



Module LLE FLEX 12mm EXC3

Modules LLE FLEX excite

Product description

- Dimmable 24 V constant voltage LED flextape (SELV)
- Ideal for application on aluminum extrusions but also for various decorative lighting applications such as cove lighting, façade accent lighting etc.
- 4,000 K module COI approved acc. to AS/NZS1680.2.5:1997
- 1 reel = 5 m or 50 m
- Long lifetime: 72,000 hours
- 5 years guarantee (conditions at www.tridonic.com)

Optical properties

- Colour temperature 2,700, 3,000, 4,000 and 6,500 K with SDCM 3[®]
- Useful luminous flux 4,070 lm/m at $t_p = 25^\circ\text{C}$
- Efficacy of the LED module 124 lm/W at $t_p = 25^\circ\text{C}$
- Small colour tolerance (MacAdam 3), CRI 90

Mechanical properties

- Extremely narrow pitch distance enables short distance to diffuser and outstanding homogeneity
- High design freedom due to 5 cm cut-options
- Self-adhesive 3M tape at the backside for simple mounting on different surfaces
- reel2reel – No solder joints on the tape, easy to separate and low length tolerances^②

System solution

- System solution in combination with Tridonic constant voltage LED driver (fixed output and dimmable)



Standards, page 4

Colour temperatures and tolerances, page 6

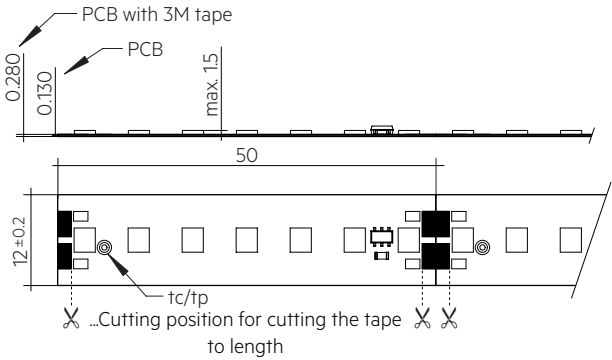




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Technical data

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 (IEC 62471)	RG1
Classification acc. to IEC 62031	Built-in
Type of protection	IP00
Lumen maintenance L70B50	72,000 h
Guarantee	5 years



Ordering data

Type	Article number	Colour temperature	Packaging carton	Weight per pc.
5,000 mm reel				
LLE FLEX 12x5000 25W-3000lm/m 927 EXC3	28003622	2,700 K	1 pc(s).	0.075 kg
LLE FLEX 12x5000 25W-3000lm/m 930 EXC3	28003623	3,000 K	1 pc(s).	0.075 kg
LLE FLEX 12x5000 25W-3000lm/m 940 EXC3	28003624	4,000 K	1 pc(s).	0.075 kg
LLE FLEX 12x5000 25W-3000lm/m 965 EXC3	28003625	6,500 K	1 pc(s).	0.075 kg
LLE FLEX 12x5000 33W-4000lm/m 927 EXC3	28003626	2,700 K	1 pc(s).	0.075 kg
LLE FLEX 12x5000 33W-4000lm/m 930 EXC3	28003627	3,000 K	1 pc(s).	0.075 kg
LLE FLEX 12x5000 33W-4000lm/m 940 EXC3	28003628	4,000 K	1 pc(s).	0.075 kg
LLE FLEX 12x5000 33W-4000lm/m 965 EXC3	28003629	6,500 K	1 pc(s).	0.075 kg
50,000 mm reel				
LLE FLEX 12x50000 25W-3000lm/m 927 EXC3	28003687	2,700 K	1 pc(s).	0.750 kg
LLE FLEX 12x50000 25W-3000lm/m 930 EXC3	28003688	3,000 K	1 pc(s).	0.750 kg
LLE FLEX 12x50000 25W-3000lm/m 940 EXC3	28003689	4,000 K	1 pc(s).	0.750 kg
LLE FLEX 12x50000 33W-4000lm/m 927 EXC3	28003691	2,700 K	1 pc(s).	0.750 kg
LLE FLEX 12x50000 33W-4000lm/m 930 EXC3	28003692	3,000 K	1 pc(s).	0.750 kg
LLE FLEX 12x50000 33W-4000lm/m 940 EXC3	28003693	4,000 K	1 pc(s).	0.750 kg

Specific technical data

Type	Photometric code	Useful luminous flux at $t_p = 25\text{ °C}^{\text{④}}$	Expected luminous flux at t_p rated ^⑤	Typ. current consumption at t_p rated	Power consumption P_{on} at $t_p = 25\text{ °C}^{\text{⑥}}$	Efficacy of the module at $t_p = 25\text{ °C}$	Expected efficacy of the module at t_p rated	Colour rendering index CRI at $t_p = 25\text{ °C}^{\text{⑦}}$
5,000 mm reel								
LLE FLEX 12x5000 25W-3000lm/m 927 EXC3	927/359	3,080 lm/m	2,846 lm/m	1,108 mA/m	26.8 W/m	115 lm/W	108 lm/W	> 90
LLE FLEX 12x5000 25W-3000lm/m 930 EXC3	930/359	3,145 lm/m	2,912 lm/m	1,108 mA/m	26.8 W/m	117 lm/W	109 lm/W	> 90
LLE FLEX 12x5000 25W-3000lm/m 940 EXC3	940/359	3,080 lm/m	2,855 lm/m	1,028 mA/m	24.9 W/m	124 lm/W	115 lm/W	> 90
LLE FLEX 12x5000 25W-3000lm/m 965 EXC3	965/359	3,080 lm/m	2,855 lm/m	1,028 mA/m	24.9 W/m	124 lm/W	115 lm/W	> 90
LLE FLEX 12x5000 33W-4000lm/m 927 EXC3	927/459	3,960 lm/m	3,680 lm/m	1,438 mA/m	34.8 W/m	114 lm/W	106 lm/W	> 90
LLE FLEX 12x5000 33W-4000lm/m 930 EXC3	930/459	4,070 lm/m	3,780 lm/m	1,438 mA/m	34.8 W/m	117 lm/W	110 lm/W	> 90
LLE FLEX 12x5000 33W-4000lm/m 940 EXC3	940/459	4,050 lm/m	3,751 lm/m	1,368 mA/m	33.1 W/m	122 lm/W	114 lm/W	> 90
LLE FLEX 12x5000 33W-4000lm/m 965 EXC3	965/459	4,050 lm/m	3,751 lm/m	1,368 mA/m	33.1 W/m	122 lm/W	114 lm/W	> 90
50,000 mm reel								
LLE FLEX 12x50000 25W-3000lm/m 927 EXC3	927/359	3,080 lm/m	2,846 lm/m	1,108 mA/m	26.8 W/m	115 lm/W	108 lm/W	> 90
LLE FLEX 12x50000 25W-3000lm/m 930 EXC3	930/359	3,145 lm/m	2,912 lm/m	1,108 mA/m	26.8 W/m	117 lm/W	109 lm/W	> 90
LLE FLEX 12x50000 25W-3000lm/m 940 EXC3	940/359	3,080 lm/m	2,855 lm/m	1,028 mA/m	24.9 W/m	124 lm/W	115 lm/W	> 90
LLE FLEX 12x50000 33W-4000lm/m 927 EXC3	927/459	3,960 lm/m	3,680 lm/m	1,438 mA/m	34.8 W/m	114 lm/W	106 lm/W	> 90
LLE FLEX 12x50000 33W-4000lm/m 930 EXC3	930/459	4,070 lm/m	3,780 lm/m	1,438 mA/m	34.8 W/m	117 lm/W	110 lm/W	> 90
LLE FLEX 12x50000 33W-4000lm/m 940 EXC3	940/459	4,050 lm/m	3,751 lm/m	1,368 mA/m	33.1 W/m	122 lm/W	114 lm/W	> 90

^① Integral measurement over the complete module.

^② For 5 m reel max. 2 solder joints and for 50 m reel max. 6 solder joints.

^③ 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.

^④ Tolerance of useful light flux - 0 % / + 20 %. Measurement uncertainty $\pm 10\%$. Values given for 1 m LLE FLEX.

^⑤ Tolerance of expected light flux - 0 % / + 20 %. Measurement uncertainty $\pm 10\%$. Values given for 1 m LLE FLEX. Based on calculation.

^⑥ Tolerance of power consumption $P_{on} \pm 15\%$. Measurement uncertainty $\pm 5\%$. Values given for 1 m LLE FLEX.

^⑦ Measurement uncertainty CRI ± 2 .

LED driver matrix – Dimmable PRE – LLE FLEX 12mm EXC3

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

Type	Assignable LED driver				
LLE FLEX 12x5000 25W-3000lm/m 927 EXC3	15–60 cm	15–120 cm	25–210 cm	45–350 cm	65–530 cm
LLE FLEX 12x5000 25W-3000lm/m 930 EXC3					
LLE FLEX 12x5000 25W-3000lm/m 940 EXC3	15–65 cm	20–130 cm	30–225 cm	45–380 cm	65–570 cm
LLE FLEX 12x5000 25W-3000lm/m 965 EXC3					
LLE FLEX 12x5000 33W-4000lm/m 927 EXC3	10–45 cm	15–95 cm	20–160 cm	35–270 cm	50–405 cm
LLE FLEX 12x5000 33W-4000lm/m 930 EXC3					
LLE FLEX 12x5000 33W-4000lm/m 940 EXC3	10–50 cm	15–95 cm	20–170 cm	35–285 cm	50–425 cm
LLE FLEX 12x5000 33W-4000lm/m 965 EXC3					

LED driver matrix – Fixed output EXC – LLE FLEX 12mm EXC3

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 12x5000 25W-3000lm/m 927 EXC3	15–120 cm	35–260 cm	45–345 cm	85–695 cm
LLE FLEX 12x5000 25W-3000lm/m 930 EXC3				
LLE FLEX 12x5000 25W-3000lm/m 940 EXC3	20–130 cm	35–280 cm	45–375 cm	90–745 cm
LLE FLEX 12x5000 25W-3000lm/m 965 EXC3				
LLE FLEX 12x5000 33W-4000lm/m 927 EXC3	15–90 cm	25–200 cm	35–265 cm	65–535 cm
LLE FLEX 12x5000 33W-4000lm/m 930 EXC3				
LLE FLEX 12x5000 33W-4000lm/m 940 EXC3	15–95 cm	25–210 cm	35–280 cm	70–560 cm
LLE FLEX 12x5000 33W-4000lm/m 965 EXC3				

LED driver matrix – Fixed output SNC – LLE FLEX 12mm EXC3

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 12x5000 25W-3000lm/m 927 EXC3	25–60 cm	45–120 cm	75–210 cm	125–350 cm	245–705 cm
LLE FLEX 12x5000 25W-3000lm/m 930 EXC3					
LLE FLEX 12x5000 25W-3000lm/m 940 EXC3	25–65 cm	50–130 cm	80–225 cm	130–380 cm	260–760 cm
LLE FLEX 12x5000 25W-3000lm/m 965 EXC3					
LLE FLEX 12x5000 33W-4000lm/m 927 EXC3	20–45 cm	35–95 cm	60–160 cm	95–270 cm	185–545 cm
LLE FLEX 12x5000 33W-4000lm/m 930 EXC3					
LLE FLEX 12x5000 33W-4000lm/m 940 EXC3	20–45 cm	35–100 cm	60–170 cm	100–285 cm	195–570 cm
LLE FLEX 12x5000 33W-4000lm/m 965 EXC3					

1. Standards

IEC 62031
IEC 62471
IEC 61000-4-2
UL 8750 (for CLASS2 circuits and dry locations)

1.1 Photometric code

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

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

1.2 Energy classification

Type	Colour temperature	Energy classification	Energy consumption
LLE FLEX 12x5000 25W-3000lm/m			
LLE FLEX 12x5000 25W-3000lm/m 927 EXC3	2,700 K	F	27 kWh / 1,000 h
LLE FLEX 12x5000 25W-3000lm/m 930 EXC3	3,000 K	F	27 kWh / 1,000 h
LLE FLEX 12x5000 25W-3000lm/m 940 EXC3	4,000 K	E	25 kWh / 1,000 h
LLE FLEX 12x5000 25W-3000lm/m 965 EXC3	6,500 K	E	25 kWh / 1,000 h
LLE FLEX 12x5000 33W-4000lm/m			
LLE FLEX 12x5000 33W-4000lm/m 927 EXC3	2,700 K	F	35 kWh / 1,000 h
LLE FLEX 12x5000 33W-4000lm/m 930 EXC3	3,000 K	F	35 kWh / 1,000 h
LLE FLEX 12x5000 33W-4000lm/m 940 EXC3	4,000 K	E	34 kWh / 1,000 h
LLE FLEX 12x5000 33W-4000lm/m 965 EXC3	6,500 K	E	34 kWh / 1,000 h
LLE FLEX 12x50000 25W-3000lm/m			
LLE FLEX 12x50000 25W-3000lm/m 927 EXC3	2,700 K	F	27 kWh / 1,000 h
LLE FLEX 12x50000 25W-3000lm/m 930 EXC3	3,000 K	F	27 kWh / 1,000 h
LLE FLEX 12x50000 25W-3000lm/m 940 EXC3	4,000 K	E	25 kWh / 1,000 h
LLE FLEX 12x50000 33W-4000lm/m			
LLE FLEX 12x50000 33W-4000lm/m 927 EXC3	2,700 K	F	35 kWh / 1,000 h
LLE FLEX 12x50000 33W-4000lm/m 930 EXC3	3,000 K	F	35 kWh / 1,000 h
LLE FLEX 12x50000 33W-4000lm/m 940 EXC3	4,000 K	E	34 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 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 3000lm/m 9xx EXC3

ta	tp	R _{th, hs-a} ^①	Cooling area ^①
25 °C	65 °C	55.53 K/W	12 cm²
35 °C	65 °C	41.62 K/W	16 cm²
40 °C	65 °C	34.67 K/W	19 cm²
45 °C	65 °C	27.72 K/W	24 cm²
50 °C	65 °C	20.77 K/W	32 cm²

LLE FLEX 4000lm/m 9xx EXC3

ta	tp	R _{th, hs-a} ^①	Cooling area ^①
25 °C	65 °C	42.39 K/W	16 cm²
35 °C	65 °C	31.77 K/W	21 cm²
40 °C	65 °C	26.46 K/W	25 cm²
45 °C	65 °C	21.15 K/W	32 cm²
50 °C	65 °C	15.84 K/W	42 cm²

^① 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.

A heat transfer coefficient of 0,0015 is used for the calculation.

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 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.

The LLE FLEX is to be installed within 2 weeks after it has been removed from the ESD blister packaging (contacting by means of soldering).

Insulation must be ensured at the contact area of the segments (e.g. by using the connector ACL or additional insulation in the area of the solder connection).

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 2 cm.

For details see Application Note: www.tridonic.com



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 Soldering guidelines



The modules are suitable only for manual soldering (max. 275 °C, 2 seconds).

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 EXC3

LLE FLEX 3000lm/m 9xx EXC3

Supply voltage	tp temperature	L90/F10	L90/F50	L80/F10	L80/F50	L70/F10	L70/F50
24 V	40 °C	41k h	51k h	>72k h	>72k h	>72k h	>72k h
24 V	45 °C	39k h	50k h	>72k h	>72k h	>72k h	>72k h
24 V	50 °C	38k h	48k h	>72k h	>72k h	>72k h	>72k h
24 V	55 °C	36k h	46k h	>72k h	>72k h	>72k h	>72k h
24 V	60 °C	35k h	45k h	71k h	>72k h	>72k h	>72k h
24 V	65 °C	33k h	43k h	68k h	>72k h	>72k h	>72k h
24 V	70 °C	32k h	42k h	65k h	>72k h	>72k h	>72k h
24 V	75 °C	31k h	40k h	62k h	>72k h	>72k h	>72k h
24 V	80 °C	30k h	39k h	60k h	>72k h	>72k h	>72k h

LLE FLEX 4000lm/m 9xx EXC3

Supply voltage	tp temperature	L90/F10	L90/F50	L80/F10	L80/F50	L70/F10	L70/F50
24 V	40 °C	41k h	51k h	>72k h	>72k h	>72k h	>72k h
24 V	45 °C	39k h	49k h	>72k h	>72k h	>72k h	>72k h
24 V	50 °C	37k h	47k h	>72k h	>72k h	>72k h	>72k h
24 V	55 °C	36k h	46k h	>72k h	>72k h	>72k h	>72k h
24 V	60 °C	34k h	44k h	70k h	>72k h	>72k h	>72k h
24 V	65 °C	33k h	43k h	67k h	>72k h	>72k h	>72k h
24 V	70 °C	32k h	41k h	64k h	>72k h	>72k h	>72k h
24 V	75 °C	30k h	40k h	61k h	>72k h	>72k h	>72k h
24 V	80 °C	29k h	38k h	59k h	>72k h	>72k h	>72k h

4.3 Switching capability

100,000 cycles

Tridonic test according to IEC 62717 Cl 10.3.3
30 s on / 30 s off at I_{max}

6. Photometric characteristics

6.1 Coordinates and tolerances according to CIE 1931

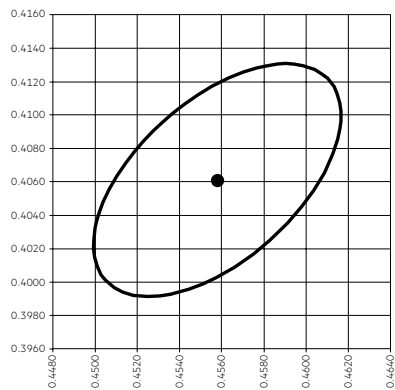
The specified colour coordinates are measured integral by a current impulse with typical values of module and a duration of 100 ms.

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

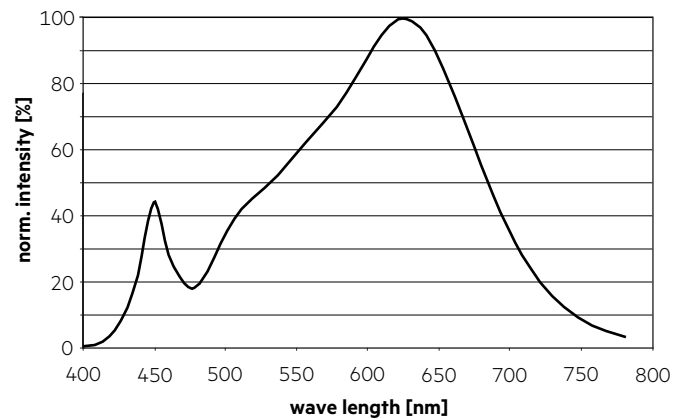
The measurement tolerance of the colour coordinates are ± 0.007 .

2,700 K

	x0	y0
Centre	0.4558	0.4061

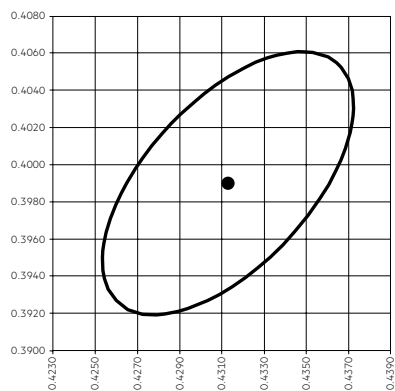


— MacAdam Ellipse: 3SDCM

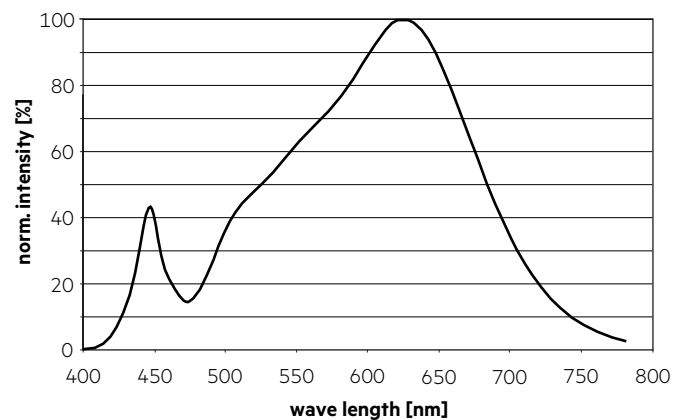


3,000 K

	x0	y0
Centre	0.4313	0.3990

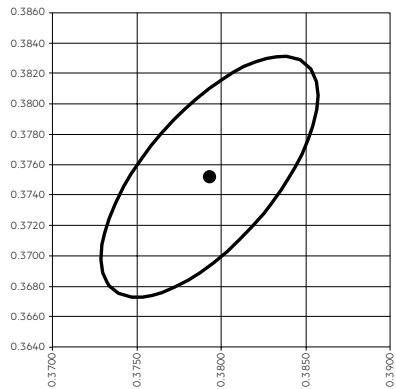


— MacAdam Ellipse: 3SDCM

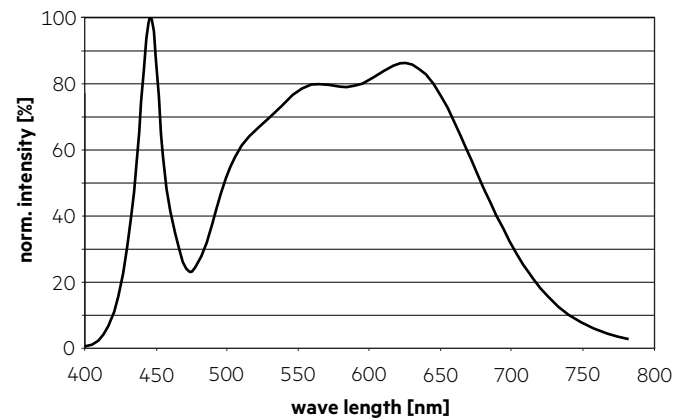


4,000 K

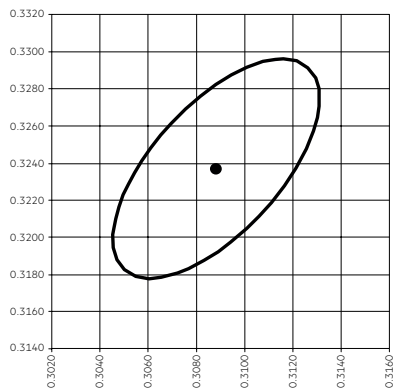
	x0	y0
Centre	0.3793	0.3752



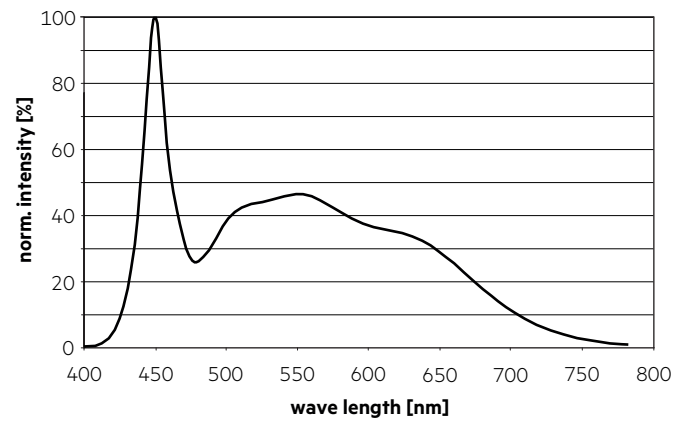
— MacAdam Ellipse: 3SDCM

**6,500 K**

	x0	y0
Centre	0.3088	0.3237

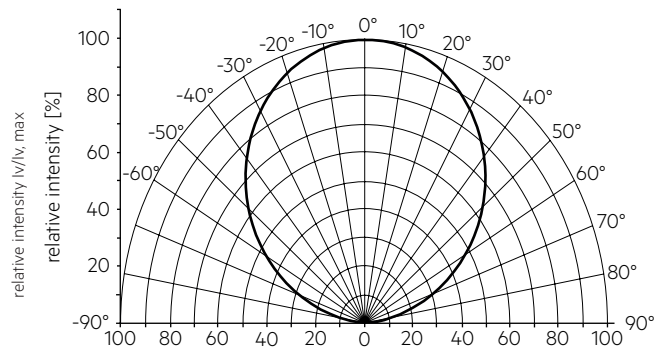


— MacAdam Ellipse: 3SDCM



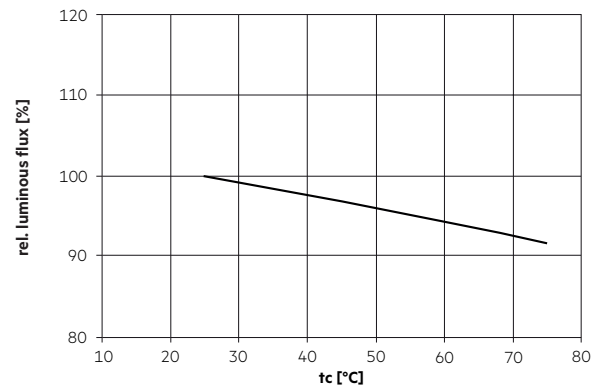
6.2 Light distribution

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



The colour temperature is measured over the complete module. 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.

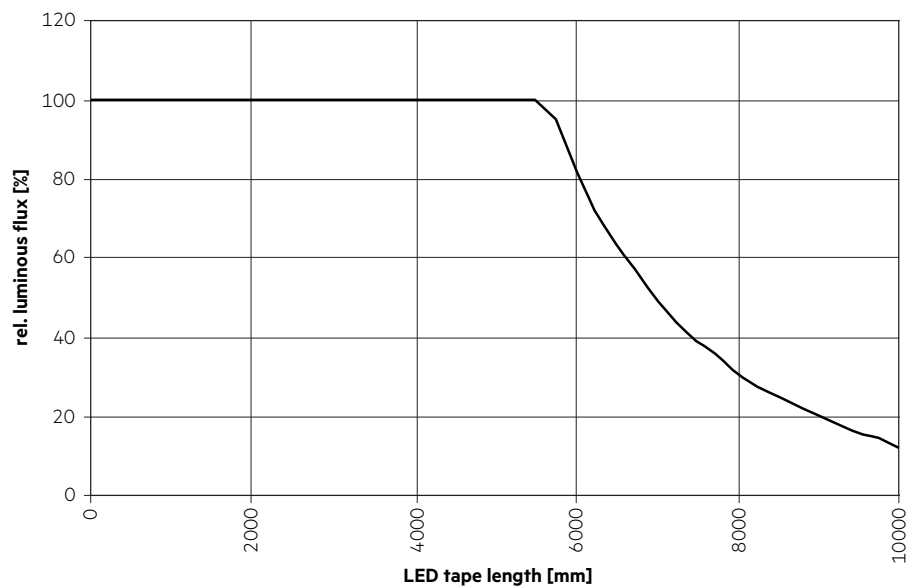
6.3 Relative luminous flux vs. tc temperature



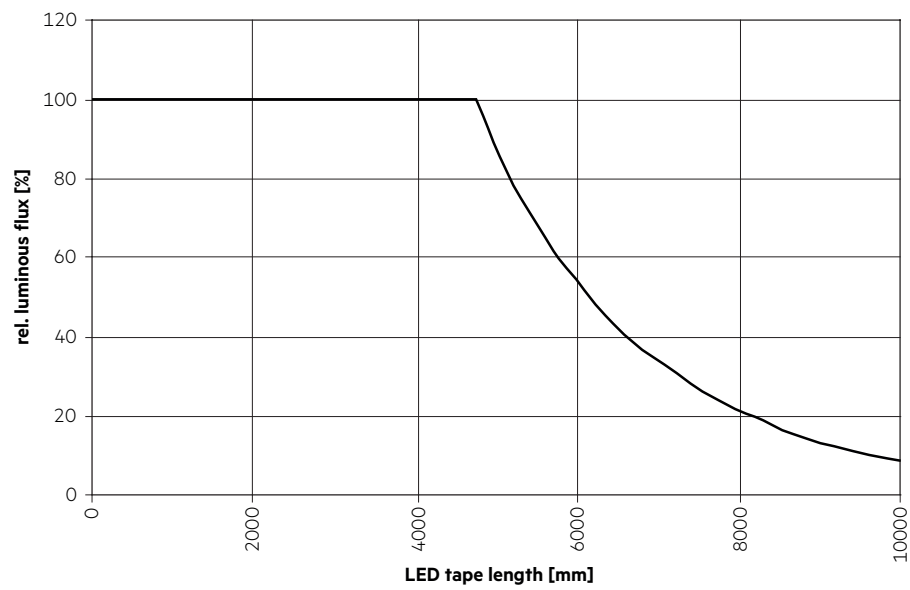
6.4 Relative luminous flux vs. LED tape length

The graphs show the luminous flux drop of the first compare to the last segment over the used tape length.

LLE FLEX 3000lm/m EXC3:



LLE FLEX 4000lm/m EXC3:



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.