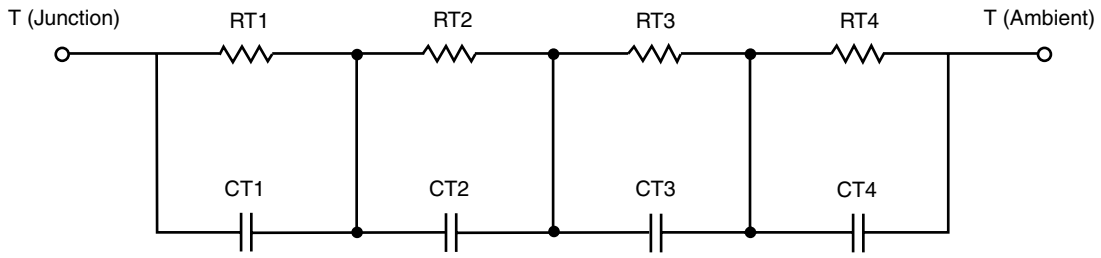
R-C Thermal Model Parameters

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

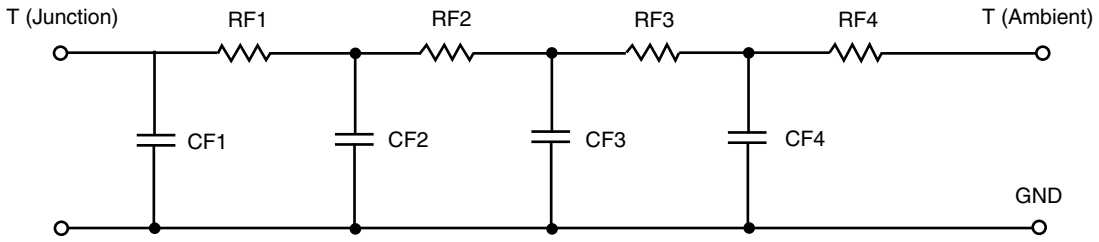


R-C VALUES FOR TANK CONFIGURATION				
THERMAL RESISTANCE (°C/W)				
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case Ch1**	**Case Ch2**
RT1	12.4956	12.4956	764.1000 m	764.1000 m
RT2	27.7856	27.7856	5.6063	5.6063
RT3	26.5938	26.5938	5.7425	5.7425
RT4	43.1250	43.1250	3.8871	3.8871
THERMAL CAPACITANCE (Joules/°C)				
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case Ch1**	**Case Ch2**
CT1	90.7923 u	90.4702 u	5.0483 m	5.0483 m
CT2	1.9884 m	1.9773 m	452.2021 u	452.2021 u
CT3	34.1358 m	34.9699 m	54.4164 u	54.4164 u
CT4	1.1117	1.1310	486.1773 u	486.1773 u

Note
N/A indicates not applicable

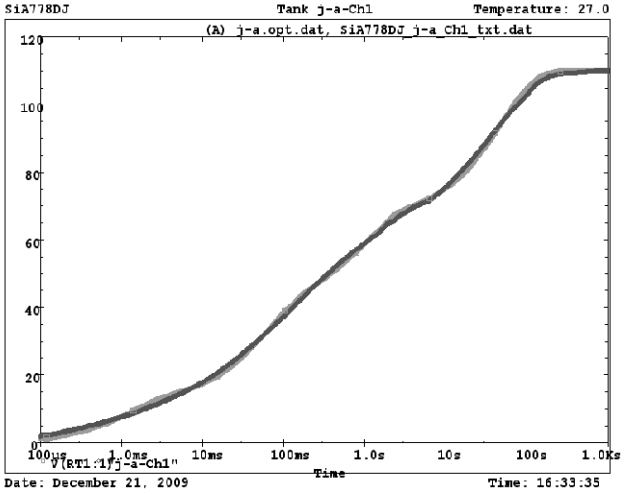
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

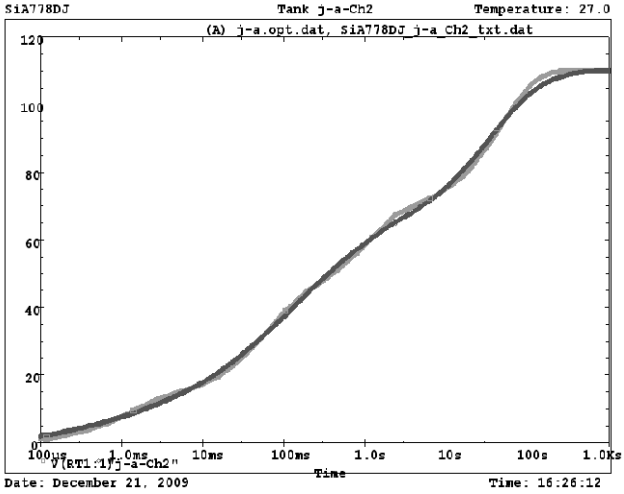
R-C THERMAL MODEL FOR FILTER CONFIGURATION

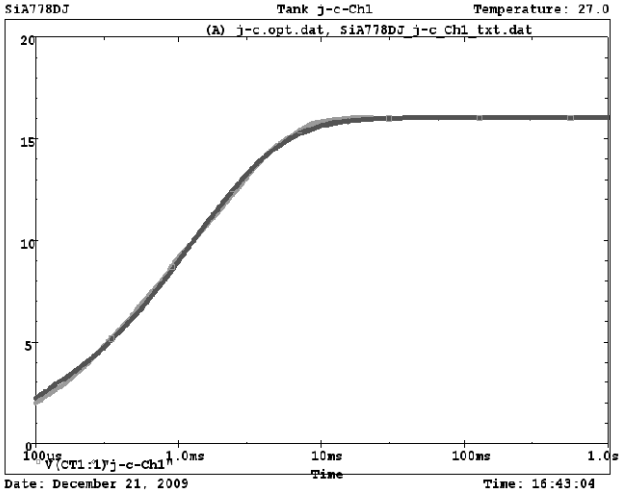


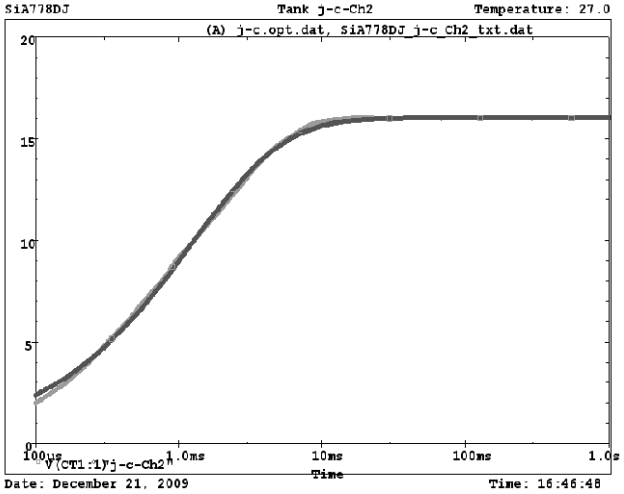
R-C VALUES FOR FILTER CONFIGURATION				
THERMAL RESISTANCE (°C/W)				
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case Ch1**	**Case Ch2**
RF1	14.2316	14.2316	8.6635	8.6635
RF2	31.2018	31.2018	4.0091	4.0091
RF3	23.4768	23.4768	1.6771	1.6771
RF4	41.0898	41.0898	1.6503	1.6503
THERMAL CAPACITANCE (Joules/°C)				
Junction to	**Ambient Ch1**	**Ambient Ch2**	**Case Ch1**	**Case Ch2**
CF1	91.1040 u	92.1039 u	43.9117 u	43.9117 u
CF2	2.0224 m	2.0224 m	226.4934 u	226.4934 u
CF3	41.6061 m	41.6062 m	229.4698 u	229.4698 u
CF4	1.1219	1.1219	103.4306 u	103.4306 u

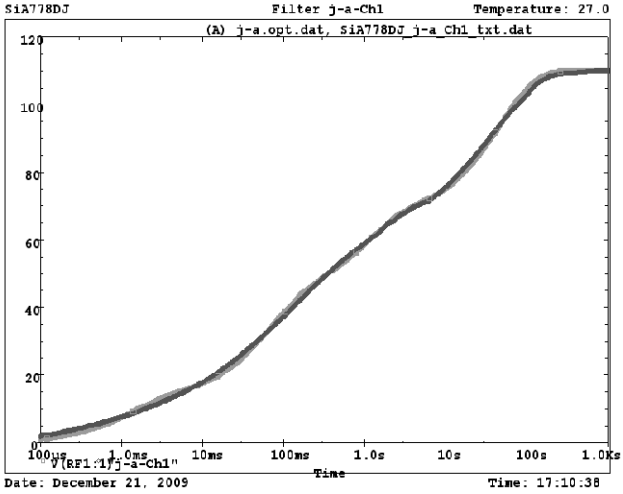
Note
N/A indicates not applicable

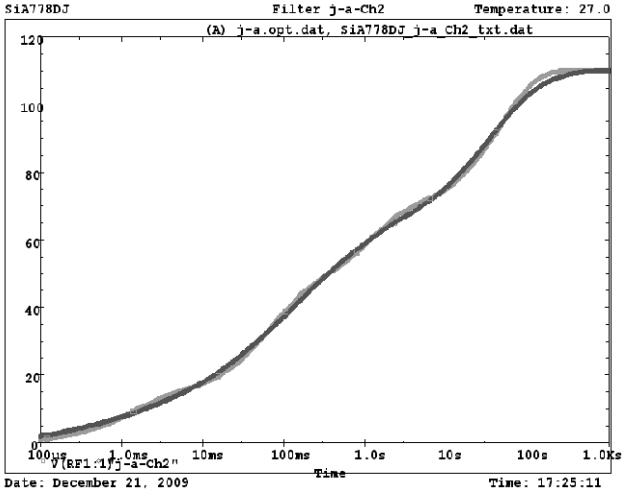

SiA778DJ
Tank j-a-Ch1
Temperature: 27.0
(A) j-a.opt.dat, SiA778DJ_j-a_Ch1_txt.dat
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)j-a-Ch1
Time
Date: December 21, 2009
Time: 16:33:35

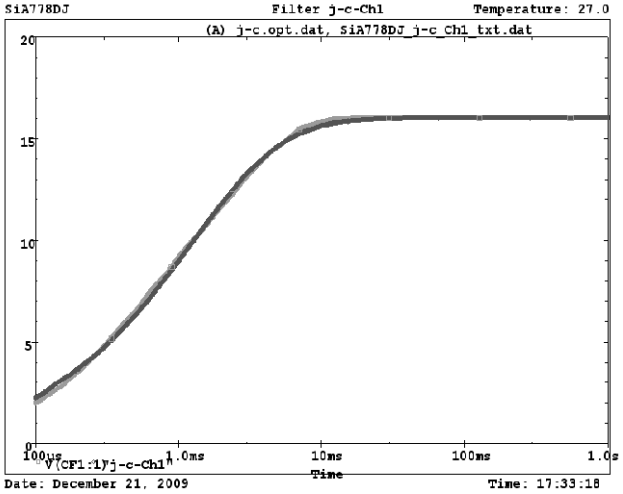

SiA778DJ
Tank j-a-Ch2
Temperature: 27.0
(A) j-a.opt.dat, SiA778DJ_j-a_Ch2_txt.dat
120
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)j-a-Ch2
Time
Date: December 21, 2009
Time: 16:26:12

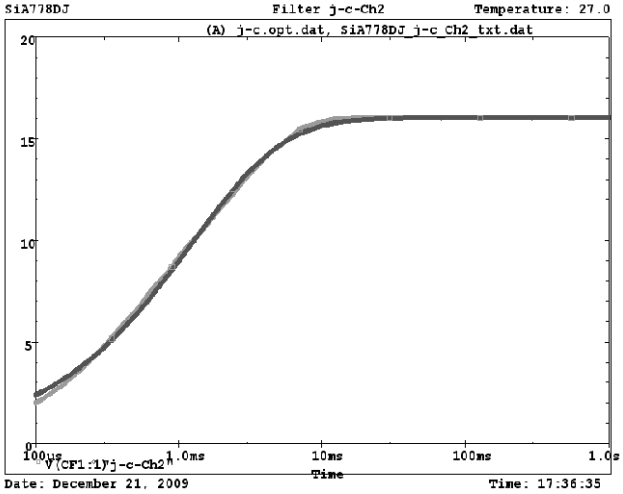

SiA778DJ
Tank j-c-Ch1
Temperature: 27.0
(A) j-c.opt.dat, SiA778DJ_j-c_Ch1_txt.dat
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
V(CT1:1)j-c-Ch1
Time
Date: December 21, 2009
Time: 16:43:04


SiA778DJ
Tank j-c-Ch2
Temperature: 27.0
(A) j-c.opt.dat, SiA778DJ_j-c_Ch2_txt.dat
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
V(CT1:1)j-c-Ch2
Time
Date: December 21, 2009
Time: 16:46:48


SiA778DJ
Filter j-a-Ch1
Temperature: 27.0
(A) j-a.opt.dat, SiA778DJ_j-a_Ch1_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-Ch1
Time
Date: December 21, 2009
Time: 17:10:38


SiA778DJ
Filter j-a-Ch2
Temperature: 27.0
(A) j-a.opt.dat, SiA778DJ_j-a_Ch2_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-Ch2
Time
Date: December 21, 2009
Time: 17:25:11


SiA778DJ
Filter j-c-Ch1
Temperature: 27.0
(A) j-c.opt.dat, SiA778DJ_j-c_Ch1_txt.dat
20
15
10
5
0
100µs
1.0ms
10ms
100ms
1.0s
V(CF1:1)j-c-Ch1
Time
Date: December 21, 2009
Time: 17:33:18


SiA778DJ
Filter j-c-Ch2
Temperature: 27.0
(A) j-c.opt.dat, SiA778DJ_j-c_Ch2_txt.dat
20
15
10
5
0
100µs
1.0ms
10ms
100ms
1.0s
V(CF1:1)j-c-Ch2
Time
Date: December 21, 2009
Time: 17:36:35