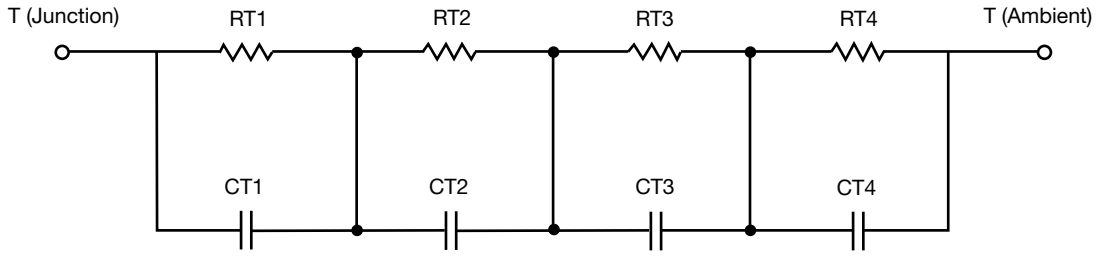
R-C Thermal Model Parameters

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

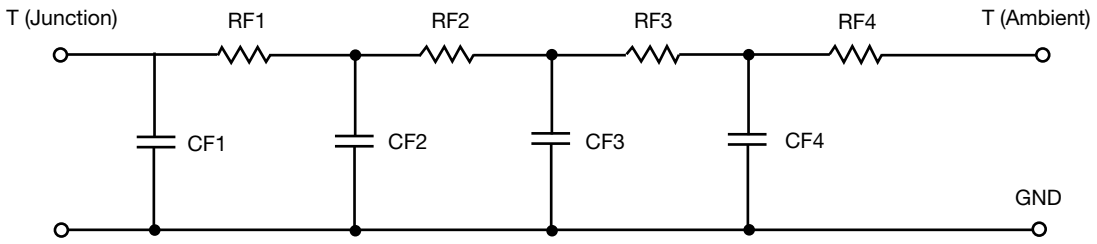


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	27.5199	N/A	5.1170
RT2	29.7857	N/A	6.6802
RT3	7.2082	N/A	6.5298
RT4	20.5010	N/A	1.6582
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	46.6008m	N/A	335.0202m
CT2	1.5644	N/A	102.8914m
CT3	7.4611m	N/A	7.9028m
CT4	4.0068	N/A	1.3600m

Note
N/A indicates not applicable

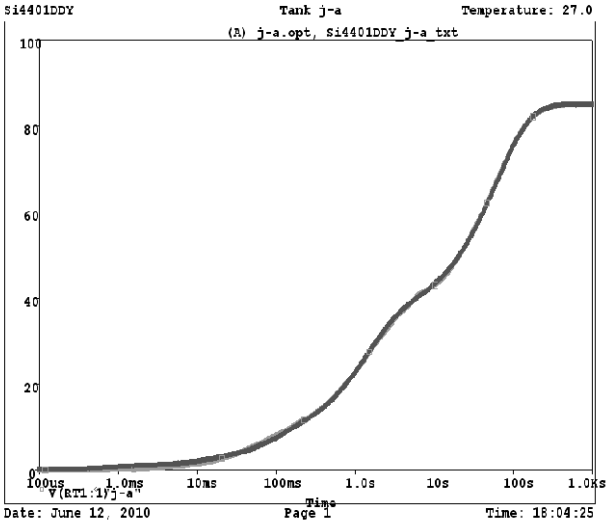
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

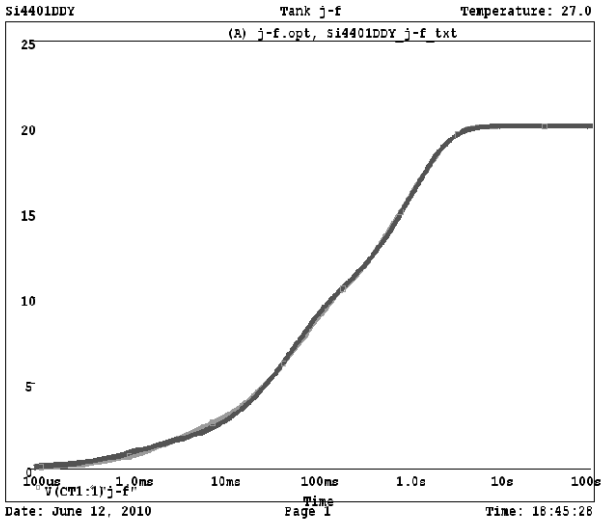
R-C THERMAL MODEL FOR FILTER CONFIGURATION

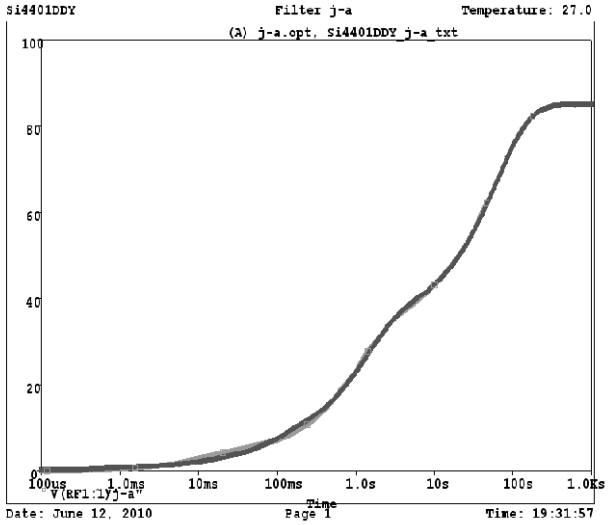


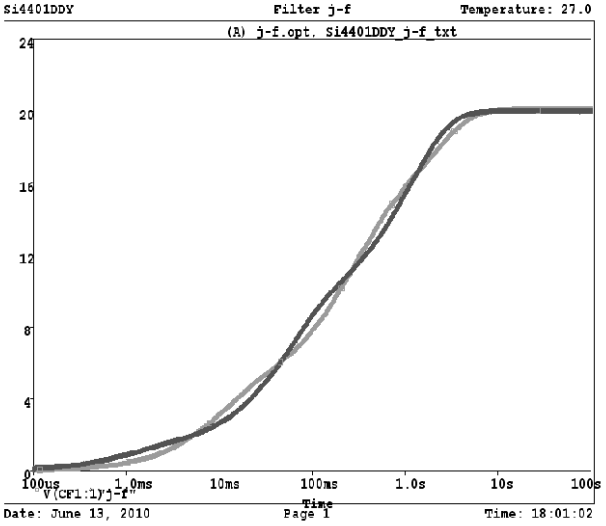
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	4.9897	N/A	5.1819
RF2	30.3637	N/A	9.4266
RF3	21.8909	N/A	1.3486
RF4	27.7372	N/A	4.1241
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	2.2745m	N/A	2.0843m
CF2	31.6182m	N/A	23.5907m
CF3	837.6736m	N/A	307.0968m
CF4	1.0105	N/A	2.4911m

Note
N/A indicates not applicable


Si4401DDY
Tank j-a
Temperature: 27.0
(A) j-a.opt, Si4401DDY_j-a_txt
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0ks
V(RT1:1)/j-a"
Time
Date: June 12, 2010
Page 1
Time: 18:04:25


Si4401DDY
Tank j-f
Temperature: 27.0
(A) j-f.opt, Si4401DDY_j-f_txt
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1)/j-f"
Time
Date: June 12, 2010
Page 1
Time: 18:45:28


Si4401DDY
Filter j-a
Temperature: 27.0
(A) j-a.opt, Si4401DDY_j-a_txt
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0ks
V(RF1:1)/j-a"
Time
Date: June 12, 2010
Page 1
Time: 19:31:57


Si4401DDY
Filter j-f
Temperature: 27.0
(A) j-f.opt, Si4401DDY_j-f_txt
24
20
16
12
8
4
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1)/j-f"
Time
Date: June 13, 2010
Page 1
Time: 18:01:02