Product Specification

PART NUMBER # REV: FLC-070FMLG000001#00

DESCRIPTION: TFT 7", 1024(H)*600(V), LVDS,
Full View 1000CD

(   )   Preliminary Specification
(V)   Approved Specification

Customer Name:	
Signature:	Date:

PREPARED BY	REVIEWED BY
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Revision History

Version	Date	Page	Description	Note
V1.0	2022/01/04		1st initial	

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1. GENERAL DESCRIPTION

1.1 Description

7 inch is a Color Active Matrix Liquid Crystal Display Module composed of a TFT LCD panel and LED backlight system.

1.2 Product Summary

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

No.	Item	Specification	Unit
1	Display Size	7"W	Inch
2	Pixel Number	1024 (H) x 3(RGB)x 600 (V)	Pixels
3	Outline Dimension	165(W) x 104(H) x 5.05(D)(Typ.)	mm
4	Active Area	154.214 (W) x 85.92 (H)	mm
5	Pixel Pitch	0.1506 (H) x 0.1432 (V)	mm
6	Display Colors	262K/16.7M	
7	Pixel Arrangement	RGB Vertical Stripe	- -
8	Display Mode	Normally Black	- -
9	Electrical Interface	LVDS 6/8 bit	- -
10	Surface Treatment	Anti-Glare	
11	Brightness	1000 (Typ.)	cd/m2
12	Contrast Ratio	800 (Typ.)	--

2. ABSOLUTE MAXIMUM RATING

2.1 Electrical Absolute Rating

Item	Symbol	Values		Unit	Note
		Min	Max		
Power Supply Voltage	VDD	-0.3	4.0	V	
	AVDD	-0.5	13.5	V	
	VGH	-0.3	40.0	V	
	VGL	-20.0	0.3	V	
	VGH-VGL	-	40.0	V	
LED Reverse Voltage	VR		5	V	Each LED
LED Forward Current	IF		30	mA	Each LED

2.2 Environment Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Top	-20	-	+70	°C	
Storage Temperature	Tstg	-30	-	+80	°C	

3. ELECTRICAL CHARACTERISTICS

3.1 LCD Electrical Specification

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	V_{DD}	3.0	3.3	3.6	V	Note 2
	AV_{DD}	8.9	9.0	9.1	V	
	V_{GH}	17	18	19	V	
	V_{GL}	-6.5	-6	-5.5	V	
Input signal voltage	V_{COM}	3.0	3.15	3.3	V	Note 4
Input logic high voltage	V_{IH}	0.7 V_{DD}	-	V_{DD}	V	Note 3
Input logic low voltage	V_{IL}	0	-	0.3 V_{DD}	V	
Current of power supply	IDD	-	33	66	mA	
	IADD	-	35	45	mA	
	IGH	-	0.31	0.62	mA	
	IGL	-	1.0	2.0	mA	
	ICOM		2.0	4.0	mA	

Note 1: Be sure to apply V_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.

Note 2: V_{DD} setting should match the signals output voltage (refer to Note 3) of customer's system board.

Note 3: LVDS, Reset.

Note 4: Typ. V_{COM} is only a reference value, it must be optimized according to each LCM. Be sure to use VR.
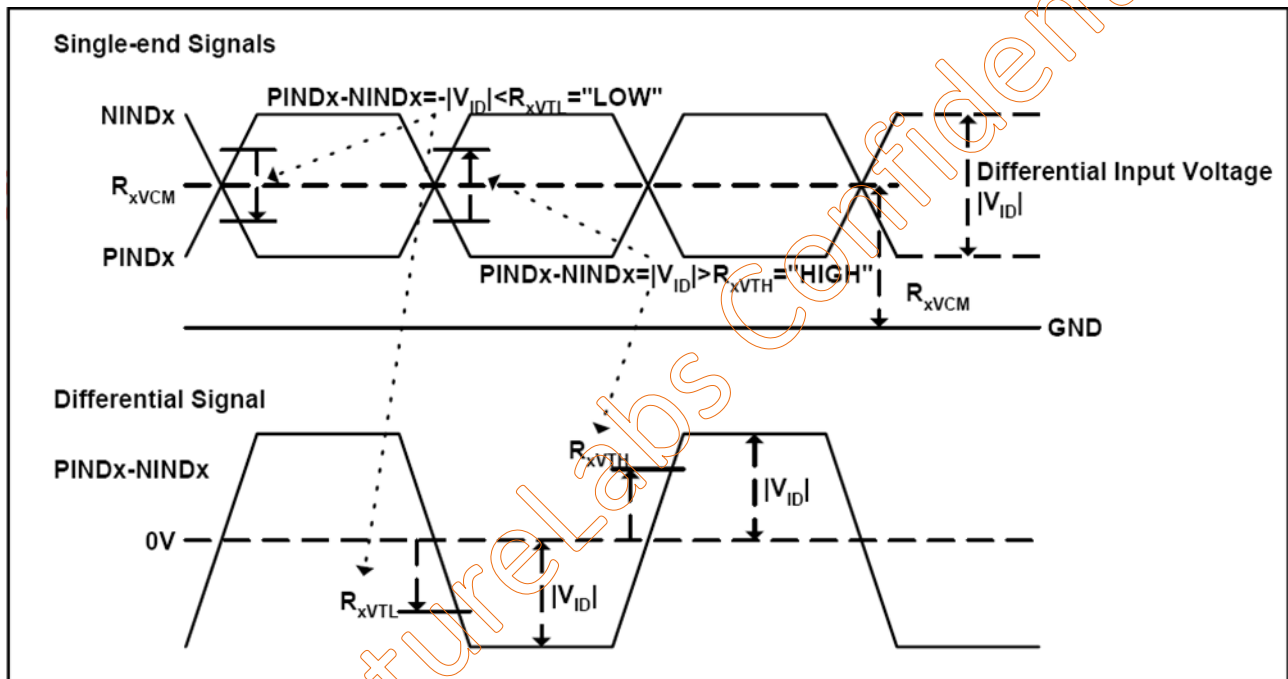
3.2 AC Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock frequency	RxFCLK	40.8	51.2	71	MHz	
Input data skew margin	TRSKM	500	-	-	ps	
Clock high time	TLVCH	-	4/(7* RxFCLK)	-	ns	
Clock low time	TLVCL	-	3/(7* RxFCLK)	-	ns	

3.3 Input Clock and Data Timing Diagram
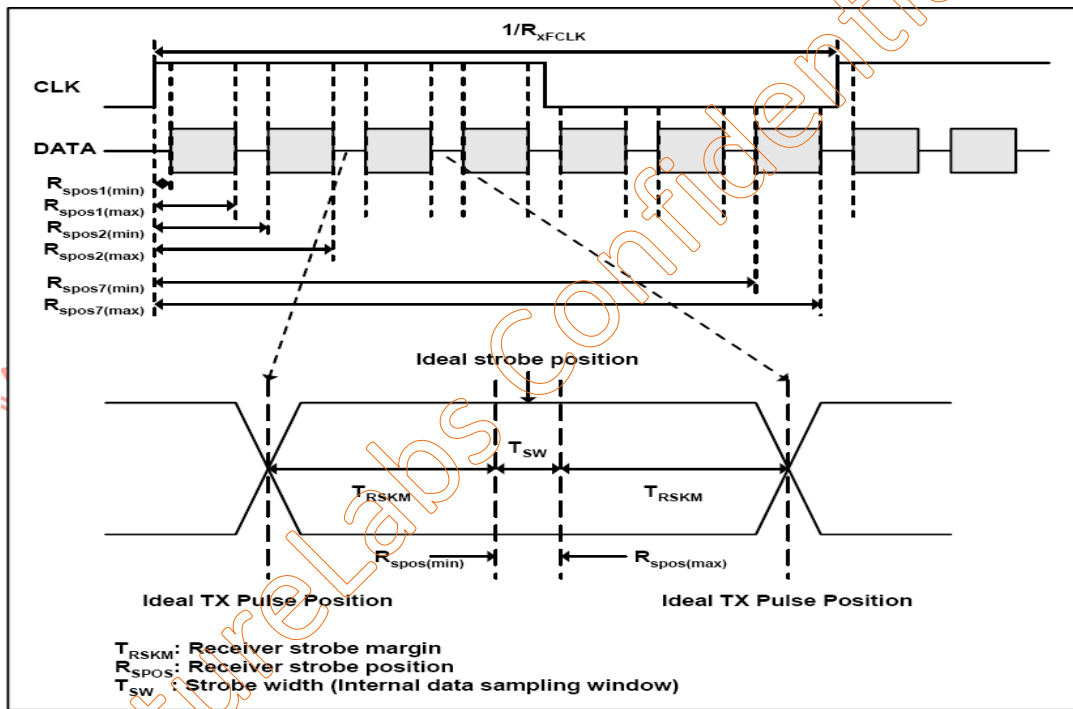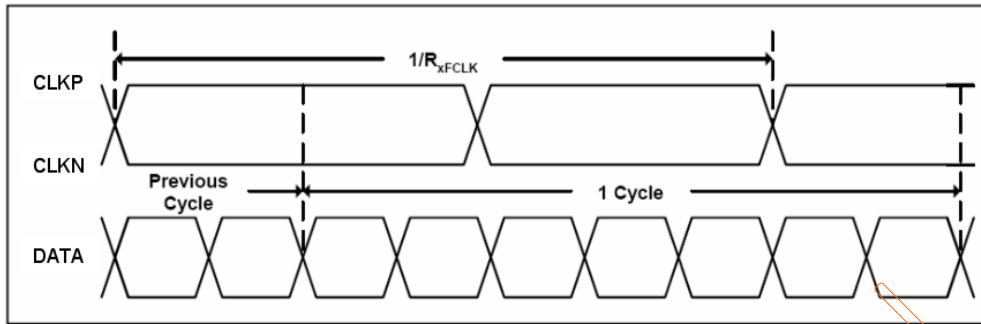
3.4 DC Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Differential input high Threshold voltage	R_XVTH	-	-	+0.1	V	R_{XVCM}=1.2V
Differential input low Threshold voltage	R_XVTL	-0.1	-	-	V	
Input voltage range (singled-end)	R_XVIN	0	-	2.4	V	
Differential input common mode voltage	R_XVCM	$|V_{ID}|/2$	-	$2.4-|V_{ID}|/2$	V	
Differential voltage	$|V_{ID}|$	0.2	-	0.6	V	
Differential input leakage current	RV_{Xliz}	-10	-	+10	uA	

3.5 Backlight Unit

The backlight system is an edge-lighting type with 28 LED.

The characteristics of LED are shown in the following tables.

Parameter	Symbol	Min.	Type	Max.	Unit.	Note
LED current	IL	-	420	-	mA	(2)
LED Voltage	VL	-	12.8	13.6	V	
Power Consumption	PBL		5376		mW	
Operating LED life time	Hr	50000	-	-	Hour	(1)(2)

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

Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL=420mA. The LED lifetime could be decreased if operating IL is larger than 420mA. The constant current driving method is suggested.
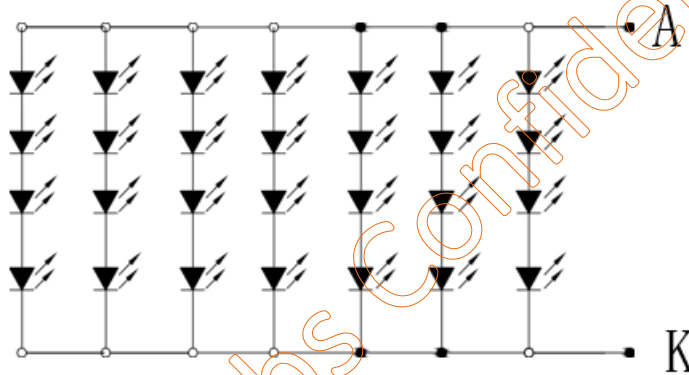

LED : 28 =4*7 LED Circuit

4.Timing Chart

4.1 Timing Table

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

4.2 LVDS INPUT DATA FORMAT

6 bits LVDS input
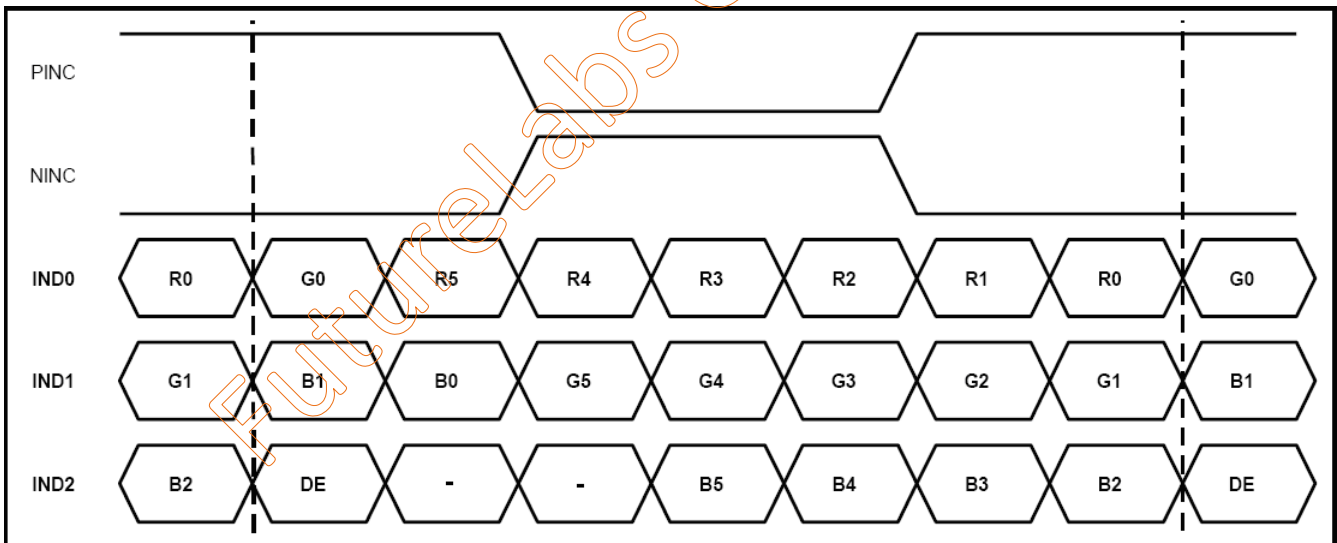
8 bits LVDS input
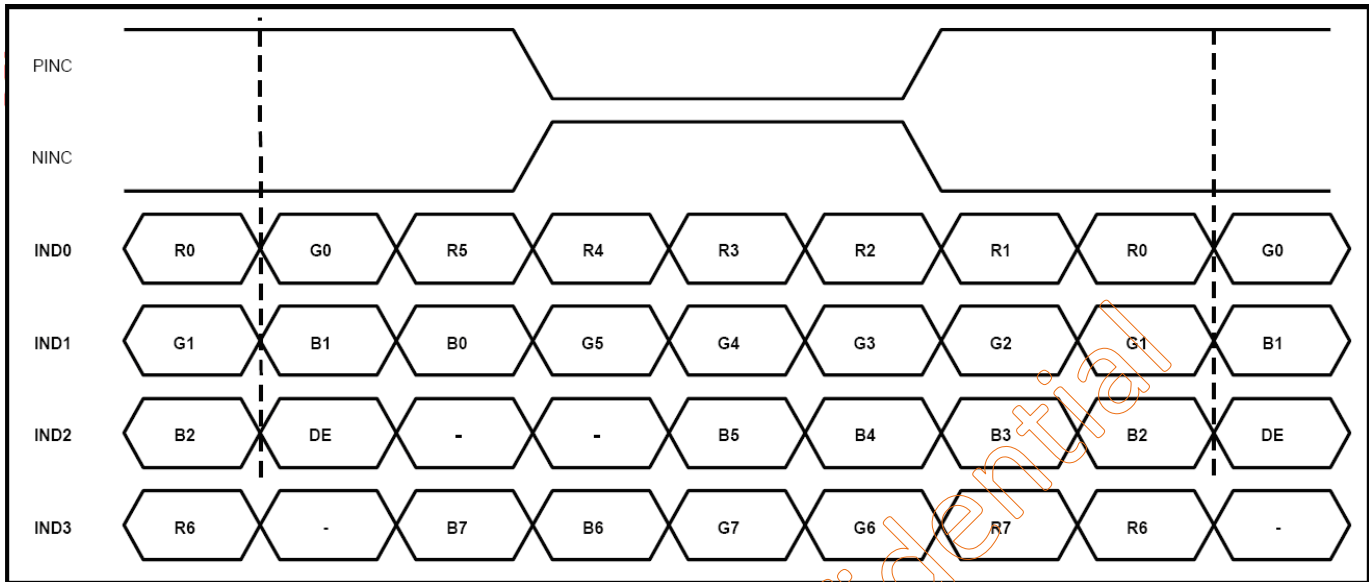
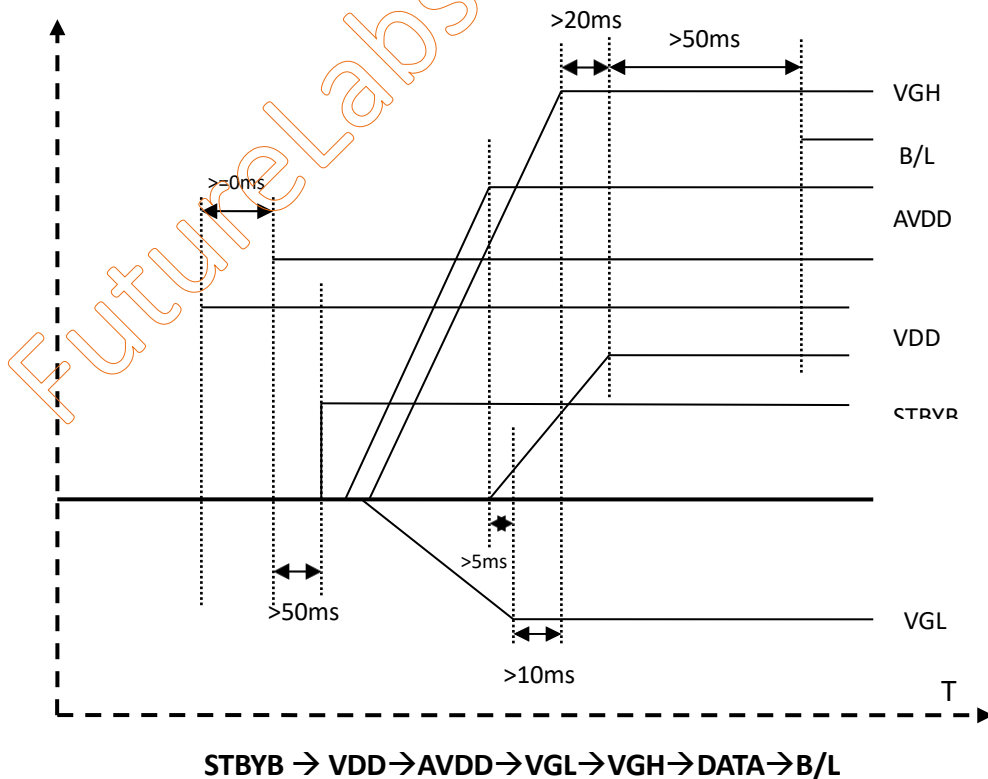Note: Support DE timing mode only, SYNC mode not supported.

4.3 Power On/Off Sequence

a. Power on :

STBYB → VDD→AVDD→VGL→VGH→DATA→B/L

b. Power off :

B/L→STBYB→DATA→VGH→VGL→AVDD→VDD
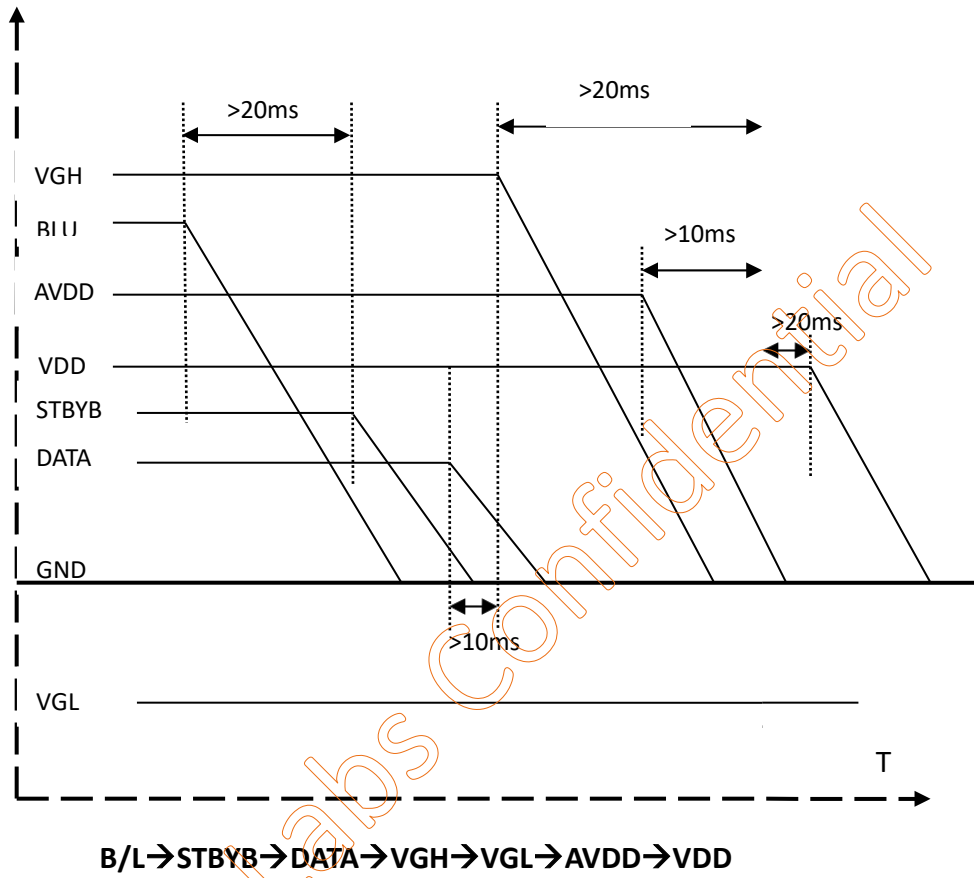
5. INTERFACE PIN DESCRIPTION

5.1 LCM Connector PIN Assignment

The electronics interface connector is Hirose FH12A-40S-0.5SH or equivalent.

Pin No.	Symbol	IO	Functions	Remark
1	VCOM	P	Common Voltage	
2	VDD	P	Power Voltage for digital circuit	
3	VDD	P	Power Voltage for digital circuit	
4	NC	---	No connection	
5	Reset	I	Global reset pin	Note 1
6	STBYB	I	Standby mode, Normally pulled high STBYB = "1" normal operation STBYB = "0" timing controller, sourcedriver will turn off, all output are High-Z	
7	GND	P	Ground	
8	RXIN0-	I	- LVDS differential data input	
9	RXIN0+	I	+ LVDS differential data input	
10	GND	P	Ground	
11	RXIN1-	I	- LVDS differential data input	
12	RXIN1+	I	+ LVDS differential data input	
13	GND	P	Ground	
14	RXIN2-	I	- LVDS differential data input	
15	RXIN2+	I	+ LVDS differential data input	
16	GND	P	Ground	
17	RXCLKIN-	I	- LVDS differential clock input	
18	RXCLKIN+	I	+ LVDS differential clock input	
19	GND	P	Ground	
20	RXIN3-	I	- LVDS differential data input	
21	RXIN3+	I	+ LVDS differential data input	
22	GND	P	Ground	
23	NC	---	No connection	
24	NC	---	No connection	
25	GND	P	Ground	

Pin No.	Symbol	IO	Functions	Remark
26	NC	---	No connection	
27	DIMO	O	Backlight CABC controller signal output	
28	SELB	I	6bit/8bit mode select	Note2
29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	
31	LED-	P	LED-	
32	LED-	P	LED-	
33	L/R	I	Horizontal inversion	Note3
34	U/D	I	Vertical inversion	Note3
35	VGL	P	Gate OFF Voltage	
36	GND	P	Power ground	
37	GND	P	Power ground	
38	VGH	P	Gate ON Voltage	
39	LED+	P	LED+	
40	LED+	P	LED+	

I: input O: Output P: Power

Note1：Global reset pin: Active low to enter reset mode. Suggest connecting with an RC reset circuit for stability. Normally pull high. (R=10KΩ, C=0.1μF)

If RC is not added, users must follow the rule, T2 > 50ms on page power on/off sequence.

Note2：If LVDS input data is 6 bits ,SELB must be set to High;

If LVDS input data is 8 bits, SELB must be set to Low.

Note3：When L/R="0", set right to left scan direction.
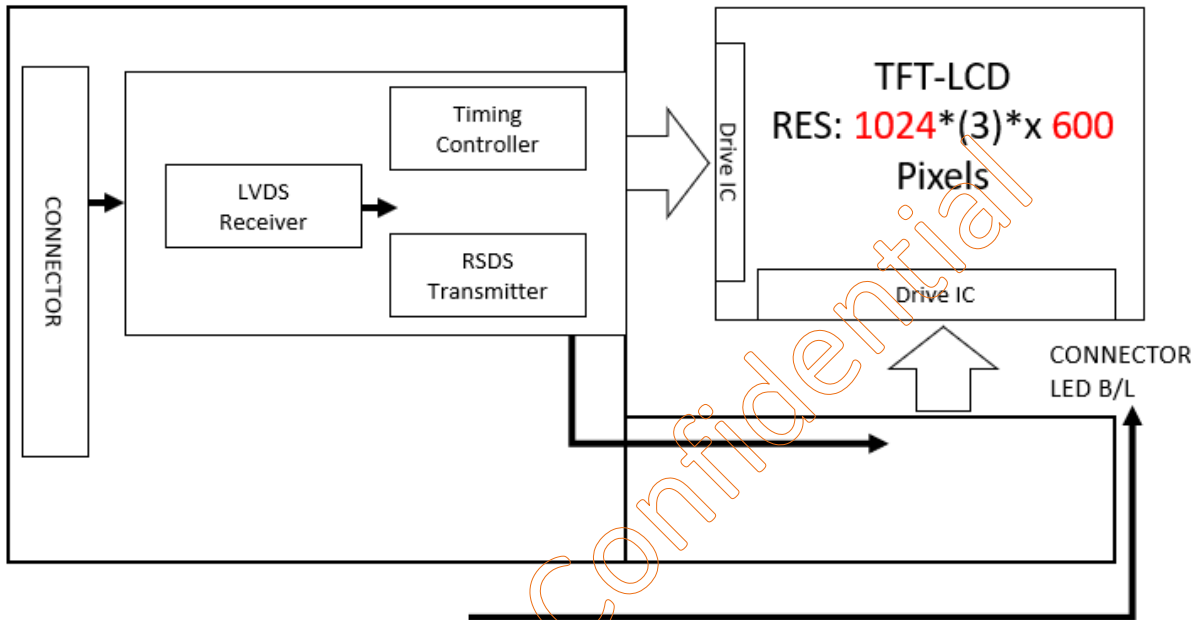
When L/R="1", set left to right scan direction.

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

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

6. BLOCK DIAGRAM

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

7. OPTICAL CHARACTERISTIC

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

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio		CR	$\theta_X=0°$	640	800	-	-	(2)(5)
Response Time		T_R	25°C	-	4	8	ms	(3)
		T_F		-	12	24		
Center Luminance of White		LC		900	1000	-	cd/m2	(4)(5)
White Variation		δW		75	80	85	%	(6)
Chromaticity	Red	Rx	$\theta_X=0°$, $\theta_Y=0°$ Viewing angle at normal direction	Typ. -0.05	0.591	Typ. +0.05	-	(1) (5)
		Ry			0.336		-	
	Green	Gx			0.342		-	
		Gy			0.593		-	
	Blue	Bx			0.144		-	
		By			0.082		-	
	White	Wx			0.284		-	
		Wy			0.299		-	
Viewing Angle	Horizontal	θ_X+	CR=10	75	80	85	Deg.	(1)(5)
		θ_X-		75	80	85		
	Vertical	θ_Y+		75	80	85		
		θ_Y-		75	80	85		

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.
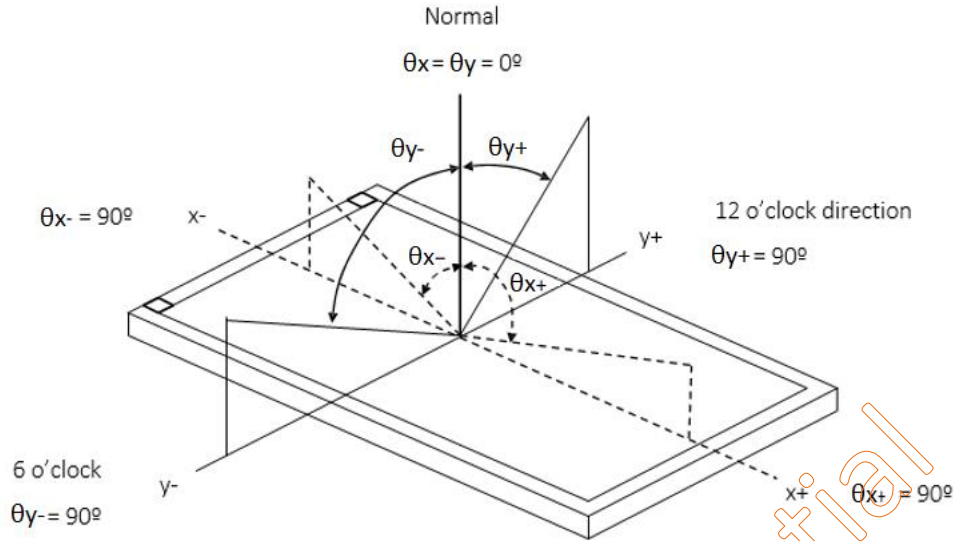
Note 2:   Definition of Contrast Ratio (CR)

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.

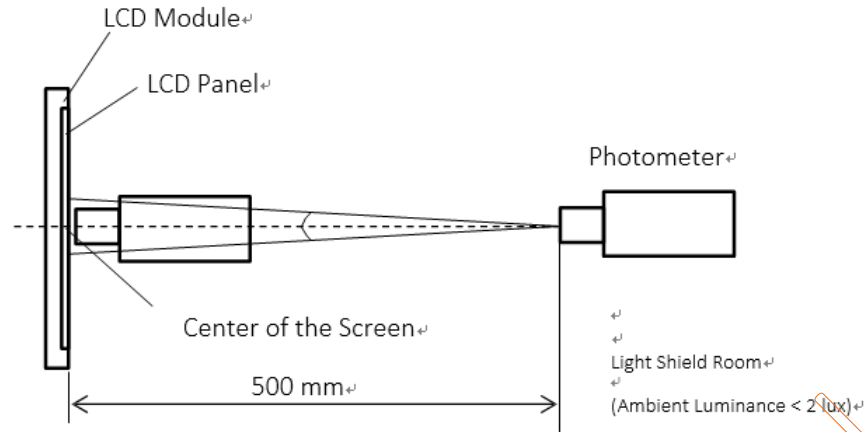Note 3:   Definition of Response Time:

The response time is set initially by defining the "Rising Time (TR)" and the "Falling Time (TF)" respectively. Please refer the figure to the followings:
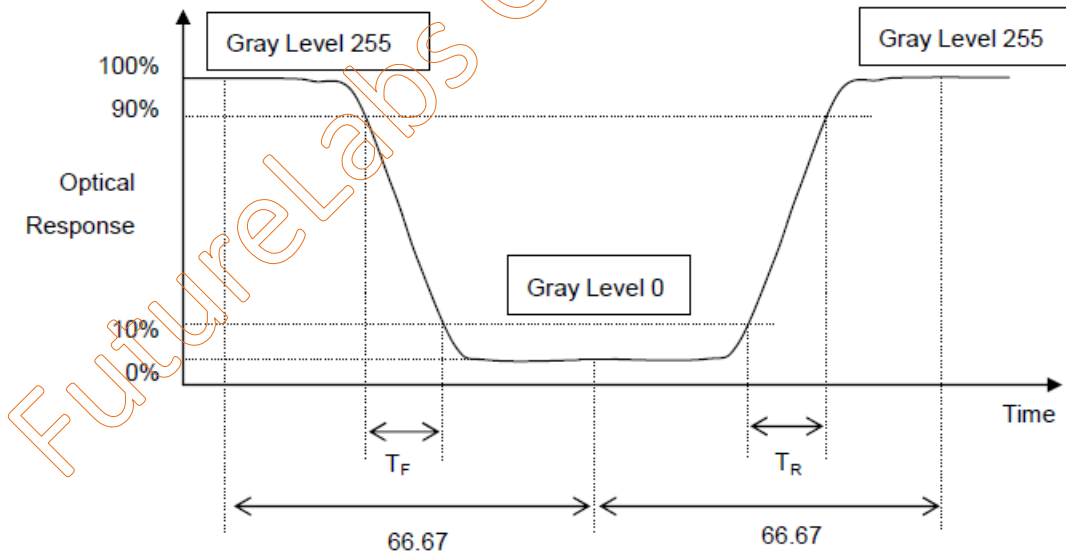
Note 4:   Definition of Brightness (L)

Measure the center area of the panel and the viewing angle of the $\theta x=\theta y =0°$

Note 5:   The method of optical measurement:

LCD Module
LCD Panel
Photometer
Center of the Screen
500 mm
Light Shield Room
(Ambient Luminance < 2 lux)
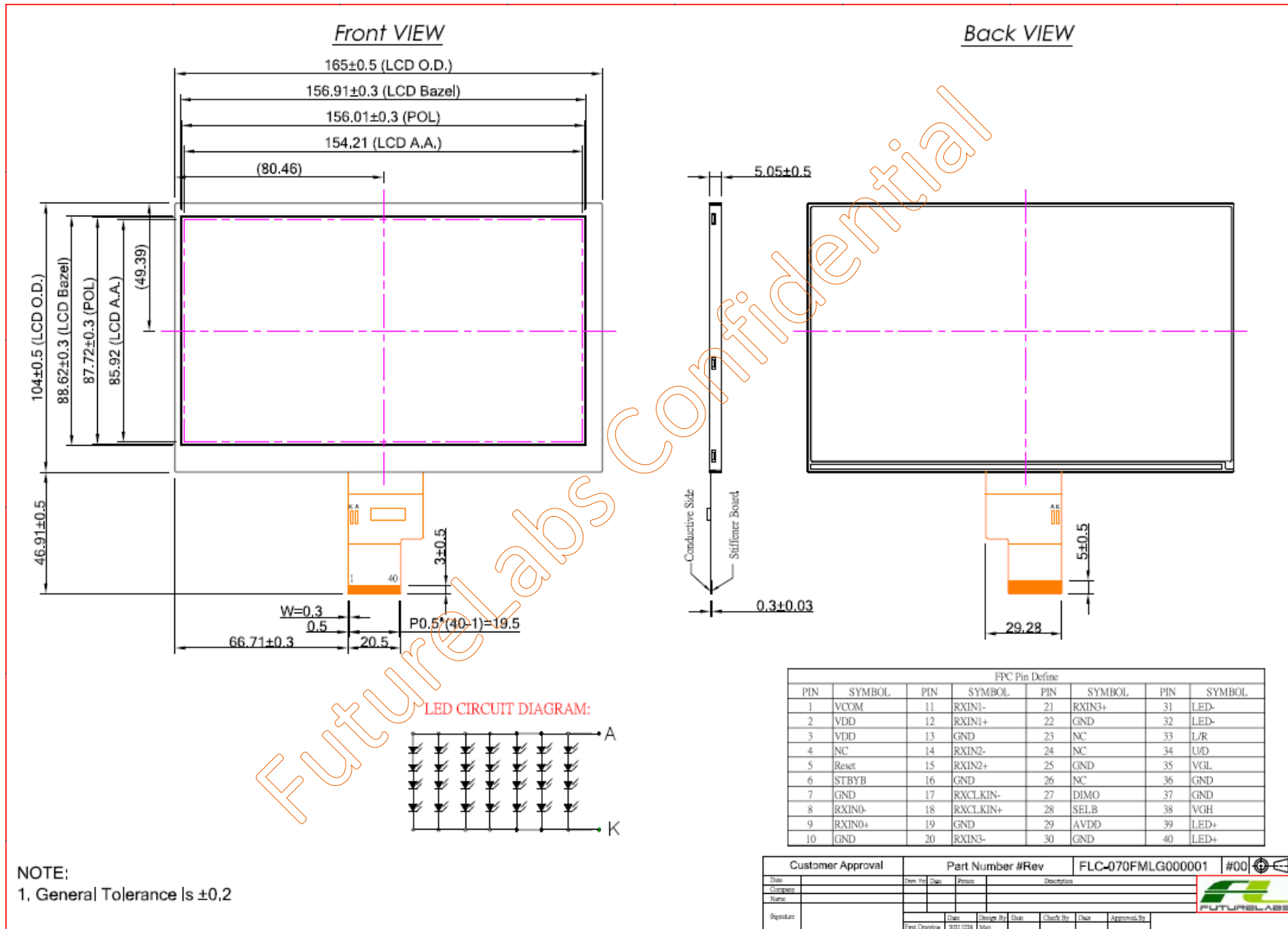
Note 6:   Definition of White Variation (δW):

Measure the luminance of gray level 255 at 9 points

δW = (Minimum [L (1), L (2), L (3), L (4)~ L (9)] / Maximum [L (1), L (2), L (3), L (4)~ L (9)])*100%

Horizontal Line

Vertical Line

D

D/10   D/2   D/10

W/10

W   W/2

W/10

Active Area

$\bigotimes$: Test Point

X=1 to 9

8. DIMENSION AND DRAWING

Front VIEW

165±0.5 (LCD O.D.)
156.91±0.3 (LCD Bazel)
156.01±0.3 (POL)
154.21 (LCD A.A.)
(80.46)
(49.39)

104±0.5 (LCD O.D.)
88.62±0.3 (LCD Bazel)
87.72±0.3 (POL)
85.92 (LCD A.A.)

46.91±0.5

3±0.5
W=0.3
0.5
66.71±0.3
20.5
P0.5*(40-1)=19.5

1 40

LED CIRCUIT DIAGRAM:
A
K

Back VIEW

5.05±0.5
Conductive Side
Stiffener Board
0.3±0.03

5±0.5
29.28

FPC Pin Define							
PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL	PIN	SYMBOL
1	VCOM	11	RXIN1-	21	RXIN3+	31	LED-
2	VDD	12	RXIN1+	22	GND	32	LED-
3	VDD	13	GND	23	NC	33	L/R
4	NC	14	RXIN2-	24	NC	34	U/D
5	Reset	15	RXIN2+	25	GND	35	VGL
6	STBYB	16	GND	26	NC	36	GND
7	GND	17	RXCLKIN-	27	DIMO	37	GND
8	RXIN0-	18	RXCLKIN+	28	SELB	38	VGH
9	RXIN0+	19	GND	29	AVDD	39	LED+
10	GND	20	RXIN3-	30	GND	40	LED+

NOTE:
1, General Tolerance Is ±0,2

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9. 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°C ± 5°C and the humidity is below 60% RH.