

# Quickly Characterize Embedded Serial Buses

Keysight embedded serial bus characterization solution

# Introduction

Today's embedded designs based on microcontroller units (MCUs) and digital signal processors (DSPs) often include a combination of real-world analog signals, digital input/outputs, and serial buses. Serial buses are pervasive in today's digital designs. Engineers use them for a variety of purposes including onboard chip-to-chip communication, CPU to peripheral control, and for remote sensor data transfer and control. It can be difficult to debug buses and correlate data transfers with other mixed-signal interactions in your system without the use of intelligent oscilloscope serial bus triggering and protocol decode.

## Use Case Summary

Embedded design engineers have traditionally used a combination of oscilloscopes, logic analyzers, and serial bus protocol analyzers to test and debug mixed-signal embedded designs. However, a mixed-signal oscilloscope (MSO) can offer space savings and a more efficient way for engineers to debug embedded designs. An MSO takes the measurement capabilities of a digital storage oscilloscope (DSO) and combines them with some of the measurement capabilities of a logic analyzer and serial bus protocol analyzer in a single instrument. A hybrid test instrument, an MSO enables you to see multiple time-aligned analog and digital waveforms on the same display.

In addition, MSOs that come with embedded analysis software further enable engineers to quickly test their embedded designs. The software includes tools to analyze some of the most common serial buses that embedded designs use, such as I2C, serial peripheral interface (SPI), universal asynchronous receiver-transmitter (UART), and more. Oscilloscopes that have serial bus triggering and hardware-based protocol decoding enable engineers to quickly debug embedded designs that include serial bus communication.

## Solution Overview

Keysight's **Embedded Serial Bus Characterization Solution** enables engineers to quickly and easily perform serial protocol analysis on the most common embedded serial buses. The mixed-signal oscilloscope provides a time-interleaved protocol lister display that time-correlates multiple analog and digital serial buses. Trigger, decode, and perform advanced analysis on embedded protocols with the included embedded analysis software.

Learn more at: [Using Oscilloscope Segmented Memory for Serial Bus Applications](#)

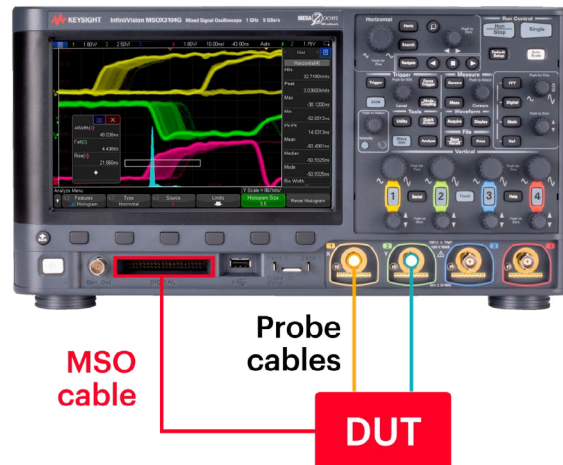
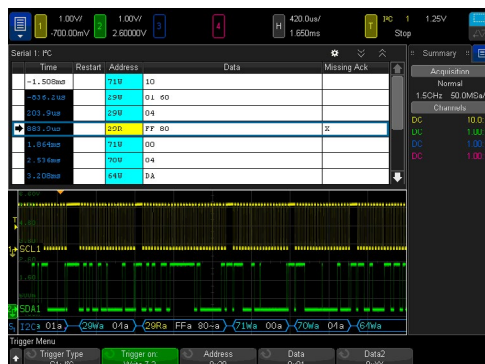


Figure 1. Embedded serial bus characterization solution

## Summary

- Embedded designs today are using an increased number of and multiple types of serial buses.
- It can be challenging to debug buses and correlate data transfers with other mixed-signal interactions in your system.
- An oscilloscope that includes embedded analysis software can help engineers quickly characterize embedded serial buses by providing intelligent built-in analysis capabilities.

For more information: [Characterize Embedded Serial Buses](#)



## Keysight embedded serial bus characterization solution

- MSOX3054G InfiniiVision 3000G X-Series Oscilloscope
- D3000GENB Embedded Analysis Software (included with 3000G)
- N2843A Passive Probes (included with 3000G)
- N2756A 16 Digital-channel MSO Cable (included with 3000G MSO models)

For more information on Keysight Technologies' products, applications, or services, please visit: [www.keysight.com](http://www.keysight.com)

This information is subject to change without notice. © Keysight Technologies, 2022, Published in USA, October 14, 2022, 7122-1110.EN