

OLED



- OLED Module Overview
 - Application
 - Bonding type
 - Feature
- Image Sticking

OLED Module Overview

3 Different Application



ICON Application



Character Application



Graphic Application

3 Different Bonding



COB Type



TAB Type



COG Type

OLED Module Overview

3 Different Application

ICON Application



Pro : Customized, beautiful, smooth icon.
Con : Must be Customized, high tooling fee.

Character Application



Pro : Easy to Text.
Con : Text only.

Graphic Application



Pro : Wide application range.
Con : Lots of time to draw.

OLED Module Overview

3 Different Bonding

COB Type



Pro : Easy to fix, HV circuit, Taiwan patent.
Con : Thicker, resolution limitation (due to IC)

TAB Type



Pro : Thinner, High yield rate (lower price)
Con : panel size/ resolution limitation (due to IC)

Landscape

COG Type

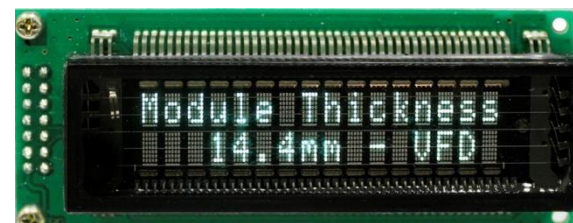


Pro : Thinner, small panel available
Con : middle yield rate

Portrait

Features-Extra thin

Display Type	OLED	LCD	VFD
Thickness (with component)	6.9mm	10.2mm	14.4mm

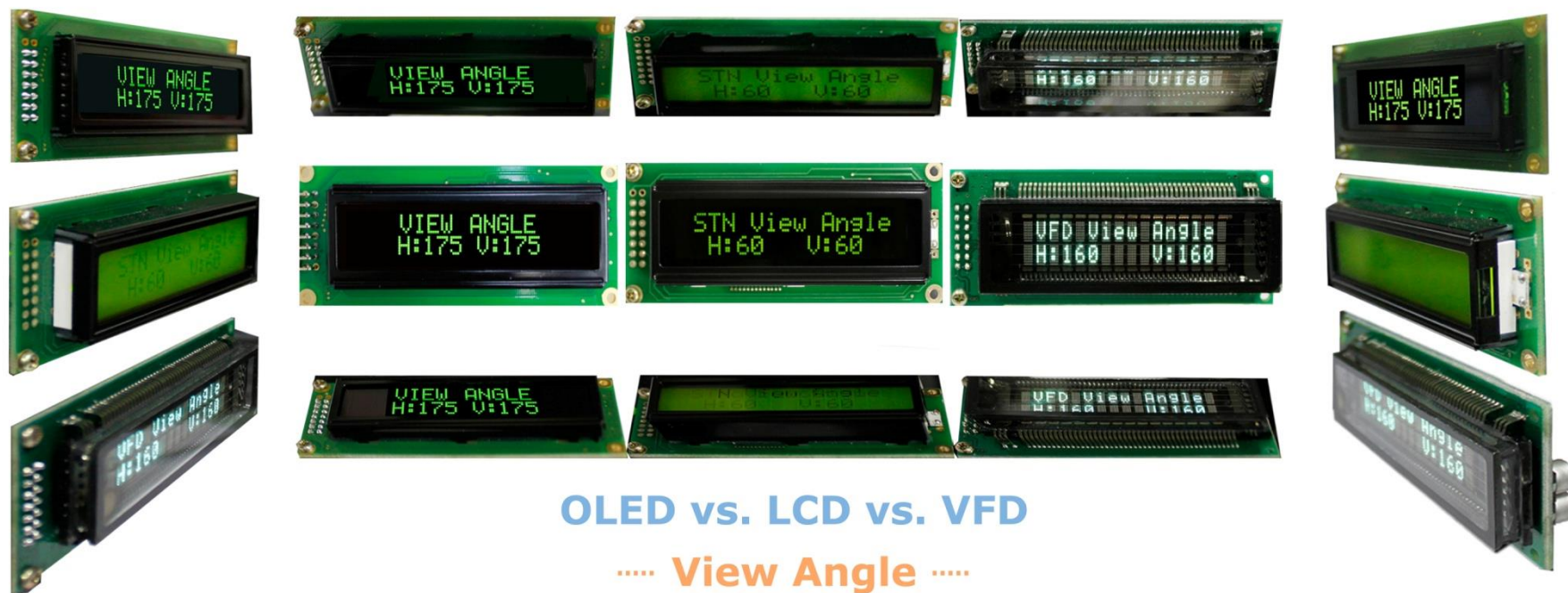


OLED vs. LCD vs. VFD

- Thickness -

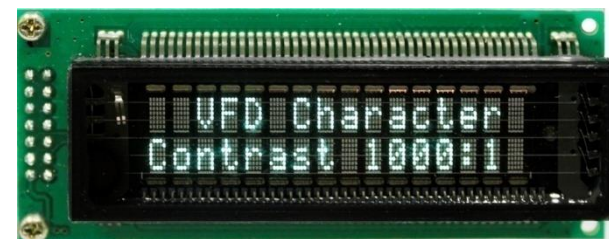
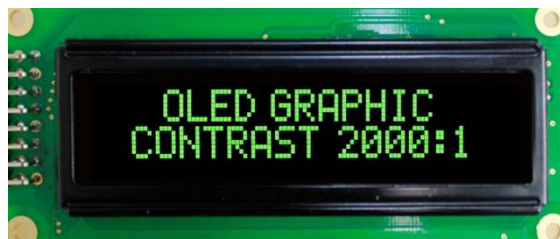
Feature-Wide View Angle

Display Type	OLED	LCD	VFD
View Angle	175(H) 175(V)	60(H) 60(V)	160(H) 160(V)

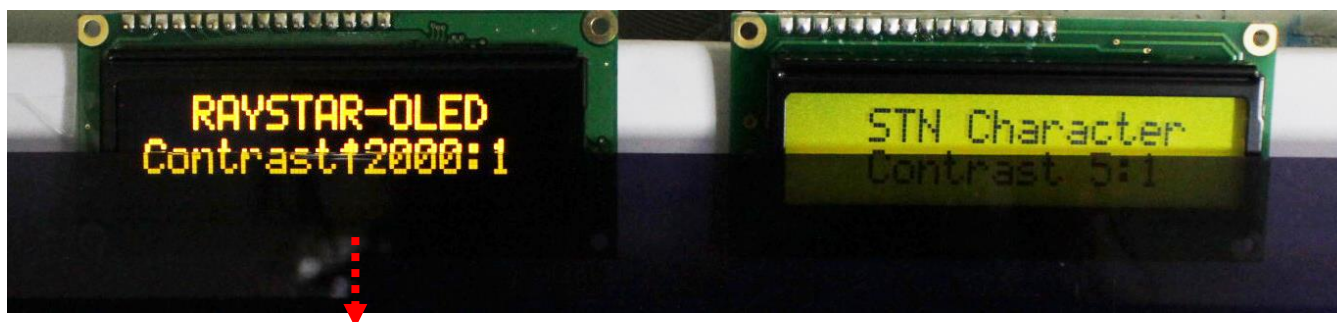


Feature-High Contrast

Display Type	OLED	LCD	VFD
Contrast	Contrast↑2000:1	Contrast 5:1	Contrast 1000:1



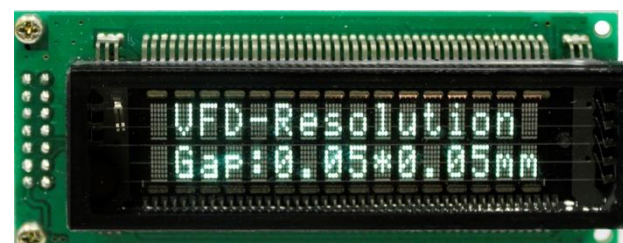
Brightness 100~2000cd/m²



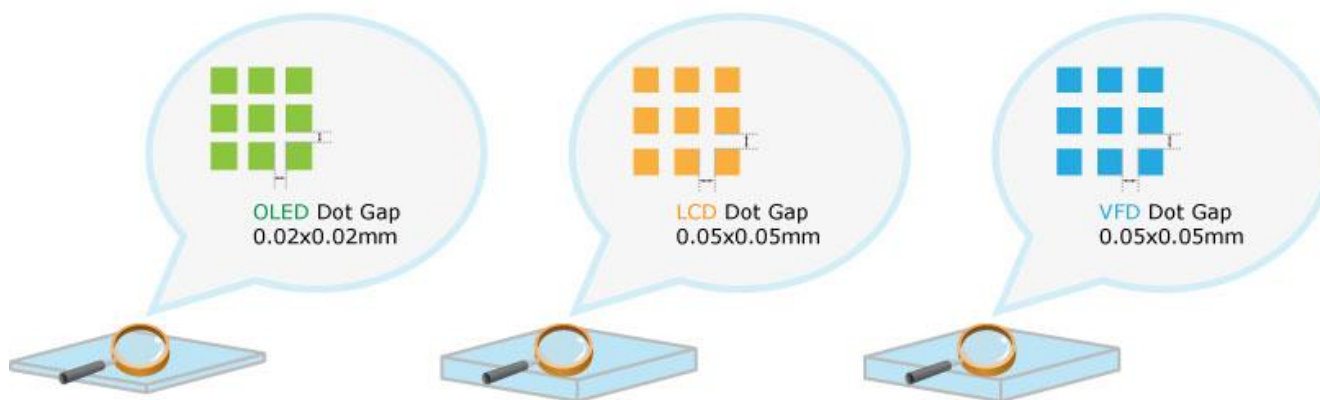
The front of the module is an acrylic board.

Feature-High Resolution

Display Type	OLED	LCD	VFD
Resolution	Gap:0.02x0.02mm	Gap:0.05x0.05mm	Gap:0.02~0.05x0.02~0.05mm

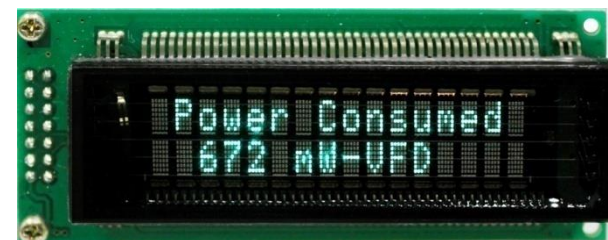


OLED vs. LCD vs. VFD



Feature-Low Power Consumption

Display Type	OLED	LCD	VFD
Power Consumed @30% lighting ratio	110 mW	500 mW	672 mW
Power Consumed @100% lighting ratio	200 mW	500 mW	680 mW



OLED vs. LCD vs. VFD



ECO Friendly

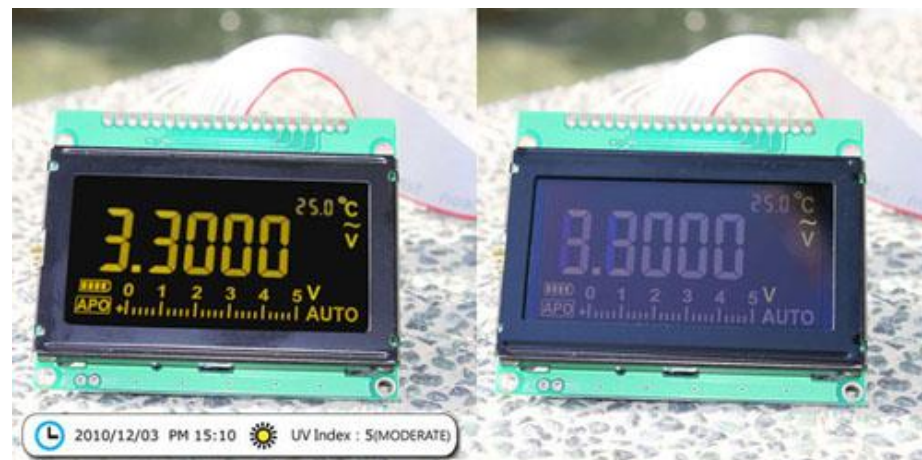


At least save 2.48kg CO² emissions per year

Feature-Sunlight Readable option



Left: With OLED Sunlight Readable Tech
Right: STN LCD Display



Left: With OLED Sunlight Readable Tech
Right: Regular OLED Display

Display Type	OLED	LCD	VFD
Sunlight Readable	Optional	No	No

Features



Case of 16*02 Character COB	PMOLED	LCD	VFD
Thickness	6.90 mm 👍	9.70 mm	14.40 mm
Weight	22g 👍	30g	35~130g
Power Consumption	200 mW 👍	500 mW	680 mW
Resolution	0.02*0.02mm 👍	0.05*0.05mm	0.02~0.05*0.02~0.05mm
Contrast	2000:1 👍	10:1	1000:1
View Angle	H:175 V:175 👍	H:60 V:60	H:160 V:160
Operation Temp.	-40℃ ~ +80℃ 👍	-20℃ ~ +70℃	-40℃ ~ +80℃
Lifetime	100k hours 👍	30k~50k hours	30k hours
Response Time	At +25℃ : 10μ Sec. 👍 At -25℃ : 10μ Sec.	At +25℃ : 0.25 Sec. At -25℃ : 4 Sec.	At +25℃ : 10μ Sec. At -25℃ : 10μ Sec.
Driving Voltage	3V ~ 5V	3V or 5V	35V
Character Font	4 types in one IC 👍	1 types in one IC	Only 1~2 types in one IC

Feature-Character Font

Display Type	OLED	LCD	VFD
Built in Font ROM	4 types in one IC	1 types in one IC	Only 1 or 2 types in one IC

RS0010 IC: 4 in 1

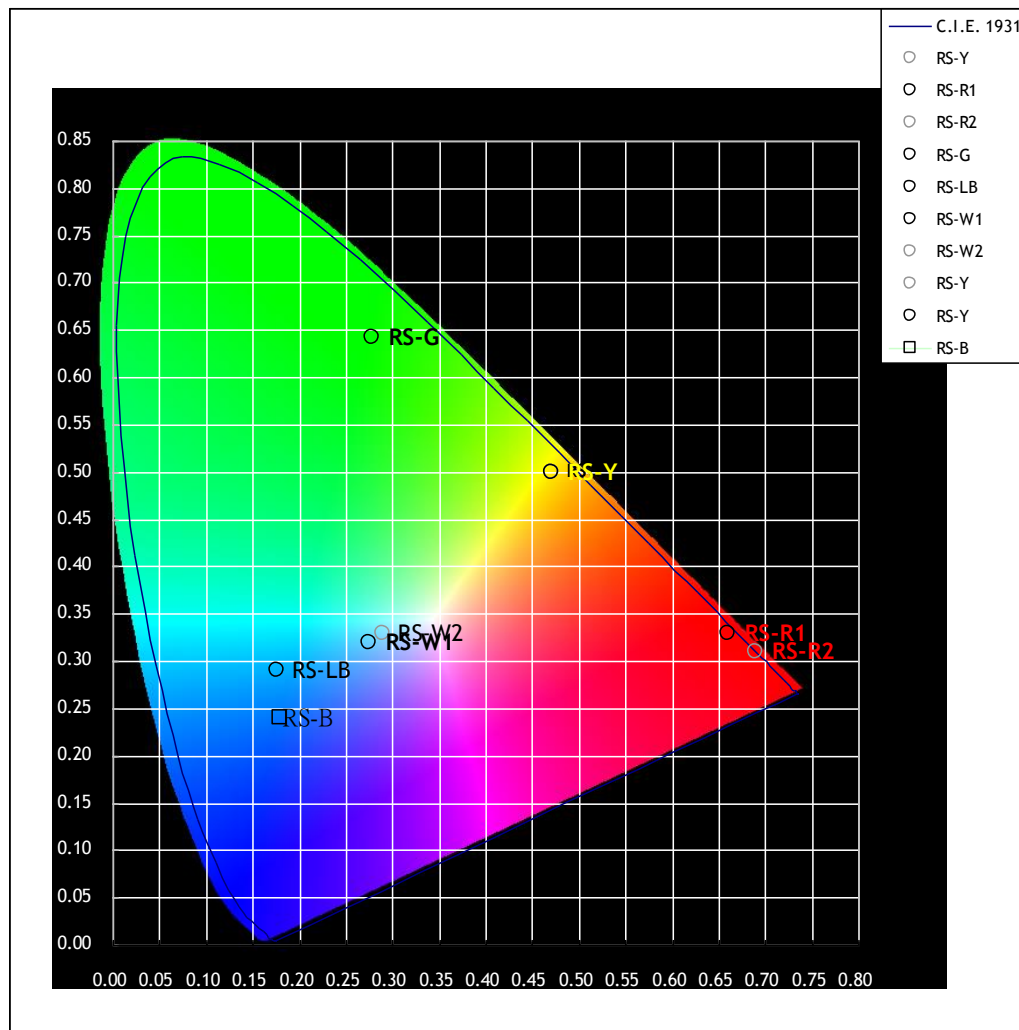
1. English Japanese font
2. Western European I font
3. Western European II font
4. English Russian font



Limitation Summary

Item	Limit
Panel Size	$\leq 5''$
Space between AA and outline	3.5 mm
Bonding Space	COB : 2.5 mm TAB : 5.5 mm COG : 7.5 mm
Dot size	$> 150\mu\text{m} * 150 \mu\text{m}$
Dot pitch	$> 172 \mu\text{m}$
Resolution	Depend on structure
manufacturing capacity	3000 pairs Maximum

Available Color



Yellow CIE(0.470 , 0.500)

Green CIE(0.278 , 0.642)

White CIE(0.275 , 0.320)

Blue CIE(0.180 , 0.240)

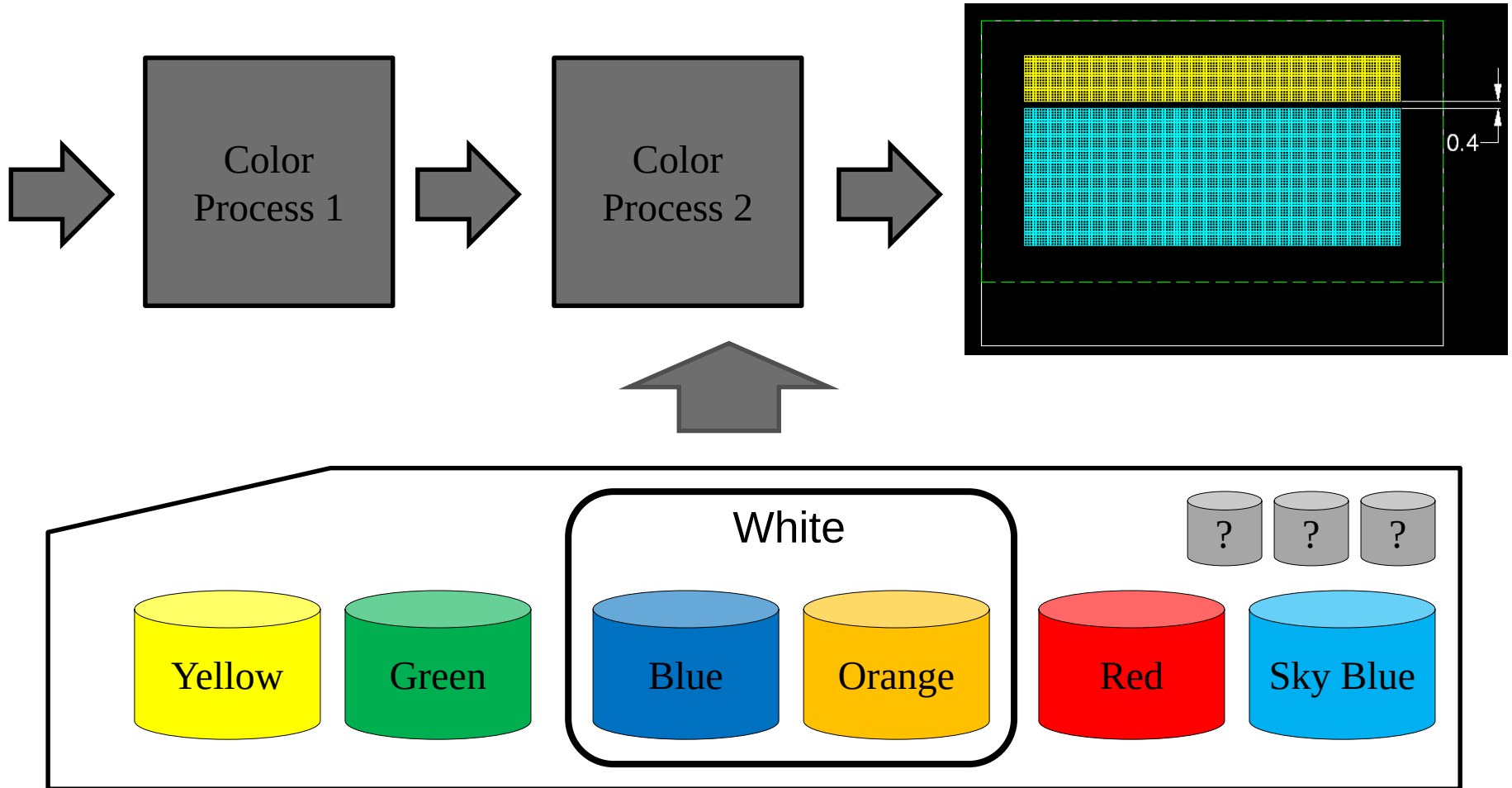
SkyBlue CIE(0.176 , 0.290)

Red CIE(0.690 , 0.310)

Brightness :
 $Y = G > W = B = S = R$

Brightness Factor:
 Dot size, color, VCC, duty,
 frame rate, panel layout

Multi-Color Available



Lifetime @ COB TYPE

	Yellow	Green	Red	Blue	White
Lifetime Estimation at 25°C	105517	100879	50188	49303	51925
Lifetime Estimation at 80°C	---	27327	6953	6774	14453
CIE-x	0.45~0.49	0.24~0.32	0.63~0.71	0.12~0.20	0.26~0.32
CIE-y	0.48~0.52	0.59~0.67	0.29~0.37	0.19~0.27	0.30~0.34



16 duty

7 VDC

50% OF INITIAL BRIGHTNESS

Factor : Brightness, color, VCC, duty, frame rate

Lifetime @ TAB TYPE

	Yellow	Green	Red	Blue	White
Lifetime Estimation at 25°C	Over than 50K hrs	49861	39381	---	---
Lifetime Estimation at 80°C	---	3455	3388	---	---
CIE-x	0.45~0.49	0.24~0.32	0.63~0.71	0.12~0.20	0.26~0.32
CIE-y	0.48~0.52	0.59~0.67	0.29~0.37	0.19~0.27	0.30~0.34

Continued testing



64 duty

5 VDC

50% OF INITIAL BRIGHTNESS

Factor : Brightness, color, VCC, duty, frame rate

Image Sticking

Image Sticking Effect, image burn-in, or ghosting means a **non-uniform usage** of the pixels.

It can be caused by the **decay of OLED efficiency** for long-time-operated pixels and is non-recoverable.

Over 3~7% brightness variation (depending different colors) with surrounding pixels can be distinguished by human eyes generally.



Show fixed images for certain time



Display new image



Residue image

How to Reduce Image Sticking

- Non-fixed image
 - Vertical/ Horizontal scrolling
 - Block Move: Display box moves like snooker ball
 - Fade Box: Display areas gradually fades in black box
 - Fade Mask: Display areas gradually narrows down vertically/ horizontally
 - Fade Scroll: Display area gradually shifts up/ down/ left/ right
- Fixed image
 - Display brightness gradually changes
 - Change to yellow color or green color
 - Reduce fixed image brightness. Show test results below



Original Image



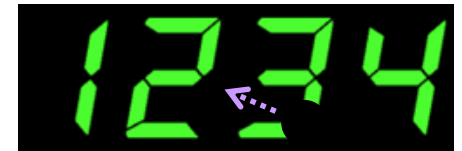
Scrolling text (horizontal)



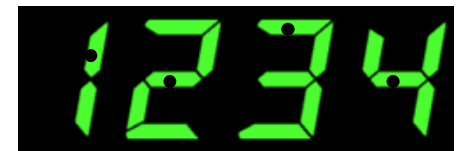
Negative mode



Scrolling text (vertical)



Screensaver (snooker ball)



Screensaver (dots)