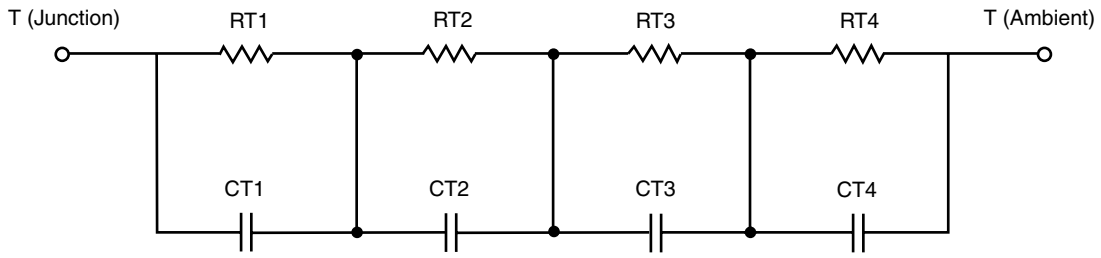
R-C Thermal Model Parameters

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

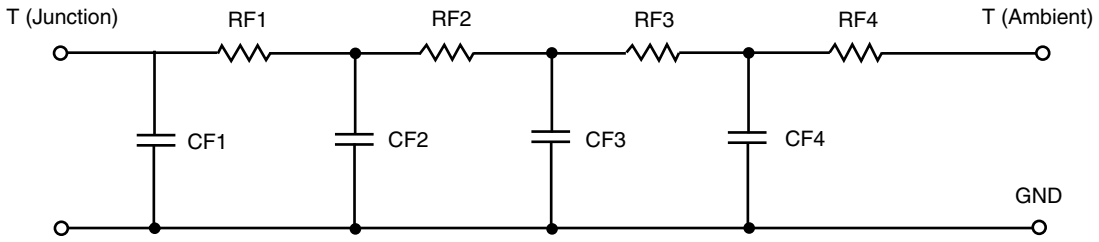


R-C VALUES FOR TANK CONFIGURATION				
THERMAL RESISTANCE (°C/W)				
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Foot Ch1**	**Foot Ch2**
RT1	9.7868	7.8748	24.8037	2.5763
RT2	37.2510	21.3289	15.0351	10.3223
RT3	35.1690	20.1076	16.5588	11.6825
RT4	42.7932	50.6887	6.6024	5.4189
THERMAL CAPACITANCE (Joules/°C)				
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Foot Ch1**	**Foot Ch2**
CT1	5.5329 m	4.7194 m	29.6557 m	2.8818 m
CT2	9.1586 m	25.6654 m	345.1851 m	185.4986 m
CT3	89.6175 m	230.4579 m	12.2885 m	27.1414 m
CT4	1.7819	1.3185	3.0925 m	17.2329 m

Note
N/A indicates not applicable

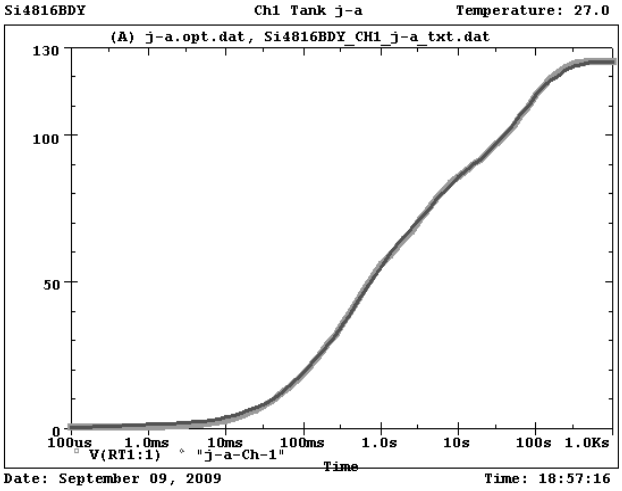
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

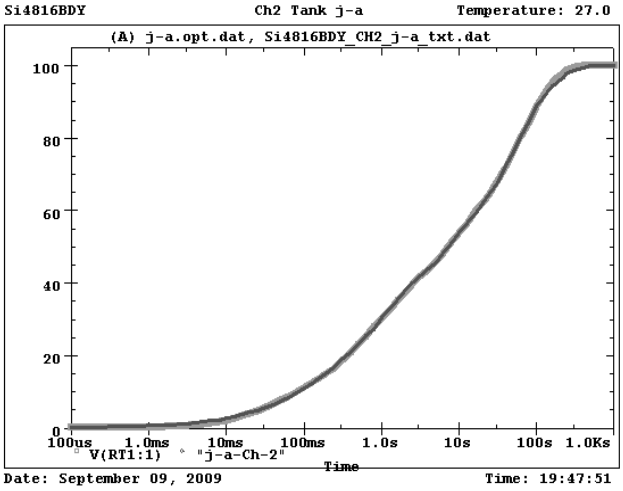
R-C THERMAL MODEL FOR FILTER CONFIGURATION

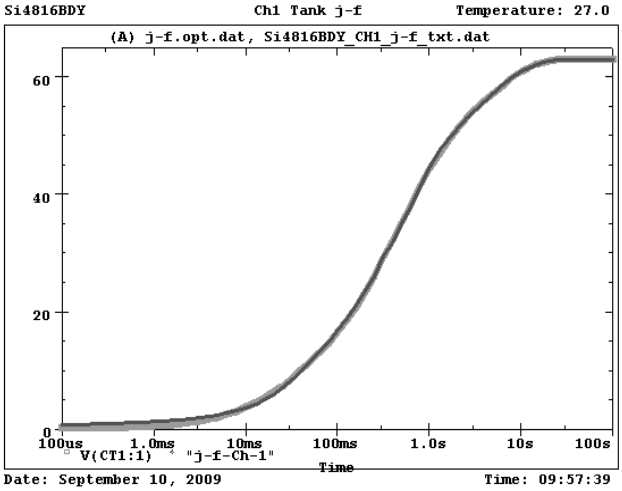


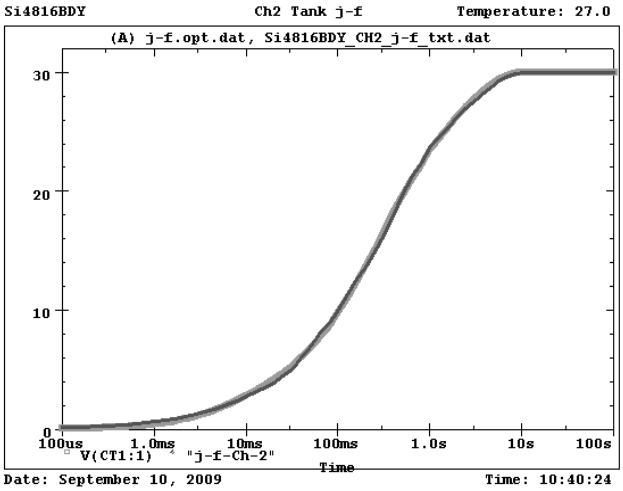
R-C VALUES FOR FILTER CONFIGURATION				
THERMAL RESISTANCE (°C/W)				
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Foot Ch1**	**Foot Ch2**
RF1	31.3327	14.5064	12.1848	4.7189
RF2	34.2469	25.7288	12.0005	8.6265
RF3	25.2637	23.7515	25.3666	9.5768
RF4	34.1567	36.0133	13.4481	7.0778
THERMAL CAPACITANCE (Joules/°C)				
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Foot Ch1**	**Foot Ch2**
CF1	3.3853 m	4.8906 m	2.4155 m	2.6732 m
CF2	16.3105 m	31.9833 m	5.0947 m	8.0627 m
CF3	220.6927 m	384.4296 m	11.0994 m	15.6341 m
CF4	2.0827	1.5463	313.9224 m	250.2287 m

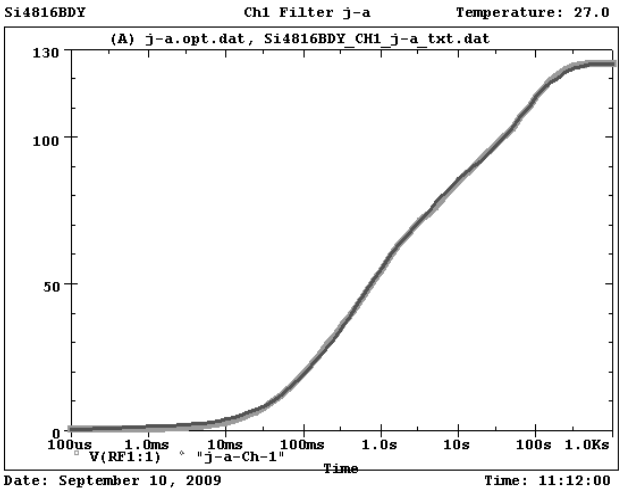
Note
N/A indicates not applicable

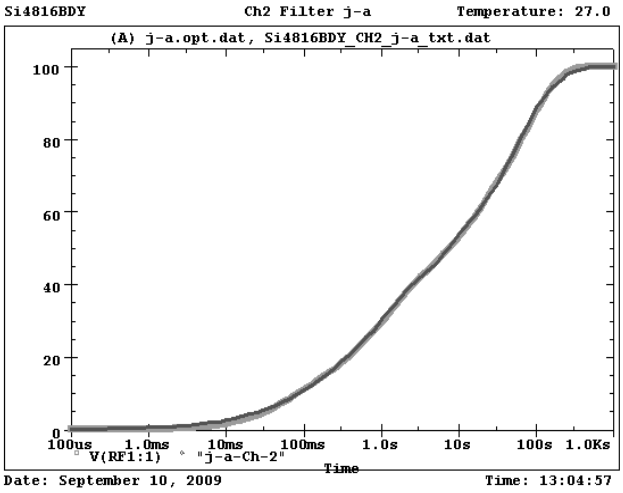

Si4816BDY
Ch1 Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, Si4816BDY_CH1_j-a_txt.dat
130
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "j-a-Ch-1"
Time
Date: September 09, 2009
Time: 18:57:16

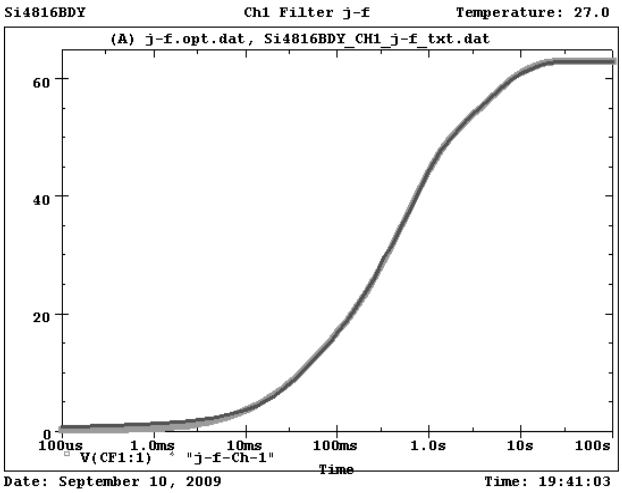

Si4816BDY
Ch2 Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, Si4816BDY_CH2_j-a_txt.dat
100
80
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "j-a-Ch-2"
Time
Date: September 09, 2009
Time: 19:47:51

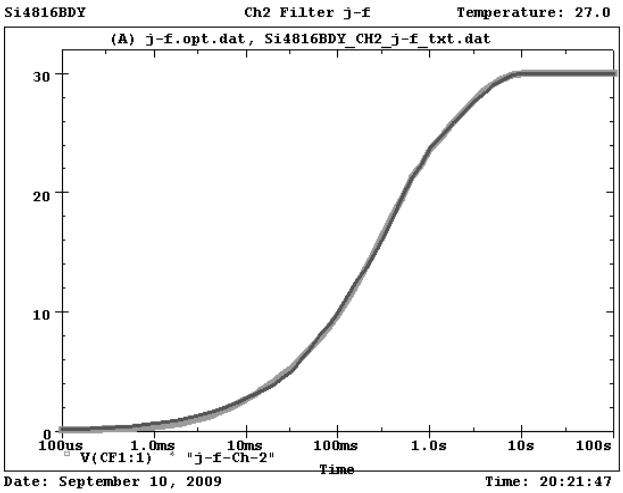

Si4816BDY
Ch1 Tank j-f
Temperature: 27.0
(A) j-f.opt.dat, Si4816BDY_CH1_j-f_txt.dat
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s
V(CT1:1) "j-f-Ch-1"
Time
Date: September 10, 2009
Time: 09:57:39


Si4816BDY
Ch2 Tank j-f
Temperature: 27.0
(A) j-f.opt.dat, Si4816BDY_CH2_j-f_txt.dat
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s
V(CT1:1) "j-f-Ch-2"
Time
Date: September 10, 2009
Time: 10:40:24


Si4816BDY
Ch1 Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, Si4816BDY_CH1_j-a_txt.dat
130
100
50
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "j-a-Ch-1"
Time
Date: September 10, 2009
Time: 11:12:00


Si4816BDY
Ch2 Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, Si4816BDY_CH2_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-Ch-2"
Time
Date: September 10, 2009
Time: 13:04:57


Si4816BDY
Ch1 Filter j-f
Temperature: 27.0
(A) j-f.opt.dat, Si4816BDY_CH1_j-f_txt.dat
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s
V(CF1:1) "j-f-Ch-1"
Time
Date: September 10, 2009
Time: 19:41:03


Si4816BDY
Ch2 Filter j-f
Temperature: 27.0
(A) j-f.opt.dat, Si4816BDY_CH2_j-f_txt.dat
30
20
10
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s
V(CF1:1) "j-f-Ch-2"
Time
Date: September 10, 2009
Time: 20:21:47