

SMT Heat Pipes - A Novel Thermal Control Option

James Frasier

ATC

james.frasier@atc.com

The need for thermal control solutions in electronics design has never been more important. New semiconductor technologies such as GaN have created massive heat flux through high power levels generate by small-packages.

These new extreme levels of thermal gradients require novel methods in heat control that will remove, spread or couple excess heat from the active device/source.

Miniature SMT heat pipes are a new multi-sourced, cost effective method to provide heat flow out of high heat flux areas such as active devices.

Unlike traditional heat pipes, SMT heat pipes conduct heat yet have exceptionally high electrical resistance, low parasitic capacitance and high breakdown voltage. SMT heat pipes come in several package sizes typically ranging from 0302 to 3737. Thermal conductivity ranges from 40 to $>500\text{mW}/^\circ\text{C}$ depending upon the exact device & configuration chosen.

Termination options are typically Sn/Ni/Pt; AgPt; Ag/non-magnetic layer and most structures are based on AlN but BeO is a material option – if desired.

The characteristics of SMT heat pipes are presented along with guidelines for use. Two application studies are shown to help define the expected performance of present day devices.