R-C Thermal Model Parameters

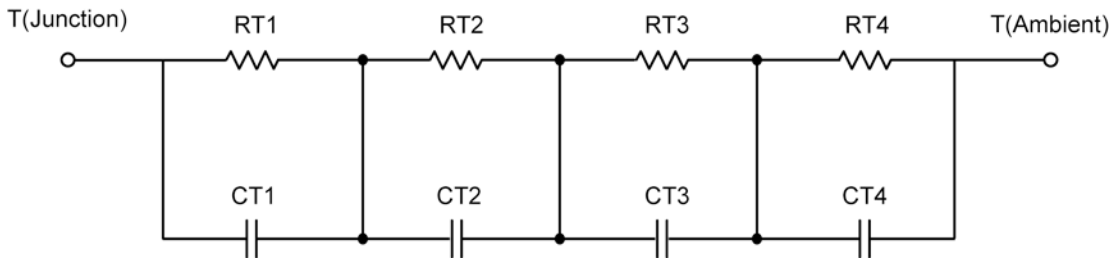
DESCRIPTION

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.

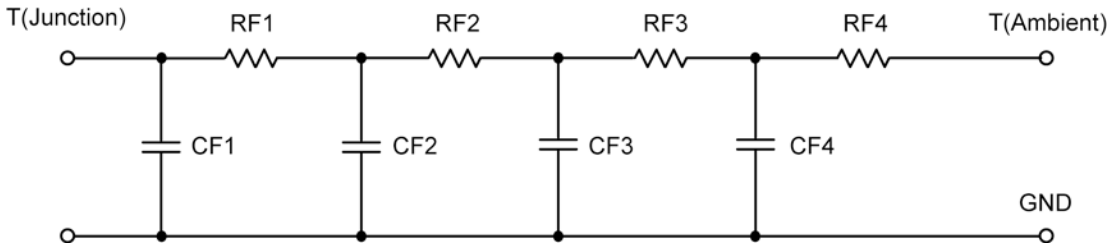
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
RT1	4.8786	5.6181	N/A	16.7367	20.1623
RT2	39.5095	36.0546	N/A	9.5815	3.3282
RT3	17.9855	17.3507	N/A	1.5829	5.0721
RT4	57.6264	55.9766	N/A	17.0989	11.4374
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
CT1	14.1668 m	14.4764 m	N/A	3.5461 m	4.1267 m
CT2	21.3591 m	23.8609 m	N/A	175.9369 u	283.0180 u
CT3	2.2388 m	2.1007 m	N/A	3.0648	50.2310 m
CT4	1.0695	1.1452	N/A	67.3159 m	132.1200 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

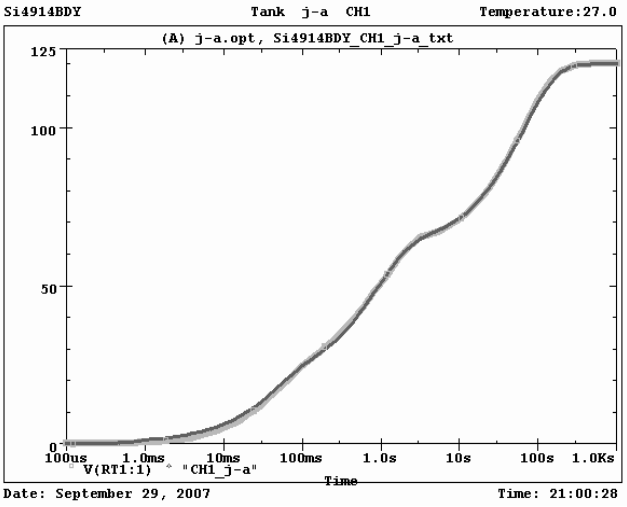


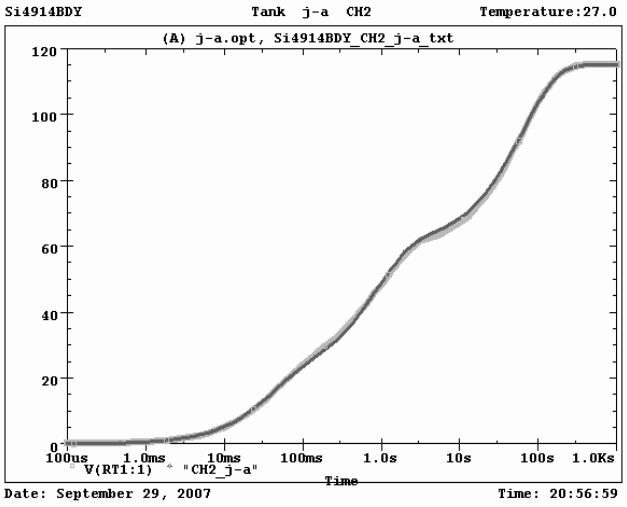
R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
RF1	6.2633	7.4026	N/A	11.3411	4.3422
RF2	24.5245	22.1085	N/A	18.3264	23.6889
RF3	33.9677	32.8372	N/A	10.6123	7.2482
RF4	55.2445	52.6517	N/A	4.7202	4.7207
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
CF1	593.9632 u	975.6683 u	N/A	180.1138 u	377.8295 u
CF2	2.3545 m	2.2315 m	N/A	4.0106 m	3.5045 m
CF3	23.6364 m	25.6770 m	N/A	90.0542 m	100.6478 m
CF4	1.1137	1.1775	N/A	949.0498 u	553.1565 u

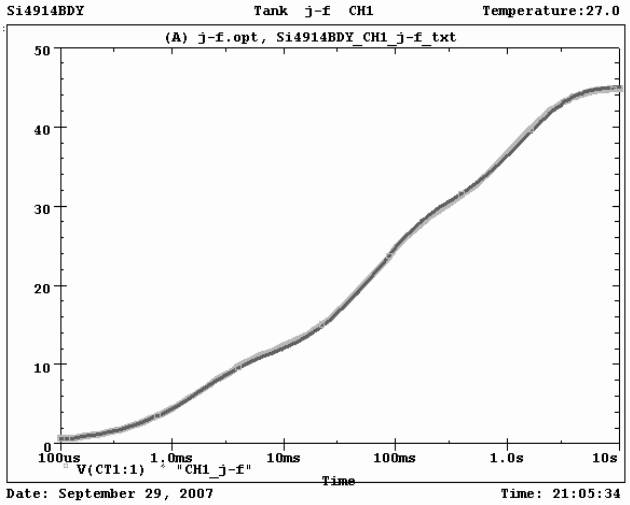
Note: NA indicates not applicable

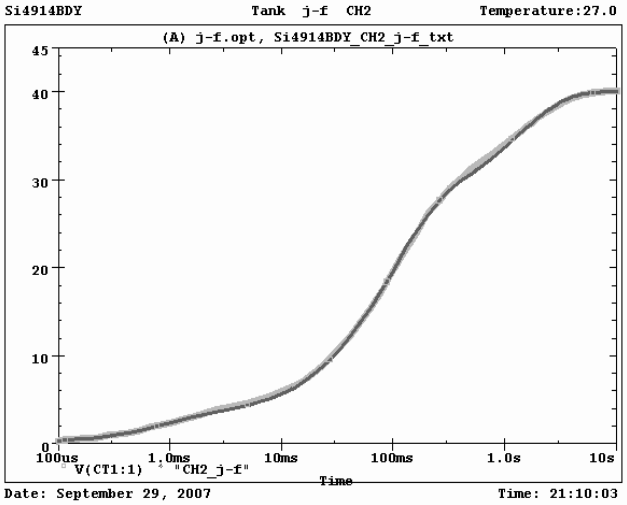
Reference:

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


Si4914BDY
Tank j-a CH1
Temperature:27.0
(A) j-a.opt, Si4914BDY_CH1_j-a_txt
125
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "CH1_j-a"
Time
Date: September 29, 2007
Time: 21:00:28


Si4914BDY
Tank j-a CH2
Temperature:27.0
(A) j-a.opt, Si4914BDY_CH2_j-a_txt
120
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "CH2_j-a"
Time
Date: September 29, 2007
Time: 20:56:59


Si4914BDY
Tank j-f CH1
Temperature:27.0
(A) j-f.opt, Si4914BDY_CH1_j-f_txt
50
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CT1:1) "CH1_j-f"
Time
Date: September 29, 2007
Time: 21:05:34


Si4914BDY
Tank j-f CH2
Temperature:27.0
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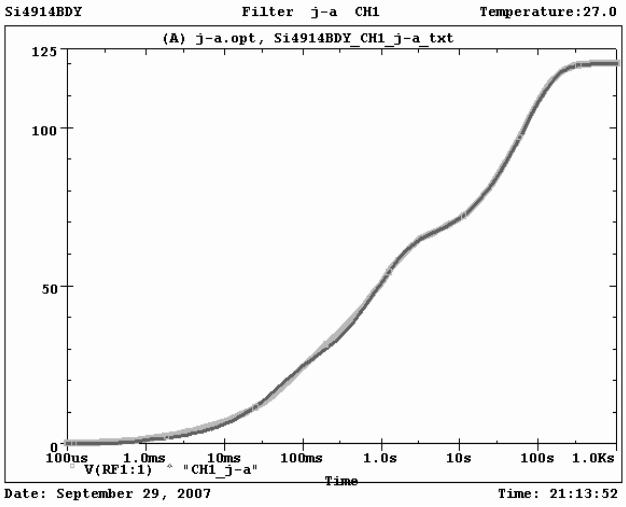
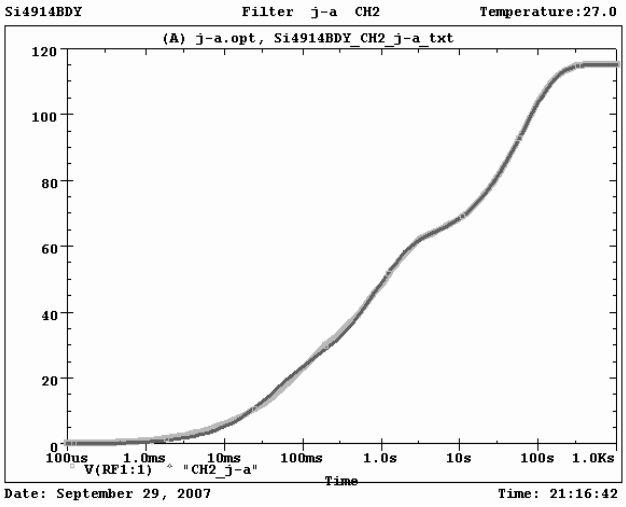
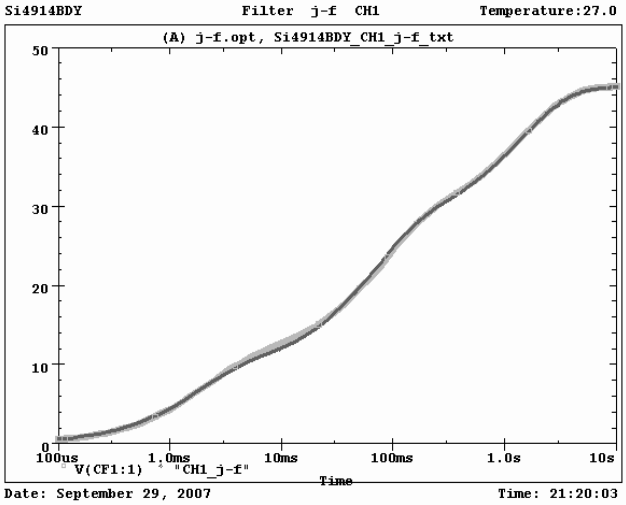
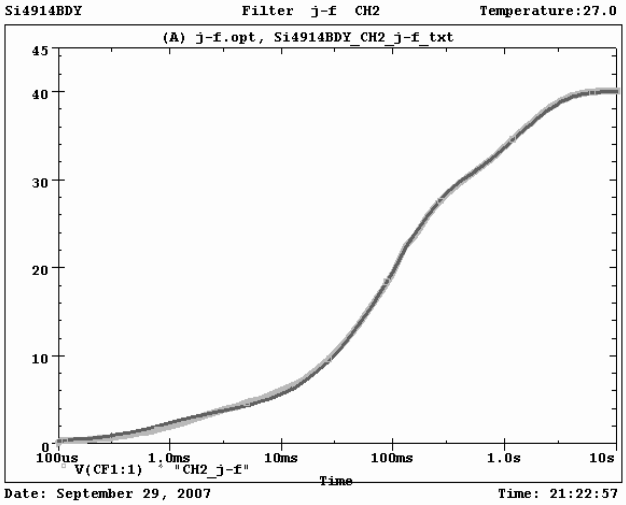
45
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CT1:1) "CH2_j-f"
Time
Date: September 29, 2007
Time: 21:10:03


Si4914BDY Filter j-a CH1 Temperature:27.0
(A) j-a.opt, Si4914BDY_CH1_j-a_txt
125
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "CH1_j-a"
Time
Date: September 29, 2007 Time: 21:13:52


Si4914BDY Filter j-a CH2 Temperature:27.0
(A) j-a.opt, Si4914BDY_CH2_j-a_txt
120
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "CH2_j-a"
Time
Date: September 29, 2007 Time: 21:16:42


Si4914BDY Filter j-f CH1 Temperature:27.0
(A) j-f.opt, Si4914BDY_CH1_j-f_txt
50
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "CH1_j-f"
Time
Date: September 29, 2007 Time: 21:20:03


Si4914BDY Filter j-f CH2 Temperature:27.0
(A) j-f.opt, Si4914BDY_CH2_j-f_txt
45
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "CH2_j-f"
Time
Date: September 29, 2007 Time: 21:22:57