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*Description:*

Fast-calculating diode with series resistance. Several calculation steps have been left out and the i-v characteristic is approximate. No capacitance. Tests indicate a speed up of 20% compared to the full diode (model d).

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*Form:* `diodeqk: <instance name> n1 n2 <parameter list>`

*n<sub>1</sub>* is the cathode terminal

*n<sub>2</sub>* is the anode terminal

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*Parameters:*

Parameter	Type	Default value	Required?
js: saturation current density (A/cm <sup>2</sup> )	TR_DOUBLE	10e-12	No
r0: series resistance	TR_DOUBLE	2	No
alfa: alpha variable	TR_DOUBLE	38.696	No
Area: area (cm <sup>2</sup> )	TR_DOUBLE	1	No

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*Example:*

diodeqk:d1 1 2 js=10e-12 rs=10 alfa=39 area=1e-4

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*Description:*Shockley model:

$$I = \cdot js * area * \left( \exp\left(\frac{V_j - V_o}{nV_t}\right) - 1 \right)$$

where:

V<sub>j</sub>: junction voltage

V<sub>o</sub>: log(5e8/alfa)/alfa (.612V default)

nV<sub>t</sub>=1/alfa (~.025V default)

$$V = I * R_s + V_j$$

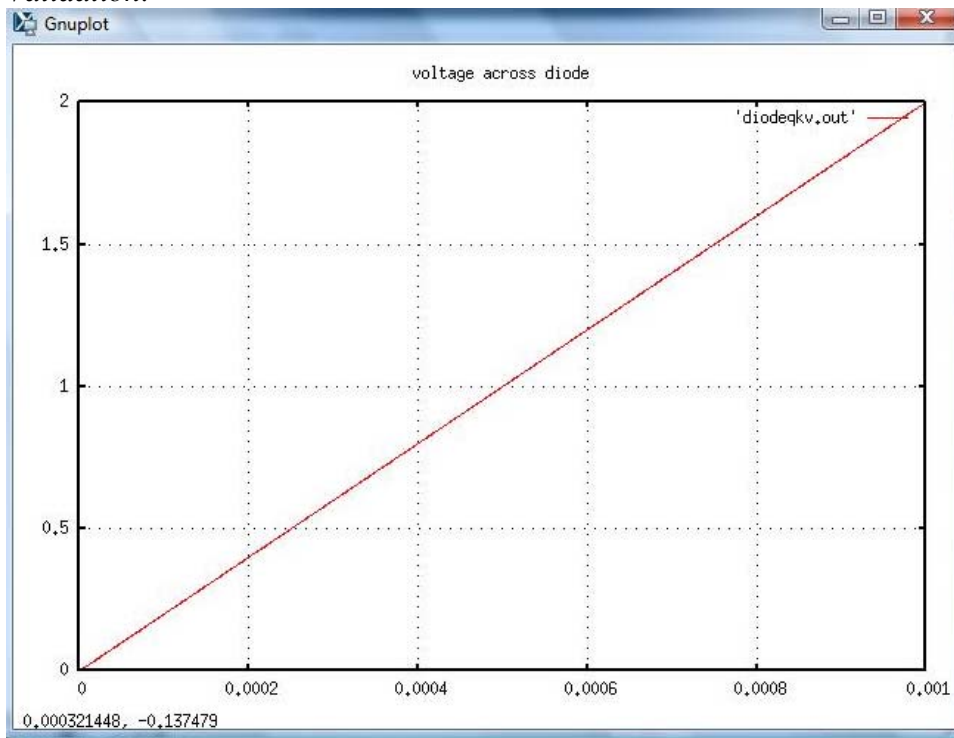
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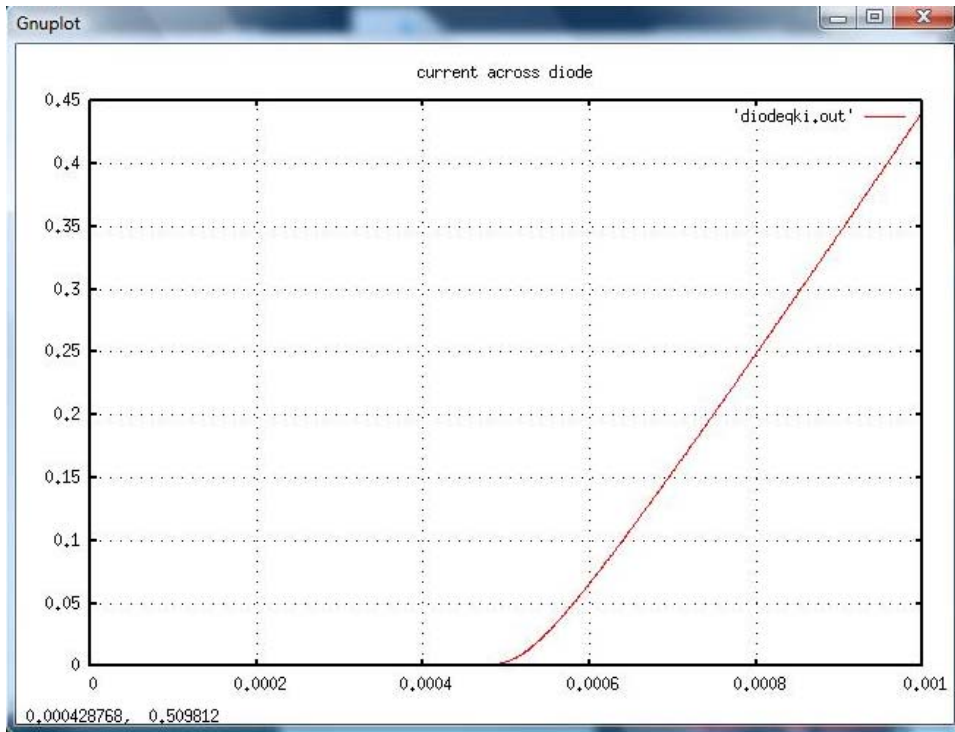
Sample Netlist: (diodeqk.net)

```
.options verbose
.options ftol=1e-10
.options jupdm=0
.tran2 tstop=1ms tstep=1us
.ref 0
vsource:v1 1 0 vdc=2 tr=1ms
diodeqk:d1 1 0
.options gnuplot
.out plot element "diodeqk:d1" 0 it "set title 'Current across diode'" in "diodeqki.out"
.out plot term 1 vt "set title 'Voltage across Diode'" in "diodeqkv.out"
.out plot element "diodeqk:d1" 0 it db "set title 'Log of Current'" in "diodeqkilog.out"
.end
```

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Validation:





**Figure 1: Results from a tran2 run on the default model showing the current as voltage is raised linearly.**

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*Known Bugs:*

No known bugs.

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*Credits:*

Name	Affiliation	Date	Links
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\*Modified from the d.cc model made by Carlos Cristofferson