R-C Thermal Model Parameters

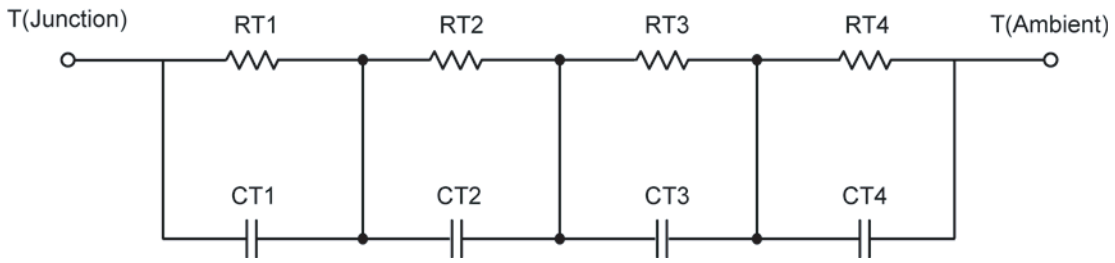
DESCRIPTION

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.

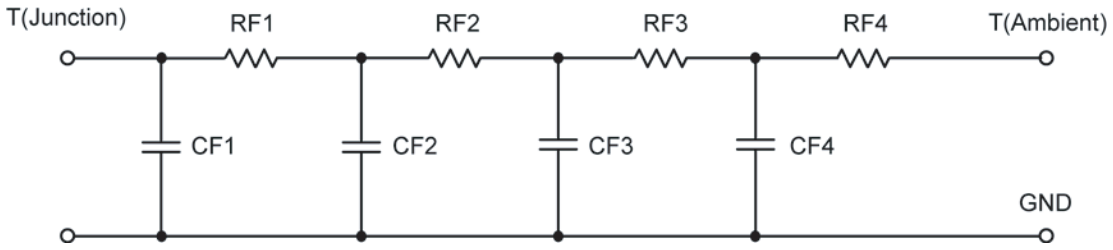
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	21.8201	N/A	11.3853
RT2	8.1139	N/A	4.0448
RT3	32.3427	N/A	13.1289
RT4	47.1462	N/A	8.4704
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	10.8053 m	N/A	4.6399 m
CT2	804.8542 u	N/A	413.3234 u
CT3	57.2589 m	N/A	30.2199 m
CT4	1.4498	N/A	217.5051 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

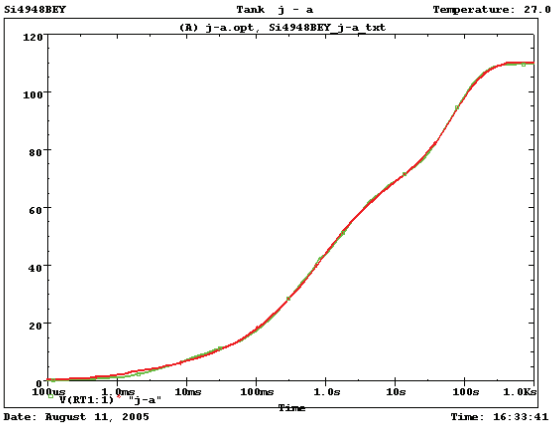


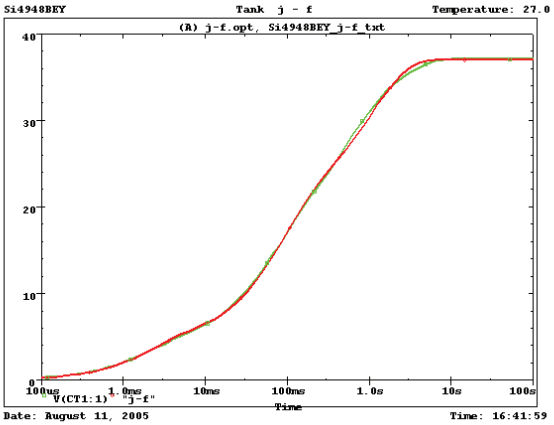
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	7.5110	N/A	5.6037
RF2	25.8169	N/A	14.8167
RF3	31.4783	N/A	13.4714
RF4	44.2066	N/A	3.1907
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	525.2266 u	N/A	426.5868 u
CF2	6.7261 m	N/A	4.2031 m
CF3	45.5528 m	N/A	38.5086 m
CF4	1.4272	N/A	625.8011 m

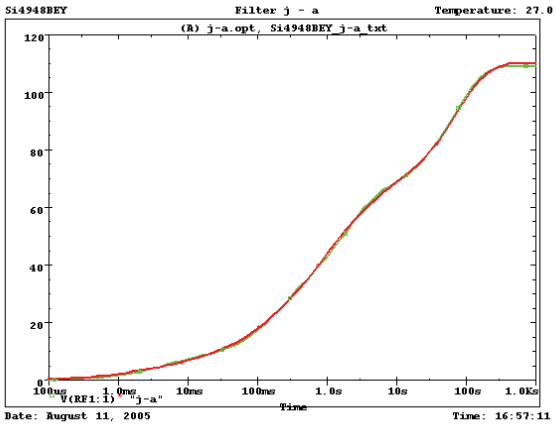
Note: NA indicates not applicable

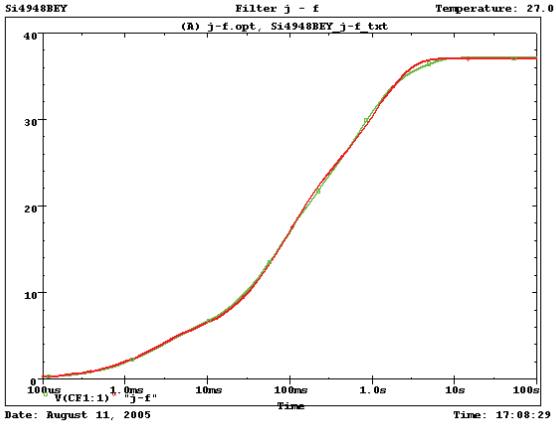
Reference:

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


Si4948BEY
Tank j - a
Temperature: 27.0
(A) j-a.opt, Si4948BEY_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "j-a"
Time
Date: August 11, 2005
Time: 16:33:41


Si4948BEY
Tank j - f
Temperature: 27.0
(A) j-f.opt, Si4948BEY_j-f_txt
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1) "j-f"
Time
Date: August 11, 2005
Time: 16:41:59


Si4948BEY
Filter j - a
Temperature: 27.0
(A) j-a.opt, Si4948BEY_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1) "j-a"
Time
Date: August 11, 2005
Time: 16:57:11


Si4948BEY
Filter j - f
Temperature: 27.0
(A) j-f.opt, Si4948BEY_j-f_txt
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1) "j-f"
Time
Date: August 11, 2005
Time: 17:08:29