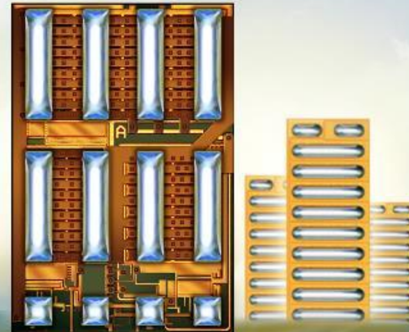
The eGaN® Technology Journey Continues



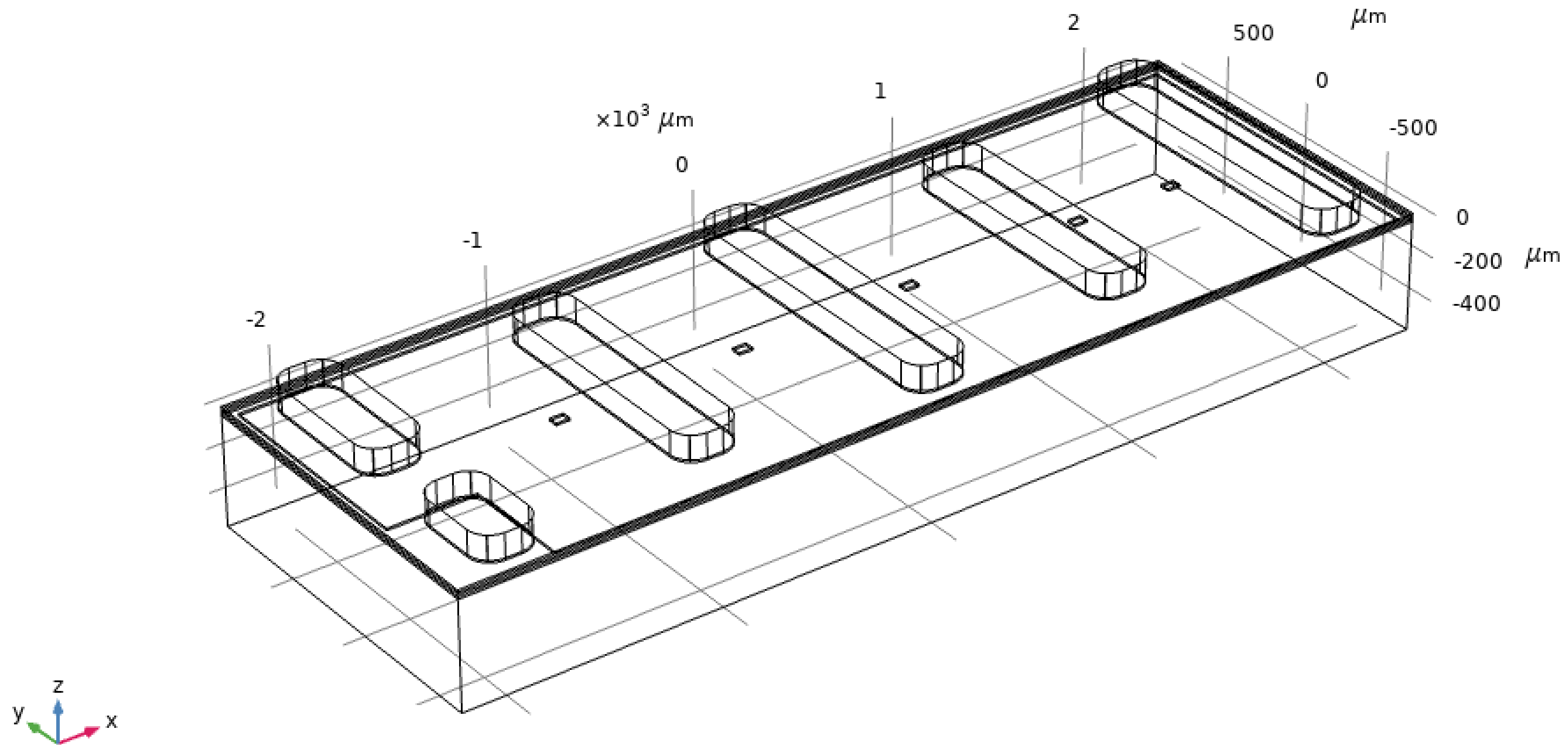
EPC2215 Thermal Model

EPC2215 FEA thermal simulations

- The thermal model applies to EPC2215.
- A power dissipation of 1 W in the device active area is assumed.
- Finite element analysis (FEA) thermal simulations
  - $R_{\Theta JB}$ and $R_{\Theta JC}$ are obtained by stationary simulations.
  - $Z_{\Theta JB}$ and $Z_{\Theta JC}$ are obtained by transient simulations.
- R-C thermal model is generated.

EPC2215 geometry in simulation

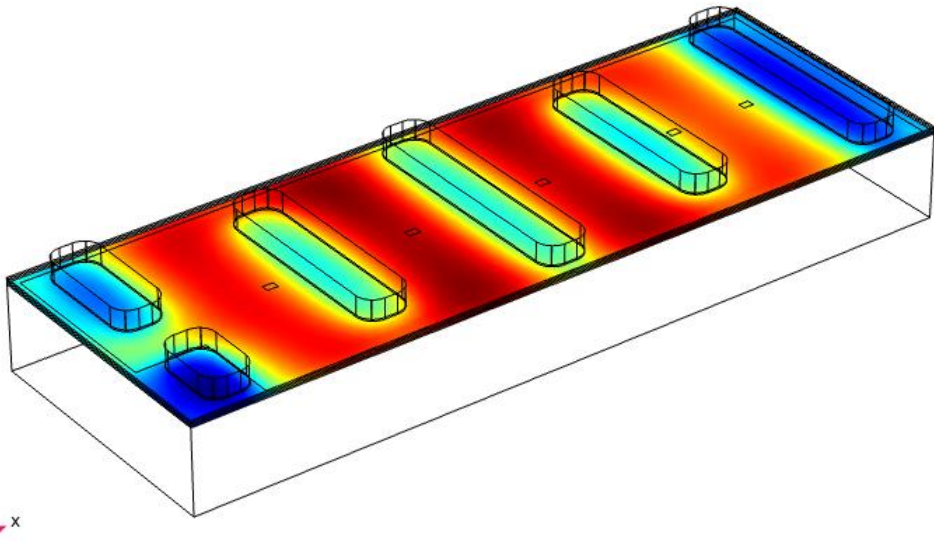
EFFICIENT POWER CONVERSION

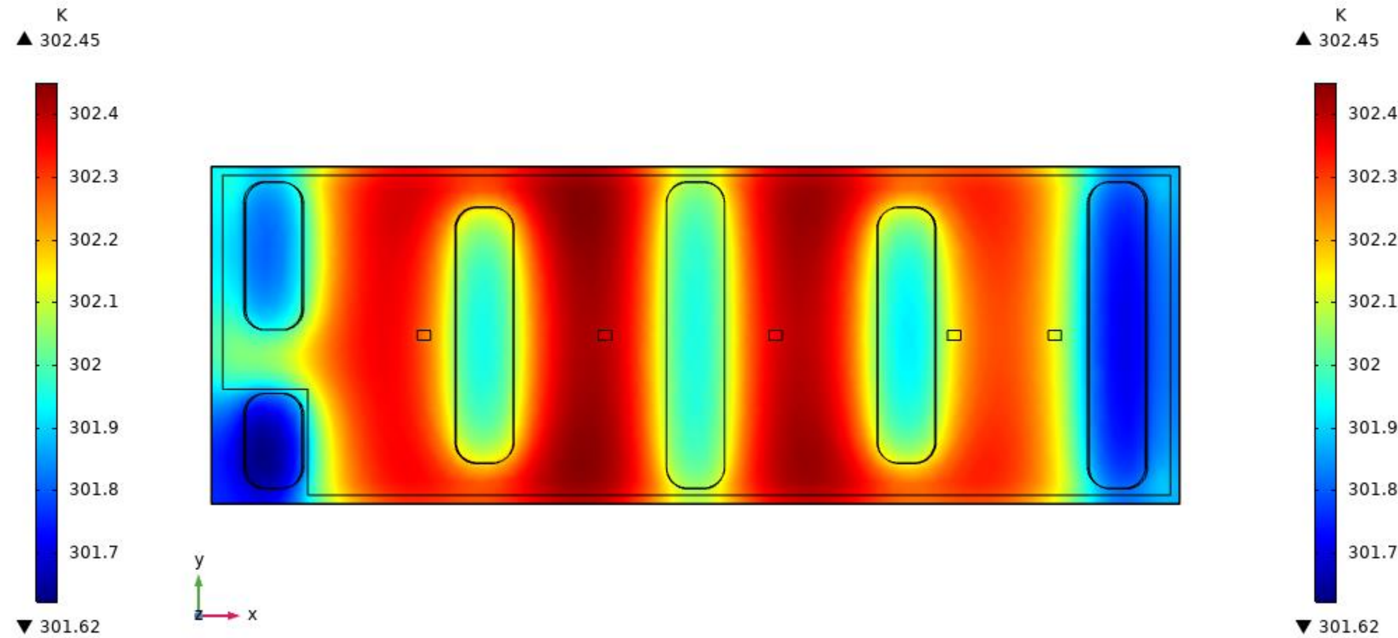


EPC2215 Steady-state $R_{\Theta JB}$

EPC EFFICIENT POWER CONVERSION

Typical $R_{\Theta JB}$ = 2.5 °C/W



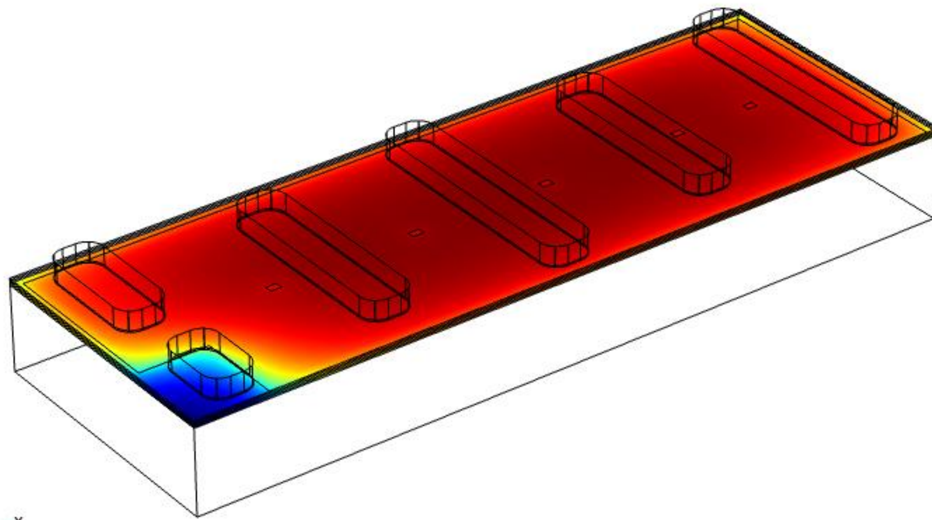


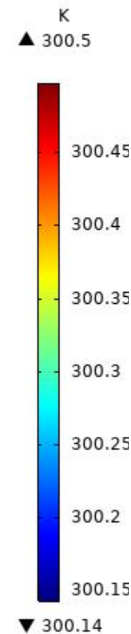
- Operating condition: Power = 1 W in the active area.
- Boundary condition: Temperature of top of solder bumps set to be 300 K.

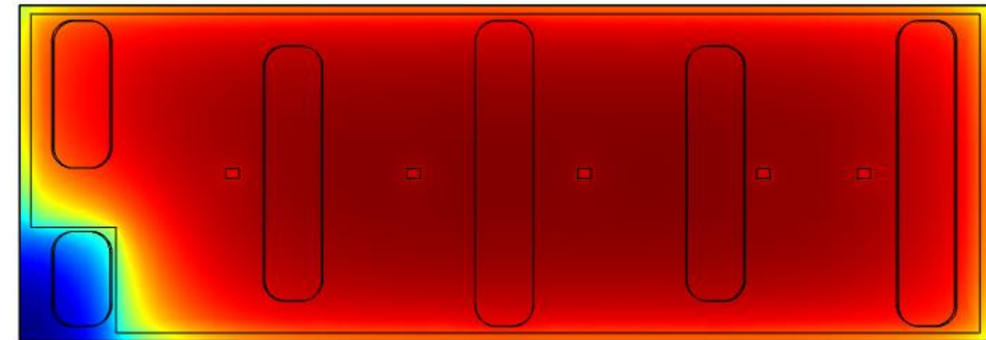
EPC2215 Steady-state $R_{\Theta JC}$

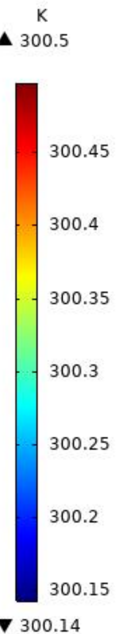
EFFICIENT POWER CONVERSION

Typical $R_{\Theta JC}$ = 0.5 °C/W









- Operating condition: Power = 1 W in the active area.
- Boundary condition: Temperature of the device backside set to be 300 K.

EPC2215 $Z_{\Theta JB}$ R-C thermal model

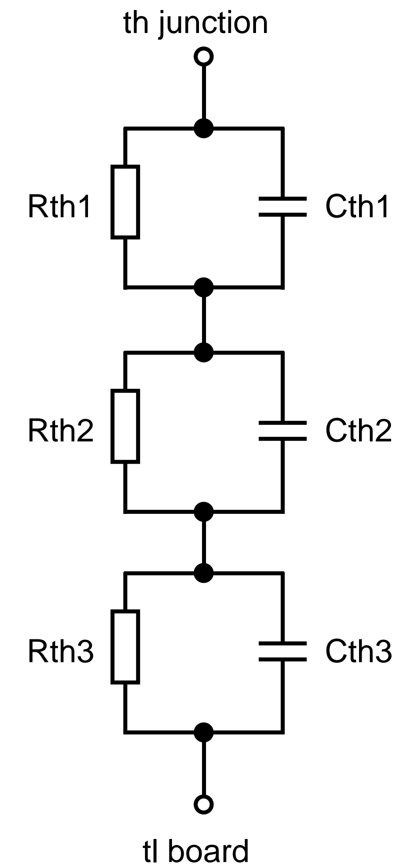
Transient junction temperature (Junction to Board, P = 1 W)

Finite element simulation
R-C thermal model

Model Parameter	Value	Unit
Rth1	2.35E+00	°C/W
Rth2	1.29E-01	
Rth3	2.29E-02	
Cth1	6.44E-03	J/°C
Cth2	1.83E-03	
Cth3	1.53E-03	

ΔT_J (°C)

Time (s)



EPC2215 $Z_{\Theta JC}$ R-C thermal model

EPC
EFFICIENT POWER CONVERSION

Transient junction temperature (Junction to Case, P = 1 W)

Finite element simulation
R-C thermal model

ΔT_J (°C)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0

10^{-6} 10^{-5} 10^{-4} 10^{-3} 10^{-2} 10^{-1} 10^{0}
Time (s)

Model Parameter	Value	Unit
Rth1	3.98E-01	°C/W
Rth2	7.86E-02	
Rth3	2.38E-02	
Cth1	3.78E-03	J/°C
Cth2	2.35E-03	
Cth3	6.22E-04