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TFT | OLED | CHARACTER | GRAPHIC | UWVD | SEGMENT | CUSTOM

TFT Display Module

Part Number

E50RE-I-LS750-CA

Overview:

- 5.0-inch TFT (120.7x75.9mm)
- 800x480 Pixels
- LVDS Interface
- -30C to 85C Operating Temperature
- Viewing Angle: All
- Transmissive, IPS
- Capacitive Touch Panel
- 750 NITS
- TFT IC: 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, capacitive touch panel, and backlight unit. The resolution of the 5.0" TFT-LCD contains 800(RGB)x480 pixels and can display up to 16.7M colors.

Features

Input Voltage: 3.3V
TFT Interface: 4-Lane LVDS / 8BIT LVDS
CTP Interface: I2C

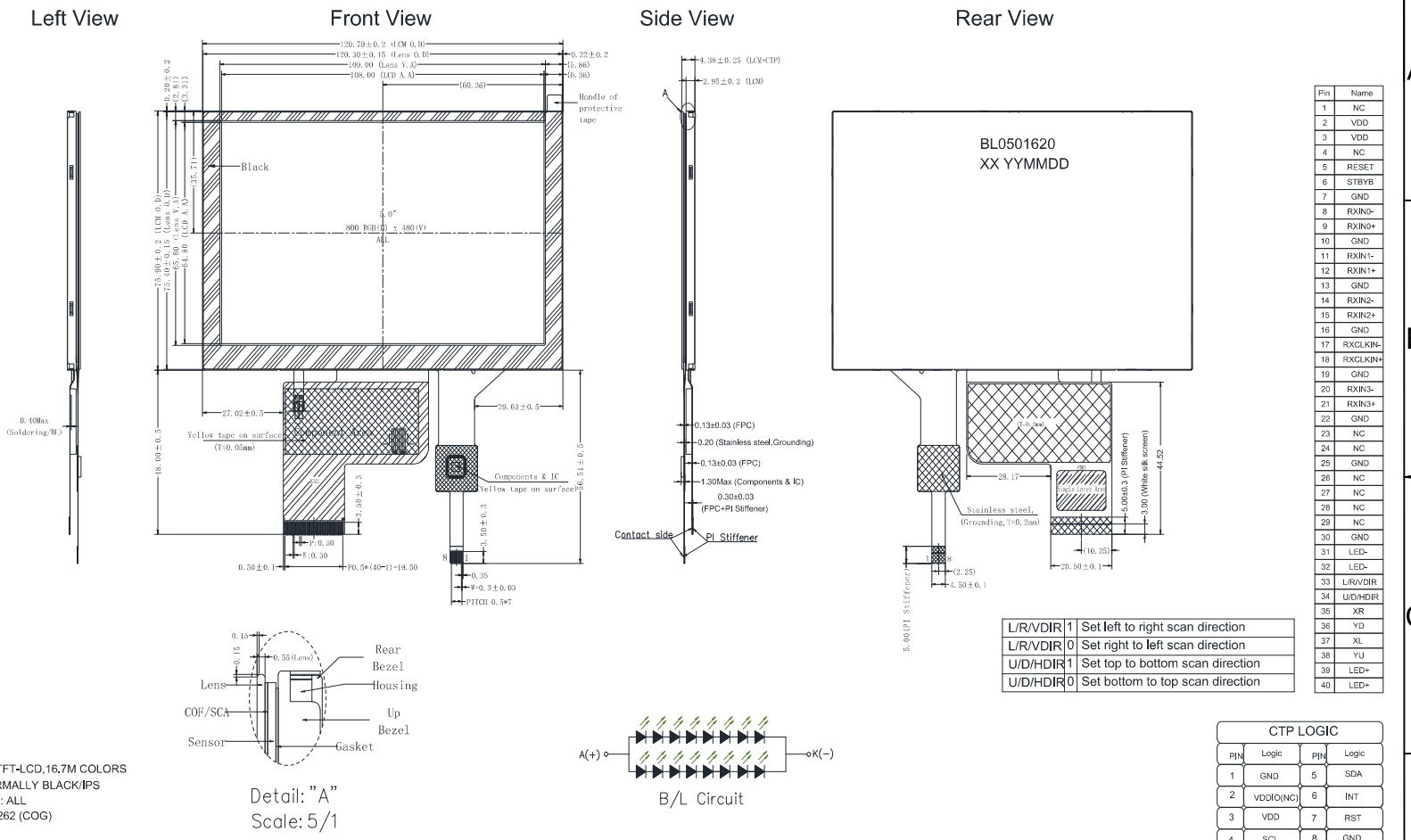
General Information Items	Specification	Unit
TFT Display Area (AA)	108.0 (H) x 64.8 (V) (5.0-Inch)	mm
CTP View Area	109.0 (H) x 65.8 (V)	mm
Driver Element	TFT Active Matrix	--
Display Colors	16.7M	Colors
Number of Pixels	800(RGB)x480	Dots
TFT Pixel Arrangement	RGB Vertical Stripe	--
Pixel Pitch	0.135 (H) x 0135 (V)	mm
Viewing Angle	ALL	O'clock
TFT IC	ST7262	--
CTP IC	GT911	--
Display Mode	Transmissive / Normally Black	--
Touch Points	5-Points and Gestures	--
Operating Temperature	-30 to +85	°C
Storage Temperature	-30 to +85	°C

Mechanical Information

Item		Min.	Typ.	Max.	Unit
Module Size	Horizontal (H)	--	120.7	--	mm
	Vertical (V)	--	75.9	--	mm
	Depth (D)	--	4.38	--	mm
Weight		--	TBD	--	g

11. Outline Dimensions

Rev.	Description	Date
1.0	First	8/27/21



Pin	Name
1	NC
2	VDD
3	VDD
4	NC
5	RESET
6	STBYB
7	GND
8	RXIN0-
9	RXIN0+
10	GND
11	RXIN1-
12	RXIN1+
13	GND
14	RXIN2-
15	RXIN2+
16	GND
17	RXCLKIN-
18	RXCLKIN+
19	GND
20	RXIN3-
21	RXIN3+
22	GND
23	NC
24	NC
25	GND
26	NC
27	NC
28	NC
29	NC
30	GND
31	LED-
32	LED-
33	L/R/VDIR
34	U/D/HDIR
35	XR
36	YD
37	XL
38	YU
39	LED+
40	LED+

L/R/VDIR	1	Set left to right scan direction
L/R/VDIR	0	Set right to left scan direction
U/D/HDIR	1	Set top to bottom scan direction
U/D/HDIR	0	Set bottom to top scan direction

Detail: "A"
Scale: 5/1

B/L Circuit

CTP LOGIC			
PIN	Logic	PIN	Logic
1	GND	5	SDA
2	VDDIO(NC)	6	INT
3	VDD	7	RST
4	SCL	8	GND

NOTES:
1.DISPLAY TYPE: 5.0",TFT-LCD,16.7M COLORS
2.DISPLAY MODE: NORMALLY BLACK/IPS
3.VIEWING DIRECTION: ALL
4.LCM DRIVER IC: ST7262 (COG)
5.TOUCH MODE: CTP
Touch Driver IC:GT911
Touch Interface:IIC
Touch And LCM Bonding Technology:Tape Bonding
6.VDD:3.3V
7.OPERATING TEMP: -30°C TO 85°C
STORAGE TEMP: -30°C TO 85°C
8.BACK LIGHT:LED WHITE, 16 LED,40mA,25.6±0.3V, 750 NITS BRIGHTNESS
9.RoHS COMPLIANT
10."*"Critical Dimension; ( )Reference Dimension

Model Name: E50RE-I-LS750-CA		
General Tol: ±0.2		
Approvals	Date	
DWN:		
CHK:		
APP:		

Drawing No.: | Scale:
Size: | Unit: mm | Page: 1/1

2. Input Terminal Pin Assignment

2.1 TFT Pin Assignment

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

NO.	Symbol	Description	I/O
1	NC	--	--
2	VDD	Supply voltage(3.3V).	P
3	VDD	Supply voltage(3.3V).	P
4	NC	--	--
5	RESET	Reset pin. The chip is in reset state when RESETB=0.	I
6	STBYB	Display power control PIN. H: Power ON. L: Power OFF. Internal pull down resistor 100K.	I
7	GND	Ground.	P
8	RXIN0-	- LVDS differential data input	I
9	RXIN0+	+ LVDS differential data input	I
10	GND	Ground.	P
11	RXIN1-	- LVDS differential data input	I
12	RXIN1+	+ LVDS differential data input	I
13	GND	Ground.	P
14	RXIN2-	- LVDS differential data input	I
15	RXIN2+	+ LVDS differential data input	I
16	GND	Ground.	P
17	RXCLKIN-	- LVDS differential clock input	I
18	RXCLKIN+	+ LVDS differential clock input	I
19	GND	Ground.	P
20	RXIN3-	- LVDS differential data input	I
21	RXIN3+	+ LVDS differential data input	I
22	GND	Ground.	P
23	NC	--	--
24	NC	--	--
25	GND	Ground.	P
26	NC	--	--

27	NC	--	--
28	NC	--	--
29	NC	--	--
30	GND	Ground.	I
31	LED-	LED Cathode	P
32	LED-	LED Cathode	P
33	L/R/VDIR	Horizontal shift direction (source output) selection(NOTE1)	I
34	U/D/HDIR	Vertical shift direction (gate output) selection(NOTE1)	I
35	XR(NC)	Touch panel Right Glass Terminal	A/D
36	YD(NC)	Touch panel Bottom Film Terminal	A/D
37	XL(NC)	Touch panel LIFT Glass Terminal	A/D
38	YU(NC)	Touch panel Top Film Terminal	A/D
39	LED+	LED Anode	P
40	LED+	LED Anode	P

I: Input, P: Power, O: Output

2.2 CTP Pin Assignment

Recommended CTP Connector: FH12-8S-1SH(55)

NO.	Symbol	Description	I/O
1	GND	Ground	P
2	VDDIO	Supply voltage for I/O.	P
3	VDD	Supply voltage	P
4	SCL	I2C clock input	I
5	SDA	I2C data input and output	I
6	INT	External interrupt to the host	I
7	RST	External Reset, Low is active	I
8	GND	Ground	P

I: Input, P: Power, O: Output

3. LCD Optical Characteristics

3.1 Optical Specifications

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Gamut		S(%)		42	46	--	%	-
Contrast Ratio		CR	Θ = 0 Normal Viewing Angle	800	1200	--		(1)(2)
Response Time	Rising	T_R		-	30	40	ms	(4)
	Falling	T_F		-	30	40		
Color Filter Chromaticity	White	W_X		-0.04	0.306	+0.04		(5)(6)
		W_Y			0.325			
	Red	R_X			0.592			
		R_Y			0.357			
	Green	G_X			0.357			
		G_Y			0.548			
	Blue	B_Y			0.148			
		B_X			0.099			
Viewing Angle	Hor.	$Θ_L$	CR ≥ 10	70	80	--	Degree	(1)(6)
		$Θ_R$		70	80	--		
	Ver.	$Θ_T$		70	80	--		
		$Θ_B$		70	80	--		
Option View Direction		ALL						(1)

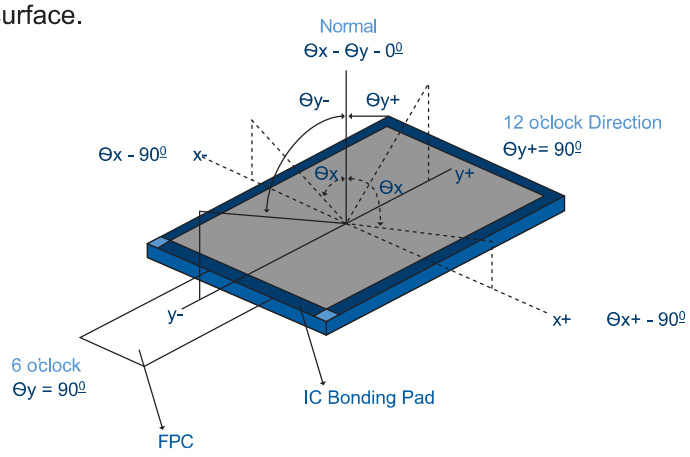
Measuring Conditions

1. Dark Room
2. Ambient Temperature of 25±2°C
3. 15 Minute Warm Up

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:

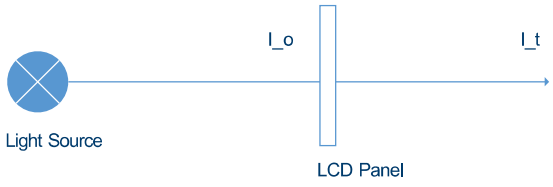
Measured at the center point of panel. The contrast ratio (Cr) measured on a module, is the ratio between the luminance (Lw) in a full white area (R=G=B=1) and the luminance (Ld) in a dark area (R=G=B=0).

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

(3) Definition of Transmittance (T%):

The transmittance of the panel including the polarizers is measured with electrical driving. The equation for transmittance Tr is:

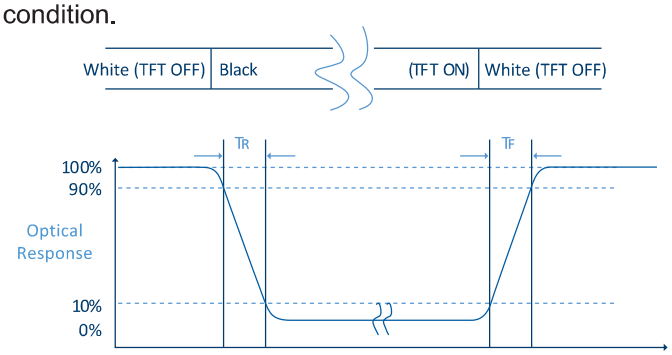
$$Tr = \frac{It}{Io} \times 100\%$$



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

(4) Definition of Response Time (T_R, T_F):

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.

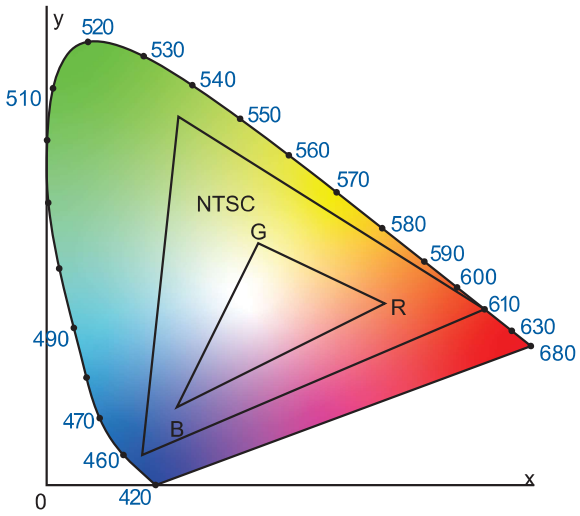
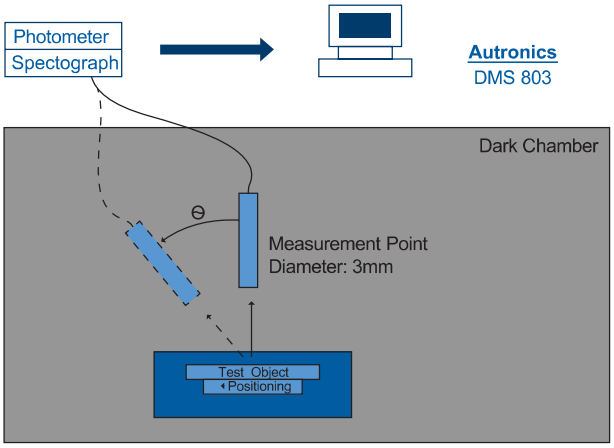


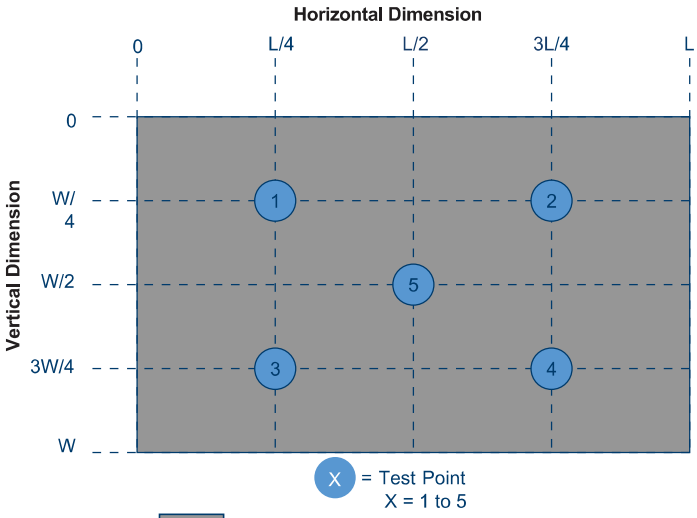
Fig. 1931 CIE Chromacity Diagram

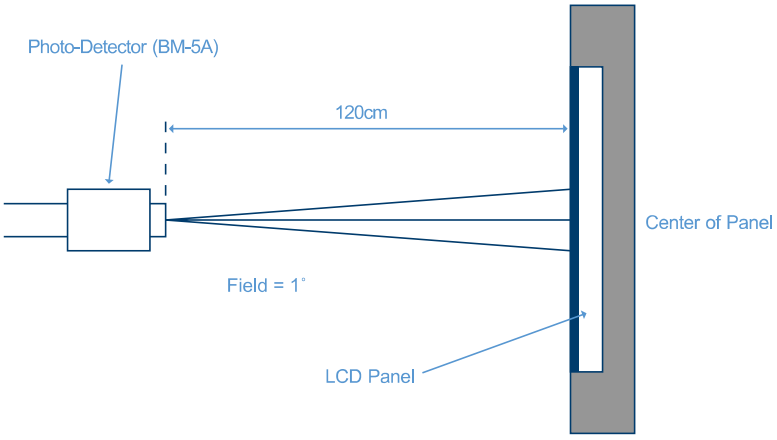
Color Gamut: $S = \frac{\text{Area of RGB Triangle}}{\text{Area of NTSC Triangle}} \times 100\%$

(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.







4. TFT Electrical Characteristics

4.1 Absolute Maximum Ratings (Ta=25°C, VSS=0V)

Characteristics	Symbol	Min.	Max.	Unit
Digital Supply Voltage	VDD	-0.3	4.0	V
Operating Temperature	TOP	-30	+85	°C
Storage Temperature	TST	-30	+85	°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.

4.2 DC Electrical Characteristics

Characteristics		Symbol	Min.	Typ.	Max	Unit
LCM Supply Voltage		VDD	3.0	3.3	3.6	V
Normal Mode Current Consumption		IDD	--	90	--	mA
Level Input Voltage (RGB Interface)		V_{IH}	2.0	--	VDD	V
		V_{IL}	GND	--	0.8	V
LVDS Interface	Differential Input High Threshold	VLVTH	--	--	100	mV
	Differential Input Low Threshold	VLVTL	-100	--	--	mV

4.3 LED Backlight Characteristics

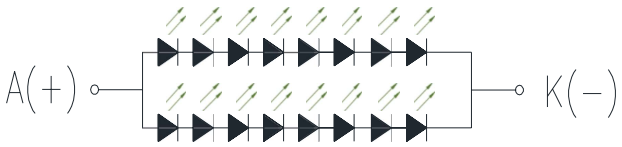
This module utilizes an edge-lit backlight system with 16 LED chips.

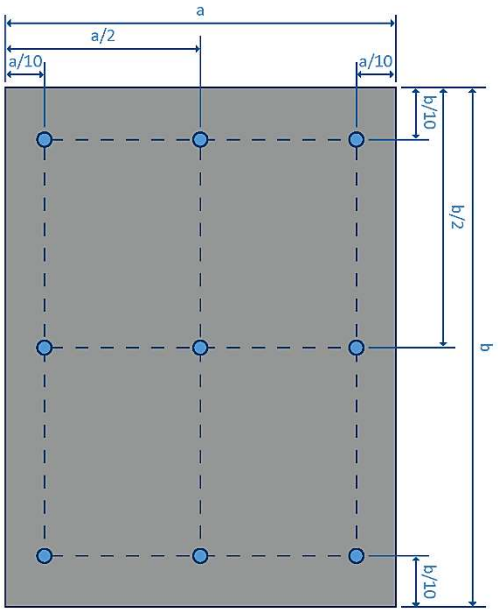
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	IF	30	40	--	mA	
Forward Voltage	VF	--	25.6	--	V	
LCM Luminance	LV	700	750	--	cd/m²	(3)
LED Lifetime	Hr	--	50,000	--	Hour	(1)(2)
Uniformity	Avg	80	--	--	%	(3)

Note 1: *LED lifetime (H_r) can be defined as the time in which it continues to operate under the condition: Ta = 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 Ta = 25°C and IF = 40mA. The LED lifetime could be decreased if operating I_F is larger than 40mA. The constant current driving method is suggested.*

Backlight Circuit:





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

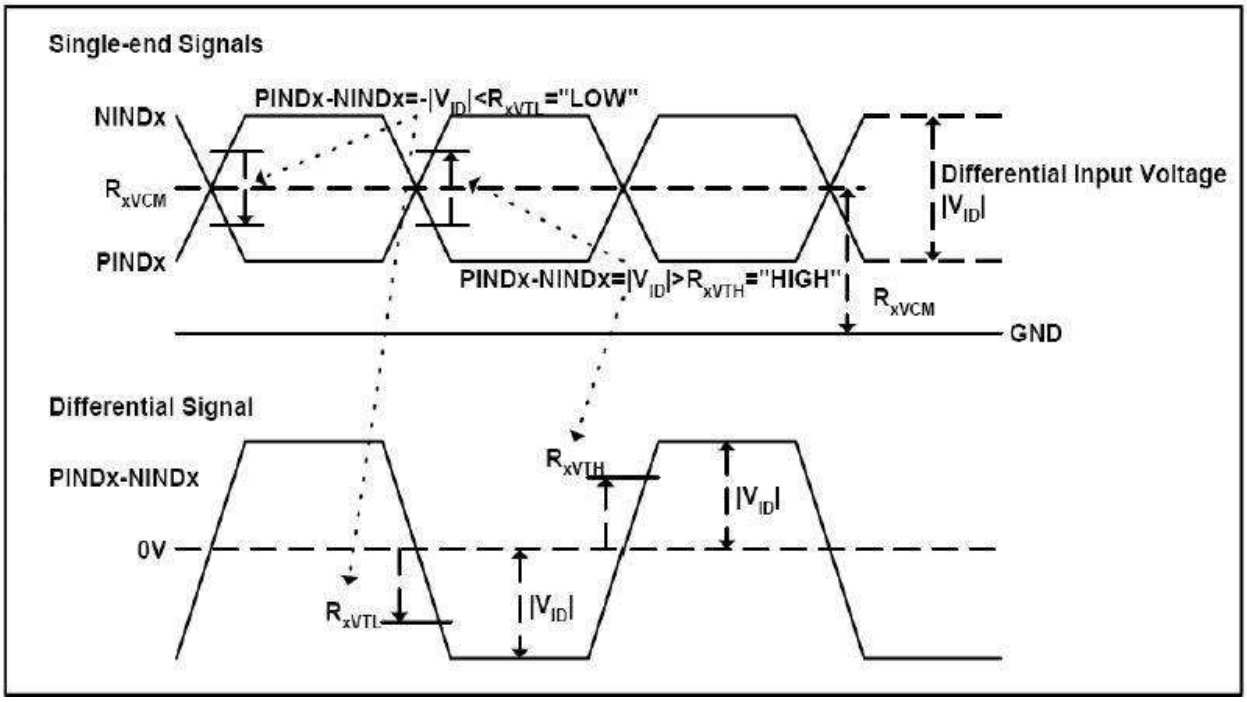
$$Luminance = \frac{(Total\ Luminance\ of\ 9\ Points)}{9}$$

$$Uniformity = \frac{Minimum\ Luminance\ in\ 9\ Points\ (1-9)}{Maximum\ Luminance\ in\ 9\ Points\ (1-9)}$$

5. LVDS Signal Timing Characteristics

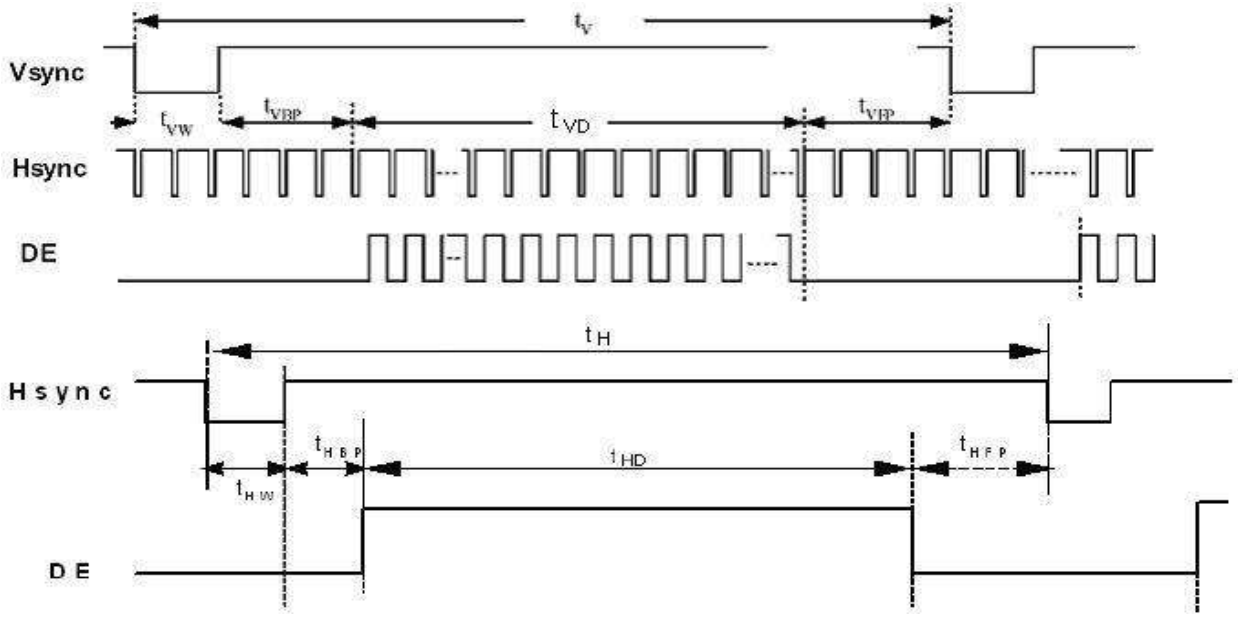
5.1 AC Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Differential input high Threshold voltage	RxVTH	--	--	+100	mV	RXVCM=1.2V
LVDS Differential input low Threshold voltage	RxVTL	-100	--	--	mV	
LVDS Differential input common mode voltage	RxVCM	0.7	--	1.6	V	
LVDS Differential voltage	|VID|	200	--	600	mV	

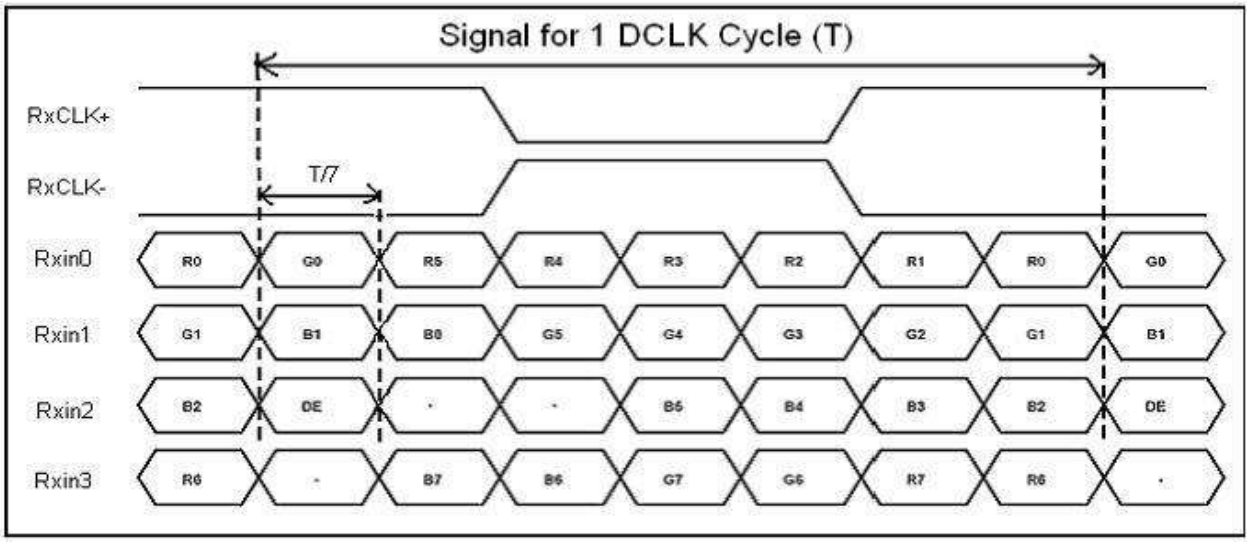


5.2 Timing Table

Item		Symbol	Min.	Typ.	Max.	Unit	Conditions
DCLK Frequency		Fclk	23	25	27	MHz	
HSYNC	Period Time	Th	808	816	896	DCLK	
	Display Period	Thdisp		800		DCLK	
	Back Porch	Thbp	4	8	48	DCLK	
	Front Porch	Thfp	4	8	48	DCLK	
	Pulse Width	Thw	2	4	8	DCLK	
VSYNC	Period Time	Tv	488	496	504	HSYNC	
	Display Period	Tvdisp		480		HSYNC	
	Back Porch	Tvbp	4	8	12	HSYNC	
	Front Porch	Tvfp	4	8	12	HSYNC	
	Pulse Width	Tvw	2	4	8	HSYNC	



5.3 LVDS Data Input Format



6. CTP Specification

6.1 Electrical Characteristics

Absolute Maximum Rating

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	VDD	2.66	3.47	V	
Operating temperature	TOP	-30	+85	℃	
Storage temperature	TST	-30	+85	℃	

DC Electrical Characteristics (Ta=25°C)

(Ambient temperature:25℃, VDD=2.8V, VDDIO=1.8V or VDDIO=VDD)

Item	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage/VDD	2.66	3.3	3.47	V	
Normal mode operating current	--	8	14.5	mA	
Green mode operating current	--	3.3	--	mA	
Sleep mode operating current	70	--	120	uA	
Doze mode operating current	--	0.78	--	mA	
Digital Input low voltage/VIL	-0.3	--	0.25*VDD	V	
Digital Input high voltage/VIH	0.75*VDD	--	VDD+0.3	V	
Digital Output low voltage/VOL	--	--	0.15*VDD	V	
Digital Output high voltage/VOH	0.85*VDD	--	--	V	

AC Characteristics

(Ambient temperature:25℃, VDD=2.8V, VDDIO=1.8V)

Parameter	Min	Typ	Max	Unit	Note
OSC oscillation frequency	59	60	61	MHZ	
I/O output rise time, low to high	-	14	-	ns	
I/O output fall time, high to low	-	14	-	ns	

6.2 I2C Timing

For information on the I2C timing and data transmission of the CTP, reference the GT911 specification in the following link: https://focuslcds.com/content/GT911.pdf

7. Quality Inspection Standards

For TFT quality inspection standards, please reference the latest information on our website through the following link: https://focuslcds.com/tft-quality-inspectionstandards/

8. Cautions and Handling Precautions

8.1 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 the displays 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.

8.2 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 ℃ 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.