

Application Note AN-79

Wave Soldering Guidelines for InSOP Packages

Solder Pad Layout Design Recommendations for Wave Soldering with InSOP Packages

Power Integrations recommends the use of IR/convection reflow for surface-mount attach of the InSOP package. However, the InSOP package was designed with wave soldering in-mind in case IR/convection reflow is not available or not preferred. InSOP utilizes 0.75 mm lead pitch and narrow leads (0.25 mm width nominal) to allow adequate spacing between leads, and can be successfully attached when using wave soldering equipment with state-of-the-art features that prevent solder bridging. However, for older or less sophisticated wave soldering equipment, special PCB/footprint layout considerations are recommended in Figure 1.

Maximum Spacing Between Solder Pads

Taking advantage of InSOP's narrow leads, solder pad-to-pad spacing can match or exceed the spacing of similar or even larger pitch and well-known wave solderable packages such as SSOP and TQFP (with 0.80 mm pitch). Of course care must be taken to ensure that the selected layout & process results in good quality solder fillets on all sides of the lead "foot", but the InSOP solder pad can be designed as narrow as 0.30 mm in width, allowing up to 0.45 mm of pad-to-pad spacing.

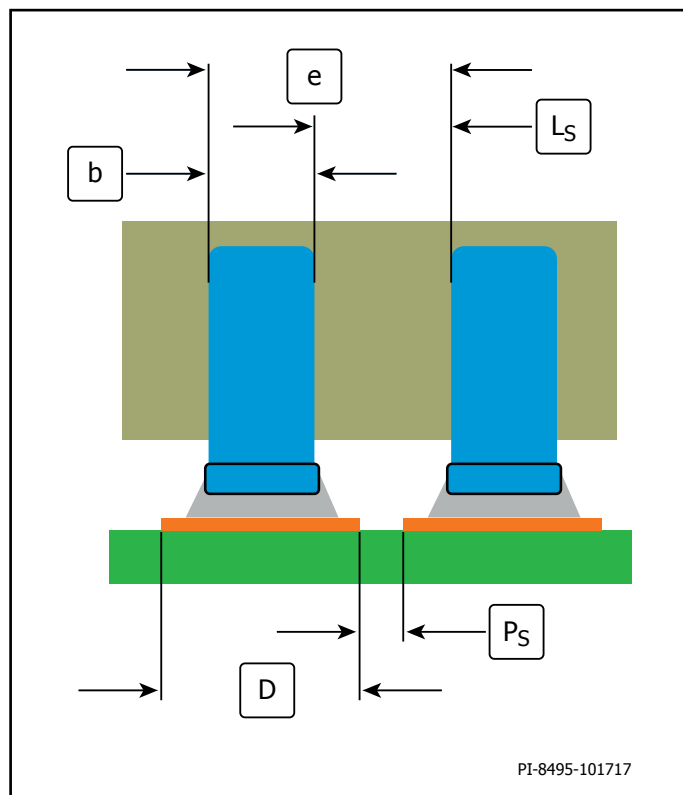


Figure 1. Solder Pad Spacing.

Layout Dimensions for Common and Finer-Pitch Wave-Solderable Leaded Packages

All Dimensions (mm)	Lead Pitch (e)	Lead Width (b)	Lead Metal-to-Metal Spacing (L_s)	Recommended Solder Pad Width for Wave Soldering (D)	Solder Pad Metal-to-Metal Spacing (P_s)
InSOP-24	0.75	0.25	0.50	0.30 - 0.35	0.40 - 0.45
TSSOP-24	0.65	0.25	0.40	0.30	0.35
SSOP-36	0.80	0.36	0.44	0.40	0.40
TQFP-32	0.80	0.35	0.45	0.40	0.40
Standard SOIC	1.27	0.40	0.87	0.60	0.67

Table 1. Layout Dimensions for Common & Finer-Pitch Wave-Solderable Leaded Packages.

Solder Thieves and Orientation Through The Wave

The well-known method of designing "solder thieves" on the PCB layout has been shown to be effective in providing good wave soldering results for the InSOP package. The general concept is shown in the figure below, and includes large pads at the end of each row of fine-pitch solder pads combined with proper orientation of the layout through the wave. The large pads, called "solder thieves", act to draw excess solder, ensuring clean/bridge-free solder joints along the entire row of solder pads.

Utilizing solder thieves with the InSOP package requires a couple special considerations due to the unique spacing of the leads. Depending on the flexibility for laying out the PCB and the orientation of the package, it may be possible to save some board space by combining the solder thief pad with the wide solder pad required for the wide "batwing lead" of the InSOP. The orientation of the package through the wave MUST be with the leads perpendicular to the PCB travel direction, so the two layout options for InSOP are shown below.

Thieves-Pad Design is Dependent on PCB Travel Directions

Exact size, location and shape of the solder thief pads may need to be modified compare to what is shown in this document depending on the type of solder wave system utilized. However, if the general principles described here are applied, the InSOP package can very successfully be used with a wave soldering process.

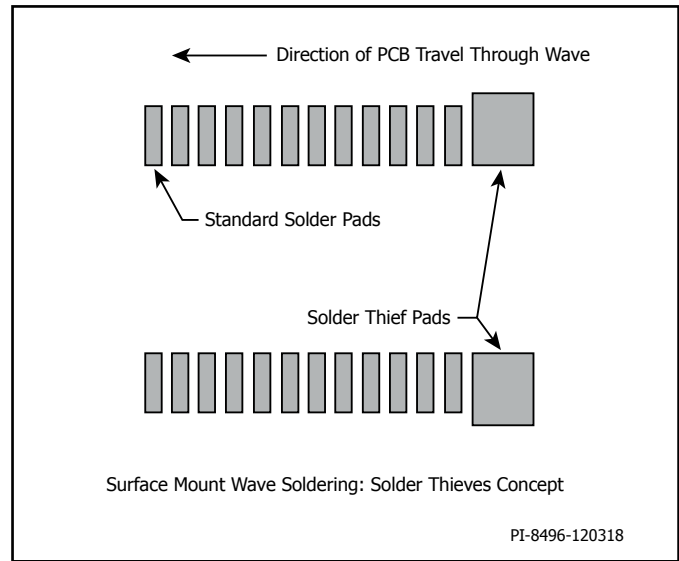


Figure 2. Solder Thieves Concept.

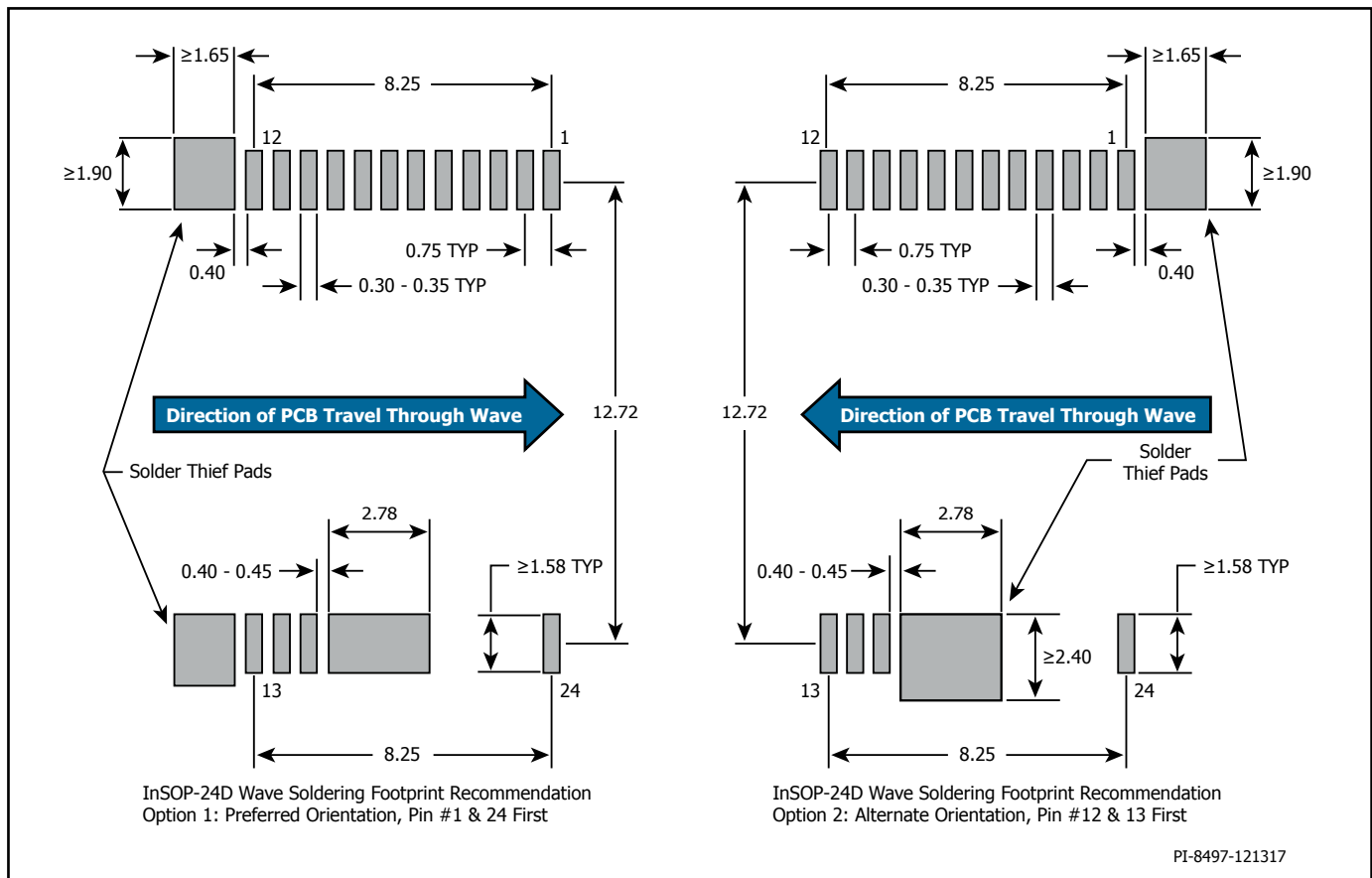
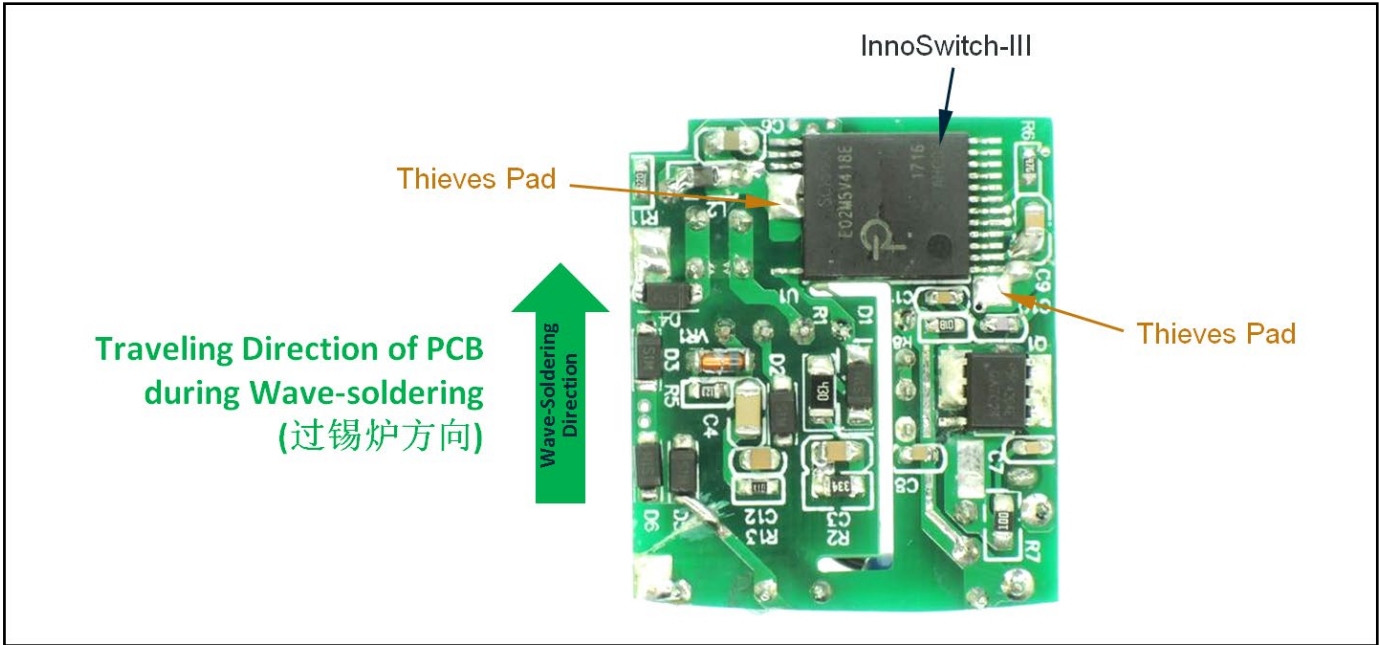


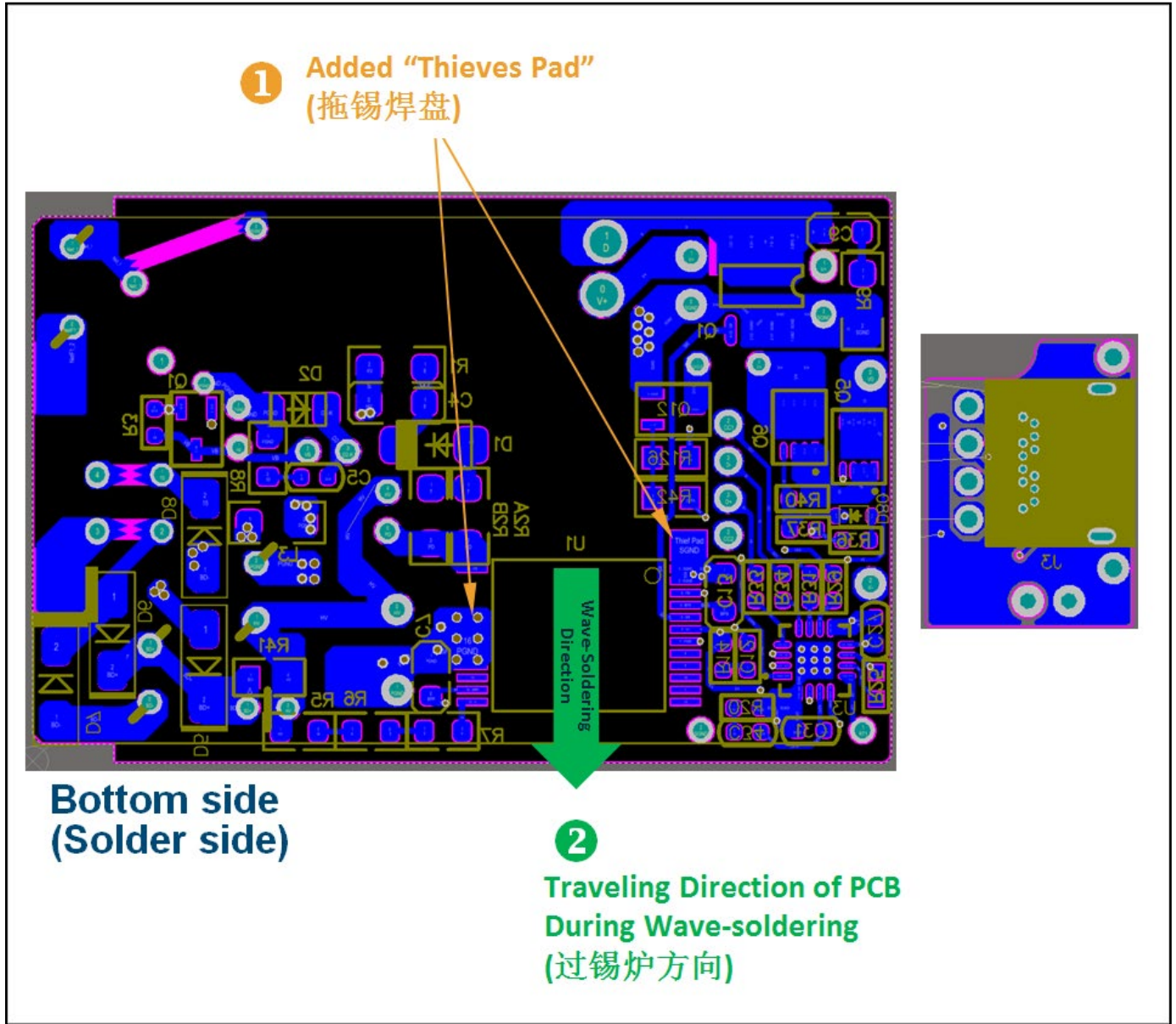
Figure 3. Wave Soldering Footprint Recommendation Preferred and Alternate Orientation.

Design Examples

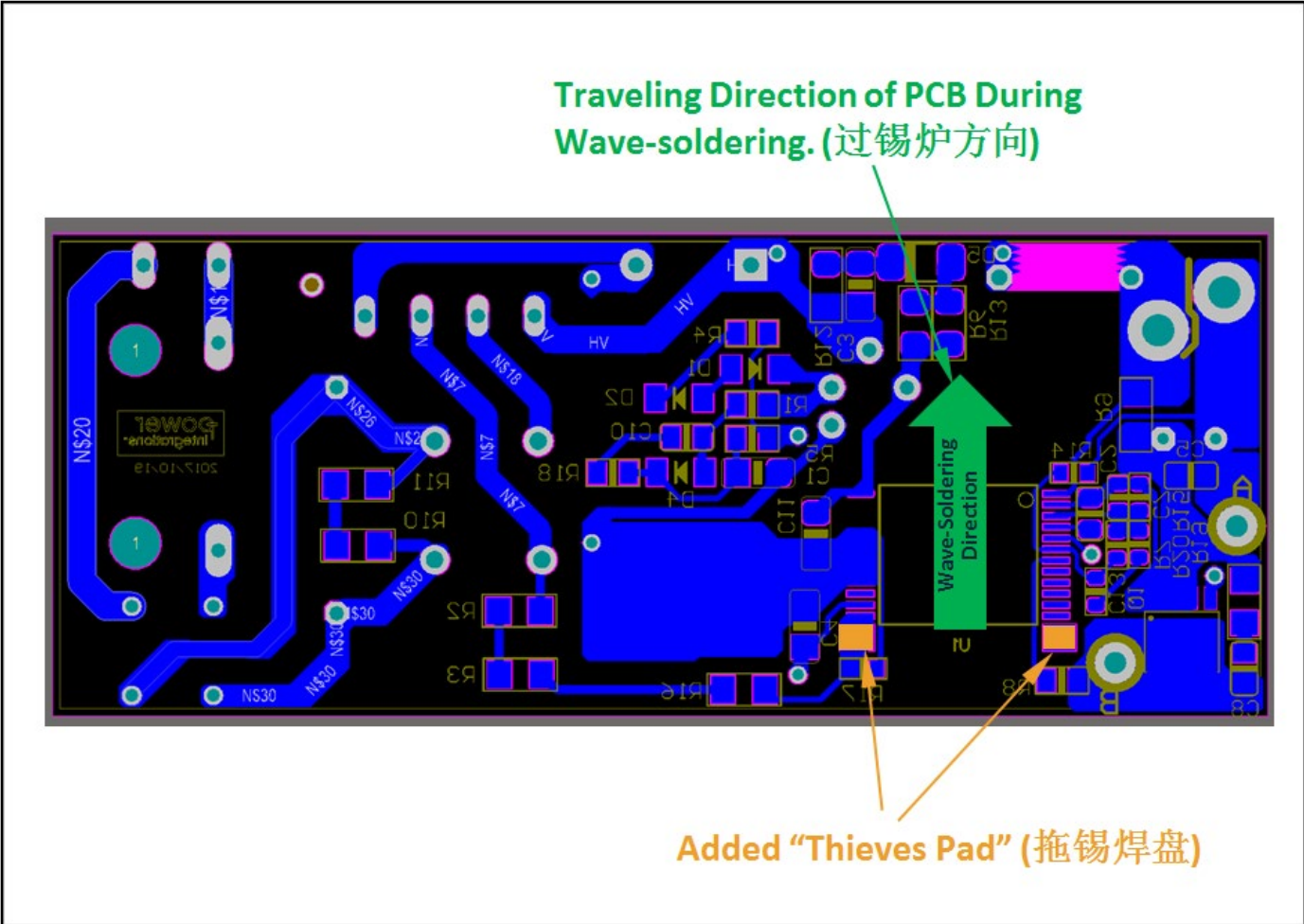
A. 10 W @ 5 V 2 A Design



B. 27 W USB-PD Design



C. 45 W @ Single 19 V 2.37 A Design



Revision	Notes	Date
A	Initial release.	12/18

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