

INTERNATIONAL STANDARD

**Digital audio interface –
Part 3: Consumer applications**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2009 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
Email: inmail@iec.ch
Web: 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.

- Catalogue of IEC publications: www.iec.ch/searchpub

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 It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

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

- Electropedia: www.electropedia.org

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

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00



IEC 60958-3

Edition 3.1 2009-12

INTERNATIONAL STANDARD

**Digital audio interface –
Part 3: Consumer applications**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE **CR**

ICS 33.160.01

ISBN 978-2-88910-352-2

CONTENTS

FOREWORD.....	5
1 Scope.....	8
2 Normative references	8
3 Terms and definitions	8
4 Interface format.....	8
5 Channel status	9
5.1 General.....	9
5.2 Application	9
5.3 Copyright management guidelines for consumer application of the digital audio interface	16
6 User data	21
6.1 General.....	21
6.2 Application	21
6.3 Information for synchronization.....	24
Annex A (normative) Application of the digital audio interface in the compact disc digital audio system	27
Annex B (normative) Application of the digital interface in the 2-channel PCM encoder/decoder.....	29
Annex C (normative) Application of the digital interface in the 2-channel digital audio tape recorder in the consumer mode.....	30
Annex D (normative) Application of the digital interface in laser optical digital audio systems for which no other category code is defined.....	34
Annex E (normative) Application of the digital interface in a digital audio mixer in the consumer mode	35
Annex F (normative) Application of the digital interface with a sampling rate converter in the consumer mode.....	36
Annex G (normative) Application of the digital interface with a digital sound sampler in the consumer mode	37
Annex H (normative) Application of the digital interface in a digital broadcast receiver (Japan) in the consumer mode.....	38
Annex J (normative) Application of the digital interface in a digital broadcast receiver (Europe) in the consumer mode	39
Annex K (normative) Application of the digital interface in a digital broadcast receiver (USA) in the consumer mode	40
Annex L (normative) Application of the digital interface for electronic software delivery in the consumer mode.....	41
Annex M (normative) Application of the digital interface in the digital compact cassette system in the consumer mode.....	42
Annex N (normative) Application of the digital interface in the mini-disc system in the consumer mode	47
Annex O (normative) Application of the digital interface in a digital sound processor in the consumer mode	48

Annex P (normative) Application of the digital interface in the digital versatile disc system (DVD) in the consumer mode	49
Annex Q (informative) Use of original sampling frequency, sampling frequency and clock accuracy	50
Annex R (normative) Application of the digital interface in magnetic disc digital audio systems in the consumer mode	52
Annex S (normative) Explanations of category code implementation	53
Annex T (informative) Application of the digital audio interface for synchronization of audio, video and multi-media equipments	58
Annex U (normative) MPEG Surround over PCM	63
Bibliography	65
Figure 1 – Example of message structure using information units	21
Figure 2 – First UI contents	22
Figure 3 – Second UI contents	23
Figure 4 – Third UI contents	23
Figure 5 – User information	23
Figure 6 – SMPTE time code information	24
Figure 7 – LTC information alignment	25
Figure 8 – VITC information alignment	25
Figure 9 – Latency information	26
Figure 10 – Latency information alignment	26
Figure C.1 – Example of different combinations of start-ID and shortening-ID	33
Figure Q.1 – Player and interface model	50
Figure S.1 – Multi-media player	53
Figure S.2 – Home-recorded medium player	54
Figure S.3 – Direct monitoring	54
Figure S.4 – Monitoring after recording	55
Figure S.5 – Integrated product	55
Figure S.6 – Digital/digital converter	56
Figure S.7 – Integrated product including digital/digital converter	56
Figure S.8 – Integrated product including magnetic disc recorder	57
Figure T.1 – Lip-sync system model	58
Figure T.2 – Lip-sync compensation	59
Figure T.3 – Time-code transmission	59
Figure T.4 – Latency parameter transmission	60
Figure T.5 – Latency parameter transmission with <i>TLV</i>	60
Figure T.6 – Example of latency parameter transmission	61
Figure T.7 – Another example for solving lip-sync problems	62
Figure U.1 – Relation between MPEG Surround buried data frame and IEC 60958-3 frame	63

Table 1– Channel status general format for consumer use.....	10
Table 2 – Mode 0 channel status format for consumer use.....	12
Table 3 – Category code groups	18
Table 4 – Category code groups for laser optical products.....	18
Table 5 – Category code groups for digital/digital converter and signal-processing products	19
Table 6 – Category code groups for magnetic tape or magnetic disc based products	19
Table 7 – Category code groups for broadcast reception of digitally encoded audio with/without video signals	19
Table 8 – Category code groups for musical instruments, microphones and other sources that create original sound	20
Table 9 – Category code groups for A/D converters for analogue signals without copyright information	20
Table 10 – Category code groups for A/D converters for analogue signals with copyright information	20
Table 11 – Category code groups for solid-state memory-based products.....	20
Table A.1 – Example of 2-channel compact disc format	28
Table C.1 – Use of Cp-bit, L-bit and category code for DAT	30
Table C.2 – User data application in the DAT system.....	32
Table M.1 – Layout of message number “000000”	43
Table M.2 – Deck status codes	44
Table M.3 – ITTS packet extended message example.....	45
Table Q.1 – Term definitions.....	50
Table Q.2 – Cases	51
Table Q.3 – Example	51

INTERNATIONAL ELECTROTECHNICAL COMMISSION

DIGITAL AUDIO INTERFACE –**Part 3: Consumer applications****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 60958-3 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

This consolidated version of IEC 60958-3 consists of the third edition (2006) [documents 100/1009/CDV and 100/1070/RVC] and its amendment 1 (2009) [documents 100/1513/CDV and 100/1592/RVC].

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience.

It bears the edition number 3.1.

A vertical line in the margin shows where the base publication has been modified by amendment 1.

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

- Electrical and optical requirements are removed from IEC 60958-3; they should be specified in IEC 60958-1. The third edition of IEC 60958-1 will include these.

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

The list of all the parts of the IEC 60958 series, under the general title *Digital audio interface*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, 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.

INTRODUCTION (to Amendment 1)

The revision of IEC 60958-3 (2006) has become necessary to transmit the audio signal and its information of the current improved audio formats and systems. The revised items apply to the small parts of IEC 60958-3.

Additional sampling frequencies have been defined for the use of audio transmission of IEC 60958 conformant data format for the new formats of the IEC 61937 series.

CGMS-A validity is added to clarify the use of CGMS-A information.

The identification of the embedded MPEG Surround information to LPCM and its normative Annex U are added.

Table 2 includes the new additions and Table 3 has been clarified.

DIGITAL AUDIO INTERFACE –

Part 3: Consumer applications

1 Scope

This part of IEC 60958 specifies the consumer application of the interface for the inter-connection of digital audio equipment defined in IEC 60958-1.

NOTE When used in a consumer digital processing environment, the interface is primarily intended to carry stereophonic programmes, with a resolution of up to 20 bits per sample, an extension to 24 bits per sample being possible.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60841:1988, *Audio recording – PCM encoder/decoder system*

IEC 60908:1999, *Audio recording – Compact disc digital audio system*

IEC 60958-1:2004, *Digital audio interface – Part 1: General*

IEC 61119-1:1992, *Digital audio tape cassette system (DAT) – Part 1: Dimensions and characteristics*

IEC 61119-6:1992, *Digital audio tape cassette system (DAT) – Part 6: Serial copy management system*

IEEE 1394:2004, *IEEE standard for high-performance serial bus bridges*

ISO/IEC 23003-1, *Information technology – MPEG audio technologies – Part 1: MPEG Surround*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60958-1 apply.

4 Interface format

The interface format as defined in IEC 60958-1 shall be used.

Unless otherwise specified in the annexes, the following specification is applicable.

- Audio sample word has a length of 20 bits/sample. The auxiliary sample bits are an optional expansion of the audio sample, if not used = “0”.
- User data is not used, all bits = “0”.
- Channel status is identical for both subframes of the interface, with the exception of the channel number, if that is not equal to zero.