

# 深圳市友创光显有限公司

## 产品规格书

Product Type: 12.1" TFT LCD Module

LCD Number: YC121FH-A00

MODULE NO. : \_\_\_\_\_

CUSTOMER	PREPARE BY	CHECK BY	APPROVED BY
APPROVED			
SUPPLIER	PREPARE BY	CHECK BY	APPROVED BY
APPROVED			

Preliminary Specification

Final Specification



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## Document Revision History

Change No.	Date	Subject And Reason	Version No.	Responser
1	2017-09-20	New	01	谢建兵

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## 1.0 General Descriptions

### 1.1 Introduction

YC121FH-A00 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, a backlight system, column driver and row driver circuit. This TFT LCD has a 12.1-inch diagonally measured active display area with XGA resolution ( 1024 horizontal by 768 vertical) pixels arrays.

### 1.2 Features

- 12.1" TFT LCD Panel
- LED Backlight System
- Supported XGA 1024x768 pixels resolution
- Compatible with RoHS standard

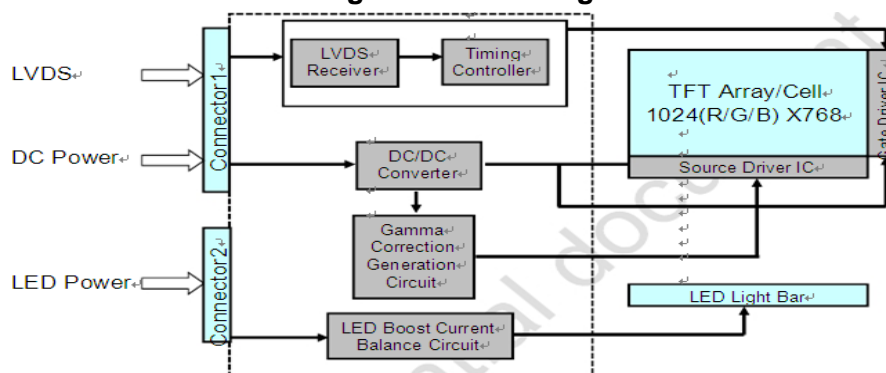
### 1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	12.1	Inch
Active Area	245.76 (H) x184.32 (V)	mm
Pixels H x V	1024(RGB) x768	-
Pixel Pitch	0.24(H)x0.24 (V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Module size	261*204*6.5	mm
White Luminance	350 (TYP)	cd /m <sup>2</sup>
Contrast Ratio	800 (TYP)	-
Response Time	16 (TYP)	msec
Input Voltage	3.3	V
Power Consumption	6.925 (Max)	W
Weight	545 (Max)	g
Outline Dimension	279.0(H) ×209.0(V) ×9.0(D)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	262K/16.7M	-
Optimum Viewing Direction	3 o'clock	-
Surface Treatment	Anti-glare & hardness 3H	-

### 1.4 Functional Block Diagram

Figure 1 shows the functional block diagram of the LCD module.

**Figure 1 Block Diagram**



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## 2.0 Absolute Maximum Ratings

Table 1 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Supply Voltage	V <sub>DD</sub>	-0.5	5	V	(1)
Operating Temperature	T <sub>OP</sub>	-20	70	°C	(1) (2) (3) (4)
Operating Humidity	H <sub>OP</sub>	10	85	%RH	-
Storage Temperature	T <sub>ST</sub>	-30	80	°C	-
Storage Humidity	H <sub>ST</sub>	10	95	%RH	-

Note (1): Humidity: 85%RH Max. (T<=40°C) Note static electricity.

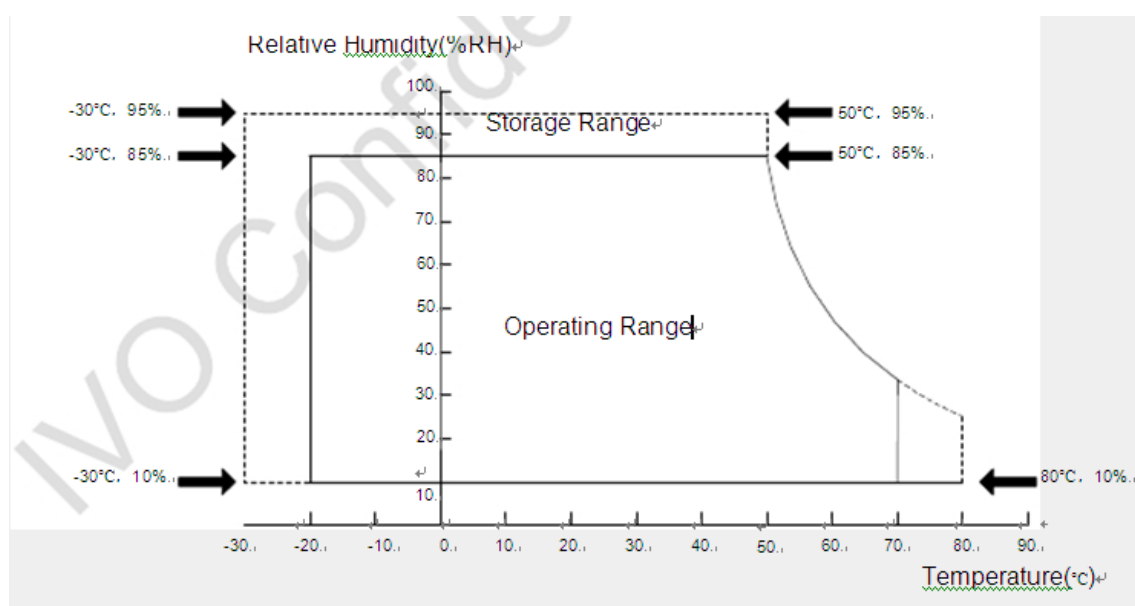
Maximum wet bulb temperature at 39°C or less. (T>40°C) No condensation.

Note (2): There is a possibility of causing deterioration in the irregularity and others of the screen and the display fineness though the liquid crystal module doesn't arrive at destruction when using it at 80~85°C or -20°C.

Note (3): There is a possibility of causing the fineness deterioration by the prolonged use in the (high temperature) humidity environment (60% or more).

Note (4): In the operating temperature item, the low temperature side is the ambient temperature regulations. The high temperature side is the panel surface temperature regulations.

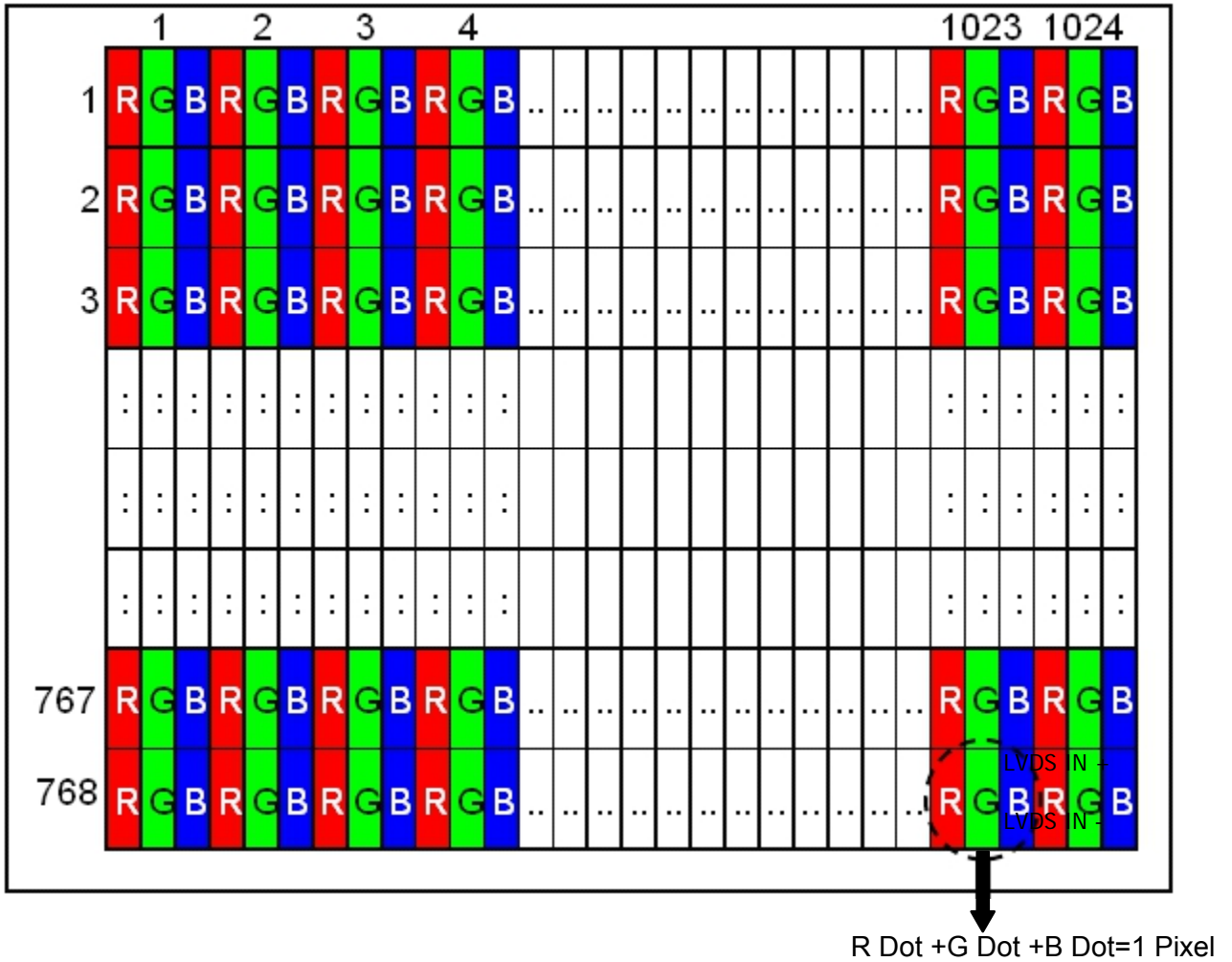
Note (5): Storage Range&Operating Range Picture:



## 3.0 Pixel Format Image

Figure 1 shows the relationship of the input signals and LCD pixel format image.

### Figure 2 Pixel Format



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## 4.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes

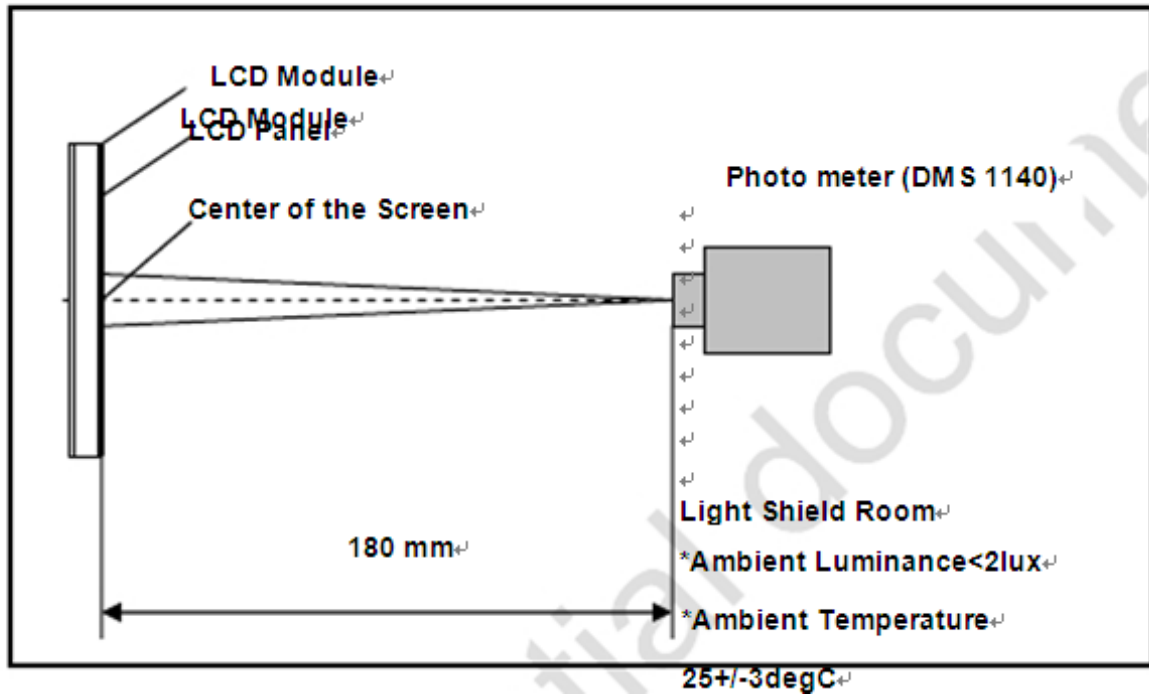
**Table 2 Optical Characteristics**

Item	Conditions	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR>10)	Horizontal	$\theta_{x+}$	70	80	-	degree  (1),(2),(3)
		$\theta_{x-}$	70	80	-	
	Vertical	$\theta_{y+}$	70	80	-	
		$\theta_{y-}$	70	80	-	
Contrast Ratio	Center	720	800	-	-	(1),(2),(4)
Response Time	Rising (90%→10%)	-	4	5.2	ms	(1),(2),(5)
	Falling (10%→90%)	-	12	15.6		
	Rising + Falling	-	16	20.8		
Color Chromaticity (CIE1931)	White x	0.255	0.305	0.355	-	(1),(2)
	White y	0.275	0.325	0.375	-	
	Red x	0.614	0.644	0.674	-	
	Red y	0.314	0.344	0.374	-	
	Green x	0.280	0.310	0.340	-	
	Green y	0.604	0.634	0.664	-	
	Blue x	0.122	0.152	0.182	-	
	Blue y	0.051	0.081	0.111	-	
NTSC		-	72	-	-	
White Luminance	5 Points Average	315	350	-	cd/m <sup>2</sup>	(1),(2),(6)
Luminance Uniformity	9 Points	75	80	-	%	(1),(2),(7)

### Note (1) Measurement Setup:

The LCD module should be stabilized at given temperature(25°C) for 15 minutes to Avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.

**Figure 3 Measurement Setup**



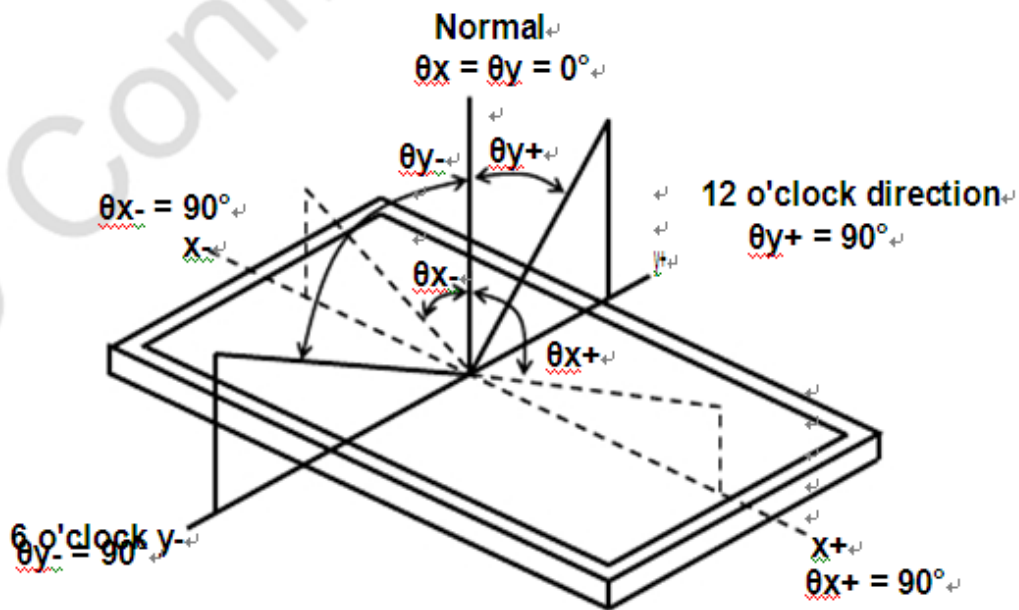
Note (2) The LED input parameter setting as: I\_LED: 500mA

V\_LED: 12V

PWM\_LED: Duty 100%

Note (3) Definition of Viewing Angle

**Figure 5 Definition of Viewing Angle**



Note (4) Definition Of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

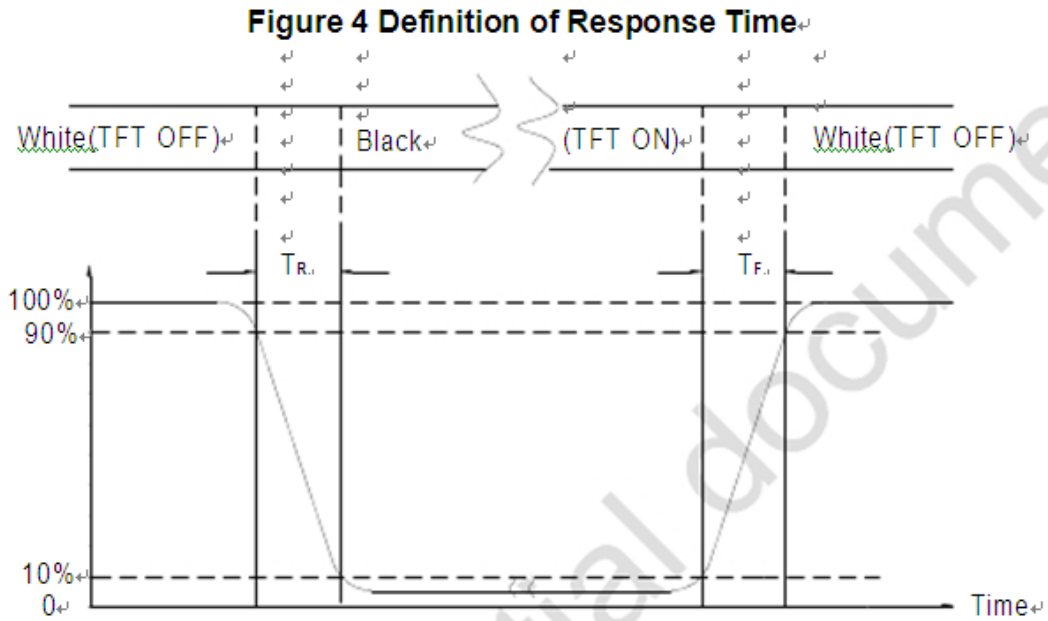
$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

L255: Luminance of gray level L255, L0: Luminance of gray level 0



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Note (5) Definition Of Response Time ( $T_R$ ,  $T_F$ )



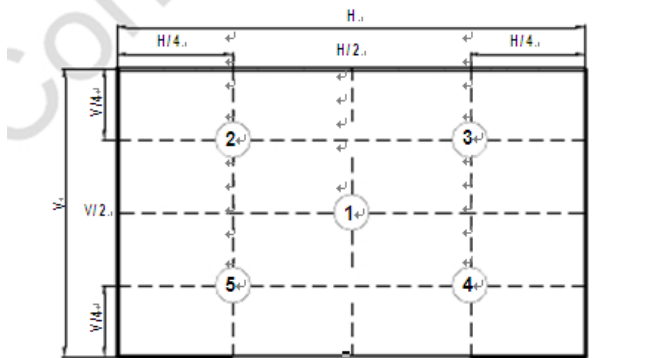
Note (6) Definition Of Luminance White

Measure the luminance of gray level L255 at center point (Ref.: Active Area)

Display Luminance =  $(L_1 + L_2 + L_3 + L_4 + L_5) / 5$

H—Active area length, V—Active area width, L—Luminance

**Figure 5 Measurement Locations Of 5 Points**

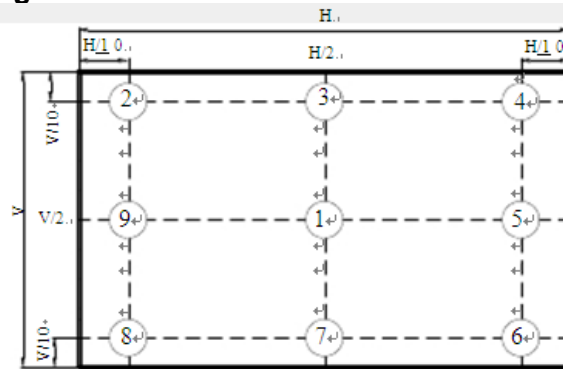


Note (7) Definition Of Luminance Uniformity (Ref.: Active Area)

Measure the luminance of gray level 255 at 9 points.

$$\text{UNF}(9\text{pts}) = \frac{\text{Min}(L_1, L_2, \dots, L_9)}{\text{Max}(L_1, L_2, \dots, L_9)}$$

**Figure 6 Measurement Locations of 9 Points**



## 5.0 Backlight

ITEM	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT	NOTE
LED current	IL	Ta=25°C (35mA/serise)	--	240	--	mA	
LED voltage	VL	Ta=25°C (35mA/serise)	18	19.2	21	V	
Power consumption	WL	Ta=25°C (35mA/serise)	--	4.608	--	W	
LED Lifetime	-	Ta=25°C IF=35mA	30000			Hr	

Remarks:

\*1)LED Circuit Diagram

\*2) A: Anode(+), K: Cathode(-)

\*3) Suggestion: Using the constant current control to avoid the leakage light and brightness quality issue.

\*4) Definition of Led lifetime: Luminance < Initial luminance 50%.

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## 6.0 Electrical Characteristics

### 6.1 Interface Connector

**Table 7 Connector Name / Designation**

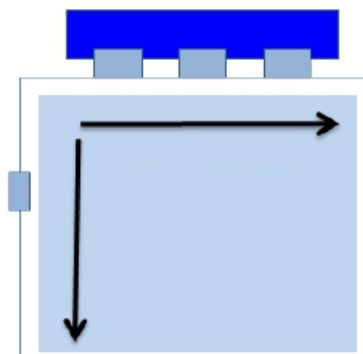
Item	Description
FPC Down Connector ( 20pin pitch=1.25mm )	PCB Jack Connector recommended model: MSB240420HE Manufactured by STM
	PIN IDE Connector model: P240420H

**Table 8 Signal Pin Assignment**

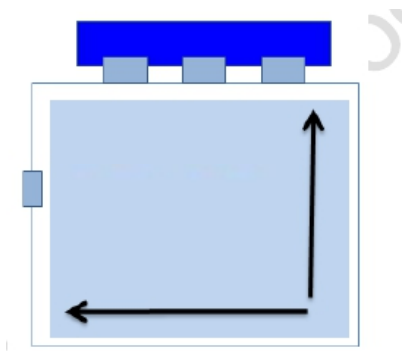
Pin #	Symbol	Description
1	VDD	Power Supply, 3.3V (typical)
2	VDD	Power Supply, 3.3V (typical)
3	VSS	Ground
4	REV	Reverse Scan selection {High: 2.5(min), 3.3(typ), 3.6(max); Low: 0.5(max)}
5	Rin1-	-LVDS differential data input (R0-R5, G0)
6	Rin1+	+LVDS differential data input (R0-R5, G0)
7	VSS	Ground
8	Rin2-	-LVDS differential data input (G1-G5, B0-B1)
9	Rin2+	+LVDS differential data input (G1-G5, B0-B1)
10	VSS	Ground
11	Rin3-	-LVDS differential data input (B2-B5, HS, VS, DE)
12	Rin3+	+LVDS differential data input (B2-B5, HS, VS, DE)
13	VSS	Ground
14	ClkIN-	-LVDS differential clock input
15	ClkIN+	+LVDS differential clock input
16	GND	Ground
17	Rin4-	-LVDS differential data input (R6-R7, G6-G7, B6-B7)
18	Rin4+	+LVDS differential data input (R6-R7, G6-G7, B6-B7)
19	SEL68	6/8 bits LVDS data input selection (H: 8bit L/NC: 6bit)
20	Bist	Internal use

Note(1) : All input signals shall be low or Hi-resistance state when VDD is off.

Note (2) REV = LOW/NC



Note (3) REV = High



## 6.2 LVDS Receiver

### 6.2.1 Signal Electrical Characteristics For LVDS Receiver

The built-in LVDS receiver is compatible with (ANSI/TIA/TIA-644 ) standard.

**Table 6 LVDS Receiver Electrical Characteristics**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	$V_{th}$	-	-	+100	mV	$V_{CM}=+1.2V$
Differential Input Low Threshold	$V_{tl}$	-100	-	-	mV	$V_{CM}=+1.2V$
Magnitude Differential Input Voltage	$ V_{ID} $	100	-	600	mV	-
Common Mode Voltage	$V_{CM}$	$ V_{ID} /2+0.6$	1.2	$1.8- V_{ID} /2$	V	-
Common Mode Voltage Offset	$\Delta V_{CM}$	-	-	50	mV	$V_{CM}=+1.2V$

Note: (1) Input signals shall be low or Hi- resistance state when VDD is off.

(2) All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.

**Figure 9 Voltage Definitions**

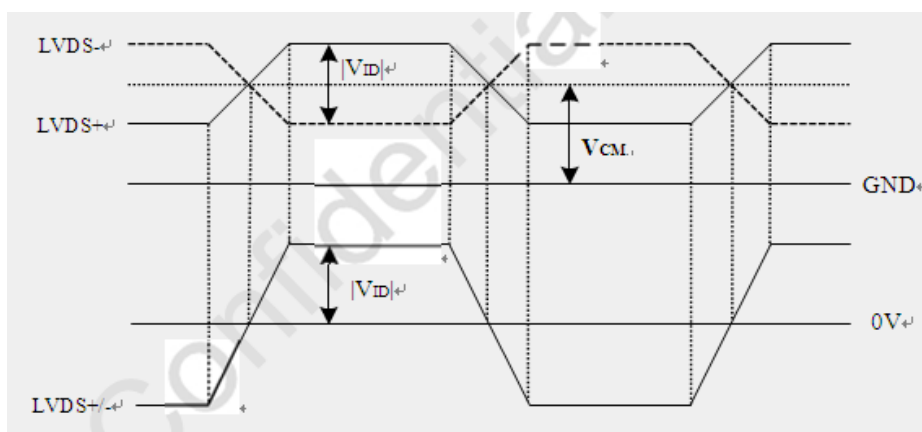


Figure 10 Measurement System

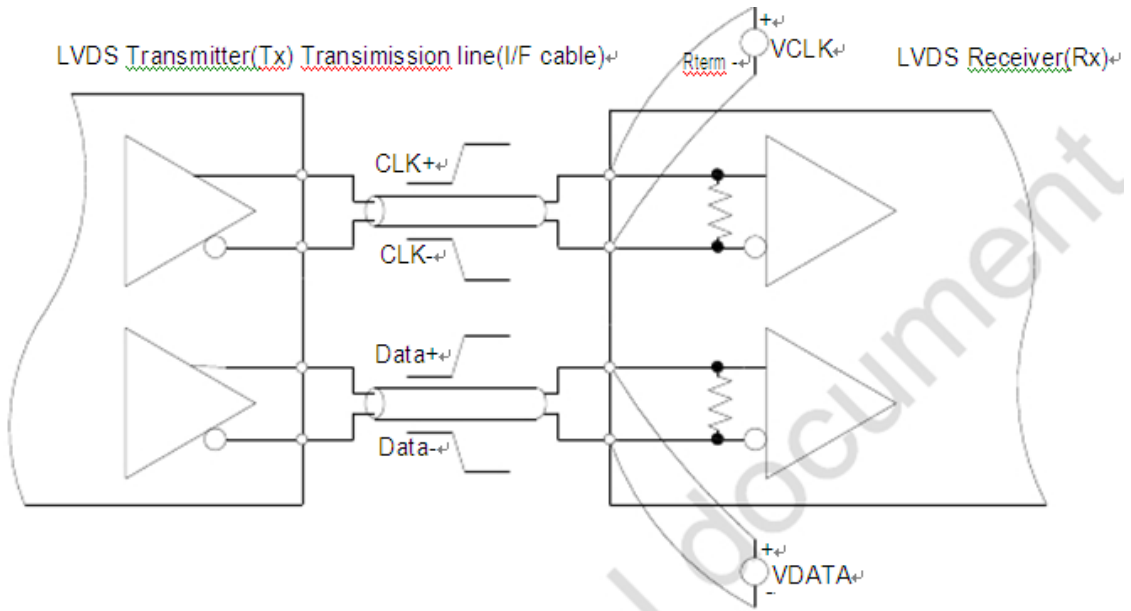


Figure 11 Date Mapping(8 Bit)

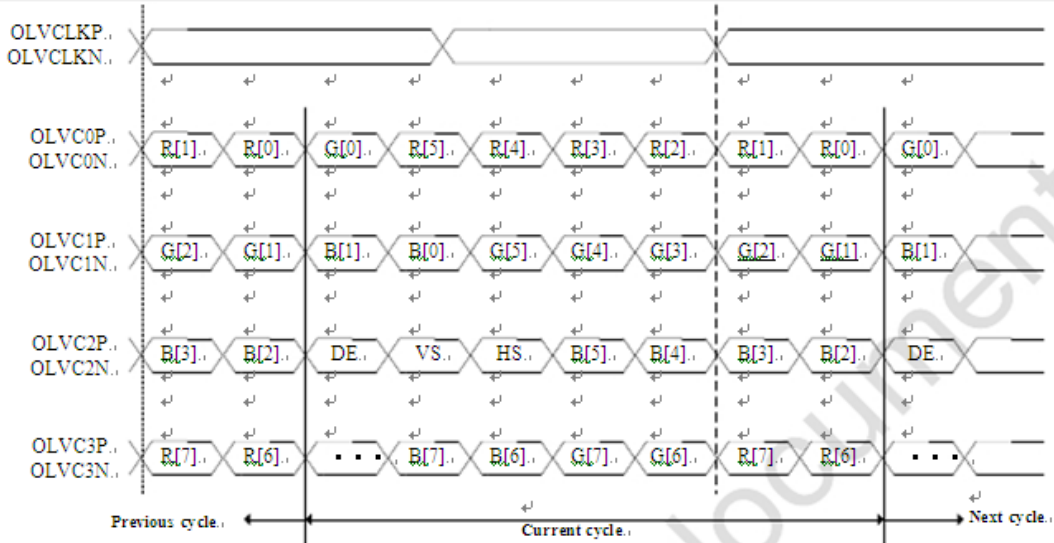


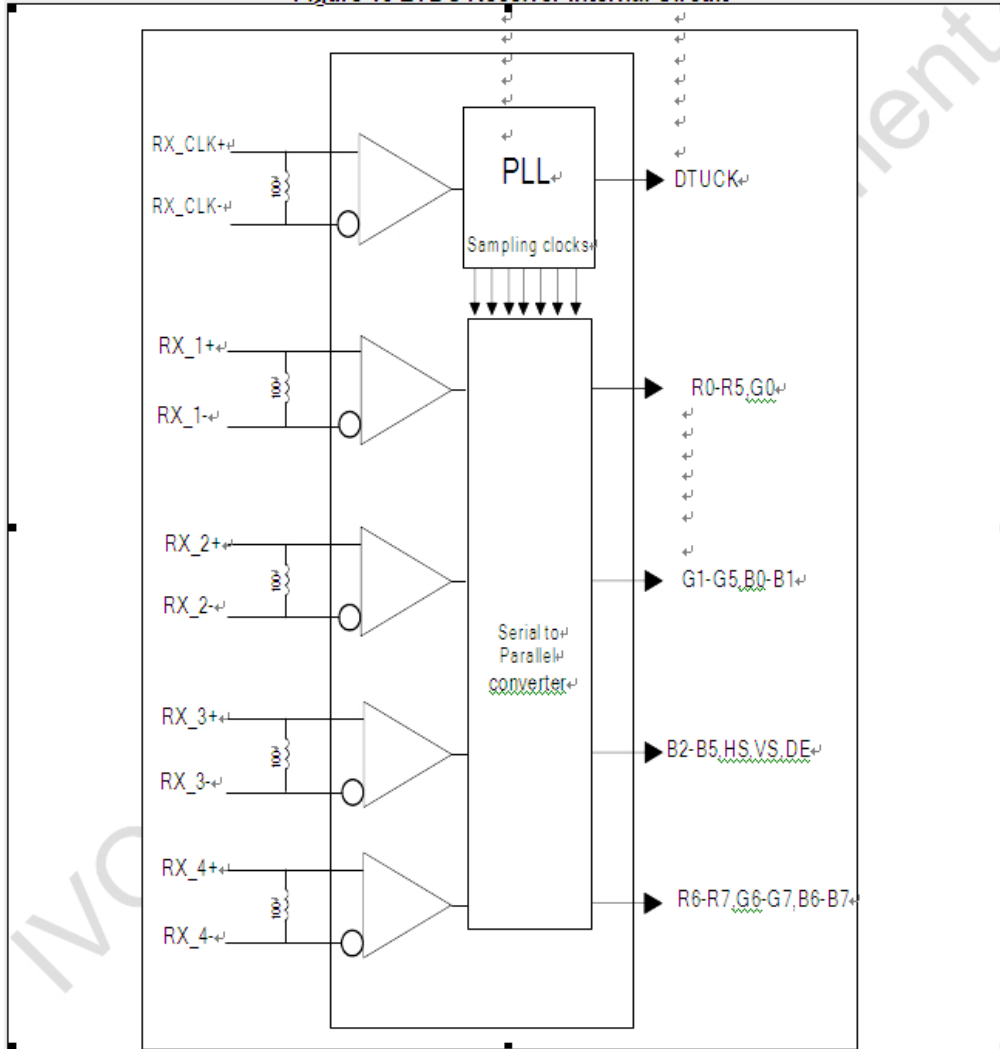
Figure 12 Data Mapping(6 Bit)



## 6.2.2 LVDS Receiver Internal Circuit

Figure 13 LVDS Receiver Internal **Circuit** shows the internal block diagram of the LVDS receiver. This LCD module equips termination resistors for LVDS link.

**Figure 13 LVDS Receiver Internal Circuit**



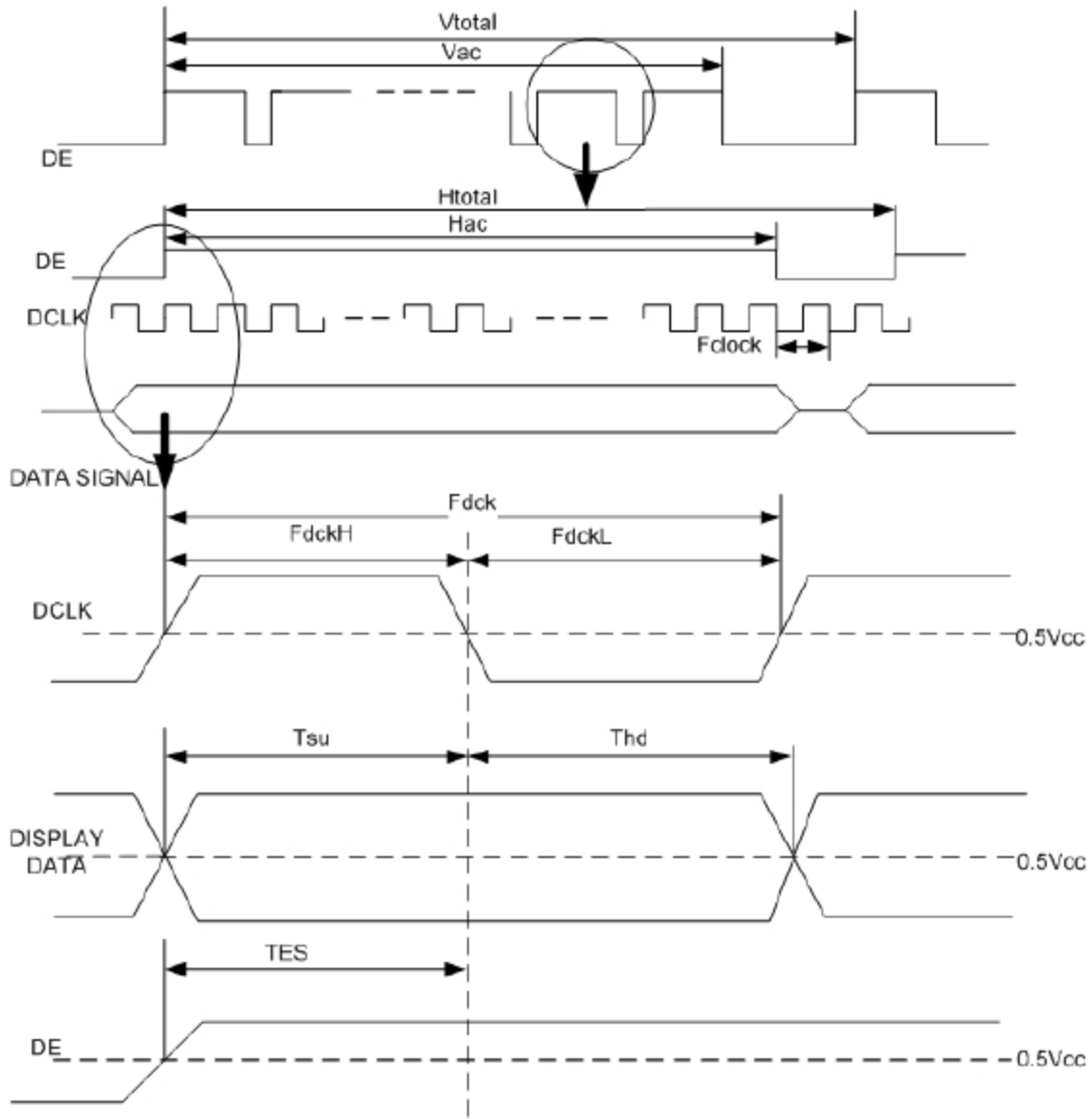
## 7.0 Interface Timings

**Table 7 Interface Timings**

Parameter	Symbol	Unit	Min.	Typ.	Max.
LVDS Clock Frequency	Fclk	MHz	50	65	80
H Total Time	HT	Clocks	1100	1344	2047
H Active Time	HA	Clocks	1024	1024	1024
H Blanking Time	HBL	Clocks	76	320	1023
V Total Time	VT	Lines	776	806	1023
V Active Time	VA	Lines	768	768	768
V Blanking Time	VBL	Lines	8	38	255
Frame Rate	Vsync	Hz	55	60	65

Note: H Blanking Time and V Blanking Time can not be changed at every frame.

Figure 14 Timing Characteristics



## 8.0 Power Consumption

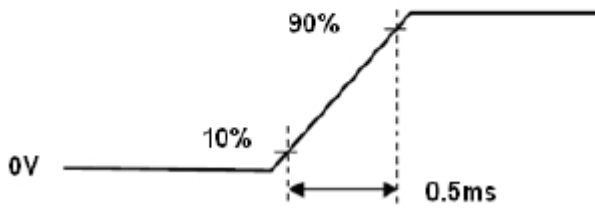
Input power voltage specifications are as follows.

Table 8 Power Voltage

Item	Symbol	Min.	Typ.	Max.	Units	Note	
LCD Drive Voltage (Logic)	VDD	3.0	3.3	3.6	V	(2), (4)	
VDD Current	Black Pattern	IDD	-	-	250	mA	(3),(4),(6)
VDD Power Consumption	Black Pattern	PDD	-	-	0.825	W	
Rush Current	Irush	-	-	3	A	(1),(4),(5)	
Allowable Logic/LCD Drive Ripple Voltage	VDDrp	-	-	200	mV	(4)	

Note (1) Measure Condition

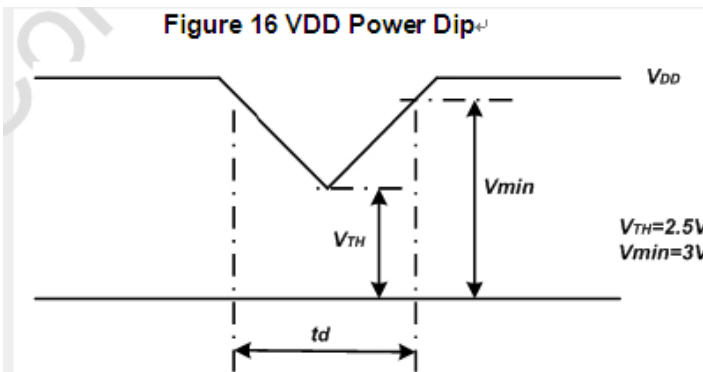
**Figure 15 VDD Rising Time**



Note (2) VDD Power Dip Condition

If  $V_{TH} < V_{DD} \leq V_{min}$ , then  $t_d \leq 10ms$ ; When the voltage returns to normal our panel must revive automatically.

**Figure 16 VDD Power Dip**



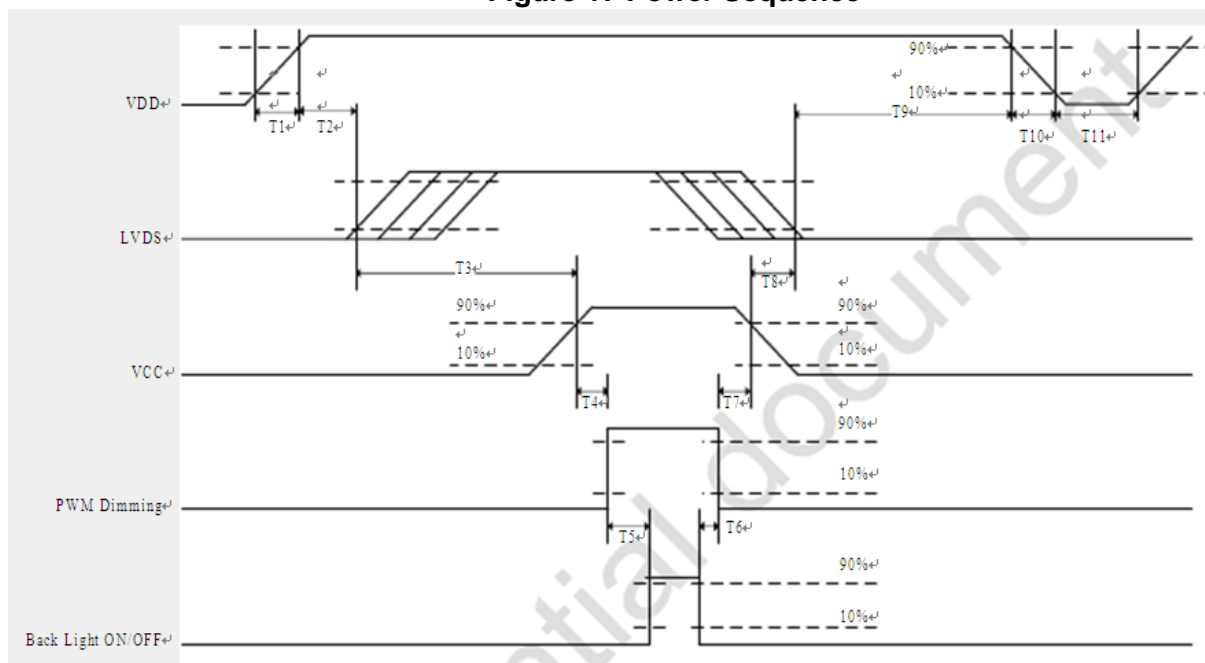
Note (3) Frame Rate=60Hz, VDD=3.3V, DC Current.

Note (4) Operating temperature 25°C, humidity 55%RH.

## 9.0 Power ON/OFF Sequence

Power on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-resistance state or low level when VDD is off.

**Figure 17 Power Sequence**





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**Table 9 Power Sequencing Requirements**

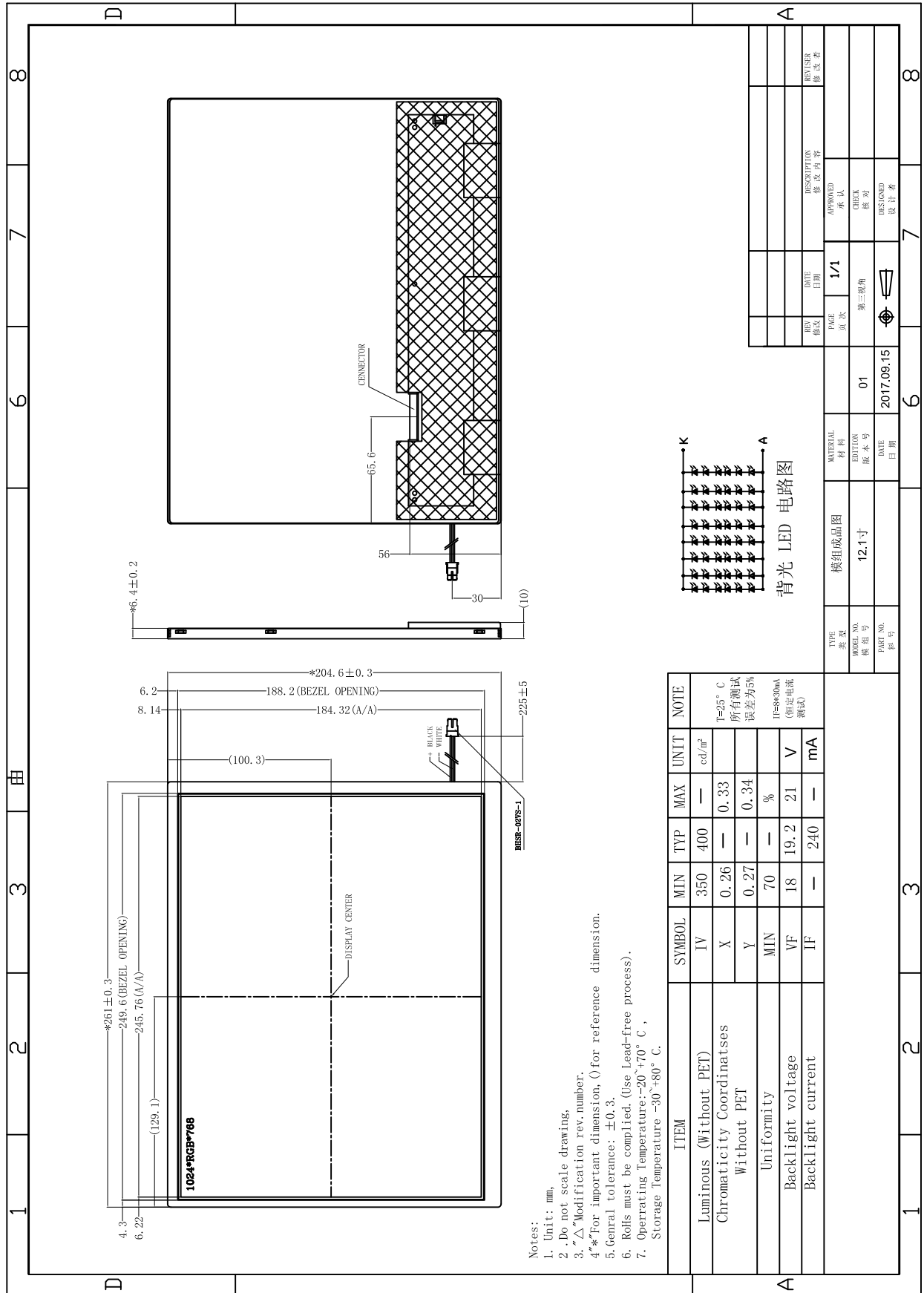
Parameter	Unit	min	typ	max
T1	ms	0.5	-	10
T2	ms	30	40	50
T3	ms	200	-	-
T4	ms	10	-	-
T5	ms	10	-	-
T6	ms	0	-	-
T7	ms	10	-	-
T8	ms	100	-	-
T9	ms	0	16	50
T10	ms	-	-	10
T11	ms	1000	-	-

Note (1) Power On Sequence: VCC-> AVDD -> VGL -> VGH -> Data -> B/L

(2) Power Off Sequence: B/L-> Data -> VGH -> VGL -> AVDD -> VCC

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## 10.0 Mechanical Characteristic



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## 11.0 Reliability Conditions

Item	Package	Test Conditions	Note
High Temperature Operation Test	Module	70°C, 300hrs	1,2,3,4,5,6
Low Temperature Operating Test	Module	-20°C, 300hrs	1,2,3,4,5,6
High Temperature Storage Test	Module	80°C, 300hrs	1,3,4,5,6
Low Temperature Storage Test	Module	-30°C, 300hrs	1,3,4,5,6
High Temp High Humidity Operating Test	Module	50°C, 85%, 300hrs	1,2,3,4,5,6

1. There is no function defect and occurrence of any new defective shall not be allowed.
2. In Operating test, the B/L voltage and current must be in spec.
3. All the judgments are under normal temperature and the sample need to be static more than 2 hours in the normal temperature before judge.
4. During measurement, the condensation water or remains shall not be allowed.
5. The minimum sample quantity of test is 3pcs.
6. There is no display function fail issue occurred, all the cosmetic specification is judged before the reliability stress.

## 12.0 General Precaution

### 12.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

### 12.2 Handling Precaution

- (1) Please mount LCD module by using mounting holes arranged in four corners tightly.
- (2) Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. IVO does not warrant the module, if customers disassemble or modify the module.
- (3) If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid Crystal, and do not contact liquid crystal with skin. If liquid crystal contacts mouth or eyes, rinse out with water immediately. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and Rinse thoroughly with water.
- (4) Disconnect power supply before handling LCD module
- (5) Refrain from strong mechanical shock and /or any force to the module.
- (6) Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature; etc otherwise LCD module may be damaged. It's recommended employing protection circuit for power supply.
- (7) Do not touch, push or rub the polarizer with anything harder than HB pencil lead. Use fingerstalls of soft gloves in order to keep clean display quality, when Persons handle the LCD module for incoming inspection or assembly.
- (8) When the surface is dusty, please wipe gently with absorbent cotton or other soft Material. When cleaning the adhesives, please use absorbent cotton wetted with a little Petroleum benzene or other adequate solvent.
- (9) Wipe off saliva or water drops as soon as possible. If saliva or water drops Contact with polarizer for a long time, they may causes deformation or color Fading.

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- (10) Protection film must remove very slowly from the surface of LCD module to Prevent from electrostatic occurrence.
- (11) Because LCD module uses CMOS-IC on circuit board and TFT-LCD panel, it is Very weak to electrostatic discharge, Please be careful with electrostatic Discharge .Persons who handle the module should be grounded through adequate methods.
- (12) Do not adjust the variable resistor located on the module.

## **12.3 Storage Precaution**

- (1) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
- (2) The module shall not be exposed under strong light such as direct sunlight. Otherwise, Display characteristics may be changed.
- (3) The module should be stored in a dark place. It is prohibited to apply sunlight or fluorescent light in storage.

## **12.4 Operation Precaution**

- (1) Do not connect or disconnect the module in the "Power On" condition.
- (2) Power supply should always be turned on/off by "Power on/off sequence"
- (3) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference should be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.
- (4) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.

## **12.5 Others**

- (1) Ultra-violet ray filter is necessary for outdoor operation.
- (2) Avoid condensation of water which may result in improper operation or disconnection of electrode.
- (3) If the module keeps displaying the same pattern for a long period of time, the image may be "sticked" to the screen.
- (4) This module has its circuitry PCB's on the rear side and should be handled carefully in order not to be stressed.

## **12.6 Disposal**

When disposing LCD module, obey the local environmental regulations.