IEC 62969-1

Edition 1.0 2017-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Semiconductor devices – Semiconductor interface for automotive vehicles – Part 1: General requirements of power interface for automotive vehicle sensors

Dispositifs à semiconducteurs – Interface à semiconducteurs pour les véhicules automobiles – Partie 1: Exigences générales de l'interface d'alimentation destinée aux capteurs de véhicules automobiles

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SEMICONDUCTOR DEVICES – SEMICONDUCTOR INTERFACE FOR AUTOMOTIVE VEHICLES –

Part 1: General requirements of power interface for automotive vehicle sensors

FOREWORD

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International Standard IEC 62969-1 has been prepared by IEC technical committee 47: Semiconductor devices.

This bilingual version (2018-01) corresponds to the monolingual English version, published in 2017-12.

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

FDIS	Report on voting
47/2433/FDIS	47/2447/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.

The French version of this standard has not been voted upon.

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

A list of all the 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- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

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

- 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 methods 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. This part 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”.

SEMICONDUCTOR DEVICES – SEMICONDUCTOR INTERFACE FOR AUTOMOTIVE VEHICLES –

Part 1: General requirements of power interface for automotive vehicle sensors

1 Scope

This part of IEC 62969 provides general requirements for performance evaluations and environmental conditions for the power interface of automotive vehicle sensors. For performance evaluations, various electrical performances such as voltage drop from power source to automotive sensors, AC noises and voltage level are included. For environmental conditions, various test conditions such as temperature, humidity and vibration are included. In addition, terms, definitions, symbols and configurations are covered in this part.

NOTE Additional information on power interface for automotive vehicle sensors is provided in Annex A.

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.

IEC 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-30, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60721 (all parts), Classification of environmental conditions

IEC 60749-10, *Semiconductor devices – Mechanical and climatic test methods – Part 10: Mechanical shock*

IEC 60749-12, *Semiconductor devices – Mechanical and climatic test methods – Part 12: Vibration, variable frequency*

IEC 61851-1, *Electric vehicle conductive charging system – Part 1: General requirements*

IEC 61967-1, *Integrated circuits – Measurement of electromagnetic emissions, 150 kHz to 1 GHz – Part 1: General conditions and definitions*

IEC 61967-2, *Integrated circuits – Measurement of electromagnetic emissions, 150 kHz to 1 GHz – Part 2: Measurement of radiated emissions – TEM cell and wideband TEM cell method*

IEC TS 61967-3, *Integrated circuits – Measurement of electromagnetic emissions – Part 3: Measurement of radiated emissions – Surface scan method*

IEC 61967-4, *Integrated circuits – Measurement of electromagnetic emissions, 150 kHz to 1 GHz – Part 4: Measurement of conducted emissions, 1 ohm/150 ohm direct coupling method*

IEC 61967-5, *Integrated circuits – Measurement of electromagnetic emissions, 150 kHz to 1 GHz – Part 5: Measurement of conducted emissions – Workbench Faraday Cage method*

IEC 61967-6, *Integrated circuits – Measurement of electromagnetic emissions, 150 kHz to 1 GHz – Part 6: Measurement of conducted emissions – Magnetic probe method*

IEC 61967-8, *Integrated circuits – Measurement of electromagnetic emissions – Part 8: Measurement of radiated emissions – IC stripline method*

IEC 62132-1, *Integrated circuits – Measurement of electromagnetic immunity – Part 1: General conditions and definitions*

IEC 62132-2, *Integrated circuits – Measurement of electromagnetic immunity – Part 2: Measurement of radiated immunity – TEM cell and wideband TEM cell method*

IEC 62132-3, *Integrated circuits – Measurement of electromagnetic immunity, 150 kHz to 1 GHz – Part 3: Bulk current injection (BCI) method*

IEC 62132-4, *Integrated circuits – Measurement of electromagnetic immunity 150 kHz to 1 GHz – Part 4: Direct RF power injection method*

IEC 62132-5, *Integrated circuits – Measurement of electromagnetic immunity, 150 kHz to 1 GHz – Part 5: Workbench Faraday cage method*

IEC TS 62215-2, *Integrated circuits – Measurement of impulse immunity – Part 2: Synchronous transient injection method*

IEC 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

3.1
power interface
physical connection between two different functional units those are connected via cable, printed circuit or wireless connection through a medium such as air to transfer the electrical power

EXAMPLE connection between battery and electrical load such as electronic control units (ECU) and sensors through electrical cable to transfer electrical power.

3.2
reference voltage
V_r
value of the voltage in accordance with which the relevant performance of a meter is fixed

[SOURCE: IEC 60050-314:2001, 314-07-04]

3.3
maximum voltage
V_{max}
the specified highest voltage applied to a load at which the load (systems or devices) operate normally

3.4
minimum voltage
V_{min}
the specified lowest voltage applied to a load at which the load (systems or devices) operate normally

4 General system

4.1 General system blocks

Power sources in automotive vehicles vary depending on the type of automotive vehicles. Using energy harvesting and wireless power transfer technologies, the battery in an automotive vehicle can be charged to provide power to sensors directly or through ECU as shown in Figure 1.

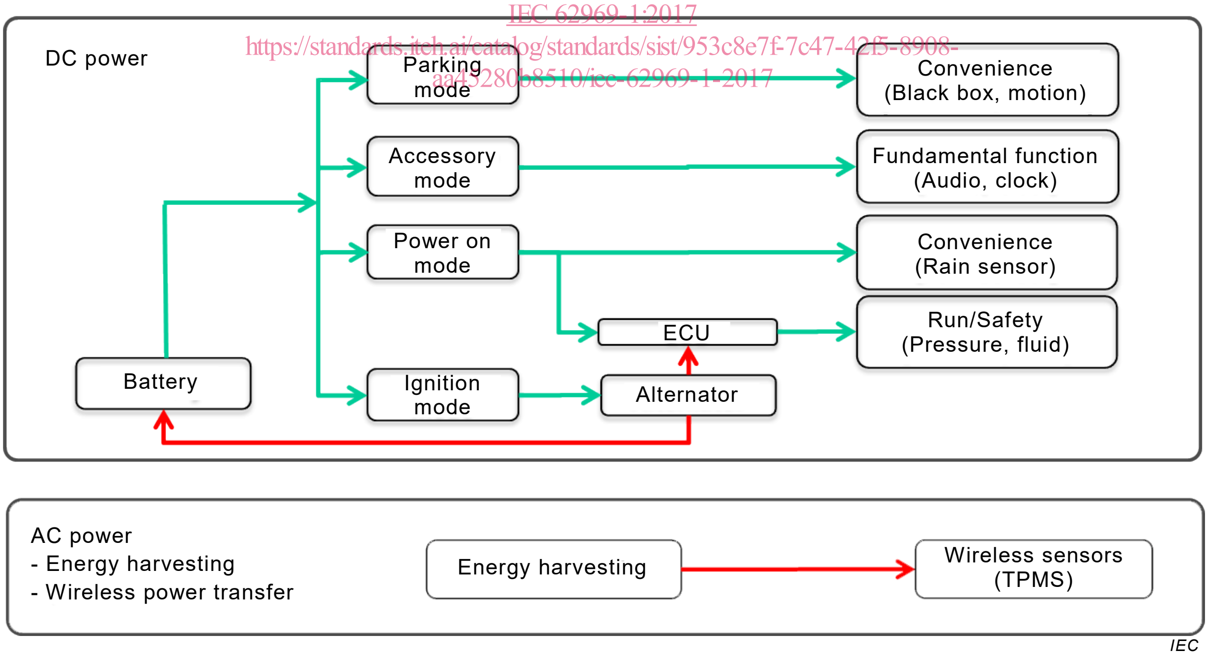

Figure 1 – Power supply chains to the vehicle sensors

4.2 Classification

4.2.1 Sensors in automotive vehicles

The type of the applicable sensors with respect to usage shall be listed as shown in Table 1.

Table 1 – Sensors for automotive vehicles

Usage	Sensors	Type
Run (power train and control)	oxygen sensor	gas sensor
	crankshaft position sensor	magnetic sensor
	engine coolant temperature sensor	temperature sensor
	wheels speed sensor	magnetic sensor
	shaft speed sensor	hall sensor
	manifold absolute pressure (MAP) sensor	pressure sensor
	throttle position sensor	hall sensor
	torque sensor	magnetic sensor
	transmission fluid temperature sensor	temperature sensor
	turbine speed sensor	magnetic sensor
	vehicle speed sensor	magnetic sensor
	current sensor	current sensor
	fuel level sensor	capacitive sensor
	engine oil level sensor	ultrasonic sensor
	brake fluid level sensor	magnetic sensor
Safety	air bag sensor	accelerometer sensor
	steering wheel angle sensor	magnetic sensor
	blind spot monitor	image sensor
	parking sensor	ultrasonic sensor
	radar sensor	radar sensor
	yaw rate sensor	gyro sensor
	tire pressure sensor	pressure sensor
Security, Convenience and Entertainment	rain sensor	light sensor
	light sensor	light sensor
	temperature/ humidity sensor	temperature/ humidity sensor
	air quality sensor	gas sensor
	black box	image sensor

NOTE Additional sensors can be added.

4.2.2 Power sources

To provide power to sensors, various power sourcing technologies can be used as in Table 2.

Table 2 – Power sources to sensors in automotive vehicles

Power sources	Power sourcing methods
Generating power using Fuel or gas	Activating engine to generate electrical power using fuel or gas
Wireless power transfer	Providing electrical power from transmitter to sensors through air or medium (inductive coupling, magnetic resonance, microwave-based transfer, etc.)
Energy harvesting	Acquiring electrical power from physical phenomena of environment such as vibration, thermal difference, etc.

NOTE Additional power sourcing technologies can be added.

4.3 Data interface

4.3.1 General

The functions described in 4.3.2 and 4.3.3 shall be included to control and monitor the status of power supply between ECU and sensors.

4.3.2 Reset

Reset function of power supply shall be provided. This function shall be done automatically or manually.

4.3.3 Monitoring

Monitoring function of power supply shall be provided. This function shall be provided with user interface (UI) such as display.

5 Environmental conditions and requirements

5.1 General

The power interface for sensors in automotive vehicles shall be designed and manufactured to resist the effect of various solvents and fluids, vibration and shock, temperature changes, humidity changes and dust.

Environmental conditions shall be defined for semiconductor components used for automotive vehicle according to existing specifications based on IEC 61851-1 and classification of environmental conditions based on IEC 60721 (all parts).

5.2 Test conditions and items

5.2.1 General

All test conditions and items shall be listed in a table or diagram as shown as an example in Figure 2.

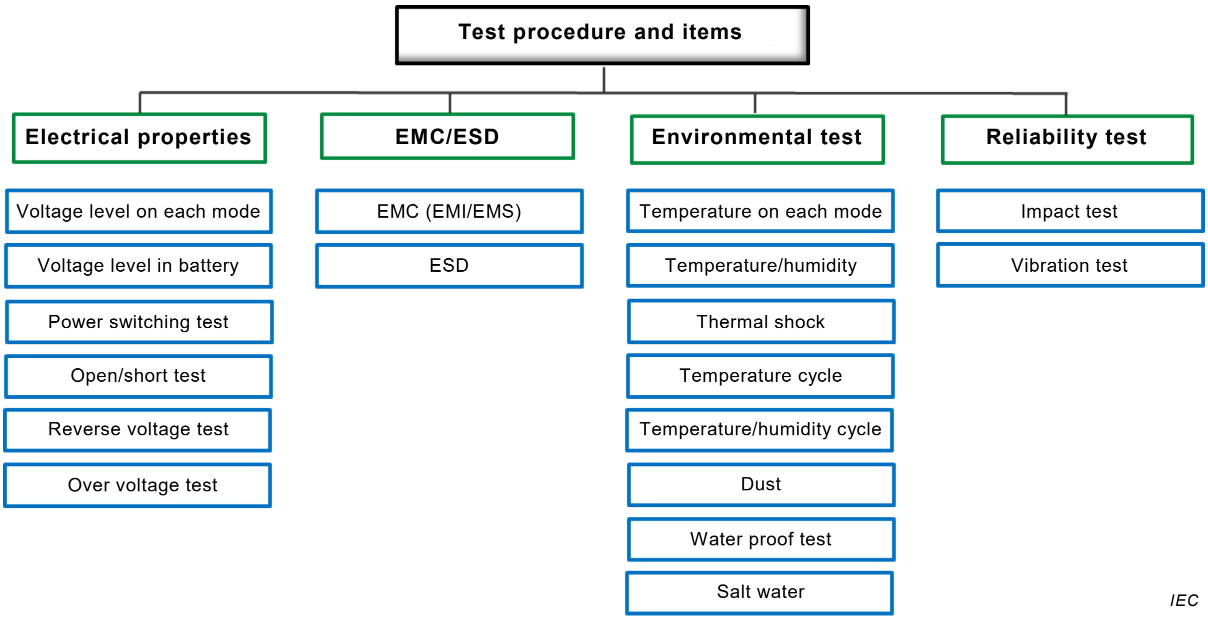

Figure 2 – Example of test conditions and items