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

TFT Display Module

Part Number

E55RB1-I-HW350-C

Overview:

- 5.50-inch TFT (79.04x137.67mm)
- 1080x1920 Pixels
- HDMI Interface
- Wide Temperature Range
- All Viewing Angles
- IPS, Transmissive
- Capacitive Touch Panel
- 350 NITS
- TFT IC: LT6911C CTP IC: GT911
- RoHS Compliant

Description

This is a color active matrix LTPS TFT (Thin Film Transistor) LCD (Liquid Crystal Display) that uses low temperature poly-silicon TFT as a switching device. This model is composed of a transmissive type LTPS TFT-LCD Panel, driver circuit, capacitive touch panel and backlight unit. The resolution of the 5.5" LTPS TFT-LCD contains 1080x1920 pixels and can display up to 16.7M colors.

Features

Input Voltage: 12V
TFT Interface: HDMI (Type A)
CTP Interface: Micro USB

General Information Items	Specification	Unit	Note
	Main Panel		
TFT Display Area (AA)	68.04(H) x 120.96(V) (5.5 inch)	mm	--
CTP View Area	68.54(H) x 121.46(V)	mm	--
Driver Element	LTPS TFT active matrix	--	--
Display Colors	16.7M	colors	--
Number of Pixels	1080(RGB)x1920	dots	--
TFT Pixel Arrangement	RGB vertical stripe	--	--
Pixel Pitch	0.021 (H) x 0.063 (V)	mm	--
Viewing Angle	ALL	o'clock	--
TFT Controller IC	LT6911C	--	--
CTP Driver IC	GT911	--	--
Display Mode	Transmissive/Normally Black	--	--
Touch Points	5-points	--	--
Operating Temperature	-20 to +70	°C	--
Storage Temperature	-30 to +80	°C	--

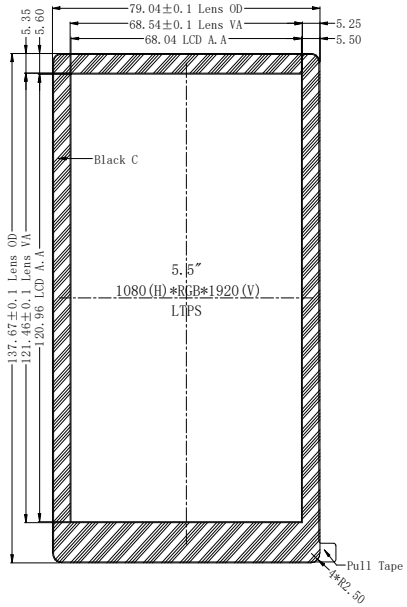
Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal (H)	--	79.04	--	mm	--
	Vertical (V)	--	137.67	--	mm	--
	Depth (D)	--	--	19.74	mm	--
Weight		--	84	--	g	Approximate

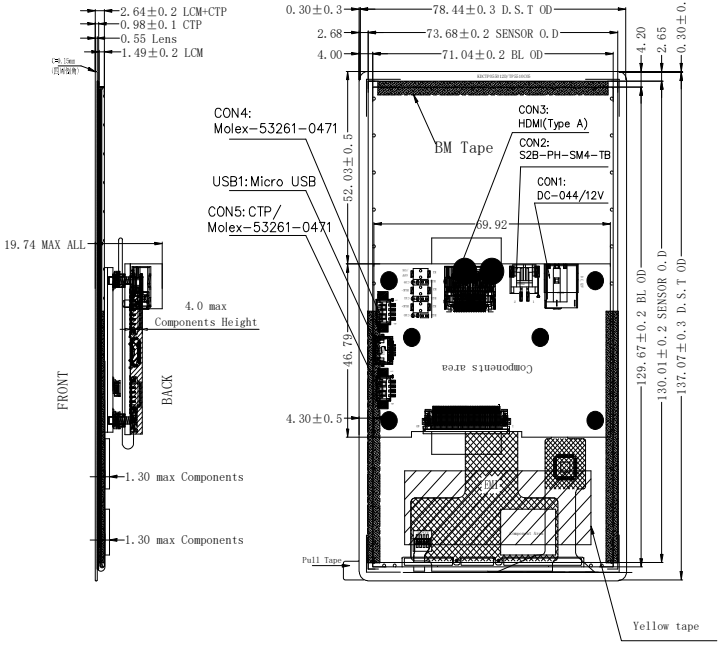
1. Outline Dimensions

Rev.	Description	Date
1.0	First	2023.01.31

Front View



Side View



Rear View

CON 1:
DC-044/12V

NO	PIN
1	DC_IN/12V
2	GND
3	GND

CON 2:
PH2.0-2Pin / 12V

NO	PIN
1	+12V
2	GND

CON 3:
HDMI IN (Type A)

NO	PIN
1	RX_D2+
2	GND
3	RX_D2-
4	RX_D1+
5	GND
6	RX_D1-
7	RX_D0+
8	GND
9	RX_D0-
10	RX_CLK+
11	GND
12	RX_CLK-
13	CEC
14	RESERVED
15	HDMI_SCL
16	HDMI_SDA
17	GND
18	HDMI_VCC
19	HDMI_HPD

CON 4:
Molex-53261-0471

NO	PIN
1	OFF/ON
2	BLK-
3	BLK+
4	GND

USB1:
Micro USB

NO	PIN
1	VBUS_5V
2	USB_DN
3	USB_DP
4	NC
5	GND

CON 5:
CTP/Molex-53261-0471

NO	PIN
1	VBUS_5V
2	USB_DN
3	USB_DP
4	GND

NOTES:

1. DISPLAY TYPE: 5.5" LTPS TFT-LCD
2. DISPLAY MODE: IPS/NORMALLY BLACK
3. LCM DRIVER IC: LT6911C
   CTP DRIVER IC: GT911
4. SUPPLY VOLTAGE: 12V
5. OPERATING TEMPERATURE: -20°C TO +70°C
6. STORAGE TEMPERATURE: -30°C TO +80°C
7. VIEWING DIRECTION: ALL
8. ROHS COMPLIANT.

Model Name: E55RB1-I-HW350-C		
General Tol: ±0.3		
Approvals	Date	
DWN:		
CHK:		
APP:		

Drawing No.:

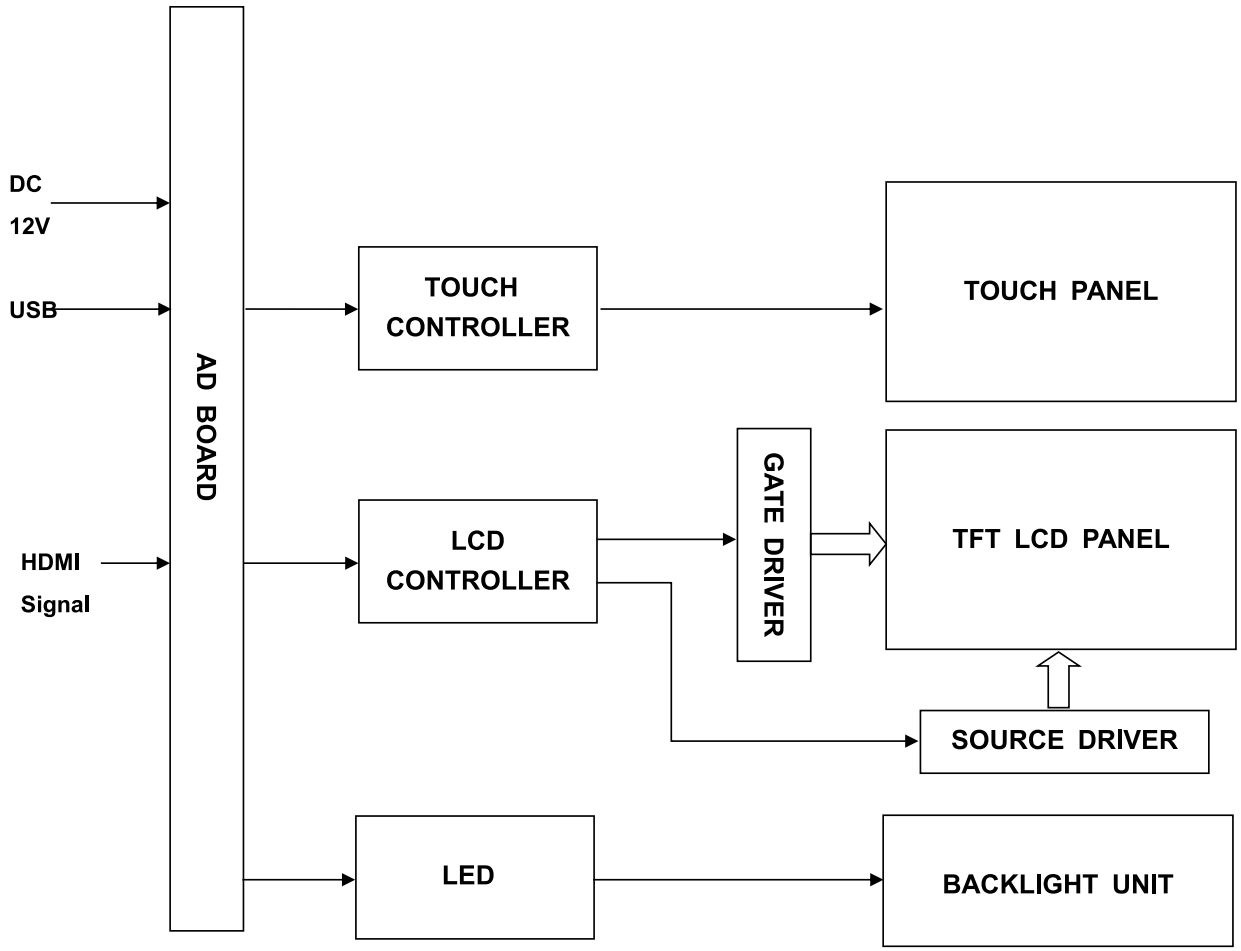
Scale:

Size:

Unit: mm

Page: 1/1

2. Block Diagram



3. Terminal Pin Assignment

3.1 Power Input Pin Assignment

CON1(DC-044 Socket)

NO.	Symbol	Description	I/O
1	DC_IN	Power supply (DC 12V).	P
2	GND	Ground.	P
3	GND	Ground.	P

Extension CON2 (JST:S2B-PH-SM4-TB)

NO.	Symbol	Description	I/O
1	+12V	Power supply (DC 12V).	P
2	GND	Ground.	P

3.2 Touch Input Pin Assignment

USB1 (Micro USB)

NO.	Symbol	Description	I/O
1	VBUS_5V	Supply voltage (5V).	P
2	USB_DN	USB- signal.	I/O
3	USB_DP	USB+ signal.	I/O
4	NC	No connection.	--
5	GND	Ground.	P

Extension CON5 (Molex:53261-0471)

NO.	Symbol	Description	I/O
1	VBUS_5V	Supply voltage (5V).	P
2	USB_DN	USB- signal.	I/O
3	USB_DP	USB+ signal.	I/O
4	GND	Ground.	P

3.3 HDMI Pin Assignment

CON3: The type of HDMI connector is a type A.

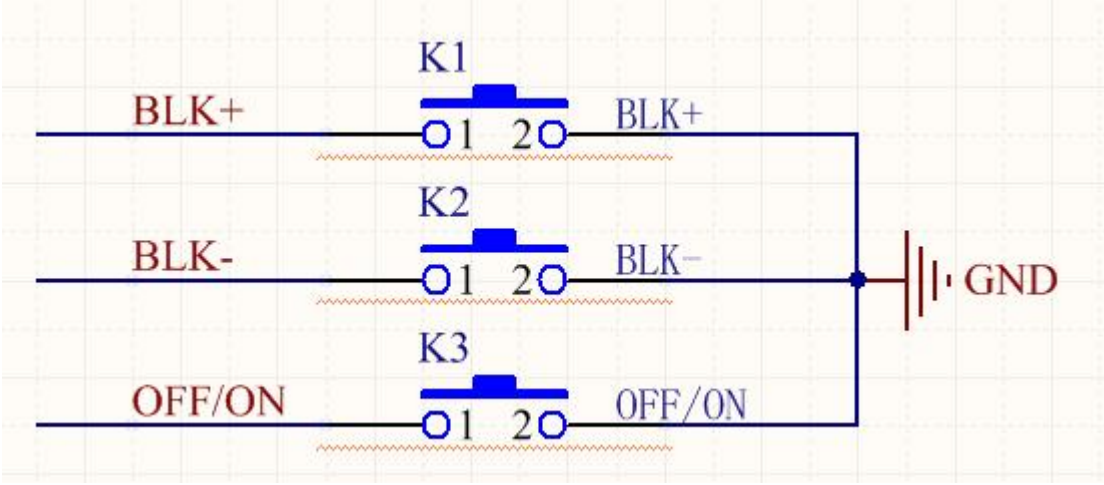
NO.	Symbol	Description	I/O
1	RX_D2+	HDMI receiver channel 2 positive analog input.	I/O
2	GND	Ground.	P
3	RX_D2-	HDMI receiver channel 2 negative analog input.	I/O
4	RX_D1+	HDMI receiver channel 1 positive analog input.	I/O
5	GND	Ground.	P
6	RX_D1-	HDMI receiver channel 1 negative analog input.	I/O
7	RX_D0+	HDMI receiver channel 0 positive analog input.	I/O
8	GND	Ground.	P
9	RX_D0-	HDMI receiver channel 0 negative analog input.	I/O
10	RX_CLK+	HDMI receiver clock positive analog input.	I
11	GND	Ground.	P
12	RX_CLK-	HDMI receiver clock negative analog input.	I
13	CEC	No connection.	--
14	RESERVED	No connection.	--
15	HDMI_SCL	HDMI receiver DDC data channel.	I
16	HDMI_SDA	HDMI receiver DDC clock channel.	I/O
17	GND	Ground.	P
18	HDMI_VCC	HDMI supply voltage (5.0V).	P
19	HDMI_HPD	HDMI receiver hot plug detect output.	O

I: Input, O: Output, P: Power

3.4 Backlight Key Output Pin Assignment

CON4 (Molex-53261-0471)

NO.	Symbol	Description	I/O
1	OFF/ON	Turn off or turn on backlight.	I
2	BLK-	Reduce brightness of backlight.	I
3	BLK+	Increase brightness of backlight. Note: The brightness is configured for maximum after power on.	I
4	GND	Ground.	P



Key Circuit Diagram

4. LCD Optical Characteristics

4.1 Optical Specifications

Item		Symbol	Condition	Min	Typ.	Max	Unit	Note
Color Gamut		S(%)		--	66	--	%	(5)
Contrast Ratio		CR	θ=0 Normal viewing angle	800	1000	--	%	(2)
Response Time	Rising	TR		--	35	45	ms	(4)
	Falling	TF						
Color Filter Chromaticity	White	WX		0.2750	0.2950	0.3150		(5)(6)
		WY		0.3030	0.3230	0.3430		
	Red	RX		0.5920	0.6320	0.6720		
		RY		0.3050	0.3450	0.3850		
	Green	GX		0.2595	0.2995	0.3395		
		GY		0.5405	0.5805	0.6205		
	Blue	BX		0.1065	0.1465	0.1865		
		BY		0.0245	0.0645	0.1045		
Viewing Angle	Hor.	ΘL	CR>10	70	80	--	degree	(1)(6)
		ΘR		70	80	--		
	Ver.	ΘT		70	80	--		
		ΘB		70	80	--		
Option View Direction		ALL						(1)

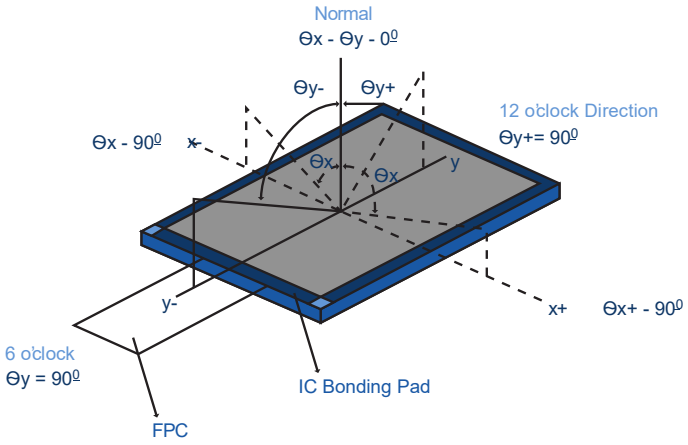
Measuring Conditions:

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).

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

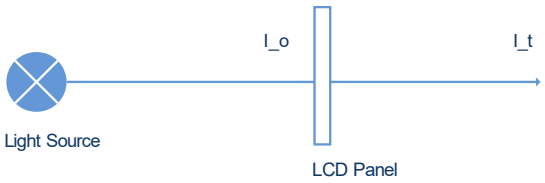
(3) Definition of Transmittance (T%):

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

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

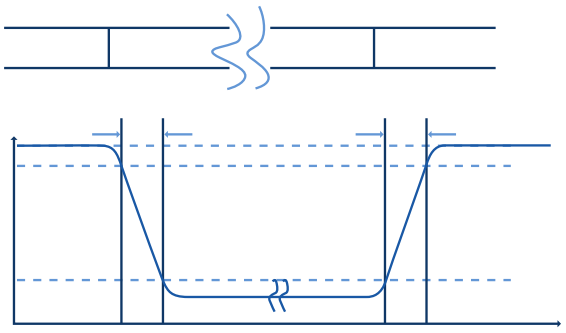
Io = the brightness of the light source.

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.

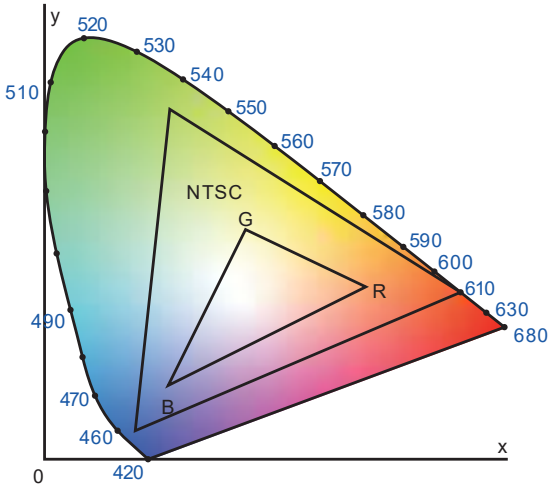
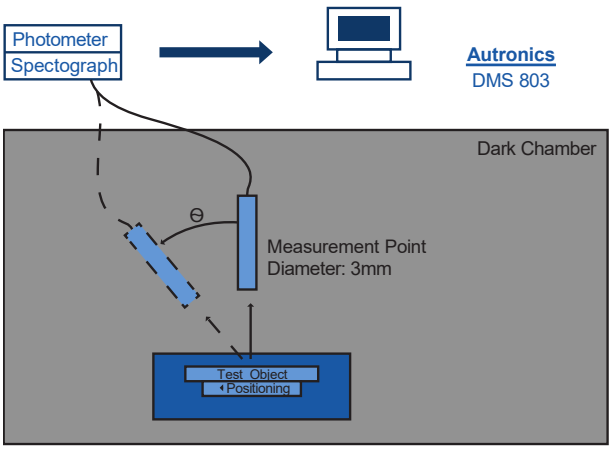


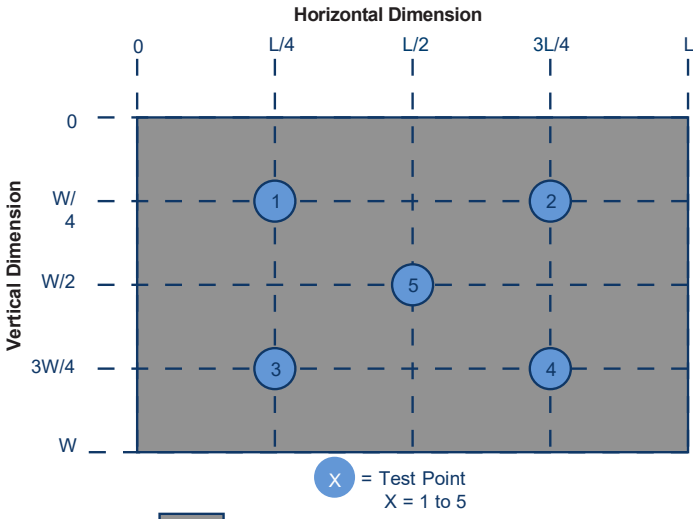
Fig. 1931 CIE Chromacity Diagram

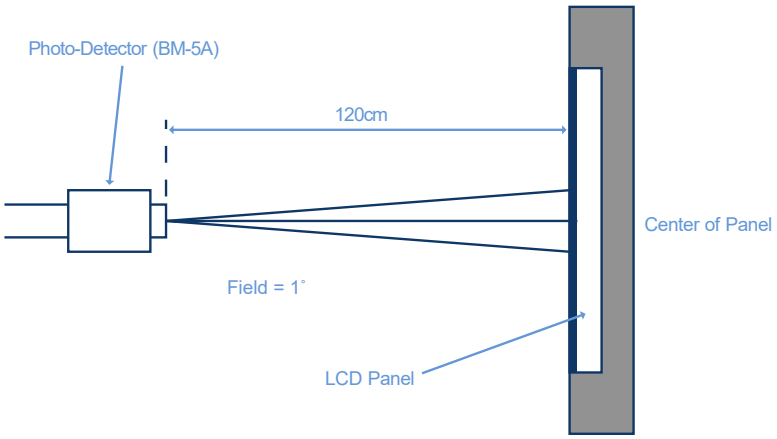
Color Gamut: $S = \frac{\text{Area of RGB Triangle}}{\text{Area of NTSC Triangle}} \times 100\%$

(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.







5. TFT Electrical Characteristics

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

Characteristics	Symbol	Min	Max	Unit
Digital Supply Voltage	DC_IN	-0.5	16.0	V
Supply Voltage (Logic)	IOVCC	-0.3	3.6	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	DC_IN	--	12	16	V	--
Supply Voltage (Logic)	IOVCC	1.65	1.8	3.3	V	--
Normal Mode Current Consumption	IVCI	--	50	140	V	--
	IIOVCC	--	15	--	V	--
Level Input Voltage	VIH	0.7*IOVCC	--	IOVCC	V	--
	VIL	GND	--	0.3*IOVCC	V	--
Level Output Voltage	VOH	0.8*IOVCC	--	IOVCC	V	--
	VOL	GND	--	0.2*IOVCC	V	--

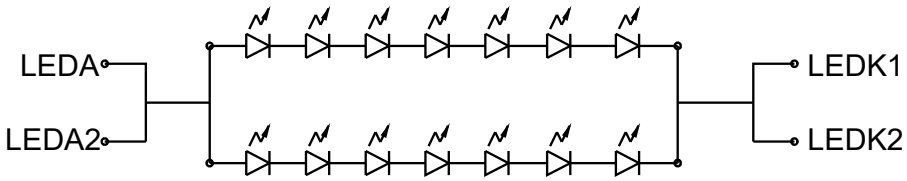
5.3 LED Backlight Characteristics

The backlight system is edge lighting type with 14 LED Chips

Item	Symbol	Min	Typ.	Max	Unit	Note
Forward Current	I_F	30	40	--	mA	--
Forward Voltage	V_F	19.6	20.3	22.4	V	--
LCM Luminance	L_V	--	350	--	cd/m2	(3)
LED Lifetime	H_r	5000	--	--	hour	(1)(2)
Uniformity	Avg	80	--	--	%	(3)

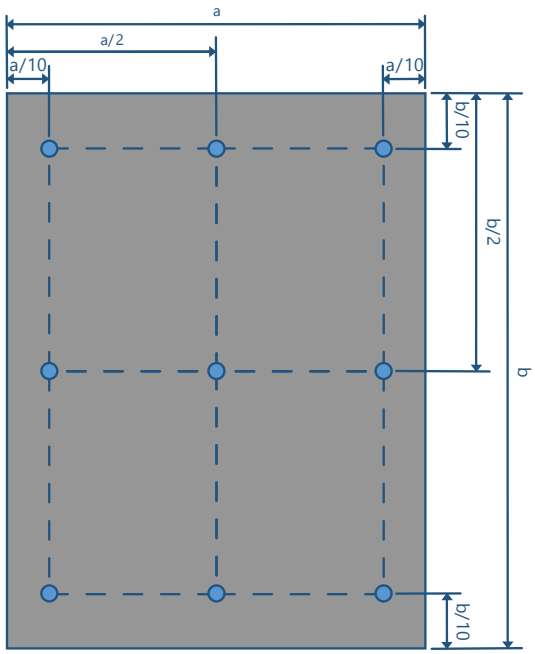
Note 1: *LED lifetime (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25 ±3°C, typical IL value indicated in the above table until the brightness becomes less than 50%.*

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 IF is larger than 40mA. The constant current driving method is suggested.*



BL CIRCUIT DIAGRAM

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



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

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

6. CTP Electrical Characteristics

6.1 Absolute Maximum Rating

Item	Symbol	Min	Max	Unit	Note
Power Supply Voltage	VDD	2.66	3.47	V	
Operating Temperature	TOP	-20	+70	°C	
Storage Temperature	TST	-30	+80	°C	

6.2 DC Electrical Characteristics

Ambient temperature: 25°C, AVDD=2.8V, VDDIO=1.8V or VDDIO=AVDD

Item	Min	Typ.	Max	Unit	Note
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	

6.3 AC Characteristics

Ambient temperature: 25°C, AVDD=2.8V, VDDIO=1.8V

Parameter	Min	Typ.	Max	Unit
OSC Oscillation Frequency	59	60	61	NHZ
I/O Output Rise Time, Low to High	--	14	--	ns
I/O Output Fall Time, High to Low	--	14	--	ns

6.4 I2CTiming

For I2C timing diagrams and tables, see page 9 of the data sheet for touch panel IC GT911. The data sheet for GT911 can be found here: https://focuslcds.com/content/GT911.pdf

6.5 Power-On Timing

For the power on timing diagram, see the first diagram on page 10 of the data sheet for touch panel IC GT911. The data sheet for GT911 can be found here: https://focuslcds.com/content/GT911.pdf

6.6 Timing for Host Resetting GT911

For the host resetting timing diagram, see the second diagram on page 10 of the data sheet for touch panel IC GT911. The data sheet for GT911 can be found here: https://focuslcds.com/content/GT911.pdf

6.7 Timing for Setting Slave Address to 0x28/0x29

For this setting slave address timing diagram, see the third diagram on page 10 of the data sheet for touch panel IC GT911. The data sheet for GT911 can be found here: https://focuslcds.com/content/GT911.pdf

6.8 Timing for Setting Slave Address to 0xBA/0xBB

For For this setting slave address timing diagram and instructions, see pages 11-12 of the data sheet for touch panel IC GT911. The data sheet for GT911 can be found here: https://focuslcds.com/content/GT911.pdf

7. Quality Inspection Standards

For TFT quality inspection standards, please see the following link: 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.