

IMPEDANCE CONTROL

HIGH-SPEED MODULE FOR IMPEDANCE CONTROL

High-speed data solutions and components are a growing requirement in the aerospace and defense industry. Modern systems are requiring higher data transfer speeds for mission-critical operations in harsh environments. The MACHFORCE® connector offers a highly dense 10G D38999 style solution with 10 Ethernet ports for applications transferring large quantities of data in rugged environments. To offer this density, the MACHFORCE integrates an innovative High-Speed Module (HSM) designed specifically with impedance control and data pair isolation in mind. When paired with a high-performance Ethernet cable, these design attributes of the HSM enable optimized electrical performance with multiple disconnects.

IMPEDANCE CONTROL WITH THE HIGH-SPEED MODULE

To maintain the 10G Ethernet performance of a twisted pair, the impedance must be kept constant. If the twist is altered, the impedance will be negatively impacted and the electrical signal will be disrupted, causing system application issues. The MACHFORCE HSM is designed to place all ten twisted pairs in individual grooves to protect them up through the crimped contact. In addition, the HSM's dielectric is manufactured with liquid crystal polymer (LCP) because it's a robust electrical conductor that maintains impedance between the cable and contact.

DATA PAIR ISOLATION WITH THE HIGH-SPEED MODULE

To protect the integrity of data traveling over twisted-pair cables, it is essential that the pairs themselves be isolated from one another. With 10G Ethernet cables in close proximity, crosstalk occurs when electromagnetic waves emitted from one twisted pair interfere with another. The HSM is designed with fins to separate the pairs and reduce crosstalk; the body of the HSM is made of aluminum, a material that naturally reduces electromagnetic interference. The aluminum fins are an essential part of the rectangular design; together with other elements of the design, they allow for closer packing of twisted-pair cables and provide greater data density in the resulting shell while protecting signal integrity and application performance.

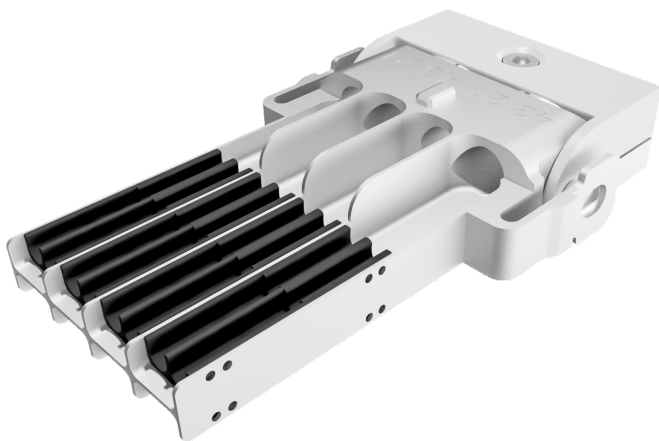


Figure 1: High-Speed Module Grooves

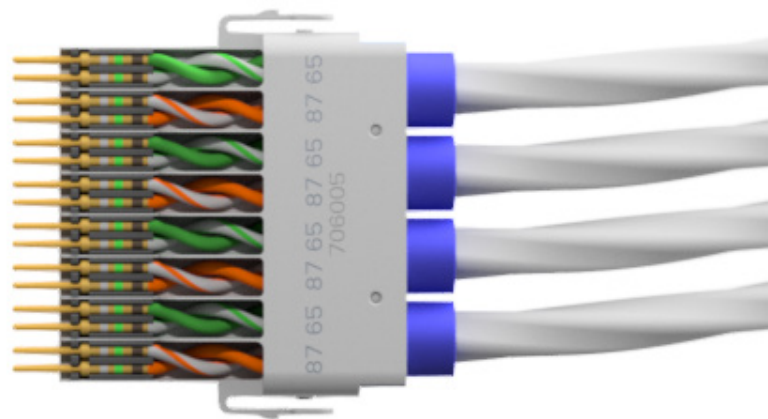


Figure 2: Ethernet Cables Maintain Twist To The Crimped Contact

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SHIELDED 10G ETHERNET CABLE SOLUTIONS FOR MACHFORCE

MACHFORCE has been tested and qualified for use with PIC Wire & Cable's 10G Ethernet cables. The E6A6824 and E6A6826 CAT6a cables offer a shielding design that minimizes crosstalk between twisted pairs. Each cable features both silver-plated copper braided shielding and foil shielding to reduce the electromagnetic waves that are emitted from the pairs. To reduce signal interference, the incorporation of innovative design features in these cables and the HSM ultimately allows for optimized electrical performance that can extend long distances and over multiple connection breaks.

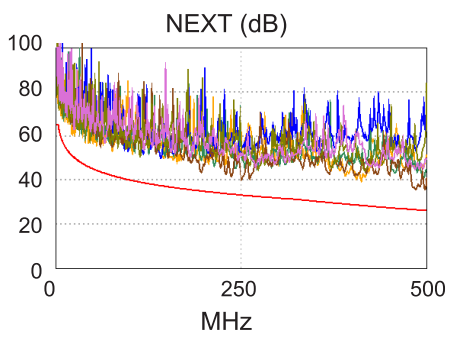


Figure 3: E6A6824 Near End Cross Talk (NEXT)

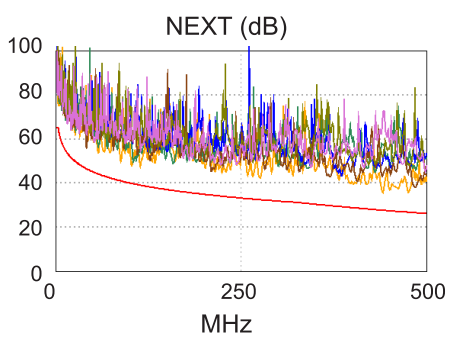
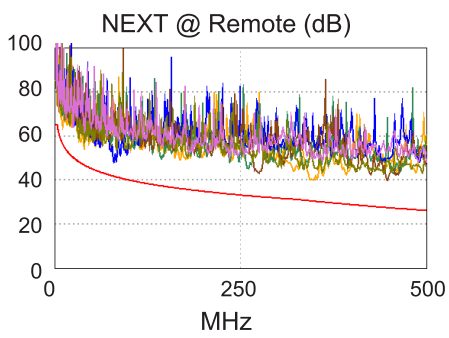


Figure 4: E6A6826 Near End Cross Talk (NEXT)

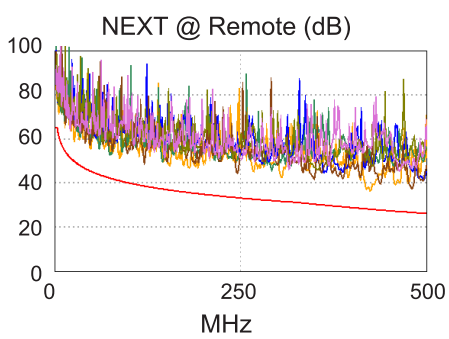


Figure 5: E6A6824 Ethernet Net Cable