

Product Specification

PART NUMBER # REV: FLC-101FMLG100SA1#00

DESCRIPTION: TFT 10.1"W 1024x600 6/8bit LVDS 1000CD Full View

- () Preliminary Specification
 (V) Approved Specification

Customer Name:	
Signature:	Date:

PREPARED BY	REVIEWED BY	SIGNATURE DATE
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Revision History

Version	Date	Page	Description	Note
V1.0	2020/11/27		First Edition	
V1.1	2020/11/30		Update Edition	

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Table of Content

Product Specification..... 1

1. GENERAL DESCRIPTION..... 4

 1.1 Description..... 4

 1.2 Product Summary..... 4

2. ABSOLUTE MAXIMUM RATING..... 5

2.1 Electrical Absolute Rating..... 5

 2.2 Environment Absolute Rating..... 5

3. ELECTRICAL CHARACTERISTICS..... 6

 3.1 LCD Electrical Specification..... 6

 3.3 Backlight Unit..... 6

4. Timing..... 7

 4.1 AC Characteristics..... 7

 4.2 Timing..... 7

 4.3 Power On/Off Sequence..... 8

5. INTERFACE PIN DESCRIPTION..... 9

 5.1 LCM Connector PIN Assignment..... 9

7. BLOCK DIAGRAM..... 11

8. OPTICAL CHARACTERISTIC..... 12

9. DIMENSION AND DRAWING..... 15

10. PRECAUTION AND PRODUCT HANDLING..... 16

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1. GENERAL DESCRIPTION

1.1 Description

10.1" w is a Color Active Matrix Liquid Crystal Display Module composed of a TFT LCD panel and LED backlight system. The screen format is intended to support the 1024x600 screen and 16.7 M colors.

1.2 Product Summary

The following items are summary on the table under Ta=25 °C condition:

No.	Item	Specification	Unit
1	Display Size	10.1"W	Inch
2	Pixel Number	1024 (H) x 3(RGB) x 600 (V)	Pixels
3	Outline Dimension	235.0(W)×143.0(H)×3.6(D)	mm
4	Active Area	222.72 (H) x 125.28 (V)	mm
5	Pixel Pitch	0.2175 x 0.2088	mm
6	Display Colors	262K / 16.7M colors	
7	Pixel Arrangement	RGB vertical stripe	--
8	Display Mode	Full View / Normally Black	--
9	Electrical Interface	LVDS	--
10	Surface Treatment	Antiglare, HC	--
11	Brightness	1000 (Typ.)	cd/m ²
12	Contrast Ratio	800 (Typ.)	--

2. ABSOLUTE MAXIMUM RATING

2.1 Electrical Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max		
Logic/LCD Drive Voltage	VDD	-0.3	--	5.0	V	
LED Forward Voltage	Vf	9.0	12.0	15.0	V	
LED Forward Current	IF	--	NA		mA	
Power Consumption	PBL	--	5.5		W	

Note (1) Permanent damage to the device may occur if max values are exceeded.

Function operation should be restricted to the conditions described under normal operating conditions.

(2) Specified values are for input pin of LED light bar at $T_a = 25 \pm 2^\circ\text{C}$

2.2 Environment Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Top	-20		+70	$^\circ\text{C}$	Note(1)(2)
Storage Temperature	Tstg	-30		+80	$^\circ\text{C}$	

Note (1): The absolute maximum rating values of this product are not allowed to be exceeded at any times. The module should not be used over the absolute maximum rating value. It will cause permanently unrecoverable function fail in such a condition

3. ELECTRICAL CHARACTERISTICS

3.1 LCD Electrical Specification

Item	Symbol	Min.	Type	Max.	Unit.	Note
Power supply voltage	VccLCD	3.0	3.3	3.6	V	
Input logic high voltage	VIH	0.7VccLCD	-	VccLCD	V	
Input logic low voltage	VIL	0	-	0.3VccLCD		
LCD current	IVccLCD	-	TBD		mA	

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

Note 2: VR Conditions: Zener Diode 20mA

3.3 Backlight Unit

Parameter guideline for LED driving is under stable conditions at 25°C (Room Temperature):

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power voltage	VccBL	9.0	12.0	15.0	V	
Forward current	IvccBL		TBD		mA	
BL Enable	BL_ENABLE	0	3.3	--	V	
PWM control duty ratio		1	--	100	%	350KHz
PWM	PWM	280	350	420	KHz	
Operating LED life time	Hr	50000	-	-	Hour	

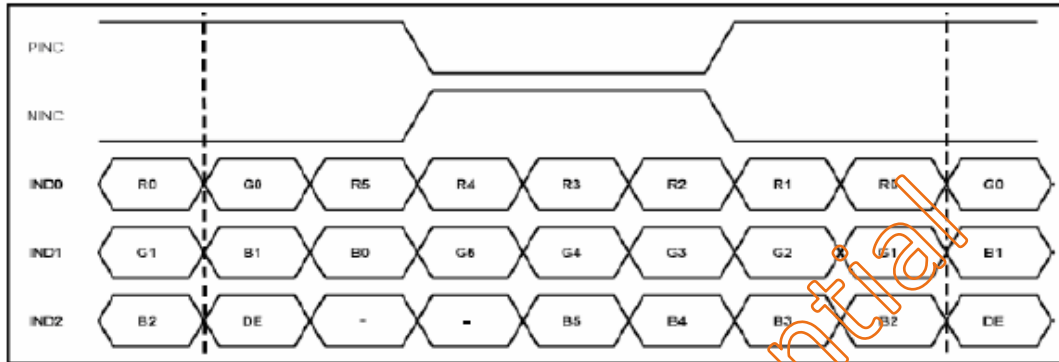
Note: (1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

(2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25°C

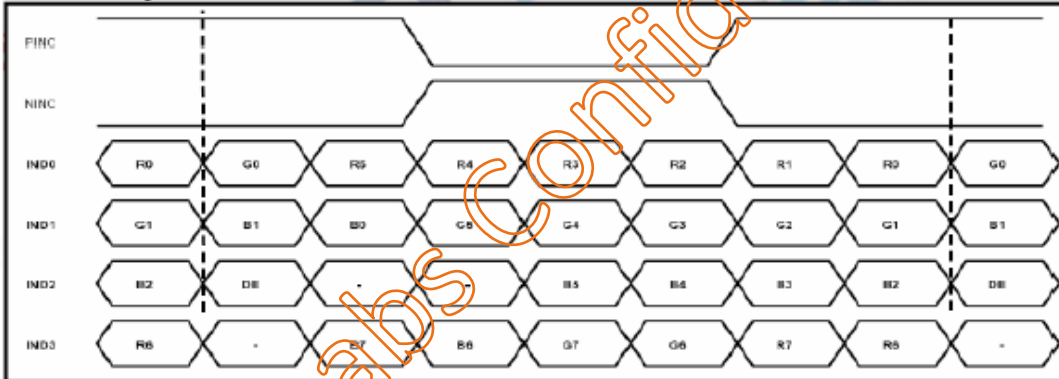
4. Timing

4.1 AC Characteristics

6bit LVDS input



8bit LVDS input

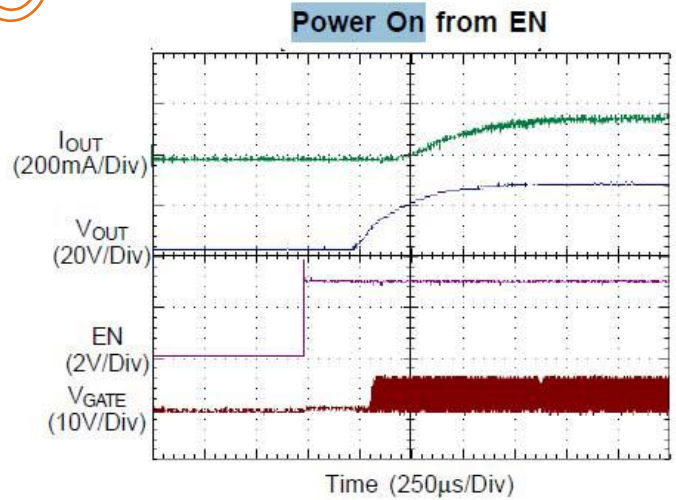
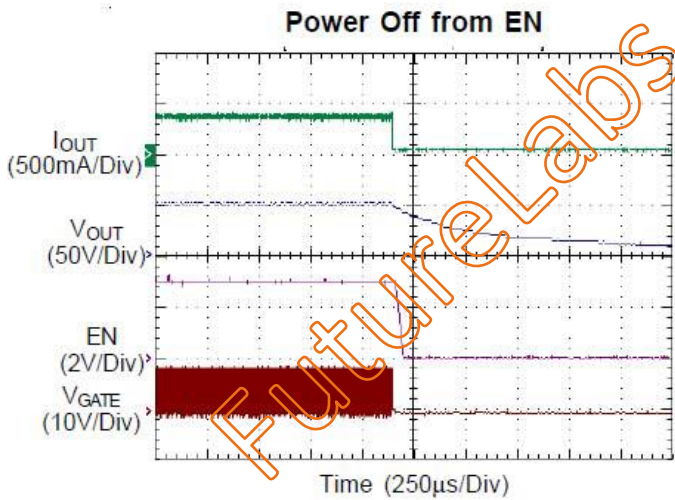
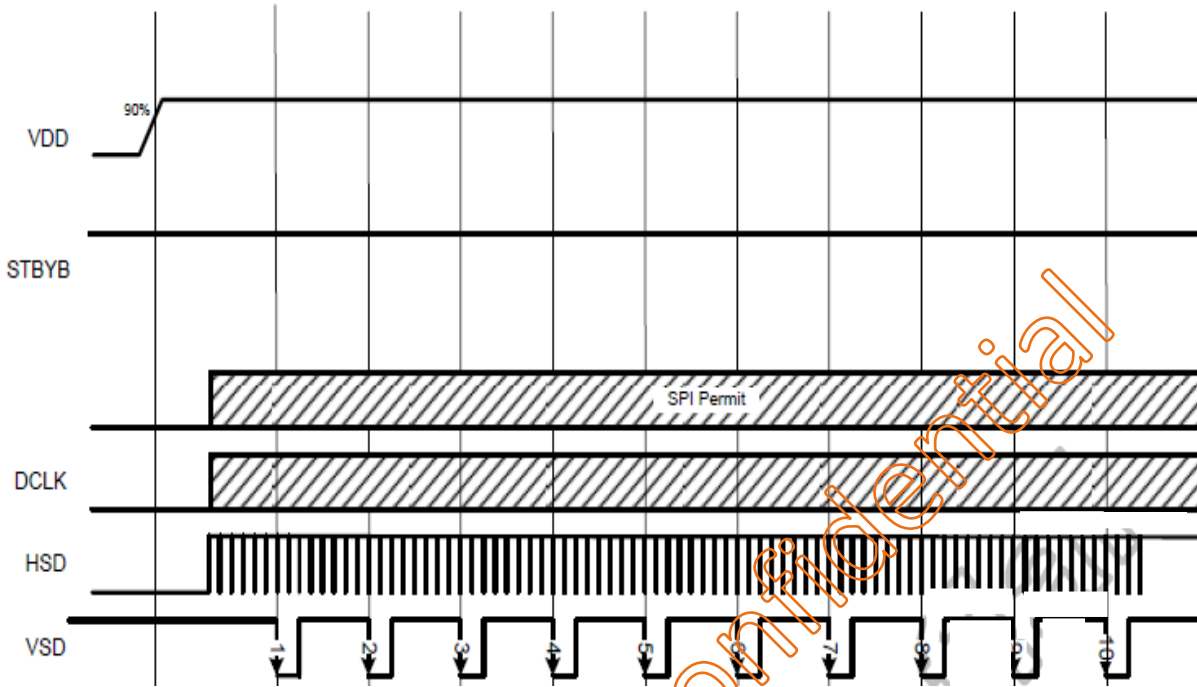


Note: Support DE timing mode only, SYNC mode not supported.

4.2 Timing

Item	Symbol	Min.	Type	Max.	Unit.	Remark
Clock Frequency	Fclk	40.8	51.2	67.2	MHz	Frame Rate=60Hz
Horizontal display area	thd	1024			DCLK	
HS period time	th	1114	1344	1400	DCLK	
HS Blanking	thb	90	320	376	DCLK	
Vertical display area	tvd	600			H	
VS period time	tv	610	635	800	H	
VS Blanking	Tvb	10	35	200	H	

4.3 Power On/Off Sequence



5. INTERFACE PIN DESCRIPTION

5.1 LCM Connector PIN Assignment

The electronics interface connector is 093G30-00001A-M4 or Equivalent

Pin No.	Symbol	I/O	Function	Remark
1	VCC (LCD)	P	Power voltage for digital circuit	
2	VCC (LCD)	P	Power voltage for digital circuit	
3	SEL	I	6bit/8bit mode select 6bit: SEL must be set to NC 8bit: SEL must be set to High	
4	RX0-	I	-LVDS differential data input	
5	RX0+	I	+LVDS differential data input	
6	RX1-	I	-LVDS differential data input	
7	RX1+	I	+LVDS differential data input	
8	RX2-	I	-LVDS differential data input	
9	RX2+	I	+LVDS differential data input	
10	GND	P	Ground	
11	RXCLK-	I	-LVDS differential clock input	
12	RXCLK+	I	+LVDS differential clock input	
13	RX3-	I	-LVDS differential data input	
14	RX3+	I	+LVDS differential data input	
15	GND	P	Ground	
16	U/D	I	Vertical Inversion	Note1
17	L/R	I	Horizontal Inversion	Note1
18	NC	-	No Connection	
19	NC	-	No Connection	

20	NC	-	No Connection
21	NC	-	No Connection
22	GND	P	Ground
23	NC	-	No Connection
24	NC	-	No Connection
25	NC	-	No Connection
26	NC	-	No Connection
27	VCC (BL)	P	Power Voltage for BL:12V
28	VCC (BL)	P	Power Voltage for BL:12V
29	BL_Enable	I	BL on/off Enable
30	PWM	I	BL brightness adjust

I: Input, O: output, P: Power

Note 1: When L/R=" 0" , set right to left scan direction.

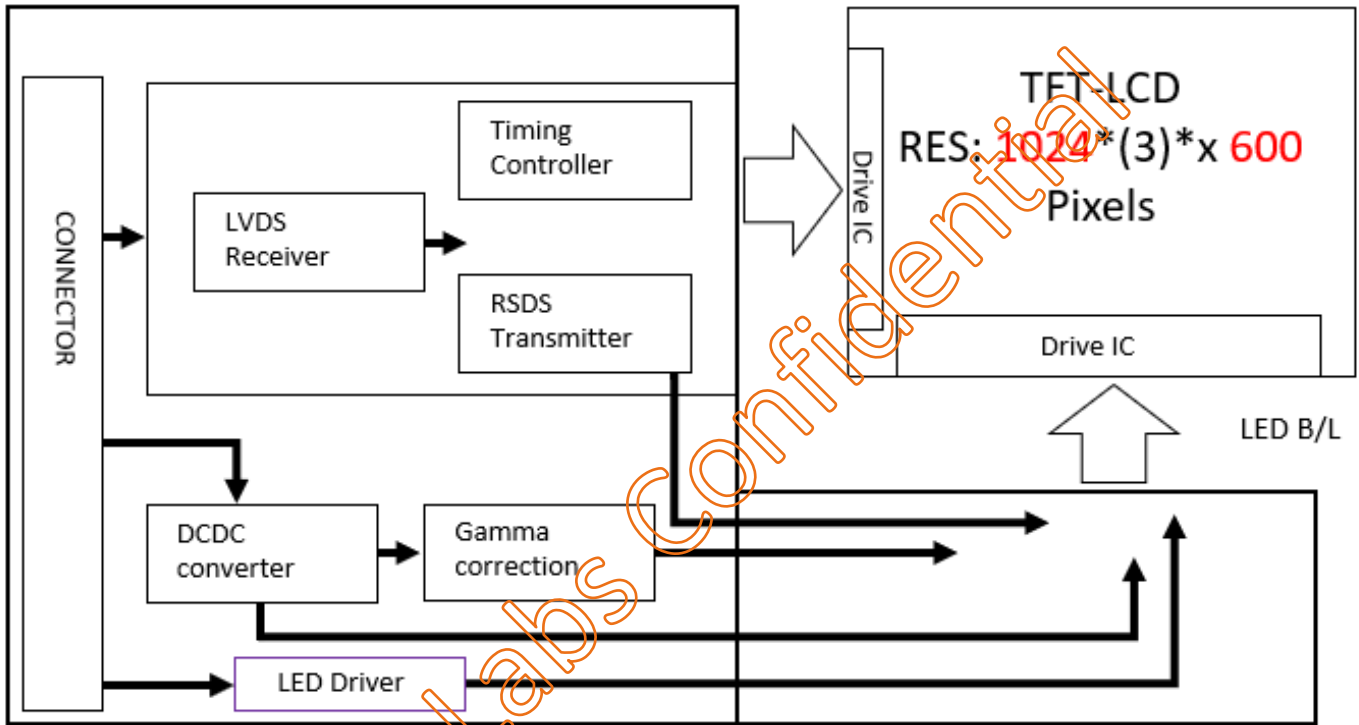
When L/R=" 1" , set left to right scan direction.

When U/D=" 0" , set top to bottom scan direction.

When U/D=" 1" , set bottom to top scan direction.

7. BLOCK DIAGRAM

The following diagram shows the functional block of the TFT module:



8. OPTICAL CHARACTERISTIC

The optical characteristics are measured under stable conditions at room temperature.

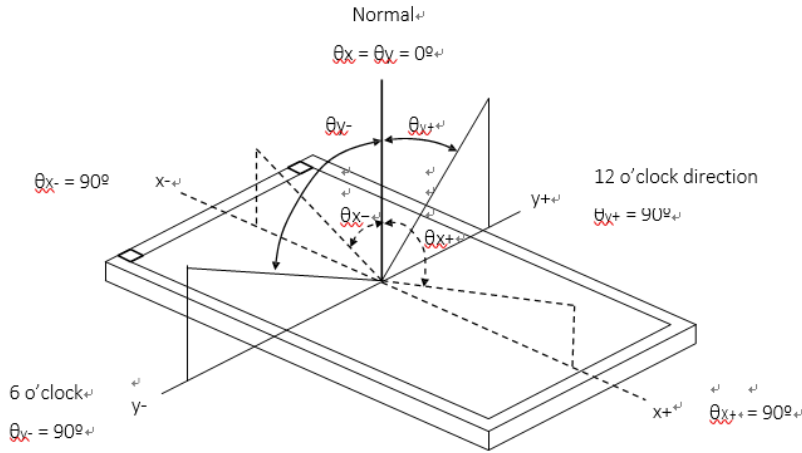
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note		
Contrast Ratio		CR	Viewing angle at normal direction $\theta_x=0^\circ, \theta_y=0^\circ$	600	800	-	-	(2)(5)		
Response Time		T _R		6	12	-	ms	(3)		
		T _F		14	28	-	ms			
Center Luminance of White		LC		850	1000	-	cd/m ²	(4)(5)		
Brightness uniformity				--	70	-	%	(5)(6)		
Chromaticity	Red	R _x		Viewing angle at normal direction $\theta_x=0^\circ, \theta_y=0^\circ$	Typ.	0.152	Typ.	-0.03	+0.03	-
		R _y	-							
	Green	G _x	-							
		G _y	-							
	Blue	B _x	-							
		B _y	-							
	White	W _x	-							
		W _y	-							
Viewing Angle	Horizontal	θ_{x+}	CR=10	-	85	-	-	Deg.	(1)(5)	
		θ_{x-}								
	Vertical	θ_{y+}								
		θ_{y-}								

The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance <2 lux, and at room temperature).

The room temperature is 25°C±2°C.

Note 1: Definition of Viewing Angle

Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or the vertical clock direction with respect to the optical axis which is normal to the LCD surface

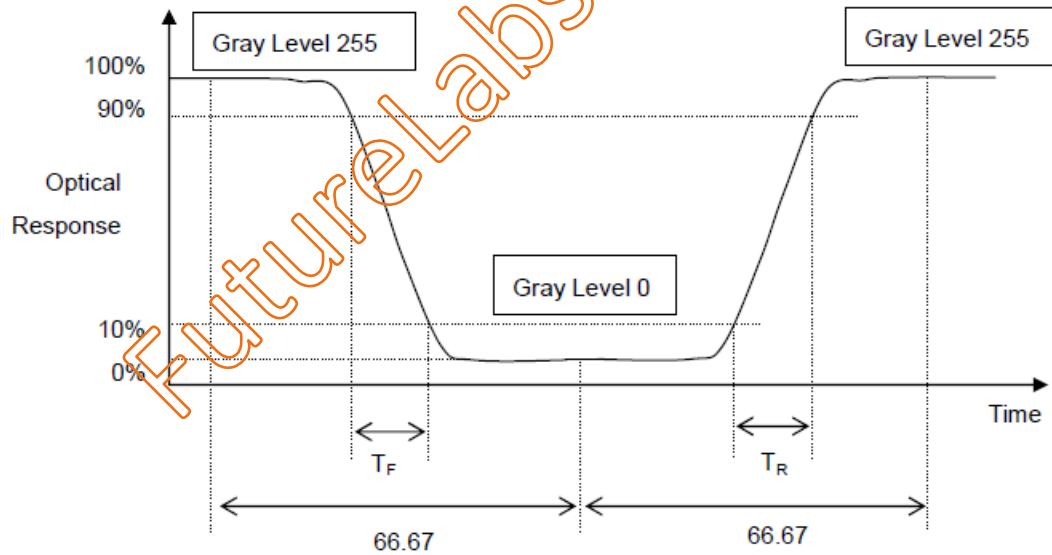


Note 2: Definition of Contrast Ratio (CR)

Measure the viewing angle of $\Theta = 0$ and at the center of the LCD surface. Luminance with all pixels in white state divide by Luminance with all pixels in Black state

Note 3 Definition of Response Time:

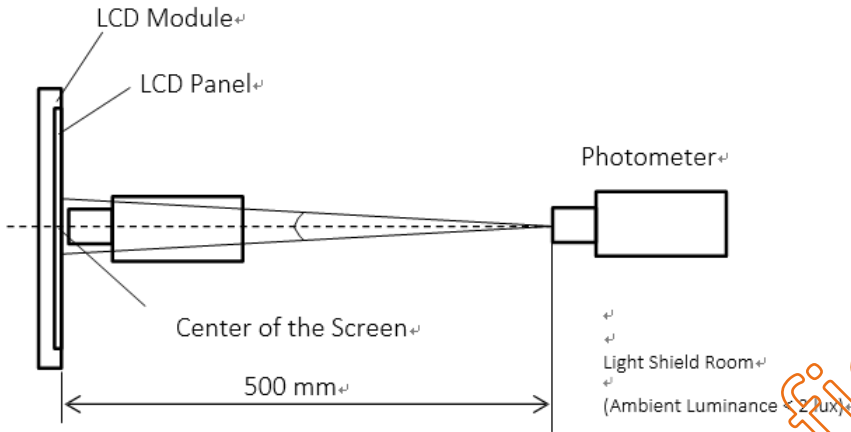
The response time is set initially by defining the "Rising Time (T_R)" and the "Falling Time (T_F)" respectively. Please refer the figure to the followings:



Note 4: Definition of Brightness (L)

Measure the center area of the panel and the viewing angle of the $\theta_x = \theta_y = 0^\circ$

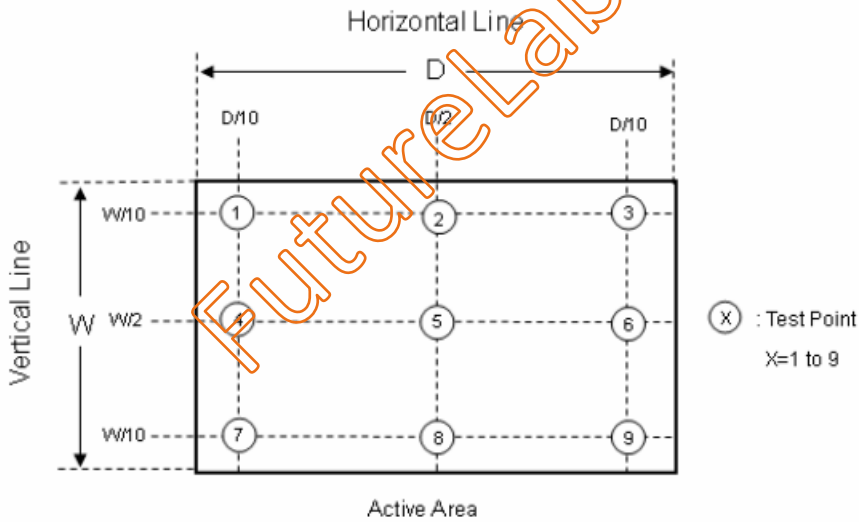
Note 5: The method of optical measurement:



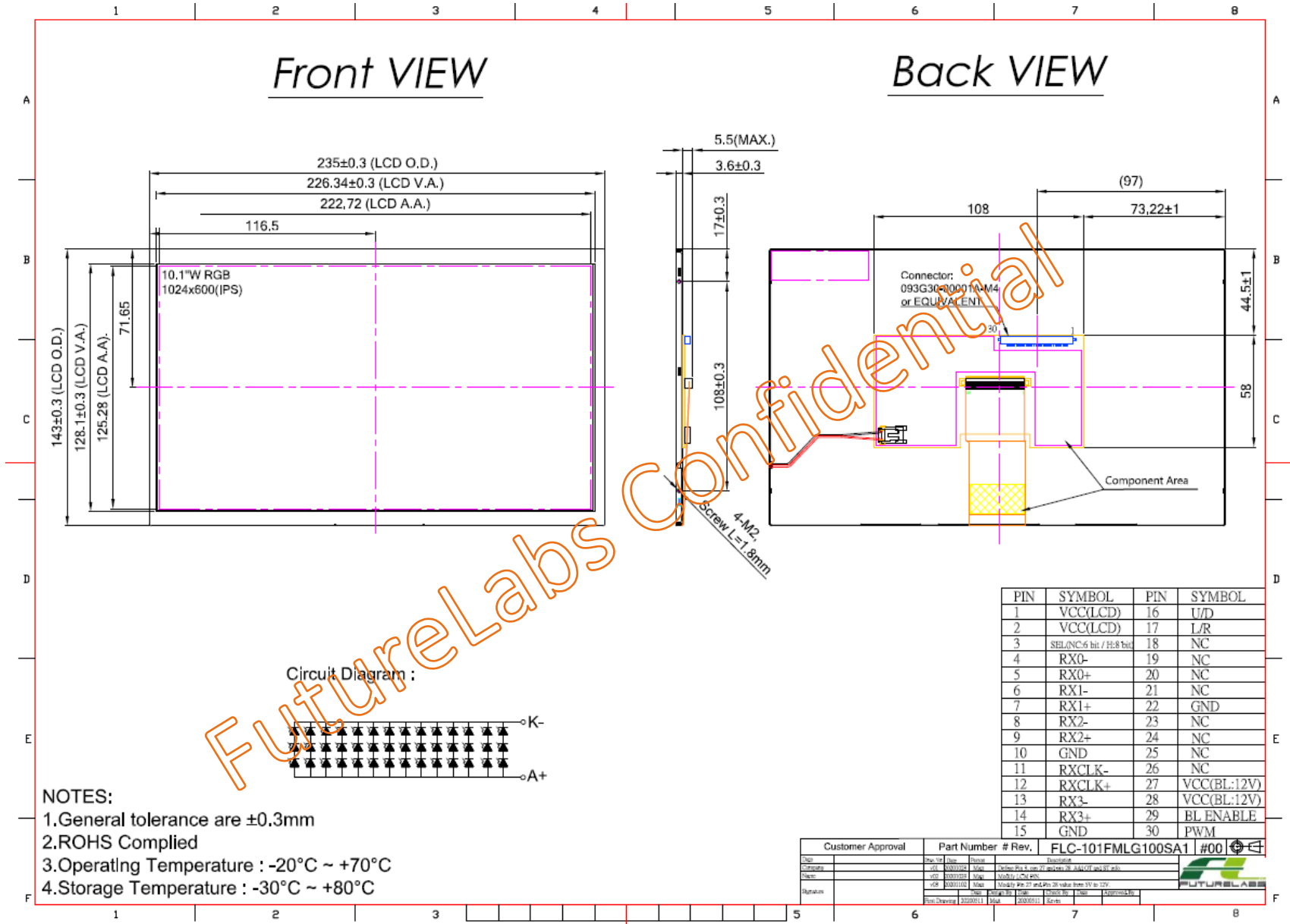
Note 6: Definition of White Variation (δW):

Measure the luminance of gray level 255 at 5 points

$$\delta W = \text{Maximum} [L(1), L(2), L(3), L(4) \sim L(9)] / \text{Minimum} [L(1), L(2), L(3), L(4) \sim L(9)]$$



9. DIMENSION AND DRAWING



10. PRECAUTION AND PRODUCT HANDLING

- Do not apply the external force such as bending or twisting to the LCD panel and backlight during assembly.
- Do not insert and plug out the input connector while the LCD panel is operating.
- Do not take apart the panel or frame from LCD module assembly or insert anything into the backlight unit.
- Do not keep the same pattern in a long period of time, it may cause image sticking on LCD panel. Can use shuffle content periodically if fixed pattern is displayed on the screen.
- Do not touch the display area with bare hands, this will stain the display area.
- Pay attention to handle lead wire of backlight, that is not tugged in connect with LED driver.
- Do not change variable resistance settings in LCD panel, it may cause not satisfy of LCD characteristics specification.
- The surface of LCD panel's polarizer is very soft and easily scratched, please use a very soft dry cloth without chemicals for cleaning.
- To avoid the static electricity to damage the CMOS LSI, the operator should be grounded when in contact with the LCD panel, and also to all electrical equipment.
- Need to follow the correct power frequency when LCD panel is connecting and operating, this can avoid damage to CMOS LSI during latch-up.
- Need to store the LCD panel indoor without the exposure of sunlight where the temperature is $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and the humidity is below 60% RH.