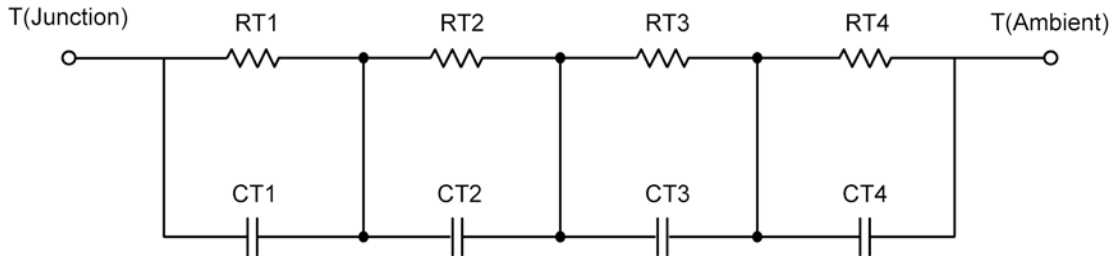
R-C Thermal Model Parameters

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."

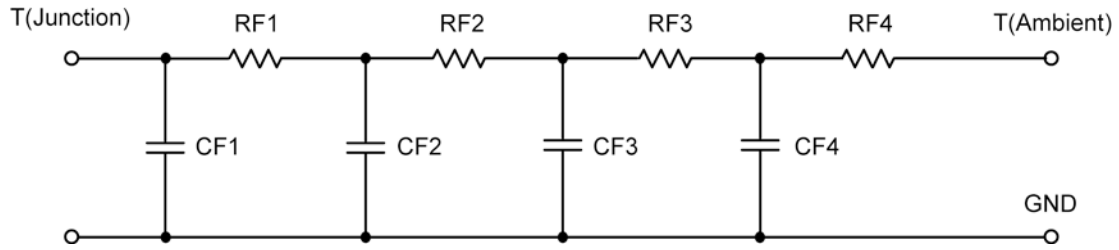
R-C THERMAL MODEL FOR TANK CONFIGURATION



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	20.7533	20.7533	2.5410	2.5410
RT2	36.4525	36.4525	17.2124	17.2124
RT3	4.1874	4.1874	1.1564	1.1564
RT4	48.6068	48.6068	22.0902	22.0902
Thermal Capacitance (Joules/°C)				
Junction to	**Ambient CH-1**	**Ambient CH-2**	**Foot CH-1**	**Foot CH-2**
CT1	5.0105 m	5.0105 m	706.7919 u	706.7919 u
CT2	29.3134 m	29.3134 m	3.8326 m	3.8326 m
CT3	286.5768 u	286.5768 u	623.4015 u	623.4015 u
CT4	1.0885	1.0885	31.1366 m	31.1366 m

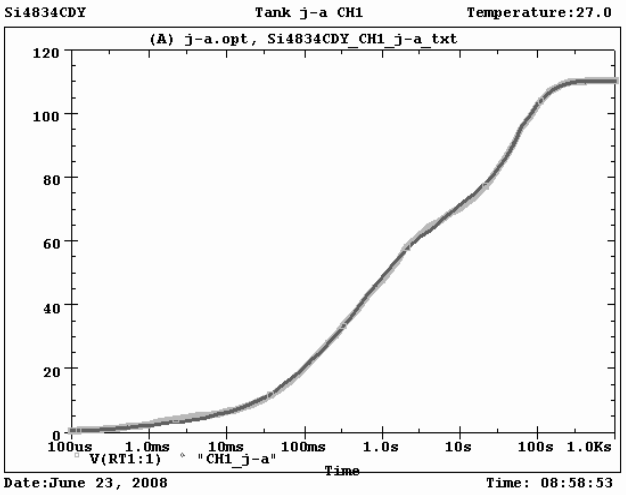
This document is intended as a SPICE modeling guideline and does not constitute a commercial product data sheet. Designers should refer to the appropriate data sheet of the same number for guaranteed specification limits.

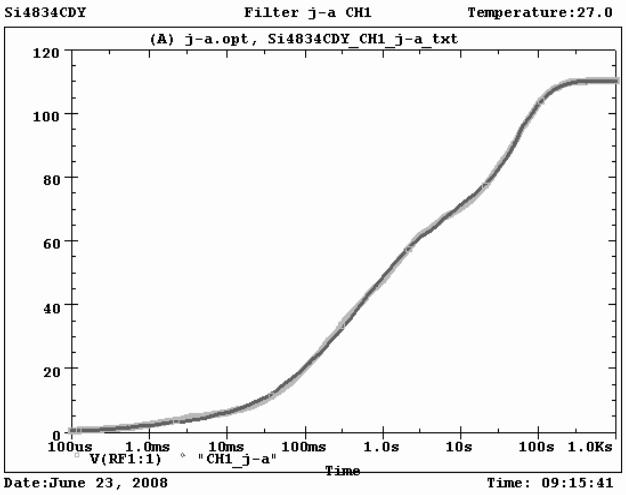
R-C THERMAL MODEL FOR FILTER CONFIGURATION

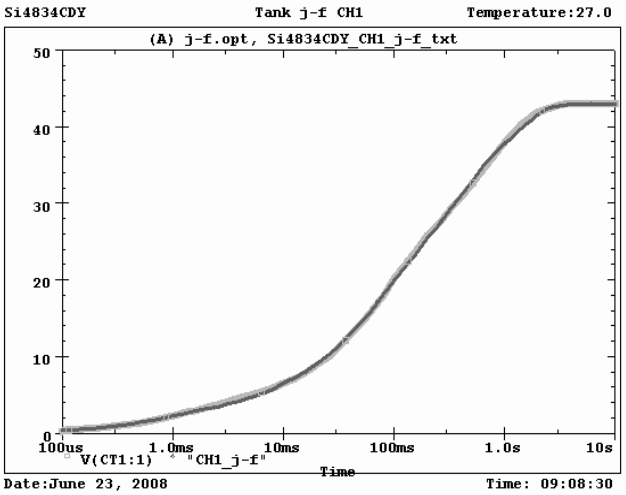


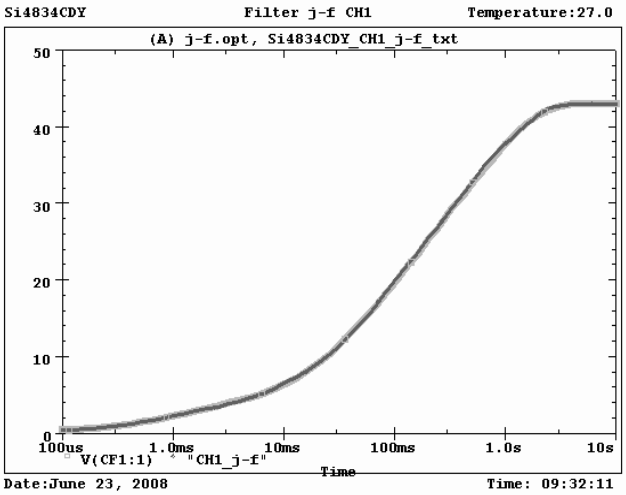
R-C VALUES FOR FILTER CONFIGURATION				
Thermal Resistance (°C/W)				
Junction to	**Ambient CH-1**	**Ambient CH-2**	**Foot CH-1**	**Foot CH-2**
RF1	4.7284	4.7284	3.5325	3.5325
RF2	31.6204	31.6204	14.5686	14.5686
RF3	28.0852	28.0852	13.4843	13.4843
RF4	45.5660	45.5660	11.4146	11.4146
Thermal Capacitance (Joules/°C)				
Junction to	**Ambient CH-1**	**Ambient CH-2**	**Foot CH-1**	**Foot CH-2**
CF1	286.4128 u	286.4128 u	285.5282 u	285.5282 u
CF2	4.3305 m	4.3305 m	2.3467 m	2.3467 m
CF3	40.7333 m	40.7333 m	9.5142 m	9.5142 m
CF4	1.1065	1.1065	52.7297 m	52.7297 m

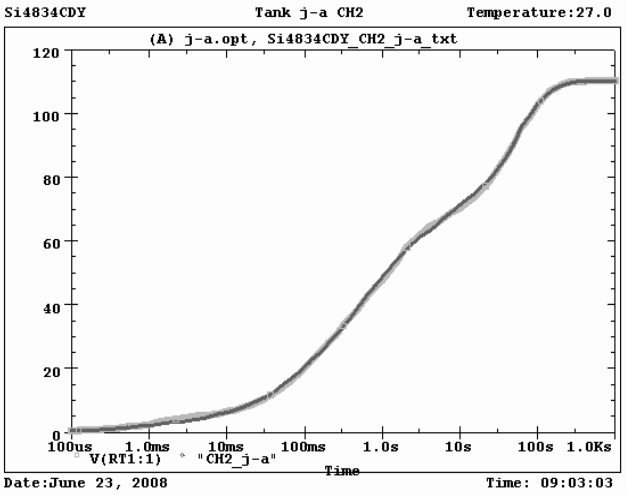
Note
NA indicates not applicable

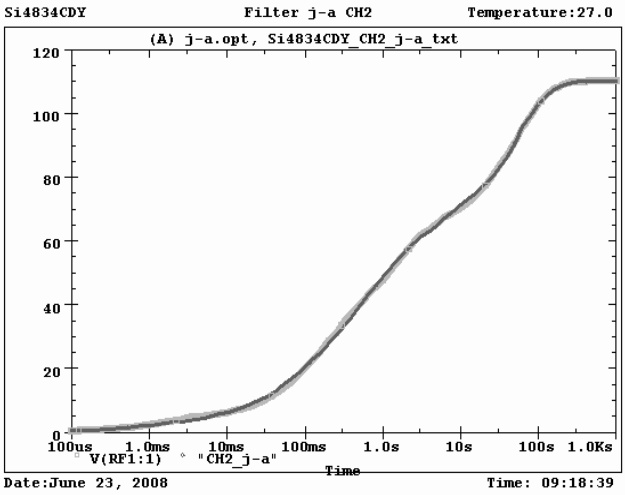

Si4834CDY
Tank j-a CH1
Temperature:27.0
(A) j-a.opt, Si4834CDY_CH1_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"CH1_j-a"
Time
Date:June 23, 2008
Time: 08:58:53

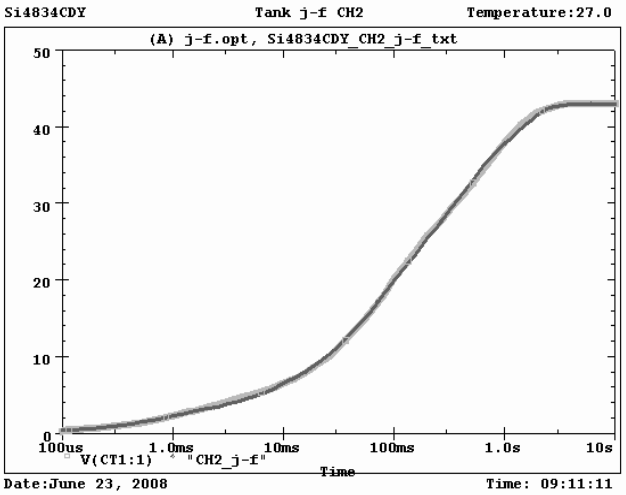

Si4834CDY
Filter j-a CH1
Temperature:27.0
(A) j-a.opt, Si4834CDY_CH1_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"CH1_j-a"
Time
Date:June 23, 2008
Time: 09:15:41

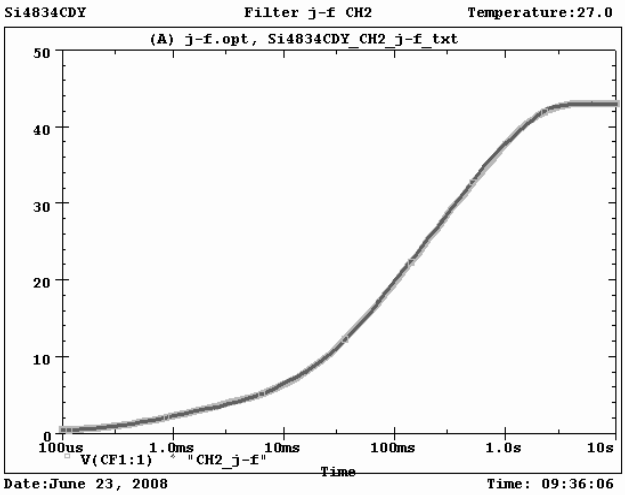

Si4834CDY
Tank j-f CH1
Temperature:27.0
(A) j-f.opt, Si4834CDY_CH1_j-f_txt
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)
"CH1_j-f"
Time
Date:June 23, 2008
Time: 09:08:30


Si4834CDY
Filter j-f CH1
Temperature:27.0
(A) j-f.opt, Si4834CDY_CH1_j-f_txt
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1)
"CH1_j-f"
Time
Date:June 23, 2008
Time: 09:32:11


Si4834CDY
Tank j-a CH2
Temperature:27.0
(A) j-a.opt, Si4834CDY_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:June 23, 2008
Time: 09:03:03


Si4834CDY
Filter j-a CH2
Temperature:27.0
(A) j-a.opt, Si4834CDY_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:June 23, 2008
Time: 09:18:39


Si4834CDY
Tank j-f CH2
Temperature:27.0
(A) j-f.opt, Si4834CDY_CH2_j-f_txt
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)
"CH2_j-f"
Time
Date:June 23, 2008
Time: 09:11:11


Si4834CDY
Filter j-f CH2
Temperature:27.0
(A) j-f.opt, Si4834CDY_CH2_j-f_txt
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1)
"CH2_j-f"
Time
Date:June 23, 2008
Time: 09:36:06