

CEZOS

L0-147045-xxx-A0230-K081



INTRODUCTION

230V AC LED module is an advanced light source designed for the best energy efficient and eco-friendly indoor and outdoor lighting. Using newest technology we provide probably the best solution for lighting. With a very high value of CRI and luminous flux. The installation is simple, and connecting few LED modules allows to create complex lighting. This solution is the best for indoor and outdoor ceiling-mounted and wall-mounted luminaries.

LED Type	OSRAM S8 - GWP9LM31.EM
LED Quantity	12 pcs
Dimension	146,6x45,0 mm (173x71,4 with optic)
Input Voltage	~230V AC
Typical Power Consumption	6-15 W (in-production set)
Viewing Angle	120° (without optic)
Material Thickness	1,5 mm
Cable Connection	Solder Pads
Max Ambient Temperature	45°C
CRI	>80

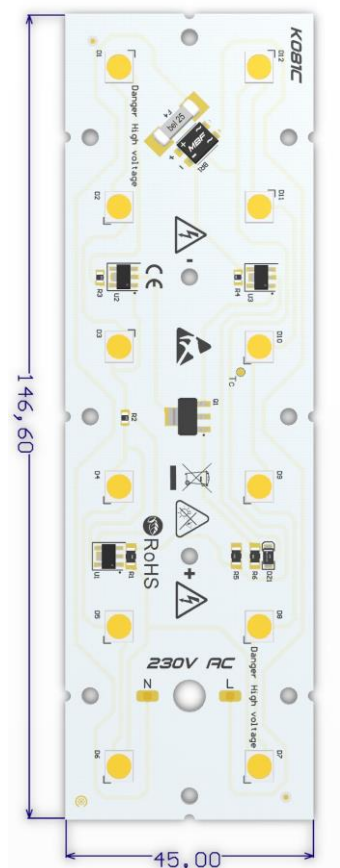
FEATURES

LEDs have significant advantages compared to other types of light sources and are very easy to use. What is more, LEDs are versatile and virtually maintenance free.

- Efficiency of the module up to 118 lm/W
- Rigid board LED module
- Viewing angle at 50% I_v: 120°
- High colour rendering index CRI >80
- High power factor
- Low Total Harmonic Distortion THD
- High efficiency
- Heat-sink required to preserve nominal power
- Small colour tolerance
- Small luminous flux tolerances
- Direct connection to mains
- Colour temperatures 2700K, 3000K, 4000K, 5000K
- Simple installation
- Long lifetime

APPLICATIONS

- Ideal for ceiling-mounted and wall-mounted luminaries
- Retrofits and fixtures
- Accent and Effect Lighting
- Professional downlights



CALCULATED PARAMETERS AT T_J = 25°C AND T_J = 65°C

Power [W]	CCT [K]	Typ. CRI	Luminous Flux* [lm]	Module Efficacy* [lm/W]	Luminous Flux** [lm]	Module Efficacy** [lm/W]	Article Number
9,9	2700	83	1067	108	1031	105	L0-147045-827-A0230-K081
	3000	83	1067	108	1031	105	L0-147045-830-A0230-K081
	4000	83	1067	108	1031	105	L0-147045-840-A0230-K081
	5000	83	1160	118	1121	114	L0-147045-850-A0230-K081
11,9	2700	83	1274	107	1231	104	L0-147045-827-A0230-K081
	3000	83	1274	107	1231	104	L0-147045-830-A0230-K081
	4000	83	1274	107	1231	104	L0-147045-840-A0230-K081
	5000	83	1385	117	1338	113	L0-147045-850-A0230-K081
14	2700	83	1490	106	1440	103	L0-147045-827-A0230-K081
	3000	83	1490	106	1440	102	L0-147045-830-A0230-K081
	4000	83	1490	106	1440	102	L0-147045-840-A0230-K081
	5000	83	1620	115	1565	111	L0-147045-850-A0230-K081

* - Parameters were calculated for temperatures T_J= 25°C

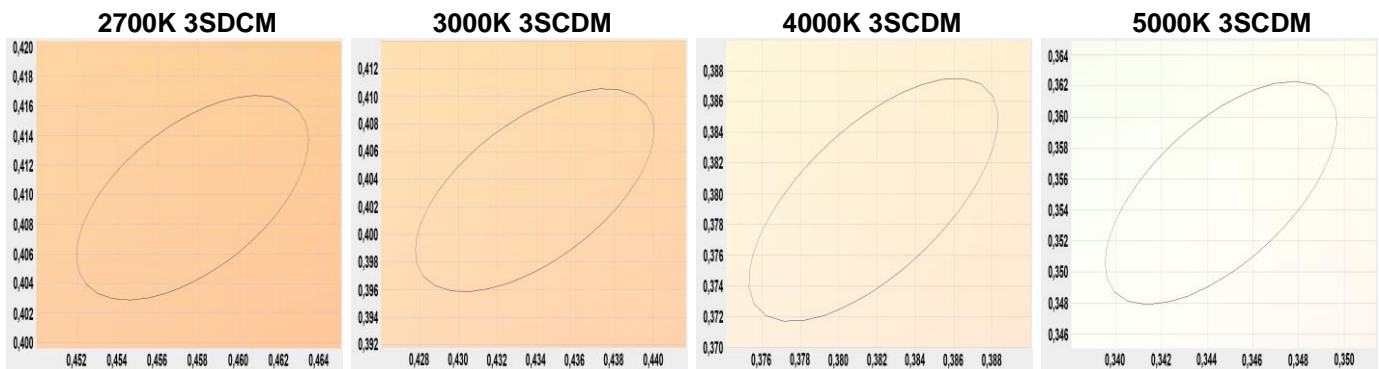
** - Parameters were calculated for temperatures T_J= 65°C

Value of these parameters were calculated for default bin and with tolerances of 15%.

Parameters shown in table above are default for temperatures T_J=25°C and T_J=65°C. Some of these parameters are temperature dependent and can be different during long time of operation. Also it is impossible to order modules with same parameters after some time. LED technology is developed fast and producers are creating new LEDs with better features very quick. If you need LED modules with different values of some parameters, we provide other LEDs with different colour temperature and features. 230V AC LED modules may be potted with polyurethane resin, in order to use modules outdoors. Thickness of polyurethane layer and size of border sides depends on the height of elements. Border sides are made of white polymer. Potting is used to protect module elements against external factors like rain, snow etc. it also avoids accidental touch of high voltage during installation and operation. Polyurethane provides good protection over long time and almost does not affect modules parameters. Parameters in table doesn't take into account the differences which can be done by potting. If parameters does not meet your needs, it is possible to make modification of any LED module or we can create completely new one. In such cases and for more information, please contact us before placing an order. Please have all of this in mind when ordering LED modules.

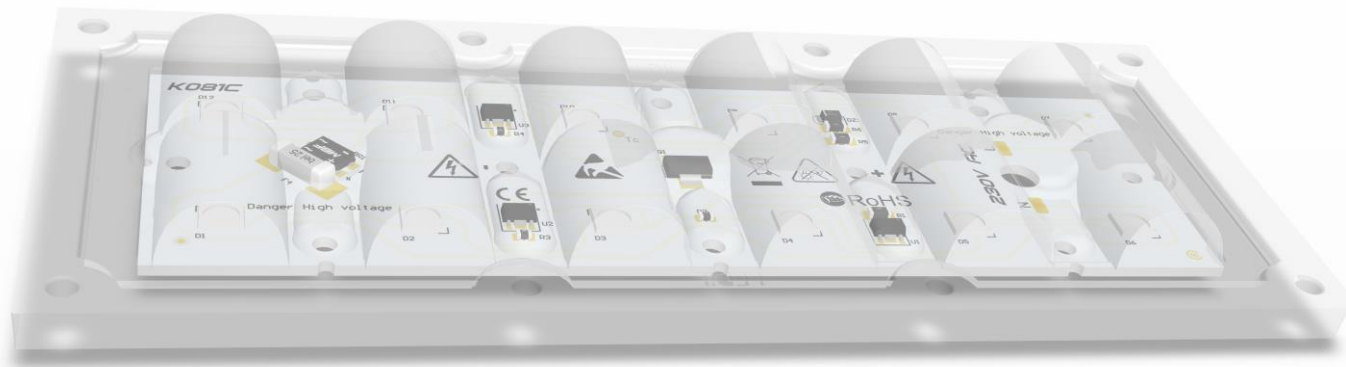
MACADAM ELLIPSE

Production of LEDs with exactly the same colour temperature is almost impossible. LEDs with similar colours are divided into bins. MacAdam Ellipses are used to describe differences in colour of LEDs with same bin. When most people can't see differences in colours, these LEDs are in first step level of MacAdam Ellipse (1SDCM). If the differences are getting bigger, then number of step is increasing. Second step of MacAdam ellipse (2SDCM) is twice bigger than first one and so on. Differences in colour for 3000K LEDs can be up to $\pm 30\text{K}$ in 1SDCM. If bin is in 4SDCM, then colour differences should be less than $\pm 100\text{K}$. LEDs with smaller number of SDCM are better but most common LEDs are in 4th to 7th step level, in other words human eyes certainly can see colour differences in LEDs that are ostensibly the same colour. In most of our projects we use LEDs in 3rd step level of MacAdam Ellipse.

**SAFETY**

Most of LEDs generate high intensity light even when they are dimmed. If LED generate high intensity light, it is classified as laser and these LEDs must have appropriate marking. Combination of many mid power LEDs or even low power LEDs with optics can be very dangerous, because optics can focus beam. Looking into LEDs beam is unhealthy and may cause irreversible effects to eye's retina. Never look into the beam without protection glasses with appropriate filter. Additionally LEDs light change intensity almost immediately. If people are photosensitive, LED light may be a trigger to epileptic seizures and alter the perception, especially when light intensity changes very fast with some frequency. 230V AC LED modules flicker at the frequency of 100Hz.

230V AC LED modules are connected directly to high voltage. It is very dangerous, so installation, modification, repair, maintenance and disassembly of these modules must be made by qualified person with appropriate certificates that allow to do such things. All connection and wiring must fulfill all current and valid national standards and requirements. Do not touch modules connectors and wires when power supply is turned on and before you make sure that there is no high voltage. If LED modules, wires and connectors are damaged, turn off power supply immediately. Wrong installation and damages may cause overheating, short circuit, electrical shock etc. In worst cases it can cause fire or generation of fumes. Modules without polyurethane aren't designed to be used in high humidity environment like bathrooms, baths, pools, outdoors etc. We are not responsible for any losses, or damage caused by improper use of LED modules! Guarantee becomes void in such cases.



PROTECTION MEASURES AGAINST DAMAGE

LED modules are delicate, and can be damaged even with small mechanical stresses. Especially sensitive parts are LEDs. Such stresses should be avoided. If it is impossible, it should be kept to minimum and LED module should be inspected before use if such situation occur. Mechanical stresses like pressure, bending, breaking, drilling, etc. may cause irreversible damage. Damaged LED modules aren't suitable for use.

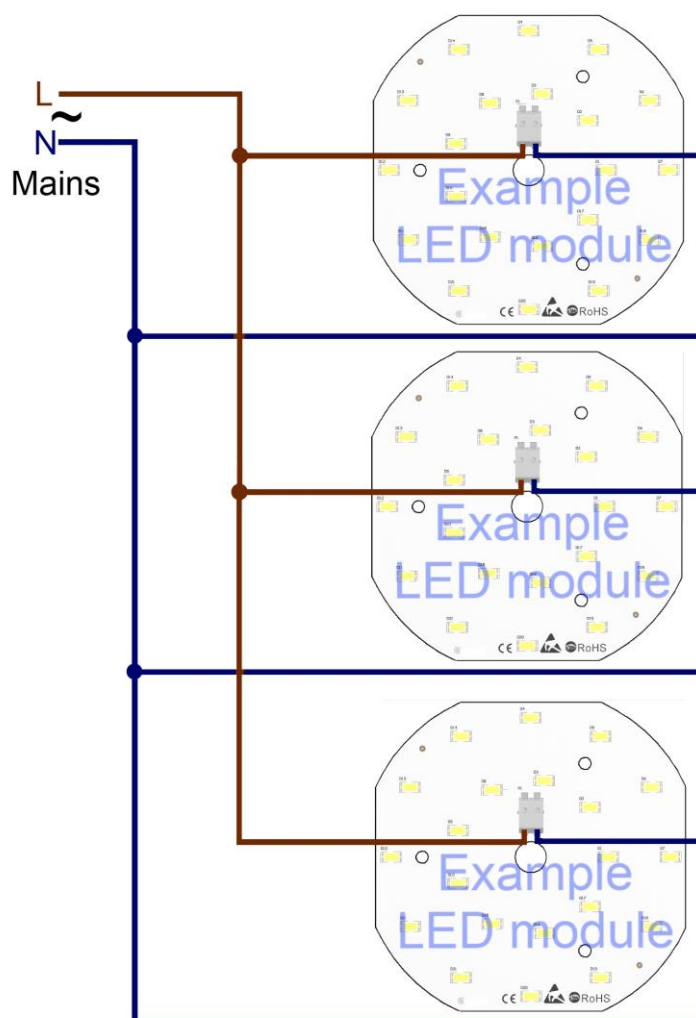
Serious threat to LED modules is electrostatic discharge. Human body generate very high electrostatic voltage. Such voltage decreases significantly lifetime of LEDs and in worst case may destroy electronic components or whole LED module. Best way to avoid damages caused by electrostatic discharge is use of electrostatic protection. Do not touch electronic components.

Additionally LED modules can be damaged by chemical substances. Depends of type of chemical substances the damage may be different. It is important not to use chemical substances like acids, sulphur compounds, alkalis, solvents, oils etc. We are not responsible for any loss, or damage resulting from improper use of modules! Guarantee become void in such cases.

Do not operate LED modules, when they aren't working properly. If modules are working incorrectly, turn off power supply. Damaged LED modules may cause electric shock or short circuit. LED modules should be disposed safely.

CONNECTIONS

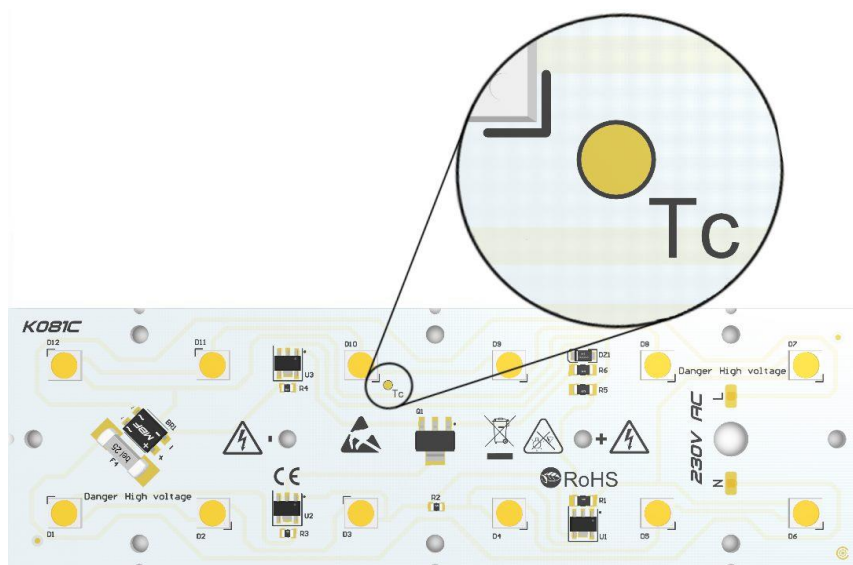
Use of few 230V AC LED modules allows to create complex lighting without big effort. Advantage of these modules is direct connection to mains without need of additional power supply unit. Mains voltage should be checked before connecting 230V AC LED module. We are not responsible for any loss, or damage resulting from improper mains voltage, overvoltage or surges! Guarantee become void in such cases.

WIRING DIAGRAM FOR 230V AC LED MODULES (ONLY PARALLEL WIRING)

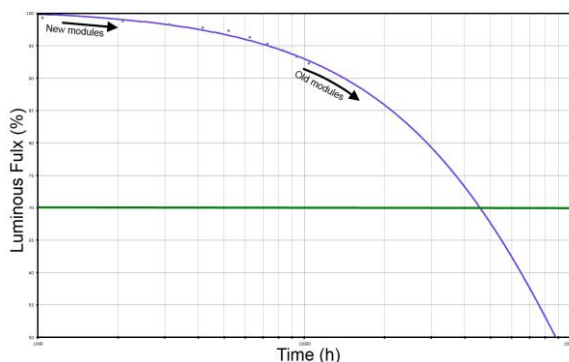
230V AC LED modules can be connected only in parallel. Series connection is unacceptable. We are not responsible for any loss, or damage resulting from improper connections! Guarantee become void in such cases. Above connection is examples and may be different from the actual.

COOLING

LED modules produce heat. 230V AC LED modules aren't self-cooling and additional heat-sink is required. Power of LED Module in higher temperatures may be lower than nominal and overheating LED Module can flicker or even turn off. Lifetime of LEDs decreases with the rise of temperature and luminous intensity in higher temperatures may be lower than nominal. Construction of the lamp or any place of installation should ensure correct heat dissipation from LED module. The lifetime of the module depends on operating temperature and used LEDs. Overheat can damage or destroy some elements or entire LED modules. Never use overheated module again as it may be damaged and can cause losses or even fire. We are not responsible for any loss, or damage resulting from overheating! Guarantee become void in such cases.



Temperature test point (T_c) for measurement is usually localized in the middle of the board near LED's thermal pad. The temperature at the T_c point can be measured with thermocouple or simple temperature probe. Example of T_c point is shown on the photo above. If the module is potted, temperature should be measured on the edge of the board. If temperature at T_c will be lower than 65°C , the value of luminous flux shouldn't be less than 80% of its nominal value after 50.000h.



Most common problem using new modules in old installation is difference in brightness of modules. This is result of luminous flux degradation over time of use. Degradation is normal effect and applies to all LEDs. This effect is different for each LED and can be only predicted by testing and estimation. It is complicate issue that mostly depends on temperature and current. Good solution to this problem is reduction of current in new modules, but degradation will be different for new and old modules. Above characteristic is examples for LEDs in temperature above 100°C and may be different from the actual.

STANDARDS AND DIRECTIVES

In the process of designing and manufacturing the following standards and directives were taken into account:

- 2014/30/EU– EMC Directive: on the harmonisation of the laws of the Member States relating to electromagnetic compatibility
- 2011/65/EC – RoHS Directive: restriction of hazardous substances in electrical and electronic equipment
- DIN IEC 62031:2008 – Safety requirements for LED modules
- EN 60598-1:2008 and A11:2009 – General requirements and tests for luminaires
- EN 62031:2008 – LED modules for general lighting – safety specifications.
- EN 55015:2013 – Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment.
- EN 61000-3-2:2014 – Electromagnetic compatibility (EMC) – Part 3-2 Limits for harmonic current emissions.
- EN 61000-3-3:2013 – Electromagnetic compatibility (EMC) – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current $\leq 16A$ per phase and not subject to conditional connection.
- EN 61547:2009 – Equipment for general lighting purposes – EMC immunity requirements.
- EN 60598-1:2011 – Luminaires – Part 1: General requirements and tests.
- EN 60335-1:2012 – General lighting solutions – house hold.
- EN 62471:2010 – Photo-biological safety of lamps and lamps systems
- EN 61347-1:2015-09 – General and safety requirements
- EU Regulation No: 874/2012 – Energy labelling of electrical lamps and luminaries

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Subject to technical changes and errors.

