

## R-C Thermal Model Parameters

### DESCRIPTION

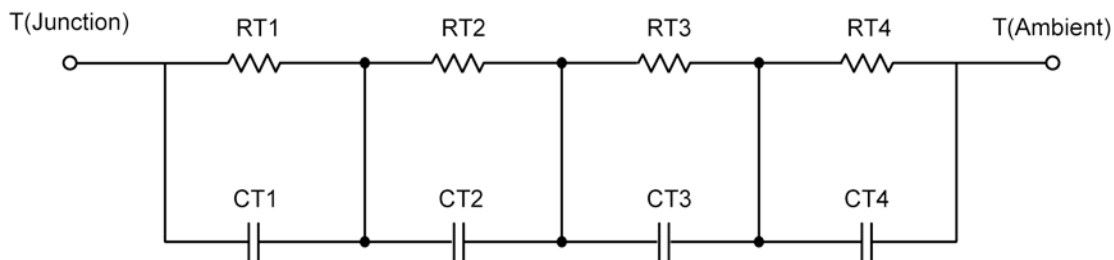
The parametric values in the R-C thermal model have been derived using curve-fitting techniques. These techniques are described in "[A Simple Method of Generating Thermal Models for a Power MOSFET](#)"[1]. When implemented in P-Spice, these values have matching characteristic curves to the Single Pulse 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



| <b>R-C VALUES FOR TANK CONFIGURATION</b> |             |             |      |            |            |
|--|-------------|-------------|------|------------|------------|
| Thermal Resistance (°C/W)                |             |             |      |            |            |
| Junction to                              | Ambient Ch1 | Ambient Ch2 | Foot | Case Ch1   | Case Ch2   |
| RT1                                      | 41.4243     | 41.4243     | N/A  | 1.3351     | 1.3351     |
| RT2                                      | 11.4403     | 11.4403     | N/A  | 1.8075     | 1.8075     |
| RT3                                      | 22.9359     | 22.9359     | N/A  | 1.0962     | 1.0962     |
| RT4                                      | 9.1995      | 9.1995      | N/A  | 1.7612     | 1.7612     |
| Thermal Capacitance (Joules/°C)          |             |             |      |            |            |
| Junction to                              | Ambient Ch1 | Ambient Ch2 | Foot | Case Ch1   | Case Ch2   |
| CT1                                      | 1.2670      | 1.2670      | N/A  | 606.9099 u | 606.9099 u |
| CT2                                      | 27.2755 m   | 27.2755 m   | N/A  | 1.7384 m   | 1.7384 m   |
| CT3                                      | 63.0297 m   | 63.0297 m   | N/A  | 595.2064 m | 595.2064 m |
| CT4                                      | 3.4661 m    | 3.4661 m    | N/A  | 9.5745 m   | 9.5745 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 ( $^{\circ}\text{C}/\text{W}$ ) |             |             |      |            |            |
|--|-------------|-------------|------|------------|------------|
| Junction to  | Ambient Ch1 | Ambient Ch2 | Foot | Case Ch1   | Case Ch2   |
| RF1  | 13.7303     | 13.7303     | N/A  | 1.9101     | 1.9101     |
| RF2  | 19.2584     | 19.2584     | N/A  | 1.9750     | 1.9750     |
| RF3  | 13.1877     | 13.1877     | N/A  | 1.1256     | 1.1256     |
| RF4  | 38.8236     | 38.8236     | N/A  | 989.3000 m | 989.3000 m |
| Thermal Capacitance (Joules/ $^{\circ}\text{C}$ )  |             |             |      |            |            |
| Junction to  | Ambient Ch1 | Ambient Ch2 | Foot | Case Ch1   | Case Ch2   |
| CF1  | 3.0472 m    | 3.0472 m    | N/A  | 391.7345 u | 391.7345 u |
| CF2  | 21.9540 m   | 21.9540 m   | N/A  | 1.1952 m   | 1.1952 m   |
| CF3  | 73.2238 m   | 73.2238 m   | N/A  | 13.5400 m  | 13.5400 m  |
| CF4  | 1.2134      | 1.2134      | N/A  | 707.1096 m | 707.1096 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

