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Applications
Engineering Note

MT-RJ – How It All Fits Together

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Introduction

The MT-RJ connector is a small-form-factor connector that was designed to meet the fiber optic industry's request for a new interface technology that is significantly lower in cost and size than the SC duplex interface. Due to the size of the SC duplex connector, the port density on electronics is only half that of RJ-45 copper connectors. The small MT-RJ interface can be spaced the same as copper, effectively doubling the number of fiber ports. The net effect is a drop in the overall price per fiber port, making fiber-to-the-desktop solutions more competitive when compared to similar copper solutions. MT-RJ is recognized by the TIA/EIA-568-B.1 *Commercial Building Telecommunications Cabling Standard*.

MT-RJ Design

As shown in Figure 1, it has a square profile with an RJ-45 style latching mechanism and contains two fibers in one, polymer ferrule. Industry standard TIA/EIA-604-12, *Fiber Optic Intermateability Connector Standard, Type MT-RJ* (FOCIS 12) ensures that connectors (or plugs) that are FOCIS 12 compliant will mate together via an adapter (or jack) that is FOCIS 12 compliant.

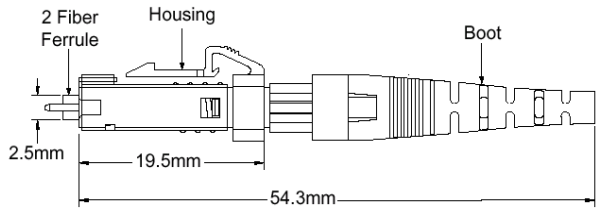


Figure 1: MT-RJ Connector

A mated MT-RJ pair is coupled together by an MT-RJ to MT-RJ adapter (see Figure 2.)

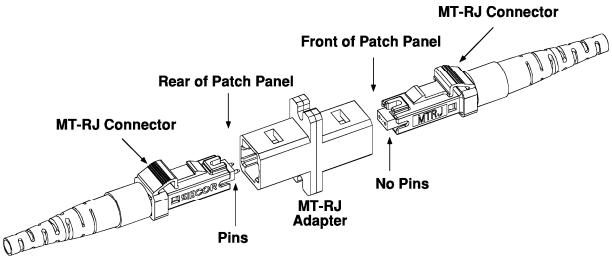


Figure 2: MT-RJ Connectors and Adapter

The adapter functions as a coarse alignment mechanism. The precision alignment mechanism for mating two MT-RJs together consists of two guide pins. These pins protrude from the connector body on both sides of the connector ferrule. An MT-RJ with two pins (male) must be mated to a non-pinned (female) MT-RJ. An MT-RJ will have either two pins or no pins. For a mated pair, a FOCIS 12 compliant adapter ensures that the pins in the male MT-RJ are properly

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inserted into the pinholes of the female MT-RJ. The adapter profile accepts the two, MT-RJ latching mechanisms to provide spring force to hold the connector endfaces together. Audible and tactile feedback are realized when an MT-RJ is properly inserted into an adapter or transceiver port. Two female MT-RJs can be mated together via an adapter. However, the cores of the four fibers will not be properly aligned, and the transmitted signal will probably be highly attenuated. Two male MT-RJs cannot be mated together via an MT-RJ adapter.

MT-RJ System Configuration

The established convention discussed in this paper ensures proper alignment of the optical fiber connectors and significantly reduces the possibility of connector and transceiver damage during mating. Transceivers should always be manufactured with two guide pins in each optical port. This is suggested in FOCIS-12, Sections 4.2.1 and 4.2.2. Note that the pins in a transceiver port could be much shorter than the pins of an MT-RJ. Alignment pins that are protected inside the transceiver port minimize potential damage to the port and patch cord. To interconnect a pinned transceiver port to an MT-RJ patch-panel, a patch cord with two, female MT-RJs should be used (see Figure 2.) If a male MT-RJ is plugged into a pinned transceiver port or an MT-RJ adapter, proper optical transmission may not occur because the connector endfaces will not contact each other. To prevent this, a female MT-RJ to female MT-RJ interconnect patch cord should be used. The non-transceiver side of the interconnect patch cord is typically inserted into the front side of a patch-panel adapter, which functions essentially like a transceiver port (the backside of the patch-panel adapter has a male MT-RJ to accept a female MT-RJ patch cord). Therefore, field-installable MT-RJs, such as the Corning Cable Systems UniCam™ MT-RJ, are typically male. As already discussed, male MT-RJs should never be used to make an interconnect patch cord that could be inserted into a transceiver port. The pins of a male MT-RJ should never be removed. Also, factory- terminated multi-fiber assemblies that will plug into the backside of an MT-RJ patch-panel (i.e., Corning Cable Systems Plug & Play™ products and standard pigtails), usually contain male MT-RJs. However, if a system contains an interconnect configuration (i.e., a backbone cable that is interconnected to distribution cable), at the interconnection point one cable must be terminated with male MT-RJs and the other cable must be terminated with female MT-RJs. Proper system polarity (i.e., transmit to receive instead of receive to receive) with MT-RJs is discussed in Corning Cable Systems Applications Engineering Note 55.

Summary

The MT-RJ is a small-form-factor connector that contains two fibers in one polymer ferrule. It is significantly lower in cost and size than the SC duplex interface and is recognized by the industry standard TIA/EIA-568-B.1. Two FOCIS 12 compliant MT-RJs will mate together via a FOCIS 12 compliant MT-RJ adapter. Two alignment mechanisms properly couple two MT-RJs together. The RJ-45 type latch on the MT-RJ and the MT-RJ adapter produce course alignment. Pins in exactly one MT-RJ of a mated pair produce precision alignment of the optical fiber cores. MT-RJ patch cords (either interconnect or cross-connect) should be female on both ends. Backbone and distribution cables that are factory-assembled or field-terminated usually contain male MT-RJs.