R-C Thermal Model Parameters

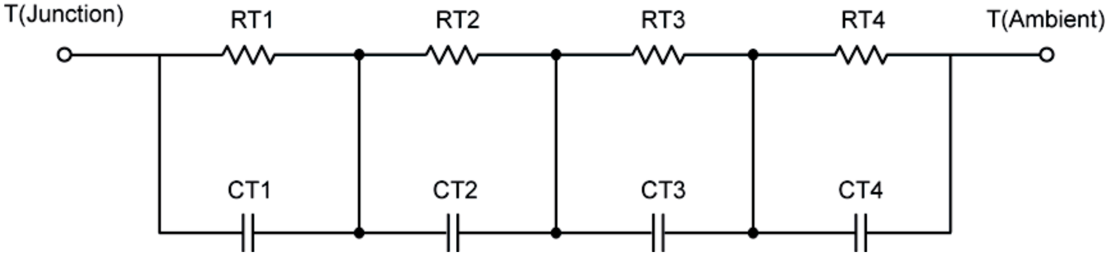
DESCRIPTION

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.

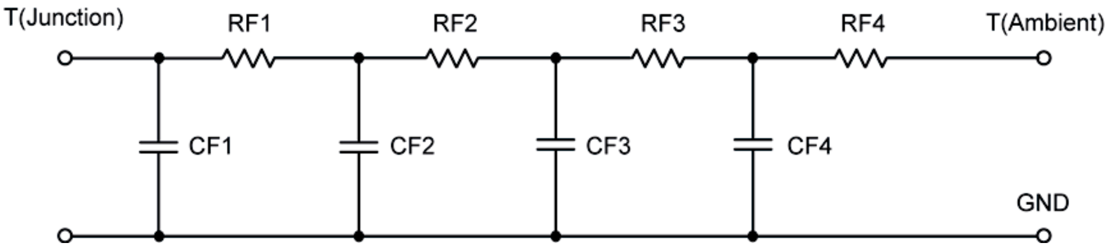
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	Ambient Mosfet	Ambient Schottky	Foot	Case Mosfet	Case Schottky
RT1	24.9258	28.9221	N/A	3.5140	2.8054
RT2	7.5912	7.3091	N/A	1.8960	4.9986
RT3	19.9327	20.8323	N/A	203.4628 m	2.8538
RT4	51.3141	52.5790	N/A	6.3864	5.2459
Thermal Capacitance (Joules/°C)					
Junction to	Ambient Mosfet	Ambient Schottky	Foot	Case Mosfet	Case Schottky
CT1	2.8414 m	1.4668 m	N/A	216.1912 u	472.9542 u
CT2	153.5979 u	170.4317 u	N/A	6.2984 m	5.8552 m
CT3	56.4764 m	32.1873 m	N/A	28.4126 m	83.4890 m
CT4	873.3419 m	1.3431	N/A	3.4802 m	5.6057 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



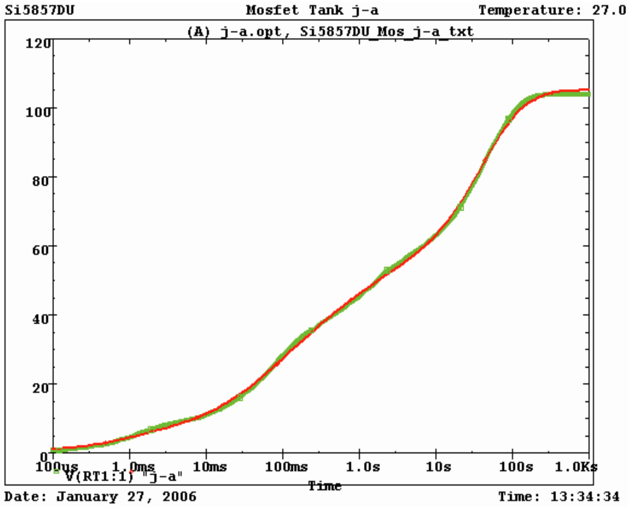
R-C VALUES FOR FILTER CONFIGURATION

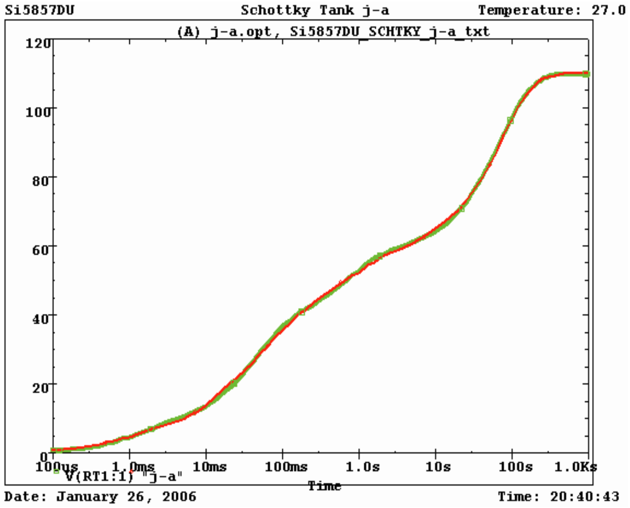
Thermal Resistance (°C/W)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Foot**	**Case Mosfet**	**Case Schottky**
RF1	9.0434	10.7289	N/A	4.1435	3.8103
RF2	26.0161	29.1305	N/A	6.5684	10.1214
RF3	19.8146	18.6173	N/A	677.6384 m	812.8294 m
RF4	49.0116	51.4622	N/A	639.9983 m	1.1347
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Foot**	**Case Mosfet**	**Case Schottky**
CF1	160.3575 u	182.4751 u	N/A	206.0856 u	393.2769 u
CF2	2.7414 m	1.4610 m	N/A	1.9243 m	2.7317 m
CF3	52.7589 m	37.8786 m	N/A	14.7848 m	139.9564 m
CF4	856.4066 m	1.3486	N/A	1.5775 m	77.1599 u

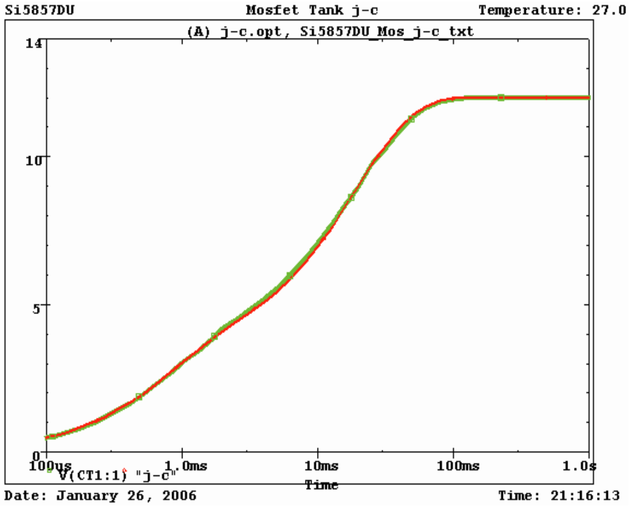
Note: NA indicates not applicable

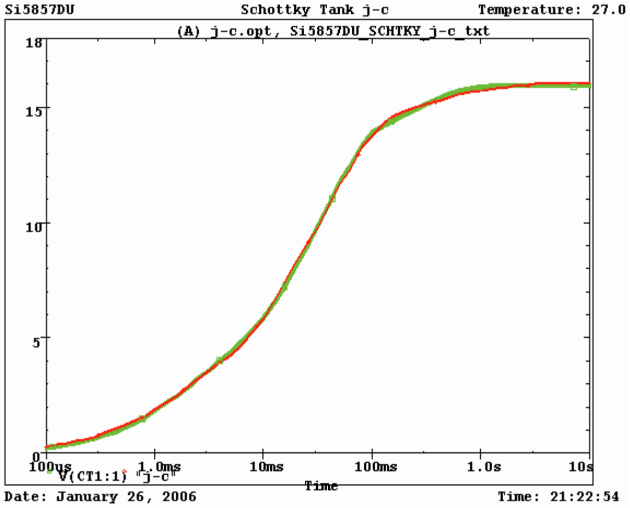
Reference:

[1] "A Simple Method of Generating Thermal Models for a Power MOSFET" by Wharton McDaniel and Kandarp Pandya, IEEE / SEMITHERM 2002


Si5857DU
Mosfet Tank j-a
Temperature: 27.0
(A) j-a.opt, Si5857DU_Mos_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: January 27, 2006
Time: 13:34:34


Si5857DU
Schottky Tank j-a
Temperature: 27.0
(A) j-a.opt, Si5857DU_SCHTKY_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: January 26, 2006
Time: 20:40:43


Si5857DU
Mosfet Tank j-c
Temperature: 27.0
(A) j-c.opt, Si5857DU_Mos_j-c_txt
14
10
5
0
100us
1.0ms
10ms
100ms
1.0s
V(CT1:1) "j-c"
Time
Date: January 26, 2006
Time: 21:16:13


Si5857DU
Schottky Tank j-c
Temperature: 27.0
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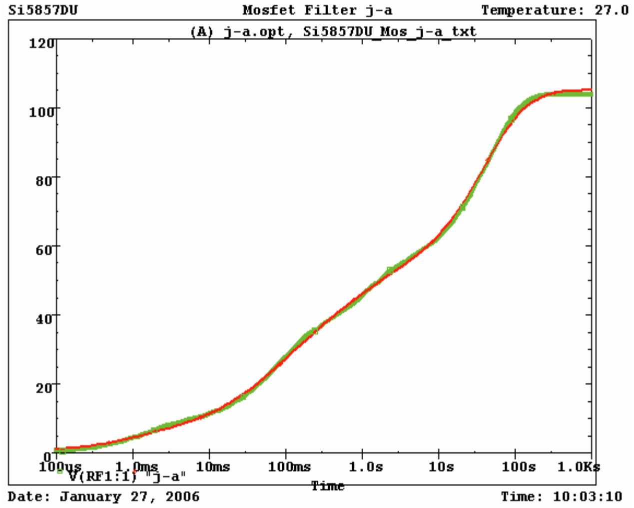
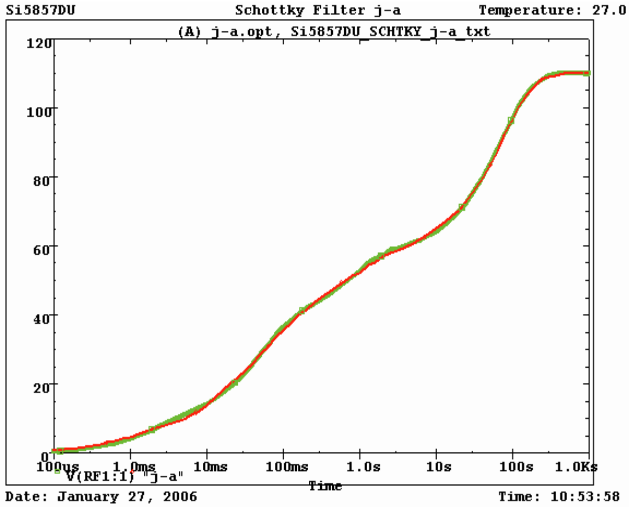
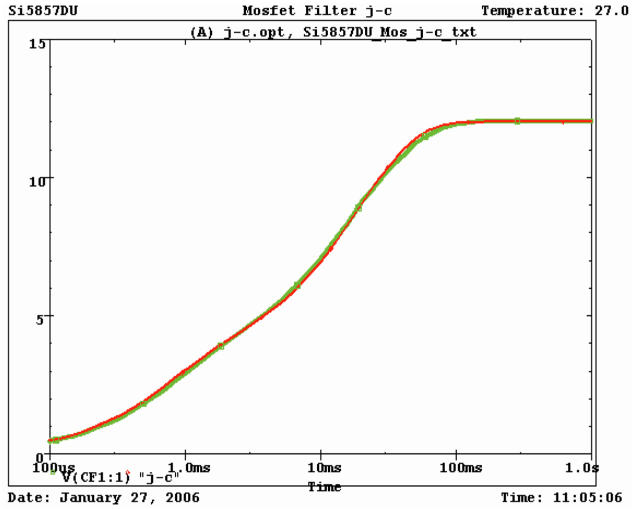
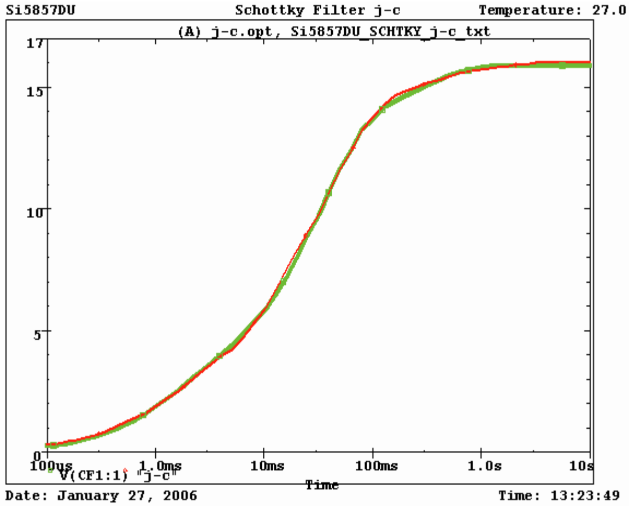
18
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1) "j-c"
Time
Date: January 26, 2006
Time: 21:22:54


Si5857DU
Mosfet Filter j-a
Temperature: 27.0
(A) j-a.opt, Si5857DU_Mos_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: January 27, 2006
Time: 10:03:10


Si5857DU
Schottky Filter j-a
Temperature: 27.0
(A) j-a.opt, Si5857DU_SCHTKY_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: January 27, 2006
Time: 10:53:58


Si5857DU
Mosfet Filter j-c
Temperature: 27.0
(A) j-c.opt, Si5857DU_Mos_j-c_txt
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
V(CF1:1) "j-c"
Time
Date: January 27, 2006
Time: 11:05:06


Si5857DU
Schottky Filter j-c
Temperature: 27.0
(A) j-c.opt, Si5857DU_SCHTKY_j-c_txt
17
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1) "j-c"
Time
Date: January 27, 2006
Time: 13:23:49