R-C Thermal Model Parameters

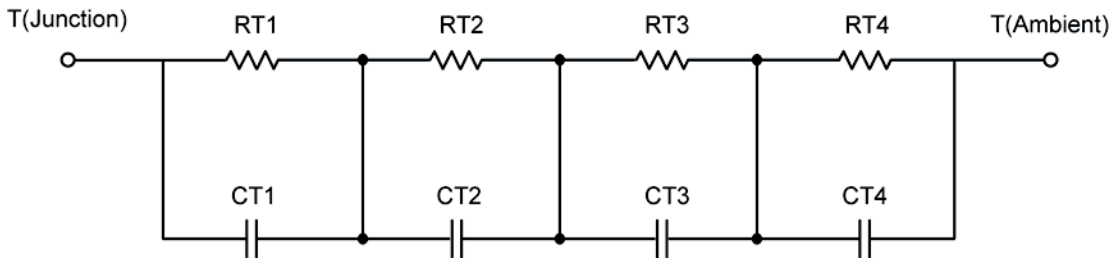
DESCRIPTION

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.

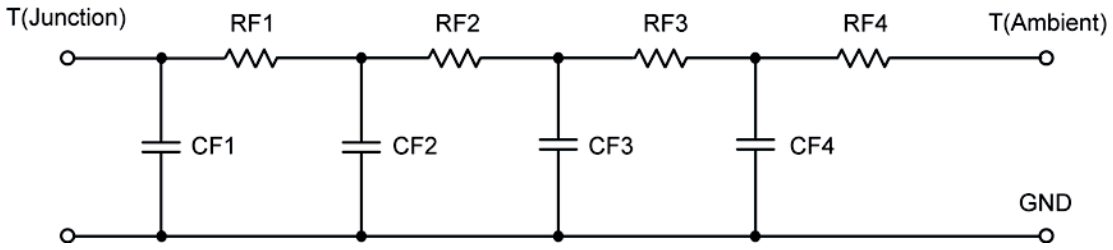
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	19.7641	N/A	7.1378
RT2	13.1526	N/A	1.4750
RT3	5.1251	N/A	4.9120
RT4	53.4355	N/A	11.4833
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	91.3997 m	N/A	8.0626 m
CT2	36.9001 m	N/A	1.8982 m
CT3	1.9595 m	N/A	426.6082 m
CT4	1.3078	N/A	34.6812 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

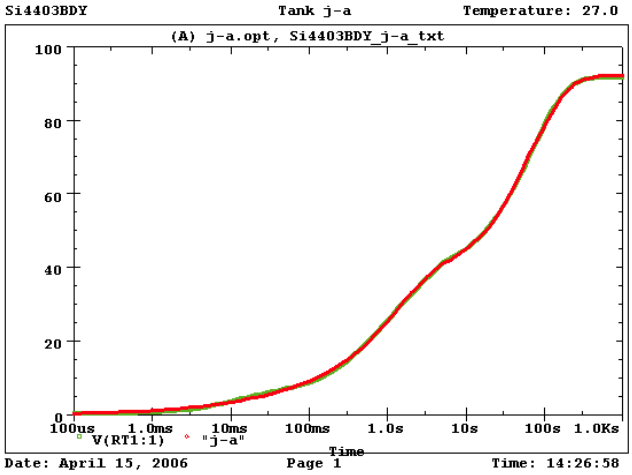


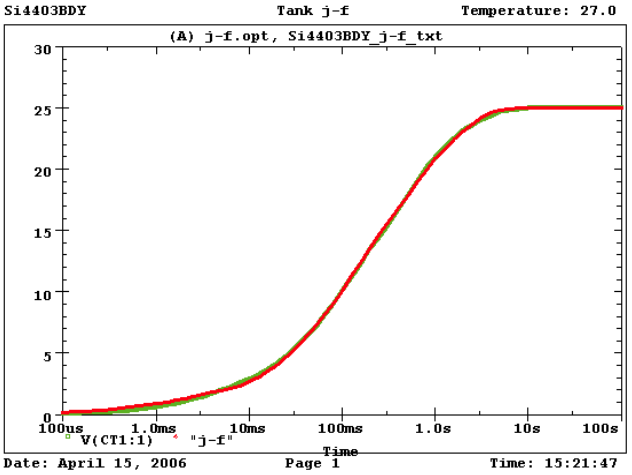
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	6.3880	N/A	2.4901
RF2	25.5351	N/A	11.5612
RF3	12.8664	N/A	9.8891
RF4	46.8675	N/A	1.0868
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	2.0978 m	N/A	1.3718 m
CF2	25.3064 m	N/A	6.2120 m
CF3	257.1027 m	N/A	62.1805 m
CF4	1.2309	N/A	3.1770

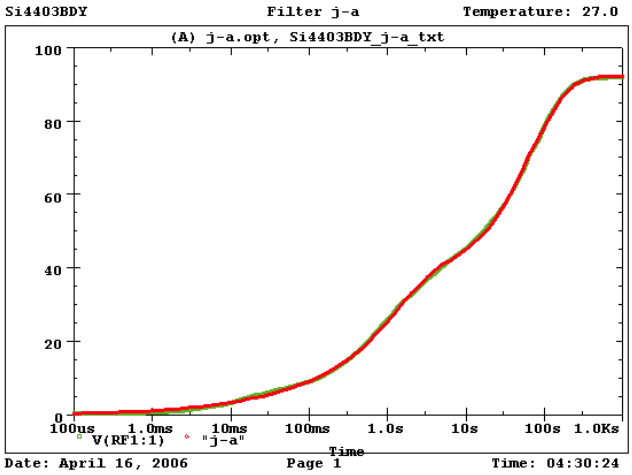
Note: NA indicates not applicable

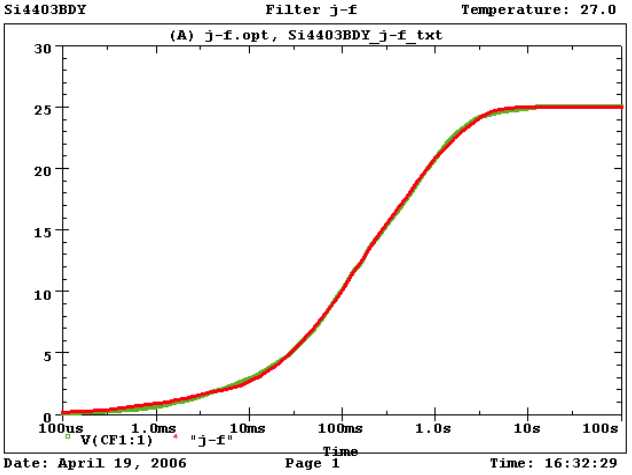
Reference:

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


Si4403BDY
Tank j-a
Temperature: 27.0
(A) j-a.opt, Si4403BDY_j-a_txt
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"j-a"
Time
Date: April 15, 2006
Page 1
Time: 14:26:58


Si4403BDY
Tank j-f
Temperature: 27.0
(A) j-f.opt, Si4403BDY_j-f_txt
30
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1)
"j-f"
Time
Date: April 15, 2006
Page 1
Time: 15:21:47


Si4403BDY
Filter j-a
Temperature: 27.0
(A) j-a.opt, Si4403BDY_j-a_txt
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"j-a"
Time
Date: April 16, 2006
Page 1
Time: 04:30:24


Si4403BDY
Filter j-f
Temperature: 27.0
(A) j-f.opt, Si4403BDY_j-f_txt
30
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1)
"j-f"
Time
Date: April 19, 2006
Page 1
Time: 16:32:29