TRIDONIC

## Module LLE 20mm 750lm 827-865 LV MINI DAISY ADV1 (LEDiL)

Modules LLE advanced

LLE 20x280mm 750lm 827-865 LV MD ADV1

Module with LEDIL DAISY-MINI lens system

For articles manufactured at Tridonic SRB d.o.o.

### Product description

_ Linear Tunable White LED module with 2,700 and 6,500 K SMT packages
_ Ideal for linear luminaires
_ SELV module – the single module has a forward voltage < 60 V
_ Push terminals for quick and simple wiring
_ Design for LEDiL DAISY-MINI portfolio
_ HE ... High Efficiency, NM ... Nominal Mode, HO ... High Output
_ Orders only in full carton quantities.
_ Long lifetime up to 72,000 hours
_ 5 years guarantee (conditions at https://www.tridonic.com/en/int/services/manufacturer-guarantee-conditions)

### Optical properties

_ Colour temperatures 2,700 K to 6,500 K
_ Useful luminous flux 1,071 lm at Irated and tp = 25 °C
_ Efficacy of the LED module 164 lm/W at Irated and tp = 25 °C
_ High colour rendering index CRI > 80
_ High colour consistency (MacAdam 3) ①
_ Small luminous flux tolerances

### Mechanical properties

_ Module dimension 20 x 280 mm
_ Simple installation of lens and module with M3 screws

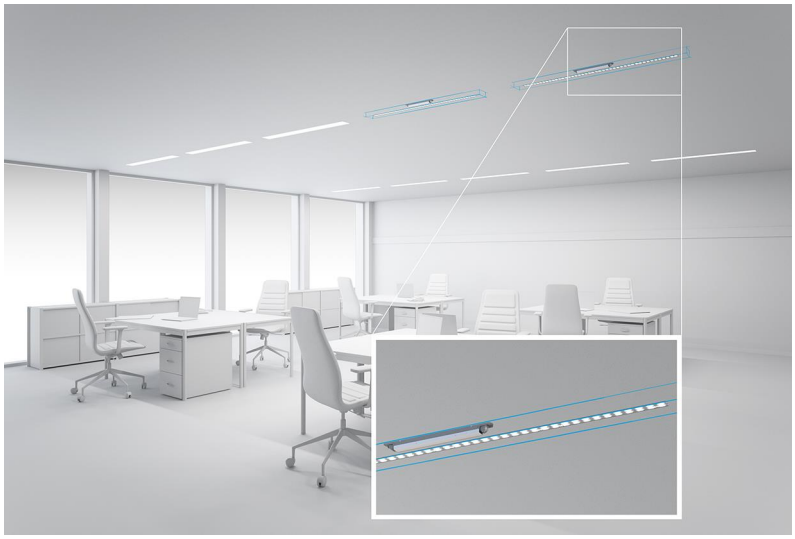
### System solution

_ Integrate compatible partner products into your final system solution: https://www.tridonic.com/en/int/products/accessories#partner

① Integral measurement over the complete module.

### Website

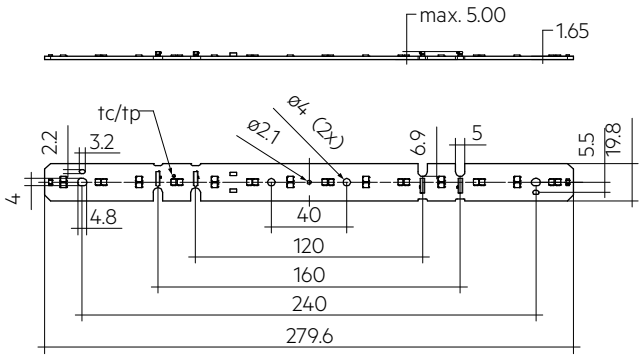
http://www.tridonic.com/28003857



Spotlights | Downlights | **Linear** | **Area** | **Floor | Wall** | **Free-standing** | Street | Decorative | High bay

## Module LLE 20mm 750lm 827-865 LV MINI DAISY ADV1 (LEDiL)

Modules LLE advanced




### Ordering data

| Type | Article number | Colour temperature | Packaging, carton | Weight per pc. |
|---|---|---|---|---|
| **LLE 20x280mm 750lm 827-865 LV MD ADV1** | **28003857** | 2,700 – 6,500 K | 210 pc(s). | 0.016 kg |

### Technical data

| | |
|---|---|
| Beam characteristic | 120° |
| Ambient temperature ta | -40 … +65 °C |
| tp rated | 55 °C |
| tc | 80 °C |
| Irated for 750 lm ② | 50 mA |
| Imax for 750 lm ② | 180 mA |
| Max. permissible LF current ripple for 750 lm ② | 195 mA |
| Max. permissible peak current for 750 lm ② | 300 mA / max. 10 ms |
| Max. working voltage for insulation SELV ③ | < 60 V |
| Insulation test voltage | 0.5 kV |
| CTI of the printed circuit board | ≥ 600 |
| Colour tolerance | 3 SDCM |
| ESD classification | Severity level 2 |
| Risk group (IEC 62471) ④ | RG0 |
| Classification acc. to IEC 62031 | Built-in |
| Type of protection | IP00 |
| Lumen maintenance L70B50 | 72,000 h |
| Guarantee (conditions at www.tridonic.com) | 5 Year(s) |

### Approval marks

RoHS

### Standards

IEC 62031, IEC 62471, IEC 61000-4-2, IEC 62778, IEC 61547

**Specific technical data**

| Type | Article number | Kanal | Photometric code | Useful luminous flux at tp = 25 °C② | Expected luminous flux at tp rated③ | Typ. forward current | Min. forward voltage at tp rated | Max. forward voltage at tp = 25 °C | Power consumption Pon at tp = 25 °C⑦ | Efficacy of the module at tp = 25 °C | Expected efficacy of the module at tp rated | Colour rendering index CRI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LLE 20x280mm 750lm – Operating mode HE 50 mA per channel** | | | | | | | | | | | | |
| **LLE 20x280mm 750lm 827-865 LV MD ADV1** | **28003857** | WW | 827/359 | – | 327 lm | 50 mA | 36.0 V | 39.3 V | – | – | 177 lm/W | >80 |
| **LLE 20x280mm 750lm 827-865 LV MD ADV1** | **28003857** | CW | 865/359 | – | 362 lm | 50 mA | 36.0 V | 39.3 V | – | – | 190 lm/W | >80 |
| **LLE 20x280mm 750lm – Operating mode HE 100 mA per channel** | | | | | | | | | | | | |
| **LLE 20x280mm 750lm 827-865 LV MD ADV1** | **28003857** | WW | 827/359 | – | 639 lm | 100 mA | 37.4 V | 40.7 V | – | – | 165 lm/W | >80 |
| **LLE 20x280mm 750lm 827-865 LV MD ADV1** | **28003857** | CW | 865/359 | – | 689 lm | 100 mA | 37.4 V | 40.7 V | – | – | 178 lm/W | >80 |
| **LLE 20x280mm 750lm – Operating mode NM 150 mA per channel** | | | | | | | | | | | | |
| **LLE 20x280mm 750lm 827-865 LV MD ADV1** | **28003857** | WW | 827/359 | 996 lm | 931 lm | 150 mA | 38.6 V | 42.0 V | 6.09 W | 164 lm/W | 155 lm/W | >80 |
| **LLE 20x280mm 750lm 827-865 LV MD ADV1** | **28003857** | CW | 865/359 | – | 996 lm | 150 mA | 38.6 V | 42.0 V | – | – | 167 lm/W | >80 |

② Values for each channel.
③ If mounted with M3 screws in combination with LEDiL DAISY lens.
④ Measured at operating mode HO.
⑤ Tolerance of useful light flux - 0 % / + 15 %. Measurement uncertainty ± 10 %.
⑥ Tolerance of expected light flux - 0 % / + 15 %. Measurement uncertainty ± 10 %. Based on calculation.
⑦ Tolerance of power consumption Pon ± 10 %. Measurement uncertainty ± 5 %.

## 1. Standards

IEC 62031
IEC 62471
IEC 61000-4-2
IEC 62778
IEC 61547

### 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 | MacAdam initial | MacAdam after 25% of the lifetime (max.6000h) | Luminous flux after 25% of the lifetime (max.6000h) | |
| | | | | | Code | Luminous flux |
| 7 | 70 – 79 | | | | 7 | ≥ 70 % |
| 8 | 80 – 89 | | | | 8 | ≥ 80 % |
| 9 | ≥90 | | | | 9 | ≥ 90 % |

### 1.2 Energy classification

| Type | Colour temperature | Forward current | Energy classification | Energy consumption |
|---|---|---|---|---|
| LLE 20x280mm 750lm 827-865 LV MD ADV1 | 2,700 K | 150 mA | D | 7 kWh / 1,000 h |

Energy label and further information at www.tridonic.com in the certificates tab of the corresponding product page and at the EPREL data base https://eprel.ec.europa.eu/

## 2. Thermal details

### 2.1 tc point, ambient temperature and lifetime

The temperature at tp reference point is crucial for the light output and lifetime of a LED product.

For LLE a tp temperature of 55 °C has to be complied in order to achieve an optimum between heat sink requirements, light output and lifetime.

Compliance with the maximum permissible reference temperature at the tc point must be checked under operating conditions in a thermally stable state. The maximum value must be determined under worst-case conditions for the relevant application.

The tc and tp temperature of LED modules from Tridonic are measured at the same reference point.

### 2.2 Storage and humidity

| | |
|---|---|
| Storage temperature | -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 20x280mm 750lm LV MD ADV1**

| ta | tp | Forward current | $R_{th, hs-a}$ | Cooling area |
|---|---|---|---|---|
| 25 °C | 55 °C | 100 mA | self cooling | |
| 25 °C | 55 °C | 300 mA | 4.40 K/W | 152 cm² |
| 35 °C | 55 °C | 100 mA | 10.82 K/W | 62 cm² |
| 35 °C | 55 °C | 300 mA | 2.93 K/W | 227 cm² |
| 40 °C | 55 °C | 100 mA | 8.11 K/W | 82 cm² |
| 40 °C | 55 °C | 300 mA | 2.20 K/W | 303 cm² |
| 45 °C | 55 °C | 100 mA | 5.41 K/W | 123 cm² |
| 45 °C | 55 °C | 300 mA | 1.47 K/W | 455 cm² |
| 50 °C | 55 °C | 100 mA | 2.70 K/W | 247 cm² |
| 50 °C | 55 °C | 300 mA | 0.73 K/W | 911 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 2.25 A.

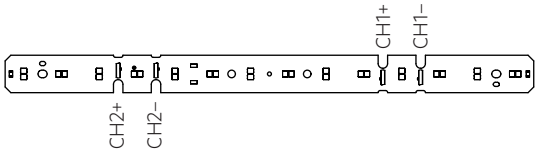
For parallel wiring only modules of the same forward voltage bin may be used.
The forward voltage bin is indicated on the label of the module.

| | | | | |
|---|---|---|---|---|
| 28003855 | LLE 20x280mm 750lm 830 LV MD ADV1 | | | |
| 1234567 | 0002 | 2AY | Tc: 80°C | CoO: RS |
| Irated/max= 100/360mADC | | Vf,max= 37,6/41,0V | | |

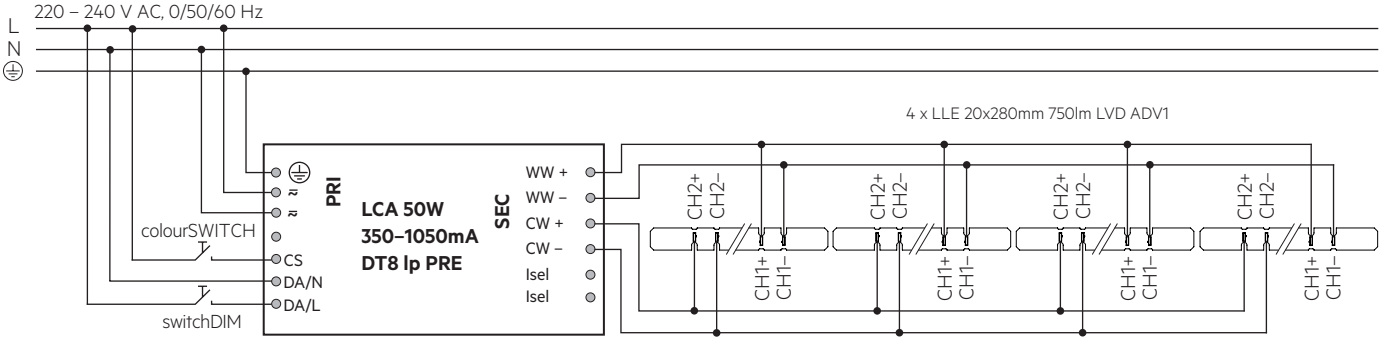
LLE have to be operated with SELV LED drivers.

LLE are basic insulated up to 60 V SELV (if mounted with M3 screws in combination with LEDiL DAISY lens) 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

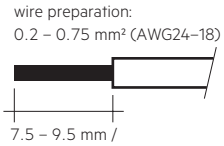



### Wiring examples




### 3.3 Wiring type and cross section

For wiring use solid wire from 0.2 – 0.75 mm² (AWG24–18).
For the push-wire connection you have to strip the insulation (7.5–9.5 mm).




Release the wires by pressing it.

### 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 with min. 4 screws and the LEDiL DAISY-MINI. If no LEDiL DAISY-MINI is mounted, use plastic washers.

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. Lifetime

### 4.1 Lifetime, lumen maintenance and failure rate

The light output of an LED module decreases over the lifetime, this is characterized with the L value.
L70 means that the LED module will give 70 % of its initial luminous flux.
This value is always related to the number of operation hours and therefore defines the lifetime of an LED module.

As the L value is a statistical value and the lumen maintenance may vary over the delivered LED modules.
The B value defines the amount of modules which are below the specific L value, e.g. L70B10 means 10 % of the LED modules are below 70 % of the initial luminous flux, respectively 90 % will be above 70 % of the initial value.
In addition the percentage of failed modules (fatal failure) is characterized by the C value.

The F value is the combination of the B and C value. That means for F degradation and complete failures are considered, e.g. L70F10 means 10 % of the LED modules may fail or be below 70 % of the initial luminous flux.

### 4.2 Lumen maintenance for LLE 20mm LV MD ADV1

LLE 20x280mm 750lm 827-865 LV MD ADV1

| Forward current | tp temperature | L90 / F10 | L90 / F50 | L80 / F10 | L80 / F50 | L70 / F10 | L70 / F50 |
|---|---|---|---|---|---|---|---|
| 100 mA per channel | 40 °C | 72k h | 64k h | 72k h | 72k h | 72k h | 72k h |
| | 45 °C | 72k h | 60k h | 72k h | 72k h | 72k h | 72k h |
| | 50 °C | 72k h | 56k h | 72k h | 72k h | 72k h | 72k h |
| | 55 °C | 70k h | 52k h | 72k h | 72k h | 72k h | 72k h |
| | 60 °C | 65k h | 48k h | 72k h | 72k h | 72k h | 72k h |
| | 65 °C | 61k h | 45k h | 72k h | 72k h | 72k h | 72k h |
| | 70 °C | 57k h | 42k h | 72k h | 72k h | 72k h | 72k h |
| | 75 °C | 53k h | 39k h | 72k h | 72k h | 72k h | 72k h |
| | 80 °C | 50k h | 37k h | 72k h | 72k h | 72k h | 72k h |

### 4.3 Switching capability

100,000 cycles

Tridonic test according to IEC 62717 Cl 10.3.3
30 s on / 30 s off at Imax

## 5. Electrical values

### 5.1 Declaration of electrical parameters

Irated … Nominal operating current the module is designed for.

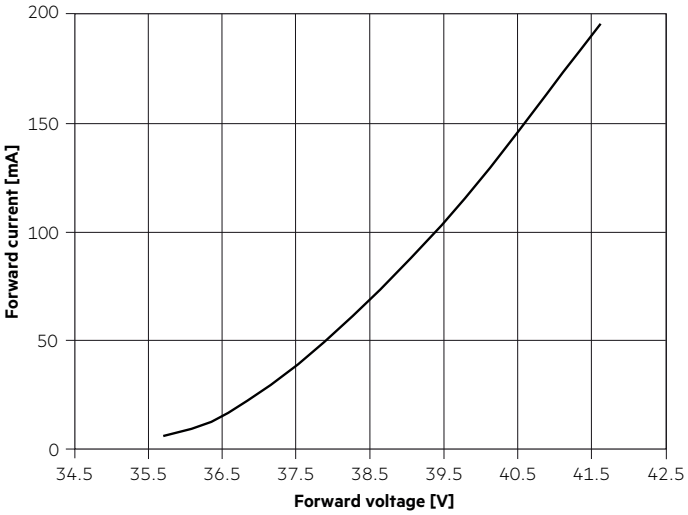
Imax … Max. permissible continuous operating current incl. The tolerances of the LED driver.

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

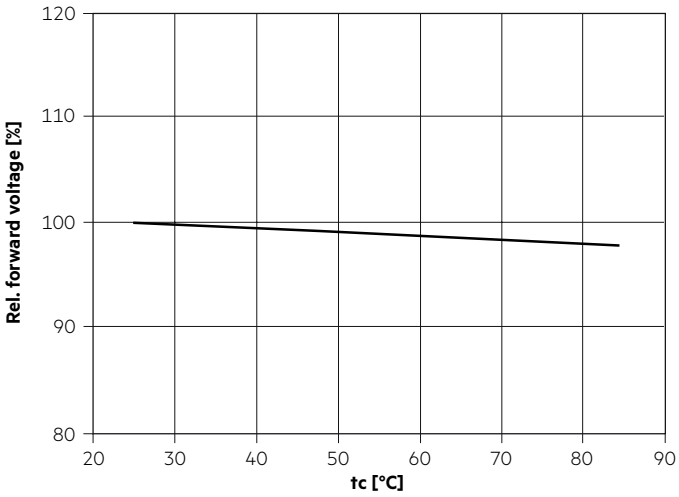
Max. permissible peak current … The max. output peak current of the LED driver must not exceed this value.

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

**LLE 20x140mm 400lm 8xx LV MD ADV1**




### 5.3 Forward voltage vs. tc temperature




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

## 6. Photometric characteristics

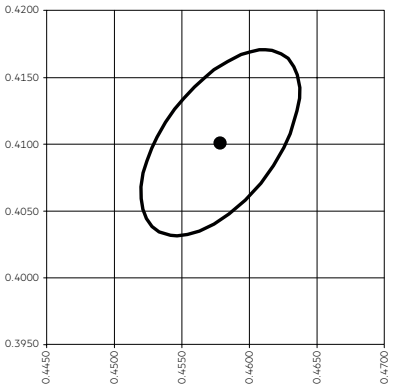
### 6.1 Coordinates and tolerances according to CIE 1931

The specified colour coordinates are measured integral after a settling time of 100 ms. The current impuls depends on the module type.
The ambient temperature of the measurement is ta = 25 °C.
The measurement tolerance of the colour coordinates are ± 0.01.

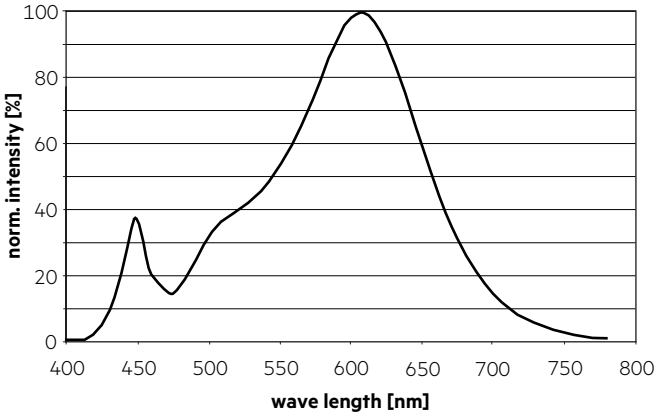
| Module type | Current impulse |
|---|---|
| LLE 20x280mm 750lm xxx LV MD ADV1 | 150 mA per channel |

**2,700 K**

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

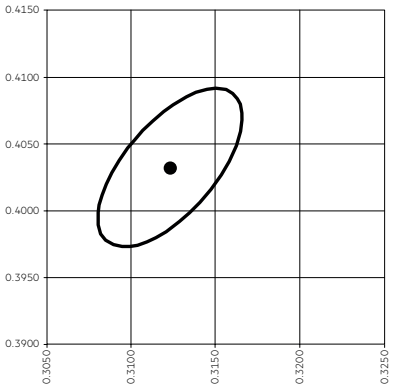



MacAdam Ellipse: 3SDCM

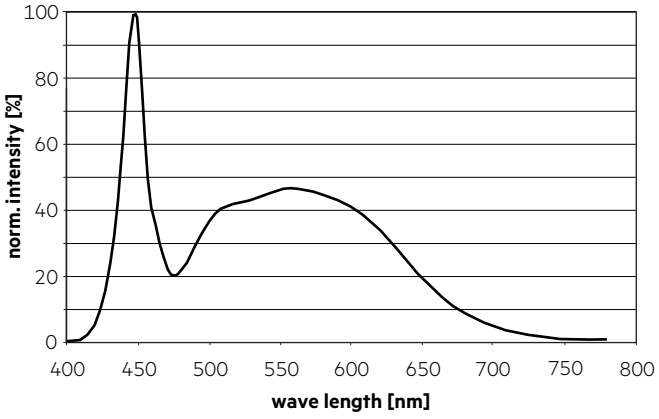



**6,500 K**

| | x0 | y0 |
|---|---|---|
| Center | 0.3123 | 0.3282 |

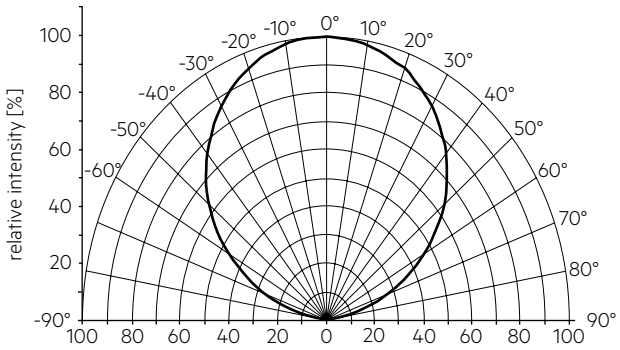



MacAdam Ellipse: 3SDCM



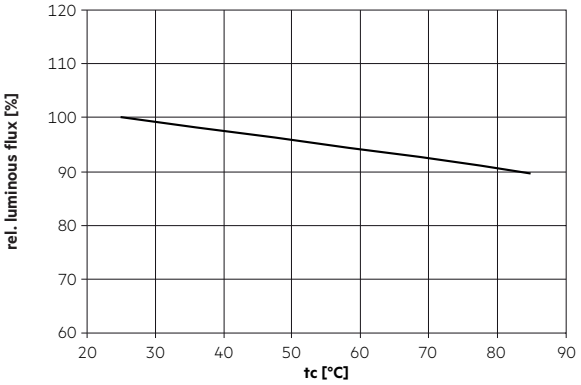
### 6.2 Light distribution

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



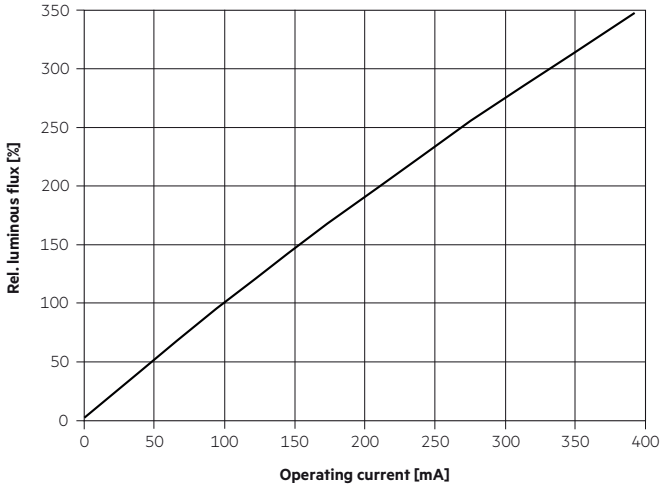

The colour temperature is measured integral over the complete module. The single LED light points can have deviations in the colour coordinates within MacAdam 5.
To ensure an ideal mixture of colours and a homogeneous light distribution a suitable optic (e. g. PMMA diffuser) and a sufficient spacing 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 20x280mm LV MD ADV1**




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 → Technical Data

Lifetime declarations are informative and represent no warranty claim.