Module LLE FLEX IP67 EXC2

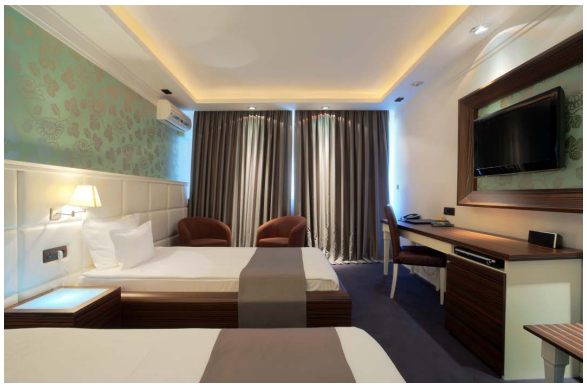
Modules LLE FLEX excite

Product description

- The protection class IP67 makes the flexible light strip resistant against water and dust. It is therefore ideal for usage in bathroom lighting, shelves, architectural or path illumination.
- With the innovative airGAP technology Tridonic is able to provide high protection but still achieve a stable colour temperature and no colour shift. In this way, LLE FLEX IP67 EXC is a perfect fit where the light-colour and quality is important.

Features and benefits

- IP67: protected against water & dust
- Colour temperature 2,700, 3,000 and 4,000 K with SDCM 3①
- Useful luminous flux 1,935 lm/m at tp = 25 °C
- Efficacy of the LED module 121 lm/W at tp = 25 °C
- High design freedom due to 5 cm cut-options
- Pitch distance of 7 mm enables high light homogeneity
- Self-adhesive 3M tape at the backside for simple mounting on different surfaces
- All the accessories – from the Interconnector to the Input-terminal till End cap – has been specifically designed for the IP67 tape and allows intuitive and easy handling which still keeps the protection of IP67 active
- Self-cooling (no additional heat sink required)
- Long lifetime up to 50,000 hours
- 5 years guarantee
- System solution in combination with Tridonic constant voltage LED driver (fixed output and dimmable)



Standards, page 4

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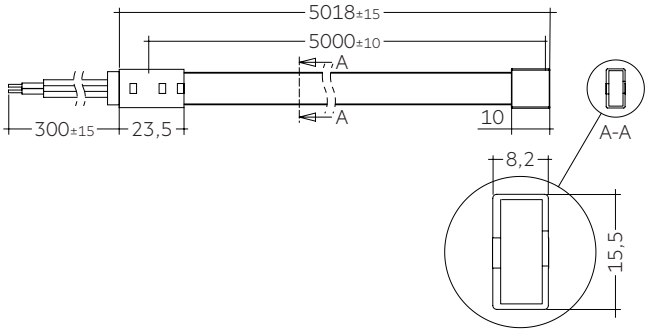
RoHS

Module LLE FLEX IP67 EXC2

Modules LLE FLEX excite

Technical data

Beam characteristic	110°
Ambient temperature range	-35 … +50 °C
tp rated	65 °C
tc for 600lm/m / 1200lm/m	65 °C
tc for 1800lm/m	75 °C
DC supply voltage	24 V
DC supply voltage range[2]	21.5 – 26.4 V
Insulation test voltage	0.5 kV
ESD classification	severity level 1
Risk group (IEC 62471)	RG0
Classification acc. to IEC 62031	Independent LED module
Type of protection	IP67
Lumen maintenance L70B50	up to 50,000 h
Guarantee (conditions at www.tridonic.com)	5 years



Ordering data

Type[5]	Article number	Colour temperature	Packaging carton	Weight per roll
LLE FLEX 5W-600lm/m 927 IP67 EXC2	**28003192**	2,700 K	20 pc(s).	0.42 kg
LLE FLEX 5W-600lm/m 930 IP67 EXC2	**28003193**	3,000 K	20 pc(s).	0.42 kg
LLE FLEX 5W-600lm/m 940 IP67 EXC2	**28003194**	4,000 K	20 pc(s).	0.42 kg
LLE FLEX 11W-1200lm/m 927 IP67 EXC2	**28003195**	2,700 K	20 pc(s).	0.42 kg
LLE FLEX 11W-1200lm/m 930 IP67 EXC2	**28003196**	3,000 K	20 pc(s).	0.42 kg
LLE FLEX 11W-1200lm/m 940 IP67 EXC2	**28003197**	4,000 K	20 pc(s).	0.42 kg
LLE FLEX 16W-1800lm/m 927 IP67 EXC2	**28003198**	2,700 K	20 pc(s).	0.42 kg
LLE FLEX 16W-1800lm/m 930 IP67 EXC2	**28003199**	3,000 K	20 pc(s).	0.42 kg
LLE FLEX 16W-1800lm/m 940 IP67 EXC2	**28003200**	4,000 K	20 pc(s).	0.42 kg

[5] 1 reel = 5 m.

Specific technical data

Type	Photometric code	Useful luminous flux at tp = 25 °C[3]	Expected luminous flux at tp rated[4]	Typ. current consumption at tp rated	Power consumption Pon at tp = 25 °C[5]	Efficacy of the module at tp = 25 °C	Expected efficacy of the module at tp rated	Colour rendering index CRI at tp = 25 °C[7]
LLE FLEX 5W-600lm/m 927 IP67 EXC2	927/359	630 lm/m	550 lm/m	226 mA/m	5.8 W/m	109 lm/W	102 lm/W	> 90
LLE FLEX 5W-600lm/m 930 IP67 EXC2	930/359	635 lm/m	556 lm/m	226 mA/m	5.8 W/m	109 lm/W	103 lm/W	> 90
LLE FLEX 5W-600lm/m 940 IP67 EXC2	940/359	635 lm/m	556 lm/m	210 mA/m	5.4 W/m	118 lm/W	111 lm/W	> 90
LLE FLEX 11W-1200lm/m 927 IP67 EXC2	927/359	1,275 lm/m	1,110 lm/m	454 mA/m	11.6 W/m	110 lm/W	103 lm/W	> 90
LLE FLEX 11W-1200lm/m 930 IP67 EXC2	930/359	1,280 lm/m	1,133 lm/m	454 mA/m	11.6 W/m	110 lm/W	105 lm/W	> 90
LLE FLEX 11W-1200lm/m 940 IP67 EXC2	940/359	1,305 lm/m	1,155 lm/m	422 mA/m	10.8 W/m	121 lm/W	113 lm/W	> 90
LLE FLEX 16W-1800lm/m 927 IP67 EXC2	927/359	1,925 lm/m	1,109 lm/m	680 mA/m	17.4 W/m	111 lm/W	68 lm/W	> 90
LLE FLEX 16W-1800lm/m 930 IP67 EXC2	930/359	1,935 lm/m	1,699 lm/m	680 mA/m	17.4 W/m	111 lm/W	104 lm/W	> 90
LLE FLEX 16W-1800lm/m 940 IP67 EXC2	940/359	1,930 lm/m	1,695 lm/m	642 mA/m	16.4 W/m	118 lm/W	110 lm/W	> 90

[1] Integral measurement over the complete module.

[2] Exceeding the max. operating voltage leads to an overload on the LLE FLEX. This may in turn result in a reduction in lifetime or even in destruction.

[3] Tolerance of useful light flux - 0 % / + 20 %. Measurement uncertainty ± 10 %. Values given for 1 m LLE FLEX.

[4] Tolerance of expected light flux - 0 % / + 20 %. Measurement uncertainty ± 10 %. Values given for 1 m LLE FLEX. Based on calculation.

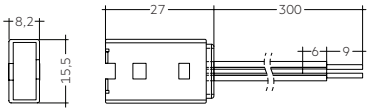
[5] Tolerance of power consumption Pon ± 15 %. Measurement uncertainty ± 5 %. Values given for 1 m LLE FLEX.

ACCES-SORIES

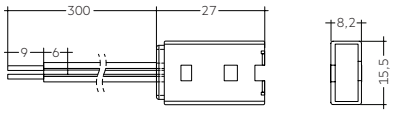
Connector for LLE FLEX IP67 EXC2

Product description

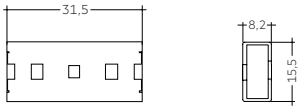
- For connection of LLE FLEX IP67 EXC2 modules
- Irated = 4.4 A
- Wire cross section AWG 18
- For assembly please reffer to the application note



ACL plug connector Wire-PCB IP67 right



ACL plug connector Wire-PCB IP67 left



ACL plug interconnector IP67

Ordering data

Type	Article number	Delivery content per piece	Packaging carton	Weight per pc.
ACL plug connector Wire-PCB IP67 R EXC2	**28003270**	10 input connector R, 10 tube sets, 10 end caps, 25 plugs, 1 silicon tube	10 pc(s).	0,180 kg
ACL connector Wire-PCB IP67 R 2pc EXC2	**28003301**	2 input connector R, 2 tube sets, 2 end caps, 4 plugs, 1 silicon tube	50 pc(s).	0,047 kg
ACL plug connector Wire-PCB IP67 L EXC2	**28003271**	10 input connector L, 10 tube sets, 10 end caps, 25 plugs, 1 silicon tube	10 pc(s).	0,180 kg
ACL connector Wire-PCB IP67 L 2pc EXC2	**28003302**	2 input connector L, 2 tube sets, 2 end caps, 4 plugs, 1 silicon tube	50 pc(s).	0,047 kg
ACL plug interconnector IP67 EXC2	**28003272**	10 interconnectors, 10 tube sets, 25 plugs, 1 silicon tube	10 pc(s).	0,095 kg
ACL plug end cap IP67 EXC2	**28003273**	20 end caps, 25 plugs, 1 silicon tube	10 pc(s).	0,030 kg

LED driver matrix – Dimmable PRE – LLE FLEX IP67 EXC2

Type	PRE 18W	PRE 35W	PRE 60W	PRE 100W	PRE 150W
Article number	28003517 28003519	28002415 28001662 28003520	28002416 28001663 28003521	28002417 28001253 28001436	28002418 28001437
LLE FLEX UL certificated	class 2	class 2	class 2	no	no

Type	Assignable LED driver				
LLE FLEX 5W-600lm/m 927 IP67 EXC2	55–305 cm	70–590 cm	120–1,020 cm	195–1,705 cm	290–2,555 cm
LLE FLEX 5W-600lm/m 930 IP67 EXC2					
LLE FLEX 5W-600lm/m 940 IP67 EXC2	60–330 cm	75–640 cm	130–1,100 cm	215–1,835 cm	320–2,755 cm
LLE FLEX 11W-1200lm/m 927 IP67 EXC2	30–150 cm	35–295 cm	60–510 cm	100–855 cm	145–1,285 cm
LLE FLEX 11W-1200lm/m 930 IP67 EXC2					
LLE FLEX 11W-1200lm/m 940 IP67 EXC2	30–165 cm	40–320 cm	65–555 cm	105–925 cm	160–1,385 cm
LLE FLEX 16W-1800lm/m 927 IP67 EXC2	20–100 cm	25–200 cm	40–345 cm	65–575 cm	100–860 cm
LLE FLEX 16W-1800lm/m 930 IP67 EXC2					
LLE FLEX 16W-1800lm/m 940 IP67 EXC2	20–105 cm	25–210 cm	45–365 cm	70–605 cm	105–910 cm

LED driver matrix – Fixed output EXC – LLE FLEX IP67 EXC2

Type	EXC 35W	EXC 75W	EXC 100W	EXC 200W
Article number	28003295	28003296	28003297	28003298
LLE FLEX UL certificated	class 2	class 2	no	no

Type	Assignable LED driver			
LLE FLEX 5W-600lm/m 927 IP67 EXC2	70–585 cm	150–1,260 cm	200–1,680 cm	390–3,355 cm
LLE FLEX 5W-600lm/m 930 IP67 EXC2				
LLE FLEX 5W-600lm/m 940 IP67 EXC2	75–630 cm	165–1,360 cm	215–1,810 cm	430–3,620 cm
LLE FLEX 11W-1200lm/m 927 IP67 EXC2	35–295 cm	75–635 cm	100–845 cm	195–1,690 cm
LLE FLEX 11W-1200lm/m 930 IP67 EXC2				
LLE FLEX 11W-1200lm/m 940 IP67 EXC2	40–320 cm	80–685 cm	110–910 cm	210–1,825 cm
LLE FLEX 16W-1800lm/m 927 IP67 EXC2	25–195 cm	50–425 cm	65–565 cm	130–1,135 cm
LLE FLEX 16W-1800lm/m 930 IP67 EXC2				
LLE FLEX 16W-1800lm/m 940 IP67 EXC2	25–210 cm	55–450 cm	70–600 cm	140–1,200 cm

LED driver matrix – Fixed output SNC – LLE FLEX IP67 EXC2

Type	SNC 18W	SNC 35W	SNC 60W	SNC 100W	SNC 150W
Article number	87500938 87500931	87500852 87500854	87500665 87500669	87500666 87500670	87500855
LLE FLEX UL certificated	class 2	class 2	class 2	no	no

Type	Assignable LED driver				
LLE FLEX 5W-600lm/m 927 IP67 EXC2	105–305 cm	205–595 cm	350–1,020 cm	580–1,705 cm	1,160–3,410 cm
LLE FLEX 5W-600lm/m 930 IP67 EXC2					
LLE FLEX 5W-600lm/m 940 IP67 EXC2	115–330 cm	225–640 cm	380–1,100 cm	635–1,835 cm	1,265–3,675 cm
LLE FLEX 11W-1200lm/m 927 IP67 EXC2	55–150 cm	105–300 cm	175–510 cm	290–855 cm	580–1,715 cm
LLE FLEX 11W-1200lm/m 930 IP67 EXC2					
LLE FLEX 11W-1200lm/m 940 IP67 EXC2	60–165 cm	110–320 cm	190–555 cm	315–925 cm	625–1,850 cm
LLE FLEX 16W-1800lm/m 927 IP67 EXC2	35–100 cm	70–200 cm	120–345 cm	195–575 cm	385–1,150 cm
LLE FLEX 16W-1800lm/m 930 IP67 EXC2					
LLE FLEX 16W-1800lm/m 940 IP67 EXC2	40–105 cm	75–210 cm	125–365 cm	205–605 cm	410–1,215 cm

1. Standards

IEC 62031
IEC 62471
IEC 62717
IEC 61000-4-2
IEC 60529
UL 2108 (for CLASS2 circuits and wet locations)

1.1 Photometric code

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

1st digit		2nd + 3rd digit	4th digit	5th digit	6th 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)	
					Code	Luminous flux
7	70 – 79				7	≥ 70 %
8	80 – 89				8	≥ 80 %
9	≥90				9	≥ 90 %

1.2 Energy classification

Type	Colour temperature	Energy classification	Energy consumption
LLE FLEX 5W-600lm/m 927 IP67 EXC2	2,700 K	F	6 kWh / 1,000 h
LLE FLEX 5W-600lm/m 930 IP67 EXC2	3,000 K	F	6 kWh / 1,000 h
LLE FLEX 5W-600lm/m 940 IP67 EXC2	4,000 K	F	6 kWh / 1,000 h
LLE FLEX 11W-1200lm/m 927 IP67 EXC2	2,700 K	F	12 kWh / 1,000 h
LLE FLEX 11W-1200lm/m 930 IP67 EXC2	3,000 K	F	12 kWh / 1,000 h
LLE FLEX 11W-1200lm/m 940 IP67 EXC2	4,000 K	E	11 kWh / 1,000 h
LLE FLEX 16W-1800lm/m 927 IP67 EXC2	2,700 K	F	18 kWh / 1,000 h
LLE FLEX 16W-1800lm/m 930 IP67 EXC2	3,000 K	F	18 kWh / 1,000 h
LLE FLEX 16W-1800lm/m 940 IP67 EXC2	4,000 K	F	17 kWh / 1,000 h

Energy label and further information at 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

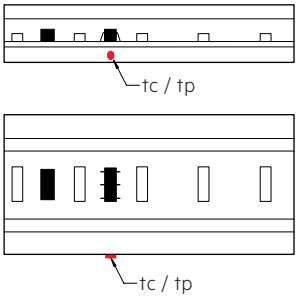
2.1 tc point, ambient temperature and lifetime

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

For LLE a tp temperature of 65 °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 measurement of the tc / tp temperature is to be carried out laterally, on the surface of the silicon package in the area of the IC.



2.2 Storage and humidity

Storage temperature	-35 … +80 °C

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.

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.

Type	Max. length
LLE FLEX 5W-600lm/m 9xx IP67 EXC2	15 m
LLE FLEX 11W-1200lm/m 9xx IP67 EXC2	8 m
LLE FLEX 16W-1800lm/m 9xx IP67 EXC2	5 m

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.

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 5 cm.
The connection area and the following segment (5 cm) must rest flat.
A bending radius in this area is not allowed.

For more details see mounting instructions.

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. 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.

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

Supply voltage	tp temperature	L90 / B10	L90 / B50	L80 / B10	L80 / B50	L70 / B10	L70 / B50
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	45,000 h	>50,000 h	>50,000 h	>50,000 h	>50,000 h	>50,000 h
24 V	65 °C	26,000 h	30,000 h	>50,000 h	>50,000 h	>50,000 h	>50,000 h

L0C10 >60 kh. At tp rated, based on 10 swichting cycles per day.

4.3 Switching capability

25,000 cycles

Tridonic test according to IEC 62717 Cl 10.3.3
30 s on / 30 s off

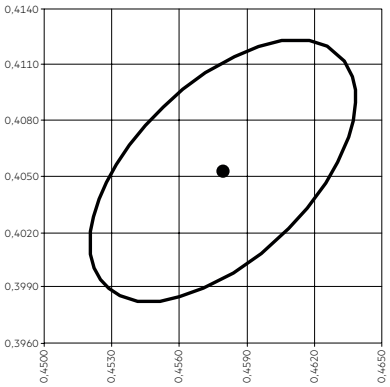
6. Photometric characteristics

6.1 Coordinates and tolerances according to CIE 1931

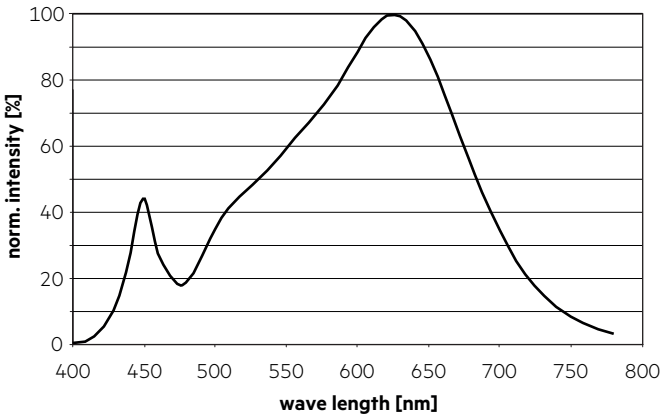
The specified colour coordinates are measured integral by a current impulse with typical values of module and a duration of ≤ 120 ms.
The ambient temperature of the measurement is ta = 25 °C.
The measurement tolerance of the colour coordinates are ± 0.01.

2,700 K

	x0	y0
Centre 600 lm/m	0.4578	0.4051
Centre 1,200 lm/m	0.4579	0.4053
Centre 1,800 lm/m	0.4580	0.4054

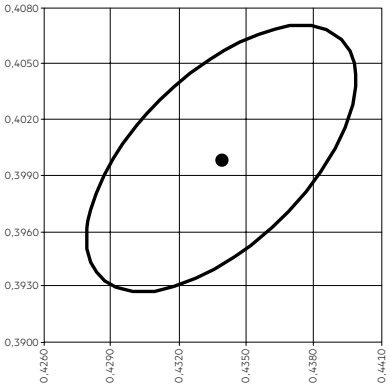


MacAdam Ellipse: 3SDCM

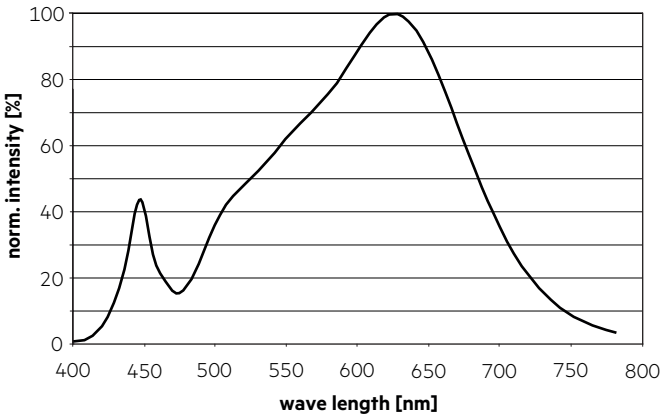


3,000 K

	x0	y0
Mittelpunkt 600 lm/m	0.4338	0.3997
Mittelpunkt 1,200 lm/m	0.4339	0.3999
Mittelpunkt 1,800 lm/m	0.4340	0.4000

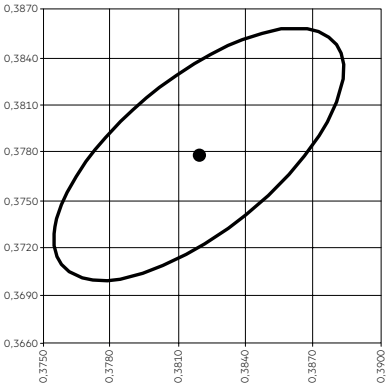


MacAdam Ellipse: 3SDCM

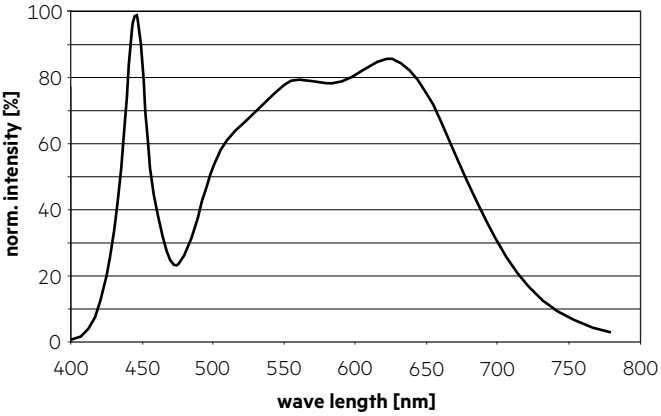


4,000 K

	x0	y0
Centre 600 lm/m	0.3818	0.3777
Centre 1,200 lm/m	0.3819	0.3779
Centre 1,800 lm/m	0.3820	0.3780

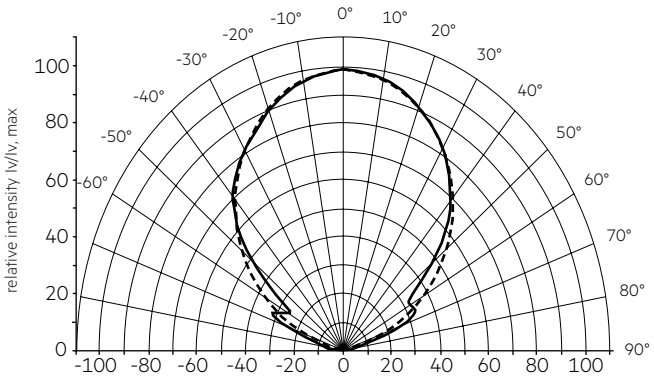


MacAdam Ellipse: 3SDCM



6.2 Light distribution

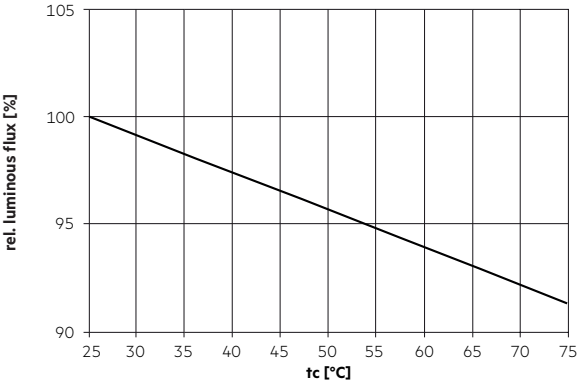
The optical design of the LLE product line ensures optimum homogeneity for the light distribution.



C0/180
C90/270

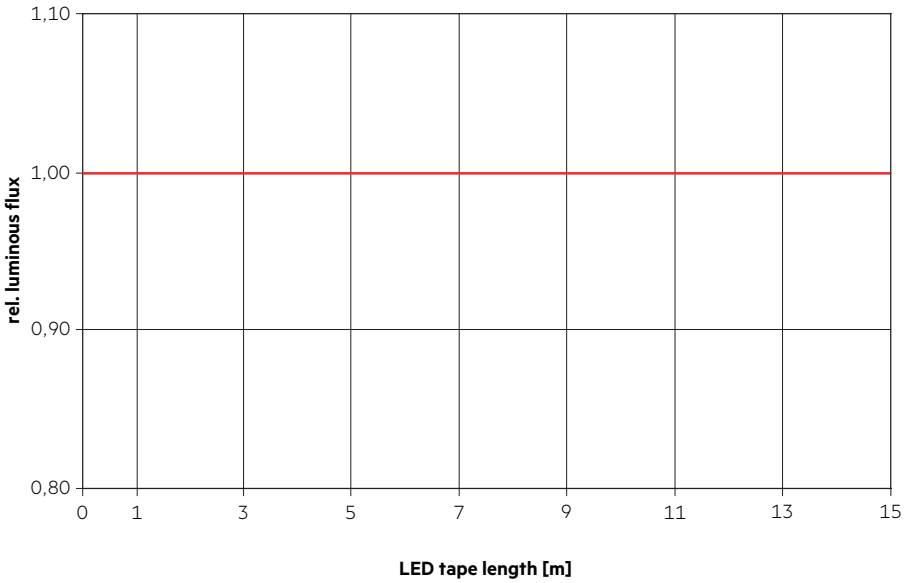
The colour temperature is measured over the complete module. The single LED light points are inside of 3SDCM. To ensure an ideal mixture of colours and a homogeneous light distribution a suitable optic (e. g. PMMA diffuser) and a sufficient spacing between module and optic (typ. 5 cm) should be used.

6.3 Relative luminous flux vs. tc temperature

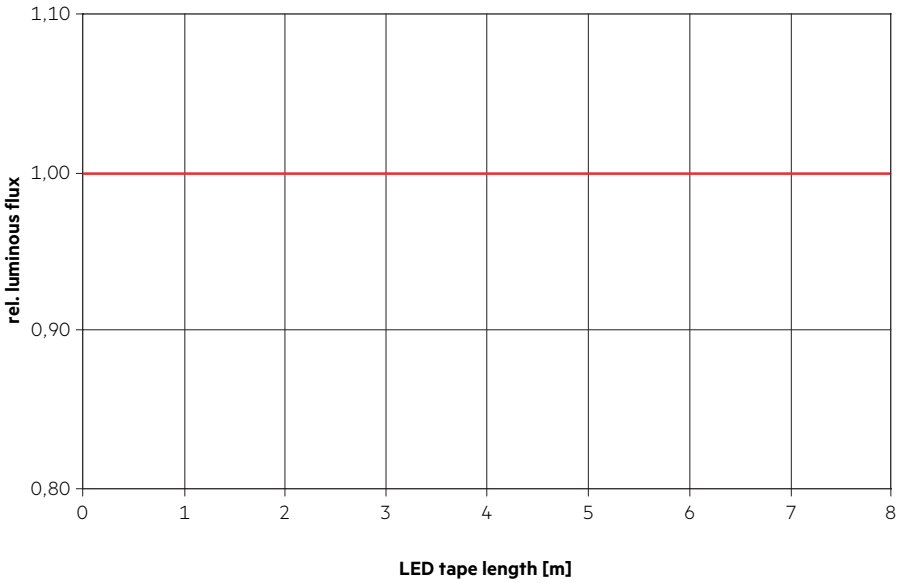


6.4 Relative luminous flux vs. LED tape length

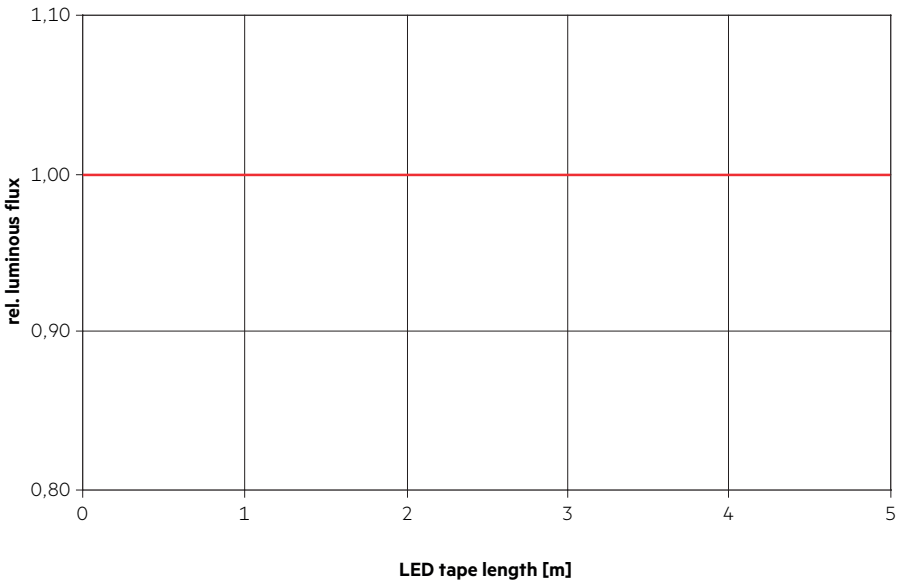
LLE FLEX G1 600lm IP67 EXC2:



LLE FLEX G1 1200lm IP67 EXC2:



LLE FLEX G1 1800lm IP67 EXC2:



7. Miscellaneous

7.1 Additional information

Additional technical information at www.tridonic.com → Technical Data

Guarantee conditions at www.tridonic.com → Services

Lifetime declarations are informative and represent no warranty claim.