



Approvals:

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Department Manager / Process Owner

Revision History

Date	Change / ECO Notice	Change Description
10/07/2013	A	Original Release.
07/15/2019	B	Update to include detail about X-out markings
04/08/2021	13490	Add PCB packaging requirements. Re-written on new template.
06/09/2026	18203	Rewrote document based on current practices and newer equipment at Distron with specific requirements.

Doc. No. DWI-009-002-48

Revision

D

Proprietary and Confidential**1.0 Purpose:**

- 1.1 To define the methods utilized for fiducials on PCBs purchased by Distron and general manufacturing requirements.

2.0 Scope:

- 2.1 All printed circuit boards purchased by Distron unless otherwise noted.

3.0 Applicable Documents:

- 3.1 SMEMA Fiducial Mark Standard
3.2 IPC-1602 Standard for Printed Board Handling and Storage

4.0 Definitions:

- 4.1 Fiducial – An artwork feature created in the PCB conductive pattern that provides a measurable point for component mounting. The fiducial is used by imaging systems of assembly equipment as a point of reference. Fiducials are placed on the top and bottom copper layers. They should not be placed on the mask or silkscreen layers as they are not as precise as the copper layer.
- 4.2 Board Fiducials – Used to locate the position of all the land patterns on a PCB.
- 4.3 Panel Fiducials – Located on the rails or perimeter of a multi-up panel.

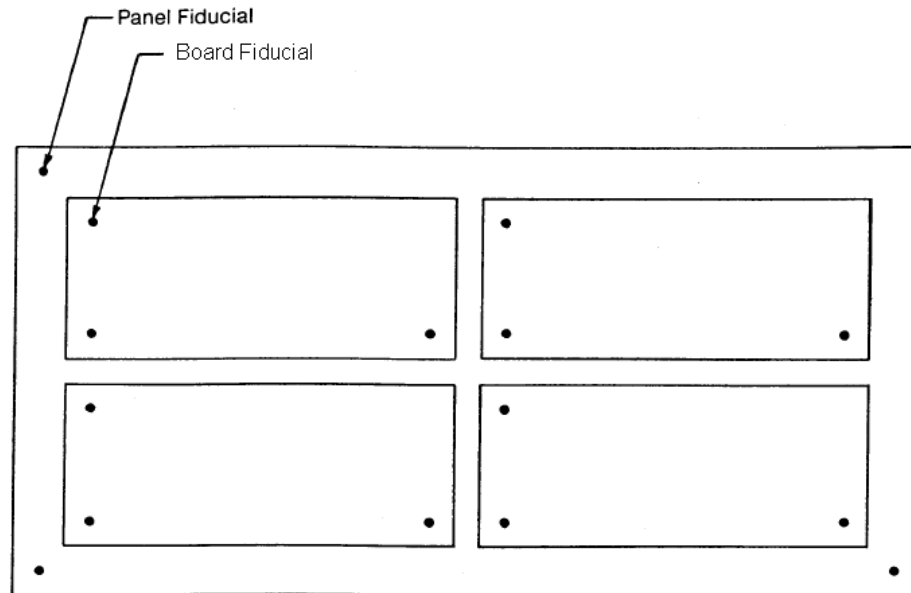
5.0 Responsibilities:

- 5.1 It is the responsibility of Purchasing, Engineering Dept and Management Representatives and / or designee to ensure the requirements within this procedure are followed.

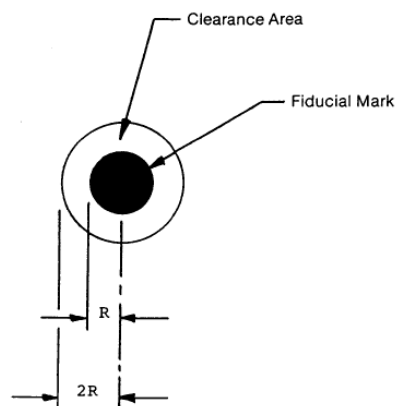
6.0 Procedure:

- 6.1 A minimum of three board fiducials, on both top and bottom of the PCB, shall be provided located in a triangular pattern as far as possible on the PCB. Fiducials located near the corners of the PCB are preferred. This section is not applicable to PCB vendors unless specifically requested.

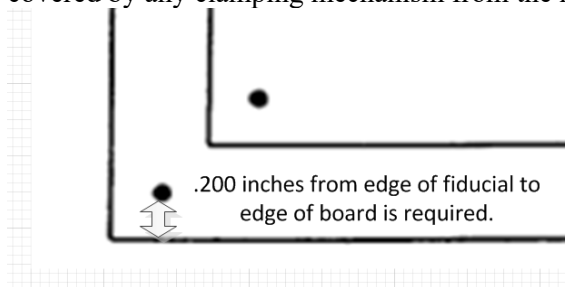
- 6.2 Three panel fiducials are required on the rails of a single-up and multi-up panels, required on both the top and bottom of the panel.



- 6.3 The shape of the fiducial shall be a solid filled circle.
- 6.4 Fiducial size can range from .026" to .050"
- 6.5 The fiducial mark tolerances should not vary by more than .001".
- 6.6 Clearance is required around each fiducial. No conductive patterns, silkscreen, soldermask, traces, pad, markings, or text is allowed in this area.
- 6.7 The size of the clearance area shall have a radius that is at least twice that of the fiducial mark and shall be concentric with the center of the fiducial mark.



- 6.8 Fiducials need to be inboard of the panel edge by at least .200" to ensure they are not covered by any clamping mechanism from the manufacturing equipment.



- 6.9 The fiducial mark should be bare or covered copper. There should be a high degree of contrast between the surface of the fiducial mark and the adjacent PCB base material.
- 6.10 For proper recognition, there must not be anything around the fiducial. This includes components that may obstruct the light or view from the fiducial recognition camera. A stop mask may be used with a keepout area so that no planes or traces are within one diameter length away from the fiducial. A solid plane can be placed under the fiducial.
- 6.11 The surface of the fiducial mark shall not be oxidized or degraded.
- 6.12 Solder resist coatings should never cover a fiducial mark or its clearance area.
- 6.13 Fiducials should be assigned reference designators in the PCB design file.
- 6.14 If PCB has a rail, an area the width of the panel rail square (same length as width) near a fiducial shall be of uniform contrast (no thieving or other copper pattern) on both top and bottom sides of the PCB. This is an area for marking at Distron.

7.0 X-Outs on Panels

- 7.1 If a panel does contain X-outs, they must be marked on both top and bottom sides with high contrast.

8.0 PCB Packaging

- 8.1 Desiccant and humidity indicator cards shall be placed in each pack at the side so it does not cause problems when stacking individual packs. The desiccant shall be certified as "Sulphur free".
- 8.2 Packs of boards shall be vacuum sealed and packed in such a way that it prevents damage during shipping, transit and handling. Capable of absorbing impacts and vibrations that would otherwise cause damage. Ensuring no bending, scratching of traces or risks of defective and non-conforming material.
- 8.3 If immersion silver plated, package with silver saver paper per IPC-1602 (Standard for Printed Board handling and Storage).

9.0 Routed Panels

- 9.1 If a panel or PCB is routed, minimum routed cutout or slot to be no less than 0.100" in width.
- 9.2 Tabs on routed panels shall have pilot holes with a typical diameter of 0.020".
- 9.3 Pilot holes to be anywhere from 3 to 7 holes per tab depending on the width of the tab.
- 9.4 Omit pilot holes from tabs when PCB thickness is less than or equal to, 0.030".

10.0 Solder Samples

- 10.1 Solder samples are non-functioning, mechanical samples.
 - 10.1.1 The sample shall meet the requirements of section 6.
 - 10.1.2 The sample should not have solder applied to the plating.
 - 10.1.3 A panel with all X-outs is acceptable for a solder sample.
- 10.2 Number of samples.
 - 10.2.1 5 panels optimal, 2 panels minimum for new part numbers or revisions that change the top or bottom layers.
 - 10.2.2 1 sample for repeat orders.
 - 10.2.3 Final quantity to be determined by Distron based on cost and complexity for each design. Contact Distron Purchasing or Engineering for quantification.

11.0 Records:

- 11.1 Keep records per the Records Control Procedure (DQP-016).

End of Document









DWI-009-002-48 PCB Fiducial and General MFG Requirements Rev D

Final Audit Report

2026-06-09

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