R-C Thermal Model Parameters

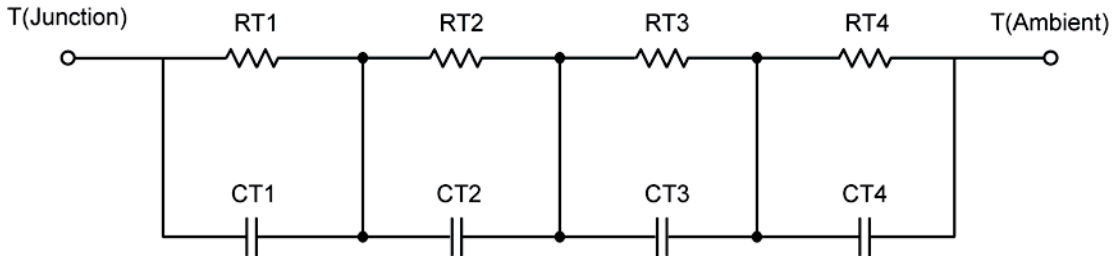
DESCRIPTION

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.

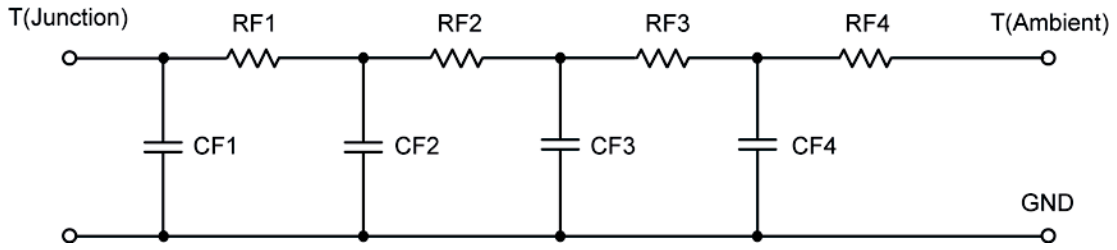
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	11.7489	N/A	3.6563
RT2	16.1103	N/A	3.0730
RT3	17.0968	N/A	9.5006
RT4	50.0439	N/A	3.7702
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	392.3342 u	N/A	256.6168 u
CT2	74.3307 m	N/A	70.0219 m
CT3	4.5164 m	N/A	1.6384 m
CT4	1.4761	N/A	5.0822 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

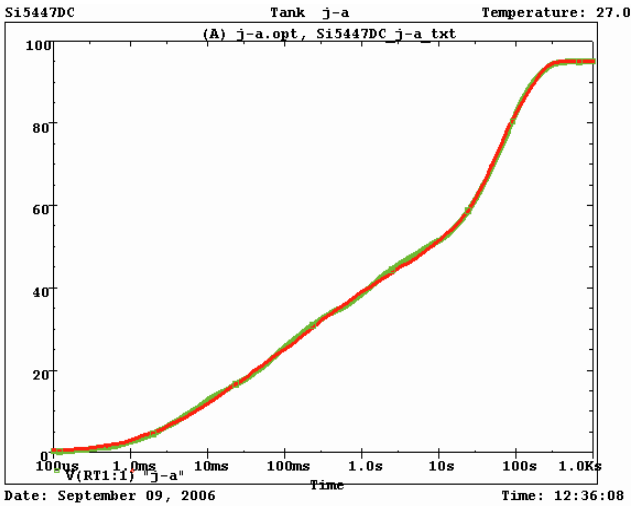


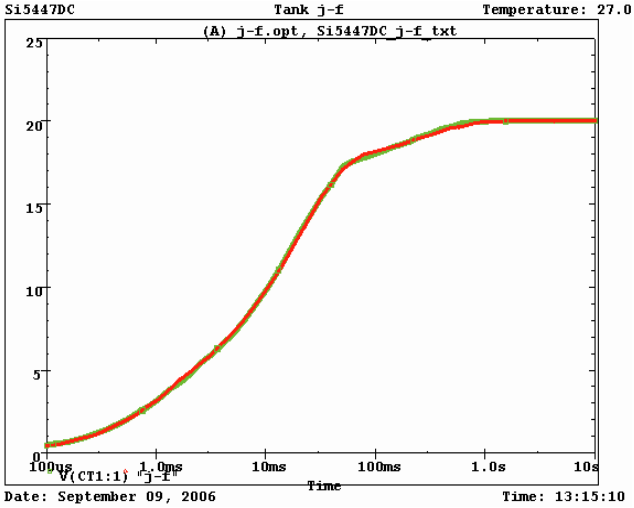
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	14.9643	N/A	6.8667
RF2	18.2851	N/A	11.4459
RF3	14.7791	N/A	1.2417
RF4	46.9715	N/A	445.7263 m
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	387.6458 u	N/A	252.6733 u
CF2	5.6945 m	N/A	1.5985 m
CF3	118.7254 m	N/A	295.5847 m
CF4	1.4650	N/A	26.9636 m

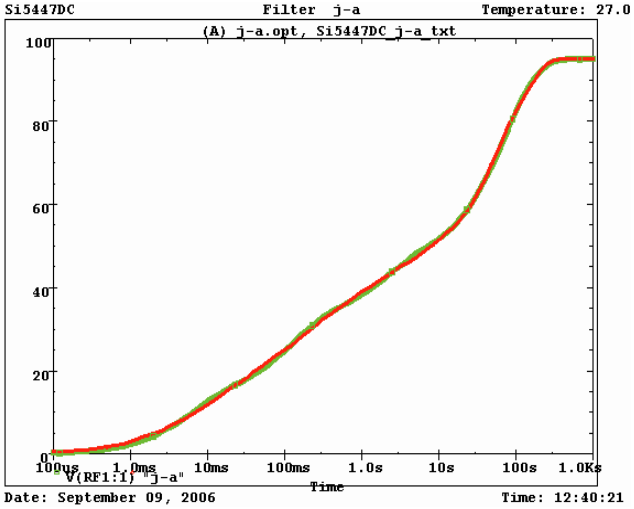
Note: NA indicates not applicable

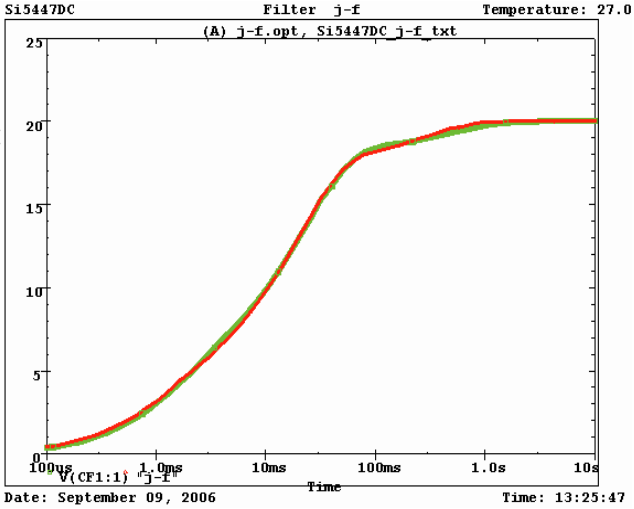
Reference:

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


Si5447DC
Tank j-a
Temperature: 27.0
(A) j-a.opt, Si5447DC_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: September 09, 2006
Time: 12:36:08


Si5447DC
Tank j-f
Temperature: 27.0
(A) j-f.opt, Si5447DC_j-f_txt
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) "j-f"
Time
Date: September 09, 2006
Time: 13:15:10


Si5447DC
Filter j-a
Temperature: 27.0
(A) j-a.opt, Si5447DC_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: September 09, 2006
Time: 12:40:21


Si5447DC
Filter j-f
Temperature: 27.0
(A) j-f.opt, Si5447DC_j-f_txt
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1) "j-f"
Time
Date: September 09, 2006
Time: 13:25:47