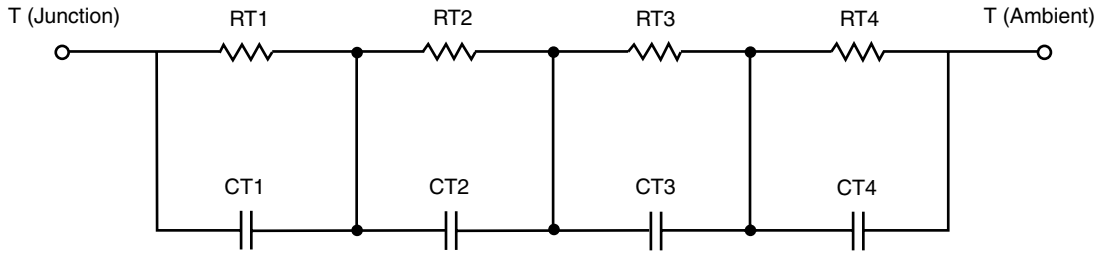
R-C Thermal Model Parameters

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

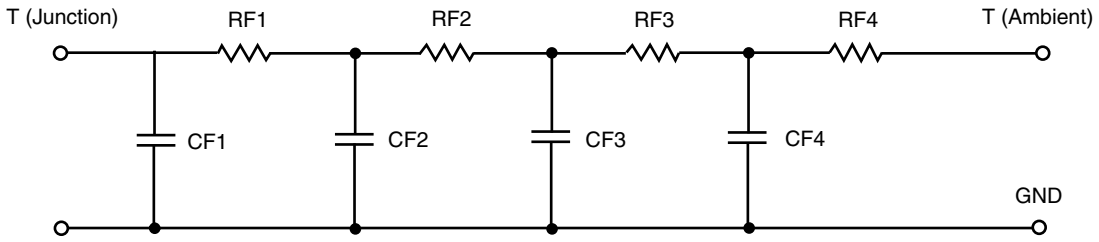


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	3.1061	646.9348 m	N/A
RT2	18.4956	537.7833 m	N/A
RT3	12.4906	1.0905	N/A
RT4	35.9466	323.8870 m	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	7.9909 m	31.9459 m	N/A
CT2	1.9843	806.9630 u	N/A
CT3	111.1324 m	6.7322 m	N/A
CT4	2.4944	61.2175 m	N/A

Note
N/A indicates not applicable

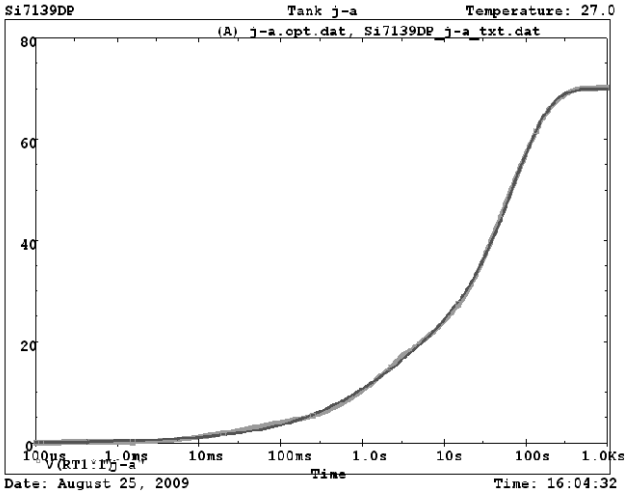
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

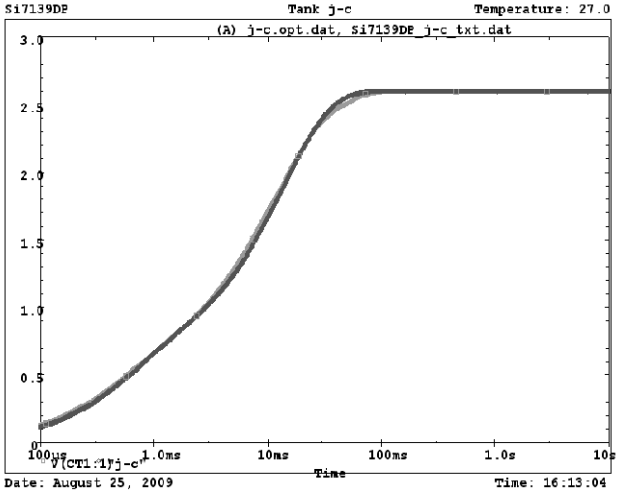
R-C THERMAL MODEL FOR FILTER CONFIGURATION

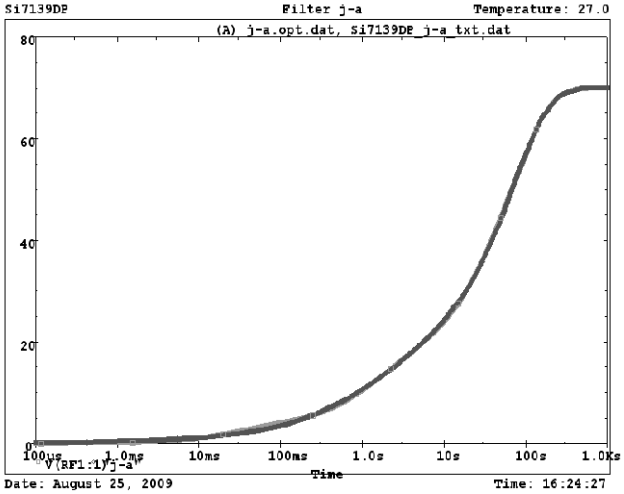


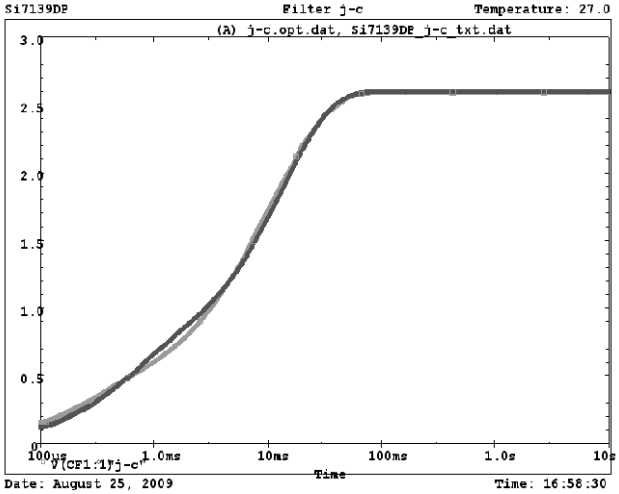
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	3.8875	512.9978 m	N/A
RF2	12.8758	1.5495	N/A
RF3	24.5685	88.1253 m	N/A
RF4	28.5542	443.6327 m	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	8.0024 m	545.7903 u	N/A
CF2	94.2256 m	3.9115 m	N/A
CF3	770.3576 m	9.9176 m	N/A
CF4	1.4362	10.9348 m	N/A

Note
N/A indicates not applicable


Si7139DP
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, Si7139DP_j-a_txt.dat
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)j-a
Time
Date: August 25, 2009
Time: 16:04:32


Si7139DP
Tank j-c
Temperature: 27.0
(A) j-c.opt.dat, Si7139DP_j-c_txt.dat
3.0
2.5
2.0
1.5
1.0
0.5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)j-c
Time
Date: August 25, 2009
Time: 16:13:04


Si7139DP
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, Si7139DP_j-a_txt.dat
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)j-a
Time
Date: August 25, 2009
Time: 16:24:27


Si7139DP
Filter j-c
Temperature: 27.0
(A) j-c.opt.dat, Si7139DP_j-c_txt.dat
3.0
2.5
2.0
1.5
1.0
0.5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1)j-c
Time
Date: August 25, 2009
Time: 16:58:30