R-C Thermal Model Parameters

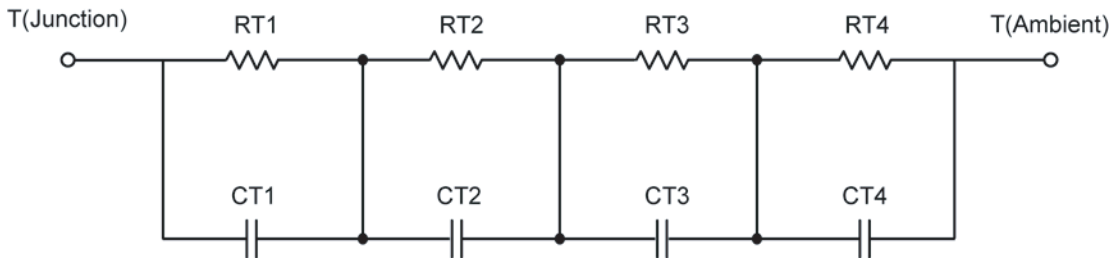
DESCRIPTION

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.

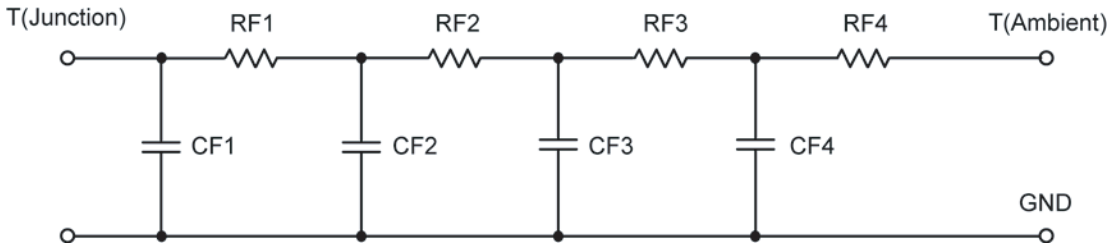
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	10.2157	N/A	24.5756
RT2	20.3157	N/A	7.1084
RT3	40.6039	N/A	10.5213
RT4	53.8647	N/A	12.7947
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	275.0620 u	N/A	1.1347 m
CT2	98.5796 m	N/A	130.9691 u
CT3	2.9226 m	N/A	91.5202 m
CT4	1.6678	N/A	5.1727 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

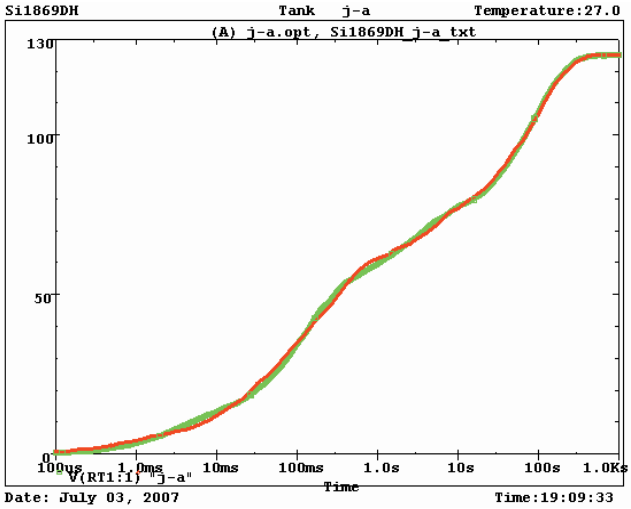


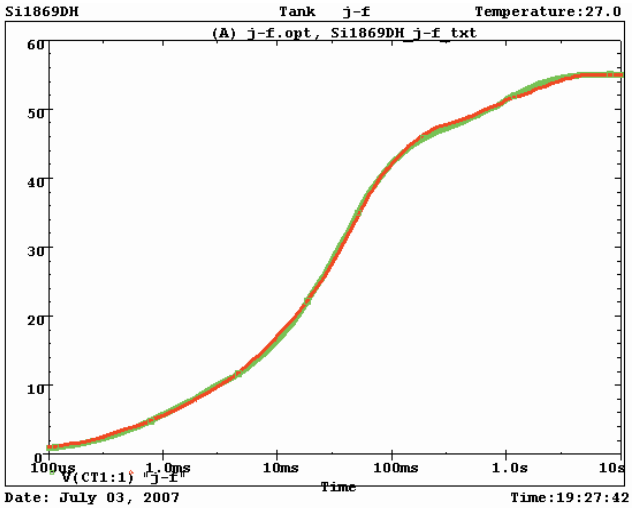
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	16.2372	N/A	11.5473
RF2	39.1284	N/A	21.9522
RF3	19.5756	N/A	12.0419
RF4	50.0588	N/A	9.4586
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	378.4797 u	N/A	137.8073 u
CF2	3.3087 m	N/A	1.0569 m
CF3	132.3272 m	N/A	93.1711 u
CF4	1.6838	N/A	103.0095 m

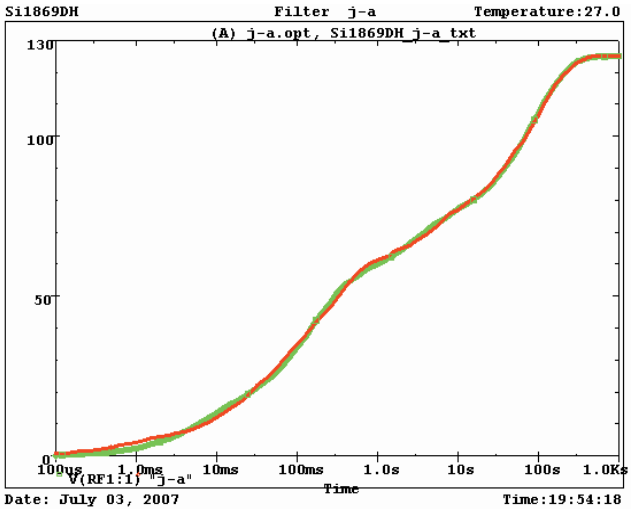
Note: NA indicates not applicable

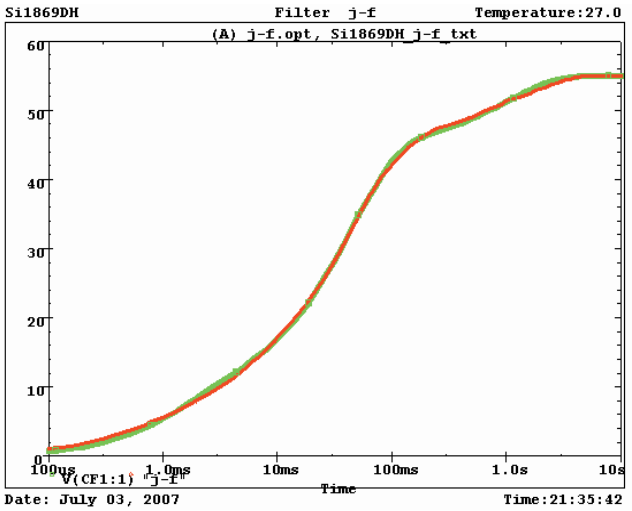
Reference:

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


Si1869DH
Tank j-a
Temperature:27.0
(A) j-a.opt, Si1869DH_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: July 03, 2007
Time:19:09:33


Si1869DH
Tank j-f
Temperature:27.0
(A) j-f.opt, Si1869DH_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: July 03, 2007
Time:19:27:42


Si1869DH
Filter j-a
Temperature:27.0
(A) j-a.opt, Si1869DH_j-a_txt
130
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "j-a"
Time
Date: July 03, 2007
Time:19:54:18


Si1869DH
Filter j-f
Temperature:27.0
(A) j-f.opt, Si1869DH_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: July 03, 2007
Time:21:35:42