R-C Thermal Model Parameters

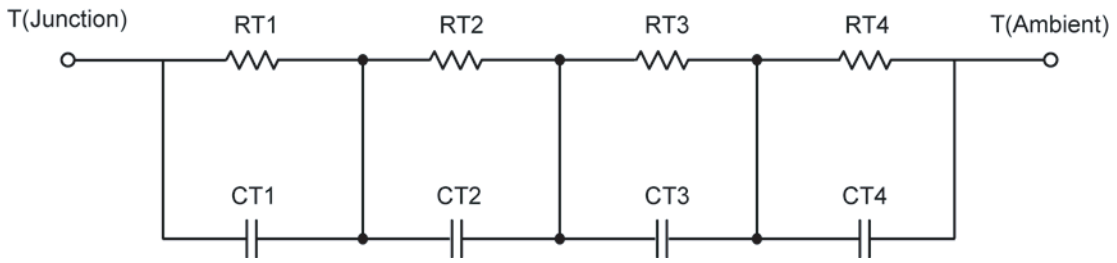
DESCRIPTION

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.

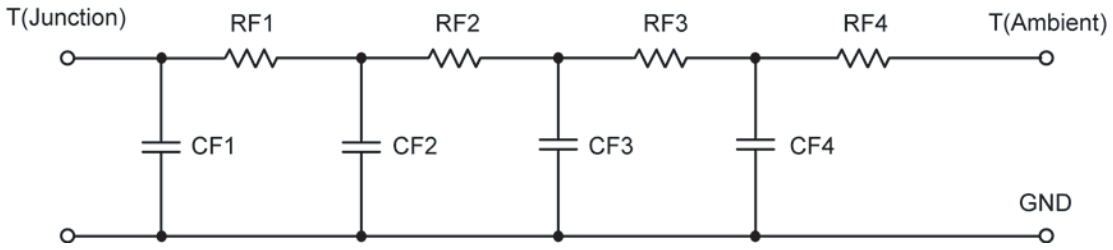
Note:
For a detailed explanation of implementing these values in P-SPICE, refer to Application Note AN609 Thermal Simulations Of Power MOSFETs on P-SPICE Platform.

R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
RT1	7.7373	3.5528	N/A	1.1556	1.6709
RT2	22.0594	25.0379	N/A	6.0797	6.8182
RT3	20.4631	19.1906	N/A	7.7724	8.4506
RT4	44.7402	47.2187	N/A	7.9923	9.0603
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
CT1	3.6025 m	620.2640 u	N/A	1.4874 m	469.5647 u
CT2	87.7105 m	55.6594 m	N/A	43.9899 m	25.9751 m
CT3	15.3555 m	8.3166 m	N/A	7.0526 m	4.8627 m
CT4	1.8351	1.5533	N/A	230.1983 m	159.5792 m

R-C THERMAL MODEL FOR FILTER CONFIGURATION

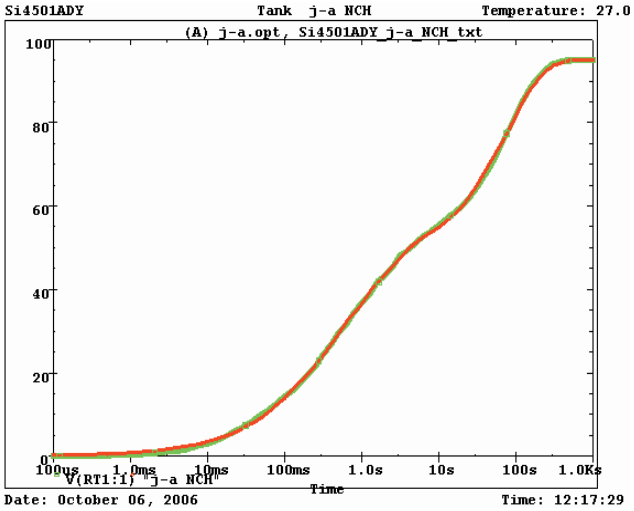


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
RF1	15.2291	6.7558	N/A	2.1532	2.6696
RF2	27.7658	22.4828	N/A	9.5153	9.6801
RF3	12.1439	20.0283	N/A	6.2303	6.3877
RF4	39.8612	45.7331	N/A	5.1012	7.2626
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
CF1	3.1519 m	1.2953 m	N/A	1.5911 m	577.0627 u
CF2	17.9897 m	7.3291 m	N/A	4.7838 m	3.7734 m
CF3	301.8091 m	58.2925 m	N/A	42.4158 m	15.4797 m
CF4	1.7350	1.5863	N/A	332.9631 m	195.0300 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


Si4501ADY
Tank j-a NCH
Temperature: 27.0
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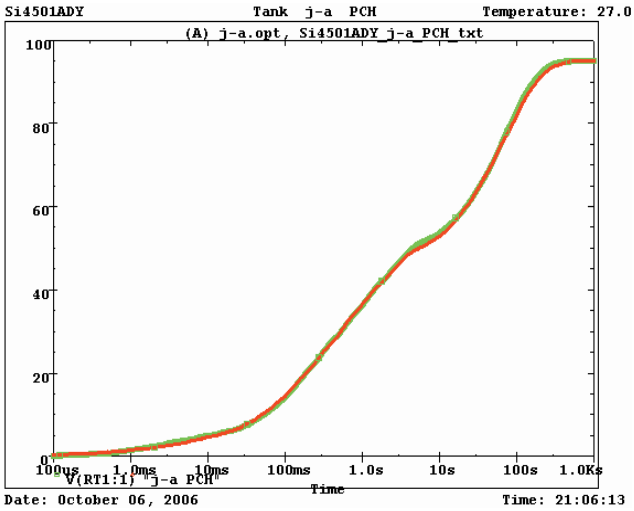
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "j-a NCH"
Time
Date: October 06, 2006
Time: 12:17:29


Si4501ADY
Tank j-a PCH
Temperature: 27.0
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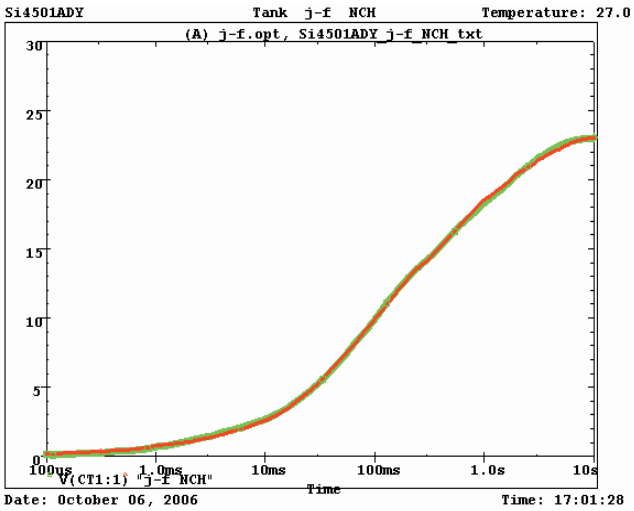
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "j-a PCH"
Time
Date: October 06, 2006
Time: 21:06:13


Si4501ADY
Tank j-f NCH
Temperature: 27.0
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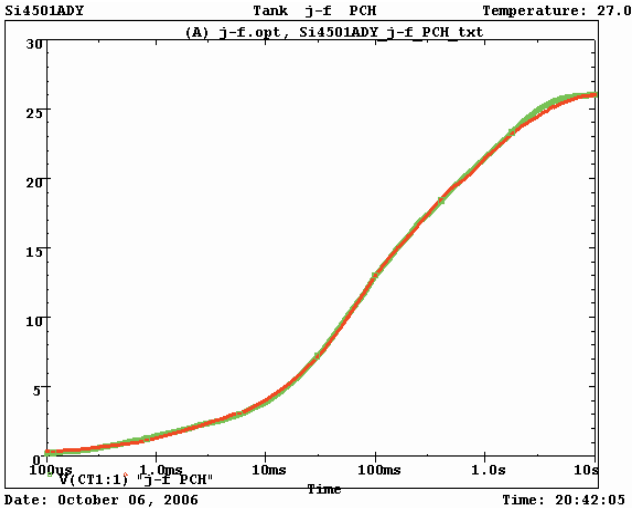
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) "j-f NCH"
Time
Date: October 06, 2006
Time: 17:01:28


Si4501ADY
Tank j-f PCH
Temperature: 27.0
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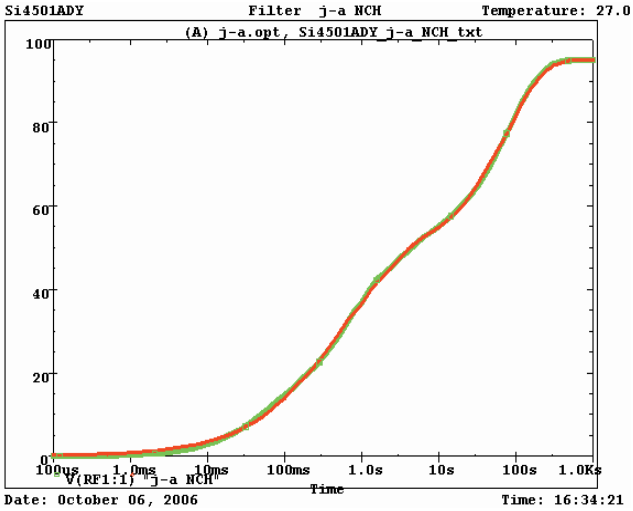
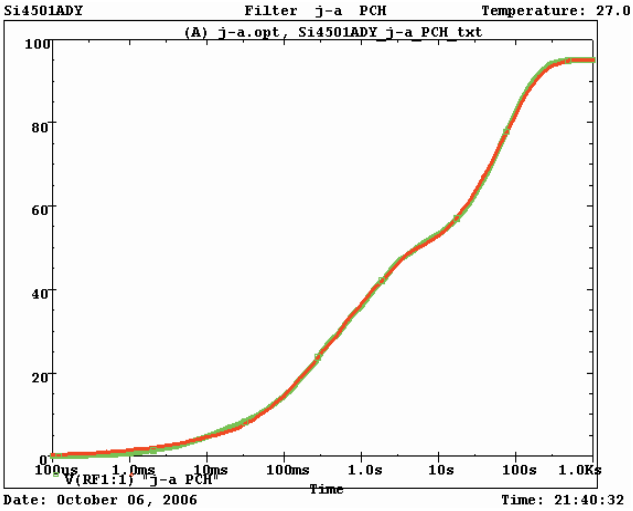
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) "j-f PCH"
Time
Date: October 06, 2006
Time: 20:42:05


Si4501ADY
Filter j-a NCH
Temperature: 27.0
(A) j-a.opt, Si4501ADY_j-a_NCH_txt
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "j-a NCH"
Time
Date: October 06, 2006
Time: 16:34:21


Si4501ADY
Filter j-a PCH
Temperature: 27.0
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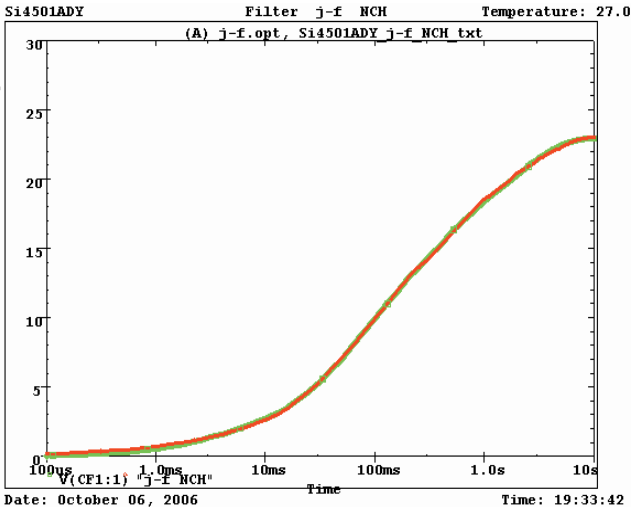
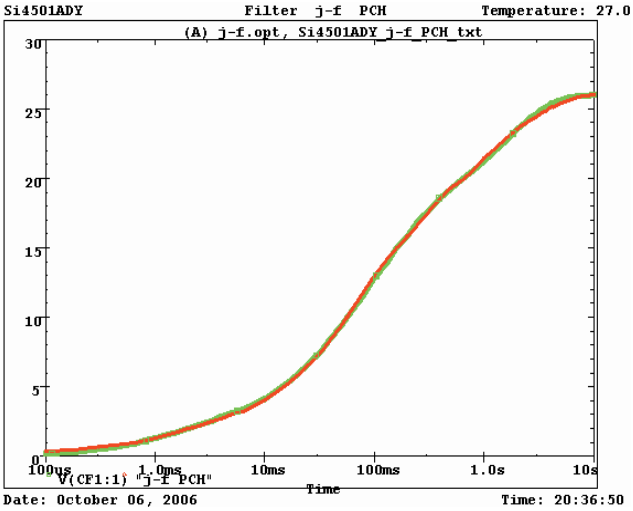
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "j-a PCH"
Time
Date: October 06, 2006
Time: 21:40:32


Si4501ADY
Filter j-f NCH
Temperature: 27.0
(A) j-f.opt, Si4501ADY_j-f_NCH_txt
30
25
20
15
10
5
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "j-f NCH"
Time
Date: October 06, 2006
Time: 19:33:42


Si4501ADY
Filter j-f PCH
Temperature: 27.0
(A) j-f.opt, Si4501ADY_j-f_PCH_txt
30
25
20
15
10
5
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "j-f PCH"
Time
Date: October 06, 2006
Time: 20:36:50