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Power Connector Overload Test Has Practical Uses For AdvancedTCA Zone 1 Connectors



hen analyzing the capabilities of power connectors, users are familiar with creepage and clearance distances, voltage ratings, contact resistance, current ratings based on continuous operation, and performance values. However, a less familiar consideration is the current overload capability.

During a current overload test, the connector's contacts are subjected to current loads in excess of their normal current rating. The current overload test is often used to uncover potential weaknesses in the contact system.

Manufacturers of AdvancedTCA systems are finding current overload tests useful in evaluating Zone 1 connectors. Zone 1 connectors are used to interface power to ATCA front boards (*see Figure 1 on next page*).

Zone 1 connector specifications require power contacts to carry 16 amperes continuous with a maximum temperature rise of 30° C. Although this is adequate under normal operation, conditions can occur which might result in higher currents being drawn through the Zone 1 connector.

For example, if a high impedance short occurred in an ATCA front board between the front board's overcurrent protection and the backplane's overcurrent protection (*see Figure 2 on next page*), the Zone 1 connector might be forced to conduct high currents for long periods of time. These currents could reach a value that is slightly less than the overcurrent protection for the entire backplane. Would the Zone 1 connector survive this type of fault?

A recent revision to PICMG 3.0 has added an overload test that requires Zone 1 connector manufacturers to demonstrate their products' capability to survive a high impedance short, commonly known as a sizzle fault test, in ATCA front boards. (*A high impedance short is*

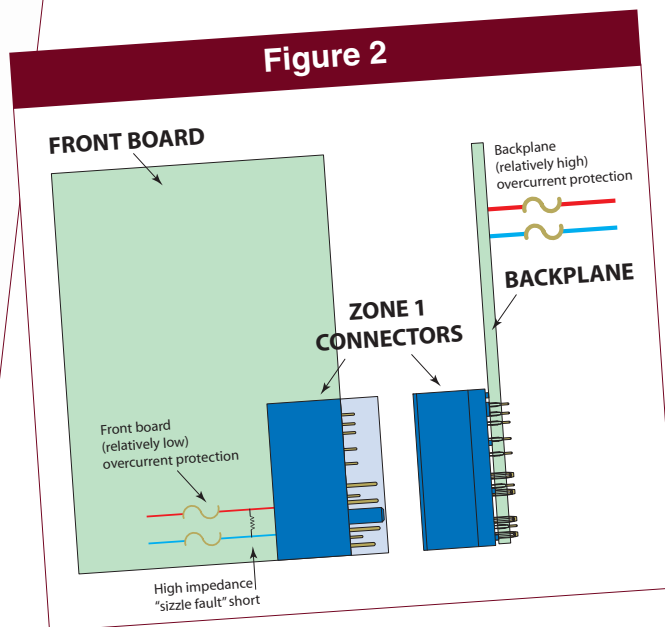
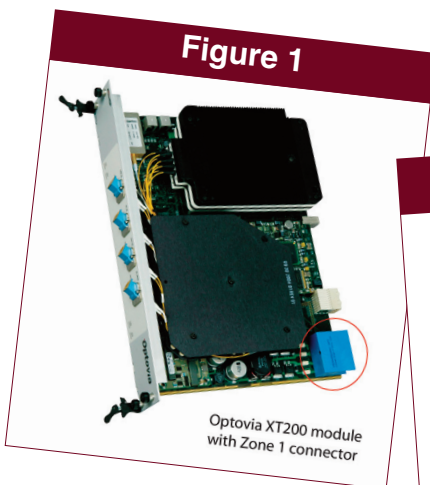
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often referred to as a “sizzle fault” because the backplane’s overcurrent protection may not open immediately, allowing the high impedance short to “sizzle”).

This Zone 1 connector “sizzle fault” test requires two power contacts to be energized at 50 amperes while two others are energized at 10 amperes. This condition is maintained for a total of 5 hours.

After being conditioned to the overload currents, the connectors are then unmated and inspected. There must be no visible damage to the insulator or contacts. Next, a fresh front board connector is mated to the backplane connector. Replacing the front board connector in the test simulates replacing a faulty front board in a deployed ATCA system. Finally, the power contacts are energized at 16 amperes. The temperature rise in the contact area must not exceed the Zone 1 connector specification requirement of 30° C. Also, the contact resistance must meet Zone 1 connector specifications as well as function according to all other Zone 1 connector requirements.

In applications where power connectors may carry currents in excess of those required in normal operation, a current overload test can be used to further evaluate a power connector’s capability. A power connector’s ability to survive “sizzle faults” could minimize the need for costly replacement of backplanes or connectors. This is the reason a Zone 1 connector overload test, Section B.4.2.4, has been added to PICMG 3.0.



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