R-C Thermal Model Parameters

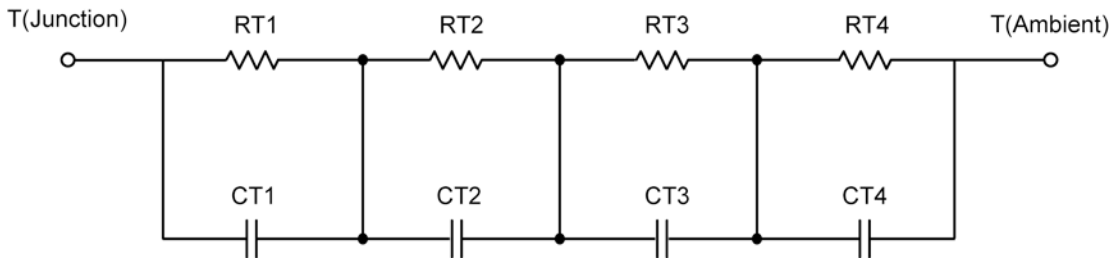
DESCRIPTION

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.

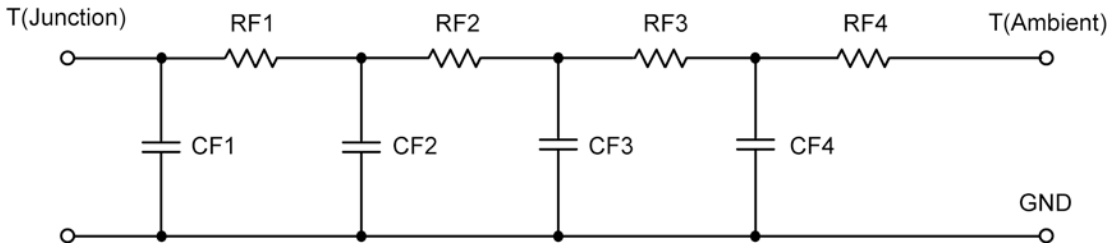
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	30.3122	N/A	5.9888
RT2	30.5137	N/A	22.2008
RT3	5.4749	N/A	4.8192
RT4	58.6992	N/A	11.9912
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	1.6745 m	N/A	275.9981 m
CT2	22.5192 m	N/A	3.0278 m
CT3	128.6939 u	N/A	157.2160 u
CT4	1.3009	N/A	1.2711 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

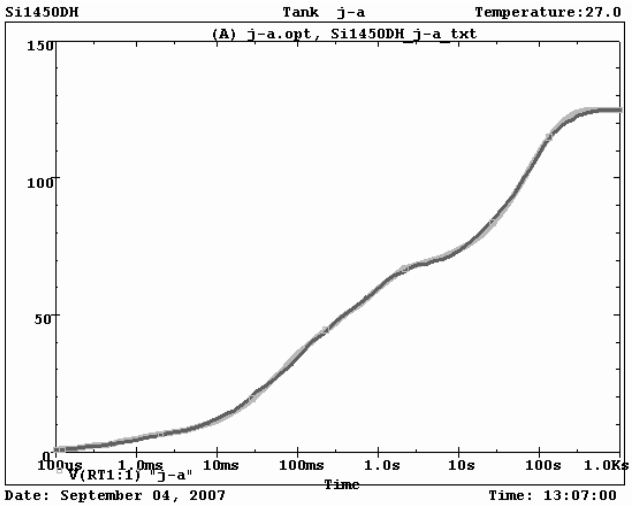


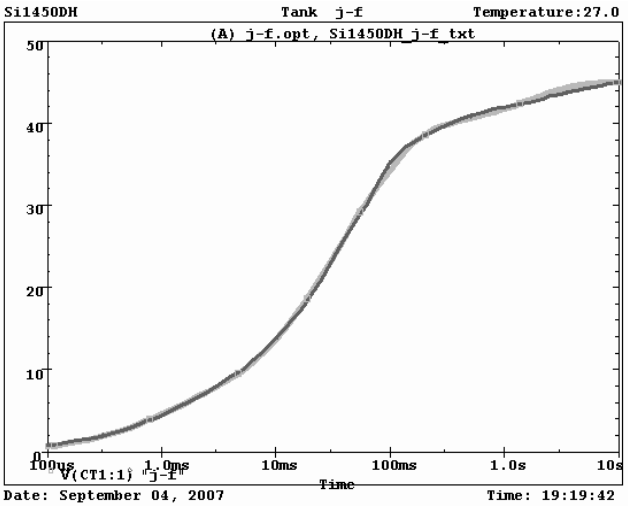
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	9.4922	N/A	9.2904
RF2	31.6850	N/A	23.1352
RF3	26.5418	N/A	7.6691
RF4	57.2810	N/A	4.9053
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	206.0568 u	N/A	179.4734 u
CF2	1.7424 m	N/A	1.1361 m
CF3	23.8550 m	N/A	8.5508 m
CF4	1.3148	N/A	398.0373 m

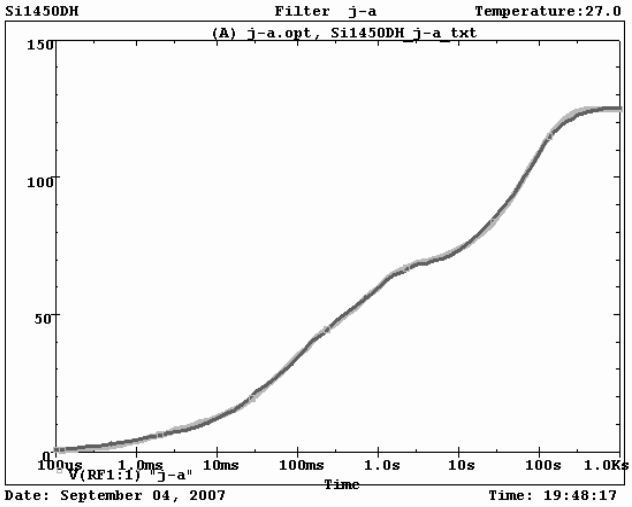
Note: NA indicates not applicable

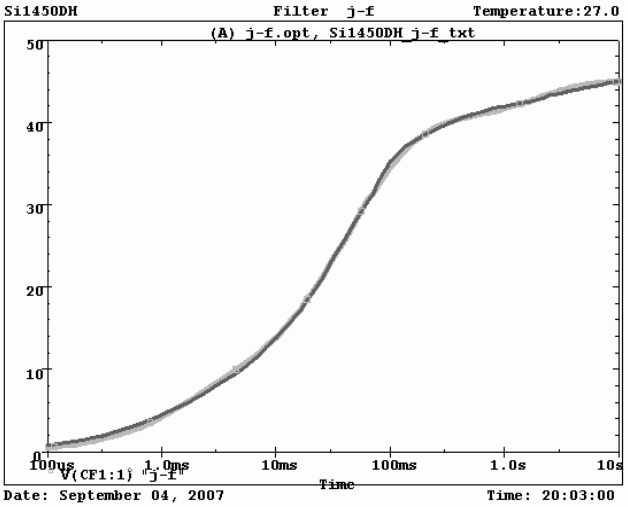
Reference:

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


Si1450DH
Tank j-a
Temperature:27.0
(A) j-a.opt, Si1450DH_j-a_txt
150
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "j-a"
Time
Date: September 04, 2007
Time: 13:07:00


Si1450DH
Tank j-f
Temperature:27.0
(A) j-f.opt, Si1450DH_j-f_txt
50
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CT1:1) "j-f"
Time
Date: September 04, 2007
Time: 19:19:42


Si1450DH
Filter j-a
Temperature:27.0
(A) j-a.opt, Si1450DH_j-a_txt
150
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "j-a"
Time
Date: September 04, 2007
Time: 19:48:17


Si1450DH
Filter j-f
Temperature:27.0
(A) j-f.opt, Si1450DH_j-f_txt
50
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "j-f"
Time
Date: September 04, 2007
Time: 20:03:00