

Board-Mounted Power Modules: Soldering and Cleaning (lead free)

Introduction

Generally, as the most common mass soldering method for the solder attachment, wave soldering is used for through-hole power modules and reflow soldering is used for surface-mount ones. Delta recommended soldering methods and process parameters are provided in this document for solder attachment of power modules onto system board. SAC305 is the suggested lead-free solder alloy for all soldering methods.

Reflow soldering is not a suggested method for through-hole power modules due to many process and reliability concerns. If you have this kind of application requirement, please contact Delta sales or FAE for further confirmation.

Wave Soldering (Lead-free)

Delta's power modules are designed to be compatible with single-wave or dual wave soldering. The suggested soldering process must keep the power module's internal temperature below the critical temperature of 217 °C continuously. The recommended wave-soldering profile is shown in the Figure 1.

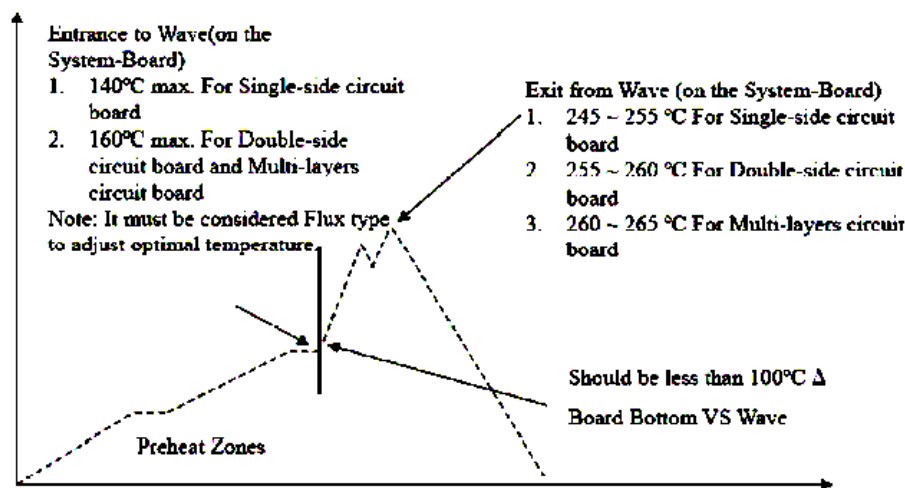


Figure1 Recommended Temperature Profile for Lead-free Wave Soldering

The typical recommended (for double-side circuit board) preheat temperature is 115+/-10°C on the top side (component side) of the circuit board. The circuit-board bottom-side preheat temperature is typically recommended to be greater than 135°C and preferably within 100 °C of the solder-wave temperature. A maximum recommended preheat up rate is 3°C /s. A maximum recommended solder pot temperature is 255+/-5°C with solder-wave dwell time of 3~6 seconds. The cooling down rate is typically recommended to be 6°C/s maximum.

Hand Soldering (Lead Free)

Hand soldering is the least preferred method because the amount of solder applied, the time the soldering iron is held on the joint, the temperature of the iron, and the temperature of the solder joint are variable. The recommended hand soldering guideline is listed in Table 1. The suggested soldering process must keep the power module's internal temperature below the critical temperature of 217°C continuously.

Table 1 Hand-Soldering Guideline

Parameter	Single-side Circuit Board	Double-side Circuit Board	Multi-layers Circuit Board
Soldering Iron Wattage	90	90	90
Tip Temperature	385+/-10°C	420+/-10°C	420+/-10°C
Soldering Time	2 ~ 6 seconds	4 ~ 10 seconds	4 ~ 10 seconds

Reflow Soldering (Lead-free)

High temperature and long soldering time will result in IMC layer increasing in thickness and thereby shorten the solder joint lifetime. Therefore the peak temperature over 245°C is not suggested due to the potential reliability risk of components under continuous high-temperature. In the meanwhile, the soldering time of temperature above 217 °C should be less than 90 seconds. Please refer to Figure 2 for recommended temperature profile parameters.

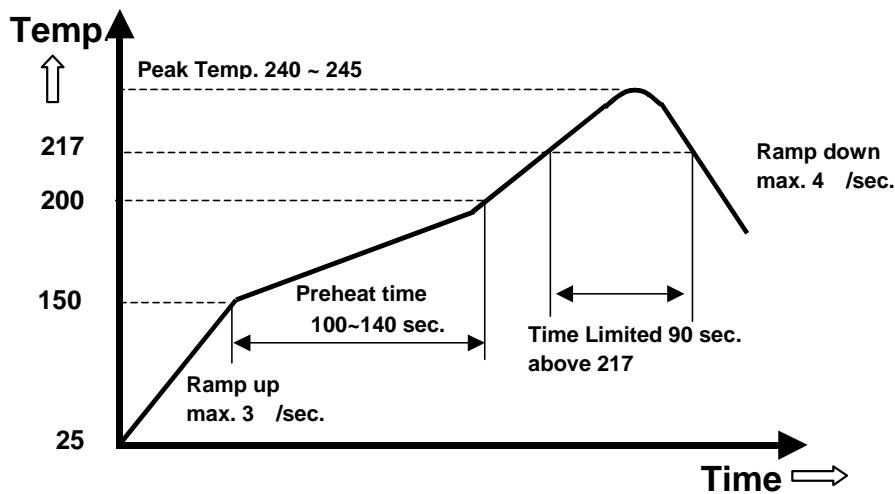


Figure2 Recommended Temperature Profile for Lead-free Reflow Soldering
 Note: The temperature is measured on solder joint of pins of power module.

BMP recommended footprint

Generally Delta recommended system board 1.60mm plated through holes for diameter 1.00 pins, 2.10mm plated through holes for diameter 1.50mm pins, 0.90mm plated through holes for 0.50mm square pins, and 1.1mm plated through holes for square 0.64mm pins by wave soldering.

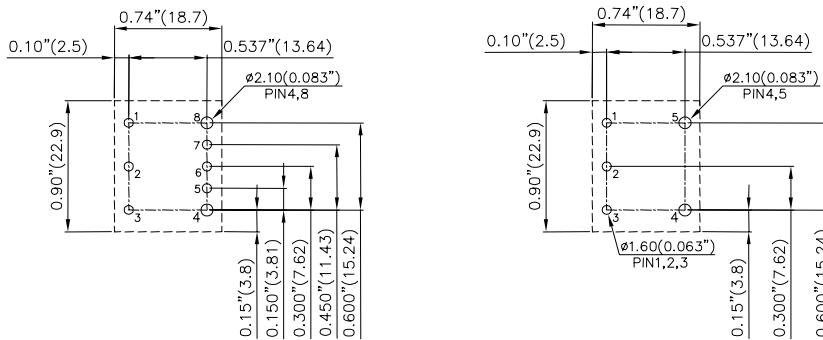
Customer can base on the actual wave soldering performance to adjust the hole size of system boards.

Detail as following

Delta thirty-second brick(TB: 1/32th) models recommended PCB footprint.

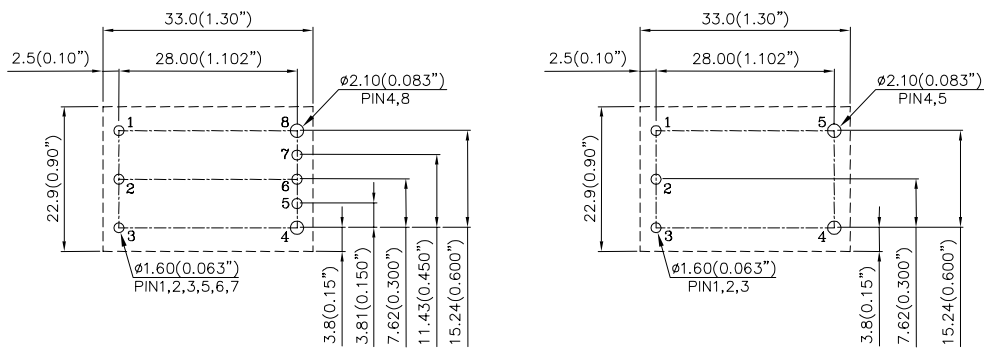
RECOMENDED P.W.B. PAD LAYOUT FOR THROUGH HOLE MODFL

1/32 BRICK



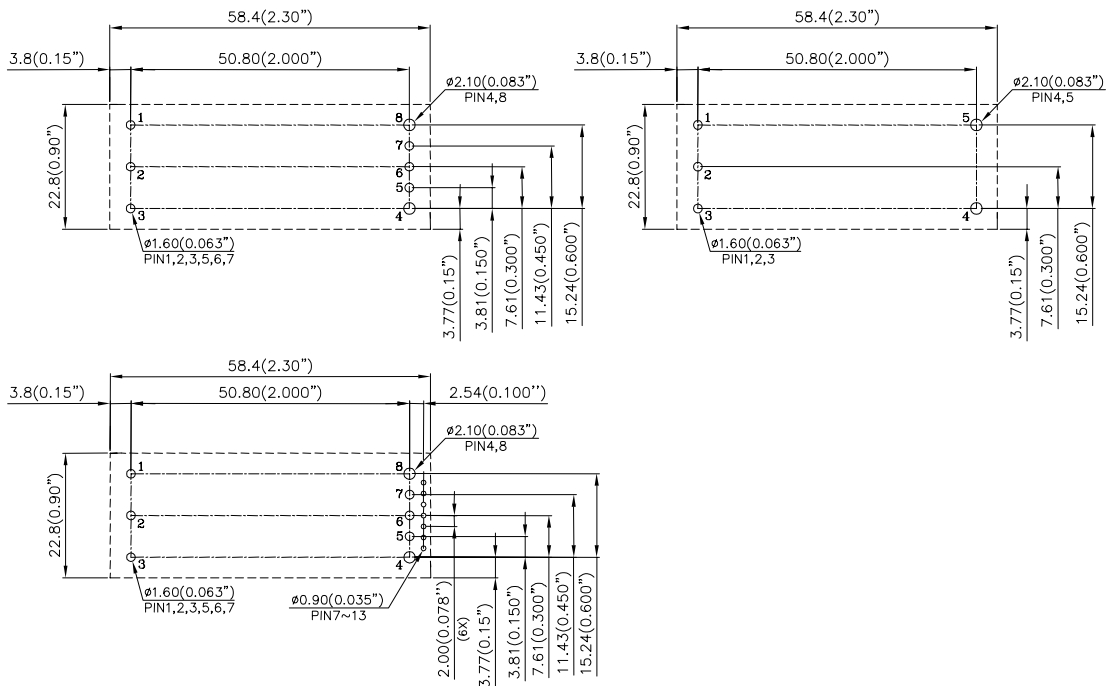
Delta sixteenth brick (VB: 1/16th) models recommended PCB footprint.

1/16 BRICK



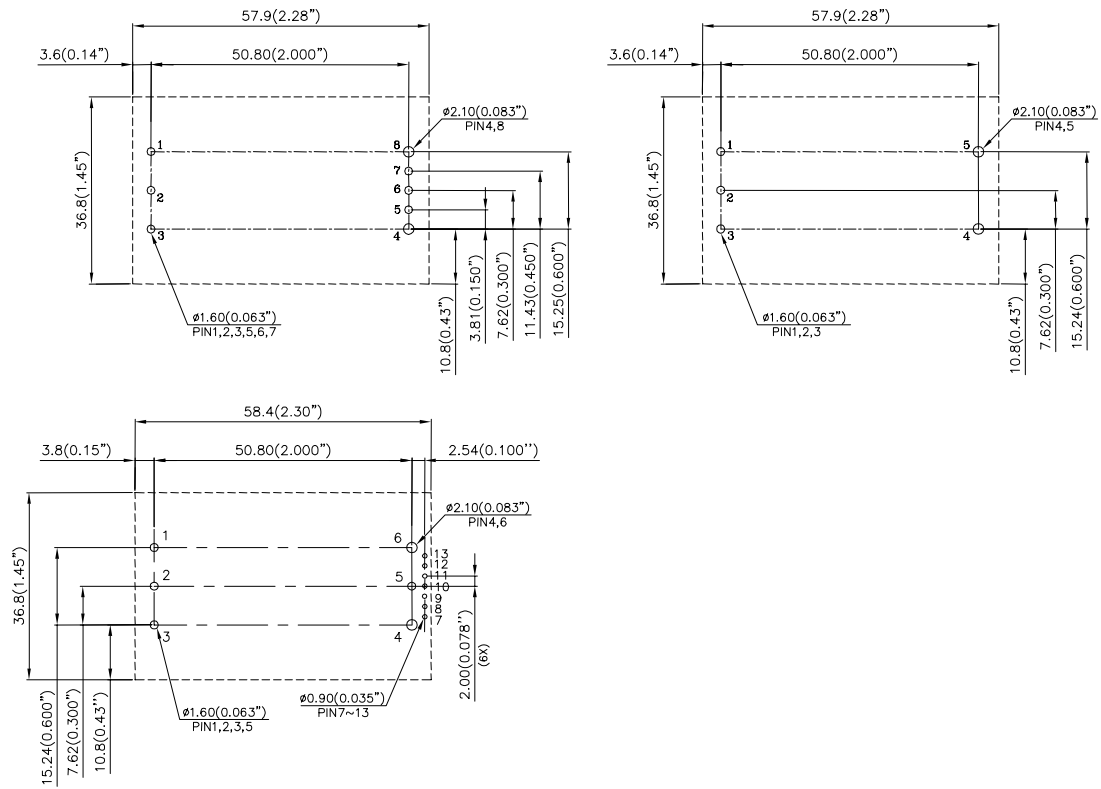
Delta eighth brick (EB: 1/8th) models recommended PCB footprint.

1/8 BRICK



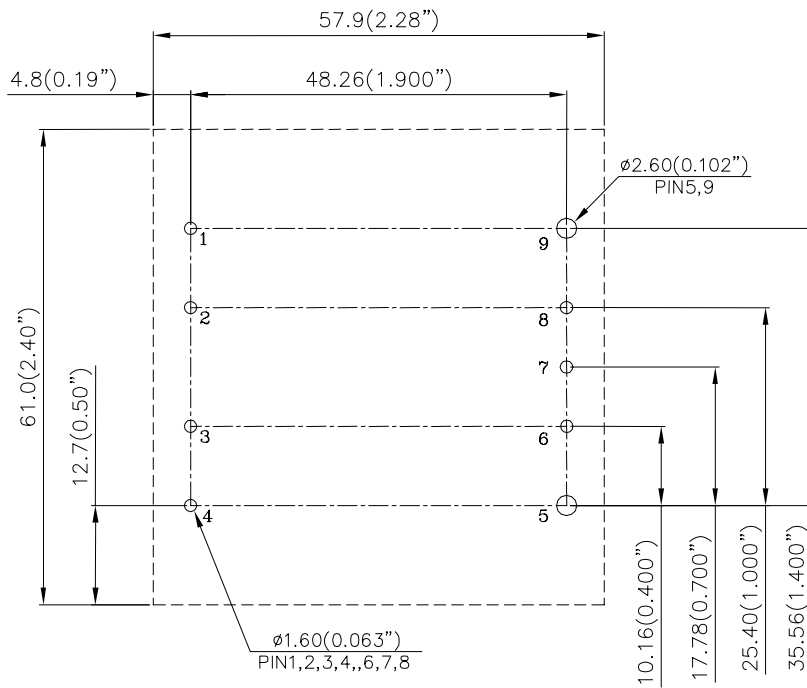
Delta quarter brick(QB: 1/4th) models recommended PCB footprint.

1/4 BRICK

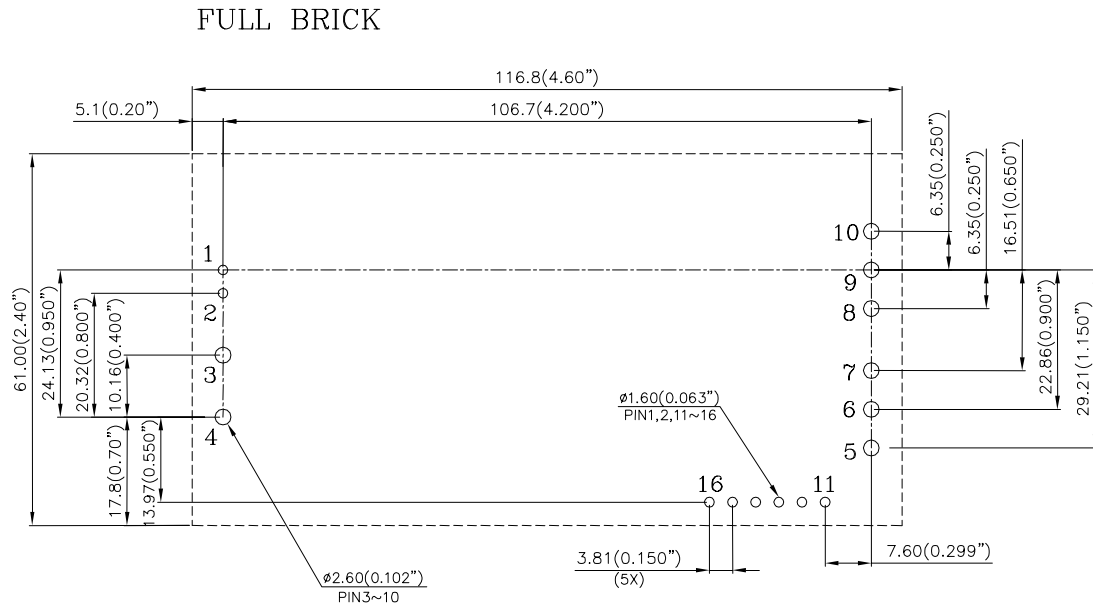


Delta half brick(HB: 1/2th) models recommended PCB footprint.

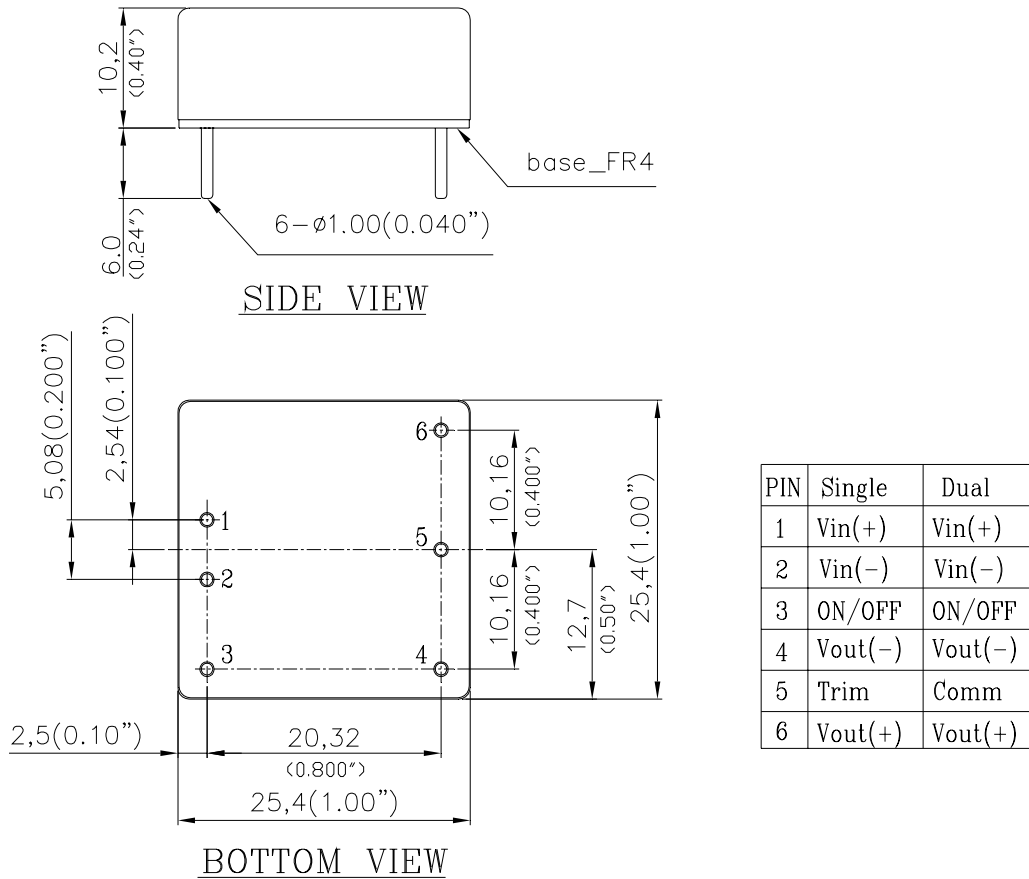
HALF BRICK



Delta full brick(FB) models recommended PCB footprint.



Delta Industrial DCDC(1"x1") models recommended PCB footprint.



NOTES:

DIMENSIONS ARE IN MILLIMETERS AND (INCHES)

TOLERANCES: X.Xmm±0.5mm(X.XX in.±0.02 in.)

X.XXmm±0.25mm(X.XXX in.±0.010 in.)