



# Re-engineered solutions for PCB labels



## Line of durable labels addresses expanded performance requirements for PCB assemblies

Harsher chemicals, extreme temperatures and more moving parts are making printed circuit board assembly (PCBA) increasingly tough on labels.

As the design and assembly of printed circuit boards (PCBs) evolves, the labels used to tag the boards — and communicate critical information about components during assembly — must remain effective, while enduring even more extreme conditions and temperatures. Fortunately, converters can help customers conquer the changing landscape of PCBs by offering label solutions that maintain label integrity in today's harsher PCBA environment.

## Labeling for PCBs

The automated PCBA process involves printing boards with circuitry and populating them with electronic components. Bonding the components to the raw boards is achieved by heating solder paste to high temperatures to ensure good adhesion. Chemical fluxes are added to prevent oxidation on the metal surfaces. After assembly, machines thoroughly clean the PCB to remove any remaining flux or residue that could cause failure, either during tests on the manufacturing line or during the end use.

Labels are affixed either manually or automatically to the raw boards before assembly begins. A barcode serializes each board and, when scanned, links to data about the manufacturers, part numbers and lot codes of each component added to the board during assembly. If a PCB (or the electronic product it operates) fails at any point, scanning the label's barcode will identify which components were added to help



electronics equipment manufacturers isolate defective parts. As a result, manufacturers rely heavily on PCB labels for automatic identification during the assembly process.

## Changes in design and assembly

Over the last two decades, design trends and environmental regulations have dramatically reshaped PCB design and assembly.

Twenty years ago, a PCB was relatively large, with 50 or more electronic components added during assembly. Since then, manufacturers have produced smaller and smaller PCBs, making today's average board a fraction of the previous size, with hundreds more components. Because it is more difficult to clean around more components in a compact space, the cleaning products and processes used during PCB assembly have become harsher as a result.

At the same time, new regulations and green initiatives have altered the chemical compounds used during PCBA. For example, removing highly conductive lead from the solder paste to improve sustainability requires PCB manufacturers to increase production temperatures to solidify bonding. Fluxes, in turn, have become more acidic and aggressive to combat that change.

## Smaller labels, bigger performance

Faced with more stringent performance demands, many label materials that previously survived the PCBA process may now fall off, burn up, degrade or otherwise fail during assemblies.

Label materials used in PCBA must now be engineered to withstand:

- Hotter ovens, where temperatures range from 260 to 300 degrees Celsius
- More aggressive fluxes used in the soldering process
- Harsher chemicals used in higher concentrations to clean PCBs after assembly
- Abrasion of higher pressure from the nozzles that spray detergent, water and air during multiple rounds of cleaning

Converters can help customers conquer the changing landscape of PCBs by offering label solutions that maintain label integrity in today's harsher PCBA environment.

And while the performance requirements for label materials have grown, the size of the labels has shrunk to accommodate smaller PCB designs, giving converters a smaller surface area on which to print and a smaller amount of adhesive to keep labels adhered.

## PCB line of labels

Maintaining label adhesion, durability and legibility during manufacturing is paramount to an efficient PCBA process. That's why Avery Dennison has continued to re-engineer its portfolio of high-temperature, chemical-resistant label materials with feedback from converters and PCB manufacturers.

Starting with a polyimide (PI) facestock, Avery Dennison's PCB line of labels incorporate topcoats optimized with heat, chemical and scratch-resistant properties to anchor barcode text and insulate labels from extreme chemicals, harsh solvents and degradation. The portfolio includes several adhesives that address performance requirements ranging from no label edge lifting to electrostatic discharge safe application environments. All labels in the portfolio have been tested to meet key performance parameters for PCB assembly.

Keep in mind that PCBA performance requirements can vary. To provide the correct label performance for each customer, share the end user's assembly requirements and process conditions with Avery Dennison, whose experts can recommend the most appropriate materials for use. >

**Contact your Avery Dennison representative to discuss a durable label solution to meet your customers' cost and performance requirements.**

