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

Part 2: High-speed medium access unit with selective wake-up functionality

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

Partie 2: Unité d'accès au médium haute vitesse avec fonctionnalité de réveil sélectif

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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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 meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 16845 consists of the following parts, under the general title *Road vehicles — Controller area network (CAN) - Conformance test plan*:

— *Part 1: Overview*[1)]

— *Part 2: High-speed medium access unit with selective wake-up functionality*

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1) Under preparation.

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Introduction

ISO 16845 was first published in 2004 to provide the methodology and abstract test suite necessary for checking the conformance of any CAN implementation of the CAN specified in ISO 11898-1. The new restructured ISO 11898 contains ISO 11898-6, which defines the physical layer requirements for partial networking.

ISO 16845-2 provides the methodology and abstract test suite necessary for checking the conformance of any CAN implementation specified in ISO 11898-6.

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

Part 2: High-speed medium access unit with selective wake-up functionality

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1 Scope

This part of ISO 16845 establishes test cases and test requirements to realize a test plan verifying if the CAN transceiver with implemented selective wake-up functions conform to the specified functionalities referenced in ISO 11898-6. The kind of testing defined in this part of ISO 16845 is named as conformance testing.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 9646-1, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 1: General concepts*

ISO/IEC 9646-2, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 2: Abstract Test Suite specification*

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

ISO 11898-2:2003, *Road vehicles — Controller area network (CAN) — Part 2: High-speed medium access unit*

ISO 11898-5:2007, *Road vehicles — Controller area network (CAN) — Part 5: High-speed medium access unit with low-power mode*

ISO 11898-6:2013, *Road vehicles — Controller area network (CAN) — Part 6: High-speed medium access unit with selective wake-up functionality*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11898-2:2003, ISO 11898-5:2007 and the following apply.

3.1
implementation under test
IUT
device (e.g. standalone transceiver, SBC) which will be tested according to this conformance test plan

Note 1 to entry: An IUT can be part of an SUT.

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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
system under test
SUT
system where the IUT is implemented if the IUT is part of a system or cannot operate as a standalone device

3.4
test system
TS
system which fulfils all requirements to perform the tests defined in ISO 16845-2

3.5
upper tester
UT
part of the test system which emulates the interfaces of the overlying OSI layer from sight of the IUT

4 Symbols and abbreviated terms

ACK	Acknowledge
ASP	Abstract service primitives
CAN	Controller Area Network
CRC	Cyclic Redundancy Check
DLC	Data Length Code
EOF	End of Frame
ID	Identifier
MAC	Medium Access Control
OSI	Open System Interconnection
PCO	Point of control and observation
PHS	Physical Signalling
PL	Physical Layer
PMA	Physical Medium Attachment
FEC	Frame Error Counter
SOF	Start of Frame
WUF	Wake-up frame
WUP	Wake-up pattern
IMF	Intermission field

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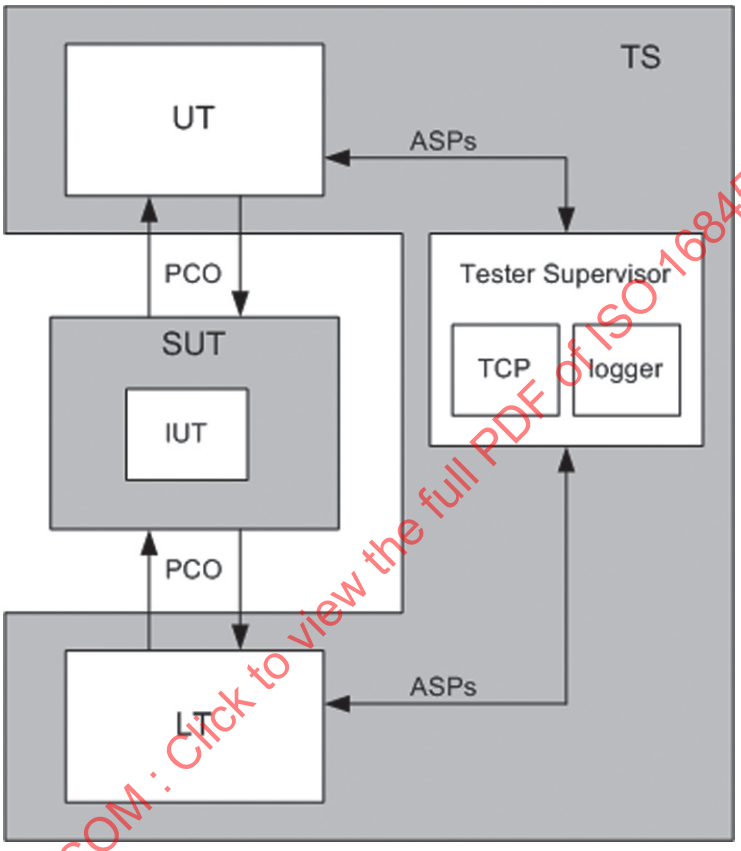
5 OSI conformance test method

OSI conformance testing was mainly introduced by the ISO 9646-1and 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.

Figure 1 depicts the OSI coordinated test method.



Key

SUT	System Under Test	LT	Lower Tester
UT	Upper Tester	TCP	Test Coordination Procedure
IUT	Implementation Under Test	TS	Test System

Figure 1 — The OSI coordinated test method

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

The coordinated test method is the most suitable for CAN devices. It provides a simple interface to the Implementation Under Test, i.e. the CAN-Bus itself, and a flexible test coordination protocol using CAN messages between the Lower Tester (LT) as part of the Test System and the Upper Tester (UT) in the System Under Test. The Lower Tester controls and observes the Implementations Under Test lower service boundary indirectly via the underlying service provider, using the Abstract Service Primitives (ASPs) of the CAN protocol. The Upper Tester controls and observes the Implementations Under Test upper service boundary. The Test Coordination Procedures (TCPs) ensure the cooperation between the Lower Tester and the Upper Tester.

In case of CAN Transceiver with partial networking functionalities, influencing variables from the upper tester side are the digital CAN signals (RxD and TxD), host interface signals and I/O signals like INH or

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Wake. The lower tester 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.

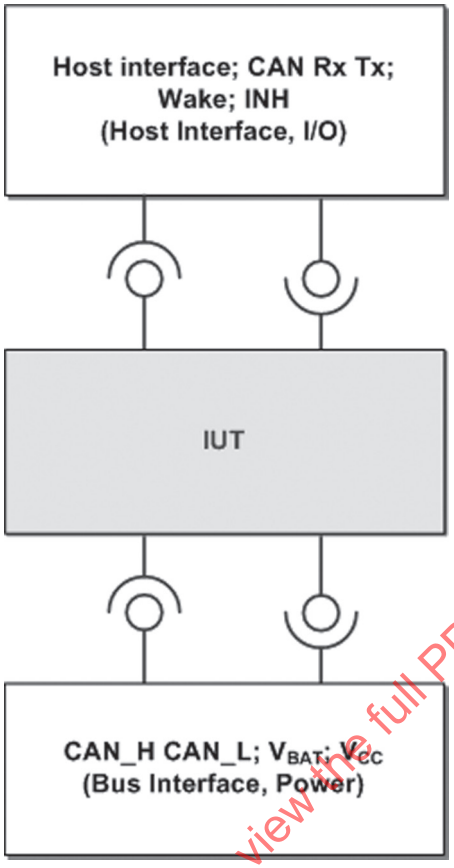

Figure 2 — Influencing variables on IUT

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 depicts abstract logical devices of upper and lower tester.

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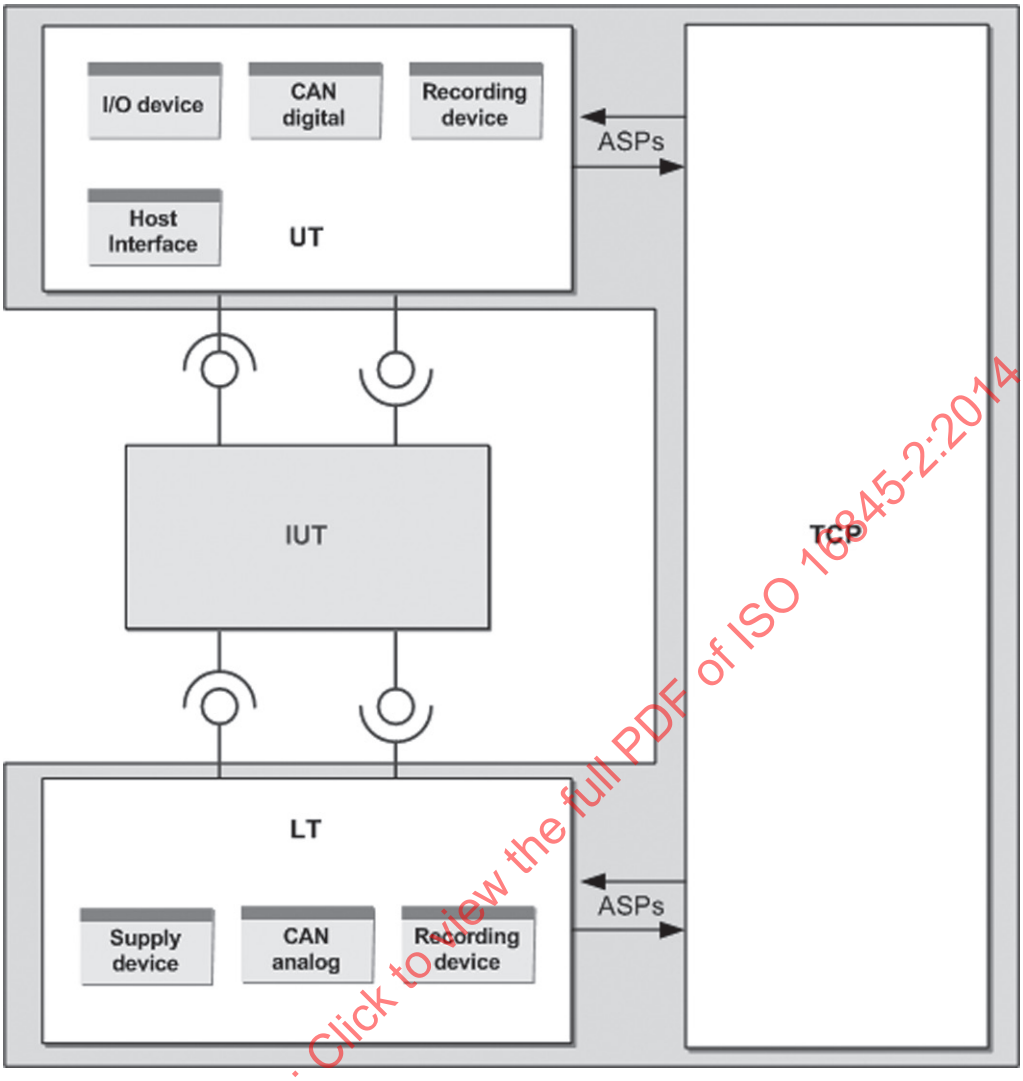

Figure 3 — Abstract logical devices of upper and lower tester

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The OSI model divides a communication interface into seven logical layers which contain defined interfaces from / to the upper or lower layer. Following the OSI coordinated test method the test system realises the upper layer with the help of the upper tester and the lower layer with the help of the lower tester. For transceivers without partial networking capability, the transceiver is implemented inside the logical layer 1 - the physical layer with the lower interface as the CAN bus and the upper interface to the 2nd layer, known as the data link- or protocol layer, with logical signals TxD and RxD. In case of a high speed CAN transceiver 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 part of ISO 16845 is split into 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.

6 Organization

6.1 General organization

The abstract test suites of the TS are independent to one another. Each abstract test suite checks the behaviour of the IUT for a particular parameter of the CAN protocol specification as defined in ISO 11898-1. Each test case may be executed one after another in any order or alone.

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Test cases requiring variations of individual parameters have to be repeated for each value of the parameter. Each repetition is named elementary test. A test case including different elementary tests is valid only if all tests pass.

The result of executing a test case on an IUT should be the same whenever it is performed. To realize such reproducibility of test results this part of ISO 16845 is designed in the way to minimize the possibility that a test case produces different test outcomes on different occasions. Therefore, test requirements which have to be met and how the verdicts are to be assigned are defined in an unambiguous way.

6.2 Test case organization

6.2.1 Overview

Each elementary test is made of three states:

— Setup state;

— Test state;

— Verification state.

Before the first elementary test is started the IUT has to be initialised into the default state.

6.2.2 Setup state

6.2.2.1 General

The setup state is a defined and explicitly entered and verified state in which the IUT has to be before entering the test state. A test starts with unpowered IUT. The first step is to set IUT power supply on. The IUT, unless otherwise specified, is configured with data as found in 6.2.4.2.

6.2.2.2 Default setup

Figure 4 describes the default setup for the test which shall be applied unless otherwise specified in setup of the test case description. Furthermore, the setup information of the related device documentation shall be followed.

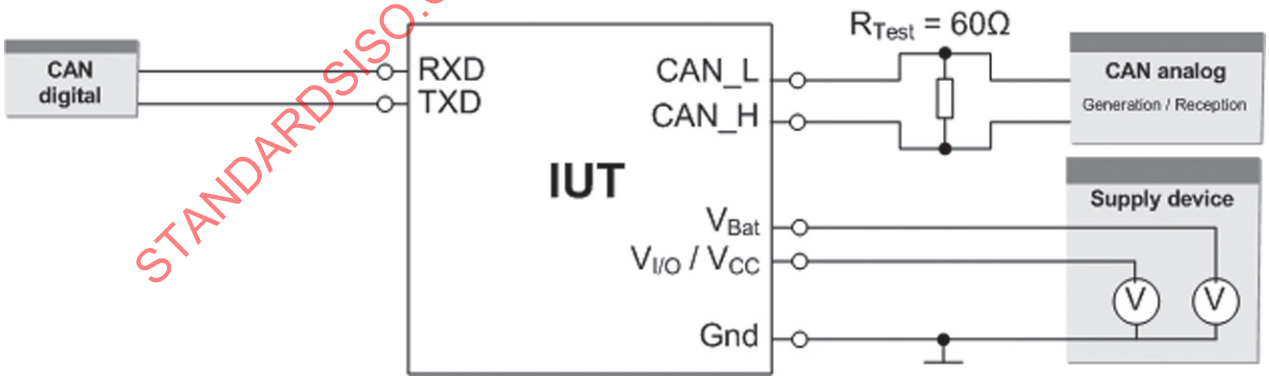

Figure 4 — Default setup for test

6.2.2.3 Default state

The Default state is characterised by the following default value:

— IUT power supply on;

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— IUT configured to test bit rate;

— IUT set to Normal mode.

After the end of each Elementary test, the default state must be re-applied.

6.2.3 Test state

The time between two frames on the bus shall be, unless otherwise specified, at least 2 bits of idle after IMF. The idle phase shall not be longer than $t_{SILENCE(min)}$.

6.2.4 Test frame definition for protocol related test cases

6.2.4.1 Elements of test frames

In the protocol related test cases the focus is on correct frame reception and handling. Therefore, test frames or test pattern will be sent to the IUT. The test frames with 11-bit identifiers are structured as depicted in Figure 5. The elements of the test frame are described below.

Figure 5 — 11-bit CAN-ID format frame elements

Figure 6 depicts the structure of the test frames in extended frame format. The elements of the test frame are described below.

Figure 6 — 29-bit CAN-ID format frame elements

The elements and the default values are defined in Table 1:

Table 1 — Elements of test frames

Element	Meaning	Bit size	Default value
SOF	Start of frame	1	0
ID	11 or 29 bit identifier (29 bit split in to 11 and 18 bit)	11 or 29	refer to sub-clause 6.2.4.2
RTR	Remote transmission request	1	0 = data frame = default 1 = remote frame
SRR	Substitute Remote Request	1	1
IDE	Identifier extended bit	1	0 = 11 bit ID frame (default) 1 = 29 bit ID frame
r0	Reserved bit 0	1	0
r1	Reserved bit 1	1	0
DLC	Data length code	4	refer to sub-clause 6.2.4.2
Data	Data field	0 … 8 [Byte]	refer to sub-clause 6.2.4.2
CRC	Cyclic redundancy check	15	Correspond to data
CRC_DEL	Cyclic redundancy check delimiter	1	1

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Table 1 *(continued)*

Element	Meaning	Bit size	Default value
ACK	Acknowledgement slot	1	refer to sub-clause 6.2.4.2
ACK_DEL	ACK delimiter	1	1
EOF	End of frame	7	1
IMF	Intermission field	3	1

6.2.4.2 IUT configuration and default parameters

Unless otherwise specified in the corresponding test case definition, the used test frame shall be as defined in Table 2.

Table 2 — Definition of the default test frames

Frame format	ID	DLC	Data	ACK
11 bit ID	0x000 (default)000h	1 (default)1	0x01 (default)01h	0
29 bit ID	00000000h	1	01h	0

Further default parameters which shall be used unless otherwise specified in the corresponding test case definition are:

— Used frame type: 11 bit identifier;

— ID configuration: corresponding to the used test frame (wake-up condition fulfilled);

— Data field configuration: corresponding to the used test frame (wake-up condition fulfilled);

— ID mask: set all bits to care;

— Data mask bit: if implemented, it shall be set to enable;

— t_{WAIT}: 8 recessive bits after intermission field.

6.2.4.3 Sync frame sequence

The sync frame sequence as it is used in several test cases shall be as defined in Table 3.

Table 3 — Definition of the sync frame sequence

Frame	ID	DLC	Data
1 to 5 [a]	555h	1	FFh
[a] 9 in case of data rate > 500 kbit/s.			

The frame generator sends each sync frame without a dominant acknowledge field followed by an active error frame with intermission field prolonged by two further bits.

6.3 Hierarchical structure of tests

6.3.1 Overview

All the Tests defined in the test plan are grouped into categories in order to aid planning, development, understanding or execution of each test case. There are two levels of categories:

— the test groups;

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— the test cases.

6.3.2 Test group structure

The test cases are grouped by different functional blocks of the IUT which will be verified separately. Each test group consists of one or several test cases.

6.3.3 Test case structure

Each test case of a test group focuses one particular requirement which will be verified.

Each test case is defined by a specific number and a particular name in order to differentiate the test cases and to easily summarise the goal of the test case.

Table 4 depicts the structure of the defined test cases.

Table 4 — Structure of the defined test cases

Number - Title	Test case number - Title and remarks of the test case
Purpose	Short description of the purpose of the test case
Test variables	The parameter definition of the test case [optional: elementary test case definition] [optional: test frame sequence definition]
Setup	Setup of the test case
Execution	Test steps dealing with the setup being applied and what is observed and measured
Response	Description about what is expected as the result
Reference	Link to the requirement specification

6.3.4 Elementary tests

Some test cases may be subdivided into elementary tests which are repetitions of the test case for several values of the focussed parameter to test. Each elementary test has its own parameter definition which is defined in the Test variables of the test case definition.

6.3.5 Applicable test cases for devices with enhanced voltage biasing

It must be distinguished between devices which support the complete requirements or only the enhanced biasing functionalities defined in ISO 11898-6. The following test cases are applicable for devices which support only the enhanced voltage biasing compliant to ISO 11898-6.

Static test cases: Test case 1 – Test case 25.

Dynamic test cases: Test case 91 - Test case 98.

7 Test cases

All defined test cases must be executed in accordance with the supported device specific bit rates defined in the device datasheet.

In case the IUT supports other bit rates, the following scenarios are possible:

— If the IUT supports only one bit rate, then all test cases must be executed using this specific bit rate;

— If the IUT supports two bit rates, then all test cases must be executed with both bit rate;

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— If the IUT supports more than two bit rates or a range of bit rates, then all test cases must be executed considering the highest and the lowest bit rate, as well as a bit rate in-between.

If supported by the IUT, all test cases must be executed using a bit rate of 500 kbit/s.

7.1 Transceiver physical layer part

7.1.1 General

Due to the fact that the following test cases defined in Clause 7 will be checked by a static test, the parameters given in the device data sheet shall be defined under the same conditions defined in the test case definition and the corresponding references.

7.1.2 Static test cases

Table 5 — Test case 1

No.	Requirement	Min.	Max.	Unit
Test case 1 — There are two biasing conditions: Biasing to 2,5V or biasing to GND.		-	-	-

7.1.3 Maximum ratings

These test cases verify maximum ratings on V_{CAN_H}, V_{CAN_L} and optional split pins. Due to the potential damage after high loaded conditions, they should be executed first.

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Table 6 — Test case 2

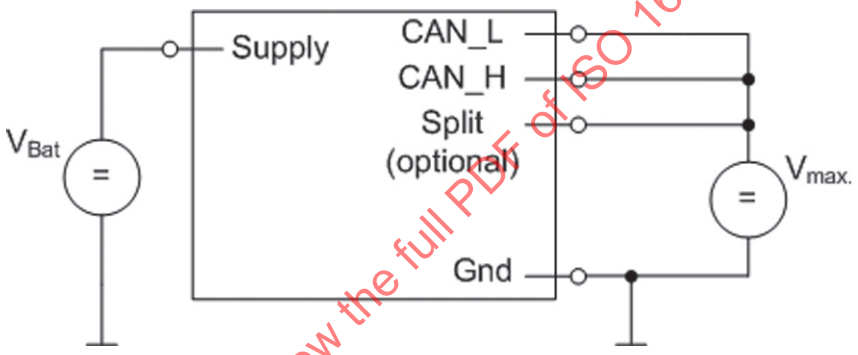
Number - Title	Test case 2 — Maximum ratings $V_{max.}$ for V_{CAN_H}, V_{CAN_L} and optional V_{Split}
Purpose	The purpose of this test is to measure that the IUT shall not be damaged after stressed with $V_{max.}$ on V_{CAN_H}, V_{CAN_L} and optional split pin (if implemented).
Test variables	• Battery Voltage: refer to elementary test definition • t_{WAIT}: = 30 s Elementary tests are defined as follows: Test V_{Bat} V_{max} #1 14 V 40 V #2 28 V 58 V #3 42 V 58 V
Setup	Figure 7 depicts the measurement setup for test case 2  Figure 7 — Measurement setup for test case 2
Execution	1) Setup according to 'Test variables' and 'Setup' as shown above. 2) The test system holds the Voltage of V_{max}. for a duration of t_{WAIT}. 3) After test step 2, the IUT shall not be damaged due to the Voltage V_{max}. 4) After test step 2, the test system stimulates the IUT to drive recessive and dominant output voltage.
Response	The IUT shall be able to transmit and receive in conformance with ISO 11898-6. The IUT shall be able to drive the split output voltage (if available) in conformance with ISO 11898-6.
Reference	ISO 11898-5, Table 7
Note: This is a static test case.	

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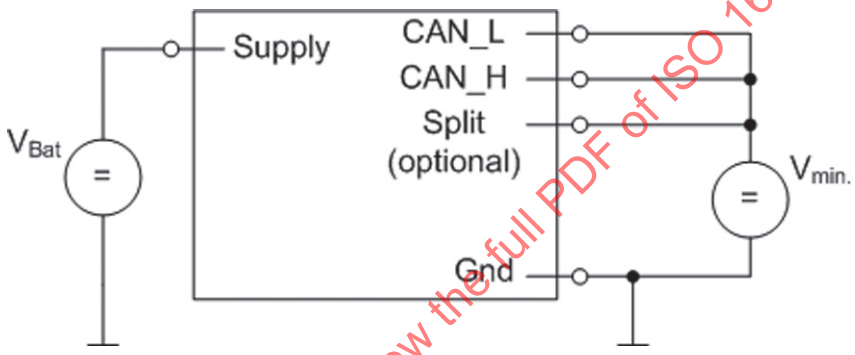
Table 7 — Test case 3

Number - Title	Test case 3 — Maximum ratings $V_{min.}$ for V_{CAN_H}, V_{CAN_L} and optional V_{Split}
Purpose	The purpose of this test is to measure that the IUT shall not be damaged after stressed with $V_{min.}$ on V_{CAN_H}, V_{CAN_L} and optional split pin (if implemented).
Test variables	— Battery Voltage: refer to elementary test definition — t_{WAIT}: = 30 s Elementary tests are defined as follows: Test V_{Bat} V_{min} #1 14 V −27 V #2 28 V −58 V #3 42 V −58 V
Setup	Figure 8 depicts the measurement setup for test case 3  Figure 8 — Measurement setup for test case 3
Execution	1) Setup according to 'Test variables' and 'Setup' as shown above. 2) The test system holds the Voltage of V_{min}. for a duration of t_{WAIT}. 3) After test step 2, the IUT shall not be damaged due to the voltage V_{max}. 4) After test step 2, the test system stimulates the IUT to drive recessive and dominant output voltage.
Response	— The IUT shall be able to transmit and receive in conformance with ISO 11898-6. — The IUT shall be able to drive the split output voltage (if available) in conformance with ISO 11898-6.
Reference	ISO 11898-5, Table 7
Notes: This is a static test case.	

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7.1.4 Transmitter part

7.1.4.1 Output bus voltages of CAN node

Table 8 — Test case 4

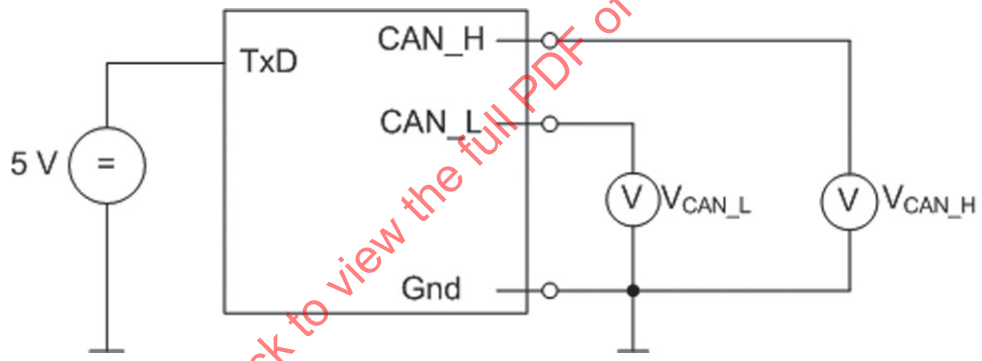
Number - Title	Test case 4 — Recessive output bus voltage V_{CAN_H}
Purpose	The purpose of this test is to measure the CAN bus output voltage level of V_{CAN_H} in recessive state.
Test variables	— System state: refer to elementary test definition Elementary tests are defined as follows: Test / System state / Value [V] (min. / max.) #1 Normal mode 2 3 #2 Low-power mode after $t_{SILENCE}$ expired −0,1 0,1
Setup	Figure 9 depicts the measurement setup for test case 4  Figure 9 — Measurement setup for test case 4
Execution	The IUT is setup according to 'Setup' as shown above. The voltage of V_{CAN_H} is measured.
Response	The voltage shall conform to the values depicted in Test variables.
Reference	ISO 11898-5, Table 8
Notes: This is a static test case.	

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Table 9 — Test case 5

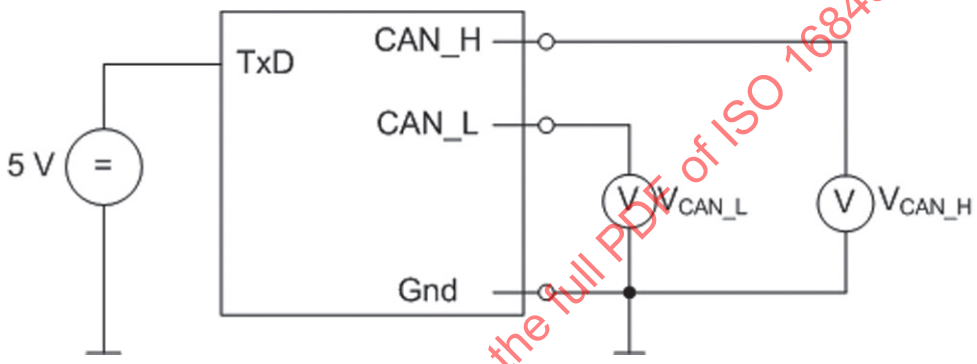
Number - Title	Test case 5 — Recessive output bus voltage V_{CAN_L}
Purpose	The purpose of this test is to measure the CAN bus output voltage level of V_{CAN_L} in recessive state.
Test variables	— System state: refer to elementary test definition Elementary tests are defined as follows: Test | System state | Value [V] min. | Value [V] max. #1 | Normal mode | 2 | 3 #2 | Low-power mode after $t_{SILENCE}$ expired | −0,1 | 0,1
Setup	Figure 10 depicts the measurement setup for test case 5  Figure 10 — Measurement setup for test case 5
Execution	The IUT is setup according to 'Setup' as shown above. The voltage of V_{CAN_L} is measured.
Response	The voltage shall conform to the values depicted in Test variables.
Reference	ISO 11898-5, Table 8
Notes: This is a static test case.	

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Table 10 — Test case 6

Number - Title	Test case 6 — Recessive differential output bus voltage V_{diff}
Purpose	The purpose of this test is to verify the differential CAN bus output voltage V_{diff} in recessive state.
Test variables	• System state: refer to elementary test definition Elementary tests are defined as follows: Test / System state / Value [mV] min. / Value [mV] max. #1 / Normal mode / −500 / 50 #2 / Low-power mode after $t_{SILENCE}$ expired / −500 / 50
Setup	-
Execution	V_{diff} shall be calculated as follows: $V_{diff} = V_{CAN_H} - V_{CAN_L}$ where V_{CAN_H} = result of test case 4 V_{CAN_L} = result of test case 5
Response	The voltage shall conform to the values depicted in test variables.
Reference	ISO 11898-5, Table 8
Notes: This is a static test case.	

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Table 11 — Test case 7

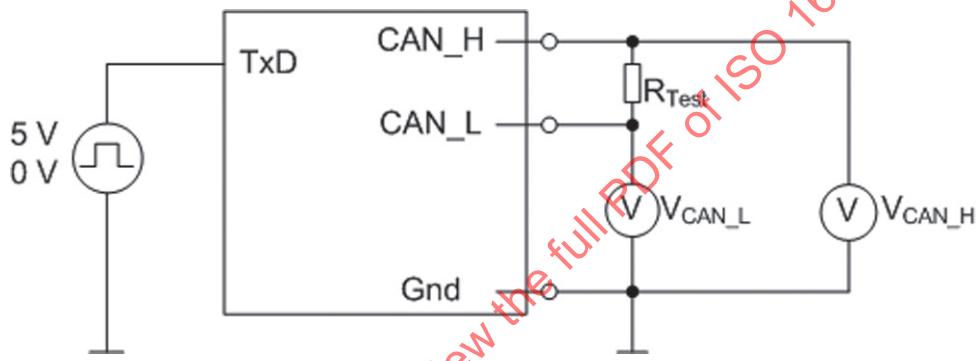
Number - Title	Test case 7 — Dominant output bus voltage V_{CAN_H}
Purpose	The purpose of this test is to measure the CAN bus output voltage level of V_{CAN_H} in dominant state.
Test variables	• System state: = Normal mode • R_{Test}: Refer to elementary test definition Elementary tests are defined as follows: **Test** / **R_{Test} [Ω]** / **Value [V]** (min. / max.) #1 / 50 / 2,75 / 4,5 #2 / 65 / 2,75 / 4,5
Setup	Figure 11 depicts the measurement setup for test case 7.  Figure 11 — Measurement setup for test case 7
Execution	The IUT is setup according to 'Setup' as shown above. The voltage of V_{CAN_H} is measured.
Response	The voltage shall conform to the values depicted in Test variables.
Reference	ISO 11898-5, Table 10
Notes: This is a static test case.	

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Table 12 — Test case 8

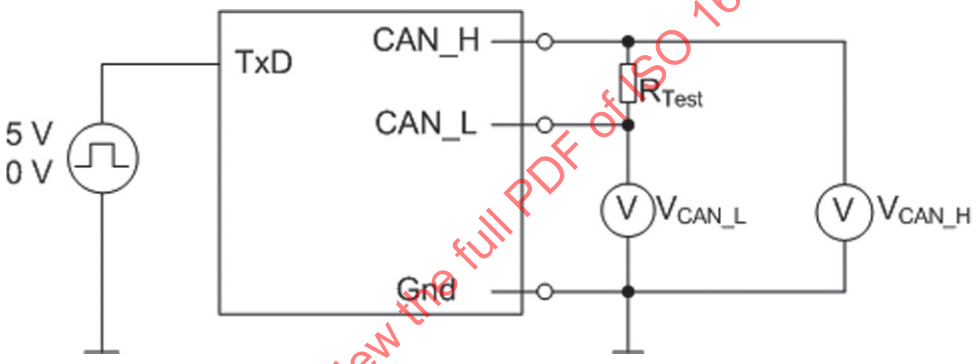
Number - Title	Test case 8 — Dominant output bus voltage V_{CAN_L}
Purpose	The purpose of this test is to measure the CAN bus output voltage level of V_{CAN_L} in dominant state.
Test variables	• System state: = Normal mode • R_{Test}: refer to elementary test definition Elementary tests are defined as follows: **Test** **R_{Test} [Ω]** **Value [V]** min. max. #1 50 0,5 2,25 #2 65 0,5 2,25
Setup	Figure 12 depicts the measurement setup for test case 8  Figure 12 — Measurement setup for test case 8
Execution	The IUT is setup according to 'Setup' as shown above. The voltage of VCAN_L is measured.
Response	The voltage shall conform to the values depicted in Test variables.
Reference	ISO 11898-5, Table 10
Notes: This is a static test case.	

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Table 13 — Test case 9

Number - Title	Test case 9 — Dominant differential output bus voltage V_{diff}
Purpose	The purpose of this test is to verify the differential CAN bus output voltage V_{diff} in dominant state.
Test variables	• System state: = Normal mode • R_{Test}: refer to elementary test definition Elementary tests are defined as follows: **Test** **R_{Test} [Ω]** **Value [V]** min. max. #1 50 1,5 3,0 #2 65 1,5 3,0
Setup	-
Execution	V_{diff} shall be calculated as follows: $V_{diff} = V_{CAN_H} - V_{CAN_L}$ where V_{CAN_H} = result of test case 7 V_{CAN_L} = result of test case 8
Response	The voltage shall conform to the values depicted in test variables.
Reference	ISO 11898-5, Table 10
Notes: This is a static test case.	

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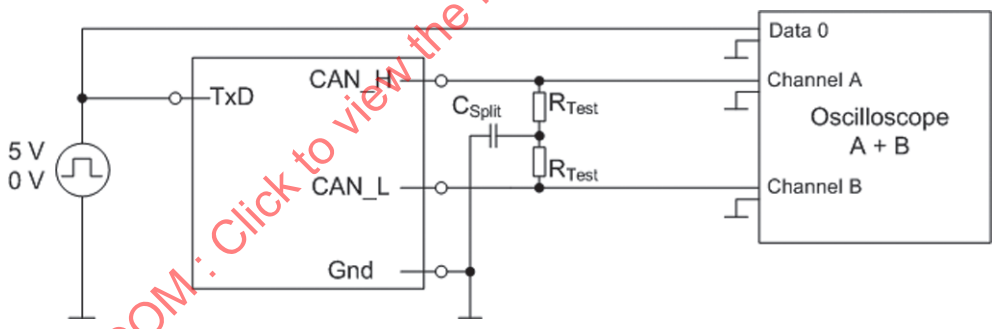
7.1.4.2 Transceiver driver symmetry

Table 14 — Test case 10

Number - Title	Test case 10 — Transceiver driver symmetry
Purpose	The purpose of this test is to verify the bus output signal symmetry.
Test variables	• System state: = Normal • Observation: refer to elementary test definition • R_{Test}: = 30 Ω • C_{Split}: = 4,7 nF • f_{TxD}: = 250 kHz rectangular signal, duty cycle = 50 % Elementary tests are defined as follows: Test / Observation / Value [V] min. / max. #1 dominant state 0,9 * VCC 1,1 * VCC #2 recessive state 0,9 * VCC 1,1 * VCC #3 transition dom-rec 0,9 * VCC 1,1 * VCC #4 transition rec-dom 0,9 * VCC 1,1 * VCC
Setup	Figure 13 depicts the measurement setup for test case 10  Figure 13 — Measurement setup for test case 10
Execution	1) The IUT is setup according to 'Setup' as shown above. 2) The voltages of VCAN_H and VCAN_L are measured. 3) The common mode bus voltage shall be calculated as follows: VSYM = VCAN_H + VCAN_L
Response	The voltage shall conform to the range depicted in Test variables.
Reference	ISO 11898-5, Table 5
Notes: This is a static test case.	

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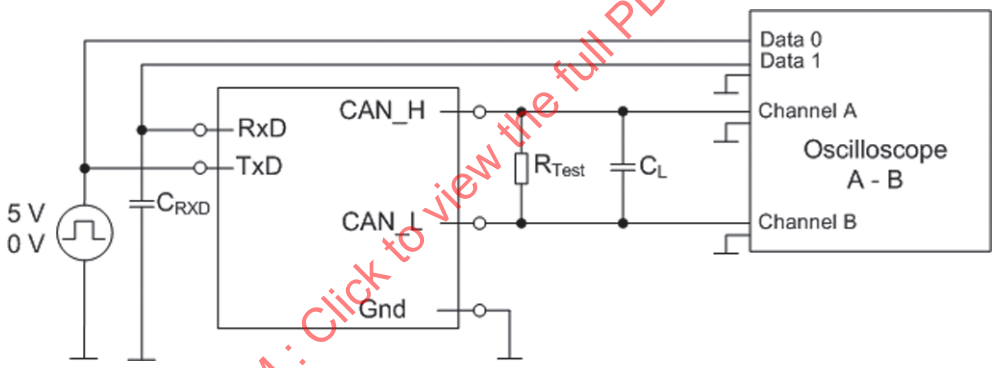
7.1.4.3 Propagation delay from TxD to RxD

Table 15 — Test case 11

Number - Title	Test case 11 — Propagation delay from TxD to RxD
Purpose	The purpose of this test is to measure the propagation delay of the IUT from TxD to RxD.
Test variables	• System state: = Normal • R_{Test}: = 60 Ω • C_{RxD}: = 15 pF • C_L: = 100 pF • f_{TxD}: = 250 kHz rectangular signal, duty cycle = 50 % • Trigger event: refer to elementary test definition Elementary tests are defined as follows: **Test** **Trigger event** #1 falling edge #2 rising edge
Setup	Figure 14 depicts the measurement setup for test case 11  Figure 14 — Measurement setup for test case 11
Execution	1) Setup according to 'Test variables' and 'Setup' as shown above. 2) Measure the delay time from 50 % of TxD edge to 50 % of the corresponding RxD edge.
Response	The delay time shall be: $t_{Prop} \leq 255$ ns
Reference	ISO 11898-5, Table 11
Notes: This is a static test case.	

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7.1.5 Receiver part

7.1.5.1 Input thresholds of CAN node

Table 16 — Test case 12

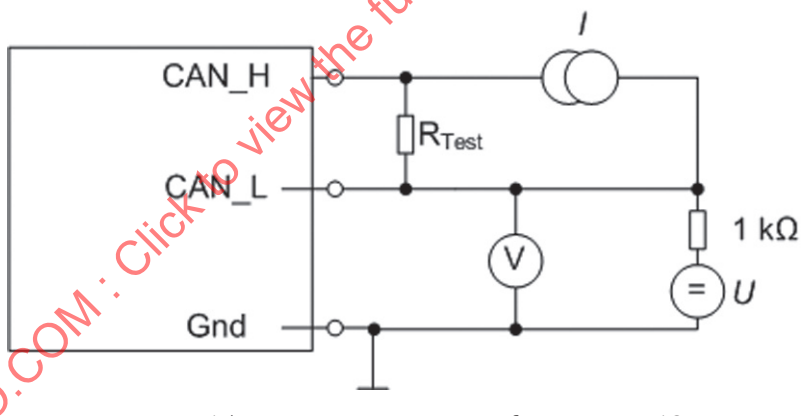
Number - Title	Test case 12 — Recessive input threshold of CAN node during biasing on condition				
Purpose	The purpose of this test is to measure the recessive input threshold of the DUT under normal conditions.				
Test variables	• System state: = biasing on condition • Common mode voltage refer to elementary test definition • R_{Test}: = 60 Ω Elementary tests are defined as follows:				
	Test	Common mode voltage		Value [mV]	
				min.	max.
	#1	min (–12 V)	U = $f(x)$ that V = –12 V	500	900
	#2	typ (+2,5 V)	U = $f(x)$ that V = +2,45 V	500	900
	#3	max (+12 V)	U = $f(x)$ that V = +11,95 V	500	900
Setup	Figure 15 depicts the measurement setup for test case 12  Figure 15 — Measurement setup for test case 12				
Execution	1) Setup according to 'Test variables' and 'Setup' as shown above. 2) The current, I, is adjusted to a value which induces the upper threshold of the differential input voltage for detecting a recessive bit during the recessive state.				
Response	The threshold voltage (induced by the current I) shall be inside the corresponding range depicted in test variables.				
Reference	ISO 11898-6, Table 2 ISO 11898-5, Tables 1, 8 and 10 ISO 11898-2, sub-Clause 6.3.2				
Notes: This is a static test case.					

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Table 17 — Test case 13

Number - Title	Test case 13 — Recessive input threshold of CAN node during biasing off condition
Purpose	The purpose of this test is to measure the recessive input threshold of the DUT under low-power conditions.
Test variables	• System state: = biasing off condition • Common mode voltage refer to elementary test definition • R_{Test}: = 60 Ω Elementary tests are defined as follows:

Test	Common mode voltage		Value [mV] min.	max.
#1	min (–12 V)	U = f (x) that V = –12 V	400	1150
#2	typ (+2,5 V)	U = f (x) that V = 0,0V	400	1150
#3	max (+12 V)	U = f (x) that V = +11,95V	400	1150

Setup	Figure 16 depicts the measurement setup for test case 13

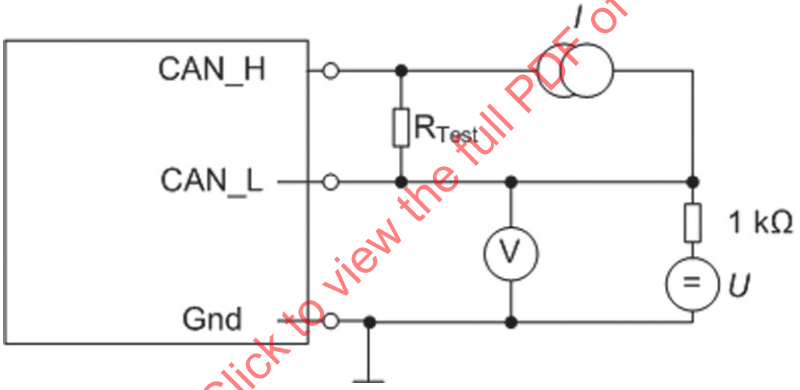

Figure 16 — Measurement setup for test case 13

Execution	1) Setup according to 'Test variables' and 'Setup' as shown above. 2) The current, I, is adjusted to a value which induces the upper threshold of the differential input voltage for detecting a recessive bit during the recessive state.
Response	The threshold voltage (induced by the current I) shall be inside the corresponding range depicted in Test variables.
Reference	ISO 11898-5, Tables 3, 8 and 10 ISO 11898-2, sub-Clause 6.3.2
Notes: This is a static test case.	

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Table 18 — Test case 14

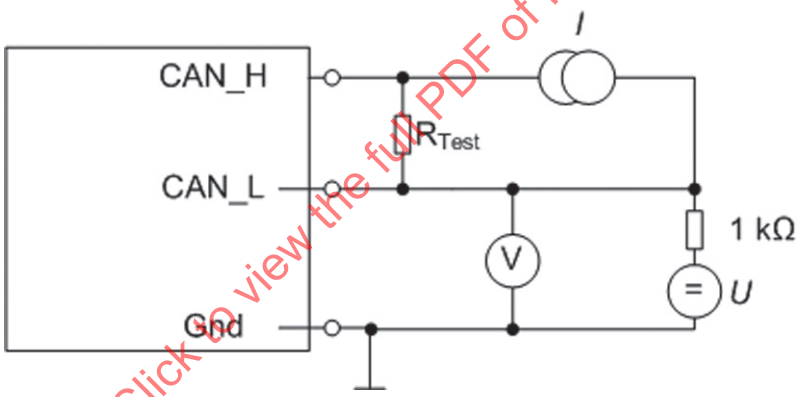
Number - Title	Test case 14 — Dominant input threshold of CAN node during biasing on condition
Purpose	The purpose of this test is to measure the dominant input threshold of the DUT with maximum common mode voltage.
Test variables	• System state: = biasing on condition • Common mode voltage refer to elementary test definition • R_{Test}: = 60 Ω Elementary tests are defined as follows: Test / Common mode voltage / Value [mV] min. / max. #1 min (–12 V) U = $f(x)$ that V = –12 V 500 900 #2 typ (+2,5 V) U = $f(x)$ that V = +2,45 V 500 900 #3 max (+12 V) U = $f(x)$ that V = +11,95 V 500 900
Setup	Figure 17 depicts the measurement setup for test case 14  Figure 17 — Measurement setup for test case 14
Execution	1) Setup according to 'Test variables' and 'Setup' as shown above. 2) The test system triggers the IUT for cyclic transmitting frames. 3) The current, I, is adjusted to a value which induces the lower threshold of the differential input voltage for detecting a dominant bit during the recessive state.
Response	The threshold voltage shall be inside the corresponding range depicted in test variables.
Reference	ISO 11898-5, Tables 2, 8 and 10 ISO 11898-2, sub-Clause 6.3.2
Notes: This is a static test case.	

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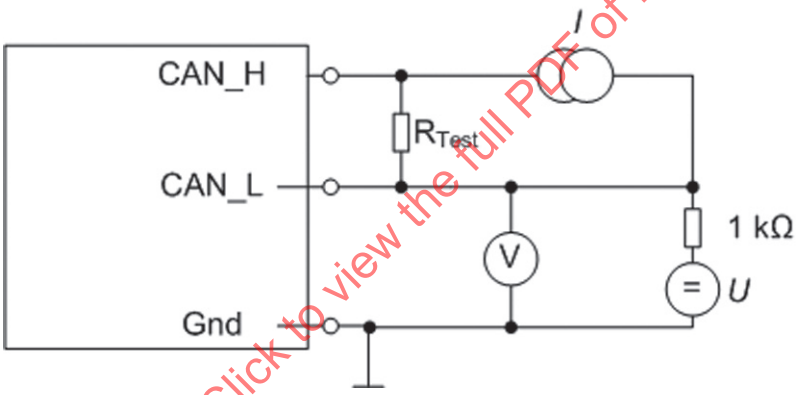
Table 19 — Test case 15

Number - Title	Test case 15 — Dominant input threshold of CAN node during biasing off condition
Purpose	The purpose of this test is to measure the dominant input threshold of the DUT under low-power conditions.
Test variables	• System state: = biasing on condition • Common mode voltage refer to elementary test definition • R_{Test}: = 60 Ω Elementary tests are defined as follows: Test — Common mode voltage — Value [mV] min. — max. #1 min (–12 V) U = $f(x)$ that V = –12 V 400 1150 #2 typ (+2,5 V) U = $f(x)$ that V = 0,0 V 400 1150 #3 max (+12 V) U = $f(x)$ that V = +11,95 V 400 1150
Setup	Figure 18 depicts the measurement setup for test case 15  Figure 18 — Measurement setup for test case 15
Execution	1) Setup according to 'Test variables' and 'Setup' as shown above. 2) The test system sends cyclic dominant and recessive pulses with pulse length shorter than filter (min). 3) The current, I, is adjusted to a value which induces the lower threshold of the differential input voltage for detecting a dominant bit during the recessive state.
Response	The threshold voltage shall be inside the corresponding range depicted in test variables.
Reference	ISO 11898-5, Tables 3, 8 and 10 ISO 11898-2, sub-Clause 6.3.2
Notes: This is a static test case.	

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7.1.6 IUT Parameter

7.1.6.1 Internal resistance

Table 20 — Test case 16

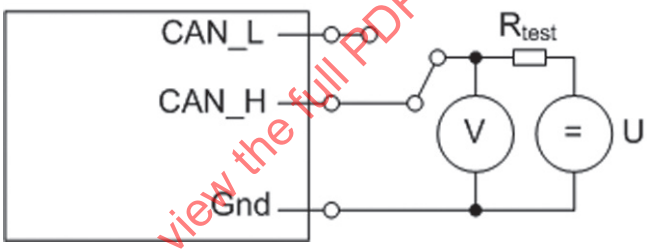
Number - Title	Test case 16 — Internal resistance of *CAN_H*
Purpose	The purpose of this test is to measure the internal resistance of *CAN_H*.
Test variables	• System state: refer to elementary test definition • R_{Test}: = 10 kΩ • U: = 5 V Elementary tests are defined as follows: Test — System state — Value [kΩ] min. — max. #1 — Normal — 5 — 50 #2 — Low-power ($t_{SILENCE}$ expired) — 5 — 50
Setup	Figure 19 depicts the measurement setup for test case 16  Figure 19 — Measurement setup for test case 16
Execution	1) Measure V 2) For elementary test #1 (normal mode) calculate R_{IN_H} with following formula: $R_{IN_H} = \frac{R_{Test}(V_{CAN_H} - V)}{V - U}$ 3) For elementary test #2 (low-power mode $t_{SILENCE}$ expired) calculate R_{IN_H} with following formula: $R_{IN_H} = \frac{R_{test} \cdot V}{U - V}$
Response	— The calculated value of R_{IN_H} shall be inside the corresponding range depicted in test variables. — The deviation between R_{IN_H} and R_{IN_L} (test case 17) shall be less than 3 %.
Reference	ISO 11898-5, Table 9
Notes: This is a static test case.	

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Table 21 — Test case 17

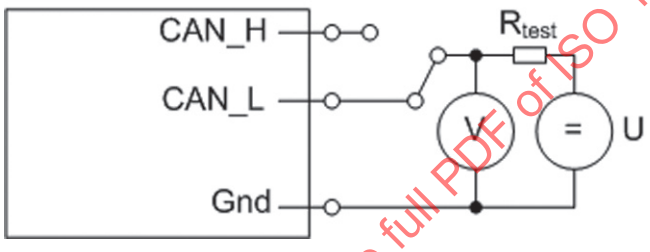
Number - Title	Test case 17 — Internal resistance of *CAN_L*
Purpose	The purpose of this test is to measure the internal resistance of *CAN_L*.
Test variables	• System state: refer to elementary test definition • R_{Test}: = 10 kΩ • U: = 5 V Elementary tests are defined as follows: Test — System state — Value [kΩ] min. — max. #1 — Normal — 5 — 50 #2 — Low-power ($t_{SILENCE}$ expired) — 5 — 50
Setup	Figure 20 depicts the measurement setup for test case 17  Figure 20 — Measurement setup for test case 17
Execution	1) Measure V 2) For elementary test #1 (normal mode) calculate R_{IN_L} with following formula: $R_{IN_L} = \frac{R_{\mathrm{Test}}(V_{CAN_L} - V)}{V - U}$ 3) For elementary test #2 (low-power mode $t_{SILENCE}$ expired) calculate R_{IN_L} with following formula: $R_{IN_L} = \frac{R_{\mathrm{Test}} \cdot V}{U - V}$
Response	— The calculated value of R_{IN_L} shall be inside the corresponding range depicted in test variables. — The deviation between R_{IN_H} and R_{IN_L} (test case 16) shall be less than 3 %.
Reference	ISO 11898-5, Table 9
Notes: This is a static test case.	

Table 22 — Test case 18

Number - Title	Test case 18 — Differential internal resistance
Purpose	The purpose of this test is to measure the internal differential resistance.

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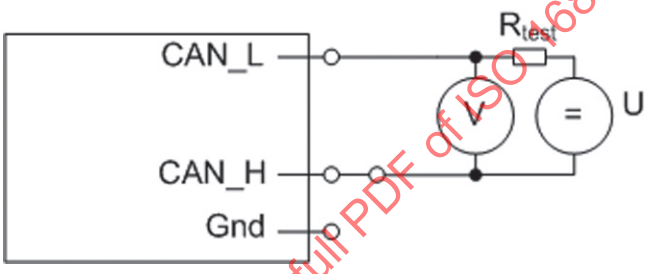
Table 22 *(continued)*

Number - Title	Test case 18 — Differential internal resistance
Test variables	• System state: refer to elementary test definition • R_{Test}: = 10 kΩ • U: = 5 V Elementary tests are defined as follows: Test / System state / Value [kΩ] min. / Value [kΩ] max. #1 / Normal / 10 / 100 #2 / Low-power ($t_{SILENCE}$ expired) / 10 / 100
Setup	Figure 21 depicts the measurement setup for test case 18  Figure 21 — Measurement setup for test case 18
Execution	1) Measure V 2) Calculate R_{diff} with following formula: $R_{diff} = \frac{R_{\text{Test}}(V_{diff} - V)}{V - U}$
Response	The calculated value of R_{diff} shall be inside the corresponding range depicted in Test variables.
Reference	ISO 11898-6, Table 9

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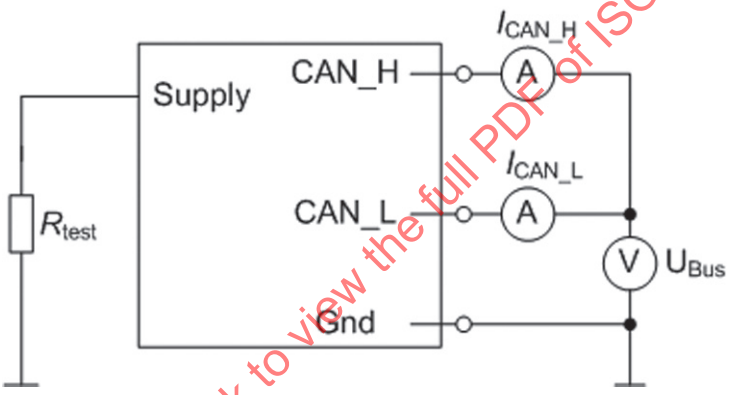
7.1.6.2 Current measurements

Table 23 — Test case 19

Number - Title	Test case 19 — Input leakage current on CAN_H and CAN_L, unpowered device
Purpose	The purpose of this test is to measure the input leakage currents on CAN_H and CAN_L.
Test variables	• V_S, V_{DD}, V_{IO}: = connected to GND over R_{test} • U_{Bus}: = 5V • R_{Test}: refer to elementary test definition Elementary tests are defined as follows: Test R_{test} #1 0 Ω #2 47 kΩ
Setup	Figure 22 depicts the measurement setup for test case 19  Figure 22 — Measurement setup for test case 19
Execution	1) Setup according to 'Test variables' and 'Setup' as shown above. 2) Measure the current flow into the IUT at CAN_L and CAN_H.
Response	The currents on CAN_H and CAN_L shall be: −10 ≤ ILEAK_IN ≤ 10 µA
Reference	ISO 11898-6, Table 1
Notes: This is a static test case.	

7.1.6.3 V_{Split} output voltage

The test cases of this test group shall be tested if the optional split pin is implemented.

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Table 24 — Test case 20

<table>
<tr><td>Number - Title</td><td>Test case 20 — V_{Split} output voltage during normal mode</td></tr>
<tr><td>Purpose</td><td>The purpose of this test is to measure the optional output voltage of V_{Split} (if Split pin implemented).</td></tr>
<tr><td>Test variables</td><td>• System state: = Normal mode
• R_{Test}: refer to elementary test definition
• I_{Split}: refer to elementary test definition
• load condition: refer to elementary test definition

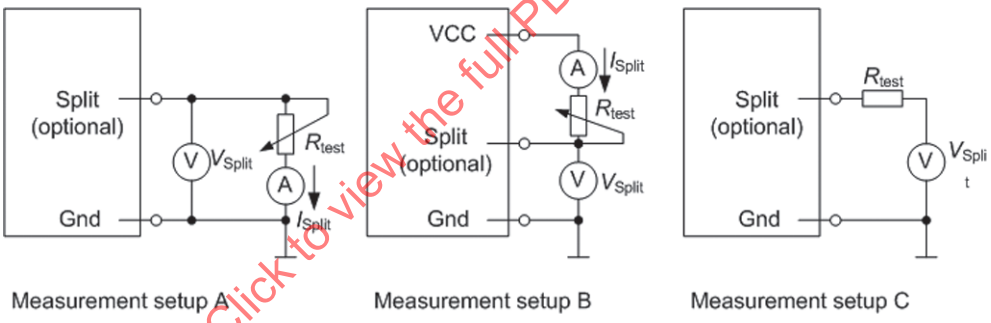
Elementary tests are defined as follows:
<table>
<tr><th rowspan="2">Test</th><th rowspan="2">Load</th><th rowspan="2">Measurement setup (refer to Figure 23)</th><th rowspan="2">R_{Test}</th><th rowspan="2">I_{Split} [µA]</th><th colspan="2">Value [V_{CC}]</th></tr>
<tr><th>min.</th><th>max.</th></tr>
<tr><td>#1</td><td>loaded</td><td>A</td><td>5 kΩ</td><td>500</td><td>0,3</td><td>0,7</td></tr>
<tr><td>#2</td><td>loaded</td><td>B</td><td>5 kΩ</td><td>−500</td><td>0,3</td><td>0,7</td></tr>
<tr><td>#3</td><td>unloaded</td><td>C</td><td>≥ 1 MΩ</td><td>-</td><td>0,45</td><td>0,55</td></tr>
</table></td></tr>
<tr><td>Setup</td><td>Figure 23 depicts the measurement setup for test case 20
 

Figure 23 — Measurement setup for test case 20</td></tr>
<tr><td>Execution</td><td>1) Setup according to ‘Test variables’ and ‘Setup’ as shown above. For setup A and B, adjust R_{Test} in order to obtain the specified I_{Split}.
2) Measure the V_{Split} output voltage.</td></tr>
<tr><td>Response</td><td>The measured V_{Split} output voltage shall be inside the corresponding range depicted in Test variables.</td></tr>
<tr><td>Reference</td><td>ISO 11898-5, Table 6</td></tr>
<tr><td colspan="2">Notes: This is a static test case.</td></tr>
</table>

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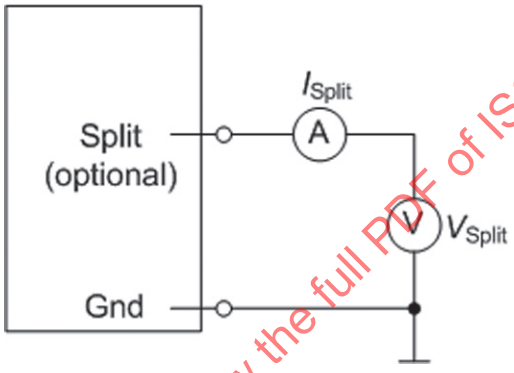
Table 25 — Test case 21

Number - Title	Test case 21 — V_{Split} output voltage and I_{Split} leakage current during low-power mode, $t_{SILENCE}$ expired
Purpose	The purpose of this test is to measure the leakage current of the optional Split pin (if implemented).
Test variables	• System state: = Low-power mode $t_{SILENCE}$ expired Elementary tests are defined as follows: Test Value V_{Split} #1 –12V #2 12V
Setup	Figure 24 depicts the measurement setup for test case 21  Figure 24 — Measurement setup for test case 21
Execution	1) Setup according to 'Test variables' and 'Setup' as shown above. 2) Measure the V_{Split} output voltage and the I_{Split} leakage current.
Response	The measured leakage current shall be: $I_{Split} \leq 5$ µA
Reference	ISO 11898-5, Table 6
Notes: This is a static test case.	

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7.1.6.4 AC parameter

Table 26 — Test case 22

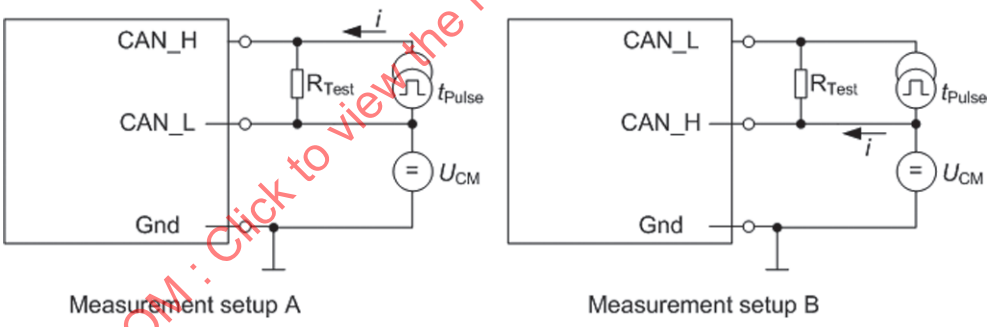
Number - Title	Test case 22 —CAN activity filter time - t_{Filter}
Purpose	The purpose of this test is to check if the IUT wake-up filter time is implemented inside the defined range.
Test variables	• System state: = Low-power mode $t_{SILENCE}$ expired • WUP: = dominant–recessive–dominant pulses each with the length t_{Pulse} • t_{Pulse} refer to elementary test definition and Execution • R_{Test}: = 60 Ω • U_{CM} refer to elementary test definition Elementary tests are defined as follows: Test | U_{CM} | Measurement setup (refer to Figure 25) | Value [µs] min. | max. #1 | min. (= –12 V) | A | 0,5 | 5 #2 | typ. (= 0 V) | A | 0,5 | 5 #3 | max. (= 12 V) | B | 0,5 | 5
Setup	Figure 25 depicts the measurement setup for test case 22  Figure 25 — Measurement setup for test case 22
Execution	1) Setup according to ‘Test variables’ and ‘Setup’ as shown above. 2) The current, *I*, is adjusted for dominant pulses of the WUP to a value which induces the min. threshold of the differential input voltage for detecting a dominant bit during the recessive state. The current, *i*, is adjusted in that way, that a WUP occurs with pulse length t_{Pulse} = 0,05 µs. 3) t_{Pulse} is increased by 0,05 µs. 4) Repeat steps 2 and 3 until the biasing of the IUT is switched on.
Response	The pulse length t_{Pulse} where the IUT wakes up first time shall be between the min. and max. values depicted in test variables.
Reference	— ISO 11898-6, Table 3 — ISO 11898-5, Table 1 and Table 2
Notes: This is a static test case.	

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Table 27 — Test case 23

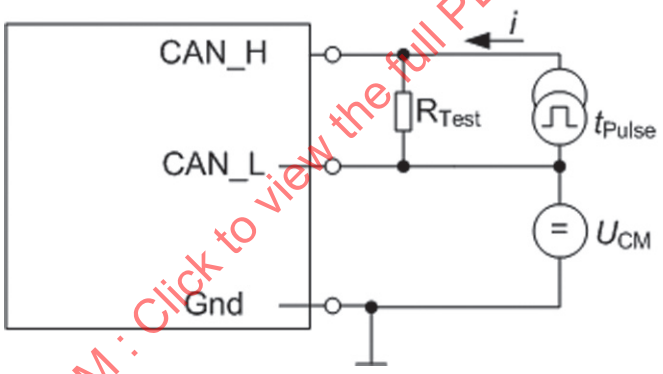
Number - Title	Test case 23 — Optional wake-up timeout - t_{Wake}
Purpose	The purpose of this test is to check if the IUT's wake-up timeout is implemented inside its defined range.
Test variables	• System state: = Low-power mode $t_{SILENCE}$ expired • WUP: = dominant–recessive–dominant pulses each with the length t_{Pulse} • t_{Pulse}: = 5 µs • t_{Pulse2}: refer to elementary test definition and execution • R_{Test}: = 120 Ω • U_{CM}: = 0 V Elementary tests are defined as follows: Test — WUP — Value [ms] min. — max. #1 — dominant (t_{Pulse2}), recessive (t_{Pulse}), dominant (t_{Pulse}) — 0,5 — 10 #2 — dominant (t_{Pulse}), recessive (t_{Pulse2}), dominant (t_{Pulse}) — 0,5 — 10
Setup	Figure 26 depicts the measurement setup for test case 23  Figure 26 — Measurement setup for test case 23
Execution	1) Setup according to 'Test variables' and 'Setup' as shown above. 2) The current, *I*, is adjusted for dominant pulses of the WUP to a value which induces the min. threshold of the differential input voltage for detecting a dominant bit during the recessive state. The current, *I*, is adjusted in that way, that a WUP according Test variables occurs. 3) The IUT shall wake-up (biasing is switched on). 4) The Test system waits for at least $t_{SILENCE}$. The biasing is switched off. 5) t_{Pulse2} is increased by 0,1 ms. 6) Repeat steps 2 to 5 until the biasing is not switched on after the WUP.
Response	The pulse length t_{Pulse2} where the timeout expires first time shall be between the min. and max. values depicted in test variables.
Reference	ISO 11898-6, Table 3
Notes: This is a static test case.	

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Table 28 — Test case 24

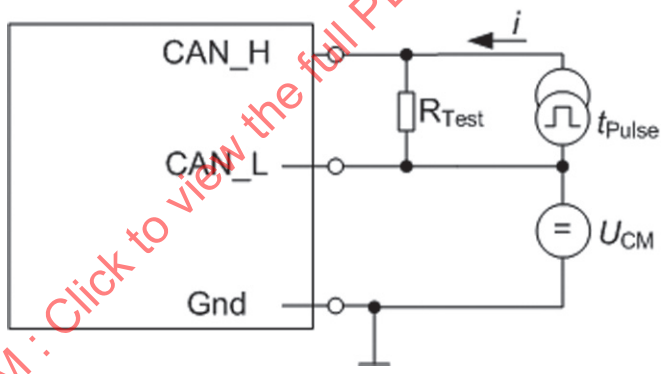
Number - Title	Test case 24 — Bus inactivity timeout - $t_{SILENCE}$
Purpose	The purpose of this test is to check if the IUT's bus inactivity timeout is implemented inside its defined range.
Test variables	• System state: = Low-power mode $t_{SILENCE}$ expired • WUP: = dominant–recessive–dominant pulses each with the length t_{Pulse} • t_{Pulse}: = 5,5 µs • t_{Pulse2}:refer to elementary test definition and execution • R_{Test}: = 120 Ω • U_{CM}: = 0 V Elementary tests are defined as follows: test — State which is frozen by test system — t_{Pulse2} [s] min. — max. #1 — dominant (t_{Pulse2}), recessive (t_{Pulse}), dominant (t_{Pulse}) — 0,6 — 1,2 #2 — dominant (t_{Pulse}), recessive (t_{Pulse2}), dominant (t_{Pulse}) — 0,6 — 1,2
Setup	Figure 27 depicts the measurement setup for test case 24  Figure 27 — Measurement setup for test case 24
Execution	1) Setup according to 'Test variables' and 'Setup' as shown above. 2) The current, I, is adjusted for dominant pulses of the WUP to a value which induces the min. threshold of the differential input voltage for detecting a dominant bit during the recessive state. The current, I, is adjusted in that way, that a WUP according Test variables occurs. 3) The IUT shall wake-up (biasing is switched on). 4) The test system is switched on sending WUPs as depicted in step 2. 5) The test system freezes the current state as depicted in test variables. 6) The test system measures the time from the bus level state change until biasing is switched off.
Response	The pulse length t_{Pulse2} where the timeout expires first time shall be between the min. and max. values depicted in test variables.
Reference	ISO 11898-6, Table 3
Notes: This is a static test case.	

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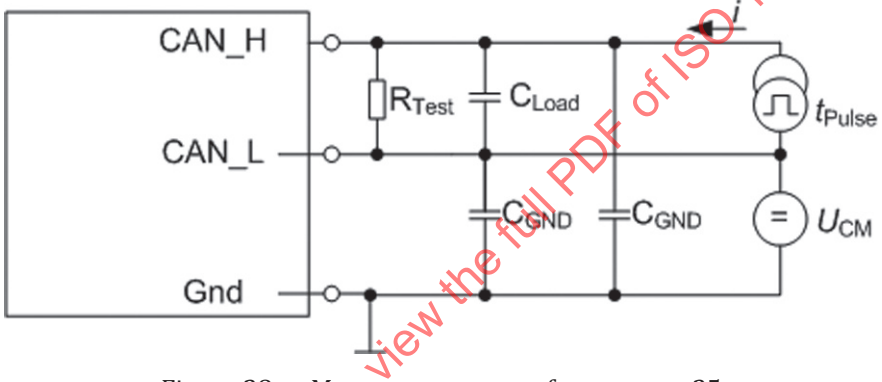
Table 29 — Test case 25

Number - Title	Test case 25 — Bias reaction time - t_{bias}
Purpose	The purpose of this test is to check if the IUT's biasing reaction time does not exceed the defined maximum value.
Test variables	• System state: = Low-power mode $t_{SILENCE}$ expired • WUP: = dominant–recessive–dominant pulses each with the length t_{Pulse} • t_{Pulse}: = 5 µs • R_{Test}: = 60 Ω • C_{Load}: = 100 pF • C_{GND}: = 100 pF • U_{CM}: = 0 V
Setup	Figure 28 depicts the measurement setup for test case 25.  Figure 28 — Measurement setup for test case 25
Execution	1) Setup according to 'Test variables' and 'Setup' as shown above. 2) The current, *I*, is adjusted in that way, that a WUP according Test variables occurs. 3) The IUT shall wake-up.
Response	The biasing of the IUT is switched on latest 200 µs after step 2.
Reference	ISO 11898-6, Table 3
Notes: This is a static test case.	

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7.2 Normal CAN communication acceptance

7.2.1 Valid frame format class

Table 30 — Test case 26

Number - Title	**Test case 26 — Identifier** test **in 11-bit CAN-ID format**
Purpose	This test verifies the behaviour of the IUT when receiving a correct data frame with different identifiers in a 11-bit CAN-ID format frame.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame: • ID: Refer to test execution • DLC: 0 Elementary tests are defined as follows: Test Configured wakeup ID #1 000h #2 555h #3 2AAh #4 7FFh #5 Randomly generated ID
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system generates first ID with a value of 000h. 3) If the ID is not equal to the configured wakeup ID, the test system sends test frame with the generated ID; otherwise go to test step 4. 4) If the ID is smaller than 7FFh, the test system increments the ID by 1 and goes back to test step 3, otherwise go to test step 5. 5) The test system waits at least two times the maximum bias reaction time (t_{bias}). 6) The test system sends the test frame with configured wakeup ID.
Response	The last test frame shall cause a wake-up. All previously sent test frames shall not cause a wake-up.
Reference	ISO 11898-1

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Table 31 — Test case 27

Number - Title	Test case 27 — Identifier test in 29-bit CAN-ID format
Purpose	This test verifies the behaviour of the IUT when receiving a correct data frame with different identifiers in a 29-bit CAN-ID format frame.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration Configured ID: refer to elementary test definition Test frame: • ID: Refer to test execution Elementary tests are defined as follows: Test Configured wakeup ID #1 00000000h #2 15540000h #3 0AA80000h #4 1FFC0000h #5 Randomly generated ID
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system generates first ID with a value of 00000000h. 3) If the ID is not equal to the configured wakeup ID, the test system sends test frame with the generated ID; otherwise go to test step 4. 4) If the ID is smaller than 1FFC0000h, the test system increment the ID by 00040000h and goes back to test step 3, otherwise go to test step 5. 5) The test system waits at least two times the maximum bias reaction time (t_{bias}). 6) The test system sends the test frame with configured wakeup ID.
Response	The last test frame shall cause a wake-up. All previously sent test frames shall not cause a wake-up.
Reference	ISO 11898-1

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Table 32 — Test case 28

Number - Title	Test case 28 — WUP element of WUF
Purpose	This test verifies the behaviour of the IUT detecting a WUP which is element of a WUF.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame: • DLC: = 0 • ID: = 078h (contains 5 bits dominant, 5 bits recessive, 5 bits dominant)
Setup	— The IUT is configured corresponding test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system waits for at least $t_{SILENCE(max)}$. 2) The test system sends test frame 6 times each separated by at least two times the maximum bias reaction time (t_{bias}).
Response	— The WUP inside the first test frame has to be detected; i.e. the biasing is switched on after receiving the first test frame. — The IUT shall wakeup latest after the reception of the sixth test frame.
Reference	ISO 11898-1

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Table 33 — Test case 29

Number - Title	Test case 29 — WUF element of another valid frame – test 1
Purpose	This test verifies the behaviour of the IUT detecting a WUF which is element of a valid frame.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 012h • DLC: = 0 Test frames as defined in table below: Frame Frame definition #1 ID = 012h, DLC = 5, Data = 01h, 20h, 0Fh, 76h, 7Fh #2 ID = 0960F012h, DLC = 0 #3 ID = 0F4FD012h, DLC = 0 #4 ID = 011h, DLC = 8, Data = 9Ah, 4Fh, 01h, 20h, 0Fh, 76h, 7Fh, FFh #5 ID = 0960F011h, DLC = 8, Data = 9Ah, 4Fh, 01h, 20h, 0Fh, 76h, 7Fh, FFh 1 #6 ID = 0F4FD011h, DLC = 8, Data = 9Ah, 4Fh, 01h, 20h, 0Fh, 76h, 7Fh, FFh 2 #7 ID = 012h, DLC = 0
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frames 1 to 7 as defined in Test variables, each separated by at least two times the maximum bias reaction time (t_{bias}).
Response	The IUT shall detect the wakeup condition on reception of test frame 7.
Reference	ISO 11898-1

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Table 34 — Test case 30

Number - Title	Test case 30 — WUF element of another valid frame – test 2
Purpose	This test verifies the behaviour of the IUT detecting a WUP which is element of a WUF.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 4C7h • DLC: = 3 • Data field: = each FFh Test frames as defined in table below: Frame Frame definition #1 ID = 0960F4C7h, DLC = 3, Data = C7h, 8Eh, 68h #2 ID = 0F4FD4C7h, DLC = 3, Data = C7h, 8Eh, 68h #3 ID = 18B084C7h, DLC = 3, Data = C7h, 8Eh, 68h #4 ID = 1E9FA4C7h, DLC = 3, Data = C7h, 8Eh, 68h #5 ID = 4C7h, DLC = 3, Data = C7h, 8Eh, 68h
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frames 1 to 5 as defined in Test variables, each separated by at least two times the maximum bias reaction time (t_{bias}).
Response	The IUT shall detect the wakeup condition on reception of test frame 5.
Reference	ISO 11898-1

Table 35 — Test case 31

Number - Title	Test case 31 — Acceptance of no nominal «SRR» in 29-bit CAN-ID format test
Purpose	The purpose of this test is to verify that the IUT accepts the no nominal value of «SRR» bits in a valid 29-bit CAN-ID frame.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame: • SRR: = 0
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame as defined in test variables.
Response	The test frame shall cause a wake-up.
Reference	ISO 11898-1

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Table 36 — Test case 32

Number - Title	Test case 32 — Absent bus idle after data frame
Purpose	This test verifies the behaviour of the IUT when receiving two consecutive frames not separated by a bus Idle State.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame_1: ID: 10h; DLC: 0 • Length of Intermission field [bits]:Refer to elementary test definition Test frame_2: • All values are set to default parameters as defined in 6.2.4.2 Elementary tests are defined as follows: Test — Length of intermission field [bits] of test frame_1 #1 — 2 #2 — 3
Setup	— The IUT is configured corresponding Test variables, test frame 2 for wake-up. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame_1 with shortened IMF as depicted in Test variables. 3) The test system sends test frame_2.
Response	The test frame_2 shall cause a wake-up.
Reference	ISO 11898-1

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Table 37 — Test case 33

Number - Title	Test case 33 — Stuff acceptance test 1
Purpose	This test verifies the behaviour of the IUT when receiving a correct 11-bit CAN-ID frame with particular data containing critical stuffing bit profiles in the different fields of the frame.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame: • ID: Refer to elementary test definition • DLC: Refer to elementary test definition • Data: Refer to elementary test definition Elementary tests are defined as follows: Test ID DLC Data #1 078h 8 01h, E1h, E1h, E1h, E1h, E1h, E1h, E1h #2 41Fh 0 - #3 47Fh 1 1Fh #4 758h 0 - #5 777h 1 1Fh
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame as depicted in test variables.
Response	The test frame shall cause a wake-up.
Reference	ISO 11898-1

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Table 38 — Test case 34

Number - Title	Test case 34 — Stuff acceptance test 2
Purpose	This test verifies the behaviour of the IUT when receiving a correct 29-bit CAN-ID frame with particular data containing critical stuffing bit profiles in the different fields of the frame.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame: • ID: Refer to elementary test definition • DLC: Refer to elementary test definition • Data: Refer to elementary test definition Elementary tests are defined as follows: Test ID DLC Data #1 07C30F0Fh 8 each 3Ch #2 07C0F0F0h 1 41h #3 00BC0000h 1 A0h
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame as depicted in test variables.
Response	The test frame shall cause a wake-up.
Reference	ISO 11898-1

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Table 39 — Test case 35

Number - Title	Test case 35 — Acceptance of Sync Sequence
Purpose	This test verifies if the IUT is able to receive correct sync sequences.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: • WUP: = dominant – recessive – dominant pulses each with the length t_{Pulse} • t_{Pulse}: ≥ 5,5 µs • t_{WAIT}: Refer to elementary test definition Sync frame: • ID: Refer to elementary test definition • DLC: Refer to elementary test definition • Data: Refer to elementary test definition Wake-up frame: • ID: = 07830F0Fh • DLC: = 7 • Data = each 87h Elementary tests are defined as follows:

Test	ID	RTR	DLC	Data	t_{WAIT}
#1	000h	0	0	-	0,9 * $t_{SILENCE(min)}$
#2	000h	0	0	-	1 bit time
#3	555h	0	8	each AAh	1 bit time
#4	555h	0	8	each AAh	0,9 * $t_{SILENCE(min)}$
#5	4C7h	0	3	C7h, 8Eh, 68h	1 bit time
#6	07830F0Fh	0	6	each 87h	1 bit time
#7	0E0h	1	1	00h	1 bit time

Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system waits for at least 1.1 * $t_{SILENCE(max)}$. 2) The test system sends WUP as defined in test variables. 3) The test system sends sync frame as defined in Test variables. 4) The test system waits for t_{WAIT}. 5) The test system repeats test steps 2 and 3 for four times (or 8 in case of data rate > 500 kbit/s). 6) The test system waits at least two times the maximum bias reaction time (t_{bias}). 7) The test system sends wake-up frame.
Response	The wakeup frame at step 7 shall cause a wake-up.
Reference	ISO 11898-6, sub-clause 5.4.5.2.1

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7.2.2 Error detection class

Table 40 — Test case 36

Number - Title	Test case 36 — Stuff error test 1
Purpose	This test verifies that the IUT detects a stuff error whenever it receives 6 consecutive bits of the same value until the position of the CRC delimiter in a 11-bit CAN-ID frame.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame: • ID: Refer to elementary test definition • DLC: Refer to elementary test definition • Data: Refer to elementary test definition Elementary tests are defined as follows: Test ID DLC Data #1–18 078h 8 01h, E1h, E1h, E1h, E1h, E1h, E1h, E1h #19–22 41Fh 1 80h #23–25 47Fh 1 1Fh #26–27 777h 1 1Fh Each stuff bit derives one elementary test. Therefore, 28 elementary tests exist.
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame as depicted in test variables containing a stuff error in one position. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame as depicted in test variables not containing any stuff error.
Response	— The IUT shall not accept the test frame containing the stuff error. — The IUT shall accept the second test frame without a stuff error and shall wake-up.
Reference	ISO 11898-1

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Table 41 — Test case 37

Number - Title	Test case 37 — Stuff error test 2
Purpose	This test verifies that the IUT detects a stuff error whenever it receives 6 consecutive bits of the same value until the position of the CRC delimiter in an 29-bit CAN-ID frame.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame: • ID: Refer to elementary test definition • DLC: Refer to elementary test definition • Data: Refer to elementary test definition Elementary tests are defined as follows: Test ID DLC Data #1–23 07C30F0Fh 8 each 3Ch #24–29 1FB80000h 1 A0h Each stuff bit derives one elementary test. Therefore, 29 elementary tests exist.
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame as depicted in test variables containing a stuff error in one position. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame as depicted in test variables not containing any stuff error.
Response	— The IUT shall not accept the test frame containing the stuff error. — The IUT shall accept the second test frame without a stuff error and shall wake-up.
Reference	ISO 11898-1

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Table 42 — Test case 38

Number - Title	Test case 38 — CRC error test
Purpose	The purpose of this test is to verify: — that the IUT uses the specific CRC mechanism as defined in ISO 11898-1. — that the IUT detects a CRC error.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 There are two elementary tests to perform: Test #1 A dominant bit in the CRC field is changed to a recessive one. #2 A recessive bit in the CRC field is changed to a dominant one.
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame containing a CRC error as depicted in test variables. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame not containing any CRC error.
Response	— The IUT shall not accept the test frame containing the CRC error. — The IUT shall accept the second test frame without a CRC error and shall wake-up.
Reference	ISO 11898-1

Table 43 — Test case 39

Number - Title	Test case 39 — Form error in data frame test 1
Purpose	This test verifies that the IUT detects a form error when the recessive bit of CRC delimiter is forced to dominant state by the LT.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2.
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame containing a dominant CRC delimiter. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame with correct CRC delimiter.
Response	— The IUT shall not accept the test frame containing the form error. — The IUT shall accept the second test frame without any form error and shall wake-up.
Reference	ISO 11898-1

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7.2.3 Error frame management class

Table 44 — Test case 40

Number - Title	Test case 40 — Absent bus idle after error scenario
Purpose	The purpose of this test is to verify that the IUT accepts a frame starting after the second bit of the intermission following an error frame.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2, except: • Intermission field size: = 2 bits
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends 4 sync frames as depicted in test variables (or 8 in case of data rate > 500 kbit/s). 2) The test system sends a sync frame (including the active error frame) containing a shortened IMF as defined in the test variables followed by a test frame without any delay in between.
Response	The IUT has to receive the test frame and detect the wake-up condition.
Reference	ISO 11898-1

Table 45 — Test case 41

Number - Title	Test case 41 — Active error condition during ignored frames after switching on the bias
Purpose	This test verifies that the IUT handles the error scenario with no acknowledged frames.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Frame sequence: • WUP: dominant – recessive – dominant pulses each with the length t_{Pulse} • t_{Pulse}: ≥ 5,5 µs Test frame: • DLC: = 0 • ID: = 078h • Ack_field: = recessive (followed by an active error frame)
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system waits for at least 1.1 * $t_{SILENCE(max)}$. 2) The IUT sends WUP as depicted in Test variables 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame and active error frame as depicted in test variables. 5) The test system waits at least two times the maximum bias reaction time (t_{bias}). 6) The test system repeats test steps 4 and 5 for 4 times (or 8 in case of data rate > 500 kbit/s).
Response	The IUT shall receive at least the fifth (or ninth in case of data rate > 500 kbit/s) test frame which will cause a wake-up.
Reference	ISO 11898-1

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Table 46 — Test case 42

Number - Title	Test case 42 — Passive error condition during ignored frames after switching on the bias
Purpose	This test verifies that the IUT handles the error scenario with no acknowledged frames.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Frame sequence: • WUP: dominant – recessive – dominant pulses each with the length t_{Pulse} • t_{Pulse}: ≥ 5,5 µs Test frame: • ID: = 078h • DLC: = 0 • Ack_field: = recessive (followed by a passive error frame)
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system waits for at least 1.1 * $t_{SILENCE(max)}$. 2) The IUT sends WUP as depicted in Test variables. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame, passive error frame and interframe space as depicted in test variables. 5) The test system waits at least two times the maximum bias reaction time (t_{bias}). 6) The test system repeats test step 4 and 5 for 4 times (or 8 in case of data rate > 500 kbit/s).
Response	The IUT shall wake-up latest after the reception of the fifth (or ninth in case of data rate > 500 kbit/s) test frame.
Reference	ISO 11898-1

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7.2.4 CAN bit decoding

Table 47 — Test case 43

Number - Title	Test case 43 — Correct sampling of the 10th bit after the last dominant edge causing resync
Purpose	This test verifies if the IUT is able to sample the 10th and 11th bit correctly under the consideration of the minimum amount of edges.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame: • DLC: = 7 • ID: Refer to elementary test definition • Data field bytes: = each 087h Elementary tests are defined as follows: Test ID #1 078h #2 07C30F0Fh
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame as defined in Test variables.
Response	The IUT shall sample all bits correctly. The test frame shall cause a wake-up due to the correct bit sampling.
Reference	ISO 11898-6, sub-clause 5.4.5.2.2

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Table 48 — Test case 44

Number - Title	Test case 44 — Correct sampling of the 10th bit after the last dominant edge after hard sync.
Purpose	This test verifies if the IUT is able to sample the 10th and 11th bit correctly under the consideration of the minimum amount of edges and a hard synchronisation on frame start.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: • IMF = 1 bit * (2 + e) • e Refer to elementary test definition Test frame: • DLC: = 7 • ID: = 078h • Data field bytes: = each 87h Sync frame: • DLC: = 1 • ID: = 555h • Data field byte: = FFh Elementary tests are defined as follows: Test e #1 0,95 #2 0,90 #3 0,85 ... ... #19 0,05
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends 4 sync frames as depicted in test variables (or 8 in case of data rate > 500 kbit/s). 2) The test system sends a sync frame (including the active error frame) containing a shortened IMF as defined in the test variables followed by a test frame without any delay in between.
Response	The IUT shall sample all bits correctly. The test frame shall cause a wake-up due to the correct bit sampling.
Reference	ISO 11898-6, sub-clause 5.4.5.2.2

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Table 49 — Test case 45

Number - Title	Test case 45 — IUT robustness against dominant bit extensions.
Purpose	This test verifies if the IUT is able to sample all bits correctly even if there are extensions of dominant bit phases.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame: • DLC: = 7 • ID: Refer to elementary test definition • Data field bytes: Refer to elementary test definition Elementary tests are defined as follows: Test ID Data #1 078h each 87h #2 07830F0Fh each 87h #3 555h each AAh
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame as defined in Test variables where each dominant bit, which is followed by a recessive bit, is prolonged by 55 % of the bit time and the recessive bit which follows it is shortened by 55 % of bit time.
Response	The IUT shall sample all bits correctly. The test frame shall cause a wake-up due to the correct bit sampling.
Reference	ISO 11898-6, sub-clause 5.4.5.2.2

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Table 50 — Test case 46

Number - Title	Test case 46 — IUT robustness against dominant bit shortening.
Purpose	This test verifies if the IUT is able to sample all bits correctly even if there are shortenings of dominant bit phases.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame: • DLC: = 7 • ID: Refer to elementary test definition • Data: Refer to elementary test definition Elementary tests are defined as follows: Test ID Data #1 078h each 87h #2 07830F0Fh each 87h #3 555h each AAh
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame as defined in Test variables where each dominant bit, which is following a recessive bit, is shortened by 5 % of the bit time and the recessive bit which follows it is lengthened by 5 % of bit time.
Response	The IUT shall sample all bits correctly. The test frame shall cause a wake-up due to the correct bit sampling.
Reference	ISO 11898-6, sub-clause 5.4.5.2.2

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Table 51 — Test case 47

<table>
<tr><td>Number - Title</td><td>Test case 47 — Correct sampling after bit deformation and hard sync.</td></tr>
<tr><td>Purpose</td><td>This test verifies if the IUT is able to sample all bits correctly after a hard synchronisation even if there are shortenings and extensions of dominant bit phases.</td></tr>
<tr><td>Test variables</td><td>All parameters are set to the default parameters as defined in 6.2.4.2 except:
• IMF = 1 bit * (2 + e)
• e Refer to elementary test definition

Test frame:
• DLC: = 7
• ID: Refer to elementary test definition
• Data: Refer to elementary test definition

Elementary tests are defined as follows:
<table>
<tr><td>Test</td><td>ID</td><td>Data</td><td>e</td><td>Test</td><td>ID</td><td>Data</td><td>e</td></tr>
<tr><td>#1</td><td>078h</td><td>each 87h</td><td>0,95</td><td>#20</td><td>555h</td><td>each AAh</td><td>0,95</td></tr>
<tr><td>#2</td><td>078h</td><td>each 87h</td><td>0,90</td><td>#21</td><td>555h</td><td>each AAh</td><td>0,90</td></tr>
<tr><td>#3</td><td>078h</td><td>each 87h</td><td>0,85</td><td>#22</td><td>555h</td><td>each AAh</td><td>0,85</td></tr>
<tr><td>…</td><td></td><td>…</td><td>…</td><td>…</td><td>…</td><td>…</td><td>…</td></tr>
<tr><td>#19</td><td>078h</td><td>each 87h</td><td>0,05</td><td>#38</td><td>555h</td><td>each AAh</td><td>0,05</td></tr>
</table>
All elementary test cases must be executed applying the following two bit deformations.
• Each dominant bit, which is following a recessive bit, is shortened by 5 % of the bit time and the recessive bit which follows it is lengthened by 5 % of bit time, and
• Each dominant bit which is followed by a recessive bit, is prolonged by 55 % of the bit time and the recessive bit which follows it is shortened by 55 % of bit time.</td></tr>
<tr><td>Setup</td><td>— The IUT is configured corresponding Test variables.
— The IUT is set to low-power mode with configured selective wake-up.</td></tr>
<tr><td>Execution</td><td>1) The test system sends 4 sync frames as depicted in test variables (or 8 in case of data rate > 500 kbit/s).
2) The test system sends a sync frame (including the active error frame) containing a shortened IMF as defined in the test variables followed by a test frame without any delay in between.</td></tr>
<tr><td>Response</td><td>The IUT shall sample all bits correctly. The test frame shall cause a wake-up due to the correct bit sampling.</td></tr>
<tr><td>Reference</td><td>ISO 11898-6, sub-clause 5.4.5.2.2</td></tr>
</table>

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Table 52 — Test case 48

Number - Title	Test case 48 — No frame constant bit deformation due to loss of arbitration or ringing effects.
Purpose	This test verifies if the IUT is able to sample all bits correctly after loss of arbitration or ringing effects (no constant dominant bit shortening) even if there are shortenings and extensions of dominant bit phases.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame: • ID: = 07830F0Fh • DLC: = 7 • Data: = each 87h Elementary tests are defined as follows: Prolongation of each dominant bit which is followed by a recessive bit and shortening the following recessive bit Test — From SOF until IDE — After IDE until EOF #1 — 0 % of the bit time — 55 % of the bit time #2 — 55 % of the bit time — 0 % of the bit time #3 — −5 % of the bit time — 0 % of the bit time #4 — 0 % of the bit time — −5 % of the bit time #5 — −5 % of the bit time — 55 % of the bit time #6 — 55 % of the bit time — −5 % of the bit time
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame as defined in Test variables.
Response	The IUT shall sample all bits correctly. The test frame shall cause a wake-up due to the correct bit sampling.
Reference	ISO 11898-6, sub-clause 5.4.5.2.2

Table 53 — Test case 49

Number - Title	Test case 49 — Glitch filtering test in idle state
Purpose	The purpose of this test is to verify that the IUT will not interpret a dominant phase as a SOF when the dominant level is smaller than 55 % of a bit time.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: • Glitch length = 54 % of bit time
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends a dominant glitch with glitch length as depicted in test variables. 3) The test system waits for two bit times before sending the test frame.
Response	The IUT shall receive this frame correctly and detect the wake-up condition.
Reference	ISO 11898-6, sub-clause 5.4.5.2.2

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Table 54 — Test case 50

Number - Title	Test case 50 — Clock tolerance test
Purpose	Purpose of test is to check the oscillator tolerance behaviour to be in sync (±0,5 %) after a wake frame.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: No wake-up frame 1: • ID: = 15555555h • DLC: = 10 • Data: = each AAh No wake-up frame 2: • ID: = 0E0h • RTR: = 1 Wake-up frame: • ID: = 07830F0Fh • DLC: = 7 • Data = each 87h Elementary tests are derived as follows: One test for each combination of tolerance's corner points (Bus traffic at opposite tolerance as wake-up frames). Test — No Wake-up frame — Clock tolerance #1 — Frame 1 — No wake-up frames and sync frames with bit rate on 99,5 % bit rate. Wake-up frames with bit rate on 100,5 % bit rate #2 — Frame 1 — No wake-up frames and sync frames with bit rate on 100,5 % bit rate. Wake-up frames with bit rate on 99,5 % bit rate #3 — Frame 2 — No wake-up frames and sync frames with bit rate on 99,5 % bit rate. Wake-up frames with bit rate on 100,5 % bit rate #4 — Frame 2 — No wake-up frames and sync frames with bit rate on 100,5 % bit rate. Wake-up frames with bit rate on 99,5 % bit rate
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence". 2) The test system sends 10 no wake-up frames as "Bus traffic". 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends one wake-up frame.
Response	The last test frame shall cause a wake-up. All previously sent test frames shall not cause a wake-up.
Reference	ISO 11898-6, sub-clause 5.4.5.2.2

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Table 55 — Test case 51

Number - Title	Test case 51 — Not constant network timing due to loss of arbitration
Purpose	This test verifies if the IUT is able to sample all bits correctly in case a far node wins the arbitration against a near node.
Test variables	Test frame: • ID: = 07830F0Fh • DLC: = 7 • Data field bytes: = each 87h • Timing deviation: = 55 % of bit time The test must be performed inserting the timing deviation after the last dominant bit followed by a recessive bit within the ID field.
Setup	The IUT is set to sleep mode; selective wake-up function enabled.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame as defined in Test variables as depicted in test variables.
Response	The IUT shall sample all bits correctly. The test frame shall cause a wake-up due to the correct bit sampling.
Reference	ISO 11898-6, Sub-Clause 5.4.5.2.2 (Figure 5 case A)

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7.3 Wake-up frame evaluation

7.3.1 CAN message ID filter test

Table 56 — Test case 52

Number - Title	Test case 52 — Message filter / 11-bit CAN-ID – test 1
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 2AAh • ID mask: Refer to elementary test definition • DLC: = 0 Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask test ID Mask #1 CCC CCCC CCCC #7 CCC CCDC CCCC #2 CCC CCCC CCCD #8 CCC CDCC CCCC #3 CCC CCCC CCDC #9 CCC DCCC CCCC #4 CCC CCCC CDCC #10 CCD CCCC CCCC #5 CCC CCCC DCCC #11 CDC CCCC CCCC #6 CCC CCCD CCCC #12 DCC CCCC CCCC
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence". 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (tbias). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3 and 5.4.5.2.5

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Table 57 — Test case 53

Number - Title	Test case 53 — Message filter / 11-bit CAN-ID – test 2
Purpose	The purpose of this test is to verify that the IUT only accepts received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 555h • ID mask: Refer to elementary test definition • DLC: = 0 Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask test ID Mask #1 CCC CCCC CCCC #7 CCC CCDC CCCC #2 CCC CCCC CCCD #8 CCC CDCC CCCC #3 CCC CCCC CCDC #9 CCC DCCC CCCC #4 CCC CCCC CDCC #10 CCD CCCC CCCC #5 CCC CCCC DCCC #11 CDC CCCC CCCC #6 CCC CCCD CCCC #12 DCC CCCC CCCC
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence". 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3 and 5.4.5.2.5

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Table 58 — Test case 54

Number - Title	Test case 54 — Message filter / 11-bit CAN-ID – test 3
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 000h • ID mask: Refer to elementary test definition • DLC: = 0 Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config Msg. ID in D fields Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask test ID Mask #1 DDD DDDD DDDC #7 DDD DCDD DDDD #2 DDD DDDD DDCD #8 DDD CDDD DDDD #3 DDD DDDD DCDD #9 DDC DDDD DDDD #4 DDD DDDD CDDD #10 DCD DDDD DDDD #5 DDD DDDC DDDD #11 CDD DDDD DDDD #6 DDD DDCD DDDD
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence". 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3 and 5.4.5.2.5

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Table 59 — Test case 55

Number - Title	Test case 55 — Message filter / 11-bit CAN-ID – test 4
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 7FFh • ID mask: Refer to elementary test definition • DLC: = 0 Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask test ID Mask #1 DDD DDDD DDDC #7 DDD DCDD DDDD #2 DDD DDDD DDCD #8 DDD CDDD DDDD #3 DDD DDDD DCDD #9 DDC DDDD DDDD #4 DDD DDDD CDDD #10 DCD DDDD DDDD #5 DDD DDDC DDDD #11 CDD DDDD DDDD #6 DDD DDCD DDDD
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence". 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3 and 5.4.5.2.5

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Table 60 — Test case 56

Number - Title	Test case 56 — Message filter / 29-bit CAN-ID – test 1
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 1AAAAAAAh • ID mask: Refer to elementary test definition Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask #1 C CCCC CCCC CCCC CCCC CCCC CCCC CCCC #2 C CCCC CCCC CCCC CCCC CCCC CCCC CCCD #3 C CCCC CCCC CCCC CCCC CCCC CCCC CCDC … #29 C DCCC CCCC CCCC CCCC CCCC CCCC CCCC #30 D CCCC CCCC CCCC CCCC CCCC CCCC CCCC
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence". 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (tbias). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3 and 5.4.5.2.5

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Table 61 — Test case 57

Number - Title	Test case 57 — Message filter / 29-bit CAN-ID – test 2
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 05555555h • ID mask: Refer to elementary test definition Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask #1 C CCCC CCCC CCCC CCCC CCCC CCCC CCCC #2 C CCCC CCCC CCCC CCCC CCCC CCCC CCCD #3 C CCCC CCCC CCCC CCCC CCCC CCCC CCDC … #29 C DCCC CCCC CCCC CCCC CCCC CCCC CCCC #30 D CCCC CCCC CCCC CCCC CCCC CCCC CCCC
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence". 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3 and 5.4.5.2.5

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Table 62 — Test case 58

Number - Title	Test case 58 — Message filter / 29-bit CAN-ID – test 3
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 00000000h • ID mask: Refer to elementary test definition Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask #1 D DDDD DDDD DDDD DDDD DDDD DDDD DDDC #2 D DDDD DDDD DDDD DDDD DDDD DDDD DDCD ... #28 D CDDD DDDD DDDD DDDD DDDD DDDD DDDD #29 C DDDD DDDD DDDD DDDD DDDD DDDD DDDD
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence". 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3 and 5.4.5.2.5

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Table 63 — Test case 59

Number - Title	Test case 59 — Message filter / 29-bit CAN-ID – test 4
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 1FFFFFFFh • ID mask: Refer to elementary test definition Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask #1 D DDDD DDDD DDDD DDDD DDDD DDDD DDDC #2 D DDDD DDDD DDDD DDDD DDDD DDDD DDCD … #28 D CDDD DDDD DDDD DDDD DDDD DDDD DDDD #29 C DDDD DDDD DDDD DDDD DDDD DDDD DDDD
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence". 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3 and 5.4.5.2.5

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7.3.2 CAN message Data filter test

Table 64 — Test case 60

Number - Title	Test case 60 — Message data filter – matching data field
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the data field evaluation.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • DLC: = x Test frame: • Data byte x of test frame: Refer to elementary test definition • x: ∈ {1, 2, …, 15} Elementary tests are defined as follows: Test — Data field *x* of test frame *(for x ≤ 8, otherwise x = x- 8)* — Other data field of test frame #1–15 — 0000 0001b — 00h #16–30 — 0000 0010b — 00h #31–45 — 0000 0100b — 00h #46–60 — 0000 1000b — 00h #61–75 — 0001 0000b — 00h #76–90 — 0010 0000b — 00h #91–105 — 0100 0000b — 00h #106–120 — 1000 0000b — 00h All eight elementary tests shall be executed for all DLC settings (x = 1, 2, … ,15) separately.
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame but with data bytes being the bitwise inverted value of the configured bytes. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame.
Response	The reception of test frame in test step 4) shall cause a wake-up due to one matching logical “1” bit in the data field.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3 and 5.4.5.2.7

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7.3.3 CAN message DLC filter tests

Table 65 — Test case 61

Number - Title	Test case 61 — Message DLC filter test
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the DLC evaluation.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • DLC: refer to elementary test definition • Data field: each data byte 01h (for 0 < DLC ≤ 15) Test frame: • DLC: refer to execution • Data: each data byte 01h (for 0 < DLC ≤ 15) Elementary tests are defined as follows: Test DLC #1 0 #2 1 #3 2 … #15 14 #16 15
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence". 2) The test system generates first DLC with a value of 0. 3) If the DLC is not equal to the configured DLC, the test system sends test frame with actual DLC. 4) If the DLC is smaller than 15, the test system increment the DLC by 1 and go back to test step 3, otherwise go to test step 5. 5) The test system waits at least two times the maximum bias reaction time (t_{bias}). 6) The test system sends the test frame with configured DLC.
Response	Only the last sent test frame shall cause a wake-up due to matching DLC evaluation.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3 and 5.4.2.5.6

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7.3.4 Optional data mask bit tests

Table 66 — Test case 62

Number - Title	Test case 62 — Message filter / 11-bit CAN-ID – test 1 while data mask bit is set to 0.
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 2AAh • ID mask: Refer to elementary test definition • Data mask bit: disabled Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields • DLC: = 4 • Data: each AAh Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask test ID Mask #1 CCC CCCC CCCC #7 CCC CCDC CCCC #2 CCC CCCC CCCD #8 CCC CDCC CCCC #3 CCC CCCC CCDC #9 CCC DCCC CCCC #4 CCC CCCC CDCC #10 CCD CCCC CCCC #5 CCC CCCC DCCC #11 CDC CCCC CCCC #6 CCC CCCD CCCC #12 DCC CCCC CCCC
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence" but in extended format with ID: 15555555h. 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (tbias). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3, 5.4.5.2.5 and 5.3.4
Note: This test case is applicable if the optional data mask bit is implemented.	

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Table 67 — Test case 63

Number - Title	Test case 63 — Message filter / 11-bit CAN-ID – test 2 while data mask bit is set to 0.
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 555h • ID mask: Refer to elementary test definition • Data mask bit: disabled Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields • DLC: = 4 • Data: each AAh Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask Test ID Mask #1 CCC CCCC CCCC #7 CCC CCDC CCCC #2 CCC CCCC CCCD #8 CCC CDCC CCCC #3 CCC CCCC CCDC #9 CCC DCCC CCCC #4 CCC CCCC CDCC #10 CCD CCCC CCCC #5 CCC CCCC DCCC #11 CDC CCCC CCCC #6 CCC CCCD CCCC #12 DCC CCCC CCCC
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence" but in extended format with ID: 15555555h. 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (tbias). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3, 5.4.5.2.5 and 5.3.4
Note: This test case is applicable if the optional data mask bit is implemented.	

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Table 68 — Test case 64

Number - Title	Test case 64 — Message filter / 11-bit CAN-ID – test 3 while data mask bit is set to 0.
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 000h • ID mask: Refer to elementary test definition • Data mask bit: disabled Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config Msg. ID in D fields • DLC: = 4 • Data: each AAh Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask Test ID Mask #1 DDD DDDD DDDC #7 DDD DCDD DDDD #2 DDD DDDD DDCD #8 DDD CDDD DDDD #3 DDD DDDD DCDD #9 DDC DDDD DDDD #4 DDD DDDD CDDD #10 DCD DDDD DDDD #5 DDD DDDC DDDD #11 CDD DDDD DDDD #6 DDD DDCD DDDD
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence" but in extended format with ID: 15555555h. 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3, 5.4.5.2.5 and 5.3.4
Note: This test case is applicable if the optional data mask bit is implemented.	

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Table 69 — Test case 65

Number - Title	Test case 65 — Message filter / 11-bit CAN-ID – test 4 while data mask bit is set to 0.
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 7FFh • ID mask: Refer to elementary test definition • Data mask bit: disabled Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields • DLC: = 4 • Data: each AAh Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask Test ID Mask #1 DDD DDDD DDDC #7 DDD DCDD DDDD #2 DDD DDDD DDCD #8 DDD CDDD DDDD #3 DDD DDDD DCDD #9 DDC DDDD DDDD #4 DDD DDDD CDDD #10 DCD DDDD DDDD #5 DDD DDDC DDDD #11 CDD DDDD DDDD #6 DDD DDCD DDDD
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence" but in extended format with ID: 15555555h. 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3, 5.4.5.2.5 and 5.3.4
Note: This test case is applicable if the optional data mask bit is implemented.	

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Table 70 — Test case 66

Number - Title	Test case 66 — Message filter / 29-bit CAN-ID – test 1 while data mask bit is set to 0.
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 0AAAAAAAh • ID mask: Refer to elementary test definition • Data mask bit: disabled Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields • DLC: = 4 • Data: each AAh Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask #1 C CCCC CCCC CCCC CCCC CCCC CCCC CCCC #2 C CCCC CCCC CCCC CCCC CCCC CCCC CCCD #3 C CCCC CCCC CCCC CCCC CCCC CCCC CCDC ... #29 C DCCC CCCC CCCC CCCC CCCC CCCC CCCC #30 D CCCC CCCC CCCC CCCC CCCC CCCC CCCC
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence". 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3, 5.4.5.2.5 and 5.3.4
Note: This test case is applicable if the optional data mask bit is implemented.	

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Table 71 — Test case 67

Number - Title	Test case 67 — Message filter / 29-bit CAN-ID – test 2 while data mask bit is set to 0.
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 15555555h • ID mask: Refer to elementary test definition • Data mask bit: disabled Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields • DLC: = 4 • Data: each AAh Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask #1 C CCCC CCCC CCCC CCCC CCCC CCCC CCCC #2 C CCCC CCCC CCCC CCCC CCCC CCCC CCCD #3 C CCCC CCCC CCCC CCCC CCCC CCCC CCDC … #29 C DCCC CCCC CCCC CCCC CCCC CCCC CCCC #30 D CCCC CCCC CCCC CCCC CCCC CCCC CCCC
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3, 5.4.5.2.5 and 5.3.4
Note: This test case is applicable if the optional data mask bit is implemented.	

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Table 72 — Test case 68

Number - Title	Test case 68 — Message filter / 29-bit CAN-ID – test 3 while data mask bit is set to 0.
Purpose	The purpose of this test is to verify that the IUT only accept received frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 00000000h • ID mask: Refer to elementary test definition • Data mask bit: disabled Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields • DLC: = 4 • Data: each AAh Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask #1 D DDDD DDDD DDDD DDDD DDDD DDDD DDDC #2 D DDDD DDDD DDDD DDDD DDDD DDDD DDCD … #28 D CDDD DDDD DDDD DDDD DDDD DDDD DDDD #29 C DDDD DDDD DDDD DDDD DDDD DDDD DDDD
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence". 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3, 5.4.5.2.5 and 5.3.4
Note: This test case is applicable if the optional data mask bit is implemented.	

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Table 73 — Test case 69

Number - Title	Test case 69 — Message filter / 29-bit CAN-ID – test 4 while data mask bit is set to 0.
Purpose	The purpose of this test is to verify that the IUT only accepts frames matching the mask criteria.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • ID: = 1FFFFFFFh • ID mask: Refer to elementary test definition • Data mask bit: disabled Test frame: • ID of test frame_1: unequal to config ID in C fields, equal to config ID in D fields • ID of test frame_2: equal to config ID in C fields, unequal to config ID in D fields • DLC: = 4 • Data: each AAh Elementary tests are defined as follows (with C = care and D = don't care): Test ID Mask #1 D DDDD DDDD DDDD DDDD DDDD DDDD DDDC #2 D DDDD DDDD DDDD DDDD DDDD DDDD DDCD … #28 D CDDD DDDD DDDD DDDD DDDD DDDD DDDD #29 C DDDD DDDD DDDD DDDD DDDD DDDD DDDD
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends "sync frame sequence". 2) The test system sends test frame_1. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame_2.
Response	— The reception of test frame_1 shall not cause a wake-up. — The reception of test frame_2 shall cause a wake-up.
Reference	ISO 11898-6, sub-clauses 5.4.5.2.3, 5.4.5.2.5 and 5.3.4
Note: This test case is applicable if the optional data mask bit is implemented.	

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Table 74 — Test case 70

Number - Title	Test case 70 —Acceptance of frames independent of the DLC while data mask bit is set to 0.
Purpose	The purpose of this test is to verify if the IUT is able to detect a frame as a valid wake-up frame (independent of the DLC) as long as the configured ID matches the device configuration.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • DLC: = 8 • Data field: = each FFh • Data mask: disabled Test frame: • DLC see execution
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system set the test frame DLC to 0. 3) The test system sends the test frame with configured wakeup ID. 4) The test system waits at least two times the maximum bias reaction time (t_{bias}). 5) The IUT is set to low-power mode with configured selective wake-up. 6) The test system increments the test frame DLC by 1. 7) If DLC < 16, go to step 3, otherwise end test execution.
Response	Each test frame shall cause a wake-up.
Reference	ISO 11898-6, sub-Clauses 5.3.4 and 5.4.5.2.3
Note: This test case is applicable if the optional data mask bit is implemented.	

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Table 75 — Test case 71

Number - Title	Test case 71 —Acceptance of remote frames independent of the DLC while data mask bit is set to 0.
Purpose	The purpose of this test is to verify if the IUT is able to detect a remote frame as a valid wake-up frame (independent of the DLC) as long as the configured ID matches the device configuration.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: IUT configuration: • DLC: = 8 • Data field: = each FFh • Data mask: disabled Test frame: • RTR = 1 • DLC see execution
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system set the test frame DLC to 0. 3) The test system sends the test frame with configured wakeup ID. 4) The test system waits at least two times the maximum bias reaction time (t_{bias}). 5) The IUT is set to low-power mode with configured selective wake-up. 6) The test system increments the test frame DLC by 1. 7) If DLC < 16, go to step 3, otherwise end test execution.
Response	Each test frame shall cause a wake-up.
Reference	ISO 11898-6, sub-Clauses 5.3.4 and 5.4.5.2.3.
Note: This test case is applicable if the optional data mask bit is implemented.	

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7.3.5 Non-acceptance of Remote frames

Table 76 — Test case 72

Number - Title	Test case 72 — Non-acceptance of remote frames
Purpose	The purpose of this test is to verify if the IUT does not detect a remote frame as a valid wake-up frame.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame: • DLC: = 0 • RTR: Refer to Execution
Setup	— The IUT is configured corresponding Test variables. — The IUT is set to low-power mode with configured selective wake-up.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends test frame containing a recessive RTR bit. 3) The test system waits at least two times the maximum bias reaction time (t_{bias}). 4) The test system sends test frame containing a dominant RTR bit
Response	— The first test frame shall not cause a wake-up. — The second test frame shall cause a wake-up.
Reference	ISO 11898-6, sub-clause 5.4.5.2.3.

7.4 Frame error counter management

This test group considers the correct implementation of the counter for erroneous frames as it is defined in ISO 11898-6. In the following this counter is referenced as Frame Error Counter (FEC).

If the frame error counter overflow threshold value is implemented, the IUT must be configured to wake-up on counter overflow with the 32nd increment immediately or upon the next received WUP.

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Table 77 — Test case 73

Number - Title	Test case 73 — FEC increment on form error in CRC delimiter
Purpose	The purpose of this test is to verify that the IUT increases its FEC, when detecting a form error on the CRC delimiter.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame 1: • ID: = 2AAh • DLC: = 0 Test frame 2: • ID: = 078h-(contains 5 bits dominant, 5 bits recessive, 5 bits dominant) • DLC: = 0
Setup	— The IUT selective wake-up is configured with default parameters as defined in 6.2.4.2. — The IUT is set to low-power mode with selective wake-up enabled.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends 5 (or 9 in case of data rate > 500 kbit/s) times test frame 1. 3) The test system repeats sending the test frame 1 but with a dominant CRC delimiter 32 times. The test system waits at least two times the maximum bias reaction time (t_{bias}) between repetitions. 4) The test system sends test frame 2 as depicted in Test variables (a WUP which is element of a valid frame).
Response	The IUT increment its FEC by one for each erroneous frame sent by the test system in step 3. After occurrence of all erroneous frames, the IUT shall wake-up (immediately or upon the next WUP which is element of a valid frame) due to a FEC overflow.
Reference	ISO 11898-6, sub-clause 5.4.5.2.4.

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Table 78 — Test case 74

Number - Title	Test case 74 — FEC increment on stuff error
Purpose	The purpose of this test is to verify that the IUT increases its FEC, when detecting a stuff error.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame 1: • Stuff error type Refer to elementary test definition • Stuff error location Refer to elementary test definition • Frame configuration Refer to elementary test definition Test frame 2: • ID: = 078h-(contains 5 bits dominant, 5 bits recessive, 5 bits dominant) • DLC: = 0 Test frame 3: • ID: = 2AAh • DLC: = 0 • Elementary tests are defined as follows:

Test	Stuff error type	Location of stuff error	Frame configuration
#1	recessive	Arbitration field bit 10	ID: 078h
#2	dominant	Arbitration field bit 11	Default
#3	recessive	control field bit next RTR	ID: 0000000Fh RTR: 1 IDE: 1
#4	dominant	control field bit next r0	Default
#5	recessive	data field bit 5	Data: F0h
#6	dominant	data field bit 6	Data: 04h
#7	recessive	CRC field bit 15	ID: 7EFh RTR: 1 DLC: 2
#8	dominant	CRC field bit 3	ID: 41Fh Data: 00h

Setup	— The IUT selective wake-up is configured with default parameters as defined in 6.2.4.2. — The IUT is set to low-power mode with selective wake-up enabled.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends 5 (or 9 in case of data rate > 500 kbit/s) times test frame 3. 3) The test system sends the test frame 1 with configuration and stuff error as depicted in Test variables 32 times. The test system waits at least two times the maximum bias reaction time (t_{bias}) between repetitions. 4) The test system sends test frame 2 as depicted in Test variables (a WUP which is element of a valid frame).
Response	The IUT increment its FEC by one for each erroneous frame sent by the test system in step 3. After occurrence of all erroneous frames, the IUT shall wake-up (immediately or upon the next WUP which is element of a valid frame) due to a FEC overflow.
Reference	ISO 11898-6, sub-clause 5.4.5.2.4

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Table 79 — Test case 75

Number - Title	Test case 75 — FEC increment on CRC error
Purpose	The purpose of this test is to verify that the IUT increases its FEC, when detecting a CRC error.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame 1: • ID: = 2AAh • DLC: = 0 Test frame 2: • ID: = 078h-(contains 5 bits dominant, 5 bits recessive, 5 bits dominant) • DLC: = 0
Setup	— The IUT selective wake-up is configured with default parameters as defined in 6.2.4.2. — The IUT is set to low-power mode with selective wake-up enabled.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends 5 (or 9 in case of data rate > 500 kbit/s) times test frame 1. 3) The test system repeats sending the test frame 1 but with a corrupted CRC field 32 times. The test system waits at least two times the maximum bias reaction time (t_{bias}) between repetitions. 4) The test system sends test frame 2 as depicted in Test variables (a WUP which is element of a valid frame).
Response	The IUT increment its FEC by one for each erroneous frame sent by the test system in step 3. After occurrence of all erroneous frames, the IUT shall wake-up (immediately or upon the next WUP which is element of a valid frame) due to a FEC overflow.
Reference	ISO 11898-6, sub-clause 5.4.5.2.4.

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Table 80 — Test case 76

Number - Title	Test case 76 — FEC decrement on valid frame reception
Purpose	The purpose of this test is to verify that the IUT decrements it's FEC, after reception of a valid frame.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame 1: • ID: = 2AAh • DLC = 0 Test frame 2: • ID: = 078h-(contains 5 bits dominant, 5 bits recessive, 5 bits dominant) • DLC: = 0
Setup	— The IUT selective wake-up is configured with default parameters as defined in 6.2.4.2. — The IUT is set to low-power mode with selective wake-up enabled.
Execution	1) The test system sends "sync frame sequence". 2) The test system sends 5 (or 9 in case of data rate >500 kbit/s) times test frame 1. 3) The test system sends 2 times test frame 1 containing a corrupted CRC field. The FEC should be increased by one after each erroneous frame. 4) Then, the test system sends 2 times test frame 1. The FEC should be decreased by one after each valid frame until zero. 5) Then, the test system sends test frames 1 containing a CRC error in data field 32 times. The test system waits at least two times the maximum bias reaction time (t_{bias}) between repetitions. 6) The test system sends test frame 2 as depicted in Test variables (a WUP which is element of a valid frame).
Response	The IUT must increment its FEC by one for each erroneous frame sent by the test system in step 3. After occurrence of all erroneous frames, the IUT shall wake-up (immediately or upon the next WUP which is element of a valid frame) due to a FEC overflow.
Reference	ISO 11898-6, sub-clause 5.4.5.2.4

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Table 81 — Test case 77

Number - Title	Test case 77 — FEC incremented once when active error flag length is 13 bits
Purpose	The purpose of this test is to verify that the IUT increases its FEC only one time, when detecting an active error flag with a length of 13 bits.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: Test frame 1: • ID: = 2AAh • DLC: = 0 Test frame 2: • ID: = 078h-(contains 5 bits dominant, 5 bits recessive, 5 bits dominant) • DLC: = 0
Setup	— The IUT selective wake-up is configured with default parameters as defined in 6.2.4.2. — The IUT is set to low-power mode with selective wake-up enabled.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends 5 (or 9 in case of data rate > 500 kbit/s) times test frame 1. 3) The test system sends test frame 1 containing a stuff error 30 times (The FEC shall have a value of 30). The test system waits at least two times the maximum bias reaction time (t_{bias}) between repetitions. 4) The test system waits at least two times the maximum bias reaction time (t_{bias}). 5) The test system generates an active error flag with a length of 13 bits (The FEC shall have a value of 31), followed by error delimiter and 3 intermission bits. 6) The test system sends test frame 2 as depicted in Test variables (a WUP which is element of a valid frame). The FEC shall have a value of 30. 7) The test system waits at least two times the maximum bias reaction time (t_{bias}). 8) The test system sends 2 times test frame 1 containing a stuff error (The FEC shall be incremented by 2). The test system waits at least two times the maximum bias reaction time (t_{bias}) between repetitions. 9) The test system sends test frame 2 as depicted in Test variables (a WUP which is element of a valid frame).
Response	— After occurrence of all erroneous frames sent by test system in test steps 3 to 5, the IUT shall not wake-up (not immediately nor upon the next WUP) due to a FEC overflow. — The IUT shall wake-up after receiving the second test frame sent by test system in test step 8 (immediately or upon the next WUP which is element of a valid frame) due to a FEC overflow.
Reference	ISO 11898-6, sub-clause 5.4.5.2.4

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Table 82 — Test case 78

Number - Title	Test case 78 — FEC incremented once when active error flag is longer than 13 bits
Purpose	The purpose of this test is to verify that the IUT increases its FEC only one time, when detecting an active error flag which is longer than 13 bits.
Test variables	All parameters are set to the default parameters as defined in 6.2.4.2 except: • n = 8 (number of dominant bit, sent after the active error flag) Test frame 1: • ID: = 2AAh • DLC: = 0 Test frame 2: • ID: = 078h-(contains 5 bits dominant, 5 bits recessive, 5 bits dominant) • DLC: = 0
Setup	— The IUT selective wake-up is configured with default parameters as defined in 6.2.4.2. — The IUT is set to low-power mode with selective wake-up enabled.
Execution	1) The test system sends “sync frame sequence”. 2) The test system sends 5 (or 9 in case of data rate > 500 kbit/s) times test frame 1. 3) The test system sends test frame 1 containing a stuff error 30 times (The FEC shall have a value of 30). The test system waits at least two times the maximum bias reaction time (t_{bias}) between repetitions. 4) The test system waits at least two times the maximum bias reaction time (t_{bias}). 5) The test system generates an active error flag followed by n dominant bits (The FEC shall have a value of 31), followed by error delimiter and 3 intermission bits. 6) The test system sends test frame 2 as depicted in Test variables (a WUP which is element of a valid frame). The FEC shall have a value of 30. 7) The test system waits at least two times the maximum bias reaction time (t_{bias}). 8) The test system sends 2 times test frame 1 containing a stuff error (The FEC shall be incremented by 2). The test system waits at least two times the maximum bias reaction time (t_{bias}) between repetitions. 9) The test system sends test frame 2 as depicted in Test variables (a WUP which is element of a valid frame).
Response	— After occurrence of all erroneous frames (sent by test system in test steps 3 to 5), the IUT shall not wake-up (not immediately nor upon the next WUP) due to a FEC overflow. — The IUT shall wake-up after receiving the second test frame sent by test system in test step 8 (immediately or upon the next WUP which is element of a valid frame) due to a FEC overflow.
Reference	ISO 11898-6, sub-clause 5.4.5.2.4

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