ACCU-SEMBLY
ELECTRONIC ASSEMBLY SOLUTIONS
ISO 9001 & AS9100 CERTIFIED
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PCB PANELIZATION FOR EFFICIENT ASSEMBLY

Panelization is required when one or more of the following conditions exist:

- The PCB shape does not have parallel edges along the 2 longest sides for conveyor transport.
- The size of the PCB does not meet the minimum requirement for the assembly equipment.
- The PCB does not have sufficient clearance between components and the edge of the board.
- It will facilitate processing and handling of higher quantity assemblies.

PCB shape

PCBs must have 2 parallel sides (preferably the 2 longest sides) for process through automated assembly equipment. Breakaway rails can be used to accommodate a wide variety of odd board shapes.

PCB Size

PCB sizes within the following parameters can be accommodated for assembly using automated assembly equipment.

- Minimum PCB size: 2” x 2” (50 mm x 50 mm).
- Maximum PCB / panel size: 18” x 17.3” (460 mm x 440 mm).
- These sizes include any necessary breakaway rails.

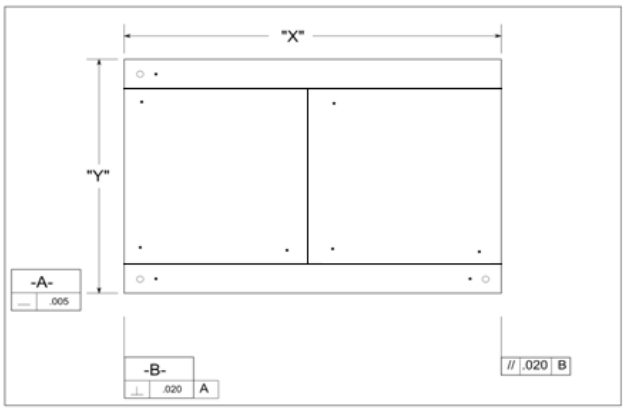
PCB Edge Clearance

A strip with a width of 0.118” (3 mm) for single side SMT and 0.197” (5 mm) on double sided SMT along the transport sides of the PCB to provide enough clearance for machine handling. If it will be a double sided SMT PCB, then 0.197” (5 mm) clearance should be maintained on both sides.

Breakaway Rails

Typically, rails are 0.4” or 0.5” (10.16 mm or 12.70 mm) wide, with tooling holes and fiducials located halfway between the PCB edge and the rail edge. Asymmetrical fiducials are preferred, such that rotating the panel 180° will not result in fiducials being in the same locations. Fiducials on both the PCBs and on the rails is preferred.

Breakaway Rail with Panelization Example



Breakaway Rail Design Specifications

- Straightness to be within 0.005” (0.127 mm)
- Parallelism with respect to datum A - 0.020” (0.5 mm)
- Parallelism with respect to datum B - 0.020” (0.5 mm)
- Perpendicularity with respect to datum A - 0.020” (0.5 mm)

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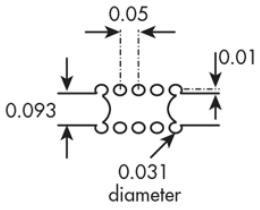
General Handling

- Panelization reduces the handling time required to process an assembly and is generally cost effective.
- Panels that are V-scored are preferred over tab routed panels.
- If tab routing must be done, rat bite holes are required along the edge of all tabs.



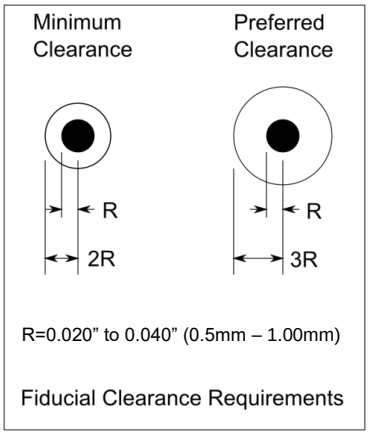
Double-side breakout

- In all cases, the panel must be sufficiently rigid to allow for machine processing.
- Panelized assembly sizes of less than 8" X 12" (200 mm x 300 mm) is preferred because larger panels flex and become difficult to support.
- Panels made with thinner material, or which require the installation of heavy components such as transformers, may need to be smaller to minimize flexing. Surface mount machines can process PCBs from 0.015" to 0.15" (0.4 mm to 4 mm) thick; 0.060" (1.5 mm) is typical. Thinner boards can also be supported with a fixture.

Fiducial Mark Design Specifications

The Surface Mount Equipment Manufacturers Association (SMEMA) has standardized design rules for fiducial marks.

These rules are supported by the IPC and adopted as standard and are consistent as to:



Fiducial Clearance Requirements

- Shape: The optimum fiducial is a solid filled circle.
- Size: The minimum diameter of the fiducial mark is 0.040" (1 mm). The maximum diameter of the mark is 0.080" (2 mm). One millimeter is preferred. Fiducial marks should not vary in size on the same PCB by more than 0.001" (0.025 mm).
- Clearance: A clear area devoid of any other circuit features, solder mask or markings shall exist around the fiducial mark. The size of the clear area shall be at a minimum, equal to the radius of the mark. The preferred clearance around the mark is equal to the mark diameter.
- Material: The fiducial mark may be bare copper, gold, bare copper protected by a clear anti-oxidant, nickel or tin plated, or solder coated (HASL). The preferred thickness of plating or solder coating is 0.0002" to 0.0004" (0.005 to 0.010 mm). Solder coating should never exceed 0.001" (0.025 mm). If solder mask is used, it should never cover the fiducial mark or the clearance area. Oxidation of a fiducial mark's surface may degrade its readability.
- Edge Clearance: The fiducial shall be located no closer to the PCB edge than the sum of 0.200" (5 mm) (SMEMA Standard Transport Clearance) and the minimum fiducial clearance required.
- Contrast: Best performance is achieved with a high contrast between the fiducial mark and the PCB base material.

Prior to manufacturing any PCB, please submit a panel drawing or Gerber file to Accu-sembly for approval.