
**Road vehicles — Electrical
disturbances from conduction and
coupling —**

**Part 1:
Definitions and general
considerations**

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*Véhicules routiers — Perturbations électriques par conduction et
par couplage —*

Partie 1: Définitions et généralités

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#).

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 32, *Electrical and electronic components and general system aspects*.

This third edition cancels and replaces the second edition (ISO 7637-1:2002), which has been technically revised. It also incorporates the Amendment ISO 7637-1:2002/Amd 1: 2008.

ISO 7637 consists of the following parts, under the general title *Road vehicles — Electrical disturbances from conduction and coupling*:

- *Part 1: Definitions and general considerations*
- *Part 2: Electrical transient conduction along supply lines only*
- *Part 3: Electrical transient transmission by capacitive and inductive coupling via lines other than supply lines*

The following parts are under preparation:

- *Part 4: Electrical transient conduction along shielded high voltage supply lines only*
- *Part 5: Enhanced definitions and verification methods for harmonization of pulse generators according to ISO 7637-2 [Technical Report]*

[Annex A](#) forms an integral part of this part of ISO 7637.

Introduction

Electrical and radio-frequency disturbances occur during normal operation of many items of motor vehicle equipment. They are generated over a wide frequency range and can be distributed to on-board electronic devices and systems by conduction, coupling or radiation.

In recent years, an increasing number of electronic devices for controlling, monitoring and displaying a variety of functions have been introduced into vehicle designs. It is necessary to consider the electrical and electromagnetic environment in which these devices operate and, in particular, the disturbances generated in the vehicle electrical system itself. Such disturbances can cause degradation (temporary malfunction or even permanent damage) of the electronic equipment. Moreover, “worst-case” situations are usually those resulting from disturbances generated inside the vehicle by, for example, ignition systems, generator and alternator systems, electric motors and actuators.

[Annex A](#) specifies a general method for function performance status classification (FPSC). Typical severity levels are included in an annex of each of the other parts of ISO 7637.

While narrowband signals generated on or outside the vehicle (by broadcasting and radio-transmitters) can also affect the performance of electronic devices, and recognizing that protection from such potential disturbances has to be considered as part of total system certification, these matters are nevertheless outside the scope of ISO 7637 and are not covered by it.

ISO 11451 and ISO 11452 specify test methods for immunity to radiated disturbances for vehicles and for components, respectively. ISO 10605 specifies test methods for immunity to electrostatic discharge (ESD) for vehicle and for components.

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Road vehicles — Electrical disturbances from conduction and coupling —

Part 1: Definitions and general considerations

1 Scope

This part of ISO 7637 defines the basic terms relating to electrical disturbances from conduction and coupling used in the other parts of ISO 7637. It also gives general information on the whole ISO 7637 series.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-151, *International Electrotechnical Vocabulary — Part 151: Electrical and magnetic devices*

3 Terms and definitions (standards.iteh.ai)

For the purposes of this document, the terms and definitions given in IEC 60050-151 and the following apply. <https://standards.iteh.ai/catalog/standards/sist/1aae42c3-193c-4454-a4f0-99dbd2d24859/iso-7637-1-2015>

3.1 artificial network

AN

network inserted in the supply lead or signal/load lead of apparatus to be tested which provides, in a given frequency range, a specified load impedance for the measurement of disturbance voltages and which can isolate the apparatus from the supply or signal sources/loads in that frequency range

Note 1 to entry: Network inserted in the d.c. power lines of the DUT which provides, in a given frequency range, a specified load impedance and which isolates the DUT from the d.c. power supply in that frequency range.

3.2 burst

transient comprised of a complex series of transient voltage variations

Note 1 to entry: For bursts, in addition to the parameters given in the definitions; [3.2.1](#), [3.2.2](#) and [3.2.3](#) are also relevant. For an illustration of a burst transient waveform, see ISO 7637-2.

3.2.1 burst cycle time

time between the start of the first *pulse* ([3.13](#)) of two consecutive *bursts* ([3.2](#))

3.2.2 burst duration

time during which a complex series of transient voltage variations occurs during a single *burst* ([3.2](#))

3.2.3 time between bursts

time between the end of one *burst* ([3.2](#)) and the start of the next one

**3.3
coupling**

means or device for transferring power between systems

Note 1 to entry: For coupling, in addition to the parameters given in the definitions; [3.3.1](#) and [3.3.2](#) are also relevant.

[SOURCE: IEC 60050-726-14-01, modified]

**3.3.1
coupling clamp**

device of defined dimensions and electromagnetic characteristics designed for common-mode *coupling* ([3.3](#)) of the disturbance transient to the circuit under test without any galvanic connection to it

**3.3.1.1
capacitive coupling clamp**

CCC

special fixture that facilitates capacitive *coupling* ([3.3](#)) of fast transient *test pulses* ([3.15](#)) into signal lines under test without any galvanic connection to the terminals of the circuits, or any other part of the DUT

**3.3.1.2
inductive coupling clamp**

ICC

bulk current injection (BCI) type probe to provide the means of *coupling* ([3.3](#)) slow transient *test pulses* ([3.15](#)) into signal lines under test without any galvanic connection to the terminals of the circuits, or any other part of the DUT

**3.3.2
coupling network**

electrical circuit for the purpose of transferring energy from one circuit to another

**3.3.3
direct capacitive coupling**

DCC

method using discrete, non-polarized capacitor to couple fast and slow transient test pulses into the DUT's signal lines under test

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**3.4
degradation**

(of performance) undesired departure in the operational performance of any device, equipment or system from its intended performance

Note 1 to entry: The term “degradation” can apply to temporary or permanent failure.

[SOURCE: IEC 60050-161-01-19]

**3.5
electromagnetic compatibility**

EMC

ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable *electromagnetic disturbances* ([3.6](#)) to anything in that environment

[SOURCE: IEC 60050-161-01-07]

**3.6
electromagnetic disturbance**

any electromagnetic phenomenon which can degrade the performance of a device, equipment or system, or adversely affect living or inert matter

Note 1 to entry: An electromagnetic disturbance may be an electromagnetic noise, an unwanted signal or a change in the propagation medium itself.

[SOURCE: IEC 60050-161-01-05]

3.7 electromagnetic interference EMI

degradation (3.4) of the performance of equipment, transmission channel or system caused by an *electromagnetic disturbance* (3.6)

Note 1 to entry: The English words “interference” and “disturbance” are often used indiscriminately.

[SOURCE: IEC 60050-161-01-06, modified]

3.8 electromagnetic radiation

phenomenon by which energy in the form of electromagnetic waves emanates from a source into space; energy transferred through space in the form of electromagnetic waves

Note 1 to entry: By extension, the term “electromagnetic radiation” sometimes also covers induction phenomena.

[SOURCE: IEC 60050-731-01-01, modified]

3.9 susceptibility

(electromagnetic) inability of a device, equipment or system to perform without *degradation* (3.4) in the presence of an *electromagnetic disturbance* (3.6)

Note 1 to entry: Susceptibility is a lack of immunity.

[SOURCE: IEC 60050-161-01-21]

3.10 ground (reference) plane

flat conductive surface whose potential is used as a common reference

[SOURCE: IEC 60050-161]

3.11 immunity (to a disturbance)

ability of a device, equipment or system to perform without *degradation* (3.4) in the presence of an *electromagnetic disturbance* (3.6)

[SOURCE: IEC 60050-161-01-20]

3.12 peak amplitude

highest absolute value of the amplitude of a *transient* (3.17)

3.13 pulse

comparatively smooth *transient* (3.17) with defined shape and time characteristics

Note 1 to entry: For pulses, the definitions given in 3.13.1, 3.13.2, 3.13.3, and 3.13.4 relative to pulse characteristics are also relevant.

3.13.1 pulse duration

time from the instant the absolute value of the *pulse* (3.13) rises above 10 % of the absolute value of the *peak amplitude* (3.12) to the instant it falls below 10 % of this

3.13.2 pulse fall time

time taken for the absolute value of the *pulse* (3.13) to decrease from 90 % to 10 % of the absolute value of the *peak amplitude* (3.12)