R-C Thermal Model Parameters

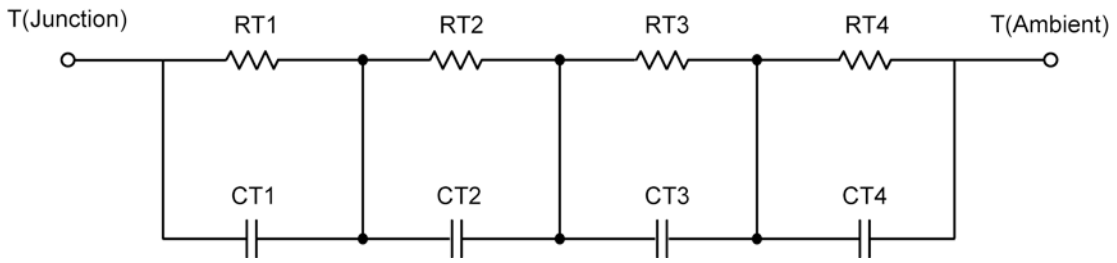
DESCRIPTION

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.

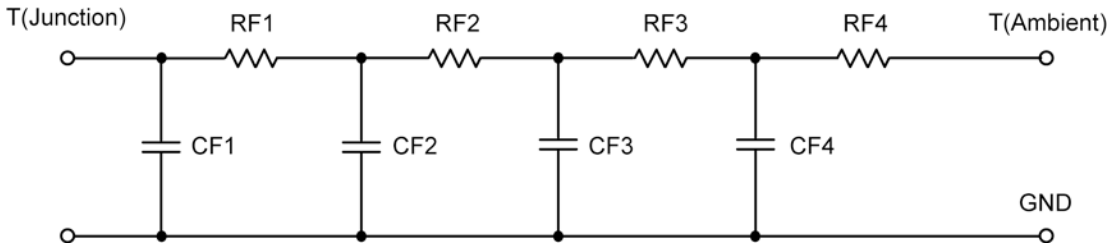
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
RT1	6.9442	6.9442	N/A	11.6583	11.6583
RT2	30.0404	30.0404	N/A	3.6731	3.6731
RT3	25.8463	25.8463	N/A	8.9996	8.9996
RT4	47.1691	46.1691	N/A	19.6690	19.6690
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
CT1	386.3454 u	386.3454 u	N/A	2.2210 m	2.2210 m
CT2	57.6804 m	57.6804 m	N/A	170.7109 u	170.7109 u
CT3	6.9241 m	6.9241 m	N/A	180.0765 m	180.0765 m
CT4	1.1640	1.1640	N/A	11.0677 m	11.0677 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

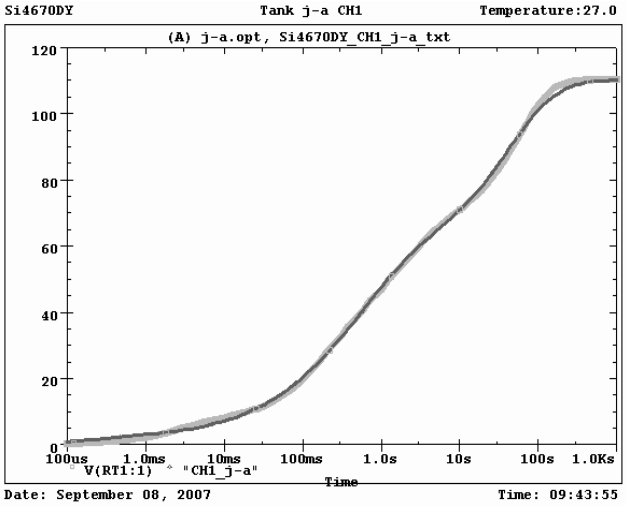


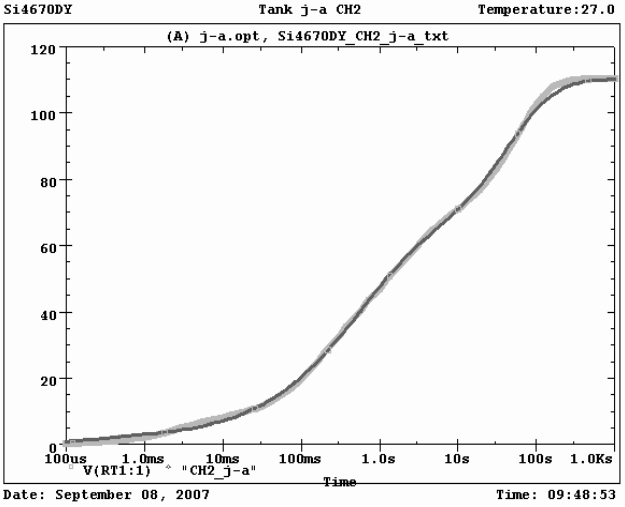
R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
RF1	10.1112	10.1112	N/A	4.0004	4.0004
RF2	32.1645	32.1645	N/A	16.0635	16.0635
RF3	25.8678	25.8678	N/A	16.7291	16.7291
RF4	41.8565	41.8565	N/A	7.2070	7.2070
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
CF1	598.9369 u	598.9369 u	N/A	114.1659 u	114.1659 u
CF2	7.0199 m	7.0199 m	N/A	1.6842 m	1.6842 m
CF3	77.6140 m	77.6140 m	N/A	10.3273 m	10.3273 m
CF4	1.2853	1.2853	N/A	172.1413 m	172.1413 m

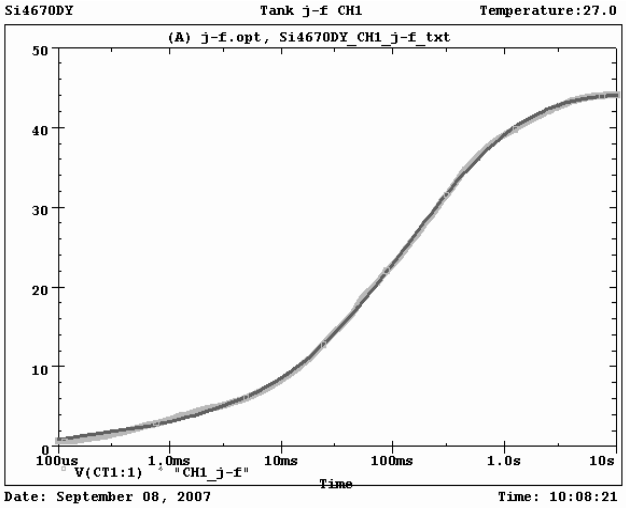
Note: NA indicates not applicable

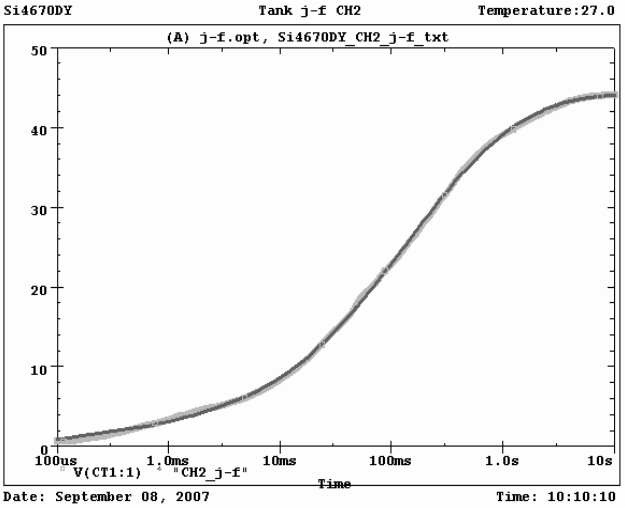
Reference:

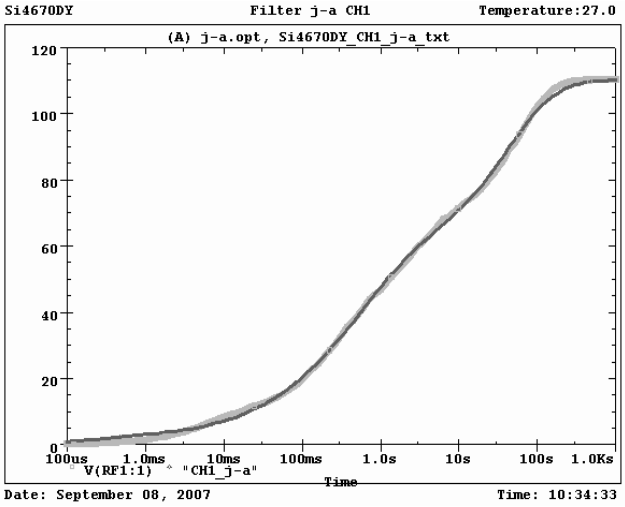
[1] "A Simple Method of Generating Thermal Models for a Power MOSFET" by Wharton McDaniel and Kandarp Pandya, IEEE / SEMITHERM 2002

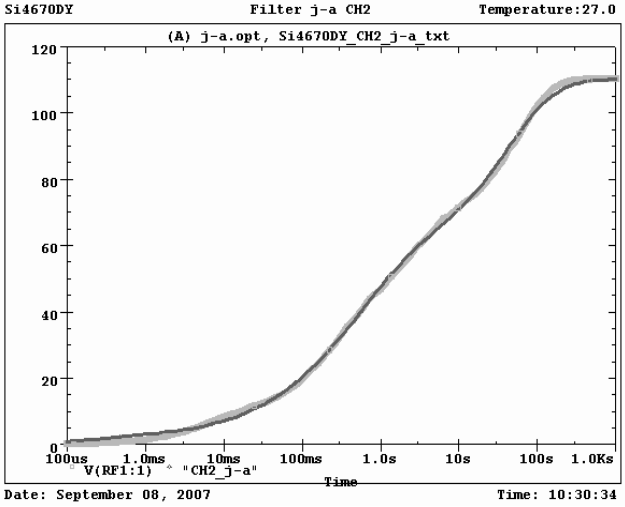

Si4670DY
Tank j-a CH1
Temperature:27.0
(A) j-a.opt, Si4670DY_CH1_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) : "CH1_j-a"
Time
Date: September 08, 2007
Time: 09:43:55

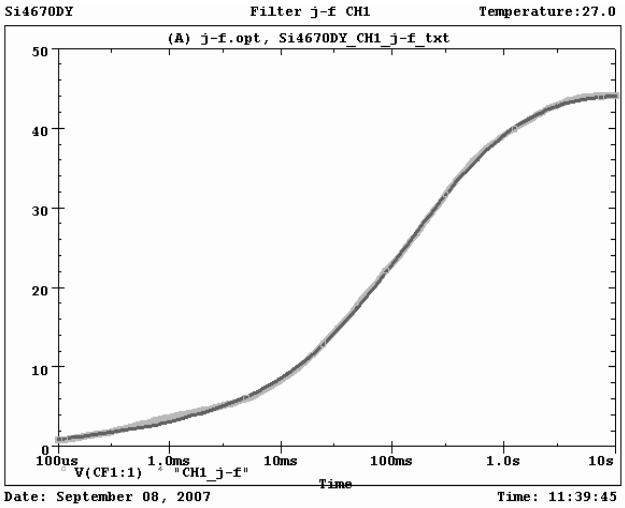

Si4670DY
Tank j-a CH2
Temperature:27.0
(A) j-a.opt, Si4670DY_CH2_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) : "CH2_j-a"
Time
Date: September 08, 2007
Time: 09:48:53

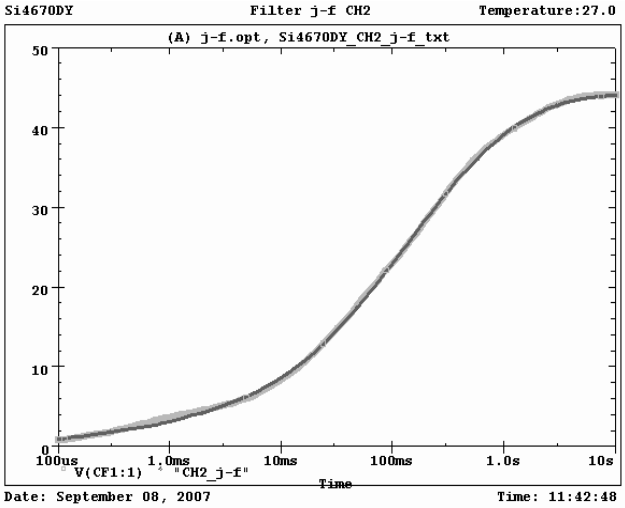

Si4670DY
Tank j-f CH1
Temperature:27.0
(A) j-f.opt, Si4670DY_CH1_j-f_txt
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) : "CH1_j-f"
Time
Date: September 08, 2007
Time: 10:08:21


Si4670DY
Tank j-f CH2
Temperature:27.0
(A) j-f.opt, Si4670DY_CH2_j-f_txt
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) : "CH2_j-f"
Time
Date: September 08, 2007
Time: 10:10:10


Si4670DY
Filter j-a CH1
Temperature:27.0
(A) j-a.opt, Si4670DY_CH1_j-a_txt
120
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: September 08, 2007
Time: 10:34:33


Si4670DY
Filter j-a CH2
Temperature:27.0
(A) j-a.opt, Si4670DY_CH2_j-a_txt
120
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: September 08, 2007
Time: 10:30:34


Si4670DY
Filter j-f CH1
Temperature:27.0
(A) j-f.opt, Si4670DY_CH1_j-f_txt
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1) "CH1_j-f"
Time
Date: September 08, 2007
Time: 11:39:45


Si4670DY
Filter j-f CH2
Temperature:27.0
(A) j-f.opt, Si4670DY_CH2_j-f_txt
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1) "CH2_j-f"
Time
Date: September 08, 2007
Time: 11:42:48