SLOVENSKI STANDARD
SIST EN 60512-23-4:2002

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Connectors for electronic equipment - Tests and measurement - Part 23-4: Screening and filtering tests - Test 23d: Transmission line reflections in the domain (IEC 60512-23-4:2001)

Connectors for electronic equipment - Tests and measurements -- Part 23-4: Screening and filtering tests - Test 23d: Transmission line reflections in the time domain

Steckverbinder für elektronische Einrichtungen - Mess- und Prüfverfahren -- Teil 23-4: Prüfingen der Schirmung und Dämpfung - Prüfung 23d: Reflexion in Übertragungsstrecken im Zeitbereich

Connecteurs pour équipements électroniques - Essais et mesures -- Partie 23-4: Essais de blindage et de filtrage - Essai 23d: Réflexions de ligne de transmission en domaine temporel

Ta slovenski standard je istoveten z: **EN 60512-23-4:2001**

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English version

Connectors for electronic equipment – Tests and measurements Part 23-4: Screening and filtering tests – Test 23d: Transmission line reflections in the time domain (IEC 60512-23-4:2001)

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC
European Committee for Electrotechnical Standardization
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Foreword

The text of document 48B/1008/FDIS, future edition 1 of IEC 60512-23-4, prepared by SC 48B, Connectors, of IEC TC 48, Electromechanical components and mechanical structures for electronic equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60512-23-4 on 2001-07-01.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2002-04-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2004-07-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex A is normative and annex B is informative.

Endorsement notice

The text of the International Standard IEC 60512-23-4:2001 was approved by CENELEC as a European Standard without any modification.

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CONNECTORS FOR ELECTRONIC EQUIPMENT – TESTS AND MEASUREMENTS –

Part 23-4: Screening and filtering tests – Test 23d: Transmission line reflections in the time domain

1 Scope and object

This part of IEC 60512 defines two test methods for evaluating the performance of a connector in a transmission line by measuring the reflections produced by it in the time domain. In these methods, the connector under test is treated as a discontinuity in a transmission line with a controlled characteristic impedance.

Test method A uses precision coaxial and semi-rigid coaxial cables to connect the connector under test and the test equipment. This method is suitable for many connector or cable assembly geometries.

Test method B uses precision test boards, precision coaxial cables and semi-rigid coaxial cables to connect the connector under test and the test equipment. This method is suitable for printed board connectors.

2 Test equipment

Time domain reflectometer (TDR) or pulse generator and oscilloscope, precision cables of the characteristic impedance for which the connectors are intended, and a step generator, if applicable.

3 Test specimen

The test specimen shall consist of a mated pair of connector and/or cable assemblies including multiple contacts which may be variously connected to signal or ground conductors on the appropriate test cables.

4 Test fixtures

4.1 Test fixtures for test method A

The required fixturing is semi-rigid coaxial cable (or equivalent). Special fixturing, if required, is described in 6.1.

4.2 Test boards for test method B

For board-to-board connectors two printed circuit test boards incorporating a controlled characteristic impedance trace construction are used. Annex A contains a detailed description of the requirements and construction of these test boards.

5 Test procedure (methods A and B)

5.1 *Calibration of the test signal:* measure the effective rise time and amplitude of the test signal using a calibration trace to include the effect of fixturing on measurement system rise time.

NOTE It is recommended that the product of the upper frequency limit (MHz) and input signal rise time be approximately 0,6.

5.2 *Zero-reflection baseline:* establish a zero-reflection baseline for the measurement of the connector reflection (see clause B.2 of annex B for more information).

5.3 *Launch a signal* at one or more of the specified rise times. Figure 1 shows a typical waveform.

5.4 *Connector reflection amplitudes* (measurements in terms of the reflection coefficient rho (ρ) and not voltage).

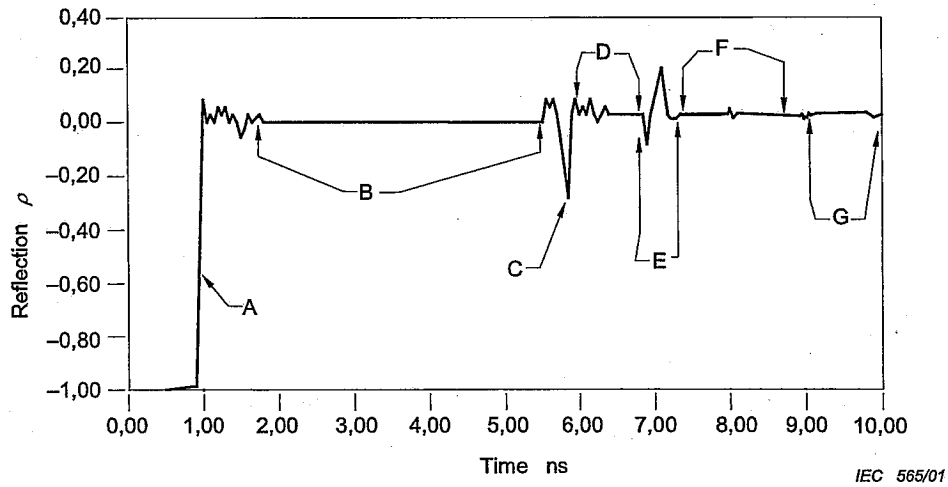
5.4.1 Measure the maximum positive and negative excursions (with respect to the zero-reflection baseline) of the reflection waveform corresponding to the connector under test.

5.4.2 Calculate the percentage of the measured step amplitude of the test system with test fixturing.

Connector reflection amplitude =

$$\frac{100 \times \text{measured connector reflection amplitude}}{\text{measured step amplitude of equipment with fixture}} \ (\%)$$

5.5 *Repeat steps 5.3 and 5.4* if multiple signal rise times are to be used. See clause B.3 of annex B for guidance regarding method/options to change signal rise times.



Portions of typical TDR waveform:

A TDR output voltage step
B Coaxial cable
C Cable to test board 1 connection
D Test board 1 trace
E Connector under test
F Test board 2 trace
G Resistive termination

Figure 1 – Typical TDR waveform showing connector reflection

6 Documentation on testing

6.1 Test methods A and B

The following items describe the required information when reporting results of this test:

a) description of the equipment used, including the manufacturer and model numbers of equipment mainframe and plug-ins;

b) method used to vary signal rise time (see clause B.3);

c) signal-to-ground pin pattern;

d) indication as to whether adjacent signal lines or pins of footprint description are open (floating), terminated resistor (for example terminated in 50 Ω, 75 Ω, or other ohmic values), grounded, or connected to power supply layer;

e) description of any special coaxial adaptors, probes, or attenuators that were used for connecting the test equipment to the test boards or cables. Description also of the connection method of the test connector to the printed board (for example, through hole mount, surface mount, press-in, or other), and the signal path in the test fixture;

f) description of the type and value of the resistive termination connected to the far end of the line under test (if applicable);

g) description of the types and values of the resistive terminations attached to other lines coupled to the line under test (if applicable);

h) the following measurements:

   1) rise time and amplitude of the test equipment step signal, INCLUDING the effect of test fixturing,

   2) for each test point and connector signal line to be tested, the maximum (positive or zero) and minimum (negative or zero) excursions of the reflection waveform due to the connector under test. These values are measured with respect to the zero reflection baseline specified in clause B.2. Report these values as a percentage of the measured step amplitude of the test equipment with test fixturing.

It is recommended that the photos of the oscilloscope traces, or plots of the TDR system, fixture test step calibration waveforms, and typical connector reflection waveforms labelled with corresponding test points and measurement numbers be included.

Format for reporting connector reflections – The following is a suggested format for reporting connector reflection amplitudes at a given signal rise time:

Reflection measurement	Test point on test board 1	Maximum reflection (positive or zero)	Minimum reflection (negative or zero)
		%	%
		%	%
		%	%