VEGALAS™ Power – Guideline for handling and integration

Application Note

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Tobelbader Strasse 30,
8141 Premstaetten Austria
Phone +43 3136 500-0
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VEGALAS™ Power

Abstract

VEGALAS™ Power is designed for high-brightness projection and lighting applications in entertainment and industrial environments. It features a robust multi-chip design that enables high-power densities, simplifies thermal management and reduces system cost. This Application Note provides recommendations for proper handling and gives a guideline for the optical, electrical and thermal integration. Please read carefully and follow the instructions in order to avoid damages and secure long lifetime under application conditions.

Table of contents

1 Basic information

The VEGALAS™ Power (Figure 1) offers a powerful blue laser designed for demanding projection applications. The module is easy to mount on a heatsink and offers high reliability and long lifetime. Additionally, an NTC and connector are integrated on board.

Figure 1: Overview VEGALAS™ Power

PLPM7 455QA_LL

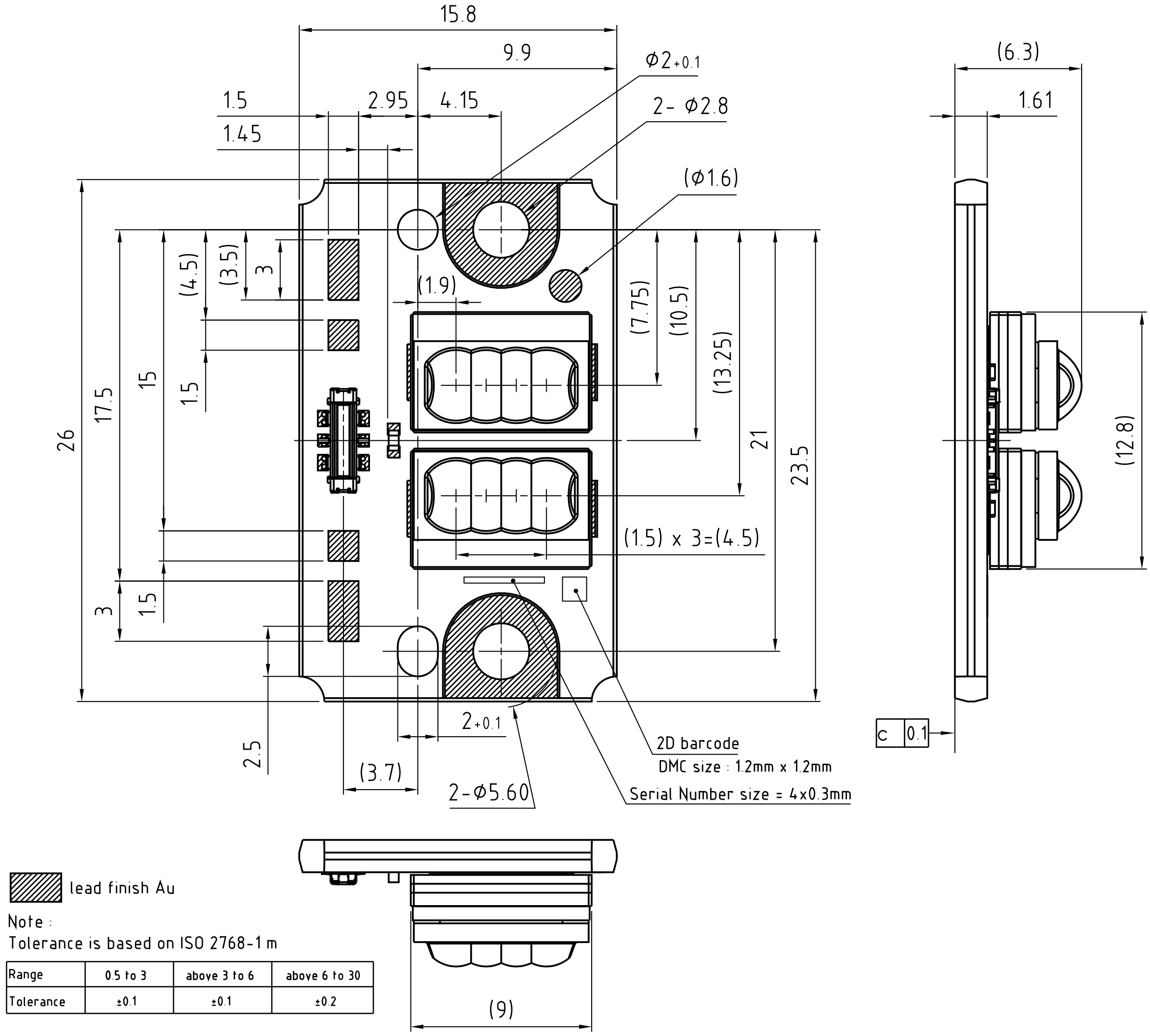
As is the case for all LEDs from ams OSRAM, the laser module also fulfills the current RoHS guidelines (European Union and China) and therefore contains no lead (Pb) or other substances defined as hazardous.

1.1 Mechanical and optical design resources

Figure 2 shows detailed information on the mechanical dimensions. To obtain CAD data and optical rayfile, please visit the "Optical Simulation / Ray Files + Package CAD Data" webpage on the ams OSRAM website. Please note that the CAD model represents the outer shell geometry (width, length and height) of the LED without internal details. Details on the outer surface of the package are for reference and visualization of the LED package only.

For more information on importing rayfiles and ray-measurement files, please refer to the application note "Importing rayfiles and ray-measurement files of LEDs".

Figure 2: Dimensional drawing



Note :
Tolerance is based on ISO 2768-1 m

Range	0.5 to 3	above 3 to 6	above 6 to 30
Tolerance	±0.1	±0.1	±0.2

1.2 Mechanical connection

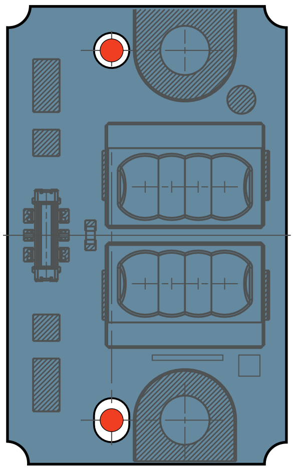
The metal base plate of the laser module needs to be mechanically mounted to the fixture/ heatsink on application side using two screws. To ensure optimal thermal contact, thermal grease should be applied between the laser baseplate and heatsink, the screws should be tightened using an adequate torque. This enables efficient heat transfer.

It is generally recommended to use a locking compound for each screw and to check the maximum torque of the screw. To ensure optimal thermal contact between the laser baseplate and the thermal grease or heatsink, the screws should be tightened using this torque.

1.3 Alignment pins

To ensure precise mechanical alignment of the laser module on the fixture or heatsink, two round alignment pins should be considered. These pins should fit into the round and oblong holes on the metal core plate of the laser module, as shown in the technical drawing. This alignment mechanism allows precise placement during assembly. Figure 3 shows a schematic sketch of the alignment pins (red) through the laser module MCB (blue).

Figure 3: Schematic sketch of alignment pins



2 Handling recommendations

When handling, please be aware that each mechanical stress can have direct effects on the functionality and lifetime of the laser module. Excessive stress may lead to a failure. The use of any kind of sharp objects should generally be avoided, since this can damage the component.

2.1 Chemical compatibility

The laser modules are hermetically sealed. The light is emitted through the lenses on the topside of the package. For proper operation of the laser module, environmental factors such as humidity and dust should be avoided.

Aggressive gases such as sulfur compounds, halogens, or organic emissions from plastics, adhesives, or packaging materials can interact chemically with the module and lead to discoloration or corrosion. To avoid such effects, exposure to outgassing materials should be minimized as much as possible during storage, assembly, and operation.

2.2 ESD stability

Be aware of ESD safety while handling lasers. As a matter of principle, common ESD safety precautions must be observed during the handling, assembly and production of electronic devices. For further information on ESD protection please refer to the application note "ESD protection while handling LEDs".

2.3 Cleaning

Any direct mechanical or chemical cleaning should be avoided. Isopropyl alcohol (IPA) can be used if cleaning is mandatory. Other substances, such as ultrasonic or plasma cleaning, are generally not recommended. For dusty modules, cleaning with purified compressed air (e.g., central supply or spray can) is recommended. To ensure the compressed air is free of oil residues, using a spray can is advised. A maximum pressure of 4 bar at a distance of 20 cm from the component should be maintained.

All materials and methods should be tested beforehand to ensure they do not cause damage to the component.

2.4 Eye safety

Depending on the operating mode, these devices emit highly concentrated visible light that can be dangerous to the human eye. Products containing these laser components must comply with the safety requirements of IEC 60825-1 "Safety of laser products." It is essential to always observe the applicable eye protection regulations when handling the laser. An appropriate laser classification is available and should be taken into account in risk assessment and product design.

2.5 Precautions and storage

For storage and dispatch, the laser modules are packed in trays. It is generally recommended to leave them in their original packaging until they are assembled, and to store components under ambient conditions during processing. Drying cabinets with dry nitrogen (N_2) or dry air are suitable for this type of storage.

A suitable storage system should be implemented in order to ensure that assembled modules are not damaged. To avoid the risk of damage to the assemblies, make sure that they are not exposed to compression forces of any kind.

3 Module integration

3.1 Thermal integration

For good thermal contact, thermal grease should be applied between the back of the laser module and the heat sink or application fixture. Poor thermal contact can lead to overheating.

The main thermal path is from the laser diodes via the copper plate on the back of the module to the application heat sink. The temperature T_m is measured using an integrated NTC resistance sensor (TDK B57221V2103F260). Typical operating temperatures are around T_m=60°C. The maximum operating temperature specified in the data sheet must be observed. The junction temperature must not exceed 135°C in any case. Higher temperatures and higher driving currents can impair the performance and lifetime of the module.

3.2 Electrical integration

For electrical connection of the laser module and the integrated NTC temperature sensor, the use of a connector is recommended. This simplifies assembly and ensures reliable contact. The preferred connector is the Japan Aviation Electronics Industry LTD WP10-S004VA10-R15000.

If using a connector is not feasible, cable soldering can be considered as an alternative. In this case, preheating of the metal core board (MCB) is advised to support proper solder flow. The soldering process should be kept as short as possible to avoid thermal stress. The soldering surface of the MCB features a NiPdAu finish, which is compatible with standard Pb-free cable soldering processes.

When soldering wires to the metal board with a soldering iron, pre-heating of the backside is mandatory. Without this step, sufficient heat cannot be distributed and the pad may be burn and lift off. For backside heating a heating plate with a temperature range of 100°C ~ 120°C is recommended but may be adapted to specific integration conditions. Additional flux and a suitable solder alloy must be added. If the cable or wire is mechanically fixed, mini wave soldering (without backside heating) may be a suitable method.

For laser operation, a stabilized constant current source with minimal ripple should be used.

3.3 Optical integration

The laser module is equipped with collimation optics that align the laser beams in both the fast and slow axis. Beam tilt, divergence, and tolerances are defined in the product datasheet. In the optical path, back reflections of the collimated laser beam into the module should be avoided.

4 Summary

The VEGALAS™ Power laser module combines high-performance blue laser output with robust mechanical, thermal, electrical, and optical integration. It enables easy mounting by screwing and alignment pins support accurate positioning. The electrical connection is preferably made using a special connector, or alternatively by soldering. The product complies with IEC 60825-1 for laser safety and should be protected from aggressive outgassing substances. Care must be taken to avoid back reflections in the optical path. Common ESD safety precautions must be observed.

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