SLOVENSKI STANDARD
SIST EN 62037:2001

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RF connectors, connector cable assemblies and cables - Intermodulation level measurement (IEC 62037:1999)

RF connectors, connector cable assemblies and cables - Intermodulation level measurement

HF-Steckverbinder, konfektionierte Kabel und Kabel - Messung des Intermodulationspegels

Connecteurs, cordons et câbles - Mesure du niveau d'intermodulation

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33.120.30	Radiofrekvenčni konektorji (RF)	R.F. connectors

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EUROPEAN STANDARD

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RF connectors, connector cable assemblies and cables Intermodulation level measurement (IEC 62037:1999)

Connecteurs, cordons, câbles
Mesures du niveau d'intermodulation
(CEI 62037:1999)

HF-Steckverbinder, konfektionierte Kabel und Kabel - Messung des Intermodulationspegels
(IEC 62037:1999)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

The text of document 46/94/FDIS, future edition 1 of IEC 62037, prepared by IEC TC 46, Cables, wires, waveguides, r.f. connectors, and accessories for communication and signalling, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62037 on 1999-10-01.

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) 2000-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2002-10-01

Endorsement notice

The text of the International Standard IEC 62037:1999 was approved by CENELEC as a European Standard without any modification.

INTERNATIONAL STANDARD

IEC 62037

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RF connectors, connector cable assemblies and cables – Intermodulation level measurement

Connecteurs, cordons, câbles – Mesures du niveau d'intermodulation

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

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International Standard IEC 62037 has been prepared by IEC technical committee 46: Cables, wires, waveguides, r.f. connectors, and accessories for communication and signalling.

The text of this standard is based on the following documents:

FDIS	Report on voting
46/94/FDIS	46/97/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

The committee has decided that this publication remains valid until 2009. At this date, in accordance with the committee's decision, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

RF CONNECTORS, CONNECTOR CABLE ASSEMBLIES AND CABLES – INTERMODULATION LEVEL MEASUREMENT

1 Scope and object

This technical specification is applicable to the intermodulation (IM) level measurement of r.f. connectors, connector cable assemblies and cables.

The object of the test procedure given in this technical specification is to characterize the level of unwanted signals caused by the presence of two or more transmitting signals in passive r.f. components.

2 Level of intermodulation products

The basic theory of the generation of intermodulation products in r.f. circuits is well described in the literature.

In the case of passive r.f. components, intermodulation distortion is caused by sources of nonlinearity of mostly unknown nature, location and behaviour. A few examples are inter-metallic contacts, choice of materials, corrosion products, dirt, etc. Most of these effects are subject to changes over time due to mechanical stress, temperature changes, variations in material characteristics (cold flow, etc.), climatic changes and so on.

The generation of intermodulation products does not necessarily follow the law of the usual non-linear equation of quadratic form. Therefore, accurate calculation to other power levels causing the intermodulation is not possible.

On the other hand, generation of intermodulation is inherently not frequency selective. This allows for the testing of r.f. components at appropriate frequencies within the band of operation.

3 Principle of test procedure

For the test, signals of frequencies f_1 and f_2 with equal specified test port power level are combined and fed to the device under test (DUT). The test signals should contain at least 10 dB less harmonic or self-intermodulation signal level than the expected level generated in the DUT.

The intermodulation products of order ($f_1 \pm f_2$) or ($2f_2 \pm f_1$) etc. are measured with a calibrated receiver.

In most cases, the third order intermodulation signals represent the worst case condition of unwanted signals generated; therefore the measurement of these signals characterizes the DUT in a sufficient way. However, the test set-ups given in this technical specification are suitable for measuring other intermodulation products.

4 Test set-up

Experience shows that the generation of intermodulation products originates from point-sources inside a DUT. Therefore, either the reflected or the transmitted intermodulation signal can be measured.

Two different test set-ups are described in figures 1 and 2 and are for reference only. Other topologies are possible.

Set-up 1 is for measuring the reflected intermodulation signal only, and set-up 2 is for measuring the transmitted intermodulation signal also. Both of them allow the measurement of intermodulation signals of more than 100 dB below carrier level. The universal measurement method is the reflecting method, because it is applicable to one-port and multi-port devices.

The set-ups may be assembled from standard microwave or radio link hardware selected for this particular application. All components shall be checked for lowest self-intermodulation generation.

Experience shows that devices containing magnetic materials (circulators, isolators, etc.) can be prominent sources of intermodulation signal generation.

4.1 Test equipment

Two high power signal sources or signal generators with power amplifiers are required to reach the specified test port power. The summing device may be a circulator, hybrid junction, coupler or filter network, provided that the self-intermodulation generated is at least 10 dB below the level to be measured on the DUT.

The DUT shall be terminated by a load for the specified power if necessary. The receiving bandpass filter, tuned for the desired intermodulation signal, is followed by a low noise amplifier (if required) and a receiver.

4.1.1 Set-up 1

This set-up is to measure the reflected IM-product and is therefore suitable for 1-port and 2-port DUTs. A 2-port DUT shall be connected to a linear termination.

a) Generators

The generators shall provide continuous wave (CW) signals of the specified test port power. They shall have sufficient frequency stability to make sure that the IM-product can be detected properly by the receiver.

b) Transmit-filters

The filters are bandpass-filters tuned to the particular frequencies. They isolate the generators from each other and filter out the harmonics of f_1 and f_2.

c) Summing device 1

The summing device is used for combining the high-power signals f_1 and f_2, delivering them to the test port, and provides a port for the extraction of the reflected signal f_{IM}.

d) Receive-filter

This filter is used for isolating the input of the receiver from the high-power signals f_1 and f_2 to the extent that IM-products are not generated within the receiver.

e) Test port

The DUT is connected to P4. The specified input power shall be available here.