HMI Components Division
Diamond Electronics Limited

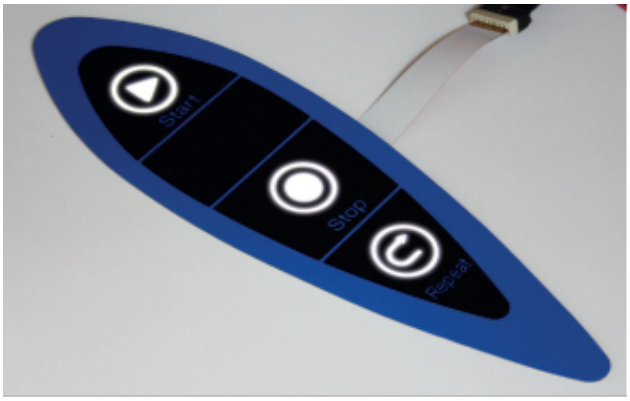
Backlighting a Membrane Keypad using Light Guide Film (LGF)

At Diamond HMI, our engineers have years of experience in designing membrane keypads, particularly in integrating backlighting to enhance switch functionality. This manual focuses on Light Guide Film. Breaking down the key design considerations to determine whether Light Guide Film could be a viable option for your switch.

Light Guide Film (LGF):

Light Guide Film is a thin film that evenly directs light produced by side-firing, or right-angle, LEDs across an area of a keypad that needs to be backlit. The film is placed directly below the graphic overlay and above the circuit layer so that the light will not be blocked by any circuit traces or tactile devices.

This film can be cut into any pattern or shape within your switch. Multiple light guide films can be used within one application to provide discrete backlighting to different graphic features. Options to add a variety of coloured LEDs are available to achieve unique lighting effects, or white LEDs can light additional printed graphics on the overlay.



Light guide film is simply a conduit for LED light; therefore, the film must be adjacent to a right-angle LED. The placement of the LEDs within your switch depends on several factors. Further details of this will be provided during the time of design.

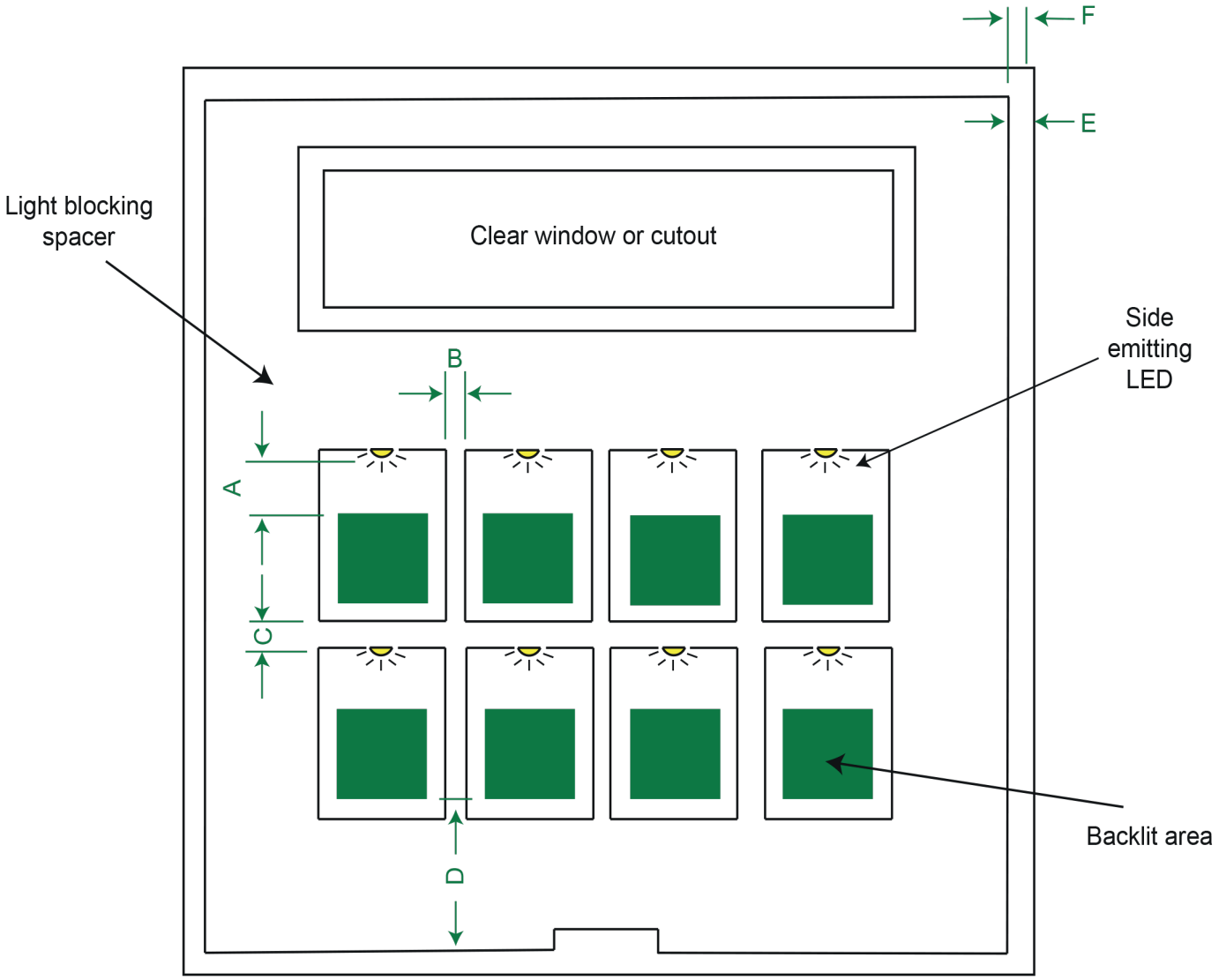
Light Film Guide:

Light guide film has several advantages over other technologies such as EL or Fibre Optic mats...

- When a membrane switch is required to not exceed a specific thickness, LGF is perfect, as its extremely thin.
- LGF has a limited impact on the tactile feel of buttons.
- It provides even backlighting across large andsmall areas. Ideal for applications where the light remains on while the switch is powered.

Before starting to design your membrane switch, you need to consider these critical pre-design areas:

- Ensuring there is enough space for the right-angle LEDs.
- Allowing enough space between the light source and the backlit areas.
- The distances from LED to the backlit area.



LTR	DIM (mm)	DESCRIPTION
A	≥ 8	Distance between LED and the illuminated area.
B	≥ 4	Distance between discrete illuminated areas perpendicular to light path.
C	≥ 6	Distance between discrete illuminated areas parallel to light path.
D	≥ 5	Distance between illuminated area and termination location.
E	0.5	Distance between edge of circuit layers and edge of overlay.
F	≥ 5	Distance between light blocking spacer and part edge.