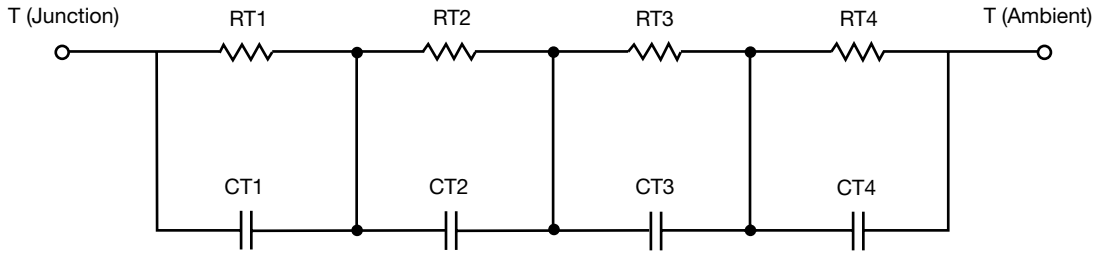
# R-C Thermal Model Parameters

## 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

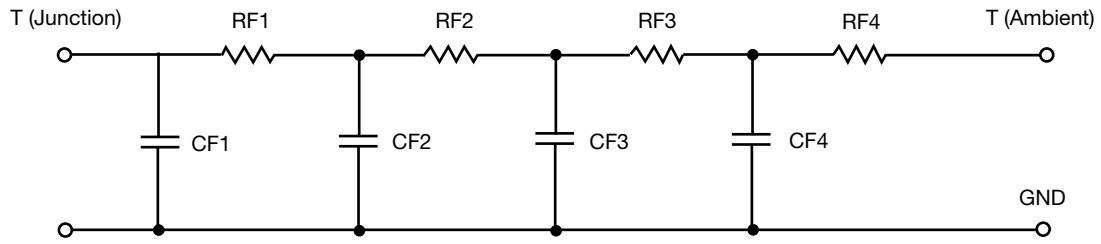



| R-C VALUES FOR TANK CONFIGURATION | | | |
|---|---|---|---|
| THERMAL RESISTANCE (°C/W) | | | |
| **Junction to** | **Ambient Full Copper (FC)** | **Case** | **Ambient Minimum Copper (MC)** |
| RT1 | 41.7716 | N/A | 53.5334 |
| RT2 | 9.8053 | N/A | 37.0723 |
| RT3 | 23.9352 | N/A | 58.5941 |
| RT4 | 24.4879 | N/A | 40.8002 |
| THERMAL CAPACITANCE (Joules/°C) | | | |
| **Junction to** | **Ambient Full Copper (FC)** | **Case** | **Ambient Minimum Copper (MC)** |
| CT1 | 268.7307 u | N/A | 831.5863 u |
| CT2 | 560.9886 m | N/A | 59.9225 m |
| CT3 | 4.6235 m | N/A | 4.9132 m |
| CT4 | 1.6627 | N/A | 593.8783 m |

**Note**
N/A indicates not applicable

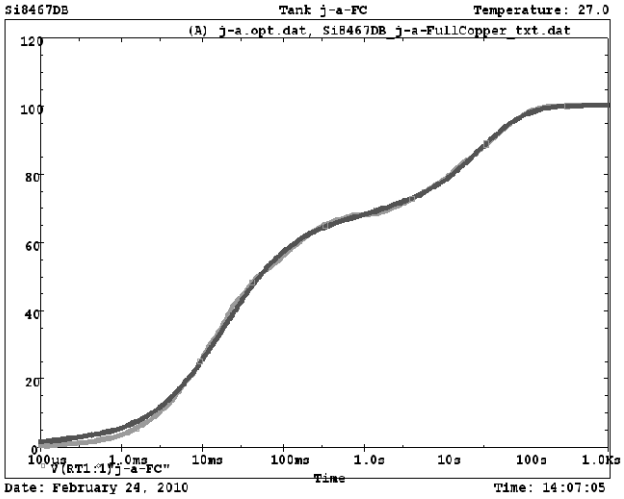
*This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.*

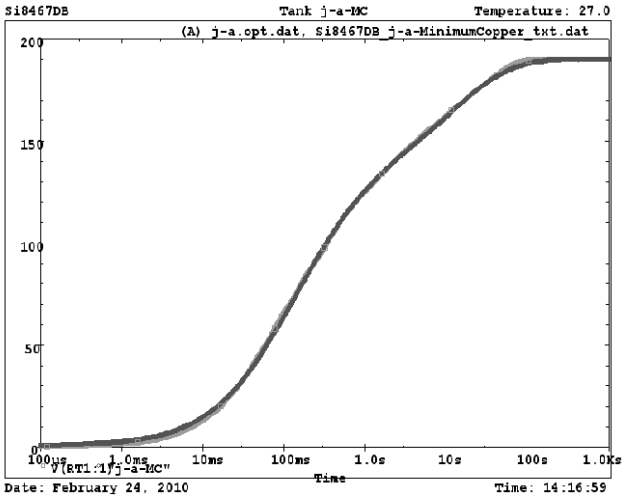
## R-C THERMAL MODEL FOR FILTER CONFIGURATION

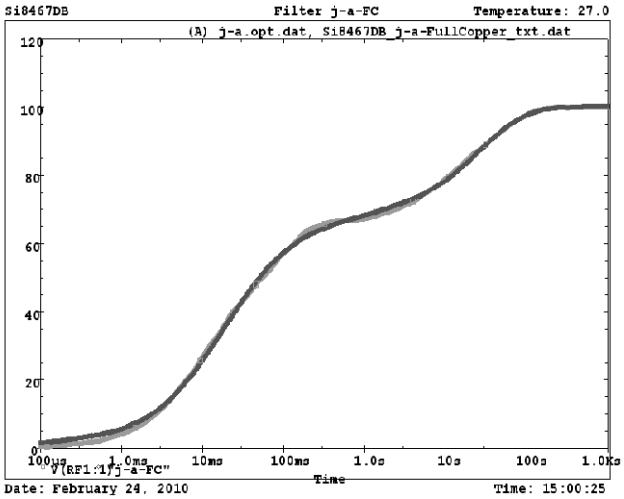


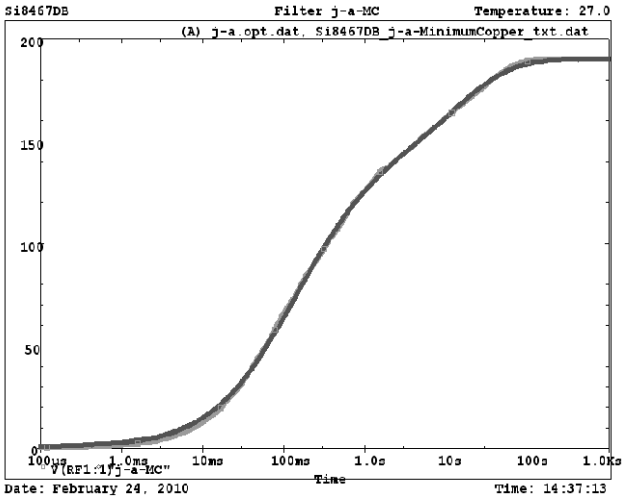

| R-C VALUES FOR FILTER CONFIGURATION | | | |
|---|---|---|---|
| THERMAL RESISTANCE (°C/W) | | | |
| **Junction to** | **Ambient Full Copper (FC)** | **Case** | **Ambient Minimum Copper (MC)** |
| RF1 | 39.7173 | N/A | 76.2752 |
| RF2 | 26.0422 | N/A | 54.0982 |
| RF3 | 21.2421 | N/A | 29.6710 |
| RF4 | 12.9610 | N/A | 29.9583 |
| THERMAL CAPACITANCE (Joules/°C) | | | |
| **Junction to** | **Ambient Full Copper (FC)** | **Case** | **Ambient Minimum Copper (MC)** |
| CF1 | 225.6878 u | N/A | 726.5842 u |
| CF2 | 2.5206 m | N/A | 6.5736 m |
| CF3 | 475.7535 m | N/A | 105.7789 m |
| CF4 | 2.9455 | N/A | 724.3197 m |

**Note**
N/A indicates not applicable


Si8467DB
Tank j-a-FC
Temperature: 27.0
(A) j-a.opt.dat, Si8467DB_j-a-FullCopper_txt.dat
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)j-a-FC"
Time
Date: February 24, 2010
Time: 14:07:05


Si8467DB
Tank j-a-MC
Temperature: 27.0
(A) j-a.opt.dat, Si8467DB_j-a-MinimumCopper_txt.dat
200
150
100
50
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)j-a-MC"
Time
Date: February 24, 2010
Time: 14:16:59


Si8467DB
Filter j-a-FC
Temperature: 27.0
(A) j-a.opt.dat, Si8467DB_j-a-FullCopper_txt.dat
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)j-a-FC"
Time
Date: February 24, 2010
Time: 15:00:25


Si8467DB
Filter j-a-MC
Temperature: 27.0
(A) j-a.opt.dat, Si8467DB_j-a-MinimumCopper_txt.dat
200
150
100
50
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)j-a-MC"
Time
Date: February 24, 2010
Time: 14:37:13