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Measurement methods and test procedures — Differential mode delay of multimode optical fibers

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In the event of any doubts arising as to the contents,
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Foreword

This Japanese Industrial Standard has been revised by the Minister of Economy, Trade and Industry based on the provision of Article 14, paragraph (1) of the Industrial Standardization Act applied mutatis mutandis pursuant to the provision of Article 16 of the said Act in response to a proposal for revision of Japanese Industrial Standard with a draft being attached, submitted by Japanese Standards Association (JSA), an accredited standards development organization. This edition replaces the previous edition (**JIS C 6864** : 2008), which has been technically revised.

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Measurement methods and test procedures — Differential mode delay of multimode optical fibers

Introduction

This Japanese Industrial Standard has been prepared based on IEC 60793-1-49 : 2018, Edition 3, with some modifications of the technical contents.

The dotted underlines indicate changes from the corresponding International Standard. A list of modifications with the explanations is given in Annex JA.

1 Scope

This Standard specifies test methods for differential mode delay of multimode, graded-index glass-core fibers. The test method is commonly used in production and research facilities, but is not easily accomplished in the field.

This Standard describes a method for characterizing the modal structure of a graded-index multimode fiber. This information is useful for assessing the bandwidth performance of a fiber especially when the fiber is intended to support a range of launch conditions, for example, those produced by standardized laser transmitters.

With this method, the output from a probe fiber that is single-moded at the test wavelength excites the multimode fiber under test. The probe spot is scanned across the end-face of the fiber under test at specified radial positions, and a set of response pulses are acquired at these positions.

Three specifiable parameters can be derived from the collected set of data.

- The first parameter, differential modal delay (*DMD*), is the difference in optical pulse delay time between the fastest and slowest mode groups of the fiber under test. *DMD* specifications place limits on modal delay over a specified range of probe fiber radial offset positions. *DMD* specifications are determined by modeling and experimentation to correspond to a minimum effective modal bandwidth (*EMB*) for the expected range of transmitters used in a link at a given performance level.
- The second specifiable parameter is derived by combining the pulses using sets of specific radial weights to determine an approximation of a set of pulses from typical transmitters. Using Fourier transforms, the calculated effective modal bandwidth (*EMBc*) is determined for each weight set. The minimum of these *EMBc* values (min*EMBc*) is the specifiable parameter.
- The third specifiable parameter, the computed overfilled launch bandwidth, *OMBc*, is determined in a manner similar to *EMBc*, but by applying just one weight set to the set of pulses; this weight set corresponds to the overfilling condition, where all mode groups are equally excited.

The test's intent is to quantify the effects of interactions of the fiber modal structure