



*Allgood Technology*  
Electronic Assembly Services

## **A Guide to Fiducial Marks for PCB assembly**

Fiducial Marks are precision targets built into a PCB surface which are used by a vision-equipped pick and place machine to fine tune it's placement accuracy. Because they are formed in the outermost copper layer, their position relative to the other component locations remains fixed from board to board – unlike a silkscreen printed mark, which varies from board to board.

### **Do I need Fiducial Marks?**

Strictly speaking only if the board is to be machine placed. But, whilst we hand build many prototypes, we do increasingly machine place parts even on one off's and then we do need them.

We can get by using board features such as vias for fiducials but they are not as good.

So YES please include them at the PCB layout stage as a matter of course – or ask the PCB plant to add them for you.

### **Do I need Fiducial Marks on both sides?**

If the board has SMT on both sides - YES

### **How many do I need, where do they go - and what shape is best?**

Two minimum, three is optimum. Best located as far apart as possible near the corners.

Almost any shape can be recognised by our MYDATA software but the shape we prefer is a 1 or 2mm diameter flat, circular, undrilled pad, in a resist aperture of about 3-4mm diameter minimum and clear of any nearby tracks or features within about 5mm – this is to help the camera distinguish the mark and not get confused by other features it can see in its field of view. Tinned pads are ok if you have to use them but not ideal due to variable reflectivity.

### **Do I need local fiducials on large IC's etc?**

Always a good idea to increase accuracy of placement of large devices. Place two fiducials at opposite corners. On components with a central clear area under the package (e.g. QFP and some partially gridded BGA layouts) a single mark at the exact centre of the package can be used instead.

### **Can you use other features – existing through holes, spare pads etc as Fiducials?**

Yes we can but results will be poorer – in particular drilled vias and through holes are very confusing for the camera as the hole is always off centre. Far better to incorporate a proper pad.

### **My PCB's are panelled – do I need fiducials on the panel frame as well?**

NO – as long as each circuit has fiducials in the same place on every circuit.

### **Can the PCB plant add them for me?**

Yes they can – just advise shape and position required – it is quite simple for them to add them to the artwork.

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