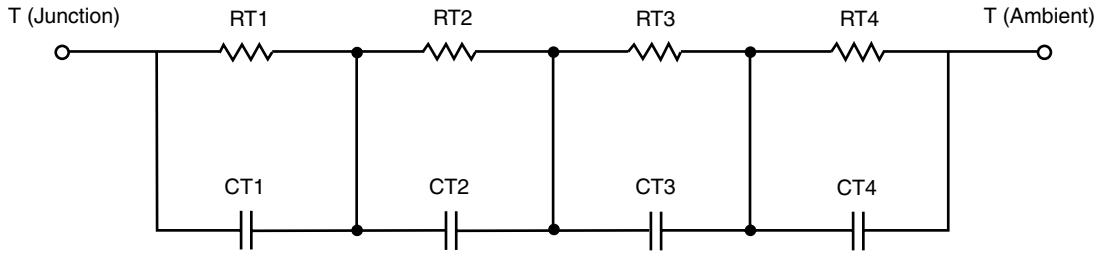
R-C Thermal Model Parameters

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

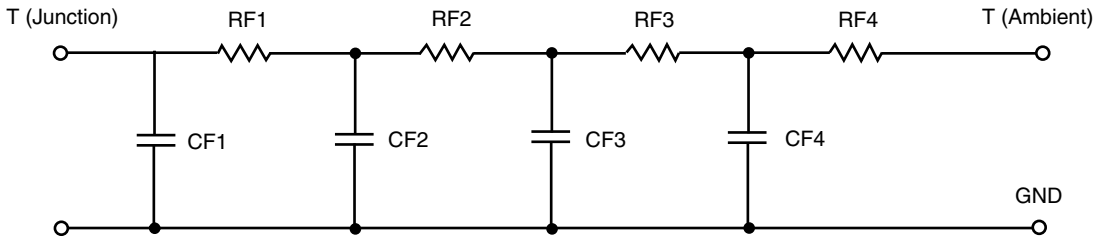


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	14.2032	2.0828	N/A
RT2	18.3665	5.4710	N/A
RT3	5.4087	344.3345 m	N/A
RT4	32.0115	128.1886 m	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	68.4629 m	807.8529 u	N/A
CT2	2.3358	10.2412 m	N/A
CT3	2.8222 m	3.3755	N/A
CT4	2.3304	60.2258 u	N/A

Note
N/A indicates not applicable

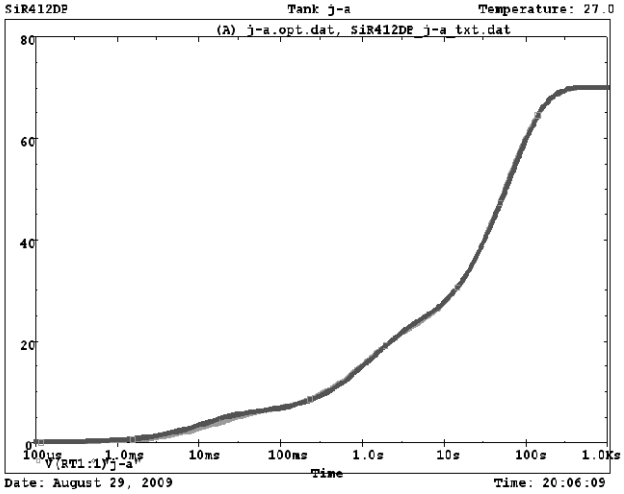
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

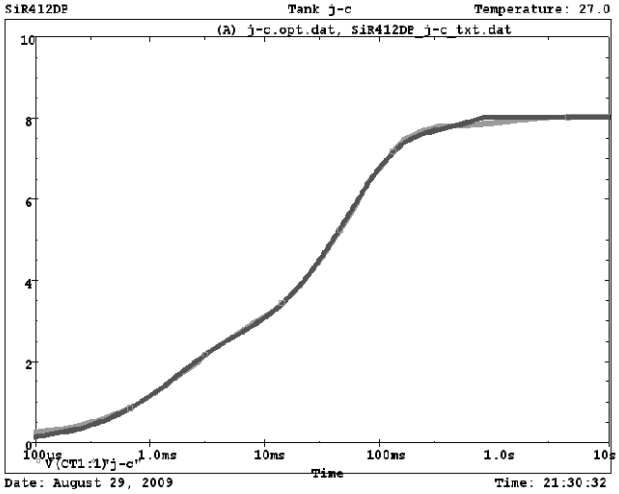
R-C THERMAL MODEL FOR FILTER CONFIGURATION

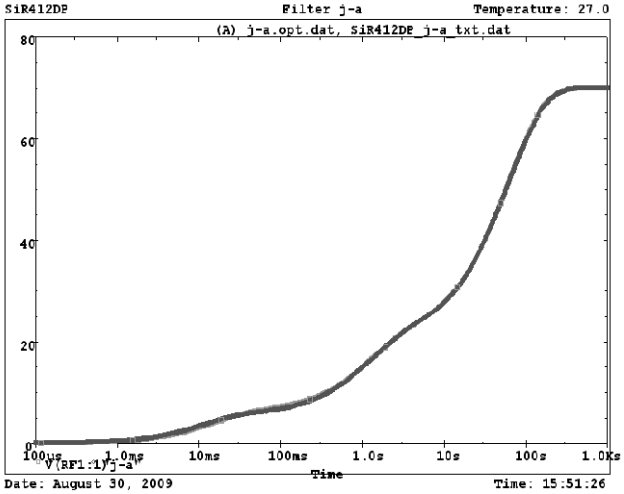


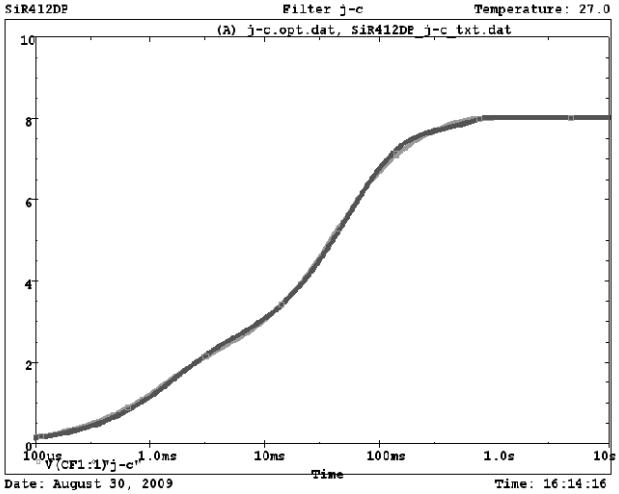
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	6.3408	2.1874	N/A
RF2	15.7101	1.7962	N/A
RF3	23.5841	2.8402	N/A
RF4	24.2886	1.1785	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	2.2990 m	555.4353 u	N/A
CF2	72.9963 m	7.4504 m	N/A
CF3	1.1029	184.5275 u	N/A
CF4	504.2183 m	122.4060 m	N/A

Note
N/A indicates not applicable


SiR412DP
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, SiR412DP_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 29, 2009
Time: 20:06:09


SiR412DP
Tank j-c
Temperature: 27.0
(A) j-c.opt.dat, SiR412DP_j-c_txt.dat
10
8
6
4
2
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)j-c
Time
Date: August 29, 2009
Time: 21:30:32


SiR412DP
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, SiR412DP_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 30, 2009
Time: 15:51:26


SiR412DP
Filter j-c
Temperature: 27.0
(A) j-c.opt.dat, SiR412DP_j-c_txt.dat
10
8
6
4
2
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1)j-c
Time
Date: August 30, 2009
Time: 16:14:16