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DWDM and CWDM Three Port Device Optical Parameter Definition and Test Requirements

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Optical Parameter Definition and Test Requirement

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DWDM and CWDM Three Port Device
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1.0 Glossary Terms

DWDM ..... Dense Wavelength Division Multiplexing

CWDM ..... Coarse Wavelength Division Multiplexing

ITU ..... International Telecommunication Union

ITU-T..... Telecommunication Standardization Sector of ITU

ILmax ..... Maximum Insertion Loss

ILmin..... Minimum Insertion Loss

PDL ..... Polarization Dependent Loss

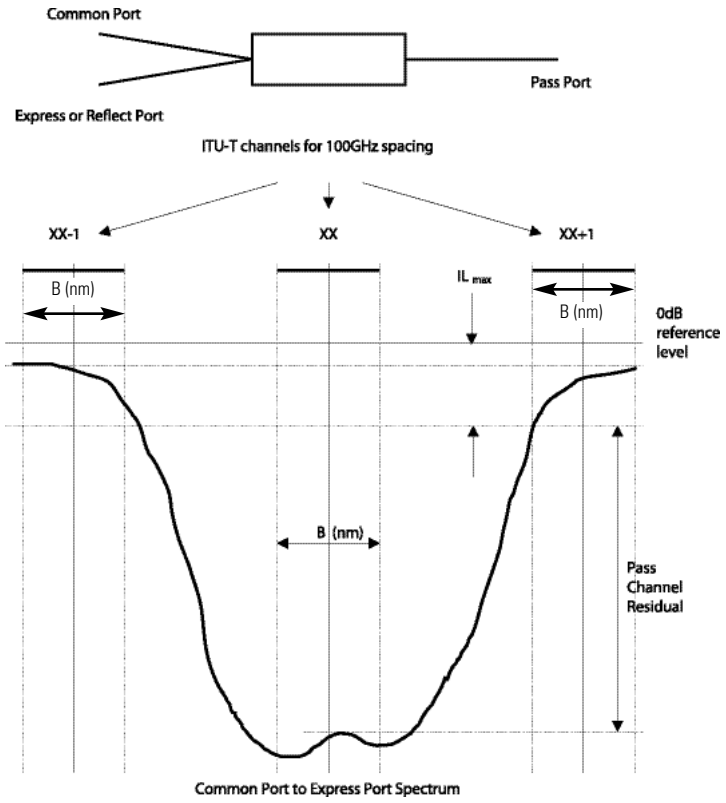
PMD ..... Polarization Mode Dispersion

2.0 Reference Documents

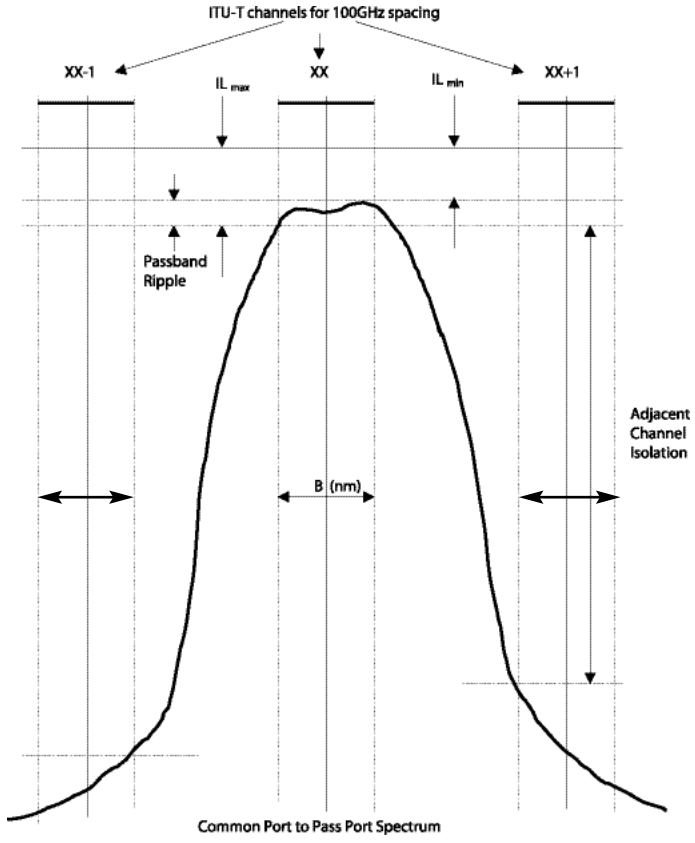
OP-410-018A ..... Testing Procedure for Single Channel CWDM

DWDM and CWDM Three Port Device
Optical Parameter Definition and Test Requirement

3.0 Optical Parameter Definitions for DWDM Three Port Devices



Common Port to Express Port Spectrum



Common Port to Pass Port Spectrum

DWDM and CWDM Three Port Device
Optical Parameter Definition and Test Requirement

3.1 ITU-T Channel Spacing
The separation of ITU-T frequency grid positions. It has an absolute value of 100GHz for 100GHz DWDM, 200GHz for 200GHz DWDM

3.2 Minimum Passband Width
Defined as XX ±B/2, this is a spectral width value centered on the ITU-T specific wavelength XX, XX is used to denote the ITU-T channel number associated with the pass channel of a filter, for example, XX=33 for ITU-T channel 33

3.3 Adjacent Channel
The adjacent channels of channel XX are channel XX-1 and channel XX+1 for 100GHz channel spacing, channel XX-2 and channel XX+2 for 200GHz channel spacing

3.4 Non-Adjacent Channel
The non-adjacent channels of channel XX are channel XX-2 and below and channel XX+2 and above for 100GHz channel spacing, channel XX-4 and below and channel XX+4 and above for 200GHz channel spacing

3.5 Maximum Pass Channel Insertion Loss ILmax
This is the loss measured from the 0dB level to the pass channel spectrum minimum point in the minimum passband region for channel XX over temperature and all polarization states

3.6 Minimum Pass Channel Insertion Loss ILmin
This is the loss measured from the 0dB level to the pass channel spectrum peak in the minimum passband region for channel XX over temperature and all polarization states

3.7 Passband Ripple
This is the difference between ILmax and ILmin for a given pass channel in any one state of temperature and polarization

3.8 Adjacent Channel Isolation
This is the difference between the minimum point on the pass channel spectrum within the minimum passband of channel XX over temperature and the maximum point within the adjacent channels minimum passband over temperature and all polarization states

3.9 Non-Adjacent Channel Isolation
This is the difference between the minimum point on the pass channel spectrum within the minimum passband of channel XX over temperature and the maximum point within minimum passband across all non-adjacent channels over temperature and all polarization states

3.10 Maximum Adjacent Channel Insertion Loss at Express Port
This is the loss measured from the 0dB level to the express channel spectrum minimum point in the minimum passband region for adjacent express channels over temperature and all polarization states

3.11 Maximum Non-Adjacent Channel Insertion Loss at Express Port
This is the loss measured from the 0dB level to the express channel spectrum minimum point in the minimum passband region across all non-adjacent express channels over temperature and all polarization states

3.12 Pass Channel Residual at Express Port
This is the difference between the minimum point on the express channel spectrum within the minimum passband of adjacent channels over temperature and the maximum point within the minimum passband of pass channel XX over temperature and all polarization states

3.13 Return Loss
The return loss is the back reflectance along the same optical path from any port with the other ports optically terminated, the return loss spec applies to the minimum pass band of channel XX and the minimum pass band of all its adjacent and non-adjacent channels over temperature

3.14 Directivity
The directivity is the leakage of signal into undesirable optical path due to scattering, which is the insertion loss between pass port and express port with the common port optically terminated for three port device. It applies to the minimum passband of channel XX and the minimum passband of all its adjacent and non-adjacent channels over temperature

3.15 Polarization Dependent Loss
PDL is the maximum difference in attenuation of signals over all states of polarization. It applies to the minimum passband of channel XX and the minimum passband of all its adjacent and non-adjacent channels over temperature

3.3.16 Polarization Mode Dispersion

PMD is the dispersion of an optical signal due to the different polarizations of light traveling at different speeds through optical component. It applies to the minimum passband of channel XX and the minimum passband of all its adjacent and non-adjacent channels over temperature

3.17 Temperature Range of Operation

The temperature range over which the filter is expected to maintain measured values within all defined specifications

3.18 Optical Input Power Range

The filter will meet all specifications while the total power at any port remains within the range 0mW to maximum power

DWDM and CWDM Three Port Device
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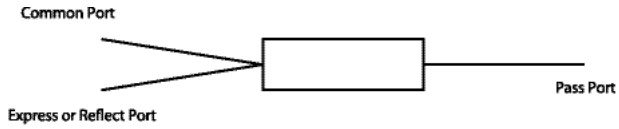
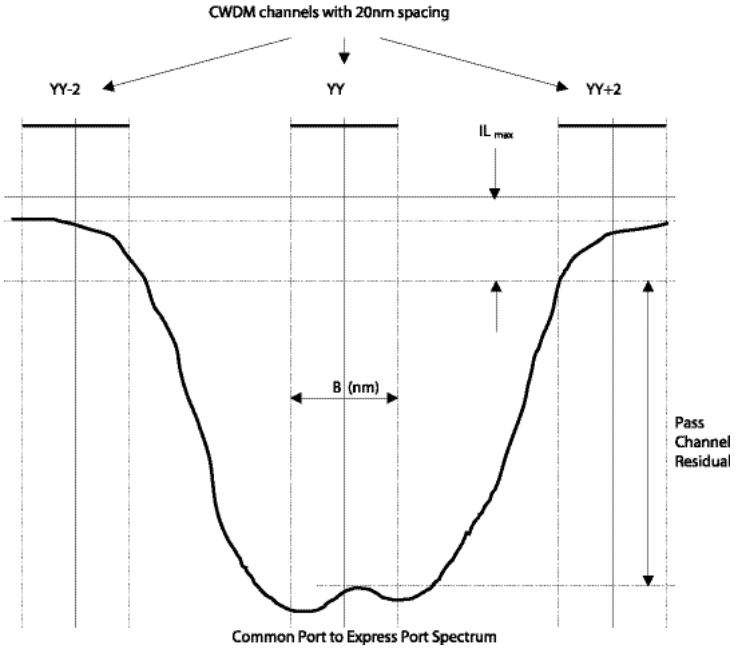
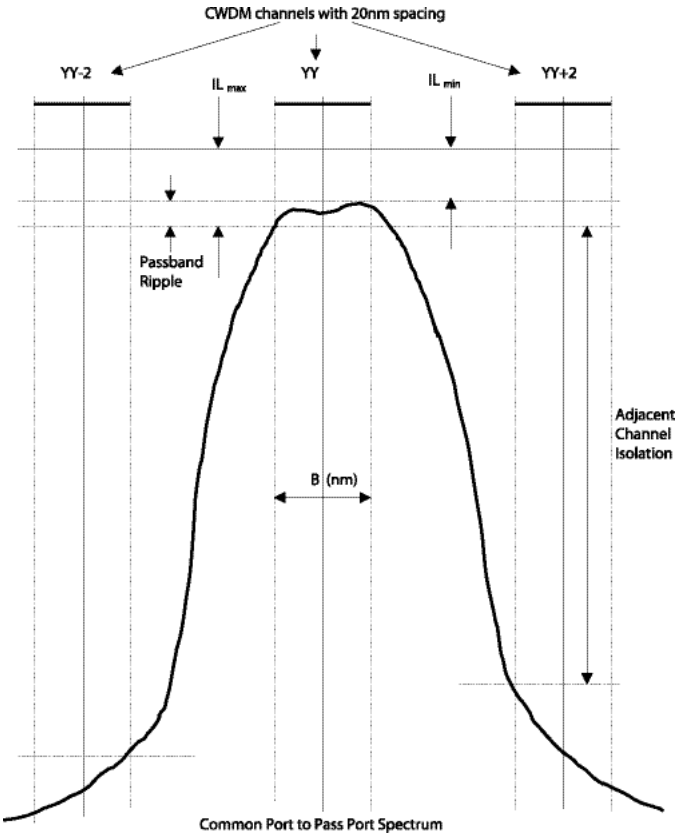
4.0 Optical Parameter Definitions for CWDM Three Port Devices





Common Port to Express Port Spectrum



Common Port to Pass Port Spectrum

DWDM and CWDM Three Port Device
Optical Parameter Definition and Test Requirement

4.1 Channel Spacing
All the optical parameter definitions for CWDM will be similar to DWDM except the channel spacing for CWDM is 20nm

4.2 Center Wavelength
The center wavelength of CWDM is not on DWDM ITU-T grid, for 8 channel CWDM, they are 1YY1nm,
YY=47, 49, 51, 53, 55, 57, 59, 61

4.3 Minimum Passband Width
Defined as lYY ±B/2, this is a spectral width value centered on the ITU-T specific wavelength lYY, YY is used to denote the channel number associated with the pass channel of a filter

4.4 Adjacent Channel
The adjacent channels of channel YY are channel YY-2 and channel YY+2

4.5 Non-Adjacent Channel
The non-adjacent channels of channel YY are channel YY-4 and below and channel YY+4 and above

4.6 Maximum Pass Channel Insertion Loss ILmax
This is the loss measured from the 0dB level to the pass channel spectrum minimum point in the minimum passband region for channel YY over temperature and all polarization states

4.7 Minimum Pass Channel Insertion Loss ILmin
This is the loss measured from the 0dB level to the pass channel spectrum peak in the minimum passband region for channel YY over temperature and all polarization states

4.8 Passband Ripple
This is the difference between ILmax and ILmin for a given pass channel in any one state of temperature and polarization

4.9 Adjacent Channel Isolation
This is the difference between the minimum point on the pass channel spectrum within the minimum passband of channel YY over temperature and the maximum point within the adjacent channels minimum passband over temperature and all polarization states

4.10 Non-Adjacent Channel Isolation
This is the difference between the minimum point on the pass channel spectrum within the minimum passband of channel YY over temperature and the maximum point within minimum passband across all non-adjacent channels over temperature and all polarization states

4.11 Maximum Adjacent Channel Insertion Loss at Express Port
This is the loss measured from the 0dB level to the express channel spectrum minimum point in the minimum passband region for adjacent express channels over temperature and all polarization states

4.12 Maximum Non-Adjacent Channel Insertion Loss at Express Port
This is the loss measured from the 0dB level to the express channel spectrum minimum point in the minimum passband region across all non-adjacent express channels over temperature and all polarization states

4.13 Pass Channel Residual at Express Port
This is the difference between the minimum point on the express channel spectrum within the minimum passband of adjacent channels over temperature and the maximum point within the minimum passband of pass channel YY over temperature and all polarization states

4.14 Return Loss
The return loss is the back reflectance along the same optical path from any port with the other ports optically terminated, the return loss spec applies to the minimum pass band of channel YY and the minimum pass band of all its adjacent and non-adjacent channels over temperature

4.15 Directivity
The directivity is the leakage of signal into undesirable optical path due to scattering, which is the insertion loss between pass port and express port with the common port optically terminated for three port device. It applies to the minimum passband of channel YY and the minimum passband of all its adjacent and non-adjacent channels over temperature

4.16 Polarization Dependent Loss
PDL is the maximum difference in attenuation of signals over all states of polarization. It applies to the minimum passband of channel YY and the minimum passband of all its adjacent and non-adjacent channels over temperature

4.17 Polarization Mode Dispersion
PMD is the dispersion of an optical signal due to the different polarizations of light traveling at different speeds through optical component. It applies to the minimum passband of channel YY and the minimum passband of all its adjacent and non-adjacent channels over temperature

4.18 Temperature Range of Operation
The temperature range over which the filter is expected to maintain measured values within all defined specifications

4.19 Optical Input Power Range
The filter will meet all specifications while the total power at any port remains within the range 0mW to maximum power

5.0 Test Requirement

5.1 IL, PDL and Isolation Test Requirement
IL, PDL and Isolation data need to be collected over the minimum passband width of the pass channel and/or its adjacent and non-adjacent channels. The spec applies to whole temperature range of operation and all polarization states. If the PDL variation over the minimum passband of pass channel is very small, single point test at passband CWL will be sufficient. Also the express channel PDL and pass channel PDL over the minimum passband width of its adjacent and non-adjacent channels are vary small and can be neglected

5.2 Return Loss and Directivity Test Requirement
Directivity and pass port RL data need to be collected over the minimum passband width of the pass channel, however the common port and express port RL data need to be collected over the minimum passband width of the pass channel and its adjacent and non-adjacent channels

