



Why there's no **substitute** for quality in outdoor LEDs

LEDs have a great deal to live up to. Not only are they a shining example of high efficacy, durability and low maintenance, these benefits also translate into energy and maintenance savings that reduce the total cost of ownership of an installation. They are also far more versatile than traditional light sources in terms of form factor, CCT, CRI and optical control. So it's no wonder LEDs have transformed the way OEMs think about outdoor lighting.



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But while the right LEDs can be extremely reliable over a long lifetime, can electronic LED drivers deliver the continuous high performance and reliability needed to support long system lifetime (25+ years) in challenging outdoor applications?

With Philips quality at the heart of your solution, the answer is yes. We understand that OEMs, customers and lighting professionals need to feel confidence that they have access to the highest quality products. Only a reliability program that spans the full cycle of lighting components, from product design and testing to installation and maintenance, can offer this reassurance.

Our six pillars of quality

The Philips six pillars of quality cover every aspect of designing LED solutions for outdoor customers. Quality you can count on for lighting, assurance, innovation, people, support and leadership.

Our LED components are rigorously tested so you can build quality lighting specifically designed for demanding outdoor conditions. You can also rely on robust performance in the most extreme weather conditions. So you can live up to the promise of long-lasting LED lighting for every installation.

LEDs and lifetime

Assessing LED module lifetime and failure rates is not as simple as it appears. OEMs that take the 'DIY approach' to manufacturing their own LED light sources cannot provide credible reliability data at the module level by simply using the LED data. This includes LM80 data or calculations using the TM21 method, which cannot provide accurate reliability data on lumen depreciation or catastrophic failures.

A further consideration is the location of your lighting installation, which will always determine the eventual lifetime of any LED. For example, luminaires in the tropics operating in night temperatures of more than 30°C will endure more than those in milder climates with average night temperatures of 15°C. Switching can also influence LED lifetime due to the effect of thermal shock on soldering, as can mechanical stress cause by stormy weather or heavy traffic.

Robust and reliable

Developing reliable products that deliver the longest lifetime, while also delivering on cost, size and time to market, is a challenge for every OEM. Our LED modules and drivers are designed to meet strict electrical, thermal and optical benchmarks for reliability, with high surge protection as standard for extremely low failure rates.

The importance of surge protection

Surges are nothing more than a sudden, brief rise in voltage and/or current in an electrical system. They be caused by direct or indirect lightning strikes, high load switching, and static charging and discharging. Spikes of several kilovolts can last just a few microseconds, but have a devastating impact on outdoor lighting systems. Not only do they wear out LED drivers and distribution panels prematurely, they also cause material damage to luminaires and break surge protection devices (SPD). But more importantly, voltage surges can also leave the public without lighting. And that can have critical safety consequences in applications such as traffic tunnels, road signs, or pedestrian crossings.

Build a reputation for quality

At Signify we have taken our vast experience in quality testing conventional lighting and applied the learning to LED. This has enabled us to maximize the longevity of our LED modules and drivers and offer far more accurate lifespan probabilities.

For example, extensive qualification testing is performed at the design stage for Philips Xitanium LED drivers to catch any issues during product development, and ensure they comply with all relevant industry standards. This includes operating the drivers under all possible conditions, including extreme temperatures and humidity.

Driving lifetime expectations

Philips Xitanium LED drivers are developed through our tightly controlled design and development process that evaluates quality at every milestone. Based on our knowledge



of LED drivers and components, we take into account those components that are most likely to fail, especially when the driver is operating at high temperatures.

In addition, the construction of the LED fixture and the ability to lower the temperature of the driver and modules has a significant effect on lifetime. One critical aspect is the thermal stress arising from the mutual heating of components. For example, a driver typically generates 20 to 25°C of heat, but when mounted very close to the LED board this can lead to further temperature increases.

Philips drivers can be connected to an NTC temperature sensor that can be programmed to dim the module down at over-temperature to protect the module without switching off the lights. A built-in MainsGuard feature also ensure the luminaire remains on – even at low input voltage, limiting the input current to max 130% to prevent tripping.

Built-in reliability

To minimize the risks associated with LED module failure, we have developed an LED module reliability program that assesses performance at the module level according to quality control, testing, validation and compliance with international standards. Methods such as FMEA and our Six Sigma modelling system also facilitate more accurate predictions of LED module longevity.

To ensure high driver reliability in the most demanding applications, we perform Advanced Life Testing life testing, including HALT/MEOST. Data from new product testing is compared with the field data of existing products. This ensures every new product provides the same reliability as products that have been previously released – and guarantees the lowest product and component failure levels in the industry.

Each and every component is subjected to extensive design qualification, testing and long-term reliability checks known as 'building block release'. These include component tests on

color shift, solder joint reliability, batch variation, wire bond performance and electrical overstress. We only ever use the best components, ensuring highly reliable solutions that consistently achieve industry-leading lifetimes.

System efficiency also has a significant impact on the reliability and lifetime of a LED driver. As power loss is dissipated as heat within the driver, it increases the operating temperature of driver components, reducing their reliability. Our LED drivers operate with higher efficacy to minimize power dissipation. This significantly improves their lifetime and reliability compared to inferior, lower-efficiency alternatives.

Superior surge protection

When it comes to surge protection, IEC761547 requires all luminaires to be protected from overvoltages of up to 1 kV in differential mode (DM) and 2 kV in common mode (CM). Signify goes beyond this, exceeding expected norms by designing in higher protection levels that withstand the most demanding outdoor environments.

Philips Xitanium LED Xtreme drivers provide 8 kV to 10 kV CM protection, and 6 kV DM protection at the driver level. When integrated into outdoor luminaires with a minimum protection of 6 kV CM and 6 kV DM at the luminaire level, this ensures protection for most European street lighting applications up to Class 4.

Additional protective measures can also be applied to luminaire installations in areas with a high lightning strike density, or in critical application such as airports and major roads. This can be done by adding an external surge protector device (SPD), which provides even higher protection for the driver and other devices in the luminaire to support the longevity of our LED solutions.

Clearly better quality

In summary, the lifetime, reliability and surge protection, Philips outdoor LED modules and drivers are maximized during their design and manufacture. Testing and qualification then ensure that the actual quality and behavior in the field is comparable with modelling used to gauge driver failure rates. Our LED module reliability program also eliminates the risk of early failure with accurate lifetime data that offer OEMs new levels of trust. Add to this, a continuous cycle of feedback and improvements, and you can be sure that Philips LED modules and drivers perform far better than their theoretical estimates. For OEMs the advantages are clear. By choosing Signify quality over inferior alternatives, they can guarantee their LED modules and drivers will support the extreme reliability of LEDs over their entire lifetime. OEMs can also rely on Signify's global expertise from design to installation and beyond, with all the quality people and support tools that you'd expect from the number one name in LED. So when it comes to outdoor LED modules and drivers, there really is no substitute for quality.

Further reading

To find out more, please download the following:

Reliability and lifetime of outdoor LED systems

Can electronic LED drivers provide the required current/voltage input to LEDs over their entire lifetime? This paper addresses this question in general, and looks at the Xitanium LED driver family in particular.



The challenges of surge protection

Voltage surges can prematurely wear out LED drivers and disrupt street lighting. This white paper examines the causes and effects of voltage surges, as well as ways of maximizing protection and continuity of service.



Are you reliably informed about LED modules?

This white paper describes the Philips Lighting LED module reliability program, which has been developed to ensure its LED modules deliver the right light – and the right level of trust – while gathering accurate data.

