

# Via Layers and Netlist

## Overview

This appnote describes the way blind and buried via layers need to be set up for netlist extraction. This applies to contour netlist extraction (available in CAMMaster).

Blind and buried vias are drilled, plated holes that do not go through the whole board. Blind vias start on the top or bottom of the board but stop at one of the internal layers. Buried vias connect internal layers and are not exposed to the top or bottom of the board.

Before starting a netlist extract, the layers of the job have to be set up in the proper order. The order is determined by the board layer number of each layer. Circuit layers must be set up in the order in which they appear in the board, with the component side layer (CPU) first and the solder side layer (CPL) last. So, CPU must have the smallest board layer number among circuit layers and CPL the highest. Circuit layers are CPU, CPL, SIG and the various plane layer types (power and ground). The through drill layer (of type DRI) can be positioned either before or after the stackup of the circuit layers.

There are two ways of setting up the blind and buried via layer types (VIA, VID, BLI or BUR can be used interchangeably as the layer type). The old way requires more effort and must be used in versions of CAMMaster previous to version 11. The new and more convenient way has been introduced in V11.0 of CAMMaster. Below is a description of the two methods.

## Sandwiched Via Layers

This is the old method (before V11.0), but can still be used, if desired.

This method requires a copy of a via layer to be inserted in the stackup between any two circuit layers it crosses. So, for instance, a blind via going from layer 1 to 4 would have the drill (via) layer inserted between 1&2, 2&3, 3&4. A buried via from layers 5-7 would have the drill layer inserted between 5&6, 6&7. This requires making many identical copies of the same drill data.

An example setup is shown below (from the "Setup/Layers" (F10) dialog):

L#	B Lay	Name	Type	Traces	Pads	Poly
1	1	top	CPU	1891	1227	25
2	2	via top to layer4	VID	0	256	0
3	3	layer2	P01	1629	190	346
4	4	via top to layer4	VID	0	256	0
5	5	layer3	SIG	2495	295	223
6	6	via top to layer4	VID	0	256	0
7	7	layer4	P01	1480	185	309
8	8	via layer4 to layer6	VID	0	186	0
9	9	layer5	SIG	2191	249	203
10	10	via layer4 to layer6	VID	0	186	0
11	11	layer6	SIG	1364	184	256
12	12	via layer6 to bottom	VID	0	112	0
13	13	layer7	P01	2003	206	163
14	14	via layer6 to bottom	VID	0	112	0
15	15	bottom	CPL	1176	184	163
16	16	upper soldermask	MSU	873	80	35
17	17	through drill	DRI	4	188	0

Note that the via layer that goes from "top" to "layer4" needs to be inserted three times (separate copies of the layer need to be made). By the fact that layer 2 is given board layer number 2, it will be considered to connect the preceding and following board layer numbers, so number 1 and number 3 (layers "top" and "layer2"). Also note that we needed to set the board layer number of "layer2" to 3 to make room for the via layer below. This can be confusing.

Same applies to the buried via layer going from "layer4" to "layer6", etc.

This method may require making several copies of the same via layer, if it crosses more than two layers, but works in all versions of CAMMaster.

## Encoded Via Layers

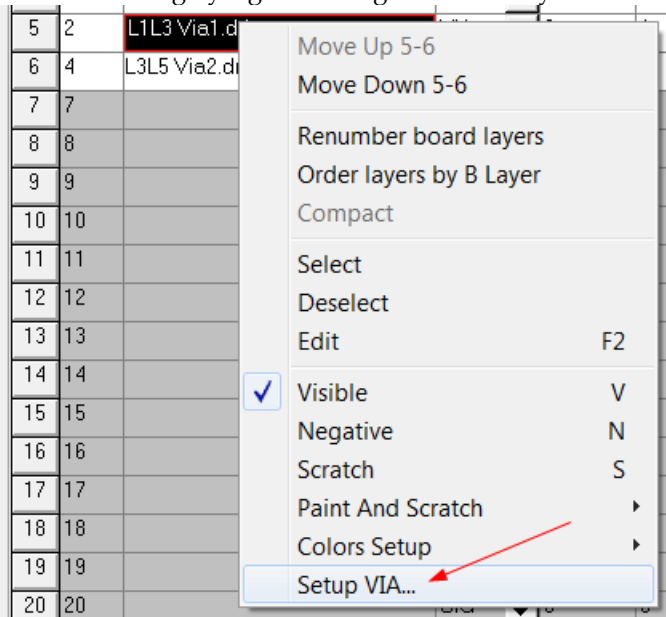
This new method was introduced in V11.0 of CAMMaster and works by encoding the function of the via layer in the layer name field. A setup with the same functionality as the previous one is shown below:

L#	B Lay	Name	Type	Traces	Pads	Poly
1	1	top	CPU	1891	1227	25
2	2	layer2	P01	1629	190	346
3	3	layer3	SIG	2495	295	223
4	4	layer4	P01	1480	185	309
5	5	layer5	SIG	2191	249	203
6	6	layer6	SIG	1364	184	256
7	7	layer7	P01	2003	206	163
8	8	bottom	CPL	1176	184	163
9	9	upper soldermask	MSU	873	80	35
10	10	through drill	DRI	4	188	0
11	11	L1L4 via top to layer4	VID	0	256	0
12	12	L4L6 via layer4 to layer6	VID	0	186	0
13	13	L6L8 via layer6 to bottom	VID	0	112	0

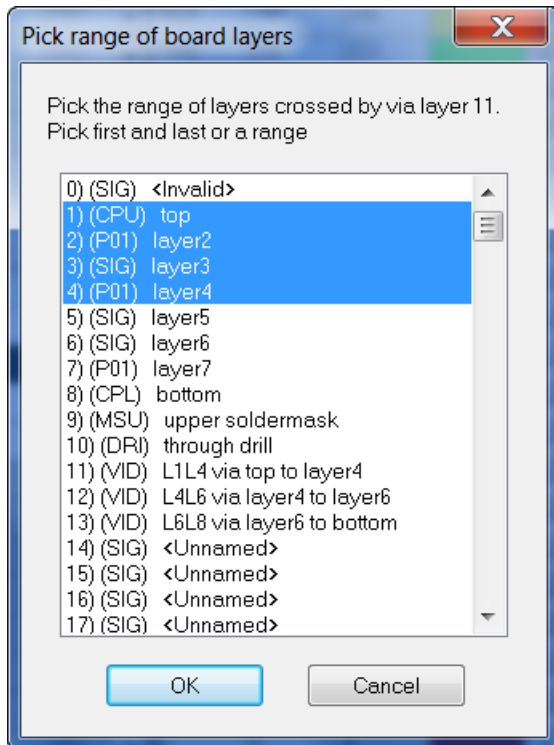
Now only one copy of each via layer is needed. They can be given any board layer number and positioned anywhere in the stackup. In this example they have been moved to the end of the layer list.

The key for this method is the  $LxLy$  that appears at the start of the layer name. This will tell CAMMaster which circuit layers the given via layer crosses. So for via layer 11, L1L4 means that it crosses from board layer number 1 to board layer number 4. Note that these numbers are board layer numbers, not layer numbers, although in many cases layer numbers and board layer numbers are the same.

To enter this information one can type it in manually in the layer name box using the  $LxLy$  syntax or one can use a dialog by right-clicking on the via layer and then picking "Setup VIA...".



This will bring up a dialog like the one below:



and allows picking the first and last layer in the range crossed from the list. When the dialog is closed it will enter the appropriate info into the layer name of the via layer.

Note that "LxLy" must appear at the very beginning of the layer name (and in fact can be the whole layer name, if so desired). Alternate ways of entering the same info are:

"Lx Ly" (with space separating) and

"Lx-Ly" with a dash separating.

They all mean the same thing.

In version 11 and above of CAMMaster one can use either the old method or the new method and one can even use a combination of the two in the same setup.

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