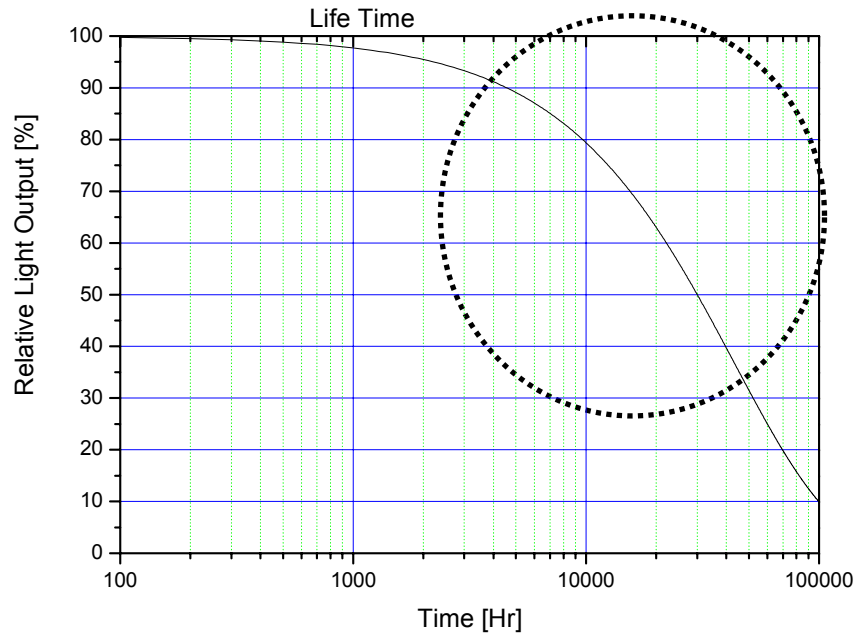
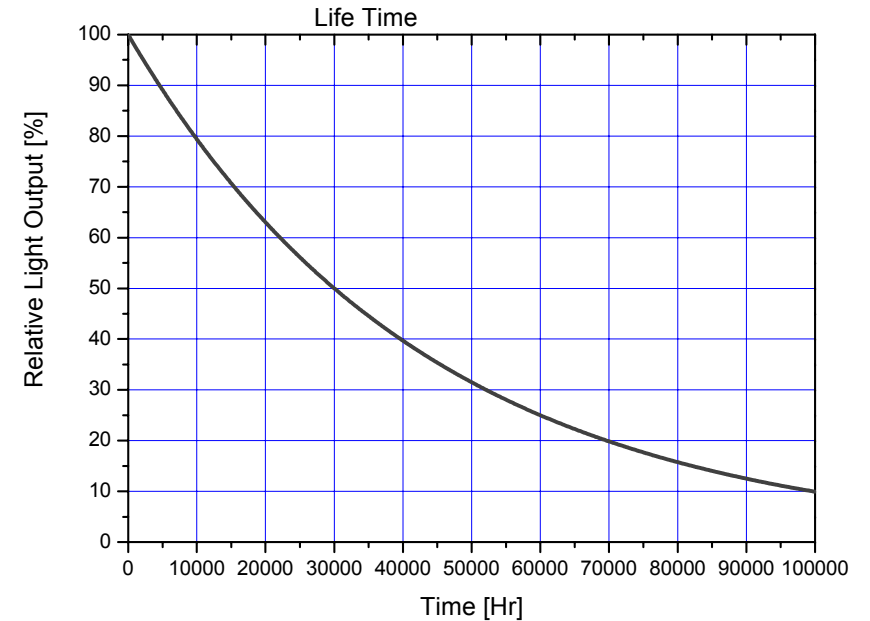

Life Time Graph of Z-Power LED

Life Time Graph of P1 1W Series for $T_J = 90\text{ }^{\circ}\text{C}$



Detail



*This calculation can be done using the Arrhenius Model as shown below

$$R(t) = \exp(-\lambda t)$$

where

$R(t)$ = Probability that unit will operate at time t

λ = failure rate

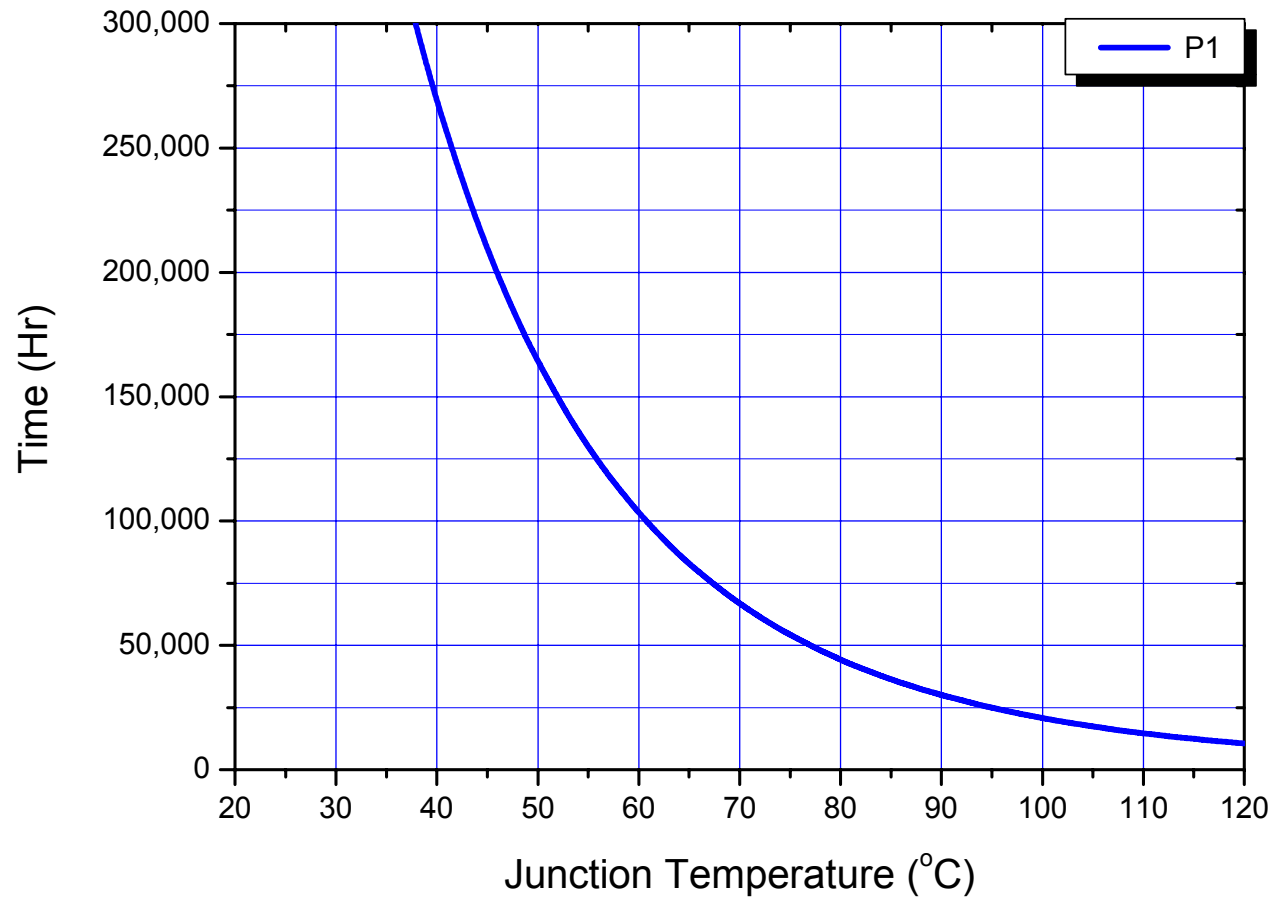
t = Time component is on

30,000hr 50% degradation

Life time of P1 blue can be shorter than others as junction temperature goes higher.

Tj vs. Life Time Graph of Z-Power P1 1W Series

50% Degradation graph of Luminous output



Life time of P1 blue can be shorter than others as junction temperature goes higher.

*This calculation can be done using the Arrhenius Model as shown below

$$R(t) = \exp(-\lambda t)$$

$$\lambda_2 = \lambda_1 \exp \left[\frac{E_A}{k} \left(\frac{1}{T_1} - \frac{1}{T_2} \right) \right]$$

where

$R(t)$ = Probability that unit will operate at time t

λ = failure rate

t = Time component is on

λ_1 = failure rate at junction temperature T_1

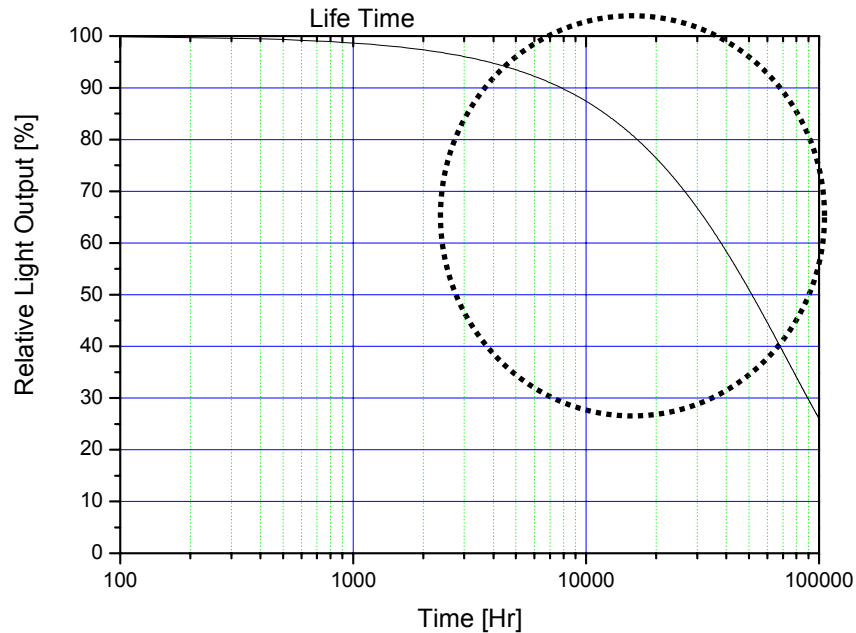
λ_2 = failure rate at junction temperature T_2

E_A = activation energy, in units eV

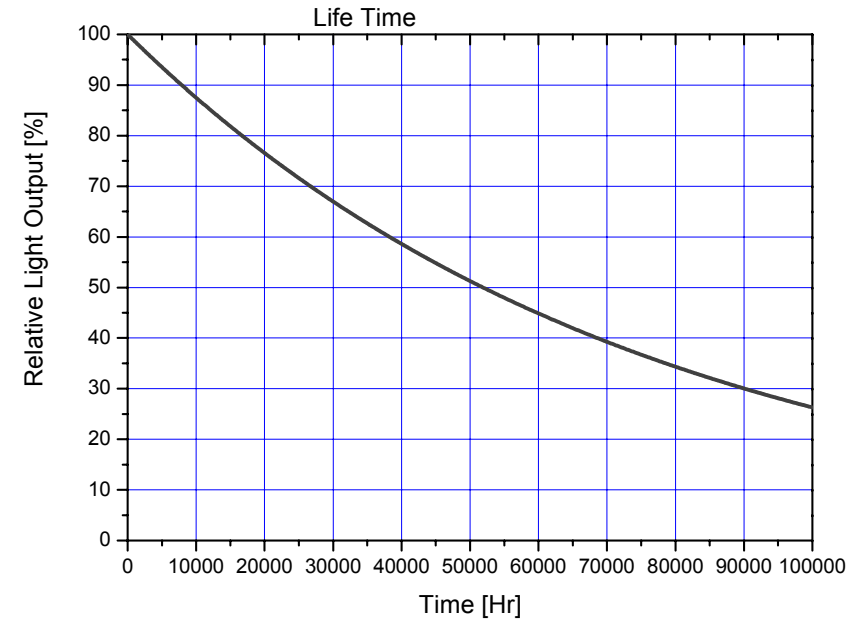
k = Boltzmann's constant ($8.617 \times 10^{-5} \text{ eV/K}$)

T = junction temperature in °K (°K = °C + 273)

Life Time Graph of P9 White for $T_J = 90\text{ }^{\circ}\text{C}$



Detail



*This calculation can be done using the Arrhenius Model as shown below

$$R(t) = \exp(-\lambda t)$$

where

$R(t)$ = Probability that unit will operate at time t

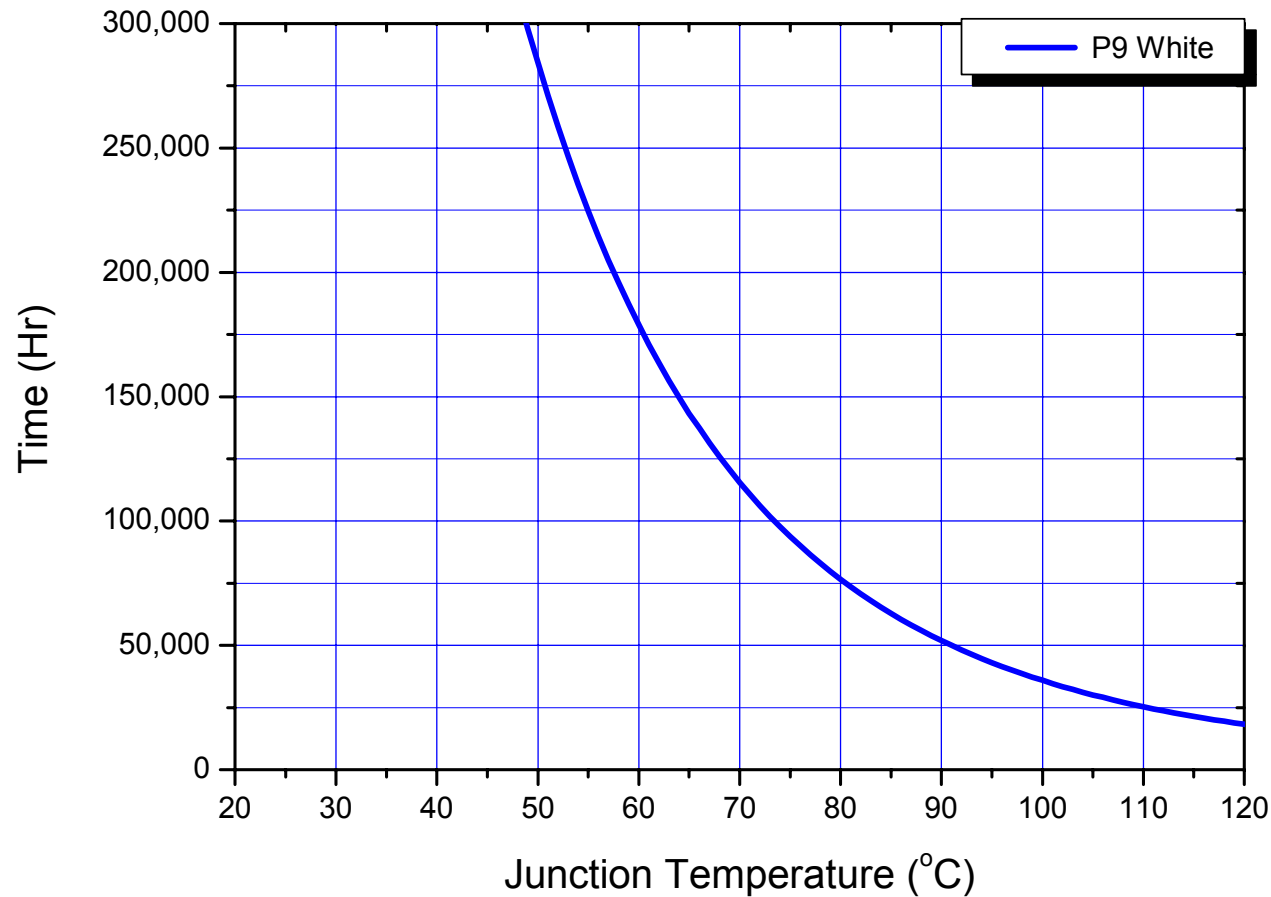
λ = failure rate

t = Time component is on

50,000hr 50% degradation

Tj vs. Life Time Graph of Z-Power 0.5W series

50% Degradation graph of Luminous output



*This calculation can be done using the Arrhenius Model as shown below

$$R(t) = \exp(-\lambda t)$$

$$\lambda_2 = \lambda_1 \exp \left[\frac{E_A}{k} \left(\frac{1}{T_1} - \frac{1}{T_2} \right) \right]$$

where

$R(t)$ = Probability that unit will operate at time t

λ = failure rate

t = Time component is on

λ_1 = failure rate at junction temperature T_1

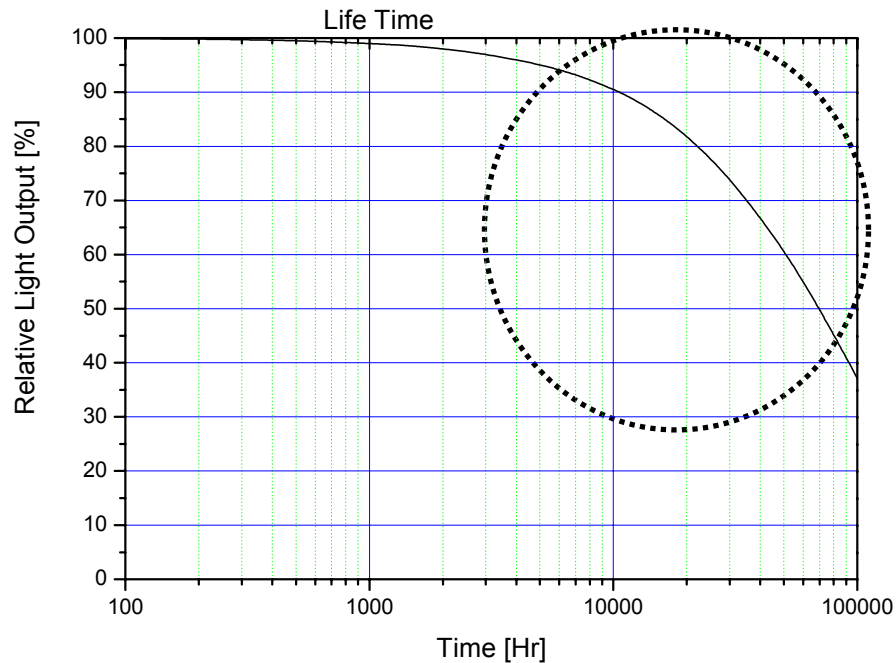
λ_2 = failure rate at junction temperature T_2

E_A = activation energy, in units eV

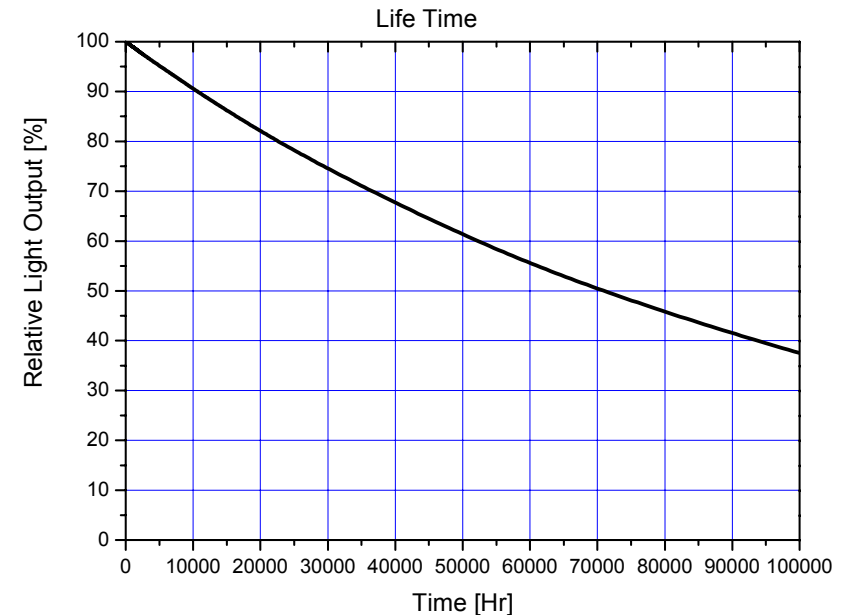
k = Boltzmann's constant ($8.617 \times 10^{-5} \text{ eV/K}$)

T = junction temperature in °K (°K = °C + 273)

Life Time Graph of P4 1W Pure White for $T_J = 90^\circ\text{C}$ (@350mA)



Detail



*This calculation can be done using the Arrhenius Model as shown below

$$R(t) = \exp(-\lambda t)$$

where

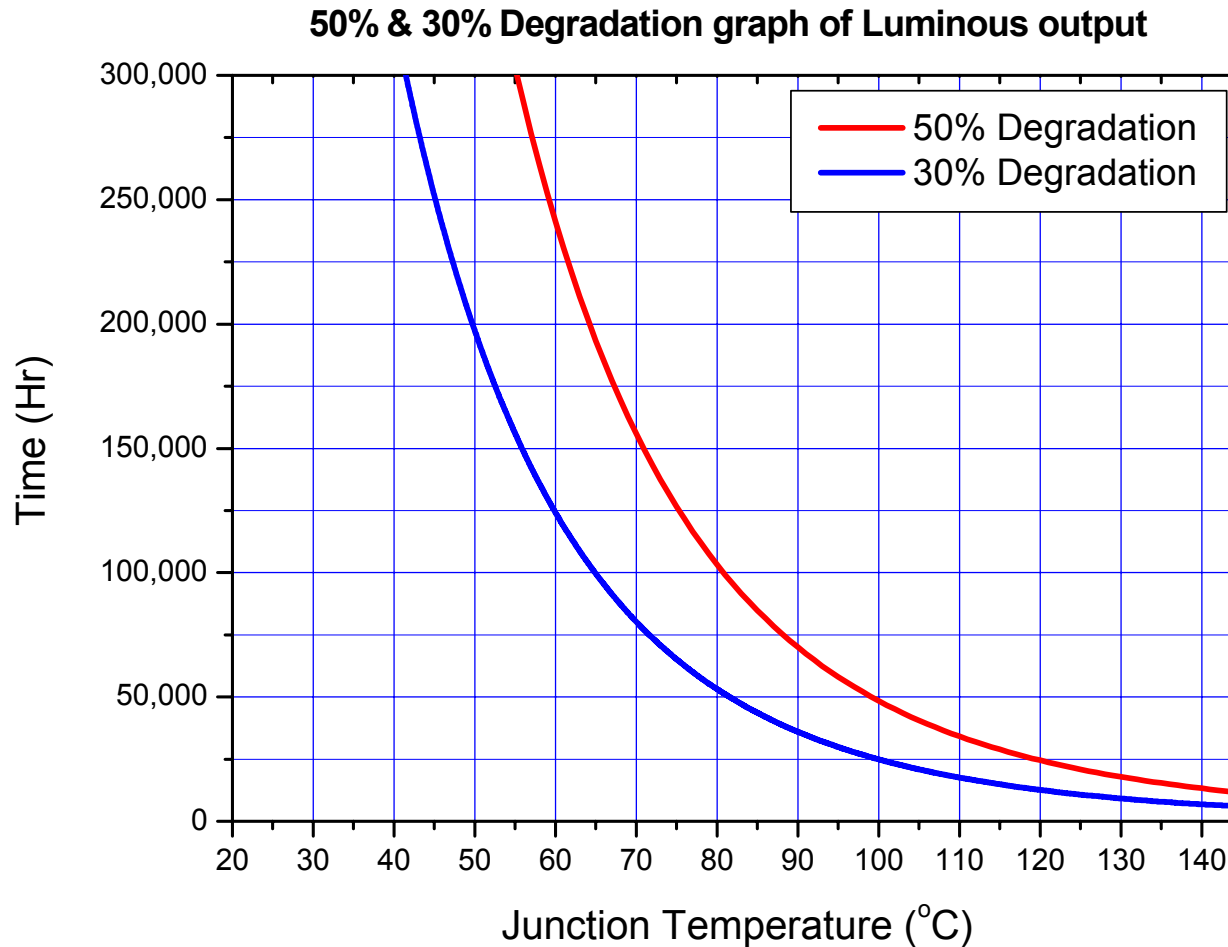
$R(t)$ = Probability that unit will operate at time t

λ = failure rate

t = Time component is on

70,000hr 50% degradation

Tj vs. Life Time Graph of Z-Power P4 1W Pure White Series



*This calculation can be done using the Arrhenius Model as shown below

$$R(t) = \exp(-\lambda t)$$

$$\lambda_2 = \lambda_1 \exp \left[\frac{E_A}{k} \left(\frac{1}{T_1} - \frac{1}{T_2} \right) \right]$$

where

$R(t)$ = Probability that unit will operate at time t

λ = failure rate

t = Time component is on

λ_1 = failure rate at junction temperature T_1

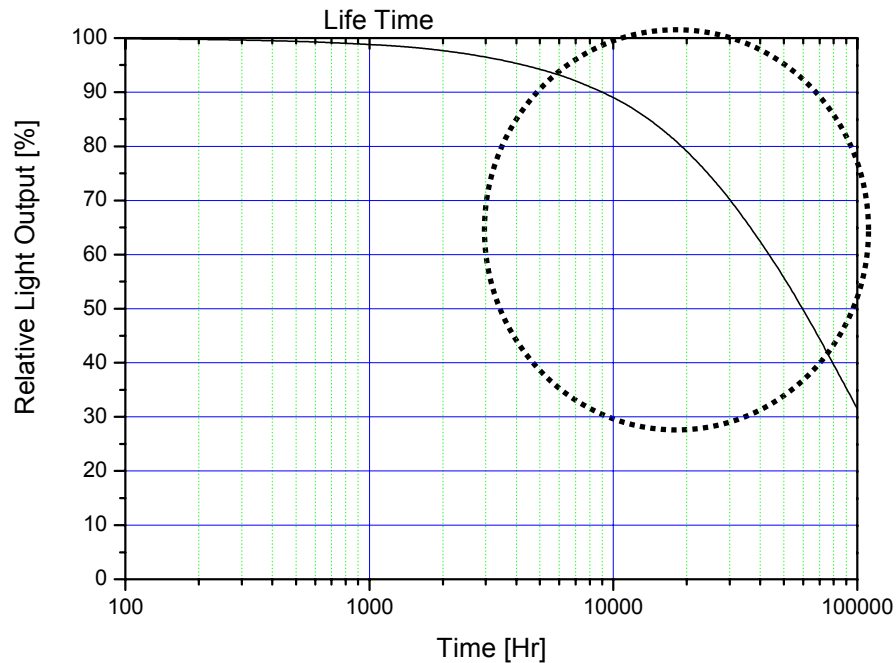
λ_2 = failure rate at junction temperature T_2

E_A = activation energy, in units eV

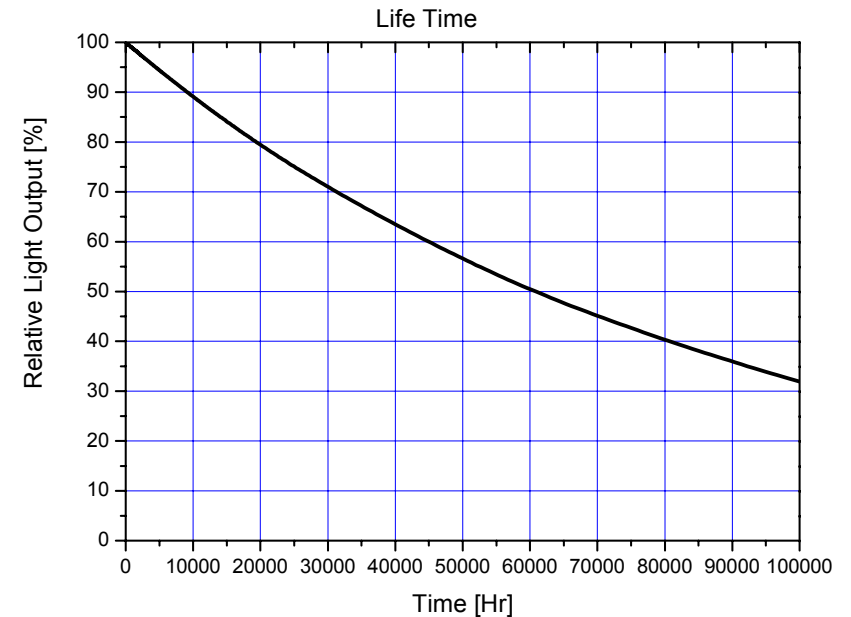
k = Boltzmann's constant ($8.617 \times 10^{-5} \text{ eV/K}$)

T = junction temperature in °K (°K = °C + 273)

Life Time Graph of P4 2.5W Pure White for $T_J = 90\text{ }^{\circ}\text{C}$ (@700mA)



Detail



*This calculation can be done using the Arrhenius Model as shown below

$$R(t) = \exp(-\lambda t)$$

where

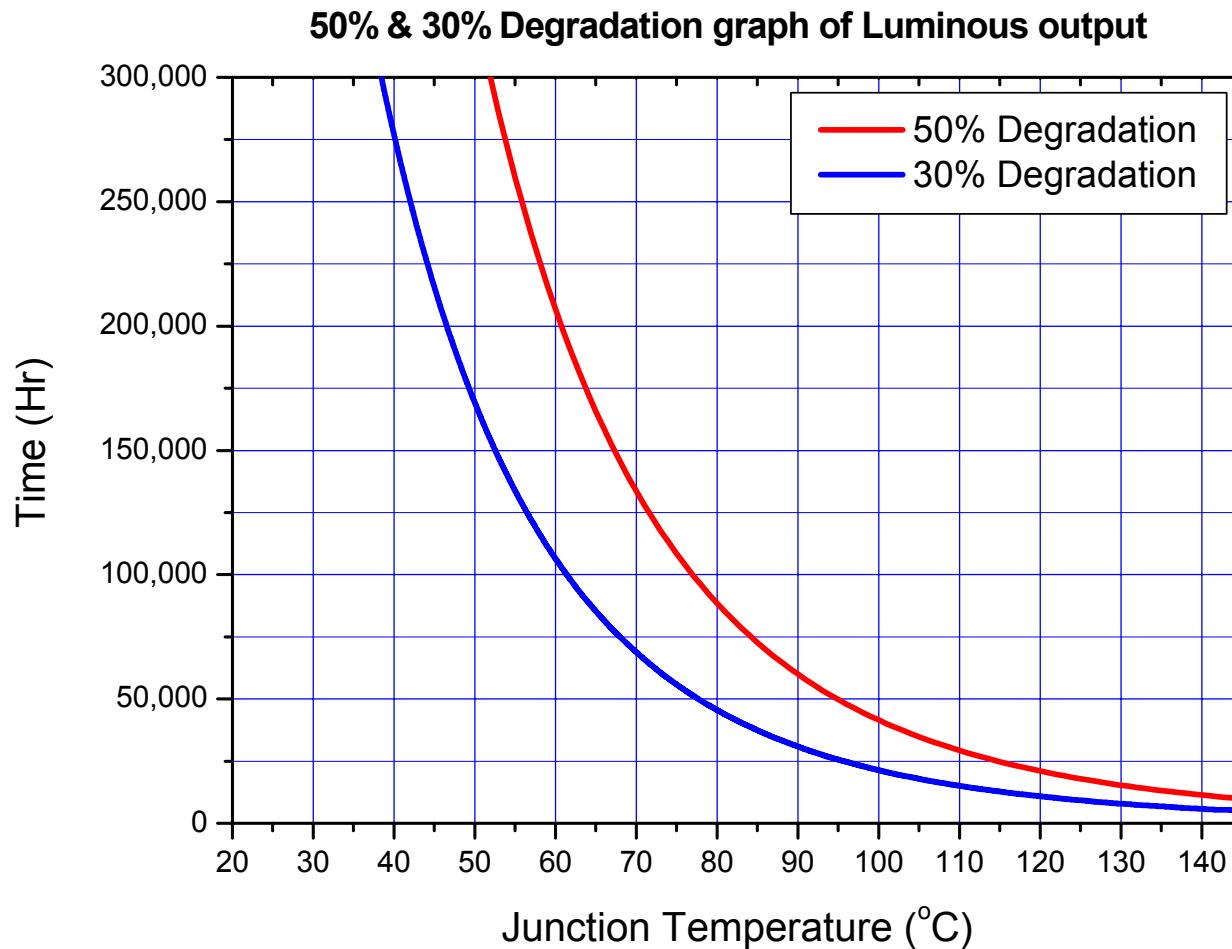
$R(t)$ = Probability that unit will operate at time t

λ = failure rate

t = Time component is on

60,000hr 50% degradation

Tj vs. Life Time Graph of Z-Power P4 2.5W Pure White Series



*This calculation can be done using the Arrhenius Model as shown below

$$R(t) = \exp(-\lambda t)$$

$$\lambda_2 = \lambda_1 \exp \left[\frac{E_A}{k} \left(\frac{1}{T_1} - \frac{1}{T_2} \right) \right]$$

where

$R(t)$ = Probability that unit will operate at time t

λ = failure rate

t = Time component is on

λ_1 = failure rate at junction temperature T_1

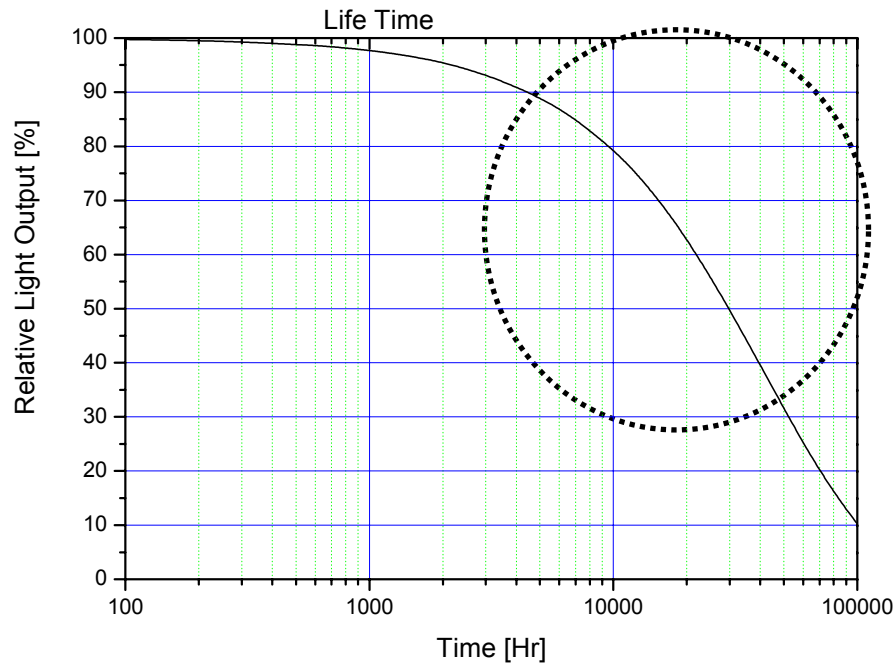
λ_2 = failure rate at junction temperature T_2

E_A = activation energy, in units eV

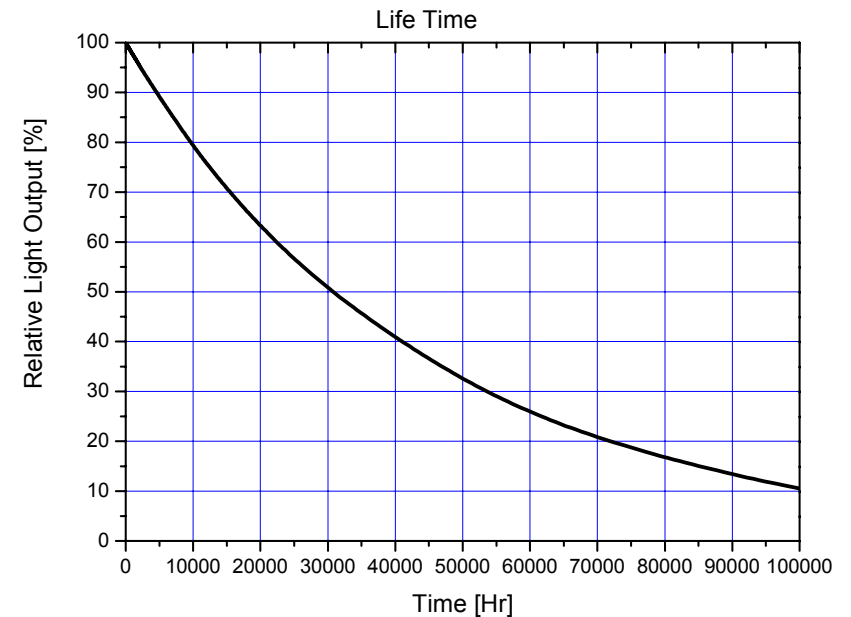
k = Boltzmann's constant ($8.617 \times 10^{-5} \text{ eV/K}$)

T = junction temperature in °K (°K = °C + 273)

Life Time Graph of P4 4W Pure White for $T_J = 90^\circ\text{C}$ (@1A)



Detail



*This calculation can be done using the Arrhenius Model as shown below

$$R(t) = \exp(-\lambda t)$$

where

$R(t)$ = Probability that unit will operate at time t

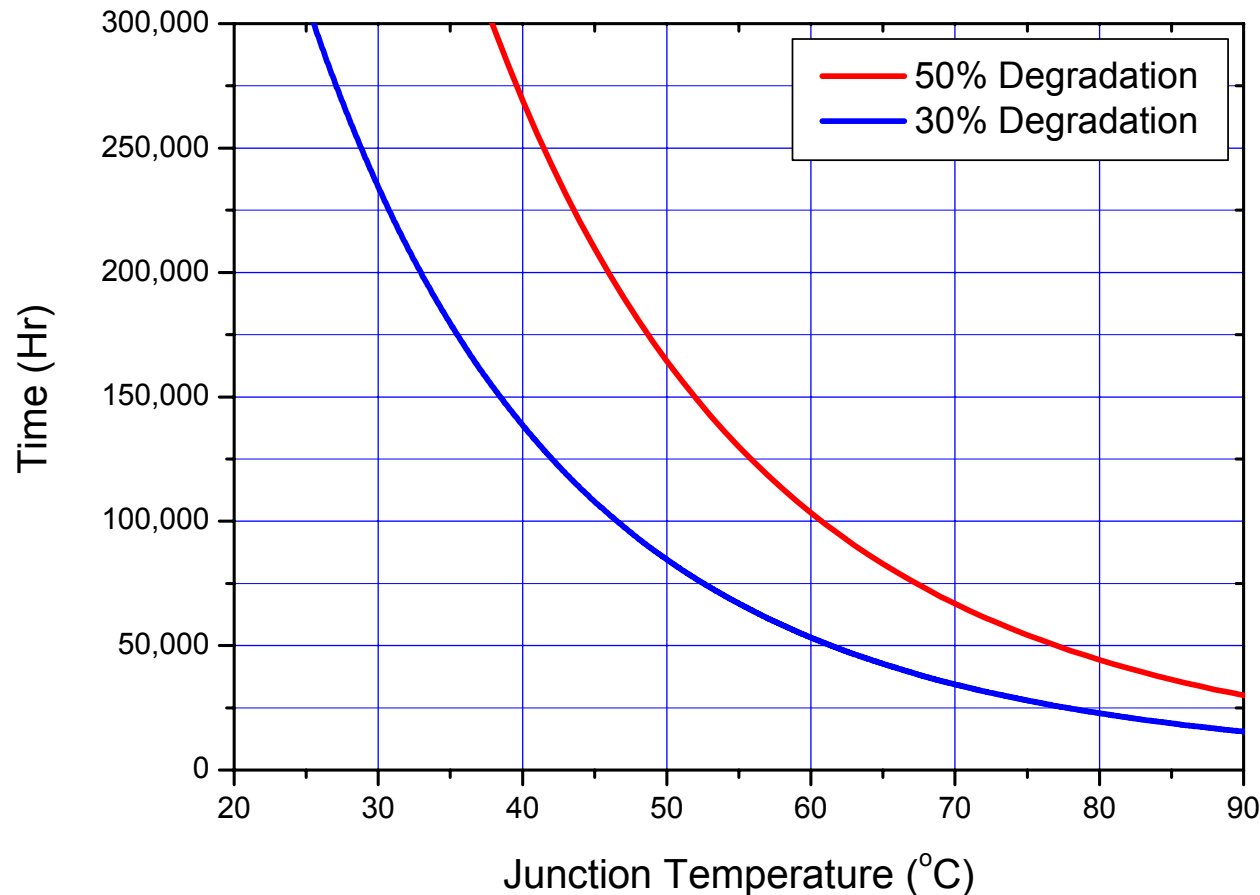
λ = failure rate

t = Time component is on

30,000hr 50% degradation

Tj vs. Life Time Graph of Z-Power P4 4W Pure White Series

50% & 30% Degradation graph of Luminous output



*This calculation can be done using the Arrhenius Model as shown below

$$R(t) = \exp(-\lambda t)$$

$$\lambda_2 = \lambda_1 \exp \left[\frac{E_A}{k} \left(\frac{1}{T_1} - \frac{1}{T_2} \right) \right]$$

where

$R(t)$ = Probability that unit will operate at time t

λ = failure rate

t = Time component is on

λ_1 = failure rate at junction temperature T_1

λ_2 = failure rate at junction temperature T_2

E_A = activation energy, in units eV

k = Boltzmann's constant ($8.617 \times 10^{-5} \text{ eV/K}$)

T = junction temperature in °K (°K = °C + 273)