
**Road vehicles — EMC guidelines for
installation of aftermarket radio
frequency transmitting equipment**

*Véhicules routiers — Guide sur la compatibilité électromagnétique
(CEM) pour l'installation en seconde monte d'équipements radio-
téléphone*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/TS 21609:2003](https://standards.iteh.ai/catalog/standards/sist/c002826f-3cae-456f-8b14-40cf8a54bf2e/iso-ts-21609-2003)

<https://standards.iteh.ai/catalog/standards/sist/c002826f-3cae-456f-8b14-40cf8a54bf2e/iso-ts-21609-2003>



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/TS 21609:2003](https://standards.iteh.ai/catalog/standards/sist/c002826f-3cae-456f-8b14-40cf8a54bf2e/iso-ts-21609-2003)

<https://standards.iteh.ai/catalog/standards/sist/c002826f-3cae-456f-8b14-40cf8a54bf2e/iso-ts-21609-2003>

© ISO 2003

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote.
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

ISO/TS 21609 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/TS 21609:2003](#)

<https://standards.iteh.ai/catalog/standards/sist/c002826f-3cae-456f-8b14-40cf8a54bf2e/iso-ts-21609-2003>

Road vehicles — EMC guidelines for installation of aftermarket radio frequency transmitting equipment

1 Scope

This Technical Specification gives requirements and recommendations for the installation in road vehicles of

- radio frequency (RF) transmitting and receiving equipment,
- “in-road-vehicle” mounting kits for transportable and handheld RF equipment, and
- ancillary equipment associated with these.

As well as methods for installation, it establishes methods for minimizing the possibility of electromagnetic interference (EMI) between the installed equipment and the vehicle electrical and electronic systems.

iTeh STANDARD PREVIEW

2 Normative references (standards.iteh.ai)

The following referenced documents are indispensable for the application 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.

standards/sist/c002826f-3cae-456f-8b14-40cf8a54bf2e/iso-ts-21609-2003

IEC 60050, *International Electrotechnical Vocabulary (IEV)*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms and definitions given in IEC 60050 and the following terms, definitions and abbreviated terms apply.

3.1 Definitions

3.1.1

mobile equipment

receiver, transmitter or transmitter/receiver (transceiver) that is intended for installation and use in a vehicle, and powered by the main battery of the vehicle

3.1.2

ancillary equipment

any equipment required as part of the installation in addition to the radio

EXAMPLE Voltage converter.

3.1.3

equipment supplier

supplier of the equipment to the installer

NOTE The equipment supplier could be a dealer, distributor or manufacturer.

3.1.4

floating system

isolated ground return

3.1.5

ground plane

conducting plane of a minimum dimension proportional to the wavelength λ on which a panel mount antenna is fitted

3.1.6

installer

radio equipment installation technician

3.1.7

radiating element

part of an antenna which radiates the signal

3.1.8

vehicle supplier

supplier of the vehicle, who could be a dealer or the manufacturer/importer of the vehicle

3.2 Abbreviated terms

ABS	anti blocking system
CB	citizen band
ECU	electronic control unit
EMC	electromagnetic compatibility
EMI	electromagnetic interference
HT	high tension (i.e. the high voltage circuits of the ignition system)
ICE	in-car entertainment
PMR	private mobile radio
RF	radio frequency
RFI	radio frequency interference
VSWR	voltage standing wave ratio

4 General

Installation of RF-transmitting equipment shall be performed by competent personnel. The vehicle and RF transmitting equipment manufacturers' instruction manuals and installation notes shall be followed.

NOTE Vehicle manufacturer's instructions take priority in case of conflict.

The installation shall comply with national legal requirements for the installation and use of RF equipment in vehicles.

Installation shall be checked for possible interference between the RF-transmitting equipment and the vehicle electric systems in accordance with 6.3.

4.1 Customer liaison and installation requirements

4.1.1 General

The customer shall

- be advised to use a suitable antenna for the particular application and optimum position,
- be made aware of the various fixing locations and mounts available for the items to be fitted, and
- be asked whether an ignition switched supply to the equipment is required.

4.1.2 EMC requirements

After-market RF-transmitting equipment for installation in road vehicles shall fulfil the requirements of RF-product relevant EMC standards and road vehicle standards. Contact the road vehicle manufacturer and/or equipment supplier if necessary to ensure that the latest version is used.

The purpose of road vehicle EMC standards (see Table 1) and legal requirements (Table 2) is to ensure

- the protection of broadcast receivers in a residential environment from radio disturbances from vehicles at distances greater than 10 m,
- that vehicle RF-receivers have sufficient protection from unwanted emissions of other electric systems (RF-systems included) installed in the same vehicle, and
- that no vehicle functions are affected because of the susceptibility of RF-systems to radiated or conducted disturbances.

ISO/TS 21609:2003
<https://standards.iteh.ai/catalog/standards/sist/002826f-5cae-456f-8614-40c18a546f2e/iso-ts-21609-2003>
Table 1 — ISO and IEC/CISPR EMC and RFI standards for road vehicles

Standard	Title
ISO 7637	<i>Road vehicles — Electrical disturbances by conduction and coupling</i>
ISO 10605	<i>Road vehicles — Test methods for electrical disturbances from electrostatic discharge</i>
ISO 11451	<i>Road vehicles — Vehicle test methods for electrical disturbances from narrowband radiated electromagnetic energy</i>
ISO 11452	<i>Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy</i>
ISO 13766	<i>Earth-moving machinery — Electromagnetic compatibility</i>
ISO 14982	<i>Agricultural and forestry machinery — Electromagnetic compatibility — Test methods and acceptance criteria</i>
CISPR 12	<i>Vehicles, motorboats and spark-ignited engine-driven devices — Radio disturbance characteristics — Limits and methods of measurement</i>
CISPR 25	<i>Radio disturbance characteristics for the protection of receivers used on board vehicles, boats, and on devices — Limits and methods of measurement</i>

Table 2 — Selection of EMC regulations for vehicles and equipment

Standard	Title
95/54/EC	<i>Commission Directive 95/54/EC of 31 October 1995 adapting to technical progress Council Directive 72/245/EEC on the approximation of the laws of the Member States relating to the suppression of radio interference produced by spark-ignition engines fitted to motor vehicles and amending Directive 70/156/EEC on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers</i>
ECE-R 10	<i>Uniform provisions concerning the approval of vehicles with regard to electromagnetic compatibility</i>
1999/5/EC	<i>Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity</i>
ECE-R 97	<i>Uniform provisions concerning the approval of vehicle alarm systems and of vehicles with regard to their alarm systems</i>
CFR Title 47 Part 15	<i>Telecommunication, Radio Frequency Devices</i>

In addition to vehicle standards, RF-product specific EMC standards (see Table 3) are designed to ensure that

- the RF-system operates in environments specified in the applicable radio EMC standard, and
- unwanted emissions are controlled to a specific level.

4.1.3 Vehicle supplier’s warranty (standards.iteh.ai)

Installation of mobile radio equipment to any part of the vehicle, other than an authorized connection or mounting location, may invalidate the vehicle warranty. If in doubt, the vehicle or equipment supplier shall be consulted.

4.1.4 Electromagnetic and radio frequency interference

Full consideration shall be given to the positioning of mobile RF-transmitting equipment such that electromagnetic interference (EMI) and radio frequency interference (RFI) is minimized between the RF transmitting equipment being installed and the vehicle electrical and electronic systems.

Mobile equipment may include radio equipment, ancillary equipment, antenna and feeder cable.

4.1.5 Radio equipment and ancillary items

Prior to the installation of the radio equipment or any other ancillary items, it is essential that the vehicle manufacturer’s and equipment supplier’s instructions be followed, in order to ensure that the safe operation of the vehicle is not impaired.

Care shall be taken when planning the installation that any additional equipment used does not constitute a safety hazard and does not contravene safety regulations.

Care shall be taken to ensure that any microphone/handset lead is not installed such that the lead can interfere with the vehicle controls or driver.

Where a hand portable or transportable unit is installed in road vehicles, the correct car adapter kit specified for the product shall be used.

Table 3 — Selection of EMC product standards for RF-equipment

Standard	Title
EN 301 489-1	<i>Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements</i>
Draft EN 301 489-3	<i>Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz</i>
Draft EN 301 489-5	<i>Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 5: Specific conditions for Private land Mobile Radio (PMR) and ancillary equipment (speech and non-speech)</i>
Draft EN 301 489-6	<i>Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 6: Specific conditions for Digital Enhanced Cordless Telecommunications (DECT) equipment</i>
Draft EN 301 489-7	<i>Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 7: Specific conditions for mobile and portable radio and ancillary equipment of digital cellular radio telecommunications systems (GSM and DCS)</i>
Draft EN 301 489-12	<i>Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 12: Specific conditions for Very Small Aperture Terminal, Satellite Interactive Earth Stations operated in the frequency ranges between 4 GHz and 30 GHz in the Fixed Satellite Service (FSS)</i>
Draft EN 301 489-13	<i>Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 13: Specific conditions for Citizens' Band (CB) radio and ancillary equipment (speech and non-speech)</i>
Draft EN 301 489-15	<i>Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 15: Specific conditions for commercially available amateur radio equipment</i>
Draft EN 301 489-16	<i>Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 16: Specific conditions for analogue cellular radio communications equipment, mobile and portable</i>
Draft EN 301 489-18	<i>Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 18: Specific conditions for Terrestrial Trunked Radio (TETRA) equipment</i>
Draft EN 301 489-22	<i>Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 22: Specific conditions for ground based VHF aeronautical mobile and fixed radio equipment</i>
RSS-119	<i>Land mobile and fixed radio transmitters and receivers, 27.41 MHz to 960 MHz</i>
RSS-128	<i>800 MHz Dual-mode TDMA cellular telephones</i>
RSS-129	<i>800 MHz Dual-mode CDMA cellular telephones</i>
RSS-136	<i>Land and mobile station radiotelephone transmitters and receivers operating in the 26,960 – 27,410 MHz general radio service band</i>