

Methods of test for

Electrical disturbance by conduction and coupling —

**Part 2: Electrical transient conduction
along supply lines only on passenger
cars and light commercial vehicles
with 12 V supply**

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Automobile Standards Policy Committee (AUE/-) to Technical Committee AUE/16, upon which the following bodies were represented:

- Association of Trailer Manufacturers
- British Cable Makers Confederation
- Department of Transport
- Institution of Electrical Engineers
- Motor Industry Research Association
- National Caravan Council Ltd.
- Society of Motor Manufacturers and Traders Ltd.

This British Standard, having been prepared under the direction of the Automobile Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 29 November 1991

© BSI 03-1999

The following BSI references relate to the work on this standard:
Committee reference AUE/16
Draft for comment 88/73080 DC

ISBN 0 580 20152 X

Amendments issued since publication

Amd. No.	Date	Comments

Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
1 Scope	1
2 Normative reference	1
3 Test procedure	1
4 Test instrument description and specifications	3
5 General techniques to improve electromagnetic compatibility of device	10
Annex A Failure mode severity classification	12
Figure 1 — Conducted voltage transients measurement test setup	2
Figure 2 — Conducted current transients measurement test setup	2
Figure 3 — Transient immunity test setup	3
Figure 4 — Schematic diagram of artificial network	4
Figure 5 — $ Z_{PB} $ as a function of frequency from 100 kHz to 100 MHz (AB short-circuited)	4
Figure 6 — Test pulse 1	5
Figure 5 — Test pulse 2	6
Figure 8 — Test pulse 3a	7
Figure 9 — Test pulse 3b	7
Figure 10 — Test pulse 4	8
Figure 11 — Test pulse 5	9
Figure 12 — Test pulse 6	10
Figure 13 — Test pulse 7	10
Table A.1 — Test levels	13
Table A.2 — Example 1	13
Table A.3 — Example 2	14
Publication(s) referred to	Inside back cover

National foreword

This British Standard has been prepared under the direction of the Automobile Standards Policy Committee and is identical with ISO 7637-1 *“Road vehicles — Electrical disturbance by conduction and coupling — Part 1: Passenger cars and light commercial vehicles with nominal 12 V supply voltage — Electrical transient conduction along supply lines only”*, published by the International Organization for Standardization (ISO).

The Technical Committee has reviewed the provisions of ISO 6722-3, to which reference is made in the text and has decided that they are acceptable for use in conjunction with this standard.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This part of ISO 7637 specifies test methods and procedures to ensure the compatibility to conducted electrical transients of equipment installed on passenger cars and light commercial vehicles fitted with a 12 V electrical system. It describes bench tests for both the injection and measurement of transients.

Functional status classifications for immunity to transients are given in Annex A.

NOTE General guidelines for the evaluation of transient emissions, test procedures for which are given in clause 3, will form the subject of a future addendum.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 7637. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 7637 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 6722-3:1984, *Road vehicles — Unscreened low-tension cables — Part 3: Conductor sizes and dimensions*.

3 Test procedures

3.1 General

Methods for measuring the transient emission on supply lines and test methods for the immunity of devices against such transients are given. These tests, called “bench tests”, are made in the laboratory.¹⁾

The bench test methods, some of which require the use of the artificial network, will provide comparative results between laboratories. They also give a basis for the development of devices and systems and may be used during the production phase.

A bench test method for the evaluation of the immunity of a device against supply line transients may be performed by means of a test pulse generator; this may not cover all types of transients which can occur in a vehicle. Therefore, the test pulses described in 4.6 are characteristic of typical pulses.

In special cases, it may be necessary to apply additional test pulses. However, some test pulses may be omitted, if a device — depending on its function or its connection — is not influenced by comparable transients in the vehicle. It is part of the vehicle manufacturer's responsibility to define the test pulses required for a specific device.

To ensure proper vehicle operation in the electromagnetic environment, on-board testing is essential.

3.2 Test temperature and test voltage

The ambient temperature during the test shall be $23\text{ °C} \pm 5\text{ °C}$.

The test voltages shall be as follows:

$$U_A = 13,5\text{ V} \pm 0,5\text{ V}$$

$$U_B = 12\text{ V} \pm 0,2\text{ V}$$

unless other values are agreed upon by the users of this part of ISO 7637, in which case such values shall be documented in the test reports.

3.3 Transient emissions test

3.3.1 Voltage transients

Voltage transients from the disturbance source, the device under test, are measured using the artificial network to standardize the impedance loading on the device under test (see 4.1). The disturbance source is connected via the artificial network to the shunt resistor R_{s1} (see 4.2), the switch S (see 4.3) and the power supply (see 4.4), as given in Figure 1.

The leads between the terminals of the disturbance source, the device under test, and the artificial network shall be laid out in a straight parallel line and shall have a length of $0,5\text{ m} \pm 0,05\text{ m}$.

The cable sizes shall be chosen in accordance with ISO 6722-3.

The disturbance voltage is measured at the terminals P and B of the artificial network (see Figure 1) using a voltage probe and an oscilloscope or waveform acquisition equipment.

Repetitive transients are measured with switch S closed. If the transient is caused by a supply disconnection, measurement is started at the moment of opening switch S.

3.3.2 Current transients

The test setup for measuring the disturbance current is shown in Figure 2.

The disturbance source is connected via the artificial network to the power supply. Resistor R_{s2} (see 4.2) is connected to the terminals of the artificial network on the power supply side (see Figure 2).

¹⁾ A future part of ISO 7637 will cover on-board vehicle tests.

The leads between the terminals of the disturbance source and the artificial network shall be laid out in a straight parallel line and shall have a length of $0,5\text{ m} \pm 0,05\text{ m}$.

The disturbance source is disconnected by the switch S.

The disturbance current measurement is started when switch S is opened.

The disturbance current should be measured between the artificial network and the device under test as close to the artificial network as possible.

3.4 Transient immunity test

The test setup for transient immunity measurements of electrical/electronic devices is given in Figure 3.

The leads between the terminals of the test pulse generator and the device under test shall be laid out in a straight parallel line and shall have a length of $0,5\text{ m} \pm 0,05\text{ m}$.

The test pulse generator (see 4.6) is set up to provide the specific pulse polarity, amplitude, duration and resistance with switch T (see 4.3) open. (The appropriate values are selected from Annex A.) Next, the device under test is connected to the generator by closing switch T.

Depending on the real conditions, the function of the device under test should be evaluated during and/or after the application of the test pulses.

For correct generation of the required test pulses, it may be necessary to switch the power supply on and off. The switching can be performed by the test pulse generator if the power supply is integral to it.

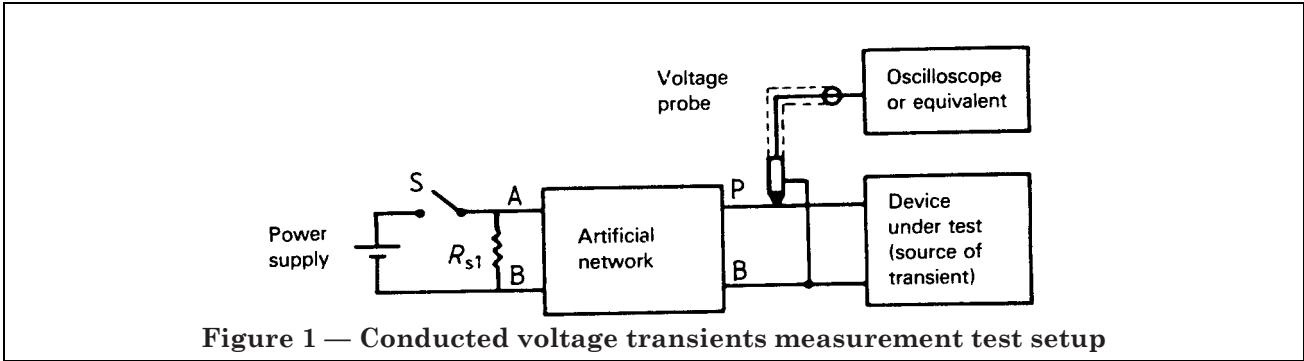


Figure 1 — Conducted voltage transients measurement test setup

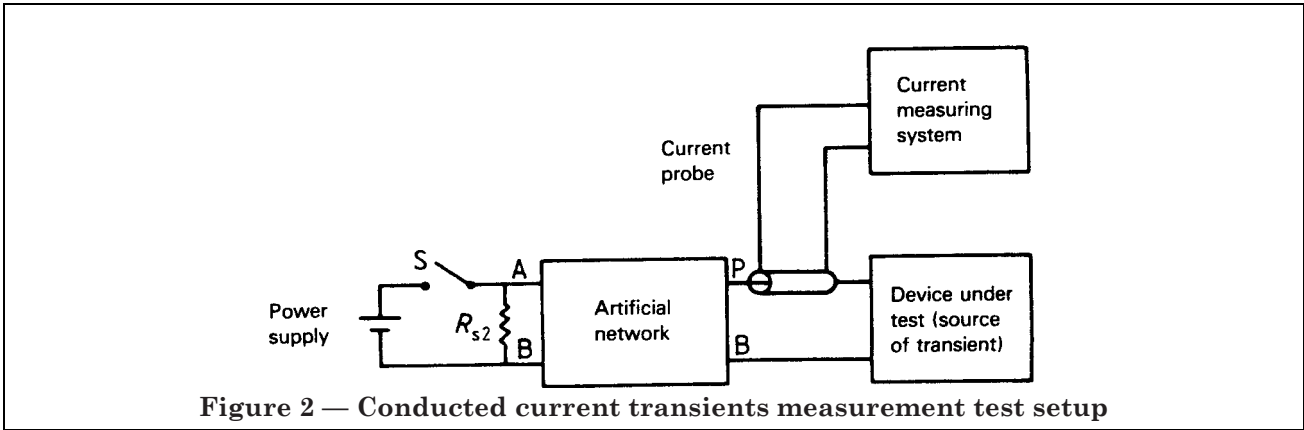


Figure 2 — Conducted current transients measurement test setup