International Standard

ISO 14229-1

Road vehicles — Unified diagnostic services (UDS) —

Part 1: Application layer

Véhicules routiers — Services de diagnostic unifiés (SDU) —

Partie 1: Couche application

Fourth edition
2026-06

Sample Document
get full document from ecommerce.sist.si

Reference number
ISO 14229-1:2026(en)

© ISO 2026

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

Sample Document

get full document from ecommerce.sist.si



COPYRIGHT PROTECTED DOCUMENT

© ISO 2026

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

Contents

Page

Foreword ..... **viii**
Introduction ..... **ix**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **2**
4 Symbols and abbreviated terms **4**
4.1 Symbols 4
4.2 Abbreviated terms 5
5 Conventions **6**
6 Application layer services **6**
6.1 General 6
6.2 Format description of application layer services 8
6.3 Format description of service primitives 8
6.3.1 General definition 8
6.3.2 Service request and service indication primitives 9
6.3.3 Service response and service confirm primitives 9
6.3.4 Service request-confirm and service response-confirm primitives 10
6.4 Service data unit specification 11
6.4.1 Mandatory parameters 11
6.4.2 Vehicle system requirements 13
6.4.3 Optional parameters - A_AE, application layer remote address 13
7 Application layer protocol **14**
7.1 General definition 14
7.2 A_PDU, application protocol data unit 14
7.3 A_PCI, application protocol control information 14
7.4 SID, service identifier 15
7.5 A_NR_SID, Negative response service identifier 16
7.6 Negative response/confirmation service primitive 16
7.7 Server response implementation rules 16
7.7.1 General definitions 16
7.7.2 General server response behaviour 17
7.7.3 Request message with SubFunction parameter and server response behaviour 18
7.7.4 Request message without SubFunction parameter and server response behaviour 22
7.7.5 Pseudo code example of server response behaviour 24
7.7.6 Multiple concurrent request messages with physical and functional addressing 25
8 Service description conventions **26**
8.1 Service description 26
8.2 Request message 26
8.2.1 Request message definition 26
8.2.2 Request message SubFunction parameter $Level (LEV_) definition 27
8.2.3 Request message data parameter definition 29
8.3 Positive response message 29
8.3.1 Positive response message definition 29
8.3.2 Positive response message data parameter definition 30
8.4 Supported negative response codes (NRC_) 30
8.5 Message flow examples 31
9 Diagnostic and communication management functional unit **32**
9.1 Overview 32
9.2 DiagnosticSessionControl (10_{16}) service 32
9.2.1 Service description 32

Sample Document
Document from ecommerce.sist.si

© ISO 2026 – All rights reserved

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

9.2.2 Request message ... 35
9.2.3 Positive response message ... 37
9.2.4 Supported negative response codes (NRC_) ... 38
9.2.5 Message flow example(s) DiagnosticSessionControl – Start programmingSession ... 38
9.3 ECUReset (11_{16}) service ... 39
9.3.1 Service description ... 39
9.3.2 Request message ... 39
9.3.3 Positive response message ... 41
9.3.4 Supported negative response codes (NRC_) ... 41
9.3.5 Message flow example ECUReset ... 42
9.4 SecurityAccess (27_{16}) service ... 42
9.4.1 Service description ... 42
9.4.2 Request message ... 44
9.4.3 Positive response message ... 45
9.4.4 Supported negative response codes (NRC_) ... 46
9.4.5 Message flow example(s) SecurityAccess ... 47
9.5 CommunicationControl (28_{16}) service ... 49
9.5.1 Service description ... 49
9.5.2 Request message ... 49
9.5.3 Positive response message ... 50
9.5.4 Supported negative response codes (NRC_) ... 51
9.5.5 Message flow example CommunicationControl (disable transmission of network management messages) ... 51
9.5.6 Message flow example CommunicationControl (switch a remote network into the diagnostic-only scheduling mode where the node with address $000A_{16}$ is connected to) ... 52
9.5.7 Message flow example CommunicationControl (switch to application scheduling mode with enhanced address information, the node $000A_{16}$, which is connected to a sub-network, is addressed) ... 52
9.6 Authentication (29_{16}) service ... 53
9.6.1 Service overview ... 53
9.6.2 Authentication with PKI Certificate Exchange (APCE) ... 54
9.6.3 Authentication with Challenge-Response (ACR) ... 59
9.6.4 Common requirements ... 63
9.6.5 Request message ... 64
9.6.6 Positive response message ... 70
9.6.7 Supported negative response codes (NRC_) ... 77
9.6.8 Message flow example(s) Authentication ... 78
9.7 TesterPresent ($3E_{16}$) service ... 98
9.7.1 Service description ... 98
9.7.2 Request message ... 99
9.7.3 Positive response message ... 99
9.7.4 Supported negative response codes (NRC_) ... 100
9.7.5 Message flow example(s) TesterPresent ... 100
9.8 ControlDTCSetting (85_{16}) service ... 101
9.8.1 Service description ... 101
9.8.2 Request message ... 101
9.8.3 Positive response message ... 102
9.8.4 Supported negative response codes (NRC_) ... 103
9.8.5 Message flow example(s) ControlDTCSetting ... 103
9.9 ResponseOnEvent (86_{16}) service ... 104
9.9.1 Service description ... 104
9.9.2 Request message ... 112
9.9.3 Positive response message ... 118
9.9.4 Supported negative response codes (NRC_) ... 121
9.9.5 Message flow example(s) ResponseOnEvent ... 122
9.10 LinkControl (87_{16}) service ... 136
9.10.1 Service description ... 136
9.10.2 Request message ... 136

Sample Document
gitstandards.sist.si

© ISO 2026 – All rights reserved

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

9.10.3 Positive response message ... 138
9.10.4 Supported negative response codes (NRC_) ... 138
9.10.5 Message flow example(s) LinkControl ... 139

10 Data transmission functional unit ... 141
10.1 Overview ... 141
10.2 ReadDataByIdentifier (22_{16}) service ... 142
10.2.1 Service description ... 142
10.2.2 Request message ... 142
10.2.3 Positive response message ... 143
10.2.4 Supported negative response codes (NRC_) ... 144
10.2.5 Message flow example ReadDataByIdentifier ... 146
10.3 ReadMemoryByAddress (23_{16}) service ... 148
10.3.1 Service description ... 148
10.3.2 Request message ... 148
10.3.3 Positive response message ... 149
10.3.4 Supported negative response codes (NRC_) ... 150
10.3.5 Message flow example ReadMemoryByAddress ... 151
10.4 ReadScalingDataByIdentifier (24_{16}) service ... 153
10.4.1 Service description ... 153
10.4.2 Request message ... 154
10.4.3 Positive response message ... 154
10.4.4 Supported negative response codes (NRC_) ... 155
10.4.5 Message flow example ReadScalingDataByIdentifier ... 157
10.5 ReadDataByPeriodicIdentifier ($2A_{16}$) service ... 160
10.5.1 Service description ... 160
10.5.2 Request message ... 163
10.5.3 Positive response message ... 163
10.5.4 Supported negative response codes (NRC_) ... 164
10.5.5 Message flow example ReadDataByPeriodicIdentifier ... 167
10.6 DynamicallyDefineDataIdentifier ($2C_{16}$) service ... 177
10.6.1 Service description ... 177
10.6.2 Request message ... 178
10.6.3 Positive response message ... 182
10.6.4 Supported negative response codes (NRC_) ... 182
10.6.5 Message flow examples DynamicallyDefineDataIdentifier ... 183
10.7 WriteDataByIdentifier ($2E_{16}$) service ... 196
10.7.1 Service description ... 196
10.7.2 Request message ... 196
10.7.3 Positive response message ... 197
10.7.4 Supported negative response codes (NRC_) ... 197
10.7.5 Message flow example WriteDataByIdentifier ... 199
10.8 WriteMemoryByAddress ($3D_{16}$) service ... 200
10.8.1 Service description ... 200
10.8.2 Request message ... 201
10.8.3 Positive response message ... 202
10.8.4 Supported negative response codes (NRC_) ... 203
10.8.5 Message flow example WriteMemoryByAddress ... 204

11 Stored data transmission functional unit ... 207
11.1 Overview ... 207
11.2 ClearDiagnosticInformation (14_{16}) service ... 207
11.2.1 Service description ... 207
11.2.2 Request message ... 207
11.2.3 Positive response message ... 208
11.2.4 Supported negative response codes (NRC_) ... 208
11.2.5 Message flow example ClearDiagnosticInformation ... 210
11.3 ReadDTCInformation (19_{16}) service ... 210
11.3.1 Service description ... 210
11.3.2 Request message ... 221

Sample Document
Sample Document from ecommerce.sist.si

© ISO 2026 – All rights reserved

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

11.3.3 Positive response message ... 230
11.3.4 Supported negative response codes (NRC_) ... 246
11.3.5 Message flow examples – ReadDTCInformation ... 246

12 InputOutput control functional unit ... 275
12.1 Overview ... 275
12.2 InputOutputControlByIdentifier ($2F_{16}$) service ... 275
12.2.1 Service description ... 275
12.2.2 Request message ... 276
12.2.3 Positive response message ... 277
12.2.4 Supported negative response codes (NRC_) ... 278
12.2.5 Message flow example(s) InputOutputControlByIdentifier ... 279

13 Routine functional unit ... 287
13.1 Overview ... 287
13.2 RoutineControl (31_{16}) service ... 288
13.2.1 Service description ... 288
13.2.2 Request message ... 289
13.2.3 Positive response message ... 290
13.2.4 Supported negative response codes (NRC_) ... 291
13.2.5 Message flow example(s) RoutineControl ... 294

14 Upload download functional unit ... 297
14.1 Overview ... 297
14.2 RequestDownload (34_{16}) service ... 297
14.2.1 Service description ... 297
14.2.2 Request message ... 297
14.2.3 Positive response message ... 299
14.2.4 Supported negative response codes (NRC_) ... 299
14.2.5 Message flow example(s) RequestDownload ... 301
14.3 RequestUpload (35_{16}) service ... 301
14.3.1 Service description ... 301
14.3.2 Request message ... 302
14.3.3 Positive response message ... 303
14.3.4 Supported negative response codes (NRC_) ... 304
14.3.5 Message flow example(s) RequestUpload ... 305
14.4 TransferData (36_{16}) service ... 306
14.4.1 Service description ... 306
14.4.2 Request message ... 306
14.4.3 Positive response message ... 307
14.4.4 Supported negative response codes (NRC_) ... 308
14.4.5 Message flow example(s) TransferData ... 310
14.5 RequestTransferExit (37_{16}) service ... 310
14.5.1 Service description ... 310
14.5.2 Request message ... 311
14.5.3 Positive response message ... 311
14.5.4 Supported negative response codes (NRC_) ... 312
14.5.5 Message flow example(s) for downloading/uploading data ... 313
14.6 RequestFileTransfer (38_{16}) service ... 319
14.6.1 Service description ... 319
14.6.2 Request message ... 320
14.6.3 Positive response message ... 321
14.6.4 Supported negative response codes (NRC_) ... 323
14.6.5 Message flow example(s) RequestFileTransfer ... 325

15 Security sub-layer definition ... 327
15.1 General ... 327
15.1.1 Purpose ... 327
15.1.2 Security sub-layer description ... 327
15.1.3 Security sub-layer access ... 328
15.1.4 General server response behaviour ... 332

Sample Document
generated on request from ecommerce.sist.si

© ISO 2026 – All rights reserved

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

15.2 SecuredDataTransmission (84_{16}) service ... 334
15.2.1 Service description ... 334
15.2.2 Request message ... 334
15.2.3 Positive response message for successful internal message ... 336
15.2.4 Supported negative response codes (NRC_) ... 338
15.2.5 Message flow example SecuredDataTransmission ... 338

16 Non-volatile server memory programming process ... 341
16.1 General ... 341
16.2 Programming phases ... 343
16.3 Detailed programming sequence ... 344
16.3.1 Programming phase #1 — Download of application software and/or application data ... 344
16.4 Server reprogramming requirements ... 353
16.4.1 Requirements for servers to support programming ... 353
16.4.2 Software, data identification and fingerprints ... 356
16.4.3 Server routine access ... 357
16.5 Non-volatile server memory programming message flow examples ... 357
16.5.1 General information ... 357
16.5.2 Programming phase #1 — Pre-Programming step ... 357
16.5.3 Programming phase #1 — Programming step ... 358
16.5.4 Programming phase #1 — Post-Programming step ... 362

Annex A (normative) **Global parameter definitions ... 363**

Annex B (normative) **Diagnostic and communication management functional unit data parameter definitions ... 371**

Annex C (normative) **Data transmission functional unit data parameter definitions ... 375**

Annex D (normative) **Stored data transmission functional unit data parameter definitions ... 389**

Annex E (normative) **Input output control functional unit data parameter definitions ... 406**

Annex F (normative) **Routine functional unit data parameter definitions ... 407**

Annex G (normative) **Upload and download functional unit data parameter ... 408**

Annex H (informative) **Examples for addressAndLengthFormatIdentifier parameter values ... 409**

Annex I (normative) **Security access state chart ... 411**

Annex J (normative) **Implementation for multiple client environments ... 421**

Bibliography ... 426

Sample Document
Get full document from ecommerce.sist.si

© ISO 2026 – All rights reserved

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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

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.

Sample Document

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

This fourth edition cancels and replaces the third edition (ISO 14229-1:2020), which has been technically revised. It also incorporates the Amendment ISO 14229-1:2020/Amd 1:2022.

del tuli dokumenta - izvod dokumenta je last SIST.SI

The main changes are as follows:

— corrections related to the service "responseOnEvent".

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.

© ISO 2026 – All rights reserved

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

Introduction

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

To achieve this, the ISO 14229 series is based on the Open Systems Interconnection (OSI) Basic Reference Model in accordance with ISO/IEC 7498-1 [1] and ISO/IEC 10731 [2], which structures communication systems into seven layers in accordance with Figure 1.

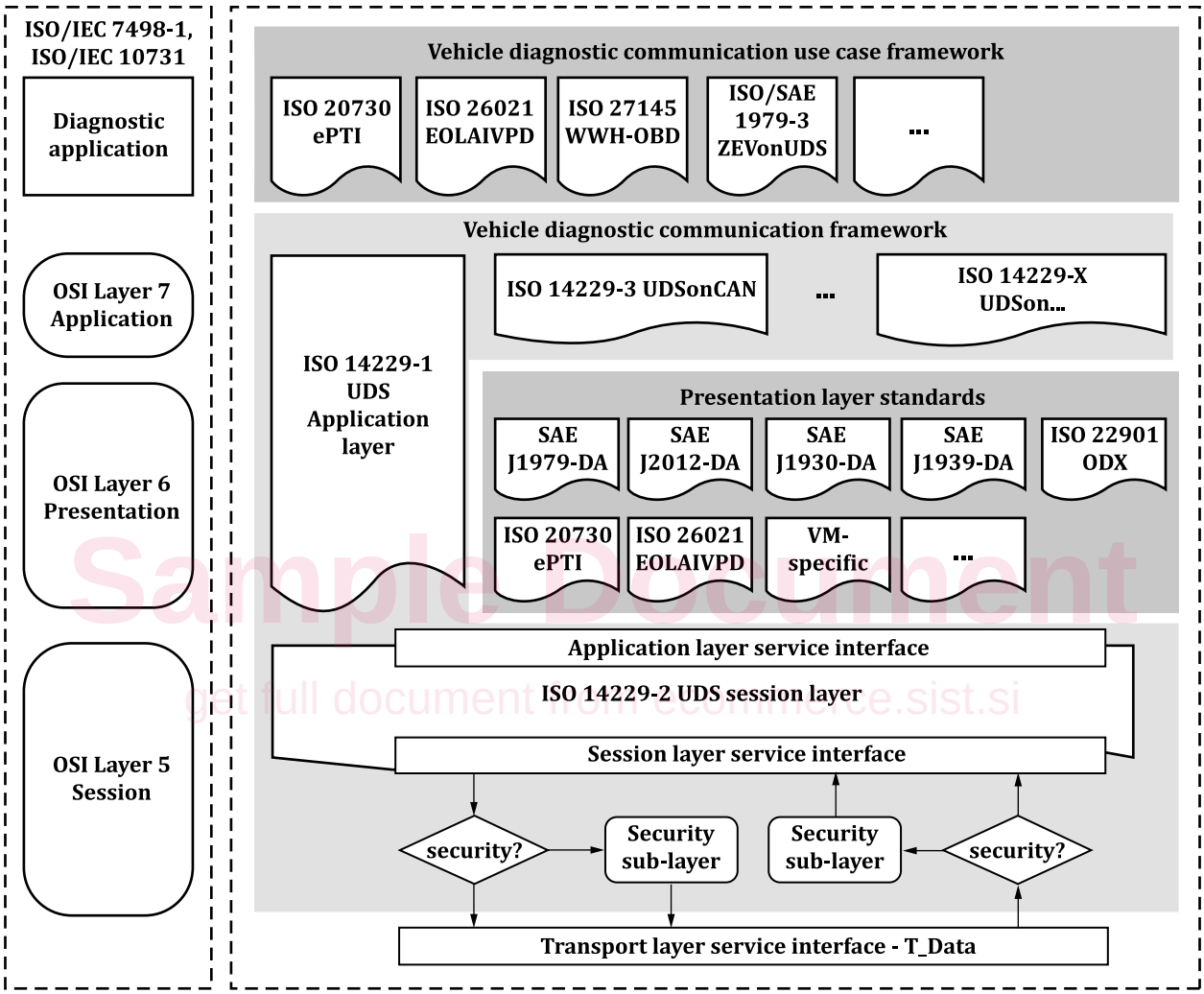


Figure 1 — UDS-based vehicle diagnostic communication framework according to OSI model

When mapped on the OSI model, the services used by a diagnostic tester (client) and an Electronic Control Unit (ECU, server) are broken into the following layers:

— Application layer (layer 7): unified diagnostic services specified in this document, ISO 14229-3 [3] UDSonCAN to ISO 14229-X UDSon... , ISO 20730-1 [4] ePTI, ISO 26021-1 [5] EOLAIVPD, ISO 27145-3 [6] WWH-OBD, ISO/SAE AWI 1979-3 [7] ZEonUDS, and further standards;

— Presentation layer (layer 6): vehicle manufacturer specific, SAE J1979-DA [8], SAE J2012-DA [9], SAE J1939-DA [10], SAE J1930-DA [11], ISO 22901 [12] ODX, ISO 20730-3 [13] ePTI, and ISO 26021-3 [14] EOLAIVPD;

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

© ISO 2026 – All rights reserved

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

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. Future modifications to this document provide long-term backward compatibility with the implementation standards as described above.

Sample Document

get full document from ecommerce.sist.si

© ISO 2026 – All rights reserved

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

Road vehicles — Unified diagnostic services (UDS) —

Part 1: Application layer

1 Scope

This document specifies data link independent requirements of diagnostic communication services. These allow a diagnostic tester (client) to control diagnostic functions in an in-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.

This document specifies diagnostic communication services, which allow the diagnostic tester (client) to stop or to resume non-diagnostic message transmission, to read vehicle identification data and real-time sensor data, read and clear diagnostic information, control actuators, start/stop routines, and many more functions to assist in diagnosing the vehicle's electronic systems.

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

This document does not specify any implementation requirements.

Sample Document
get full document from ecommerce.sist.si

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

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

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

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*

ITU-T X.690, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*

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*

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

© ISO 2026 – All rights reserved

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 http://www.electropedia.org/

3.1
boot memory partition
area of the *server* (3.18) memory in which the *boot software* (3.2) is located

3.2
boot software
software which is executed in a special part of *server* (3.18) memory which is used primarily to boot the *ECU* (3.9) and perform *server* (3.18) programming

Note 1 to entry: This area of memory is not erased during a normal programming sequence and executes when the *server* (3.18) application is missing or otherwise deemed invalid to always ensure the capability to reprogram the *server* (3.18) .

Note 2 to entry: See 9.2.2 and Clause 16.

3.3
client
function that is part of the *tester* (3.20) and that makes use of the *diagnostic services* (3.6)

Note 1 to entry: A *tester* (3.20) normally makes use of other functions such as data base management, specific interpretation, human-machine interface.

Sample Document
get full document from ecommerce.sist.si

3.4
diagnostic channel
dedicated transmission path from *client* (3.3) to *server* (3.18) for diagnostic communication

Note 1 to entry: Several simultaneously connected clients to one *server* (3.18) can be differentiated by an individual *tester* (3.20) source address.

3.5
diagnostic data
data that is located in the memory of an *electronic control unit* (3.9) which can be inspected and/or possibly modified by the *tester* (3.20)

Note 1 to entry: Diagnostic data includes analogue inputs and outputs, digital inputs and outputs, intermediate values and various status information.

Note 2 to entry: Examples of *diagnostic data* (3.5) are vehicle speed, throttle angle, mirror position, system status, etc. Three types of values are defined for diagnostic data:

— the current value: the value currently used by (or resulting from) the normal operation of the *electronic control unit* (3.9) ;

— a stored value: an internal copy of the current value made at specific moments (e.g. when a malfunction occurs or periodically); this copy is made under the control of the *electronic control unit* (3.9) ;

— a static value: e.g. VIN.

Note 3 to entry: The *server* (3.18) is not obliged to keep internal copies of its data for diagnostic purposes, in which case the *tester* (3.20) may only request the current value.

© ISO 2026 – All rights reserved

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

The *server* (3.18) is not obliged to keep internal copies of its data for diagnostic purposes, in which case the *tester* (3.20) may only request the current value.

Note 4 to entry: Defining a repair shop or development testing session selects different *server* (3.18) functionality (e.g. access to all memory locations may only be allowed in the development testing session).

3.6
diagnostic service
information exchange initiated by a *client* (3.3) in order to require diagnostic information from a *server* (3.18) or/and to modify its behaviour for diagnostic purpose

3.7
diagnostic session
state within the *server* (3.18) in which a specific set of *diagnostic services* (3.6) and functionality is enabled

3.8
diagnostic trouble code
numerical unique identifier for a fault condition identified by the on-board diagnostic system

3.9
electronic control unit
unit providing information regarding the connected sensor and control network

Note 1 to entry: Systems considered as electronic control units include anti-lock braking system (ABS) and engine management system.

3.10
functional unit
set of functionally close or complementary *diagnostic services* (3.6)

Sample Document

3.11
local server
server (3.18) that is connected to the same local network as the *client* (3.3) and is part of the same address space as the *client* (3.3)

get full document from ecommerce.sist.si

3.12
permanent DTC
diagnostic trouble code (3.8) that remains in non-volatile memory, even after a clear DTC request, until other criteria (typically regulatory) are met (e.g. the appropriate monitors for each DTC have successfully passed)

Note 1 to entry: Refer to the relevant legislation for all necessary requirements.

3.13
record
one or more *diagnostic data* (3.5) elements that are referred to together by a single means of identification

Note 1 to entry: A snapshot including various input/output data and trouble codes is an example of a record.

3.14
remote server
server (3.18) that is not directly connected to the main diagnostic network

Note 1 to entry: A remote server is identified by means of a remote address. Remote addresses represent an own address space that is independent from the addresses on the main network.

Note 2 to entry: A remote server is reached via a *local server* (3.11) on the main network. Each *local server* (3.11) on the main network can act as a gate to one independent set of remote servers. A pair of addresses therefore always identifies a *remote server* (3.14) : one local address that identifies the gate to the remote network and one remote address identifying the *remote server* (3.14) itself.

© ISO 2026 – All rights reserved

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

3.15
remote client
client (3.3) that is not directly connected to the main diagnostic network

Note 1 to entry: A *remote client* (3.15) is identified by means of a remote address.

Note 2 to entry: Remote addresses represent an own address space that is independent from the addresses on the main network.

3.16
reprogramming software
part of the *boot software* (3.2) that allows for reprogramming of the *electronic control unit* (3.9)

3.17
security
mechanism for protecting vehicle modules from "unauthorized" intrusion through a vehicle *diagnostic data* (3.5) link

3.18
server
function that is part of an *electronic control unit* (3.9) and that provides the *diagnostic services* (3.6)

Note 1 to entry: This document differentiates between the *server* (3.18) (i.e. the function) and the *electronic control unit* (3.9) to ensure independence from implementation.

3.19
supported DTC
diagnostic trouble code (3.8) which is currently configured/calibrated and enabled to execute under predefined vehicle conditions

Sample Document

3.20
tester
entity that controls functions such as test, inspection, monitoring, or diagnosis of an on-vehicle *electronic control unit* (3.9) and can be dedicated to a specific type of operator, e.g. an off-board scan tool dedicated to service technician, an off-board test tool dedicated to assembly plants, or an on-board *tester* (3.20)

Note 1 to entry: The *tester* (3.20) is also referenced as the *client* (3.3).

4 Symbols and abbreviated terms

4.1 Symbols

$t_{L5_S3_Client}$	OSI layer 5 client session timer
$t_{L5_S3_Server}$	OSI layer 5 server session timer
$t_{L7_P2_Client}$	OSI layer 7 client reception timer
$t_{L7_P2_Server}$	OSI layer 7 server response timer
$t_{L7_P2*_Client_Max}$	OSI layer 7 client reception time enhanced maximum value
$t_{L7_P2*_Server_Max}$	OSI layer 7 server response time enhanced maximum value

© ISO 2026 – All rights reserved

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026

4.2 Abbreviated terms

.con	service primitive .confirmation
.ind	service primitive .indication
.req	service primitive .request
A_PCI	application layer protocol control information
ACR	Authentication with Challenge-Response
APCE	Authentication with PKI Certificate Exchange
BER	Basic Encoding Rules in accordance with ITU-T X.690
CMAC	Cipher-based Message Authentication Code
CVC	Card Verifiable Certificate
DTC	diagnostic trouble code
ECU	electronic control unit
EDR	event data recorder
EOLAIVPD	end-of-life activation of in-vehicle pyrotechnic devices
ePTI	vehicle interface for electronic Periodic Technical Inspection
GMAC	Galois Message Authentication Code
HMAC	Hash-based Message Authentication Code
N/A	not applicable
NR_SID	negative response service identifier
NRC	negative response code
OID	Object Identifier in accordance with ISO/IEC 9834-1
OSI	open systems interconnection
PKCS	Public-Key Cryptography Standards
PKI	Public-Key Infrastructure
POWN	Proof of Ownership
RA	remote address
SA	source address
SID	service identifier
TA	target address
TA_type	target address type
WWH-OBD	World-Wide Harmonized On-Board Diagnostics in accordance with ISO/IEC 9594-8

Sample Document
get full document from ecommerce.sist.si

© ISO 2026 – All rights reserved

ISO 14229-1:2026 • https://ecommerce.sist.si/catalog/standards/iso/54e9da1f-6177-4147-b878-6d504e35db0e/iso-14229-1-2026