

**Module LLE 55mm CRI90 HV ADV6**

Modules LLE advanced



**Product description**

- \_ Ideal for linear and panel lights
- \_ Perfectly uniform light, even if several LED modules are used together in a line
- \_ Push terminals for quick and simple wiring of LED module to LED module
- \_ HE ... High Efficiency, NM ... Nominal Mode, HO ... High Output
- \_ Long lifetime up to 102,000 hours
- \_ 5 years guarantee (conditions at <https://www.tridonic.com/en/int/services/manufacturer-guarantee-conditions>)

**Optical properties**

- \_ Colour temperatures 3,000, 4,000 and 5,000 K
- \_ Efficacy of the LED module 207 lm/W at Irated and tp = 25 °C
- \_ High colour rendering index CRI > 90
- \_ High colour consistency (MacAdam 3)
- \_ Small luminous flux tolerances

**Mechanical properties**

- \_ Module dimension 55 x 280 mm and 55 x 566 mm
- \_ Simple installation via clips or screws

**System solution**

- \_ Combine Tridonic's LED modules and dimmable drivers to achieve an outstanding system efficacy (configuration possible via <https://setbuilder.tridonic.com/>)

**Website**

<http://www.tridonic.com/28005983>



Linear



High bay



Decorative



Downlights



Spotlights



Free-standing



Area



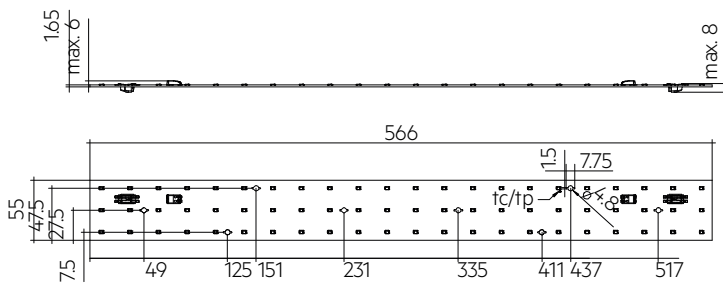
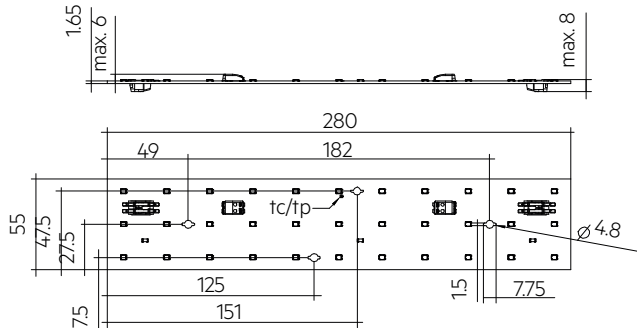
Floor | Wall



Street

## Module LLE 55mm CRI90 HV ADV6

Modules LLE advanced



## Ordering data

Type	Article number	Colour temperature	Packaging, carton	Weight per pc.
LLE 55x280mm 2000lm 930 HV ADV6	28005983	3,000 K	128 pc(s).	0.059 kg
LLE 55x280mm 2000lm 940 HV ADV6	28005984	4,000 K	128 pc(s).	0.059 kg
LLE 55x280mm 2000lm 950 HV ADV6	28005985	5,000 K	128 pc(s).	0.059 kg
LLE 55x566mm 4000lm 930 HV ADV6	28005989	3,000 K	96 pc(s).	0.099 kg
LLE 55x566mm 4000lm 940 HV ADV6	28005990	4,000 K	96 pc(s).	0.099 kg
LLE 55x566mm 4000lm 950 HV ADV6	28005991	5,000 K	96 pc(s).	0.099 kg

**Technical data**

Beam characteristic	120°
Ambient temperature $t_a$	-25 ... +50 °C
$t_p$ rated	65 °C
$t_c$	95 °C
I <sub>rated</sub>	325 mA
I <sub>max</sub>	720 mA
Max. permissible LF current ripple	900 mA
Max. permissible peak current	1,350 mA / max. 10 ms
Max. working voltage for insulation <sup>①</sup>	450 V
Insulation test voltage	1.9 kV
Colour tolerance	3 SDCM
ESD classification	Severity level 2
Risk group (IEC 62471)	RG1 (≤ 720 mA (I <sub>max</sub> ))
Classification acc. to IEC 62031	Built-in
Type of protection	IP00
Lumen maintenance L70B50	102,000 h
Guarantee (conditions at <a href="http://www.tridonic.com">www.tridonic.com</a> )	5 Year(s)

**Approval marks****Standards**

IEC 62031, IEC 62471, IEC 61000-4-2, IEC 62778, IEC 61547

**Specific technical data**

Type	Article number	Photometric code	Useful luminous flux at $t_p = 25\text{ °C}$ <sup>③</sup>	Expected luminous flux at $t_p$ rated <sup>④</sup>	Typ. forward current	Min. forward voltage at $t_p$ rated <sup>⑤</sup>	Max. forward voltage at $t_p = 25\text{ °C}$ <sup>⑥</sup>	Power consumption $P_{on}$ at $t_p = 25\text{ °C}$ <sup>⑥</sup>	Efficacy of the module at $t_p = 25\text{ °C}$	Expected efficacy of the module at $t_p$ rated	Colour rendering index CRI
<b>Operating mode HE</b>											
LLE 55x280mm 2000lm 930 HV ADV6	28005983	930/359	-	986 lm	200 mA	28.4 V	31.0 V	-	-	169 lm/W	>90
LLE 55x280mm 2000lm 940 HV ADV6	28005984	940/359	-	1,046 lm	200 mA	28.4 V	31.0 V	-	-	179 lm/W	>90
LLE 55x280mm 2000lm 950 HV ADV6	28005985	950/359	-	1,046 lm	200 mA	28.4 V	31.0 V	-	-	179 lm/W	>90
LLE 55x566mm 4000lm 930 HV ADV6	28005989	930/359	-	1,973 lm	200 mA	56.7 V	62.0 V	-	-	169 lm/W	>90
LLE 55x566mm 4000lm 940 HV ADV6	28005990	940/359	-	2,091 lm	200 mA	56.7 V	62.0 V	-	-	179 lm/W	>90
LLE 55x566mm 4000lm 950 HV ADV6	28005991	950/359	-	2,091 lm	200 mA	56.7 V	62.0 V	-	-	179 lm/W	>90
<b>Operating mode NM</b>											
LLE 55x280mm 2000lm 930 HV ADV6	28005983	930/359	1,648 lm	1,575 lm	325 mA	29.1 V	31.7 V	9.9 W	166 lm/W	162 lm/W	>90
LLE 55x280mm 2000lm 940 HV ADV6	28005984	940/359	1,747 lm	1,670 lm	325 mA	29.1 V	31.7 V	9.9 W	176 lm/W	172 lm/W	>90
LLE 55x280mm 2000lm 950 HV ADV6	28005985	950/359	1,747 lm	1,670 lm	325 mA	29.1 V	31.7 V	9.9 W	176 lm/W	172 lm/W	>90
LLE 55x566mm 4000lm 930 HV ADV6	28005989	930/359	3,297 lm	3,150 lm	325 mA	58.1 V	63.5 V	19.8 W	167 lm/W	162 lm/W	>90
LLE 55x566mm 4000lm 940 HV ADV6	28005990	940/359	3,495 lm	3,339 lm	325 mA	58.1 V	63.5 V	19.8 W	177 lm/W	172 lm/W	>90
LLE 55x566mm 4000lm 950 HV ADV6	28005991	950/359	3,495 lm	3,339 lm	325 mA	58.1 V	63.5 V	19.8 W	177 lm/W	172 lm/W	>90
<b>Operating mode HO</b>											
LLE 55x280mm 2000lm 930 HV ADV6	28005983	930/359	-	2,357 lm	500 mA	29.9 V	32.6 V	-	-	153 lm/W	>90
LLE 55x280mm 2000lm 940 HV ADV6	28005984	940/359	-	2,499 lm	500 mA	29.9 V	32.6 V	-	-	162 lm/W	>90
LLE 55x280mm 2000lm 950 HV ADV6	28005985	950/359	-	2,499 lm	500 mA	29.9 V	32.6 V	-	-	162 lm/W	>90
LLE 55x566mm 4000lm 930 HV ADV6	28005989	930/359	-	4,714 lm	500 mA	59.8 V	65.2 V	-	-	153 lm/W	>90
LLE 55x566mm 4000lm 940 HV ADV6	28005990	940/359	-	4,998 lm	500 mA	59.8 V	65.2 V	-	-	162 lm/W	>90
LLE 55x566mm 4000lm 950 HV ADV6	28005991	950/359	-	4,998 lm	500 mA	59.8 V	65.2 V	-	-	162 lm/W	>90

① If mounted with M4 screws with 7 mm head diameter.

② The detailed explanation, see data sheet section 1.1.

③ Tolerance of useful light flux - 0 % / + 15 %. Measurement uncertainty ± 10 %.

④ Tolerance of expected light flux - 0 % / + 15 %. Measurement uncertainty ± 10 %. Based on calculation.

⑤ Measurement tolerance forward voltage: ±0.1 V.

⑥ Tolerance of power consumption  $P_{on}$  ± 15 %. Measurement uncertainty ± 5 %.

## ACL LENS 55x280mm

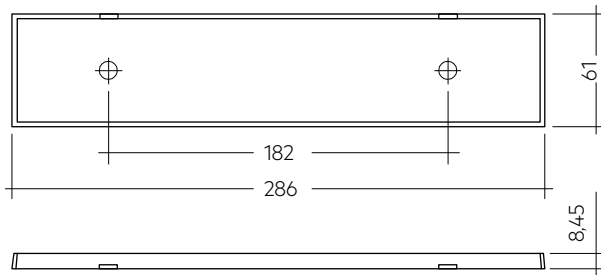
Accessory

**Product description**

- \_ ACL LENS for LLE 55x280mm
- \_ Available with different beam characteristics
- \_ Easy mounting with M4 screws
- \_ ACL SHADE to reduce UGR
- \_ ACL LENS made of PMMA, ACL SHADE made of ABS
- \_ Max. permissible temperature 80 °C
- \_ Max. permissible tc temperature 75 °C at the LED module
- \_ Photometric data available on website

**Website**

<http://www.tridonic.com/28002206>

**Ordering data**

Type	Article number	Length L	Beam characteristic	Efficiency	Packaging, carton	Weight per pc.
ACL LENS 55X280mm 60°	28002206	286.00 mm	60°	91 %	72 pc(s).	0.088 kg
ACL LENS 55X280mm 90°	28002207	286.00 mm	90°	90 %	72 pc(s).	0.092 kg
ACL LENS 55X280mm 90x45°	28002208	286.00 mm	90x45°	90 %	72 pc(s).	0.091 kg
ACL LENS 55X280mm DA25°	28002209	286.00 mm	double asymmetric 25°	94 %	60 pc(s).	0.072 kg
ACL LENS 55X280mm A20°	28002210	286.00 mm	asymmetric 20°	93 %	60 pc(s).	0.058 kg
ACL SHADE 55X280mm UGR	28002211	290.58 mm	UGR improving	-	60 pc(s).	0.027 kg

## ACL CLIP 4.3mm

Accessory

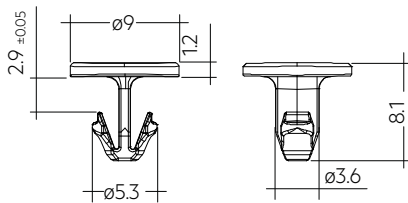


## Product description

- \_ Clip for fixation of LED modules with 4.3 mm holes
- \_ Fast snap on mounting (sheet thickness 0.5 – 1.0 mm for PUSH-FIX and 1 – 2 mm for PUSH-FIX Long)
- \_ For drilling hole 4 mm
- \_ Clip made of polycarbonate
- \_ Minimum sales quantity 500 pcs.

## Website

<http://www.tridonic.com/28001036>



## Ordering data

Type	Article number	Colour	Packaging, bag <sup>①</sup>	Weight per pc.
ACL CLIP 4.3mm PUSH-FIX	28001036	White	500 pc(s).	0.001 kg
ACL CLIP 4,3mm PUSH-FIX Long	28002314	Transparent	500 pc(s).	0.001 kg

① Minimum sales quantity 500 pcs.

## 1. Standards

IEC 62031  
IEC 62471  
IEC 61000-4-2  
IEC 62778  
IEC 61547

### 1.1 Photometric code

Key for photometric code, e. g. 830 / 349

1 <sup>st</sup> digit	2 <sup>nd</sup> + 3 <sup>rd</sup> digit	4 <sup>th</sup> digit	5 <sup>th</sup> digit	6 <sup>th</sup> digit
Code CRI	Colour temperature in Kelvin x 100	MacAdam initial	MacAdam after 25% of the lifetime (max.6000h)	Luminous flux after 25% of the lifetime (max.6000h)
7 70 – 79				Code Luminous flux
8 80 – 89				7 ≥ 70 %
9 ≥90				8 ≥ 80 % 9 ≥ 90 %

### 1.2 Risk group

Forward current	Risk group (IEC 62471)
< 720 mA (I <sub>max</sub> )	RG1

### 1.3 Energy classification

Type	Colour temperature	Forward current	Energy classification	Energy consumption
LLE 55x280mm 2000lm 930 HV ADV6	3,000 K	325 mA	D	10 kWh / 1,000 h
LLE 55x280mm 2000lm 940 HV ADV6	4,000 K	325 mA	C	10 kWh / 1,000 h
LLE 55x280mm 2000lm 950 HV ADV6	5,000 K	325 mA	C	10 kWh / 1,000 h
LLE 55x566mm 4000lm 930 HV ADV6	3,000 K	325 mA	D	20 kWh / 1,000 h
LLE 55x566mm 4000lm 940 HV ADV6	4,000 K	325 mA	C	20 kWh / 1,000 h
LLE 55x566mm 4000lm 950 HV ADV6	5,000 K	325 mA	C	20 kWh / 1,000 h

Energy label and further information at [www.tridonic.com](http://www.tridonic.com) in the certificates tab of the corresponding product page and at the EPREL data base <https://eprel.ec.europa.eu/>

## 2. Thermal details

### 2.1 tc point, ambient temperature and lifetime

The temperature at tp reference point is crucial for the light output and lifetime of a LED product.

For LLE a tp temperature of 50 °C has to be complied in order to achieve an optimum between heat sink requirements, light output and lifetime.

Compliance with the maximum permissible reference temperature at the tc point must be checked under operating conditions in a thermally stable state. The maximum value must be determined under worst-case conditions for the relevant application.

The tc and tp temperature of LED modules from Tridonic are measured at the same reference point.

### 2.2 Storage and humidity

Storage temperature	-25... +85 °C
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Operation only in non condensing environment.

Humidity during processing of the module should be between 30 to 70 %.

### 2.3 Heat sink values

#### LLE 55x280mm 2000lm CRI90 ADV6

ta	tp	Forward current	R <sub>th, hs-a</sub>	Cooling area
25 °C	65 °C	325 mA		self cooling
25 °C	65 °C	720 mA		self cooling
35 °C	65 °C	325 mA		self cooling
35 °C	65 °C	720 mA		self cooling
40 °C	65 °C	325 mA		self cooling
40 °C	65 °C	720 mA		self cooling
45 °C	65 °C	325 mA		self cooling
45 °C	65 °C	720 mA	4,30 K/W	155 cm <sup>2</sup>
50 °C	65 °C	325 mA		self cooling
50 °C	65 °C	720 mA	3,14 K/W	212 cm <sup>2</sup>

#### LLE 55x566mm 4000lm CRI90 ADV6

ta	tp	Forward current	R <sub>th, hs-a</sub>	Cooling area
25 °C	65 °C	325 mA		self cooling
25 °C	65 °C	720 mA		self cooling
35 °C	65 °C	325 mA		self cooling
35 °C	65 °C	720 mA		self cooling
40 °C	65 °C	325 mA		self cooling
40 °C	65 °C	720 mA		self cooling
45 °C	65 °C	325 mA		self cooling
45 °C	65 °C	720 mA		self cooling
50 °C	65 °C	325 mA		self cooling
50 °C	65 °C	720 mA	1,57 K/W	424 cm <sup>2</sup>

### Notes

The actual cooling surface can differ because of the material, the structural shape, outside influences and the installation situation. Depending on the heat sink a heat conducting paste or heat conducting film might be necessary to keep the specified tp temperature.

For applications with a small distance between LED module and lens, screw mounting is recommended to ensure a reliable thermal connection between LED module and cooling surface.

## 3. Installation / wiring

### 3.1 Electrical supply/choice of LED driver

LLE modules from Tridonic are not protected against overvoltages, overcurrents, overloads or short-circuit currents. Safe and reliable operation can only be guaranteed in conjunction with a LED driver which complies with the relevant standards. The use of LED driver from Tridonic in combination with LLE modules guarantees the necessary protection for safe and reliable operation.

If a LED driver other than Tridonic is used, it must provide the following protection:

- Short-circuit protection
- Overload protection
- Overtemperature protection



LLE modules must be supplied by a constant current LED driver. Operation with a constant voltage LED driver will lead to an irreversible damage of the module.

Wrong polarity can damage the LLE.

The LLE module is designed for serial wiring.

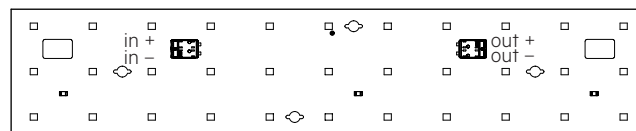
LLE can be operated either from SELV LED drivers or from LED drivers with LV output voltage.



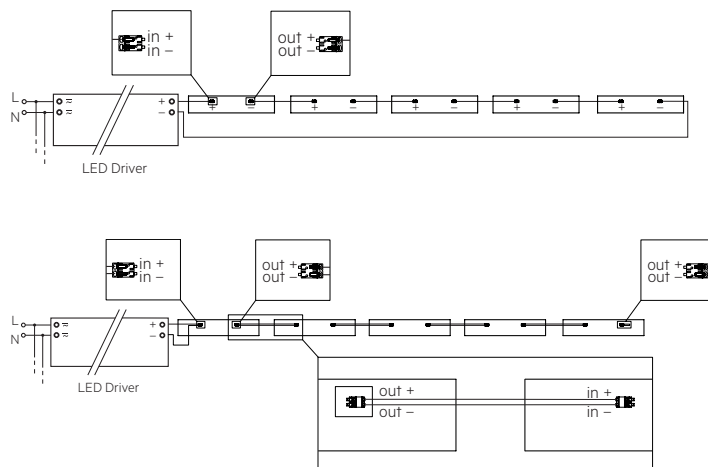
LLE are basic insulated up to 450 V (if mounted with M4 screws with head diameter 7 mm) against ground and can be mounted directly on earthed metal parts of the luminaire. If the max. output voltage of the LED driver (also against earth) is above 450 V, an additional insulation between LED module and heat sink is required (for example by insulated thermal pads) or by a suitable luminaire construction.

At voltages > 60 V an additional protection against direct touch (test finger) to the light emitting side of the module has to be guaranteed. This is typically achieved by means of a non removable light distributor over the module.

### 3.2 Wiring

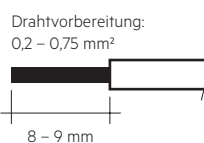


### Wiring examples



### 3.3 Wiring type and cross section

For wiring use stranded wire with ferrules or solid wire from 0.2 to 0.75 mm<sup>2</sup>. For the push-wire connection you have to strip the insulation (8–9 mm).



To remove the wires use a suitable tool (e.g. Microcon release pin) or through twist and pull.

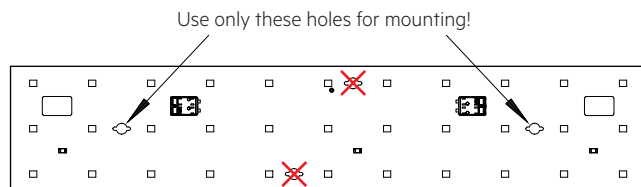
### 3.4 Mounting instruction



None of the components of the LLE (substrate, LED, electronic components etc.) may be exposed to tensile or compressive stresses.

Max. torque for fixing: 0,5 Nm.

The LED modules are mounted onto a heat sink with min. 2 screws per module or ACL CLIP 4.3mm.



Chemical substance may harm the LED module. Chemical reactions could lead to colour shift, reduced luminous flux or a total failure of the module caused by corrosion of electrical connections.

Materials which are used in LED applications (e.g. sealings, adhesives) must not produce dissolver gas. They must not be condensation curing based, acetate curing based or contain sulfur, chlorine or phthalate.

Avoid corrosive atmosphere during usage and storage.

### 3.5 EOS/ESD safety guidelines



The device / module contains components that are sensitive to electrostatic discharge and may only be installed in the factory and on site if appropriate EOS/ESD protection measures have been taken. No special measures need be taken for devices/modules with enclosed casings (contact with the pc board not possible), just normal installation practice. Please note the requirements set out in the document EOS / ESD guidelines (Guideline\_EOS\_ESD.pdf) at: <http://www.tridonic.com/esd-protection>

## 4. Lifetime

### 4.1 Lifetime, lumen maintenance and failure rate

The light output of an LED module decreases over the lifetime, this is characterized with the L value.  
L70 means that the LED module will give 70 % of its initial luminous flux.  
This value is always related to the number of operation hours and therefore defines the lifetime of an LED module.

As the L value is a statistical value and the lumen maintenance may vary over the delivered LED modules.

The B value defines the amount of modules which are below the specific L value, e.g. L70B10 means 10 % of the LED modules are below 70 % of the initial luminous flux, respectively 90 % will be above 70 % of the initial value.  
In addition the percentage of failed modules (fatal failure) is characterized by the C value.

### 4.2 Lumen maintenance for LLE 55mm CRI90 HV ADV6

Forward current	tp	L90 / B10	L90 / B50	L80 / B10	L80 / B50	L70 / B10	L70 / B50
	tempera- ture						
720 mA	55 °C	52k h	52k h	> 102k h	> 102k h	> 102k h	> 102k h
	85 °C	52k h	52k h	> 102k h	> 102k h	> 102k h	> 102k h

L00C03 > 102k h. At tp rated and I rated, based on 10 swichting cycles per day.

### 4.3 Switching capability

100,000 cycles

Tridonic test according to IEC 62717 Cl 10.3.3  
30 s on / 30 s off at a forward current of 165 mA

## 5. Electrical values

### 5.1 Declaration of electrical parameters

I<sub>rated</sub> ... Nominal operating current the module is designed for.

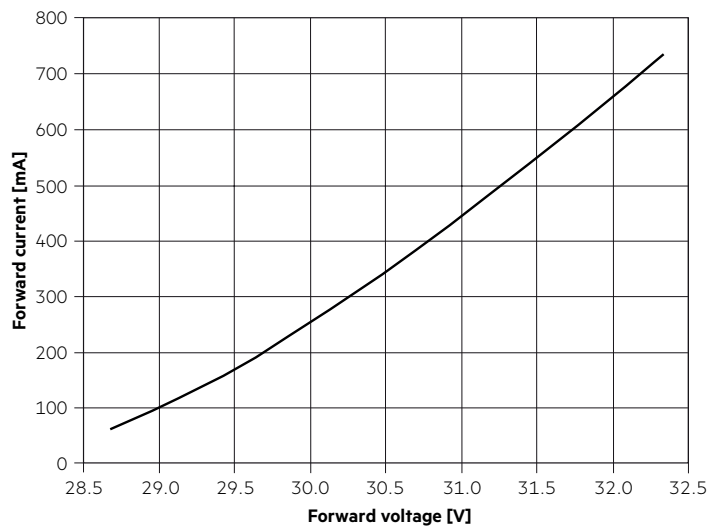
I<sub>max</sub> ... Max. permissible continuous operating current incl. The tolerances of the LED driver.

Max. permissible LF current ripple ... Max. output current of the LED driver incl. Tolerances and LF current ripple must not exceed this value.

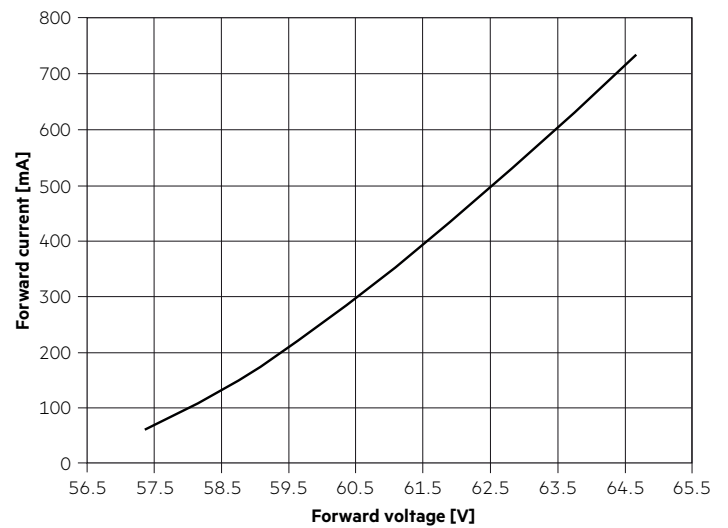
Max. permissible peak current ... The max. output peak current of the LED driver must not exceed this value.

### 5.2 Typ. forward voltage vs. forward current

LLE 55x280mm 2000lm CRI90 HV ADV6

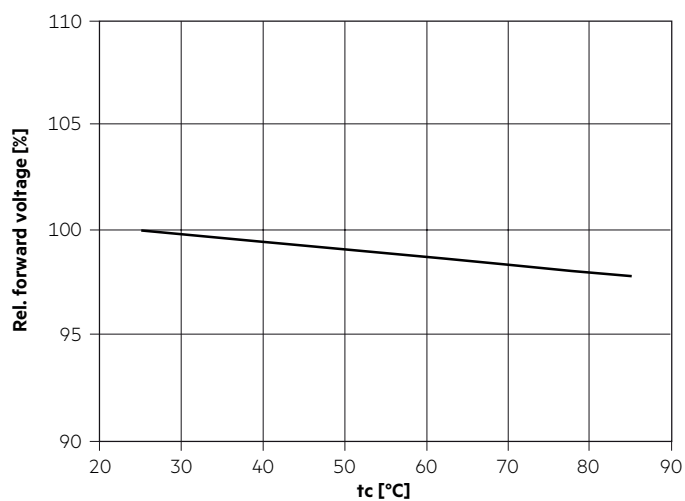


LLE 55x566mm 4000lm CRI90 HV ADV6



The diagrams are based on statistic values.  
The real values can be different.

### 5.3 Forward voltage vs. tc temperature



The diagrams are based on statistic values.  
The real values can be different.

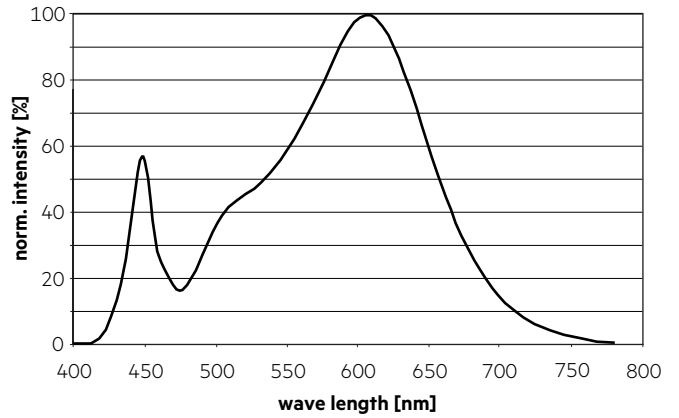
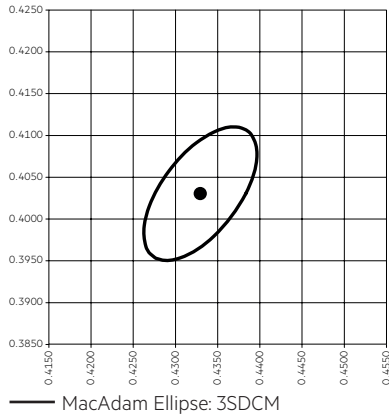
## 6. Photometric characteristics

### 6.1 Coordinates and tolerances according to CIE 1931

The specified colour coordinates are integral measured by current impulse of 165 mA and a duration of 100 ms.  
 The ambient temperature of the measurement is  $t_a = 25^\circ\text{C}$ .  
 The measurement tolerance of the colour coordinates are  $\pm 0.01$ .

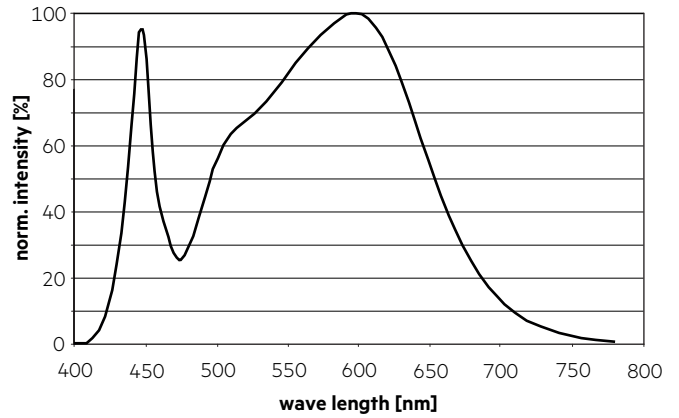
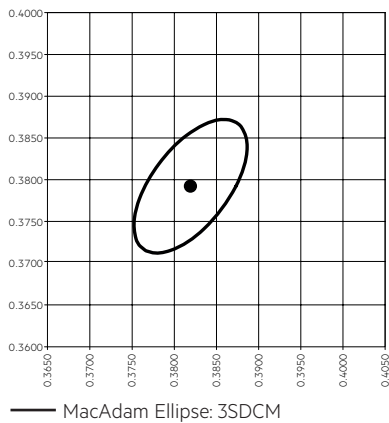
#### 3,000 K

	x0	y0
Centre	0.4338	0.4030



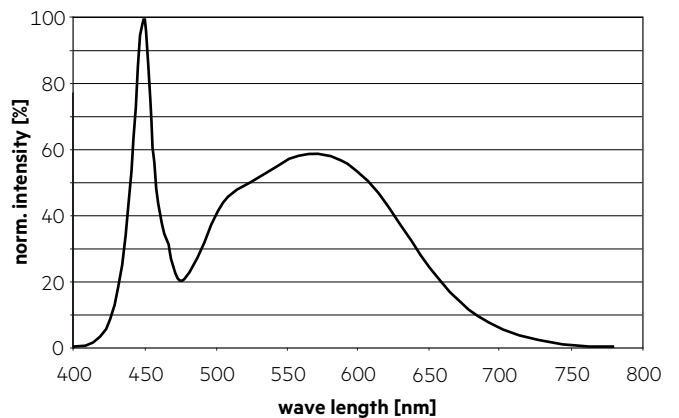
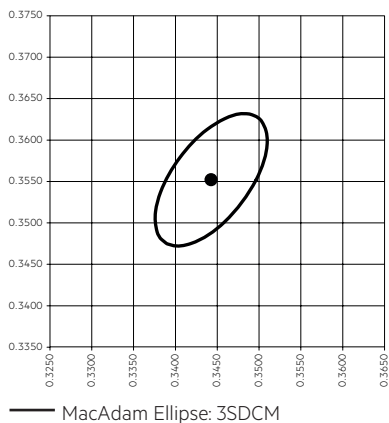
#### 4,000 K

	x0	y0
Center	0.3818	0.3797



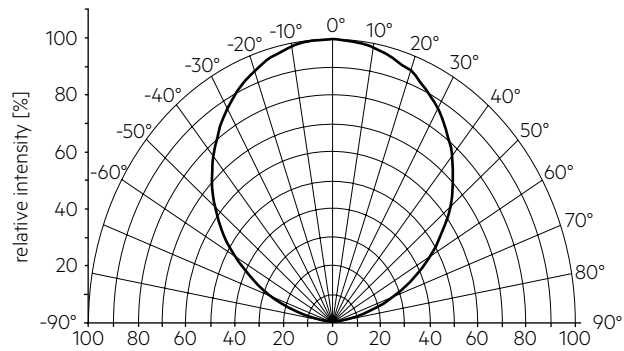
#### 5,000 K

	x0	y0
Center	0.3447	0.3553



## 6.2 Light distribution

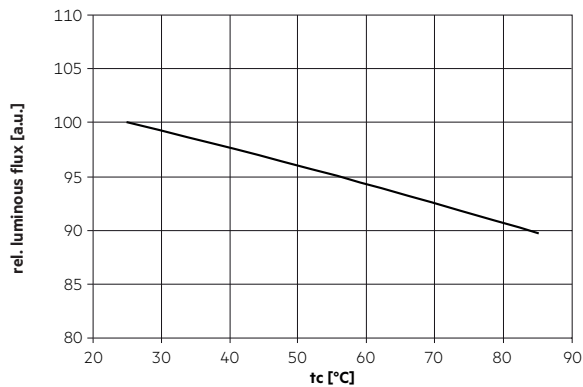
The optical design of the LLE product line ensures optimum homogeneity for the light distribution.



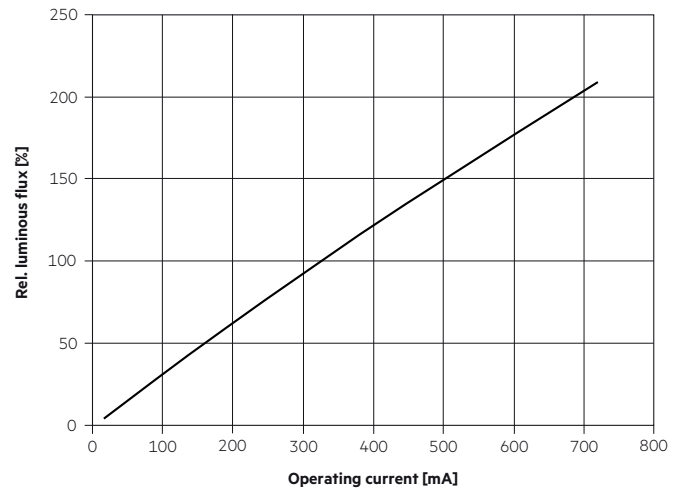
The colour temperature is measured integral over the complete module. The single LED light points can have deviations in the colour coordinates within MacAdam 5.

To ensure an ideal mixture of colours and a homogeneous light distribution a suitable optic (e. g. PMMA diffuser) and a sufficient spacing between module and optic (typ. 4 cm) should be used.

## 6.3 Relative luminous flux vs. tc temperature



## 6.4 Relative luminous flux vs. operating current



The diagrams are based on statistic values.  
The real values can be different.

## 7. Miscellaneous

### 7.1 Additional information

Additional technical information at [www.tridonic.com](http://www.tridonic.com) → Technical Data

Energy label and further information at [www.tridonic.com](http://www.tridonic.com) in the certificates tab of the corresponding product page and at the EPREL data base <https://eprel.ec.europa.eu/>

Guarantee conditions at [www.tridonic.com](http://www.tridonic.com) → Services

Lifetime declarations are informative and represent no warranty claim.