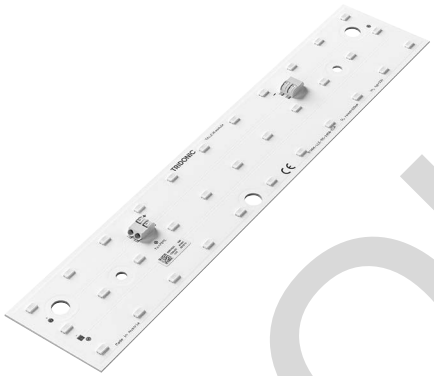
Module STARK LLE-55-280-1650 CLASSIC

Modules LLE ADVANCED

Product description

- Ideal for linear and panel lights
- LED system solution with outstanding system efficiency up to 126 lm/W, consisting of linear LED modules and dimmable LED Driver LCAI 65 W 150–400 mA ECO lp
- Efficiency of the module up to 150 lm/W
- Outstanding colour rendering index CRI > 80
- Small colour tolerance MacAdam 3③
- Small luminous flux tolerances
- Colour temperature 3,000 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 guarantee



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EAC CE RoHS

Module STARK LLE-55-280-1650 CLASSIC
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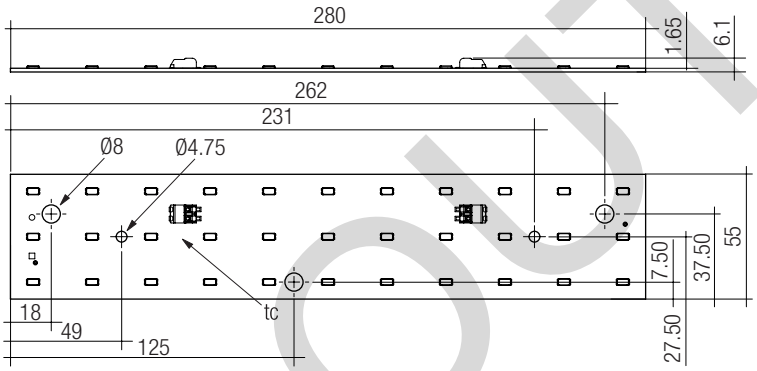
Technical data

Beam characteristic	120°
Ambient temperature range	-30 … +45 °C
tp rated	65 °C
tc	75 °C
Max. DC forward current	600 mA
Max. permissible LF current ripple	660 mA
Max. permissible peak current	780 mA / max. 10 ms
Max. permissible output voltage of LED Driver②	300 V
Insulation test voltage	1.6 kV
ESD classification	severity level 4
Risk group (EN 62471:2008)	1
Type of protection	IP00



Ordering data

Type	Article number	Colour temperature	Packaging carton	Weight per pc.
LLE-55-280-1650-830-CLA	**89602382**	3,000 K	240 pc(s).	0.051 kg
LLE-55-280-1650-840-CLA	**89602022**	4,000 K	240 pc(s).	0.051 kg

Specific technical data

Type	Photo-metric code	Typ. luminous flux at tp = 25 °C①	Typ. luminous flux at tp = 65 °C①	Typ. forward current	Min. forward voltage at tp = 65 °C	Max. forward voltage at tp = 25 °C	Typ. power consumption at tp = 65 °C①	Efficacy of the module at tp = 25 °C	Efficacy of the module at tp = 65 °C	Efficacy of the system at tp = 65 °C	Colour rendering index CRI
LLE-55-280-1650-830-CLA	830/349	1,580 lm	1,480 lm	325 mA	29.7 V	34.5 V	10.1 W	149 lm/W	146 lm/W	131 lm/W	> 80
LLE-55-280-1650-840-CLA	840/349	1,630 lm	1,520 lm	325 mA	29.7 V	34.5 V	10.1 W	154 lm/W	150 lm/W	135 lm/W	> 80

① Tolerance range for optical and electrical data: ±10 %.

② If mounted with M4 screws and plastic washers.

③ Central measurement over the complete module.

1. Standards

IEC 62031
IEC 62471
IEC 61547
IEC 55015
IEC 61000-4-2

1.1 Photometric code

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

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

1.2 Energy classification

Type	Energy classification
LLE-55-280-1650-8x0-CLA	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 Module 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	-30 … +80 °C

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

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

Module LLE				
ta	tp	Forward current	$R_{th,\ hs\text{-}a}$	Cooling area
25 °C	65 °C	325 mA	6.4 K/W	104 cm²
30 °C	65 °C	325 mA	5.6 K/W	118 cm²
40 °C	65 °C	325 mA	4.0 K/W	167 cm²
45 °C	65 °C	325 mA	3.2 K/W	206 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 guarantees the necessary protection for safe and reliable operation.

If a LED Driver other than from 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.

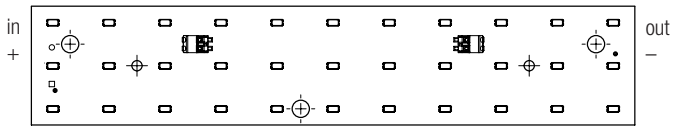
Wrong polarity can damage the LLE modules.

If LLE modules 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.

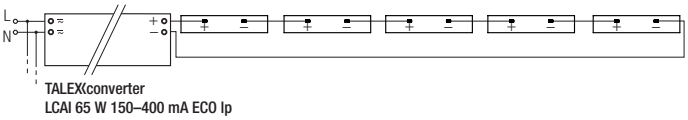
LLE modules can be operated either from SELV LED Drivers or from LED Drivers with LV output voltage.

LLE are basic isolated up to 300 V (if mounted with M4 screws 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 300 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

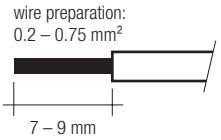


Wiring examples



3.3 Wiring type and cross section

The wiring can be stranded or solid cable with a cross section of 0.2 to 0.75 mm². For the push-wire connection you have to strip the insulation (7–9 mm).



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

3.4 Mounting instruction

None of the components of the LLE modules (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. 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 be condensation curing based, acetate curing based or contain sulfur, chlorine or phthalate.
Avoid corrosive atmosphere during usage and storage.

3.5 EOS/ESD safety guidelines

The device / module contains components that are sensitive to electrostatic discharge and may only be installed in the factory and on site if appropriate EOS/ESD protection measures have been taken. No special measures need be taken for devices/modules with enclosed casings (contact with the pc board not possible), just normal installation practice. Please note the requirements set out in the document EOS / ESD guidelines (Guideline_EOS_ESD.pdf) at:
http://www.tridonic.com/esd-protection

4. Life-time

4.1 Life-time, lumen maintenance and failure rate

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

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

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

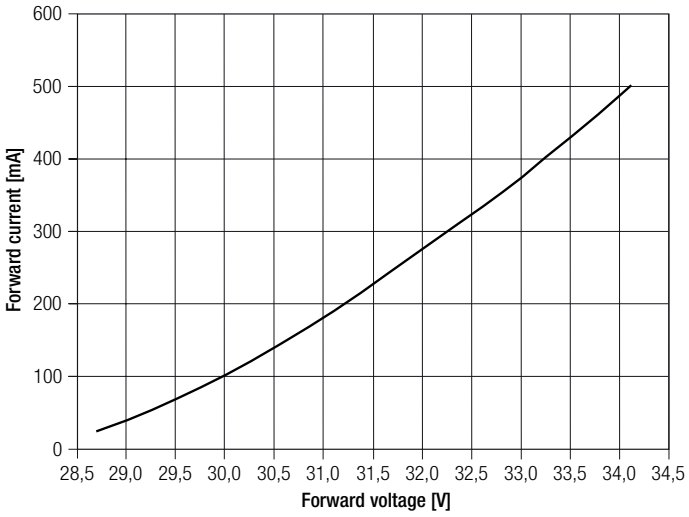
4.2 Lumen maintenance for Module LLE 55x280mm 1650lm

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

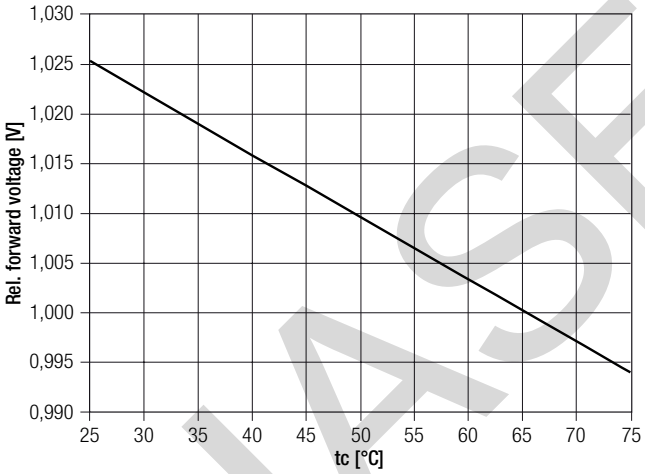
Forward current	tp temperature	L80 / F10	L80 / F50	L70 / F10	L70 / F50
325 mA	65 °C	tbd h	tbd h	tbd h	>50,000 h

5. Electrical values

5.1 Typ. forward voltage vs. forward current



5.2 Forward voltage vs. tc temperature



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

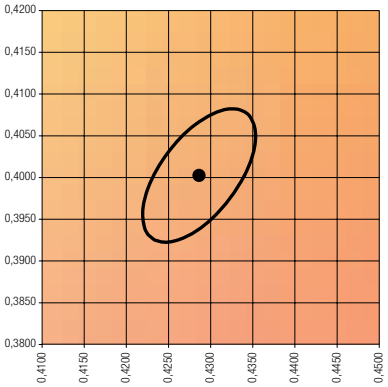
6. Photometric charcteristics

6.1 Coordinates and tolerances according to CIE 1931

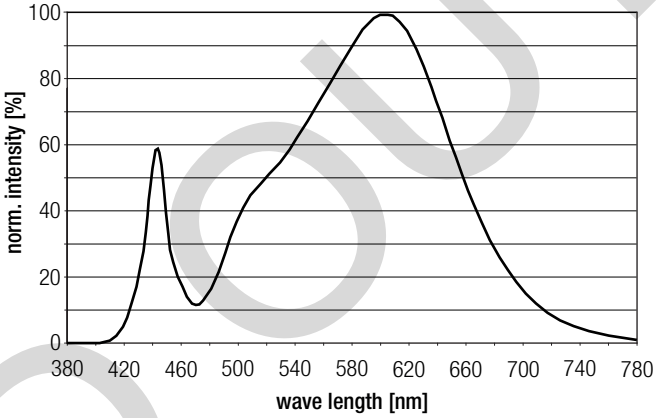
The specified colour coordinates are integral measured by a current impulse of 325 mA and a duration of 100 ms.
The ambient temperature of the measurement is ta = 25 °C.
The measurement tolerance of the colour coordinates are ± 0.01.

3,000 K

	x0	y0
Centre	0.4284	0.4003

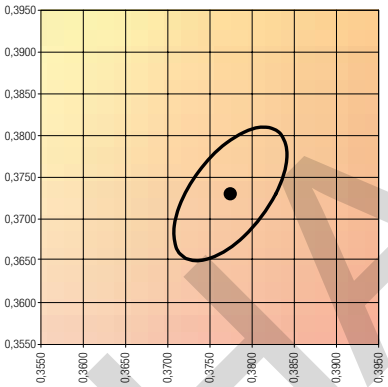


MacAdam Ellipse: 3SDCM

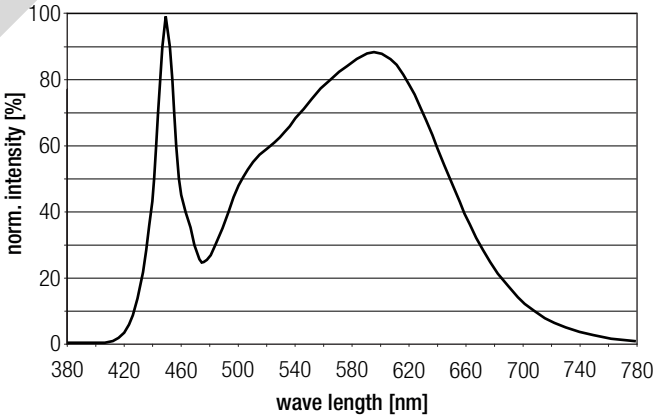


4,000 K

	x0	y0
Centre	0.3828	0.3803

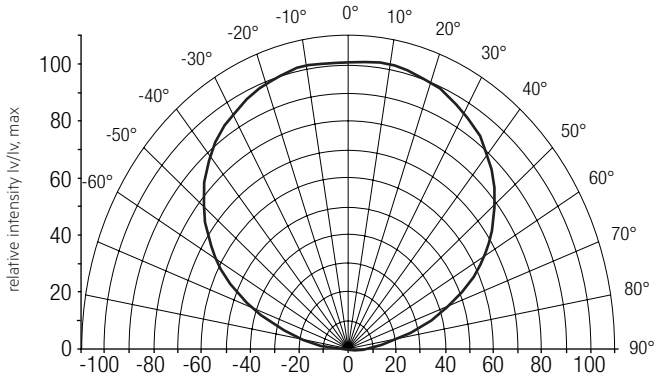


MacAdam Ellipse: 3SDCM



6.2 Light distribution

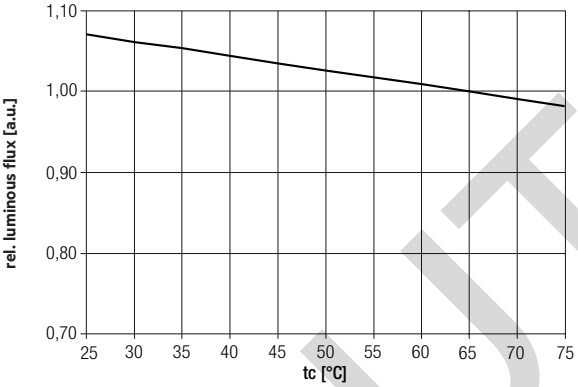
The optical design of the Module LLE product line ensures optimum homogenity for the light distribution.



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