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High-Performance OT-DCM Series

Dispersion Compensation Module

Operation Manual

SAFETY

Safety Precautions

While this DCM is a totally passive device, it typically handles high light levels that can present a hazard,

Laser Safety Procedure

ALWAYS read the product data sheet and the laser safety label before powering the product. Note the operation wavelength, optical output power and safety classifications.

If safety goggles or other eye protection is used, be certain that the protection is effective at the wavelength emitted by the device under test **BEFORE** applying power.

ALWAYS connect a fiber to the output of the device **BEFORE** power is applied. Power should never be applied without an attached fiber. If the device has a connector output, a connector should be attached that is connected to a fiber. This will ensure that all light is confined within the fiber waveguide, virtually eliminating all potential hazard.

NEVER look at the end of the fiber to see if light is coming out. **NEVER!** Most fiber optic laser wavelengths (1310nm and 1550nm) are totally invisible to the unaided eye and will cause permanent damage. Shorter wavelengths lasers (e.g., 780nm) are visible and are very damaging. Always use instruments, such as an optical power meter, to verify light output.

NEVER, NEVER, NEVER look into the end of a fiber on a powered device with **ANY** sort of magnifying device. This includes microscopes, eye loupes and magnifying glasses. This **WILL** cause a permanent and irreversible burn on your retina. Always double check that power is disconnected before using such devices. If possible, completely disconnect the unit or transmitter from any power source.

If you have questions about laser safety procedures, please call Olson Technology before powering your product.

THEORY OF OPERATION

The most commonly used fiber in the world today is NDSF (non-dispersion shifted fiber) such as Corning SMF-28®. For long distance applications, a wavelength near 1550 nm is usually used resulting in dispersion of about 17.5ps/nm/km as shown in Figure 1 below. Dispersion causes the bit error rate (BER) to increase in digital systems and the analog distortion, primarily CSO and 2nd order distortion, to increase sharply with increasing fiber distance. The DCM offers a way to nullify most of this dispersion allowing very long fiber links to be achieved.

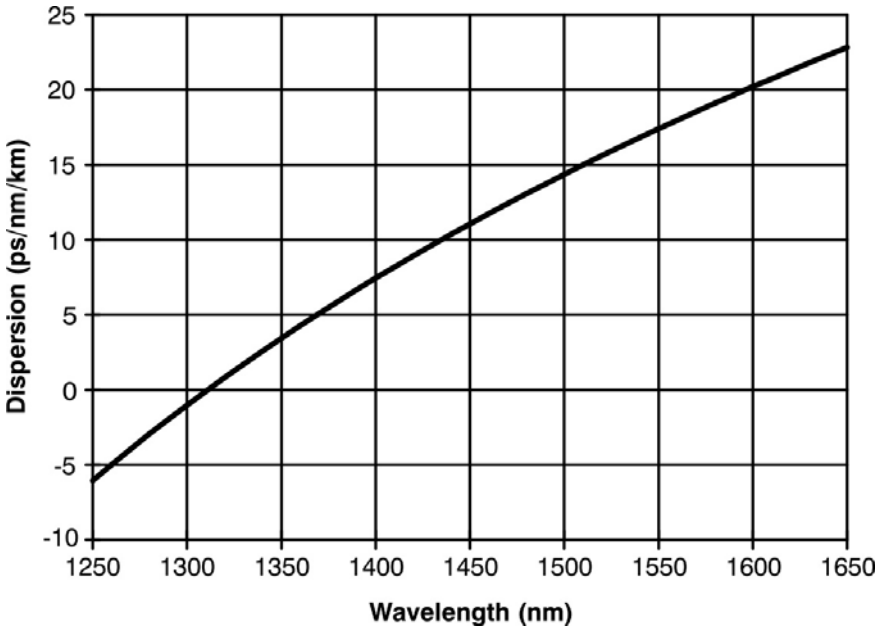

Figure 1 - Dispersion Characteristics of NDSF

Basically a DCM is a device that has negative dispersion. The Olson OT-DCM-xxx module contains a special fiber that has a very high negative dispersion. It operates over a wide wavelength range. Figure 2 below shows the benefit of using a DCM.

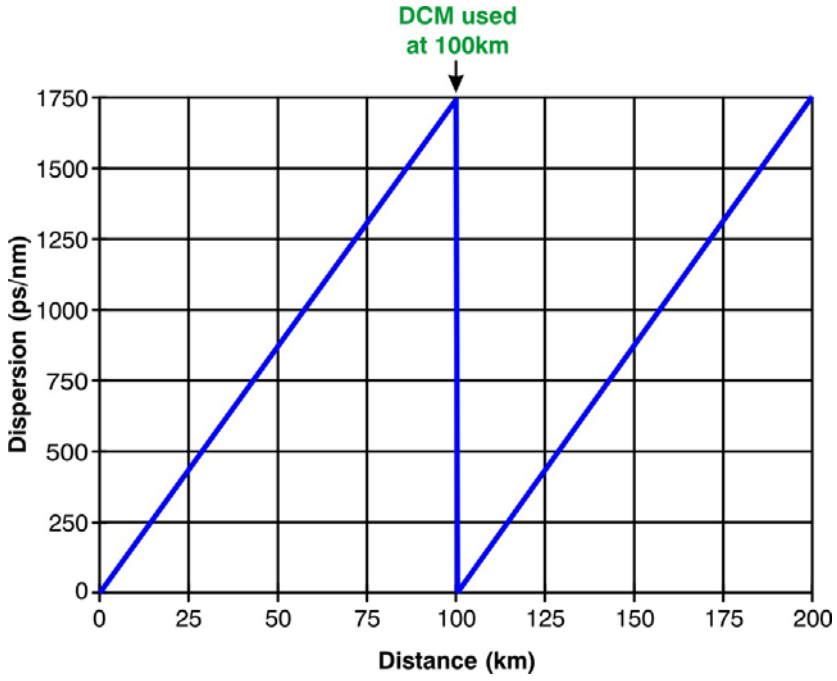

Figure 2 - The Effect of a DCM on a Long Fiber Run

In Figure 2, an OT-DCM-100 (optimized for 100km) was inserted in-line at the 100km distance. This resets the dispersion to nearly zero and an additional 100km distance can be achieved with essentially the same results as were achieved at 100km.

One downside of a DCM is its relatively high insertion loss. The way this is usually circumvented is shown in Figure 3.

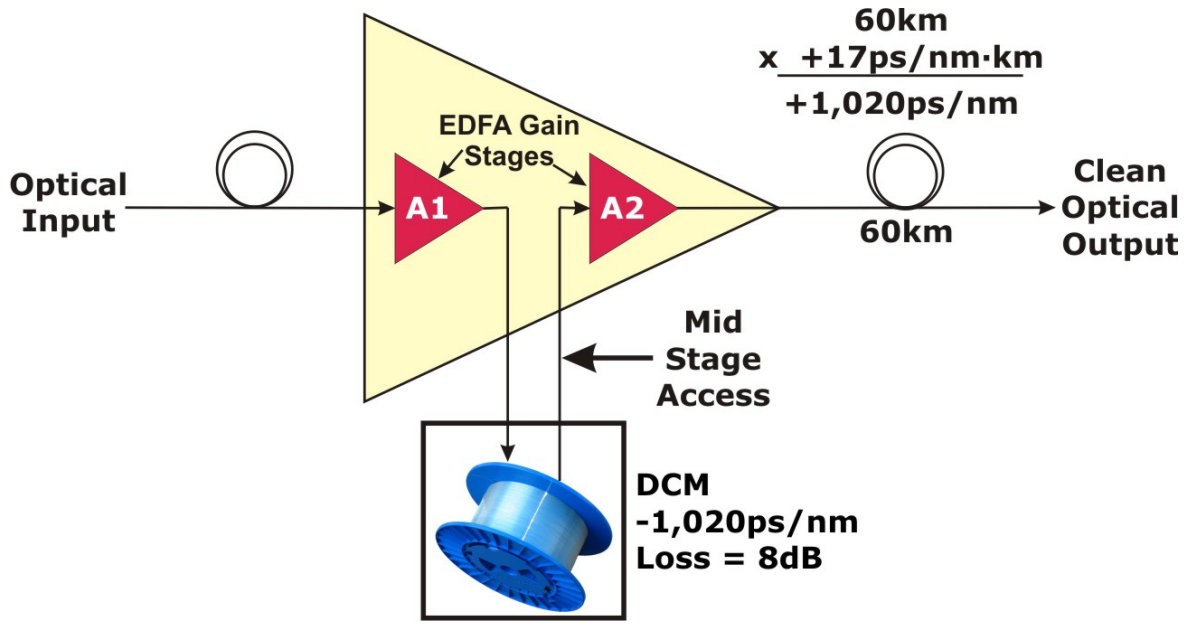

Figure 3 - Typical DCM Application

INSTALLATION AND USE

The DCM is a completely passive device (i.e. no power required) in a 1RU 19" compatible rack. On the rear panel are two optical connectors. One is labeled *INPUT*, the other *OUTPUT*. The ports are actually completely symmetrical and can be interchanged. In a normal installation, the DCM will connect to the *MIDDLE IN* and *MIDDLE OUT* ports on an Olson OTEA-CM-M Series EDFA. This EDFA has a unique feature called mid-stage access.

DCM MODULE SPECIFICATIONS

1. Operating Range

Operating Wavelength (nm)	C-band : 1525-1565
Operating Temperature (°C)	-35 to 70
Storage Temperature (°C)	-40 to 85
Relative Humidity (%)	< 95

2. Optical Specifications

Model[1]	Dispersion @ 1545nm (ps/nm)		IL[2] (dB)	WDL (dB)	PDL (dB)	PMD (ps)	RDS[3] @ 1545nm (nm^{-1})	
	Min	Max	Max	Max	Max	Max	Min	Max
OT-DCM-20	-337	-319	3.3	0.5	0.1	0.4	0.0029	0.0043
OT-DCM-40	-673	-640	4.7	0.5	0.1	0.5		
OT-DCM-60	-1009	-960	6.4	0.6	0.1	0.6		
OT-DCM-80	-1340	-1286	8.0	0.7	0.1	0.7		
OT-DCM-100	-1675	-1608	9.6	0.7	0.1	0.8		

Notes：

1. Each DCM module is designed to compensate for a specific amount of dispersion. For example, the OT-DCM-20 is designed to compensate for 20km of G.652 fiber dispersion, and the OT-DCM-100 is designed to compensate for 100km of G.652 fiber dispersion.
2. Insertion Loss: Includes fiber loss, splice loss and connector loss.
3. RDS = Relative Dispersion Slope, dispersion slope divided by dispersion.

3. Return Loss

Return loss (SC/APC or FC/APC): ≥ 60dB

4. Physical characteristics

1RU 19" standard rack
Connector type: SC/APC or FC/APC