INTERNATIONAL STANDARD

IEC 62300

First edition
2004-11

Consumer audio/video equipment digital interface with plastic optical fibre

Reference number
IEC 62300:2004(E)

Publication numbering

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International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE M

For price, see current catalogue

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CONSUMER AUDIO/VIDEO EQUIPMENT DIGITAL INTERFACE WITH PLASTIC OPTICAL FIBRE

FOREWORD

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International Standard IEC 62300 has been prepared by technical area 4: Digital system interfaces and protocols, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

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

FDIS	Report on voting
100/840/FDIS	100/868/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 2.

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- withdrawn;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.

CONSUMER AUDIO/VIDEO EQUIPMENT DIGITAL INTERFACE WITH PLASTIC OPTICAL FIBRE

1 Scope

This International Standard specifies the principal electrical and optical parameters for a consumer audio/video equipment digital interface that uses plastic optical fibre (POF).

NOTE A description of the principal features of such an interface is given in Annex C.

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 60050-731, *International Electrotechnical Vocabulary (IEV) – Chapter 731: Optical fibre communication*

IEC 60793-2-40, *Optical fibres – Part 2-40: Product specifications – Sectional specification for category A4 multimode fibres*

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification, requirements and user's guide*

IEC 60825-2, *Safety of laser products – Part 2: Safety of optical fibre communication systems*

IEC 61754-21, *Fibre optic connector interfaces – Part 21: Type SMI connector family for plastic optical fibre* [1]

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions contained in IEC 60050-731 apply.

3.2 Abbreviations

BER	Bit error rate
D-VCR	Digital video cassette recorder
E/O	Electrical to optical
HDTV	High definition television
O/E	Optical to electrical
PECL	Positive shifted emitter coupled logic
PMD	Physical media dependent
POF	Plastic optical fibre
RMS	Root mean square

[1] To be published.

Rx Receiver
SFF Small form factor
STB Set top box
Tx Transmitter

4 System consideration

4.1 Area of application

This digital interface covers audio and/or video and accompanied data systems for consumer audio/video equipment and multimedia systems in bi-direction, mainly used for audio equipment, TV-set, D-VCR, etc.

4.2 Operating environment

The environmental conditions for the digital interface are mainly defined in other standards for the individual units. Where no range is given, the interface shall operate at least within the temperature range 0 °C to 50 °C and in a relative humidity range of 25 % to 75 %.

5 Configuration of digital interface and characteristics to be specified

5.1 Configuration of digital interface

The basic configuration of this digital interface is shown in Figure 1. The reference points 1 and 4 apply to the electrical input and output of the electro-optical and opto-electrical converter respectively. The optical matching values specified in this standard apply at the reference points 2 and 3. The overall characteristics of a POF are specified in Annex A for a wide-band POF and in Annex B for the optical connectors.

NOTE Some applications based on this digital interface are illustrated in Annex C.

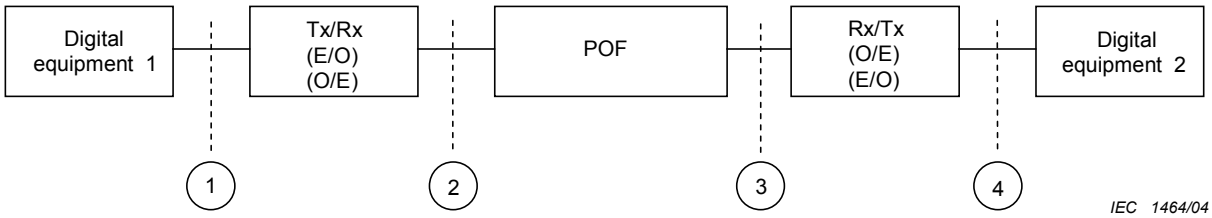

Figure 1 – Basic digital interface

5.2 Characteristics of electrical interface

The characteristics of electrical interface at the reference points 1 and 4 shown in Figure 1 shall be as specified in Table 1.

Table 1 – Electrical interface

Parameter		Units
Maximum bit rate	500	Mbit/s
Amplitude deviation from 800 mV	±250	mV
Level	PECL	
Type of signal	Differential	

5.3 Characteristics of optical interface

The characteristics of optical interface at the reference points 2 and 3 shown in Figure 1 shall be as specified in Figure 2 and Table 2.

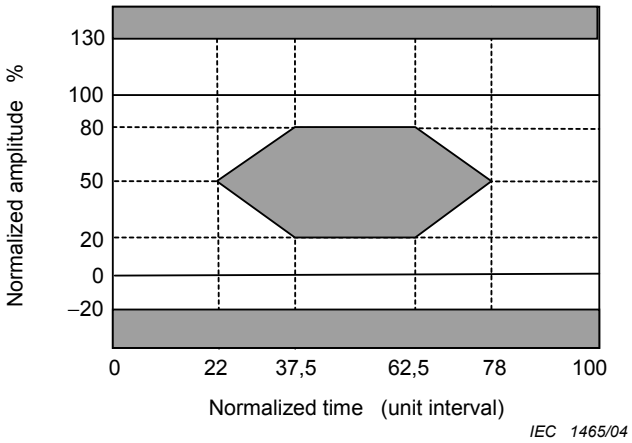

Figure 2 – Eye pattern mask at transmitter

Table 2 – Optical interface

Parameter		**Units**
Tx & Rx		
Maximum bit rate	500	Mbit/s
Link length	1 to 50	m
Transmitter characteristics		
Wavelength deviation from 650 nm	±10	nm
Mean launched power from 1 m POF	–6 to –2	dBm
Maximum RMS spectral width	20	nm
Minimum extinction ratio	10	dB
Receiver characteristics		
Overload (BER 10^{-12})	–2	dBm
Sensitivity (BER 10^{-12})	–19	dBm
Rise/fall time (max.) (10-90 %)	1	ns
NOTE The ambient temperature is taken to be 25 ºC.		

6 Safety aspects

The transmitter shall be so designed as to prevent harmful effects to persons. Compliance shall be checked in accordance with IEC 60825-1 and IEC 60825-2.

Annex A
(normative)

Wide-band POF

A.1 Introduction

A wide-band POF introduces a high-speed digital interface between consumer audio/video equipment.

A.2 Physical dimension

The cladding diameter is 750 µm and plastic jacket diameter is 2,2 mm.

Specification details are in accordance with IEC 60793-2-40.

A.3 Characteristics

Transmission loss is less than 0,18 dB/m at 640 nm or 660 nm. Bending loss is less than 0,5 dB/turn of 25 mm radius.

Details of characteristics are in accordance with IEC 60793-2-40.

Annex B
(normative)

Optical connector

B.1 Introduction

An optical connector is about half the size of the conventional PN connector, whose size is suitable to SFF size.

B.2 Physical dimension

The principal physical characterisics of the plug and receptacle of the optical connector are shown in Figures B.1 and B.2, and in Figures B.3 and B.4, respectively.

Specification details are in accordance with IEC 61754-21.

Figure B.1 – Optical connector (plug)

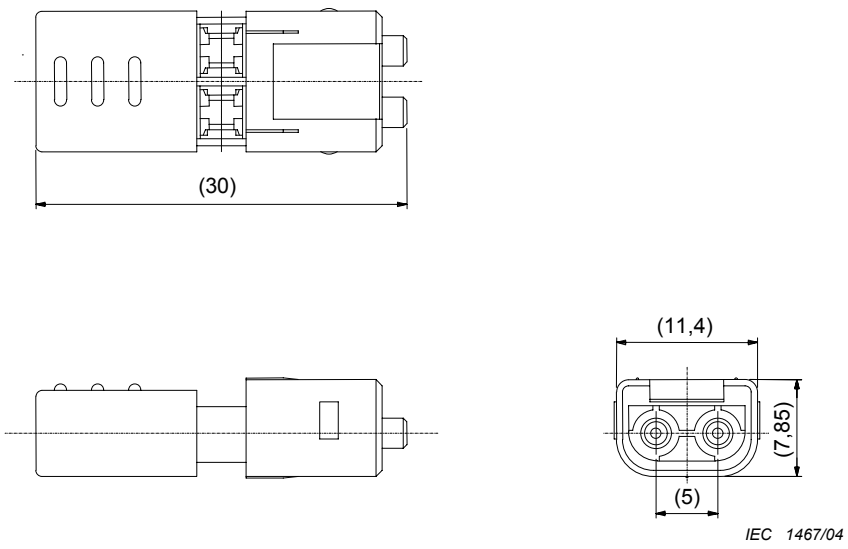

Figure B.2 – Optical connector (plug)

Figure B.3 – Optical connector (receptacle)

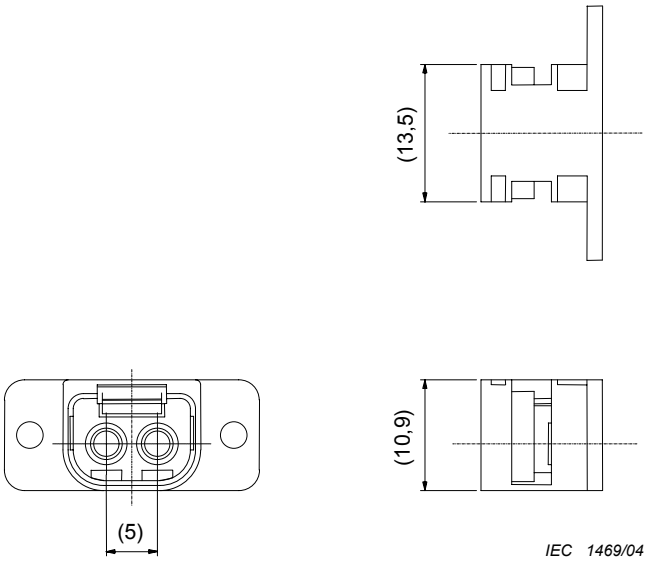

Figure B.4 – Optical connector (receptacle)

B.3 Characteristics

Details of characteristics are in accordance with IEC 61754-21.

Annex C
(informative)

Interface applications

C.1 Principal features

The digital interface specified in this standard uses wide-band POF that includes both the multi-layer type and the graded index type. These features provide an optical signal speed of up to 500 Mbit/s and a single hop distance of up to 50 m. By using this interface, the high-speed digital signals which include audio/video signal and multimedia data are transmitted simultaneously. It is further possible to realize consumer audio/video equipment platform and/or multimedia system with low cost and high performance.

This digital interface has five features that are important in consumer audio/video equipment.

- It is possible to transmit the high speed digital signal without introducing any electromagnetic interference.
- This interface overcomes the transmission limitation of an electrical interface.
- The optical connector of the interface is so small that it is convenient to mount in consumer audio/video equipment, such as D-VCR, STB, HDTV, and so on.
- Wide-band POF and an optical transceiver of the interface operate up to 500 Mbit/s and the single hop distance is up to 50 m. This feature applies to such as IEEE P1394b/S400.
- This interface has upward compatibility for an industrial optical interface based on POF.

Typical applications are discussed in Clauses C.2 and C.3.

C.2 Connection between D-VCR and TV

The basic connection between D-VCR and TV using the interface is shown in Figure C.1. In this application, the request control signal is transmitted from TV to D-VCR and the digital video stream is transmitted from D-VCR to TV through POF.

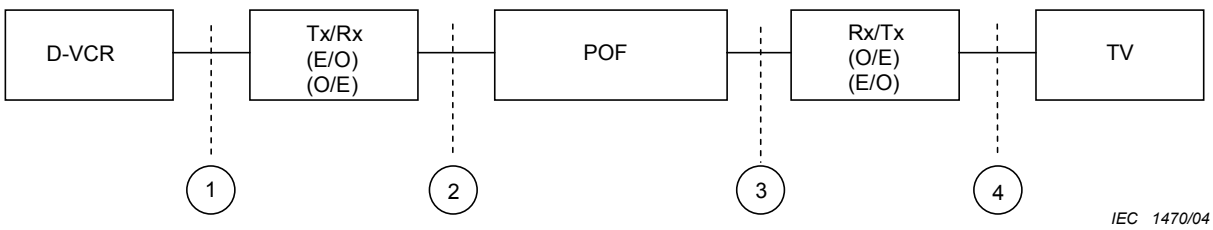

Figure C.1 – Connection between D-VCR and TV using the interface

C.3 Connection between a CD player and an audio amplifier

The basic connection between CD player and audio amplifier using the interface is shown in Figure C.2. In this application, the request control signal is transmitted from an audio amplifier to a CD player and the digital audio stream is transmitted from the CD player to the audio amplifier through POF. After that, the audio signal is regenerated by a speaker.

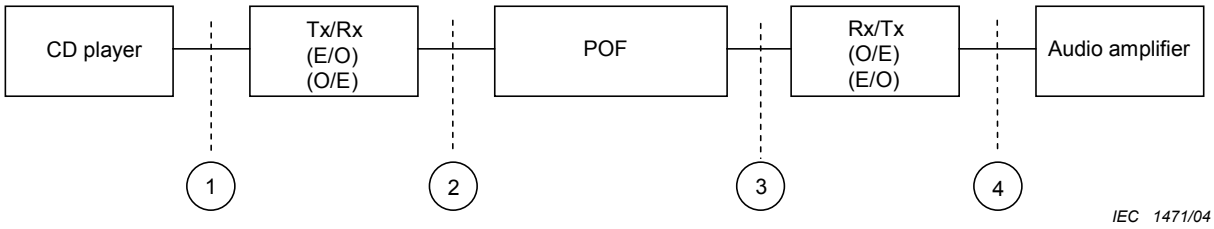

Figure C.2 – Connection between a CD player and an audio amplifier using the interface

Bibliography

IEEE P1394b: *High Performance Serial Bus* (Supplement)

IEEE 1394-1995: *Standard for a High Performance Serial Bus*

IEEE 1394a-2000: *Standard for a High Performance Serial Bus* (Amendment)

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ISBN 2-8318-7721-0

ICS 33.160.99; 33.180.20

Typeset and printed by the IEC Central Office
GENEVA, SWITZERLAND