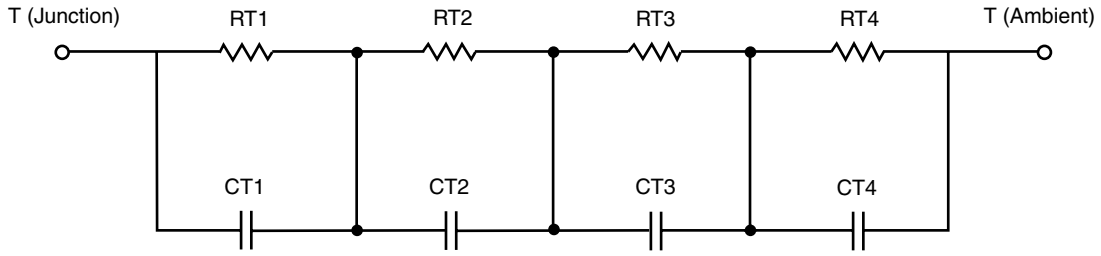
R-C Thermal Model Parameters

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

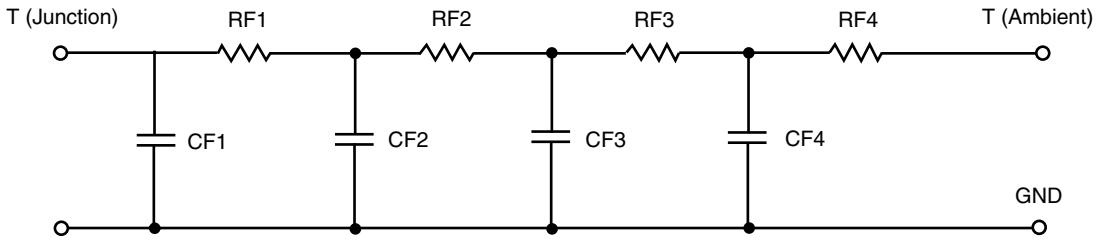


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	28.2437	1.2564	N/A
RT2	13.6754	5.4219	N/A
RT3	25.0823	4.5497	N/A
RT4	42.9986	4.8038	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	2.3059 m	6.5731 m	N/A
CT2	103.0821 u	55.6126 u	N/A
CT3	39.7108 m	404.2072 u	N/A
CT4	1.1246	429.5997 u	N/A

Note
N/A indicates not applicable

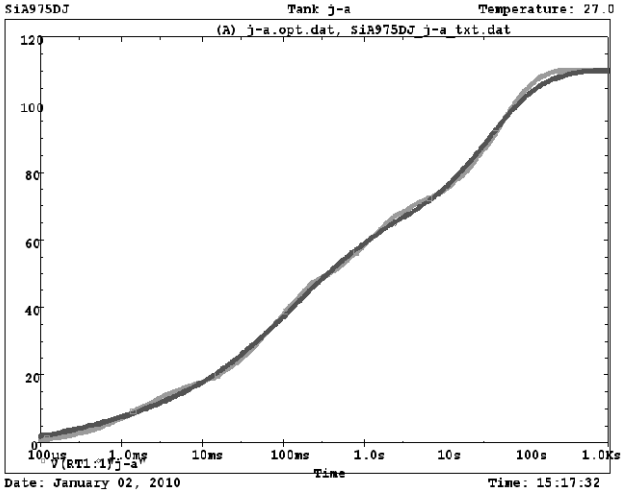
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

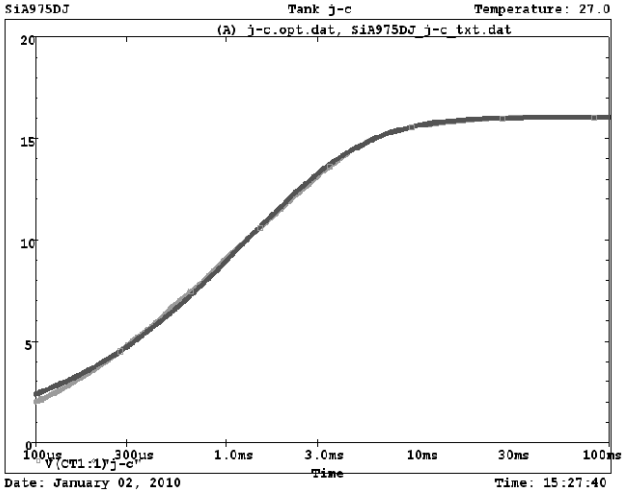
R-C THERMAL MODEL FOR FILTER CONFIGURATION

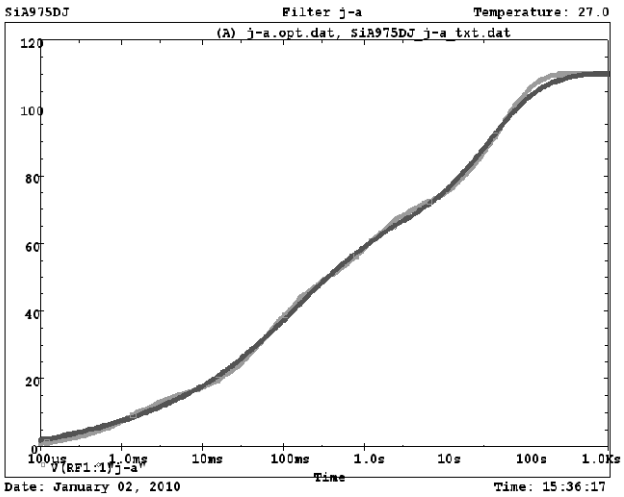


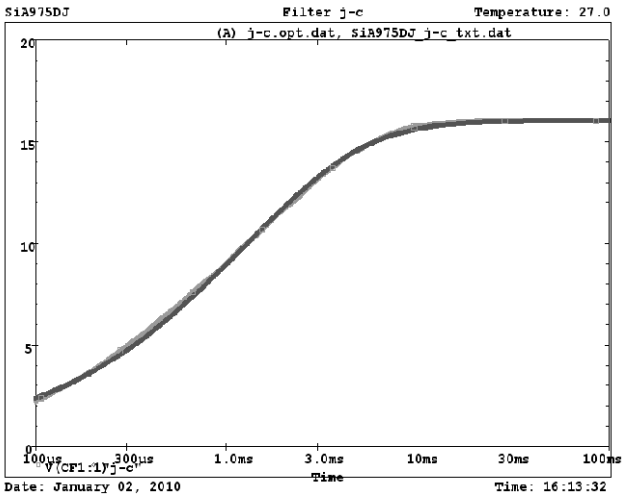
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	14.2316	6.6789	N/A
RF2	31.2018	4.9199	N/A
RF3	23.4768	2.7079	N/A
RF4	41.0898	1.6933	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	92.1039 u	37.0761 u	N/A
CF2	2.0224 m	118.4691 u	N/A
CF3	41.6062 m	211.8647 u	N/A
CF4	1.1219	980.4259 u	N/A

Note
N/A indicates not applicable


SiA975DJ
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, SiA975DJ_j-a_txt.dat
120
100
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)j-a
Time
Date: January 02, 2010
Time: 15:17:32


SiA975DJ
Tank j-c
Temperature: 27.0
(A) j-c.opt.dat, SiA975DJ_j-c_txt.dat
20
15
10
5
0
100µs
300µs
1.0ms
3.0ms
10ms
30ms
100ms
V(CT1:1)j-c
Time
Date: January 02, 2010
Time: 15:27:40


SiA975DJ
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, SiA975DJ_j-a_txt.dat
120
100
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)j-a
Time
Date: January 02, 2010
Time: 15:36:17


SiA975DJ
Filter j-c
Temperature: 27.0
(A) j-c.opt.dat, SiA975DJ_j-c_txt.dat
20
15
10
5
0
100µs
300µs
1.0ms
3.0ms
10ms
30ms
100ms
V(CF1:1)j-c
Time
Date: January 02, 2010
Time: 16:13:32