilities of oscilloscopes, with some of the measurement capabilities of logic analyzers and serial bus protocol analyzers. MSOs have three primary attributes. The most obvious attribute is the ability to simultaneously capture multiple scope and logic signals with a time-correlated display of waveforms. Just think of it as having a few channels with high vertical resolution (typically 8 bits) plus several additional channels with very low vertical resolution (1 bit).

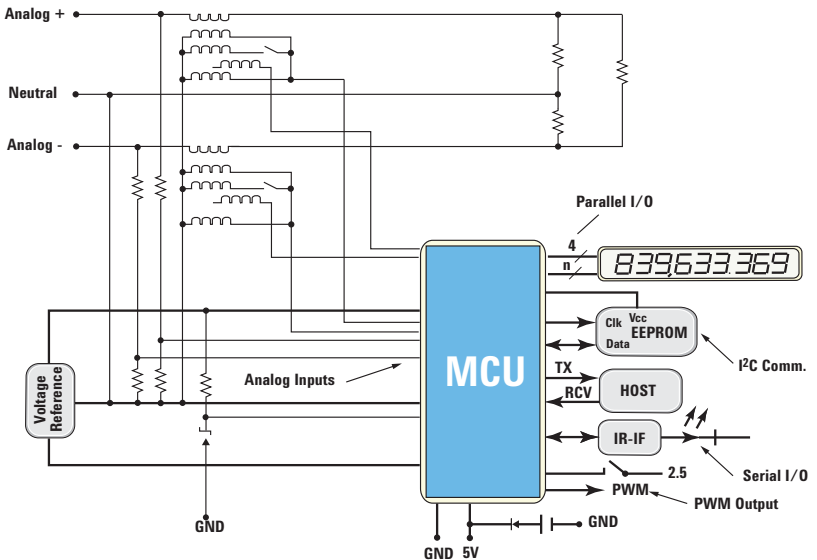


Figure 1. Typical MCU-based embedded design.



Figure 2. MSOs can capture and display multiple analog and digital signals simultaneously providing an integrated and time-correlated display of multiple waveforms.



Secondly, although MSOs may lack the large number of digital channels of a logic analyzer, one of the primary advantages of an MSO is its familiar use-model, which is that of an oscilloscope. And lastly, with the additional logic channels available in MSOs, users now have many more triggering possibilities that can be used to “zero-in” on specific parallel and serial bus I/O interaction in today’s mixed-signal designs.

In Figure 2 we show an Agilent InfiniiVision X-Series MSO capturing the input of a MCU-controlled digital-to-analog converter (DAC) using its digital channels of acquisition, while monitoring the output of the DAC with a single analog channel of acquisition. In this example the MSO was setup to trigger on a logical pattern condition of the input of the DAC when it was at its lowest value of 0000 1010 (1A_{HEX}).

To learn more about making measurements with a mixed signal oscilloscope (MSO), refer to Agilent’s application note titled, Evaluating Oscilloscopes to Debug Mixed-signal Designs (publication # 5989-3702EN).

Agilent’s InfiniiVision 2000 & 3000 X-Series Mixed Signal Oscilloscopes feature the fastest waveform update rates at the lowest price points

If you are in the market today to purchase your next oscilloscope, Agilent Technologies’ newest 2000 & 3000 X-Series oscilloscopes come in various bandwidth models ranging from 70 MHz up to 500 MHz. The entry-level InfiniiVision 2000 X-Series scopes include MSO models with 8 channels of digital acquisition. These MSO models are the lowest priced MSOs on the market today.

The higher performance InfiniiVision 3000 X-Series scopes include various bandwidth models with 16 channels of digital acquisition.

Agilent InfiniiVision X-Series MSOs are the only MSOs on the market today with integrated digital channels of acquisition that don’t degrade waveform update rates (up to 1,000,000 waveforms per second). And all InfiniiVision X-Series DSOs can be upgraded to have MSO capabilities after-purchase.

To learn more about Agilent’s InfiniiVision 2000 and 3000 X-Series oscilloscope and mixed signal oscilloscopes, go to www.agilent.com/find/2000X-Series or www.agilent.com/find/3000X-Series.

Product specifications and descriptions in this document subject to change without notice.

© Agilent Technologies, Inc. 2011
Published in USA, October 26, 2011
5990-8559EN