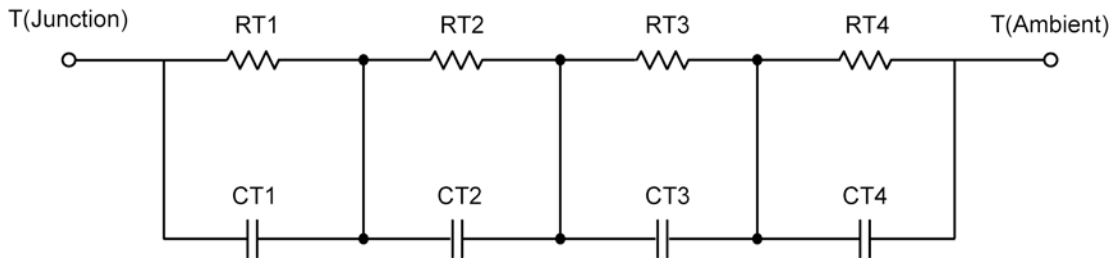
R-C Thermal Model Parameters

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."

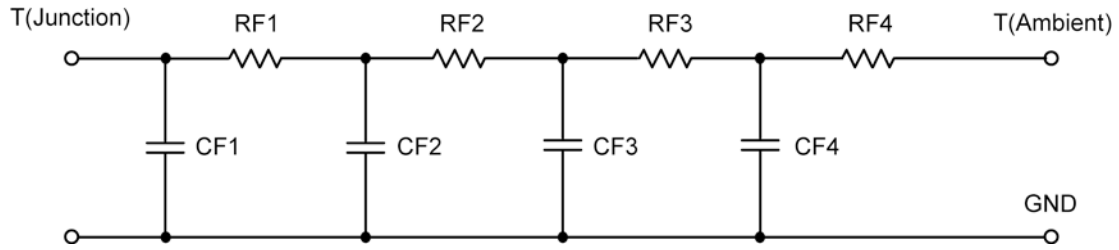
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION				
Thermal Resistance (°C/W)				
Junction to	**Ambient CH-1**	**Ambient CH-2**	**Foot CH-1**	**Foot CH-2**
RT1	5.3706	6.0843	12.2365	11.2418
RT2	13.9001	20.5627	2.0389	3.9722
RT3	22.7949	35.2184	8.1081	7.4426
RT4	67.9344	48.1346	15.6165	17.3434
Thermal Capacitance (Joules/°C)				
Junction to	**Ambient CH-1**	**Ambient CH-2**	**Foot CH-1**	**Foot CH-2**
CT1	1.8711 m	375.7156 u	26.0601 m	14.9375 m
CT2	26.4051 m	9.5952 m	5.6456 m	386.8720 u
CT3	107.5402 m	53.1650 m	7.6634 m	7.9256 m
CT4	1.3240	1.3277	97.9139 m	73.6406 m

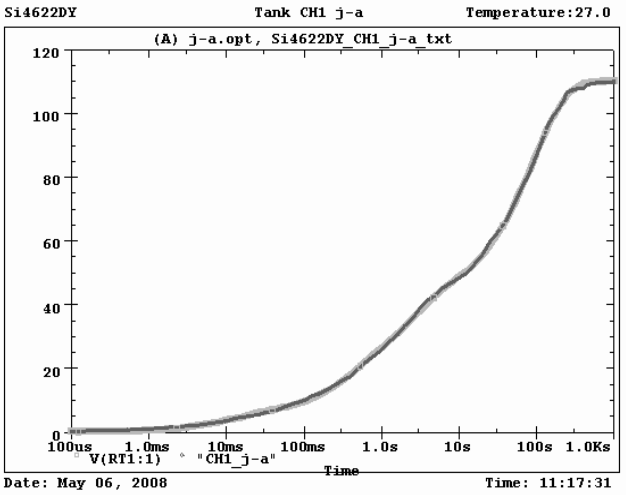
This document is intended as a SPICE modeling guideline and does not constitute a commercial product data sheet. Designers should refer to the appropriate data sheet of the same number for guaranteed specification limits.

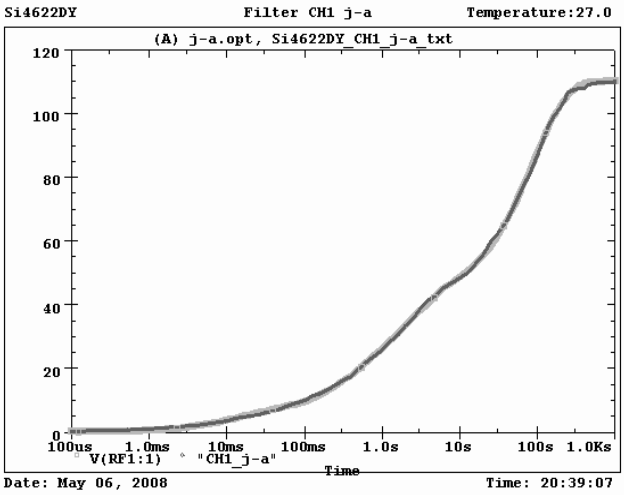
R-C THERMAL MODEL FOR FILTER CONFIGURATION

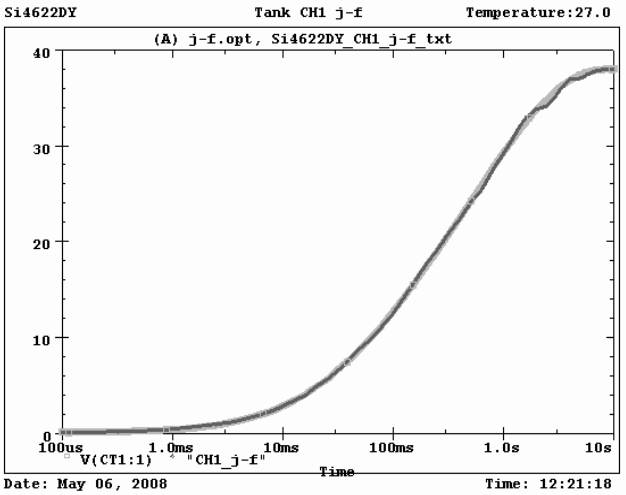


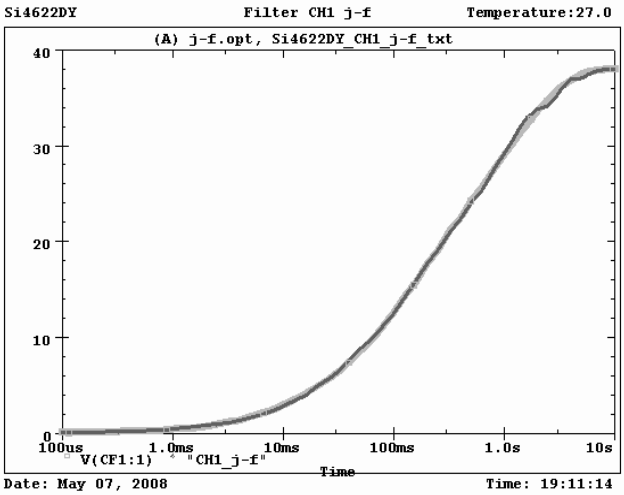
R-C VALUES FOR FILTER CONFIGURATION				
Thermal Resistance (°C/W)				
Junction to	**Ambient CH-1**	**Ambient CH-2**	**Foot CH-1**	**Foot CH-2**
RF1	6.6668	7.5027	5.7321	5.2833
RF2	19.3735	31.8453	13.6203	14.8778
RF3	19.6179	26.2762	10.3193	8.0975
RF4	64.3418	44.3758	8.3283	11.7414
Thermal Capacitance (Joules/°C)				
Junction to	**Ambient CH-1**	**Ambient CH-2**	**Foot CH-1**	**Foot CH-2**
CF1	1.7668 m	562.0009 u	2.5332 m	445.0213 u
CF2	21.0055 m	8.8443 m	4.9463 m	4.8117 m
CF3	90.4077 m	76.0922 m	32.5943 m	16.6508 m
CF4	1.2649	1.3584	120.1723 m	91.2372 m

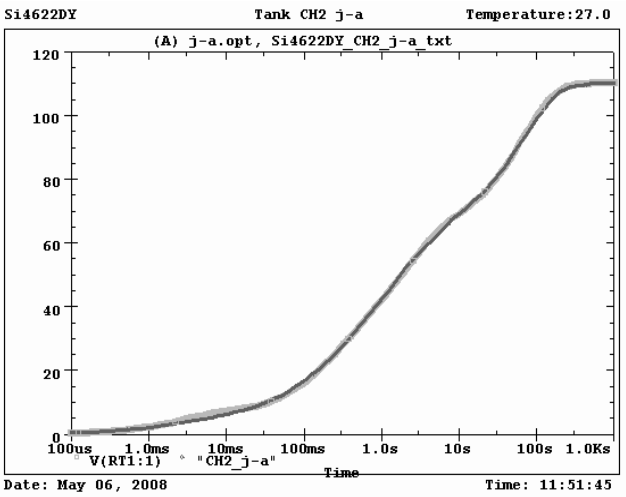
Note
NA indicates not applicable

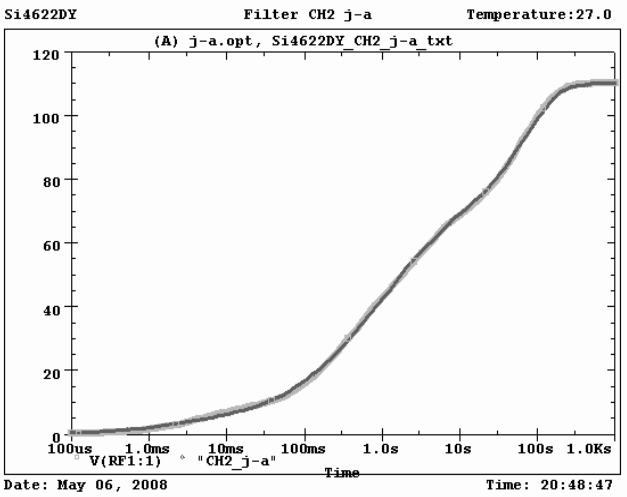

Si4622DY
Tank CH1 j-a
Temperature:27.0
(A) j-a.opt, Si4622DY_CH1_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"CH1_j-a"
Time
Date: May 06, 2008
Time: 11:17:31

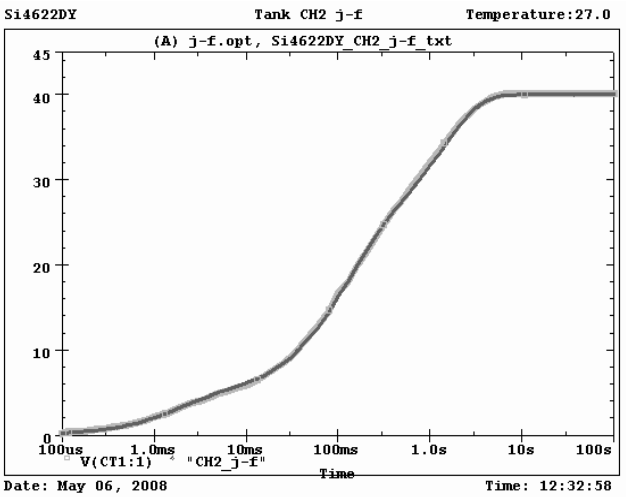

Si4622DY
Filter CH1 j-a
Temperature:27.0
(A) j-a.opt, Si4622DY_CH1_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"CH1_j-a"
Time
Date: May 06, 2008
Time: 20:39:07

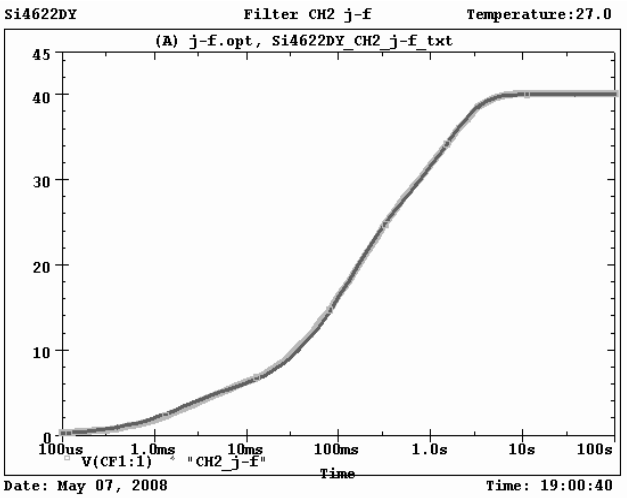

Si4622DY
Tank CH1 j-f
Temperature:27.0
(A) j-f.opt, Si4622DY_CH1_j-f_txt
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)
"CH1_j-f"
Time
Date: May 06, 2008
Time: 12:21:18


Si4622DY
Filter CH1 j-f
Temperature:27.0
(A) j-f.opt, Si4622DY_CH1_j-f_txt
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1)
"CH1_j-f"
Time
Date: May 07, 2008
Time: 19:11:14


Si4622DY
Tank CH2 j-a
Temperature:27.0
(A) j-a.opt, Si4622DY_CH2_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"CH2_j-a"
Time
Date: May 06, 2008
Time: 11:51:45


Si4622DY
Filter CH2 j-a
Temperature:27.0
(A) j-a.opt, Si4622DY_CH2_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"CH2_j-a"
Time
Date: May 06, 2008
Time: 20:48:47


Si4622DY
Tank CH2 j-f
Temperature:27.0
(A) j-f.opt, Si4622DY_CH2_j-f_txt
45
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1)
"CH2_j-f"
Time
Date: May 06, 2008
Time: 12:32:58


Si4622DY
Filter CH2 j-f
Temperature:27.0
(A) j-f.opt, Si4622DY_CH2_j-f_txt
45
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1)
"CH2_j-f"
Time
Date: May 07, 2008
Time: 19:00:40