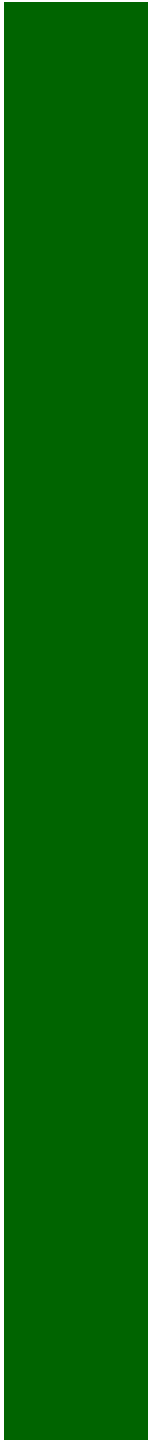


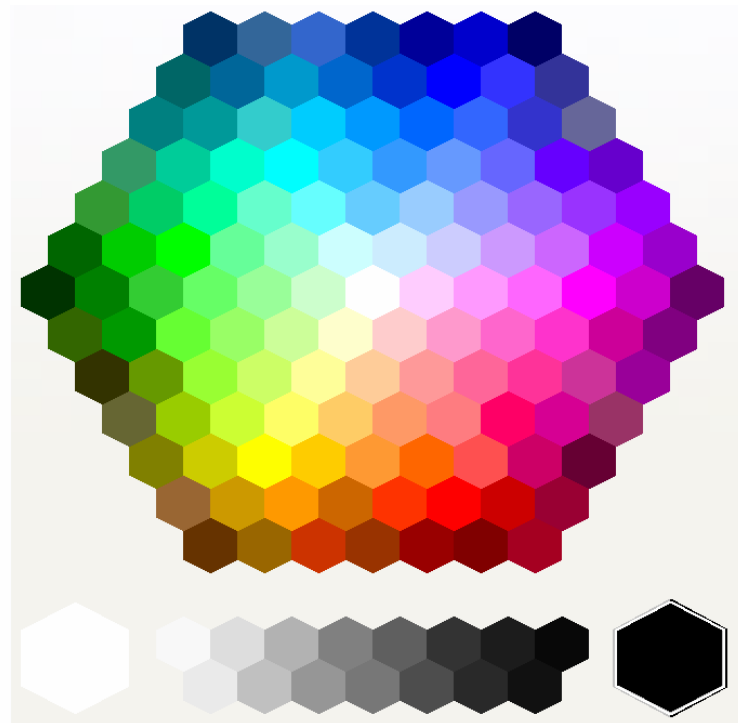
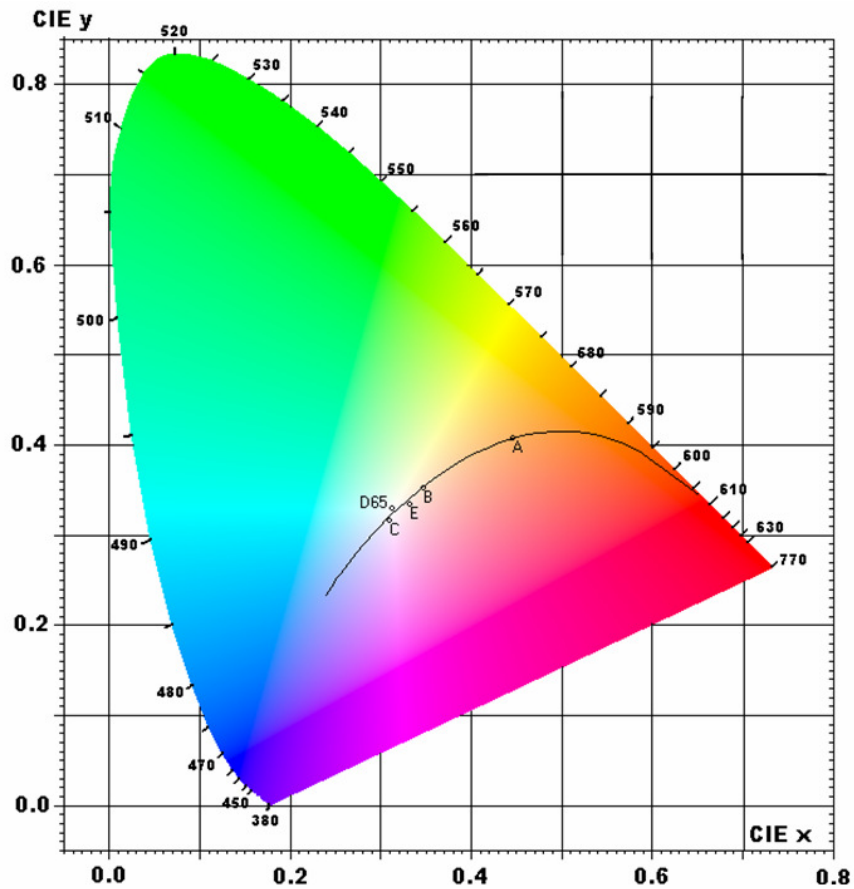


# Field-Sequential (FS) Color LCDs

*A Technology Brought To You Exclusively By Orient Display Corporation*

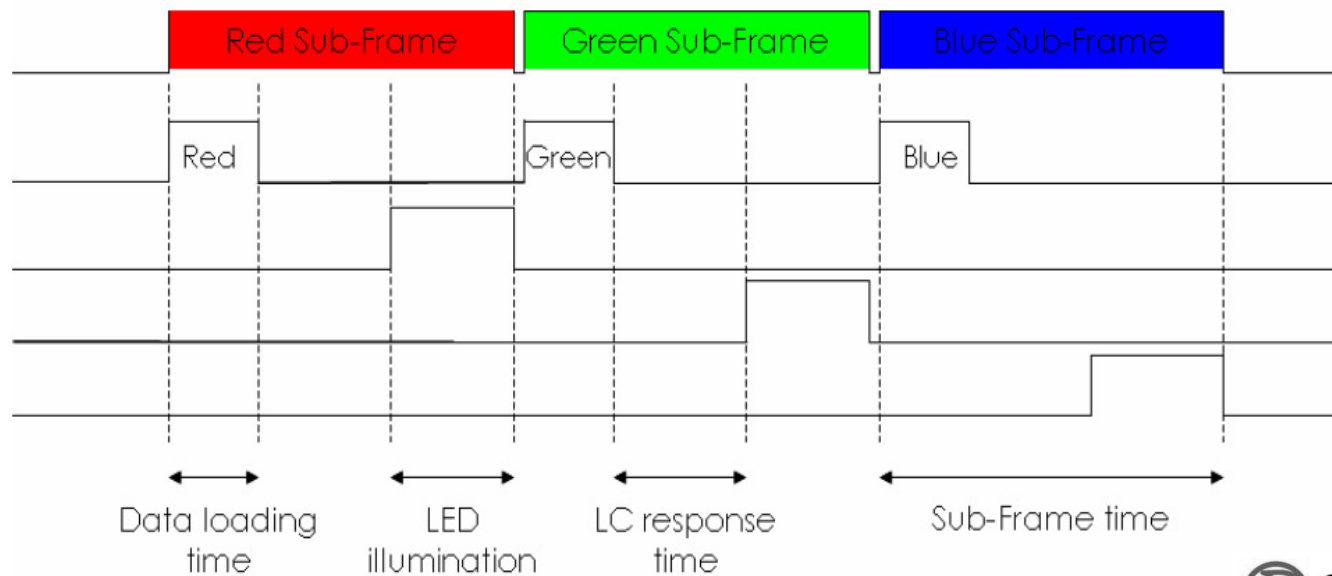


# The Bright and Colorful World of High Contrast FS LCDs



# How Does a Field Sequential LCD Work?

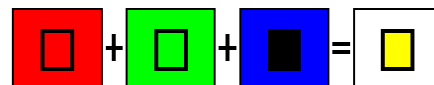
- The FS LCD uses a special RGB LED in the backlight to produce colors.
- The colors are brighter because there is no color filter.
- The lack of filter allows a darker black positive mode and a brighter white negative mode to increase contrast.
- Each color of the RGB LED is energized in the special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



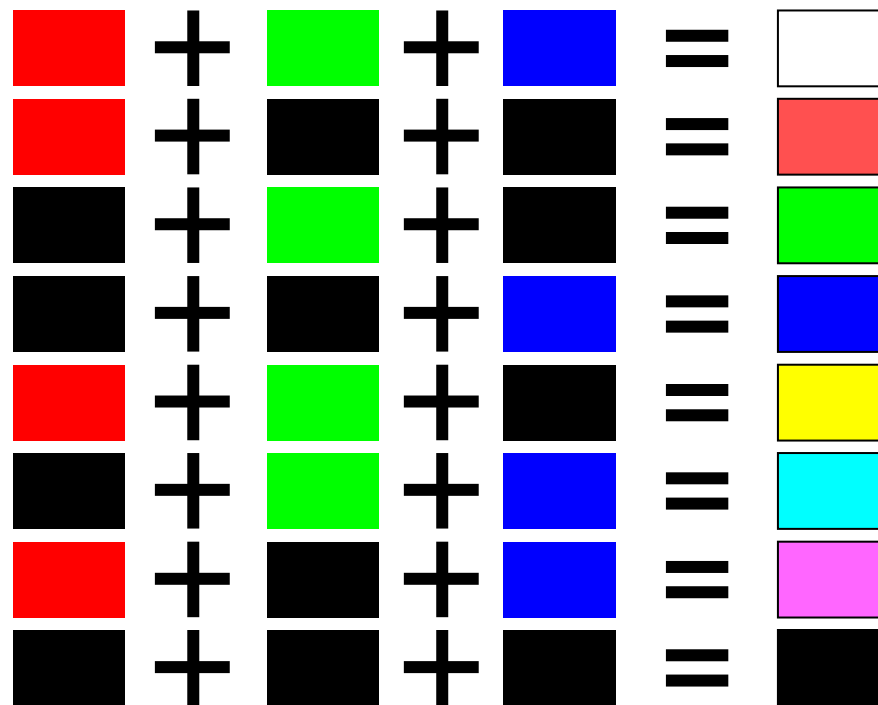
# How Are The Colors Created?

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.



# FS LCD Logic Table

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.

<b>LCD</b>	1	0	0	0	1	0	0	0	1	1	1	0	0	1	1	1	0	1	0	0	0	1	1	1
<b>LED</b>	<b>R</b>																							
	<b>G</b>																							
	<b>B</b>																							
	1	0	0	0	1	0	0	0	1	1	1	0	0	1	1	1	0	1	1	1	1	0	0	0
<b>Color</b>																								

**1 Shows LCD is on, 0 shows the LCD is off**

# FS LCD Characteristics

Storage Temperature	-30°C to 80°C
Operating Temperature	0°C to 60°C
Driving Method	Static
Drive Frequency	55 to 60Hz
Operating Voltage	3 to 5V
Segments	Up to 320 SEG
Module Structure	COB (Chip-on-Board)

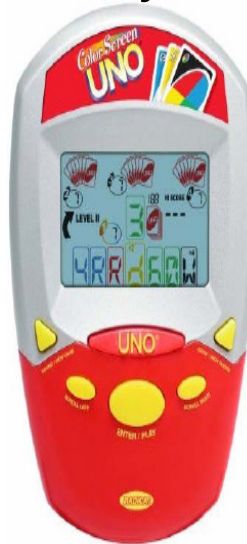
- 8- Color Display: 
- Vivid Colors with Wide Viewing Angle
- Higher Contrast and Higher Brightness
- Rapid Response
- FS LCD can be integrated with Capacitive Touch Screen

# Applications with FS LCDs

Handheld Video Games



Toys

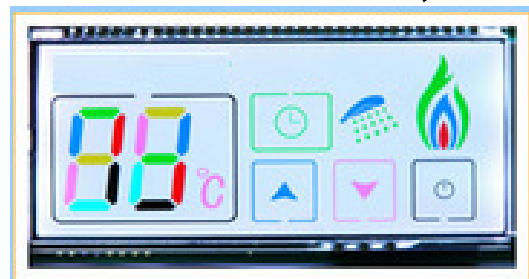


Industrial Instrumentation Panels

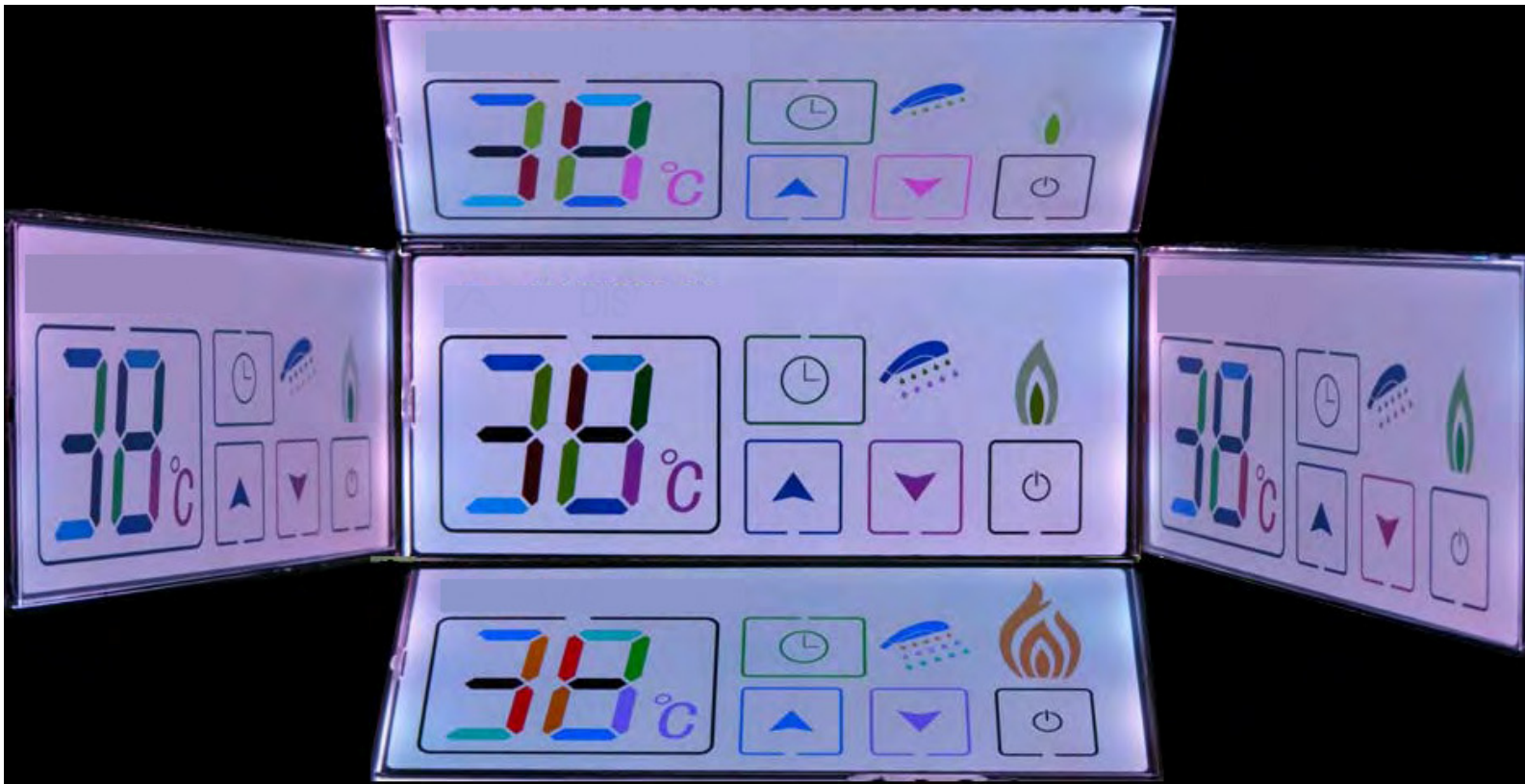


Medical Applications

Household Appliances: Induction Cooker, Refrigerator, Air Conditioners, Water Heaters, Oven, etc..



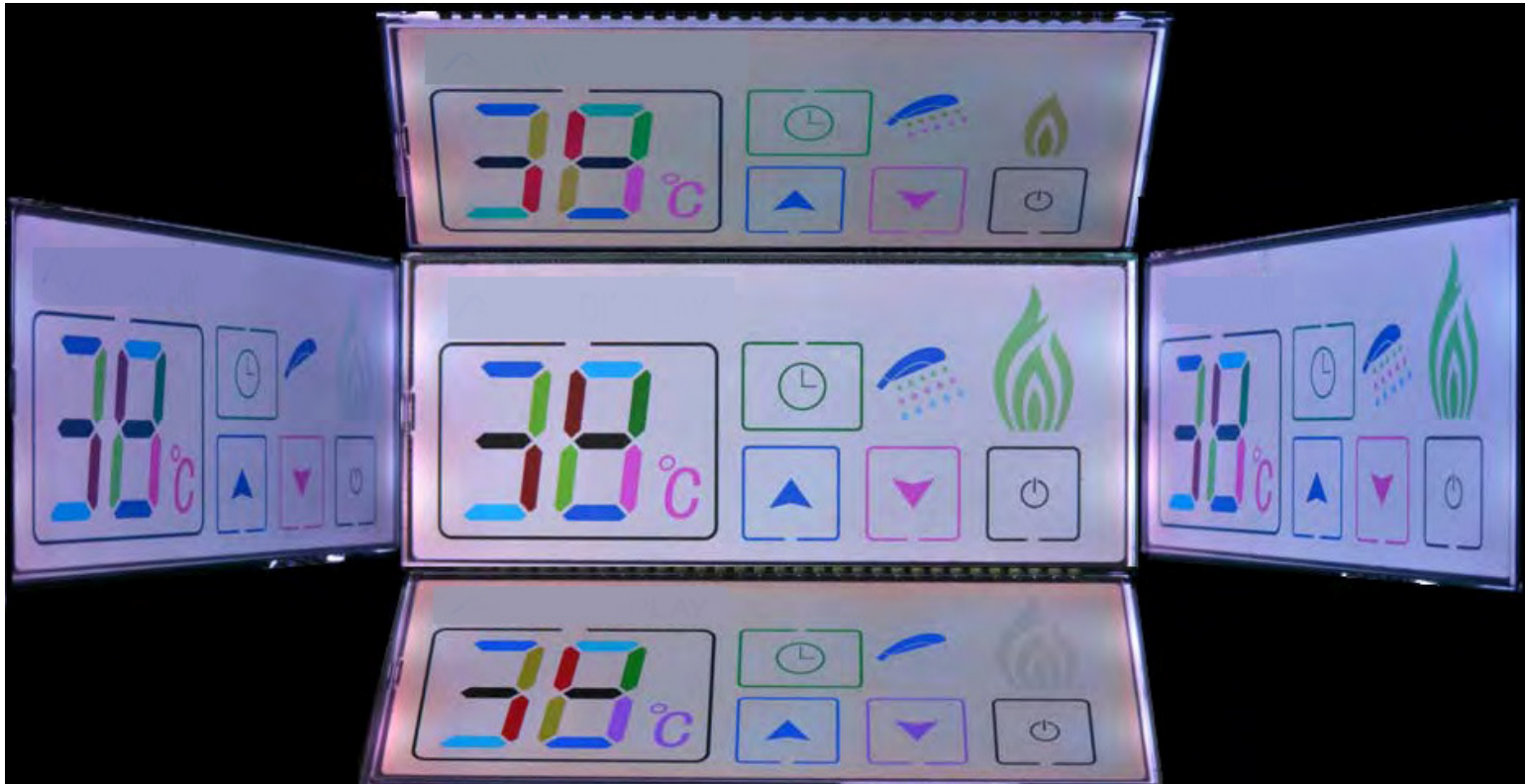
# FS LCD Development: Generation 1



Continuous Improvement of FS LCD Brightness & Contrast

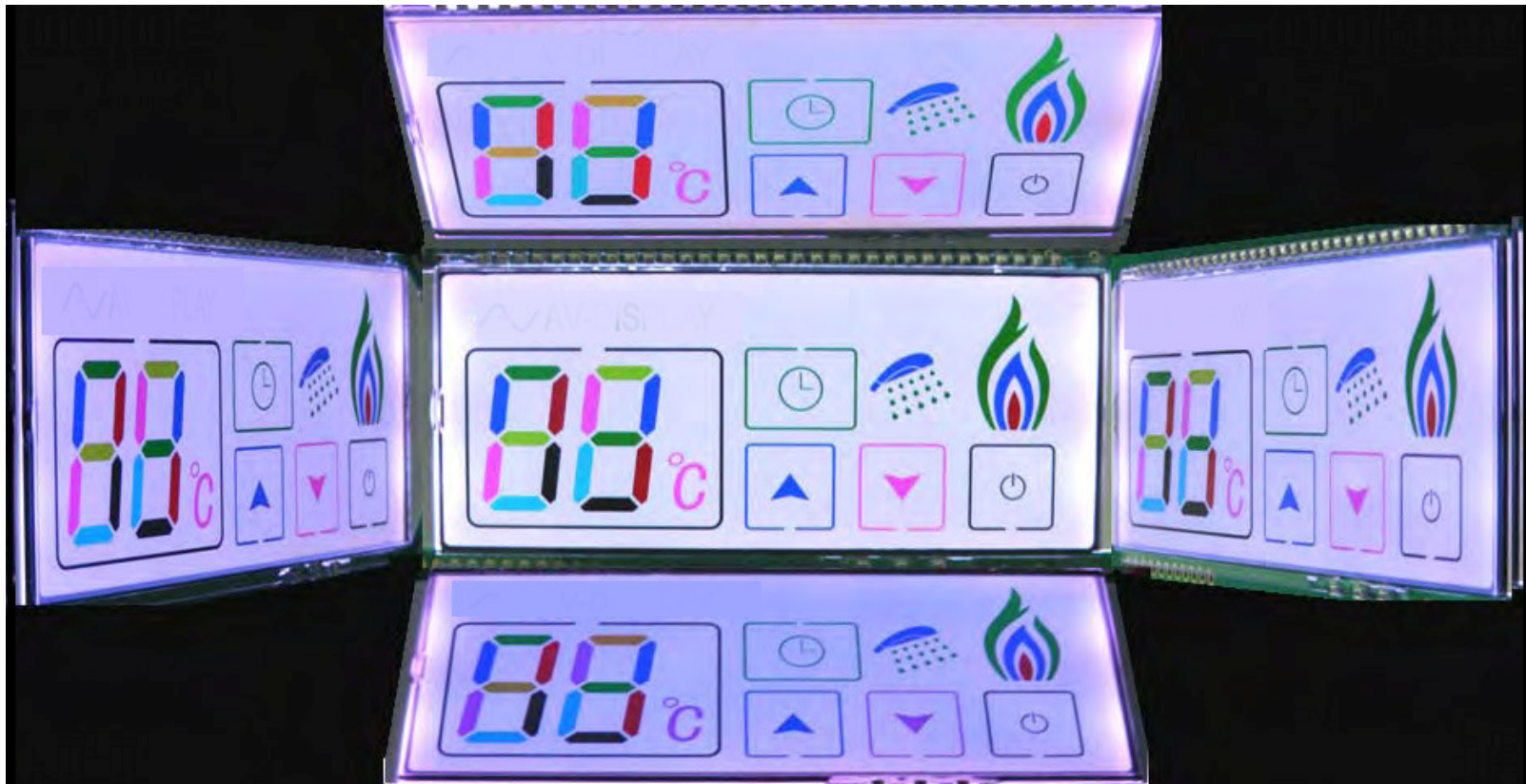


# FS LCD Development: Generation 2



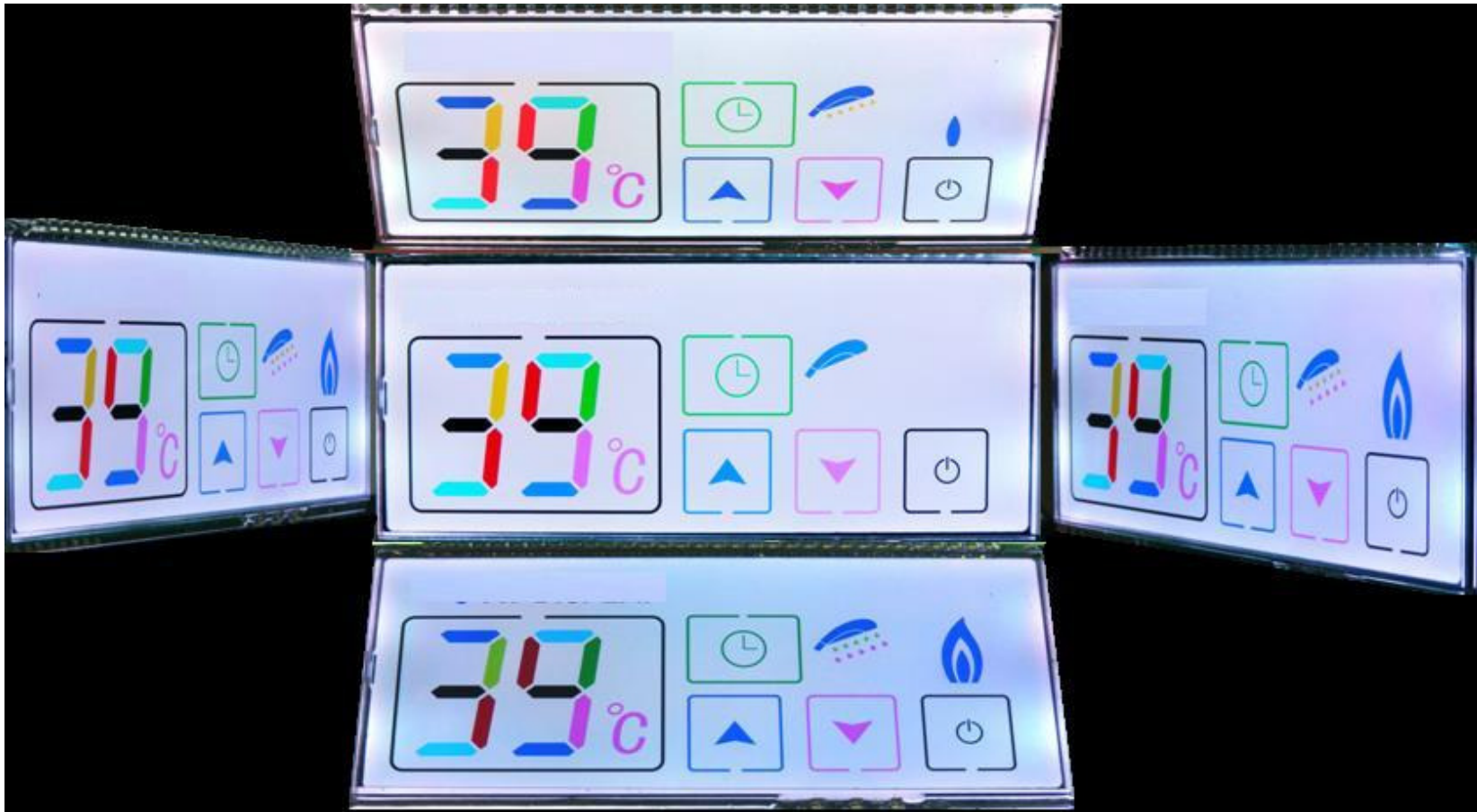
Continuous Improvement of FS LCD Brightness & Contrast

# 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 ( $\frac{1}{2}$  to  $\frac{1}{4}$  Duty)
- FS LCD with Low Operating Temperature ( $-10^{\circ}\text{C}$ ,  $-20^{\circ}\text{C}$ )



#### **USA OFFICE**

##### **Orient Display (USA) Corp**

14925 SE Allen Road, Suite 203 B  
Bellevue, WA 98006  
Tel: (425)698-1938  
Fax: (425)698-1852

Seattle Office  
Hours of Operation  
Monday - Friday:  
8:00 am - 4:30 pm  
(Pacific Time)

#### **CANADA OFFICE**

##### **Orient Display (North America)**

145 Royal Crest Court Unit 42  
Markham, ON L3R 9Z4 Canada  
Tel: (905) 477-1166  
Fax: (905) 477-1782

Canada Office  
Hours of Operation  
Monday - Friday:  
9:00 am - 5:30 pm  
(Eastern Standard Time)