R-C Thermal Model Parameters

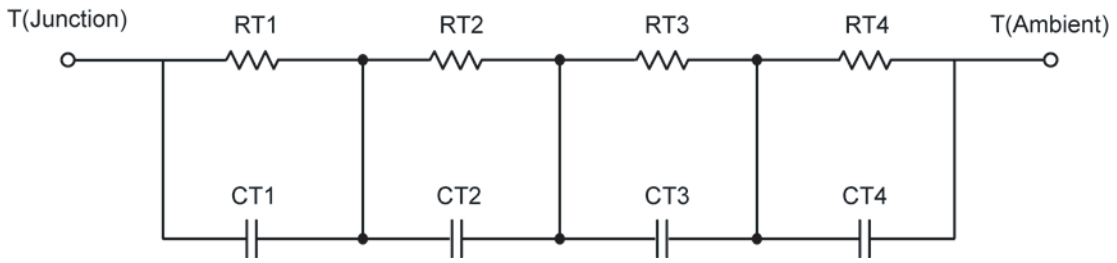
DESCRIPTION

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.

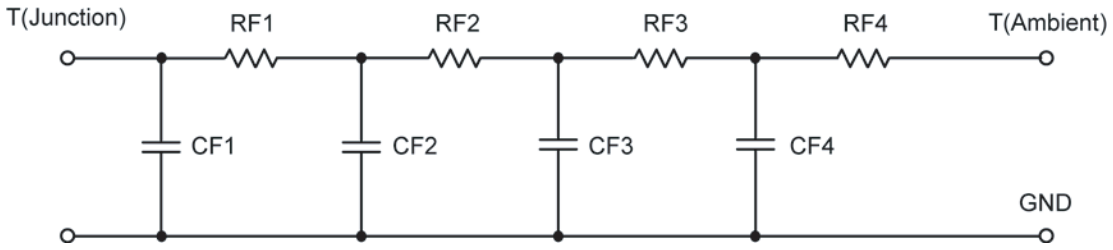
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	55.7768	N/A	12.6236
RT2	27.6343	N/A	5.1966
RT3	28.6623	N/A	6.3099
RT4	7.9266	N/A	20.8699
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	1.6762	N/A	7.6376 m
CT2	108.3584 m	N/A	245.7523 u
CT3	12.2944 m	N/A	10.8991 m
CT4	865.6593 u	N/A	47.9345 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

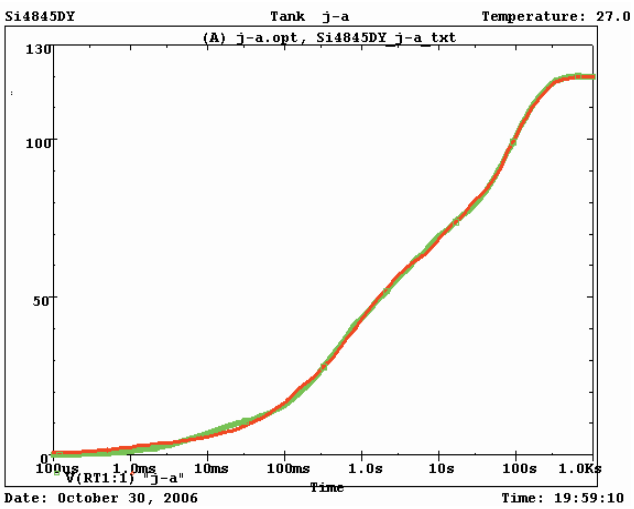


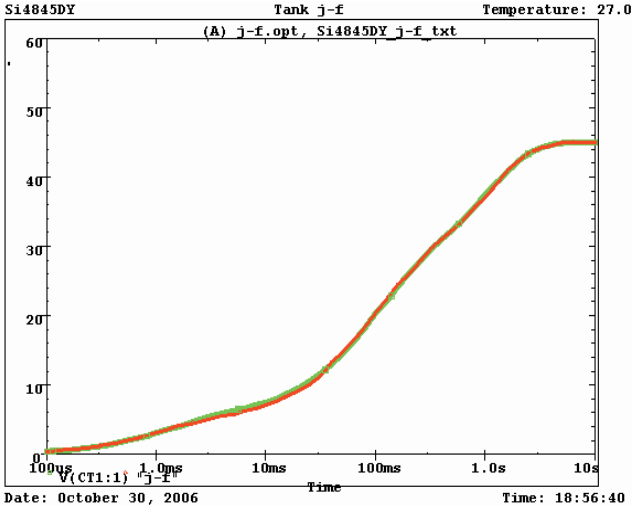
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	9.9293	N/A	5.5579
RF2	35.6105	N/A	17.6774
RF3	23.6406	N/A	8.2896
RF4	50.8206	N/A	13.4751
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	991.3878 u	N/A	239.4860 u
CF2	11.0310 m	N/A	3.5233 m
CF3	139.4146 m	N/A	12.8456 m
CF4	1.7139	N/A	58.7674 m

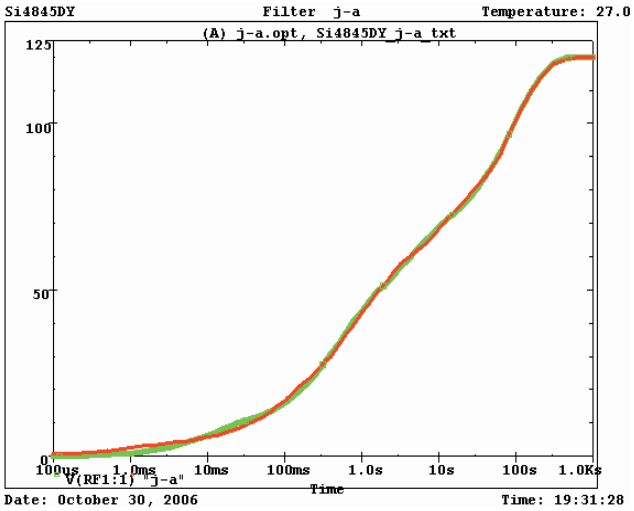
Note: NA indicates not applicable

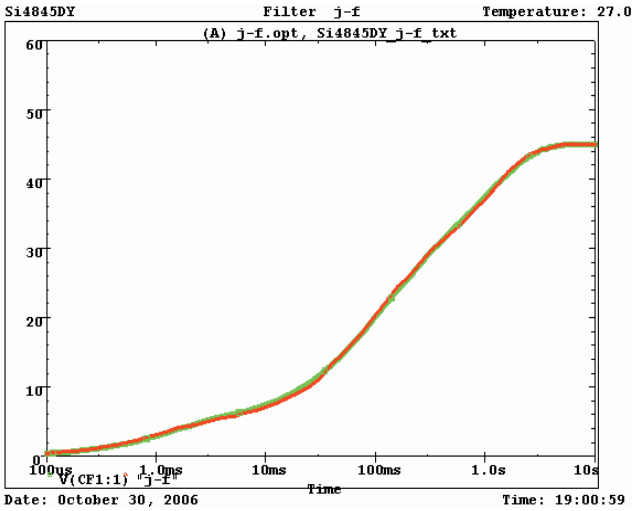
Reference:

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


Si4845DY
Tank j-a
Temperature: 27.0
(A) j-a.opt, Si4845DY_j-a_txt
130
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "j-a"
Time
Date: October 30, 2006
Time: 19:59:10


Si4845DY
Tank j-f
Temperature: 27.0
(A) j-f.opt, Si4845DY_j-f_txt
60
50
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CT1:1) "j-f"
Time
Date: October 30, 2006
Time: 18:56:40


Si4845DY
Filter j-a
Temperature: 27.0
(A) j-a.opt, Si4845DY_j-a_txt
125
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "j-a"
Time
Date: October 30, 2006
Time: 19:31:28


Si4845DY
Filter j-f
Temperature: 27.0
(A) j-f.opt, Si4845DY_j-f_txt
60
50
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "j-f"
Time
Date: October 30, 2006
Time: 19:00:59