R-C Thermal Model Parameters

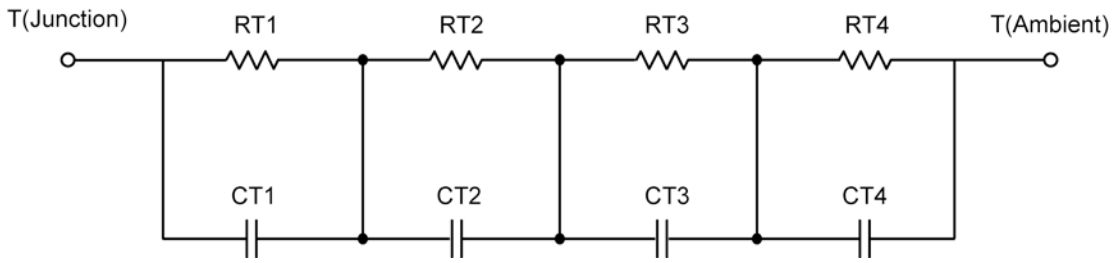
DESCRIPTION

The parametric values in the R-C thermal model have been derived using curve-fitting techniques. These techniques are described in "A Simple Method of Generating Thermal Models for a Power MOSFET"[1]. When implemented in P-Spice, these values have matching characteristic curves to the Single Pulse Transient Thermal Impedance curves for the MOSFET.

R-C values for the electrical circuit in the Foster/Tank and Cauer/Filter configurations are included.

Note:
For a detailed explanation of implementing these values in P-SPICE, refer to Application Note AN609 Thermal Simulations Of Power MOSFETs on P-SPICE Platform.

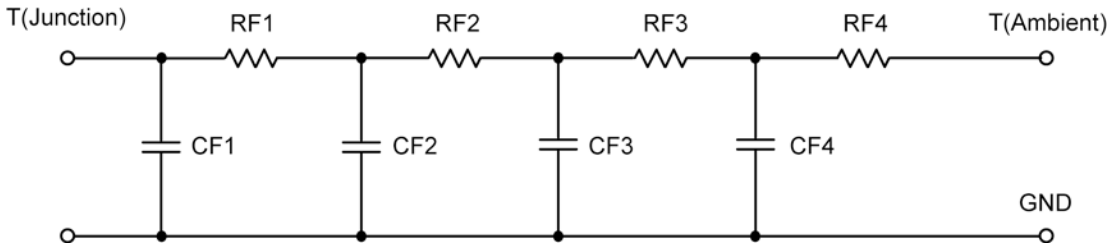
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case Drain -Top**	**Case Source**
RT1	4.0839	13.1408 m	229.4359 m
RT2	2.8985	487.0575 m	2.4496
RT3	10.5925	322.8526 m	18.9606 m
RT4	50.4251	176.9491 m	2.0035 m
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case Drain -Top**	**Case Source**
CT1	42.8964 m	250.3603 u	1.7816 m
CT2	113.1816 m	31.6762 m	27.4580 m
CT3	191.5102 m	63.7973 m	1.4509
CT4	1.3901	3.3354 m	1.5555 m

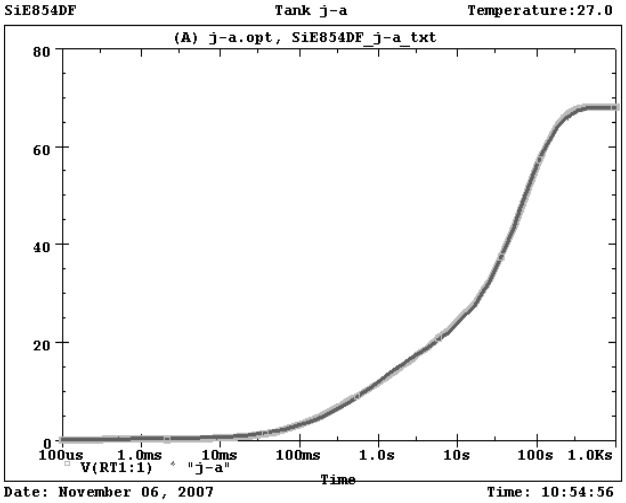
This document is intended as a SPICE modeling guideline and does not constitute a commercial product data sheet. Designers should refer to the appropriate data sheet of the same number for guaranteed specification limits.

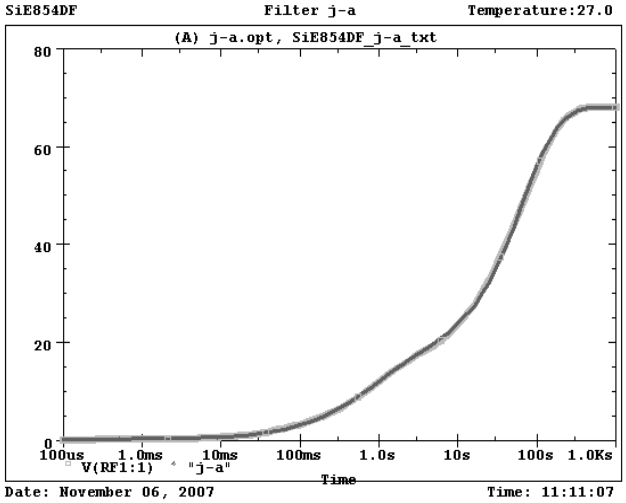
R-C THERMAL MODEL FOR FILTER CONFIGURATION

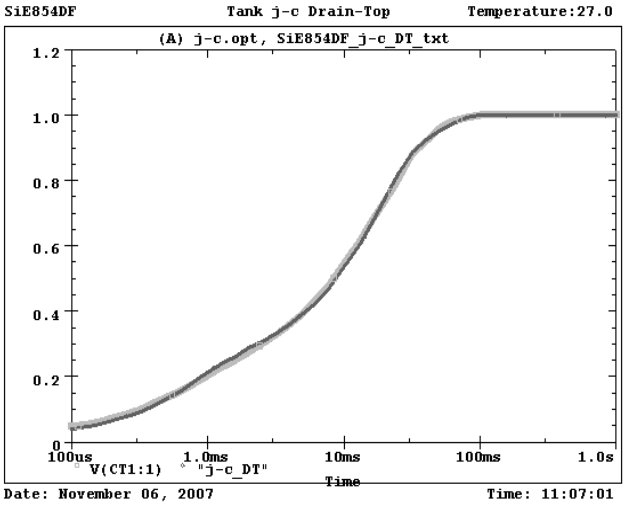


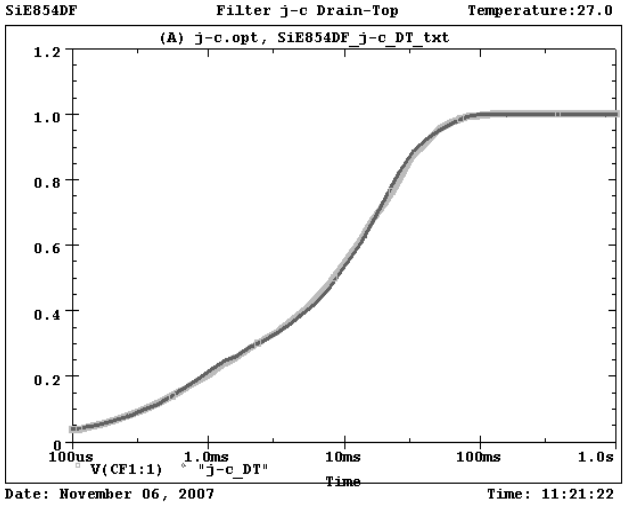
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case Drain -Top**	**Case Source**
RF1	3.7413	270.5949 m	286.8241 m
RF2	12.3473	945.5000 u	1.2831
RF3	28.3916	8.1951 m	1.0331
RF4	23.5198	720.2645 m	96.9759 m
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case Drain -Top**	**Case Source**
CF1	17.4636 m	2.7316 m	1.7681 m
CF2	46.2435 m	5.1728 m	25.3698 m
CF3	894.9969 m	13.7470 m	1.9573 m
CF4	1.8159	2.9036 m	135.6344 m

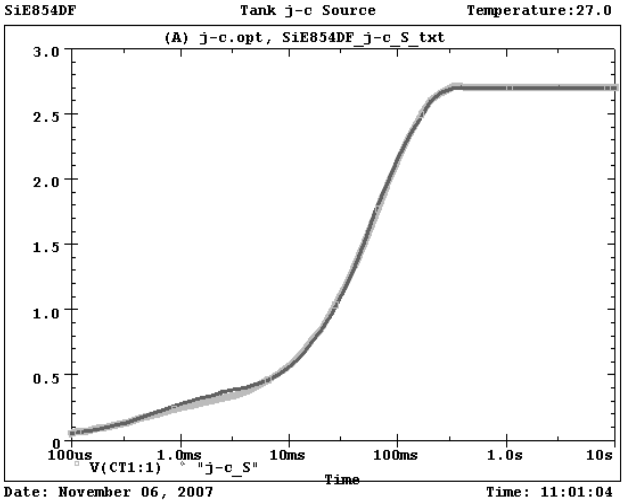
Note: NA indicates not applicable

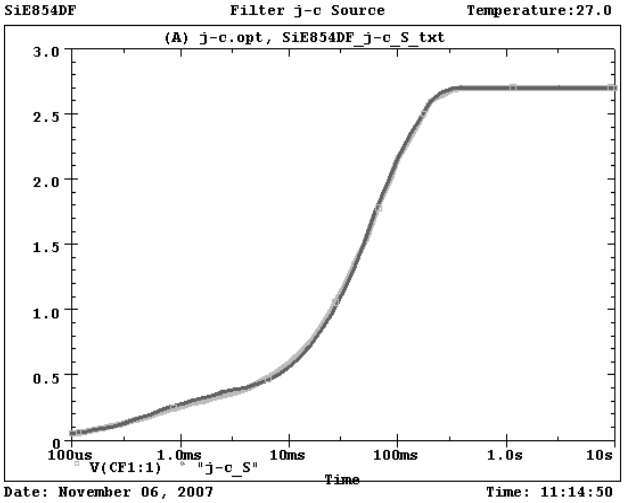

SiE854DF
Tank j-a
Temperature:27.0
(A) j-a.opt, SiE854DF_j-a_txt
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"j-a"
Time
Date: November 06, 2007
Time: 10:54:56


SiE854DF
Filter j-a
Temperature:27.0
(A) j-a.opt, SiE854DF_j-a_txt
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"j-a"
Time
Date: November 06, 2007
Time: 11:11:07


SiE854DF
Tank j-c Drain-Top
Temperature:27.0
(A) j-c.opt, SiE854DF_j-c_DT_txt
1.2
1.0
0.8
0.6
0.4
0.2
0
100us
1.0ms
10ms
100ms
1.0s
V(CT1:1)
"j-c_DT"
Time
Date: November 06, 2007
Time: 11:07:01


SiE854DF
Filter j-c Drain-Top
Temperature:27.0
(A) j-c.opt, SiE854DF_j-c_DT_txt
1.2
1.0
0.8
0.6
0.4
0.2
0
100us
1.0ms
10ms
100ms
1.0s
V(CF1:1)
"j-c_DT"
Time
Date: November 06, 2007
Time: 11:21:22


SiE854DF
Tank j-c Source
Temperature:27.0
(A) j-c.opt, SiE854DF_j-c_S_txt
3.0
2.5
2.0
1.5
1.0
0.5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) "j-c_S"
Time
Date: November 06, 2007
Time: 11:01:04


SiE854DF
Filter j-c Source
Temperature:27.0
(A) j-c.opt, SiE854DF_j-c_S_txt
3.0
2.5
2.0
1.5
1.0
0.5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1) "j-c_S"
Time
Date: November 06, 2007
Time: 11:14:50