BS EN 62343-3-3:2014

BSI Standards Publication

Dynamic modules

Part 3-3: Performance specification templates - Wavelength selective switches

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 62343-3-3:2014. It is identical to IEC 62343-3-3:2014.

The UK participation in its preparation was entrusted by Technical Committee GEL/86, Fibre optics, to Subcommittee GEL/86/3, Fibre optic systems and active devices.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2014

ISBN 978 0 580 81919 3
ICS 33.180.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2014.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 62343-3-3

July 2014

ICS 33.180.20

English Version

Dynamic modules - Part 3-3: Performance specification templates - Wavelength selective switches (IEC 62343-3-3:2014)

Modules dynamiques - Partie 3-3: Modèles de spécification de performance - Commutateurs sélectifs en longueur d'onde (CEI 62343-3-3:2014)

Dynamische Module - Vorlagen für Leistungsspezifikationen - Teil 3-3: Wellenlängen-Wählschalter (IEC 62343-3-3:2014)

This European Standard was approved by CENELEC on 2014-06-10. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

The text of document 86C/1156/CDV, future edition 1 of IEC 62343-3-3, prepared by SC 86C "Fibre optic systems and active devices" of IEC/TC 86 "Fibre optics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62343-3-3:2014.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2015-03-10
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2017-06-10

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 62343-3-3:2014 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60793-2-50	NOTE	Harmonized as EN 60793-2-50.
IEC 60869-1	NOTE	Harmonized as EN 60869-1.
IEC 60876-1	NOTE	Harmonized as EN 60876-1.
IEC 61300 Series	NOTE	Harmonized as EN 61300 Series (partially modified).
IEC 61300-3-4	NOTE	Harmonized as EN 61300-3-4.
IEC 61300-3-20	NOTE	Harmonized as EN 61300-3-20.
IEC 61753-1	NOTE	Harmonized as EN 61753-1.
IEC 61753-081-2	NOTE	Harmonized as EN 61753-081-2.
IEC 61754 Series	NOTE	Harmonized as EN 61754 Series (partially modified).
IEC 61978-1	NOTE	Harmonized as EN 61978-1.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu

Publication	Year	Title	EN/HD	Year
IEC 61290-7-1	-	Optical amplifiers - Test methods - Part 7-1: Out-of-band insertion losses - Filtered optical power meter method	EN 61290-7-1	-
IEC 61300-2-14	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-14: Tests - High optical power	EN 61300-2-14	-
IEC 61300-3-2	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-2: Examinations and measurements - Polarization dependent loss in a single-mode fibre optic device	EN 61300-3-2	-
IEC 61300-3-6	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-6: Examinations and measurements - Return loss	EN 61300-3-6	-
IEC 61300-3-14	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-14: Examinations and measurements - Accuracy and repeatability of the attenuation settings of a variable attenuator	EN 61300-3-14	-
IEC 61300-3-21	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-21: Examinations and measurements - Switching time	EN 61300-3-21	-
IEC 61300-3-29	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-29: Examinations and measurements - Spectral transfer characteristics of DWDM devices	EN 61300-3-29	-

Publication	Year	Title	EN/HD	Year
IEC 61300-3-32	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-32: Examinations and measurements - Polarisation mode dispersion measurement for passive optical components	EN 61300-3-32	-
IEC 61300-3-38	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-38:Examinations and measurements - Group delay, chromatic dispersion and phase ripple	EN 61300-3-38	-
IEC 61753-021-2	-	Fibre optic interconnecting devices and passive components performance standard - - Part 021-2: Grade C/3 single-mode fibre optic connectors for category C - Controlled environment	EN 61753-021-2	-
IEC 62074-1	-	Fibre optic interconnecting devices and passive components - Fibre optic WDM devices - Part 1: Generic specification	EN 62074-1	-
IEC 62343-4-1 [1)]	-	Dynamic modules - Part 4-1: Software and hardware interface standards - 1x9 wavelength selective switch	-	-
ITU-T Recommendation G.694.1	-	Spectral grids for WDM applications: DWDM frequency grid	-	-
ITU-T Recommendation G.Sup39	-	Optical system design and engineering considerations	-	-

[1)] Under consideration.

CONTENTS

INTRODUCTION

A wavelength selective switch (WSS) is a dynamic module (DM), which is mainly used in a reconfigurable optical add-drop multiplexer (ROADM) system to switch a particular wavelength signal to any output ports in DWDM networks. The WSS module has one input port and a plurality of output ports (i.e. $1 \times N$ WSS) and can be used in reverse, with N input ports and one output port, depending on its application. It is controlled with software, which determines any wavelength signal among a DWDM signal from one input port to switch to a particular output port in case of $1 \times N$ application.

DYNAMIC MODULES –

Part 3-3: Performance specification templates – Wavelength selective switches

1 Scope

This part of IEC 62343 provides a performance specification template for wavelength selective switches. The object is to provide a framework for the preparation of detail specifications on the performance of wavelength selective switches.

Additional specification parameters may be included for detailed product specifications or performance specifications. However, specification parameters specified in this standard shall not be removed from the detail product specifications or performance specifications.

The technical information regarding wavelength selective switches, and their applications in DWDM systems will be described in IEC TR 62343-6-4, currently under consideration.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61290-7-1, *Optical amplifiers – Test methods – Part 7-1: Out-of-band insertion losses – Filtered optical power meter method*

IEC 61300-2-14, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-14: Tests – High optical power*

IEC 61300-3-2, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-2: Examination and measurements – Polarization dependent loss in a single-mode fibre optic device*

IEC 61300-3-6, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-6: Examinations and measurements – Return loss*

IEC 61300-3-14, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-14: Examinations and measurements – Accuracy and repeatability of the attenuation settings of a variable attenuator*

IEC 61300-3-21, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-21: Examinations and measurements – Switching time and bounce time*

IEC 61300-3-29, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-29: Examinations and measurements – Measurement techniques for characterizing the amplitude of the spectral transfer function of DWDM components*

IEC 61300-3-32, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-32: Examinations and measurements – Polarization mode dispersion measurement for passive optical components*

IEC 61300-3-38, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-38: Examinations and measurements – Group delay, chromatic dispersion and phase ripple*

IEC 61753-021-2, *Fibre optic passive component performance standard – Part 021-2: Grade C/3 single-mode fibre optic connectors for category C – Controlled environment*

IEC 62074-1, *Fibre optic interconnecting devices and passive components – Fibre optic WDM devices – Part 1: Generic specification*

IEC 62343-4-1, *Dynamic modules – Part 4-1: Software and hardware interface standards – 1x9 wavelength selective switch* [1]

ITU-T Recommendation G.694.1, *Spectral grids for WDM applications: DWDM frequency grid*

ITU-T G.Sup39, *Optical system design and engineering considerations*

3 Terms and definitions

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

3.1
wavelength selective switch
WSS
dynamic module, which is mainly used in a reconfigurable optical add drop multiplexer (ROADM) system to switch all wavelength signals to their respective required output port in DWDM networks

Note 1 to entry: It is electrically controlled with software, which directs each wavelength signal among an input DWDM signal from one input port to the required output port for each wavelength signal.

3.2
operating wavelength range
specified range of wavelengths from λ_{imin} to λ_{imax} about a nominal operating wavelength λ_I, within which a dynamic optical module is designed to operate with a specified performance and generally corresponds to spectral bands for single-mode systems defined in ITU-T G.Sup39

3.3
port
optical fibre or optical fibre connector attached to a WSS module for the entry and/or exit of the optical signal (input and/or output)

3.4
channel
signal at wavelength, λ, that corresponds to ITU grid (ITU-T Recommendation G.694.1) within the range of operating wavelength range

1 Under consideration.

3.5
channel spacing
centre-to-centre difference in frequency (or wavelength) between adjacent channels in a device

3.6
channel frequency range
frequency range within which a device is expected to operate with a specified performance

Note 1 to entry: For a particular nominal channel central frequency, f_{nomi}, this frequency range is from $f_{imin} = (f_{nomi} – \Delta f_{max})$ to $f_{imax} = (f_{nomi} + \Delta f_{max})$, where Δf_{max} is the maximum channel central frequency deviation.

Note 2 to entry: Nominal channel centre frequency and maximum channel centre frequency deviation are defined in ITU-T Rec. G.692.

3.7
insertion loss
IL
value defined in the equation below at the particular wavelength between two conducting ports

Note 1 to entry: It is the reduction in optical power between an input and output port of a module expressed in decibels.

$$IL = –10 \log (P_{out}/P_{in})$$

where

P_{in} is the optical power launched into input port;

P_{out} is the optical power received from the output port.

3.8
insertion loss uniformity
difference between the maximum and minimum insertion loss at the output for a specified set of input ports

3.9
insertion loss ripple
maximum peak-to-peak variation of the insertion loss within a channel frequency (or wavelength) range

3.10
***X*-dB passband width**
width of a channel centred about the channel central wavelength within which the optical attenuation is within X dB

Note 1 to entry: The terms “operating wavelength range” or “channel passband” are used and have the same meaning as passband for DWDM devices. The X-dB bandwidth is defined through the spectral dependence of a_{ij} (where $i \neq j$) as the minimum wavelength range centred about the operating wavelength λ_h within which the variation of a_{ij} is less than X dB. The minimum wavelength range is determined considering thermal wavelength shift, polarization dependence and long-term aging shift (refer to Figure 1 below).

Note 2 to entry: It is recommended that the passband width be specified as 0,5 dB, 1 dB and 3 dB (X = 0,5, 1 and 3).

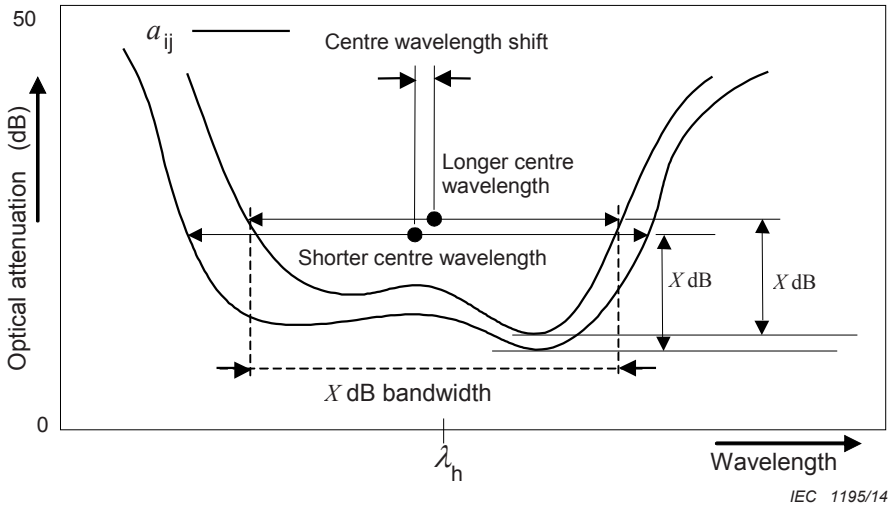


Figure 1 – Illustration of X-dB bandwidth

3.11
return loss
RL
fraction of input power that is returned from any port of a module expressed in decibels and defined in this equation at the particular wavelength between two conducting ports

$$RL = -10\ log\ (P_{refl}/P_{in})$$

where

P_{in} is the optical power launched into port;

P_{refl} is the optical power received back from the same port.

3.12
adjacent channel crosstalk
adjacent channel isolation
crosstalk with the restriction that x, the isolation wavelength number, is restricted to the channels immediately adjacent to the (channel) wavelength number associated with output port

Note 1 to entry: Adjacent channel crosstalk is a negative value in dB (see Figure 2, below).

Note 2 to entry: The adjacent channel isolation is different from adjacent channel crosstalk. In Figure 2, an up-pointing arrow shows positive, a down-pointing arrow negative. Generally, there are two adjacent channel isolations for the shorter wavelength (higher frequency) side and a longer wavelength (lower frequency) side.

Note 3 to entry: The term crosstalk and isolation are often used with almost the same in meaning. Care should be taken not to confuse crosstalk and isolation. Crosstalk is defined so that for WDM devices, the value of the ratio between the optical power of the specified signal and the specified noise, is a negative value in dB. The crosstalk is defined for each output port. Crosstalk for WDM devices is defined for a DEMUX ($1 \times N$ WDM device). The crosstalk for port o to port j is the subtraction from the insertion loss of port i to o (conducting port pair) to the isolation of port j to o (isolated port pair). For WDM devices having three of more ports, the crosstalk should be specified as the maximum value of the crosstalk for each output port. On the other hand, isolation is the minimum value of a_{ij} (where $i \neq j$) within isolation wavelength range for isolated port pair. Isolation is positive value in dB.

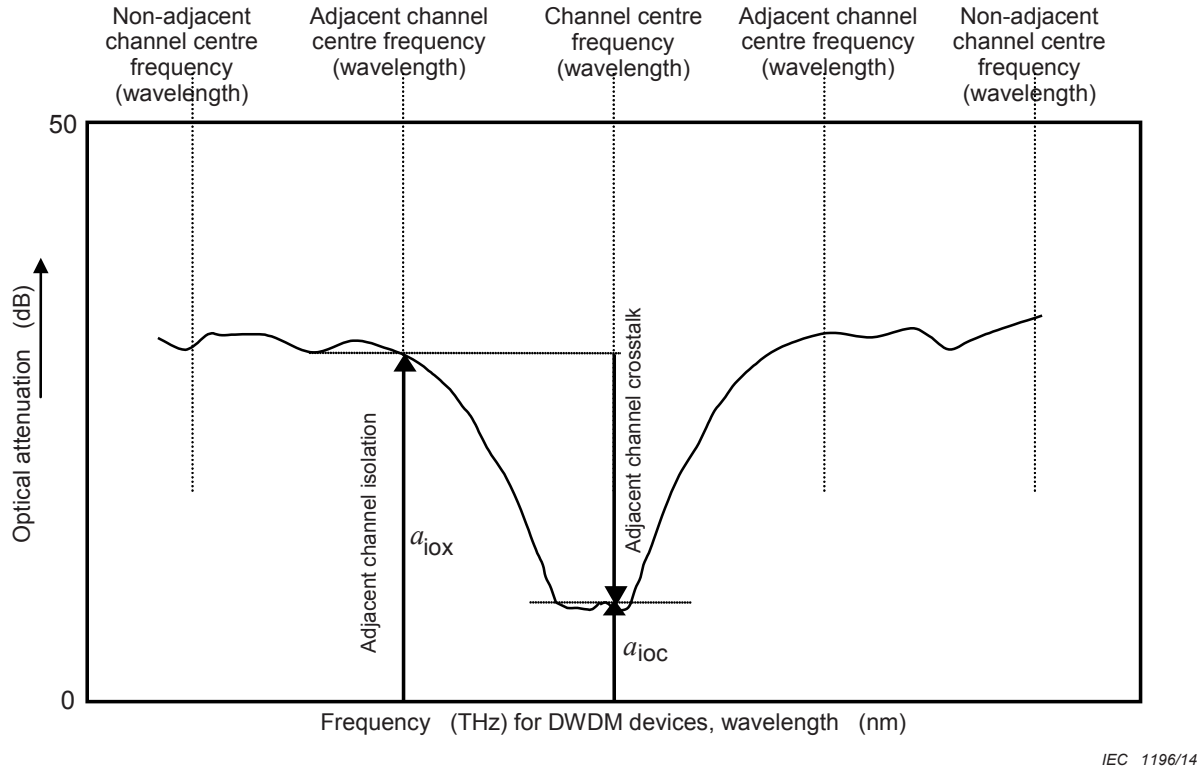


Figure 2 – Illustration of adjacent channel crosstalk

3.13
non-adjacent channel crosstalk
non-adjacent channel isolation
crosstalk with the restriction that the isolation wavelength (frequency) is restricted to each of the channels not immediately adjacent to the channel associated with output port

Note 1 to entry: The non-adjacent channel crosstalk is different from non-adjacent channel isolation. In Figure 3, up-pointing arrow shows positive, down-pointing arrow negative.

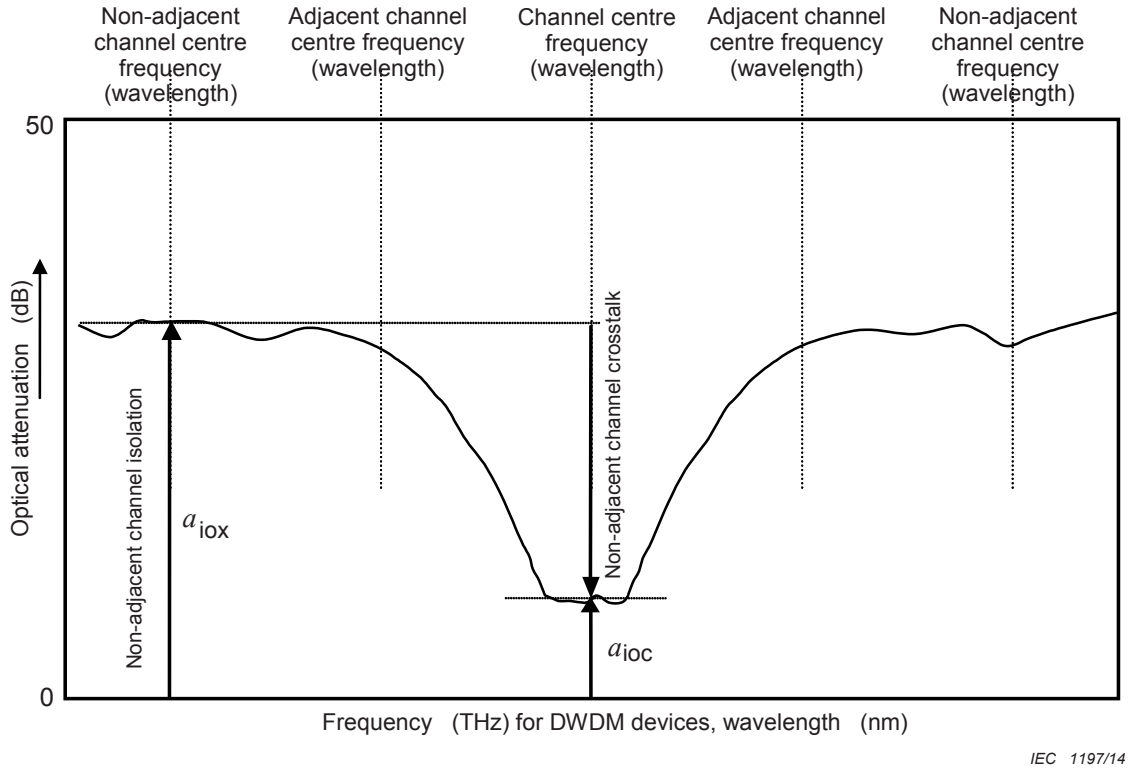


Figure 3 – Illustration of non-adjacent channel crosstalk

3.14
total channel crosstalk
total channel isolation
cumulative isolation due to the contributions at all the isolation wavelengths (frequencies) and transfer matrix coefficient for ports i and j, t_{ij} for any two ports i and j (where $i \neq j$). It is the ratio defined as

$$XT_{\text{tot}} = -10 \times \text{Log}\left[\frac{t_{ij}(\lambda_h)}{\sum_{k(k\neq h)}^{N} t_{ij}(\lambda_k)}\right]$$

where

N is the number of channels of the device;

λ_h is the nominal operating wavelength (frequency) for the two of ports, i and j;

λ_k are the nominal isolation wavelengths (frequencies) for the same pair of ports.

Note 1 to entry: Total channel crosstalk is also expressed by total channel isolation as in the following equation:

$$XT_{\text{tot}} = a_{ij}(\lambda_h) - I_{\text{tot}}$$

Note 2 to entry: Total channel crosstalk is a negative value in dB. For a WDM device, total channel crosstalk shall be specified as the maximum value of total channel crosstalk of all channels.

3.15
transient crosstalk
transient isolation/transient directivity
crosstalk that is attributed to both channel crosstalk (due to same wavelength and/or other wavelengths) and port isolation, predicted to change during switching operation in WSS module

Note 1 to entry: Hitless operation means that there is no influence on other performance during switching operation.

3.16
channel blocking attenuation
attenuation value when a particular channel is set in the blocking state (possible maximum attenuation)

3.17
attenuation without power
attenuation value when electric power for driving the attenuation is not supplied

3.18
variable attenuation range
attenuation value that can be changed with channel-by-channel independently controlled by driving circuit with software

3.19
variable attenuation resolution
resolution of the setting of attenuation value

3.20
attenuation accuracy
precision of attenuation value when once set by driving circuit with software and includes the point of view of both repeatability and stability in the timeframe

Note 1 to entry: This is important when used in open loop operation.

3.21
response time for attenuation
elapsed time to change the attenuation value of any channel from an initial value to the desired value, measured from the time the actuation energy is applied

3.22
out-of-band attenuation
minimum attenuation (in dB) of channels that fall outside of the operating wavelength range

3.23
switching time
when switching from isolated state to conducting state, switching time (t_s) is defined as follows

$$t_s = t_l + t_r + t_b$$

where

t_l is latency time;

t_r is rise time;

t_b is bounce time.

Note 1 to entry: When switching from conducting state to isolated state, switching time (t_s') is defined as follows:

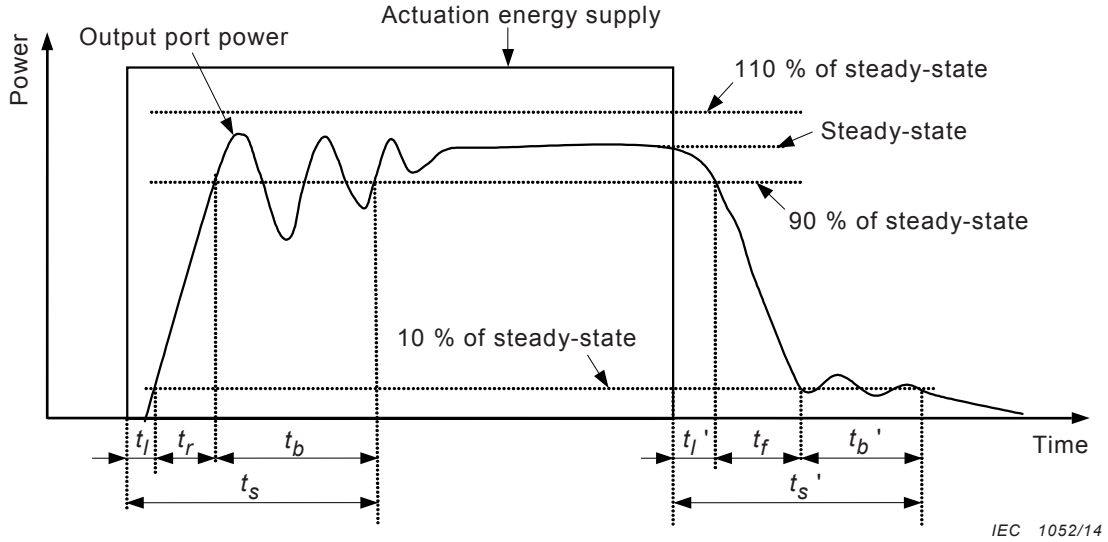
$$t_s' = t_l' + t_f + t_b'$$

where

t_l' is latency time;

t_f is fall time;

t_b' is bounce time.



where

t_s, t_s' is the switching time;

t_l, t_l' is the latency time;

t_r is the rise time;

t_f is the fall time;

t_b, t_b' is the bounce time.

Figure 4 – Illustration of latency time, rise time, fall time, bounce time, and switching time

Note 2 to entry: If, for any reason, the steady-state power of the isolated state is not zero, all the power levels leading to the definitions of latency time, rise time, fall time, bounce time, and thus of switching time, should be normalized subtracting from them the steady-state power of the isolated state, before applying such definitions.

3.24
polarization dependent loss
PDL
maximum variation of insertion loss due to a variation of the state of polarization (SOP) over all the SOPs

3.25
polarization mode dispersion
PMD
change in the shape and r.m.s. width of a pulse due to the average delay of the travelling time between the two principal states of polarization (PSP), differential group delay (DGD), and/or to the waveform distortion for each PSP

Note 1 to entry: PMD, together with polarization dependent loss (PDL) and polarization dependent gain (PDG), when applicable, may introduce waveform distortion leading to unacceptable bit error increase.

3.26
group delay ripple
maximum peak-to-peak variation of the group delay approximated by a desired function as wavelength (or frequency), typically a linear fit, within a channel wavelength (or frequency) range

3.27
phase ripple
maximum peak-to-peak variation in measured phase spectrum when compared to a quadratic fit within a channel wavelength (or frequency) range

Note 1 to entry: Phase ripple (unit: radian) is calculated as the product of a peak-to-peak group delay ripple (unit: s) and a period of group delay ripple (unit: Hz). Refer to IEC 61300-3-38.

3.28
chromatic dispersion
group delay difference between two closely spaced wavelengths inside an optical signal going through a pair of conducting ports of a DWDM device

Note 1 to entry: It corresponds to the difference between the arrival times of these two closely spaced wavelengths. Chromatic dispersion is defined as the variation (first order derivative) of this group delay over a range of wavelengths especially over the channel operating wavelength range at the given time, temperature, pressure and humidity. It is expressed in terms of units of ps/nm or ps/GHz and it is a predictor of the broadening of a pulse transmitted through the module.

3.29
maximum input power (single channel)
allowable optical power which causes no damage by the optical power such as degradation of adhesive or fibre fuse as for a particular channel

3.30
maximum input power (single port)
allowable optical power, which causes no damage by the optical power such as degradation of adhesive or fibre fuse as for a particular port

4 Test report

Fully documented test reports and supporting evidence shall be prepared and be available for inspections as evidence that the tests have been carried out and complied with.

5 Reference components

The testing for these components does not require the use of reference components.

6 Performance requirements

6.1 Dimensions

Dimensions shall comply with either an appropriate IEC interface standard or with those given in the manufacturer's drawings where the IEC interface standard does not exist or cannot be used.

6.2 Sample size

The test sample size and sequencing requirements for the module components shall be defined in the relevant specification.

6.3 Test details and requirements

The requirements are given only for non-connectorized WSS devices. For connectorized components, the connector performances shall be in compliance with IEC 61753-021-2.

A minimum length of fibre or cable of 1,5 m per port shall be included in all climatic and environmental tests.

The channel spacings, unless otherwise specified, shall be in accordance with ITU-T Recommendation G.694-1. Environmental test shall be measured for a single input/output port combination.

The test details and requirements for performance standard are shown in Table 1.

Table 1 – Tests and requirements

No.	Test parameter/test method	Unit	Details
1	Operating wavelength	nm	
2	Number of ports		
3	Number of channels		
4	Channel spacing	GHz [a]	
5	Channel frequency range IEC 62074-1	GHz	Information (not test item). Channel central frequency: ITU-T grid or custom design. ITU-T Recommendation G.694.1
6	Insertion loss IEC 61300-3-29, IEC 62074-1	dB	Condition: the insertion loss shall be determined as the worst case over all states of polarization and over the operating wavelength range. Launch fibre length: ≥1,5 m. The test conditions shall provide loss measurement results with an accuracy of better than ±0,05 dB over the operating wavelength range
7	Insertion loss uniformity IEC 61300-3-29	dB	Condition: the insertion loss uniformity shall be determined as the worst case over all states of polarization including channel and port. Launch fibre length: ≥1,5 m. The test conditions shall provide loss measurement results with an accuracy of better than ±0,05 dB over the operating wavelength range
8	Insertion loss ripple IEC 61300-3-29	dB	Condition: the Insertion loss ripple shall be determined as the worst case over all states of polarization. Launch fibre length: ≥1,5 m. The test conditions shall provide loss measurement results with an accuracy of better than ±0,05 dB over the operating wavelength range
9	X-dB passband width IEC 61300-3-29, IEC 62074-1	GHz	Condition: the X-dB passband width, which is measured at X-dB down (defined in Figure 1), shall be determined as the worst case over all states of polarization. It is recommended that the passband width be specified as 0,5 dB, 1 dB and 3 dB. Launch fibre length: ≥1,5 m
10	Return loss IEC 61300-3-6	dB	Condition: all ports not under test shall be terminated to avoid unwanted reflections contributing to the measurement. Launch fibre length: ≥1,5 m. The test conditions shall provide return loss measurement results with an accuracy of better than ±0,1 dB over the operating wavelength range
11	Adjacent channel crosstalk IEC 61300-3-29, IEC 62074-1	dB	Condition: the adjacent channel isolation shall be determined as the worst case over all states of polarization. Launch fibre length: ≥1,5 m. The test conditions shall provide isolation measurement results with an accuracy of better than ±0,1 dB over the operating wavelength range

No.	Test parameter/test method	Unit	Details
12	Non-adjacent channel crosstalk IEC 61300-3-29, IEC 62074-1	dB	Condition: the non-adjacent channel isolation shall be determined as the worst case over all states of polarization. Launch fibre length: ≥1,5 m. The test conditions shall provide isolation measurement results with an accuracy of better than ±0,1 dB over the operating wavelength range
13	Total channel crosstalk IEC 61300-3-29, IEC 62074-1	dB	Condition: the minimum total channel isolation shall be determined as the worst case over all states of polarization. Launch fibre length: ≥1,5 m. The test conditions shall provide isolation measurement results with an accuracy of better than ±0,1 dB over the operating wavelength range
14	Transient crosstalk (Transient isolation/transient directivity)	dB	Categorization, definition and measurement method are under consideration
15	Channel blocking attenuation IEC 61300-3-7	dB	Launch fibre length: ≥1,5 m. Launch conditions: the wavelength of the source shall be longer than cut-off wavelength of the fibre. Source: the stability at the operating wavelength shall be better than ±0,05 dB over the measuring period of at least within 1 h. Waveband to meet the operating wavelength of WSS. Detector system: linearity within ±0,05 dB. Spectral response matched to source. Dynamic range within the attenuation values to be measured.
16	Attenuation without power IEC 61300-3-7	dB	Launch fibre length: ≥1,5 m. Launch conditions: the wavelength of the source shall be longer than cut-off wavelength of the fibre. Source: the stability at the operating wavelength shall be better than ±0,05 dB over the measuring period of at least within 1 h. Waveband to meet the operating wavelength of WSS. Detector system: linearity within ±0,05 dB. Spectral response matched to source. Dynamic range within the attenuation values to be measured.
17	Variable attenuation range IEC 61300-3-7	dB	Launch fibre length: ≥1,5 m. Launch conditions: the wavelength of the source shall be longer than cut-off wavelength of the fibre. Source: the stability at the operating wavelength shall be better than ±0,05 dB over the measuring period of at least within 1 h. Waveband to meet the operating wavelength of WSS. Detector system linearity within ±0,05 dB. Spectral response matched to source. Dynamic range within the attenuation values to be measured

No.	Test parameter/test method	Unit	Details
18	Variable attenuation resolution	dB	Method under consideration. Same as measurement method of switching time defined in IEC 61300-3-21
19	Attenuation accuracy IEC 61300-3-14	dB	Launch fibre length: ≥1,5 m. Launch conditions: the wavelength of the source shall be longer than cut-off wavelength of the fibre. Source: the stability at the operating wavelength shall be better than ±0,05 dB over the measuring period of at least within 1 h. Waveband to meet the operating wavelength of WSS. Detector system: linearity within ±0,05 dB. Spectral response matched to source
20	Response time for attenuation	ms	Method under consideration. Same as measurement method of switching time defined in IEC 61300-3-21
21	Out of band attenuation IEC 61290-7-1	dB	
22	Switching time IEC 61300-3-21	ms	
23	Polarization dependent loss IEC 61300-3-2, IEC 62074-1	dB	The allowable PDL combination applies to all combination of input and output ports. Launch fibre length: ≥1,5 m
24	Polarization mode dispersion IEC 61300-3-32, IEC 62074-1	ps	The allowable PMD combination applies to all combination of input and output ports
25	Group delay ripple IEC 61300-3-38	ps	IEC 61300-3-38
26	Phase ripple IEC 61300-3-38	rad	IEC 61300-3-38
27	Chromatic dispersion IEC 61300-3-38	ps/nm	IEC 61300-3-38
28	Maximum input power (single channel) IEC 61300-2-14	dBm	Input port: single port
29	Maximum input power (single port) IEC 61300-2-14	dBm	Input port: single port
30	Storage temperature (range)	ºC	
31	Storage humidity	RH %	
32	Operating case temperature	ºC	
33	Operating humidity	RH %	
34	Temperature control		(equipped or not)
35	Supply voltage	V	
36	Power consumption	W	
37	Module size	mm × mm × mm	
38	Fibre type		For example, IEC 60793-2-50
39	Pigtail fibre length	m	

No.	Test parameter/test method	Unit	Details
40	Pigtail fibre buffer diameter	μm	
41	Optical connector		For example, IEC 61754 series
42	Optical connector labelling		
43	Electrical interface		IEC 62343-4-1, under consideration
44	Communication interfaces		IEC 62343-4-1, under consideration
[a] 50 GHz and 100 GHz are commercially available.			

Bibliography

IEC 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres*

IEC 60869-1, *Fibre optic interconnecting devices and passive components – Fibre optic passive power control devices – Part 1: Generic specification*

IEC 60876-1, *Fibre optic spatial switches – Part 1: Generic specification*

IEC 61300 (all parts), *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures*

IEC 61300-3-4, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-4: Examinations and measurements – Attenuation*

IEC 61300-3-20, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-20: Examinations and measurements – Directivity of fibre optic branching devices*

IEC 61753-1, *Fibre optic interconnecting devices and passive components performance standard – Part 1: General and guidance for performance standards*

IEC 61753-081-2, *Fibre optic interconnecting devices and passive components performance standard – Part 081-2: Non-connectorized single-mode fibre optic middle-scale 1 × N DWDM devices for category C – Controlled environments*

IEC 61754 (all parts), *Fibre optic interconnecting devices and passive components – Fibre optic connector interfaces*

IEC 61978-1, *Fibre optic interconnecting devices and passive components – Fibre optic passive chromatic dispersion compensators – Part 1: Generic specification*[2]

IEC TR 62343-6-3, *Dynamic modules – Part 6-3: Round robin measurement results for group delay ripple of tunable dispersion compensators*

IEC TR 62343-6-4, *Dynamic modules – Part 6-4: Design guides – Reconfigurable optical add drop multiplexer (ROADM)*[3]

IEC TS 62538, *Categorization of optical devices*

ITU-T Recommendation G.671, *Transmission characteristics of optical components and subsystems*

ITU-T Recommendation G.692*, Optical interfaces for multichannel systems with optical amplifiers*

_____

2 A third edition is under consideration.

3 Under consideration.

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™