R-C Thermal Model Parameters

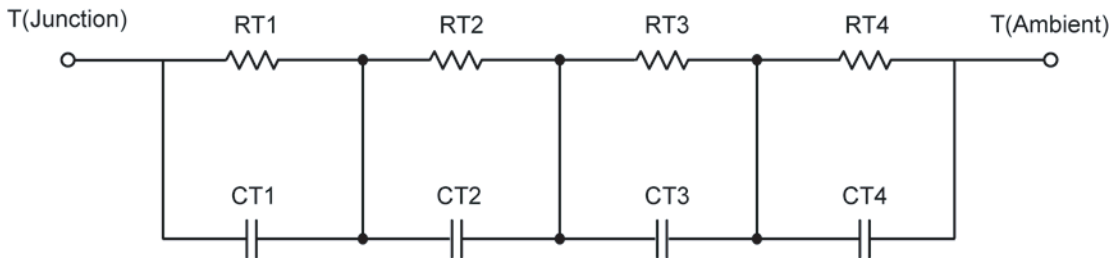
DESCRIPTION

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.

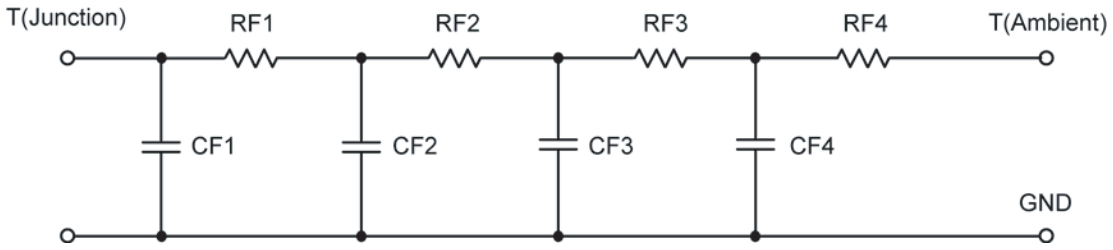
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	6.4512	N/A	12.8938
RT2	19.7375	N/A	3.6871
RT3	28.1266	N/A	13.3442
RT4	55.6847	N/A	10.0749
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	1.2110 m	N/A	140.7837 m
CT2	8.6101 m	N/A	435.8247 u
CT3	53.9851 m	N/A	4.4091 m
CT4	1.2507	N/A	16.4710 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

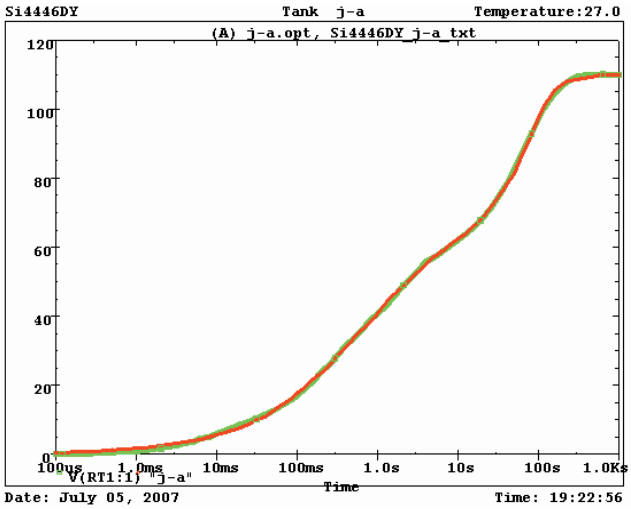


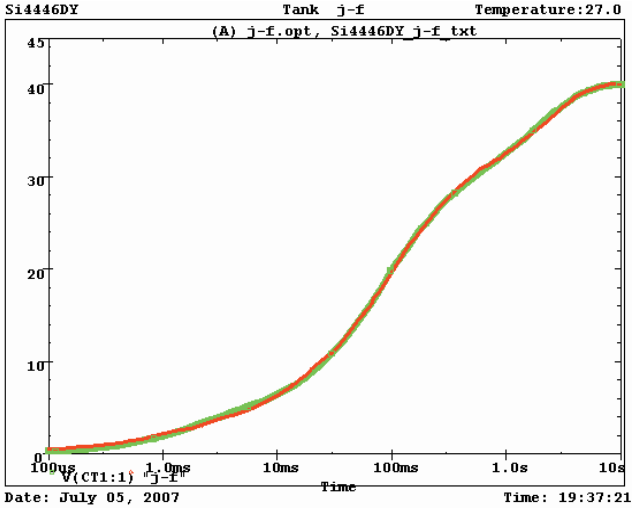
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	7.9351	N/A	4.3869
RF2	23.8402	N/A	17.8937
RF3	25.0868	N/A	7.8069
RF4	53.1379	N/A	9.9125
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	986.3980 u	N/A	389.8923 u
CF2	6.2199 m	N/A	2.8419 m
CF3	50.8583 m	N/A	19.1939 m
CF4	1.2517	N/A	160.4153 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


Si4446DY
Tank j-a
Temperature:27.0
(A) j-a.opt, Si4446DY_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: July 05, 2007
Time: 19:22:56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Tank j-f
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40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
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Time
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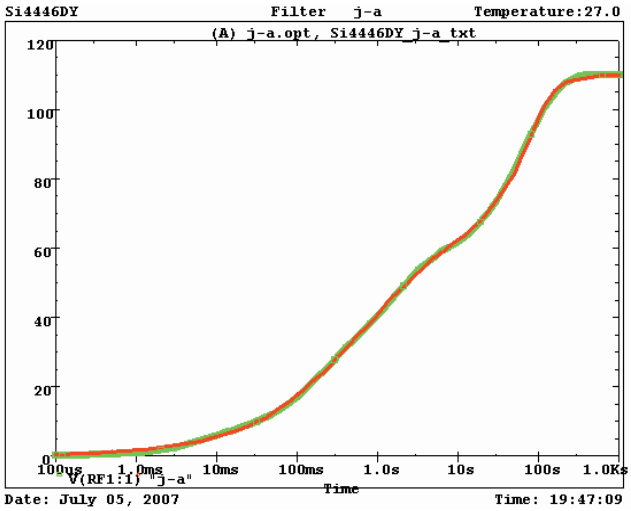
Time: 19:37:21


Si4446DY
Filter j-a
Temperature:27.0
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120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
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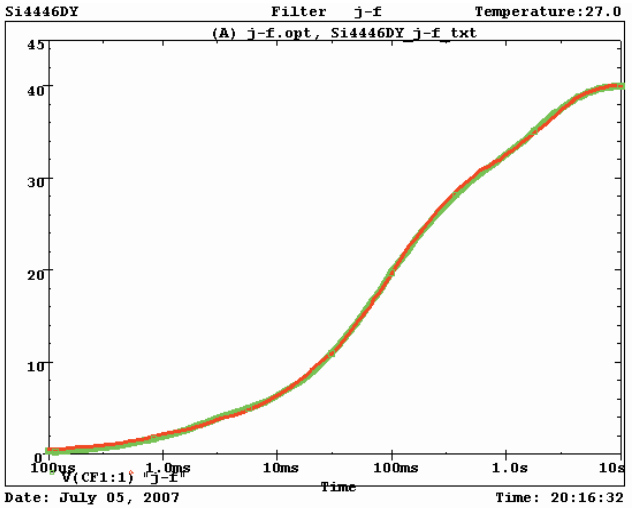
Time
Date: July 05, 2007
Time: 19:47:09


Si4446DY
Filter j-f
Temperature:27.0
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45
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1) "j-f"
Time
Date: July 05, 2007
Time: 20:16:32