R-C Thermal Model Parameters

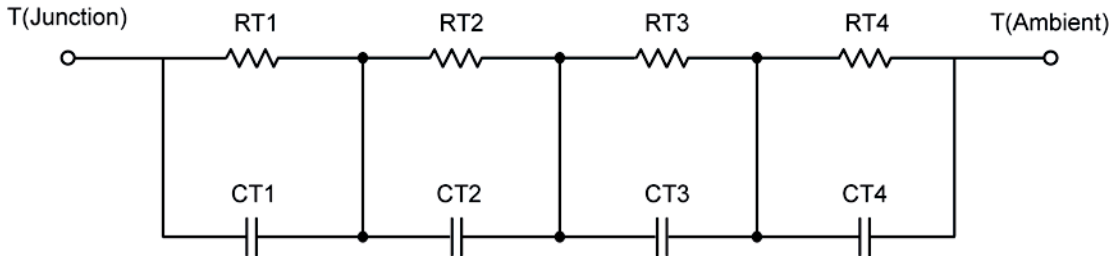
DESCRIPTION

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.

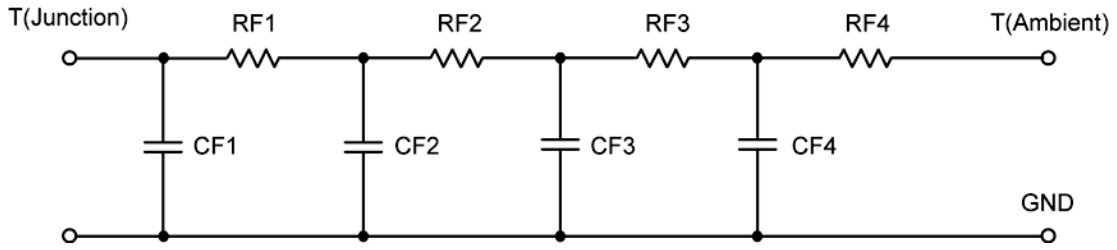
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Foot**	**Case Ch1**	**Case Ch2**
RT1	29.1250	29.1250	N/A	12.4930 u	12.4930 u
RT2	6.9670	6.9670	N/A	7.8166	7.8166
RT3	18.5814	18.5813	N/A	3.8770	3.8770
RT4	50.1265	50.1265	N/A	3.3831	3.3831
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Foot**	**Case Ch1**	**Case Ch2**
CT1	4.5843 m	4.5843 m	N/A	3.3132 u	3.3132 u
CT2	283.6332 u	283.6335 u	N/A	2.6715 m	2.6715 m
CT3	107.8806 m	107.8794 m	N/A	164.1373 u	164.1373 u
CT4	1.5756	1.5756	N/A	3.3150 m	3.3150 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

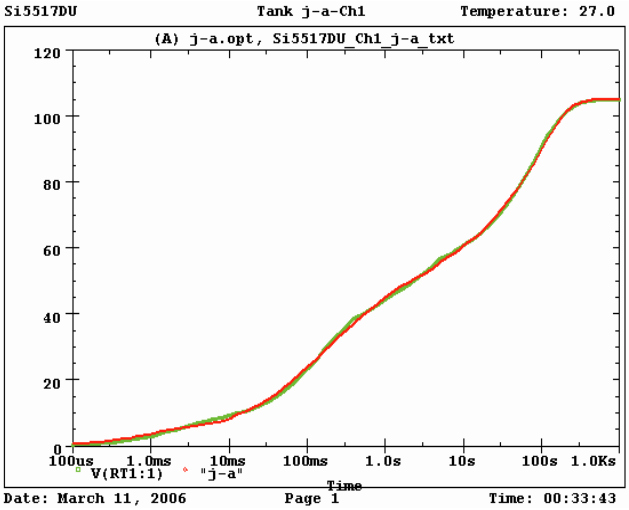


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Foot**	**Case Ch1**	**Case Ch2**
RF1	9.3413	9.3413	N/A	5.5864	5.5864
RF2	29.9229	29.9229	N/A	2.3591	2.3591
RF3	18.5687	18.5687	N/A	6.5605	6.5605
RF4	47.0389	47.0389	N/A	511.4712 m	511.4712 m
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Foot**	**Case Ch1**	**Case Ch2**
CF1	356.4670 u	356.4669 u	N/A	174.6616 u	174.6616 u
CF2	4.6000 m	4.6000 m	N/A	1.8003 m	1.8003 m
CF3	116.2239 m	116.2237 m	N/A	183.9506 u	183.9506 u
CF4	1.5853	1.5853	N/A	5.4784 m	5.4784 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


Si5517DU
Tank j-a-Ch1
Temperature: 27.0
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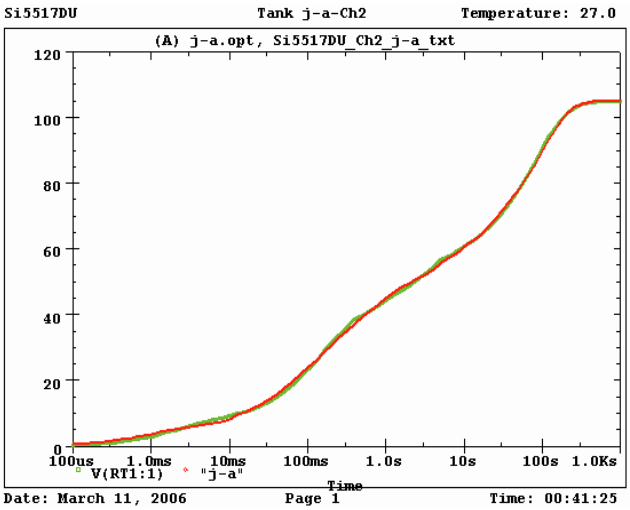
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"j-a"
Time
Date: March 11, 2006
Page 1
Time: 00:33:43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Tank j-a-Ch2
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20
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100us
1.0ms
10ms
100ms
1.0s
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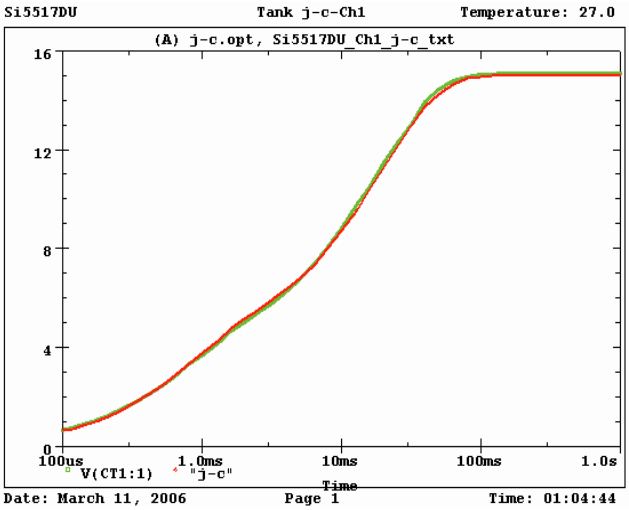
100s
1.0Ks
V(RT1:1)
"j-a"
Time
Date: March 11, 2006
Page 1
Time: 00:41:25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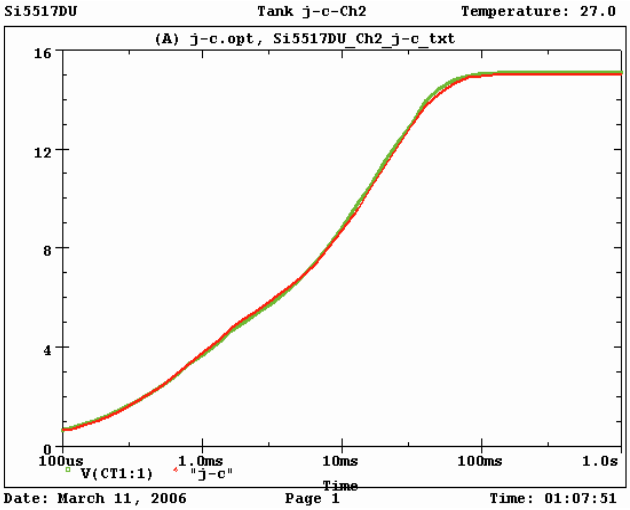
12
8
4
0
100us
1.0ms
10ms
100ms
1.0s
V(CT1:1)
"j-c"
Time
Date: March 11, 2006
Page 1
Time: 01:04:44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Tank j-c-Ch2
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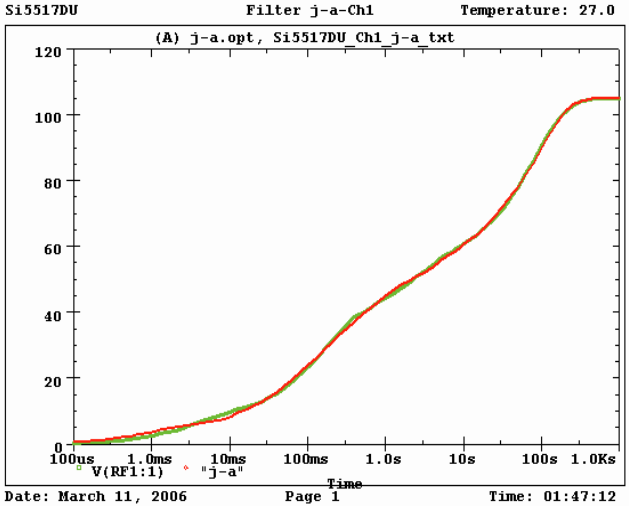
16
12
8
4
0
100us
1.0ms
10ms
100ms
1.0s
V(CT1:1)
"j-c"
Time
Date: March 11, 2006
Page 1
Time: 01:07:51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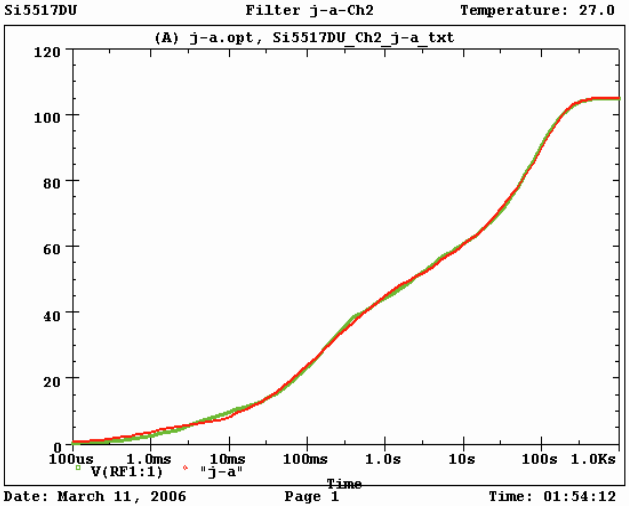
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"j-a"
Time
Date: March 11, 2006
Page 1
Time: 01:47:12


Si5517DU
Filter j-a-Ch2
Temperature: 27.0
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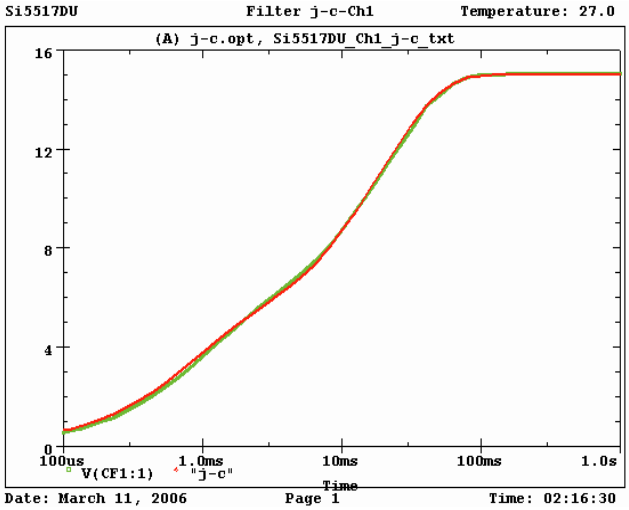
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"j-a"
Time
Date: March 11, 2006
Page 1
Time: 01:54:12


Si5517DU
Filter j-c-Ch1
Temperature: 27.0
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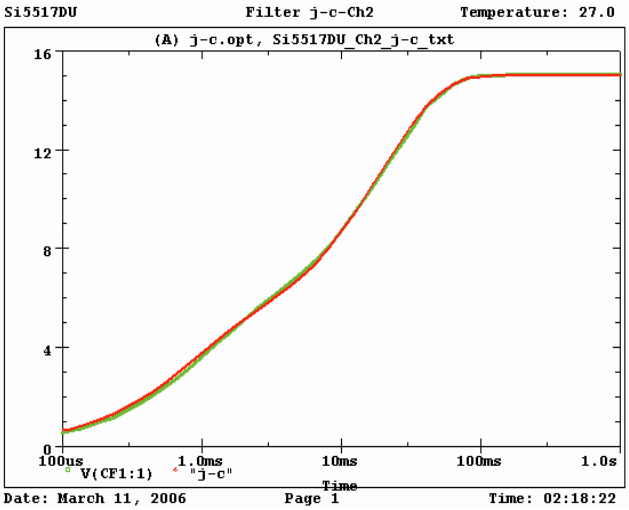
12
8
4
0
100us
1.0ms
10ms
100ms
1.0s
V(CF1:1)
"j-c"
Time
Date: March 11, 2006
Page 1
Time: 02:16:30


Si5517DU
Filter j-c-Ch2
Temperature: 27.0
(A) j-c.opt, Si5517DU_Ch2_j-c_txt
16
12
8
4
0
100us
1.0ms
10ms
100ms
1.0s
V(CF1:1)
"j-c"
Time
Date: March 11, 2006
Page 1
Time: 02:18:22