

# Process C1004

## CMOS 1.0 $\mu$ m

## 5 Volt Digital

### Electrical Characteristics

T=25°C Unless otherwise noted

N-Channel Transistor	Symbol	Minimum	Typical	Maximum	Unit	Comments
Threshold Voltage	$V_{T_N}$	0.55	0.75	0.95	V	100x1.0 $\mu$ m
Body Factor	$\gamma_N$		0.60		$V^{1/2}$	100x1.0 $\mu$ m
Conduction Factor	$\beta_N$	74	87	100	$\mu A/V^2$	100x100 $\mu$ m
Effective Channel Length	$L_{eff_N}$	0.60	0.75	0.90	$\mu$ m	100x1.0 $\mu$ m
Width Encroachment	$\Delta W_N$		0.8		$\mu$ m	Per side
Punch Through Voltage	$BVDSS_N$	7			V	
Poly Field Threshold	$VTF_{P(N)}$	10			V	

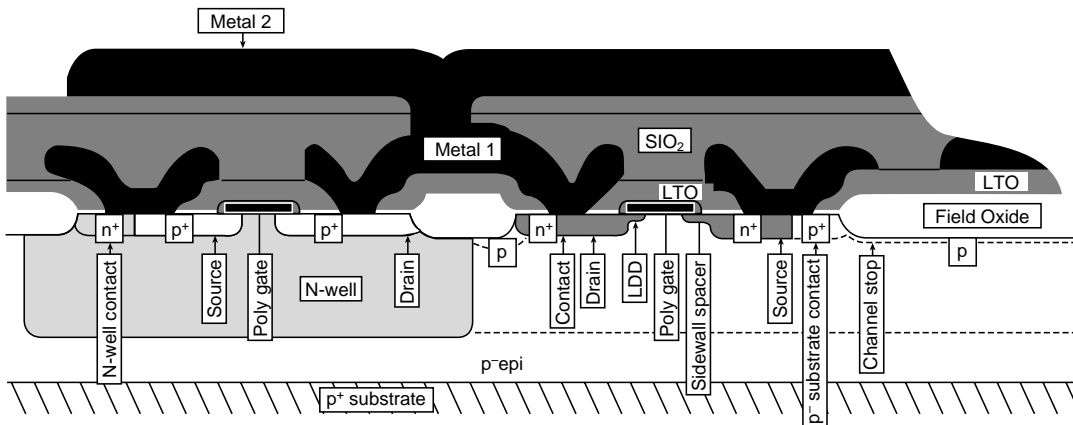
P-Channel Transistor	Symbol	Minimum	Typical	Maximum	Unit	Comments
Threshold Voltage	$V_{T_P}$	-0.85	-1.0	-1.15	V	100x1.0 $\mu$ m
Body Factor	$\gamma_P$		0.4		$V^{1/2}$	100x1.0 $\mu$ m
Conduction Factor	$\beta_P$	24	28	32	$\mu A/V^2$	100x100 $\mu$ m
Effective Channel Length	$L_{eff_P}$	0.83	0.98	1.13	$\mu$ m	100x1.0 $\mu$ m
Width Encroachment	$\Delta W_P$		0.85		$\mu$ m	Per side
Punch Through Voltage	$BVDSS_P$	-7			V	
Poly Field Threshold Voltage	$VTF_{P(P)}$	-10			V	

Diffusion & Thin Films	Symbol	Minimum	Typical	Maximum	Unit	Comments
Well (field) Sheet Resistance	$\rho_{N-well(f)}$	0.8	1.0	1.22	$K\Omega/\square$	n-well
N+ Sheet Resistance	$\rho_{N+}$	20	35	50	$\Omega/\square$	
N+ Junction Depth	$x_{jN+}$		0.45		$\mu$ m	
P+ Sheet Resistance	$\rho_{P+}$	60	80	100	$\Omega/\square$	
P+ Junction Depth	$x_{jP+}$		0.5		$\mu$ m	
Gate Oxide Thickness	$T_{GOX}$		20		nm	
Field Oxide Thickness	$T_{FIELD}$		700		nm	
Poly Sheet Resistance	$\rho_{POLY}$	15	22	30	$\Omega/\square$	
Metal-1 Sheet Resistance	$\rho_{M1}$		50		$m\Omega/\square$	
Metal-2 Sheet Resistance	$\rho_{M2}$		30		$m\Omega/\square$	
Passivation Thickness	$T_{PASS}$		200+900		nm	oxide+nit.

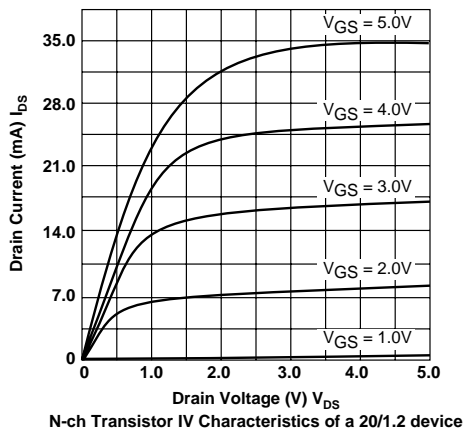
Capacitance	Symbol	Minimum	Typical	Maximum	Unit	Comments
Gate Oxide	$C_{ox}$	1.52	1.64	1.82	fF/ $\mu$ m <sup>2</sup>	
Metal-1 to Poly1	$C_{M1P}$		0.046		fF/ $\mu$ m <sup>2</sup>	
Metal-1 to Silicon	$C_{MIS}$		0.028		fF/ $\mu$ m <sup>2</sup>	
Metal-2 to Metal-1	$C_{MM}$		0.038		fF/ $\mu$ m <sup>2</sup>	

## Physical Characteristics

Starting Material	P <100>	N+/P+ Width/Space	2.0 / 1.2 $\mu$ m
Starting Mat. Resistivity	7-8.5 $\Omega$ -cm	N+ To P+ Space	7.0 $\mu$ m
Typ. Operating Voltage	5V	Contact To Poly Space	0.8 $\mu$ m
Well Type	N-well	Contact Overlap Of Diffusion	0.7 $\mu$ m
Metal Layers	2	Contact Overlap Of Poly	0.7 $\mu$ m
Poly Layers	1	Metal-1 Overlap Of Contact	0.7 $\mu$ m
Contact Size	1.2x1.2 $\mu$ m	Metal-1 Overlap Of Via	0.7 $\mu$ m
Via Size	1.2x1.2 $\mu$ m	Metal-2 Overlap Of Via	0.7 $\mu$ m
Metal-1 Width/Space	1.4 / 1.2 $\mu$ m	Minimum Pad Opening	65x65 $\mu$ m
Metal-2 Width/Space	2.0 / 1.4 $\mu$ m	Minimum Pad-to-Pad Spacing	5.0 $\mu$ m
Gate Poly Width/Space	1.0 / 1.4 $\mu$ m	Minimum Pad Pitch	80.0 $\mu$ m



ID vs VD, W/L = 20/1.2



ID vs VD, W/L = 20/1.2

