R-C Thermal Model Parameters

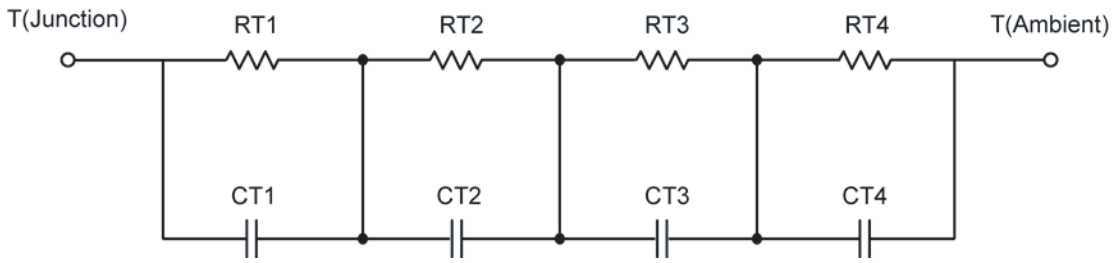
DESCRIPTION

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.

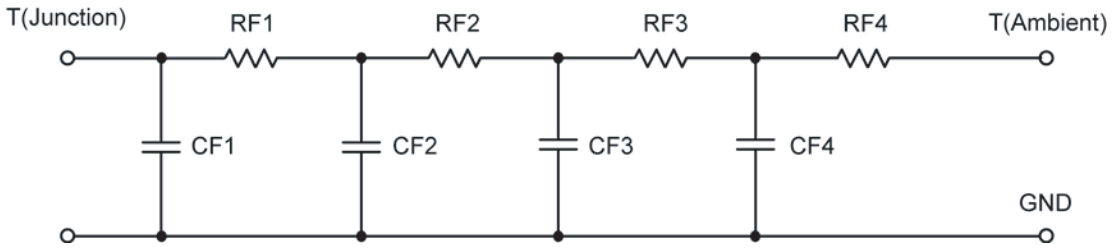
Note:
For a detailed explanation of implementing these values in P-SPICE, refer to Application Note AN609 Thermal Simulations Of Power MOSFETs on P-SPICE Platform.

R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
RT1	24.4450	23.3574	N/A	782.1677 m	3.6286
RT2	7.1875	8.7515	N/A	4.1108	14.2974
RT3	32.6068	26.7530	N/A	19.4573	8.4828
RT4	45.4755	54.4994	N/A	15.5279	15.3515
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
CT1	9.1109 m	15.1428 m	N/A	2.6819 m	141.0513 u
CT2	641.4146 u	1.3219 m	N/A	486.7394 u	7.6766 m
CT3	66.3570 m	99.1571 m	N/A	62.0502 m	1.6330 m
CT4	1.4126	1.7136	N/A	6.0012 m	57.6691 m

R-C THERMAL MODEL FOR FILTER CONFIGURATION

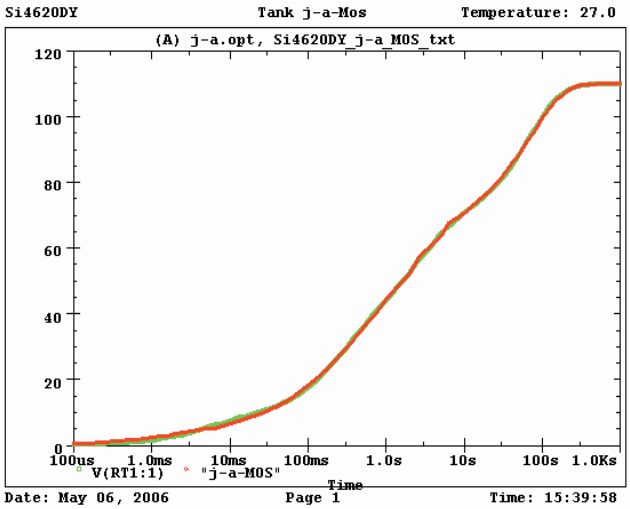


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
RF1	15.4024	6.8265	N/A	5.7373	5.1170
RF2	31.5529	27.8619	N/A	16.2579	14.4393
RF3	23.0210	26.5777	N/A	11.9169	15.0952
RF4	39.9629	52.0612	N/A	6.0079	7.2439
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
CF1	1.4343 m	687.7941 u	N/A	404.1575 u	135.1459 u
CF2	13.4367 m	8.6147 m	N/A	5.0729 m	1.6570 m
CF3	112.3900 m	75.7342 m	N/A	45.2999 m	12.4517 m
CF4	1.6075	1.6656	N/A	107.8941 m	156.7133 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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40
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1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
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Time
Date: May 06, 2006
Page 1
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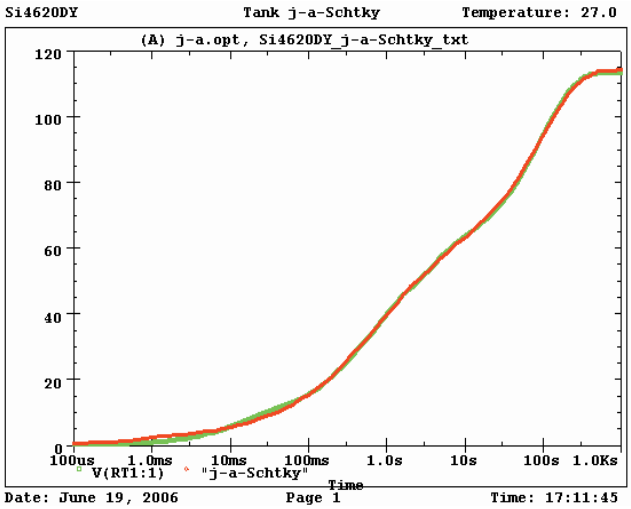
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10ms
100ms
1.0s
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Time
Date: June 19, 2006
Page 1
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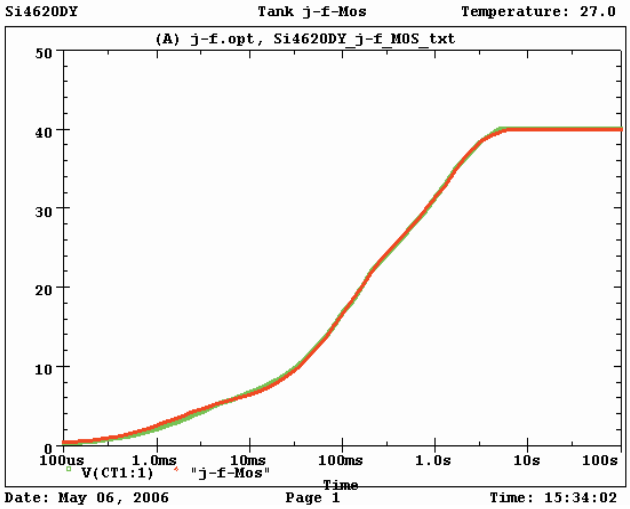
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1.0ms
10ms
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100s
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Time
Date: May 06, 2006
Page 1
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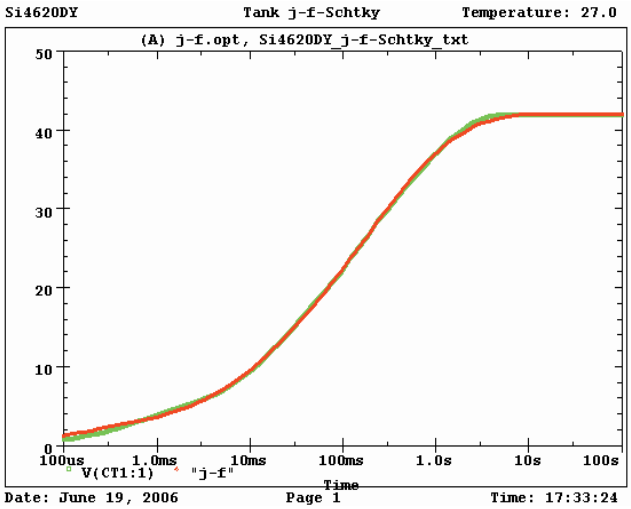
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10
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10ms
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100s
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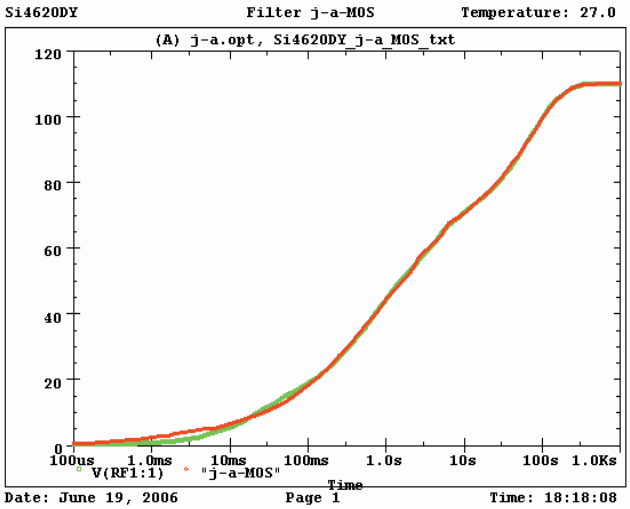
Time
Date: June 19, 2006
Page 1
Time: 17:33:24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100
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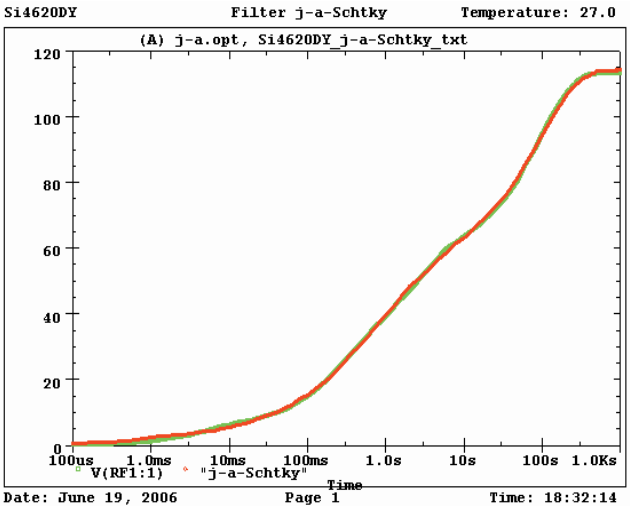
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"j-a-MOS"
Time
Date: June 19, 2006
Page 1
Time: 18:18:08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Filter j-a-Schtky
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80
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40
20
0
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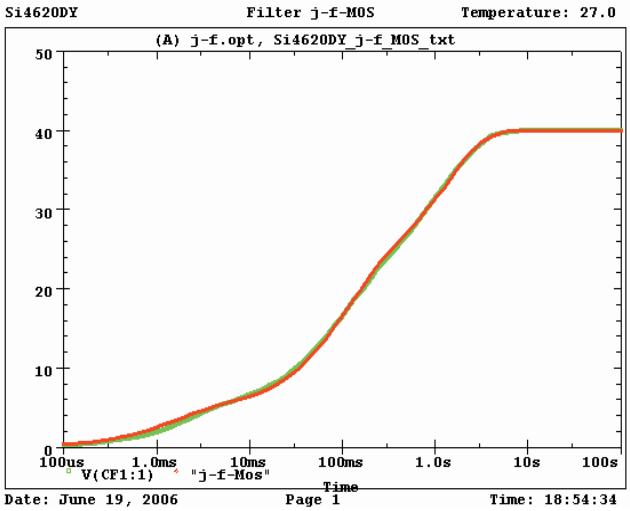
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"j-a-Schtky"
Time
Date: June 19, 2006
Page 1
Time: 18:32:14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Filter j-f-MOS
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20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
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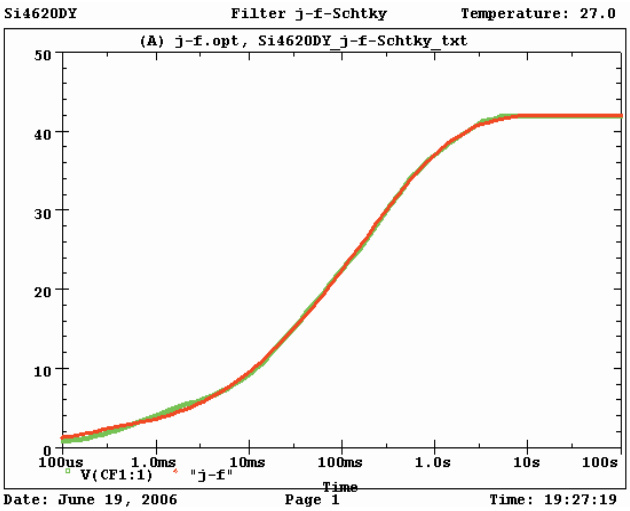
Time
Date: June 19, 2006
Page 1
Time: 18:54:34


Si4620DY
Filter j-f-Schtky
Temperature: 27.0
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30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1)
"j-f"
Time
Date: June 19, 2006
Page 1
Time: 19:27:19