LL1x21-CC

1x21 W **Constant Current** LED driver

freedom in lighting **Helvar**

21 W 220 – 240 V 0 / 50 – 60 Hz

- Maximum 21 W load
- PCB Iset (patent pending) for setting the output current
- Low current ripple, complying with IEEE 1789 recommendation
- Load output is basic isolated from the mains
- Driver protection Class I
- Suitable for Class I luminaires
- Open & short circuit protection
- Protected up to 2 kV power network fast transients

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	2 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)
Accuracy	± 5 %
Ripple	< 2 %*, at ⩽ 120 Hz

*) Low frequency, LED load: Cree MX-3 LEDs

PstLM	< 0.2*
SVM	< 0.04*

*) At full power, measured with Cree XP-G LED modules.

U_{out} (max) (abnormal)	100 V
Start time	< 1.1 s

I_{out}	350 mA	300 mA
PCB Iset	Not removed	Removed
P_{out}(max)	21 W	19.5 W
U_{out}	40 – 60 V	45 – 65 V
λ at full load	0.97	0.97
Efficiency (n) at full load	0.86	0.86

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

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Operating window

Driver performance

Typical efficiency, 300 mA

- 300 mA, 220 VAC input
- 300 mA, 230 VAC input
- 300 mA, 240 VAC input

Typical power factor, 300 mA

- 300 mA, 220 VAC input
- 300 mA, 230 VAC input
- 300 mA, 240 VAC input

Typical efficiency, 350 mA

- 350 mA, 220 VAC input
- 350 mA, 230 VAC input
- 350 mA, 240 VAC input

Typical power factor, 350 mA

- 350 mA, 220 VAC input
- 350 mA, 230 VAC input
- 350 mA, 240 VAC input
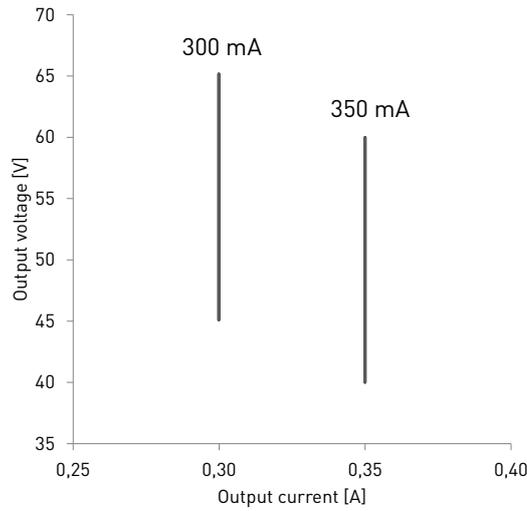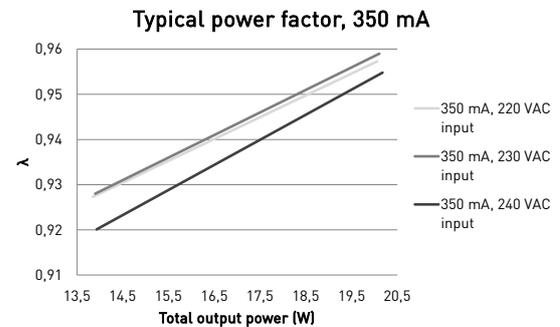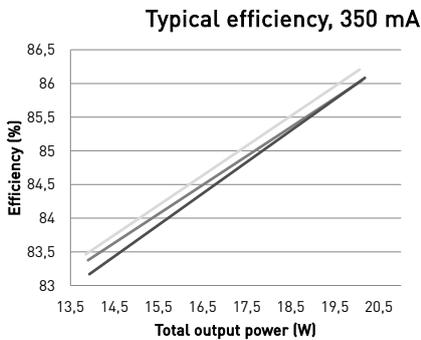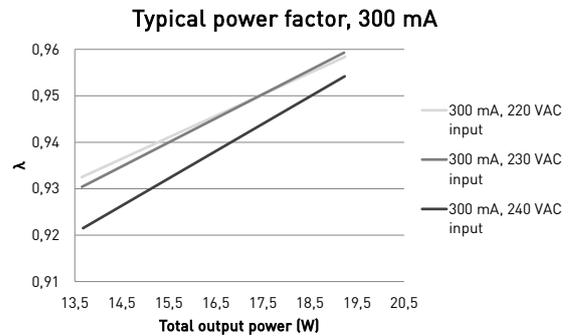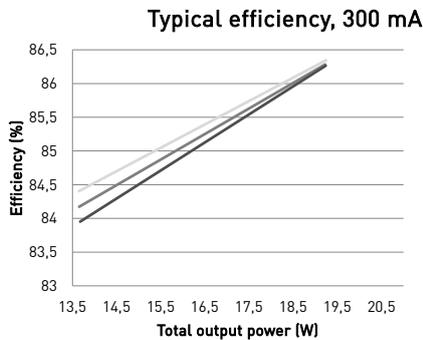
Operating Conditions and Characteristics

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

Based on I_{cont}	Based on inrush current I_{peak}	Typ. peak inrush current I_{peak}	1/2 value time, Δt	Calculated energy, $I_{peak}^2 \Delta t$
99 pcs.	110 pcs.	5 A	22 µs	0.0005 A²s

LL1x21-CC

Connections and Mechanical Data

Wire size	0.5 mm^2 – 1.5 mm^2
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
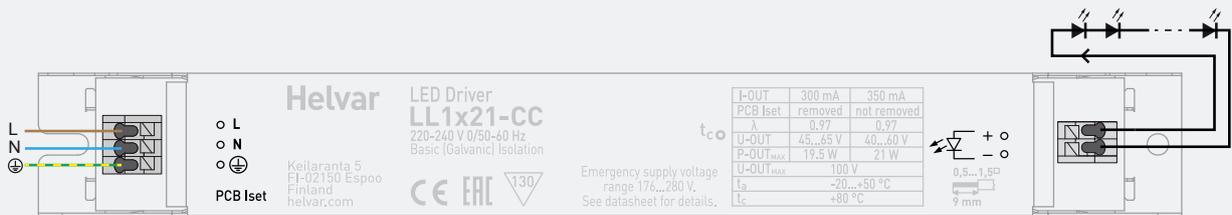
Note:

• *Not suitable for load side switching operation*

Dimensions (mm)
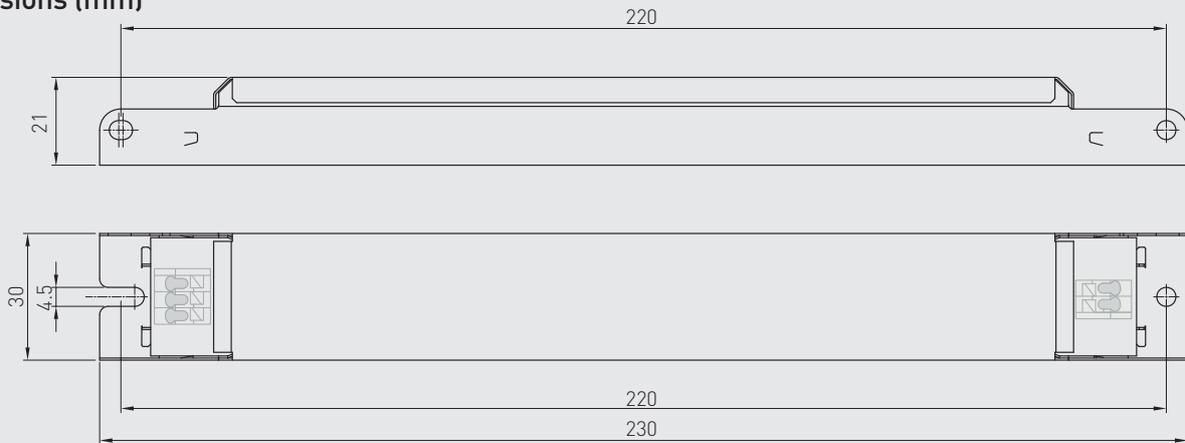
Using the PCB Iset current selection

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 examply by the luminaire design or by sufficient instructions and markings.
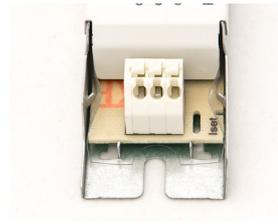
Figure 1.

Figure 2.

Figure 3.

Figure 4.

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 Uout (max) (abnormal).

Short circuit

Driver can withstand output short circuit.

Conformity & standards

General and safety requirements	EN 61347-1
Particular safety requirements for DC or AC supplied electronic control gear for LED modules	EN 61347-2-13
Thermal protection class	EN 61347, C5e
Mains current harmonics	EN 61000-3-2
Limits for voltage fluctuations and flicker	EN 61000-3-3
Radio frequency interference	EN 55015
Immunity standard	EN 61547
Performance requirements	EN 62384
Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers	IEEE 1789-2015
Compliant with relevant EU directives	
RoHS / REACH compliant	
CE / UKCA Marked	

Label symbols

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