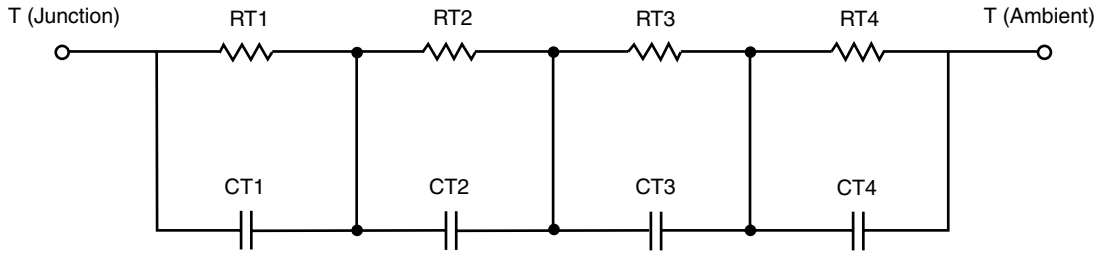
R-C Thermal Model Parameters

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

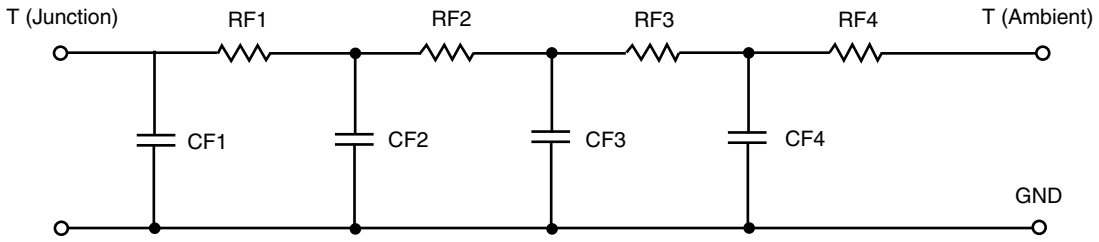


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	13.1050	1.3523	N/A
RT2	27.0718	5.6589	N/A
RT3	26.9401	5.0019	N/A
RT4	42.8831	3.9869	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	96.2070 u	1.0155 m	N/A
CT2	2.0933 m	564.8306 u	N/A
CT3	34.5359 m	55.9280 u	N/A
CT4	1.1437	357.4204 u	N/A

Note
N/A indicates not applicable

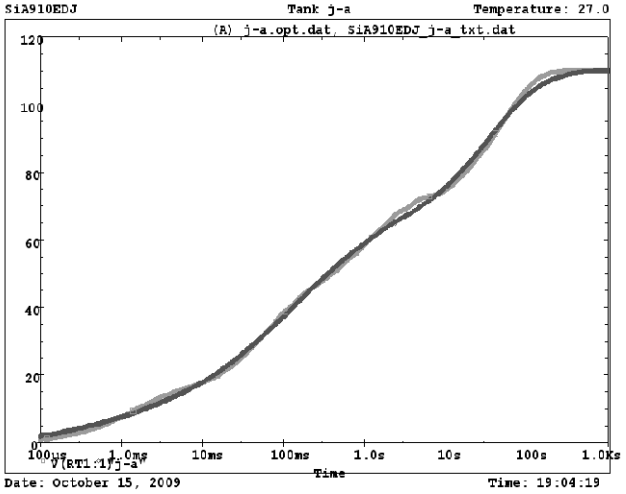
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

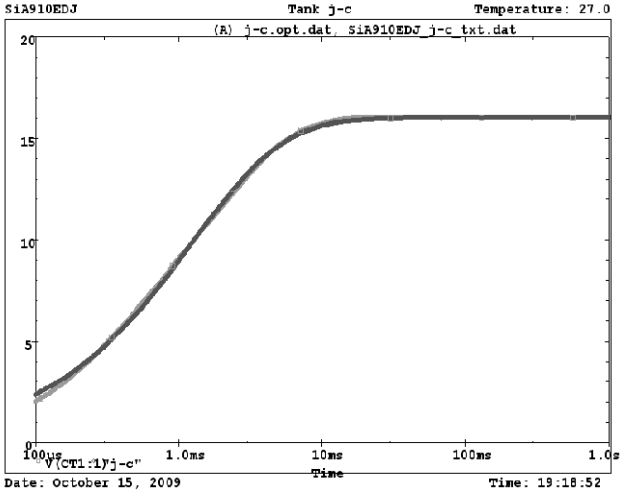
R-C THERMAL MODEL FOR FILTER CONFIGURATION

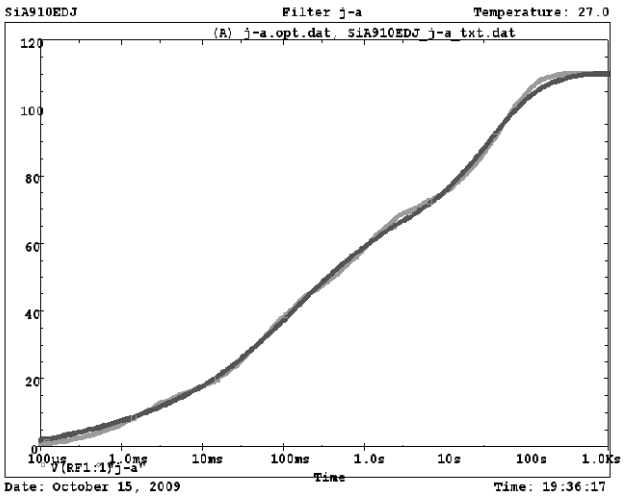


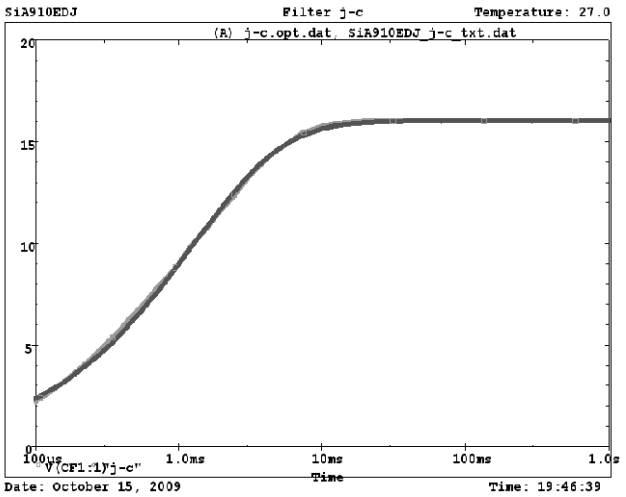
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	14.4086	6.6789	N/A
RF2	28.3271	4.9199	N/A
RF3	25.9635	2.7079	N/A
RF4	41.3008	1.6933	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	108.8115 u	37.0761 u	N/A
CF2	1.8188 m	118.4691 u	N/A
CF3	33.0691 m	211.8647 u	N/A
CF4	1.1423	980.4259 u	N/A

Note
N/A indicates not applicable


SiA910EDJ
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, SiA910EDJ_j-a_txt.dat
120
100
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)j-a
Time
Date: October 15, 2009
Time: 19:04:19


SiA910EDJ
Tank j-c
Temperature: 27.0
(A) j-c.opt.dat, SiA910EDJ_j-c_txt.dat
20
15
10
5
0
100µs
1.0ms
10ms
100ms
1.0s
V(CT1:1)j-c
Time
Date: October 15, 2009
Time: 19:18:52


SiA910EDJ
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, SiA910EDJ_j-a_txt.dat
120
100
80
60
40
20
0
100µs
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)j-a
Time
Date: October 15, 2009
Time: 19:36:17


SiA910EDJ
Filter j-c
Temperature: 27.0
(A) j-c.opt.dat, SiA910EDJ_j-c_txt.dat
20
15
10
5
0
100µs
1.0ms
10ms
100ms
1.0s
V(CF1:1)j-c
Time
Date: October 15, 2009
Time: 19:46:39