

R-C Thermal Model Parameters

DESCRIPTION

The parametric values in the R-C thermal model have been derived using curve-fitting techniques. R-C values for the electrical circuit in the Foster/Tank and Cauer/Filter configurations are included. When implemented in P-Spice, these values have matching characteristic curves to the single-pulse transient thermal impedance curves for the MOSFET.

These RC values can be used in the P-SPICE simulation to evaluate the thermal behavior of the MOSFET junction temperature under a defined power profile. These techniques are described in Application Note AN609, "Thermal Simulation of Power MOSFETs on the P-Spice Platform."

R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION				
Thermal Resistance (°C/W)				
Junction to	Ambient-Mosfet	Foot-Mosfet	Ambient-Schtky	Foot-Schtky
RT1	31.9387	10.5163	34.5106	10.6720
RT2	24.8096	16.6868	29.7204	16.7531
RT3	13.7827	4.9227	14.1654	4.6302
RT4	44.4690	7.8742	51.6036	7.9447
Thermal Capacitance (Joules/°C)				
Junction to	Ambient-Mosfet	Foot-Mosfet	Ambient-Schtky	Foot-Schtky
CT1	2.3068 m	5.1475 m	1.5958 m	3.7903 m
CT2	52.7293 m	1.0306 m	29.5762 m	775.2434 u
CT3	220.4734 u	60.1946 u	104.3228 u	39.9338 u
CT4	2.2233	614.6721 u	1.7477	392.1594 u

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

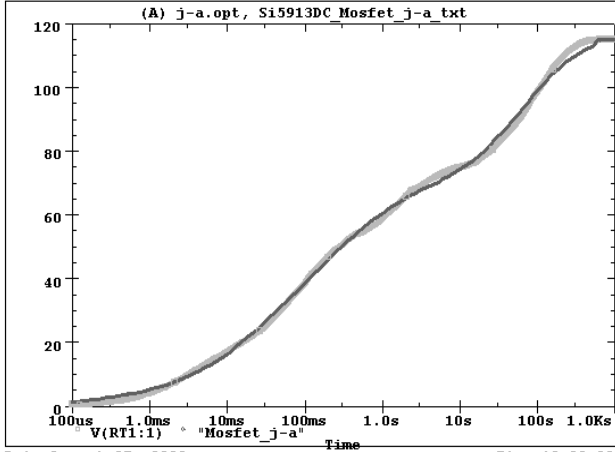
R-C VALUES FOR FILTER CONFIGURATION				
Thermal Resistance ($^{\circ}\text{C}/\text{W}$)				
Junction to	Ambient-Mosfet	Foot-Mosfet	Ambient-Schtky	Foot-Schtky
RF1	16.9201	6.9446	16.4997	8.0216
RF2	32.6059	16.2526	36.8540	17.2373
RF3	22.7873	15.4097	26.9578	14.1077
RF4	42.6867	1.3931	49.6885	633.4000 m
Thermal Capacitance (Joules/ $^{\circ}\text{C}$)				
Junction to	Ambient-Mosfet	Foot-Mosfet	Ambient-Schtky	Foot-Schtky
CF1	207.4130 u	54.6938 u	102.1242 u	59.8676 u
CF2	2.1551 m	287.3902 u	1.5196 m	222.9306 u
CF3	64.7996 m	1.1348 m	35.4203 m	1.2801 m
CF4	2.2796	118.9786 m	1.8345	60.5322 m

Note

NA indicates not applicable



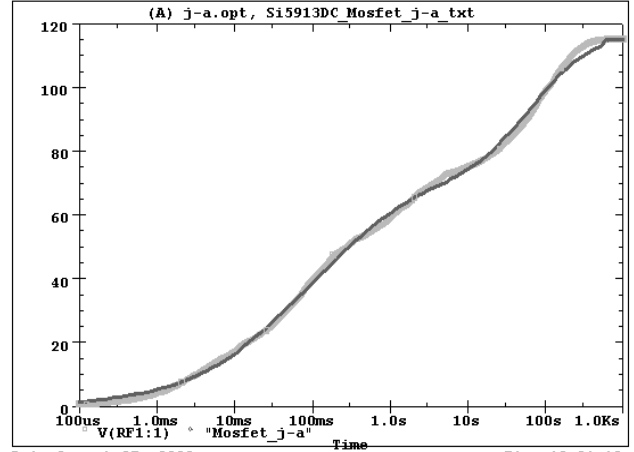
Si5913DC Tank j-a Mosfet Temperature:27.0



Date:August 27, 2008

Time:18:39:30

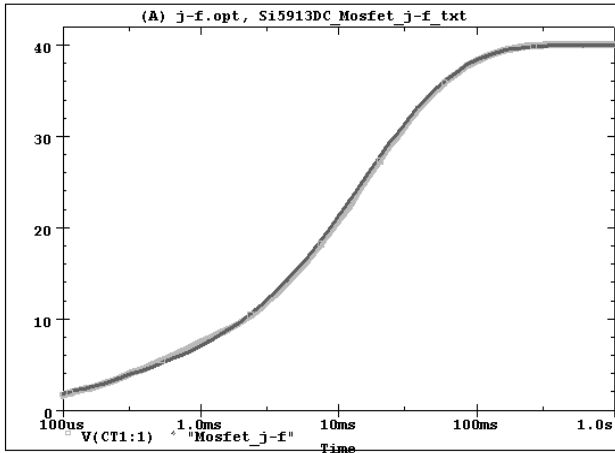
Si5913DC Filter j-a Mosfet Temperature:27.0



Date:August 27, 2008

Time:19:01:18

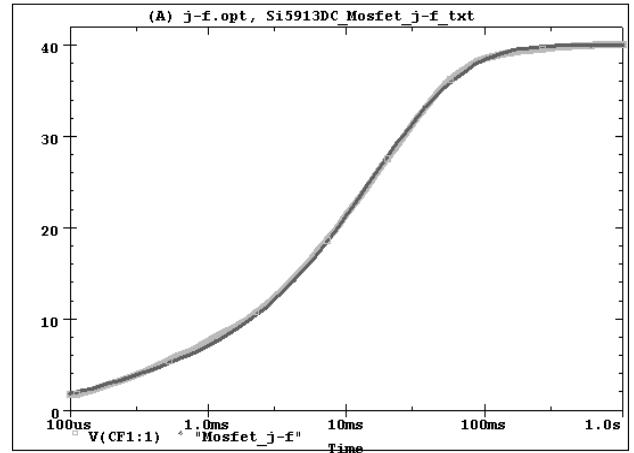
Si5913DC Tank j-f Mosfet Temperature:27.0



Date:August 27, 2008

Time:18:53:01

Si5913DC Filter j-f Mosfet Temperature:27.0

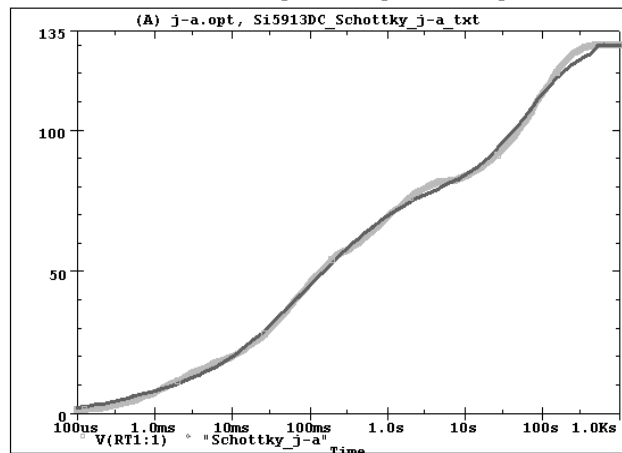


Date:August 27, 2008

Time:19:45:13

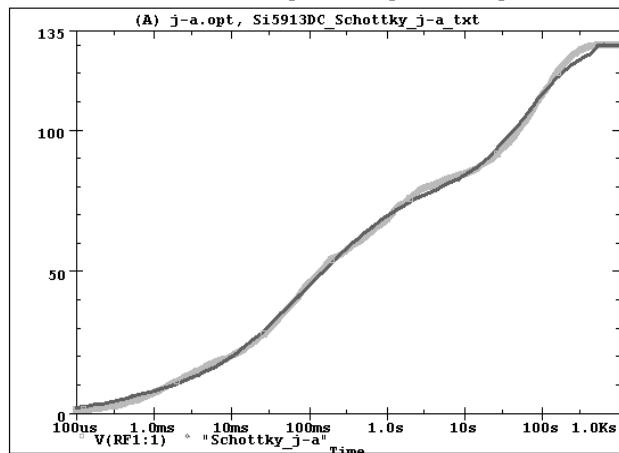


Si5913DC Tank j-a Schottky Temperature:27.0



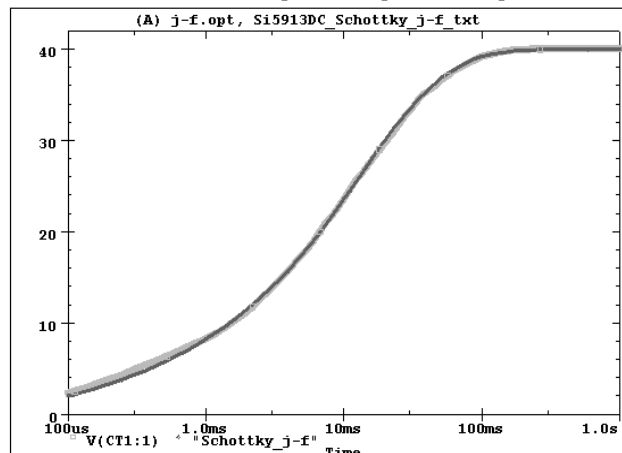
Date:August 27, 2008 Time:18:48:44

Si5913DC Filter j-a Schottky Temperature:27.0



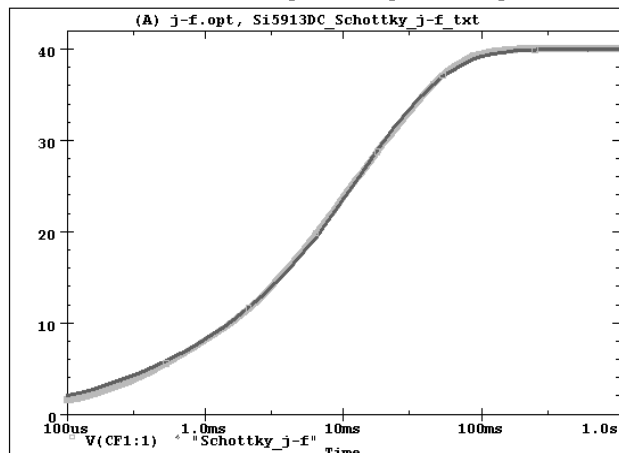
Date:August 27, 2008 Time:19:40:54

Si5913DC Tank j-f Schottky Temperature:27.0



Date:August 27, 2008 Time:18:56:08

Si5913DC Filter j-f Schottky Temperature:27.0



Date:August 27, 2008 Time:19:48:14