



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS C 5932 : 2012

(OITDA/JSA)

General rules of optical isolator

ICS 33.180.20

Reference number : JIS C 5932 : 2012 (E)

PROTECTED BY COPYRIGHT

Date of Establishment: 1993-10-01

Date of Revision: 2012-05-21

Date of Public Notice in Official Gazette: 2012-05-21

Investigated by: Japanese Industrial Standards Committee
Standards Board

Technical Committee on Electronics Technology

JIS C 5932:2012, First English edition published in 2013-06

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

© JSA 2013

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 the publisher.

Printed in Japan

PROTECTED BY COPYRIGHT

Contents

	Page
Introduction.....	1
1 Scope.....	1
2 Normative references	1
3 Terms and definitions	2
3.1 Basic term definitions.....	2
3.2 Component definitions	2
3.3 Performance parameter definitions	3
4 Classification.....	4
5 Appearance and structure.....	5
5.1 Appearance	5
5.2 Structure.....	5
6 Performance	5
6.1 Optical performance	5
6.2 Environment and durability properties	5
7 Test method.....	5
8 Marking.....	5
9 Packaging	6
10 Safety	6
Annex A (informative) Example of technology of optical bulk isolator	7
Annex B (informative) Example of technology of optical waveguide isolator	9
Annex JA (informative) Example of style of individual standard of optical isolator.....	11
Annex JB (informative) Comparison table between JIS and corresponding International Standard	13

Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Optoelectronics Industry and Technology Development Association (OITDA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14. Consequently, **JIS C 5932:2006** is replaced with this Standard.

This **JIS** document is protected by the Copyright Law.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public or the utility model right. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public or the utility model right.

General rules of optical isolator

Introduction

This Japanese Industrial Standard has been prepared based on the third edition of **IEC 61202-1** published in 2009 with some modifications of the technical contents to correspond to the actual situation in Japan.

The portions given dotted underlines are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with the explanations is given in Annex JB. The matters contained in Annex JA are not given in the corresponding International Standard.

1 Scope

This Standard specifies the general rules of optical isolators used in the field of fibre optics (hereafter referred to as “optical isolators”) and provides common specifications of optical isolators such as related terms and definitions and classification.

NOTE : The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

IEC 61202-1:2009 *Fibre optic interconnecting devices and passive components—Fibre optic isolators—Part 1: Generic specification* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS C 5860 *General rules of passive devices for light beam transmission*

JIS C 5873 *Test methods of optical isolators for light beam transmission*

JIS C 5900 *General rules of passive devices for fiber optic transmission*

JIS C 5901 *Test methods of passive devices for fibre optic transmission*

NOTE : Corresponding International Standard: IEC 61300 (all parts) *Fibre optic interconnecting devices and passive components—Basic test and measurement procedures* (MOD)

JIS C 5933 *Test methods of optical isolators for fiber optic transmission*

JIS C 5970 *F01 Type connectors for optical fiber cables*

NOTE : Corresponding International Standard: IEC 61754-13 *Fibre optic connector interfaces—Part 13: Type FC-PC connector* (MOD)

3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in clause 3 of JIS C 5900 or clause 3 of JIS C 5860 and the following.

3.1 Basic term definitions

3.1.1 input port

port designed for ingress of an optical power

For an optical isolator, the port identification (either input or output) is fixed.

3.1.2 output port

port designed for regress of an optical power

For an optical isolator, the port identification (either input or output) is fixed.

3.1.3 forward direction

direction designed to ingress from the input port (input end face) to the output port (output end face) optically

3.1.4 backward direction

direction designed to regress from the output port (output end face) to the input port (input end face) optically

3.2 Component definitions

3.2.1 optical isolator

optical transmission component provided with an input port (input end face) and an output port (output end face), in which transmission of light is intended in the direction from the input port (input end face) to the output port (output end face) and displacement of light is intended in the direction from the output port (output end face) to the input port (input end face)

3.2.2 optical bulk isolator

type of isolator composed of magneto-optic materials (ferromagnetic crystal or paramagnetic glass, diamagnetic glass, etc.) based on magneto-optic effect

See Annex A for example of its technology.

3.2.3 optical waveguide isolator

type of isolator with planer epitaxial magneto-optic crystal layers on a suitable substrate

See Annex B for example of its technology.

3.2.4 polarization dependent optical isolator

type of isolator not designed to have performance independent of the state of the polarization of the incident light

3.2.5 polarization independent optical isolator

type of isolator in which the optical performance characteristics are independent of the polarization state of the incident light

3.2.6 polarization maintain optical isolator

type of isolator with the polarization-maintaining optical fibre for input port and output port, designed to have maintain polarization of the light so that polarization state of the output (regress) light and the input (ingress) light is the same

3.2.7 single stage isolator

type of isolator composed of a non-reciprocal part such as a set of polarizer, Faraday rotator and analyser

3.2.8 dual stage isolator, double stage isolator

type of isolator composed of two non-reciprocal parts connected in tandem for the purpose of obtaining more isolation

3.2.9 polarization mode dispersion compensated optical isolator

type of isolator with the specified value of zero (0) for the polarization mode dispersion (PMD) which is attributed to birefringent crystals

3.3 Performance parameter definitions**3.3.1 operating wavelength**

nominal wavelength, at which an optical isolator operates with the specific performance

3.3.2 operating wavelength range

range of wavelengths from the minimum wavelength, including the operating wavelength, to the maximum wavelength, within which an optical isolator is designed to operate with the specified performance

3.3.3 insertion loss

measure of the decrease in optical power resulting from the insertion of an optical isolator in its forward direction, defined as equation (1):

$$a_f = -10 \log_{10} \frac{P_2}{P_1} \dots\dots\dots (1)$$

where, a_f : insertion loss (dB)

P_1 : optical power launched into the input port (input end face) of the isolator (W)

P_2 : power of any polarized light received back from the output port (output end face) of the isolator (W)

In the case of polarization-independent isolators, a_f is defined as the maximum value for any state of polarization. In the case of polarization-dependent isolators, a_f is defined as the linearly polarized light which coincides with the polarizing direction of the polarizer in the isolator. In the case of polarization-dependent isolators for spatial beam transmission, for which the incident polarization plane is not specified, the minimum value shall be adopted for the linearly polarized light of all the polarization planes.