

# Optoelectronics: LEDs and Displays

FARNELL  
InOne



TECHNOLOGY **FIRST**

All products in this brochure are RoHS Compliant

## Highly Energy Efficient!

- ▶ Significant cost savings
- ▶ Mimics the effect of regular filament lamps
- ▶ Sealed sockets for outdoor use
- ▶ Farnell InOne next day delivery



Replacement Bulbs p15 ▶



*Let us shed some light...  
OLED, TFT, colour sensors & more!  
These changing technologies explained inside ▶*



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## Masterpieces in polymer displays!

- ▶ Vivid colour, high brightness and high contrast
- ▶ Energy efficient
- ▶ Full video capability
- ▶ Wide viewing angle
- ▶ Reliability

OSRAM

Displays p4 ▶

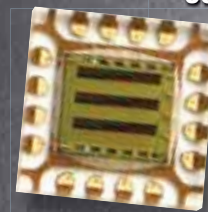


## The very latest power LEDs!

- ▶ 140+200 Lms
- ▶ Reel alternative to Halogen/Tungsten filaments
- ▶ Rivals incandescent/fluorescent sources
- ▶ RGB solutions for dazzling & unique effects

lamina®

Visible LEDs p9 ▶



## Brand new digital colour sensors

- ▶ Low cost
- ▶ High level of integration
- ▶ Advanced illumination sensor
- ▶ CMOS technology

AVAGO

Non-Visible LEDs p19 ▶

# TECHNOLOGY **FIRST**

Welcome to the second edition of TECHNOLOGY FIRST - a series of guides offering you the widest choice and information in an ever-changing marketplace.

Optoelectronics has rapidly evolved in recent times, with the development of high power LED technology and the miniaturisation of displays for industrial applications providing huge impacts on the marketplace.

Farnell InOne's comprehensive Optoelectronics range now contains over 15,000 products. This guide examines these changing technologies with emphasis on **Displays**, **Visible LEDs** and **Non-visible LEDs** to offer you a side-by-side comparison from leading manufacturers.

All products in this brochure are **RoHS Compliant**

### Smallest TFT in stock

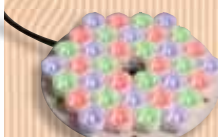


3.5" colour display

**SHARP**

05 ▶

### New to the industry



Light engines

**Dialight Lumidrive**

13 ▶



### PLUS

Visit our dedicated Optoelectronics web area containing everything in this guide plus more. Featuring a further 1,200 brand new Optoelectronics products, latest innovations and comprehensive design information on **Optocouplers**, **Fibre Optics** and **Associated IC products**

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*"Make an Informed Choice in Optoelectronics"*



## Displays

As the consumer market grows, it demands miniature displays which have higher resolution, are brighter, faster and more power efficient. Leading manufacturers have made considerable investment developing their standard range of LCD products and are now expanding to small TFT screens and Organic LED technology for use in the industrial arena. Described here are some of these technologies together with some accessories.



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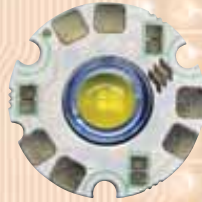
04 ▶

## Visible LEDs

In the last few years the efficiency of coloured LED increased to an amazing 60 lm/W depending on the colour; a trend that will continue in the future.

As today's white LEDs reach efficiencies up to 15 lm/W - they are increasingly used in general lighting. In emergency lighting as well as decorative lighting, they are already widely used. Today applications such as illuminated advertising also benefit from the advantages of LED, particularly by using coloured LED-modules.

This section looks at the leading suppliers' products grouped by standard surface-mount and through-hole LEDs, Power LEDs and associated accessories, Replacement Bulbs and LED Modules/Arrays.

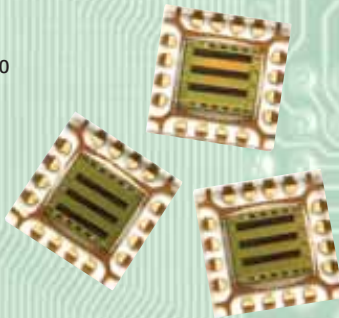


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## Non-Visible LEDs

There are many products that could fit into this category. We have split the products up into 5 groups: Emitters/Detectors (which includes IR devices), Transceivers, Optoswitches, Sensors and Laser Diodes.



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Manufacturers featuring in this brochure and on the Technology FIRST website:-



Additional manufacturers that appear on the Technology FIRST website:-



## Displays: OLED

OLED (Organic Light Emitting Diode) displays are solid state devices consisting of thin films of organic molecules which create light when an electric current is applied to them.

OLED displays have a number of advantages over other technologies. They feature high contrast and ultra sharp images - the self-emitting light provides excellent visibility and there is no viewing angle problem. OLED technology has a fast response, up to 1000 times faster than LCD displays, and handles video rendering and games excellently with no blurred images. OLED displays are thin and

lightweight, although currently only small size displays up to 2.4" are available. Power consumption is low, as unlike LCD no backlight is required, and the displays have a wide operating temperature range. OLED technology also offers the possibility of flexible displays.

Applications are potentially very wide for this technology - it currently suits portable and handheld communications and consumer electronic devices, and as larger sizes become available more industrial, automotive and larger consumer applications will be able to benefit.



The PMO09704 from Pacer is a 2.4" 128x64 mono colour (yellow) OLED display which requires only a 3.3V supply. Operating lifetimes of up to 66000 hours can be achieved.

Order Code	Mfrs. List No.	Description	Price Each
122-6870	PMO09704	DISPLAY, OLED 2.4" YELLOW	£70.38



## OSRAM

Pictiva™ OLED displays from OSRAM Opto Semiconductors are masterpieces in the polymer display industry. The Organic Light Emitting Diodes offer vivid colour and contrast, video capability, wide viewing angle and a thin-form factor. The displays are available in different sizes and in a variety of colours.

### Vivid colour, high brightness and high contrast

The self-emissive Pictiva™ OLED technology enables brilliant colours as well as high brightness and contrast.

### Energy efficient

As power consumption is dependent on the number of pixels that light up, the designer is in perfect control. Our displays captivate their viewers with superior performance compared to alternatives using backlights.

### Full video capability

Due to their fast response time small animations or trailers look brilliant on 4-Bit grayscale monochrome Pictiva™ OLED displays. In full colour you even get the perfect mini-TV experience.

### Wide viewing angle

Their self-emissive technology delivers a constant high contrast over the whole viewing angle of 180° both horizontally and vertically.

### Thin-form factor

Our displays offer much more flexibility for design-in due to a thin-form factor. Also no backlight is required either.

### Reliability

The long lifetime of 55,000 hours at standard brightness (up to 100,000h at reduced luminance) makes our displays well suited for high quality applications.



Order Code	Mfrs. List No.	Description	Price Each
124-4118	OE128064P000M00A01	OLED Reference Design Kit	£183.42
122-6428	OS080048PK09M00A11	80x48 Orange	£21.54
124-4117	OS096016PP08M02B10	0.8" 96 x 16 Orange, Parallel Interface	£12.49
124-2050	OS096036PK10MY0B10	1.0" 96 x 36 Yellow, Parallel Interface	£14.36
122-6431	OS096036PN10MB2B10	96x36 Blue	£17.96
124-2049	OS096064PH10FC1A10	1.0" 96 x 64 FULL COLOUR, Parallel Interface	£20.96
124-2047	OS096064PK11MG1B10	1.1" 96 x 64 Green, Parallel Interface	£17.10
124-2048	OS096064PK11MO1B10	1.1" 96 x 64 Orange, Parallel Interface	£17.10
124-2046	OS096064PK11MY0B10	1.1" 96 x 64 Yellow, Parallel Interface	£17.10
122-6429	OS096064PK12MY0A00	94x64 Yellow	£37.85
124-2045	OS128048PN11AG1B10	1.1" 128 x 48 Area Colour, Parallel Interface	£14.36
124-2044	OS128048PN11MB2B10	1.1" 128 x 48 Blue, Parallel interface	£13.30
122-6432	OS128048PN11MG1B10	128x48 Green	£17.96
124-4116	OS128048PN11MW0B10	1.1" 128 x 48 White, Parallel interface	£18.94
122-6433	OS128064PK16MY0A00	128x64 Yellow	£34.00
124-2043	OS128064PK27MY0B00	2.7" 96 x 64 Yellow, Parallel interface	£36.80





## Displays: TFT

Thin Film Transistor LCD panel. A type of LCD flat panel display screen in which each pixel is controlled by one to four transistors. This allows the electrical current that illuminates the display to be turned on and off at a faster rate which makes the display brighter and shows motion smoother. In turn this improves the display of small fonts without appearing jagged or fuzzy. This is rapidly becoming the standard technology used in LCD screens as it provides an increased level of resolution and image sharpness.

This developing technology, sometimes called active matrix LCDs, attempts to place the controller of the panel directly on the surface of the glass and provides the best resolution of all the flat panel techniques. This technology was developed in the mobile phone, digital camera and notebook markets but is now accessible to the industrial market place also with the help of leading manufacturers such as Sharp Microelectronics, Toshiba and Densitron.

### SHARP

Introducing a specially selected range of Sharp TFT displays ideal for the requirements of the industrial market.

Ranging from smaller 3.5" transfective displays ideal for handheld applications where low power or sunlight readability is required, up to a family of 10.4" Strong LCDs.

Sharp's technology overcomes the need for compact LCDs

affected by harsh environments, such as resistance to vibration or temperature extremes. The Strong LCDs employ a new mounting and drive technology, liquid crystal capable of withstanding a wide range of temperatures and backlights designed to provide an extended service life.



Order Code	Mfrs. List No.	Description	Price Each
109-8277	LQ057Q3DC12	LCD Display, RGB 320X240	£111.98
109-8278	LQ064V3DG01	LCD Display, RGB 640X480	£138.15
109-8280	LQ084S3DG01	LCD Display, RGB 600X800	£191.52
109-8281	LQ104V1DG51	LCD Display, RGB 480X640	£185.24
109-8282	LQ104V1DW02	LCD Display, RGB 480X640	£216.64
109-8283	LQ104S1DG21	LCD DISPLAY, RGB 800X600	£185.24
109-8284	LQ104S1LG21	LCD DISPLAY, RGB 480X640	£185.24
109-8285	LQ035Q7DH02F	LCD DISPLAY, RGB 240X320	£57.56
109-8286	LQ035Q7DH03	LCD DISPLAY, RGB 240X320	£54.42



Densitron has come up with another innovative LCD product: a 320 x 234 dot, 32K colour, 5V operation, 8051 bus interface TFT LCD for all low-to-mid volume industrial applications.

Utilising its Human-Machine Interface (HMI) experience, Densitron's LM67802 TFT LCD module is designed to reduce the hardware and software re-design efforts by letting users drive a TFT LCD using the well known 8051 bus.

The LM67802 is a compact (148 x 120 x 19.4mm) TFT LCD module with the following features:

- Separate On-Screen Display function (character/text) and graphic interfaces: graphic contents can be addressable directly from ROM
- Built-in 5 x 8 English, Japanese and European Character Generator and 16 x 16 English and Numeric fonts to reduce software development time
- Graphic Download Capabilities via RS232
- Bitmap Graphic Support
- Built-in Positive Voltage and Temperature Compensation Circuits
- Typical Brightness of 300 nit
- Well located Mounting Holes

During product development, Densitron's engineers have overcome the 8051 slow refresh rate issue. Mastering this technology allows Densitron to produce a truly innovative product at extremely competitive prices, while ensuring designers will meet their time-to-market requirements.

Order Code	Mfrs. List No.	Description	Price Each
122-0216	LMR67802	5.6" 320 x 234 TFT LCD that is easy to interface and mount	£207.88

### TOSHIBA

In April 2002, Toshiba Corporation and Matsushita Electric Industrial Co., Ltd. merged their LCD businesses into a new joint venture company, Toshiba Matsushita Display Technology Co., Ltd, now known as TMDisplay. The new company brings together each company's strengths and capabilities in LCD technology to satisfy a broad range of customer requirements and market segments.

TMDisplay is a leading manufacturer of thin-film transistor (TFT) LCD modules. By using its advanced technology, it is positioned as one of the world leaders in the LCD market.

TMDisplay enjoy a strong market position for displays for mobile telephones, car navigation systems, notebook PCs, and a host of industrial applications.

With their highly technological and competitive edge, TMDisplay have an unparalleled share for this field and their goal is to become the leading provider of displays in the world by further strengthening the technological advantage. Some of its most popular products for the Global industrial market are shown below.



Order Code	Mfrs. List No.	Description	Price
122-5914	LTA065B0D0F	6.5" VGA Industrial 400cd/m2	£208.63
122-5915	LTM08C351S	8.4" SVGA Industrial 350cd/m2	£291.67
122-5916	LTM08C351L	8.4" SVGA Industrial 350cd/m2 LVDS	£291.67
122-5917	LTD104C11S	10.4" VGA Industrial 400cd/m2	£291.67
122-5918	LTD121C30S	12.1" SVGA Industrial 350cd/m2	£329.17
122-5919	LTD121C33S	12.1" SVGA Industrial 350cd/m2 LVDS	£329.17
122-5920	LTD121GA0S	12.1" XGA Industrial 350cd/m2	£343.75
122-5921	PS-DA0253-01(S)	Inverter, LCD Backlit	£34.09
122-5922	VNL08C351-INV	Inverter, LCD Backlit	£34.09
122-5924	VNR104C11S	Inverter, LCD Backlit	£34.09

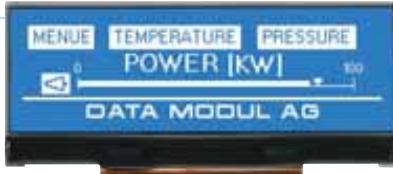
## Displays: LCD

Liquid Crystal Display. A display that consists of two polarizing transparent panels and a liquid crystal surface sandwiched in between. An electric current, causing minor temperature variations, passed through the liquid causes the crystals to align (crystallize) so that light cannot pass through them and returns to a liquid state when the current is switched off. Each crystal, therefore, is like a shutter, either

allowing light to pass through or blocking the light. The light source is usually direct light, however often an external back light is fitted to allow visibility under low-light conditions.

Farnell InOne has a variety of suppliers for this type of display technology including Batron, Densitron, Everbouquet, Hitachi, Powertip, Toshiba and Varitronix.

**BATRON**  
A DATA MODULE BRAND



### I<sup>2</sup>C Interface displays

5V LCD modules offer the potential of I<sup>2</sup>C serial interfacing, in a range offering character or graphical solutions. The HQ versions feature a 15 micron dot gap. Transflective versions utilise efficient LED backlights, maximising the potential applications.

- I<sup>2</sup>C serial interface
- High definition pixels on HQ types
- Reflective and Transflective types
- Alphanumeric and Graphic options
- COB and COG versions

Order Code	Mfrs. List No.	Description	Price Each
122-0409	BTHQ21605V-COG-FSRE-I2C	2x16	£14.62
122-0411	BTHQ21605V-COG-FSTF-I2C-LED-White	2x16	£28.73
122-0412	BT96040AV-COG-SRE-12-I2C	96x40	£16.64
122-0413	BT96040AV-COG-FSTF-12-I2C	96x40	£17.80

### Multi Colour Backlight Graphic LCD modules

The RGB LED backlight provides any background colour to be selected. This provides the user with LCDs to coordinate with housings or environments. Dynamic backlight colour change can allow control equipments to show alternating system states to highlight the process condition.

- 15 micron dot gap
- Any colour of backlight
- 128x64 and 240x64 resolutions
- Chip on glass
- Wide range of applications



Order Code	Mfrs. List No.	Description	Price Each
122-0414	BT120032AVB-COG-SRE-12	120x32	£14.58
122-0415	BT120032AVB-COG-STF-12-LED02YG	120 x 32	£17.25
122-0416	BTHQ128064AVD-COG-FSTF-LEDMULTI	128x64	£23.82
122-0417	BTHQ128064AVE-COG-FERE	128x64	£18.82
122-0418	BTHQ128064AVE-COG-FETF-06-LED-WHITE	128x64	£31.09
122-0419	BTHQ128064AVE-COG-EMN-06-LED-WHITE	128x64	£28.18
122-0420	BTHQ240064AVB-COG-FETF-06-LEDMULTI	240x64	£69.96
122-0422	BTHQ240064AVB-COG-FERE	240x64	£62.18

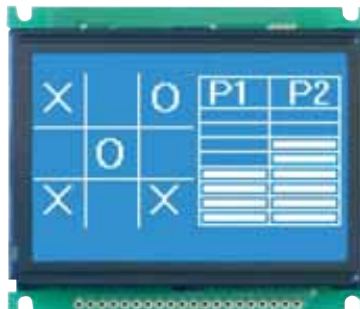
DISPLAYS

**EVERBOUQUET INTERNATIONAL**  
WAYTON TECHNOLOGY

### Graphic Displays with Chinese Character Fonts

- Chinese character set on board
- Fits same footprint as industry standard character modules
- 160x32 and 192x32 resolutions
- Provides easy to use option for applications within the Asian markets

The 160x32 version fits the footprint as standard 2x16 displays (80x36mm), and the 192x32 is the same as standard 2x20 (116x37mm). There are various backlight and temperature-range models providing the end user with access to any worldwide market.



Order Code	Mfrs. List No.	Description	Price
122-0423	MC16011A-SYR	LCD MODULE, 1x16 STN	£5.64
122-0424	MC1602C-SYR	LCD MODULE, 2x16 STN	£5.87
122-0425	MC16021E-SYR	LCD MODULE, 2x16 STN	£6.42
122-0426	MC1602F-SYR	LCD MODULE, 2x16 STN	£6.15
122-0427	MC1602J-SYR	LCD MODULE, 2x16 STN	£10.27
122-0428	MC1604B-SYR	LCD MODULE, 4x16 STN	£10.05
122-0429	MC2002D-SYR	LCD MODULE, 2x20 STN	£8.71
122-0430	MC24021A-SYR	LCD MODULE, 2x24 STN	£9.40
122-0431	MC2004E-SYR	LCD MODULE, 4x20 STN	£12.04
122-0432	MC1602C8-SYL	LCD MODULE, 2x16 STN B/L	£7.49
122-0434	MC16021E8-SYL	LCD MODULE, 2x16 STN B/L	£7.98
122-0435	MC1602F7-SYL	LCD MODULE, 2x16 STN B/L	£7.60
122-0436	MC1602J-SYL	LCD MODULE, 2x16 STN B/L	£15.42
122-0437	MC2002D-SYL	LCD MODULE, 2x20 STN B/L	£11.62
122-0438	MC24021A-SYL	LCD MODULE, 2x24 STN B/L	£12.71
122-0439	MC2004E-SYL	LCD MODULE, 4x20 STN B/L	£15.27
122-0440	MC4002D7-SYL	LCD MODULE, 2x40 STN B/L	£18.53
122-0441	MG1206D-SBLW	LCD MODULE, 128x64 STN White B/L	£16.35
122-0442	MG1203D-SYL	LCD MODULE, 12x32 STN B/L	£13.87
122-0443	MG1206B-SYL	LCD MODULE, 128x64 STN B/L	£25.76
122-0444	MG1603GC9-SBLW	LCD MODULE, 160x32 STN B/L	£17.62
122-0446	MG1603GC9-SYL	LCD MODULE, 160x32 STN B/L	£13.58
122-0447	MG1903AC-SYL	LCD MODULE, 192x32 STN B/L	£19.35
122-0448	MG2406B-SYL	LCD MODULE, 240x64 STN LED B/L LCD	£47.87
122-0449	MG24065G-SYL	LCD MODULE, 240x64 STN LED B/L LCD	£57.53

**POWERTIP**

Powertip founded in 1991 is one of the leading manufacturers of Liquid Crystal Display (LCD) technology employing some 550 manufacturing and engineering personnel within their factories located in Taiwan and China.

With a total of 14,400 square meters of manufacturing space, they are fully equipped to handle the market needs for chip-on glass (COG), chip-on film (COF), tape-automated-bonding (TAB), chip-on board (COB) and surface-mount technology (SMT) LCD module designs.

Powertip offer over 79 different series (comprising over 1000 configurations) of standard LCD modules, and with their own glass and backlight factories are able to meet the changing demands of today's industry.

A variety of products are on offer, including, standard mono character modules which utilise COB technology and STN fluid such as the PC1602LRS series and the new "Easy Fluid" range.

Recently released are a range of Mono Graphic LCDs offering 128x64Dot resolution and a duty cycle of 1/64. A Tab solution is employed for a compact connection method. LED backlight and FSTN technology make this easy to use Graphic a viable product in daylight applications. See part 121-8607 for more detail.

Along with these Powertip have developed a range of 1/4 VGA mono and colour graphic LCDs with an extended temperature range. A standard 6'o'clock view angle, bright LED backlight (white) and a 4 wire fitted touchscreen, make these products ideal for small hand held instrument applications where user input is required. See part 121-8609 for further detail.

Order Code	Mfrs. List No.	Description	Price
121-8607	PG12864LRF-NRA-B	LCD GRPHC 128X64 FSTN LED B/L	£38.96
121-8609	JXG320240WRF-DE4-HY4	LCD GRPHC 320X240 FSTN T/SCRN	£97.85





## LM4769

The high performance LM4769 QVGA Monochrome Graphics display measures 154mm x 120mm and offers a generous viewing area of 120mm x 92mm, such as a 5.95" diagonal screen size. It is operated with a standard 5v power supply, with built in negative voltage generator, and features an on-board graphic controller S1D13700, with built-in 32K bytes SRAM. Moreover, the display allows users to select between Intel 8080 and Motorola 6800 bus protocol by PCB JUMPER setting.

The great value LM4769 is available in the background colours of black, white, yellow, green or blue, and comes in the following models:

- LED backlight with positive image;
- LED backlight with negative image; and
- CFL backlight with negative image

Touch screen versions of the above models are also available, enabling developers to use the displays in human interface applications.

While the LED backlight format is renowned for its high reliability, the CFL backlight format is a popular choice for its high brightness. All of the above models are RoHS compliant and can operate in a wide temperature range, allowing them to be used under both indoor and outdoor conditions without any additional modifications required.



## LMR4270

Measuring 180mm x 65mm, the COB package mode LMR4270 Monochrome Graphic display offers a generous viewing area of 133mm x 39mm (5.46"). It is operated with a standard 5v power supply, with an integrated negative voltage generator, and features on-board graphic controller T6963C, with built-in 8K bytes SRAM and optional upgrade to 32K bytes SRAM. Moreover, the display allows users to select between Intel 8080 and Motorola 6800 bus protocol.

## LMR4234

Measuring a compact 144mm x 104mm, the COB package mode LMR4234 Monochrome Graphic display provides a good size viewing area of 114mm x 64mm (5.1"). It is operated with a standard 5v power supply, with an integrated negative voltage generator, and features on-board graphic controller T6963C, with built-in 8K bytes SRAM and optional upgrade to 32K bytes SRAM. Moreover, the display allows users to select between Intel 8080 and Motorola 6800 bus protocol.

Both of the above parts have low power consumption and are available in the background colours of yellow-green or white and come in EL, LED and CCFL backlight formats with positive or negative image. Touch screen versions of the above models are also available, enabling developers to use the displays in human interface applications.

While LED is renowned for its high reliability, CCFL is a popular choice for its high brightness, and EL has extremely low current requirements and very low heat generation.

All of the above models are RoHS compliant and can operate in a wide temperature range, allowing them to be used under both indoor and outdoor conditions without any additional modifications required.



Order Code	Mfrs. List No.	Description	Price Each
122-0217	LMR4270BG-WCY	LCD MODULE 64x240 Y/G	£68.85
122-0218	LMR4270EW-WCB	LCD MODULE 64x240 BLUE	£69.95
122-0219	LMR4270BW-WCF	LCD MODULE 64x240 WHITE	£71.60
122-0220	LMR4234BG-WCY	LCD MODULE 128x240 Y/G	£108.33
122-0221	LMR4234EW-WCB	LCD MODULE 128x240 BLUE	£106.50
122-0222	LMR4234BW-WCF	LCD MODULE 128x240 WHITE	£111.98
122-0223	LMR4769EW-WCB	LCD MODULE 240x320 BLUE	£145.91
122-0224	LMR4769BW-WNF	LCD MODULE 240x320 WHITE	£152.58

## Display Excellence

Hitachi Displays are synonymous with high quality and exceptional optical performance. With nearly one hundred years of experience in the technology sector the company has the expertise to combine this extensive design experience with advanced manufacturing technologies to offer the customer the perfect solution. In-house design and production of key components such as colour filters, LCD drivers and backlights allows Hitachi to provide cost effective solutions with continuity of supply.

Suitable for a multitude of applications such as industrial, consumer, POS, kiosk, process control and many more, Hitachi's range of LCD modules, inverters and starter kits feature high brightness, outstanding reliability, serviceability and low power consumption all within a compact and lightweight design.

Available from sizes 3.3" to 5.7", Hitachi has the ability to offer the customer true display excellence.



**HITACHI**

Order Code	Mfrs. List No.	Description	Price
108-2080	INVC196	INVERTER, GRAPHIC LCD	£20.12
120-0166	SP10Q003-T.	LCD GRAPHIC MODULE	£72.47
120-0167	SP10Q005-T.	LCD GRAPHIC MODULE	£60.91
120-0168	SP14Q002-A1.	LCD GRAPHIC MODULE	£59.55
120-0169	SP14Q002-C2A.	LCD GRAPHIC MODULE	£92.35
108-2090	START7520.	STARTER KIT, GRAPHIC LCD	£84.85
120-0170	SX14Q001.	LCD GRAPHIC MODULE	£118.18



With a strong focus on innovative product design and progressive technology, Varitronix engineer and provide advanced display technologies for a wide range of applications, from automotive and telecommunications, to industrial and consumer applications.

Specialising in small to medium sized LCDs, Varitronix achieve excellence through their solid technological base and rich production experience. Offering a comprehensive range of LCD modules such as alphanumeric, 16 x 2, 20 x 2, 40 x 2, 3.5 digit, 6 digit, 8 digit and many more, Varitronix are able to supply colour monochrome and Electroluminescent products for all sectors.

Widely recognised as a leading LCD manufacturer with expertise in manufacturing colour displays, Varitronix has the quality, innovation and vision to fulfil your requirements.

Order Code	Mfrs. List No.	Description	Price
118-3125	MDL81809-LV.	LCD ALPHANUMERIC 8X1	£18.34
118-3191	MDLS161663V.	LCD MODULE 16 X 1 STN.	£17.95
118-3148	MDLS16168-LV.	LCD GRAPHIC MODULE	£15.63
118-3153	MDLS16168-STET-LED04.	LCD MODULE 16X1	£20.32
118-3192	MDLS162653V.	LCD MODULE 16 X 2 STN.	£20.97
118-3193	MDLS16265LED043V.	LCD MODULE 16 X 2	£22.09
118-3149	MDLS16268C-LV.	LCD GRAPHIC MODULE	£22.80
118-3154	MDLS16268-C-LV-LED04.	LCD MODULE 16X2	£22.44
118-3174	MDLS16266-LV.	LCD MODULE, 16X2 STN.	£22.04
118-3181	MDLS162D65-LV-LED04.	LCD MODULE, 16X2	£37.77
118-3137	MDLS16465-LV-LED04.	LCD, 16X4 B/L	£35.22
118-3176	MDLS20265-LV.	LCD MODULE 20X2 STN.	£22.67
118-3182	MDLS20265-LV-LED04.	LCD MODULE 20X2	£45.85
118-3141	MDLS20464-LV.	LCD, 20X4	£30.63
118-3142	MDLS20464-LV-LED04.	LCD, 20X4 B/L	£61.61
118-3177	MDLS24265-LV.	LCD MODULE, 24X2 STN.	£22.10
118-3179	MDLS24265-LV-EL.	LCD MODULE, 24X2 E/L	£35.35
118-3183	MDLS24265SP-LV-LED04.	LCD MODULE 24X2	£35.81
118-3178	MDLS40266-LV.	LCD MODULE, 40X2 STN.	£37.94
118-3180	MDLS40266-LV-EL.	LCD MODULE, 40X2 E/L	£48.81
118-3184	MDLS40266-LV-LED04.	LCD MODULE 40X2	£64.29
118-3135	MDLS40466-LV.	LCD, 40X4	£47.61

Order Code	Mfrs. List No.	Description	Price
118-3143	MDLS40466-LV-LED04.	LCD, 40X4 B/L	£88.02
118-3186	MGLS10032A-LV2-LED03.	LCD GRAPHIC MOD	£40.48
118-3152	MGLS128128T-LV2-LED04.	LCD GRAPHIC MODULE	£75.91
118-3150	MGLS128128T-STD2.	LCD GRAPHIC MODULE	£63.79
118-3188	MGLS12864T.	LCD GRAPHIC MODULE	£41.85
118-3189	MGLS12864T-LV2-LED03.	LCD GRAPHIC MOD	£47.41
118-3190	MGLS19264-LED03.	LCD GRAPHIC MODULE	£68.68
118-3196	MGLS240128T-STD2-LED3.	LCD MODULE	£87.93
118-3195	MGLS24064-STD2-LED03.	LCD GRAPH MOD	£70.42
118-3194	MGLS24066-STD2.	LCD GRAPHIC MODULE	£61.71
118-3127	TRIMODS1531.	LCD, 16X1	£8.87
118-3132	TRIMODS1533.	LCD, 16X1	£11.39
118-3128	TRIMODS1535.	LCD, 16X2	£10.80
118-3133	TRIMODS1537.	LCD, 16X2	£14.25
118-3136	TRIMODS1538TNLEDTFV.	LCD, 16X2 B/L	£17.00
118-3129	TRIMODS1539.	LCD, 16X4	£18.42
118-3130	TRIMODS1543.	LCD, 20X2	£16.73
118-3134	TRIMODS1544.	LCD, 20X2	£19.93
118-3139	TRIMODS1545.	LCD, 20X2 B/L	£32.54
118-3131	TRIMODS1546.	LCD, 20X4	£22.62
118-3157	TRIMODS1554B/LSTN.	LCD MODULE 40X2	£24.92
118-3156	TRIMODS1554NONB/L-STN.	LCD MODULE 40X2	£21.54
118-3155	TRIMODS1554NONB/L-TN.	LCD MODULE 40X2	£20.56
118-3158	VI301-DPRC.	LCD 3.5 DIGIT	£7.60
118-3145	VI302-DP-FC-S-LV.	LCD 3.5 DIGIT	£5.06
118-3159	VI302-DPRC.	LCD 3.5 DIGIT	£5.06
118-3144	VI303-DP-FC-S-LV.	LCD 3.5 DIGIT	£7.31
118-3160	VI303-DPRC.	LCD 3.5 DIGIT	£4.90
118-3161	VI315-DPRC.	LCD 3.5 DIGIT	£16.07
118-3162	VI320-DPRC.	LCD 3.5 DIGIT	£23.80
118-3164	VI401-DPRC.	LCD 4 DIGIT	£7.60
118-3146	VI402-DP-FC-S-LV.	LCD 4 DIGIT	£4.73
118-3165	VI402-DPRC.	LCD 4 DIGIT	£4.70
118-3147	VI415-DP-FC-S-LV.	LCD 4 DIGIT	£8.20
118-3166	VI415-DPRC.	LCD 4 DIGIT	£8.20
118-3167	VI421-DPRC.	LCD 4 DIGIT	£16.10
118-3169	VI502-DPRC.	LCD 4.5 DIGIT	£5.65
118-3170	VI510-DPRC.	LCD 4.5 DIGIT	£23.80
118-3168	VI514-DPRC.	LCD 4.5 DIGIT	£7.09
118-3185	VI602-DP-FC-S.	LCD 6 DIGIT	£8.05
118-3171	VI602-DPRC.	LCD 6 DIGIT	£8.01
118-3172	VI607-DPRC.	LCD 6 DIGIT	£20.55
118-3173	VI804-DPRC.	LCD 8 DIGIT	£19.79

DISPLAYS

## Accessories



To complement their range of 128x64 and 240x64 LCD modules, Batron supply a range of compatible bezels. The bezels are ideal for pre-production and production engineering of chip on glass LCD modules as they provide flexible and user definable fixer holes.

Order Code	Mfrs. List No.	Description	Price
122-0451	BT21011	Bezel for LCD Module	£3.43
122-0452	BT21012	Bezel for LCD Module	£3.43
122-0455	BT21013	Bezel for LCD Module	£3.43
122-0456	BT21014	Bezel for LCD Module	£3.43
122-0458	BT21015	Bezel for LCD Module	£3.43
122-0459	BT21016	Bezel for LCD Module	£3.43

For a wider selection of IC Display Drivers, please see our website

[www.farnellinone.com/edworld](http://www.farnellinone.com/edworld)



## Visible LEDs: Power LED

Visible LEDs have a high luminous efficiency compared to incandescent bulbs, and this efficiency is forecast to increase further in future, leading to their adoption in a growing number of applications. Additionally, lifetimes of 50K hours+ can be confidently predicted in many cases.

Typically, LEDs have been driven at low power with a minimum power dissipation of 150 mW, so that most lighting applications required numerous low-power LEDs.

The new high-power visible LEDs have power dissipations ranging from 500mW to as much as 10 Watts in a single package. These high-power components can replace other lighting technologies in most applications.

By combining LED technology with newer Optic technology, even further advances in Optoelectronics are possible. Leading this market and represented here are Lumileds, Osram, Avago, CML, Optek, OMC and Lamina.



Avago Technologies' new InGaN 1W High Power LED is an easy-to-use high flux output SMD package. It is designed to be compatible with the industry standard IR solder reflow process which makes for easy assembly. It has a moisture sensitivity level of 2a, placing it among the best in the high power LED package market. With a floor life of up to four weeks (@30°C and not more than 60% relative humidity), customers have more flexibility in planning their production schedules.

With an exposed die-attach pad design, heat easily flows out of the LED region thereby achieving a very low package thermal resistance of 10°C/W. Coupled with a heat and UV-resistant silicone encapsulation, the LED is well-protected to provide a trouble-free long operating life. The slim package profile and the smooth radiation pattern make Avago's High Power LED ideal for many solid state lighting applications.

Now available from Farnell InOne: Avago's White, Blue, and Green InGaN 1W High Power SMD LEDs.

Order Code	Mfrs. List No.	Description	Price
124-1243	ASMT-MW00-NF100	LED, SMT 1W WHITE	£3.68
124-1244	ASMT-MB00-NAE00	LED, SMT 1W BLUE	£3.59
124-1245	ASMT-MG00-NGJ00	LED, SMT 1W GREEN	£4.14



Lumileds Lighting is the world's leading manufacturer of high-power Light Emitting Diodes (LEDs) and a pioneer in the use of solid-state lighting solutions for everyday purposes. The company's patented Luxeon® Power Lighting Sources are the first to combine the brightness of conventional lighting with the small footprint, long life and other advantages of LEDs.

Lumileds also supplies cored LED material and LED packaging, manufacturing billions of LEDs annually, and ranks as the producer of the world's brightest red, amber, blue, green and white LEDs. Lumileds mission is to bring the small form factor, long life span and other benefits of solid-state illumination based on LEDs to general lighting applications such as light fixtures, traffic signals, automotive, signaling and LCD displays through power LED technology.

In the last decade, Luxeon solid-state light sources have emerged as one of the leading manufacturers of light emitting diodes with the efficiency, power, durability and reliability necessary to fulfil the promise of solid-state lighting for myriad lighting segments.

Now the lighting community can choose from a wide variety of Luxeon products designed to meet specific need or to provide more efficient, longer lasting alternatives to traditional lamps.

### LUXEON®

In the last decade, LUXEON® solid-state light sources have emerged as the only light emitting diodes with the efficiency, power, durability and reliability necessary to fulfill the promise of solid-state lighting for myriad lighting segments.

Philips Lumileds' LUXEON® technology enables LEDs to match the brightness of conventional light sources and for the first time, makes it possible to replace incandescent, halogen and fluorescent bulbs in many products with smaller, longer-lasting and more energy efficient LEDs.

LUXEON® gives lighting designers the ability to create a new breed of lighting fixtures that dedicate much less space to the light source, eliminate the need to replace bulbs, and offers precise beam control.

The lighting community can choose from a wide variety of LUXEON® products designed to meet the specific needs or to provide more efficient, longer lasting alternatives to traditional lamps.

#### LUXEON® I

Our original high-power light source now delivers 45 lumens in white and is available in a range of colours and configurations.

#### LUXEON® III

Delivers 27-190 lumens and maintains the footprint and benefits of our LUXEON® products.

#### LUXEON® V

Is the world's brightest solid-state light source delivering up to 120 lumens in white and comparable light output in other colours.

#### LUXEON® K2

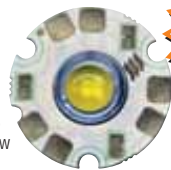
The latest addition to the LUXEON® high-power LED family, establishes elevated standards for light output, thermal management, cost and manufacturability

Order Code	Mfrs. List No.	Description	Price
122-5059	LXK2-PW12-R00-REEL-LF	LUXEON K2 WHITE LAMB, FLUX R	£4.30
122-5060	LXK2-PW14-T00-REEL-LF	LUXEON K2 WHITE-LAMB(85LM-1AMP)	£4.03
122-5061	LXK2-PW14-U00-REEL-LF	LUXEON K2, WHITE LAMB, FLUX U	£4.30
122-5062	LXK2-PM12-R00-REEL-LF	LUXEON K2 GREEN LAMB, FLUX R	£3.58
122-5063	LXK2-PM14-U00-REEL-LF	LUXEON K2 GREEN LAMB, FLUX U	£3.58
122-5064	LXK2-PE12-Q00-REEL-LF	LUXEON K2 CYAN LAMB, FLUX Q	£3.58
122-5065	LXK2-PE14-T00-REEL-LF	LUXEON K2 CYAN LAMB,FLUX T	£3.58
122-5067	LXK2-PB12-K00-BULK-LF	LUXEON K2 BLUE LAMB, FLUX K	£3.58
122-5068	LXK2-PB14-N00-REEL-LF	LUXEON K2 BLUE LAMB FLUX N	£3.58
122-5069	LXK2-PR12-L00-REEL-LF	LUXEON K2 ROYALBLUE LAMB FLUXL	£3.58
122-5070	LXK2-PR14-Q00-REEL-LF	LUXEON K2 ROYALBLUE LAMB FLUXQ	£3.58
122-5071	LXK2-PD12-Q00-REEL-LF	LUXEON K2 RED LAMB, FLUX Q	£2.93
122-5072	LXK2-PD12-R00-REEL-LF	LUXEON K2 RED LAMB, FLUX R	£3.22
122-5073	LXK2-PH12-R00-REEL-LF	LUXEON K2 RED-ORG LAMB, FLUX R	£2.93
122-5074	LXK2-PH12-S00-REEL-LF	LUXEON K2 RED-ORG LAMB, FLUX S	£3.22
122-5075	LXK2-PL12-P00-REEL-LF	LUXEON K2 AMBER LAMB, FLUX P	£2.93
122-5076	LXK2-PL12-Q00-REEL-LF	LUXEON K2 AMBER LAMB, FLUX Q	£3.22



Introducing the latest in high brightness LightEngines from Lamina Ceramics - ATLAS.

These record breaking products bring the benefits of solid state lighting to applications which until now were possible only with traditional lighting sources.



Lamina ATLAS provides the industry's best LED light output with over 200 and 140 lumens available from the Daylight and Warm White versions respectively.

As the first real LED alternative to halogen and tungsten filament ATLAS Warm White is perfect for illuminating interior spaces of home and leisure, whilst the Daylight White model of rivals incandescent and fluorescent sources. Also available is an RGB solution that provides a homogenous colour mix from a single component, allowing the creation of dazzling effects impossible to achieve with other technologies.

With an unrivalled thermal resistance of just 3.5°C/W, heatsinking requirements can be minimised and LED junction temperatures stay lower - leading to more light output in the application and a higher degree of reliability.

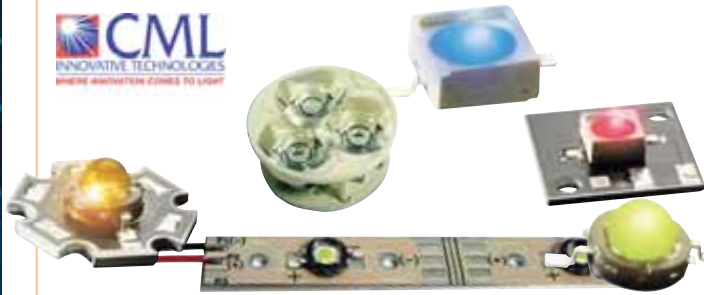
ATLAS features a lambertian light emission pattern that can be optically controlled with coordinating wide, medium and narrow optics. Prototyping has never been easier - ATLAS can be bought presoldered on the EZ-Connect PCB, enabling 'plug and play' operation, and pretapped heatsinks are available.

\*Natural convection. Lamina LightEngines are mounted using M2 X 0.4 cheese head screws, 18-8 SS (BuckHickman InOne Order Code 88-57580) with thermal grease in the joint, or alternatively with thermally conductive adhesive (Farnell InOne Order Code 878-3721). Please refer to ATLAS datasheets for more details.\*

Colour	Typ. Wavelength (nm)	Power	Typ. Luminous Flux	Typ. Forward Voltage	Test Current
Warm White	3050K	5.27 W	120 lm	7.5 V	700 mA
Warm White	3050K	8.61 W	162 lm	8.2 V	1050 mA
Daylight White	4700K	5.27 W	175 lm	7.5 V	700 mA
Daylight White	4700K	8.61W	250 lm	8.2 V	1050 mA
RGB	Red	1.6 W	52 lm	4.6 V	350 mA
RGB	Green	2.3 W	59 lm	6.7 V	350 mA
RGB	Blue	2.7 W	14 lm	7.6 V	350 mA

Order Code	Mfrs. List No.	Description	Price
122-5173	NT-42D0-0426	LED, ATLAS 8.6W DL/WHITE	£9.06
122-5174	NT-42D1-0425	LED, ATLAS 8.6W WM/WHITE	£9.41
122-5175	NT-43F0-0424	LED, ATLAS 6.6W RGB	£14.12
122-5176	EZ-42D0-0433	LED, ATLAS PCB DL/WHITE	£14.35
122-5177	EZ-42D1-0432	LED, ATLAS PCB WM/WHITE	£14.71
122-5178	EZ-43F0-0431	LED, ATLAS PCB RGB	£19.41
122-5179	EZ-46WH-0354	CABLE ASSMBLY, ATLAS PCB	£2.65

For drivers, heatsinks and optics suitable for Lamina ATLAS please see page 13



CML offer one of the most comprehensive ranges of power LEDs available at this time, in 1W, 2.5W and 5W. The 1W range is available in warm white, pure white, green, red, amber, cyan, blue and RGB. Emitters are available with flat lens or dome lens and can also be supplied on a Star PCB.

The 2.5W range is available in warm white, pure white, green, red, amber, cyan and blue. Emitters are available with flat lens and dome lens and can also be supplied on a Star PCB.

The CML 5W range is available in warm white, pure white, green, red, amber, cyan and blue. Emitters are available with flat lens and dome lens and can also be supplied on a Star PCB.

**Applications**

Gaming, flash lights, aviation, signalisation, architectural.

Order Code	Mfrs. List No.	Description	Price
122-8944	CMDA30CW15D13L	LED, 1W EMITTER WHT	£3.00
122-8945	CMDA30WW15D13L	LED, 1W EMITTER W/WHT	£3.04
122-8946	CMDA30CB15D13L	LED, 1W EMITTER BLUE	£2.42
122-8947	CMDA30AG15D13L	LED, 1W EMITTER GRN	£2.42
122-8949	CMDA30AR15D13L	LED, 1W EMITTER RED	£1.31
122-8951	CMDA30DY15D13L	LED, 1W EMITTER AMBR	£1.31
122-8952	CMDA30RGB15D13L	LED, 1W EMITTER RGB	£9.27
122-8952	CMDA31CW15D13L	LED, 1W STAR EMTR WHT	£3.64
122-8953	CMDA31WW15D13L	LED, 1W STAR EMTR W/WHT	£3.64
122-8954	CMDA31CB15D13L	LED, 1W STAR EMTR BLUE	£3.04
122-8955	CMDA31AG15D13L	LED, 1W STAR EMTR GRN	£3.13
122-8956	CMDA31AR15D13L	LED, 1W STAR EMTR RED	£1.96
122-8957	CMDA31DY15D13L	LED, 1W STAR EMTR AMBR	£1.96
122-9052	CMDA31RGB15D13L	LED, 1W STAR EMTR RGB	£9.27
122-8958	CMDA33CW15D13L	LED, 1W EMITTER WHT	£3.04
122-8959	CMDA33WW15D13L	LED, 1W EMITTER W/WHT	£4.05
122-8960	CMDA33CB15D13L	LED, 1W EMITTER BLUE	£3.04
122-8962	CMDA33AG15D13L	LED, 1W EMITTER GRN	£2.53
122-8963	CMDA33AR15D13L	LED, 1W EMITTER RED	£1.96
122-8964	CMDA33DY15D13L	LED, 1W EMITTER AMBR	£1.96
122-8965	CMDA34CW15D13L	LED, 1W STAR PCB WHT	£3.64
122-8966	CMDA34WW15D13L	LED, 1W STAR PCB W/WHT	£4.80
122-8967	CMDA34CB15D13L	LED, 1W STAR PCB BLUE	£3.04
122-8968	CMDA34AG15D13L	LED, 1W STAR PCB GRN	£3.44
122-8969	CMDA34AR15D13L	LED, 1W STAR PCB RED	£1.96
122-8970	CMDA34DY15D13L	LED, 1W STAR PCB AMBR	£1.96
122-8971	CMDA36CW15D13L	LED, 2.5W EMITTER WHT	£4.85
122-8972	CMDA36WW15D13L	LED, 2.5W EMITTER W/WT	£5.51
122-8974	CMDA36CB15D13L	LED, 2.5W EMITTER BLUE	£4.56
122-8975	CMDA36AG15D13L	LED, 2.5W EMITTER GRN	£5.22
122-8976	CMDA36AR15D13L	LED, 2.5W EMITTER RED	£2.45
122-8977	CMDA36DY15D13L	LED, 2.5W EMITTER AMBR	£2.45
122-8978	CMDA37CW15D13L	LED, 2.5W STAR WHT	£5.60
122-8979	CMDA37WW15D13L	LED, 2.5W STAR W/WT	£6.25
122-8980	CMDA37CB15D13L	LED, 2.5W STAR BLUE	£5.31
122-8981	CMDA37AG15D13L	LED, 2.5W STAR GRN	£5.96
122-8982	CMDA37AR15D13L	LED, 2.5W STAR RED	£3.20
122-8983	CMDA37DY15D13L	LED, 2.5W STAR AMBR	£3.20
122-8984	CMDA39CW15D13L	LED, 2.5W EMITTER WHT	£5.31
122-8986	CMDA39WW15D13L	LED, 2.5W EMITTER W/WHT	£5.96
122-8987	CMDA39CB15D13L	LED, 2.5W EMITTER BLUE	£4.96
122-8988	CMDA39AG15D13L	LED, 2.5W EMITTER GRN	£5.67
122-8989	CMDA39AR15D13L	LED, 2.5W EMITTER RED	£2.89
122-8990	CMDA39DY15D13L	LED, 2.5W EMITTER AMBR	£2.89
122-8991	CMDA40CW15D13L	LED, 2.5W STAR PCB WHT	£6.05
122-8992	CMDA40WW15D13L	LED, 2.5W STAR PCB WWT	£6.71
122-8993	CMDA40CB15D13L	LED, 2.5W STAR PCB BLU	£5.71
122-8994	CMDA40AG15D13L	LED, 2.5W STAR PCB GRN	£6.42
122-8995	CMDA40AR15D13L	LED, 2.5W STAR PCB RED	£3.64
122-8996	CMDA40DY15D13L	LED, 2.5W STAR PCB AMB	£3.64

Order Code	Mfrs. List No.	Description	Price
122-8998	CMDA51CW15D13L	LED, 5W EMITTER WHT	£8.07
122-8999	CMDA51WW15D13L	LED, 5W EMITTER W/WHT	£11.36
122-9001	CMDA51CB15D13L	LED, 5W EMITTER BLUE	£7.38
122-9002	CMDA51AG15D13L	LED, 5W EMITTER GRN	£8.49
122-9003	CMDA51AR15D13L	LED, 5W EMITTER RED	£4.44
122-9004	CMDA51DY15D13L	LED, 5W EMITTER AMBR	£4.44
122-9005	CMDA52CW15D13L	LED, 5W STAR PCB WHT	£10.93
122-9006	CMDA52WW15D13L	LED, 5W STAR PCB W/WHT	£12.11
122-9007	CMDA52CB15D13L	LED, 5W STAR PCB BLUE	£10.02
122-9008	CMDA52AG15D13L	LED, 5W STAR PCB GRN	£11.42
122-9009	CMDA52AR15D13L	LED, 5W STAR PCB RED	£6.38
122-9010	CMDA52DY15D13L	LED, 5W STAR PCB AMBR	£6.38
122-9012	CMDA54CW15D13L	LED, 5W STAR EMTR WHT	£10.62
122-9013	CMDA54WW15D13L	LED, 5W STAR EMTR W/WT	£11.76
122-9014	CMDA54CB15D13L	LED, 5W STAR EMTR BLUE	£9.69
122-9015	CMDA54AG15D13L	LED, 5W STAR EMTR GRN	£11.11
122-9016	CMDA54AR15D13L	LED, 5W STAR EMTR RED	£6.04
122-9017	CMDA54DY15D13L	LED, 5W STAR EMTR AMBR	£6.04
122-9018	CMDA55CW15D13L	LED, 5W STAR PCB WHT	£11.36
122-9019	CMDA55WW15D13L	LED, 5W STAR PCB W/WHT	£12.51
122-9020	CMDA55CB15D13L	LED, 5W STAR PCB BLUE	£10.44
122-9021	CMDA55AG15D13L	LED, 5W STAR PCB GRN	£11.85
122-9022	CMDA55AR15D13L	LED, 5W STAR PCB RED	£6.78
122-9024	CMDA55DY15D13L	LED, 5W STAR PCB AMBR	£6.78
122-9025	CMDA42CW15D13L	LED, 1W EMITTER WHT	£3.04
122-9026	CMDA42WW15D13L	LED, 1W EMITTER W/WHT	£3.73
122-9027	CMDA42CB15D13L	LED, 1W EMITTER BLUE	£2.53
122-9028	CMDA42AG15D13L	LED, 1W EMITTER GRN	£2.84
122-9029	CMDA42AR15D13L	LED, 1W EMITTER RED	£1.64
122-9030	CMDA42DY15D13L	LED, 1W EMITTER AMBR	£1.64
122-9031	CMDA43CW15D13L	LED, 1W STAR PCB WHT	£3.44
122-9032	CMDA43WW15D13L	LED, 1W STAR PCB W/WHT	£4.47
122-9033	CMDA43CB15D13L	LED, 1W STAR PCB BLUE	£2.93
122-9034	CMDA43AG15D13L	LED, 1W STAR PCB GRN	£2.98
122-9036	CMDA43AR15D13L	LED, 1W STAR PCB RED	£2.38
122-9037	CMDA43DY15D13L	LED, 1W STAR PCB AMBR	£2.38
122-9038	CMDA48CW15D13L	LED, 2.5W EMITTER WHT	£3.53
122-9039	CMDA48WW15D13L	LED, 2.5W EMITTER W/WT	£5.51
122-9040	CMDA48CB15D13L	LED, 2.5W EMITTER BLUE	£3.53
122-9041	CMDA48AG15D13L	LED, 2.5W EMITTER GRN	£3.84
122-9042	CMDA48AR15D13L	LED, 2.5W EMITTER RED	£2.45
122-9043	CMDA48DY15D13L	LED, 2.5W EMITTER AMBR	£2.45
122-9044	CMDA49CW15D13L	LED, 2.5W STAR PCB WHT	£4.20
122-9045	CMDA49WW15D13L	LED, 2.5W STAR PCB WWT	£6.25
122-9046	CMDA49CB15D13L	LED, 2.5W STAR PCB BLU	£3.78
122-9048	CMDA49AG15D13L	LED, 2.5W STAR PCB GRN	£4.29
122-9049	CMDA49AR15D13L	LED, 2.5W STAR PCB RED	£3.20
122-9050	CMDA49DY15D13L	LED, 2.5W STAR PCB AMB	£3.20
122-9051	CMDA30RGB15D13L	LED, 1W STAR EMTR RGB	£9.27
122-9052	CMDA31RGB15D13L	LED, 1W STAR PCB RGB	£9.27



Farnell InOne's new range of ultra-high output, 350mA and 700mA power LED semiconductors from OMC, in the industry standard TO-220 package, incorporate the proven thermal properties and price advantages for which the well-established TO-220 leadframe has been renowned.

For decades the TO220 package has offered an immensely economic option from the point of view of both semiconductor manufacturers and end users.

Applying high power LEDs will now be far more straightforward and cost-effective as designers can select from the massive pre-existing range of off-the-shelf TO-220 heatsinks, mounting solutions and other accessories, instead of having to design, tool and manufacture custom heat-sink solutions.

Inherently optically efficient, the TO-220 package is also easy to PCB mount using existing auto-insertion machinery, reducing setup costs and assembly times and significantly lowering production costs. OMC have also produced easy to fit, real estate efficient lenses designed for this package.

In addition to the discrete lamps, in order to facilitate some of the most common applications these high power devices are also available thermally bonded to a heat-conducting PCB strip, which can in turn be screw-mounted and thermally attached to, for example, an extruded metal heatsink.

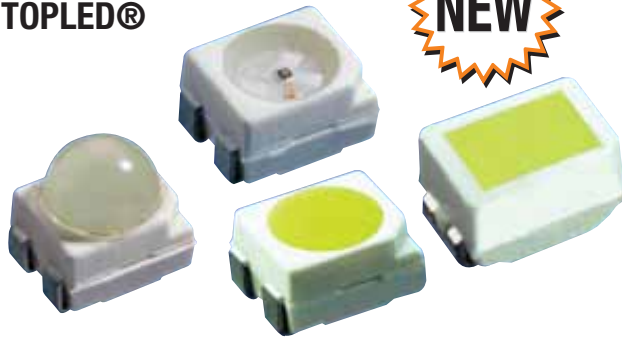
Also available, in an applications-specific package, is an RGB (red-green-blue) power LED, combining three individually addressable high power chips in a single package, facilitating the production of low profile, high output full-colour-range products.

Order Code	Mfrs. List No.	Description	Price
122-6704	OMCPR1DINOL	LED PWR350 TO220 RED	£3.67
122-6705	OMCPG1DINOL	LED PWR350 TO220 GREEN	£6.00
122-6706	OMCPB1DINOL	LED PWR350 TO220 BLUE	£6.00
122-6707	OMCPY1DINOL	LED PWR350 TO220 AMBER	£3.67
122-6709	HLLPW1DINOL	LED PWR350 TO220 DAYL WHT	£5.71
122-6711	HLLPW2DINOL	LED PWR350 TO220 WARM WHT	£5.71
122-6712	HLLPW3DINOL	LED PWR700 TO220 DAYL WHT	£10.69
122-6713	HLLPW4DINOL	LED PWR700 TO220 WARM WHT	£10.69
122-6714	OMCP3RGB100	LED HIGH POWER RGB	£14.57



# OSRAM

## TOPLED®



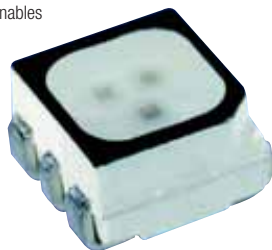
"Extremely powerful" is the simplest description of the new Advanced Power TOPLED® from OSRAM Opto Semiconductors. The LED achieves even higher lighting performance thanks to its very low thermal resistance. The Advanced Power TOPLED® completes the high power product line and is situated between the Golden DRAGON® and the Power TOPLED®. Proof, if ever it were needed, that even a small idea can send waves far and wide.

Order Code	Mfrs. List No.	Description	Price
122-6364	LBW5SG-DYEZ-35-Z	LED, SMD BLUE	£10.70
122-6367	LW55SG-GXHX-35-Z	LED, SMD BLUE-GREEN	£10.70
122-6385	LAE65F-CADA-24-1-Z	LED, SMD RED	£0.58
122-6398	LTW55G-GXHY-35-Z	LED, SMD TRUE GREEN	£10.70
122-6402	LAW57B-FYGY-24-Z	LED, SMD WHITE	£2.61
122-6412	LWW5SG-GYHY-5K8L-Z	LED, SMD WHITE	£10.70
122-6425	LYW57B-FYGY-26-Z	LED, SMD YELLOW	£2.61
124-2030	LAG6SP-CBEA-24-1-Z	TOPLED PLCC6 High Flux 0.65 Watt Red-orange LED	£0.79
124-2031	LRG6SP-CADB-1-1-Z	TOPLED PLCC6 High Flux 0.65 Watt Red LED	£0.99
124-2033	LTG6SP-CBEB-36-1-Z	TOPLED PLCC6 High Flux 0.65 Watt True Green LED	£2.60
124-2034	LBG6SP-V2BB-35-1-Z	TOPLED PLCC6 High Flux 0.65 Watt Blue LED	£2.60
124-2035	LRE6SF-V2AB-1-1-Z	Power TOPLED PLCC4 High Flux Red LED	£2.60
124-2036	LOE6SF-ABCB-24-1-Z	Power TOPLED PLCC4 High Flux Orange LED	£0.31
124-2037	LYE6SF-V2AB-35-1-Z	Power TOPLED PLCC4 High Flux Yellow LED	£0.43
124-2038	LBE6SG-S2U1-35-1-Z	Power TOPLED PLCC4 High Flux Blue LED	£0.86
124-2041	LTE6SG-V2AB-36-1-Z	Power TOPLED PLCC4 High Flux True Green LED	£0.86
124-2042	LWE6SG-V2AB-5K8L-1-Z	Power TOPLED PLCC4 High Flux White LED	£0.86
124-4086	LAW5SN	LED, SMD 4.6W RED-ONG	£5.51
124-4088	LRW5SN	LED, SMD 4.6W RED	£5.51
124-4089	LYW5SN	LED, SMD 4.6W YELL	£5.51
124-4091	LTW5SN	LED, SMD 4.6W GRN	£7.89
124-4092	LBW5SN	LED, SMD 4.6W BLUE	£7.89
124-4093	LWW5SN	LED, SMD 4.6W WHITE	£7.89
124-4094	LCWW5SN	LED, SMD 4.6W W/WHITE	£8.66
124-4096	LAW5SM-HYJZ-24-Z	LED, SMD 2.2W RED-ONG	£4.60
124-4098	LRW5SM-HYJZ-1-Z	LED, SMD 2.2W RED	£4.60
124-4099	LYW5SM-GYHZ-45-Z	LED, SMD 2.2W YELL	£4.60
124-4100	LCWW5SM-GZJX-N3P5-Z	LED, SMD 2.2W YELL	£7.23
124-4101	LAS33B-BBDA-24-1-Z	LED, ULTRAFUX RED-ONG	£0.33
124-4102	LAS35B-BBDA-24-1-Z	LED, ULTRAFUX RED-ONG	£0.33
124-4104	LYS33B-BBDA-45-1-Z	LED, ULTRAFUX YELL	£0.33
124-4105	LYS35B-BBDA-45-1-Z	LED, ULTRAFUX YELL	£0.33
124-4106	LAS33F-DBFA-24-1-Z	LED, ULTRAFUX RED-ONG	£0.37
124-4107	LAS35F-DBFA-24-1-Z	LED, ULTRAFUX RED-ONG	£0.37
124-4108	LYS33F-DAEB-45-1-Z	LED, ULTRAFUX YELL	£0.37
124-4109	LYS35F-DAEB-45-1-Z	LED, ULTRAFUX YELL	£0.37

## MULTILED®



The new MULTILED® from OSRAM Opto Semiconductors is simply amazing. With this package you can mix every colours you want by controlling the LED chips separately. It's possible because of the new 6-lead technology, which enables independent driving of each chip. Beyond it the MULTILED® has a long product life time of up to 50 000 hours due to silicone encapsulation and features compact package outlines. Providing amazing technology, performance, brightness and colour liability the new MULTILED® from OSRAM is really outperforming its competitors.



Order Code	Mfrs. List No.	Description	Price
124-4114	LRTBG6TG-TU7-1+W7-36+ST7-68	LED, SMD RGB	£1.71

## Golden DRAGON®



We are sure that you have already discovered our Golden DRAGON® products in the LED heavens for yourself. Now it's time to introduce our brightest starlights: Golden DRAGON® ThinFilm/ThinGaN® and Golden DRAGON® ARGUS®. Our high performance LEDs emit the maximum light from the smallest possible source and have an extremely long lifetime. With these products designers and developers break into a new universe of illumination. The Golden DRAGON® portfolio is the only high-performance LED that can be processed using standard soldering techniques, through that it simply saves money.



Order Code	Mfrs. List No.	Description	Price
124-2028	LBW5SM-EYGX-35-Z	High flux 500mA 2.2 Watt Blue LED	£5.29
124-2029	LWW5SM-HYJY-5K8L-0-Z	High flux 500mA 2.2 Watt White LED	£5.29

## OSTAR®



You will really feel the power of brightness with the new OSTAR®-Lighting from OSRAM Opto Semiconductors. With more than 400 lm @ 700 mA operating current OSTAR®-Lighting is the company's brightest white light source ever. This is achieved by the latest ThinGaN® chip architecture and by chip level conversion. Beyond it the OSTAR®-Lighting comes with a very small and flat package. You shouldn't miss this power.

Technological power The new OSTAR®-Lighting is a pure surface emitter and is characterized by true Lambertian radiation characteristics. This allows effective light coupling into following optics and reduces stray light in secondary optics. Beyond it the package has an installation depth of less than 7mm.



Order Code	Mfrs. List No.	Description	Price
124-2021	LEWE2A-LYNY-6K8L	OSTAR Lighting, 4 chip WHITE without lens	£31.66
124-2022	LEWE2B-MXPX-6K8L	OSTAR Lighting, 4 chip WHITE with lens	£81.86
124-2023	LEWE3A-MYPX-6K8L	OSTAR Lighting, 6 chip WHITE without lens	£43.68
124-2024	LEWE3B-NXQX-6K8L	OSTAR Lighting, 6 chip WHITE with lens	£63.70

For a wider selection of Power LEDs and associated LED Drivers please see our website

[www.farnellinone.com/edworld](http://www.farnellinone.com/edworld)



The OPTEK Lednium surface mount series' combine high brightness LEDs chips with a revolutionary three dimensional packaging technology. Described as one of the industry's brightest single-source LED assemblies, the range offers a 120° viewing angle with excellent special uniformity, critical for lighting design engineers incorporating solid state light sources into applications such as automotive exterior and interior lighting, indoor and outdoor electronic signage and displays, architectural lighting and general lighting applications.

OPTEK offer the 10 Watt OVTLO9LGA series and the 1 Watt OVTLO1LGA series. OPTEK's Lednium series devices have a robust energy-efficient design with long operating life and exceptionally low thermal resistance, and are available in amber, blue, green, red and white (plus multi-coloured for the 10W series).

Order Code	Mfrs. List No.	Description	Price
122-6863	OVTLO1LGAW	LED, LEDNIUM 1W WHITE	£2.40
122-6864	OVTLO1LGAB	LED, LEDNIUM 1W, BLUE	£2.33
122-6865	OVTLO1LGAR	LED, LEDNIUM 1W, RED	£2.08
122-6866	OVTLO1LGAG	LED, LEDNIUM 1W, GREEN	£2.33
122-6867	OVTLO1LGAA	LED, LEDNIUM 1W, AMBER	£2.08
122-6856	OVTLO9LGAW	LED, MULTICHIP 10W WHITE	£37.87
122-6857	OVTLO9LGAB	LED, MULTICHIP 10W BLUE	£33.22
122-6858	OVTLO9LGAR	LED, MULTICHIP 10W RED	£29.25
122-6859	OVTLO9LGAG	LED, MULTICHIP 10W GREEN	£33.22
122-6860	OVTLO9LGAA	LED, MULTICHIP 10W AMBER	£29.25
122-6862	OVTLO9GAM	LED, MULTICHIP 10W RGB	£33.22



## Visible LEDs: Power LED Accessories

This is a hugely popular and growing support area to Power LEDs producing a variety of specialist drivers, lenses/optics and light engines. Another word for Accessories could be solutions and many of these products combine Power LEDs into stand-alone

modules with built in drivers. There is also a selection of evaluation kits allowing design engineers a try-before-you-buy experience into this emerging technology area. Featured in this campaign are products from Lumidrives, Lamina, OMC and CML.



## ACSENTIO

Part of the Connect&Glo© program is CML-IT's Arcilume range of products, designed to illuminate different interior or exterior areas of buildings with style and innovative LED solutions.

A key product is the Accentio series of accent lighting offering subtle shades of light. Available in blue, red, green, yellow and white, Accentio lights are available in 12V, 24V and 240V versions. Easy to fit and install, the lights feature an internal heat management system enabling them to run at relatively low temperatures, making them an ideal for use within furniture and fittings.

Easily fitted using a standard GX53 socket Accentio simply twists and locks into place.



### Applications

Interior design Accent Lighting, Furniture Illumination, Display Cabinets, Marine, Recreational Vehicles.

## Light Engines and Rods

CML offer a range of Light Engines specifically designed to optimise the features of our range of both Flexible Light rods in 5.5, 6.5, 7, 9, 10, 12 & 14mm diameter and Rigid Light Rods 6.5, 10 & 14mm diameter with 60 or 90 degree viewing angle.

### Applications

These products are designed specifically for producing lighting effects in a variety of applications, interior design, retail point of sale, signage, guidance lighting and as an excellent replacement for neon signs, where due to it ease of use in forming signs can be made easily and used safely.

Order Code	Mfrs. List No.	Description	Price
123-1788	8510LE15RED-6.5	LIGHT ENGINE, RED	£5.64
123-1793	8510LE15GRN-6.5	LIGHT ENGINE, GREEN	£5.64
123-1796	8510LE15AMB-6.5	LIGHT ENGINE, AMBER	£5.64
123-1800	8510LE15BLU-6.5	LIGHT ENGINE, BLUE	£5.64
123-1803	8510LE15WHT-6.5	LIGHT ENGINE, WHITE	£5.64
123-1805	8570LE12RED-10	LIGHT ENGINE, RED	£31.82
123-1809	8570LE12GRN-10	LIGHT ENGINE, GREEN	£36.38
123-1811	8570LE12AMB-10	LIGHT ENGINE, AMBER	£31.82
123-1815	8570LE12BLU-10	LIGHT ENGINE, BLUE	£36.38
123-1826	8570LE12RED-14	LIGHT ENGINE, RED	£31.82
123-1829	8570LE12GRN-14	LIGHT ENGINE, GREEN	£36.38
123-1830	8570LE12AMB-14	LIGHT ENGINE, AMBER	£31.82
123-1833	8570LE12BLU-14	LIGHT ENGINE, BLUE	£36.38
123-1836	8570LE12CW-14	LIGHT ENGINE, WHITE	£36.38
123-1841	8570LE12RED-12	LIGHT ENGINE, RED	£31.82
123-1843	8570LE12GRN-12	LIGHT ENGINE, GREEN	£36.38
123-1847	8570LE12AMB-12	LIGHT ENGINE, AMBER	£31.82
123-1848	8570LE12BLU-12	LIGHT ENGINE, BLUE	£36.38
123-1761	7530A10-1000	LIGHT GUIDE, 6.5MM X 1M	£8.85
123-1768	7530A11-1000	LIGHT GUIDE, 10MM X 1M	£16.85
123-1772	7530A12-1000	LIGHT GUIDE, 14MM X 1M	£26.62
123-1779	7540SS6-3000	LIGHT GUIDE, FLEX 6.5MM	£59.28
123-1781	7540SS10-3000	LIGHT GUIDE, FLEX 10MM	£70.18
123-1785	7540SS12-3000	LIGHT GUIDE, FLEX 12MM	£84.85
123-1787	7540SS14-3000	LIGHT GUIDE, FLEX 14MM	£98.75

Order Code	Mfrs. List No.	Description	Price
122-9053	CML12RS	"LED LAMP, GX53 12V RED OPAQUE"	£19.13
122-9054	CML12RC	"LED LAMP, GX53 12V RED CLEAR"	£19.13
122-9055	CML12GS	"LED LAMP, GX53 12V GRN OPAQUE"	£19.13
122-9056	CML12GC	"LED LAMP, GX53 12V GRN CLEAR"	£19.13
122-9057	CML12YS	"LED LAMP, GX53 12V YEL OPAQUE"	£19.13
122-9058	CML12YC	"LED LAMP, GX53 12V YEL CLEAR"	£19.13
122-9061	CML12BS	"LED LAMP, GX53 12V BLU OPAQUE"	£19.13
122-9062	CML12BC	"LED LAMP, GX53 12V BLU CLEAR"	£19.13
122-9063	CML12WS	"LED LAMP, GX53 12V WHT OPAQUE"	£19.13
122-9064	CML12WC	"LED LAMP, GX53 12V WHT CLEAR"	£19.13
122-9065	CML24RS	"LED LAMP, GX53 24V RED OPAQUE"	£19.13
122-9066	CML24RC	"LED LAMP, GX53 24V RED CLEAR"	£19.13
122-9067	CML24GS	"LED LAMP, GX53 24V GRN OPAQUE"	£19.13
122-9068	CML24GC	"LED LAMP, GX53 24V GRN CLEAR"	£19.13
122-9069	CML24YS	"LED LAMP, GX53 24V YEL OPAQUE"	£19.13
122-9070	CML24YC	"LED LAMP, GX53 24V YEL CLEAR"	£19.13
122-9071	CML24BS	"LED LAMP, GX53 24V BLU OPAQUE"	£19.13
122-9073	CML24BC	"LED LAMP, GX53 24V BLU CLEAR"	£19.13
122-9074	CML24WS	"LED LAMP, GX53 24V WHT OPAQUE"	£19.13
122-9075	CML24WC	"LED LAMP, GX53 24V WHT CLEAR"	£19.13
122-9076	CML110RS	"LED LAMP, GX53 130V RED OPAQUE"	£19.13
122-9077	CML110RC	"LED LAMP, GX53 130V RED CLEAR"	£19.13
122-9078	CML110GS	"LED LAMP, GX53 130V GRN OPAQUE"	£19.13
122-9079	CML110GC	"LED LAMP, GX53 130V GRN CLEAR"	£19.13
122-9080	CML110YS	"LED LAMP, GX53 130V YEL OPAQUE"	£19.13
122-9081	CML110YC	"LED LAMP, GX53 130V YEL CLEAR"	£19.13
122-9082	CML110BS	"LED LAMP, GX53 130V BLU OPAQUE"	£19.13
122-9083	CML110BC	"LED LAMP, GX53 130V BLU CLEAR"	£19.13
122-9085	CML110WS	"LED LAMP, GX53 130V WHT OPAQUE"	£19.13
122-9086	CML110WC	"LED LAMP, GX53 130V WHT CLEAR"	£19.13
122-9087	CML240RS	"LED LAMP, GX53 230V RED OPO"	£19.13
122-9088	CML240RC	"LED LAMP, GX53 230V RED CLR"	£19.13
122-9089	CML240GS	"LED LAMP, GX53 230V GRN OPO"	£19.13
122-9090	CML240GC	"LED LAMP, GX53 230V GRN CLR"	£19.13
122-9091	CML240YS	"LED LAMP, GX53 230V YEL OPO"	£19.13
122-9092	CML240YC	"LED LAMP, GX53 230V YEL CLR"	£19.13
122-9093	CML240BS	"LED LAMP, GX53 230V BLU OPO"	£19.13
122-9094	CML240BC	"LED LAMP, GX53 230V BLU CLR"	£19.13
122-9095	CML240WS	"LED LAMP, GX53 230V WHT OPO"	£19.13
122-9097	CML240WC	"LED LAMP, GX53 230V WHT CLR"	£19.13

VISIBLE LEDs