Lifetime Aging Report

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:

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

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

A = scaling factor

E_A = Activation Energy [eV]

k = Boltzman constant [8.617 $\cdot 10^{-5}$ ev/K]

T_1 = Temperature [K]

The acceleration factor used to estimate lifetime at lower temperature T_2

a

Is computed from (1):

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

With T_1 = 25°C and T_2=60°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

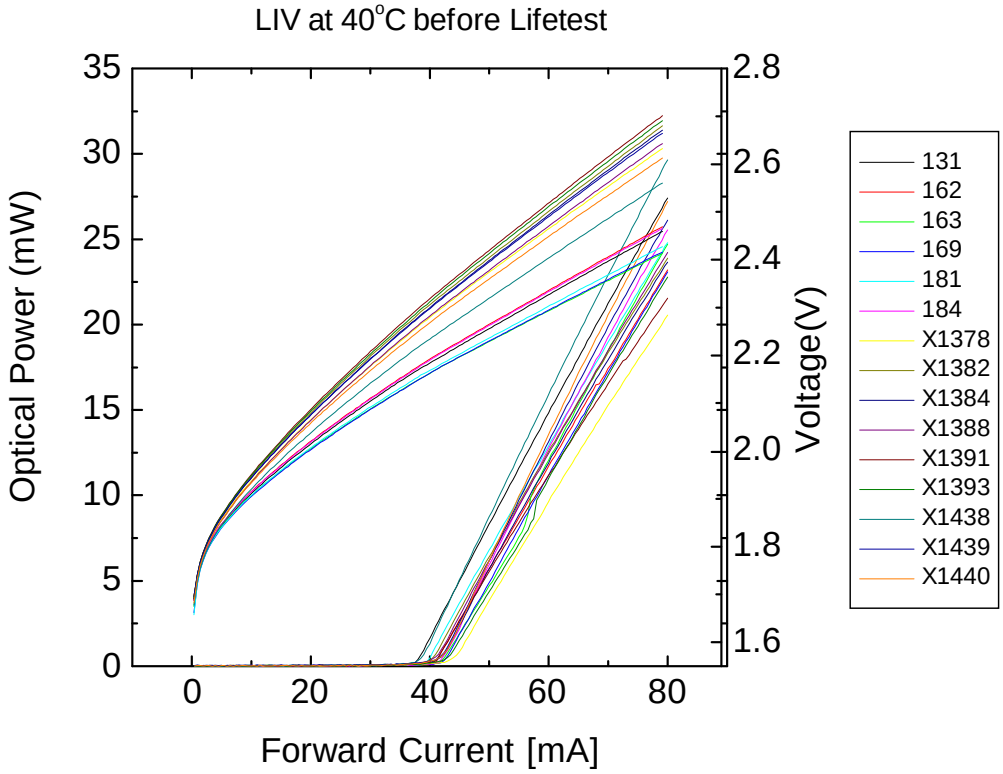

Figure 2