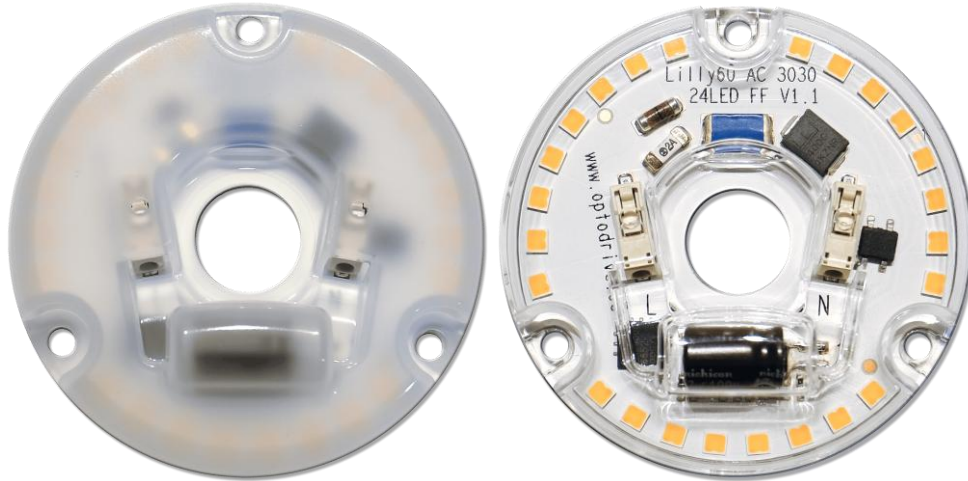




LILLY60 AC



LILLY60 AC

2W | 4W | 6W | 8W | 10 | 15W
Flicker free

Compact round LED-light engine for pendants.

No driver is required!



Key features

Lilly60 is specifically crafted for light fixture manufacturer and their design of 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. Lilly sets a new benchmark for efficiency, delivering outstanding light output tailored for both aesthetic and functional lighting needs.



1. Effortless Connectivity

- Direct connection to **110VAC** or **230VAC** with no external drivers required, simplifying installation across different environments.

2. Flicker-Free Dimming

- Provides smooth, flicker-free dimming using either standard dimmers or smart control protocols for consistent, comfortable lighting.

3. Sustainable Design

- Compliant with the latest **EU circular economy** directives, making it both eco-friendly and future-proof.



LILLY60 AC 230W

Document no:
n/a

Revision:
2.5

Page:
Page 3 of 21

Object:
Datasheet LILLY60 AC 230VAC

Author:
ML/SL

Date:
2025-11-13

Content

Key features.....	2
Introduction.....	4
Short form Characteristics.....	5
Article number structure	6
Dimensions LED Module.....	8
Mounting instructions	9
Parameters of the lens system	11
Parameters of the Light Output	12
CCT structure graphical representation	14
Electro Optical data	15
Lifetime (Calculated).....	16
Light fitting routine tests	18
Precautions for use.....	19
ROHS III and TSCA Compliant	20



LILLY60 AC 230W

Document no:
n/a

Revision:
2.5

Page:
Page 4 of 21

Object:
Datasheet LILLY60 AC 230VAC

Author:
ML/SL

Date:
2025-11-13

Introduction

The Lilly60 LED module offers versatile dimming capabilities, working seamlessly with standard dimmers right out of the box. 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.

Lilly60 Package

Designed for pendant applications, the Lilly60 is a round LED light engine with a centered hole for easy wire integration. Its plug-in connectors allow for quick and straightforward setup.

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

Lilly60 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.



LILLY60 AC 230W

Document no:
n/a

Revision:
2.5

Page:
Page 5 of 21

Object:
Datasheet LILLY60 AC 230VAC

Author:
ML/SL

Date:
2025-11-13

Short form Characteristics

MODULE CHARACTERISTICS	4W version	6W	10W
Power	4W +/-10% ea.	6W +/-10% ea.	10W +/-10% ea.
Voltage	120V or 230V		
Number of LED's	28 (120VAC) 32 (230VAC)		
Colour Rendering Index	>Ra90		
Colour temperature	2200K, 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	100-130VAC or 220-240VAC		
Dimmable	Yes		
Power factor	>0.95		
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		
Switching Cycles on/off	Tested 1.000.000 at 25°C and 500.000 at 85°C		
Energy class (230VAC)	D, E or F depending on Kelvin version		

PHOTOMETRICAL

Flux nominal CRI90	See page 6: Article name and versions		
Efficiency CRI90	85-120lm/W		
SDCM (Mac Adam)	3		
SVM	0.3		
PstLM	0.3		

ENVIRONMENTAL

Temperature range	-25°C to 85°C (-13°F to 185°F) (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)		
---------------------	---------------------------------------	--	--



LILLY60 AC 230W

Document no:
n/a

Revision:
2.5

Page:
Page 6 of 21

Object:
Datasheet LILLY60 AC 230VAC

Author:
ML/SL

Date:
2025-11-13

Article number structure

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

Name	Lilly
Size	60mm
AC	AC= VAC
P	Power (Watt)
V	Voltage: 230VAC or 120VAC
N	Amount of LEDs
X	CRI: 8=Ra>80, 9=Ra>90
YY	CCT: 22 =2200K, 27 =2700K, 30 =3000K, 40 =4000K
NN	130 – cover transparent, D – Cover diffused
ZZ	Variance code FF – Flickerfree, H – Heatpad mounted

Article name and versions 230VAC

ARTICLE NAME	POWER	CURRENT	LEDS	CRI	CCT	LENS	Lumen		Energy Class
							25°C	65°C	
Lilly60 AC.4.230.32.922-130.FF	4	230	32	90	2200	130°	300	280	F
Lilly60 AC.4.230.32.927-130.FF	4	230	32	90	2700	130°	380	350	E
Lilly60 AC.4.230.32.930-130.FF	4	230	32	90	3000	130°	400	380	D
Lilly60 AC.4.230.32.940-130.FF	4	230	32	90	4000	130°	410	390	D
Lilly60 AC.6.230.32.922-130.FF	6	230	32	90	2200	130°	460	430	F
Lilly60 AC.6.230.32.927-130.FF	6	230	32	90	2700	130°	580	550	E
Lilly60 AC.6.230.32.930-130.FF	6	230	32	90	3000	130°	610	575	D
Lilly60 AC.6.230.32.940-130.FF	6	230	32	90	4000	130°	620	590	D
Lilly60 AC.10.230.32.922-130.FF	10	230	32	90	2200	130°	750	710	F
Lilly60 AC.10.230.32.927-130.FF	10	230	32	90	2700	130°	960	920	E
Lilly60 AC.10.230.32.930-130.FF	10	230	32	90	3000	130°	1010	960	D
Lilly60 AC.10.230.32.940-130.FF	10	230	32	90	4000	130°	1030	990	D
Lilly60 AC.4.230.32.922-D.FF	4	230	32	90	2200	130°	270	250	F
Lilly60 AC.4.230.32.927-D.FF	4	230	32	90	2700	130°	330	310	E
Lilly60 AC.4.230.32.930-D.FF	4	230	32	90	3000	130°	370	350	D
Lilly60 AC.4.230.32.940-D.FF	4	230	32	90	4000	130°	375	355	D
Lilly60 AC.6.230.32.922-D.FF	6	230	32	90	2200	130°	420	390	F
Lilly60 AC.6.230.32.927-D.FF	6	230	32	90	2700	130°	510	480	E
Lilly60 AC.6.230.32.930-D.FF	6	230	32	90	3000	130°	540	510	D
Lilly60 AC.6.230.32.940-D.FF	6	230	32	90	4000	130°	550	520	D
Lilly60 AC.10.230.32.922-D.FF	10	230	32	90	2200	130°	670	640	F
Lilly60 AC.10.230.32.927-D.FF	10	230	32	90	2700	130°	870	830	E
Lilly60 AC.10.230.32.930-D.FF	10	230	32	90	3000	130°	920	880	D
Lilly60 AC.10.230.32.940-D.FF	10	230	32	90	4000	130°	930	890	D



Article name and versions 120VAC

ARTICLE NAME	POWER	CURRENT	LEDS	CRI	CCT	LENS	Lumen	
							25°C	65°C
Lilly60 AC.4.120.28.922-130.FF	4	120	28	90	2200	130°	300	280
Lilly60 AC.4.120.28.927-130.FF	4	120	28	90	2700	130°	380	350
Lilly60 AC.4.120.28.930-130.FF	4	120	28	90	3000	130°	400	380
Lilly60 AC.4.120.28.940-130.FF	4	120	28	90	4000	130°	410	390
Lilly60 AC.6.120.28.922-130.FF	6	120	28	90	2200	130°	460	430
Lilly60 AC.6.120.28.927-130.FF	6	120	28	90	2700	130°	580	550
Lilly60 AC.6.120.28.930-130.FF	6	120	28	90	3000	130°	610	575
Lilly60 AC.6.120.28.940-130.FF	6	120	28	90	4000	130°	620	590
Lilly60 AC.10.120.28.922-130.FF	10	120	28	90	2200	130°	750	710
Lilly60 AC.10.120.28.927-130.FF	10	120	28	90	2700	130°	960	920
Lilly60 AC.10.120.28.930-130.FF	10	120	28	90	3000	130°	1010	960
Lilly60 AC.10.120.28.940-130.FF	10	120	28	90	4000	130°	1030	990
Lilly60 AC.4.120.28.922-D.FF	4	120	28	90	2200	130°	270	250
Lilly60 AC.4.120.28.927-D.FF	4	120	28	90	2700	130°	330	310
Lilly60 AC.4.120.28.930-D.FF	4	120	28	90	3000	130°	370	350
Lilly60 AC.4.120.28.940-D.FF	4	120	28	90	4000	130°	375	355
Lilly60 AC.6.120.28.922-D.FF	6	120	28	90	2200	130°	420	390
Lilly60 AC.6.120.28.927-D.FF	6	120	28	90	2700	130°	510	480
Lilly60 AC.6.120.28.930-D.FF	6	120	28	90	3000	130°	540	510
Lilly60 AC.6.120.28.940-D.FF	6	120	28	90	4000	130°	550	520
Lilly60 AC.10.120.28.922-D.FF	10	120	28	90	2200	130°	670	640
Lilly60 AC.10.120.28.927-D.FF	10	120	28	90	2700	130°	870	830
Lilly60 AC.10.120.28.930-D.FF	10	120	28	90	3000	130°	920	880
Lilly60 AC.10.120.28.940-D.FF	10	120	28	90	4000	130°	930	890

Thermal Transfer & Potential Difference

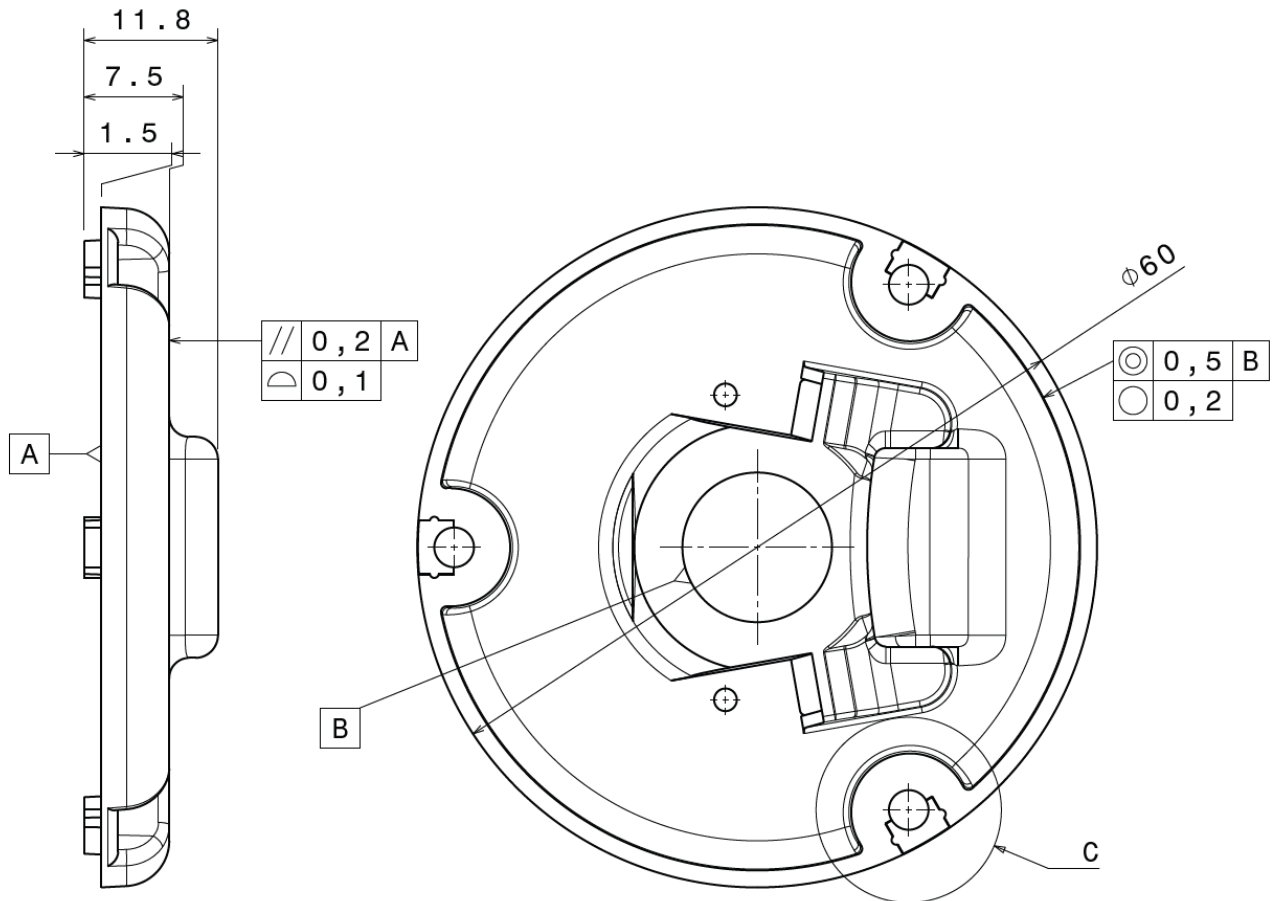
When mounting directly onto copper or brass, a thermally conductive and electrically insulating heat-pad is recommended, especially for Class II or in humid environments. Powder coating and certain aluminum surface treatments may improve heat dissipation. Galvanic corrosion between aluminum and brass/copper should always be considered.

Ordering data

Lilly AC – Packaging information

Description	Qty (pcs)	Dimension (cm)			GW (kg)
		Length	Width	Height	
Inner box	40	35,6	27,7	9,6	1,45
Outer box	320	46,5	37,5	39,6	11,40

Dimensions LED Module

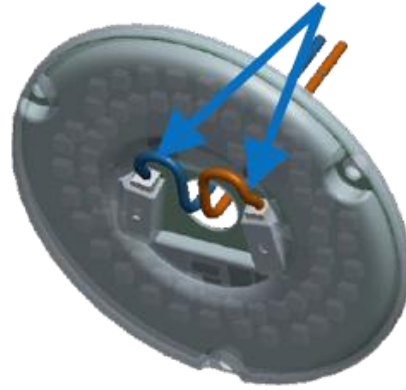


Mounting instructions

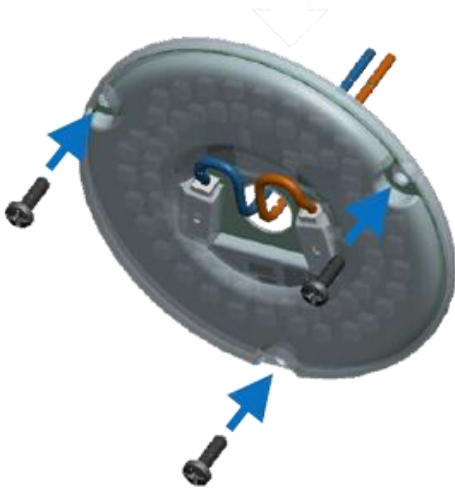
Mounting



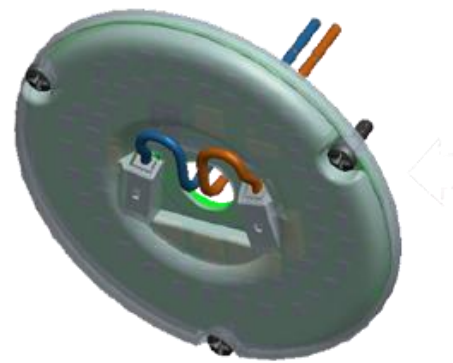
1 Insert the AC wire into the cover hole.



2 Slot in AC cable into AC connector.



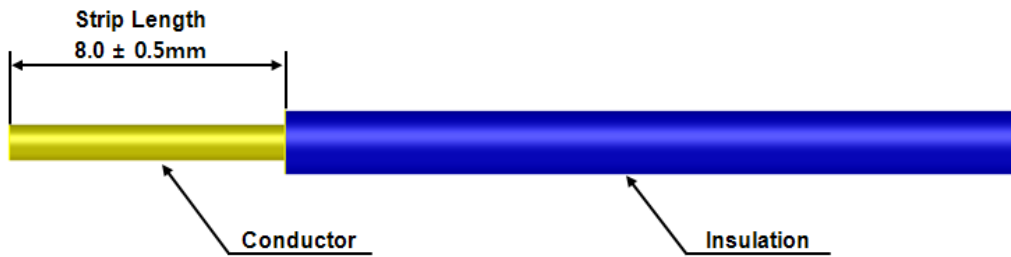
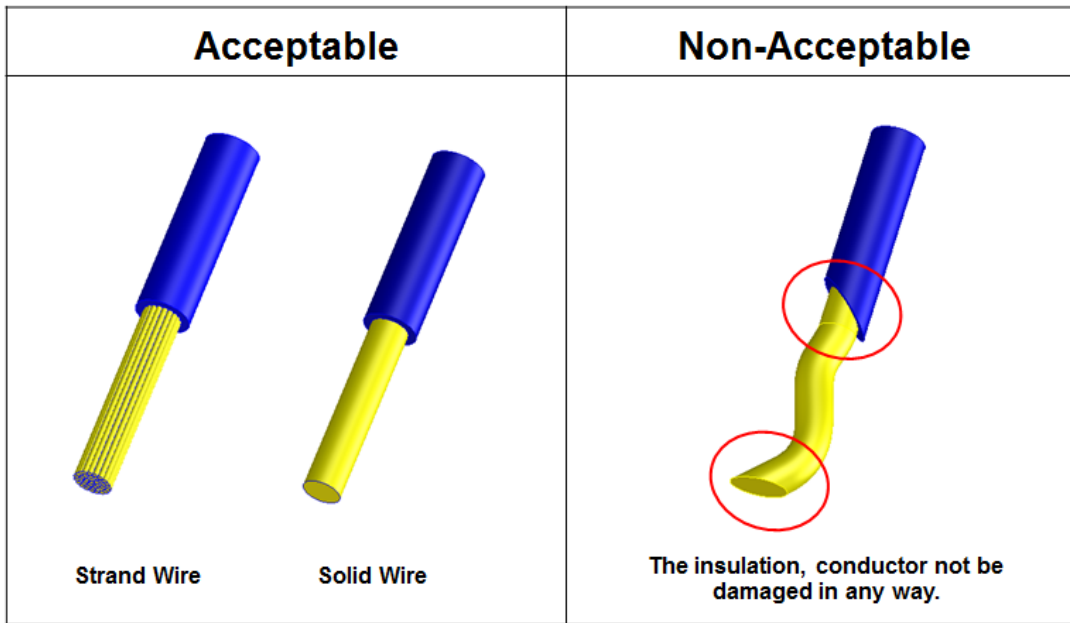
3 Mount the screws to fixate module.



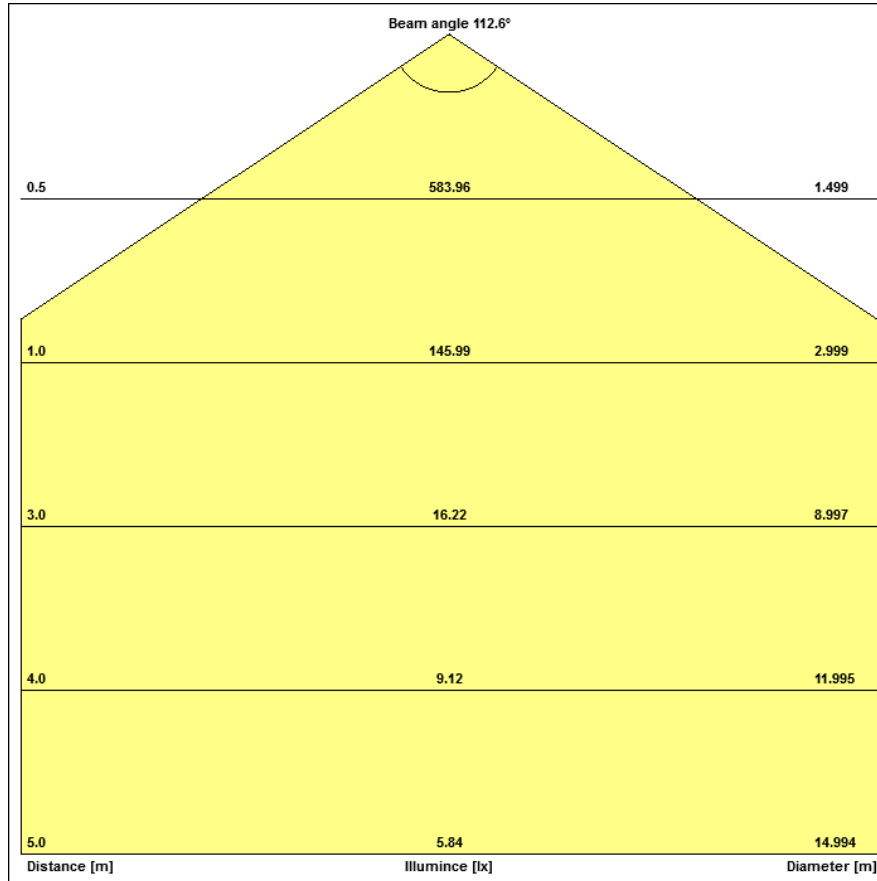
4 Mounted.

Wiring

Type of wire	AWG	mm ²
Stranded	22-18	0.32-0.8mm ²
Solid	32-18	0.51-1.02∅ (0.2-0.8mm ²)
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	Φ_v		400		lm
	6W	Φ_v		600		lm
	10W	Φ_v		1000		lm
Correlated Colour Temperature	22 ^{*(2)}	CCT		2200		K
	27 ^{*(2)}	CCT		2700		K
	30 ^{*(2)}	CCT		3000		K
	40 ^{*(2)}	CCT		4000		K
CRI						
	R _a		91	94		
Power	P _o		3.6	4,0		W
	P _o		5.4	6,0		W
	P _o		9,0	10,0		W

⁽²⁾See detailed information in chapter "Binning structure graphical representation"

EPREL Measurement and Control

All measurement for EPREL (EU 2019/2015) is done with the cover removed. All light output measurements are taken without the cover as per the standard and all other measurements included in this document are taken with the cover fitted in place. All EPREL numbers are available from Optoga or their distributors.



LILLY60 AC 230W

Document no:
n/a

Revision:
2.5

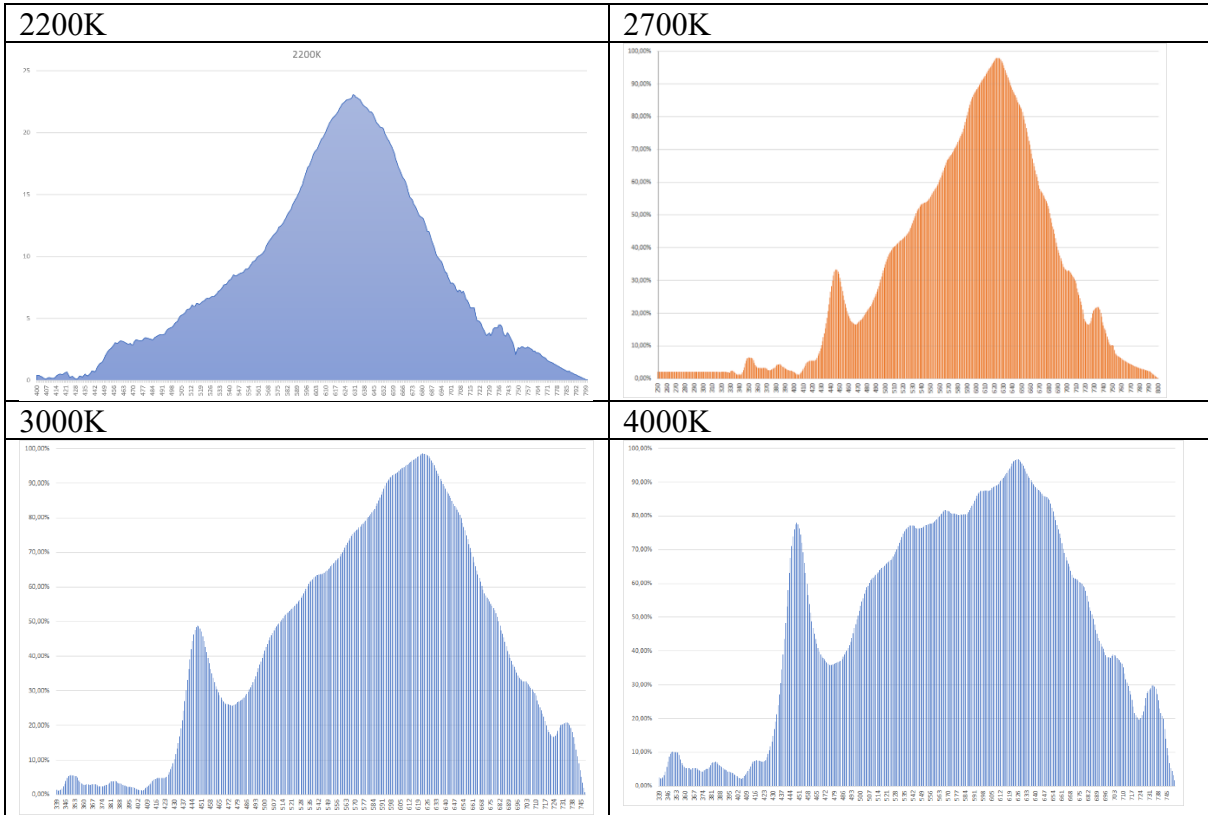
Page:
Page 13 of 21

Object:
Datasheet LILLY60 AC 230VAC

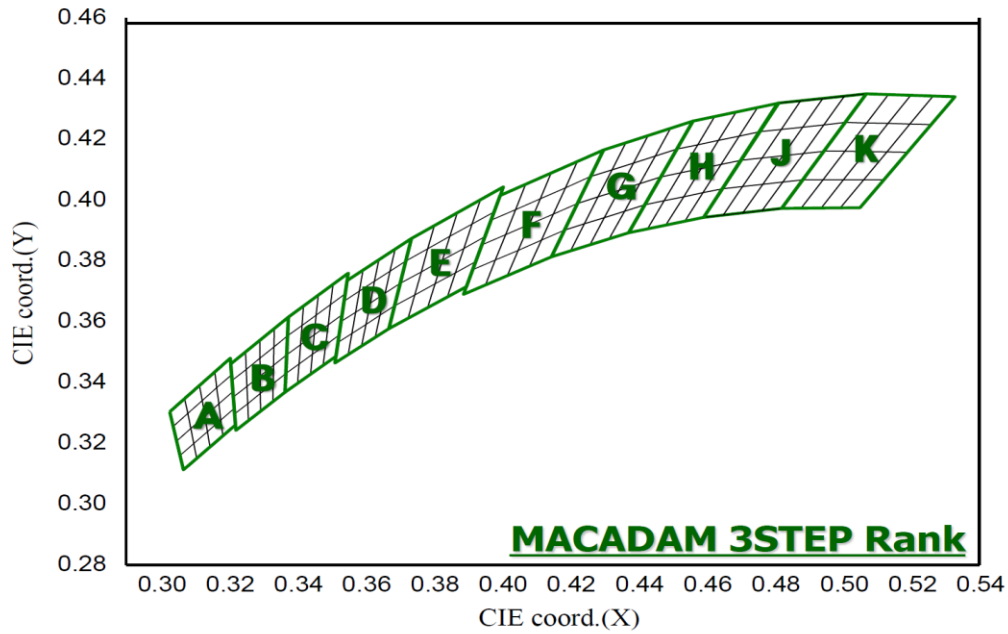
Author:
ML/SL

Date:
2025-11-13

Colour Spectrum



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

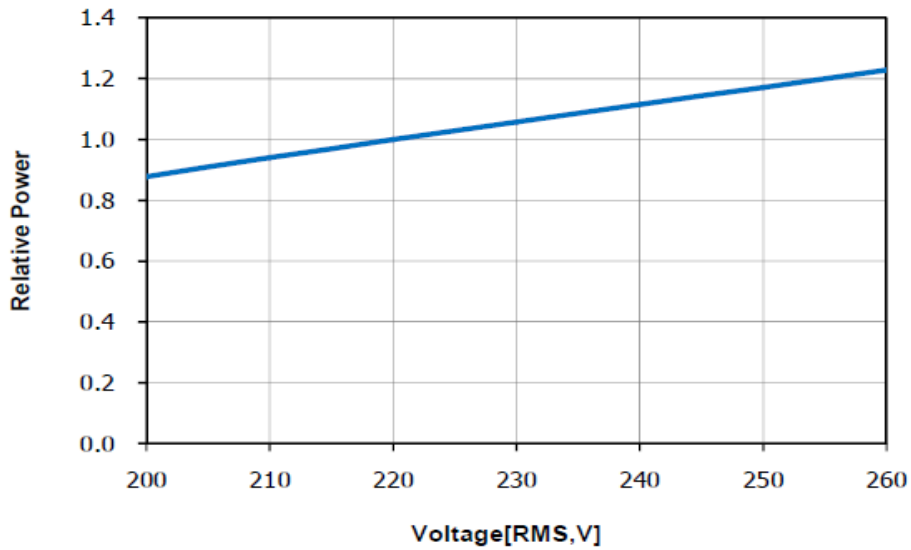
Short form letters for CCT (K)

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

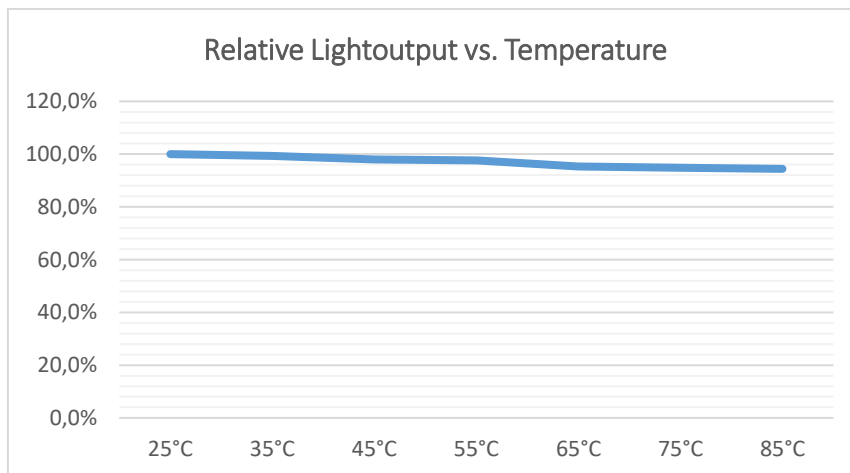
Electro Optical data

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 control

At verification, the temperature at the designated Tc measurement points shall be confirmed to remain within the specified limits. Compliance with these limits determines the expected operational lifetime of the module. This verification shall be performed only after proper attachment of the heat sink.

Lifetime Calculation at Tc

The calculated lifetime is based on the maximum recommended temperature at the Tc measurement point. The **absolute maximum Tc is 85 °C**, and this limit shall not be exceeded. For reliable design margins and extended service life, a **recommended Tc of 65 °C** should be applied in luminaire design.



Projected lifetime based on TM-21

The applied power load for the LED module is defined in accordance with the lumen maintenance projection. Lifetime projections are based on LM-80 test data from discrete LEDs operated under the specified thermal conditions at a drive current of 30 mA.

	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	36 000h	32 000h	20 000h	18 000h

Lifetime and Reliability

The projected lifetime values presented are based on TM-21 extrapolation of LM-80 test data for the LEDs used in the module. These figures represent lumen maintenance of the LED packages only.

An LED module, however, consists of several additional components such as PCB substrates, solder joints, driver electronics, optical materials and connectors. The overall service life of the module may therefore be influenced by these elements, depending on the application environment and operating conditions.

Optoga modules are designed and verified to ensure that supporting components are selected and dimensioned to match the LED lifetime at the recommended Tc values. This means that the projected lumen maintenance according to TM-21 is complemented by robust module design, providing customers with reliable long-term performance in real installations.

Thermal performance and lifetime correlation

The lifetime projections above are valid only when the module operates within its specified thermal limits. Since the LED junction temperature is directly dependent on the case temperature (Tc) and the luminaire's heat dissipation capability, proper thermal design is essential to maintain the expected lumen maintenance and reliability values.

Thermal Design

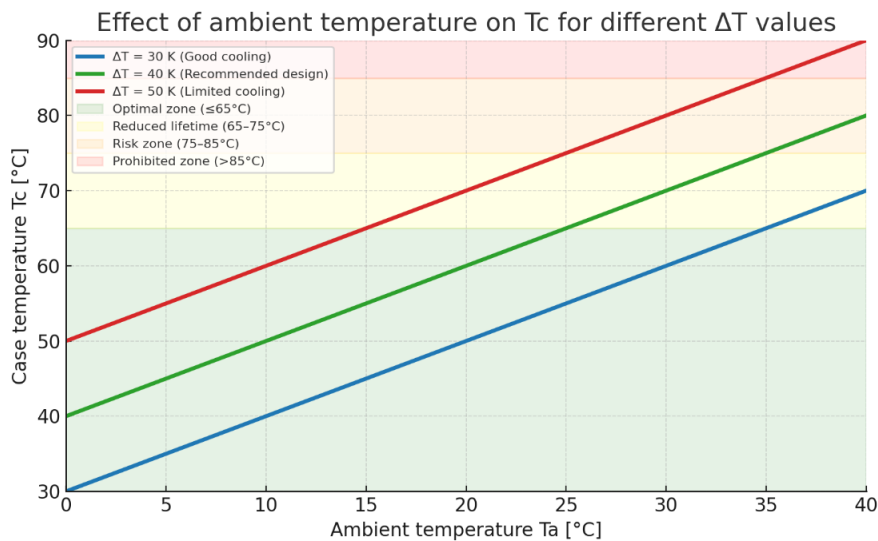
Lilly60 Thermal Design ($T_a = 25\text{ °C}$, $T_{c,target} = 65\text{ °C}$)

Input Power	Required R_{th} (sink–ambient)	Typical Metal Area*
2W	$\leq 28\text{ K/W}$	$\approx 40\text{--}50\text{ cm}^2$
4W	$\leq 14\text{ K/W}$	$\approx 80\text{--}100\text{ cm}^2$
6W	$\leq 9.3\text{ K/W}$	$\approx 130\text{--}150\text{ cm}^2$
10W	$\leq 5.5\text{ K/W}$	$\approx 220\text{--}250\text{ cm}^2$
15W	$\leq 3.6\text{ K/W}$	$\approx 330\text{--}360\text{ cm}^2$

* Free convection, $T_a = 25\text{ °C}$. Effective metal area thermally connected to the module, all sides exposed to air (not only the module footprint).

The table below provides indicative thermal requirements for different power levels of the Lilly60 LED module. The values are based on a design case with ambient temperature $T_a = 25\text{ °C}$ and target case temperature $T_c = 65\text{ °C}$. To achieve this, the luminaire’s metal construction should be used as the primary heatsink.

The specified R_{th} (sink–ambient) represents the maximum allowable thermal resistance between the luminaire surface and the surrounding air. Lower values (larger effective metal area or better ventilation) will result in lower T_c and longer lifetime. At higher ambient temperatures, or if the luminaire is enclosed or mounted close to a ceiling, the available temperature difference ($T_c - T_a$) decreases. In such cases, reduce the required R_{th} by approximately 25 % for each 10 °C increase in T_a , or verify T_c by measurement during worst-case operation.



Operation at 65 °C corresponds to the recommended design level and provides full lifetime according to TM-21. At 75 °C the L90 value decreases and at 85 °C the lifetime is shortened drastically. This clearly shows the importance of keeping T_c within the green zone ($\leq 65\text{ °C}$) or strictly controlled in the yellow zone.



Verification of Conformity

The module are tested at Intertek Semco according to IEC 62031.

SAFETY (LVD)	IEC 62031:2020	
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 63271	
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 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 the routine test should 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 and TSCA Compliant

All our LED modules meet the Restrictions of Hazardous Substances (RoHS III) and Toxic Substances Control Act (TSCA).

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, the Japan Ministry of Trade and Industry (MITI) and US Environmental Protection Agency under TSCA Section 6(h). 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 according to these mentioned directives. We also manage those required by the Toxic Substances Control Act (TSCA), to reduce exposure to certain Persistent, Bioaccumulative and Toxic (PBT) chemicals.

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 (Cr⁶⁺)
- 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 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.



Köpingsvägen 4 • SE-732 31 Arboga • SWEDEN

Tel +46 (0) 589 490 950

info@optoga.com • www.optoga.com

Copyright © 2017 Optoga AB. All rights reserved.