



# FELICIA AC



## FELICIA AC

2W | 5W

*A secure and complete solution for outdoor luminaires.*

*No Driver is required!*





## Felicia AC

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n/a

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1.1

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**Datasheet Felicia AC (22LED)**

Author:  
SL

Date:  
2020-10-27

## Key features

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### Story

The Felicia LED-module is designed for the smallest fixtures. It has one of the world's smallest footprints for AC-modules. Mostly used in outdoor and decorative lights.

### Key features

- Small footprint
- Available with Security Cover
- No driver required





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## Introduction

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### Felicia package

The solution is developed to make it easy for the designers and engineers to choose from low to high power, from AC to DC and choose between a variety of lenses in the same luminaire or in similar design.

### AC design

All driver and dimmer components are built-in.

The advantage with an AC driver that has been built-in is:

- Lifetime – Connected to a heat sink and therefore has a controlled environment
- Dimming – Dimming via standard trailing edge dimmers
- Small – No extra boxes
- Simple – Easily adapted into to the production line

### Light output

Colour stability is important to ensure that the installation has a uniform light output. Parameters such as binning, lifetime and thermal control are vital for good results.

### Dimming

Use the latest dimmers from standard manufacturers for LED and make sure that the dimmer has the capacity to manage the low load of the LEDs power consumption. In some cases the dimmer requires more than one LED module connected in order to work as expected due to the minimum load required for the dimmer to function properly.



## Short form Characteristics

MECHANICAL	2W version	5W version
Module dimension with cover	34.56 mm in diameter	
Weight	TBD	
Assembly holes	2 x 3.2 mm	
Wire connector	CviLux CP04-02S0 or JST BH	
<b>ELECTRICAL</b>		
Power	2 W +/-10% ea.	5 W +/-10% ea.
Input voltage	230VAC	
Input voltage range	220-240VAC	
Power factor	0.98	
Total harmonic distortion	<15%	
Type of current	AC	
LED current	9mA or 22 mA +/-10% ea.	
Peak inrush current	600mA	
Inrush current duration	< 35µs	
Surge protection	1000V	
Over temp. protection	150°C	
Energy class	A+	
<b>PHOTOMETRICAL</b>		
Flux nominal	CRI90 – 170lm CRI80 – 200lm	CRI90 – 425lm CRI80 – 500lm
Efficiency	85lm/W 100lm/W	85lm/W 100lm/W
Number of LED's	22	
Rendering index	>Ra80 and >Ra90	
SDCM (Mac Adam)	3	
Flicker percent	100%	
Flicker index	TBD	
Spread angle lens	130°	
Colour temperatures	2700K, 3000K, 4000K	
<b>ENVIRONMENTAL</b>		
Temperature range	-40°C to 85°C (Absolute maximum temp Tc 85°C)	
Relative Humidity	10-75%	
Ambient air pressure	500-1060 HPa	
<b>LIFE LENGHT</b>		
Life length L70B10	>50 000h	



## Article number structure

Article number: Felicia AC.P.230.22.8yy-NN

**CLARA AC.P.230.1.8YY-NN**

<b>AC</b>	AC= 230VAC, ED=External Driver required, ID=Internal Driver
<b>P</b>	Power (Watt)
<b>V</b>	Voltage: 120VAC or 230VAC
<b>N</b>	Amount of LEDs (22)
<b>8</b>	CRI: 8=Ra>80, 9=Ra>90
<b>YY</b>	CCT: 27 =2700K, 30 =3000K, 40 =4000K
<b>NN</b>	Viewing angle code/IP class

## Article name and versions

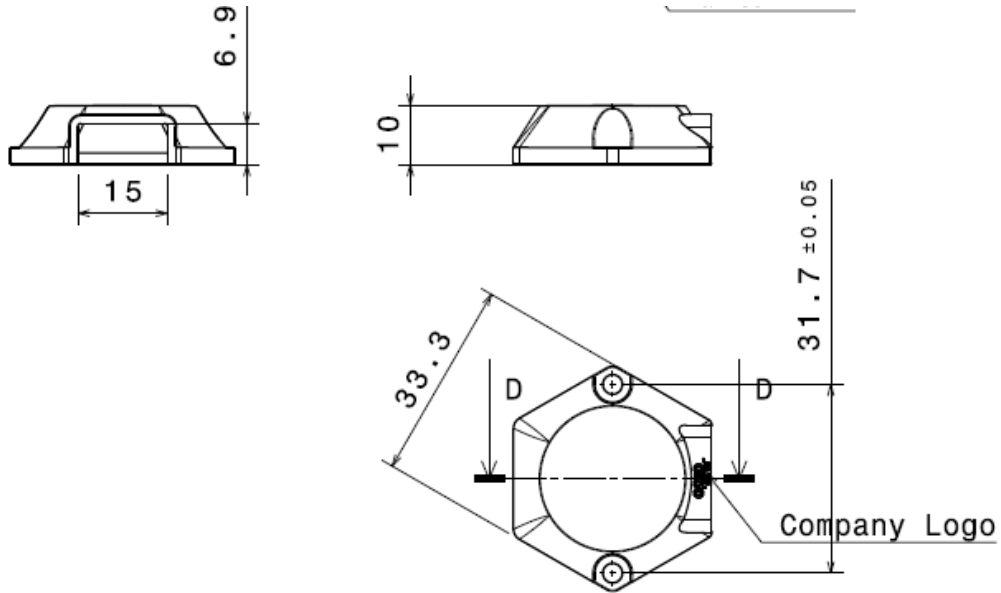
ARTICLE NAME	POWER	CURRENT	LEDS	CRI	CCT	LENS
Felicia AC.2.230.22.827-130	2	230	22	80	2700	130
Felicia AC.2.230.22.830-130	2	230	22	80	3000	130
Felicia AC.2.230.22.840-130	2	230	22	80	4000	130
Felicia AC.5.230.22.827-130	5	230	22	80	2700	130
Felicia AC.5.230.22.830-130	5	230	22	80	3000	130
Felicia AC.5.230.22.840-130	5	230	22	80	4000	130
Felicia AC.2.230.22.927-130	2	230	22	90	2700	130
Felicia AC.2.230.22.930-130	2	230	22	90	3000	130
Felicia AC.2.230.22.940-130	2	230	22	90	4000	130
Felicia AC.5.230.22.927-130	5	230	22	90	2700	130
Felicia AC.5.230.22.930-130	5	230	22	90	3000	130
Felicia AC.5.230.22.940-130	5	230	22	90	4000	130

### Packaging Information Felicia AC 22LED

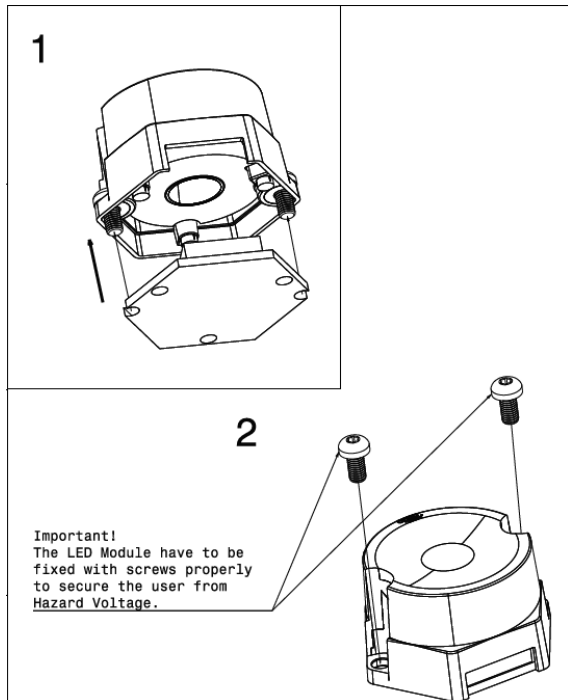
Description	Qty (pcs)	Dimension (cm)			Weight
		Length	Width	Height	
Inner Box	175	35,6	22,7	9,6	
Outer Box	1400	46,5	37,5	39,6	12,60

## Dimensions LED Module:

Felicia Cover



## Mounting instructions





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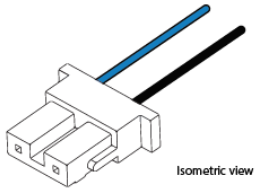
Date:  
2020-10-27

## Wiring

ARTICLE NUMBER	ARTICLE NAME	LENGTH
104411	Wire AC 100	100 mm (With end sleeves)
104189	Wire AC 200	220 mm
<b>103817</b>	<b>Wire AC 220</b>	<b>220 mm (std)</b>
104506	Wire AC 600	600 mm

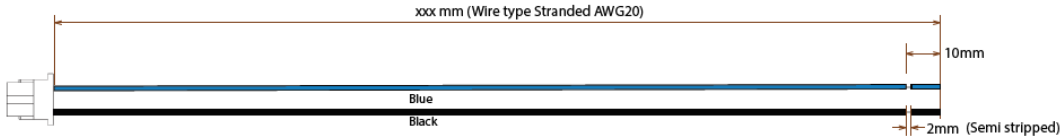
REV	DATE	DESCRIPTION	INIT
A		Created drawing	FEH
B		Updated wire size	ML



Isometric view



xxx mm (Wire type Stranded AWG20)

Connector: JST BHR-02VS-1 or CviluxCP040250000

Terminal: SBH-001T-P0.5 or CviluxCP04T031PE0

Article no.	Product	Circuits	Length
104411	AC wire 2-pol AWG20 (4.0)	2	100mm (With end sleeve)
104189	AC wire 2-pol AWG20 (4.0)	2	200mm
103817	AC wire 2-pol AWG20 (4.0)	2	220mm
104506	AC wire 2-pol AWG20 (4.0)	2	600mm

This drawing is our property. It can't be reproduced or communicated without our written agreement.		DRAWING TITLE	
DRAWN BY	DATE	AC wire 2-pol AWG20 (4.0)	
CHECKED BY	DATE	SIZE	DRAWING NUMBER
Stefan Larsson	XXX	SCALE	WEIGHT (kg) 0,00
DESIGNED BY	DATE	SHEET	1 / 1
XXX	xxx		REV B



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## Parameters of the Lens system

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The lens system is mounted and fixated onto the PCB with a double press-fit. The light parameters are according to the following:

### Felicia AC

Version	Viewing angle	FWHM angle
Felicia 130° (Cover)	130°	65°

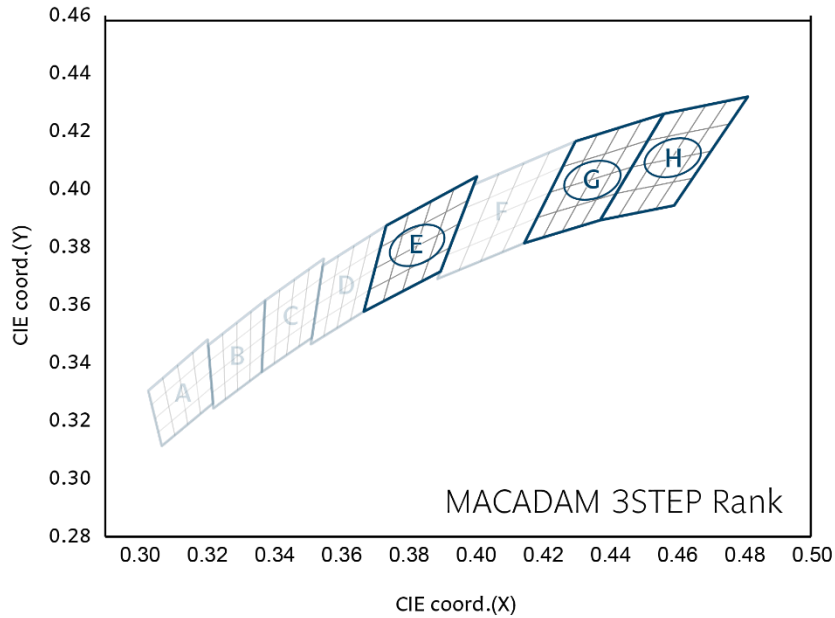
Lens material optical grade PMMA.

- Allows use of high current and temperature conditions
- Best available optical efficiency, up to 90%
- Very even colour distribution over the whole beam angle
- Integrated holder. Fastening to heat sink with two screws
- Compact dimensions



# CCT structure graphical representation

## Binning structure graphical representation IEC 1976



\* Note that the Blue boxes represent Energy Star Rank

Short form in diagram	Colour Code	CCT
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
27	2700K
30	3000K
40	4000K



# Photometrical

## CRI80

Parameter		Symbol	Value			Unit
			Min	Typ	Max	
Luminous Flux	2W*	$\Phi_v$		200		lm
	5W**	$\Phi_v$		500		lm
Correlated Colour Temperature	27	CCT	2600	2700	2800	K
	30	CCT	2900	3000	3100	K
	40	CCT	3900	4000	4100	K
CRI		$R_a$	80	85		-
Power		$P_o$	1,8	2	2.2	W
		$P_o$	4,5	5	5,5	W

\*Electro-Optical characteristics LED at  $I_f=9mA$ , 230VAC,  $T_A=25^\circ C$

\*\*Electro-Optical characteristics LED at  $I_f=22mA$ , 230VAC,  $T_A=25^\circ C$

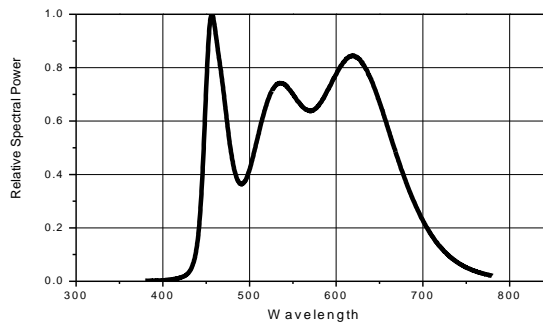
## CRI90

Parameter		Symbol	Value			Unit
			Min	Typ	Max	
Luminous Flux	2W*	$\Phi_v$		170		lm
	5W**	$\Phi_v$		425		lm
Correlated Colour Temperature	27	CCT	2600	2700	2800	K
	30	CCT	2900	3000	3100	K
	40	CCT	3900	4000	4100	K
CRI		$R_a$	90	94		-
Power		$P_o$	1,8	2	2.2	W
		$P_o$	4,5	5	5,5	W

\*Electro-Optical characteristics LED at  $I_f=9mA$ , 230VAC,  $T_A=25^\circ C$

\*\*Electro-Optical characteristics LED at  $I_f=22mA$ , 230VAC,  $T_A=25^\circ C$

## Colour Spectrum Warm White

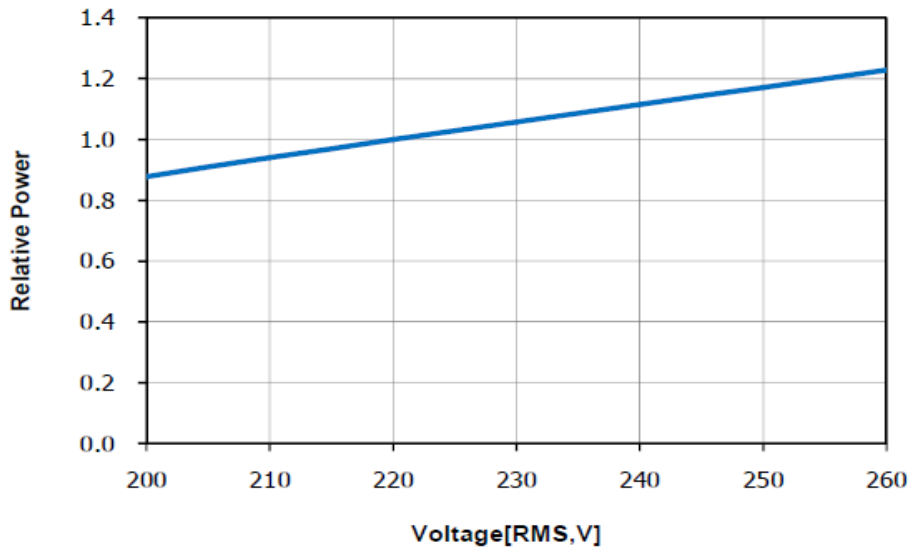




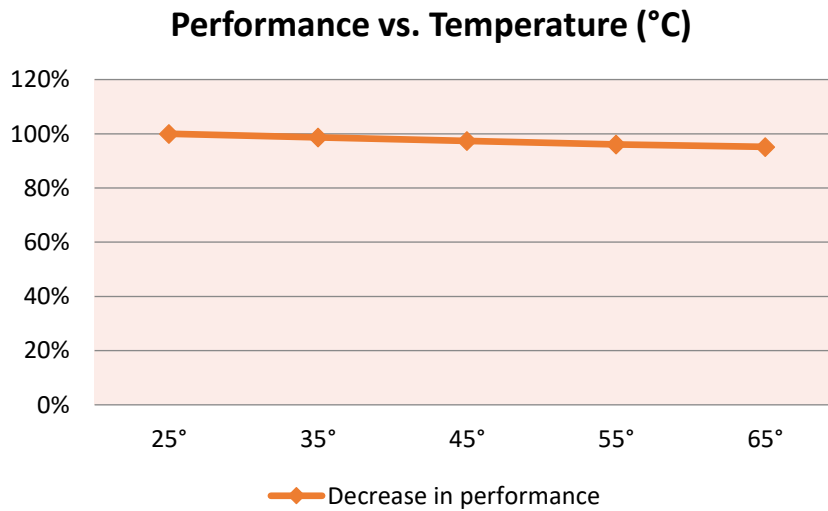
## Electro Optical data

### 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.



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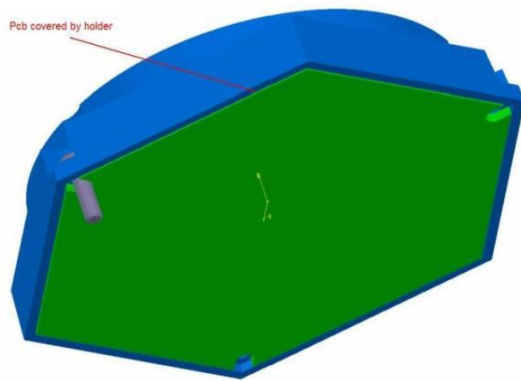
Date:  
2020-10-27

### Thermal information

The thermal area (green) should be properly connected to an even and fine surface of a heat sink. Without this arrangement the unit will be overheated and will not be able to survive.

### Maximum Temperature

Secure the temperature in your application not to exceed 85°C. Read more in the section “Measurement control”.



## Measurement Control

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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.

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

### 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.

### Measurement points



#### ■ Tc

This step will be implemented after the heat sink has been connected properly!



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## Lifetime (Calculated)

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

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Predicted light output based on LED lifetime (LM80) performance <u>ONLY</u>				
	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 to be tested at Intertek Semco according to IEC 62031.

Radio Disturbance	IEC 55015:2006 + A1:2007 + A2:2009	
SURGE	IEC 61000-4-5	1 kv
Fast transient BURST	IEC 61547	2 kv
SAFETY	IEC 62031:2008	
Photo Biological Safety	IEC 62471:2008	
Radio Disturbance	IEC 55015:2006 + A1:2007 + A2:2009	
ESD*	IEC 61000-4-2	8 kv Air discharge 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

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- 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 II Compliant

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

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 II 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 2011/65/EU (RoHS II) the following substances must not be used in this product

- Lead (Pb) alloys
- Mercury (Hg)
- Cadmium (Cd)
- Chromium (6+) compounds
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ethers (PBDE)

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

Read more about OptoDrive at [www.optoga.com](http://www.optoga.com).

You can contact us via [info@optoga.com](mailto: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 develops 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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