

Introduction

The Cadence[®] OrCAD[®] and Allegro[®] Padstack Editor allows for the creation of the following pad shapes: - circle, square, oblong, rectangle, rounded rectangle, chamfered rectangle, octagon, donut and n-sided polygons, however there are times when something more complex is required, in this situation a shape needs to be created and used. This application note will show you how to create and use a shape for use as a SOT89 tab pin.

How to create an alternative shaped pad or pin

Launch PCB Editor, and create a new shape symbol: File > New... will open the New Drawing Dialogue, then change the 'Drawing Type' to Shape Symbol, enter a 'Drawing Name' and click OK.

New Drawing			X
Project Directory	: C:/library/footprints		ОК
Drawing <u>N</u> ame:	sot89_tab	Browse	Cancel
Drawing <u>T</u> ype:	Shape symbol		Help
	Mechanical symbol Format symbol Shape symbol Flash symbol		

Once in shape symbol editor draw your shape using Etch\Top to create the shape of the tab pin. The most

important part of this step is to ensure that the origin point 0,0 is at the location inside the shape where you want the pin connection point to be. You can use the command line to enter specific co-ordinates to create this shape so that 0,0 is at the correct location.

For the SOT89 tab pad enter the following at the command line after invoking the add shape command.

x -18 -28, ix 36, iy 72, ix 16 16, iy 102, ix -68, iy -102, ix 16 -16, iy -72.

An alternative method is to add this complete line at the command line and then the shape is drawn in one go: - x -18 -28;

ix 36; iy 72; ix 16 16; iy 102; ix -68; iy -102; ix 16 -16; iy -72. By using the semi-colon means you can add a sequence of commands to draw a completed shape.

This will draw the shape shown above guaranteeing that 0,0 is at the centre of the pad shown.

Save the shape file as sot89_tab.ssm in the psmpath location.

Open Pad Designer (Start > All Programs > Cadence > Release XX.X > PCB Editor Utilities > Padstack Editor)



挮 Pad Editor: (C:/Work	(ing)								_	
File View Help										cādenc
2D Top Padstack View	₽×	Start Drill Se	condary Drill	Drill Symbol	Drill Offset	Design Lavers	Mask Lavers	Options Sun	marv	
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		Mounting	Fiducial	Bond	Die Pad					
		Hole		Finger						
		Select the d	efault nad (eometry						
2D Padstack Side Views	ā×			jeometry.						
				Oblong	Rectangle	Rounded	Chamfered			
		Circle	Square			Rectangle	Rectangle	Octagon	Donut	
								-		
		n-Sided Polygon								
Side Front										

Select File > New, specify a name for the padstack ensuring the save directory is set to the padpath location. Set the Padstack usage to SMD Pin. Set the units and decimal places as required. On the Design Layers tab change the Geometry dropdown for Regular Pad on Layer BEGIN LAYER from None to Shape Symbol.

	Regular Pad o	on layer BEGIN LAY	ER				
	Geometry:	None					
		Circle	^				
		Square	_				
);	cimal places: 🛛 🔻	Oblong					
		Rectangle					
		Rounded rectangle					
		Chamfered rectangle					
		N-sided polygon					
		Octagon					
		Donut					
		Shape symbol	¥				

Select the browse button next to Shape symbol and choose the shape symbol you generated earlier. Another method if you haven't already created the shape symbol is to select the "Create New Shape Symbol" option which will launch PCB Editor and start a new shape symbol based on the name you specify. Once you have chosen the shape symbol and selected OK the shape name is applied to the Regular Pad for BEGIN LAYER.

	iped pad/pin				
	Library Shape Symbol Browser		?	×	
S	elect a pad symbol from the	e list	Selected pad sy	ymbol	
na	ame filter: 🔹		sot89_tab		
 	tumodulepin1sm 460_180_top ha_sot89 ha_sot89 koicws20-mask koicws20-mask koicws40-pad koicws40a-mask koicws40a-mask koicws40a-mask koicws40a-mask koicws40b-mask	^			
s	ot89-5_tab ot89_tab				
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	OK	Cancel		Help	
File View Help Image: Constraint of the state of th	Start Drill Seconda	ry Drill Drill Symbol Drill Offset I	Design Layers Mask Lay	ers Options Summary	cādence
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File View Help	B × Start Drill Seconda Select pad to ch: Layer N BEGIN LAY ADJACENT B × Geometry: Shape symbol: So Flash symbol: Width: 0.: Width: 0.: Offset x: 0.1	ry Drill Drill Symbol Drill Offset C ange Regular Pad ER Symbol sot89_tab LAYER -	Design Layers Mask Lay Thermal Pad None	ers Options Summary Anti Pad Keep Ou None None - None	t
File View Help	B × Start Dril Seconda Select pad to ch. BEGIN LAY ADJACENT B × B combined B × B × B × B × B × Shape symbol: Width: Q Height: Q Offset y: Q	ry Drill Drill Symbol Drill Offset C ange lame Regular Pad ER Symbol sot89_tab LAYER - layer BEGIN LAYER hape symbol 1727 4826 00000 1702	Design Layers Mask Lay	ers Options Summary Anti Pad Keep Ou None - None	t

Repeat these steps for the soldermask and pastemask definitions via the Mask Layers tab. Remember if you under or oversize the pads for these layers you will need to generate different shape.ssm file as required. Once complete save the pad in the padpath location.



There is a useful option if you need to oversize/undersize the shape for the mask layers. Open the shape symbol then hover over the shape boundary until it highlights (ensure you are in General Edit App mode first) then right click > Expand/Contract and the set the values via the Options Pane. The use File > Save As to save as a soldermask or pastemask version. How to Create an alternative shaped pad/pin

To use the pad when you create your Package Symbol (dra) file go to PCB Editor File > New > Package Symbol

New Drawing								
Project Directory:	C:/library/footprints		OK					
Drawing <u>N</u> ame:	sot89_new	Browse	Cancel					
Drawing <u>T</u> ype:	Package symbol		Help					
	Board Board (wizard) Module Package symbol Package symbol (wizard)							

To add pads use Layout > Pins. Browse to the pad name shown in the options menu

Options	д ^	×
 Connect 	🔘 Mechanical	
Padstack:	SOT89TAB_	
Copy mode:	Rectangular 🖌	
Qty X: 1 Y: 1 Rotation:	Spacing Order 50.000 Right 50.000 Down 0.000	Browse to the pad
Pin #: Text block: Offset X:	2 Inc: 1 1 • -50.000 Y: 0.000	

Add the newly created pad as you would normally.



Creating padstacks for through hole pins using shapes

The same principle can be used for creating padstacks for through hole pins. In this case the Shape is assigned to all of the padstack layers, Begin Layer, Default Inner and End Layer. If the Soldermask and Pastemask layers are going to be the same, the same shape can also be assigned to them. If different shapes are required to define Soldermask and Pastemask, these can be designed as shape symbols in PCB Editor and then used by the Pad Designer. Use the Expand / Contract option for the shape, with Shapes enabled in the Find Filter, hover over the shape and right-click>Expand / Contract and specify the amount to Expand, or Contract, in the Options pane. Then use File > Save As to save the modified shape as a new name.



Note that, even though shape symbols in PCB Editor can only be defined on the Etch / Top and Etch Bottom layers, the Pad Designer and the Package Symbol Editor in PCB Editor will correctly process the shape to the required board design layer.

🚀 Pad Editor: rect_shape (C:/Working)								_	
File View Help									cādence
2D Top Padstack View 🗗 🗙	Start Drill	Secondary Dril	Drill Symbo	l Drill O	ffset	Design Layers	Mask Layers (Options Summar	у
	Lave	r: DEFAULT INTERN	AL						^
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	Laye	r: END LAYER							
	E E	ad Geometry	Width Heigl	nt X offset	Y offset	Shape n	ame		
	Reg	ular Shape symbo	2.3876 1.701	8 -0.7366	-0.5969	ss-pwrpak12	12-2msk1		
	The	rmal None		_					
	Ant	None							
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	Laye	r: ADJACENT LAYER	ι						
	F	ad Geometry	Width Height	X offset Y	offset				
2D Padstack Side Views 🗗 🗙	Reg	ular None							
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	Kee	p Out None							
	Mask layer p	ads							
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	SOL	DERMASK_BOTTOM	Shape symbol	2.3876 1.7	018 -0.73	366 -0.5969	ss-pwrpak1212-2msk1		
	PAS	TEMASK_TOP	Shape symbol	2.3876 1.7	018 -0.73	366 -0.5969	ss-pwrpak1212-2msk1	I	
	PAS	TEMASK_BOTTOM	None]	
	FILI	MMASK_TOP	None						~
			1				10	1	
Side Front				58	ave	Print			
Thru Pin Units: Millimeter 🔻 Decima	places: 4 🔻								

In this case, the same shape has been assigned to all layers, the shape was added to the Begin Layer and then Copied to all the other layers using CTRL+C and CTRL+V including the Soldermask and Pastemask layers on the Mask Layers tab.

Define the drill as normal on the Drill tab:

挮 Pad Editor: rect_shape (C:/Working)								-		X
File View Help									cāden	ıce
2D Top Padstack View 🗗 🗙	Start Drill	Secondary Drill	Drill Symbol	Drill Offset	Design Layers	Mask Layers	Options	Summary		
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2D Padstack Side Views 🗗 🗙	Hole platir	g								
	Hole/slot pla	ting:		Plate	d 🕶					
	Define the drill rows and columns									
	Number of	drill rows:								
	Number of	drill columns:			1					
	Clearance b	Clearance between columns: 0.0000								
	Clearance b	etween rows:			0.0000					
	Drills are	staggered								
Side Front										
Thru Pin Units: Millimeter 🔻 Decimal	places: 4 🔻									d

Don't forget to define a Drill Symbol on the Drill Symbol tab, or accept the warning.

Save the padstack definition to a "padpath" location so that PCB Editor can find it. Then File > New, Package Symbol and design a symbol using the new padstack.

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