SRI VASAVI INSTITUTE OF ENGINEERING & TECHNOLOGY
Department of Electronics and Communication Engineering

# Differentiation

COURSE :VLSID (C322) Class: III B.Tech ECE A&B
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sheet Resistance Rs of MOS Layers for different technologies (5µm ,2µm ,1.2µm )

| Layer | $R_s$ ohm per square | | |
|---|---|---|---|
| | 5 µm | Orbit | Orbit 1.2 µm |
| Metal | 0.03 | 0.04 | 0.04 |
| Diffusion (or active)** | 10→50 | 20→45 | 20→45 |
| Silicide | 2→4 | — | — |
| Polysilicon | 15→100 | 15→30 | 15→30 |
| n-transistor channel | $10^{4\dagger}$ | $2 \times 10^{4\dagger}$ | $2 \times 10^{4\dagger}$ |
| p-transistor channel | $2.5 \times 10^{4\dagger}$ | $4.5 \times 10^{4\dagger}$ | $4.5 \times 10^{4\dagger}$ |

area capacitance values for MOS circuits

| Capacitance | Value in $pF \times 10^{-4}/\mu m^2$ (Relative values in brackets) | | | | | |
|---|---|---|---|---|---|---|
| | 5 µm | | 2 µm | | 1.2 µm | |
| Gate to channel | 4 | (1.0) | 8 | (1.0) | 16 | (1.0) |
| Diffusion (active) | 1 | (0.25) | 1.75 | (0.22) | 3.75 | (0.23) |
| Polysilicon* to substrate | 0.4 | (0.1) | 0.6 | (0.075) | 0.6 | (0.038) |
| Metal 1 to substrate | 0.3 | (0.075) | 0.33 | (0.04) | 0.33 | (0.02) |
| Metal 2 to substrate | 0.2 | (0.05) | 0.17 | (0.02) | 0.17 | (0.01) |
| Metal 2 to metal 1 | 0.4 | (0.1) | 0.5 | (0.06) | 0.5 | (0.03) |
| Metal 2 to polysilicon | 0.3 | (0.075) | 0.3 | (0.038) | 0.3 | (0.018) |

- **For 5µm MOS circuits**
  Area/standard square = 5µm X 5µm = 25 $\mu m^2$(minimum transistor size)
  Capacitance value = 4 X $10^{-4}$ pF/ $\mu m^2$( form table 3.2)
  Thus, standard value $\square C_g$= 25 $\mu m^2$ X 4 X 10-4 pF/ $\mu m^2$ = 0.01 pF

- **For 2µm MOS circuits**
  Area/standard square = 2µm X 2µm = 4 $\mu m^2$
  Capacitance value = 8 X $10^{-4}$ pF/ $\mu m^2$
  Thus, standard value $\square C_g$ = 4 $\mu m^2$ X 8 X $10^{-4}$ pF/ $\mu m^2$ = 0.01 pF

- **For 1.2µm MOS circuits**
  Area/standard square = 1.2µm X 1.2µm = 1.44 $\mu m^2$
  Capacitance value = 16 X 10-4 pF/ $\mu m^2$
  Thus, standard value $\square C_g$ = 1.44 $\mu m^2$ X 16 X $10^{-4}$ pF/ $\mu m^2$ = 0.0023 pF

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