# R-C Thermal Model Parameters

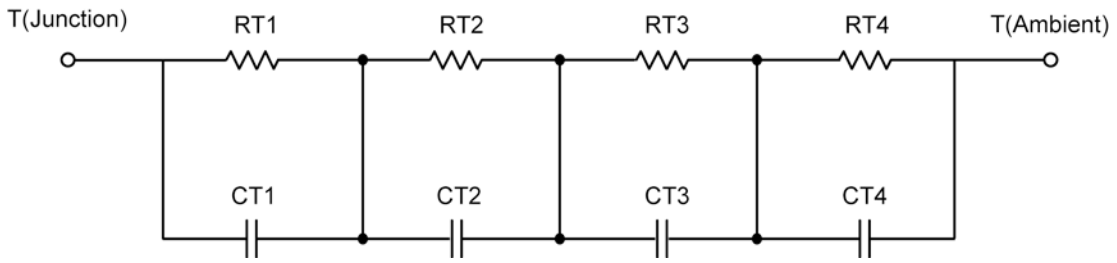
## DESCRIPTION

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.*

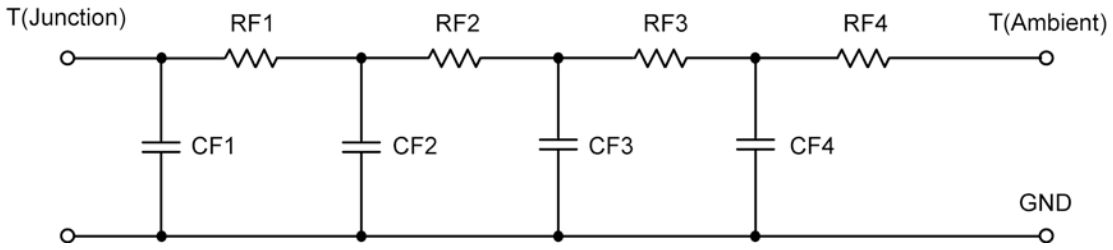
## R-C THERMAL MODEL FOR TANK CONFIGURATION




| R-C VALUES FOR TANK CONFIGURATION | | | |
|---|---|---|---|
| **Thermal Resistance (°C/W)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RT1 | 1.4533 | N/A | 2.2103 |
| RT2 | 17.3894 | N/A | 1.8456 |
| RT3 | 53.4932 | N/A | 9.5636 |
| RT4 | 7.6641 | N/A | 2.3805 |
| **Thermal Capacitance (Joules/°C)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CT1 | 21.3508 m | N/A | 31.0748 m |
| CT2 | 41.0128 m | N/A | 128.7508 m |
| CT3 | 1.4298 | N/A | 150.3429 m |
| CT4 | 491.3727 m | N/A | 25.2299 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

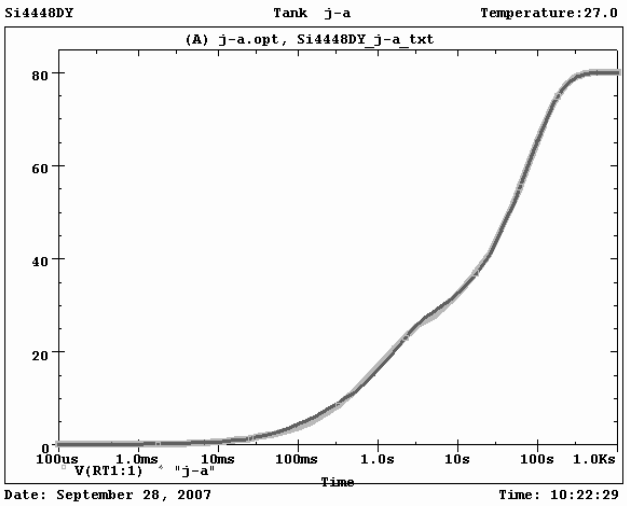


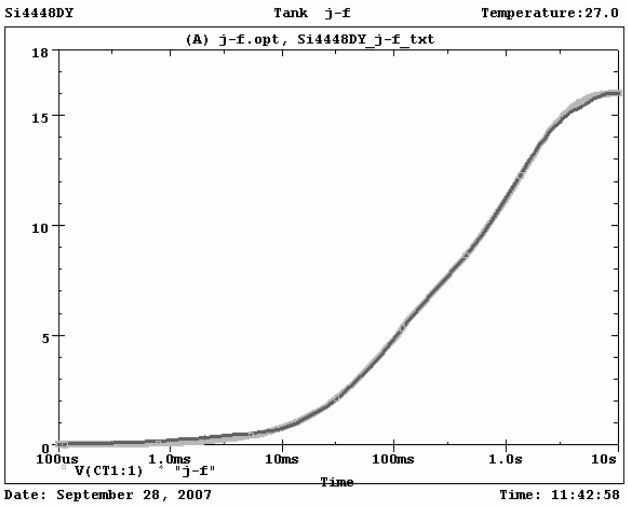

| R-C VALUES FOR FILTER CONFIGURATION | | | |
|---|---|---|---|
| **Thermal Resistance (°C/W)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RF1 | 2.3339 | N/A | 575.5312 m |
| RF2 | 17.8843 | N/A | 6.8042 |
| RF3 | 11.5786 | N/A | 8.4874 |
| RF4 | 48.2032 | N/A | 132.8688 m |
| **Thermal Capacitance (Joules/°C)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CF1 | 8.7151 m | N/A | 5.8049 m |
| CF2 | 25.2051 m | N/A | 8.4331 m |
| CF3 | 266.7055 m | N/A | 146.8477 m |
| CF4 | 1.2849 | N/A | 2.2433 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*


Si4448DY
Tank j-a
Temperature:27.0
(A) j-a.opt, Si4448DY_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: September 28, 2007
Time: 10:22:29


Si4448DY
Tank j-f
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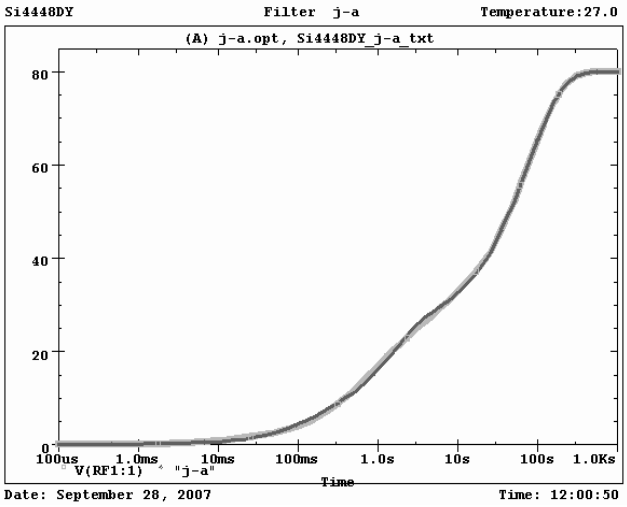
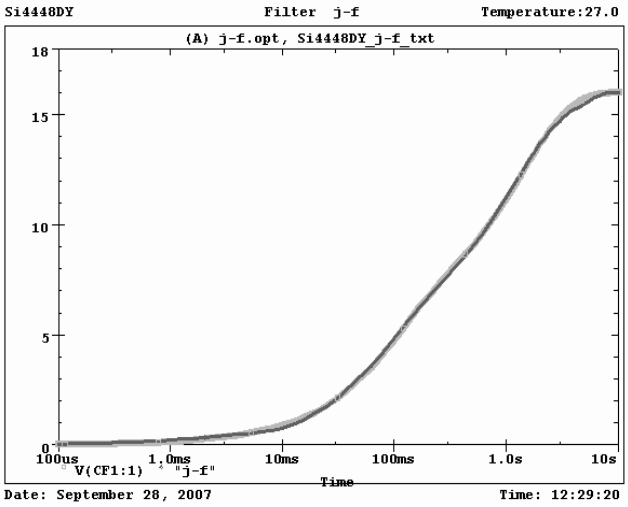
18
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) "j-f"
Time
Date: September 28, 2007
Time: 11:42:58


Si4448DY
Filter j-a
Temperature:27.0
(A) j-a.opt, Si4448DY_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: September 28, 2007
Time: 12:00:50


Si4448DY
Filter j-f
Temperature:27.0
(A) j-f.opt, Si4448DY_j-f_txt
18
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1) "j-f"
Time
Date: September 28, 2007
Time: 12:29:20