R-C Thermal Model Parameters

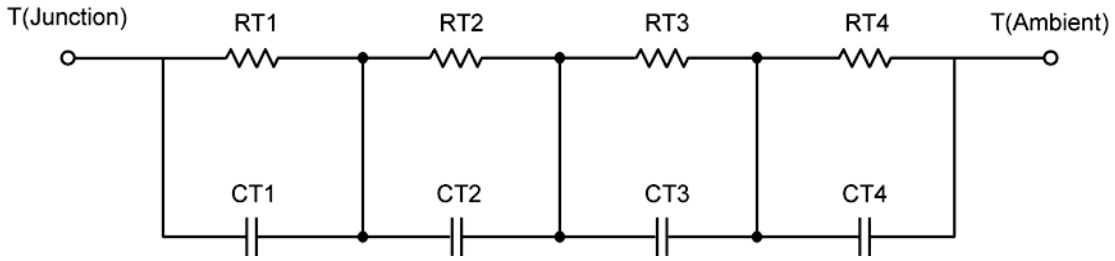
DESCRIPTION

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.

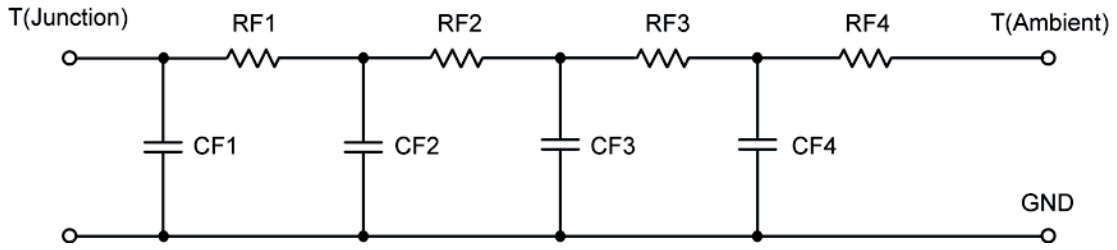
Note:
For a detailed explanation of implementing these values in P-SPICE, refer to Application Note AN609 Thermal Simulations Of Power MOSFETs on P-SPICE Platform.

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	6.2110	6.2110	N/A	18.7124	18.7124
RT2	18.1882	18.1882	N/A	5.2760	5.2760
RT3	22.6830	22.6830	N/A	5.4256	5.4256
RT4	42.9178	42.9178	N/A	10.5860	10.5860
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
CT1	230.3558 u	230.3558 u	N/A	2.6508 m	2.6508 m
CT2	43.1801 m	43.1801 m	N/A	176.6220 u	176.6220 u
CT3	1.8140 m	1.8140 m	N/A	156.9217 m	156.9217 m
CT4	2.0941	2.0941	N/A	1.1876 m	1.1876 m

R-C THERMAL MODEL FOR FILTER CONFIGURATION

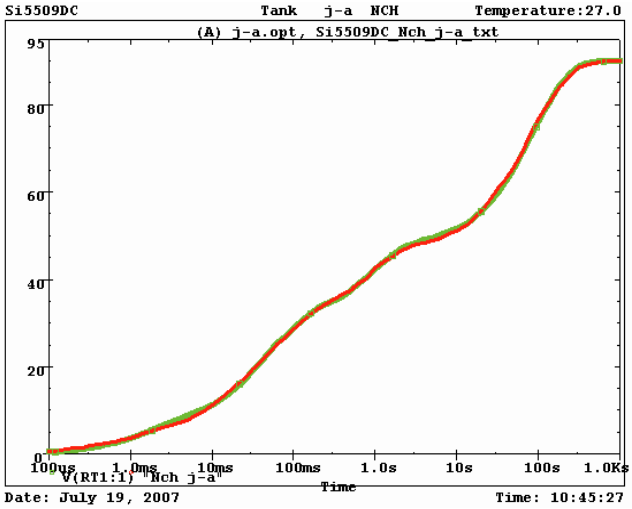


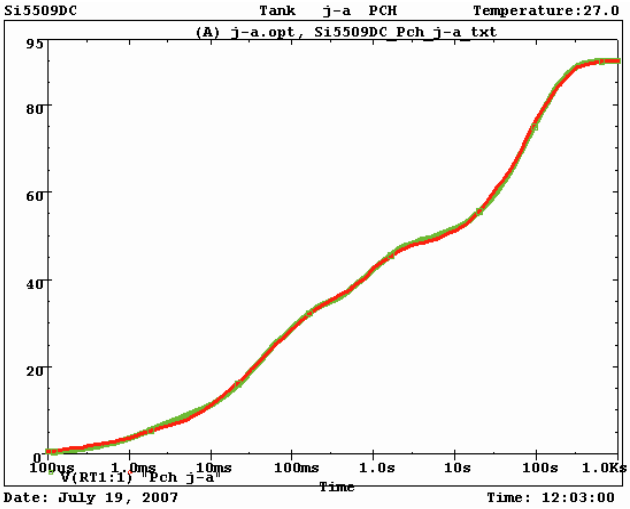
R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
RF1	9.6261	9.6261	N/A	9.3804	9.3804
RF2	20.7173	20.7173	N/A	18.8236	18.8236
RF3	16.8011	16.8011	N/A	7.1975	7.1975
RF4	42.8555	42.8555	N/A	4.5985	4.5985
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
CF1	268.5222 u	268.5222 u	N/A	171.1301 u	171.1301 u
CF2	1.7706 m	1.7706 m	N/A	924.7617 u	924.7617 u
CF3	38.2910 m	38.2910 m	N/A	5.8829 m	5.8829 m
CF4	1.9602	1.9602	N/A	151.8791 m	151.8791 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


Si5509DC
Tank j-a NCH
Temperature:27.0
(A) j-a.opt, Si5509DC_Nch_j-a_txt
95
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "Nch j-a"
Time
Date: July 19, 2007
Time: 10:45:27


Si5509DC
Tank j-a PCH
Temperature:27.0
(A) j-a.opt, Si5509DC_Pch_j-a_txt
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80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
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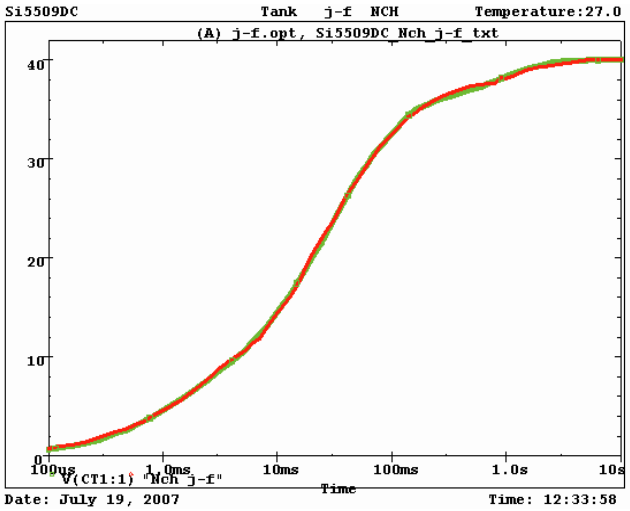
Time
Date: July 19, 2007
Time: 12:03:00


Si5509DC
Tank j-f NCH
Temperature:27.0
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40
30
20
10
0
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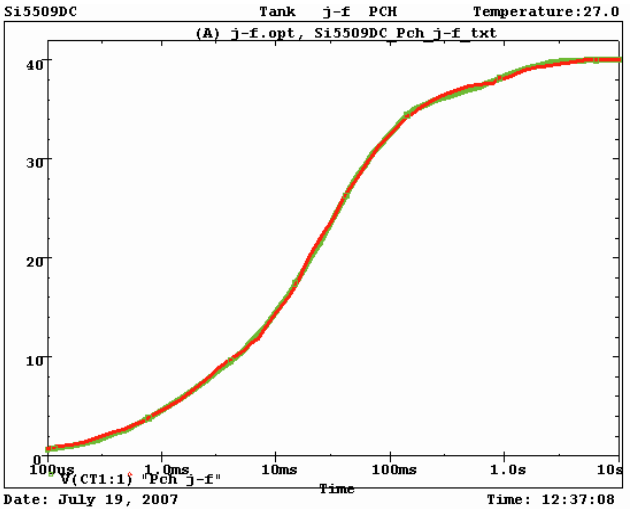
Time
Date: July 19, 2007
Time: 12:33:58


Si5509DC
Tank j-f PCH
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40
30
20
10
0
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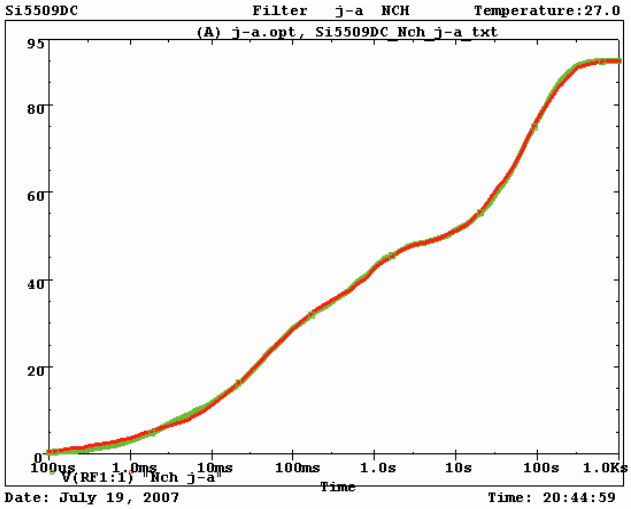
V(CT1:1) "Pch j-f"
Time
Date: July 19, 2007
Time: 12:37:08


Si5509DC Filter j-a NCH Temperature:27.0
(A) j-a.opt, Si5509DC_Nch_j-a_txt
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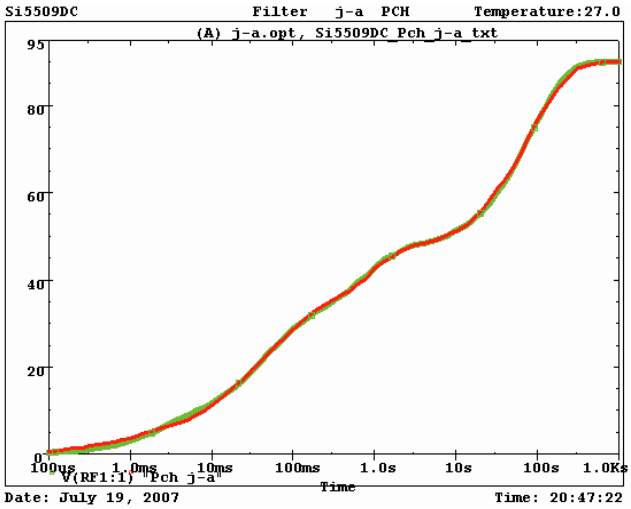
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "Nch j-a"
Time
Date: July 19, 2007
Time: 20:44:59


Si5509DC Filter j-a PCH Temperature:27.0
(A) j-a.opt, Si5509DC_Pch_j-a_txt
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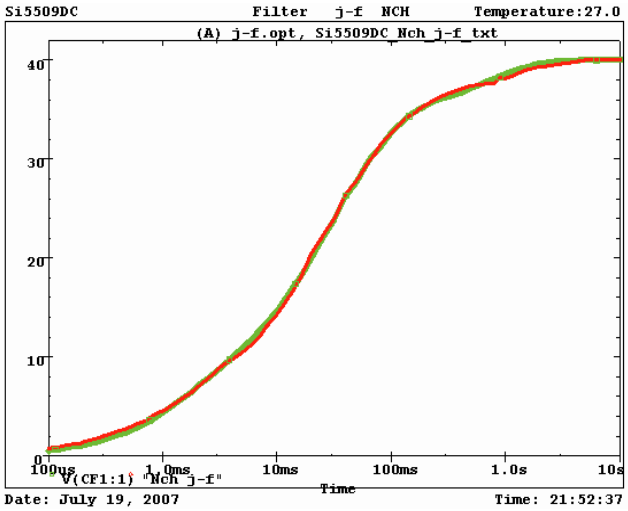
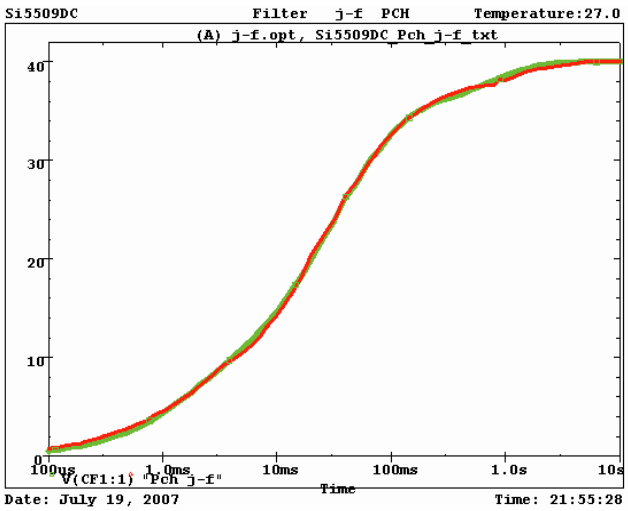
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "Pch j-a"
Time
Date: July 19, 2007
Time: 20:47:22


Si5509DC Filter j-f NCH Temperature:27.0
(A) j-f.opt, Si5509DC_Nch_j-f_txt
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "Nch j-f"
Time
Date: July 19, 2007
Time: 21:52:37


Si5509DC Filter j-f PCH Temperature:27.0
(A) j-f.opt, Si5509DC_Pch_j-f_txt
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "Pch j-f"
Time
Date: July 19, 2007
Time: 21:55:28