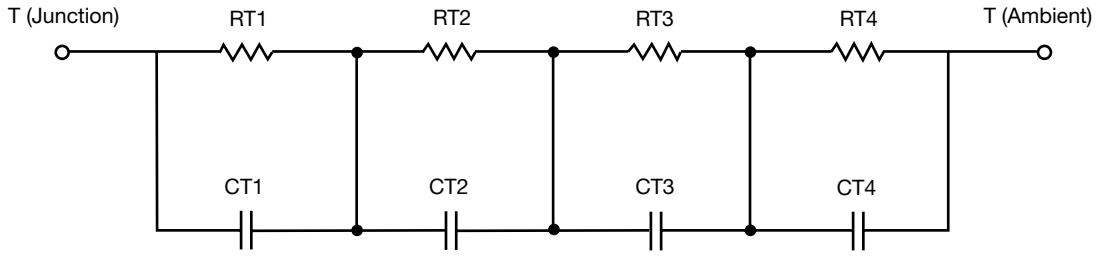
# R-C Thermal Model Parameters

## 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



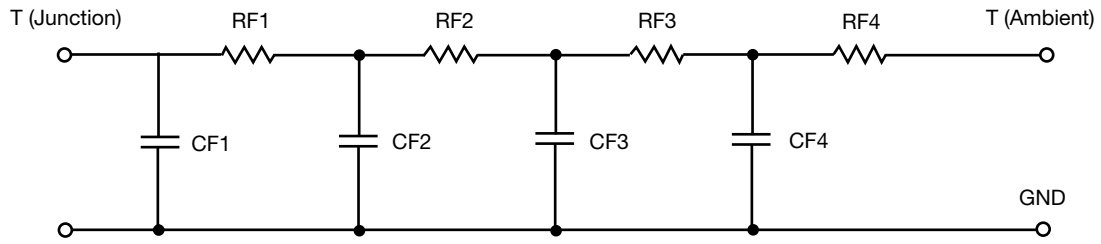

| R-C VALUES FOR TANK CONFIGURATION | | | |
|---|---|---|---|
| THERMAL RESISTANCE (°C/W) | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RT1 | 56.3957 | N/A | 20.9140 |
| RT2 | 33.3195 | N/A | 12.9620 |
| RT3 | 25.6825 | N/A | 5.2000 |
| RT4 | 9.6023 | N/A | 5.9240 |
| THERMAL CAPACITANCE (Joules/°C) | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CT1 | 1.2534 | N/A | 2.9764 m |
| CT2 | 2.4797 m | N/A | 1.3829 m |
| CT3 | 36.8004 m | N/A | 153.2290 u |
| CT4 | 305.4960 u | N/A | 185.2213 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.*

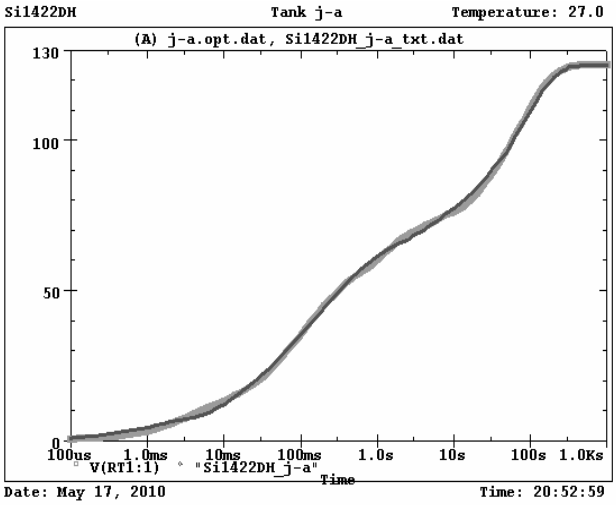
## R-C THERMAL MODEL FOR FILTER CONFIGURATION

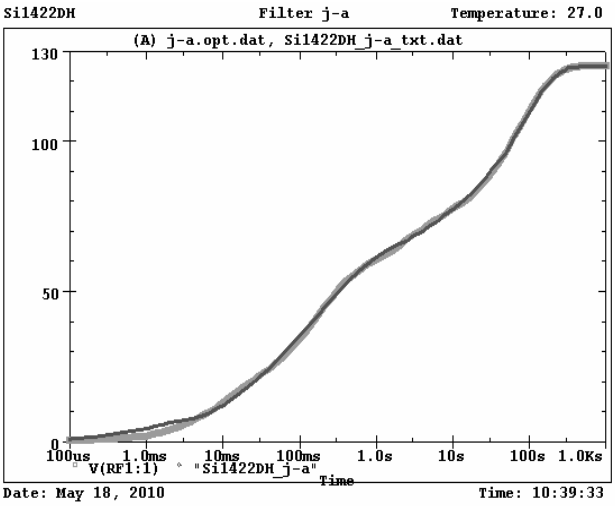


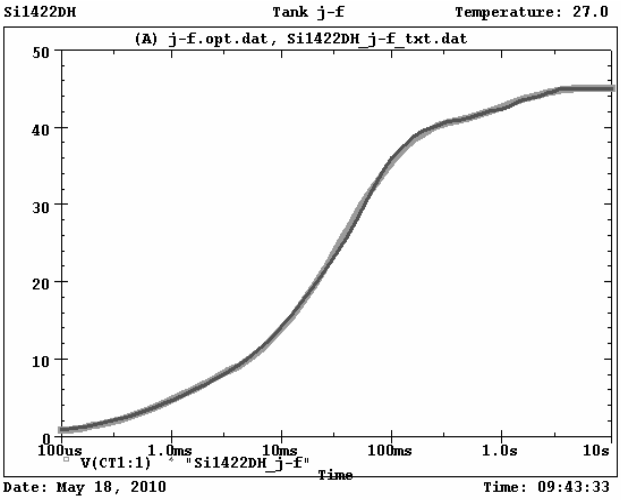

| R-C VALUES FOR FILTER CONFIGURATION | | | |
|---|---|---|---|
| THERMAL RESISTANCE (°C/W) | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| RF1 | 20.1067 | N/A | 9.7686 |
| RF2 | 35.7439 | N/A | 29.3397 |
| RF3 | 18.3049 | N/A | 4.6142 |
| RF4 | 50.8445 | N/A | 1.2775 |
| THERMAL CAPACITANCE (Joules/°C) | | | |
| **Junction to** | **Ambient** | **Case** | **Foot** |
| CF1 | 471.2701 u | N/A | 171.9346 u |
| CF2 | 4.0092 m | N/A | 1.3145 m |
| CF3 | 117.5512 m | N/A | 152.4186 m |
| CF4 | 1.3760 | N/A | 584.9003 m |

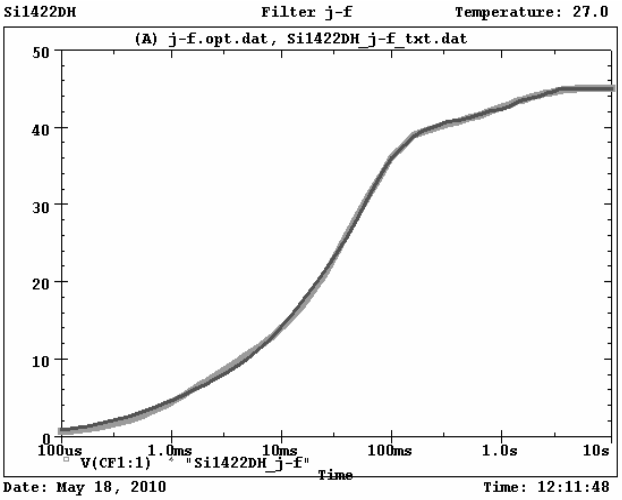
**Note**

- N/A indicates not applicable


Si1422DH
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, Si1422DH_j-a_txt.dat
130
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "Si1422DH_j-a"
Time
Date: May 17, 2010
Time: 20:52:59


Si1422DH
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, Si1422DH_j-a_txt.dat
130
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "Si1422DH_j-a"
Time
Date: May 18, 2010
Time: 10:39:33


Si1422DH
Tank j-f
Temperature: 27.0
(A) j-f.opt.dat, Si1422DH_j-f_txt.dat
50
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CT1:1) "Si1422DH_j-f"
Time
Date: May 18, 2010
Time: 09:43:33


Si1422DH
Filter j-f
Temperature: 27.0
(A) j-f.opt.dat, Si1422DH_j-f_txt.dat
50
40
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s
V(CF1:1) "Si1422DH_j-f"
Time
Date: May 18, 2010
Time: 12:11:48