

# Fabrication Drawings and Electrical Test— Reading the Fine Print

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When a new PCB design is born, designers envision what the product will provide when completed. Whether the product is for the consumer, aerospace, military, medical or countless other markets, the designers—or more likely, the customers—expect certain deliverables on the commodity they wish to purchase. To provide the desired functionality of the product design, engineers specify these deliverables on blueprints (prints) or fabrication drawings (fab drawings). These documents are the recipe for the manufacturing requirements of the given product.

A multitude of information is provided in these documents. In most cases the designers do not know the specific processes involved that satisfy their requirements, nor do they have to. They specify their requirements on the fab drawing and allow the PCB manufacturer to use the necessary processes to supply

the final product, and herein lies the problem. Some complex designs could have fabrication drawings exceeding 20 pages, and may include requirements ranging from which raw materials are to be used to what type of anti-static packaging is required for shipping.

For this discussion, we will focus on how these documents pertain to electrical test (ET). In most fabrication drawings, many pages are graphical in nature and depict special dimensional or mechanical attributes, while others show drill/cutter requirements, plating requirements, special layup instructions, and almost always a note(s) page. Should ET read the entire package? Yes. Why? Because many times there can be mechanical attributes that will influence how the final product can be tested. However, there are some main topics ET will definitely be looking for:



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### Got Class?

The PCB industry has documented different performance classes for printed wiring boards. In ET this is very important to know. Testing a board with parameters to match or exceed its class requirement is mandatory. The performance class is always found on the fab drawing. Many times a reference to IPC-6012 Class I, II or III will be documented. From this information ET knows what parameters and test methodology are allowed.

### Spec Check?

Above and beyond the IPC manufacturing specification, ET must also be aware of any proprietary specification that may be called out. If the proprietary specification has any specifics around ET, it is desirable that this information be on the print notes as well. If those requirements are not specified it could lead to a non-

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conformance issue at the customer. Electrical test must also review for a military specification. If the ET department or contractor is granted suitability to test military product by the Defense Logistics Agency (DLA) they must test according to the specification and report product tested in the required annual report. Electrical test contractors or the internal ET department can only certify the product conforms to the electrical requirements of the specification unless the department has the final authority to write the certificate of compliance for the entire manufacturing process. In the scope of today's discussion, ET does not have the authority to certify the product is built to a certain specifica-

tion. ET can certify the product was tested in accordance with the given specification.

### Stamp it?

This is a subject that may require ET to review other pages of the drawing set other than the notes section. If a board passes ET it will usually receive a stamp or mark that shows it has passed ET. There are cases where the fab drawing states exactly where a stamp should be placed and conversely may also state the area(s) where it cannot be placed.

### Is ET Special?

Another attribute ET should be looking for are special test requirements or parameters. These requirements will override the default specifications in most cases. This could be identification of buried passive components and capacitive attributes that may be present, which ET should know about so as to adjust equipment as necessary to avoid false failures and unnecessary delays.

### Getting it Right!

From the receipt of the new order the sales/tooling department needs to make sure all requirements are flowed down to every department involved. Missing information to any given department can cause delays. This is even more critical when independent contractors are used, whether in-house or external. Missing mechanical attributes such as layup or image array orientation are just as important to ET as missing electrical attributes. Missing information in these areas can cause costly delays, including wrong fixture tooling, incorrect programming for flying probes and incorrect parameters being used to test product. Diligence in all these areas can mean the difference between successful on-time delivery and costly restarts. **PCB**



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