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

TFT Display Module

Part Number
E101GD-I-LS305-C

Overview:

- 10.1-Inch TFT (229.46x149.43 MM)
- 1280x800 Pixels
- 4 Lane LVDS Interface
- Operating Temp: 0C to 50C
- All Viewing Angle
- Transmissive / Normally Black
- Capacitive Touch Panel
- 305 NITS
- CTP IC Controller: GT928
- 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 an HDMI board backlight unit. The resolution of a 10.1" TFT LCD contains 1280(RGB)x800pixels and can display up to 16M colors.

TFT Features

Low Input Voltage: 3.3V
TFT Interface: 4-Lane LVDS

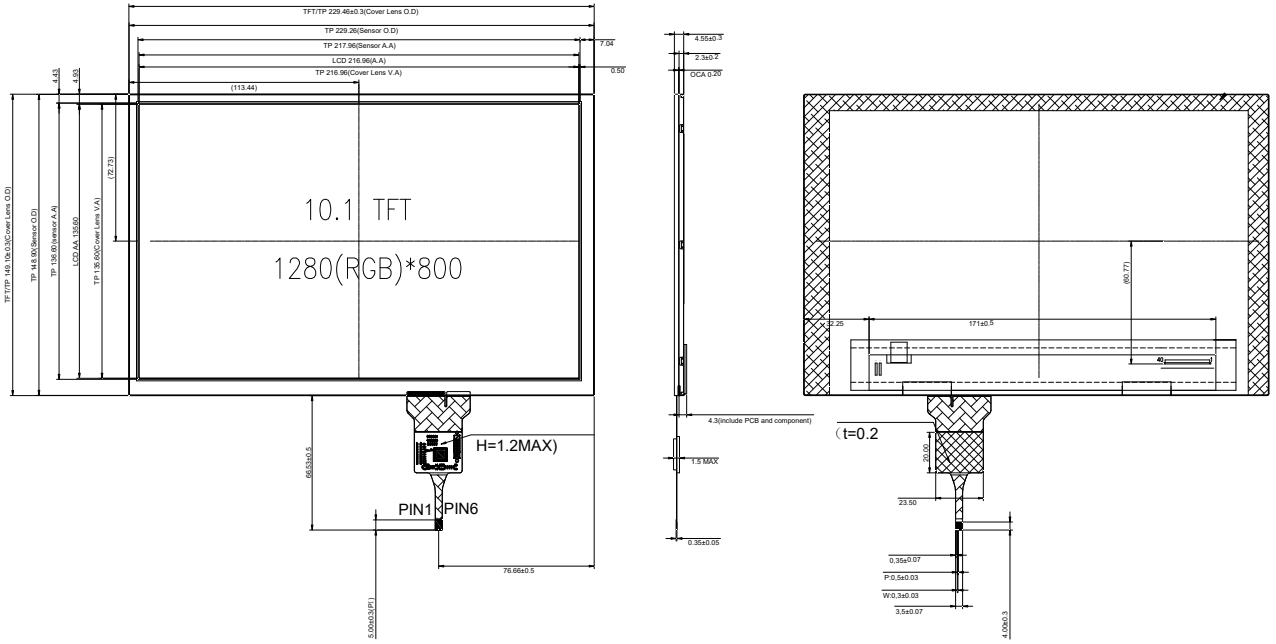
General Information Items	Specification	Unit	Note
	Main Panel		
TFT Display area (AA)	216.96(H) x135.6 (V) (10.1 inch)	mm	-
Driver Element	TFT active matrix	-	-
Display Colors	16M	colors	-
Number of Pixels	1200RGB(H)x800(V)	dots	-
TFT Pixel Arrangement	RGB vertical stripe	-	-
Pixel Pitch	0.1692(H)x0.1692(V)	mm	-
Viewing Angle	All	o'clock	-
Display Mode	Transmissive, Normally Black	-	-
CTP Controller	GT928	-	-
Operating temperature	0 - +50	℃	-
Storage temperature	-20 - +60	℃	-

Mechanical Information

Item		Min	Typ.	Max	Unit	Note
Module Size	Horizontal (H)		229.46		mm	-
	Vertical (V)		149.43		mm	-
	Depth (D)		4.55		mm	-
	Weight		TBD		g	

1. Outline Dimensions

Rev.	Description	Date
1.0	First	06/14/2022



Pin	Name
1	VCOM
2	VDD
3	VDD
4	NC
5	NC
6	NC
7	GND
8	Rxin0-
9	Rxin0+
10	GND
11	Rxin1-
12	Rxin1+
13	GND
14	Rxin2-
15	Rxin2+
16	GND
17	RxCLK-
18	RxCLK+
19	GND
20	Rxin3-
21	Rxin3+
22	GND
23	NC
24	NC
25	GND
26	NC
27	LED-PWM
28	NC
29	AVDD
30	GND
31	LED
32	LED
33	NC
34	NC
35	VGL
36	NC
37	CABC-EN
38	VGH
39	LED+
40	LED+

CTP PIN

Pin	Name
1	RST
2	VDD3.3V
3	GND
4	INT
5	SDA
6	SCL

Notes:

1. Display Type: 10.1" TFT 1280 x 800 (RGB)
2. Display Mode: Transmissive: Normally Black
3. Logic Power Supply Voltage: 3.3V
4. Operating Temp: -0C to +50C
5. Storage Temp: -20C to 60C
6. All Viewing Direction
7. Backlight: White/Vf=8.7~9.9V If=260mA
8. Rohs Compliant

Model Name: E101GD-I-LS305-C		FOCUS LCDs LCDs MADE SIMPLE®
General Tol: X.X ± 0.3 / X.XX ±0.2		
Approvals	Date	Drawing No.: / Scale:
DWN:		
CHK:		Size: / Unit: mm / Page: 1/1
APP:		

2. Input Terminal Pin Assignment

Pin No.	Symbol	Function	I/O
1	VCOM	Common Voltage	P
2	VDD	Power Supply	P
3	VDD	Power Supply	P
4	NC	No Connection	-
5	NC	No Connection	-
6	NC	No Connection	-
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 Diifferentiial 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	RxCLK-	LVDS Differential Data Input -	I
18	RxCLK+	LVDs Differential Data 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	No Connection	-
24	NC	No Connection	-
25	GND	Ground	P
26	NC	No Connection	-
27	LED_PWM	CABC controller signal output for backlight	O
28	NC	No Connection	-
29	AVDD	Power for Analog Circuit	P
30	GND	Ground	P
31	LED-	LED Cathode	P
32	LED-	LED Cathode	P
33	NC	No Connection	-
34	NC	No Connection	-
35	VGL	Gate OFF Voltage	P
36	NC	No Connection	-
37	CABC_EN	CABC Cable input	I
38	VGH	Gate On Voltage	P
39	LED+	LED Anode	P
40	LED+	LED Anode	P

2.1 CTP Pin Assignment

NO.	Symbol	Description
1	RST	Reset
2	VDD3.3V	Supply Voltage
3	GND	Ground
4	INT	External Interrupt to the host.
5	SDA	I2C data input and output
6	SCL	I2C Clock Input

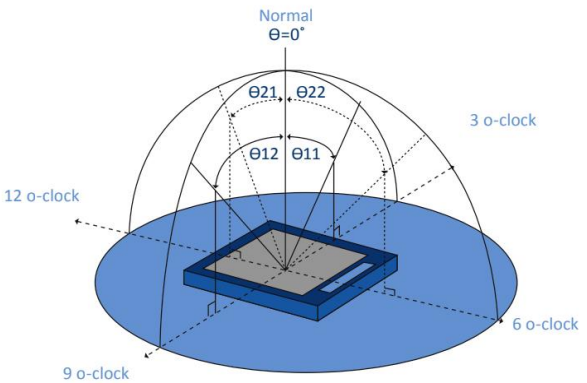
3. LCD Optical Characteristics

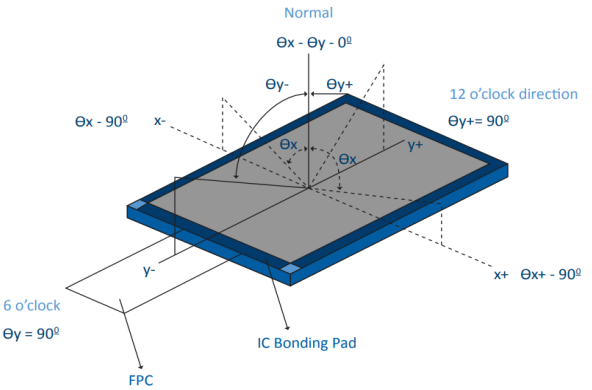
3.1 Optical Specifications

Item		Symbol	Condition	Min	Typ.	Max	Unit
Color Gamut		S(%)		70	75	--	%
Contrast Ratio		CR		600	800	--	--
Response Time	Rising	T_{on}		--	10	20	ms
	Falling	T_{off}		--	15	30	ms
Color Filter Chromaticity	White	W_X	θ=0 Normal Viewing Angle	0.26	0.31	0.36	
		W_Y		0.28	0.33	0.38	
	Red	R_X		--	--	--	
		R_Y		--	--	--	
	Green	G_X		--	--	--	
		G_Y		--	--	--	
	Blue	B_X		--	--	--	
		B_Y		--	--	--	
Viewing Angle	Hor.	ΘL	Φ = 180° (9 o'clock)	75	85	--	degree
		ΘR	Φ = 0° (3 o'clock)	75	85	--	
	Ver.	ΘT	Φ = 90° (12 o'clock)	75	85	--	
		ΘB	Φ = 270° (6 o'clock)	75	85	--	
Option View Direction		ALL					

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.



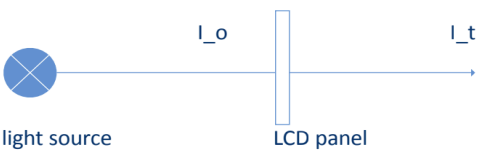


(2) Definition of Contrast Ratio (Cr): measured at the center point of panel. The contrast ratio (Cr) measured on a module, is the ratio between the luminance (Lw) in a full white area (R=G=B=1) and the luminance (Ld) in a dark area (R=G=B=0).

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

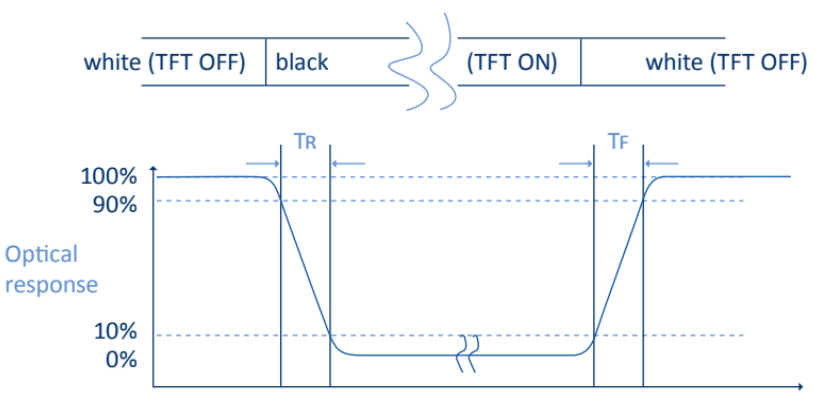
(3) Definition of transmittance (T%): The transmittance of the panel including the polarizers is measured with electrical driving. The equation for transmittance Tr is:

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



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.

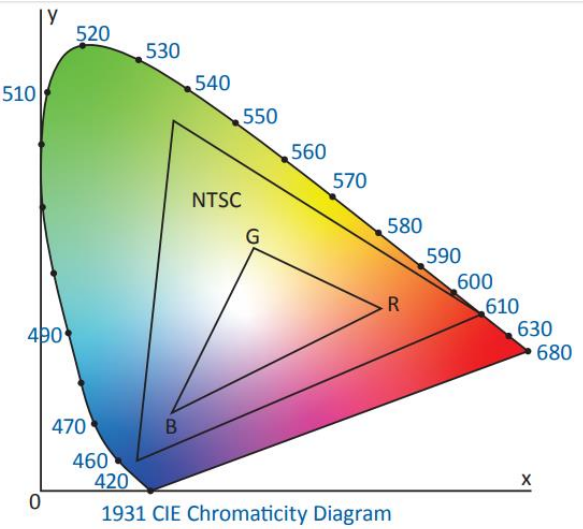
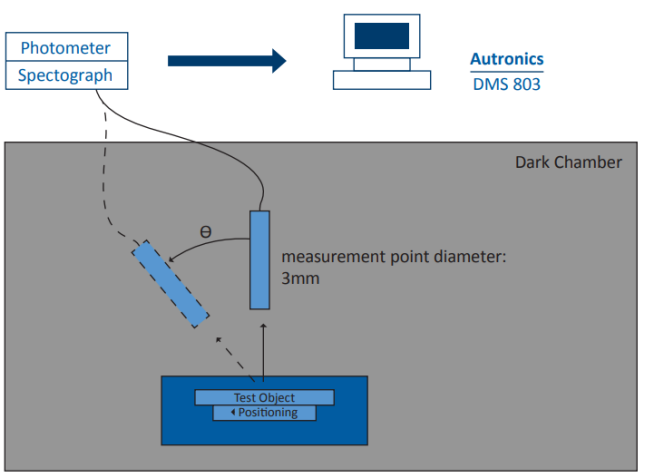


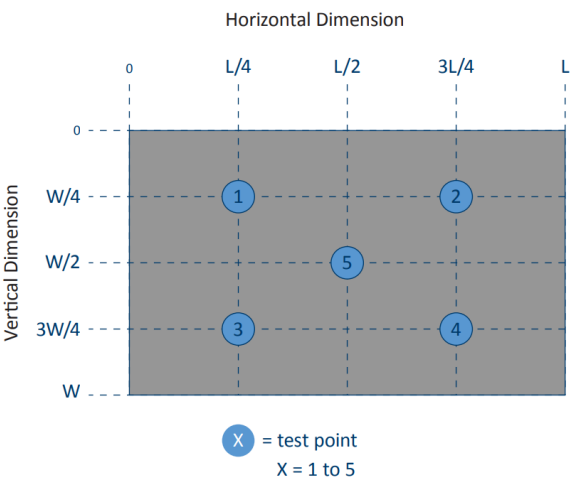
Fig. 1931 CIE chromacity diagram

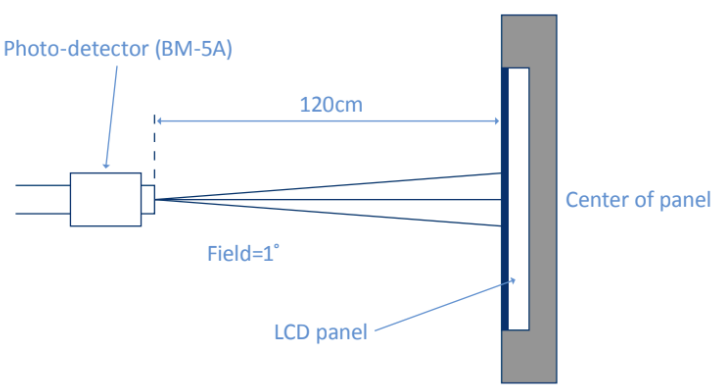
Color gamut: $S = \frac{\text{Area of RGB triangle}}{\text{Area of NTSC triangle}} \times 100\%$

(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 Rating (Ta=25 ℃, VSS=0V)

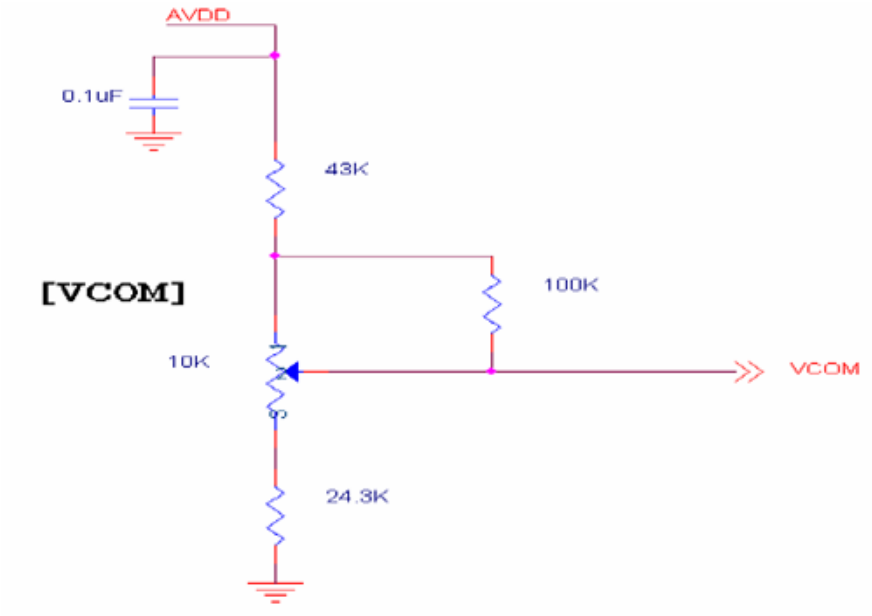
Characteristics	Symbol	Min	Max	Unit
Power Supply Voltage (Analog)	VDD	-0.3	3.9	V
	AVDD	-0.3	14	V
Input Signal Voltage (LED)	VGH	-0.3	42.0	V
Input Signal Voltage (PWR)	VGL	-19	0.3	V
Operating Temperature	TOP	0	+50	℃
Storage Temperature	TST	-20	+60	℃

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 Typical Operating Conditions

Characteristics	Symbol	Min	Typ.	Max	Unit	Unit
Power Voltage	VDD	2.3	2.5	2.7	V	Note 1
	AVDD	8.0	8.2	8.4	V	
	V_{GH}	21.7	22	22.3	V	
	V_{GL}	-7.3	-7	-6.7	V	
Input signal voltage	VCOM	2.7	3.0	3.3	V	Note 4
Input logic high voltage	V_{IH}	0.8 VDD	--	3.6	℃	Note 2
Input logic low voltage	V_{IL}	0	--	$0.2DV_{DD}$	℃	

Note 1: Be sure to apply VDD and V_{GL} to the LCD first, and then apply V_{GH}.
Note 2: VDD setting should match the signals output voltage (refer to Note 3) of customer's system board.
Note 4: Typical VCOM is only a reference value, it must be optimized according to each LCM. Be sure to use VR.



4.3 DC Electrical Characteristics

(Ta=25 2°C)

Characteristics	Symbol	Min	Typ.	Max	Unit
LED Voltage	VF	8.7	9.2	9.9	V
LED Current	IF	--	200	--	mA
Power Consumption	P_{BL}	--	--	--	mW

Note (1) Where I_F = 200MA, V_F = 9.2V $P_{BL} = V_F \times I_F$

4.4 LED Backlight Characteristics

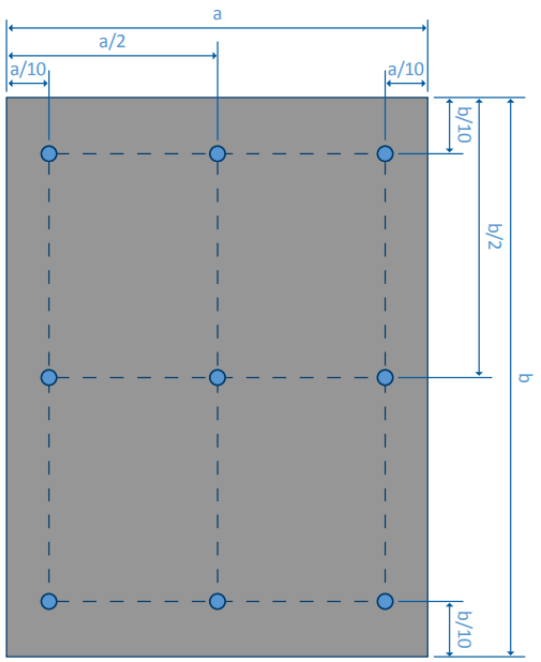
The backlight system is edge lighting type with 39 LED chips

Item	Symbol	Min	Typ.	Max	Unit	Note
Forward Current	I_F	--	200	--	mA	
Forward Voltage	V_F	8.7	9.2	9.9	V	
LCM Luminance	LV		305	--	cd/m2	Note 3
LED lifetime	Hr	--	50000	--	hour	Note1 & 2
Uniformity	Avg	80	--	--	%	Note 3

Note 1: LED lifetime (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±2 ℃, 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℃ and IL = 200mA. The LED lifetime could be decreased if operating IL is larger than 200mA. The constant current driving method is suggested.

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

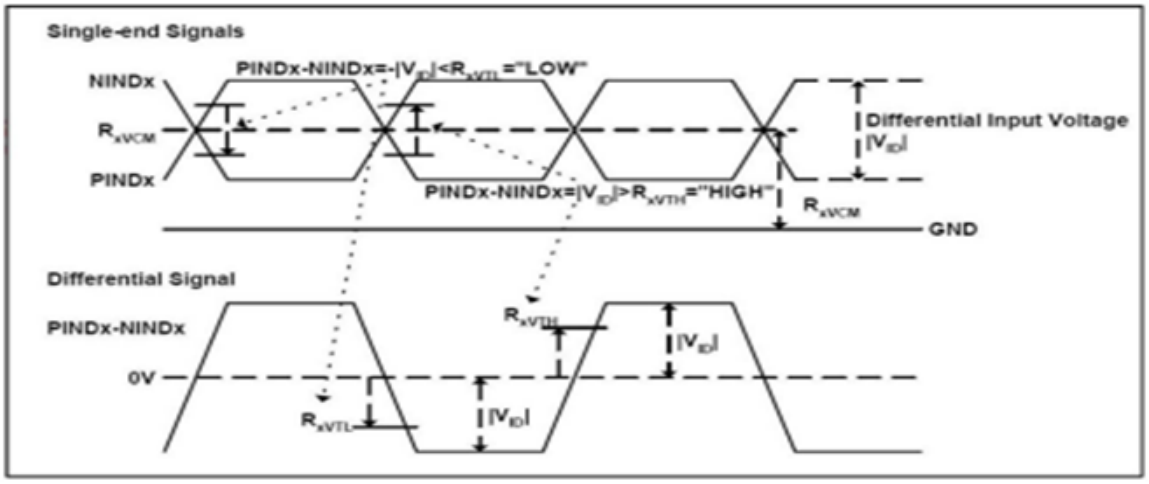


$$\text{Luminance} = \frac{\text{(Total Luminance of 9 points)}}{9}$$

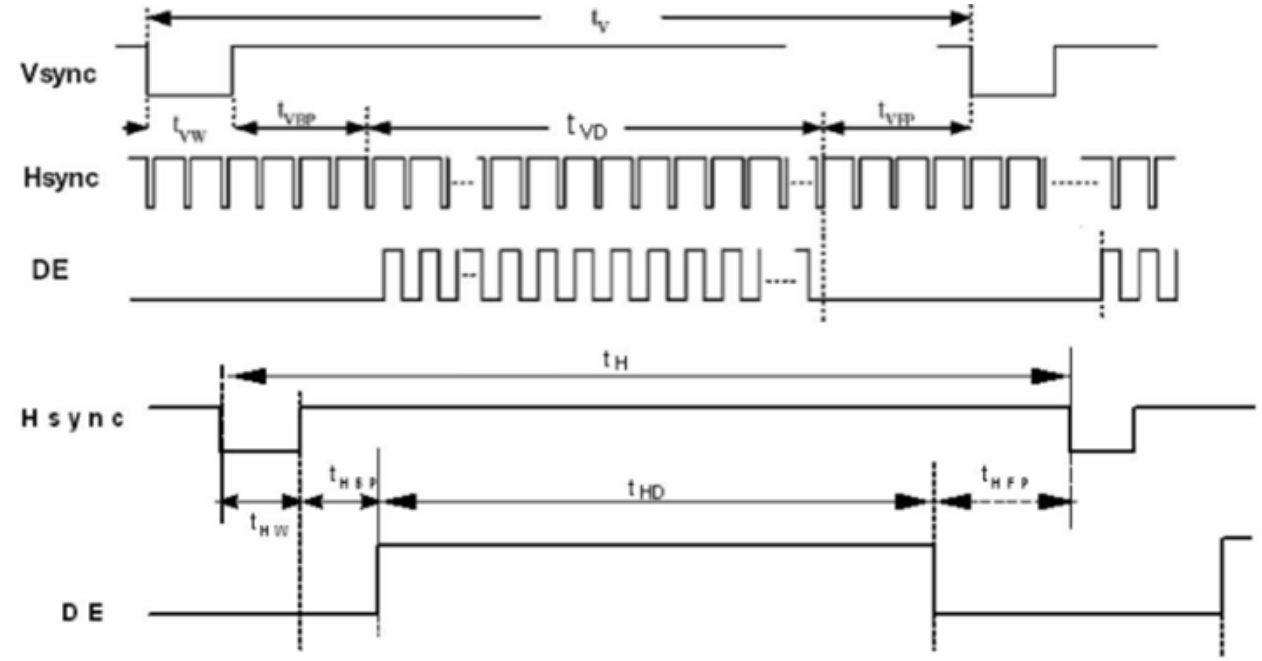
$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points(1-9)}}{\text{maximum luminance in 9 points(1-9)}}$$

5. Interface Timing

Item	Symbol	Min	Typ.	Max	Unit	Note
LVDS Differential input high Threshold voltage	R_{xVTH}	--	--	+100	mV	R_{XVCM}=1.2V
LVDS Differential input low Threshold voltage	R_{xVTL}	-100	--	--	mV	
LVDS Differential input common mode voltage	R_{xVCM}	0.7	--	1.6	V	
LVDS Differential voltage	$\|V_{ID}\|$	100	--	600	mV	



Item	Symbol	Min	Typ.	Max	Unit	Note
Clock Frequency	1/TC	(68.9)	71.1	(73.4)	MHz	Frame Rate =60Hz
Horizontal display area	t_{HD}		1280		T_C	
HS period time	t_H	(1410)	1440	(1470)	T_C	
HS Width + Back Porch + Front Porch	$t_{HW} + t_{HBP} + t_{HFP}$	(60)	160	(190)	T_C	
Vertical display area	t_{VD}		800		T_H	
VS period time	t_V	(815)	823	(833)	T_H	
VS Width + Back Porch + Front Porch	$t_{VW} + t_{VBP} + t_{VFP}$	(15)	23	(33)	T_H	



6. Controller Information

For more detailed information on the driver for this module, please refer to GT928 Specifications

7. Quality Inspection Information

For more detailed information about quality inspection for this module, please visit:
https://focuslcds.com/lcd-resources/tft-quality-inspection-standards/

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 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.

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.