

**GLOSSARY of Printed Circuit Design and Manufacturing**

| No. | GLOSSARY            | Meanings  |
|-----|---------------------|---|
| 1   | E-pad               | "Engineering-pad." A plated-through hole or surface mount pad on a PCB placed on the board for the purpose of attaching a wire by soldering. These are usually labeled with silkscreen. E-pads are used to facilitate proto-typing, or simply because wires are used for interconnections instead of headers or terminal blocks .   |
| 2   | ECL                 | Emitter Coupled Logic. A type of unsaturated logic performed by emitter-coupled transistors. Higher speeds may be achieved with ECL than are obtainable with standard logic circuits. ECL is costly, power hungry, and difficult to use, but it is four times faster than TTL   |
| 3   | electrical object   | [Protel] A graphical object (in a PCB or schematic file) to which an electrical connection can be made, such as a component pin or a wire.  |
| 4   | embedded            | (Of a micro-processor(s), or system controlled by such) Dedicated to doing one job or supporting one device and built into the product.   |
| 5   | EMC                 | electromagnetic compatibility. (1) The ability of electronic equipment to operate without degradation in an intended electromagnetic environment (2) The ability of equipment to operate in its electromagnetic environment without creating interference with other devices. [From the National Instruments, Developer Zone, Measurement Encyclopedia , which unfortunately has gone off-line as of 2017] At circuit board level, one could substitute the term circuit for equipment in the above definitions. Eg. "If the ground returns are common, they can be connected at a single point near the external ground connection, which is good EMC practice."   |
| 6   | emitter             | An electrode on a transistor from which a flow of electrons or holes enters the region between the electrodes   |
| 7   | EMP                 | Electromagnetic pulse. A reaction of large magnitude resulting from the detonation of nuclear weapons   |
| 8   | end-to-end design   | a version of CAD/CAM/CAE in which the software packages used and their inputs and outputs are integrated with each other and allow design to flow smoothly with no manual intervention necessary (other than a few keystrokes or menu selections) to get from one step to the other. Flow can occur in both directions. In the field of PCB design, end-to-end design sometimes refers to only the electronic schematic/pcb layout interface, but this is a narrow view of the potentialities of the concept. For example, end-to-end systems can also implement electronic circuit simulation, parts procurement and beyond. For an introduction to the overall design flow of an electronics project, see the PCB designer definition and follow the link to the plain English description for a printed circuit board designer |
| 9   | Excellon            | NC Drill file format. An ASCII format used in a file which drives an NC Drill machine. The earliest NC Drill machines were made by Excellon Automation Company. The format is in broad use, although the company has been sold.   |
| 10  | fab                 | Short for fabrication.  |
| 11  | fabrication drawing | A drawing used to aid the construction of a printed board. It shows all of the locations of the holes to be drilled, their sizes and tolerances, dimensions of the board edges, and notes on the materials and methods to be used. Called "fab drawing" for short. It relates the board edge to at least one hole location as a reference point so that the NC Drill file can be properly lined up.   |
| 12  | FC                  | Flexible Circuit, flexible circuitry, flexcircuit or flex circuit   |
| 13  | fine line design    | Printed circuit design permitting two (rarely three) traces between adjacent DIP pins. It entails the use of either dry film solder mask or liquid photoimageable solder mask (LPI), both of which are more accurate than wet solder mask.  |
| 14  | fine pitch          | Refers to chip packages with lead pitches below 0.050". The largest pitch in this class of parts is 0.8mm, or about 0.031". Lead pitches as small as 0.5mm (0.020") are used.   |

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| 15  | finger                   | A gold-plated terminal of a card-edge connector. [Derived from its shape.]  |
| 16  | flash                    | 1. v. To turn a vector photoplotter lamp on for a brief but precise duration and then off, during which time the relative positions of the lamp and film remain fixed. This exposes the film with the image of a small object (the size and shape of which is controlled by the transparent portion of an aperture ). 2. n. A small image on film created in such wise or as directed by a command in a Gerber file .) The maximum size (x or y dimension)for a flash varies from one photoplotting shop to another, but is commonly ½ inch.  |
| 17  | flex circuit             | Flexible circuit, or flexcircuit; a printed circuit made of thin, flexible material. For more information, see flexible circuitry .   |
| 18  | flexible circuitry       | An array of conductors bonded to a thin, flexible dielectric. It has the unique property of being a three-dimensional circuit that can be shaped in multiplanar configurations, rigidized in specific areas, and molded to backer boards for specific applications. As an interconnect, the main advantages of flex over traditional cabling are greater reliability, size and weight reduction, elimination of mechanical connectors, elimination of wiring errors, increased impedance control and signal quality, circuit simplification, greater operating temperature range, and higher circuit density. |
| 19  | flexible printed circuit | Flex circuit . Abbreviated FPC or FC.   |
| 20  | flip-chip                | A mounting approach in which the chip ( die ) is inverted and connected directly to the substrate rather than using the more common wire bonding technique. Examples of this kind of flip-chip mounting are beam lead and solder bump .   |
| 21  | first article            | A sample part or assembly manufactured prior to the start of production for the purpose of ensuring that the manufacturer is capable of manufacturing a product which will meet the requirements.   |
| 22  | footprint                | 1. The pattern and space on a board taken up by a component.<br>2. Decal .  |
| 23  | FPC                      | Flexible Printed Circuit, or flex circuit .   |
| 24  | FR-1                     | A low-grade version of FR-2.  |
| 25  | FR-2                     | A NEMA grade of Flame-Retardant industrial laminate having a substrate of paper and a resin binder of phenolic. It is suitable for printed circuit board laminate and cheaper than the woven glass fabrics such as FR-4.  |
| 26  | FR-4                     | A NEMA grade of Flame-Retardent industrial laminate having a substrate of woven-glass fabric and resin binder of epoxy. FR-4 is the most common dielectric material used in the construction of PCBs. Its dielectric constant is from 4.4 to 5.2 at below-microwave frequencies. As frequency climbs over 1 GHz, the dielectric constant of FR-4 gradually drops.   |
| 27  | FR-6                     | Fire-Retardant glass-and-polyester substrate material for electronic circuits. Inexpensive; popular for automobile electronics.   |