Application Note

Simultaneous analysis of eight CAN buses

Verification of bus arbitration

Overview

The CAN bus is a standard protocol for connecting multiple electronic control systems via a data bus and is currently used in various fields such as automotive, transportation, FA and industrial equipment.

In the CAN bus, when the data bus is free, all connected nodes can transmit data equally. If more than one node starts sending data messages at the same time, the node sending the data message with the higher priority ID acquires the transmission right. It is also possible for multiple nodes to receive data with the ID they need at the same time.

A mechanism to prevent collisions between nodes by using IDs contained in data is called arbitration.

In particular, as the number of ECUs in an automobile increases, it is becoming more and more important to check the operation of arbitration and to grasp the delays when gateways connecting ECUs are involved in complex situations.

Key Points

Serial analysis function options

The DLM5000 is capable of triggering and decoding signals from CAN/CAN FD as well as UART (RS 232)/I2C/SPI/LIN/FlexRay/SENT/ CXPI/PSI5 Airbag serial bus signals.

Unique serial bus auto setup

No tedious initial settings such as bit rate or voltage level are required. The DLM5000 automatically analyzes the input signal and sets up the parameters. In addition to significantly reducing the configuration time, it can also prevent misconfigurations.

Simultaneous analysis of up to 4 buses, or up to 8 buses by 2-unit connection

The DLM5000 can analyze up to 4 buses at the same time and display decoded signals together with waveforms or in list form.

When 2 DLM5000s are connected with "DLMSync", up to 8 buses can be analyzed simultaneously.

Zoom 2 locations simultaneously

You can display two zoomed waveforms with different time axis scales at the same time. Being able to zoom in on two distant locations at the same time, such as “cause” and “effect” of a certain event, or to display them with different zoom factors is very useful for analysis.

History function

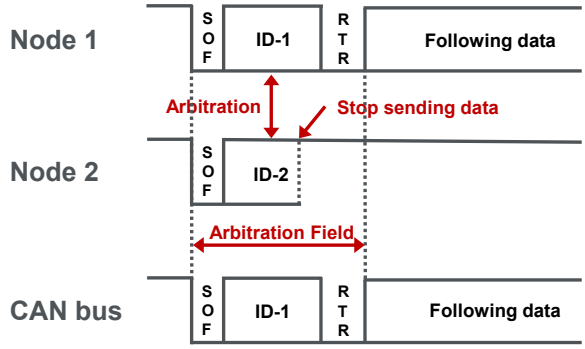
Up to 100,000 previously captured waveforms can be automatically stored in the acquisition memory without user setting. You can display and analyze the stored waveforms.

Statistical calculation of waveform parameters

The DLM5000 can statistically analyze the parameters of repetitive waveforms.

Details

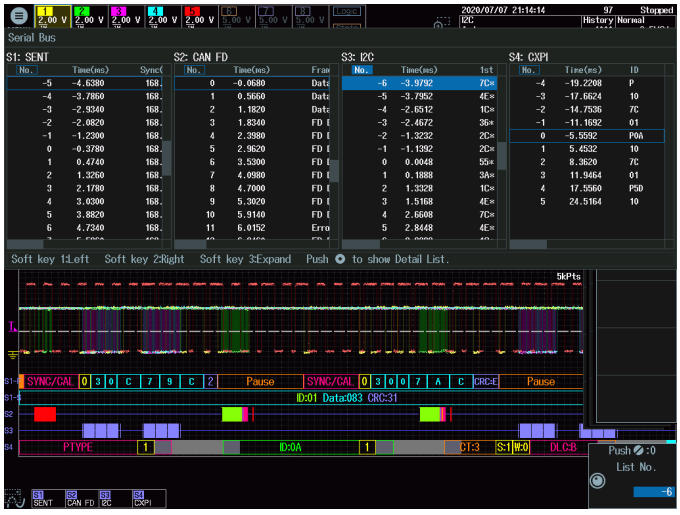
To verify the operation of arbitration, ID from each node and data on the CAN bus must be measured and analyzed simultaneously.



Example of arbitration

Connect the DLM5000 to the CAN bus and each node, and then you can simultaneously measure and analyze up to 4 buses, or even up to 8 buses with 2-unit connection by DLMSync.

For example, waveform data and decoded data of arbitration can be displayed by triggering with SOF of CAN bus data and measuring along with output data of each node.

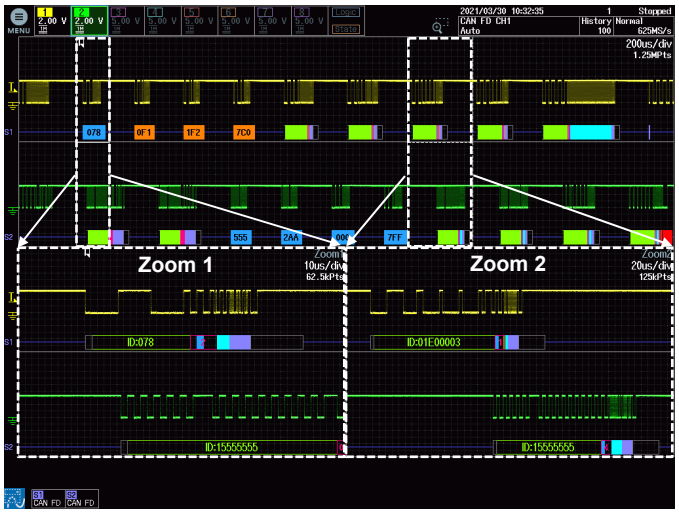


Example of 4 different serial bus analysis
List display (upper) and waveforms/decode display (lower)

Dual Zoom for higher productivity

You can display two zoomed waveforms with different time axis scales at the same time. You can also use the AutoScroll feature to automatically move the zoom display position.

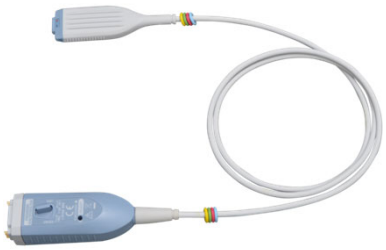
The capability to simultaneously magnify two distant parts, such as "Cause" and “Effect“ of an event, or to change the magnification ratio is useful for software debugging.



For checking the waveform quality of high-speed signals such as CAN FD

Differential Probe PBDH0500 701925

Bandwidth : 500 MHz
Attenuation : 50:1
Max. Differential Input Voltage :
±25 V(DC + ACpeak)
Probe Power : Dedicated probe interface



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