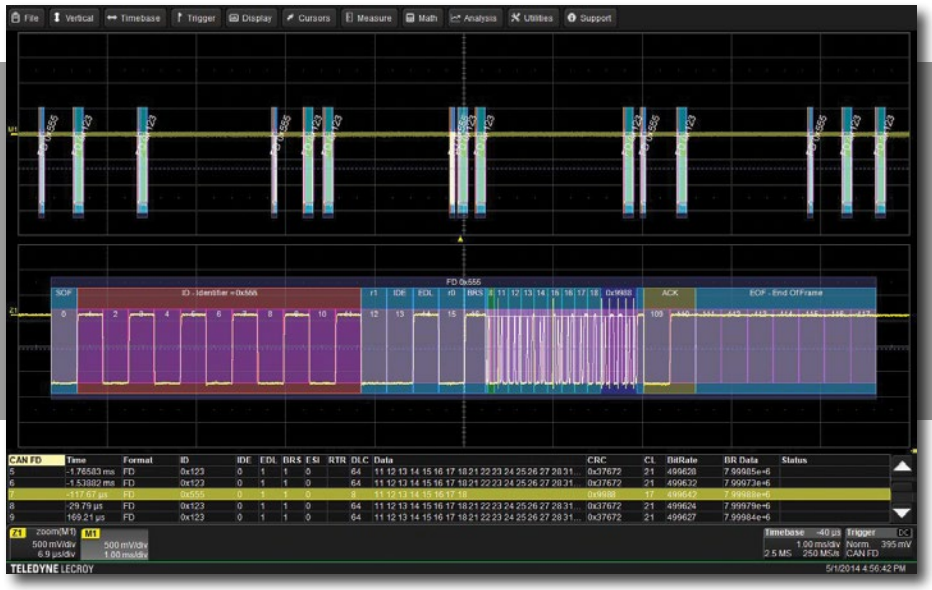
TELEDYNE LECROY
Everywhereyoulook™

CAN and CAN FD Trigger, Decode and Measure



Key Features

- **Comprehensive CAN and CAN FD (non-ISO and ISO) trigger and decode**
- **Flexible triggering for data, error and remote frames**
- **Easily view decoded signals with intuitive color-coded decode overlay**
- **CAN and CAN FD specific parameters to measure, plot and analyze bus performance**
- **Import a .dbc file to allow for analysis to be performed on the Symbolic (Application) layer**
- **Supports CAN signals up to 1 Mb/s and CAN FD signals up to 10 Mb/s**
- **Powerful conditional ID and Data triggering (in range, out of range, less than, greater than)**
- **Convenient table display with "zoom to byte" capability**
- **Quick search to identify specific message packets**
- **Simultaneously decode up to 4 busses including CAN, CAN FD or other protocols**

With CAN and CAN FD trigger and decode the oscilloscope becomes the ideal tool for debugging CAN controllers, busses and systems. Identify and isolate specific frames with ID, Remote and Error frame triggering. Decoding CAN signals provides tremendous insight into activity on the bus, and measurement tools enable fast analysis of bus performance.

The Most Intuitive Decode

Decoded protocol information is color-coded to specific portions of the CAN, CAN FD, and ISO CAN FD frame, and displayed directly on top of physical layer signals creating an intuitive and easy-to-understand visual display. The decoded information adjusts as the horizontal scale is changed to always provide the right amount of detail in both short and long acquisitions.

Measure and Plot Bus Performance

Powerful measurements and sophisticated statistical, graphical, and plotting tools simplify CAN system debugging. Understanding CAN bus problems and performance is quick and easy.

Powerful CAN Triggering

The CAN and CAN FD trigger will isolate Frame IDs, specific data packets, remote frames or error frames. For CAN FD signals, the oscilloscope can trigger on both ISO and non-ISO variants as well as specific frames with the Bit Rate Shift (BRS) bit. Powerful, conditional triggering enables triggering on a range of events such as a series of Frame IDs or data messages.

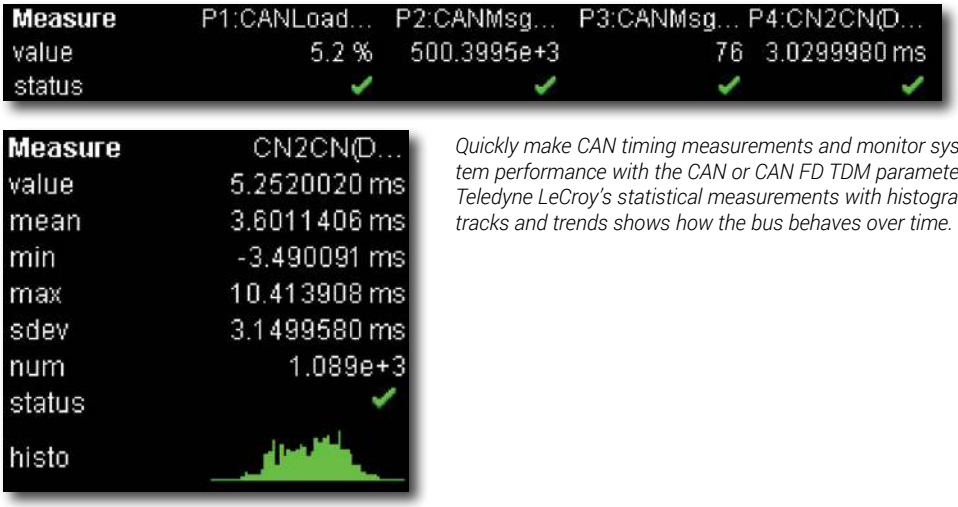
Analyze the Symbolic Layer

Importing a .dbc file allows for decoding, triggering, and measurements to be performed directly on the Symbolic (Application) layer, enabling an easier to understand CAN toolset.

TIME SAVING ANALYSIS AND DEBUG TOOLS

Timing and Bus Measurements

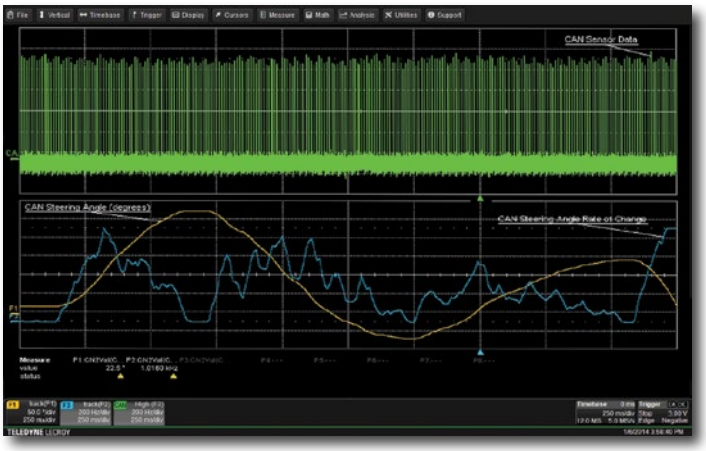
CAN and CAN FD specific measurement parameters allow you to quickly and easily characterize a system and make gateway measurements. Measure the time between two messages on the bus or from a CAN message to analog signal. Measurement statistics and histicons provide insight into the range of measurements on the bus.



Quickly make CAN timing measurements and monitor system performance with the CAN or CAN FD TDM parameters. Teledyne LeCroy's statistical measurements with histograms, tracks and trends shows how the bus behaves over time.

Data Extraction and Graphing

Extract data from the CAN and CAN FD message streams and use track functions to graphically plot the data. Measured values are used to convert digital information into an analog waveform for easy comparison to other electrical signals.



Information on the steering angle and steering angle rate of change is extracted from the CAN message acquisition, rescaled to decimal values, and plotted as a time-correlated "Track"

Interactive Table Display Summarizes Results

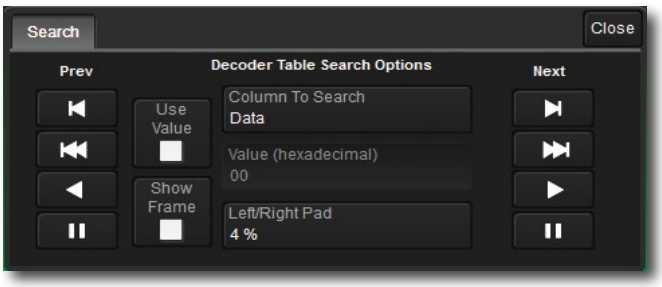
Turn the oscilloscope into a protocol analyzer with the table display of decoded information. Customize the table to show only the data of interest and touch a message in the table to automatically display it on the screen. Export the table for offline analysis.

CAN FD	Time	Format	ID	IDE	EDL	BRS	ESI	RTR	DLC	Data	CRC	CL	BitRate	BR Data
10	-12.06818 ms	FD	0x3c1	0	1	1	0		2	33 e1	0x3fd1	17	500443	1.9988493e+6
11	-9.20686 ms	FD Ext	0xa1fef1	1	1	1	0		1	34	0x1d443	17	500228	2.0077723e+6
12	-9.08856 ms	FD Ext	0x1050ff71	1	1	1	0		12	35 bd df ee f7 fa fd ff cc cc cc cc	0x210b	17	500168	2.0000233e+6
13	-6.11374 ms	FD	0x0f1	0	1	1	0		48	36 7f 3e 1f 0e 87 42 a1 cc cc cc cc cc cc cc cc cc cc cc cc...	0x152cf5	21	500634	2.0000919e+6
14	-5.84494 ms	FD Ext	0xae6d051	1	1	1	0		1	37	0x5ae8	17	500213	1.9989850e+6
15	-3.04262 ms	FD Ext	0x5736821	1	1	1	0		12	38 15 0b 04 82 41 a1 d1 cc cc cc cc	0x169f2	17	500264	2.0003262e+6
16	-2.88033 ms	FD Ext	0x8c57361	1	1	1	0		12	39 b5 db 6c 36 9b cc e6 cc cc cc cc	0x12867	17	500163	1.9996196e+6
17	-5 ns	FD Ext	0x10e8c571	1	1	1	0		3	3a b0 6c	0x16d76	17	500274	2.0054911e+6
18	122.30 µs	FD	0x0a1	0	1	1	0		48	3b 57 2a 15 8b c4 62 31 cc cc cc cc cc cc cc cc cc cc cc cc...	0xa6f07	21	500637	2.0001325e+6

Display decoded values in an easy-to-understand table. Values can be displayed in either hexadecimal or symbolic formats. Filter decoded values to isolate information of interest.

Time Saving Search

Search through long records of decoded CAN data for specific Frame IDs, data values, frame types or status bits.



Search through long records of decoded data by entering specific message or frame details.

SPECIFICATIONS

	CANbus TD	CANbus TDM / CANbus TDM SYMBOLIC	CAN FDbus TD	CAN FDbus TDM / CAN FDbus TDM SYMBOLIC
	Definition			
Protocol Setup	Select bit rate (10, 25, 33.333, 50, 83.333, 100, 125, 250, 500, 1000 kb/s or user-defined between 10-1000 kb/s)		Select Nominal bit rate (10, 25, 33.333, 50, 83.333, 100, 125, 250, 500 kb/s, 1 Mb/s or user-defined between 10 kb/s -1 Mb/s) Select Data bit rate (0.5, 1.0, 1.5, 2.0, 5.0, 8.0, 10.0 Mb/s or user-defined between 0.5 - 10 Mb/s)	
	Decode Capability			
Format	Hexadecimal	Hexadecimal or Symbolic*	Hexadecimal	Hexadecimal or Symbolic*
Decode Setup	Threshold definition required. Default is to Percent amplitude. Select bit rate(s).		Threshold definition required. Default is to Percent amplitude. Select bit rate(s) and data rate(s). Select ISO or non-ISO frames.	
Decode Input	Any analog Channel, Memory or Math trace.			
# of Decode Waveforms	Up to 4 buses may be decoded at one time. In addition, zooms can be displayed (with decoded information)			
Location	Overlayed over DATA waveform, on Grid.			
Filtering	Filter on IDs. Select In Range or Out of Range.			
Visual Aid	Color Coding for Frame, ID, IDE, DLC, DATA, CRC, Ack, Stuff Bits, Bit Index, and Errors Decode information is intelligently annotated based on timebase setting		Color Coding for Frame, ID, IDE, EDL, BRS, ESI, RTR, DLC, DATA, CRC, Ack, Stuff Bits, Bit Index, and Errors Decode information is intelligently annotated based on timebase setting	
	Trigger Capability			
Format	Hexadecimal or Binary	Hexadecimal, Binary or Symbolic*	Hexadecimal or Binary	Hexadecimal, Binary or Symbolic*
Trigger Setup	Trigger on All Frames, Frame ID, ID with Data, Remote Frames or Error Frames		Trigger on All Frames, Frame ID, ID with Data, Remote Frames or Error Frames. Support for ISO and non-ISO frames and BRS.	
Address (ID) Condition Setup	Specify one Frame ID or a range of Frame IDs. Frame ID trigger can be combined with Data			
Conditional Trigger Setup	Conditional Frame ID and Conditional Data triggering available. Choose from ≤, <, =, >, ≥, <>, in range, out of range or don't care conditions			
Data Setup	Hexadecimal: # Data Bytes = 0 to 12. Data can be defined by nibble. Triggers on that data pattern regardless of position Binary: Any combination of 0, 1, or X for 1-96 bits. Triggers on that data pattern regardless of position. Symbolic* : Select any message or signal from user defined .dbc file.			
Nominal Bit Rates	10, 25, 33.333, 50, 83.333, 100, 125, 250, 500 kb/s, 1 Mb/s or user-defined between 10 kb/s -1 Mb/s			
Data Bit Rates	NA		0.5, 1.0, 1.5, 2.0, 5.0, 8.0, 10.0 Mb/s or user-defined between 0.5 - 10 Mb/s	
Sampling Point	Configure trigger sampling point for Nominal bit rate		Configure trigger sampling point for Nominal and Data bitrate	
Error Type	Error Frames, Stuff Bit Errors, CRC Mismatch Errors		Error Frames, Stuff Bit Errors, CRC Mismatch Errors, Stuffbit Counter Error, Stuffbit Counter Parity Error	
Trigger Input	Any analog Channel or the EXT input			
	Search Capability			
Search Options	Search for Index, ID, IDE, DLC, Data, and Status		Search for Index, ID, IDE, EDL, BRS, ESI, DLC, Data, CL and Status	
	Measure/Graph Capability			
CAN Timing Measurements	NA	CAN-CAN, CAN-Analog, Analog-CAN, CANMsgNum, DeltaCan, Time@CAN, CAN Message bit rate	NA	CAN-CAN, CAN-Analog, Analog-CAN, CANMsgNum, DeltaCan, Time@CAN, CAN Message bit rate
CAN Data Extraction	NA	CAN-Value	NA	CAN-Value
CAN Bus Load Measurements	NA	CAN Bus Load %	NA	CAN Bus Load %
Graphing Functions	NA	Track, Trend and Histogram of CAN measurements	NA	Track, Trend and Histogram of CAN measurements
	Compatibility			
Compatible With:	For scope model compatibility refer to Compatibility section on the last page. The minimum required software version for CANbus TDM and CANbus TD is 5.7.2.1 (specifications and images shown here are from software version 7.4.0.0 or later). The minimum software version for CAN FDbus TD is 7.4.0.0. The minimum software version for CAN FDbus TDM is 7.6.1.0. The minimum software version for CANbus TDM SYMBOLIC and CAN FDbus TDM SYMBOLIC is 7.8.0.2.			

** Only available with TDM SYMBOLIC option*

ORDERING INFORMATION

Analysis Capability

	CAN Trigger/Decode	CAN FD Trigger/Decode	CAN Measure/Graphing	CAN FD Measure/Graphing	CAN Symbolic Analysis	CAN FD Symbolic Analysis
CANbus TD	•					
CAN FDbus TD	•	•				
CANbus TDM	•		•			
CAN FDbus TDM	•	•	•	•		
CANbus TDM SYMBOLIC	•		•		•	
CAN FDbus TDM SYMBOLIC	•	•	•	•	•	•

CAN and CAN FD products are available in several different configurations:

- *TD options provide trigger and decode capabilities*
- *TDM options add measurement and graphing capabilities to the TD options*
- *TDM SYMBOLIC options add symbolic analysis capabilities to the TDM options*
- *CAN FDbus options support both CAN FD and the legacy CAN protocol*

Compatibility

2 \ 1	WS3k	WSXs	HDO4k	WRXi	WR6Zi	HDO6k	HDO8k	WPZi	WM8Zi	LM9Zi	LM10Zi
CANbus D											•
CANbus TD	•	•	•	•	•	•	•	•	•	•	
CANbus TDM				•	•	•	•	•	•	•	
CANbus TDM SYMBOLIC				•	•	•	•	•	•	•	
CAN FDbus D											•
CAN FDbus TD	•	•	•	•	•	•	•	•	•	•	
CAN FDbus TDM				•	•	•	•	•	•	•	
CAN FDbus TDM SYMBOLIC				•	•	•	•	•	•	•	

Ordering Information

Exact ordering part numbers can be obtained from pre-pending the scope model prefix from a column in **section 1** to the CAN analysis capability in a row of **section 2**. For example, the part number for CAN FDbus TD on the HDO6000 would be "HDO6k-CAN FDbus TD". Please visit **teledynelecroy.com** for the most up to date compatibility and ordering information.

Customer Service

Teledyne LeCroy oscilloscopes and probes are designed, built, and tested to ensure high reliability. In the unlikely event you experience difficulties, our digital oscilloscopes are fully warranted for three years and our probes are warranted for one year. This warranty includes:

• No charge for return shipping • Long-term 7-year support • Upgrade to latest software at no charge

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Local sales offices are located throughout the world.
Visit our website to find the most convenient location.