P Channel MOSFET level 2 model **mosp2**

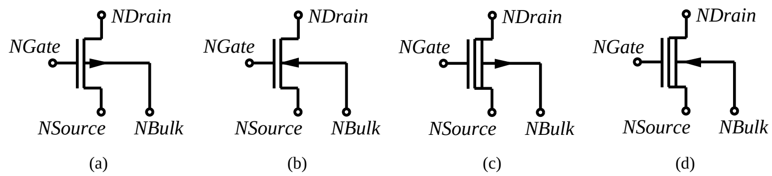

Figure 1: P Channel MOSFET Level 2 model

Form:

`mosp2`:⟨`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?
vt0: Zero bias threshold voltage (V)	DOUBLE	0	no
kp: Transconductance parameter (A/V^2)	DOUBLE	2×10^{-5}	no
gamma: Bulk threshold parameter (V$^{0.5}$)	DOUBLE	0	no
phi: Surface inversion potential (V)	DOUBLE	0.6	no
lambda: Channel-length modulation (1/V)	DOUBLE	0	no
rd: Drain ohmic resistance (Ω)	DOUBLE	0	no
rs: Source ohmic resistance (Ω)	DOUBLE	0	no
is: Bulk junction saturation current (A)	DOUBLE	1×10^{-14}	no
pb: Bulk junction potential (V)	DOUBLE	0.8	no
js: Bulk junction saturation current density (A)	DOUBLE	0	no
tox: Oxide thickness (m)	DOUBLE	1×10^{-7}	no
ld: Lateral diffusion length (m)	DOUBLE	0	no
u0: Surface mobility (cm^2/V-s)	DOUBLE	600	no
fc: Forward bias junction fit parameter	DOUBLE	0.5	no
nsub: Substrate doping (cm^{-3})	DOUBLE	1×10^{15}	no
tpg: Gate material type	DOUBLE	1	no
nss: Surface state density (cm^{-2})	DOUBLE	0	no
delta: Width effect on threshold	DOUBLE	0	no
uexp: Crit. field exp for mob. deg.	DOUBLE	0	no
ucrit: Crit. field for mob. degradation	DOUBLE	1×10^{4}	no
vmax: Maximum carrier drift velocity	DOUBLE	0	no
xj: Junction depth	DOUBLE	0	no
neff: Total channel charge coeff.	DOUBLE	1	no
nfs: Fast surface state density	DOUBLE	0	no
tnom: Nominal temperature (C)	DOUBLE	27	no
kf: Flicker noise coefficient	DOUBLE	0	no
af: Flicker noise exponent	DOUBLE	1	no
t: Device temperature (C)	DOUBLE	27	no
l: Device length (m)	DOUBLE	2×10^{-6}	no
w: Device width (m)	DOUBLE	50×10^{-6}	no
alpha: Impact ionization current coefficient	DOUBLE	0	no

Example:

```
mosp2:p1 2 3 0 0 l=1.2u w=20u
```

Description:

*f*REEDA™has the NMOS level 2 model based on the MOS level , Grove-Frohman model in SPICE. The model uses the charge conservative Yang-Chatterjee model for modeling charge and capacitance.

Notes:

This is the `M` element in the SPICE compatible netlist. The unmodified Yang-Chatterjee charge model has a charge partition scheme in the saturation region that sets the drain charge to zero. This results in a loss of the high-frequency current roll-off at the drain node in saturation.

Version:

2002.08.01

Credits:

Name	Affiliation	Date	Links
Aaron Walker	NC State University	August 2002	NC STATE UNIVERSITY www.ncsu.edu