



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS C 6189 : 2004

Test methods of optical return loss meters

ICS 33.180.10

Reference number : JIS C 6189 : 2004 (E)

PROTECTED BY COPYRIGHT

Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization 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, utility model right or application for registration of utility model after opening to the public which have technical properties. 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, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

Date of Establishment: 2004-03-20

Date of Public Notice in Official Gazette: 2004-03-22

Investigated by: Japanese Industrial Standards Committee
Standards Board
Technical Committee on Electronics

JIS C 6189:2004, First English edition published in 2004-08

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 2004

All rights reserved. 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

Contents

	Page
1 Scope	1
2 Normative references	1
3 Definitions	1
4 Standard test condition	1
5 Outline of tests	2
5.1 Types of tests	2
5.2 Calculation of test results	2
5.3 Logarithmic expression of error	3
6 Optical return loss accuracy test	3
6.1 Outline of optical return loss accuracy test	3
6.2 Intrinsic error test	3
6.3 Individual error test	4
7 Other performance tests	7
7.1 Output optical power test	7
7.2 Test of centre wavelength of output light	8
7.3 Test of optical spectrum band width of output light	8
8 Strength test	9
8.1 Vibration test	9
8.2 Drop test	10

Test methods of optical return loss meters

1 Scope This Japanese Industrial Standard specifies the test methods of the optical return loss meters which measure the optical return loss of the optical parts using optical fiber.

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

JIS C 0040 *Environmental testing Part 2 : Tests—Test Fc : Vibration (sinusoidal)*

JIS C 0043 *Environmental testing Part 2 : Tests. Test Ec : Drop and topple, primarily for equipment-type specimens*

JIS C 1002 *Glossary of terms used in electronic measuring apparatus*

JIS C 6182 *Test methods of optical power meters for laser beam*

JIS C 6183 *Test methods of fiber-optic spectrum analyzer*

JIS C 6832 *Silica glass multimode optical fibers*

JIS C 6835 *Silica glass single-mode optical fiber*

JIS Z 8103 *Glossary of terms used in measurement*

JIS Z 8120 *Glossary of optical terms*

3 Definitions For the purpose of this Standard, the definitions given in **JIS C 1002**, **JIS Z 8103** and **JIS Z 8120**, and the following definitions apply:

- a) Instrument capable of measuring the optical return loss of the optical parts using optical fiber. Consisting of light source, optical coupler, detector which converts the optical return quantity into electric output and indicator.
- b) Optical reflector having optical fiber connector terminals, of sufficiently small wavelength dependency, polarization dependency and temperature dependency on the optical return loss, of previously known optical return quantity and of error assessed.

4 Standard test condition Unless otherwise specified, the condition to be standard when testing the optical return loss meters (hereafter, the optical return loss meters to be the objects of the test are referred to as “meters to be tested”) shall be as follows.

If the test under the standard test condition is difficult to be carried out, the condition of actual test execution and its influence shall be described in the test report.

- a) Temperature $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$
- b) Relative humidity $(65 \pm 10)\%$

- c) **Optical fiber** Unless otherwise specified, the optical fibers given in table 1 shall be used according to the output light wavelength of the meter to be tested and the type of adopted optical fiber.

The symbols in the table are as specified in **JIS C 6832** or **JIS C 6835**.

The optical fiber length shall be of such a length that the back scattering light of its own does not affect the lower limit of measurement of the optical return loss meter.

In general, it is recommended to be 3 m or under.

Table 1 Optical fibers used at the time of test

Type of meter to be tested		Optical fiber used at the time of test
Type of adopted optical fiber	Output light wavelength (mm)	
Multimode optical fiber	850	SGI-50/125
	1 310	
Singlemode optical fiber	1 310	SSMA-9/125, SSMA-9.5/125, SSMA-10/125
	1 550	SSMA-9/125, SSMA-9.5/125, SSMA-10/125, SSMB-8/125

5 Outline of tests

5.1 Types of tests The performance of the meters to be tested shall be assessed as the results of optical return loss accuracy test, tests on such items as light power of output light, central light wavelength and optical spectrum width, and strength test. Each test, however, stands on a different assessment level and, therefore, the error obtained by each test shall be taken as an assessed value of the relevant item, and shall not be put together for overall assessment.

5.2 Calculation of test results The measurement accuracy of the meters to be tested is assessed on the optical return loss accuracy. The assessment is that first the intrinsic error under the standard test condition is obtained in the intrinsic error test and then the partial error of the meter to be tested is obtained in each error test. Each error in percent (%) is obtained and the limits of operating error are calculated by the formulae (1) and (2) to take them as the accuracy of the meter to be tested.

The formulae (1) and (2) are cited from the assessment formulae in **JIS C 6182** and **JIS C 8163**.

$$e_{tu} = \overline{\varepsilon_{to}} + \sum_{i=1}^p \overline{\varepsilon_{ti}} + 2 \sqrt{\varepsilon_{to}^2 + \sum_{i=1}^p \varepsilon_{ti}^2} \dots\dots\dots (1)$$

$$e_{tl} = \overline{\varepsilon_{to}} + \sum_{i=1}^p \overline{\varepsilon_{ti}} - 2 \sqrt{\varepsilon_{to}^2 + \sum_{i=1}^p \varepsilon_{ti}^2} \dots\dots\dots (2)$$