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Electric vehicles -- test specification for CAN bus nodes

电动汽车CAN总线测试规范

(English Translation)

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Foreword

"Electric Vehicle CAN Bus Test Specification" explains the test of the physical layer, data link layer and application layer of CAN bus of electric vehicle in order to effectively verify and confirm the node and bus system of the electric vehicle CAN bus system.

This specification was proposed by the Electric Vehicle Industry Technology Innovation Alliance.

This specification is under the jurisdiction of the China Automotive Engineering Society.

This specification was drafted by Tianjin Qingyuan Electric Vehicle Co., Ltd. and Beijing University of Aeronautics and Astronautics.

1 Scope

This specification specifies the basic method for high-speed CAN bus testing of pure electric passenger cars. The extended program and plug-in passenger cars are used as reference.

This specification applies to CAN bus networks with baud rates between 125 Kbps and 1 Mbps.

This specification does not include EMC and EMI testing for the CAN bus.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this edition.

file. For undated references, the latest edition (including all amendments) applies to this

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document.

ISO 11898-2003 Road vehicles-Controller area network(CAN) ISO 16845-2004 Road vehicles-Controller area network (CAN) -- Conformance test plan ISO 7637-2008 Road vehicles-Electrical disturbances from conduction and coupling SAE J1939-Recommended Practice for a Serial Control and Communications Vehicle Network

3 Definitions and acronyms

The following definitions and acronyms apply to this document.

The response is used to verify that the required operation has been understood and executed.

The address is used to define the 8-bit field of the message source (and destination, where applicable).

Arbitration A single or multiple ECUs resolve the bus collision process when accessing a shared network.

The CAN data frame establishes the ordered bit field required for the CAN frame. It is used to transmit information, starting with SOF and ending with EOF.

The device has one or more components of the ECU and network interface.

ECU An integrated computer-controlled electronic device that transmits and receives messages.

The extended frame uses a 29-bit identifier for the CAN data frame, which is defined in the CAN 2.0 rules.

A complete message consisting of a series of data bits. A frame is divided into multiple fields, each of which contains a type of predefined data.

See CAN data frame.

A "message" of a message is equivalent to one or more "CAN data frames" having the same number of parameter sets. For example, one has a single A parameter number of packets may be sent with multiple CAN data frames.

Hardware connection between the node ECU and the physical medium. A node can declare multiple addresses in the network.

DUT device under test.

Figure 0 Test the symbols used in the build diagram

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4.1.1 Verification

Test equipment and instruments need to be in good working order and need to be labeled with valid verification labels.

4.1.2 Alternative equipment

Alternative laboratory facilities and equipment may be used, but must be consistent with the physical definition of all specified measurement variables in this specification.

5.1 Physical layer

This chapter details the verification test of the physical layer of the high-speed CAN interface, which is only applicable to the two-wire high-speed CAN bus device.

5.1.1
CAN bus output voltage level test

5.1.1.1 Implicit output voltage level

Test range. measure the CAN bus output voltage level in the recessive state and check if they meet the physical layer of the car LAN.

Claim.

Test conditions. See Table 1. Apply test circuit according to Figure 1.

Test method. Measure the absolute value of the differential voltage between the CANH and CANL lines. In addition, the bus common mode voltage VCM is also measured.

Vdiff = VCAN_H - VCAN_L VCM = 0.5 * (VCAN_H VCAN_L) Detection criteria. see Table 1

Table 1 ECU recessive output voltage

Recessive state

Parameter symbol

condition

Minimum rated maximum Output bus voltage VCAN_H

2.5 V 7.0 V no load

Output bus voltage VCAN_L -2.0 V 2.5 V no load Differential output voltage Vdiff -120mV 0 12mV See Table 2 (Test Example 1) Note. A secondary termination resistor can be added when testing that the CAN line is too long or there are too many CAN nodes causing distortion in the CAN signal.

Table 2 Test configuration based on termination resistance

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Note 1: If the device under test does not have a terminating resistor installed, you can add a terminal network to the dotted rectangles 1 and 2.

Note 2: If the device under test already contains a 120ohm termination resistor, you can add a terminal network to the dotted rectangle 1.

Note 3: If the device under test contains a central termination resistor (60 ohm), no additional terminal network can be added.

Note 4: RX is used to simulate 4 additional CAN communication nodes with a secondary termination resistance of 1200ohm.

Note 5: Table 2 lists the applicable resistance values.

Figure 1 High-speed CAN test setup

5.1.1.2 Dominant output voltage level

Test range. measure the CAN bus output voltage level in the recessive state and check if they meet the physical layer of the car LAN.

Claim.

Test conditions. See Table 1. Apply test circuit according to Figure 1.

Test method. Measure the absolute value of the differential voltage between the CANH and CANL lines. In addition, the bus common mode voltage VCM is also measured.

Vdiff = VCAN_H - VCAN_L VCM = 0.5 * (VCAN_H VCAN_L) Detection criteria. see Table 3 Device under test terminal resistance terminal network 1 terminal network 2 Rx Test Method 1 Test Method 2 no terminal connection no connection 180ohm Central terminal (60ohm) No connection, no connection, no connection, 180ohm Fixed terminal (120ohm) connection no connection no connection 180ohm Secondary terminal (1200ohm) connection no connection 211ohm CAN-H CAN-L

Table 3 dominant output voltage

Note 1: If the device under test (device under test) does not have a terminating resistor installed, you can add a terminal network to the dotted rectangles 1 and 2.

Note 2: If the device under test already contains a 120ohm termination resistor, you can add a terminal network to the dotted rectangle 1.

Note 3: If the device under test contains a central termination resistor (60ohm), no additional terminal network can be added.

Note 4: RX is used to simulate 4 additional CAN communication nodes with a secondary termination resistance of 1200ohm.

Note 5: Table 2 lists the applicable resistance values.

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