



# STEFFI-C ED



## STEFFI-C ED

The LED Engine is designed to meet the demands from high volume producers and is easily connected to an external driver. Integrated high output optics are suited to support the light outputs for particular applications such as Downlights, Under shelf lights, Kitchen lights etc.



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## Introduction

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### Applications

The LED module and light engine is named Steffi-C and it is a design for light fittings and luminaires aiming for various areas such as under shelf, kitchen and retail. It has been designed in order to meet the demands on high performance optical solutions in both light emitting and in colour rendering.

### Steffi-C package

Mechanically it is constructed with our package design Steffi-C ( 44,6mm x 13,2mm ).

In the design concept there are standard dimmers with the same snap-in connector ( that fits the whole Optodrive™ concept ) as well as several heat sink designs with worldwide distribution.

### ED design

ED stands for “External driver”. It has a standard 2 pin plug-in connector that fits all different ED designs.

### Light output

The colour stability is of high importance in order to ensure that the installations have a uniform light output. Parameters such as binning, lifetime and thermal control are vital for good results.

### Technical attributes

- Energy saving and a high lumen output
- High Colour Rendering
- Uniform Colour temperature
- Controlled lifetime
- Simple integration



Please note that the article number structure for the variations of the modules comes separately.



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## Short form Characteristics

Mechanical	
Board dimensions:	44,6mm
Wire Connector:	PHR-2 or equivalent
Assembly holes:	2 x 3.8mm
Height:	13,2mm

Electrical	
Number of LED's:	3
Power supply:	External constant current LED driver
LED current:	350mA, 500mA or Max 700mA
Input Voltage:	
Power:	
Input Current:	
Module current:	
Power factor:	
Total Harmonic Distortion:	
Over temp protection:	
Efficiency	

Light	
CCT:	
CRI:	
Light output:	
SDCM (Mac Adam)	

Environmental operation conditions:	
Temperature range:	-40°C to 65°C (Absolute maximum temp Tc 65°C)
Relative Humidity:	10-75%
Ambient air pressure:	500-1060 HPa



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Dimming Signal:	
PWM high level:	
PWM low level:	
PWM frequency <sup>1</sup> :	
Efficiency:	
Reversed polarity protection:	
Transient protection:	
Overvoltage protection Dimming signal:	
Dim incoming:	
LED light output:	
No dim input:	
Dimlight (all versions except DALI)	

Dimming

TBD.



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## Wiring diagram:

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See separate wiring diagram documentation.



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## Article number structure

Optodrive™ Article Number consists of two parts:

- 1<sup>st</sup> part: Module Number
- 2<sup>nd</sup> part: Bin Code or Rank

Article number: Steffi-C ED.9.350.3.9yy-50	
Steffi-C:	Module name
ED:	External driver
P:	Power (Watt)
350:	350 mA
3:	Amount of LEDs
9:	CRI
yy:	Kelvin 27 =2700K, 30 =3000K, 40 =4000K
NN:	Viewing angle code

Article name	Module name	P. supply	Power	Voltage	LED	CRI	CCT	Lens	Lumen min
Steffi-C ED.9.350.3.927-50	Steffi-C	ED	9W	350mA 700mA	3	>90	2700	50°	210lm 340lm
Steffi-C ED.9.350.3.930-50	Steffi-C	ED	9W	350mA 700mA	3	>90	3000	50°	210lm 340lm
Steffi-C ED.9.350.3.940-50	Steffi-C	ED	9W	350mA 700mA	3	>90	4000	50°	210lm 340lm



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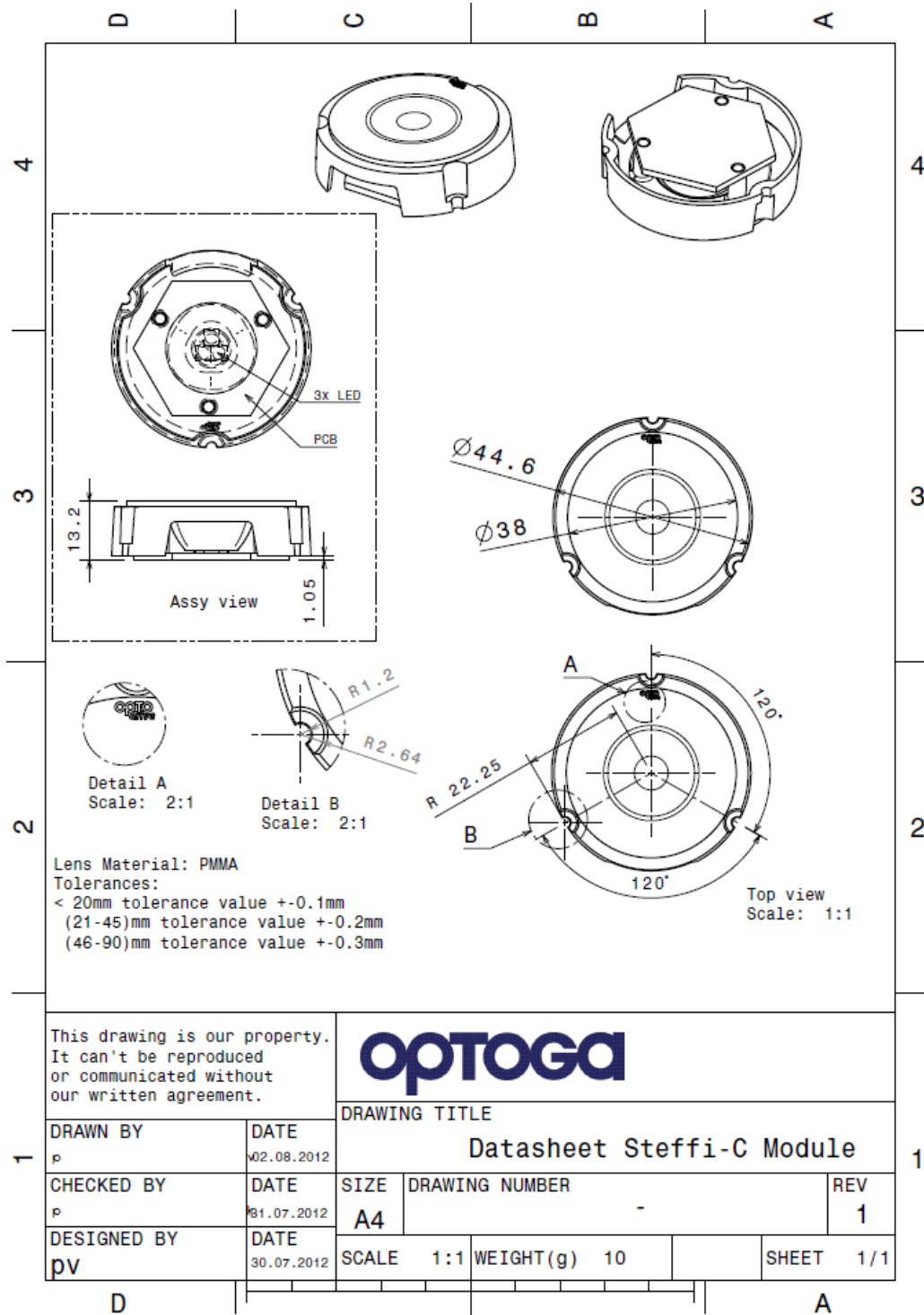
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## Dimensions LED Module:





## Parameters of the Lens system

The lens system is mounted and fixated onto the PCB with a double press-fit. The light parameters are according to the following:

Version	Viewing Angle	FWHM Angle
Steffi-C	50°	± 25°

Lens material is optical grade PMMA.

- Allows use of high current and temperature conditions
- Best available optical efficiency with up to 90%
- Very even colour distribution over the whole beam angle
- Integrated holder. Fastening to heat sink with two screws
- Compact dimensions (suitable to replace MR11 halogen bulbs).





## Parameters of the light output

### 4000Kelvin

Steffi-C ED.9.350.3.940-50 (1) (2)						
3 LED	Rank / Binning	Symbol	Value(4)			Unit
			Min	Typ	Max	
Luminous Flux	350mA	$\Phi V$	210	240		lm
	700mA	$\Phi V$	340	380		lm
Correlated Colour Temperature	940 (1)	CCT		4000		K
CRI		Ra	-	93	-	Ra
Power (2)		Po		3.3		W

### 3000Kelvin

Steffi-C ED.9.350.3.930-50 (1) (2)						
3 LED	Rank / Binning	Symbol	Value(4)			Unit
			Min	Typ	Max	
Luminous Flux	350mA	$\Phi V$	210	240		lm
	700mA	$\Phi V$	340	380		lm
Correlated Colour Temperature	930 (1)	CCT		3000		K
CRI		Ra	-	93	-	Ra
Power (2)		Po		3.3		W

### 2700Kelvin

Steffi-C ED.9.350.3.927-50 (1) (2)						
3 LED	Rank / Binning	Symbol	Value(4)			Unit
			Min	Typ	Max	
Luminous Flux	350mA	$\Phi V$	210	240		lm
	700mA	$\Phi V$	340	380		lm
Correlated Colour Temperature	927 (1)	CCT		2700		K
CRI		Ra	-	93	-	Ra
Power (2)		Po		3.3		W

(1)See detailed information in chapter "Binning structure graphical representation" Marked "colour shortform letter" page 11.

(2)Electro-Optical characteristics LED at  $I_F=350mA$ ,  $T_A=25^\circ C$



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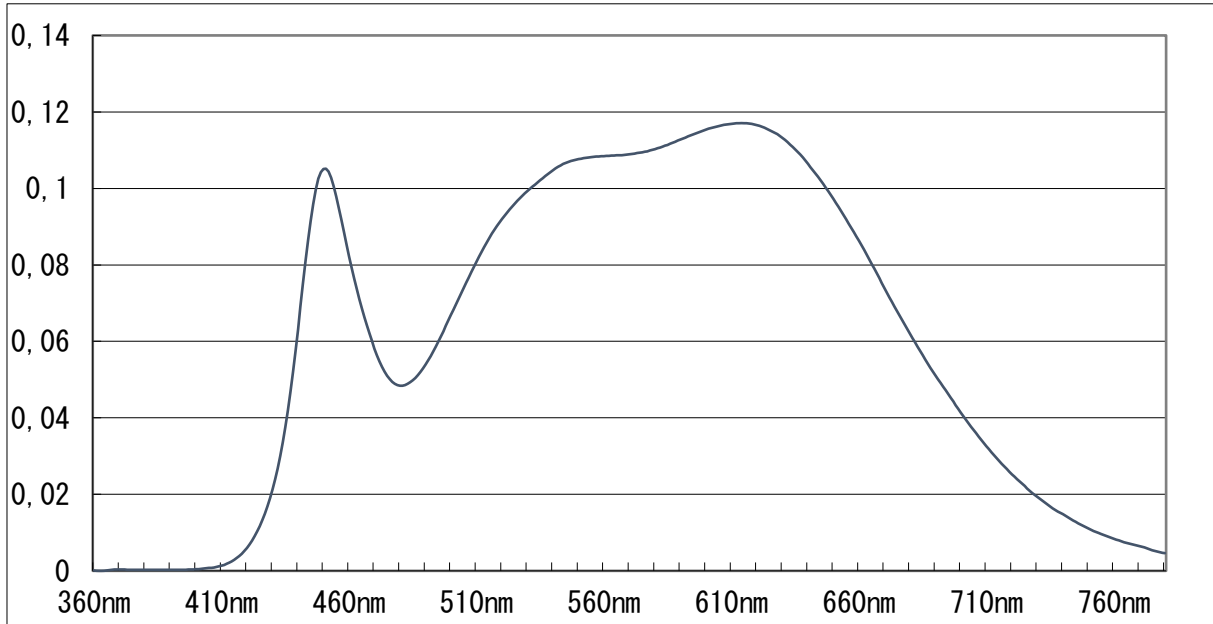
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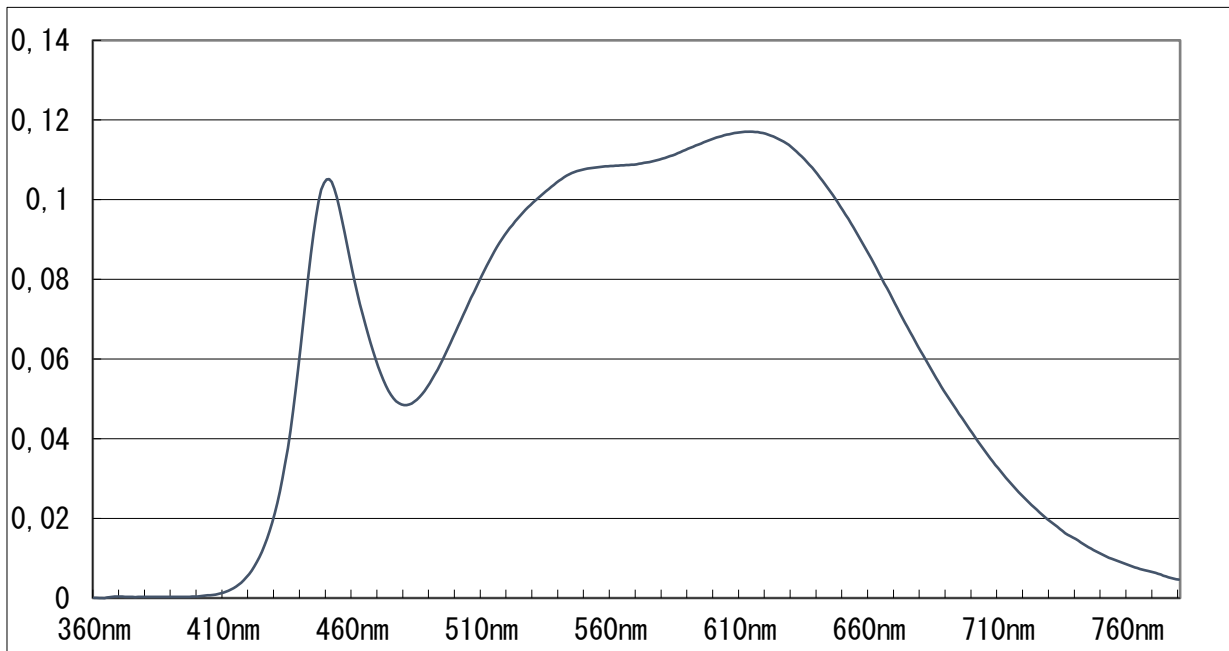
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## Colour Spectrum

Neutral White: 940



Warm White: 927





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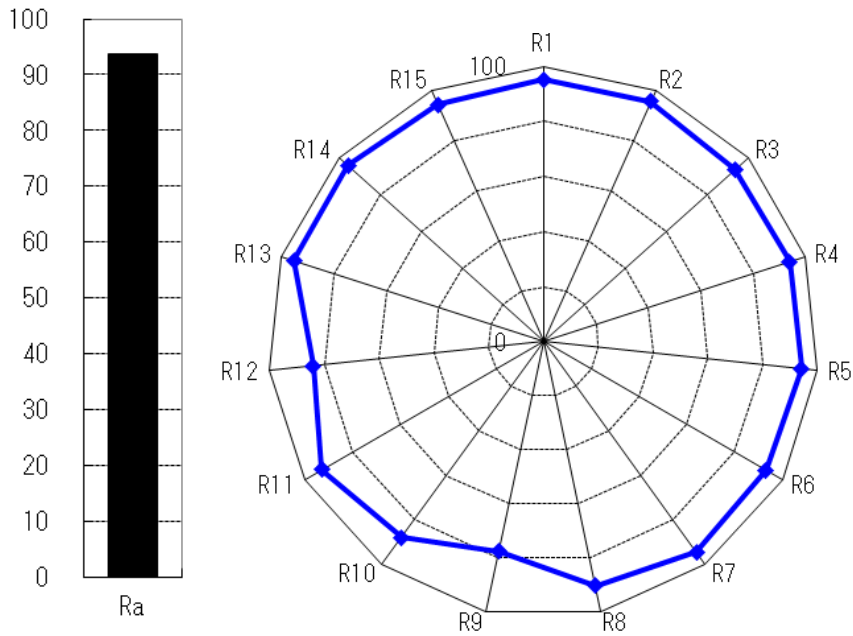
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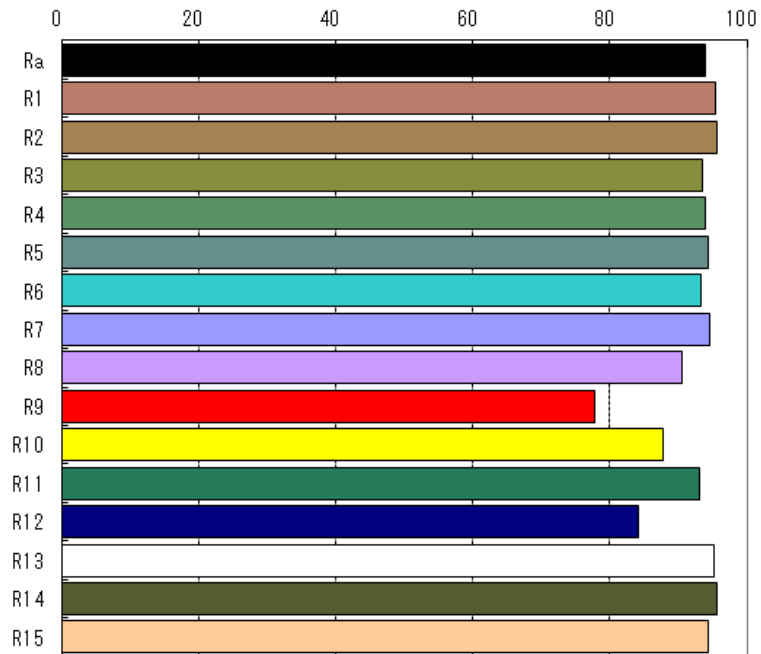
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## Typical CRI information

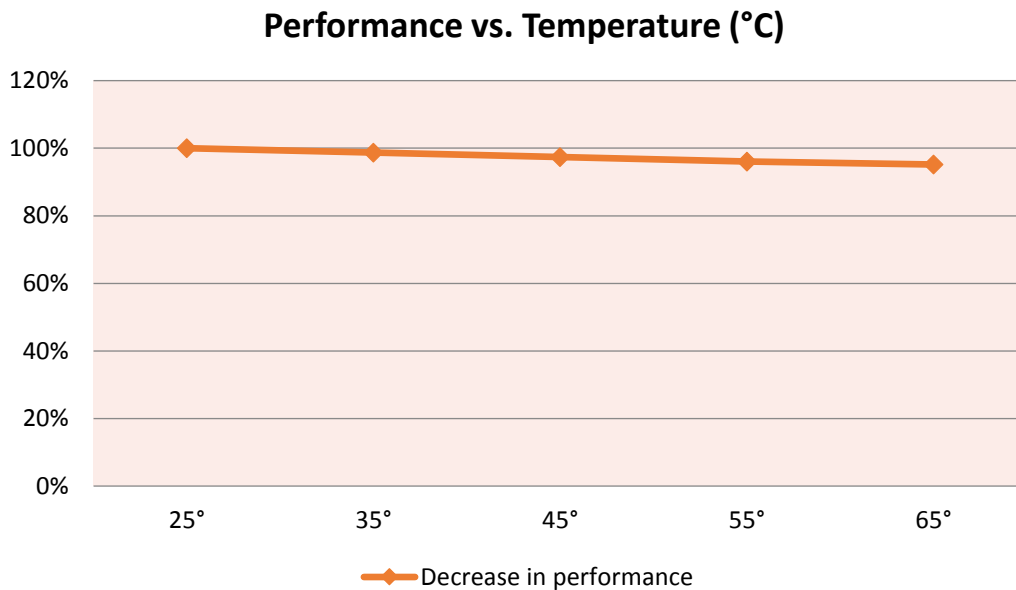


Ra	94
R1	95
R2	96
R3	94
R4	94
R5	94
R6	93
R7	95
R8	91
R9	78
R10	88
R11	93
R12	84
R13	95
R14	96
R15	94



## Electro Optical data

### Temperature Characteristics



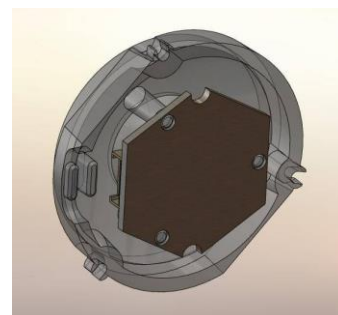
Consider the thermal capabilities of where the LED module is to be fitted. The temperature is an important factor for light output as well as for long time light output degradation.

### Thermal information

The thermal area ( backside of PCB ) has to be properly connected to an even and fine surface of a heat sink. Without this arrangement the unit will be overheated and will not be able to survive.

### Maximum Temperature

Secure the temperature in your application not to exceed 65°C.  
Read more in the section on how to measure temperatures.





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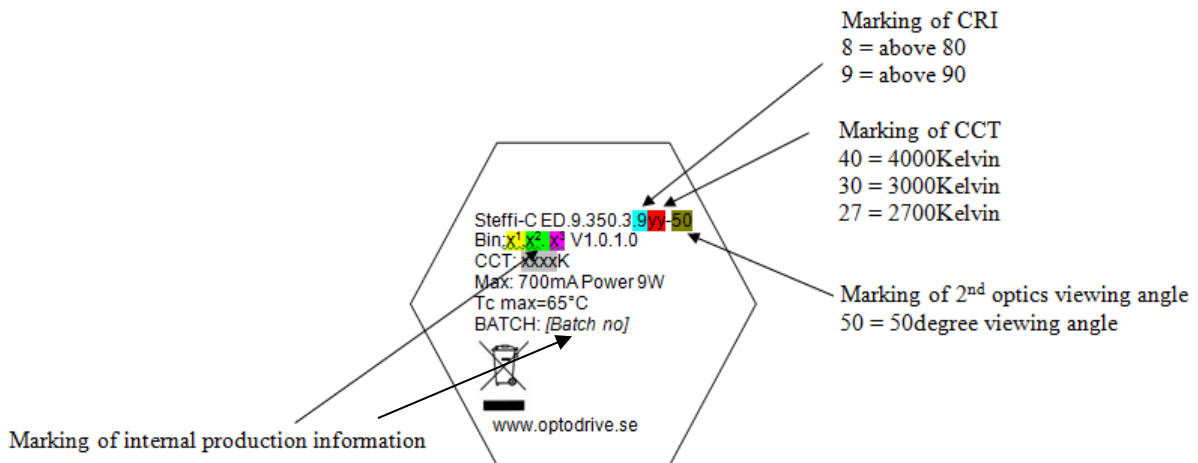
## Binning and Marking

Short form letters for colours

Article name	Colour Code	Colour	CCT
Steffi-C ED.9.350.3.940-50	940	Neutral White	4000Kelvin
Steffi-C ED.9.350.3.930-50	930	Warm White	3000Kelvin
Steffi-C ED.9.350.3.927-50	927	Warm White	2700Kelvin

Marking of product

( Information is shown on the back of LED module )





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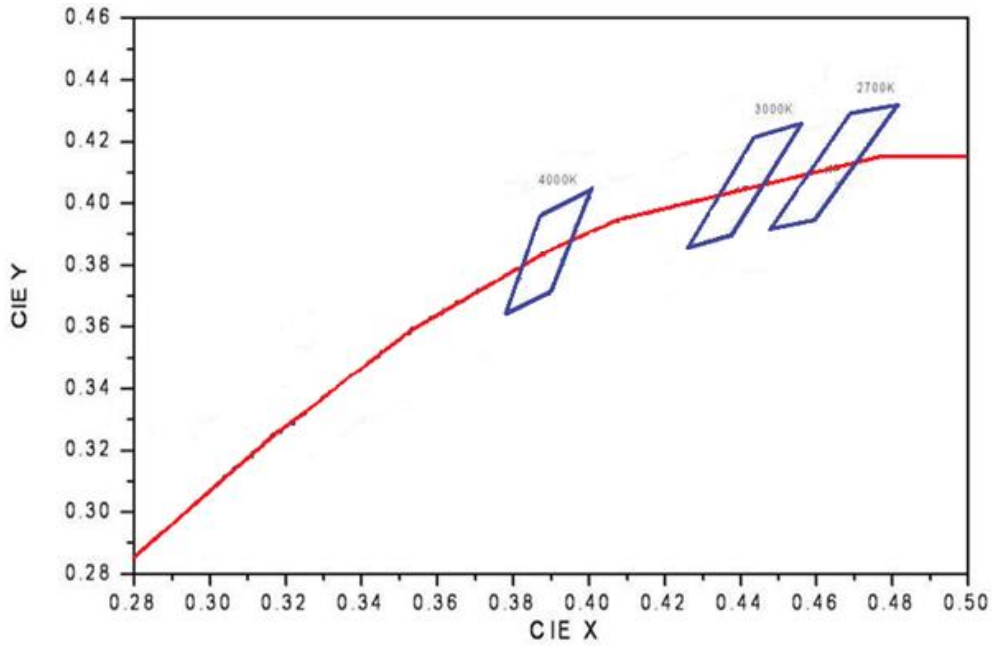
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## Binning structure graphical representation IEC 1931



\* Note that only Energy Star Rank is available

## 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.*

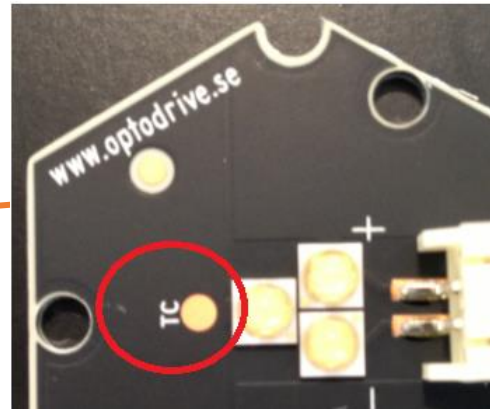
### Measurement points

When the measurement takes place you verify that the temperature on the marked measurement points are satisfying. Pending on the result you know what lifetime to expect from the module.

### Measurement points

- TC

This step will be implemented after the heat sink has been connected properly!







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## Lifetime (Calculated)

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The lifetime is calculated at the maximum temperature recommended at the Tc (measuring point). It is important not to exceed this recommendation; you find more information under the chapter “measurement control”.

Unit	Tc Maximum		30% degradation $L_{70}$
Steffi-C (350mA)	65° C		67 500 Hours
Steffi-C (700mA)	65° C		37 500 hours



## 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.

### 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 Compliant

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

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 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 2002/95/EC (RoHS) the following substances must not be used in this product

- Lead (Pb) alloys
- Mercury (Hg)
- Cadmium (Cd)
- Chromium (6+) compounds

# Do you want to know more about benefits of OptoDrive LED?

Read more about OptoDrive at [www.optodrive.se](http://www.optodrive.se).

You can contact us via [info@optoga.com](mailto:info@optoga.com).

Obviously, 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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