R-C Thermal Model Parameters

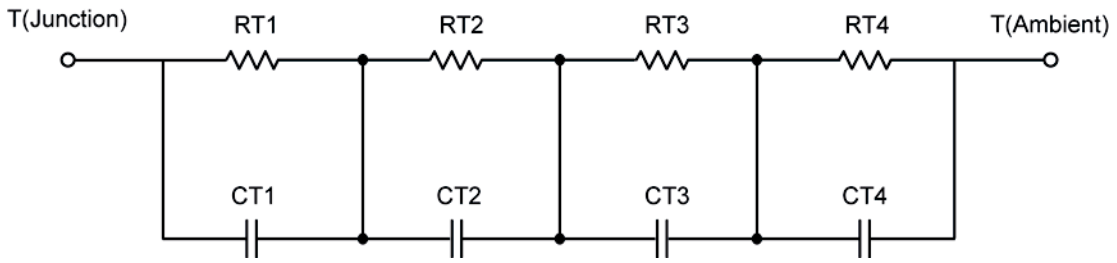
DESCRIPTION

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.

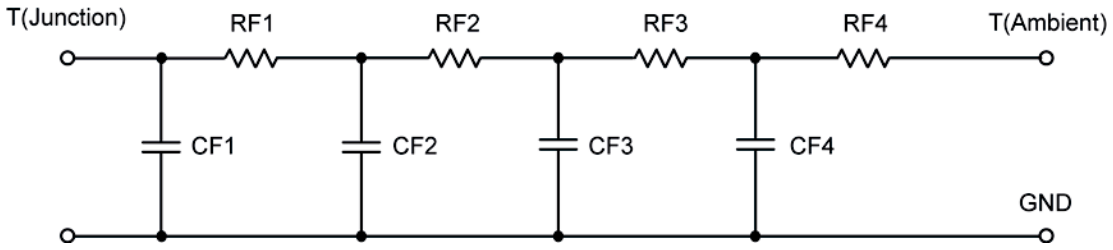
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	1.9611	N/A	11.0505
RT2	19.3099	N/A	1.9764
RT3	25.8667	N/A	3.9989
RT4	47.8623	N/A	9.9742
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	1.4486 m	N/A	7.2654 m
CT2	7.0641 m	N/A	1.7656 m
CT3	53.8282 m	N/A	1.0249
CT4	1.3823	N/A	52.2730 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

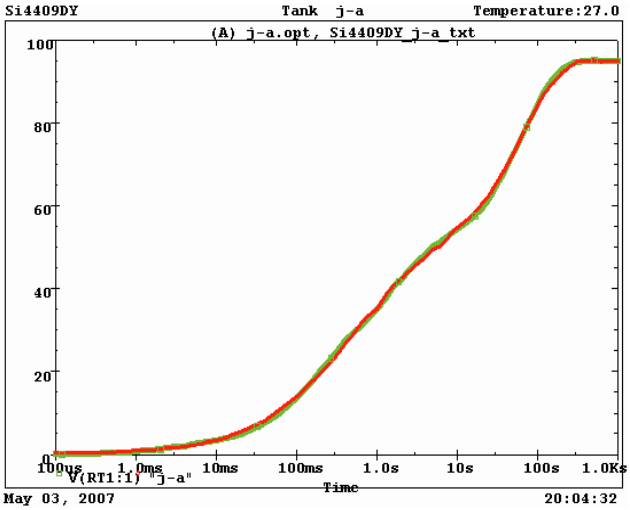


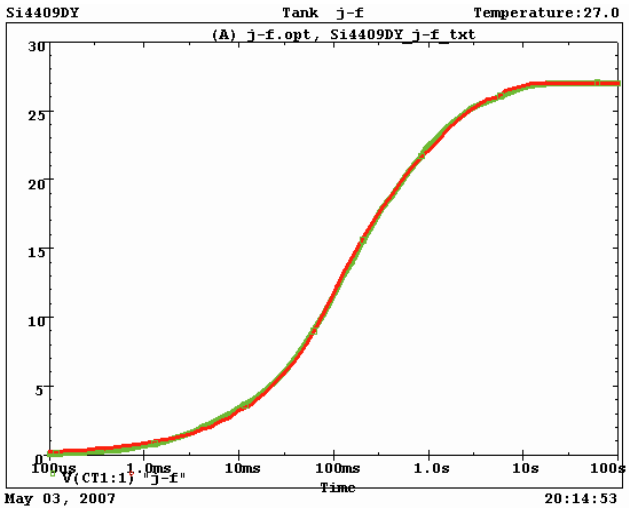
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	3.6561	N/A	3.1319
RF2	26.6992	N/A	11.1077
RF3	20.6825	N/A	7.1519
RF4	43.9622	N/A	5.6085
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	966.9509 u	N/A	1.5723 m
CF2	6.9415 m	N/A	4.6335 m
CF3	84.8892 m	N/A	24.5301 m
CF4	1.4438	N/A	352.6829 m

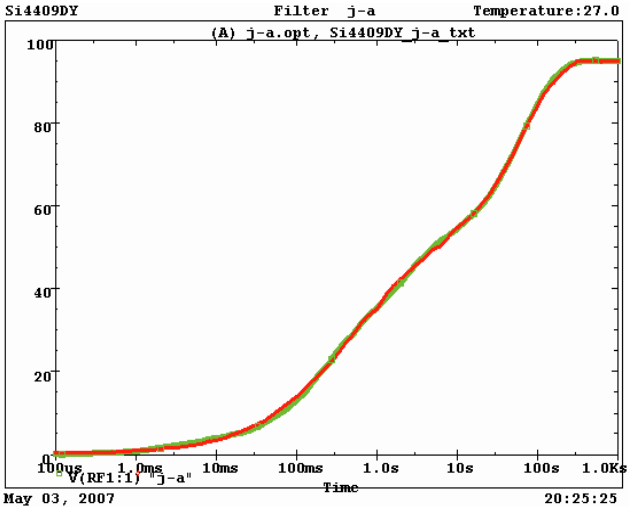
Note: NA indicates not applicable

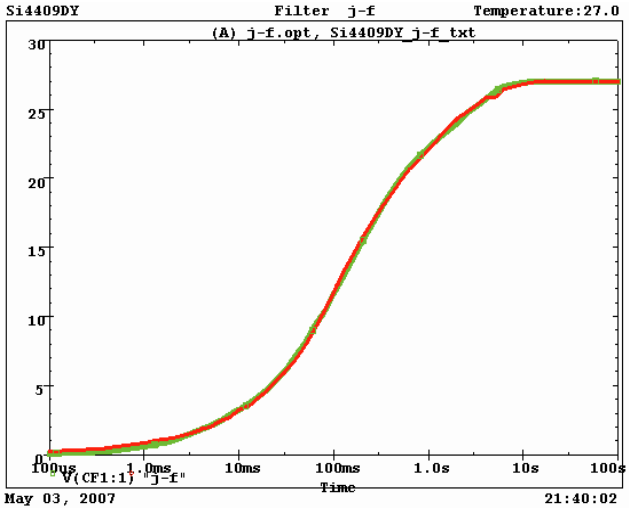
Reference:

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


Si4409DY
Tank j-a
Temperature:27.0
(A) j-a.opt, Si4409DY_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
May 03, 2007
20:04:32


Si4409DY
Tank j-f
Temperature:27.0
(A) j-f.opt, Si4409DY_j-f_txt
30
25
20
15
10
5
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s
V(CT1:1) "j-f"
Time
May 03, 2007
20:14:53


Si4409DY
Filter j-a
Temperature:27.0
(A) j-a.opt, Si4409DY_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
May 03, 2007
20:25:25


Si4409DY
Filter j-f
Temperature:27.0
(A) j-f.opt, Si4409DY_j-f_txt
30
25
20
15
10
5
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s
V(CF1:1) "j-f"
Time
May 03, 2007
21:40:02