**Mains Characteristics**

- **Voltage range**: 198 VAC – 264 VAC
  - withstands min 176 VAC (max. 1 hour)
  - max 300 VAC (max. 1 hour)
- **DC range**: 176 VDC – 280 VDC
  - starting voltage > 190 VDC
- **Mains current at full load**: 95 – 120 mA
- **Frequency**: 0 / 50 Hz – 60 Hz
- **THD at full power**: < 15 %
- **Leakage current to earth**: < 0.3 mA
- **Tested surge protection**: 1 kV L-N, 2 kV L-GND (IEC 61000-4-5)
- **Tested fast transient protection**: 4 kV (IEC 61000-4-4)

**Insulation between circuits & driver case**

- **Mains circuit - Output**: Basic isolated
- **Mains & output - Driver case**: Basic insulation

**Load Output**

- **Output current (I_{out})**: 300 mA / 350 mA (default)
  - ± 5 %
  - < 2 %*, at ≤ 120 Hz
  - *Low frequency, LED load: Cree MX-3 LEDs or equivalent (total load dynamic resistance > 12 Ω)
- **U_{out} (max) [abnormal]**: 100 V
- **Start time**: < 1.1 s

<table>
<thead>
<tr>
<th>I_{out}</th>
<th>350 mA</th>
<th>300 mA</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCB Iset</td>
<td>Not removed</td>
<td>Removed</td>
</tr>
<tr>
<td>P_{out}(max)</td>
<td>21 W</td>
<td>19.5 W</td>
</tr>
<tr>
<td>U_{out}</td>
<td>40 – 60 V</td>
<td>45 – 65 V</td>
</tr>
<tr>
<td>λ at full load</td>
<td>0.97</td>
<td>0.97</td>
</tr>
<tr>
<td>Efficiency [η] at full load</td>
<td>0.86</td>
<td>0.86</td>
</tr>
</tbody>
</table>

*For more information how to use PCB Iset, please see the page 4.*
Operating window

![Graph showing operating window](image)

**Operating Conditions and Characteristics**

- Highest allowed $t_c$ point temperature: 80 °C
- Ambient temperature range: -20 °C ... +50 °C
- Storage temperature range: -40 °C ... +80 °C
- Maximum relative humidity: No condensation
- Life time (90 % survival rate)
  - 100,000 h, at $t_c = 70$ °C
  - 70,000 h, at $t_c = 75$ °C
  - 50,000 h, at $t_c = 80$ °C

**Quantity of drivers per miniature circuit breaker 16 A Type C**

<table>
<thead>
<tr>
<th>Based on $I_{ext}$</th>
<th>Based on inrush current $I_{peak}$</th>
<th>Typ. peak inrush current $I_{peak}$</th>
<th>1/2 value time, $\Delta t$</th>
<th>Calculated energy, $I_{peak}^2 \Delta t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>99 pcs.</td>
<td>110 pcs.</td>
<td>5 A</td>
<td>22 μs</td>
<td>0.0005 A²s</td>
</tr>
</tbody>
</table>
Connections and Mechanical Data

- **Wire size**: 0.5 mm² – 1.5 mm²
- **Wire type**: Solid core and fine-stranded
- **Wire insulation**: According to EN 60598
- **Maximum driver to LED wire length**: 1 m
- **Weight**: 153 g
- **IP rating**: IP20

Connections

![Diagram of LED Driver LL1x21-CC](image)

**Note:**
- Not suitable for load side switching operation

Dimensions (mm)

![Dimensions Diagram](image)
Using the PCB Iset current selection

1) To configure the LL1x21-CC for 300 mA output, the pre-cut piece of PCB must be removed. The piece is located next to input connector PE terminal, please see the illustration of PCB Iset piece in the Figure 1.

2) The recommended tool for removing the PCB Iset piece is side-cutting pliers, as seen in the Figure 2.

3) First cut the side of the PCB Iset piece following the pre-cut line, as seen in the Figure 3.

4) Next, snap the PCB Iset piece off of the main PCB.

5) Remove the piece completely, as seen in Figure 4.

6) Take special attention, that:
   - cutting surface has clean finish without any cracks on the PCB
   - the PCB Iset piece does not get stuck under the main PCB
   - the connector or the main PCB does not get damaged
   - the insulating film does not get damaged.

7) After removing the PCB Iset piece, please note that the mains circuit PCB tracks are nearer to the PCB edge. Make sure, that the access to the conductor terminals and the part where the piece has been removed is restricted, for example by the luminaire design or by sufficient instructions and markings.

LL1x21-CC LED driver is suited for built-in usage in luminaires. With LL1x2130-SR strain reliefs, independent use is possible too (see the LL1x2130-SR datasheet for details). In order to have safe and reliable LED driver operation, the LED luminaires will need to comply with the relevant standards and regulations (e.g. IEC/EN 60598-1). The LED luminaire shall be designed to adequately protect the LED driver from dust, moisture and pollution. The luminaire manufacturer is responsible for the correct choice and installation of the LED drivers according to the application and product datasheets. Operating conditions of the LED driver may never exceed the specifications as per the product datasheet.

Installation & operation

Maximum ambient and $t_c$ temperature:

- For built-in components inside luminaires, the $t_a$ ambient temperature range is a guideline given for the optimum operating environment. However, integrator must always ensure proper thermal management (i.e. mounting base of the driver, air flow etc.) so that the $t_c$ point temperature does not exceed the $t_c$ maximum limit in any circumstance.
- Reliable operation and lifetime is only guaranteed if the maximum $t_c$ point temperature is not exceeded under the conditions of use.

Lamp failure functionality

No load
When open load is detected, driver limits output voltage according to $U_{out}$ (max) (abnormal).

Short circuit
Driver can withstand output short circuit.

Conformity & standards

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Particular safety requirements for DC or AC supplied electronic control gear for LED modules</td>
<td>EN 61347-2-13: 2014</td>
</tr>
<tr>
<td>Thermal protection class</td>
<td>EN 61347, C5e</td>
</tr>
<tr>
<td>Mains current harmonics</td>
<td>EN 61000-3-2: 2014</td>
</tr>
<tr>
<td>Limits for voltage fluctuations and flicker</td>
<td>EN 61000-3-3: 2013</td>
</tr>
<tr>
<td>Radio frequency interference</td>
<td>EN 55015: 2013</td>
</tr>
<tr>
<td>Immunity standard</td>
<td>EN 61547: 2009</td>
</tr>
<tr>
<td>Compliant with relevant EU directives</td>
<td></td>
</tr>
<tr>
<td>RoHS / REACH compliant</td>
<td></td>
</tr>
<tr>
<td>CE Marked</td>
<td></td>
</tr>
</tbody>
</table>

Label symbols

Thermally controlled control gear, incorporating means of protection against overheating to prevent the case temperature under any conditions of use from exceeding 130 °C.