R-C Thermal Model Parameters

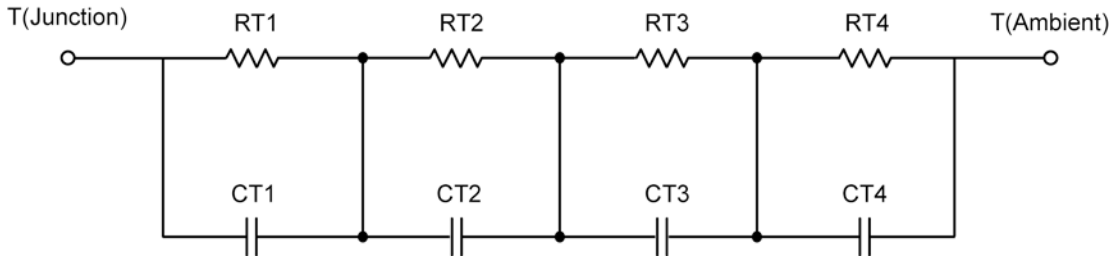
DESCRIPTION

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.

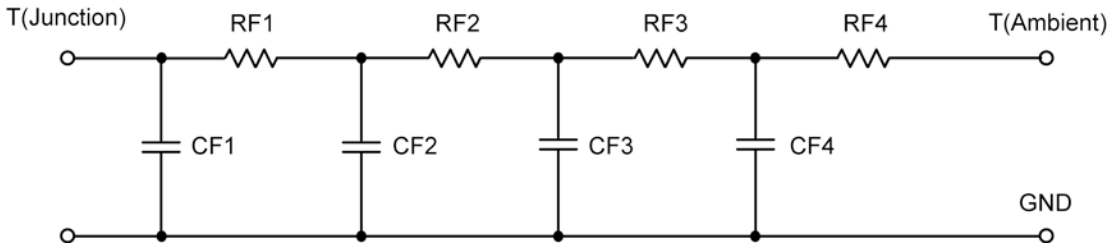
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
RT1	11.2168	13.8406	N/A	16.1397	16.0671
RT2	18.4393	37.0568	N/A	5.6895	6.8444
RT3	27.6054	35.4157	N/A	5.7106	4.3191
RT4	52.7385	43.6869	N/A	12.4602	12.7694
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
CT1	261.6816 u	160.0571 u	N/A	1.0650 m	1.0134 m
CT2	62.7069 m	16.7926 m	N/A	190.0133 u	126.9905 u
CT3	2.3243 m	1.5077 m	N/A	113.4392 m	47.8784 m
CT4	1.6657	1.5618	N/A	5.6021 m	3.8544 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

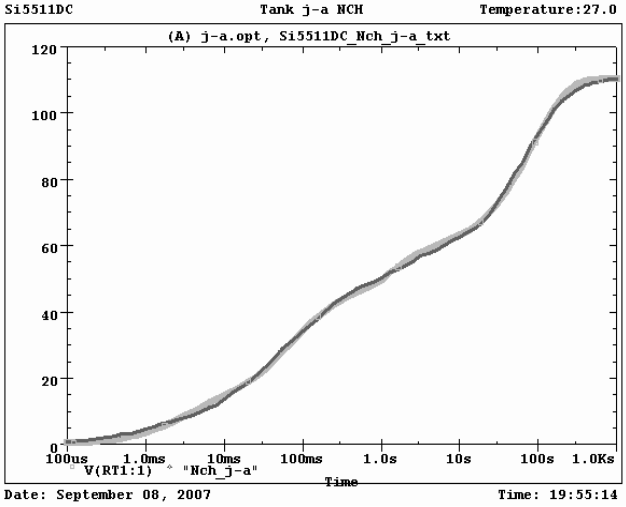


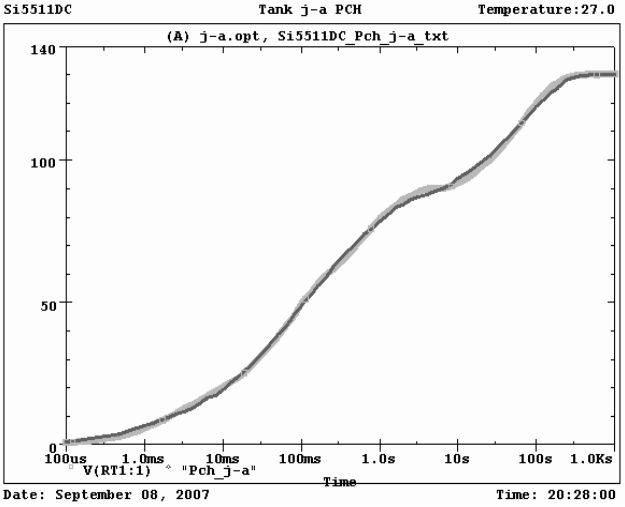
R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
RF1	12.7807	17.6211	N/A	5.2426	7.4009
RF2	28.7107	38.8562	N/A	16.1924	16.1632
RF3	16.3308	31.0808	N/A	13.5578	13.5702
RF4	52.1778	42.4419	N/A	5.0072	2.8657
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
CF1	222.8081 u	151.9924 u	N/A	105.0144 u	93.7044 u
CF2	1.9944 m	1.3434 m	N/A	546.3891 u	510.6238 u
CF3	68.4032 m	19.6890 m	N/A	2.5039 m	1.9051 m
CF4	1.5533	1.5973	N/A	171.3385 m	70.9733 m

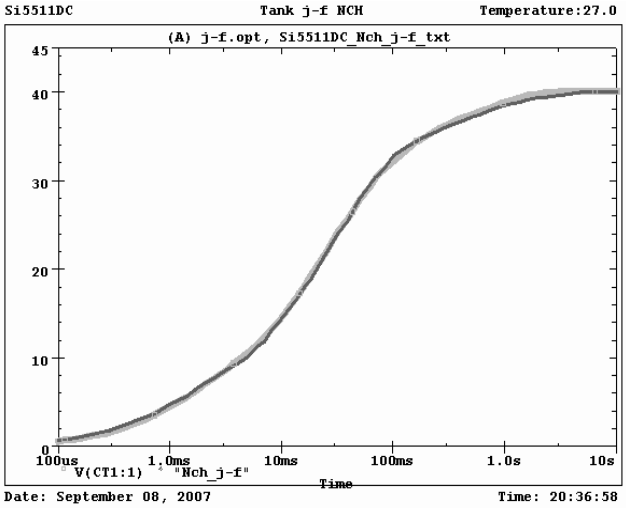
Note: NA indicates not applicable

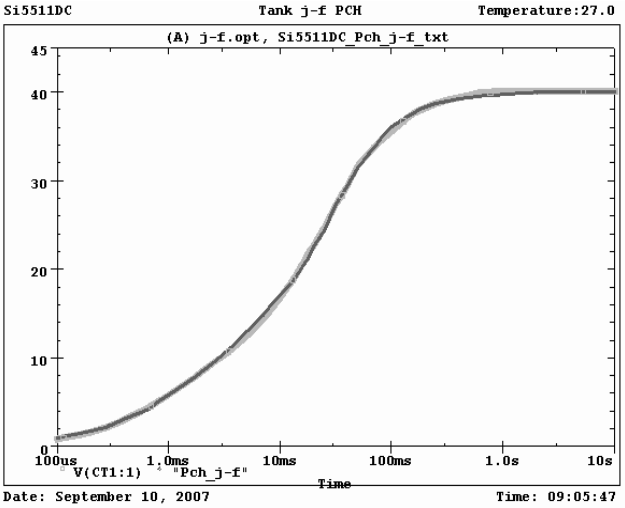
Reference:

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


Si5511DC
Tank j-a NCH
Temperature:27.0
(A) j-a.opt, Si5511DC_Nch_j-a_txt
120
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: September 08, 2007
Time: 19:55:14


Si5511DC
Tank j-a PCH
Temperature:27.0
(A) j-a.opt, Si5511DC_Pch_j-a_txt
140
100
50
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"Pch_j-a"
Time
Date: September 08, 2007
Time: 20:28:00


Si5511DC
Tank j-f NCH
Temperature:27.0
(A) j-f.opt, Si5511DC_Nch_j-f_txt
45
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)
"Nch_j-f"
Time
Date: September 08, 2007
Time: 20:36:58


Si5511DC
Tank j-f PCH
Temperature:27.0
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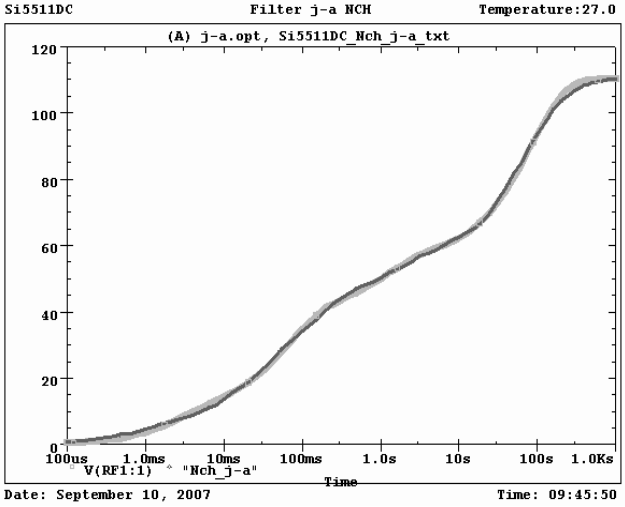
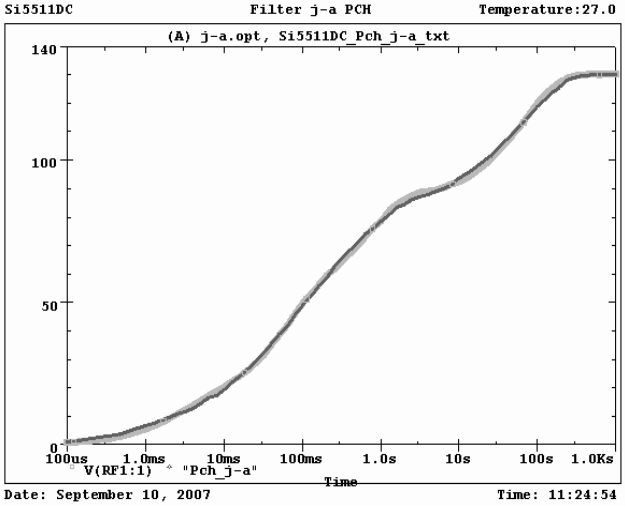
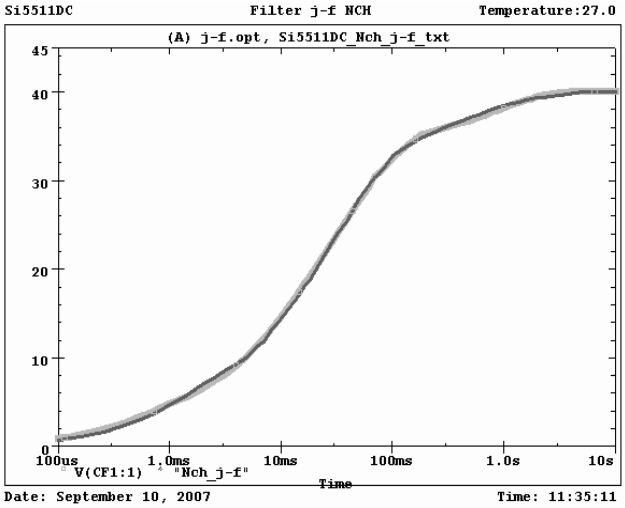
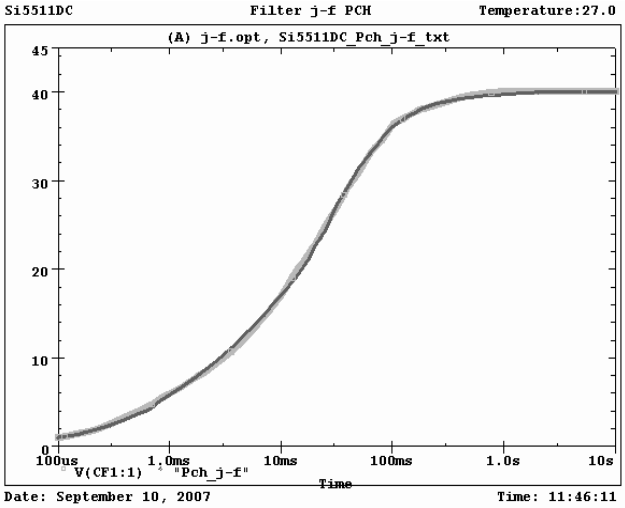
45
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)
"Pch_j-f"
Time
Date: September 10, 2007
Time: 09:05:47


Si5511DC
Filter j-a NCH
Temperature:27.0
(A) j-a.opt, Si5511DC_Nch_j-a_txt
120
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: September 10, 2007
Time: 09:45:50


Si5511DC
Filter j-a PCH
Temperature:27.0
(A) j-a.opt, Si5511DC_Pch_j-a_txt
140
100
50
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1) "Pch_j-a"
Time
Date: September 10, 2007
Time: 11:24:54


Si5511DC
Filter j-f NCH
Temperature:27.0
(A) j-f.opt, Si5511DC_Nch_j-f_txt
45
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1) "Nch_j-f"
Time
Date: September 10, 2007
Time: 11:35:11


Si5511DC
Filter j-f PCH
Temperature:27.0
(A) j-f.opt, Si5511DC_Pch_j-f_txt
45
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1) "Pch_j-f"
Time
Date: September 10, 2007
Time: 11:46:11