

ICS 43.040.15



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 42691.6-2023

**Road vehicles - Local Internet Network(LIN) - Part 6: Protocol
conformance test specification**

道路车辆 局域互联网络 (LIN) 第6部分：协议一致性测试规范
(English Translation)

Issued on: May 23, 2023

Implemented on: December 1, 2023

Issued by: State Administration for Market Regulation

Table of Contents

Foreword...	6
Introduction...	8
1 Scope...	11
2 Normative references...	11
3 Terms, definitions, symbols and abbreviated terms...	11
3.1 Terms and definitions...	11
3.2 Symbols...	12
3.3 Abbreviated terms...	14
4 Conventions...	15
5 General test specification considerations...	16
5.1 General...	16
5.2 Test conditions...	16
5.3 Mandatory requirements for IUT as master...	16
5.4 Mandatory requirements for IUT as slave...	16
5.5 Test case architecture...	16
5.6 Classification...	17
5.7 Test system requirements...	18
5.8 Test system definition...	20
5.9 Global predefinitions for the test setup...	20
6 Essential test cases before test start...	22
6.1 General...	22
6.2 [PT-CT 1] Diagnostic frame "master request", IUT as slave...	22
6.3 [PT-CT 2] Diagnostic frame "slave response", IUT as slave...	23
6.4 [PT-CT 3] Error in received frame, IUT as slave...	23
7 Timing parameters...	24
7.1 General...	24
7.2 [PT-CT 4] Length of break field low phase, IUT as master...	24
7.3 [PT-CT 5] Variation of length of break field low phase, IUT as slave...	24
7.4 [PT-CT 6] Length of break delimiter, IUT as master...	25
7.5 [PT-CT 7] Variation of length of break delimiter, IUT as slave...	25
7.6 [PT-CT 8] Inconsistent break field error, IUT as slave...	26
7.7 [PT-CT 9] Inconsistent sync byte field error, IUT as slave...	27

7.8 [PT-CT 10] Verification of the sync byte field, IUT as master.....	27
7.9 [PT-CT 11] Incomplete frame reception, IUT as slave.....	28
7.10 [PT-CT 12] Unknown frame reception, IUT as slave.....	28
7.11 [PT-CT 13] Length of header, IUT as master.....	29
7.12 [PT-CT 14] Variation of length of header, IUT as slave.....	29
7.13 [PT-CT 15] Bit rate tolerance, IUT as master.....	30

Foreword

This document was drafted in accordance with the rules provided in GB/T 1.1-2020

Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents.

This document is Part 6 of GB/T 42691 Road vehicles - Local Interconnect Network (LIN). The following parts have been issued for GB/T 42691:

- Part 1: General information and use case definition;
- Part 2: Transport protocol and network layer services;
- Part 3: Protocol specification;
- Part 4: Electrical physical layer (EPL) specification 12 V/24 V;
- Part 5: Application programmers interface (API);
- Part 6: Protocol conformance test specification;
- Part 7: Electrical Physical Layer (EPL) conformance test specification;
- Part 8: Electrical physical layer (EPL) specification: LIN over DC powerline (DC-LIN).

This document is identical to ISO 17987-6:2016, Road vehicles - Local Interconnect Network (LIN) - Part 6: Protocol conformance test specification.

1 Scope

This document specifies the protocol conformance test requirements and methods for Local Area Network (hereinafter referred to as LIN) of road vehicles. 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.

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 version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 42691.2-2023, Road vehicles - Local Interconnect Network (LIN) - Part 2:

Transport protocol and network layer services (ISO 17987-2:2016, IDT)

GB/T 42691.3-2023, Road vehicles - Local Interconnect Network (LIN) - Part 3:

Protocol specification (ISO 17987-3:2016, IDT)

GB/T 42691.4-2023, Road vehicles - Local Interconnect Network (LIN) - Part 4:

Electrical physical layer (EPL) specification 12 V/24 V (ISO 17987-4:2016, IDT)

3.1 Terms and definitions

3.1.1

class B device

μC-based LIN device.

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

-- 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 frame can't be triggered during normal communication (a slave 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 slave node because the first

SynchBreak is taken as wake up event and the slave node performs its initialization sequence. Latest after 100 ms, the slave 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/...

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

-- A sleep counter is implemented in the slave 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 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.

Note: 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.

.....