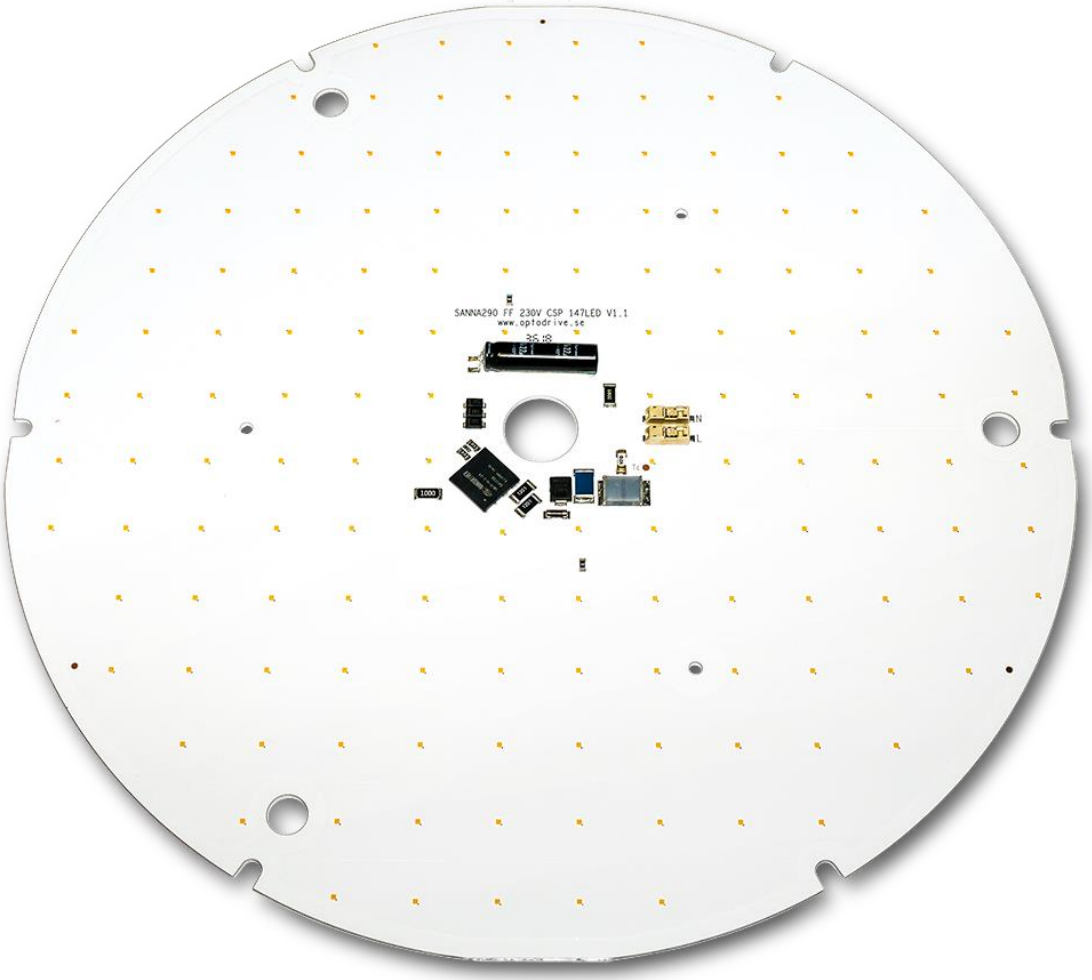
# SANNA290 AC FF




# SANNA290 AC

## FLICKERFREE

20W

*Round LED-module for lightings with opalized glass in professional fixtures*

***No driver is required***

# Key features

Sanna290 is specifically crafted for downlights and environments where the focus is on creating a welcoming and comfortable ambiance, whether for social interactions or professional tasks. With integrated drivers, these AC LED light engines simplify installation and offer versatile dimming options. Sanna sets a new benchmark for efficiency, delivering outstanding light output tailored for both aesthetic and functional lighting needs.



1. Integrated Smart Lighting
    - Built-in drivers with possible support for DALI, Casambi, and other smart control systems, offering seamless dimming options.
2. Effortless Connectivity
    - Direct connection to 230VAC with no external drivers required, simplifying installation across different environments.
3. Flicker-Free Dimming
    - Provides smooth, flicker-free dimming using either standard dimmers or smart control protocols for consistent, comfortable lighting.
4. IoT-Ready
    - Easy integration into IoT ecosystems, enabling smart control and energy efficiency for both personal and commercial applications.
5. Sustainable Design
    - Compliant with the latest EU circular economy directives, making it both eco-friendly and future-proof.

# Content

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# Introduction

The Sanna290 LED module offers versatile dimming capabilities, working seamlessly with standard dimmers right out of the box. For more advanced, intelligent lighting control, our compact DimIn unit can be integrated, enabling compatibility with DALI, Casambi, or other communication protocols. This opens up new possibilities where the distinction between a single fixture and an interconnected system becomes fluid, allowing for highly personalized and intuitive lighting solutions. The only limit is how you choose to control the light from this LED module.

## Sanna290 Package

Designed for pendant applications, the Sanna290 is a round LED light engine with a centered hole for easy wire integration. Its plug-in connectors allow for quick and straightforward setup. With the option to integrate smart systems like DALI, Casambi, or other IoT-based protocols, this module fits into various lighting ecosystems. Additionally, all IoT LED modules feature an electrically isolated heat pad, ensuring safety and compatibility with Class II fixture installations.

## Light Quality

Maintaining color stability is a priority, ensuring consistent and even light output throughout the installation’s lifespan. Key parameters such as precise binning, long lifetime, and efficient thermal management are carefully controlled to deliver superior performance and longevity.

## Dimming Capabilities

Sanna290 stands out with its impressive dimming capabilities. Whether using traditional phase dimmers or advanced communication protocols like DALI or Casambi, this module minimizes flicker and other unwanted effects, ensuring a smooth and pleasant lighting experience.

## Smart Lighting

The Sanna290 LED module is IoT-ready, designed to integrate easily with systems like Casambi, DALI, or other communication standards. Our goal is to make smart lighting accessible to small and medium-sized manufacturers, allowing them to incorporate advanced controls without requiring extensive technical expertise. Whether it's straightforward integration or the addition of new smart features, the process is simple, aligning with the latest EU directives on the circular economy for sustainable, future-proof solutions.

# Short form Characteristics

| MECHANICAL | 20W version |
|---|---|
| Module dimension with cover | 290 mm diameter |
| Weight | TBD |
| Assembly holes | 6 x M3 |
| Wire connector | Poke in |

| ELECTRICAL | |
|---|---|
| Power | 20W |
| Input voltage | 230VAC |
| Input voltage range | 220-240VAC |
| Power factor | > 0.95 |
| Total harmonic distortion | <15% |
| Surge protection | 1500V |
| Fast transient burst | 2000V |
| Over temp. protection | 150°C |
| Energy class | D |

| PHOTOMETRICAL | |
|---|---|
| Flux nominal | 2300lm |
| Efficiency | >115lm/W |
| Number of LED's | 90 |
| Rendering index | >Ra90 |
| SDCM (Mac Adam) | 3 |
| SVM | 0.3 |
| PstLM | 0.3 |
| Spread angle lens | 130° |
| Colour temperatures | 2200K, 2700K, 3000K, 4000K |

| ENVIRONMENTAL | |
|---|---|
| Temperature range | -40°C to 65°C (Absolute maximum temp Tc 65°C) |
| Relative Humidity | 10-75% |
| Ambient air pressure | 500-1060 hPa |

| LIFE LENGHT | |
|---|---|
| Life length L70B10 | >50 000h |

# Article number structure

| Sanna290 AC.P.230.147.8yy-NN.FF.IOT | |
|---|---|
| AC | AC= 230VAC, ED=External Driver required, ID=Internal Driver |
| P | Power (Watt) |
| V | Voltage: 230VAC |
| N | Amount of LEDs |
| 8 | CRI: 8=Ra>80, 9=Ra>90 |
| YY | CCT: 27 =2700K, 30 =3000K, 40 =4000K |
| NN | Viewing angle code |
| FF | Flickerfree version |
| IOT | Possibility to connect Casambi and DALI, still fully dimmable from mains |

## Article name and versions

| ARTICLE NAME | POWER | CURRENT | CRI | CCT | LENS | Lumen Tc°C | | Energy Class |
|---|---|---|---|---|---|---|---|---|
| | | | | | | 25°C | 65°C | |
| Sanna290 AC.20.230.96.927-NN.IOT.FF | 20 | 230 | 90 | 2200 | 110° | 1490 | 1410 | F |
| Sanna290 AC.20.230.96.927-NN.IOT.FF | 20 | 230 | 90 | 2700 | 110° | 1940 | 1860 | E |
| Sanna290 AC.20.230.96.930-NN.IOT.FF | 20 | 230 | 90 | 3000 | 110° | 2140 | 2030 | D |
| Sanna290 AC.20.230.96.940-NN.IOT.FF | 20 | 230 | 90 | 4000 | 110° | 2180 | 2110 | D |
| | | | | | | | | |
| Sanna290 AC.20.230.96.927-130.IOT.FF | 20 | 230 | 90 | 2200 | 110° | 1490 | 1410 | F |
| Sanna290 AC.20.230.96.927-130.IOT.FF | 20 | 230 | 90 | 2700 | 110° | 1940 | 1860 | E |
| Sanna290 AC.20.230.96.930-130.IOT.FF | 20 | 230 | 90 | 3000 | 110° | 2140 | 2030 | D |
| Sanna290 AC.20.230.96.940-130.IOT.FF | 20 | 230 | 90 | 4000 | 110° | 2180 | 2110 | D |
| | | | | | | | | |
| Sanna290 AC.20.230.96.927-D.IOT.FF | 20 | 230 | 90 | 2200 | 110° | 1490 | 1410 | F |
| Sanna290 AC.20.230.96.927-D.IOT.FF | 20 | 230 | 90 | 2700 | 110° | 1940 | 1860 | E |
| Sanna290 AC.20.230.96.930-D.IOT.FF | 20 | 230 | 90 | 3000 | 110° | 2140 | 2030 | D |
| Sanna290 AC.20.230.96.940-D.IOT.FF | 20 | 230 | 90 | 4000 | 110° | 2180 | 2110 | D |

## Smart Lighting with IoT

The world of lighting design is evolving rapidly, and smart LED engines are leading the charge. With IoT technology, designers can now integrate DALI and Casambi directly into their lighting systems, creating dynamic, adaptable environments. From enhancing comfort in workspaces to crafting immersive lighting experiences, smart lighting provides an unparalleled level of control.

Imagine having these capabilities built into your LED module from the start—Optoga makes it possible. The compact, sugar-cube-sized DimIn modules are the key. They seamlessly fit into our IoT interface and can be easily swapped between DALI, Casambi, or even basic dimming controls, making smart lighting accessible to everyone. All that's needed is a mains connection (230VAC) and two wires—either for DALI or for connecting a potentiometer or switch.

| Platform | Table- or freestanding light | Downlight | Spotlight | Pendent | Medium size Opaque glass | Medium size Opaque glass HCL/TW | Big size Opaque glass |
|---|---|---|---|---|---|---|---|
| Lilly80 AC IoT | X | X | | X | X | | |
| ADA60 AC IoT | X | X | X | X | X | | |
| ADA76 AC IoT | X | X | X | (X) | | | |
| Sanna158 IoT | X | | | X | X | | |
| Sanna158 AC IoT HCL | | | | X | | X | |
| Sanna290 IoT | | | | X | | | X |

## DimIn Modules for Ultimate Control

- DALI: Our DALI-compatible device works seamlessly with DALI-2 systems, offering precise control over lighting with bus-powered simplicity.
- Casambi: Casambi isn't just wireless control—it's a smart, connected lighting system that can respond to changing environments, adjust brightness, and create human-centered lighting that enhances well-being and productivity.
- Switch: Use a momentary switch for simple, smooth dimming control in freestanding devices.
- POT: The potentiometer option allows easy dimming (up/down) and on/off functionality, perfect for standalone fixtures.

### Potentiometer Control

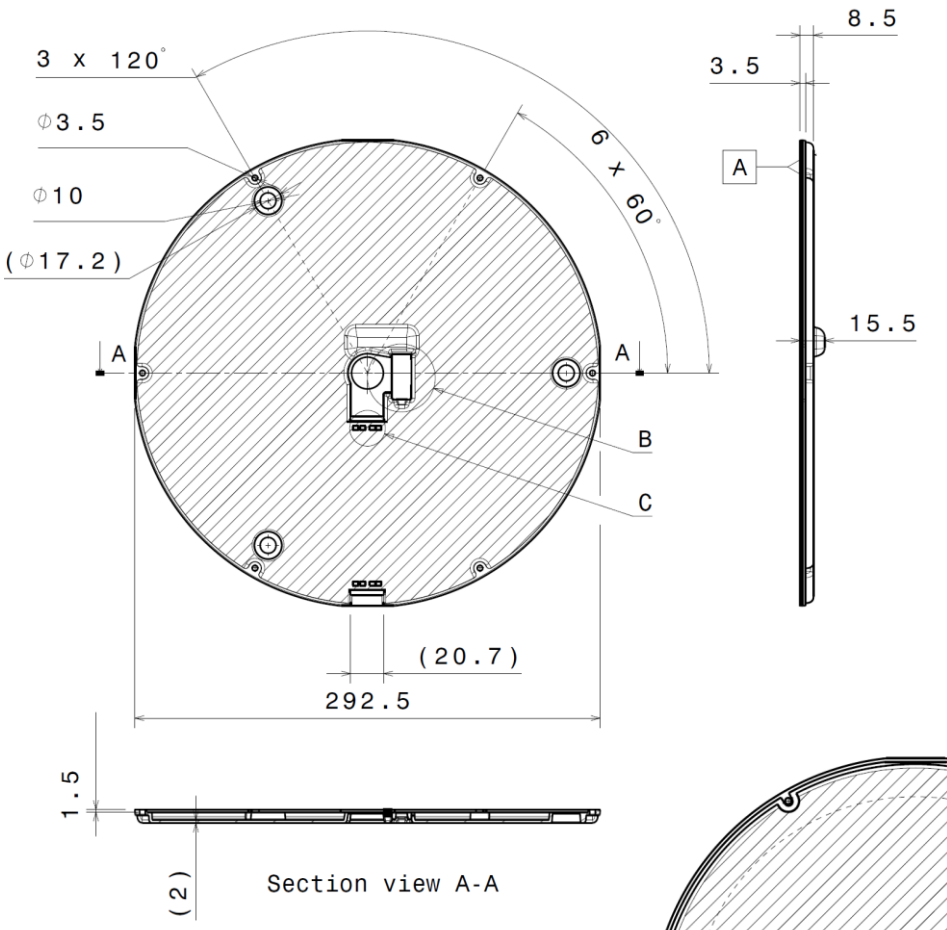
With our easy-to-use potentiometer, users can enjoy intuitive lighting control. The click mechanism provides tactile feedback for on/off, while a smooth clockwise rotation increases light intensity on a logarithmic scale—ideal for precise control over ambiance.

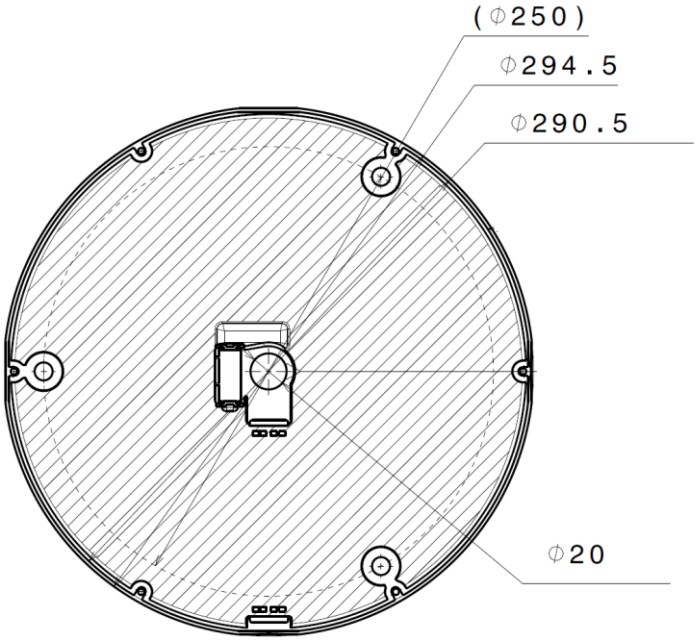
# Ordering data

## Sanna290 AC – Packaging information

| Description | Qty (pcs) | Dimension (cm) | | | GW (kg) |
|---|---|---|---|---|---|
| | | Length | Width | Height | |
| Inner box | 10 | 32 | 32 | 12 | 25.6 |
| Outer box | 80 | 64 | 34 | 48 | 35 |

# Dimensions

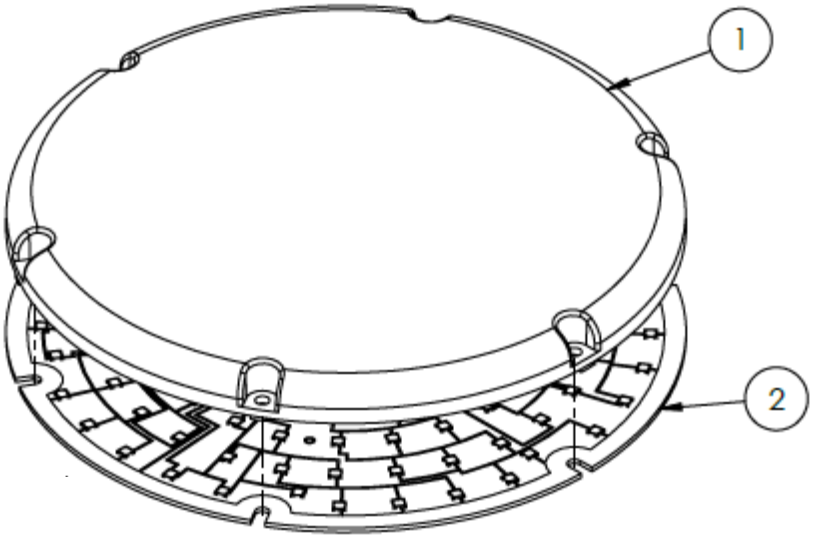

3 x 120°
ϕ3.5
ϕ10
(ϕ17.2)
6 x 60°
A
A
B
C
8.5
3.5
A
15.5
(20.7)
292.5
1.5
(2)
Section view A-A


(ϕ250)
ϕ294.5
ϕ290.5
ϕ20

# Mounting instructions

## Mounting and de-mounting instructions

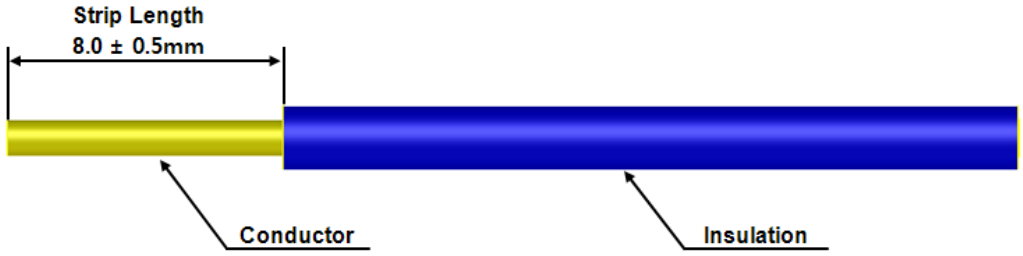
The LED module is to be fixated with screws before the wire connection is made. Never connect or disconnect the LED module with the power ON. Read the information under "Precautions for use" before handling the device.




1. Sanna290 cover
2. Sanna290 PCB

## Wiring

| Type of wire | AWG | mm² |
|---|---|---|
| Stranded | 22-20 | 0.32-0.5mm² |
| Solid | 24-18 | 0.51-1.02Ø (0.2-0.8mm²) |
| Insulation diameter | Max 2.1 mm | |



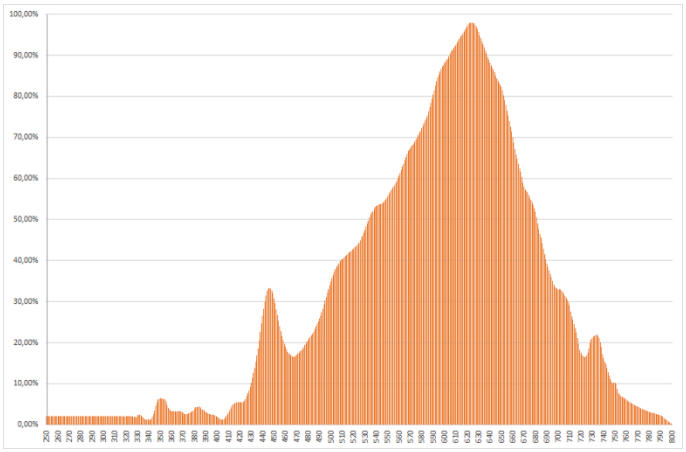
# Photometrical

## Flux

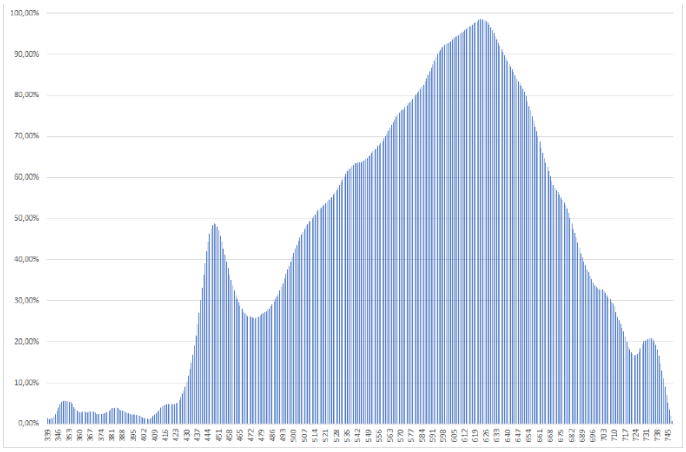
| Parameter | | Symbol | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| Luminous Flux | 20W | $\Phi_V$ | | 2300 | | lm |
| | | | | | | lm |
| Correlated Colour Temperature | 27*(2) | CCT | | 2700 | | K |
| | 30*(2) | CCT | | 3000 | | K |
| | 40*(2 | CCT | | 4000 | | K |
| CRI | | $R_a$ | 90 | 94 | | |
| | | | | | | |
| Power | | Po | | 20 | | W |
| | | Po | | | | W |

## Colour Spectrum

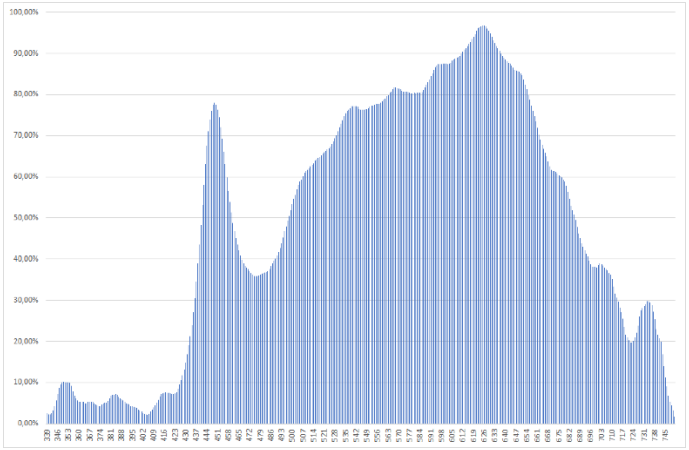
### 2700K



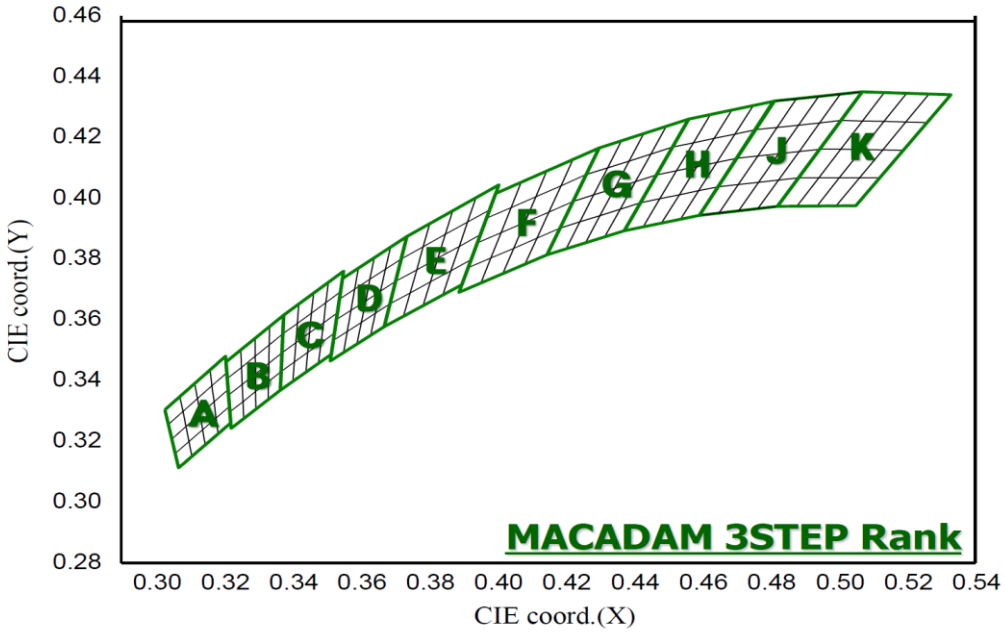
### 3000K



### 4000K



# CCT structure graphical representation




| Short form in diagram | Colour Code | CCT |
|---|---|---|
| K | 22 | 2200K |
| H | 27 | 2700K |
| G | 30 | 3000K |
| E | 40 | 4000K |

## Colour Rendering Index (CRI)

| CRI Code | CRI (min) Ra |
|---|---|
| 8 | >80 |
| 9 | >90 |

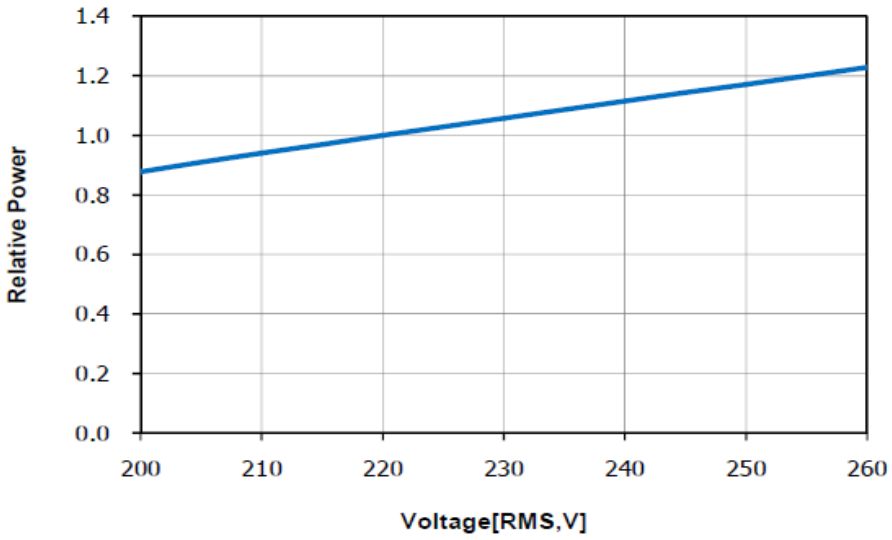
## Short form letters for CCT (K)

| Colour Code | CCT |
|---|---|
| 22 | 2200K |
| 27 | 2700K |
| 30 | 3000K |
| 40 | 4000K |

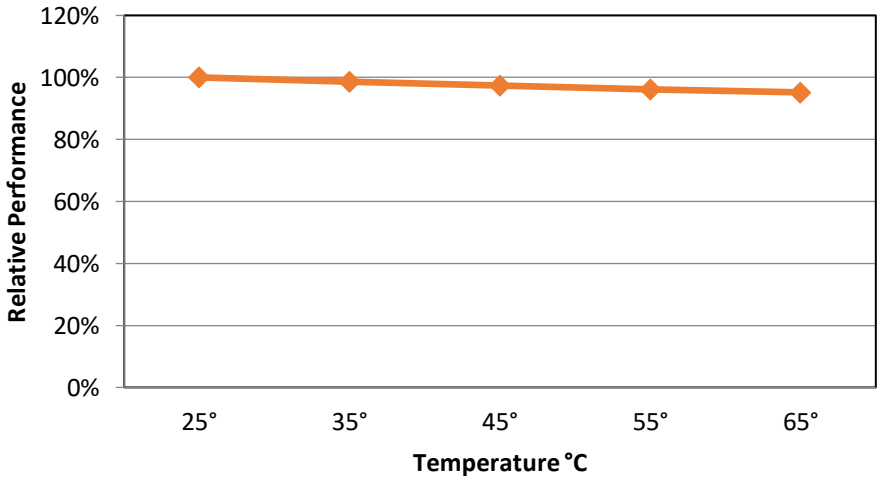
# Electrical Optical Data

## Current vs. Voltage

*With increasing voltage the light output and the heat increases.*




## Temperature Characteristics




Consider the thermal capabilities of where the LED module is to be fitted. The temperature is an important factor for light output as well as for long time light output degradation.

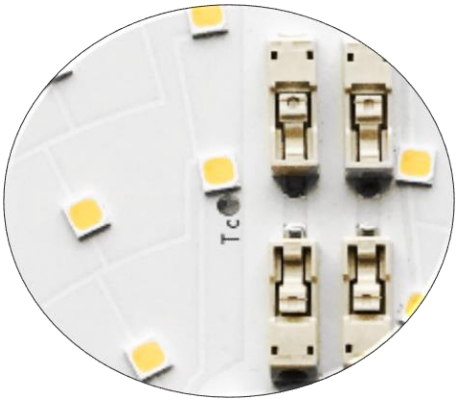
# Lifetime (Calculated)

## Measurement points

When the measurement takes place you verify that the temperature on the marked measurement points is satisfying. Pending on the result you know what lifetime to expect from the module. This step will be implemented after the heat sink has been connected properly!

The lifetime is calculated at the maximum temperature recommended at the Tc (measuring point). It is important not to exceed this recommendation.

| Tc(Surface temperature) | Time for 80% light-output (L80B10) |
|---|---|
| 65°C | >50 000 Hr |




## Measurement Control

The recommended maximum value is 65°C on Tc or measuring point. If this value is exceeded we cannot guarantee the function and the lifetime of the product. The purpose of the measurement is to control the Junction (Tj) temperature of the LED and also in order to control the performance on the complete setup. By measuring the junction temperature (Tj) the average lifetime of the product is known.

*The thermal connection is measured in temperature vs. Power.*

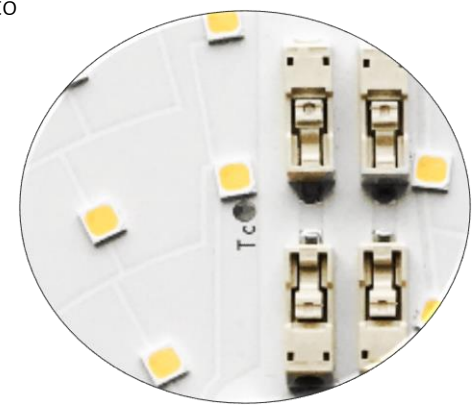
## Maximum Temperature

Secure the temperature in your application not to exceed 65°C. Read more in the section “Measurement control”.

# Lifetime (Calculated)

## Measurement points

When the measurement takes place you verify that the temperature on the marked measurement points is satisfying. Pending on the result you know what lifetime to expect from the module. This step will be implemented after the heat sink has been connected properly!




The lifetime is calculated at the maximum temperature recommended at the Tc (measuring point). It is important not to exceed this recommendation.

## Measurement Control

The recommended maximum value is 85°C on Tc or measuring point. If this value is exceeded, we cannot guarantee the function and the lifetime of the product. The purpose of the measurement is to control the Junction (Tj) temperature of the LED and also in order to control the performance on the complete setup. By measuring the junction temperature (Tj) the average lifetime of the product is known.

## Maximum Temperature

Secure the temperature in your application not to exceed 65°C. Read more in the section “Measurement control”.

## Projected lifetime based on TM-21

The power load used with the LED module is according to the “lumen maintenance projection”. It is a LM80 projected lifetime based on discreet LEDs tested in the stated temperature environment at a 30mA power load.

# Lifetime (Calculated)

The lifetime is calculated at the maximum temperature recommended at the Tc (measuring point). It is important not to exceed this recommendation; you find more information under the chapter “measurement control”.

| Predicted light output based on LED lifetime (LM80) performance ONLY | | | | |
|---|---|---|---|---|
| | 55°C ($T_c$) | 65°C ($T_c$) | 75°C ($T_c$) | 85°C ($T_c$) |
| L70 | >50 000h | >50 000h | >50 000h | >50 000h |
| L80 | >50 000h | >50 000h | >50 000h | >50 000h |
| L90 | >50 000h | >50 000h | 45 000h | 37 000h |

# Verification of Conformity

The module are under testing at Intertek Semco according to IEC 62031.

| | | |
|---|---|---|
| Radio Disturbance | IEC 55015:2006 + A1:2007 + A2:2009 | |
| SURGE | IEC 61000-4-5 | 2 kv |
| Fast transient BURST | IEC 61547 | 2 kv |
| SAFETY | IEC 62031:2008 | |
| Photo Biological Safety | IEC 62471:2008 | |
| EMC | IEC 61000-3-2:2006 | |
| EMC | IEC 61000-3-3:2008 | |
| ESD* | IEC 61000-4-2 | 8 kv Air discharge<br>4 kv Contact discharge |

** Please consult the document ESD standards on Optodrive ED, ID and AC*

## Production Setup

Production in accordance with IPC-6012-B and IPC-A-600G class 2

The LED Module is in accordance to EU Directive 2002/95/EC(ROHS)

The bare PCB is isolation tested with 3000VDC/10mA for 10 seconds

## PCB Material Setup

In all questions regarding the bare PCB please use “Material Data sheet Optodrive” as a guideline.

# Light fitting routine tests

According to EN/IEC 60598-1 should the routine test be performed as a dielectric strength test or insulation test. Only the insulation test of 500Vdc should be performed according to standard, 1s with min 2MΩ.

No dielectric tests are allowed to be performed on OptoDrive LED Modules.

# Precautions for use

- This device should not be used in any type of fluids such as water, oil, organic solvent etc.
- When cleaning is required, use only water together with mild soap on the outside of the lens. Cleaning inside of the LED module is strictly prohibited.
- The appearance and specifications of the product may be modified for improvement without notice.
- Long time exposure of sunlight or occasional UV exposure will cause lens discoloration.
- Opening of the LED module is prohibited due to risk of EMC, dust, grease and other exposures that will damage it.
- The LED Module should always be mounted to a proper heat sink before it's connected with its proper leads.

## Handling in regards to static electricity

- The Optodrive products have integrated circuits (IC) on board that may be damaged if exposed to static electricity. Please handle the products only while using equipment that prevents static electricity. Do not handle them without having ESD protection.
- The Optodrive products are not be installed into the end product without proper ESD protection.
- Optodrive LED Modules meet IEC61547:2009 and IEC61000-4-2. We recommend the light fixture manufacturer to take the mentioned standards under consideration.

## Storage before use

- Use only properly rated test equipment and tools for the rated voltage and current of the product being tested.
- It is strongly suggested to wear rubber insulated gloves and rubber bottom shoes while handling the product.
- Do not wear any conductive items (such as jewelry) which could accidentally contact electric circuits.
- Faults, lightning, or switching transients can cause voltage surges in excess of the normal ratings.
- Internal component failure can cause excessive voltages.
- Stored or residual electricity in long wire could be hazardous.

# ROHS III Compliant

All our LED modules meet the Restrictions of Hazardous Substances (RoHS III)!

There has been a growing consensus that Lead Free Systems should increase for the safety of our environment. It is a very serious problem that lead and other harmful materials are being used in commercial and industrial products, causing more and more environmental problems. This has led to regulations such as RoHS (Restriction of the use of certain Hazardous Substances) from the EU and the Japan Ministry of Trade and Industry (MITI). All LED module makers providing products to these countries should comply with these restrictions. In order to meet the RoHS III regulation, Optoga is strictly implementing a ban on lead and other hazardous materials in its products. This is in compliance with our responsibilities as good corporate citizens.

## Design for Environment:

According to the EU-directive (RoHS III) the following substances must not be used in this product

- Lead (Pb)
- Mercury (Hg)
- Cadmium (Cd)
- Chromium VI ($Cr^{6+}$)
- Polybrominated biphenyls PBB
- Polybrominated diphenyl ethers PBDE
- Bis(2-ethylhexyl) phthalate DEPH
- Butyl benzyl phthalate BBP
- Dibutyl phthalate DBP
- Diisobutyl phthalate DIBP

# Do you want to know more about benefits of OptoDrive LED?

Read more about OptoDrive at www.optoga.com.
You can contact us via info@optoga.com.
You can also call us on +46 (0)589 490 950.

Optoga AB
Optoga was founded in November 2004 in Arboga, Sweden and has many years of experience in electronics design. The company developes and supplies LEDs and LED-module solutions for the lighting industry, vehicle manufacturers and electronics companies.

With the OptoDrive LED-module, Optoga has taken the initiative to replace strip lights, incandescent and halogen bulbs with LED-based sources.

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