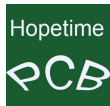


GLOSSARY of Printed Circuit Design and Manufacturing

No.	GLOSSARY	Meanings
1	Manhattan length	<p>The length of the two sides of a right triangle as a distance between two points, as opposed to the hypotenuse.. (Derived from the Manhattan algorithm for determining the length of a taxicab trip following streets and avenues on the island of Manhattan, NY.) Routing of traces in orthogonal patterns in a PCB design, or in a semiconductor chip, follows the same pattern as streets and avenues in a city. The minimum distance between two component leads, or two nodes on a chip, when routing on 90 degrees is the Manhattan length .</p> <p>Advanced PCB auto-routers permit specification of maximum length of classes of nets as a percentage of Manhattan length . For example, one could specify clocks as 120% and random nets as 160% of Manhattan length . (This percentage, expressed as a ratio, becomes the "Manhattan coefficient", ie. a Manhattan coefficient of 1.2 means the routed length is 120% of the Manhattan length .) Specifying such limits on the auto-router prevents long and circuitous routes.</p>
2	master aperture list	<p>1. An aperture list which is used for every PCB designed by a PCB design service bureau or department. If a new design requires one or more new apertures, they are added to the list, either at the end or in some previously unused positions set aside for that purpose. The previously used aperture positions are never edited to change their parameters. Thus the updated list can still be used as a master for any previous PCB's designed. This type of master aperture list became possible only with the advent of laser photoplotters , which can have upwards of 1000 positions if need be.</p> <p>2. Any aperture list which is used with two or more PCB's would be called the master aperture list for that set of PCB's.</p>
3	MCR	<p>Molded Carrier Ring. A type of fine-pitch chip package named for the method of supporting and protecting the leads. The leads are left straight; the ends of the leads are embedded in a strip of plastic, which is the Molded Carrier Ring. Just before assembly (placing on a PCB for soldering), the MCR is cut off and the leads are formed. In this way, the delicate leads are protected against damage in handling until just before assembly.</p>
4	MELF	<p>Metal Electrical Face - A surface mount discrete part, usually a diode, that is barrel shaped, or cylindrical. The ends of the "barrel" are capped with metal, the "metal electrical face." The "barrel" is laid on its side, the metal ends upon landing pads, and the part is soldered that way. The two most common sizes are MLL34 and MLL41, which are roughly MELF versions of a DO-35 and DO-41 respectively</p>
5	MIC	<p>Monolithic Integrated Circuit .</p>
6	micro ball grid array	<p>A fine pitch ball grid array . Fine pitch for BGAs is anything equal to or less than 0.5 mm [19.7 mil]. In practice, a micro-BGA is one that is so dense, it requires controlled-depth laser-drilled blind microvia-in-pad technology</p>
7	micro-BGA	<p>micro Ball Grid Array</p>
8	mil	<p>One thousandth of an inch (0.0254 mm). [From abbreviation of mil li-inch, which means one-thousandth of an inch.]</p>
9	MLC	<p>Multi-Layer Ceramic</p>
10	monolithic	<p>1. Existing as one large, undifferentiated whole. 2. (of an integrated circuit or its elements) built upon or formed within a single slice of silicon substrate.</p>
11	monolithic integrated circuit	<p>1. Abbreviated MIC. An integrated circuit formed upon or within a semiconductor substrate with at least one of the circuit elements formed within the substrate. 2. A complete electronic circuit fabricated as an inseparable assembly of circuit elements in a single small structure. It cannot be divided without permanently destroying its intended electronic function.</p>
12	MTF	<p>Multi-layer Thin Film</p>



GLOSSARY of Printed Circuit Design and Manufacturing

No.	GLOSSARY	Meanings
13	mullite	A substrate compound of alumina and silica ($3Al_2O_3 \cdot 2SiO_2$)
14	multimeter	A portable test instrument which can be used to measure voltage, current, and resistance.
15	NC drill	Numeric Controlled (computer controlled) drill machine. A machine used to drill the holes in a printed board at exact locations, which are specified in a data file. Also known as "CNC drill."
16	NC drill file	A text file which tells an NC drill where to drill its holes
17	negative	1. n . A reverse-image contact copy of a positive, useful for checking revisions of a PCB. If the negative of the current version is superimposed over a positive of an earlier version, all areas will be solid black except where changes have been made. 2. adj . (Of a PCB image) Representing copper (or other material) as clear areas and absence of material as black areas. Typical of power and ground planes and solder mask
18	NEMA	National Electrical Manufacturers Association
19	net	A collection of terminals all of which are, or must be, connected to each other electrically. Also known as a signal.
20	netlist	List of names of symbols or parts and their connection points which are logically connected in each net of a circuit. A netlist can be "captured" (extracted electronically on a computer) from a properly prepared CAE schematic
21	node	A pin or lead which will have at least one wire connected to it. In a netlist, a node is described by a component reference designator together with a pin number.
22	open	Open circuit. An unwanted break in the continuity of an electrical circuit which prevents current from flowing.