



BSI Standards Publication

Road vehicles — Local Interconnect Network (LIN)

Part 6: Protocol conformance test specification

National foreword

This British Standard is the UK implementation of ISO 17987-6:2025. It supersedes BS ISO 17987-6:2016, which is withdrawn.

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Network (LIN) —**

**Part 6:
Protocol conformance test
specification**

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Foreword

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

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

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

This second edition cancels and replaces the first edition (ISO 17987-6:2016), which has been technically revised.

The main changes are as follows:

- master and slave terms used for the LIN node types in the ISO 17987 series are replaced within this document with inclusive language terms commander and responder. This also applies for abbreviations and file formats NCF and LDF;
- variables and formulae aligned with the ISO/IEC Directives, Part 2;
- adoptions based on updates in the corresponding requirement document (ISO 17987-2);
- editorial updates and several statements improved to avoid ambiguities.

A list of all parts in the ISO 17987 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The LIN protocol as proposed is an automotive focused low speed universal asynchronous receiver transmitter (UART) based network. Some of the key characteristics of the LIN protocol are signal-based communication, schedule table-based frame transfer, commander/responder communication with error detection, node configuration and diagnostic service transportation.

The LIN protocol is for low-cost automotive control applications as, for example, door module and air conditioning systems. It serves as a communication infrastructure for low-speed control applications in vehicles by providing:

- signal-based communication to exchange information between applications in different nodes;
- bit rate support from 1 kbit/s to 20 kbit/s;
- deterministic schedule table-based frame communication;
- network management that wakes up and puts the LIN cluster into sleep state in a controlled manner;
- status management that provides error handling and error signalling;
- transport layer that allows large amount of data to be transported (such as diagnostic services);
- specification of how to handle diagnostic services;
- electrical physical layer specifications;
- node description language describing properties of responder nodes;
- network description file describing behaviour of communication;
- application programming interface.

The ISO 17987 series is based on the open systems interconnection (OSI) basic reference model as specified in ISO/IEC 7498-1 which structures communication systems into seven layers.

The OSI model structures data communication into seven layers called (top down) application layer (layer 7), presentation layer, session layer, transport layer, network layer, data link layer and physical layer (layer 1). A subset of these layers is used in the ISO 17987 series.

The ISO 17987 series distinguishes between the services provided by a layer to the layer above it and the protocol used by the layer to send a message between the peer entities of that layer. The reason for this distinction is to make the services, especially the application layer services and the transport layer services, reusable also for other types of networks than LIN. In this way, the protocol is hidden from the service user and it is possible to change the protocol if special system requirements demand it.

The ISO 17987 series provides all documents and references required to support the implementation of the requirements related to the following.

- ISO 17987-1: provides an overview of the ISO 17987 series and structure along with the use case definitions and a common set of resources (definitions, references) for use by all subsequent parts.
- ISO 17987-2: specifies the requirements related to the transport protocol and the network layer requirements to transport the PDU of a message between LIN nodes.
- ISO 17987-3: specifies the requirements for implementations of the LIN protocol on the logical level of abstraction. Hardware related properties are hidden in the defined constraints.
- ISO 17987-4: specifies the requirements for implementations of active hardware components which are necessary to interconnect the protocol implementation.

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- ISO 17987-5: specifies the LIN application programmers interface (API) and the node configuration and identification services. The node configuration and identification services are specified in the API and define how a responder node is configured and how a responder node uses the identification service.
- ISO 17987-6 (this document): specifies tests to check the conformance of the LIN protocol implementation according to ISO 17987-2 and ISO 17987-3. This comprises tests for the data link layer, the network layer and the transport layer.
- ISO 17987-7: specifies tests to check the conformance of the LIN electrical physical layer implementation (logical level of abstraction) according to ISO 17987-4.

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Part 6: Protocol conformance test specification

1 Scope

This document specifies the LIN protocol conformance test. This test verifies the conformance of LIN communication controllers with respect to ISO 17987-2 and ISO 17987-3.

This document provides all necessary technical information to ensure that test results are identical even on different test systems, provided that the particular test suite and the test system are compliant to the content of this document.

[Annex A](#), [Annex B](#) and [Annex C](#) specify the protocol conformance test plans for responder nodes supporting auto addressing procedures according procedure C, procedure D or procedure E, see ISO 17987-3:2025, Annex C.

2 Normative references

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

ISO/IEC 7498-1, *Information technology — Open Systems Interconnection — Basic Reference Model: The Basic Model*

ISO 17987-1, *Road vehicles — Local Interconnect Network (LIN) — Part 1: General information and use case definition*

ISO 17987-2:2025, *Road vehicles — Local Interconnect Network (LIN) — Part 2: Transport protocol and network layer services*

ISO 17987-3:2025, *Road vehicles — Local Interconnect Network (LIN) — Part 3: Protocol specification*

ISO 17987-4:2025, *Road vehicles — Local Interconnect Network (LIN) — Part 4: Electrical physical layer (EPL) specification 12 V/24 V*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17987-1, ISO/IEC 7498-1 and the following apply.

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

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

3.1.1

class B device

µC-based LIN device

Note 1 to entry: These are devices where it is possible to take measurements on the Rx and Tx interface circuits between the µC and the transceiver.

3.1.2

class C device

integrated LIN devices (ECU) with µC and transceiver

Note 1 to entry: These are devices where it is not possible to take measurements on the Rx and Tx interface circuits between the µC and the transceiver.

3.2 Symbols

$F_{\text{TOL_RES_COMMANDER}}$	bit rate tolerance of the commander node (absolute value), according to ISO 17987-3	%
$F_{\text{TOL_RES_RESPONDER}}$	bit rate tolerance of a responder node without making use of synchronization (absolute value), according to ISO 17987-3	%
$F_{\text{TOL_SYNC}}$	bit rate tolerance of a responder node making use of synchronization (relative value to commander node after synchronization, valid for the complete message), according to ISO 17987-3	%
$F_{\text{TOL_UNSYNC}}$	bit rate tolerance of a responder node making use of synchronization, according to ISO 17987-3	%
R_{BIT}	Common bit sample resolution	s
$R_{\text{BIT_HIGH}}$	High bit sample resolution	s
T_{AWAKE}	measured time between end of wake-up signal and start of break of a header	s
T_{BIT}	length of a bit (time), depending on the bit rate	s
$T_{\text{BIT_MAX_COMMANDER}}$	$T_{\text{BIT_MAX_COMMANDER}} = T_{\text{BIT}} (1 - F_{\text{TOL_RES_COMMANDER}})$	s
$T_{\text{BIT_MIN_COMMANDER}}$	$T_{\text{BIT_MIN_COMMANDER}} = T_{\text{BIT}} (1 + F_{\text{TOL_RES_COMMANDER}})$	s
$T_{\text{BIT_NOM_COMMANDER}}$	$T_{\text{BIT_NOM_COMMANDER}} = T_{\text{BIT}}$	s
T_{BRKDEL}	break delimiter, according to ISO 17987-3	$(1 - 14,6) T_{\text{BIT}}$
$T_{\text{BRKDEL_MAX}}$	calculated maximum of break delimiter: $T_{\text{HEADER_MAX}} - (T_{\text{BRKFLD_MIN}} + 20 T_{\text{BIT}})$	$14,6 T_{\text{BIT}}$
$T_{\text{BRKDEL_MIN}}$	minimum of break delimiter, according to ISO 17987-3	$1 T_{\text{BIT}}$
T_{BRKFLD}	break field low phase, according to ISO 17987-3	$(13 - 26,6) T_{\text{BIT}}$
$T_{\text{BRKFLD_MAX}}$	calculated maximum of break field low phase: $T_{\text{HEADER_MAX}} - (T_{\text{BRKDEL_MIN}} + 20 T_{\text{BIT}})$	$26,6 T_{\text{BIT}}$

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$T_{\text{BRKFLD_MIN}}$	minimum of break field low phase, according to ISO 17987-3	$13 T_{\text{BIT}}$
T_{FRAME}	length of an 8 byte frame, according to ISO 17987-3 (see frame length) $T_{\text{FRAME}} = T_{\text{HEADER}} + T_{\text{RESPONSE}}$	$(124 - 173,6) T_{\text{BIT}}$
$T_{\text{FRAME_MAX}}$	maximum length of an 8 byte frame, according to ISO 17987-3	$173,6 T_{\text{BIT}}$
$T_{\text{FRAME_MIN}}$	minimum length of an 8 byte frame, according to ISO 17987-3	$124 T_{\text{BIT}}$
$T_{\text{FRAME_SLOT_MEASURE}}$	measured between falling edges of the break field	s
$T_{\text{FRAME_SLOT_SPECIFIED}}$	length that is specified in the LDF	s
$T_{\text{H_INTERBYTE}}$	inter-byte space between sync byte field and protected identifier	$0 - 13,6 T_{\text{BIT}}$
T_{HEADER}	length of the header of a message frame based on T_{BIT} nominal	$34 - 47,6 T_{\text{BIT}}$
$T_{\text{HEADER_MAX}}$	maximum length of the header of a message frame, according to ISO 17987-3	$47,6 T_{\text{BIT}}$
$T_{\text{HEADER_MIN}}$	minimum length of the header of a message frame, according to ISO 17987-3	$34 T_{\text{BIT}}$
$T_{\text{JITTER_DEFINED}}$	jitter according LDF or NCF of the IUT	s
$T_{\text{JITTER_MEASURE}}$	measured jitter as described in ISO 17987-3 (see frame slot)	s
$T_{\text{RESPONSE_MAX}}$	maximum response length	$126 T_{\text{BIT}}$
$T_{\text{RESPONSE_MIN}}$	nominal response length	$90 T_{\text{BIT}}$
T_{SLEEP}	measured time after that a responder node enters automatically a sleep state ISO 17987-2:2025, 5.4	s

3.3 Abbreviated terms

AC	alternate current
API	application programming interface
BFS	byte field synchronization
CF	transport layer consecutive frame
DC	direct current
EBS	earliest bit sample
EMC	electromagnetic compatibility
EMI	electromagnetic interference

EPL	electrical physical layer
ESD	electrostatic discharge
FF	transport layer first frame
GND	ground
IUT	implementation under test
LBS	latest bit sample
Max.	maximum
Min.	minimum
NVM	non-volatile memory
no.	number
OSI	open systems interconnection
PID	protected identifier
PDU	protocol data unit
PT-CT	LIN data link layer, network layer and transport layer protocol conformance test
RSID	response service identifier
Rx	Rx pin of the transceiver
RXD	receive data
SF	transport layer single frame
SID	service identifier
SR	sample window repetition
TC	test case
TRX	transceiver
Tx	Tx pin of the transceiver
TXD	transmit data
Typ	typical
UART	universal asynchronous receiver transmitter

4 Conventions

The ISO 17987 series and ISO 14229-7 are based on the conventions specified in the OSI service conventions (ISO/IEC 10731) as they apply for physical layer, protocol, network and transport protocol and diagnostic services.

5 General test specification considerations

5.1 General

This test specification is not able to cover all contingencies. Due to the fact of the missing vehicle environment, it is possible that the IUT's behaviour differs.

5.2 Test conditions

The tests shall be done at temperature in the range of 15 °C to 35 °C.

5.3 Mandatory requirements for IUT as commander

It is mandatory for the LDF to perform the LIN conformance tests for IUT as commander.

If the LDF is not able to describe all features of the IUT, an additional device-specific datasheet is necessary (for example, used diagnostic services).

Depending on the implementation of the IUT as commander, it is allowed to use all possible commander request frames (e.g. instead of TST_FRM_ASSIGNIDRANGE) for testing, except mandatory supported frames.

IUT initialization is required before each test case. Deviations are marked in the test case respectively.

5.4 Mandatory requirements for IUT as responder

It is mandatory for the NCF or alternatively the LDF to perform the LIN conformance tests for IUT as responder.

The used test tool shall verify the syntax of the NCF/LDF for plausibility (not for the content).

The NCF/LDF shall match with the implementation of the device.

If the NCF/LDF is not able to describe all features of the IUT, an additional device-specific datasheet is necessary (for example, used diagnostic services).

If an IUT is not fully configured after reset, an IUT initialization is required before each test case, except if the AssignFrameIdentifierRange command is part of the test. Preconfigured responder nodes are fully configured after reset. Deviations are marked in the test case respectively.

5.5 Test case architecture

In the description of each test case, it is specified for which device type the test case is applicable, i.e. for commander or responder.

Each specification of a test case consists of five parts:

- set up
 - defines the IUT as commander or responder;
 - defines settings for the implementation under test (IUT) and the test system (for details, see [5.9.1](#));
 - defines the bit rate for the respective test case;
- system Init
 - defines to what state the IUT shall have been set before starting the execution of the test. If not otherwise defined, the IUT as commander sends requests and the IUT as responder waits for requests; the configured NAD of the IUT shall be in responder node addresses range from 01₁₆ to 7D₁₆;

- an initialization of the IUT shall be performed before each test case. To initialize the IUT, a reset is carried out and thereafter, the IUT shall be reconfigured, e.g. by a Frame ID configuration process;
- test
 - defines the way of stimulating the IUT;
 - if more than one step is defined in this field, the steps shall be executed in the order as they are stated in the document;
- verification
 - defines the expected behaviour of the IUT when executing the test steps;
- reference
 - defines the reference to this document or other parts of the ISO 17987 series.

5.6 Classification

The classification describes the LIN integration level. [Table 1](#) defines the classification.

Table 1 — Classification

No.	Classification	Description	Comment
1	Class A device	Transceiver devices	Data link layer and node configuration/ network management tests not applicable
2	Class B device	µC based devices	IUT as commander or responder with Rx and Tx pin connectors
3	Class C device	integrated devices (ECU) with µC and transceiver	IUT as commander or responder with analogue LIN bus connector available

5.7 Test system requirements

5.7.1 Generation of LIN frames

The test system shall ensure the precision of the bit time of a commander node as defined in ISO 17987-3.

5.7.2 Common requirements for the test cases

For proper measurement and verification of LIN frames, the test system shall use a minimum over sampling factor of 16, see [Formula \(1\)](#):

$$R_{\text{BIT}} \leq \frac{T_{\text{BIT}}}{16} \quad (1)$$

5.7.3 Common requirements for bit timing testing

For proper measurement and verification of the bit timing tests, the test system shall measure with a minimum over sampling of 10 to the precision of the commander tolerance given by ISO 17987-4 [see [Formula \(2\)](#)]. See [7.13](#), [7.14](#), [7.15](#).

$$R_{\text{BIT_HIGH}} \leq \frac{T_{\text{BIT}} \frac{0,5}{100}}{10} \quad (2)$$

5.7.4 Test system for IUT as responder node

If the IUT is a responder node the test system acts as a commander node. The transmission of a frame by the test system is a synonym for the transmission of the frame header if the specific frame is published by the IUT according to the frame definition.

EXAMPLE “The test system sends TST_FRM_IUT_TX” corresponds to “The test system sends the header of TST_FRM_IUT_TX”.

5.7.5 Sleep state verification for IUT as responder node

Some test cases require verification of the responder node bus sleep state after transmission of a go-to-sleep command or bus idle timeout. As a direct verification is not possible due to the design of the test system, an indirect method is needed. Depending on the IUT specification, one of the following verification alternatives shall be selected for the sleep state verification procedure.

- Observing of the current consumption of the IUT. It shall be verified that the current consumption is reduced after sleep state criteria is fulfilled and the ECU specific delay is passed. The ECU specific delay between entering sleep state and reduction of ECU current shall be provided by the IUT vendor and considered in the test verification.

Prerequisite: ECU enters low power mode after a specified delay when the LIN sleep state is entered.

- The test system forces the sleep state transition. After that, the IUT is stimulated to send a wakeup signal in sleep state. If possible, it should also be verified that a wake-up signal cannot be triggered during normal communication (a responder node shall not be able to send a wakeup if it is in operational state).

Prerequisite: ECU wake-up can be triggered by an external stimulus.

- The test system forces the sleep state transition. In the next step, the test system sends the header of TST_FRM_STATUS_SIG multiple times without preceding wake-up, one or more headers are not answered by the responder node because the first SynchBreak is taken as wake-up event and the responder node performs its initialization sequence. At the latest after 100 ms, the responder shall answer to the headers.

Prerequisite: ECU enters a low-power mode when sleep state is entered and requires more than one header to recover from sleep state (otherwise, it could not be distinguished from operational state).

- A monitor or debugger is used to verify the network management state of the IUT.

Prerequisite: Accessible port for monitor or debugger.

- An ECU test pin is used to indicate the current network management state.

Prerequisite: Free and accessible test pin.

- In Class B devices, the LIN transceiver is set into sleep state – verify LIN transceiver state by oscilloscope/logger/etc.

Prerequisite: LIN transceiver is set to sleep state (with a specified delay) when the responder node enters sleep state.

- A sleep counter is implemented in the responder node which is incremented anytime the sleep state is entered. The current sleep counter state can be read out by a ReadByIdentifier request. Depending on the ECU power mode, the counter is located in the RAM or non-volatile memory. The test system verifies the sleep counter before and after performing the test and derives the verdict from the counter difference.

Prerequisite: The counter is implemented in the ECU and accessible via ReadByIdentifier request.

Hint: LIN sleep state and ECU power mode are not identical. ECU power mode transitions depend on ECU requirements that can be triggered by LIN sleep state transitions. This test only verifies the valid reception of a sleep state frame and entering LIN sleep state. The ECU power mode may only be used as indicator for the LIN sleep state.

5.8 Test system definition

A detailed test system definition is not part of this document. The test system shall be implemented in a way that the test cases are performed as specified and independent from test persons and from other test cases and of the reproducibility.

5.9 Global predefinitions for the test setup

5.9.1 Configuration of IUT and test system

Before executing the tests, the IUT and tests system shall be set up according to the next test case and considering the following properties:

- the protected identifier (PID) sent by a commander;
- the contents of the data of a responder answer;
- the delay between commander requests;
- the bit rate used for the test.

In [Table 2](#), several frames for the IUT and the test system are defined. In each test case specification, there is a row called “configuration” mostly referring to a row in [Table 2](#). The configuration described in that row shall be applied to the respective test case.

If there is no reference to [Table 2](#), the settings are described in the test case specification itself.

- If the IUT is not able to support the given PID, the table shall be adapted to the possibilities of the IUT.
- For the delay between the commander requests, see [5.9.2](#).

All used frames shall be valid and according to the device specification. [Table 2](#) defines the configuration of IUT and test system.

Table 2 — Configuration of IUT and test system

TST_Frame	Requirements for the test frame
TST_FRM_ASSIGNIDRANGE	AssignFrameIdentifierRange service
TST_FRM_RDBI_0	ReadByIdentifier (Identifier = 0) all other parameters shall be filled with default values according to the IUT specification and according to the test case specification.
TST_FRM_RDBI_X	ReadByIdentifier (Identifier ≠ 0) shall be used with the correct NAD, supplier ID and function ID according to the IUT specification. The ID is variable and >0
TST_FRM_RDBI_0_NAD	ReadByIdentifier (Identifier = 0) with different NAD
TST_FRM_IUT_TX	device specific transmit frame (IUT is publisher)
TST_FRM_IUT_RX	device specific receive frame (IUT is subscriber)
TST_FRM_REQ_EVT	request for event triggered frame
TST_HDR_RR_3D	responder response header, Identifier = 3D ₁₆
TST_FRM_STATUS_SIG	read response_error signal
TST_HDR_RESERVE_3E	reserved frame header: Identifier = 3E ₁₆
TST_HDR_RESERVE_3F	reserved frame header: Identifier = 3F ₁₆
TST_FRM_SLEEP_CMD	go-to-sleep command
TST_FRM_REQ_FUNC_7E	diagnostic request with functional NAD = 7E ₁₆
TST_FRM_ASSIGN_NAD	assign NAD
TST_FRM_SAVE_CONFIG	save configuration request

Table 2 (continued)

TST_Frame	Requirements for the test frame
TST_FRM_CR_3C_SF, TST_FRM_CR_3C_FF, TST_FRM_CR_3C_CF	This is a (SF, FF, CF) commander request message ($3C_{16}$) which can carry any kind of diagnostic message, except messages of configuration and identification.
TST_FRM_RR_3D_SF, TST_FRM_RR_3D_FF, TST_FRM_RR_3D_CF	This is a (SF, FF, CF) responder response message ($3D_{16}$) which can carry any kind of diagnostic message, except messages of configuration and identification.
TST_FRM_UNKNOWN	All undefined (not configured in the IUTs LDF, NCF) frame IDs from $0_{10} - 59_{10}$ with all combination of parity bits and all known frame IDs with possible incorrect parity bits Number of data bytes 8, data bytes 1 to 8 shall be filled with $00_{16}, 01_{16}, 02_{16}, 03_{16}, 04_{16}, 05_{16}, 06_{16}, 07_{16}$.

5.9.2 Default delays for frame headers

If not otherwise specified, the delay between the commander headers is defined as shown in [Table 3](#).

Table 3 — Default delays for frame headers

Bit rate	Commander delay
2 400 bit/s	80 ms
9 600 bit/s	20 ms
10 417 bit/s	20 ms
19 200 bit/s	10 ms

Remark:

Default delay shall be used, unless $P2_{min}$ or min_period for a frame is defined in the NCF or LDF. If $P2_{min}$ is longer than the default value, $P2_{min}$ shall be used.

5.9.3 Default bit rate

The default bit rate is set to the highest bit rate that is specified by the specification of the IUT. Test cases with different bit rate settings can only be performed when the required bit rate is in accordance with the specification of the IUT.

5.9.4 Time measurement

The time measurement for commander nodes is done at the sync byte field as shown below. For responder nodes, the answer to ReadByIdentifier ($ID = 2_{10}$) and evaluation of RSID ($7F_{16}$) in the mandatory negative response is used. In this case, the distance between falling edges of “start bit” and bit 7 is measured.

The time measurement shall be done between falling edges of the pattern. The falling edge is available in a distance of 8 bit times, which allows a simple calculation of the basic bit time T_{BIT} .

[Figure 1](#) shows the byte field for time measurement.

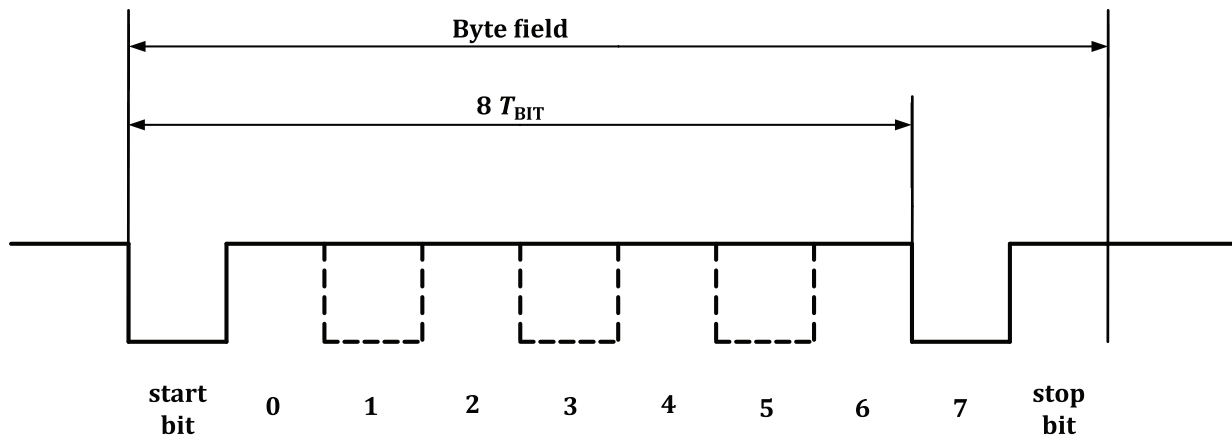


Figure 1 — Byte field for time measurement

5.9.5 Default spaces between the different frame parts of a LIN message

If not otherwise specified in the test cases, inter byte spaces between the header bytes and data fields are set to zero.

6 Essential test cases before test start

6.1 General

These test cases shall have the result “pass”; otherwise, a further execution of the remaining test cases make no sense.

6.2 [PT-CT 1] Diagnostic frame “commander request”, IUT as responder

This test verifies if the IUT as responder is able to receive commander request frames. In this test case, the diagnostic frame type “commander request” is checked.

[Table 4](#) defines the test system for diagnostic frame “commander request”.

Table 4 — Test system: Diagnostic frame “commander request”

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_ASSIGNIDRANGE, TST_FRM_STATUS_SIG
	bit rate	Default
System Init	Default	
Test	The test system sends TST_FRM_ASSIGNIDRANGE assigning a valid PID to TST_FRM_STATUS_SIG. The test system sends TST_FRM_STATUS_SIG.	
Verification	IUT shall answer.	
Reference	ISO 17987-3:2025, 5.2.4.5 and 6.3.6.5	

6.3 [PT-CT 2] Diagnostic frame “responder response”, IUT as responder

This test verifies if the IUT as responder is able to answer to a responder response header. In this test case, the “responder response frame” is checked.

[Table 5](#) defines the test system for diagnostic frame “responder response”.

Table 5 — Test system: Diagnostic frame “responder response”

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_RDBI_0, TST_HDR_RR_3D
	bit rate	Default
System Init	Default	
Test	The test system sends TST_FRM_RDBI_0. The test system sends TST_HDR_RR_3D.	
Verification	The IUT shall answer. The IUT shall receive the request from the test system and the response shall have 8 data bytes and use the classic checksum.	
Reference	ISO 17987-3:2025, 5.2.2.5	

6.4 [PT-CT 3] Error in received frame, IUT as responder

This test verifies if the IUT as responder is able to report its status to the network.

[Table 6](#) defines the test system for “error in received frame”.

Table 6 — Test system: Error in received frame

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_RDBI_0, TST_FRM_STATUS_SIG
	bit rate	Default
System Init	TST_FRM_STATUS_SIG shall be sent twice by the test system to ensure that the response_error signal is cleared.	
Test	The test system sends TST_FRM_RDBI_0 with inverted checksum. After that, TST_FRM_STATUS_SIG is sent from the test system.	
Verification	The IUT shall answer to TST_FRM_STATUS_SIG and sends the mandatory response_error signal = TRUE.	
Reference	ISO 17987-3:2025, 5.5.4	

7 Timing parameters

7.1 General

This clause verifies if the timing parameters of the IUT conform to the timing parameters that are defined in ISO 17987-3. The IUT is stimulated to transmit or receive defined frames and the resulting behaviour is observed and compared with the expected behaviour.

7.2 [PT-CT 4] Length of break field low phase, IUT as commander

This test verifies the correct length of the break field low phase T_{BRKFLD} as defined in ISO 17987-3.

[Table 7](#) defines the test system for “length of break field low phase”.

Table 7 — Test system: Length of break field low phase

State	Description	
Set up	IUT as	Commander
	Classification	Class B, class C devices
	Configuration	TST_FRM_ASSIGNIDRANGE
	bit rate	Default
System Init	Default	
Test	The IUT sends TST_FRM_ASSIGNIDRANGE.	
Verification	13 Bit / (Baud × 1,005) – 5,76 μs ^a ≤ T _{BRKF_{LD}} ≤ T _{BRKF_{LD}} _{MAX} . The measurement shall be performed at 0,4 V _{sup} of the slopes.	
Reference	ISO 17987-3:2025, 5.2.2.3 ISO 17987-4:2025, Table 10, parameter 17	
^a Taking into account the worst case for the commander bit rate and duty cycle.		

7.3 [PT-CT 5] Variation of length of break field low phase, IUT as responder

This test verifies if the IUT as responder recognizes a header with different length of break field low phase T_{BRKFLD} .

The test shall be repeated with different lengths of break field low phase T_{BRKFLD} according to the test definition.

[Table 8](#) defines the test system for “variation of length of break field low phase”.

Table 8 — Test system: Variation of length of break field low phase

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_IUT_TX
	bit rate	Default
System Init	Default	
Test	a) The test system sends TST_FRM_IUT_TX with the length of break field low phase T_{BRKFLD} from 0,5 T_{BIT} to 9,3 T_{BIT} , with 0,1 T_{BIT} steps. Every step is repeated five times. b) The test system sends TST_FRM_IUT_TX with the length of break field low phase T_{BRKFLD} from 11 to 26,6 T_{BIT} , with 0,1 T_{BIT} steps. Every step is repeated five times.	
Verification	In test part a), the IUT shall not answer any of the headers. In test case b), the IUT shall answer to all of the headers in the range of break field low phase T_{BRKFLD} of 13 T_{BIT} to 26,6 T_{BIT} . ^a	
Reference	ISO 17987-3:2025, 5.2.2.3	
^a The answer of the IUT to the header with the length of break field of 11 T_{BIT} to 12,9 T_{BIT} shall be documented.		

7.4 [PT-CT 6] Length of break delimiter, IUT as commander

This test verifies the correct length of the break delimiter T_{BRKDEL} .

[Table 9](#) defines the test system for “length of break delimiter”.

Table 9 — Test system: Length of break delimiter

State	Description	
Set up	IUT as	Commander
	Classification	Class B, class C Devices
	Configuration	TST_FRM_IUT_TX, TST_FRM_IUT_RX
	bit rate	Default
System Init	Default	
Test	The IUT sends TST_FRM_IUT_TX or TST_FRM_IUT_RX.	
Verification	$9/16 T_{\text{BIT}} + 2 \mu\text{s} T_{\text{BRKDEL_MIN}} \leq T_{\text{BRKDEL}} \leq T_{\text{BRKDEL_MAX}}$. The measurement should be performed at $0,6 V_{\text{sup}}$ of the slopes. Reference:	
Reference	ISO 17987-3:2025, 5.2.2.3 ISO 17987-4:2025, Table 10, parameter 18 ISO 17987-4:2025, Table 19, parameter 77	

7.5 [PT-CT 7] Variation of length of break delimiter, IUT as responder

This test verifies if the IUT as responder recognizes a header with different length of break delimiter T_{BRKDEL} .

The test consists of three separate test cases. The length of break delimiter T_{BRKDEL} is set according to [Table 11](#).

The IUT as responder shall accept a break delimiter of 12th/16th bit length. The shortened delimiter on the LIN bus results from capacity loads on LIN.

[Table 10](#) defines the test system for “variation of length of break delimiter”.

Table 10 — Test system: Variation of length of break delimiter

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_IUT_TX
	bit rate	Default
System Init	Default	
Test	The test system sends TST_FRM_IUT_TX with the length of break delimiter T_{BRKDEL} as defined in Table 11 .	
Verification	The IUT shall respond to the header. 10th/16th would reflect the maximum bit sample point. Considering responder nodes which are not synchronized to the commander bit rate, an additional margin of 14 % shall be added resulting in 12th/16th T_{BRKDEL} .	
Reference	ISO 17987-3:2025, 5.2.2.3	

[Table 11](#) defines the test cases for “variation of length of break delimiter”.

Table 11 — Test cases: Variation of length of break delimiter

PT-CT-TC	T_{BRKFLD}	T_{BRKDEL}	$T_{\text{H_Interbyte}}$	Comment
[PT-CT 7].1	$T_{\text{BRKFLD_MIN}}$	$T_{\text{BRKDEL_MIN}}$ class B device: $1 T_{\text{BIT}}$ class C device: $0,75 T_{\text{BIT}}$	0	minimum header length
[PT-CT 7].2	$T_{\text{BRKFLD_MIN}}$	$T_{\text{BRKDEL_MAX}}$	0	—
[PT-CT 7].3	$T_{\text{BRKFLD_MIN}}$	10 Bit	0	—

7.6 [PT-CT 8] Inconsistent break field error, IUT as responder

This test verifies if the IUT as responder detects an inconsistent break field error. The IUT as responder shall not accept a zero byte (00₁₆) as a break field.

[Table 12](#) defines the test system for “inconsistent break field error”.

Table 12 — Test system: Inconsistent break field error

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_RDBI_0, TST_HDR_RR_3D
	bit rate	Default
System Init	Default	
Test	The test system sends TST_FRM_RDBI_0 with 13 bit break field and TST_HDR_RR_3D. After that, the test system sends TST_FRM_RDBI_0 with 9 bit break field and TST_HDR_RR_3D.	
Verification	The IUT shall respond to the first commander request. The IUT shall detect the inconsistent break field error and shall not respond to the second commander request.	
Reference	ISO 17987-3:2025, 5.2.2.3	

7.7 [PT-CT 9] Inconsistent sync byte field error, IUT as responder

This test verifies if the IUT as responder detects a sync byte field error, i.e. the edges of the sync byte field are not detected within the given tolerance.

[Table 13](#) defines the test system for “inconsistent sync byte field error”.

Table 13 — Test system: Inconsistent sync byte field error

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_STATUS_SIG, TST_FRM_RDBI_0, TST_HDR_RR_3D
	bit rate	Default
System Init	TST_FRM_STATUS_SIG shall be sent twice by the test system to ensure that the response_error signal is cleared.	
Test	Step 1: X is set to 0. Step 2: The test system sends TST_FRM_RDBI_0 frame with sync byte field value X . Step 3: The test system sends TST_HDR_RR_3D header. Step 4: After that, TST_FRM_STATUS_SIG header is sent from the test system. Step 5: $X = X + 1$. Step 6: If $X \leq FF_{16}$ then continue with step 2, otherwise end test.	
Verification	The IUT shall not respond to the header in Step 3 with exception of value $X = 55_{16}$ where a positive response is expected. The IUT shall respond to TST_FRM_STATUS_SIG header in step 4 and sends the mandatory response_error signal = FALSE.	
Reference	ISO 17987-3:2025, 5.2.2.4	

7.8 [PT-CT 10] Bit rate detection, IUT as responder with making use of detection

This test verifies if the IUT as responder supports bit rate detection.

[Table 14](#) defines the test system for “verification of the supported bit rates”.

Table 14 — Test system: Verification of the supported bit rates

State	Description	
Set up	IUT as	Responder node supporting bit rate detection
	Classification	Class B, class C devices
	Configuration	TST_FRM_IUT_RX See referenced test cases
	bit rate	As declared by the responder node (NCF or LDF Node_attributes bitrate definition). In case the responder node should support a bit rate range the test is performed with the lowest supported bit rate, highest supported bit range and common bit rate values of 9,6 kbit/s, 10,417 kbit/s, 19,2 kbit/s as far as in the supported range.
System Init	The test cases [PT-CT X] System Init is replaced with the following adapted initialization sequence: 1. Device is powered up 2. Wake-up signal of 250 us length 3. Wait for 100 ms 4. The test system sends TST_FRM_IUT_RX two times. 5. Applicable only for test cases PT-CT 11, PT-CT 49 and PT-CT 50: TST_FRM_STATUS_SIG shall be sent twice by the test system to ensure that the response_error signal is cleared. 6. Applicable only for test case PT-CT 55: The test system sends TST_FRM_SLEEP_CMD with data bytes 2 to 8 filled with FF₁₆.	
Test	1. Test system sets B = lowest supported bit rate of the responder node. 2. All test cases [PT-CT X] in the list below are executed with adapted system Init as described above. After each test case power is removed from the DUT before the next test is performed. 3. Test system sets the next bit rate (increasing order) and continues with step 2 or ends the bit rate detection test after performing the highest supported bit rate of the responder node. List of test cases to be performed for each supported bit rate: 1. [PT-CT 2] Diagnostic frame “responder response”, IUT as responder 2. [PT-CT 5] Variation of length of break field low phase, IUT as responder 3. [PT-CT 7] Variation of length of break delimiter, IUT as responder 4. [PT-CT 8] Inconsistent break field error, IUT as responder 5. [PT-CT 9] Inconsistent sync byte field error, IUT as responder 6. [PT-CT 11] Incomplete frame reception, IUT as responder 7. [PT-CT 14] Variation of length of header, IUT as responder 8. [PT-CT 16] Bit rate tolerance, IUT as responder without making use of synchronization, if applicable 9. [PT-CT 17] Bit rate tolerance, IUT as responder with making use of synchronization, if applicable 10. [PT-CT 23] Sample point test, IUT as responder	

Table 14 (continued)

State	Description
	11. [PT-CT 49] Error in received frame, IUT as responder 12. [PT-CT 50] Error in transmitted frame, IUT as responder 13. [PT-CT 51] response_error signal handling, IUT as responder 14. [PT-CT 53] Receive 'go-to-sleep command', IUT as responder 15. [PT-CT 55] Receive a wake-up signal, IUT as responder
Verification	For each bit rate the responder nodes perform all test cases successfully.
Reference	ISO 17987-4:2025, 5.2.2

7.9 [PT-CT 10] Verification of the sync byte field, IUT as commander

This test verifies if the IUT as commander sends a sync byte field with the data “55₁₆”.

[Table 15](#) defines the test system for “verification of the sync byte field”.

Table 15 — Test system: Verification of the sync byte field

State	Description	
Set up	IUT as	Commander
	Classification	Class B, class C devices
	Configuration	TST_FRM_RDBI_0
	bit rate	Default
System Init	Default	
Test	The IUT as commander sends TST_FRM_RDBI_0.	
Verification	The IUT shall send the sync byte field without failure.	
Reference	ISO 17987-4:2025, 5.2.2	

7.10 [PT-CT 11] Incomplete frame reception, IUT as responder

This test verifies if the IUT as responder responds to a frame correctly after an incomplete frame and if the response_error signal is set as expected.

[Table 16](#) defines the test system for “incomplete frame reception”.

Table 16 — Test system: Incomplete frame reception

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_STATUS_SIG, TST_FRM_IUT_RX
	bit rate	Default
System Init	TST_FRM_STATUS_SIG shall be sent twice by the test system to ensure that the response_error signal is cleared.	
Test	The test system sends the profile described in Table 17 followed by TST_FRM_STATUS_SIG. The minimum distance between the test profile and TST_FRM_STATUS_SIG should be the frame maximum time.	
Verification	The IUT shall respond to TST_FRM_STATUS_SIG by and set the response_error signal as described in Table 17 .	
Reference	ISO 17987-3:2025, 5.5.4	

[Table 17](#) defines the test cases for “incomplete frame reception”.

Table 17 — Test cases: Incomplete frame reception

PT-CT-TC	Profile test	response_error signal during verification step
[PT-CT 11].1	The test system sends only the break field.	FALSE
[PT-CT 11].2	The test system sends only the break field and the sync byte field.	FALSE
[PT-CT 11].3	The test system sends just the header of TST_FRM_IUT_RX.	FALSE
[PT-CT 11].4	The test system sends just the header of TST_FRM_IUT_RX and the first data byte.	TRUE

7.11 [PT-CT 12] Unknown frame reception, IUT as responder

This test verifies if the IUT as responder ignores an unknown complete or unknown incomplete frame and does not set the response_error signal to TRUE.

[Table 18](#) defines the test system for “unknown frame reception”.

Table 18 — Test system: Unknown frame reception

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_UNKNOWN, TST_FRM_STATUS_SIG
	bit rate	Default
System Init	TST_FRM_STATUS_SIG shall be sent twice by the test system to ensure that the response_error signal is cleared.	
Test	The test system sends TST_FRM_UNKNOWN with the profile described in Table 19 followed by TST_FRM_STATUS_SIG.	
Verification	The IUT shall respond to TST_FRM_STATUS_SIG by sending the mandatory response_error signal = FALSE.	
Reference	ISO 17987-3:2025, 5.5.4	

[Table 19](#) defines the Test cases for “unknown frame reception”.

Table 19 — Test cases: Unknown frame reception

PT-CT-TC	Response field
[PT-CT 12].1	No response field
[PT-CT 12].2	Just the first data byte
[PT-CT 12].3	All data bytes (according to TST_FRAME specification or frame length according to LDF/NCF), but wrong checksum

7.12 [PT-CT 13] Length of header, IUT as commander

This test verifies the correct length of the header T_{HEADER} .

[Table 20](#) defines the test system for “length of header”.

Table 20 — Test system: Length of header

State	Description	
Set up	IUT as	Commander
	Classification	Class B, class C devices
	Configuration	TST_FRM_IUT_RX, TST_FRM_IUT_TX
	bit rate	Default
System Init	Default	
Test	The IUT sends all defined TST_FRM_IUT_RX and all defined TST_FRM_IUT_TX.	
Verification	$T_{\text{HEADER_MIN}} \leq T_{\text{HEADER}} \leq T_{\text{HEADER_MAX}}$	
Reference	ISO 17987-3:2025, 5.2.3	

7.13 [PT-CT 14] Variation of length of header, IUT as responder

This test verifies if the IUT as responder recognizes headers with different length T_{HEADER} .

The test consists of four separate test cases. The length of break field low phase T_{BRKFLD} , break delimiter T_{BRKDEL} and the inter byte space between sync byte field and Identifier $T_{\text{H_INTERBYTE}}$ are set according to [Table 21](#).

Table 21 — Test system: Variation of length of header

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_RDBI_0, TST_HDR_RR_3D
	bit rate	Default
System Init	Default	
Test	The test system sends TST_FRM_RDBI_0 followed by TST_HDR_RR_3D. Both frames use the length of the parts of header as defined in Table 22 .	
Verification	The IUT shall answer to the request.	
Reference	ISO 17987-3:2025, 5.2.3	

[Table 22](#) defines the test cases for “variation of length of header”.

Table 22 — Test cases: Variation of length of header

PT-CT-TC	T_{BRKFLD}	T_{BRKDEL}	$T_{\text{H_INTERBYTE}}$	$\geq T_{\text{HEADER}}$	T_{BIT}
[PT-CT 14].1	$T_{\text{BRKFLD_MIN}}$	$T_{\text{BRKDEL_MIN}}$	$0 T_{\text{BIT}}$	$T_{\text{HEADER_MIN}}$	$T_{\text{BIT_MIN_COMMANDER}}$
[PT-CT 14].2	$18 T_{\text{BIT}}$	$2 T_{\text{BIT}}$	$6,6 T_{\text{BIT}}$	$T_{\text{HEADER_MAX}} - 1 T_{\text{BIT}}$	$T_{\text{BIT_MAX_COMMANDER}}$
[PT-CT 14].3	$15 T_{\text{BIT}}$	$3 T_{\text{BIT}}$	$2 T_{\text{BIT}}$	$40 T_{\text{BIT}}$	$T_{\text{BIT_MAX_COMMANDER}}$
[PT-CT 14].4	$T_{\text{BRKFLD_MIN}}$	$T_{\text{BRKDEL_MIN}}$	$12,6 T_{\text{BIT}}$	$T_{\text{HEADER_MAX}} - 1 T_{\text{BIT}}$	$T_{\text{BIT_MAX_COMMANDER}}$

7.14 [PT-CT 15] Bit rate tolerance, IUT as commander

This test verifies if the commander bit rate tolerance $F_{\text{TOL_RES_COMMANDER}} < \pm 0,5 \%$. For this test, a bit rate measurement is done in the sync byte field.

[Table 23](#) defines the test system for “bit rate tolerance”.

Table 23 — Test system: Bit rate tolerance

State	Description	
Set up	IUT as	Commander
	Classification	Class B, class C devices
	Configuration	TST_FRM_ASSIGNIDRANGE
	bit rate	According to the IUT specification
System Init	Default	
Test	The IUT sends TST_FRM_ASSIGNIDRANGE with all bit rates defined in the IUT specification or LDF.	
Verification	$(\text{test case bit rate} - F_{\text{TOL_RES_COMMANDER}}) \leq \text{measured bit rate} \leq$ $(\text{test case bit rate} + F_{\text{TOL_RES_COMMANDER}})$	
Reference	ISO 17987-4:2025, 5.1	

7.15 [PT-CT 16] Bit rate tolerance, IUT as responder without making use of synchronization

This test verifies if the IUTs bit rate tolerance $F_{\text{TOL_RES_RESPONDER}} < \pm 1,5 \%$.

For this test, a bit rate measurement is done in the responder answer. The measurement is done according to 5.9.4.

Table 24 defines the test system for “bit rate tolerance”.

Table 24 — Test system: Bit rate tolerance

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_RDBI_X (Identifier = 2), TST_HDR_RR_3D
	bit rate	According to the IUT specification
System Init	Default	
Test	The test system sends TST_FRM_RDBI_X (Identifier = 2) and TST_HDR_RR_3D according to Table 25 with all bit rate specified in the IUT specification or NCF/LDF $\pm 0,5 \%$ tolerance.	
Verification	The IUT shall answer to the request with negative response (RSID = $7F_{16}$). $(\text{test system bit rate} - F_{\text{TOL_RES_RESPONDER}}) \leq \text{measured responder bit rate of the responder answer} \leq$ $(\text{test system bit rate} + F_{\text{TOL_RES_RESPONDER}})$	
Reference	ISO 17987-4:2025, 5.1	

Table 25 defines the test cases for “bit rate tolerance”.

Table 25 — Test cases: Bit rate tolerance

PT-CT-TC	TST_FRAME	Bit rate tolerance
[PT-CT 16].1	TST_FRM_RDBI_X	+0,5 %
[PT-CT 16].2	TST_FRM_RDBI_X	-0,5 %

7.16 [PT-CT 17] Bit rate tolerance, IUT as responder with making use of synchronization

This test verifies if the IUT as a responder is able to synchronize itself with a bit rate tolerance.

$F_{\text{TOL_SYNC}} < \pm 2 \%$ (relative value to the commander node). For this test, a bit rate measurement is done in the responder answer.

NOTE This test case verifies the tolerance of a synchronized node. A responder node making use of synchronization and direct break detection can have a bit rate tolerance $F_{\text{TOL_UNSYNC}}$ of $< \pm 14 \%$ in case of lost synchronization.

The measurement is done according to [5.9.4](#).

[Table 26](#) defines the test system for “bit rate tolerance”.

Table 26 — Test system: Bit rate tolerance

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_RDBI_X (Identifier = 2), TST_HDR_RR_3D
	bit rate	Min./max. bit rates according to the IUT specification
System Init	Default	
Test	The test system sends TST_FRM_RDBI_X (Identifier = 2) followed by TST_HDR_RR_3D according to Table 27 with all bit rate specified in the IUT specification or NCF/LDF $\pm 0,5$ % tolerance.	
Verification	The IUT shall answer to the request with negative response (RSID = $7F_{16}$). (test system bit rate - F_{TOL_SYNC}) $\leq$ measured responder bit rate of the responder answer $\leq$ (test system bit rate + F_{TOL_SYNC}).	
Reference	ISO 17987-4:2025, 5.1	

[Table 27](#) defines the test cases: bit rate tolerance.

Table 27 — Test cases: Bit rate tolerance

PT-CT-TC	TST_FRAME	Bit rate tolerance
[PT-CT 17].1	TST_HDR_RR_3D	+0,5 %
[PT-CT 17].2	TST_HDR_RR_3D	-0,5 %

7.17 Length of response

7.17.1 [PT-CT 18] Length of response, IUT as responder

This test verifies if the length of T_{FRAME_MAX} is not exceeded by the IUTs in-frame-response space and inter-byte spaces.

[Table 28](#) defines the test system for “length of response (responder)”.

Table 28 — Test system: Length of response (responder)

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_IUT_TX according to Table 29 ^a
	bit rate	Default
System Init	Default	
Test	The header length is set to the maximum T_{HEADER_MAX} (worst case, considering the allowed deviation in the baudrate of < 2 %). The test system sends the headers of all TST_FRM_IUT_TX with different available data length.	
Verification	The IUT shall respond to the header with $T_{Response} \leq T_{RESPONSE_MAX}$ The verification shall be done as shown in Figure 2 : Frame structure.	
Reference	ISO 17987-3:2025, 5.2.3	

^a If there is no TST_FRM_IUT_TX available with the data length 8 byte, then use TST_FRM_RDBI_0 and TST_HDR_RR_3D or TST_FRM_RDBI_X and TST_HDR_RR_3D with parameters according to [Table 29](#).

[Table 29](#) defines the test cases for “length of response (responder)”.

Table 29 — Test cases: Length of response (responder)

Requirements	Value
header size	maximum
break field low phase length	19 bit
break delimiter length	7 bit
$T_{H_Interbyte}$	0

Figure 2 shows the frame structure.

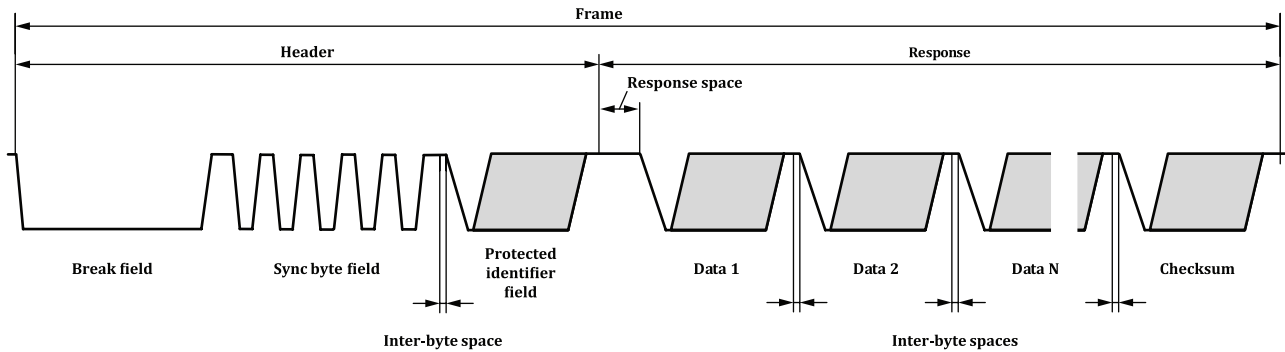


Figure 2 — Frame structure

7.17.2 [PT-CT 19] Length of response, IUT as commander

This test verifies if the length of T_{FRAME_MAX} is not exceeded by the IUT in-frame-response space and inter byte spaces.

Table 30 defines the test system for “length of response (commander)”.

Table 30 — Test system: Length of response (commander)

State	Description	
Set up	IUT as	Commander
	Classification	Class B, class C devices
	Configuration	TST_FRM_IUT_TX
	bit rate	Default
System Init	Default	
Test	The IUT as commander sends all TST_FRM_IUT_TX.	
Verification	The IUT shall send the response with $T_{Response} \leq T_{RESPONSE_MAX}$. The verification shall be done as shown in Figure 2.	
Reference	ISO 17987-3:2025, 5.2.3	

7.17.3 [PT-CT 20] Acceptance of response field, IUT as responder

This test verifies if the IUT accepts frames with different lengths of the response field (variation of length of response space and inter byte space).

Table 31 defines the test system for “acceptance of response field”.

Table 31 — Test system: Acceptance of response field

State	Description	
Set up	IUT as	Responder
	Classification	Class B, class C devices
	Configuration	TST_FRM_RDBI_0, TST_HDR_RR_3D
	bit rate	Default
System Init	Default	
Test	The test system sends TST_FRM_RDBI_0 with the length of the response field as defined in Table 32 . The test system sends TST_HDR_RR_3D.	
Verification	The IUT shall answer to TST_HDR_RR_3D.	
Reference	ISO 17987-3:2025, 5.2.3	

[Table 32](#) defines the test cases for “acceptance of response field”.

Table 32 — Test cases: Acceptance of response field

PT-CT-TC	Response space	Inter byte space	Comments
[PT-CT 20].1	$0 T_{\text{BIT}}$	each space = $0 T_{\text{BIT}}$	$T_{\text{RESPONSE_MIN}}$
[PT-CT 20].2	$2 T_{\text{BIT}}$	each space = $4 T_{\text{BIT}}$	$T_{\text{RESPONSE_MAX}} - 2 T_{\text{BIT}}$ (tolerance required due to response verification in LIN controller hardware)
[PT-CT 20].3	$0 T_{\text{BIT}}$	space between data byte data 7 and data 8 = $(T_{\text{RESPONSE_MAX}} - T_{\text{RESPONSE_MIN}}) - 2 T_{\text{BIT}} = 34 T_{\text{BIT}}$. other spaces = $0 T_{\text{BIT}}$	$T_{\text{RESPONSE_MAX}} - 2 T_{\text{BIT}}$ Maximum inter-byte space if no response space exist (tolerance required due to response verification in LIN controller hardware)
[PT-CT 20].4	$(T_{\text{RESPONSE_MAX}} - T_{\text{RESPONSE_MIN}}) - 2 T_{\text{BIT}} = 34 T_{\text{BIT}}$	each space = $0 T_{\text{BIT}}$	$T_{\text{RESPONSE_MAX}} - 2 T_{\text{BIT}}$ Maximum response space if no inter byte space exist (tolerance required due to response verification in LIN controller hardware)

7.18 Verification of schedule table timing

7.18.1 [PT-CT 21] Verification of jitter, IUT as commander

This test verifies the jitter based on one application schedule table defined in the LDF file.

[Table 33](#) defines the test system for “verification of jitter”.

Table 33 — Test system: Verification of jitter

State	Description	
Set up	IUT as	Commander
	Classification	Class B, class C devices
	Configuration	Defined schedule tables
	bit rate	Default
System Init	Default	
Test	The IUT as commander sends out at least 100 consecutive frames of the schedule table.	
Verification	The jitter (see Figure 3) shall be compared with the defined jitter in the LDF. $T_{\text{FRAME_SLOT_MEASURE}}$ shall be measured between falling edges of the break field. $T_{\text{JITTER_MEASURE}} \leq T_{\text{JITTER_DEFINED}}$	
Reference	ISO 17987-3:2025, 5.2.3	

[Figure 3](#) shows the frame structure and jitter.

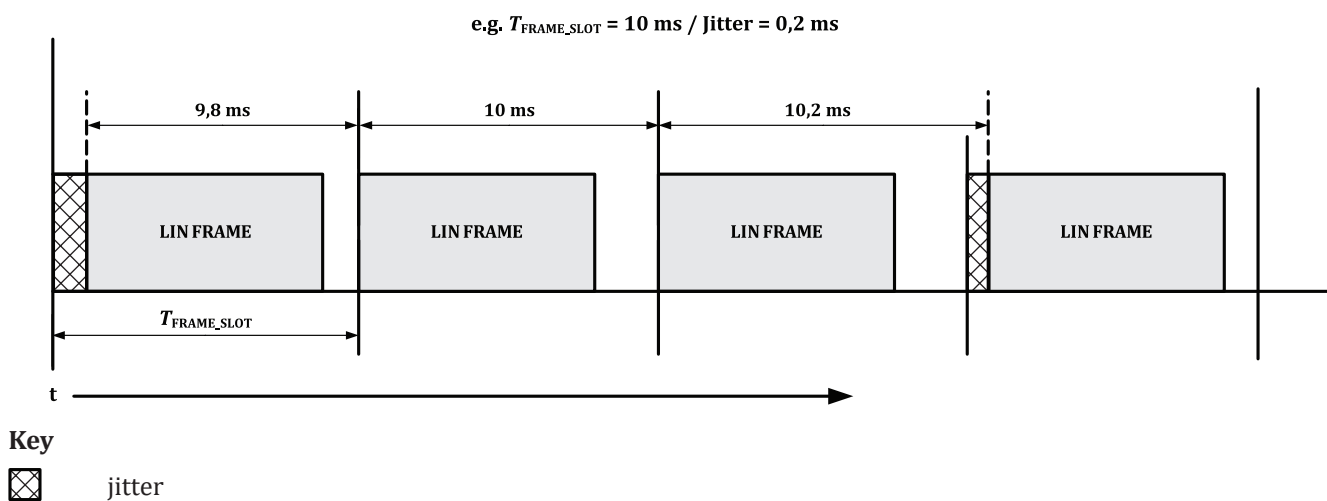


Figure 3 — Frame structure and jitter

7.18.2 [PT-CT 22] Schedule table management, IUT as commander

This test verifies if the IUT as commander respects $T_{\text{FRAME_SLOT}}$ space.

[Table 34](#) defines the test system for “schedule table management”.

Table 34 — Test system: Schedule table management

State	Description	
Set up	IUT as	Commander
	Classification	Class B, class C devices
	Configuration	Defined schedule tables, TST_FRM_IUT_RX
	bit rate	Default
System Init	Default	

Table 34 (continued)

State	Description
Test	The IUT as commander sends out at least 100 consecutive frames of the schedule table. The test system sends the response field of all the TST_FRM_IUT_RX frames as described in Table 35 .
Verification	$T_{\text{FRAME_SLOT_SPECIFIED}} - \text{jitter_ldf} < T_{\text{FRAME_SLOT_MEASURE}} < T_{\text{FRAME_SLOT_SPECIFIED}} + \text{jitter_ldf}$ jitter_ldf is defined in the LDF file. $T_{\text{FRAME_SLOT_MEASURE}}$ shall be measured between falling edges of the break field. The IUT as commander shall respect $T_{\text{FRAME_SLOT}}$ spaces.
Reference	ISO 17987-3:2025, 5.3.3

[Table 35](#) defines the test cases for “schedule table management”.

Table 35 — Test cases: Schedule table management

PT-CT-TC	Response field of TST_FRM_IUT_RX frame
[PT-CT 22].1	The test system shall not send a response field.
[PT-CT 22].2	The test system sends only the first data byte of the response field.
[PT-CT 22].3	The test system sends the complete response field. The end of the response shall correspond with the start of the next slot.

7.19 [PT-CT 23] Sample point test, IUT as responder

The bits of a byte field shall be sampled according to ISO 17987-4.

[Table 36](#) defines the test system for “sample point test”.

Table 36 — Test system: Sample point test

State	Description
Set up	IUT as Responder
	Classification Class B, class C devices
	Configuration TST_FRM_RDBI_0, TST_HDR_RR_3D
	bit rate Default
System Init	Default
Test	The test system sends TST_FRM_RDBI_0. After that, the test system sends TST_HDR_RR_3D as in the following: — the test system shall overwrite the recessive level of the PID bit 0 in 1 µs or alternatively 1/16 bit steps starting from the rising edge of the bit until the responder does not respond anymore; — in the second step, the test system shall overwrite the recessive level of the PID bit 0 in 1 µs or alternatively 1/16 bit steps starting from the falling edge of the bit towards the start bit until the responder does not respond any more.
Verification	The device shall respond to the commander node as long as the disturbance is outside the range $t_{\text{EBS}} - t_{\text{LBS}}$ (see Figure 4). For the execution of the test, t_{LBS} is taken with the fixed value of $10/16 t_{\text{BIT}}$.
Reference	ISO 17987-4:2025, 5.2.3

[Figure 4](#) shows the sample point test.