INTERNATIONAL STANDARD

ISO 11452-9

Second edition
2021-10

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

Part 9: Portable transmitters

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

Partie 9: Émetteurs portables

Reference number
ISO 11452-9:2021(E)

© ISO 2021



COPYRIGHT PROTECTED DOCUMENT

© ISO 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Test conditions ... **1**

5 Test location ... **2**

6 Test instrumentation ... **2**
6.1 General ... 2
6.2 Simulated portable transmitters ... 2
6.2.1 General ... 2
6.2.2 Dual directional coupler ... 3
6.2.3 Power monitoring ... 3
6.2.4 Low loss coaxial cable ... 4
6.2.5 Vector network analyser (VNA) ... 4
6.2.6 Transmit antenna ... 4
6.2.7 Stimulation and monitoring of the DUT ... 5

7 Test set-up ... **5**
7.1 Ground plane ... 5
7.2 LV power supply system ... 5
7.3 HV power supply system ... 6
7.4 Location of the DUT ... 6
7.5 Location of the test harness ... 7
7.6 Location of the load simulator ... 7
7.7 Location of the simulated portable transmitter equipment. ... 7

8 Test procedure ... **17**
8.1 General ... 17
8.2 Test plan ... 17
8.3 Test procedure ... 17
8.3.1 General ... 17
8.3.2 DUT test ... 18
8.3.3 Antenna positioning for coupling to the DUT/connectors ... 21
8.3.4 Antenna positioning for coupling to harness ... 26
8.4 Test report ... 36

Annex A (normative) **Net power characterization procedure** ... **37**

Annex B (informative) **Typical characteristics and use of portable transmitters** ... **48**

Annex C (informative) **Characteristics of simulated portable transmitter antenna** ... **51**

Annex D (informative) **Function performance status classification (FPSC)** ... **73**

Annex E (informative) **Remote/local grounding** ... **74**

Annex F (informative) **Broadband noise source by AWG (arbitrary waveform generator)** ... **76**

© ISO 2021 – All rights reserved

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 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.

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

This second edition cancels and replaces the first edition (ISO 11452-9:2012), which has been technically revised.

The main changes are as follows:

— change of the frequency range from 26 MHz – 5,85 GHz to 142 MHz – 6 GHz;

— suppression of test methodology with commercial transmitters;

— use of modulation from ISO 11452-1;

— modifications of ground plane dimensions;

— introduction of additional artificial networks (HV-AN, AMN, AAN) for DUT powered by a shielded power system;

— addition of test set-up descriptions and figures for HV power supply system;

— addition of wording for DUT, connector and harness testing;

— addition of new Annex A with description of test methodology for net power characterization procedure;

— addition in Annex C of microwave broadband dipole antenna and HF broadband sleeve antenna;

— addition of Annex F on broadband noise source with arbitrary waveform generator.

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.

© ISO 2021 – All rights reserved

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

Part 9: Portable transmitters

1 Scope

This document specifies test methods and procedures for testing electromagnetic immunity of electronic components for passenger cars and commercial vehicles to portable transmitters in close proximity, regardless of the propulsion system (e.g. spark-ignition engine, diesel engine, electric motor). The device under test (DUT), together with the wiring harness (prototype or standard test harness), is subjected to an electromagnetic disturbance generated by portable transmitters inside an absorber-lined shielded enclosure, with peripheral devices either inside or outside the enclosure. 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*

Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz). International Commission on Non-Ionizing Radiation Protection (ICNIRP)

3 Terms and definitions

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

3.1
reference position
geometrical centre of the radiation pattern of the antenna, which is determined by the manufacturer based on near field measurement

4 Test conditions

The applicable frequency range of the test method is 142 MHz to 6 GHz.

© ISO 2021 – All rights reserved