

High Voltage Technology Overview

The 0.18-micron high voltage technology is ideal for very high voltage devices with standard analog/digital circuits on the same die. The technology addresses a variety of challenging markets such as next generation LED lighting, on-line switches and gate-driver applications. With the highest levels of IP security and a collaborative, U.S.-based foundry, TSI Semiconductors is your reliable supply chain partner who helps you bring disruptive technologies to market while scaling with your growth.

TSI Semiconductors 0.18um Process Device Menu	
Process	High Voltage
VGS	1.8V, 5V & 20V
Triple Well Isolation FETs	Yes
	1.8V, 5V, 12V, 20V, 25V, 50V, 120V
	High Vt * (2ML)
	Super high Vt * (2ML)
Resistors	N+, P+ diffusion & poly
	RR poly high R 1.6KΩ/sq (1ML)
	RP poly precision R 165Ω/sq (1ML)
	TaN BEOL (1ML)
Diodes	Schottky Barrier
Decoupling Caps and Varactors	1.8V/5V N, P caps, vars
BEOL Caps	Vertical native (VNcap) High voltage Vncap - 120V
	Single MIM - 2.1 fF/μm ² * (1ML)
	Dual MIM - 4.1 fF/μm ² * (1ML)
BEOL Metal	7LM: M1-MT Analog Metal (AM) - 4μm
	M3,V3,M4,V4,M5,V5
Inductors	Analog Metal (AM) - 4μm Al
Masks (1P, 3LM)	27

* Optional Devices/Layers

High Voltage FET Options								
		HV Asymmetric FETs in HV well			HV Symmetric FETs		HV Stepped FETs	
VGS	VDS	20V	50V	120V	20V	50V	12V	20V
	1.8V (3.5nm)	nfeti20t pfet20t	nfeti50t pfet50t					
	5V (12nm)	nfeti25m pfet25m	nfeti50m pfet50m	nfeti120m pfet120m			nfeti12mh* pfet12mh	nfet20mh*
	20V (52nm)	nfeti20h pfet20h	nfeti50h pfet50h		nfet20hs* pfet20hs	nfet50hs* pfet50hs		

*Substrate Based

HV Process Technology					
Device\Parameter	L_{min} (μm)	V_t (V)	I_{dsat} ($\mu A/\mu m$)	Breakdown (V)	R_s ($m\Omega * mm^2$)
nfeti20t	0.2	0.43	200	32	35
pfet20t	0.2	-0.34	-143	-37	53
nfeti50t	0.2	0.41	172	93	168
pfet50t	0.2	-0.34	-125	-79	185
nfeti25m	0.4	0.71	340	39	45.6
pfet25m	0.6	-0.515	-220	-40	66
nfeti50m	0.4	0.70	265	85	144
pfet50m	0.6	-0.515	-205	-79	193
nfeti120m	1.0	0.99	176	155	423
pfet120m	1.0	-0.63	-132	-155	784
nfeti12mh*	0.4	0.84	400	22	13.6
pfet12mh	0.6	-0.58	-284	-17.5	37.3
nfet20mh*	0.4	0.79	395	36	17.5
nfeti20h	0.5	2.00	577	33.5	30
pfet20h	0.6	-2.50	-346	-46	63
nfeti50h	0.5	2.14	353	98	140
pfet50h	0.6	-2.52	-310	-80	184
nfet20hs*	0.7	2.15	341	43	47
pfet20hs	2.0	-1.79	-248	-32	129
nfet50hs*	1.3	2.15	229	97	317
pfet50hs	3.0	-1.80	-159	-84	635

*Substrate Based

Bipolars			
Bipolars	V_{be} (V)	β_f (Ic/Ib)	V_A (V)
VNPN	0.738	48	50
VPNP	0.606	76	91

Summary

0.18-micron high voltage FET device options include thin (1.8v), medium (5v), thick (20v) gate oxides, tapered oxide asymmetric devices and some symmetric devices.

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