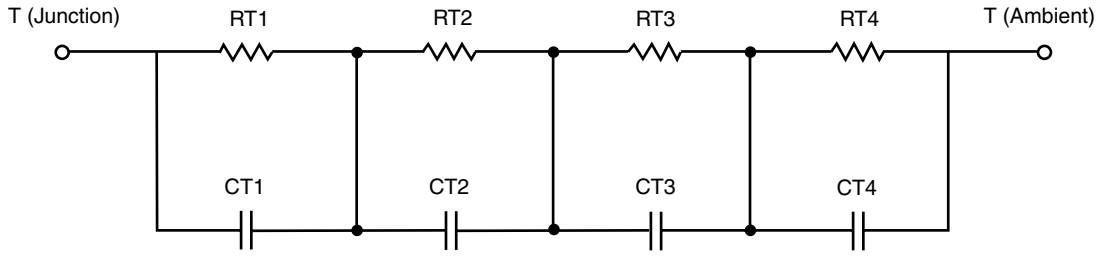
R-C Thermal Model Parameters

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

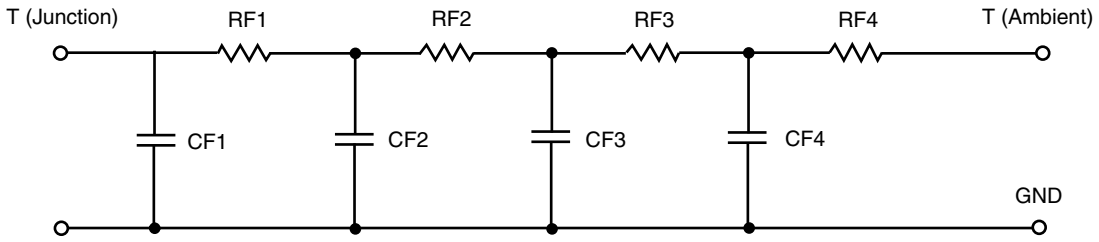


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	27.3986	1.1278 m	N/A
RT2	13.8449	51.4366 m	N/A
RT3	14.7742	4.9136	N/A
RT4	48.9841	4.5126	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	4.4995 m	5.4337 u	N/A
CT2	250.7954 u	1.1487 m	N/A
CT3	317.1987 m	65.6663 u	N/A
CT4	1.6789	333.4860 u	N/A

Note
N/A indicates not applicable

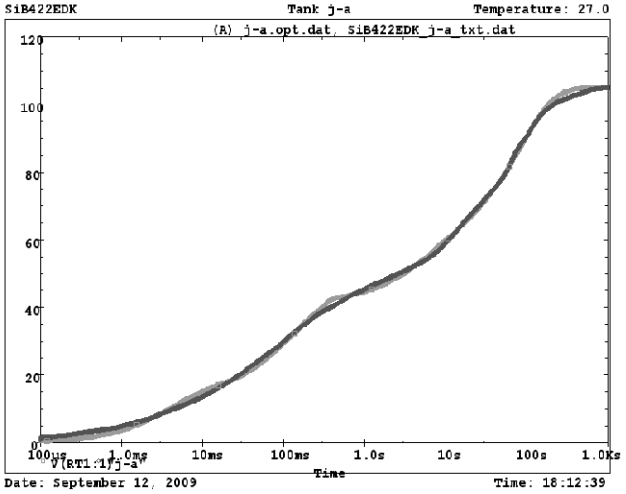
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

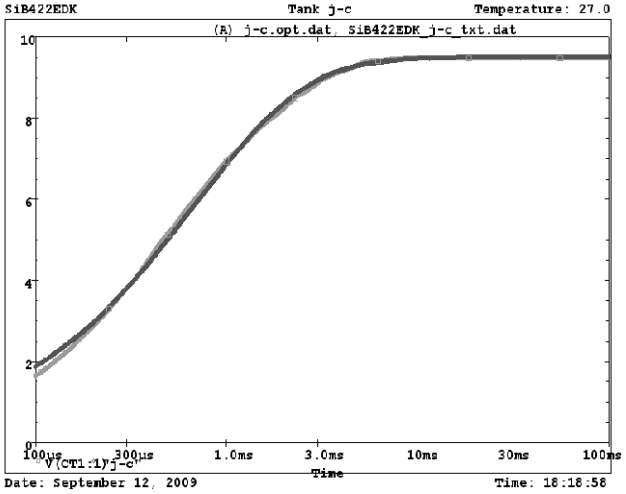
R-C THERMAL MODEL FOR FILTER CONFIGURATION

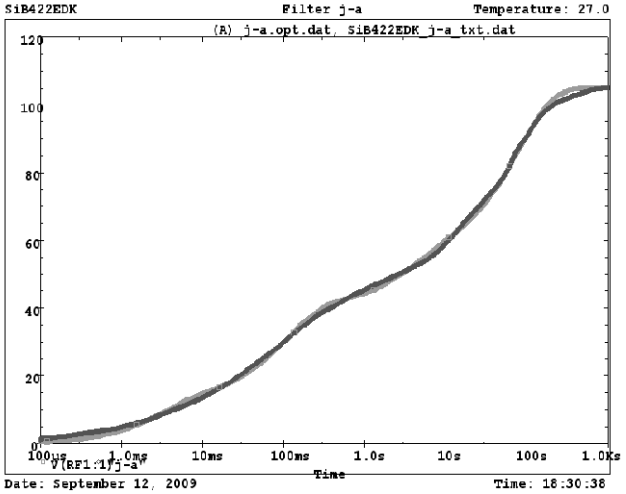


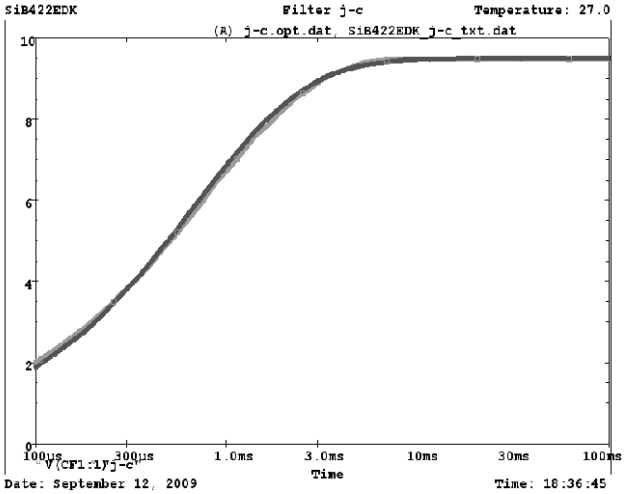
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	14.2399	2.7405	N/A
RF2	26.7362	4.8557	N/A
RF3	18.7649	148.0019 m	N/A
RF4	45.2590	1.7443	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	217.8029 u	32.0110 u	N/A
CF2	3.6830 m	77.9058 u	N/A
CF3	208.5384 m	542.5505 u	N/A
CF4	1.5514	15.9981 u	N/A

Note
N/A indicates not applicable


SiB422EDK
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, SiB422EDK_j-a_txt.dat
120
100
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)j-a
Time
Date: September 12, 2009
Time: 18:12:39


SiB422EDK
Tank j-c
Temperature: 27.0
(A) j-c.opt.dat, SiB422EDK_j-c_txt.dat
10
8
6
4
2
0
100µs
300µs
1.0ms
3.0ms
10ms
30ms
100ms
V(CT1:1)j-c
Time
Date: September 12, 2009
Time: 18:18:58


SiB422EDK
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, SiB422EDK_j-a_txt.dat
120
100
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)j-a
Time
Date: September 12, 2009
Time: 18:30:38


SiB422EDK
Filter j-c
Temperature: 27.0
(A) j-c.opt.dat, SiB422EDK_j-c_txt.dat
10
8
6
4
2
0
100µs
300µs
1.0ms
3.0ms
10ms
30ms
100ms
V(CF1:1)j-c
Time
Date: September 12, 2009
Time: 18:36:45