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Road vehicles— FlexRay communications system —

Part 4: Electrical physical layer specification

Véhicules routiers — Système de communications FlexRay —

Partie 4: Spécification de la couche d'application électrique

Reference number
ISO 17458-4:2013(E)

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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 17458-4 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 17458 consists of the following parts, under the general title *Road vehicles — FlexRay communications system*:

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

— *Part 2: Data link layer specification*

— *Part 3: Data link layer conformance test specification*

— *Part 4: Electrical physical layer specification*

— *Part 5: Electrical physical layer conformance test specification*

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Introduction

The FlexRay communications system is an automotive focused high speed network and was developed with several main objectives which were defined beyond the capabilities of established standardized bus systems like CAN and some other proprietary bus systems. Some of the basic characteristics of the FlexRay protocol are synchronous and asynchronous frame transfer, guaranteed frame latency and jitter during synchronous transfer, prioritization of frames during asynchronous transfer, single or multi-master clock synchronization, time synchronization across multiple networks, error detection and signalling, and scalable fault tolerance.

The FlexRay communications system is defined for advanced automotive control applications. It serves as a communication infrastructure for future generation high-speed control applications in vehicles by providing:

— A message exchange service that provides deterministic cycle based message transport;

— Synchronization service that provides a common time base to all nodes;

— Start-up service that provides an autonomous start-up procedure;

— Error management service that provides error handling and error signalling;

— Wakeup service that addresses the power management needs.

Since start of development the automotive industry world-wide supported the specification development. The FlexRay communications system has been successfully implemented in production vehicles today.

The ISO 17458 series specifies the use cases, the communication protocol and physical layer requirements of an in-vehicle communication network called "FlexRay communications system".

This part of ISO 17458 has been established in order to define the electrical physical layer of the FlexRay data link.

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 protocol and physical layer requirements specified by ISO 17458 are broken into:

— Diagnostic services (layer 7), specified in ISO 14229-1 [7], ISO 14229-4 [9];

— Presentation layer (layer 6), vehicle manufacturer specific;

— Session layer services (layer 5), specified in ISO 14229-2 [8];

— Transport layer services (layer 4), specified in ISO 10681-2 [1];

— Network layer services (layer 3), specified in ISO 10681-2 [1];

— Data link layer (layer 2), specified in ISO 17458-2, ISO 17458-3;

— Physical layer (layer 1), specified in ISO 17458-4, ISO 17458-5;

in accordance with Table 1.

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Table 1 — FlexRay communications system specifications applicable to the OSI layers

Applicability	OSI 7 layers	FlexRay communications system	Vehicle manufacturer enhanced diagnostics
Seven layer according to ISO 7498-1 and ISO/IEC 10731	Application (layer 7)	vehicle manufacturer specific	ISO 14229-1, ISO 14229-4
	Presentation (layer 6)	vehicle manufacturer specific	vehicle manufacturer specific
	Session (layer 5)	vehicle manufacturer specific	ISO 14229-2
	Transport (layer 4)	vehicle manufacturer specific	ISO 10681-2
	Network (layer 3)	vehicle manufacturer specific	
	Data link (layer 2)	ISO 17458-2, ISO 17458-3	
	Physical (layer 1)	ISO 17458-4, ISO 17458-5	

Table 1 shows ISO 17458 Parts 2 – 5 being the common standards for the OSI layers 1 and 2 for the FlexRay communications system and the vehicle manufacturer enhanced diagnostics.

The FlexRay communications system column shows vehicle manufacturer specific definitions for OSI layers 3 – 7.

The vehicle manufacturer enhanced diagnostics column shows application layer services covered by ISO 14229-4 which have been defined in compliance with diagnostic services established in ISO 14229-1, but are not limited to use only with them. ISO 14229-4 is also compatible with most diagnostic services defined in national standards or vehicle manufacturer's specifications. The presentation layer is defined vehicle manufacturer specific. The session layer services are covered by ISO 14229-2. The transport protocol and network layer services are specified in ISO 10681.

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