

Ultra Thin Illuminated Capacitive Switches



Printed light-guide combined with capacitive switch technology delivering unique human-machine interface solutions for electronic products.

Thin illumination technology for Capacitive Switches & Sliders with LEDs & printed lightguide technology.

Unique technology to enhance the visibility, function & value of user interfaces on Consumer, Medical, Automotive & Industrial products.

Ultra thin, capacitive switch friendly illumination technology. Scaleable brightness & size of illuminated area. High levels of lighting uniformity and wide range of highly visible saturated colors.

Capacitive switches are rapidly increasing their advance in consumer products and other market sectors. They have significant advantages including:

- Higher reliability
 - o No mechanical contacts
 - o Higher IP rating - waterproof and dustproof with no need to cut keyholes in the outer panel.
- Thin/Low profile
- Flat outer surface, can be formed into curves & are easy to clean.



figure 1 - Illuminated Capacitive Switch Products

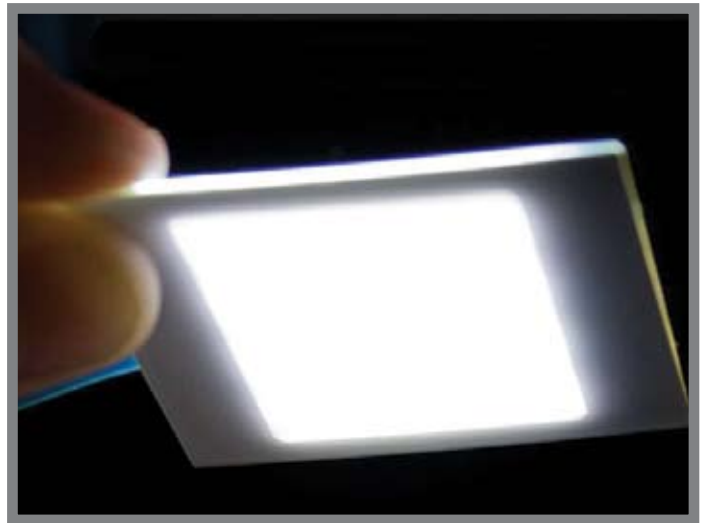


figure 2 - Backlight

A significant limitation is the lack of feedback to let the user know the key has been successfully pressed or the value of the parameter set by a capacitive switch slider.

Building in a small speaker for audible feedback or using a vibrating sensor can solve some of these problems. However the use of light gives the designer more options to better communicate to status of the device to the user.

Design LED Products have developed and patented a printed light guide technology that can be used with capacitive switches.

A standard side emitting LED is embedded within a lightguide structure. The lightguide contains a scattering pattern that controls both the location and uniformity of the escaping light. See figure 4.

The typical thickness of the device is 1-2mm (including PCB & outer graphic) and lighting uniformity is 70%+ beyond which the human eye cannot detect any variation.



designled
technology driven

Illuminated Capacitive Switches

The light guide is immediately above the sense pad and there is no need to create holes in the sense pad to allow for the escape of light. Additionally the LED can be located a distance away from the sense pads to reduce any electrical interference effects.

This greatly assists the design, commissioning and reliable operation of the capacitive switch circuit.

Additional effects include:

- Color change – by including two different colored LEDs in the same lightguide
- Secret until lit graphics
- Left/Right or Top/Bottom fades
- Simple animation sequences by using a combination of the above.

Product Design Options

Illuminated capacitive switch: Buttons and Sliders.

Additional Options

Illuminated status icons or backlit areas on the same panel.

Lightguide Design Options

Multiple Segmented lightguides
Single lightguide



figure 3 - Medical Instrument with segmented lighting and Cap Switch

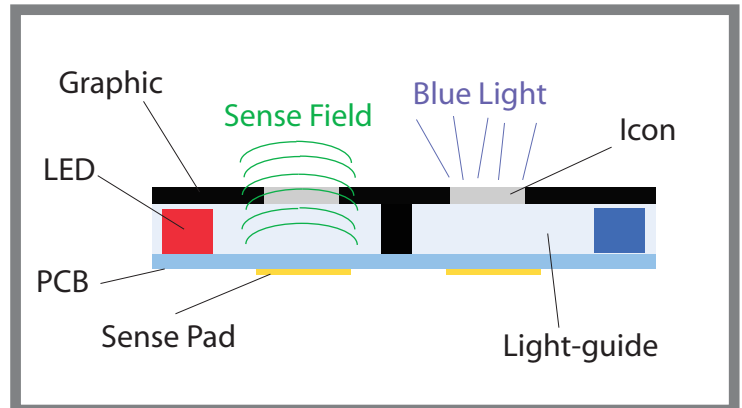


figure 4 - Schematic of the side-elevation of the device structure

Lightguide Dimensions

Scaleable, typical min & max are 10x10mm and 500x500mm

Depth

1–2 mm (typical, includes LEDs, PCB & outer graphic)

Separation gap

2mm (typ) between adjacent lightguides

Illumination options

Color change Often used to denote a change of mode

Secret until lit graphics

Typically this is used

- only when the key choice is valid and
- to achieve a minimalist look

Left/Right or Up/Down fading

Illumination

Brightness Scaleable according to number of LEDs used and lightguide size. Typ 300 Cd/m²+

Colors White, Single colour Red, Green or Blue, RGB triplets

Uniformity 70%+ (appears uniform to the human eye)

PCB options

FR4, flexible Polyester, Polyimide etc.