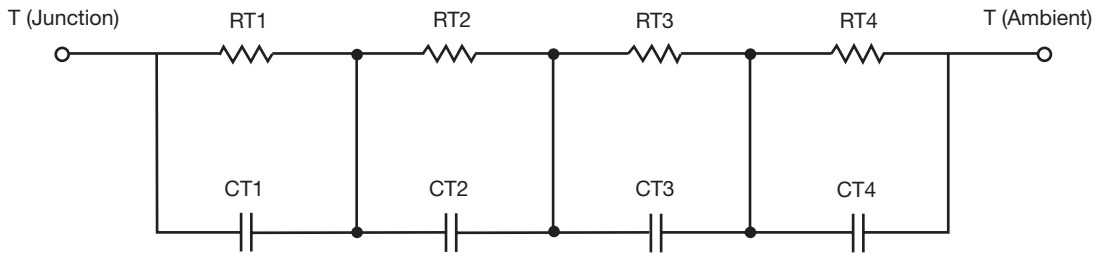
# R-C Thermal Model Parameters

## DESCRIPTION

The parametric values in the R-C thermal model have been derived using curve-fitting techniques. R-C values for the electrical circuit in the Foster/tank and Cauer/filter configurations are included. When implemented in P-SPICE, these values have matching characteristic curves to the single-pulse transient thermal impedance curves for the MOSFET.

These RC values can be used in the P-SPICE simulation to evaluate the thermal behavior of the MOSFET junction temperature under a defined power profile. These techniques are described in application note AN609, “Thermal Simulation of Power MOSFETs on the P-SPICE Platform”.

## R-C THERMAL MODEL FOR TANK CONFIGURATION

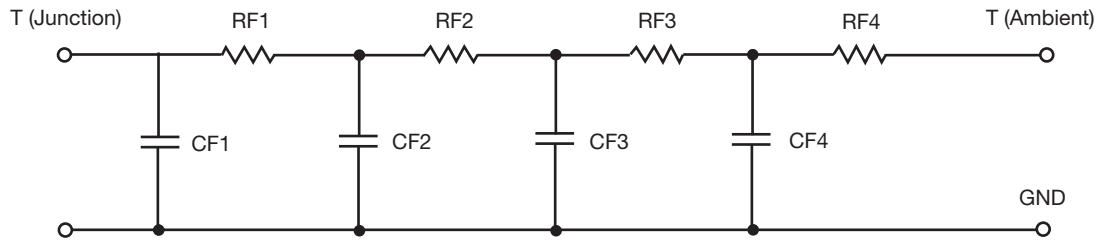



| R-C VALUES FOR TANK CONFIGURATION | | | |
|---|---|---|---|
| THERMAL RESISTANCE (°C/W) | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RT1 | 55.5474 | N/A | 11.4054 |
| RT2 | 20.5045 | N/A | 5.4069 |
| RT3 | 34.4088 | N/A | 1.0497 |
| RT4 | 9.2383 | N/A | 19.9603 |
| THERMAL CAPACITANCE (Joules/°C) | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CT1 | 1.8266 | N/A | 13.6705 m |
| CT2 | 2.4408 | N/A | 8.0367 m |
| CT3 | 39.6228 m | N/A | 4.1226 m |
| CT4 | 2.4286 m | N/A | 61.4736 m |

**Note**
N/A indicates not applicable

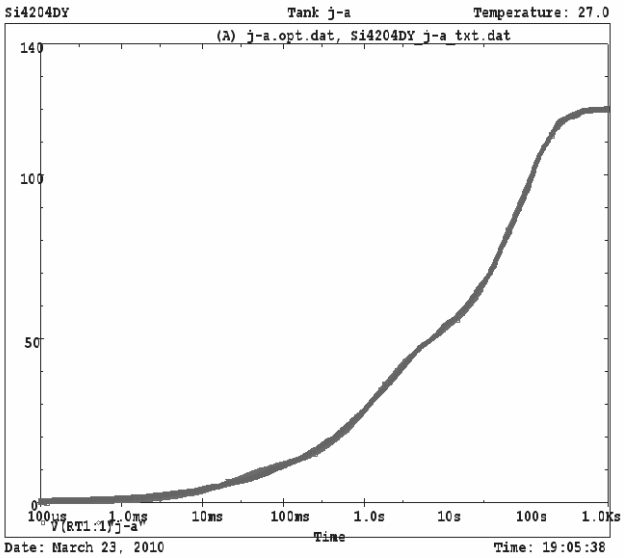
*This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.*

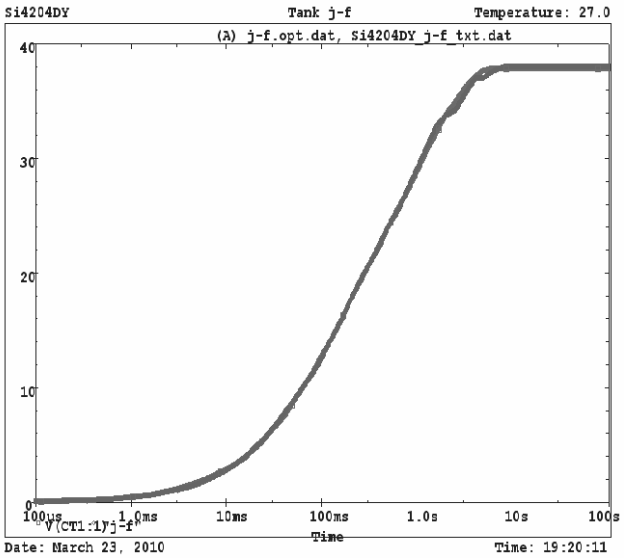
## R-C THERMAL MODEL FOR FILTER CONFIGURATION

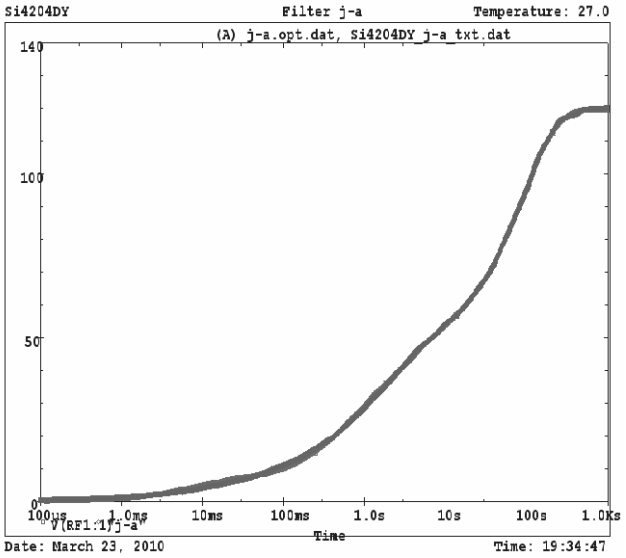


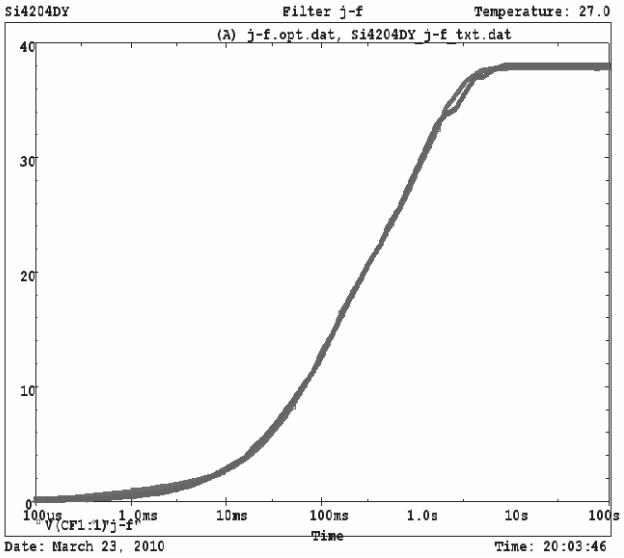

| R-C VALUES FOR FILTER CONFIGURATION | | | |
|---|---|---|---|
| THERMAL RESISTANCE (°C/W) | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RF1 | 6.3710 | N/A | 1.1666 |
| RF2 | 26.7613 | N/A | 17.7941 |
| RF3 | 19.8290 | N/A | 7.5156 |
| RF4 | 66.6294 | N/A | 11.3324 |
| THERMAL CAPACITANCE (Joules/°C) | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CF1 | 1.0603 m | N/A | 718.7540 u |
| CF2 | 20.6997 m | N/A | 4.4438 m |
| CF3 | 153.0634 m | N/A | 45.7759 m |
| CF4 | 1.1714 | N/A | 17.6255 m |

**Note**
N/A indicates not applicable


Si4204DY
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, Si4204DY_j-a_txt.dat
140
100
50
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)j-a
Time
Date: March 23, 2010
Time: 19:05:38


Si4204DY
Tank j-f
Temperature: 27.0
(A) j-f.opt.dat, Si4204DY_j-f_txt.dat
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1)j-f
Time
Date: March 23, 2010
Time: 19:20:11


Si4204DY
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, Si4204DY_j-a_txt.dat
140
100
50
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)j-a
Time
Date: March 23, 2010
Time: 19:34:47


Si4204DY
Filter j-f
Temperature: 27.0
(A) j-f.opt.dat, Si4204DY_j-f_txt.dat
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1)j-f
Time
Date: March 23, 2010
Time: 20:03:46