

# INTERNATIONAL STANDARD

---

**Multimedia systems –  
Guide to the recommended characteristics of analogue interfaces to achieve  
interoperability**





## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2018 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

#### IEC Catalogue - [webstore.iec.ch/catalogue](http://webstore.iec.ch/catalogue)

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

#### IEC publications search - [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

#### IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

#### Electropedia - [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

#### IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

#### IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [csc@iec.ch](mailto:csc@iec.ch).



IEC 61938

Edition 3.0 2018-01

# INTERNATIONAL STANDARD

---

**Multimedia systems –  
Guide to the recommended characteristics of analogue interfaces to achieve  
interoperability**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 33.160.01, 35.200

ISBN 978-2-8322-5056-3

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

## CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references .....	10
3 Terms and definitions .....	10
4 General conditions.....	13
5 Power supply.....	13
5.1 Alternating current (AC) power supply voltages and frequencies .....	13
5.2 Direct current (DC) power supply voltages.....	14
5.3 Power supply feed for microphones.....	14
6 Interconnections .....	14
6.1 Connections.....	14
6.1.1 General .....	14
6.1.2 Characteristics of cables .....	14
6.2 Connectors .....	16
7 Marking and symbols for marking .....	16
7.1 Marking.....	16
7.2 Symbols for marking .....	16
8 Electrical recommended values.....	16
8.1 General purpose output/input .....	16
8.2 General purpose audio output/input .....	16
8.2.1 Audio-only interfaces for consumer equipment.....	16
8.2.2 Interfaces for professional equipment and consumer equipment where audio and video signals are present on the same connector or cable.....	17
8.3 General purpose video input/output .....	19
9 Interoperability of microphones and amplifiers .....	19
9.1 Microphones (excluding piezoelectric types).....	19
9.2 Power supply feed for electret microphones fed over a signal conductor ("plug-in power") .....	20
9.3 Power supply feed for electret microphones fed by a separate conductor ("soundcard power" or "PC power") .....	21
9.4 Phantom supply system .....	21
9.4.1 General .....	21
9.4.2 Supply voltage polarity .....	21
9.4.3 Circuit diagram .....	22
9.4.4 Value of the supply voltage .....	22
9.4.5 Supply current .....	22
9.4.6 Marking .....	22
9.5 A-B supply system .....	23
9.5.1 General .....	23
9.5.2 Output impedance of the microphone .....	23
9.5.3 Circuit diagram .....	23
9.5.4 Connection of the power supply to earth .....	23
9.5.5 Marking .....	23
9.6 Polarity of the audio frequency voltage.....	23
10 Interoperability of record-playing units (pick-ups) and amplifiers .....	25

11	Interoperability of loudspeakers and amplifiers .....	26
11.1	Single unit loudspeakers.....	26
11.2	Loudspeaker systems .....	26
11.2.1	Loudspeakers with built-in amplifier .....	26
11.2.2	Impedance-defined loudspeaker systems .....	26
11.2.3	Constant voltage loudspeaker systems.....	27
11.3	Voltage (or power) interoperability of amplifiers and loudspeakers .....	27
11.3.1	Overview .....	27
11.3.2	Interoperability requirements .....	27
11.4	Polarity of the sound pressure .....	28
12	Interoperability of headphones and amplifiers .....	28
12.1	General.....	28
12.2	Interoperability of headphones with stationary amplifiers .....	28
12.3	Interoperability of portable audio headphones/earphones and portable audio equipment .....	29
12.3.1	General .....	29
12.3.2	Portable audio headphones/earphones .....	29
12.3.3	Portable audio equipment.....	29
12.3.4	Recommended values and input/output values for portable audio headphones/earphones and portable audio equipment .....	29
13	Interoperability of amplifiers with other amplifiers.....	30
13.1	Pre-amplifiers and power amplifiers for general purpose and sound reinforcement.....	30
13.2	Broadcast and similar line amplifiers.....	31
	Annex A (informative) Pairing and screening of conductors.....	32
	Annex B (informative) Phantom power variants for specialized applications.....	33
	Bibliography.....	34
	Figure 1 – Audio and video sources and destinations .....	9
	Figure 2 – Example of plug-in power system for a single microphone.....	23
	Figure 3 – Example of plug-in power system for a two-channel microphone .....	24
	Figure 4 – Example of soundcard power system.....	24
	Figure 5 – Example of phantom power supply system .....	24
	Figure 6 – Example of A-B power supply system .....	25
	Figure B.1 – Caution symbol.....	33
	Table 1 – Direct current (DC) power supply voltages and tolerances.....	14
	Table 2 – General purpose values for audio-only interfaces .....	16
	Table 3 – General purpose values for audio signals for professional interfaces.....	18
	Table 4 – General purpose recommended values for video signals .....	19
	Table 5 – Recommended values for microphones and amplifiers.....	20
	Table 6 – Required values for phantom supply systems .....	25
	Table 7 – Required values for A-B power supply systems .....	25
	Table 8 – Recommended values for analogue record-playing units and amplifiers.....	25
	Table 9 – Recommended values for impedance-defined loudspeaker systems .....	26
	Table 10 – Recommended values for constant voltage loudspeaker systems .....	27

Table 11 – Recommended values for headphones and amplifiers in stationary applications .....	28
Table 12 – Recommended values for portable audio headphones/earphones and portable audio equipment .....	29
Table 13 – Recommended values for pre-amplifiers and power amplifiers .....	31
Table 14 – Recommended values for broadcast and similar line amplifiers .....	31

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

---

**MULTIMEDIA SYSTEMS –  
GUIDE TO THE RECOMMENDED CHARACTERISTICS  
OF ANALOGUE INTERFACES TO ACHIEVE INTEROPERABILITY****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.

International Standard IEC 61938 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

This third edition cancels and replaces the second 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) electric tolerance is standardized;
- b) recommended value of output source impedance is adjusted;
- c) value of 6  $\Omega$  is additionally recommended to impedance-defined loudspeaker systems;
- d) values in each table are chosen with respect to the state of the art and representative of best practice in industry.

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

CDV	Report on voting
100/2879/CDV	100/2996/RVC

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

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://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.

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

## INTRODUCTION

The first edition of IEC 61938 was derived from IEC 60268-15, IEC 60574-4 and IEC 60933-1 and also from related proposals which had been submitted up until the date of this revision. IEC 60268-15 was the first standard to address 'interoperability' – the ability of equipment from different manufacturers to be assembled into a system with full compatibility at every 'interface'. The aim of the previous revision was to make the intention of this document easily comprehensible by using widely used terminology in the title and text of the document. The purpose of this revision is to expand the measurement frequency range in step with the progress of recent equipment.

The features of the revision are the following:

- a) unification and arrangement of existing related standards, including effective proposals which have been submitted;
- b) extension of the measurement frequency range.

NOTE The standard numbers mentioned above correspond to the revised numbers, if applicable.

## **MULTIMEDIA SYSTEMS – GUIDE TO THE RECOMMENDED CHARACTERISTICS OF ANALOGUE INTERFACES TO ACHIEVE INTEROPERABILITY**

### **1 Scope**

This document gives guidance on current practice for the characteristics of multimedia analogue interfaces to achieve interoperability between equipment from different manufacturers. It is not a performance standard.

Recommendations for interfaces for equipment used in vehicles, and for analogue video interfaces for broadcast and similar equipment, are not given.

Refer to IEC 60958 for the interconnection of digital signals.

Figure 1 shows in a diagram the possible interfaces of the audio and video sources and destinations.