

PCB Mount VIA Soldering Guidelines

Ankur Patel
Applications Engineering



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Introduction

This application note provides soldering process information for PCB mount VIA products including the MFTM, AITM, PFTM, VIA BCM[®], VIA DCMTM, etc. This document is intended to provide guidelines for making high quality solder connections of input, output and signal pins of ROHS (lead free) compliant VIA modules to printed circuit boards.

Storage

VIA modules should be stored at a temperature as specified in the data sheet. For example, the storage temperature range is -40°C to 125°C for C-grade and T-grade products.

Handling

VIA modules should remain in the original sealed package until the time of use. All personnel and equipment handling VIAs should have proper ESD protection to avoid damaging the units during the mounting process. ESD ratings are specified in the data sheet.

Placement

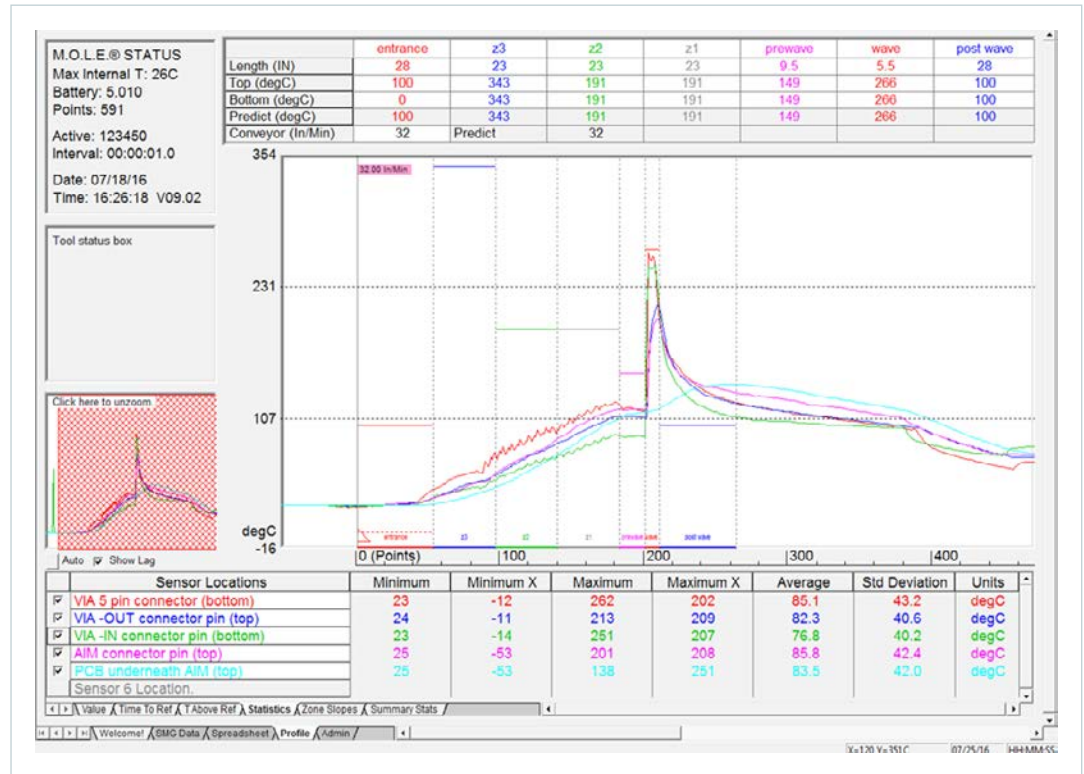
Use the recommended hole pattern as illustrated in the datasheet to support proper seating of the VIA pins within the PCB. The VIA should be placed such that each lead rests in its appropriate hole without damage, distension or distortion.

Soldering Process

Note: Hand soldering of VIA products is not recommended.

The following description of a wave soldering process is based upon a Vectra Wave Solder machine made by Speedline.

Figure 1
Recommended Soldering Process Profile



Fluxing

Vicor recommends no-clean flux for use with VIA wave soldering. EF2210, a no-clean flux with J-STD classification of ORLO, is preferable. Flux tank pressure is set at 40psi. However, this parameter is a function of how the customer's equipment operates and must be set accordingly.

Precise control of flux quantity is necessary, as too little or too much flux will result in poor solder joint formation or other defects.

Pre-heating

Preheating the PCB and VIA mounting pins prior to wave soldering is generally required to support proper solder joint formation. The following pre-heater zone settings are used by Vicor during PCB assembly.

Zone 3 is the first zone after flux application. It is the first preheating stage and uses a 23" IR heater. The temperature setting for bottom and top side pre-heaters in this zone is 650°F (343°C).

Zone 2 is between zone 3 and zone 1 and uses a 23" convection heater. The temperature setting for bottom and top side pre-heaters in this zone is 375.8°F (191°C).

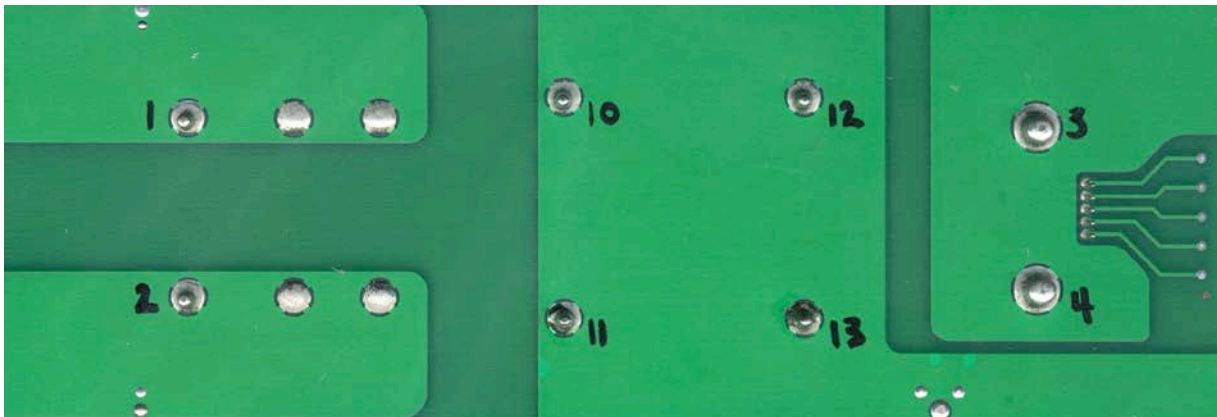
Zone 1 immediately precedes the wave soldering stage and uses a 23" convection heater. The temperature setting for bottom and top side pre-heaters in this zone is 375.8°F (191°C).

Wave Stage

PCB mount VIA modules achieve an adequate solder connection at a preferred conveyor speed of 3.25 feet per minute, solder temperature of 510°F (266°C) and dwell time of 8 seconds. All of these parameters are critical for proper solder joint formation. Figure 2 depicts properly formed joints after soldering 4414 VIA BCM (K = 1/32) pins on a four-layer printed circuit board.

Figure 2

Properly Formed Solder Joints



The following images show the cross section of solder joints after soldering 4414 VIA BCM pins on a four-layer printed circuit board. Solder joint #1 is for +input pin, solder joint #4 is for +output pin, solder joint #10 and solder joint #13 are for -output pins.

Figure 3

Cross-section of Solder Joint for Pin #1



Figure 4

Cross-section of Solder Joint for Pin #4

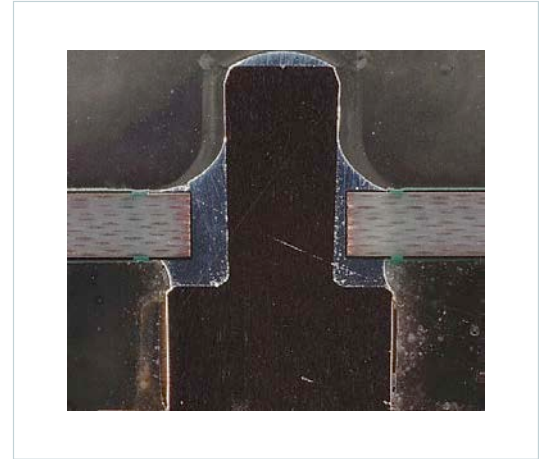


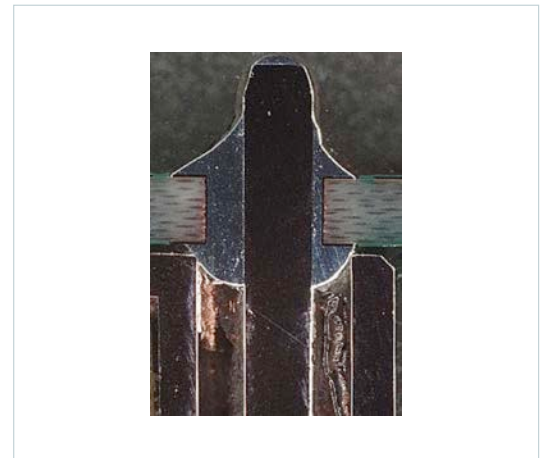
Figure 5

Cross-section of Solder Joint for Pin #10



Figure 6

Cross-section of Solder Joint for Pin #13



Post-Wave Cleaning

VIA products are not sealed against moisture and are, therefore, not compatible with cleaning processes.

Inspection

The necessary pin protrusion from the PCB to ensure a proper solder joint is 50 – 120 mils. The formation of solder bridges between joints of the same potential and shorting is not expected. It is recommended to follow the applicable IPC standards for percentage acceptable through hole fill with solder. The images above show 100% hole fill achieved. Refer to IPC-A-610, "Acceptability of Electronic Assemblies" for relevant inspection methodology and criteria.

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Vicor Corporation

25 Frontage Road
Andover, MA, USA 01810
Tel: 800-735-6200
Fax: 978-475-6715
www.vicorpower.com

email

Customer Service: custserv@vicorpower.com
Technical Support: apps@vicorpower.com