R-C Thermal Model Parameters

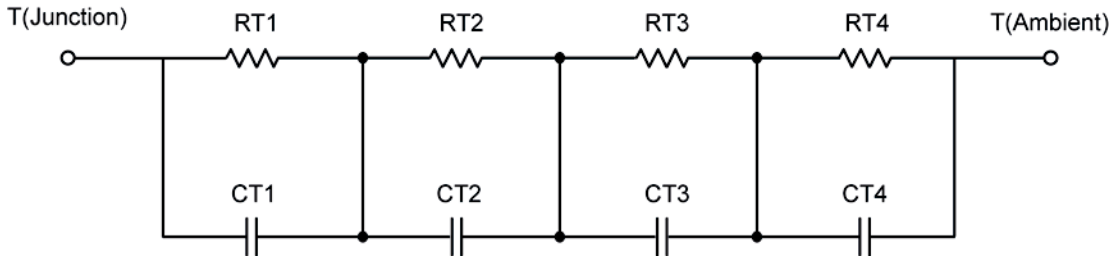
DESCRIPTION

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.

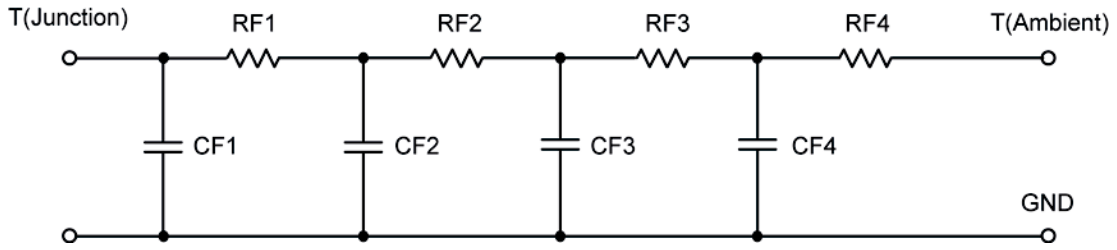
Note:
For a detailed explanation of implementing these values in P-SPICE, refer to Application Note AN609 Thermal Simulations Of Power MOSFETs on P-SPICE Platform.

R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Foot**	**Case Nch**	**Case Pch**
RT1	12.4956	12.4956	N/A	764.1000 m	764.1000 m
RT2	27.7856	27.7856	N/A	5.6063	5.6063
RT3	26.5938	26.5938	N/A	5.7425	5.7425
RT4	43.1250	43.1250	N/A	3.8871	3.8871
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Foot**	**Case Nch**	**Case Pch**
CT1	90.6762 u	90.6762 u	N/A	5.0483 m	5.0483 m
CT2	1.9927 m	1.9927 m	N/A	452.2021 u	452.2021 u
CT3	34.1260 m	34.1260 m	N/A	54.4164 u	54.4164 u
CT4	1.1120	1.1120	N/A	486.1773 u	486.1773 u

R-C THERMAL MODEL FOR FILTER CONFIGURATION

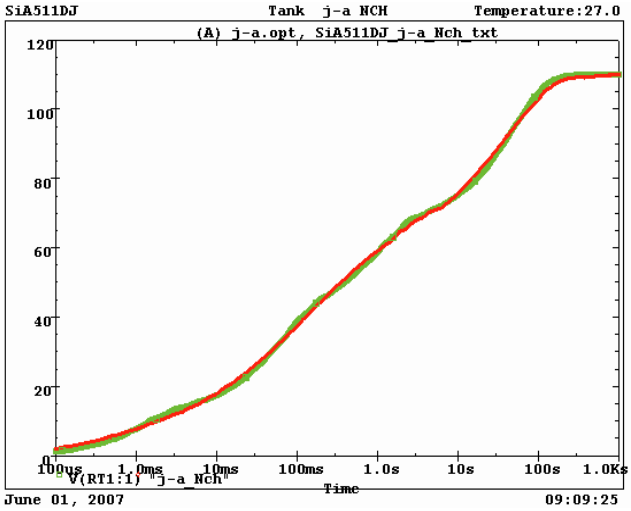


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Foot**	**Case Nch**	**Case Pch**
RF1	14.2316	14.2316	N/A	8.6635	8.6635
RF2	31.2018	31.2018	N/A	4.0091	4.0091
RF3	23.4768	23.4768	N/A	1.6771	1.6771
RF4	41.0898	41.0898	N/A	1.6503	1.6503
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Nch**	**Ambient Pch**	**Foot**	**Case Nch**	**Case Pch**
CF1	92.1040 u	92.1040 u	N/A	43.9117 u	43.9117 u
CF2	2.0224 m	2.0224 m	N/A	226.4934 u	226.4934 u
CF3	41.6061 m	41.6061 m	N/A	229.4698 u	229.4698 u
CF4	1.1219	1.1219	N/A	103.4306 u	103.4306 u

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


SiA511DJ
Tank j-a NCH
Temperature:27.0
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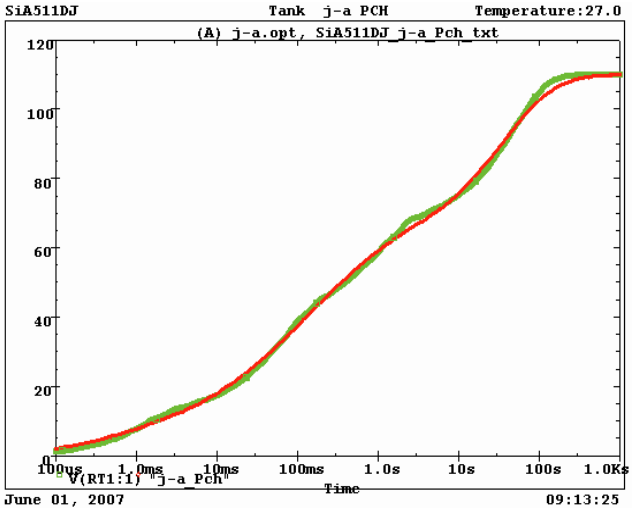
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "j-a_Nch"
Time
June 01, 2007
09:09:25


SiA511DJ
Tank j-a PCH
Temperature:27.0
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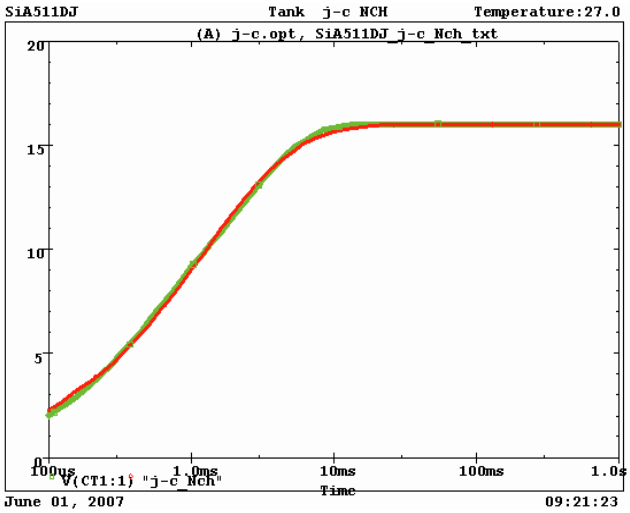
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "j-a_Pch"
Time
June 01, 2007
09:13:25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Tank j-c NCH
Temperature:27.0
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15
10
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10ms
100ms
1.0s
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Time
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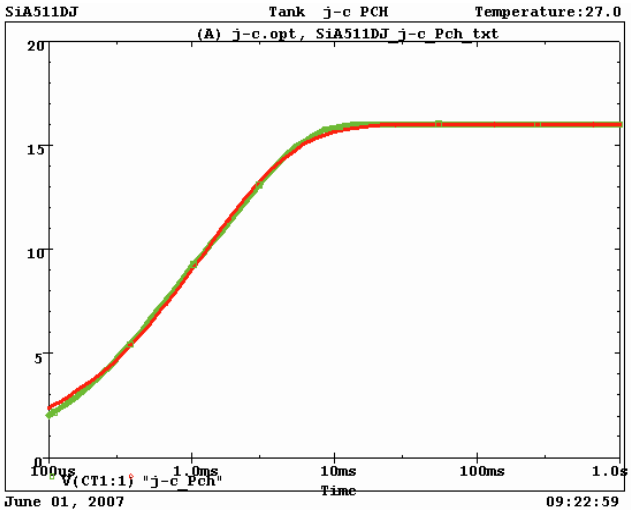
09:21:23


SiA511DJ
Tank j-c PCH
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15
10
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10ms
100ms
1.0s
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Time
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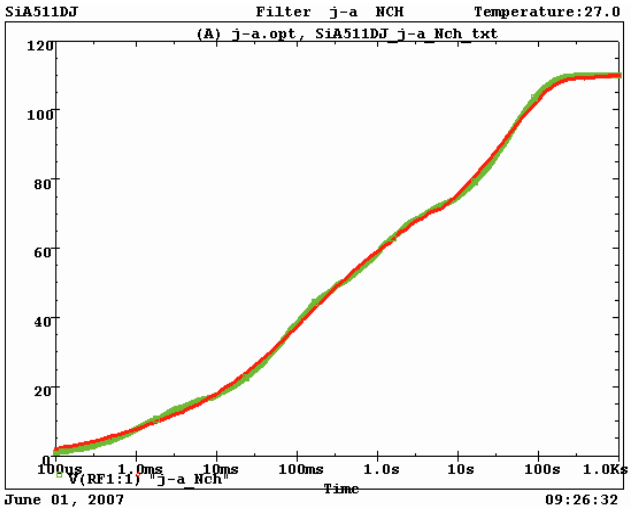
09:22:59


SiA511DJ
Filter j-a NCH
Temperature:27.0
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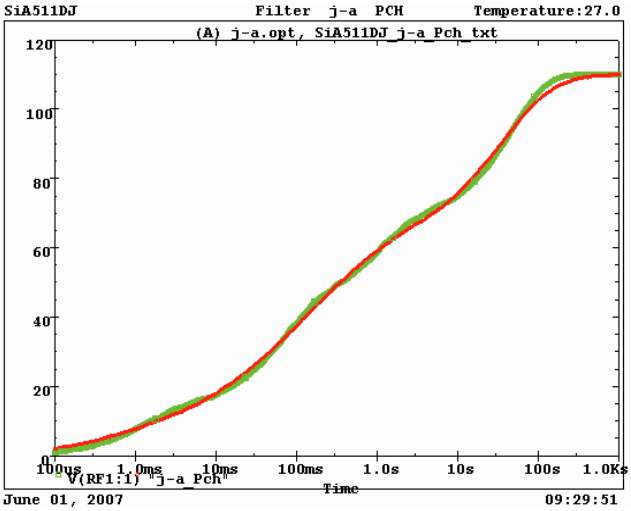
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1) "j-a_Nch"
Time
June 01, 2007
09:26:32


SiA511DJ
Filter j-a PCH
Temperature:27.0
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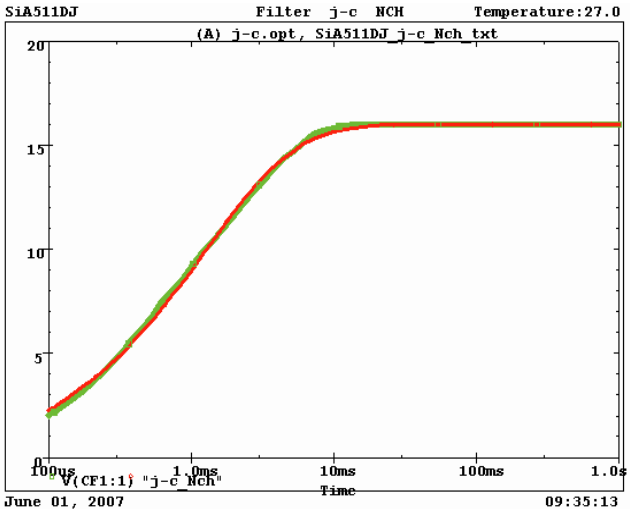
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1) "j-a_Pch"
Time
June 01, 2007
09:29:51


SiA511DJ
Filter j-c NCH
Temperature:27.0
(A) j-c.opt, SiA511DJ_j-c_Nch_txt
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15
10
5
0
100us
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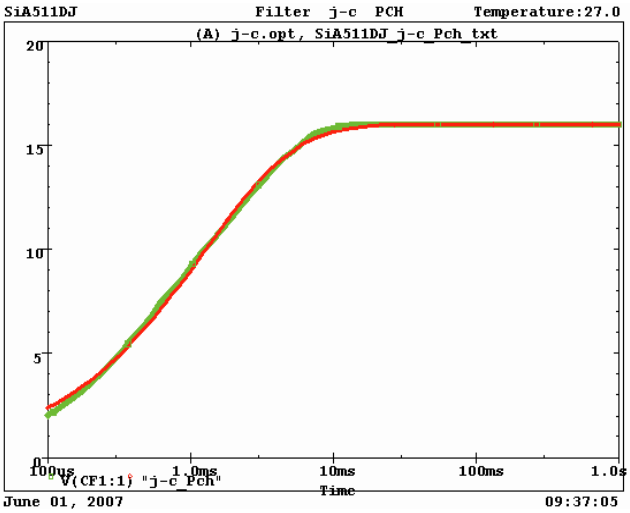
10ms
100ms
1.0s
V(CF1:1) "j-c_Nch"
Time
June 01, 2007
09:35:13


SiA511DJ
Filter j-c PCH
Temperature:27.0
(A) j-c.opt, SiA511DJ_j-c_Pch_txt
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15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
V(CF1:1) "j-c_Pch"
Time
June 01, 2007
09:37:05