R-C Thermal Model Parameters

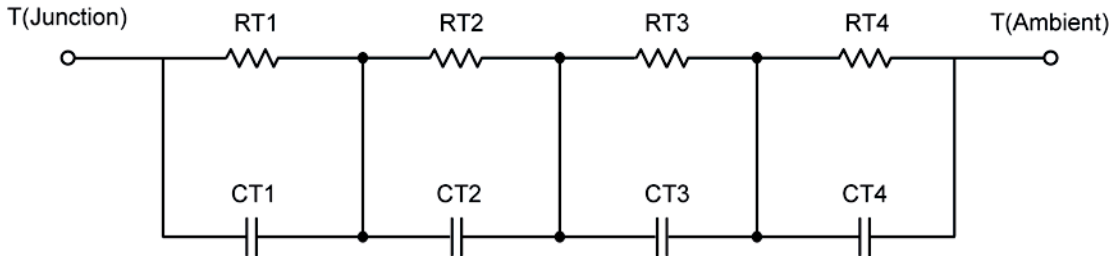
DESCRIPTION

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.

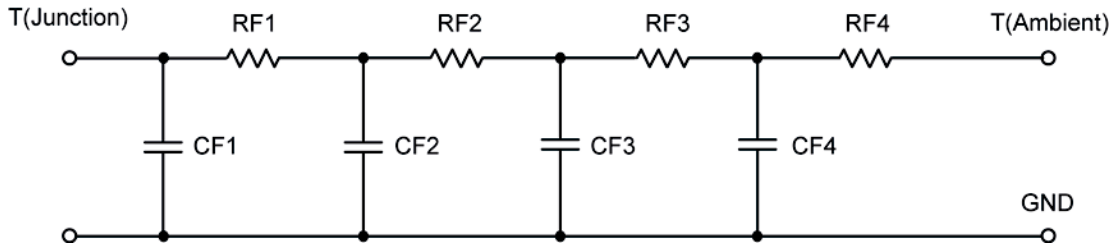
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
RT1	54.3742	55.7729	N/A	16.4506	13.4972
RT2	12.7464	12.1965	N/A	2.6852	2.8840
RT3	19.6508	17.7997	N/A	9.8088	10.2140
RT4	25.1789	21.7817	N/A	9.1519	8.3398
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
CT1	1.0634	1.1221	N/A	3.5481 m	4.5375 m
CT2	2.0051 m	2.2112 m	N/A	241.5987 u	320.3257 u
CT3	68.7777 m	88.6339 m	N/A	101.5941 m	150.5469 m
CT4	13.1140 m	36.3152 m	N/A	17.8759 m	27.7434 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

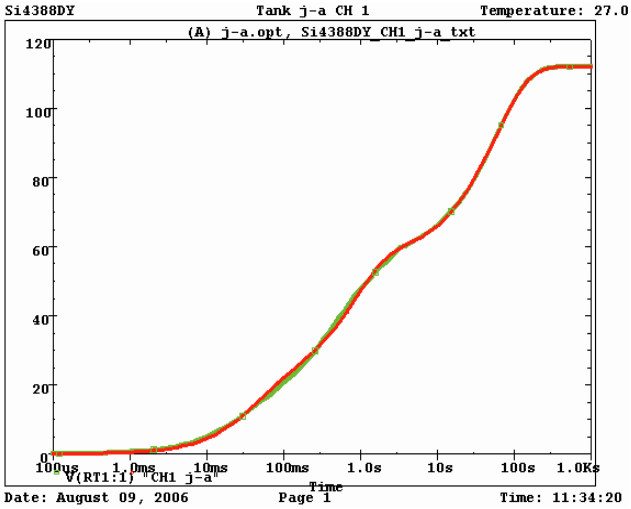


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
RF1	19.5195	17.2371	N/A	3.6981	3.6424
RF2	36.7127	35.5109	N/A	13.8937	16.6244
RF3	24.1536	24.3343	N/A	11.4644	8.0837
RF4	31.9045	30.2264	N/A	8.9977	6.5778
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
CF1	1.6785 m	2.1885 m	N/A	347.4966 u	333.8751 u
CF2	15.2886 m	29.9751 m	N/A	2.4322 m	3.3893 m
CF3	640.8601 m	713.1027 m	N/A	3.2092 m	36.8606 m
CF4	1.2474	1.3907	N/A	88.3398 m	114.6110 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


Si4388DY
Tank j-a CH 1
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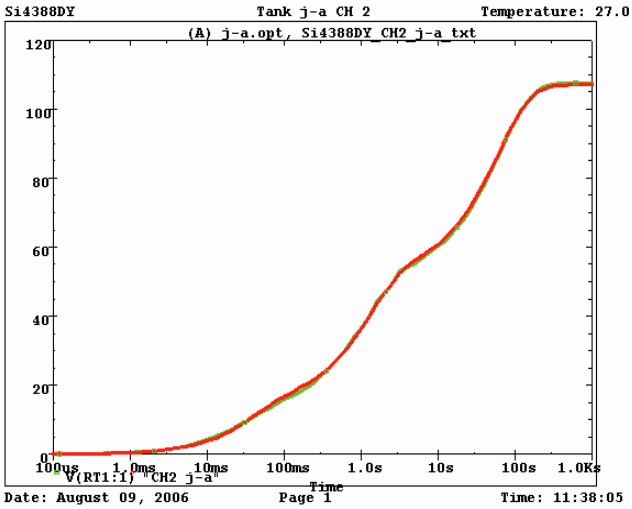
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "CH1 j-a"
Time
Date: August 09, 2006
Page 1
Time: 11:34:20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100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
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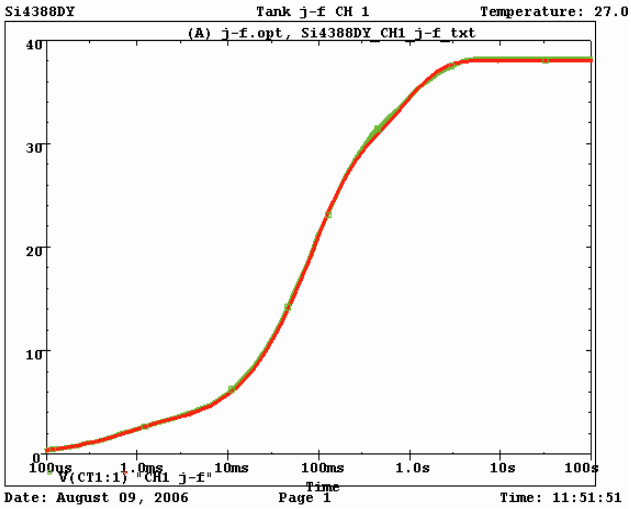
Time
Date: August 09, 2006
Page 1
Time: 11:38:05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Tank j-f CH 1
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30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
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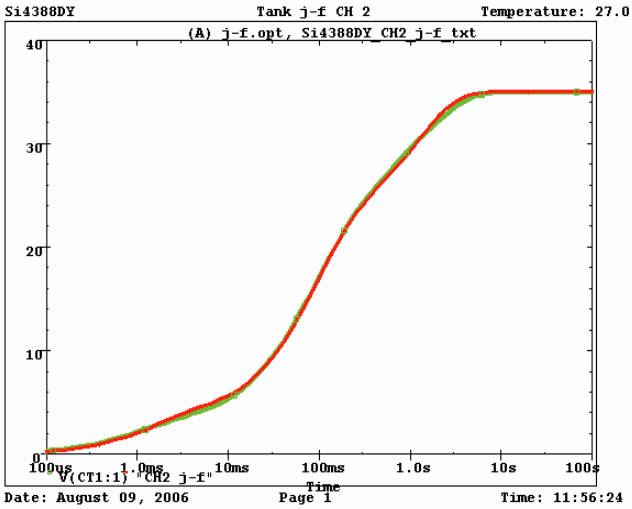
Time
Date: August 09, 2006
Page 1
Time: 11:51:51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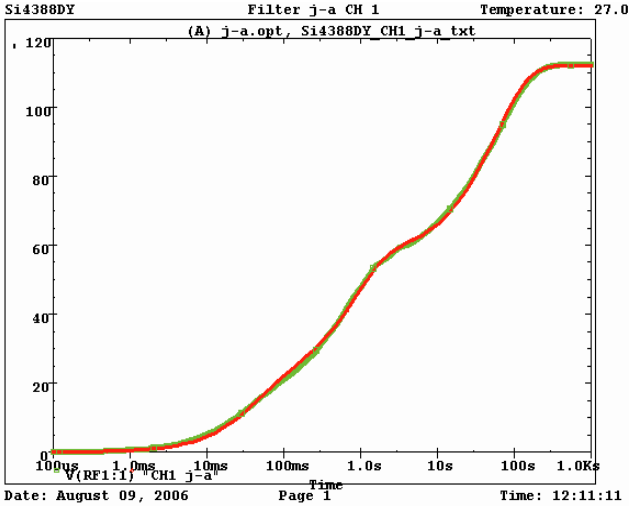
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1) "CH2 j-f"
Time
Date: August 09, 2006
Page 1
Time: 11:56:24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Filter j-a CH 1
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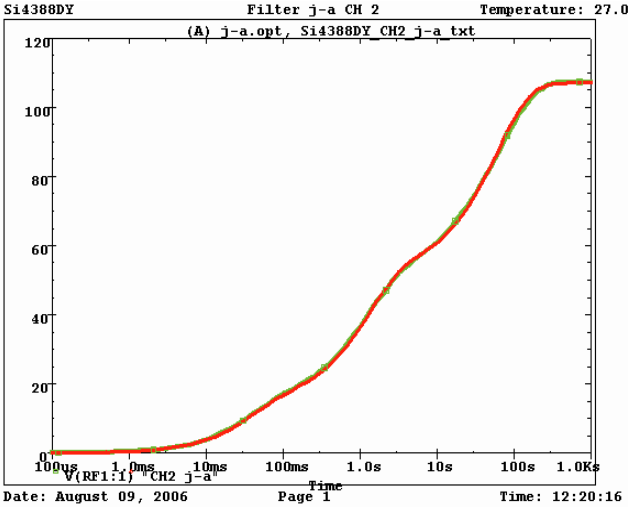
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1) "CH1 j-a"
Time
Date: August 09, 2006
Page 1
Time: 12:11:11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Filter j-a CH 2
Temperature: 27.0
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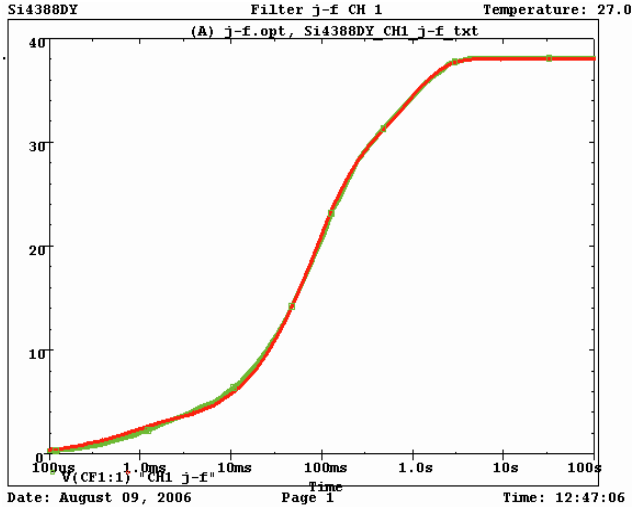
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1) "CH2 j-a"
Time
Date: August 09, 2006
Page 1
Time: 12:20:16


Si4388DY
Filter j-f CH 1
Temperature: 27.0
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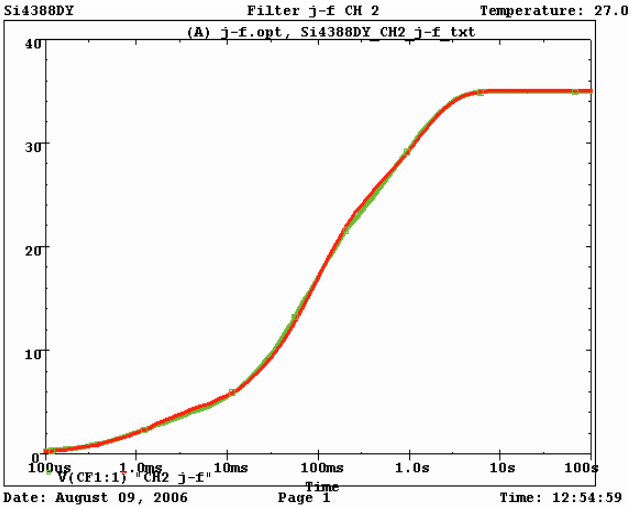
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1) "CH1 j-f"
Time
Date: August 09, 2006
Page 1
Time: 12:47:06


Si4388DY
Filter j-f CH 2
Temperature: 27.0
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30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1) "CH2 j-f"
Time
Date: August 09, 2006
Page 1
Time: 12:54:59