Application Notes for Surface Mount Brick Converters

To give customers the flexibility to optimize the system manufacturing process, some of NetPower's DC-DC converters are available in surface mount (SMT) packages as an option. These SMT converters can be pick-placed by machines, and can be reflowed in convection, IR, or convection/IR combined ovens. The availability of the SMT option is specified in individual datasheets.

An SMT converter has the same electrical and mechanical characteristics as the corresponding through-hole converter except using SMT pins. The locations and functions of the pins are the same as those in the corresponding through-hole converter. In this application note, eighth brick converter drawings are used as an example for illustration, and the principle applies to other brick converters as well.

Mechanical Drawings

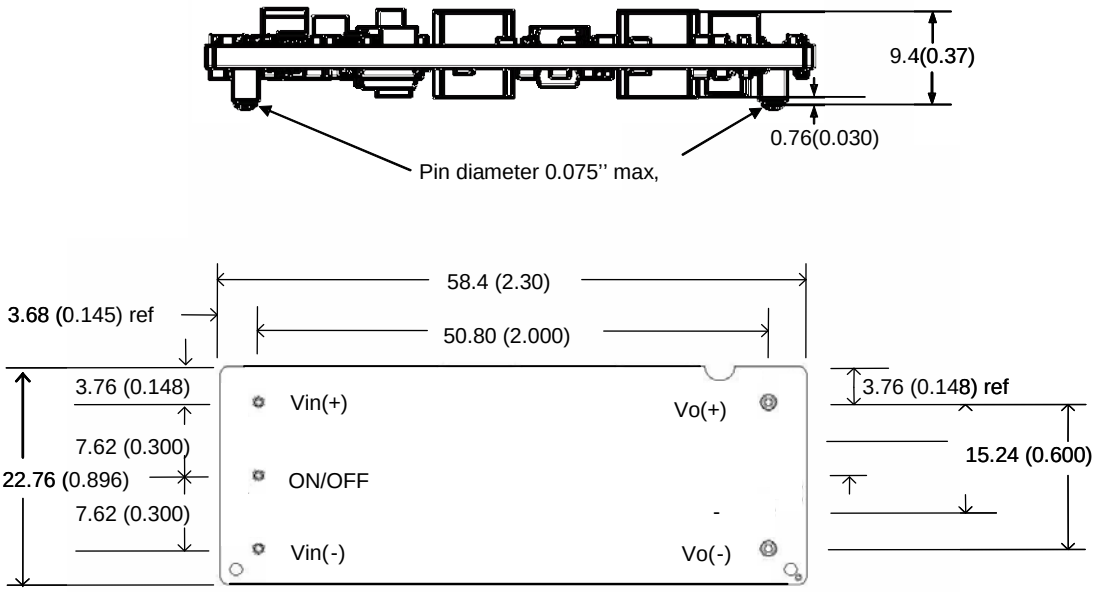

Fig. 1. Mechanical Outline of an SMT Eighth Brick Converter
Top: side view; Bottom: top view

All dimensions in mm (inches). Tolerances: .x ± .5 (.xx ± 0.02), .xx + .25 (.xxx ± 0.010)

Recommended Pad Layout

SMT converters improve the manufacturing process, yet special considerations should be given to the electrical and thermal properties of the interconnection between the converter and the system board on which the converter is installed on. The recommended pad layout for an eighth brick converter is shown in Fig. 2. Due to the diversity and complexity of the system board design and assembly processes, the recommendations given here are for reference only. When using an SMT power converter in an application, special attention needs to be paid to the design and manufacturing requirements of the system board. The final pad design should be proved in the actual application environment. The via design for the power pins needs to be carefully evaluated since the voltage drop and temperature rise in the power vias need to be well managed. The vias should be located as close to the corresponding pin as possible. The minimum diameter of vias is recommended to be in the range of 0.02'' to 0.025''. The distance between adjacent vias is determined by the mechanical integrity of the board, and the current path to nearby vias. If multiple rows of vias are used to increase the total current carrying capability, the location of the vias should be arranged so that the current path to each via is not blocked. To maintain a high reliability design, the temperature rise inside any via should be maintained within 10°C.

Fig. 2 also shows some recommendations for solder mask and stencil opening design. It should be noted that the design details are related to the system board design and manufacturing requirements, and the recommendations given here are meant to serve as a starting point in consideration.

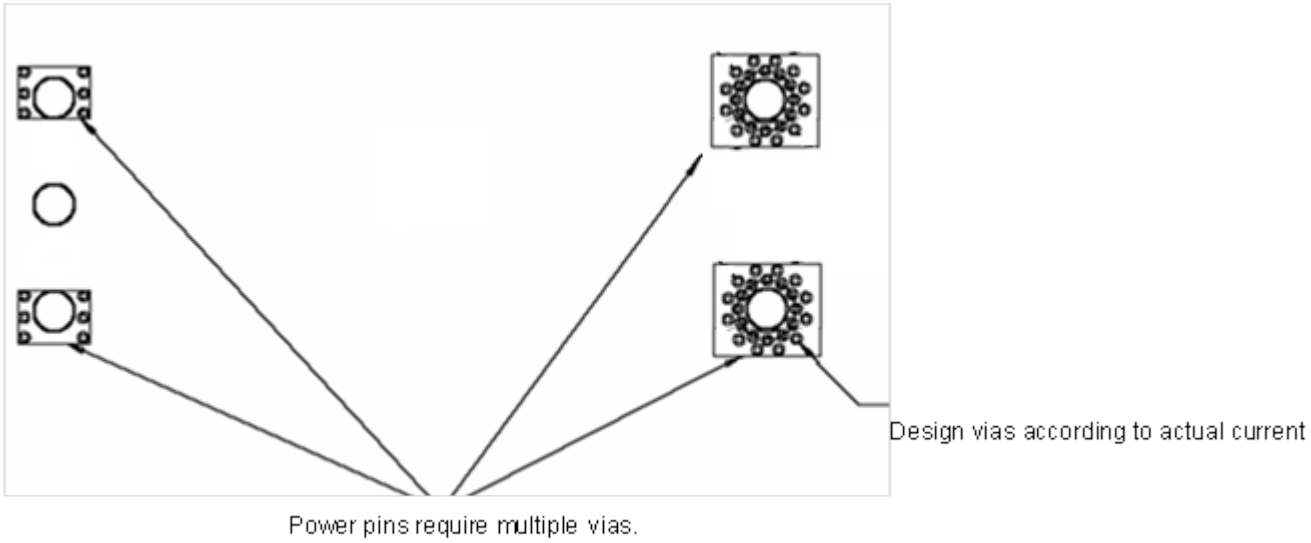

Fig. 2. Recommended Pad Layout
(See Fig. 1 for pin and pad locations)

Pick and Placement

If the SMT converters are installed by pick & place machines, a tray is recommended to hold the converters during the pick and placement process. Since the tray used to ship the converters is designed to provide protection during transportation and handling, it is not suitable for use with the pick & place machines. The most convenient pick point is the top surface of a ferrite core closer to the center of the converter as shown in Fig. 3. Please note that due to the construction of the converter, the location of the pick point is usually neither the weight center

nor the geometric center of the converter. The nozzle used to pick the converter should be able to handle the weight of the converter.

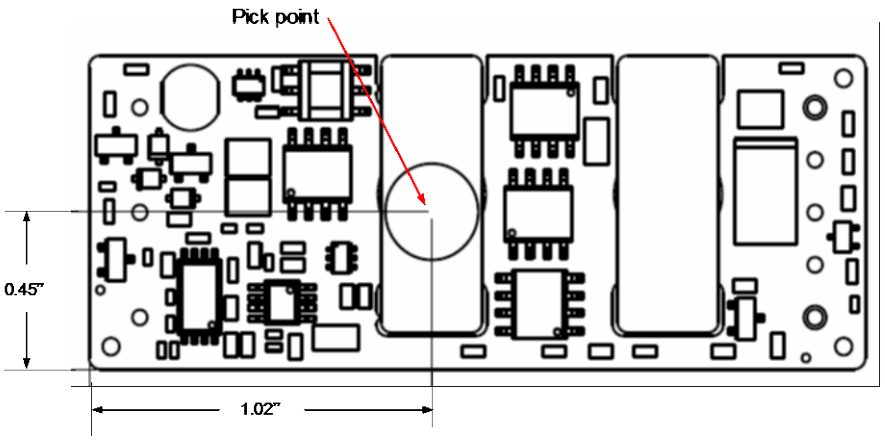

Fig. 3. Pick point of an eighth brick converter

Reflow soldering

These converters can be soldered with infrared radiant (IR), convection, or IR/convection combined reflow ovens. The reflow profile depends upon the solder paste used on the system board. We recommend using a soak zone for preheating due to heavy copper used in these converters. A peak temperature of approximately 225°C for leaded reflow and approximately 250°C for lead-free reflow should be maintained. The duration in which the reflow temperature is kept above the eutectic temperature (reference to the specifications of the solder paste used) should be at least 60 seconds. The best location to monitor the temperature during reflow is on the Vo(-) pin.

For more information or further assistance, please contact: support@netpowercorp.com