SVENSK STANDARD SS-EN IEC 62037-6

Utgåva 2

2022-03-16

REDLINE VERSION

Passiva radiofrekvens- och mikrovågskomponenter – Mätning av intermodulationsnivån – Del 6: Mätning av passiv intermodulation i antenner

Passive RF and microwave devices, intermodulation level measurement – Part 6: Measurement of passive intermodulation in antennas

En så kallad ”Redline version” (RLV) innehåller både den fastställda IEC-standarden och en ändringsmarkerad standard. Alla tillägg och borttagningar sedan den tidigare utgåvan är markerade med färg. Med en RLV sparar du mycket tid när du ska identifiera och bedöma aktuella ändringar i standarden. SEK Svensk Elstandard kan bara ge ut en RLV i de fall den finns tillgänglig från IEC.

IEC 62037-6

Edition 2.0 2021-11
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Passive RF and microwave devices, intermodulation level measurement – Part 6: Measurement of passive intermodulation in antennas

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.040.20

ISBN 978-2-8322-1057-0

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD 3
1 Scope 5
2 Normative references 5
3 Terms, definitions and abbreviated terms 5
3.1 Terms and definitions 5
3.2 Abbreviated terms 5
4 Definitions of antenna as it pertains to PIM 6
4.1 Antenna 6
4.2 Antenna under test 6
4.3 Active antenna 6
4.4 Antenna PIM 6
5 Antenna design and field installation considerations 6
5.1 Environmental effects on PIM performance 6
5.2 Antenna interface connection 6
5.3 Mounting considerations to avoid PIM generation 7
5.4 Neighbouring sources of interference 7
5.5 Standard practices and guidelines for material selection 7
6 PIM measurement considerations 7
6.1 Quality assurance process and handling procedures 7
6.2 Measurement accuracy 7
6.3 Test environment 8
6.4 Safety 8
6.5 Test set-up 8
6.5.1 Coaxial test cable assemblies 8
6.5.2 Defining a good low PIM reference load 8
6.5.3 Test set-up and test site baseline PIM verification 9
6.6 PIM test configurations 9
6.7 Combined environmental and PIM testing 11
6.7.1 General 11
6.7.2 Mechanical considerations 11
6.7.3 Test system cables and connectors 11
6.8 PIM test chamber design 11
6.8.1 General 11
6.8.2 RF absorber materials 12
6.8.3 Supporting structures and walls 12
6.8.4 RF shielding 12
7 Dynamic PIM measurement considerations 13
7.1 General 13
7.2 Dynamic testing methodology 13
7.3 Shocks test 13
Bibliography 15

Figure 1 – Antenna reverse PIM test set-up 10
Figure 2 – Antenna forward PIM test set-up 10
Figure 3 – Hammer description 14

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

PASSIVE RF AND MICROWAVE DEVICES, INTERMODULATION LEVEL MEASUREMENT –

Part 6: Measurement of passive intermodulation in antennas

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 62037-6:2013. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 62037-6 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 second edition cancels and replaces the first edition published in 2013. This edition constitutes a technical revision.

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

a) dynamic testing requirements updated to define impact energy and locations to apply impacts to devices under test;

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

Draft	Report on voting
46/838/FDIS	46/859/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/standardsdev/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.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

PASSIVE RF AND MICROWAVE DEVICES, INTERMODULATION LEVEL MEASUREMENT –

Part 6: Measurement of passive intermodulation in antennas

1 Scope

This part of IEC 62037 defines the test fixtures and procedures recommended for measuring levels of passive intermodulation generated by antennas, typically used in wireless communication systems. The purpose is to define qualification and acceptance test methods for antennas for use in low intermodulation (low IM) applications.

2 Normative references

~~The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.~~

~~IEC 62037-1:2012, *Passive r.f. and microwave devices, intermodulation level measurement – Part 1: General requirements and measuring methods*~~

~~IEC 62037-3, *Passive r.f. and microwave devices, intermodulation level measurement – Part 3: Measurement of passive intermodulation in coaxial connectors*~~

There are no normative references in this document.

SVENSK STANDARD SS-EN IEC 62037-6

Fastställd	Utgåva	Sida	Ansvarig kommitté
2022-03-16	2	1 (1+15)	SEK TK 46

Passiva radiofrekvens- och mikrovågskomponenter – Mätning av intermodulationsnivån – Del 6: Mätning av passiv intermodulation i antenner

Passive RF and microwave devices, intermodulation level measurement – Part 6: Measurement of passive intermodulation in antennas

Som svensk standard gäller europastandarden EN IEC 62037-6:2022. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 62037-6:2022.

Nationellt förord

Europastandarden EN IEC 62037-6:2022

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 62037-6, Second edition, 2021 - Passive RF and microwave devices, intermodulation level measurement - Part 6: Measurement of passive intermodulation in antennas**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN 62037-6, utgåva 1, 2013, gäller ej fr o m 2024-12-28.

ICS 33.040.20

Denna standard är fastställd av SEK Svensk Elstandard,
som också kan lämna upplysningar om **sakinnehållet** i standarden.
Postadress: Box 1284, 164 29 KISTA
Telefon: 08 - 444 14 00.
E-post: sek@elstandard.se. Internet: www.elstandard.se

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a mätning, säkerhet och provning och för utförande, skötsel och dokumentation av elprodukter och elanläggningar.

Genom att utforma sådana standarder blir säkerhetsfordringar tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard
Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62037-6

January 2022

ICS 33.040.20

Supersedes EN 62037-6:2013 and all of its amendments and corrigenda (if any)

English Version

Passive RF and microwave devices, intermodulation level measurement - Part 6: Measurement of passive intermodulation in antennas (IEC 62037-6:2021)

Dispositifs RF et à micro-ondes passifs, mesure du niveau d'intermodulation - Partie 6: Mesure de l'intermodulation passive dans les antennes (IEC 62037-6:2021)

Passive HF- und Mikrowellenbauteile, Messung des Intermodulationspegels - Teil 6: Messung der passiven Intermodulation in Antennen (IEC 62037-6:2021)

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 62037-6:2022 E

SEK Svensk Elstandard SS-EN IEC 62037-6, utg 2:2022

European foreword

The text of document 46/838/FDIS, future edition 2 of IEC 62037-6, prepared by IEC/TC 46 “Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories” was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62037-6:2022.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2022–09–28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024–12–28

This document supersedes EN 62037-6:2013 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users’ national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 62037-6:2021 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60068-2-75 NOTE Harmonized as EN 60068-2-75

IEC 62037-1 NOTE Harmonized as EN 62037-1

IEC 62037-3 NOTE Harmonized as EN 62037-3

ISO 2039-2 NOTE Harmonized as EN ISO 2039-2

IEC 62037-6

Edition 2.0 2021-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Passive RF and microwave devices, intermodulation level measurement – Part 6: Measurement of passive intermodulation in antennas

Dispositifs RF et à micro-ondes passifs, mesure du niveau d'intermodulation – Partie 6: Mesure de l'intermodulation passive dans les antennes

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 33.040.20

ISBN 978-2-8322-1049-3

CONTENTS

FOREWORD 3
1 Scope 5
2 Normative references 5
3 Terms, definitions and abbreviated terms 5
3.1 Terms and definitions 5
3.2 Abbreviated terms 5
4 Definitions of antenna as it pertains to PIM 5
4.1 Antenna 5
4.2 Antenna under test 6
4.3 Active antenna 6
4.4 Antenna PIM 6
5 Antenna design and field installation considerations 6
5.1 Environmental effects on PIM performance 6
5.2 Antenna interface connection 6
5.3 Mounting considerations to avoid PIM generation 7
5.4 Neighbouring sources of interference 7
5.5 Standard practices and guidelines for material selection 7
6 PIM measurement considerations 7
6.1 Quality assurance process and handling procedures 7
6.2 Measurement accuracy 7
6.3 Test environment 8
6.4 Safety 8
6.5 Test set-up 8
6.5.1 Coaxial test cable assemblies 8
6.5.2 Defining a good low PIM reference load 8
6.5.3 Test set-up and test site baseline PIM verification 8
6.6 PIM test configurations 9
6.7 Combined environmental and PIM testing 10
6.7.1 General 10
6.7.2 Mechanical considerations 10
6.7.3 Test system cables and connectors 10
6.8 PIM test chamber design 11
6.8.1 General 11
6.8.2 RF absorber materials 11
6.8.3 Supporting structures and walls 11
6.8.4 RF shielding 12
7 Dynamic PIM measurement considerations 12
7.1 General 12
7.2 Dynamic testing methodology 13
7.3 Shocks test 13
Bibliography 14

Figure 1 – Antenna reverse PIM test set-up 9
Figure 2 – Antenna forward PIM test set-up 10
Figure 3 – Hammer description 13

INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

PASSIVE RF AND MICROWAVE DEVICES, INTERMODULATION LEVEL MEASUREMENT –

Part 6: Measurement of passive intermodulation in antennas

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 62037-6 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 second edition cancels and replaces the first edition published in 2013. This edition constitutes a technical revision.

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

a) dynamic testing requirements updated to define impact energy and locations to apply impacts to devices under test;

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

Draft	Report on voting
46/838/FDIS	46/859/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/standardsdev/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.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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

PASSIVE RF AND MICROWAVE DEVICES, INTERMODULATION LEVEL MEASUREMENT –

Part 6: Measurement of passive intermodulation in antennas

1 Scope

This part of IEC 62037 defines the test fixtures and procedures recommended for measuring levels of passive intermodulation generated by antennas, typically used in wireless communication systems. The purpose is to define qualification and acceptance test methods for antennas for use in low intermodulation (low IM) applications.

2 Normative references

There are no normative references in this document.