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Space engineering - CANbus extention protocol

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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Podľa zákona č. 264/1999 Z. z. o technických požiadavkách na výrobky a o posudzovaní zhody a o zmene a doplnení niektorých zákonov v znení neskorších predpisov sa slovenská technická norma a časti slovenskej technickej normy môžu rozmnožovať alebo rozširovať len so súhlasom slovenského národného normalizačného orgánu.

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English version

Space engineering - CANbus extention protocol

Ingénierie spatiale - Protocole d'extension du CANbus

Raumfahrttechnik - CANbus-Erweiterungsprotokoll

This European Standard was approved by CEN on 11 May 2017.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN and CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European foreword

This document (EN 16603-50-15:2017) has been prepared by Technical Committee CEN-CENELEC/TC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16603-50-15:2017) originates from ECSS-E-ST-50-15C.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2017, and conflicting national standards shall be withdrawn at the latest by December 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a standardization request given to CEN by the European Commission and the European Free Trade Association.

This document has been developed to cover specifically space systems and has therefore precedence over any EN covering the same scope but with a wider domain of applicability (e.g.: aerospace).

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard specifies requirements for the use of the CAN (Controller Area Network) data bus in spacecraft onboard applications. These requirements extend the CAN Network specification to cover the aspects required to satisfy the particular needs of spacecraft data handling systems. This standard is one of a series of ECSS standards relating to data link interfaces and communication protocols e.g. MIL-STD-1553 and ECSS-E-ST-50-5x Space Wire.

In order to provide a uniform set of communication services across these standards the CCSDS Spacecraft Onboard Interface Services (SOIS) Subnetwork Recommendations have been applied as driving requirements for protocol specification.

The CAN Network has been successfully used for three decades in automotive and critical control industry. In particular, its use in applications that have demanding safety and reliability requirements, or operate in hostile environments have similarities to spacecraft onboard applications.

The CAN Network is being adopted for a variety of space applications and care has therefore been taken during the drafting of this standard to include existing experience and feedback from European Space industry.

In addition to the CAN Network data link specifications, this standard also specifies the optional use of the CANopen standard as an application layer protocol operating over CANbus.

The set of CANopen specifications comprises the application layer and communication profile as well as application, device, and interface profiles. CANopen provides very flexible configuration capabilities.

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Scope

This European Standard is applicable to spacecraft projects that opt to use the CAN Network for spacecraft on-board communications and control. It also defines the optional use of the CANopen standard as an application layer protocol operating in conjunction with the CAN Network data link layer.

This standard does not modify the basic CAN Network specification and complies with ISO 11898-1/-2:2003. This standard does define protocol extensions needed to meet spacecraft specific requirements.

This standard covers the vast majority of the on-board data bus requirements for a broad range of different mission types. However, there can be some cases where a mission has particularly constraining requirements that are not fully in line with those specified in this standard. In those cases this standard is still applicable as the basis for the use of CAN Network, especially for physical layer and redundancy management.

This standard may be tailored for the specific characteristic and constraints of a space project in conformance with ECSS-S-ST-00.

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Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this ECSS Standard. For dated references, subsequent amendments to, or revision of any of these publications do not apply. However, parties to agreements based on this ECSS Standard are encouraged to investigate the possibility of applying the more recent editions of the normative documents indicated below. For undated references, the latest edition of the publication referred to applies.

EN reference	Reference in text	Title
EN 16601-00-01	ECSS-S-ST-00-01	ECSS system – Glossary of terms
EN 16603-20	ECSS-E-ST-20	Space engineering - Electrical and electronic
EN 16603-20-07	ECSS-E-ST-20-07	Space engineering - Electromagnetic compatibility
EN 16602-70-08	ECSS-Q-ST-70-08	Space product assurance - Manual soldering of high-reliability electrical connections
EN 16602-70-26	ECSS-Q-ST-70-26	Space product assurance - Crimping of high-reliability electrical connections
	ESCC 3401/029 Issue 1, October 2002	Connectors Electrical Rectangular Microminiature, based on type MDM
	ESCC 3401/01 Issue 2, March 2010	Connectors, Electrical, Rectangular, Microminiature, Solder Bucket Contacts, with EMI Backshell, based on Type MDM
	ANSI/TIA/EIA-485-A-1998 (reaffirmed 28 March 2003)	Electrical Characteristics of Balanced Voltage Digital Interface Circuits. NOTE: This standard referenced in this document as RS-485.
	DIN 41652-1 (1990-06)	Rack and panel connectors, trapezoidal, round contacts \varnothing 1 mm; common mounting features and dimensions; survey of types
	ISO 11898-1:2003	Road vehicles – Controller Area Network (CAN) - Part 1: Data link layer and physical signalling
	ISO 11898-2:2003	Road vehicles – Controller Area Network (CAN) - Part 2: High-speed medium access unit
	CiA 102 v. 2.0	CAN physical layer for industrial applications (available from www.can-cia.org)

	CiA 301 Version 4.2.0	CANopen Application Layer and Communication Profile, CAN in Automation (available from www.can-cia.org)
	CiA 306 Version 1.3.0	CANopen electronic data sheet specification (available from www.can-cia.org)
	iCC 2012	CAN in Automation - Computation of CAN Bit Timing Parameters Simplified - Meenanath Taralkar, OTIS ISRC PVT LTD, Pune, India (available from www.can-cia.org)
	MIL-DTL-38999 (formerly MIL-C D38999 Series 3)	Connectors, Electrical, Circular, Miniature, High Density, Quick Disconnect (Bayonet, Threaded, and Breech Coupling), Environment Resistant, Removable Crimp and Solder Contacts, General Specification for. U.S. Department of Defense. 30 May 2008.
	RS-485	The current reference of this standard is ANSI/TIA/EIA-485-A-1998 (reaffirmed 28 March 2003)

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