



#### Module LLE FLEX G2 8mm ADV

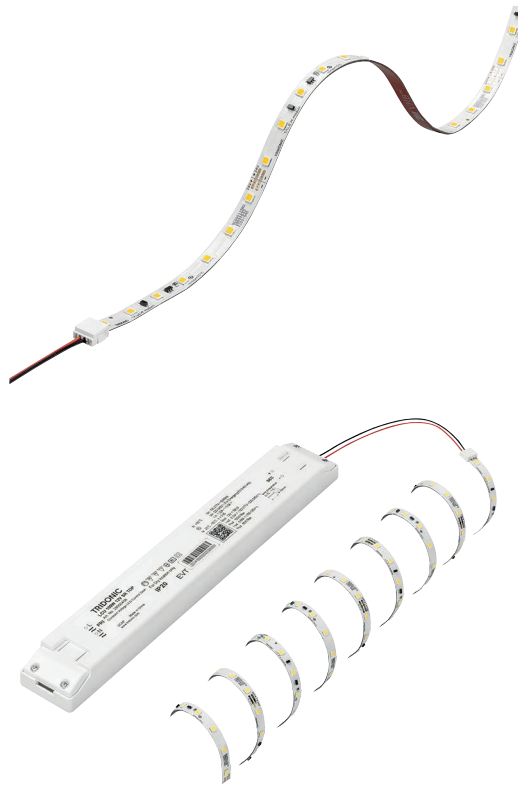
Modules LLE FLEX ADVANCED

#### Product description

- Dimmable 24 V constant voltage stripe (SELV)
- Ideal for various decorative lighting applications: facade accent lighting, ceiling integration, cove lighting and for aluminium extrusions

#### Features and benefits

- Luminous flux range of 600, 1200 and 1,800 lm/m
- Colour temperature 2,700, 3,000, 4,000 and 6,500 K with SDCM 3<sup>®</sup>
- Efficacy of the module up to 141 lm/W at  $t_p = 65\text{ °C}$
- High design freedom due to 10 cm cut-options
- Pitch distance of 1.4 cm enables high light homogeneity
- 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
- Long life-time up to 50,000 hours
- 5-year guarantee
- System solution in combination with Tridonic constant voltage LED Driver (fixed output and dimmable)



**Standards**, page 5

**Colour temperatures and tolerances**, page 7



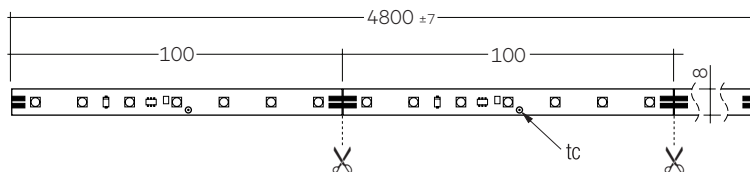


## Module LLE FLEX G2 8mm ADV

Modules LLE FLEX ADVANCED

### 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 <sup>®</sup>	21.5 – 26.4 V
Insulation test voltage	0.5 kV
ESD classification	severity level 4
Risk group (EN 62471:2008)	0
Type of protection	IP00



### Ordering data

Type	Article number	Colour temperature	Packaging carton	Weight per roll
<b>4,800 mm roll</b>				
LLE FLEX G2 8x4800 4W-600lm/m 827 ADV	28001832	2,700 K	15 pc(s)	0.07 kg
LLE FLEX G2 8x4800 4W-600lm/m 830 ADV	28001900	3,000 K	15 pc(s)	0.07 kg
LLE FLEX G2 8x4800 4W-600lm/m 840 ADV	28001901	4,000 K	15 pc(s)	0.07 kg
LLE FLEX G2 8x4800 4W-600lm/m 865 ADV	28001902	6,500 K	15 pc(s)	0.07 kg
LLE FLEX G2 8x4800 8W-1200lm/m 827 ADV	28001833	2,700 K	15 pc(s)	0.07 kg
LLE FLEX G2 8x4800 8W-1200lm/m 830 ADV	28001903	3,000 K	15 pc(s)	0.07 kg
LLE FLEX G2 8x4800 7W-1200lm/m 840 ADV	28001904	4,000 K	15 pc(s)	0.07 kg
LLE FLEX G2 8x4800 7W-1200lm/m 865 ADV	28001905	6,500 K	15 pc(s)	0.07 kg
LLE FLEX G2 8x4800 12W-1800lm/m 827 ADV	28001834	2,700 K	15 pc(s)	0.07 kg
LLE FLEX G2 8x4800 12W-1800lm/m 830 ADV	28001906	3,000 K	15 pc(s)	0.07 kg
LLE FLEX G2 8x4800 11W-1800lm/m 840 ADV	28001907	4,000 K	15 pc(s)	0.07 kg
LLE FLEX G2 8x4800 11W-1800lm/m 865 ADV	28001908	6,500 K	15 pc(s)	0.07 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
LLE FLEX G2 8x4800 4W-600lm/m 827 ADV	827/56x	600 lm/m	520 lm/m	157 mA/m	3.8 W/m	146 lm/W	136 lm/W	> 80
LLE FLEX G2 8x4800 4W-600lm/m 830 ADV	830/56x	600 lm/m	520 lm/m	157 mA/m	3.8 W/m	146 lm/W	136 lm/W	> 80
LLE FLEX G2 8x4800 4W-600lm/m 840 ADV	840/56x	600 lm/m	520 lm/m	157 mA/m	3.8 W/m	146 lm/W	136 lm/W	> 80
LLE FLEX G2 8x4800 4W-600lm/m 865 ADV	865/56x	600 lm/m	520 lm/m	157 mA/m	3.8 W/m	146 lm/W	136 lm/W	> 80
LLE FLEX G2 8x4800 8W-1200lm/m 827 ADV	827/56x	1,200 lm/m	1,050 lm/m	326 mA/m	7.8 W/m	141 lm/W	134 lm/W	> 80
LLE FLEX G2 8x4800 8W-1200lm/m 830 ADV	830/56x	1,200 lm/m	1,050 lm/m	326 mA/m	7.8 W/m	141 lm/W	134 lm/W	> 80
LLE FLEX G2 8x4800 7W-1200lm/m 840 ADV	840/56x	1,200 lm/m	1,050 lm/m	308 mA/m	7.4 W/m	150 lm/W	141 lm/W	> 80
LLE FLEX G2 8x4800 7W-1200lm/m 865 ADV	865/56x	1,200 lm/m	1,050 lm/m	308 mA/m	7.4 W/m	150 lm/W	141 lm/W	> 80
LLE FLEX G2 8x4800 12W-1800lm/m 827 ADV	827/56x	1,800 lm/m	1,550 lm/m	492 mA/m	11.8 W/m	140 lm/W	131 lm/W	> 80
LLE FLEX G2 8x4800 12W-1800lm/m 830 ADV	830/56x	1,800 lm/m	1,550 lm/m	492 mA/m	11.8 W/m	140 lm/W	131 lm/W	> 80
LLE FLEX G2 8x4800 11W-1800lm/m 840 ADV	840/56x	1,800 lm/m	1,550 lm/m	469 mA/m	11.3 W/m	147 lm/W	137 lm/W	> 80
LLE FLEX G2 8x4800 11W-1800lm/m 865 ADV	865/56x	1,800 lm/m	1,550 lm/m	469 mA/m	11.3 W/m	147 lm/W	137 lm/W	> 80

<sup>®</sup> Tolerance range for optical and electrical data: ±15 %. Values given for 1 m LLE-FLEX.

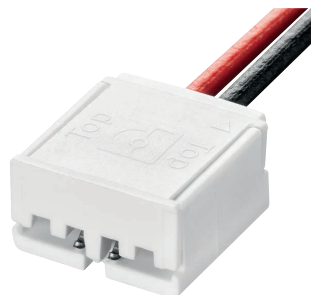
<sup>®</sup> Exceeding the max. operating voltage leads to an overload on the LLE-FLEX. This may in turn result in a reduction in life-time or even in destruction.

<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



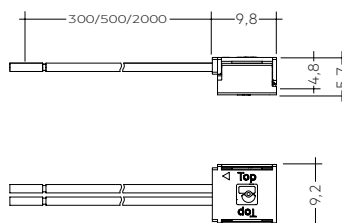
ACL plug connector Wire to PCB



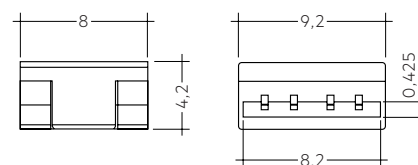
ACL plug connector PCB to PCB



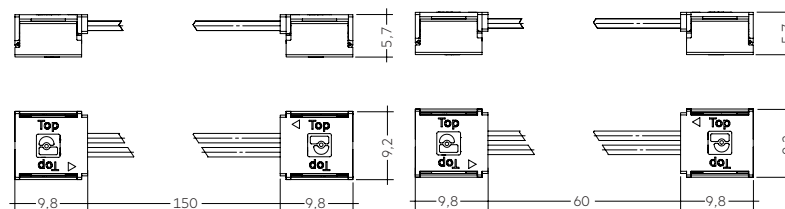
ACL plug corner connector



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	-	20 pc(s).	-	0.002 kg
ACL plug corner connector 60x9.8x5.7mm	28001655	-	20 pc(s).	-	0.002 kg

## LED Driver matrix – LLE FLEX G2 8mm

REMOTE – Dimming			
Type	LCA 100W 24V one4all SC PRE	LCA 100W 24V one4all Ip PRE	LCA 150W 24V one4all SC PRE
Article number	28001253	28001436	28001437

Type	Assignable LED Driver			
LLE FLEX G2 8x4800 4W-600lm/m 827 ADV	28001832	290–2,400 cm	290–2,400 cm	430–3,600 cm
LLE FLEX G2 8x4800 4W-600lm/m 830 ADV	28001900	290–2,400 cm	290–2,400 cm	430–3,600 cm
LLE FLEX G2 8x4800 4W-600lm/m 840 ADV	28001901	290–2,400 cm	290–2,400 cm	430–3,600 cm
LLE FLEX G2 8x4800 4W-600lm/m 865 ADV	28001902	290–2,400 cm	290–2,400 cm	430–3,600 cm
LLE FLEX G2 8x4800 8W-1200lm/m 827 ADV	28001833	140–1,150 cm	140–1,150 cm	210–1,730 cm
LLE FLEX G2 8x4800 8W-1200lm/m 830 ADV	28001903	140–1,150 cm	140–1,150 cm	210–1,730 cm
LLE FLEX G2 8x4800 7W-1200lm/m 840 ADV	28001904	150–1,220 cm	150–1,220 cm	220–1,830 cm
LLE FLEX G2 8x4800 7W-1200lm/m 865 ADV	28001905	150–1,220 cm	150–1,220 cm	220–1,830 cm
LLE FLEX G2 8x4800 12W-1800lm/m 827 ADV	28001834	90–760 cm	90–760 cm	140–1,150 cm
LLE FLEX G2 8x4800 12W-1800lm/m 830 ADV	28001906	90–760 cm	90–760 cm	140–1,150 cm
LLE FLEX G2 8x4800 11W-1800lm/m 840 ADV	28001907	100–800 cm	100–800 cm	150–1,200 cm
LLE FLEX G2 8x4800 11W-1800lm/m 865 ADV	28001908	100–800 cm	100–800 cm	150–1,200 cm

## LED Driver matrix – LLE FLEX G2 8mm

REMOTE – Fixed-output						
Type	LCU 35W 24V TOP SR	LCU 60W 24V TOP SR	LCU 96W 24V TOP SR	LCU 180W 24V TOP SR	0010 K001 24 V	0025 K210 24 V
Article number	28000411	28000412	28000413	28000414	86453122	28000858

Type	Assignable LED Driver						
LLE FLEX G2 8x4800 4W-600lm/m 827 ADV	28001832	100–820 cm	130–1,410 cm	260–2,260 cm	480–4,240 cm	30–260 cm	10–660 cm
LLE FLEX G2 8x4800 4W-600lm/m 830 ADV	28001900	100–820 cm	130–1,410 cm	260–2,260 cm	480–4,240 cm	30–260 cm	10–660 cm
LLE FLEX G2 8x4800 4W-600lm/m 840 ADV	28001901	100–820 cm	130–1,410 cm	260–2,260 cm	480–4,240 cm	30–260 cm	10–660 cm
LLE FLEX G2 8x4800 4W-600lm/m 865 ADV	28001902	100–820 cm	130–1,410 cm	260–2,260 cm	480–4,240 cm	30–260 cm	10–660 cm
LLE FLEX G2 8x4800 8W-1200lm/m 827 ADV	28001833	50–390 cm	70–680 cm	130–1,090 cm	240–2,040 cm	20–120 cm	10–310 cm
LLE FLEX G2 8x4800 8W-1200lm/m 830 ADV	28001903	50–390 cm	70–680 cm	130–1,090 cm	240–2,040 cm	20–120 cm	10–310 cm
LLE FLEX G2 8x4800 7W-1200lm/m 840 ADV	28001904	50–420 cm	70–720 cm	130–1,150 cm	250–2,160 cm	20–130 cm	10–330 cm
LLE FLEX G2 8x4800 7W-1200lm/m 865 ADV	28001905	50–420 cm	70–720 cm	130–1,150 cm	250–2,160 cm	20–130 cm	10–330 cm
LLE FLEX G2 8x4800 12W-1800lm/m 827 ADV	28001834	40–260 cm	50–450 cm	90–720 cm	160–1,350 cm	10–80 cm	10–210 cm
LLE FLEX G2 8x4800 12W-1800lm/m 830 ADV	28001906	40–260 cm	50–450 cm	90–720 cm	160–1,350 cm	10–80 cm	10–210 cm
LLE FLEX G2 8x4800 11W-1800lm/m 840 ADV	28001907	40–270 cm	50–470 cm	90–750 cm	160–1,420 cm	10–80 cm	10–220 cm
LLE FLEX G2 8x4800 11W-1800lm/m 865 ADV	28001908	40–270 cm	50–470 cm	90–750 cm	160–1,420 cm	10–80 cm	10–220 cm

It must not be more than one role (480 cm) chained together!

For detailed information see LED Driver data sheet.

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

### 1.2 Energy classification

Type	Energy classification
LLE FLEX G2 8x4800 4W-600lm/m 827 ADV	A++
LLE FLEX G2 8x4800 4W-600lm/m 830 ADV	A++
LLE FLEX G2 8x4800 4W-600lm/m 840 ADV	A++
LLE FLEX G2 8x4800 4W-600lm/m 865 ADV	A++
LLE FLEX G2 8x4800 8W-1200lm/m 827 ADV	A++
LLE FLEX G2 8x4800 8W-1200lm/m 830 ADV	A++
LLE FLEX G2 8x4800 7W-1200lm/m 840 ADV	A++
LLE FLEX G2 8x4800 7W-1200lm/m 865 ADV	A++
LLE FLEX G2 8x4800 12W-1800lm/m 827 ADV	A+
LLE FLEX G2 8x4800 12W-1800lm/m 830 ADV	A+
LLE FLEX G2 8x4800 11W-1800lm/m 840 ADV	A++
LLE FLEX G2 8x4800 11W-1800lm/m 865 ADV	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	-30... +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 G2 600lm/m

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 G2 1200lm/m

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	17.8 K/W	37.5 cm <sup>2</sup>
50 °C	65 °C	12.6 K/W	53.0 cm <sup>2</sup>

### LLE FLEX G2 1800lm/m

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	18.3 k/W	36.4 cm <sup>2</sup>
45 °C	65 °C	11.2 k/W	59.5 cm <sup>2</sup>
50 °C	65 °C	7.7 K/W	87.1 cm <sup>2</sup>

<sup>①</sup> Values for a single segment of the LLE FLEX (100 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
- Overtemperature protection



LLE 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 100 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 8mm

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

Supply voltage	tp temperature	L90 / F10	L90 / F50	L80 / F10	L80 / F50	L70 / F10	L70 / F50
24 V	45 °C	50.000 h	50.000 h	50.000 h	50.000 h	50.000 h	50.000 h
24 V	55 °C	41.000 h	50.000 h	50.000 h	50.000 h	50.000 h	50.000 h
24 V	65 °C	22.000 h	50.000 h	42.000 h	50.000 h	50.000 h	50.000 h
24 V	75 °C	12.000 h	28.000 h	23.000 h	50.000 h	50.000 h	50.000 h

## 6. Photometric characteristics

### 6.1 Coordinates and tolerances according to CIE 1931

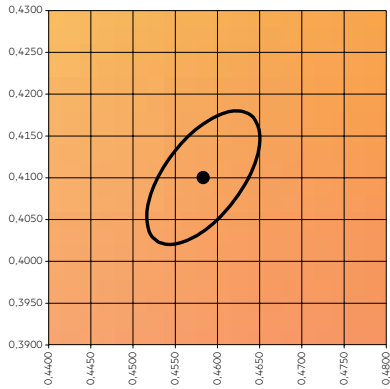
The specified colour coordinates are measured integral by a current impulse with typical values of module and a duration of 100 ms.

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

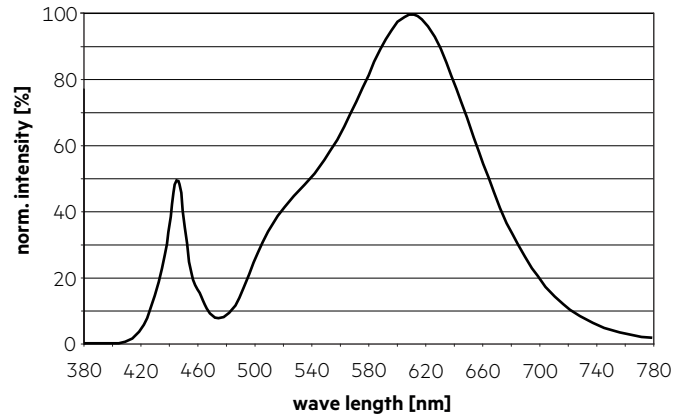
The measurement tolerance of the colour coordinates are  $\pm 0.01$ .

#### 2,700 K

	x0	y0
Centre	0.4578	0.4101

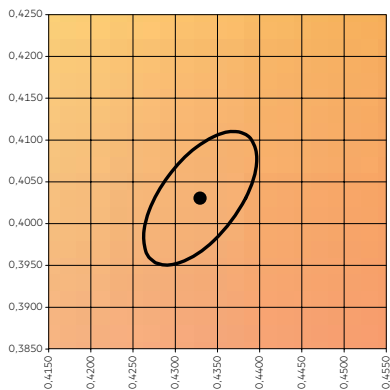


MacAdam Ellipse: 3SDCM

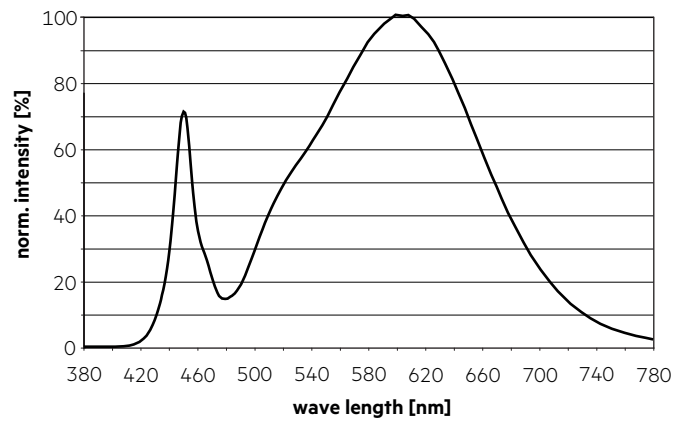


#### 3,000 K

	x0	y0
Centre	0.4338	0.4030

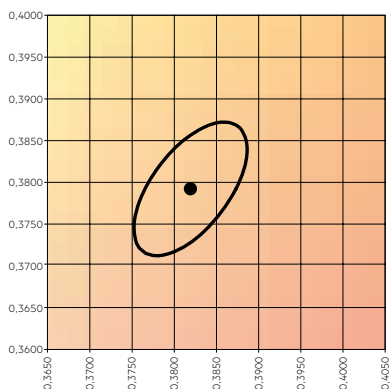


MacAdam Ellipse: 3SDCM

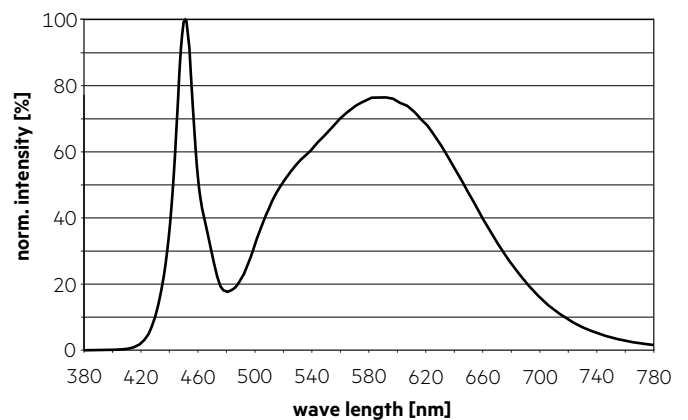


#### 4,000 K

	x0	y0
Centre	0.3818	0.3797

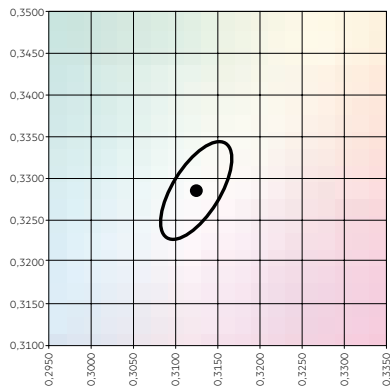


MacAdam Ellipse: 3SDCM

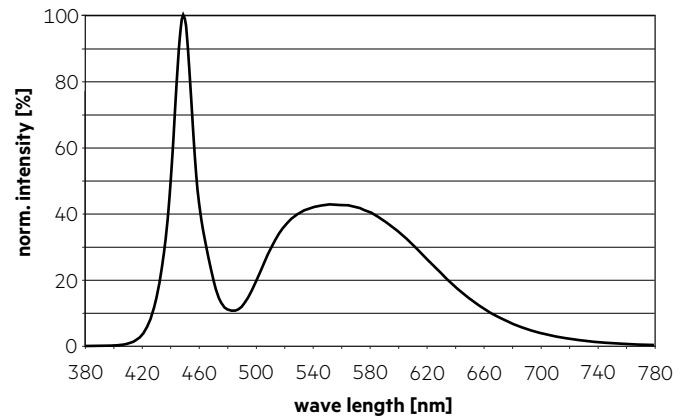


6,500 K

	x0	y0
Centre	0.3123	0.3282

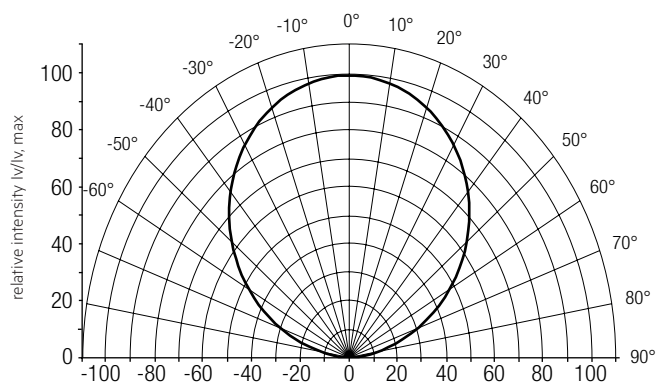


MacAdam Ellipse: 3SDCM

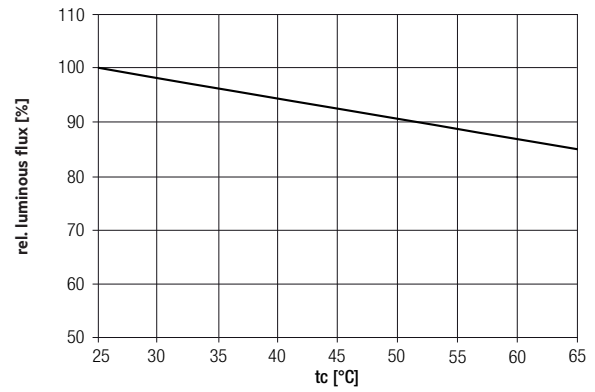


6.2 Light distribution

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



6.3 Relative luminous flux vs. tc temperature



The colour temperature is measured over the complete module. The single LED light points are inside 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.

3D-Data, photometric data and Design-in guide available on request or go to [www.tridonic.com](http://www.tridonic.com)