IEC 62779-2

Edition 1.0 2016-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Semiconductor devices – Semiconductor interface for human body communication –
Part 2: Characterization of interfacing performances

Dispositifs à semiconducteurs – Interface à semiconducteurs pour les communications via le corps humain –
Partie 2: Caractérisation des performances d'interfaçage

IEC 62779-2:2016-02(en-fr)

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SEMICONDUCTOR DEVICES – SEMICONDUCTOR INTERFACE FOR HUMAN BODY COMMUNICATION –

Part 2: Characterization of interfacing performances

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.
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International Standard IEC 62779-2 has been prepared by IEC technical committee 47: Semiconductor devices.

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

FDIS	Report on voting
47/2268/FDIS	47/2278/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.

A list of all parts in the IEC 62779 series, published under the general title *Semiconductor devices – Semiconductor interface for human body communication*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability 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.

INTRODUCTION

The IEC 62779 series is composed of three parts as follow:

- IEC 62779-1 defines general requirements of a semiconductor interface for human body communication. It includes general and functional specifications of the interface.
- IEC 62779-2 defines a measurement method on electrical performances of an electrode that constructs a semiconductor interface for human body communication.
- IEC 62779-3 defines functional type of a semiconductor interface for human body communication, and operational conditions of the interface.

SEMICONDUCTOR DEVICES – SEMICONDUCTOR INTERFACE FOR HUMAN BODY COMMUNICATION –

Part 2: Characterization of interfacing performances

1 Scope

This part of IEC 62779 defines a measurement method on electrical performances of an electrode that composes a semiconductor interface for human body communication (HBC). In the measurement method, a signal transmitter is electrically isolated from a signal receiver, so an isolation condition between the transmitter and receiver is maintained to accurately measure the electrode's performances. This part includes general and functional specifications of the measurement method.

HBC uses the body of a user as a transmission medium using near-field coupling inside the body: a signal transmitter and receiver are coupled with each other through a near field that is formed inside the human body and air. The intensity of the near field is strong especially inside the body due to high dielectric constant of the body, so a data signal is transmitted through the human body by modulating the near field. A signal transmitter and receiver for HBC include an internal ground respectively, and, in most HBC applications, the grounds are separated from each other as maintaining the coupling condition through the air. Quality of a data transmission strongly depends on a coupling degree between the grounds; hence, it is important to maintain the coupling degree between grounds of a signal transmitter and receiver for an accurate measurement of the electrode's performances. This part defines a measurement method to measure electrical performances of an electrode while the coupling degree between grounds of a signal transmitter and receiver is maintained.

NOTE 1 HBC semiconductor interface consists of an electrode and analog front end.

NOTE 2 General analog and digital modulation techniques can be used to modulate a near field used in HBC, and a modulation technique to be used is determined according to required performances for a data transmission and a HBC application.

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.

None.

3 Terms, definitions and letter symbols

For the purposes of this document, the following terms and definitions apply.

3.1 General terms

3.1.1
electrode
physical structure to transmit an electrical signal between an analog front end and the human body while attached to or located near the human body

Note 1 to entry: An electrode transfers an electrical signal to be transmitted to a non-metallic transmission channel, the human body. It also transfers an electrical signal received from the human body to the analog front end.

Note 2 to entry: electrode can have an adhesive material on its surface like a disposable ECG electrode to be attached itself to the human body; or a metal surface for a simple implementation. In the case of a metal surface, an electrode makes contact with the human body by attaching it to the human body using an attachment aid like a rubber band; or simply touching it with the hand.

[SOURCE: IEC 62779-1: 3.1.1, modified – Note 2 to entry has been added.]

3.1.2
transmitter module
circuit module that generates a pulse signal to be transmitted to the human body through an electrode for measurement of the electrode's performances; and a synchronization signal of an optical type to be transmitted through an optical cable for synchronization of the pulse signal transmitted through the human body

Note 1 to entry: A transmitter module includes a signal amplifier to amplify the transmitting pulse signal; and a signal filter to remove a signal component causing an interference to other measurement modules and measurement equipment.

3.1.3
receiver module
circuit module that processes a pulse signal received from the human body through an electrode to increase signal quality for measurement of the electrode's performances

Note 1 to entry: A receiver module includes a signal amplifier to amplify the received pulse signal; and a signal filter to remove a noise or interference signal from the received pulse signal.

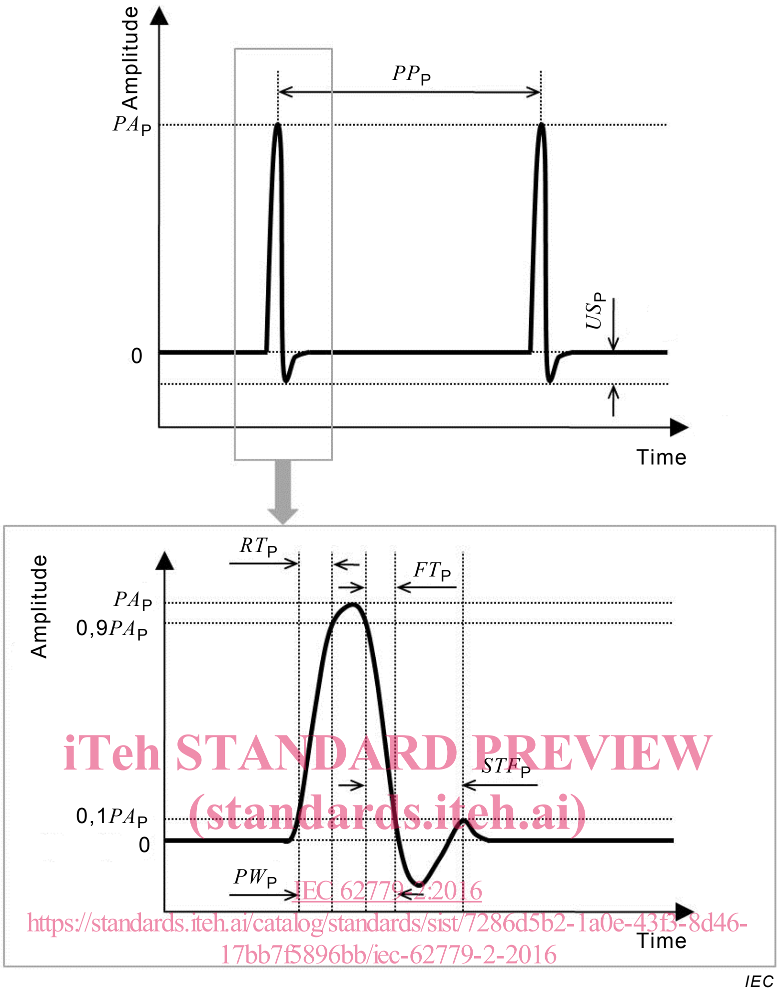
3.1.4
synchronization module

circuit module that transforms a synchronization signal transmitted through an optical cable into an electrical signal; and generates a trigger signal using the transformed synchronization signal to trigger measurement equipment

Note 1 to entry: A synchronization module includes an optical transceiver to transform an optical signal into an electrical signal or vice versa.

3.1.5
pulse signal
electrical signal that is generated in the transmitter module and then transmitted to the human body through an electrode to measure the electrode's performances while having a specific pulse-width to include a signal component at frequency bands over which the performances are to be measured

Note 1 to entry: Figure 1 shows a pulse signal and its related terms.



Key

PA_p	Pulse amplitude	PP_p	Pulse period
US_p	Undershoot	PW_p	Pulse width
RT_p	Rising time	FT_p	Falling time
STF_p	Settling time of falling		

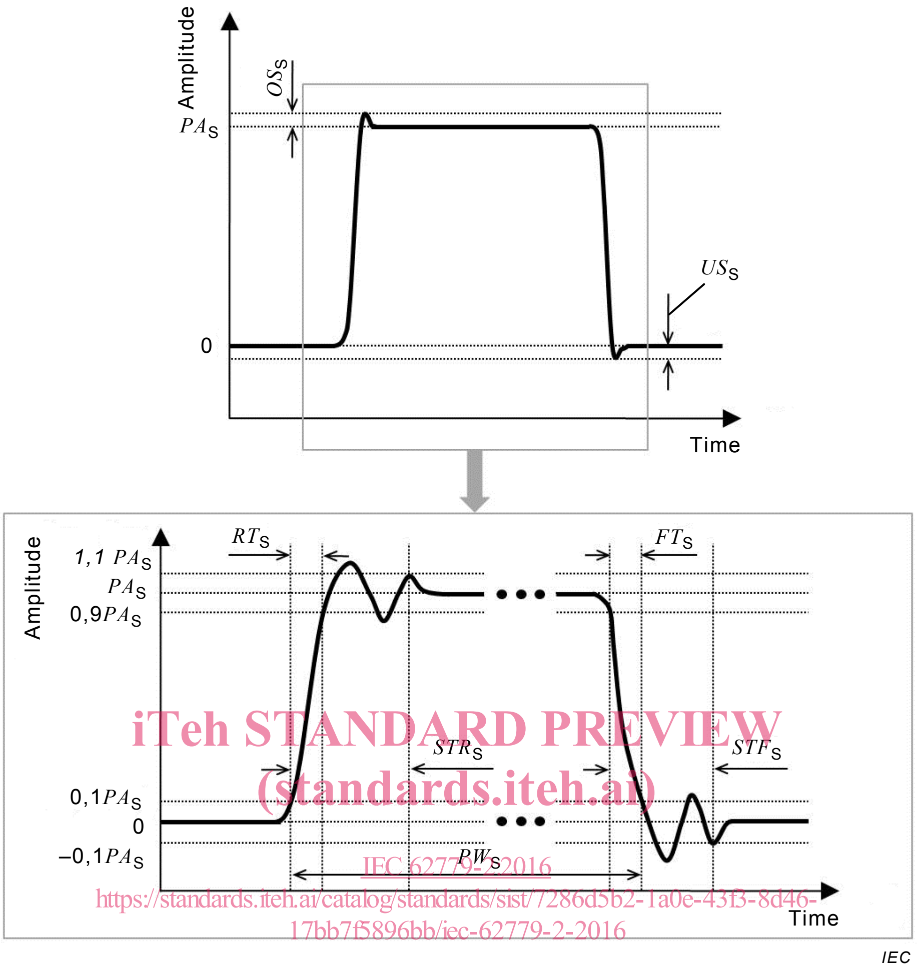
Figure 1 – Pulse signal

Note 2 to entry: A pulse signal has a short pulse-width to include a signal component at a wide-frequency band.

3.1.6
synchronization signal

electrical signal that is synchronized to the pulse signal and then transformed into an optical signal to be transmitted to a synchronization module through an optical cable for the purpose of synchronization between the transmitter and receiver modules

Note 1 to entry: Figure 2 shows a synchronization signal and its related terms.



Key

PA_s	Pulse amplitude	OS_s	overshoot
US_s	Undershoot	PW_s	Pulse width
RT_s	Rising time	FT_s	Falling time
STR_s	Settling time of rising	STF_s	Settling time of falling

Figure 2 – Synchronization signal

3.2 Signal characteristics

3.2.1
pulse amplitude
PA_p
peak amplitude of pulse signal in volts

3.2.2
pulse period
PP_p
time period of periodic pulses in seconds

3.2.3
undershoot
US_p
minimum amplitude in volts during transient period of a falling signal

3.2.4
pulse width
PW_p
time interval in seconds between points at which a pulse signal has 10 % value of pulse amplitude

3.2.5
rising time
RT_p
time interval in seconds required for a pulse signal to rise from 10 % value of pulse amplitude to 90 % value

3.2.6
falling time
FT_p
time interval in seconds required for a pulse signal to fall from 90 % value of pulse amplitude to 10 % value

3.2.7
settling time of falling
STF_p
maximum time interval in seconds required for a pulse signal to fall from 90 % value of pulse amplitude to 10 % or −10 % value during transient period of a falling signal

3.2.8
pulse amplitude
PA_s
peak amplitude of a synchronization signal in volts after transient period of a rising signal

3.2.9
overshoot
OS_s
differential amplitude in volts from pulse amplitude to peak amplitude during transient period of a rising signal

3.2.10
undershoot
US_s
minimum amplitude in volts during transient period of a falling signal

3.2.11
pulse width
PW_s
time interval in seconds between points at which a synchronization signal has 10 % value of pulse amplitude

3.2.12
rising time
RT_s
time interval in seconds required for a synchronization signal to rise from 10 % value of pulse amplitude to 90 % value

3.2.13
falling time
FT_s
time interval in seconds required for a synchronization signal to fall from 90 % value of pulse amplitude to 10 % value