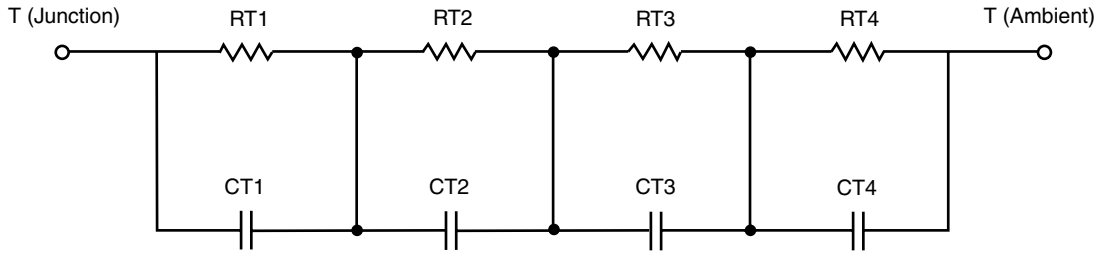
R-C Thermal Model Parameters

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

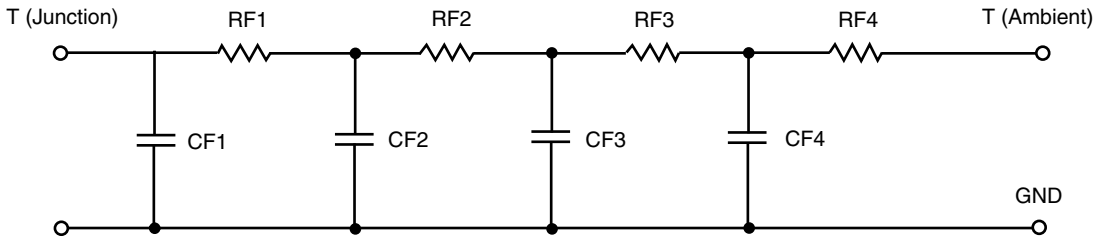


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	7.7642	N/A	6.9603
RT2	42.8284	N/A	16.1965
RT3	29.4621	N/A	18.9526
RT4	49.9453	N/A	27.8906
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	646.6272 u	N/A	518.4919 u
CT2	3.8976 m	N/A	5.5598 m
CT3	48.4779 m	N/A	58.4466 m
CT4	1.7739	N/A	13.7265 m

Note
N/A indicates not applicable

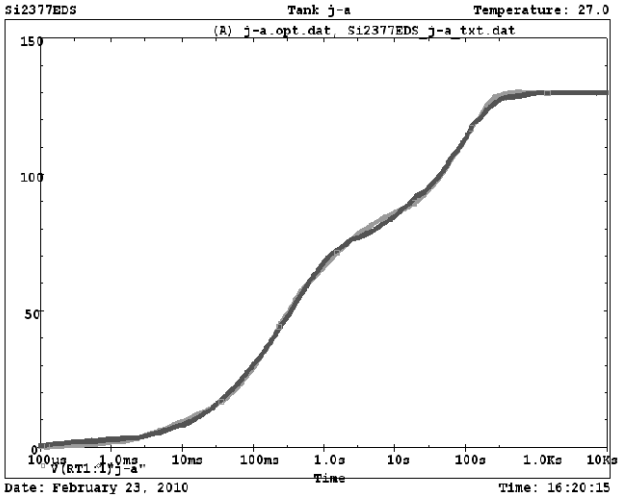
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

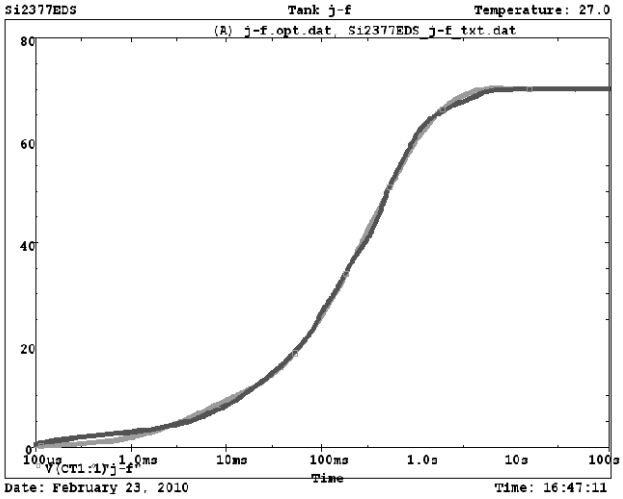
R-C THERMAL MODEL FOR FILTER CONFIGURATION

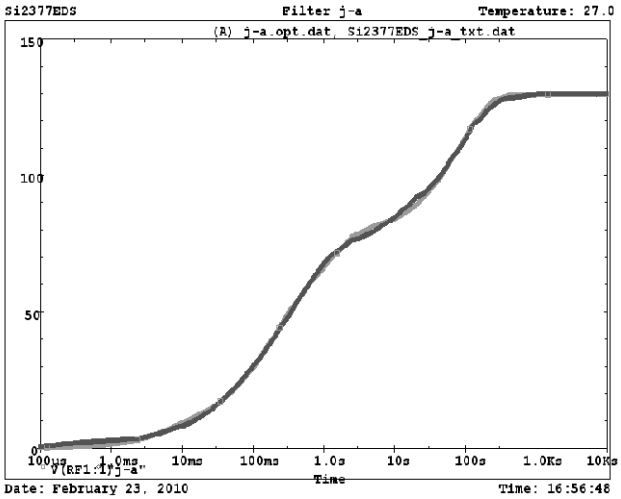


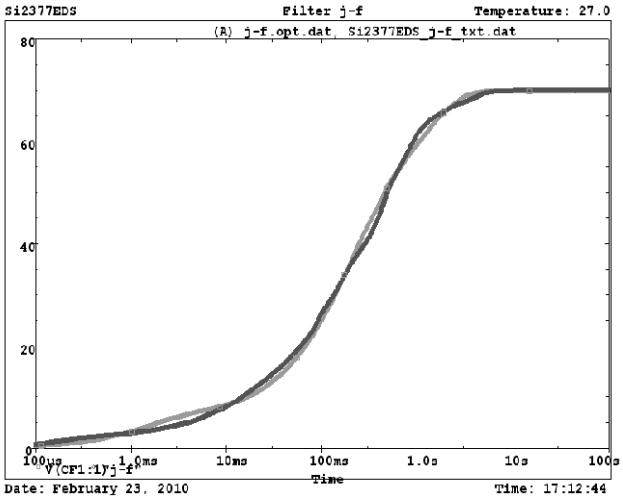
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	12.0985	N/A	6.7684
RF2	42.1387	N/A	42.9200
RF3	25.5586	N/A	6.0652
RF4	49.6526	N/A	14.0957
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	641.6996 u	N/A	220.4506 u
CF2	3.0731 m	N/A	3.8210 m
CF3	35.4774 m	N/A	27.5313 m
CF4	1.6093	N/A	30.1735 m

Note
N/A indicates not applicable


Si2377EDS
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, Si2377EDS_j-a_txt.dat
150
100
50
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
10Ks
V(RT1:1)/j-a
Time
Date: February 23, 2010
Time: 16:20:15


Si2377EDS
Tank j-f
Temperature: 27.0
(A) j-f.opt.dat, Si2377EDS_j-f_txt.dat
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1)/j-f
Time
Date: February 23, 2010
Time: 16:47:11


Si2377EDS
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, Si2377EDS_j-a_txt.dat
150
100
50
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
10Ks
V(RF1:1)/j-a
Time
Date: February 23, 2010
Time: 16:56:48


Si2377EDS
Filter j-f
Temperature: 27.0
(A) j-f.opt.dat, Si2377EDS_j-f_txt.dat
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1)/j-f
Time
Date: February 23, 2010
Time: 17:12:44