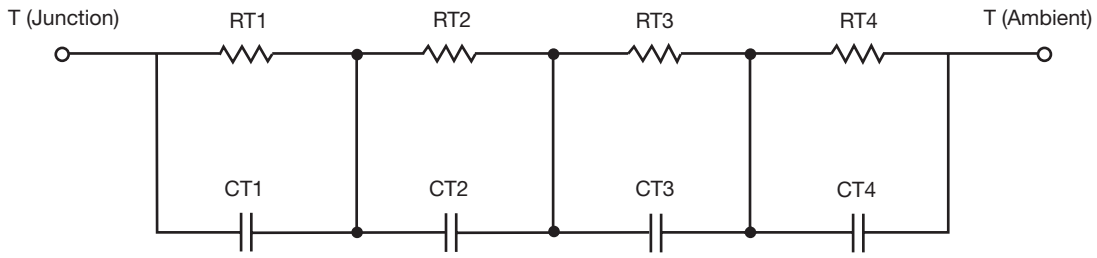
R-C Thermal Model Parameters

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

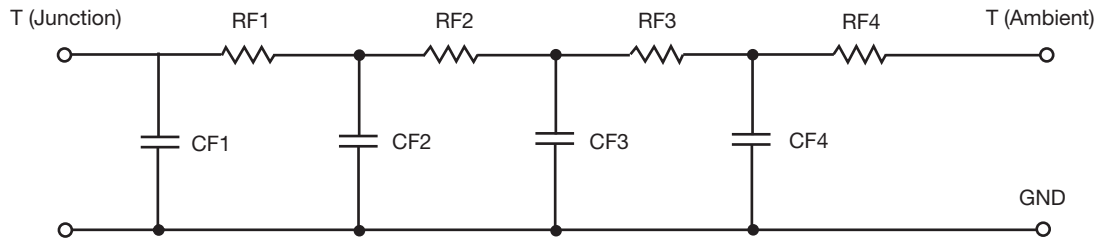


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	18.0689	N/A	4.9401
RT2	5.4156	N/A	10.4938
RT3	16.9694	N/A	7.1546
RT4	44.2707	N/A	2.3594
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	152.3338 m	N/A	137.2410 m
CT2	1.9182 m	N/A	95.0127 m
CT3	27.8612 m	N/A	9.3168 m
CT4	1.4614	N/A	796.9543 u

Note
N/A indicates not applicable

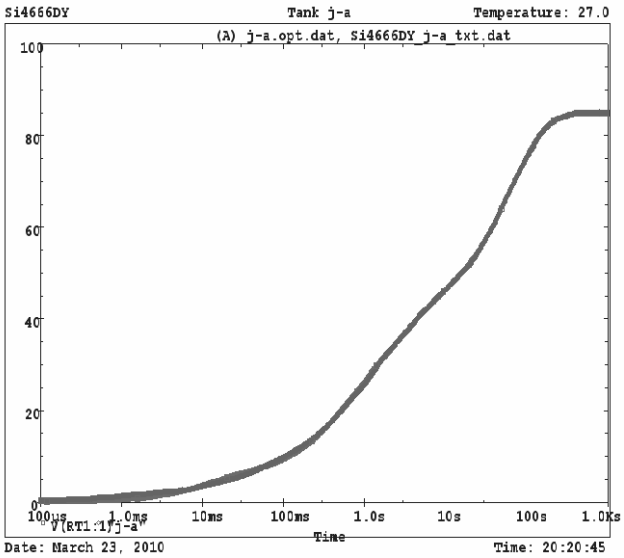
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

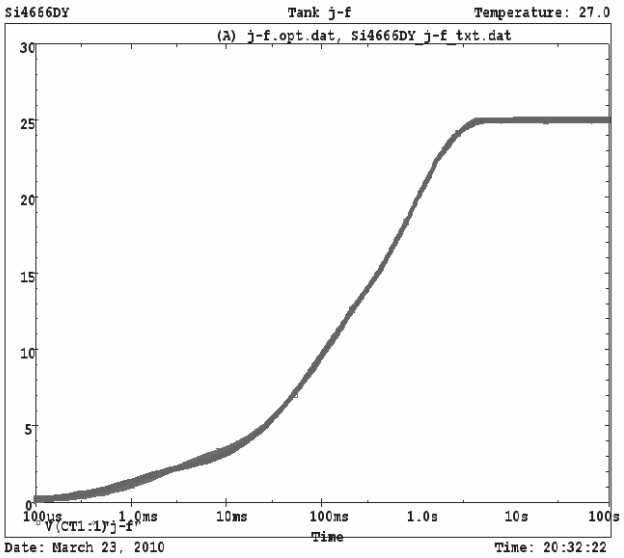
R-C THERMAL MODEL FOR FILTER CONFIGURATION

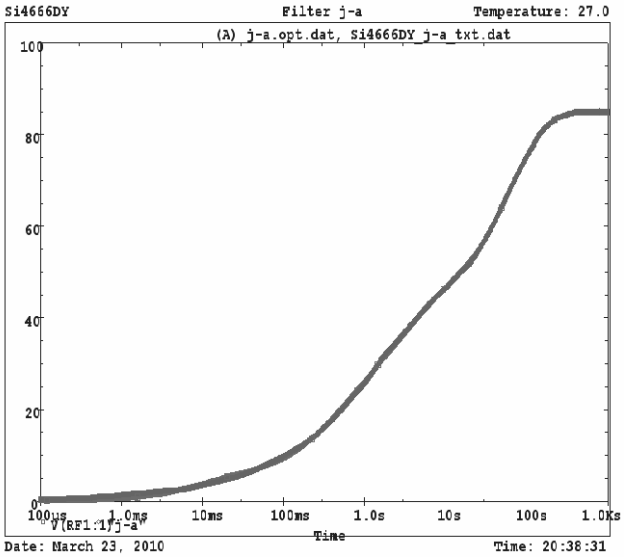


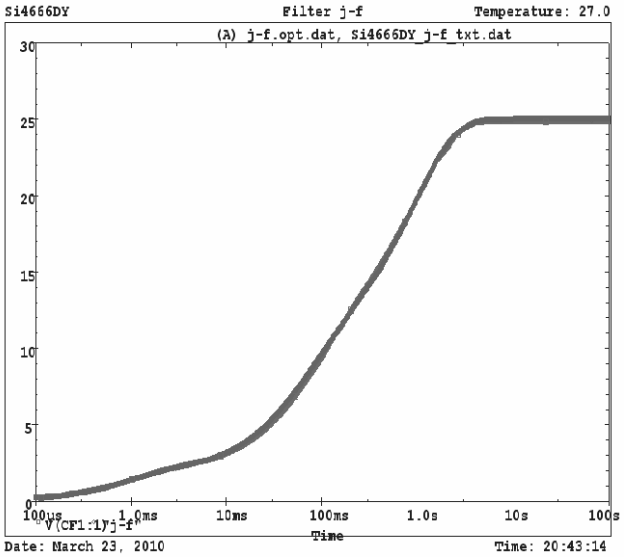
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	5.7796	N/A	2.1842
RF2	20.4494	N/A	10.4481
RF3	18.5618	N/A	6.0392
RF4	39.9509	N/A	6.1943
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	1.6320 m	N/A	443.9731 u
CF2	18.9296 m	N/A	7.7565 m
CF3	123.9004 m	N/A	56.2817 m
CF4	1.4972	N/A	34.0342 m

Note
N/A indicates not applicable


Si4666DY
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, Si4666DY_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: March 23, 2010
Time: 20:20:45


Si4666DY
Tank j-f
Temperature: 27.0
(A) j-f.opt.dat, Si4666DY_j-f_txt.dat
30
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1)j-f
Time
Date: March 23, 2010
Time: 20:32:22


Si4666DY
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, Si4666DY_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: March 23, 2010
Time: 20:38:31


Si4666DY
Filter j-f
Temperature: 27.0
(A) j-f.opt.dat, Si4666DY_j-f_txt.dat
30
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1)j-f
Time
Date: March 23, 2010
Time: 20:43:14