

Features

- Double Poly / Double Metal
- 8 μm Poly and Metal Pitch
- 10 Volts Maximum Operating Voltage
- 15 Volts High Voltage Option
- Isolated Vertical PNP Bipolar Module

Description

Mitel 4 μm process is a double poly/double metal CMOS process with an operating voltage range of 5 to 10 volts. In addition, a high voltage option is also available in which a special drain structure allows the maximum operating voltage to be increased to 18 volts. No compromises are made with packing density since all high voltage gates are drawn at 4 μm . Also, an Isolated Vertical PNP bipolar module with good gain characteristics and high BV_{ceo} can be implemented on both options.

Process Parameters

Process Parameters	4 μm 10 volts	4 μm 15 volts	Units
Metal I pitch (width/space)	4 / 4	4 / 4	μm
Metal II pitch (width/space)	3 / 4	3 / 4	μm
Poly pitch (width/space)	4 / 4	4 / 4	μm
Contact	4 x 4	4 x 4	μm
Via	3 x 3	3 x 3	μm
Gate geometry	4.0	4.0	μm
P-well junction depth	5.7	7.0	μm
N+ junction depth	1.5	1.4	μm
P+ junction depth	0.90	0.95	μm
Gate oxide thickness	640	800	Å
Inter poly oxide thick.	800	625	Å

MOSFET Electrical Parameters

Electrical Parameters	4 MICRON - 10 volts						4 MICRON - 15 volts						Units	Conditions
	N Channel			P Channel			N Channel			P Channel				
	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.		
V _t (50x4 μm)	0.4	0.7	0.9	0.4	0.7	0.9	0.6	0.9	1.2	0.8	1.1	1.4	V	saturation
I _{ds} (50x4 μm)	32			17			94			37			$\mu\text{A}/\mu\text{m}$	10V : V _{ds} =V _{gs} = 3v 15V : V _{ds} =V _{gs} =7.5v
Body factor	0.8			0.4			1.3			0.5			\sqrt{V}	
B _{vdss}	15	>20		15	>20		20	27		20	22		V	10V : I _{ds} =1 μA 15V : I _{ds} =20nA
Subthres. slope	114			90			108			80			mV/ dec.	V _{ds} =0.1v
Field threshold	12	34		12	25		18	24		18	22		V	I _{ds} = 14 μA
L effective	1.6			2.6			1.9			2.6			μm	L drawn = 4 μm

4 Micron CMOS Process Family

Capacitances (fF/ μm^2)

	4 μm - 10 volts			4 μm - 15 volts		
	min.	typ.	max.	min.	typ.	max.
Inter-poly	0.35	0.43	0.55	0.45	0.55	0.65
Gate oxide	0.51	0.54	0.58	0.41	0.43	0.46
N+ Junction	0.33			0.29		
P+ Junction	0.14			0.10		

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

	4 μm - 10 volts			4 μm - 15 volts		
	min.	typ.	max.	min.	typ.	max.
Pwell	5200			3300		
Pfield in Pwell	1000	2000	3000	1000	2000	3000
N+	6	9	14	30	39	50
P+	70	94	110	75	90	125
Poly gate	14	21	26	16	20	28
Poly capacitor	30	43	80	20	28	50
Metal I	0.038			0.038		
Metal II	0.038			0.038		

Bipolar characteristics

		4 μm - 10 volts			4 μm - 15 volts		
		min.	typ.	max.	min.	typ.	max.
NPN vertical	Gain*	580			240		
	Bvceo (V)	70	90		70	90	
PNP vertical	Gain*	-	-	-	50	120	200
	Bvceo (V)	-	-	-	20	30	

¹Test condition : Vce = 5 volts

FIG 1: I-V Characteristics for a 50x4 μm N-MOSFET (4 μm High Voltage Process)

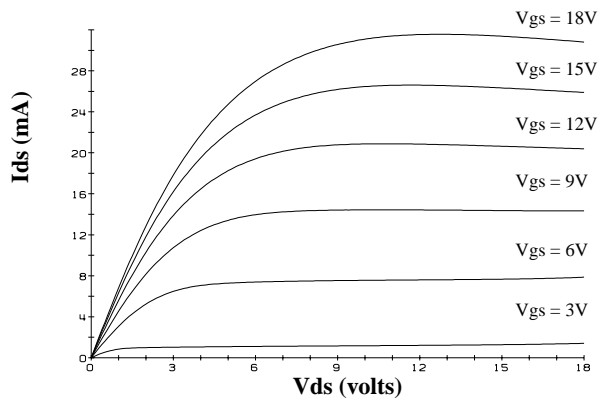


FIG 2 : I-V Characteristics for a 50x4 μm P-MOSFET (4 μm High Voltage Process)

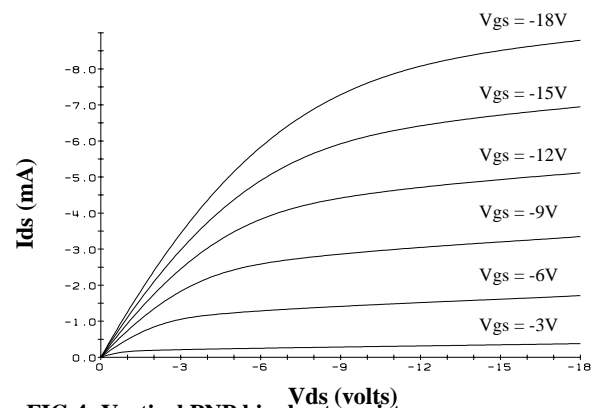


FIG 3: Substrate Current per Gate Width for a 50x4 μm N-MOSFET (4 μm High Voltage Process)

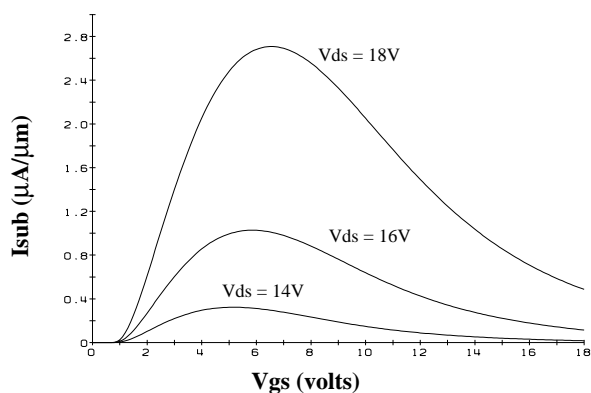
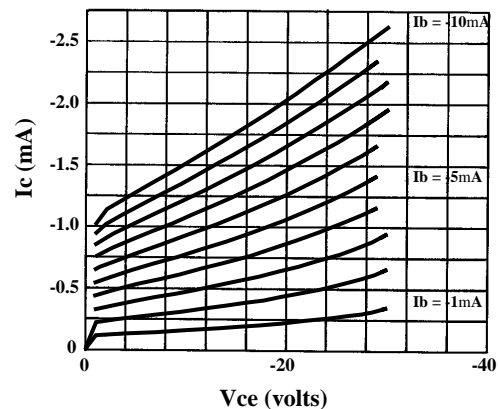


FIG 4 : Vertical PNP bipolar transistor



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.