BS ISO 10681-1:2010

BSI Standards Publication

Road vehicles — Communication on FlexRay

Part 1: General information and use case definition

National foreword

This British Standard is the UK implementation of ISO 10681-1:2010.

The UK participation in its preparation was entrusted to Technical Committee AUE/16, Electrical and electronic equipment.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

ISBN 978 0 580 62868 9

ICS 43.040.15

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2010

Amendments issued since publication

Date	Text affected

BS ISO 10681-1:2010

INTERNATIONAL STANDARD

ISO 10681-1

First edition
2010-06-15

Road vehicles — Communication on FlexRay —

Part 1: General information and use case definition

Véhicules routiers — Communication par FlexRay —

Partie 1: Informations générales et définitions du cas d'utilisation

Reference number
ISO 10681-1:2010(E)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

COPYRIGHT PROTECTED DOCUMENT

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

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 10681-1 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 10681 consists of the following parts, under the general title *Road vehicles — Communication on FlexRay*:

— *Part 1: General information and use case definition*

— *Part 2: Communication layer services*

Introduction

This part of ISO 10681 is based on the Open Systems Interconnection (OSI) Basic Reference Model specified in ISO/IEC 7498 and ISO/IEC 10731, which structures communication systems into seven layers (see example in Table 1). When mapped on this model, ISO 10681 incorporates the network layer (layer 3) and the transport layer (layer 4) services as communication layer services.

The ISO 10681 document set provides an implementer with all documents and references required to support the communication implementation on FlexRay networks.

— ISO 10681-1: *General information and use case definition* (this part), provides an overview of the document set along with the use case definitions and a common set of resources (definitions, references) for use by all subsequent parts.

— ISO 10681-2: *Communication layer services* specifies a communication protocol to meet the requirements of FlexRay-based vehicle network systems as specified in the FlexRay Communications Systems Protocol Specification.

NOTE Additional parts of ISO 10681 will be introduced as necessary.

Table 1 — Example of enhanced diagnostic specifications according to the OSI layers

Applicability	OSI layers	Vehicle manufacturer enhanced diagnostics
Seven layer according to ISO/IEC 7498-1 and ISO/IEC 10731	Application layer	ISO 14229-1
	Presentation layer	N/A
	Session layer	ISO 14229-2
	Transport layer	ISO 10681-2
	Network layer	
	Data link layer	FlexRay Communications Systems Protocol Specification
	Physical layer	FlexRay Communications System Electrical Physical Layer Specification

INTERNATIONAL STANDARD ISO 10681-1:2010(E)

Road vehicles — Communication on FlexRay —

Part 1: General information and use case definition

1 Scope

This part of ISO 10681 defines common requirements for vehicle systems implemented on a FlexRay communication link, as specified in the FlexRay Communications Systems Protocol Specification.

It also describes general use cases and communication scenarios that are covered by FlexRay transport and network layer. Each use case drives specific communication capabilities and requirements of the vehicle communication interface.

2 Normative references

The following referenced documents are indispensable for the application 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*

3 Terms and definitions

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

3.1
communication layer
CL
layer that includes the network layer (layer 3) and the transport layer (layer 4)

4 Use case definitions and requirements

4.1 Overview

The following subclauses provide an overview of all the kinds of reasonable communication use cases.

4.2 Identified use cases

4.2.1 Use case 1: Multipurpose communication layer

The communication layer shall be able to handle various message transmission types such as Diagnostics, Multi Media or Inter ECU communication. However, usage purposes are not limited to the ones stated above.

a) **Transmit messages with known data length:** Message transmission where the length of the transmitted message is known by the application. This kind of feature applies to most known applications (e.g. ECU programming, diagnostics, etc.).

b) **Transmit messages with unknown but finite data length:** The final message length is unknown at start of message transmission. However, the data shall be finite in order to keep the transport layer implementation manageable. The feature might be used for any data streaming applications.

c) **Additional acknowledgement with retry mechanism:** A message transmission is acknowledged (positive / negative) once it is completed. In addition, a retry mechanism might be supported, where the message transmission is being repeated at the detected first wrong byte position. This feature might be used for, e.g., Inter ECU communication mechanism.

d) **Routing data on the fly:** Gateway mechanism, where the data are already transmitted onto the target subnet, while it is still in the process of being received on the source subnet.

e) **Support of dynamic frame length:** Variable payload length (PDU_Size) in a single FlexRay frame, e.g. for optimized gateway handling in regard of buffer requirements. Possible applications could be “routing data on the fly” or “data streaming”.

4.2.2 Use case 2: Optimize flash programming time

a) **Flexible bandwidth usage:** Achieve optimized message transmission independent of the given network bandwidth assignment.

b) **Support of parallel diagnostic communication:** The communication layer shall be capable to support concurrent ECU programming events.

4.2.3 Use case 3: Optimize gateway implementations

a) **Routing data on the fly:** See d) in use case 1 (4.2.1).

b) **Receive and forward:** Allow to transfer a message from a given network onto FlexRay (and vice versa) without re-mapping payload information of a frame, where only the PCI information needs to be adapted.

c) **Optimize addressing scheme:** – See d) in use case 1 (4.2.1).

4.2.4 Use case 4: Communication layer definition

The communication layer definition shall be independent of static or dynamic segment usage as far as possible.

Bibliography

[1] ISO/IEC 10731, *Information technology — Open Systems Interconnection — Basic Reference Model — Conventions for the definition of OSI services*

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

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

[4] ISO 14229-4 [2], *Road vehicles — Unified diagnostic services (UDS) — Part 4: Unified diagnostic services on FlexRay implementation (UDSonFR)*

[5] *FlexRay Communications System — Protocol Specification*

1) Under preparation. (Revision of ISO 14229-1:2006)

2) Under preparation.

ICS 43.040.15

Price based on 3 pages

This page deliberately left blank

British Standards Institution (BSI)

BSI is the independent national body responsible for preparing British Standards and other standards-related publications, information and services.
It presents the UK view on standards in Europe and at the international level.

It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover.

Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001

BSI offers Members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Tel: +44 (0)20 8996 7669 Fax: +44 (0)20 8996 7001
Email: plus@bsigroup.com

Buying standards

You may buy PDF and hard copy versions of standards directly using a credit card from the BSI Shop on the website **www.bsigroup.com/shop.** In addition all orders for BSI, international and foreign standards publications can be addressed to BSI Customer Services.

Tel: +44 (0)20 8996 9001 Fax: +44 (0)20 8996 7001
Email: orders@bsigroup.com

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Knowledge Centre.

Tel: +44 (0)20 8996 7004 Fax: +44 (0)20 8996 7005
Email: knowledgecentre@bsigroup.com

Various BSI electronic information services are also available which give details on all its products and services.

Tel: +44 (0)20 8996 7111 Fax: +44 (0)20 8996 7048
Email: info@bsigroup.com

BSI Subscribing Members are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration.

Tel: +44 (0)20 8996 7002 Fax: +44 (0)20 8996 7001
Email: membership@bsigroup.com

Information regarding online access to British Standards via British Standards Online can be found at **www.bsigroup.com/BSOL**

Further information about BSI is available on the BSI website at **www.bsigroup.com/standards**

Copyright

Tel: +44 (0)20 8996 7070
Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Tel +44 (0)20 8996 9001
Fax +44 (0)20 8996 7001
www.bsigroup.com/standards

raising standards worldwide™