R-C Thermal Model Parameters

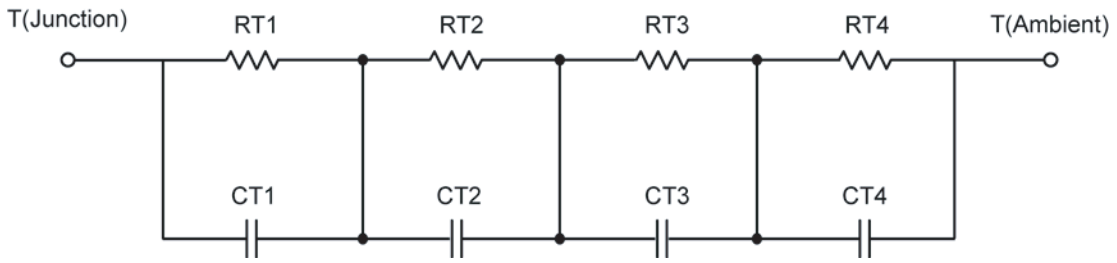
DESCRIPTION

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.

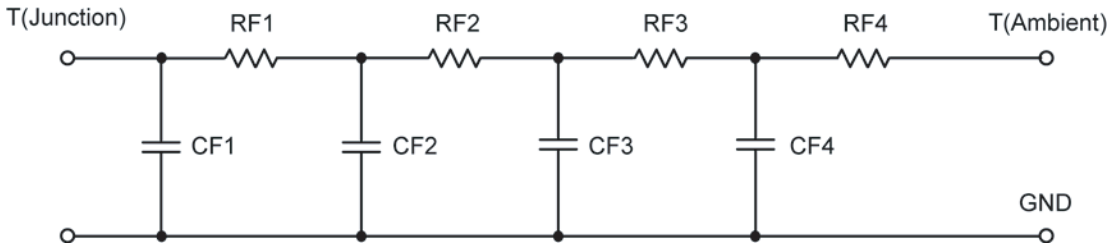
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
RT1	21.6841	21.6841	N/A	13.9304	13.4229
RT2	7.0702	7.0702	N/A	4.7464	4.1892
RT3	33.4730	33.4730	N/A	13.4924	12.7968
RT4	47.0954	47.0954	N/A	7.8625	6.8748
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
CT1	11.0131 m	11.0131 m	N/A	6.4758 m	4.5782 m
CT2	746.2615 u	746.2615 u	N/A	479.1574 u	405.7899 u
CT3	61.2112 m	61.2112 m	N/A	49.7764 m	46.9719 m
CT4	1.3769	1.3769	N/A	280.2423 m	342.6373 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

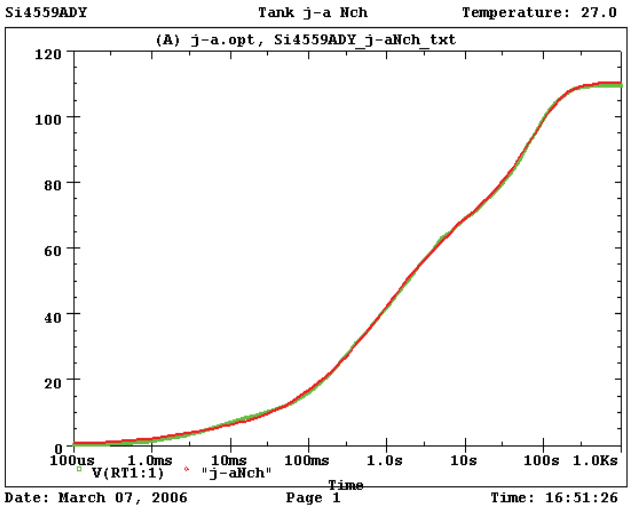


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
RF1	7.3489	7.3489	N/A	5.9484	6.0702
RF2	25.6210	25.6210	N/A	17.9502	16.7481
RF3	31.8235	31.8235	N/A	8.9119	7.6007
RF4	44.7814	44.7814	N/A	7.0769	6.6731
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Case**	**Foot Nch**	**Foot Pch**
CF1	672.0478 u	672.0478 u	N/A	457.3987 u	486.5529 u
CF2	7.1850 m	7.1850 m	N/A	5.6889 m	5.0247 m
CF3	48.6044 m	48.6044 m	N/A	56.7819 m	67.0714 m
CF4	1.3569	1.3569	N/A	76.8666 m	45.7039 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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80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
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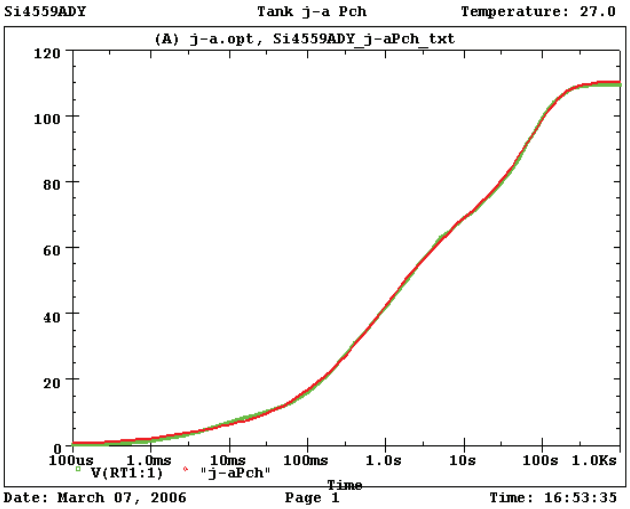
Time
Date: March 07, 2006
Page 1
Time: 16:51:26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20
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100us
1.0ms
10ms
100ms
1.0s
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1.0Ks
V(RT1:1)
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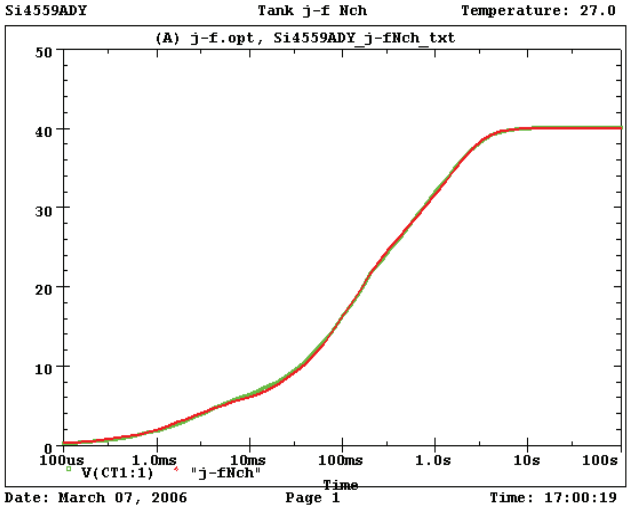
Time
Date: March 07, 2006
Page 1
Time: 16:53:35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30
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10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
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Time
Date: March 07, 2006
Page 1
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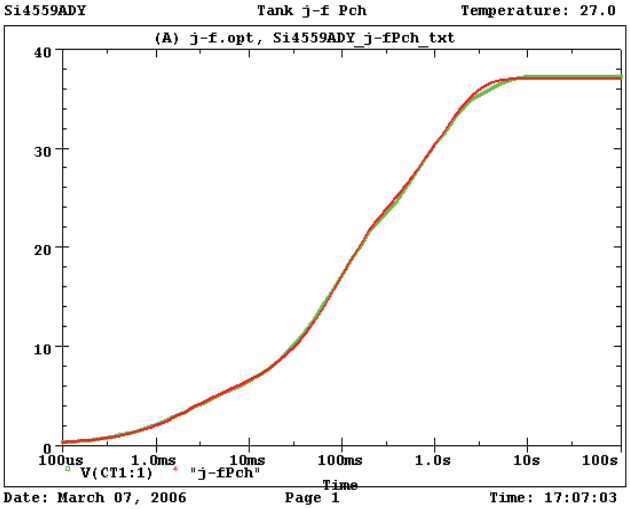
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Tank j-f Pch
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30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1)
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Time
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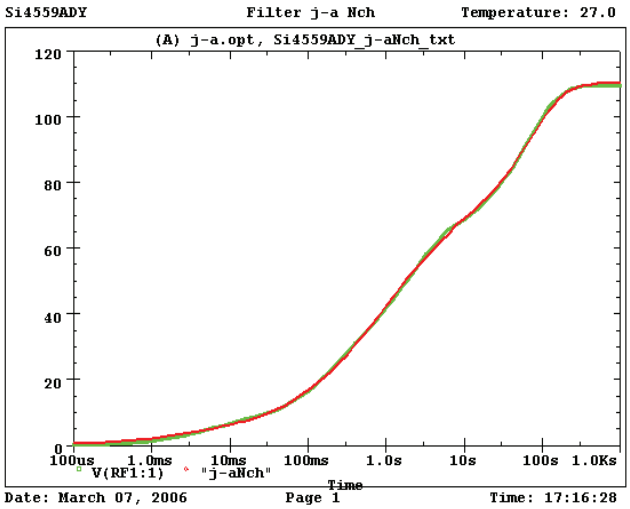
Page 1
Time: 17:07:03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Filter j-a Nch
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100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
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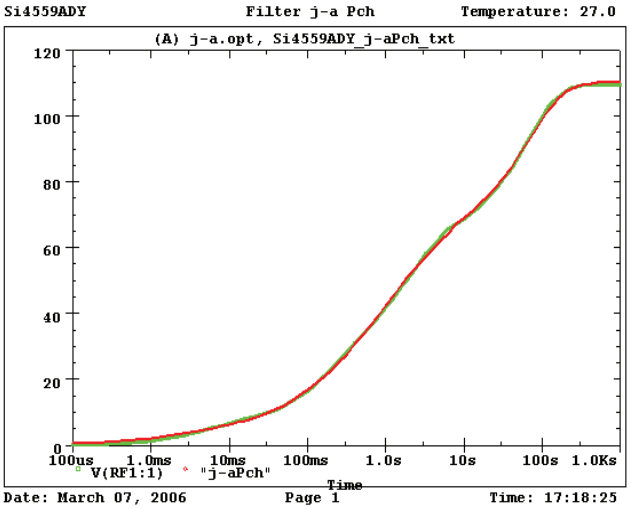
Time
Date: March 07, 2006
Page 1
Time: 17:16:28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Filter j-a Pch
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80
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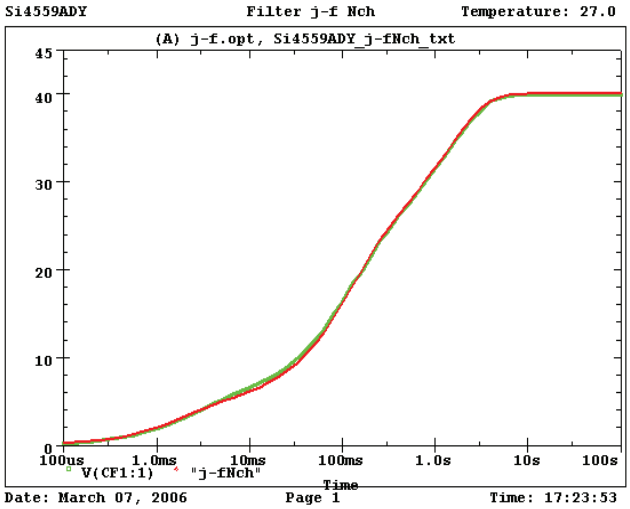
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"j-aPch"
Time
Date: March 07, 2006
Page 1
Time: 17:18:25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30
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10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
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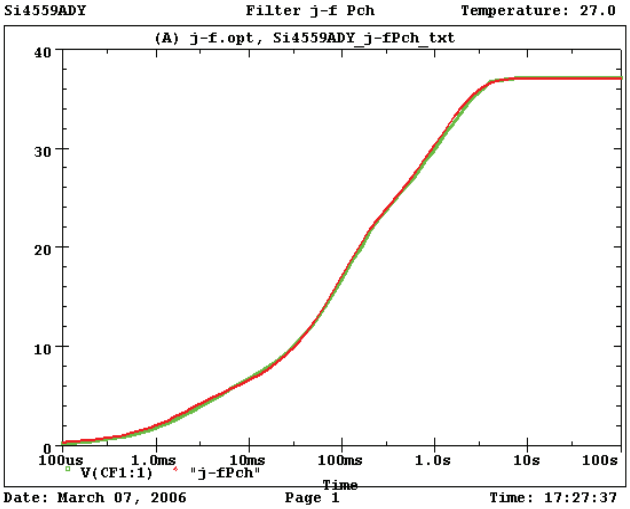
"j-fNch"
Time
Date: March 07, 2006
Page 1
Time: 17:23:53


Si4559ADY
Filter j-f Pch
Temperature: 27.0
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30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1)
"j-fPch"
Time
Date: March 07, 2006
Page 1
Time: 17:27:37