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晶采光電科技股份有限公司  
**AMPIRE CO., LTD.**

# SPECIFICATIONS FOR LCD MODULE

<b>CUSTOMER</b>	
<b>CUSTOMER PART NO.</b>	
<b>AMPIRE PART NO.</b>	<b>AM-800480AYTZQW-B0H</b>
<b>APPROVED BY</b>	
<b>DATE</b>	

- Approved For Specifications
- Approved For Specifications & Sample

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**RECORD OF REVISION**

Revision Date	Page	Contents	Editor
2016/06/07 2016/7/6	--	New Release Update Outline dimension drawing	Alan Kokai

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### 1.0 General Descriptions

#### 1.1 Features

- 7 inch (16:9 diagonal) configuration
- 16.7M colors ( R , G , B, 8bit digital each)
- RoHS

#### 1.2 Product Summary

NO	Item	Specification	Remark
1	LCD Size	7.0 inch (Diagonal)	
3	Resolution	800 x 3 (RGB) x 480	
4	Display Mode	Normally Black.	
5	Pixel pitch	0.1926 (W) x 0.179(H) mm	
6	Active area	154.08(W) x 85.92(H) mm	
7	Module Size	164.9(W) x 100.0(H) x 5.7(T) mm	Note 1
8	LCD Surface treatment	Anti-Glare	
9	Color arrangement	RGB-stripe	
10	Luminance	555 Cd/m <sup>2</sup>	Cd/m <sup>2</sup>
11	Viewing Direction	All direction	

(Note1) Refer to the mechanical drawing.

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**2.0 Absolute Maximum Ratings**

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Power voltage	VCC	-0.5	3.96	V	GND=0V
Power voltage of LED Driver IC	VLED	-0.3	6	V	GND=0V
Voltage range at any terminal		-0.5	VCC+0.3	V	

**2.1 Environment Absolute Rating**

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	Topa	-20	70	°C	
Storage Temperature	Tstg	-30	80	°C	

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**3.0 Optical Specifications**

Item	Conditions		Min.	Typ.	Max.	Unit	Note		
Viewing Angle (CR>10)	Horizontal	$\theta_L$	(80)	(88)	-	degree	(1),(2),(3)		
		$\theta_R$	(80)	(88)	-				
	Vertical	$\theta_U$	(80)	(88)	-				
		$\theta_D$	(80)	(88)	-				
Contrast Ratio	Center		(700)	(900)	-	-	(1),(2),(4) $\theta_x=\theta_y=0^\circ$		
Response Time	Rising + Falling		-	(30)	(40)	ms	(1),(2),(5) $\theta_x=\theta_y=0^\circ$		
Color Chromaticity (CIE1931)	Red	x	Typ (+0.05)	(0.633)	Typ (+0.05)	-	(1),(2),(3) $\theta_x=\theta_y=0^\circ$		
	Red	y		(0.329)		-			
	Green	x		(0.320)		-			
	Green	y		(0.613)		-			
	Blue	x		(0.150)		-			
	Blue	y		(0.053)		-			
	White	x		Typ.		(0.308)		Typ.	-
	White	y		(-0.05)		(0.332)		(+0.05)	-
NTSC	-		--	(70)	-	%	(1),(2),(3) $\theta_x=\theta_y=0^\circ$		
White Luminance	Center Point		(450)	(555)	-	cd/m <sup>2</sup>	(1),(2),(6) $\theta_x=\theta_y=0^\circ$		

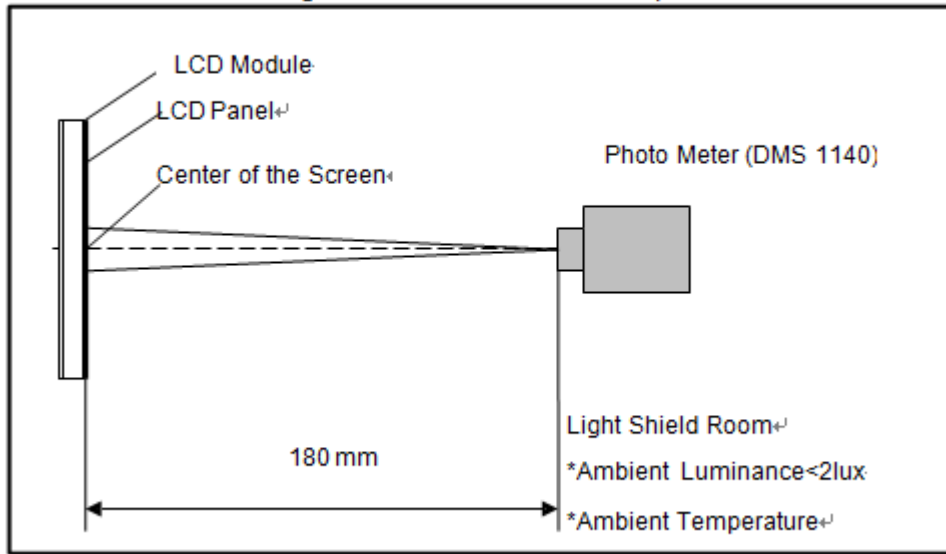
Note (1) Measurement Setup:

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.

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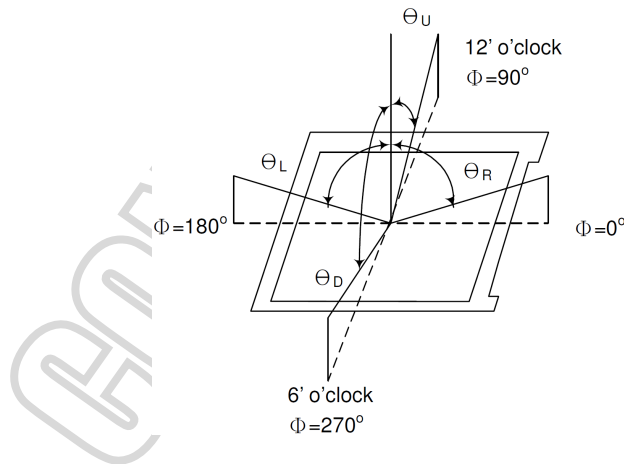
Figure 3 Measurement Setup



Note (2) The LED input parameter setting as:

$I_{LED}$ : 180mA

Note (3) Definition of Viewing Angle



Note (4) Definition Of Contrast Ratio (CR)

The contrast ratio can be calculated by the following

expression: Contrast Ratio (CR) =  $L_{255} / L_0$

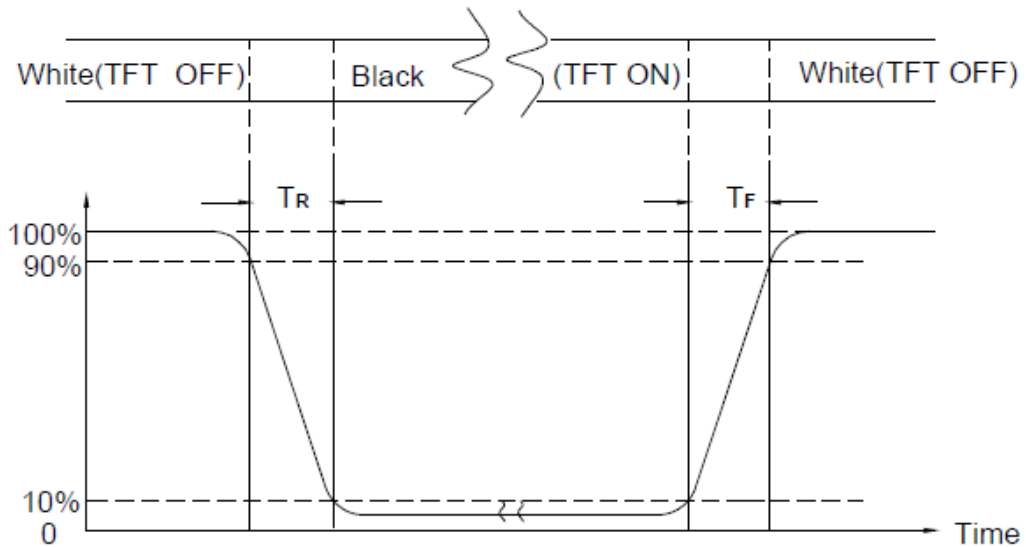
$L_{255}$ : Luminance of gray level 255,  $L_0$ : Luminance of gray level 0

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

**Figure 5 Definition of Response Time**



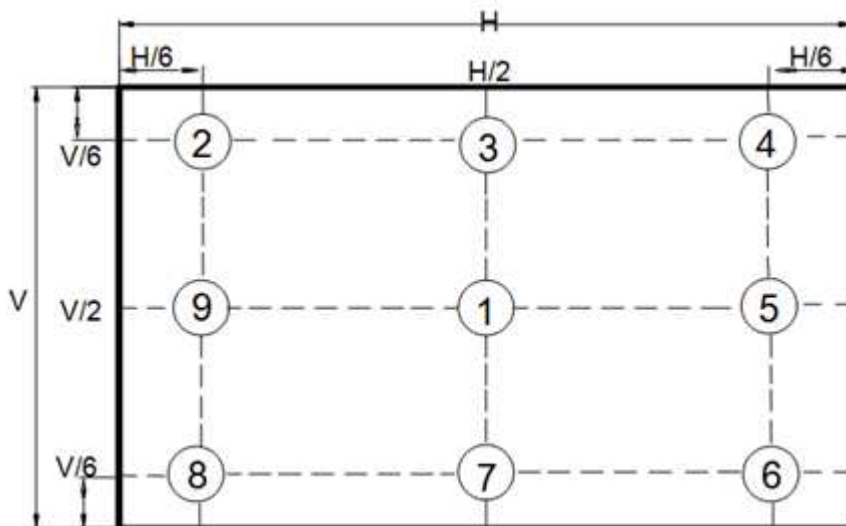
Note (6) Definition of Luminance Uniformity (Ref.: Active Area)

Measure the luminance of gray level 255 at 9 points.

$$\text{Luminance Uniformity} = \text{Min.}(L1, L2, \dots L9) / \text{Max.}(L1, L2, \dots L9)$$

H—Active Area Width, V—Active Area Height, L—Luminance

**Figure 6 Measurement Locations of 9 Points**



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## 4.0 Interface

Pin No	Symbol	Function
1	GND	Power Ground
2	GND	Power Ground
3	Vcc	Power Supply for LCD
4	Vcc	Power Supply for LCD
5	PD16	Data 16 → Red 0
6	PD17	Data 17 → Red 1
7	PD18	Data 18 → Red 2
8	PD19	Data 19 → Red 3
9	PD20	Data 20 → Red 4
10	PD21	Data 21 → Red 5
11	PD22	Data 22 → Red 6
12	PD23	Data 23 → Red 7
13	PD8	Data 8 → Green 0
14	PD9	Data 9 → Green 1
15	PD10	Data 10 → Green 2
16	PD11	Data 11 → Green 3
17	PD12	Data 12 → Green 4
18	PD13	Data 13 → Green 5
19	PD14	Data 14 → Green 6
20	PD15	Data 15 → Green 7
21	PD0	Data 0 → Blue 0
22	PD1	Data 1 → Blue 1
23	PD2	Data 2 → Blue 2
24	PD3	Data 3 → Blue 3
25	PD4	Data 4 → Blue 4
26	PD5	Data 5 → Blue 5
27	PD6	Data 6 → Blue 6
28	PD7	Data 7 → Blue 7
29	GND	Power Ground
30	DCLK	Clock Signals
31	NC	NC
32	Hsync	Horizontal SYNC. (Sync mode used)
33	Vsync	Vertical SYNC. (Sync mode used)
34	DE	Data Enable
35	VLED	Power Supply for Backlight : 5V
36	VLED	
37	GND	Power Ground
38	GND	Power Ground
39	VLEDADJ	LED PWM Signal
40	VLEDADJ	



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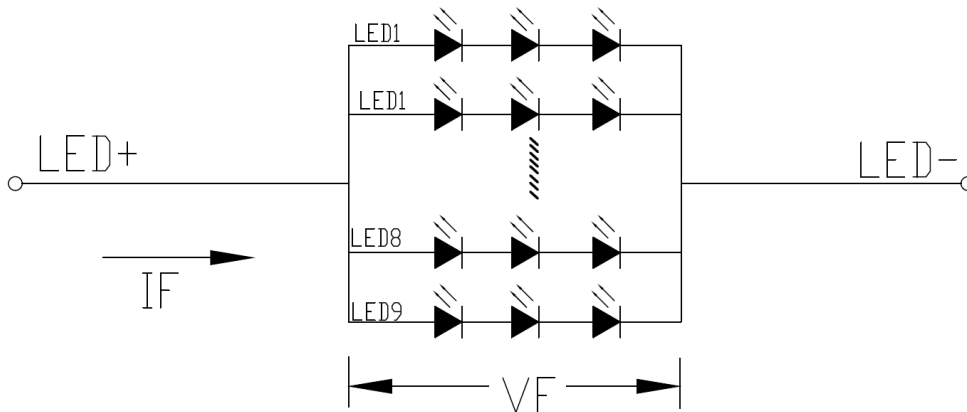
## 5. Backlight Unit

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Driver Voltage	VLED	4.5	5.0	5.5	V	
Power Supply Current For LED Driver	ILED	-	380	-	mA	VLED=5V VADJ=3.3V (duty 100%)
ADJ Input Voltage	V <sub>ADJ</sub>	-	3.3	-	V	duty=100% Note(1)
LED voltage	V <sub>BL</sub>	9.0	9.3	9.6	V	IBL=180mA
LED current	IBL	--	180	--	mA	Ta=25°C
LED Life Time	-	--	20K	--	Hour	

Note (1) The constant current source is needed for white LED back-light driving.

When LCM is operated over 60 deg.C ambient temperature, the I<sub>LED</sub> of the LED back-light should be adjusted to 135mA max

Note (2) Brightness to be decreased to 50% of the initial value(Ta=25°C).



Note (3) VLEDADJ is PWM signal input. It is for brightness control.

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
ADJ signal frequency	f <sub>PWM</sub>	100	--	50K	Hz
ADJ signal logic level High	V <sub>IH</sub>	2V	--	VLED (5.0V)	V
ADJ signal logic level Low	V <sub>IL</sub>	0	--	0.5	V

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## 6.ELECTRICAL CHARACTERISTICS

### TTL mode AC electrical characteristics

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
VDD Power on alew rate	TPOR	From 0V to 90% VDD	-	-	20	ms
GRB pulse width	TGRB	DCLK=65MHz	50	-	-	μs
DCLK cycle time	Tcph	-	14	-	-	ns
DCLK pulse duty	Tcwh	-	40	50	60	%
VSD setup time	Tvst	-	5	-	-	ns
VSD hold time	Tvhd	-	5	-	-	ns
HSD setup time	Thst	-	5	-	-	ns
HSD hold time	Thhd	-	5	-	-	ns
Data setup time	Tdsu	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
Data hold time	Tdhd	D0[7:0], D1[7:0], D2[7:0] to DCLK	5	-	-	ns
DE setup time	Tesu	-	5	-	-	ns
DE hold time	Tehd	-	5	-	-	ns
Output stable time	Tsst	10% to 90% target voltage. CL=90pF, R=10K. <b>(Cascade)</b>	-	-	6	μs
		Dual gate			3	

Table 4.2 AC electrical characteristics

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## 7. Timing Chart

### 7.1

TTL mode data input format

Vertical timing

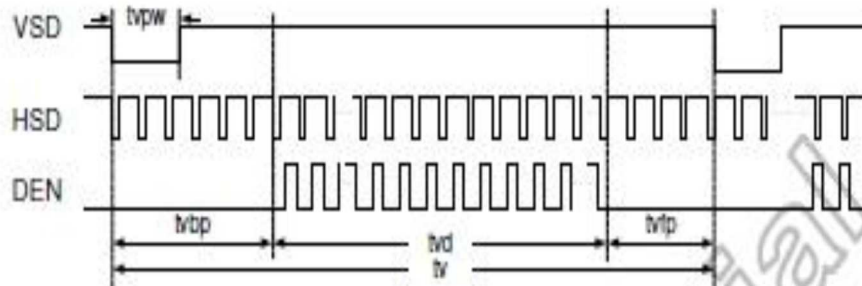


Figure 5.1.1: Vertical input timing diagram

Horizontal timing

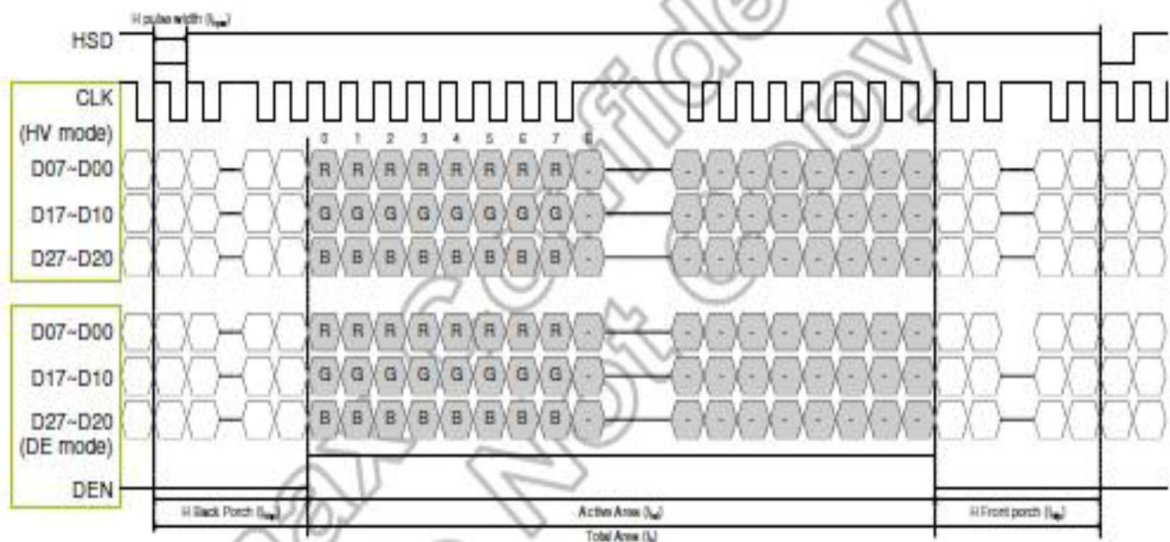


Figure 5.1.2: Horizontal input timing diagram

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## 7.2 Parallel RGB input timing table

### DE mode

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	26.2	29.2	54.6	MHz
Horizontal display area	thd		800		DCLK
HSD period	th	890	928	1300	DCLK
HSD blanking	thb+ thfp	90	128	500	DCLK
Vertical display area	tvd		480		T <sub>H</sub>
VSD period	tv	490	525	700	T <sub>H</sub>
VSD blanking	tvbp+ tvfp	10	45	220	T <sub>H</sub>

### HV mode

#### Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK frequency	fclk	27.7	29.2	39.6	MHz
Horizontal display area	thd		800		DCLK
HSD period	th	900	928	1100	DCLK
HSD pulse width	thpw	1	-	40	DCLK
HSD back porch	thbp		88		DCLK
HSD front porch	thfp	12	40	212	DCLK

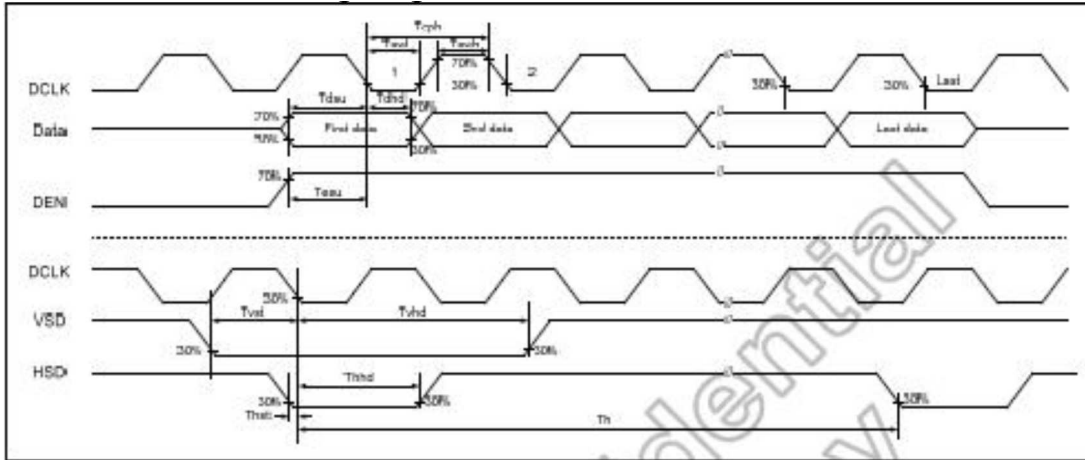
#### Vertical timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd		480		T <sub>H</sub>
VSD period	tv	513	525	600	T <sub>H</sub>
VSD pulse width	tvpw	1	-	3	T <sub>H</sub>
VSD back porch	tvbp		32		T <sub>H</sub>
VSD front porch	tvfp	1	13	88	T <sub>H</sub>

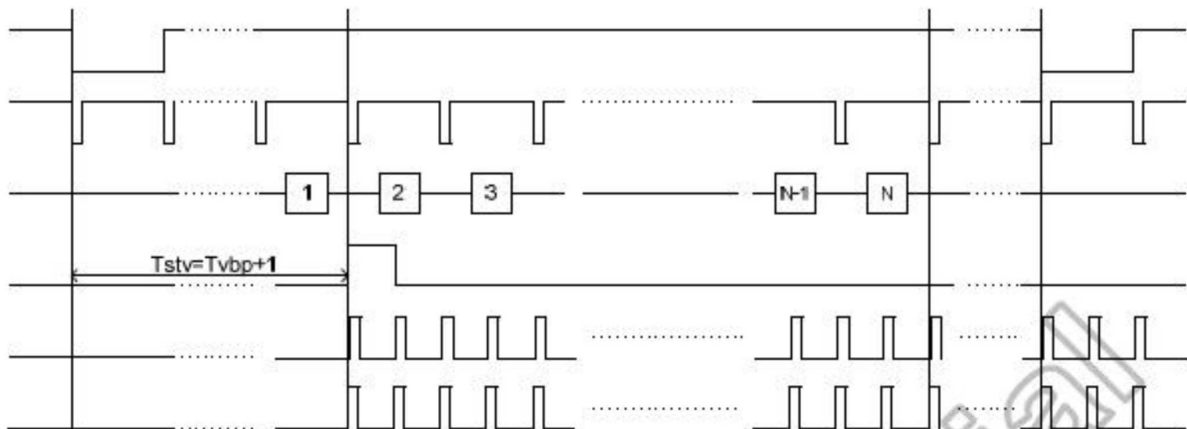
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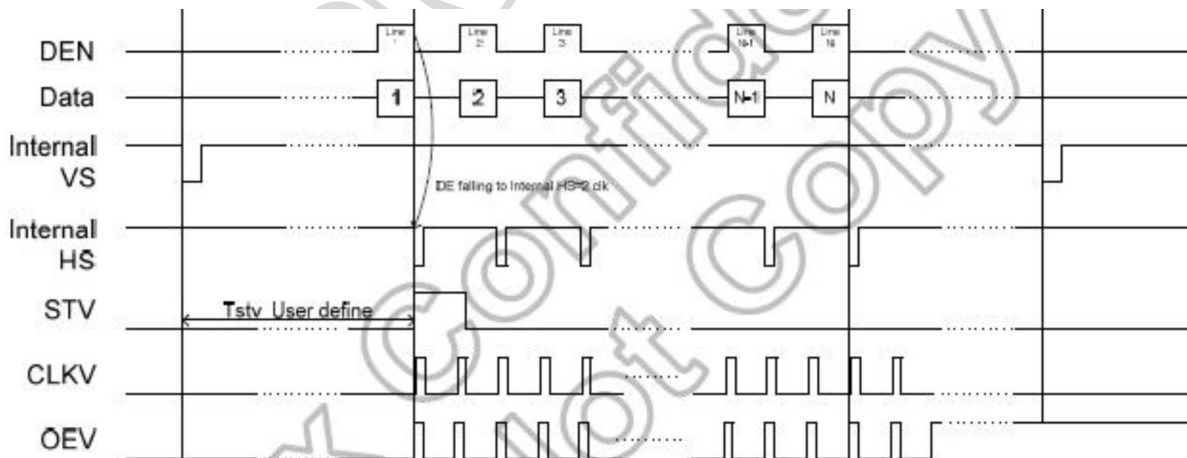
**7.3 Input clock and data timing diagram**



**7.4 Vertical timing diagram HV(dual gate)**



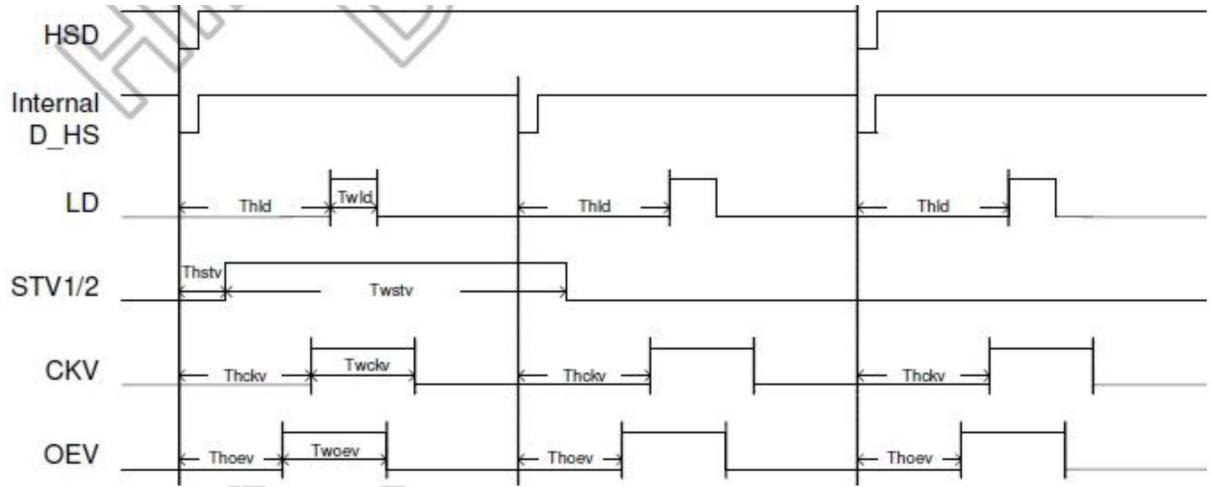
**7.5 Vertical timing diagram DE(dual gate)**



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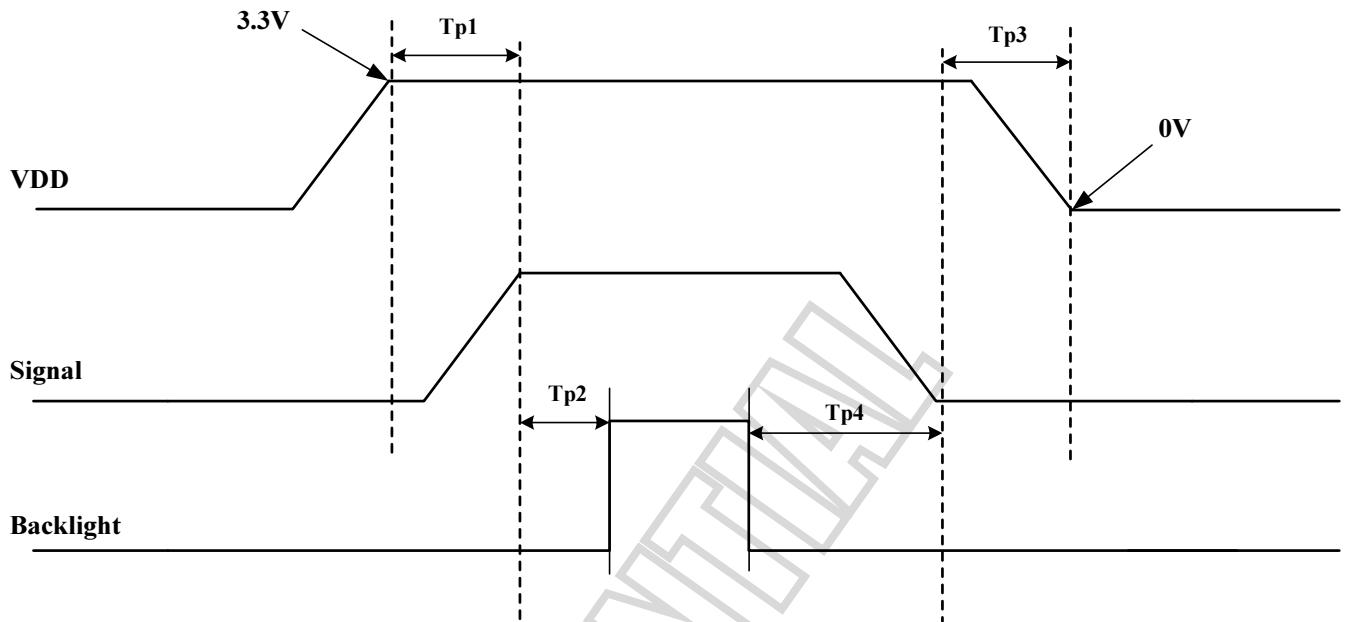
**7.6 Gate output timing diagram(dual gate)**



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### 7.7 Power On / Off Sequence



Item	Symbol	Value			Units	Remark
		Min.	Typ.	Max.		
VDD on to signal starting	$T_{p1}$	5	-	50	ms	
Signal starting to backlight on	$T_{p2}$	150	-	-	ms	
Signal off to VDD off	$T_{p3}$	5	-	50	ms	
Backlight off to signal off	$T_{p4}$	150	-	-	ms	

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**8 .Reliability Test Items**

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=240 hrs	
Low Temperature Operation	-20±3°C , t=240 hrs	
High Temperature Storage	80±3°C , t=240 hrs	1,2
Low Temperature Storage	-30±3°C , t=240 hrs	1,2
Storage at High Temperature and Humidity	60°C, 90% RH , 240 hrs	1,2
Thermal Shock Test	-30°C (30min) ~ 80°C (30min) 100 cycles	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2

Note 1 : Condensation of water is not permitted on the module.

Note 2 : The module should be inspected after 1 hour storage in normal conditions (15-35°C , 45-65%RH).



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### **9.0 General Precaution**

#### **9.1 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.

#### **9.2 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.
- (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.

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### **9.3 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.

### **9.4 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.

### **9.5 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.
- (5) Do not keep the LCD at the same display pattern continually. The residual image will happen and it will damage the LCD. Please use screen saver.

### **9.6 Disposal**

When disposing LCD module, obey the local environmental regulations.

