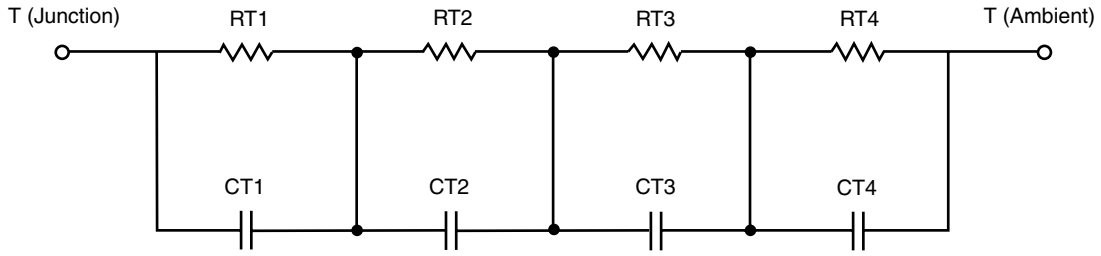
R-C Thermal Model Parameters

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

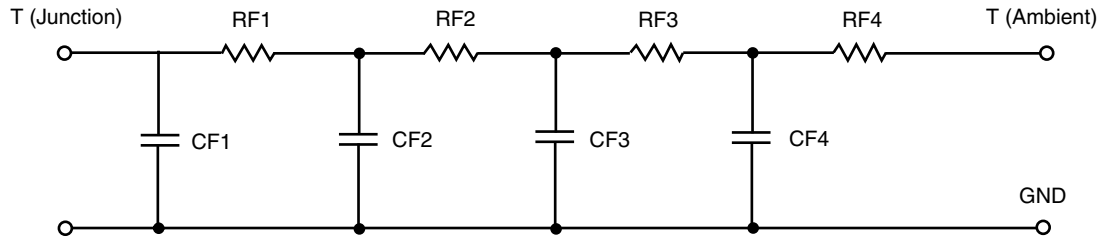


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	2.7571	785.3683 m	N/A
RT2	8.9502	137.9901 m	N/A
RT3	10.5524	390.5275 m	N/A
RT4	27.7084	386.1141 m	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	22.3993 m	12.3931 m	N/A
CT2	431.7358 m	9.1847 m	N/A
CT3	2.6683	280.8023 m	N/A
CT4	4.1807	1.7131 m	N/A

Note
N/A indicates not applicable

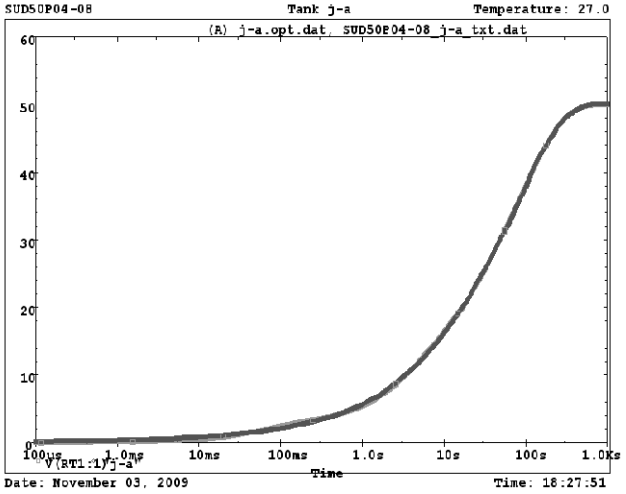
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

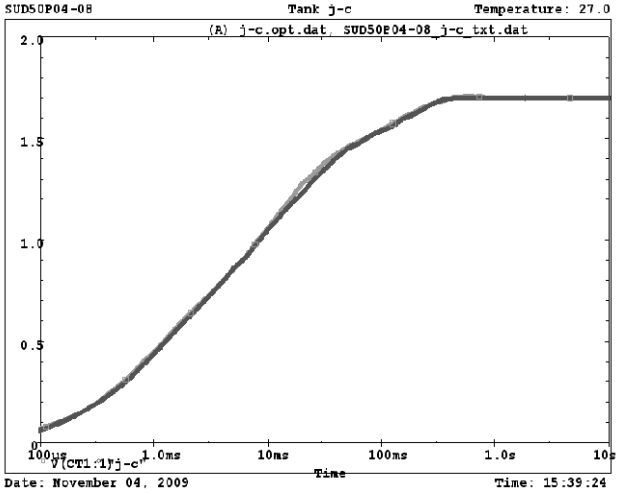
R-C THERMAL MODEL FOR FILTER CONFIGURATION

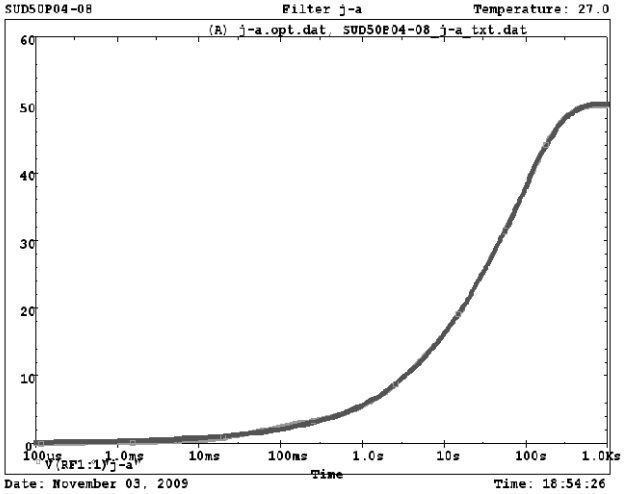


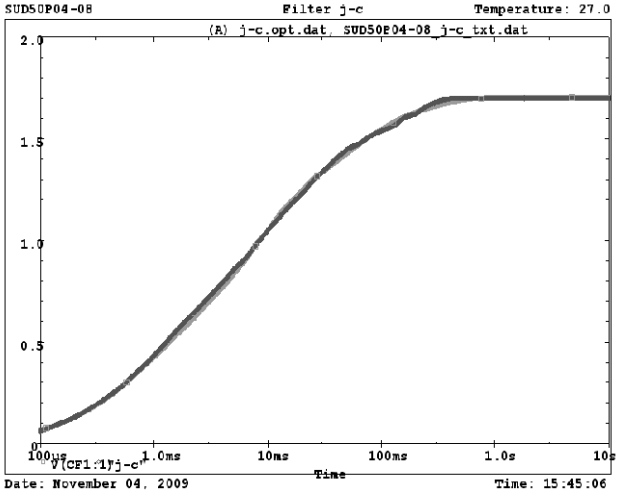
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	2.8457	541.4117 m	N/A
RF2	10.2462	698.2421 m	N/A
RF3	15.5302	352.2096 m	N/A
RF4	21.2510	112.4902 m	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	18.7147 m	1.3051 m	N/A
CF2	270.8021 m	8.1007 m	N/A
CF3	886.9383 m	117.6379 m	N/A
CF4	3.5282	1.5863	N/A

Note
N/A indicates not applicable


SUD50P04-08
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, SUD50P04-08_j-a_txt.dat
60
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)/j-a
Time
Date: November 03, 2009
Time: 18:27:51


SUD50P04-08
Tank j-c
Temperature: 27.0
(A) j-c.opt.dat, SUD50P04-08_j-c_txt.dat
2.0
1.5
1.0
0.5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)/j-c
Time
Date: November 04, 2009
Time: 15:39:24


SUD50P04-08
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, SUD50P04-08_j-a_txt.dat
60
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)/j-a
Time
Date: November 03, 2009
Time: 18:54:26


SUD50P04-08
Filter j-c
Temperature: 27.0
(A) j-c.opt.dat, SUD50P04-08_j-c_txt.dat
2.0
1.5
1.0
0.5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1)/j-c
Time
Date: November 04, 2009
Time: 15:45:06