# R-C Thermal Model Parameters

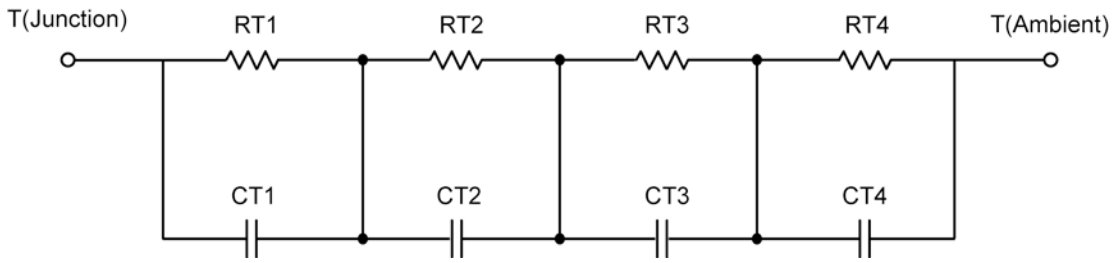
## DESCRIPTION

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.*

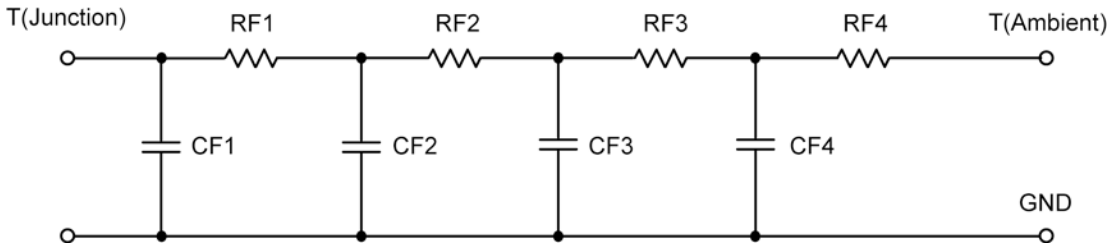
## R-C THERMAL MODEL FOR TANK CONFIGURATION




| R-C VALUES FOR TANK CONFIGURATION | | | |
|---|---|---|---|
| **Thermal Resistance (°C/W)** | | | |
| **Junction to** | **Ambient** | **Case Drain Top** | **Case Source** |
| RT1 | 1.2715 | 541.9300 u | 383.3629 m |
| RT2 | 7.4755 | 23.8824 m | 2.9708 |
| RT3 | 10.4813 | 959.1097 m | 41.5326 m |
| RT4 | 48.7717 | 216.4666 m | 4.3045 m |
| **Thermal Capacitance (Joules/°C)** | | | |
| **Junction to** | **Ambient** | **Case Drain Top** | **Case Source** |
| CT1 | 2.1640 m | 45.9474 m | 1.0194 m |
| CT2 | 230.0674 m | 33.4132 m | 16.5459 m |
| CT3 | 42.6031 m | 18.2706 m | 1.1614 |
| CT4 | 1.2991 | 2.5656 m | 6.8350 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

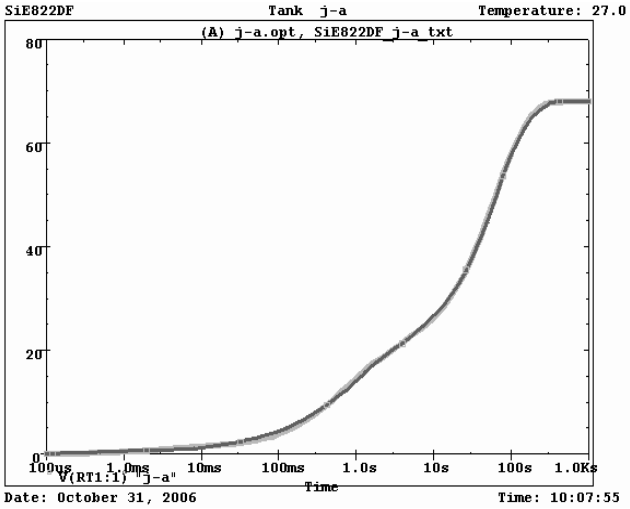


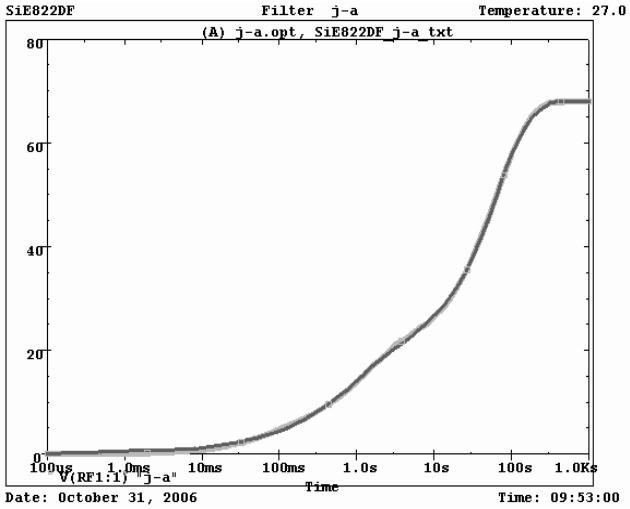

| R-C VALUES FOR FILTER CONFIGURATION | | | |
|---|---|---|---|
| **Thermal Resistance (°C/W)** | | | |
| **Junction to** | **Ambient** | **Case Drain Top** | **Case Source** |
| RF1 | 6.0874 | 310.0466 m | 422.0638 m |
| RF2 | 7.6744 | 555.8000 u | 1.2538 |
| RF3 | 7.6389 | 52.0767 m | 727.6428 m |
| RF4 | 46.5993 | 837.3209 m | 996.4934 m |
| **Thermal Capacitance (Joules/°C)** | | | |
| **Junction to** | **Ambient** | **Case Drain Top** | **Case Source** |
| CF1 | 11.6397 m | 2.0570 m | 924.6388 u |
| CF2 | 60.3507 m | 396.0260 u | 14.1029 m |
| CF3 | 17.0829 m | 16.5376 m | 1.3296 m |
| CF4 | 1.3018 | 85.3684 u | 9.2135 m |

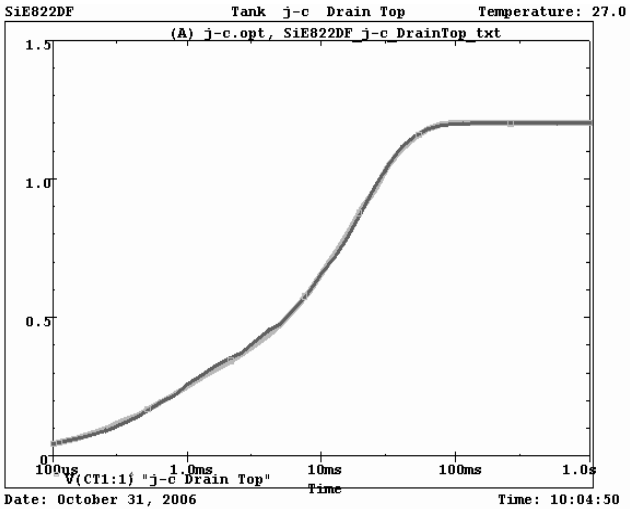
*Note: NA indicates not applicable*

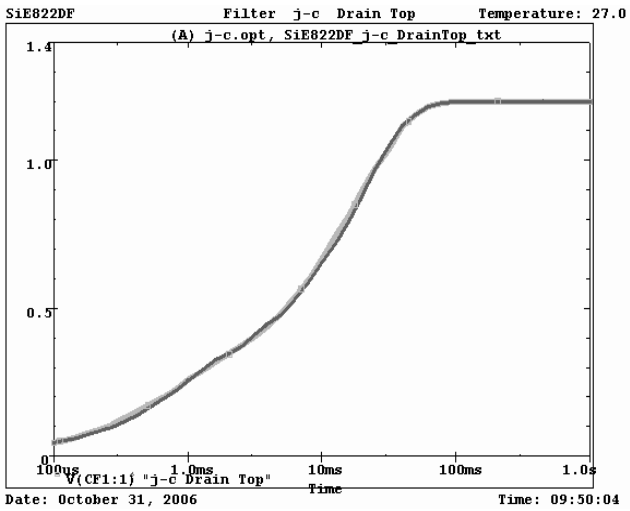
*Reference:*

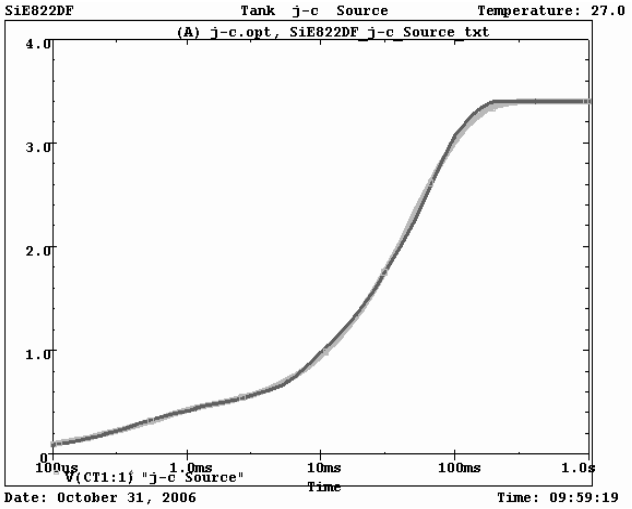
*[1] "A Simple Method of Generating Thermal Models for a Power MOSFET" by Wharton McDaniel and Kandarp Pandya, IEEE / SEMITHERM 2002*

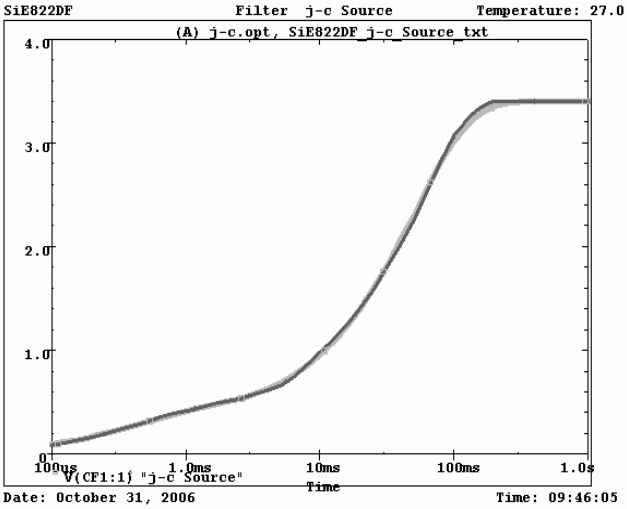

SiE822DF
Tank j-a
Temperature: 27.0
(A) j-a.opt, SiE822DF_j-a_txt
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "j-a"
Time
Date: October 31, 2006
Time: 10:07:55


SiE822DF
Filter j-a
Temperature: 27.0
(A) j-a.opt, SiE822DF_j-a_txt
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "j-a"
Time
Date: October 31, 2006
Time: 09:53:00


SiE822DF
Tank j-c Drain Top
Temperature: 27.0
(A) j-c.opt, SiE822DF_j-c_DrainTop_txt
1.5
1.0
0.5
0
100us 1.0ms 10ms 100ms 1.0s
V(CT1:1) "j-c Drain Top"
Time
Date: October 31, 2006
Time: 10:04:50


SiE822DF
Filter j-c Drain Top
Temperature: 27.0
(A) j-c.opt, SiE822DF_j-c_DrainTop_txt
1.4
1.0
0.5
0
100us 1.0ms 10ms 100ms 1.0s
V(CF1:1) "j-c Drain Top"
Time
Date: October 31, 2006
Time: 09:50:04


SiE822DF
Tank j-c Source
Temperature: 27.0
(A) j-c.opt, SiE822DF_j-c_Source_txt
4.0
3.0
2.0
1.0
0
100us
1.0ms
10ms
100ms
1.0s
V(CT1:1) "j-c Source"
Time
Date: October 31, 2006
Time: 09:59:19


SiE822DF
Filter j-c Source
Temperature: 27.0
(A) j-c.opt, SiE822DF_j-c_Source_txt
4.0
3.0
2.0
1.0
0
100us
1.0ms
10ms
100ms
1.0s
V(CF1:1) "j-c Source"
Time
Date: October 31, 2006
Time: 09:46:05