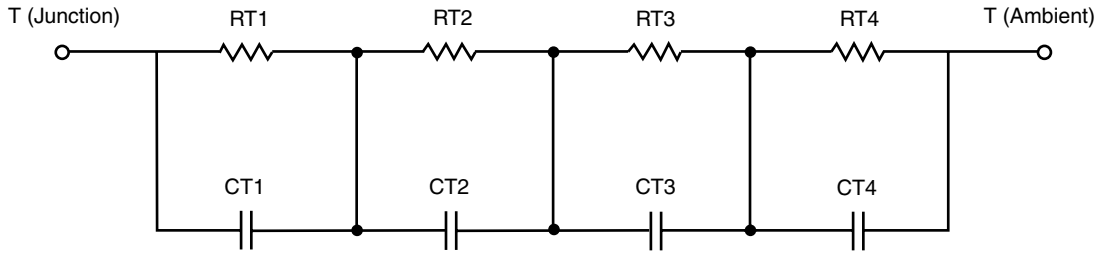
R-C Thermal Model Parameters

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

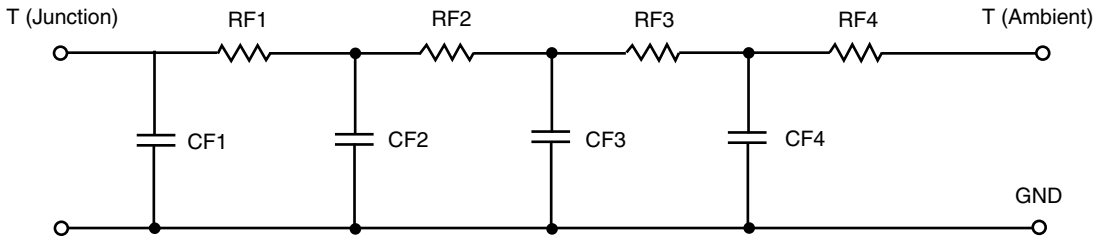


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	11.6896	322.3634 m	N/A
RT2	29.0173	151.4366 m	N/A
RT3	14.5773	4.6136	N/A
RT4	49.7158	4.4126	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	190.9854 u	1.1733 u	N/A
CT2	3.6354 m	10.6419 m	N/A
CT3	280.9408 m	81.8806 u	N/A
CT4	1.7157	300.8006 u	N/A

Note
N/A indicates not applicable

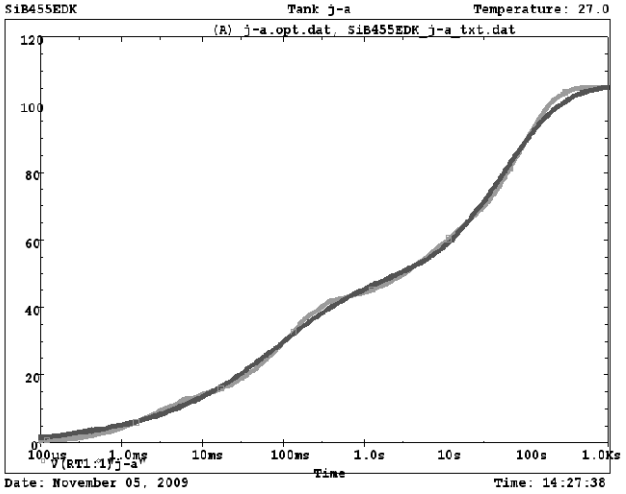
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

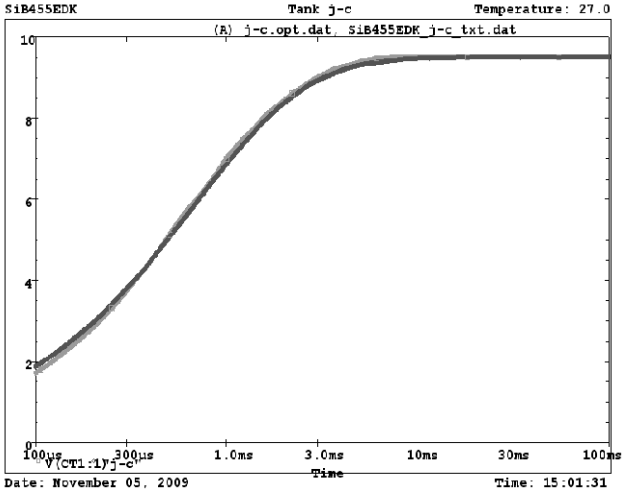
R-C THERMAL MODEL FOR FILTER CONFIGURATION

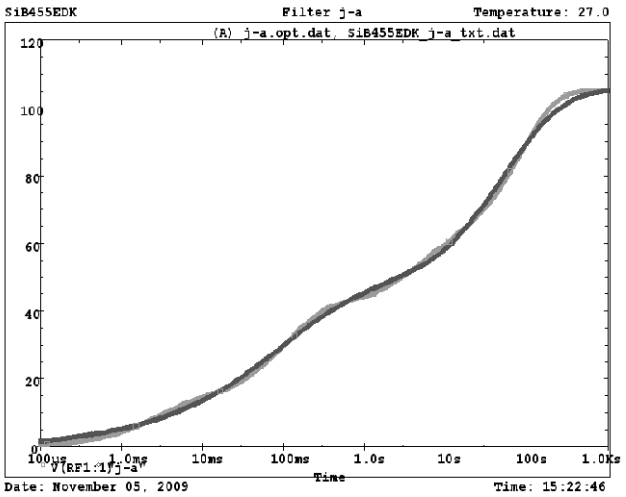


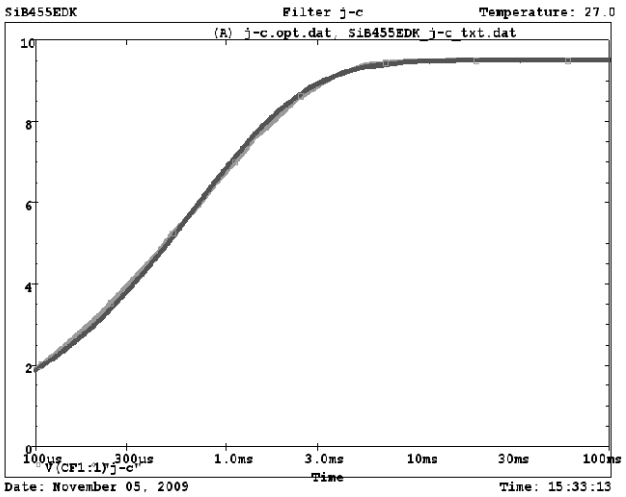
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	13.5612	4.5235	N/A
RF2	27.4850	3.8638	N/A
RF3	19.1865	99.5030 m	N/A
RF4	44.7673	1.0032	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	194.3628 u	40.9905 u	N/A
CF2	3.6248 m	141.3380 u	N/A
CF3	219.9348 m	778.5330 u	N/A
CF4	1.6960	318.3538 u	N/A

Note
N/A indicates not applicable


SiB455EDK
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, SiB455EDK_j-a_txt.dat
120
100
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)j-a
Time
Date: November 05, 2009
Time: 14:27:38


SiB455EDK
Tank j-c
Temperature: 27.0
(A) j-c.opt.dat, SiB455EDK_j-c_txt.dat
10
8
6
4
2
0
100µs
300µs
1.0ms
3.0ms
10ms
30ms
100ms
V(CT1:1)j-c
Time
Date: November 05, 2009
Time: 15:01:31


SiB455EDK
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, SiB455EDK_j-a_txt.dat
120
100
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)j-a
Time
Date: November 05, 2009
Time: 15:22:46


SiB455EDK
Filter j-c
Temperature: 27.0
(A) j-c.opt.dat, SiB455EDK_j-c_txt.dat
10
8
6
4
2
0
100µs
300µs
1.0ms
3.0ms
10ms
30ms
100ms
V(CF1:1)j-c
Time
Date: November 05, 2009
Time: 15:33:13