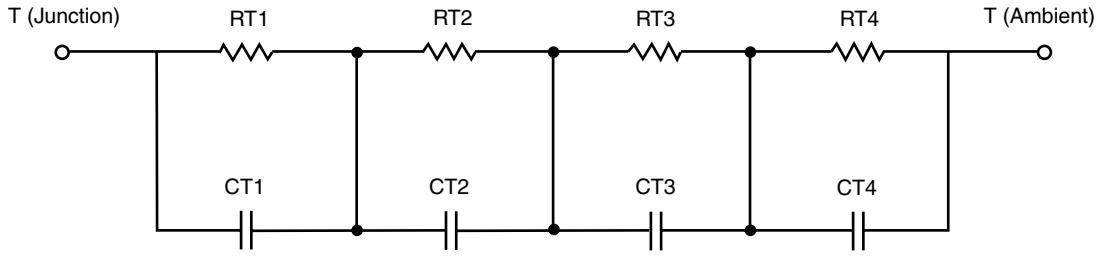
R-C Thermal Model Parameters

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

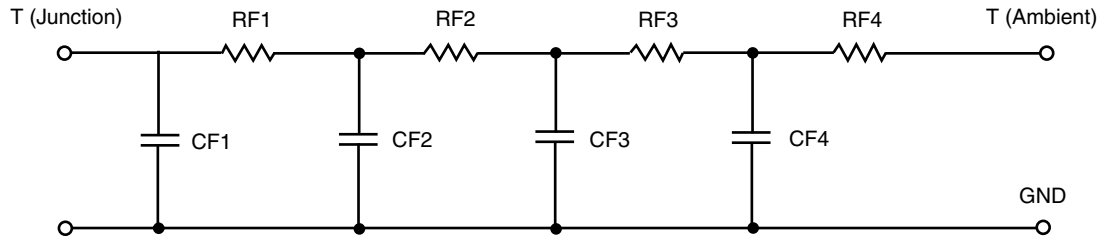


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	22.6846	N/A	4.1774
RT2	27.6875	N/A	6.7704
RT3	1.7746	N/A	4.5570
RT4	27.9635	N/A	502.7316 m
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	45.3529 m	N/A	575.5221 m
CT2	1.9088	N/A	116.5819 m
CT3	2.3231 m	N/A	17.8113 m
CT4	3.5756	N/A	1.3837 m

Note
N/A indicates not applicable

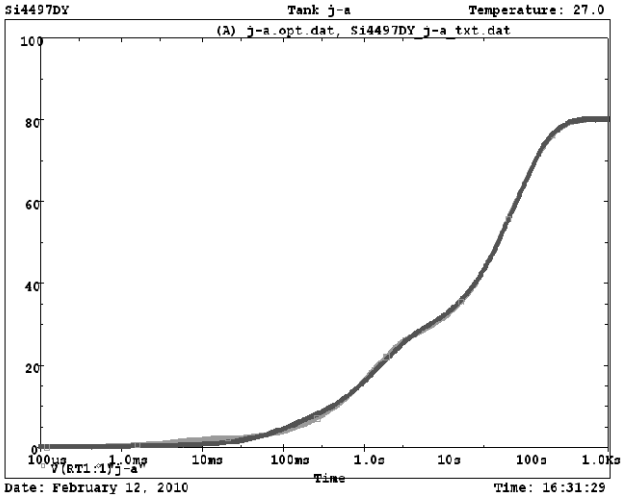
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

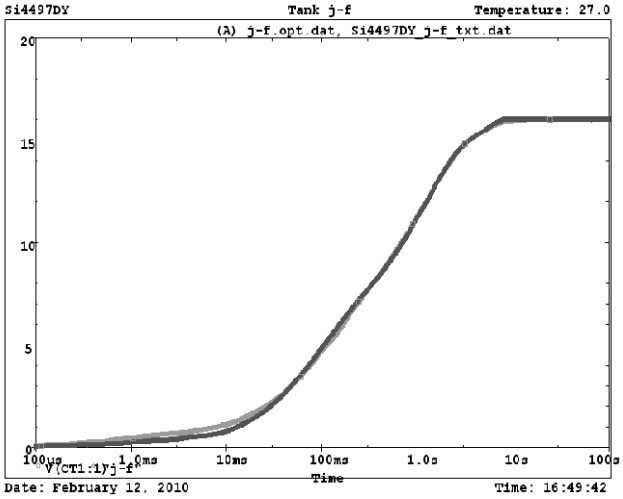
R-C THERMAL MODEL FOR FILTER CONFIGURATION

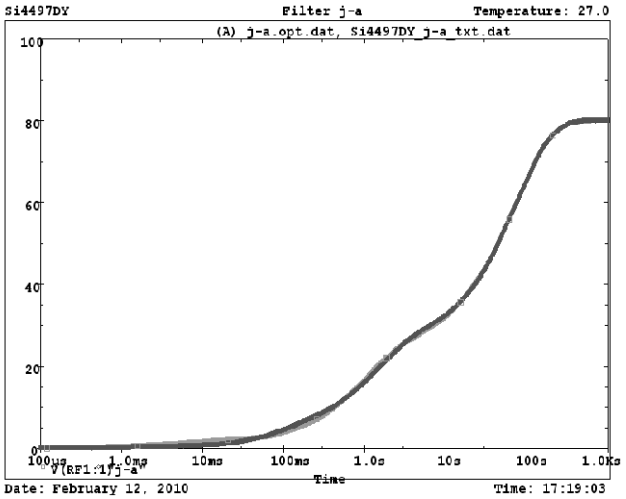


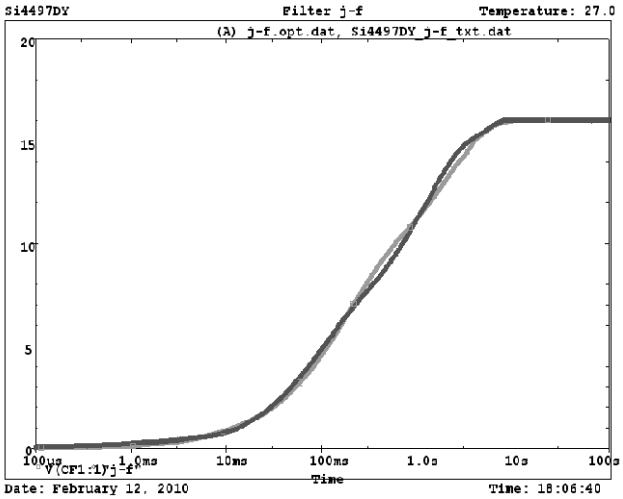
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	1.6324	N/A	1.5673
RF2	23.4945	N/A	5.7456
RF3	21.4176	N/A	2.2033
RF4	33.4410	N/A	6.5273
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	2.2825 m	N/A	8.5528 m
CF2	37.9716 m	N/A	10.4834 m
CF3	926.8064 m	N/A	13.6329 m
CF4	1.0108	N/A	263.3356 m

Note
N/A indicates not applicable


Si4497DY
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, Si4497DY_j-a_txt.dat
100
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)j-a
Time
Date: February 12, 2010
Time: 16:31:29


Si4497DY
Tank j-f
Temperature: 27.0
(A) j-f.opt.dat, Si4497DY_j-f_txt.dat
20
15
10
5
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1)j-f
Time
Date: February 12, 2010
Time: 16:49:42


Si4497DY
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, Si4497DY_j-a_txt.dat
100
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)j-a
Time
Date: February 12, 2010
Time: 17:19:03


Si4497DY
Filter j-f
Temperature: 27.0
(A) j-f.opt.dat, Si4497DY_j-f_txt.dat
20
15
10
5
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1)j-f
Time
Date: February 12, 2010
Time: 18:06:40