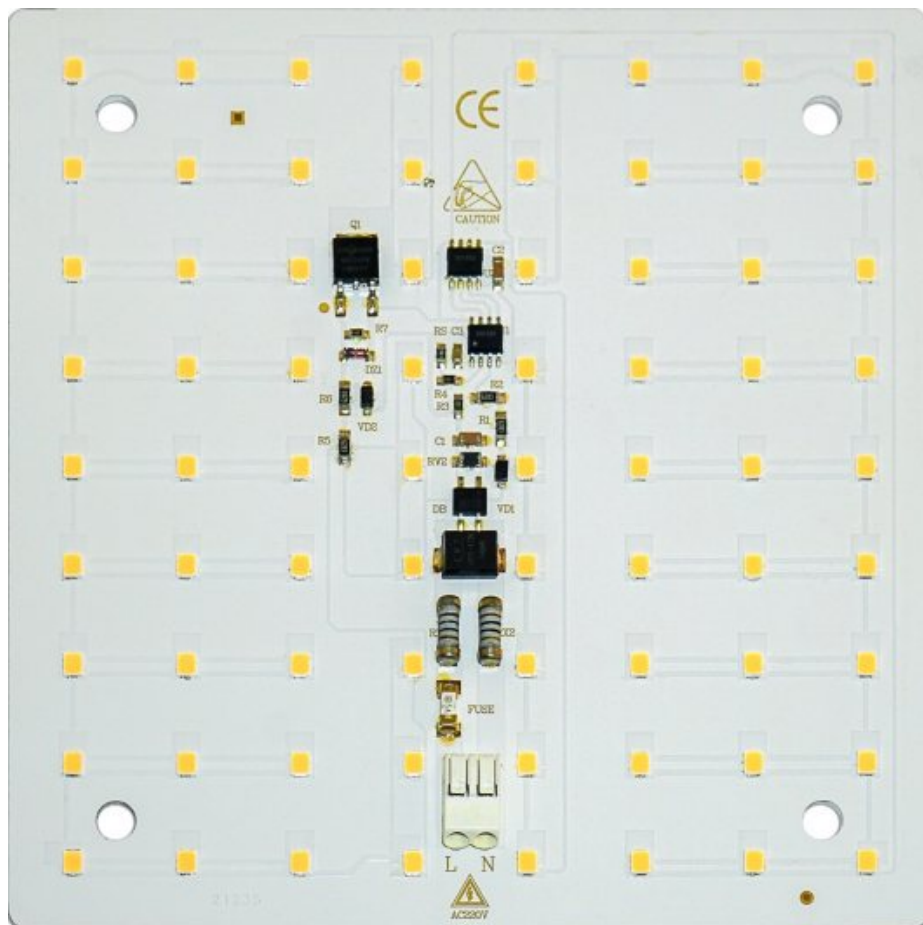


MANKUN

DOB Driverless LED Module AC 220V ~ 240V



Introduction to this guide

AC 220V ~ 240V 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.

Module Type	21235
LED Quantity	72 pcs
Dimension	130x130 mm
Input Voltage	~230V AC
Typical Power Consumption	30 W
Viewing Angle	115°
Material Thickness	1,5 mm
Cable Connection	0.2...0.75 mm ² / 24...18 AWG
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.

Technical data

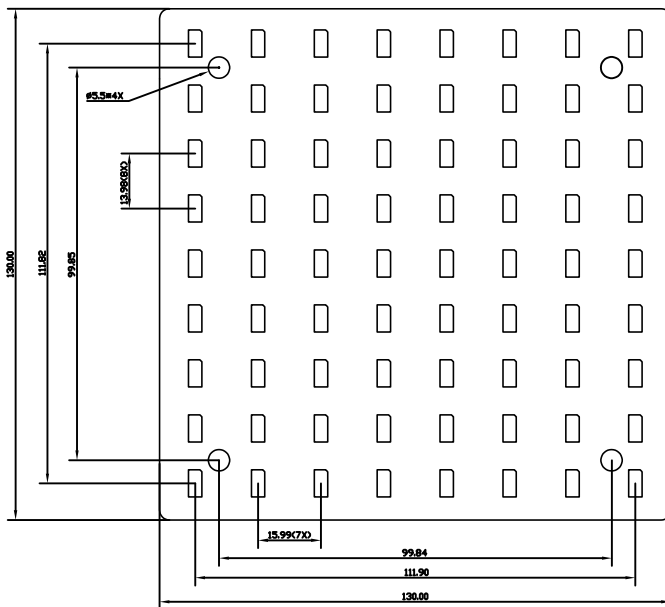
- Rigid board LED module
- Input voltage: AC 230V, 50–60 Hz
- Power factor: > 0.97
- Efficacy of the module up to 123 lm/W
- Colour temperatures 2700K, 3000K, 4000K, 5000K
- High colour rendering index CRI > 80
- On-board push-in terminals (WAGO 2060)
- Low Total Harmonic Distortion THD<15%
- Heat-sink required to preserve nominal power
- Small colour tolerance
- Small luminous flux tolerances
- Direct connection to mains
- Simple installation
- Life-time of 50,000 hours or more
- 2-year guarantee

Typical applications

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

Website

<http://www.led-module.cn/prol291>



Specific technical data

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

Module Model	CRI>80	CCT(K)	LED Specifications	Power (W)	Luminous Flux at Tp=25°C (Lm)	Efficacy at Tp=25°C (Lm/w)	Imax Voltage(V)	Luminous Flux at Tp=65°C (Lm)	Efficacy at Tp=65°C (Lm/w)
AC230V-72D-21168	82	2700	L1282780XXXXXXXX	30.5	3751	123	AC220V	3660	120
		3000	L1283080XXXXXXXX		3873	127		3843	124
		4000	L1284080XXXXXXXX		3965	130		3873	127
		5000	L1285080XXXXXXXX		3965	130		3873	127
AC230V-72D-21168	82	2700	L1282780XXXXXXXX	30.5	3660	120	AC230V	3568	117
		3000	L1283080XXXXXXXX		3843	124		3690	121
		4000	L1284080XXXXXXXX		3873	127		3843	124
		5000	L1285080XXXXXXXX		3873	127		3843	124
AC230V-72D-21168	82	2700	L1282780XXXXXXXX	30.5	3538	116	AC240V	3446	113
		3000	L1283080XXXXXXXX		3660	120		3568	117
		4000	L1284080XXXXXXXX		3751	123		3660	120
		5000	L1285080XXXXXXXX		3751	123		3660	120

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

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

Value of these parameters were calculated for default bin and with tolerances of 15%. Please contact us before ordering for more information.

Parameters shown in table above are default for temperatures TJ=25°C and TJ=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.

AC 230V 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.

Photometric characteristics

Coordinates and tolerances according to CIE 1931

MacAdam Ellipse: 3SDCM

Production of LEDs with exactly the same colour temperature is almost impossible. LEDs with similar colours are divided into bins.

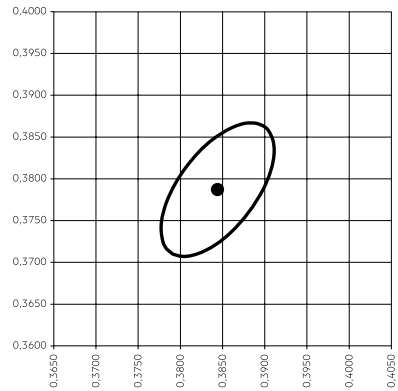
MacAdam Ellipses are used to describe differences in colour of LEDs with same bin. When most people can't see differences in colours, these LEDs are in first step level of MacAdam Ellipse (1SDCM).

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 $\pm 30K$ in 1SDCM. If bin is in 4SDCM, then colour differences should be less than $\pm 100K$.

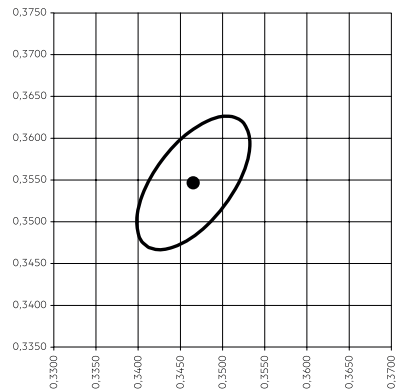
LEDs with smaller number of SDCM are better but most common LEDs are in 4th to 7th step level, in other words human eyes certainly can see colour differences in LEDs that are ostensibly the same colour. In most of our projects we use LEDs in 3rd step level of MacAdam Ellipse.

4000K 3SDCM



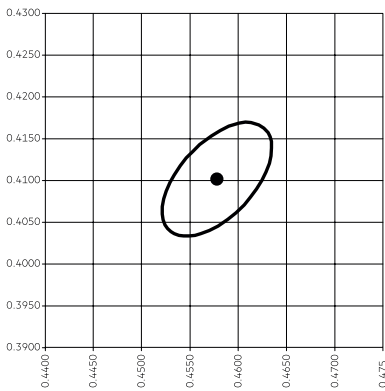
— MacAdam Ellipse: 3SDCM

5000K 3SDCM



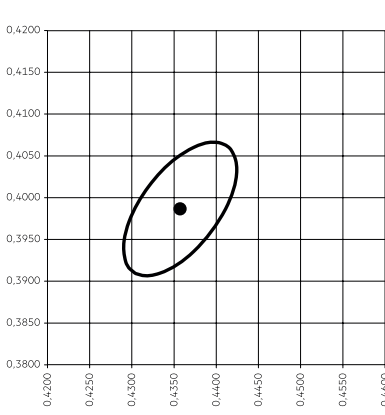
— MacAdam Ellipse: 3SDCM

2700K 3SDCM



— MacAdam Ellipse: 3SDCM

3000K 3SDCM



— MacAdam Ellipse: 3SDCM

Security

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 photo-sensitive, LED light may be a trigger to epileptic seizures and alter the perception, especially when light intensity changes very fast with some frequency. AC230V LED modules flicker at the frequency of 100Hz.

AC 230V 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 overheat, 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.

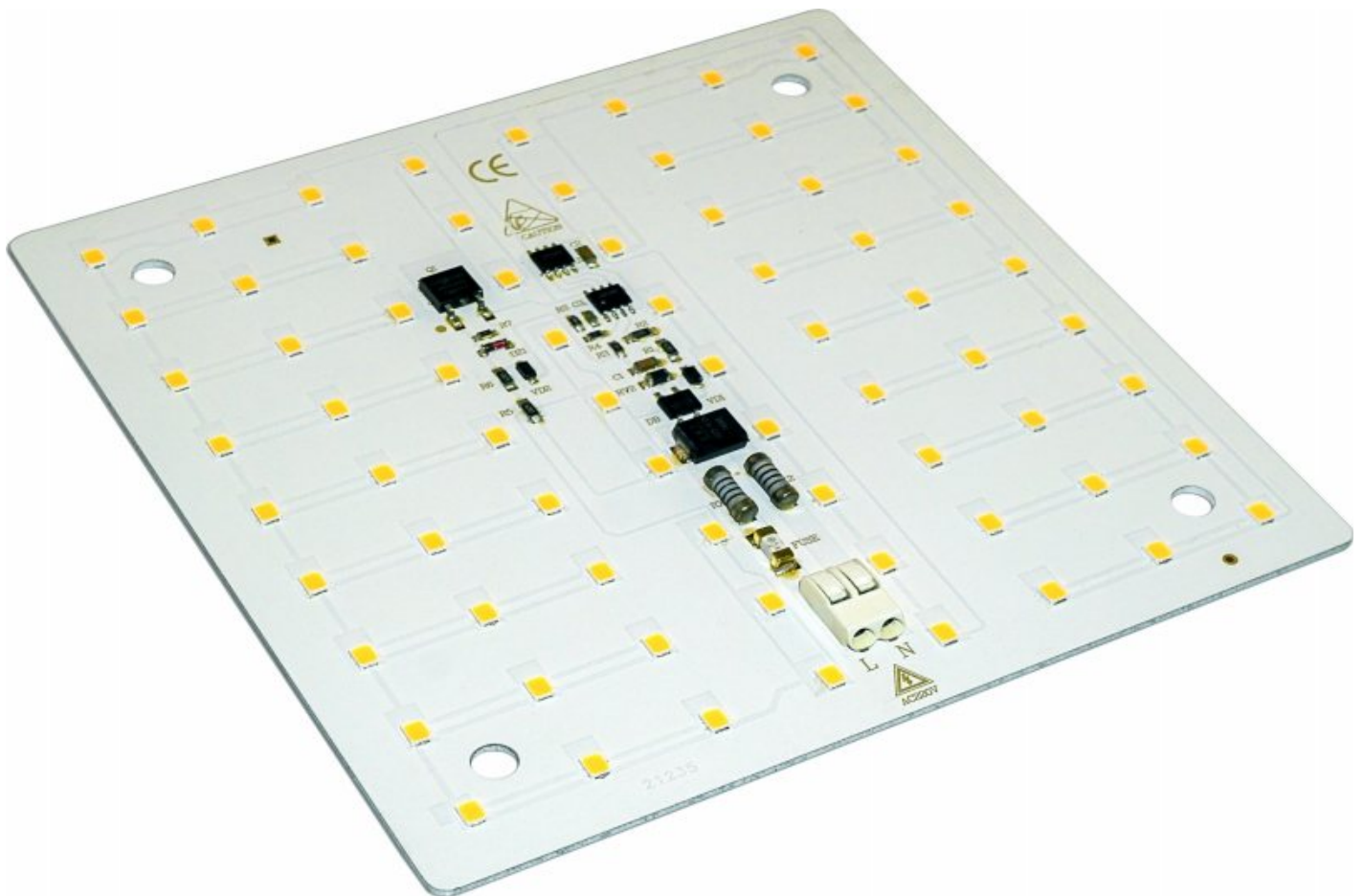
Protection measures against damage

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.

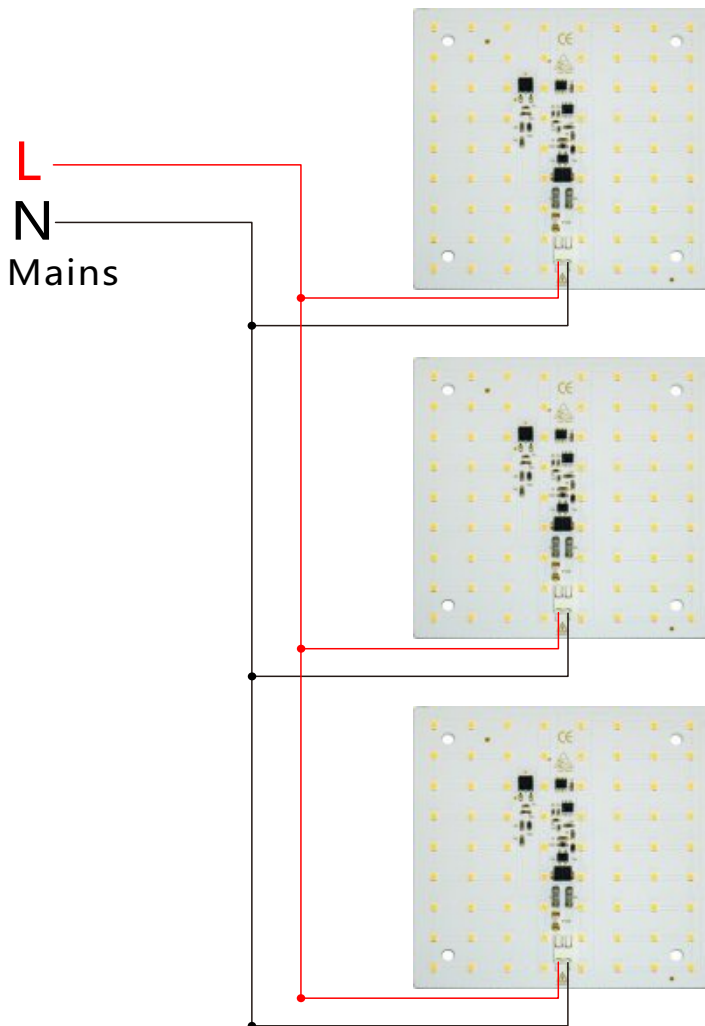
Do not operate LED modules, when they aren't working properly. If modules are working incorrectly, turn off power supply. Damaged LED modules may cause electric shock or short circuit. LED modules should be disposed safely.



Wiring example

Use of few AC 230V 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 AC 230V 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 AC 230V LED Modules(only parallel wiring)



AC 230V 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.

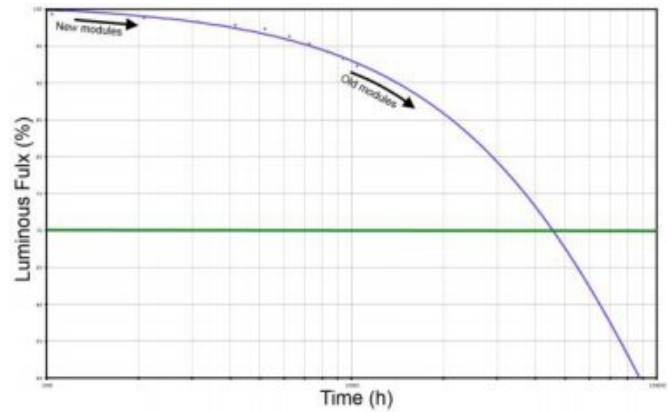
Regarding heat dissipation

LED modules produce heat. AC 230V 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 (Tc) for measurement is usually localized in the middle of the board near LED's thermal pad. The temperature at the Tc point can be measured with thermocouple or simple temperature probe.

This module doesn't have Tc point. If the module is potted, temperature should be measured on the edge of the board. If temperature at Tc 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:

- 2004/108/EC – EMC Directive: 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 ≤ 16A per phase and not subject to conditional connection.
- EN 61547:2009 – Equipment for general lighting purposes – EMC immunity requirements.
- EN 62471:2010 – Photobiological safety of lamps and lamp systems.
- EN 60598-1:2011 – Luminaires – Part 1: General requirements and tests.
- EN 60335-1:2012 – General lighting solutions – house hold.
- EN 62471:2008 – 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