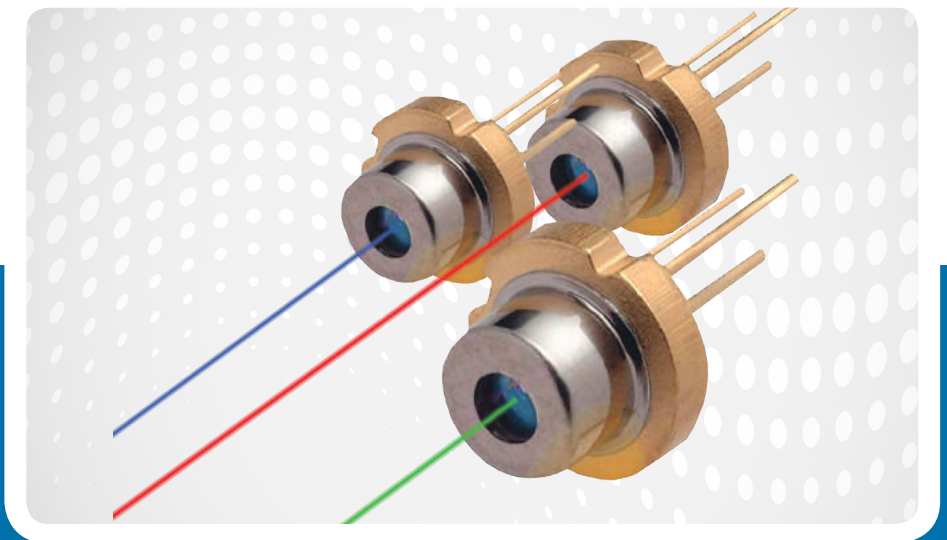


## **Selecting the optimum laser diode for your application**



Whitepaper

# Selecting the **optimum** laser diode for your application

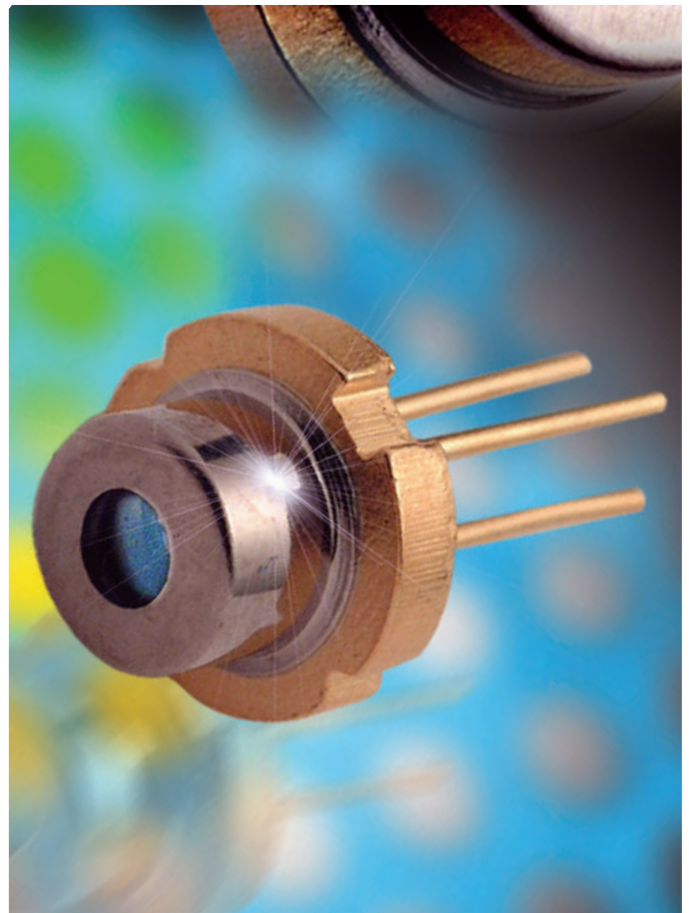
Ensuring that the correct laser diode is chosen for your specific application is critical. In this whitepaper we will discuss the issues you will face when specifying a laser diode; the necessary trade-offs between performance, cost and lifetime; and the process of choosing a vendor who can meet your needs.

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## SPECIFYING YOUR LASER DIODE

When specifying your laser diode, it is important to understand the level of flexibility that will be acceptable for your application. The details of your specification will impact on both the performance and cost of your solution. For example, if you are looking for a 650 nm red laser diode, how tight is the tolerance around 650 nm? A typical laser diode manufacturer will specify 650 nm  $\pm 10$  nm, and that may be a tighter specification than some applications need, but a much wider specification than is required by others. If you need a tighter wavelength specification, such as may be required by biomedical applications, the vendor you choose must first recognize and understand this, and then be able to supply to the tighter specification.

It is important that the vendor fully understands your application and has the technical skill to delve into the necessary level of detail. For instance, if you specify that you want 20,000 hours of use from a diode, inform the vendor where that figure comes from and what the impact would be of having a laser diode that only lasts for 10,000 hours or one that provides 50,000 hours.



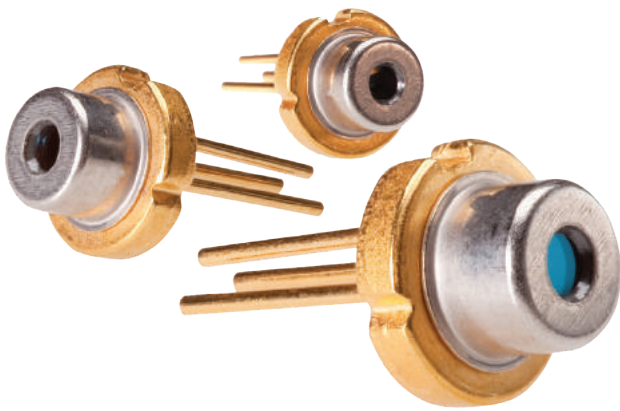
Care is needed because if the laser diode is over specified, it will cost you more than necessary, but if it is under specified, it will not perform as required.

A key consideration therefore is how important is cost when compared to reliability.

Whilst a vendor cannot make these decisions for you, the right vendor will be able to offer full guidance on what you can expect and at what cost.

## THE TRADE-OFF

There are certain inevitable trade-offs when selecting a laser diode, and one significant decision to be made is the balance between cost and lifetime. If a 10 mW diode is being driven hard (i.e. at 10mW) to achieve that output level it will only last a certain amount of time – typically 5-10,000 hours of continuous use, which equates to between 7 and 14 months of continuous use. If a 10 mW rated diode is only driven at 5 mW, however, it should last far longer.



If lifetime is critical to your application, it may benefit you to pay a little more for a higher rated laser diode and then drive it at the lower power level. This is an important consideration for applications where failure of the laser diode is going to be a high cost event in terms of repair and maintenance, or indeed downtime of equipment. However, if cost is critical and replacement of the laser is a straightforward process, it may be more sensible to use a lower rated diode to gain cost savings.

## SELECTING A VENDOR

Suppliers must be knowledgeable about the breadth of laser diode technology and about the specific laser

diodes they are offering. The vendor needs to be willing and able to take the time to truly understand your application and must not be restricted to a very limited range of laser diodes. A vendor who is only authorized to sell laser diodes from a limited number of manufacturers will typically promote a limited range that may not be best suited to your application needs.

If the vendor has a close relationship with the laser diode manufacturer they may be able to ask the manufacturer to select the laser diode to meet your detailed specification – even to the point of controlling their manufacturing processes to target a very specific wavelength. If that is not possible, then the vendor might select laser diodes that meet the tighter specifications from the volume of stock they hold.

A further advantage of choosing a vendor with close ties to the manufacturers is that they will get advance notice of any new products due for release to ensure you are working with the latest technology. The vendor will also receive advance warning of product end of life which is important because users need time to select and then qualify alternatives when a laser diode is withdrawn.

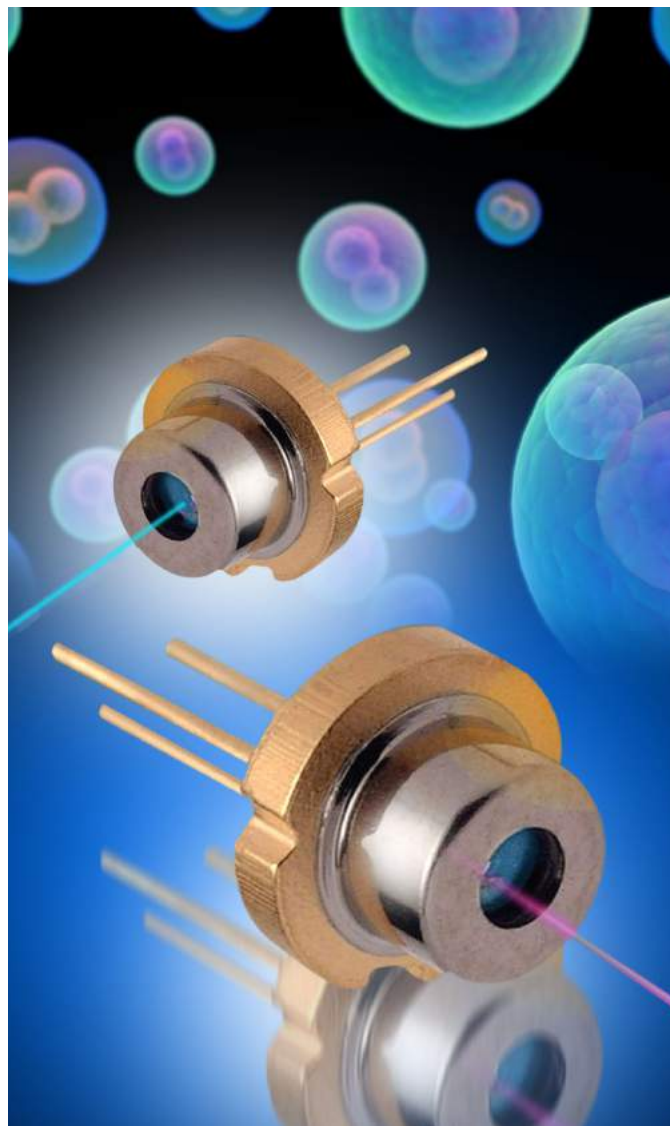
By putting these three elements together – vendor understanding of laser diode technology; vendor commitment to understanding your requirements; vendor inventory and supply chain relationships - your vendor will be far more likely to fulfil your needs in terms of both performance and cost. In practice, ensuring the vendor you have chosen meets those

criteria largely comes down to experience. Often it will be quite clear that a vendor is only offering laser diodes from a particular manufacturer, and in that case it is important that you are not pushed down a particular route too early in the process. The best way to ensure that this does not happen is by talking with the vendor and discovering how willing and able they are to engage in a full technical discussion. The key consideration is whether that vendor has a team of technically qualified sales people who will discuss the specifics of your application, or does it simply have sales staff.

Ultimately, you should be looking for the vendor to provide a clear recommendation of potential laser diodes to be used in the application and establish the pros and cons of each option. The process varies tremendously but generally there should be an initial discussion with technically qualified sales people or engineers, following which a recommendation of perhaps two or three options will be given. The vendor should be able to provide sample diodes for your evaluation to ensure the chosen laser diode meets your specific needs.

After the evaluation, the vendor should be available to offer further advice if needed.

One final point that is crucial for the vendor you select is that they can assure the laser diodes are handled safely and without any risk to the parts. Given the sensitivity of this technology to ESD (electrostatic discharge), this is important for ensuring the laser diode you receive functions as it is supposed to, and for as long as it should.



## CONCLUSION

Selecting the right vendor is critical to selecting the optimum laser diode for your application.

ProPhotonix offers Ushio, Osram, Panasonic, Sony, QSI and Ondax semiconductor laser diode products. Within this line-up we offer laser diodes with wide ranges of wavelengths and power outputs that suit diverse needs. In addition to distributing laser diodes, we use them in manufacturing our own laser modules. Because of this we have the hands-on experience that enables us to offer guidance and advice from a unique perspective, rather than simply having knowledge of part numbers.





In addition to officially representing these manufacturers, we hold stock from many other laser diode manufacturers which ensures we are not restricted in any way by what we are able to recommend. This close relationship with the manufacturers not only means that we carry small quantities of stock for most of the laser diodes we provide – ensuring samples are readily available – but we either have or can quickly get access to additional technical data regarding the performance of the products. Laser diode manufacturers obviously publish a certain amount of data, but there may be a specific application that requires additional clarity on a particular point, and we can get that answer quickly and easily. For support in selecting the optimum laser diode for your application, talk to one of our technical sales team.

Contact [sales@prophotonix.com](mailto:sales@prophotonix.com)

## Need a datasheet?

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### Laser Diode Selector

With over 11 years' experience in laser diode technology, ProPhotonix offers:

- Technical support helping you select the ideal laser diode to get the most from your application
- A wide range of laser diodes in stock for immediate shipment
- Excellent value due to the strength of our relationship with laser diode manufacturers
- Advice on other elements of your system including optics, fibre, electronics & complete laser modules

#### Select your Laser Diode

To select your laser diode, simply select the relevant criteria from any of the drop down menus and press submit.

Manufacturer:

Wavelength:

Power:

Package:

Operating Temperature:

Pin Configuration:

Part # Manufacturer Wavelength (nm) Power (mW) Package (mm) OP Temp (°C) Pin Config

Visit the Laser Diode Selector  
[www.prophotonix.com](http://www.prophotonix.com)