BSI Standards Publication

Road vehicles — Unified diagnostic services (UDS)

Part 1: Application layer

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National foreword

This British Standard is the UK implementation of ISO 14229-1:2020+A1:2022. It supersedes BS ISO 14229-1:2020, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to ISO text carry the number of the ISO amendment. For example, text altered by ISO amendment 1 is indicated by A1 A1.

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A list of organizations represented on this committee can be obtained on request to its committee manager.

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Third edition
2020-02

Road vehicles — Unified diagnostic services (UDS) —

Part 1: Application layer

Véhicules routiers — Services de diagnostic unifiés (SDU) —

Partie 1: Couches application

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Contents

Page

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).

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

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

This third edition cancels and replaces the second edition (ISO 14229-1:2013), which has been technically revised. The main changes compared to the previous edition are as follows:

— new diagnostic service for Authentication has been introduced to address cyber security topics;

— new clause "Security sub-layer definition";

— some unused SubFunction of ReadDTCInformation service are deleted, e.g. Mirror Memory;

— the ReadDataByPeriodicIdentifier is updated; and

— several clarifications and corrections are implemented.

A list of all parts in the ISO 14229 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

ISO 14229 has been established in order to define common requirements for diagnostic systems, whatever the serial data link is.

To achieve this, ISO 14229 is based on the Open Systems Interconnection (OSI) Basic Reference Model in accordance with ISO/IEC 7498-1 and ISO/IEC 10731, which structures communication systems into seven layers. When mapped on this model, the services used by a diagnostic tester (client) and an Electronic Control Unit (ECU, server) are broken into the following layers in accordance with Table 1:

— Application layer (layer 7), unified diagnostic services specified in this document, ISO 14229-3 UDSonCAN, ISO 14229-4 UDSonFR, ISO 14229-5 UDSonIP, ISO 14229-6 UDSonK-Line, ISO 14229-7 UDSonLIN, ISO 14229-8[1] UDSonCXPI, further standards and ISO 27145-3 VOBD.

— Presentation layer (layer 6), vehicle manufacturer specific, ISO°27145-2 VOBD.

— Session layer services (layer 5) specified in ISO 14229-2.

— Transport layer services (layer 4), specified in ISO 15765-2 DoCAN, ISO 10681-2 Communication on FlexRay, ISO 13400-2 DoIP, ISO 17987-2 LIN, ISO 20794-3[2] CXPI, ISO 27145-4 VOBD.

— Network layer services (layer 3), specified in ISO 15765-2 DoCAN, ISO 10681-2 Communication on FlexRay, ISO 13400-2 DoIP, ISO 17987-2 LIN, ISO 20794-3 CXPI, ISO 27145-4 VOBD.

— Data link layer (layer 2), specified in ISO 11898-1, ISO 11898-2, ISO 17458-2, ISO 13400-3, IEEE 802.3, ISO 14230-2, ISO 17987-3 LIN, ISO 20794-4[3] CXPI, and further standards, ISO 27145-4 VOBD.

— Physical layer (layer 1), specified in ISO 11898-1, ISO 11898-2, ISO 17458-4, ISO 13400-3, IEEE 802.3, ISO 14230-1, ISO 17987-4 LIN, ISO 20794-4 CXPI, and further standards, ISO 27145-4 VOBD.

NOTE The diagnostic services in this document are implemented in various applications, e.g. road vehicles – tachograph systems, road vehicles – interchange of digital information on electrical connections between towing and towed vehicles, road vehicles – diagnostic systems, etc. Future modifications to this document will provide long-term backward compatibility with the implementation standards as described above.

[1] Under preparation. Stage at the time of publication: ISO/FDIS 14229-8:2020.

[2] Under preparation. Stage at the time of publication: ISO/FDIS 20794-3:2020.

[3] Under preparation. Stage at the time of publication: ISO/FDIS 20794-4:2020.

Table 1 — Example of diagnostic/programming specifications applicable to the OSI layers

<table>
<tr><th>OSI seven layer[a]</th><th colspan="7">Enhanced diagnostics services</th><th>VOBD</th></tr>
<tr><td>Application (layer 7)</td><td colspan="7">ISO 14229-1, ISO 14229-3 UDSonCAN, ISO 14229-4 UDSonFR, ISO 14229-5 UDSonIP, ISO 14229-6 UDSonK-Line, ISO 14229-7 UDSonLIN, ISO 14229-8 UDSonCXPI, further standards</td><td>ISO 27145-3</td></tr>
<tr><td>Presentation (layer 6)</td><td colspan="7">vehicle manufacturer specific</td><td>ISO 27145-2</td></tr>
<tr><td>Session (layer 5)</td><td colspan="8">ISO 14229-2</td></tr>
<tr><td>Transport (layer 4)</td><td rowspan="2">ISO 15765-2</td><td rowspan="2">ISO 10681-2</td><td rowspan="2">ISO 13400-2</td><td rowspan="2">Not applicable</td><td rowspan="2">ISO 17987-2</td><td rowspan="2">ISO 20794-3</td><td>further standards</td><td rowspan="4">ISO 27145-4</td></tr>
<tr><td>Network (layer 3)</td><td>further standards</td></tr>
<tr><td>Data link (layer 2)</td><td rowspan="2">ISO 11898-1, ISO 11898-2</td><td>ISO 17458-2</td><td rowspan="2">ISO 13400-3, IEEE 802.3</td><td>ISO 14230-2</td><td>ISO 17987-3</td><td rowspan="2">ISO 20794-4</td><td>further standards</td></tr>
<tr><td>Physical (layer 1)</td><td>ISO 17458-4</td><td>ISO 14230-1</td><td>ISO 17987-4</td><td>further standards</td></tr>
<tr><td colspan="9">[a] Seven layers according to ISO/IEC 7498-1 and ISO/IEC 10731.</td></tr>
</table>

INTERNATIONAL STANDARD ISO 14229-1:2020(E)

Road vehicles — Unified diagnostic services (UDS) —

Part 1: Application layer

1 Scope

This document specifies data link independent requirements of diagnostic services, which allow a diagnostic tester (client) to control diagnostic functions in an on-vehicle electronic control unit (ECU, server) such as an electronic fuel injection, automatic gearbox, anti-lock braking system, etc. connected to a serial data link embedded in a road vehicle.

It specifies generic services, which allow the diagnostic tester (client) to stop or to resume non-diagnostic message transmission on the data link.

This document does not apply to non-diagnostic message transmission on the vehicle's communication data link between two electronic control units. However, this document does not restrict an in-vehicle on-board tester (client) implementation in an ECU in order to utilize the diagnostic services on the vehicle's communication data link to perform bidirectional diagnostic data exchange.

This document does not specify any implementation requirements.

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 14229-2, *Road vehicles — Unified diagnostic services (UDS) — Part 2: Session layer services*

ISO 7816-8, *Identification cards — Integrated circuit cards — Part 8: Commands and mechanisms for security operations*

ISO/IEC 9594-8, *Information technology — Open Systems Interconnection — The Directory — Part 8: Public-key and attribute certificate frameworks*

IEEE 754-2008, *IEEE Standard for Floating-Point Arithmetic*

IEEE 1609.2, *Standard for Wireless Access in Vehicular Environments — Security Services for Applications and Management Messages*

X.509, *Information technology — Open Systems Interconnection — The Directory: Public-key and attribute certificate frameworks*

RFC 5280, *Internet Engineering Task Force — Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*

RFC 5755, *Internet Engineering Task Force — An Internet Attribute Certificate Profile for Authorization*