Name(s)
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Project Number
S0315

Project Title
Two Phase Immersion Cooling of Desktop Computer

Abstract

Objectives/Goals
The goal of this project is to build a self-contained two-phase immersion cooling unit that can effectively dissipate the heat from a full size ATX form factor desktop computer being used to mine cryptocurrency. The criteria and constraints for this project is that it must be able to run cryptocurrency mining software for 30 minutes. The temperature on both the GPU and the CPU must not exceed their manufacturer specified maximum limits (98C and 80C respectively).

Methods/Materials
Construction and testing of this two-phase immersion cooling system followed this structure:
1. Construct enclosure, lid, attach input/output fittings
2. Assemble computer components onto the sliding tray
3. Assemble radiator and pump system and fill with coolant
4. Fill system with Novec fluid
5. Power on and verify function
6. Run benchmarking software for 30 minutes
7. Record temperatures of the CPU, GPU, Novec fluid, and ambient air

Results
The results of the thirty-minute stress test indicated that the two-phase immersion cooling unit was successful. The CPU reached a maximum temperature of 74 degrees celsius and the GPU reached a maximum temperature of 65 degrees celsius at an ambient temperature of 27 degrees celsius.

Conclusions/Discussion
In conclusion, the two-phase immersion cooling unit was successful in keeping the full-size computer components cooled below their maximum temperature during a thirty-minute stress test utilizing only one gallon of Novec 649.

Summary Statement
I created a two-phase immersion cooling system that is capable of dissipating the heat from a desktop computer running cryptocurrency mining stress tests for at least thirty minutes.

Help Received
I designed, built, and tested the immersion cooling unit myself. I received a one gallon sample of Novec 649 from 3M.