

LED LINEAR ALLROUND – GEN. 4

IPOO BUILT-IN MODULES



LED LINEAR ALLROUND – GEN. 4

WU-M-541-SQ5/xx

These modules were designed for built-in into luminaire casings. They enable a modular luminaire design.

The modules are available in four shapes (4, 8, 12 or 16 LEDs) and in up to 6 white colour tones.

Typical Applications (depending on the choice of optics)

- Integration in luminaires
- Street lighting, urban street lighting
- Tunnel lighting
- Flood and area lighting
- Indoor lighting
- Industrial lighting for:
 - Production halls
 - Warehouses
- Lighting for sports facilities

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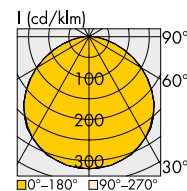
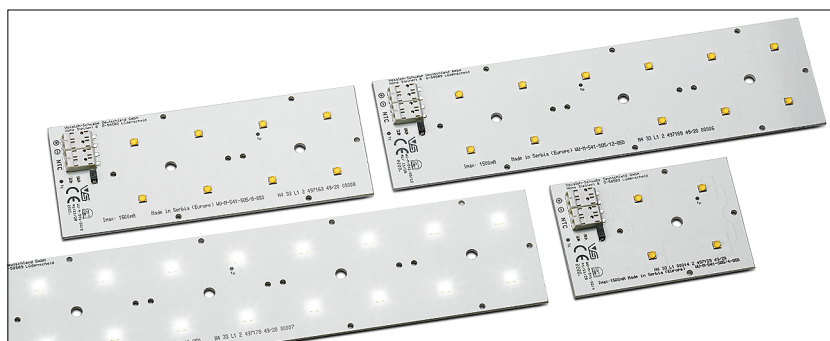
- **HIGHLY EFFICIENT: UP TO 205 LM/W**
AT $T_P = 60^\circ\text{C}$, $I_F = 350\text{ mA}$
- **FLEXIBLE LIGHT DISTRIBUTION BY VARIOUS ATTACHMENT OPTICS**
- **HUGE RANGE OF CCT & CRI VARIANTS**
- **INITIAL COLOUR ACCURACY: 5 SDCM**
- **PROTECTION AGAINST TRANSIENT MAIN PEAKS: 4 KV**
- **VDE (ACC. TO EN 62031)**



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Technical Notes

- LED built-in module for integration into luminaires
- 4, 8, 12 or 16 high-efficiency High Power LEDs
- Dimensions (excl. optics) LxVxH
 - 4 LEDs: 70.6x49.5x6 mm
 - 8 LEDs: 121.4x49.5x6 mm
 - 12 LEDs: 172.2x49.5x6 mm
 - 16 LEDs: 223x49.5x6 mm
- Push-in terminals for quick and simple wiring
- Suitable for standard 2x2 optics
- Design for optimum thermal management
- Degree of protection: IP00
- ESD protection class 3a (up to 8kV)
- NTC resistor for external driver feedback of module temperature
- Type: NCP18xH103J03RB



WU-M-541-SQ5/xx

Electrical Characteristics

at $t_p = 60^\circ\text{C}$

Type	No. of LEDs	Voltage DC (V)															Temperature coefficient mV/K
		350 mA			500 mA			700 mA			1050 mA			1400 mA			
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	
WU-M-541-SQ5/4	4	10.1	10.7	11.3	10.3	10.9	11.5	10.5	11.1	11.7	10.7	11.3	11.9	10.9	11.5	12.1	-6.1
WU-M-541-SQ5/8	8	20.3	21.4	22.6	20.6	21.8	22.9	20.9	22.1	23.3	21.4	22.6	23.8	21.8	23.1	24.3	-12.2
WU-M-541-SQ5/12	12	30.4	32.2	33.9	30.9	32.6	34.4	31.4	33.2	35.0	32.1	33.9	35.7	32.7	34.6	36.4	-18.3
WU-M-541-SQ5/16	16	40.5	42.9	45.2	41.1	43.5	45.9	41.8	44.2	46.6	42.8	45.2	47.7	43.6	46.1	48.6	-24.4

Type	No. of LEDs	Power consumption (W)														
		350 mA			500 mA			700 mA			1050 mA			1400 mA		
		min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.	min.	typ.	max.
WU-M-541-SQ5/4	4	3.5	3.8	4.0	5.1	5.4	5.7	7.3	7.7	8.2	11.2	11.9	12.5	15.3	16.1	17.0
WU-M-541-SQ5/8	8	7.1	7.5	7.9	10.3	10.9	11.5	14.6	15.5	16.3	22.5	23.7	25.0	30.5	32.3	34.0
WU-M-541-SQ5/12	12	10.6	11.3	11.9	15.4	16.3	17.2	22.0	23.2	24.5	33.7	35.6	37.5	45.8	48.4	51.0
WU-M-541-SQ5/16	16	14.2	15.0	15.8	20.6	21.8	22.9	29.3	30.9	32.6	44.9	47.5	50.0	61.1	64.6	68.0

Use of external LED constant current driver required.

Maximum Ratings

Exceeding the maximum ratings can lead to destruction of the module.

Type	Operation current mA	Operation temperature range at t_c point		Storage temperature range		Max. allowed repetitive peak current (mA)
		$^\circ\text{C min.}$	$^\circ\text{C max.}$	$^\circ\text{C min.}$	$^\circ\text{C max.}$	mA
All types	≤ 500 mA	-40	+90	-40	+85	2000
	≤ 1050 mA	-40	+85			
	≤ 1400 mA	-40	+80			
	≤ 1500 mA	-40	+75			

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Operating Life

Lumen degradation	Operating life in hours at measured temperature at t _p point								
	at If ≤ 700 mA			at 700 mA < If ≤ 1050 mA			at If > 1050 mA		
	60°C	70°C	85°C	60°C	70°C	85°C	60°C	70°C	80°C
L90/B10	> 150,000	> 150,000	> 150,000	> 150,000	> 150,000	112,000	> 102,000	97,000	80,000
L80/B10	> 150,000	> 150,000	> 150,000	> 150,000	> 150,000	> 150,000	> 102,000	> 102,000	> 102,000
L70/B10	> 150,000	> 150,000	> 150,000	> 150,000	> 150,000	> 150,000	> 102,000	> 102,000	> 102,000

These values do not refer to the colour temperature. | Lxx/Byy (lumen maintenance at xx%, failure rate yy%)

Optical Characteristics

at t_p = 60 °C

Type	Ref. No.	Colour	Correl. colour temp. K	Luminous flux* (lm) and typ. efficiency (lm/W)														
				350 mA			500 mA			700 mA			1050 mA			1400 mA		
				min. lm	typ. lm	typ. lm/W	min. lm	typ. lm	typ. lm/W	min. lm	typ. lm	typ. lm/W	min. lm	typ. lm	typ. lm/W	min. lm	typ. lm	typ. lm/W
CRI ≥ 70																		
WU-M-541-SQ5/4-730	570545	warm white	3000	705	715	191	970	985	181	1300	1320	171	1820	1850	156	2270	2305	143
WU-M-541-SQ5/4-740	570546	neutral white	4000	745	770	205	1030	1060	195	1385	1425	184	1945	2005	169	2435	2505	155
WU-M-541-SQ5/4-750	570547	cool white	5000	745	765	204	1030	1060	195	1380	1420	184	1940	1995	168	2425	2495	155
WU-M-541-SQ5/8-722	570548	warm white	2200	1130	1200	160	1535	1630	150	2035	2160	139	2820	2990	126	—	—	—
WU-M-541-SQ5/8-730	570549	warm white	3000	1410	1430	191	1945	1975	181	2600	2640	171	3640	3695	156	4540	4610	143
WU-M-541-SQ5/8-740	570550	neutral white	4000	1495	1535	205	2065	2125	195	2770	2855	184	3895	4005	169	4870	5015	155
WU-M-541-SQ5/8-750	570551	cool white	5000	1490	1530	204	2055	2115	195	2765	2845	184	3875	3990	168	4850	4990	155
WU-M-541-	570552	warm white	2200	1695	1800	160	2305	2445	150	3055	3235	139	4230	4485	126	—	—	—
WU-M-541-	570553	warm white	3000	2115	2150	191	2915	2960	181	3900	3965	171	5460	5545	156	6805	6915	143
WU-M-541-	570554	neutral white	4000	2240	2305	205	3095	3185	195	4160	4280	184	5840	6010	169	7305	7520	155
WU-M-541-	570555	cool white	5000	2230	2300	204	3085	3175	195	4145	4265	184	5815	5985	168	7275	7490	155
WU-M-541-	570556	warm white	2200	2260	2395	160	3075	3260	150	4070	4315	139	5640	5980	126	—	—	—
WU-M-541-	570557	warm white	3000	2820	2865	191	3885	3945	181	5205	5285	171	7280	7390	156	9075	9220	143
WU-M-541-	570558	neutral white	4000	2985	3075	205	4125	4245	195	5545	5710	184	7785	8015	169	9745	10030	155
WU-M-541-	570559	cool white	5000	2975	3065	204	4115	4235	195	5525	5690	184	7755	7985	168	9700	9985	155
CRI ≥ 80																		
WU-M-541-SQ5/4-830	570560	warm white	3000	625	645	172	860	890	164	1145	1185	153	1575	1635	138	1950	2020	125
WU-M-541-SQ5/4-840	570561	neutral white	4000	670	700	187	915	965	177	1230	1290	167	1710	1795	151	2115	2220	138
WU-M-541-SQ5/4-850	570562	cool white	5000	660	705	188	910	975	179	1225	1305	169	1715	1830	154	2140	2280	141
WU-M-541-SQ5/8-830	570563	warm white	3000	1250	1295	172	1720	1780	164	2290	2375	153	3155	3265	138	3900	4040	125
WU-M-541-SQ5/8-840	570564	neutral white	4000	1335	1400	187	1835	1925	177	2460	2580	167	3420	3590	151	4230	4440	138
WU-M-541-SQ5/8-850	570565	cool white	5000	1320	1410	188	1825	1945	179	2450	2610	169	3430	3660	154	4275	4560	141
WU-M-541-	570566	warm white	3000	1875	1940	172	2580	2675	164	3440	3560	153	4730	4900	138	5850	6060	125
WU-M-541-	570567	neutral white	4000	2005	2105	187	2750	2890	177	3685	3870	167	5130	5385	151	6345	6660	138
WU-M-541-	570568	cool white	5000	1980	2115	188	2735	2920	179	3670	3915	169	5145	5485	154	6415	6840	141
WU-M-541-	570569	warm white	3000	2500	2590	172	3440	3565	164	4585	4750	153	6305	6535	138	7805	8080	125
WU-M-541-	570570	neutral white	4000	2670	2805	187	3670	3850	177	4915	5160	167	6840	7180	151	8455	8880	138
WU-M-541-	570571	cool white	5000	2640	2820	188	3645	3890	179	4895	5220	169	6860	7315	154	8555	9125	141

On account of the complex manufacturing process of the modules, the above values only represent statistical variables.

The values do not necessarily correspond exactly to the actual parameters of every single product, which can vary from the typical specification.

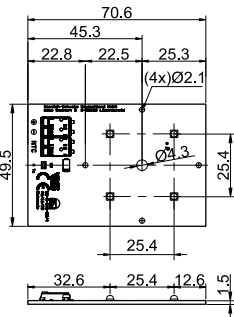
* Measurement tolerance of luminous flux: ±7% | ** Measurement tolerance CRI: ±2

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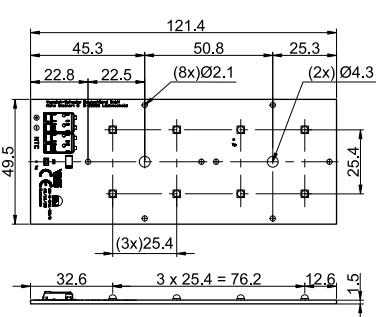
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Mechanical Dimensions

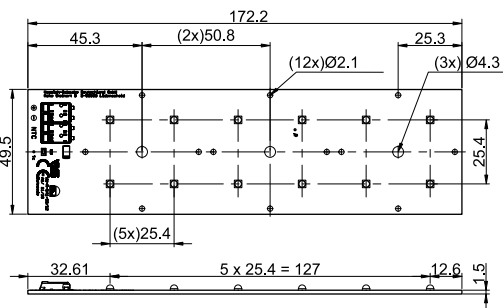
WU-M-541-SQ5/4



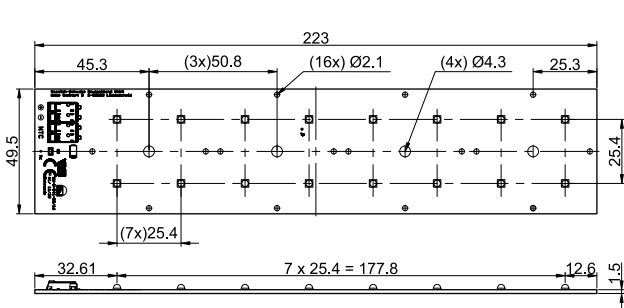
WU-M-541-SQ5/8



WU-M-541-SQ5/12

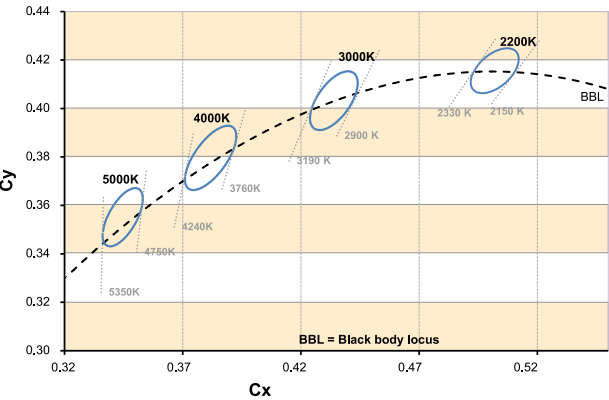


WU-M-541-SQ5/16



All holes Ø 2.1 mm are fixing holes for optics. | All holes Ø 4.3 mm are fixing holes for PCB.

Bins



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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. Safety regulations acc. to EN 60598 has to be observed. Installation must be carried out in a voltage-free state (i.e. disconnection from the mains).

- LED built-in modules must not be subjected to any undue mechanical stress, e. g.:
 - handle LED modules carefully
 - avoid shear and compressive forces onto
 - the optics during handling and installation
 - avoid vibrations of more than 2 kHz, 40 G
- The module must be fixed onto a thermally conductive surface with 1 to 4 M3 screws (respectively M4). Recommended torque: $0,6 \pm 0,1$ Nm.
 - In case of using 2x2-array lenses (available from third party suppliers), please refer to your lens supplier to define the max. allowed torque to be applied to the screws (usually M3).
 - In this regard please observe also the usage of proper thermal interface material. Make sure not to go below the min. contact pressure needed. The installation instructions of the selected interface materials have to be followed.
- When installing/screwing the module into a luminaire, please ensure that the cables are not squeezed between luminaire/heat sink and LED module. Also ensure that the mounting surface is clean and flat. For a reliable thermal attachment, we recommend the mounting surface flatness of ≤ 0.2 mm.
- Safe operation only possible by the use of external constant current sources (I_{\max} see table "Electrical Characteristics").
- Operation is dependent on constant current drivers that should provide the following protective measures:
 - short-circuit protection
 - overload protection
 - overheating protection
- Please ensure the correct polarity of the leads prior to commissioning. Reversed polarity can destroy the modules.
- The maximum output of the power supply must be observed.
- 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.
- The clearance and creepage distances of LED modules WU-M-541-SQ5/xx are designed for working voltages up to 600 V DC (basic insulation) and up to 300 V DC (reinforced insulation) acc. to EN 62031/EN 60598.
- If a system consists of multiple LED Linear Allround modules connected to a single driver, only one module will be monitored by the NTC. That means that one module is in "master" mode operated and the rest are operated in "slave" mode.
- Please ensure standard ESD (electrostatic discharge) protection measures are employed when handling and installing LED modules. Electrostatic discharge can damage LEDs.
- To ensure problem-free operation, the specified maximum temperature at the t_c and t_p point (see "Operating Life") must be observed (measured in accordance with EN 60598-1). To satisfy this point, it is necessary to put measures in place to ensure any heat is dissipated from the LED module to the environment.
- To ensure good thermal contact, it is recommended to use proper thermal interface material (e.g. thermal paste, phase change or thermal pads).
- When mounting LED Linear Allround modules directly on the luminaire housing, we recommend to use aluminum of at least 3 mm thickness. Thicker material will improve the heatflow through the luminaire, resulting in a lower t_p temperature on the module itself.
- Use anodised or painted surfaces rather than blank surfaces to enhance the heat-transfer via thermal radiation.
- Try to limit as far as possible the number of thermal interfaces in the primary heat path towards ambient air. For the primary heat path use solely materials with high thermal conductivity (e.g. aluminum).
- The LED Linear Allround modules are built-in modules and have no IP-classification (IPOO). They are not designed for operation in "open air". 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.
- A parallel connection of the modules is not allowed.
- 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

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Assembly and Safety Information

- The photobiological safety of the LED modules must be classified into risk groups in accordance with EN 62471: 2008.
 - general lighting
exempt group: WU-M-541-SQ5/xx
 - other applications
risk group 2: WU-M-541-SQ5/xx



Assessment in acc. with IEC/TR 62778:

Given a clearance of more than d_{\min} , within which the lighting intensity limit of $E_{\text{thr}} = 740 \text{ lx}$ is attained, the classification goes down to risk group 1.

Applied Standards

EN 62031

LED modules for general lighting – Safety specifications



EN 62471

Photobiological safety of lamps and lamp systems

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.

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