

# Glossary

## ACF (Anisotropic conductive film)

Conductive film used to connect LCD panel electrodes and driver-IC tape carrier package.

## Active Matrix Display

LCD screen is refreshed frequently because pixels store a charge (i.e. TFT).

## Bias (Duty Bias)

Related to the number of voltage levels used when driving the LCD. Defined as  $1/N$ , where N equals the number of voltage levels minus 1.

## COB (Chip on Board)

The LCD driver is formatted into an area on the PCB. Electrical connections are made by micro diameter gold wires. The entire area is then covered with epoxy.

## COF (Chip on Flex)

The LCD driver is incorporated into a flex connector, which is attached to the contact edge of LCD.

## CCFL (Cold Cathode Fluorescent Lamp)

A type of fluorescent backlighting or edge lighting. Used in medium to large size graphic LCD modules.

## COG (Chip on Glass)

LCD driver IC chip is actually mounted on the surface of the LCD glass.

## Contrast Ratio

The difference in luminance between the unselected area and the selected area.

## Direct/Static Drive

Each conductive lead on the contact edge, connects to one segment or annunciator.

## Duty Ratio

$1/N$ , where N equals the number of energized or unenergized segments selected by one complete cycle.

## EL

Electro luminescence.

## Font

The active pattern which has all information to be displayed in the LCD glass.

## FPC (Flex-printed circuit)

A thin, flexible tape used as an interface with COG, TAB and COF bonding.

## FSTN

Film compensated STN, black and white display.

## Heat Seal

A flat, flexible, adhesive connector which is bonded to the contact edge of the glass by heat.

## LED Backlight

A form of backlighting for small to medium size LCDs that use surface mount LEDs on a substrate with a light diffuser over the top. In some cases LEDs are placed at each end of module and light is directed in the center. (edge lighting)

## LVDS (Low Voltage Differential Signaling)

A digital interface known for its high data transfer rates and long transmissions.

## Multiplex

Using multiple backplanes (commons) in order to reduce the number of connections between the drivers and LCD.

## Negative Image

The viewing area is dark color in the OFF state. This condition is achieved by having both front and rear polarizers in the same axis. In this mode, light passes through the energized areas. Some type of backlight must be used in order to effectively view the information.

## Passive Matrix Display

Pixels do not have a steady electrical charge (i.e. TN, STN, FSTN, CSTN).

## Polarizer

Is made of a polymer acetate with iodide molecules incorporated in the material. The molecules are arranged to only allow scattered light to enter in one plane/axis. Twisted nematic LCDs require two polarizers, one on the front and one on the back.

## Positive Image

Active elements, when energized, appear dark in color against a light background (non-energized): i.e., Reflective/transmissive, (Passive) inverse image.

## Reflective

Typically a smooth silver/gray piece of polished aluminum foil bonded to the rear polarizer, reflects the incoming ambient light.

## Response Time (T<sub>off</sub>)

Total of delay time (T<sub>d</sub> off) and fall time (T<sub>f</sub>).

## Response Time (T<sub>on</sub>)

Total of rise time (T<sub>r</sub>) and delay time (T<sub>d</sub> on).

## Rise Time

Time interval between 10% (off) to 90% (on).

## STN (Super-Twisted Nematic)

An improved twisted nematic fluid (200° twist or greater) which has better contrast and optimum viewing range than standard twisted nematic (90°)

## TAB

Tape automated bonding.

## TFT

Thin-film transistor.

## Transflective

A type of backing which is bonded to the rear polarizer. Enables light to pass through the back, as well as reflecting light from the front.

## Transmissive

A type of LCD which does not have a reflector or transflector laminated to the rear polarizer. A backlight must be used with this type of LCD configuration. The most common is transmissive negative image.

## TN (Twisted Nematic)

A type of liquid crystal whereby the alignment surface and therefore the LC molecules are oriented 90° from each surface of glass.

## VGA

Video graphics array (640x480 resolution).

## Viewing Angle

A cone perpendicular to the LCD in which minimum contrast can be seen.

## V<sub>op</sub> (Operating Voltage)

Discrepancy between segment voltage and common voltage.