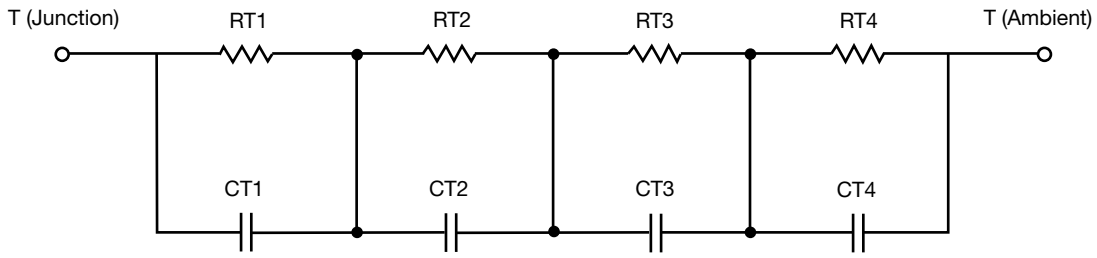
R-C Thermal Model Parameters

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

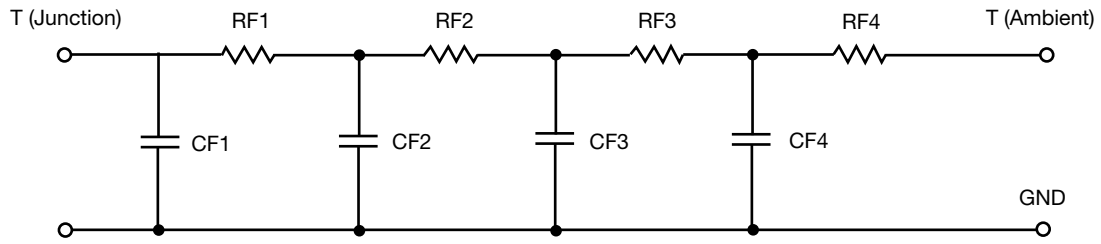


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	11.0650	171.8207m	N/A
RT2	30.7584	810.1699m	N/A
RT3	5.8792	605.2805m	N/A
RT4	2.2974	512.7289m	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	1.3952	1.3311m	N/A
CT2	3.5079	2.7273m	N/A
CT3	337.9535m	29.6840m	N/A
CT4	16.0464m	354.0204m	N/A

Note
N/A indicates not applicable

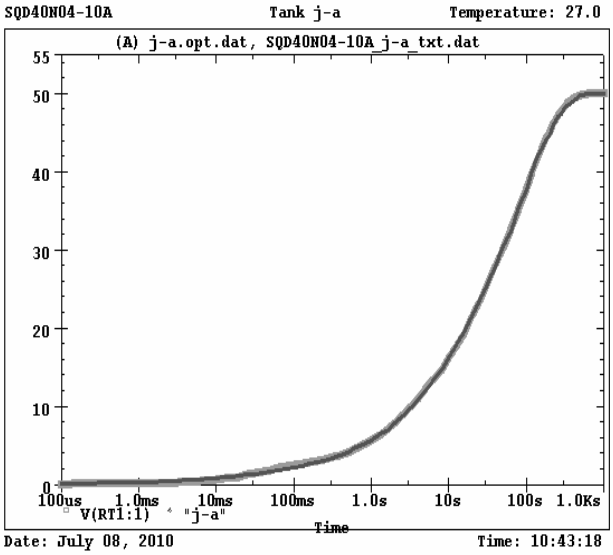
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

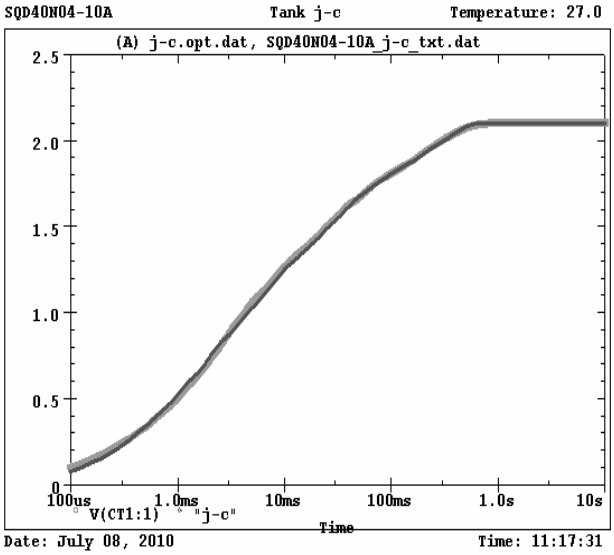
R-C THERMAL MODEL FOR FILTER CONFIGURATION

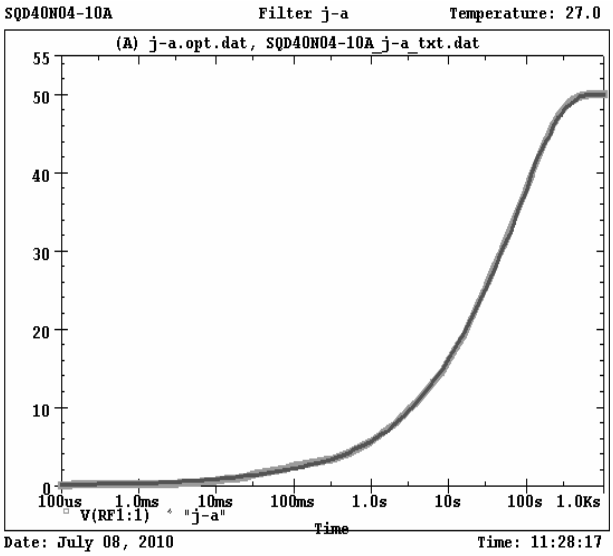


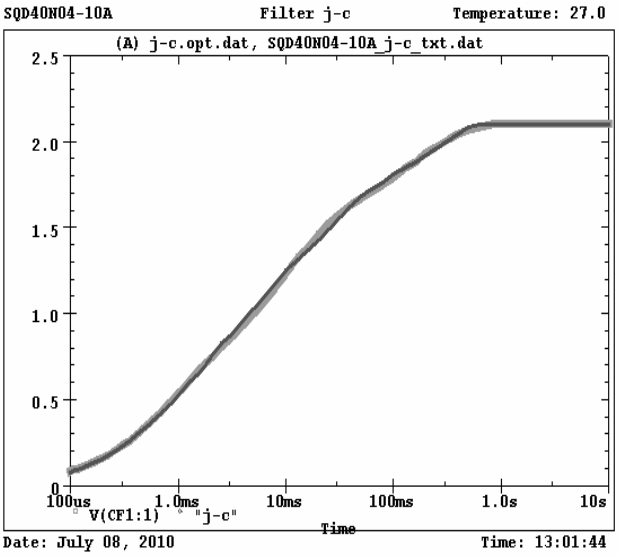
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	2.3831	748.8177m	N/A
RF2	8.1629	813.2411m	N/A
RF3	18.4257	383.8155m	N/A
RF4	21.0283	154.1257m	N/A
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	14.8069m	1.1021m	N/A
CF2	204.4835m	10.3350m	N/A
CF3	783.8484m	228.6863m	N/A
CF4	4.0119	647.8371m	N/A

Note
N/A indicates not applicable


SQD40N04-10A
Tank j-a
Temperature: 27.0
(A) j-a.opt.dat, SQD40N04-10A_j-a_txt.dat
55
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"j-a"
Time
Date: July 08, 2010
Time: 10:43:18


SQD40N04-10A
Tank j-c
Temperature: 27.0
(A) j-c.opt.dat, SQD40N04-10A_j-c_txt.dat
2.5
2.0
1.5
1.0
0.5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CT1:1)
"j-c"
Time
Date: July 08, 2010
Time: 11:17:31


SQD40N04-10A
Filter j-a
Temperature: 27.0
(A) j-a.opt.dat, SQD40N04-10A_j-a_txt.dat
55
50
40
30
20
10
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"j-a"
Time
Date: July 08, 2010
Time: 11:28:17


SQD40N04-10A
Filter j-c
Temperature: 27.0
(A) j-c.opt.dat, SQD40N04-10A_j-c_txt.dat
2.5
2.0
1.5
1.0
0.5
0
100us
1.0ms
10ms
100ms
1.0s
10s
V(CF1:1)
"j-c"
Time
Date: July 08, 2010
Time: 13:01:44