

White Paper

Military Connector Types for the Rugged Embedded Computer

Overview

Military connectors are produced to be held at military standards. The rugged embedded computer's design needs to be able to withstand the protection of the connections from environmental factors, which allows them to be used in military and aerospace applications. These connectors are of Military Standard, "MIL-STD". They are used in aerospace, industrial, marine, and even automotive commercial applications. There are mainly 4 different types of military connectors: circular, rectangular, fiber optic, and RF.

Circular Military Connectors

Circular connectors applies to any electrical connector having multi-pin interconnects with cylindrical contact housings and circular contact interface geometries. Circular connectors are chosen for ease of engagement and disengagement, their ability to conveniently house different types of contacts, their wide range of allowable contact voltages and currents, ease of environmental sealing and their rugged mechanical performance. The MIL-DTL-5015 and MIL-DTL-38999 are the most commonly used types in military, aerospace, and other high-reliability applications.

MIL-DTL-5015 describes circular connectors with solder or removable crimp contacts (both front and rear release). They are for use in electronic, electrical power, and control circuits. They are used in big quantities for defense, civil, and industrial applications due to their versatility, reliability, and ease of supply. These connectors are rated for operation within a temperature range of $-55\text{ }^{\circ}\text{C}$ ($-67\text{ }^{\circ}\text{F}$) to either $125\text{ }^{\circ}\text{C}$ ($257\text{ }^{\circ}\text{F}$), $175\text{ }^{\circ}\text{C}$ ($347\text{ }^{\circ}\text{F}$), or $200\text{ }^{\circ}\text{C}$ ($392\text{ }^{\circ}\text{F}$) depending upon the class of the connector.

MIL-DTL-38999 describes four series of miniature, high density, bayonet, threaded, or breech coupling, circular, environment resistant, electrical connectors using removable crimp or fixed solder contacts and can withstand operating temperature from -65°C to 200°C .

Rectangular Military Connectors

Multi-pin D-Sub rectangular connectors are beneficial when space is the main concern. Rectangular power connectors do not offer as much environmental protections as circular connectors. Typical applications include use for power, high vibration, and engine designs.

Fiber Optic Military Connectors

These are typically plugs or so-called male connectors with a protruding ferrule that holds the fibers and aligns two fibers for mating. They use a mating adapter to mate the two connectors that fit the securing mechanism of the connectors. MIL-C-83522 is a military specification describing the characteristics, performance and testing criteria for single terminus fiber-optic connectors. The connections must have consistent optical performance, and must be supplied under a MIL-STF-790 reliability assurance program.

MIL-STF-83526 is a military specification describing the characteristics, performance and testing criteria for an environmental resistant, hermaphroditic interface, fiber-optic circular connector. The connectors covered have a consistent and predictable optical performance using low loss optical fiber cables in military; ground based, fiber-optic data transmission systems, and is sufficiently rugged to withstand military field applications.

Radio Frequency Connectors

RF connectors are specialized devices used to terminate and interconnect coaxial which carry high frequency signals. Typical applications include use in aviation and military equipment applications and general electronic testing equipment. MIL-PRF-39012 is a performance specification describing the general requirements and test for RF connectors used with flexible RD cables and certain other types of coaxial transmission lines.