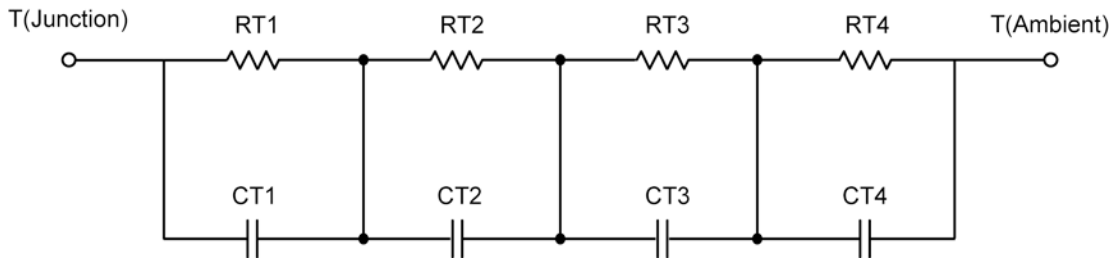
# R-C Thermal Model Parameters

## 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."

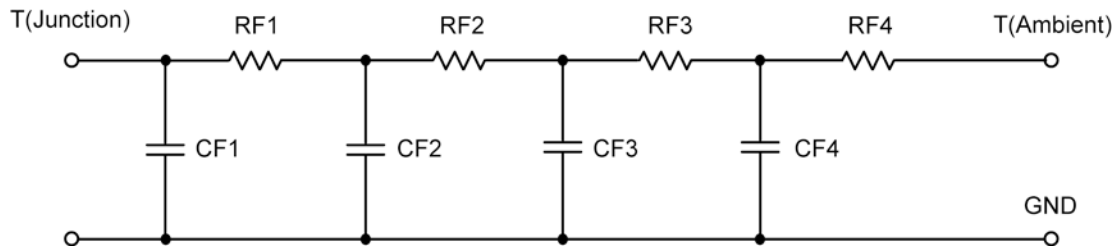
## R-C THERMAL MODEL FOR TANK CONFIGURATION




| R-C VALUES FOR TANK CONFIGURATION | | | |
|---|---|---|---|
| **Thermal Resistance (°C/W)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RT1 | 14.5763 | N/A | 2.8467 |
| RT2 | 4.3314 | N/A | 9.5981 |
| RT3 | 14.9344 | N/A | 7.2461 |
| RT4 | 51.1579 | N/A | 1.3091 |
| **Thermal Capacitance (Joules/°C)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CT1 | 175.4991 m | N/A | 920.8617 m |
| CT2 | 4.4678 m | N/A | 108.2899 m |
| CT3 | 50.3394 m | N/A | 14.1998 m |
| CT4 | 1.5960 | N/A | 1.3711 m |

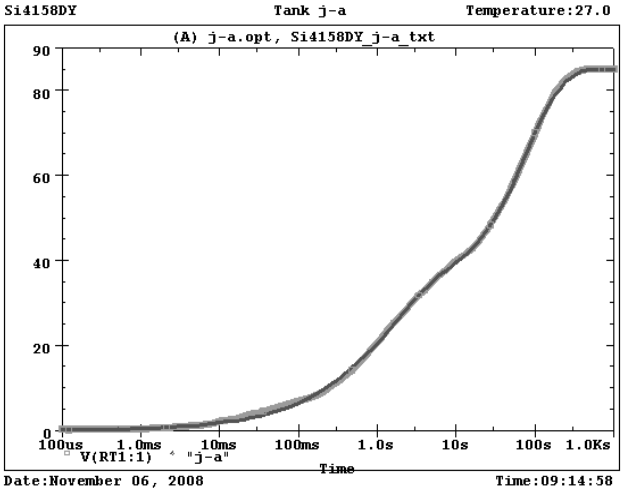
*This document is intended as a SPICE modeling guideline and does not constitute a commercial product data sheet. Designers should refer to the appropriate data sheet of the same number for guaranteed specification limits.*

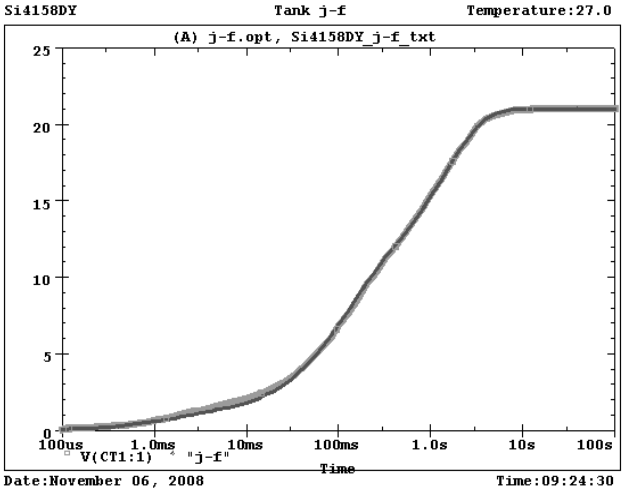
## R-C THERMAL MODEL FOR FILTER CONFIGURATION

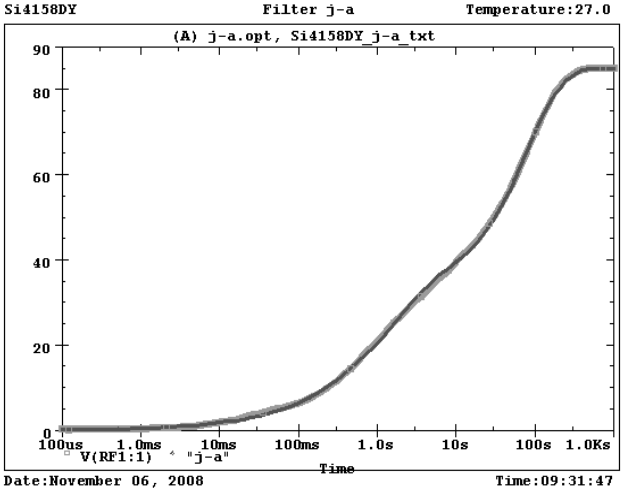


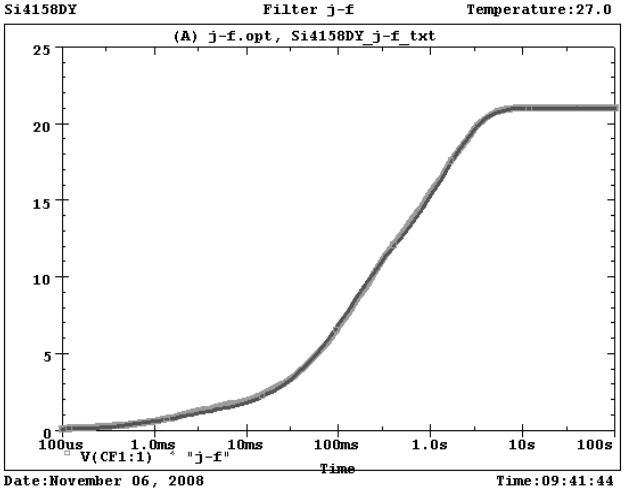

| R-C VALUES FOR FILTER CONFIGURATION | | | |
|---|---|---|---|
| **Thermal Resistance (°C/W)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RF1 | 4.5627 | N/A | 1.4839 |
| RF2 | 21.1903 | N/A | 9.6270 |
| RF3 | 14.9135 | N/A | 4.9738 |
| RF4 | 44.3335 | N/A | 4.9153 |
| **Thermal Capacitance (Joules/°C)** | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CF1 | 4.2357 m | N/A | 1.2971 m |
| CF2 | 27.4088 m | N/A | 11.4598 m |
| CF3 | 280.1964 m | N/A | 92.4171 m |
| CF4 | 1.5730 | N/A | 111.5716 m |

**Note**
NA indicates not applicable


Si4158DY
Tank j-a
Temperature:27.0
(A) j-a.opt, Si4158DY_j-a_txt
90
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"j-a"
Time
Date:November 06, 2008
Time:09:14:58


Si4158DY
Tank j-f
Temperature:27.0
(A) j-f.opt, Si4158DY_j-f_txt
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1)
"j-f"
Time
Date:November 06, 2008
Time:09:24:30


Si4158DY
Filter j-a
Temperature:27.0
(A) j-a.opt, Si4158DY_j-a_txt
90
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"j-a"
Time
Date:November 06, 2008
Time:09:31:47


Si4158DY
Filter j-f
Temperature:27.0
(A) j-f.opt, Si4158DY_j-f_txt
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1)
"j-f"
Time
Date:November 06, 2008
Time:09:41:44