

Magic VLSI_Part-1

```
$ magic -T scmos  
$ Ctrl + Z to kill  
$ magic -T scmos& (to run in the background)
```

- Magic has two windows - command window and canvas
- Enterring commands -

1. Magic command window -

% grid on

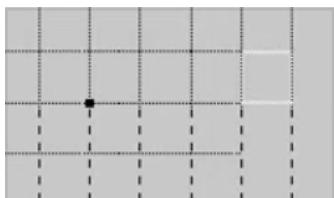
Alternate : Keep the four directional cursor on the layout + press G

Z - for zoom out

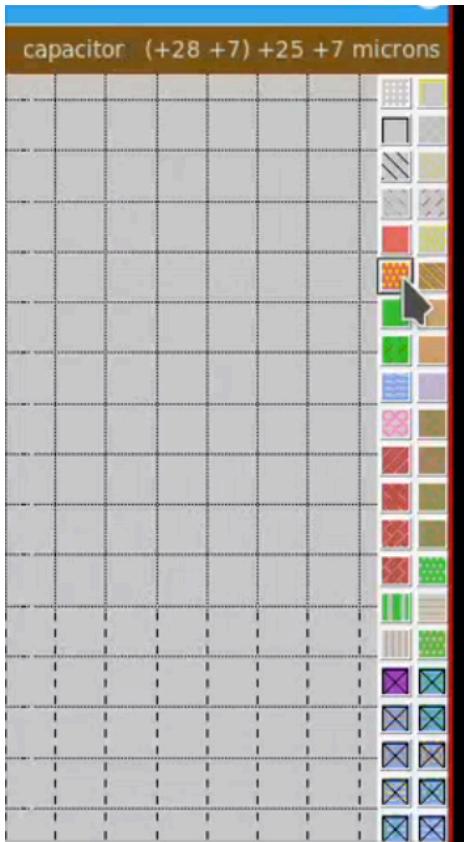
Shift + z - zoom in

2. Second way of entering commands is by keeping the canvas/layout window active and pressing colon (:) in the command window

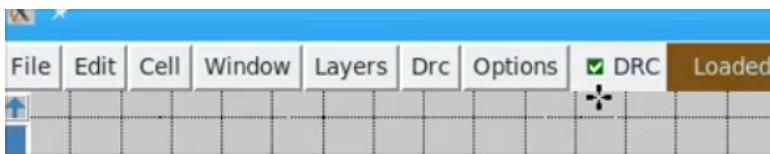
- Options > Tech manager > scmos
- General info -



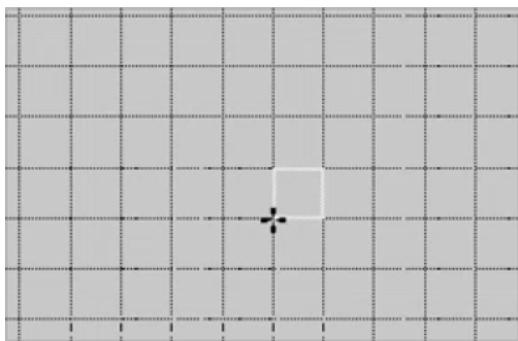
Black dot at (0,0)



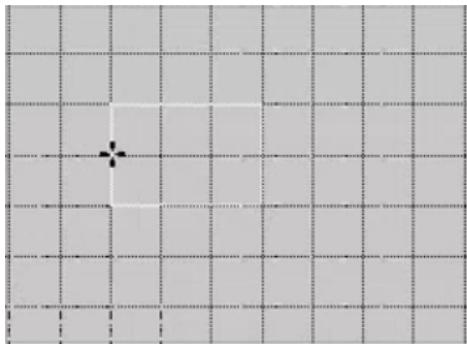
RHS : pallets (switch it ON/OFF in Options > Toolbar)



DRC - Design Rule Check (Green - OK + proceed)
Check for minimum dimensions and spacing between geometrical objects



Cursor + left click-> anchors that particular spot
Cursor + right click after above step -> to select given area
Example - 3x2 dimension

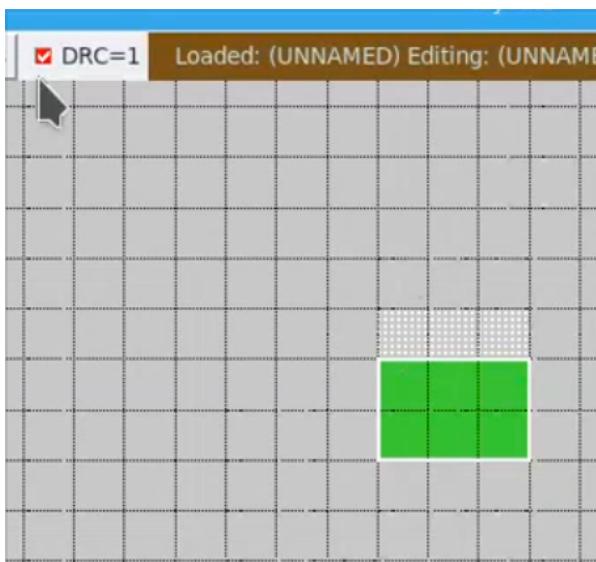


Paint the selected area by choosing from palette

Ex: green - for n diffusion

Alternate: place the cursor in the selected area, go to command window and press ' : '

: paint ndiff



Gray area corresponds to the substrate (P)

Top view is visible on the canvas

Dotted rectangular area = error (also notice red check next DRC - 1 DRC violation)

: drc find

```
texthelper updatedisplay uplevel upsidedown upvar  
Unknown macro or short command: 'XK_q'  
: paint ndiff  
: drc find  
Error area #1:  
N-type Diffusion width must be at least 3 (MOSIS rule #2.1a)
```

To remove any layer, pick that area (white outline) and click anywhere on the substrate.

To move a selected area:

Click on it -> gets white outline

: select area

Now the outline can be freely moved by using command window-

: move e 1

(move east by 1 unit)

Press ' .' to run the same command again

To get specific help with commands -

% help (general)

% help move (will give all move related commands)

% help select

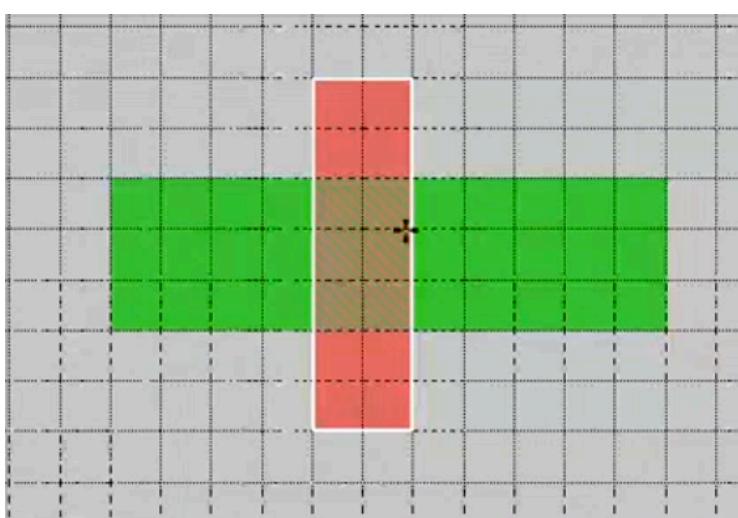
% select help

- Designing NMOS -

After paint ndiff

Poly -

: paint poly



Pure red - poly overhang

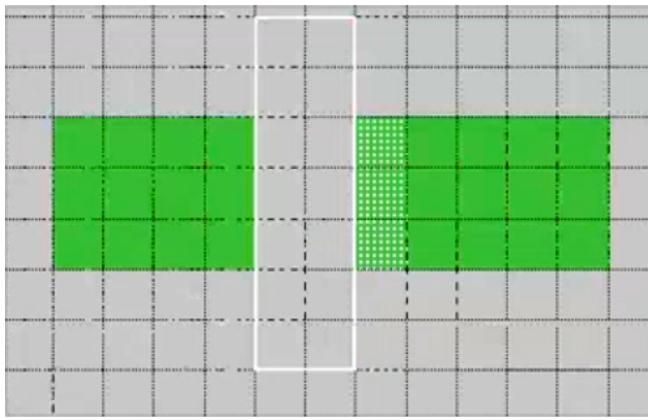
Green + red - gate

- To selectively only remove poly -

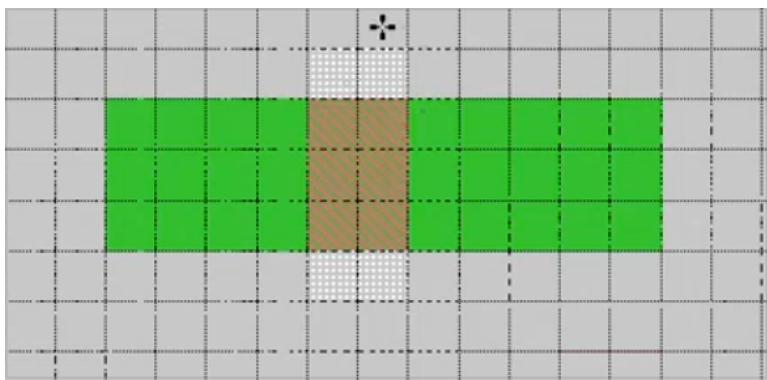
: select area poly

(syntax - select area layer)

: erase



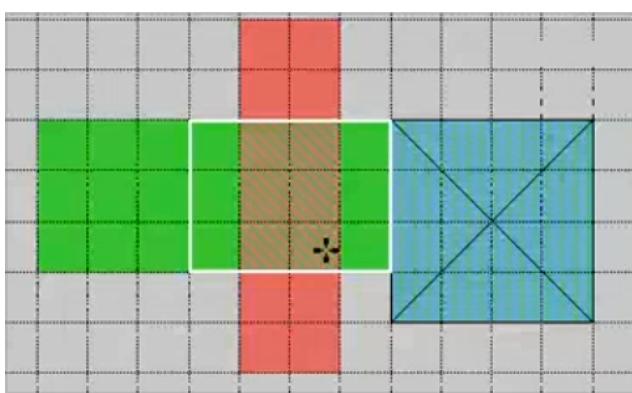
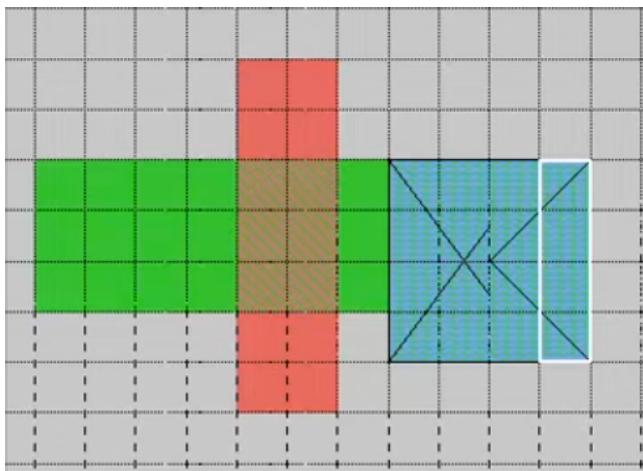
Method 2 : Instead of erase -
: delete (after selecting)



Gate area still remains
Now to remove this -
: select area nfet
: delete

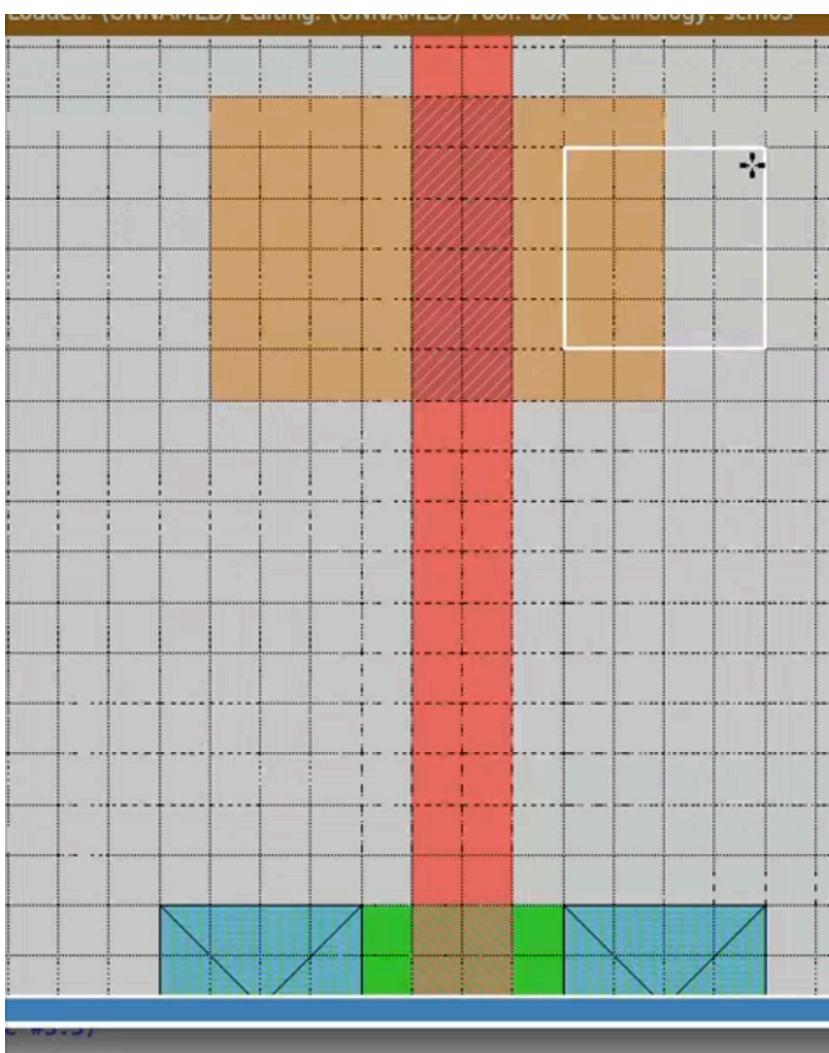
Note - width of nmosfet (green) = 3 grids = 3λ
Length = 2 grids = 2λ (p.s. the remaining green area is Source and drain)

Add contacts -
: paint ndc
(N diffusion contact)

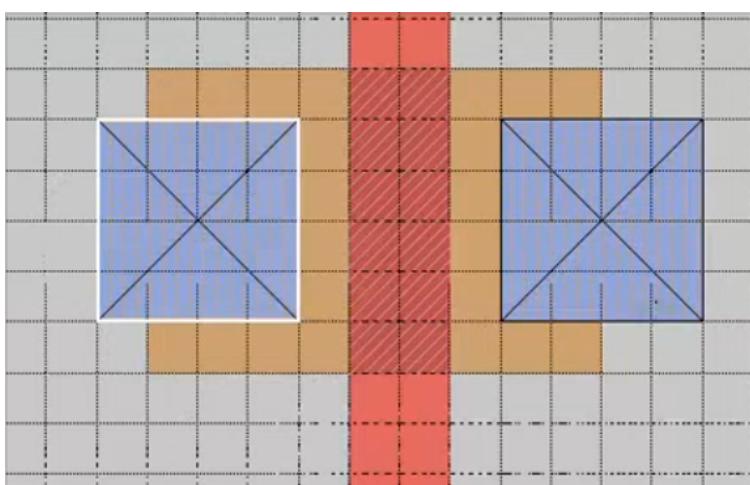


Replicate contact on lhs

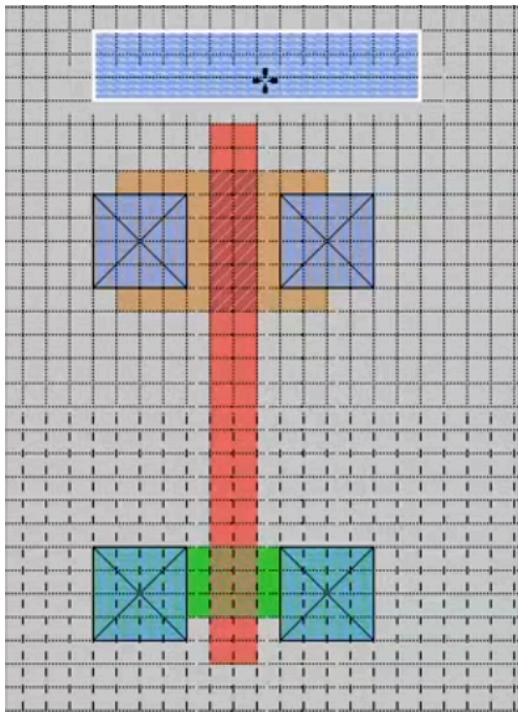
PMOS - diff has to be twice the size of ndiff



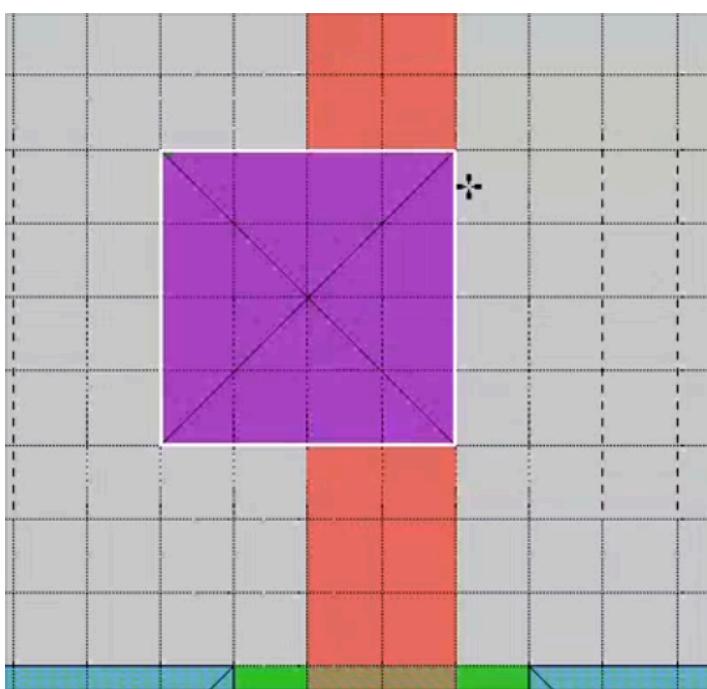
: paint pdc



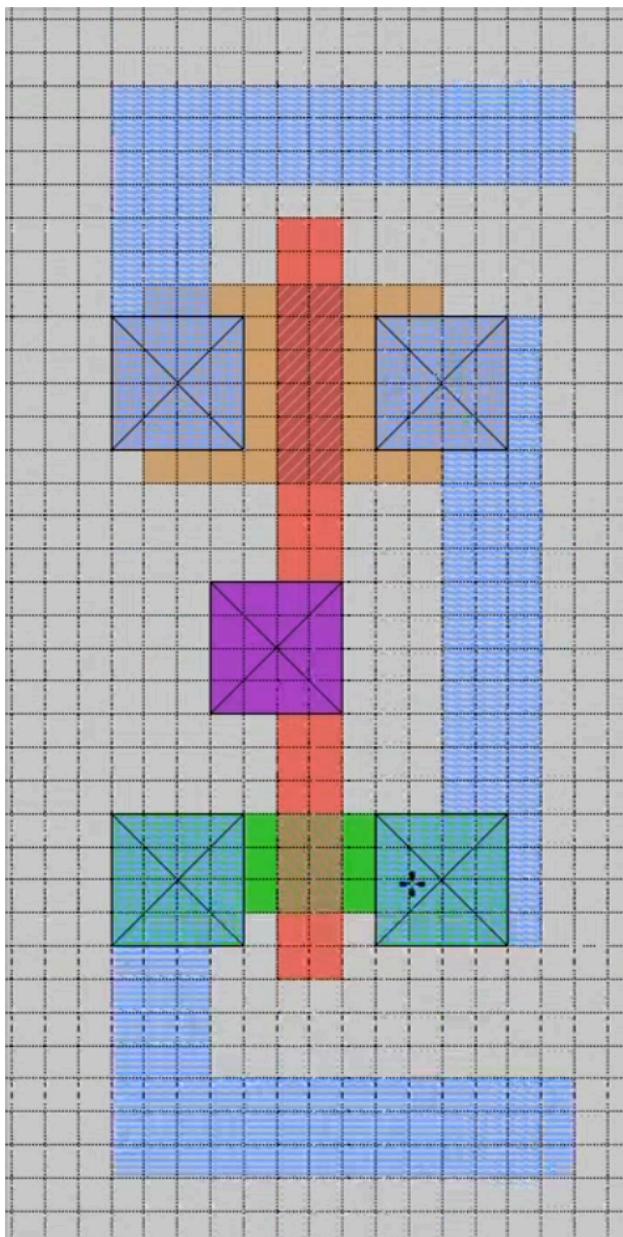
: paint m1
(Metal 1)



: paint pc
(Poly contact)

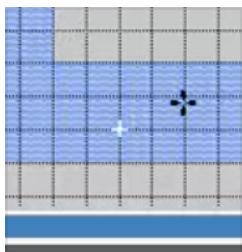


Inverter -



Labelling -

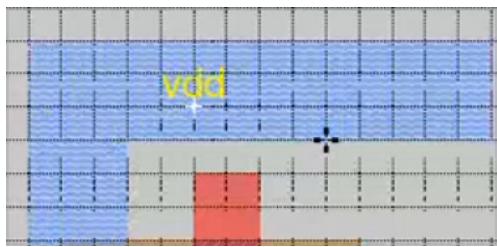
Click a point on the area, then in command line -



Syntax => :label str [pos [layer]]

:label vdd n

(n - north of point selected)



- Saving the file -
- : save filename.mag