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Part 1-2: Time domain test method for twinax cables for digital communications - Impedance

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IEC 62783-1-2 has been prepared by subcommittee 46C: Wires and symmetric cables, of IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories. It is an International Standard.

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

Draft	Report on voting
46C/1306/CDV	46C/1320/RVC

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/publications.

A list of all parts in the IEC 62783 series, published under the general title *Twinax cables for digital communications*, 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– withdrawn, or

– revised.

INTRODUCTION

This document gives the introductions of differential-mode impedance and common-mode impedance, as well as odd-mode impedance and even-mode impedance. These four types of impedance are used in the design and measurements of differential devices. This document also specifies the test methods of time domain impedance for twinax cables used in high-performance information technology systems and data interface interconnection systems.

Although frequency domain analysis has powerful functions, time domain analysis is still an effective tool, especially in the short-reach and high frequency data transmission applications, for example fault localization, identifying impedance variations in connectors, PCBs, and transmission lines, selectively eliminating redundant responses (e.g. gate function in VNA-based time domain analysis), etc.

Time domain analysis includes time domain transmission and time domain reflection. This document concerns the latter. Impedance measurement is the most typical application of time domain reflectometry. This measurement technology is based on the transmission line theory, which works similarly to the principle of radar. When the signal travels along the transmission line or DUT, there are no reflections if the transmission line is homogeneous and continuous, but if impedance varies, a part of or all incident signal is reflected back, while the rest keeps travelling forward.

Time domain analysis can be achieved either by traditional time domain reflectometer or modern vector analyzer equipped with IFFT function.

When measuring the reflection signals, reflection coefficient ρ at a given point along a transmission line or device under test depends on the deviation between the impedance of this point and its nominal impedance; the position of reflection (i.e. the distance to the source) can be determined according to the travelling delay of the reflected signal and propagation velocity in the transmission line or DUT. A traditional time domain reflectometer (TDR) instrument displays this information directly.

1 Scope

This part of IEC 62783 gives the definitions of different types of impedance in time domain and specifies the test method of these kinds of impedance. It is applicable for determining the values of time domain impedance of twinax cables and twinax cable assemblies.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 62783-1:2023, *Twinax cables for digital communications - Part 1: Generic specification*

IEC 62783-1-1:2022, *Twinax cables for digital communications - Part 1-1: Time-domain test methods for twinax cables for digital communications - General requirements*