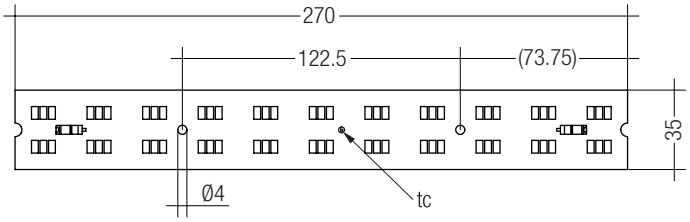
RoHS

## Module STARK LLE 35-270-1250
Module LLE ADVANCED

### Product description

- Ideal for linear and panel lights
- LED system solution with outstanding system efficacy up to 114 lm/W, consisting of linear LED modules and dimmable LED Driver LCAI 080/0350
- Efficacy of the module up to 131 lm/W
- High colour rendering index CRI > 80
- Small colour tolerance MacAdam 3①
- Small luminous flux tolerances
- Colour temperatures 3,000 K and 4,000 K
- Perfectly uniform light, even if several LED modules are used together in a line
- Push terminals for quick and simple wiring of LED module to LED module
- Simple installation (e.g. screws)
- Long life-time: 50,000 hours
- 5-year system guarantee on the complete product


### Technical data

| | |
|---|---|
| Beam characteristic | 120° |
| Ambient temperature ta | -30 … +55 °C |
| Typ. tp point | 65 °C |
| Max. working voltage for insulation | 500 V |
| Risk group (EN 62471:2008) | 0 |
| Classification acc. to EN 62031 | Built-in |
| Type of protection | IP00 |

### Ordering data

| Type | Article number | Colour temperature | Packaging carton | Weight per pc. |
|---|---|---|---|---|
| **STARK-LLE-G2-1250-830-CLA** | **28000140** | 3,000 K | 200 pc(s). | 0.045 kg |
| **STARK-LLE-G2-1250-840-CLA** | **28000141** | 4,000 K | 200 pc(s). | 0.057 kg |

**Standards**, page 2

**Colour temperatures and tolerances**, page 5

### Specific technical data

| Type | Photo-metric code | Typ. luminous flux at tp = 25 °C② | Typ. lumino-us flux at tp = 65 °C② | Typ. forward current②③④ | Min. forward voltage at tp = 65 °C | Max. forward voltage at tp = 25 °C | Typ. power consumption at tp = 65 °C② | 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 | Energy classi-fication |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Operating mode HE at 300 mA** | | | | | | | | | | | | |
| **STARK-LLE-G2-1250-830-CLA** | 830/369 | 1,210 lm | 1,180 lm | 300 mA | 28.1 V | 36.0 V | 9.8 W | 123 lm/W | 120 lm/W | 110 lm/W | > 80 | A+ |
| **STARK-LLE-G2-1250-840-CLA** | 840/369 | 1,280 lm | 1,250 lm | 300 mA | 28.1 V | 36.0 V | 9.8 W | 131 lm/W | 128 lm/W | 118 lm/W | > 80 | A+ |
| **Operating mode HO at 350 mA** | | | | | | | | | | | | |
| **STARK-LLE-G2-1250-830-CLA** | 830/369 | 1,390 lm | 1,360 lm | 350 mA | 28.6 V | 36.6 V | 11.6 W | 120 lm/W | 117 lm/W | 108 lm/W | > 80 | A+ |
| **STARK-LLE-G2-1250-840-CLA** | 840/369 | 1,470 lm | 1,440 lm | 350 mA | 28.6 V | 36.6 V | 11.6 W | 127 lm/W | 124 lm/W | 114 lm/W | > 80 | A+ |

① Integrated measurement over the complete module.

② Tolerance range for optical and electrical data: ±10 %.

③ Max. permissible repetitive peak current: 900 mA.

④ Max. permissible surge current: 1.5 A, duration max. 10 µs.

**Standards**
EN 62031
EN 62471
EN 61347-1
EN 61547
EN 55015

**Photometric code**

Key for photometric code, e. g. 830 / 339

| 1st digit | | 2nd + 3rd digit | 4th digit | 5th digit | 6th digit | |
|---|---|---|---|---|---|---|
| Code | CRI | Colour tempera-ture in Kelvin x 100 | McAdam initial | McAdam after 25% of the life-time (max.6000h) | Lumen maintanance after 25% of the life-time (max.6000h) | |
| | | | | | Code | Remaining lumen |
| 7 | 67 – 76 | | | | 7 | ≥ 70 % |
| 8 | 77 – 86 | | | | 8 | ≥ 80 % |
| 9 | 87 – ≥90 | | | | 9 | ≥ 90 % |

**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.

**tc point, ambient temperature and life-time**
The temperature at tc 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.

**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 2 screws per module.
In order not to damage the modules only rounded head screws and an additional plastic flat washer should be used.

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 becondensation curing based, acetate curing based or contain sulfur, chlorine or phthalate.
Avoid corrosive atmosphere during usage and storage.

**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

**Heat sink values**

**LLE**

| ta | tp | Forward current | $R_{th, hs-a}$ | Cooling area |
|---|---|---|---|---|
| 25 °C | 65 °C | 300 mA | 6.6 K/W | 99 cm² |
| 25 °C | 65 °C | 350 mA | 4.9 K/W | 132 cm² |
| 35 °C | 65 °C | 300 mA | 4.9 K/W | 132 cm² |
| 35 °C | 65 °C | 350 mA | 3.7 K/W | 176 cm² |
| 45 °C | 65 °C | 300 mA | 3.3 K/W | 198 cm² |
| 45 °C | 65 °C | 350 mA | 2.4 K/W | 265 cm² |
| 55 °C | 65 °C | 300 mA | 1.7 K/W | 396 cm² |
| 55 °C | 65 °C | 350 mA | 1.1 K/W | 529 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 tc temperature.

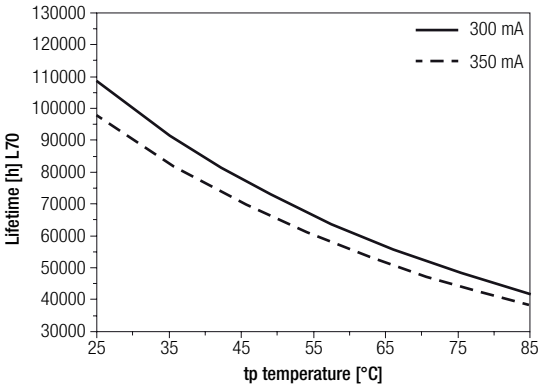
### Thermal behaviour

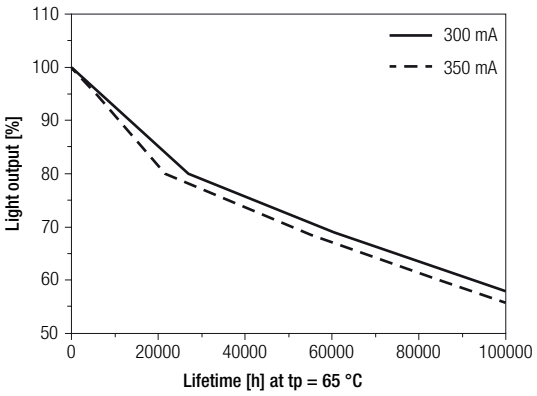
| | |
|---|---|
| storage temperature | -40 ... +85 °C |
| operating temperature ta | -30 ... +55 °C |
| tp (at typ. current) | 65 °C |
| tc max. (at typ. current) | 85 °C |
| max. humidity* | 0 ... 80 % |

* not condensating

### Lumen maintenance

| tp temperature in °C | forward current in mA | luminous flux in % | operating time in h |
|---|---|---|---|
| 65 | 300 | 80 | 25.000 |
| | | 70 | 55.000 |
| | | 50 | > 100.000 |
| | 350 | 80 | 20.000 |
| | | 70 | 50.000 |
| | | 50 | > 100.000 |




### Selection of the LED Driver

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

LLE are basic isolated against ground and can be mounted directly on earthed metal parts of the luminaire also when used in conjunction with the LED Driver LCAI 080/0350. In this case the light emitting side of the module has to be protected against direct touch (test finger). This is typically achieved by means of a non removable light distributor over the module.

### 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:

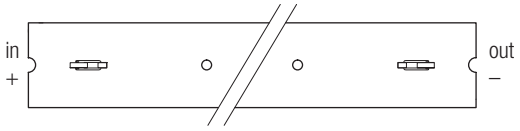
- Short-circuit protection
- Overload protection
- Overtemperature protection

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.

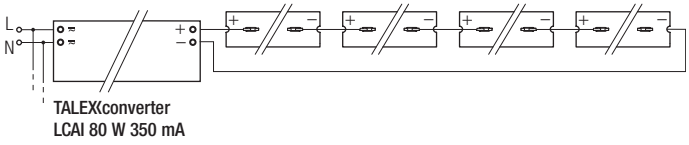
Wrong polarity can damage the LLE.

With parallel wiring tolerance-related differences in output are possible (thermal stress of the module) and can cause differences in brightness. If one module fails, the remaining modules may be overloaded.

### Wiring

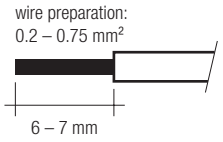



### Wiring examples



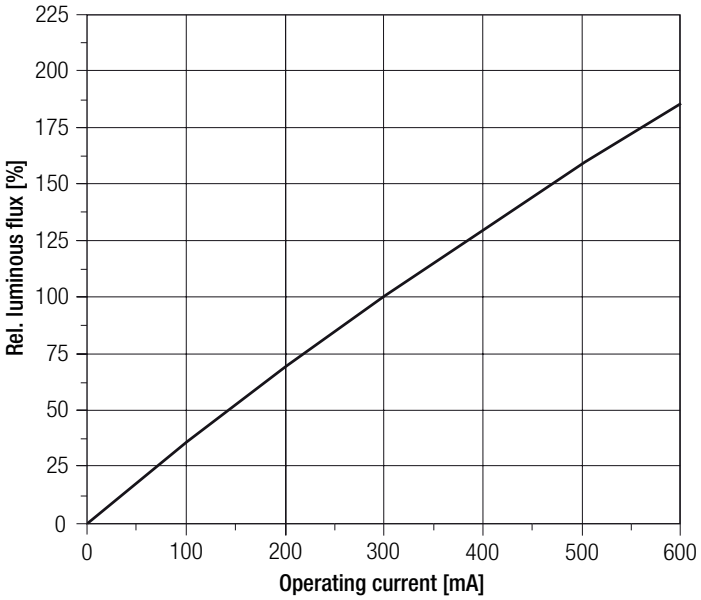

### Wiring type and cross section

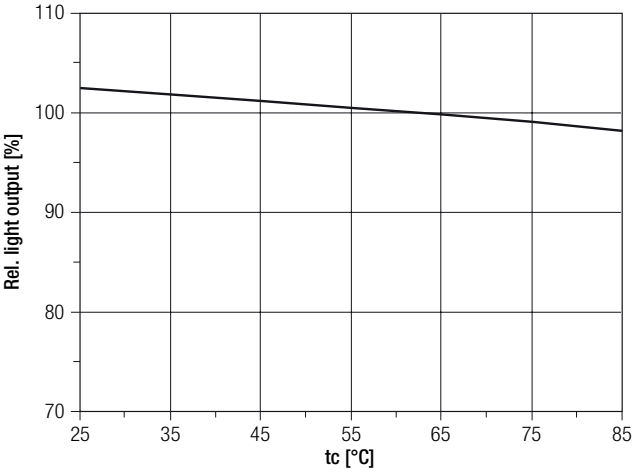
The wiring can be solid cable with a cross section of 0.2 to 0.75 mm².
For the push-wire connection you have to strip the insulation (6–7 mm).




Inserting stranded wires / removing wires by lightly pressing on the push button.

**Relative luminous flux**



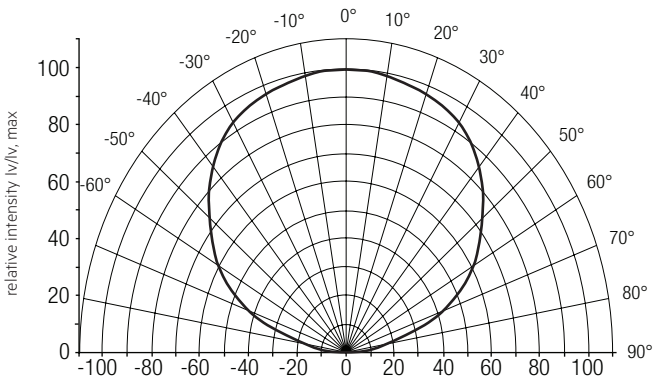




The diagrams are based on statistic values.
The real values can be different.

**Optical characteristics LLE**

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

**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 7.
To ensure an ideal mixture of colours and a homogenious light distribution a suitable optic (e. g. PMMA diffuser) and a sufficient spacing between module and optic (typ. 6 cm) should be used.

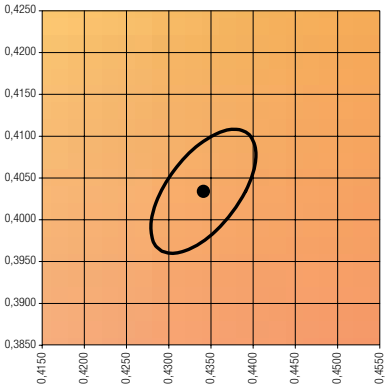
For further information see Design-in Guide, 3D data and photometric data on www.tridonic.com or on request.

**Coordinates and tolerances according to CIE 1931**

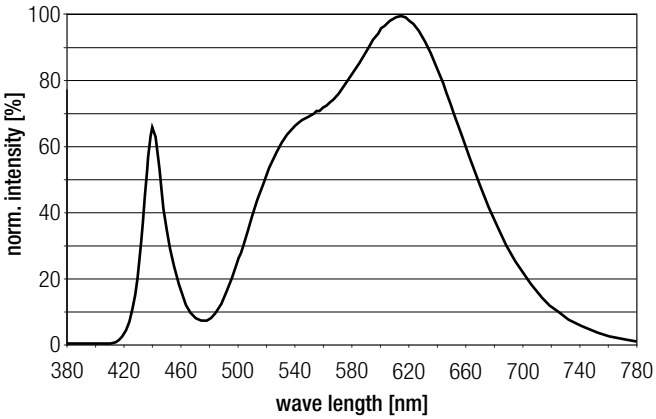
The specified colour coordinates are measured by a current impulse with typical values of module and a duration of 100 ms.
The ambient temperature of the measurement is ta = 25 °C.
The measurement tolerance of the colour coordinates are ± 0.01.

**3,000 K**

| | x0 | y0 |
|---|---|---|
| Centre | 0.4344 | 0.4032 |

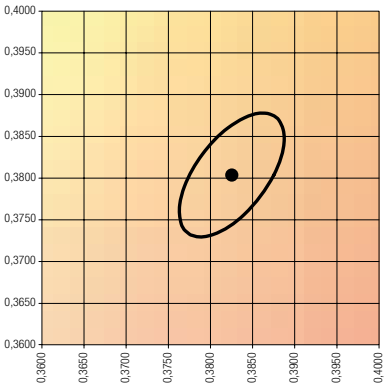



MacAdam Ellipse: 3SDCM




**4,000 K**

| | x0 | y0 |
|---|---|---|
| Centre | 0.3828 | 0.3803 |




MacAdam Ellipse: 3SDCM