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Understanding the Centroid File

What is a Centroid file and why is it important to Screaming Circuits?

Screaming Circuits® uses automated equipment to place the surface mount components on your pcbs. One of the tools we use to rapidly program these machines is the Centroid file (aka Insertion, Pick-and-place or XY file). Some CAD packages will automatically generate this file and some will not. Sometimes you may need to modify the file. We can make minor changes to the file or create it for you for a small fee.

The Centroid file describes the position and orientation of all of the surface mount components on the pc board. It includes: the reference designator, X and Y position, rotation and the Side of Board (Top or Bottom). Only SMT parts should be listed in the Centroid file

The basic format for the Centroid file is a comma delimited (.csv) file with data in the following order: "RefDes", "Layer", "LocationX", "LocationY", "Rotation"

Example Centroid file:

RefDes	,	Layer	,	LocationX	,	LocationY	,	Rotation
C1	,	Top	,	0.5750	,	0.2055	,	0
D1	,	Bottom	,	1.5500	,	1.8255	,	270
LED1	,	Top	,	0.1902	,	2.0900	,	0
R1	,	Top	,	0.3650	,	1.9750	,	90
R2	,	Top	,	0.4755	,	1.1352	,	180
U1	,	Top	,	0.6352	,	0.4451	,	270

RefDes

“RefDes” is the reference designator that matches your BOM and PCB markatation.

Layer

“Layer” is either the word “Top” or “Bottom”. This is not necessarily the CAD layer designator; Just “top” for a part located on the top of the board and “Bottom” for parts on the bottom side of the board. Top is often referred to as the “component side and “Bottom” the “solder side” by assemblers and pcb fab houses.

Location:

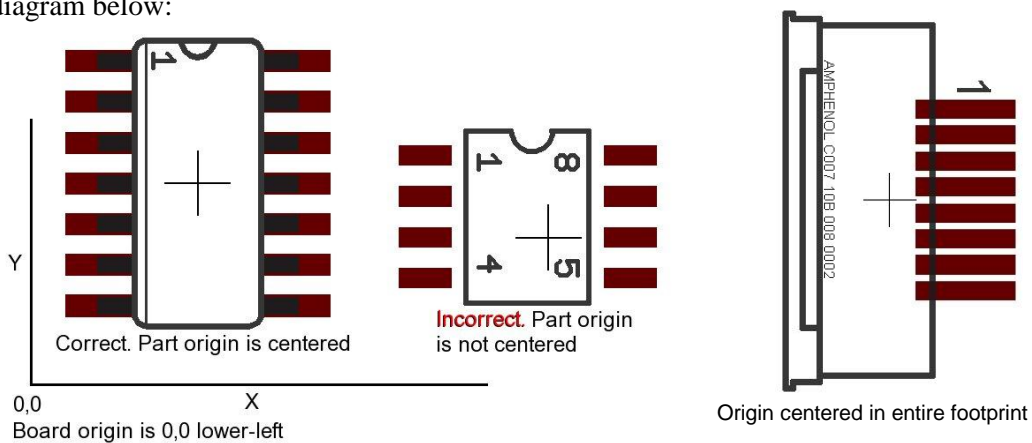
The “LocationX” and “LocationY” values describe the part’s offset from the board origin. The location values require that the part origin be centered in the part. The board XY origin of 0,0 is in the lower left corner of the board. The 0,0 origin for the bottom of the board is in the lower left corner, looking at the top of the board, though the board. Preferred units are in inches (0.0000”).

Rotation:

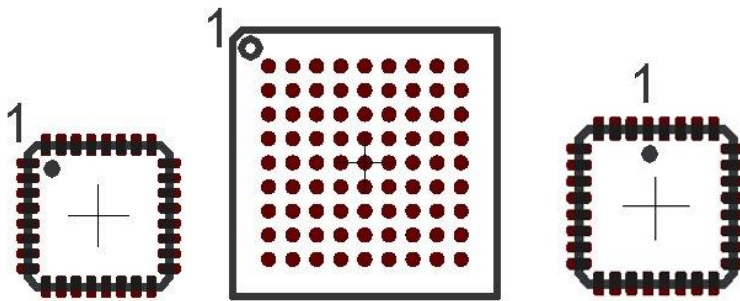
Rotation goes counter-clockwise for all parts on top and clock-wise for parts on the bottom. In both cases, this is from the perspective of looking at the top of the board. For bottom side parts, it is looking through the board, still from the perspective of looking at the top of the board.

Package specific details:

Make sure your part libraries correctly place the part origin in the center, as illustrated in the diagram below:

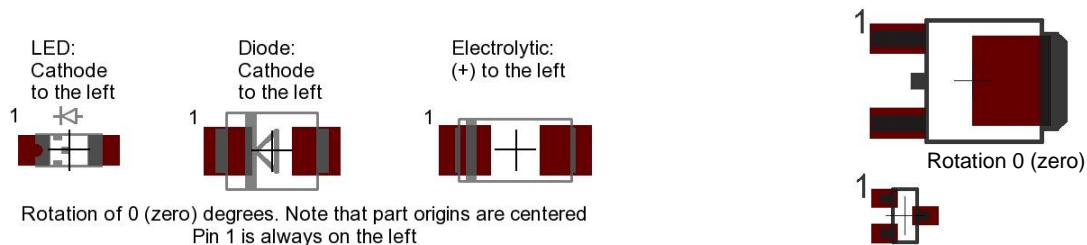


Dual inline chips have pin one on the upper left, as illustrated, when at a rotation of 0 (zero) degrees. The board origin is in the lower left. The part origin for odd shaped parts is centered in the entire part footprint including the leads, not just the package.



Quad-packs and BGAs have pin one at the upper left with a rotation of zero. Some PLCC and leadless chip carriers have pin one in the center of one side. In such a case, pin one would be centered on the upper side when set at zero degrees rotation.

Two pin and single in-line components are oriented at 0 (zero) rotation with pin one to the left.

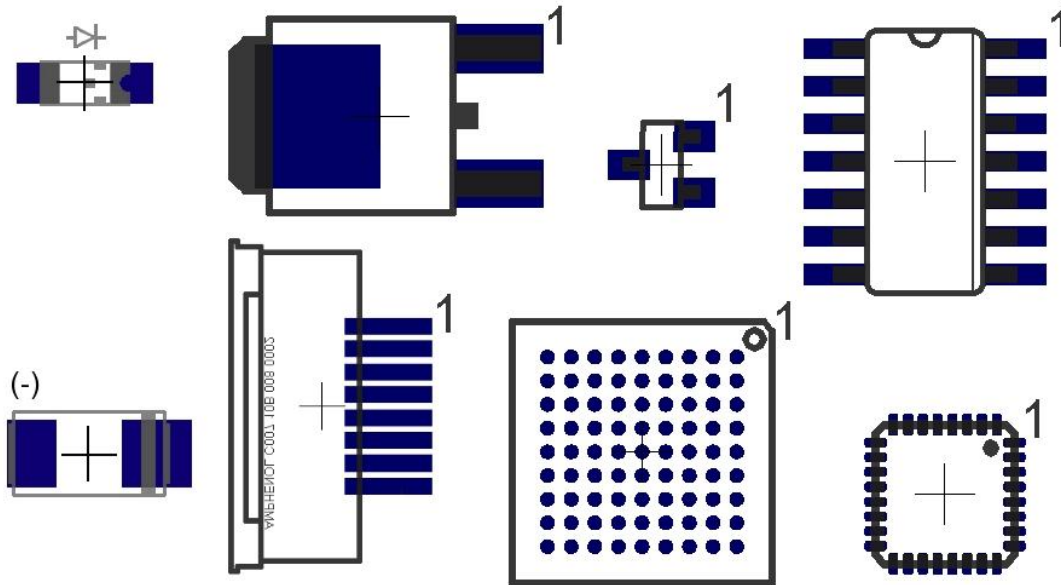


LEDs and diodes have the cathode on the left and the anode on the right. Polarized capacitors are horizontal with (+) on the left and (-) on the right. Non-polarized two-pin passives are oriented horizontally when at a rotation of 0.

Three-pin and odd shaped parts have pin one in the upper left like dual inline packages.

Bottom side of board

When components are on the bottom side of the board, the reference point is still 0,0 on the lower left of the board based on looking through the board, at the top of the board. Pin one of the part, with a rotation of 0 (zero) degrees is mirrored horizontally from parts on top of the board.



Rotation 0 (zero) degrees, bottom of board

Rotation:

Rotation goes counter-clockwise for all parts on the top and clockwise for parts on the bottom. This is from the perspective of looking down at the top (component side) of the board.

