R-C Thermal Model Parameters

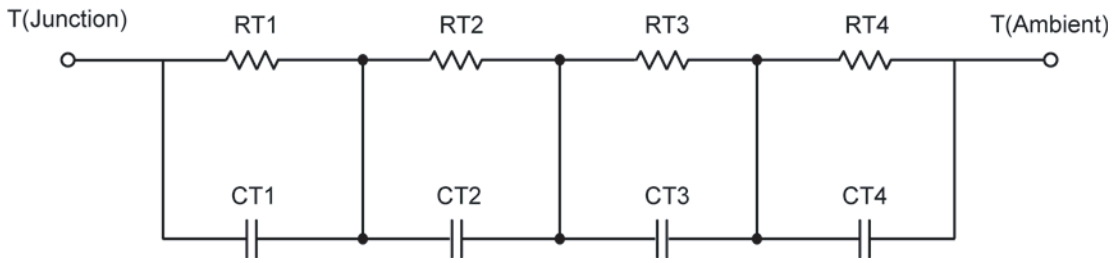
DESCRIPTION

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.

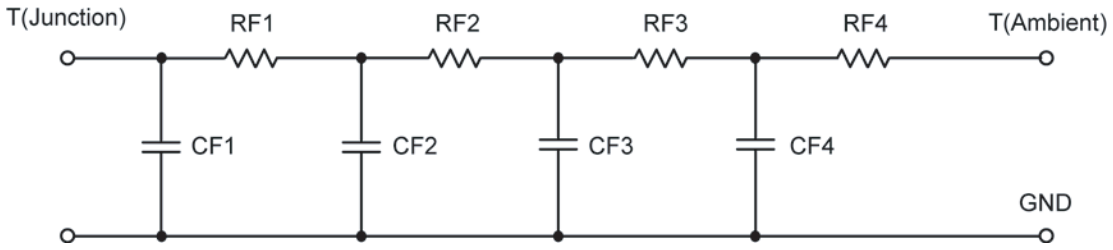
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	1.6612	1.3034 m	N/A
RT2	12.9010	763.6878 m	N/A
RT3	9.6360	1.5671	N/A
RT4	45.6388	1.1817	N/A
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	1.7031 m	5.8945 m	N/A
CT2	400.0587 m	817.8719 µ	N/A
CT3	33.4493 m	13.5018 m	N/A
CT4	1.5835	11.1512 m	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

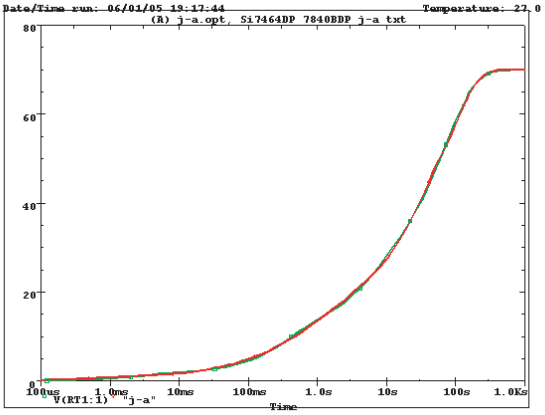


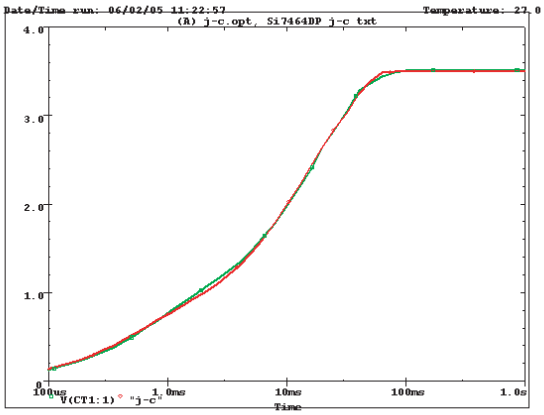
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	8.8695	1.8143 m	N/A
RF2	5.2485	880.7106 m	N/A
RF3	12.5339	1.6900	N/A
RF4	43.0731	916.3063 m	N/A
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	12.1549 m	172.7263 µ	N/A
CF2	167.0679 m	503.1365 µ	N/A
CF3	184.4786 µ	5.1743 m	N/A
CF4	1.3995	367.1440 µ	N/A

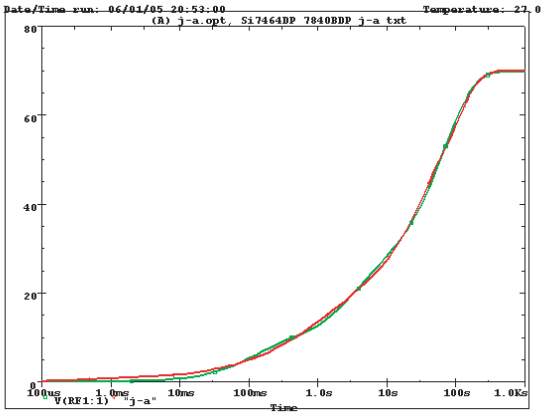
Note: NA indicates not applicable

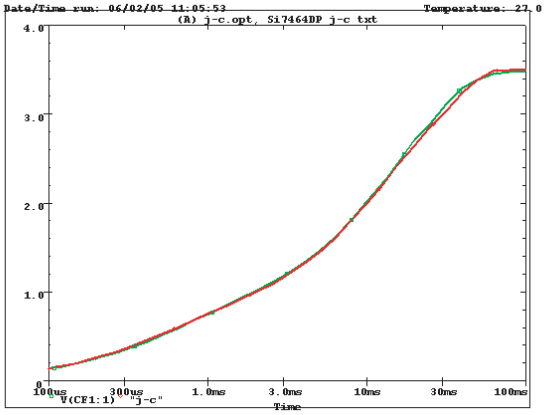
Reference:

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


Date/Time run: 06/01/05 19:17:44
Temperature: 27.0
(R) j-a.opt, Si7464DP 7840BDP j-a txt
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "j-a"
Time


Date/Time run: 06/02/05 11:22:57
Temperature: 27.0
(R) j-c.opt, Si7464DP j-c txt
4.0
3.0
2.0
1.0
0
100us
1.0ms
10ms
100ms
1.0s
V(CT1:1) "j-c"
Time


Date/Time run: 06/01/05 20:53:00
Temperature: 27.0
(R) j-a.opt, Si7464DP 7840BDP j-a txt
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1) "j-a"
Time


Date/Time run: 06/02/05 11:05:53
Temperature: 27.0
(R) j-c.opt, Si7464DP j-c txt
4.0
3.0
2.0
1.0
0
100us
300us
1.0ms
3.0ms
10ms
30ms
100ms
V(CF1:1) "j-c"
Time