

VEGA 07 SERIES



Multi Spectral Light Source



DS 45005-01

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Index

DESCRIPTION	3
LED-BASED MODULE – Features	3
LED-CHANNELS	4
SPECTRAL MODULATION	5
COLORIMETRIC RESULTS: COLOR MATCHING and STABILITY OVER TIME	6
PHOTOMETRIC DATA.....	6
ELECTRICAL SPECIFICATIONS	7
MECHANICAL DIMENSIONS	8
THERMAL MANAGMENT	9
HEAT SINK MOUNTING INTERFACE.....	9
HEAT SINK DIMENSIONING.....	10
PCB THERMAL PROTECTION	10
FEATURES - SUMMARY	11
MAINTENANCE AND SERVICE.....	12
WARNING AND SAFETY.....	12
ENVIRONMENTAL AND DISPOSAL COMPLIANCE.....	12
WARRANTY	13

DESCRIPTION

The VEGA 07 module is the most advanced light engine from LEDMOTIVE. It's built up with seven different colored (or channel) high output power LED to provide with a versatile multispectral light source in the visible range of the electromagnetic spectrum for smart lighting solutions. Light can be dimmed down to 5% of the full power for each color independently. The LED module can deliver either white light or any light spectrum from the modulation of each of its different channels separately. Being a standard LED technology no warm up time is required.



Figure 1. VEGA 07 side view

Embedded in the VEGA 07 module are the driver electronics for precise control of current, PWM and light output control, as well as an optical device for sensing purposes. A closed feedback loop allows for color matching with a target value and provides stability to avoid drifts in time due to thermal or ageing effects.

LED-BASED MODULE – Features

- High power multi-spectral LED module engine
- Built up with 7 different (colored) LED types
- Independent color channel dimming
- Precise, accurate and stable light emission
- Light emitting surface of 23mm
- Compact and light weight system
- No warm up required
- Optical feedback control with proprietary color science algorithms.
- Overheat temperature protection limit control.
- The default wired communication is based on a EIA-485 using the LEDMOTIVE LIGHT HUB® device
- Optional: Software tool to select the heat sink and analyze the thermal response.

LED-CHANNELS

The VEGA 07 module contains seven LED channels for multispectral reproduction. The spectral output covers the wavelength range from 420 nm to 730 nm as shown in Table 1 and Figure 2.

Channel	Color	Peak Emission (nm)	Radiometric value (W)	Photometric value(lm)	FWHM (nm)
CH 1	Royal Blue	455	1.26	45.7	23
CH 2	Blue	480	1.08	123.4	27
CH 3	Cyan	505	1.18	409.1	34
CH 4	Green	535	0.64	363.7	37
CH 5	Lime	550	2.2	971.4	117
CH 6	PC Amber	595	2.53	907.6	81
CH 7	Red	640	0.95	151.5	20

Table 1. LED channel physical description

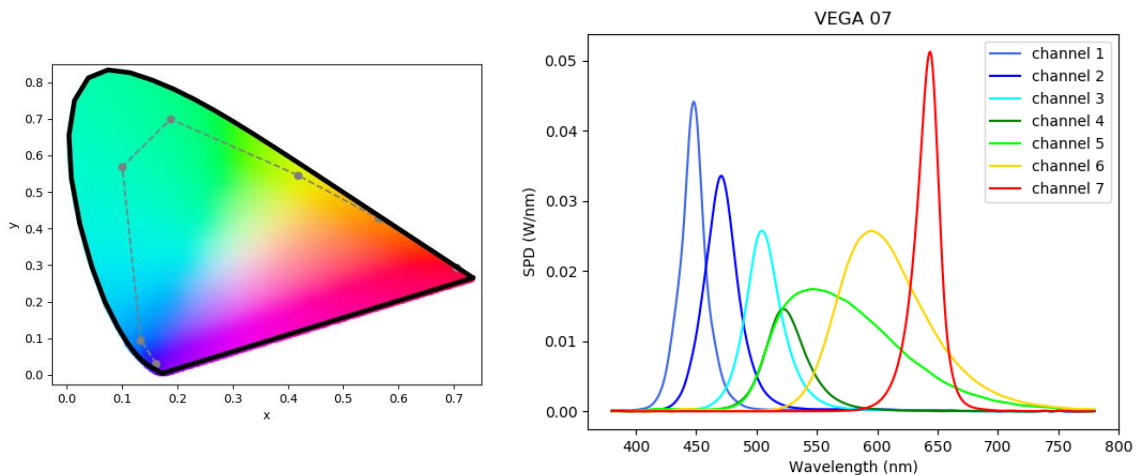


Figure 2. (left) CIE 1931 xy coordinates of the 7 channels that define the color gamut and (right) Spectral Power Distributions (SPDs) of each LED channel

Since the light output of the VEGA 07 module is generated by mixing 7 wavelength (color) channels, every spectrum is determined by 7 independent PWM signals. Consequently, the luminous flux is not constant across the 1931 CIE diagram. All active channels are mixed, providing with a smooth (uniform in color) light with a Lambertian pattern profile

SPECTRAL MODULATION

Product performance based on two different spectral modulations that reproduce a blackbody radiation curve at two different temperatures (2700 K and 6500 K) with a high CRI(Ra) value is shown in Figure 3:

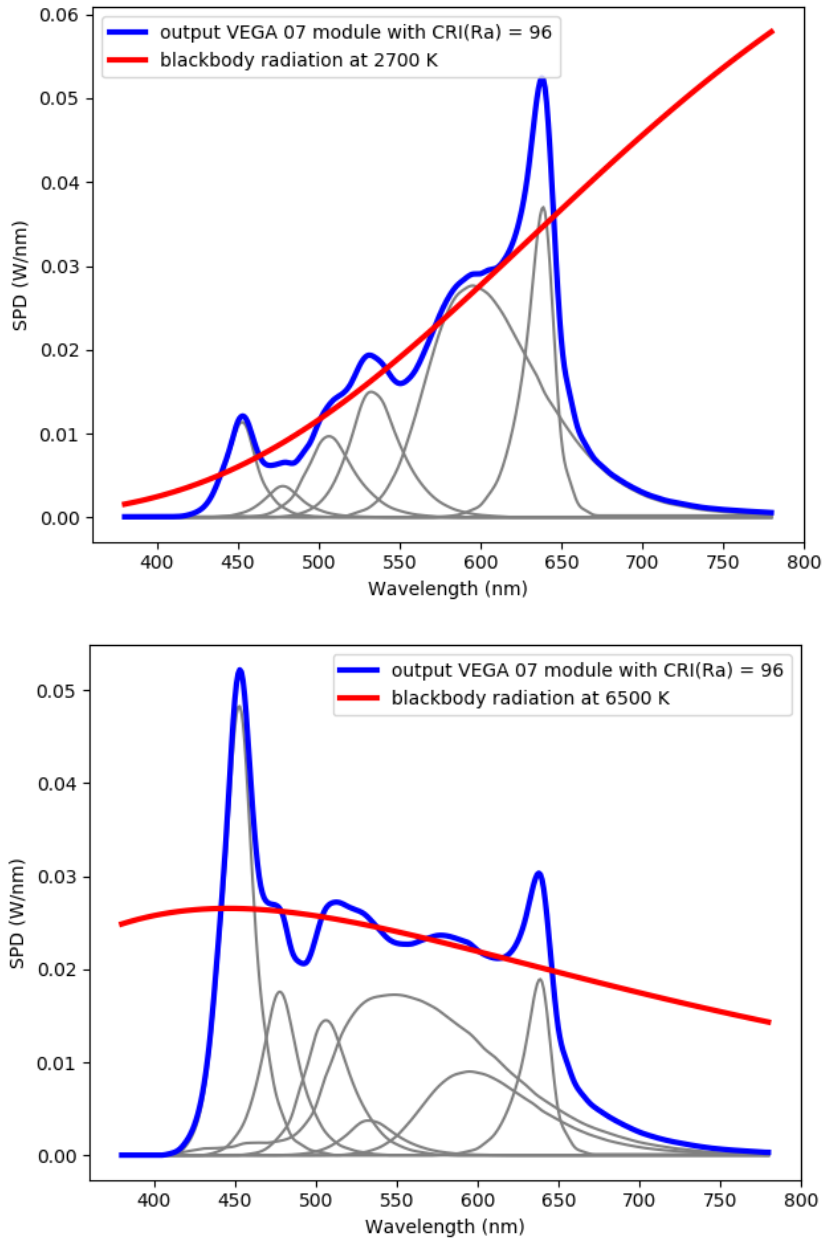


Figure 3. Example of two different spectral fittings (2700 K and 6500 K blackbody radiation)

COLORIMETRIC RESULTS: COLOR MATCHING and STABILITY OVER TIME

The typical color matching and stability is shown in Figure 4 and is based on a variety of different Correlated Color Temperatures (CCTs). The typical colorimetric response with the optical feedback loop enabled is $Duv' < 5 \times 10^{-3}$. All results are within the 2nd step Mac Adam ellipse from the ANSI C78.377-2015 specifications.

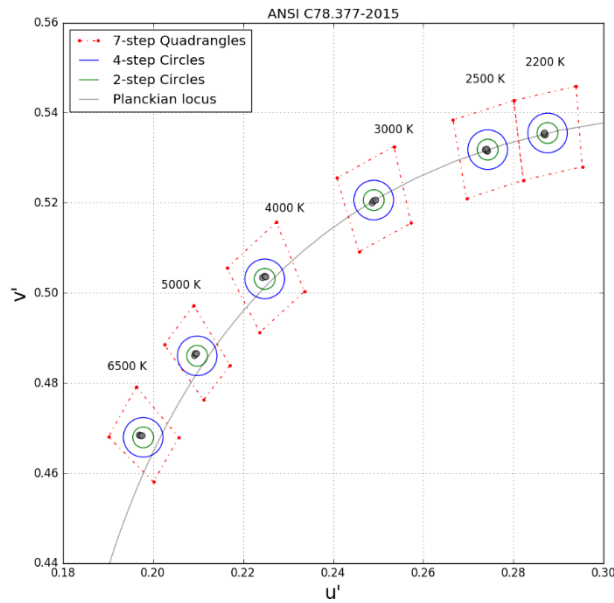


Figure 4. Color Matching and Stability response. Tolerance of ± 0.005 on x and y coordinates in the CIE 1931 color space

PHOTOMETRIC DATA

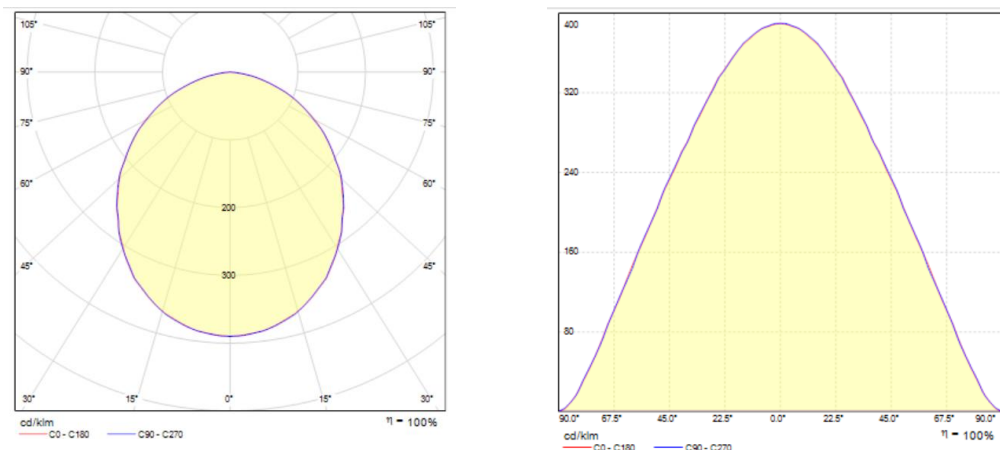


Figure 5. Light distribution

ELECTRICAL SPECIFICATIONS

Nominal Input Voltage	24 V DC (Constant Voltage) $\pm 5\%$
Max. Power Input	80 W (limited by firmware)
Max. Current Input	3.3 A* (limited by firmware)
Power and data connector	MOLEX 43025-0409
Data communication (A, B) control	LED MOTIVE proprietary protocol**

* fuse protection at 4.0 A

** based on a communication bus EIA-485 (also known as RS-485)

Table 2. Electrical specifications

Figure 6 shows the schematics of the VEGA 07 module displaying its different types of connectors and wiring connections. The 12 V denotes a fan power output, a 24V denotes an external power supply output and the A, B denotes the control communication signal entry points.

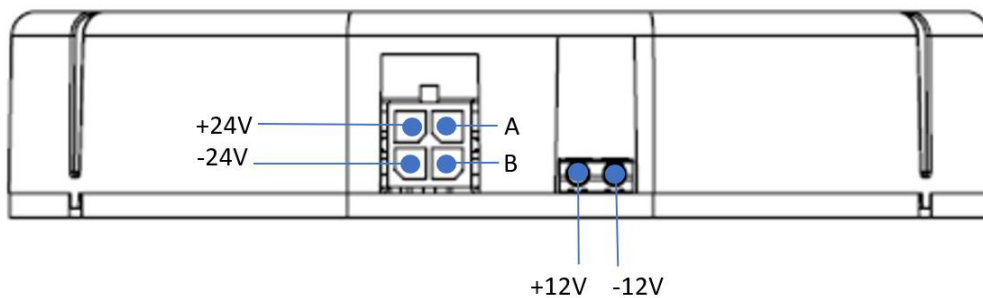


Figure 6. Wiring Schematics

The module includes a fan power connector in case an active cooling fan is attached to a heat sink and the LED module

Fan output voltage	12 V DC (Constant Voltage)
Fan power connector	MOLEX 104238-0210
Max fan output current	100 mA***

*** resettable fuse at 25°C

Table 3. fan connector details

MECHANICAL DIMENSIONS

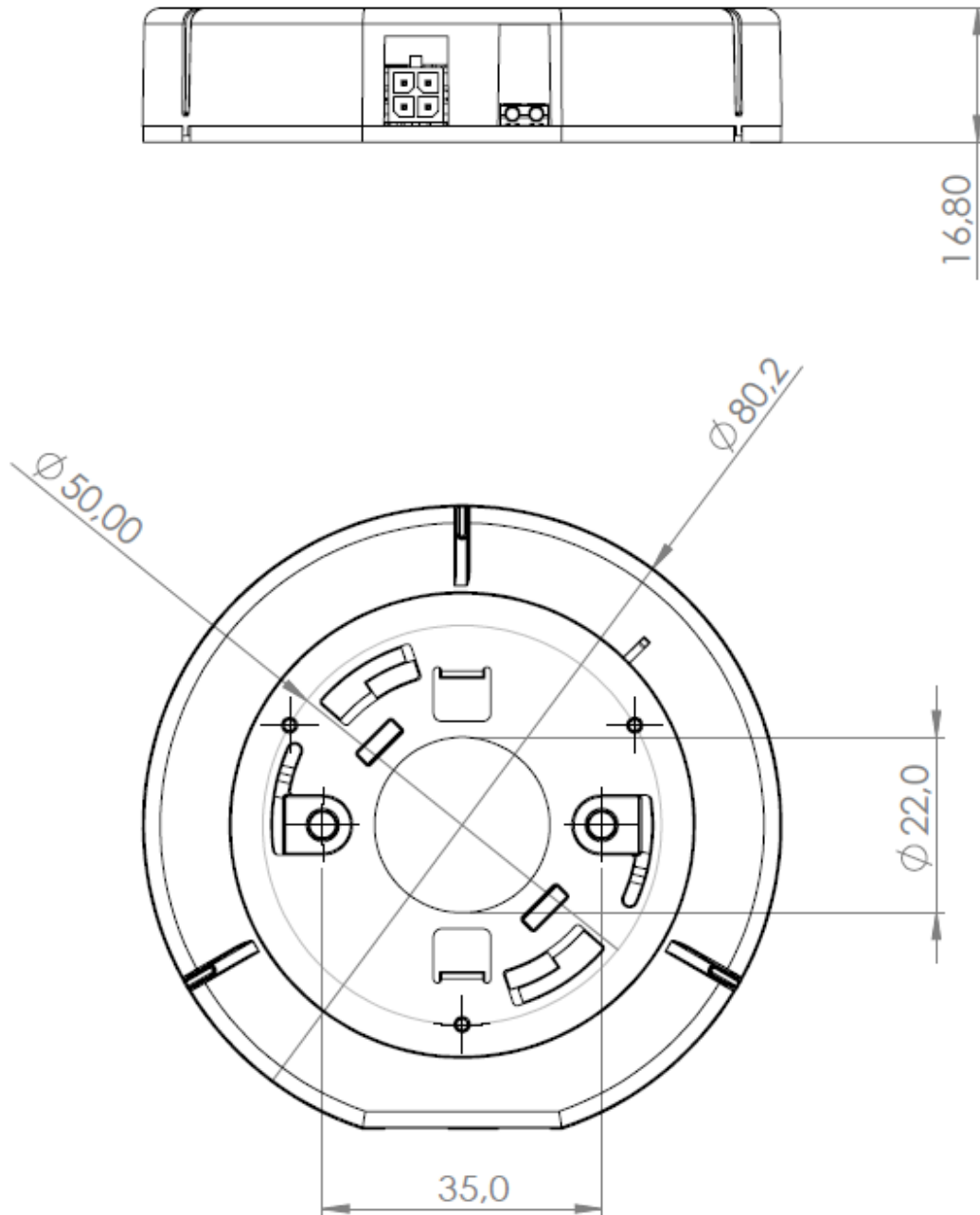


Figure 7. All dimensions are in millimeters (mm)

THERMAL MANAGMENT

A cooling component is needed to dissipate the heat away from the base of the VEGA 07 module. Either a passive heat sink or an active cooling with a fan can be used depending on a fixture size restriction. Active cooling is generally smaller but has moving parts while passive cooling is bigger and heavier.

VEGA 07 generates a maximum of 45 thermal power (W). The maximum temperature in the check point is indicated in Figure 8 and should not be higher than 80 °C

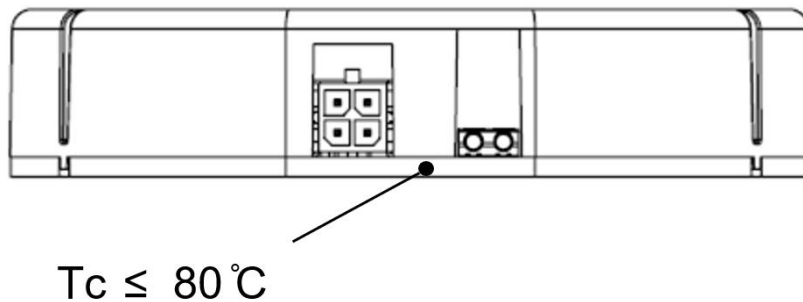


Figure 8. Thermal check point

HEAT SINK MOUNTING INTERFACE

The mounting holes for the heat sink are according to the Zhaga standard (book 10) with two holes 35 mm apart, as shown in Figure 9. Based on the current experience LEDMOTIVE recommends using heat sinks with thermal resistance $< 0.5\text{C/W}$.

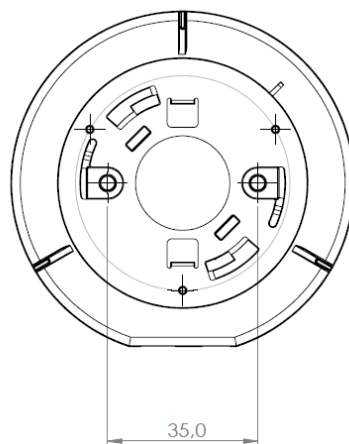


Figure 9. Mounting holes for the heat sink

HEAT SINK DIMENSIONING

In order to maximize the luminous flux, a proper heat sink needs to be selected accordingly.

As a reference value, testing* has been carried out to provide a reference value. A heat sink with a heat resistance of $R_{hs} \leq 1.2 \text{C/W}^*$ should be used. It is recommended to use thermal interface material between the module and the selected heat sink to reduce the thermal impedance. The heat dissipation is dependent of many variables such as the desired output spectrum, the dimming level, the luminaire design, the location of the luminaire in the ceiling, etc. Therefore, is it highly recommended to perform a test at least in the final luminaire configuration.

A specific software to check the thermal behavior has been developed and it's available under request.

* performed at ambient temperature of 25°C, with a 4000K spectrum at CRI>95, using a thermal compound of 2.9W/mK between the module and the heat sink.

PCB THERMAL PROTECTION

The VEGA 07 module incorporates an automatic temperature check and control algorithm for protection. This protection control** is enabled by default from the factory. In an unlikely event of PCB overheating (fan or dissipation failure, poor heat dissipation due to wrong dimensioning, harsh environments, etc.), the VEGA 07 will automatically reduce its luminous flux and consequently its consumed electrical power to keep the temperature within a safety range and to protect its components. In this way, the optimal working conditions that warrant the lifespan of the LED engine and its components are always preserved.

** when PCB temperature raises over 80°C

FEATURES - SUMMARY

Source type	Multiple high-power LED
Output	7 different spectral bands
Max Radiometric Power	9.7 W (all channels at full power) ¹
Max Luminous Flux	2800 lumens
Spectral range	420-730 nm
Light output pattern	Lambertian
Operating temperature range	0 °C to +35 °C
Synchronous operation mode speed	250 milliseconds
Feedback control loop	Enabled by default
Nominal Input voltage	24 V DC (Constant voltage) ± 5%
Max Input current	3.3 A (limited by firmware)
Max Input electrical power	80 W (limited by firmware)
Communications protocol	bus EIA-485
Dimensions (mm)	Ø82.5 x 16.6 mm
IP	20
Insulation Class	Class II

¹ Radiometric power may change depending on the available LED binning

MAINTENANCE AND SERVICE

- Do not open, disassemble or manipulate the VEGA 07 LED-based module.
- If a fingerprint mark or dirt is observed at the diffuser, you may clean it. Before cleaning, disconnect from the main supply and allow the system to cool down. Wipe the surface of the diffuser gently with a tissue containing ethanol.
- No user serviceable parts inside. Replacement of the entire VEGA07 is required when malfunction may occur.

WARNING AND SAFETY

- Before installing, servicing, or performing routine maintenance upon this product, follow the general precautions.
- ALWAYS adhere to safety instructions and warnings
- All necessary measures must be taken to avoid electric shock when handling electrical and/or electronic equipment. In case of doubt disconnect the main power supply when handling lighting equipment.
- All statements regarding safety of operation, warranty and technical data only apply when the unit is operated correctly according to its specifications. The safety of any system incorporating the equipment is the responsibility of the assembler of the system.
- The VEGA 07 is intended for use in dry interiors only. It is not water resistant and must be protected from adverse weather conditions (hot and humid).
- Keep away from flammable materials. To avoid damage, do not expose it to spray, liquids, dust or chemical products.
- Do not cover the optical output of the VEGA 07 with an adherent film.
- Do not stare directly into the LED Light source at short distance or long-exposures
- Ensure that heat sink fins and/or fans are not obstructed.
- During normal operation, the fixture can achieve high temperature, be careful when handling it to avoid skin burning.
- Do not operate the VEGA 07 with missing or damaged components.

ENVIRONMENTAL AND DISPOSAL COMPLIANCE

- LEDMOTIVE is committed to provide environmentally friendly products to the solid-state lighting market. VEGA 07 is compliant to the European Union directives on the restriction of hazardous substances in electronic equipment, namely the RoHS Directive 2011/65/EU and REACH Regulation (EC) 1907/2006.
- LEDMOTIVE will not intentionally add the following restricted materials to its products: lead mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE).

- In accordance with EU Directive WEEE (Waste Electrical and Electronic Equipment), LED modules must not be disposed of with another household waste.
- At the end of their life, it must be taken to the appropriate local facility available for the disposal or recycling of the electronic parts.

WARRANTY

- This product has passed the proper EU regulations and directives.
- LEDMOTIVE offers a five-year limited warranty

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