

LED LINE SMD W2.5 LIGHT&DARK TW



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WU-M-694-W/B, WU-M-695-W/B

Typical Applications

Built-in luminaires/general illumination

- Office lighting
- Retail, corridor and shelf lighting



LED Line SMD W2.5 Light&Dark TW

- **LONG SERVICE LIFE TIME: 90,000 H (L80, B10)**
- **HIGHLY EFFICIENT: UP TO 193 LM/W
AT T_p = 50 °C**
- **2 LENGTHS AVAILABLE: 280 / 560 MM**
- **2 PCBs COLOUR AVAILABLE: WHITE AND BLACK**
- **COLOUR TUNING: 2700-6500 K**
- **ENEC APPROVED**
- **WARRANTY 5 YEARS**

LED Line SMD W2.5 Light&Dark TW

Technical Notes

- LED built-in module for integration into luminaires
- Dimensions
WU-M-694: 280x25 mm
WU-M-695: 560x25 mm
- Driving current:
WU-M-694-W/B, WU-M-695-W/B:
150 mA, 200 mA, 300 mA, 350 mA, 500 mA
- On-board push-in terminals
- Beam angle: 120°
- Colour rendering index (CRI): Ra80 and Ra90



Electrical Characteristics

at $t_p = 50^\circ\text{C}$

Type	Number of LEDs*	Typ. voltage DC** (V)					Typ. power consumption** (W)				
		150 mA V	200 mA V	300 mA V	350 mA V	500 mA V	150 mA W	200 mA W	300 mA W	350 mA W	500 mA W
WU-M-694-W/B	14	18.9	19.3	19.9	20.3	21.1	2.8	3.9	6.0	7.2	10.5
WU-M-695-W/B	28	37.9	38.5	39.9	40.5	42.1	5.7	7.7	12.0	14.2	21.1

* per channel | ** Tolerance of voltage and power: $\pm 10\%$ / data per channel | **Use of external LED constant current driver required.**

Maximum Ratings

Exceeding the maximum ratings can lead to reduction of service life or destruction of the module.

Type	Operating current (mA)	Operation temperature range at t_c point		Storage temperature range		Max. allowed repetitive peak current for frequencies ≥ 100 Hz [mA]
		$^\circ\text{C min.}$	$^\circ\text{C max.}$	$^\circ\text{C min.}$	$^\circ\text{C max.}$	
WU-M-694-W/B	all	-20	+80	-20	+70	600
WU-M-695-W/B	all	-20	+80	-20	+70	600

Operating Life

in hours at measured temperature at t_p point

Type	150 mA			200 mA			300 mA			350 mA			500 mA		
	40 $^\circ\text{C}$	50 $^\circ\text{C}$	80 $^\circ\text{C}$	40 $^\circ\text{C}$	50 $^\circ\text{C}$	80 $^\circ\text{C}$	40 $^\circ\text{C}$	50 $^\circ\text{C}$	80 $^\circ\text{C}$	40 $^\circ\text{C}$	50 $^\circ\text{C}$	80 $^\circ\text{C}$	40 $^\circ\text{C}$	50 $^\circ\text{C}$	80 $^\circ\text{C}$
WU-M-694-W/B – 28 LEDs – 280mm															
L80/B10	>90,000	>90,000	>86,000	>72,000	>72,000	>57,000	>72,000	>72,000	>57,000	>72,000	>72,000	>56,000	>72,000	>72,000	>36,000
WU-M-695-W/B – 56 LEDs – 560mm															
L80/B10	>90,000	>90,000	>86,000	>72,000	>72,000	>57,000	>72,000	>72,000	>57,000	>72,000	>72,000	>56,000	>72,000	>72,000	>36,000

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Optical Characteristics – CRI > 80

at $t_p = 50\text{ °C}$, without secondary optics

CRI: $R_a > 80$

Type	Ref. No.		Colour	Correlated colour temp.* K	Typ. luminous flux** and typ. efficiency**										Photometric code			
	PCB colour White (W)	Black (B)			at 150 mA		200 mA		300 mA		350 mA		500 mA		< 500 mA	≥ 500 mA		
					lm	lm/W	lm	lm/W	lm	lm/W	lm	lm/W	lm	lm/W	lm	lm/W		
WU-M-694-W/B 28LEDs - 280mm																		
WU-M-694-W/B-827/865	572464	572466	warm white	2700	515	181	680	176	995	166	1145	162	1590	151	827/349	827/359		
			cool white	6500	545	193	720	187	1055	176	1215	172	1690	160	865/349	865/359		
WU-M-695-W/B 56LEDs - 560mm																		
WU-M-695-W/B-827/865	572468	572470	warm white	2700	1030	181	1360	176	1990	166	2290	162	3180	151	827/349	827/359		
			cool white	6500	1095	193	1445	187	2110	176	2435	172	3375	160	865/349	865/359		

* Colour tolerance: 3 MacAdam | ** Production tolerance of luminous flux and efficiency: ±10%

Tunable Characteristics – CRI > 80

at $t_{c1} / t_{c2} (t_p) = 50\text{ °C}$; without secondary optics

CCT (K) for type WU-M-694-W/B							
Channel 1 / 2700 K	500 mA	2770 K	not allowed	not allowed	not allowed	not allowed	not allowed
	350 mA	2760 K	3515 K	3710 K	4035 K	4175 K	not allowed
	300 mA	2755 K	3605 K	3815 K	4160 K	4310 K	not allowed
	200 mA	2745 K	3885 K	4140 K	4535 K	4695 K	not allowed
	150 mA	2740 K	4130 K	4410 K	4825 K	4985 K	not allowed
	0 mA	0 K	6760 K	6785 K	6835 K	6860 K	6935 K
Operating current		0 mA	150 mA	200 mA	300 mA	350 mA	500 mA
Channel 2 / 6500 K							

Typ. luminous flux (lm) for type WU-M-694-W/B							
Channel 1 / 2700 K	500 mA	1590 lm	not allowed	not allowed	not allowed	not allowed	not allowed
	350 mA	1145 lm	1695 lm	1870 lm	2200 lm	2365 lm	not allowed
	300 mA	995 lm	1540 lm	1715 lm	2050 lm	2210 lm	not allowed
	200 mA	680 lm	1225 lm	1400 lm	1735 lm	1895 lm	not allowed
	150 mA	515 lm	1065 lm	1235 lm	1570 lm	1730 lm	not allowed
	0 mA	0 lm	545 lm	720 lm	1055 lm	1215 lm	1690 lm
Operating current		0 mA	150 mA	200 mA	300 mA	350 mA	500 mA
Channel 2 / 6500 K							

CCT (K) for type WU-M-695-W/B							
Channel 1 / 2700 K	500 mA	2770 K	not allowed	not allowed	not allowed	not allowed	not allowed
	350 mA	2760 K	3515 K	3710 K	4035 K	4175 K	not allowed
	300 mA	2755 K	3605 K	3815 K	4160 K	4310 K	not allowed
	200 mA	2745 K	3885 K	4140 K	4535 K	4695 K	not allowed
	150 mA	2740 K	4130 K	4410 K	4825 K	4985 K	not allowed
	0 mA	0 K	6760 K	6785 K	6835 K	6860 K	6935 K
Operating current		0 mA	150 mA	200 mA	300 mA	350 mA	500 mA
Channel 2 / 6500 K							

Typ. luminous flux (lm) for type WU-M-695-W/B							
Channel 1 / 2700 K	500 mA	3180 lm	not allowed	not allowed	not allowed	not allowed	not allowed
	350 mA	2290 lm	3385 lm	3735 lm	4405 lm	4725 lm	not allowed
	300 mA	1990 lm	3080 lm	3430 lm	4100 lm	4420 lm	not allowed
	200 mA	1360 lm	2455 lm	2805 lm	3470 lm	3795 lm	not allowed
	150 mA	1030 lm	2125 lm	2475 lm	3140 lm	3465 lm	not allowed
	0 mA	0 lm	1095 lm	1445 lm	2110 lm	2435 lm	3375 lm
Operating current		0 mA	150 mA	200 mA	300 mA	350 mA	500 mA
Channel 2 / 6500 K							

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LED Line SMD W2.5 Light&Dark TW

Optical Characteristics – CRI > 90

at $t_p = 50\text{ }^\circ\text{C}$, without secondary optics

CRI: $R_a > 90$

Type	Ref. No.		Colour	Correlated colour temp.* K	Typ. luminous flux** and typ. efficiency**										Photometric code			
	PCB colour				at		150 mA		200 mA		300 mA		350 mA		500 mA		< 500 mA	≥ 500 mA
	White (W)	Black (B)			lm	lm/W	lm	lm/W	lm	lm/W	lm	lm/W	lm	lm/W	lm	lm/W		
WU-M-694-W/B 28LEDs - 280mm																		
WU-M-694-W/B-927/965	572465	572467	warm white	2700	430	152	570	148	835	139	960	136	1335	127	927/349	927/359		
			cool white	6500	455	160	600	156	875	147	1010	143	1405	133	965/349	965/359		
WU-M-695-W/B 56LEDs - 560mm																		
WU-M-695-W/B-927/965	572469	572471	warm white	2700	865	152	1140	148	1665	139	1920	136	2665	127	927/349	927/359		
			cool white	6500	910	160	1200	156	1755	147	2025	143	2805	133	965/349	965/359		

* Colour tolerance: 3 MacAdam | ** Production tolerance of luminous flux and efficiency: ±10%

Tunable Characteristics – CRI > 90

at $t_{c1} / t_{c2} (t_p) = 50\text{ }^\circ\text{C}$; without secondary optics

CCT (K) for type WU-M-694-W/B							
Channel 1 / 2700 K	500 mA	2770 K	not allowed	not allowed	not allowed	not allowed	not allowed
	350 mA	2760 K	3510 K	3700 K	4025 K	4165 K	not allowed
	300 mA	2755 K	3600 K	3810 K	4155 K	4300 K	not allowed
	200 mA	2745 K	3880 K	4130 K	4525 K	4685 K	not allowed
	150 mA	2740 K	4120 K	4400 K	4815 K	4975 K	not allowed
	0 mA	0 K	6760 K	6785 K	6835 K	6860 K	6935 K
Operating current		0 mA	150 mA	200 mA	300 mA	350 mA	500 mA
Channel 2 / 6500 K							

Typ. luminous flux (lm) for type WU-M-694-W/B							
Channel 1 / 2700 K	500 mA	1335 lm	not allowed	not allowed	not allowed	not allowed	not allowed
	350 mA	960 lm	1415 lm	1560 lm	1840 lm	1970 lm	not allowed
	300 mA	835 lm	1160 lm	1435 lm	1710 lm	1845 lm	not allowed
	200 mA	570 lm	1025 lm	1170 lm	1445 lm	1580 lm	not allowed
	150 mA	430 lm	885 lm	1030 lm	1310 lm	1445 lm	not allowed
	0 mA	0 lm	455 lm	600 lm	875 lm	1010 lm	1405 lm
Operating current		0 mA	150 mA	200 mA	300 mA	350 mA	500 mA
Channel 2 / 6500 K							

CCT (K) for type WU-M-695-W/B							
Channel 1 / 2700 K	500 mA	2770 K	not allowed	not allowed	not allowed	not allowed	not allowed
	350 mA	2760 K	3510 K	3700 K	4025 K	4165 K	not allowed
	300 mA	2755 K	3600 K	3810 K	4155 K	4300 K	not allowed
	200 mA	2745 K	3880 K	4130 K	4525 K	4685 K	not allowed
	150 mA	2740 K	4120 K	4400 K	4815 K	4975 K	not allowed
	0 mA	0 K	6760 K	6785 K	6835 K	6860 K	6935 K
Operating current		0 mA	150 mA	200 mA	300 mA	350 mA	500 mA
Channel 2 / 6500 K							

Typ. luminous flux (lm) for type WU-M-695-W/B							
Channel 1 / 2700 K	500 mA	2665 lm	not allowed	not allowed	not allowed	not allowed	not allowed
	350 mA	1920 lm	2830 lm	3120 lm	3675 lm	3945 lm	not allowed
	300 mA	1665 lm	2575 lm	2865 lm	3420 lm	3690 lm	not allowed
	200 mA	1140 lm	2050 lm	2340 lm	2895 lm	3160 lm	not allowed
	150 mA	865 lm	1775 lm	2065 lm	2620 lm	2885 lm	not allowed
	0 mA	0 lm	910 lm	1200 lm	1755 lm	2025 lm	2805 lm
Operating current		0 mA	150 mA	200 mA	300 mA	350 mA	500 mA
Channel 2 / 6500 K							

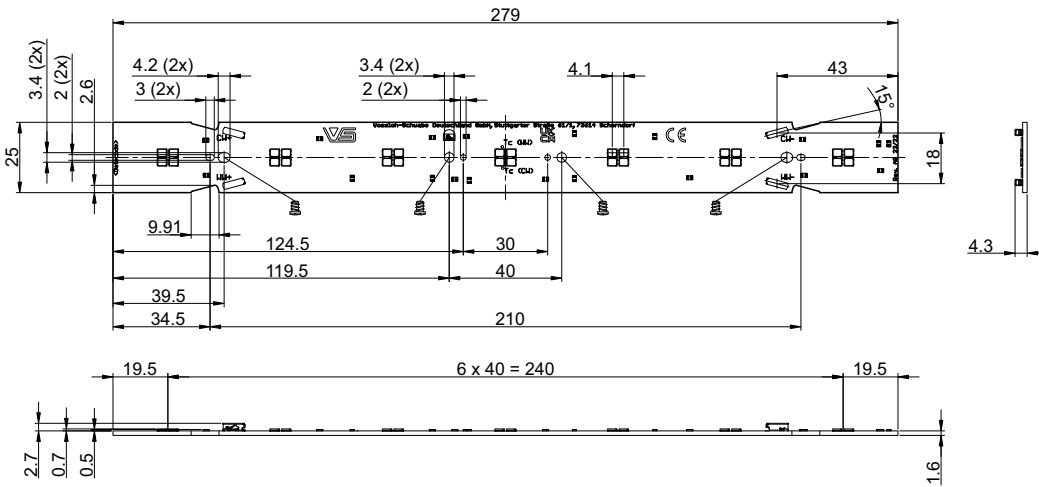
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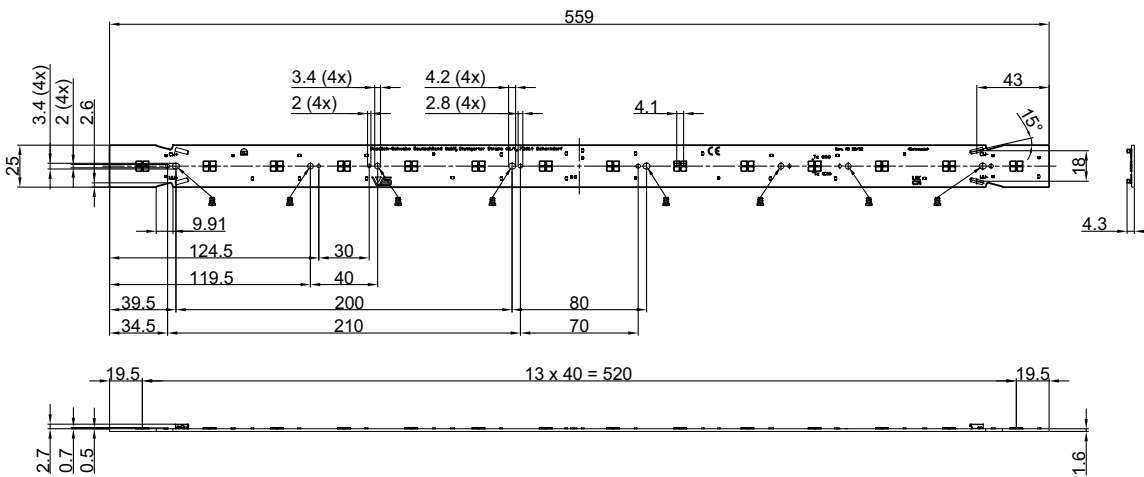
Mechanical Dimensions

STC = Small Top Connection


WU-M-694-W/B

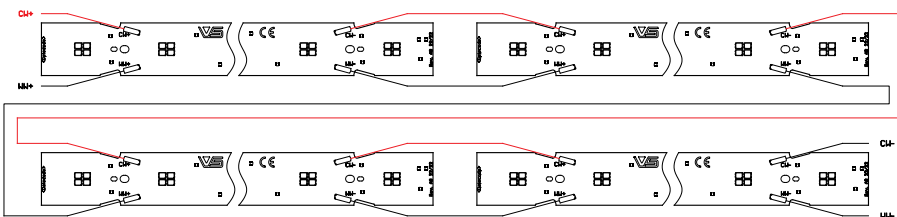


WU-M-695-W/B



Connection Example

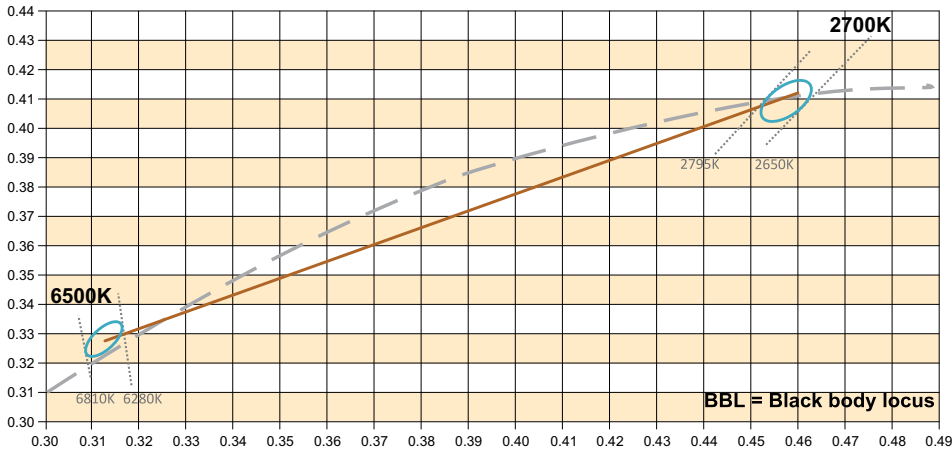
- The number of modules that can be connected in series depends on the available output voltage of the LED driver.
- The clearance and creepage distances are designed for working voltages up to 500 V DC (basic insulation) and 250 V DC (reinforced insulation).
- In case of assembly of the LED modules in profiles (e.g. aluminium) where the profile touches the top edge of the PCB the clearance and creepage distances are reduced to 250 V DC (basic insulation).
- Only the marked holes  are fixing holes for screws M3. Please do not use other holes for fixation!



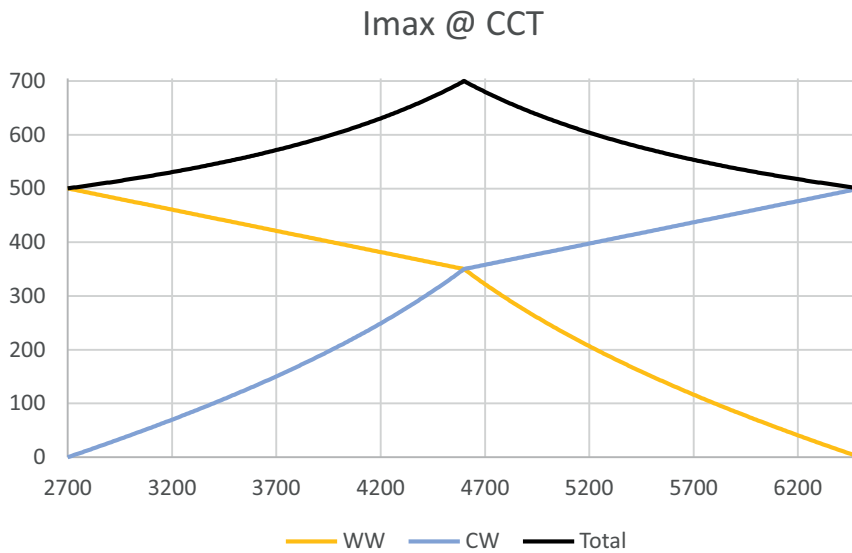
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LED Line SMD W2.5 Light&Dark TW

Bins



Max. operating current vs. colour temperature.



Currents mixing: 500mA per channel (Single channel), 350mA per channel (mixing currents).
 $I_{max} = I_{cw} + I_{ww} = 700\text{mA}$

Product Guarantee

- 5 years
- The conditions for the Product Guarantee of the Vossloh-Schwabe Group shall apply as published on our homepage (www.vossloh-schwabe.com). We will be happy to send you these conditions upon request.

Linear LED Constant Current Drivers

Please visit our homepage for details for suitable LED constant current drivers: www.vossloh-schwabe.com

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Assembly and Safety Information

Installation must be carried out under observation of the relevant regulations and standards. The LED modules are designed for operation within a casing or luminaire. Installation must be carried out in a voltage-free state (i.e. disconnection from the mains). The following advice must be observed; non-observance can result in the destruction of the LED assembly modules, fire and/or other hazards.

- Consider safety regulations acc. EN 60598 in the luminair design, especially when the operating LED driver is not galvanic isolated.
 - In mode of operation regard to sufficient isolation.
 - Live parts must not be touched in operation mode.



Danger of death!!!

- ESD (electrostatic discharge) protection measures must be observed when handling and installing the LED modules. See VS's application notes on ESD protection.
- Adequate anti-static electricity measures, including the use of conductive shoes, ionizers, work bench grounding, wrist straps, flooring and stools should be used.
- LED assembly modules must not be subjected to any undue mechanical stress, e. g.:
 - do not treat as bulk cargo
 - avoid shear and compressive forces during handling and installation
 - do not damage circuit paths
 - avoid any pressure on the light emitting surface
- Safe operation only possible by the use of external constant current sources (I_{max} . see table "Electrical Characteristics").
- Operation only with power supply units that feature the following protection:
 - Short-circuit protection
 - Overload protection
 - Overheating protection
- The module can be fixed with M3 screws. Fixation only with flat or cylinder head screws (M3) (no countersunk screws)
Max. torque: 1.2 Nm (M3)
- Please ensure the correct polarity of the leads prior to commissioning. Reversed polarity can destroy the modules.
- For interconnection the LED modules is equipped with push-in terminals (WAGO 2065).
- Safety regulations acc. to EN 60598 (or further standards) has to be observed if the maximum output voltage exceed the permitted touchable value.
- Measurement tolerances:
 - luminous flux: $\pm 7\%$
 - voltage: $\pm 3\%$
 - CRI: ± 1
- The following points must be observed when connecting LED modules in parallel:
 - All LED strings that are wired in parallel must contain the same number of LEDs (symmetrical loading).
 - Owing to differing forward biases, there can be a difference of up to 10% in brightness between modules connected in parallel.
- To ensure problem-free operation, the specified maximum temperature at the t_p point (see "Operating Life") must be observed (and measured in accordance with EN 60598-1). To satisfy this point, it may be necessary to put measures in place to ensure any heat is dissipated from the PCB to the environment.

- In the event of outdoor applications or applications in damp locations, care must be taken to protect LED assembly modules against humidity, splashes and jets of water. Any corrosion damage resulting from humidity or contact with condensation will not be recognised as a defect or manufacturing fault. LED assembly modules are not specially protected against foreign bodies or dust. Depending on the type of application, further protection must be ensured to prevent dust and foreign bodies from entering.
- Due to the manufacturing process, the PCBs of the LED assembly modules can have sharp edges and corners. Care must therefore be taken during handling and installation to avoid injury.
- For optimal load of used constant current driver the modules can only be connected in series. The quantity of LED modules is limited by the sum of forward voltage and the capacity of used constant current driver. Safety regulations acc. to EN 60598 has to be observed if the sum of forward voltage exceed the permitted touchable value.
- Operating LED modules in the presence of certain chemical substances or in chemically enriched (aggressive) environments can impair module functionality or even cause total module failure. Detailed information can be found in our "Chemical Incompatibility" PDF on our website www.vossloh-schwabe.com
- The photobiological safety of the LED modules must be classified into risk groups in accordance with EN 62471: 2008.
Rating in accordance with IEC / TR 62778: risk group 1

WU-M-694-W/B, WU-M-695-W/B:

CCT K	Max. operating current for risk group 1 mA	E threshold for higher operating currents to be risk group 1 lx
≤ 2700	634 (max. rated 500 mA)	1221
6500	376	793

Applied Standards

EN 62031

LED modules for general lighting – Safety specifications



EN 62471

Photobiological safety of lamps and lamp systems