

TUNNEL DIODE

tundiode

Description:

This element implements a tunnel diode that is used in special low-power microwave applications, such as local oscillator and frequency locking circuits.

Form: `tundiode:<instance name> n_1 n_2 <parameter list>`

instance name is the model name,

n_1 is the positive element terminal,

n_2 is the negative element terminal.

Parameters:

Parameter	Type	Default value	Required?
is: Saturation Current (A)	DOUBLE	1e-16	no
ct0: Zero-Bias Depletion Capacitance (F)	DOUBLE	0	no
fi: Built-In Barrier Potential (V)	DOUBLE	0.8	no
gama: Capacitance Power-Law Parameter	DOUBLE	0.5	no
cd0: Zero-Bias Diffusion Capacitance (F)	DOUBLE	0	no
afac: Slope Factor of Diffusion Capacitance (1/V)	DOUBLE	38.696	no
r0: Bias-Dependent Part of Series Resistance in Forward-Bias (ohms)	DOUBLE	0	no
t: Intrinsic Time Constant of Depletion Layer (s)	DOUBLE	0	no
area: Area Multiplier	DOUBLE	1	no
jv: Valley Current (A)	DOUBLE	1e-04	no
jp: Peak Current (A)	DOUBLE	1e-03	no
vv: Valley Voltage (V)	DOUBLE	0.5	no
vpk: Peak Voltage (V)	DOUBLE	0.1	no
a2: Prefactor in the Excess Current	DOUBLE	30	no
mt: Slope Factor of Tunnel Current)	DOUBLE	-1	no
mx: Slope Factor of Excess Current	DOUBLE	1	no
mth: Slope Factor of Thermal Current	DOUBLE	1	no
temper: Temperature (K)	DOUBLE	300	no

Example:

diodeltun:d1 11 1 js=2.0e-16 jp=1.0e-03 jv=1.8e-04 vp=0.065 vv=0.350

Bugs:

Series inductance which is part of a tunnel diode is not included in model.

Notes:

Nonlinear resistance and capacitance from the microwave diode model was carried over into the tunnel diode model. No confirmation was found to show that the expressions for the resistance and capacitance were completely applicable to the tunnel diode.

Version:

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Credits:

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