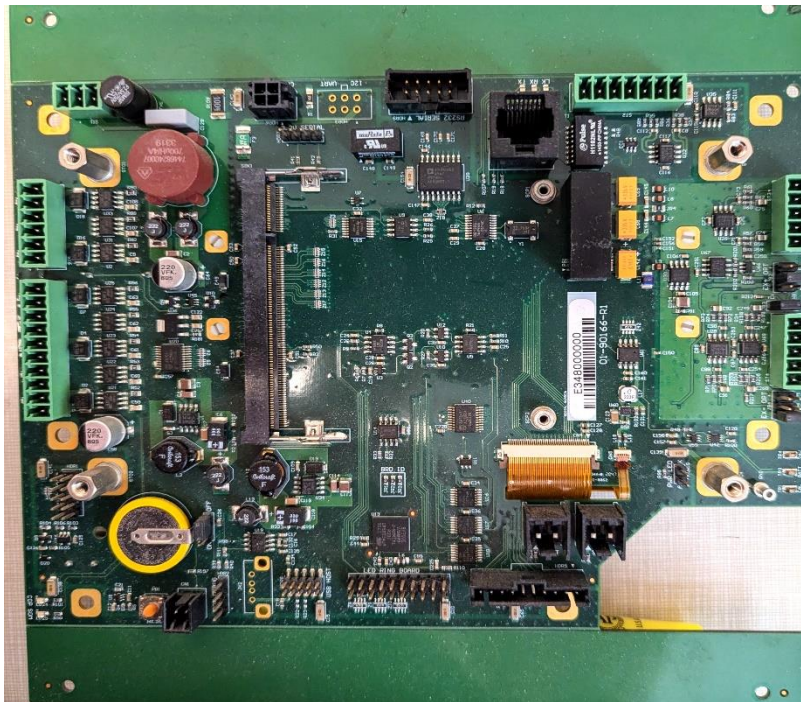


CM Board Design Guidelines

(Addition costs may incur if guidelines can't be met)

Board Design Guidelines

- Minimum length- 51 mm
- Minimum width (including rails)- 73 mm
- Maximum length- 350 mm (Board handler/magazine size restrictions)
- Maximum width (including rails)- 250 mm
- Rail width Top and Bottom Minimum- 7.0 mm
- Rail width standard- 11.0 mm
 - On designs that are of abnormal shape or contain cutouts from the PCB that could interfere with machine sensors, BOT side (or both) rail width(s) should be increased to 22.0mm. (See below)



- Rail fiducials from rail edge: >4.0 mm
- Rail fiducials from rail scoring: >2.0 mm
- Bottom side rail clearance: No bottom side rail overhang permitted
- Maximum spacing between boards on array: 3.0 mm

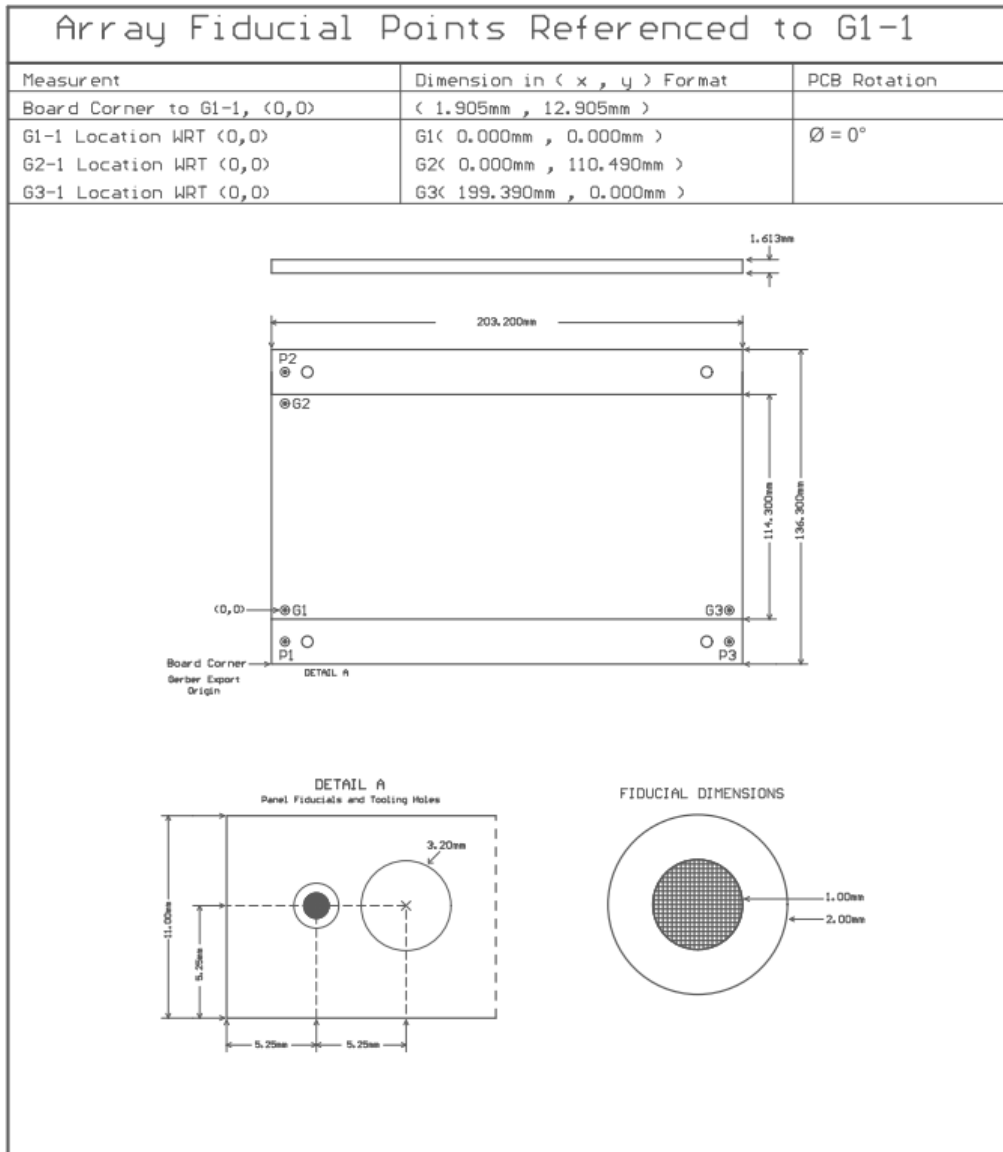
- In order to utilize the automated equipment to remove side rails, there should be no through hole parts that overhang the rail score lines.

- If the layout prohibits automated rail removal, all sensitive components should be kept at a safe distance from the rail score lines.

- See associated Fiducial Drawing below.

Note: EMAC can produce the PCB Panelization with rails if the customer doesn't wish to perform this.

Fiducial Drawing Example



- If PCB finish is HASL, the local fiducials must be uncoated. HASL is too uneven of a surface for effective part alignment by the Pick & Place (PNP).
- Origin array **MUST** have a PCB rotation of 0 degrees. Pick & Place software currently cannot derive arrays based on anything but this.

Solder Sample Board Guidelines

- If customer is providing PCB's, EMAC ideally requires two solder samples of full panels, even on high board count arrays.

SMT Part Size Limitations for Pick & Place Machines

- Minimum part size placeable: Nothing smaller than 0201 (Imperial)
- Maximum part size placeable
 - Max BGA: 55mm
 - Max connector with full pick and place capability is: 75mm
 - Connectors greater than 75mm can be machine placed by SMT, but must meet the following criteria:
 - It must have a unique pin gap for alignment & inspection purposes
 - The part must be parallel to the board rails
 - The part cannot be rotated in any manner.(If any of these parameters cannot be met, please consult EMAC)
- Maximum part height
 - For machine placement: 12mm
 - Component proximity: 0.254mm (10mil) minimum
(Smaller distances increase the risk of parts drifting in reflow)

Serial Number Location

- By default, all serial number locations should be:
 - Single Side: assigned to the side of the PCB with SMT component placement.
 - Double Sided: assigned to the TOP side of the PCB

For Part Cross Evaluation

- A manufacturing part number cross can be used if the part height is within 10% of the nominal value (Parts cannot exceed the maximum height listed previously)
- If the new cross has a different body style/shape than the original: confirm that it will not interfere with components surrounding it.
- Top side component height clearance
 - AOI (surface mount components): 30mm
- Bottom side components height clearance
 - Stencil Printer: 12.7mm
 - AOI (surface mount components): 50mm
 - Selective Solder Machine (thru-hole components)- 30mm

Clearance Area Around the Solder Joints for Selective Soldering

- For Through-Hole Designs - Best Results Utilize a 9mm Nozzle, roughly the size of a Sharpie marker. This is due to the fact that the heat needed for soldering is conveyed to the board via the nozzle. A smaller nozzle may not maintain the heat needed for constant and consistent soldering.
- Board designers should use at least 4.5mm of clearance on three sides of any pins or row of pins to allow the nozzle to get to the pins without disturbing other components. On the fourth side at least 9mm of clearance should be given to allow the nozzle to properly peel-off or pull away from the pins and move to the next set of pins without damaging or disturbing other components.
- Peel-off can be achieved by pulling down vertically, but tangent process yields better results.
- Positioning components perpendicular to pin rows (as seen in figure 1) is exceptionally helpful to manufacturing. However, placing components parallel to pin rows (as seen in figure 2) puts the component at risk of the solder nozzle touching both terminals and desoldering the component. Figure 3 shows how parallel components can accidentally be desolder and figure 4 demonstrates how perpendicular positioning keeps one terminal away from the nozzle preventing accidental desoldering.

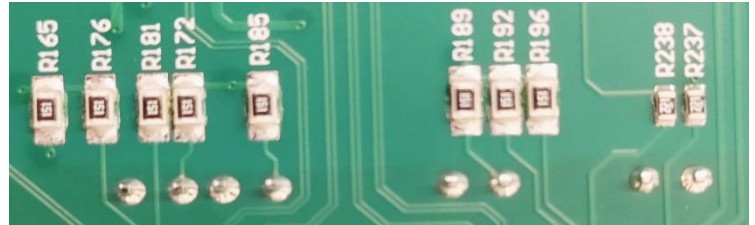


Figure 1: Components perpendicular to the row of pins.



Figure 2: Components parallel to the row of pins.



Figure 3

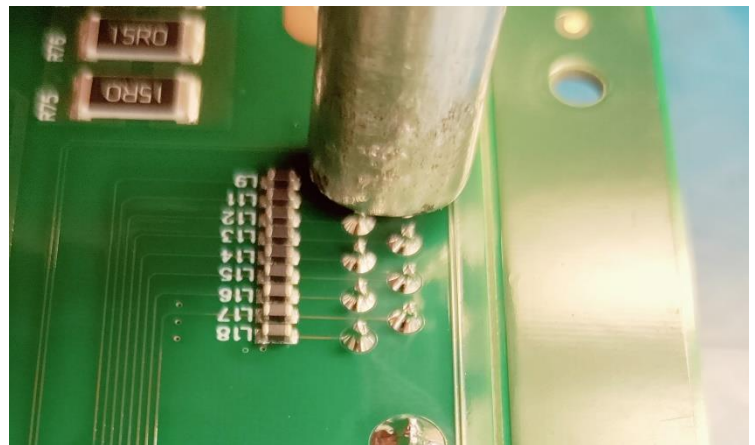


Figure 4