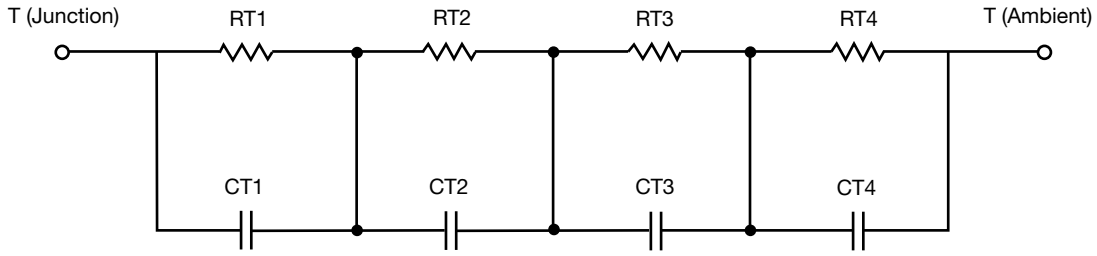
R-C Thermal Model Parameters

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

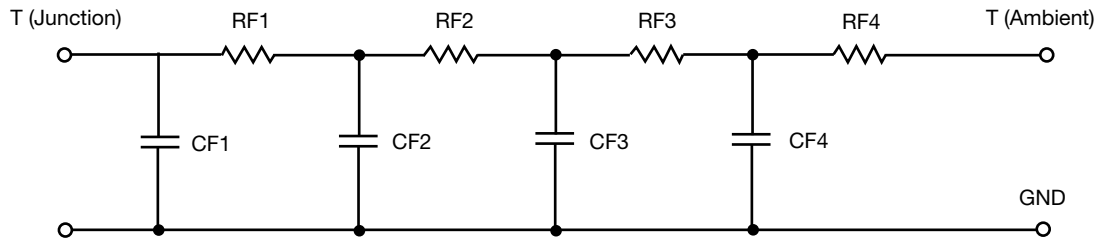


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	7.7577	N/A	3.4405
RT2	26.8456	N/A	13.2268
RT3	28.9084	N/A	8.2703
RT4	46.3048	N/A	15.0762
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	723.2020u	N/A	342.6764u
CT2	110.2712m	N/A	53.6638m
CT3	12.1684m	N/A	235.3301m
CT4	1.4648	N/A	5.0585m

Note
N/A indicates not applicable

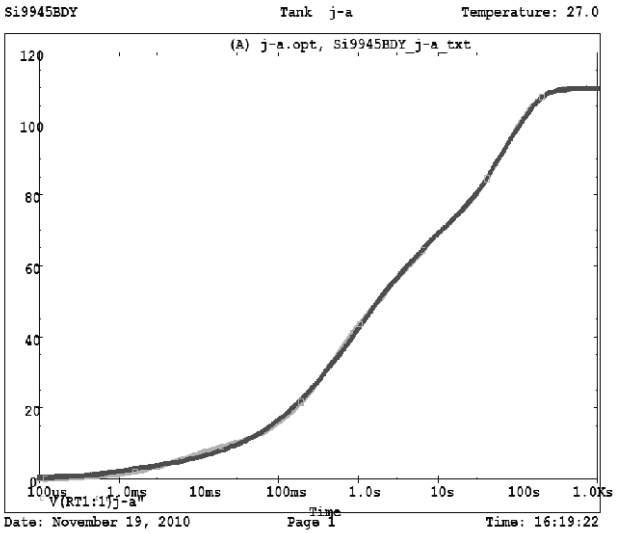
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

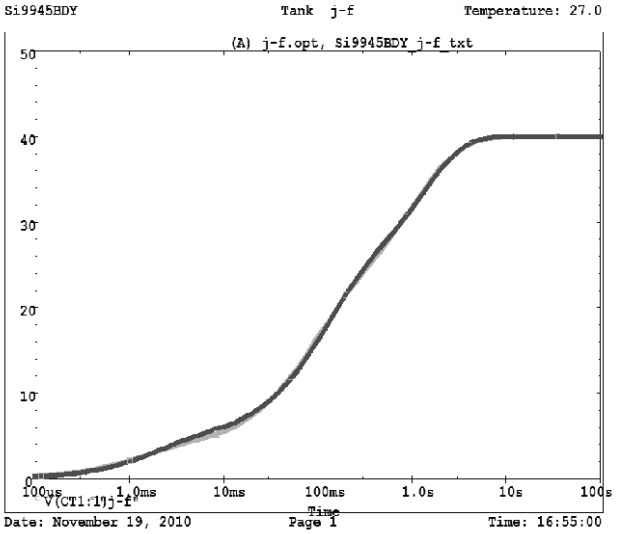
R-C THERMAL MODEL FOR FILTER CONFIGURATION



R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	7.5431	N/A	4.0496
RF2	32.6239	N/A	17.0531
RF3	26.0453	N/A	13.1980
RF4	43.4749	N/A	5.7102
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	483.3203u	N/A	316.3567u
CF2	9.3659m	N/A	4.2443m
CF3	80.8029m	N/A	36.3998m
CF4	1.4093	N/A	222.0795m

Note
N/A indicates not applicable


Si9945BDY
Tank j-a
Temperature: 27.0
(A) j-a.opt, Si9945BDY_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)j-a
Time
Date: November 19, 2010
Page 1
Time: 16:19:22


Si9945BDY
Tank j-f
Temperature: 27.0
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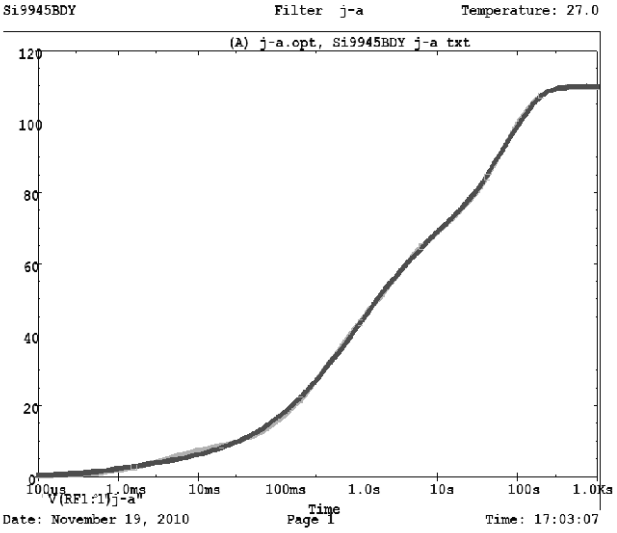
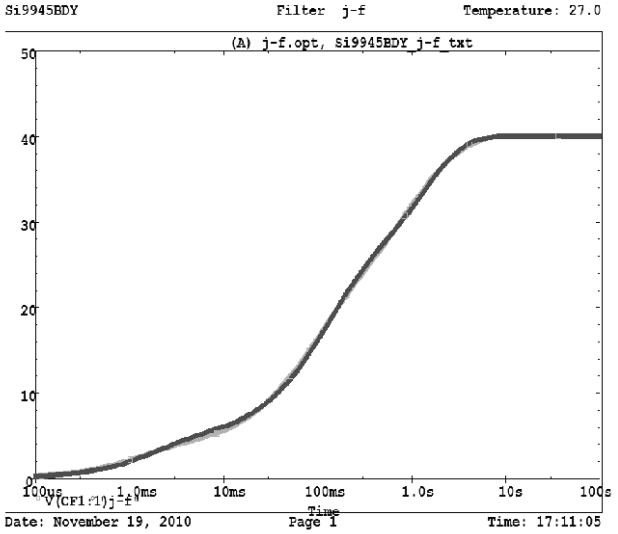
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1)j-f
Time
Date: November 19, 2010
Page 1
Time: 16:55:00


Si9945BDY
Filter j-a
Temperature: 27.0
(A) j-a.opt, Si9945BDY_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)j-a
Time
Date: November 19, 2010
Page 1
Time: 17:03:07


Si9945BDY
Filter j-f
Temperature: 27.0
(A) j-f.opt, Si9945BDY_j-f_txt
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1)j-f
Time
Date: November 19, 2010
Page 1
Time: 17:11:05