

## Features

- Double Poly / Double Metal
- 4  $\mu\text{m}$  Poly and Metal I Pitch
- 320 ps Delay per stage (Ring Osc.)
- 5.5 Volts Maximum Operating Voltage
- 2.7~3.6 Volts Low Voltage Option
- Shrinkable to Mitel 1.5 $\mu\text{m}$  Process
- ProToDuction<sup>™</sup> Option for fast prototypes

## Description

The 2 $\mu\text{m}$  P-Well process provides flexibility, speed and packing density needed in mixed signal designs. The aggressive design rules make it comparable to most 1.5 $\mu\text{m}$  processes. Also, the MOSFET transistors are designed with very shallow source-drain junctions and a thin gate oxide to improve speed. A low voltage option is available for 3 volts applications. It offers low and matched threshold voltages for improved dynamic range needed in mixed analog/digital applications.

## Process Parameters

Process Parameters	2 $\mu\text{m}$ 5volts & 3volts	Units
Metal I pitch (width/space)	2 / 2	$\mu\text{m}$
Metal II pitch (width/space)	2.6 / 2.4	$\mu\text{m}$
Poly pitch (width/space)	2 / 2	$\mu\text{m}$
Contact	2 x 2	$\mu\text{m}$
Via	2.4 x 2.4	$\mu\text{m}$
Gate geometry	2	$\mu\text{m}$
P-well junction depth	4	$\mu\text{m}$
N+ junction depth	0.20	$\mu\text{m}$
P+ junction depth	0.28	$\mu\text{m}$
Gate oxide thickness	325	Å
Inter poly oxide thick.	500	Å

## MOSFET Electrical Parameters

Electrical Parameters	2 MICRON - 5 volts						2 MICRON - 3 volts						Units	Conditions
	N Channel			P Channel			N Channel			P Channel				
	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.		
Vt (10x2 $\mu\text{m}$ )	0.55	0.70	0.85	0.55	0.70	0.85	0.35	0.50	0.65	0.35	0.50	0.65	V	saturation
I <sub>ds</sub> (10x2 $\mu\text{m}$ )	160			70			175			80			$\mu\text{A}/\mu\text{m}$	V <sub>ds</sub> =V <sub>gs</sub> =5volts
Gain $\beta$ (10x2 $\mu\text{m}$ )	325			120			325			120			$\mu\text{A}/\text{V}^2$	
Body Factor (50x50 $\mu\text{m}$ )	0.40			0.40			0.35			0.35			$\bar{V}$	
Bvdss	10	12		10	13		10	12		10	13		V	I <sub>ds</sub> =100nA
Subthreshold Slope	100			100									mV/dec.	V <sub>ds</sub> =0.1v
Substrate Current	0.25		0.34				0.25		0.34				$\mu\text{A}/\mu\text{m}$	V <sub>ds</sub> =5.5v; V <sub>gs</sub> =2.7v
Field Threshold	10	18		10	17		10	18		10	17		V	I <sub>ds</sub> = 14 $\mu\text{A}$
L Effective	1.8			1.7			1.8			1.7			$\mu\text{m}$	L drawn = 2 $\mu\text{m}$

# 2 Micron CMOS Process Family

## Capacitances (fF/ $\mu\text{m}^2$ )

	2 $\mu\text{m}$ 5 volts & 3 volts		
	min.	typ.	max.
Inter-poly	0.62	0.73	0.84
Gate oxide	0.99	1.06	1.15
N+ Junction		.195	
P+ Junction		.138	

## Bipolar gain<sup>1</sup>

	2 $\mu\text{m}$ - 5 volts min. typ. max.		
	NPN vertical		300

<sup>1</sup>Test condition :  $V_{ce} = 5$  volts

## Resistances ( $\Omega/\text{sq.}$ )

	2 $\mu\text{m}$ 5 volts & 3 volts			Temp. coef. ( $\Omega/\text{sq.}$ ) $^{\circ}\text{C}$
	min.	typ.	max.	
Pwell		13000		140
Pfield in Pwell	3000	3600	4200	32
N+	35	45	55	.06
P+	80	100	120	.15
Poly gate	15	20	25	.02
Poly capacitor	75	100	125	.06
Metal I		0.038		
Metal II		0.038		

FIG 1: I-V Characteristics for a 50x2 $\mu\text{m}$  N-MOSFET (2 $\mu\text{m}$  5 volts process)

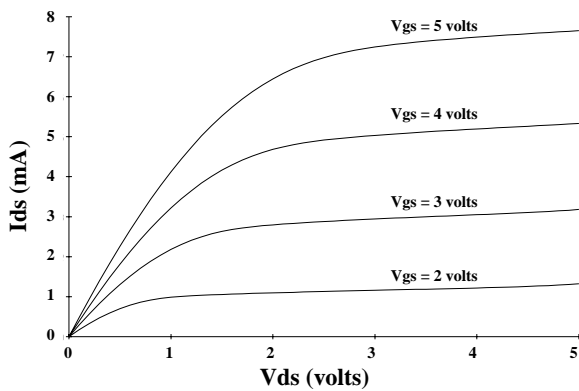


FIG 2: I-V Characteristics for a 50x2 $\mu\text{m}$  P-MOSFET (2 $\mu\text{m}$  5 volts process)

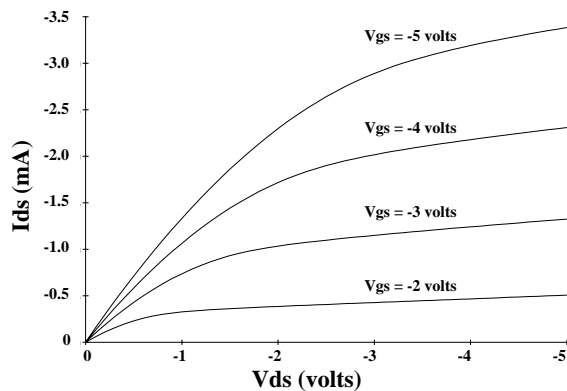


FIG 3: Subthreshold Characteristics at  $V_{ds}=0.1$  volts for a 50x2 $\mu\text{m}$  N-MOSFET (2 $\mu\text{m}$  5 volts Process)

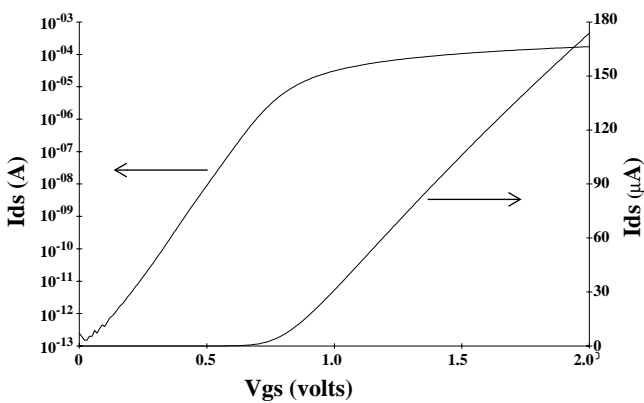
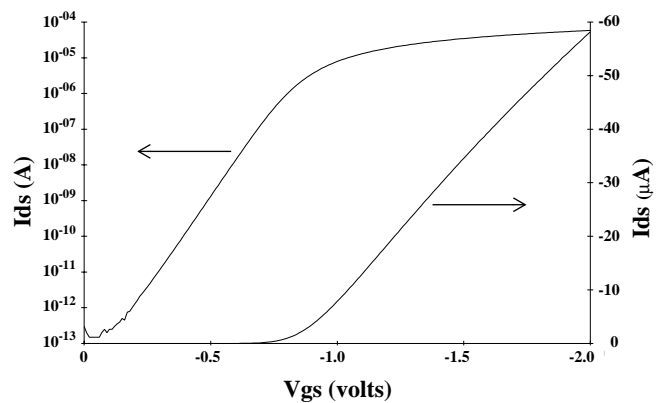


FIG 4: Subthreshold Characteristics at  $V_{ds}=-0.1$  volts for a 50x2 $\mu\text{m}$  P-MOSFET (2 $\mu\text{m}$  5 volts Process)



Note: These values are for guidance only. Many of them can be adjusted to suit customer requirements. For full process specifications contact a Mitel sales office or representative.