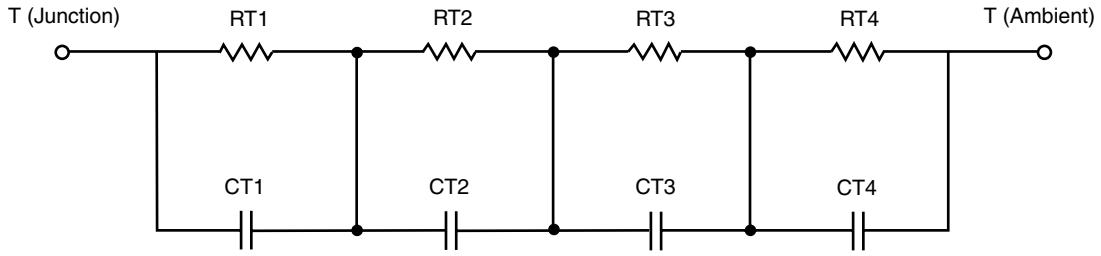
R-C Thermal Model Parameters

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

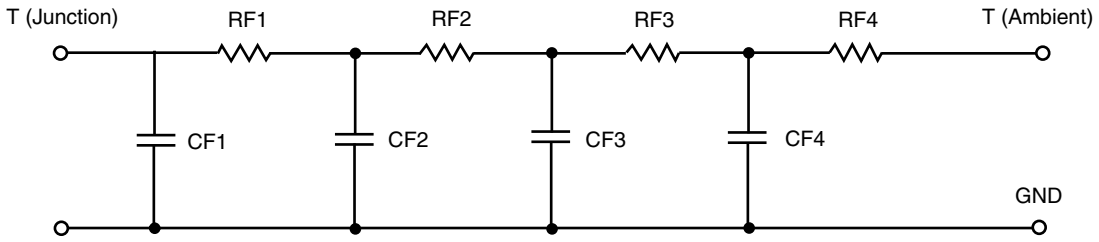


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	12.1615	474.6711 m	N/A
RT2	16.3733	281.8562 m	N/A
RT3	4.2506	544.2870 m	N/A
RT4	37.2576	1.7004	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	69.6690 m	705.5484 u	N/A
CT2	1.9481	87.3678 m	N/A
CT3	3.3962 m	9.7498 m	N/A
CT4	2.2136	4.1923 m	N/A

Note
N/A indicates not applicable

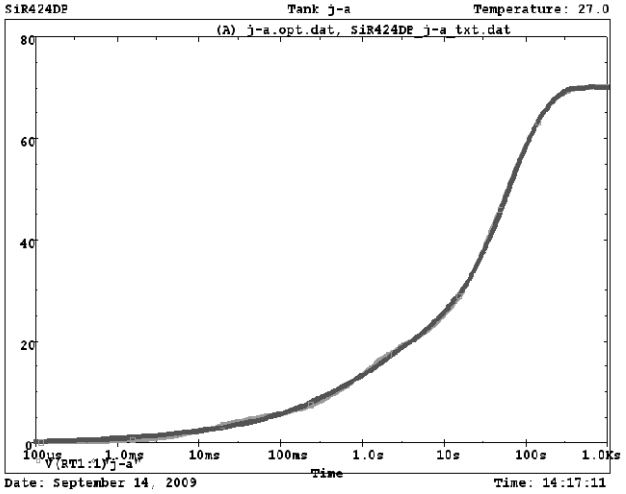
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

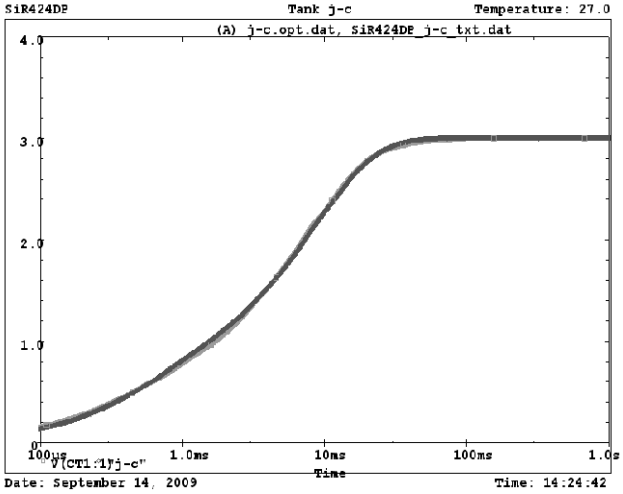
R-C THERMAL MODEL FOR FILTER CONFIGURATION

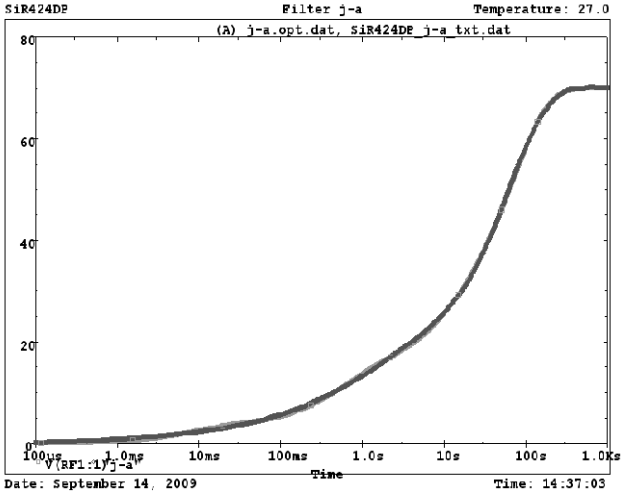


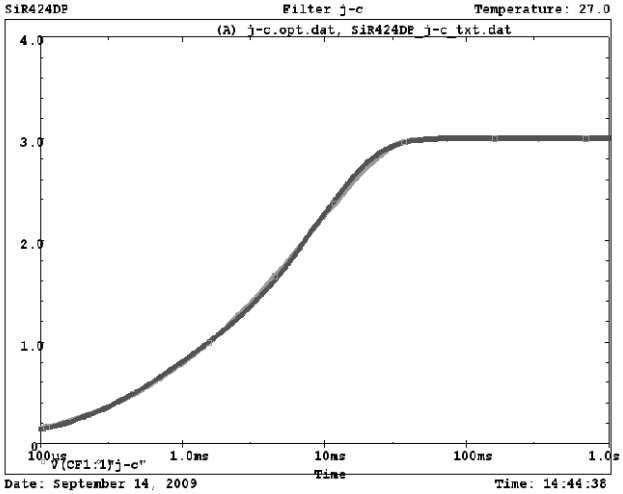
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	3.7138	703.7223 m	N/A
RF2	11.5920	1.0663	N/A
RF3	17.6393	674.2435 m	N/A
RF4	36.9398	559.4822 m	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	2.1969 m	603.0452 u	N/A
CF2	43.7302 m	1.5371 m	N/A
CF3	568.2210 m	4.7703 m	N/A
CF4	1.1676	2.3109 m	N/A

Note
N/A indicates not applicable


SiR424DP
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, SiR424DP_j-a_txt.dat
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)/j-a
Time
Date: September 14, 2009
Time: 14:17:11


SiR424DP
Tank j-c
Temperature: 27.0
(A) j-c.opt.dat, SiR424DP_j-c_txt.dat
4.0
3.0
2.0
1.0
0
100us
1.0ms
10ms
100ms
1.0s
V(CT1:1)/j-c"
Time
Date: September 14, 2009
Time: 14:24:42


SiR424DP
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, SiR424DP_j-a_txt.dat
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)/j-a"
Time
Date: September 14, 2009
Time: 14:37:03


SiR424DP
Filter j-c
Temperature: 27.0
(A) j-c.opt.dat, SiR424DP_j-c_txt.dat
4.0
3.0
2.0
1.0
0
100us
1.0ms
10ms
100ms
1.0s
V(CF1:1)/j-c"
Time
Date: September 14, 2009
Time: 14:44:38