

15 laser diodes (Model TO-658PLR-35) were subjected to high temperature lifetest (60°C) at constant current .

The pre an post burn-in LIV curves from the 15 laser diodes illustrated in figure 1 and 2 are well behaved.

No diodes failed in 3,800 hours of operation at 60°C.

The formula used to estimate time to failure is the Arrhenius formula:

$$t_{T_1} = A \cdot e^{\left(\frac{E_A}{k \cdot T_1}\right)} \quad (1)$$

Where t_{T_1} = the time to failure [hours]

A = scaling factor

E_A = Activation Energy [eV]

k = Boltzman constant [8.617 · 10⁻⁵ ev/K]

T_1 = Temperature [K]

The acceleration factor α used to estimate lifetime at lower temperature T_2 is computed from (1):

$$\alpha = \frac{t_{T_1}}{t_{T_2}} = e^{\frac{E_A}{k} \left(\frac{1}{T_1} - \frac{1}{T_2} \right)} \quad (2)$$

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With $T_1 = 25^\circ\text{C}$ and $T_2 = 60^\circ\text{C}$ (test temperature), and a activation energy E_A chosen conservatively (0.3eV), the acceleration factor is computed with Equation (2) and equal to 3.4.

Therefore, we estimate that 3,800 hours of operation at 60 °C is equivalent to 12,920 hours at 25 °C.

Figure 1

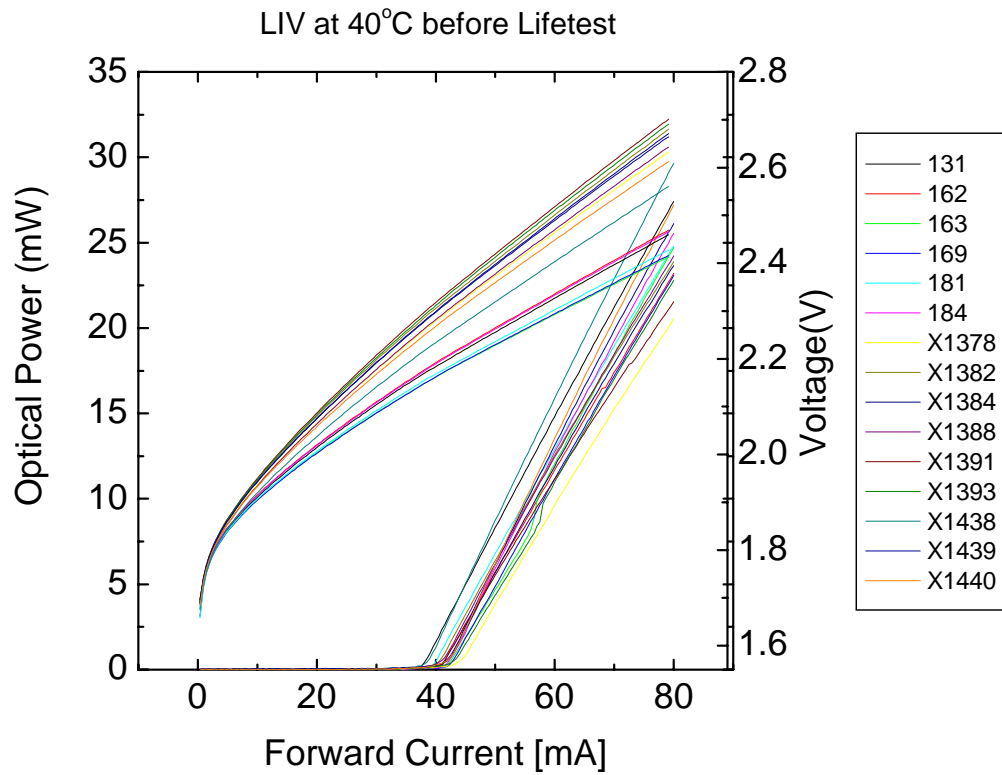


Figure 2

