IEC 62037-1

Edition 3.0 2025-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Passive RF and microwave devices, intermodulation level measurement – Part 1: General requirements and measuring methods

Dispositifs RF et à micro-ondes passifs, mesure du niveau d'intermodulation – Partie 1: Exigences générales et méthodes de mesure

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PASSIVE RF AND MICROWAVE DEVICES, INTERMODULATION LEVEL MEASUREMENT –

Part 1: General requirements and measuring methods

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IEC 62037-1 has been prepared by IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories. It is an International Standard.

This third edition cancels and replaces the second edition published in 2021. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) added clarification that PIM generation is typically frequency dependent and noted that testing with swept or multiple fixed frequencies often provides more accurate results;
b) identified multi-port PIM analyzers as a possible test set-up topography;

c) added specification that test power level does not exceed the power handling capability of the DUT;

d) updated test specification to include missing parameters needed to properly define a PIM test;

e) added clarification that PIM test reports include the maximum PIM value measured over the test duration;

f) corrected error in Figure 3 that was erroneously changed in IEC 62037-1:2021.

The text of this International Standard is based on the following documents:

Draft	Report on voting
46/1035/FDIS	46/1043/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all the parts in the IEC 62037 series, published under the general title *Passive RF and microwave devices, intermodulation level measurement*, can be found on the IEC website.

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PASSIVE RF AND MICROWAVE DEVICES, INTERMODULATION LEVEL MEASUREMENT –

Part 1: General requirements and measuring methods

1 Scope

This part of IEC 62037 deals with the general requirements and measuring methods for intermodulation (IM) level measurement of passive RF and microwave components, which can be caused by the presence of two or more transmitting signals.

The test procedures given in this document give the general requirements and measurement methods required to characterize the level of unwanted IM signals using two transmitting signals.

The IEC 62037 series addresses the measurement of PIM but does not cover the long-term reliability of a product with reference to its performance.

2 Normative references

There are no normative references in this document.

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3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

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No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
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3.2 Abbreviated terms

CATV	community antenna television
CFEC	carbon fibre epoxy composite
CW	continuous wave
DUT	device under test
IM	intermodulation
PCB	printed circuit board
PIM	passive intermodulation
RBW	resolution bandwidth
VDA	vacuum deposited aluminium

4 Characteristics of intermodulation products

PIM interference is caused by sources of non-linearity 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.) and climatic changes.

The generation of intermodulation products originates from point sources inside a DUT and propagates equally in all available directions.

The generation of passive intermodulation (PIM) 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 and PIM comparisons should be made at the same power level.

Furthermore, PIM generation is typically frequency dependent and shall be investigated over the specified frequency band. Testing with swept or multiple fixed frequencies often provides more accurate results. See Annex B for additional information.

5 Principle of test procedure

Test signals of frequencies f_1 and f_2 with equal specified test port power levels are combined and fed to the DUT. The test signals should contain a harmonic or self-intermodulation signal level at least 10 dB lower than the expected level generated in the DUT.

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The PIM is measured over the specified frequency range. The intermodulation products of order $(2f_1 \pm f_2)$, $(2f_2 \pm f_1)$, etc., are measured.

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 Clause 6 are suitable for measuring other intermodulation products.

In other systems (such as CATV), the third order intermodulation signals might not be applicable in characterizing the DUT.

Intermodulation can be measured in the reverse and forward direction. Reverse and forward refer to the direction of propagation of the most powerful carrier.

6 Test set-up

6.1 General

Experience shows that the generation of intermodulation products originates from point sources inside a device under test (DUT) and propagates equally in all available directions. Therefore, either the reverse (reflected) or the forward (transmitted) intermodulation signal can be measured.

Two different test set-ups are described in 6.2.2 and 6.2.3 and are for reference only. Other topologies are possible such as multi-port PIM analyzers.