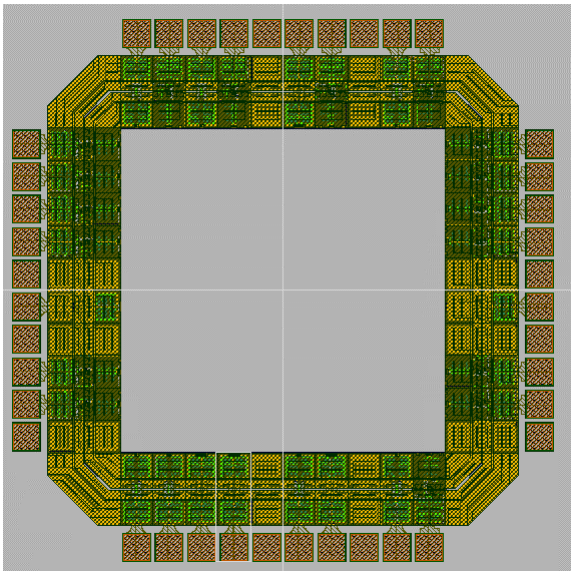
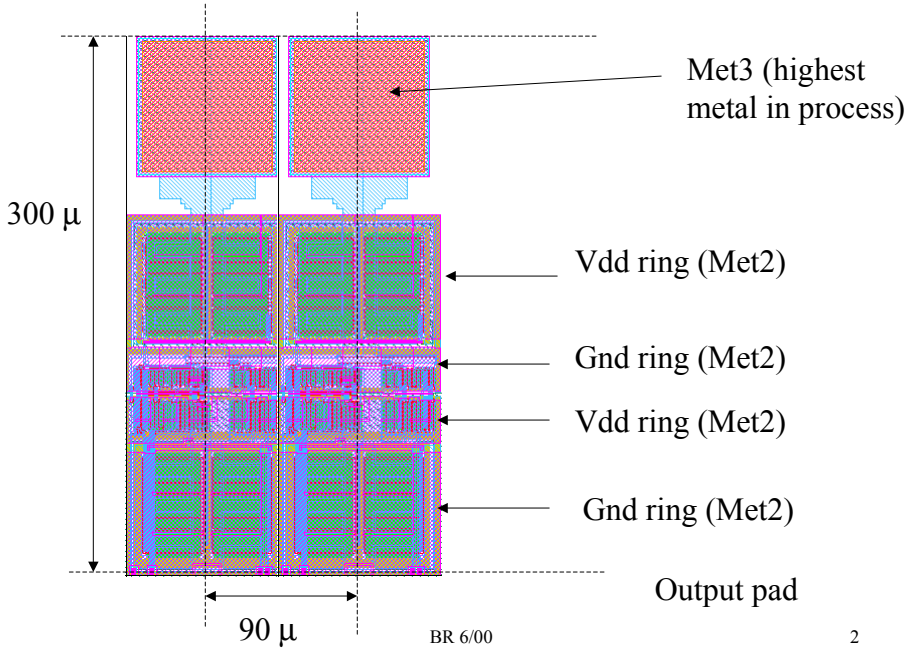
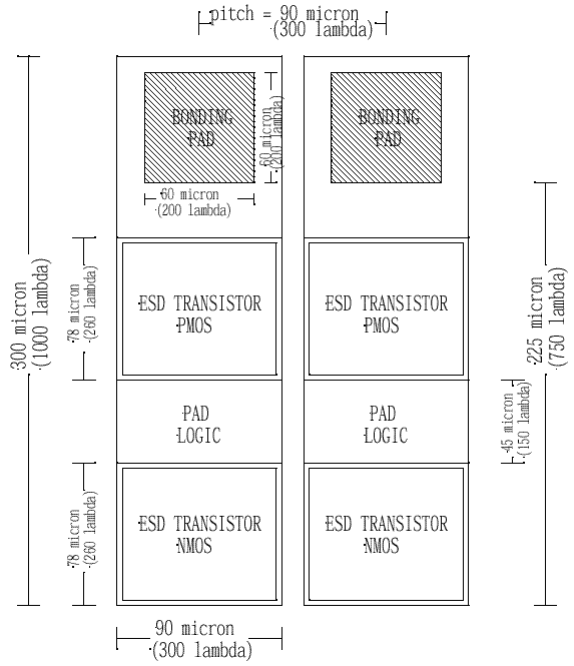


HP 0.5 tinychip Padframe (40 pin) with Tanner pads

Core area: 900µ x 900 µ

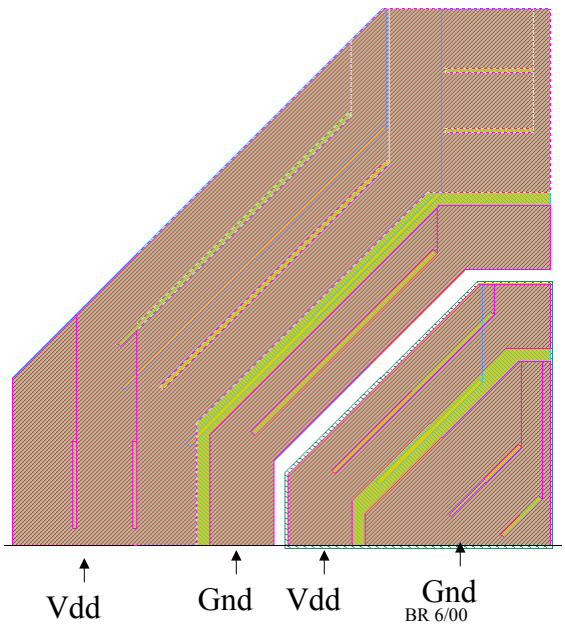




From Tanner documentation

Want minimum pitch pins so can get high pin count. ASIC pins tend to be long/narrow.

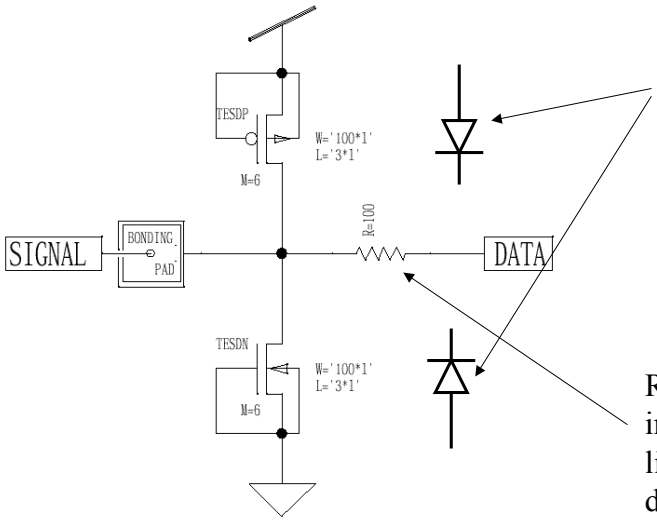
Tanner pads follow HP internal rules, not MOSIS rules.



Corner pad

Used for continuity of power/gnd rings at corners

Vdd/Gnd Input Signal clamping



Diodes Clamps input signals to Vdd/Gnd

Width large for high current capability

Resistor for input current limiting, diffusion or poly resistor

ESD Protection

A thick film device built from Met1, field oxide, and diffusion is used for ESD protection.

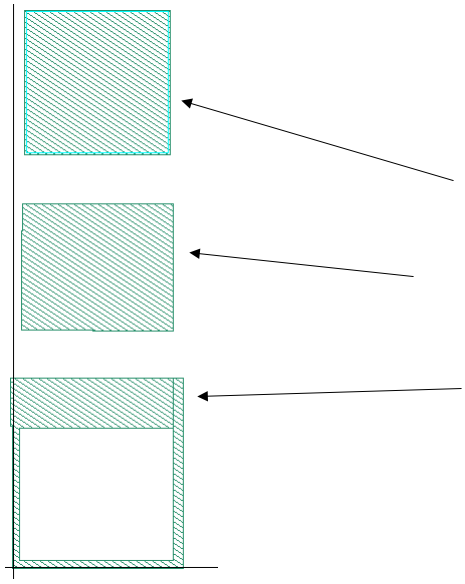
Field oxide device usually has threshold voltage in the 10's of volts.

Metal 1 provides 'gate' of device, tied to pad, also tied to drain.

Width of device is very high to provide low on resistance, high current density.

Will handle any short duration spikes due to electro static discharge.

Most processes have special high threshold transistors that can be used for ESD protection instead of field oxide devices.

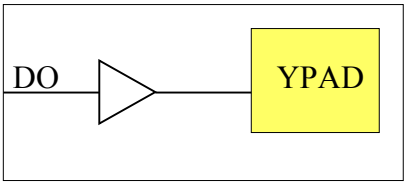


ASIC Pads

- Most ASIC pads have multiple Vdd/Gnd Rings
- Leda Systems 0.25u, 0.35u pad library has the following rings
  - Avdd, Avss -- analog VDD/Gnd
  - Evdd, Evss – external Vdd/Gnd – supports pads with different Vdd/Gnd from core
  - Nvdd, Nvss – internal Vdd/Gnd – core VDD/GND
  - Vss/Vdd -- ?? (also core Vdd/Gnd??)

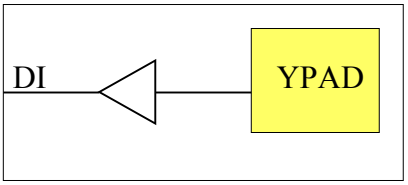
Tanner Pads used Tutorial Files

- PADOUT (output only pad)




```
module PADOUT ( DO, YPAD);
output YPAD;
input DO;
```

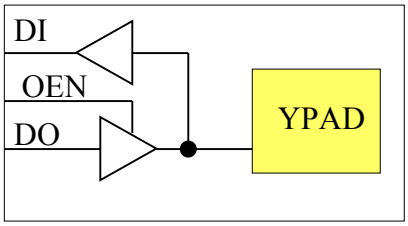
- PADINC (input only pad)




```
module PADINC ( DI, YPAD );
output DI;
input YPAD;
```


Tanner Pads used Tutorial Files (cont.)

- PADBIDIRHE (bi-directional pad)



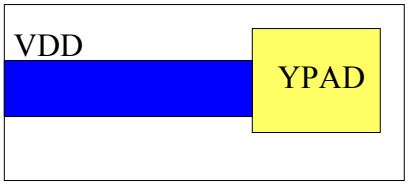

```
module PAD_BIDIRHE (OEN,
DO, DI, YPAD);

input OEN;
input DO;
output DI;
inout YPAD;
```

If OEN = '1' , then YPAD = DO else YPAD = 'Z'.

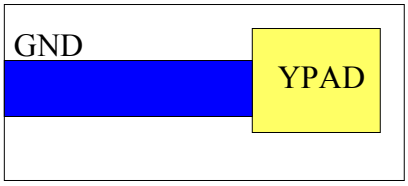
Tanner Pads used Tutorial Files (cont.)

- PADVDD (vdd pad, vdd to core and pad rings)




```
module PADVDD ( vdd, YPAD);
inout YPAD, vdd;
```

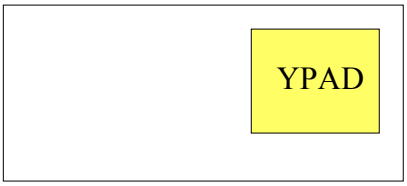
- PADGND (gnd pad, gnd to core and pad rings)




```
module PADGND ( vdd, YPAD);
inout YPAD, gnd;
```


Tanner Pads used Tutorial Files (cont.)

- PADNC (filler pad)




```
module PADNC ();
```

A no-connection pad is used to fill out the padframe if you don't need the I/Os. Could also use extra Vdd/GND pads.

You don't want to use input/output pads with unconnected inputs because these can consume power if the inputs float.