



#### Module LLE 24x280-560mm 650lm LV ADV5

Modules LLE advanced

#### Product description

- Ideal for linear and panel lights
- 4 terminals for parallel wiring
- 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
- Broad portfolio from extruded lenses and covers available
- Long life-time: 72,000 hours
- 5-year guarantee

#### Optical properties

- Colour temperatures 2,700 K, 3,000 K, 3,500 K and 4,000 K
- Typ. luminous flux 650 and 1,300 lm
- Efficacy of the module up to 203 lm/W
- High colour rendering index CRI > 80
- High colour consistency (MacAdam 3)<sup>®</sup>
- Small luminous flux tolerances

#### Mechanical properties

- Module dimension 24 x 280 mm and 24 x 560 mm (ZHAGA compliant)
- Simple installation (e.g. clips or screws)

#### System solution

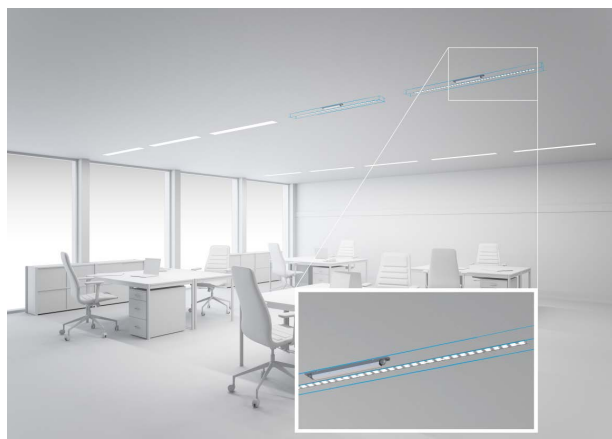
- LED system solution with outstanding system efficacy up to 183 lm/W, consisting of linear LED modules and dimmable LED Driver LCA 50W 350–1050mA Ip PRE



LLE 24x280mm 650lm LV ADV5



LLE 24x560mm 1300lm LV ADV5



**Standards**, page 10

**Colour temperatures and tolerances**, page 14

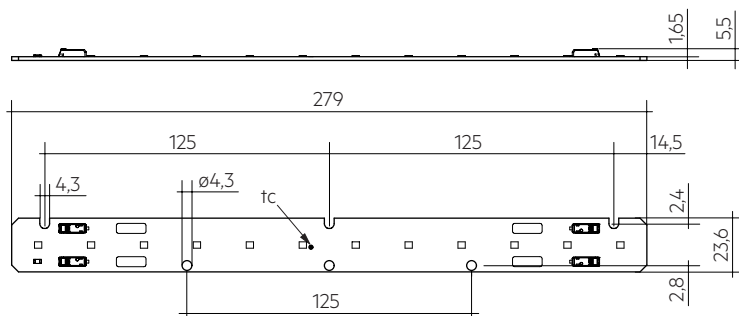


## Module LLE 24x280-560mm 650lm LV ADV5

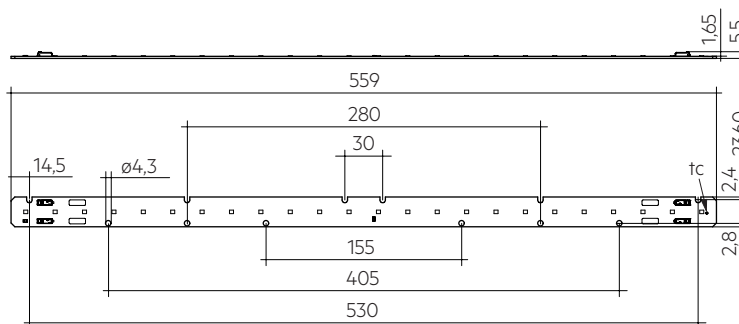
Modules LLE advanced

### Technical data

|                                                       |                     |
|-------------------------------------------------------|---------------------|
| Beam characteristic                                   | 120°                |
| Ambient temperature range                             | -40 ... +65 °C      |
| tp rated                                              | 50 °C               |
| tc                                                    | 85 °C               |
| Irated for 650 lm                                     | 100 mA              |
| Irated for 1,300 lm                                   | 200 mA              |
| I <sub>max</sub> for 650 lm                           | 180 mA              |
| I <sub>max</sub> for 1,300 lm                         | 360 mA              |
| Max. permissible LF current ripple for 650 lm         | 200 mA              |
| Max. permissible LF current ripple for 1,300 lm       | 400 mA              |
| Max. permissible peak current for 650 lm              | 300 mA / max. 10 ms |
| Max. permissible peak current for 1,300 lm            | 600 mA / max. 10 ms |
| Max. working voltage for insulation SELV <sup>®</sup> | 60 V                |
| Insulation test voltage                               | 0.5 kV              |
| CTI of the printed circuit board                      | ≥ 600               |
| ESD classification                                    | severity level 4    |
| Risk group (IEC 62471)                                | RG0                 |
| Classification acc. to IEC 62031                      | Built-in            |
| Type of protection                                    | IP00                |
| Life-time                                             | up to 72,000 h      |
| Guarantee                                             | 5 years             |



LLE 24x280mm 650lm LV ADV5



LLE 24x560mm 1300lm LV ADV5

### Ordering data

| Type                            | Article number | Colour temperature | Packaging carton | Weight per pc. |
|---------------------------------|----------------|--------------------|------------------|----------------|
| LLE 24x280mm 650lm 827 LV ADV5  | 89603320       | 2,700 K            | 210 pc(s).       | 0.023 kg       |
| LLE 24x280mm 650lm 830 LV ADV5  | 89603321       | 3,000 K            | 210 pc(s).       | 0.023 kg       |
| LLE 24x280mm 650lm 835 LV ADV5  | 89603322       | 3,500 K            | 210 pc(s).       | 0.023 kg       |
| LLE 24x280mm 650lm 840 LV ADV5  | 89603323       | 4,000 K            | 210 pc(s).       | 0.023 kg       |
| LLE 24x560mm 1300lm 827 LV ADV5 | 89603324       | 2,700 K            | 180 pc(s).       | 0.046 kg       |
| LLE 24x560mm 1300lm 830 LV ADV5 | 89603325       | 3,000 K            | 180 pc(s).       | 0.046 kg       |
| LLE 24x560mm 1300lm 840 LV ADV5 | 89603327       | 4,000 K            | 180 pc(s).       | 0.046 kg       |

## Specific technical data

| Type <sup>®</sup>                                                  | Photo-<br>metric<br>code | Typ.<br>luminous flux<br>at<br>tp = 25 °C <sup>®</sup> <sup>®</sup> | Typ.<br>luminous flux<br>at<br>tp = 50 °C <sup>®</sup> <sup>®</sup> | Typ.<br>forward<br>current | Min. forward<br>voltage<br>at<br>tp = 50 °C <sup>®</sup> | Max. forward<br>voltage<br>at<br>tp = 25 °C <sup>®</sup> | Typ. power<br>consumption<br>at tp = 50 °C <sup>®</sup> | Efficacy<br>of the module<br>at tp = 25 °C | Efficacy<br>of the module<br>at tp = 50 °C | Efficacy<br>of the system<br>at tp = 50 °C | Colour<br>rendering<br>index CRI |
|--------------------------------------------------------------------|--------------------------|---------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------|----------------------------------------------------------|----------------------------------------------------------|---------------------------------------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|----------------------------------|
| <b>Operating mode HE at 75 mA per feet (280 mm module length)</b>  |                          |                                                                     |                                                                     |                            |                                                          |                                                          |                                                         |                                            |                                            |                                            |                                  |
| LLE 24x280mm 650lm 827 LV ADV5                                     | 827/359                  | 455 lm                                                              | 445 lm                                                              | 75 mA                      | 31.2 V                                                   | 33.8 V                                                   | 2.4 W                                                   | 185 lm/W                                   | 181 lm/W                                   | 167 lm/W                                   | > 80                             |
| LLE 24x280mm 650lm 830 LV ADV5                                     | 830/359                  | 475 lm                                                              | 465 lm                                                              | 75 mA                      | 31.2 V                                                   | 33.8 V                                                   | 2.4 W                                                   | 193 lm/W                                   | 190 lm/W                                   | 175 lm/W                                   | > 80                             |
| LLE 24x280mm 650lm 835 LV ADV5                                     | 835/359                  | 480 lm                                                              | 470 lm                                                              | 75 mA                      | 31.2 V                                                   | 33.8 V                                                   | 2.4 W                                                   | 195 lm/W                                   | 191 lm/W                                   | 176 lm/W                                   | > 80                             |
| LLE 24x280mm 650lm 840 LV ADV5                                     | 840/359                  | 500 lm                                                              | 490 lm                                                              | 75 mA                      | 31.2 V                                                   | 33.8 V                                                   | 2.4 W                                                   | 203 lm/W                                   | 199 lm/W                                   | 183 lm/W                                   | > 80                             |
| LLE 24x560mm 1300lm 827 LV ADV5                                    | 827/359                  | 910 lm                                                              | 885 lm                                                              | 150 mA                     | 31.2 V                                                   | 33.8 V                                                   | 4.9 W                                                   | 185 lm/W                                   | 181 lm/W                                   | 167 lm/W                                   | > 80                             |
| LLE 24x560mm 1300lm 830 LV ADV5                                    | 830/359                  | 955 lm                                                              | 925 lm                                                              | 150 mA                     | 31.2 V                                                   | 33.8 V                                                   | 4.9 W                                                   | 193 lm/W                                   | 190 lm/W                                   | 175 lm/W                                   | > 80                             |
| LLE 24x560mm 1300lm 840 LV ADV5                                    | 840/359                  | 1,000 lm                                                            | 975 lm                                                              | 150 mA                     | 31.2 V                                                   | 33.8 V                                                   | 4.9 W                                                   | 203 lm/W                                   | 199 lm/W                                   | 183 lm/W                                   | > 80                             |
| <b>Operating mode NM at 100 mA per feet (280 mm module length)</b> |                          |                                                                     |                                                                     |                            |                                                          |                                                          |                                                         |                                            |                                            |                                            |                                  |
| LLE 24x280mm 650lm 827 LV ADV5                                     | 827/359                  | 585 lm                                                              | 570 lm                                                              | 100 mA                     | 31.6 V                                                   | 34.2 V                                                   | 3.3 W                                                   | 176 lm/W                                   | 173 lm/W                                   | 159 lm/W                                   | > 80                             |
| LLE 24x280mm 650lm 830 LV ADV5                                     | 830/359                  | 615 lm                                                              | 600 lm                                                              | 100 mA                     | 31.6 V                                                   | 34.2 V                                                   | 3.3 W                                                   | 184 lm/W                                   | 181 lm/W                                   | 167 lm/W                                   | > 80                             |
| LLE 24x280mm 650lm 835 LV ADV5                                     | 835/359                  | 620 lm                                                              | 605 lm                                                              | 100 mA                     | 31.6 V                                                   | 34.2 V                                                   | 3.3 W                                                   | 186 lm/W                                   | 183 lm/W                                   | 168 lm/W                                   | > 80                             |
| LLE 24x280mm 650lm 840 LV ADV5                                     | 840/359                  | 645 lm                                                              | 630 lm                                                              | 100 mA                     | 31.6 V                                                   | 34.2 V                                                   | 3.3 W                                                   | 194 lm/W                                   | 190 lm/W                                   | 175 lm/W                                   | > 80                             |
| LLE 24x560mm 1300lm 827 LV ADV5                                    | 827/359                  | 1,170 lm                                                            | 1,140 lm                                                            | 200 mA                     | 31.6 V                                                   | 34.2 V                                                   | 6.6 W                                                   | 176 lm/W                                   | 173 lm/W                                   | 159 lm/W                                   | > 80                             |
| LLE 24x560mm 1300lm 830 LV ADV5                                    | 830/359                  | 1,230 lm                                                            | 1,200 lm                                                            | 200 mA                     | 31.6 V                                                   | 34.2 V                                                   | 6.6 W                                                   | 184 lm/W                                   | 181 lm/W                                   | 167 lm/W                                   | > 80                             |
| LLE 24x560mm 1300lm 840 LV ADV5                                    | 840/359                  | 1,290 lm                                                            | 1,260 lm                                                            | 200 mA                     | 31.6 V                                                   | 34.2 V                                                   | 6.6 W                                                   | 194 lm/W                                   | 190 lm/W                                   | 175 lm/W                                   | > 80                             |
| <b>Operating mode HO at 165 mA per feet (280 mm module length)</b> |                          |                                                                     |                                                                     |                            |                                                          |                                                          |                                                         |                                            |                                            |                                            |                                  |
| LLE 24x280mm 650lm 827 LV ADV5                                     | 827/359                  | 940 lm                                                              | 915 lm                                                              | 165 mA                     | 32.7 V                                                   | 35.3 V                                                   | 5.6 W                                                   | 166 lm/W                                   | 162 lm/W                                   | 149 lm/W                                   | > 80                             |
| LLE 24x280mm 650lm 830 LV ADV5                                     | 830/359                  | 980 lm                                                              | 955 lm                                                              | 165 mA                     | 32.7 V                                                   | 35.3 V                                                   | 5.6 W                                                   | 173 lm/W                                   | 170 lm/W                                   | 156 lm/W                                   | > 80                             |
| LLE 24x280mm 650lm 835 LV ADV5                                     | 835/359                  | 990 lm                                                              | 965 lm                                                              | 165 mA                     | 32.7 V                                                   | 35.3 V                                                   | 5.6 W                                                   | 175 lm/W                                   | 171 lm/W                                   | 157 lm/W                                   | > 80                             |
| LLE 24x280mm 650lm 840 LV ADV5                                     | 840/359                  | 1,030 lm                                                            | 1,010 lm                                                            | 165 mA                     | 32.7 V                                                   | 35.3 V                                                   | 5.6 W                                                   | 182 lm/W                                   | 179 lm/W                                   | 165 lm/W                                   | > 80                             |
| LLE 24x560mm 1300lm 827 LV ADV5                                    | 827/359                  | 1,880 lm                                                            | 1,830 lm                                                            | 330 mA                     | 32.7 V                                                   | 35.3 V                                                   | 11.3 W                                                  | 166 lm/W                                   | 162 lm/W                                   | 149 lm/W                                   | > 80                             |
| LLE 24x560mm 1300lm 830 LV ADV5                                    | 830/359                  | 1,960 lm                                                            | 1,910 lm                                                            | 330 mA                     | 32.7 V                                                   | 35.3 V                                                   | 11.3 W                                                  | 173 lm/W                                   | 170 lm/W                                   | 156 lm/W                                   | > 80                             |
| LLE 24x560mm 1300lm 840 LV ADV5                                    | 840/359                  | 2,060 lm                                                            | 2,010 lm                                                            | 330 mA                     | 32.7 V                                                   | 35.3 V                                                   | 11.3 W                                                  | 182 lm/W                                   | 179 lm/W                                   | 165 lm/W                                   | > 80                             |

<sup>®</sup> Integral measurement over the complete module.

<sup>®</sup> If mounted with M4 screws and plastic washers.

<sup>®</sup> HE ... high efficiency, NM ... nominal mode, HO ... high output.

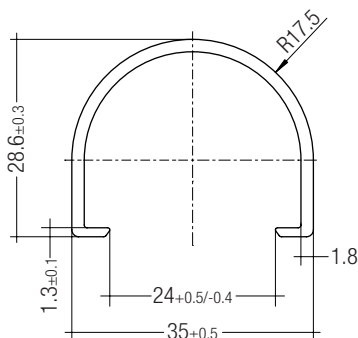
<sup>®</sup> Tolerance range for optical and electrical data: ±10 %.

<sup>®</sup> Measurement tolerance optical data: ±5 %.

<sup>®</sup> Measurement tolerance forward voltage: ±0.1 V.

#### Product description

- LINEAR COVER for LLE 24
- Protection against direct touch for non-SELV applications  
(recommendation: use all fixing points)
- 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:  $\pm 1$  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       |

**Product description**

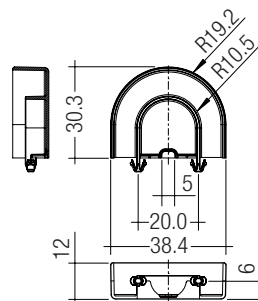
- ENDCAP for LLE 24
- PUSH-FIX: Fast snap on mounting (sheet thickness 0.5 – 1.0 mm), for drilling hole 4 mm
- SCREW-FIX: Screw mounting with EJOT Delta PT WN 5451 30x8, tightening torque 0.7 Nm
- Made of Polycarbonat



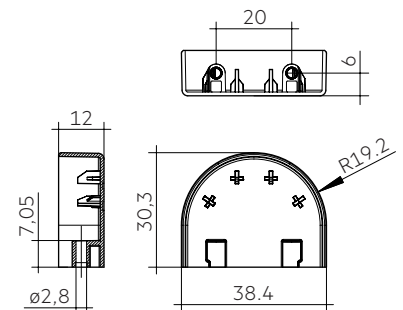
ACL ENDCAP LLE24 PUSH-FIX



ACL ENDCAP LLE24 SCREW-FIX



ACL ENDCAP LLE24 PUSH-FIX



ACL ENDCAP LLE24 SCREW-FIX

**Ordering data**

| Type                       | Article number | Colour | Packaging carton | Weight per pc. |
|----------------------------|----------------|--------|------------------|----------------|
| ACL ENDCAP LLE24 PUSH-FIX  | 28001037       | White  | 480 pc(s).       | 0.003 kg       |
| ACL ENDCAP LLE24 SCREW-FIX | 28002315       | White  | 480 pc(s).       | 0.003 kg       |

#### Product description LINEAR LENS

- Linear lens for LLE 24
- Available with different beam characteristics
- Protection against direct touch for non-SELV applications (recommendation: use all fixing points)
- Fast snap on mounting on to LLE 24 with clips or plastic washers
- Linear lense made of PMMA
- Available lengths: 1,200, 1,500, 1,600 and 1,800 mm, Tolerance: + 10 mm, at 1,600 mm length  $\pm$  20 mm tolerance and raw ends
- Max. permissible temperature 80 °C
- Photometric data available on website

#### Product description Endcap

- ENDCAP for LINEAR LENS 24mm INTENSE, ASY and DASY
- Mounting by clipping in and screwing from below using screw EJOT Delta PT WN 5451 20x4, tightening torque 0.7 Nm
- Made of Polyamide UL94 V0



ACL LINEAR LENS 24mm 60°



ACL LINEAR LENS 24mm 90°



ACL LINEAR LENS 24mm INTENSE



ACL LINEAR LENS 24mm BATWING



ACL LINEAR LENS 24mm ASY

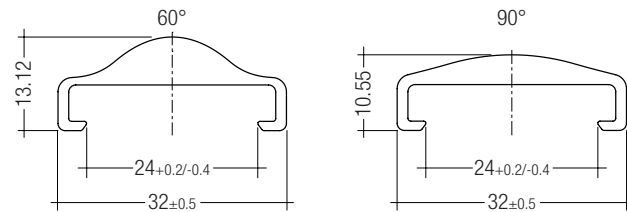


ACL LINEAR LENS 24mm DASY

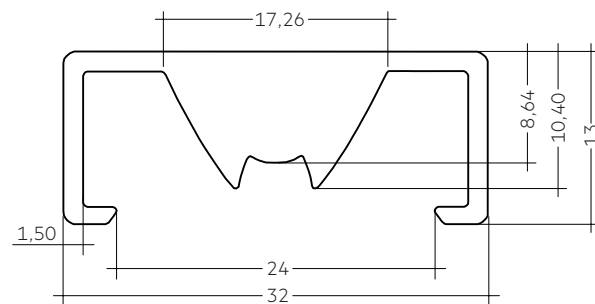


ACL Endcap LENS 24mm PSF

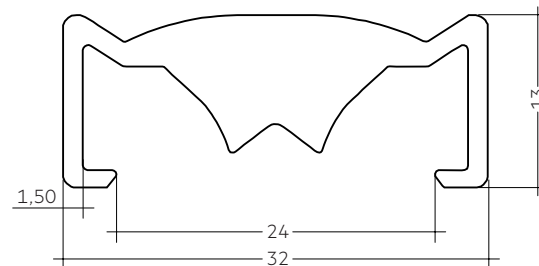
**ACL LENS 24mm**



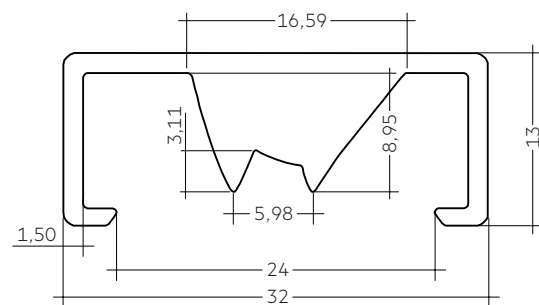
ACL LINEAR LENS 24mm 60° and 90°



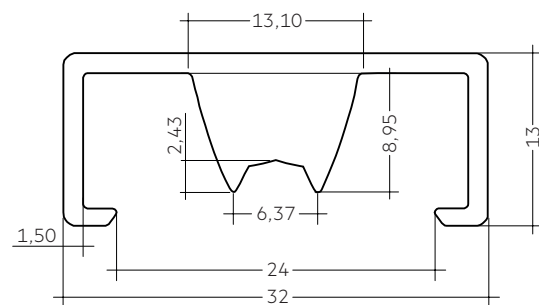
ACL LINEAR LENS 24mm INTENSE



ACL LINEAR LENS 24mm BATWING

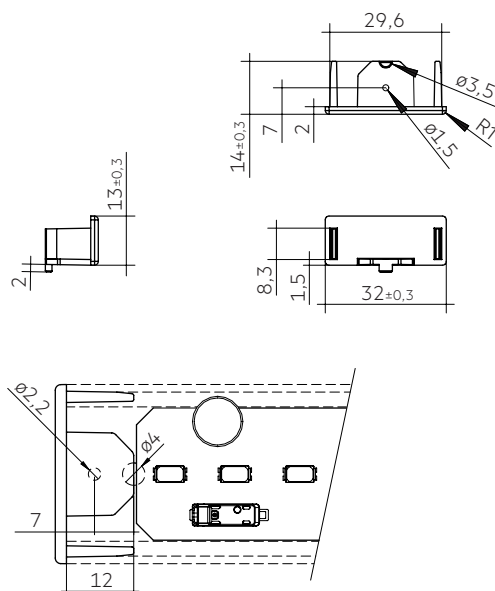


ACL LINEAR LENS 24mm ASY



ACL LINEAR LENS 24mm DASY

## ACL LENS 24mm



ACL Endcap LENS 24mm PSF

### Ordering data

| Type                              | Article number | Beam characteristic | Efficiency | Packaging carton | Weight per pc. |
|-----------------------------------|----------------|---------------------|------------|------------------|----------------|
| ACL LINEAR LENS 24x1200mm 60°     | 28001428       | 60°                 | 97 %       | 21 pc(s).        | 0.196 kg       |
| ACL LINEAR LENS 24x1200mm 90°     | 28001429       | 90°                 | 97 %       | 21 pc(s).        | 0.165 kg       |
| ACL LINEAR LENS 24x1600mm 60°     | 28000953       | 60°                 | 97 %       | 21 pc(s).        | 0.261 kg       |
| ACL LINEAR LENS 24x1600mm 90°     | 28000955       | 90°                 | 97 %       | 21 pc(s).        | 0.221 kg       |
| ACL LINEAR LENS 24x1200mm INTENSE | 28002024       | 40°                 | 95 %       | 18 pc(s).        | 0.261 kg       |
| ACL LINEAR LENS 24x1500mm INTENSE | 28002025       | 40°                 | 95 %       | 18 pc(s).        | 0.326 kg       |
| ACL LINEAR LENS 24x1800mm INTENSE | 28002026       | 40°                 | 95 %       | 18 pc(s).        | 0.392 kg       |
| ACL LINEAR LENS 24x1200mm BATWING | 28002027       | batwing             | 95 %       | 18 pc(s).        | 0.275 kg       |
| ACL LINEAR LENS 24x1500mm BATWING | 28002028       | batwing             | 95 %       | 18 pc(s).        | 0.344 kg       |
| ACL LINEAR LENS 24x1800mm BATWING | 28002029       | batwing             | 95 %       | 18 pc(s).        | 0.412 kg       |
| ACL LINEAR LENS 24x1200mm ASY     | 28002030       | asymmetric          | 95 %       | 18 pc(s).        | 0.250 kg       |
| ACL LINEAR LENS 24x1500mm ASY     | 28002031       | asymmetric          | 95 %       | 18 pc(s).        | 0.312 kg       |
| ACL LINEAR LENS 24x1800mm ASY     | 28002032       | asymmetric          | 95 %       | 18 pc(s).        | 0.375 kg       |
| ACL LINEAR LENS 24x1200mm DASY    | 28002033       | double asymmetric   | 92 %       | 18 pc(s).        | 0.249 kg       |
| ACL LINEAR LENS 24x1500mm DASY    | 28002034       | double asymmetric   | 92 %       | 18 pc(s).        | 0.311 kg       |
| ACL LINEAR LENS 24x1800mm DASY    | 28002035       | double asymmetric   | 92 %       | 18 pc(s).        | 0.373 kg       |
| ACL Endcap LENS 24mm PSF          | 28002669       | –                   | –          | 720 pc(s).       | 0.003 kg       |

**ACCES-  
SORIES**

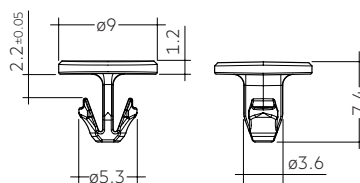
**CLIP 4.3mm**

**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 PUSH-FIX and 1 – 2 mm for PUSH-FIX Long)
- For drilling hole 4 mm
- Clip made of Polycarbonat



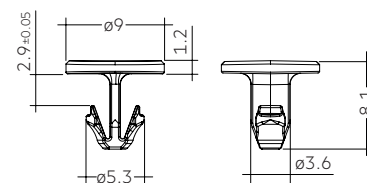
ACL CLIP 4.3mm PUSH-FIX



ACL CLIP 4.3mm PUSH-FIX



ACL CLIP 4.3mm PUSH-FIX Long



ACL CLIP 4.3mm PUSH-FIX Long

**Ordering data**

| Type                         | Article number | Colour      | Packaging bag <sup>①</sup> | Weight per pc. |
|------------------------------|----------------|-------------|----------------------------|----------------|
| ACL CLIP 4.3mm PUSH-FIX      | 28001036       | White       | 500 pc(s).                 | 0.001 kg       |
| ACL CLIP 4.3mm PUSH-FIX Long | 28002314       | Transparent | 500 pc(s).                 | 0.001 kg       |

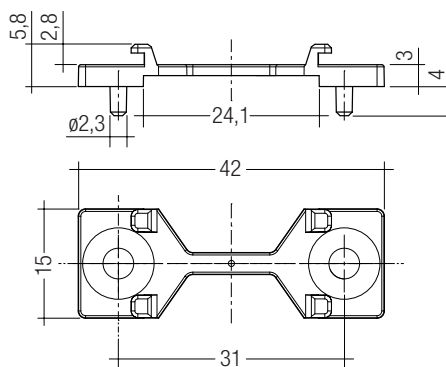
<sup>①</sup> Minimum sales quantity 500 pcs.

**ACCES-  
SORIES**

**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<sup>®</sup>
- 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 <sup>①</sup> | Weight per pc. |
|-------------------------------|----------------|--------|-------------------------------|----------------|
| ACL BRIDGE LLE24/40 SCREW-FIX | 28001205       | White  | 600 Stk.                      | 0.001 kg       |

<sup>①</sup> Minimum sales quantity 600 pcs.

<sup>®</sup> Beam characteristics will change due to the elevated fixation (see photometric files for details).

## 1. Standards

IEC 62031  
IEC 62471  
IEC 61000-4-2  
IEC 62778  
IEC 61547  
UL 8750 (for CLASS2 circuits and dry locations)

### 1.1 Photometric code

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

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

### 1.2 Energy classification

| Type             | Energy classification |
|------------------|-----------------------|
| LLE 24mm LV ADV5 | 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 50 °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 ... +80 °C |
|---------------------|----------------|

Operation only in non condensing environment.  
Humidity during processing of the module should be between 30 to 70 %.

## 2.3 Heat sink values

### LLE 24x280mm 650lm ADV5

| ta    | tp    | Forward current | Rth, hs-a | Cooling area |
|-------|-------|-----------------|-----------|--------------|
| 25 °C | 50 °C | 100 mA          |           | self cooling |
| 25 °C | 50 °C | 165 mA          | 8.14 K/W  | 82 cm²       |
| 35 °C | 50 °C | 100 mA          | 8.60 K/W  | 77 cm²       |
| 35 °C | 50 °C | 165 mA          | 4.88 K/W  | 137 cm²      |
| 40 °C | 50 °C | 100 mA          | 5.73 K/W  | 116 cm²      |
| 40 °C | 50 °C | 165 mA          | 3.25 K/W  | 205 cm²      |
| 45 °C | 50 °C | 100 mA          | 2.86 K/W  | 233 cm²      |
| 45 °C | 50 °C | 165 mA          | 1.62 K/W  | 411 cm²      |

### LLE 24x560mm 1300lm ADV5

| ta    | tp    | Forward current | Rth, hs-a | Cooling area |
|-------|-------|-----------------|-----------|--------------|
| 25 °C | 50 °C | 200 mA          |           | self cooling |
| 25 °C | 50 °C | 330 mA          | 4.07 K/W  | 164 cm²      |
| 35 °C | 50 °C | 200 mA          | 4.30 K/W  | 155 cm²      |
| 35 °C | 50 °C | 330 mA          | 2.44 K/W  | 273 cm²      |
| 40 °C | 50 °C | 100 mA          | 2.87 K/W  | 233 cm²      |
| 40 °C | 50 °C | 165 mA          | 1.63 K/W  | 410 cm²      |
| 45 °C | 50 °C | 200 mA          | 1.43 K/W  | 466 cm²      |
| 45 °C | 50 °C | 330 mA          | 0.81 K/W  | 822 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.

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

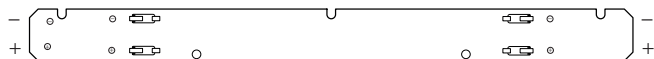
The max. permissible output current of the LED Driver for parallel wiring is 3 A.

LLE have to be operated with SELV LED Drivers.

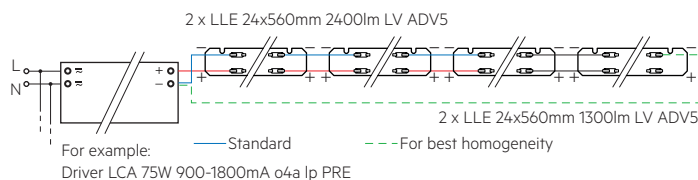
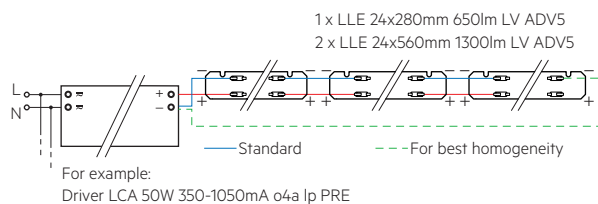
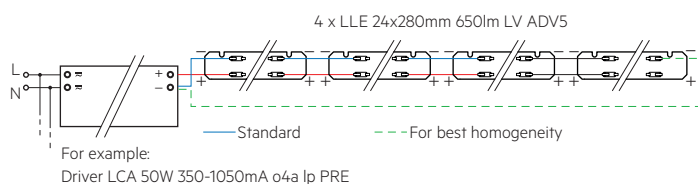


LLE are basic insulated up to 60 V SELV (if mounted with M4 screws with head diameter 7 mm in combination with plastic washers) against ground and can be mounted directly on earthed metal parts of the luminaire. If the max. output voltage of the LED Driver (also against earth) is above 60 V SELV, an additional insulation between LED module and heat sink is required (for example by insulated thermal pads) or by a suitable luminaire construction.

### 3.2 Wiring



#### Wiring examples



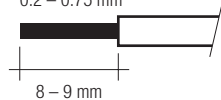
| Type                        | Recommendation for max. number with parallel wiring* |
|-----------------------------|------------------------------------------------------|
| LLE 24x280mm 650lm LV ADV5  | 12                                                   |
| LLE 24x560mm 1300lm LV ADV5 | 6                                                    |

\* with direkt chaining (without additional terminals).

### 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 mm<sup>2</sup>.  
For the push-wire connection you have to strip the insulation (8–9 mm).

wire preparation:  
0.2 – 0.75 mm<sup>2</sup>



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.

Only touch the module at the edge to separate the modules (see marking below).



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.

### 4.2 Lumen maintenance for LLE 24mm LV ADV5

| Forward current                             | tp<br>tempera-<br>ture | L90 / F10 | L90 / F50 | L80 / F10 | L80 / F50 | L70 / F10 | L70 / F50 |
|---------------------------------------------|------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| 50 mA / ft<br>(280 mm<br>module<br>length)  | 40 °C                  | 43,000 h  | 59,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 45 °C                  | 42,000 h  | 57,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 50 °C                  | 41,000 h  | 55,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 55 °C                  | 40,000 h  | 54,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 60 °C                  | 39,000 h  | 52,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 65 °C                  | 38,000 h  | 50,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 70 °C                  | 38,000 h  | 49,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 75 °C                  | 37,000 h  | 47,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 80 °C                  | 36,000 h  | 46,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 85 °C                  | 35,000 h  | 45,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
| 65 mA / ft<br>(280 mm<br>module<br>length)  | 40 °C                  | 43,000 h  | 58,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 45 °C                  | 42,000 h  | 57,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 50 °C                  | 41,000 h  | 55,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 55 °C                  | 40,000 h  | 53,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 60 °C                  | 39,000 h  | 51,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 65 °C                  | 38,000 h  | 50,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 70 °C                  | 37,000 h  | 48,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 75 °C                  | 36,000 h  | 47,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 80 °C                  | 36,000 h  | 45,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 85 °C                  | 35,000 h  | 44,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
| 100 mA / ft<br>(280 mm<br>module<br>length) | 40 °C                  | 42,000 h  | 58,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 45 °C                  | 41,000 h  | 56,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 50 °C                  | 40,000 h  | 54,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 55 °C                  | 40,000 h  | 52,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 60 °C                  | 39,000 h  | 51,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 65 °C                  | 38,000 h  | 49,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 70 °C                  | 37,000 h  | 48,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 75 °C                  | 36,000 h  | 46,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 80 °C                  | 35,000 h  | 45,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 85 °C                  | 34,000 h  | 44,000 h  | 70,000 h  | >72,000 h | >72,000 h | >72,000 h |
| 125 mA / ft<br>(280 mm<br>Modüllänge)       | 40 °C                  | 42,000 h  | 57,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 45 °C                  | 41,000 h  | 55,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 50 °C                  | 40,000 h  | 54,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 55 °C                  | 39,000 h  | 52,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 60 °C                  | 38,000 h  | 50,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 65 °C                  | 37,000 h  | 49,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 70 °C                  | 37,000 h  | 47,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 75 °C                  | 36,000 h  | 46,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 80 °C                  | 35,000 h  | 44,000 h  | 71,000 h  | >72,000 h | >72,000 h | >72,000 h |
|                                             | 85 °C                  | 34,000 h  | 43,000 h  | 69,000 h  | >72,000 h | >72,000 h | >72,000 h |
| 150 mA / ft<br>(280 mm<br>module<br>length) | 40 °C                  | 42,000 h  | 56,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 45 °C                  | 41,000 h  | 55,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 50 °C                  | 40,000 h  | 53,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 55 °C                  | 39,000 h  | 51,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 60 °C                  | 38,000 h  | 50,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 65 °C                  | 37,000 h  | 48,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 70 °C                  | 36,000 h  | 47,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 75 °C                  | 35,000 h  | 45,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 80 °C                  | 35,000 h  | 44,000 h  | 70,000 h  | >72,000 h | >72,000 h | >72,000 h |
|                                             | 85 °C                  | 34,000 h  | 43,000 h  | 69,000 h  | >72,000 h | >72,000 h | >72,000 h |
| 165 mA / ft<br>(280 mm<br>module<br>length) | 40 °C                  | 41,000 h  | 56,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 45 °C                  | 40,000 h  | 54,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 50 °C                  | 39,000 h  | 52,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 55 °C                  | 38,000 h  | 51,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 60 °C                  | 38,000 h  | 49,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 65 °C                  | 37,000 h  | 48,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 70 °C                  | 36,000 h  | 46,000 h  | >72,000 h | >72,000 h | >72,000 h | >72,000 h |
|                                             | 75 °C                  | 35,000 h  | 45,000 h  | 71,000 h  | >72,000 h | >72,000 h | >72,000 h |
|                                             | 80 °C                  | 34,000 h  | 43,000 h  | 70,000 h  | >72,000 h | >72,000 h | >72,000 h |
|                                             | 85 °C                  | 34,000 h  | 42,000 h  | 68,000 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

## 5. Electrical values

### 5.1 Declaration of electrical parameters

I<sub>rated</sub> ... Nominal operating current the module is designed for.

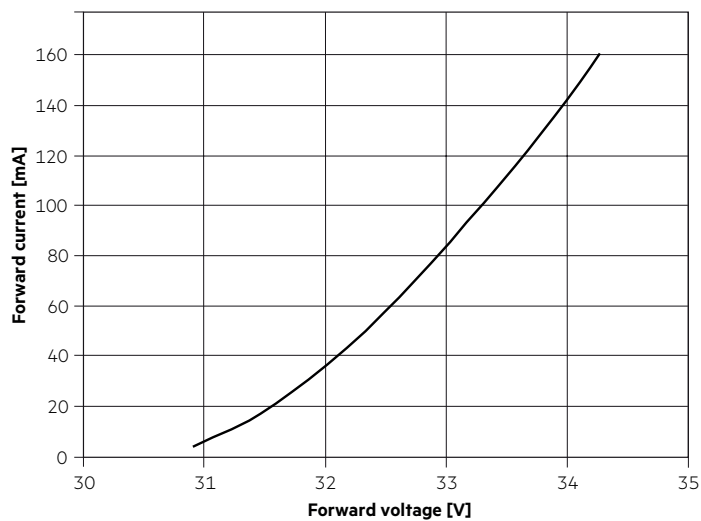
I<sub>max</sub> ... Max. permissible continuous operating current incl. The tolerances of the LED driver.

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

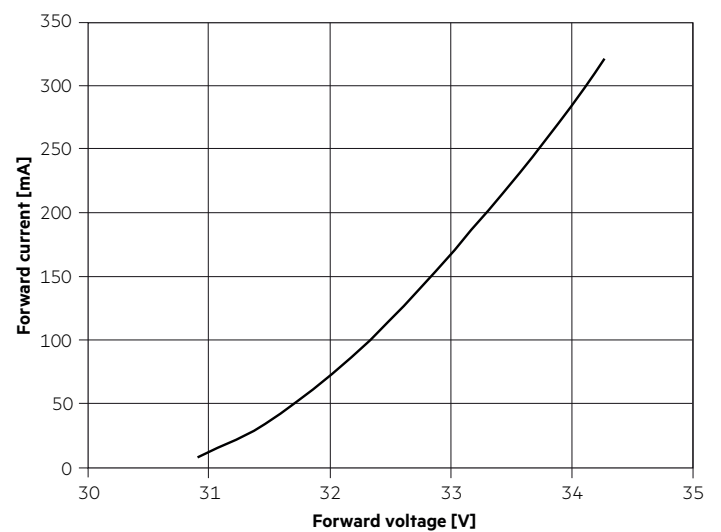
Max. permissible peak current ... The max. output peak current of the LED driver must not exceed this value.

### 5.2 Typ. forward voltage vs. forward current

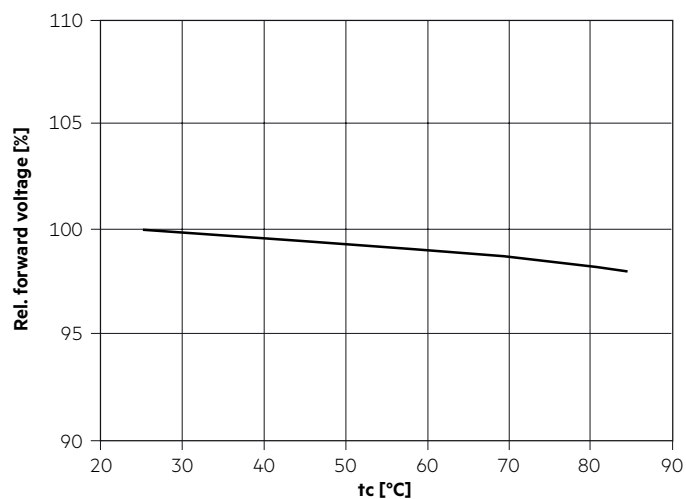
LLE 24x280mm 650lm 8xx LV ADV5



LLE 24x560mm 1300lm 8xx LV ADV5



### 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

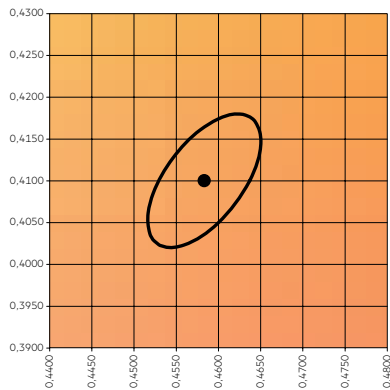
The specified colour coordinates are integral measured by current impulse of 195 mA and a duration of 100 ms.

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

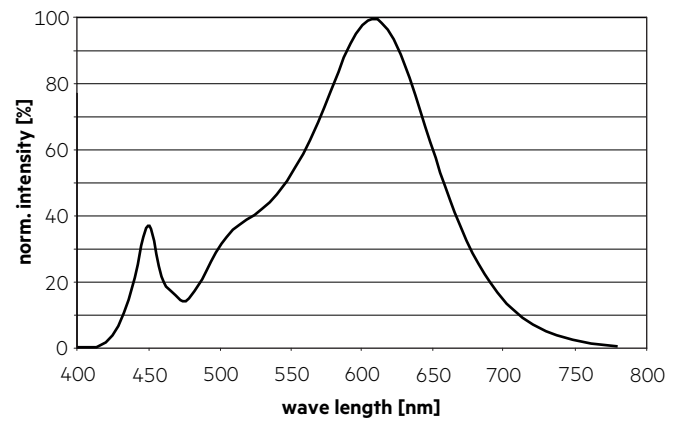
The measurement tolerance of the colour coordinates are  $\pm 0.01$ .

#### 2,700 K

|        | x0     | y0     |
|--------|--------|--------|
| Centre | 0.4578 | 0.4101 |

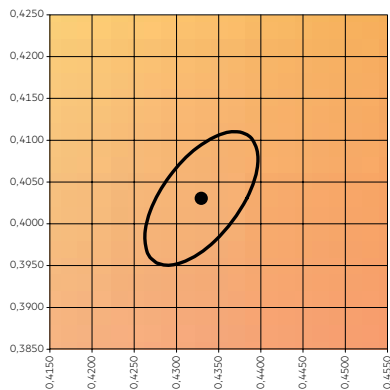


— MacAdam Ellipse: 3SDCM

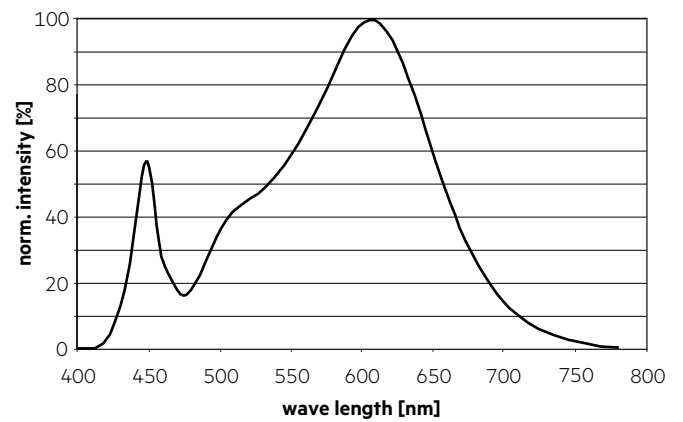


#### 3,000 K

|        | x0     | y0     |
|--------|--------|--------|
| Centre | 0.4338 | 0.4030 |

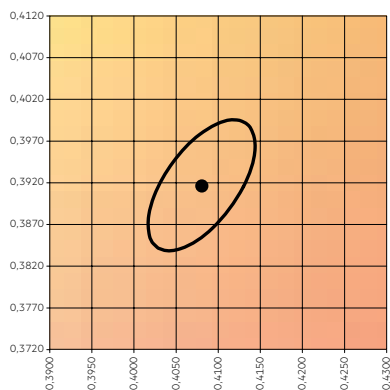


— MacAdam Ellipse: 3SDCM

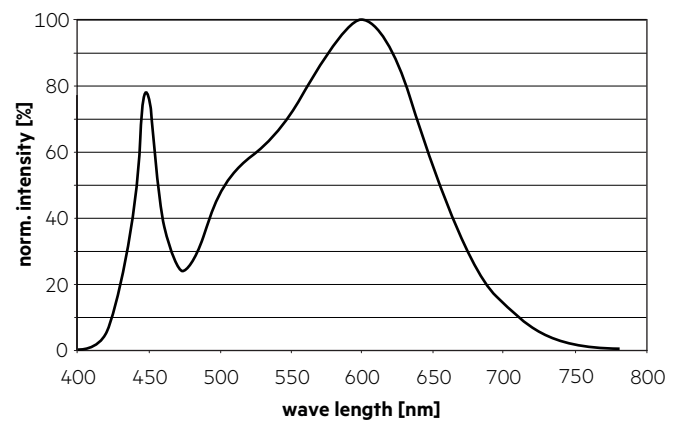


#### 3,500 K

|        | x0     | y0     |
|--------|--------|--------|
| Centre | 0.4073 | 0.3917 |

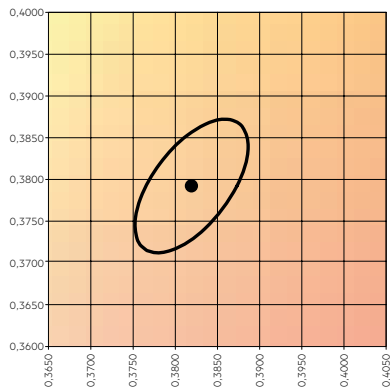


— MacAdam Ellipse: 3SDCM

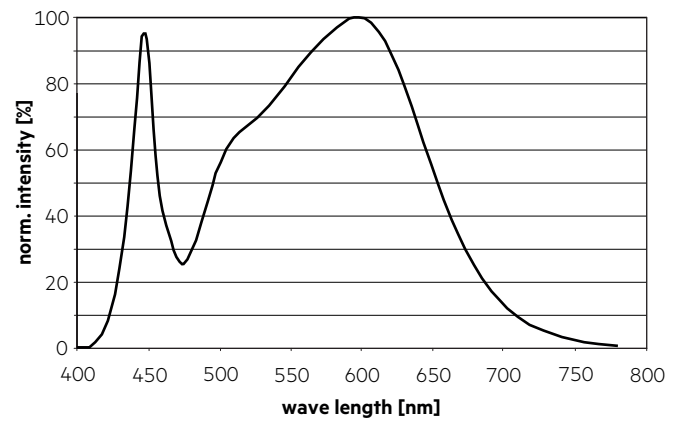


#### 4,000 K

|        | x0     | y0     |
|--------|--------|--------|
| Center | 0.3818 | 0.3797 |

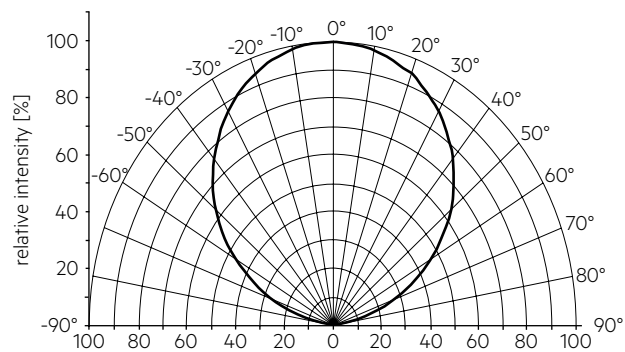


— MacAdam Ellipse: 3SDCM



## 6.2 Light distribution

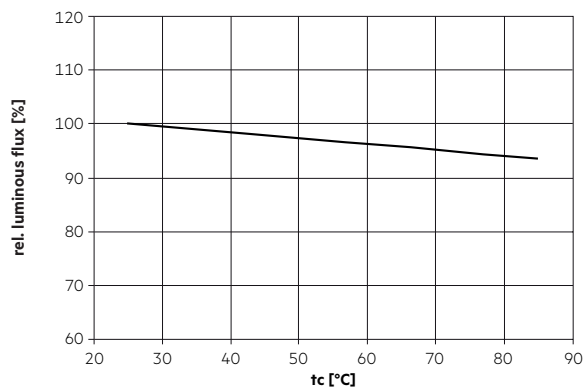
The optical design of the LLE product line ensures optimum homogeneity for the light distribution.



The colour temperature is measured integral over the complete module. The single LED light points can have deviations in the colour coordinates within MacAdam 5.

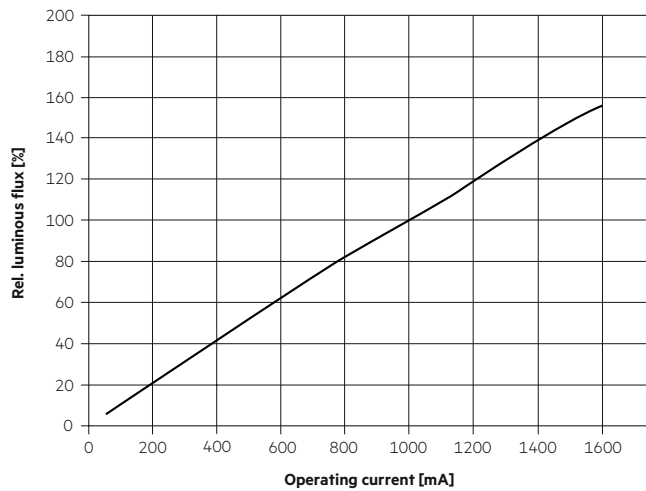
To ensure an ideal mixture of colours and a homogeneous light distribution a suitable optic (e. g. PMMA diffuser) and a sufficient spacing between module and optic (typ. 4 cm) should be used.

## 6.3 Relative luminous flux vs. tc temperature

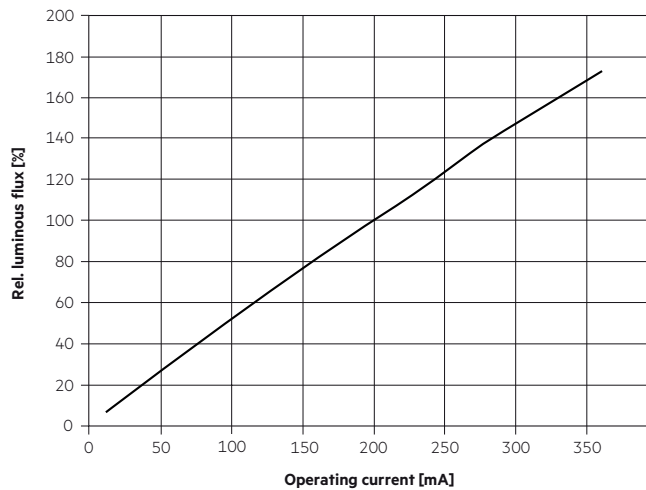


## 6.4 Relative luminous flux vs. operating current

### LLE 24x280mm 650lm 8xx LV ADV5



### LLE 24x560mm 1300lm 8xx LV ADV5



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

## 7. Miscellaneous

### 7.1 Additional information

Additional technical information at [www.tridonic.com](http://www.tridonic.com) → Technical Data

Guarantee conditions at [www.tridonic.com](http://www.tridonic.com) → Services

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