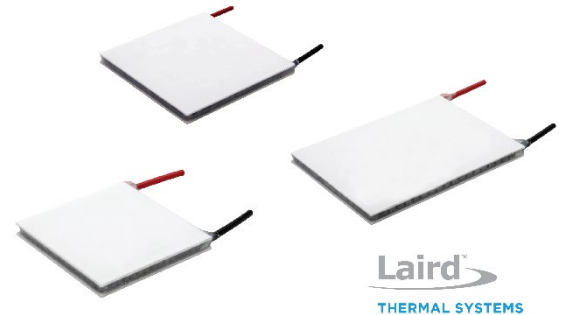


PowerCycling PCX Series Test Protocol

The PowerCycling PCX Series thermoelectric cooler (TEC) is a high-performance thermoelectric cooler that uses an enhanced module construction to provide long life operation in thermal cycling applications. It is ideal for molecular diagnostics where fast temperature ramp rates are required while maintaining precise temperature with minimal gradient. The product line has been qualified to withstand harsh mechanical and environmental testing according to recognized specifications accepted in military, telecommunications, and PCR OEM qualification standards, with minimal degradation in performance.



Military standards were originally developed for defense and aerospace related organizations, but these standards have been adopted by leading OEM's ranging from those using thermoelectrics for telecommunications infrastructure to those using them for medical or analytical applications. Telcordia (previously Bellcore) is a company that provides technical analysis, testing, and consulting services to product suppliers and service providers in the communications market.

Laird Thermal Systems uses state-of-the-art proprietary testing equipment and methodologies to ensure our products meet and/or exceed industry standards. Qualifying representative samples of the PCX Series were subjected to the following tests. All TECs met or exceeded the suggested passing criterion for each test.

- Functional Testing – used to validate cooling capacity, temperature differential ΔT , and coefficient of performance (COP)
- End of line Tests - Visual Inspection, AC Resistance Test, and IR Testing
- Die Shear Force - determines the level of shear force that the TEC can withstand.
- High Temperature Storage - determines the effect of prolonged exposure at a high temperature on the TECs.
- Thermal Shock - determines the integrity of the TECs after exposure to extreme high and low temperatures.
- High Temperature & Humidity - determines the effect of prolonged exposure at a constant high temperature and high humidity on the TECs.
- Reverse Power Cycling - determines the effect of electrically induced thermal stresses generated by sudden changes between “positive” and “negative” power conditions to induce 200K rapid temperature cycles.

Reliability Report

A detailed reliability report is available. The report provides details on each test conducted, testing methodology, equipment used, test conditions, and results. This report and all its contents are to be treated as confidential information. The report may not be reproduced, nor may the information contained within be divulged to third parties, without the prior written consent of Laird Thermal Systems.

Use this [form](#) to request a copy of the report.