



# LILLY60 AC



## LILLY60 AC

4W | 6W | 10W

Flicker free

*Compact round LED-light engine for pendants.*

***No driver is required!***



## Key features

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### Story

Lilly is designed for pendants and places where the need is to create a good atmosphere for people to dwell in whether they take care of business or socialize.

These AC LED –light engines or LED modules are designed with internal drivers and are therefore very easy to connect into applications with different dimming scenarios. The light output efficiency is the highest available on the market for these types of applications.

### Key features

- High efficiency
- Center-hole for wires
- Optimized Uniformity
- Lens with poke-in connector
- Architectural Lighting
- Decorative Lighting





# LILLY60 AC 230W

Document no:  
n/a

Revision:  
1.1

Page:  
Page 3 of 20

Object:  
Datasheet LILLY60 AC 230VAC

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## Content

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Introduction.....	4
Short form Characteristics.....	5
Article number structure .....	6
Dimensions LED Module.....	7
Mounting instructions .....	8
Parameters of the lens system .....	10
Parameters of the Light Output .....	11
CCT structure graphical representation .....	13
Electro Optical data .....	14
Lifetime (Calculated).....	15
Verification of Conformity .....	17
Precautions for use.....	18
ROHS III Compliant .....	19



## Introduction

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### Lilly package

The light-engine is a round LED-light engine for pendants with a centered hole for wires. Wires are easily inserted into poke-in connectors.

### 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.



# LILLY60 AC 230W

Document no:  
n/a

Revision:  
1.1

Page:  
Page 5 of 20

Object:  
Datasheet LILLY60 AC 230VAC

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## Short form Characteristics

MODULE CHARACTERISTICS	4W version	6W	10W
Power	4W +/-10% ea.	6W +/-10% ea.	10W +/-10% ea.
Voltage		230	
Number of LED's		24	
Colour Rendering Index		>Ra80, >Ra90	
Colour temperature		2700K, 3000K, 4000K	
Optics		130°	

### MECHANICAL

Module dimension with cover		Round Ø 60mm	
Inner diameter hole		13mm	
Height		8mm	
Weight		19g	
Assembly holes		3 x 3.5 mm	
Wire connector		Poke in	

### ELECTRICAL

Input voltage range		220-240V	
Dimmable		Yes	
Power factor		>0.5	
Total harmonic distortion		<15%	
Peak inrush current		600mA	
Inrush current duration		< 35µs	
Type of power		AC	
Surge protection		1.5kV	
Burst protection		2kV	
Over temp. protection		150°C	
Energy class	CRI80	E	E
3000K	CRI90	F	F

### PHOTOMETRICAL

Flux nominal CRI90	430lm	630lm	830lm
Efficiency CRI90 (CRI80)		105lm/W (120lm/W)	
SDCM (Mac Adam)		3	
SVM		0.5	
PstLM		0.6	

### ENVIRONMENTAL

Temperature range	-40°C to 85°C (Absolute maximum temp Tc 85°C)		
Relative Humidity	10-75%		
Ambient air pressure	500-1060 HPa		

### LIFETIME

Life length L70B10*	>50 000h (according to TM21 standard)		
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## LILLY60 AC 230W

Document no:  
n/a

Revision:  
1.1

Page:  
Page 6 of 20

Object:  
Datasheet LILLY60 AC 230VAC

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ML/SL

Date:  
2021-12-07

## Article number structure

LILLY60 AC.P.230.24.XYY-NN.ZZ

Name	Lilly
Size	60mm
AC	AC= 230VAC,
P	Power (Watt)
V	Voltage: 230VAC
N	Amount of LEDs
X	CRI: 8=Ra>80, 9=Ra>90
YY	CCT: 27 =2700K, 30 =3000K, 40 =4000K
NN	Viewing angle code
ZZ	Variance code FF – Flickerfree,

## Article name and versions

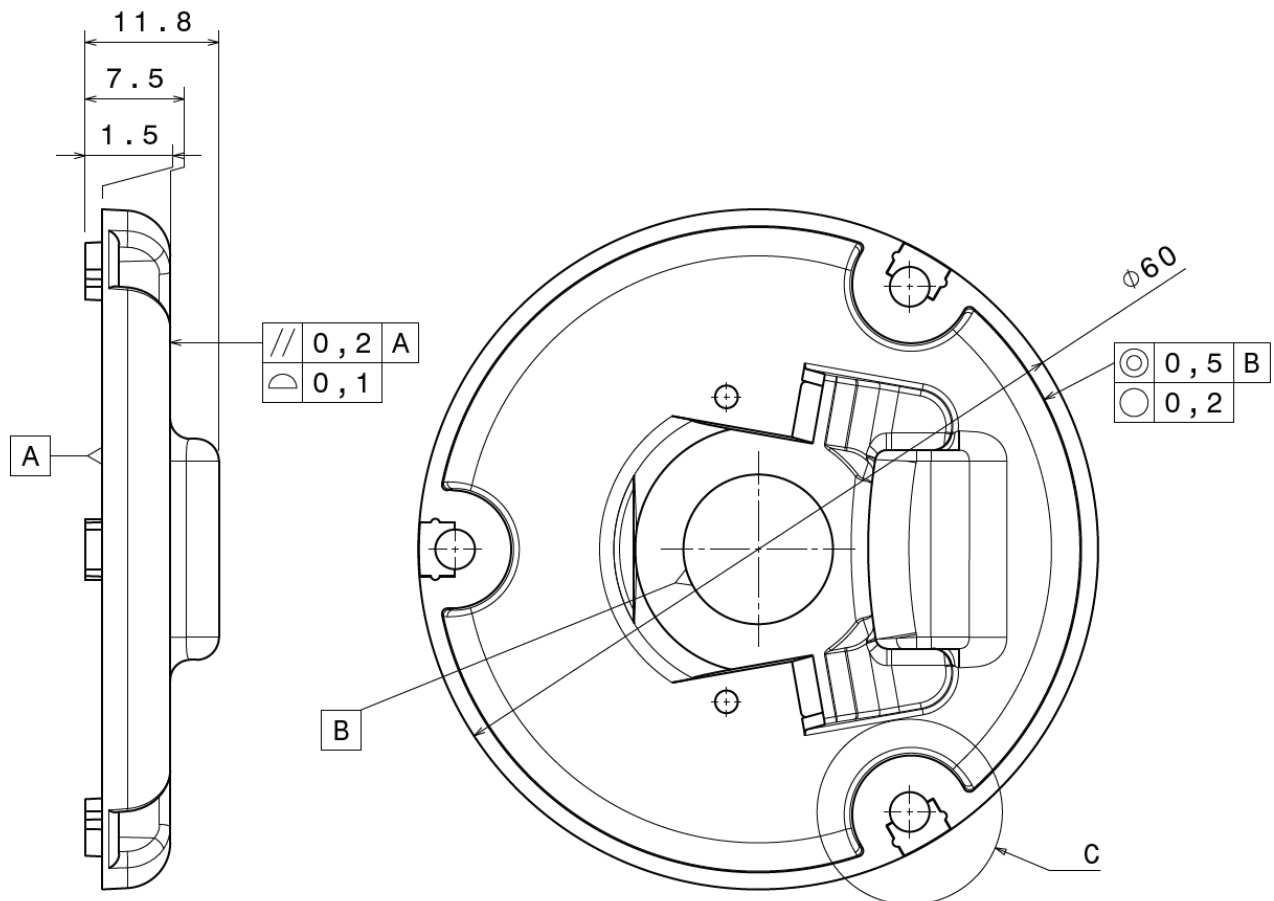
ARTICLE NAME	POWER	CURRENT	LEDS	CRI	CCT	LENS
Lilly60 AC.4.230.24.830-130.FF	4	230	24	80	3000	130°
Lilly60 AC.4.230.24.840-130.FF	4	230	24	80	4000	130°
Lilly60 AC.4.230.24.927-130.FF	4	230	24	90	2700	130°
Lilly60 AC.4.230.24.930-130.FF	4	230	24	90	3000	130°
Lilly60 AC.4.230.24.940-130.FF	4	230	24	90	4000	130°
Lilly60 AC.6.230.24.830-130.FF	6	230	24	80	3000	130°
Lilly60 AC.6.230.24.840-130.FF	6	230	24	80	4000	130°
Lilly60 AC.6.230.24.927-130.FF	6	230	24	90	2700	130°
Lilly60 AC.6.230.24.930-130.FF	6	230	24	90	3000	130°
Lilly60 AC.6.230.24.940-130.FF	6	230	24	90	4000	130°
Lilly60 AC.10.230.24.830-130.FF	10	230	24	80	3000	130°
Lilly60 AC.10.230.24.840-130.FF	10	230	24	80	4000	130°
Lilly60 AC.10.230.24.927-130.FF	10	230	24	90	2700	130°
Lilly60 AC.10.230.24.930-130.FF	10	230	24	90	3000	130°
Lilly60 AC.10.230.24.940-130.FF	10	230	24	90	4000	130°

## Ordering data

### Lilly AC – Packaging information

Description	Qty (pcs)	Dimension (cm)			GW (kg)
		Length	Width	Height	
Inner box	48	35.6	22.7	9.6	
Outer box	384	46.5	37.5	39.6	

## Dimensions LED Module

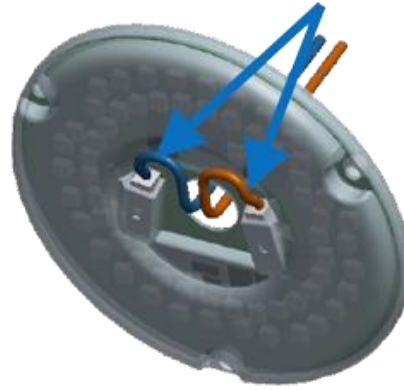


## Mounting instructions

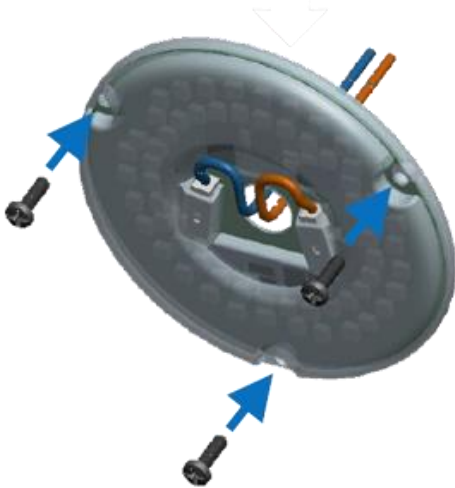
### Mounting



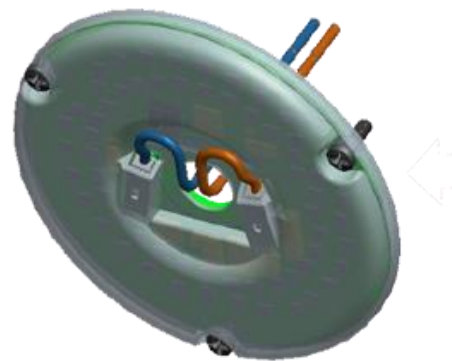
1 Insert the AC wire into the cover hole.



2 Slot in AC cable into AC connector.



3 Mount the screws to fixate module.

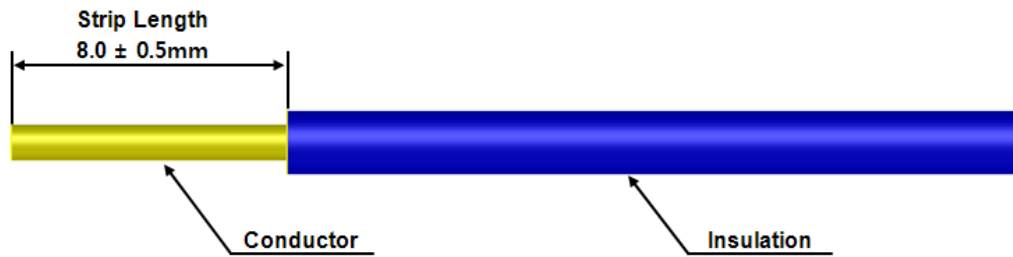
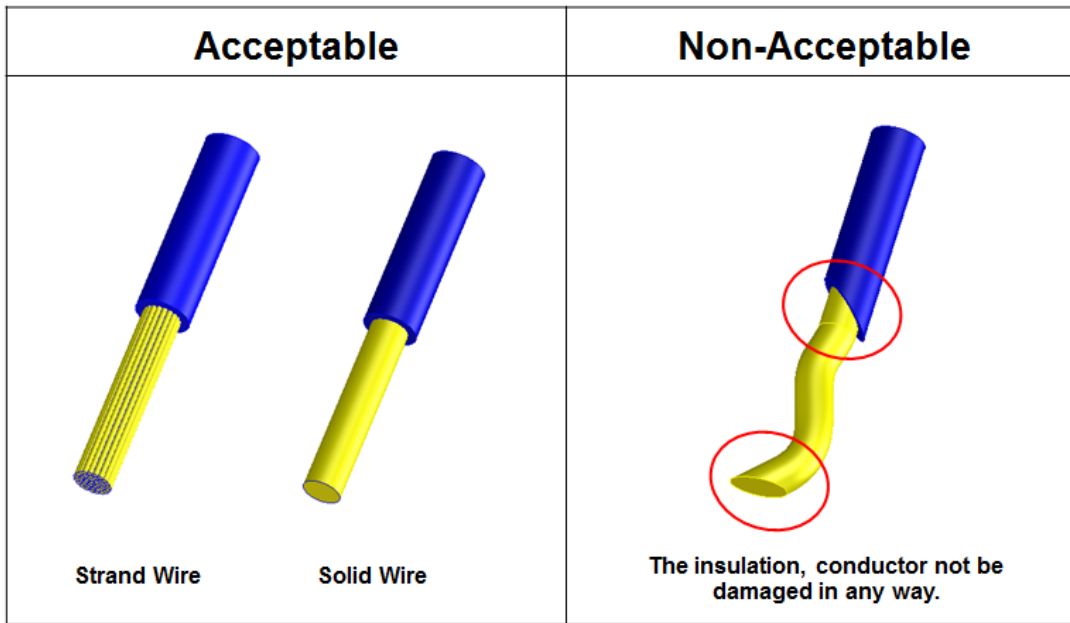


4 Mounted.

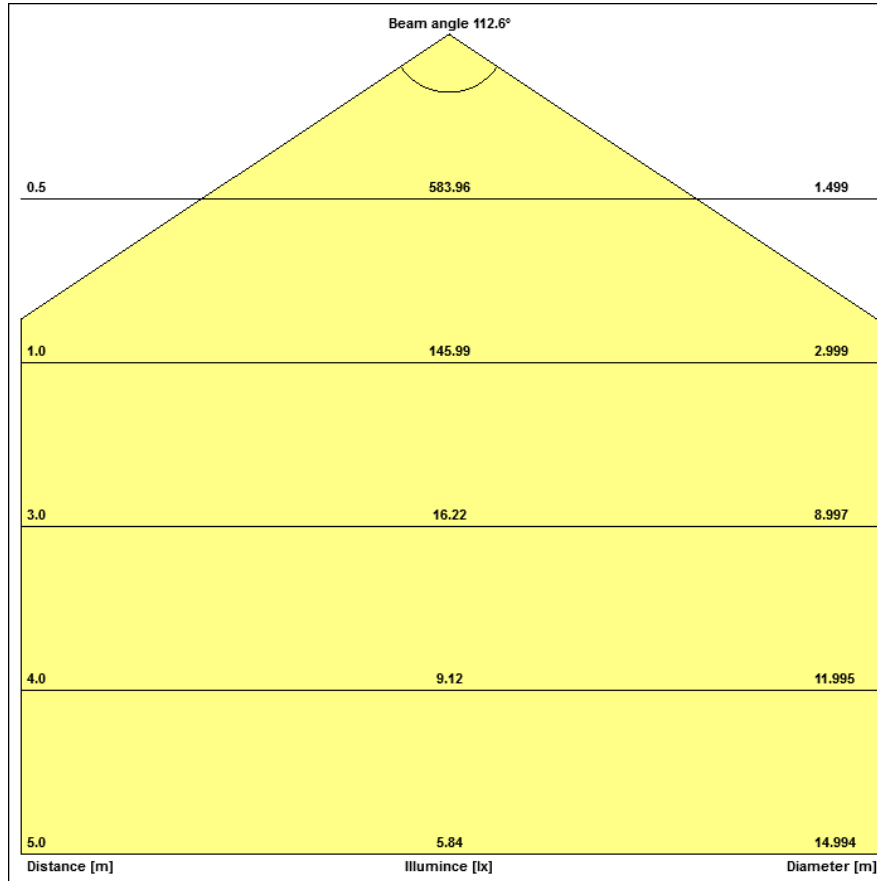


### Wiring

Type of wire	AWG	mm <sup>2</sup>
Stranded	22-18	0.32-0.8mm <sup>2</sup>
Solid	24-18	0.51-1.02∅ (0.2-0.8mm <sup>2</sup> )
Insulation diameter	Max 2.1 mm	



## Parameters of the lens system





## Parameters of the Light Output

### LUMEN OUTPUT LILLY AC

Parameter	Symbol	Value			Unit
		Min	Typ	Max	
Luminous Flux (3000K/CRI90)	4W	$\Phi_v$	400		lm
	6W	$\Phi_v$	600		lm
	10W	$\Phi_v$	1000		lm
Correlated Colour Temperature	27 <sup>*(2)</sup>	CCT	2700		K
	30 <sup>*(2)</sup>	CCT	3000		K
	40 <sup>*(2)</sup>	CCT	4000		K
CRI	R <sub>a</sub>	82	85		-
	R <sub>a</sub>	91	94		
Power	P <sub>o</sub>	3.6	3,95		W
	P <sub>o</sub>	5.4	5,90		W
	P <sub>o</sub>	8,9	9,90		W

<sup>(2)</sup>See detailed information in chapter "Binning structure graphical representation"



# LILLY60 AC 230W

Document no:  
n/a

Revision:  
1.1

Page:  
Page 12 of 20

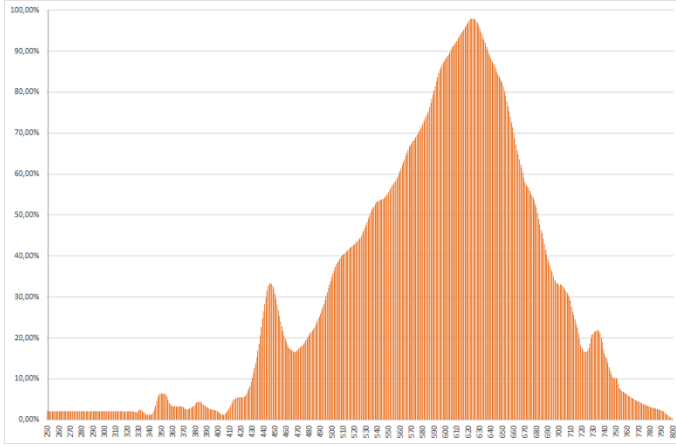
Object:  
Datasheet LILLY60 AC 230VAC

Author:  
ML/SL

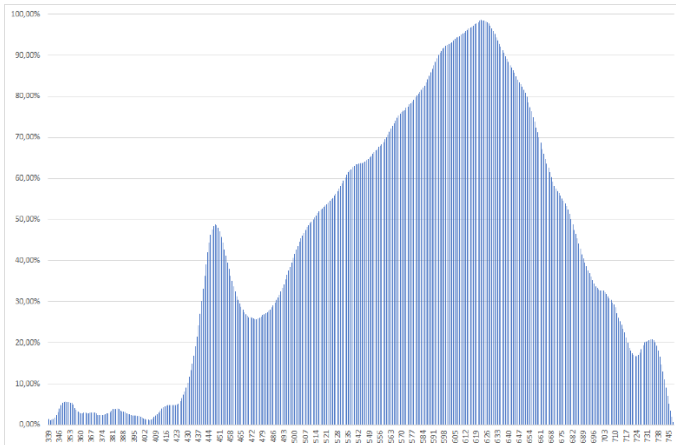
Date:  
2021-12-07

## Colour Spectrum

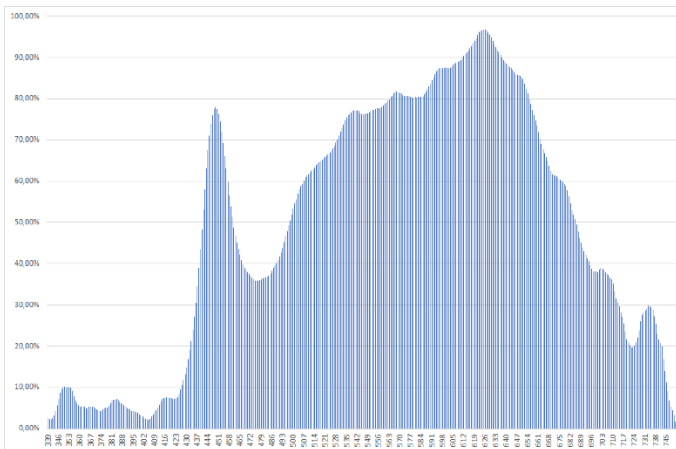
### 2700K



### 3000K

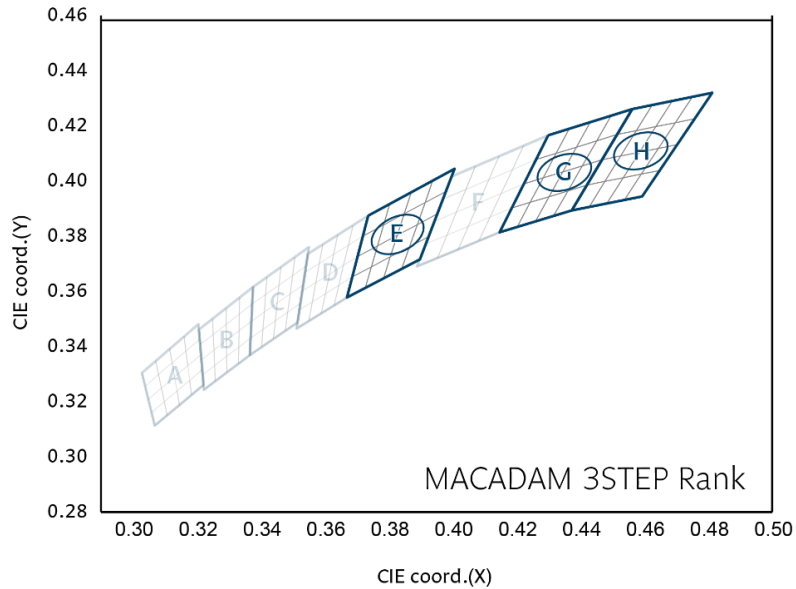


### 4000K



## 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

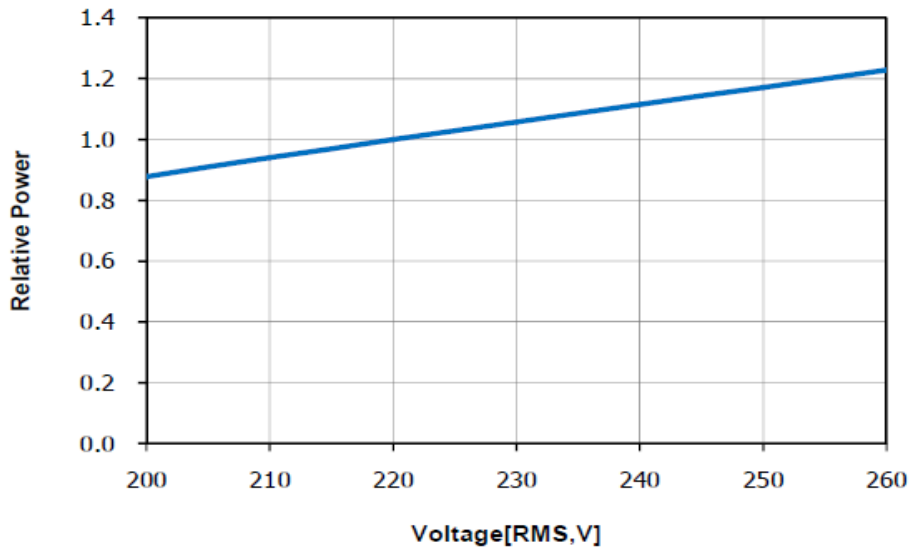
### Short form letters for CCT (K)

Colour Code	CCT
27	2700K
30	3000K
40	4000K

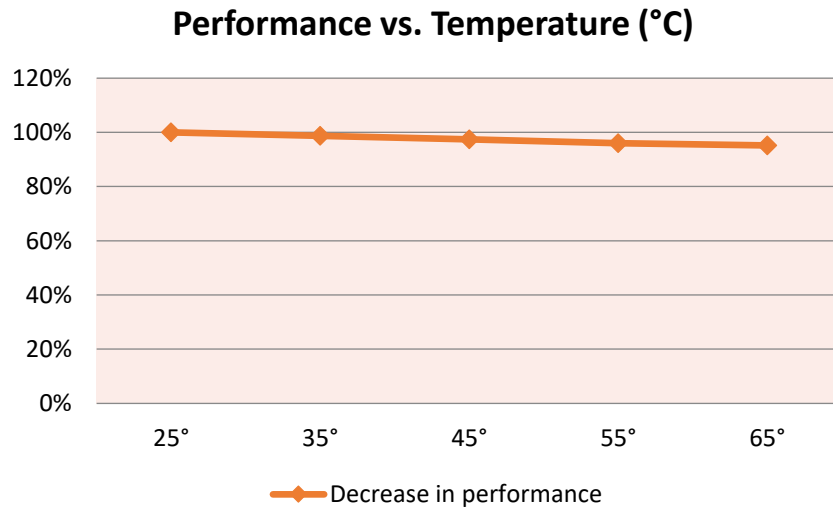
## Electro Optical data

### 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.

## 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 T<sub>c</sub> (measuring point). It is important not to exceed this recommendation.

### 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.

	55°C	65°C	75°C	85°C
L70B10	>50 000h	>50 000h	>50 000h	>50 000h
L80B10	>50 000h	47 000h	38 000h	33 000h
L90B10	28 000h	24 000h	20 000h	18 000h

## 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.

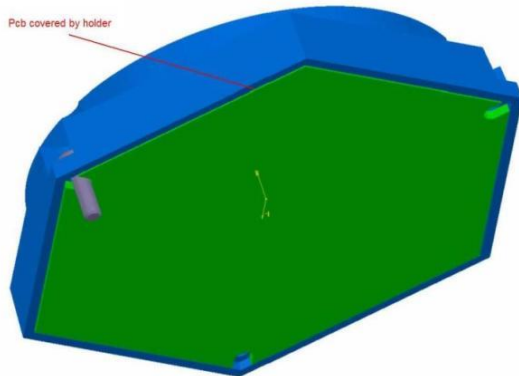
*The thermal connection is measured in temperature vs. Power.*

## 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”.







## Verification of Conformity

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

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

\* 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 for 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

Light fitting standard according to EN/IEC-60598-1 production control specifications function test. The insulation test of 500Vdc should be performed 1s with min 2MΩ. No dielectric test should be performed.

### IEC Protection Classes

The Clara Optodrive module is designed to be built in directly to a Class I fixture.

For Class II fixture use, an electrical insulating pad is needed between the module and the fixture. The pad needs to be minimum 2.5mm wider than the module in all directions; insulating screws such as nylon or plastic must be used when assembling the module to the fixture.



## 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 III Compliant

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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<sup>6+</sup>)
- 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](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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