

**Marshall 2 Series****Product description**

- Edgelit panel for direct recessed mount and surface or suspended mount with accessories
- Luminous flux range variants up to 4,640 lm
- For suspended ceiling grid measure of 600
- LED system solution with outstanding system efficacy up to 119 lm/W
- Efficacy of the module up to 137 lm/W
- High colour rendering index CRI > 80
- Small colour tolerance MacAdam 4¹
- UGR < 19
- Small luminous flux tolerances
- Colour temperatures 3,000, 4,000 and 6,500 K
- Diffuser material standard article: PS, diffuser material TPA article: PC
- Lightguide material: PMMA
- Long life-time: 50,000 hours
- 5-year guarantee

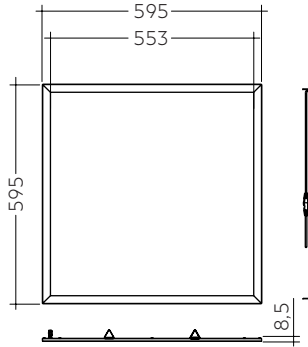
**Standards**, page 5**Colour temperatures and tolerances**, page 8



Marshall 2 Series

Technical data

Beam characteristic	90°
Ambient temperature range	-20 ... +40 °C
tp rated	45 °C
tc	70 °C
Irated	800 mA
Imax	900 mA
Max. permissible LF current ripple	1,170 mA
Max. permissible peak current	1,500 mA / max. 10 ms
Max. working voltage for insulation SELV	60 V
Insulation test voltage	0.5 kV
ESD classification	severity level 2
Risk group (IEC 62471:2008) ³	RG0
Classification acc. to IEC 62031	Independent
Type of protection	IP20
Lifetime	up to 50,000 hours
Warranty	5 Years



600x600mm MAR2

Ordering data

Type	Colour temperature	Packaging carton	Weight per pc.
MAR2-23A-830-D1-WH-TPB	3,000 K	5 pc(s).	2.33 kg
MAR2-23A-840-D1-WH-TPB	4,000 K	5 pc(s).	2.33 kg
MAR2-23A-865-D1-WH-TPB	6,500 K	5 pc(s).	2.33 kg
MAR2-32A-830-D1-WH-TPB	3,000 K	5 pc(s).	2.33 kg
MAR2-32A-840-D1-WH-TPB	4,000 K	5 pc(s).	2.33 kg
MAR2-32A-865-D1-WH-TPB	6,500 K	5 pc(s).	2.33 kg
MAR2-36A-830-D1-WH-TPB	3,000 K	5 pc(s).	2.33 kg
MAR2-36A-840-D1-WH-TPB	4,000 K	5 pc(s).	2.33 kg
MAR2-36A-865-D1-WH-TPB	6,500 K	5 pc(s).	2.33 kg
MAR2-23A-830-D1-WH-TPA	3,000 K	5 pc(s).	2.52 kg
MAR2-23A-840-D1-WH-TPA	4,000 K	5 pc(s).	2.52 kg
MAR2-32A-830-D1-WH-TPA	3,000 K	5 pc(s).	2.52 kg
MAR2-32A-840-D1-WH-TPA	4,000 K	5 pc(s).	2.52 kg
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DALI available - Change D1 to D3 for DALI

Specific technical data

Type ^①	Photo-metric code	Typ. luminous flux at tp = 25 °C ^②	Typ. luminous flux at tp = 45 °C ^②	Typ. forward current	Min. forward voltage at tp = 45 °C	Max. forward voltage at tp = 25 °C	Typ. power consumption at tp = 45 °C ^②	Efficacy of the module at tp = 25 °C	Efficacy of the module at tp = 45 °C	Efficacy of the system at tp = 45 °C	Colour rendering index CRI
MAR2-23-830-D1-WH-TPB	830	2,930 lm	2,750 lm	600 mA	36.9 V	40.2 V	23.0 W	126 lm/W	120 lm/W	110 lm/W	> 80
MAR2-23-840-D1-WH-TPB	840	3,170 lm	2,960 lm	600 mA	36.9 V	40.2 V	23.0 W	137 lm/W	129 lm/W	119 lm/W	> 80
MAR2-23-865-D1-WH-TPB	865	3,170 lm	2,960 lm	600 mA	36.9 V	40.2 V	23.0 W	137 lm/W	129 lm/W	119 lm/W	> 80
MAR2-32-830-D1-WH-TPB	830	3,850 lm	3,620 lm	800 mA	37.6 V	41.1 V	31.3 W	122 lm/W	116 lm/W	107 lm/W	> 80
MAR2-32-840-D1-WH-TPB	840	4,170 lm	3,900 lm	800 mA	37.6 V	41.1 V	31.3 W	132 lm/W	125 lm/W	115 lm/W	> 80
MAR2-32-865-D1-WH-TPB	865	4,170 lm	3,900 lm	800 mA	37.6 V	41.1 V	31.3 W	132 lm/W	125 lm/W	115 lm/W	> 80
MAR2-36-830-D1-WH-TPB	830	4,280 lm	4,020 lm	900 mA	38.0 V	41.5 V	35.6 W	119 lm/W	113 lm/W	104 lm/W	> 80
MAR2-36-840-D1-WH-TPB	840	4,640 lm	4,330 lm	900 mA	38.0 V	41.5 V	35.6 W	129 lm/W	122 lm/W	112 lm/W	> 80
MAR2-36-865-D1-WH-TPB	865	4,640 lm	4,330 lm	900 mA	38.0 V	41.5 V	35.6 W	129 lm/W	122 lm/W	112 lm/W	> 80
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① Integral measurement over the complete module.

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

③ Measured at lmax.

Marshall 2 Mounting Accessories

Product description surface mount kit

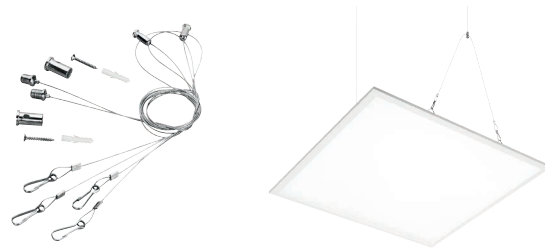
- Aluminum frame for easy surface mounting

Product description cable Suspension kit

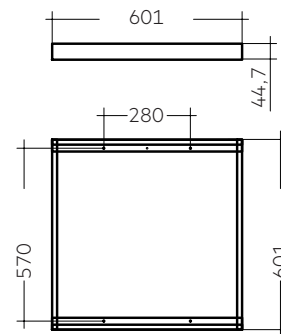
- Steel wire system for suspended mounting
- Suspension height up to 1.2 m



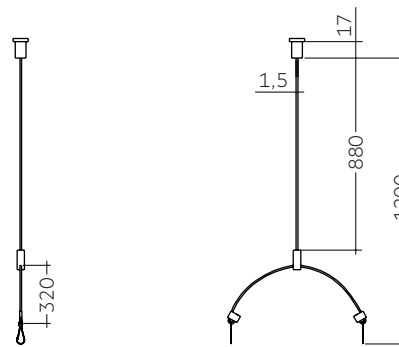
Surface mount kit Al white



Cable suspension kit steel silver



Surface mount kit Al white



Suspension kit Steel silver

Ordering data

Type	Colour	Packaging	Weight per pc.
Surface mount kit Al white	White	20 pc(s).	0.69 kg
Suspension kit Steel silver	Silver	100 pc(s).	0.12 kg

1. Standards

EN 62031
EN 62471
EN 61000-4-2
EN 62717
EN 60598-1

1.1 Photometric code

Key for photometric code, e. g. 830

1 st digit		2 nd + 3 rd digit
Code	CRI	Colour temperature in Kelvin x 100
7	70 – 79	
8	80 – 89	
9	≥90	

1.2 Energy classification

Type	Energy classification
Marshall 2	A+

2. Thermal details

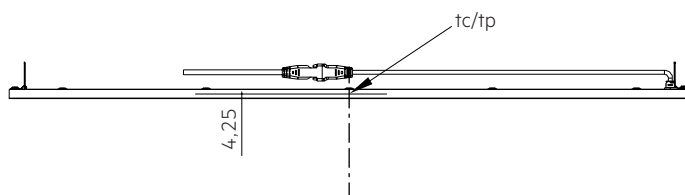
2.1 tc point, ambient temperature and life-time

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

A tp temperature of 45°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	-20...+50 °C
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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 Marshall 2 will be greatly reduced or the Marshall may be destroyed.


3. Installation / wiring

3.1 Electrical supply/choice of LED Driver


Marshall 2 modules from Kellwood 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.

If a LED Driver other than Tridonic is used, it must provide the following protection:

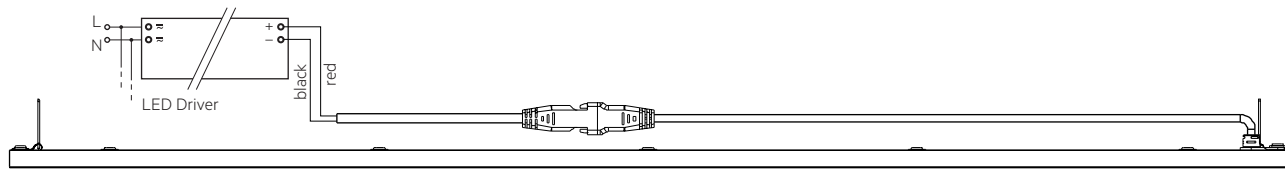
- Short-circuit protection
- Overload protection
- Overtemperature protection

 Marshall 2 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 Marshall 2

 Marshall modules must be operated with SELV LED Drivers.

3.2 Wiring



3.4 Mounting instruction



None of the components of the panel (substrate, LED, electronic components etc.) may be exposed to tensile or compressive stresses.

Recessed mounting for suspended ceilings with grid measure of 600.

For surface mounted applications use the Surface mount kit and for suspended mounting the Suspension kit.

For more details see mounting instructions.



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.

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 Marshall 2 Series

Marshall 2 23W:

Forward current	tp temperature	L90 / F10	L90 / F50	L80 / F10	L80 / F50	L70 / F10	L70 / F50
		45 °C	28k h	32k h	> 50k h	> 50k h	> 50k h
600 mA	55 °C	28k h	32k h	> 50k h	> 50k h	> 50k h	> 50k h
	65 °C	25k h	25k h	> 50k h	> 50k h	> 50k h	> 50k h

Marshall 2 32W:

Forward current	tp temperature	L90 / F10	L90 / F50	L80 / F10	L80 / F50	L70 / F10	L70 / F50
		45 °C	28k h	32k h	> 50k h	> 50k h	> 50k h
800 mA	55 °C	28k h	32k h	> 50k h	> 50k h	> 50k h	> 50k h
	65 °C	25k h	25k h	> 50k h	> 50k h	> 50k h	> 50k h

Marshall 2 36W:

Forward current	tp temperature	L90 / F10	L90 / F50	L80 / F10	L80 / F50	L70 / F10	L70 / F50
		45 °C	28k h	32k h	> 50k h	> 50k h	> 50k h
900 mA	55 °C	28k h	32k h	> 50k h	> 50k h	> 50k h	> 50k h
	65 °C	25k h	25k h	> 50k h	> 50k h	> 50k h	> 50k h

Lumen maintenance values are based on LM80 data. Table may be updated when more recent results are available.

5. Electrical values

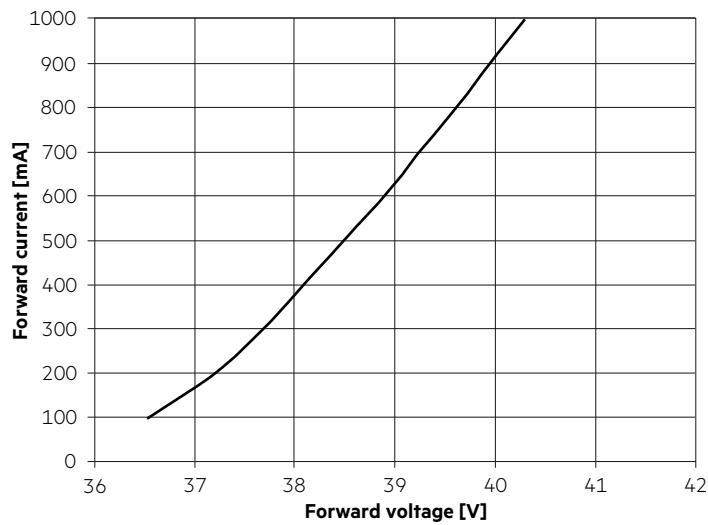
5.1 Declaration of electrical parameters

Irated ... Nominal operating current the module is designed for.

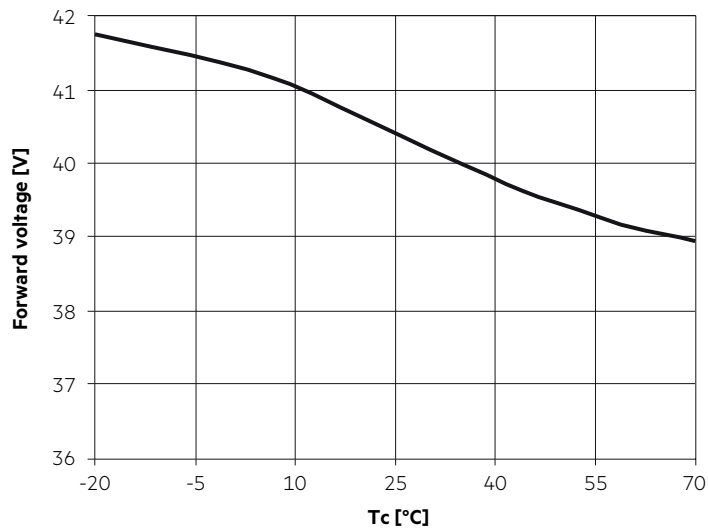
I_{max} ... Max. permissible continuous operating current incl. the tolerances of the LED Driver.

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.



5.3 Forward voltage vs. tp temperature



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

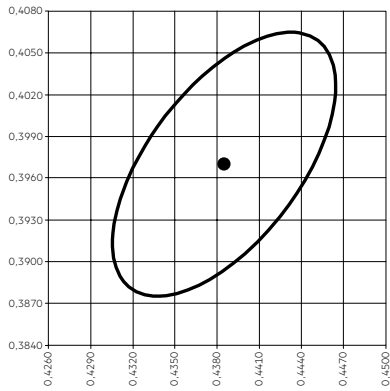
6. Photometric characteristics

6.1 Coordinates and tolerances according to CIE 1931

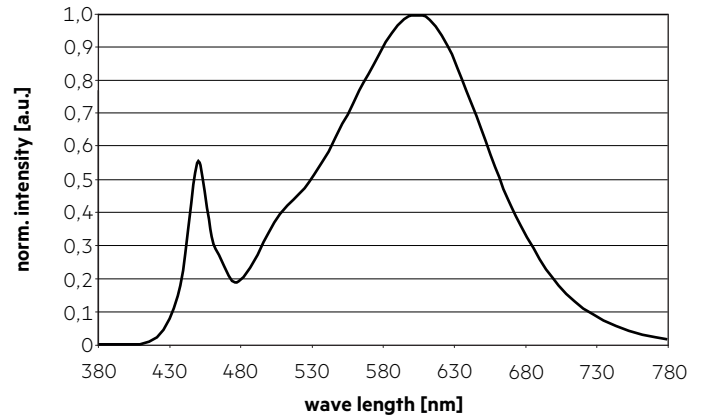
The specified colour coordinates are measured integral by a steady state at the rated current. Integration time is 100 ms.
The ambient temperature of the measurement is $t_a = 25^\circ\text{C}$.
The measurement tolerance of the colour coordinates are ± 0.005 .

3,000 K

	x0	y0
Centre	0.4385	0.3970

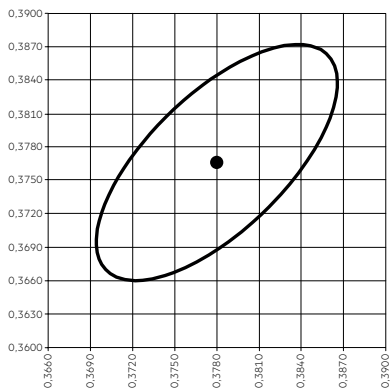


— MacAdam Ellipse: 4SDCM

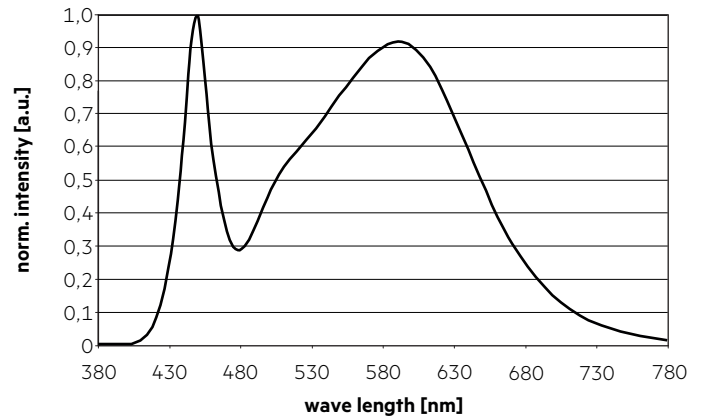


4,000 K

	x0	y0
Centre	0.3780	0.3766

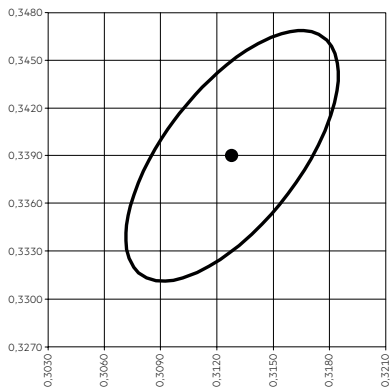


— MacAdam Ellipse: 4SDCM

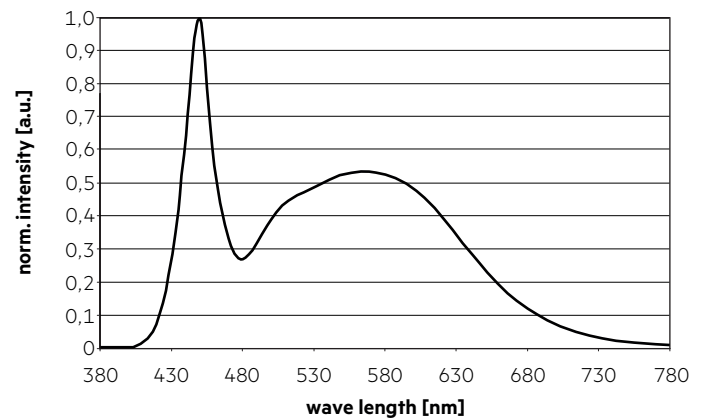


6,500 K

	x0	y0
Centre	0.3128	0.3390



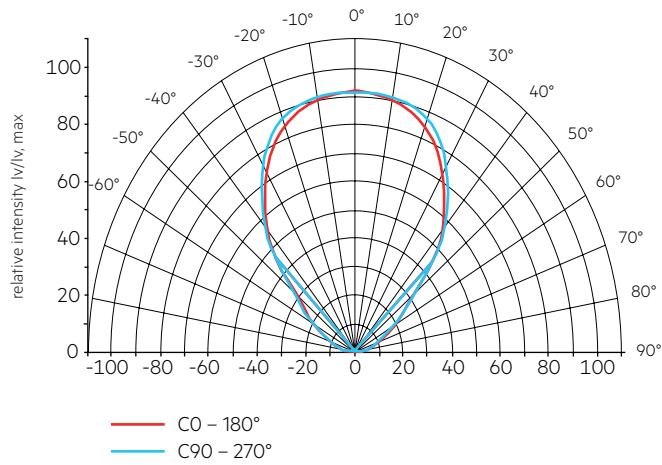
— MacAdam Ellipse: 4SDCM



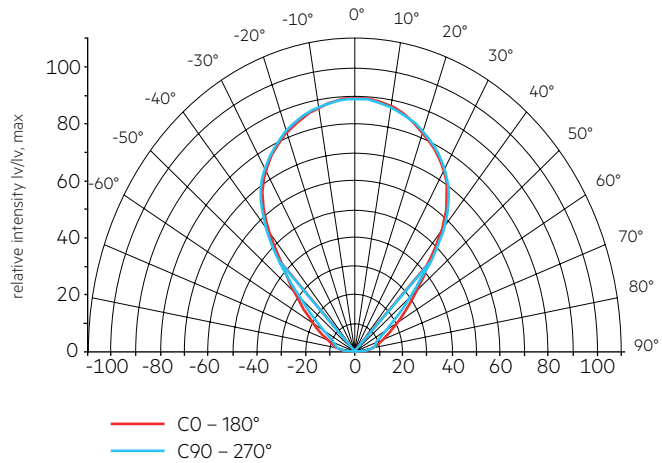
6.2 Light distribution

The optical design of the MAR2 product line ensures optimum homogeneity for the light distribution.

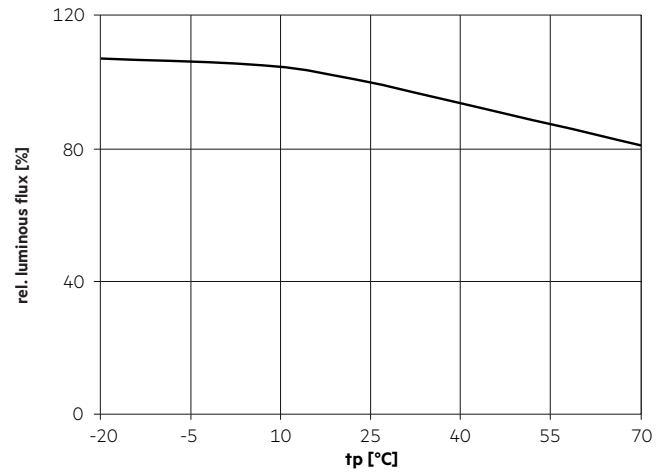
MAR2 600x600 3800lm TPB:



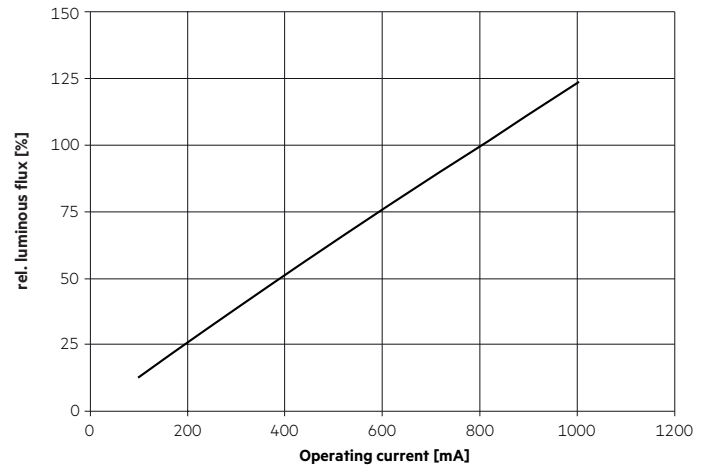
MAR2 600x600 3800lm TPA:



6.3 Relative luminous flux vs. tc temperature



6.4 Relative luminous flux vs. operating current



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

The random appearance of minor shining dots is state of the art and technologically inevitable. This does not qualify for returns or warranty claims.