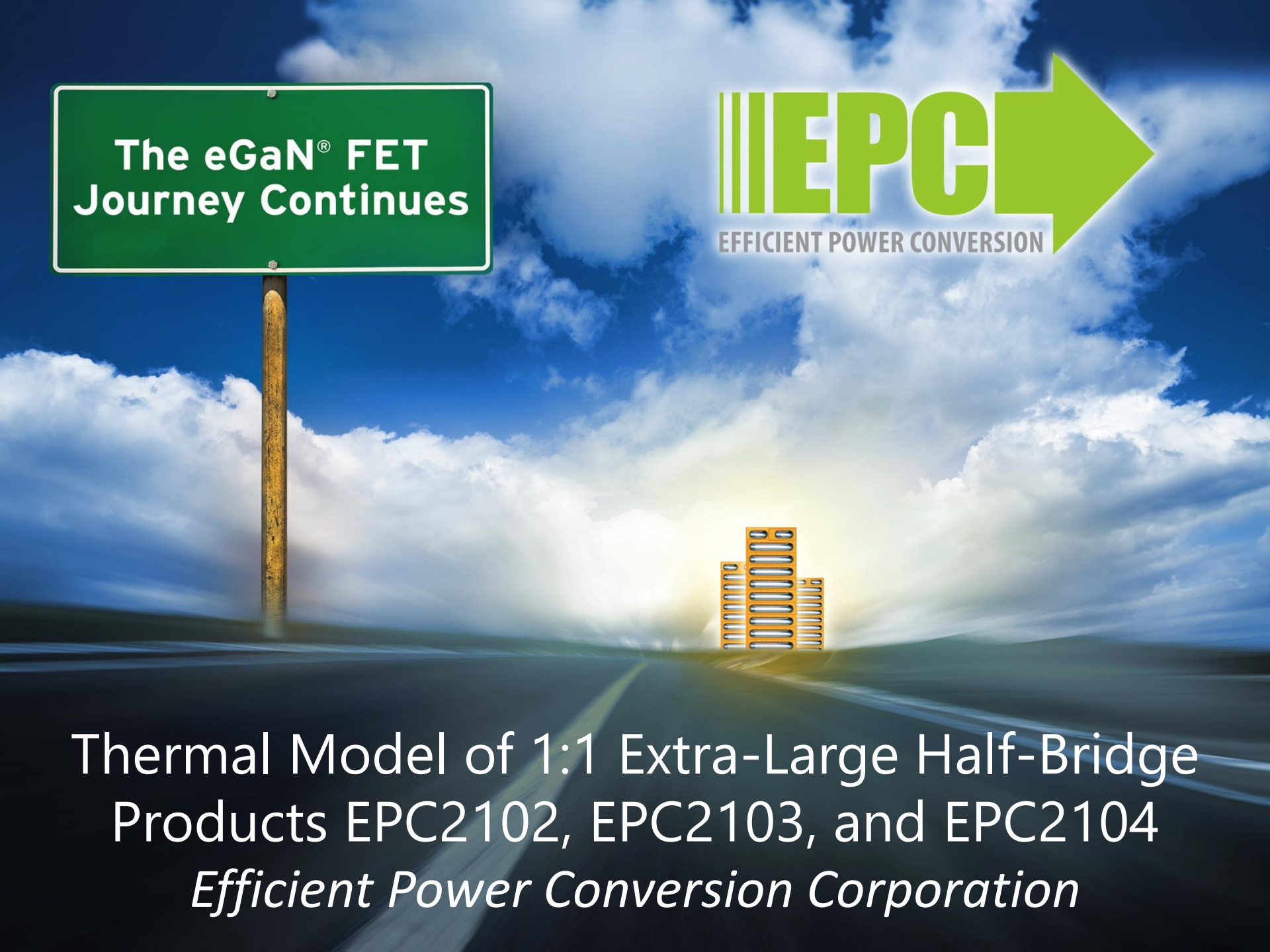


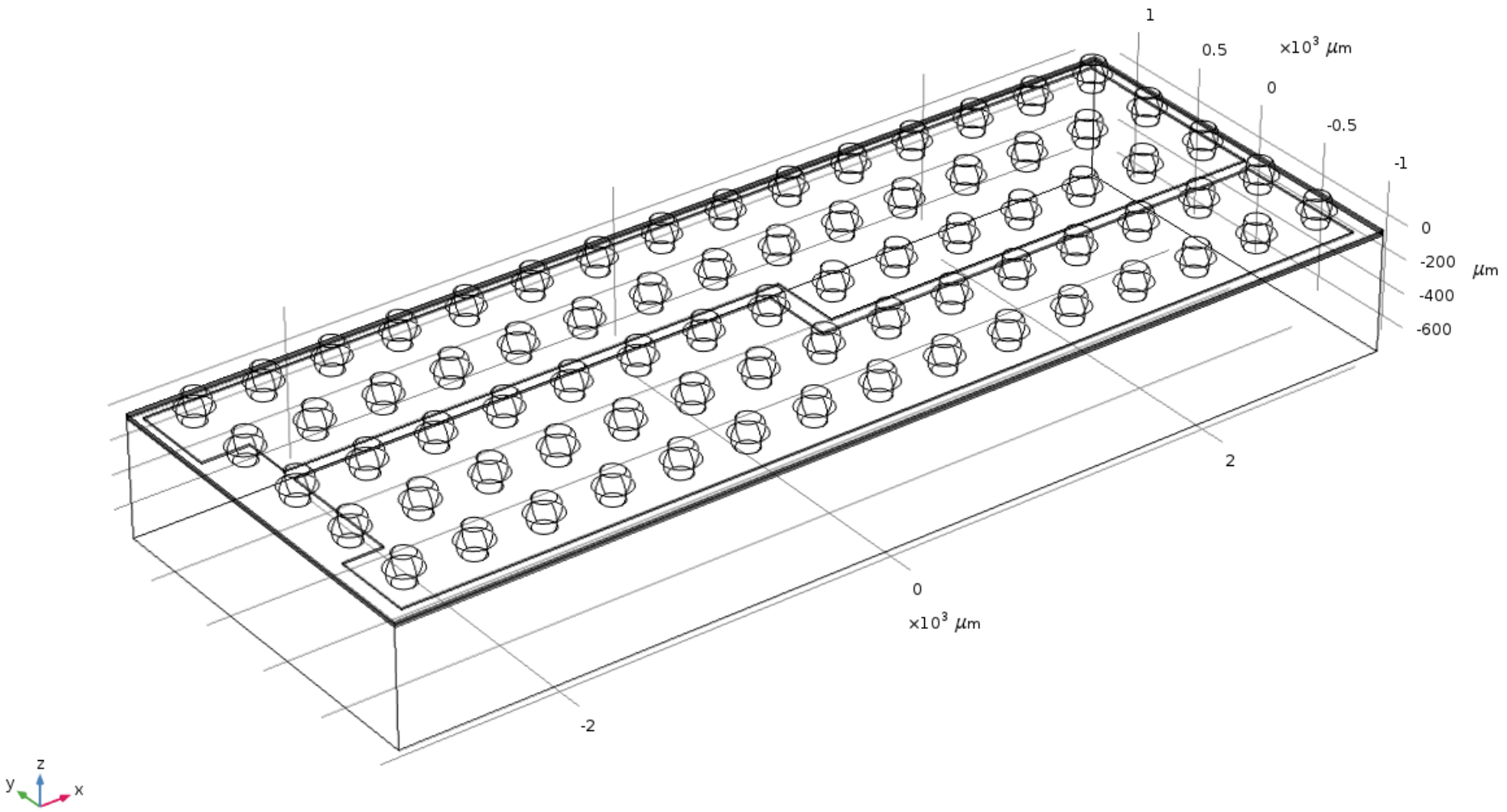
Thermal Model of 1:1 Extra-Large Half-Bridge Products EPC2102, EPC2103, and EPC2104

Efficient Power Conversion Corporation

1:1 XL half-bridge device FEA thermal simulation

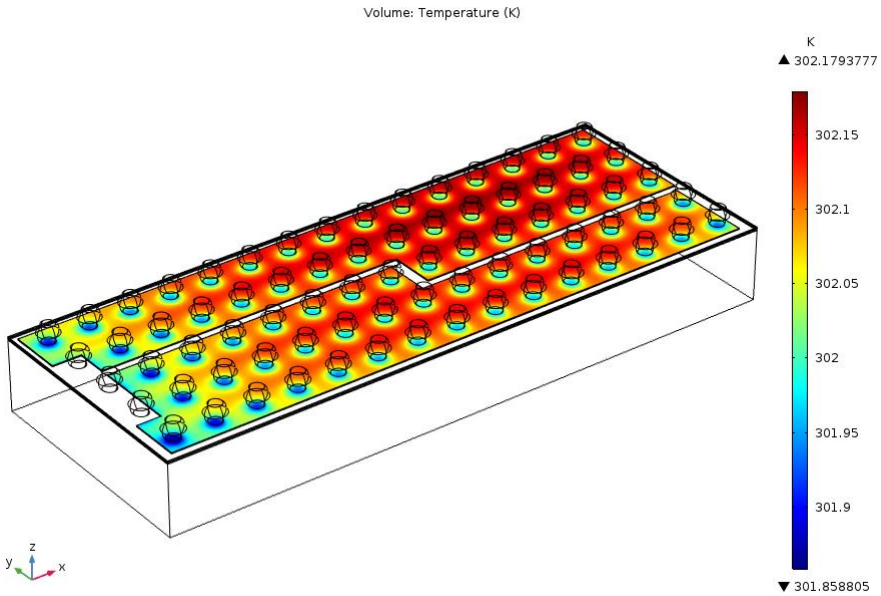
- The thermal model applies to 1:1 half-bridge products including **EPC2102**, **EPC2103**, and **EPC2104**.
- Equal power density of Q1 and Q2 and a total power dissipation of 1 W in the device active area is assumed.
- $R_{\Theta JB}$ and $R_{\Theta JC}$ are obtained by static steady simulations.
- $Z_{\Theta JB}$ and $Z_{\Theta JC}$ are obtained by transient simulations. SPICE thermal model of RC network is generated.

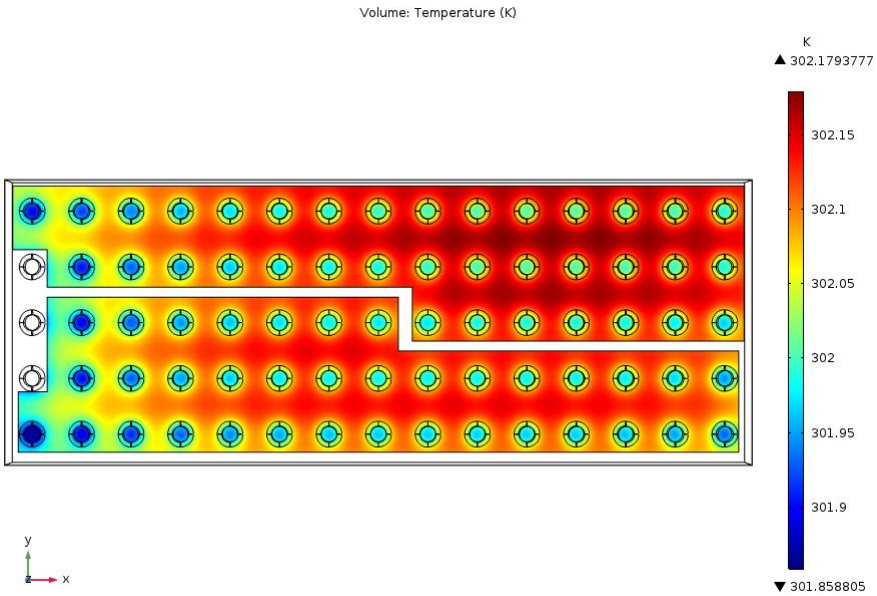
1:1 XL half-bridge device structure



Steady-State $R_{\Theta JB}$

Typical $R_{\Theta JB}$ = 2.2 °C/W

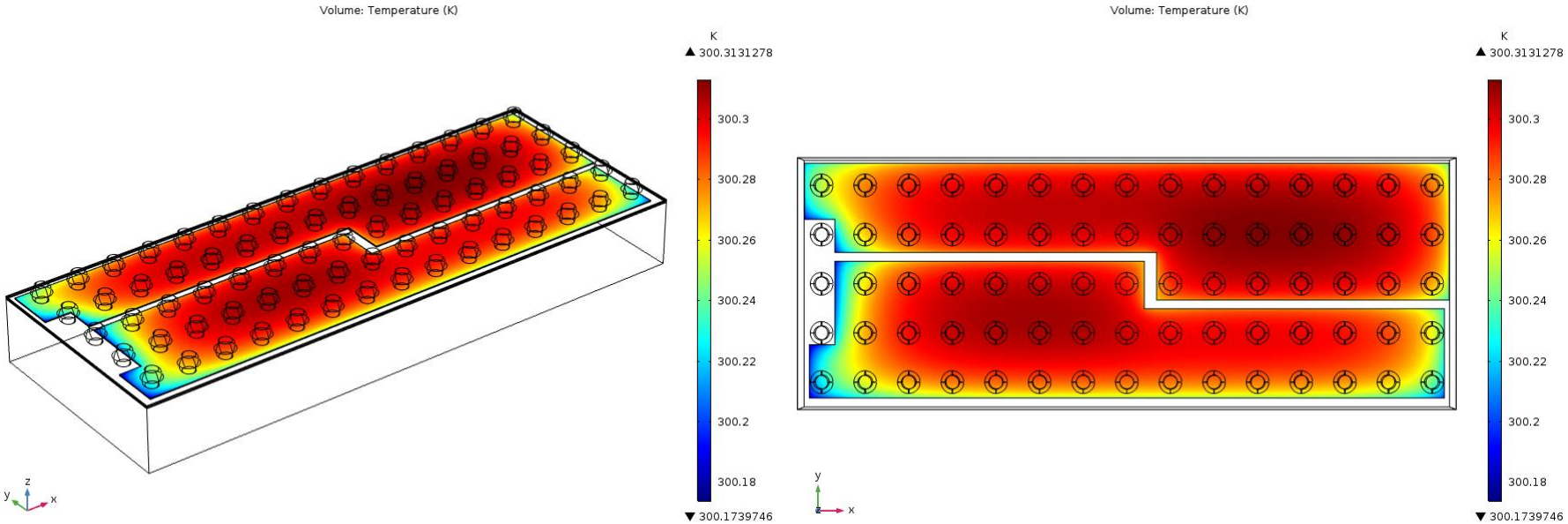




- Operating condition: Total power = 1 W with equal power density of Q1 and Q2.
- Boundary condition: Temperature of top of solder balls set to be 300 K.

Steady-State $R_{\Theta JC}$

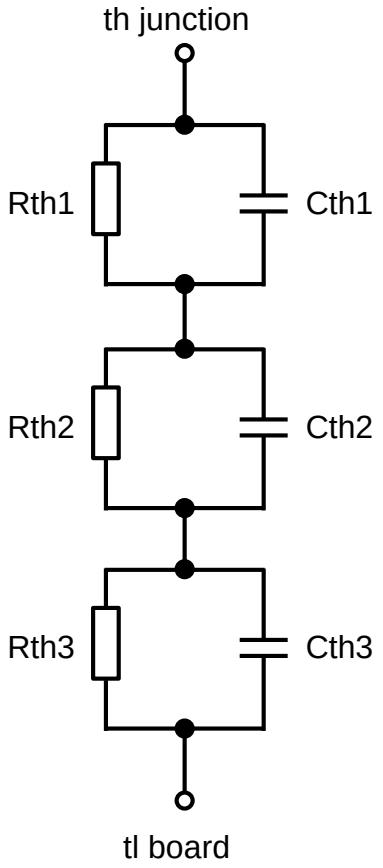
Typical $R_{\Theta JC}$ = 0.3 °C/W



- Operating condition: Total power = 1 W with equal power density of Q1 and Q2.
- Boundary condition: Temperature of bottom of the device backside set to be 300 K.

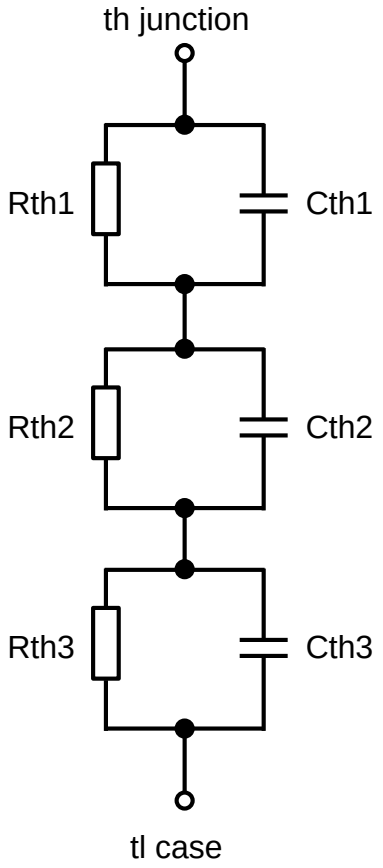
$Z_{\Theta JB}$ SPICE Thermal Model

Fitting parameter	Value	Unit
Rth1	2.08E+00	°C/W
Rth2	7.28E-02	
Rth3	2.55E-02	
Cth1	2.12E-02	J/°C
Cth2	7.79E-03	
Cth3	1.63E-03	



$Z_{\Theta JC}$ SPICE Thermal Model

Fitting parameter	Value	Unit
Rth1	2.56E-01	°C/W
Rth2	4.16E-02	
Rth3	1.53E-02	
Cth1	1.06E-02	J/°C
Cth2	5.46E-03	
Cth3	1.44E-03	



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