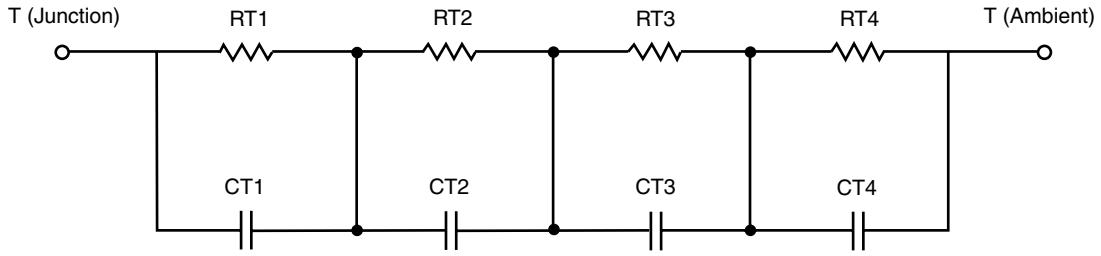
R-C Thermal Model Parameters

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

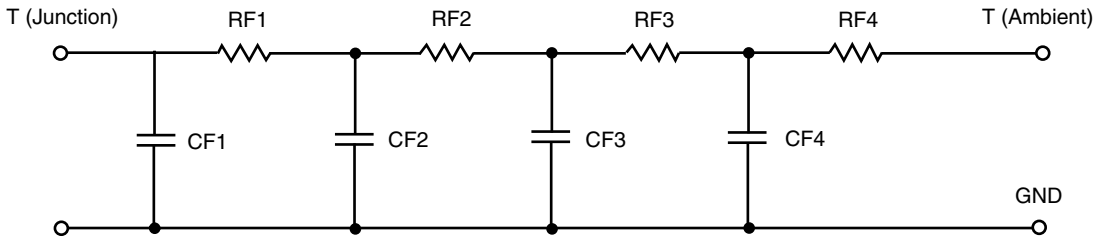


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	5.8682	1.0249	N/A
RT2	16.4116	980.2257 m	N/A
RT3	11.4715	3.3510	N/A
RT4	46.2487	1.1779	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	470.1880 u	218.4500 u	N/A
CT2	6.8808 m	560.0599 u	N/A
CT3	152.4062 m	4.2476 m	N/A
CT4	1.5882	6.9147 m	N/A

Note
N/A indicates not applicable

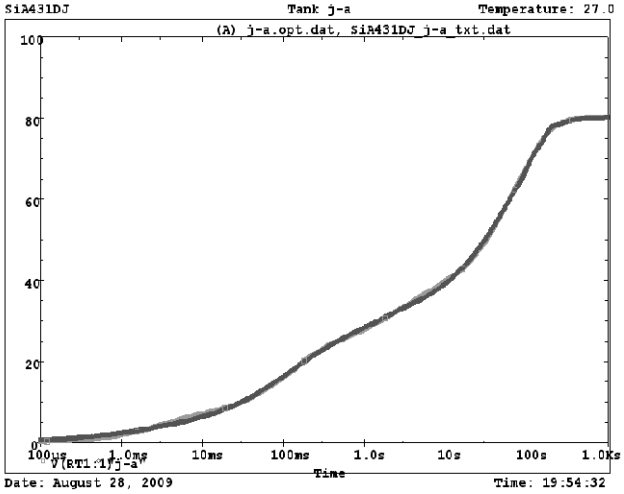
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

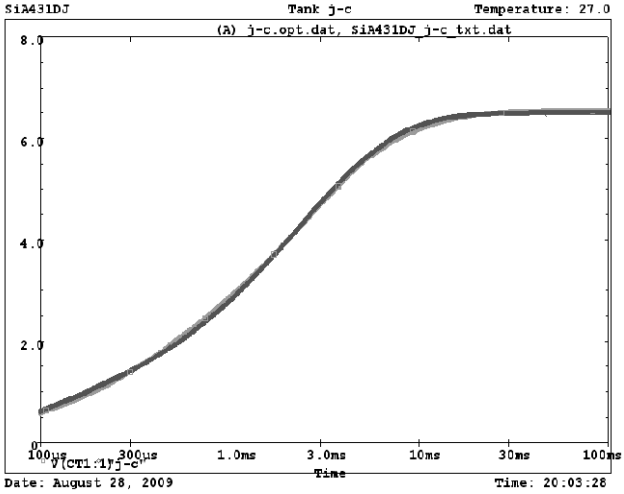
R-C THERMAL MODEL FOR FILTER CONFIGURATION

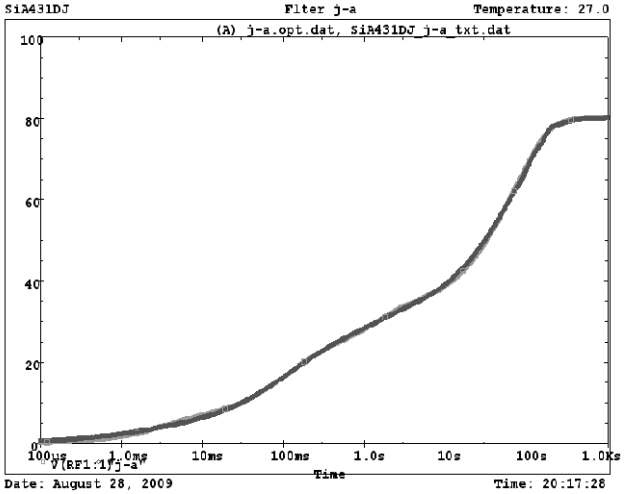


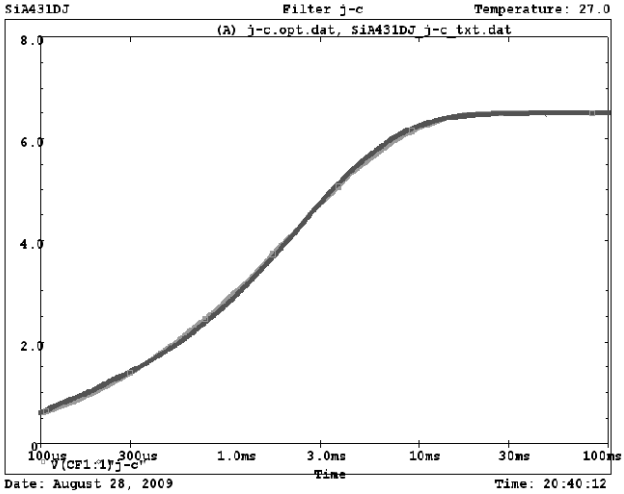
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	6.7252	2.2174	N/A
RF2	15.7322	2.2926	N/A
RF3	11.6591	352.9234 m	N/A
RF4	45.8835	974.7191 m	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	477.0735 u	145.8982 u	N/A
CF2	5.7707 m	348.3403 u	N/A
CF3	92.5329 m	1.6644 m	N/A
CF4	1.4290	1.1764 m	N/A

Note
N/A indicates not applicable


SiA431DJ
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, SiA431DJ_j-a_txt.dat
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)/j-a
Time
Date: August 28, 2009
Time: 19:54:32


SiA431DJ
Tank j-c
Temperature: 27.0
(A) j-c.opt.dat, SiA431DJ_j-c_txt.dat
8.0
6.0
4.0
2.0
0
100us
300us
1.0ms
3.0ms
10ms
30ms
100ms
V(CT1:1)/j-c
Time
Date: August 28, 2009
Time: 20:03:28


SiA431DJ
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, SiA431DJ_j-a_txt.dat
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)/j-a
Time
Date: August 28, 2009
Time: 20:17:28


SiA431DJ
Filter j-c
Temperature: 27.0
(A) j-c.opt.dat, SiA431DJ_j-c_txt.dat
8.0
6.0
4.0
2.0
0
100us
300us
1.0ms
3.0ms
10ms
30ms
100ms
V(CF1:1)/j-c
Time
Date: August 28, 2009
Time: 20:40:12