



AirJet® Mini Sport

The waterproof solid-state active cooling solution for products on the move.



Heat has become the biggest bottleneck in computing. The latest processors promise higher performance, but only 50% or less of that performance is realized in actual devices. While processors continue to advance and generate more heat, thermal solutions have not kept pace. Thermal is the only aspect of modern day computing that still uses century old technology. In today's devices, what often determines performance is the capability of the thermal solution, not the sophistication of the processor.

Frore Systems has developed a revolutionary thermal solution, AirJet®, the world's first solid-state active cooling chip. AirJet is a fully self contained active heat sink. AirJet® is silent, thin, light and outperforms fans.

Inside AirJet are tiny membranes that vibrate at ultrasonic frequency. These membranes generate powerful suction that pulls air in through inlet vents on top of the chip. Inside AirJet the air flow is transformed into high velocity pulsating jets.

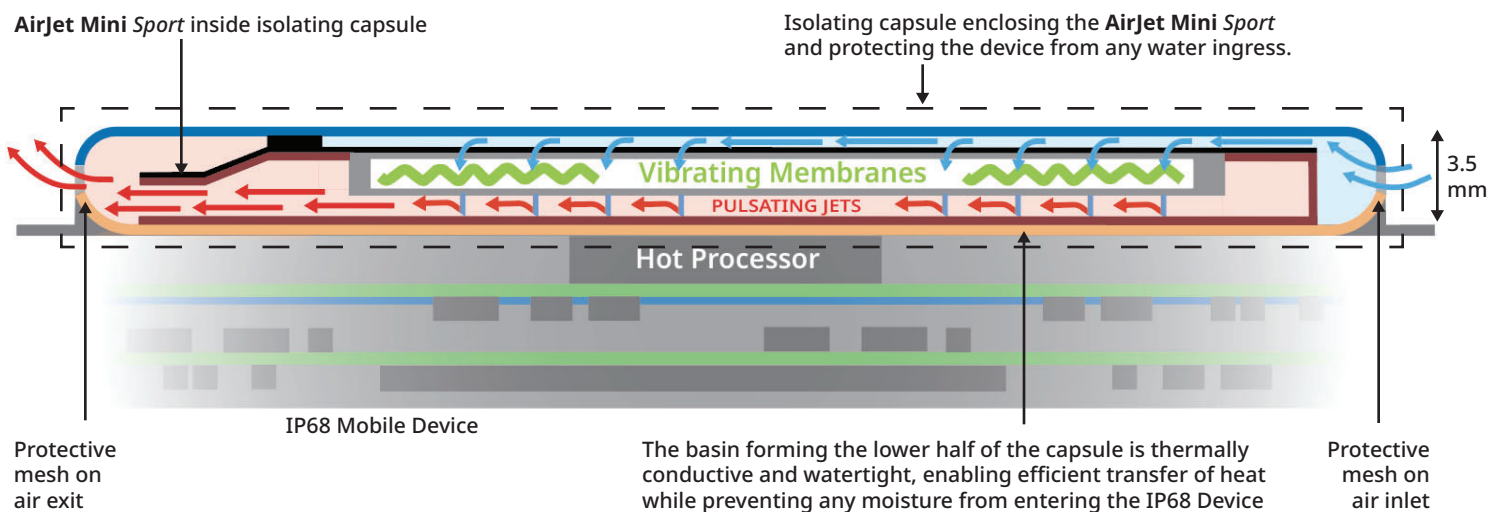
The pulsating jets of air remove heat from the heat spreader at the bottom of the AirJet with high efficiency. The flowing air reaches the same temperature as the heat spreader which is in contact with the processor. Hot air exits to the side via an integrated spout.

Metric

AirJet® Mini Sport

Total heat dissipation (@ 85C die temperature, 25C ambient)	5.25 W (Net 4.25W)
Maximum noise (inside device at 50cm)	21 dBA
Maximum power consumption	1 W
Back pressure	1750 Pa
Dimensions (width x length x thickness)	27.5x41.5x2.65mm
Weight	7 g
Waterproof (full performance recovery after 30 mins submerged in 1.5m of water)	Yes

Cross Section of AirJet® Mini Sport Implementation in IP68 Device



AirJet® Mini Sport

AirJet's multiphysics design converges structural, fluidic, acoustic and electrical resonance. AirJet is manufactured using proprietary techniques that draw from multiple sectors, including semiconductor, flat panel display, aerospace and automotive.

AirJet Mini Sport generates 1750 Pascals of back pressure, ensuring air flow into and out from compact product enclosures. When integrated into a host device with processor die temperature of 85C, **AirJet Mini Sport** silently removes 5.25 W of heat, while consuming only 1 W of power. The **AirJet Mini Sport** is integrated into the host device inside an isolating capsule enabling the efficient transfer of heat while completely protecting the host device from water.

AirJet Mini Sport is water resilient.

AirJet Mini Slim supports IP68 devices. When the host device is immersed in over 1.5m of water for 30 mins, the AirJet is flooded, but is capable of full performance recovery once dry, similar to IP68 compliant speakers and USB-C connectors.

AirJet Mini Sport is dust resilient.

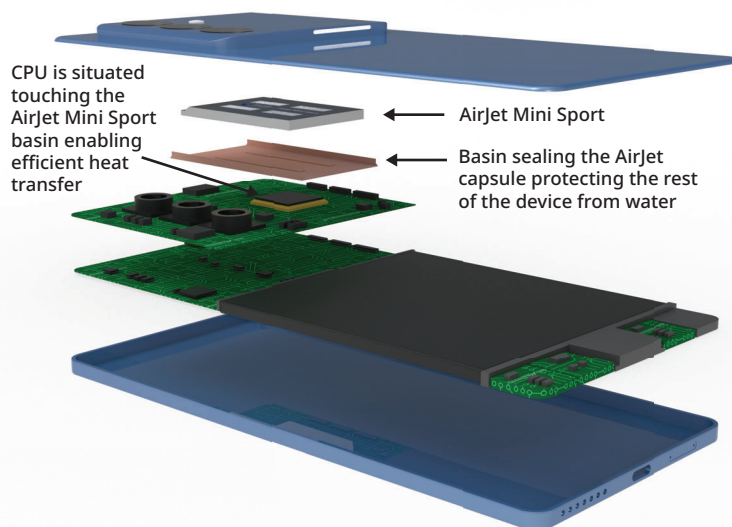
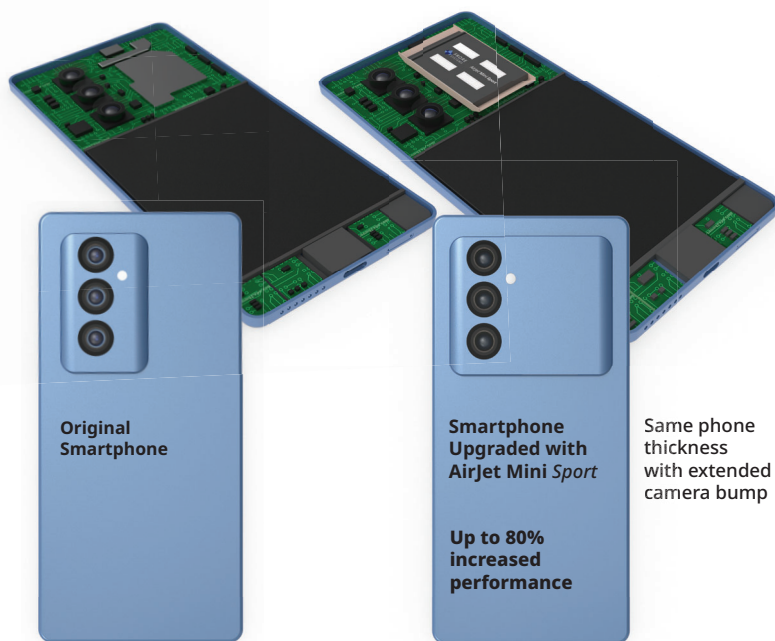
The inlet air vents of the AirJet Mini Sport are protected with dust filters and the self-cleaning feature enables automatic reversal of the air flow, clearing any dust away from **AirJet Mini Sport** filters. This ensures the sustained thermal performance of AirJet and, as a result, the sustained high performance of the host device throughout the product lifetime.

The **AirJet Mini Sport** is just 2.65mm thick and 7g. This ultra-thin profile opens up new possibilities for manufacturers catering to consumer demand for higher performance in more compact IP68 devices like smartphones and action cameras - products where consumers expect high performance everywhere - on land or in water.

For example, 8mm thick smartphones, with a 3.5mm camera bump, have a thermal limit of only 3 to 5 Watts sustained processor power. Integrating one **AirJet Mini Sport** adds 2.5 Watts, increasing the sustained processor power to 5.5 or 7.5 Watts, at a silent 21 dBA noise level while remaining IP68. The smartphone thickness is unchanged, but its processor performance increases by up to 83%, enabling the latest On-Device AI capabilities.

Bump extension to integrate AirJet Mini Sport

CPU moved to face back cover to contact the AirJet Mini Sport basin enabling efficient heat transfer and dissipation.



AirJet Mini Sport also features Thermoception, a capability that enables the chip to independently sense its surrounding temperature. This allows the **AirJet Mini Sport** to optimize its performance autonomously, maximizing heat removal without relying on temperature sensors in the host device.

Thanks to **AirJet Mini Sport**, compact IP68 devices can now deliver on the promise of cutting-edge performance and On-Device AI capabilities everywhere - on land and in water. **Do more.**