# R-C Thermal Model Parameters

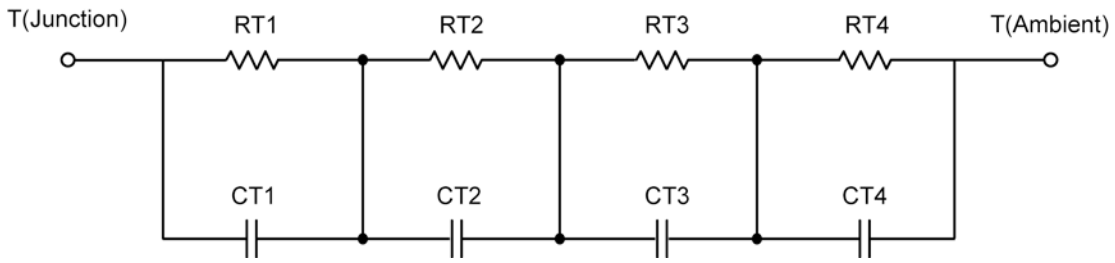
## DESCRIPTION

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.*

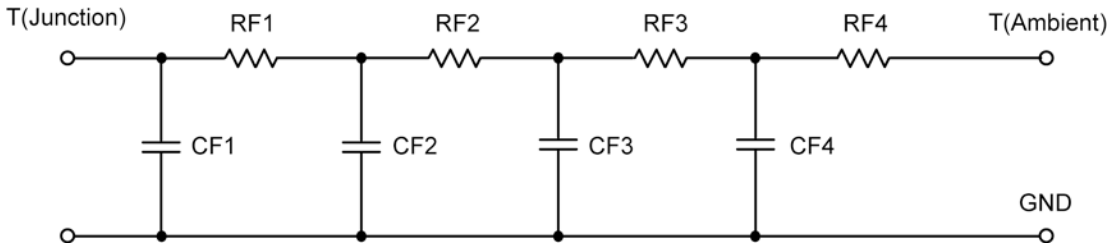
## R-C THERMAL MODEL FOR TANK CONFIGURATION




| R-C VALUES FOR TANK CONFIGURATION | | | |
|---|---|---|---|
| **Thermal Resistance (°C/W)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RT1 | N/A | 85.0649 m | N/A |
| RT2 | N/A | 389.7232 m | N/A |
| RT3 | N/A | 257.7333 m | N/A |
| RT4 | N/A | 367.4785 m | N/A |
| **Thermal Capacitance (Joules/°C)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CT1 | N/A | 866.2762 m | N/A |
| CT2 | N/A | 1.9029 m | N/A |
| CT3 | N/A | 35.7097 m | N/A |
| CT4 | N/A | 89.8563 m | 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

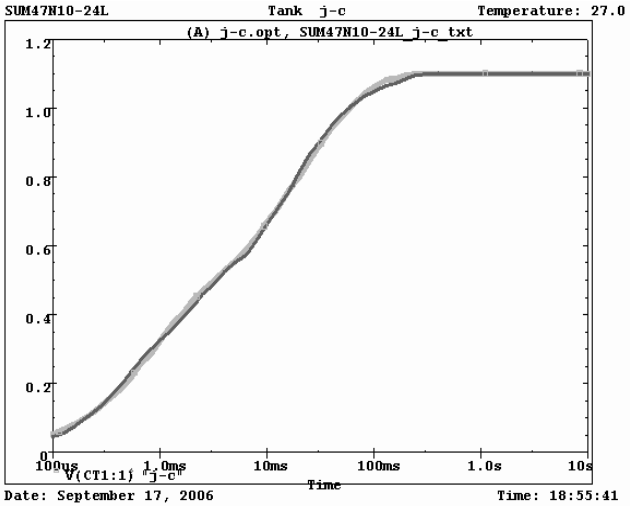


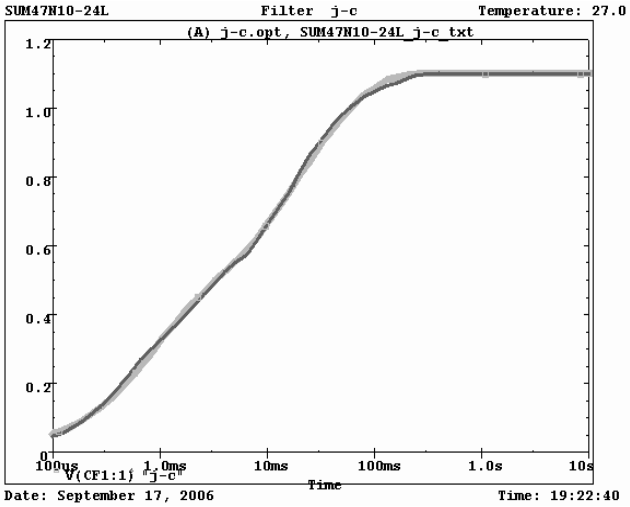

| R-C VALUES FOR FILTER CONFIGURATION | | | |
|---|---|---|---|
| **Thermal Resistance (°C/W)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RF1 | N/A | 321.9701 m | N/A |
| RF2 | N/A | 139.7272 m | N/A |
| RF3 | N/A | 439.1969 m | N/A |
| RF4 | N/A | 197.3941 m | N/A |
| **Thermal Capacitance (Joules/°C)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CF1 | N/A | 1.7350 m | N/A |
| CF2 | N/A | 1.1826 m | N/A |
| CF3 | N/A | 26.8611 m | N/A |
| CF4 | N/A | 173.6240 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*


SUM47N10-24L
Tank j-c
Temperature: 27.0
(A) j-c.opt, SUM47N10-24L_j-c_txt
1.2
1.0
0.8
0.6
0.4
0.2
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) "j-c"
Time
Date: September 17, 2006
Time: 18:55:41


SUM47N10-24L
Filter j-c
Temperature: 27.0
(A) j-c.opt, SUM47N10-24L_j-c_txt
1.2
1.0
0.8
0.6
0.4
0.2
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1) "j-c"
Time
Date: September 17, 2006
Time: 19:22:40