

What Your Electronic Manufacturing Service Provider Needs from You

by Jim Usery.

Contract electronics manufacturing service or EMS providers typically work with customers in a wide range of industries with differing requirements for inventory control, testing, product packaging, and product support. In some applications, the EMS provider simply assembles the printed circuit boards and then ships the boards to the customer. In other applications, the EMS provider will assemble the printed circuit board, load firmware/software into memory, test the board, and then assemble the board and associated cables, enclosures, and documentation into a finished product that is shipped to the customer. Some customers will provide all of the materials, raw boards and electronic components, required for a job and the EMS provider assembles the printed circuit boards, performs any required testing, and ships the finished boards to the customer. This is generally considered as inventory provided on a consignment basis where the EMS provider basically provides labor and expertise only. Some customers provide some portion on the materials, such as specialty or high cost integrated circuits, proprietary parts such as transformers or coils, raw printed circuit boards, etc. and rely on the EMS provider to purchase the remainder of the components needed to assemble the boards. Most EMS providers prefer to use their own purchasing power, their extensive contacts, and their existing parts inventory where applicable to provide all of the required materials for a customer's particular project. This method is generally considered as inventory provided on a turn-key basis.

But before any of this can happen, the EMS provider must provide an assembled board quote or pricing estimate to the customer for the project. In addition to the quantity commitments, production release quantity and annual usage quantity, this pricing process also requires a detailed bill of material from the customer along with a set of the Gerber files for the printed circuit boards. The BOM should define all of the components along with the approved vendor and vendor's part number for each component. This information allows the Materials Management group to determine availability, packaging, and pricing for each component based on the quantities and vendor information. The BOM information is also needed to allow a technical review to determine the amount of labor and the equipment required to place the parts and to solder the components to the board.

The Gerber files for the printed circuit board design provide Materials Management with the information they need in order to get raw board pricing and lead times from the printed circuit board manufacturing vendors. The Gerber files also provide the Manufacturing Group with the information they need to develop the manufacturing plan, are components on top only or top and bottom of board; surface mount, thru hole, or mixed component types; wave solder or reflow oven processes required, etc. The Manufacturing Group also has to estimate time to program the component placement equipment and to load the components in the placement feeders, set-up costs, costs to order the solder paste stencils, and must also quantify test plans, procedures, and required test equipment. In order to correctly place components on the printed circuit board with each component properly oriented, the EMS provider will need silkscreen files to know the correct orientation of the parts on each side of the board. The screen paste file for surface mount applications will be required to order the stencils for the solder paste application to the board prior to the part placements.

All of this may seem to be a lot of information, but each piece is needed in order to provide the most cost effective pricing for the finished product. Fortunately, the Gerber files are usually readily available from the pcb design system as the Gerber format is the industry standard output format. The BOM is usually in the form of an Excel spreadsheet or formal drawing. Assist your EMS provider by providing

the approved vendor's name and part number for each component.

In Summary:

The information required to prepare an accurate quotation for a typical printed circuit board assembly project includes:

- Definition of inventory method, consignment, partial consignment, or turn-key.
- Complete Bill of Material with at least one manufacturer's name and part number for each component along with notes identifying any components to be supplied by the customer.
- Gerber files for the printed circuit board designs.
- Estimated Annual Usage, EAU, quantities and production release quantities.
- Name of technical contact person, along with their telephone number, fax number, and email address.

Additional information that may be helpful if you have it available:

- Assembly, schematic, and PCB drawings.
- Sample board assembly or prototype board assembly to review.
- Test requirements and procedures required by the customer.

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