Field-Sequential (FS) Color LCDs

A Technology Brought To You Exclusively By Orient Display Corporation
The Bright and Colorful World of High Contrast FS LCDs
How Does a Field Sequential LCD Work?

- The FS LCD uses a special RGB LED in the backlight to produce colors.
- The colors are brighter because there is no color filter.
- The lack of filter allows a darker black positive mode and a brighter white negative mode to increase contrast.
- Each color of the RGB LED is energized in the special sequence shown below:
How Are The Colors Created?

Colors are produced by mixing the primary R, G, and B of the LED. To create yellow, turn on Red + Green, and turn off Blue:

Using this method, the FS LCD can create 8 colors.
If the LCD frame rate is set to 60Hz, each frame is 16.5ms. Each Frame is divided into 3 sub frames, each sub-frame is 5.5ms. In 5.5ms, the signal should be sent to the LCD and the LCD completes the response.

The Field Sequential LCD can display different colors by following the logic Table below.

<table>
<thead>
<tr>
<th>LCD</th>
<th>1 0 0 0 1 0 0 0 1 1 1 0 0 1 1 1 0 1 0 0 0 1 1 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>R G B</td>
</tr>
<tr>
<td></td>
<td><img src="image.png" alt="LED Image" /></td>
</tr>
</tbody>
</table>

1 Shows LCD is on, 0 shows the LCD is off
## FS LCD Characteristics

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>-30°C to 80°C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>0°C to 60°C</td>
</tr>
<tr>
<td>Driving Method</td>
<td>Static</td>
</tr>
<tr>
<td>Drive Frequency</td>
<td>55 to 60Hz</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>3 to 5V</td>
</tr>
<tr>
<td>Segments</td>
<td>Up to 320 SEG</td>
</tr>
<tr>
<td>Module Structure</td>
<td>COB (Chip-on-Board)</td>
</tr>
</tbody>
</table>

- 8- Color Display: ![Color Swatch](image)
- Vivid Colors with Wide Viewing Angle
- Higher Contrast and Higher Brightness
- Rapid Response
- FS LCD can be integrated with Capacitive Touch Screen
Applications with FS LCDs

Handheld Video Games

Toys

Industrial Instrumentation Panels

Medical Applications

Household Appliances: Induction Cooker, Refrigerator, Air Conditioners, Water Heaters, Oven, etc..
FS LCD Development: Generation 1

Continuous Improvement of FS LCD Brightness & Contrast
FS LCD Development: Generation 2

Continuous Improvement of FS LCD Brightness & Contrast
FS LCD Development: Generation 3

Continuous Improvement of FS LCD Brightness & Contrast
FS LCD Development: Generation 4

Continuous Improvement of FS LCD Brightness & Contrast
FS LCD Future Developments

- FS LCD with Multi Channel (½ to ¼ Duty)
- FS LCD with Low Operating Temperature (-10°C, -20°C)