

Squeegee Blades

Application Bulletin

Squeegee blades are an intricate part of the print process. In a typical printing process, the paste does not fill the aperture until the paste bead has traveled at least 75% beyond the leading edge of the aperture. The aperture fills from the trailing edge of the aperture backwards. It is the rolling of the solder paste bead that generates the downward force that drives the paste to fill the aperture. This understanding of the aperture filling process is important to understanding why the attack angle of the blade becomes critical.

Miniature components such as 01005 passives and 0.3 mm CSPs/BGAs demand the accuracy and precise deposition of solder paste volume. It is well known that stencil printing is a complex process, influenced by several variables that include hardware, software, materials and process factors. Squeegee blade assembly happens to be an element of printing that can have a significant effect on the print quality. Studies show most of the qualities are affected by squeegee blade type and attack angle of the blade.

In general, only two metal blade printing parameters which affect aperture filling can be controlled: squeegee speed and downward squeegee pressure. The speed should not be set so high that the paste does not roll as it moves across the stencil or so low that the print cycle time does not keep up with the manufacturing line. The blade pressure is usually set so that no paste remains on the stencil behind the squeegee. Higher pressures will not only damage the stencil, but also shear-thin the paste to such an extent that the flux will separate from the metal and problems such as paste sticking to the blade, lack of tack at placement, or poor solderability will occur further down the assembly line.

What is the optimal squeegee blade assembly for a print process?

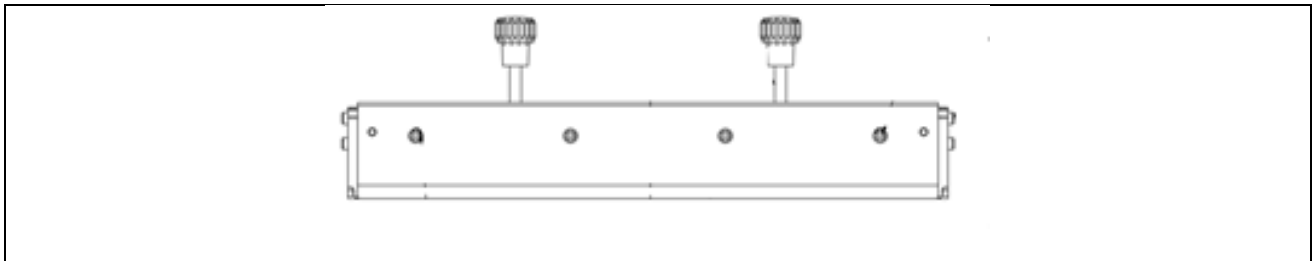
Below describe the following squeegee blade assemblies available for the current MPM printers: Momentum series, Momentum II, and the Edison. Within each description there is a recommended use as a starting point in selecting the correct squeegee blade assembly for the print process. It's possible a different blade type or angle may be required to achieve optimal aperture fill.

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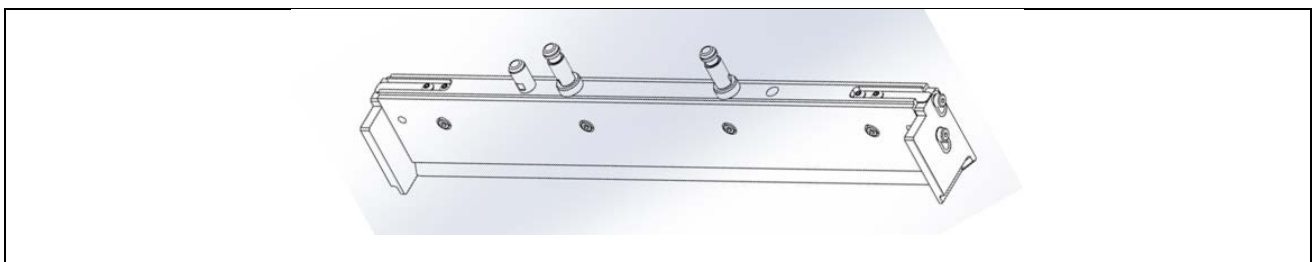
1023036-xxx: Currently the default blade assembly that's being shipped with the Momentum series printers. The blade holders have spring loaded floating side dams which keeps the paste roll with in the squeegee blade area, reducing bleed out on the outside of the blades. The blade holders are secured to the print head using a knob-screw.

Recommended use: This style blade assembly shows to have excellent print results on fine pitch devices, (0201's, 01005's etc.) and micro BGA's.



2006150-xxx: Currently the default blade assembly that's being shipped with the Edison series printers and will be used on Momentum II printers utilizing the Quick Release assembly. The blade holders have spring loaded floating side dams which keeps the paste roll with in the squeegee blade area, reducing bleed out on the outside of the blades. This assembly is like the blade assembly 1023036, with a lower deflection point of the squeegee blade.

Recommended use: This style blade assembly shows to have excellent print results on fine pitch devices, (0201's, 01005's etc.) and micro BGA's.

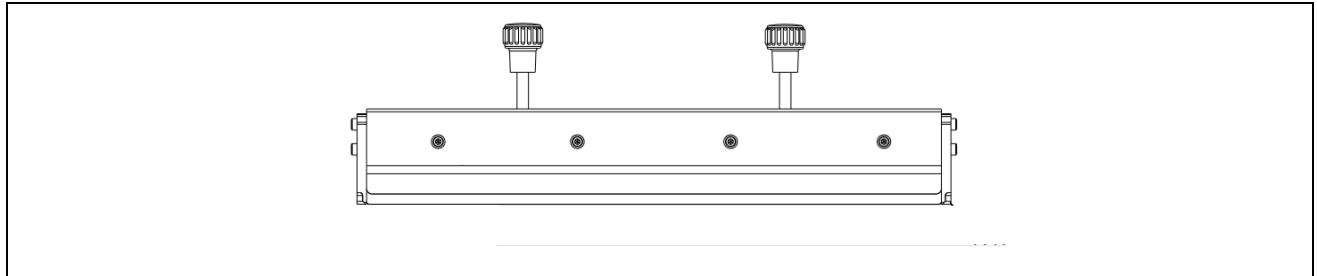


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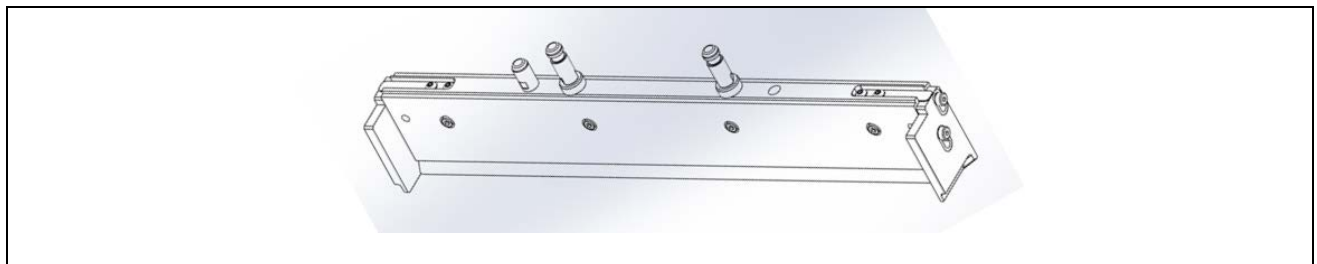
1018140-xxx: Also, referred to as 'High Performance Squeegee' (HPS). This assembly comes standard with a dual blade setup. The blade holders have spring loaded floating side dams which keeps the paste roll within the squeegee blade area, reducing bleed out on the outside of the blades. Utilizes the knob-screw post to mount to the print head. Single blade replacement is available. This was the standard Momentum series printer blade assembly prior to 1023036-xxx. This assembly is like the blade assembly 1024009, with a higher deflection point of the squeegee blades.

Recommended use: Best results shown to be on larger devices (0201, 0402, 0603, etc.)
Excellent fill of the apertures. It also works well with finer pitch devices.



1024009-xxx: Is used on Edison printers only which utilizes the Quick Release feature. This assembly is like the blade assembly 1018140, with a higher deflection point of the squeegee blades. The blade holders have spring loaded floating side dams which keeps the paste roll within the squeegee blade area, reducing bleed out on the outside of the blades. This blade assembly is comparable to the Accela style blade but the holder mounting is different.

Recommended use: Best results shown to be on larger devices (0201, 0402, 0603, etc.) with excellent fill of the apertures.

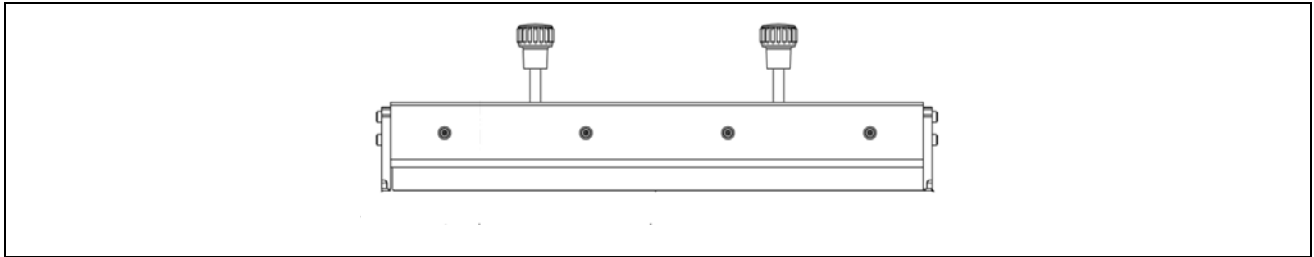


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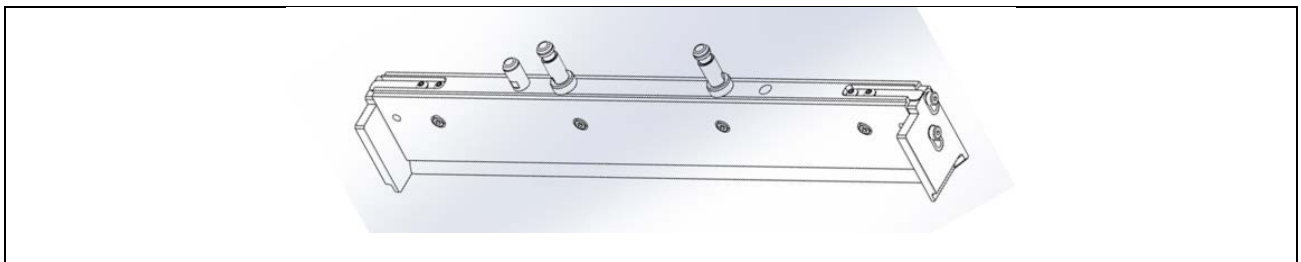
1019813-xxx: The blade holders are set to a 55-degree angle. Due to the 55-degree angle, these blades are for special applications. The blade holders have spring loaded floating side dams which keeps the paste roll within the squeegee blade area, reducing bleed out on the outside of the blades. Utilizes the knob-screw post to mount to the print head. Can be used on Edison printers as well as the Momentum II printers utilizing the Quick Release feature by changing the mounting hardware to locking pins. The blade holders have spring loaded floating side dams which keeps the paste roll with in the squeegee blade area, reducing bleed out on the outside of the blades.

Recommended use: To achieve slightly larger aperture fill (increase volume) for larger devices.



1024142-xxx: The blade holders are set to a 45-degree angle. Due to the 45-degree angle, these blades are for special applications. Can be used on Edison printers as well as the Momentum II printers utilizing the Quick Release feature. The blade holders have spring loaded floating side dams which keeps the paste roll with in the squeegee blade area, reducing bleed out on the outside of the blades.

Recommended use: The main requirements for Pin N Paste process is stencil & substrate design. The 45-degree assembly can assist with larger aperture fill or thick stencils and Pin N Paste process.

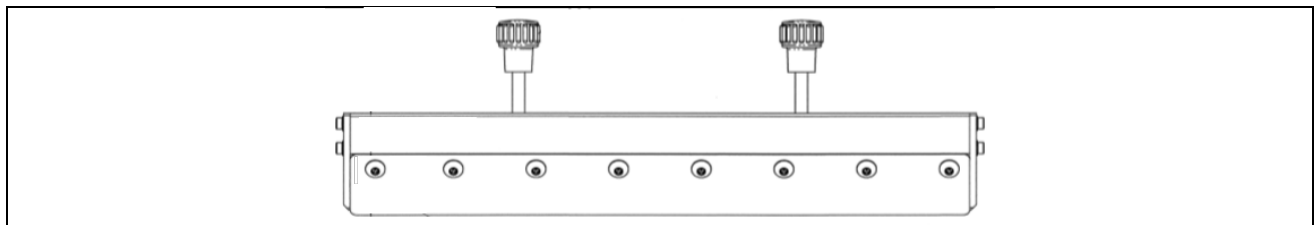


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1006638-xxx: This is the original blade assembly for the Momentum printers. These were replaced with 1018140 assembly. The blade holders do not have floating side dams. The side dams must be adjusted manually. The blades have mounting holes to attach to the squeegee holders. This assembly utilizes the knob – screw mounting.

Recommended use: Best results shown to be on larger devices (0201, 0402, 0603, etc.) with excellent fill of the apertures.



Notes:

The following blade holder assemblies are similar with each other except on how they are secured to the print head.

- 1018140 & 1024009 are the same (knob and screw mounting)
- 1023036 & 2006150 are the same (Quick Release mounting)

All holders are interchangeable by switching out either the knob-screw posts with the Quick Release location pins or visa-a-versa.

A recommended starting point for print force is 1.5 lbs. (0.68 kg) per inch of substrate length in X.

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Squeegee Assembly Number	Where Used	Blade Holder Angle / degree	Blade				Squeegee Assembly Length mm / inch																		
			Replacement	Thickness mm / inch	Deflection point tip of blade to bottom of holder (Exposed Length)	Present of Backing Plate Thickness mm/inch	150 / 5.9	165 / 6.5	200 / 7.87	220 / 8.6	250 / 9.8	300 / 11.8	350 / 13.7	360 / 14.2	400 / 15.7	420 / 16.5	430 / 16.9	450 / 17.7	460 / 18.1	500 / 19.6	520 / 20.5	550 / 21.6	608 / 23.9	610 / 24.0	
1023036-xxx	*Momentum Series	60	1019822-xxx	.203 / .008	8mm	N/A			x		x	x	x		x			x		x		x		x	
1018140-xxx			1017192-xxx	.178 / .007	15mm	.318 / .015		x		x		x		x				x		x		x			
			1017331-xxx	.305 / .012		N/A																			
1006638-xxx			1013667-xxx	.305 / .012	18mm	N/A	x			x		x		x		x	x	x	x		x		x		x
2006150-xxx	**Edison	60	1019822-xxx	.203 / .008	8mm	N/A			x		x	x	x		x			x							
	**Momentum II							x		x	x	x		x				x				x			
1024009-xxx	**Edison		1017331-xxx	.305 / .012	15mm	N/A			x		x	x	x		x			x							
1024142-xxx	Special	45	1017331-xxx	.305 / .012	15mm	N/A			x		x	x	x		x			x							
1019813-xxx		55	1019822-xxx	.203 / .008	16mm	N/A		x		x		x		x	x	x	x	x		x		x			

* Momentum Series utilizes the Knob - Screw mounting

** Edison & Momentum II utilizes the Quick Release mounting