



IPC-9241

Guidelines for Microsection Preparation

Developed by the Microsection Subcommittee (7-12) of the Testing Committee (7-10) of IPC

Users of this publication are encouraged to participate in the development of future revisions.

Contact:

IPC

Table of Contents

1 SCOPE	1	5.3 Tool Stops	15
2 APPLICABLE DOCUMENTS	1	5.3.1 Calibration	15
2.1 IPC	1	5.3.2 Maintenance	15
3 SAMPLE REMOVAL PROCESS	1	5.3.3 Purchasing	16
3.1 Sample Location	1	5.3.4 Location of Stops On Mount Holder	16
3.1.1 Coupon Test Strip	1	5.3.5 Tool Stop Audits	16
3.1.2 Part	1	5.4 Consumables	16
3.2 Removal Method	2	5.4.1 Abrasive Paper	16
3.2.1 Punching	2	5.5 Grind Process Quality	17
3.2.2 Sawing	2	5.5.1 Flat Mounts	17
3.2.3 Abrasive Cut-Off Wheels	2	5.5.2 Scratch Removal	17
3.2.4 Routing	3	5.5.3 Cleanliness	17
3.2.5 Pre-Routing	3	5.5.4 Gaps	17
4 MOUNT PROCESS	4	6 POLISH PROCESS	17
4.1 Sample Orientation	4	6.1 Equipment	18
4.1.1 Same Product Type within A Mount	4	6.1.1 Controls	18
4.1.2 Samples Should Not Touch	4	6.1.2 Calibration and Maintenance	19
4.1.3 Sample Orientation	4	6.2 Tooling	19
4.1.4 Traceability	4	6.2.1 Mount Holder Construction	19
4.2 Tooling System	4	6.2.2 Mount Holder Process	19
4.2.1 Holes Drilled at Drill Process	4	6.3 Consumables	19
4.2.2 Tooling Pins	5	6.3.1 Cloth Construction	20
4.2.3 Mounting Molds	5	6.3.2 Cloth Maintenance	21
4.3 Mounting	7	6.3.3 Polish Abrasives	21
4.3.1 Methods	7	6.3.4 Coolants	22
4.3.2 Mounting Material	7	6.4 Cleanliness	23
4.4 Mount Process Quality	9	6.5 Polish Process Quality	23
4.4.1 Target PTHs in the Same Axis	9	6.5.1 Heat Generation	24
4.4.2 No Gaps on the Mount or Sample	9	6.5.2 Material Removal Uneven	24
5 GRIND PROCESS	10	6.5.3 Sample Deformation	24
5.1 Equipment	11	6.5.4 Smear Metal	24
5.1.1 Controls	11	7 MICRO-ETCHING	24
5.1.2 Calibrations	12	7.1 Application Methods	24
5.1.3 Maintenance	12	7.1.1 Safety	24
5.2 Tooling	13	7.1.2 Swab	25
5.2.1 Mount Holder Construction	13	7.1.3 Immersion	25
5.2.2 Mount Holder Process Guidelines	14	7.2 Types	25
		8 TROUBLESHOOT GUIDE	26

9 GLOSSARY 27

9.1 Abrasion 27

9.2 Charging 27

9.3 Coupon Test Strip 27

9.4 Crescent Moon Scratch 27

9.5 Grind 27

9.6 Grinding Wheel 27

9.7 Grit Size 27

9.8 Grind Mount Holder 27

9.9 Micro Etchant 27

9.10 Mounting 27

9.11 Polish Mount Holder 27

9.12 Polish 27

9.13 Sample Removal 27

9.14 Scratch 27

9.15 Scratch Trace 27

9.16 Stops, Tooling 27

9.17 Target PTH 27

9.18 Tooling Edge, Mount 27

9.19 Tooling Holes, Microsection 27

9.20 Tooling Pins, Microsection 27

10 REFERENCES 28

11 RECOMMENDED READING 28

Figures

Figure 4-1 Planar Distortion 5

Figure 4-2 Center Line Integrity 5

Figure 4-3 Center Line Error Estimation 6

Figure 4-4 Reference Zero Relationship Between Target Holes and Tooling Edge 6

Figure 4-5 Samples Above Potting Material 8

Figure 4-6 Samples Above Potting Material 8

Figure 4-7 Target Holes in Same Axis 9

Figure 4-8 Gaps Between Mounting Material and Samples 9

Figure 4-9 Depression in Mounting Material 9

Figure 5-1 Abrasive Paper Grit Size (American vs. European) 10

Figure 5-2 Effects of Mechanical Grinding and Polishing 10

Figure 5-3 Perpendicularity of Motor to Sandpaper Disc Assembly 12

Figure 5-4 Position of Mount Holder on Sandpaper Disc 12

Figure 5-5 Mount Holder Collar: Effects of Deflection 13

Figure 5-6 Crescent Moon Scratch Pattern 13

Figure 5-7 Effect of Wear Depression on Mount Holders 14

Figure 5-8 Balanced Mount Holder 14

Figure 5-9 Carbide Pad Flatness and Height 15

Figure 5-10 Carbide Pad Should Be Center On Arc 16

Figure 5-11 Leaf Cut Effect 16

Figure 5-12 Effect of Debris Trapped Between Mount Holder and Tooling Edge 17

Figure 6-1 Scratch Deformation 18

Figure 6-2 Smeared Metal 18

Figure 6-3 Rounding at Copper Plate and Solder Interface 20

Figure 6-4 Rounding at Copper Plate and Solder Interface on the Surface 20

Figure 6-5 Acceptable Polish Quality 23

Figure 6-6 Acceptable Polish Quality 23

Figure 6-7 Contact Area Comparison – Sandpaper vs. Polish Cloth 24

Tables

Table 4-1 Mounting Material Characteristics 7

Table 7-1 Etchant Types 25

Table 8-1 Cause and Solution for Common Microsection Problems 26

Guidelines for Microsection Preparation

1 SCOPE

Microsection preparation is a process. These guidelines discuss the many variables and problems associated with the process from sample removal to micro-etch. The guidelines do not promote any one vendor's process, but discuss the variables common to microsectioning.

The process variables and problems are organized so the reader can research a specific issue or overview the variables of a process area.

2 APPLICABLE DOCUMENTS

2.1 IPC¹

IPC-2221 Generic Standard on Printed Board Design

IPC-2222 Sectional Design Standard for Rigid Organic Printed Boards

IPC-2223 Sectional Design Standard for Flexible Printed Boards

IPC-T-50 Terms and Definitions for Interconnecting and Packaging Electronic Circuits

IPC-TM-650 Test Methods Manual²

2.1.1 Microsectioning, Manual and Semi or Automatic

2.2.5 Dimensional Inspections Using Microsections

3 SAMPLE REMOVAL PROCESS

3.1 Sample Location

3.1.1 Coupon Test Strip Companies generally use a “home grown” or military conformance coupon for microsection inspection. IPC-2221 outlines the attributes a coupon test strip should exhibit based on the product type being built.

Benefits:

- Production parts are not lost due to microsection testing.
- The internal and external features are the same from panel to panel to facilitate Statistical Process Control (SPC) data collection.
- The strips may be used to screen product as required.
- The customer can correlate to your microsection results easier because you both sample in the same location on the same test design.

Drawbacks:

- Space is lost on the panel that could be used to build parts.
- The test strip may not be representative of the associated part.

3.1.2 Part The actual production parts are used for microsection inspection.

Benefits:

- Space is not wasted on the panel due to test strips.
- There are no paneling constraints that dictate where the test strip must be placed to preserve part correlation.
- There is less of an issue over how representative the test strip is to the associated part.

1. www.ipc.org

2. Current and revised IPC Test Methods are available on the IPC Web site (www.ipc.org/html/testmethods.htm)