R-C Thermal Model Parameters

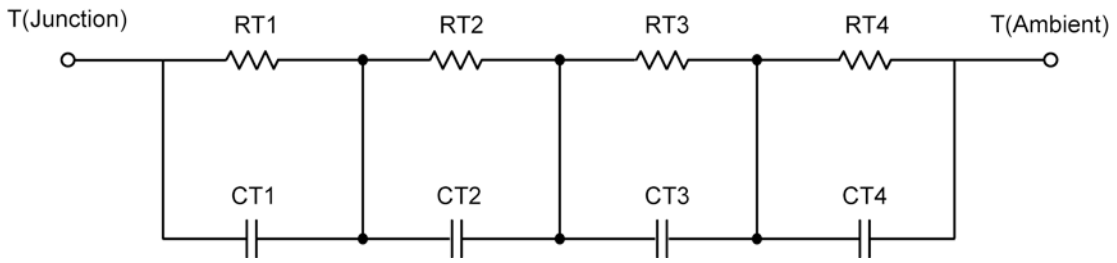
DESCRIPTION

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.

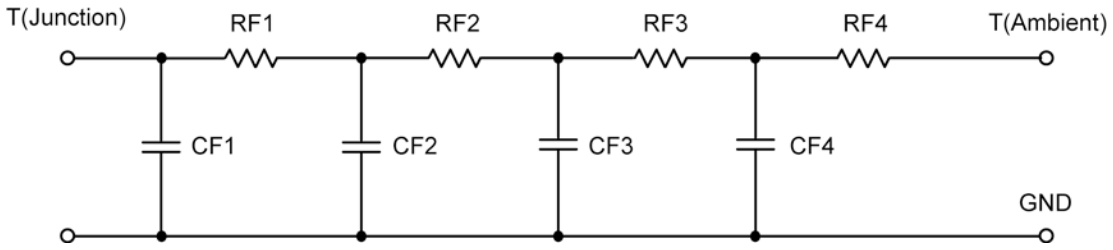
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	5.6429	N/A	1.7981
RT2	9.1819	N/A	8.3861
RT3	26.3958	N/A	2.8307
RT4	53.7794	N/A	10.9851
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	712.3648 u	N/A	370.7541 u
CT2	21.5506 m	N/A	12.1387 m
CT3	53.1312 m	N/A	2.8770 m
CT4	1.1873	N/A	128.6109 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

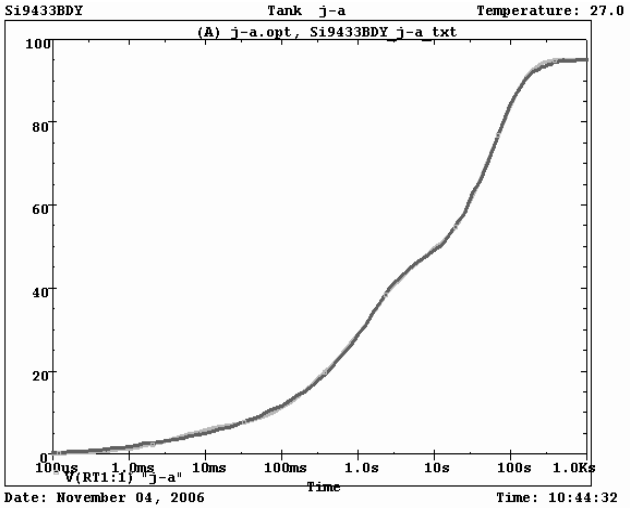


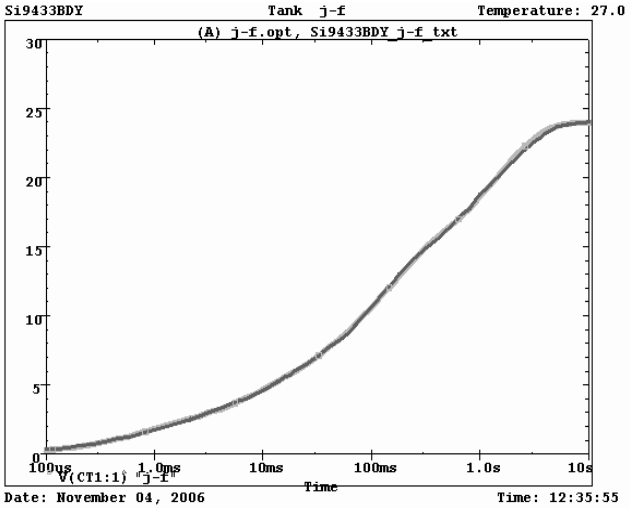
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	6.6819	N/A	3.5216
RF2	17.4443	N/A	6.2612
RF3	19.8009	N/A	6.1328
RF4	51.0729	N/A	8.0844
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	757.5251 u	N/A	443.8253 u
CF2	16.9792 m	N/A	5.3715 m
CF3	46.7434 m	N/A	18.5880 m
CF4	1.1917	N/A	164.4405 m

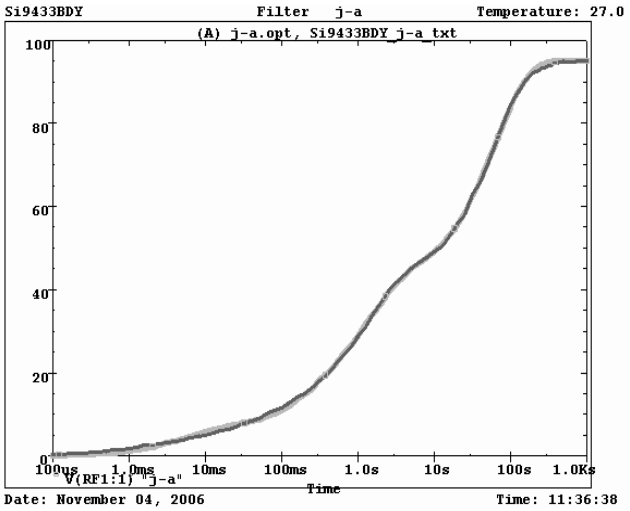
Note: NA indicates not applicable

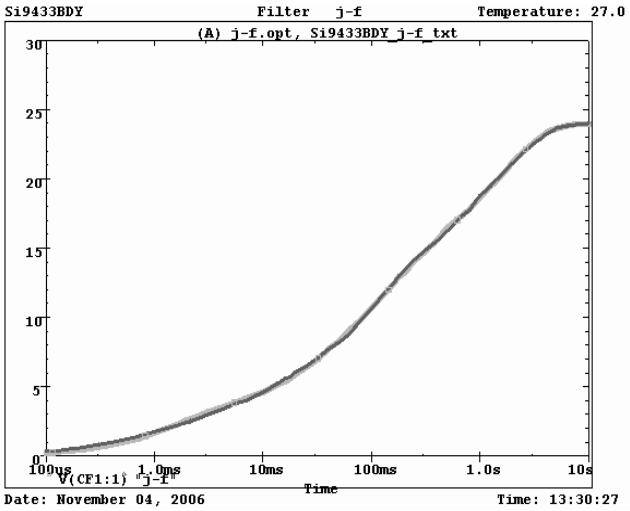
Reference:

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


Si9433BDY
Tank j-a
Temperature: 27.0
(A) j-a.opt, Si9433BDY_j-a_txt
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "j-a"
Time
Date: November 04, 2006
Time: 10:44:32


Si9433BDY
Tank j-f
Temperature: 27.0
(A) j-f.opt, Si9433BDY_j-f_txt
30
25
20
15
10
5
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CT1:1) "j-f"
Time
Date: November 04, 2006
Time: 12:35:55


Si9433BDY
Filter j-a
Temperature: 27.0
(A) j-a.opt, Si9433BDY_j-a_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: November 04, 2006
Time: 11:36:38


Si9433BDY
Filter j-f
Temperature: 27.0
(A) j-f.opt, Si9433BDY_j-f_txt
30
25
20
15
10
5
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "j-f"
Time
Date: November 04, 2006
Time: 13:30:27