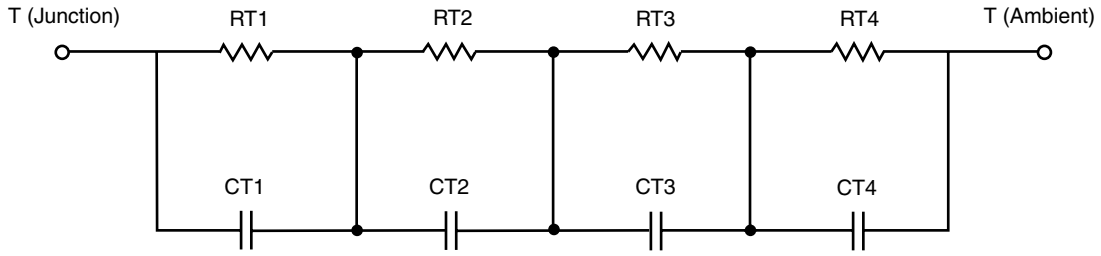
R-C Thermal Model Parameters

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

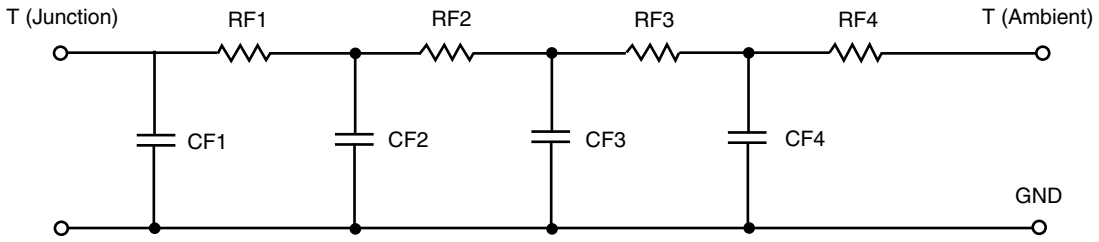


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	6.7437	43.9707 m	N/A
RT2	15.5118	1.2169	N/A
RT3	16.8096	321.0293 m	N/A
RT4	45.5344	1.1181	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	4.7677 m	24.4063 m	N/A
CT2	48.7862 m	1.2080 m	N/A
CT3	420.4853 m	2.1222	N/A
CT4	849.3727 m	12.5919 m	N/A

Note
N/A indicates not applicable

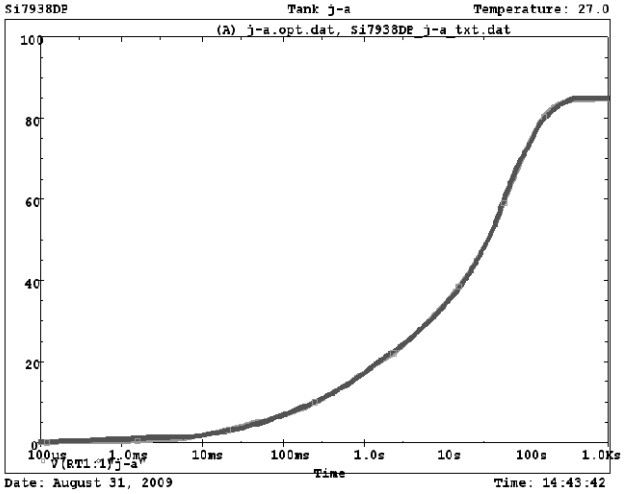
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

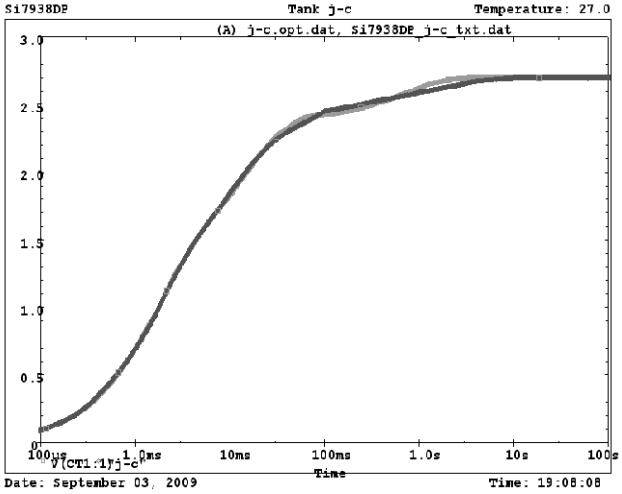
R-C THERMAL MODEL FOR FILTER CONFIGURATION

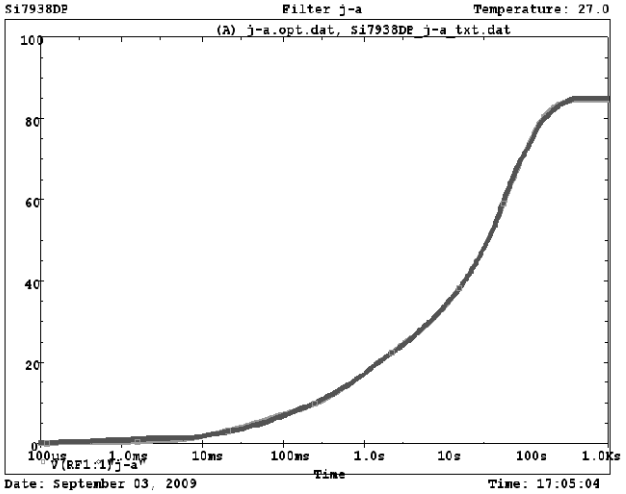


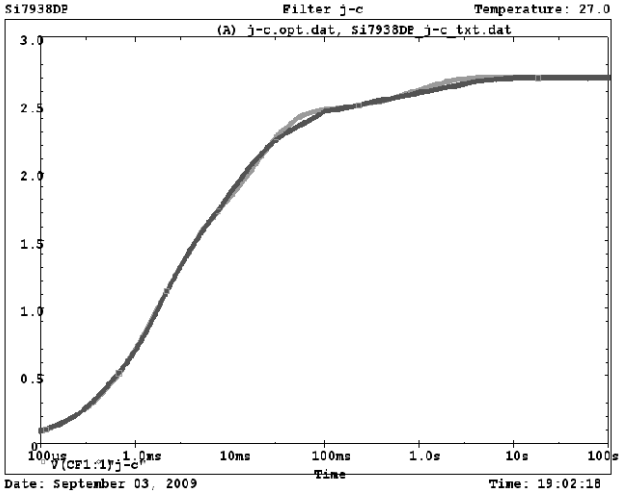
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	3.8804	1.5045	N/A
RF2	10.4091	123.6809 m	N/A
RF3	19.6239	819.1907 m	N/A
RF4	31.0866	252.6284 m	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	13.0526 m	1.0552 m	N/A
CF2	78.5055 m	14.4672 m	N/A
CF3	718.0263 m	2.9659 m	N/A
CF4	1.3336	3.5436	N/A

Note
N/A indicates not applicable


Si7938DP
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, Si7938DP_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 31, 2009
Time: 14:43:42


Si7938DP
Tank j-c
Temperature: 27.0
(A) j-c.opt.dat, Si7938DP_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
100s
V(CT1:1)/j-c
Time
Date: September 03, 2009
Time: 19:08:08


Si7938DP
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, Si7938DP_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: September 03, 2009
Time: 17:05:04


Si7938DP
Filter j-c
Temperature: 27.0
(A) j-c.opt.dat, Si7938DP_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
100s
V(CF1:1)/j-c
Time
Date: September 03, 2009
Time: 19:02:18