

LINEAR LED BUILT-IN MODULES

T5/T8 REPLACEMENT



LUGA LINE 2016 LED MODULES COB FOR LINEAR LIGHTING

DML059C*FC**

Typical Applications

Built-in luminaires/general illumination

- Office lighting
- Retail lighting
- T5/T8 replacement as built-in module
- Furniture lighting

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■ **LONG SERVICE LIFETIME: 50,000 H (L90, B10)**

■ **NARROW COLOUR TOLERANCE: 3 MACADAM**

■ **HIGHLY EFFICIENT: UP TO 166 LM/W AT $T_p = 65^\circ\text{C}$**

■ **SPECIAL COLOURS (PEARL WHITE)
WITH BRILLIANT WHITE EFFECT**

■ **COB TECHNOLOGY (CHIP-ON-BOARD)**
homogeneous light field (no individual light points visible),
perfect for use with reflectors

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Technical Notes

- LED built-in module for integration into luminaires
- Dimensions: 280x15 mm
- Typ. driving current: 350 mA, 500 mA, 700 mA, 1050 mA
- Colour accuracy initially: 3 SDCM per BIN; 4 SDCM colour shift after 50,000 hrs.



Electrical Characteristics

at $t_p = 65^\circ\text{C}$

Type	Typ. voltage DC* (V)				Temperature coefficient mV/K	Typ. power consumption* (W)			
	350 mA	500 mA	700 mA	1050 mA		350 mA	500 mA	700 mA	1050 mA
DML059***FC	14.9	15.7	16.7	18.3	-7	5.2	7.9	11.7	19.3

*Voltage and power tolerance: $\pm 10\%$

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 range at t_c -point		Ambient temperature range		Storage temperature range		Max. allowed repetitive peak current (mA)	Max. permitted output voltage of operating device V
		$^\circ\text{C min.}$	$^\circ\text{C max.}$	$^\circ\text{C min.}$	$^\circ\text{C max.}$	$^\circ\text{C min.}$	$^\circ\text{C max.}$		
DML059***FC	≤ 700	-40	+95	-40	+40	-40	+105	1800	150
	> 700	-40	+85						

Optical Characteristics

at $t_p = 65^\circ\text{C}$

Type	Ref. No.	Colour	Correlated colour temperature* K	Typ. luminous flux** and efficiency at								Typ. beam angle ($^\circ$)	Typ. CRI R_a	Photometric Code
				350 mA		500 mA		700 mA		1050 mA				
				lm	lm/W	lm	lm/W	lm	lm/W	lm	lm/W			
DML059C27FC	561627	warm white	2700	770	148	1080	137	1470	126	2105	109	120	82	827/349
DML059C30FC	561628	warm white	3000	800	154	1120	142	1530	131	2185	113	120	82	830/349
DML059C30FBC	561629	warm white	3000 (below BBL)	755	145	1060	134	1445	124	2060	107	120	82	830/349
DML059C35FC	561630	neutral white	3500	820	158	1145	145	1565	134	2240	116	120	82	835/349
DML059C40FC	561631	neutral white	4000	850	163	1185	150	1625	139	2325	120	120	84	840/349
DML059C40FBC	561632	neutral white	4000 (below BBL)	790	152	1110	141	1510	129	2160	112	120	84	840/349
DML059C50FC	561633	cold white	5000	865	166	1210	153	1655	141	2365	123	120	84	850/349
DML059C65FC	561634	cold white	6500	855	164	1195	151	1635	140	2340	121	120	84	865/349
DML059S31FPC	561635	pearl white	3100	675	130	945	120	1290	110	1845	96	120	95	931/349

* Colour tolerance: 3 MacAdam | ** Production tolerance of luminous flux and efficiency: $\pm 10\%$ | Min. CRI R_a : $> 80 / > 90$

Minimum order quantity: 60 pcs.

Operating Life

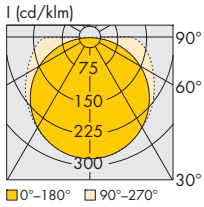
at $t_p = 65^\circ\text{C}$

Lumen maintenance	DML059***FC		
	I_f 350 mA	I_f 700 mA	I_f 1050 mA
L90/B10	60,000 hrs.	55,000 hrs.	50,000 hrs.
L80/B10	80,000 hrs.	75,000 hrs.	70,000 hrs.
L70/B10	90,000 hrs.	85,000 hrs.	80,000 hrs.

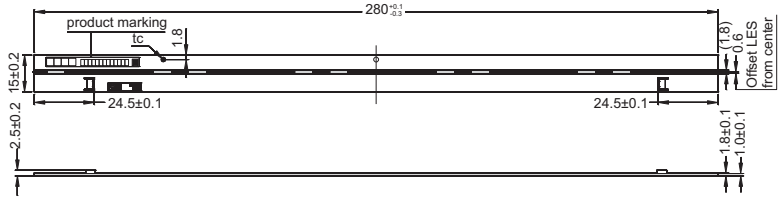
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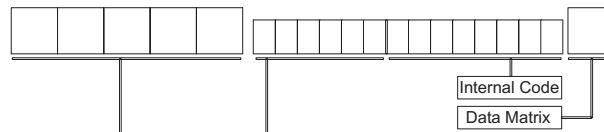
Typical Light Distribution Curve



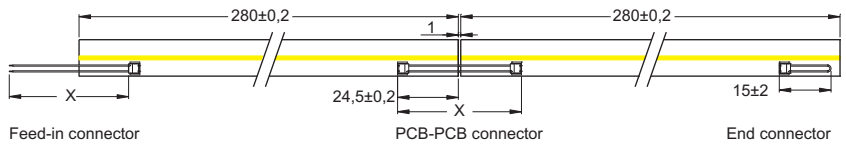
Mechanical Dimensions



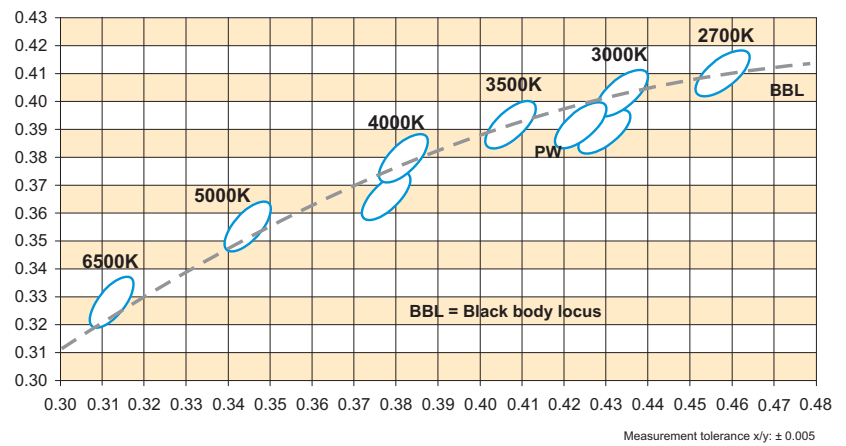
Product Code



Code 1	Code 2	Product Name
27CCF	59C27F	DML059C27FC
30CCF	59C30F	DML059C30FC
30BCF	59B30F	DML059C30FBC
35CCF	59C35F	DML059C35FC
40CCF	59C40F	DML059C40FC
40BCF	59B40F	DML059C40FBC
50CCF	59C50F	DML059C50FC
65CCF	59C65F	DML059C65FC
31SCF	59S31F	DML059S31FPC



Bins



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Accessories for LUGA Line 2016

Connectors with other lead lengths on request

Feed-in connector

Feed in connector for power supply

Colour: - black

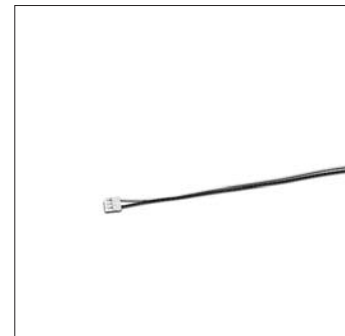
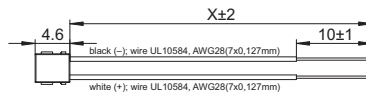
+ white

Max. permissible current: 1.5 A

Number of strands: 2 (Strand diameter: 0.09 mm²/AWG28)

Ref. No.: 551131 X = 310 mm

Ref. No.: 550952 X = 610 mm



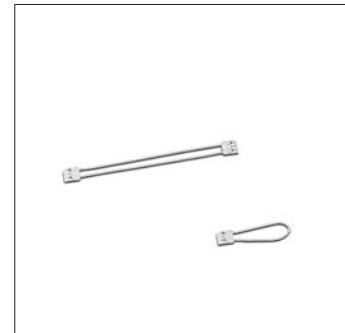
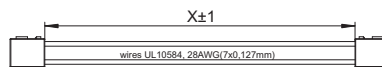
PCB-PCB connector

Max. permissible current: 1.5 A

Ref. No.: 551129 X = 41 mm

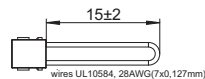
Ref. No.: 549993 X = 61 mm

Ref. No.: 549992 X = 220 mm



End connector

Ref. No.: 551132



Plastic holder for LUGA Line modules

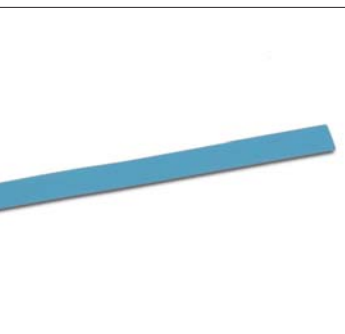
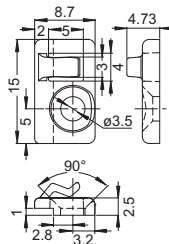
For fixing LUGA Line modules

Fixing hole for countersunk screw M3

With cable holder

Min. 2.5 pcs. per LUGA Line module needed

Ref. No.: 551039



Thermally Conductive Adhesive Transfer Tapes

Dimension: 278x13 mm

Ref. No.: 548179

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.

- 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 could 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
- Please ensure the correct polarity of the leads prior to commissioning. Reversed polarity can destroy the modules.
- For interconnection of the LED modules three different connectors are available:
 - Feed-in cable (Ref. No. 550952, 551131)
 - PCB-PCB-connector (Ref. No. 551129, 549992, 549993)
 - End-connector (Ref. No. 551132)
- Safety regulations acc. to EN 60598 (or further standards) has to be observed if the maximum output voltage exceed the permitted touchable value.
- Max. number of modules connected in series: 5
- 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.
 - All modules that are wired in parallel must be thermally connected (same temperatures at all LED modules).
- To ensure problem-free operation, the specified maximum temperature at the t_c 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.
- Measurement tolerances:
 - luminous flux: $\pm 7\%$
 - voltage: $\pm 3\%$
 - CRI: $\pm 1\%$
- LED modules must be attached in such a way as to ensure that any temperature-related material tension between the (ceramic) LED module and the substrate of the luminaire (e.g. aluminium) can be balanced out. VS recommends using (non-adhesive) thermally conductive paste in combination with mechanical fixing clips, which must allow the module to expand in a lateral direction on the substrate surface. In addition, Vossloh-Schwabe provides a thermally conductive adhesive transfer pad (Ref. No. 548179) that can also balance out any material stresses. Care must be taken to check whether the luminaire/application is suitable for use with adhesive transfer pads given the respective material and ambient conditions. A space of at least 0.5 mm must be left between any two modules.
- Products equipped with adhesive transfer tape must only be applied to dry and clean surfaces that are free from grease, oil, silicone or other soiling. It is therefore recommended to clean the substrate with isopropyl alcohol (IPA). Please ensure a full-surface bond over the entire contact area when sticking the module to the substrate. The following substances are regarded as critical for creating an adhesive bond:
 - Polyefins (polyethylene, polypropylene)
 - Rubber
 - Powder-coated materials
 - Silicone rubber
 - TeflonOwing to the varying application options and different types of surface as well as ambient conditions, VS accepts no liability for the quality of the adhesive bond achieved when mounting these products. Prior to sticking a VS product care must be taken to check whether the material in question is actually suitable for the intended purpose under consideration of all possible application-relevant influences. Supplementary holders must be used if necessary.
- 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.

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Assembly and Safety Information

- 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 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. Assessment of risk groups in acc. with IEC/TR 62778: risk group 1

Applied Standards

EN 62031

LED modules for general lighting – Safety specifications



pending

EN 62471

Photobiological safety of lamps and lamp systems