PRODUCT SHOWCASE
TWENTY20

plus Opto
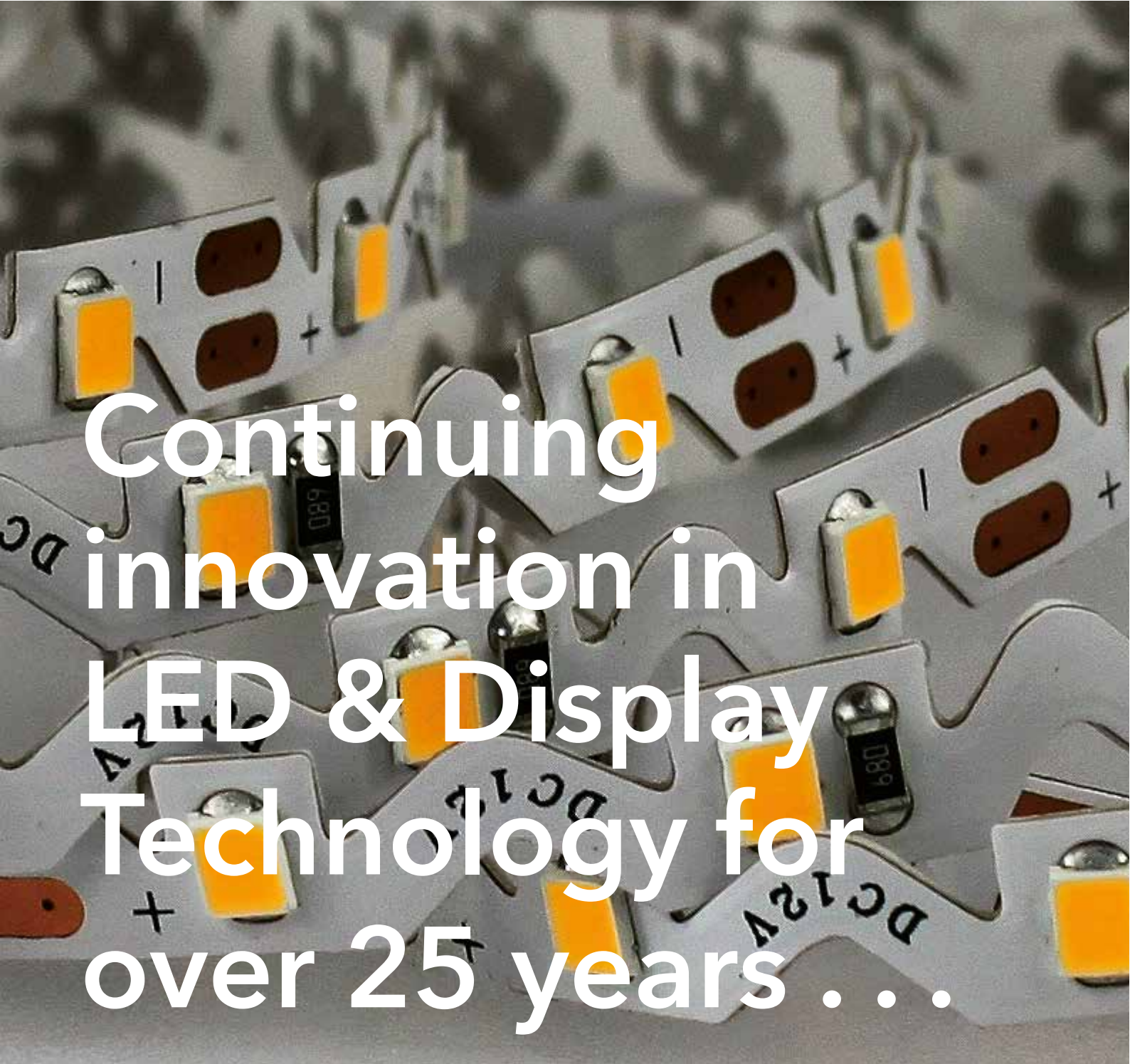THE OPTOELECTRONIC SPECIALISTS

Continuing innovation in LED & Display Technology for over 25 years . . .

Plus Opto was established in 1994 and continues to innovate with a focus on optoelectronic solutions, across an increasing range of products and applications. Developments in LED chip materials, technologies and production methods have resulted in significant growth in LED usage and new applications. Key markets include: information displays, fire & security systems, signalling, architectural, commercial & retail lighting. Our LED products are supported with a range of Drivers & Controllers maximising light performance.

Alongside its established LED activity Plus Opto continues to build its display business based on LCD technology from one of the world leaders, Winstar Display Co. Based in Taiwan, Winstar Display Co. offers an extensive range of LCD Modules including traditional character & graphic modules in STN, FSTN and VATN technologies. High performance displays using PMOLED and TFT technology provide significant advantages over traditional designs offering high resolution, colour and high contrast. Winstar continue to innovate with the latest IPS technology and Smart Displays driving new innovation into the market.

Display implementation may be supported through a range of single board computing modules from Blue Chip Technology, ranging from low-cost integrated ARM-based SBCs to fully enclosed IP-rated plug and play HMI modules.

Commitment to customer service is demonstrated in our comprehensive UK stockholding and efficient order processing. Full technical support is available on all products.

CONTENTS

If you would prefer to receive your Plus Opto Product Showcase electronically, please email your full name to sales@plusopto.co.uk with Product Showcase in the subject line.

The Benefits

Low Voltage
Safe low voltage operation

Long Life
LED lifetimes exceed 50,000 hours L70

Maintenance Free
Fit and forget

Energy Efficient
Over 10x more energy efficient

Cool Running
No radiated heat

Highly Durable
Resistant to Temperature, Shock & Vibration

True Colours
Wide range of colours including White

Temperature Resistant
Operation across a wide range of temperatures

Flexible Drive
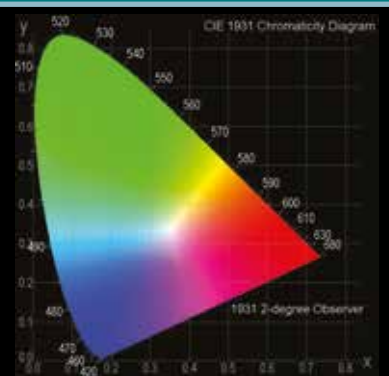Instantaneous switching, ability to colour change

LED Colour Guide

Cherry Red 660nm
Bright Red 625-630nm
Sunset Orange 623nm
Orange 605nm
Amber 590nm
Yellow 585nm
Yellow/Green 570nm
Green 525/530nm
Cyan 505nm
Blue 470nm
Cool White 7000/10000°K
Pure White 5650/7000°K
Neutral White 4500/5650K
Natural White 3500/4500°K
Warm White 2850/3500°K

Bin Grading for colour consistency

LED binning is essential in order to maximise effective utilisation of emitters in lighting applications.

Binning for light output, and particularly colour, ensures consistency of luminaire performance. Our binning for colour temperature is defined by (x,y) coordinates on the CIE 1931 Chromaticity Diagram. We provide binning to ANSI standard, and SDM1 & SDM3 to offer extremely tight colour control.

Surface Mount PLCC LEDs

With the increase in demand for portability and reduced equipment size where PCB area is at a premium, Surface Mount LEDs offer a cost-effective solution.

• PLCC-2, PLCC-4, PLCC-6 & Side Emit packages
• High performance, high efficiency
• Lensed variants
• Choice of mono colours & RGB
• Reduced assembly cost due to auto insertion

Applications range from general indication, displays, LED assemblies & modules.

Mid Power LEDs

At the forefront of new and exciting lighting designs, our range of mid-power LEDs are capable of handling higher drive currents to produce high luminous output.

• 2835, 3030, 5050, 5630 package options
• High efficiency >160lm/W
• Choice of mono, bi-colour, full colour RGB
• Tight binning system for consistency
• Range of secondary optics available
• Addressable options with integral driver IC
• High CRI

High Power LEDs

At the forefront of new and exciting lighting designs, our range of high power LEDs are capable of handling higher drive currents to produce high luminous output.

• 3535 and 3030 industry standard package options
• Choice of White Colour Temperature
• Wavelengths from UV to Infra Red
• Tight binning system for consistency
• Range of secondary optics available
• High CRI

High Performance LEDs

Our extensive range of high-performance LED lamps covers almost all industry-standard devices, at extremely competitive prices.

Virtually every size, shape and style of LED lamp is available with a wide range of colours and a choice of lens options.

For volume requirements we offer lead cropping and / or pre-forming, wire lead termination and tape & reel packaging for automatic insertion.

LEDs from Blue Chip suppliers such as Nichia, Osram, Dominant, Ligitek, Samsung , Refond, Everlight, Philips and Cree.

Chip LEDs

Produced in high volume for use in compact designs, chip type surface mount LEDs provide an excellent solution for applications where space is at a premium.

• Standard packages 0402 to 1206 & side emit
• Choice of colours including RGB
• Lensed variants
• Wide angle or lensed types
• Supplied on 8mm tape & reel for auto Insertion

Applications include indicator lamps, switches and backlighting arrays. A range of optical light guides is also available for application flexibility.

Multi-Chip COB LEDs

Our range of COB multi-chip LED arrays are designed for high-intensity lighting applications and are available in power ratings up to 200W.

Features include

• High flux output
• High efficiency up to 190lm/W
• High CRI
• Low thermal resistance, excellent heat dissipation
• Choice of colour temperatures
• Standard and custom formats
• LM-80 certified & Zhaga compatible

PCB Indicators

To facilitate ease of assembly we offer a wide range of PCB Indicators based on discrete LEDs packaged in housings.

Options include:

• Choice of LED sizes 2.0 to 20mm diameter
• Choice of colours / permutations
• Vertical or right angle orientation
• Choice of clear, tinted or diffused lens
• Ultra bright, low current, bi-colour, and flashing

Panel Mount Indicators

For status indication in panel applications we offer a range of panel-mount LED indicators.

Features include.

• Rugged construction
• Choice of bezel styles, sizes & finishes
• Range of operating voltages from 12V to 230VAC
• Choice of emitted colours
• IP rated options
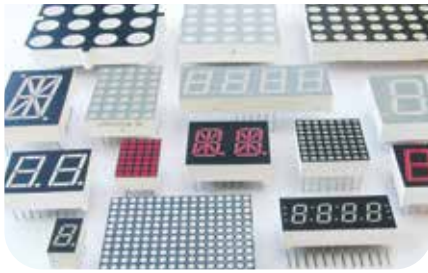• Termination by rigid wire lead, faston tab or flying leads

LED Light Bar & Bargraph Arrays

For legend illumination, backlighting and small area illumination we offer a range of multi-chip Light Bars and Bargraph arrays.

Features include:

• SIL and DIL format
• Single
• x / y stackable
• Choice of colours & permutations

LEDs are matched for uniform intensity and colour. Applications include: solid state metering, audio monitoring, level display and instrumentation.

LED Displays

Our extensive range of LED Displays is available in a spectrum of colours for high visibility applications.

Types include:

• Alphanumeric types in 14 & 16 segment format
• Dot Matrix displays 5x7, 5x8, 8x8, 16x16
• Custom displays

All industry standard character heights and pin-out configurations are supported. To ensure consistent matching across multi line displays, parts are supplied categorised for colour and intensity.
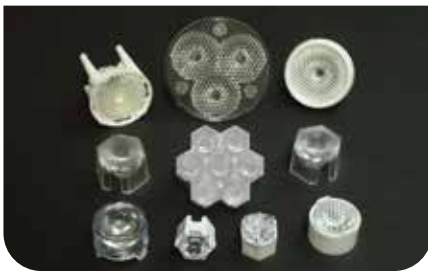
Custom LED Displays

Many of our customers choose a custom display. A bespoke panel may give your product a special ergonomic quality, or simply a distinctive appearance that makes your product stand out from the competition. Customisation can include special icons, logos or fonts.

Infra Red Products

From low cost 3mm and 5mm plastic IR emitters & detectors through to photodiodes hermetically sealed devices, we offer a wide range of infrared products and the latest high power 3535 infra red devices with a variety of output options. Transmissive and Reflective switches provide solutions in position sensing and control applications. Receiver modules offer integrated modular solutions for remote control systems. Where circuit isolation is required optocouplers form an integral part of the design, with a series of generic part numbers with relevant safety approvals where required.

Secondary Optics

To support our range of LED emitters we offer a range of advanced optics to maximize efficiency and provide beam directivity.

• High optical performance
• Choice of beam angles
• Elliptical pattern types
• Multi-cell optic modules
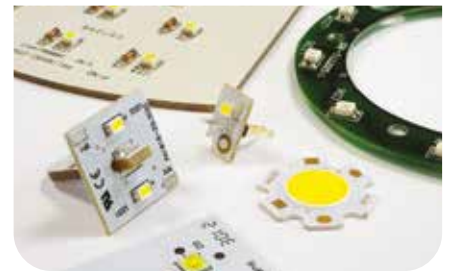• Street Lighting modules
• Design and mould tooling facilities

LED Accessories

To assist the application of our products we offer a range of accessories to ease assembly, & improve performance & reliability.

• Support hardware: Spacers, bezels, grommets and clips
• Secondary optics: Lenses, reflectors and mounts
• Light Pipes: Rigid and flexible light guides
• Interconnection: Cables, distribution boxes and connectors

In addition we can offer custom moulding, flying wire leads and connector attach to customers' specification.
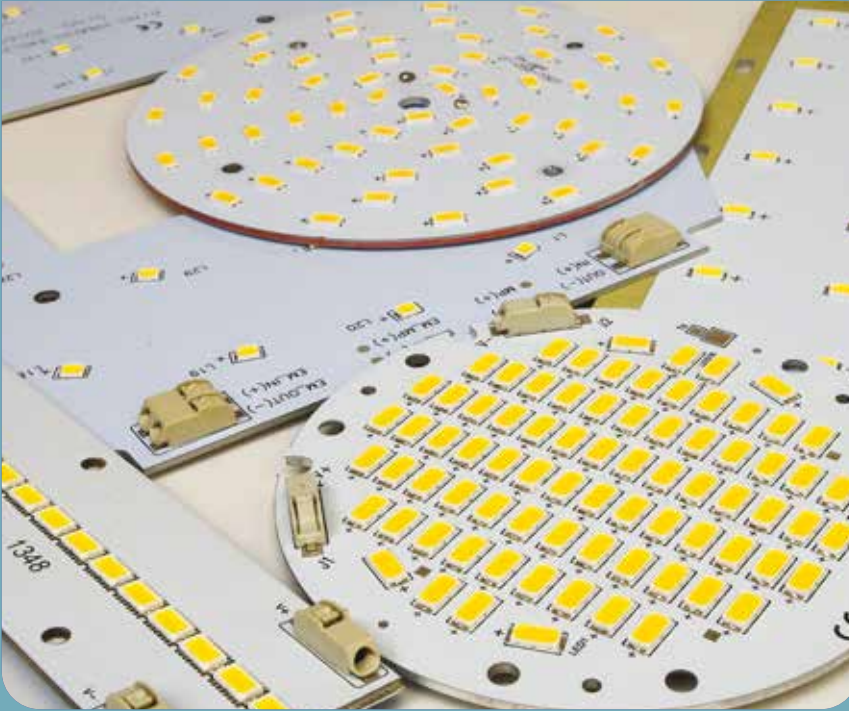
LED Assemblies

From our extensive range of LEDs we offer both standard and custom designed LED assemblies using surface mount, through-hole, mid and high power emitters.

• Low Power
• Mid & High power using Metal Clad PCBs
• Choice of colours including RGB & RGBW
• Optional secondary optics for directivity

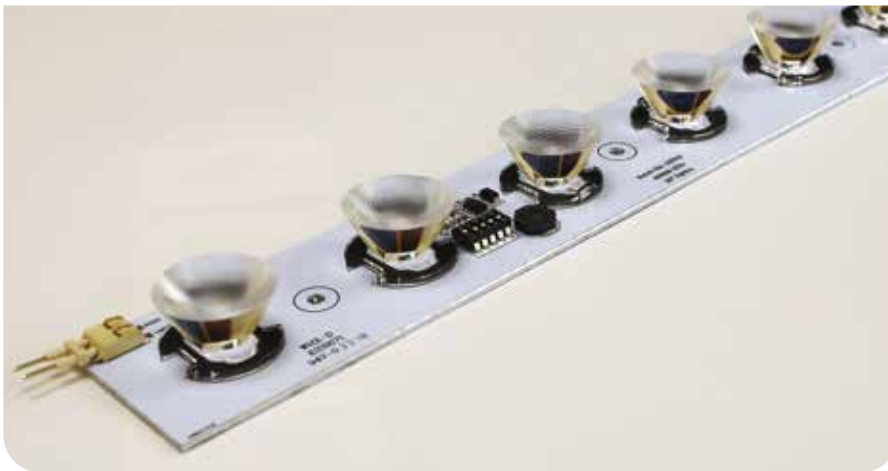Emitters are selected for colour consistency, intensity and beam angle.

To meet increasing demand to adopt LED technology we offer a bespoke design service. We can assist you to develop LED Assemblies and Light Engines for your application. A wide choice of shapes and sizes can be produced along with on-board or external drive, control solutions, interconnect and optics.

Our range of Linear LED Strips features:

• Standard & Custom dimensions
• Choice of LED type density / intensity
• Choice of power ratings
• Choice of colours / white colour temperature
• Multi-colour RGB and RGBW
• Tuneable white, adjustable CCT
• Pixel addressable LED strips
• Choice of Optics

Applications include Industrial & Commercial lighting, point-of-sale and retail lighting.

LED Assemblies & Light Engines

We offer a convenient, ready-made solution to retrofit LED lighting requirements from a range of standard LED Light Engines. Designed for downlights, linear fluorescent replacement, and bulkhead luminaires, these simple and reliable LED assemblies meet customers' increasing demand to adopt LED technology. We offer a range of Light Engines in a choice of shapes and sizes along with a bespoke design service to provide solutions for a wide range of applications. These products are complemented with an extensive range of LED drivers & controllers.

Connection options to facilitate easy installation include.

• Plug & play connection
• Distribution boxes for multiple connections
• Connector termination
• Cabling solutions

Our range of Flexible LED strip is designed and constructed for reliability and long life. This extensive range facilitates creative lighting schemes.

Strip may be specified in a choice of colours & emitter densities from 30 LEDs/m to 420

LEDs/m. Emitter packages include:

2210 LED package   2835 LED package
2216 LED package   5050 LED package
3528 LED package   5630 LED package

Configurations are based on 12v or 24vdc operating voltage in mono or multicolour

with power ratings from 4.8W/m up to 22W/m.

Options include:

• Colour tuneable
• Bendable
• Pixel addressable
• Choice of IP ratings
• Custom lengths & termination
• Choice of adhesive fixing tape
• High CRI

Standard packaging is 5.0 metre length/ reel. Long lengths are available up to 50 metres/reel.

To facilitate ease of connection we offer a range of Flexible LED strip connectors based on press & connect IDC system. Please refer to our interconnection solutions on page 20. Connectors are available in multi-pole to suit the LED strip width and configuration and are available in straight or right angle.

Neon Flex strip provides a rugged, flexible solution for linear lighting applications. Designed as an upgrade alternative to traditional glass neon the construction is resistant to abrasion, chemicals & salt water. The silicone diffusion produces a smooth even illumination with no spotting.

Features include:

• Monocolour & multicolour
• Waterproof IP67
• UV resistant
• 2835 High performance LED emitters
• Cuttable at intervals
• Digital RGB DMX addressable control
• 15mm bend radius

Please refer to our range of LED Drivers & Controllers for the drive options and connectivity!

Flexible LED Sheet comprises of an array of mid-power LED emitters mounted on FPC designed for backlighting and area lighting applications.

Features include:

• Dimension 503x235mm

• 12v or 24vdc operation

• Low 55 LED density or high 105 LED density

• Cuttable at intervals

• White or Multicolour RGBW

• Pixel Addressable versions

• Choice of Beam angle 120°, 160° & 175°

• IP65 option

Waterproof LED Chain Modules are designed for channel letter illumination and backlighting in signage applications. We offer an extensive range of low voltage waterproof LED modules.
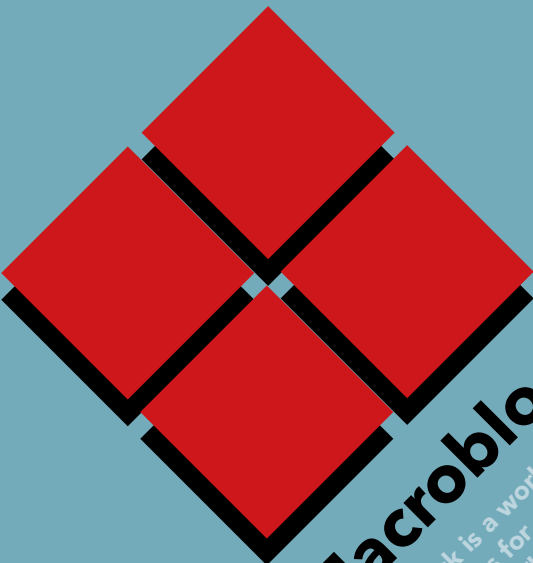
Options include:

• Single & Multi LED modules

• Choice of LED emitter

• Choice of luminous intensity / power ratings

• Choice of colour temperature

• Full colour RGB Modules

Modules are supplied pre-wired in strings for ease of installation with 3M adhesive tape applied for fixing. Custom lengths are available on request.

At Plus Opto we have an extensive range of Flexible LED Sheets . . .

Macroblock is a world leading manufacturer of LED drivers and focuses on IC designs for optimum performance in LED display and lighting applications. Their technology has been seen in major worldwide events such as the 2008 Beijing Olympics. Macroblock's patented S-PWM (Scrambled-PWM) technology enhances Pulse Width Modulation by scrambling the image into sub-images, giving increased refresh rate, avoiding flicker and improving fidelity.

The Precision Drive series features +/- 1.5% current accuracy within a single driver, and between lots to enhance output characteristics. IC protection and error detection functions feature on many devices The wide range and continuing technology advances make Macroblock the first choice in LED drivers.

LED Display Drivers

- 8, 16 & 24 channel constant currant drivers
- LED error detection
- Open circuit detection
- (S)PWM control
- Free design tools

LED Lighting Drivers

Macroblock provides a diverse product portfolio of LED lighting drivers including linear regulators, DC/DC controllers and converters. These drivers enhance long distance transmission and reduce signal distortion.

- Ease of use and low BOM cost
- Accurate current that gives precise LED colour tuneing
- Potection that enhances system reliability
- Flexible and accurate dimming
- Free design tools

Backlighting Drivers

Macroblock offers a variety of solutions for LED backlighting applications and feature excellent current accuracy and PWM function to provide dynamic colour & greyscales.

- Up to 16 120mA output per channel
- Thermal pads for enhanced heat dissipation
- LED open and short circuit detection
- Soft start function
- Free design tools

A wide range and continuing technology advances make Macroblock the leading choice in LED drivers!

Character LCD Modules

A wide range of low-cost industry-standard character LCD modules, with a choice of backlight colours to suit your application.
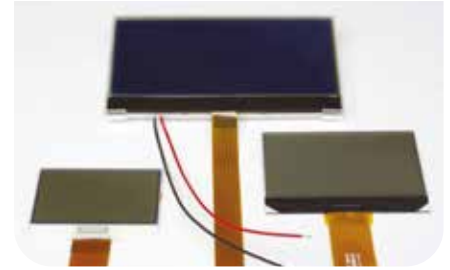
• From 8x2 to 40x4 characters

• Choice of TN, STN, FSTN, DFSTN or VATN liquids

• Positive or negative mode

• Choice of mono colours & RGB

• Built-in controllers

• Extended operating temperature as standard

• Semi-customisation (e.g. custom interconnect)

Graphic LCD Modules

Graphic modules offer great flexibility in formatting data and allow customers to form their own graphics, symbols and text in a number of languages.

• 122x32 to 320x240 pixels as standard

• Choice of STN or FSTN technologies

• Positive or negative mode

• Many with on-board controllers

• Choice of backlit colours

• Factory fitted touchscreen

• Semi-customisation available Chip on Glass, Chip on Board or Glass Only

Chip-On-Glass Displays

COG displays are available in both character and graphics formats. The driver chip is bonded directly to the glass, and it is possible to connect many more common and segment lines to the LCD than with conventional heat seal or elastomeric (zebra) strip technology.

• 16x2, 20x2, 24x2 and 20x4 character displays

• 128x64 to 320x240 graphics displays available

• Positive or negative mode

• Choice of backlit colours available

• Serial or parallel interface

OLED Displays

Passive Matrix OLEDs (PMOLED) offer many advantages over traditional LCDs and are nowadays being designed in to a growing range of equipment and applications.
Available in graphic and character formats, OLEDs bring a modern, high-tech look and feel to your fascia.
OLED Features Include:

• Fast Response Times "10μsec @ 25°C" across the full temperature range

• 175° viewing angle

• Low Profile - no backlight required due to emissive technology

• High Brightness of up to 2000cd/m²

• High Contrast Ratio of up to 2000:1

• Extended operating Temperature of -40°to 80°C

• Low Power Consumption

• Choice of yellow, green, blue, red or white on black background

• Option of anti-glare (matte) polariser surface

• Serial or parallel address

• Wide range of industry-standard outlines

WINSTAR

Micro OLEDs

Mini- and micro- OLEDs, with a diagonal of under 1" offer a cost-effective alternative to LEDs for indication in large equipment, or a small, lightweight display in the burgeoning wearables sector.

A choice of white, blue or yellow emitting colour introduce versatility and choice with all the advantages of OLED at a budget price.

Character OLED Displays

Our range of OLED character modules allows a simple upgrade from standard STN/TN character displays. These displays also incorporate a "4 in 1" font driver which allows the user to select from English, Japanese, European or Russian character sets.

Character OLEDS feature:

- Same mechanical footprint as industry-standard character LCD displays
- Lower profile (no backlight necessary)
- Often pin-compatible and electrically drop-in substitutes for character LCD

Graphic OLED Displays

As the cost of developing custom OLEDs is relatively high, Winstar's approach is to offer a wide range of standard outlines, giving a real choice of production items. Winstar's policy is to support industrial projects in a low-volume high-mix model.

PMOLEDs are produced in their own factory so you can have confidence in long-term availability, and not be subject to the highs and lows of consumer products demands.

Field Sequential Colour LCD (FSC-LCD)

Solely for custom design solutions, FSC-LCDs implement an RGB backlight technology to display bright colours at a fraction of the cost of a TFT or C-STN display. This is done without the use of filters and allows for a white or black background that is sharper than that currently offered by an FSTN filter.

- Each segment can display 8 different colours
- Low power
- High contrast
- Low cost tooling and unit price

VATN

The new VATN display technology is available in 5 colours and a choice of character formats.

Vertical Alignment (VA) is a form of LCD technology where the liquid crystal naturally aligns vertically to the glass substrate. When no voltage is applied the liquid crystal remains perpendicular to the substrate, creating a truly black display.

When a voltage is applied the liquid crystal shifts to a tilted position allowing the light to pass through and create a greyscale display, depending on the amount of "tilt" generated by the electric field.
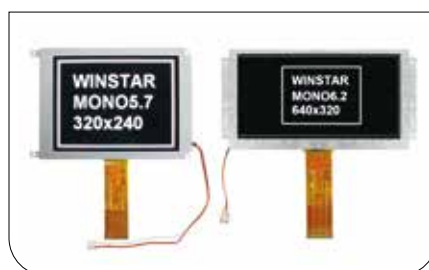
Key advantages of VATN displays:

- Super high contrast ratio: can be up to 120:1

- Wide viewing angle around 170°(H) 110° (V)
- Negative mode only
- Available backlights: white, green, yellow-green, red and blue
- High brightness backlight
- Choice of character formats: 8x2, 16x1, 16x2, 16x4, 20x2
- Serial or parallel interface

We can also offer a custom design service with monochrome icon / characters modules as well as up to four colours of silk ink.

OLED (Organic Light Emitting Diode) has a far higher resolution with a faster response time . . .

TFT Displays

We offer a comprehensive range of industrial TFT displays, ranging from 0.96" to 15" and beyond, with resolutions from 80x160 to high resolution graphic formats.

- Range of standard form factors
- Wide viewing angles
- High Colour Saturation, high brightness LED backlights
- High brightness LED backlights
- Resistive and Capacitive touchscreens available
- Guaranteed Long term availability
- With and without on-board controller
- Optional controller board version

Many TFT suppliers source their displays according to the popular consumer electronics market demands. Winstar offers a range of TFTs dedicated to the industrial market so you can be assured of long-term availability as well as a range of features suited to industrial applications.

Monochrome TFT

Monochrome TFT offers a high contrast, wide-viewing angle solution compared with Mono STN displays, but is easier to drive than colour TFT. Monochrome TFT is an ideal high-performance display for automotive and industrial applications, where full colour is not a requirement. The display can be configured to operate in 2, 4 or 16 levels of greyscale. Display driver supports 3- or 4- line serial interface and an 8-bit parallel interface, compatible with standard 8080 or 6800 systems. In addition the device may be configured in sleep mode, which does not clear the memory content of the display.

Features include:

- Very high contrast (up to 900:1)
- Brightness up to 1000cd/m^2
- Short response times
- Available in 3.5" 5.7" and 6.2" formats
- Normally black VA technology
- Wide viewing angle
- Does not need an external controller board to drive the MCU

Bar TFT Series

The wide aspect ratio "Letterbox" or "Bar" format brings TFT to a wider range of industrial applications. The 5.2" WF52 is mechanically compatible with the WG24064 graphic LCD range, with common mounting holes and many common pins for a quick upgrade. Other Bar TFT sizes are available and more are on the roadmap. The WF39A series is a 3.9" diagonal 480 x 128 pixel resolution TFT with just 40.64mm height, making it ideal for integration in 1U rack systems.

Features include:

- Crisp clear high-brightness graphic images
- 24-bit RGB or MCU Interface
- 3.9" ~ 12.3" diagonal
- Wide ("letterbox") format
- Drop-in mechanical replacement for many Graphic LCDs
- On-board graphic controller available on some models

IPS TFTs

In Plane Switching technology means the display offers high quality colour reproduction and a wide viewing angle.

IPS Features include:

- High contrast

- All round viewing
- Consistent, accurate colour at all viewing angle
- Fast response time
- Variety of interfaces

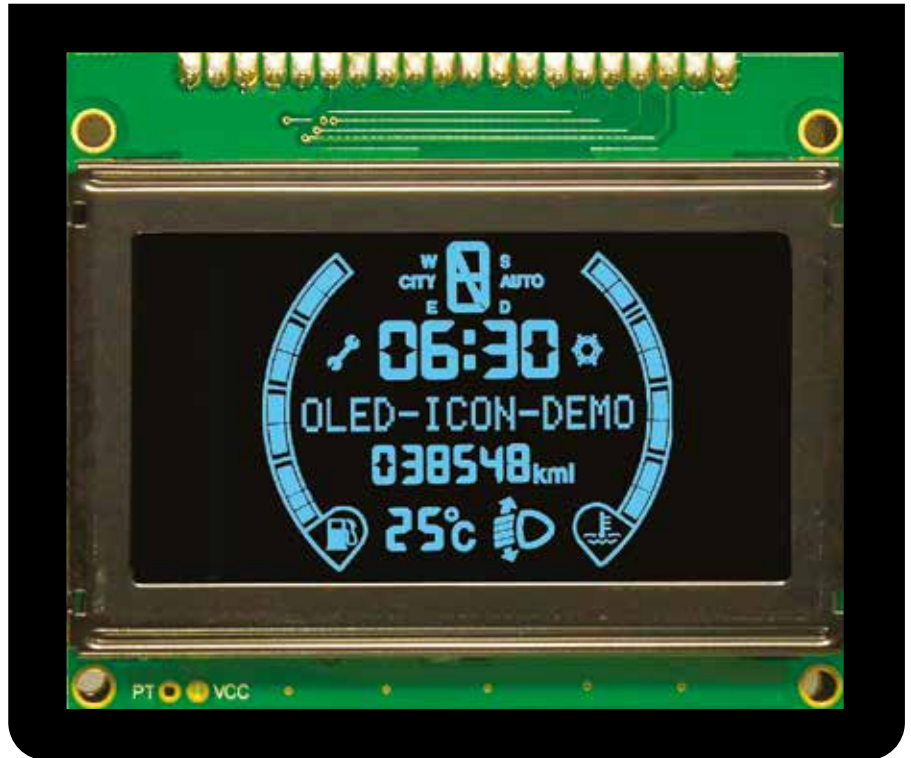IPS displays are now available in a range of sizes from 0.96"

We are also able to offer complementary products such as single board computers (SBC), touch panels (capacitive and resistive) and all relevant cables and connectors. Several devices are also offered with "O-Film" for a wider viewing angle . . .

Custom Displays

If a standard display doesn't meet the design criteria, we are able to assist with a bespoke solution. Whilst our range of off-the-shelf LCD modules is comprehensive, it may be that a special display is required, perhaps with symbols or text and a numerical layout designed for easier interface. Designers often find that a custom display improves product differentiation enabling the product to stand out against competitors.

The process begins with identifying the preferred dimensions and segment content. At an early stage we can advise on the most cost-effective overall size to ensure that the concept is commercially viable.

Drawings are prepared and when approved, prototypes are produced. These are evaluated and used to test the electronics design. Once approved the custom LCD can go into mass production.

Our role is to advise and ensure that the manufacturer correctly understands & implements the requirements, using our experience & expertise to reduce the time taken to develop a cost-effective and attractive display.

Value Added Displays

We offer a range of features to simplify integration of TFTs into your system. The popular SSD1963 Graphics controller is integrated in Winstar's "Q" series. This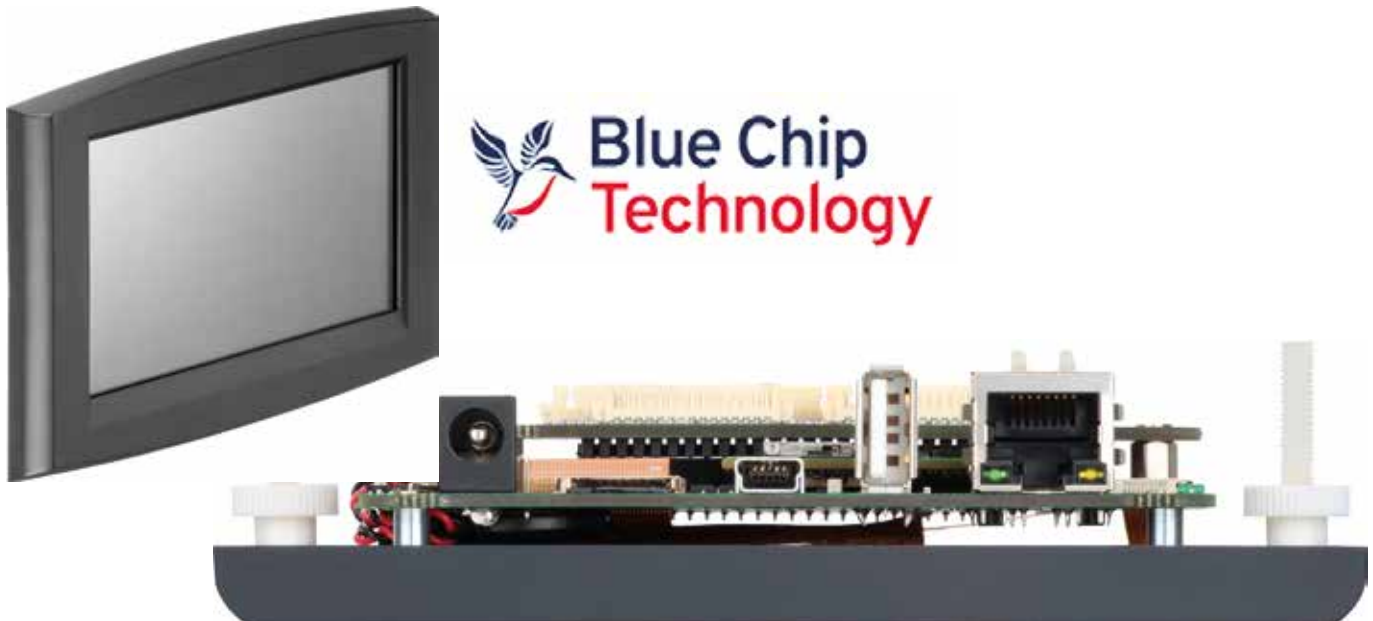 range of TFTs have a common 36-way FPC connection making upgrade easy. The "M" series (Clever System) features an integrated micro controller with SPI or UART interface and offers a free GUI to assist importing of images and fonts. Touch screens, "O-Film" for wider view angle, custom cover lens, HDMI input and customised mounting frame are some of the options we have supported. We also have a range of panels ready to connect to the popular Raspberry Pi single board computer.

System Integration

Implementing a display in your system is not always a trivial task. From selecting the appropriate signal protocol, to determining mechanical layout may take many man hours that could be better spent developing your core IP. Winstar's dedicated System Integration team are well-placed to design and build your display sub-system. Please contact Plus Opto to discuss your requirements.

HMI

BETA is a configurable HMI that is designed to simplify touch screen development and integration. Customers can choose their own configuration - including screen size, processing power, I/O and more - to create a final build that suits their application. It can be configured for deployment as a touch screen interface and/or 'brains' of a larger system, or as a self-contained, handheld mobile device. Ultimately, BETA helps to reduce the costs and complexity involved in embedded projects needing a touch screen.

Key Points

• Pre-integrated, pre-tested.
The complex challenges in nterfacing an embedded computer with an LCD and touch screen have already been overcome. Furthermore, EMC and thermal testing has been carried out, so the BETA is already CE approved and ready to go from day one.

• Flexible configuration.
Often pre-built systems include components and functionality that are surplus to requirements and can increase costs and complexity unnecessarily. The modular nature of the BETA means customers can more closely customise it to suit their

requirements, thereby reducing costs and complexity.

• Availability, stability and support.
Many consumer tablets and commercial touch screen solutions are not suitable for the requirements of embedded applications due to short-term availability, poor stability and lack of support. The BETA, on the other hand, will be in production until at least 2021, is designed to cope with demanding embedded applications, and comes with direct UK support and expert guidance.

• Simple integration with existing products.
When a customer looks to modernise the interface of their product, they aren't always looking to change their entire system. The BETA gives customers the option to easily integrate with pre-existing electronics through a variety of interfaces. This allows for a phased upgrade of the product, thus reducing costs.

• Configuration.
The flexibility of BETA derives from the number of options available for each of the core components, as well as the availability of extras (add-on components).

Please note that not all components are compatible with one another, so some guidance is needed for customers to identify an achievable configuration. If you have any queries regarding BETA configurations, please speak to our Sales team.

Extras

While many configurations can be made from just the core components alone, there are some further additions that can enhance the functionality of the BETA, including:

• Operating System (various flavours of Android, Linux and Windows)
• Expansion Connector Adapters (useful for interfacing with other systems)
• WiFi
• Bluetooth
• Dual SIM
• Battery
• Rear Cover

Further options will continue to be added as the BETA is developed, making it suitable for a wider range of applications.

Please contact Plus Opto to discuss your requirements . . .

Using the latest materials and production techniques, LED chip efficiency continues to increase, facilitating new products with high intensity light output and low energy consumption. LED technology is now widely adopted in lighting schemes.
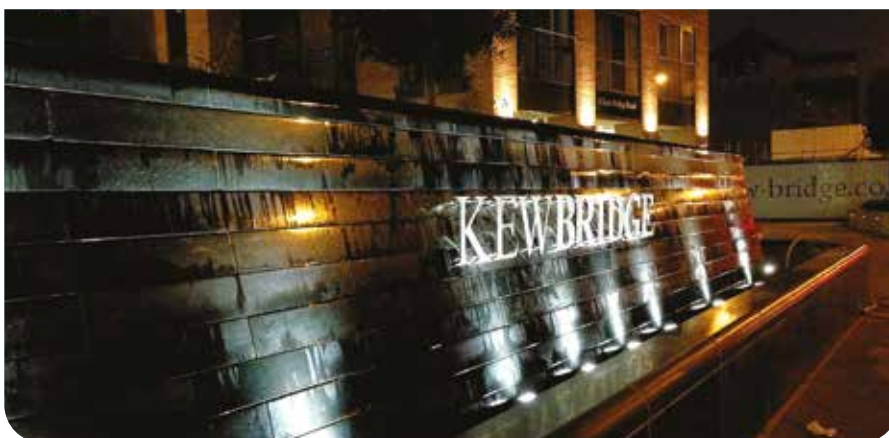
With the benefits of low power consumption, low heat generation and lifetimes quoted in excess of 50,000 hours LED lighting products are offered as a one time "fit and forget" solution reducing energy and maintenance costs.

A range of standard replacement products and innovative luminaires allows the retrofit and replacement of existing lamps & fittings.

Products include:
• LED Light panels
• LED Downlights
• LED Spotlights
• Linear LED fittings
• Lamp Replacements
• Floodlights

A full spectrum of colours is available and white colour temperatures from Cool White 8000K to Warm White 2400K. Options include High CRI, White CCT tuneable and full colour RGB and RGBW.

Applications are diverse and include:
• Retail Lighting
• Architectural Lighting
• Industrial & Commercial Lighting
• Signage & Advertising

In addition, we offer custom LED lighting solutions for applications where a bespoke scheme is required.

Our lighting products are fully supported with Drivers & Controls which are outlined on pages 18 & 19

We offer an extensive range of linear LED fittings designed for a wide range of lighting applications. A choice of profiles, light sources, optics and drive solutions facilitate creative lighting schemes.

Features include:

• Wide choice of profiles

• Choice of LED emitter types

• Choice of colours / white colour temperatures

• Full colour RGB, RGBA, RGBW & RGBWW

• Diffused, Frosted or Clear filter

• Optics

• Choice of IP ratings

• Custom lengths cut to suit the application

Please refer to our range of LED Drivers & Controllers for the drive options

Connection options to facilitate easy installation include.

• Plug & play connection

• Distribution boxes for multiple connections

• Connector termination

• Cabling solutions

Extensive range of linear LED fittings designed for a wide range of lighting applications . . .

To support our extensive range of LED products and facilitate reliable, efficient power management we offer a wide choice of solutions for driving LED products.

• Constant current
• Constant voltage
• Range of AC input mains supply
• Output power ratings from 1W to 600W

• Choice of IP rating
• Choice of connection/termination
• Optional dimming functions

Drivers comply with international standards and feature protection including

• Short circuit, overload protection
• Thermal protection

Dimmable LED Drivers

To facilitate further control over lighting levels and energy consumption, our range of drivers extends into intelligent dimmable versions.

Control protocols include:

• Analogue 0-10v and 1-10v control input
• Fixed resistance
• PWM
• DALI
• DMX
• Triac AC mains: leading or trailing edge
• Casambi
• Push & step dimming
• Sensor dimming
• 4-in-1 dimmable drivers

Features include:

• PFC >99%
• 0-100% dimming range
• Soft start to avoid power surge
• No colour temperature change when dimming

We offer a range of LED pixel controllers to control virtually all IC-driven LED emitters. These compact controllers have integrated colour changing scenes and effects to produce dynamic lighting displays.

Options include:

• Stand-alone RF pixel controller with remote
• DMX to SPI convertor pixel drivers

Effect selection allows variety of dynamic lighting effects, such as the IC type, pixel quantity, speed adjust, brightness control, effect mode and DIY custom scene programming.

Tuneable White Drivers

To promote human well-being in areas such as offices and educational institutions, hospitals and care homes we offer a range of Tunable White LED drivers developed specifically for dimming and tuning of white colour of LED luminaires & fixtures. The two driver output channels may be connected to two LED modules with different colour temperatures i.e. warm white and cool white allowing easy control of the colour temperature.

Control protocols include DALI, Casambi and

RF and drive outputs in constant voltage or constant current.

A wide choice of connection options is available including plug & play, distribution boxes and cabling solutions to facilitate easy installation.
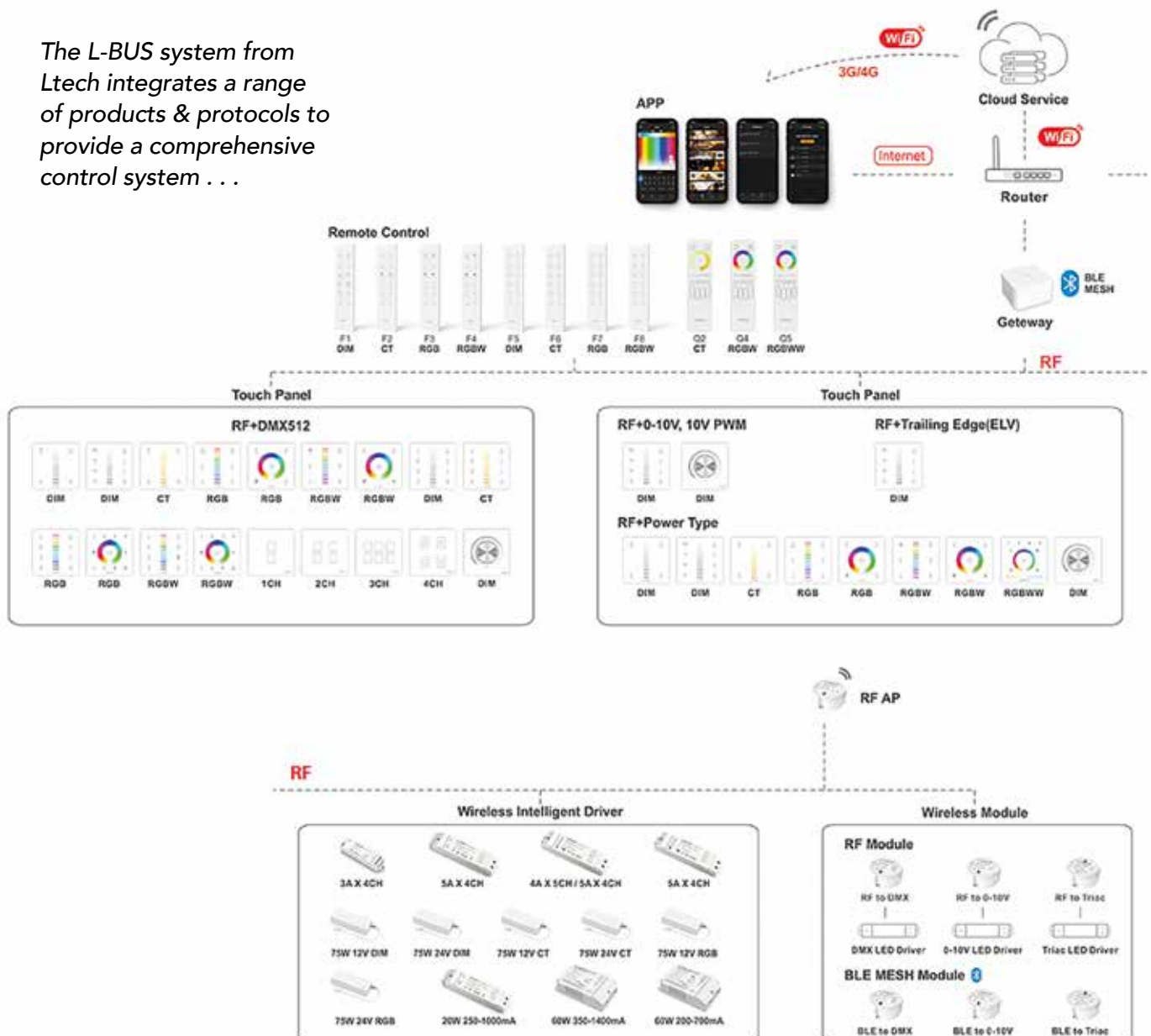
We offer a wide choice of LED controllers to support our range of LED Strips, Assemblies, Modules and Fittings for use in lighting applications.

Available in Constant Voltage or Constant Current output types & protocols include:

- DMX RDM
- Artnet
- PWM
- DALI
- Analogue 0-10v / 1-10v
- SPI
- WiFi 802.11
- Wireless RF 2.4GHz
- Pre-programmed mini-controllers
- Wall mount Touch & Rotary controllers
- Hand-held remote controllers

The L-BUS system from Ltech integrates a range of products & protocols to provide a comprehensive control system . . .
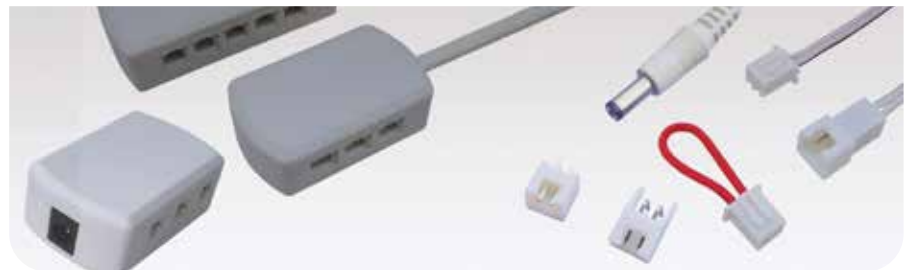
Flexible Strip Connectors

We offer a range of flexible LED strip connectors to facilitate easy connection and termination of linear strip schemes. Connectors are multi-pole press & connect IDC to reduce wire preparation.

- 2-way for mono-colour strip
- 3-way for colour tuneable and SPI
- 4-way for RGB
- 5-way for RGBW
- IP20 and IP65
- Max current rating 5A
- Choice of FPC widths
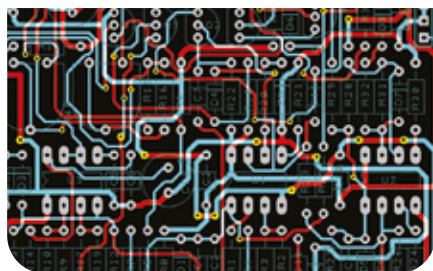- Right angle types

Distribution Boxes

To facilitate low voltage DC connections in parallel configuration we offer a variety of distribution boxes for ease of installation.

- Compact 55x30x22mm unit
- Single input 2-pin VH to 10 output ports XHP2
- Optional Fused output ports
- 5-way Versions for RGB

Distribution boxes are designed to be compatible with our range of constant voltage LED strips, modules and assemblies.

To facilitate ease of connection for LED strips, assemblies & modules we offer a variety of products from basic link cables connector, attach to distribution boxes and In line IDC connectors . . .

We offer a bespoke design service to assist our customers in the development of LED lighting solutions for a wide range of applications, such as POS, vending, merchandising, accent lighting, or any application that requires illumination.

Our services include:

- Concept analysis
- PCB Design
- Prototyping service
- Evaluation boards and demo kit
- Intensity and spectral measurement
- LED selection and binning
- Tooling
- Samples & pre-production quantity
- Connection solutions

Benefits of our design service include:

Low client cost

Value engineering
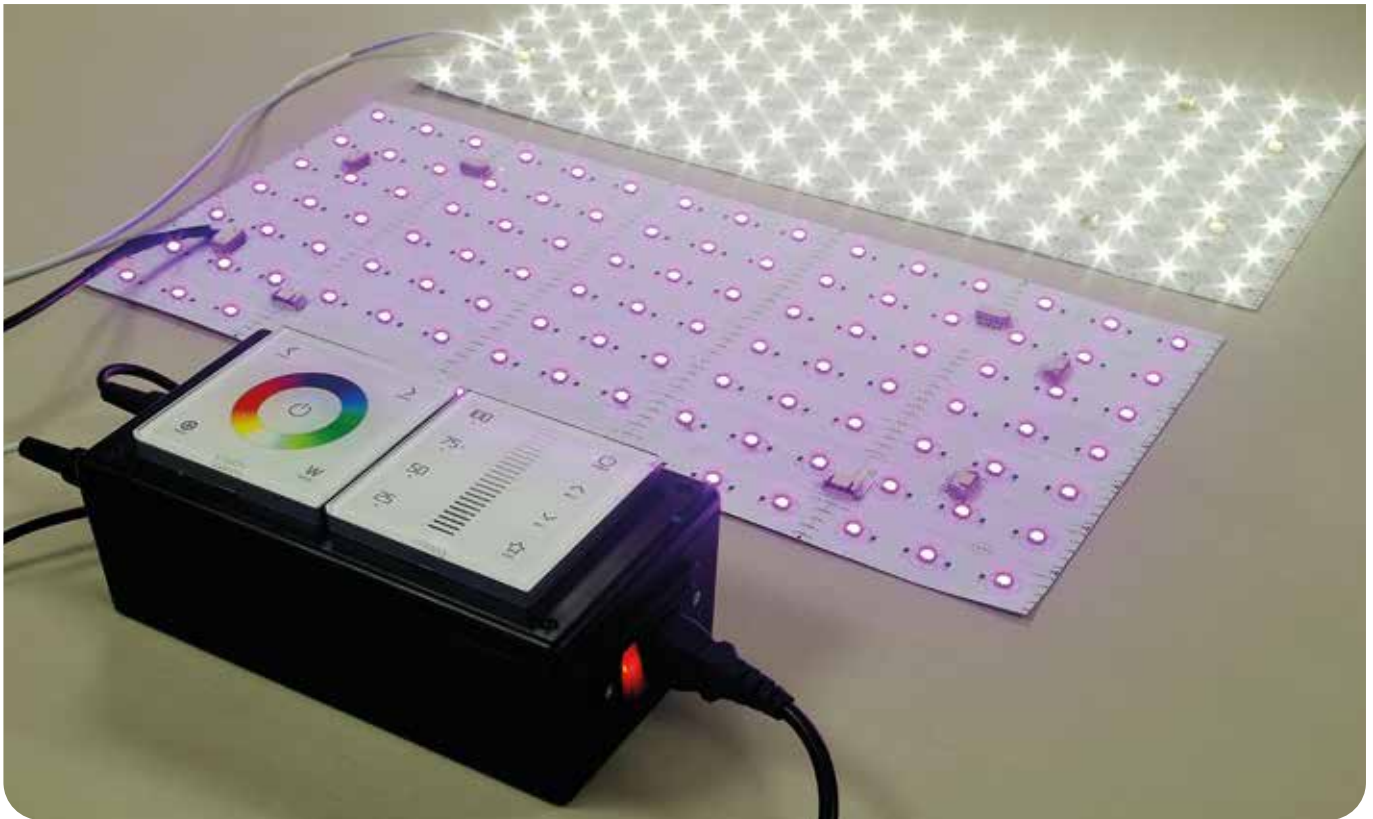
Flexibility of design

Complete"Turn Key" solutions

Shorter "time to market"

Dedicated project manager

Specifications are being continually updated for improvement. Further information and product data sheets can be found on our website at, www.plusopto.co.uk Please contact our office for the latest information particularly with regard to the latest LED intensity yields and binning detail. Products and specifications may be subject to change without notice.

To assist in the design and application of our products we can provide equipment to demonstrate the appearance and function of our Displays, LEDs and LED drivers & Controllers.

Our sales team would be pleased to arrange an on-site visit to physically demonstrate and discuss the various features and benefits of specific products.

In addition we offer bespoke demo kit to support the development of customers specific applications.

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