R-C Thermal Model Parameters

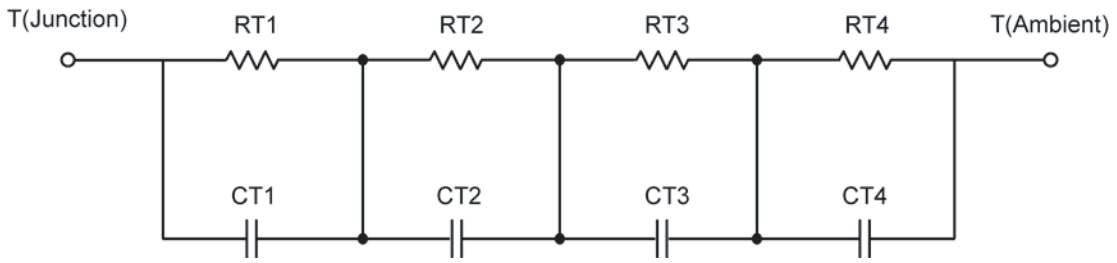
DESCRIPTION

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.

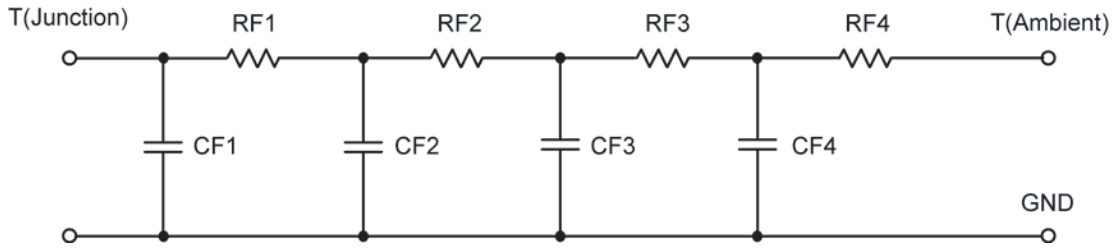
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
RT1	6.0545	6.2738	N/A	8.2801	10.3324
RT2	17.2439	13.3174	N/A	946.9524 m	2.2401
RT3	24.6116	26.7131	N/A	2.2557	3.2629
RT4	46.8942	48.0832	N/A	10.4672	10.1175
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
CT1	758.3167 u	367.4853 u	N/A	8.0720 m	6.5828 m
CT2	16.7936 m	10.8942 m	N/A	1.4542 m	754.7546 u
CT3	161.2268 m	96.9052 m	N/A	1.7482 m	1.0484 m
CT4	1.4835	1.5761	N/A	119.4180 m	116.6314 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

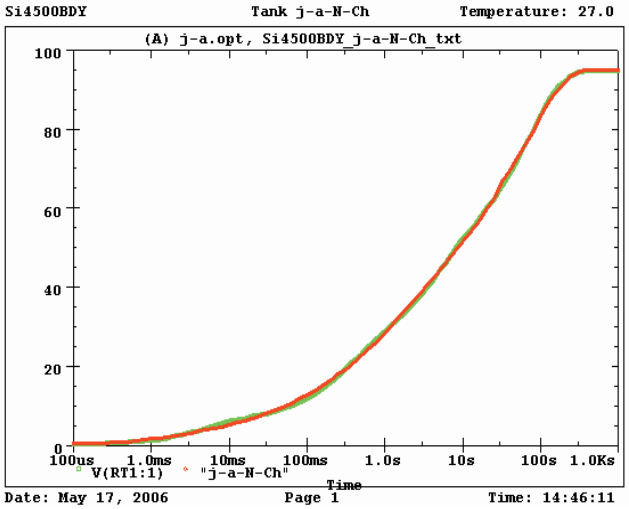


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
RF1	7.5642	6.8208	N/A	3.0698	6.5004
RF2	18.4895	15.2713	N/A	8.3084	6.5976
RF3	26.0950	27.3218	N/A	8.6396	4.5412
RF4	42.5245	44.9440	N/A	1.9890	8.3279
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
CF1	947.4298 u	431.7272 u	N/A	639.6264 u	409.9855 u
CF2	15.0457 m	9.2834 m	N/A	5.1273 m	6.5231 m
CF3	121.8680 m	81.4055 m	N/A	79.2674 m	1.9847 m
CF4	1.4316	1.5389	N/A	914.3533 m	140.8816 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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Tank j-a-N-Ch
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80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
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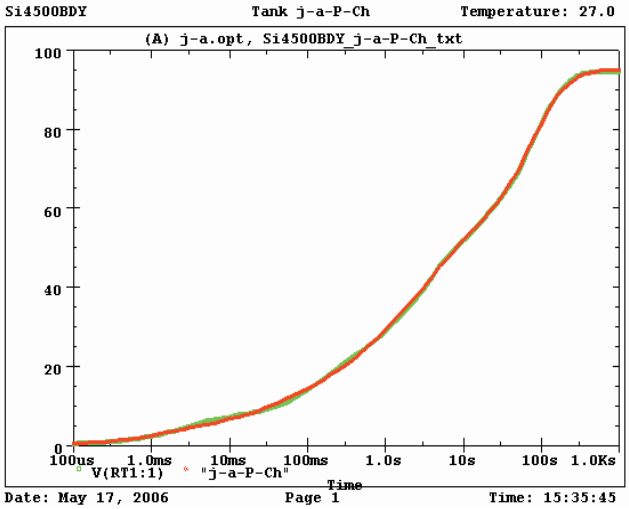
Time
Date: May 17, 2006
Page 1
Time: 14:46:11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Time
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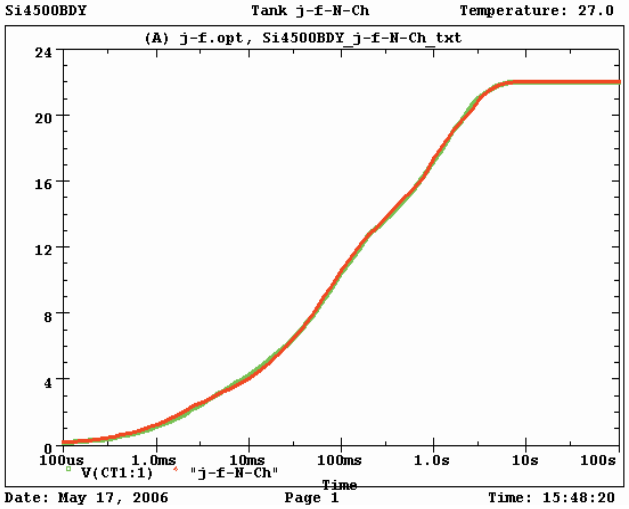
Page 1
Time: 15:35:45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20
16
12
8
4
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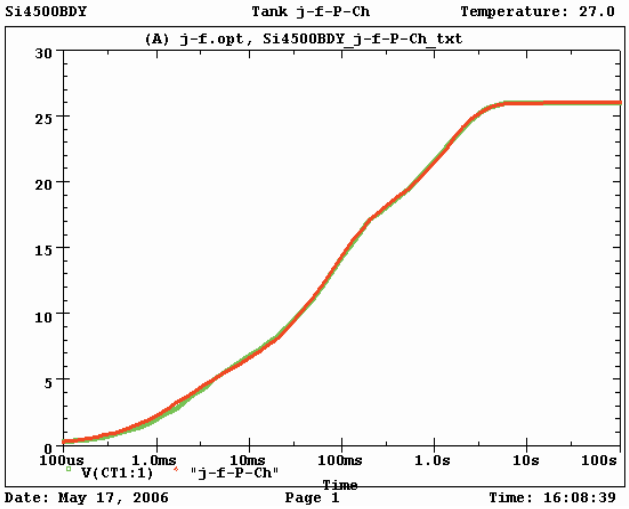
Time
Date: May 17, 2006
Page 1
Time: 15:48:20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Tank j-f-P-Ch
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15
10
5
0
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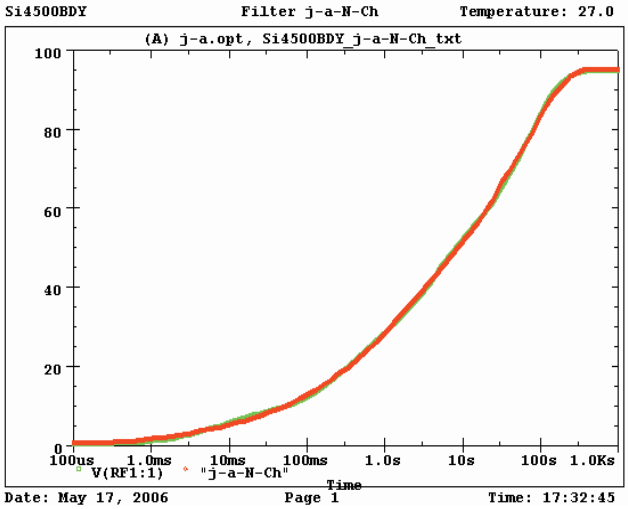
Time
Date: May 17, 2006
Page 1
Time: 16:08:39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Filter j-a-N-Ch
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60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
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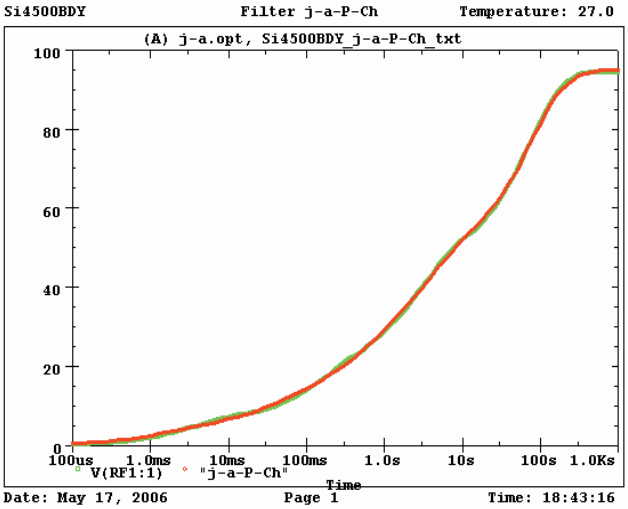
Time
Date: May 17, 2006
Page 1
Time: 17:32:45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Filter j-a-P-Ch
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60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
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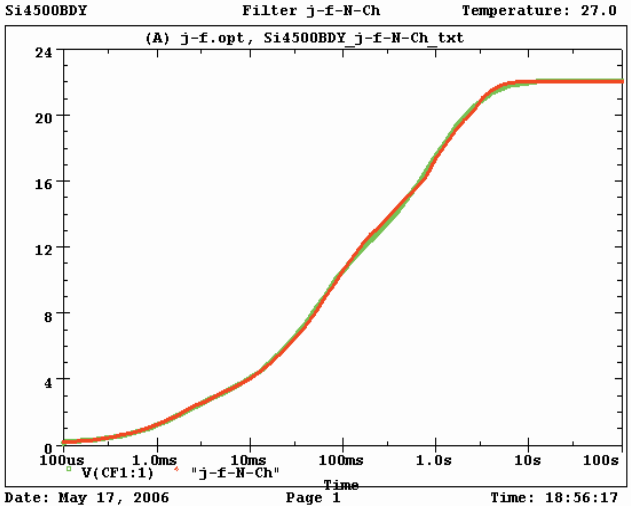
Time
Date: May 17, 2006
Page 1
Time: 18:43:16


Si4500BDY
Filter j-f-N-Ch
Temperature: 27.0
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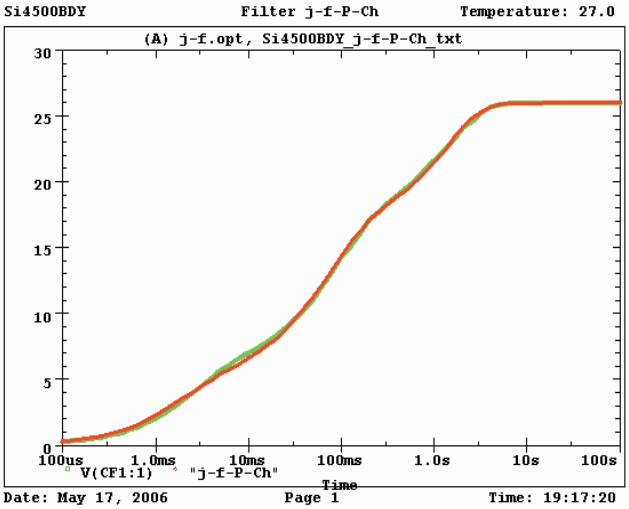
20
16
12
8
4
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s
V(CF1:1) "j-f-N-Ch"
Time
Date: May 17, 2006
Page 1
Time: 18:56:17


Si4500BDY
Filter j-f-P-Ch
Temperature: 27.0
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25
20
15
10
5
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s
V(CF1:1) "j-f-P-Ch"
Time
Date: May 17, 2006
Page 1
Time: 19:17:20