R-C Thermal Model Parameters

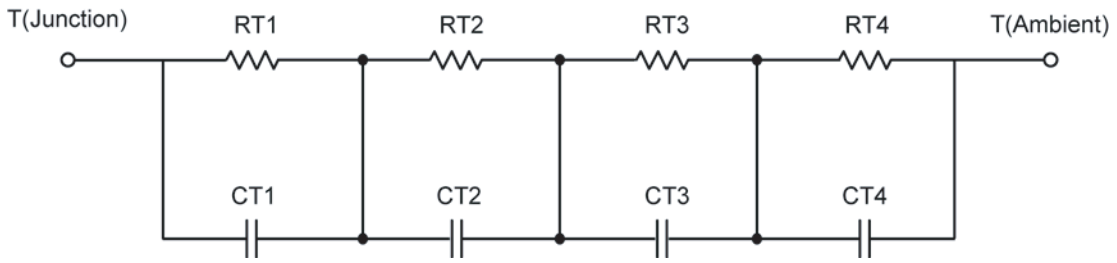
DESCRIPTION

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.

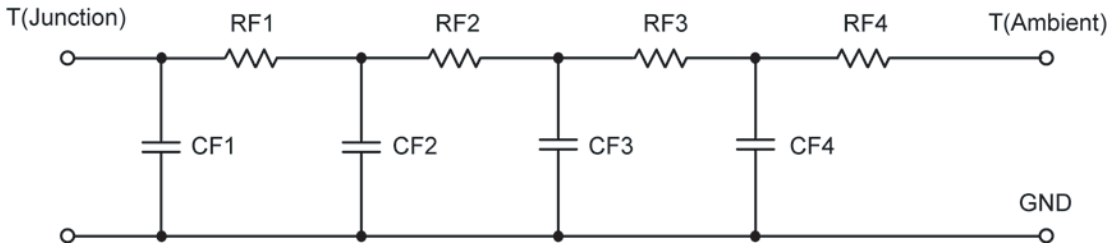
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	5.7229	N/A	14.4066
RT2	29.4366	N/A	2.8075
RT3	24.3709	N/A	2.9437
RT4	60.0317	N/A	19.2927
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	842.3959 u	N/A	70.5422 m
CT2	64.3556 m	N/A	370.4615 u
CT3	6.9092 m	N/A	5.4704 m
CT4	1.1832	N/A	4.5576 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

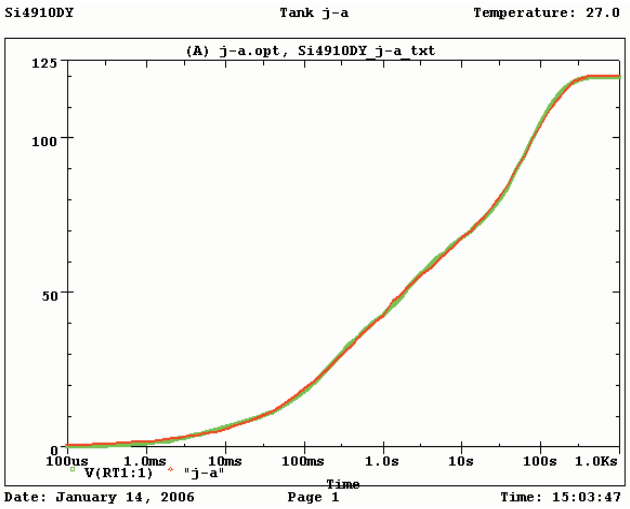


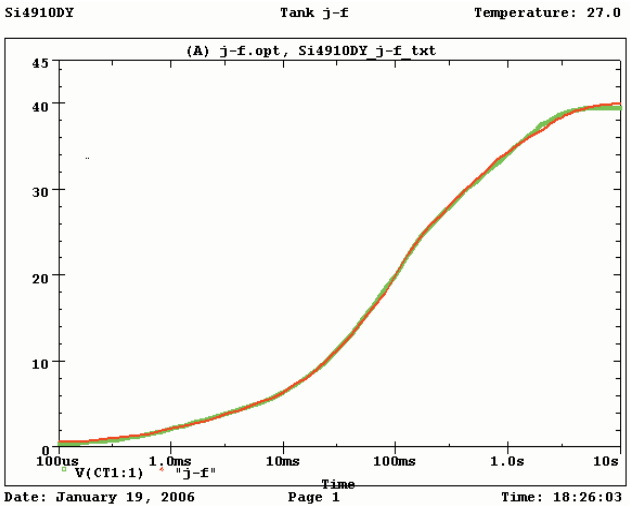
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	8.9669	N/A	4.3517
RF2	27.9555	N/A	20.8754
RF3	26.8302	N/A	11.6210
RF4	55.9723	N/A	3.3029
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	946.1059 u	N/A	364.5361 u
CF2	6.2504 m	N/A	2.9188 m
CF3	71.9748 m	N/A	46.3456 m
CF4	1.2187	N/A	722.6150 m

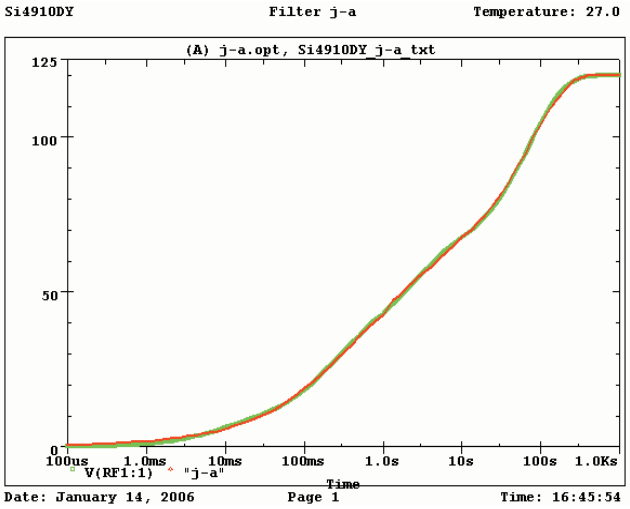
Note: NA indicates not applicable

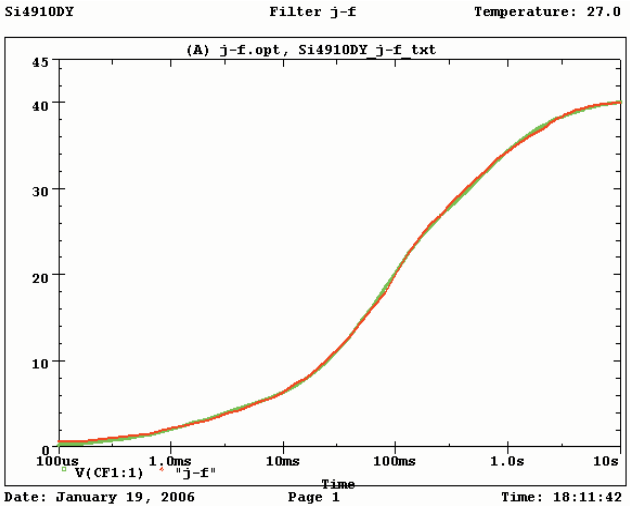
Reference:

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


Si4910DY
Tank j-a
Temperature: 27.0
(A) j-a.opt, Si4910DY_j-a_txt
125
100
50
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"j-a"
Time
Date: January 14, 2006
Page 1
Time: 15:03:47


Si4910DY
Tank j-f
Temperature: 27.0
(A) j-f.opt, Si4910DY_j-f_txt
45
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)
"j-f"
Time
Date: January 19, 2006
Page 1
Time: 18:26:03


Si4910DY
Filter j-a
Temperature: 27.0
(A) j-a.opt, Si4910DY_j-a_txt
125
100
50
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"j-a"
Time
Date: January 14, 2006
Page 1
Time: 16:45:54


Si4910DY
Filter j-f
Temperature: 27.0
(A) j-f.opt, Si4910DY_j-f_txt
45
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1)
"j-f"
Time
Date: January 19, 2006
Page 1
Time: 18:11:42