INTERNATIONAL STANDARD

ISO 14229-4

First edition
2012-12-01

Road vehicles — Unified diagnostic services (UDS) —

Part 4: Unified diagnostic services on FlexRay implementation (UDSonFR)

Véhicules routiers — Services de diagnostic unifiés (SDU) — Partie 4: SDU sur l'implémentation FlexRay (SDUsurFR)

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 14229-4:2012
https://standards.iteh.ai/catalog/standards/sist/b0b88a65-15a0-4e49-9612-460bed96f45d/iso-14229-4-2012

Reference number
ISO 14229-4:2012(E)

© ISO 2012

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 14229-4:2012
https://standards.iteh.ai/catalog/standards/sist/b0b88a65-15a0-4e49-9612-460bed96f45d/iso-14229-4-2012

COPYRIGHT PROTECTED DOCUMENT

© ISO 2012

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

© ISO 2012 – All rights reserved

Contents

Page

Foreword ..... **iv**

Introduction ..... **v**

1 Scope **1**

2 Normative references **1**

3 Terms, definitions and abbreviated terms **1**
3.1 Terms and definitions 1
3.2 Abbreviated terms 1

4 Conventions **2**

5 Document overview **2**

6 Unified diagnostic services implementation on FlexRay **4**
6.1 General 4
6.2 UDS on FlexRay services overview 4
6.3 CommunicationControl (0x28) service 5
6.4 ResponseOnEvent (0x86) service 5
6.5 LinkControl (0x87) service 7
6.6 ReadDataByPeriodicIdentifier (0x2A) service 8

7 Application layer requirements **14**
7.1 Application layer services 14
7.2 Application layer protocol 14
7.3 Application layer timing 14

8 Presentation layer requirements **14**

9 Session layer requirements **14**

10 Transport/Network layer interface adaptation **14**
10.1 General information 14
10.2 DoFR Transport/Network layer interface adaptation 14

11 Data Link layer diagnostic implementation requirements **15**

Bibliography **16**

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 14229-4:2012
https://standards.iteh.ai/catalog/standards/sist/b0b88a65-15a0-4e49-9612-4000cd96f45d/iso-14229-4-2012

© ISO 2012 – All rights reserved

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 14229-4 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 14229 consists of the following parts, under the general title *Road vehicles — Unified diagnostic services (UDS)*:

iTeh STANDARD PREVIEW
(standards.iteh.ai)

— *Part 1: Specification and requirements*

— *Part 2: Session layer services*

ISO 14229-4:2012
https://standards.iteh.ai/catalog/standards/sist/80688a65-15a0-4e49-9612-460bed96f45d/iso-14229-4-2012

— *Part 3: Unified diagnostic services on CAN implementation (UDSonCAN)*

— *Part 4: Unified diagnostic services on FlexRay implementation (UDSonFR)*

— *Part 5: Unified diagnostic services on Internet Protocol implementation (UDSonIP)*

— *Part 6: Unified diagnostic services on K-Line implementation (UDSonK-Line)*

The following parts are under preparation / are planned:

— *Part 7: Unified diagnostic services on Local Interconnet Network implementation (UDSonLIN)*

 © ISO 2012 – All rights reserved

Introduction

This part of ISO 14229 has been established in order to enable the implementation of unified diagnostic services, as specified in ISO 14229-4, on FlexRay (UDSonFR).

To achieve this, it is based on the Open Systems Interconnection (OSI) Basic Reference Model specified in ISO/IEC 7498-1 and ISO/IEC 10731, which structures communication systems into seven layers. When mapped on this model, the services specified by ISO 14229 are divided into:

— Application layer (layer 7):
  — Vehicle manufacturer enhanced diagnostics: ISO 14229-1, ISO 14229-4,
  — Legislated OBD: ISO 15031-5,
  — Legislated WWH-OBD: ISO 14229-1 / ISO 27145-3;
— Presentation layer (layer 6):
  — Vehicle manufacturer enhanced diagnostics: vehicle manufacturer specific,
  — Legislated OBD: SAE J1930-DA, SAE J1979-DA, SAE J2012-DA,
  — Legislated WWH-OBD: ISO 27145-2 with reference to SAE J1930-DA, SAE J1939, Companion Spreadsheet (SPNs), SAE J1939-73:2010, Appendix A (FMIs), SAE J1979-DA and SAE J2012-DA;
— Session layer services (layer 5):
  — Vehicle manufacturer enhanced diagnostics: ISO 14229-2,
  — Legislated OBD: ISO 14229-2,
  — Legislated WWH-OBD: ISO 14229-2;
— Transport layer services (layer 4):
  — Vehicle manufacturer enhanced diagnostics: ISO 10681-2,
  — Legislated OBD: ISO 10681-2, ISO 15765-4
  — Legislated WWH-OBD: ISO 27145-4;
— Network layer services (layer 3):
  — Vehicle manufacturer enhanced diagnostics: ISO 10681-2,
  — Legislated OBD: ISO 15765-2, ISO 15765-4
  — Legislated WWH-OBD: ISO 27145-4;
— Data link layer (layer 2):
  — Vehicle manufacturer enhanced diagnostics: ISO 17458-2,
  — Legislated OBD: ISO 11898-1, ISO 11898-2, ISO 15765-4,
  — Legislated WWH-OBD: ISO 27145-4;
— Physical layer (layer 3):
  — Vehicle manufacturer enhanced diagnostics: ISO 17458-4,
  — Legislated OBD: ISO 11898-1, ISO 11898-2, ISO 15765-4,

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 14229-4:2012
https://standards.iteh.ai/catalog/standards/sist/b0b88a65-15a0-4e49-9612-460bed96f45d/iso-14229-4-2012

© ISO 2012 – All rights reserved

— Legislated WWH-OBD: ISO 27145-4;

in accordance with Table 1.

Table 1 — DoFR enhanced diagnostics, legislated OBD and WWH-OBD specification reference applicable to the OSI layers

<table>
<tr><th>Applicability</th><th>OSI 7 layers</th><th>Vehicle manufacturer enhanced diagnostics</th><th>Legislated OBD (On-Board Diagnostics)</th><th colspan="3">Legislated WWH-OBD (On-Board Diagnostics)</th></tr>
<tr><td rowspan="8">Seven layer according to ISO/IEC 7498-1 and ISO/IEC 10731</td><td>Application (layer 7)</td><td>ISO 14229-1/ ISO 14229-4</td><td>ISO 15031-5</td><td colspan="3">ISO 14229-1/ISO 27145-3</td></tr>
<tr><td>Presentation (layer 6)</td><td>Vehicle manufacturer specific</td><td>SAE J1930-DA, SAE J1979-DA, SAE J2012-DA</td><td colspan="3">ISO 27145-2
SAE J1930-DA, SAE J1939 Companion Spreadsheet (SPNs),
SAE J1939-73:2010, Appendix A (FMIs),
SAE J1979-DA, SAE J2012-DA</td></tr>
<tr><td>Session (layer 5)</td><td colspan="5">ISO 14229-2</td></tr>
<tr><td>Transport (layer 4)</td><td rowspan="2">ISO 10681-2</td><td rowspan="2">ISO 15765-2, ISO 15765-4</td><td rowspan="2">ISO 15765-2, ISO 15765-4</td><td rowspan="3">ISO 27145-4</td><td rowspan="2">ISO 13400-2</td></tr>
<tr><td>Network (layer 3)</td></tr>
<tr><td>Data link (layer 2)</td><td>ISO 17458-2</td><td rowspan="2">ISO 11898-1, ISO 11898-2, ISO 15765-4</td><td rowspan="2">ISO 11898-1, ISO 11898-2, ISO 15765-4</td><td rowspan="2">ISO 13400-3, IEEE 802.3</td></tr>
<tr><td>Physical (layer 1)</td><td>ISO 17458-4</td></tr>
</table>

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 14229-4:2012
https://standards.iteh.ai/catalog/standards/sist/b0b88a65-15a0-4e49-9612-460bed96f45d/iso-14229-4-2012

© ISO 2012 – All rights reserved

Road vehicles — Unified diagnostic services (UDS) —

Part 4: Unified diagnostic services on FlexRay implementation (UDSonFR)

1 Scope

This part of ISO 14229 specifies the implementation of a common set of unified diagnostic services (UDS) on FlexRay networks (FR) in road vehicles (UDSonFR).

UDSonFR references ISO 14229-1 and ISO 14229-2 and specifies implementation requirements of the diagnostic services to be used for diagnostic communication over FlexRay.

NOTE UDSonFR does not specify any requirements of the in-vehicle FlexRay architecture.

This part of ISO 14229 does not include any redundant information of the documents as listed in the introduction. It focuses on

— additional requirements specific to the implementation of UDS on the FlexRay network, and

— specific restrictions in the implementation of UDS on the FlexRay network.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

2 Normative references

ISO 14229-4:2012
https://standards.iteh.ai/catalog/standards/sist/b0b88a65-15a0-4e49-9612-460be9968154/iso-14229-4-2012

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

ISO 14229-1, *Road vehicles — Unified diagnostic services (UDS) — Part 1: Specification and requirements*

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

ISO 10681-2, *Road vehicles — Communication on FlexRay — Part 2: Communication layer services*

ISO 17458-2, *Road vehicles — FlexRay Communication Systems — Protocol specification*

ISO 17458-4, *FlexRay Communication Systems — Electrical physical layer specification*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14229-1, ISO 14229-2, and ISO 10681-2 apply.

3.2 Abbreviated terms

CF consecutive frame

DoFR diagnostic communication over FlexRay

© ISO 2012 – All rights reserved

FC	flow control
FR	FlexRay
ISO	International Standardization Organization
LF	last frame
OSI	Open System Interconnection
Rx	reception
SA	source address
SID	service identifier
SM	subnet mask
SOM	start of message
STF	start frame
STRT	serviceToRespondTo
TA	target address
UDS	unified diagnostic services
Tx	transmission
UDSonFR	Unified Diagnostic Services (UDS) on FlexRay

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 14229-4:2012
https://standards.iteh.ai/catalog/standards/sist/b0b88a65-15a0-4e49-9612-460bed96f45d/iso-14229-4-2012

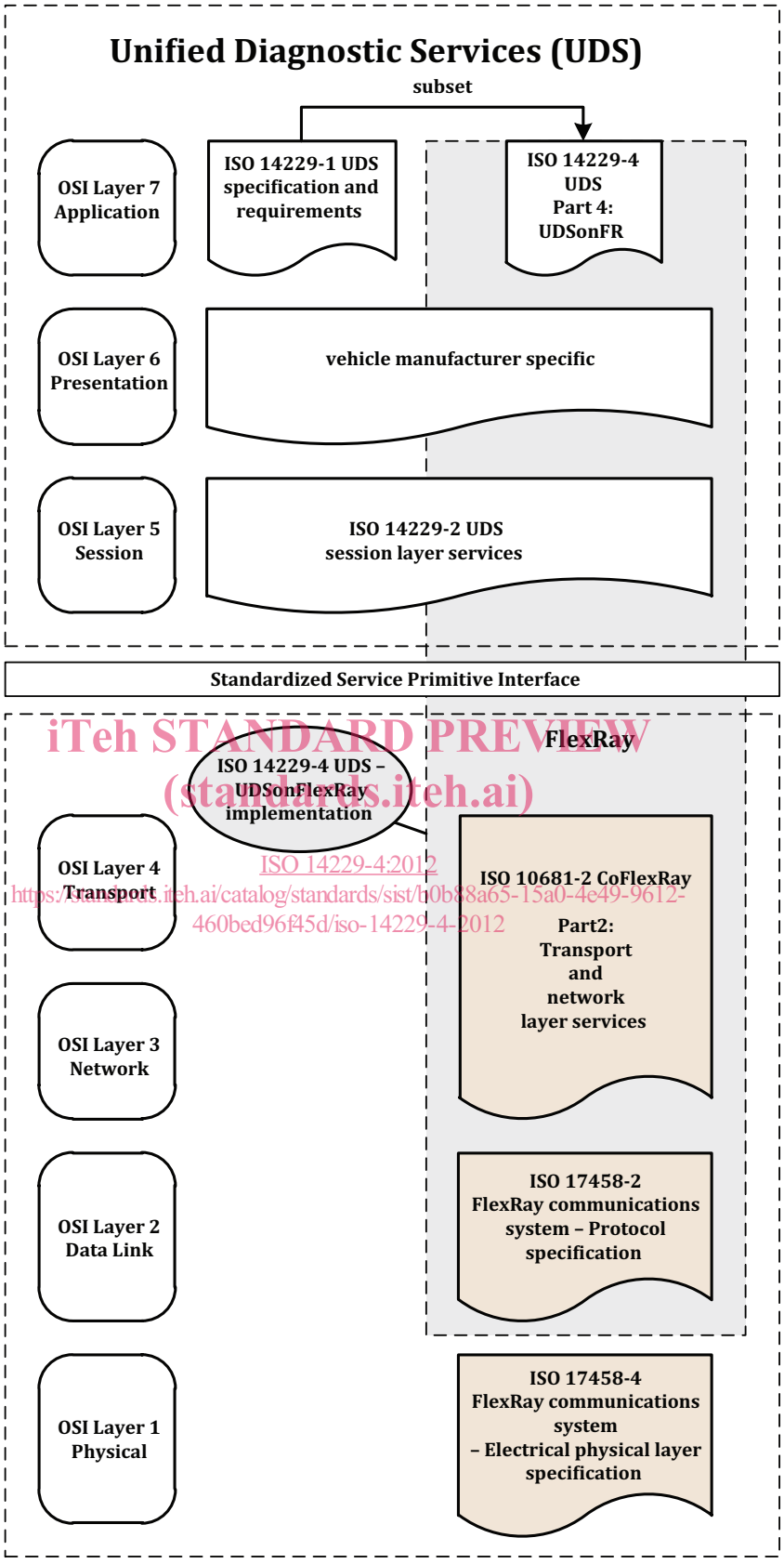
4 Conventions

This part of ISO 14229 is based on the conventions discussed in the OSI Service Conventions (ISO/IEC 10731:1994) as they apply for diagnostic services.

5 Document overview

Figure 1 illustrates the document references from ISO 14229-1, ISO 14229-2 and ISO 10681-1 and ISO 10681-2. ISO 14229-4 uses only a subset of the diagnostic services defined in ISO 14229-1 (see Table 2).

© ISO 2012 – All rights reserved



iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 14229-4:2012
https://standards.iteh.ai/catalog/standards/sist/b0b88a65-15a0-4e49-9612-460bed96f45d/iso-14229-4-2012

Figure 1 — ISO 14229-4, UDSonFR document reference according to OSI model

© ISO 2012 – All rights reserved

6 Unified diagnostic services implementation on FlexRay

6.1 General

This clause defines how the diagnostic services as defined in ISO 14229-1 apply to FlexRay. For each service, the applicable sub-function and data parameters are defined.

NOTE The sub-function parameter definitions take into account that the most significant bit is used for the suppressPosRspMsgIndicationBit parameter as defined in ISO 14229-1.

6.2 UDS on FlexRay services overview

The purpose of Table 2 is to reference all ISO 14229-1 and ISO 14229-2 services as they are applicable for an implementation in ISO 14229-4, UDSonFR. Table 2 contains the sum of all applicable services. Certain applications using this part of ISO 14229 to implement UDSonFR may restrict the number of useable services and may categorize them in certain application areas/diagnostic sessions (default session, programming session, etc.).

Services in Table 2 that are marked "No FlexRay specific requirements" shall be implemented as defined in ISO 14229-1 and ISO 14229-2 with no additional restrictions. Services that are marked "FlexRay specific requirements" shall be implemented as defined by the subclause listed in the Table 2 entry.

Table 2 — Overview of applicable ISO 14229-1 unified diagnostic services and data ranges

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 14229-4:2012
https://standards.iteh.ai/catalog/standards/sist/1d1f8a88a65-15a0-4e49-9612-460bed96d45d/iso-14229-4-2012

Diagnostic service name (ISO 14229-1)	Comment	Reference in this document
Diagnostic and Communication Management Functional Unit		
DiagnosticSessionControl	No FlexRay specific requirements	—
ECUReset	No FlexRay specific requirements	—
SecurityAccess	No FlexRay specific requirements	—
CommunicationControl	FlexRay specific requirements	see 6.3
TesterPresent	No FlexRay specific requirements	—
SecuredDataTransmission	No FlexRay specific requirements	—
ControlDTC-Setting	No FlexRay specific requirements	—
ResponseOnEvent	FlexRay specific requirements	see 6.4
LinkControl	FlexRay specific requirements	see 6.5
Data Transmission Functional Unit		
ReadDataByIdentifier	No FlexRay specific requirements	—
ReadMemoryByAddress	No FlexRay specific requirements	—
ReadScalingDataByIdentifier	No FlexRay specific requirements	—
ReadDataByPeriodicIdentifier	FlexRay specific requirements	see 6.6
DynamicallyDefineDataIdentifier	No FlexRay specific requirements	—
WriteDataByIdentifier	No FlexRay specific requirements	—
WriteMemoryBy-Address	No FlexRay specific requirements	—
ReadDTCInformation	No FlexRay specific requirements	—
ClearDiagnosticInformation	No FlexRay specific requirements	—
Input/Output Control Functional Unit		
InputOutputControlByIdentifier	No FlexRay specific requirements	—

© ISO 2012 – All rights reserved

Table 2 *(continued)*

Diagnostic service name (ISO 14229-1)	Comment	Reference in this document
Remote Activation Of Routine Functional Unit		
RoutineControl	No FlexRay specific requirements	—
Upload/Download Functional Unit		
Request-Download	No FlexRay specific requirements	—
RequestUpload	No FlexRay specific requirements	—
TransferData	No FlexRay specific requirements	—
RequestTransferExit	No FlexRay specific requirements	—
RequestFileTransfer	No FlexRay specific requirements	—

6.3 CommunicationControl (0x28) service

The following requirements as stated in Table 3 shall apply for this service when implemented on FlexRay.

Table 3 — Service 0x28 sub-function implementation definition on FlexRay

Hex (bit 6-0)	Description	Cvt	Mnemonic
00	**enableRxAndTx** — FlexRay communication in the static segment is switched on; — FlexRay communication in the dynamic segment (if applicable) is switched on;	M	ERXTX
01	**enableRxAndDisableTx** Enables the Rx – communication in the static and dynamic segment; Disables the Tx - communication in the static and the dynamic segment[a]: — In the static segment only null frames are sent in the individual slots. — In the dynamic segment (if applicable) communication is switched off (results in minislots only).	M	ERXDTX
02	**disableRxAndEnableTx** — Disables the Rx – communication in the static and dynamic segment; — Enables the Tx - communication in the static and the dynamic segment;	M	DRXETX
03	**disableRxAndTx** Disables the communication (Rx and Tx) in the static and the dynamic segment. Impacts on Tx and Rx for the static and dynamic segment are the same as described for sub-function 0x01 and 0x02.	M	DRXTX
a It needs to be ensured that basic network functionality (e.g. synchronization) is not negatively influenced by disabling Tx communication.			

iTeh STANDARD PREVIEW
(standards.iteh.ai)
ISO 14229-4:2012
https://standards.iteh.ai/catalog/standards/sist/b0b88a65-15a0-4e49-9612-460bed96f85d/iso-14229-4-2012

6.4 ResponseOnEvent (0x86) service

In addition to the generic implementation requirements stated in ISO 14229-1 the following additional FlexRay specific implementation requirements shall apply:

While the ResponseOnEvent service is active, the server shall be able to process concurrent diagnostic request and response messages accordingly. This should be accomplished with a different serviceToRespondToFlexRay source address. If the same diagnostic FlexRay source and target

© ISO 2012 – All rights reserved