

CASE STUDY

OPTOELECTRONIC INTERCONNECTS FOR DEFENSE APPLICATIONS



The Customer's Challenge

Communication equipment deployed in military and defense applications requires a high level of reliability, ruggedization, and performance, often in less-than-ideal operating environments. Video signals are particularly susceptible to signal integrity issues and electromagnetic interference (EMI) over long cable runs. A high-tech design and manufacturer of embedded computing systems needed a solution to the EMI and distance issues for their AdvancedTCA system to be deployed for a defense application, where the quality of the video image was critical and EMI immunity of the interconnect was required.

The Design Solution

The Inneos SX4-01MM mini-module optical subassembly was the design solution chosen to be deployed in the system due to the combination of its compact design, high-bandwidth performance, and ruggedized design. The SX4-01MM optical engine provided a full electrical-to-optical conversion solution in a simple plug-down module configuration, so the engineering team did not need to spend valuable engineering time and resources on the O-E conversion, but rather could simply focus on the electrical architecture of their AdvancedTCA system to provide the full design solution in a shorter timeframe. The metal housing and integrated gaskets of the module provided an EMI shield and heat sink for improved performance and reliability. Integrated threaded screw connectors ensured that the modules were securely attached to the card. This allowed the design to pass both 30G shock and 1G, 5-500Hz vibration testing. Inneos' US-based manufacturing was an important discriminator, as the design team knew they could trust the quality and performance of the SX4-10MM optical subassembly.



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The AdvancedTCA card integrated an array of ten SX4-01MM modules with each module's single SC-style fiber connection port positioned along the front panel. The SX4-01MM uses coarse-wavelength division multiplexing (CWDM) to simultaneously provide four high-bandwidth channels of light at different wavelengths so the DVI video did not need any multiplexing or compression, providing up to 300m single optical fiber interconnects with high-bandwidth and EMI-immunity for the AdvancedTCA system. The single fiber solution was especially attractive for this application because the standard SC-terminated fiber cables could be pulled, cut to length and terminated in the field, making the installation process much faster and more efficient.

The Results

The Inneos SX4-01MM optical engine provided a high bandwidth video interconnect solution that performed excellently in the field. The assembly of the modules onto the AdvancedTCA card was fast and efficient due to the plug-down electrical design. Being able to transmit the DVI video entirely without compression provided ten (10) very high-performance, EMI-immune video links, which was critical for the defense application. The modules have been deployed in the operational environment for over 7 years and additional systems are still being deployed, a testament to the viability of the Inneos interconnect solution for this high-performance, high-reliability environment.

