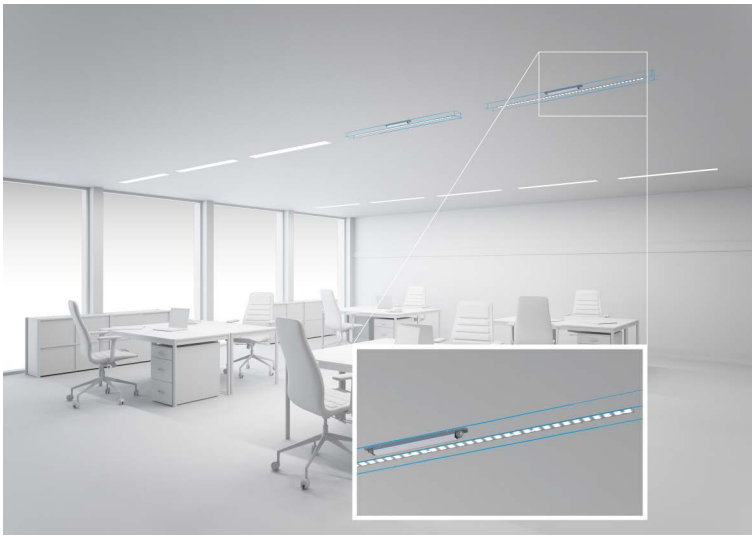
Module LLE G2 55mm 4000lm ADV

Modules LLE ADVANCED

Product description

- Ideal for linear and panel lights
- LED system solution with outstanding system efficiency up to 165 lm/W, consisting of linear LED modules and dimmable LED Driver LCA 50W 100-400mA one4all lp PRE
- Efficiency of the module up to 186 lm/W
- Outstanding colour rendering index CRI > 80
- Small colour tolerance MacAdam 3③
- Small luminous flux tolerances
- Colour temperature 3,000, 4,000, 5,000 and 6,500 K
- Perfectly uniform light, even if several LED modules are used together in a line
- Push terminals for quick and simple wiring of LED module to LED module
- Simple installation (e.g. screws)
- Long life-time: 50,000 hours
- 5-year guarantee



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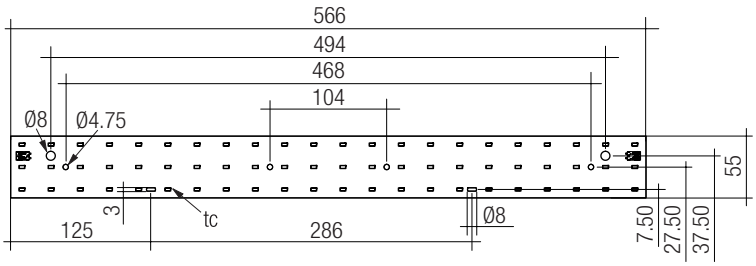
RoHS

Module LLE G2 55mm 4000lm ADV

Modules LLE ADVANCED

Technical data

Beam characteristic	120°
Ambient temperature range	-40 … +65 °C
tp rated	65 °C
tc	85 °C
Irated	800 mA
Imax	1,000 mA
Max. DC forward current	1,200 mA
Max. permissible LF current ripple	1,320 mA
Max. permissible peak current	1,560 mA / max. 10 ms
Max. working voltage for insulation[②]	500 V
Insulation test voltage	2 kV
CTI of the printed circuit board	≥ 600
ESD classification	severity level 4
Risk group (IEC 62471:2008)[③]	RG1
Classification acc. to IEC 62031	Built-in
Type of protection	IP00



Ordering data

Type	Article number	Colour temperature	Packaging carton	Weight per pc.
LLE G2 55x566mm 4000lm 830 T2 ADV	**28001754**	3,000 K	160 pc(s).	0.096kg
LLE G2 55x566mm 4000lm 840 T2 ADV	**28001755**	4,000 K	160 pc(s).	0.150 kg
LLE G2 55x566mm 4000lm 850 T2 ADV	**28001756**	5,000 K	160 pc(s).	0.150 kg
LLE G2 55x566mm 4000lm 865 T2 ADV	**28001757**	6,500 K	160 pc(s).	0.150 kg

Specific technical data

Type[4]	Photo-metric code	Typ. luminous flux at tp = 25 °C[5]	Typ. luminous flux at tp = 65 °C[5]	Typ. forward current	Min. forward voltage at tp = 65 °C	Max. forward voltage at tp = 25 °C	Typ. power consumption at tp = 65 °C[5]	Efficacy of the module at tp = 25 °C	Efficacy of the module at tp = 65 °C	Efficacy of the system at tp = 65 °C	Colour rendering index CRI
LLE G2 55x566mm 4000lm ADV – Operating mode HE at 450 mA											
LLE G2 55x566mm 4000lm 830 ADV	830/359	2,430 lm	2,320 lm	450 mA	28.4 V	32.9 V	13.7 W	174 lm/W	169 lm/W	155 lm/W	> 80
LLE G2 55x566mm 4000lm 840 ADV	840/359	2,550 lm	2,420 lm	450 mA	28.4 V	32.9 V	13.7 W	183 lm/W	176 lm/W	162 lm/W	> 80
LLE G2 55x566mm 4000lm 850 ADV	850/359	2,600 lm	2,460 lm	450 mA	28.4 V	32.9 V	13.7 W	186 lm/W	179 lm/W	165 lm/W	> 80
LLE G2 55x566mm 4000lm 865 ADV	865/359	2,560 lm	2,420 lm	450 mA	28.4 V	32.9 V	13.7 W	184 lm/W	176 lm/W	162 lm/W	> 80
LLE G2 55x566mm 4000lm ADV – Operating mode HE at 550 mA											
LLE G2 55x566mm 4000lm 830 ADV	830/359	2,950 lm	2,810 lm	550 mA	28.8 V	33.3 V	17.1 W	171 lm/W	165 lm/W	152 lm/W	> 80
LLE G2 55x566mm 4000lm 840 ADV	840/359	3,090 lm	2,930 lm	550 mA	28.8 V	33.3 V	17.1 W	179 lm/W	172 lm/W	158 lm/W	> 80
LLE G2 55x566mm 4000lm 850 ADV	850/359	3,150 lm	2,980 lm	550 mA	28.8 V	33.3 V	17.1 W	183 lm/W	175 lm/W	161 lm/W	> 80
LLE G2 55x566mm 4000lm 865 ADV	865/359	3,110 lm	2,940 lm	550 mA	28.8 V	33.3 V	17.1 W	180 lm/W	173 lm/W	159 lm/W	> 80
LLE G2 55x566mm 4000lm ADV – Operating mode NM at 600 mA											
LLE G2 55x566mm 4000lm 830 ADV	830/359	3,200 lm	3,050 lm	600 mA	29.0 V	33.5 V	18.6 W	170 lm/W	164 lm/W	151 lm/W	> 80
LLE G2 55x566mm 4000lm 840 ADV	840/359	3,350 lm	3,190 lm	600 mA	29.0 V	33.5 V	18.6 W	178 lm/W	171 lm/W	157 lm/W	> 80
LLE G2 55x566mm 4000lm 850 ADV	850/359	3,420 lm	3,240 lm	600 mA	29.0 V	33.5 V	18.6 W	181 lm/W	174 lm/W	160 lm/W	> 80
LLE G2 55x566mm 4000lm 865 ADV	865/359	3,370 lm	3,190 lm	600 mA	29.0 V	33.5 V	18.6 W	179 lm/W	171 lm/W	157 lm/W	> 80
LLE G2 55x566mm 4000lm ADV – Operating mode NM at 650 mA											
LLE G2 55x566mm 4000lm 830 ADV	830/359	3,440 lm	3,270 lm	650 mA	29.2 V	33.7 V	20.1 W	167 lm/W	162 lm/W	149 lm/W	> 80
LLE G2 55x566mm 4000lm 840 ADV	840/359	3,620 lm	3,440 lm	650 mA	29.2 V	33.7 V	20.1 W	176 lm/W	170 lm/W	156 lm/W	> 80
LLE G2 55x566mm 4000lm 850 ADV	850/359	3,670 lm	3,480 lm	650 mA	29.2 V	33.7 V	20.1 W	178 lm/W	172 lm/W	158 lm/W	> 80
LLE G2 55x566mm 4000lm 865 ADV	865/359	3,640 lm	3,440 lm	650 mA	29.2 V	33.7 V	20.1 W	177 lm/W	170 lm/W	156 lm/W	> 80
LLE G2 55x566mm 4000lm ADV – Operating mode NM at 700 mA											
LLE G2 55x566mm 4000lm 830 ADV	830/359	3,700 lm	3,520 lm	700 mA	29.4 V	33.9 V	21.9 W	166 lm/W	160 lm/W	147 lm/W	> 80
LLE G2 55x566mm 4000lm 840 ADV	840/359	3,870 lm	3,670 lm	700 mA	29.4 V	33.9 V	21.9 W	174 lm/W	167 lm/W	154 lm/W	> 80
LLE G2 55x566mm 4000lm 850 ADV	850/359	3,950 lm	3,740 lm	700 mA	29.4 V	33.9 V	21.9 W	177 lm/W	170 lm/W	156 lm/W	> 80
LLE G2 55x566mm 4000lm 865 ADV	865/359	3,890 lm	3,680 lm	700 mA	29.4 V	33.9 V	21.9 W	175 lm/W	167 lm/W	154 lm/W	> 80
LLE G2 55x566mm 4000lm ADV – Operating mode HO at 800 mA											
LLE G2 55x566mm 4000lm 830 ADV	830/359	4,130 lm	3,920 lm	800 mA	29.7 V	34.2 V	25.4 W	160 lm/W	154 lm/W	142 lm/W	> 80
LLE G2 55x566mm 4000lm 840 ADV	840/359	4,340 lm	4,110 lm	800 mA	29.7 V	34.2 V	25.4 W	168 lm/W	162 lm/W	149 lm/W	> 80
LLE G2 55x566mm 4000lm 850 ADV	850/359	4,410 lm	4,160 lm	800 mA	29.7 V	34.2 V	25.4 W	171 lm/W	164 lm/W	151 lm/W	> 80
LLE G2 55x566mm 4000lm 865 ADV	865/359	4,370 lm	4,120 lm	800 mA	29.7 V	34.2 V	25.4 W	170 lm/W	162 lm/W	149 lm/W	> 80
LLE G2 55x566mm 4000lm ADV – Operating mode HO at 900 mA											
LLE G2 55x566mm 4000lm 830 ADV	830/359	4,590 lm	4,370 lm	900 mA	30.0 V	34.6 V	28.8 W	157 lm/W	152 lm/W	140 lm/W	> 80
LLE G2 55x566mm 4000lm 840 ADV	840/359	4,810 lm	4,570 lm	900 mA	30.0 V	34.6 V	28.8 W	165 lm/W	160 lm/W	147 lm/W	> 80
LLE G2 55x566mm 4000lm 850 ADV	850/359	4,900 lm	4,640 lm	900 mA	30.0 V	34.6 V	28.8 W	168 lm/W	161 lm/W	148 lm/W	> 80
LLE G2 55x566mm 4000lm 865 ADV	865/359	4,830 lm	4,570 lm	900 mA	30.0 V	34.6 V	28.8 W	165 lm/W	158 lm/W	145 lm/W	> 80
LLE G2 55x566mm 4000lm ADV – Operating mode HO at 1,000 mA											
LLE G2 55x566mm 4000lm 830 ADV	830/359	5,000 lm	4,770 lm	1.000 mA	30.4 V	34.9 V	32.4 W	152 lm/W	147 lm/W	135 lm/W	> 80
LLE G2 55x566mm 4000lm 840 ADV	840/359	5,240 lm	4,980 lm	1.000 mA	30.4 V	34.9 V	32.4 W	160 lm/W	154 lm/W	142 lm/W	> 80
LLE G2 55x566mm 4000lm 850 ADV	850/359	5,340 lm	5,060 lm	1.000 mA	30.4 V	34.9 V	32.4 W	163 lm/W	156 lm/W	144 lm/W	> 80
LLE G2 55x566mm 4000lm 865 ADV	865/359	5,270 lm	4,980 lm	1.000 mA	30.4 V	34.9 V	32.4 W	161 lm/W	154 lm/W	142 lm/W	> 80

[1] Integral measurement over the complete module.

[2] If mounted with M4 screws with 7 mm head diameter.

[3] Measured at operating mode HO.

[4] HE ... high efficiency, NM ... nominal mode, HO ... high output.

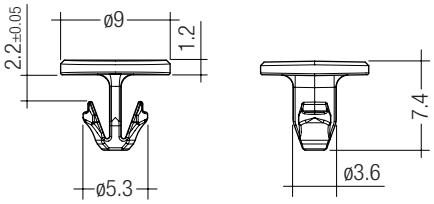
[5] Tolerance range for optical and electrical data: ±10 %.

ACCES-SORIES

CLIP 4.3mm

Product description

- Clip for fixation of LED modules with 4.3 mm holes
- Fast snap on mounting (sheet thickness 0.5 – 1.0 mm)
- For drilling hole 4 mm
- Clip made of Polycarbonat



Ordering data

Type	Article number	Colour	Packaging bag[1]	Weight per pc.
ACL CLIP 4.3mm PUSH-FIX	**28001036**	White	500 pc(s).	0.001 kg

[1] Minimum sales quantity 500 pcs.

1. Standards

IEC 62031
IEC 62471
IEC 61000-4-2

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

1.2 Energy classification

Type	Energy classification
LLE G2 55mm 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	-40 … +100 °C

Operation only in non condensing environment.
Humidity during processing of the module should be between 0 to 60 %.

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 module will be greatly reduced or the LLE may be destroyed.

2.4 Heat sink values

LLE G2 55x566mm 4000lm ADV

ta	tp	Forward current	$R_{th, hs-a}$	Cooling area
25 °C	65 °C	450 mA		self cooling
25 °C	65 °C	600 mA		self cooling
25 °C	65 °C	800 mA		self cooling
25 °C	65 °C	1.000 mA		self cooling
35 °C	65 °C	450 mA		self cooling
35 °C	65 °C	600 mA		self cooling
35 °C	65 °C	800 mA		self cooling
35 °C	65 °C	1.000 mA	1.8 K/W	380 cm²
45 °C	65 °C	450 mA		self cooling
45 °C	65 °C	600 mA		self cooling
45 °C	65 °C	800 mA	1.6 K/W	429 cm²
45 °C	65 °C	1.000 mA	1.2 K/W	570 cm²
55 °C	65 °C	450 mA	1.6 K/W	429 cm²
55 °C	65 °C	600 mA	1.1 K/W	602 cm²
55 °C	65 °C	800 mA	0.8 K/W	858 cm²
55 °C	65 °C	1.000 mA	0.6 K/W	1.141 cm²

Notes
The actual cooling surface can differ because of the material, the structural shape, outside influences and the installation situation. Depending on the heat sink a heat conducting paste or heat conducting film might be necessary to keep the specified tp temperature.

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:
- Short-circuit protection
- Overload protection
- Overtemperature protection

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

Wrong polarity can damage the LLE.

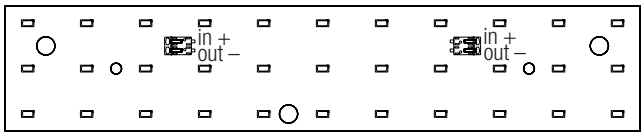
With parallel wiring tolerance-related differences in output are possible (thermal stress of the module) and can cause differences in brightness. It is recommended to use modules out of one batch / carton for parallel wiring only.

If a wire breaks or a complete module fails then the current passing through the other module increases.
This may reduce its life considerably.

LLE can be operated either from SELV LED Drivers or from LED Drivers with LV output voltage.

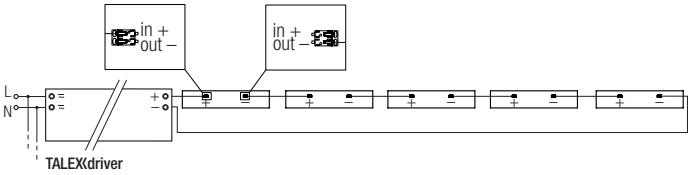
LLE modules are basic isolated up to 500 V (if mounted with M4 screws with 7 mm head diameter) against ground and can be mounted directly on earthed metal parts of the luminaire. If the max. output voltage of the LED Driver (also against earth) is above 500 V, an additional isolation between LED module and heat sink is required (for example by isolated thermal pads) or by a suitable luminaire construction.
At voltages > 60 V an additional protection against direct touch (test finger) to the light emitting side of the module has to be guaranteed. This is typically achieved by means of a non removable light distributor over the module.

3.2 Wiring

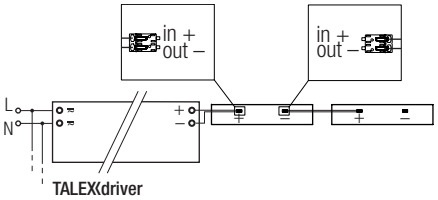


Wiring examples

Serial wiring:

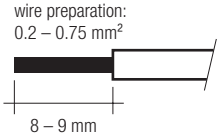


Parallel wiring:



3.3 Wiring type and cross section

The wiring can be in stranded wires or solid with a cross section of 0.2 to 0.75 mm².
For the push-wire connection you have to strip the insulation (8–9 mm).



To remove the wires use a suitabel tool (e.g. Microcon release pin) or through twist and pull .

3.4 Mounting instruction

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

Max. torque for fixing: 0.5 Nm.

The LED modules are mounted onto a heat sink with 4 M4 screws per module or ACL CLIP 4.3mm.

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.

3.5 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 maintenace 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 inital luminous flux, respectivly 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.

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

4.2 Lumen maintenance for LLE G4 24mm ADV

LLE G2 55x566mm 4000lm ADV

Forward current	tp temperature	L90 / F10	L90 / F50	L80 / F10	L80 / F50	L70 / F10	L70 / F50
450 mA	55 °C	33,000 h	37,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	26,000 h	29,000 h	52,000 h	59,000 h	>60,000 h	>60,000 h
	75 °C	21,000 h	24,000 h	43,000 h	49,000 h	>60,000 h	>60,000 h
550 mA	55 °C	31,000 h	35,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	26,000 h	29,000 h	51,000 h	58,000 h	>60,000 h	>60,000 h
	75 °C	21,000 h	24,000 h	43,000 h	48,000 h	>60,000 h	>60,000 h
600 mA	55 °C	31,000 h	35,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	25,000 h	29,000 h	51,000 h	57,000 h	>60,000 h	>60,000 h
	75 °C	22,000 h	24,000 h	43,000 h	49,000 h	>60,000 h	>60,000 h
650 mA	55 °C	30,000 h	34,000 h	58,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	25,000 h	28,000 h	49,000 h	56,000 h	>60,000 h	>60,000 h
	75 °C	21,000 h	24,000 h	42,000 h	48,000 h	>60,000 h	>60,000 h
700 mA	55 °C	29,000 h	33,000 h	57,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	25,000 h	28,000 h	49,000 h	55,000 h	>60,000 h	>60,000 h
	75 °C	21,000 h	24,000 h	42,000 h	48,000 h	>60,000 h	>60,000 h
800 mA	55 °C	29,000 h	33,000 h	56,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	24,000 h	28,000 h	48,000 h	55,000 h	>60,000 h	>60,000 h
	75 °C	21,000 h	24,000 h	42,000 h	47,000 h	>60,000 h	>60,000 h
900 mA	55 °C	28,000 h	31,000 h	53,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	24,000 h	27,000 h	47,000 h	53,000 h	>60,000 h	>60,000 h
	75 °C	21,000 h	24,000 h	41,000 h	47,000 h	>60,000 h	>60,000 h
1,000 mA	55 °C	27,000 h	30,000 h	51,000 h	58,000 h	>60,000 h	>60,000 h
	65 °C	23,000 h	27,000 h	46,000 h	52,000 h	>60,000 h	>60,000 h
	75 °C	21,000 h	24,000 h	41,000 h	47,000 h	>60,000 h	>60,000 h

5. Electrical values

5.1 Declaration of electrical parameters

Irated ... Nominal operating current the module is designed for.

Imax ... Max. permissible continuous operating current.

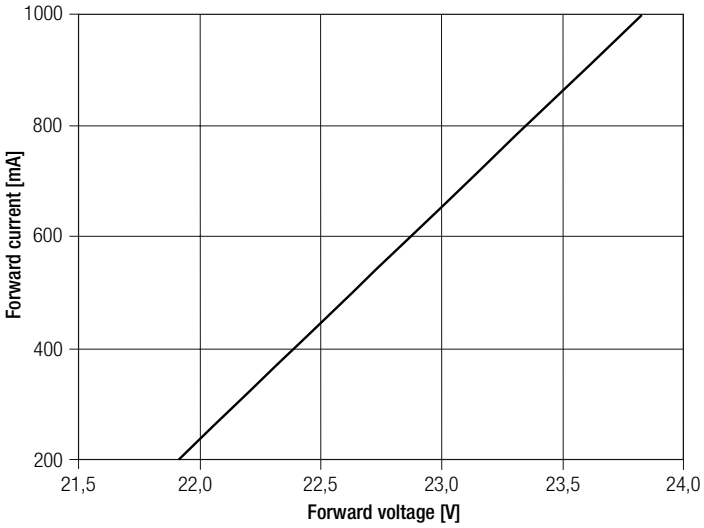
Max. DC forward current ... Max. permissible continuous operating current incl. The tolerances of the LED Driver. LED module may be destroyed if this value is exceeded.

Max. permissible LF current ripple ... Max. output current of the LED Driver incl. Tolerances and LF current ripple must not exceed this value.

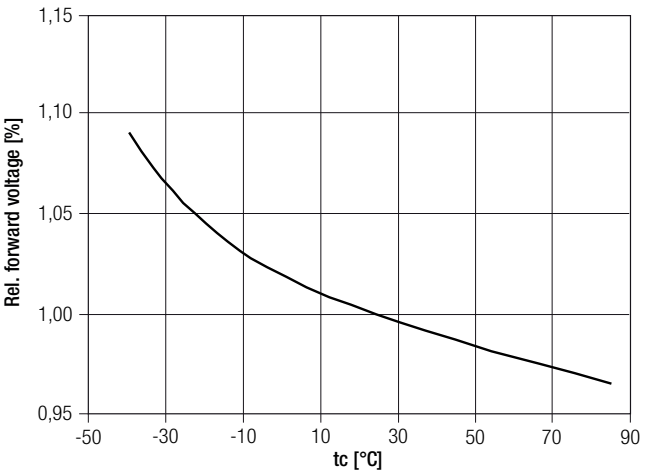
Max. permissible peak current ... The max. output peak current of the LED Driver must not exceed this value.

5.2 Typ. forward voltage vs. forward current

LLE G2 55x566mm 4000lm ADV



5.3 Forward voltage vs. tc temperature



The diagrams are based on statistic values.
The real values can be different.

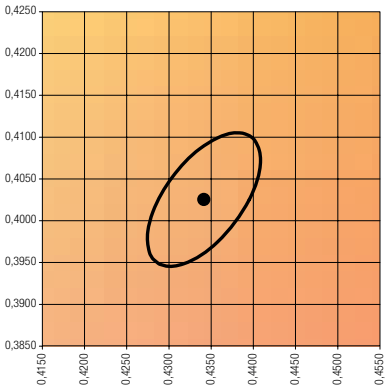
6. Photometric characteristics

6.1 Coordinates and tolerances according to CIE 1931

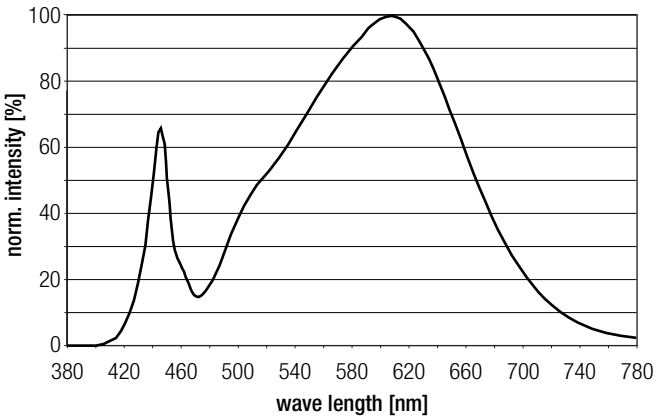
The specified colour coordinates are integral measured by current impulse of 325 mA and a duration of 100 ms.
The ambient temperature of the measurement is ta = 25 °C.
The measurement tolerance of the colour coordinates are ± 0.01.

3,000 K

	x0	y0
Centre	0.4340	0.4026

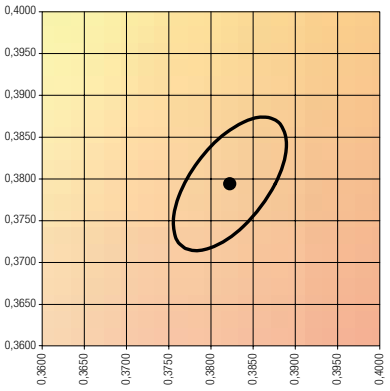


MacAdam Ellipse: 3SDCM

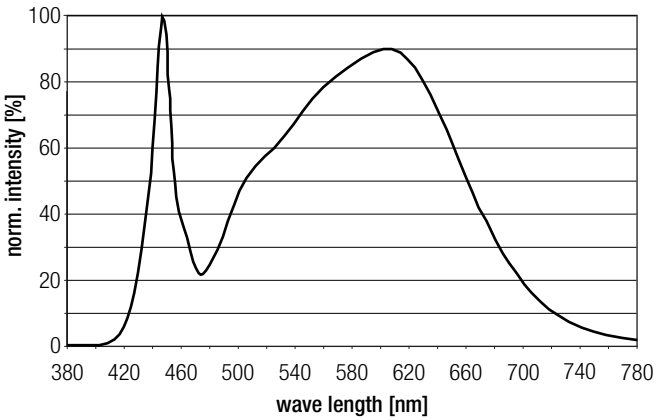


4,000 K

	x0	y0
Mittelpunkt	0.3822	0.3794

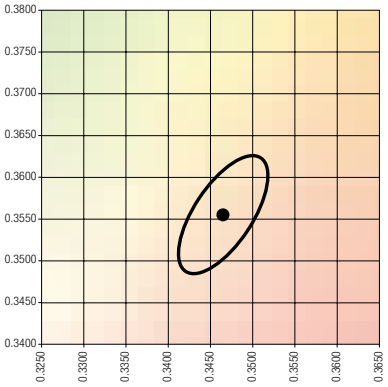


MacAdam Ellipse: 3SDCM

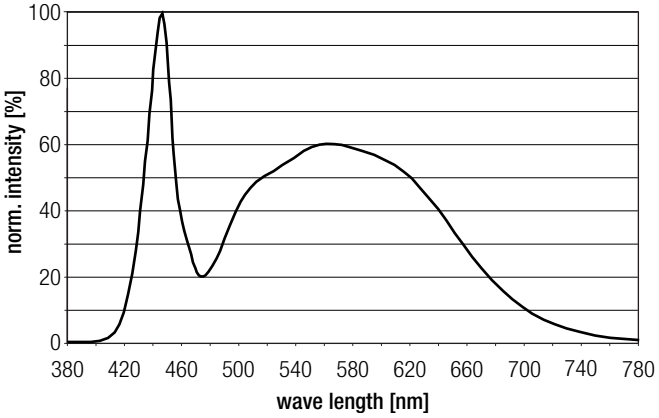


5,000 K

	x0	y0
Mittelpunkt	0.3447	0.3547

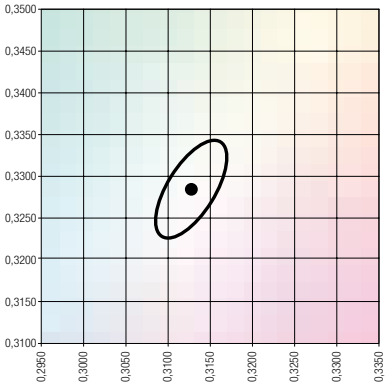


MacAdam Ellipse: 3SDCM

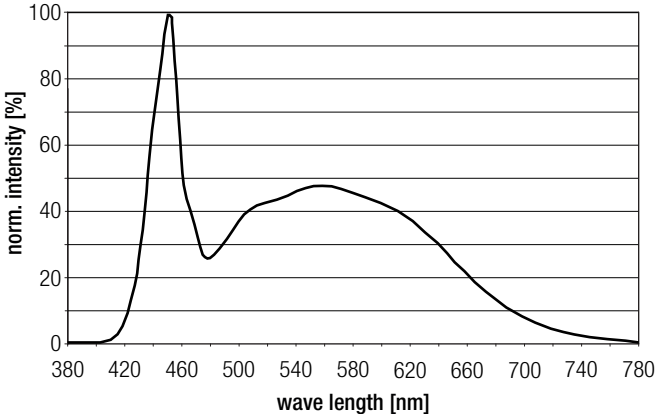


6,500 K

	x0	y0
Mittelpunkt	0.3126	0.3280

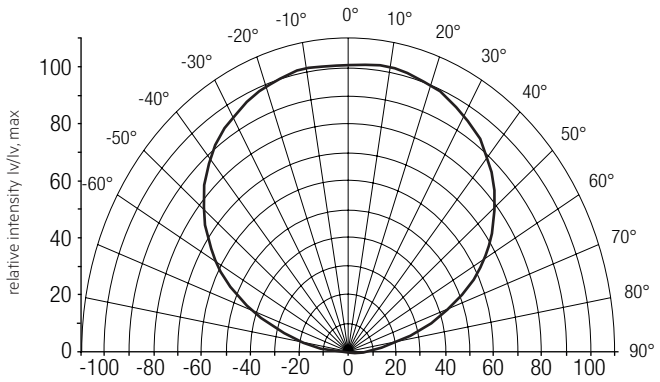


MacAdam Ellipse: 3SDCM



6.2 Light distribution

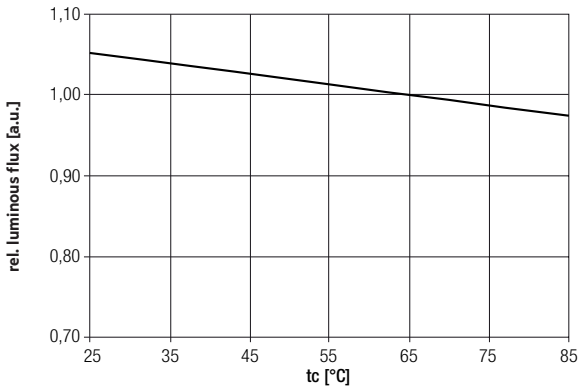
The optical design of the LLE product line ensures optimum homogenity for the light distribution.



The colour temperature is measured integral over the complete module. The single LED light points can have deviations in the colour coordinates within MacAdam 3.
To ensure an ideal mixture of colours and a homogenious light distribution a suitable optic (e. g. PMMA diffuser) and a sufficient spacing between module and optic (typ. 4 cm) should be used.

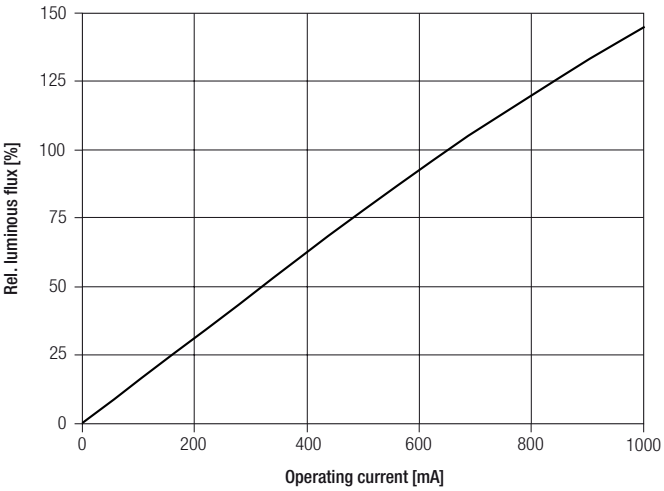
For further information see Design-in Guide, 3D data and photometric data on www.tridonic.com or on request.

6.3 Relative luminous flux vs. tc temperature



6.4 Relative luminous flux vs. operating current

LLE G2 55x566mm 4000lm ADV



The diagrams are based on statistic values.
The real values can be different.