

SMiT™ RF Shield Clips

1.0 Faster Assembly and Greater Flexibility for EMI/RFI Shields

The Autosplice SMiT Shield Clips are a surface mount product that offer an automated solution to EMI/RFI shield assembly. As a discrete receptacle component, the SMiT Clips are a cost-effective alternative to hand soldering.

The SMiT Shield Clips are packaged in EIA tape and reel and are compatible with standard high-speed placement equipment. The clip can be placed anywhere on the PCB, eliminating the need for excess holes saving PCB real estate.

The following application notes review Autosplice's recommendations for the stencil & solder pad, picking and placement of the SMiT Shield Clips, frequency and aperture gaps as well as additional indirect benefits of the shields clips.

2.0 Stencil & Solder Pad Recommendations

Standard Clip

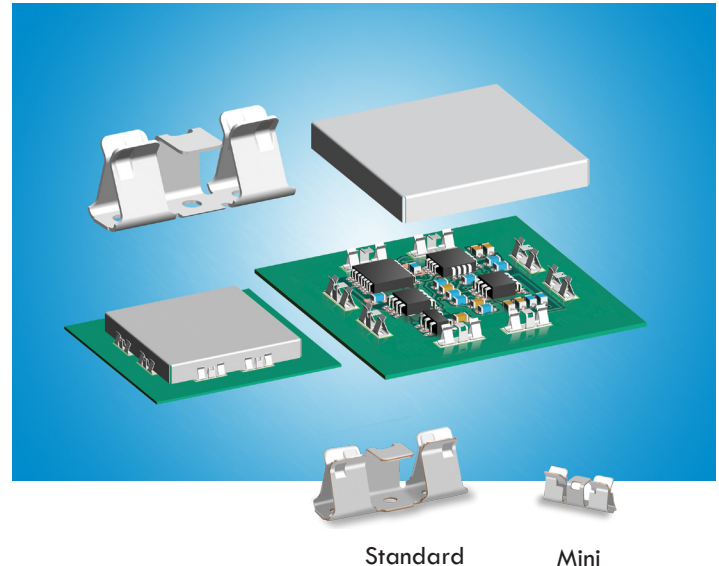
Rectangular Pad $.095'' + .000'' / -.005'' \times .370''$

A reduction in pad width to $.085''$ in some applications will still allow for the clip to self align, but may sacrifice solder fillet formation in certain areas.

Mini Clip

Rectangular pad $.040'' + .000'' / -.005'' \times .220''$

Paste Pattern is 1:1 aperture to pad for a standard paste thickness of $.006''$.



Autosplice's recommended pad and paste patterns have been determined to provide maximum solder fillet formation and enhance self-alignment of the Shield Clip to the pad during reflow.

Applications with thicker paste requirements may require smaller stencil aperture. For example: a paste thickness of $.008''$, Autosplice recommends a stencil aperture of $.085'' \times .325''$ (standard clip). Controlling the paste volume will help avoid excess solder fillets and misalignment after reflow. It will also ensure that the Shield Clip will solder flush to the PCB pad surface. A clip misplaced of up to 20 degrees off pad center has been able to achieve alignment after reflow with proper pad and paste parameters established.

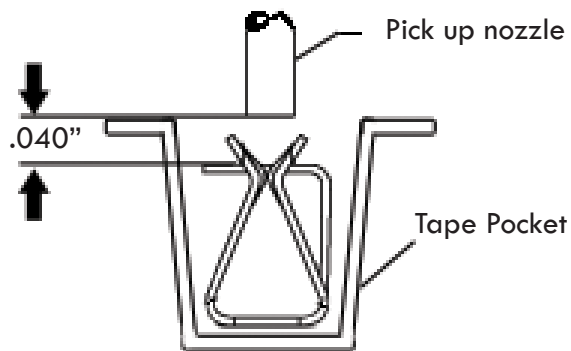
There are many pastes and pad variations that could achieve similar results. Autosplice recommendations are guidelines to achieve maximum results based on an overall assessment of standard SMT placement practices. Paste type, reflow parameters, PCB type and ground plane design may alter results slightly.



Recommendations for continuous ground planes vary greatly. Please consult with our engineers to determine the pad & stencil geometry that best suit your application's needs.

3.0 Pick & Placement

Autosplice's SMI Shield Clips come packaged in 16mm (Standard Clip) and 12mm (Mini-Clip) EIA standard tape & reel. These clips are compatible with brand name equipment such as FUJI, Panasonic, Siemens, Sanyo and others.

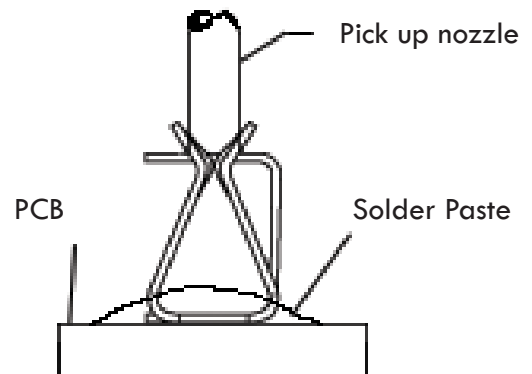


Autosplice's Shield Clips have been placed at speeds of up to 20,000 parts per hour. As with most surface mount components, there are some pick and placement criteria that will assist in setting up your system to achieve maximum placement speed and accuracy.

3.1 Picking the SMI Shield Clip

Our shield clips are compatible with standard SMT vacuum nozzles. For example: the standard clip utilizes a 1mm vacuum nozzle and the mini-clip can be placed with a .6mm to .7mm vacuum nozzle. Actual nozzle sizes differ from various platform manufacturers but all have sizes close in range to the sizes mentioned above.

The pick up platform on the clip is located .035"-.040" from the top of the pocket.



The placements machine needs to be programmed to pick the part out of the pocket with the nozzle level with the top of the pocket. It is critical that the vacuum of the nozzle be allowed to pull the part from the pocket and not push down on the pick up platform of the clip.

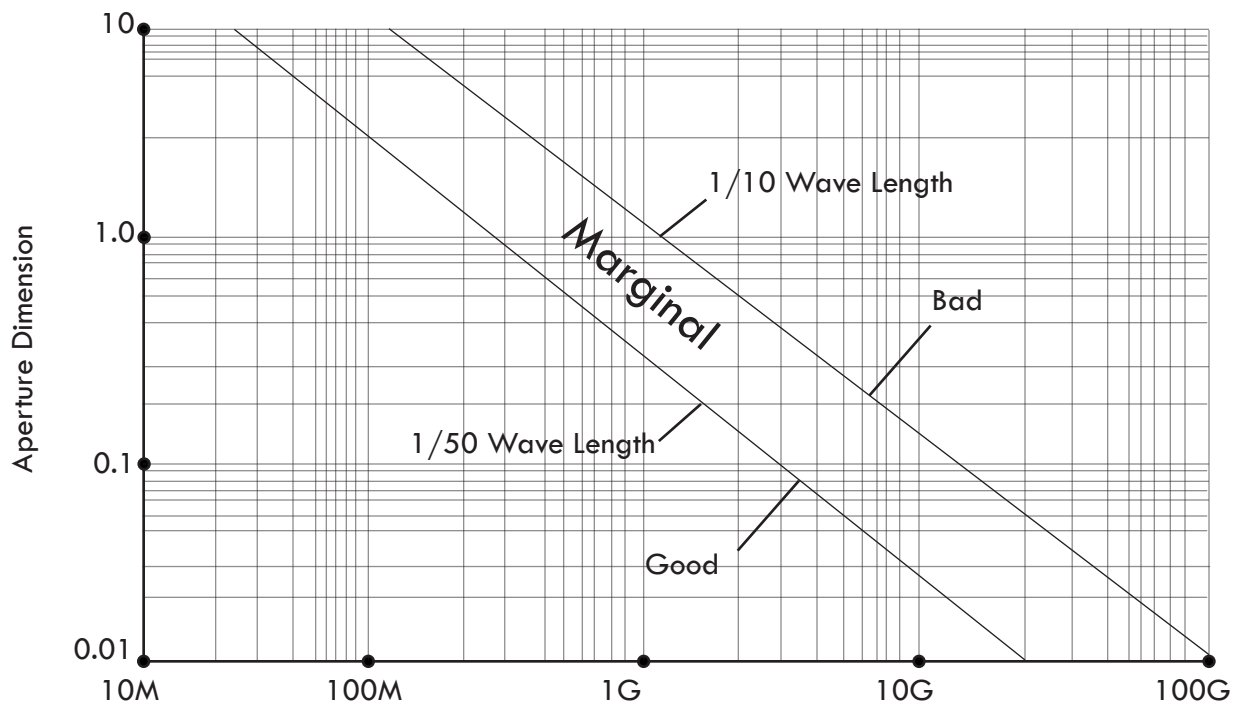
If the pick up platform is deformed due to nozzle pressure, the placement machine could detect a miss-pick or experience placement anomalies.

3.2 Placing the SMI Shield Clip

The clips' features and recommended PCB pad size are designed to allow for placement up to 20 degrees off center and allow the clip to self align on the pad during reflow.

Most SMT "Chip Shooters" have the capability to far exceed this placement accuracy without sacrificing performance. It is recommended that the placement machine always be setup for maximum performance.

Shielding Aperture Design



The SMiT Clips need to be placed to a depth of at least 50% into the paste without being pushed 100% onto the PCB surface. This will guarantee that the clip will be secure against PCB movement before reflow and be pulled down flush to the PCB during the reflow process. The pickup platform of the clip should not be deflected during the placement operation.

4.0 Frequency & Aperture Gap

Some applications require access holes or apertures throughout the shield to allow for testing, circuit tuning, cleaning, etc. The size, frequency and pitch of apertures allowed for any particular application is directly related to the radiated frequency trying to be contained, or protected from.

The Aperture Design Rules Chart can be used as a reference guide in determining the aperture allowed for any particular range of frequency. In designing for aperture allowance, both operating and resonance frequency need to be considered.

The Aperture Design Rules Chart is only a guide to get you started. AutosplICE always recommends extensive

testing for shielding effectivity before finalizing any design. To address the common questions of clip placement pitch and the gap created between the edge of the shield and the PCB, the Aperture Design Rules for the operating resonance frequencies must be accommodated.

These design rules indicate distance between the Shield Clips, as well as the requirements for mass and size and retention of the shield.

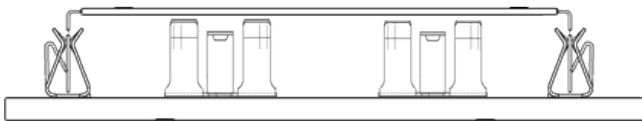
For example: to determine the aperture gap between the PCB and the bottom of the shield on an application that needed to be shielded against a frequency of 1 GHz, the Aperture Design Rules suggests a maximum aperture of .110".

Using the standard clip as a reference: Testing would start with the clips on .456" centers, that would result in a gap of .100" between clips. As testing continues at various frequency levels spacing could be increased at intervals of 10% until maximum spacing is reached, while maintaining the target shielding effectiveness of the application.

At higher frequencies, the shield edge could be notched at clip location to reduce the gap at the PCB level. This would minimize the gap between the Shield Edge and the PCB surface reducing aperture size. Autosplice SMiT Shield Clips are being used successfully in applications within a frequency range of 500 MHz to 2.5 GHz.

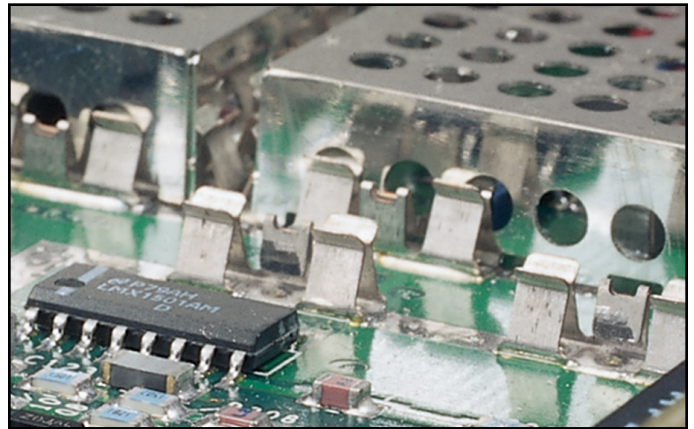
5.0 Recommended Mechanical Hold Downs

The shield clip provides an electrical ground between a shield and a PCB. Each clip has 1/10th of a lb. retention force. In some high vibration environments, additional mechanical hold downs are recommended.



SMiT™ Shield Clips Benefits

- Eliminates the need for secondary soldering.
- Saves PCB real estate.
- Eliminates the need for costly two piece assembly.
- Allows for inspection, testing, tuning and cleaning of the circuit without the shield in place.
- Eliminates the need for desoldering when removing shields.



Specifications:

Material: Copper Alloy and Stainless Steel

Plating Options: Lead Free Matte (Tin) or Tin Lead (90/10)

Life Cycle: 10 actuations minimum

Operating Temperature: -40°C to 105°C at 85% RH

Solderability: Per Mil-STD-202, Method 208

Paste Recommendations Thickness: .006"-.008" (0.15-0.20)

For further information contact the Autosplice Engineering Department at **800-535-5538**

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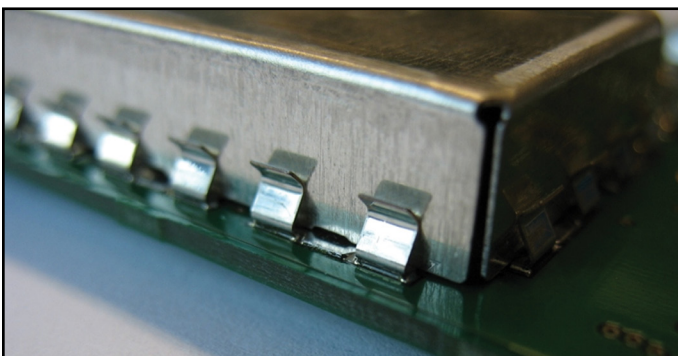
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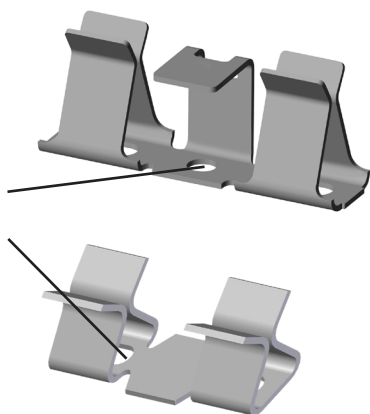
Shield Clip - Global Product Offering

Part Number	Description	Shield Thickness	Solder Wicking Holes	Height	Quantity per reel	Base Material	Plating	Pad size	Pick Up Location
*ATC-AA-01-001	Micro Miniature	.006" + .003" (.015mm + .08mm)	No.	.031" (.8mm)	10,000	Stainless Steel	Post Plated Tin (matte). (RoHs)	.03"X .173" (.8mm X 4.4mm)	Bottom.
*ATC-BB-02-001	Micro	.006" + .003" (.015mm + .08mm)	No.	.047" (1.2mm)	10,000	Stainless Steel	Post Plated Tin (matte). (RoHs)	.039"X .205" (1mm X 5.2mm)	Bottom.
7-88-70001-1	Compact	.006" + .003" (.015mm + .08mm)	No.	.05" (1.28mm)	10,000	Stainless Steel	Preplated Matte Sn over Nickel. (RoHs)	.035"X .264" (.9mm X 6.7mm)	Bottom.
7-V2008-110TT	Mini	.007" +/- .002" (.18mm +/- .05mm)	Yes.	.08" (2.04mm)	5,000	Stainless Steel	Preplated Matte Sn over Nickel. (RoHs)	.04"X .22" (1.02mm X 2.2mm)	Top.
*7-V2008-111AA	Mini	.007" +/- .002" (.18mm +/- .05mm)	Yes.	.08" (2.04mm)	5,000	Copper Alloy	Preplated Tin/Lead over Nickel.	.04"X .22" (1.02mm X 2.2mm)	Top.
*7-V2008-111TT	Mini	.007" +/- .002" (.18mm +/- .05mm)	Yes.	.08" (2.04mm)	5,000	Copper Alloy	Preplated Matte Sn over Nickel. (RoHs)	.04"X .22" (1.02mm X 2.2mm)	Top.
7-V2019-115TT	Midi	.014" +/- .002" (.36mm +/- .05mm)	Yes.	.134" (3.4mm)	4,500	Copper Alloy	Preplated Matte Sn over Nickel. (RoHs)	.09"X .37" (2.29mm X 9.4mm)	Bottom.
*7-V2004-115AA	Midi	.014" +/- .002" (.36mm +/- .05mm)	Yes.	.142" (3.62mm)	2,000	Copper Alloy	Preplated Tin/Lead over Nickel.	.09"X .37" (2.29mm X 9.4mm)	Top.
*7-V2004-115TT	Midi	.014" +/- .002" (.36mm +/- .05mm)	Yes.	.142" (3.62mm)	2,000	Copper Alloy	Preplated Matte Sn over Nickel. (RoHs)	.09"X .37" (2.29mm X 9.4mm)	Top.
*7-V2004-125AA	Midi	.019" +/- .002" (.48mm +/- .05mm)	Yes.	.142" (3.62mm)	2,000	Copper Alloy	Preplated Tin/Lead over Nickel.	.09"X .37" (2.29mm X 9.4mm)	Top.
*7-V2004-125TT	Midi	.019" +/- .002" (.48mm +/- .05mm)	Yes.	.142" (3.62mm)	2,000	Copper Alloy	Preplated Matte Sn over Nickel. (RoHs)	.09"X .37" (2.29mm X 9.4mm)	Top.

*Preferred, generally in stock by distributor. Lead Free RoHs compliant.

Top Pick Up

Solder Wicking Holes

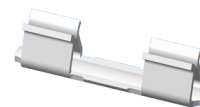


Bottom Pick Up

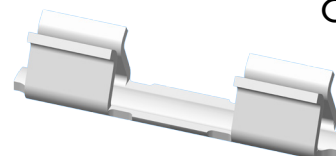
Height

Height

Micro



Compact



Authorized Distributors



800.325.0534
Contact Casey Donovan
cdonovan@keiconn.com



800.400.7041
contact@heilind.com



Sample Kit Available