

Module SLE G5 ADV Glass

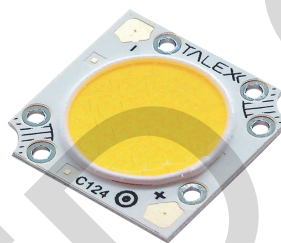
Modules SLE ADVANCED

Product description

- For spotlights and downlights
- Housing with Snap-On feature for easy reflector mounting
- 50 mm housing with 35 mm mounting hole distance acc. to Zhaga
- A glass cover applied directly to the LES provides optimum protection against dust and contact
- ENEC and CB certificates
- ENEC+
- UL certificates
- Luminous flux up to 8,440 lm at $t_p = 65^\circ\text{C}$
- High efficacy up to 173 lm/W for the LED module at $t_p = 25^\circ\text{C}$
- High system efficacy up to 150 lm/W at $t_p = 65^\circ\text{C}$
- High colour consistency (MacAdam 3)
- Small LES (light emitting surface) diameter enables small beam angle for spotlights
- Excellent thermal management by COB technology
- Uniform radiation with Dam&Fill technology
- Fixing holes for M3 screws
- Integrated LED module
- Cooling required
- Flexible operating modes
- 5-year guarantee



LES19 + LES23 with housing



LES15



Standards, page 5

Colour temperatures and tolerances, page 12

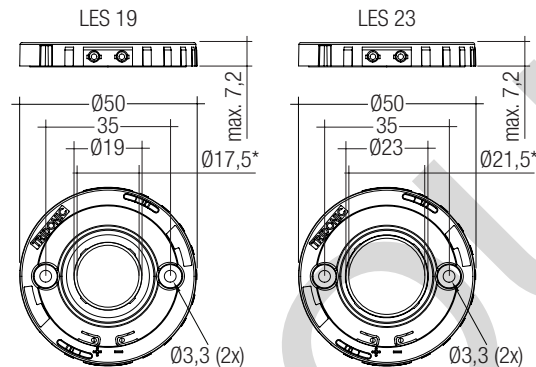


Module SLE G5 ADV Glass

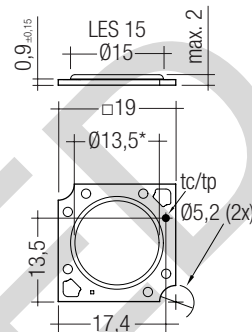
Modules SLE ADVANCED

Technical data

Beam characteristic	115°
Ambient temperature range	-25 ... +50 °C
tp rated	65 °C
tc ^①	Up to 100 °C
Max. allowed Silicontemperature / Tjunction_max	150 °C / 140 °C
Max. DC forward current for LES15 ^②	700 mA
Max. DC forward current for LES19 ^②	1,400 mA
Max. DC forward current for LES23 ^②	1,750 mA
Max. permissible LF current ripple for LES15	960 mA
Max. permissible LF current ripple for LES19	1,680 mA
Max. permissible LF current ripple for LES23	2,400 mA
Max. permissible peak current for LES15	1,920 mA / max. 10 ms
Max. permissible peak current for LES19	3,360 mA / max. 10 ms
Max. permissible peak current for LES23	4,800 mA / max. 10 ms
Max. working voltage for insulation nonSELV ^③	50 V
Max. working voltage for insulation SELV for LES15 ^③	60 V
Max. working voltage for insulation SELV for	75 V
LES19, LES23 ^③	
Insulation test voltage	0.5 kV
ESD classification	Severity level 4
Risk group (EN 62471:2008) for LES15	RG1
Risk group (EN 62471:2008) for LES19	RG1
Risk group (EN 62471:2008) for LES23 (3,000 K)	RG1
Risk group (EN 62471:2008) for LES23 (4,000 K)	RG2 at d = 200 mm, RG1 at d ≥ 2 m
Type of protection	IP00



Dimensions in mm, *optical LES



Dimensions in mm, *optical LES

Ordering data

Type	Article number	Colour temperature	Housing	Connection cable	Glass	Pa-ckaging	Weight per pc.
SLE G5 15mm 3000lm 830 R ADV G	89600866	3,000 K	no	no	yes	20 pc(s).	0.009 kg
SLE G5 15mm 3000lm 840 R ADV G	89600867	4,000 K	no	no	yes	20 pc(s).	0.009 kg
SLE G5 19mm 5000lm 830 H ADV G	89600875	3,000 K	yes	no	yes	50 pc(s).	0.009 kg
SLE G5 19mm 5000lm 840 H ADV G	89600876	4,000 K	yes	no	yes	50 pc(s).	0.009 kg
SLE G5 23mm 6000lm 830 H ADV G	89600873	3,000 K	yes	no	yes	50 pc(s).	0.009 kg
SLE G5 23mm 6000lm 840 H ADV G	89600874	4,000 K	yes	no	yes	50 pc(s).	0.009 kg

Specific technical data

Type ^①	Photo-metric code	Forward current	Luminous flux at tp = 25 °C ^②	Luminous flux at tp = 65 °C ^②	Power consumption ^③	Min. forward voltage at tp = 65 °C	Max. forward voltage at tp = 25 °C	Luminous efficacy module at tp = 25 °C	Luminous efficacy module at tp = 65 °C	Luminous efficacy system at tp = 65 °C ^④	Colour rendering index CRI
SLE 15mm 3000lm – Operating mode HE at 350 mA											
SLE G5 15mm 3000lm 830 ADV	830/359	350 mA	1,860 lm	1,720 lm	119 W	31.7 V	36.8 V	154 lm/W	145 lm/W	130 lm/W	80
SLE G5 15mm 3000lm 840 ADV	840/359	350 mA	1,920 lm	1,800 lm	119 W	31.7 V	36.8 V	159 lm/W	151 lm/W	136 lm/W	80
SLE 15mm 3000lm – Operating mode NM at 500 mA											
SLE G5 15mm 3000lm 830 ADV	830/359	500 mA	2,560 lm	2,340 lm	17.8 W	33.2 V	38.6 V	141 lm/W	131 lm/W	118 lm/W	80
SLE G5 15mm 3000lm 840 ADV	840/359	500 mA	2,640 lm	2,440 lm	17.8 W	33.2 V	38.6 V	146 lm/W	137 lm/W	123 lm/W	80
SLE 15mm 3000lm – Operating mode HO at 700 mA											
SLE G5 15mm 3000lm 830 ADV	830/359	700 mA	3,400 lm	3,070 lm	26.3 W	35.0 V	40.7 V	127 lm/W	117 lm/W	105 lm/W	80
SLE G5 15mm 3000lm 840 ADV	840/359	700 mA	3,500 lm	3,190 lm	26.3 W	35.0 V	40.7 V	131 lm/W	121 lm/W	109 lm/W	80
SLE 19mm 5000lm – Operating mode HE at 500 mA											
SLE G5 19mm 5000lm 830 ADV	830/359	500 mA	2,800 lm	2,610 lm	16.6 W	31.0 V	36.1 V	166 lm/W	157 lm/W	142 lm/W	80
SLE G5 19mm 5000lm 840 ADV	840/359	500 mA	2,920 lm	2,740 lm	16.6 W	31.0 V	36.1 V	173 lm/W	165 lm/W	149 lm/W	80
SLE 19mm 5000lm – Operating mode NM at 1,050 mA											
SLE G5 19mm 5000lm 830 ADV	830/359	1,050 mA	5,390 lm	4,920 lm	38.4 W	34.1 V	39.8 V	138 lm/W	128 lm/W	115 lm/W	80
SLE G5 19mm 5000lm 840 ADV	840/359	1,050 mA	5,590 lm	5,160 lm	38.4 W	34.1 V	39.8 V	143 lm/W	134 lm/W	121 lm/W	80
SLE 19mm 5000lm – Operating mode HO at 1,400 mA											
SLE G5 19mm 5000lm 830 ADV	830/359	1,400 mA	6,800 lm	6,100 lm	54.0 W	36.0 V	41.8 V	124 lm/W	113 lm/W	102 lm/W	80
SLE G5 19mm 5000lm 840 ADV	840/359	1,400 mA	7,040 lm	6,400 lm	54.0 W	36.0 V	41.8 V	128 lm/W	119 lm/W	107 lm/W	80
SLE 23mm 6000lm – Operating mode HE at 700 mA											
SLE G5 23mm 6000lm 830 ADV	830/359	700 mA	3,970 lm	3,780 lm	23.3 W	30.9 V	36.0 V	168 lm/W	162 lm/W	146 lm/W	80
SLE G5 23mm 6000lm 840 ADV	840/359	700 mA	4,090 lm	3,880 lm	23.3 W	30.9 V	36.0 V	173 lm/W	167 lm/W	150 lm/W	80
SLE 23mm 6000lm – Operating mode NM at 1,400 mA											
SLE G5 23mm 6000lm 830 ADV	830/359	1,400 mA	7,350 lm	6,900 lm	50.7 W	33.7 V	39.3 V	143 lm/W	136 lm/W	122 lm/W	80
SLE G5 23mm 6000lm 840 ADV	840/359	1,400 mA	7,570 lm	7,080 lm	50.7 W	33.7 V	39.3 V	147 lm/W	140 lm/W	126 lm/W	80
SLE 23mm 6000lm – Operating mode HO at 1,750 mA											
SLE G5 23mm 6000lm 830 ADV	830/359	1,750 mA	8,840 lm	8,200 lm	65.8 W	35.0 V	40.7 V	132 lm/W	125 lm/W	112 lm/W	80
SLE G5 23mm 6000lm 840 ADV	840/359	1,750 mA	9,120 lm	8,440 lm	65.8 W	35.0 V	40.7 V	136 lm/W	128 lm/W	115 lm/W	80

^① See derating curves in data sheet section 2.3.

^② Max. DC forward current varies over the temperature of the LED module. See derating curves in data sheet section 2.3.

^③ The detailed explanation, see data sheet section 3.1.

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

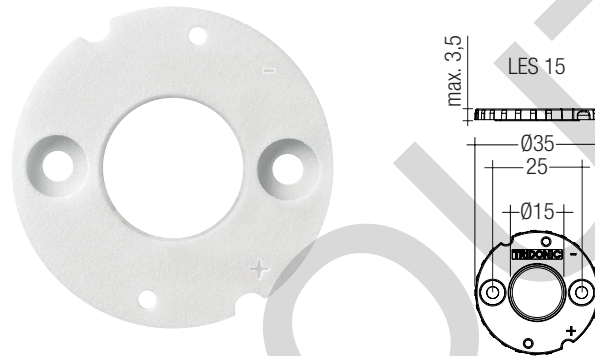
^⑤ Assumed efficiency for the LED Driver is 0.9.

^⑥ All values at tp = 65 °C.

^⑦ HE ... high efficiency, NM ... nominal mode, HO ... high output.

Product description

- Housing for LES 15
- Diameter: 35 mm
- Material: Lexan Resin 943



Ordering data

Type	Article number	Packaging bag	Weight per pc.
SLE housing for LES 15	28001039	100 pc(s).	0.002 kg

1. Standards

EN 62031
 EN 62471
 IEC 62717
 IEC 61000-4-2
 UL 8750 - certificate number: E366084

1.1 Glow wire test

according to EN 62031 with increased temperature of 850 °C passed.

1.2 Photometric code

Key for photometric code, e. g. 830 / 359

1 st digit	2 nd + 3 rd digit	4 th digit	5 th digit	6 th 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)
7 70 – 79				Code Luminous flux
8 80 – 89				7 ≥ 70 %
9 ≥ 90				8 ≥ 80 %

1.3 Energy classification

Type	Forward current	Energy classification
SLE G5 15mm 3000lm 830 ADV	350 mA	A++
	500 mA	A+
	700 mA	A+
SLE G5 15mm 3000lm 840 ADV	350 mA	A++
	500 mA	A++
	700 mA	A+
SLE G5 19mm 5000lm 830 ADV	500 mA	A++
	1,050 mA	A+
	1,400 mA	A+
SLE G5 19mm 5000lm 840 ADV	500 mA	A++
	1,050 mA	A+
	1,400 mA	A+
SLE G5 23mm 6000lm 830 ADV	700 mA	A++
	1,050 mA	A+
	1,400 mA	A+
SLE G5 23mm 6000lm 840 ADV	700 mA	A++
	1,050 mA	A++
	1,400 mA	A+

2. Thermal details

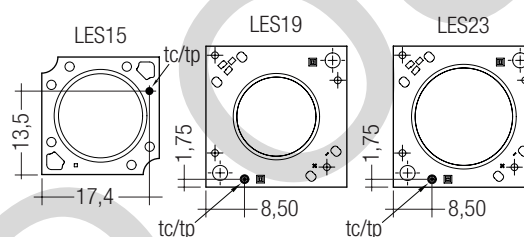
2.1 tp point, ambient temperature and life-time

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

For SLE G5 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 tp 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.

To check the tc / tp temperature, the temperature sensor has to be mounted on the PCB at the marked position as stated in the drawing.



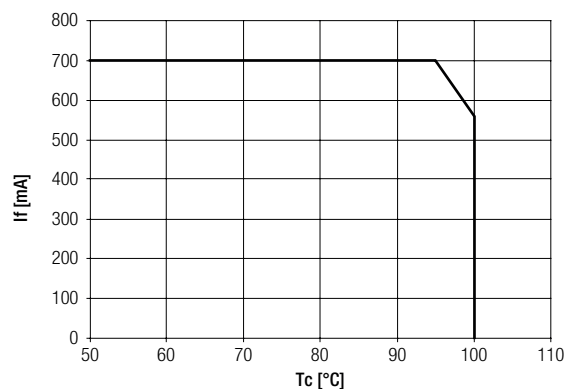
2.2 Storage and humidity

storage temperature	-30 ... +80 °C
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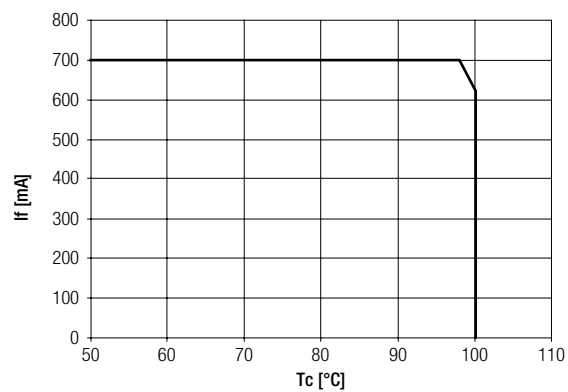
Operation only in non condensing environment.
 Humidity during processing of the module should be between 30 to 70 %.

2.3 Derating curves

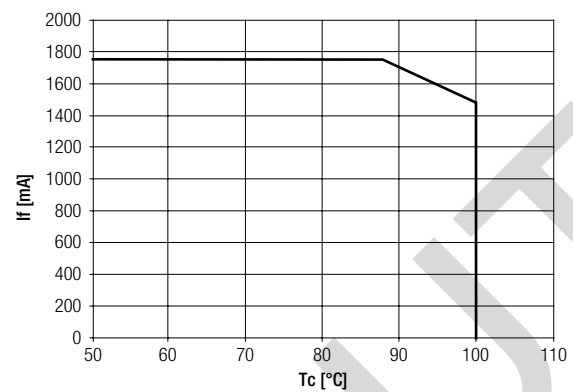
SLE G5 15mm 3000lm 830 ADVANCED



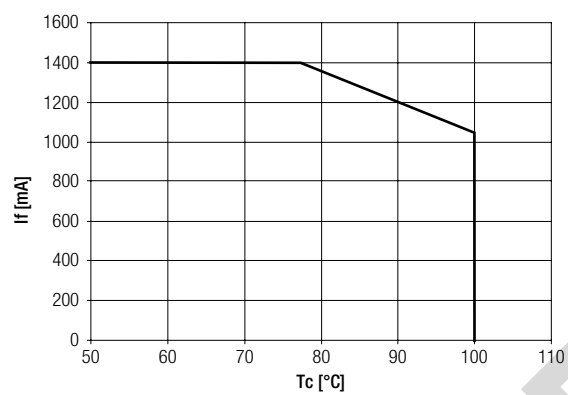
SLE G5 15mm 3000lm 840 ADVANCED



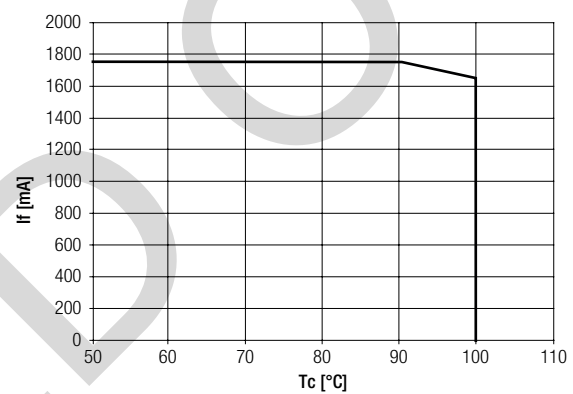
SLE G5 23mm 6000lm 830 ADVANCED



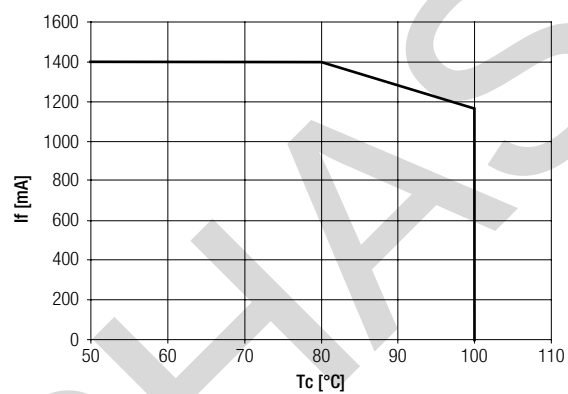
SLE G5 19mm 5000lm 830 ADVANCED



SLE G5 23mm 6000lm 840 ADVANCED



SLE G5 19mm 5000lm 840 ADVANCED



2.4 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 SLE G5 will be greatly reduced or the SLE G5 may be destroyed.

2.5 Heat sink values

SLE G5 15mm 3000lm 8x0 ADVANCED

ta	tp	Operating current	R _{th, hs-a}
25 °C	65 °C	350 mA	5.67 K/W
30 °C	65 °C	350 mA	4.92 K/W
40 °C	65 °C	350 mA	3.43 K/W
50 °C	65 °C	350 mA	1.93 K/W
25 °C	65 °C	500 mA	3.42 K/W
30 °C	65 °C	500 mA	2.95 K/W
40 °C	65 °C	500 mA	2.02 K/W
50 °C	65 °C	500 mA	1.09 K/W
25 °C	65 °C	700 mA	2.04 K/W
30 °C	65 °C	700 mA	1.75 K/W
40 °C	65 °C	700 mA	1.16 K/W
50 °C	65 °C	700 mA	0.57 K/W

SLE G5 19mm 5000lm 8x0 ADVANCED

ta	tp	Operating current	R _{th, hs-a}
25 °C	65 °C	500 mA	4.44 K/W
30 °C	65 °C	500 mA	3.87 K/W
40 °C	65 °C	500 mA	2.73 K/W
50 °C	65 °C	500 mA	1.59 K/W
25 °C	65 °C	1,050 mA	1.58 K/W
30 °C	65 °C	1,050 mA	1.37 K/W
40 °C	65 °C	1,050 mA	0.95 K/W
50 °C	65 °C	1,050 mA	0.52 K/W
25 °C	65 °C	1,400 mA	1.00 K/W
30 °C	65 °C	1,400 mA	0.87 K/W
40 °C	65 °C	1,400 mA	0.59 K/W
50 °C	65 °C	1,400 mA	0.31 K/W

SLE G5 23mm 6000lm 8x0 ADVANCED

ta	tp	Operating current	R _{th, hs-a}
25 °C	65 °C	700 mA	3.23 K/W
30 °C	65 °C	700 mA	2.81 K/W
40 °C	65 °C	700 mA	1.98 K/W
50 °C	65 °C	700 mA	1.14 K/W
25 °C	65 °C	1,400 mA	1.21 K/W
30 °C	65 °C	1,400 mA	1.05 K/W
40 °C	65 °C	1,400 mA	0.71 K/W
50 °C	65 °C	1,400 mA	0.38 K/W
25 °C	65 °C	1,750 mA	0.85 K/W
30 °C	65 °C	1,750 mA	0.73 K/W
40 °C	65 °C	1,750 mA	0.49 K/W
50 °C	65 °C	1,750 mA	0.25 K/W

Notes

The actual cooling can differ because of the material, the structural shape, outside influences and the installation situation. A thermal connection between SLE G5 and heat sink with heat-conducting paste or heat conducting adhesive film is absolutely necessary.

Additionally the SLE G5 has to be fixed on the heat sink with M3 screws to optimise the thermal connection.

Use of thermal interface material with thermal conductivity of $\lambda > 1 \text{ W/mK}$ and layer thickness of interface material with max. 50 μm or a similar interface material where the quotient of layer thickness and thermal conductivity $b < 50 \text{ }\mu\text{mmK/W}$.

3. Installation / wiring

3.1 Electrical supply/choice of LED Driver

SLE G5 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 Drivers from Tridonic in combination with SLE G5 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



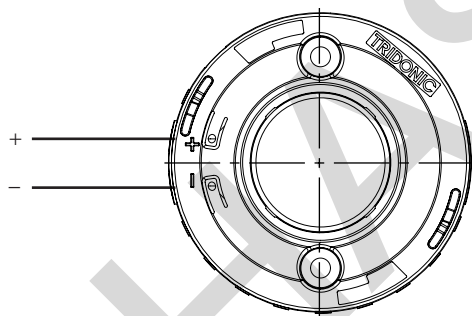
SLE G5 must be supplied by a constant current LED Driver. Operation with a constant voltage LED Driver will lead to an irreversible damage of the module. Wrong polarity can damage the SLE G5.



SLE G5 are basic isolated up to 75 V SELV (LES19 and LES23) / 60 V SELV (LES15) / 50 V nonSELV 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 75 V SELV (LES19 and LES23) / 60 V SELV (LES15) / 50 V nonSELV, 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.

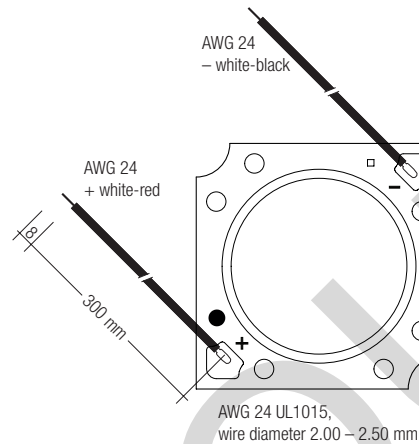
3.2 Wiring

Wiring with housing (LES19 and LES23)

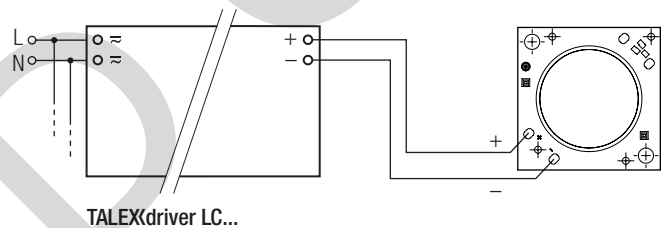


Wiring without housing

LES15



Wiring example

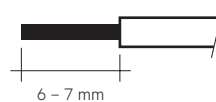


3.3 Wiring type and cross section

The wiring has to be solid cable with a cross section of 0.5 to 0.75 mm² or with stranded wire with soldered ends with a cross section of 0.5 mm². For the push-wire connection you have to strip the insulation (6 - 7 mm).

Loosen wire through twisting and pulling.

wire preparation:



3.4 Mounting instruction



SLE G5 from Tridonic which have to be installed on a heat sink have to be connected with heat-conducting paste or heat conducting adhesive film and fixed with M3 screws.

The fixing/cooling surface must be cleaned by removing all dirt, dust and grease before installing the LED modules.

None of the components of the SLE G5 (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 2 screws per module. In order not to damage the modules only rounded head screws and an additional plastic flat washer should be used for LED modules without housing.

For further information please refer to the brochure entitled "Technical Design-In-Guide SLE GEN5".



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.

For further information for EOS/ESD safety guidelines and the ESD classification please refer to the brochure entitled <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.

4.2 Lumen maintenance

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

SLE G5 15mm 3000lm 8x0 ADVANCED

Operating current	tp temperature	L80 / F10	L80 / F50	L70 / F10	L70 / F50
350 mA	65 °C	49,000 h	>60,000 h	>60,000 h	>60,000 h
	75 °C	43,000 h	>60,000 h	>60,000 h	>60,000 h
	85 °C	38,000 h	56,000 h	>60,000 h	>60,000 h
500 mA	65 °C	45,000 h	>60,000 h	>60,000 h	>60,000 h
	75 °C	39,000 h	59,000 h	>60,000 h	>60,000 h
	85 °C	34,000 h	52,000 h	55,000 h	>60,000 h
700 mA	65 °C	40,000 h	59,000 h	>60,000 h	>60,000 h
	75 °C	35,000 h	52,000 h	55,000 h	>60,000 h
	85 °C	30,000 h	46,000 h	49,000 h	>60,000 h

SLE G5 19mm 5000lm 8x0 ADVANCED

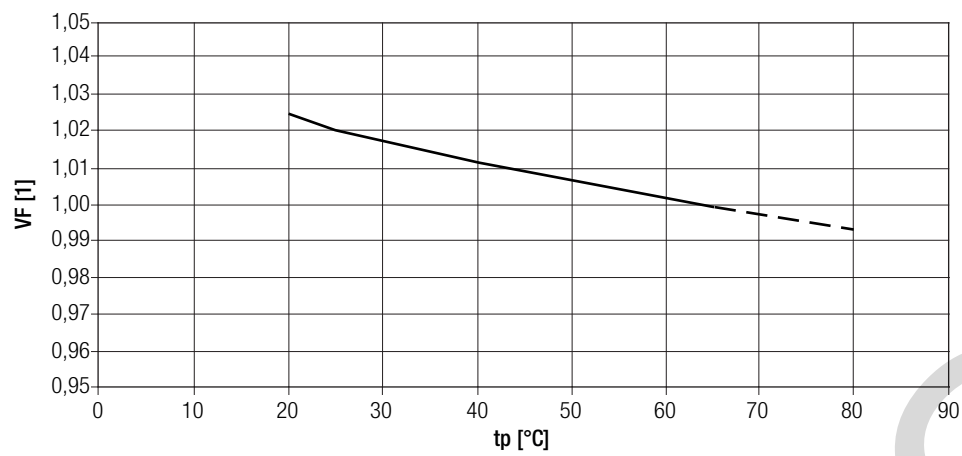
Operating current	tp temperature	L80 / F10	L80 / F50	L70 / F10	L70 / F50
500 mA	65 °C	51,000 h	>60,000 h	>60,000 h	>60,000 h
	75 °C	44,000 h	>60,000 h	>60,000 h	>60,000 h
	85 °C	39,000 h	58,000 h	>60,000 h	>60,000 h
1,050 mA	65 °C	42,000 h	>60,000 h	>60,000 h	>60,000 h
	75 °C	37,000 h	55,000 h	59,000 h	>60,000 h
	85 °C	32,000 h	49,000 h	52,000 h	>60,000 h
1,400 mA	65 °C	37,000 h	55,000 h	59,000 h	>60,000 h
	75 °C	32,000 h	48,000 h	51,000 h	>60,000 h
	85 °C	28,000 h	42,000 h	45,000 h	>60,000 h

SLE G5 23mm 6000lm 8x0 ADVANCED

Operating current	tp temperature	L80 / F10	L80 / F50	L70 / F10	L70 / F50
700 mA	65 °C	51,000 h	>60,000 h	>60,000 h	>60,000 h
	75 °C	44,000 h	>60,000 h	>60,000 h	>60,000 h
	85 °C	39,000 h	58,000 h	>60,000 h	>60,000 h
1,400 mA	65 °C	43,000 h	>60,000 h	>60,000 h	>60,000 h
	75 °C	38,000 h	57,000 h	>60,000 h	>60,000 h
	85 °C	33,000 h	50,000 h	53,000 h	>60,000 h
1,750 mA	65 °C	40,000 h	59,000 h	>60,000 h	>60,000 h
	75 °C	35,000 h	52,000 h	55,000 h	>60,000 h
	85 °C	30,000 h	46,000 h	49,000 h	>60,000 h

5. Electrical values

5.1 Forward voltage vs. tp temperature



The diagrams 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.

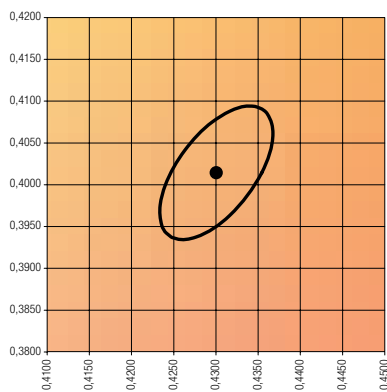
Module type	Current impulse
TALEXmodule SLE G5 15mm 3000lm 8x0 ADV	500 mA
TALEXmodule SLE G5 19mm 5000lm 8x0 ADV	1,050 mA
TALEXmodule SLE G5 23mm 6000lm 8x0 ADV	1,400 mA

The ambient temperature of the measurement is $t_a = 25^\circ\text{C}$.

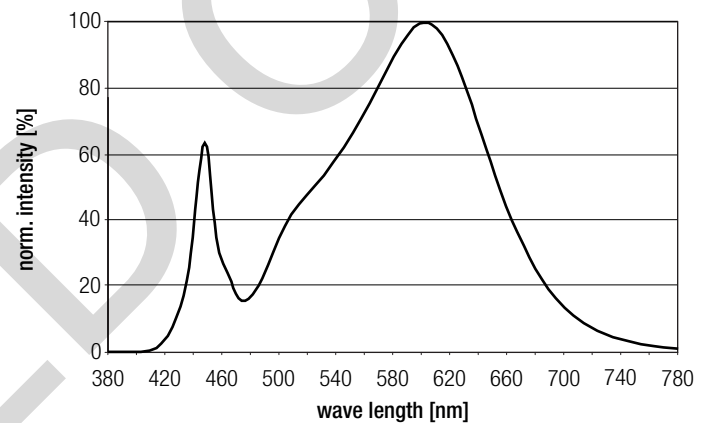
The measurement tolerance of the colour coordinates are ± 0.01 .

3,000 K

	x0	y0
Centre	0.4300	0.4016

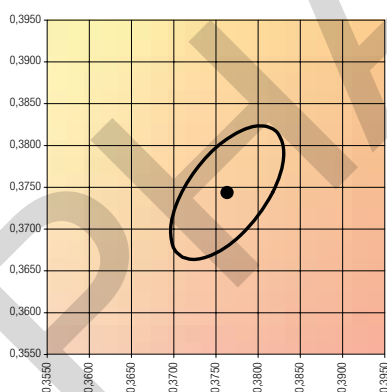


MacAdam ellipse: 3SDCM

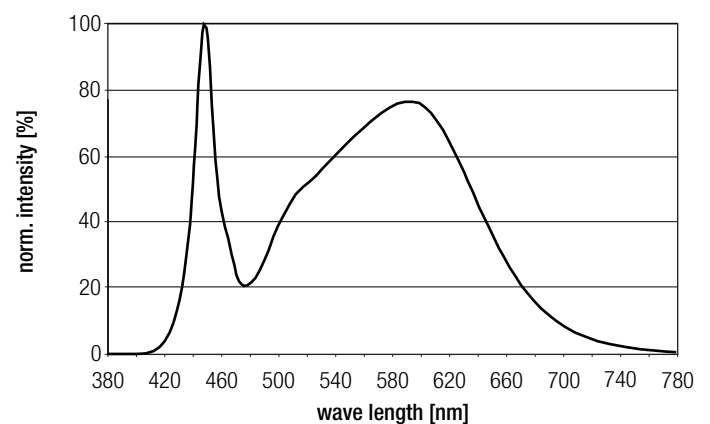


4,000 K

	x0	y0
Centre	0.3761	0.3740

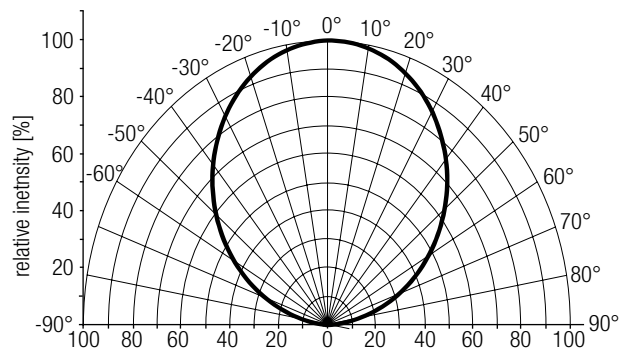


MacAdam ellipse: 3SDCM



6.2 Light distribution

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



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. tp temperature

