

## Design, Development, Manufacture, Test and Integration

Some of our customer's projects requirements span all of our key capability areas but most require a bespoke combination of our services.

Whatever service you require, our approach starts with discussing your technical requirements and understanding how we can positively impact your project.

We are not a 'one solution fits all' company; with our expert in-house capabilities we provide a customised service to meet the specific needs of our customers.

Our capabilities cover the Design, Development, Manufacture, Test and Integration of customised LED modules.



## Avionic, Military & Security Displays

PRP's custom display products have been incorporated on a large number of major airborne platforms. The same attributes that have made PRP's LED displays so successful in avionics applications make them well suited to many high reliability applications such as instrument panel displays in military ground-based and naval applications.





## Monolithic Semiconductor Processing

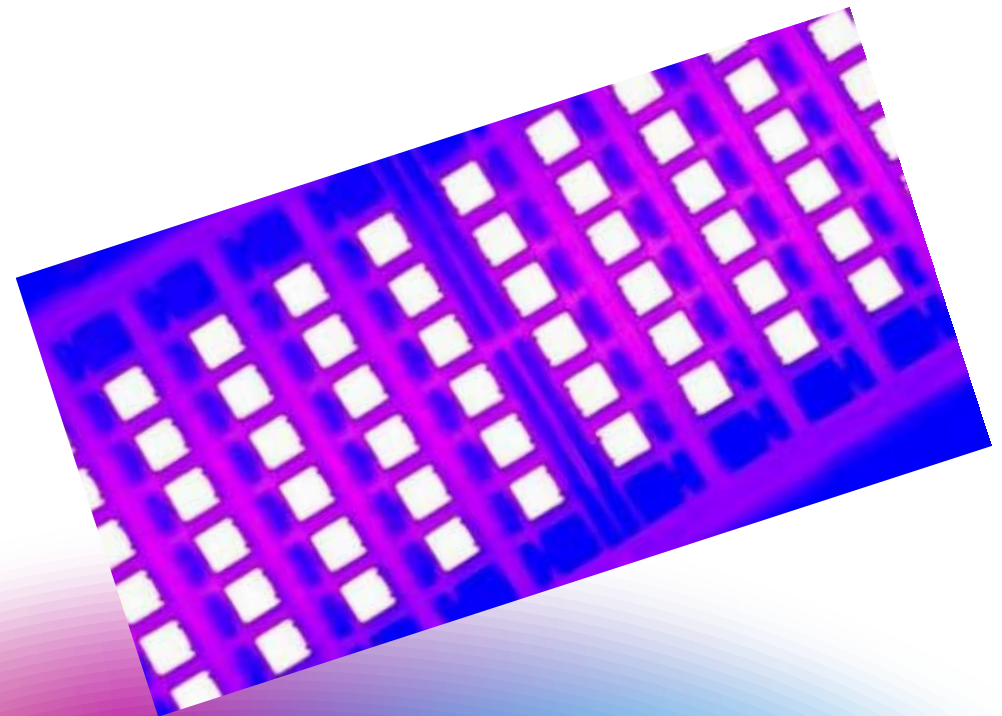
PRP Optoelectronics' in-house fab produces optoelectronic devices with output wavelengths spanning from IR to UV. Achievable emitter size and pitch can be as small as  $10\mu\text{m}$  and  $15\mu\text{m}$  respectively.



## So what is a Monolithic LED?

A monolithic LED differs from a standard LED in that it is a single piece of semiconductor where the light emitting active regions have been defined within it. This allows for emitters to be custom shapes and sizes and if required to be spaced so as to achieve very high resolutions. Wavelengths across the visible spectrum and into the UV and IR are available.

Individual emitters can be less than 10 microns with gaps of just a few microns, luminance values of greater than  $35000\text{ cdm}^{-2}$  are achievable for visible wavelengths.





## Services

One of our core strengths is our ability to develop complete systems in-house; to enable this our interdisciplinary development team comprises experienced optical, mechanical, hardware, firmware and software engineers. This approach leads to reduced complexity, shorter delivery times and competitive costs.

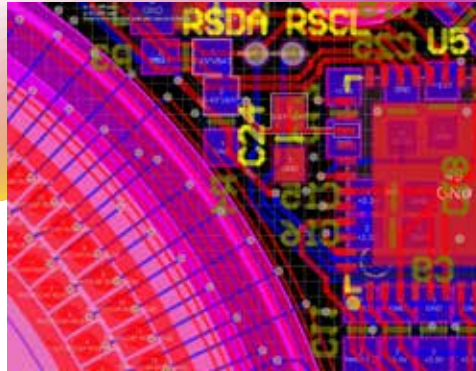
Many of the products we've produced that are based on our hybrid and monolithic LED technology incorporate drive electronics into the same package as the LEDs. We have extensive experience in power management, mixed-mode ASIC and FPGA programming.

Our LED development team is located at a state of the art wafer processing facility within the UK Government's Science and Technology Facilities Council (STFC) Rutherford Appleton Laboratory. Drawing upon a wealth of semiconductor processing experience they develop customer specific LED chips using a range of advanced materials ranging from Infra-Red to the Ultra Violet region of the spectrum.



## System Design

Operating within the parameters of your Requirements Specification our technical team will design a solution suitable for your end user and its operational environment. If your solution requires a bespoke LED we will design a mask set to produce chips to meet your specifications. We are vastly experienced in designing devices that require specific filtering, lensing and thermal management considerations.



Our design process is clearly focussed on design for manufacture so we use the latest CAD software and engineering tools. We have close relationships with rapid prototyping partners allowing us to offer fast, cost effective conceptual prototyping if required.

Upon completion of this phase we will provide you with a system design to meet your performance requirements, cost and quality goals. Outputs from the design phase include drawings, 3D models and a compliance matrix.

## Testing

In line with our commitment to quality we perform functional tests on each device as standard. For our customers that require high reliability devices we perform a range of further tests on 100% of their devices. Our in-house test capability covers mechanical, optical and life cycle testing.



### Mechanical Tests:

- Wire bond strength
- Die shear

### Optical Tests:

- Radiometric or Photometric output measurement
- Wavelength

### Life Cycle Tests:

- Thermal cycling
- Burn in

## Integration

With a wealth of experience in technical development, precision assembly and quality management PRP is an ideal integration partner. Working in partnership with our customers we manage the supply chain, production, assembly and testing.

Our project managers will liaise closely with you and your suppliers to ensure the quality, lead time and availability of your product meet the agreed terms.



## Manufacturing

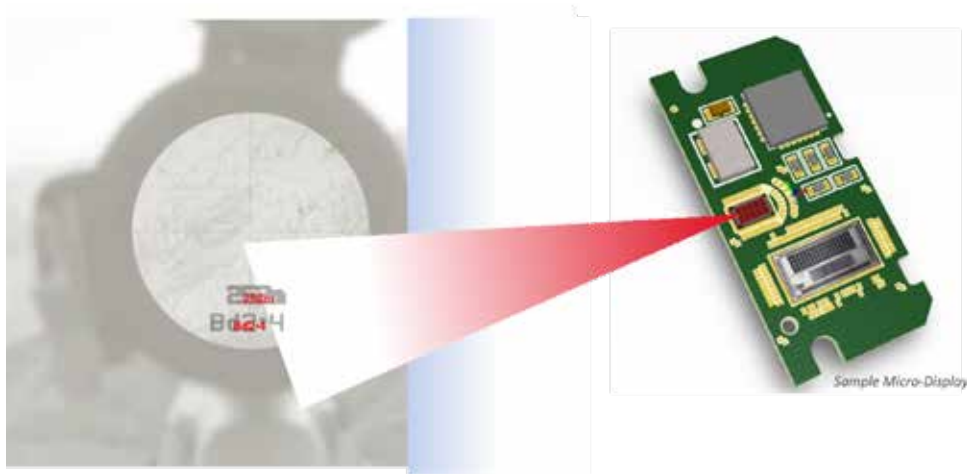
Our wafer fab at the Rutherford Appleton Laboratory enables us to manufacture low to medium volumes of custom LEDs. We process the wafers from epi (fully grown wafer) right through to individually packaged chips.

In conjunction with our wafer fab we have a number of clean room manufacturing pods within our manufacturing facility in Swindon. Here our manufacturing team assemble and package modules using our manual and automated systems which include pick and place, wire bonding (Au, Al) and encapsulation.



## Micro-Display

A high performance monolithic LED chip that displays data clearly and brightly exactly when it's needed



Micro-Display uses PRP's monolithic array technology to provide clear, bright and easy to integrate LED displays

Micro-Display has been designed with gun sights, scopes and range-finders in mind.

Placing Micro-Display in the optical path enables scrollable menus and icons to be viewed within the eyepiece.

Each individually addressable red LED pixel within the micro array is 70 microns wide with a pixel to pixel pitch of 100 microns.

Micro-Display uses an industry standard driver which makes it faster, cheaper and easier to integrate within your product line.

Using our design and development experience PRP can package Micro-Display into a single, cost effective chip customised to meet your requirements.

### Features

- 100Hz display refresh rate
- 1000:1 brightness control
- Individually addressable pixels
- Built-in character generation
- Industry standard I2C interface

### Micro-Display Benefits

- Scrollable menus and icon display
- Illuminated reticle selection
- Easy localisation of products for territory

## Commitment to Quality

PRP's Quality Management System is approved to ISO 9001:2015.

PRP Optoelectronics has a market leading capability in the development of monolithic LED arrays. We currently produce high accuracy multi-pixel arrays in a variety of wavelengths. Our ability to create large arrays of accurately pitched micron-scale pixels is used in industry proven non-contact, high speed, photographic quality printing applications.

PRP is ready to support the next generation of contactless, chemically-enabled printing applications, as well as other direct write-applications such as photolithography in the semiconductor, display and PCB industries.

We offer a complete design and manufacturing capability for print head modules, which includes packaging techniques and in-house design of custom drive electronics and ASICs, as well as design and production of the light emission array itself.

## Contact us:

Email: [webenquiries@prpopto.co.uk](mailto:webenquiries@prpopto.co.uk)

Telephone: +44 (0) 1793 881497

Unit 2 Western Gate  
Hillmead Enterprise Park  
Langley Road  
Swindon, Wilts  
SN5 5WN

[www.prpopto.com](http://www.prpopto.com)