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Technical application guide

PrevaLED® BRICK

Light is OSRAM

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Contents

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1 Introduction

1.1 PrevaLED® BRICK

PrevaLED® BRICK is the latest member in the OSRAM PrevaLED® LED module family and offers a platform for a wide range of applications in the industry and outdoor lighting segments. By using its modular approach and combining it with LED drivers from the OPTOTRONIC® outdoor range, a broad spectrum of different luminaire designs can be covered.

1.2 Product benefits

Perfect solution for industry and outdoor applications
PrevaLED® BRICK LED modules are dedicated modules for outdoor (e.g. street lighting) and industry (e.g. high-bay) applications. They offer a mixture of state-of-the-art efficiency, superior lifetime and reliability plus a high robustness against environmental influences.

Aligned with Zhaga book 15 and standard optics
PrevaLED® BRICK modules are aligned with dimensions and with the hole patterns defined in Zhaga book 15. Therefore, many standard optics modules available from third parties can be combined with PrevaLED® BRICK modules. More details can be found in chapter 6.3.

Perfect match to OPTOTRONIC® LED drivers
PrevaLED® BRICK LED modules are perfectly matched to outdoor and industry OPTOTRONIC® LED drivers such as OPTOTRONIC® (OT) 1DIM, OT 2DIM, OT 4 DIM and OT IND drivers. Detailed information on system matches can be found in chapter 3.4.

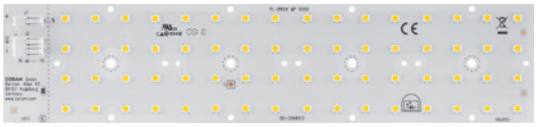
1.3 Product features

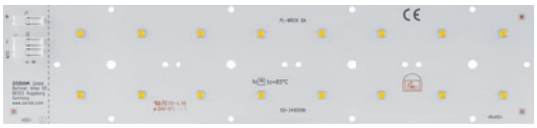
PrevaLED® BRICK HP
The robust and long-lasting solution for all demanding applications
- Luminous flux: up to 7,800 lm
- Module efficacy: up to 176 lm/W
- Average lifetime (L90B10): 100,000 h (temperature up to t_c = 55 °C)
- Available with color temperature: 2,200 K, 2,700 K, 3,000 K or 4,000 K
- Available with CRI > 70 and CRI > 80
- Initial color consistency: ≤ 5 SDCM
- CE-marked, ENEC-certified

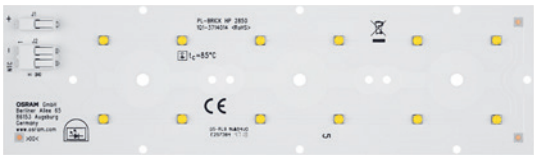
PrevaLED® BRICK MP
The highly efficient and cost-effective solution offering state-of-the-art light quality
- Luminous flux: up to 5,470 lm
- Module efficacy: up to 188 lm/W
- Average lifetime (L80B50): 100,000 h (temperature up to t_c = 55 °C)
- Available with color temperature: 4,000 K or 5,000 K
- Available with CRI > 80
- High initial color consistency: ≤ 3 SDCM
- CE-marked, ENEC-certified

OSRAM guarantee
For both modules, OSRAM offers a standard guarantee of 5 years, which can be extended to 8 or 10 years when used in combination with OPTOTRONIC® drivers.

More information about OSRAM guarantees can be found here: www.osram.com/guarantee.







1.4 Nomenclature and marking (example)

Product family and dimming
PrevaLED® BRICK HP
PrevaLED® BRICK MP

LED version
MP: Mid-Power
HP: High-Power

Typical lumen output
1900: for BRICK HP 2x4
3800: for BRICK HP 2x8
5000: for BRICK MP

CRI and CCT
730: CRI > 70; 3,000 K
740: CRI > 70; 4,000 K
850: CRI > 80; 5,000 K

LED configuration
(electrical connection can be different)
2x4: 2 rows with 4 LEDs each
2x6: 2 rows with 6 LEDs each
2x8: 2 rows with 8 LEDs each
16x4: 4 rows with 16 LEDs each

1.5 Electrical and optical data at typical conditions

PrevaLED® BRICK MP (temperature values valid for t_p = 55 °C)

Typical technical data*

Product name	Flux (lm)	CCT (K)	CRI	SDCM	U_f (V)	I_f (mA)	P (W)	Efficacy (lm/W)
PL-BRICK MP 5000-840 16x4	2860	4000	> 80	3	43.7	350	15	188
PL-BRICK MP 5000-840 16x4	4010	4000	> 80	3	44.7	500	22	181
PL-BRICK MP 5000-850 16x4	2860	5000	> 80	3	43.7	350	15	188
PL-BRICK MP 5000-850 16x4	4010	5000	> 80	3	44.7	500	22	181

Typical data at maximum current*

Product name	Flux (lm)	CCT (K)	CRI	SDCM	U_f (V)	I_f (mA)	P (W)	Efficacy (lm/W)
PL-BRICK MP 5000-840 16x4	5470	4000	> 80	3	45.4	700	32	174
PL-BRICK MP 5000-850 16x4	5470	5000	> 80	3	45.4	700	32	174

* Energy efficiency class according to 2012/874/EC: A++

PrevaLED® BRICK HP (temperature values valid for t_p = 55 °C)

Typical technical data at rated conditions[1)]

Product name	Flux (lm)	CCT (K)	CRI[3)]	SDCM	U_f (V)	I_f (mA)[2)]	P (W)	Efficacy (lm/W)
PL-BRICK HP 1900-722 2x4	1960	2200	>70	5	22.7	700	15.9	124
PL-BRICK HP 1900-727 2x4	2275	2700	>70	5	22.7	700	15.9	143
PL-BRICK HP 1900-730 2x4	2440	3000	>70	5	22.5	700	15.8	155
PL-BRICK HP 1900-740 2x4	2495	4000	>70	5	22.5	700	15.8	159
PL-BRICK HP 1900-840 2x4	2045	4000	>80	5	22.5	700	15.8	130
PL-BRICK HP 2850-722 2x6	2940	2200	>70	5	34.0	700	23.8	124
PL-BRICK HP 2850-727 2x6	3410	2700	>70	5	34.0	700	23.8	143
PL-BRICK HP 2850-730 2x6	3600	3000	>70	5	33.8	700	23.6	155
PL-BRICK HP 2850-740 2x6	3743	4000	>70	5	33.8	700	23.6	159
PL-BRICK HP 2850-840 2x6	3068	4000	>80	5	33.8	700	23.6	130
PL-BRICK HP 3800-722 2x8	3920	2200	>70	5	45.3	700	31.7	124
PL-BRICK HP 3800-727 2x8	4550	2700	>70	5	45.3	700	31.7	143
PL-BRICK HP 3800-730 2x8	4880	3000	>70	5	45.0	700	31.5	155
PL-BRICK HP 3800-740 2x8	4990	4000	>70	5	45.0	700	31.5	159
PL-BRICK HP 3800-840 2x8	4090	4000	>80	5	45.0	700	31.5	130

Typical technical data[1)]

Product name	Flux (lm)	CCT (K)	CRI[3)]	SDCM	U_f (V)	I_f (mA)[2)]	P (W)	Efficacy (lm/W)
PL-BRICK HP 1900-722 2x4	1050	2200	>70	5	22.0	350	7.7	137
	1530	2200	>70	5	22.4	530	11.9	129
	2795	2200	>70	5	23.2	1050	24.4	115
PL-BRICK HP 1900-727 2x4	1222	2700	>70	5	22.0	350	7.7	159
	1775	2700	>70	5	22.4	530	11.9	150
	3240	2700	>70	5	23.2	1050	24.4	133
PL-BRICK HP 1900-730 2x4	1310	3000	>70	5	21.8	350	7.7	172
	1905	3000	>70	5	22.2	530	11.8	162
	3470	3000	>70	5	23.1	1050	24.2	143
PL-BRICK HP 1900-740 2x4	1340	4000	>70	5	21.8	350	7.7	176
	1945	4000	>70	5	22.2	530	11.8	166
	3550	4000	>70	5	23.1	1050	24.2	147
PL-BRICK HP 1900-840 2x4	1100	4000	>80	5	21.8	350	7.7	145
	1600	4000	>80	5	22.2	530	11.8	136
	2895	4000	>80	5	23.1	1050	24.2	120
PL-BRICK HP 2850-722 2x6	1580	2200	>70	5	33	350	11.5	137
	2295	2200	>70	5	33.5	530	17.8	129
	4190	2200	>70	5	34.9	1050	36.6	115
PL-BRICK HP 2850-727 2x6	1830	2700	>70	5	33	350	11.5	159
	2660	2700	>70	5	33.5	530	17.8	150
	4860	2700	>70	5	34.9	1050	36.6	133
PL-BRICK HP 2850-730 2x6	1965	3000	>70	5	32.7	350	11.4	172
	2858	3000	>70	5	33.3	530	17.6	162
	5205	3000	>70	5	34.7	1050	36.4	143
PL-BRICK HP 2850-740 2x6	2010	4000	>70	5	32.7	350	11.4	176
	2918	4000	>70	5	33.3	530	17.6	166
	5325	4000	>70	5	34.7	1050	36.4	147
PL-BRICK HP 2850-840 2x6	1650	4000	>80	5	32.7	350	11.4	145
	2400	4000	>80	5	33.3	530	17.6	136
	4343	4000	>80	5	34.7	1050	36.4	120
PL-BRICK HP 3800-722 2x8	2105	2200	>70	5	44.0	350	15.4	137
	3060	2200	>70	5	44.7	530	23.7	129
	5590	2200	>70	5	46.5	1050	48.8	115
PL-BRICK HP 3800-727 2x8	2440	2700	>70	5	44.0	350	15.4	159
	3550	2700	>70	5	44.7	530	23.7	150
	6480	2700	>70	5	46.5	1050	48.8	133
PL-BRICK HP 3800-730 2x8	2620	3000	>70	5	43.6	350	15.3	172
	3810	3000	>70	5	44.4	530	23.5	162
	6940	3000	>70	5	46.1	1050	48.4	143
PL-BRICK HP 3800-740 2x8	2680	4000	>70	5	43.6	350	15.3	176
	3890	4000	>70	5	44.4	530	23.5	166
	7100	4000	>70	5	46.1	1050	48.4	147
PL-BRICK HP 3800-840 2x8	2200	4000	>80	5	43.6	350	15.3	145
	3200	4000	>80	5	44.4	530	23.5	136
	5790	4000	>80	5	46.1	1050	48.4	120

[1)] Tolerance for optical and electrical data: +/-10 %
[2)] I_f(max) = 1,400 mA
[3)] Tolerance for CRI: +/-1

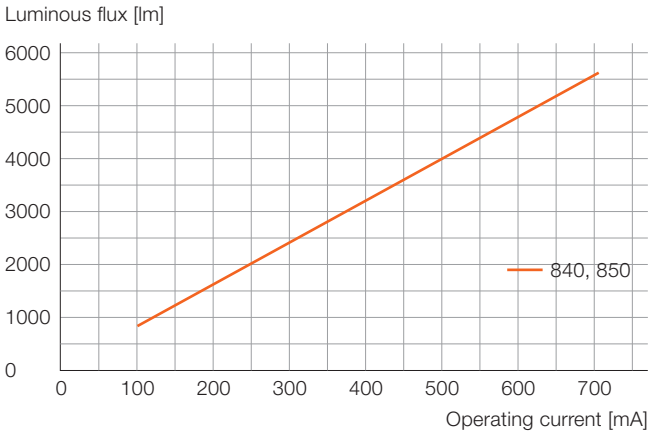
Due to the special conditions of the manufacturing processes of LEDs, the typical data of technical parameters can only reflect statistical figures and do not necessarily correspond to the actual parameters of each single product which could differ from the typical data.

Typical values valid for t_p = 55 °C
Energy efficiency class according to 2012/874/EC: A++

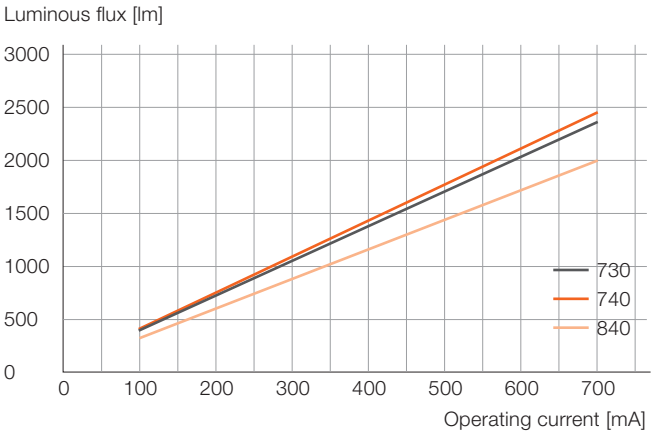
1.6 Luminous flux as a function of forward current

The luminous flux of the LED modules depends on the applied forward current. It is possible, however, to vary the forward current up to the absolute maximum current values, e.g. to exactly set a requested value for the luminous flux. The diagrams below show the luminous flux at nominal conditions (t_p = 55 °C) for different currents.

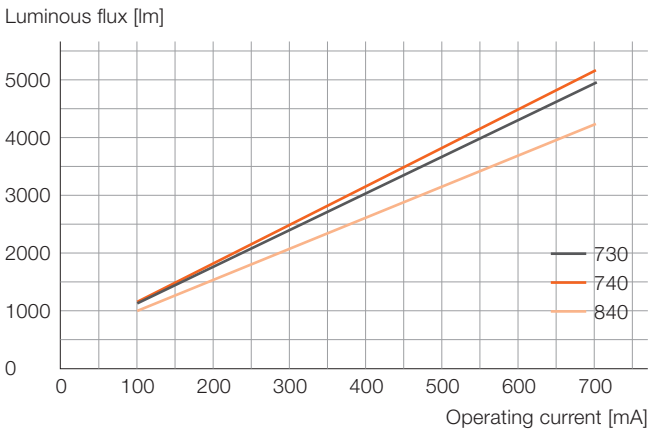
PL-BRICK MP 5000 8xx 16x4



PL-BRICK HP 1900-xxx 2x4



PL-BRICK HP 3800-xxx 2x8



By choosing the requested luminous flux on the y-axis of the diagram, you can derive the needed forward current that has to be applied to the LED module on the x-axis. This also works the other way around: For a set current, you can read the corresponding luminous flux on the y-axis.

1.7 Luminous flux and efficiency as functions of t_c point temperature

All tables and diagrams shown up to now were measured or calculated for a t_c point temperature of 55 °C, the nominal temperature condition of the PrevaLED® BRICK LED modules. It is of course realistic and likely that the t_c point temperature in a given luminaire differs from the nominal conditions and that this has an impact on the luminous flux and efficiency.

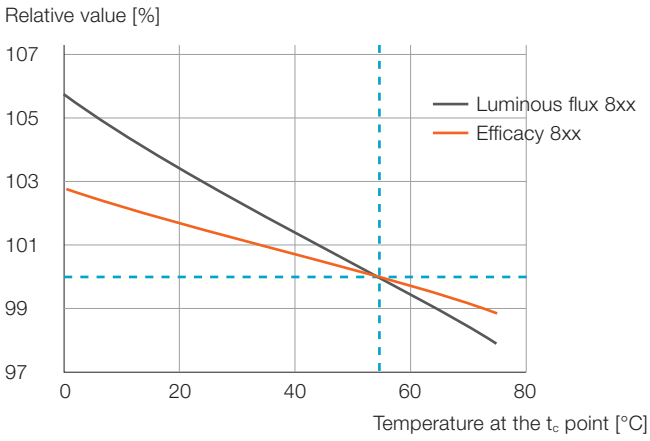
If the t_c point temperature on the LED module is lower than the nominal temperature of 55 °C, the relative luminous flux and relative efficiency are increased.

If the t_c point temperature on the LED module is higher than the nominal temperature of 55 °C, the relative luminous flux and relative efficiency are decreased.

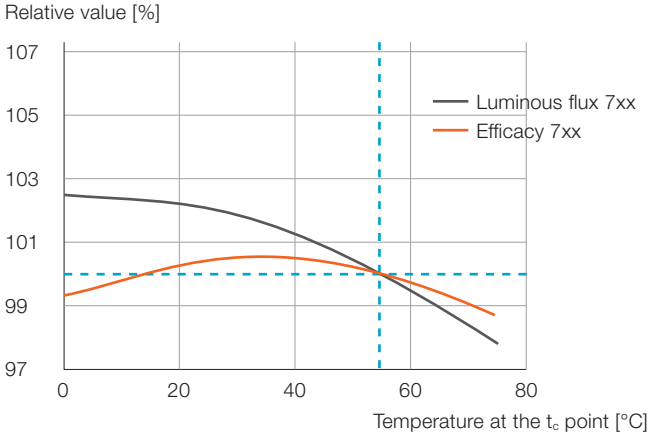
The diagrams below show the correlation between the t_c point temperature and the relative luminous flux/ efficiency. Since they show only relative values, the diagrams give an approximation that can be used for the different module types (e.g. different color temperatures, different module lengths).*

Luminous flux and efficacy as functions of t_c point temperature

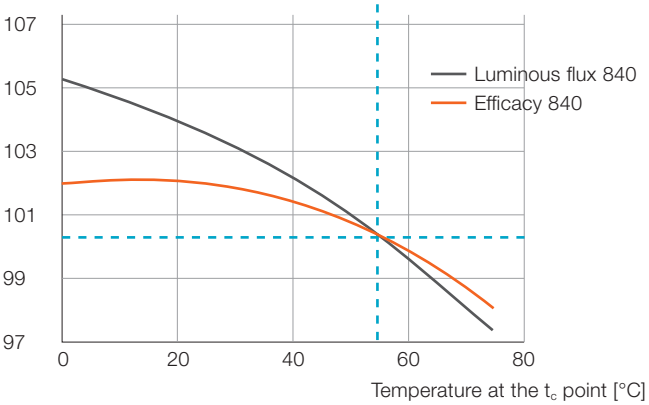
PL-BRICK MP 5000 8xx 16x4



PL-BRICK MP 3800 7xx 2x8



PL-BRICK HP 3800 840 2x8



The diagrams of the PrevaLED® BRICK HP 3800-7xx and 840 2x8 can be adapted accordingly to PrevaLED® BRICK HP 2850-7xx and 840 2x6 as well as HP 1900-7xx and 840 2x4.

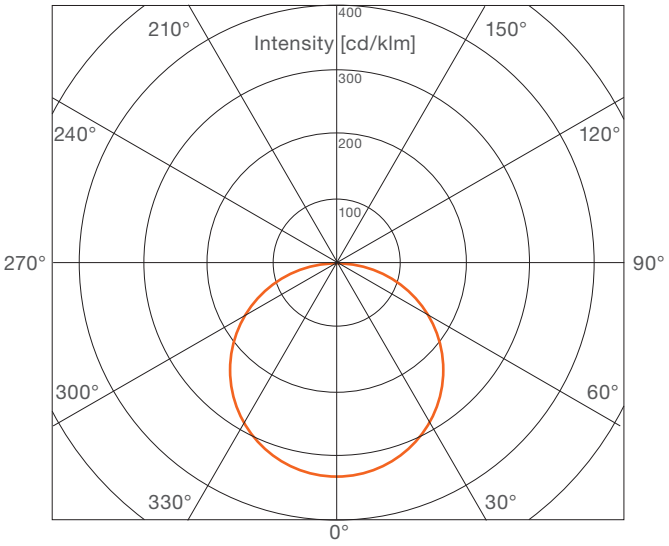
*All tolerances given in the datasheet of the PrevaLED® BRICK LED modules are still valid.

2 Optical and electrical considerations

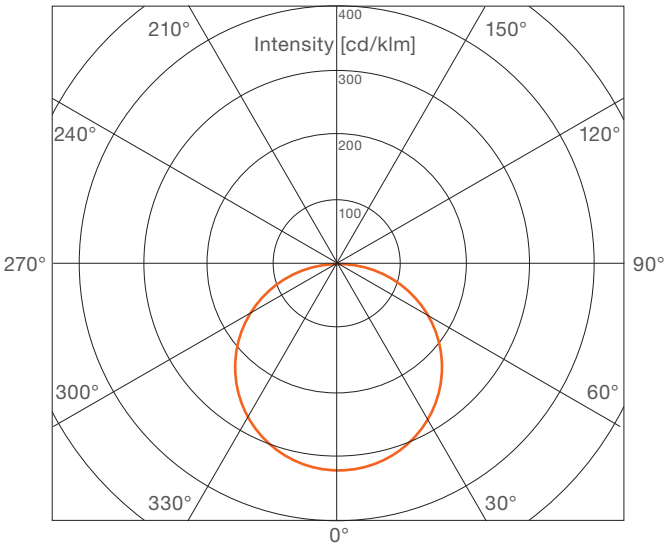
2.1 Light distribution

The light distribution of PrevaLED® BRICK HP and MP has a Lambertian shape with a beam angle of 120° FWHM (full width at half maximum).

PrevaLED® BRICK MP



PrevaLED® BRICK HP



2.2 Color temperature and coordinates

The color coordinates within the CIE 1931 color space are given in the tables below. Within each available color temperature, the PrevaLED® BRICK series provides a Standard Deviation of Color Matching (SDCM) of 5. SDCM is measured in “MacAdam ellipses” and determines the light color of LED modules with similar color temperature. A low number of MacAdam ellipses means a better color consistency.

PrevaLED® BRICK MP

PrevaLED® BRICK MP is available with color temperatures of 4,000 K and 5,000 K at CRI > 80.

	4,000 K	5,000 K
Cx	0.3763	0.3356
Cy	0.3739	0.3461

PrevaLED® BRICK HP

PrevaLED® BRICK HP is available with color temperatures of 2,200 K, 2,700 K, 3,000 K and 4,000 K at CRI > 70 and CRI > 80.

	2,200 K	2,700 K
Cx	0.4999	0.45895
Cy	0.4167	0.41244

	3,000 K	4,000 K
Cx	0.4369	0.3828
Cy	0.4062	0.3819

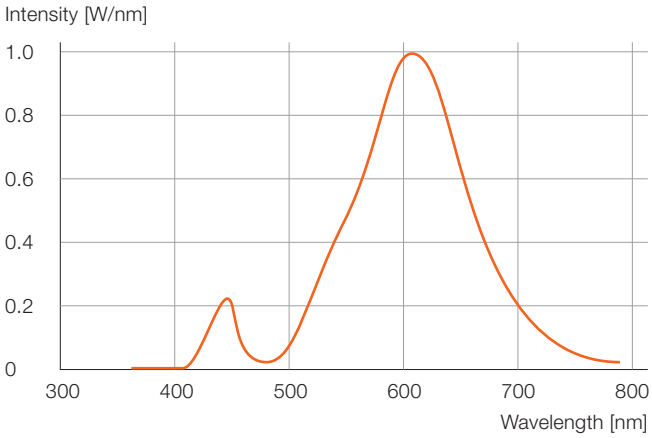
* All values in this chapter are general values. Values for specific modules may vary from these values. Please refer to the corresponding datasheet.

2.3 Spectral distribution

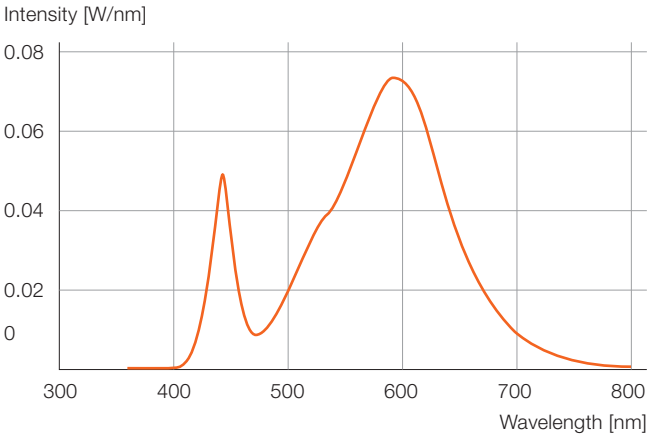
The following diagrams show the typical spectral distribution of PrevaLED® BRICK LED modules for different available color temperatures. The diagrams of the PrevaLED® BRICK HP 3800-7xx and 840 2x8 can be adapted accordingly to PrevaLED® BRICK HP 2850-7xx and 840 2x6 as well as 1900-7xx and 840 2x4.

Spectral distribution

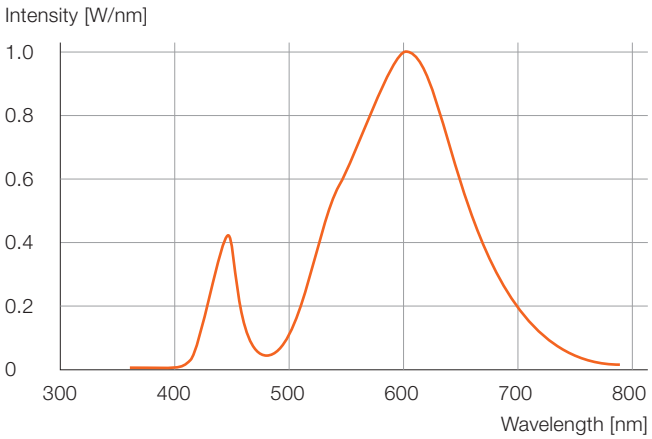
PL-BRICK HP 3800-722 2x8



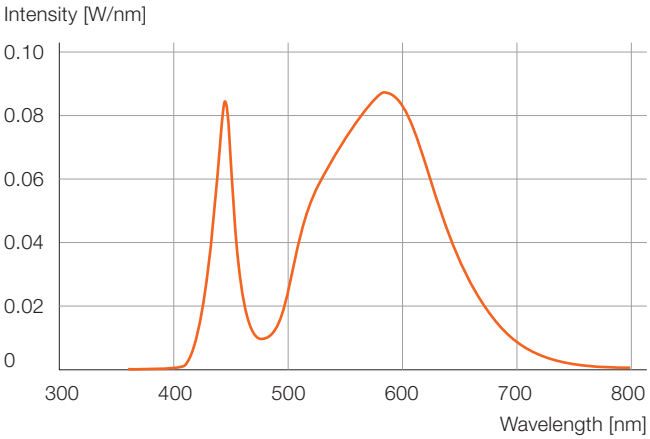
PL-BRICK HP 3800-730 2x8



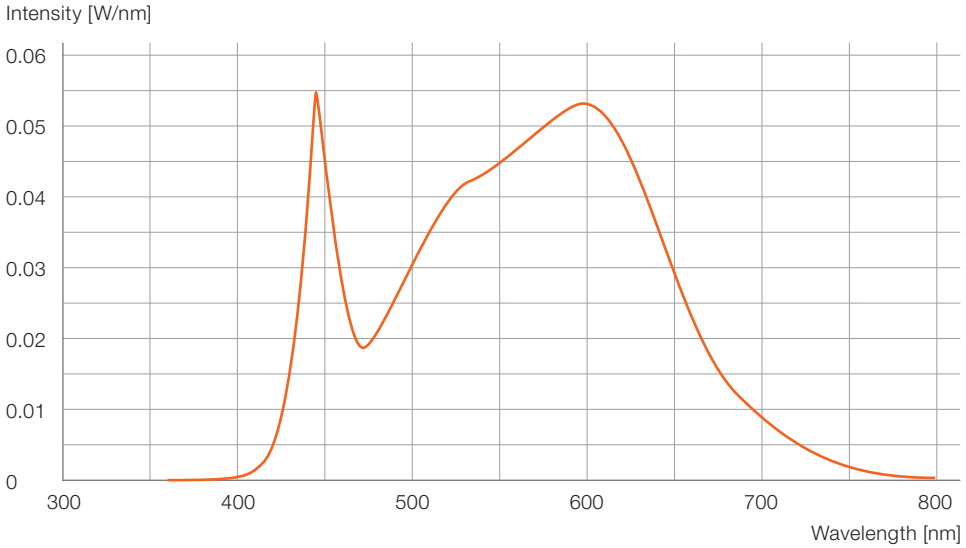
PL-BRICK HP 3800-727 2x8



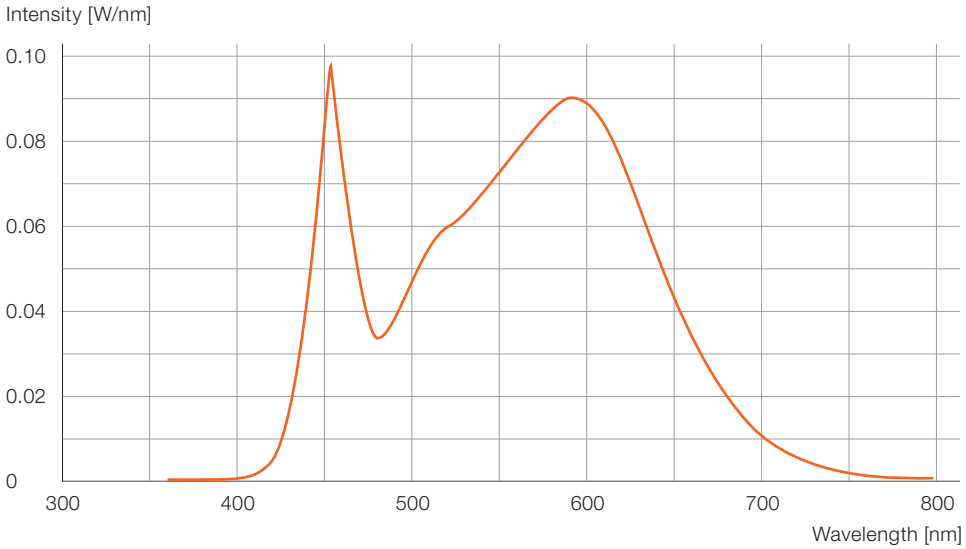
PL-BRICK HP 3800-740 2x8



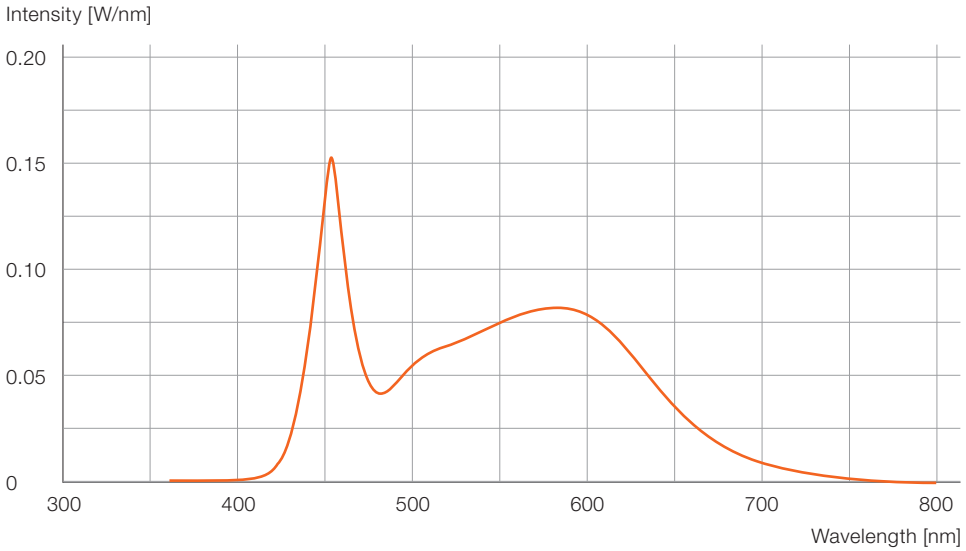
PL-BRICK HP 3800-840 2x8



PL-BRICK MP 5000-840 16x4



PL-BRICK MP 5000-850 16x4



Values measured at t_p = 55 °C

2.4 Color rendering

PrevaLED® BRICK LED modules provide a color rendering index (CRI) of > 70 and > 80 for the HP version and > 80 for the MP version. The tables below show the individual R_a values from R1 to R14 for the available color temperatures (measured at nominal current, t_p = 55 °C).

R_a values for PrevaLED® BRICK HP

	Dusky pink	Mustard yellow	Yellowish green	Light green	Turquois	Azure	Aster violet	Lilac violet	Red, saturated	Yellow, saturated	Green, saturated	Blue, saturated	Pink, skin color	Leaf green	General CRI
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R_a
CRI > 70															
CCT = 2200 K	66	82	94	66	65	74	77	44	-19	59	59	47	70	96	**71**
CCT = 2700 K	69	80	88	69	66	70	80	50	-16	52	63	42	70	93	**72**
CCT = 3000 K	67	81	93	69	68	74	77	43	-38	57	65	53	69	96	**72**
CCT = 4000 K	68	76	84	72	68	68	80	51	-34	45	68	43	68	91	**71**
CRI > 80															
CCT = 4000 K	84	90	95	87	85	87	89	70	21	76	86	72	85	97	**86**

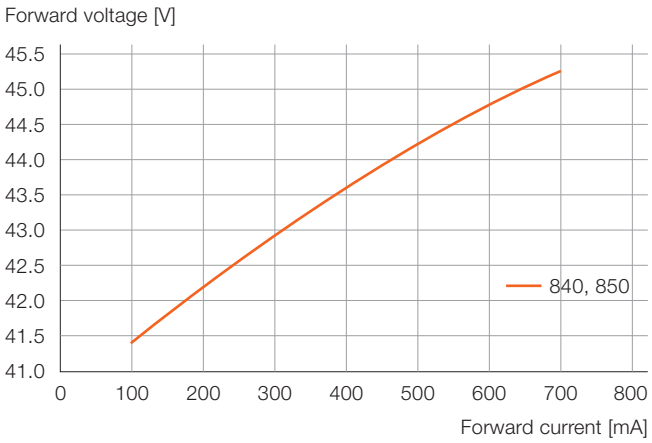
R_a values for PrevaLED® BRICK MP

	Dusky pink	Mustard yellow	Yellowish green	Light green	Turquois	Azure	Aster violet	Lilac violet	Red, saturated	Yellow, saturated	Green, saturated	Blue, saturated	Pink, skin color	Leaf green	General CRI
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R_a
CRI > 80															
CCT = 4000 K	82	92	96	81	82	88	84	63	7	80	80	66	85	98	**83**
CCT = 5000 K	84	92	94	84	85	87	86	69	15	80	84	66	87	98	**85**

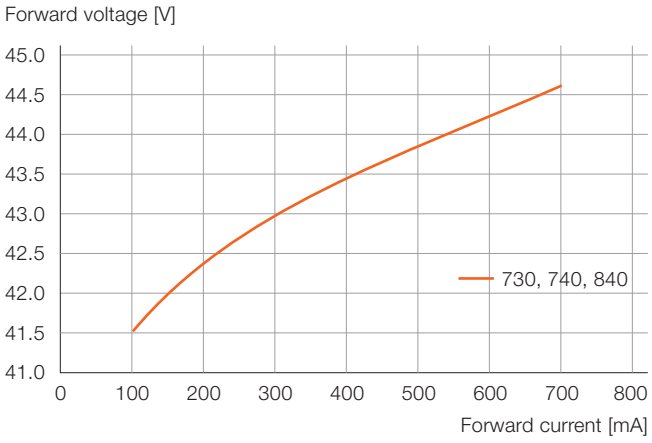
2.5 Forward voltage as a function of forward current*

The diagrams below show the relative dependence of the forward voltage (V_f) on the forward current (I_f) for the different PrevaLED® BRICK LED modules.

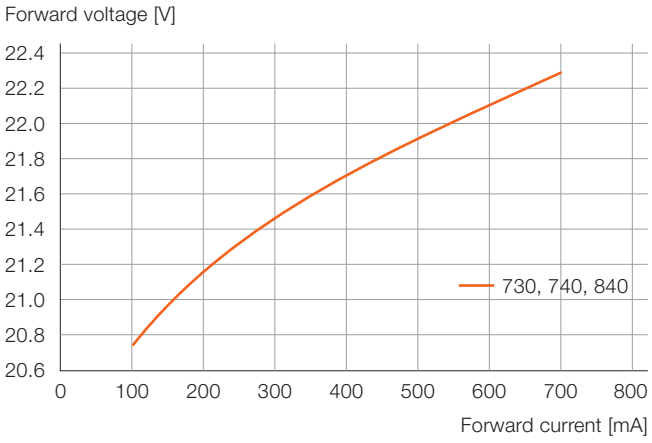
PL-BRICK MP 5000-8xx 16x4



PL-BRICK HP 3800-xxx 2x8



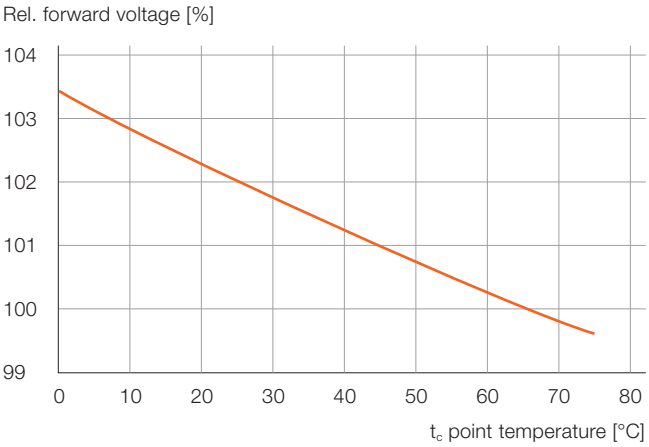
PL-BRICK HP 1900-xxx 2x4



2.6 Forward voltage as a function of t_c point temperature

The diagram below shows the relative dependence of the forward voltage on the temperature at the t_c point of the LED module (down to a temperature of 0 °C). The voltage increases with decreasing temperature. Therefore, when looking for a suitable LED driver, the forward voltage of the cold system at the coldest specified temperature has to be considered.

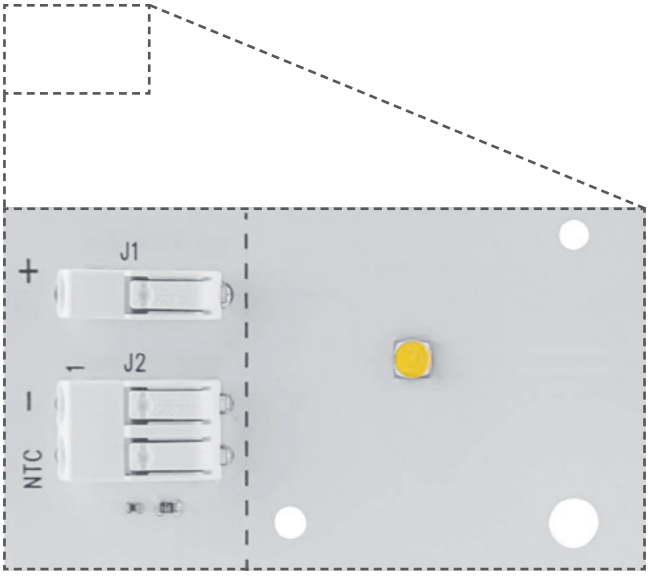
Relative forward voltage as a function of t_c point temperature



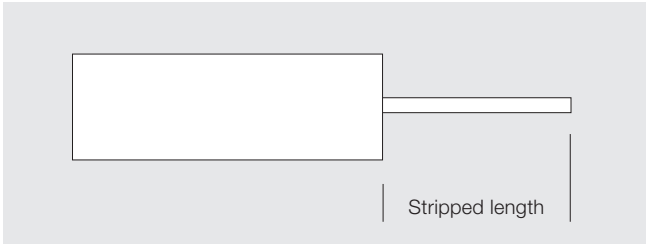
* All tolerances given in the datasheet of the PrevaLED® BRICK LED modules are still valid.

3 LED systems: PrevaLED® BRICK and OPTOTRONIC® LED drivers

3.1 Wiring information



The connector used on the PrevaLED® BRICK HP and MP LED modules (pictured above) can handle solid wires and fine-stranded wires with cross-sections from 0.2 to 0.75 mm² (AWG 24–18). The use of solid wires is recommended. The maximum insulation diameter is 2.3 mm.

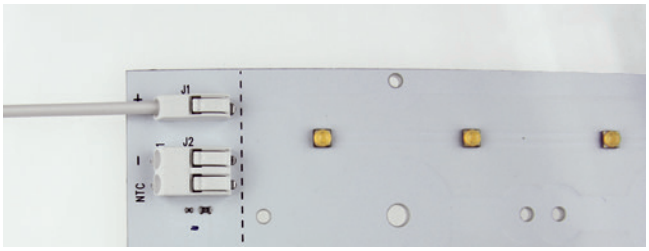


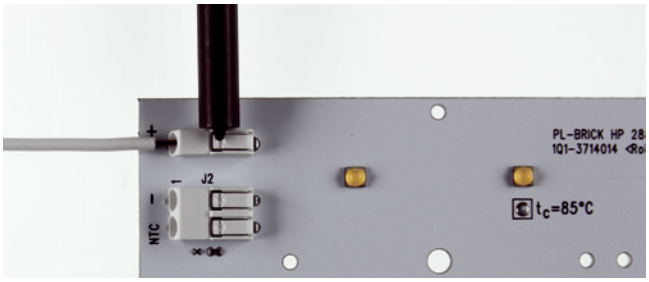
The stripped length is recommended to be 7…9 mm. Please insert wires in 0° orientation into the PCB.

3.2 Disconnecting the wire from the connector

The connector on the PrevaLED® BRICK LED modules has an easy and simple “poke-in” and release mechanism. Solid wires can simply be plugged into the connector. If fine-stranded wires are used, it is recommended to use the release button on top of the connector also for easier insertion. The wires/cables can be removed by pressing the release button on top of the connector and pulling the wires/cables out.

The pictures on the right show how to disconnect a wire from the connector.





For pressing the release button on top of the connector, it is recommended to use the WAGO 206-860 release tool in order not to damage the release latch of the connector.

3.3 Electrostatic discharge (ESD)

PrevaLED® BRICK LED modules fulfill the requirement of the immunity standard IEC/EN 61547. Please note that an electrostatic discharge of more than 2 kV HBM can cause damage, ranging from performance degradation to complete device failure.

OSRAM recommends to handle and store all PrevaLED® BRICK LED modules using appropriate ESD protection methods.

3.4 LED module/driver combinations

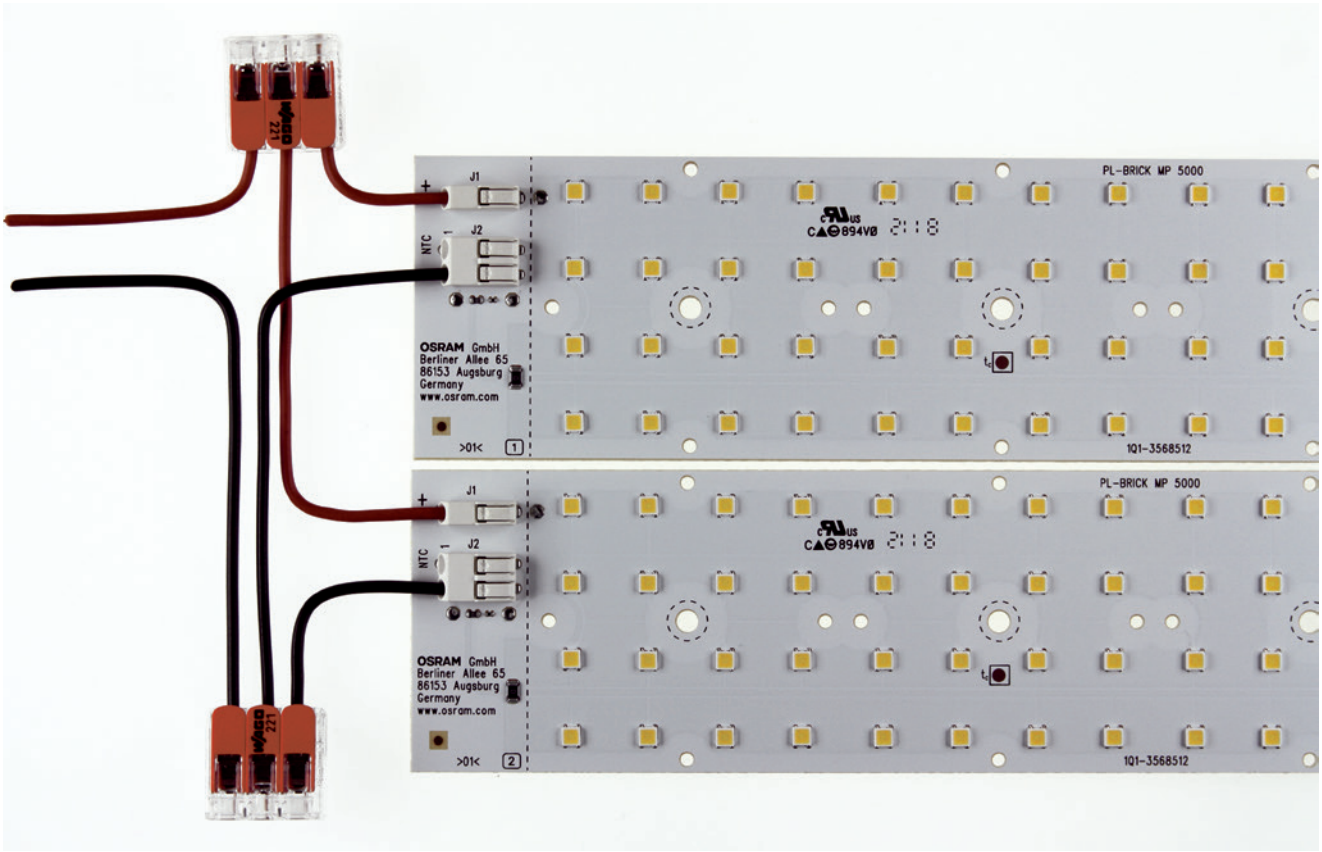
PrevaLED® BRICK LED modules are designed to be used together with OSRAM OPTOTRONIC® LED drivers – both in the SELV and non-SELV range. A single LED module is within the SELV range. By connecting more than one module in series, the voltage reaches the range of the OPTOTRONIC® non-SELV LED drivers.

Series and parallel connection

PrevaLED® BRICK LED Mid-Power modules can be connected either in parallel or in series, as shown in the pictures below.

If LED modules are connected in parallel, the “+” of one LED module is connected to the “+” of the following LED module and the “-” of one LED module is connected to the “-” of the following LED module. The last LED module in the chain is connected to the LED driver (here again, the “+” of the LED module is connected with the “+” of the LED driver and the “-” of the LED module with the “-” of the LED driver.

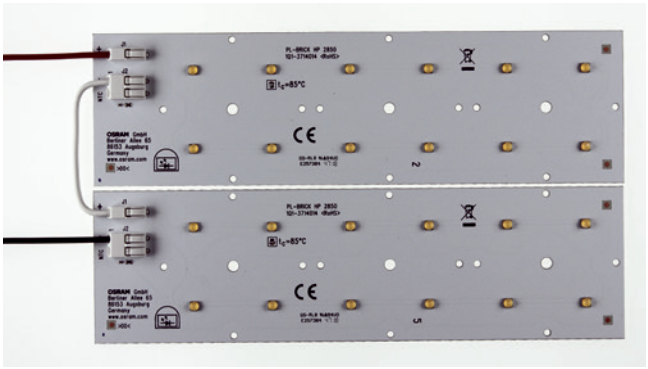
The picture below shows two PrevaLED® BRICK MP 5000 LED modules connected in parallel. One cable clamp is used to connect all the “+” wires (red) and one to connect all the “-” wires (black).



PrevaLED® BRICK MP LED modules connected in parallel to an LED driver.

PrevaLED® BRICK HP modules connected in series to an LED driver
If LED modules are connected in series, the "+" of the first LED module is connected to the LED driver and the "-" of the first LED module is connected to the "+" of the second LED module. The "-" of the last LED module in the chain is connected to "-" of the LED driver.

The picture below shows two PrevaLED® BRICK HP 2850 LED modules connected in series. The "+" connector of the upper LED module is connected to the LED driver. The "-" of the upper LED module is connected to the "+" of the lower LED module. The "-" of the lower LED module is connected to the LED driver.



Electrically, parallel and/or series connections of PrevaLED® BRICK LED modules have the following impacts on the electrical parameters:

When connecting two modules in parallel:
V_f (two modules) = V_f (single module)
I_f (two modules) = 2 x I_f (single module)

When connecting two modules in series:
V_f (two modules) = 2 x V_f (single module)
I_f (two modules) = I_f (single module)

OSRAM OPTOTRONIC® SELV LED drivers usually cover a voltage range up to 54 V. This means that for using SELV LED drivers, a parallel-only wiring of the PrevaLED® BRICK LED modules to the LED driver is necessary. When using LED drivers from the non-SELV/non-isolated portfolio (voltage range from 54 V to 150 V…240 V), it is possible to connect the LED modules in series to the LED driver or to use a combination of parallel and series connection.

When connecting N modules in parallel:
V_f (N modules) = V_f (single module)
I_f (N modules) = N x I_f (single module)

When connecting N modules in series:
V_f (N modules) = N x V_f (single module)
I_f (N modules) = I_f (single module)

How to read the matching list

2-6 2-4s1-3p	First line: Possible amount of modules Second line: Possibilities of connections
Example:	
2-6	means from 2 up to 6 modules possible
1-4s1-3p	means 1s2p, 1s3p, 2s1p, 2s2p, 2s3p, 3s1p, 3s,2p, 4s1p are the possible configurations

Matching list PrevaLED® BRICK Mid-Power 16x4

Serial and parallel connection

Total amount of modules for each combination is shown

	Voltage window	Current window	Power window	PrevaLED® BRICK MP 16x4		
				350 mA	500 mA	700 mA
				43.7 V	44.7 V	45.4 V
				15 W	22 W	32 W
	U_f [V]	I_f [mA]	P [W]			
OT 50/120-277/700 P5	24…74	700	17…50	1s2p		1
OT 100/120-277/700 P5	55…152	700	50…100	2-3s2p		2-3s1p
OT 180/120-277/700 P5	115…257	700	80…180	3-5s2p		3-5s1p
OT 250/120-277/700 P5	180…357	700	125…250	5-7s2p		4-7
OT20/170-240/1A0 1DIMLT2 G1 CE NFC	10-38	200-1050	2-22	1	1	
OT40/170-240/1A0 1DIMLT2 G1 CE NFC	15-56	200-1050	3-40	1s1-2p	1	1
OT75/170-240/1A0 1DIMLT2 G1 CE NFC	35-115	200-1050	7-75	1-4 1-2s1-3p	1-2 1-2s1-2p	1-2s1p
OT110/170-240/1A0 1DIMLT2 G1 CE NFC	80-220	200-1050	16-110	2-6 2-4s1-3p	2-4 2-4s1-2p	2-3s1p
OT 50/120-277/800 2DIMLT2 P	30-115	350-800	11-50	1-2 1-2s1-2p	1-2s1p	1
OT 50/120-277/1A2 2DIMLT2 P	2-55	600-1250	12-50	1s2-3p	1s2p	1
OT 100/120-277/800 2DIMLT2 P	50-186	350-800	45-100	3-6 2-4s1-2p	3-4s1p	2-3s1p
OT 110/120-277/1A4 2DIMLT2 P	35-85	600-1400	45-110	1s3-4p	1s2p	1s1-2p
OT 40/120-277/1A0 4DIMLT2 E	18-56	350-1050	7-40	1s1-2p	1	1
OT 60/120-277/1A0 4DIMLT2 E	30-115	350-1050	11-60	1-4 1-2s1-3p	1-2 1-2s1-2p	1
OT 90/170-240/1A0 4DIMLT2 E	57-186	350-1050	20-90	2-6 2-4s1-3p	2-4 2-4s1-2p	2s1p
OT 165/170-240/1A0 4DIMLT2 E	90-285	350-1050	32-165	3-10 3-6s1-3p	3-6 3-6s1-2p	2-5s1p
OT 20/170-240/800 4DIM NFC E	10-38	200-1050	2-22	0	0	0
OT 40/170-240/1A0 4DIM NFC E	15-56	200-1050	3-40	1s1-2p	1	1
OT 75/170-240/1A0 4DIM NFC E	35-115	200-1050	7-75	1-2 1-2s1-2p	1-2 1-2s1-2p	1-2s1p
OT 110/170-240/1A0 4DIM NFC E	80-220	200-1050	16-110	2-6 2-4s1-3p	2-4 2-4s1-2p	2-3s1p
OTi DALI 100/220-240/700 D LT2 IND L	64-300	200-1050	28-100	2-6 2-6s1-2p	2-5s1p	1-3s1p
OTi DALI 150/220-240/1A0 D LT2 IND L	64-300	200-1050	43-150	3-10 2-6s1-2p	2-6 2-6s1-2p	2-4s1p

Matching list PrevaLED® BRICK High-Power 2x4

Only serial connection

Total amount of modules for each combination is shown

	Voltage window	Current window	Power window	PrevaLED® BRICK HP 2x4			
				350 mA	530 mA	700 mA	1050 mA
				22 V	22 V	23 V	23 V
				8 W	12 W	16 W	24 W
	U_f [V]	I_f [mA]	P [W]				
OT 50/120-277/700 P5	24…74	700	17…50			2	
OT 100/120-277/700 P5	55…152	700	50…100			4-6	
OT 180/120-277/700 P5	115…257	700	80…180			6-10	
OT 250/120-277/700 P5	180…357	700	125…250			10-14	
OT20/170-240/1A0 1DIMLT2 G1 CE NFC	10…38	200…1050	2…22	1	1	1	
OT40/170-240/1A0 1DIMLT2 G1 CE NFC	15…56	200…1050	3…40	1-2	1-2	1-2	1
OT75/170-240/1A0 1DIMLT2 G1 CE NFC	35…115	200…1050	7…75	2-4	2-4	2-4	2-3
OT110/170-240/1A0 1DIMLT2 G1 CE NFC	80…220	200…1050	16…110	4-9	4-9	4-6	4
OT 50/120-277/800 2DIMLT2 P	30…115	350…800	11…50	2-4	2-4	2	
OT 50/120-277/1A2 2DIMLT2 P	20…55	600…1250	12…50			1-2	1-2
OT 100/120-277/800 2DIMLT2 P	50…186	350…800	45…100	3-7	4-7	3-6	
OT 110/120-277/1A4 2DIMLT2 P	35…85	600…1400	45…110			3	2-3
OT 40/120-277/1A0 4DIMLT2 E	18…56	350…1050	7…40	1-2	1-2	1-2	1
OT 60/120-277/1A0 4DIMLT2 E	30…115	350…1050	11…60	2-4	2-4	2-3	2
OT 90/170-240/1A0 4DIMLT2 E	57…186	350…1050	20…90	3-7	3-7	3-5	3
OT 165/170-240/1A0 4DIMLT2 E	90…285	350…1050	32…165	5-11	5-11	4-10	4-6
OT 20/170-240/800 4DIM NFC E	10…38	200…1050	2…22	1	1	1	
OT 40/170-240/1A0 4DIM NFC E	15…56	200…1050	3…40	1-2	1-2	1-2	1
OT 75/170-240/1A0 4DIM NFC E	35…115	200…1050	7…75	2-4	2-4	2-4	2-3
OT 110/170-240/1A0 4DIM NFC E	80…220	200…1050	16…110	4-9	4-9	4-6	4

Matching list PrevaLED® BRICK High-Power 2x6

Only serial connection

Total amount of modules for each combination is shown

	Voltage window	Current window	Power window	PrevaLED® BRICK HP 2x6			
				350 mA	530 mA	700 mA	1050 mA
				33 V	34 V	34 V	35 V
				12 W	18 W	24 W	37 W
	U_f [V]	I_f [mA]	P [W]				
OT 50/120-277/700 P5	24…74	700	17…50			1-2	
OT 100/120-277/700 P5	55…152	700	50…100			3-4	
OT 180/120-277/700 P5	115…257	700	80…180			4-9	
OT 250/120-277/700 P5	180…357	700	125…250			6-9	
OT20/170-240/1A0 1DIMLT2 G1 CE NFC	10…38	200…1050	2…22	1	1		
OT40/170-240/1A0 1DIMLT2 G1 CE NFC	15…56	200…1050	3…40	1	1	1	1
OT75/170-240/1A0 1DIMLT2 G1 CE NFC	35…115	200…1050	7…75	2-3	2-3	2-3	2
OT110/170-240/1A0 1DIMLT2 G1 CE NFC	80…220	200…1050	16…110	3-6	3-5	3-4	
OT 50/120-277/800 2DIMLT2 P	30…115	350…800	11…50	1-3	1-2	1-2	
OT 50/120-277/1A2 2DIMLT2 P	20…55	600…1250	12…50			1	1
OT 100/120-277/800 2DIMLT2 P	50…186	350…800	45…100	4-5	3-5	2-4	
OT 110/120-277/1A4 2DIMLT2 P	35…85	600…1400	45…110			2	2
OT 40/120-277/1A0 4DIMLT2 E	18…56	350…1050	7…40	1	1	1	1
OT 60/120-277/1A0 4DIMLT2 E	30…115	350…1050	11…60	1-3	1-3	1-2	1
OT 90/170-240/1A0 4DIMLT2 E	57…186	350…1050	20…90	2-5	2-5	2-3	2
OT 165/170-240/1A0 4DIMLT2 E	90…285	350…1050	32…165	4-7	3-7	3-6	3-4
OT 20/170-240/800 4DIM NFC E	10…38	200…1050	2…22	1	1		
OT 40/170-240/1A0 4DIM NFC E	15…56	200…1050	3…40	1	1	1	1
OT 75/170-240/1A0 4DIM NFC E	35…115	200…1050	7…75	2-3	2-3	2-3	2
OT 110/170-240/1A0 4DIM NFC E	80…220	200…1050	16…110	3-6	3-5	3-4	

Matching list PrevaLED® BRICK High-Power 2x8

Only serial connection

Total amount of modules for each combination is shown

	Voltage window	Current window	Power window	PrevaLED® BRICK HP 2x8			
				350 mA	530 mA	700 mA	1050 mA
				44 V	45 V	45 V	47 V
				16 W	24 W	32 W	49 W
	U_f [V]	I_f [mA]	P [W]				
OT 50/120-277/700 P5	24…74	700	17…50			1	
OT 100/120-277/700 P5	55…152	700	50…100			2-3	
OT 180/120-277/700 P5	115…257	700	80…180			3-5	
OT 250/120-277/700 P5	180…357	700	125…250			5-7	
OT20/170-240/1A0 1DIMLT2 G1 CE NFC	10…38	200…1050	2…22				
OT40/170-240/1A0 1DIMLT2 G1 CE NFC	15…56	200…1050	3…40	1	1	1	
OT75/170-240/1A0 1DIMLT2 G1 CE NFC	35…115	200…1050	7…75	1-2	1-2	1-2	1
OT110/170-240/1A0 1DIMLT2 G1 CE NFC	80…220	200…1050	16…110	2-4	2-4	2-3	2
OT 50/120-277/800 2DIMLT2 P	30…115	350…800	11…50	1-2	1-2	1	
OT 50/120-277/1A2 2DIMLT2 P	20…55	600…1250	12…50			1	1
OT 100/120-277/800 2DIMLT2 P	50…186	350…800	45…100	2-4	2-4	2-3	
OT 110/120-277/1A4 2DIMLT2 P	35…85	600…1400	45…110			1	1
OT 40/120-277/1A0 4DIMLT2 E	18…56	350…1050	7…40	1	1	1	
OT 60/120-277/1A0 4DIMLT2 E	30…115	350…1050	11…60	1-2	1-2	1	1
OT 90/170-240/1A0 4DIMLT2 E	57…186	350…1050	20…90	2-4	2-3	2	
OT 165/170-240/1A0 4DIMLT2 E	90…285	350…1050	32…165	3-6	4-6	2-5	2-3
OT 20/170-240/800 4DIM NFC E	10…38	200…1050	2…22				
OT 40/170-240/1A0 4DIM NFC E	15…56	200…1050	3…40	1	1	1	
OT 75/170-240/1A0 4DIM NFC E	35…115	200…1050	7…75	1-2	1-2	1-2	1
OT 110/170-240/1A0 4DIM NFC E	80…220	200…1050	16…110	2-4	2-4	2-3	2

4 Thermal considerations

At nominal operating conditions, with the PrevaLED® BRICK family mounted onto or into a luminaire housing with heat exchange to the environment, no special additional heat sink is needed to avoid exceeding t_c max = 85 °C.

To avoid overheating, it is nevertheless strongly recommended to check the LED module temperature in any newly designed luminaires.

It should also be mentioned here that lower t_c point temperatures on the LED module increase the module's efficiency and lifetime. Therefore, providing efficient cooling for the PrevaLED® BRICK LED modules increases the system efficiency of the luminaire/application.

4.1 Introduction and definitions

For any LED module, including the PrevaLED® BRICK family, different temperatures (t_p, t_c, t_c max etc.) are mentioned in the datasheet. In the following, you will find a short overview of the different meanings.

4.1.1 t_p

t_p is the performance temperature of the module. That means that all the tables, diagrams and numbers in the datasheet (and in this technical application guide) refer to the performance temperature t_p (if not mentioned otherwise).

4.1.2 t_c

t_c is the critical module temperature of the LED module. Up to this temperature, one special feature can be guaranteed (e.g. the efficiency of the LED module at nominal current is higher than 170 lm/W up to a temperature of t_c = 55 °C).

4.1.3 t_c max

t_c max is the absolute maximum temperature up to which the operation of the LED module is recommended. All the temperatures mentioned above are measured at the same point on the LED module, which is called the "t_c point" of the LED module. Its position on the PrevaLED® BRICK LED modules is shown below.

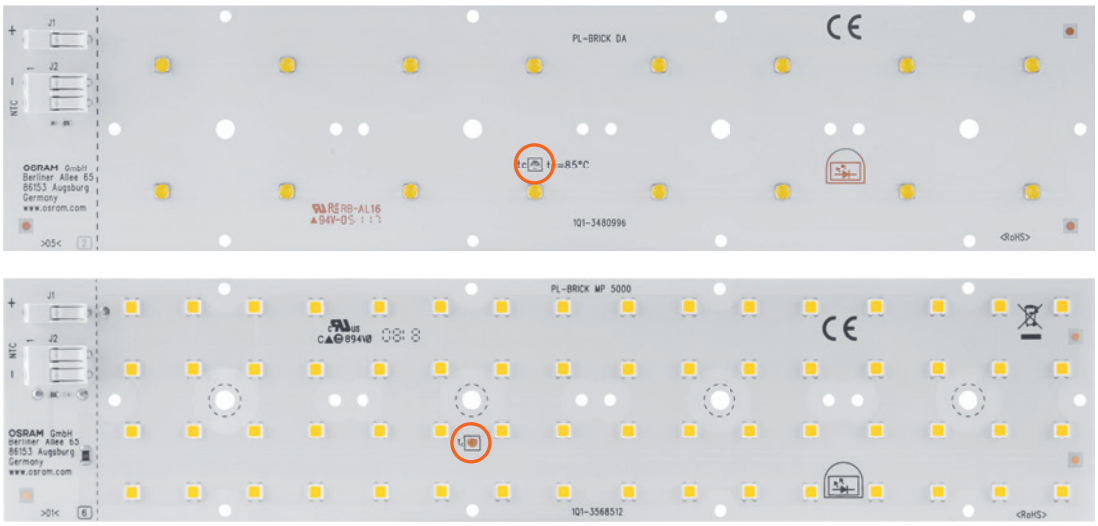
4.2 t_c point location and measurement

Proper thermal design of an LED luminaire is critical for achieving best performance and ensuring long lifetime of all components. To achieve a lifetime of 100,000 hours (L80B50), the sufficient heat exchange and thermal conduction between the LED module and the luminaire housing has to be verified by measuring the temperature at the t_c point.

The maximum temperature reached at the t_c point must not exceed 85 °C. This reference point for PrevaLED® BRICK LED modules is shown in the image below.

The easiest way to measure the temperature at the t_c point is by using a thermocouple. It is recommended to use a thermocouple that can be glued onto the LED module. Make sure that the thermocouple is fixed with direct contact to the t_c point.

Position of the t_c measurement point on PrevaLED® BRICK LED modules



Examples of suitable thermocouples

K-type thermocouple with miniature connector

Different thermocouples

Illustration	Description	Temperature range [°C]
	**PVC-insulated thermocouple**	-10 … +105
	**PFA-insulated thermocouple**	-75 … +260
	**Sprung thermocouple**	-75 … +260

5 Lifetime and lumen maintenance

For the definition of the lifetime of an LED module, see IEC/PAS 62717, where the following types are defined:

The luminous flux of an LED module decreases over its lifespan. This decrease is specified by the L value. LXX means that XX % of the initial light output is emitted by the LED module (e.g. L70 = 70 %). The L value is always connected to an operating time and defines the lifetime of an LED module. Please be aware that the L value is a statistical value. Therefore, the decrease in light output can and will vary for different modules.

The B value specifies how many LED modules are below a stated limit, e.g. B10 means that minimum 90 % of the LED modules are above a given L value.

The C value gives the number of fatal failures, meaning the number of LED modules that are destroyed and do not emit any light at all (e.g. C10 after 50,000 hours means that after 50,000 hours in operation, 10 % of the LED modules do not emit any light).

The F value is the combination of the B and C value, meaning that both fatal failures and degradation are considered.

Some examples:

- L0C10 is the lifetime where the light output is 0 % for 10 % of the LED modules.
- L70B50 is the lifetime where the light output is ≥ 70 % for 50 % of the LED modules. The B value includes only gradual reduction of lumen output over time (not the abrupt luminous flux degradation).
- L70F50 is the lifetime where the light output is ≥ 70 % for 50 % of the LED modules. The F value includes reduction of lumen output over time including abrupt degradation (luminous flux = 0).

PrevaLED® BRICK LED modules have a lifetime of 50,000 hours (L80B50) at a t_c point temperature of 55 °C. This means that after 50,000 hours, a minimum of 50 % of the utilized LED modules will maintain at least 80 % of the initial luminous flux.

Please note:
A higher t_c temperature leads to a shorter lifetime of the LED module. Moreover, the failure rate will also increase.

Illustration of the temperature-dependent lumen maintenance (B10) at current I_{nom} and CRI > 80

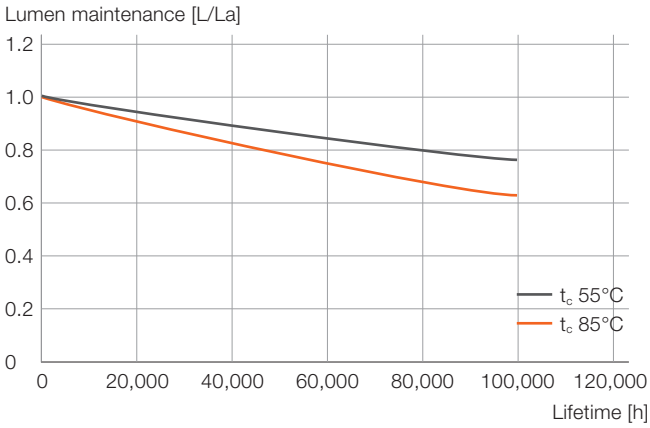


Illustration of the temperature-dependent lumen maintenance (B50) at current I_{nom} and CRI > 80

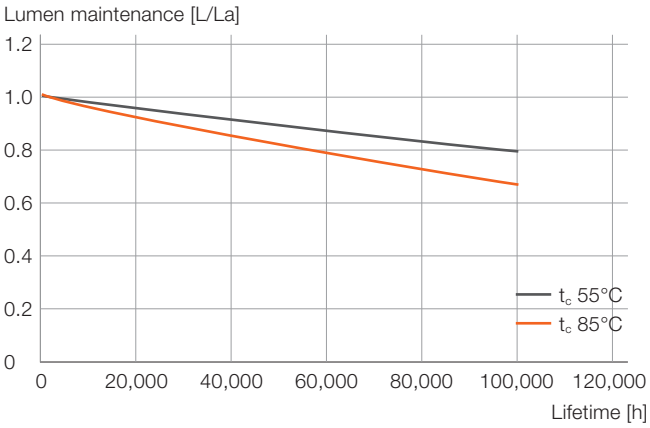


Illustration of the temperature-dependent lumen maintenance (B10) at current I_{nom} and CRI > 70

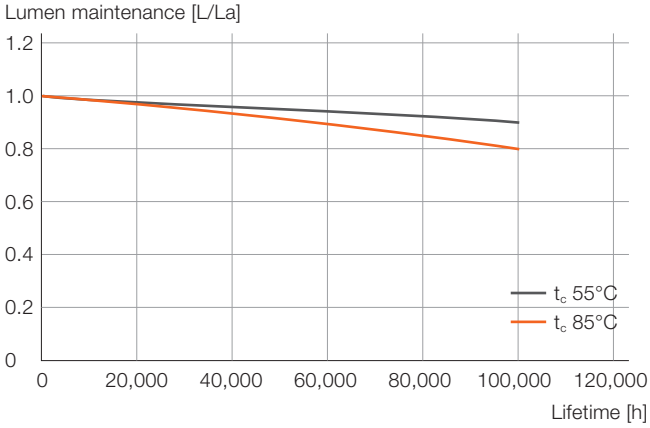
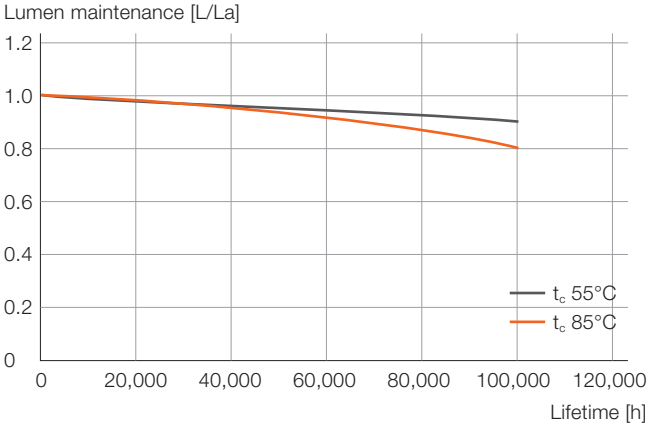


Illustration of the temperature-dependent lumen maintenance (B50) at current I_{nom} and CRI > 70



Lifetime data

PrevaLED® BRICK Mid-Power

		LxBy					
	x	70		80		90	
	y	10	50	10	50	10	50
t_p [°C] = 55	I = 300 mA	100,000	100,000	96,000	100,000	44,000	53,000
	I = 500 mA	100,000	100,000	90,000	100,000	41,000	49,000
	I = 700 mA	100,000	100,000	84,000	100,000	38,000	46,000
t_p [°C] = 65	I = 300 mA	100,000	100,000	76,000	92,000	35,000	42,000
	I = 500 mA	100,000	100,000	71,000	86,000	32,000	39,000
	I = 700 mA	100,000	100,000	67,000	81,000	30,000	37,000
t_p [°C] = 75	I = 300 mA	99,000	100,000	61,000	74,000	28,000	34,000
	I = 500 mA	93,000	100,000	57,000	70,000	26,000	32,000
	I = 700 mA	87,000	100,000	54,000	65,000	25,000	30,000
t_p [°C] = 85	I = 300 mA	80,000	97,000	50,000	60,000	23,000	28,000
	I = 500 mA	75,000	92,000	47,000	57,000	21,000	26,000
	I = 700 mA	71,000	86,000	44,000	53,000	20,000	24,000

Temperature ratings

t_p (performance temperature)	75 °C
$t_{c\,max}$ (maximum temperature)	80 °C (I_f = 700 mA), 90 °C (I_f = 350 mA)
t_a (ambient temperature range)	-30 °C < t_a < +70 °C
t_{stg} (storage temperature range)	-30 °C < t_a < +85 °C

PrevaLED® BRICK High-Power

CRI 70 versions

		LxBy					
	x	70		80		90	
	y	10	50	10	50	10	50
t_p [°C] = 55 °C	530 mA	100,000	100,000	100,000	100,000	100,000	100,000
	700 mA	100,000	100,000	100,000	100,000	100,000	100,000
	1050 mA	100,000	100,000	100,000	100,000	100,000	100,000
	1400 mA	100,000	100,000	100,000	100,000	100,000	100,000
t_p [°C] = 70 °C	530 mA	100,000	100,000	100,000	100,000	100,000	100,000
	700 mA	100,000	100,000	100,000	100,000	100,000	100,000
	1050 mA	100,000	100,000	100,000	100,000	100,000	100,000
	1400 mA	100,000	100,000	100,000	100,000	80,000	96,000
t_p [°C] = 85 °C	530 mA	100,000	100,000	100,000	100,000	100,000	100,000
	700 mA	100,000	100,000	100,000	100,000	100,000	100,000
	1050 mA	100,000	100,000	100,000	100,000	38,000	46,000
	1400 mA	100,000	100,000	100,000	100,000	26,000	32,000

CRI 80 versions

		LxBy					
	x	70		80		90	
	y	10	50	10	50	10	50
t_p [°C] = 55 °C	530 mA	100,000	100,000	100,000	100,000	100,000	100,000
	700 mA	100,000	100,000	100,000	100,000	100,000	100,000
	1050 mA	100,000	100,000	100,000	100,000	100,000	100,000
	1400 mA	100,000	100,000	100,000	100,000	100,000	100,000
t_p [°C] = 70 °C	530 mA	100,000	100,000	100,000	100,000	100,000	100,000
	700 mA	100,000	100,000	100,000	100,000	100,000	100,000
	1050 mA	100,000	100,000	100,000	100,000	67,000	75,000
	1400 mA	100,000	100,000	100,000	100,000	53,000	59,000
t_p [°C] = 85 °C	530 mA	100,000	100,000	100,000	100,000	82,000	92,000
	700 mA	100,000	100,000	100,000	100,000	73,000	82,000
	1050 mA	100,000	100,000	100,000	100,000	30,000	34,000
	1400 mA	100,000	100,000	100,000	100,000	24,000	27,000

Temperature ratings

t_p (performance temperature)	55 °C
$t_{c\,max}$ (maximum temperature)	85 °C
t_a (ambient temperature range)	-20 °C < t_a < +70 °C
t_{stg} (storage temperature range)	-30 °C < t_a < +85 °C

6 Mechanical considerations

6.1 LED module dimensions

The PrevaLED® BRICK family has three types of LED module dimensions:

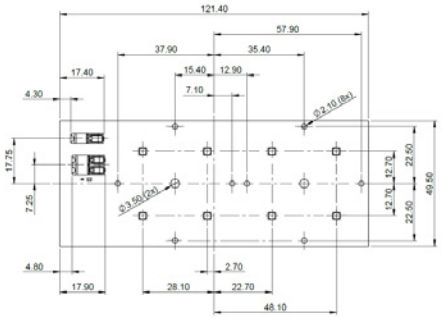
PrevaLED® BRICK High-Power 2x8 and PrevaLED® BRICK Mid-Power 16x4
223.5 mm x 49.5 mm x 6 mm

PrevaLED® BRICK High-Power 2x4
121.4 mm x 49.5 mm x 6 mm

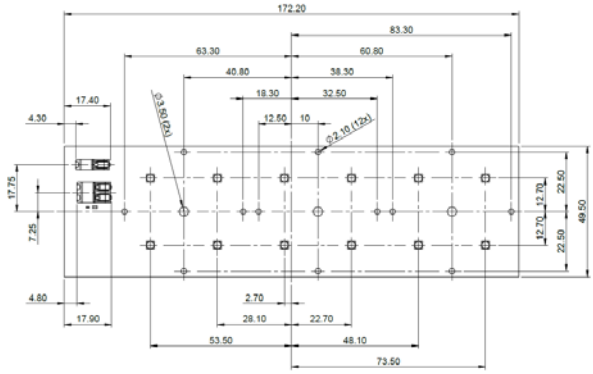
PrevaLED® BRICK High-Power 2x6
172.2 mm x 49.5 mm x 6 mm

Module dimensions overview

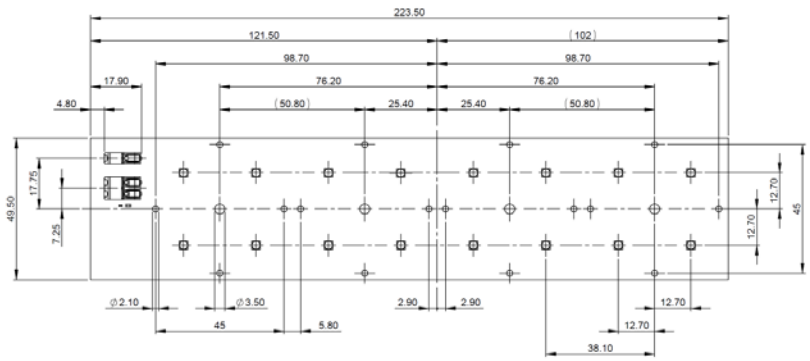
PrevaLED® BRICK HP 1900 xx0 2x4



PrevaLED® BRICK HP 2850 xx0 2x6



PrevaLED® BRICK HP 3800 xx0 2x8

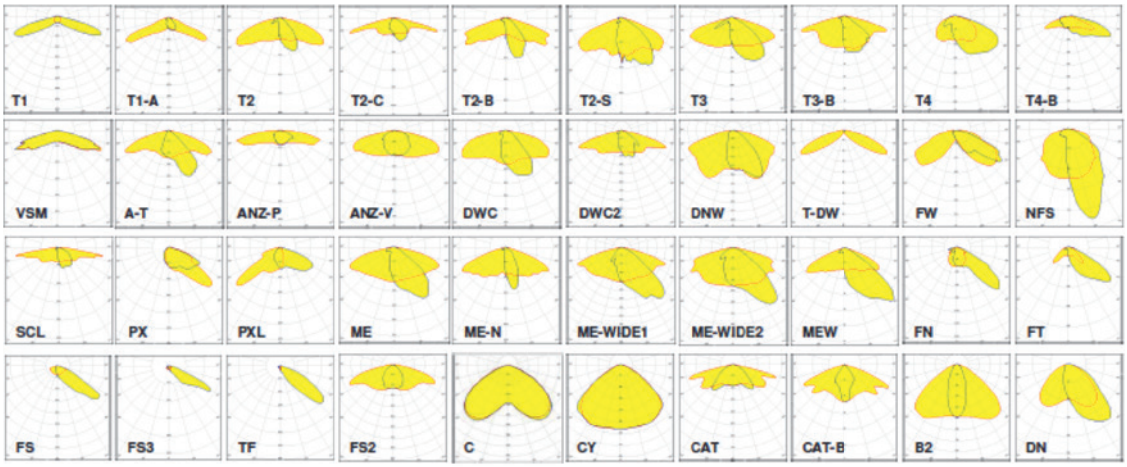


6.2 Number of LEDs, LED pitch

Number of LEDs and LED pitch for the different modules in the PrevaLED® BRICK family

Product name	Number of LEDs	Pitch [mm]
PL-BRICK HP 1900-xxx 2x4	8	25.4
PL-BRICK HP 2850-xxx 2x6	12	25.4
PL-BRICK HP 3800-xxx 2x8	16	25.4
PL-BRICK MP 5000-8x0 16x4	64	12.5

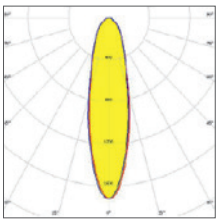
6.3 Compatible optics for PrevaLED® BRICK High-Power from LEDIL



6.4 Compatible optics for PrevaLED® BRICK Mid-Power from LEDIL

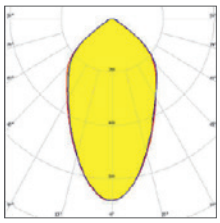
Symmetric light distribution for high-bay applications

C15430_STRADELLA-16-HB-S



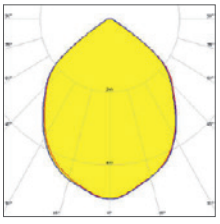
Dimensions: 49.5 x 49.5 mm
Height: 7.5 mm
~25° spot beam for industrial applications

C15431_STRADELLA-16-HB-M



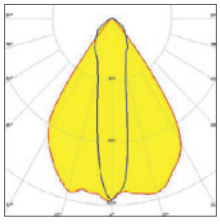
Dimensions: 49.5 x 49.5 mm
Height: 6.8 mm
~60° medium beam for industrial applications

C15432_STRADELLA-16-HB-W



Dimensions: 49.5 x 49.5 mm
Height: 7.1 mm
~90° wide beam for industrial applications

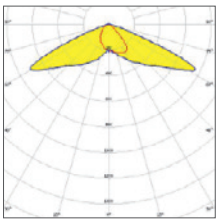
C16156_STRADELLA-16-HB-O



Dimensions: 49.5 x 49.5 mm
Height: 8.28 mm
Oval beam for high-bay aisles

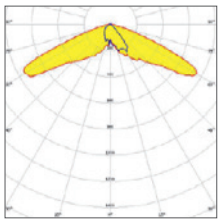
Asymmetric light distribution for street lighting applications

C16220_STRADELLA-16-T1-A



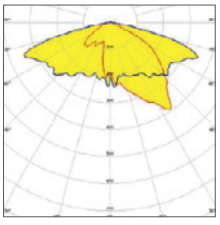
Dimensions: 49.5 x 49.5 mm
Height: 4.3 mm
Asymmetric IESNA Type I (short) beam designed for tilted poles. Suitable for Indian EESL specification.

C16414_STRADELLA-16-T1-A-PC



Dimensions: 49.5 x 49.5 mm
Height: 4.3 mm
Asymmetric IESNA Type I (short) beam designed for tilted poles. Suitable for Indian EESL specification. Variant made from PC.

C16503_STRADELLA-16-T3



Dimensions: 49.5 x 49.5 mm
Height: 3.7 mm
IESNA Type III (medium) beam for roads that are equal to or wider than mounting height.

6.5 Mechanical protection

For operation in damp, wet or dusty environments, the user has to make sure that an adequate ingress protection (IP) is chosen. The LED module has to be protected by a suitable IP rating of the luminaire housing. Please consider the luminaire standard IEC 60598 as well as the different requirements.

6.6 Mounting instructions

Please apply force only to the dedicated mounting positions. Strong mechanical stress can lead to irreversible damage of the LED module. To fix the LED module to the fixture, you can use M4 screws according to DIN 7984.

The maximum allowed screw head diameter (without using an isolating washer between the screw and the mounting hole) is 7.5 mm. With larger screw heads, the minimum distance between the screw and other conductive parts on the PrevaLED® BRICK LED module can be below the limit for creepage distances.

The maximum torque that should be applied on the screws depends on factors such as the screw type and the luminaire material. It is also influenced by the usage of washers. In most cases, a torque between 0.5 Nm and 1 Nm is enough to fix the LED module in the luminaire housing and will not damage the module.

Possible screws

Cylinder head, torx drive	**M4 screw (ISO 4762)**
Diameter	4.0 mm
Head diameter	7.0 mm
Head height	4.0 mm

Flat head, button head Torx drive, hex drive	**M4 screw (ISO 7380)**
Diameter	4.0 mm
Head diameter	7.5 mm
Head height	2.1 mm

It is also possible to use clips instead of screws, e.g. the push-to-fix (P2F) connectors from BJB: www.bjb.com.

To achieve optimal fixation of the LED module and also optimal thermal management, it is recommended to use all mounting holes in the PrevaLED® BRICK LED modules. Nevertheless, it is possible to reduce the number of screws, but in that case thermal behavior and mechanical strength has to be verified.

In any case, it is strongly recommended to perform mechanical and thermal testing of the LED modules in the luminaire.

7 Safety information

The LED module itself and all its components must not be mechanically stressed.

The modules are intended for operation only with matching OPTOTRONIC® LED drivers
To also ease the luminaire/installation approval, electronic control gear for LEDs or LED modules should carry the CE mark and be ENEC-certified. In Europe, the declarations of conformity must include the following standards: CE: EC 61347-2-13, EN 55015, IEC 61547 and IEC 61000-3-2 – ENEC: 61347-2-13 and IEC/EN 62384.

Also check for the mark of an independent authorized certification institute.

Please see the relevant brochure for more detailed information (see “Related and Further Information”).

- Installation of LED modules (with power supplies) needs to be made with regard to all applicable electrical and safety standards. Only qualified personnel should be allowed to perform installations.
- Observe ESD precautions when installing the module.
- Photobiological safety according to IEC 62471, risk group RG1
- Max. voltage U-OUT = 250 V for operation on non-isolated and SELV LED control gear.

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