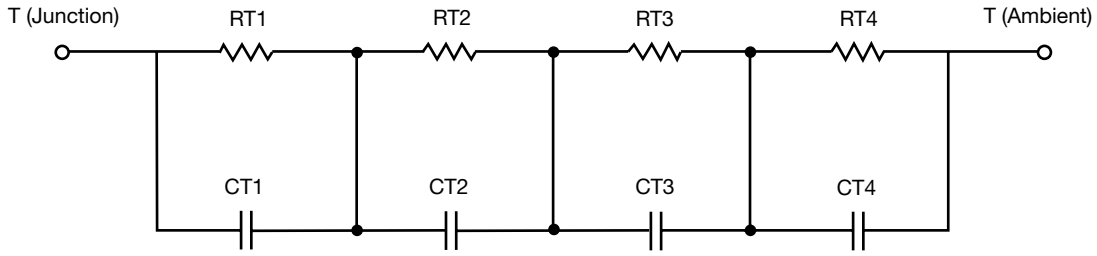
R-C Thermal Model Parameters

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



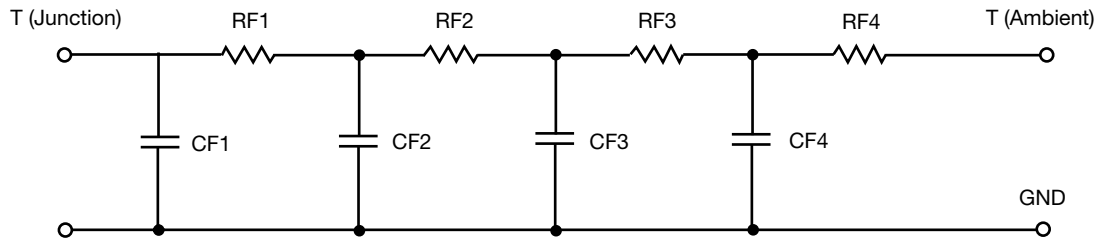
R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	21.5961	N/A	5.0589
RT2	3.0023	N/A	5.9266
RT3	22.3777	N/A	4.7965
RT4	33.0239	N/A	218.0000 m
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	2.1861	N/A	423.4357 m
CT2	22.3442 m	N/A	123.5962 m
CT3	55.3654 m	N/A	14.9315 m
CT4	3.0214	N/A	3.5309 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.

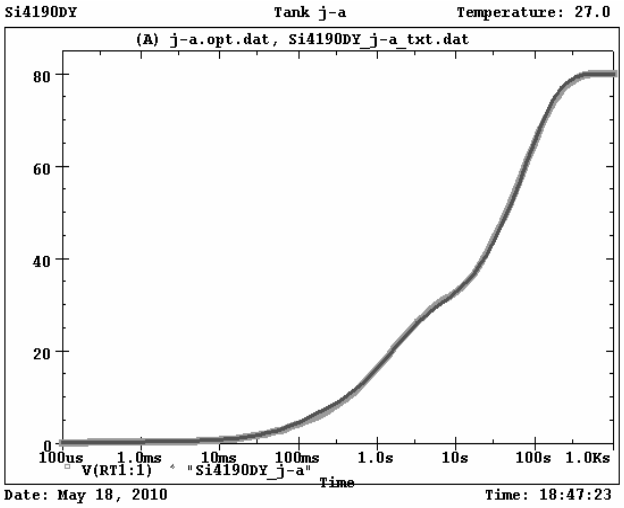
R-C THERMAL MODEL FOR FILTER CONFIGURATION

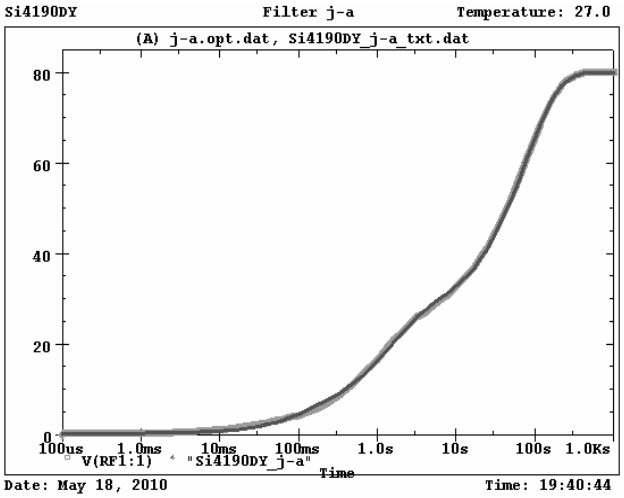


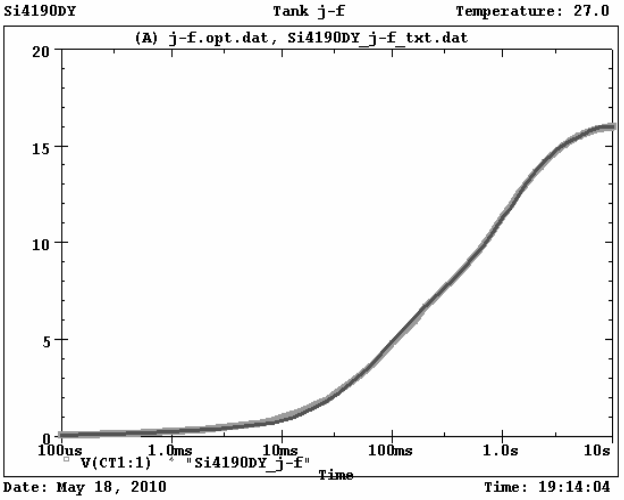
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	3.0181	N/A	452.4000 m
RF2	22.2313	N/A	6.4187
RF3	20.3404	N/A	7.5636
RF4	34.4102	N/A	1.5653
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	7.9839 m	N/A	3.2376 m
CF2	36.2109 m	N/A	10.6658 m
CF3	885.9636 m	N/A	110.9308 m
CF4	1.0250	N/A	1.1075

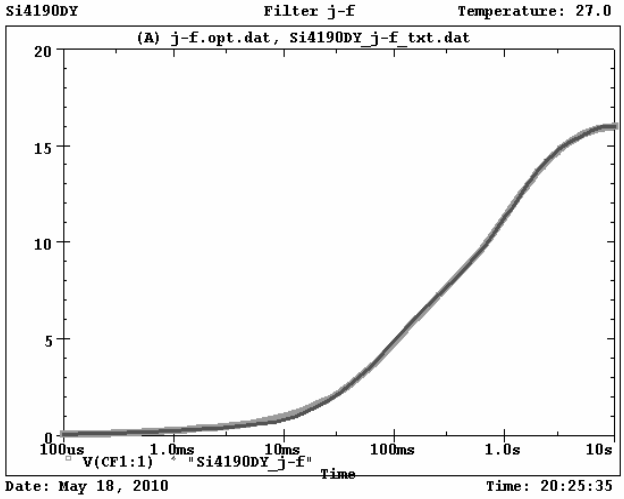
Note

- N/A indicates not applicable


Si4190DY
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, Si4190DY_j-a_txt.dat
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"Si4190DY_j-a"
Time
Date: May 18, 2010
Time: 18:47:23


Si4190DY
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, Si4190DY_j-a_txt.dat
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"Si4190DY_j-a"
Time
Date: May 18, 2010
Time: 19:40:44


Si4190DY
Tank j-f
Temperature: 27.0
(A) j-f.opt.dat, Si4190DY_j-f_txt.dat
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)
"Si4190DY_j-f"
Time
Date: May 18, 2010
Time: 19:14:04


Si4190DY
Filter j-f
Temperature: 27.0
(A) j-f.opt.dat, Si4190DY_j-f_txt.dat
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1)
"Si4190DY_j-f"
Time
Date: May 18, 2010
Time: 20:25:35