

HTM035A01

LCD Module User Manual

Shenzhen HOT Display Technology Co., Ltd.

Rev.	Descriptions	Date
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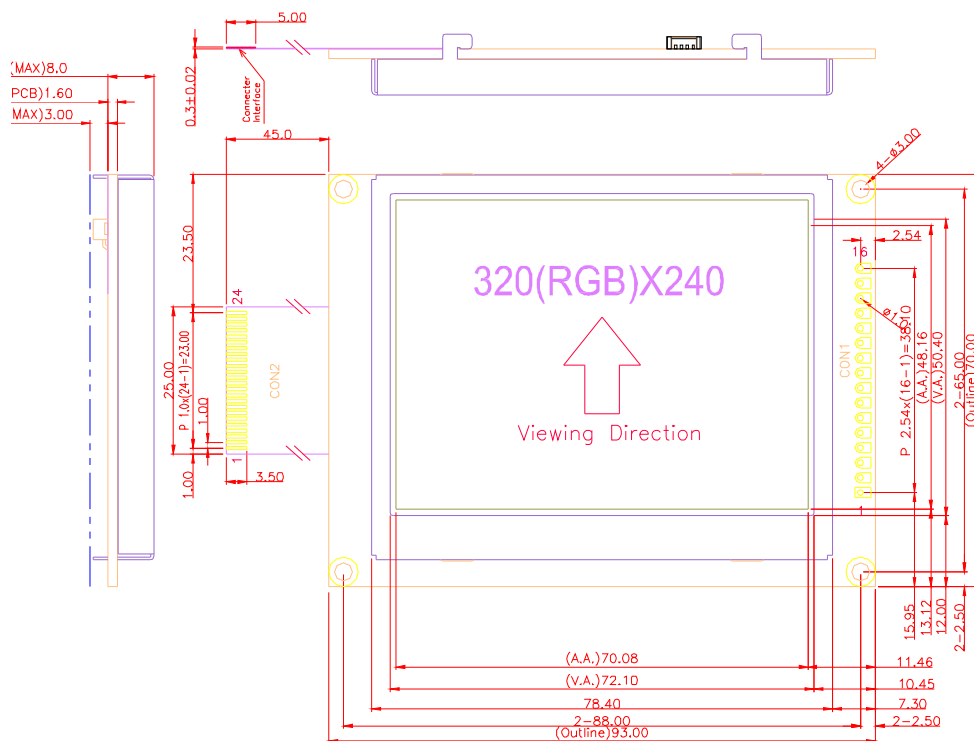
1. Basic Specifications

1.1 Display Specifications

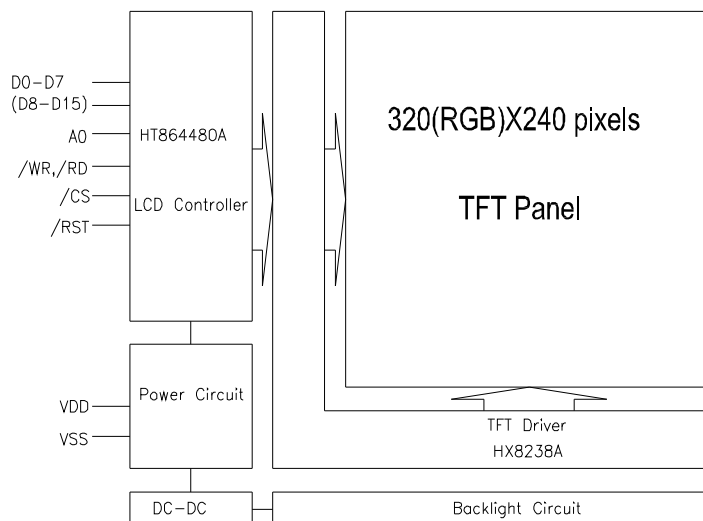
- 1 >LCD Display Mode : 3.5" TFT-LCD, Transmissive
- 2 >Number of Pixel : 320(H)*RGB*240(V)
- 3 >Dot Pitch : 0.219(H)*0.219(V)
- 4 >Display Color : 16.7M
- 5 >Driving Method : Normally White. 6H

1.2 Mechanical Specifications

- 1>Outline Dimension : 93.0 x70.0 x 10.0mm (See attached Outline Drawing for Data)



1.3 Circuit Diagram



1.4 Terminal Function

1.41 CON1

Pin No.	Pin Name	Function
1	VSS	Negative Power Supply,0V
2	VDD	Power Supply For Logic Circuit 3.3V
3	LEDEN	Backlight Enable(L:Open;H:Close)
4	/CS	Chip Selection Input
5	/RST	Reset Signal
6	A0(RS)	Data/Command Control.
7	/WR	Write (/WR) Control Signal Input.
8	/RD	Read (/RD) Control Signal Input.
9~16	DB0~DB7	8-bit Date bus

1.42 CON2

Pin No.	Pin Name	Function
1	VSS	Negative Power Supply,0V
2	VDD	Power Supply For Logic Circuit 3.3V
3	LEDEN	Backlight Enable(L:Open;H:Close)
4	/CS	Chip Selection Input
5	/RST	Reset Signal
6	A0(RS)	Data/Command Control.
7	/WR	Write (/WR) Control Signal Input.
8	/RD	Read (/RD) Control Signal Input.
9~24	DB0~DB15	16-bit Date bus

2. Absolute Maximum Ratings

Items	Symbol	MIN.	MAX.	Unit	Condition
Supply Voltage	V _{DD}	V _{SS}	+3.3	V	V _{SS} = 0V
Input Voltage	V _{IN}	V _{SS}	V _{DD} +0.3	V	V _{SS} = 0V
Operating Temperature	T _{OP}	-20	+70	°C	No Condensation
Storage Temperature	T _{st}	-25	+80	°C	No Condensation

3. Electrical Characteristics

3.1 TFT-LCD Module Operating conditions

V_{SS} = 0V, Top = 25°C

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Operating Voltage	V _{DD}	2.5	3.3	3.6	V	V _{DD}
Input High Voltage	V _{IH}	0.8 x V _{DD}	-	V _{DD}	V	/CS1,/RES,A0,/WR, /RD,D0~D7
Input Low Voltage	V _{IL}	V _{SS}	-	0.2 x V _{DD}	V	
Output High Voltage	V _{OH}	0.8 x V _{DD}	-	V _{DD}	V	D0~D7
Output Low Voltage	V _{OL}	V _{SS}	-	0.2 x V _{DD}	V	D0~D7
Analog operating current	I _{CC}	-	TBD	-	mA	Note (1)

Note (1) DOTCLK=6.5MHZ

3.2 LED Backlight Circuit

V_{SS} = 0V, Top = 25°C

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Forward Voltage	V _f BLA	18.0	19.2	19.8	V	V _{DD}
Forward Current	I _f BLA	-	20	-	mA	V _{DD}
Power Consumption	P _{WF}	-	384	-	mW	
DC-DC	I _f	-	20	30	mA	V _{DD}



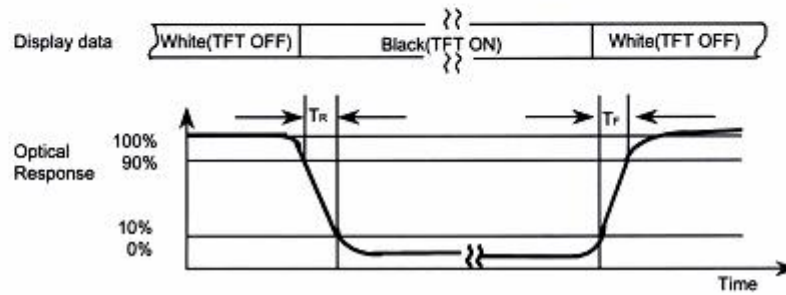
3.3 LCM Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast ratio (center point)	CR	$\theta = 0$ $\phi = 0$ (Normal Viewing Angle) B / L on	-	300	-	-	(1) BM-7f	
Luminance of white (Center point)	YL		200	250	-	cd / m ²	(4)BM-7f	
Uniformity of luminance	-		80	-	-	%	(4)BM-7f	
Response time	T _R		-	15	-	ms	(2)	
	T _F		-	35	-	ms		
Color chromaticity (CIE 1931)	White		W _X	0.280	0.310	0.340	-	(4) BM-7f
			W _Y	0.270	0.300	0.330		
	Red		R _X	0.588	0.638	0.688		
			R _Y	0.298	0.348	0.398		
	Green		G _X	0.268	0.318	0.368		
		G _Y	0.562	0.612	0.662			
	Blue	B _X	0.092	0.142	0.192			
		B _Y	0.048	0.098	0.148			
Viewing angle	Hor.	θL	-	70	-	Degrees	(3)	
		θR	-	70	-			
	Ver	ϕH	-	50	-			
		ϕL	-	60	-			

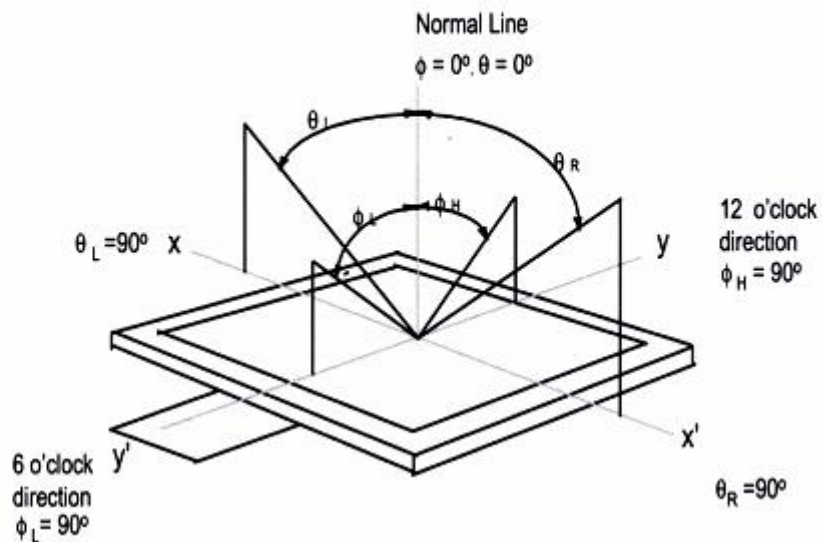
Note (1) Contrast ratio is defined as follows

$$CR = \frac{\text{Luminance (brightness) all pixels "White"}}{\text{Luminance (brightness) all pixels "dark"}}$$

(2) Response time is defined as follows



(3) Definition of Viewing Angle



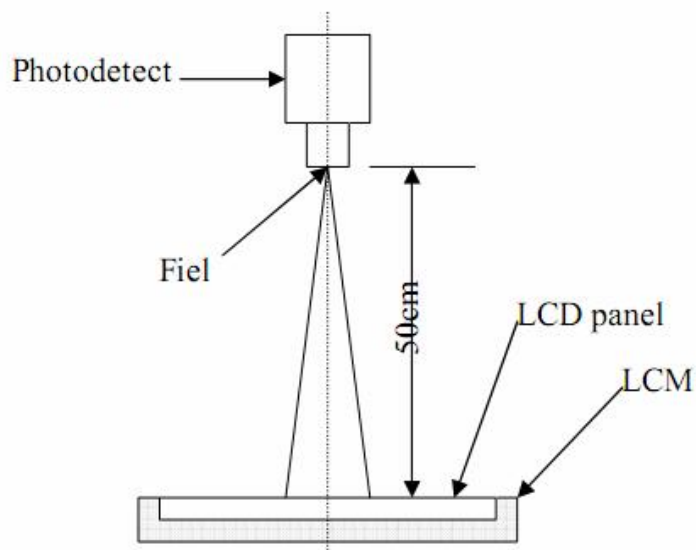
(4) Optical measurement equipment setup

-Measurement should be executed in a stable, windless, and dark room. After lighting the backlight for 30mins.

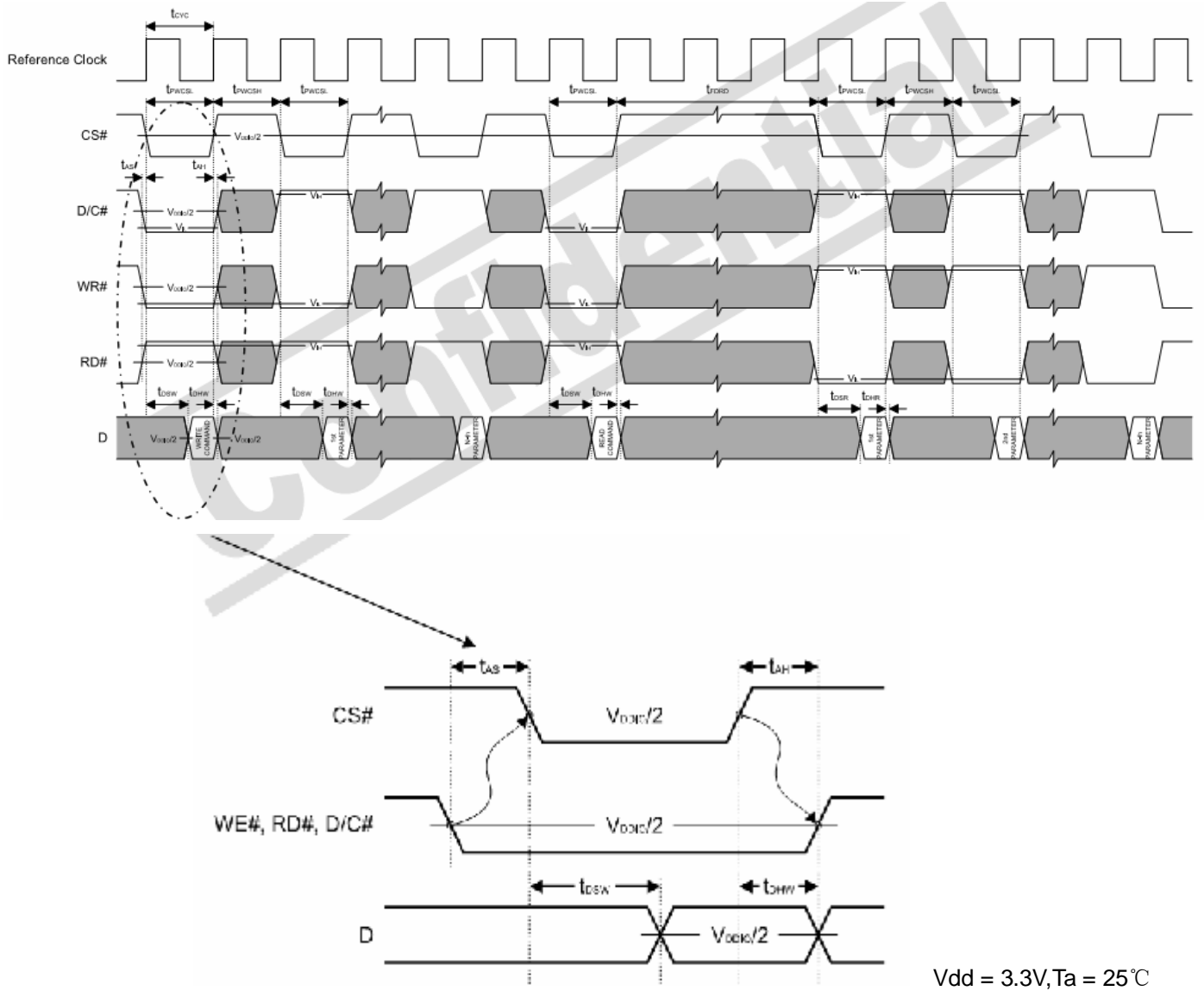
-Environment condition : Common air conditioner cleanness · $T_a=23\pm 5^{\circ}\text{C}$ · Humidity= $60\pm 15\%$

-Distance : 50cm

-Photodetector : BM-7f (Field 1°)

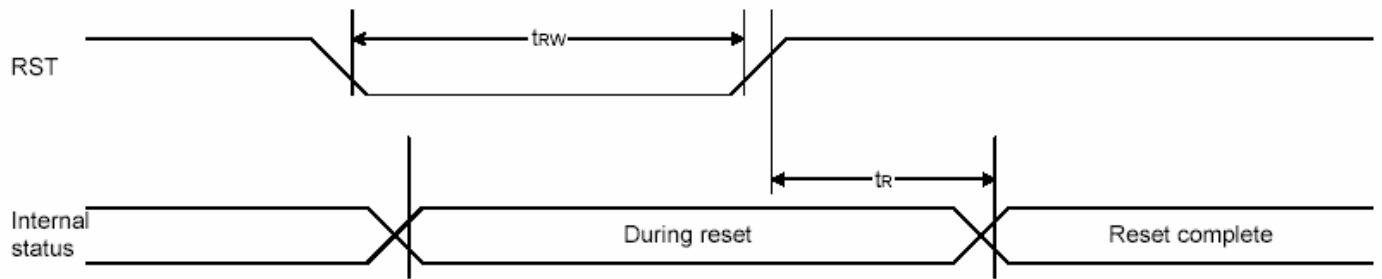


3.4 AC Characteristics
8080 Mode System Bus Timing



Symbol	Parameter	Min	Typ	Max	Unit
t_{cyc}	Reference Clock Cycle Time	9	-	-	ns
t_{pwCSL}	Pulse width CS# low	1	-	-	t_{cyc}
t_{pwCSH}	Pulse width CS# high	1	-	-	t_{cyc}
t_{FDRD}	First Read Data Delay	5	-	-	t_{cyc}
t_{AS}	Address Setup Time	1	-	-	ns
t_{AH}	Address Hold Time	1	-	-	ns
t_{DSW}	Data Setup Time	4	-	-	ns
t_{DHW}	Data Hold Time	1	-	-	ns
t_{DSR}	Data Access Time	-	-	5	ns
t_{DHR}	Output Hold time	1	-	-	ns

3.5 Reset Timing



(VDD=3.3V, Ta=255°C)

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Reset time	Tr	-	-	1	μ S	-
Reset Low pulses width	Trw	1	-	-	μ S	-

Note:

*a. all timing is using 20% and 80% of VDD as the reference.

4. Function specifications

4.1 The Parallel Interface

Shared			8080 Mode		Function
/RST	/CS	A0	/RD	/WR	
H	L	H	L → H	L	Read display data
H	L	H	H	L → H	Write display data
H	L	L	L → H	L	Status read
H	L	L	H	L → H	Write Command

4.2 Basic Setting

To drive the LCD module correctly and provide normally display, please use the following setting

```
uint16 HDP=479;
uint16 HT=525; //horizontal total period (display + non-display) in pixel clock
uint16 HPS=46; //non-display period
uint16 LPS=0; //horizontal sync pulse
uint8 HPW=46; //horizontal sync pulse width

uint16 VDP=271;
uint16 VT=288; //vertical total (display + non-display) period in line
uint16 VPS=17; //non-display period in lines
uint16 FPS=0; //vertical sync pulse
uint8 VPW=5; //vertical sync pulse width
```

4.3 Resetting the LCD module

The LCD module should be initialized by using /RST terminal.

While turning on the VDD and VSS power supply, maintain /RST terminal at LOW level, After the Power supply stabilized, release the reset terminal(/RST = High)

4.4 Display Commands

Please refer to LCD Controller datasheet

4.5 Basic Operating Sequence

Refer to example program