



1.5 Micron CMOS Process Family

Features

- LO_VMOS Processes (2.7~3.6 Volts Low Voltage Option)
- 1.2 Volts Very Low Voltage Option
- 5.5 Volts Maximum Operating Voltage
- Double Poly / Double Metal
- 3 μm Poly and Metal I Pitch
- ProToDuction™ Option for low cost prototypes
- 150mm Wafers

Process parameters

	1.5 μm	Units
Metal I pitch (width/space)	1.5 / 1.5	μm
Metal II pitch (width/space)	2.0 / 1.8	μm
Poly pitch (width/space)	1.5 / 1.5	μm
Contact	1.5 x 1.5	μm
Via	1.8 x 1.8	μm
Gate geometry	1.5	μm
P-well junction depth	3.0	μm
N+ junction depth (5V&3V / 1.2V)	0.28 / 0.20	μm
P+ junction depth	0.28	μm
Gate oxide thickness	270	Å
Inter poly oxide thickness	480	Å

Description

The 1.5 μm process provides the flexibility, speed and packing density needed in mixed signal designs. The aggressive design rules make it comparable to most 1.2 μm processes. 3 volts and a 1.2 volts options are also available for low voltage applications; they offer low and matched threshold voltages for improved dynamic range.

Technology outline

- Drain Engineered Structure to Ensure Reliability against Hot-Carrier Injection
- Planarization with SOG Sandwich Structure
- Nitride Passivation for Reliability against Moisture
- Latchup Free Process on Non-Epi Material Achieved with Optimized I/O Protection

MOSFET Electrical Parameters

	1.5 MICRON - 1.2 volts			1.5 MICRON - 3 volts			1.5 MICRON - 5 volts			Units	Conditions
	N Channel min. typ. max.	P Channel min. typ. max.		N Channel min. typ. max.	P Channel min. typ. max.		N Channel min. typ. max.	P Channel min. typ. max.			
V _t (50x1.5 μm)	0.30 0.40 0.50	0.30 0.40 0.50		0.35 0.50 0.65	0.35 0.50 0.65		0.55 0.70 0.85	0.55 0.70 0.85		V	Saturation
I _{ds} (50x1.5 μm)	260	110		280	120		196 240	78 100		$\mu\text{A}/\mu\text{m}$	V _{ds} =V _{gs} =5V
Gain β (50x1.5 μm)	2.92	1.05		3.50	1.05		2.90	0.80		mA/V^2	Linear (1.2V&3.0V) Saturation (5V)
Body Factor (50x50 μm)	0.50	0.77		0.52	0.75		0.45	0.81		$\sqrt{V}$	
Bvdss (50x1.5 μm)	5 10	5 9		7 12	7 12		10 12	10 12		V	I _{ds} =20nA
Subthreshold Slope	85	105		87	106		93	101		mV/dec.	V _{ds} =0.1V
Substrate Current	1.1	NA		0.26	NA		0.21	NA		$\mu\text{A}/\mu\text{m}$	V _{ds} =5.5V, V _{gs} =2.3V
Field Threshold	10 15	10 14		10 15	10 14		10 17	10 20		V	I _{ds} = 1 $\mu\text{A}/\text{square}$
L Effective	1.27	1.12		1.09	1.05		1.2	1.2		μm	L _{drawn} = 1.5 μm
Gate Propagation Delay Propagation Delay Time per Stage (47 Stage Ring Oscillator)	Typ. = 2.4 ns @1.2V			Typ. = 530 ps @3.3V			Typ. = 380 ps @5.0V				P 6.3/1.5 N 2.3/1.5



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1.5 Micron CMOS Process Family (cont'd)

Capacitances (fF/ μm^2)

	1.5 μm		
	min.	typ.	max.
Inter-poly	0.62	0.72	0.84
Gate oxide		1.3	
N+ Junction		0.29	
P+ Junction		0.27	

Bipolar gain¹

	1.5 μm - 5 volts		
	min.	typ.	max.
NPN vertical		180	

¹Test condition : $V_{ce} = 5$ volts

Resistances (Ω /sq.)

	1.5 μm		
	min.	typ.	max.
Pwell		5700	
Pfield in Pwell	2600	3000	3400
N+	30	40	50
P+	70	90	110
Poly gate	15	20	25
Poly capacitor	75	100	125
Metal I		0.038	
Metal II		0.038	

FIG 1 : I-V Characteristics for a 10x1.5 μm N-MOSFET (1.5 μm 5 volts process)

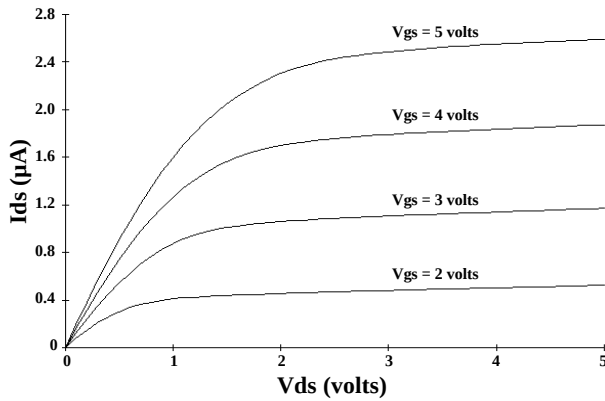


FIG 2 : I-V Characteristics for a 10x1.5 μm P-MOSFET (1.5 μm 5 volts process)

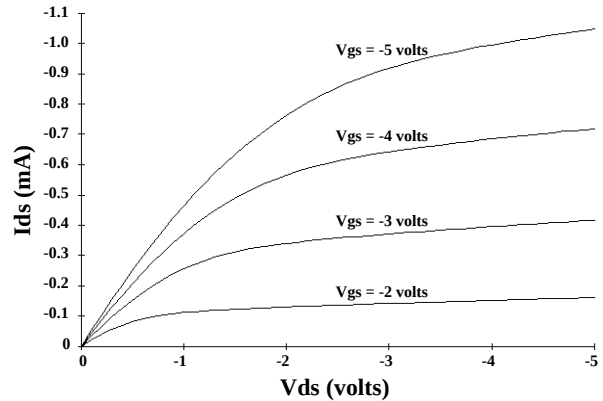


FIG 3 : Subthreshold Characteristics at $V_{ds}=0.1$ volt for a 10x1.5 μm N-MOSFET (1.5 μm 5 volts process)

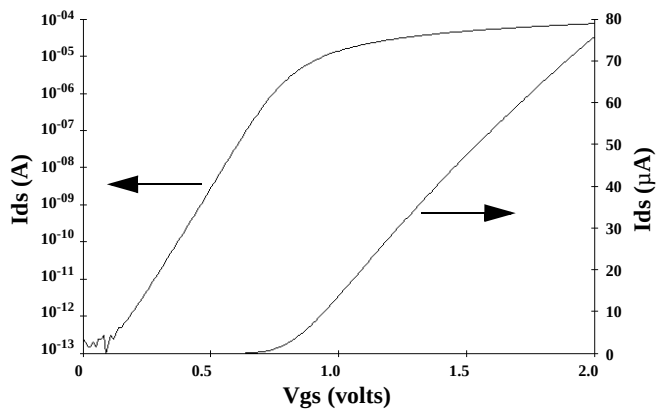
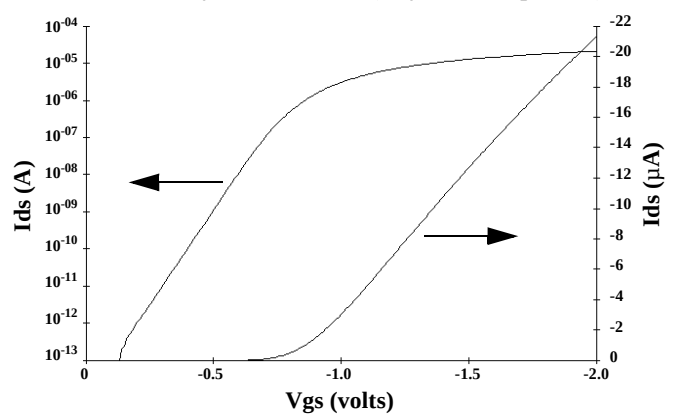


FIG 4 : Subthreshold Characteristics at $V_{ds}=-0.1$ volt for a 10x1.5 μm P-MOSFET (1.5 μm 5 volts process)



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.