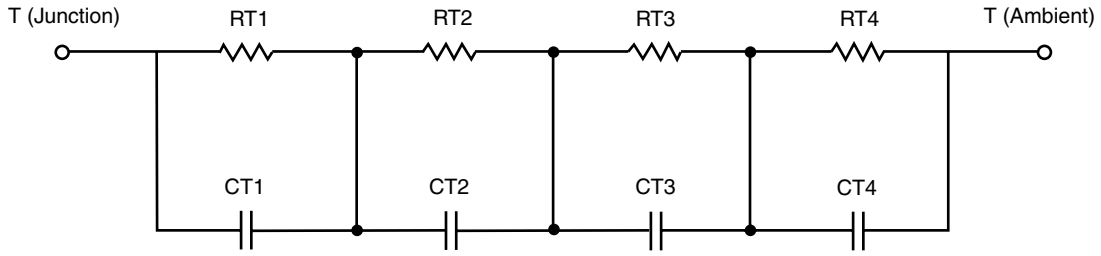
R-C Thermal Model Parameters

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

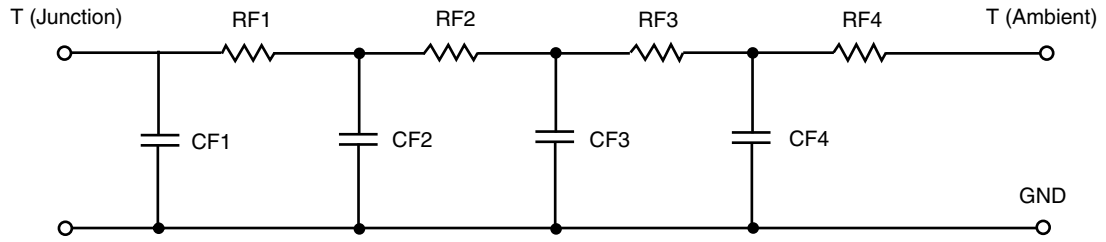


R-C VALUES FOR TANK CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient Full-Copper**	**Case**	**Ambient Minimum-Copper**
RT1	24.2293	N/A	43.8718
RT2	20.6472	N/A	45.4365
RT3	12.0432	N/A	33.6909
RT4	28.1111	N/A	52.0008
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient Full-Copper**	**Case**	**Ambient Minimum-Copper**
CT1	1.1126 m	N/A	8.1275 m
CT2	4.0837	N/A	111.0149 m
CT3	31.2962 m	N/A	1.0558 m
CT4	1.3629	N/A	1.0061

Note
N/A indicates not applicable

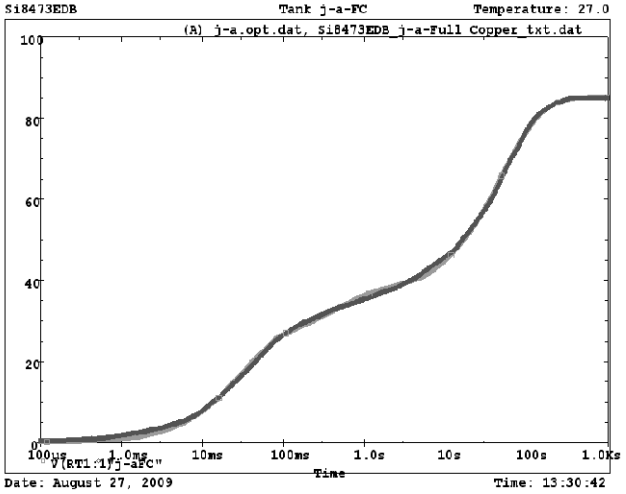
This document is intended as a SPICE modeling guideline and does not constitute a commercial product datasheet. Designers should refer to the appropriate datasheet of the same number for guaranteed specification limits.

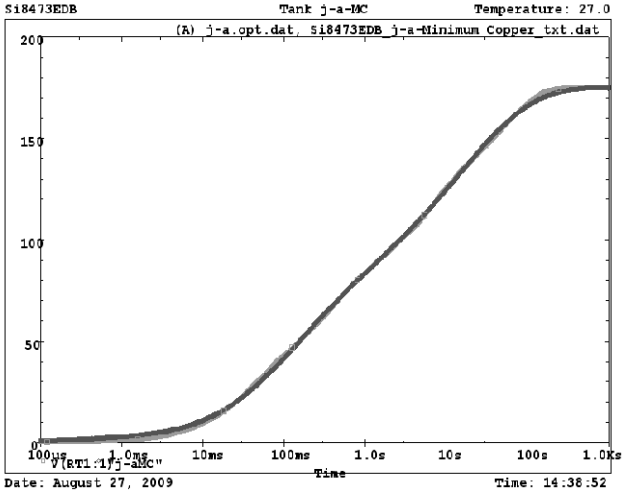
R-C THERMAL MODEL FOR FILTER CONFIGURATION

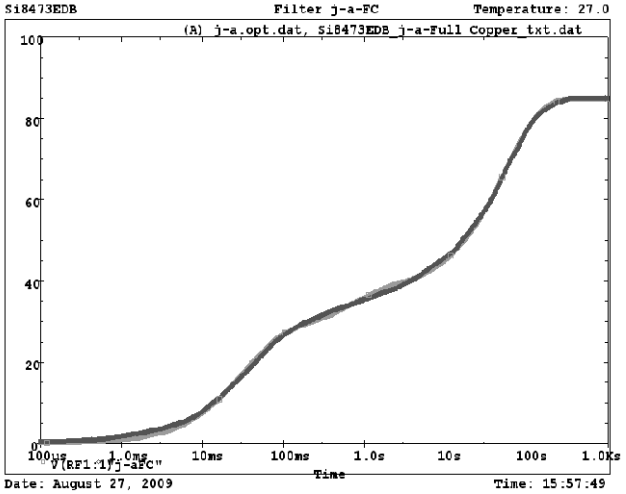


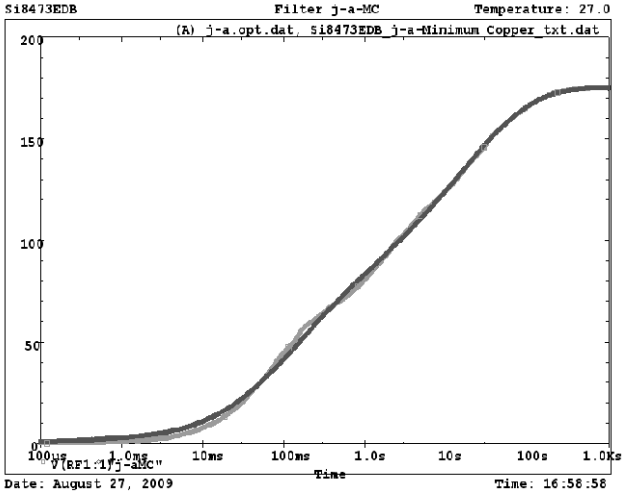
R-C VALUES FOR FILTER CONFIGURATION			
THERMAL RESISTANCE (°C/W)			
Junction to	**Ambient Full-Copper**	**Case**	**Ambient Minimum-Copper**
RF1	27.2164	N/A	60.2879
RF2	11.1106	N/A	50.2497
RF3	25.9637	N/A	45.3393
RF4	20.4595	N/A	18.8026
THERMAL CAPACITANCE (Joules/°C)			
Junction to	**Ambient Full-Copper**	**Case**	**Ambient Minimum-Copper**
CF1	1.1173 m	N/A	1.2150 m
CF2	54.1228 m	N/A	30.7458 m
CF3	1.1151	N/A	353.2520 m
CF4	31.7019 m	N/A	3.8756

Note
N/A indicates not applicable


Si8473EDB
Tank j-a-FC
Temperature: 27.0
(A) j-a.opt.dat, Si8473EDB_j-a-Full Copper_txt.dat
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)/j-aFC"
Time
Date: August 27, 2009
Time: 13:30:42


Si8473EDB
Tank j-a-MC
Temperature: 27.0
(A) j-a.opt.dat, Si8473EDB_j-a-Minimum Copper_txt.dat
200
150
100
50
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)/j-aMC"
Time
Date: August 27, 2009
Time: 14:38:52


Si8473EDB
Filter j-a-FC
Temperature: 27.0
(A) j-a.opt.dat, Si8473EDB_j-a-Full Copper_txt.dat
100
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)/j-aFC"
Time
Date: August 27, 2009
Time: 15:57:49


Si8473EDB
Filter j-a-MC
Temperature: 27.0
(A) j-a.opt.dat, Si8473EDB_j-a-Minimum Copper_txt.dat
200
150
100
50
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)/j-aMC"
Time
Date: August 27, 2009
Time: 16:58:58