R-C Thermal Model Parameters

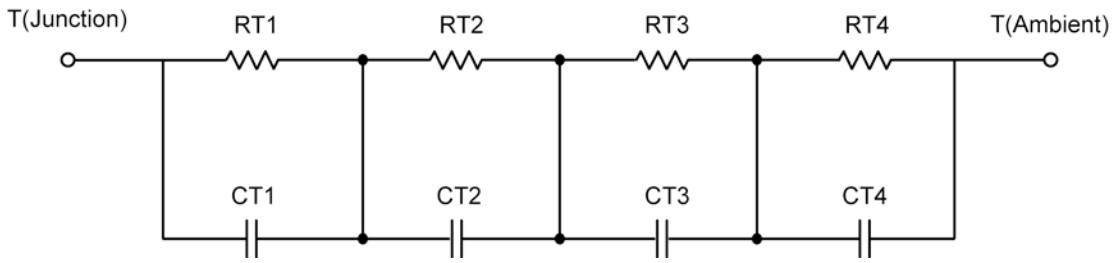
DESCRIPTION

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.

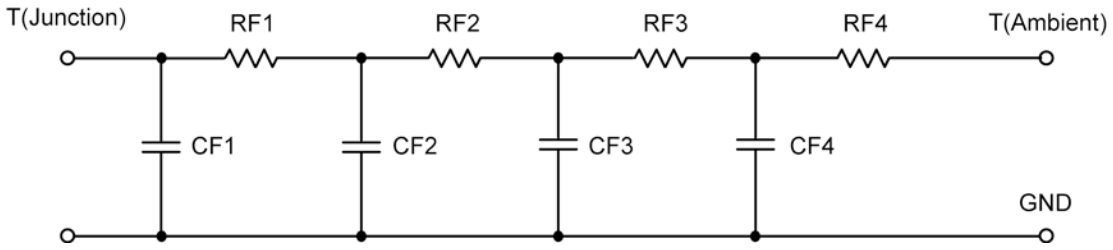
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	27.0713	1.9818	N/A
RT2	13.9534	1.4707	N/A
RT3	14.8827	3.1117	N/A
RT4	49.0926	2.9358	N/A
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	5.0661 m	118.4340 u	N/A
CT2	260.9856 u	154.0489 u	N/A
CT3	391.3129 m	581.9782 u	N/A
CT4	2.2125	246.5084 u	N/A

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

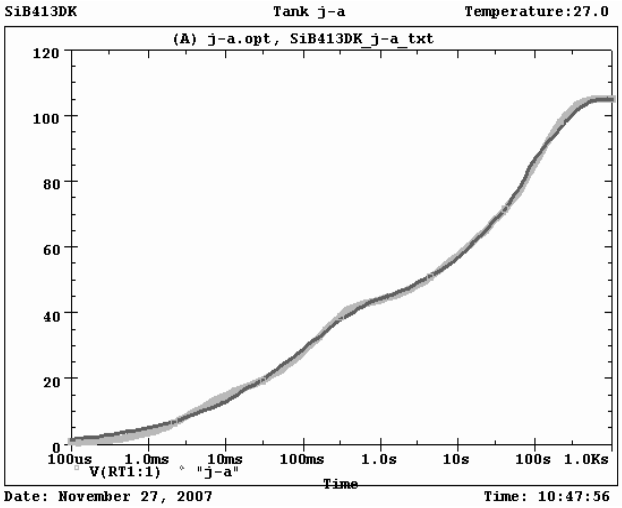


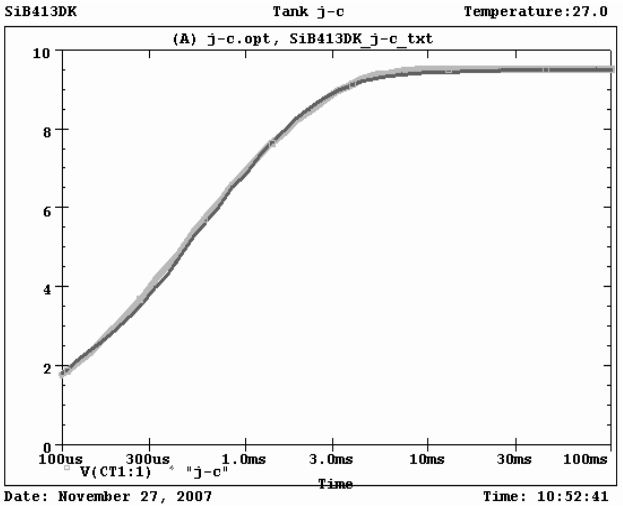
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	14.3660	2.5823	N/A
RF2	27.3222	4.5152	N/A
RF3	18.7728	1.0943	N/A
RF4	44.5390	1.3082	N/A
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	222.1962 u	35.2139 u	N/A
CF2	4.4046 m	53.5437 u	N/A
CF3	315.7482 m	365.0170 u	N/A
CF4	2.0547	457.7854 u	N/A

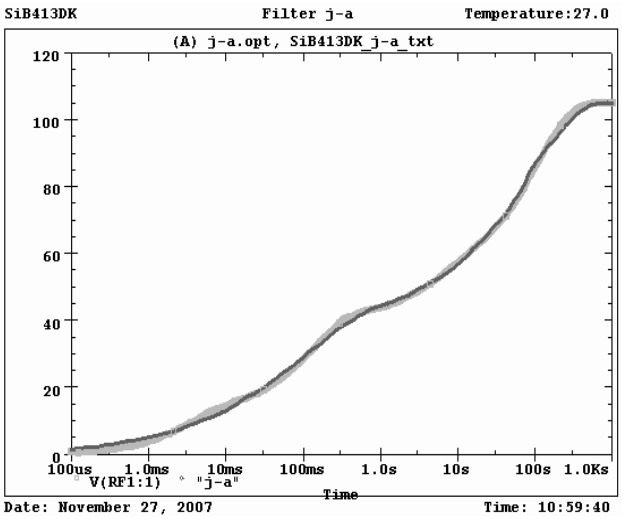
Note: NA indicates not applicable

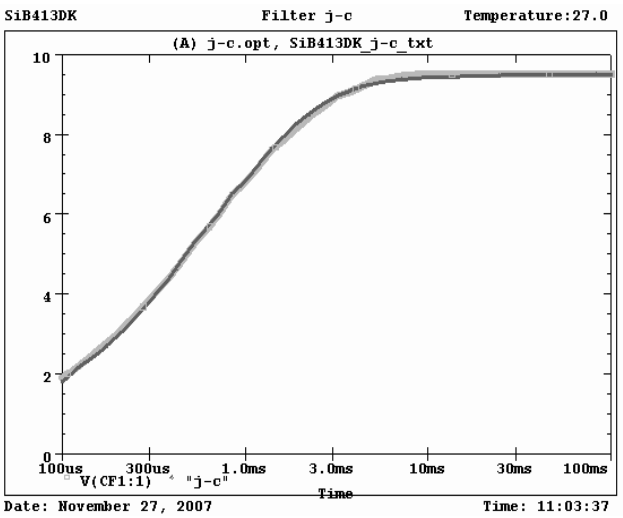
Reference:

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


SiB413DK
Tank j-a
Temperature:27.0
(A) j-a.opt, SiB413DK_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: November 27, 2007
Time: 10:47:56


SiB413DK
Tank j-c
Temperature:27.0
(A) j-c.opt, SiB413DK_j-c_txt
10
8
6
4
2
0
100us 300us 1.0ms 3.0ms 10ms 30ms 100ms
V(CT1:1) "j-c"
Time
Date: November 27, 2007
Time: 10:52:41


SiB413DK
Filter j-a
Temperature:27.0
(A) j-a.opt, SiB413DK_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: November 27, 2007
Time: 10:59:40


SiB413DK
Filter j-c
Temperature:27.0
(A) j-c.opt, SiB413DK_j-c_txt
10
8
6
4
2
0
100us 300us 1.0ms 3.0ms 10ms 30ms 100ms
V(CF1:1) "j-c"
Time
Date: November 27, 2007
Time: 11:03:37