

ULE2200 Series Reliability Report

OptoElectronix Quality Goal

Our goal is 100 percent customer satisfaction (zero customer returns). One way we insure that OptoElectronixTM products are designed and manufactured to meet this goal is to perform a series of stringent reliability tests on all products prior to their release to production. These reliability tests place the products into situations that greatly exceed the conditions they will see over their lifetime.

This reliability testing report details the tests performed and the results for our ULE2000 series Universal Light EngineTM products.

Reliability Tests Performed

Power Temperature Cycling

The Power Temperature Cycling test determines the performance of the Universal Light Engine modules when operated at maximum-rated power and cycled 100 times over extreme temperatures (-20°C to +70°C, or -4°F to 158°F) at a rapid rate of change. This simulates extreme operating and environmental conditions and provides excellent evidence that the devices will withstand more normal conditions for very long periods of time.

| Power Temperature Cycling | |
|------------------------------------|---|
| Test Conditions | -20°C to +70°C, with a 45-minute rise/fall time. Product remains at each temperature extreme for 20 minutes with the LED current at 500 mA. |
| Number of Power Temperature Cycles | 100 |
| Total Units Into the Test | 24 |
| Units Passing the Test | 24 |

Ambient Operating Life Test

The Ambient Operating Life Test determines device performance when operated at maximum-rated power at ambient temperature of 25°C (77°F). This test simulates normal operating conditions for the device. The test is run for 2,000 hours. Because early mortality in electronic devices is the most common cause of failure, passing this test is evidence that such failures are not evident in design or manufacture.

| Ambient Operating Life Test | |
|---------------------------------------|--------------------------------|
| Test Conditions | 25°C with LED current at 500mA |
| Number of Hours | 2,000 (83 days) |
| Total Units Into the Test | 24 |
| Units Passing the Test at 2,000 Hours | 24 |

High Relative Humidity With Elevated Temperature and High Power Test

This test determines device performance when operated in hot, humid environments: 85 percent relative humidity and 85°C (185°F) for 500 hours. Passing this test ensures that the device will operate in high humidity.

| High Relative Humidity With Elevated Temperature | |
|--|---|
| Test Conditions | 85°C with 85% relative humidity, LED current at 500mA |
| Number of Hours | 672 (28 days) |
| Total Units Into the Test | 24 |
| Units Passing the Test at 672 Hours | 24 |

Product Test Vehicles

- ULE2210A LED light engine with a warm white LED, 12V_{AC} operation, utilizing an OSRAM LED.
- ULE2210B LED light engine with a warm white LED, 12V_{AC} operation, utilizing a Cree LED.

Overall Reliability Testing Results

All three tests resulted in 64,500 device-hours with zero failures. Based on this data the mean time between failure (MTBF) is 29,000 hours with a confidence level of 90 percent.

The ULE2210A and ULE2210B successfully passed reliability testing and were released to production status and are shipping to customers.

Data sheets for products in the ULE2000 Series can be found at www.optoelectronix.com/products/ULE.

For detailed reliability data on the LEDs utilized in the Universal Light Engine modules tested, please go to the individual LED manufacturers' websites:

ULE2210A

OSRAM: www.osram-os.com/osram_os/EN/Products/Product_Promotions/DRAGON_Family/Golden_DRAGON/Products/index.html

ULE2210B

Cree: www.cree.com/products/pdf/XLamp_Reliability.PDF

For more information on OptoElectronix LED lighting products, please contact Nu Horizons Electronics, www.nuhorizons.com/nusolutions/lighting/oei/, or your local sales representative, listed at www.optoelectronix.com.

OptoElectronix is the leader in *The Art of LEDs* — the conception, design, and manufacture of cutting-edge, standard, highly efficient LED-based lighting.