1. Functional Description

The AMG-LL79X is a family of step down regulator modules for LED lighting applications. By providing a highly efficient constant current regulation from an AC or DC source, the AMG-LL79X is perfectly suited for applications that require no isolation and require a small form factor.

2. Features

- ❑ Supply voltage 12VAC...280VAC, 18VDC...400VDC
- ❑ Constant current output versions 20mA, 30mA, 50mA
- ❑ Low current ripple (<10% Ipp)
- ❑ Capable of driving ...25 white LEDs
- ❑ Up to 93% efficiency
- ❑ Average lifetime >100 000h
- ❑ Module size: LL790/LL791 – 20mm x 13mm x 12mm
  LL792/LL793 – 25mm x 20mm x 12mm
- ❑ RoHS compliant

3. Application

The AMG-LL79X is suitable for driving single LED in low power luminaire, indication and decoration lights.

3.1. Application Circuit Drawing

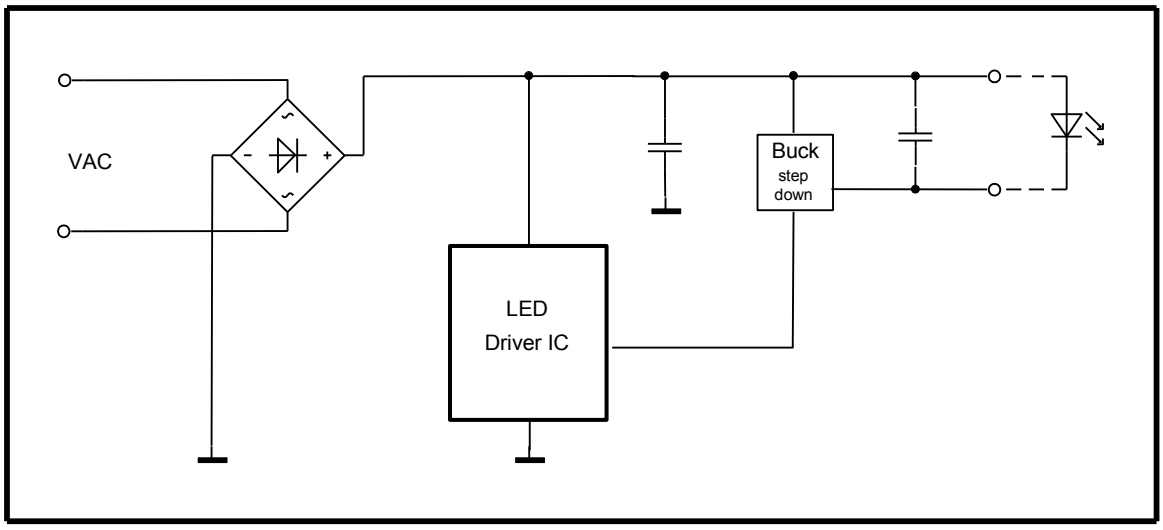

Figure 1: Simplified application example

3.2. Application Notes

The module can be operated directly off the mains. As such, all applicable safety rules and guidelines have to be observed. Specifically, but not limited, during test and evaluation.

Warning, High Voltage!

Caution: Exposed voltage on the circuit board. Working with line voltage is dangerous! Electrical shock above 42V can be life threatening! Use only under the supervision of qualified personnel! Use only in a laboratory environment! Ensure all applicable safety regulations are observed.

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4. Picture

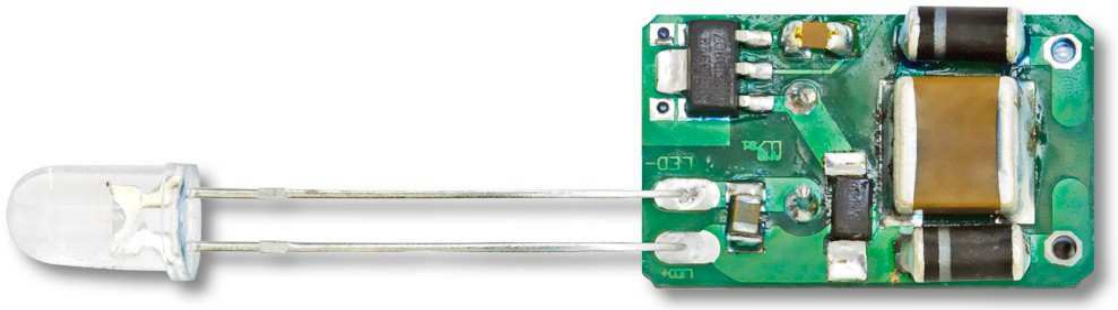
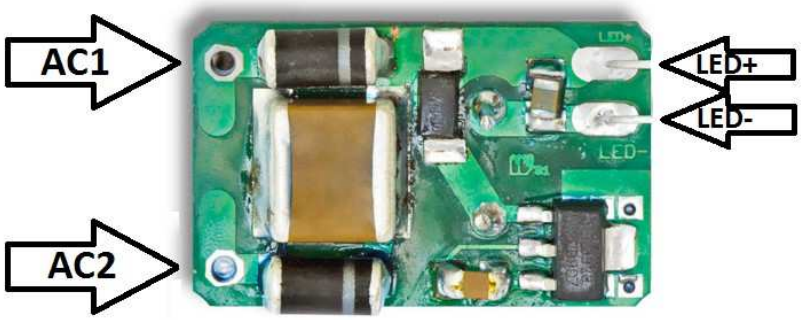


Figure 2: Example Picture

5. Pinning

Symbol	Description
AC1	Supply voltage input. Apply a DC voltage of 18V to 400V or an AC voltage of 12 to 280V here. The input is not protected against over voltage and over power.
AC2	Supply voltage return input.
LED+	Positive output for LED, connect the anode of the first LED of the string to this pin.
LED-	Negative output for LED, connect the cathode of the last LED of the string to this pin. This pin is not identical to GND!



6. Absolute Maximum Ratings

The Absolute Maximum Ratings may not be exceeded under any circumstances.

#	Parameter	Min	Max	Unit
1	Supply Voltage	0	420	VDC
2	Supply Current		I_{LED} + 10mA	mA
3	Ambient Temperature*	-40	+85	°C

Note(s):

1. * - in still air

7. Electrical Characteristics

7.1. Operational Range

#	Symbol	Parameter	Min	Max	Unit
1	V_{in}	Supply Voltage	12	280	VAC
			18	400	VDC
2	I_{LED}	Average LED Current LL790	13	27	mA
		Average LED Current LL791	29	38	
		Average LED Current LL792	35	65	

Note(s):

8. Application

8.1. Thermal Precautions

When operating at elevated ambient temperature, vertical mounting in an air volume sufficiently large enough to allow convection is recommended to reduce surface temperature of the module. Additional cooling measures can help to further reduce the module temperature and increase long term reliability. No part of the module surface may exceed 85°C during the operation at any time.

8.2. Failure Modes

The most common failure mode occur when the module is destroyed due to over temperature or over voltage.

8.3. Recommended Safety Measures

Materials with low flash points must be kept away from the module. The surface temperature of parts on the module may reach up to 85°C surface temperature when used at elevated ambient temperatures and maximum power.

8.4. Application Notes

a) Connecting the LEDs

The maximum of LEDs that can be driven by the Module depends on the supply voltage and the combined forward voltage of the LEDs. Supply voltage needs to be approximately 25% higher than the total forward voltage of the LED string for the proper operation.

b) EMC

The module has been designed to produce a minimal level of EM emissions. On the module level, this product cannot be EMC approved.

c) Efficiency

The modules efficiency depends on a number of parameters. Since there are a couple of constant losses independent of the total power delivered by the module the basic rule is that the module is more efficient when used at high power (e.g. more LEDs connected). A lower difference between input and output voltage does also increase efficiency.

d) Output current

The output current varies somewhat depending on the forward voltage of LEDs and the input voltage.

e) Reliability

The reliability data is based on the data provided by component manufacturers:

Failure Rate (FIT): 190,5 * $10^{-9}h^{-1}$

Mean Time to Failure (MTTF): 5249343,8h
Average Lifetime: 100300h

all @25°C

f) Isolation

The module is coated with an isolation film to protect it against creepage caused by humidity. This isolation coat can be soldered through for attaching the connecting cables. Care needs to be taken during the mounting process to not damage the isolation coat.

g) Mounting

When mounting on a conductive surface make sure to add spacers or an insulating layer under the module to avoid short circuits.

9. Ordering Information

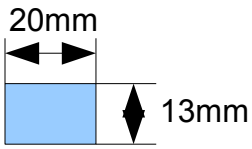
Order Code	Color Code	Description
AMG-LL790-IPM04E		20mA avg. LED current
AMG-LL791-IPM04E		30mA avg. LED current
AMG-LL792-IPM04E		50mA avg. LED current

Note(s):

10. Module Dimensions

a) LL790/LL791

Length: 20mm
Width: 13mm

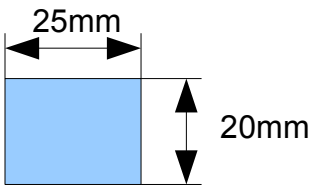


Height at thickest point: 12mm

Outer Contour: ±0.2mm

b) LL792

Length: 25mm
Width: 20mm



Height at thickest point: 12mm

Outer Contour: ±0.2mm

11. Notes and Cautions

11.1. ESD Protection

The Requirements for Handling Electrostatic Discharge Sensitive Devices are described in the JEDEC standard JESD625-A. Please note the following recommendations:

- When handling the device, operators must be grounded by wearing a for the purpose designed grounded wrist strap with at least 1MΩ resistance and direct skin contact.
- Operators must wear at all times ESD protective shoes or the area should be surrounded by for ESD protection intended floor mats.
- Opening of the protective ESD package that the device is delivered in must only occur at a properly equipped ESD workbench. The tape with which the package is held together must be cut with a sharp cutting tool, never pulled or ripped off.
- Avoid any unnecessary contact with the device or any unprotected conductive points.
- Only use qualified and grounded tools, measuring equipment, casing and workbenches.
- Outside properly protected ESD-areas the device or any electronic assembly that it may be part of should always be transported in EGB/ESD shielded packaging.

12. Disclaimer

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13. Contact Information

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