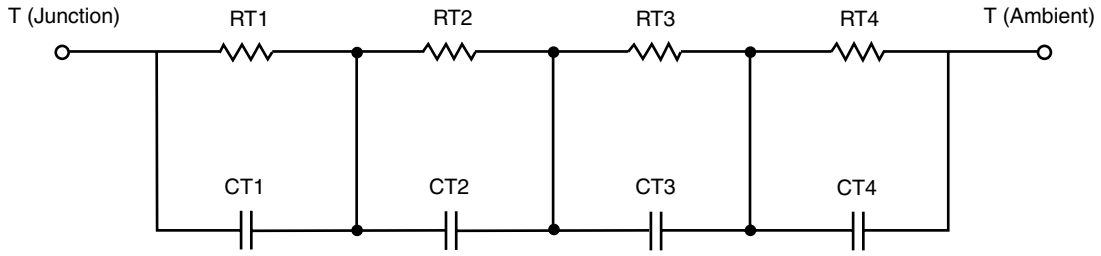
R-C Thermal Model Parameters

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

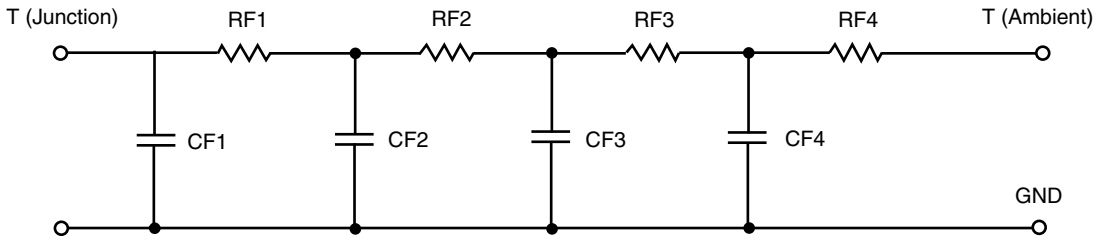


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	14.6069	N/A	3.5653
RT2	5.2515	N/A	10.7587
RT3	52.5882	N/A	1.8164
RT4	22.2677	N/A	3.8596
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	3.3585 m	N/A	813.8292 u
CT2	660.4486 u	N/A	2.6061 m
CT3	1.2672	N/A	317.1266 m
CT4	36.2949 m	N/A	21.6815 m

Note
N/A indicates not applicable

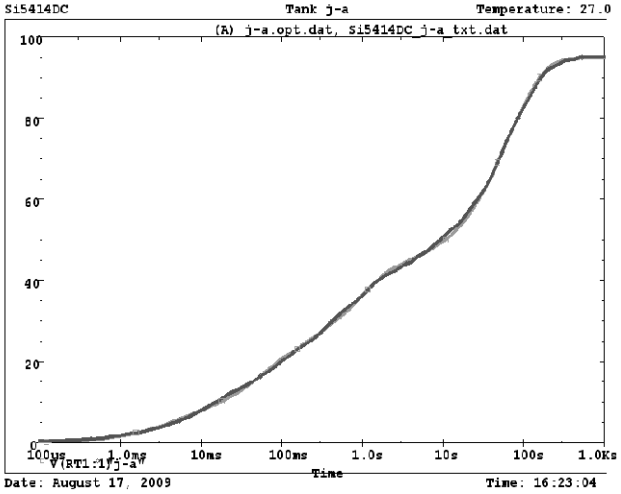
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

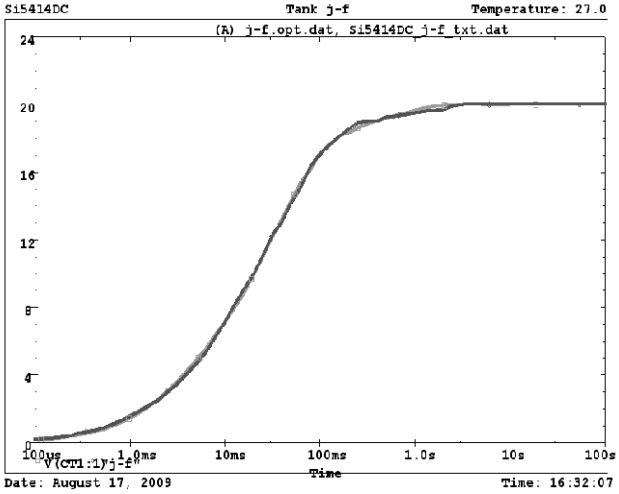
R-C THERMAL MODEL FOR FILTER CONFIGURATION

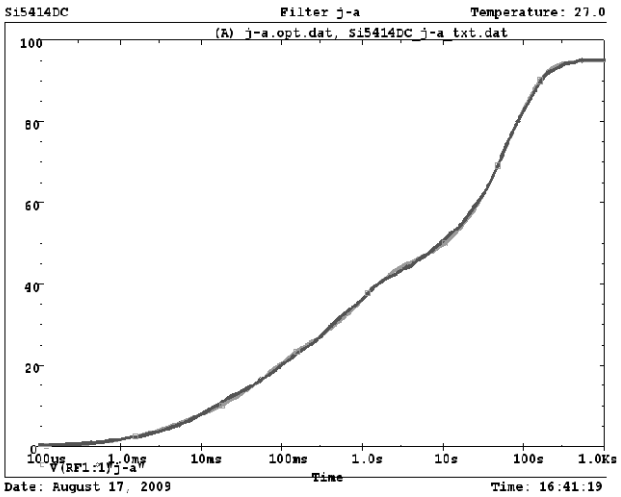


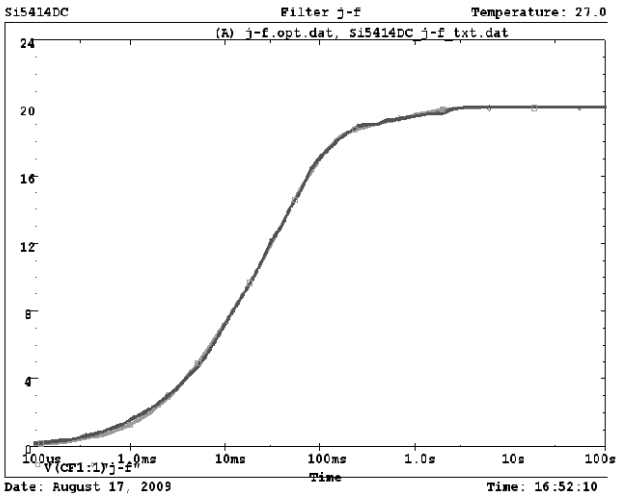
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	7.2691	N/A	8.2425
RF2	15.9979	N/A	7.9316
RF3	20.6375	N/A	2.4415
RF4	50.8537	N/A	1.3844
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	511.3698 u	N/A	710.3537 u
CF2	2.9334 m	N/A	3.0841 m
CF3	39.0221 m	N/A	9.4373 m
CF4	1.2805	N/A	487.6336 m

Note
N/A indicates not applicable


Si5414DC
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, Si5414DC_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 17, 2009
Time: 16:23:04


Si5414DC
Tank j-f
Temperature: 27.0
(A) j-f.opt.dat, Si5414DC_j-f_txt.dat
24
20
16
12
8
4
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1)/j-f
Time
Date: August 17, 2009
Time: 16:32:07


Si5414DC
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, Si5414DC_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 17, 2009
Time: 16:41:19


Si5414DC
Filter j-f
Temperature: 27.0
(A) j-f.opt.dat, Si5414DC_j-f_txt.dat
24
20
16
12
8
4
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1)/j-f
Time
Date: August 17, 2009
Time: 16:52:10