

# **2.8" TFT LCD with Touch Screen**

## **SPECIFICATION**

**Model Name: ELT240320TP**  
**Date: 2007-10-10**  
**Version: 0.4**

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**1.Mechanical Specification:**

<b>Item</b>	<b>Standard Value</b>	<b>Unit</b>
Display size	2.8	inch
Module Dimension	H/W/D 69.2x50 x4.2	mm
Active Area	W/H 43.2x57.6	mm
Number of Dots	W/RGB/H 240x3x320	Dot
Pixel size	W/H 0.18x0.18	mm
LCD Type	TFT/ Transmissive / Negative	-
Driving IC	ILI9320	
Approx. Weight	TBD	g
Various color Display	65K	
	262K	
Backlight Color	White	
Brightness(cd/m <sup>2</sup> )	220(typ.)/210(Min.)	

**Application Product**

- Embedded Electronics Product
- Advertising Display Product
- Mobile phone
- MP4,PDA
- AV Product

## 2. Absolute Maximum Ratings:

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply Voltage for Logic	V <sub>CC</sub>	-0.3	-	+4.6	V	-
Input voltage	V <sub>in</sub>	-0.5	-	V <sub>DD</sub> +0.5	V	-
Operating Temperature	T <sub>OP</sub>	-20	-	+60	°C	-
Storage Temperature	T <sub>ST</sub>	-30	-	+70	°C	-

## 3. Electrical Characteristics:

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage for Logic	V <sub>DD</sub>	T <sub>a</sub> =25°C	2.5	2.8	3.3	V
Power input voltage	V <sub>ci</sub>	-	2.5	-	3.3	V
High-level input voltage	V <sub>IHC</sub>	V <sub>DD</sub> =2.8V	0.8V <sub>DD</sub>	-	V <sub>DD</sub>	V
Low-level input voltage	V <sub>ILC</sub>	V <sub>DD</sub> =2.8V	0	-	0.2V <sub>DD</sub>	V
TFT gate on voltage	V <sub>GH</sub>	V <sub>DD</sub> =2.8V	-	15	-	V
TFT gate off voltage	V <sub>GL</sub>	V <sub>DD</sub> =2.8V	-	-10	-	V
TFT common electrode voltage	V <sub>comH</sub>	-	2.5	-	4	V
	V <sub>comL</sub>	-	-1.5	-	0	V
Consumption current of V <sub>DD</sub>	I <sub>DD</sub>	Electric VR Value=TBD	-	2.5	4	mA
Power Supply Current for V <sub>DD</sub>	I <sub>DD</sub>	V <sub>DD</sub> =2.8V	-	-	7	mA

#### 4. Optical Characteristics:

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
View Angle (V)	$\theta$	Center	-10	-	35	Deg.
View Angle (H)	$\phi$	CR>10	-45	-	45	Deg.
Contrast Ratio	CR	Ta=25°C	150	300	-	-
Response Time(Rise)	Tr	-	-	10	-	ms
Response Time(Fall)	Tf	-	-	15	-	ms

#### Color of CIE Coordinate

Item	Symbol	Condition	Min	Typ	Max	Note
Color of CIE Coordinate	Red	x	0.635	0.655	0.675	Color of CIE Coordinate
		y	0.309	0.329	0.349	
	Green	x	0.292	0.312	0.332	
		y	0.555	0.575	0.595	
	Blue	x	0.114	0.134	0.154	
		y	0.115	0.135	0.155-	
	White	x	0.290	0.310	0.330	
		y	0.321	0.341	0.361	

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### Notes :

1. Contrast Ratio(CR) is defined mathematically as :

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

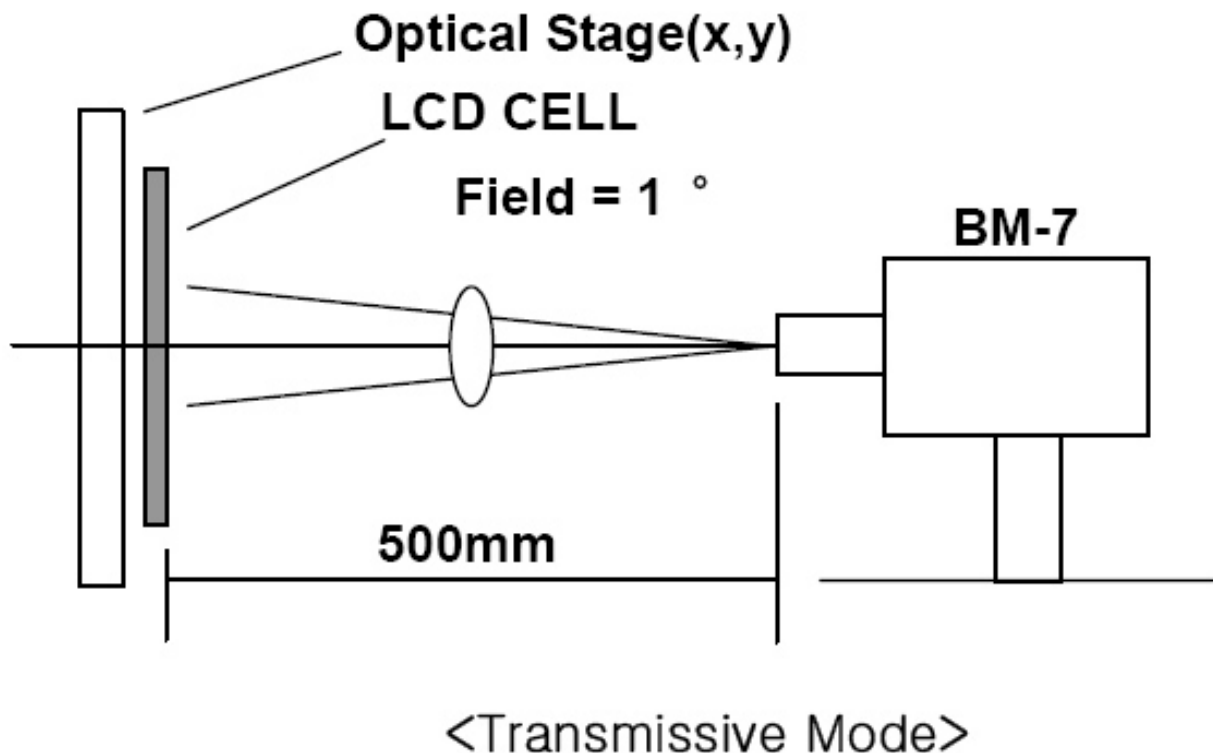
2. Surface luminance is the center point across the LCD surface 500mm from the surface with all pixels displaying white. For more information see FIG 1.

3. Response time is the time required for the display to transition from to black(Rise Time, TrR) and from black to white(Decay Time, TrD). For additional information see FIG 3.

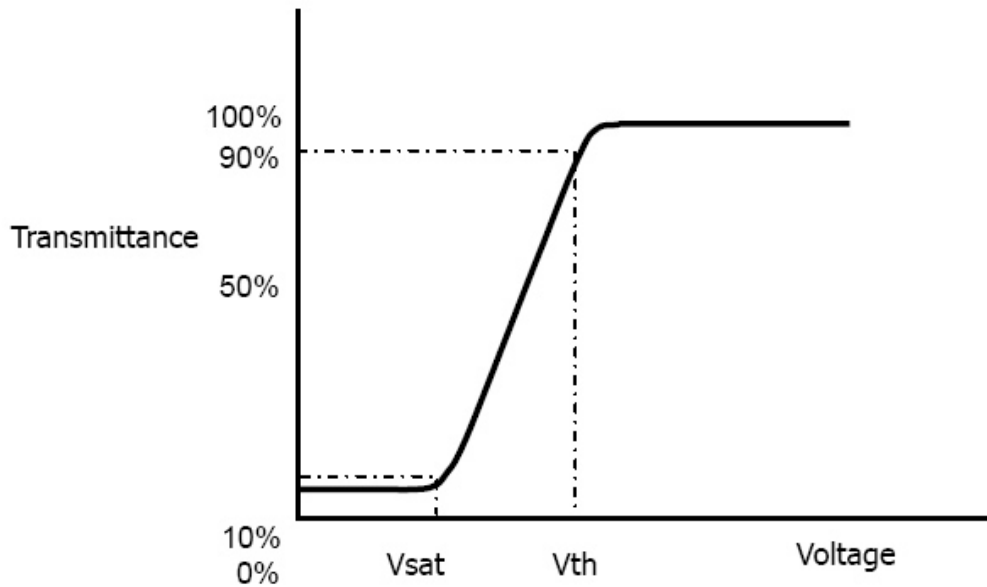
4. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface. For more information see FIG 5.

5. Optimum contrast is obtained by adjusting the LCD Threshold voltage(Vth & Vsat)

**FIG. 1 Optical Characteristic Measurement Equipment and Method**

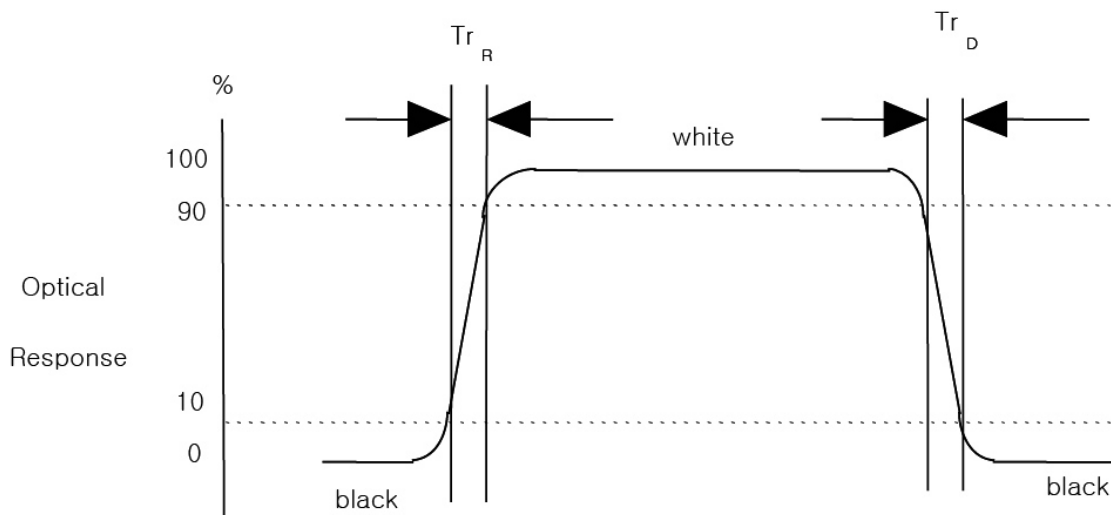


**FIG. 2 The definition of  $V_{th}$  and  $V_{sat}$**



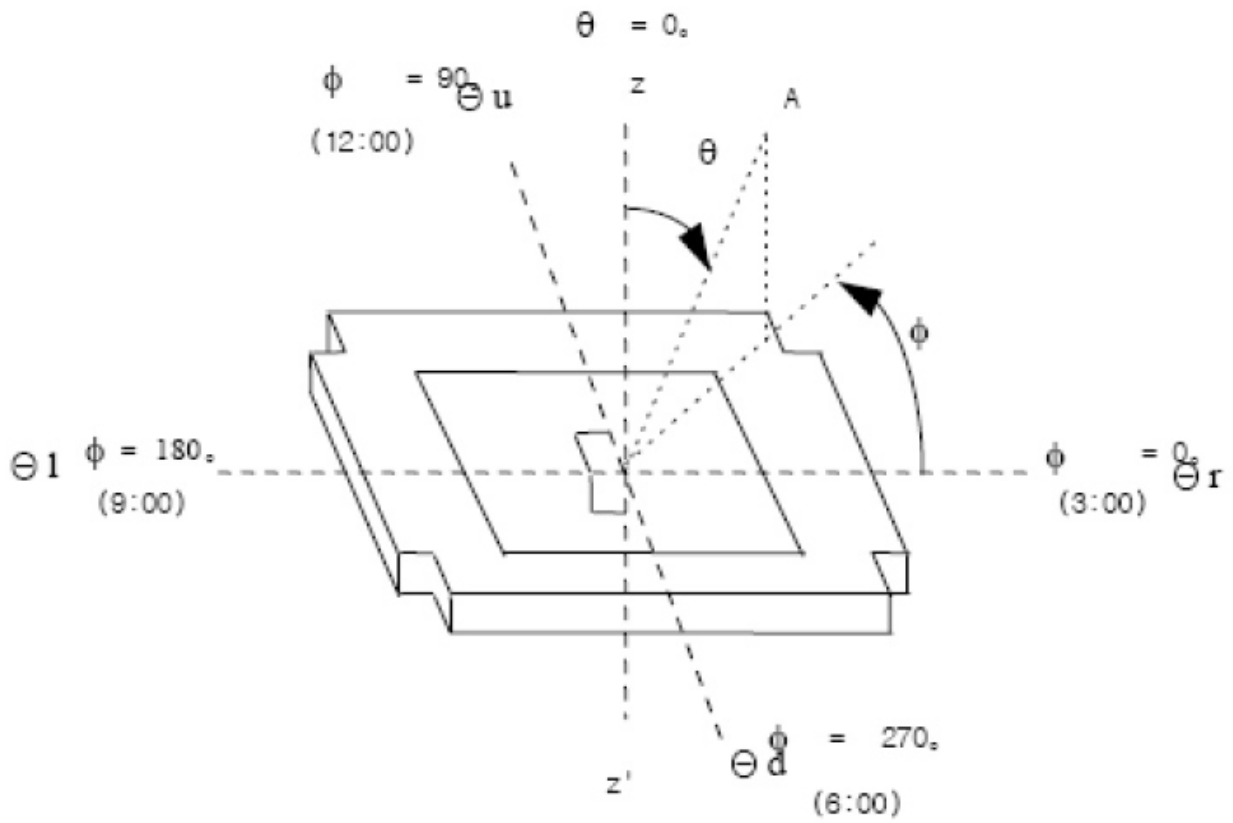
**FIG. 3 The definition of Response Time**

The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”.



**FIG. 4 The definition of viewing angle**

<dimension of viewing angel range>





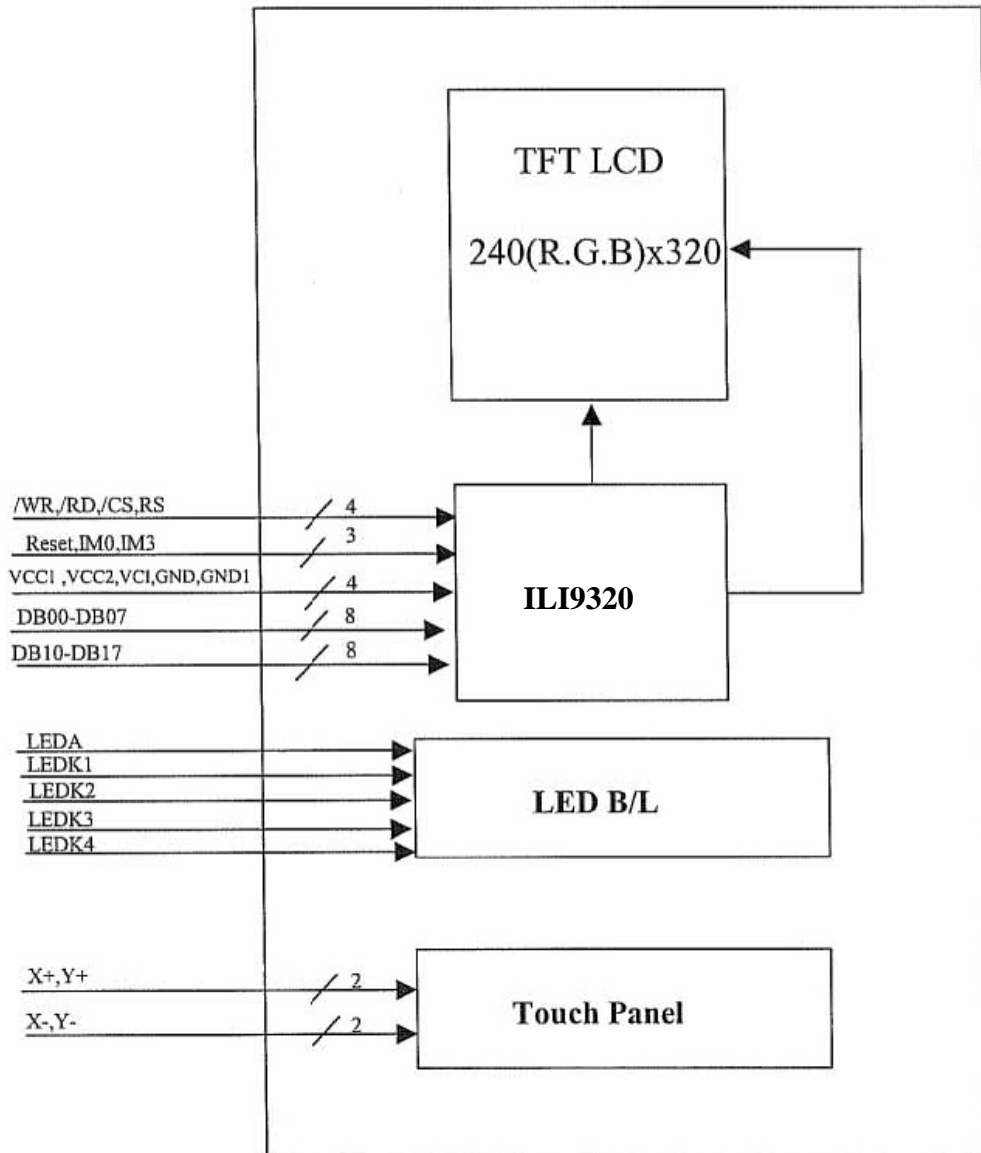
### 5. Interface

	Symbol	Function		
1	DB0	Data Bus Bit 0 Contact to Drive IC Data Bus Bit 0		
2	DB1	Data Bus Bit 1 Contact to Drive IC Data Bus Bit 1		
3	DB2	Data Bus Bit 2 Contact to Drive IC Data Bus Bit 2		
4	DB3	Data Bus Bit 3 Contact to Drive IC Data Bus Bit 3		
5	GND	System Ground.(0V)		
6	VCC	A Power supply for the internal logic circuit. (+2.8V)		
7	/CS	Chip select signal. Active "L".		
8	RS	Command / Display data selection 0 : Command , 1 : Display data		
9	/WR	I80 system : Serves as a write signal and writes data at the rising edge. M68 system: 0: Write 1: Read		
10	/RD	I80 system : Serves as a read signal and reads data at the low level. M68 system: 0: Read/Write disable, 1:Read/Write enable		
11	IM0	IM0	Data Bus Width	LCM DB Pin
		0	16bit parallel interface	DB0~DB7 AND DB10~DB17
		1	8-bit parallel interface	DB0~DB7
Unused pin must fixed either VCC2 or GND1 level.				
12	X+	Touch Panel output pin. (Touch screen X coordinate right)		
13	Y+	Touch Panel output pin. (Touch screen Y coordinate down)		
14	X-	Touch Panel output pin. (Touch screen X coordinate left)		
15	Y-	Touch Panel output pin. (Touch screen Y coordinate up)		
16	LEDA	Backlight LED Anode input pin (A)		
17	LEDK1	Backlight LED anode input pin.(K1)		
18	LEDK2	Backlight LED anode input pin.(K2)		

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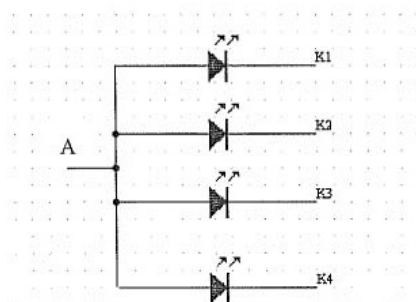
	Symbol	Function
19	LEDK3	Backlight LED cathode input pin (K3)
20	LEDK4	Backlight LED cathode input pin (K4)
21	IM3	0 : Format for I80 series MPU, 1 : Format for M68 series MPU
22	DB4	Data Bus Bit 04 Contact to Drive IC Data Bus Bit 4
23	DB10	Data Bus Bit 10 Contact to Drive IC Data Bus Bit 8
24	DB11	Data Bus Bit 11 Contact to Drive IC Data Bus Bit 9
25	DB12	Data Bus Bit 12 Contact to Drive IC Data Bus Bit 10
26	DB13	Data Bus Bit 13 Contact to Drive IC Data Bus Bit 11
27	DB14	Data Bus Bit 14 Contact to Drive IC Data Bus Bit 12
28	DB15	Data Bus Bit 15 Contact to Drive IC Data Bus Bit 13
29	DB16	Data Bus Bit 16 Contact to Drive IC Data Bus Bit 14
30	DB17	Data Bus Bit 17 Contact to Drive IC Data Bus Bit 15
31	/RESET	Reset input pin for TFT LCD. When /RESET is "L", initialization is executed.
32	VCI	A Power supply for step-up circuit and power supply circuit. (+2.8V)
33	VCC2	Power supply for I/O circuit. (+2.8V)
34	GND	System Ground.(0V)
35	DB5	Data Bus Bit 5 Contact to Drive IC Data Bus Bit 5
36	DB6	Data Bus Bit 6 Contact to Drive IC Data Bus Bit 6
37	DB7	Data Bus Bit 7 Contact to Drive IC Data Bus Bit 7

**6. Block Diagram:**



**7.Backlight:**

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage	VF	Ta =25°C	-	3.5	-	V
Forward Current	IF	Ta =25°C	-	80	-	mA
LED chips	-	-	-	4	-	PCS



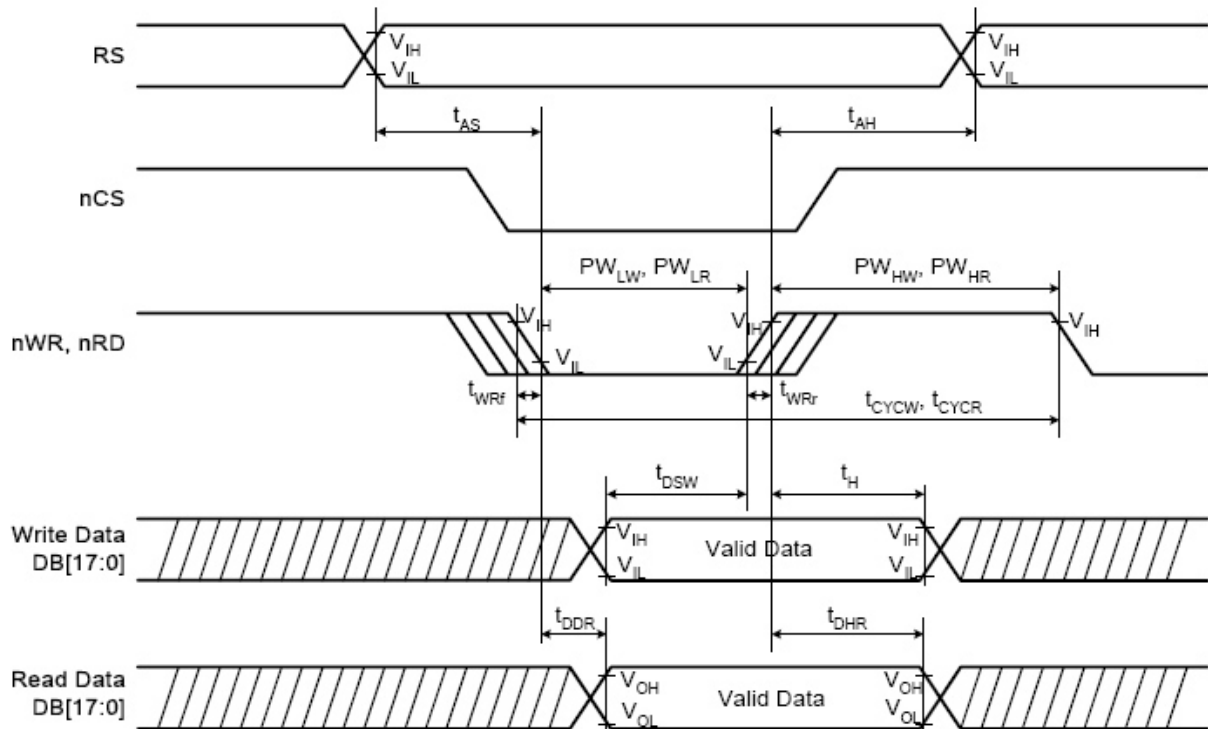


## 9. Timing Control:

### 9.1 Parallel 8080 Timing Charecteristics

#### Normal Write Mode (IOVCC = 1.65~3.3V, VCC=2.4~3.3V)

Item	Symbol	Unit	Min.	Typ.	Max.	Test Condition
Bus cycle time	Write	$t_{CYCW}$	ns	100	-	-
	Read	$t_{CYCR}$	ns	300	-	-
Write low-level pulse width	$PW_{LW}$	ns	50	-	500	-
Write high-level pulse width	$PW_{HW}$	ns	50	-	-	-
Read low-level pulse width	$PW_{LR}$	ns	150	-	-	-
Read high-level pulse width	$PW_{HR}$	ns	150	-	-	-
Write / Read rise / fall time	$t_{WRr}/t_{WRf}$	ns	-	-	25	-
Setup time	Write ( RS to nCS, E/nWR )	$t_{AS}$	ns	10	-	-
	Read ( RS to nCS, RW/nRD )			5	-	-
Address hold time	$t_{AH}$	ns	5	-	-	
Write data set up time	$t_{DSW}$	ns	10	-	-	
Write data hold time	$t_H$	ns	15	-	-	
Read data delay time	$t_{DDR}$	ns	-	-	100	
Read data hold time	$t_{DHR}$	ns	5	-	-	



## 10. General Precautions

### 10.1. Safety

Liquid crystal is poisonous. Do not put it in your mouth. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

### 10.2. Handling

1. The LCD panel is plate glass. Do not subject the panel to mechanical shock or to excessive force on its surface.
2. The polarizer attached to the display is easily damaged. Please handle it carefully to avoid scratch or other damages.
3. To avoid contamination on the display surface, do not touch the module surface with bare hands.
4. Keep a space so that the LCD panels do not touch other components.
5. Put cover board such as acrylic board on the surface of LCD panel to protect panel from damages.
6. Transparent electrodes may be disconnected if you use the LCD panel under environmental conditions where the condensation of dew occurs.
7. Do not leave module in direct sunlight to avoid malfunction of the ICs.

### 10.3. Static Electricity

1. Be sure to ground module before turning on power or operating module.
2. Do not apply voltage which exceeds the absolute maximum rating value.

### 10.4. Storage

1. Store the module in a dark room where must keep at 25℃ ±10℃ and 65%RH or less.
2. Do not store the module in surroundings containing organic solvent or corrosive gas.
3. Store the module in an anti-electrostatic container or bag.

### 10.5. Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft cloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.