



Module LLE FLEX 12mm ADV3

Modules LLE FLEX advanced

Product description

- Dimmable 24 V constant voltage LED flextape (SELV)
- Ideal for various decorative lighting applications: facade accent lighting, ceiling integration, cove lighting and for aluminium extrusions
- 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 3,810 lm/m at $t_p = 25\text{ °C}$
- Efficacy of the LED module 146 lm/W at $t_p = 25\text{ °C}$
- Small colour tolerance (MacAdam 3)

Mechanical properties

- High design freedom due to 10 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[®]

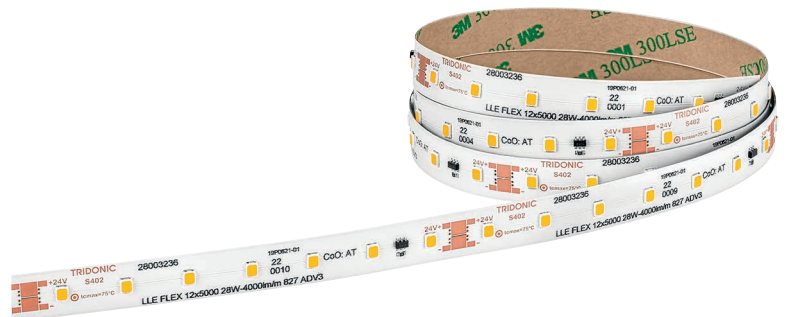
System solution

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



Standards, page 4

Colour temperatures and tolerances, page 6



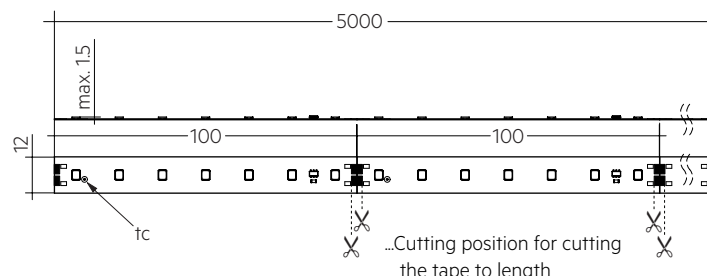


Module LLE FLEX 12mm ADV3

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 [®]	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 (conditions at www.tridonic.com)	5 years



Ordering data

Type	Article number	Colour temperature	Packaging carton	Weight per pc.
LLE FLEX 12x5000 20W-3000lm/m 827 ADV3	28003232	2,700 K	10 pc(s).	0.082 kg
LLE FLEX 12x5000 20W-3000lm/m 830 ADV3	28003233	3,000 K	10 pc(s).	0.082 kg
LLE FLEX 12x5000 20W-3000lm/m 840 ADV3	28003234	4,000 K	10 pc(s).	0.082 kg
LLE FLEX 12x5000 20W-3000lm/m 865 ADV3	28003235	6,500 K	10 pc(s).	0.082 kg
LLE FLEX 12x5000 27W-4000lm/m 827 ADV3	28003236	2,700 K	10 pc(s).	0.082 kg
LLE FLEX 12x5000 27W-4000lm/m 830 ADV3	28003237	3,000 K	10 pc(s).	0.082 kg
LLE FLEX 12x5000 27W-4000lm/m 840 ADV3	28003238	4,000 K	10 pc(s).	0.082 kg
LLE FLEX 12x5000 27W-4000lm/m 865 ADV3	28003239	6,500 K	10 pc(s).	0.082 kg

Specific technical data

Type	Photometric code	Useful luminous flux at tp = 25 °C [®]	Expected luminous flux at tp rated [®]	Typ. current consumption at tp rated	Power consumption Pon at tp = 25 °C [®]	Efficacy of the module at tp = 25 °C	Expected efficacy of the module at tp rated	Colour rendering index CRI at tp = 25 °C
LLE FLEX 12x5000 20W-3000lm/m 827 ADV3	827/359	2,860 lm/m	2,645 lm/m	884 mA/m	21.5 W/m	133 lm/W	124 lm/W	> 80
LLE FLEX 12x5000 20W-3000lm/m 830 ADV3	830/359	2,950 lm/m	2,725 lm/m	884 mA/m	21.5 W/m	137 lm/W	128 lm/W	> 80
LLE FLEX 12x5000 20W-3000lm/m 840 ADV3	840/359	2,900 lm/m	2,676 lm/m	819 mA/m	19.9 W/m	146 lm/W	136 lm/W	> 80
LLE FLEX 12x5000 20W-3000lm/m 865 ADV3	865/359	2,900 lm/m	2,685 lm/m	819 mA/m	19.9 W/m	146 lm/W	136 lm/W	> 80
LLE FLEX 12x5000 27W-4000lm/m 827 ADV3	827/359	3,710 lm/m	3,438 lm/m	1,169 mA/m	28.3 W/m	131 lm/W	123 lm/W	> 80
LLE FLEX 12x5000 27W-4000lm/m 830 ADV3	830/359	3,810 lm/m	3,539 lm/m	1,169 mA/m	28.3 W/m	135 lm/W	126 lm/W	> 80
LLE FLEX 12x5000 27W-4000lm/m 840 ADV3	840/359	3,810 lm/m	3,530 lm/m	1,099 mA/m	26.6 W/m	143 lm/W	134 lm/W	> 80
LLE FLEX 12x5000 27W-4000lm/m 865 ADV3	865/359	3,810 lm/m	3,530 lm/m	1,099 mA/m	26.6 W/m	143 lm/W	134 lm/W	> 80

[®] Integral measurement over the complete module.

[®] For 5 m reel max. 2 solder joints.

[®] 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.

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

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

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

LED driver matrix – Dimmable PRE – LLE FLEX 12mm ADV3

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 20W-3000lm/m 827 ADV3	20–70 cm	20–150 cm	40–260 cm	60–440 cm	80–660 cm
LLE FLEX 12x5000 20W-3000lm/m 830 ADV3					
LLE FLEX 12x5000 20W-3000lm/m 840 ADV3	20–80 cm	20–160 cm	40–280 cm	60–470 cm	90–710 cm
LLE FLEX 12x5000 20W-3000lm/m 865 ADV3					
LLE FLEX 12x5000 27W-4000lm/m 827 ADV3	20–60 cm	20–110 cm	30–200 cm	40–330 cm	60–500 cm
LLE FLEX 12x5000 27W-4000lm/m 830 ADV3					
LLE FLEX 12x5000 27W-4000lm/m 840 ADV3	20–60 cm	20–120 cm	30–210 cm	50–350 cm	70–530 cm
LLE FLEX 12x5000 27W-4000lm/m 865 ADV3					

LED driver matrix – Fixed output EXC – LLE FLEX 12mm ADV3

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 20W-3000lm/m 827 ADV3	20–150 cm	40–320 cm	60–430 cm	110–870 cm
LLE FLEX 12x5000 20W-3000lm/m 830 ADV3				
LLE FLEX 12x5000 20W-3000lm/m 840 ADV3	20–160 cm	50–350 cm	60–470 cm	110–940 cm
LLE FLEX 12x5000 20W-3000lm/m 865 ADV3				
LLE FLEX 12x5000 27W-4000lm/m 827 ADV3	20–110 cm	30–240 cm	40–330 cm	80–650 cm
LLE FLEX 12x5000 27W-4000lm/m 830 ADV3				
LLE FLEX 12x5000 27W-4000lm/m 840 ADV3	20–120 cm	30–240 cm	50–350 cm	90–700 cm
LLE FLEX 12x5000 27W-4000lm/m 865 ADV3				

LED driver matrix – Fixed output SNC – LLE FLEX 12mm ADV3

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 20W-3000lm/m 827 ADV3	30–70 cm	60–150 cm	100–260 cm	160–440 cm	310–880 cm
LLE FLEX 12x5000 20W-3000lm/m 830 ADV3					
LLE FLEX 12x5000 20W-3000lm/m 840 ADV3	30–80 cm	60–160 cm	100–280 cm	170–470 cm	330–950 cm
LLE FLEX 12x5000 20W-3000lm/m 865 ADV3					
LLE FLEX 12x5000 27W-4000lm/m 827 ADV3	30–60 cm	40–110 cm	70–200 cm	120–330 cm	230–660 cm
LLE FLEX 12x5000 27W-4000lm/m 830 ADV3					
LLE FLEX 12x5000 27W-4000lm/m 840 ADV3	30–60 cm	50–120 cm	80–210 cm	130–350 cm	250–710 cm
LLE FLEX 12x5000 27W-4000lm/m 865 ADV3					

1. Standards

IEC 62031
IEC 62471
IEC 62778
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 initial	MacAdam 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 12x5000 20W-3000lm/m			
LLE FLEX 12x5000 20W-3000lm/m 827 ADV3	2.700 K	E	22 kWh / 1.000 h
LLE FLEX 12x5000 20W-3000lm/m 830 ADV3	3.000 K	E	22 kWh / 1.000 h
LLE FLEX 12x5000 20W-3000lm/m 840 ADV3	4.000 K	E	20 kWh / 1.000 h
LLE FLEX 12x5000 20W-3000lm/m 865 ADV3	6.500 K	E	20 kWh / 1.000 h
LLE FLEX 12x5000 27W-4000lm/m			
LLE FLEX 12x5000 27W-4000lm/m 827 ADV3	2.700 K	E	29 kWh / 1.000 h
LLE FLEX 12x5000 27W-4000lm/m 830 ADV3	3.000 K	E	29 kWh / 1.000 h
LLE FLEX 12x5000 27W-4000lm/m 840 ADV3	4.000 K	E	27 kWh / 1.000 h
LLE FLEX 12x5000 27W-4000lm/m 865 ADV3	6.500 K	E	27 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
---------------------	---------------

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 12mm 3000lm/m

ta	tp	R _{th, hs-a} ^①	Cooling area ^①
25°C	65°C	42.2 k/W	16 cm ²
35°C	65°C	31.7 k/W	21 cm ²
40°C	65°C	26.4 k/W	25 cm ²
45°C	65°C	21.1 k/W	32 cm ²
50°C	65°C	15.8 k/W	42 cm ²

LLE FLEX 12mm 4000lm/m

ta	tp	R _{th, hs-a} ^①	Cooling area ^①
25°C	65°C	30.9 k/W	22 cm ²
35°C	65°C	23.2 k/W	29 cm ²
40°C	65°C	19.3 k/W	35 cm ²
45°C	65°C	15.4 k/W	43 cm ²
50°C	65°C	11.6 k/W	58 cm ²

^① 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.

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 100 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

LLE FLEX 12mm 3000lm/m ADV3

Supply voltage	tp temperature	L90/F10	L90/F50	L80/F10	L80/F50	L70/F10	L70/F50
24 V	40 °C	61,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
	45 °C	57,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
	50 °C	53,000 h	71,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
	55 °C	50,000 h	66,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
	60 °C	46,000 h	62,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
	65 °C	43,000 h	58,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
	70 °C	40,000 h	54,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
75 °C	37,000 h	51,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h	

LLE FLEX 12mm 4000lm/m ADV3

Supply voltage	tp temperature	L90/F10	L90/F50	L80/F10	L80/F50	L70/F10	L70/F50
24 V	40 °C	59,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
	45 °C	55,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
	50 °C	51,000 h	69,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
	55 °C	48,000 h	64,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
	60 °C	44,000 h	60,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
	65 °C	41,000 h	56,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
	70 °C	39,000 h	52,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 h
75 °C	36,000 h	49,000 h	>72,000 h	>72,000 h	>72,000 h	>72,000 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 Imax

6. Photometric characteristics

6.1 Coordinates and tolerances according to CIE 1931

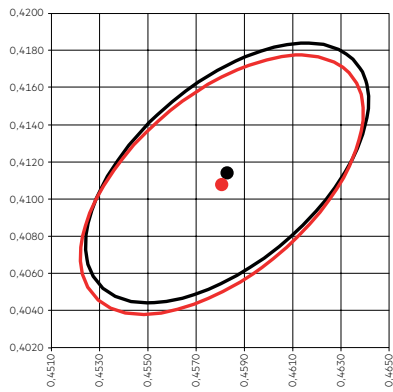
The specified colour coordinates are measured integral by a current impulse with typical values of module and a duration of 100 ms.

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

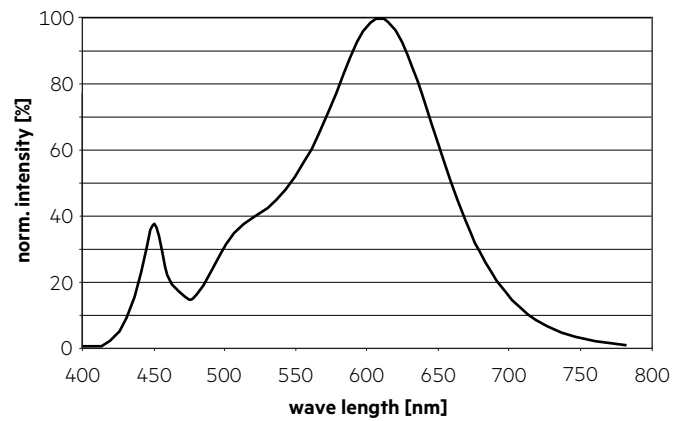
The measurement tolerance of the colour coordinates are ± 0.01 .

2,700 K

	x0	y0
Centre 3,000 lm/m	0.4573	0.4074
Centre 4,000 lm/m	0.4571	0.4068

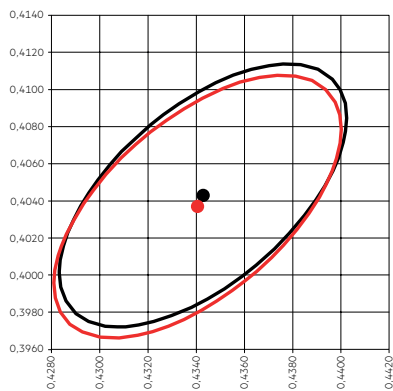


— MacAdam Ellipse: 3SDCM

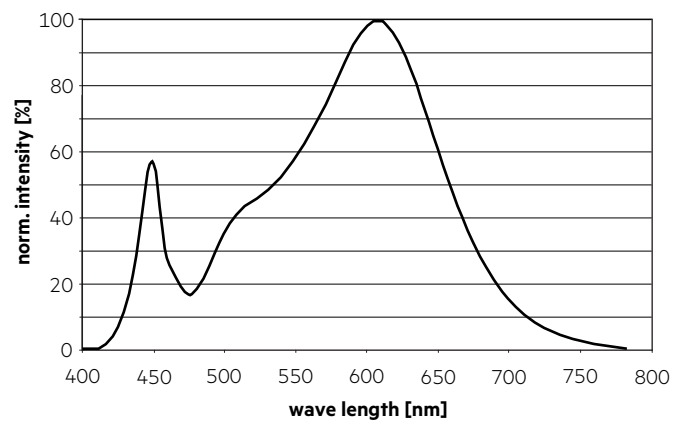


3,000 K

	x0	y0
Centre 3,000 lm/m	0.4333	0.4003
Centre 4,000 lm/m	0.4331	0.3997

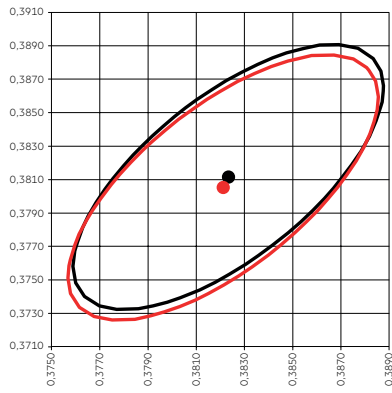


— MacAdam Ellipse: 3SDCM

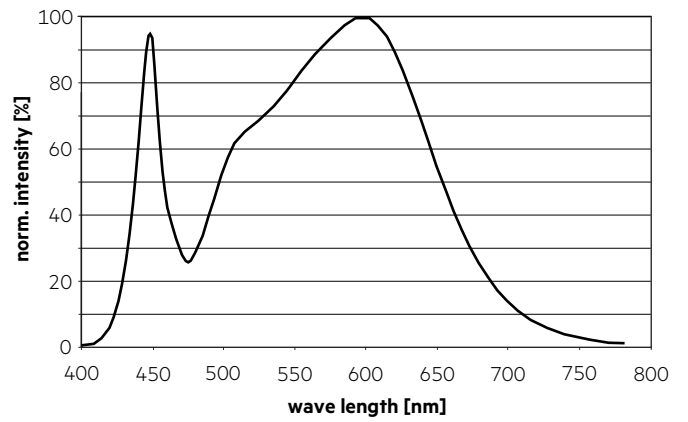


4,000 K

	x0	y0
Centre 3,000 lm/m	0.3813	0.3772
Centre 4,000 lm/m	0.3811	0.3765

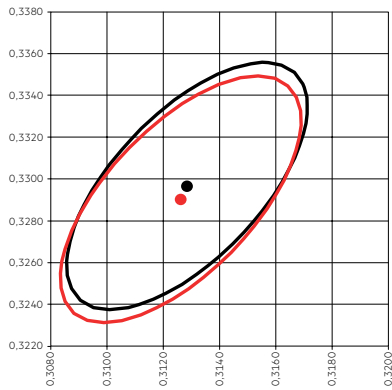


— MacAdam Ellipse: 3SDCM

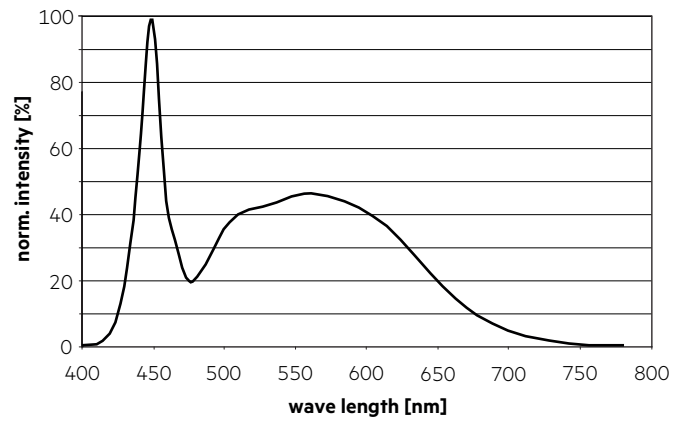


6,500 K

	x0	y0
Centre 3,000 lm/m	0.3118	0.3257
Centre 4,000 lm/m	0.3116	0.3250

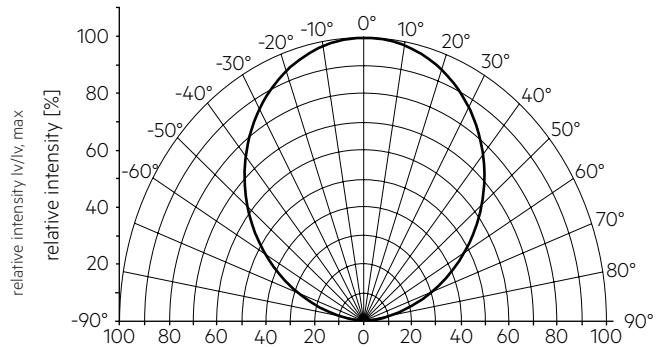


— MacAdam Ellipse: 3SDCM



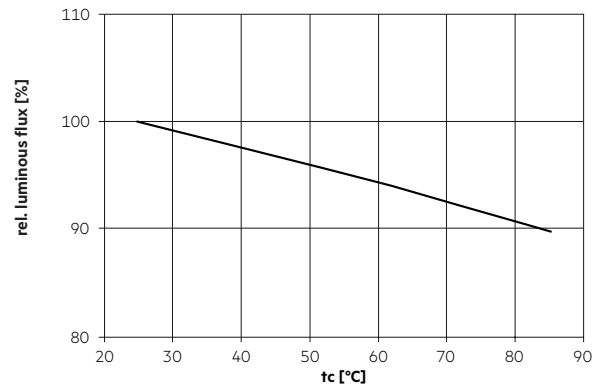
6.2 Light distribution

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. 1.5 cm) should be used.

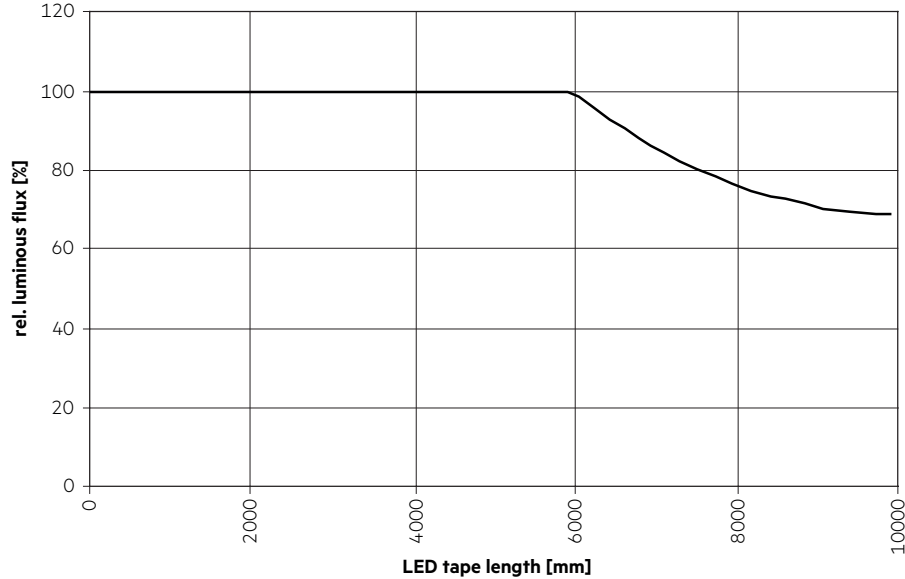
6.3 Relative luminous flux vs. tc temperature



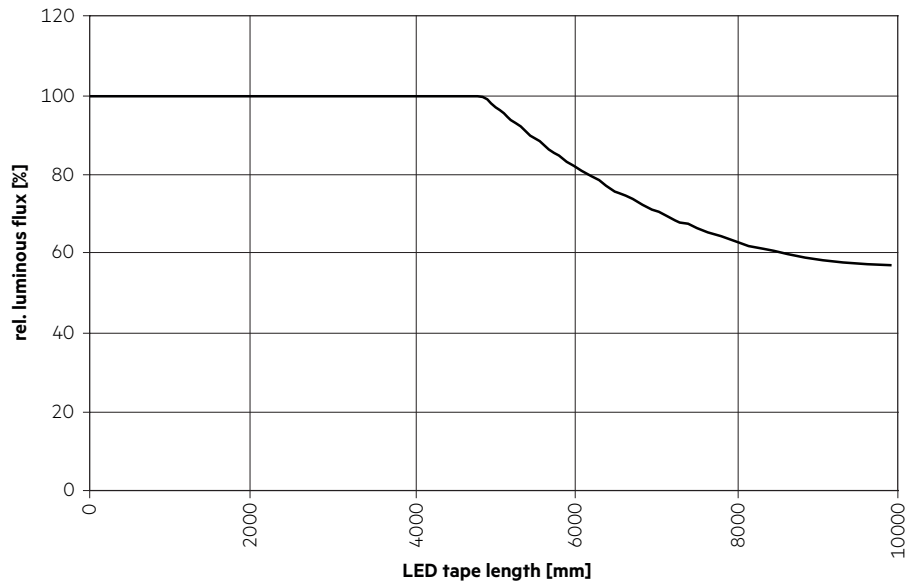
6.4 Relative luminous flux vs. LED tape length

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

LLE FLEX 12mm 3000lm/m ADV3:



LLE FLEX 12mm 4000lm/m ADV3:



7. Miscellaneous

7.1 Additional information

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

Lifetime declarations are informative and represent no warranty claim.