R-C Thermal Model Parameters

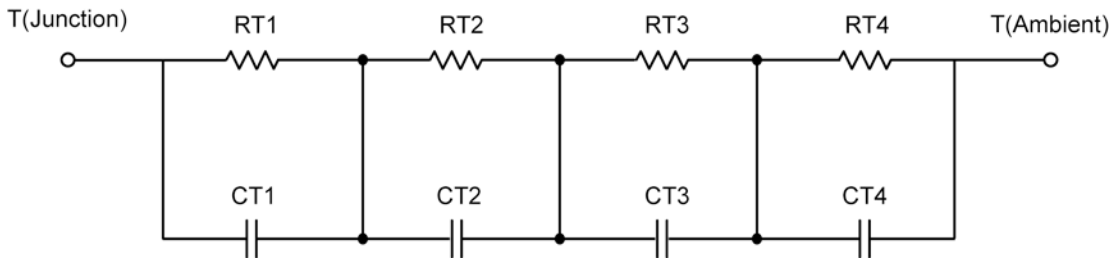
DESCRIPTION

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.

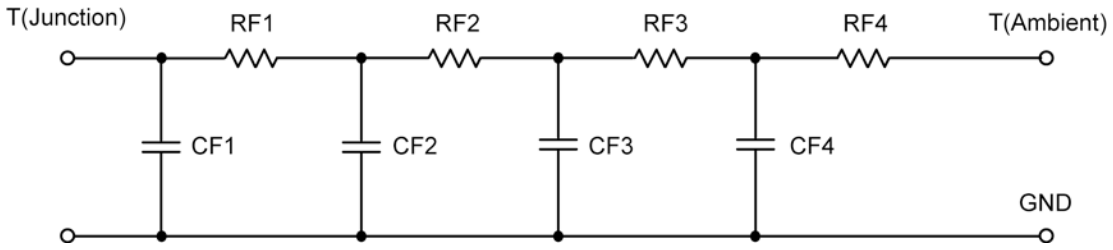
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
RT1	18.4089	11.5754	N/A	10.2105	13.6083
RT2	17.8851	11.2291	N/A	3.6948	7.3450
RT3	41.9173	39.2836	N/A	14.0966	6.3519
RT4	33.7887	44.9119	N/A	9.9981	7.6948
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
CT1	1.3648 m	484.8991 u	N/A	17.6473 m	128.6931 m
CT2	838.2108 m	7.2946	N/A	35.2934 u	17.2943 m
CT3	13.6660 m	30.6165 m	N/A	1.5248 m	209.7274 u
CT4	2.7414	1.3527	N/A	470.7153 u	4.5199 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

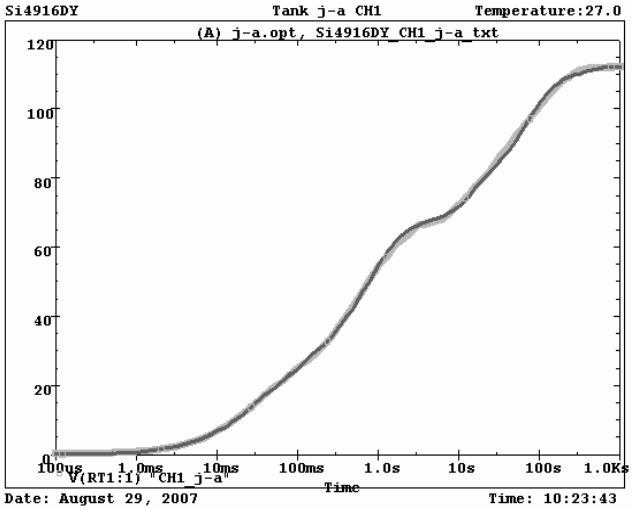


R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
RF1	23.1011	12.1842	N/A	5.0652	7.2555
RF2	43.2081	39.5572	N/A	16.5384	10.1416
RF3	25.8733	36.2647	N/A	10.1157	7.5443
RF4	19.8175	18.9939	N/A	6.2807	10.0586
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case**	**Foot Ch1**	**Foot Ch2**
CF1	1.4204 m	511.9182 u	N/A	42.7903 u	206.3354 u
CF2	14.6599 m	29.5456 m	N/A	336.0674 u	3.3030 m
CF3	1.1011	906.7256 m	N/A	2.4894 m	18.9229 m
CF4	2.1279	1.9760	N/A	28.8869 m	184.6816 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


Si4916DY
Tank j-a CH1
Temperature:27.0
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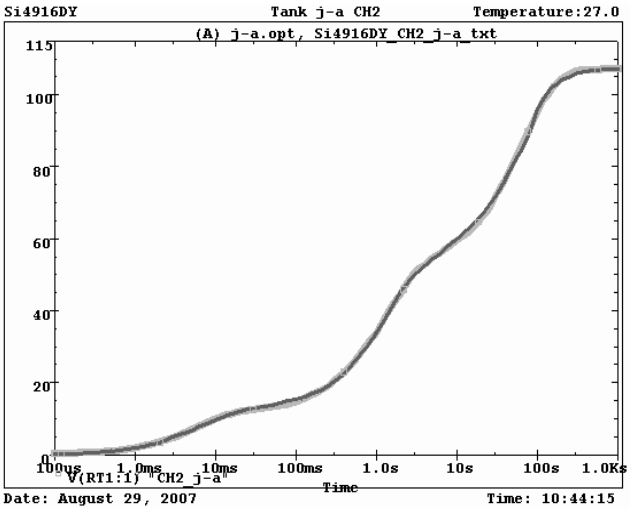
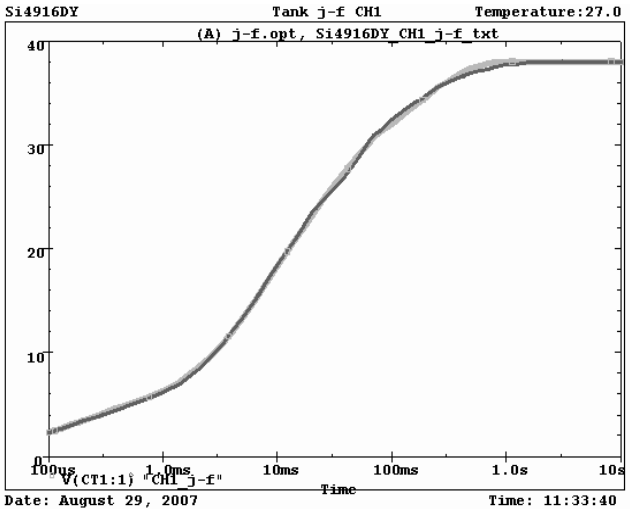
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "CH1_j-a"
Time
Date: August 29, 2007
Time: 10:23:43


Si4916DY
Tank j-a CH2
Temperature:27.0
(A) j-a.opt, Si4916DY_CH2_j-a_txt
115
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1) "CH2_j-a"
Time
Date: August 29, 2007
Time: 10:44:15


Si4916DY
Tank j-f CH1
Temperature:27.0
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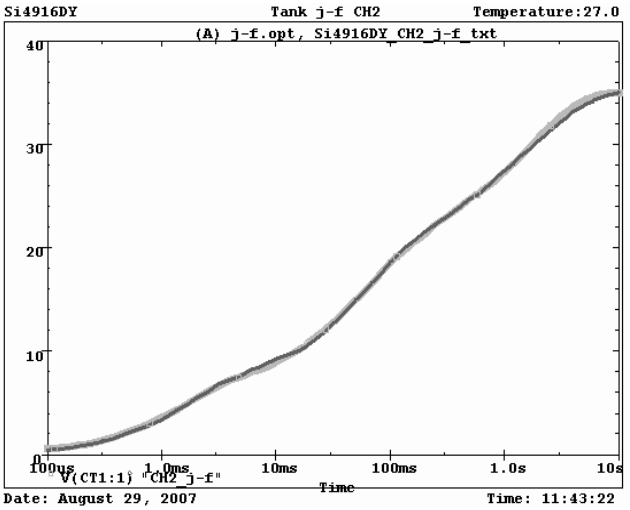
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) "CH1_j-f"
Time
Date: August 29, 2007
Time: 11:33:40


Si4916DY
Tank j-f CH2
Temperature:27.0
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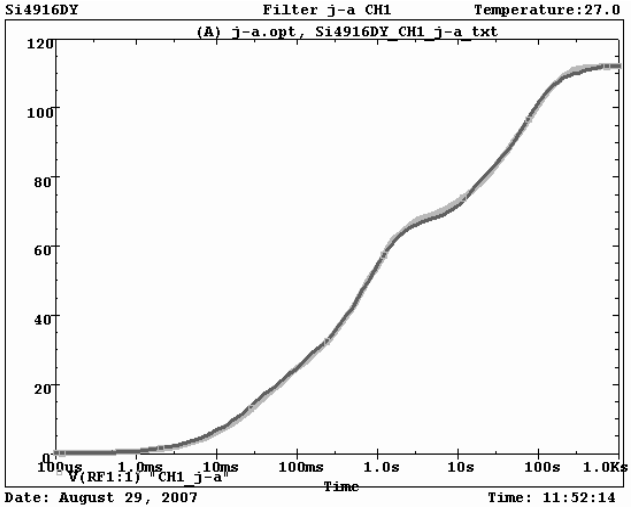
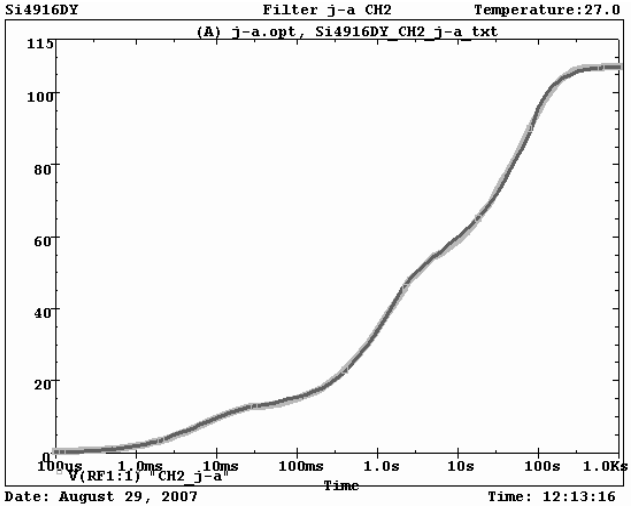
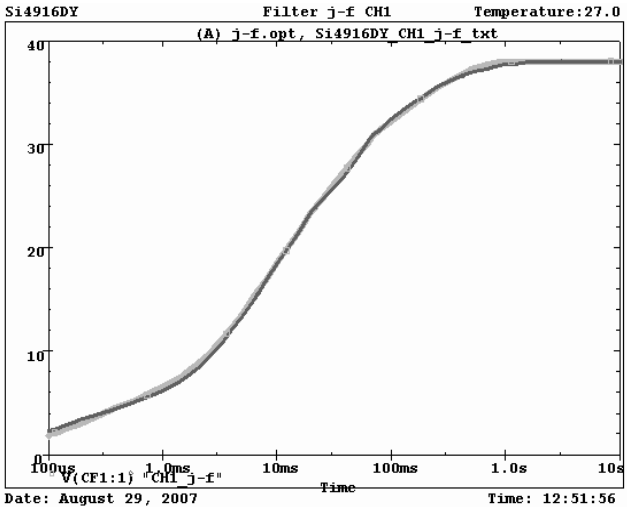
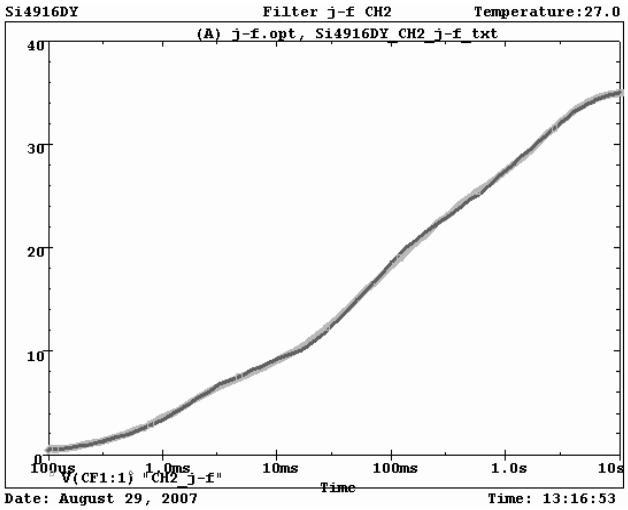
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) "CH2_j-f"
Time
Date: August 29, 2007
Time: 11:43:22


Si4916DY
Filter j-a CH1
Temperature:27.0
(A) j-a.opt, Si4916DY_CH1_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1) "CH1_j-a"
Time
Date: August 29, 2007
Time: 11:52:14


Si4916DY
Filter j-a CH2
Temperature:27.0
(A) j-a.opt, Si4916DY_CH2_j-a_txt
115
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1) "CH2_j-a"
Time
Date: August 29, 2007
Time: 12:13:16


Si4916DY
Filter j-f CH1
Temperature:27.0
(A) j-f.opt, Si4916DY_CH1_j-f_txt
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1) "CH1_j-f"
Time
Date: August 29, 2007
Time: 12:51:56


Si4916DY
Filter j-f CH2
Temperature:27.0
(A) j-f.opt, Si4916DY_CH2_j-f_txt
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1) "CH2_j-f"
Time
Date: August 29, 2007
Time: 13:16:53