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1.0 GENERAL DESCRIPTION

1.1 Introduction

This is a color active matrix TFT LCD FOB using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This FOB has a 13.3inch diagonally measured active area with Full-HD resolutions (1920 horizontal by 1080 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this FOB can display 262k(6bit) colors and color g amut 72%. The TFT-LCD panel used for this FOB is a low reflection and higher color type. All input signals are eDP1.3 interface compatible.

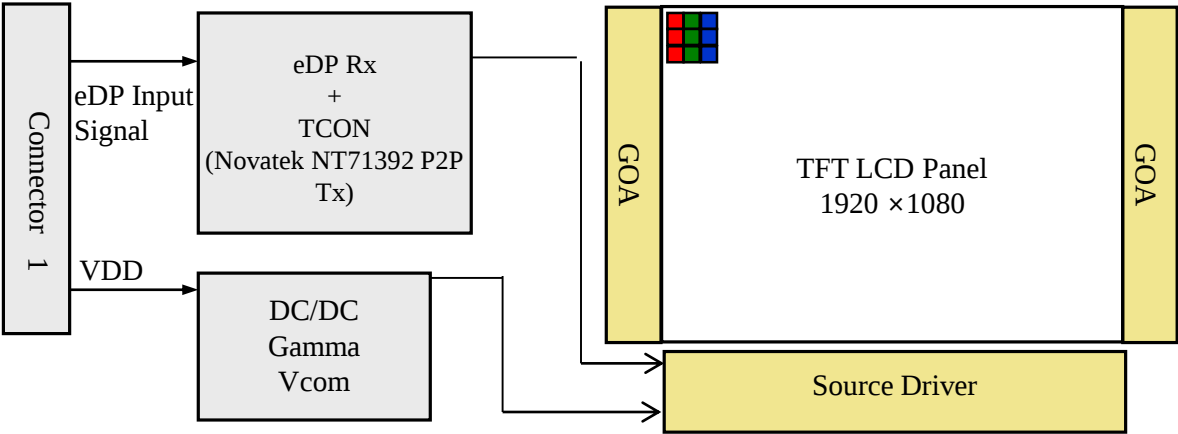


Figure 1. Drive Architecture

1.2 Features

- 2 lane eDP interface with 2.7Gbps link rates
- Thin and light weight
- 262k(6bit) color depth, color gamut 72%
- Data enable signal mode
- Side mounting frame
- Green product (RoHS & Halogen free product)
- Low driving voltage and low power consumption
- On board EDID chip

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1.3 Application

- Notebook PC (Wide type)

1.4 General Specification

The followings are general specifications at the model FOB. (listed in Table 1)

<Table 1. General Specifications>

Parameter	Specification	Unit	Remarks
Active area	293.76 (H) x 165.24 (V)	mm	
Number of pixels	1920 (H) ×1080 (V)	pixels	
Pixel pitch	153(H) ×153(V)	um	
Pixel arrangement	RGB Vertical stripe		
Display colors	262k(6bit)		
Color gamut	72%		
Display mode	Normally Black		
Panel outline	298.36x175.29x0.5	mm	
Surface treatment	Glare		
Surface hardness	3H		

2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

< Table 2. Absolute Maximum Ratings>

Ta=25+/-
2 ° C

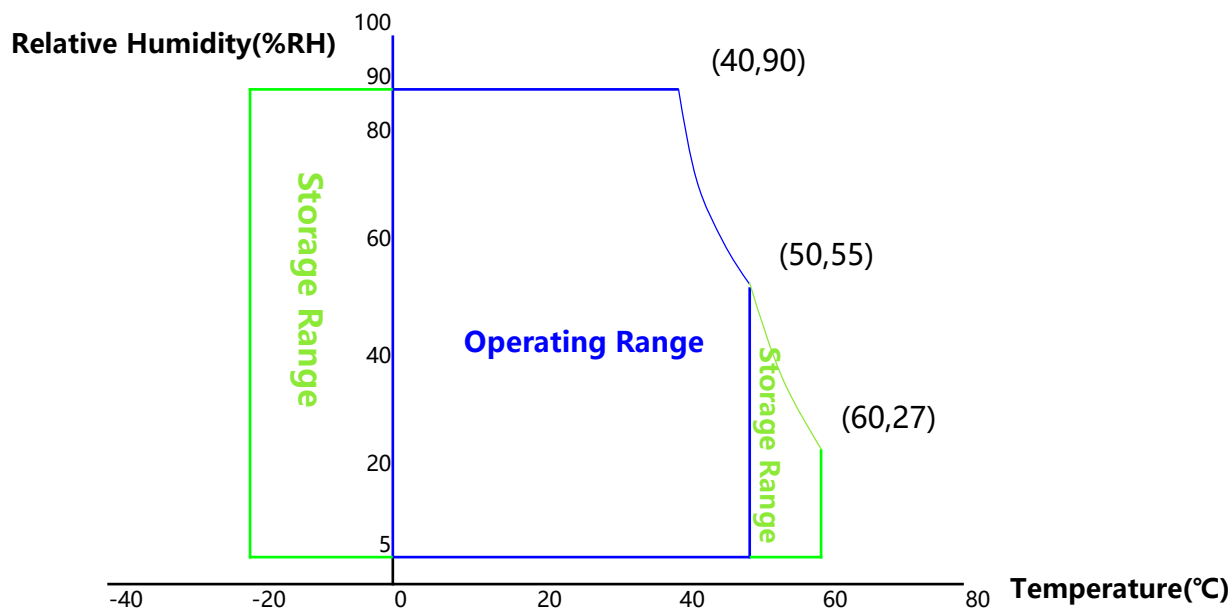
Parameter	Symbol	Min.	Max.	Unit	Remarks
Power Supply Voltage	V _{DD}	-0.5	4.0	V	Note 1
Logic Supply Voltage	V _{IN}	V _{SS} -0.3	V _{DD} +0.3	V	
Operating Temperature	T _{OP}	0	+50	° C	Note 2
Storage Temperature	T _{ST}	-20	+60	° C	

Notes :

1. Permanent damage to the device may occur if maximum values are exceeded functional operation should be restricted to the condition described under normal operating conditions.

2. Temperature and relative humidity range are shown in the figure below.

90 % RH Max. (40 ° C ≥ Ta) Maximum wet - bulb temperature at 39 ° C or less. (Ta > 40 ° C) No condensation.



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3.0 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications

< Table 3. Electrical Specifications >

Ta=25+/-2°C

Parameter		Min.	Typ.	Max.	Unit	Remarks
Power Supply Voltage	V _{DD}	3.0	3.3	3.6	V	Note 1
Permissible Input Ripple Voltage	V _{RF}	-	-	100	mV	At V _{DD} = 3.3V
Power Supply Current	I _{DD}	-	242	-	mA	Note 1
Differential Input Voltage	V _{ID}	120	-	1320	mV	
Power Consumption	P _D	-	0.8	1.6	W	Note 1

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25°C.
a) Typ : Mosaic Pattern
b) Max :RGB

2. Calculated value for reference (V_{LED} × I_{LED})

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4.0 OPTICAL SPECIFICATION

4.1 Overview

The test of optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = $25\pm 2^{\circ}\text{C}$) with the equipment of luminance meter system (PR730&PR810) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0° . We refer to $\theta\varnothing=0$ ($=\theta_3$) as the 3 o'clock direction (the “right”), $\theta\varnothing=90$ ($=\theta_{12}$) as the 12 o'clock direction (“upward”), $\theta\varnothing=180$ ($=\theta_9$) as the 9 o'clock direction (“left”) and $\theta\varnothing=270$ ($=\theta_6$) as the 6 o'clock direction (“bottom”). While scanning θ and/or $\varnothing$, the center of the measuring spot on the display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement. VDD shall be 3.3+/- 0.3V at 25°C . Optimum viewing angle direction is 6 ’clock.

4.2 Optical Specifications

<Table 4. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	Θ_3	CR > 10	-	85	-	Deg.	Note 1
		Θ_9		-	85	-	Deg.	
	Vertical	Θ_{12}		-	85	-	Deg.	
		Θ_6		-	85	-	Deg.	
Luminance Contrast Ratio		CR	$\Theta = 0^{\circ}$	600	800	-		Note 2
Color Gamut		-	-	-	72	-	%	-
Response Time (Rising + Falling)		T _{RT}	Ta= 25°C $\Theta = 0^{\circ}$	-	30	35	ms	Note 3

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Notes :

1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see Figure 7).
2. Contrast measurements shall be made at viewing angle of $\Theta=0$ and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see Figure 7) Luminance Contrast Ratio (CR) is defined mathematically.

CR =

$$\frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. The electro-optical response time measurements shall be made as Figure 10 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is T_f , and 90% to 10% is T_r .

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5.0 INTERFACE CONNECTION

5.1 Electrical Interface Connection

The electronics interface connector is UJU IS050-L30B-C10.
The connector interface pin assignments are listed in Table 5.

<Table 5. Pin Assignments for the Interface Connector>

Terminal	Symbol	Functions
Pin No.	Symbol	Description
1	NC	No connection
2	H-GND	Ground
3	LAN1_N	Complement Signal Link_Lane1
4	LAN1_P	True Signal Link_Lane1
5	H-GND	Ground
6	LAN0_N	Complement Signal Link_Lane0
7	LAN0_P	True Signal Link_Lane0
8	H-GND	High Speed Ground
9	AUXP	True Signal Link_Auxiliry Channel
10	AUXN	Complement Signal Link_Auxiliry Channel
11	H-GND	Ground
12	LCD_VCC	Power Supply, 3.3V (typ.)
13	LCD_VCC	Power Supply, 3.3V (typ.)
14	BIST	Panel self test enable
15	H-GND	Ground
16	H-GND	Ground
17	HPD	HPD(Hot Plug Detect) Signal Pin
18	BL_GND	High Speed Ground
19	BL_GND	High Speed Ground
20	BL_GND	High Speed Ground
21	BL_GND	High Speed Ground
22	BL_EN	Backlight on/off Control pin
23	BL_PWM	Back light PWM Dimming
24	NC	No connection
25	NC	No connection
26	BL_PWR	Backlight power
27	BL_PWR	Backlight power
28	BL_PWR	Backlight power
29	BL_PWR	Backlight power
30	NC	No connection

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5.2 eDP Interface

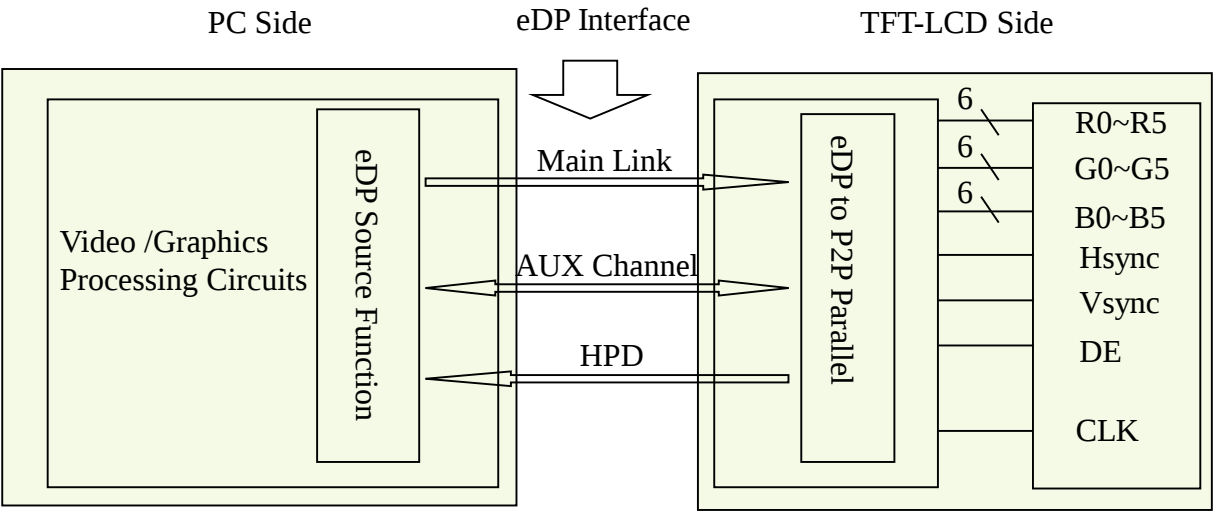


Figure 5. eDP Interface Architecture

Note:
 Transmitter : NT71851 or equivalent.
 Transmitter is not contained in FOB.

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5.3 Data Input Format

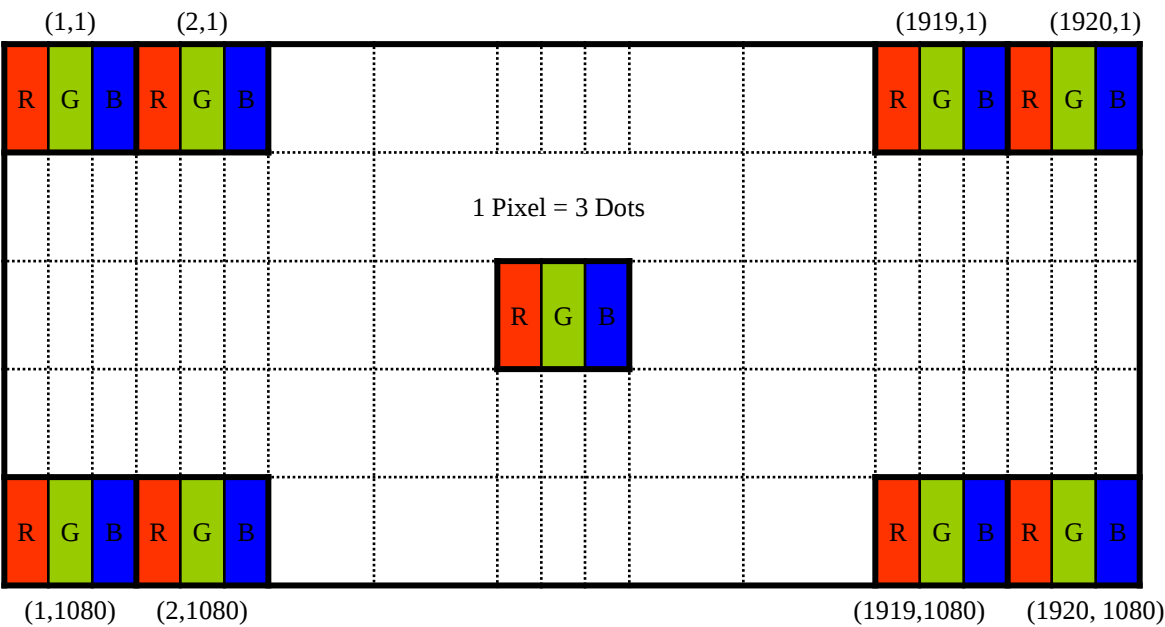


Figure 6. Display Position of Input Data (V-H)

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