

PRODUCT SPECIFICATION

7.0" TN TFT LCD MODULE
MODEL: NTFT7s800480 Ver:1.7

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1. General Description

The specification is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT-LCD panel, driver ICs and a backlight unit.

2. Module Parameter

Features	Details	Unit
Display Size(Diagonal)	7.0"	
LCD type	TN TFT	
Display Mode	Transmissive / Normally White	
Resolution	800 RGB x 480	Pixels
View Direction	12 O'CLOCK	Best Image
Gray Scale Inversion Direction	6 O'CLOCK	
Module Outline	165(H) x 104(V) x 3.5(T) (Note1)	mm
Active Area	153.84(H) x 85.63(V)	mm
Pixel pitch	192.3 x178.4	
Pixel Arrangement	RGB Vertical stripe	
Polarizer Surface Treatment	Anti-glare	
Display Colors	16.7M	
Interface	24bits-RGB Interface	
With or Without Touch Panel	Without	-
Operating Temperature	-20~70	°C
Storage Temperature	-30~80	°C
Weight	TBD	g

Note 1: Exclusive hooks, posts, FFC/FPC tail etc.

3. Absolute Maximum Ratings

V_{SS}=0V, Ta=25°C

Item	Symbol	Min.	Max.	Unit
Power supply voltage1	VCC	-0.3	5.0	V
Power supply voltage2	AVDD	-0.5	13.5	V
Gate On Voltage	VGH	-0.3	42	V
Gate Off Voltage	VGL	-20	0.3	V
Gate On-Gate Off Voltage	VGH-VGL	12	40	V
Storage temperature	T _{STG}	-30	+80	°C
Operating temperature	T _{OP}	-20	+70	°C

Note 1: If Ta below 50°C, the maximal humidity is 90%RH, if Ta over 50°C, absolute humidity should be less than 60%RH.

Note 2: The response time will be extremely slow when the operating temperature is around -10°C, and the back ground will become darker at high temperature operating.

4. DC Characteristics

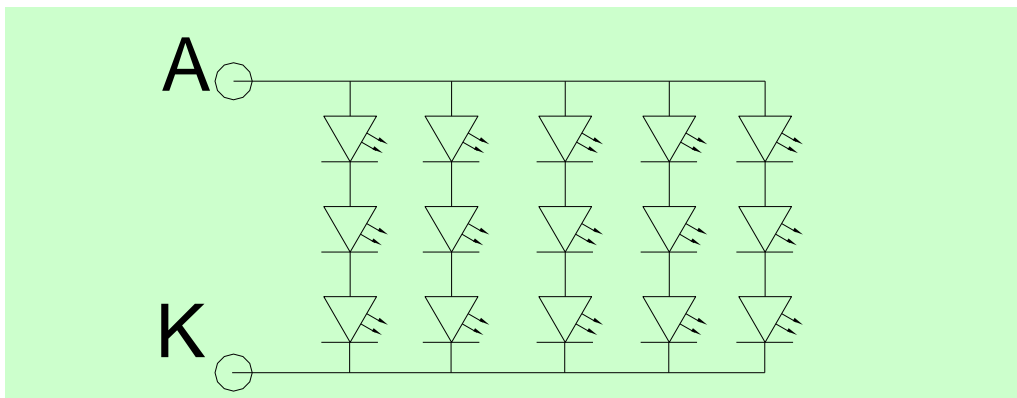
Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	VGH	-	(18)	-	V
	VGL	-	(-8)	-	V
	AVDD	-	(10.3)	-	V
	VCC	3.0	3.3	3.6	V
VCOMin	VCOMin	-	(3.3)	-	V
Logic Input Voltage	VIH	0.7VCC	-	VCC	V
	VIL	GND	-	0.3VCC	V

5. Backlight Characteristic

5.1. Backlight Characteristic

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V _F	T _a =25 °C, I _F =20mA/LED	8.7	9.6	10.5	V
Forward Current	I _F	T _a =25 °C, V _F =3.2V/LED	-	100	-	mA
Power dissipation	P _D	-	-	960	-	mW
Uniformity	Avg	-	70	75	-	%
Drive method	Constant current					
LED Configuration	15 White LEDs (3 LEDs in string and 5 groups in parallel)					

5.2. Backlighting circuit



6. Optical Characteristics

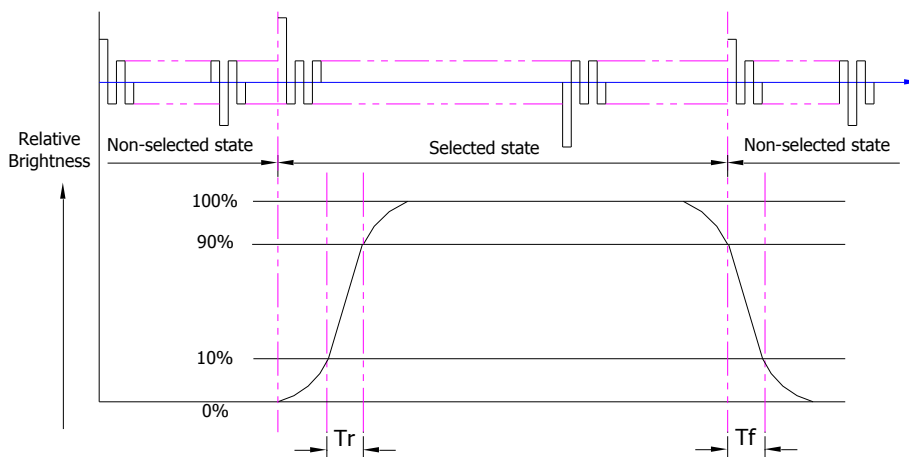
6.1. Optical Characteristics

Ta=25°C, V_{DD}=3.2V, TN LC+ Polarizer

	Item	Symbol	Condition	Specification			Unit	
				Min.	Typ.	Max.		
Backlight On (Transmissive Mode)	Luminance on TFT(I _f =20mA/LED)	Lv	Normally viewing angle θ _X = φ _Y = 0°	220	280	-	cd/m ²	
	Contrast ratio(See 6.3)	CR		-	400	-		
	Response time (See 6.2)	TR+TF		-	25	35	ms	
	Chromaticity Transmissive (See 6.5)	Red	X _R	Center CR≥10	(0.539)	(0.587)	(0.639)	
			Y _R		(0.305)	(0.355)	(0.405)	
		Green	X _G		(0.285)	(0.335)	(0.385)	
			Y _G		(0.549)	(0.599)	(0.649)	
		Blue	X _B		(0.102)	(0.152)	(0.202)	
			Y _B		(0.079)	(0.129)	(0.179)	
		White	X _W		(0.260)	(0.310)	(0.360)	
			Y _W		(0.280)	(0.330)	(0.380)	
	Viewing Angle (See 6.4)	Horizontal	θ _{X+}	-	70	-	Deg.	
			θ _{X-}	-	70	-		
Vertical		φ _{Y+}	-	55	-			
		φ _{Y-}	-	65	-			
NTSC				-	52	-	%	

6.2. Definition of Response Time

6.2.1. Normally Black Type (Negative)



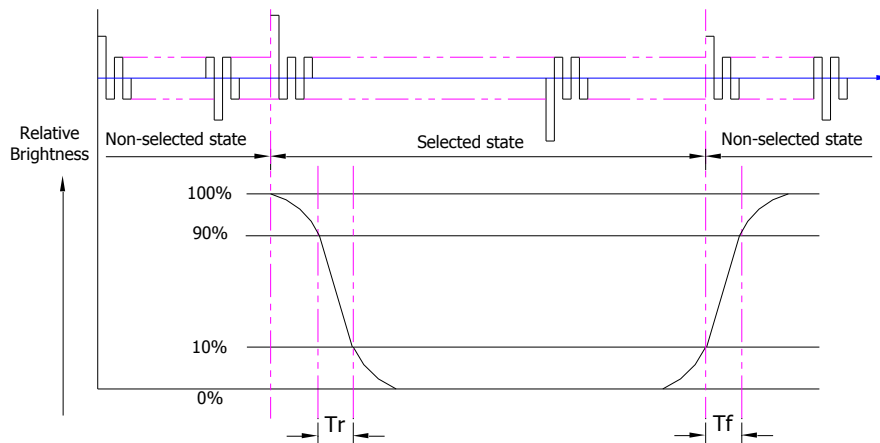
Tr is the time it takes to change from non-selected state with relative luminance 10% to selected state with relative luminance 90%;

Tf is the time it takes to change from selected state with relative luminance 90% to

non-selected state with relative luminance 10%.

Note: Measuring machine: LCD-5100

6.2.2. Normally White Type (Positive)



Tr is the time it takes to change from non-selected state with relative luminance 90% to selected state with relative luminance 10%;

Tf is the time it takes to change from selected state with relative luminance 10% to non-selected state with relative luminance 90%;

Note: Measuring machine: LCD-5100 or EQUI

6.3. Definition of Contrast Ratio

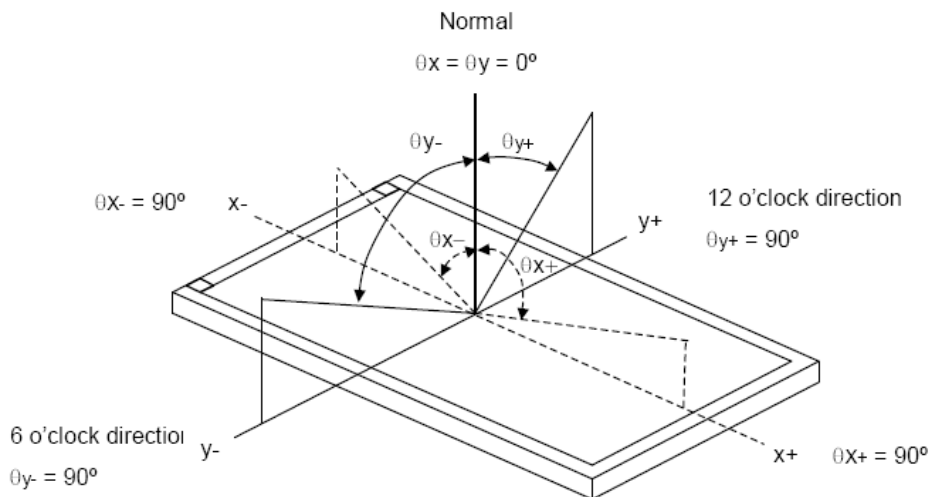
Contrast is measured perpendicular to display surface in reflective and transmissive mode.

The measurement condition is:

Measuring Equipment	Eldim or Equivalent
Measuring Point Diameter	3mm//1mm
Measuring Point Location	Active Area centre point
Test pattern	A: All Pixels white
	B: All Pixel black
Contrast setting	Maximum

Definitions: CR (Contrast) = Luminance of White Pixel / Luminance of Black Pixel

6.4. Definition of Viewing Angles



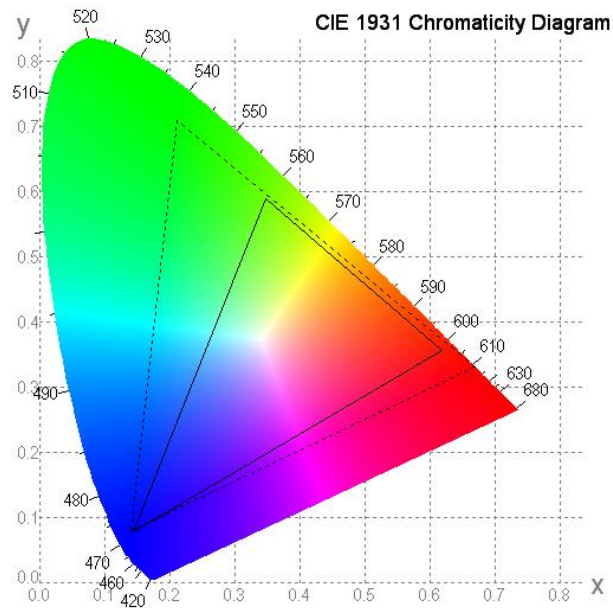
Measuring machine: LCD-5100 or EQUI

6.5. Definition of Color Appearance

R,G,B and W are defined by (x, y) on the IE chromaticity diagram

NTSC=area of RGB triangle/area of NTSC triangleX100%

Measuring picture: Red, Green, Blue and White (Measuring machine: BM-7)



6.6. Definition of Surface Luminance, Uniformity and Transmittance

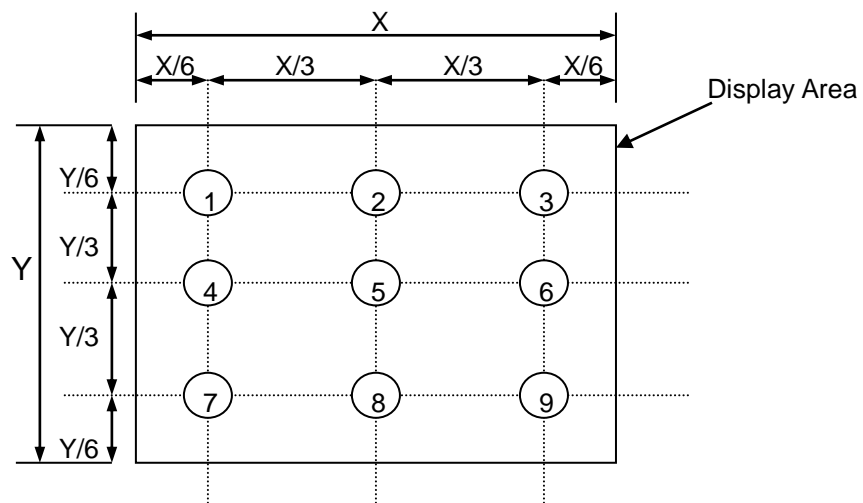
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

6.6.1. Surface Luminance: $L_V = \text{average } (L_{P1}:L_{P9})$

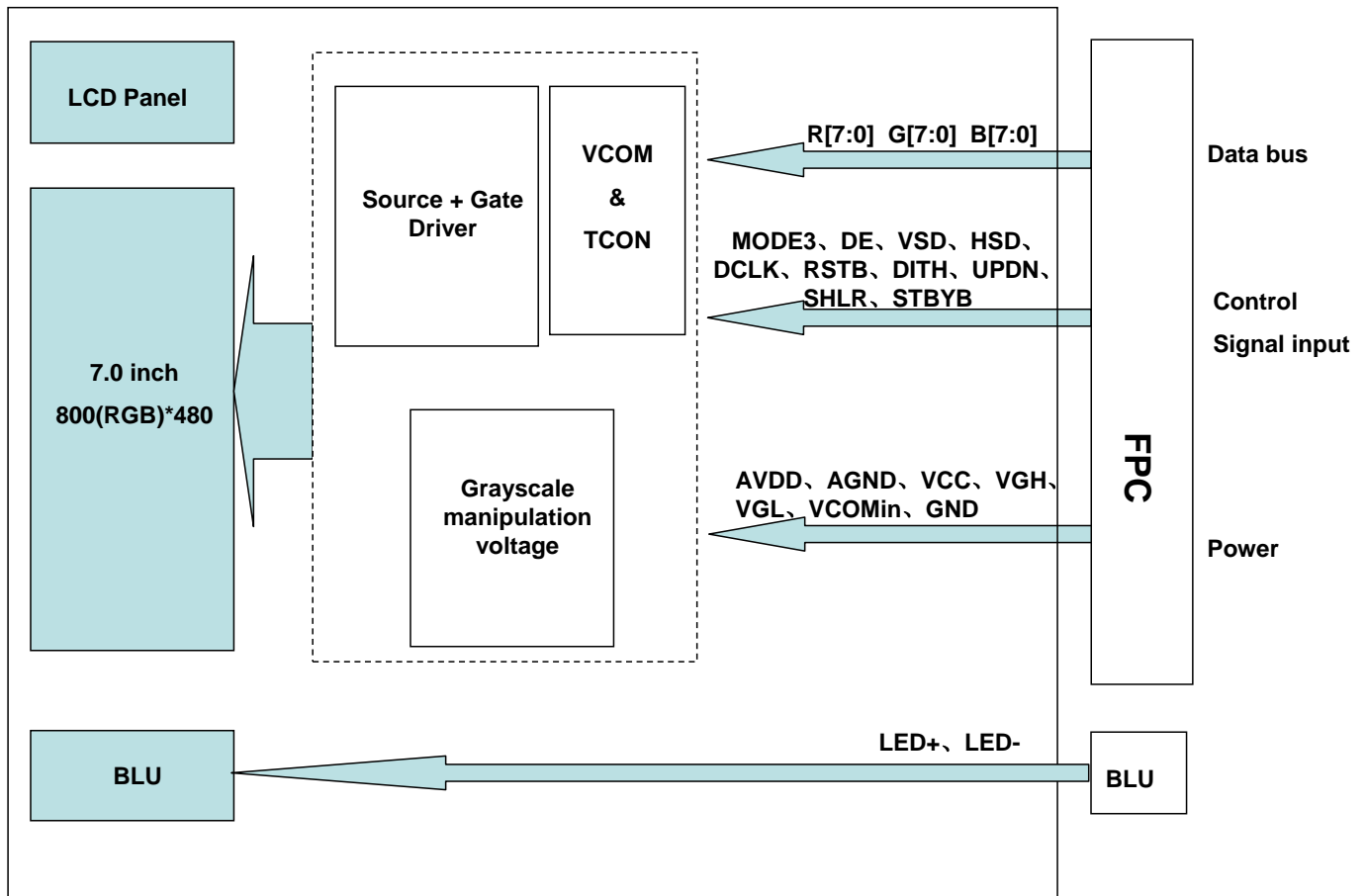
6.6.2. Uniformity = $\text{Minimal } (L_{P1}:L_{P9}) / \text{Maximal } (L_{P1}:L_{P9}) * 100\%$

6.6.3. Transmittance = $L_V \text{ on LCD} / L_V \text{ on Backlight} * 100\%$

Note: Measuring machine: BM-7



7. Block Diagram and Power Supply



8. Interface Pins Definition

8.1. FPC CON

No.	Symbol	Function
1	AGND	Analog Ground
2	AVDD	Analog Power
3	VCC	Digital Power
4-11	R0-R7	Data input
12-19	G0-G7	Data input
20-27	B0-B7	Data input
28	DCLK	Clock input
29	DE	Data enable signal
30	HSD	Horizontal sync input .Negative polarity
31	VSD	Vertical sync input .Negative polarity
32	MODE3	DE/SYNC mode select. Normally pull high. H:DE MODE, L:HSD/VSD mode
33	RSTB	Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability .normally pull.
34	STBYB	Standby mode, normally pull high STBYB="1",normal operation TBYB="0", timing control, source driver will turn off, all output are high-Z
35	SHLR	Source right or left sequence control. SHLR="L", shift left: last data=S1-S2.....S1200=First data ; SHLR="H" shift right: first data S1-S2.....S1200=last data ;
36	VCC	Digital Power
37	UPDN	Gate up or down scan control. UPON="L ",DOWN shift:G1->G2...->G480; UPON="H",UPshift:G1->G2...->G480;
38	GND	Digital ground
39	AGND	Analog ground
40	AVDD	Analog Power
41	VCOMin	For external VCOM DC input(optional)
42	DITH	Dithering setting :DITH="H" 6BIT resolution(last 2 bits of input data truncated) (default setting) DITH="L "8bit resolution
43-55	NC	NC
56	VGH	Positive power for TFT
57	VCC	Digital Power
58	VGL	Negative power for TFT
59	GND	Digital Power ground
60	NC	Not connect

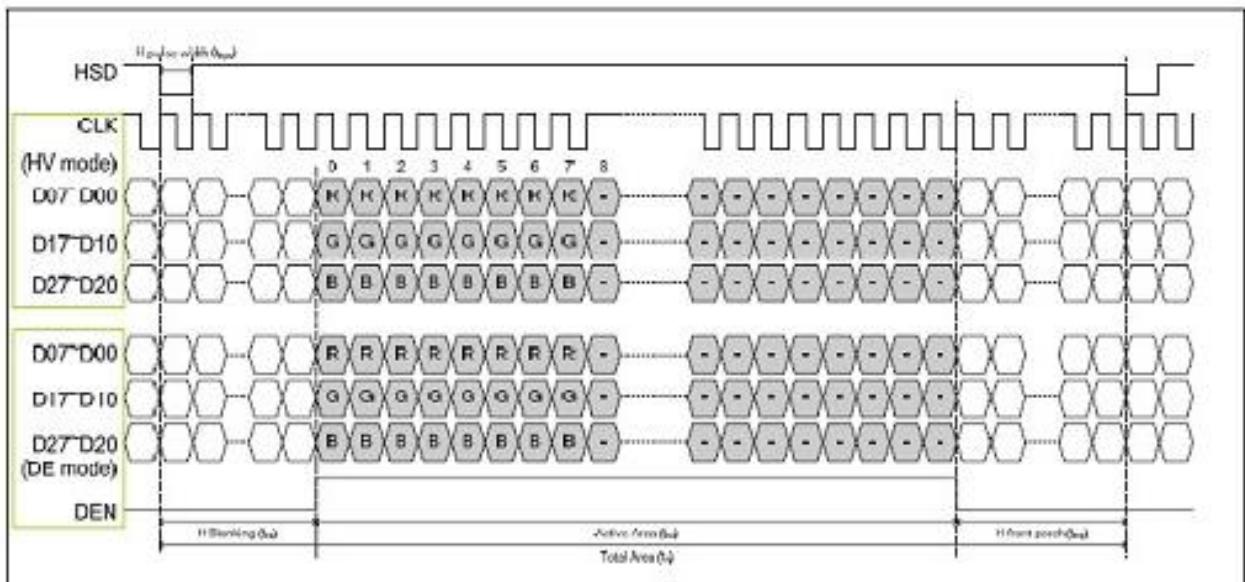
9. AC Characteristics

9.1 Timing Characteristics of input signals

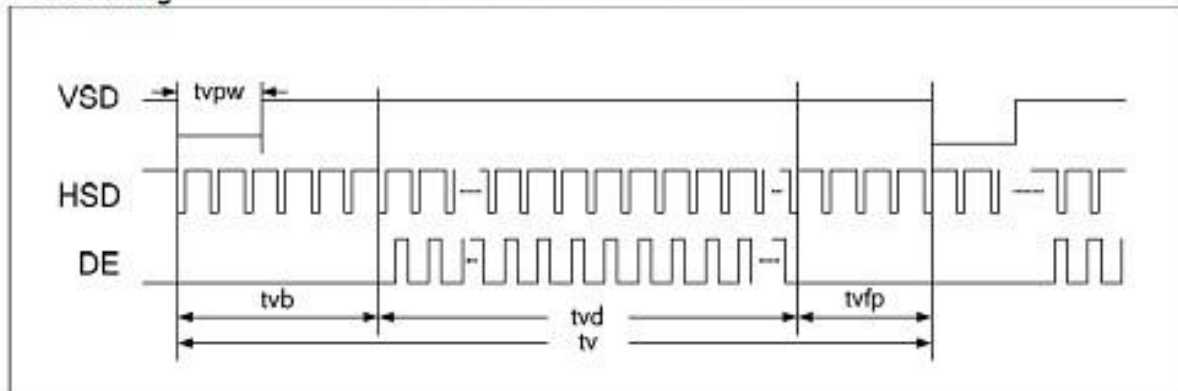
Parameter	Symbol	Spec.			Unit
		Min.	typ.	Max.	
H _S setup time	T _{hst}	8	-	-	ns
H _S hold time	T _{hhd}	8	-	-	ns
V _S setup time	T _{vst}	8	-	-	ns
V _S hold time	T _{vhd}	8	-	-	ns
Data setup time	T _{dsu}	8	-	-	ns
Data hold time	T _{dhd}	8	-	-	ns
DE setup time	T _{esu}	8	-	-	ns
DE hold time	T _{ehd}	8	-	-	ns
VDD Power On Slew rate	T _{POR}	-	-	20	ms
RSTB pulse width	T _{Rst}	10	-	-	us
CLKIN cycle time	T _{cph}	20	-	-	ns
CLKIN pulse duty	T _{cwh}	40	50	60	%
Output stable time	T _{sst}	-	-	6	us

9.2 Data Input format

Horizontal timing



Vertical timing



Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	typ.	Max.	
Horizontal Display Area	thd	800			DCLK
DCLK frequency	fclk	-	30	50	MHz
One Horizontal Line	th	862	1056	1200	DCLK
HS pulse width	thpw	1	-	40	DCLK
HS Back Porch (Blanking)	thb	46			DCLK
HS Front Porch	thfp	16	210	354	DCLK
DE mode Blanking	th-thd	85	256	400	DCLK

Vertical timing

Parameter	Symbol	Spec.			Unit
		Min.	typ.	Max.	
Vertical Display Area	tvd	480			T_H
VS period time	tv	513	525	650	T_H
VS pulse width	tv _{pw}	3	-	20	T_H
VS Back Porch (Blanking)	tv _b	23			T_H
VS Front Porch	tv _{fp}	7	22	147	T_H
DE mode Blanking	tv-tvd	30	45	170	T_H

10. Precautions and Warranty

12.1 Safety

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

12.1.2 Since the liquid crystal cells are made of glass, do not apply strong impact on them. Handle with care.

12.2 Handling

12.2.1 Reverse and use within ratings in order to keep performance and prevent damage.

12.2.2 Do not wipe the polarizer with dry cloth, as it might cause scratch. If the surface of the LCD needs to be cleaned, wipe it swiftly with cotton or other soft cloth soaked with petroleum IPA, do not use other chemicals.

12.3 Storage

12.3.1 Do not store the LCD module beyond the specified temperature ranges.

12.4 Metal Pin (Apply to Products with Metal Pins)

12.4.1 Pins of LCD and Backlight

12.4.1.1 Solder tip can touch and press on the tip of Pin LEAD during the soldering

12.4.1.2 Recommended Soldering Conditions

Solder Type: Sn96.3~94-Ag3.3~4.3-Cu0.4~1.1

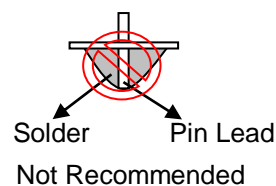
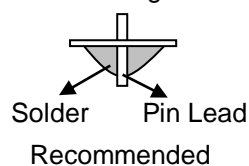
Maximum Solder Temperature: 370°C

Maximum Solder Time: 3s at the maximum temperature

Recommended Soldering Temp: 350±20°C

Typical Soldering Time: ≤3s

12.4.1.3 Solder Wetting



12.4.2 Pins of EL

12.4.2.1 Solder tip can touch and press on the tip of EL leads during soldering.

12.4.2.2 No Solder Paste on the soldering pad on the motherboard is recommended.

12.4.2.3 Recommended Soldering Conditions

Solder type: Nippon Alimit Leadfree SR-34, size 0.5mm

Recommended Solder Temperature: 270~290°C

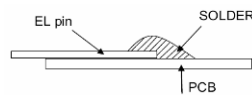
Typical Soldering Time: ≤2s

Minimum solder distance from EL lamp (body):2.0mm

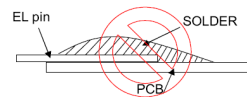
12.4.2.4 No horizontal press on the EL leads during soldering.

12.4.2.5 180° bend EL leads three times is not allowed.

12.4.2.6 Solder Wetting

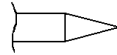


Recommended

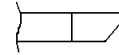


Not Recommended

12.4.2.7 The type of the solder iron:

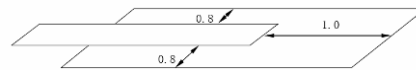


Recommended



Not Recommended

12.4.2.8 Solder Pad



12.5 Operation

- 12.5.1 Do not drive LCD with DC voltage
- 12.5.2 Response time will increase below lower temperature
- 12.5.3 Display may change color with different temperature
- 12.5.4 Mechanical disturbance during operation, such as pressing on the display area, may cause the segments to appear "fractured".

12.6 Static Electricity

- 12.6.1 CMOS LSIs are equipped in this unit, so care must be taken to avoid the electro-static charge, by ground human body, etc.
- 12.6.2 The normal static prevention measures should be observed for work clothes and benches.
- 12.6.3 The module should be kept into anti-static bags or other containers resistant to static for storage.

12.7 Limited Warranty

- 12.7.1 Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss.
- 12.7.2 If possible, we suggest customer to use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used.
- 12.7.3 After the product shipped, any product quality issues must be feedback within three months, otherwise, we will not be responsible for the subsequent or consequential events.

11. Outline Drawing

