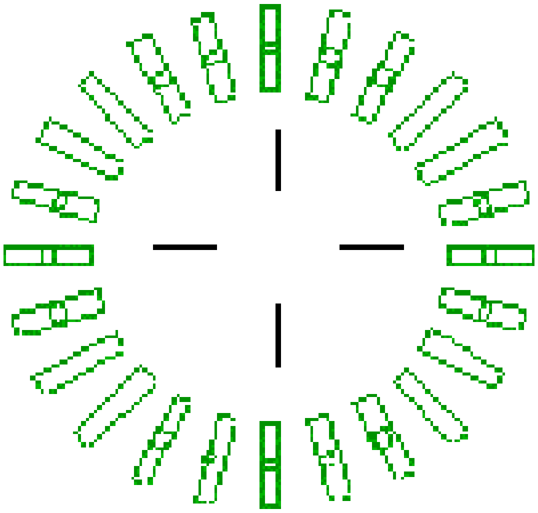
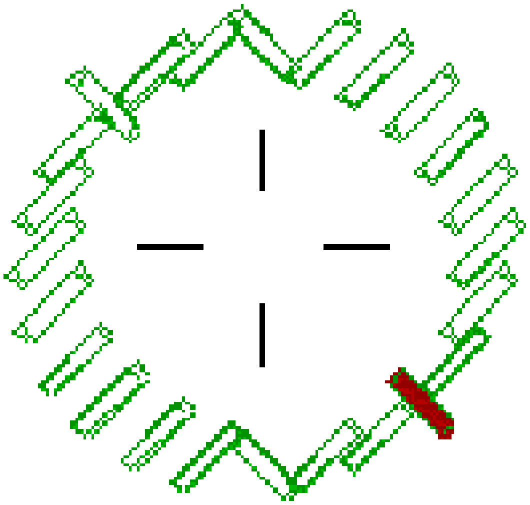
Agilent Technologies

Starburst Component Inspection: The Preferred Workaround

There is a new component type that is available. It is called a "Starburst" component. It is a round Gullwing device that has individual pins rotated and evenly spaced around the circumference. Each individual pin is rotated some small amount from the pins on either side of it. In the case of the 24 pin Starburst component used in this example, each pin is rotated 15 degrees more than the previous. It looks like the following:



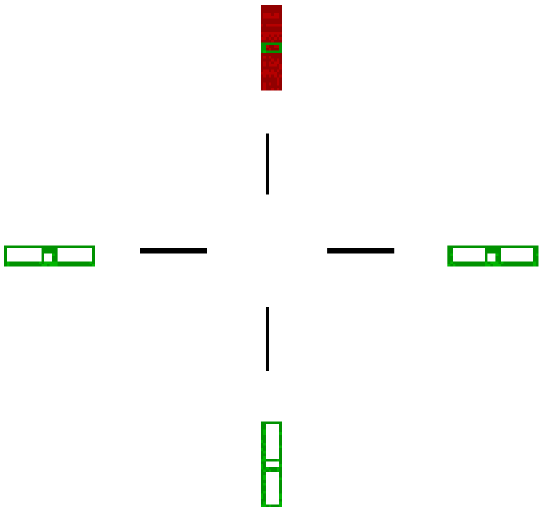
Unfortunately, the pin orientation does not survive the CAD conversion into the NDF structure. The NDF files can not handle non-orthogonal pins. The component is barely recognizable as a round component when we view it in DRAWCAD. It might look something like this real example:



Your goal is to orient the pins correctly so the 5DX can inspect them. There is not an automatic way to do this. Fortunately, there is a manual way. It is not as elegant as we would like, but it is a good workaround.

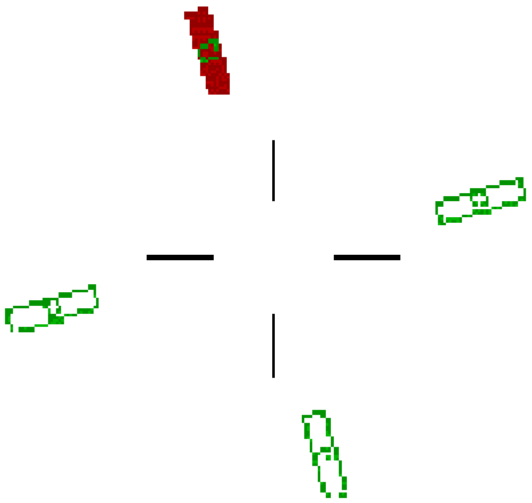
The fundamental problem is that we can not rotate individual ***pins*** by 15 degrees. We can, however, rotate ***components*** by 15 degrees. Therefore, the problem becomes "how do we create a component where the pins remain at the orthogonal directions in the PACKAGE file while we rotate the whole component in the BOARD file?"

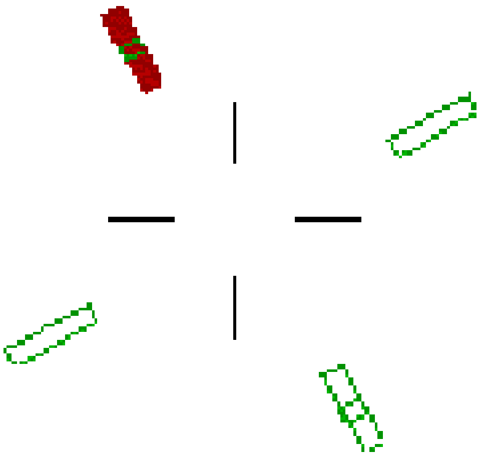
The only way to do this at the present time is to break this 24 pin component into six separate 4 pin components. The individual package pattern will look like this:



We can now create six components that use this same LAND and PACKAGE pattern.

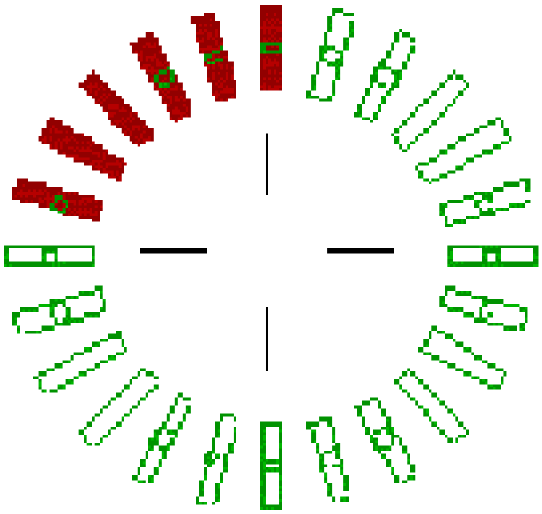
We can rotate each one 15 degrees more than the last one in the BOARD ndf. The next two devices look like this:





Notice that the pins are rotated 15 degrees from the previous drawing.

The other parts of the component are similarly rotated. If we use the same center for all of these devices, all six of our four pin components will line up correctly. It will appear that we have a twenty-four pin device with each pin rotated 15 degrees. It will look like our first drawing, except it has six pin ones:



The problem with this method is that there are now six pin 1’s, six pin 2’s, etc. Also, there are now six components instead of just one. This is the trade off. You can inspect the device, but you have to do it as six devices. It is better than not being able to inspect it at all.

Note: There is a way to make six different LAND and PACKAGE entries so that you will have only one of each pin number, but you will get WARNING messages that there is no pin 1 when you compile. This is disturbing to some people, and is a little more difficult to accomplish, so that method is left as an exercise for the user. The technique is similar to the one described here, except that you must create six different LAND and PACKAGE patterns, keeping the pin numbers in the desired position for each pattern. It is a tedious and error prone process. Therefore, it is not the preferred method.

The mechanics of the preferred method are as follows:

Step 1: Create a new LAND pattern.

In this case, we know the dimensions and offsets of the pads. We look at the original twenty-four pin device to obtain them. Use CREATE NEW SM LAND PATTERN to create the new four pin device. Use a new land/package name, so you do not overwrite your initial CAD data.

#FOOTPRINT	PIN	X-PAD	Y-PAD	PAD	DX	DY
@STAR	1	0.0000	210.0000	R	16.0000	85.0000
@STAR	2	-210.0000	0.0000	R	85.0000	16.0000
@STAR	3	0.0000	-210.0000	R	16.0000	85.0000
@STAR	4	210.0000	0.0000	R	85.0000	16.0000

Step 2: Generate the PACKAGE data with GENERATE PACKAGE DATA under the SM LAND menu. Leave the pin offset at 0.

Notice the ROT (rotation) at the end of each line. You have to match the orthogonal rotation to the actual pin orientation. Pin 1, in this example, is in the 90 degree position. This is known as “forcing the orientation.” You have to do this, or this whole procedure will not work. You will get errors when you Compile if you do not.

FOOTPRINT	PITCH	PACKAGE	ALGORITHM	PIN	X-PAD	Y-PAD	PAD	DX	DY	ROT
@STAR	50.0000	PLASTIC	GULLWING	1	0.0000	210.0000	R	15.0000	10.0000	90
@STAR	50.0000	PLASTIC	GULLWING	2	-210.0000	0.0000	R	10.0000	15.0000	180
@STAR	50.0000	PLASTIC	GULLWING	3	0.0000	-210.0000	R	15.0000	10.0000	270
@STAR	50.0000	PLASTIC	GULLWING	4	210.0000	0.0000	R	10.0000	15.0000	0

Note: In some rare cases, you might have to generate the PACKAGE twice before the correct pin placement is achieved. There is an intermittent bug in some versions of CADLINK. Draw the package before you save it to make sure it is correct.

Step3: Create the components in the COMPONENT ndf.

```
 #@STAR     TRUE    STAR07    SM       0
@STAR_1     TRUE     STAR     SM       0
@STAR_2     TRUE     STAR     SM       0
@STAR_3     TRUE     STAR     SM       0
@STAR_4     TRUE     STAR     SM       0
@STAR_5     TRUE     STAR     SM       0
@STAR_6     TRUE     STAR     SM       0
```

The first line is the original line. It is now commented out. There are six new lines that all use the same PACKAGE pattern.

Step4: Create the land structure in the BOARD ndf.

```
 #@STAR    1866.000    2635.000    225    STAR07
@STAR_1    1866.000    2635.000      0     STAR
@STAR_2    1866.000    2635.000    015     STAR
@STAR_3    1866.000    2635.000    030     STAR
@STAR_4    1866.000    2635.000    045     STAR
@STAR_5    1866.000    2635.000    060     STAR
@STAR_6    1866.000    2635.000    075     STAR
```

The first line is the original line. It is now commented out. There are six new lines that all use the same LAND pattern and the same X/Y locations. The thing to notice here is the rotations. Each new line is rotated 15 degrees more than the previous one. This is how the pin rotations for the entire Starburst part are generated.

Step5: Compile. You are done with this component.