

## Styles of LCD (Liquid Crystal Display)



A standard transfective LCD



A transfective LCD with a Visualux LED backlight



A negative transmissive LCD with a Visualux LED backlight

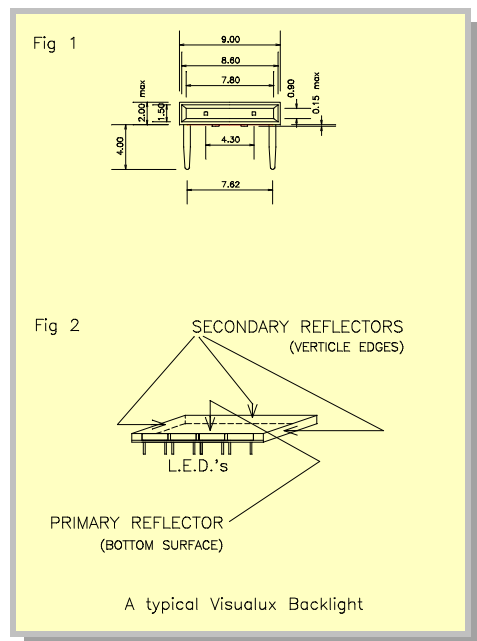
There are three main types of LCD display:

- ❖ Reflective - This type of display relies completely on reflected light (daylight or artificial light) to be viewable - you cannot see it in the dark and it cannot be backlit.
- ❖ Transfective - This type of display can use reflected light or be backlit.
- ❖ Transmissive - This type of display can usually be viewed using reflected light or be backlit.

# Visualux (edge lit) Backlights

Visualux Backlights were primarily designed for use with transfective and transmissive LCDs but are being used in a number of other areas that include status warning indicators and low power, long life, lighting systems. All Visualux Backlights are supplied, unless otherwise requested, as an S-Series style backlight. Below are descriptions of the standard options that are available.

## S-Series



The ultimate Backlight, designed for applications where maximum light output efficiency is the primary concern. Visualux Backlights use custom designed LED emitters (fig.1) to 'fire' light into a cast acrylic light guide. The S-Series uses ultra white secondary reflectors, located on the vertical edges, to reflect light down to the primary reflector that is located below the viewing area (fig.2). We use ultra white spray coatings for our primary and secondary reflectors, unlike our competitors who use a white adhesive tape which can easily delaminate. The S-Series has been designed to utilise all available emitted light and this results in a very low light loss factor.

## E-Series

The E-Series Visualux Backlight is manufactured to the same high standards as the S-Series but has been designed for applications where cost effectiveness is of more importance than light output efficiency. Instead of ultra white secondary reflectors, the E-Series uses the reflective properties of a precision machined edge.

## SA-Series

This series of Visualux Backlights has been designed for applications that require all the benefits of the Visualux technology but at the lowest possible price. SA-Series Backlights are supplied as two separate unassembled components, e.g. LED emitter and light guide. The LED emitter is the same type as used in the S and E Series Visualux Backlights and the cast acrylic light guide is of the same design as the E-Series which utilised the reflective properties of the light guides precision machined edge but without the machined ledge for the LED emitters.

## PCB Modules

The PCB modules are either S,E or SA Series Backlights mounted on to a single sided or PTH circuit board. Apart from the Backlight we are able to mount resistors and other devices that may be required. The major advantage of this system is that only two leads are needed to be terminated.

## Visualux (edge lit) Backlights

When the Visualux Backlights are used with transfective LCDs a brilliant white reflector is usually sufficient. However, a transmissive (transparent) LCD will benefit from using a Backlight that has a brightly coloured primary reflector, because the LCD characters or graphics will have a contrasting background even if the Backlight is not illuminated.

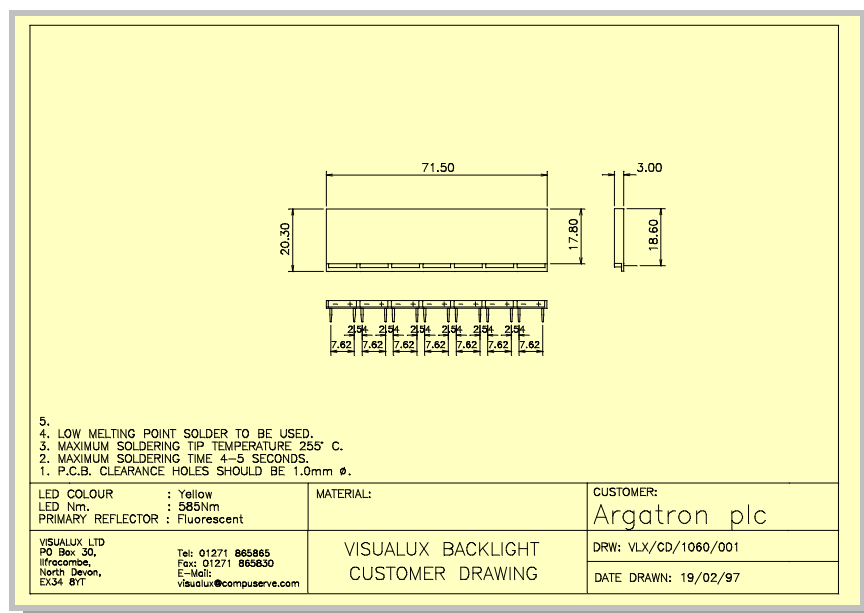
One of the major benefits of using a Visualux Backlight is the exceptionally long life span of the device, which can be up to 100,000 hours - this is equivalent, in most cases, to the life of a typical LCD.

Visualux Backlights are available in a large range of standard sizes with a brilliant white or brightly coloured primary reflector. The secondary reflectors of the S-Series are always brilliant white.

Customised sizes are available and the cost for the origination of S and E-Series Backlights is usually less than £200. For this sum you will receive an engineering drawing, which is allocated its own unique data reference number and a quantity of Backlights dependent on the complexity of the part. Delivery is usually 3 - 4 weeks from receipt of order. For large volume usage we can also supply LED emitters made to your custom design.

Visualux operate a policy of constant development, so if you do not find the type or style of Backlight that you require in this Designers Catalogue, please contact your local Visualux sales office to discuss your requirements.

### A typical Visualux Backlight custom drawing



# Visualux (*edge lit*) Backlights

## Specification for the Visualux Backlight body (Light Guide)

<b>Mechanical Properties:</b>	<b>Test</b>	<b>Unit</b>	<b>Values</b>
Tensile Strength	DIN 53455	N/mm <sup>2</sup>	65-68
Compressive Strength	DIN 53454	N/mm <sup>2</sup>	125
Flexural Strength	DIN 53452	N/mm <sup>2</sup>	120
Impact Strength	DIN 53453	kJ/m <sup>2</sup>	12
Modules of elasticity	DIN 53457	N/mm <sup>2</sup>	3,000
Elongation at break	DIN 53455	%	4
Indentation hardness	DIN 53456	N/mm <sup>2</sup>	175

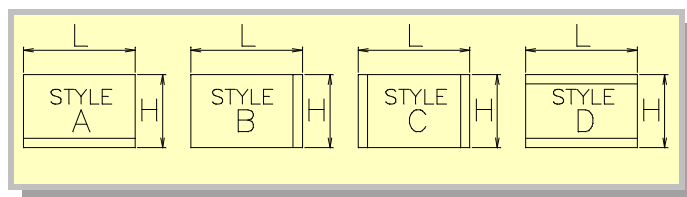
<b>Thermal Properties:</b>			
Heat Stability - Vicat B	DIN 53460	°C	105
Forming temperature		°C	150-170
Coefficient of linear thermal expansion	VDE 0304/1	mm/m°C.	0.08
Specific heat		kJ/kg°C.	1.46
Thermal conductivity		W/m°C.	0.19

<b>Electrical Properties:</b>			
Dielectric strength	DIN 53481	kV/mm.	40
Volume resistivity	DIN 53482	ohm x cm.	10 <sup>15</sup>
Dielectric constant, 10 <sup>3</sup> Hz.	DIN 53483		3.4
Dissipation factor, 50 Hz.	DIN 53483		0.06

<b>Other Properties:</b>			
Specific gravity	DIN 53472	g/cm <sup>2</sup>	1.2
Water absorption	at 20°C.in 24 hrs.	%	0.17
Light transmission	4500 A	%	92

# Visualux (*edge lit*) Backlights

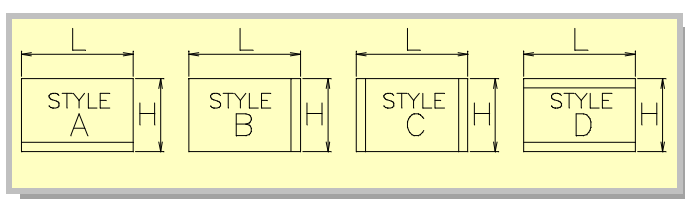
A range of Visualux Backlight designs



Reference	Style	L	H	No. of LEDs	Illuminated Area (mm)
VLX100	A	66.50	29.50	6	66.50 x 27.00
VLX102	A	47.00	29.50	4	47.00 x 27.00
VLX104	A	47.00	20.50	4	47.00 x 18.00
VLX106	A	47.00	23.00	4	47.00 x 20.50
VLX108	A	66.00	18.00	6	66.00 x 19.50
VLX110	A	66.00	22.00	6	66.00 x 19.50
VLX112	B	26.00	10.50	1	23.50 x 10.50
VLX114	B	26.00	9.50	1	23.50 x 9.50
VLX116	B	31.00	10.50	1	28.50 x 10.50
VLX118	B	38.50	14.50	1	36.00 x 14.50
VLX120	B	43.50	10.50	1	41.00 x 10.50
VLX122	B	26.00	18.00	1	23.50 x 18.00
VLX124	B	30.00	15.50	1	27.50 x 15.50
VLX126	B	50.50	15.50	1	48.00 x 15.50
VLX128	B	52.50	17.00	1	50.00 x 17.00
VLX130	B	51.50	12.50	1	49.00 x 12.50
VLX132	B	42.00	20.00	1	39.50 x 20.00
VLX134	B	50.50	20.00	1	48.00 x 20.00
VLX136	B	57.00	20.00	1	54.50 x 20.00
VLX138	B	49.50	13.00	1	47.00 x 13.00
VLX140	A	76.50	28.00	7	76.50 x 25.50
VLX142	A	90.00	28.00	8	90.00 x 25.50
VLX144	A	90.00	22.00	8	90.00 x 19.50
VLX146	A	98.00	24.50	9	98.00 x 22.00
VLX148	A	88.00	35.00	8	88.00 x 32.50
VLX150	A	108.00	35.00	10	108.00 x 32.50
VLX152	A	134.00	35.00	13	134.00 x 32.50
VLX154	A	67.00	28.50	6	67.00 x 26.00
VLX156	A	47.50	17.00	4	47.50 x 14.50
VLX158	A	48.70	23.30	4	48.70 x 20.80

# Visualux (*edge lit*) Backlights

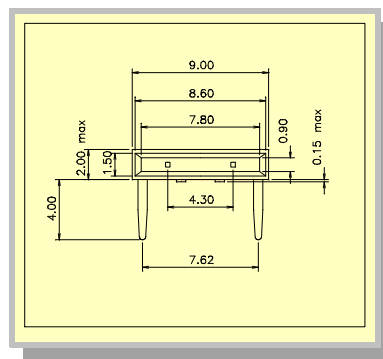
A range of Visualux Backlight designs



Reference	Style	L	H	No. of LEDs	Illuminated Area (mm)
VLX200	C	68.50	28.50	4	63.50 x 28.50
VLX202	C	53.00	23.00	4	48.00 x 23.00
VLX204	C	68.50	18.80	2	63.50 x 18.80
VLX206	C	71.00	15.50	2	66.00 x 15.50
VLX208	C	28.50	10.50	2	23.50 x 10.50
VLX210	C	28.50	9.50	2	23.50 x 9.50
VLX212	C	33.50	10.50	2	28.50 x 10.50
VLX214	C	41.00	14.50	2	36.00 x 14.50
VLX216	C	46.00	10.50	2	41.00 x 10.50
VLX218	C	28.50	18.00	2	23.50 x 18.00
VLX220	C	32.50	15.50	2	27.50 x 15.50
VLX222	C	53.00	15.50	2	48.00 x 15.50
VLX224	C	55.50	17.00	2	50.50 x 17.00
VLX226	C	54.00	12.50	2	49.00 x 12.50
VLX228	C	44.50	20.00	2	39.50 x 20.00
VLX230	C	53.00	20.00	2	48.00 x 20.00
VLX232	C	59.50	20.00	2	54.50 x 20.00
VLX234	C	65.00	14.50	2	60.00 x 14.50
VLX236	C	73.00	14.50	2	68.00 x 14.50
VLX238	C	67.00	17.00	2	62.00 x 17.00
VLX240	C	52.00	13.00	2	47.00 x 13.00
VLX242	C	61.00	13.00	2	56.00 x 13.00
VLX244	C	71.00	16.50	2	66.00 x 16.50
VLX246	C	82.00	26.00	4	77.00 x 26.00
VLX248	D	166.00	65.00	32	166.00 x 60.00
VLX250	D	93.50	76.00	18	93.50 x 71.00
VLX252	D	67.50	53.00	12	67.50 x 48.00
VLX254	D	72.00	48.00	14	43.00 x 72.00

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## Specification for Visualux Backlight LEDs



CHARACTERISTICS	RATINGS
Peak Forward Current 10 seconds pulse 0.3 duty cycle	1.0 Amp
Operating Temperature	-30°C +85°C
Storage Temperature	-55°C +100°C
Average Forward Current	25mA

COLOUR:	RED	GREEN	AMBER	YELLOW	HIGH EFFICIENCY RED
REFERENCE NO:	LL-1-2-R	LL-1-2-G	LL-1-2-A	LL-1-2-Y	LL-1-2-HER
Forward Voltage (VF) IF=20mA	4.2v Typ. 4.6v Max.	4.2v Typ. 4.6v Max.	3.6vTyp. 4.0v Max.	4.2v Typ. 4.6v Max.	3.6v Typ. 4.0v Max.
Reverse Current (IR) VR=10v	0.1mA Max.	0.1mA Max.	0.1mA Max.	0.1mA Max.	0.1mA Max.
Luminous Intensity (IV) IF=10mA	Typ. 15mcd	Typ. 40mcd	Typ. 30mcd	Typ. 35mcd	Typ. 80mcd
Peak Wavelength (P)	630Nm	570Nm	610Nm	585Nm	660Nm

### SPECIAL NOTE

- ❖ Low melting point solder should be used.
- ❖ Maximum soldering tip temperature should not exceed 255°C.
- ❖ Maximum soldering time should not exceed 3-4 seconds from the reflector edge.