Surface mount technology

With PCB design engineers increasingly pursuing demands for smaller, lighter and more economical designs, surface-mount technology has revolutionized the industry. Utilizing components for several operations increases functionality and reduces costs by allowing smaller components to be placed automatically, at high speed.

The advance in design of FPGAs, memory chips and processor modules, while being expensive, has reduced the component count for many given circuit designs and has revolutionized the volume and ease with which PCBs can be populated.

With such a high density and volume of components mounted on any given PCB, real estate is at a premium. However, more and more production and test engineers appreciate the inclusion of individual test-points, placed strategically, to allow for circuit testing, analysis and fault finding.

Oxley has long been recognized as an innovative manufacturer of precision connector components and the Surface-Mount Oxley (SMOX) Test-Point is the latest addition to a wide range of interconnection products. Available taped and reeled and with a compatible mating socket, the SMOX connection system lends itself to a wide range of production and research and development applications.

Applications

The SMOX connection system is the only surface-mount test-point available on the market with a specially designed socket for easy low contact resistance and gentle detachment. The applications and potential uses are limitless.

Requiring a minimum pad size of only two millimeters, and being a single-pole device, the SMOX can be placed accurately by any pick and place machine in even the most congested designs. The socket is normally used with the recommended PTFE insulated sleeve (diameter 3.2 mm) but for those very close pitch designs this can be replaced with alternative insulation techniques.

Detecting and localizing board faults is an obvious application where the ability to quickly and individually identify faulty components, cracked solder joints or short-circuits can save time compared with testing via an edge-mounted connector or under a microscope.

On thick multi-layer boards, where complex track designs can lead to very expensive PCBs, the benefits of quickly and effectively identifying and repairing a faulty populated PCB can be easily recognized. The ability to monitor waveform characteristics and determine the performance of a circuit with variable components is vital and not just in a test laboratory. Where exact frequency output is required, a certain waveform is needed or the ability to manually set the characteristics of each manufactured production board is desirable, the inclusion of SMOX test-points fulfills that requirement.

Frequently Asked Questions

Which pick and place machines can place the SMOX?
Any machine manufactured by the major suppliers can be used. Examples include Fuji (642E, 652C), Mydata (TP9, TP11) Quad (Q5X) and Panasonic.

What speed can the SMOX be placed at?
Trials show that with the latest multi-head/nozzle machines (i.e. Fuji 642E),
the SMOX can be placed at up to 40,000 components per hour.

How can I pick up the SMOX?

There is no consensus on this subject. Some customers prefer to pick up on the ball, to increase the speed of pick-up, while others prefer the security of the flat shoulder.

What size nozzle do I use?

It is recommended that a nozzle with an internal diameter of 0.9mm ± 0.05 be used when picking up on the ball and a nozzle with a minimum internal diameter of 1.1mm when picking up on the shoulder.

What guarantees are there that the component is picked up correctly?

A custom designed pocket is used to ensure the SMOX stays in the vertical position. The machine's camera vision system checks for pick-up accuracy.

What size and shape of solder pads are recommended?

Any square or round pad with a minimum width (or diameter) of 2mm.

Does the SMOX on tape and reel allow for successful high volume placing?

Yes. Trials at speeds of up to 0.0945 seconds each (40,000 components per hour) have shown successful placement rates of up to 99.95%.

Does the design of the SMOX allow for successful reflow soldering?

Due to the chamfered base, the solder wicks up the chamfer allowing a good fillet to be formed.

How does the socket help the SMOX connection system?

The innovative design of the socket spill enables the socket to detach with minimal force if the cable is caught accidentally. Thus, there is no risk of damage to the PCB.

Features

- Available loose or taped and reeled - SMOX/060/B1/LP available taped and reeled on reels of 3,000 off components for placement in small, medium and large volumes
- Gold plated SMOX test-point for low contact resistance (less than 2mW through 8 points of contact) and durability
- SMOX connector system to reduce the risk of accidental damage to the PCB. Can be used on any pick and place machine using vacuum nozzles
- Square or round solder pads can be used, with a minimum pad size of 2mm diameter
- Unique retention mechanism enhances reliability through low stress connections
- Chamfer design allows excellent solder fillets to be formed
- Award winning kinematic design allows rapid connection/disconnection
- Proven application through Snaplox range of test points
- Hand or automatic assembly

Packaging

The SMOX/060/B1/LP.R3K test-point is available on tape and reel to enable placement on to PCBs by a variety of pick and place machines. The plastic reels are an industry standard 7” diameter and the .R3K extension denotes 3,000 components in a custom designed carrier tape.

The solid flat bottomed pocket ensures the component is in the correct vertical position when the heat sealing backing tape is peeled off. 100% visual inspection by camera during population of the tape ensures no components are heat-sealed in the wrong position or any empty pockets sealed by mistake.

Consideration has been given to taping and reeling both the SMOX/060/B1 and SMOX/060/TP and as applications and products utilising surface-mount technology grows, these are likely to be the next products available taped and reeled. For customers requiring the SMOX socket to be supplied assembled, a standard product is available on 15” of cable with other lengths possible where demand exists.

Socket assembly

The LS/B1/093 SMOX socket comes in two parts: a silver plated copper alloy spill, which has a solder
bucket cable termination, and a PTFE bush, available as a standard white with colour options of red and black.

To assemble, the PTFE sleeve is slid up the cable and the prepared cable end is soldered into the solder bucket. The PTFE sleeve slides down over the spill and is locked in place. Options for very dense designs include the use of heat-shrink instead of the PTFE sleeve to reduce the overall diameter.