OSFP THERMAL SOLUTIONS

PRODUCTS

Passive Cooling (Heatsink)
- Bonded Fin Heatsink
- Crimped Heatsink
- Extruded Heatsink
- Skived Fin Heatsink
- Stacked/Zipper Fin Heatsink
- BGA Heatsink

Active Cooling (Fan)
- AC Fans
- DC Fans
- DC Blowers
- DC Impellers
- Crossflow Fans
- Frameless DC Fans

Metal Fabrications
- CNC Machining
- Die Casting
- Extrusion
- Plastic Injection Molding
- Sheet Metal

Cold Plates

Heat Pipes

Vapor Chambers

Friction Stir Welding

Thermal Pad / Grease

MCPCBs

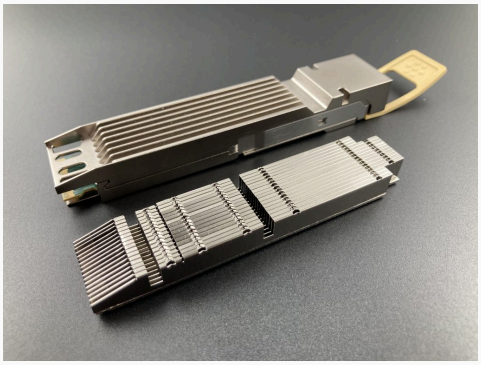
Air Cooled OSFP Thermal Solutions

Cofan's air-cooled OSFP thermal modules are engineered to meet the growing thermal demands of next-generation AI servers and high-speed telecommunications infrastructure. Designed specifically for OSFP (Octal Small Form-Factor Pluggable) applications, these modules leverage advanced aluminum heat sink technologies—including extruded, skived fin, and zipper fin designs—optimized for forced-air environments.

Supporting optical transceivers from 800G up to 3.2T, Cofan's solutions are also adaptable to both air- and liquid-cooled systems, ensuring efficient thermal performance across a wide range of deployment scenarios.

Purpose-built for high-density AI server platforms, these modules operate seamlessly with embedded high-performance server fans to deliver consistent and reliable cooling.

Backed by precision aluminum manufacturing and advanced thermal engineering, Cofan delivers scalable, production-ready OSFP cooling solutions.



Family of Air Cooled OSFP Frames (Cast fins show in top image and zipper fin shown in foreground image)

- OSFP Frame Cooling Solutions -

- Cast Cooling Fins
  Cofan's Cast fin heat sinks are most appropriate for lower-power OSFP module frames, typically below ~15W per port, where complex geometries or integrated structural features are desired. Die casting or investment casting allows for intricate shapes, mounting bosses, and combined mechanical/thermal components in a single piece. Thermal performance is generally inferior to skived or optimized extruded designs, making casting more suitable for mechanically driven, high volume designs rather than high heat flux applications. Cost effectiveness is strong when part consolidation reduces assembly labor.

- Extruded Cooling Fins
  Cofan's Extruded fin heat sinks are the most cost-effective and widely used solution for air-cooled OSFP module frames operating in the ~8W to 20W range. Aluminum extrusion enables low-cost, high-volume production This technology is well suited for applications with strong front-to-back airflow and moderate thermal loads. Advantages include low tooling cost per unit at volume, good mechanical durability, corrosion resistance (with anodizing), and rapid scalability. Overall, extrusion provides the best cost-per-watt performance at moderate power levels.

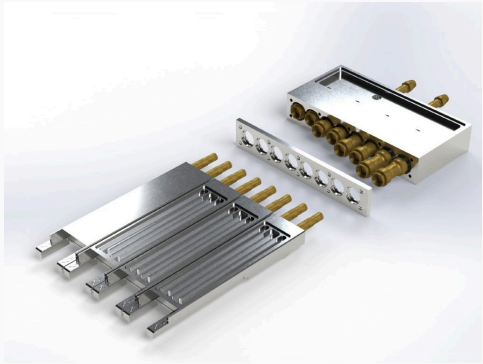
- Skived Cooling Fins
  Cofan's Skived fin technology is best suited for higher-power, air-cooled OSFP module frames total power dissipation in the ~18W to 35W range. Skived heat sinks are ideal when airflow is moderate but not extreme, and when board-level temperature margin is tight. Advantages include superior thermal conductivity, high aspect-ratio fins, and strong mechanical integrity. Disadvantages include higher manufacturing cost relative to extrusion technology. Cost effectiveness is moderate-to-high production volume for mid-to-high power designs where thermal margin justifies the added expense.

- Zipper Fin Cooling Fins
  Cofan's Zipper fin heat sinks are the ideal solution for higher-power air-cooled OSFP module frames in the ~25W to 40W range per port, particularly when airflow is high and directional (e.g., high-performance switches). Zipper fins are fabricated from stamped metal fins and mechanically bonded onto a plate, enabling very high fin density and thin fin geometries. This creates exceptional air-side surface area and improved convective heat transfer under forced airflow. Disadvantages include

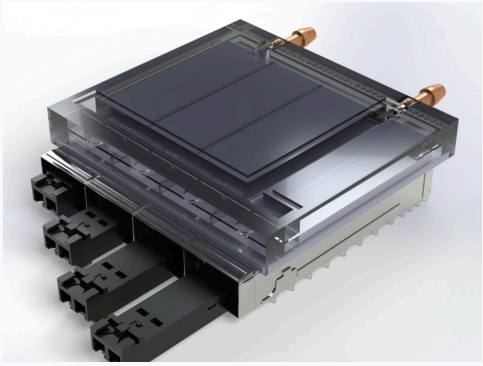
high tooling costs making them the preferred configuration of high volume and high power dissipation applications. Zipper fins are generally very cost-effective but slightly more expensive than simple extrusions.

Hot Swapalble Liquid Cooled OSFP Manifolds

The integrated quick-disconnect (QD) manifold architecture is engineered to deliver high thermal performance without sacrificing serviceability in dense switch environments. By combining a balanced 1 × 4 parallel coolant distribution network with dual-valve, drip-less quick disconnect couplings, the system ensures uniform flow to each OSFP cold plate while minimizing pressure drop and eliminating flow starvation across ganged modules. The manifold's internal geometry is optimized to equalize hydraulic resistance across all four channels, preserving consistent case temperatures and predictable thermal behavior even as module power levels approach 80W per port. Precision sealing interfaces and redundant O-ring features further enhance leak integrity, enabling operation at elevated pressures typical of rack-level or facility CDU liquid loops.



Quick Disconnect Liquid Cooled OSFP with Manifold Assembly



Conduction Cooled OSFP with Manifold Assembly

From an operational standpoint, the quick-disconnect interface dramatically improves maintainability and uptime. Blind-mate capable QD fittings allow technicians to remove or replace a 1 × 4 OSFP thermal assembly without draining the entire coolant loop, reducing service time and eliminating spill risk. The automatic shutoff valves isolate fluid upon demating, preserving loop pressure and protecting adjacent modules from thermal disturbance. High cycle-life construction (10,000+ mate/demate cycles) ensures long-term reliability in high-service environments such as AI clusters and hyperscale data centers. The result is a scalable, field-serviceable liquid cooling solution that aligns with modern data center requirements for modularity, uptime, and thermal headroom.

OSFP Thermal Solutions Features & Benefits

1. Thermal Performance & Capacity
   - Heat Dissipation Capability: Ability to support current and future power levels e.g. up to 80Watts and 3.2T
   - Low Thermal Resistance: Efficient heat transfer from critical components (laser diode, DSP) to the cold plate.
   - Uniform Temperature Control: Minimizes thermal gradients across the module.

2. Cold Plate & Interface Design
   - Direct-to-Component Cooling: Cold plate or thermal interface positioned close to primary heat sources.
   - Optimized Flow Channels: Microchannel or optimized flow geometry for high heat transfer efficiency.
   - Flatness & Contact Pressure Control: Ensures consistent thermal contact without damaging components.

3. Coolant Compatibility
   - Fluid Type Support: Compatibility with water, water-glycol, or dielectric fluids.
   - Corrosion Resistance: Materials and coatings suitable for long-term coolant exposure.
   - Low Pressure Drop: Minimizes system pumping requirements.

4. Mechanical & Form-Factor Compliance
   - OSFP MSA Compliance: Maintains electrical, mechanical, and pluggability standards.
   - Tool-Less or Easy Serviceability: Enables module replacement without system disruption.
   - Robust Sealing: Leak-resistant design with qualified O-rings or gaskets.

5. Reliability & Safety
   - Leak Detection & Containment: Design provisions to prevent coolant leaks.
   - Thermal Redundancy: Fail-safe behavior under reduced flow or pump failure.
   - Qualification & Testing: Validated through leak, pressure, thermal cycling, and vibration testing.

6. System Integration
   - Quick-Disconnect Fluid Couplings: Supports hot-swap or rapid service (Optional)
   - Manifold Compatibility: Aligns with rack or chassis-level liquid distribution (Optional)
   - Scalability: Supports high port-count deployments without performance degradation.

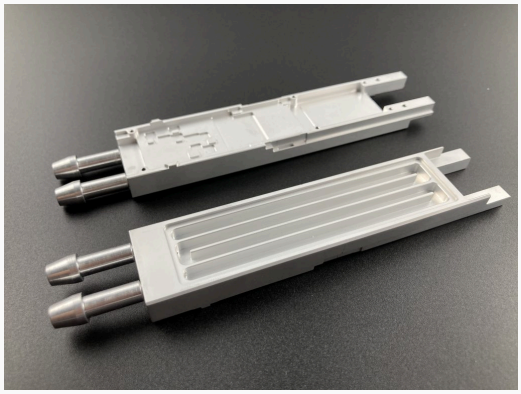
7. Manufacturing & Quality
   - Repeatable Assembly Process: Ensures consistent thermal performance across units.
   - High-Yield Leak Testing: 100% leak and flow testing during production.
   - Traceability: Lot tracking and process documentation for quality assurance.

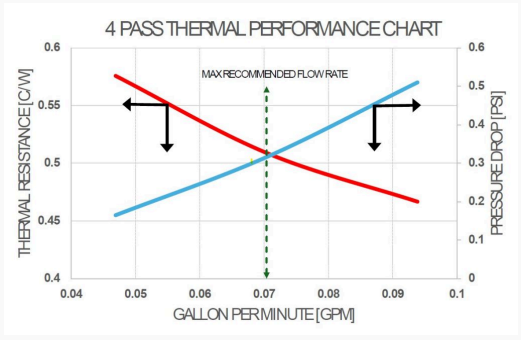
8. Power & Performance Roadmap Support
   - Future-Proof Design: Margin to support higher data rates (800G → 3.2T).
   - Advanced Materials: Use of high-conductivity aluminum metals and compliant TIMs.
   - CFD-Validated Design: Thermal modeling to ensure performance under real-world conditions.

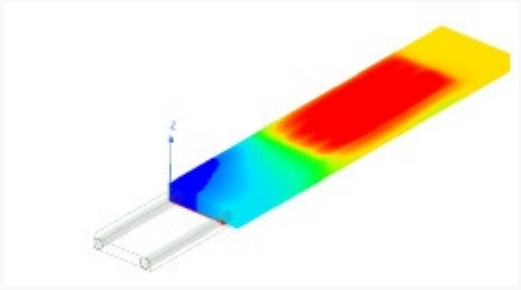
9. Cost & Total Cost of Ownership

- System-Level Efficiency: Reduced fan power and cooling infrastructure costs.
- Maintenance Impact: Ease of replacement and long-term reliability.
- Supply Chain Stability: Proven supplier and scalable manufacturing.

4-Pass Cooling Channels







Skived Fin Enhanced Cooling Channels