



## Module LLE FLEX G1 8mm EXC

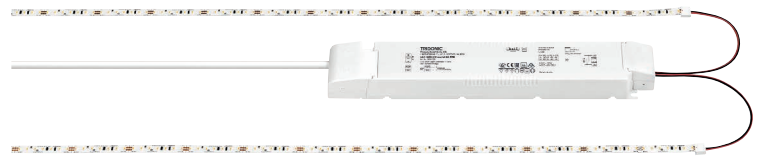
Modules LLE FLEX EXCITE

### Product description

- Dimmable 24 V constant voltage strip (SELV)
- Ideal for application on aluminum extrusions but also for various decorative lighting applications such as cove lighting, façade accent lighting etc.

### Features and benefits

- Extremely narrow pitch distance enables short distance to diffuser and outstanding homogeneity
- Small colour tolerance (MacAdam 3), CRI 90
- Luminous flux range of 600, 1,200, 1,800 and 2,500 lm/m
- Colour temperature 2,700, 3,000, 4,000 and 6,500 K with SDCM 3<sup>®</sup>
- High design freedom due to 5 cm cut-options
- Self-adhesive 3M tape at the backside for simple mounting on different surfaces
- PCB to PCB and wire to PCB connectors for toolless handling and connection
- Small colour tolerance (MacAdam 3)
- Life-time 50,000 hours
- 5-year guarantee
- System solution in combination with Tridonic constant voltage LED Driver (fixed output and dimmable)



**Standards**, page 6

**Colour temperatures and tolerances**, page 8

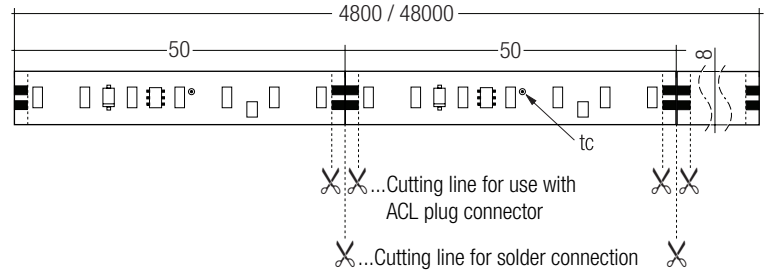


### Module LLE FLEX G1 8mm EXC

Modules LLE FLEX EXCITE

#### Technical data

Beam characteristic	120°
Ambient temperature range	-35 ... +50 °C
tp rated	65 °C
tc	75 °C
DC supply voltage	24 V
DC supply voltage range®	21.5 – 26.4 V
Insulation test voltage	0.5 kV
ESD classification	severity level 1
Risk group (EN 62471:2008)	0
Classification acc. to IEC 62031	Built-in
Type of protection	IP00



#### Ordering data

Type	Article number	Colour temperature	Packaging carton	Weight per pc.
<b>4,800 mm roll</b>				
LLE FLEX G1 8x4800 6W-600lm/m 927 EXC	87500524	2,700 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 6W-600lm/m 930 EXC	87500525	3,000 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 6W-600lm/m 940 EXC	87500526	4,000 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 6W-600lm/m 965 EXC	87500527	6,500 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 11W-1200lm/m 927 EXC	87500528	2,700 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 11W-1200lm/m 930 EXC	87500529	3,000 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 11W-1200lm/m 940 EXC	87500530	4,000 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 11W-1200lm/m 965 EXC	87500531	6,500 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 18W-1800lm/m 927 EXC	87500532	2,700 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 18W-1800lm/m 930 EXC	87500533	3,000 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 16W-1800lm/m 940 EXC	87500534	4,000 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 16W-1800lm/m 965 EXC	87500535	6,500 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 26W-2500lm/m 927 EXC	87500536	2,700 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 26W-2500lm/m 930 EXC	87500537	3,000 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 23W-2500lm/m 940 EXC	87500538	4,000 K	15 pc(s).	0.055 kg
LLE FLEX G1 8x4800 23W-2500lm/m 965 EXC	87500539	6,500 K	15 pc(s).	0.055 kg
<b>48,000 mm roll</b>				
LLE FLEX G1 8x48000 11W-1200lm/m 927 EXC	87500540	2,700 K	5 pc(s).	0.500 kg
LLE FLEX G1 8x48000 11W-1200lm/m 930 EXC	87500541	3,000 K	5 pc(s).	0.500 kg
LLE FLEX G1 8x48000 11W-1200lm/m 940 EXC	87500542	4,000 K	5 pc(s).	0.500 kg
LLE FLEX G1 8x48000 18W-1800lm/m 927 EXC	87500556	2,700 K	5 pc(s).	0.500 kg
LLE FLEX G1 8x48000 18W-1800lm/m 930 EXC	87500557	3,000 K	5 pc(s).	0.500 kg
LLE FLEX G1 8x48000 16W-1800lm/m 940 EXC	87500558	4,000 K	5 pc(s).	0.500 kg
LLE FLEX G1 8x48000 26W-2500lm/m 927 EXC	87500543	2,700 K	5 pc(s).	0.500 kg
LLE FLEX G1 8x48000 26W-2500lm/m 930 EXC	87500544	3,000 K	5 pc(s).	0.500 kg
LLE FLEX G1 8x48000 23W-2500lm/m 940 EXC	87500545	4,000 K	5 pc(s).	0.500 kg

## Specific technical data

Type <sup>®</sup>	Photometric code	Typ. luminous flux at tp = 25 °C <sup>®</sup>	Typ. luminous flux at tp = 65 °C <sup>®</sup>	Typ. current consumption at tp = 65 °C <sup>®</sup>	Typ. power consumption at tp = 65 °C <sup>®</sup>	Efficacy of the module at tp = 25 °C	Efficacy of the module at tp = 65 °C	Colour rendering index CRI
<b>LLE FLEX G1 8x4800 6W-600lm/m 927 EXC</b>	927/359	670 lm/m	600 lm/m	256 mA/m	6.2 W/m	100 lm/W	90 lm/W	> 90
<b>LLE FLEX G1 8x4800 6W-600lm/m 930 EXC</b>	930/359	670 lm/m	600 lm/m	256 mA/m	6.2 W/m	100 lm/W	90 lm/W	> 90
<b>LLE FLEX G1 8x4800 6W-600lm/m 940 EXC</b>	940/359	685 lm/m	615 lm/m	236 mA/m	5.6 W/m	111 lm/W	100 lm/W	> 90
<b>LLE FLEX G1 8x4800 6W-600lm/m 965 EXC</b>	965/359	685 lm/m	615 lm/m	236 mA/m	5.6 W/m	111 lm/W	100 lm/W	> 90
<b>LLE FLEX G1 8x4800(O) 11W-1200lm/m 927 EXC</b>	927/359	1,320 lm/m	1,190 lm/m	470 mA/m	11.2 W/m	107 lm/W	96 lm/W	> 90
<b>LLE FLEX G1 8x4800(O) 11W-1200lm/m 930 EXC</b>	930/359	1,320 lm/m	1,190 lm/m	470 mA/m	11.2 W/m	107 lm/W	96 lm/W	> 90
<b>LLE FLEX G1 8x4800(O) 11W-1200lm/m 940 EXC</b>	940/359	1,360 lm/m	1,220 lm/m	446 mA/m	10.8 W/m	116 lm/W	105 lm/W	> 90
<b>LLE FLEX G1 8x4800 11W-1200lm/m 965 EXC</b>	965/359	1,360 lm/m	1,220 lm/m	446 mA/m	10.8 W/m	116 lm/W	105 lm/W	> 90
<b>LLE FLEX G1 8x4800(O) 18W-1800lm/m 927 EXC</b>	927/359	1,960 lm/m	1,770 lm/m	751 mA/m	18.0 W/m	100 lm/W	90 lm/W	> 90
<b>LLE FLEX G1 8x4800(O) 18W-1800lm/m 930 EXC</b>	930/359	1,960 lm/m	1,770 lm/m	751 mA/m	18.0 W/m	100 lm/W	90 lm/W	> 90
<b>LLE FLEX G1 8x4800(O) 16W-1800lm/m 940 EXC</b>	940/359	1,980 lm/m	1,780 lm/m	662 mA/m	15.8 W/m	114 lm/W	103 lm/W	> 90
<b>LLE FLEX G1 8x4800 16W-1800lm/m 965 EXC</b>	965/359	1,980 lm/m	1,780 lm/m	662 mA/m	15.8 W/m	114 lm/W	103 lm/W	> 90
<b>LLE FLEX G1 8x4800(O) 26W-2500lm/m 927 EXC</b>	927/359	2,750 lm/m	2,470 lm/m	1,120 mA/m	26.0 W/m	94 lm/W	85 lm/W	> 90
<b>LLE FLEX G1 8x4800(O) 26W-2500lm/m 930 EXC</b>	930/359	2,750 lm/m	2,470 lm/m	1,120 mA/m	26.0 W/m	94 lm/W	85 lm/W	> 90
<b>LLE FLEX G1 8x4800(O) 23W-2500lm/m 940 EXC</b>	940/359	2,720 lm/m	2,440 lm/m	944 mA/m	22.6 W/m	110 lm/W	99 lm/W	> 90
<b>LLE FLEX G1 8x4800 23W-2500lm/m 965 EXC</b>	965/359	2,720 lm/m	2,440 lm/m	944 mA/m	22.6 W/m	110 lm/W	99 lm/W	> 90

<sup>®</sup> Tolerance range for optical and electrical data: ±10 %. Values given for 1 m LLE-FLEX.

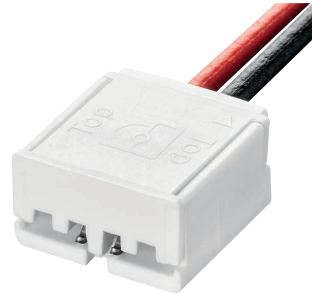
<sup>®</sup> Exceeding the max. operating voltage leads to an overload on the LLE-FLEX. This may in turn result in a reduction in life-time or even in destruction.

<sup>®</sup> Integral measurement over the complete module.

Connector for LLE-FLEX

Product description

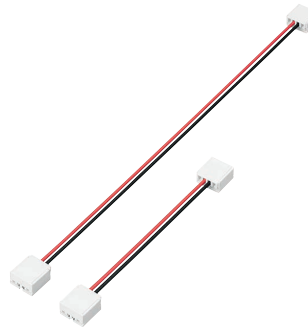
- For connection of LLE-FLEX modules
- Easy assembly: remove adhesive 3M tape on the backside of the LLE-FLEX in the connection area, insert the LLE-FLEX into the connector and lock it by pressing down the top of the connector
- The insertion length of the LLE-FLEX must be at least 4 mm (cut the LLE-FLEX at the dotted lines)
- Glow wire test according to IEC 60695-2-11: 650 °C
- I<sub>rated</sub> = 5 A
- U<sub>rated</sub> = 29.9 V
- Wire cross section AWG 22



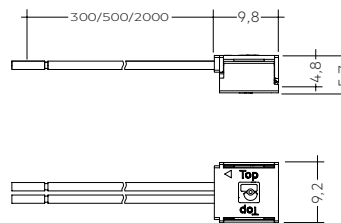
ACL plug connector Wire to PCB



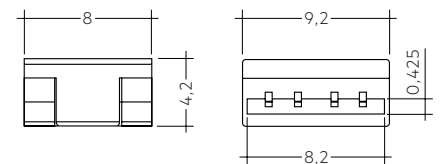
ACL plug connector PCB to PCB



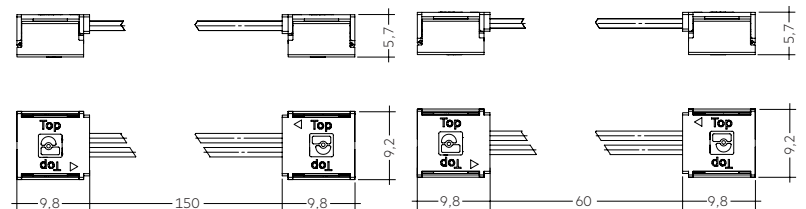
ACL plug corner connector



ACL plug connector Wire to PCB



ACL plug connector PCB to PCB



ACL plug corner connector 150x9.8x5.7mm

ACL plug corner connector 60x9.8x5.7mm

Ordering data

Type	Article number	Cable length	Packaging carton	Packaging bag	Weight per pc.
ACL plug connector Wire to PCB 9x4.2mm	28000994	300 mm	250 pc(s).	10 pc(s).	0.004 kg
ACL plug connector Wire-PCB 500x9x5.7mm	28001657	500 mm	20 pc(s).	-	0.008 kg
ACL plug connector Wire-PCB 2000x9x5.7mm	28001656	2,000 mm	10 pc(s).	-	0.018 kg
ACL plug connector PCB to PCB 8x4.2mm	28000995	-	25 pc(s).	25 pc(s).	0.001 kg
ACL plug corner connector 150x9.8x5.7mm	28001654	-	10 pc(s).	-	0.002 kg
ACL plug corner connector 60x9.8x5.7mm	28001655	-	20 pc(s).	-	0.002 kg

**LED Driver matrix – LLE FLEX G1 8mm EXC**

Type	LCA 100W 24V one4all SC PRE	LCU 35W 24V SR TOP	LCU 60W 24V SR TOP	LCU 96W 24V SR TOP	LCU 180W 24V SR TOP
Article number	28001253	28000411	28000412	28000413	28000414
<b>LLE FLEX UL certified</b>	no	class 2	class 2	class 2	no

Type	Assignable LED Driver				
LLE FLEX G1 8mm 600lm/m 927/930	160–1400 cm	55–485 cm	75–830 cm	145–1325 cm	270–2490 cm
LLE FLEX G1 8mm 600lm/m 940/965	175–1520 cm	60–525 cm	80–900 cm	160–1440 cm	295–2705 cm
LLE FLEX G1 8mm 1200lm/m 927/930	90–765 cm	30–265 cm	40–450 cm	80–725 cm	150–1360 cm
LLE FLEX G1 8mm 1200lm/m 940/965	95–805 cm	35–275 cm	45–475 cm	85–765 cm	155–1435 cm
LLE FLEX G1 8mm 1800lm/m 927/930	55–480 cm	20–165 cm	25–285 cm	50–455 cm	95–855 cm
LLE FLEX G1 8mm 1800lm/m 940/965	65–540 cm	25–185 cm	30–320 cm	60–515 cm	105–965 cm
LLE FLEX G1 8mm 2500lm/m 927/930	40–320 cm	15–110 cm	20–190 cm	35–305 cm	65–570 cm
LLE FLEX G1 8mm 2500lm/m 940/965	50–425 cm	15–130 cm	20–225 cm	40–360 cm	75–675 cm

The maximum chaining is 480 cm. By using the 2,500 lm/m variants the max. chaining is 250 cm.

## 1. Standards

IEC 62031  
IEC 62471  
IEC 62717  
IEC 61000-4-2

### 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	McAdam initial	McAdam after 25% of the life-time (max.6000h)	
7	70 – 79			Luminous flux after 25% of the life-time (max.6000h)	
8	80 – 89			Code	Luminous flux
9	≥90			7	≥ 70 %
			8	≥ 80 %	
			9	≥ 90 %	

### 1.2 Energy classification

Type	Energy classification
LLE FLEX G1 8x4800 6W-600lm/m 927 EXC	A+
LLE FLEX G1 8x4800 6W-600lm/m 930 EXC	A+
LLE FLEX G1 8x4800 6W-600lm/m 940 EXC	A+
LLE FLEX G1 8x4800 6W-600lm/m 965 EXC	A+
LLE FLEX G1 8x4800(O) 11W-1200lm/m 927 EXC	A+
LLE FLEX G1 8x4800(O) 11W-1200lm/m 930 EXC	A+
LLE FLEX G1 8x4800(O) 11W-1200lm/m 940 EXC	A+
LLE FLEX G1 8x4800 11W-1200lm/m 965 EXC	A+
LLE FLEX G1 8x4800(O) 18W-1800lm/m 927 EXC	A+
LLE FLEX G1 8x4800(O) 18W-1800lm/m 930 EXC	A+
LLE FLEX G1 8x4800(O) 16W-1800lm/m 940 EXC	A+
LLE FLEX G1 8x4800 16W-1800lm/m 965 EXC	A+
LLE FLEX G1 8x4800(O) 26W-2500lm/m 927 EXC	A+
LLE FLEX G1 8x4800(O) 26W-2500lm/m 930 EXC	A+
LLE FLEX G1 8x4800(O) 23W-2500lm/m 940 EXC	A+
LLE FLEX G1 8x4800 23W-2500lm/m 965 EXC	A+

## 2. Thermal 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 65°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.

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

### 2.2 Storage and humidity

Storage temperature	-35 ... +80 °C
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Operation only in non condensing environment.

Humidity during processing of the module should be between 0 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.

### 2.4 Heat sink values

#### LLE FLEX G1 8x4800 6W-600lm/m 9xx EXC

ta	tp	R <sub>th, hs-a</sub> <sup>①</sup>	Cooling area <sup>①</sup>
25°C	65°C	–	self cooling
35°C	65°C	–	self cooling
45°C	65°C	–	self cooling
50°C	65°C	–	self cooling

#### LLE FLEX G1 8x4800(O) 11W-1200lm/m 9xx EXC

ta	tp	R <sub>th, hs-a</sub> <sup>①</sup>	Cooling area <sup>①</sup>
25°C	65°C	–	self cooling
35°C	65°C	–	self cooling
45°C	65°C	–	self cooling
50°C	65°C	–	self cooling

#### LLE FLEX G1 8x4800(O) 18/16W-1800lm/m 9xx EXC

ta	tp	R <sub>th, hs-a</sub> <sup>①</sup>	Cooling area <sup>①</sup>
25°C	65°C	–	self cooling
35°C	65°C	273 K/W	24.4 cm <sup>2</sup>
45°C	65°C	17.2 K/W	38.8 cm <sup>2</sup>
50°C	65°C	12.2 K/W	45.6 cm <sup>2</sup>

#### LLE FLEX G1 8x4800(O) 26/23W-2500lm/m 9xx EXC

ta	tp	R <sub>th, hs-a</sub> <sup>①</sup>	Cooling area <sup>①</sup>
25°C	65°C	24.1 K/W	27.7 cm <sup>2</sup>
35°C	65°C	17.3 K/W	38.5 cm <sup>2</sup>
45°C	65°C	10.5 K/W	63.5 cm <sup>2</sup>
50°C	65°C	7.1 K/W	93.9 cm <sup>2</sup>

<sup>①</sup> Values for a single segment of the LLE FLEX (50 mm).

### Notes

The actual cooling surface can differ because of the material, the structural shape, outside influences and the installation situation.

## 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:

- SELV
- Short-circuit protection
- Overload protection
- Overttemperature protection



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

Wrong polarity can damage the LLE-FLEX.

### 3.2 Mounting instruction



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

The LLE-FLEX is separable each 50 mm with the full function of each segment.

Insulation must be ensured at the contact area of the segments (e.g. by using the connector ACL).

The fixing/cooling surface must be cleaned before installing the LLE-FLEX modules to remove all dirt, dust and grease.

Prevent shear- or peel forces

Min. bending radius of the LLE-FLEX is 3 cm.



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.

### 3.3 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 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.

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 for LLE FLEX G1 8mm EXC

Supply voltage	tp temperature	L90/B10	L90/B50	L80/B10	L80/B50	L70/B10	L70/B50
24 V	40 °C	>60,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
24 V	45 °C	>60,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
24 V	55 °C	>60,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
24 V	65 °C	60,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
24 V	75 °C	45,000 h	50,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h

## 6. Photometric characteristics

### 6.1 Coordinates and tolerances according to CIE 1931

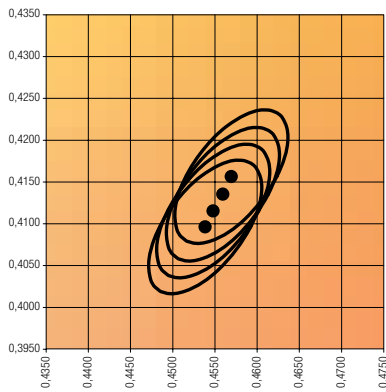
The specified colour coordinates are measured integral by a current impulse with typical values of module and a duration of 100 ms.

The ambient temperature of the measurement is  $t_a = 25^\circ\text{C}$ .

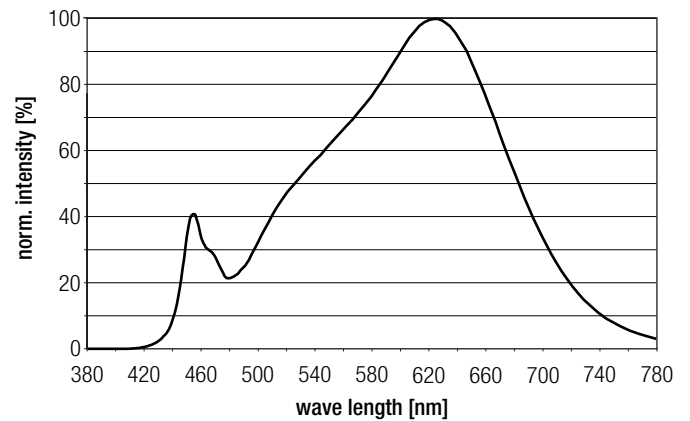
The measurement tolerance of the colour coordinates are  $\pm 0.01$ .

#### 2,700 K

	x0	y0
Centre 600 lm/m	0.4544	0.4097
Centre 1,200 lm/m	0.4549	0.4115
Centre 1,800 lm/m	0.4556	0.4134
Centre 2,500 lm/m	0.4563	0.4154

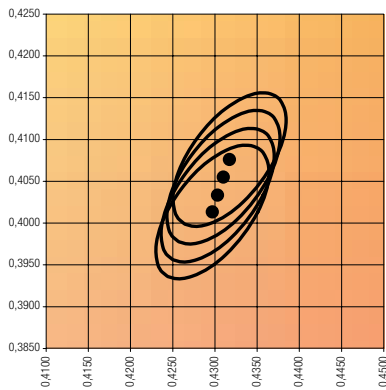


MacAdam Ellipse: 3SDCM

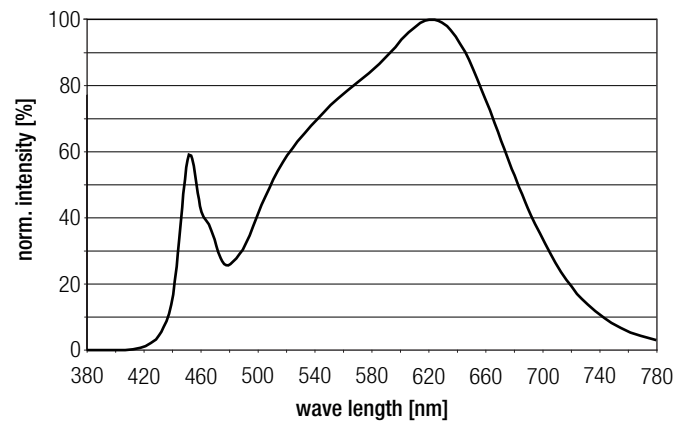


#### 3,000 K

	x0	y0
Mittelpunkt 600 lm/m	0.4292	0.4010
Mittelpunkt 1,200 lm/m	0.4300	0.4033
Mittelpunkt 1,800 lm/m	0.4306	0.4050
Mittelpunkt 2,500 lm/m	0.4315	0.4072



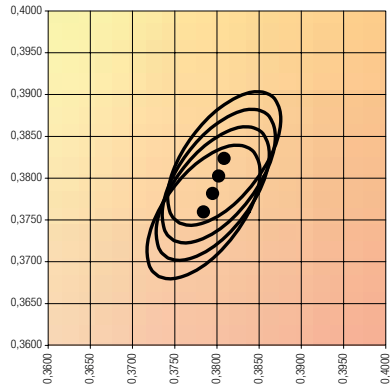
MacAdam Ellipse: 3SDCM



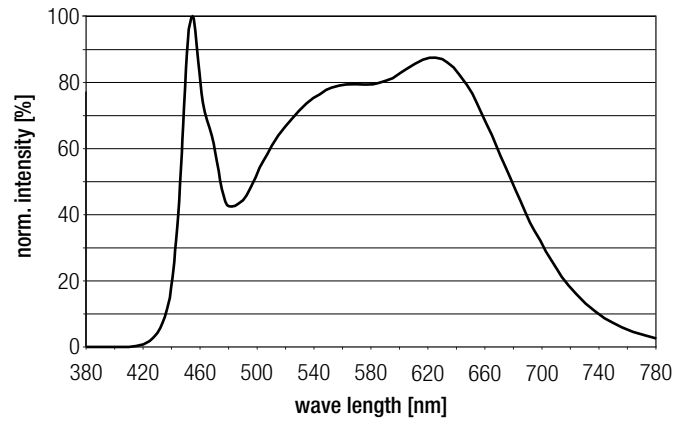


**4,000 K**

	x0	y0
Centre 600 lm/m	0.3778	0.3753
Centre 1,200 lm/m	0.3788	0.3779
Centre 1,800 lm/m	0.3795	0.3798
Centre 2,500 lm/m	0.3804	0.3821

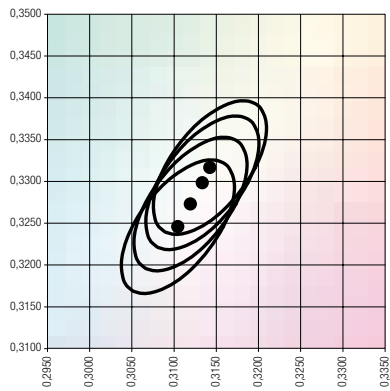


— MacAdam Ellipse: 3SDCM

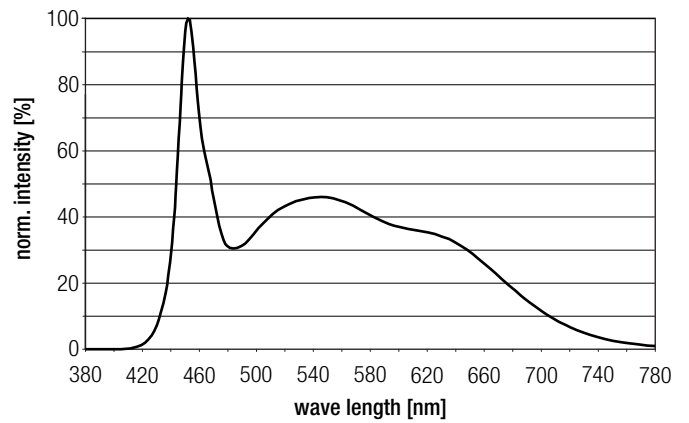


**6,500 K**

	x0	y0
Centre 600 lm/m	0.3102	0.3243
Centre 1,200 lm/m	0.3116	0.3273
Centre 1,800 lm/m	0.3128	0.3297
Centre 2,500 lm/m	0.3138	0.3316

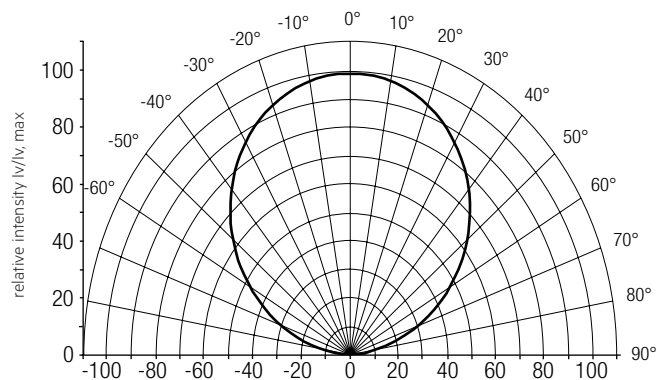


— MacAdam Ellipse: 3SDCM



## 6.2 Light distribution

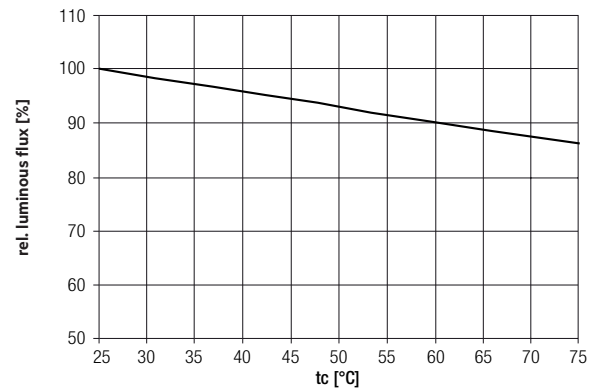
The optical design of the LLE product line ensures optimum homogeneity for the light distribution.



The colour temperature is measured over the complete module. The single LED light points can be outside of 5SDCM.

To ensure an ideal mixture of colours and a homogenous light distribution a suitable optic (e. g. PMMA diffuser) and a sufficient spacing between module and optic (typ. 5 cm) should be used.

## 6.3 Relative luminous flux vs. tc temperature



## 7. Miscellaneous

### 7.1 Additional information

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

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

Life-time declarations are informative and represent no warranty claim.