



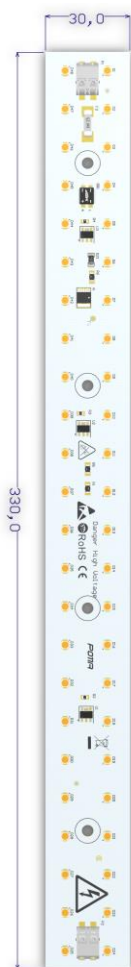
L0-330030-xxx-A0230-P011



**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.

<b>LED Type</b>	OSRAM S5 - GW PSLR31
<b>LED Quantity</b>	48 pcs
<b>Dimension</b>	330x30 mm
<b>Input Voltage</b>	~230 V AC
<b>Typical Power Consumption</b>	16 W
<b>Viewing Angle</b>	120°
<b>Material Thickness</b>	1,5 mm
<b>Cable Connection</b>	ADELS 351102
<b>Max Ambient Temperature</b>	45°C
<b>CRI</b>	>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 142 lm/W
- Rigid board LED module
- Viewing angle at 50% I<sub>v</sub>: 120°
- High colour rendering index CRI >80
- Power factor >0,97
- Low Total Harmonic Distortion THD <15%
- Efficiency >90%
- 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<sub>J</sub> = 25°C AND T<sub>J</sub> = 65°C

Power [W]	CCT [K]	Typ. CRI	Luminous Flux* [lm]	Module Efficacy* [lm/W]	Luminous Flux** [lm]	Module Efficacy** [lm/W]	Article Number
9,8	2700	82	1201	123	1122	114	L0-330030-827-A0230-P011
		92	1092	111	1021	104	L0-330030-927-A0230-P011
	3000	82	1293	132	1209	123	L0-330030-830-A0230-P011
		92	1177	120	1100	112	L0-330030-930-A0230-P011
	4000	82	1391	142	1300	133	L0-330030-840-A0230-P011
		92	1266	129	1183	121	L0-330030-940-A0230-P011
	5000	82	1391	142	1300	133	L0-330030-850-A0230-P011
11,7	2700	82	1414	121	1321	113	L0-330030-827-A0230-P011
		92	1286	110	1202	103	L0-330030-927-A0230-P011
	3000	82	1523	131	1423	122	L0-330030-830-A0230-P011
		92	1386	119	1295	111	L0-330030-930-A0230-P011
	4000	82	1638	141	1531	131	L0-330030-840-A0230-P011
		92	1491	128	1393	119	L0-330030-940-A0230-P011
	5000	82	1638	141	1531	131	L0-330030-850-A0230-P011
14	2700	82	1670	120	1561	112	L0-330030-827-A0230-P011
		92	1520	109	1420	102	L0-330030-927-A0230-P011
	3000	82	1799	129	1681	121	L0-330030-830-A0230-P011
		92	1637	117	1530	110	L0-330030-930-A0230-P011
	4000	82	1935	139	1808	130	L0-330030-840-A0230-P011
		92	1761	126	1646	118	L0-330030-940-A0230-P011
	5000	82	1935	139	1808	130	L0-330030-850-A0230-P011

\* - Parameters were calculated for temperatures T<sub>J</sub>= 25°C

\*\* - Parameters were calculated for temperatures T<sub>J</sub>= 65°C

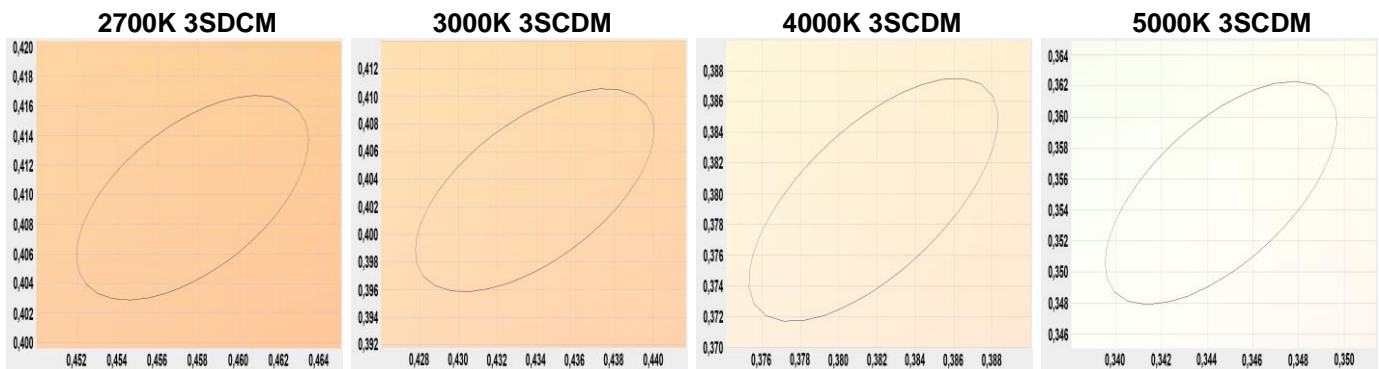
Value of these parameters were calculated for default bin and with tolerances of 15%.

Please contact us before ordering for more information.

Parameters shown in table above are default for temperatures T<sub>J</sub>=25°C and T<sub>J</sub>=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.

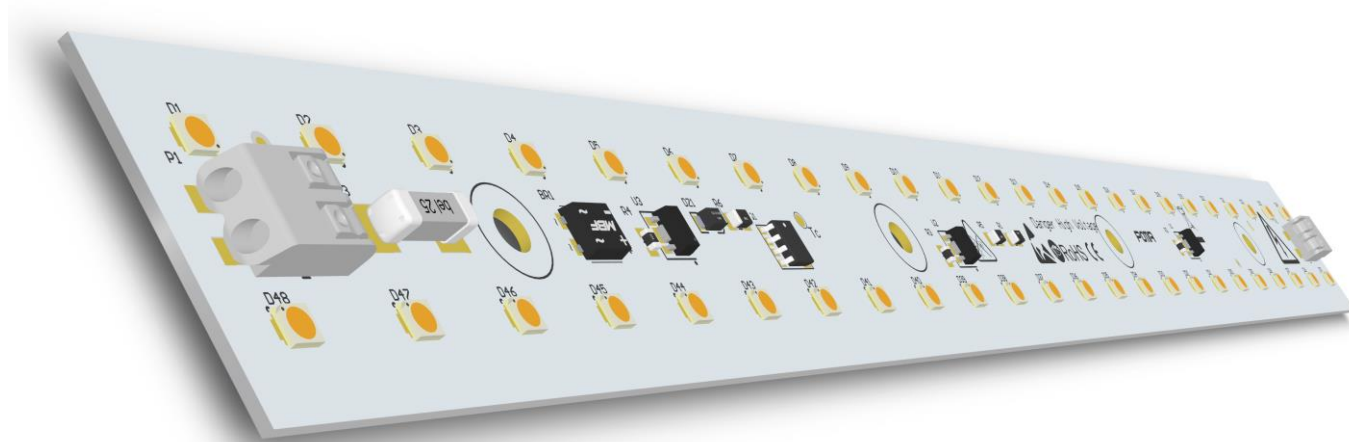
**MACADAM ELLIPSE**

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  $\pm 30K$  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 4<sup>th</sup> to 7<sup>th</sup> 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 3<sup>rd</sup> 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 overhear, 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.

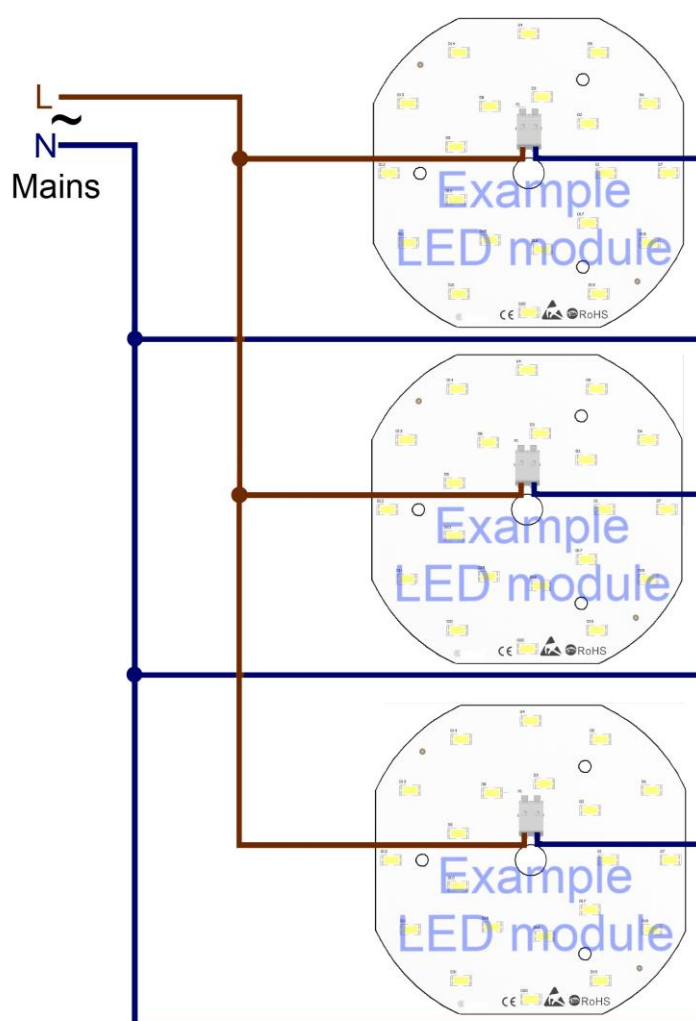
Serious threat to LED modules is electrostatic discharge. Human body generate very high electrostatic voltage. Such voltage decreases significantly lifetime of LEDs and in worst case may destroy electronic components or whole LED module. Best way to avoid damages caused by electrostatic discharge is 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. Modules can be operated using a TRIAC Dimmer. Thanks to dimmer it is possible to reduce the light intensity. Lower light intensity is safer for people with photosensitivity. While choosing a dimmer it is important to check max power of modules which are to be connected, their overall power determine the selection. We are not responsible for any loss, or damage resulting from improper selection of dimmers! Guarantee become void in such cases.

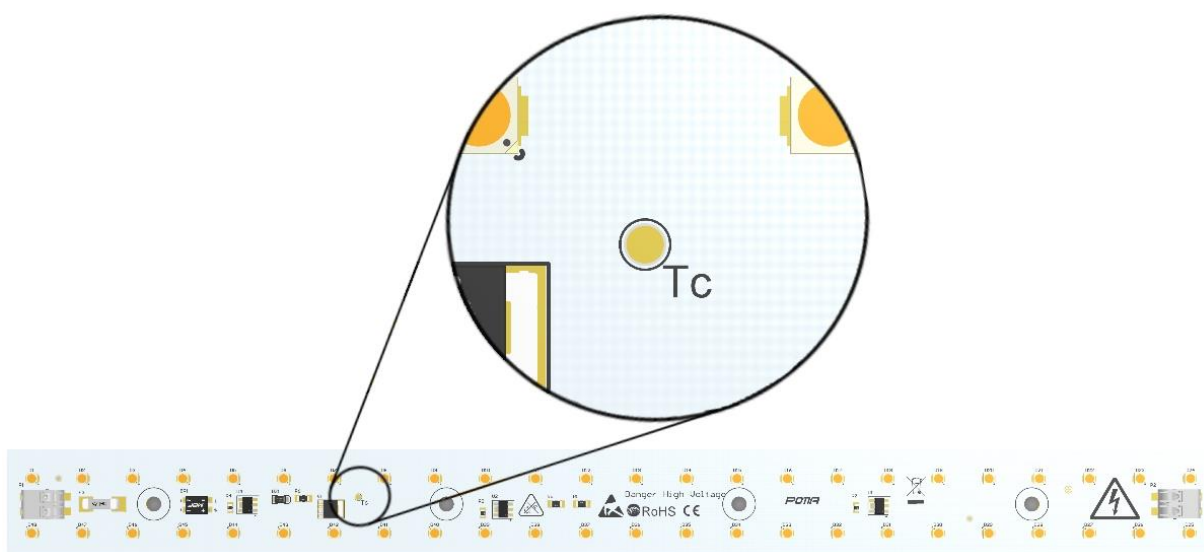
**WIRING DIAGRAM FOR 230V AC LED MODULES (ONLY PARALLEL WIRING)**

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.

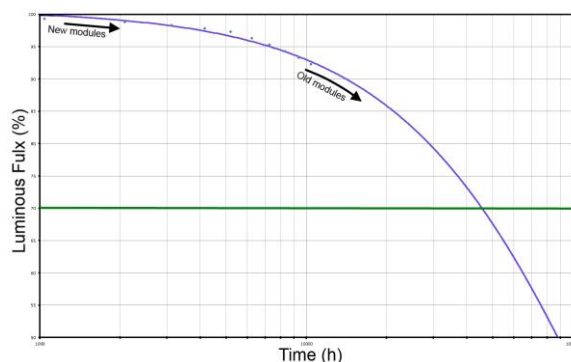


**COOLING**

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.

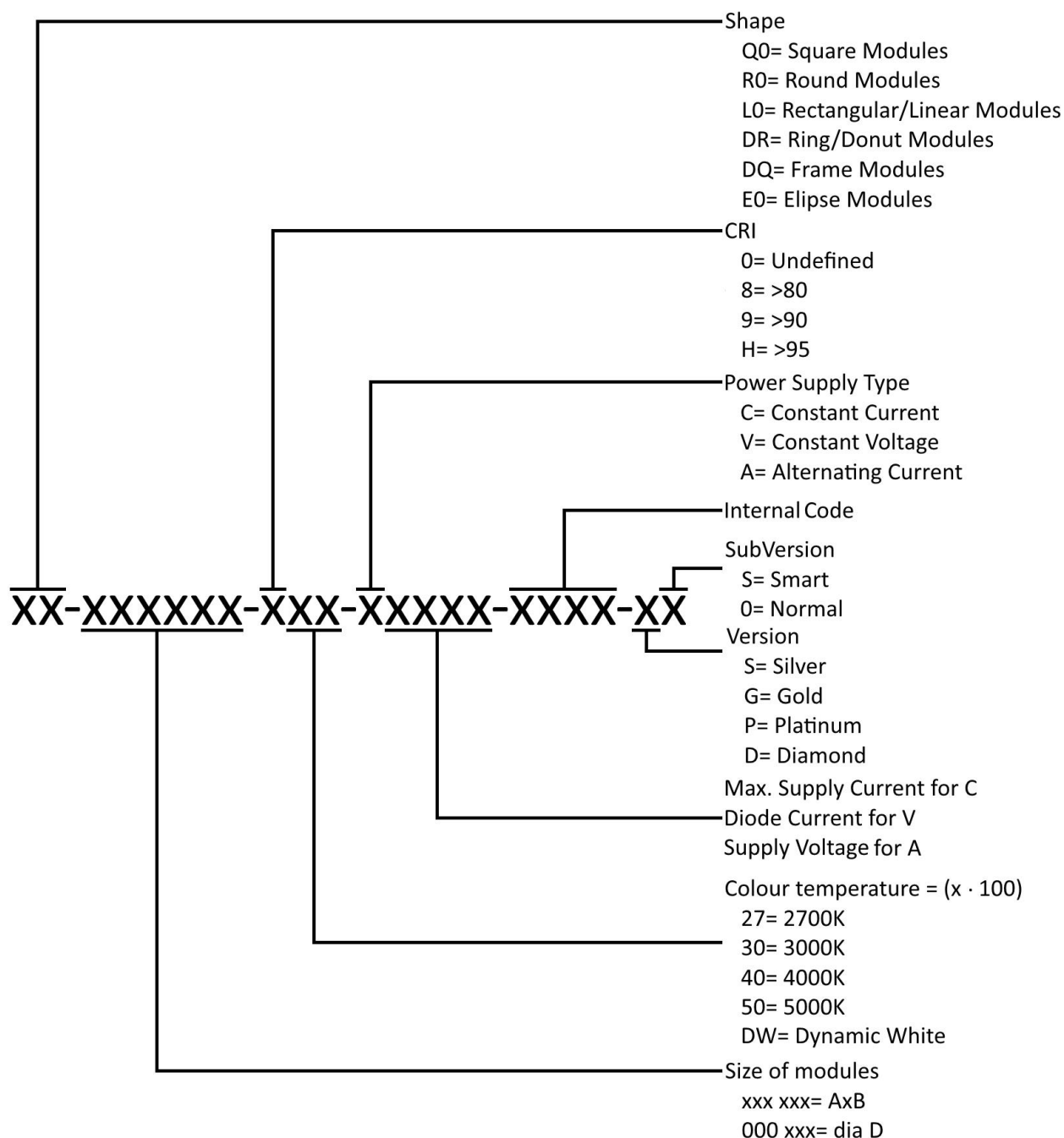


Temperature test point ( $T_c$ ) for measurement is usually localized in the middle of the board near LED's thermal pad. The temperature at the  $T_c$  point can be measured with thermocouple or simple temperature probe. Example of  $T_c$  point is shown on the photo above. If the module is potted, temperature should be measured on the edge of the board. If temperature at  $T_c$  will be lower than  $65^{\circ}\text{C}$ , 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  $100^{\circ}\text{C}$  and may be different from the actual.

## DESCRIPTION OF ARTICLE NUMBER



Above description of article number is standard for white modules, but it may be different. If modules doesn't have any version or subversion, than last two position are skipped.



**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  $\leq 16A$  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

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Subject to technical changes and errors.

