SLOVENSKI STANDARD
oSIST prEN 62343-5-2:2017

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Dinamični moduli - 5-2. del: Preskusne metode - 1xN fiksno omrežje WSS - Merjenje dinamičnega presluha

Dynamic modules - Part 5-2: Test methods - 1xN fixed-grid WSS - Dynamic crosstalk measurement

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COMMITTEE DRAFT FOR VOTE (CDV)

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IEC SC 86C : FIBRE OPTIC SYSTEMS AND ACTIVE DEVICES	
SECRETARIAT: United States of America	SECRETARY: Mr Jack Dupre
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TITLE:

Dynamic modules - Part 5-2: Test methods - 1xN fixed-grid WSS - Dynamic crosstalk measurement

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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DYNAMIC MODULES –
Part 5-2: Test methods – 1xN fixed-grid WSS – Dynamic crosstalk measurement

FOREWORD

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

FDIS	Report on voting
86C/XX/FDIS	86C/XX/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

98 The committee has decided that the contents of this document will remain unchanged until the
99 stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to
100 the specific document. At this date, the document will be

101 • reconfirmed,
102 • withdrawn,
103 • replaced by a revised edition, or
104 • amended.
105

106 The National Committees are requested to note that for this document the stability date
107 is 2022.

108 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE
109 DELETED AT THE PUBLICATION STAGE.

110

111

112

INTRODUCTION

Dynamic crosstalk is attributed to both channel crosstalk (due to same wavelength and/or other wavelengths) and port isolation. It is predicted to change during port switching operations and is a significant performance issue studied and summarized in IEC TR 62343-6-9 for 1xN (N≥3) wavelength selective switch (WSS).

It was revealed that dynamic crosstalk exists in actual 1xN (N≥3) WSS in IEC TR 62343-6-9 and predicted that it would influence transmission properties to some extent when a specific channel passes through the WSS.

This document standardizes the measurement method of dynamic crosstalk of 1xN (N≥3) WSS.

This standard is based on OITDA (Optoelectronic Industry and Technology Development Association) Standard, OITDA DM 01, "Measurement methods of dynamic crosstalk for 1xN fixed-grid wavelength selective switches".

DYNAMIC MODULES –
Part 5-2: Test methods – 1xN fixed-grid WSS – Dynamic crosstalk measurement

1 Scope

This part of the 62343 series describes the measurement methods of dynamic crosstalk during port switching for 1xN fixed-grid wavelength selective switches (WSSs).

The objective of this part of IEC 62343 is to establish a standard test method for different-channel dynamic crosstalk and same-channel dynamic crosstalk that occur when a particular optical channel signal is switched to the specific branching port against a common port in ITU-T 50 GHz and 100 GHz fixed grid 1xN (N≥3) WSSs.

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 60050, *International Electrotechnical Vocabulary*

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*

IEC TR 61931, *Fibre optic – Terminology*

IEC 62343, *Dynamic modules – General and guidance*

IEC 62343-3-3, *Dynamic modules – Part 3-3: Performance specification templates – Wavelength selective switches*

IEC TS 62538, *Categorization of optical devices*

IEC TS 62627-09 Edition 1.0 (2016-10-24), *Fibre optic interconnecting devices and passive components – Vocabulary for passive optical devices*

ISO/IEC Guide 99, *International vocabulary of metrology – Basic and general concepts and associated terms (VIM)*

3 Terms, definitions and abbreviations

For the purpose of this International Standard, the definitions of IEC 60050 (IEV), IEC TR 61931, IEC 62343, IEC TS 62538, ISO/IEC Guide 99 (VIM), and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Basic terms and definitions

3.1.1
fixed grid
frequency of channel spacings of WSS having a port configuration of 1xN (N≥2) is predetermined for all channels and not variable

3.1.2
port pair
combination of input port and one arbitrary output port among N ports, as for a WSS having a port configuration of 1xN (N≥2)

NOTE 1 to entry: It is also valid when the WSS is used as Nx1 port configuration. In this case, port pair is defined as a combination of one arbitrary input port among N ports and one output port, as for the WSS having a port configuration of Nx1 (N≥2).

3.1.3
conducting port pair
two ports, i and j, between which transfer coefficient, t_{ij} which is defined in IEC TS 62627-09 is nominally greater than zero

Note 1 to entry: Conducting port pair is defined at a specific switching state and a specified wavelength.

[SOURCE: IEC TS 62627-09, 3.2.8, modified]

3.1.4
isolated port pair
two ports, i and j, between which transfer coefficient, t_{ij} which is defined in IEC TS 62627-09 is nominally zero, and logarithmic transfer coefficient, a_{ij} which is defined in IEC TS 62627-09 is nominally infinite

Note 1 to entry: Isolated port pair is defined at a specific switching state and a specified wavelength.

[SOURCE: IEC TS 62627-09, 3.2.9, modified]

3.1.5
attenuating port pair
two ports, i and j, between which transfer coefficient, t_{ij} which is defined in IEC TS 62627-09 is nominally greater than zero and smaller than insertion loss

Note 1 to entry: Attenuating port pair is defined at a specific switching state and a specified wavelength.

3.1.6
conducting channel
channel intended to be conducted at the specific conducting port pair

3.1.7
isolated channel
channel intended to be isolated at the specific conducting port pair

3.1.8
common port
port for “1” side, not for “N” side, with WSS having a port configuration of 1xN (N≥2)

3.1.9
branching port
port for “N” side, not for “1” side, with WSS having a port configuration of 1xN (N≥2)

3.1.10
static state
state when conducting port pair, isolated port pair and attenuating port pair are not under switching and/or attenuating operation, and the optical power is kept within 10 % in linear scale at any intended conduction port pair

3.1.11
dynamic state
state when at least one conducting port pair, isolated port pair or attenuating port pair is under switching and/or attenuating operation, and optical power varies more than 10 % in linear scale at a specific intended conduction port pair in this state

3.2 Performance parameter definitions

3.2.1
crosstalk

ratio of the transfer coefficient of the power to be isolated to the transfer coefficient for the power to be conducted for an output port

Note 1 to entry: Crosstalk is generally a negative value expressed in dB.

Note 2 to entry: For fibre optic filters and WDM devices, crosstalk is defined for one port pair at two or more different wavelengths (channels).

Note 3 to entry: For fibre optic switches, crosstalk is defined for two or more port pairs at one wavelength.

Note 4 to entry: Crosstalk for a passive optical device (component) is generally the maximum value of crosstalks for all port pairs defining crosstalks.

Note 5 to entry: For WSS, crosstalk is defined for two or more port pairs at two or more different wavelengths (channels).

[SOURCE: IEC TS 62627-09, 3.4.10, modified]

3.2.2
static crosstalk

crosstalk in a static state for 1xN (N≥2) WSS. Static crosstalk is the ratio of unintended signal transmission ratio divided by intended signal transmission ratio

Note 1 to entry: Static crosstalk is generally a negative value expressed in dB.

Note 2 to entry: Two types of static crosstalk are defined: different channel static crosstalk and same channel static crosstalk.

3.2.3
different channel static crosstalk

static crosstalk, specified by ratio of isolated channel power divided by conducting channel power in the same conducting port pair, when the input channel power in the isolated channel and conducting channel is the same

Note 1 to entry: Different channel static crosstalk is generally a negative value expressed in dB.

3.2.4
same channel static crosstalk

static crosstalk, specified by ratio of channel power in the isolated port pair divided by the channel power in the conducting port pair, when the input channel power in the isolated port pair and the conducting port pair are the same

Note 1 to entry: Same channel static crosstalk is generally a negative value expressed in dB.

3.2.5
dynamic crosstalk
transient crosstalk

crosstalk 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: Dynamic crosstalk is generally a negative value expressed in dB.

Note 2 to entry: Two types of dynamic crosstalk are defined: different channel dynamic crosstalk and same channel dynamic crosstalk.

Note 3 to entry: Dynamic crosstalk is applied to 1xN (N≥3) WSSs.

[SOURCE: IEC 62343-3-3, modified]

3.2.6
different channel dynamic crosstalk

optical power ratio of isolated channel power divided by conducting channel power in the selected output port, when the input power of the conducting channel and the isolated channel are the same

Note 1 to entry: Different channel dynamic crosstalk is generally a negative value expressed in dB.

Note 2 to entry: Signal leakage of the blue isolated channel in port 2 is the noise component for the red conducting channel signal in port 2 for the demultiplexing WSSs shown in Figure 1(a).

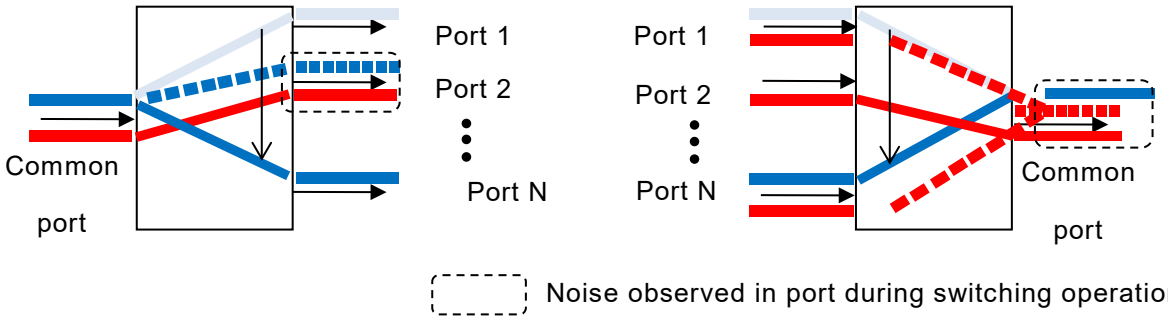
Note 3 to entry: Different channel dynamic crosstalk is applied to 1xN (N≥3) WSSs.

3.2.7
same channel dynamic crosstalk

optical power ratio of isolated channel power in the isolated port pair divided by conducting channel power in the conducting port pair, when the channel power in the input port of the conducting port pair and the channel power in the input port of the isolated port pair are the same. Same channel dynamic crosstalk is applied to 1xN (N≥3) WSSs

Note 1 to entry: Same channel dynamic crosstalk is generally a negative value expressed in dB.

Note 2 to entry: Red coloured signals in ports 1 and N are the noise components for the red signal in port 2, when the conducting port pair for the blue signal is switched from port 1 to N in the multiplexing WSS shown in Figure 1(b). All red signals in the isolated port pairs will be noise components. However, same channel dynamic crosstalk is defined by the ratio of the optical loss between the conducting port pair and an isolated port pair.



(a) Demultiplexing WSS (b) Multiplexing WSS

Figure 1 – Noise observed in port during conducting port switching in 1xN WSS

3.3 Abbreviations

ASE	amplified spontaneous emission
DEMUX	demultiplexing
DWDM	dense wavelength division multiplexing
ITU-T	International Telecommunication Union, Telecommunication Standardization Sector
LC	liquid crystal
LCOS	liquid crystal on silicon
LED	light emitting diode
MEMS	micro-electro-mechanical system
MUX	multiplexing
OE	optical-to-electrical
OPM	optical power meter
PDL	polarization dependent loss
RBD	reference branching device
ROADM	reconfigurable optical add drop multiplexing
TJ	temporary joint
TLS	tuneable laser source
WSS	wavelength selective switch