

Thermal Management of a Compact Electronic Device Subjected to Different Harsh Operating Conditions

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Abstract : In a harsh environment, it is crucial to investigate the thermal problem systematically implement a reliable and effective cooling technique for military equipment. In this study, an electronic device has been designed to fit different boundary conditions. Many alternatives can be possible solutions for the thermal problem. Therefore, it is an important step to define an easy-to-produce design and a low power fan selection for the optimum unit-design satisfying IP68. The equipment is planned to serve at 71°C environment conditions and it also can be screwed to a cold plate at +85°C. In both conditions, it is intended to use the same chassis without any modifications. To optimize such a rugged device, all CFD analysis has been done with Ansys Fluent 2021®. After studying pin fins, it is seen that the surface area is not enough, hence the fin-type is changed to a straight rectangular type with forced convection cooling. Finally, a very compact product that can serve in a harsh environment is obtained.

Keywords : electronic cooling, harsh environment, forced convection, compact design

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