

PASSIVE THERMAL MANAGEMENT OF SURVEILLANCE SYSTEMS USING PULSATING HEAT PIPES

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Abstract

Surveillance systems have presented to be important applications for high performance thermal control devices, especially passive ones using heat pipe technology. This is usually applied when the heat source is located far from the heat sink and the use of liquid cooling or any other active thermal control system is not possible. Design and application of pulsating heat pipes (PHPs) and heat pipes become an indicated solution especially for restricted areas for integration. This paper presents several applications using pulsating heat pipes responsible for the thermal control management of electronic components of a surveillance system using an open loop PHP with conventional heat pipes. Despite the relatively high temperature differences observed between the heat source and sink (up to 25 °C), the open loop PHP was able to transport the rejected heat from the electronic components to a remote heat dissipation area, while keeping their temperatures within the required range (below 80 °C) with relatively high thermal conductances (up to 1.6 W/°C). The solution presented has demonstrated the capability of spreading the heat, resulting on a more homogeneous temperature distribution, therefore contributing to enhance the heat dissipation capability to the environment, proving to be a stable and reliable technology to be applied for heavy duty surveillance systems.