R-C Thermal Model Parameters

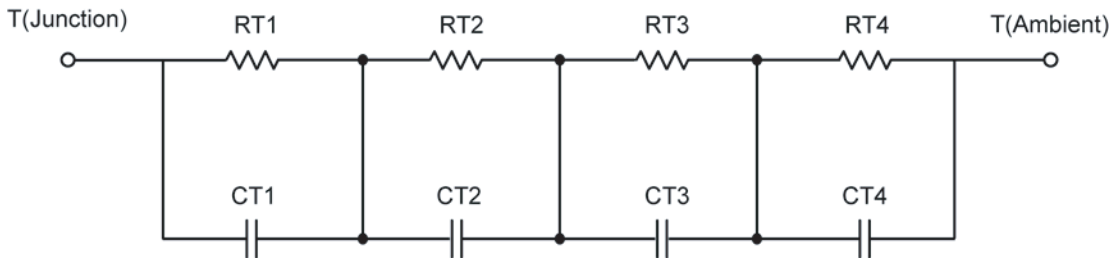
DESCRIPTION

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.

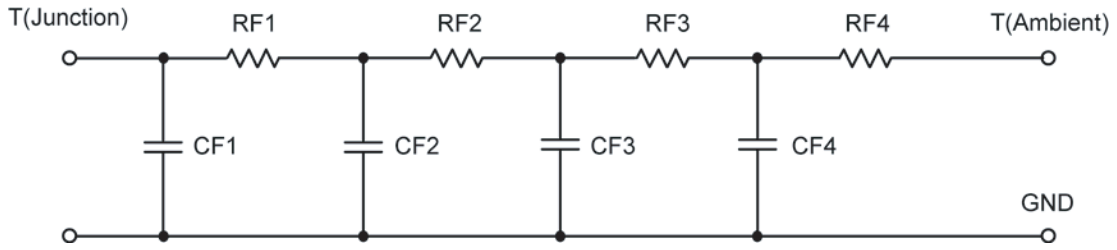
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
RT1	8.6772	8.8404	N/A	7.2784	10.1934
RT2	21.7006	23.9341	N/A	768.0000 m	859.7000 m
RT3	23.0715	23.9536	N/A	4.0080	3.2112
RT4	31.5507	33.2719	N/A	9.9456	10.7357
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
CT1	6.4353 m	5.6388 m	N/A	256.3157 m	158.3009 m
CT2	41.9438 m	38.7697 m	N/A	2.3443 m	1.7721 m
CT3	720.9290 m	729.5309 m	N/A	10.7314 m	10.2046 m
CT4	3.6132	3.4268	N/A	32.4342 m	20.9940 m

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

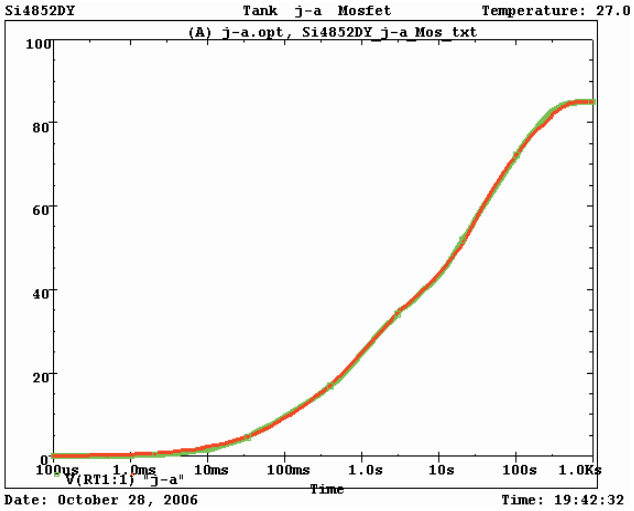


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
RF1	10.2356	10.3786	N/A	776.7000 m	923.1000 m
RF2	22.8597	23.9462	N/A	7.2545	7.5731
RF3	29.4805	30.7399	N/A	9.4785	10.6126
RF4	22.4242	24.9353	N/A	4.4903	5.8912
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
CF1	4.9170 m	4.5468 m	N/A	804.6013 u	1.0487 m
CF2	33.3367 m	29.2049 m	N/A	6.7787 m	5.3347 m
CF3	590.0595 m	518.6554 m	N/A	29.4018 m	22.0132 m
CF4	4.3994	3.9923	N/A	453.5955 m	309.6214 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


Si4852DY
Tank j-a Mosfet
Temperature: 27.0
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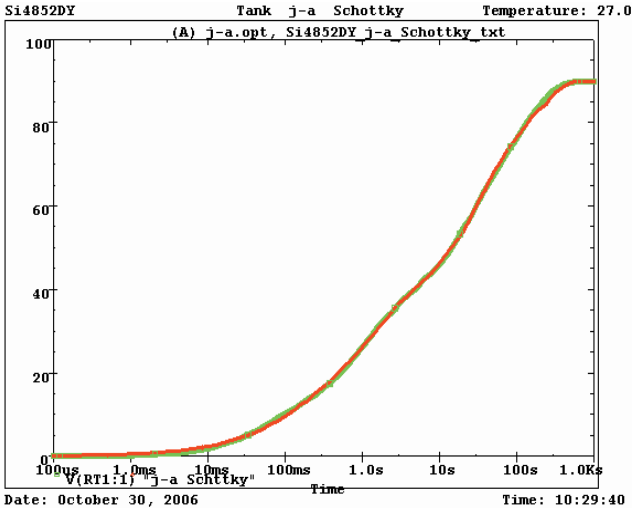
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "j-a"
Time
Date: October 28, 2006
Time: 19:42:32


Si4852DY
Tank j-a Schottky
Temperature: 27.0
(A) j-a.opt, Si4852DY_j-a_Schottky_txt
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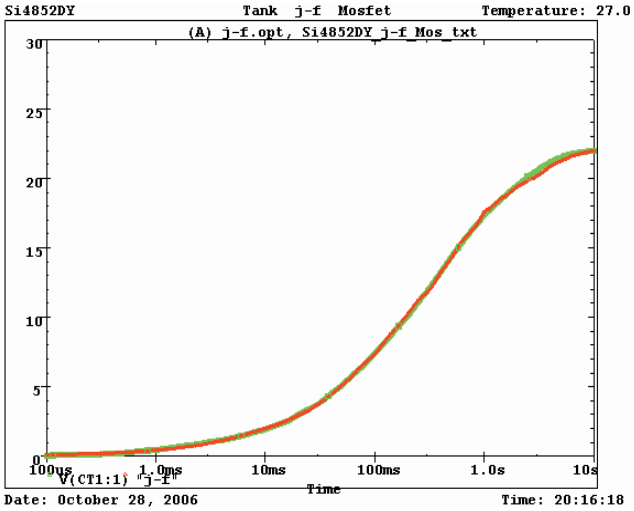
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "j-a Schttky"
Time
Date: October 30, 2006
Time: 10:29:40


Si4852DY
Tank j-f Mosfet
Temperature: 27.0
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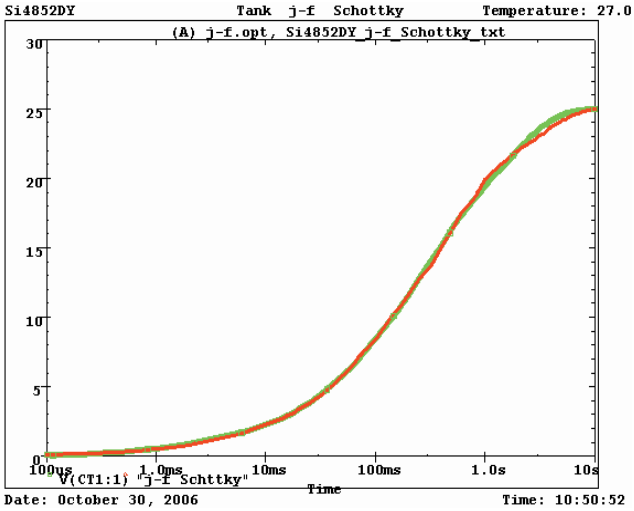
30
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) "j-f"
Time
Date: October 28, 2006
Time: 20:16:18


Si4852DY
Tank j-f Schottky
Temperature: 27.0
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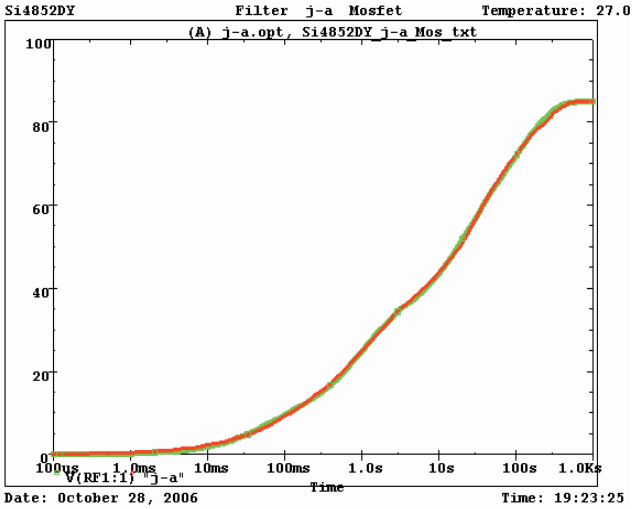
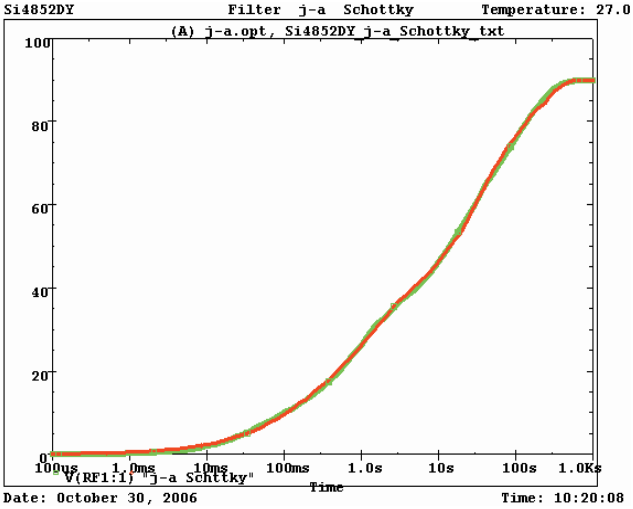
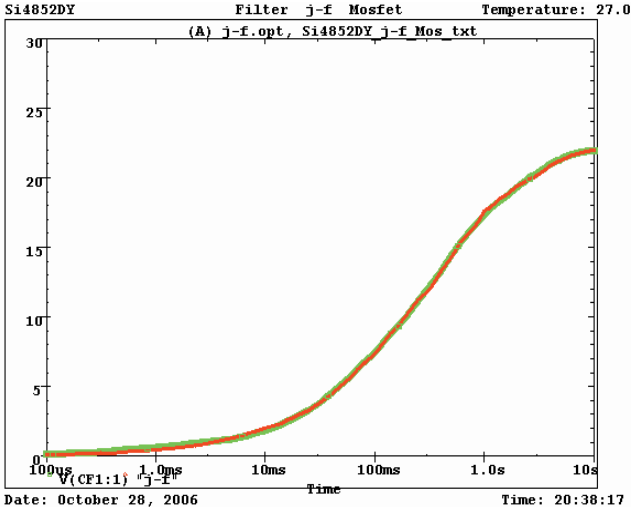
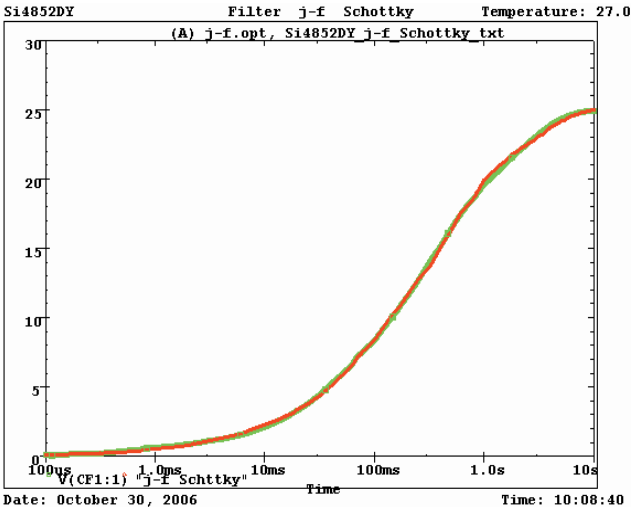
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) "j-f Schttky"
Time
Date: October 30, 2006
Time: 10:50:52


Si4852DY
Filter j-a Mosfet
Temperature: 27.0
(A) j-a.opt, Si4852DY_j-a_Mos_txt
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "j-a"
Time
Date: October 28, 2006
Time: 19:23:25


Si4852DY
Filter j-a Schottky
Temperature: 27.0
(A) j-a.opt, Si4852DY_j-a_Schottky_txt
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "j-a Schttky"
Time
Date: October 30, 2006
Time: 10:20:08


Si4852DY
Filter j-f Mosfet
Temperature: 27.0
(A) j-f.opt, Si4852DY_j-f_Mos_txt
30
25
20
15
10
5
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "j-f"
Time
Date: October 28, 2006
Time: 20:38:17


Si4852DY
Filter j-f Schottky
Temperature: 27.0
(A) j-f.opt, Si4852DY_j-f_Schottky_txt
30
25
20
15
10
5
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "j-f Schttky"
Time
Date: October 30, 2006
Time: 10:08:40