24926 Highway 108
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Model OT-DCM-Fxx

Dispersion Compensation Module

OPERATING MANUAL

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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 1550nm is usually used resulting in dispersion of about 17ps/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.

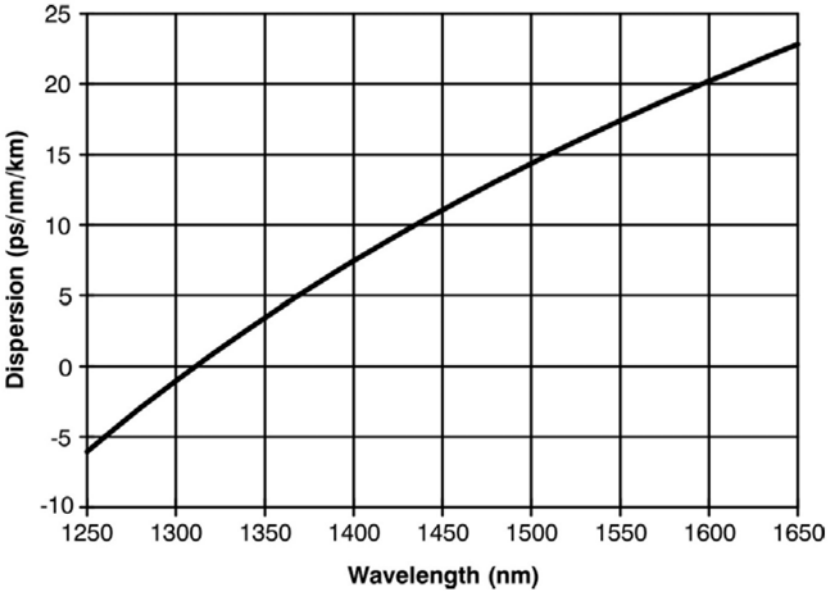

Figure 1 - Dispersion Characteristics of NDSF

A DCM is a device that has negative dispersion. The Olson OT-DCM-F series module contains a special fiber that has a very high negative dispersion equivalent to "xx" km (ranging from 10 to 100 in 10's) of Corning SMF-28® fiber. It operates over a wide wavelength range. Figure 2 below shows the benefit of using a DCM.

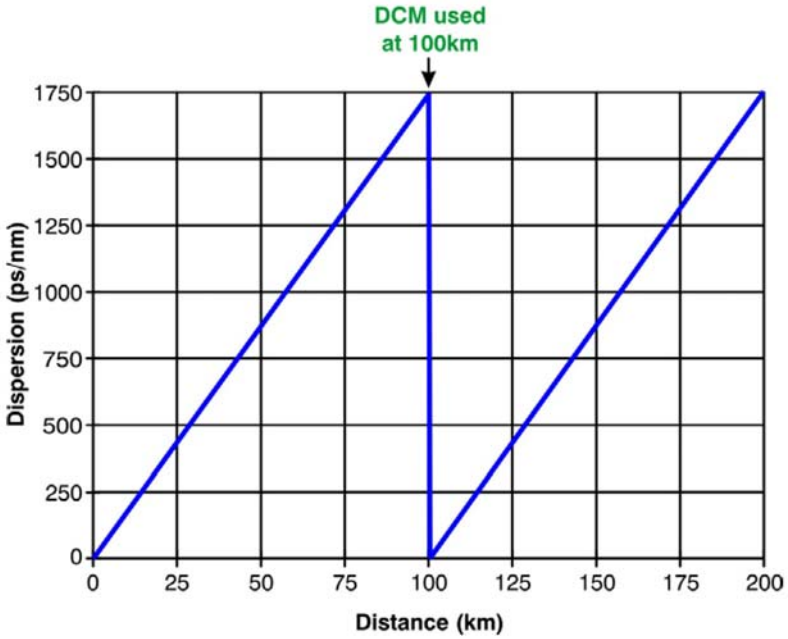

Figure 2 - The Effect of a DCM on a Long Fiber Run

In Figure 2, an OT-DCM-F100 (optimized for 100km or Corning SMF-28®) was inserted in-line at the 100km distance. This resets the dispersion to nearly zero and allows 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. Figure 3 illustrates how this is usually circumvented.

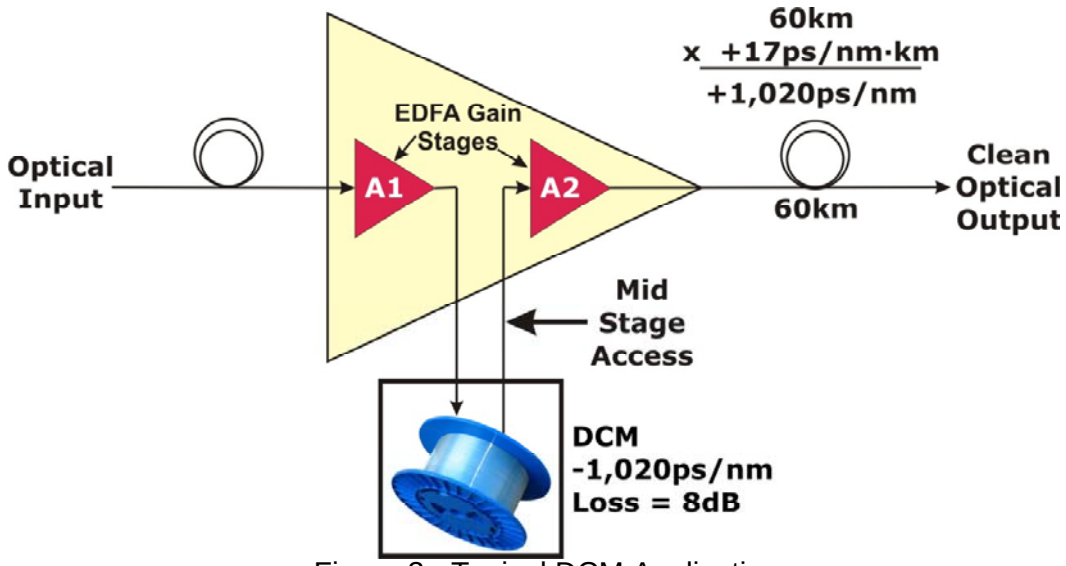

Figure 3 - Typical DCM Application

GENERAL FEATURES

The Olson Technology OT-DCM-F Series Dispersion Compensation Module operates near 1550nm where NDSF dispersion has a typical value of 17ps/nm/km. The DCM is a totally passive device consisting of a spool of special fiber (Dispersion Compensating Fiber (DCF)) that has high negative dispersion. Unlike Fiber Bragg Gratings (FBG's), DCM's based on DCF work over a continuous range of wavelengths. The front panel of the DCM, shown in Figure 4, only has vendor and part number markings. The rear panel of the DCM, shown in Figure 5, has the optical input and output connectors. These are always angle polished connector (APC) types.

Figure 4 - OT-DCM-F Front Panel

Figure 5 - OT-DCM-F Rear Panel

Typical Parameters of OT-DCM-F10 Dispersion Compensation Module

Model	SMF-28 Fiber Compensation Distance (km)	Dispersion (typical value) (ps/nm)	Polarization Dispersion (dB)	Typical Insertion Loss (dB)
OT-DCM-F10	10	-170	1.2	1.8
OT-DCM-F20	20	-340	1.5	3.6
OT-DCM-F30	30	-510	1.9	4.3
OT-DCM-F40	40	-680	2.2	5.0
OT-DCM-F50	50	-850	2.4	6.0
OT-DCM-F60	60	-1,020	2.6	7.0
OT-DCM-F70	70	-1,190	2.8	7.7
OT-DCM-F80	80	-1,360	3.0	8.5
OT-DCM-F90	90	-1,510	3.2	9.2
OT-DCM-F100	100	-1,700	3.4	10.0