YOKOGAWA ◆

Digital Oscilloscopes

DL9000 Series CAN Bus Signal Analysis Function (Optional)

for **CAN**

Node 2

Node 1

Node n

signal *plorer*

High Speed Protocol Analysis (Approximately 15 updates/second*)
Real-time Analysis and Display — Even During Waveform Acquisition

Dedicated triggers for CAN Version 2.0A/B (high-speed and low-speed CAN bus signals: used extensively for the internal busses of automobiles, factory automation equipment, medical devices, and other applications) and CAN bus signal protocol analysis functions are available as an option on any DL9000 series instrument. A number of triggers and powerful analysis functions for CAN bus come together in a instrument. Two models of differential probes are available for CAN measurements (sold separately).

* During continuous measurement at 5 ms/div and a record length of 1.25 MW. (Update rates will vary, depending on setup conditions.)

■ Comes Standard with a Wide Variety of Dedicated CAN Bus Triggers

The DL9000 applies triggers based on a variety of specified conditions, enabling reliable capture of only the desired CAN bus signals. It offers Start of Frame, ID, and Data conditions, combinations of these conditions, and Remote Frame and Error Frame triggers. You can even set up to four CAN ID/ Data conditions, combined with OR logic, and trigger if any of the conditions occur. You can also set conditions relative to a specified trigger Data value such as True/ False, Greater than/Less than Data value, between two(2) data values, or out of Data range.

<Data trigger setting example>
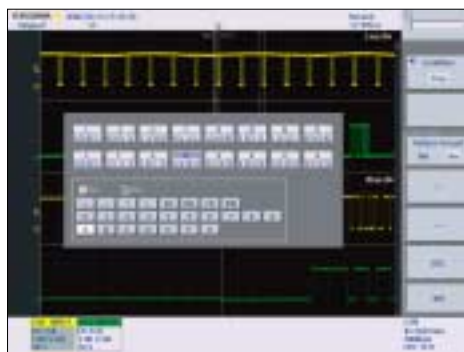
Combination Triggers: Create triggers consisting of CAN events and events on other channels (e.g., a sensor input, or another CAN bus event) (Event Interval Trigger)

● Trigger on Combinations with Non-CAN Signals
Triggers can be activated on combinations of CAN and analog signal trigger conditions. For example, you can debug a system by setting up a condition in which the trigger activates on a time difference between a CAN signal trigger condition and a signal input to another channel such as a sensor or actuator operation signal.

● Trigger on Combination of Two CAN Signals
You can set a condition in which a trigger activates on the time difference (delay time, etc.) between trigger conditions set on two separate CAN networks. This is useful for verifying the complementary operation of two corresponding CAN sub-networks.

Setting Triggers Based on Combinations of Two Conditions (Events)

■ Supports System Debugging and Troubleshooting with High Speed Analysis & Waveform Display

The CAN bus protocol analysis results list can be displayed while the waveforms are being acquired. Analysis results of frame type, time from trigger position, ID, DLC, Data, and CRC, and Ack/Non-Ack are aligned in a single screen with their corresponding waveforms, enabling you to easily compare waveform quality and bus protocol together. You can capture waveforms and analyze the data in real time at update rates of approximately fifteen times per second.*
You can save the analysis results (list) to a text file in csv format.

*During continuous measurement at 5 ms/div and a record length of 1.25 MW.
(Update rates will vary, depending on setup conditions.)

<Waveform Display and Analysis Results>

<Detailed Analysis Results>

Simultaneous Analysis and Display of Two Different CAN Bus Signals

You can analyze two CAN bus signals simultaneously and display the results. For example, you can check waveforms and protocol data from two CAN sub-networks with different conditions at the same time, and verify the correlation between the signals.

<Two different CAN bus signals: analyzed and displayed simultaneously>

Automatically Search Captured Signals for Specific Frames/Fields

You can perform searches of the captured data by specifying Start of Frame, ID, and Data conditions (or combinations of these), and Remote Frame and Error Frame conditions.
When frames are detected that match the search criteria, the analysis list is highlighted and that portion of the waveform is displayed in the zoom window. You can identify portions of the waveform such as the ID or Data field of a specific frame and display those in the zoom area(Field Jump function).

<Field jump function display>

Specifications

Supported CAN bus:	CAN version 2.0A/B Hi-Speed CAN (ISO11898) Low-Speed CAN (ISO11519-2)
Bit rate:	1Mbps/500kbps/250kbps//125kbps/83.3kbps/ User-defined rate (100 bps resolution)

• Trigger functions (Standard function)

Trigger source:	CH1 to CH4 : Differential signal input using a differential probe.
Trigger Types:	SOF Trigger Frame ID Trigger Data Field Trigger: Max. 8byte can be set Remote Frame Trigger Error Frame Trigger Ack Trigger Frame ID/ Data OR Trigger (Max. four bit conditions of ID and Data combined with OR logic can be set) Event Interval Trigger

• Analysis Functions

Number of analyzable frames:	Max. 3,000
Analysis results display:	Listing and waveform display of analysis results Detailed analysis list display (Items: Frame type, Time from trigger position, ID,DLC, Data, CRC, and Ack/Non-Ack)
• Auxiliary analysis functions	Data Search function Field Jump function Stuff bit calculation function
• Analysis result save function	Save the list of the detailed analysis to a file in ASCII format

Note

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- Before operating the product, read the user's manual thoroughly for proper and safe operation.
- If this product is for use with a system requiring safeguards that directly involve personnel safety, please contact the Yokogawa sales offices.

Model and Suffix Codes

Model	Suffix Codes					Description
701307						Digital Oscilloscope DL9040 4 ch, 500 MHz, max. 5 GS/s (2.5 GS/s/ch), 2.5 Mword/ch
701308						Digital Oscilloscope DL9040L 4 ch, 500 MHz, max. 5 GS/s (2.5 GS/s/ch), 6.25 Mword/ch
701310						Digital Oscilloscope DL9140 4 ch, 1 GHz, max. 5 GS/s (2.5 GS/s/ch), 2.5 Mword/ch
701311						Digital Oscilloscope DL9140L 4 ch, 1 GHz, max. 5 GS/s (2.5 GS/s/ch), 6.25 Mword/ch
701312						Digital Oscilloscope DL9240 4 ch, 1.5 GHz, max. 10 GS/s (5 GS/s/ch), 2.5 Mword/ch
701313						Digital Oscilloscope DL9240L 4 ch, 1.5 GHz, max. 10 GS/s (5 GS/s/ch), 6.25 Mword/ch
Power cable	-D					UL/CSA standard
	-F					VDE standard
	-Q					BS standard
	-R					AS standard
	-H					GB standard
Help menu language		-HE				English Help
		-HC				Chinese Help
		-HK				Korean Help
Options			/B5			Built-in printer
				/P2 [1]		Probe power connections on rear panel (2 outputs for current probes, differential probes)
					/C10 [2]	Ethernet interface
					/C8 [2]	Built-in HDD + Ethernet interface
					/F5 [3]	I²C + SPI bus analyzer
					/F7 [3]	CAN+SPI bus analyzer
					/F8 [3]	I²C+CAN+SPI bus analyzer

1: Please order /P2 option when you use either 701920 or 701922 differential probe.
2: Choose either one.
3: Choose either one. I²C,SPI and CAN bus triggers are standard.

Accessories (Optional)

Name	Model	Specifications
Differential probe	701922	DC~200MHz
Differential probe	701920	DC~500MHz

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