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TFT | CHARACTER | UWVD | FSC | SEGMENT | CUSTOM | REPLACEMENT

TFT Display Module

Part Number

E50CB-FS1000-N

Overview:

- 5.0-inch TFT (120.7x75.8 mm)
- 800 x 480 pixels
- 16-bit color @ 60Hz
- 1.5" depth
- White LED back-light
- Transmissive, Normally Black
- No user interface
- 1000 NITS
- Controller: ST7262
- RoHS Compliant

Description

This is a color active matrix TFT (Thin Film Transistor) LCD (Liquid Crystal Display) that uses amorphous silicon TFT as a switching device. This model is composed of a transmissive type TFT-LCD Panel, driver circuit and a backlight unit. The resolution of the 5.0" TFT-LCD contains 800(RGB)x480 pixels.

TFT Features

Low Input Voltage: 3.3V

TFT Interfaces: 16/18/24-bit RGB

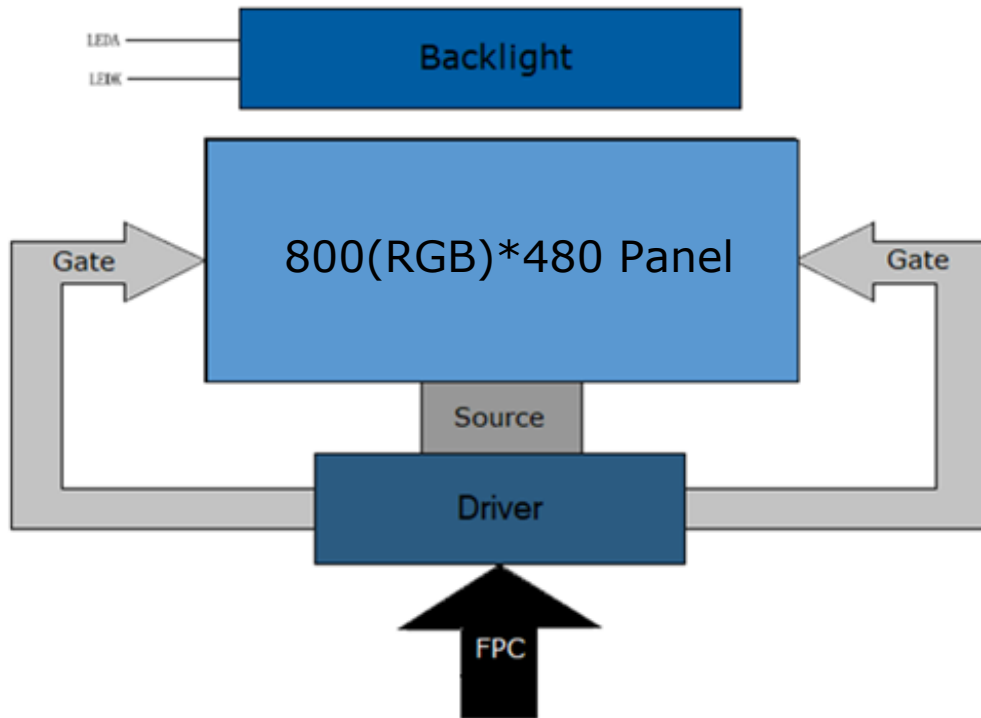
Technology Type: IPS

General Information Items	Specification	Unit	Note
	Main Panel		
TFT Display area (AA)	108.00 (H) x 64.80 (V) (5.0 inch)	mm	-
Driver element	TFT active matrix	-	-
Number of pixels	800(RGB)x480	dots	-
TFT Pixel arrangement	RGB vertical stripe	-	-
Pixel pitch	0.135 (H) x 0.135 (V)	mm	-
Viewing angle	ALL	o'clock	-
TFT Controller IC	ST7262	-	-
LCM Interface	16/18/14-bit RGB	-	-
Display mode	Transmissive/ Normally Black	-	-
Backlight Type	LED	-	-
Operating temperature	-20~+70	°C	-
Storage temperature	-30~+80	°C	-

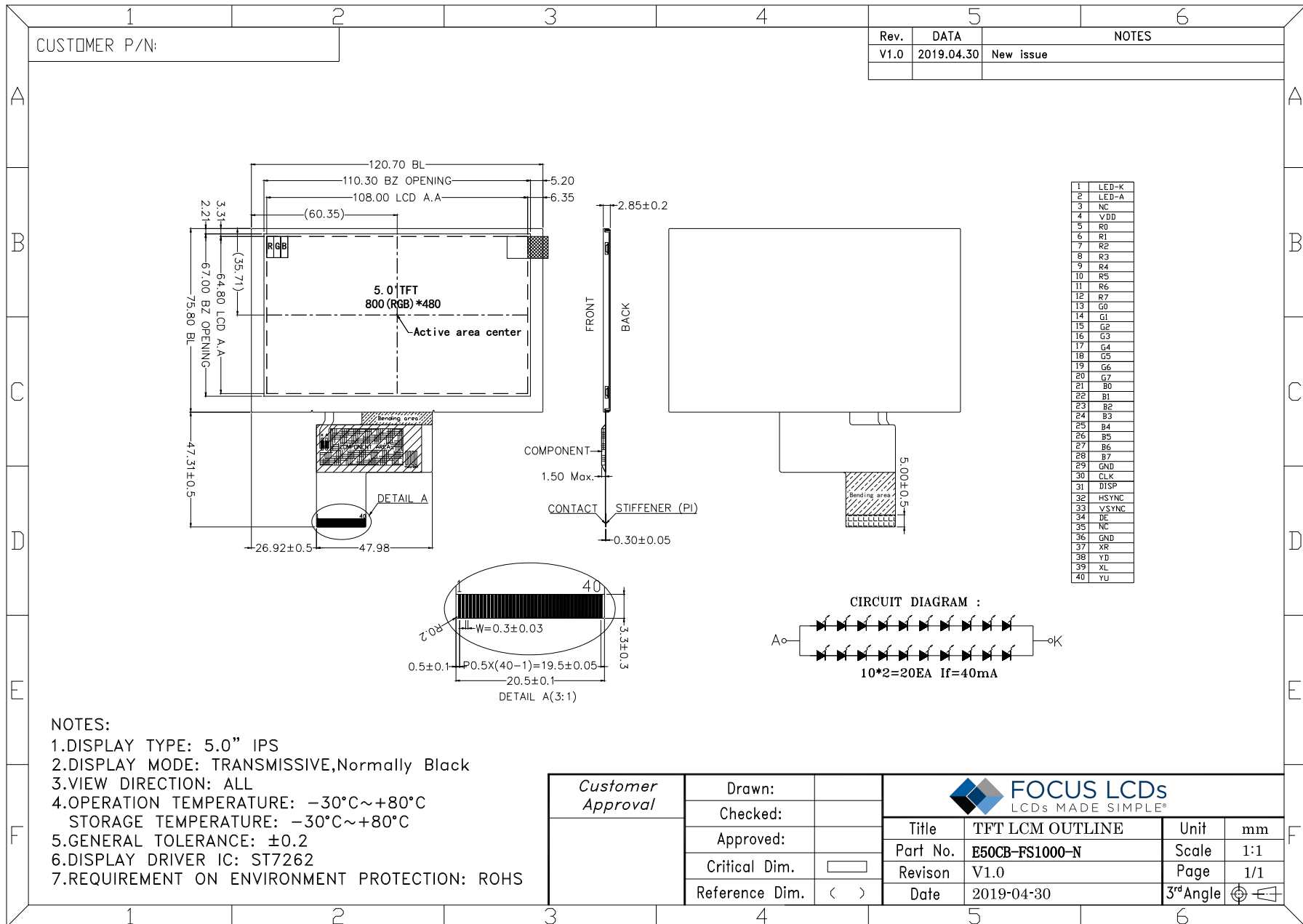
Mechanical Information

Item		Min	Typ.	Max	Unit	Note
Module size	Height (H)		120.70		mm	-
	Vertical (V)		75.80		mm	-
	Depth (D)		2.85		mm	-

1. Block Diagram



2. Outline Dimensions



- NOTES:
- 1.DISPLAY TYPE: 5.0" IPS
 - 2.DISPLAY MODE: TRANSMISSIVE, Normally Black
 - 3.VIEW DIRECTION: ALL
 - 4.OPERATION TEMPERATURE: -30°C~+80°C
STORAGE TEMPERATURE: -30°C~+80°C
 - 5.GENERAL TOLERANCE: ±0.2
 - 6.DISPLAY DRIVER IC: ST7262
 - 7.REQUIREMENT ON ENVIRONMENT PROTECTION: ROHS

<i>Customer Approval</i>	Drawn:		FOCUS LCDs LCDs MADE SIMPLE®			
	Checked:					
	Approved:		Title	TFT LCM OUTLINE	Unit	mm
	Critical Dim.	□	Part No.	E50CB-FS1000-N	Scale	1:1
	Reference Dim.	()	Revision	V1.0	Page	1/1
			Date	2019-04-30	3 rd Angle	

3. Input Terminal Pin Assignment

Recommended Connector: FH12S-40S-0.5SH(55)

NO.	Symbol	Description	I/O
1	VLED-	Cathode of LED backlight	P
2	VLED+	Anode of LED backlight	P
3	NC	Not connected	
4	VDD	Power Supply	P
5-12	R0-R7	Red data	I
13-20	G0-G7	Green data	I
21-28	B0-B7	Blue data	I
29	GND	Power ground	P
30	PCLK	Pixel clock	I
31	DISP	DISP set display mode. L: standby mode. H: Normal display mode	I
32	HSYNC	Horizontal sync signal	I
33	VSYSN	Vertical sync signal	I
34	DE	Data enable	I
35	NC	Not connected	
36	GND	Ground	P
37	XR(NC)	Touch panel control pins (Not connected)	
38	YD(NC)		
39	XL(NC)		
40	YU(NC)		

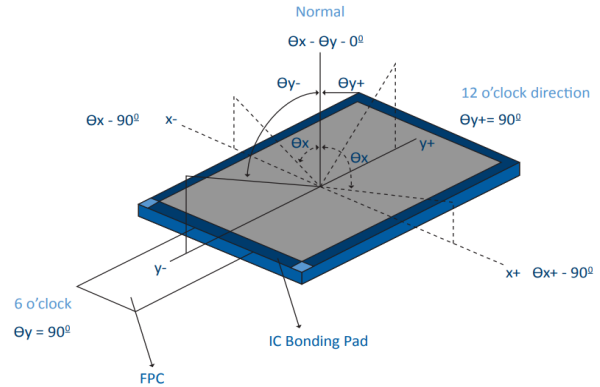
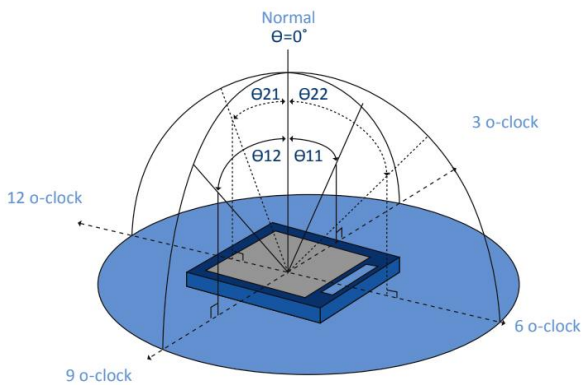
4. LCD Optical Characteristics

4.1 Optical Specifications

Item	Symbol	Condition	Min	Typ.	Max	Unit	Note	
Luminance	L		--	1000	--	cd/m ²	(3)	
Contrast Ratio	CR	θ=0 Normal viewing angle	800	1000	--	%	(2)	
Response Time	Rising		TR/TF	--	30	40	ms	(4)
	Falling							
Color Filter Chromaticity	White		W _x	--	0.342	--		(5)(6)
			W _y	--	0.394	--		
	Red		R _x	--	--	--		
			R _y	--	--	--		
	Green		G _x	--	--	--		
			G _y	--	--	--		
Blue	B _x		--	--	--			
	B _y	--	--	--				
Viewing Angle	Hor.	θ _L	--	80	--	degree	(1)(6)	
		θ _R	--	80	--			
	Ver.	θ _T	--	80	--			
		θ _B	--	80	--			
Option View Direction	ALL						(1)	

Optical Specification Reference Notes:

(1) Definition of Viewing Angle: The 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.

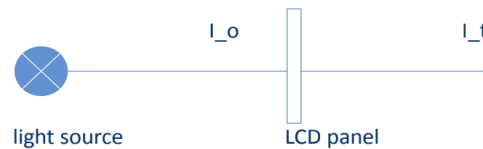


(2) Definition of Contrast Ratio (Cr): measured at the center point of panel. The contrast ratio (Cr) measured on a module, is the ratio between the luminance (Lw) in a full white area (R=G=B=1) and the luminance (Ld) in a dark area (R=G=B=0).

$$Cr = \frac{Lw}{Ld}$$

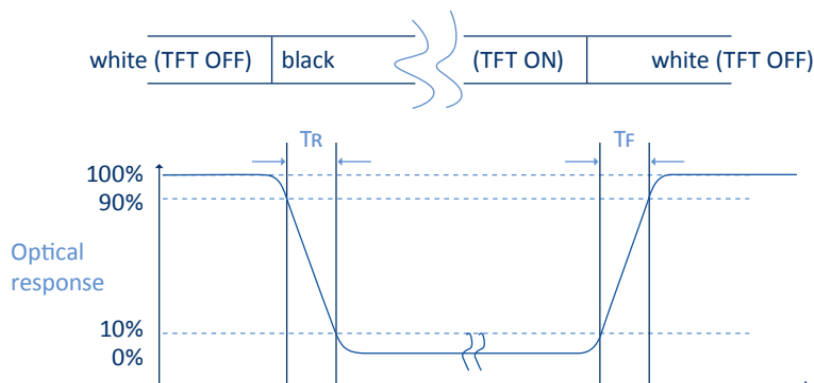
(3) Definition of transmittance (T%): The transmittance of the panel including the polarizers is measured with electrical driving. The equation for transmittance Tr is:

$$Tr = \frac{It}{Io} \times 100\%$$



Io = the brightness of the light source.
 It = the brightness after panel transmission

(4) Definition of Response Time (Tr, Tf): The rise time 'Tr' is defined as the time for luminance to change from 90% to 10% as a result of a change of the electrical condition. The fall time 'Tf' is defined as the time for luminance to change from 10% to 90% as a result of a change of the electrical condition.



(5) Definition of Color Gamut:

Measuring machine CFT-01. NTSC's Primaries: $R(x,y,Y), G(x,y,Y), B(x,y,Y)$. FPM520 of Westar Display Technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics. The color chromaticity shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

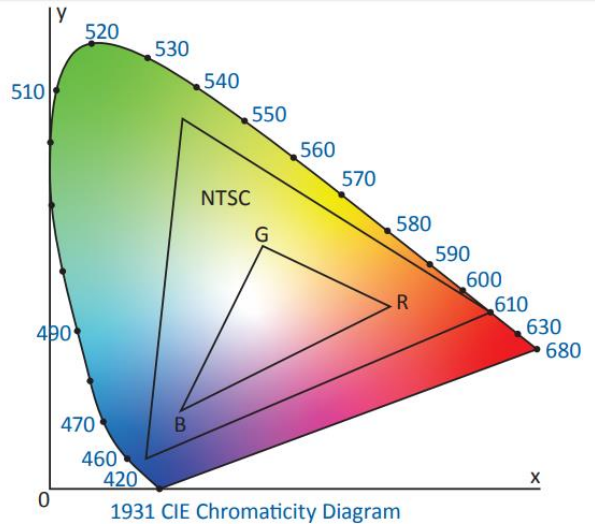
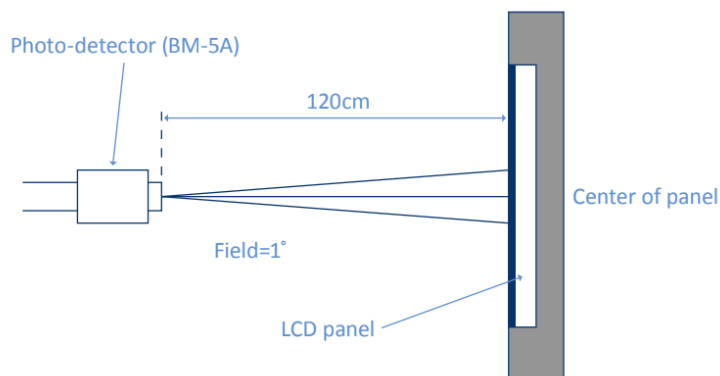
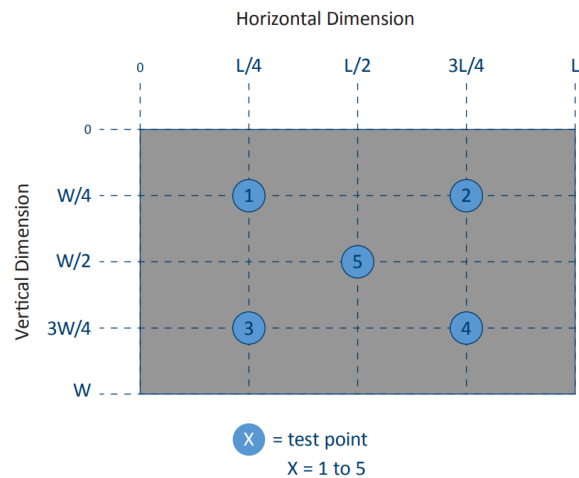
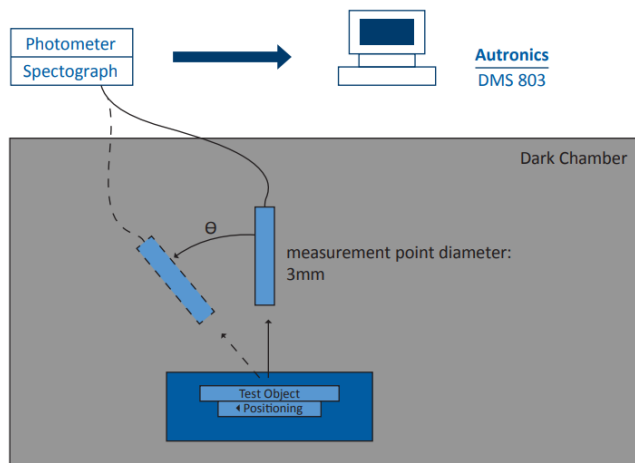


Fig. 1931 CIE chromacity diagram

$$\text{Color gamut: } S = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}} \times 100\%$$

(6) Definition of Optical Measurement Setup:

The LCD module should be stabilized at a given temperature for 20 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 20 minutes.



5. TFT Electrical Characteristics

5.1 Absolute Maximum Rating (Ta=25 °C, VSS=0V)

Characteristics	Symbol	Min	Max	Unit
Digital Supply Voltage	VDD	-0.3	4.0	V
Operating Temperature	TOP	-20	+70	°C
Storage Temperature	TST	-30	+80	°C

NOTE: If the absolute maximum rating of the above parameters is exceeded, even momentarily, the quality of the product may be degraded. Absolute maximum ratings specify the values which the product may be physically damaged if exceeded. Be sure to use the product within the range of the absolute maximum ratings.

5.2 DC Electrical Characteristics

Characteristics	Symbol	Min	Typ.	Max	Unit	Note
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	
Level Input Voltage	VIH	0.7VDD	--	VDD	V	VDD=3.3V
	VIL	0	--	0.3VDD	V	
Level Output Voltage	VOH	VDD-0.4	--	VDD	V	VDD=3.3V
	VOL	GND	--	GND+0.4	V	

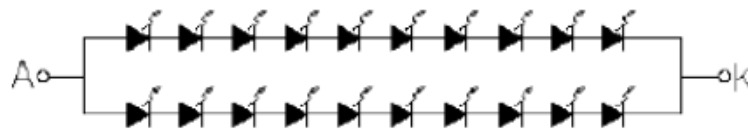
5.3 LED Backlight Characteristics

The backlight system is edge lighting type with 20 chips

Item	Symbol	Min	Typ.	Max	Unit	Note
Forward Current	I _F	--	40	--	mA	
Forward Voltage	V _F	--	30	--	V	
LCM Luminance	LV	1000	--	--	cd/m ²	Note 3
LED lifetime	Hr	50000	--	--	hour	Note1 & 2
Uniformity	AV _g	80	--	--	%	Note 3

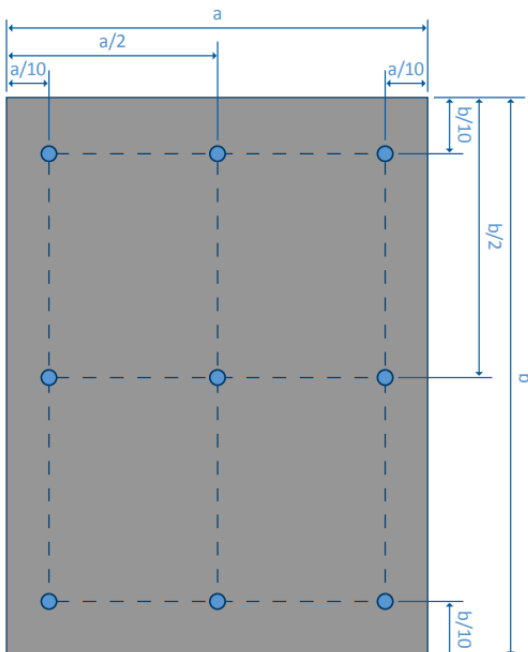
Note 1: LED lifetime (Hr) can be defined as the time in which it continues to operate under the condition: T_a=25 ±3 °C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note 2: The “LED lifetime” is defined as the module brightness decrease to 50% original brightness at T_a=25°C and I_L= 40mA



Backlight LED Circuit

Note 3: Luminance Uniformity of these 9 points is defined as below:



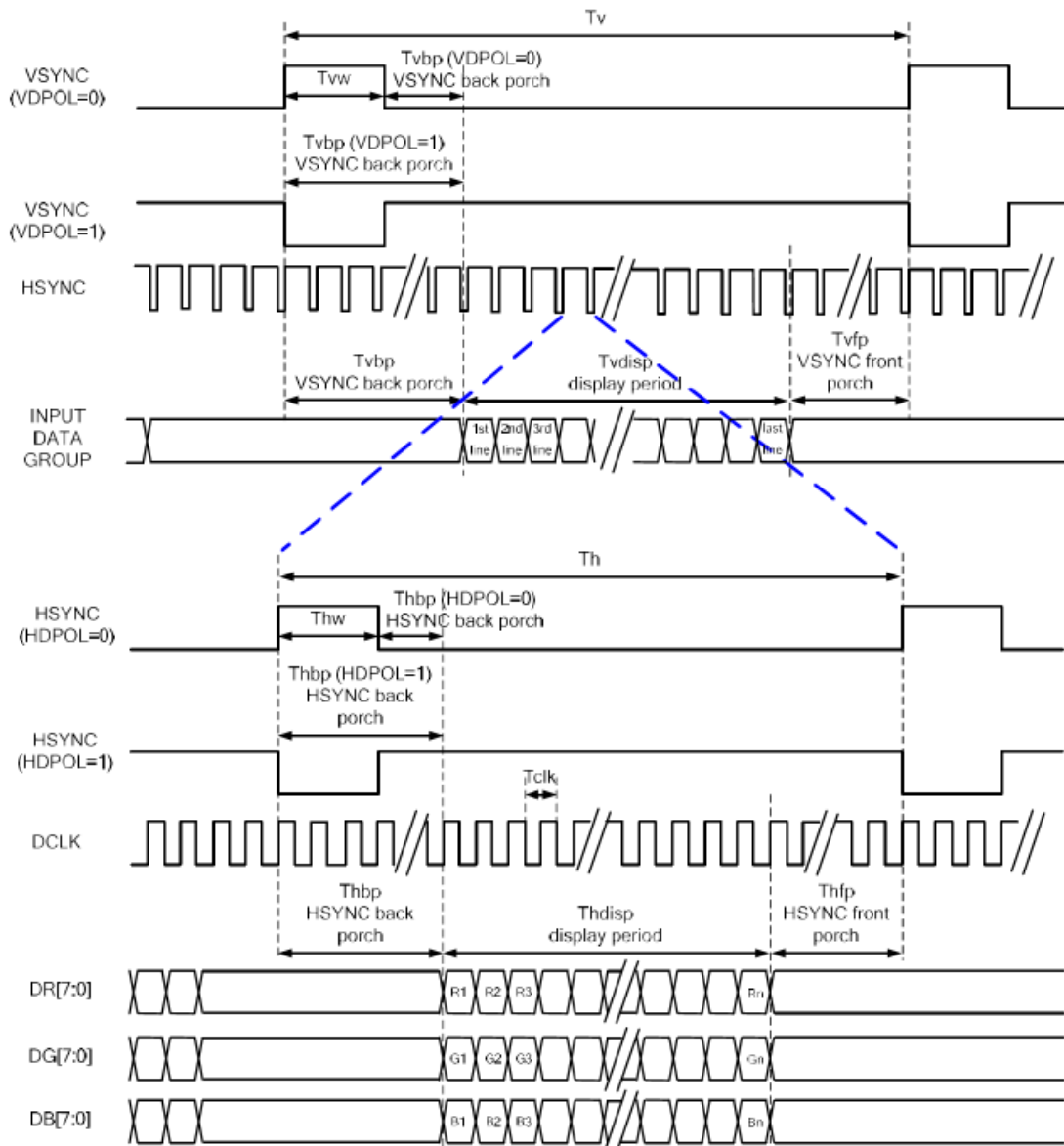
$$\text{Luminance} = \frac{\text{(Total Luminance of 9 points)}}{9}$$

$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points(1-9)}}{\text{maximum luminance in 9 points(1-9)}}$$

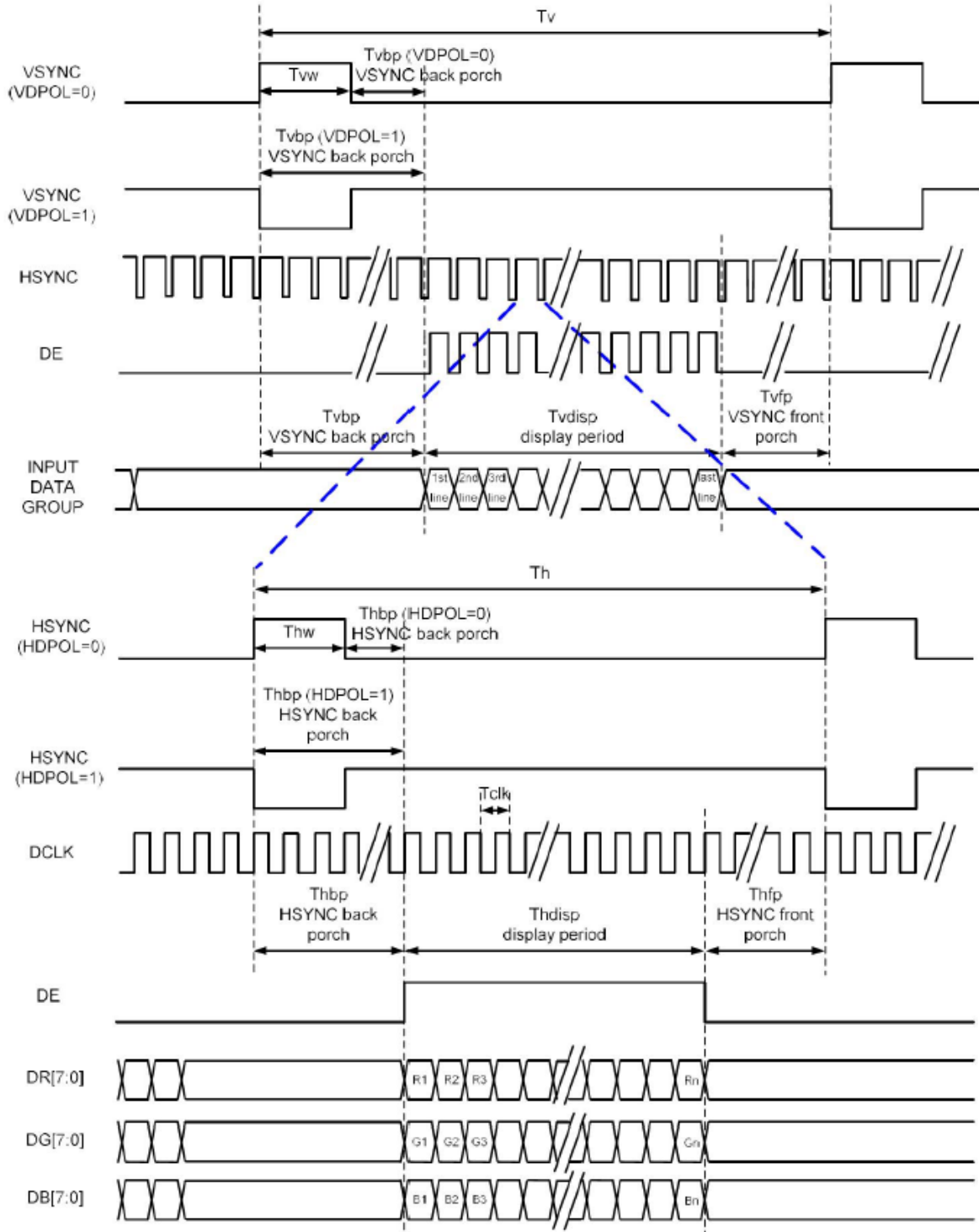
6. AC Timing Characteristics

RGB Mode Selection	DCLK	HSYNC	VSYNC	DE
SYNC-DE Mode	input	input	input	input
SYNC Mode	input	input	input	GND
DE Mode	input	GND	GND	input

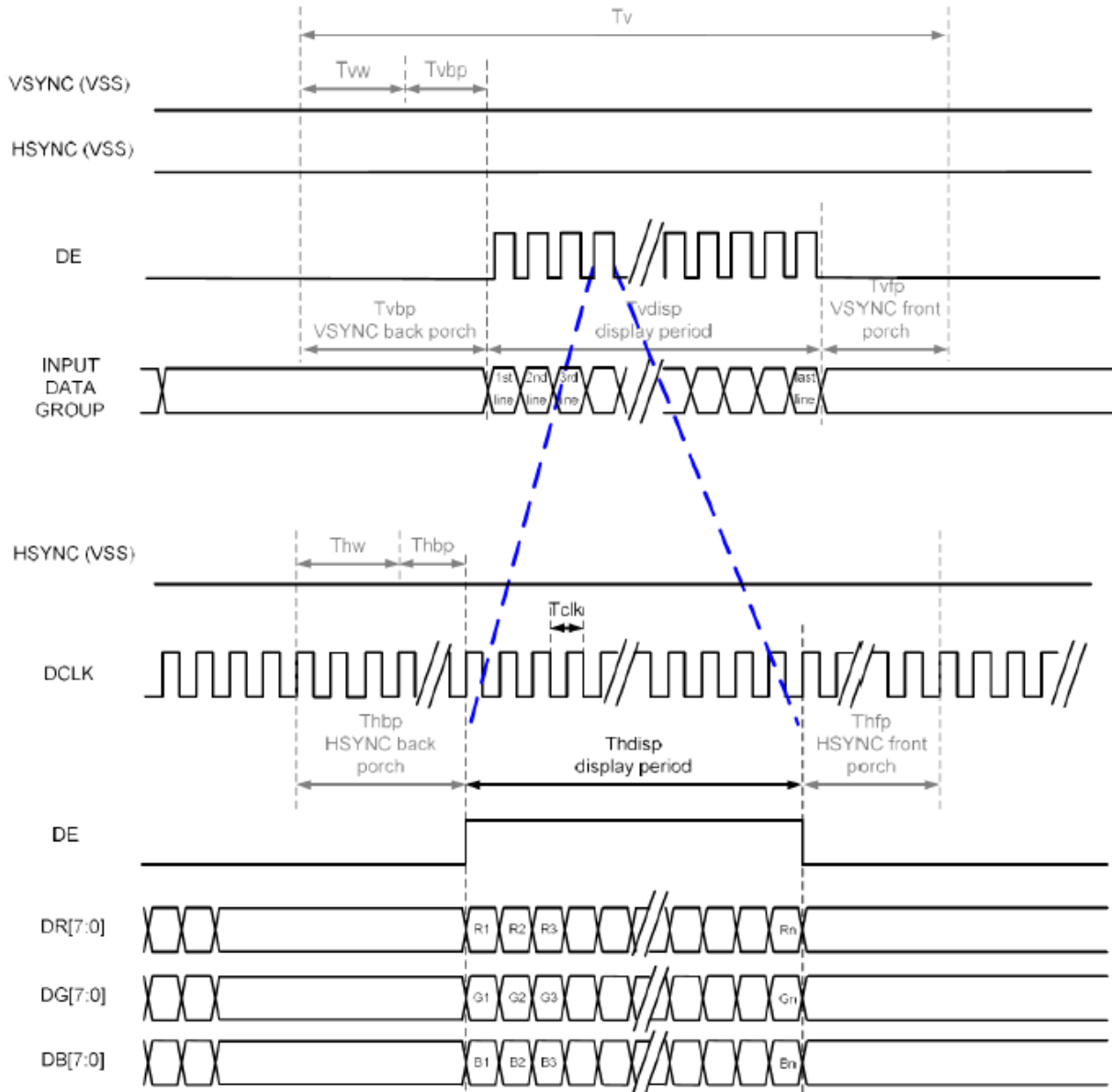
6.1 SYNC MODE



6.2 SYNC-DE MODE



6.3 DE MODE



6.4 Parallel 24-bit RGB Input Timing Table

Characteristics		Symbol	Min	Typ.	Max	Unit
DCLK Frequency		fclk	23	25	27	MHz
HSYNC	Period time	th		816	896	DCLK
	Display Period	thdisp	800	800	800	
	Back Porch	thbp		8	48	DCLK
	Front Porch	thfp		8	48	DCLK
	Pulse Width	thw		4	8	DCLK
VSYNC	Period Time	tv		496	504	HSYNC
	Display Period	tvdisp		480	480	
	Back Porch	tvbp		8	12	HSYNC
	Front Porch	tvfp		8	12	HSYNC
	Pulse Width	tvw		4	8	HSYNC

7. Cautions and Handling Precautions

7.1 Handling and Operating the Module

1. When the module is assembled, it should be attached to the system firmly. Do not warp or twist the module during assembly work.
2. Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
3. Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
4. Do not allow drops of water or chemicals to remain on the display surface. If you have the droplets for a long time, staining and discoloration may occur.
5. If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
6. The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane. Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
7. If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.
8. Protect the module from static; it may cause damage to the CMOS ICs.
9. Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
10. Do not disassemble the module.
11. Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
12. Pins of I/F connector shall not be touched directly with bare hands.
13. Do not connect, disconnect the module in the "Power ON" condition.
14. Power supply should always be turned on/off by the item Power On Sequence & Power Off Sequence

7.2 Storage and Transportation.

1. Do not leave the panel in high temperature, and high humidity for a long time. It is highly recommended to store the module with temperature from 0 to 35 °C and relative humidity of less than 70%
2. Do not store the TFT-LCD module in direct sunlight.
3. The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
4. It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module. In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.
5. This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.