An integrated and easy to design system offer heat sink and optics with good protection on IP 66
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**Disclaimer**
Thank you for choosing the Philips CertaFlux PLM Gen1. In this guide you will find the information required to design this module into a luminaire.

**Information and support**
If you require any further information or support, please consult your local Philips office or visit our website:
http://www.lighting.philips.com.sg/oem-sg

**Determine which documents contain what information**
In order to provide information in the best possible way, Philips’ philosophy on product documentation is the following.

- **Commercial leaflet** contains product family information & system combinations (compatible Philips driver information)
- **Datasheet** contains the module (module and multi-connector) specification
- **Design-In Guide** describes how to design-in the products

All these documents can be found on the download page of the OEM website
http://www.lighting.philips.com.sg/oem-sg

If you require any further information or support, please consult your local Philips office.
**Warnings and instructions**

**Safety warnings and installation instructions**
To be taken into account during design-in and manufacturing.

**Design-in phase**
- Do not apply mains power to the module directly.
- Connect the modules and drivers before switching on mains.
- Avoid contamination (direct or indirect) from any incompatible chemicals reacting with the LED. A list of incompatible chemicals is provided in the chapter for Compliance and Approval.
- The general IEC recommendations for luminaire design and legal safety regulations (ENEC, CE, ANSI, etc.) are also applicable to Philips PLM systems. Luminaire manufacturers are advised to conform to the international standards for luminaire design Class I, IEC 60598-Luminaires).
- Class I luminaires must provide a protective earth.
- The luminaire must be constructed in such a way that the LED module cannot be touched by an end-user, both in off state and when live.
- It is mandatory to design the luminaire in such a way that it can only be opened with special tools (by a qualified person) in order to prevent touching of live parts.
- Do take into account the minimum required creepage and clearance distances.
- Connect all electrical components first before switching on mains.
- The LED module shall be powered by a LED control gear IEC/EN 61347-2-13 certified.

Avoid possibilities of water or dirt ingress: use appropriate IP-rating of luminaire with regard to specific conditions of application.

**Warnings:**
- Metal enclosure of Certaflux PLM System must be grounded
**Manufacturing phase**
- Do not use damaged or defective LED modules, including damaged connectors or PCB.
- Do not drop the LED module or let any object fall onto the LED module because this may damage the glass of the module. If the LED module has been dropped or an object has fallen onto the LED module, do not use it, even if there are no visible defects or signs of damage.
- Connect all electrical components first before switching on mains.
- The LED module shall be powered by a LED control gear IEC/EN 61347-2-13 certified.

**Installation and service for luminaires incorporating the Philips Certaflux PLM system**
- Do not service the luminaire when the mains voltage is connected; this includes connecting or disconnecting the LED module cables.
- Do not use damaged products.
- The CertaFlux PLM should always be replaced by an OEM-qualified installer.
- The water proof connector has to be fully tightened up to prevent the water penetration via the connection in the field application.
- Due to the Tcase nominal temperature of the Certaflux PLM of 75 °C, it is important to take into account the maximum touchable metal surface temperatures of the module. With such a high Tc temperature the maximum temperature for touch safety can easily be exceeded. Do not touch the module.

**Philips Design-in support**
Is available; please contact your Philips sales representative.
Introduction to the Certaflux PLM system

Applications and luminaire classification
The CertaFlux PLM is an integrated module solution with IP66 protection, excellent optical and heat management, made possible by its mid-power LED and glass lens technology. The entire system set includes PLM module, IP67 driver and connectors, creating a total IP solution perfect for easy design-in for outdoor applications. CertaFlux PLM is a modular system, with each module having lumen output up to 4500lm and higher at specific luminaire design. The portfolio has been broadened to include color temperatures of 3000K, 4000K and 5000K, suitable for new road, streetlight installations and can replace SON 150W, 250W and 400W.

Luminaire Class I applications
Certaflux PLM modules are suitable for luminaire Class I applications in combination with approved Philips Xitanium IP67 outdoor drivers. Approved combinations comply with the latest IEC60598 luminaire standard requirements.

Commercial naming of the Philips PLM modules
The names of Philips PLM module are defined as shown in underneath example.

CertaFlux PLM II 4500lm 730 G1
Cetlaflux: Our brand name for cost effective and reliable LED lighting
PLM: protected lighting module
II: type II light distribution
4500lm: with lumen output of 4500lm
730: For a color rendering index >70, 30 stands for a CCT of 3000 K
G1: Indicates the generation 1
In this design-in guide
In this design-in guide you will find all necessary guidelines to configure the Certaflux PLM system to your needs. The PLM module range is designed to enable all types of luminaires in outdoor and street lighting that were traditionally equipped with SON-T/HPL/HPS lamps. The Philips PLM range is capable of truly replacing all those conventional outdoor luminaires.

Cautions during storage and transportation
When storing this product for a long time (more than one week)
- Store in a dark place. Do not expose to direct sunlight
- For Philips PLM modules: do maintain
  • temperature between -40..+85 °C
  • relative Humidity (RH) 5..85%

During transportation and storage for a short time
Maintain temperature below 85°C at normal, noncondensing relative humidity.

Xitanium outdoor IP67 drivers for Certaflux PLM
These highly efficient LED drivers are designed for the PLM modules. These are available as an independent IP67 driver, dimmable or with a fixed output. More information about the Xitanium drivers can be found in the Xitanium outdoor IP67 driver design in guide and commercial leaflet. These documents can be downloaded via http://www.lighting.philips.com.sg/oem-sg

The Xitanium driver datasheets can also be downloaded on this website.

It is highly recommended to use the approved Philips Xitanium LED drivers. For a list of approved drivers please refer to www.easydesignintool.com
Light distribution
CetraFlux PLM module is suitable for a variety of applications, including urban street and road lighting. Optical files can be downloaded from http://www.lighting.philips.com.sg/oem-sg

Application guide
To better support OEM customer to understand the outdoor application with Philips Certaflux PLM system, a specific application guide could be downloaded from http://www.lighting.philips.com.sg/oem-sg as reference only.

Color consistency
Color consistency refers to the spread in color points between modules. It is specified in SDCM (Standard Deviation of Color Matching) or MacAdam ellipses, which are identical. The current general specification of Certaflux PLM modules module is 7 SDCM. This results in good color consistency performance for outdoor application.

Color targets
The color target points of the Certaflux PLM modules are found in the respective datasheets on http://www.lighting.philips.com.sg/oem-sg

Spectral light distribution
The color target points of the Certaflux PLM modules are found in the respective datasheets on http://www.lighting.philips.com.sg/oem-sg

Note:
Component and process tolerances can result in imperfectly symmetrical light distributions. Maximum acceptable tolerances will have minimal impact on optical distributions and optical performance in the final application for a variety of reasons.

All polar intensity diagram illustrations are just an indication of the beam shape. We suggest making use of the IES files available on the CertaFlux PLM II module website.
Mechanical design-in

**Certaflux PLM modules dimensions**
3D CAD files can be downloaded from our website http://www.lighting.philips.com.sg/oem-sg

Basic dimensions for each module can also be found in the datasheets which are also available at the aforementioned website.

**Recommended torque**
The recommended torque for mechanical fixation of the Certaflux PLM modules to the luminaire fixture is 0.7 Nm
Recommend using an M4 hexagonal socket-head cap screw with an M4 spring-lock washer for screws with cylindrical heads. Recommend to use stainless screws.

**Wiring**
To better support OEM customer for easy design in, 2 types of multi-connector will offer to customer. Please check the multi-connector datasheet for more information.

**Installation instructions**
Please refer to multi-connector datasheet for module and driver wiring.
CertaFlux PLM II is a product with integrated heatsink. The heatsink can warrantee the lifetime performance of the product if certain precautions are taken into account in luminaire design. For detail please refer to section thermal management.
CertaFlux PLM II is a product with integrated optics. No additional secondary optics are needed.
Min module mounting pitch is 5mm
Do not apply mains power directly to the LED module.

**Module placement in a luminaire**
Please follow remark on PLM II module as below picture for installing the module to right direction, this is critical to get the correct light distribution.
The critical thermal management points for the LED module are set out in this chapter in order to facilitate the design-in of Certaflux PLM module systems. If these thermal points are taken into account, this will help to ensure optimum performance and lifetime of the LED system.

**Optimum performance**

The main thermal specification that needs to be taken into account when designing in the PLM LED module is the $T_{case}$ temperature. The $T_{case}$ must never exceed $T_{case, lifetime}$ tested in a draft-free lab environment. Please refer to the product datasheet for further details.

**Operating temperature**

**Definitions**

- **Module temperature**: temperature measured at the specified $T_{case}$ point (at the base) of the module
- **Driver temperature**: temperature measured at the specified $T_{case}$ point on the driver
- **Ambient temperature**: temperature of the air surrounding the luminaire in the test environment or application
- **Ambient temperature in a lab environment**: air temperature in a testing area, in a controlled environment free from drafts
- **Average ambient temperature**: monthly average temperature based on at least 2 measurements per day, with at least 8-hour intervals between measurements

**Module temperature**

To achieve typical product lifetime characteristics, it is crucial to ensure that the product is operating within the specified temperature limits. These limits are determined not only by the product and the application, but also by the luminaire design and ambient environment.

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**Warnings:**

- Maximum $T_{case}$ should never exceed specified $T_{case, max}$
- Please refer to the specific datasheet for the maximum $T_{case, Value}$
- Thermal design should ensure that driver $T_{case} <$ max specified driver $T_{case}$
- Thermal design must ensure maximum $\Delta T$ ($T_{case} - T_{amb}$) $\leq$ 50 $^\circ$C
Measurement of critical temperature point
On the back of the module there is a Tcase (Tc) point, which should be used for all temperature measurements. The temperature must be stable before any reliable data can be obtained (depending on the size and material of the luminaire, this will take between 30 and 180 minutes and even overnight).

Note:
It is important that the Tcase point is free of thermal interface material when the thermocouple is connected so that temperature measurements can be taken.

In order to ensure accurate Tcase test results, the case temperature should not vary by more than 1°C for a period of at least 30 minutes.

Recommended minimum module mounting pitch is 5mm.

Recommend Open slots in top cover have been designed to optimize heat management and minimize environmental pollution (i.e. dirt, dust etc).
Electrical design-in and flexibility

**Connection to the mains supply**
The mains supply must be connected to the LED driver.

**Philips Xitanium IP67 driver**
The Certaflux PLM products are designed to be used with Philips Xitanium IP67 drivers. This allows for an easier design-in for non-IP rated luminaire design. More information about the Xitanium drivers for Certaflux PLM modules can be found in the Xitanium outdoor IP67 driver design in guide and commercial leaflet. These documents can be downloaded via http://www.lighting.philips.com.sg/oem-sg

The Xitanium driver datasheets can also be downloaded on this website. Full system overviews can be obtained using the Easy Design-in tool at www.easydesignintool.philips.com.

**Dimming function**
The Xitanium IP67 1-10V dimming drivers offer a full range of output current control, enabling customized luminaire design and performance.

For more information about the dimming functions of Xitanium drivers can be found in the Xitanium outdoor driver design in guide and commercial leaflet. These documents can be downloaded via http://www.lighting.philips.com.sg/oem-sg

For other dimming functions, please contact your Philips sales representative.
Compatible Drivers with Certaflux PLM
A list of compatible drivers, specific to your choice of module and operating point can be obtained from the Easy Design-in Tool that can be found at www.easydesignintool.com
In case of queries, please contact your Philips representative.

Surge Protection in a CertaFlux PLM system
CertaFlux PLM has a high level of integrated protection against the adverse effects of external surges and electro-static discharges. For optimum system protection, apply external common-mode and differential-mode surge protection at luminaire level in order to mitigate the harmful effects of surges on the LED driver and the CertaFlux PLM. More details on surge protection please visit http://www.lighting.philips.com.sg/oem-sg
Lumen maintenance
B50L70 @ 50,000 hours
The quality of the Certaflux PLM portfolio is backed by the Philips’ claim of B50L70 @ 50,000 hours. This means that at 50,000 hours of operation at least 50% of the module population will emit at least 70% of its original amount of lumens. This is contrary to conventional light sources, where some time after Service Life Hours the conventional light source emits no light at all.

In this section the example graphs show the estimated lumen depreciation curves for different percentage of the population and at nominal Tc temperatures. The actual data for the Certaflux PLM modules can be found in the associated datasheet at http://www.lighting.philips.com.sg/oem-sg

Average rated life is based on engineering data testing and probability analysis. The Certaflux PLM modules are specified to reach B50L70 for the nominal specifications

Lumen maintenance for B10 and B50
The example graph is showing the lumen maintenance (% of initial lumen over time) for B50 (50% of the population) and B10 (90% of the population). Please look up the actual lumen maintenance graph in the associated datasheet of the Certaflux PLM you are using at http://www.lighting.philips.com.sg/oem-sg
Controllability

Dimming the Philips Certaflux PLM system
As a system, the Philips Certaflux PLM and Xitanium dimmable drivers support dimming between 100% and 10%, depending on the driver specification. The Xitanium driver range supports various dimming protocols.
Please refer to the driver design-in guide for more detailed information.
Further information about our entire portfolio of control products is available at:
www.Philips.com/lightingcontrols
Compliance and approval

**Compliance and approbation**
The modules bear the CE mark indicating that they comply with the appropriate European EU directives. Certaflux PLM modules will also be LED module performance (IEC62717) certified. The relevant standards are summarized below. To ensure luminaire approval, the conditions of acceptance need to be fulfilled. Details can be requested from your local sales representative. All luminaire manufacturers are advised to conform to the international (luminaire standards IEC 60598-1) and national standards of luminaire design.

**IP rating, humidity and condensation**
The Certaflux PLM modules are IP66 modules which will enable OEM customer to easy design outdoor luminaire.

**Electrostatic discharge (ESD)**
**ESD consultancy**
Depending on the protection level of the LED module a minimum set of measures has to be taken when handling Certaflux PLM modules. Philips LED products have a high degree of ESD protection by design. ESD measures are required in a production environment.

**Environmental compliance**
Independent ESD consultancy companies can advise and supply adequate tools and protection guidance. Philips Innovation Services can provide consultancy [www.innovationservices.philips.com](http://www.innovationservices.philips.com)
More information can be found in the section entitled ‘Contact details’.
Blue Light Hazard
The photobiological safety standard IEC TR 62778 ('Photobiological safety of lamps and lamp systems') gives guidance on how to evaluate the photobiological safety of lamps and lamp systems including luminaires. This standard specifies the exposure limits, reference measurement technique and classification scheme for the evaluation and control of photobiological hazards from all electrically powered incoherent broadband sources of optical radiation including LEDs in the wavelength range from 200 nm through 3000 nm. Measured results of emission limits for Certaflux PLM modules using the non-GLS (20 cm) method are listed in the datasheets that can be found at http://www.lighting.philips.com.sg/oem-sg

From the nature of most LEDs applying blue light, emphasis has been put on the hazard in terms of Photo Biological Safety (PBS). Evaluation by the European lighting industry (ELC, Celma) has concluded LED light sources are safe for customers when used as intended. A photobiological safety report is available at http://www.lighting.philips.com.sg/oem-sg

Nevertheless luminaire makers have to comply with luminaire standards including PBS. To avoid extensive retesting, it is preferred to build on the test conclusions of the LED (module) suppliers; however this should be discussed and agreed upon with the used certification body. The testing conclusion then will be expressed in Risk Groups (RG), where RG0 and RG1 are considered safe and/or do not require specific action for the luminaire makers (as compared to RG2 and 3).
Chemical Compatibility

The LED contains a silicone overcoat to protect the LED chip and extract the maximum amount of light. As with most silicones used in LED optics, care must be taken to prevent any incompatible chemicals from directly or indirectly reacting with the silicone.

The silicone overcoat used in the LED is gas sensitive. Consequently, oxygen and volatile organic compound (VOC) gas molecules can diffuse into it. VOCs may originate from adhesives, solder fluxes, conformal coating materials, potting materials and even some of the inks that are used to print the PCBs.

A list of commonly used chemicals, that should be avoided as they may react with the silicone material, is provided on the left. Note that Philips does not warrant that this list is exhaustive since it is impossible to determine all chemicals that may affect LED performance. These chemicals may not be directly used in the final products but some of them may be used in intermediate manufacturing steps (e.g. cleaning agents). Consequently, trace amounts of these chemicals may remain on (sub) components, such as heat sinks. It is recommended to take precautions when designing your application.

Cautions

During storage and transportation

Store in a dark place. Do not expose to sunlight. Maintain temperature between -40 +85 °C, and RH 5 – 85%.

During operation

Philips shall not be held responsible or liable for any damage, costs or expenses to the user, resulting from an accident or any other cause during operation if the system is used without due observance of the absolute maximum ratings and other instructions provided by Philips.

Note:

That warranty is applicable for the Philips Certaflux PLM modules for 1 switching cycle per day in combination with a released Philips Xitanium IP67 driver.
Contact details

Philips
www.Philips.com/Technology

Or contact your local Philips sales representative

Philips ESD support
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The Philips corporate EMC competence center is a leading provider of approbation and consultancy services.
Disclaimer

Philips will perform the testing of the LED systems to high standards of workmanship. The tests are carried out with reference to the EN/IEC standards, if any, which are regarded by Philips as being of major importance for the application of the lamp gear and the lamp within the fixture for horticultural applications.

The design-in guide, regarding the testing and design in of the LED system provided by Philips, is not an official testing certificate, and cannot be regarded as a document for official release of the fixture. The OEM is liable for the official testing by a certified test body and all markings, such as CE and ENEC marks, on the fixture assembly.

The design-in guide is for information purposes only and may contain recommendations for detecting weak points in the design of the system (lamp – lamp gear – fixture), if any.

Specifically mentioned materials and/or tools from third parties are only indicative: other equivalent equipment may be used but it is recommended that you contact Philips for verification.

Philips will not be liable for unforeseen interactions of the proposed solutions when applied in the fixtures or applications using these fixtures. Philips has not investigated whether the recommendations are or will in the future be in conflict with existing patents or any other intellectual property right. Philips does not warrant that its recommendations are technically or commercially the best options.

Since the tests are only performed on one particular fixture provided by the customer, it will be treated as a prototype. This means that there is no statistical evidence regarding later production quality and performance of the lamp – lamp gear – fixture system.

As Philips does not have control over manufacturing of the fixtures, Philips cannot be held liable for the fixture assembly.

Philips will not accept claims for any damage caused by implementing the recommendations.

No warranty whatsoever may be claimed by the OEM with regard to the content and/or quality of the design-in guide or any other advice, or the conclusions and/or recommendations in the design-in guide or any other document, either express or implied, and Philips expressly disclaims any implied warranties of any kind, including without limitation any warranties of satisfactory quality, fitness for a particular purpose or non-infringement and any warranties regarding the design-in guide or any other advice or the use of the results of any activity performed while testing the fixture with respect to its correctness, quality, accuracy, completeness, reliability, performance or otherwise.

The OEM expressly agrees that test design-in guides are provided by Philips on an ‘as is’ basis and an ‘as available’ basis at customer’s sole risk and expense. Philips shall not be liable for any lost profits or lost savings, indirect, incidental, punitive, special, or consequential damages whether or not such damages are based on tort, warranty, contract, or any other legal theory – even if Philips has been advised, or is aware, of the possibility of such damages.

The OEM must bring any claim for damages within ninety (90) days of the day of the event giving rise to any such claim, and all lawsuits relative to any such claim.