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Semiconductor devices - Semiconductor interfaces for automotive vehicles - Part 4: Evaluation method of data interface for automotive vehicle sensors (IEC 62969-4:2018)

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Dispositifs à semiconducteurs - Interface à semiconducteurs pour les véhicules automobiles - Partie 4: Méthode d'évaluation de l'interface de données destinée aux capteurs de véhicules automobiles (IEC 62969-4:2018)

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European foreword

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The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2019-05-22
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**Dispositifs à semiconducteurs – Interface à semiconducteurs pour les véhicules automobiles –
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SEMICONDUCTOR DEVICES – SEMICONDUCTOR INTERFACE FOR AUTOMOTIVE VEHICLES –

Part 4: Evaluation method of data interface for automotive vehicle sensors

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International Standard IEC 62969-4 has been prepared by IEC technical committee 47: Semiconductor devices.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
47/2470/FDIS	47/2487/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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A list of all parts in the IEC 62969 series, published under the general title *Semiconductor devices – Semiconductor interface for automotive vehicles*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
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INTRODUCTION

The IEC 62969 series is composed of four parts as follow:

- IEC 62969-1 *Semiconductor devices – Semiconductor interface for automotive vehicles – Part 1: General requirements of power interface for automotive vehicle sensors*
- IEC 62969-2 *Semiconductor devices – Semiconductor interface for automotive vehicles – Part 2: Efficiency evaluation methods of wireless power transmission using resonance for automotive vehicle sensors*
- IEC 62969-3 *Semiconductor devices – Semiconductor interface for automotive vehicles – Part 3: Shock driven piezoelectric energy harvesting for automotive vehicle sensors*
- IEC 62969-4 *Semiconductor devices – Semiconductor interface for automotive vehicles – Part 4: Evaluation method of data interface for automotive vehicle sensors*

The IEC 62969 series covers power and data interfaces for sensors in automotive vehicles. The first part covers general requirements of test conditions such as temperature, humidity, vibration, etc., for automotive sensor power interface. It also includes various electrical performances of power interface such as voltage drop from power source to automotive sensors, noises, voltage level, etc. The second part covers "Efficiency evaluation methods of wireless power transmission using resonance for automotive vehicle sensors ". The third part covers "Shock driven piezoelectric energy harvesting for automotive vehicle sensors". The fourth part covers "Evaluation methods of data interface for automotive vehicle sensors".

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SEMICONDUCTOR DEVICES – SEMICONDUCTOR INTERFACE FOR AUTOMOTIVE VEHICLES –

Part 4: Evaluation method of data interface for automotive vehicle sensors

1 Scope

This part of IEC 62969 specifies a method of directly fault injection test for automotive semiconductor sensor interface that can be used to support the conformance assurance in the vehicle communications interface.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

There are no normative references in this document.

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3 Terms, definitions and abbreviated terms

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For the purposes of this document, the following terms and definitions apply.

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- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Terms and definitions

3.1.1
data interface
transfer of data with electrical signal from a sensor source to another ECU in vehicle such as ECU and sensors via cable or electric and/or magnetic fields through air or medium

3.1.2
fault injection
technique for improving the coverage of a test by introducing faults to device under test

3.1.3
disturbance
temporary change of environmental conditions that can cause a fault to the device under test

3.1.4
crosstalk
appearance of undesired energy in a channel, owing to the presence of a signal in another channel, caused by, for example induction, conduction or non-linearity

[SOURCE: IEC 60050-722:1992, 722-15-03]

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3.2 Abbreviated terms

ECU: Electronic Control Unit (see IEC 60050-442:1998, 442-04-22)

DUT: Device Under Test

4 Evaluation and tests

4.1 Evaluation test setup

Figure 1 shows the conceptual diagram of the semiconductor-based sensor data interface test with fault injection.

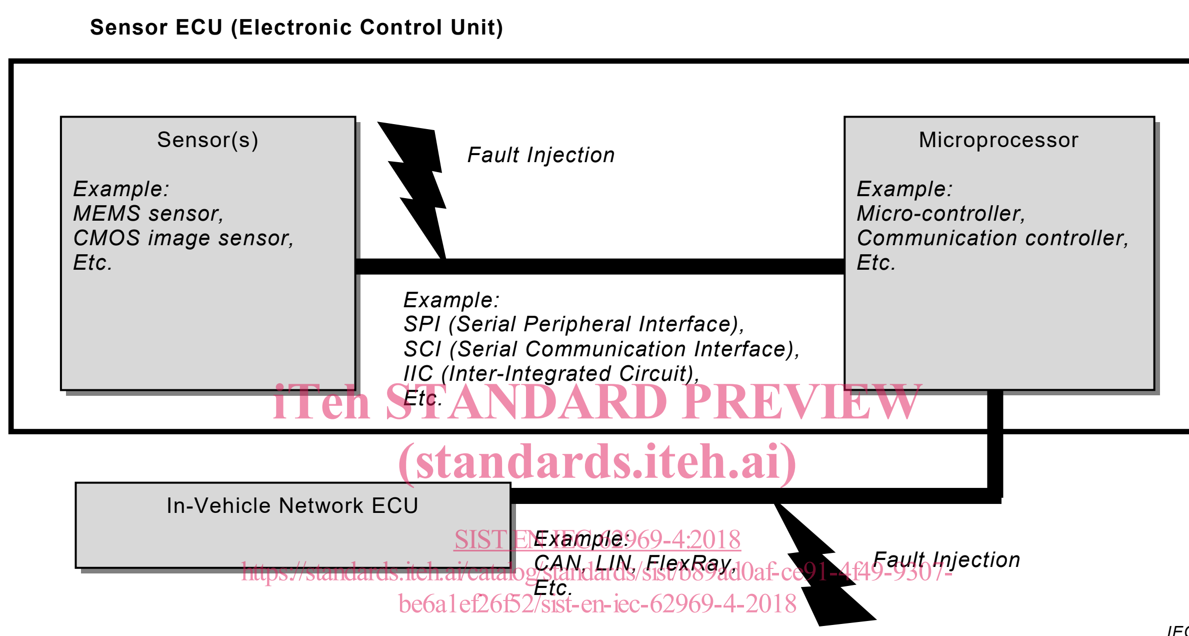

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Figure 1 – The semiconductor-based sensor data interface test with fault injection

The fault injection tool can do the fault injection to a semiconductor type sensor and works as a communication monitoring for the fault injection node and system during fault injection. The fault injection tool provides fault injection of physical level and monitoring of node level.

It offers many new possibilities for the analysis of data interface errors. A representation of the physical layer is often indispensable, particularly during the execution of conformity tests. With data interface-specific trigger conditions and time synchronization, it can find the causes of protocol errors much quicker than with a traditional test method.

4.2 Block diagram

The block diagrams of the data communication interfaces and digital or analog disturbance units clarify the terminal assignments and uses of the externally accessible interface lines.

Figure 2 shows conceptual block diagram of the data interface example of duplex channel.

The signals for generating trigger events are evaluated via the trig-high and trig-low connections. The digital disturbance types 'recessive' and 'dominant' are also output over these two connections.

V_{Ref} represents the reference voltage of the data interface signals. If the high-speed interface is being used, V_{Ref} shall be connected to the GND. When using the low-speed interface, connection to the GND is optional.