
**Road vehicles — Controller area
network (CAN) conformance test
plan —**

**Part 2:
High-speed medium access unit —
Conformance test plan**

*Véhicules routiers — Gestionnaire de réseau de communication (CAN)
plan d'essai de conformité —*

*Partie 2: Unité d'accès au médium haute vitesse — Plan d'essai de
conformité*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by ISO/TC 22, *Road vehicles*, Subcommittee SC 31, *Data communication*.

This second edition cancels and replaces the first edition (ISO 16845-2:2014), which has been technically revised and includes the following changes:

- several clauses, subclauses, tables and figures have been technically revised. In particular, the test cases and test requirements to verify if the CAN transceiver with implemented selective wake-up functions conform to the specified functionalities within ISO 11898-6:2013 were extended. This was done to provide a conformance test plan for the whole CAN medium access unit implementations compliant with ISO 11898-2:2016 (which is the result of the merge of ISO 11898-2:2003, ISO 1898-5:2007 and ISO 11898-6:2013).

A list of all the parts in the ISO 16845 series can be found on the ISO website.

Introduction

ISO 16845 was first published in 2004 to provide a test plan for conformance testing of the CAN data link layer and physical signalling as standardized in ISO 11898-1. With ISO 11898-6:2013, CAN high-speed medium access units were standardized, which partly implements a CAN data link layer, in order to provide selective wake-up functionality. This standard was merged together with ISO 11898-5:2007 and ISO 11898-2:2003 to produce ISO 11898-2:2016. In order to provide a conformance test plan for CAN medium access unit implementations compliant with ISO 11898-2:2016, this document has been developed. It comprises static tests and dynamic tests.

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Road vehicles — Controller area network (CAN) conformance test plan —

Part 2:

High-speed medium access unit — Conformance test plan

1 Scope

This document specifies the conformance test plan for the CAN physical layer as standardized in ISO 11898-2:2016. It specifies static and dynamic tests. The dynamic tests includes the test cases for the partly implemented Classical CAN protocol and CAN FD protocol as standardized in ISO 11898-1:2015. The static tests describe the data to be given in datasheets.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 11898-1:2015, *Road vehicles — Controller area network (CAN) — Part 1: Data link layer and physical signalling*

ISO 11898-2:2016, *Road vehicles — Controller area network (CAN) — Part 2: High-speed medium access unit*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11898-2:2016 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1 implementation under test

IUT

HS-PMA which will be conformance tested according to this document

EXAMPLE Standalone transceiver or SBC.

3.2 lower tester

LT

part of the test system, which emulates the interfaces of the underlying OSI layer from sight of the IUT

3.3 normal mode

mode, in which biasing as well as RX and TX are enabled and low-power mode is disabled

3.4
system under test
SUT

system, which embeds the IUT as a part or contains the IUT, because it cannot operate as a stand-alone component

3.5
test system
TS

system, which fulfils in this case all requirements to perform the tests defined in this specification

3.6
upper tester
UT

part of the test system, which emulates the interfaces of the overlying OSI layer from sight of the IUT

3.7
valid frame

syntactically correct CAN frame

3.8
invalid frame

syntactically incorrect CAN frame with CAN conform error treatment

3.9
sync frame

syntactically correct CAN frame which is present on the bus while the IUT is in low power mode.

Note 1 to entry: It could be a WUF or non WUF.

3.10
sync sequence

group of sync frames which the IUT may use to calibrate or fine tune internal parameter to be prepared to detect a WUF

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4 Symbols and abbreviated terms

The following symbols and abbreviated terms are used in this document:

ACK	acknowledge
ASP	abstract service primitives
CAN	controller area network
CBFF	classical base frame format
CEFF	classical extended frame format
CRC	cyclic redundancy check
DLC	data length code
EOF	end of frame
FBFF	FD base frame format
FEC	frame error counter
FEFF	FD extended frame format

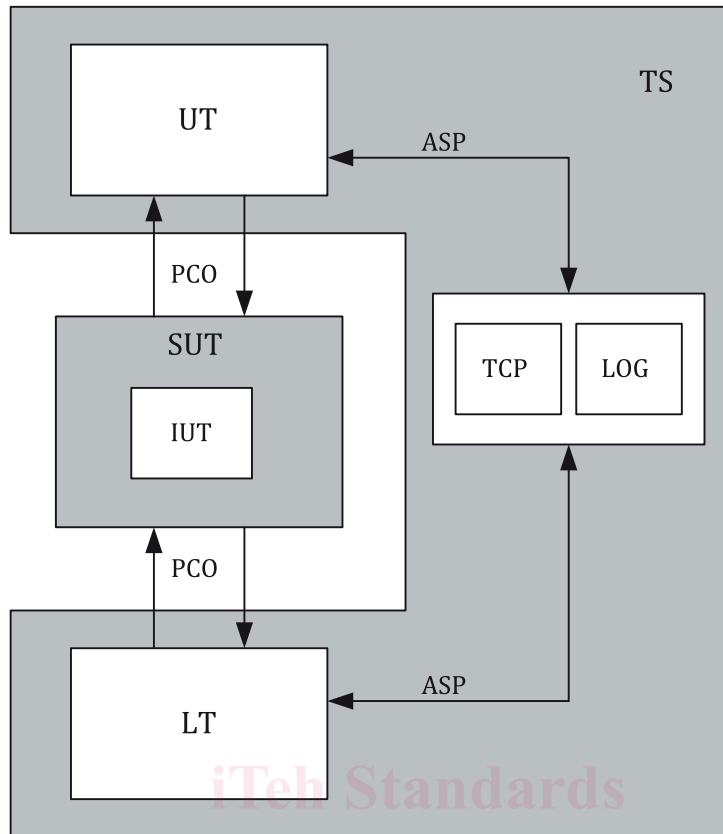
ID	identifier
IMF	intermission field
MAC	medium access control
OSI	open system interconnection
PCO	point of control and observation
PHS	physical signalling
PL	physical layer
PMA	physical medium attachment
SBC	system base chip
SOF	start of frame
WUF	wake-up frame
WUP	wake-up pattern

5 Global overview

5.1 OSI conformance test method

OSI conformance testing was mainly introduced by the ISO 9646, ISO 9646-1 and ISO 9646-2, for the purpose of regulating and harmonizing impartial tests. In general information about the internal structure of the implementation as well as source code is not available to the party performing the tests. This explains why the preferred OSI conformance testing methodology is black box testing and consequently does not take into account any implementation details.

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Figure 1 — The OSI coordinated test method depicts the OSI coordinated test method.



- Key**
- ASP abstract service primitives
 - IUT implementation under test
 - LOG logger
 - LT lower tester
 - PCO point of control and observation
 - SUT system under test
 - TCP test coordination procedure
 - TS test system
 - UT upper tester

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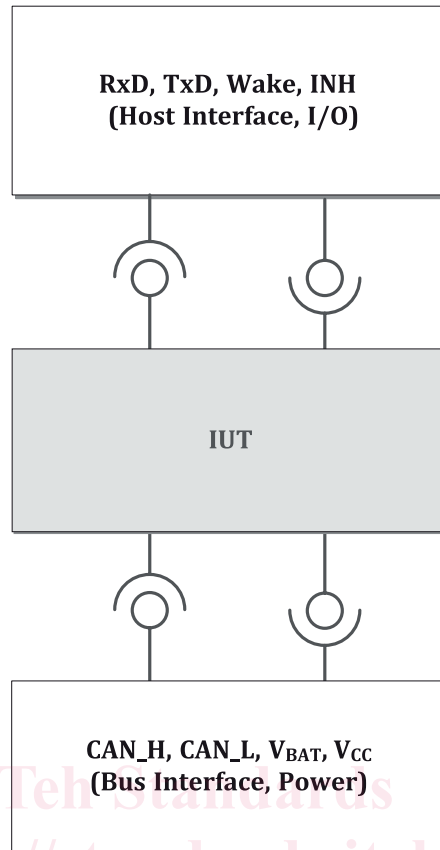
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Figure 1 — The OSI coordinated test method

OSI conformance testing proposes many test methods suitable for different sorts of IUT, providing different points of control and observation.

A coordinated test method which provides a simple interface to the IUT is the most suitable for HS-PMA, i.e. the CAN network itself, and a flexible test coordination protocol using CAN messages between the LT as part of the TS and the UT in the SUT. The LT controls and observes the IUT lower service boundary indirectly via the underlying service provider, using the ASPs of the CAN protocol. The UT controls and observes the IUT upper service boundary. The TCPs ensure the cooperation between the LT and the UT.

In case of IUTs with partial networking functionalities, influencing variables from the UT side are the digital CAN signals (RXD and TXD), host interface signals and I/O signals like INH or wake. The LT influencing variables are the analogue bus interface with the signals CAN_H and CAN_L and the supply power. [Figure 2](#) depicts the influencing variables on the IUT.

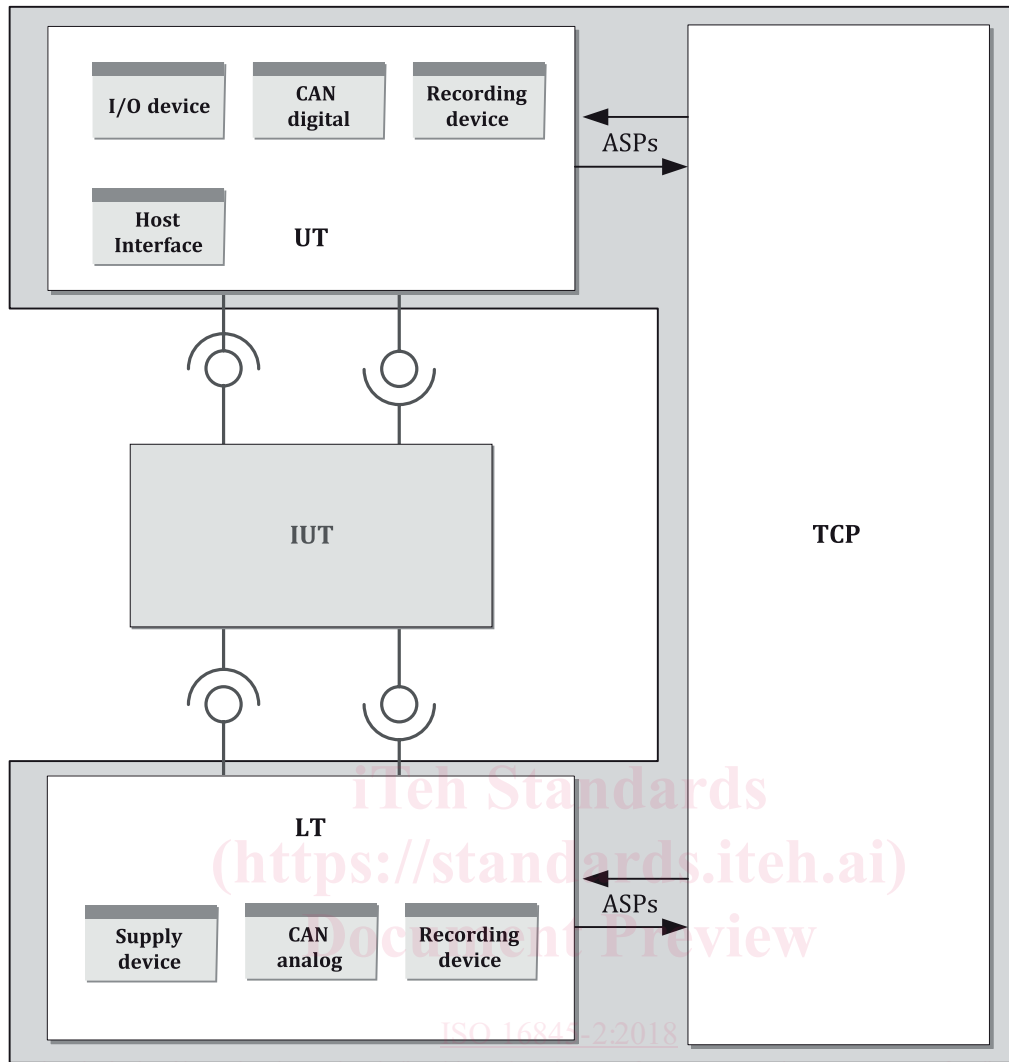
**Key**

CAN_H	CAN high signal
CAN_L	CAN low signal
INH	inhibit output
IUT	implementation under test
I/O	input/output
RXD	receive data output
TXD	transmit data input
V _{BAT}	battery supply input
V _{CC}	supply input
Wake	mode signalling output

Figure 2 — Influencing variables on IUT

To realise all services stimulating the IUT and recording the responses of the IUT regarding all influencing variables, abstract logical devices are defined as followed.

[Figure 3](#) — Abstract logical devices of UT and LT depicts abstract logical devices of UT and LT.



Key

- IUT implementation under test
- LT lower tester
- TCP test coordination procedure
- UT upper tester

Figure 3 — Abstract logical devices of UT and LT

The OSI model divides a communication interface in seven logical layers which contain defined interfaces from / to the upper or lower layer (as introduced by the ISO 7498-1). Following the OSI coordinated test method the TS realises the upper layer with help of the UT and the lower layer with help of the LT. For IUTs without partial networking capability, the IUT is implemented inside the logical layer 1 – the physical layer with the lower interface as the CAN network and the upper interface to the layer 2, known as the data link- or protocol layer, with logical signals TXD and RXD. In case of an IUT supporting partial networking the IUT itself contains functionalities appropriate to the data link layer (partial networking functionalities) and physical layer (typical transceiver functionalities). To follow the OSI coordinated test method this test specification is split in a physical layer part, verifying the transceiver characteristics appropriated to the OSI physical layer and a data link layer part, verifying the protocol implementation necessary for partial networking functionalities.