

What is Wrong with Pin Mapping How to Fix It

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October 1, 2014

signal_name == Data Book Name

The first column is pin_name (aka component “Pin Number”), and the second column is signal_name. On page 21 of IBIS 6.0:

“The second column, signal_name, gives the data book name for the signal on that pin.”

What does it mean when two supply pins have the same Data Book Name (e.g. VDD, with VDD=3V)?

There is no Data Book standard, but if you ask any designer, it means they have the same Voltage.

Pin Mapping can be Problematic

[Pin]	signal_name	model_name	R_pin	L_pin	C_pin
1	VDD	POWER			
2	VDDQ	POWER			
3	VDDQ	GND			
4	VPP	POWER			
6	VSS	GND			
10	DQ1	DQ	342.6m	1.366nH	0.495pF

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[Pin Mapping]	pulldown_ref	pullup_ref	gnd_clamp_ref	power_clamp_ref	ext_ref
1	NC	PWR			
2	NC	PWR			
3	GND2	NC			
4	NC	PWR			
6	GND1	NC			
10	NC	NC	GND1	PWR	

Problem 1:

2	VDDQ	POWER
3	VDDQ	GND

Signal Name pins 2 and 3 are signal_name VDDQ and therefore data book name VDDQ. I do not think one can be POWER and the other GND.

Problem 2:

Bus Label PWR “Shorts” pins 1, 2 and 4, and therefore signal_names VDD, VDDQ and VPP. This is inconsistent with the common understanding that the data book Pinout Names define the connectivity.

New Rules

All POWER and GND pins that have the same “bus label” must have the same signal_name.

- If two pins have the same signal_name, then if one of the pins had model_name POWER than the other pin must have model_name POWER.
- If two pins have the same signal_name, then if one of the pins had model_name GND than the other pin must have model_name GND.
- A Pin Mapping Bus Label may contain only I/O pins and POWER pins or I/O pins and GND pins.
- All of the POWER pins in a Pin Mapping Bus Label must have the same signal_name.
- All of the GND pins in a Pin Mapping Bus Label must have the same signal_name.

Comments on New Rules

Arpad:

By not allowing a Bus Label to connect two POWER or GND pins with the same name, then we can use Pin Mapping to determine uniquely what is the Reference voltage signal_name. Yes it would only apply to POWER and GND pins because IBIS allows all of the pins of the same memory data bus to have the same signal_name.

Randy:

If two data book names are the same, they are at the same Voltage, but may be supplied by two different voltage sources both supplying the same Voltage. And if two names are different and the two names have the same voltage, they may be supplied by one or two voltage source that supply the same voltage, and in this special case, the pins on the two voltage may be shorted together in the package.

So to translate this into [Pin Mapping] rules, a Bus Label may “connect” two different supply pin signal_names, as long as the PCB supplies the same voltage to the pins on each signal name.

How Pin Mapping has Been Used

As a practical matter, the only IBIS files I have seen that use Pin Mapping have Bus Labels equal to signal_name.

We could enhance Pin Mapping to allow reserved Bus Labels to be a signal_names of POWER and GND pins, and do not require these Bus Labels on the POWER and GND pins.