R-C Thermal Model Parameters

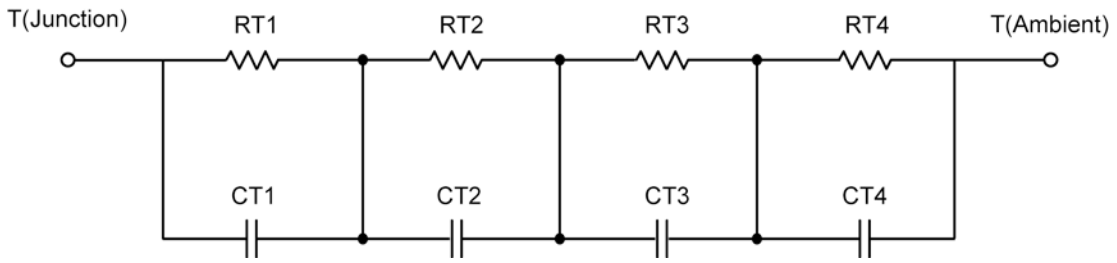
DESCRIPTION

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.

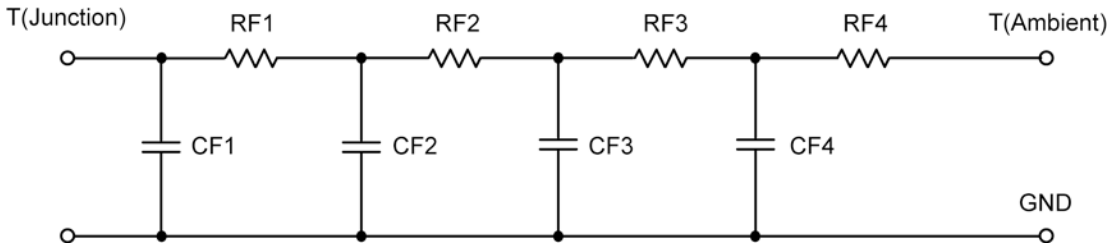
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
RT1	5.7407	18.5197	N/A	12.8956	14.4852
RT2	22.4526	17.2773	N/A	3.7536	7.2459
RT3	35.2874	35.4608	N/A	13.1181	9.9573
RT4	46.5193	43.7422	N/A	10.2327	15.3116
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
CT1	391.8258 u	64.9041 u	N/A	134.3353 m	92.0114 m
CT2	7.3908 m	3.6401 m	N/A	297.7361 u	48.6379 u
CT3	50.6844 m	31.3345 m	N/A	5.1404 m	666.1825 u
CT4	1.3716	1.2455	N/A	43.7374 m	6.9648 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

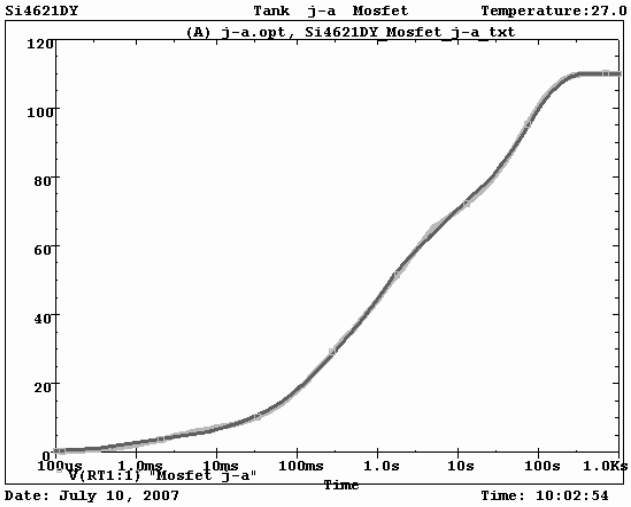


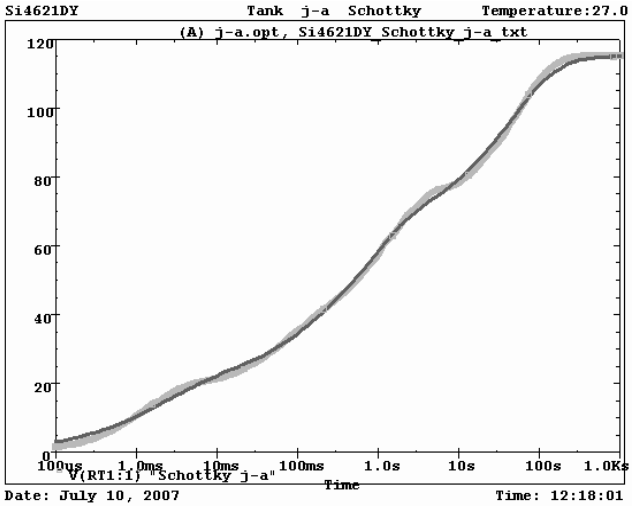
R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
RF1	7.7511	20.4519	N/A	3.9925	8.2309
RF2	27.1046	24.8031	N/A	4.7093	11.3266
RF3	31.3650	28.6084	N/A	14.1123	16.4593
RF4	43.7793	41.1366	N/A	17.1859	10.9832
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Case**	**Foot Mosfet**	**Foot Schottky**
CF1	487.2994 u	68.4422 u	N/A	306.3353 u	44.5285 u
CF2	6.6929 m	4.6669 m	N/A	2.1131 m	601.0970 u
CF3	47.9992 m	41.6149 m	N/A	3.9615 m	7.1072 m
CF4	1.4035	1.2936	N/A	58.8460 m	125.3721 m

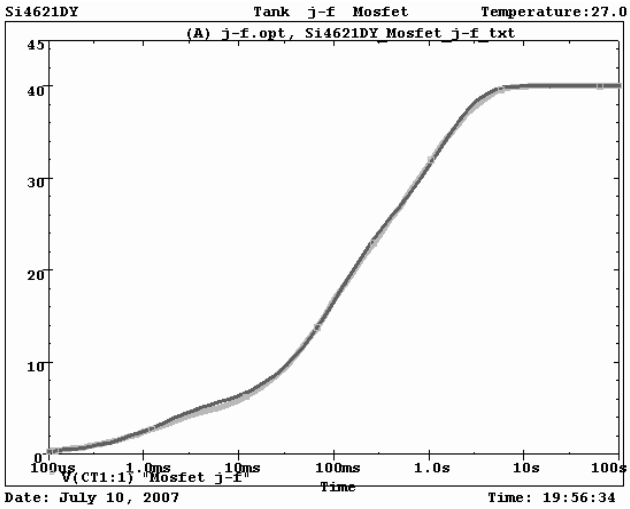
Note: NA indicates not applicable

Reference:

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


Si4621DY
Tank j-a Mosfet
Temperature:27.0
(A) j-a.opt, Si4621DY_Mosfet_j-a_txt
120
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "Mosfet j-a"
Time
Date: July 10, 2007
Time: 10:02:54


Si4621DY
Tank j-a Schottky
Temperature:27.0
(A) j-a.opt, Si4621DY_Schottky_j-a_txt
120
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "Schottky j-a"
Time
Date: July 10, 2007
Time: 12:18:01


Si4621DY
Tank j-f Mosfet
Temperature:27.0
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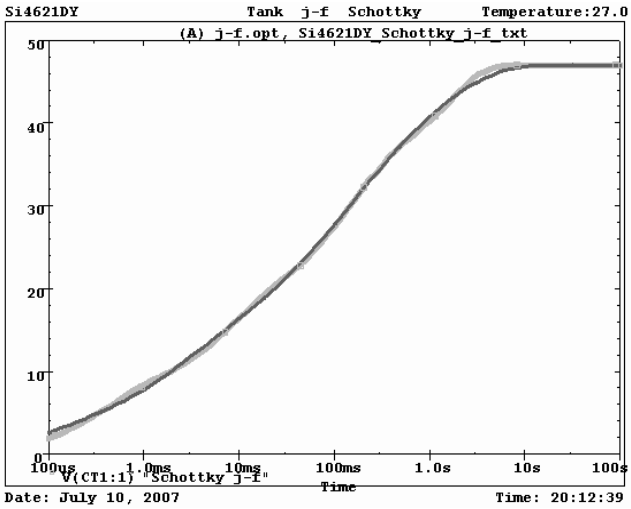
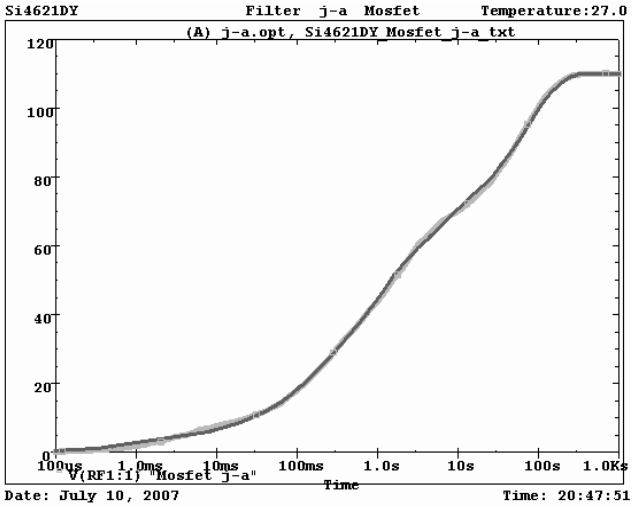
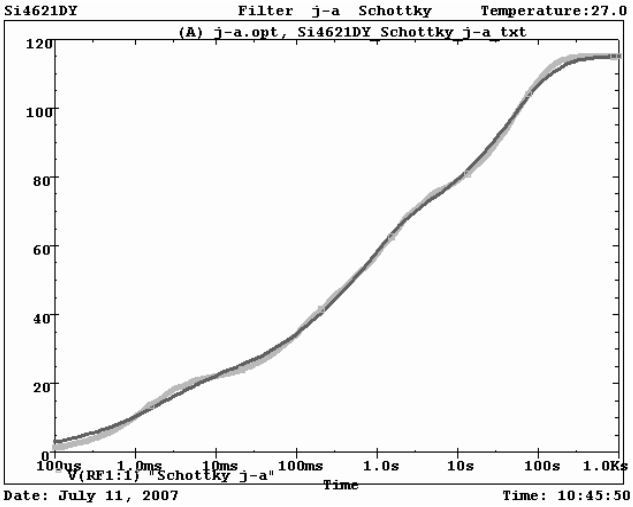
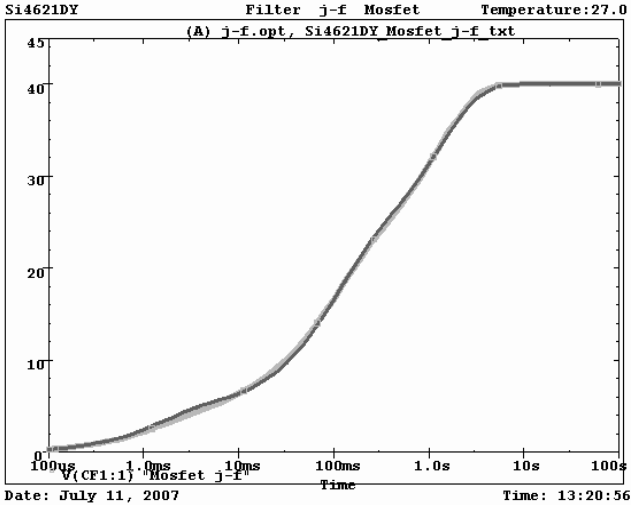
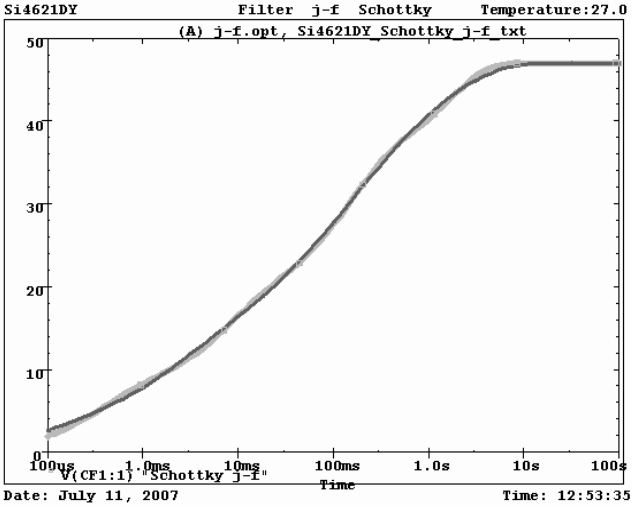
45
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s
V(CT1:1) "Mosfet j-f"
Time
Date: July 10, 2007
Time: 19:56:34


Si4621DY
Tank j-f Schottky
Temperature:27.0
(A) j-f.opt, Si4621DY_Schottky_j-f_txt
50
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s
V(CT1:1) "Schottky j-f"
Time
Date: July 10, 2007
Time: 20:12:39


Si4621DY
Filter j-a Mosfet
Temperature:27.0
(A) j-a.opt, Si4621DY_Mosfet_j-a_txt
120
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "Mosfet j-a"
Time
Date: July 10, 2007
Time: 20:47:51


Si4621DY
Filter j-a Schottky
Temperature:27.0
(A) j-a.opt, Si4621DY_Schottky_j-a_txt
120
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "Schottky j-a"
Time
Date: July 11, 2007
Time: 10:45:50


Si4621DY
Filter j-f Mosfet
Temperature:27.0
(A) j-f.opt, Si4621DY_Mosfet_j-f_txt
45
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s
V(CF1:1) "Mosfet j-f"
Time
Date: July 11, 2007
Time: 13:20:56


Si4621DY
Filter j-f Schottky
Temperature:27.0
(A) j-f.opt, Si4621DY_Schottky_j-f_txt
50
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s
V(CF1:1) "Schottky j-f"
Time
Date: July 11, 2007
Time: 12:53:35