

Experimental analysis of PCM enhanced electronic devices cooling

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Abstract

The paper presents experimental results of PCM (Phase Change Material) enhanced cooling method. Investigations were focused on obtaining the best results of the cooling system during its start-up. Analysis of two heat sinks was done. It was investigated using IR and contact thermal methods. The first one is typical heat sink available on the market. The second is partially filled with a mixture of PCM capsules and heat conducting paste (fig. 1.). Latent heat of PCMs was used to absorb more heat in comparison with typical heat sink. PCM material was a mixture of different kinds of paraffin which are encapsulated in hydrophilic silica microcapsules. Because of that this PCMs acts like a solid state in whole operating range. Nevertheless they have poor thermal conductivity. In order to increase it PCMs were mixed with heat conducting paste.

It is possible to delay the heat increase during start-up and do not increase device temperature during normal operation state (fig. 2).

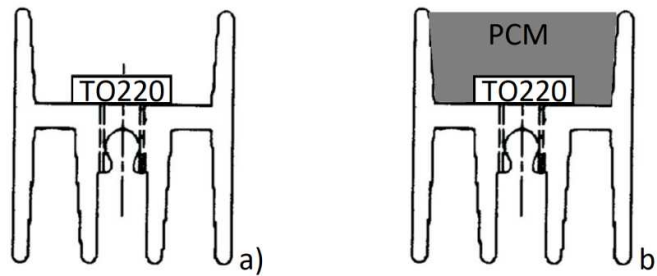


Fig. 1. a) Typical heatsink, b) heatsink filled with PCMs and conducting paste mixture

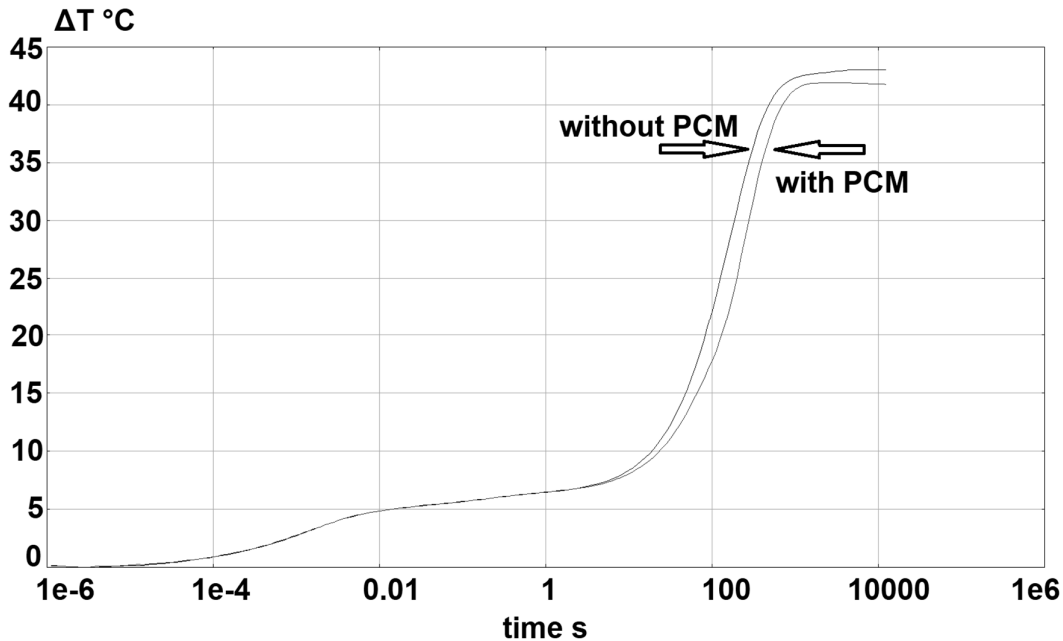


Fig. 2. Thermal response of the cooling setup with and without PCMs in the logarithmic scale (ΔT junction minus ambient temperature)

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