



Figure 1: EKV — Models.

Description:

The EPFL-EKV MOSFET model is a scalable and compact simulation model built on fundamental physical properties of the MOS structure. This model is dedicated to the design and simulation of low-voltage, low-current analog, and mixed analog-digital circuits using submicron CMOS technologies.

Form: mosnekv26:⟨instance name⟩ n_1 n_2 n_3 n_4 ⟨parameter list⟩

n_1 is the drain node,

n_2 is the gate node,

n_3 is the source node,

n_4 is the bulk node.

Parameters:

Parameter	Type	Default value	Required?
L: Channel length (m)	DOUBLE	1.00E-006	no
W: Channel width (m)	DOUBLE	1.00E-006	no
M or NP: Parallel multiple device number	DOUBLE	1	no
N or NS: Series multiple device number	DOUBLE	1	no
COX: Gate oxide capacitance per unit area (F/m ²)	DOUBLE	7.00E-004	no
XJ: Junction depth (m)	DOUBLE	1.00E-006	no
DW: Channel width correction (m)	DOUBLE	0	no
DL: Channel length correction (m)	DOUBLE	0	no
VT0: Long-channel threshold voltage (V)	DOUBLE	0.5	no
GAMMA: Body effect parameter (\sqrt{V})	DOUBLE	1	no
PHI: Bulk Fermi potential (V)	DOUBLE	0.7	no
KP: Transconductance parameter (A/V ²)	DOUBLE	5.00E-005	no
E0: Mobility reduction coefficient (V/m)	DOUBLE	1.00E+012	no
UCRIT: Longitudinal critical field (V/m)	DOUBLE	2.00E+06	no
TOX: Oxide thickness (m)	DOUBLE	4.93E-008	no
NSUB: Channel doping (cm ⁻³)	DOUBLE	1.46E+022	no
VFB: Flat-band voltage (V)	DOUBLE	0	no
U0: Low-field mobility (cm ² /(Vs))	DOUBLE	0.07142857	no
VMAX: Saturation velocity (m/s)	DOUBLE	0.00000014285714	no
LAMBDA: Depletion length coefficient (channel length modulation)	DOUBLE	0.5	no
WETA: Narrow-channel effect coefficient	DOUBLE	0.25	no
LETA: Short-channel effect coefficient	DOUBLE	0.1	no
Q0: Reverse short channel effect peak charge density (A*s/m ²)	DOUBLE	0	no
LK: Reverse short channel effect characteristic length (m)	DOUBLE	2.90E-007	no
IBA: First impact ionization coefficient (1/m)	DOUBLE	0	no
IBB: Second impact ionization coefficient (V/m)	DOUBLE	3.00E+008	no
IBN: Saturation voltage factor for impact ionization	DOUBLE	1	no
TCV: Threshold voltage temperature coefficient (V/K)	DOUBLE	1.00E-003	no
BEX: Mobility temperature exponent	DOUBLE	-1.5	no
UCEX: Longitudinal critical field temperature exponent	DOUBLE	0.8	no
IBBT: Temperature coefficient for IBB (1/K)	DOUBLE	9.00E-004	no
AVT0: Area related threshold voltage mismatch parameter	DOUBLE	0	no
AKP: Area related gain mismatch parameter (m)	DOUBLE	0	no
AGAMMA: Area related body effect mismatch parameter (\sqrt{Vm})	DOUBLE	0	no
KF: Flicker noise coefficient	DOUBLE	0	no
AF: Flicker noise exponent	DOUBLE	1	no
NQS: Non-quasi-static operation switch	DOUBLE	0	no
SATLIM: Ratio defining the saturation limit if/ir	DOUBLE	Exp(4)	no
XQC: Charge/capacitance model selector	DOUBLE	0.4	no

Example:

mosnekv26:m1 2 3 0 0 l=1.0u w=1.5u

Bugs:

This is not the complete EPFL-EKV MOSFET model. The following sets of equations from the model have not yet been implemented: Temperature dependency; Quasi-static model equations; Non-Quasi-Static (NQS) model equations; Intrinsic noise model equations

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Credits:

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