Engine LLE AC G1 24mm SNC

Module LLE ESSENCE

Product description

- Module with integrated electronic
- Ideal for linear luminaires
- Economic one-stop solution
- Enables thin designs of luminaires
- Typ. luminous flux (HO) 2,400 lm, 4,800 lm and 6,200 lm
- High system efficacy up to 131 lm/W (HE), 120 lm/W (HO)
- Colour temperatures 3,000 K, 4,000 K und 6,500 K
- Module dimensions 24 x 560 mm, 24 x 1,150 mm and 24 x 1,450 mm
- Colour rendering index CRI > 80
- Colour tolerance MacAdam 5
- Perfect homogenous light with LINEAR COVER SY Diffuse
- Push terminals for quick and simple wiring
- Simple installation (e.g. ACL ENDCAP PUSH-FIX)
- Self-cooling (no additional heat sink required)
- Long life-time: 50,000 hours
- 5-year guarantee

Standards, page 7

Colour temperatures and tolerances, page 10

LLE AC G1 24x560mm 2400lm SNC

LLE AC G1 24x1150mm 4800lm SNC

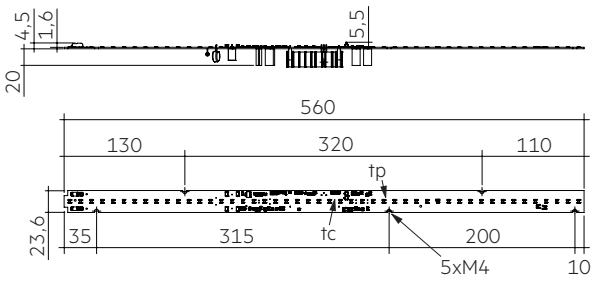
LLE AC G1 24x1450mm 6200lm SNC

RoHS

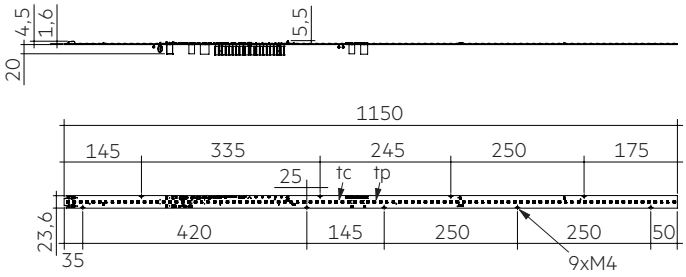
Engine LLE AC G1 24mm SNC
Module LLE ESSENCE

Technical data

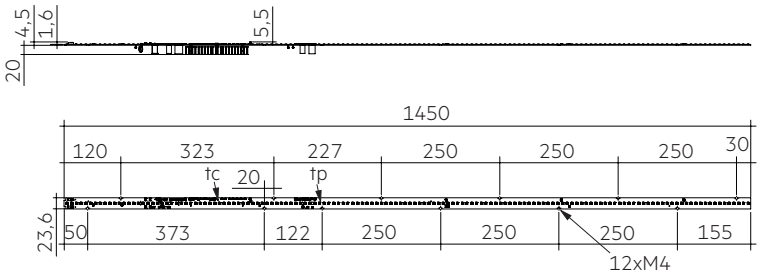
Rated supply voltage	220 – 240 V
Input voltage, AC	196 – 264 V
Mains frequency	50 / 60 Hz
λ (at 230 V, 50 Hz)	0.95
THD	20 %
Flicker	< 30 %
Beam characteristic	120°
Ambient temperature ta	-25 … +45 °C
tp rated	75 °C
tc for 560, 1150 mm	105 °C
tc for 1450 mm	110 °C
ESD classification	severity level 2
Risk group (IEC 62471:2008)	RG1
Classification acc. to IEC 62031	Built-in
Type of protection	IP00



LLE AC G1 24x560mm 2400lm SNC



LLE AC G1 24x1150mm 4800lm SNC



LLE AC G1 24x1450mm 6200lm SNC

Ordering data

Type	Article number	Colour temperature	Packaging carton	Weight per pc.
LLE AC G1 24x560mm 2400lm 830 SNC	**87500608**	3,000 K	36 pc(s).	0.075 kg
LLE AC G1 24x560mm 2400lm 840 SNC	**87500609**	4,000 K	36 pc(s).	0.075 kg
LLE AC G1 24x560mm 2400lm 865 SNC	**87500610**	6,500 K	36 pc(s).	0.075 kg
LLE AC G1 24x1150mm 4800lm 830 SNC	**87500611**	3,000 K	36 pc(s).	0.151 kg
LLE AC G1 24x1150mm 4800lm 840 SNC	**87500612**	4,000 K	36 pc(s).	0.151 kg
LLE AC G1 24x1150mm 4800lm 865 SNC	**87500613**	6,500 K	36 pc(s).	0.151 kg
LLE AC G1 24x1450mm 6200lm 830 SNC	**87500614**	3,000 K	36 pc(s).	0.176 kg
LLE AC G1 24x1450mm 6200lm 840 SNC	**87500615**	4,000 K	36 pc(s).	0.176 kg
LLE AC G1 24x1450mm 6200lm 865 SNC	**87500616**	6,500 K	36 pc(s).	0.176 kg

Specific technical data

Type	Photometric code	Typ. luminous flux at tp = 25 °C[1]	Typ. luminous flux at tp = 75 °C[1]	Input current at tp = 75 °C[1]	Input power at tp = 75 °C[1]	Efficacy of the system at tp = 75 °C	Colour rendering index CRI
Operating mode HE							
LLE AC G1 24x560mm 2400lm 830 SNC	830/559	1,320 lm	1,230 lm	47 mA	10.4 W	118 lm/W	> 80
LLE AC G1 24x560mm 2400lm 840 SNC	840/559	1,410 lm	1,320 lm	47 mA	10.4 W	126 lm/W	> 80
LLE AC G1 24x560mm 2400lm 865 SNC	865/559	1,390 lm	1,300 lm	47 mA	10.4 W	124 lm/W	> 80
LLE AC G1 24x1150mm 4800lm 830 SNC	830/559	3,070 lm	2,860 lm	107 mA	23.8 W	119 lm/W	> 80
LLE AC G1 24x1150mm 4800lm 840 SNC	840/559	3,270 lm	3,050 lm	107 mA	23.8 W	118 lm/W	> 80
LLE AC G1 24x1150mm 4800lm 865 SNC	865/559	3,220 lm	3,000 lm	107 mA	23.8 W	126 lm/W	> 80
LLE AC G1 24x1450mm 6200lm 830 SNC	830/559	4,040 lm	3,760 lm	136 mA	30.3 W	123 lm/W	> 80
LLE AC G1 24x1450mm 6200lm 840 SNC	840/559	4,320 lm	4,020 lm	136 mA	30.3 W	131 lm/W	> 80
LLE AC G1 24x1450mm 6200lm 865 SNC	865/559	4,240 lm	3,950 lm	136 mA	30.3 W	129 lm/W	> 80
Operating mode HO							
LLE AC G1 24x560mm 2400lm 830 SNC	830/559	2,500 lm	2,300 lm	95 mA	21.5 W	107 lm/W	> 80
LLE AC G1 24x560mm 2400lm 840 SNC	840/559	2,670 lm	2,460 lm	95 mA	21.5 W	114 lm/W	> 80
LLE AC G1 24x560mm 2400lm 865 SNC	865/559	2,630 lm	2,420 lm	95 mA	21.5 W	112 lm/W	> 80
LLE AC G1 24x1150mm 4800lm 830 SNC	830/559	4,930 lm	4,540 lm	183 mA	41.5 W	109 lm/W	> 80
LLE AC G1 24x1150mm 4800lm 840 SNC	840/559	5,270 lm	4,850 lm	183 mA	41.5 W	116 lm/W	> 80
LLE AC G1 24x1150mm 4800lm 865 SNC	865/559	5,180 lm	5,770 lm	183 mA	41.5 W	114 lm/W	> 80
LLE AC G1 24x1450mm 6200lm 830 SNC	830/559	6,340 lm	5,840 lm	228 mA	51.8 W	112 lm/W	> 80
LLE AC G1 24x1450mm 6200lm 840 SNC	840/559	6,780 lm	6,240 lm	228 mA	51.8 W	120 lm/W	> 80
LLE AC G1 24x1450mm 6200lm 865 SNC	865/559	6,670 lm	6,140 lm	228 mA	51.8 W	118 lm/W	> 80

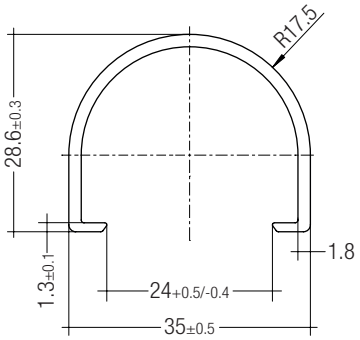
[1] Tolerance range for optical and electrical data: ±10 %.

ACCES-SORIES

LINEAR COVER SY

Product description

- LINEAR COVER for LLE 24
- Protection against direct touch for non-SELV applications
- Fast snap on mounting on to LLE 24 with clips or plastic washers
- High transmission: transparent 94 %, semi-transparent 87 %, diffuse 76 %
- Made of PMMA
- Tolerances: ± 1 mm for 597 mm length (ends finished), + 20 mm for 1,200 / 1,500 / 1,600 / 1,800 mm legth (ends raw)



Ordering data

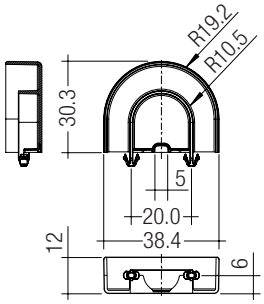
Type	Article number	Colour	Length	Packaging carton	Weight per pc.
LINEAR COVER SY Transparent 1600mm	**28000338**	Transparent	1,600 mm	12 pc(s).	0.272 kg
LINEAR COVER SY Frosted 1800mm	**28000437**	Semi-transparent	1,800 mm	12 pc(s).	0.308 kg
LINEAR COVER SY Frosted 1600mm	**28000339**	Semi-transparent	1,600 mm	12 pc(s).	0.272 kg
LINEAR COVER SY Frosted 1500mm	**28000435**	Semi-transparent	1,500 mm	12 pc(s).	0.244 kg
LINEAR COVER SY Frosted 1200mm	**28000422**	Semi-transparent	1,200 mm	12 pc(s).	0.205 kg
LINEAR COVER SY Frosted 597mm	**28000340**	Semi-transparent	597 mm	12 pc(s).	0.102 kg
LINEAR COVER SY Diffuse 1800mm	**28000438**	Diffuse	1,800 mm	12 pc(s).	0.308 kg
LINEAR COVER SY Diffuse 1600mm	**28000341**	Diffuse	1,600 mm	12 pc(s).	0.272 kg
LINEAR COVER SY Diffuse 1500mm	**28000436**	Diffuse	1,500 mm	12 pc(s).	0.257 kg
LINEAR COVER SY Diffuse 1200mm	**28000434**	Diffuse	1,200 mm	12 pc(s).	0.205 kg
LINEAR COVER SY Diffuse 597mm	**28000342**	Diffuse	597 mm	12 pc(s).	0.102 kg

ACCES-SORIES

ACL ENDCAP LLE24 PUSH-FIX

Product description

- ENDCAP for LLE 24
- Fast snap on mounting (sheet thickness 0.5 – 1.0 mm), for drilling hole 4 mm
- Made of Polycarbonat



Ordering data

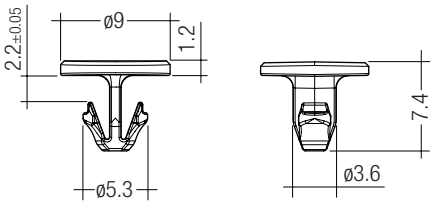
Type	Article number	Colour	Packaging carton	Weight per pc.
ACL ENDCAP LLE24 PUSH-FIX	**28001037**	White	480 pc(s).	0.003 kg

ACCES-SORIES

CLIP 4.3mm

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 drilling hole 4 mm
- Clip made of Polycarbonat



Ordering data

Type	Article number	Colour	Packaging bag[1]	Weight per pc.
ACL CLIP 4.3mm PUSH-FIX	**28001036**	White	500 pc(s).	0.001 kg

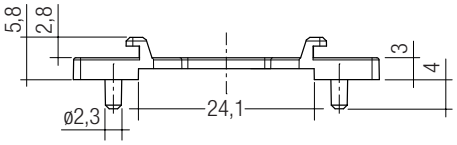
[1] Minimum sales quantity 500 pcs.

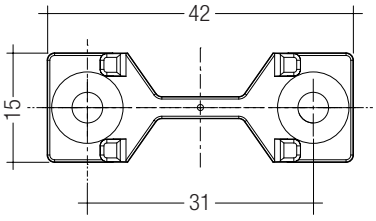
ACCES-SORIES

BRIDGE LLE24/40

Product description

- Enables the fixation of 24 mm wide Tridonic LED modules to fixtures made for 40 mm wide modules
- Ideal for extruded aluminium gear trays made for 40 mm modules with pre-alignment knobs
- Clip-on for LINEAR COVER and LINEAR LENS[2]
- For LLE 24 with 280 mm module minimum 2 bridges required
- For LLE 24 with 560 mm module minimum 3 bridges required
- Fixation via M3 or M4 countersunk screw, max. tightening torque 0.5 Nm
- BRIDGE made of white polycarbonate





Ordering data

Type	Article number	Colour	Packaging carton[1]	Weight per pc.
ACL BRIDGE LLE24/40 SCREW-FIX	**28001205**	White	600 Stk.	0.001 kg

[1] Minimum sales quantity 600 pcs.

[2] Beam characteristics will change due to the elevated fixation (see photometric files for details).

1. Standards

- IEC 55015
- IEC 61000-3-2
- IEC 61000-3-2
- IEC 61000-4-2
- IEC 61347
- IEC 62031
- EN 62471

1.1 Photometric code

Key for photometric code, e. g. 830 / 559

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

2. Thermical details

2.1 tc point, ambient temperature and life-time

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

For LLE a tp temperature of 75 °C has to be complied in order to achieve an optimum between heat sink requirements, light output and life-time.

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.

2.2 Storage and humidity

Storage temperature	-30 … +80 °C

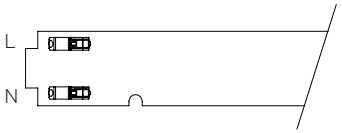
Operation only in non condensing environment.
Humidity during processing of the module should be between 30 to 70 %.

2.3 Thermal design and heat sink

The rated life of LED products depends to a large extent on the temperature. If the permissible temperature limits are exceeded, the life of the LLE will be greatly reduced or the LLE may be destroyed.

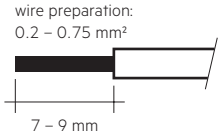
3. Installation / wiring

3.1 Wiring



3.2 Wiring type and cross section

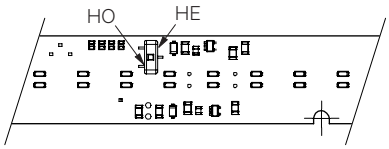
The wiring can be solid or flexible wire with a cross section of 0.2 to 0.75 mm². For the push-wire connection you have to strip the insulation (7–9 mm).



Inserting stranded wires / removing wires by lightly pressing on the push button.

3.3 Operating mode selector

The operating mode is set via slide switch.
Do not change the mode during operation of the module.



3.3 Mounting instruction

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

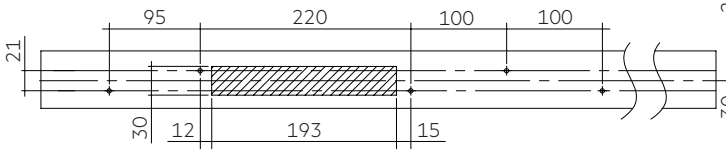
Max. torque for fixing: 0.5 Nm.

The LED modules are mounted onto a heat sink with a non-conductive mounting item like an ACL Clip 4.3 mm or a plastic rivet.

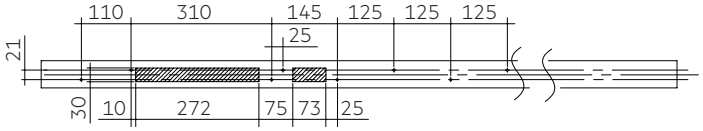
If mounted with conductive screws additional insulation is necessary. A plastic washer can be used to keep the required creepage and clearance distances.

Cut-out of mounting plate:

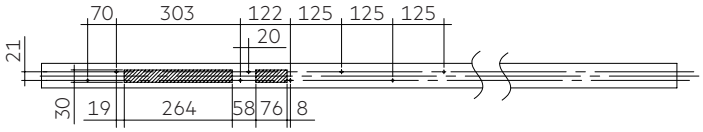
LLE AC G1 24x560mm 2400lm SNC



LLE AC G1 24x1150mm 4800lm SNC



LLE AC G1 24x1450mm 6200lm SNC



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.

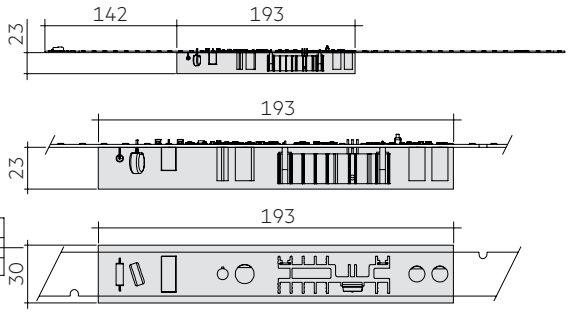
3.4 Safety instructions

A protection against direct touch (test finger) to the module has to be guaranteed. This is typically achieved by means of a non removable light distributor over the module.

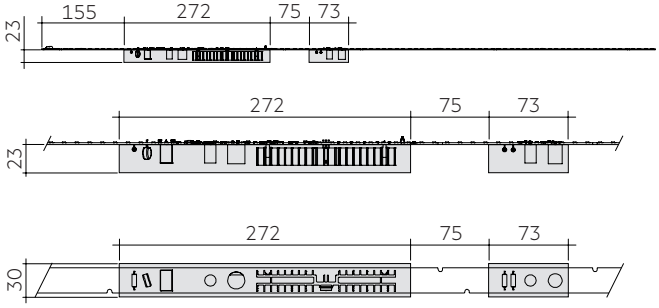
For basic insulation ensure creapage and clearance according to below drawings.

At least 1.5 mm of clearance and 2.5 mm of creapage to active parts must be ensured.

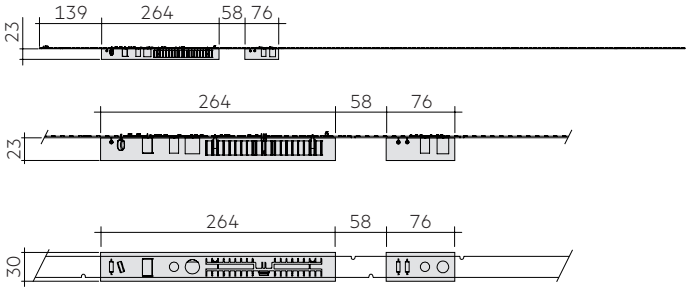
LLE AC G1 24x560mm 2400lm SNC



LLE AC G1 24x1150mm 4800lm SNC



LLE AC G1 24x1450mm 6200lm SNC



Keep clear area

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. Life-time

4.1 Life-time, lumen maintenance and failure rate

The light output of an LED Module decreases over the life-time, 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 life-time of an LED module.

As the L value is a statistical value and the lumen maintenace 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 inital luminous flux, respectivly 90 % will be above 70 % of the initial value. In addition the percentage of failed modules (fatal failure) is characterized by the C value.

The F value is the combination of the B and C value. That means for F degradation and complete failures are considered, e.g. L70F10 means 10 % of the LED modules may fail or be below 70 % of the initial luminous flux.

4.2 Lumen maintenance

tp temperature	L90 / F10	L90 / F50	L80 / F10	L80 / F50	L70 / F10	L70 / F50
55 °C	16,000 h	19,000 h	30,000 h	36,000 h	47,000 h	50,000 h
65 °C	16,000 h	19,000 h	29,000 h	36,000 h	45,000 h	50,000 h
75 °C	15,000 h	19,000 h	28,000 h	36,000 h	43,000 h	50,000 h
85 °C	10,000 h	12,000 h	19,000 h	24,000 h	28,000 h	37,000 h

4.3 Switching capability

25,000 cycles

Tested according to IEC 62717 Cl 10.3.3
30 s on / 30 s off

5. Electrical values

5.1 Maximum loading of automatic circuit breakers

Automatic circuit breaker type	C10	C13	C16	C20	B10	B13	B16	B20	Inrush current	
Installation Ø	1.5 mm²	1.5 mm²	1.5 mm²	2.5 mm²	1.5 mm²	1.5 mm²	1.5 mm²	2.5 mm²	I_{max}	time
LLE AC G1 24x560mm 2400lm SNC	60	80	100	125	60	80	100	125	25 A	5 µs
LLE AC G1 24x1150mm 4800lm SNC	30	40	50	65	30	40	50	65	30 A	5 µs
LLE AC G1 24x1450mm 6200lm SNC	25	30	40	50	25	30	40	50	30 A	5 µs

5.2 Isolation and electric strength testing of luminaires

Electronic devices can be damaged by high voltage. This has to be considered during the routine testing of the luminaires in production.

According to IEC 60598-1 Annex Q (informative only!) or ENEC 303-Annex A, each luminaire should be submitted to an isolation test with 500 V DC for 1 second. This test voltage should be connected between the interconnected phase and neutral terminals and the earth terminal.
The isolation resistance must be at least 2 MΩ.

As an alternative, IEC 60598-1 Annex Q describes a test of the electrical strength with 1500 V AC (or 1.414 x 1500 V DC). To avoid damage to the electronic devices this test must not be conducted.

5.3 AC operation

Mains voltage:
220–240 V 50/60 Hz
196–264 V 50/60 Hz for safety

6. Photometric charcteristics

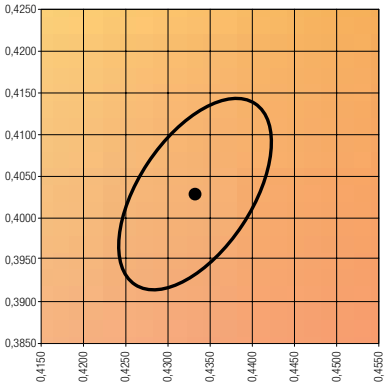
6.1 Coordinates and tolerances according to CIE 1931

The specified colour coordinates are integral measured by a current impulse with typical values of module and a duration of 100 ms.
The ambient temperature of the measurement is ta = 25 °C.
The measurement tolerance of the colour coordinates are ± 0.01.

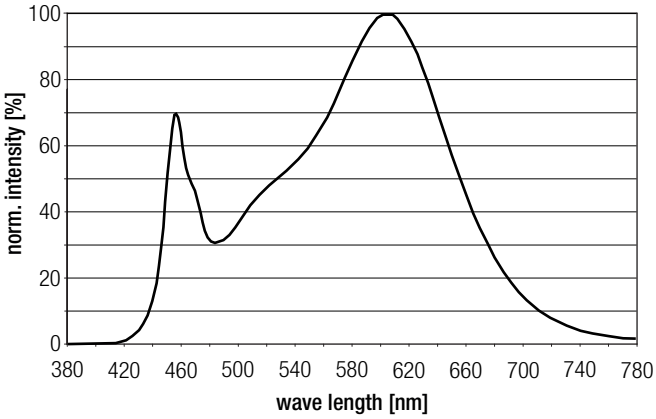
6.2 Colour coordinates for LED module without housing

3,000 K

	x0	y0
Centre HE	0.4339	0.4025
Centre HO	0.4338	0.4030

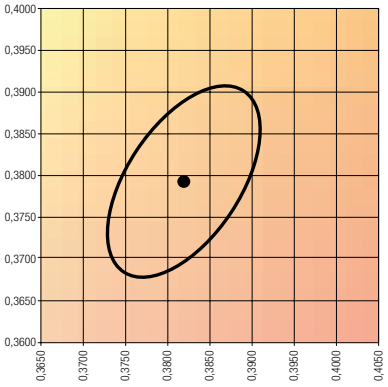


MacAdam Ellipse: 5SDCM

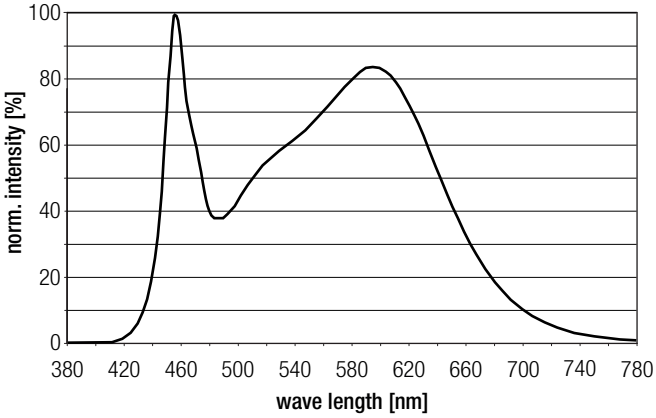


4,000 K

	x0	y0
Centre HE	0.3819	0.3792
Centre HO	0.3818	0.3797

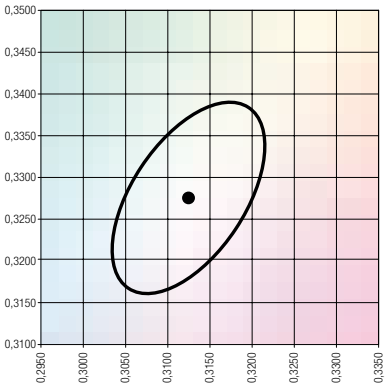


MacAdam Ellipse: 5SDCM

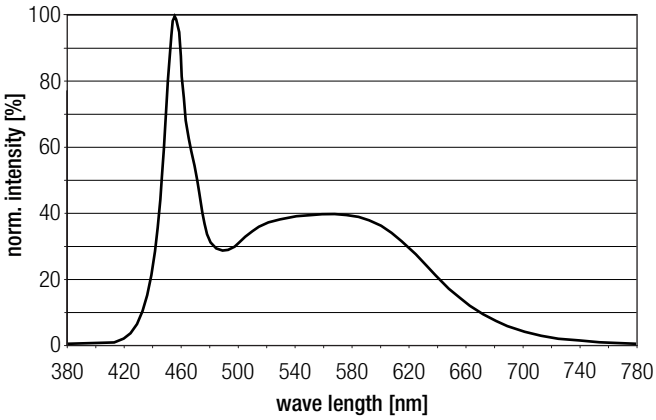


6,500 K

	x0	y0
Centre HE	0.3122	0.3274
Centre HO	0.3123	0.3282

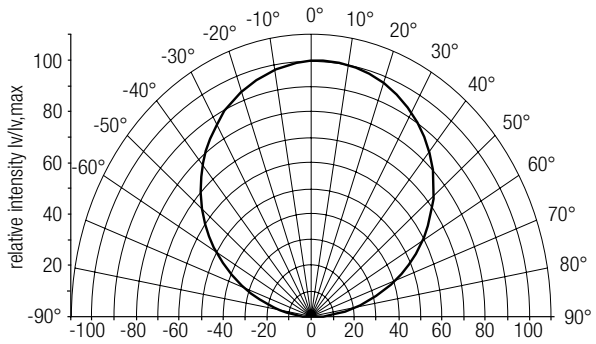


MacAdam Ellipse: 5SDCM



6.3 Light distribution

The optical design of the LLE product line ensures optimum homogenity 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 homogenious light distribution a suitable optic (e. g. PMMA diffuser) and a sufficient spacing between module and optic (typ. 5 cm) should be used.

For further information see Design-in Guide, 3D data and photometric data on www.tridonic.com or on request.