R-C Thermal Model Parameters

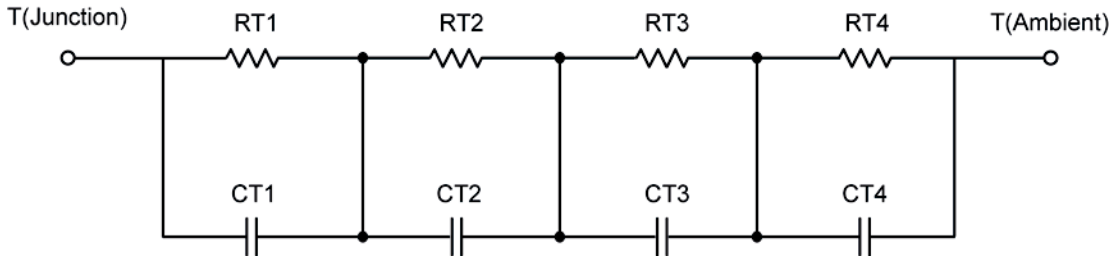
DESCRIPTION

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.

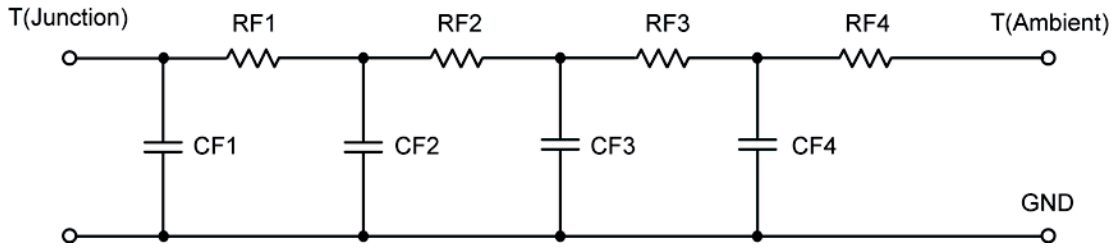
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	43.4941	N/A	12.8935
RT2	44.0172	N/A	25.6570
RT3	8.1497	N/A	23.0010
RT4	54.3390	N/A	3.4485
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	9.0229 m	N/A	8.4691 m
CT2	40.6188 m	N/A	47.2116 m
CT3	2.6348 m	N/A	14.4179 m
CT4	2.1710	N/A	1.4298 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

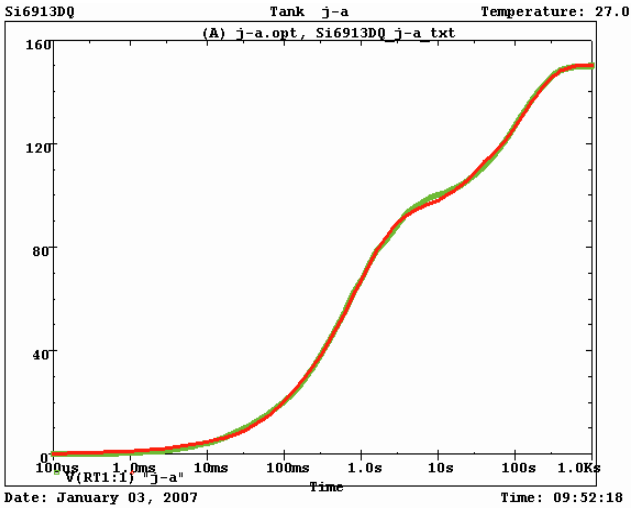


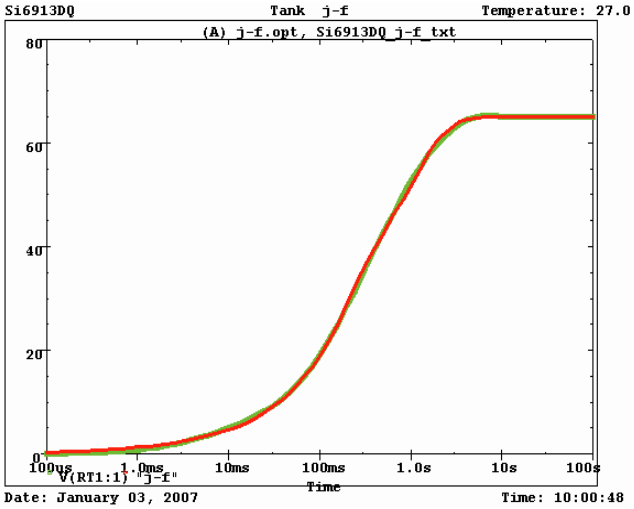
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	11.1778	N/A	3.1235
RF2	38.9903	N/A	2.2744
RF3	45.0243	N/A	29.7776
RF4	54.8076	N/A	29.8245
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	1.8281 m	N/A	973.4866 u
CF2	4.0865 m	N/A	1.1210 m
CF3	17.6257 m	N/A	2.2964 m
CF4	2.0237	N/A	22.9093 m

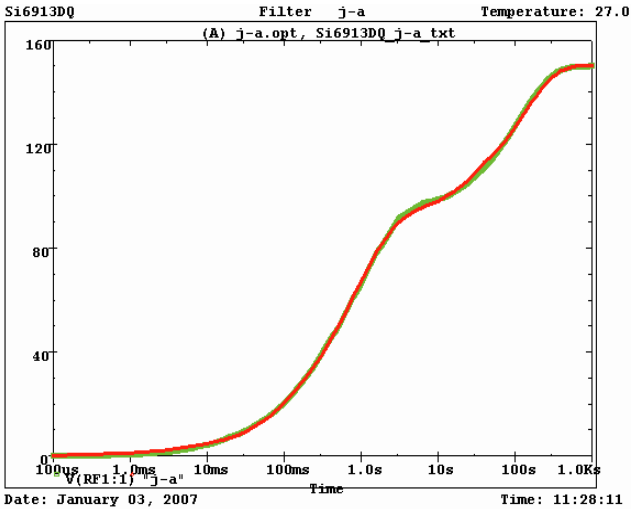
Note: NA indicates not applicable

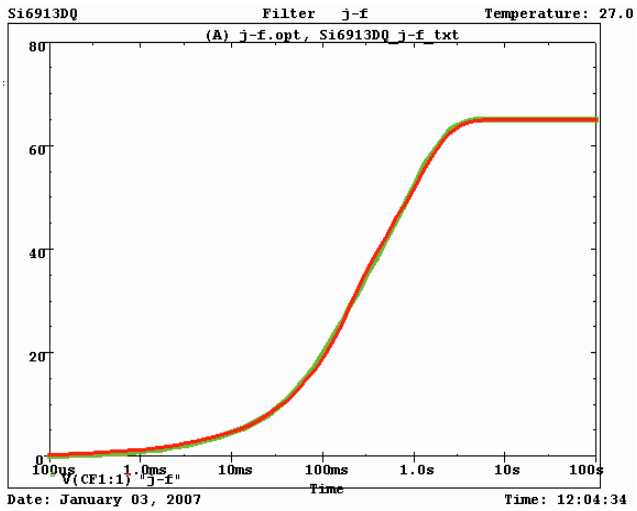
Reference:

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


Si6913DQ
Tank j-a
Temperature: 27.0
(A) j-a.opt, Si6913DQ_j-a_txt
160
120
80
40
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "j-a"
Time
Date: January 03, 2007
Time: 09:52:18


Si6913DQ
Tank j-f
Temperature: 27.0
(A) j-f.opt, Si6913DQ_j-f_txt
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(RT1:1) "j-f"
Time
Date: January 03, 2007
Time: 10:00:48


Si6913DQ
Filter j-a
Temperature: 27.0
(A) j-a.opt, Si6913DQ_j-a_txt
160
120
80
40
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1) "j-a"
Time
Date: January 03, 2007
Time: 11:28:11


Si6913DQ
Filter j-f
Temperature: 27.0
(A) j-f.opt, Si6913DQ_j-f_txt
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1) "j-f"
Time
Date: January 03, 2007
Time: 12:04:34