R-C Thermal Model Parameters

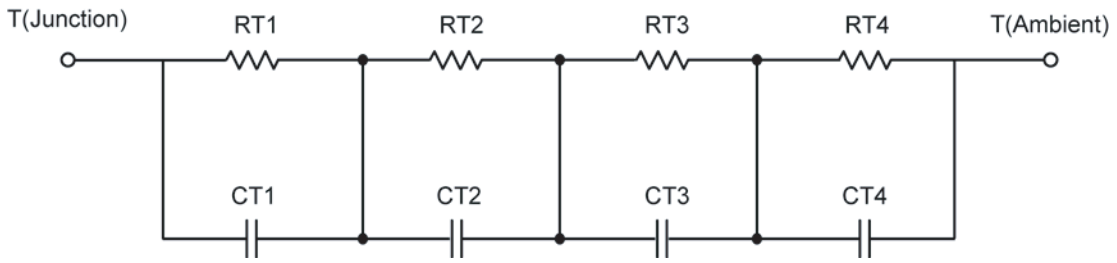
DESCRIPTION

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.

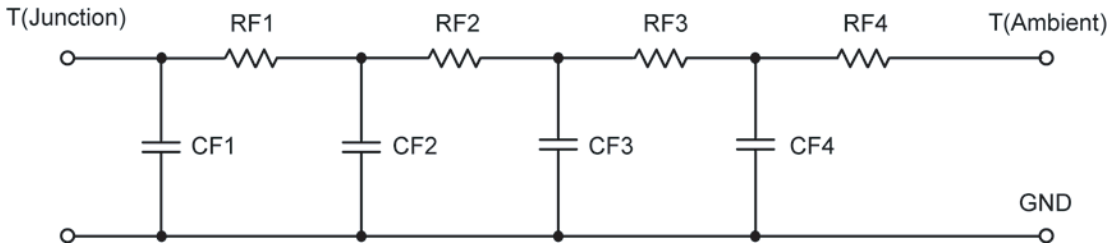
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Q1**	**Ambient Q2**	**Case**	**Foot Q1**	**Foot Q2**
RT1	2.3439	2.4039	N/A	10.8513	10.0385
RT2	26.9817	31.5605	N/A	10.9954	8.6825
RT3	21.0135	15.6551	N/A	3.3186	2.1839
RT4	54.6609	35.3805	N/A	9.8347	3.0952
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Q1**	**Ambient Q2**	**Case**	**Foot Q1**	**Foot Q2**
CT1	4.8369 m	16.5783 m	N/A	126.3851 m	2.0263
CT2	104.6846 m	175.6141 m	N/A	25.5136 m	167.0378 m
CT3	14.6919 m	34.7178 m	N/A	1.1793 m	1.3426 m
CT4	1.2039	1.1923	N/A	10.9613 m	44.5532 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

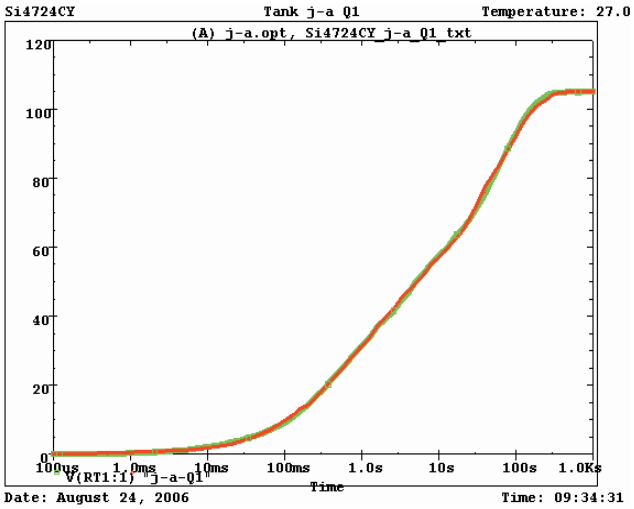


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Q1**	**Ambient Q2**	**Case**	**Foot Q1**	**Foot Q2**
RF1	12.9349	14.7665	N/A	4.3132	2.1771
RF2	29.2964	27.4412	N/A	15.2936	4.3684
RF3	29.0996	24.7704	N/A	9.5539	8.8139
RF4	33.6691	18.0219	N/A	5.8393	8.6406
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Q1**	**Ambient Q2**	**Case**	**Foot Q1**	**Foot Q2**
CF1	5.6543 m	15.2614 m	N/A	978.2987 u	1.1393 m
CF2	23.4095 m	68.2351 m	N/A	6.2472 m	27.8130 m
CF3	387.1060 m	295.0292 m	N/A	16.5248 m	135.4733 m
CF4	1.8093	2.3726	N/A	255.7887 m	2.1878

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


Si4724CY
Tank j-a Q1
Temperature: 27.0
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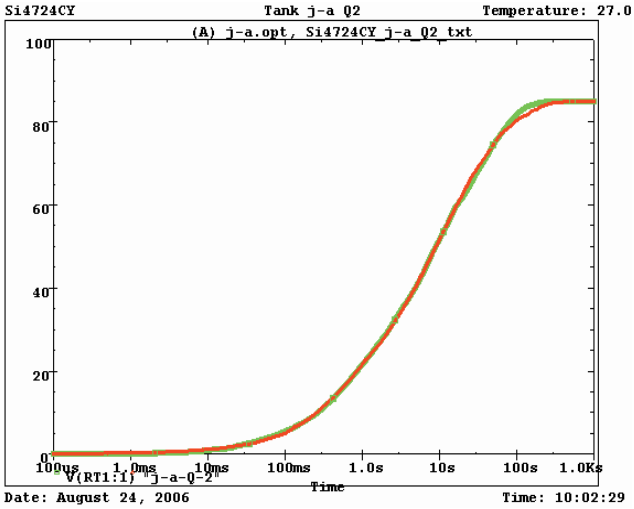
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "j-a-Q1"
Time
Date: August 24, 2006
Time: 09:34:31


Si4724CY
Tank j-a Q2
Temperature: 27.0
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60
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20
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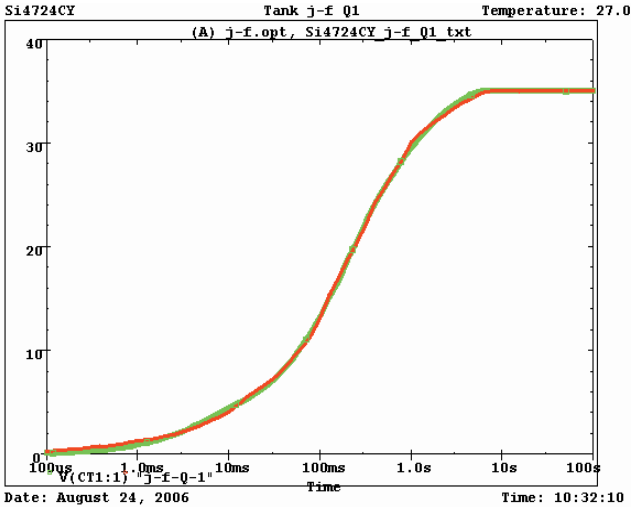
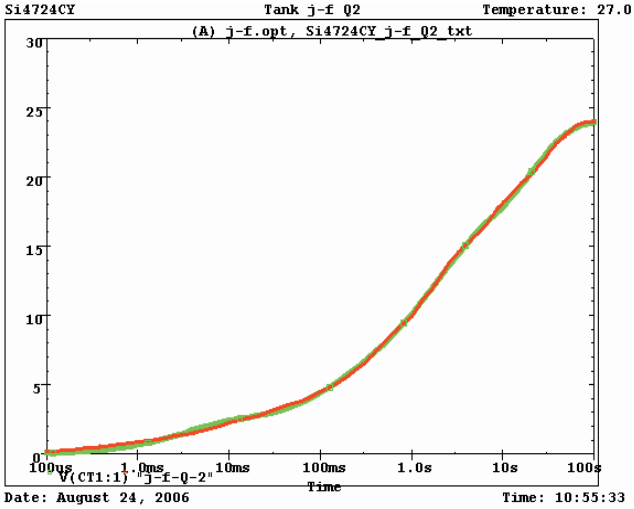
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "j-a-Q-2"
Time
Date: August 24, 2006
Time: 10:02:29


Si4724CY
Tank j-f Q1
Temperature: 27.0
(A) j-f.opt, Si4724CY_j-f_Q1_txt
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1) "j-f-Q-1"
Time
Date: August 24, 2006
Time: 10:32:10


Si4724CY
Tank j-f Q2
Temperature: 27.0
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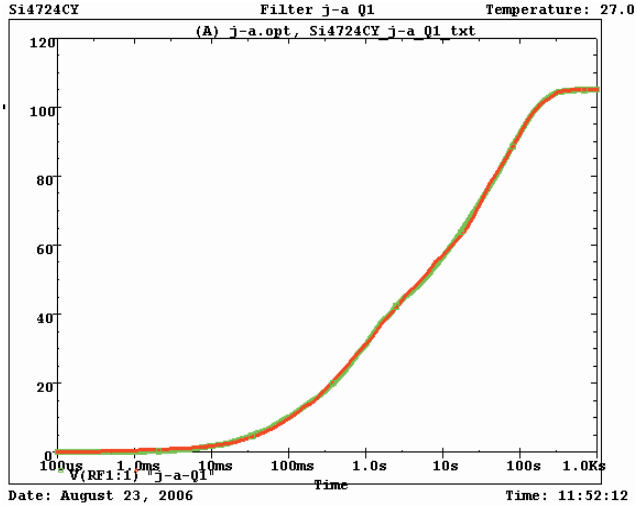
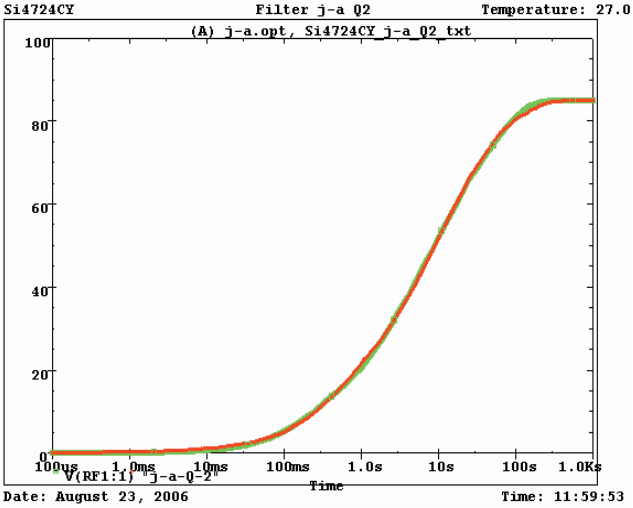
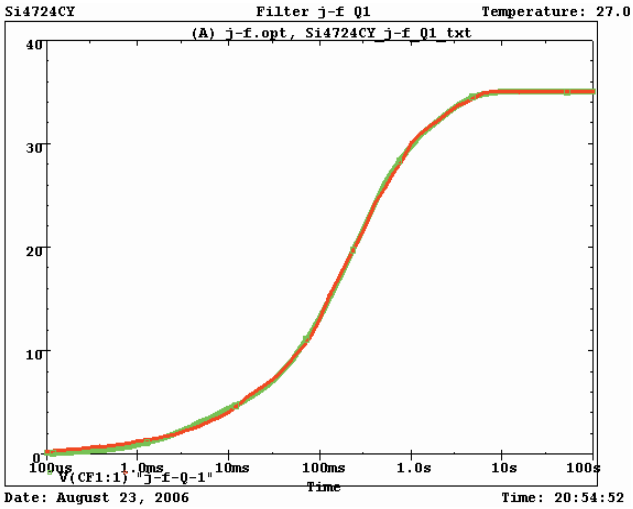
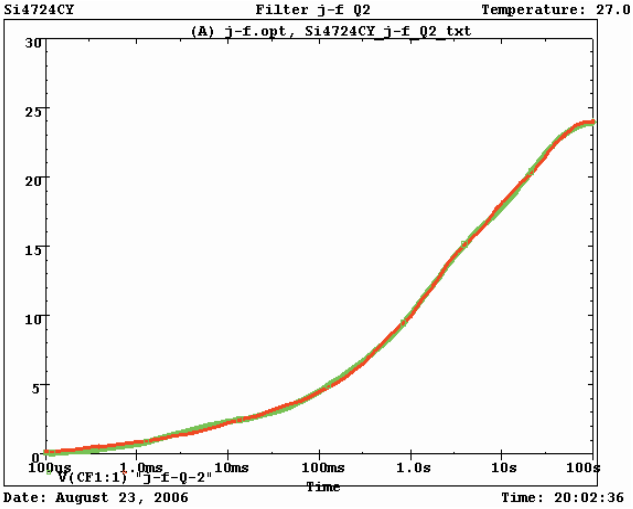
30
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1) "j-f-Q-2"
Time
Date: August 24, 2006
Time: 10:55:33


Si4724CY
Filter j-a Q1
Temperature: 27.0
(A) j-a.opt, Si4724CY_j-a_Q1_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1) "j-a-Q1"
Time
Date: August 23, 2006
Time: 11:52:12


Si4724CY
Filter j-a Q2
Temperature: 27.0
(A) j-a.opt, Si4724CY_j-a_Q2_txt
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1) "j-a-Q-2"
Time
Date: August 23, 2006
Time: 11:59:53


Si4724CY
Filter j-f Q1
Temperature: 27.0
(A) j-f.opt, Si4724CY_j-f_Q1_txt
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1) "j-f-Q-1"
Time
Date: August 23, 2006
Time: 20:54:52


Si4724CY
Filter j-f Q2
Temperature: 27.0
(A) j-f.opt, Si4724CY_j-f_Q2_txt
30
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1) "j-f-Q-2"
Time
Date: August 23, 2006
Time: 20:02:36