Module RLE PL1 EXC2 OTD

Modules RLE excite

Product description

- High efficiency outdoor modules
- Suitable for harsh and humid outdoor conditions
- Tested acc. to salt spray test (IEC 60068-2-52) and harmful gas test (GR-1217-CORE)
- Huge performance temperature range from -40 … +105 °C
- Surge tested (+/- to earth) 6 kV with Tridonic LED Driver
- Integrated NTC for overtemperature protection
- Additional shunts to bypass single light point failures
- Zhaga Book 15 compliant
- For use with standard 2x2 lenses (e.g. LEDIL Strada 2x2)
- Push terminals for quick and simple wiring
- Long life-time up to 100,000 hours
- 8-year guarantee

RLE 2x4 2000lm HP EXC2 OTD

Optical properties

- Colour temperature 4,000 K
- Typ. luminous flux 2,000 lm
- Efficacy of the module up to 158 lm/W at 650 mA (nominal operation)
- High colour rendering index CRI > 80
- Small luminous flux tolerances[1]

Mechanical properties

- Module dimension 49.5 x 121.4 mm
- Installation of the module together with lens in the luminaire by means of an M3 screw

Standards, page 3

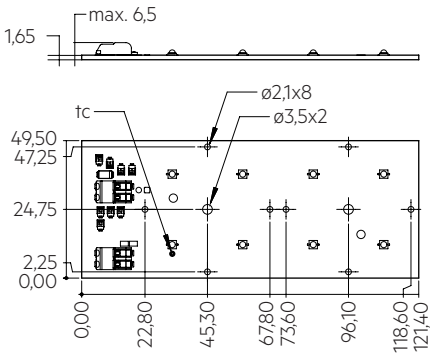
Colour temperatures and tolerances, page 7

Module RLE PL1 EXC2 OTD

Modules RLE excite

Technical data

Beam characteristic	120°
Ambient temperature range	-40 … +80 °C
tp rated	75 °C
tc	105 °C
Irated	650 mA
Imax	1,200 mA
Max. permissible LF current ripple	1,340 mA
Max. permissible peak current	2,000 mA / max. 10 ms
Max. working voltage for insulation[②]	370 V
Max. working voltage for insulation with lens	670 V
Insulation test voltage	1.74 kV
CTI of the printed circuit board	> 600
ESD classification	severity level 4
Risk group (IEC 62471)[③]	RG2 (Ethr = 767 lx, RG1 at d ≥ 50 cm)
Classification acc. to IEC 62031	Built-in
Type of protection	IP00



RLE 2x4 2000lm HP EXC2 OTD

Ordering data

Type	Article number	Colour temperature	Packaging carton	Weight per pc.
RLE 2x4 2000lm 840 PL1 EXC2 OTD	**89603159**	4,000 K	46 pc(s).	0.027 kg

Specific technical data

Type[⑤]	Photo-metric code	Typ. luminous flux at tp = 25 °C[④]	Typ. luminous flux at tp = 75 °C[④]	Typ. forward current	Min. forward voltage at tp = 75 °C	Max. forward voltage at tp = 25 °C	Typ. power consumption at tp = 75 °C[④]	Efficacy of the module at tp = 25 °C	Efficacy of the module at tp = 75 °C	Efficacy of the system at tp = 75 °C	Colour rendering index CRI
Operating mode HE											
RLE 2x4 2000lm 840 PL1 EXC2 OTD	840/579	1,890 lm	1,780 lm	500 mA	21.2 V	23.7 V	11.1 W	166 lm/W	161 lm/W	148 lm/W	> 80
Operating mode NM											
RLE 2x4 2000lm 840 PL1 EXC2 OTD	840/579	2,440 lm	2,300 lm	650 mA	21.5 V	24.0 V	14.6 W	163 lm/W	158 lm/W	145 lm/W	> 80
Operating mode HO											
RLE 2x4 2000lm 840 PL1 EXC2 OTD	840/579	3,650 lm	3,440 lm	1.050 mA	22.3 V	24.7 V	24.2 W	147 lm/W	142 lm/W	131 lm/W	> 80

① Integral measurement over the complete module.

② If mounted with M3 screws.

③ Measured at I = 1,800 mA.

④ Tolerance range for optical and electrical data: ±10 %.

⑤ HE … high efficiency, NM … nominal mode, HO … high output.

1. Standards

EC 62031
IEC 62778
IEC 62471
IEC 61000-4-2
IEC 60068-2-52
UL 8750 (for dry and damp locations)
GR-1217-CORE

1.1 Photometric code

Key for photometric code, e. g. 830 / 579

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 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	Operating mode	Energy classifiction
RLE 2x4 2000lm 840 PL1 EXC2 OTD	NM	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 RLE a tp temperature of 75 °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 0 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 RLE will be greatly reduced or the RLE may be destroyed.

2.4 Heat sink values

RLE 2x4 2000lm EXC2 OTD

ta	tp	Forward current	$R_{th, hs-a}$	Cooling area
25 °C	75 °C	500 mA	6.83 K/W	98 cm²
25 °C	75 °C	650 mA	5.01 K/W	133 cm²
25 °C	75 °C	1,050 mA	2.82 K/W	237 cm²
35 °C	75 °C	500 mA	5.47 K/W	122 cm²
35 °C	75 °C	650 mA	4.00 K/W	166 cm²
35 °C	75 °C	1,050 mA	2.25 K/W	296 cm²
40 °C	75 °C	500 mA	4.78 K/W	139 cm²
40 °C	75 °C	650 mA	3.50 K/W	190 cm²
40 °C	75 °C	1,050 mA	1.97 K/W	338 cm²
45 °C	75 °C	500 mA	4.10 K/W	163 cm²
45 °C	75 °C	650 mA	3.00 K/W	222 cm²
45 °C	75 °C	1,050 mA	1.69 K/W	395 cm²
50 °C	75 °C	500 mA	3.41 K/W	195 cm²
50 °C	75 °C	650 mA	2.50 K/W	267 cm²
50 °C	75 °C	1,050 mA	1.41 K/W	474 cm²
55 °C	75 °C	500 mA	2.73 K/W	244 cm²
55 °C	75 °C	650 mA	2.00 K/W	334 cm²
55 °C	75 °C	1,050 mA	1.12 K/W	594 cm²
60 °C	75 °C	500 mA	2.04 K/W	326 cm²
60 °C	75 °C	650 mA	1.50 K/W	445 cm²
60 °C	75 °C	1,050 mA	0.84 K/W	794 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

RLE 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 RLE 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

RLE 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.

If RLE 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.

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

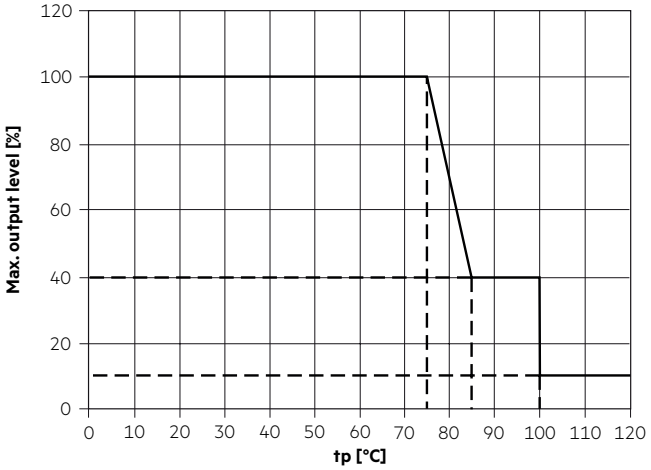
RLE modules are basic insulated up to 370 V if mounted with M3 screws or 670 V if mounted with M3 screws and lens (e.g. LEDIL Strada 2x2) against ground and can be mounted directly on earthed metal parts of the luminaire. If the max. output voltage of the LED Driver (also against earth) is above 370 V / 670 V, an additional insulation between LED module and heat sink is required (for example by insulated 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 Integrated protection

The basic protection level consists of protection against reverse polarity and an NTC for overtemperature protection of the module. Additional shunts bypass single light point failures.

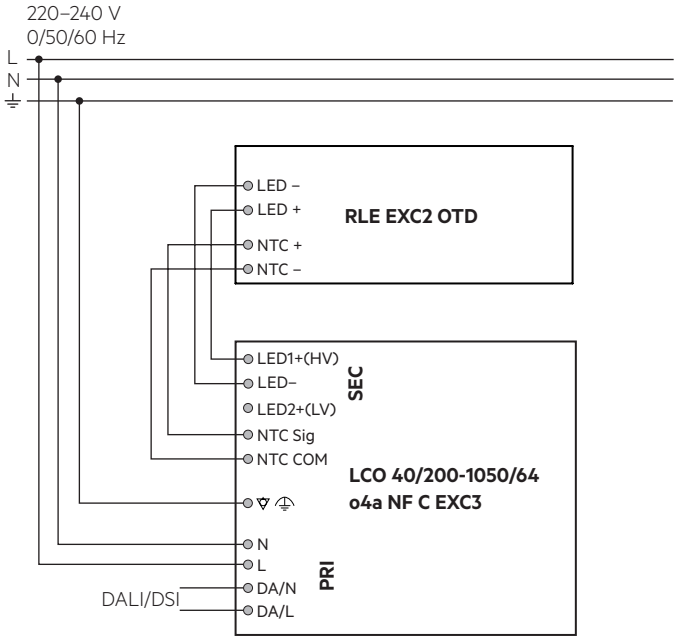
The NTC is designed to work with the LCO EXC3 drivers supporting NTC functionality (for more details see LED Driver data sheet).

NTC type: 100kΩ / 4100K



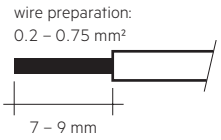
3.3 Wiring

3.4 Wiring examples



3.5 Wiring type and cross section

The wiring can be solid or stranded wires 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.

3.6 Mounting instruction

None of the components of the RLE (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 M3 screws per module.

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.

3.7 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.

Operation below 200 mA may reduce lumen maintenance.

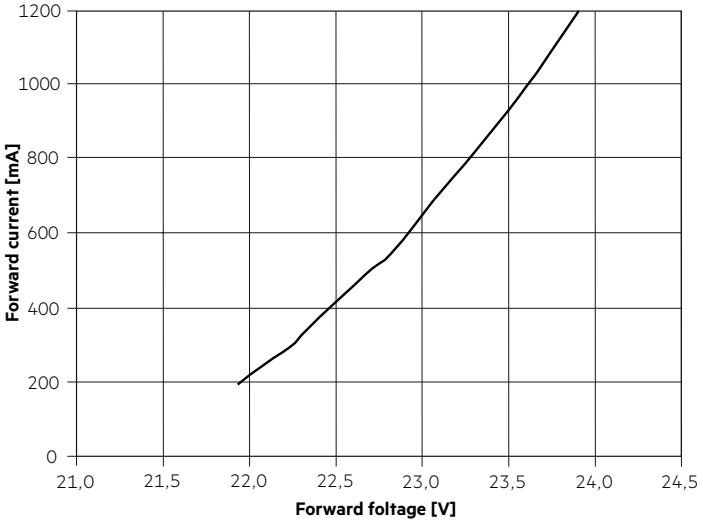
4.2 Lumen maintenance

Typ. forward current	tp temperature	L90 / B10	L90 / B50	L80 / B10	L80 / B50	L70 / B10	L70 / B50
500 mA	45 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	50 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	55 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	60 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	65 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	70 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	75 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	80 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	85 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	90 °C	91,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	95 °C	68,000 h	81,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	100 °C	52,000 h	61,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	105 °C	39,000 h	47,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
650 mA	45 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	50 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	55 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	60 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	65 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	70 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	75 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	80 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	85 °C	97,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	90 °C	73,000 h	86,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	95 °C	55,000 h	65,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	100 °C	42,000 h	49,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	105 °C	32,000 h	38,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
1,050 mA	45 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	50 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	55 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	60 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	65 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	70 °C	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	75 °C	91,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	80 °C	68,000 h	80,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	85 °C	51,000 h	61,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	90 °C	39,000 h	46,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	95 °C	30,000 h	35,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	100 °C	23,000 h	27,000 h	>100,000 h	>100,000 h	>100,000 h	>100,000 h
	105 °C	18,000 h	21,000 h	95,000 h	>100,000 h	>100,000 h	>100,000 h

5. Electrical values

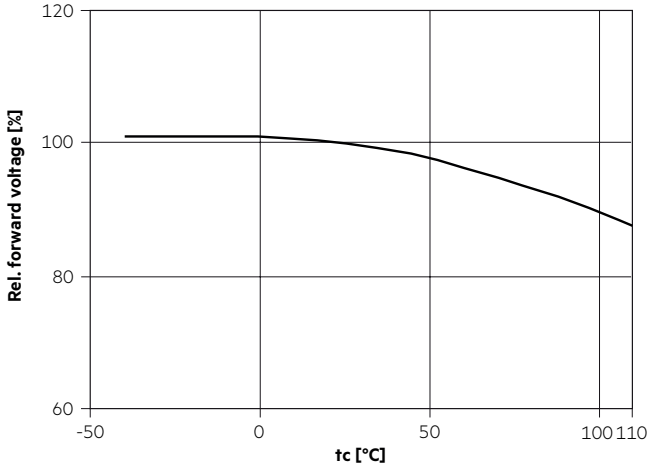
5.1 Typ. forward voltage vs. forward current

RLE 2x4 2000lm xxx HP EXC2 OTD



5.2 Forward voltage vs. tc temperature

CRI = 80



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

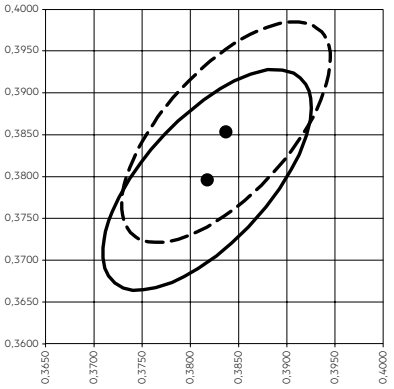
6. Photometric characteristics

6.1 Coordinates and tolerances according to CIE 1931

The specified colour coordinates are integral measured by current impulse of 700 mA and a duration of 100 ms.
The ambient temperature of the measurement is ta = 75 °C steady state.
The measurement tolerance of the colour coordinates are ± 0.01.

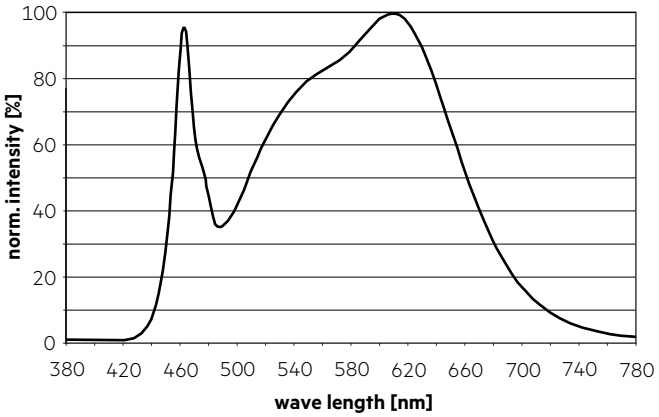
4,000 K

	x0	y0
Centre	0.3818	0.3796



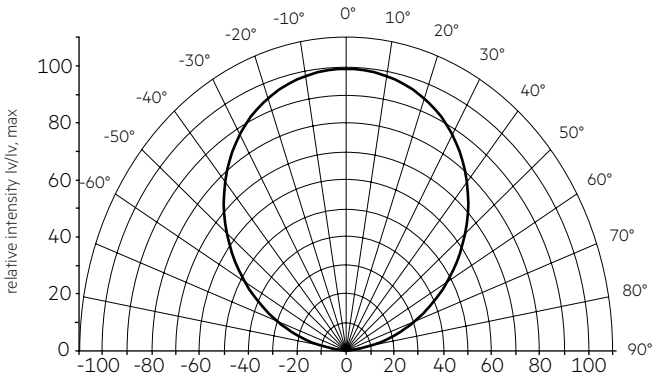
MacAdam Ellipse: 5SDCM (ta = 75 °C)

MacAdam Ellipse: 5SDCM (ta = 25 °C)



6.2 Light distribution

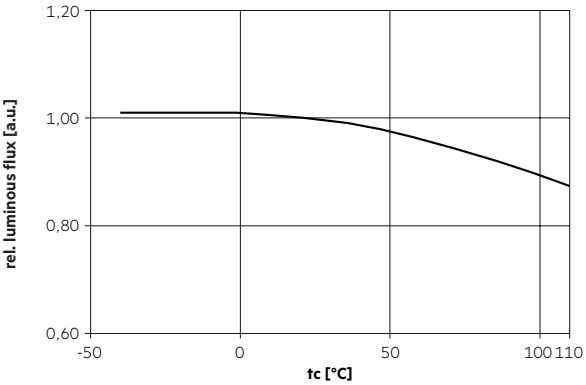
RLE G1 OTD modules are designed to be compatible with 50 x 50 mm lense arrays with 25.4 mm pitch distance. This allows multiple light distributions.



The colour temperature is measured integral over the complete module. The single LED light points can have deviations in the colour coordinates within MacAdam 4.

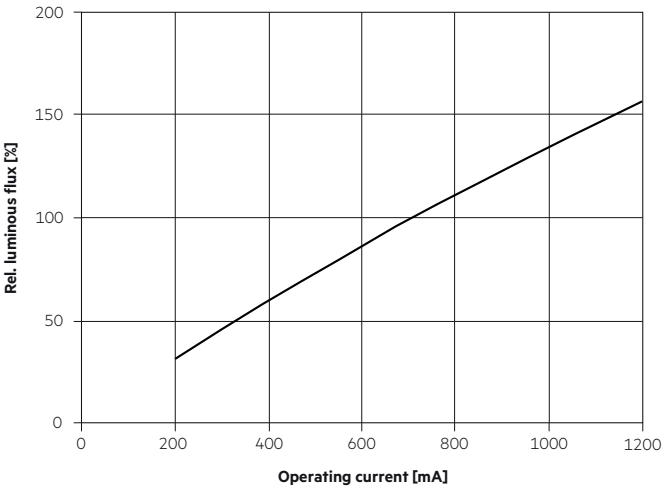
6.3 Relative luminous flux vs. tc temperature

CRI 80



6.4 Relative luminous flux vs. operating current

CRI 80



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

Guarantee conditions at www.tridonic.com → Services

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