

Design For Test (DFT) Guidelines for Takaya Fixtureless Tester APT-94XX series

Introduction

This document is to be used as an advisory guide for the P.C.B design and test requirements for assembled circuit boards. This document is to be used as a general guide only, the manufacturer must determine their own criteria when designing the P.C.B and hence this guide is not a guarantee that all problems will be solved, these guides may reduce the typical problems encountered when probing circuits using an APT-94XX series tester. These rules must be interpreted according to the process and test strategy each individual customer adopts.

P.C.B design guide

When developing a test program for Flying Probe Test (FPT), the ultimate goal of the Test Engineer is to develop a test program that will test 100 percent of the components and nets on the PCB. The ability to reach this goal is directly related to probing access achievable on any given PCB design. Providing 100 percent access to all nets on the PCB will ensure maximum test coverage. The physical locations of where the probes will contact the PCB is dependent upon the PCB design. The process of developing a test program for FTP utilizes a Test Program Generator (TPG) that will import native CAD and BOM files and through a set of rules will develop a test program with maximum achievable test coverage.

- 1) It is always preferable to probe test pads or via's rather than component pads, however certain P.C.B designs with R.F.I. problems do not allow test pads. It is never desirable to probe directly on the component pins, therefore in cases when component pads will be probed, there must be enough open pad to be able to place a probe on the pad. The pad should extend at least 10 mils beyond the end of the component pin.
- 2) For any "J" lead of gull-wing surface mount components the test pads should be lengthened so as to allow a probe pin to touch the pad without touching the component lead.

- 3) If design permits, test pad size should be a minimum of 20 mils. When PCB real estate does not allow for pads this size, smaller pads can be used. In theory the minimum size of test pads or via's is 0.2mm (8mil). Preferably that pad size should be kept to a minimum of 10mils.
- 4) When small via's are to be probed, it is preferable to keep via drill diameters to a minimum. By doing so via's can be probed directly into the center of the drill hole. It is preferable to keep maximum drill diameters of these via's to 8mils. For these via's the copper on the annular ring should have a minimum width of 5 mils.
- 5) Via's that have drill holes larger than 8mils should provide enough copper on the annular ring to that a probe can contact the annular ring. The width of the annular ring should be a minimum of 10mils.
- 6) Any via to be used as a test pad should have minimum soldermask clearance of 5mils.
- 7) It is desirable to have adequate access to "Ground" nets of the PCB. Ground nets should be accessible on both top and bottom side of board with generous amount of copper available. The ring of a mounting hole makes for good FPT access to the Ground net. If possible provide access to the Ground net at the four corners of the PCB.
- 8) There should be a test access point available for all nets on the PCB. It is preferable to have all test pads placed on the same side of the PCB. If 100 percent access is achievable on a single side of the board then the entire PCB can be tested by a single test program. If 100 percent access is not achievable from a single side then two test programs will be required to achieve maximum test coverage. In these cases it is desirable to have test pad available on each side of the board for any net that is routed on that side of the board.
- 9) If possible, keep tall components all on one side of the P.C.B, this will allow better optimization of the program (speed etc.).
- 10) On the probing side of the PCB, there is a component height limitation of 40mm (1.57"). If it is required to probe the component side then those components must be installed after FPT. Components taller than 40mm can be located on the non-probing side, in

this case the tallest component on the no-probing side is limited to 95mm (3.74").

- 11) Ensure a 3mm minimum clearance along two opposite edges of the PCB This will allow the PCB to be held correctly between the rails of the system. For odd shaped PCB's a carrier or optional mounting blocks can be used with the 94XX systems. If any electrical or mechanical components must be mounted along these edges, ensure they are installed after FP Test.
- 12) P.C.B warp-age should not be greater than 5mm from end to end.
- 13) Test for Design considerations should be taken into account, for instance if a 10pF capacitor is in parallel with a 10uF, it would be preferable to test the 10pF at side one assembly and fit the 10uF at side two assembly and test again. If both components are fitted at the same time it is possibly to only measure the 10uF. Checking for the presents of a capacitor of value "X" at the 10pF position would require the vision option.
- 14) Batteries should be removed from the P.C.B or be designed with a jumper that can be removed to allow the battery voltage to be isolated from the remainder of the circuitry during Flying Probe testing.
- 15) Ensure that there is a minimum of two fiducial marks (3 preferred) diagonally opposite each other in the P.C.B corners (as far apart as reasonably possibly), approx. 3mm in size. If there are several different but similar sized P.C.B's, layout the fiducial marks in different positions to avoid the chance of running the wrong program.
- 16) Board fiducials should be located on both Top and Bottom side of PCB's. The placement of fiducials on both sides of board should be stacked at the same X/Y position.
- 17) Fiducial marks should be either a "circle" or a "square" for automatic recognition approx. 3mm in size. For manual alignment, the same as above or "cross" or "small circles with a cross" usually give the best results. For manual alignment the fiducial mark should be as small as possible and clearly defined so as to minimize the amount of error that can be interrupted by an operator.
- 18) The maximum P.C.B size is 540mm X 460mm (21" X 18").

19) Maximum PCB thickness 5mm (0.2").

21) Barcode should be placed on the probing side of board.