2.6 Polysilicon and Diffusion Contacts

Contacts between metal1 and polysilicon go by the names polycontact, pcontact, polycut, and pc. As with all contacts, you only draw the outer boundary of the overlapping area of poly and metal1; Magic fills in the contact cut(s) at mask generation time. Pcontact areas must be at least 4 units wide and must be separated from unrelated polysilicon and pcontact by at least 3 units. This is one unit more than the normal poly-poly separation, and is required because MOSIS bloats the polysilicon around pcontacts.

There are four kinds of contacts between metal1 and diffusion, one for each of the kinds of diffusion. Contacts between metal1 and ndiffusion are called ndcontact, ndiffcut or ndc. Contacts betwen metal1 and pdiffusion are called pdcontact, pdiffcut or pdc. Contacts between metal1 and nsubstratendiff are called nsubstratencontact or nncontac t or nsc or nnc or nohmic. Lastly, contacts between metal1 and psubstratepdiff are called psubstratepcontact or ppcontact or psc or ppc or pohmic. All diffusion contacts must be at least 4 units wide, and must be separated from unrelated diffusion by 4 units, one unit more than the normal diffusion-diffusion separation. It is recommended that contacts to poly or diffusion be sized by multiple of 4. It is to warrant the cuts to be on the lambda grid.

Both poly and diffusion contacts appear on the screen as an overlap between the two constituent layers, with a cross over the contact area. All contacts must be rectangular in shape. Pdc may abut nsc and and ndc may abut psc; all other contact abutments are illegal. Pcontact must be at least 2 units from any diffusion contact, even if the two contacts are electrically connected as on the right of the figure. See Section 2.8 for more rules on substrate contacts.

2.7 Transistors

P-type transistors are drawn as an area of poly over-lapping pdiffusion, with brown stripes in the transistor area. Magic accepts the names pfet or ptransistor for this layer. N-type transistors are drawn as an area of poly overlapping ndiffusion, with green stripes in the transistor area. The names nfet, and ntransist or may be used. Transistors of each type can be generated by painting polysilicon and diffusion on top of each other, or by painting the transistor layer explicitly. The design rules are the same for both types of transistor: transistors must be at least 2 units long and 3 units wide. Polysilicon used as gate must overhung transistor by at least 2 units. Diffusion (ndiff or pdiff) must overhung transistor by at least 3 units. They must be separated from nearby poly contacts by at least 1 unit. Polysilicon must be at least 1 unit away from diffusion, except where it is forming a transistor. Transistors must be at least 2 units away from each other.

2.8 Substrate Contacts

There are several additional rules besides those in Section 2.6 that apply to substrate contacts. Substrate contacts are used to maintain proper substrate voltages and prevent