

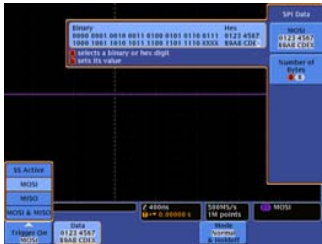
Working with Serial Applications

A Quick Guide to Common Serial Standards



I²C (Inter-IC Bus)

- Used for chip-to-chip communication
- Uses two single-ended signals: clock and data



SPI (Serial Peripheral Interface)

- Used to communicate between microcontrollers and their immediate peripheral devices
- Can use 2-, 3-, or 4-wire bus topology



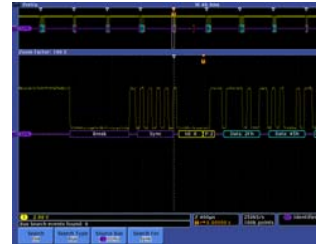
RS-232/422/485/UART

- Used for chip-to-chip and system-to-system communication
- Single-wire or differential signals



CAN (Controller Area Network)

- Used for system to system communication
- Data rates from 10 kb/s to 1 MB/s



LIN

- Used for low-cost, low-speed automotive communication
- Single-wire signaling, at rates up to 20 kbps



FlexRay

- Used for high-speed, high-reliability automotive communication
- Differential signaling, at rates up to 10 Mbps

Tektronix DPO and MSO Series oscilloscopes allow you to:

- **Trigger** on all the critical elements of your serial bus such as address, data, etc.
- **Decode** all the critical elements of each message. No more having to count 1s and 0s!
- **Search** through long acquisitions using user defined criteria to find the specific messages you're looking for.
- **Event Table** shows decoded serial bus activity in a tabular, time-stamped format for a quick summary of system activity.



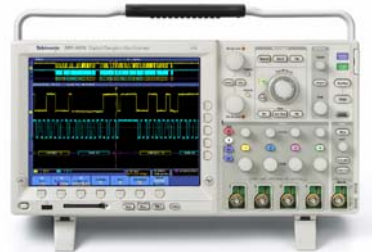
For more information on automotive electronics, visit: www.tektronix.com/automotive

Perform serial debug for common standards with Tektronix DPO and MSO Series oscilloscopes:



MSO4000 Series

- 350 MHz to 1 GHz
- 2 or 4 Analog Channels
- 16 Digital Channels
- 10 M Record Length
- 2.5 to 5 GS/s Sample Rate



DPO4000 Series

- 350 MHz to 1 GHz
- 4 Analog Channels
- 10 M Record Length
- 2.5 to 5 GS/s Sample Rate



DPO3000 Series

- 100 to 500 MHz
- 2 or 4 Analog Channels
- 5 M Record Length
- 2.5 GS/s Sample Rate

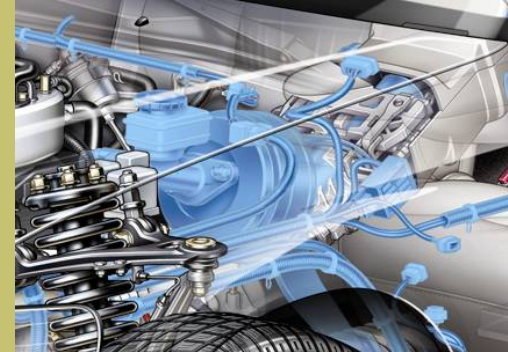
Serial Application Module Options

	Tektronix MSO4000 Series and DPO4000 Series Modules	Tektronix DPO3000 Series Modules
I²C	DPO4EMBD	DPO3EMBD
SPI	DPO4EMBD	DPO3EMBD
RS-232/422/485/UART	DPO4COMP	DPO3COMP
CAN	DPO4AUTO or DPO4AUTOMAX	DPO3AUTO
LIN	DPO4AUTO or DPO4AUTOMAX	DPO3AUTO
FlexRay	DPO4AUTOMAX	Not Available

www.tektronix.com/serialdebug



Design Implications



The increased use of Local Area Networks have added new design challenges as serial applications such as CAN, LIN, and FlexRay are integrated into automotive designs.


Serial buses are fast replacing wide parallel buses in embedded system designs, resulting in:

- Improved circuit board designs
- Simplified designs of complex systems

Learn More...

While serial buses provide a number of advantages, they also pose some significant challenges.

Get the **Serial Application Note** to learn more about common serial applications, common challenges, and how you can overcome them.



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