

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



| R-C VALUES FOR TANK CONFIGURATION | | | | | |
|--|-------------|-------------|------|------------|------------|
| Thermal Resistance (°C/W) | | | | | |
| Junction to | Ambient Ch1 | Ambient Ch2 | Case | Foot Ch1 | Foot Ch2 |
| RT1 | 6.9442 | 6.9442 | N/A | 11.6583 | 11.6583 |
| RT2 | 30.0404 | 30.0404 | N/A | 3.6731 | 3.6731 |
| RT3 | 25.8463 | 25.8463 | N/A | 8.9996 | 8.9996 |
| RT4 | 47.1691 | 46.1691 | N/A | 19.6690 | 19.6690 |
| Thermal Capacitance (Joules/°C) | | | | | |
| Junction to | Ambient Ch1 | Ambient Ch2 | Case | Foot Ch1 | Foot Ch2 |
| CT1 | 386.3454 u | 386.3454 u | N/A | 2.2210 m | 2.2210 m |
| CT2 | 57.6804 m | 57.6804 m | N/A | 170.7109 u | 170.7109 u |
| CT3 | 6.9241 m | 6.9241 m | N/A | 180.0765 m | 180.0765 m |
| CT4 | 1.1640 | 1.1640 | N/A | 11.0677 m | 11.0677 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 | Case | Foot Ch1 | Foot Ch2 |
| RF1 | 10.1112 | 10.1112 | N/A | 4.0004 | 4.0004 |
| RF2 | 32.1645 | 32.1645 | N/A | 16.0635 | 16.0635 |
| RF3 | 25.8678 | 25.8678 | N/A | 16.7291 | 16.7291 |
| RF4 | 41.8565 | 41.8565 | N/A | 7.2070 | 7.2070 |
| Thermal Capacitance (Joules/ $^{\circ}\text{C}$) | | | | | |
| Junction to | Ambient Ch1 | Ambient Ch2 | Case | Foot Ch1 | Foot Ch2 |
| CF1 | 598.9369 u | 598.9369 u | N/A | 114.1659 u | 114.1659 u |
| CF2 | 7.0199 m | 7.0199 m | N/A | 1.6842 m | 1.6842 m |
| CF3 | 77.6140 m | 77.6140 m | N/A | 10.3273 m | 10.3273 m |
| CF4 | 1.2853 | 1.2853 | N/A | 172.1413 m | 172.1413 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



