

Definition of Thermal Resistance

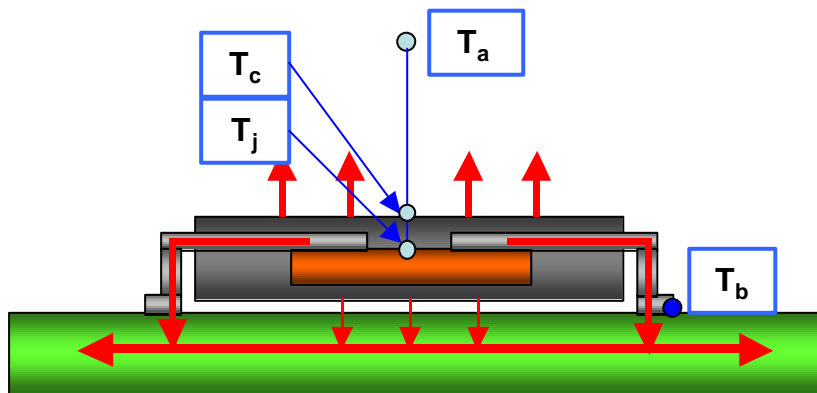
In general, thermal performance of electronic package is represented by two kinds of thermal resistance, θ_{ja} and θ_{jc} .

Heat dissipation path in a package and the equivalent thermal resistance network are described by the following figures, respectively.

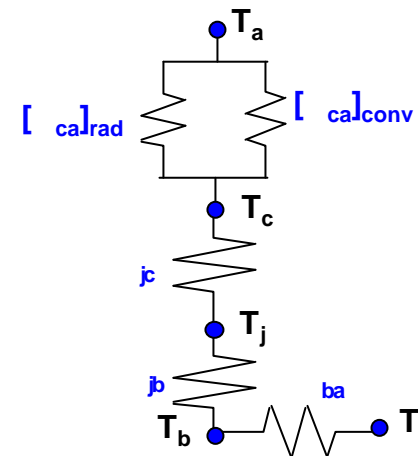
Junction-to-ambient thermal resistance, θ_{ja} is defined by

$$\theta_{ja} = \frac{T_j - T_a}{P_d}$$

Where, T_j = Junction Temperature [°C]
 T_a = Ambient Temperature [°C]
 P_d = Power Dissipation [Watt]



[Heat Dissipation Path in TSOP]



[Thermal Resistance Network]

Thermal Measurement

JEDEC has developed industry-standard specifications for thermal testing to minimize the influence of environmental factor on the calculation of θ_{ja} .

Test Environments

Junction-to-Ambient Thermal Resistance, θ_{ja}

- Natural Convection(using test chamber) : JEDEC Standard JESD51-2
- Forced Convection(using wind tunnel) : JEDEC Standard JESD51-6

Junction-to-Case Thermal Resistance, θ_{jc}

- Cold Plate Method(using water cooling) : SEMI G30-88

Device Calibration

Temperature Sensitive Parameter(TSP)

$$T_j = T_{sp} + K \times \Delta T_{sp}$$

Where, ΔT_{sp} : Change in the TSP caused by the application of Pd

K : Constant defining the relationship between the junction temperature change and TSP change($^{\circ}C / TSP$)

Test Boards

Low/High Effective Thermal Conductivity Test Board : JESD51-3/7

Area Array Thermal Test Board : JESD51-9