R-C Thermal Model Parameters

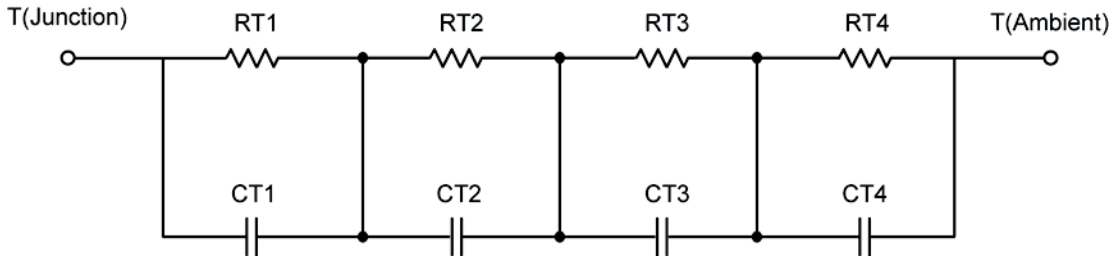
DESCRIPTION

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.

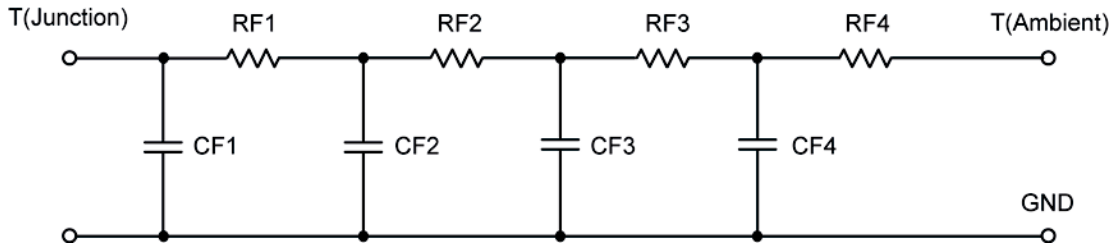
Note:
For a detailed explanation of implementing these values in P-SPICE, refer to Application Note AN609 Thermal Simulations Of Power MOSFETs on P-SPICE Platform.

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	28.8997	28.8997	N/A	22.9528	22.9528
RT2	7.3047	7.3047	N/A	5.9111	5.9111
RT3	20.9223	20.9223	N/A	1.7928	1.7928
RT4	52.5607	52.5607	N/A	9.9214	9.9214
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
CT1	1.4667 m	1.4667 m	N/A	980.9062 u	980.9062 u
CT2	165.3221 u	165.3221 u	N/A	168.5356 u	168.5356 u
CT3	32.4158 m	32.4158 m	N/A	2.5381	2.5381
CT4	1.3579	1.3579	N/A	13.6418 m	13.6418 m

R-C THERMAL MODEL FOR FILTER CONFIGURATION

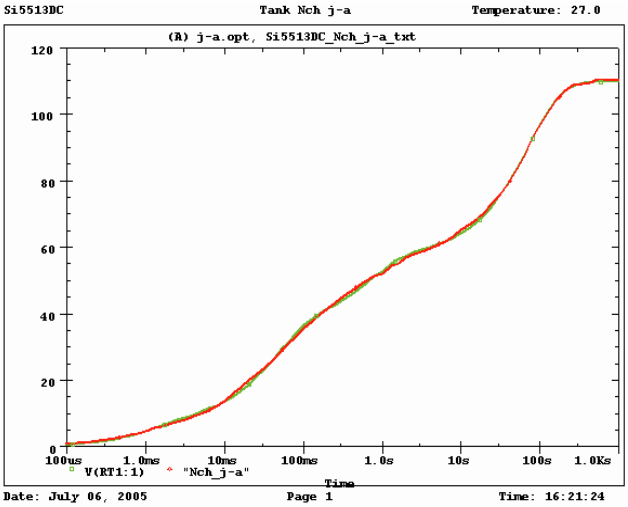


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
RF1	9.9324	9.9324	N/A	5.3124	5.3124
RF2	28.9353	28.9353	N/A	16.3119	16.3119
RF3	19.4955	19.4955	N/A	14.0691	14.0691
RF4	51.4401	51.4401	N/A	4.0773	4.0773
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
CF1	170.1651 u	170.1651 u	N/A	105.4782 u	105.4782 u
CF2	1.3594 m	1.3594 m	N/A	549.2108 u	549.2108 u
CF3	32.6863 m	32.6863 m	N/A	1.7158 m	1.7158 m
CF4	1.3801	1.3801	N/A	70.8657 m	70.8657 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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Tank Nch j-a
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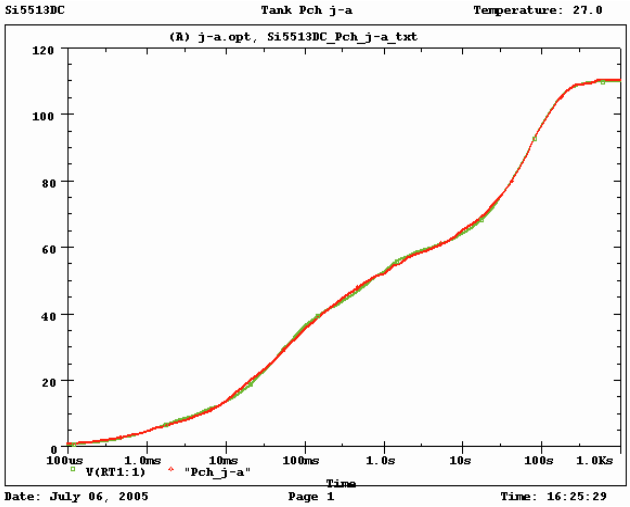
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"Nch_j-a"
Time
Date: July 06, 2005
Page 1
Time: 16:21:24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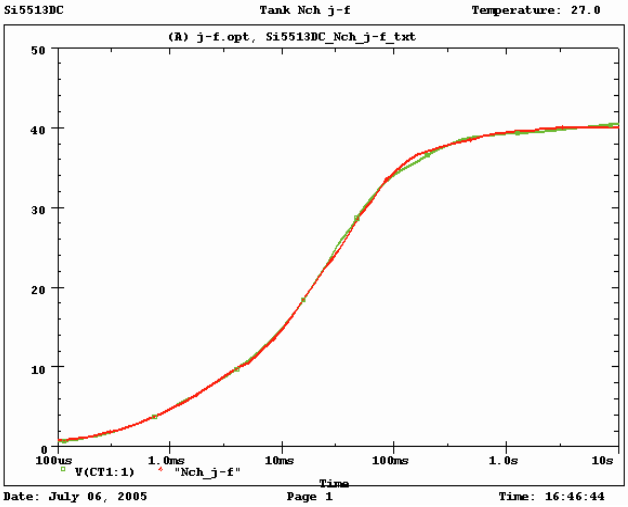
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"Pch_j-a"
Time
Date: July 06, 2005
Page 1
Time: 16:25:29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10
0
100us
1.0ms
10ms
100ms
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10s
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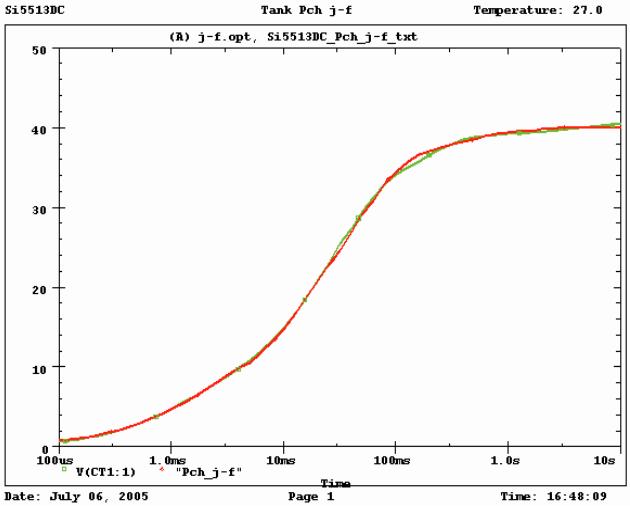
Time
Date: July 06, 2005
Page 1
Time: 16:46:44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Tank Pch j-f
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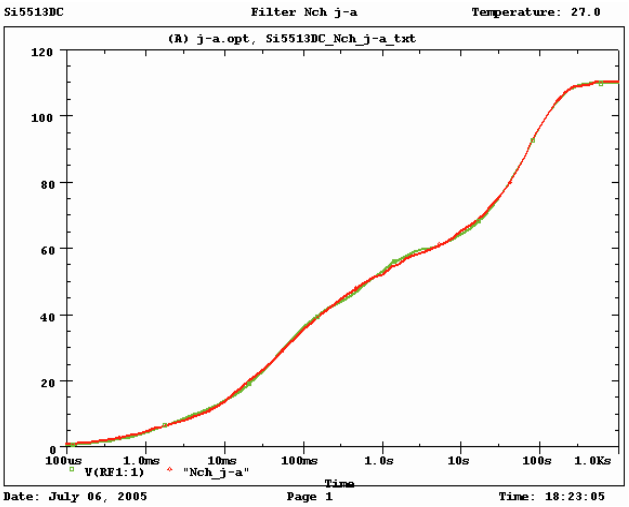
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)
"Pch_j-f"
Time
Date: July 06, 2005
Page 1
Time: 16:48:09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Filter Nch j-a
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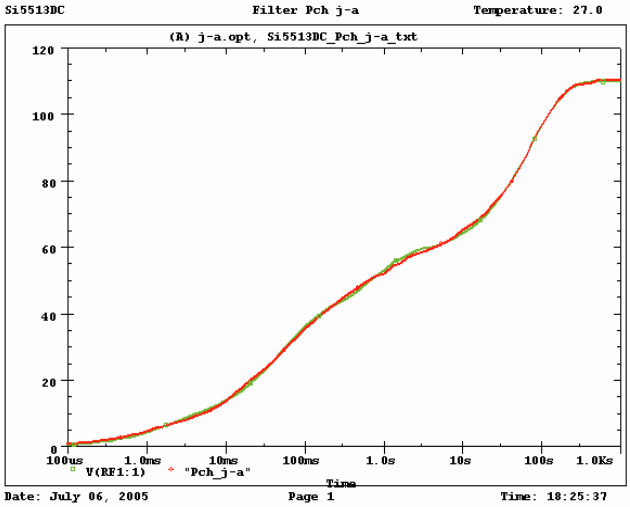
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"Nch_j-a"
Time
Date: July 06, 2005
Page 1
Time: 18:23:05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Filter Pch j-a
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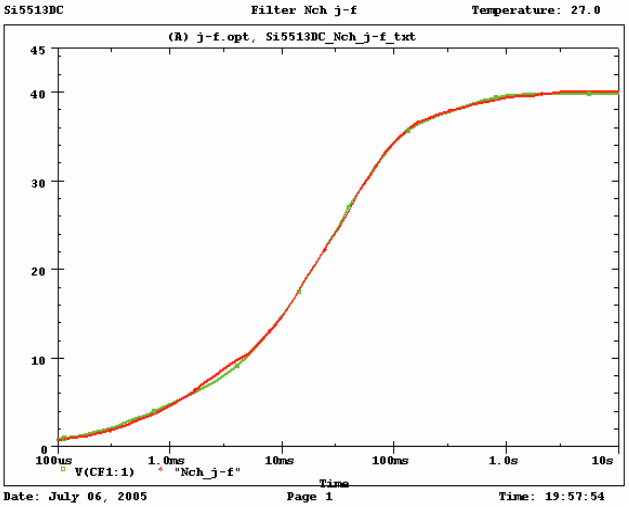
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"Pch_j-a"
Time
Date: July 06, 2005
Page 1
Time: 18:25:37


Si5513DC
Filter Nch j-f
Temperature: 27.0
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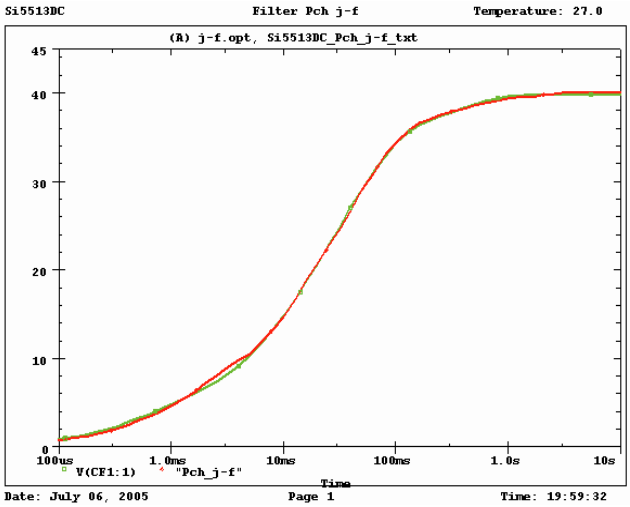
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1)
"Nch_j-f"
Time
Date: July 06, 2005
Page 1
Time: 19:57:54


Si5513DC
Filter Pch j-f
Temperature: 27.0
(A) j-f.opt, Si5513DC_Pch_j-f_txt
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40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1)
"Pch_j-f"
Time
Date: July 06, 2005
Page 1
Time: 19:59:32