



**International  
Standard**

**ISO 11452-3**

**Road vehicles — Component test  
methods for electrical disturbances  
from narrowband radiated  
electromagnetic energy —**

**Part 3:  
Transverse electromagnetic  
(TEM) cell**

*Véhicules routiers — Méthodes d'essai d'un équipement soumis  
à des perturbations électriques par rayonnement d'énergie  
électromagnétique en bande étroite —*

*Partie 3: Cellule électromagnétique transverse (TEM)*

**Fourth edition  
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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 document 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](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 32, *Electrical and electronic components and general system aspects*.

This fourth edition cancels and replaces the third edition (ISO 11452-3:2016), of which it constitutes a minor revision. The changes are as follows:

- [Formula \(1\)](#) in [6.2.2](#) was modified.

A list of all parts in the ISO 11452 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Immunity measurements of complete road vehicles are generally able to be carried out only by the vehicle manufacturer, owing to, for example, high costs of absorber-lined shielded enclosures, the desire to preserve the secrecy of prototypes or a large number of different vehicle models.

For research, development and quality control, a laboratory measuring method can be used by both vehicle manufacturers and equipment suppliers to test electronic components.

The TEM cell method has the major advantage of not radiating energy into the surrounding environment. The method can be used for testing either the immunity of a component with the field coupling to the wiring harness or the immunity of the component alone with minimum exposure to the wiring harness.

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# Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy —

## Part 3: Transverse electromagnetic (TEM) cell

### 1 Scope

This document specifies transverse electromagnetic (TEM) cell tests for determining the immunity of electronic components of passenger cars and commercial vehicles to electrical disturbances from narrowband radiated electromagnetic energy, regardless of the vehicle propulsion system (e.g. spark-ignition engine, diesel engine, electric motor).

The electromagnetic disturbances considered are limited to continuous narrowband electromagnetic fields.

### 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.

ISO 11452-1, *Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy — Part 1: General principles and terminology*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11452-1 apply.

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

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

### 4 Test conditions

The upper frequency range limit of the TEM cell is a direct function of the TEM cell dimensions.

For testing automotive electronic systems, a 0,01 MHz to 200 MHz TEM cell should be used. See [Annex A](#) for suggested cell dimensions. See [Annex B](#) for methods to determine TEM-cell frequency range.

The user shall specify the test severity level or levels over the frequency range. See [Annex E](#) for suggested test severity levels.

Standard test conditions shall be those given in ISO 11452-1 for:

- test temperature;
- supply voltage;

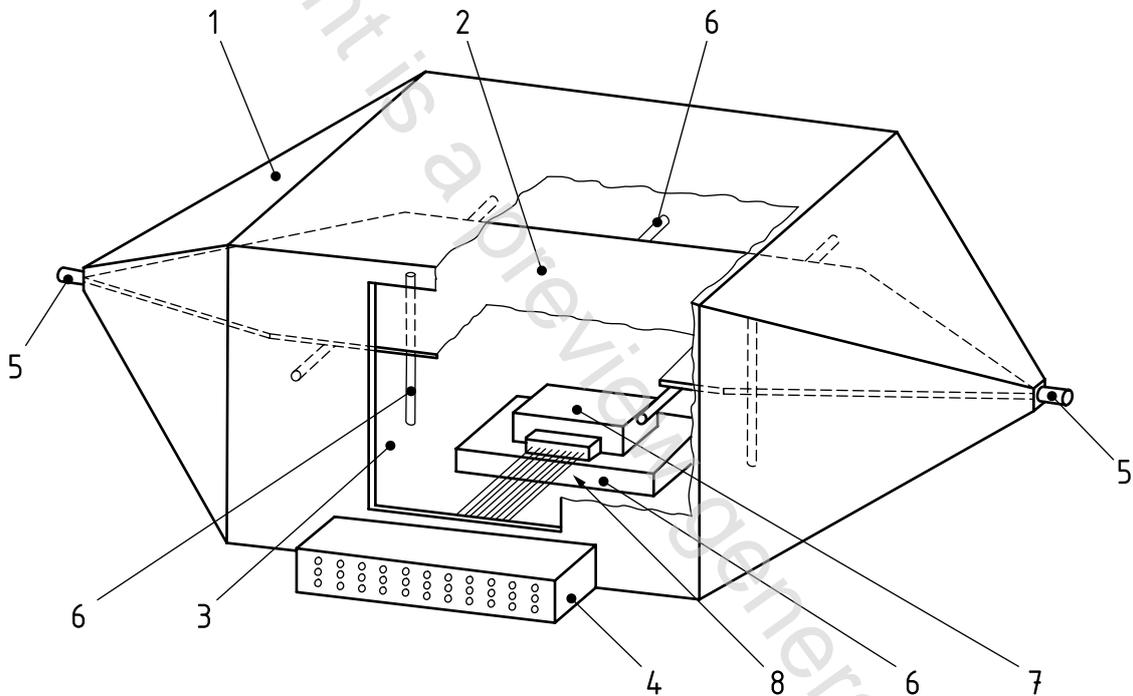
- modulation;
- dwell time;
- frequency step sizes;
- definition of test severity levels;
- test-signal quality.

## 5 Test apparatus

### 5.1 TEM cell

The TEM cell used for this test is a rectangular coaxial line with a  $50\ \Omega$  characteristic impedance (see [Figure 1](#)). The device under test is exposed to a uniform TEM field.

The TEM cell is a laboratory measurement system which can be used to generate test fields within 2 dB of the theoretical value if the device under test does not occupy an excessive portion of the test volume (see [5.3](#)).



#### Key

- 1 outer conductor (shield)
- 2 septum (inner conductor)
- 3 access door
- 4 connector panel (optional)
- 5 coaxial connectors
- 6 dielectric support (relative permittivity  $\epsilon_r \leq 1,4$ )
- 7 device under test
- 8 input/output leads

Figure 1 — TEM cell