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Enhancement of heat exchange by on-chip engineered heat sink structure YONUK CHONG, KRISS, PAUL D DRESSELHAUS, SAMUEL P BENZ, NIST — We report a method for improving heat exchange between cryo-cooled high power consuming devices and coolant. We fabricated a micro-machined monolithic heat sink structure on a high integration density superconducting Josephson device, and studied the effect of the heat sink on cooling of the device in detail. The monolithic heat sink structure showed a significant enhancement of cooling efficiency, which markedly improved the chip operation. The detailed mechanism of the enhancement still needs further modeling and study in order to optimize the design of the heat sink structure.

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