



# SANNA AC FF



## SANNA AC

FLICKERFREE

12W | 20W

*Round LED-module for lightings with opalized glass  
in professional fixtures*

*No driver is required*



## Key features

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The LED module is named SANNA and it is designed for mid-sized lightings with opalized glass. It can be used for ceiling lamps or wall lamps, as well as bigger pendulums.

### Key features

- Made for mid-sized lightings with opalized glass.
- Even light distribution
- No need for a driver
- Integrated cover
- Simple integration
- Flickerfree





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Datasheet SANNA AC FlickerFree

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## Introduction

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### Sanna package

The solution is developed to make it easy for the designers and engineers, with double connectors for wires and a hole for center mounting it is well equipped for flexible and safe mounting.

### 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.



## Short form Characteristics

MECHANICAL	12W version	20W version
Module dimension with cover	158.5 mm diameter	
Weight	TBD	
Assembly holes	6 x M3	
Wire connector	Poke in	
ELECTRICAL		
Power	12W +/- 10%	20W +/- 10%
Input voltage	230VAC	
Input voltage range	220-240VAC	
Power factor	0.98	
Total harmonic distortion	<15%	
Type of current	AC	
Surge protection	1500V	
Fast transient burst	2000V	
Over temp. protection	150°C	
Energy class	A+	
Inrush Current		
PHOTOMETRICAL		
Flux nominal	1300 lm	2400 lm
Efficiency	>115lm/W	
Number of LED's	90	
Rendering index	>Ra80 >Ra90*	
SDCM (Mac Adam)	3	
Flicker percent	<10%	
Flicker index	0.0206	
Spread angle lens	130°	
Colour temperatures	2700K, 3000K, 4000K	
ENVIRONMENTAL		
Temperature range	-40°C to 65°C (Absolute maximum temp Tc 65°C)	
Relative Humidity	10-75%	
Ambient air pressure	500-1060 hPa	
LIFE LENGHT		
Life length L70B10	>50 000h	

\*Specifications are valid for >Ra80.



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## Article number structure

Sanna AC.P.230.90.8yy-NN

AC	AC= 230VAC, ED=External Driver required, ID=Internal Driver
P	Power (Watt)
V	Voltage: 230VAC
N	Amount of LEDs
8	CRI: 8=Ra>80, 9=Ra>90
YY	CCT: 27 =2700K, 30 =3000K, 40 =4000K
NN	Viewing angle code
FF	Flickerfree version

## Article name and versions

ARTICLE NAME	POWER	CURRENT	LEDS	CRI	CCT	LENS
SANNA AC.12.230.90.830-130-FF	12	230	90	80	3000	130°
SANNA AC.12.230.90.840-130-FF	12	230	90	80	4000	130°
SANNA AC.12.230.90.927-130-FF	12	230	90	90	2700	130°
SANNA AC.12.230.90.930-130-FF	12	230	90	90	3000	130°
SANNA AC.12.230.90.940-130-FF	12	230	90	90	4000	130°
SANNA AC.20.230.90.830-130-FF	20	230	90	80	3000	130°
SANNA AC.20.230.90.840-130-FF	20	230	90	80	4000	130°
SANNA AC.20.230.90.927-130-FF	20	230	90	90	2700	130°
SANNA AC.20.230.90.930-130-FF	20	230	90	90	3000	130°
SANNA AC.20.230.90.940-130-FF	20	230	90	90	4000	130°

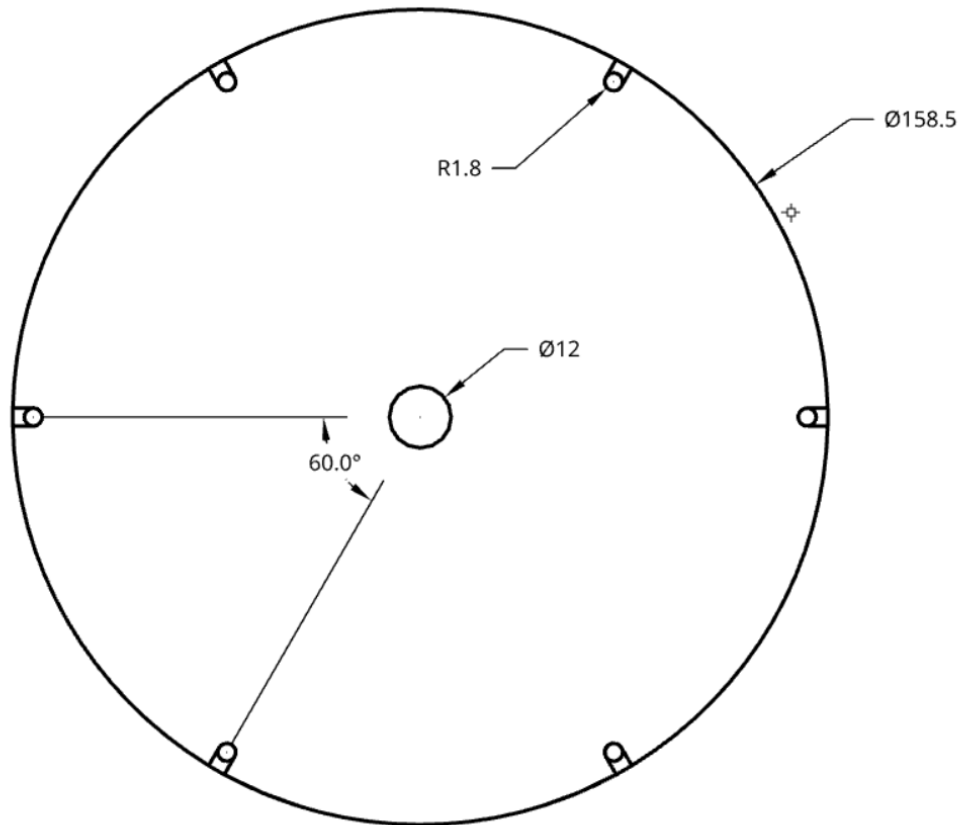
## Sanna AC – Packaging information

Description	Qty (pcs)	Dimension (cm)			GW (kg)
		Length	Width	Height	
Inner box	8	35.6	22.7	9.6	
Outer box	64	46.5	37.5	39.6	TBD

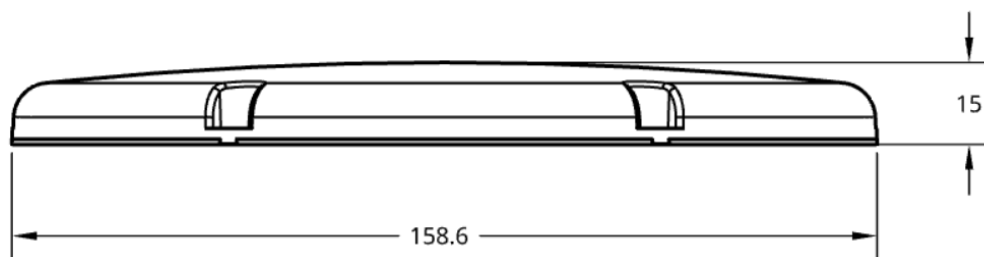


## Dimensions

### LED-module



### Bottom

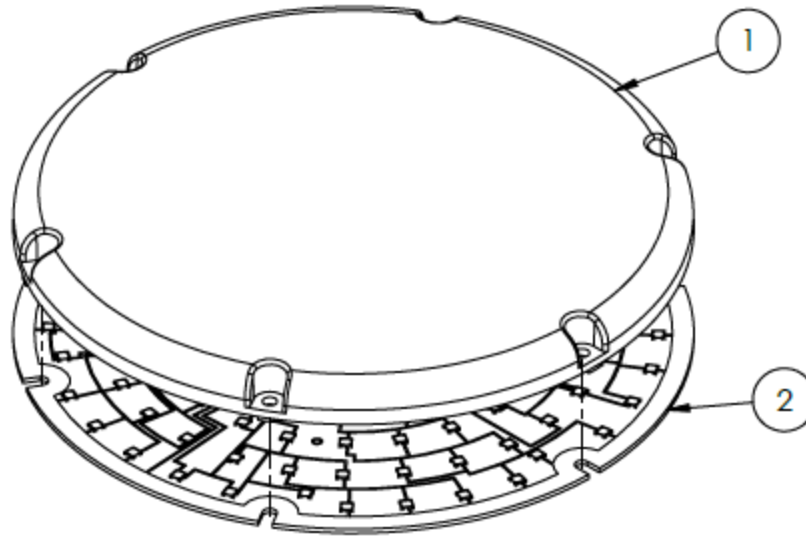


### Side

## Mounting instructions

### Mounting

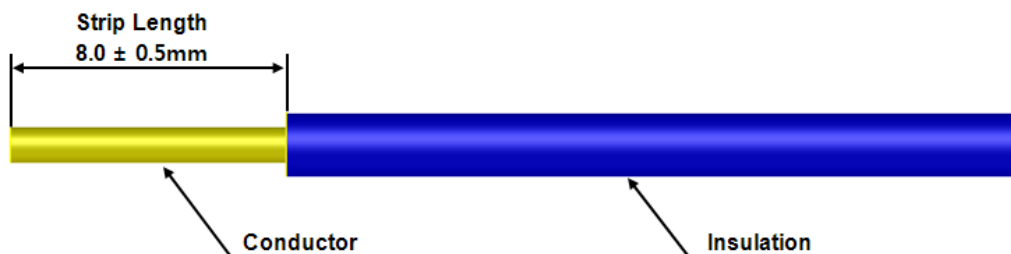
The LED module is to be fixated with M3 screws.



1. Sanna cover
2. Sanna PCB

### Wiring

Type of wire	AWG	mm <sup>2</sup>
Stranded	22-20	0.32-0.5mm <sup>2</sup>
Solid	24-18	0.51-1.02Ø (0.2-0.8mm <sup>2</sup> )
Insulation diameter	Max 2.1 mm	





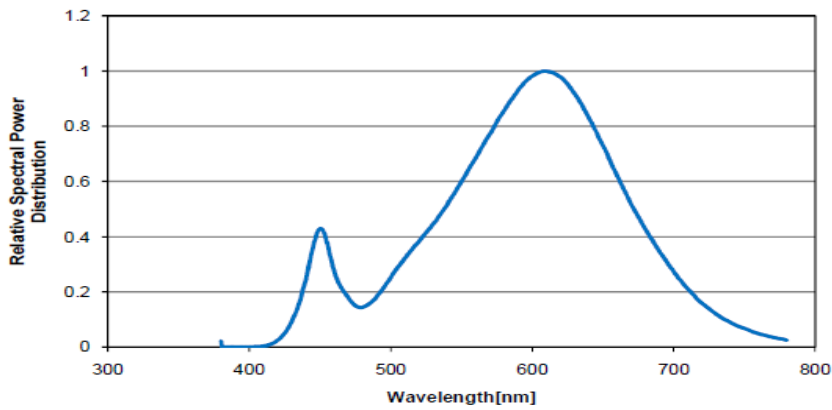
## Photometrical

### Flux

Parameter		Symbol	Value			Unit
			Min	Typ	Max	
Luminous Flux	12W	$\Phi_v$	1200	1300		lm
	20W	$\Phi_v$	2200	2400		lm
Correlated Colour Temperature	27*(2)	CCT		2700		K
	30*(2)	CCT		3000		K
	40*(2)	CCT		4000		K
CRI		$R_a$	80		89	-
		$R_a$	90			
Power		$P_o$		12		W
		$P_o$		20		W

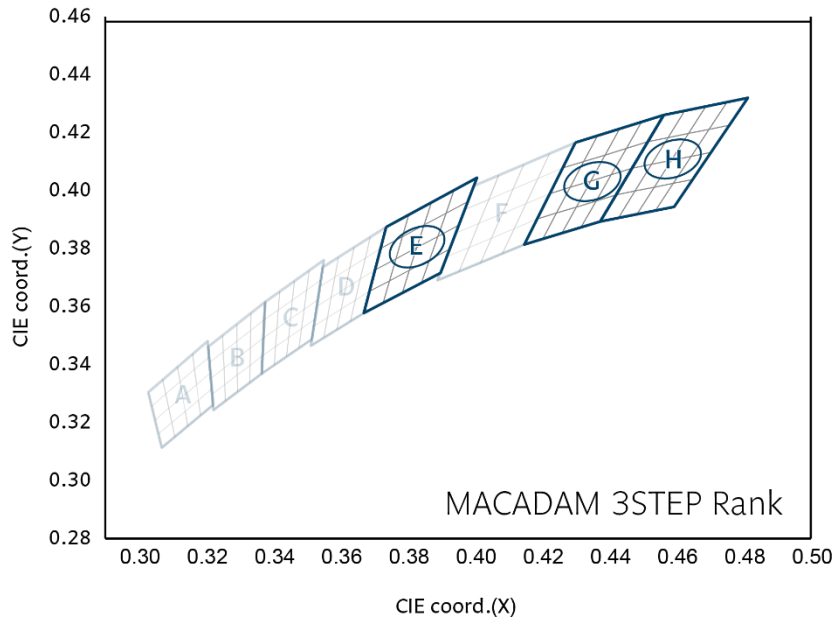
Electro-Optical characteristics LED module at 230VAC,  $T_A=25^\circ\text{C}$

### Colour Spectrum



## Binning 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)

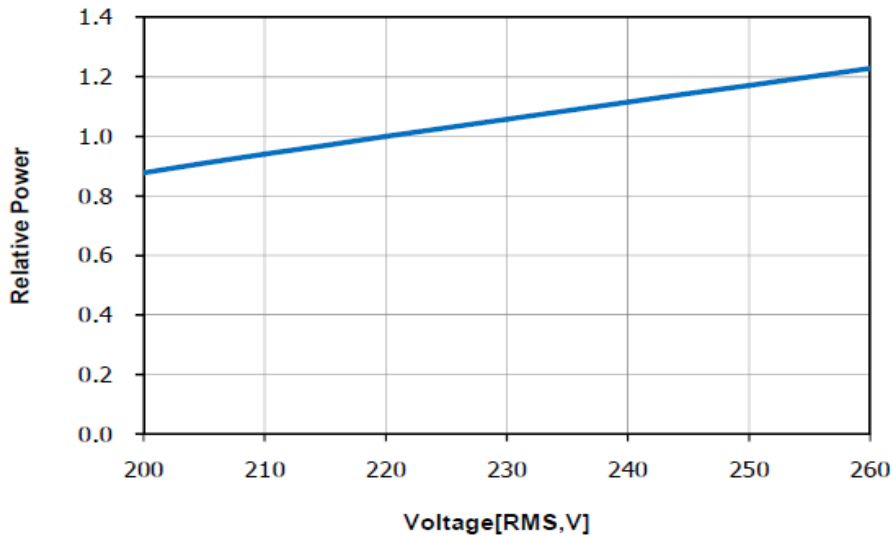
Colour Code	CCT
27	2700K
30	3000K
40	4000K



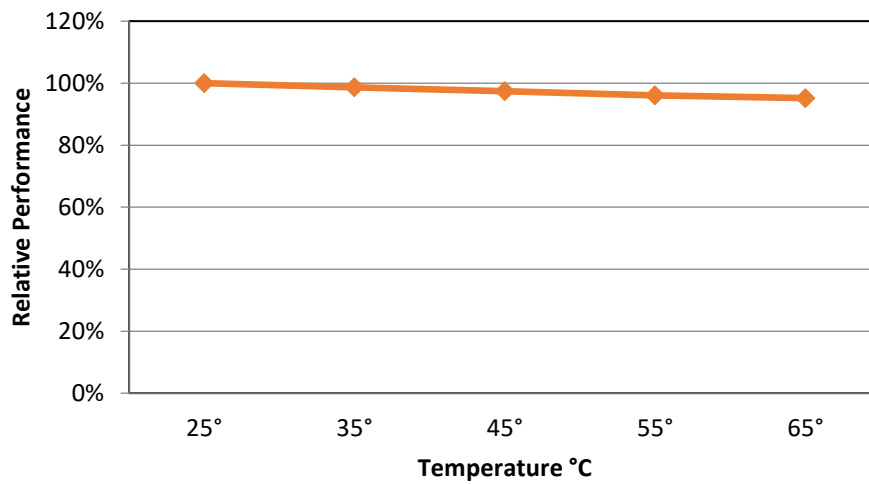
## Electrical Optical Data

### 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.



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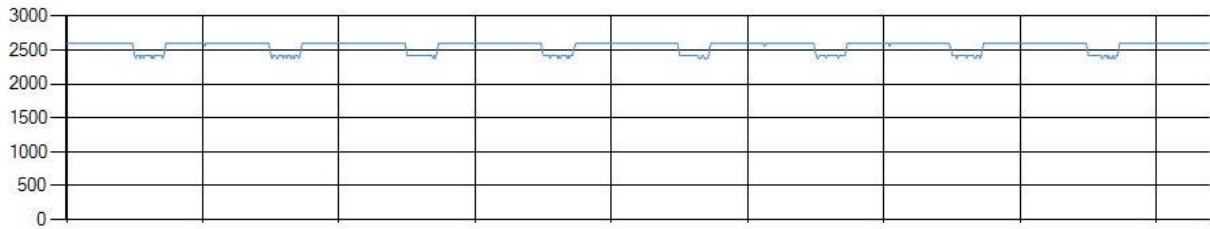
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## Flicker



### SANNA AC Flickerfree version

Flicker index	0.0206
Flicker Percent	5%
Max value	2824
Min value	2511



## Dimming references

Sanna158 AC.12.230.90.827-130.FF (1 unit per dimmer)

<i>Brand</i>	<i>Model</i>	<i>Max W</i>	<i>Min W</i>	<i>Min %</i>	<i>Flicker (perceived)</i>	<i>Noise</i>	<i>Comments</i>	<i>Score</i>
<i>Elko</i>	400GLI	14,10	0,80	6%	No	No	Start from 0 and no noise	5
<i>Niko</i>	310-0190X	11,60	0,10	1%	No	No	Depending of settings	4
<i>Vadsbo</i>	VD200	9,50	0,40	4%	Yes	No	Flicker in lower dim.	4
<i>Qlight</i>	Monodim 350	10,90	1,60	15%	No	No		5
<i>Dig trail edge</i>		11,00	0,10	1%	No	No		5
<i>Schneider</i>	SBD315RC	11,10	1,30	12%	No	No		5
<i>SG</i>	820320 LEDIM400	11,10	0,80	7%	No	No		5
<i>Elko</i>	315 GLE	10,90	1,40	13%	No	No		5
<i>Gira</i>	2262 00 / i01	14,00	0,70	5%	No	No		5
<i>Busch</i>	2247U	14,00	0,60	4%	No	No		5
<i>Q-light</i>	Duo touchdim	10,50	0,30	3%	No	No		5
<i>Q-light</i>	Zerodim 350	10,90	1,00	9%	No	No		5
<i>Ehmann</i>	T14.03.1	11,40	2,70	24%	No	No	Not enough dimming range	4
<i>V-com</i>	1-OR 2 WAY Dimmer switch	14,00	1,70	12%	No	No		5
<i>Vadsbo</i>	VD300	10,70	0,50	5%	No	No		5
<i>Eltako</i>	EUD12D-UC	14,60	0,20	1%	Yes	No	Flicker in small areas.	4
<i>Gelia</i>	EF700DC	10,60	4,40	42%	Yes	No	Flicker on full power and not enough dimming range	2
<i>Fuga</i>	506DA219	10,80	1,70	16%	Yes	No	Flickerer on highest level	2
<i>Fuga</i>	506DA109	11,00	1,30	12%	No	No		5

The Dimming references should only be considered a reference. To understand this table correctly, it is important to understand that sound or flicker should not occur in an application. It is important to understand that this is figures tested with standard dimmers and can only be considered as reference information. Please, always perform a test on the application in advance in its actual application. We don't take any responsibility for the changes, differences and updates of dimmers, LED engines and the performance etc. due to this.



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Sanna158 AC.12.230.90.827-130.FF (5 units per dimmer)

Brand	Model	Max W	Min W	Min %	Flicker (perceived)	Noise	Comments	Score
<i>Elko</i>	400GLI	70,00	0,90	1%	No	No		5
<i>Niko</i>	310-0190X	57,40	5,70	10%	No	No		5
<i>Vadsbo</i>	VD200	55,00	3,50	6%	No	No		5
<i>Qlight</i>	Monodim 350	55,10	5,30	10%	No	No		5
<i>Dig trail edge</i>		56,60	0,60	1%	No	No	Flicker in lower dim.	4
<i>Schneider</i>	SBD315RC	55,60	4,40	8%	No	No		5
<i>SG</i>	820320 LEDIM400	56,70	0,40	1%	Yes	No	Flicker in lower dim	4
<i>Elko</i>	315 GLE	55,00	3,80	7%	No	No		5
<i>Gira</i>	2262 00 / i01	69,90	0,20	0%	No	No		5
<i>Busch</i>	2247U	69,30	4,10	6%	No	No		5
<i>Q-light</i>	Duo touchdim	51,20	0,80	2%	Yes	No	Flicker	2
<i>Q-light</i>	Zerodim 350	55,60	1,00	2%	No	No		5
<i>Ehmann</i>	T14.03.1	44,30	6,30	14%	Yes	No		2
<i>V-com</i>	1-OR 2 WAY Dimmer switch	68,00	7,20	11%	No	No		5
<i>Vadsbo</i>	VD300	55,30	0,50	1%	No	No		5
<i>Eltako</i>	EUD12D-UC	65,70	0,20	0%	Yes	No	Partly flickering on the lower levels of dimming	3
<i>Gelia</i>	EF700DC	56,20	8,00	14%	No	No		5

The Dimming references should only be considered a reference. To understand this table correctly, it is important to understand that sound or flicker should not occur in an application. It is important to understand that this is figures tested with standard dimmers and can only be considered as reference information. Please, always perform a test on the application in advance in its actual application. We don't take any responsibility for the changes, differences and updates of dimmers, LED engines and the performance etc. due to this.

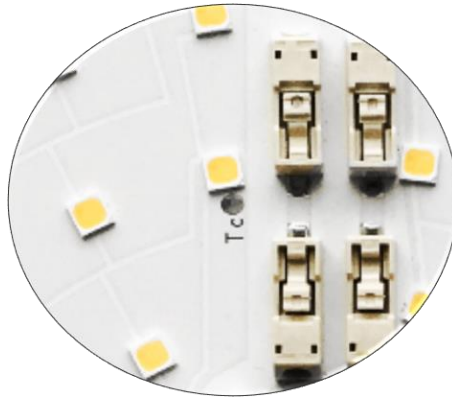
## Lifetime (Calculated)

### 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 Tc (measuring point). It is important not to exceed this recommendation.

Tc(Surface temperature)	Time for 70% light-output (L70B10)
65°C	>50 000 Hr



### Measurement Control

The recommended maximum value is 65°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.

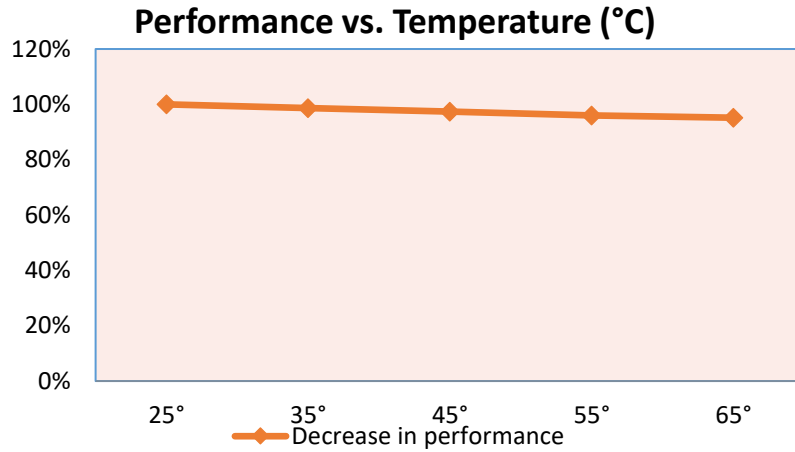
*The thermal connection is measured in temperature vs. Power.*

### Maximum Temperature

Secure the temperature in your application not to exceed 65°C. Read more in the section “Measurement control”.



### Temperature Characteristics



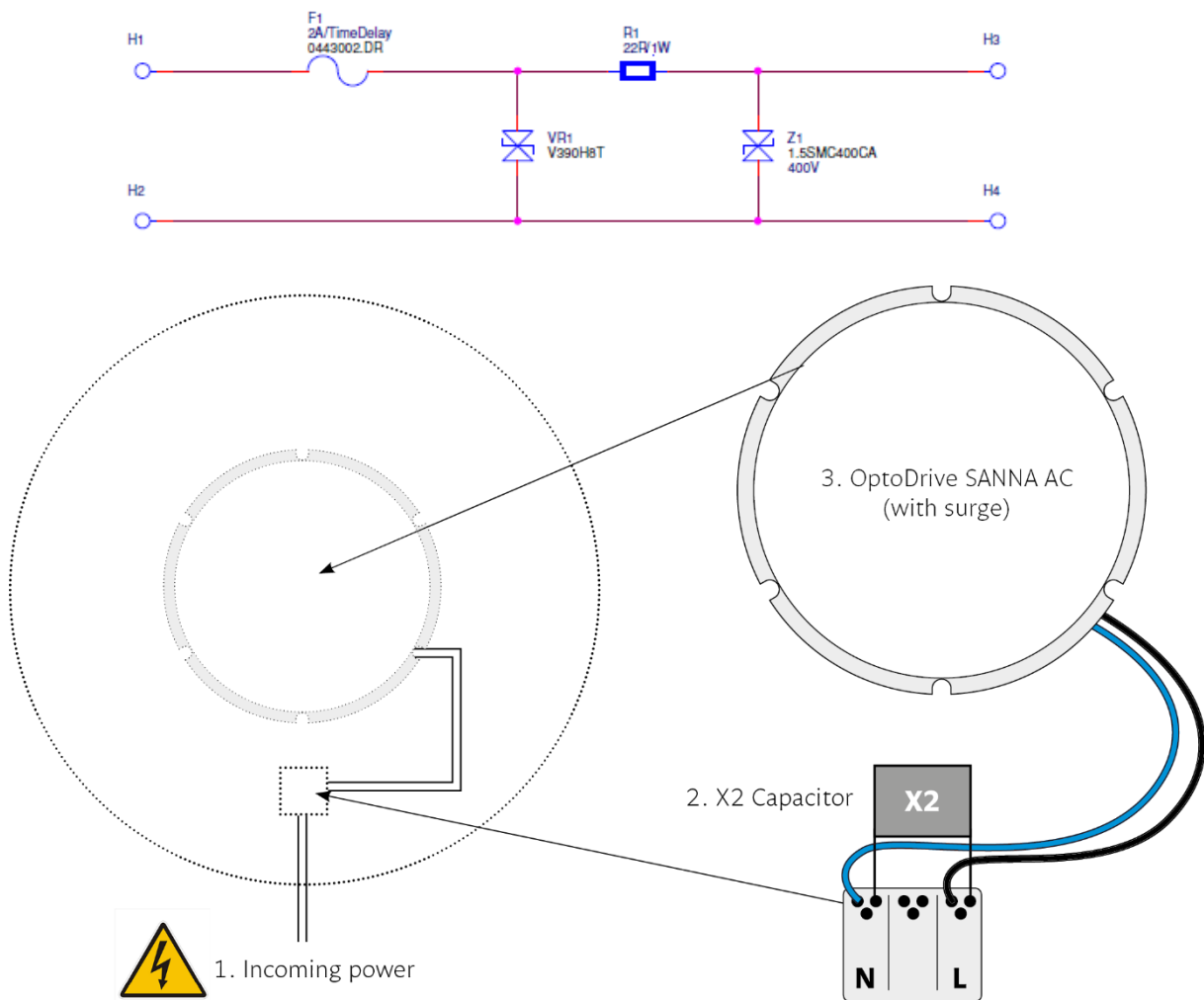
Consider the thermal capabilities of where the LED module is to be fitted. The temperature is an important factor for light output as well as for long time light output degradation.



## Surge

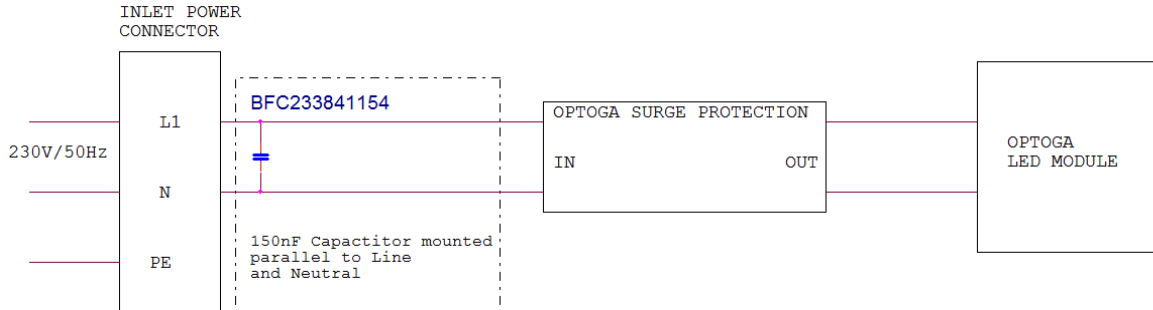
### Surge

This document specifies how to connect Optodrive AC modules to achieve long life installation both with Surge, Burst and other problematic installation questions:



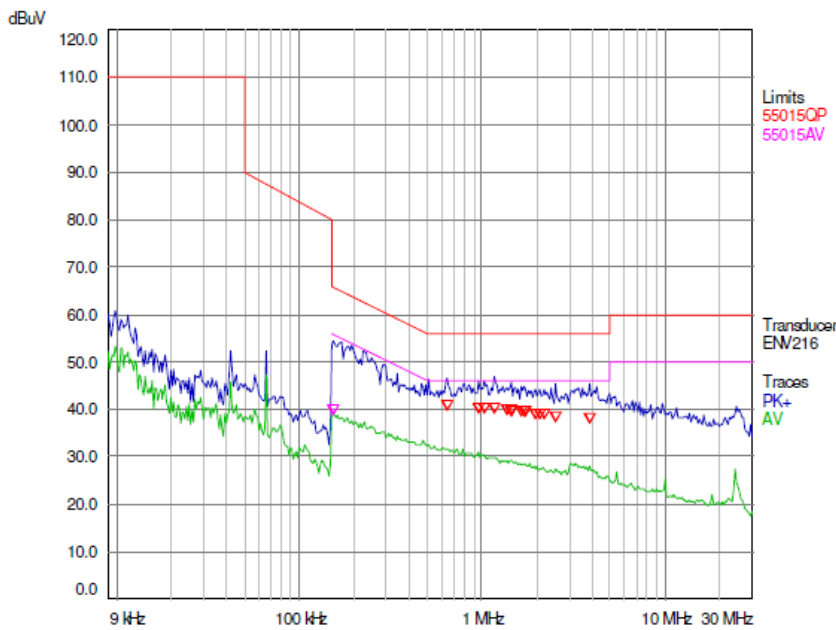
The installation set up requires an X2 Capacitor parallel to L1 and N to handle the fast and high voltage transients generated by the magnetic ballast.

## Set-up



## EMC

### Pre-measurement Graph



Surge protection IEC 61000-4-5  
The LED module passed the test at 1250V Surge

## Continues Testing

The test is ongoing from Optogas side with a set up that makes on/off 30 times per minute. This is made with magnetic ballast without filtering capacitor to simulate old fluorescent tube installations.



## Verification of Conformity

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

Radio Disturbance	IEC 55015:2006 + A1:2007 + A2:2009	
SURGE	IEC 61000-4-5	1 kv
Fast transient BURST	IEC 61547	2 kv
SAFETY	IEC 62031:2008	
Photo Biological Safety	IEC 62471:2008	
EMC	IEC 61000-3-2:2006	
EMC	IEC 61000-3-3:2008	
ESD*	IEC 61000-4-2	8 kv Air discharge 4 kv Contact discharge

\* 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 2002/95/EC(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 routine tests

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According to EN/IEC 60598-1 should the routine test 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

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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 II Compliant

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All our LED modules meet the Restrictions of Hazardous Substances (RoHS II)!

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 II 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 2011/65/EU (RoHS II) the following substances must not be used in this product

- Lead (Pb) alloys
- Mercury (Hg)
- Cadmium (Cd)
- Chromium (6+) compounds
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ethers (PBDE)

# 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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