R-C Thermal Model Parameters

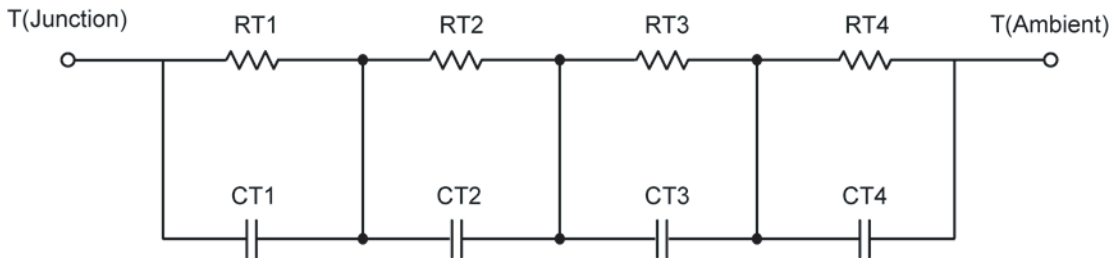
DESCRIPTION

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.

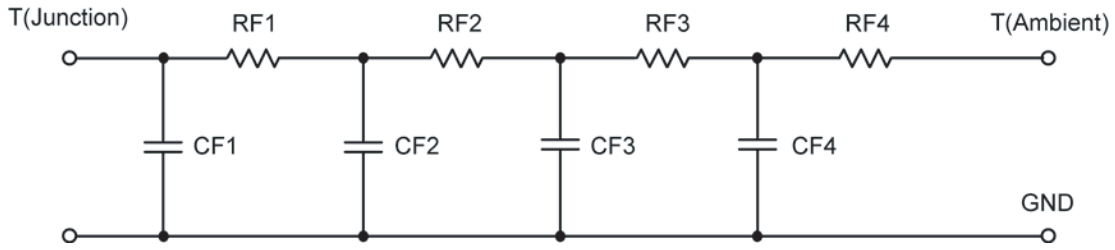
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
RT1	41.6776	54.3316	N/A	5.3717	5.3113
RT2	36.3097	11.2743	N/A	17.7081	2.4506
RT3	17.9753	22.1448	N/A	19.5964	6.9576
RT4	29.0374	12.2493	N/A	20.3238	15.2805
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
CT1	1.7072	1.3959	N/A	3.3714 m	25.2743 m
CT2	80.2618 m	291.1953 m	N/A	9.1615 m	3.6992 m
CT3	4.4484 m	43.2261 m	N/A	41.6564 m	19.2991 m
CT4	17.2445 m	6.6514 m	N/A	118.7474 m	73.5489 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

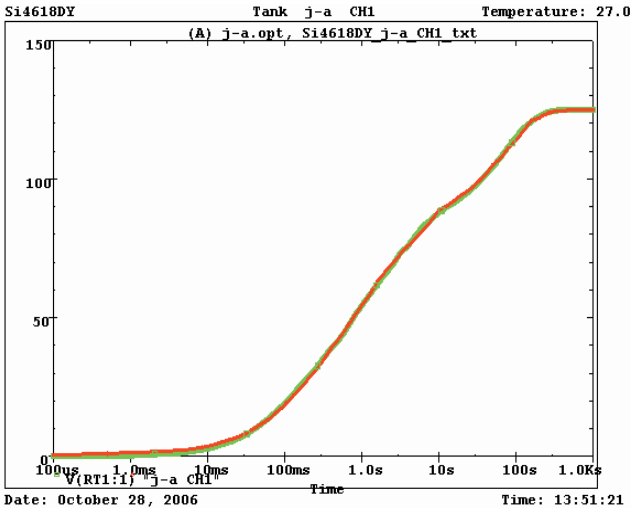


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
RF1	18.6962	12.2275	N/A	5.3236	4.4832
RF2	36.4496	30.3061	N/A	18.4934	12.1435
RF3	31.4101	23.2225	N/A	22.5511	9.3639
RF4	38.4441	34.2439	N/A	16.6319	4.0094
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
CF1	2.7859 m	4.4145 m	N/A	1.7110 m	2.7979 m
CF2	7.3436 m	26.3740 m	N/A	3.1163 m	6.8815 m
CF3	75.8715 m	738.9070 m	N/A	15.1045 m	46.0293 m
CF4	1.7475	1.3427	N/A	94.1536 m	266.7002 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


Si4618DY
Tank j-a CH1
Temperature: 27.0
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150
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
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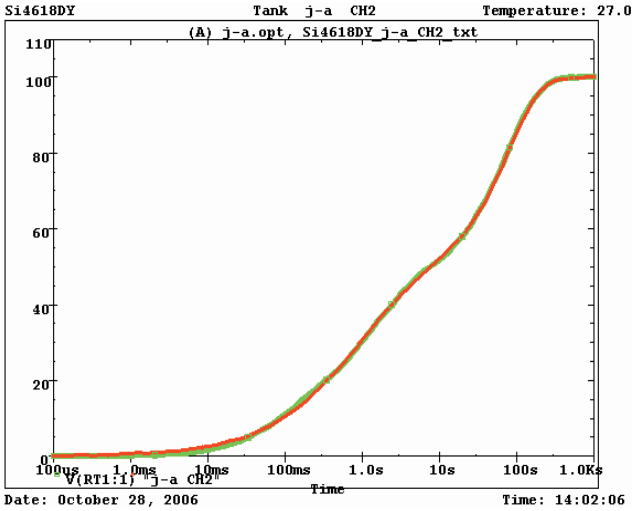
Time
Date: October 28, 2006
Time: 13:51:21


Si4618DY
Tank j-a CH2
Temperature: 27.0
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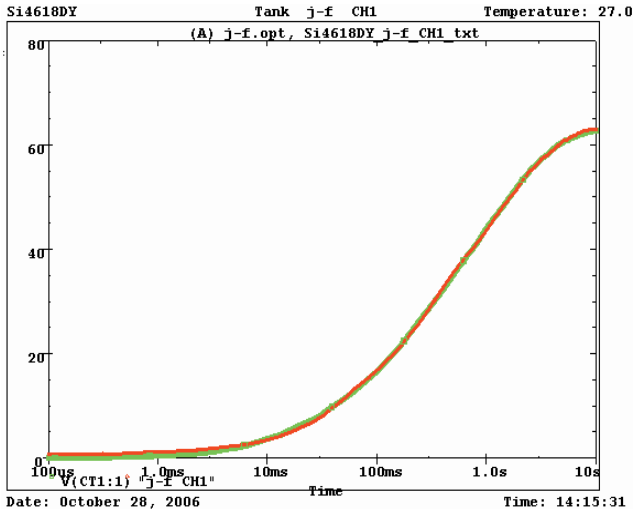
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "j-a CH2"
Time
Date: October 28, 2006
Time: 14:02:06


Si4618DY
Tank j-f CH1
Temperature: 27.0
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60
40
20
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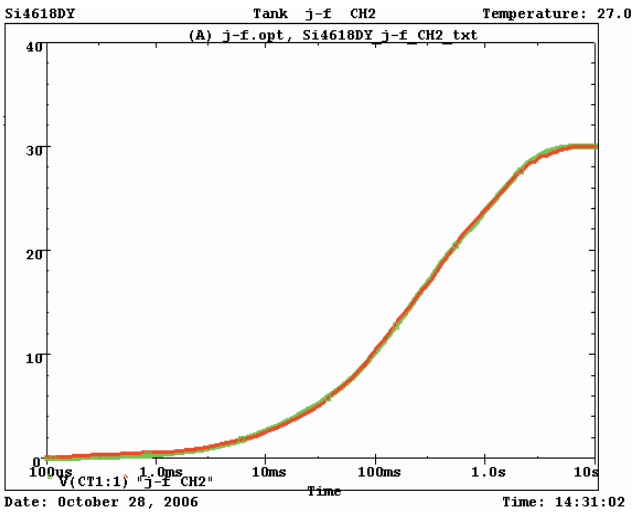
Time
Date: October 28, 2006
Time: 14:15:31


Si4618DY
Tank j-f CH2
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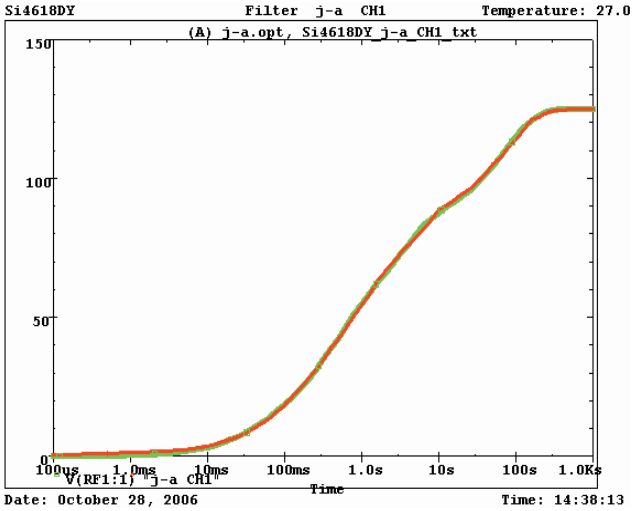
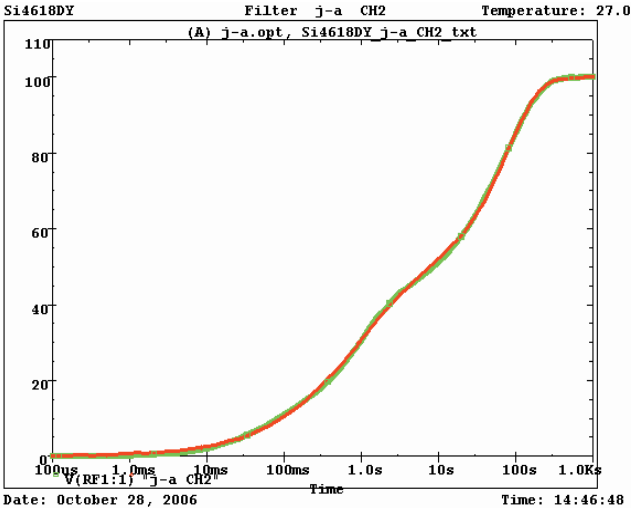
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CT1:1) "j-f CH2"
Time
Date: October 28, 2006
Time: 14:31:02


Si4618DY
Filter j-a CH1
Temperature: 27.0
(A) j-a.opt, Si4618DY_j-a_CH1_txt
150
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "j-a CH1"
Time
Date: October 28, 2006
Time: 14:38:13


Si4618DY
Filter j-a CH2
Temperature: 27.0
(A) j-a.opt, Si4618DY_j-a_CH2_txt
110
100
80
60
40
20
0
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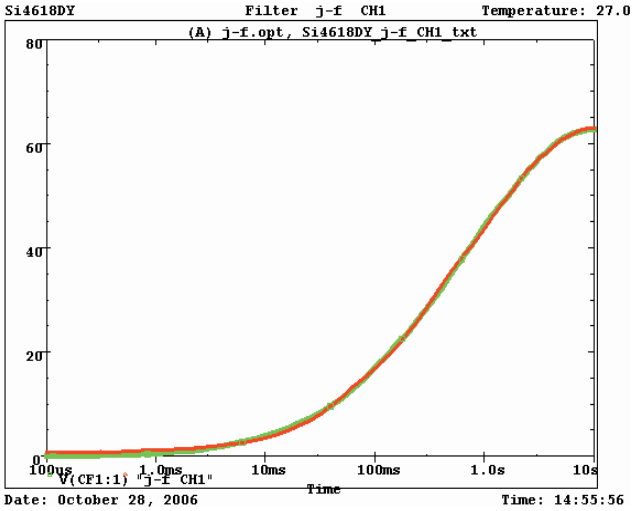
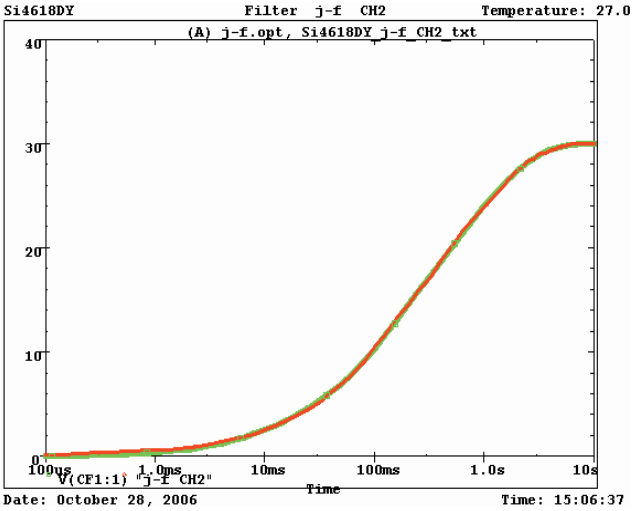
Time
Date: October 28, 2006
Time: 14:46:48


Si4618DY
Filter j-f CH1
Temperature: 27.0
(A) j-f.opt, Si4618DY_j-f_CH1_txt
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "j-f CH1"
Time
Date: October 28, 2006
Time: 14:55:56


Si4618DY
Filter j-f CH2
Temperature: 27.0
(A) j-f.opt, Si4618DY_j-f_CH2_txt
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "j-f CH2"
Time
Date: October 28, 2006
Time: 15:06:37