



Test Fixture Technologies

Precision Test and Automation Solutions

TFT Guidelines for PCB design with a view to improving test efficiency and reliability:

Taking note of the following while designing a PCB will allow it to be more reliably and more cost effectively tested:

1. Tooling Holes

- Include at least two tooling holes as far apart as possible (eg. Bottom-left and top-right corners).
- Tooling holes should ideally be 3 or 4mm in diameter.
- Tooling holes must not be plated.

2. Test Pads

- Try to provide test points all on one side of the PCB if possible, on a side without surface-mount components.
- Avoid placing test points too close together preferably not less than 2.54mm centre to centre.
- Avoid testing on long component leads preferably not longer than 2.5mm.
- Fine pitch component leads should rather be picked up via test pads.
- Avoid specifying test points on SMT devices as this provides a very small probe contact area and can cause damage to both the test probes and the device.
- Provide reasonably sized test pads at least 1.5mm diameter is optimal.
- Avoid probing through-hole-plated holes with a diameter >1.4mm.
- Avoid probing on vias.
- Try to distribute test points evenly over the PCB as high probe densities can cause the PCB to warp during testing.
- If this is not possible then try to leave adequate open areas above areas of high probe density to allow effective support of the PCB.
- Test pad centres should ideally not be closer than 1.5mm from the edge of a component.
- Test pads should not be closer than 2.5mm from the edge of the PCB.

3. Minimum Test Point Spacing

While a center-to-center spacing of 2.54mm is ideal, closer-spaced test points can be accommodated by using specialized test probes as follows: (More details on the specification of test probes can be found under the "Probe Selection" heading).

Probe Combination Minimum Center-to-center spacing.

100 mil 100 mil:	2.54 mm
100 mil 75 mil:	2.00 mm
100 mil 50 mil:	1.80 mm
75 mil 75 mil:	1.91 mm
75 mil 50 mil:	1.60 mm
50 mil 50 mil:	1.27 mm

4. How PCB design affects the effectiveness of the Test Fixture

Inadequate / lack of tooling holes mean that the PCB must be positioned by its perimeter which reduces precision. It may also be difficult to insert the PCB if the scoring / routing of the perimeter is inaccurate. In extreme cases, probes could be damaged if they skid off targets because the PCB is loose. Insufficient open space on the clamping side may necessitate pushing on surface-mount components which is not ideal as it could cause damage to the components and may also mask defects such as dry-joints which could be temporarily made by the applied pressure.

5. Test Probe Selection

TFT will select and fit appropriate test probes according to the type of test point specified and the specific requirements of each contact point.

We include a brief description of the most commonly supplied probes and their application in order to assist with the ordering of spare parts and to clarify our probe selection criteria.

The principle variables in probe design are:

- Size
- Material
- Spring Force
- Head-style

The most commonly used probes have a receptacle diameter of 1.7mm and are appropriate for spacing of 2.54mm and greater.

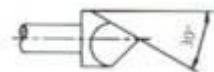
We typically fit gold-plated steel probes due to their excellent electrical contact properties and long life.

To ensure optimal contact, we typically specify the highest available spring force (3.0N for the 1.7mm probes) as it allows the probes to tolerate some dirt and flux on the PCB.

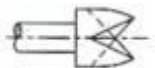
The head-style selection depends on the test point, the most common of which are as follows:



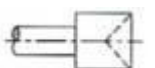
"Form I35", a sharp lance used for probing on open and closed through-hole- plating and on solder points and test pads. It can penetrate flux and dirt.



"Form T", a pyramid used for through-hole-plating contacts.



"Form L", a self-cleaning crown used for component leads, solder points and test pads.



" Form A", a 90 ° taper bore used for plug pins and wire-wrap pins.

Note that this is just a very small selection of the available probes.

Please contact us if you require more detailed information or have a specific requirement.