# R-C Thermal Model Parameters

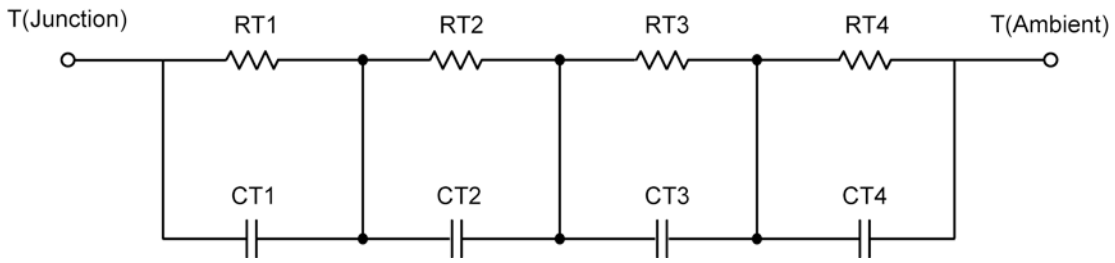
## DESCRIPTION

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.*

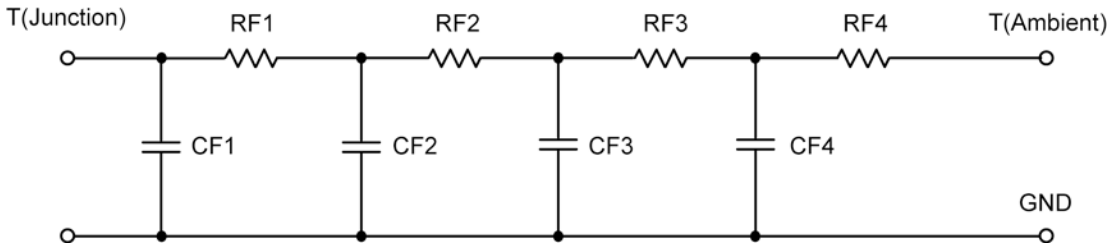
## R-C THERMAL MODEL FOR TANK CONFIGURATION




| R-C VALUES FOR TANK CONFIGURATION | | | |
|---|---|---|---|
| **Thermal Resistance (°C/W)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RT1 | 37.7200 | 193.2446 m | N/A |
| RT2 | 3.9719 | 459.0152 m | N/A |
| RT3 | 11.5863 | 982.0274 m | N/A |
| RT4 | 36.7218 | 165.7128 m | N/A |
| **Thermal Capacitance (Joules/°C)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CT1 | 772.8107 m | 532.9907 m | N/A |
| CT2 | 9.2016 m | 1.0329 m | N/A |
| CT3 | 172.8203 m | 20.0094 m | N/A |
| CT4 | 5.9611 | 1.9611 | N/A |

*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

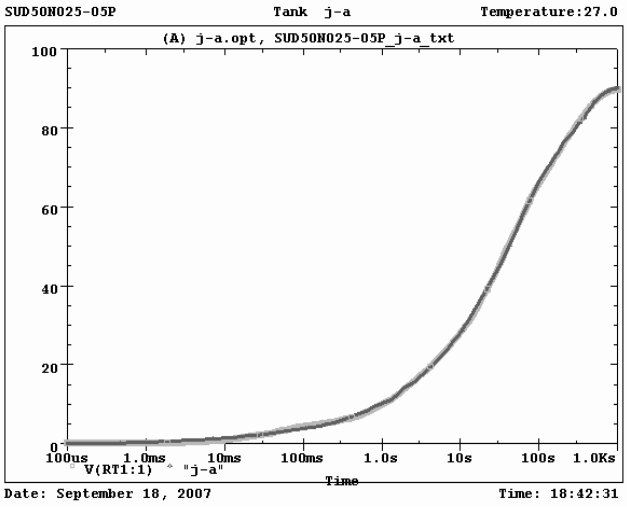


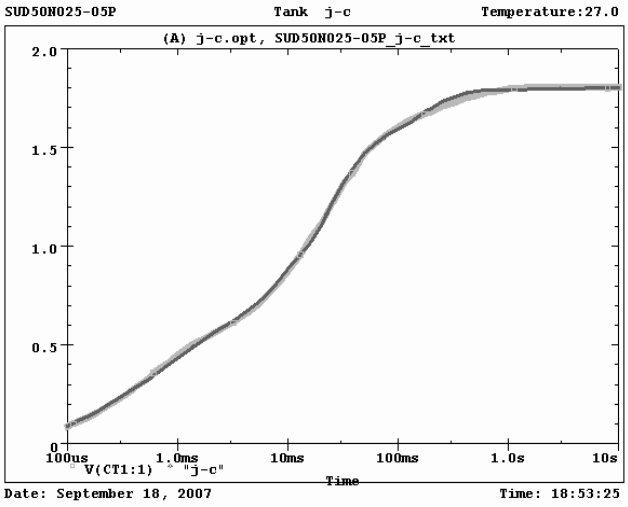

| R-C VALUES FOR FILTER CONFIGURATION | | | |
|---|---|---|---|
| **Thermal Resistance (°C/W)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RF1 | 3.8277 | 502.8130 m | N/A |
| RF2 | 17.7865 | 536.6181 m | N/A |
| RF3 | 42.7087 | 483.1726 m | N/A |
| RF4 | 25.6771 | 277.3963 m | N/A |
| **Thermal Capacitance (Joules/°C)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CF1 | 7.3269 m | 1.0192 m | N/A |
| CF2 | 119.1927 m | 14.4969 m | N/A |
| CF3 | 658.3181 m | 20.2327 m | N/A |
| CF4 | 7.8591 | 441.4775 m | N/A |

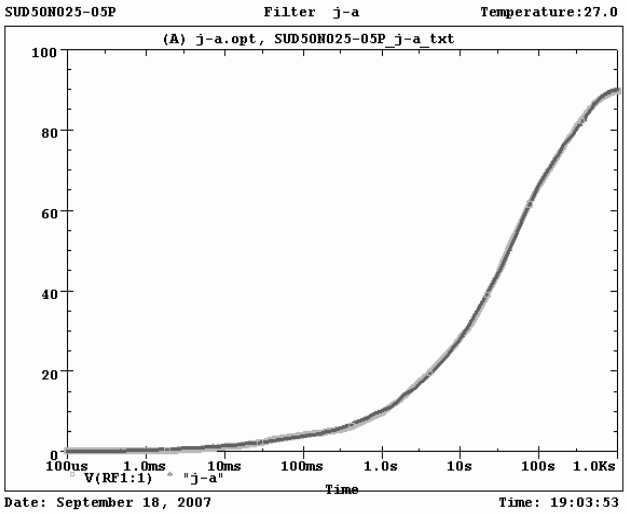
*Note: NA indicates not applicable*

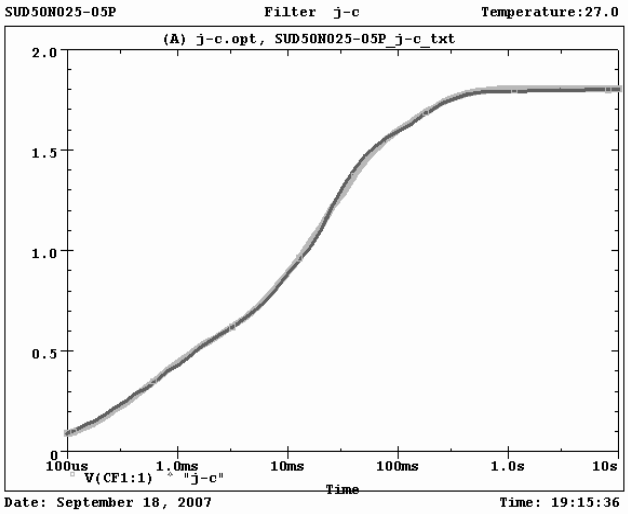
*Reference:*

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


SUD50N025-05P
Tank j-a
Temperature:27.0
(A) j-a.opt, SUD50N025-05P_j-a_txt
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) ^ "j-a"
Time
Date: September 18, 2007
Time: 18:42:31


SUD50N025-05P
Tank j-c
Temperature:27.0
(A) j-c.opt, SUD50N025-05P_j-c_txt
2.0
1.5
1.0
0.5
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CT1:1) ^ "j-c"
Time
Date: September 18, 2007
Time: 18:53:25


SUD50N025-05P
Filter j-a
Temperature:27.0
(A) j-a.opt, SUD50N025-05P_j-a_txt
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) ^ "j-a"
Time
Date: September 18, 2007
Time: 19:03:53


SUD50N025-05P
Filter j-c
Temperature:27.0
(A) j-c.opt, SUD50N025-05P_j-c_txt
2.0
1.5
1.0
0.5
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) ^ "j-c"
Time
Date: September 18, 2007
Time: 19:15:36