# R-C Thermal Model Parameters

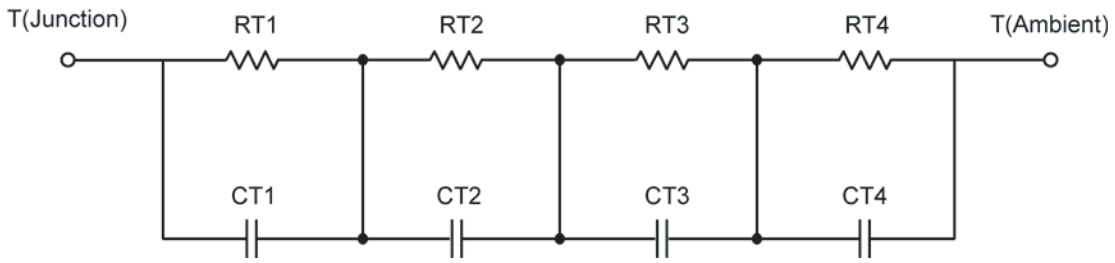
## DESCRIPTION

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.*

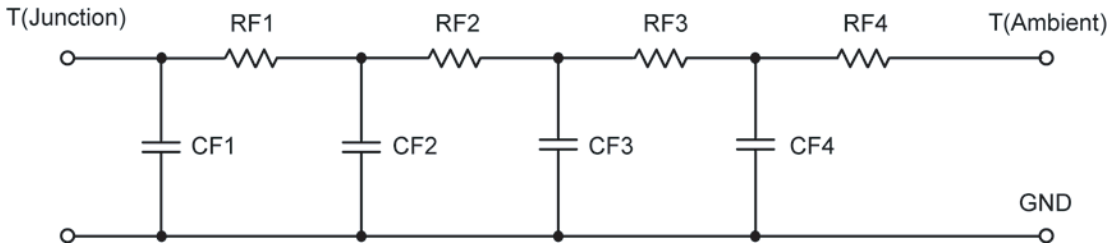
## R-C THERMAL MODEL FOR TANK CONFIGURATION




| R-C VALUES FOR TANK CONFIGURATION | | | |
|---|---|---|---|
| **Thermal Resistance (°C/W)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RT1 | 56.1006 | N/A | 16.3442 |
| RT2 | 9.6098 | N/A | 5.8412 |
| RT3 | 27.7168 | N/A | 6.1172 |
| RT4 | 30.9442 | N/A | 16.6502 |
| **Thermal Capacitance (Joules/°C)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CT1 | 1.2233 | N/A | 1.4474 m |
| CT2 | 299.5916 µ | N/A | 165.7211 µ |
| CT3 | 29.1796 m | N/A | 159.1680 m |
| CT4 | 2.4483 m | N/A | 4.0724 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

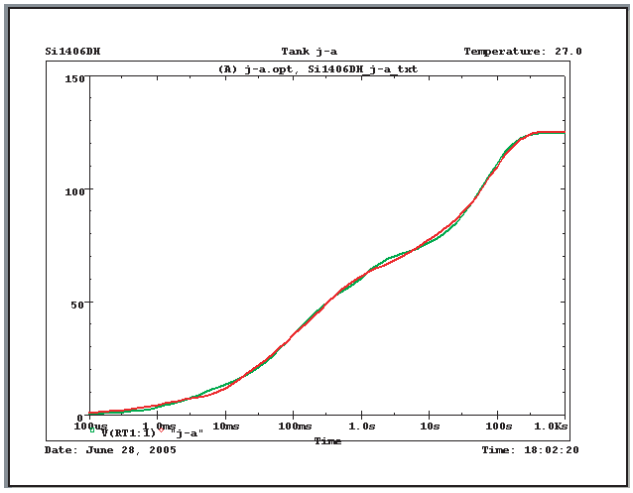


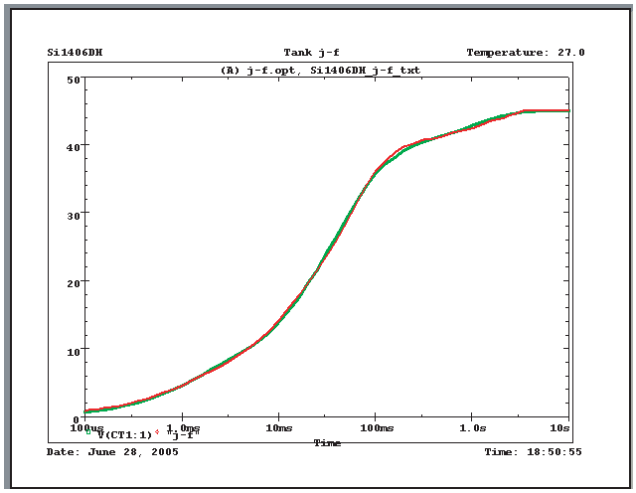

| R-C VALUES FOR FILTER CONFIGURATION | | | |
|---|---|---|---|
| **Thermal Resistance (°C/W)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RF1 | 17.0251 | N/A | 9.3126 |
| RF2 | 36.4288 | N/A | 21.7163 |
| RF3 | 19.8437 | N/A | 8.4387 |
| RF4 | 51.6171 | N/A | 5.5442 |
| **Thermal Capacitance (Joules/°C)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CF1 | 382.0981 µ | N/A | 170.4864 µ |
| CF2 | 3.2352 m | N/A | 1.1574 m |
| CF3 | 86.5188 m | N/A | 1.9990 m |
| CF4 | 1.3805 | N/A | 191.7478 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*


Si1406DH
Tank j-a
Temperature: 27.0
(A) j-a.opt, Si1406DH_j-a_txt
150
100
50
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
j-a
Time
Date: June 28, 2005
Time: 18:02:20


Si1406DH
Tank j-f
Temperature: 27.0
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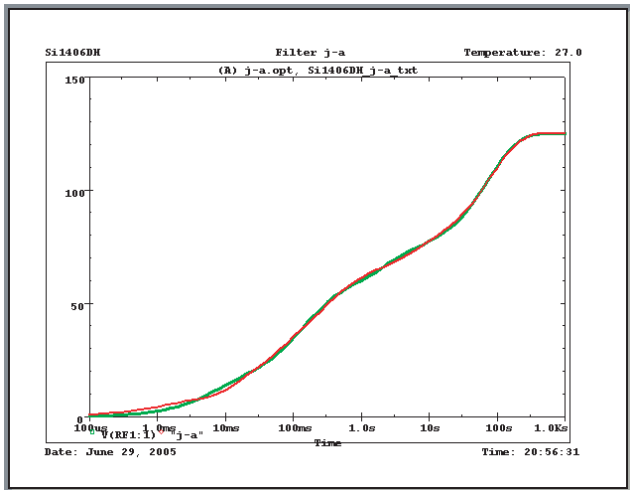
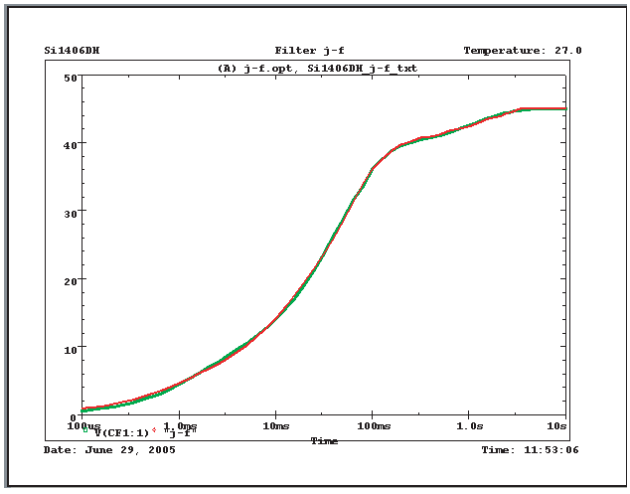
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)
j-f
Time
Date: June 28, 2005
Time: 18:50:55


Si1406DH
Filter j-a
Temperature: 27.0
(A) j-a.opt, Si1406DH_j-a_txt
150
100
50
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
j-a
Time
Date: June 29, 2005
Time: 20:56:31


Si1406DH
Filter j-f
Temperature: 27.0
(A) j-f.opt, Si1406DH_j-f_txt
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1)
j-f
Time
Date: June 29, 2005
Time: 11:53:06