



Module LLE G4 24mm 2000lm ADV

Module LLE ADVANCED

Product description

- Ideal for linear and panel lights
- Typ. luminous flux 2,000 and 4,000 lm
- LED system solution with outstanding system efficacy up to 164 lm/W, consisting of linear LED modules and dimmable LED Driver LCA 50W 100–400mA Ip PRE
- Efficacy of the module up to 185 lm/W
- High colour rendering index CRI > 80
- Small colour tolerance MacAdam 3rd
- Small luminous flux tolerances
- Colour temperatures 3,000 K, 4,000 K, 5,000 K and 6,500 K
- Module dimension 24 x 280 mm and 24 x 560 mm (ZHAGA compliant)
- 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



Standards, page 8

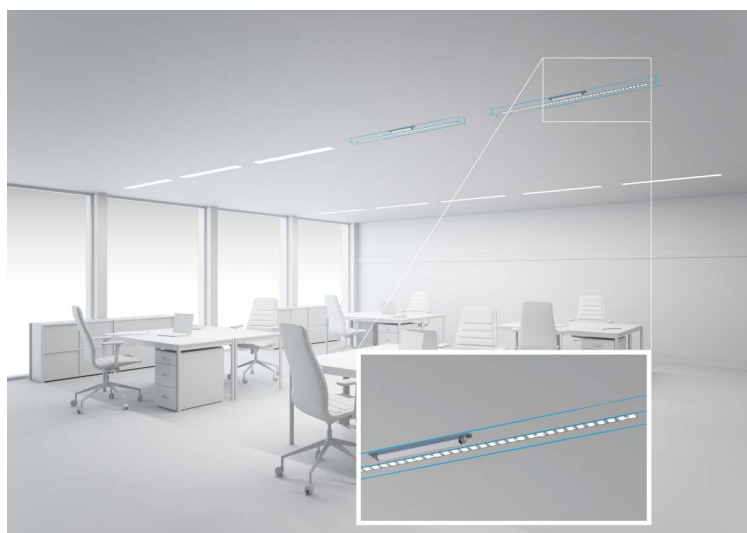
Colour temperatures and tolerances, page 12



LLE G4 24x280mm 2000lm ADV



LLE G4 24x560mm 4000lm ADV



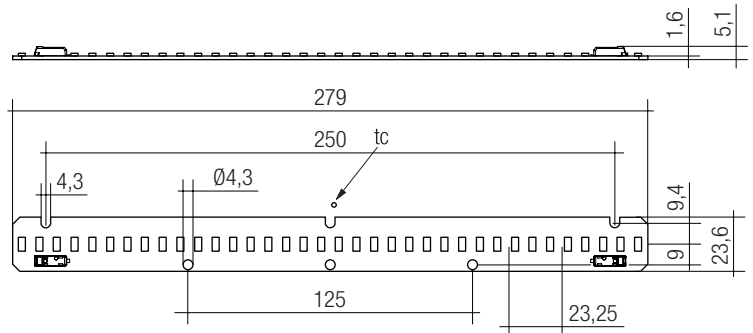


Module LLE G4 24mm 2000lm ADV

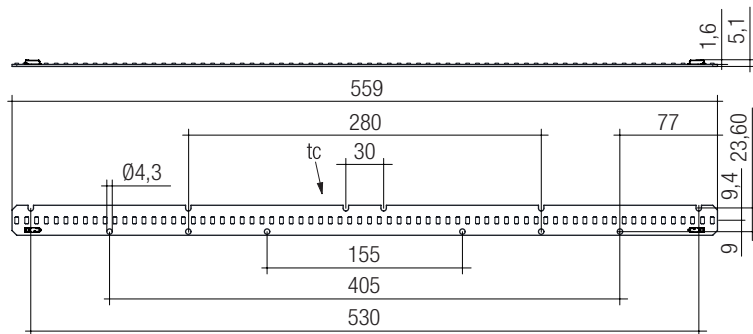
Module LLE ADVANCED

Technical data

Beam characteristic	120°
Ambient temperature range	-40 ... +65 °C
tp rated	65 °C
tc	85 °C
Irated	350 mA
I _{max}	500 mA
Max. DC forward current	600 mA
Max. permissible LF current ripple	660 mA
Max. permissible peak current	780 mA / max. 10 ms
Max. working voltage for insulation [®]	320 V
Insulation test voltage	1.64 kV
CTI of the printed circuit board	≥ 600
ESD classification	severity level 4
Risk group (IEC 62471:2008) at 450 mA [®]	RG1
Risk group (IEC 62471:2008) at 500 mA [®]	RG2 (E _{thr} =tbd, RG1 at d > tbd)
Classification acc. to IEC 62031	Built-in
Type of protection	IP00



LLE G4 24x280mm 2000lm ADV



LLE G4 24x560mm 4000lm ADV

Ordering data

Type	Article number	Colour temperature	Packaging carton	Weight per pc.
LLE G4 24x280mm 2000lm 830 2T ADV	28001496	3,000 K	300 pc(s).	0.023 kg
LLE G4 24x280mm 2000lm 840 2T ADV	28001497	4,000 K	300 pc(s).	0.023 kg
LLE G4 24x280mm 2000lm 850 2T ADV	28001498	5,000 K	300 pc(s).	0.023 kg
LLE G4 24x280mm 2000lm 865 2T ADV	28001499	6,500 K	300 pc(s).	0.023 kg
LLE G4 24x560mm 4000lm 830 2T ADV	28001501	3,000 K	240 pc(s).	0.046 kg
LLE G4 24x560mm 4000lm 840 2T ADV	28001502	4,000 K	240 pc(s).	0.046 kg
LLE G4 24x560mm 4000lm 850 2T ADV	28001503	5,000 K	240 pc(s).	0.046 kg
LLE G4 24x560mm 4000lm 865 2T ADV	28001504	6,500 K	240 pc(s).	0.046 kg

Specific technical data

Type [®]	Photo-metric code	Typ, luminous flux at tp = 25 °C [®]	Typ, luminous flux at tp = 65 °C [®]	Typ, forward current	Min, forward voltage at tp = 65 °C	Max, forward voltage at tp = 25 °C	Typ, power consumption at tp = 65 °C [®]	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
Operating mode HE at 225 mA											
LLE G4 24x280mm 2000lm 830 2T ADV	830/359	1,320 lm	1,260 lm	225 mA	30.9 V	35.8 V	7.5 W	174 lm/W	168 lm/W	155 lm/W	> 80
LLE G4 24x280mm 2000lm 840 2T ADV	840/359	1,380 lm	1,310 lm	225 mA	30.9 V	35.8 V	7.5 W	182 lm/W	175 lm/W	161 lm/W	> 80
LLE G4 24x280mm 2000lm 850 2T ADV	850/359	1,410 lm	1,330 lm	225 mA	30.9 V	35.8 V	7.5 W	185 lm/W	178 lm/W	164 lm/W	> 80
LLE G4 24x280mm 2000lm 865 2T ADV	865/359	1,390 lm	1,310 lm	225 mA	30.9 V	35.8 V	7.5 W	182 lm/W	175 lm/W	161 lm/W	> 80
LLE G4 24x560mm 4000lm 830 2T ADV	830/359	2,640 lm	2,510 lm	225 mA	61.9 V	71.6 V	15.0 W	174 lm/W	168 lm/W	155 lm/W	> 80
LLE G4 24x560mm 4000lm 840 2T ADV	840/359	2,760 lm	2,620 lm	225 mA	61.9 V	71.6 V	15.0 W	182 lm/W	175 lm/W	161 lm/W	> 80
LLE G4 24x560mm 4000lm 850 2T ADV	850/359	2,810 lm	2,670 lm	225 mA	61.9 V	71.6 V	15.0 W	185 lm/W	178 lm/W	164 lm/W	> 80
LLE G4 24x560mm 4000lm 865 2T ADV	865/359	2,780 lm	2,620 lm	225 mA	61.9 V	71.6 V	15.0 W	182 lm/W	175 lm/W	161 lm/W	> 80
Operating mode HE at 275 mA											
LLE G4 24x280mm 2000lm 830 2T ADV	830/359	1,600 lm	1,520 lm	275 mA	31.4 V	36.3 V	9.3 W	170 lm/W	164 lm/W	151 lm/W	> 80
LLE G4 24x280mm 2000lm 840 2T ADV	840/359	1,680 lm	1,590 lm	275 mA	31.4 V	36.3 V	9.3 W	178 lm/W	172 lm/W	158 lm/W	> 80
LLE G4 24x280mm 2000lm 850 2T ADV	850/359	1,710 lm	1,620 lm	275 mA	31.4 V	36.3 V	9.3 W	182 lm/W	175 lm/W	161 lm/W	> 80
LLE G4 24x280mm 2000lm 865 2T ADV	865/359	1,680 lm	1,590 lm	275 mA	31.4 V	36.3 V	9.3 W	179 lm/W	171 lm/W	157 lm/W	> 80
LLE G4 24x560mm 4000lm 830 2T ADV	830/359	3,200 lm	3,050 lm	275 mA	62.8 V	72.5 V	18.6 W	170 lm/W	164 lm/W	151 lm/W	> 80
LLE G4 24x560mm 4000lm 840 2T ADV	840/359	3,350 lm	3,180 lm	275 mA	62.8 V	72.5 V	18.6 W	178 lm/W	172 lm/W	158 lm/W	> 80
LLE G4 24x560mm 4000lm 850 2T ADV	850/359	3,420 lm	3,240 lm	275 mA	62.8 V	72.5 V	18.6 W	182 lm/W	175 lm/W	161 lm/W	> 80
LLE G4 24x560mm 4000lm 865 2T ADV	865/359	3,370 lm	3,180 lm	275 mA	62.8 V	72.5 V	18.6 W	179 lm/W	171 lm/W	157 lm/W	> 80
Operating mode NM at 300 mA											
LLE G4 24x280mm 2000lm 830 2T ADV	830/359	1,740 lm	1,660 lm	300 mA	31.6 V	36.5 V	10.2 W	169 lm/W	163 lm/W	150 lm/W	> 80
LLE G4 24x280mm 2000lm 840 2T ADV	840/359	1,820 lm	1,730 lm	300 mA	31.6 V	36.5 V	10.2 W	177 lm/W	170 lm/W	156 lm/W	> 80
LLE G4 24x280mm 2000lm 850 2T ADV	850/359	1,860 lm	1,760 lm	300 mA	31.6 V	36.5 V	10.2 W	180 lm/W	173 lm/W	159 lm/W	> 80
LLE G4 24x280mm 2000lm 865 2T ADV	865/359	1,830 lm	1,730 lm	300 mA	31.6 V	36.5 V	10.2 W	178 lm/W	170 lm/W	156 lm/W	> 80
LLE G4 24x560mm 4000lm 830 2T ADV	830/359	3,480 lm	3,310 lm	300 mA	63.2 V	73.0 V	20.4 W	169 lm/W	163 lm/W	150 lm/W	> 80
LLE G4 24x560mm 4000lm 840 2T ADV	840/359	3,640 lm	3,460 lm	300 mA	63.2 V	73.0 V	20.4 W	177 lm/W	170 lm/W	156 lm/W	> 80
LLE G4 24x560mm 4000lm 850 2T ADV	850/359	3,720 lm	3,520 lm	300 mA	63.2 V	73.0 V	20.4 W	180 lm/W	173 lm/W	159 lm/W	> 80
LLE G4 24x560mm 4000lm 865 2T ADV	865/359	3,670 lm	3,460 lm	300 mA	63.2 V	73.0 V	20.4 W	178 lm/W	170 lm/W	156 lm/W	> 80
Operating mode NM at 325 mA											
LLE G4 24x280mm 2000lm 830 2T ADV	830/359	1,880 lm	1,790 lm	325 mA	31.8 V	36.7 V	11.1 W	167 lm/W	162 lm/W	149 lm/W	> 80
LLE G4 24x280mm 2000lm 840 2T ADV	840/359	1,960 lm	1,870 lm	325 mA	31.8 V	36.7 V	11.1 W	175 lm/W	169 lm/W	155 lm/W	> 80
LLE G4 24x280mm 2000lm 850 2T ADV	850/359	2,000 lm	1,900 lm	325 mA	31.8 V	36.7 V	11.1 W	179 lm/W	172 lm/W	158 lm/W	> 80
LLE G4 24x280mm 2000lm 865 2T ADV	865/359	1,980 lm	1,870 lm	325 mA	31.8 V	36.7 V	11.1 W	176 lm/W	169 lm/W	155 lm/W	> 80
LLE G4 24x560mm 4000lm 830 2T ADV	830/359	3,750 lm	3,570 lm	325 mA	63.6 V	73.4 V	22.1 W	167 lm/W	162 lm/W	149 lm/W	> 80
LLE G4 24x560mm 4000lm 840 2T ADV	840/359	3,930 lm	3,730 lm	325 mA	63.6 V	73.4 V	22.1 W	175 lm/W	169 lm/W	155 lm/W	> 80
LLE G4 24x560mm 4000lm 850 2T ADV	850/359	4,010 lm	3,800 lm	325 mA	63.6 V	73.4 V	22.1 W	179 lm/W	172 lm/W	158 lm/W	> 80
LLE G4 24x560mm 4000lm 865 2T ADV	865/359	3,950 lm	3,730 lm	325 mA	63.6 V	73.4 V	22.1 W	176 lm/W	169 lm/W	155 lm/W	> 80
Operating mode NM at 350 mA											
LLE G4 24x280mm 2000lm 830 2T ADV	830/359	2,000 lm	1,910 lm	350 mA	32.0 V	36.9 V	12.0 W	165 lm/W	159 lm/W	146 lm/W	> 80
LLE G4 24x280mm 2000lm 840 2T ADV	840/359	2,110 lm	2,000 lm	350 mA	32.0 V	36.9 V	12.0 W	174 lm/W	167 lm/W	154 lm/W	> 80
LLE G4 24x280mm 2000lm 850 2T ADV	850/359	2,130 lm	2,020 lm	350 mA	32.0 V	36.9 V	12.0 W	175 lm/W	169 lm/W	155 lm/W	> 80
LLE G4 24x280mm 2000lm 865 2T ADV	865/359	2,120 lm	2,000 lm	350 mA	32.0 V	36.9 V	12.0 W	174 lm/W	167 lm/W	154 lm/W	> 80
LLE G4 24x560mm 4000lm 830 2T ADV	830/359	4,000 lm	3,810 lm	350 mA	64.0 V	73.8 V	23.9 W	165 lm/W	159 lm/W	146 lm/W	> 80
LLE G4 24x560mm 4000lm 840 2T ADV	840/359	4,210 lm	4,000 lm	350 mA	64.0 V	73.8 V	23.9 W	174 lm/W	167 lm/W	154 lm/W	> 80
LLE G4 24x560mm 4000lm 850 2T ADV	850/359	4,260 lm	4,040 lm	350 mA	64.0 V	73.8 V	23.9 W	175 lm/W	169 lm/W	155 lm/W	> 80
LLE G4 24x560mm 4000lm 865 2T ADV	865/359	4,230 lm	4,000 lm	350 mA	64.0 V	73.8 V	23.9 W	174 lm/W	167 lm/W	154 lm/W	> 80
Operating mode HO at 400 mA											
LLE G4 24x280mm 2000lm 830 2T ADV	830/359	2,240 lm	2,130 lm	400 mA	32.4 V	37.3 V	13.8 W	159 lm/W	153 lm/W	141 lm/W	> 80
LLE G4 24x280mm 2000lm 840 2T ADV	840/359	2,360 lm	2,240 lm	400 mA	32.4 V	37.3 V	13.8 W	167 lm/W	161 lm/W	148 lm/W	> 80
LLE G4 24x280mm 2000lm 850 2T ADV	850/359	2,390 lm	2,250 lm	400 mA	32.4 V	37.3 V	13.8 W	169 lm/W	162 lm/W	149 lm/W	> 80
LLE G4 24x280mm 2000lm 865 2T ADV	865/359	2,370 lm	2,230 lm	400 mA	32.4 V	37.3 V	13.8 W	168 lm/W	160 lm/W	147 lm/W	> 80
LLE G4 24x560mm 4000lm 830 2T ADV	830/359	4,480 lm	4,260 lm	400 mA	64.8 V	74.6 V	27.7 W	159 lm/W	153 lm/W	141 lm/W	> 80
LLE G4 24x560mm 4000lm 840 2T ADV	840/359	4,720 lm	4,470 lm	400 mA	64.8 V	74.6 V	27.7 W	167 lm/W	161 lm/W	148 lm/W	> 80
LLE G4 24x560mm 4000lm 850 2T ADV	850/359	4,770 lm	4,510 lm	400 mA	64.8 V	74.6 V	27.7 W	169 lm/W	162 lm/W	149 lm/W	> 80
LLE G4 24x560mm 4000lm 865 2T ADV	865/359	4,740 lm	4,470 lm	400 mA	64.8 V	74.6 V	27.7 W	168 lm/W	160 lm/W	147 lm/W	> 80

[®] Integral measurement over the complete module,

[®] If mounted with M4 screws and plastic washers,

[®] Measured at operating mode HO,

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

[®] Tolerance range for optical and electrical data: ±10 %,

Specific technical data

Type ^①	Photo-metric code	Typ, luminous flux at tp = 25 °C ^②	Typ, luminous flux at tp = 65 °C ^③	Typ, forward current	Min, forward voltage at tp = 65 °C	Max, forward voltage at tp = 25 °C	Typ, power consumption at tp = 65 °C ^④	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
Operating mode HO at 450 mA											
LLE G4 24x280mm 2000lm 830 2T ADV	830/359	2,490 lm	2,370 lm	450 mA	32.8 V	37.7 V	15.7 W	156 lm/W	151 lm/W	139 lm/W	> 80
LLE G4 24x280mm 2000lm 840 2T ADV	840/359	2,600 lm	2,470 lm	450 mA	32.8 V	37.7 V	15.7 W	164 lm/W	158 lm/W	145 lm/W	> 80
LLE G4 24x280mm 2000lm 850 2T ADV	850/359	2,650 lm	2,510 lm	450 mA	32.8 V	37.7 V	15.7 W	167 lm/W	160 lm/W	147 lm/W	> 80
LLE G4 24x280mm 2000lm 865 2T ADV	865/359	2,620 lm	2,470 lm	450 mA	32.8 V	37.7 V	15.7 W	164 lm/W	158 lm/W	145 lm/W	> 80
LLE G4 24x560mm 4000lm 830 2T ADV	830/359	4,970 lm	4,730 lm	450 mA	65.6 V	75.4 V	31.4 W	156 lm/W	151 lm/W	139 lm/W	> 80
LLE G4 24x560mm 4000lm 840 2T ADV	840/359	5,200 lm	4,940 lm	450 mA	65.6 V	75.4 V	31.4 W	164 lm/W	158 lm/W	145 lm/W	> 80
LLE G4 24x560mm 4000lm 850 2T ADV	850/359	5,310 lm	5,030 lm	450 mA	65.6 V	75.4 V	31.4 W	167 lm/W	160 lm/W	147 lm/W	> 80
LLE G4 24x560mm 4000lm 865 2T ADV	865/359	5,240 lm	4,950 lm	450 mA	65.6 V	75.4 V	31.4 W	164 lm/W	158 lm/W	145 lm/W	> 80
Operating mode HO at 500 mA											
LLE G4 24x280mm 2000lm 830 2T ADV	830/359	2,700 lm	2,570 lm	500 mA	33.2 V	38.1 V	17.6 W	151 lm/W	146 lm/W	134 lm/W	> 80
LLE G4 24x280mm 2000lm 840 2T ADV	840/359	2,820 lm	2,680 lm	500 mA	33.2 V	38.1 V	17.6 W	158 lm/W	153 lm/W	141 lm/W	> 80
LLE G4 24x280mm 2000lm 850 2T ADV	850/359	2,880 lm	2,730 lm	500 mA	33.2 V	38.1 V	17.6 W	162 lm/W	155 lm/W	143 lm/W	> 80
LLE G4 24x280mm 2000lm 865 2T ADV	865/359	2,840 lm	2,680 lm	500 mA	33.2 V	38.1 V	17.6 W	159 lm/W	153 lm/W	141 lm/W	> 80
LLE G4 24x560mm 4000lm 830 2T ADV	830/359	5,390 lm	5,140 lm	500 mA	66.4 V	76.1 V	35.2 W	151 lm/W	146 lm/W	134 lm/W	> 80
LLE G4 24x560mm 4000lm 840 2T ADV	840/359	5,650 lm	5,360 lm	500 mA	66.4 V	76.1 V	35.2 W	158 lm/W	153 lm/W	141 lm/W	> 80
LLE G4 24x560mm 4000lm 850 2T ADV	850/359	5,760 lm	5,460 lm	500 mA	66.4 V	76.1 V	35.2 W	162 lm/W	155 lm/W	143 lm/W	> 80
LLE G4 24x560mm 4000lm 865 2T ADV	865/359	5,680 lm	5,370 lm	500 mA	66.4 V	76.1 V	35.2 W	159 lm/W	153 lm/W	141 lm/W	> 80

^① Integral measurement over the complete module,

^② If mounted with M4 screws and plastic washers,

^③ Measured at operating mode HO,

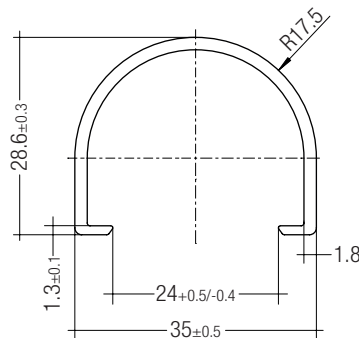
^④ HE ... high efficiency, NM ... nominal mode, HO ... high output,

^⑤ Tolerance range for optical and electrical data: ±10 %,

LINEAR COVER SY

Product description

- LINEAR COVER for LLE 24
- Protection against direct touch for non-SELV applications
- Fast snap on mounting on to LLE 24 with clips or plastic washers
- High transmission: transparent 94 %, semi-transparent 87 %, diffuse 76 %
- Made of PMMA
- Tolerances: ± 1 mm for 597 mm length (ends finished),
+ 20 mm for 1,200 / 1,500 / 1,600 / 1,800 mm length (ends raw)



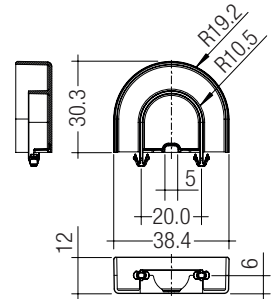
Ordering data

Type	Article number	Colour	Length	Packaging carton	Weight per pc.
LINEAR COVER SY Transparent 1600mm	28000338	Transparent	1,600 mm	12 pc(s).	0.272 kg
LINEAR COVER SY Frosted 1800mm	28000437	Semi-transparent	1,800 mm	12 pc(s).	0.308 kg
LINEAR COVER SY Frosted 1600mm	28000339	Semi-transparent	1,600 mm	12 pc(s).	0.272 kg
LINEAR COVER SY Frosted 1500mm	28000435	Semi-transparent	1,500 mm	12 pc(s).	0.244 kg
LINEAR COVER SY Frosted 1200mm	28000422	Semi-transparent	1,200 mm	12 pc(s).	0.205 kg
LINEAR COVER SY Frosted 597mm	28000340	Semi-transparent	597 mm	12 pc(s).	0.102 kg
LINEAR COVER SY Diffuse 1800mm	28000438	Diffuse	1,800 mm	12 pc(s).	0.308 kg
LINEAR COVER SY Diffuse 1600mm	28000341	Diffuse	1,600 mm	12 pc(s).	0.272 kg
LINEAR COVER SY Diffuse 1500mm	28000436	Diffuse	1,500 mm	12 pc(s).	0.257 kg
LINEAR COVER SY Diffuse 1200mm	28000434	Diffuse	1,200 mm	12 pc(s).	0.205 kg
LINEAR COVER SY Diffuse 597mm	28000342	Diffuse	597 mm	12 pc(s).	0.102 kg

ACL ENDCAP LLE24 PUSH-FIX

Product description

- ENDCAP for LLE 24
- Fast snap on mounting (sheet thickness 0.5 – 1.0 mm), for drilling hole 4 mm
- Made of Polycarbonat



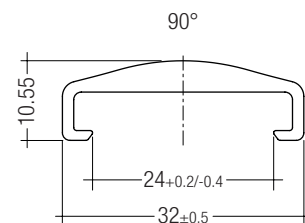
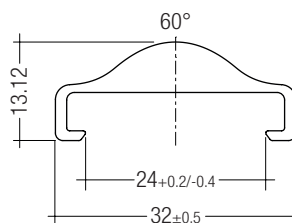
Ordering data

Type	Article number	Colour	Packaging carton	Weight per pc.
ACL ENDCAP LLE24 PUSH-FIX	28001037	White	480 pc(s).	0.003 kg

LINEAR LENS

Product description

- Linear lens for LLE 24
- Available in 60° and 90° light distribution
- Protection against direct touch for non-SELV applications
- Fast snap on mounting on to LLE 24 with clips or plastic washers
- High transmission: semi-transparent 97 %
- Linear lense made of PMMA
- Tolerances: ± 20 mm for 1,600 mm length (ends raw)



Ordering data

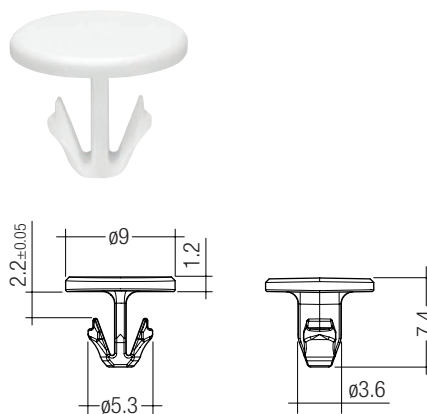
Type	Article number	Colour	Length	Packaging carton	Weight per pc.
ACL LINEAR LENS 24x1200mm 60°	28001428	Semi-transparent	1,200 mm	21 pc(s).	0.196 kg
ACL LINEAR LENS 24x1200mm 90°	28001429	Semi-transparent	1,200 mm	21 pc(s).	0.165 kg
ACL LINEAR LENS 24x1600mm 60°	28000953	Semi-transparent	1,600 mm	21 pc(s).	0.261 kg
ACL LINEAR LENS 24x1600mm 90°	28000955	Semi-transparent	1,600 mm	21 pc(s).	0.221 kg

ACCESSORIES

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

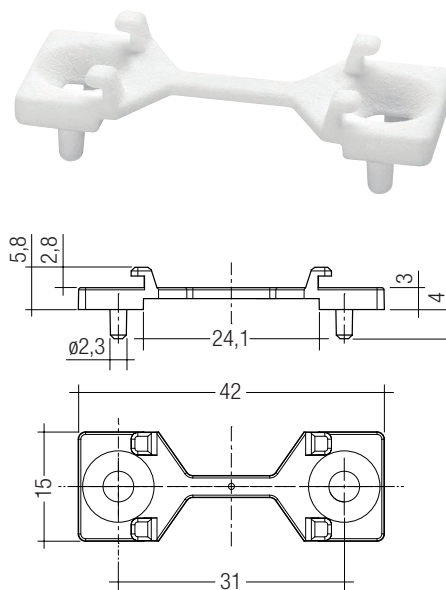
^① Minimum sales quantity 500 pcs.

ACCESSORIES

BRIDGE LLE24/40

Product description

- Enables the fixation of 24 mm wide Tridonic LED modules to fixtures made for 40 mm wide modules
- Ideal for extruded aluminium gear trays made for 40 mm modules with pre-alignment knobs
- Clip-on for LINEAR COVER and LINEAR LENS[®]
- For LLE 24 with 280 mm module minimum 2 bridges required
- For LLE 24 with 560 mm module minimum 3 bridges required
- Fixation via M3 or M4 countersunk screw, max. tightening torque 0.5 Nm
- BRIDGE made of white polycarbonate



Ordering data

Type	Article number	Colour	Packaging carton ^①	Weight per pc.
ACL BRIDGE LLE24/40 SCREW-FIX	28001205	White	600 Stk.	0.001 kg

^① Minimum sales quantity 600 pcs.

^② Beam characteristics will change due to the elevated fixation (see photometric files for details).

1. Standards

IEC 62031
IEC 62471
IEC 61000-4-2

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

1.2 Energy classification

Typ	Energieklassifizierung
LLE G4 24mm 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
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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 will be greatly reduced or the LLE may be destroyed.

2.4 Heat sink values

LLE G4 24x280mm 2000lm 8xx ADV

ta	tp	Forward current	R _{th, hs-a}	Cooling area
25 °C	65 °C	325 mA		self cooling
25 °C	65 °C	400 mA		self cooling
35 °C	65 °C	325 mA	4.3 K/W	154 cm²
35 °C	65 °C	400 mA	3.5 K/W	188 cm²
45 °C	65 °C	325 mA	2.8 K/W	138 cm²
45 °C	65 °C	400 mA	2.2 K/W	294 cm²

LLE G4 24x560mm 4000lm 8xx ADV

ta	tp	Forward current	R _{th, hs-a}	Cooling area
25 °C	65 °C	325 mA		self cooling
25 °C	65 °C	400 mA		self cooling
35 °C	65 °C	325 mA	2.2 K/W	303 cm²
35 °C	65 °C	400 mA	1.8 K/W	369 cm²
45 °C	65 °C	325 mA	1.4 K/W	447 cm²
45 °C	65 °C	400 mA	1.1 K/W	573 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 TALEX converter 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.

If LLE are wired in parallel and a wire breaks or a complete module fails then the current passing through the other module increases. This may reduce its life considerably. In addition there can be slight differences in light output caused by tolerances.

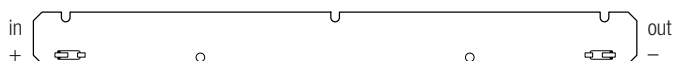
LLE modules can be operated either from SELV LED Drivers or from LED Drivers with LV output voltage.



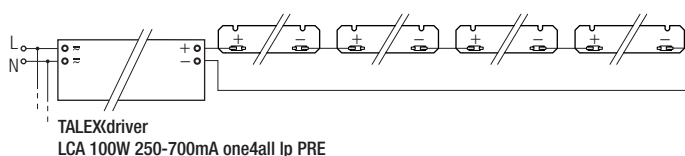
LLE modules are basic isolated up to 320 V (if mounted with M4 screws with head diameter 7 mm in combination with plastic washers) against ground and can be mounted directly on earthed metal parts of the luminaire. If the max. output voltage of the LED Driver (also against earth) is above 320 V, an additional 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



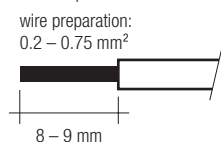
Wiring examples



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 suitable 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 min. 3 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 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.

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

4.2 Lumen maintenance for LLE G4 24mm ADV

Forward current	tp						
	tempera- ture	L90 / F10	L90 / F50	L80 / F10	L80 / F50	L70 / F10	L70 / F50
100 mA	45 °C	38,000 h	43,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	55 °C	35,000 h	40,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	30,000 h	34,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	75 °C	26,000 h	29,000 h	54,000 h	>60,000 h	>60,000 h	>60,000 h
150 mA	45 °C	37,000 h	43,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	55 °C	34,000 h	38,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	29,000 h	32,000 h	58,000 h	>60,000 h	>60,000 h	>60,000 h
	75 °C	25,000 h	28,000 h	51,000 h	57,000 h	>60,000 h	>60,000 h
200 mA	45 °C	37,000 h	42,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	55 °C	33,000 h	37,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	28,000 h	31,000 h	55,000 h	>60,000 h	>60,000 h	>60,000 h
	75 °C	23,000 h	26,000 h	48,000 h	54,000 h	>60,000 h	>60,000 h
225 mA	45 °C	37,000 h	42,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	55 °C	32,000 h	37,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	27,000 h	30,000 h	54,000 h	>60,000 h	>60,000 h	>60,000 h
	75 °C	23,000 h	25,000 h	46,000 h	52,000 h	>60,000 h	>60,000 h
275 mA	45 °C	36,000 h	41,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	55 °C	31,000 h	36,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	26,000 h	29,000 h	51,000 h	59,000 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
325 mA	45 °C	36,000 h	41,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	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	27,000 h	48,000 h	56,000 h	>60,000 h	>60,000 h
	75 °C	20,000 h	22,000 h	40,000 h	45,000 h	>60,000 h	>60,000 h
400 mA	45 °C	36,000 h	40,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	55 °C	29,000 h	33,000 h	55,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	23,000 h	25,000 h	44,000 h	51,000 h	>60,000 h	>60,000 h
	75 °C	18,000 h	19,000 h	35,000 h	40,000 h	59,000 h	>60,000 h
450 mA	45 °C	35,000 h	40,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	55 °C	28,000 h	32,000 h	53,000 h	60,000 h	>60,000 h	>60,000 h
	65 °C	21,000 h	23,000 h	41,000 h	48,000 h	>60,000 h	>60,000 h
	75 °C	16,000 h	18,000 h	32,000 h	36,000 h	54,000 h	>60,000 h
500 mA	45 °C	35,000 h	39,000 h	>60,000 h	>60,000 h	>60,000 h	>60,000 h
	55 °C	27,000 h	30,000 h	51,000 h	>60,000 h	>60,000 h	>60,000 h
	65 °C	20,000 h	22,000 h	38,000 h	44,000 h	>60,000 h	>60,000 h
	75 °C	15,000 h	16,000 h	29,000 h	32,000 h	49,000 h	56,000 h

5. Electrical values

5.1 Declaration of electrical parameters

I_{rated} ... Nominal operating current the module is designed for.

I_{max} ... Max. permissible continuous operating current.

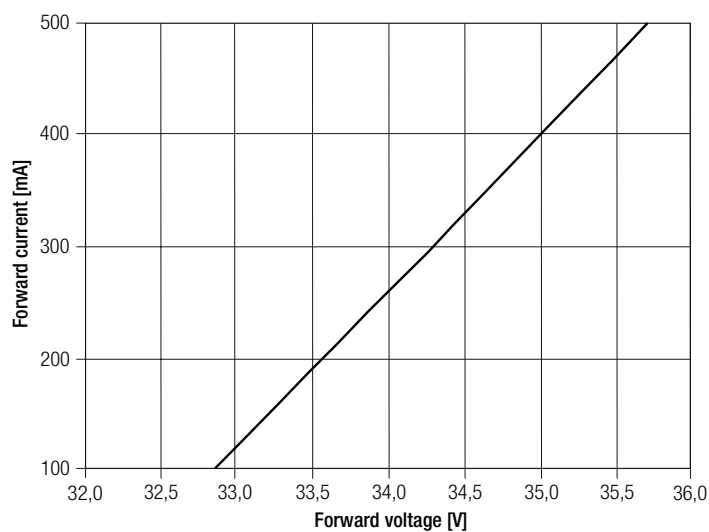
Max. DC forward current ... Max. permissible continuous operating current incl. The tolerances of the LED driver. LED module may be destroyed if this value is exceeded.

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

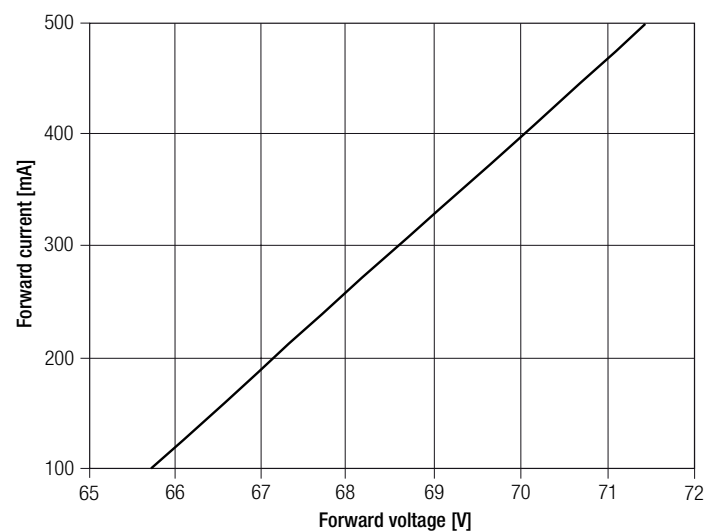
Max. permissible peak current ... The max. output peak current of the LED driver must not exceed this value.

5.2 Typ. forward voltage vs. forward current

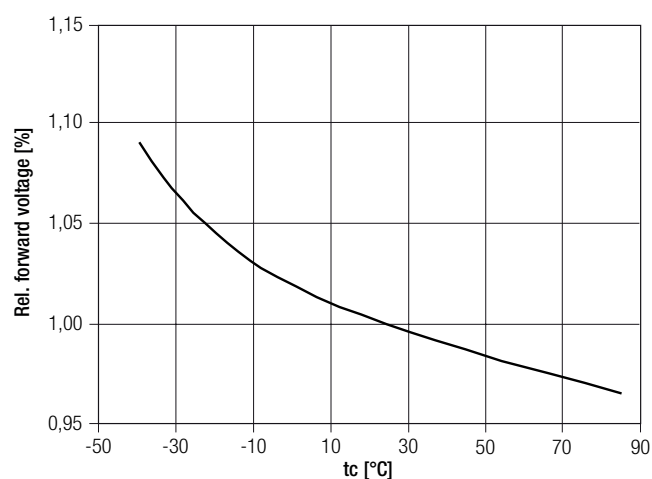
LLE G4 24x280mm 2000lm 8xx ADV



LLE G4 24x560mm 4000lm 8xx 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

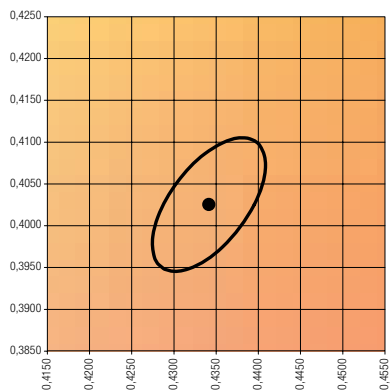
The specified colour coordinates are integral measured by current impulse of 325 mA and a duration of 100 ms.

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

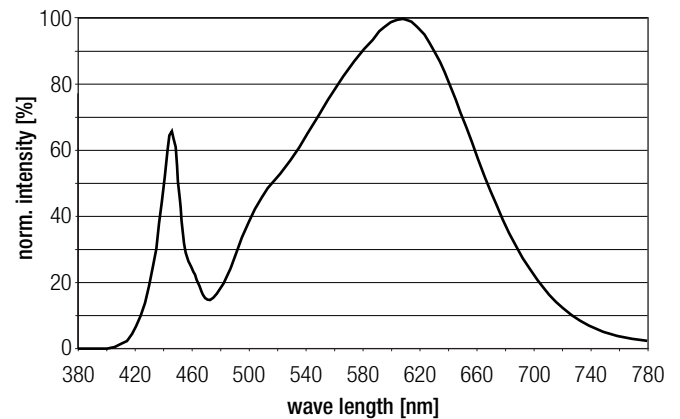
The measurement tolerance of the colour coordinates are ± 0.01 .

3,000 K

	x0	y0
Centre	0.4340	0.4026

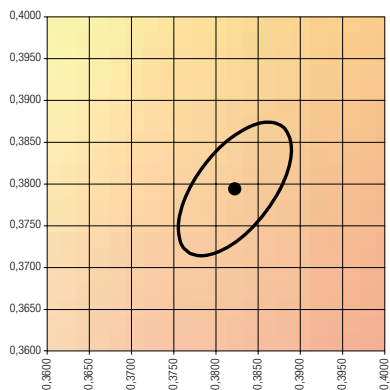


— MacAdam Ellipse: 3SDCM

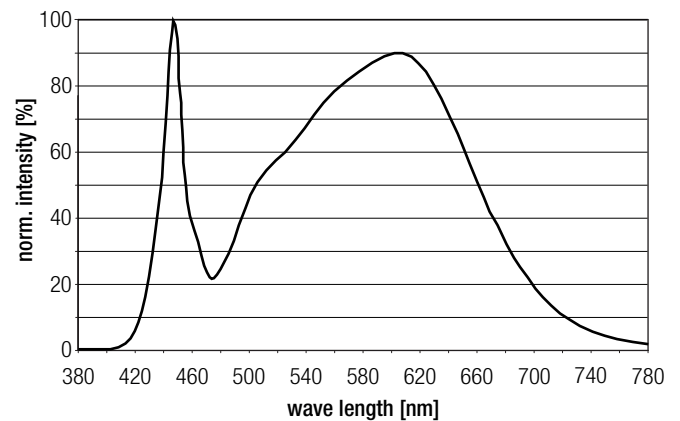


4,000 K

	x0	y0
Mittelpunkt	0.3822	0.3794

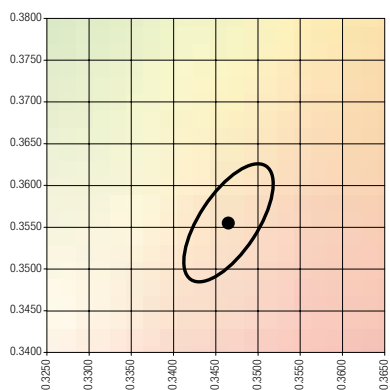


— MacAdam Ellipse: 3SDCM

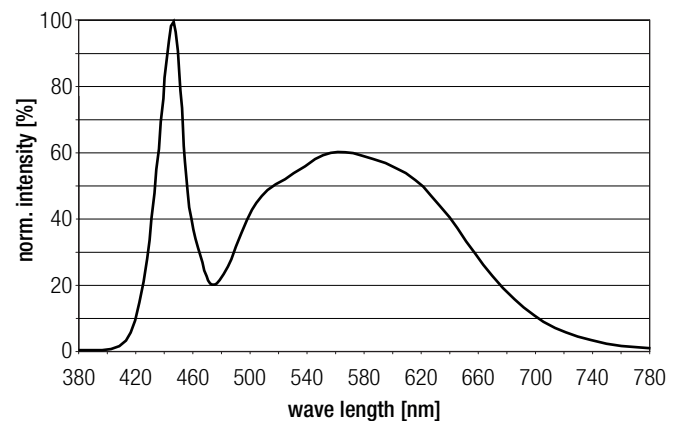


5,000 K

	x0	y0
Mittelpunkt	0.3447	0.3547

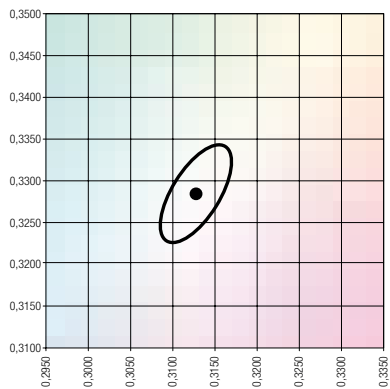


— MacAdam Ellipse: 3SDCM

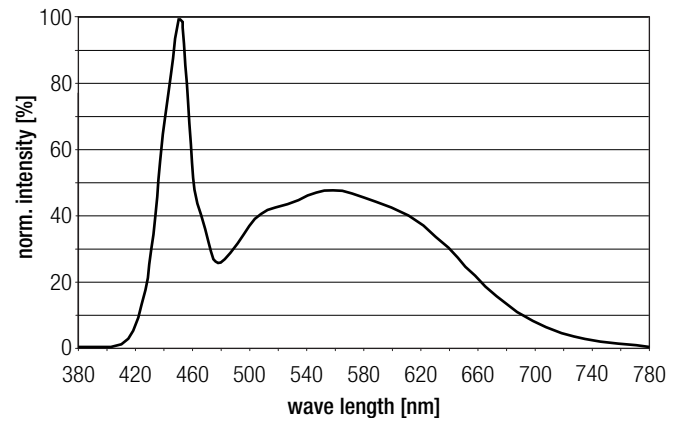


6,500 K

	x0	y0
Mittelpunkt	0.3126	0.3280

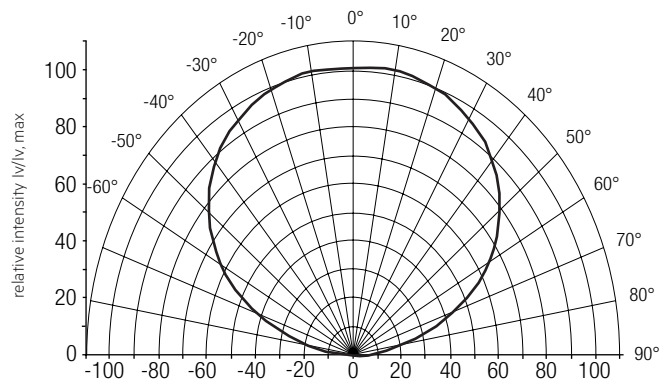


— MacAdam Ellipse: 3SDCM



6.2 Light distribution

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

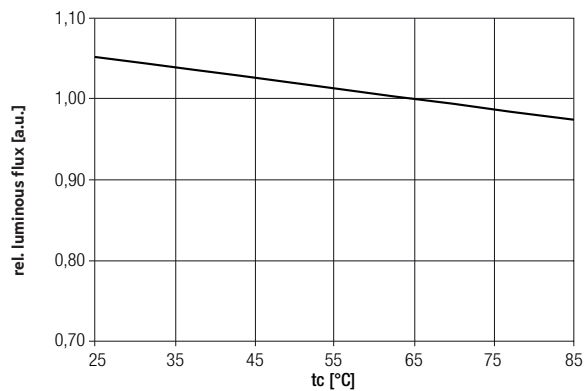


The colour temperature is measured integral over the complete module. The single LED light points can have deviations in the colour coordinates within MacAdam 3.

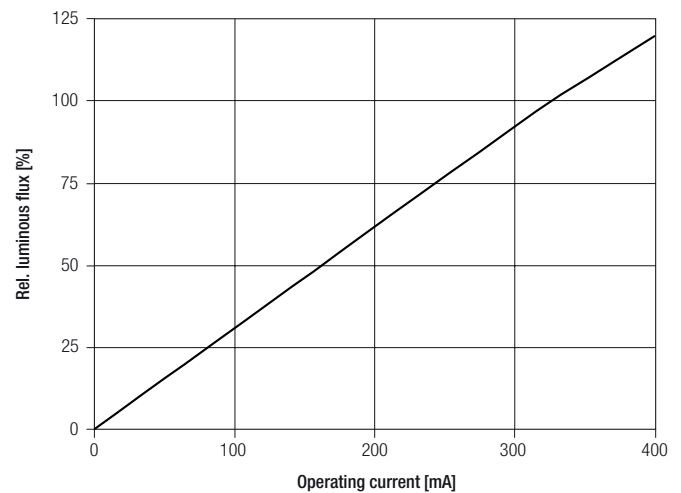
To ensure an ideal mixture of colours and a homogenous light distribution a suitable optic (e. g. PMMA diffuser) and a sufficient spacing between module and optic (typ. 4 cm) should be used.

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



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