LUGA Line RX Gen. 2 – LED Modules COB for Linear Lighting

LINEAR LED
BUILT-IN MODULES
T5/T8 REPLACEMENT

LUGA LINE RX GEN. 2
LED MODULES COB FOR LINEAR LIGHTING

DML068***GR (280 mm)
DML028***GR (93 mm)

Typical Applications
Built-in luminaires/general illumination
- Office lighting
- Retail lighting
- T5/T8 replacement as built-in module
- Furniture lighting

- LONG SERVICE LIFETIME: UP TO 100,000 H (L70, B10)
- NARROW COLOUR TOLERANCE: 3 MACADAM
- HIGHLY EFFICIENT: UP TO 180 LM/W AT Tp = 65 °C
- SPECIAL COLOURS (3000 K / 4000 K) WITH BRILLIANT WHITE EFFECT (PEARL WHITE)
- COB TECHNOLOGY (CHIP-ON-BOARD)
  homogeneous light field (no individual light points visible), perfect for use with reflectors
- VDE PENDING
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Technical Notes

- LED built-in module for integration into luminaires
- Dimensions: 280x18.4 mm and 93x18.4 mm
- Driving current: up to 1050 mA
- On-board push-in terminals (WAGO 2059)
- Colour accuracy initially: 3 SDCM per BIN;
  4 SDCM colour shift after 50,000 hrs.

Electrical Characteristics

at $T_p = 65 °C$

<table>
<thead>
<tr>
<th>Type</th>
<th>Typ. voltage DC* (V)</th>
<th>Typ. power consumption* (W)</th>
<th>Temperature coefficient</th>
<th>Typ. current</th>
<th>Typ. current</th>
<th>Typ. current</th>
<th>Typ. current</th>
<th>Typ. current</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>250 mA</td>
<td>350 mA</td>
<td>500 mA</td>
<td>700 mA</td>
<td>1050 mA</td>
<td>1250 mA</td>
<td>1500 mA</td>
<td>1750 mA</td>
</tr>
<tr>
<td>DML068**GR</td>
<td>16.5</td>
<td>16.8</td>
<td>17.2</td>
<td>17.8</td>
<td>18.8</td>
<td>-6.3</td>
<td>4.1</td>
<td>5.9</td>
</tr>
<tr>
<td>DML028**GR</td>
<td>5.6</td>
<td>5.6</td>
<td>5.7</td>
<td>5.9</td>
<td>6.2</td>
<td>-2.1</td>
<td>1.4</td>
<td>2</td>
</tr>
</tbody>
</table>

*Voltage and power tolerance: ±10 %

Maximum Ratings

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Operating current</th>
<th>Operation temperature range at $T_c$-point</th>
<th>Ambient temperature range</th>
<th>Storage temperature range</th>
<th>Max. allowed repetitive peak current (mA)</th>
<th>Max. permitted output voltage of operating device (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All types</td>
<td>≤ 500</td>
<td>-40</td>
<td>+110</td>
<td>-40</td>
<td>+40</td>
<td>-40</td>
</tr>
<tr>
<td>700</td>
<td>-40</td>
<td>+105</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1050</td>
<td>-40</td>
<td>+85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Optical Characteristics

at $T_p = 65 °C$

<table>
<thead>
<tr>
<th>Type</th>
<th>Ref. No.</th>
<th>Colour</th>
<th>Correlated colour temperature* (K)</th>
<th>Typ. luminous flux** and efficiency at 250 mA (lm/W)</th>
<th>Typ. luminous flux** and efficiency at 350 mA (lm/W)</th>
<th>Typ. luminous flux** and efficiency at 500 mA (lm/W)</th>
<th>Typ. luminous flux** and efficiency at 700 mA (lm/W)</th>
<th>Typ. luminous flux** and efficiency at 1050 mA (lm/W)</th>
<th>Beam angle*</th>
<th>Typ. CRI</th>
<th>Photometric code</th>
</tr>
</thead>
<tbody>
<tr>
<td>DML068C27GR</td>
<td>563239</td>
<td>warm white</td>
<td>2700</td>
<td>670</td>
<td>63</td>
<td>920</td>
<td>156</td>
<td>1265</td>
<td>147</td>
<td>1695</td>
<td>137</td>
</tr>
<tr>
<td>DML068C30GR</td>
<td>563240</td>
<td>warm white</td>
<td>3000</td>
<td>690</td>
<td>68</td>
<td>945</td>
<td>160</td>
<td>1300</td>
<td>151</td>
<td>1740</td>
<td>140</td>
</tr>
<tr>
<td>DML068C30GBR</td>
<td>563241</td>
<td>warm white</td>
<td>3000 (below BBL)</td>
<td>670</td>
<td>67</td>
<td>920</td>
<td>156</td>
<td>1265</td>
<td>147</td>
<td>1695</td>
<td>137</td>
</tr>
<tr>
<td>DML068C35GR</td>
<td>563242</td>
<td>neutral white</td>
<td>3500</td>
<td>705</td>
<td>72</td>
<td>960</td>
<td>164</td>
<td>1330</td>
<td>155</td>
<td>1780</td>
<td>144</td>
</tr>
<tr>
<td>DML068C40GR</td>
<td>563243</td>
<td>neutral white</td>
<td>4000</td>
<td>725</td>
<td>77</td>
<td>990</td>
<td>168</td>
<td>1370</td>
<td>159</td>
<td>1825</td>
<td>147</td>
</tr>
<tr>
<td>DML068C40GBR</td>
<td>563244</td>
<td>neutral white</td>
<td>4000 (below BBL)</td>
<td>700</td>
<td>71</td>
<td>960</td>
<td>163</td>
<td>1320</td>
<td>153</td>
<td>1770</td>
<td>143</td>
</tr>
<tr>
<td>DML068C50GR</td>
<td>563245</td>
<td>cool white</td>
<td>5000</td>
<td>740</td>
<td>80</td>
<td>1010</td>
<td>171</td>
<td>1395</td>
<td>162</td>
<td>1865</td>
<td>150</td>
</tr>
<tr>
<td>DML068C65GR</td>
<td>563246</td>
<td>cool white</td>
<td>6500</td>
<td>740</td>
<td>80</td>
<td>1010</td>
<td>171</td>
<td>1395</td>
<td>162</td>
<td>1865</td>
<td>150</td>
</tr>
<tr>
<td>DML068C31GPR</td>
<td>563247</td>
<td>pearl white</td>
<td>3100</td>
<td>560</td>
<td>137</td>
<td>770</td>
<td>131</td>
<td>1060</td>
<td>123</td>
<td>1420</td>
<td>115</td>
</tr>
</tbody>
</table>

* Colour tolerance: 3 MacAdam | ** Production tolerance of luminous flux and efficiency: ± 15 % | Min. CRI Ra: > 80 / > 90

Minimum order quantity (packaging unit): 30 pcs. (DML068); 60 pcs. (DML028)

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.
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Operating Life
at \( T_\text{op} = 65 ^\circ \text{C} \)

<table>
<thead>
<tr>
<th>Lumen maintenance</th>
<th>DML068/028***GR</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \leq 250 \text{ mA} )</td>
<td>( \geq 64,000 \text{ hrs.} )</td>
</tr>
<tr>
<td>( \leq 350 \text{ mA} )</td>
<td>( \geq 59,000 \text{ hrs.} )</td>
</tr>
<tr>
<td>( \leq 500 \text{ mA} )</td>
<td>( \geq 50,000 \text{ hrs.} )</td>
</tr>
<tr>
<td>( \leq 700 \text{ mA} )</td>
<td>( \geq 48,000 \text{ hrs.} )</td>
</tr>
<tr>
<td>( \leq 1050 \text{ mA} )</td>
<td>( \geq 32,000 \text{ hrs.} )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Luminous Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \geq 18,4 \text{ mA} )</td>
</tr>
</tbody>
</table>

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 420 V DC (basic insulation) and 215 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 270 V DC (basic insulation) and 150 V DC (reinforced insulation).

Max. diameter of screw head (M4): \( \varnothing 8 \text{ mm} \)
Torque: min. 0.3 Nm; max. 0.5 Nm

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. 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 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
- Please ensure the correct polarity of the leads prior to commissioning. Reversed polarity can destroy the modules.
- LED modules will be connected with two on-board push-in terminals (WAGO 2059).
- Safety regulations acc. to EN 60598 (or further standards) has to be observed if the maximum output voltage exceed the permitted touchable value.

- 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_{e} 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 (in addition to production tolerance):
  - luminous flux: ± 7 %
  - voltage: ± 3 %
  - CRI: ± 1 %
- 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:
- Polyethers (polyethylene, polypropylene)
- Rubber
- Powder-coated materials
- Silicone rubber
- Teflon

Owing 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.

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.