R-C Thermal Model Parameters

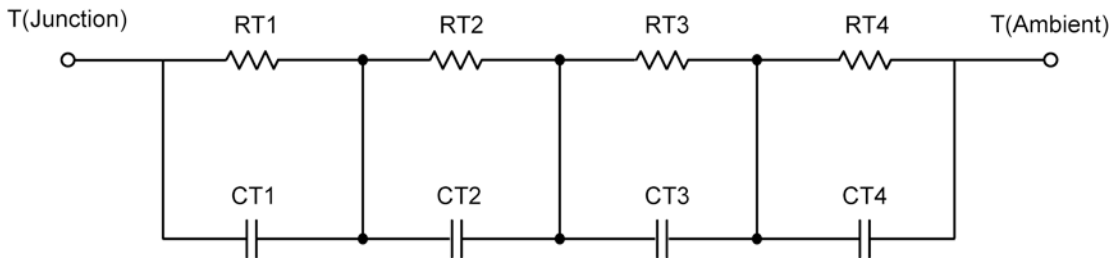
DESCRIPTION

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.

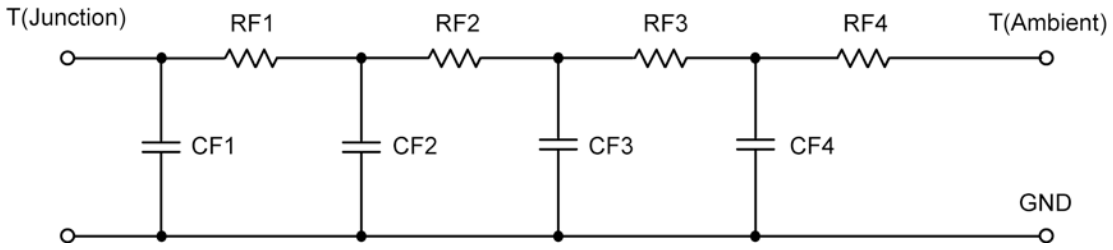
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case Drain Top**	**Case Source**
RT1	37.1751	390.6431 m	991.9351 m
RT2	17.7516	316.8882 m	1.0219
RT3	9.3082	136.0295 m	827.6268 m
RT4	3.7651	258.6697 m	458.5381 m
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case Drain Top**	**Case Source**
CT1	3.3487	10.7571 m	19.3694 m
CT2	1.2099	73.6756 m	160.1653 m
CT3	106.8798 m	556.3263 m	10.4141
CT4	18.6824 m	698.7013 u	1.1651 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

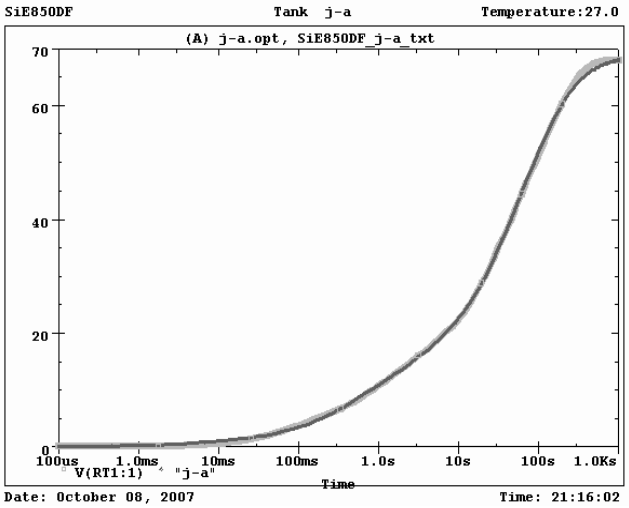


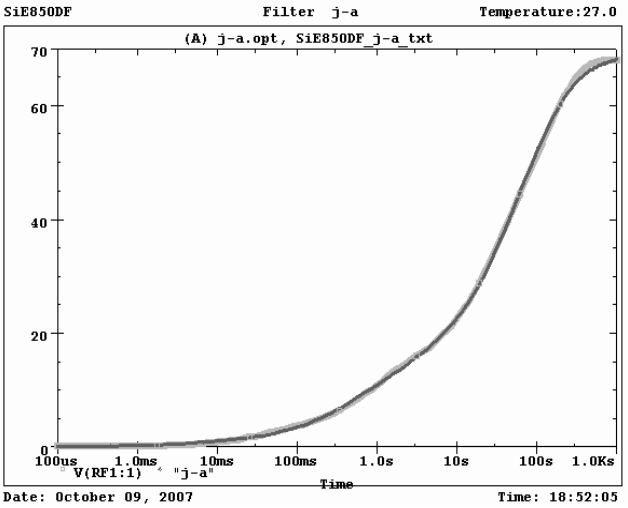
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case Drain Top**	**Case Source**
RF1	3.3382	243.7074 m	455.8700 m
RF2	11.1361	141.1494 m	949.5900 m
RF3	28.4141	405.1340 m	1.0279
RF4	25.1116	310.0092 m	866.6400 m
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case Drain Top**	**Case Source**
CF1	10.3586 m	664.0958 u	956.0032 u
CF2	63.3882 m	2.9142 m	12.2331 m
CF3	791.3262 m	8.6804 m	87.8375 m
CF4	3.9257	101.7040 m	8.4422

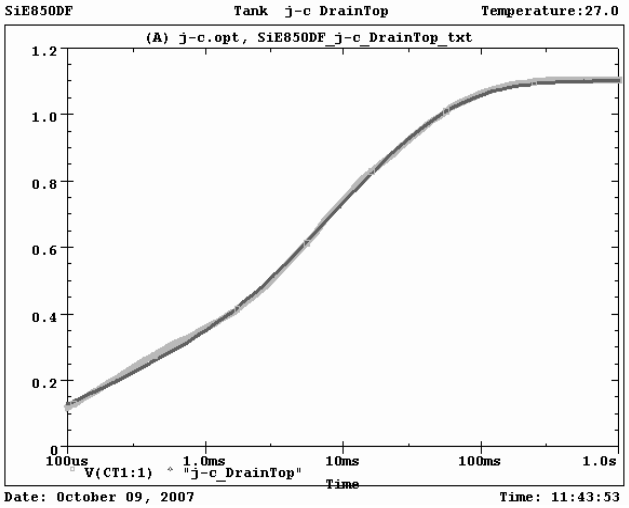
Note: NA indicates not applicable

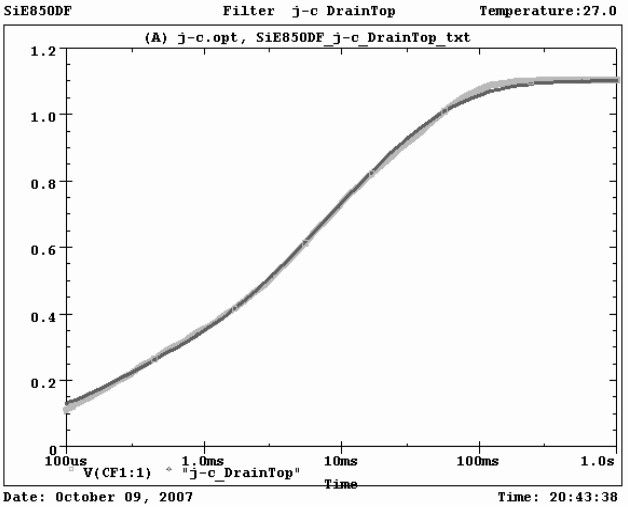
Reference:

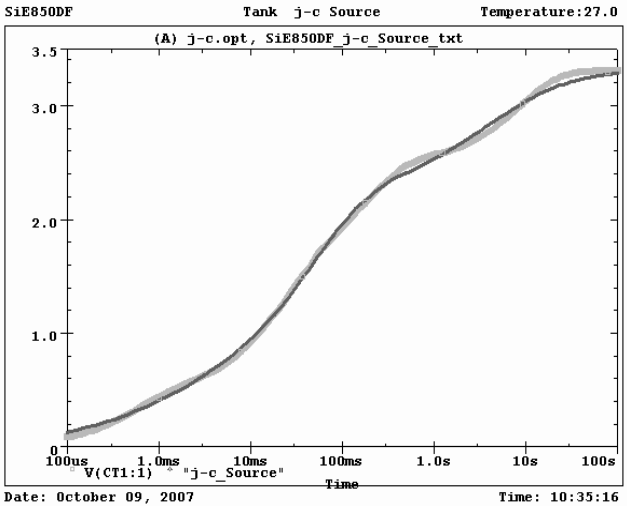
[1] "A Simple Method of Generating Thermal Models for a Power MOSFET" by Wharton McDaniel and Kandarp Pandya, IEEE / SEMITHERM 2002

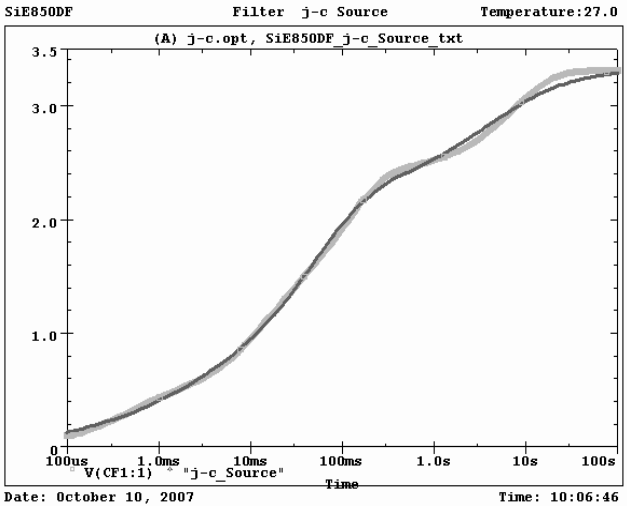

SiE850DF
Tank j-a
Temperature:27.0
(A) j-a.opt, SiE850DF_j-a_txt
70
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"j-a"
Time
Date: October 08, 2007
Time: 21:16:02


SiE850DF
Filter j-a
Temperature:27.0
(A) j-a.opt, SiE850DF_j-a_txt
70
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"j-a"
Time
Date: October 09, 2007
Time: 18:52:05


SiE850DF
Tank j-c DrainTop
Temperature:27.0
(A) j-c.opt, SiE850DF_j-c_DrainTop_txt
1.2
1.0
0.8
0.6
0.4
0.2
0
100us
1.0ms
10ms
100ms
1.0s
V(CT1:1)
"j-c_DrainTop"
Time
Date: October 09, 2007
Time: 11:43:53


SiE850DF
Filter j-c DrainTop
Temperature:27.0
(A) j-c.opt, SiE850DF_j-c_DrainTop_txt
1.2
1.0
0.8
0.6
0.4
0.2
0
100us
1.0ms
10ms
100ms
1.0s
V(CF1:1)
"j-c_DrainTop"
Time
Date: October 09, 2007
Time: 20:43:38


SiE850DF
Tank j-c Source
Temperature:27.0
(A) j-c.opt, SiE850DF_j-c_Source_txt
3.5
3.0
2.0
1.0
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1) - "j-c_Source"
Time
Date: October 09, 2007
Time: 10:35:16


SiE850DF
Filter j-c Source
Temperature:27.0
(A) j-c.opt, SiE850DF_j-c_Source_txt
3.5
3.0
2.0
1.0
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1) - "j-c_Source"
Time
Date: October 10, 2007
Time: 10:06:46