R-C Thermal Model Parameters

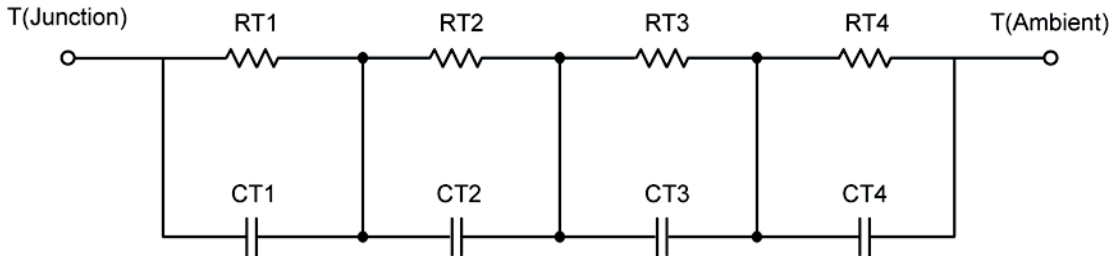
DESCRIPTION

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.

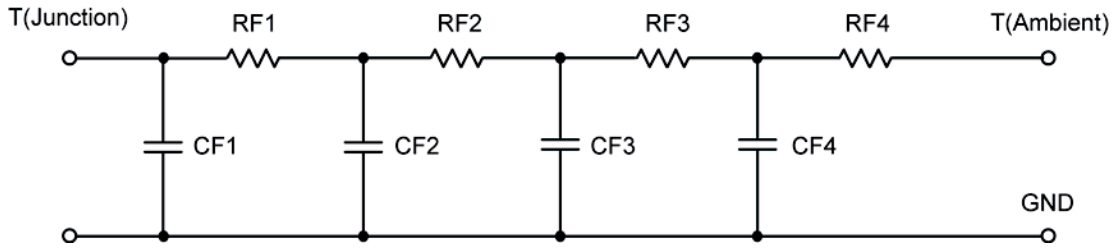
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	9.4998	N/A	5.1431
RT2	17.4907	N/A	10.6921
RT3	16.4516	N/A	2.3213
RT4	51.5579	N/A	1.8435
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	770.0682 u	N/A	82.5927 m
CT2	79.0558 m	N/A	2.2303 m
CT3	8.0881 m	N/A	845.1806 u
CT4	1.3472	N/A	7.6234 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

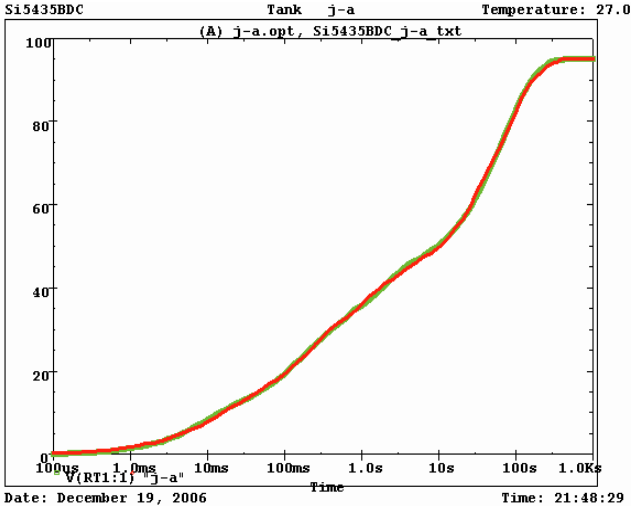


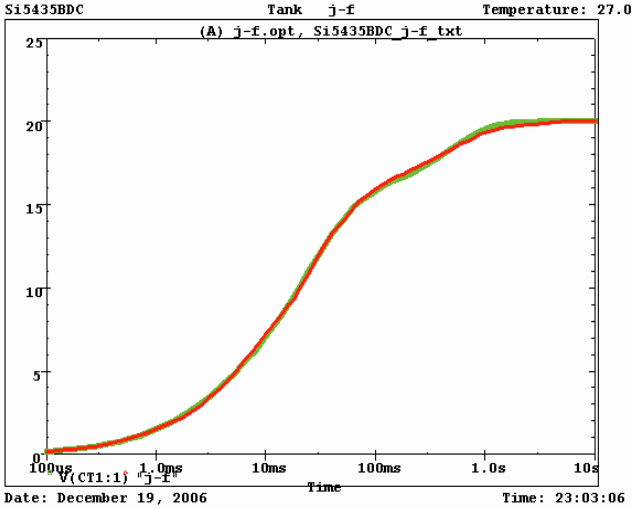
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	11.7136	N/A	4.6376
RF2	17.1896	N/A	10.0189
RF3	15.7536	N/A	2.2675
RF4	50.3432	N/A	3.0760
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	631.5197 u	N/A	609.9533 u
CF2	7.4733 m	N/A	1.1738 m
CF3	66.8229 m	N/A	27.5000 m
CF4	1.2414	N/A	123.0211 m

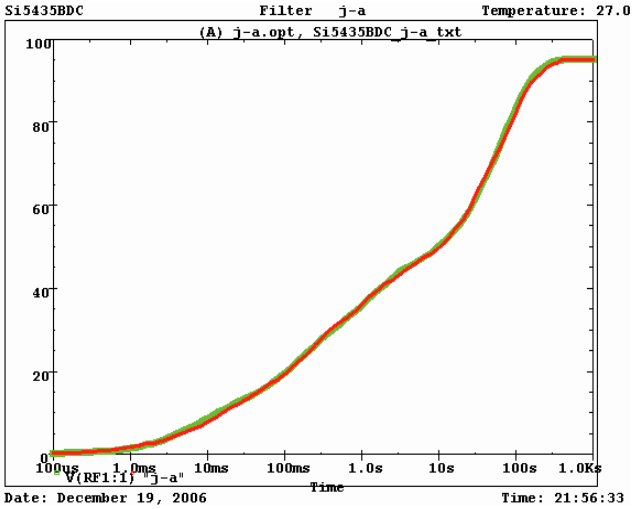
Note: NA indicates not applicable

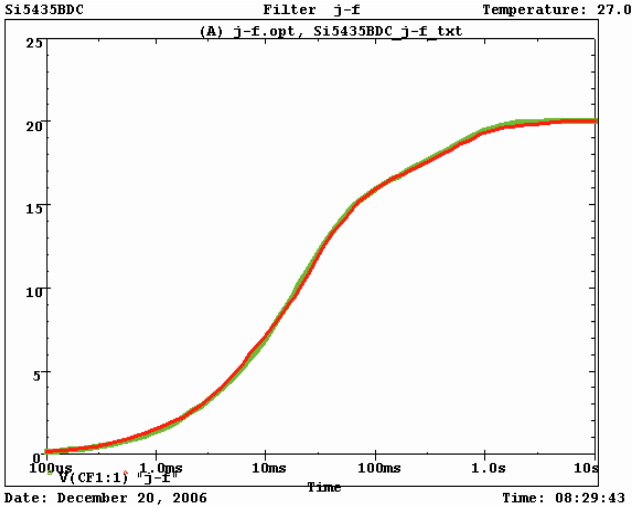
Reference:

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


Si5435BDC
Tank j-a
Temperature: 27.0
(A) j-a.opt, Si5435BDC_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: December 19, 2006
Time: 21:48:29


Si5435BDC
Tank j-f
Temperature: 27.0
(A) j-f.opt, Si5435BDC_j-f_txt
25
20
15
10
5
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CT1:1) "j-f"
Time
Date: December 19, 2006
Time: 23:03:06


Si5435BDC
Filter j-a
Temperature: 27.0
(A) j-a.opt, Si5435BDC_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: December 19, 2006
Time: 21:56:33


Si5435BDC
Filter j-f
Temperature: 27.0
(A) j-f.opt, Si5435BDC_j-f_txt
25
20
15
10
5
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "j-f"
Time
Date: December 20, 2006
Time: 08:29:43