R-C Thermal Model Parameters

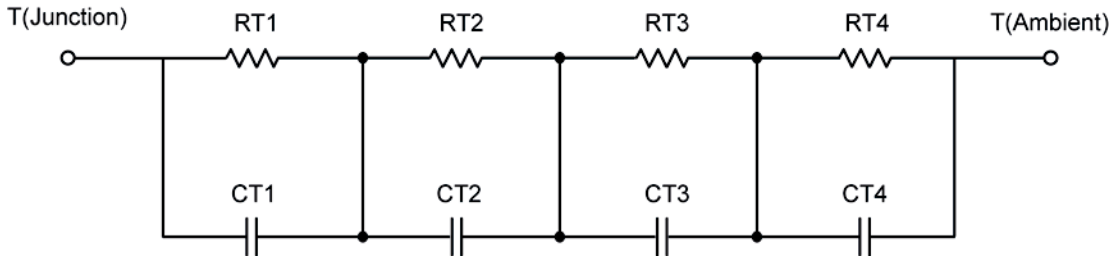
DESCRIPTION

The parametric values in the R-C thermal model have been derived using curve-fitting techniques. These techniques are described in "A Simple Method of Generating Thermal Models for a Power MOSFET"[1]. When implemented in P-Spice, these values have matching characteristic curves to the Single Pulse Transient Thermal Impedance curves for the MOSFET.

R-C values for the electrical circuit in the Foster/Tank and Cauer/Filter configurations are included.

Note:
For a detailed explanation of implementing these values in P-SPICE, refer to Application Note AN609 Thermal Simulations Of Power MOSFETs on P-SPICE Platform.

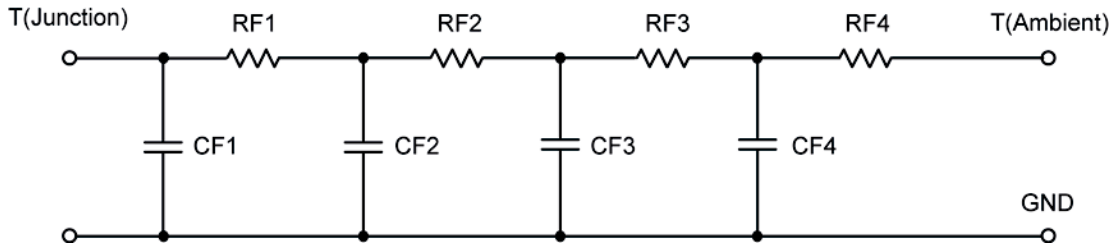
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
RT1	41.3839	50.5349	N/A	29.1228	29.3755
RT2	17.8424	18.1012	N/A	22.7539	22.6128
RT3	45.3883	46.3955	N/A	25.6195	32.7248
RT4	45.3854	49.9684	N/A	12.5038	10.2869
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
CT1	16.2326 m	11.8607 m	N/A	4.1372 m	2.9802 m
CT2	382.1978 u	309.9804 u	N/A	1.7457 m	1.4990 m
CT3	2.2476 m	1.9009 m	N/A	15.3997 m	13.5018 m
CT4	1.8854	1.7071	N/A	255.9679 u	216.5573 u

This document is intended as a SPICE modeling guideline and does not constitute a commercial product data sheet. Designers should refer to the appropriate data sheet of the same number for guaranteed specification limits.

R-C THERMAL MODEL FOR FILTER CONFIGURATION

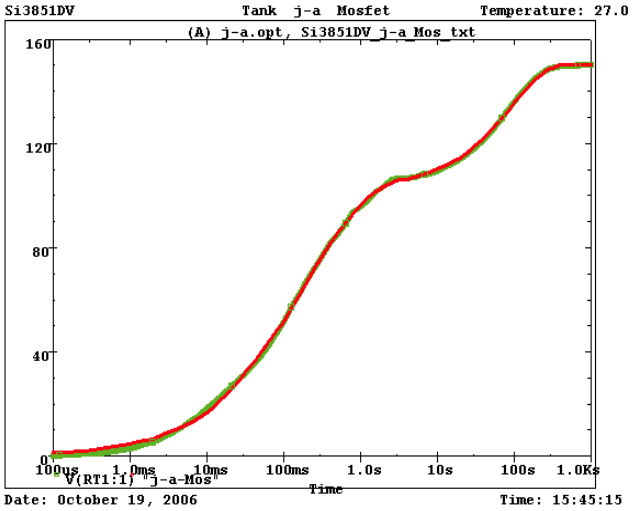


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
RF1	22.8768	24.5444	N/A	19.6121	19.9249
RF2	52.3054	54.6038	N/A	49.1762	50.8226
RF3	29.9906	36.8954	N/A	10.9809	12.0196
RF4	44.8272	48.9564	N/A	10.2308	12.2329
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
CF1	297.9236 u	270.1590 u	N/A	217.3897 u	208.7151 u
CF2	1.7173 m	1.4336 m	N/A	1.2357 m	1.1098 m
CF3	18.6657 m	13.7160 m	N/A	13.1791 m	13.5935 m
CF4	1.8697	1.7442	N/A	3.6092 m	7.4595 m

Note: NA indicates not applicable

Reference:

[1] "A Simple Method of Generating Thermal Models for a Power MOSFET" by Wharton McDaniel and Kandarp Pandya, IEEE / SEMITHERM 2002


Si3851DV
Tank j-a Mosfet
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120
80
40
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
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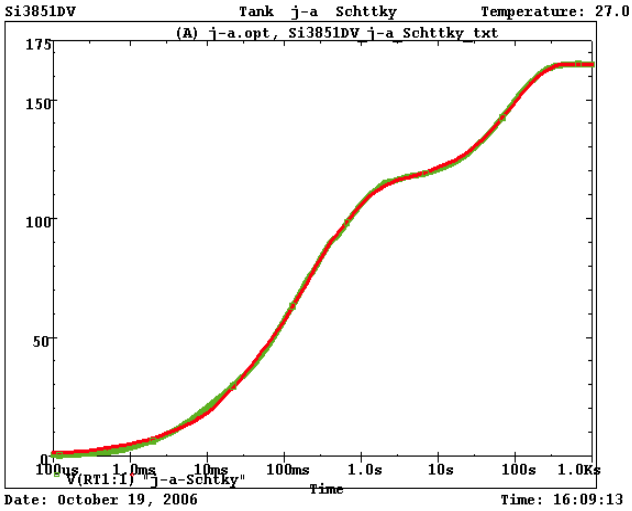
Time
Date: October 19, 2006
Time: 15:45:15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100
50
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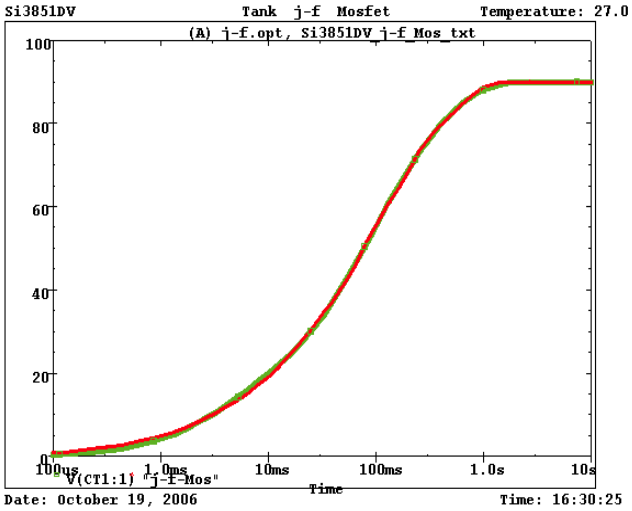
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Tank j-f Mosfet
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Time
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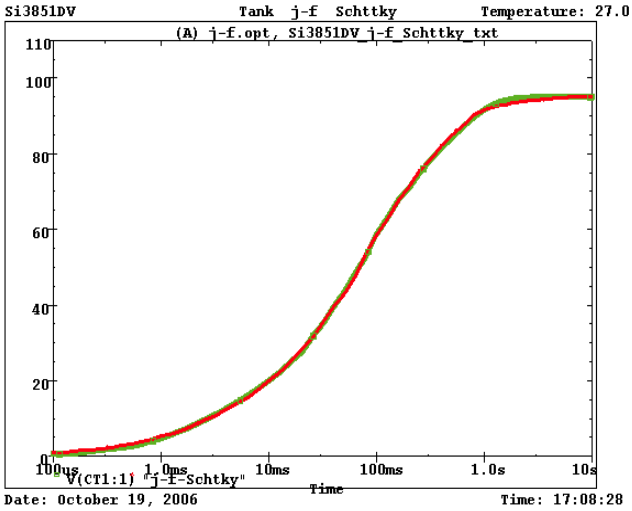
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Tank j-f Schttky
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100
80
60
40
20
0
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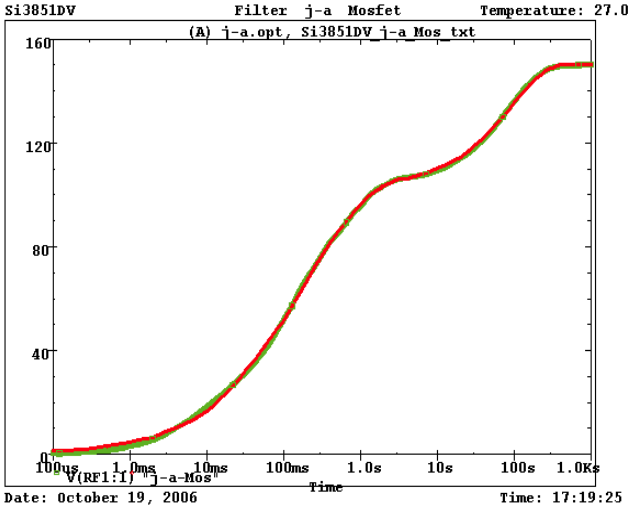
Si3851DV
Filter j-a Mosfet
Temperature: 27.0
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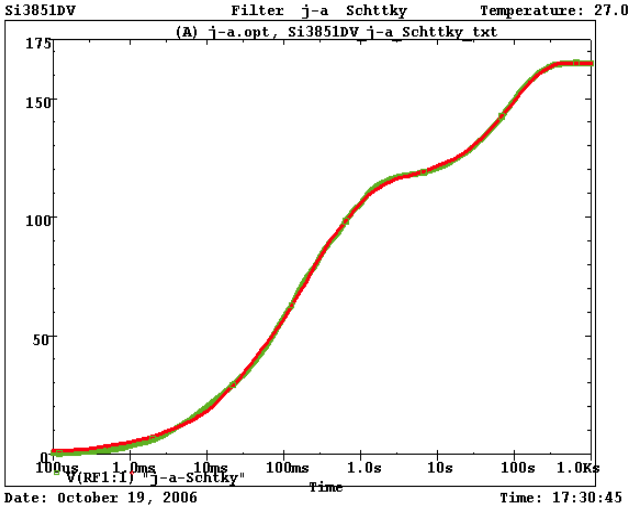
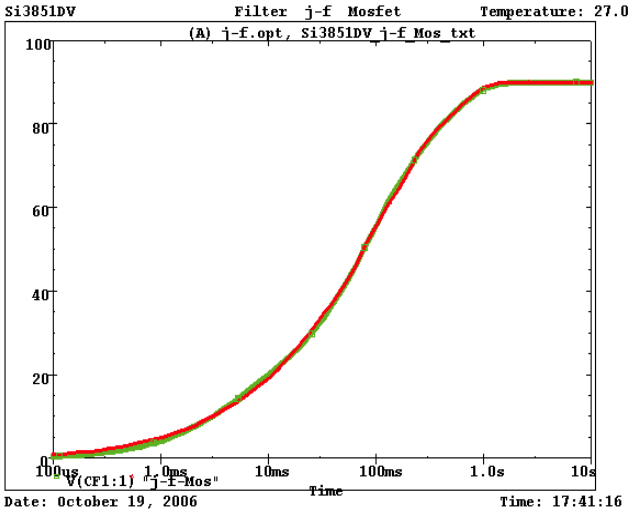
160
120
80
40
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "j-a-Mos"
Time
Date: October 19, 2006
Time: 17:19:25


Si3851DV
Filter j-a Schttky
Temperature: 27.0
(A) j-a.opt, Si3851DV_j-a_Schttky_txt
175
150
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "j-a-Schtky"
Time
Date: October 19, 2006
Time: 17:30:45


Si3851DV
Filter j-f Mosfet
Temperature: 27.0
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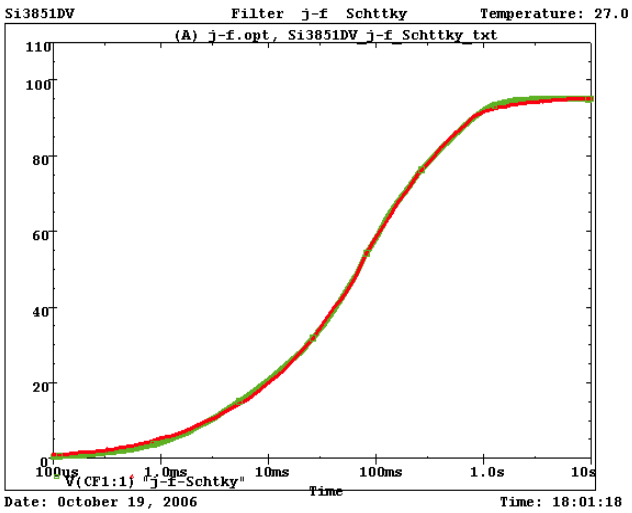
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "j-f-Mos"
Time
Date: October 19, 2006
Time: 17:41:16


Si3851DV
Filter j-f Schttky
Temperature: 27.0
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100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "j-f-Schtky"
Time
Date: October 19, 2006
Time: 18:01:18