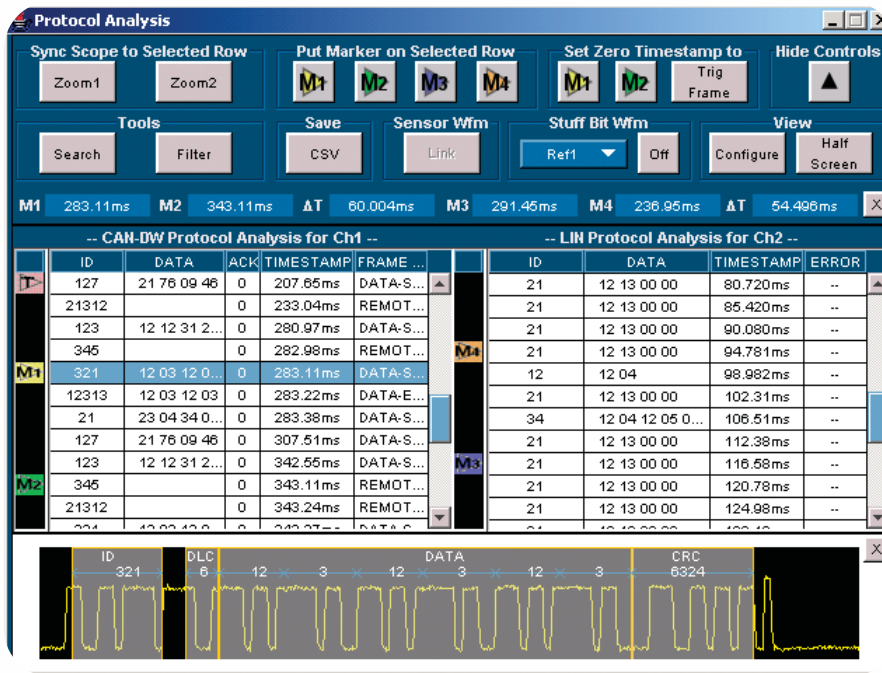


# CAN and LIN Timing and Protocol Decode Software

## ► TDSVNM



## CAN and LIN Timing and Protocol Decode Software

TDSVNM CAN and LIN Timing and Protocol Decode software transforms Tektronix digital oscilloscopes into sophisticated in-vehicle network management tools that provide industry-leading trigger capabilities, oscillator tolerance, propagation delay measurements and simultaneous protocol decoding of CAN and LIN messages that help to ensure seamless and reliable operation of the network. TDSVNM can be installed on any Tektronix TDS5000B/TDS7000/TDS7000B/DPO7000 Series oscilloscope and when used with Crescent Heart Software's ATM-1 automotive trigger module, forms a sophisticated in-vehicle network management tool.

### Seamless CAN Network Operation

The industry's first timing measurements in TDSVNM make it an ideal tool for debugging problems for seamless operation of a CAN network. TDSVNM provides oscillator tolerance and propagation delay measurements enabling proper setting of the sample point in bit time. This ensures accurate sampling of incoming CAN messages in an asynchronous CAN network. Data rate measurement quickly identifies mismatch in data rates in any of

the CAN nodes in the network. Mismatch in data rate can cause a series of error messages to be generated, hampering network performance.

Electrically, the automotive environment is noisy. CAN eye diagram analysis quickly pinpoints problems caused by excessive jitter, amplitude aberration, spikes and glitches in CAN messages.

### CAN and LIN Protocol Decoding

TDSVNM makes it very easy to interpret NRZ encoded information in CAN and LIN messages. This software converts the time domain information into Data Link layer information (Hex or Binary) in CAN or LIN format, saving valuable design time.

Time stamp information provided by the TDSVNM software quickly measures the latency time between the two associated messages for quick characterization and debugging network performance. Using the zoom features, you can now easily view the specific CAN message at higher resolution during long time capture of the CAN/LIN traffic using the long acquisition memory of the oscilloscope.

The industry's first simultaneous protocol decoding of CAN and LIN data from two

## ► Features & Benefits

Oscillator Tolerance and Propagation Delay Measurements Help in Addressing Network Synchronization Issues

Simultaneous Protocol Decoding of CAN and LIN Messages Helps in Ensuring Communication Accuracy and Acceptable Latency between Two Network Segments

Ability to Link Decoded and Time Stamped CAN Messages to their Timing Waveform to more Clearly Visualize Bus Functions

Integrated Search Functions Help to Efficiently Debug Network Problems at the Data Link Layer

CAN Eye Diagram Analysis Quickly Locates Noise in the CAN Message caused by Jitter, Amplitude Aberration, Spikes and Glitches

Bus Traffic Measurement Helps in Optimizing Network Performance for Different CAN Message Frames

CAN Single Wire, CAN Dual Wire and CAN Fault Tolerance Capabilities Provide Versatility

Speed up Network Debug by Setting Trigger Conditions Based on CAN Message Content such as ID, DATA and DLC

Setting Trigger Conditions to Detect Overload, Error and Remote Frames Helps to Quickly Identify CAN Network Communication Errors

Powerful Conditional Triggers such as If-Then-Else Enable Engineers to Monitor the CAN Network and Efficiently Capture Intermittent or Occasional Events

Characterize Long Duration Network Timing Performance by Triggering on the N<sup>th</sup> Occurrence of a Specific CAN Message or Trigger only after a User-specified Time has Elapsed

Ability to Generate the ACK Bit Removes the Need for a Receiving CAN Node when Testing a Single CAN Node

## ► Applications

In-vehicle Network Integration

Easy System Integration

CAN and LIN Protocol Decoding

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segments of an in-vehicle network makes TDSVNM a highly recommended tool for current and future needs. With this capability, engineers can easily ensure the accuracy of communication and the acceptable latency time for exchanging information across a gateway.

### Capture CAN and LIN Data

The powerful trigger capabilities offered by DPO7000 Series' internal CAN triggers and the ATM1 automotive trigger module, coupled with the TDSVNM's GUI, make this solution one of the best suited to capture CAN and LIN Traffic at specific conditions. By triggering on any of the CAN frame types and its bit value, engineers can debug difficult problems easily. The industry's first advanced trigger capability of ATM1 offers unparalleled trigger capabilities to debug and characterize network performance at different operating conditions of the vehicle. Using advanced trigger setup, you can now monitor multiple trigger conditions and take multiple actions that enable long time monitoring of CAN traffic and capture the specific event of interest.

## ► Characteristics

### DPO7000 CAN Trigger –

SOF, Data Frame, Remote Frame, Form Error, Overload Frame, EOF and Missing ACK.

### Elementary Trigger<sup>\*1</sup> –

Data Frame: ID, Data, DLC.  
Error Frame: ACK, Form, CRC, Passive, and Active.  
Remote Frame.  
Overload Frame.

ID and Data values can be set to Equal, Not Equal, Less Than, Greater Than, Within and Out of Range.

### Logical Trigger<sup>\*1</sup> –

Logical OR between any two CAN 2.0A/B messages.

### Advanced Trigger<sup>\*1</sup> –

Number of states: 3.  
Maximum number of events per if-then condition: 2.  
Maximum number of trigger actions per if-then condition: 3.  
Number of counters and timers: 2 each.

### CAN Timing Measurements –

Oscillator Tolerance<sup>\*1</sup>, Propagation Delay, Bus Traffic, Eye Diagram<sup>\*1</sup>, Data Rate<sup>\*1</sup>, Wakeup Time.

### Protocol Decoding –

CAN 2.0A, CAN 2.0B, LIN 1.2, LIN 1.3, LIN 2.0 Simultaneous protocol decoding of CAN-CAN and CAN-LIN messages from any two segments of the network.

### Protocol Decode Utilities –

Link protocol decoded message to time domain waveform; Zoom on YT waveform for specific CAN messages; Time stamp; Search; Markers; Save.

## ► Ordering Information

### TDSVNM

CAN and LIN Timing and Protocol Decode Software.

When Ordered Along with  
TDS5000B/7054/7104/  
7000B/DPO7000

### Opt. VNM –

Includes: Application CD and electronic documentation.

TDS5000B/7054/7104/  
7000B<sup>\*2</sup>/DPO7000  
After-purchase Upgrade

### Opt. VNM –

TDS5000B – Order TDS5BUP.

TDS7054/7104 – Order TDS7UP.

TDS7000B – Order TDS7BUP.

DPO7000 – Order DPO7UP.

### Recommended Accessories

Opt. LSA – Low-speed serial trigger.

Opt. 2RL – Order for DPO7000.

Opt. 3M – Order for TDS5000B.

Opt. 18 – Order for TDS5000B.

Opt. 2M or 3M – Order for TDS7054/7104.

Opt. 2M or 3M or 4M or 5M – Order for TDS7000B Series.

TCA 1 MB Probe Adapter – When using with TDS7154B/TDS7254B/TDS7404B/TDS7704B.

Others– P5205, P5210, P5200, P6246, P6247, P6248 and ADA 400A differential probes.

<sup>\*1</sup> Trigger capabilities offered and measurements enabled by ATM1 Automotive Trigger Module. ATM1 can be ordered from Crescent Heart Software <http://www.c-h-s.com>. Contact your Tektronix representative for more details.

<sup>\*2</sup> A TCA-1 MB TekConnect 1 M $\Omega$  buffer amplifier is required to use a 1 M $\Omega$  differential probe with the TDS7000B Series oscilloscopes.

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Updated 15 June 2005

Our most up-to-date product information is available at:  
[www.tektronix.com](http://www.tektronix.com)



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12/05 HB/WOW

61W-19060-1

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