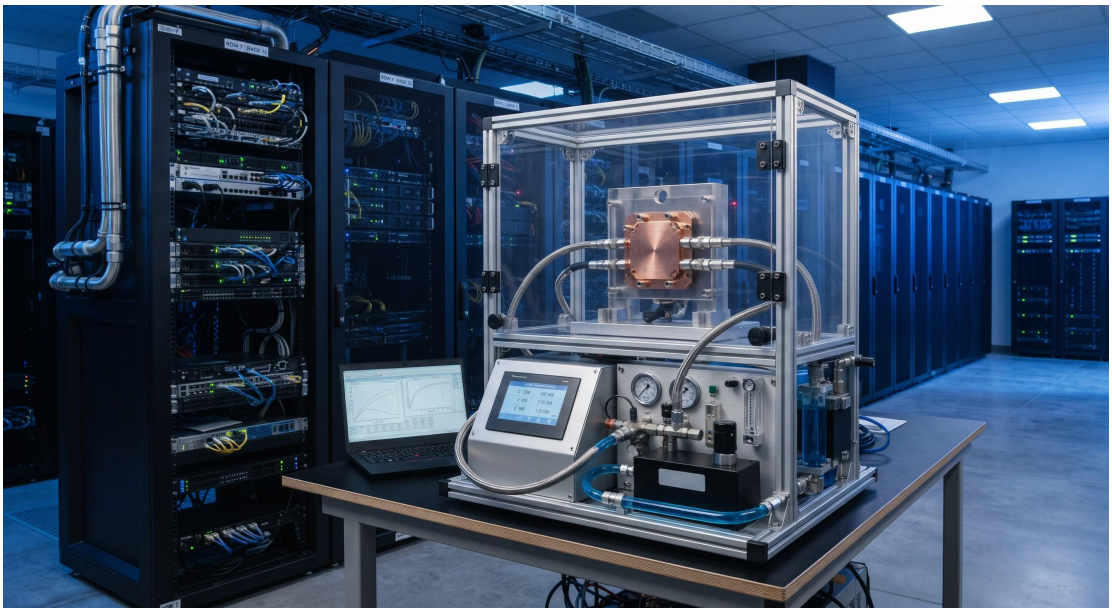
High-TDP Processor Liquid Cold Plate Burst Pressure Test Verification - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

This document presents the official technical overview and hardware datasheet for the High-TDP Processor Liquid Cold Plate Burst Pressure Test Verification platform. As high-performance processors for telecom infrastructure push thermal design power (TDP) beyond 500 W, liquid cooling becomes mandatory. The cold plate is the primary thermal interface, and its structural integrity under internal pressure is a safety-critical and reliability-critical attribute. This verification platform provides a controlled, instrumented, and repeatable methodology to validate cold plate burst pressure margins in accordance with OEM and industry standards. It is intended for design validation, production sampling, and supplier qualification of liquid cold plates used in carrier-grade telecom hardware.



ARCHITECTURE & CHASSIS DESIGN

The verification system is built around a modular test chassis that houses the cold plate under test, a high-pressure hydraulic pump, a pressure accumulator, and a digital data acquisition unit. The chassis is constructed from 3 mm stainless steel and includes a polycarbonate safety shield rated for 100 bar burst containment. The fluid loop uses deionized water with a corrosion inhibitor, and all wetted parts are 316L stainless steel or EPDM. The cold plate mounting fixture accommodates standard processor cold plate footprints from 60 mm × 60 mm to 120 mm × 120 mm. Pressure is applied via a servo-controlled hydraulic pump with a ramp rate of 0.5 to 5 bar/s. The data acquisition unit samples pressure, temperature, and flow at 1 kHz and stores results in a calibrated CSV format.

HARDWARE FEATURES

Key hardware features include: a 100 bar maximum working pressure rating with 2× safety factor; a 0.1% full-scale pressure transducer accuracy; a 1 kHz sampling rate for transient burst detection; an automated pressure ramp and hold profile editor; a burst detection algorithm with 1 ms response time; a 7-inch touchscreen HMI for local control; Ethernet and USB interfaces for remote data export; and a safety interlock that shuts down the pump if the shield is opened. The system supports cold plates with 1/4-inch, 3/8-inch, and 1/2-inch tube fittings via interchangeable adapters.

COMPLIANCE & STANDARDS

The verification methodology aligns with IEC 62368-1 for safety of electrically powered equipment, ISO 9001 for quality management, and ASTM F2922 for burst pressure testing of medical devices, adapted for telecom cold plates. The platform also supports customer-specific test protocols and generates reports traceable to NIST pressure standards. All pressure transducers are calibrated annually against a deadweight tester with 0.05% uncertainty.

TECHNICAL SPECIFICATIONS

The following table summarizes the key technical parameters of the verification platform.

Parameter	Specification
Form Factor	Benchtop / 19-inch rack-mountable chassis, 4U
Maximum Working Pressure	100 bar (10 MPa)
Pressure Transducer Accuracy	±0.1% full scale
Pressure Ramp Rate	0.5 to 5 bar/s, programmable
Data Sampling Rate	1 kHz standard; 10 kHz optional
Burst Detection Response	≤1 ms
Fluid Compatibility	Deionized water with inhibitor; 316L stainless steel and EPDM wetted parts
Cold Plate Footprint Range	60 mm × 60 mm to 120 mm × 120 mm
Tube Fitting Options	1/4-inch, 3/8-inch, 1/2-inch (interchangeable adapters)
Power Supply	100 – 240 VAC, 50/60 Hz, 1+1 redundant
Safety Certification	IEC 62368-1; polycarbonate shield rated for 100 bar containment
Calibration	Traceable to NIST; annual recalibration

	recommended

ORDERING OPTIONS

Base configuration: High-TDP Cold Plate Burst Pressure Test Verification Platform, 100 bar, with 1/4-inch adapters. Option A: 3/8-inch adapter kit. Option B: 1/2-inch adapter kit. Option C: Extended data logging package with 10 kHz sampling. Option D: On-site calibration service. Option E: Custom fixture for non-standard cold plate footprints. All options include a calibration certificate and a one-year warranty.

