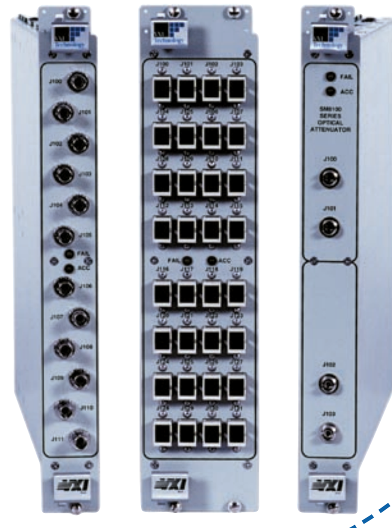
Optical Switching

Applications

Telecom
Datacom
CATV
ATM
SDH and SONET
Fiber Channel



Application Note

Overview

VXI Technology offers a broad range of switching solutions and attenuators for the optical marketplace. These products are part of our Switch Modularity and Interface Platform (SMIP), which enables them to be combined with other switching solutions from DC to microwave. All switches can be controlled via GPIB, RS-232, PCI backplane, Ethernet, Firewire and more. Since the optical marketplace is expanding rapidly with our customers often coming from other disciplines, we have put this short guide together to help answer some of the many questions that arise when ordering optical switches and attenuators.

Optical switching and attenuation are at the heart of automated lightwave test systems, providing the capability to test multiple components and eliminate redundant, labor intensive, connects and disconnects to different test equipment by providing multiple stimulus/response measurement channels. Our optical switches and attenuators are modular in design, allowing customers to configure and re-configure as needs expand. They are easily controlled over the GPIB and come with easy-to-use software drivers and executable point and click GUIs.

Advantages of Optical VXI Solutions

The VXIbus is a modular open standard that enables modular instruments, switches attenuators, etc., from any manufacturer to be housed in the same environment.
This provides customers with the following advantages:

- **Several sources for components within the same footprint**
- **Easy mean-time-to-repair by simply replacing modules**
- **No obsolescence issues**
- **Industry standard software drivers**
- **Automated control via GPIB, PCI, Firewire, Ethernet and more**
- **Reconfiguring systems simply by swapping modules around**

Basics Required Before Ordering

Many of our products are wavelength specific, so it is important to specify the actual wavelength when ordering. Typical multimode wavelengths are 850 and 1300 nanometers (nm); singlemode wavelengths are 1310 and 1550 nm.

In addition to the wavelength, it is critical to specify the fiber type, i.e. the core and clad of the fiber. The central part of the fiber is known as the core, and the surrounding material is known as the clad. The clad has a lower index of refraction than the core to completely reflect light at the boundary between the core and the clad. As a result, propagated light remains entirely within the core. Fiber diameter is expressed as the core diameter followed by that of the clad.

For example, a 50/125µm fiber has a core diameter of 50µm and a clad diameter of 125µm. When the core diameter of an optical fiber is small (typically 9µm), roughly equal to the wavelength of light being input, the transmission mode is constant. This is known as a single-mode fiber. With single mode fiber only a singlemode, the fundamental mode, is capable of propagation. This type of fiber is particularly suitable for wideband transmission over large distances, since its bandwidth is limited only by chromatic dispersion. This fiber type is normally specified as 9/125 on our products.

In contrast, multimode fibers allow many propagation modes, causing multimode distortion, and limiting the transmission bandwidth. Typical core/cladding size (measured in micrometers) is 62.5/125.

Specifying the right types of connectors is also essential since they are used to align and join two fibers together to provide a means for attaching to and decoupling from a transmitter, receiver, or another fiber (patch panel). Commonly used connectors include the SC, ST and FC. Additionally, specifying whether APC (angle polished connector) or SPC (super polished connector) types of connectors is often missed by customers. APC connectors typically give you better back reflection performance, but be sure to note that both ends need to be APC.

Handling Optical Cables/Connectors

Treat cables with care to avoid cable damage and minimize optical loss.

The minimum bend radius for most optical cables is 35 mm. Never bend an optical cable more sharply than this specification. Optical performance will degrade and the cable may break.

Avoid bending the optical cable near a cable strain relief boot. This is one of the easiest ways to permanently damage the optical fiber.

Avoid bending the optical cable over a sharp edge.

Avoid using cable tie wraps to hold optical cable. Tie wraps, when tightened, can break the cable or create micro-bends. Micro-bends can cause a dramatic reduction in optical performance.

Do not pull on the bare fiber as this can break the fiber inside the component.

Avoid using soldering irons near optical cable. Accidental damage can easily; solder splatter can contaminate and permanently damage optical fiber connectors.

In order to obtain the most stable, repeatable optical performance, immobilize optical cables using wide pieces of tape or some form of mechanical cushion after the optical cables have been connected.

Storing Optical Connectors

All switches are shipped with dust caps in place covering all optical connectors. These optical connectors should remain covered at all times when the instrument is not in use.

Cleaning Optical Connectors

Clean any exposed connector using a cleaning kit supplied by the connector manufacturer or high-grade isopropyl alcohol and a cotton swab. To clean with alcohol and a swab, soak the tip of a cotton swab in alcohol and then shake off any excess alcohol. The tip should be moist, not dripping wet. Stroke the swab tip gently across the surface of the connector and around the connector ferrule. Either allow the connector a minute to dry, or blow dry the connector using compressed air. Be careful when using compressed air because improper use may deposit a spray residue.

Mating Optical Connectors

Clean both connectors prior to mating. Any small particles trapped during the mating process can permanently damage the connector.

If possible, measure optical power throughput while mating connectors.

Insert the appropriate connector ferrule smoothly into the adapter.

Do not allow the fiber tip to make contact with any surface. If the tip accidentally contacts a surface before mating, STOP. Reclean the connector and try again.

Tighten the connector until it is finger tight, or to the torque specified by the connector manufacturer. Do not over-tighten the connector, as this can lead to optical loss and connector damage.

Check the optical insertion loss. If the loss is unacceptable, remove the connector, re-clean both ends of the mate, and reconnect. You may have to repeat this process several times before a low-loss connection is made.

After you make the connection, monitor the stability of the optical throughput for a few minutes. Optical power trending (slowly increasing or decreasing) is caused by the slow evaporation of alcohol trapped in the connection. Continue to monitor optical power until it stabilizes. If the loss is unacceptable, re-clean the connectors and start again.

MTS6000 Optical Switching Subsystem

CT100B 6 Slot Mainframe
GPIB-VXI/C GPIB Interface
SM8002-1x8-1x8 2 x (1x8) Optical Switches
SM8003-22NB-22NB 2 x (2x2) Optical Switches
SM8012 2 x Programmable Optical Attenuator