R-C Thermal Model Parameters

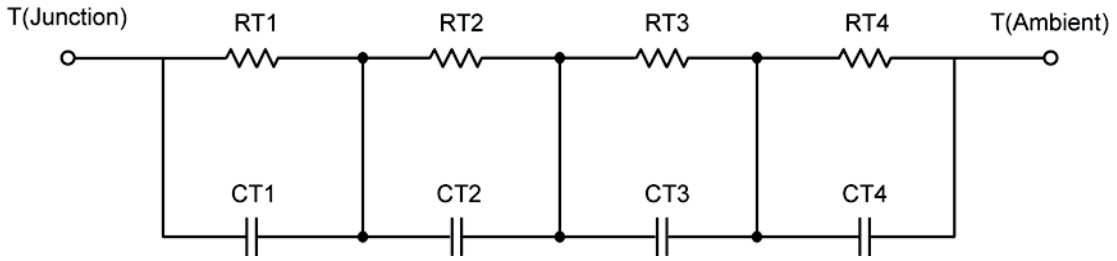
DESCRIPTION

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.

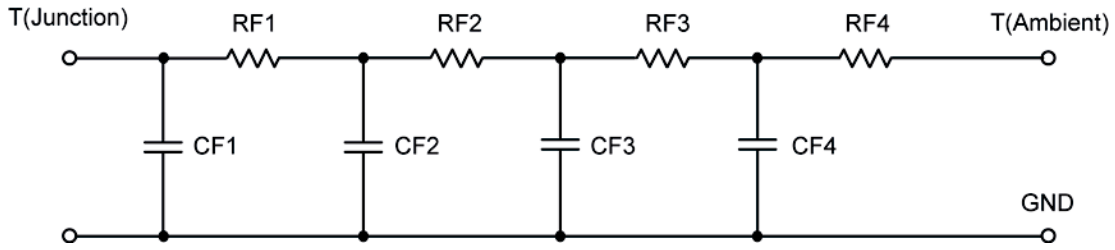
Note:
For a detailed explanation of implementing these values in P-SPICE, refer to Application Note AN609 Thermal Simulations Of Power MOSFETs on P-SPICE Platform.

R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Foot**	**Case Nch**	**Case Pch**
RT1	5.0788	5.0788	N/A	1.7033	1.7033
RT2	11.4296	11.4296	N/A	1.0356	1.0356
RT3	13.1479	13.1479	N/A	908.5000 m	908.5000 m
RT4	55.3437	55.3437	N/A	1.8526	1.8526
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Foot**	**Case Nch**	**Case Pch**
CT1	916.4415 u	916.4415 u	N/A	10.4943 m	10.4943 m
CT2	18.3715 m	18.3715 m	N/A	1.8989 m	1.8989 m
CT3	255.3144 m	255.3144 m	N/A	338.9567 m	338.9567 m
CT4	1.3848	1.3848	N/A	869.8553 u	869.8553 u

R-C THERMAL MODEL FOR FILTER CONFIGURATION

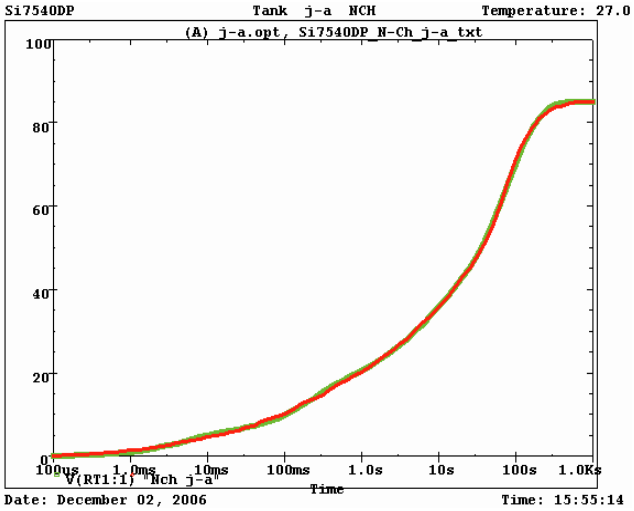


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Foot**	**Case Nch**	**Case Pch**
RF1	5.3819	5.3819	N/A	3.0847	3.0847
RF2	11.6351	11.6351	N/A	1.6725	1.6725
RF3	15.8984	15.8984	N/A	634.7250 m	634.7250 m
RF4	52.0846	52.0846	N/A	108.0750 m	108.0750 m
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Foot**	**Case Nch**	**Case Pch**
CF1	842.4869 u	842.4869 u	N/A	552.0837 u	552.0837 u
CF2	14.1484 m	14.1484 m	N/A	9.4244 m	9.4244 m
CF3	166.5741 m	166.5741 m	N/A	581.8856 m	581.8856 m
CF4	1.2308	1.2308	N/A	2.0847 m	2.0847 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


Si7540DP
Tank j-a NCH
Temperature: 27.0
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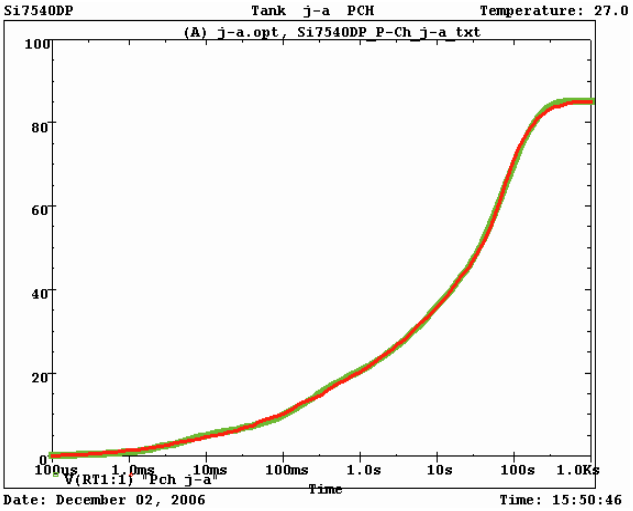
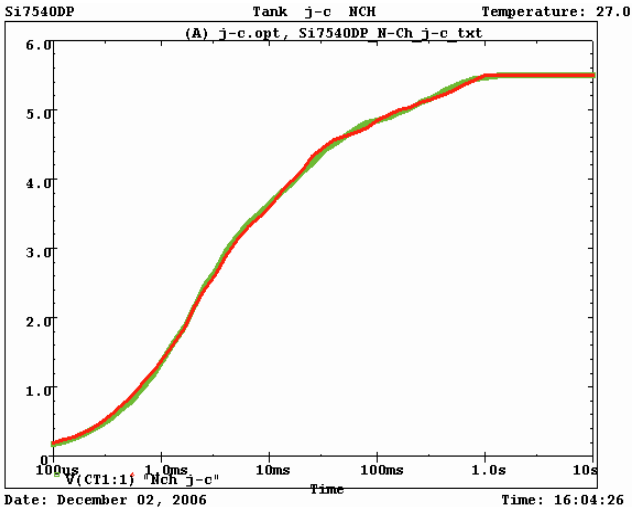
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "Nch j-a"
Time
Date: December 02, 2006
Time: 15:55:14


Si7540DP
Tank j-a PCH
Temperature: 27.0
(A) j-a.opt, Si7540DP_P-Ch_j-a_txt
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "Pch j-a"
Time
Date: December 02, 2006
Time: 15:50:46


Si7540DP
Tank j-c NCH
Temperature: 27.0
(A) j-c.opt, Si7540DP_N-Ch_j-c_txt
6.0
5.0
4.0
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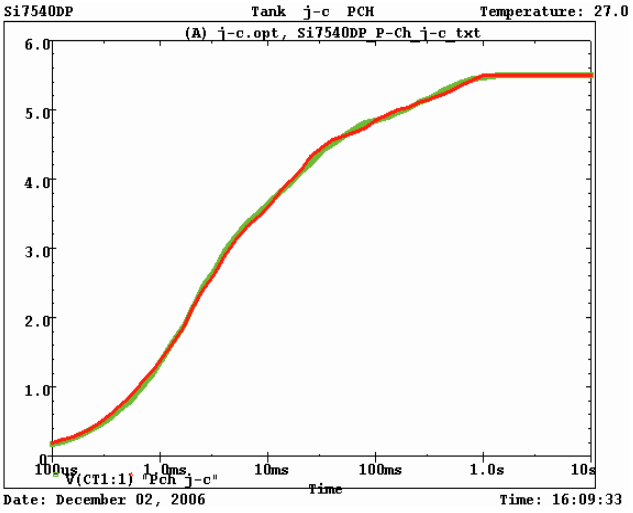
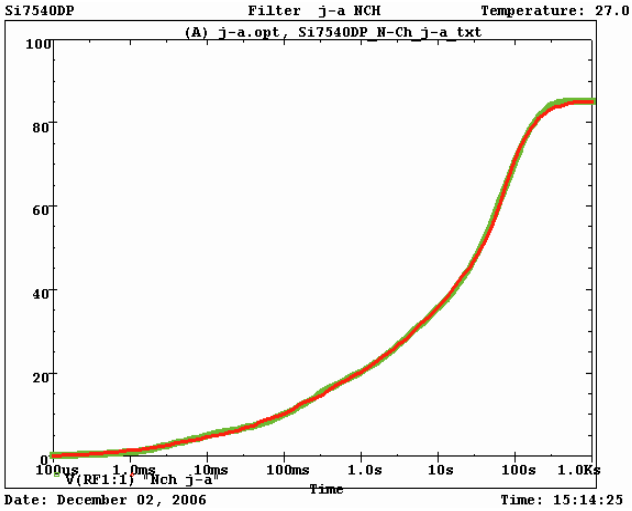
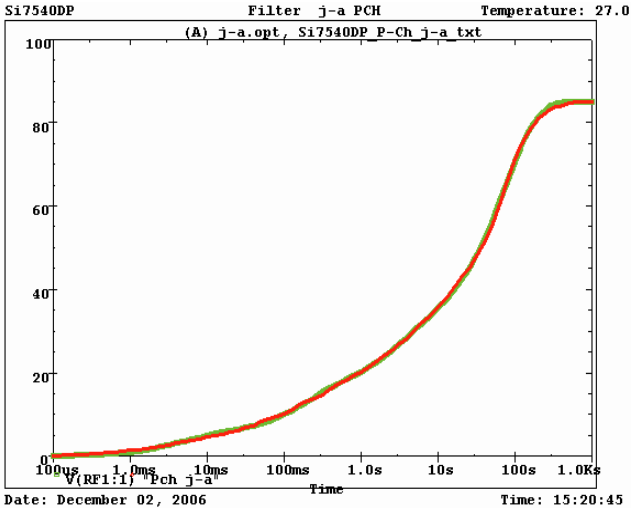
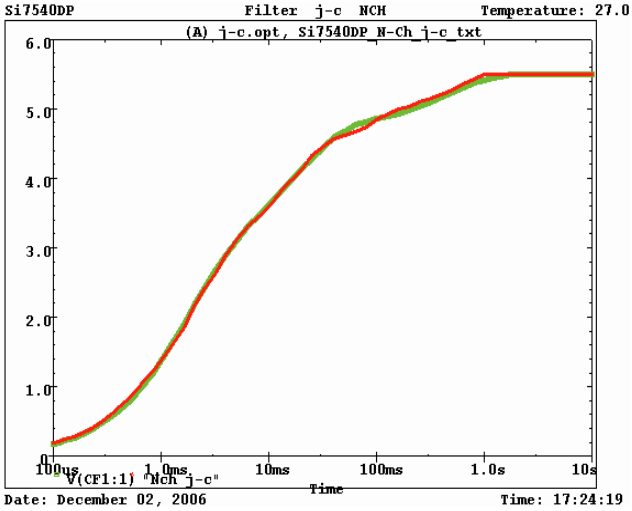
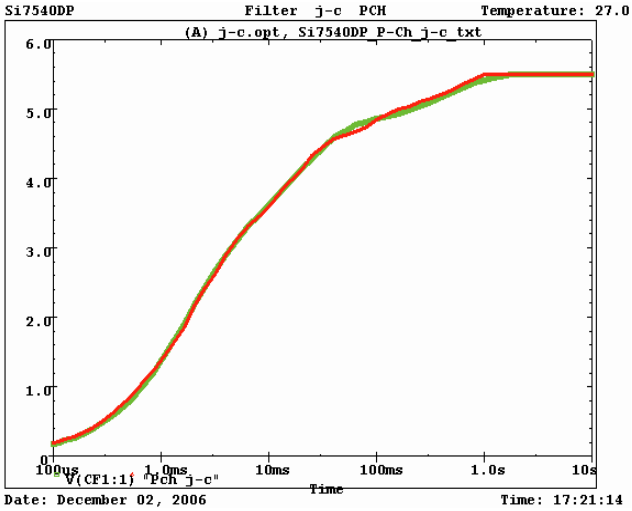
2.0
1.0
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) "Nch j-c"
Time
Date: December 02, 2006
Time: 16:04:26


Si7540DP
Tank j-c PCH
Temperature: 27.0
(A) j-c.opt, Si7540DP_P-Ch_j-c_txt
6.0
5.0
4.0
3.0
2.0
1.0
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) "Pch j-c"
Time
Date: December 02, 2006
Time: 16:09:33


Si7540DP
Filter j-a NCH
Temperature: 27.0
(A) j-a.opt, Si7540DP_N-Ch_j-a_txt
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "Nch j-a"
Time
Date: December 02, 2006
Time: 15:14:25


Si7540DP
Filter j-a PCH
Temperature: 27.0
(A) j-a.opt, Si7540DP_P-Ch_j-a_txt
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "Pch j-a"
Time
Date: December 02, 2006
Time: 15:20:45


Si7540DP
Filter j-c NCH
Temperature: 27.0
(A) j-c.opt, Si7540DP_N-Ch_j-c_txt
6.0
5.0
4.0
3.0
2.0
1.0
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "Nch j-c"
Time
Date: December 02, 2006
Time: 17:24:19


Si7540DP
Filter j-c PCH
Temperature: 27.0
(A) j-c.opt, Si7540DP_P-Ch_j-c_txt
6.0
5.0
4.0
3.0
2.0
1.0
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "Pch j-c"
Time
Date: December 02, 2006
Time: 17:21:14