R-C Thermal Model Parameters

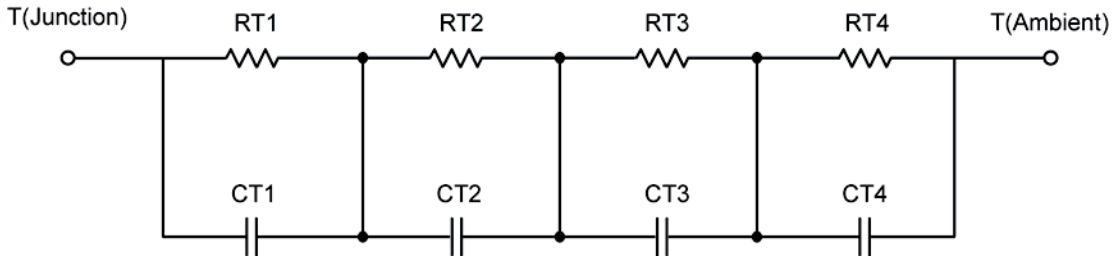
DESCRIPTION

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.

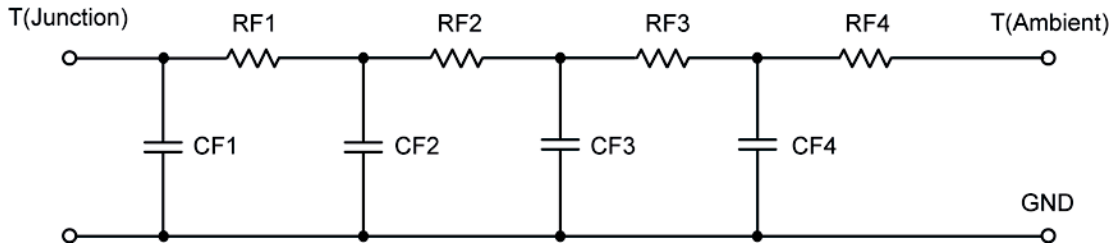
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Foot**	**Case Mosfet**	**Case Schottky**
RT1	29.1251	26.9641	N/A	13.4788 u	96.6719 m
RT2	6.9670	7.9653	N/A	7.8166	9.2662
RT3	18.5814	21.9661	N/A	3.8770	2.5413
RT4	50.1265	52.8725	N/A	3.3831	3.9421
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Foot**	**Case Mosfet**	**Case Schottky**
CT1	4.5843 m	1.5128 m	N/A	3.3132 u	552.5485 n
CT2	286.6328 u	183.5344 u	N/A	2.6699 m	2.7325 m
CT3	107.8828 m	26.6331 m	N/A	164.1397 u	489.1996 u
CT4	1.5756	1.3248	N/A	3.3130 m	40.4786 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

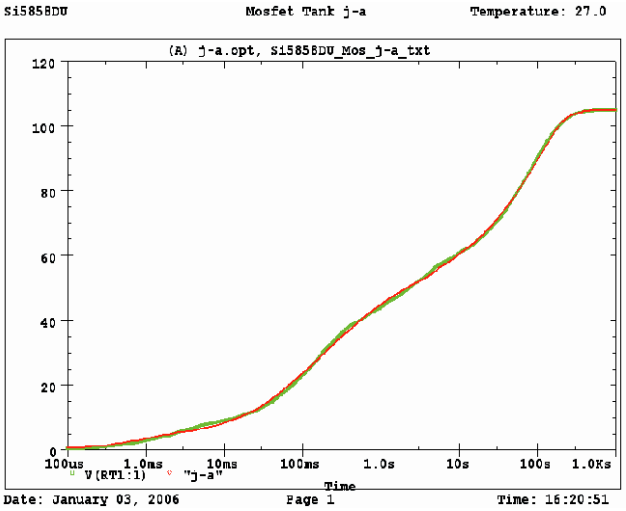


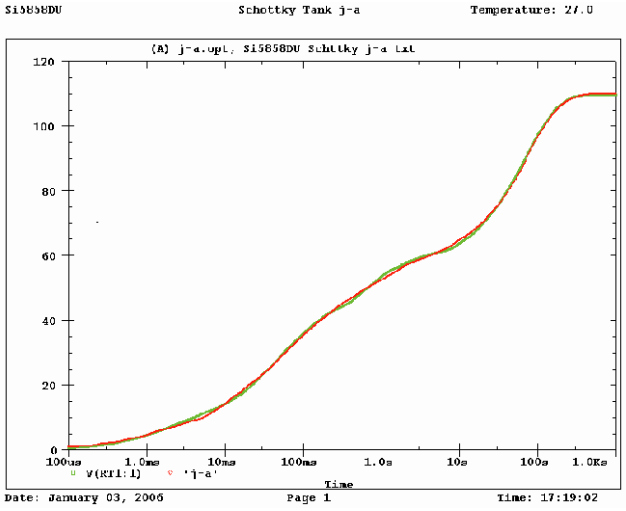
R-C VALUES FOR FILTER CONFIGURATION					
Thermal Resistance (°C/W)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Foot**	**Case Mosfet**	**Case Schottky**
RF1	9.1736	13.6647	N/A	5.5864	4.3064
RF2	28.8808	26.4897	N/A	2.3591	9.1143
RF3	18.7405	18.1736	N/A	6.5605	1.9761
RF4	47.9965	51.4571	N/A	511.4712 m	609.0441 m
Thermal Capacitance (Joules/°C)					
Junction to	**Ambient Mosfet**	**Ambient Schottky**	**Foot**	**Case Mosfet**	**Case Schottky**
CF1	358.7743 u	236.2560 u	N/A	174.6616 u	461.3789 u
CF2	4.3863 m	1.7918 m	N/A	1.8003 m	2.7165 m
CF3	89.7908 m	37.0519 m	N/A	183.9506 u	51.2715 m
CF4	1.5299	1.3457	N/A	5.4784 m	1.3402

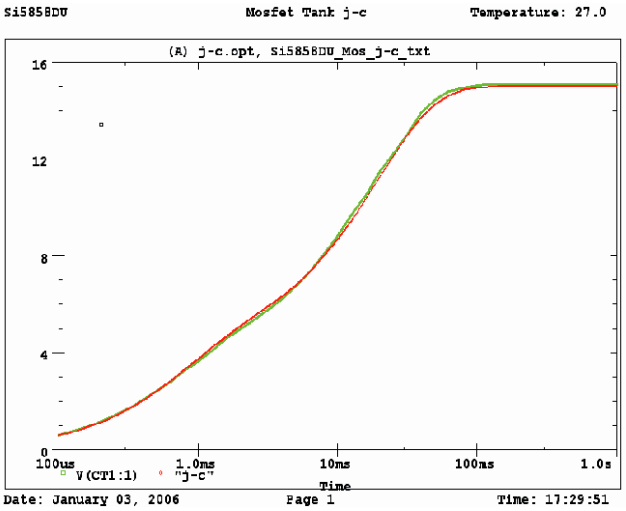
Note: NA indicates not applicable

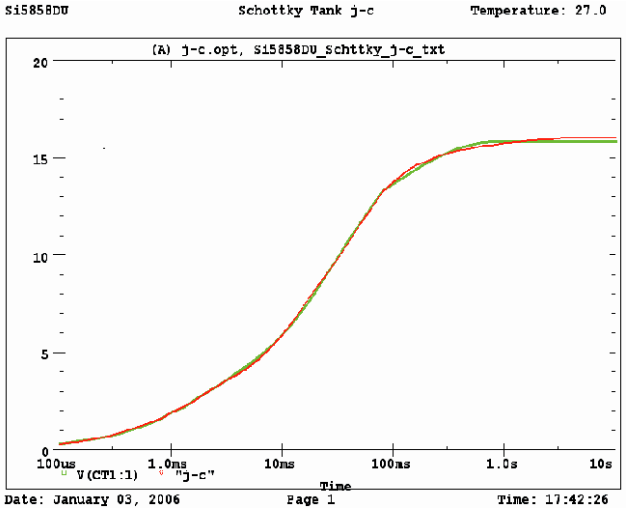
Reference:

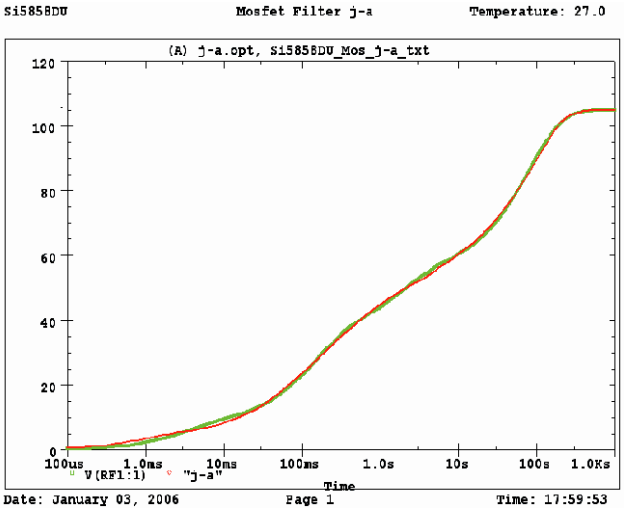
[1] "A Simple Method of Generating Thermal Models for a Power MOSFET" by Wharton McDaniel and Kandarp Pandya, IEEE / SEMITHERM 2002

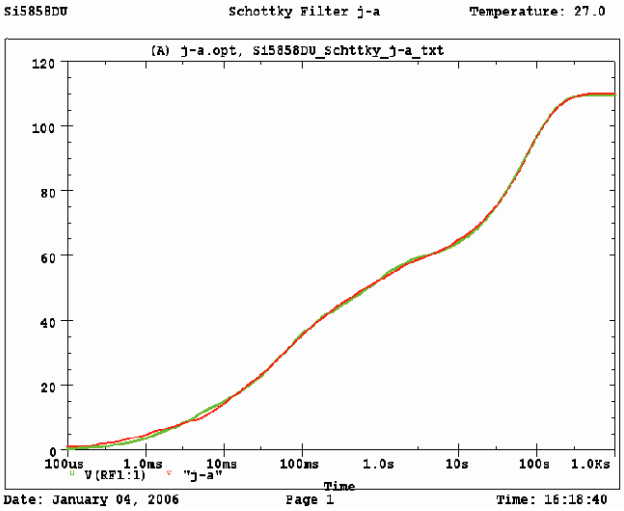

Si5858DU
Mosfet Tank j-a
Temperature: 27.0
(A) j-a.opt, Si5858DU_Mos_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"j-a"
Time
Date: January 03, 2006
Page 1
Time: 16:20:51

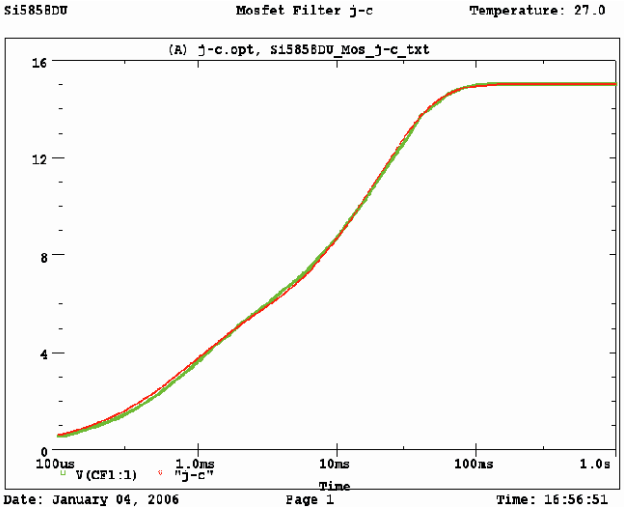

Si5858DU
Schottky Tank j-a
Temperature: 27.0
(A) j-a.opt, Si5858DU_Schttky_j-a_txt
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"j-a"
Time
Date: January 03, 2006
Page 1
Time: 17:19:02

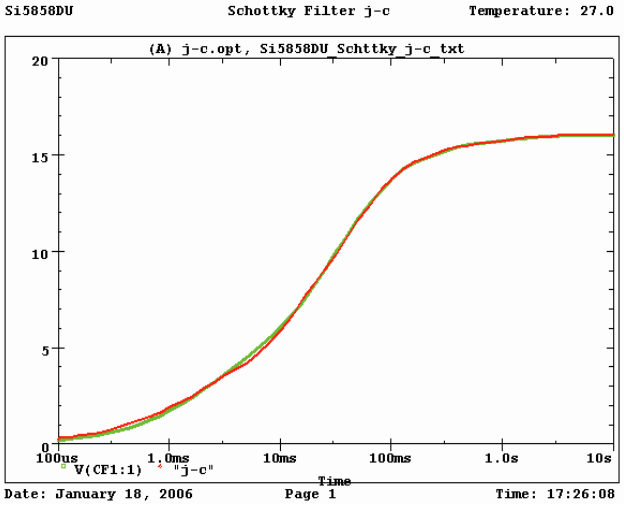

Si5858DU
Mosfet Tank j-c
Temperature: 27.0
(A) j-c.opt, Si5858DU_Mos_j-c_txt
16
12
8
4
0
100us
1.0ms
10ms
100ms
1.0s
V(CT1:1)
"j-c"
Time
Date: January 03, 2006
Page 1
Time: 17:29:51


Si5858DU
Schottky Tank j-c
Temperature: 27.0
(A) j-c.opt, Si5858DU_Schttky_j-c_txt
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)
"j-c"
Time
Date: January 03, 2006
Page 1
Time: 17:42:26


Si5858DU
Mosfet Filter j-a
Temperature: 27.0
(A) j-a.opt, Si5858DU_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 03, 2006
Page 1
Time: 17:59:53


Si5858DU
Schottky Filter j-a
Temperature: 27.0
(A) j-a.opt, Si5858DU_Schttky_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 04, 2006
Page 1
Time: 16:18:40


Si5858DU
Mosfet Filter j-c
Temperature: 27.0
(A) j-c.opt, Si5858DU_Mos_j-c_txt
16
12
8
4
0
100us
1.0ms
10ms
100ms
1.0s
V(CF1:1)
"j-c"
Time
Date: January 04, 2006
Page 1
Time: 16:56:51


Si5858DU
Schottky Filter j-c
Temperature: 27.0
(A) j-c.opt, Si5858DU_Schttky_j-c_txt
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1)
"j-c"
Time
Date: January 18, 2006
Page 1
Time: 17:26:08