Local Exclusive Representative:

CIRTECH EDA

THE NCAB GROUP

Production Process

– for multilayer PCBs

Steps 3 to 5 will be multiplied depending on the number of layers

The symbols show where in the production process the NCAB Group PCB Specification is applied

Clean Room

Boards manufactured using specific NCAB Group approved equipment

NCAB employees and dedicated teams

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PPE
Pre Production Engineering

Customer supplied data (gerber) is used to produce the manufacturing data for the specific PCB (artworks for imaging processes and drill data for drilling programs).

Engineers compare demands/specifications against capabilities to ensure compliance and also determine the process steps and associated checks. No changes are allowed without NCAB Group permission.

Material issue

Material of various types are received from approved sources and held in controlled environments until required.

Using FIFO systems, specific material is released into production for a specific purchase order with base materials cut to the required sizes. All materials used can be traced back to their manufacturing batch ID.

Inner layer

Stage 1 is to transfer the image using an artwork film to the board surface, using photosensitive dry-film and UV light, which will polymerise the dry film exposed by the artwork.

Inner layer etch

Stage 2 is to remove the unwanted copper from the panel using etching.

Once this copper has been removed, the remaining dry film is then removed leaving behind the copper circuitry that matches the design.

Inner layer AOI
Automated Optical Inspection

Inspection of the circuitry against digital "images" to verify that the circuitry matches the design and that it is free from defects.

Achieved through scanning of the board and then trained inspectors will verify any anomalies that the scanning process has highlighted. NCAB Group allows no repair of open circuits.

Lamination

The inner layers have an oxide layer applied and then "stacked" together with pre-preg providing insulation between layers and copper foil is added to the top and bottom of the stack.

The lamination process uses a combination of specific temperature, pressure for a specific time to allow the resin within the pre-preg to flow and bond the layers together to form a solid multilayer panel.

Drilling

We now have to drill the holes that will subsequently create electrical connections within the multilayer PCB.

This is a mechanical drilling process that must be optimised so that we can achieve registration to all of the the inner layer connections. The panels can be stacked at this process.

PTH
Plated Through Hole

PTH provides a very thin deposit of copper that covers the hole wall and the complete panel. A complex chemical process that must be strictly controlled to allow a reliable deposit of copper to be plated even onto the non-metallic hole wall.

Whilst not a sufficient amount of copper on its own, we now have electrical continuity between layers and through the holes.

Panel plating

Panel plating follows on from PTH to provide a thicker deposit of copper on top of the PTH deposit – typically 5 to 8 um.

The combination is used to optimise the amount of copper that is to be plated and etched in order to achieve the track and gap demands.

Outer layer image

Similar to the inner layer process (image transfer using photosensitive dry film, exposure to UV light and etching), but with one main difference – we will remove the dry film where we want to keep the copper/define circuitry – so we can plate additional copper later in the process.

There is no such thing as a standard printed circuit board. Each PCB has a unique function for a particular product. Therefore, producing a PCB is a complex process of many steps. This overview covers the most important steps when producing a multi layer PCB.

When you order PCBs from the NCAB Group, you are buying quality that pays for itself over time. This is guaranteed through a product specification and quality control that is far more stringent than other suppliers, and ensures that the product delivers what it promises. Here you can see where the NCAB process is unique or goes beyond the IPC standard.

Pattern plate

Second electrolytic plating stage, where the additional plating is deposited in areas without dry film (circuitry).

Increases the plating thickness to meet demands including NCAB Group demands with and average of 25um / min 20um through the hole. Once the copper has been plated, tin is applied to protect the plated copper.

Outer layer etch

This is normally a three step process. The first step is to remove the blue dry film. The second step is to etch away the exposed/unwanted copper whilst the tin deposit acts an etch resist protecting the copper we need.

The third and final step is to chemically remove the tin deposit leaving the circuitry.

Outer layer AOI
Automated Optical Inspection

Just like with inner layer AOI the imaged and etched panel is scanned to make sure that the circuitry meets design and that it is free from defects.

Again no repair of open circuits are allowed under NCAB Group demands.

Via hole plugging

Using soldermask ink or epoxy resin and a prepared stencil, with holes in the stencil that align with the via holes we wish to plug, we use a screen printing process to push ink or resin Into holes.

Unlike soldermask we are trying to push ink through the holes in the PCB and judge quality based upon the NCAB Group demands of ≥ 70% fill.

Soldermask

Soldermask ink is applied over the whole PCB surface. Using artworks and UV light we expose certain areas to the UV and those areas not exposed are removed during the chemical development process – typically the areas which are to be used as solderable surfaces.

The remaining soldermask is then fully cured making it a resilient finish.

Surface finish

Various finishes are then applied to the exposed copper areas. This is to enable protection of the surface and good solderability.

The various finishes can include Electroless Nickel Immersion Gold, HASL, Immersion Silver etc. Thicknesses and solderability tests are always carried out.

Profile

This is the process of cutting the manufacturing panels into specific sizes and shapes based upon the customer design as defined within the gerber data.

There are 3 main options available when providing the array or selling panel – scoring, routing or punching. All dimensions are measured against the customer supplied drawing to ensure the panel is dimensionally correct.

ET
Electrical Test

Used for checking the integrity of the tracks and the through hole interconnections – checking to ensure there are no open circuits or no short circuits on the finished board.

There are two test methods, flying probe for smaller volumes and fixture based for volumes.

Final inspection

Visual checking the PCB against acceptance criteria and using NCAB "approved" inspectors. Using manual visual inspection and AVI - compares PCB to gerber and has a faster checking speed that human eyes, but still requires human verification.

All orders are also subjected to a full inspection including dimensional, solderability, etc.

Packaging

Boards are wrapped using materials that comply with the NCAB Packaging demands (ESD etc.) and then boxed prior to be being shipped using the requested mode of transport.

ISO 26000 CONSCIOUS COMPONENT ENVIRONMENTAL, ETHICAL & SOCIAL

All our factories are ISO 9001 and ISO 14001 certified.

NCAB GROUP

Integrated PCB Production