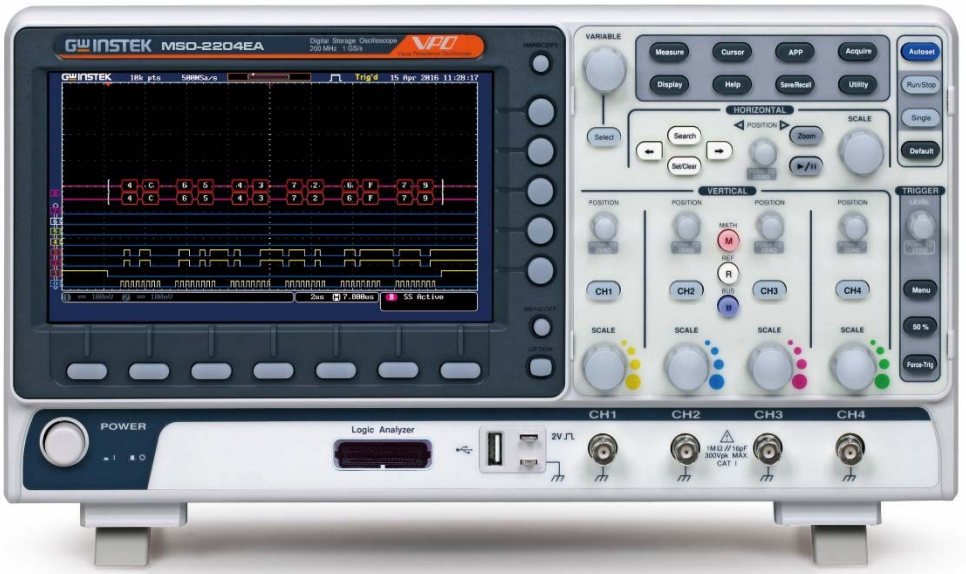
CAN/LIN Bus Measurement Solution



CAN bus Introduction

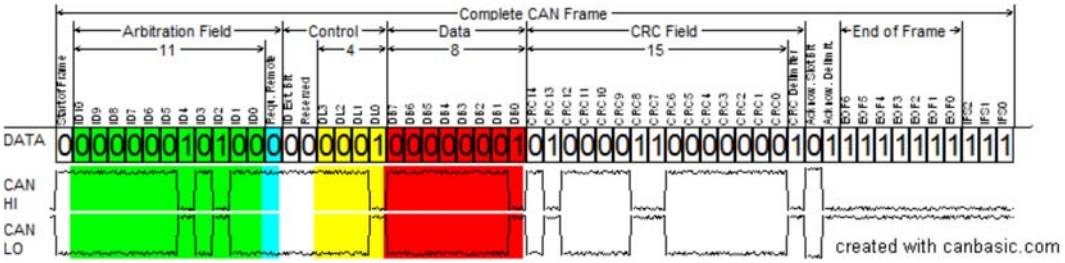
CAN bus (Controller Area Network), first brought up in 1985 by Bosch, a German automobile company, has become ISO-11898 standard communications interface which is widely utilized in the data communications among the internal electronics components for automobiles and vessels. CAN Bus is serial double cord and full duplex communications specifications. It has a very strong capability against noise since it adopts one differential transmission pair. The characteristics of reliability, multi-mainframe nodes and maintaining delay are ideal for industrial control applications. In the recent years, the industrial control sector has started to apply CAN Bus in the data transmission and control among controllers.

CAN Bus Advantages

1. Error tolerance and strong anti-interference capability
2. Five debugging mechanisms. Hardware debugs. Ideal for development under single chip criteria.
3. Priority arbitration mechanism
4. Multi-mainframe architecture—any node can freely transmit information to any other node when some CAN Bus is idle.
5. Simplify the complex wiring process, reduce wiring weight and cost.
6. Extend effective communications range.
7. Elevate integrated service capability.

CAN Bus Transmission Architecture

CAN Bus, with transmission speed from 50Kbps to 1Mbps, adopts full duplex and double cord differential transmission mode. The transmission data mode is as follows:



Its data transmission package has eight effective bits to support more efficient transmission. The entire data series includes the start of package and the end of package. Before a node starting to transmit data, the start of package will transmit signals to another node to inform the transmission will initiate and the control package will deliver the required IP address information. When transmitting an eight-bit data package, CRC (Cyclic Random Check) package continuously checks any errors in the transmitted information. After the transmission is completed the end of package will send signals to inform nodes the process is concluded.

The above-mentioned process is the complete CAN Bus information transmission cycle, which is a very safe transmission mode and cannot be easily interfered. Hence, in the automobile electronics system, CAN Bus transmission is often applied to the control wiring for ABS and airbag.

GW Instek Oscilloscope CAN Bus Test Solution

The CAN Bus test solution, with trigger and decoding functions developed by GW Instek, is a standard application equipped for MSO-2000E logic analyzer or analog channel and MDO-2000E analog channel. When engineers are conducting CAN Bus circuit development and debugging, MSO-2000E or MDO-2000E oscilloscopes can trigger packages from different CAN Bus signals for users to clearly observe every package in transmission process and to check if there are any errors in the analog signal which represent each package so as to increase the efficiency of mixed signal measurement and debugging. In addition, MSO-2000E or MDO-2000E oscilloscopes can conduct CAN Bus decoding function to assist engineers to expedite the data reading timeframe. CAN Bus trigger and decoding diagram is as follows:

CAN Bus Trigger and Decoding Display

Conclusion

Today, CAN Bus has become one of the important transmission regulations for the industrial control sector. The automobile sector in Europe and the US all rely heavily on this communications specification. In the development of chip and electronics system, GW Instek MSO-2000E and MDO-2000E oscilloscope with CAN Bus trigger and decoding solution is your ideal selection to enhance development efficiency and shorten debugging time.

LIN bus Introduction

LIN bus is designed to meet automobile network requirement to achieve low-cost, preliminary level, multi-task communications. CAN Bus is capable of establishing high-level network with high-frequency bandwidth. However, in the automobile electronics system, the high-cost CAN Bus software and hardware is not cost-effective for electrical car window and seat control devices. LIN Bus can achieve low-cost and high-efficiency communications operation. In the present automobile electronics system network, LIN Bus is mainly applied to the low-cost automobile body electronics applications. CAN Bus is mainly used for communications between power train and automobile body. The emerging FlexRay Bus, with high-speed synchronization data communications capability, can be applied to high-level system such as active suspension system. LIN Bus is a Master/Slave transmission method which is one LIN Master collocates with more than one LIN Slave to conduct half duplex transmission mode.

LIN Bus Transmission Architecture

LIN Bus is Poll Bus which is one set of master device collocating with more than one set of slave devices. The master device includes one main operation and one slave operation and each slave device only has one slave operation control unit. LIN Bus communications operation is controlled by the master operation unit of the master device. The basic unit of LIN Bus transmission is called Frame, which can be categorized by Header and Response. Header is transmitted by the master node including three precise columns: Break, Sync and ID. Response is transmitted by the slave operation unit and it can be attached to the master node or slave node including one Payload and one sum check code. Under the normal situation, the master operation unit transmits Header to Poll each slave operation (Break-Sync-ID) in the circuit. Before starting LIN Bus transmission, each slave operation has set data to be published to Bus or Subscribe data from Response to be transmitted to each received Header ID. Once Header is received, each slave operation will ID odd-even polarity and check ID to determine publish or Subscribe. If slave operation must publish Response, 1-8 data bit set will be sent to Bus and one sum check code will be attached. Data Payload and sum check code will be read from Bus to conduct appropriate internal operation if the slave operation must Subscribe. The standard Master-to-Slave communications operation is to let ID to be published to network and only one Slave will respond data Payload. Master-to-Slave communications operation is completed through one independent slave operation in the master node. The slave node can receive all information published in Bus if the node is independent. If the data bit set is to be transmitted Master will renew the data in the slave response. Master then publishes suitable Header and the internal slave operation will transmit data payload to Bus. Bus data structure is as follows:

GW Instek Oscilloscope LIN Bus Test Solution

The LIN Bus test solution, with trigger and decoding functions developed by GW Instek, is a standard application equipped for MSO-2000E digital or analog channel and on MDO-2000E analog channel. When engineers are conducting LIN Bus circuit development and debugging, MSO-2000E and MDO-2000E oscilloscopes can trigger packages from different LIN Bus signals for users to clearly observe every package in transmission process and to check if there are any errors in the analog signal which represents each package so as to increase the efficiency of mixed signal measurement and debugging. In addition, MSO-2000E and MDO-2000E oscilloscopes can conduct LIN Bus decoding function to assist engineers to expedite the data reading timeframe. LIN Bus trigger and decoding diagram is as follows:

LIN Bus Trigger and Decoding Display

Conclusion

Today, LIN Bus has become one of the important transmission regulations for the industrial control sector. The automobile sector in Europe and the US all rely heavily on this communications specification. In the development of chip and electronics system, GW Instek GDS-2000A oscilloscope with LIN Bus trigger and decoding solution is your ideal selection to enhance development efficiency and shorten debugging time.

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