

# TFT Product Specification

- ◇ PRELIMINARY SPECIFICATION
- ◆ APPROVED SPECIFICATION

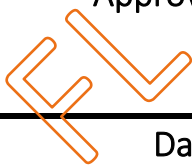
**Part Number: FLC-1234ML8000SA1**

Description: 12.3" cut TFT LCD 850CD LVDS Interface 1920x720 format can display 16.7M colors

Prepared by: Natalie

Approved by: David

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Approved by 	
Date	

## Revision History

Version	Date	Page	Description	Note
V1.0	2019/06/17		First Edition	
V2.0	2019/06/24		Second Edition	
V3.0	2019/11/16		Update LED connector P/N	P6
V4.0	2019/02/12		Update VGL Backlight	
V5.0	2020/02/25	5	Update 2.2 Environment Absolute Rating	

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## Table of Content

TFT Product Specification .....	1
<b>1. GENERAL DESCRIPTION.....</b>	<b>4</b>
1.1 Description.....	4
1.2 Product Summary .....	4
<b>2. ABSOLUTE MAXIMUM RATING.....</b>	<b>5</b>
2.1 Electrical Absolute Rating .....	5
2.2 Environment Absolute Rating .....	5
<b>3. ELECTRICAL CHARACTERISTICS .....</b>	<b>6</b>
3.1 Electrical Specifications.....	6
3.2 BLU PIN definition .....	7
<b>4. SIGNAL CHARACTERISTICS.....</b>	<b>8</b>
4.1 Interface Timing.....	8
4.1.1 LVDS Signal Timing: .....	8
4.1.2 Power ON/OFF SEQUENCE.....	9
<b>5. INTERFACE PIN DESCRIPTION .....</b>	<b>10</b>
5.1 LCM Connector PIN Assignment.....	10
<b>6. BLOCK DIAMGRAM .....</b>	<b>12</b>
<b>7. OPTICAL CHARACTERISTIC.....</b>	<b>13</b>
<b>8. DIMENSION AND DRAWING .....</b>	<b>15</b>

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# 1. GENERAL DESCRIPTION

## 1.1 Description

12.3" 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 1920x720 screen and 16.7M 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	12.3	Inch
2	Pixel Number	1920 (H) x 3 (RGB) x 720 (V)	Pixels
3	Outline Dimension	307(H) x 126(V) x 7.25(D)	mm
4	Active Area	292.032(H) x 109.512(V)	mm
5	Display Colors	16.7M	--
6	Pixel Arrangement	RGB vertical stripe	--
7	Display Mode	Normally Black / Transmissive	--
8	Electrical Interface	LVDS	
9	Pixel pitch	0.1521(H) x RGB x 0.1521 (V)	mm
10	Brightness	850 (Typ.)	cd/m2
11	Viewing Direction	All Direction	--
12	Contrast Ratio	1000 (Typ.)	--
13	Color gamut	75%	Typ



## 2. ABSOLUTE MAXIMUM RATING

### 2.1 Electrical Absolute Rating

Item	Symbol	Values		Unit	Note
		Min	Max.		
Power supply voltage for LCD	VCC	-	5.7	V	

### 2.2 Environment Absolute Rating

Item	Symbol	Unit	Note		
		Min	Max.	Unit	
Operating Temperature	Top	-30	85	°C	
Storage Temperature	Tstg	-40	85	°C	

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### 3. ELECTRICAL CHARACTERISTICS

#### 3.1 Electrical Specifications

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
TFT Gate ON Voltage	VGH	16	-	18	V	
TFT Gate OFF Voltage	VGL	-15	-	-11	V	
TFT Common Electrode Voltage	VCOM	-3	-	0	V	TBD
Voltage of VCC		3	-	3.5	V	
Current of VCC		150	-	550	V	
Supply current of LED backlight	Per string		-	90	mA	9 LED
Total Supply current of LED Backlight	I <sub>LED</sub> Total		-	360	mA	4 strings
Supply voltage of LED backlight	Per string	23.7	27.2	30.1	V	4 strings
LED Life-Time		30000			Hrs	Note 4

Note (1) AVDD should be set to satisfy the characteristic of LC.

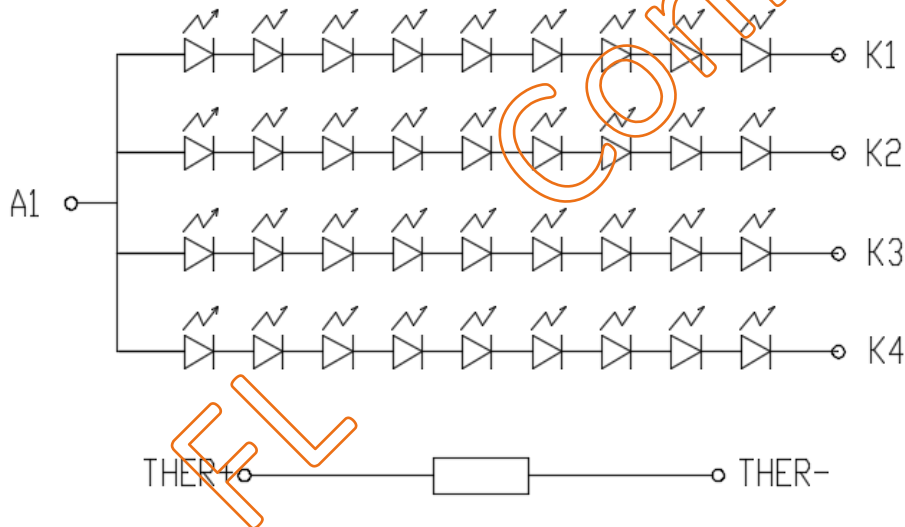
Note (2) Frame rate = 60Hz

Note (3 ) Each LED light bar consists of 36 pcs LED package ( 4 strings x9 pcs / string ).

Max Current value:360 mA. Each Strings max current value:90 mA.

Note (4): The “LED Life Time” is defined as the time period when the brightness decrease to 50% of the initial value under continuous lighting at 25°C

### Backlighting circuit :



### 3.2 BLU PIN definition

Connector Terminal : 196415-12041-36

1	LED-A	LED Anode
2	LED-A	LED Anode
3	LED-A	LED Anode
4	LED-A	LED Anode
5	NC	No Connection
6	NTC1	NTC thermistor terminal 1
7	NTC2	NTC thermistor terminal 2
8	NC	No Connection
9	LED-K1	LED string 1 cathode
10	LED-K2	LED string 2 cathode
11	LED-K3	LED string 3 cathode
12	LED-K4	LED string 4 cathode



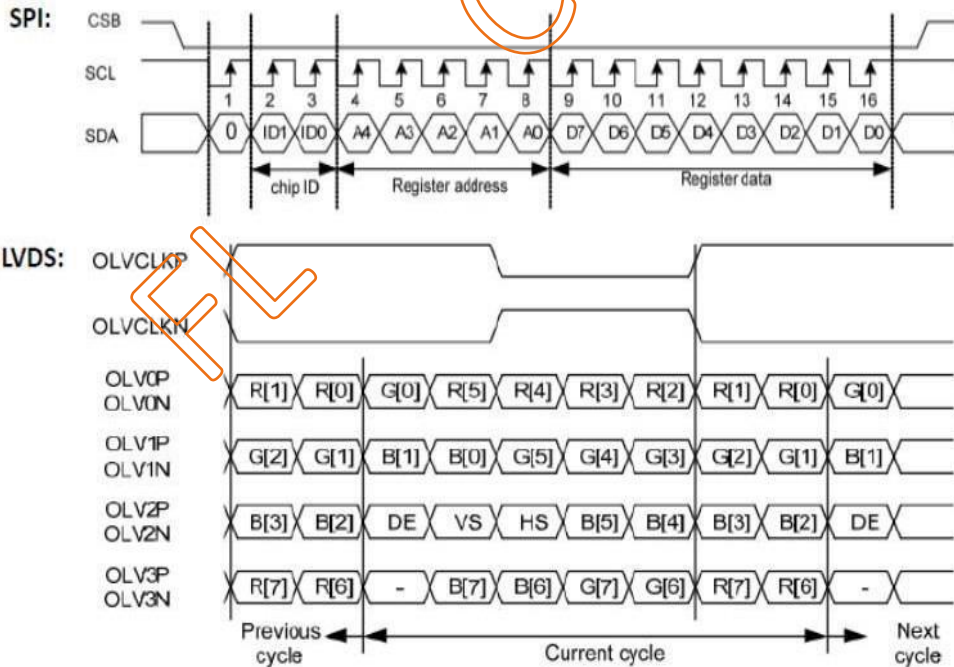
## 4. SIGNAL CHARACTERISTICS

### 4.1 Interface Timing

#### 4.1.1 LVDS Signal Timing:

Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock frequency	RxFCLK	-	44.1	-	MHz
Horizontal Display Area	thd	960			DCLK
HS Period	th	989	1002	1248	DCLK
HB Blanking	Thb+thfp		42		DCLK
Vertical Display Area	tvd	720			TH
VS Period	tv	727	733	936	TH
VS Blanking	Tvbp+tvfp		13		TH
Clock period	TLVCYC	11.76			ns
1 data bit time	UI		1/7		TLVCYC
Clock high time	TLVCH	2.8	4	4.2	UI
Clock low time	TLVCL	2.8	3	4.2	UI
LVDS WAKE-UP Time	TenLVDS			150	us

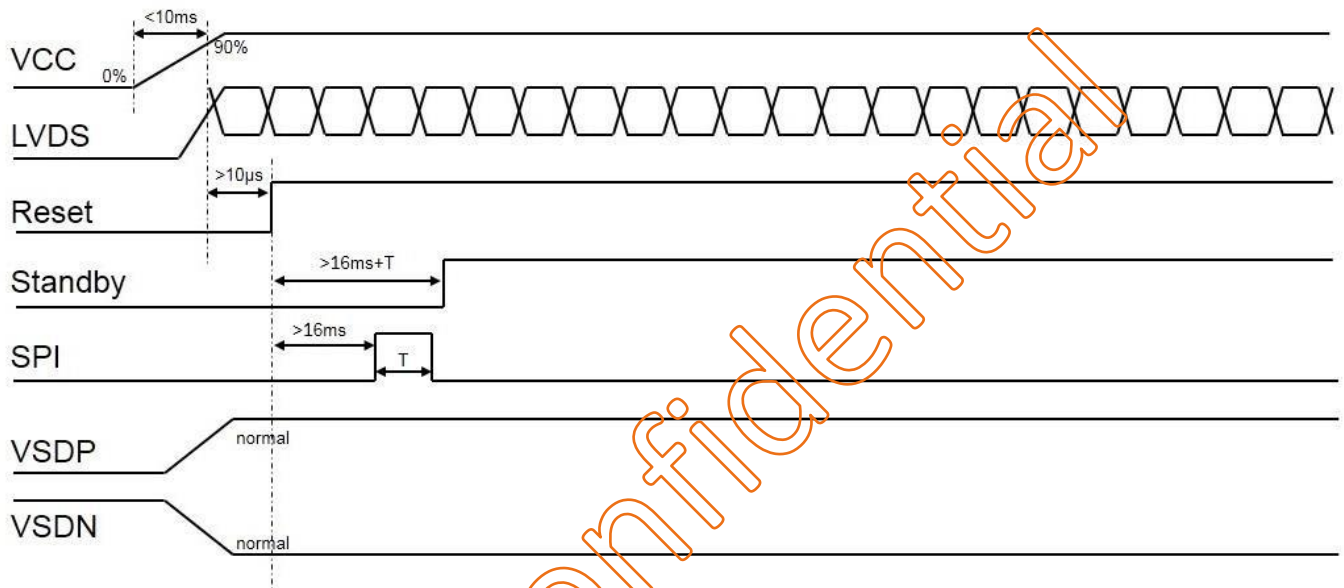
#### (1) Signal Format



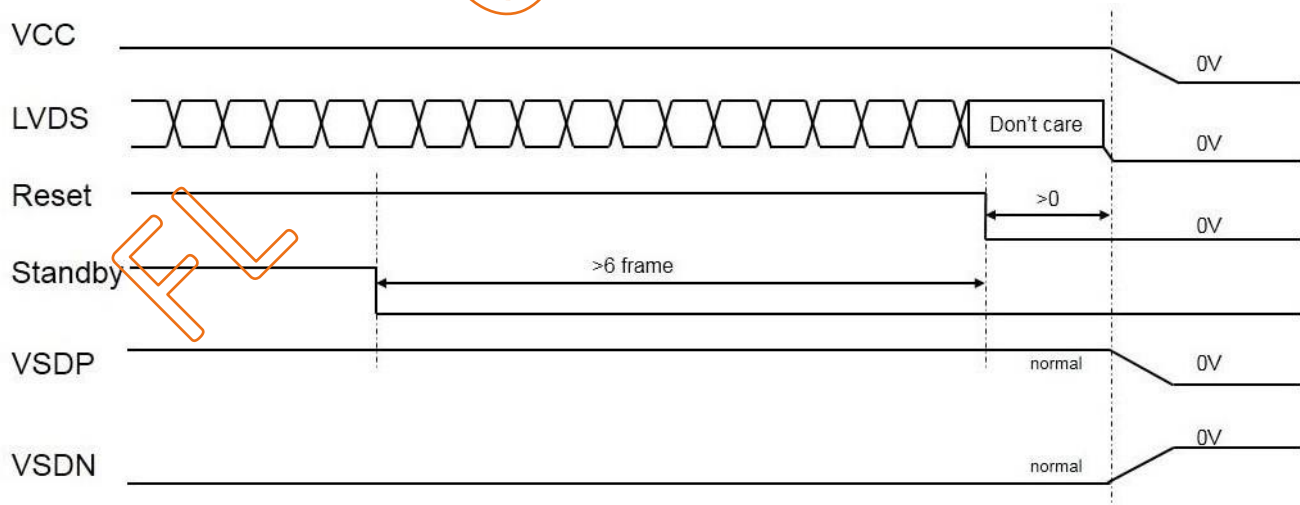


## 4.1.2 Power ON/OFF SEQUENCE

### POWER ON sequence



### POWER OFF sequence



## 5. INTERFACE PIN DESCRIPTION

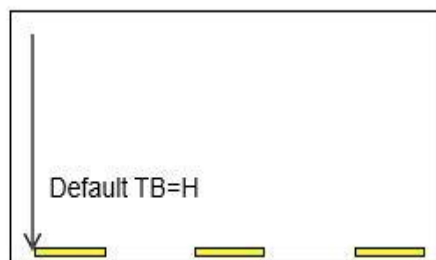
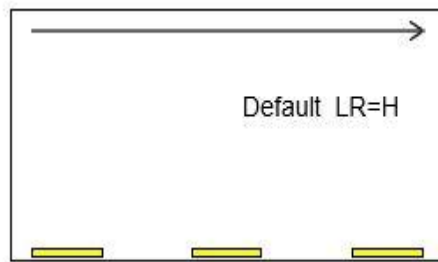
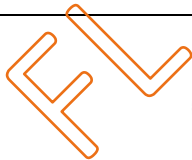
### 5.1 LCM Connector PIN Assignment

The Recommended connector is Hirose FH28-50S-0.5SH(0.5)

PIN NO	Symbol	Description	Note
1	GND	Ground	
2	VCC	Power supply	
3	VCC	Power supply	
4	VCC	Power supply	
5	VCC	Power supply	
6	GND	Ground	
7	ELV0N	EVEN LVDS Data input 0-	
8	ELV0P	EVEN LVDS Data input 0+	
9	GND	Ground	
10	ELV1N	EVEN LVDS Data input 1-	
11	ELV1P	EVEN LVDS Data input 1+	
12	GND	Ground	
13	ELV2N	EVEN LVDS Data input 2-	
14	ELV2P	EVEN LVDS Data input 2+	
15	GND	Ground	
16	ECLKN	EVEN Negative CLK input	
17	ECLKP	EVEN Positive CLK input	
18	GND	Ground	
19	ELV3N	EVEN LVDS Data input 3-	
20	ELV3P	EVEN LVDS Data input 3+	
21	GND	Ground	
22	OLV0N	ODD LVDS Data input 0-	
23	OLV0P	ODD LVDS Data input 0+	
24	GND	Ground	
25	OLV1N	ODD LVDS Data input 1-	
26	OLV1P	ODD LVDS Data input 1+	
27	GND	Ground	
28	OLV2N	ODD LVDS Data input 2-	
29	OLV2P	ODD LVDS Data input 2+	

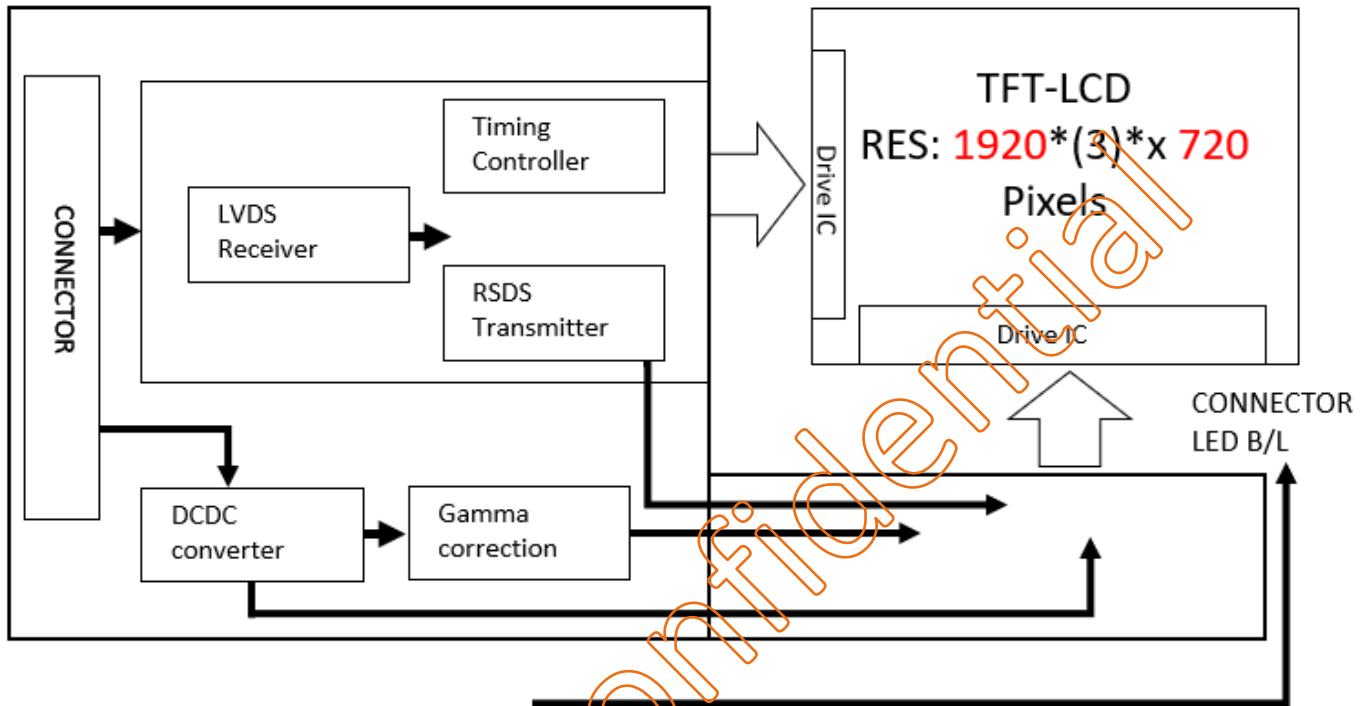
30	GND	Ground	
31	OCLKN	ODD Negative CLK input	
32	OCLKP	ODD Positive CLK input	
33	GND	Ground	
34	OLV3N	ODD LVDS Data input 3-	
35	OLV3P	ODD LVDS Data input 3+	
36	GND	Ground	
37	RESET	Reset	
38	STBYB	Standby mode setting pin, active low	
39	GND	Ground	
40	SCL	SCL	
41	CSB	CSB	
42	SDA	SDA	
43	ATREN	Enable auto reload signal	
44	VOTP	OTP Voltage	
45	GND	Ground	
46	LR	Horizontal shift direction selection	Note 1
47	TB	Vertical shift direction selection	Note 1
48	NC	No Connection	
49	FAULT	Output for fail detection	
50	NC	No Connection	

Note 1 :



## 6. BLOCK DIAMGRAM

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



## 7. OPTICAL CHARACTERISTIC

The optical characteristics are measured under table conditions at room temperature.  
 $T_a=25^{\circ}\text{C}$ ,  $VCC=3.3\text{V}$

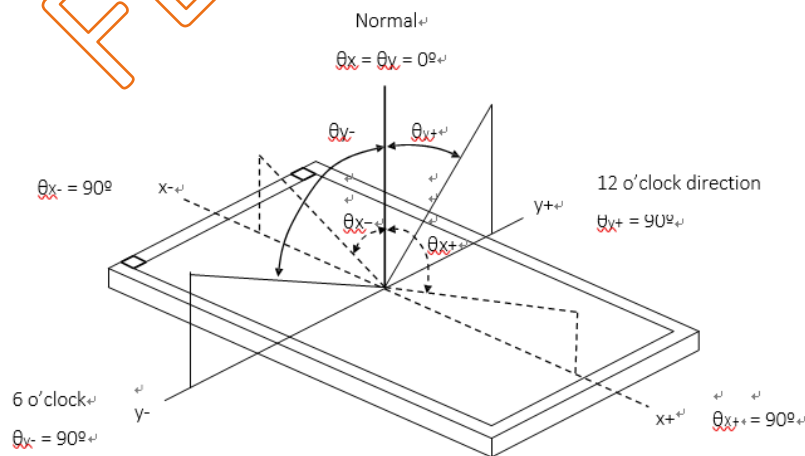
Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio	CR	$\theta_x=\theta_y=0^{\circ}$	-	1000		-	2,5,6
Response Time (White-Black)	$T_f+T_b$	$\theta_x=\theta_y=0^{\circ}$	-	25	35	ms	3,5,6
Center Luminance of White	$L_w$	$\theta_x=\theta_y=0^{\circ}$	700	850	-	$\text{cd}/\text{m}^2$	5,6
Luminance Uniformity	$\Delta L$		75	-		%	5,6
Chromaticity	Red	Rx	$\theta_x=\theta_y=0^{\circ}$	Typ.	Typ.	0.650	5,6
		Ry				0.328	
	Green	Gx				0.316	
		Gy				0.628	
	Blue	Bx				0.152	
		By				0.059	
	White	Wx				0.292	
		Wy				0.325	
Viewing Angle	Horizontal	$\theta_{x+}$	80	88	-	Deg.	1,5
		$\theta_{x-}$	80	88	-		
	Vertical	$\theta_{y+}$	80	88	-		
		$\theta_{y-}$	80	88	-		

The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance  $<1$  lux, and at room temperature).

The room temperature is  $25^{\circ}\text{C}\pm 2^{\circ}\text{C}$  and LED Backlight Current  $I_L=360\text{mA}$ .

### 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

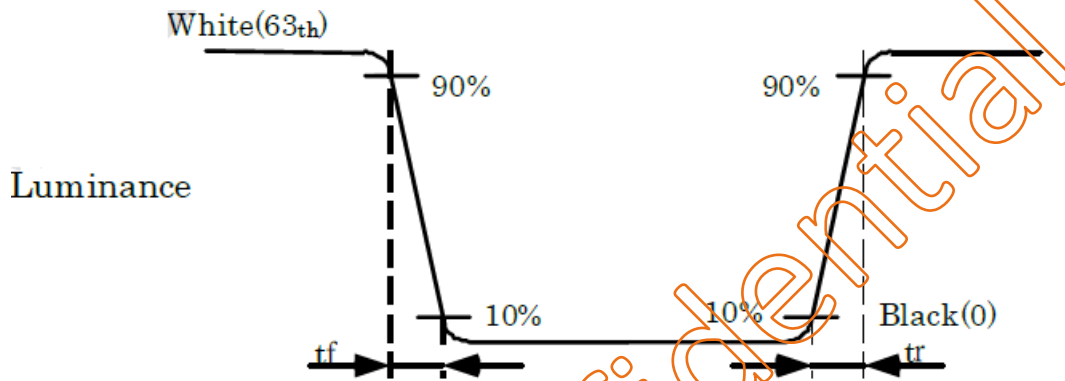


Note 2: Definition of Contrast Ratio (CR)

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:

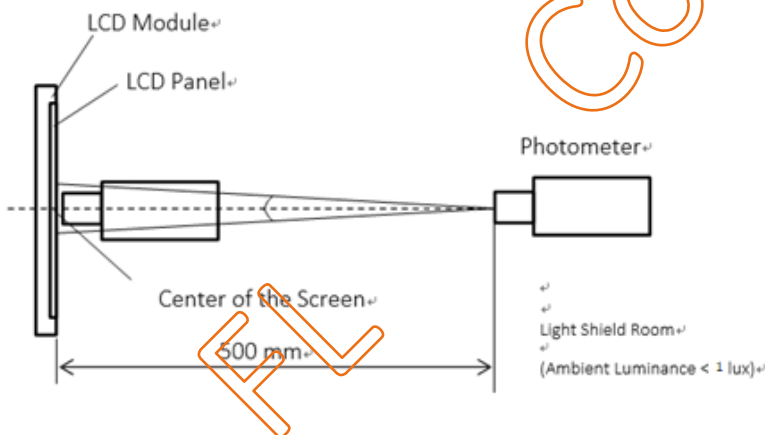
The response time is set initially by defining the "Rising Time ( $t_r$ )" and the "Falling Time ( $t_f$ )" respectively. The response time interval is between 10% and 90% of amplitudes, please refer the figure to the followings:



Note 4: Definition of Brightness ( $L_w$ )

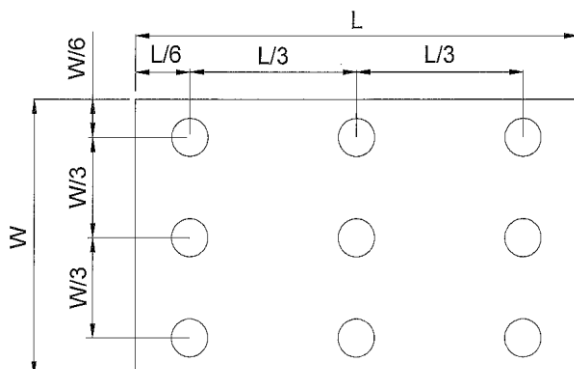
Measure the center area of the panel and the viewing angle of the  $\theta_x = \theta_y = 0^\circ$

Note 5: The method of optical measurement:



Note 6: Definition of Luminance: Measure white luminance on the point 5 as the following ( $\delta W$ ):

$$\Delta L = \frac{\text{Maximum } [L(1), L(2), L(3), L(4), \dots, L(9)]}{\text{Minimum } [L(1), L(2), L(3), L(4), \dots, L(9)]} \times 100$$



# 8. DIMENSION AND DRAWING

### Front VIEW

### Back VIEW

#### LED CN PIN MAP

NO.	Pin Define	Description
1	LED-A	LED Anode
2	LED-A	LED Anode
3	LED-A	LED Anode
4	LED-A	LED Anode
5	NC	No Connection
6	NC 1	NTC thermistor terminal 1
7	NC 2	NTC thermistor terminal 2
8	NC	No Connection
9	LED-K1	LED string 1 Cathode
10	LED-K2	LED string 2 Cathode
11	LED-K3	LED string 3 Cathode
12	LED-K4	LED string 4 Cathode

#### Backlighting circuit :

LED:JA.ZF3014W6SP01  
NTC:NCPT5XH103F05RC

#### LED CN PIN MAP

NO.	Pin Define	NO.	Pin Define	NO.	Pin Define
1	GND	11	ELV1 +	21	GND
2	VCC	12	GND	22	OLV0 -
3	VCC	13	ELV2 -	23	OLV0 +
4	VCC	14	ELV2 +	24	GND
5	VCC	15	GND	25	OLV1 -
6	GND	16	ELV1 -	26	OLV1 +
7	ELV0 -	17	ELV0 +	27	GND
8	ELV0 +	18	GND	28	OLV2 -
9	GND	19	ELV3 -	29	OLV2 +
10	ELV1 -	20	ELV3 +	30	GND
				31	OCLK -
				32	OCLK +
				33	GND
				34	OLV3 -
				35	OLV3 +
				36	GND
				37	RESET
				38	STBYB
				39	GND
				40	SCL
				41	CSB
				42	SDA
				43	ATREN
				44	VOTP
				45	GND
				46	LR
				47	TB
				48	NC
				49	FAULT
				50	NC

#### Customer Approval

Part Number: **FLC-1234ML8000SA1**

Rev	Date	By	Check	Date	Drawn	Checked	Date	Approved By

#### NOTES:

- General tolerance are  $\pm 0.5\text{mm}$
- ROHS Complied

## 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 picture for a long period of time, it may cause image sticking on LCD panel. Can use shuttle 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.

