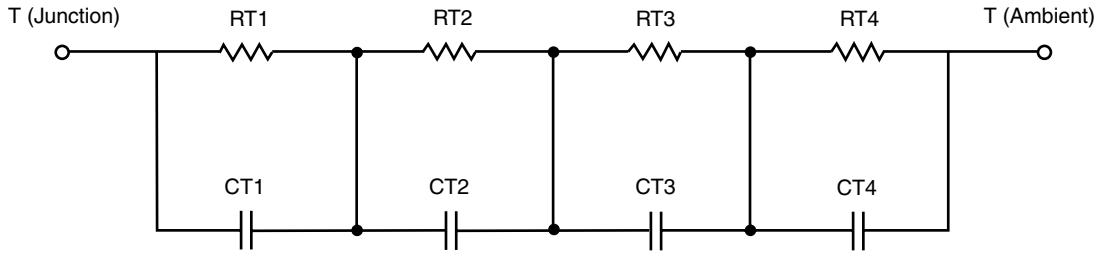
R-C Thermal Model Parameters

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

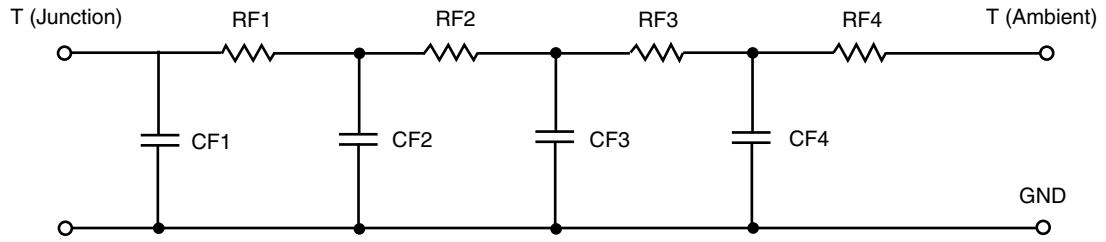


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	11.6073	2.0544	N/A
RT2	5.5097	1.3706	N/A
RT3	17.8868	317.4000 m	N/A
RT4	44.9962	2.7576	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	218.0706 m	1.1988 m	N/A
CT2	440.3491 u	194.0091 u	N/A
CT3	6.6171 m	34.1528 m	N/A
CT4	1.7910	1.0497 m	N/A

Note
N/A indicates not applicable

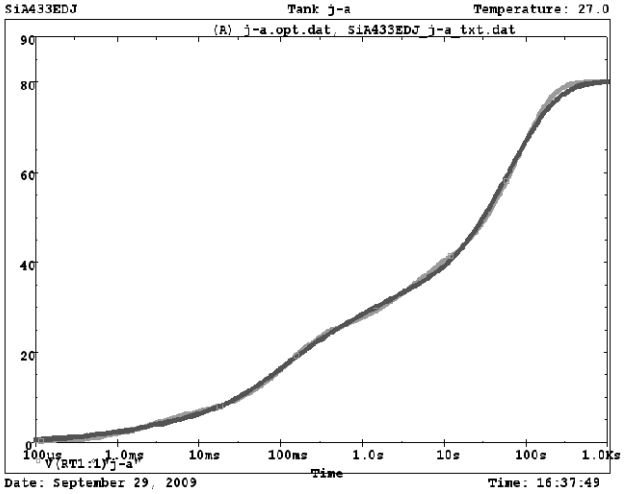
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

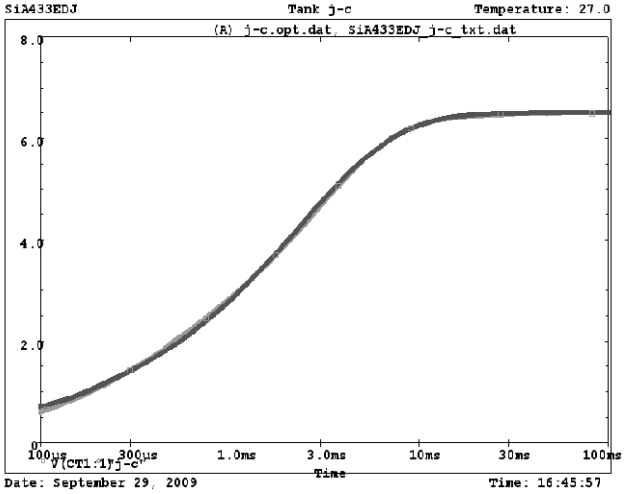
R-C THERMAL MODEL FOR FILTER CONFIGURATION

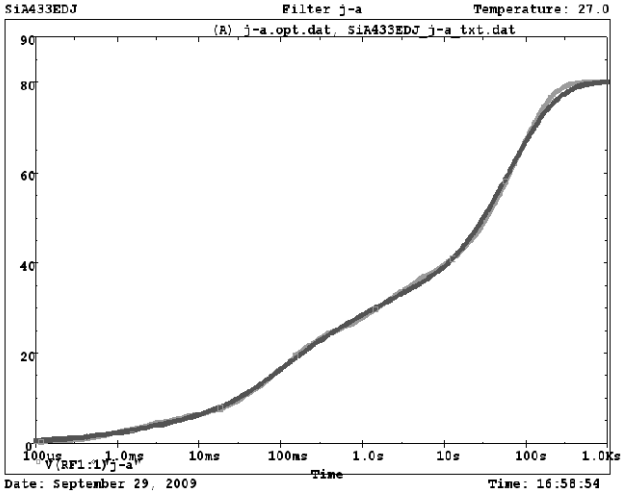


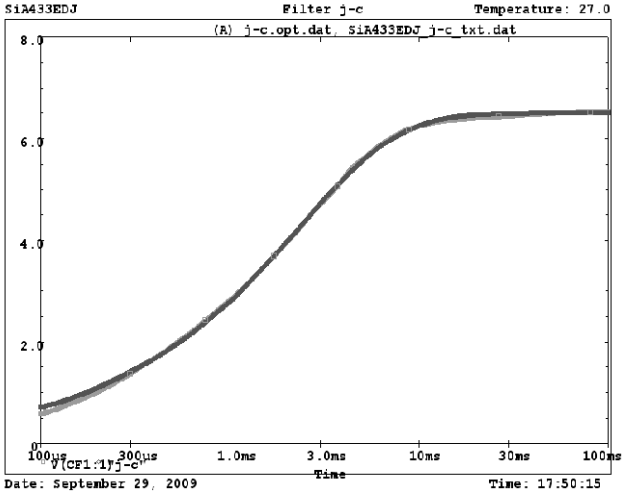
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	5.1725	2.3962	N/A
RF2	17.9817	3.9071	N/A
RF3	12.9513	209.3406 m	N/A
RF4	43.8945	21.9411 m	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	307.7798 u	152.3448 u	N/A
CF2	5.0133 m	474.6317 u	N/A
CF3	130.8577 m	104.9064 m	N/A
CF4	1.6377	199.9917 m	N/A

Note
N/A indicates not applicable


SiA433EDJ
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, SiA433EDJ_j-a_txt.dat
90
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)/j-a
Time
Date: September 29, 2009
Time: 16:37:49


SiA433EDJ
Tank j-c
Temperature: 27.0
(A) j-c.opt.dat, SiA433EDJ_j-c_txt.dat
8.0
6.0
4.0
2.0
0
100µs
300µs
1.0ms
3.0ms
10ms
30ms
100ms
V(CT1:1)/j-c
Time
Date: September 29, 2009
Time: 16:45:57


SiA433EDJ
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, SiA433EDJ_j-a_txt.dat
90
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)/j-a
Time
Date: September 29, 2009
Time: 16:58:54


SiA433EDJ
Filter j-c
Temperature: 27.0
(A) j-c.opt.dat, SiA433EDJ_j-c_txt.dat
8.0
6.0
4.0
2.0
0
100µs
300µs
1.0ms
3.0ms
10ms
30ms
100ms
V(CF1:1)/j-c
Time
Date: September 29, 2009
Time: 17:50:15