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Road Vehicles - Functional Safety - Part 11: Guidelines on applications to semiconductors

道路车辆 功能安全 第 11 部分:半导体应用指南

(ISO 26262-11:2018, Road vehicles - Functional safety - Part 11: Guidelines on applications of ISO 26262 to semiconductors, MOD)

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Foreword

This document was drafted in accordance with the rules provided in GB/T 1.1-2020 *Directives for Standardization - Part 1: Rules for the Structure and Drafting of Standardizing Documents*.

This document is Part 11 of GB/T 34590 *Road Vehicles - Functional Safety*. GB/T 34590 has issued the following parts:

-- Part 1: Vocabulary;

-- Part 2: Management of Functional Safety;

-- Part 3: Concept Phase;

-- Part 4: Product Development at the System Level;

-- Part 5: Product Development at the Hardware Level;

-- Part 6: Product Development at the Software Level;

-- Part 7: Production, Operation, Service and Decommissioning;

-- Part 8: Supporting Processes;

-- Part 9: Automotive Safety Integrity Level (ASIL)-oriented and Safety-oriented Analyses;

-- Part 10: Guideline;

-- Part 11: Guidelines on Applications to Semiconductors;

-- Part 12: Adaptation for Motorcycles.

The revision of this document adopts ISO 26262-11:2018 "Road vehicles - Functional safety - Part 11: Guidelines on applications of ISO 26262 to semiconductors".

The technical differences between this document and ISO 26262-11:2018 and their reasons are as follows:

- Replace ISO 26262-1 with the normative reference GB/T 34590.1-2022 to adapt to the technical conditions of China.

The following editorial changes are made to this document:

- Delete the number of "4.1.1";

- Change the sub-clause numbers 4.3, 4.6.2.1.1, 4.6.2.1.2, 5.5.2, A.1.3 to make the structure more complete.

Attention is drawn to the possibility that some of the elements of this document may be the

subject of patent rights. The issuing authority shall not be held responsible for identifying any or all such patent rights.

This document was proposed by the Ministry of Industry and Information Technology of the People's Republic of China.

This document shall be under the jurisdiction of National Technical Committee 114 on Auto of Standardization Administration of China (SAC/TC 114).

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The main drafters of this document: Fu Yue, Zhang Xiang, Zhang Lihong, Rao Meng, Yang Hu, Li Bo, Chen Rui, Liu Hui, Wang Junchao, Zhong Jianwei, Shen Ge, Sun Jingxin, Chen Lei, Zou Guangcai, Qian Jie, Zhang Lemin, Long Wenyuan, Feng Guoyuan, Han Bing, Xue Jianbo , Zhao Tianli, Zhang Huiling, Liang Yu, Gold, Liu Kunpeng, Xu Peng, Zhao Jinfu, Wen Jiwei, Li Yuheng, Ma Kai, Zhang Aiqin, Qin Zihao, Wei Bin, Cai Zhulin, Xia Xianzhao, Li Hongpeng, Song Weijin, Wang Zhipeng, Liu Chang, Tong Fei, Guo Feifei, Yu Jianye, Li Xinran, Chen Xiaohu.

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1 Scope

This document is intended to be applied to safety-related systems that include one or more electrical and/or electronic (E/E) systems and that are installed in series production road vehicles, excluding mopeds.

This document does not address unique E/E systems in special vehicles such as E/E systems designed for drivers with disabilities.

NOTE: Other dedicated application-specific safety standards exist and can complement this document or vice versa.

Systems and their components released for production, or systems and their components already under development prior to the publication date of this document, are exempted from the scope of this edition. This document addresses alterations to existing systems and their components released for production prior to the publication of this document by tailoring the safety lifecycle depending on the alteration. This document addresses integration of existing systems not developed according to this document and systems developed according to this document by tailoring the safety lifecycle.

This document addresses possible hazards caused by malfunctioning behaviour of safety-related E/E systems, including interaction of these systems. It does not address hazards related to electric shock, fire, smoke, heat, radiation, toxicity, flammability, reactivity, corrosion, release of energy and similar hazards, unless directly caused by malfunctioning behaviour of safety-related E/E systems.

This document describes a framework for functional safety to assist the development of safety related E/E systems. This framework is intended to be used to integrate functional safety activities into a company-specific development framework. Some requirements have a clear technical focus to implement functional safety into a product; others address the development process and can therefore be seen as process requirements in order to demonstrate the capability of an organization with respect to functional safety.

This document does not address the nominal performance of E/E systems.

This document has an informative character only. It contains possible interpretations of other parts of GB/T 34590 with respect to semiconductor development. The content is not exhaustive with regard to possible interpretations, i.e., other interpretations can also be possible in order to fulfil the requirements defined in other parts of GB/T 34590.

34590.9-2022, whenever applicable, can be used for the design of the safety mechanisms during the development of the IP.

EXAMPLE 1: Bus “fabric” with built-in bus supervisors including fault detection and notification logic (e.g., interrupt signals).

EXAMPLE 2: Voltage regulator with monitoring (under-voltage and over-voltage detection), protection (current limit or thermal protection) and self-diagnostics (monitoring and protection circuit built-in self-tests).

Alternatively, the IP can be developed with no assumed safety requirements or specific safety mechanisms to detect and control faults.

EXAMPLE 3: Bus "fabric" without built-in bus supervisors or error reporting logic.

EXAMPLE 4: Voltage regulator without monitoring, protection or built-in monitoring or protection circuit diagnostics.

Safety analyses defined in GB/T 34590.9-2022 Clause 8 can be applied to the IP. A qualitative safety analysis, and in some cases a quantitative analysis, can be provided to the IP integrator to justify the capabilities of the safety mechanisms to control given failure modes or to provide information on failure modes and related failure mode distribution. Similarly, a dependent failure analysis can be provided to demonstrate required independence or freedom from interference.

NOTE 3: The IP supplier includes example information concerning failure mode distribution in the safety analysis results, based on specific implementation assumptions. Documentation related to safety mechanisms can be provided with other safety-related documentation for the IP. This information can also be combined into a single safety manual or safety application note as described in 5.1.11 (for digital components), 5.2.6 (for analogue or mixed signal components), 5.3.6 (for PLD) and 5.5.6 (for sensors/transducers).

NOTE 4: The base failure rate depends on the actual implementation, including the technology, of the IP into the integrated circuit and the use condition of the integrated circuit, as described in 4.6. So, the base failure rate can only be provided as a reference to the IP integrator who is responsible for recalculating the failure rate according to the actual use case.

NOTE 5: This information can be included within existing documentation (e.g., integration guidelines, technical reference documents, application notes).

The IP integrator can request additional information from the IP supplier in implementing safety requirements. The IP supplier can support the request by providing information concerning measures used to avoid systematic faults, as well as safety analysis results. Safety analysis results can be used to support the evaluation of hardware metrics for the integrated IP, as well as to demonstrate freedom from interference and independence.

Since the IP will be integrated into a safety-related design, consideration of coexistence is

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