R-C Thermal Model Parameters

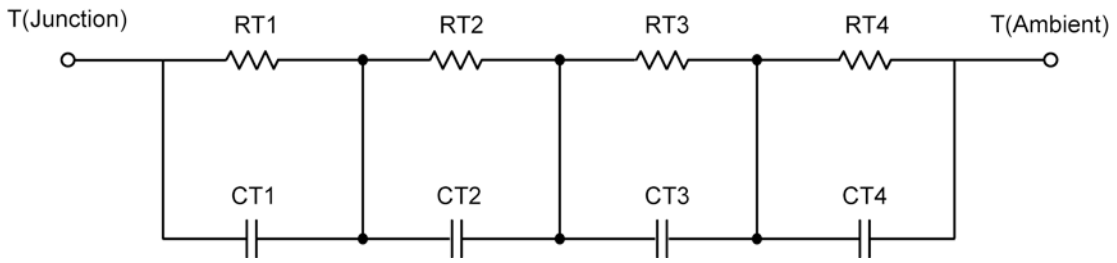
DESCRIPTION

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.

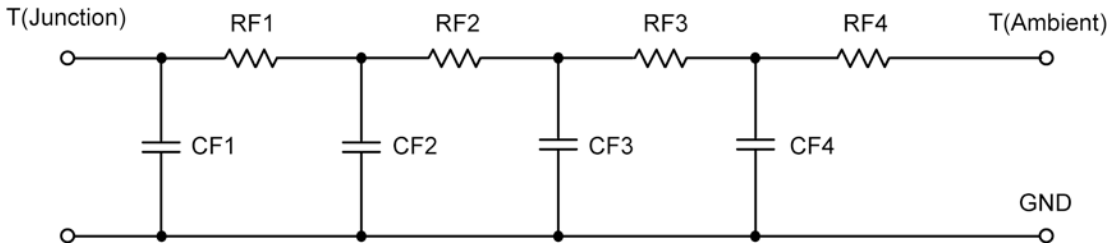
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case Drain Top**	**Case Source**
RT1	44.9153	13.1408 m	229.4359 m
RT2	8.1738	487.0575 m	2.4496
RT3	10.1018	322.8526 m	18.9606 m
RT4	4.8091	176.9491 m	2.0035 m
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case Drain Top**	**Case Source**
CT1	1.7371	250.3660 u	1.5956 m
CT2	2.4265	31.6715 m	27.3818 m
CT3	107.0599 m	63.7476 m	1.2618
CT4	32.5154 m	3.3166 m	5.0487 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

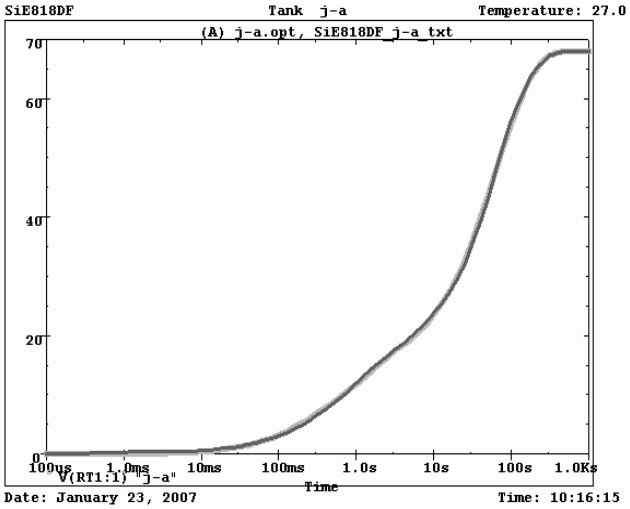


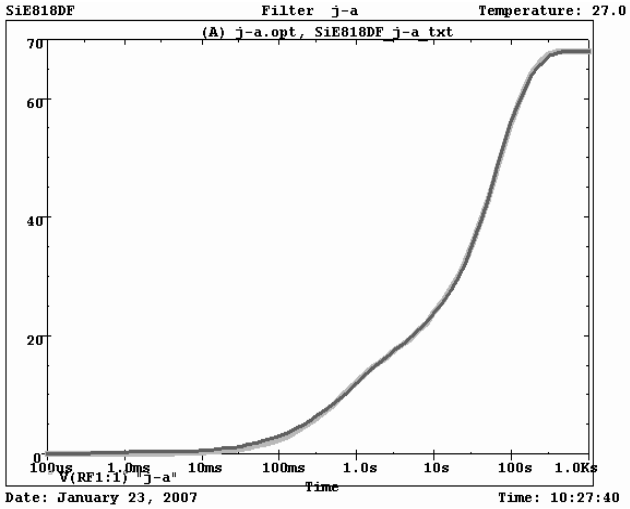
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case Drain Top**	**Case Source**
RF1	7.1102	270.5949 m	286.8241 m
RF2	8.2275	945.5000 u	1.2831
RF3	11.3316	8.1951 m	1.0331
RF4	41.3307	720.2645 m	96.9759 m
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case Drain Top**	**Case Source**
CF1	32.8978 m	2.7316 m	1.7681 m
CF2	27.9921 m	5.1728 m	25.3698 m
CF3	605.6687 m	13.7470 m	1.9573 m
CF4	955.9072 m	2.9036 m	135.6344 m

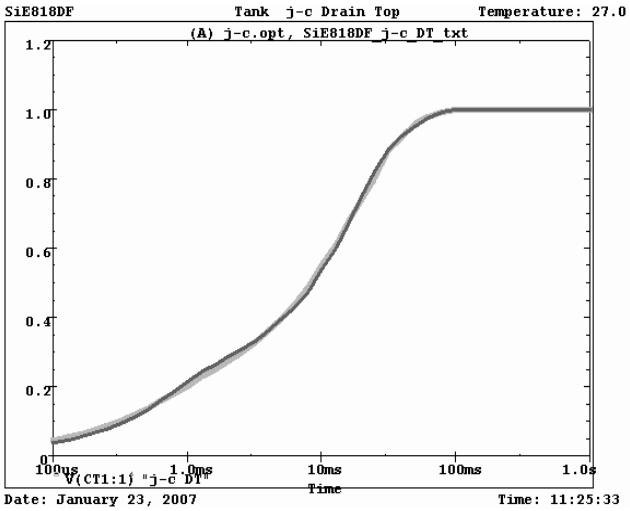
Note: NA indicates not applicable

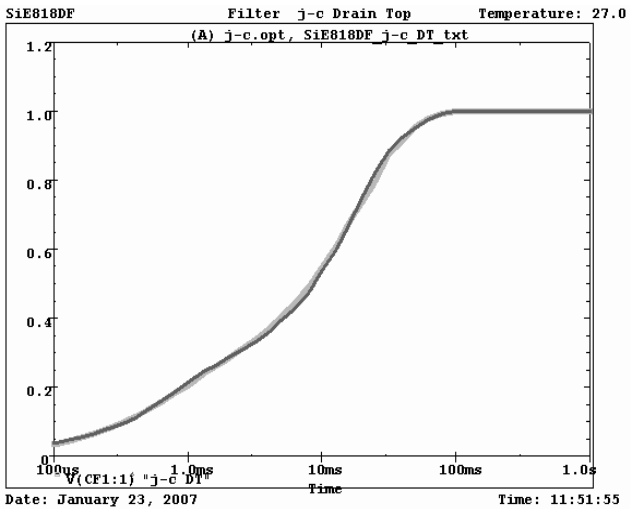
Reference:

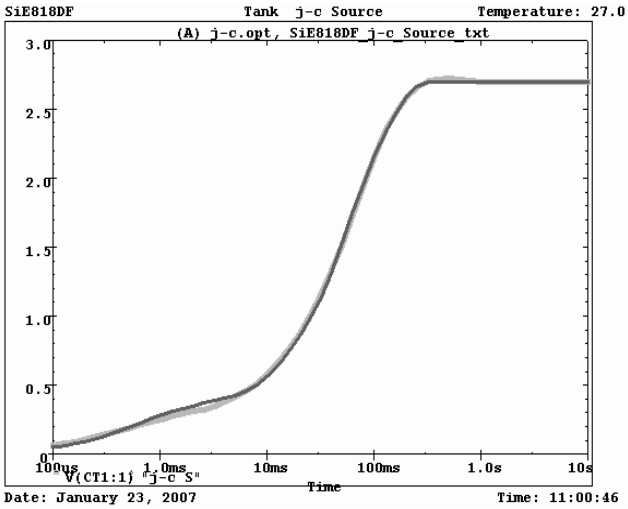
[1] "A Simple Method of Generating Thermal Models for a Power MOSFET" by Wharton McDaniel and Kandarp Pandya, IEEE / SEMITHERM 2002

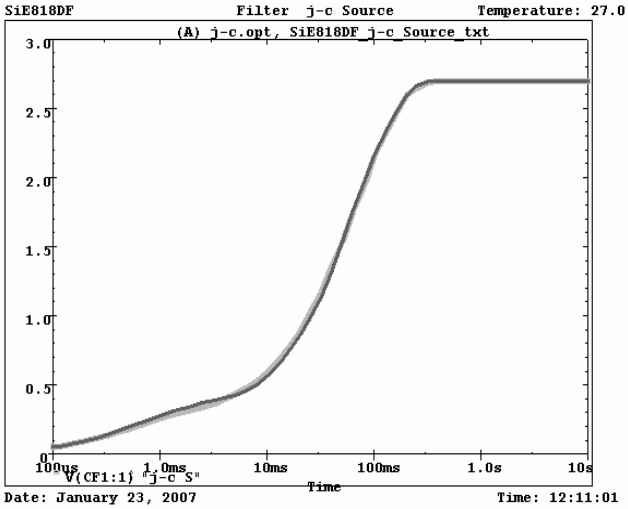

SiE818DF
Tank j-a
Temperature: 27.0
(A) j-a.opt, SiE818DF_j-a_txt
70
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RT1:1) "j-a"
Time
Date: January 23, 2007
Time: 10:16:15


SiE818DF
Filter j-a
Temperature: 27.0
(A) j-a.opt, SiE818DF_j-a_txt
70
60
40
20
0
100us 1.0ms 10ms 100ms 1.0s 10s 100s 1.0Ks
V(RF1:1) "j-a"
Time
Date: January 23, 2007
Time: 10:27:40


SiE818DF
Tank j-c Drain Top
Temperature: 27.0
(A) j-c.opt, SiE818DF_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: January 23, 2007
Time: 11:25:33


SiE818DF
Filter j-c Drain Top
Temperature: 27.0
(A) j-c.opt, SiE818DF_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: January 23, 2007
Time: 11:51:55


SiE818DF
Tank j-c Source
Temperature: 27.0
(A) j-c.opt, SiE818DF_j-c_Source_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: January 23, 2007
Time: 11:00:46


SiE818DF
Filter j-c Source
Temperature: 27.0
(A) j-c.opt, SiE818DF_j-c_Source_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: January 23, 2007
Time: 12:11:01