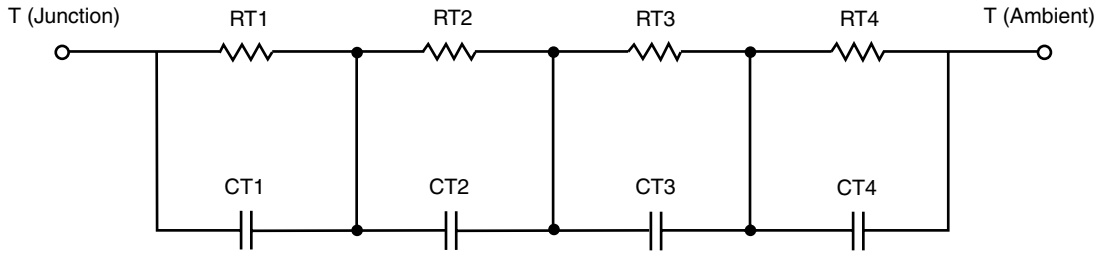
R-C Thermal Model Parameters

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

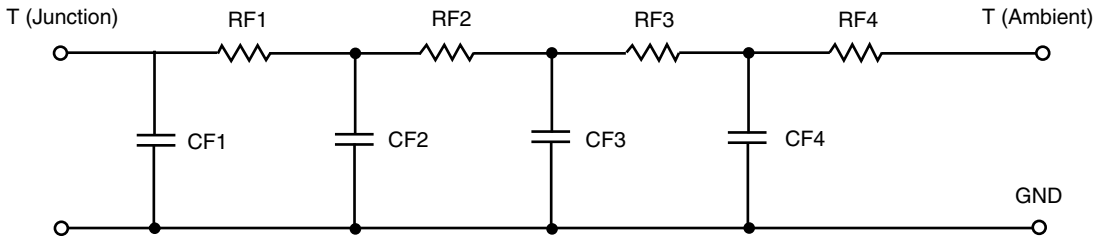


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case-Drain Top**	**Case-Source**
RT1	1.2715	541.9300 u	4.9136 m
RT2	7.4755	23.8824 m	388.3719 m
RT3	10.4813	959.1097 m	1.2410
RT4	48.7717	216.4666 m	1.7829
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case-Drain Top**	**Case-Source**
CT1	2.1640 m	45.9474 m	191.3039 m
CT2	230.0674 m	33.4132 m	1.0457 m
CT3	42.6031 m	18.2706 m	40.9728
CT4	1.2991	2.5656 m	27.6097 m

Note
N/A indicates not applicable

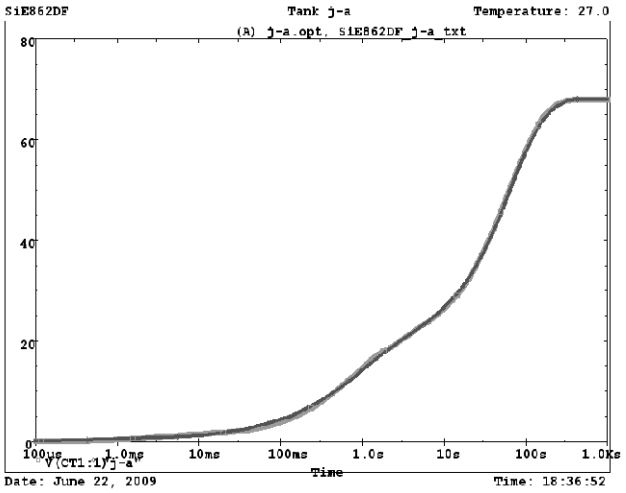
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

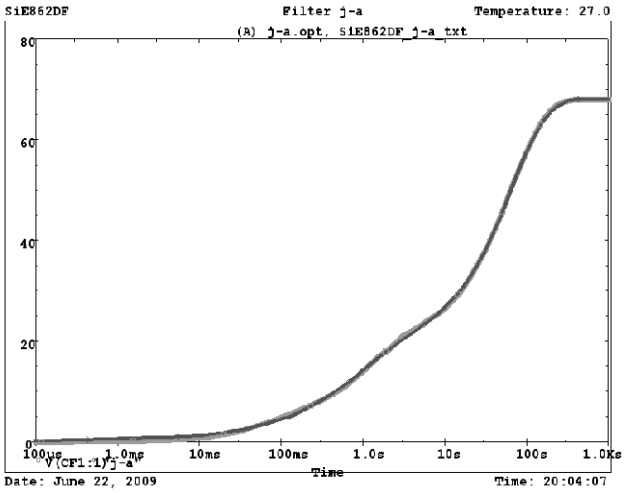
R-C THERMAL MODEL FOR FILTER CONFIGURATION

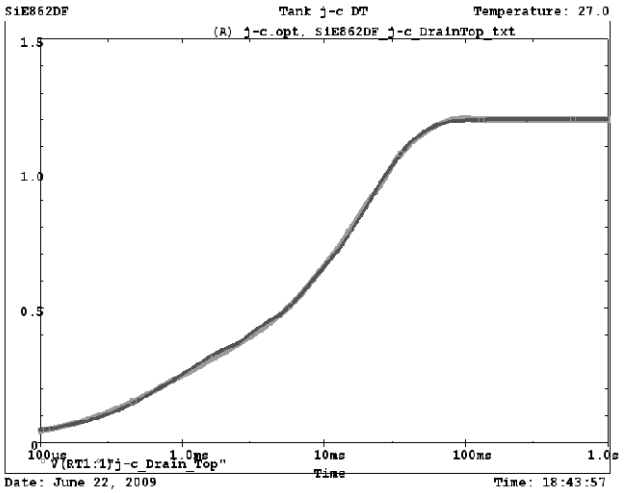


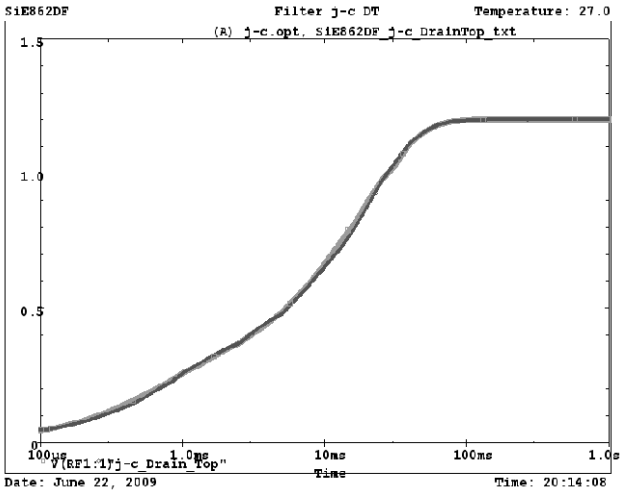
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case-Drain Top**	**Case-Source**
RF1	6.0874	310.0466 m	421.5311 m
RF2	7.6744	555.8000 u	1.2554
RF3	7.6389	52.0767 m	730.8719 m
RF4	46.5993	837.3209 m	1.0080
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case-Drain Top**	**Case-Source**
CF1	11.6397 m	2.0570 m	931.9768 u
CF2	60.3507 m	396.0260 u	14.0272 m
CF3	17.0829 m	16.5376 m	2.2019 m
CF4	1.3018	85.3684 u	7.7620 m

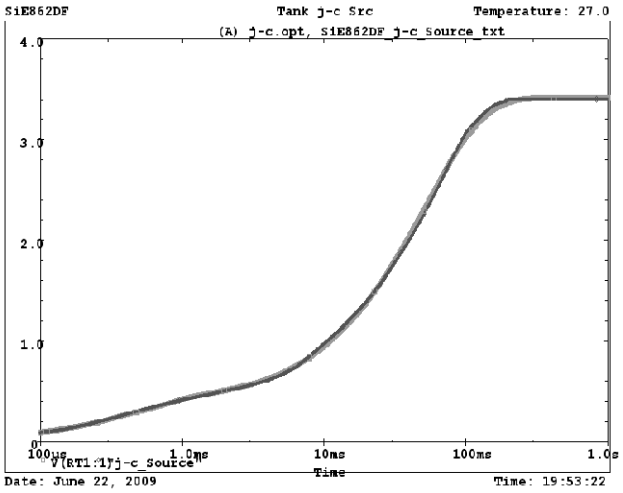
Note
N/A indicates not applicable

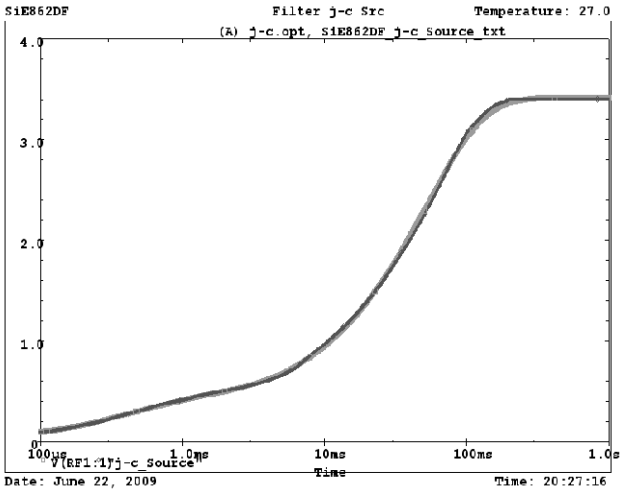

SiE862DF
Tank j-a
Temperature: 27.0
(A) j-a.opt, SiE862DF_j-a_txt
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(CT1:1)j-a
Time
Date: June 22, 2009
Time: 18:36:52


SiE862DF
Filter j-a
Temperature: 27.0
(A) j-a.opt, SiE862DF_j-a_txt
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(CF1:1)j-a
Time
Date: June 22, 2009
Time: 20:04:07


SiE862DF
Tank j-c DT
Temperature: 27.0
(A) j-c.opt, SiE862DF_j-c_DrainTop_txt
1.5
1.0
0.5
0
100us
1.0ms
10ms
100ms
1.0s
V(RT1:1)j-c_Drain_Top"
Time
Date: June 22, 2009
Time: 18:43:57


SiE862DF
Filter j-c DT
Temperature: 27.0
(A) j-c.opt, SiE862DF_j-c_DrainTop_txt
1.5
1.0
0.5
0
100us
1.0ms
10ms
100ms
1.0s
V(RF1:1)j-c_Drain_Top"
Time
Date: June 22, 2009
Time: 20:14:08


SiE862DF
Tank j-c Src
Temperature: 27.0
(A) j-c.opt, SiE862DF_j-c_Source_txt
4.0
3.0
2.0
1.0
0
100us
1.0ms
10ms
100ms
1.0s
V(RT1:1)j-c_Source
Time
Date: June 22, 2009
Time: 19:53:22


SiE862DF
Filter j-c Src
Temperature: 27.0
(A) j-c.opt, SiE862DF_j-c_Source_txt
4.0
3.0
2.0
1.0
0
100us
1.0ms
10ms
100ms
1.0s
V(RF1:1)j-c_Source
Time
Date: June 22, 2009
Time: 20:27:16