



晶采光電科技股份有限公司
AMPIRE CO., LTD.

SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AM-800480TTMQW-00H
APPROVED BY	
DATE	

- Approved For Specifications
- Approved For Specifications & Sample

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2009/9/16	--	New Release	Edward

1. Features

6.2 inch module is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a backlight system. This TFT LCD has a 6.2 (16:9) inch diagonally measured active display area with 800 horizontal by 480 vertical pixel resolutions.

- (1) Construction: 6.2" a-Si TFT active matrix, White LED Backlight.
- (2) Resolution (pixel): 800(R.G.B) X 480
- (3) Number of the Colors : 262K colors (R , G , B 6 bit digital each)
- (4) LCD type : Transmissive , normally White
- (5) Power Supply Voltage: 3.3V for logic voltage.
- (7) Viewing Direction: 6 O'clock (The direction it's hard to be discolored)
- (8) RoHS / Halogen Free Compliance.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
LCD size	6.2 inch (Diagonal)	
Outline Dimension	155.2 x 88.2.0 x 5.0 (typ.)	mm
Number of Pixel	800 RGB (H) x 480 (V)	pixels
Pixel pitch	0.1719(H) x 0.1609(V)	mm
Pixel arrangement	RGB Vertical stripe	
Display mode	Normally white	
Surface treatment	Antiglare, Hard-Coating (3H) with EWV film	
Weight	120 (typ.)	g
Back-light	Side-Light type	
Power consumption (B/L system)	1.54 (max.)	W

3. ABSOLUTE MAX. RATINGS

3-1 Electrical Absolute Rating

3-1-1 TFT LCD Module

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Power voltage	VCC	-0.3	6.0	V	GND=0
	VGH	0.3	40		
	VGL	-20	0.3		
	AVDD	0.5	15		AGND=0
	VCOM	0	6		
Logic Signal Input Level	VI	-0.3	VCC+0.3	V	

3-1-2 Back-Light Unit

Item	Symbol	Typ.	Max.	Unit	Note
LED current	IL	140	--	mA	(1)(2)(3)
LED voltage	VL	10.5	--	V	(1)(2)(3)

Note

- (1) Permanent damage may occur to the LCD module if beyond this specification.
Functional operation should be restricted to the conditions described under normal operating conditions.
- (2) $T_a = 25 \pm 2^\circ\text{C}$
- (3) Test Condition: LED current 140mA. The LED lifetime could be decreased if operating IL is larger than 140mA.

3-2 Environment Absolute Rating

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	Topa	-20	70	$^\circ\text{C}$	
Storage Temperature	Tstg	-30	80	$^\circ\text{C}$	

4. ELECTRICAL CHARACTERISTICS

4-1 TFT LCD Module

Item	Symbol	Values			Unit	Remark
		MIN	TYP	MAX		
Supply Voltage	VCC	3.0	3.3	3.6	V	
	VGH	12	15	23	V	
	VGL	-12	-7	-5	V	
	AVDD	9.9	10	10.1	V	
VCOM	VCOMin	--	3.4	--	V	
Input signal voltage	VIH	0.7VCC	--	VCC		Note (1)
	VIL	0	--	0.3VCC		
Current of power supply	IDD	--	12.37	--	mA	VCC=3.3V
	IADD	--	13.599	--	mA	AVDD=10V (Black)
	IGH	--	0.099	--	mA	VGH=15V
	IGL	--	0.371	--	mA	VGL=-7V
Input level of V1~V5	Vx	AVDD/2-		AVDD-0.1-	V	
Input level of V6~V10	Vx	0.1-		AVDD/2-	V	

Note 1: HSYNC, VSYNC, DE, Digital Data

Note 2: Be sure to apply the power voltage as the power sequence spec.

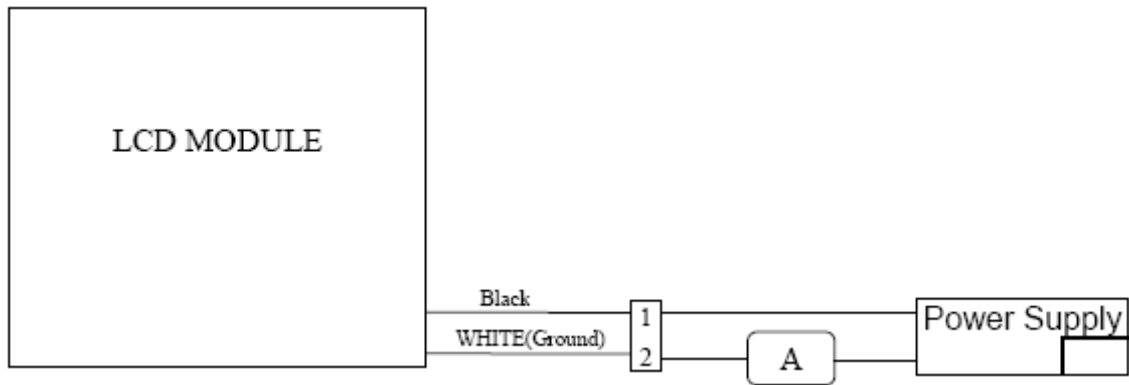
Note 3: DGND=AGND=0V

4-2 Backlight Unit

The backlight system is an edge-lighting type with 21 LED

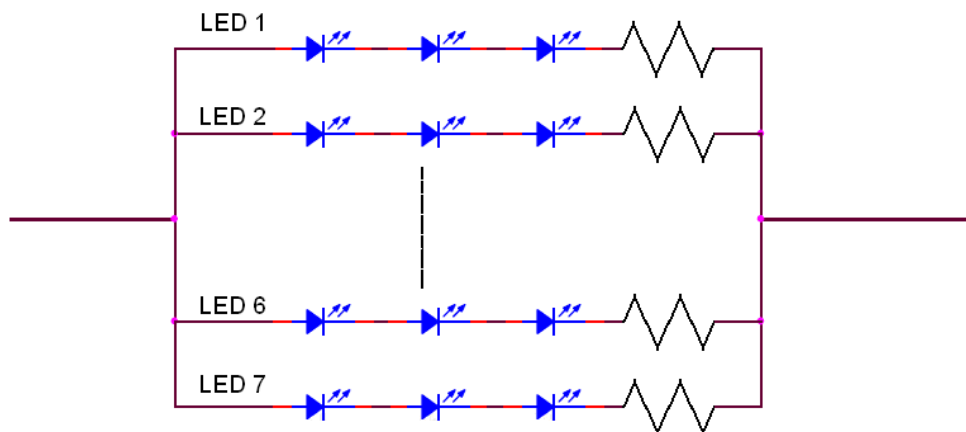
The characteristics of the LED are shown in the following tables.

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED current	IL	--	140	--	mA	(2)
LED voltage	VL	--	10.5	--	V	
Operating LED life time	Hr	20,000	--	--	Hour	(1)(2)

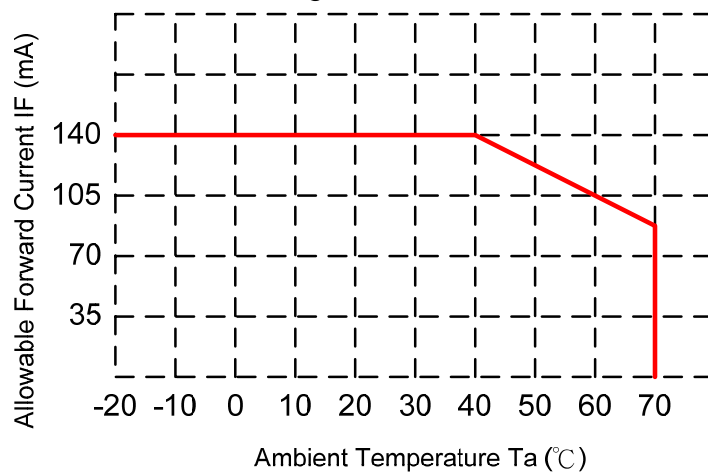


Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: $T_a=25\pm 3^{\circ}\text{C}$, typical I_L value indicated in the above table until the brightness becomes less than 50%.

Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at $T_a=25^{\circ}\text{C}$ and $I_L=140\text{mA}$. The LED lifetime could be decreased if operating I_L is larger than 140mA. The constant current driving method is suggested.



LED Light Bar Circuit



5. Optical Specifications

5-1 Optical specification

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast	CR	$\theta = 0$ Normal viewing angle	480	600	--		(1)(2)	
Response time	Rising		Tr	--	2	4	msec	(1)(3)
	Falling		Tf	--	6	12		
White luminance (Center)	Yl			320	400	--	Cd/m ²	(1)(4) (IL=120mA)
Color chromaticity (CIE1931)	White		Wx	0.260	0.310	0.360		
			Wy	0.280	0.330	0.380		
Viewing angle	Hor.	θL	65	75	--		(1)(4)	
		θR	65	75	--			
	Ver.	θU	60	70	--			
		θD	60	70	--			
Brightness uniformity	Buni	$\theta = 0$	70	--	--	%	(5)(7)	
Optima View Direction	6 o'clock						(6)	

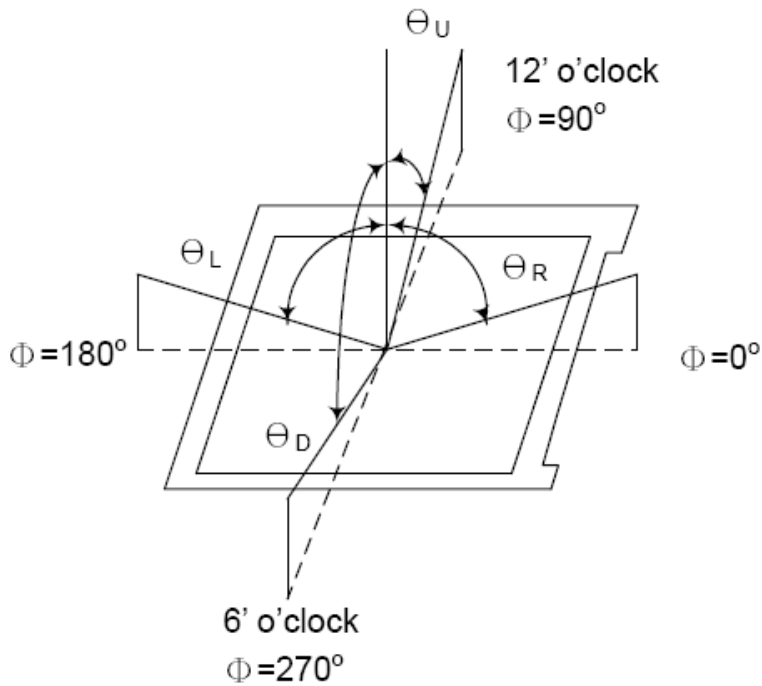
5-2 Measuring Condition

- (1) Measuring surrounding : dark room
- (2) LED current IL : 140mA
- (3) Ambient temperature : 25±2°C
- (4) 15min. warm-up time.

5-3 Measuring Equipment

- (1) FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.
- (2) Measuring spot size: 20 ~ 21 mm

Note (1) Definition of Viewing Angle :

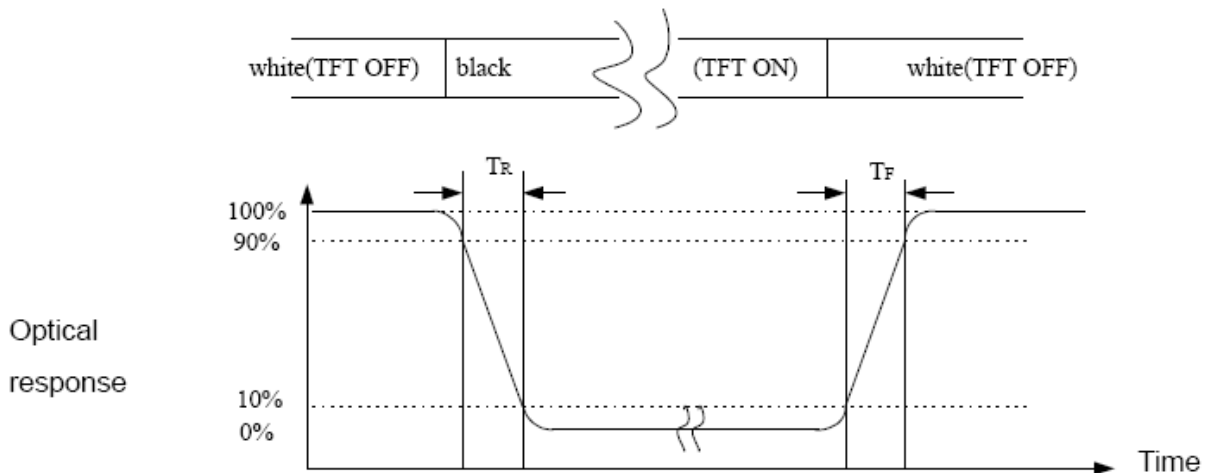


Note (2) Definition of Contrast Ratio (CR) :

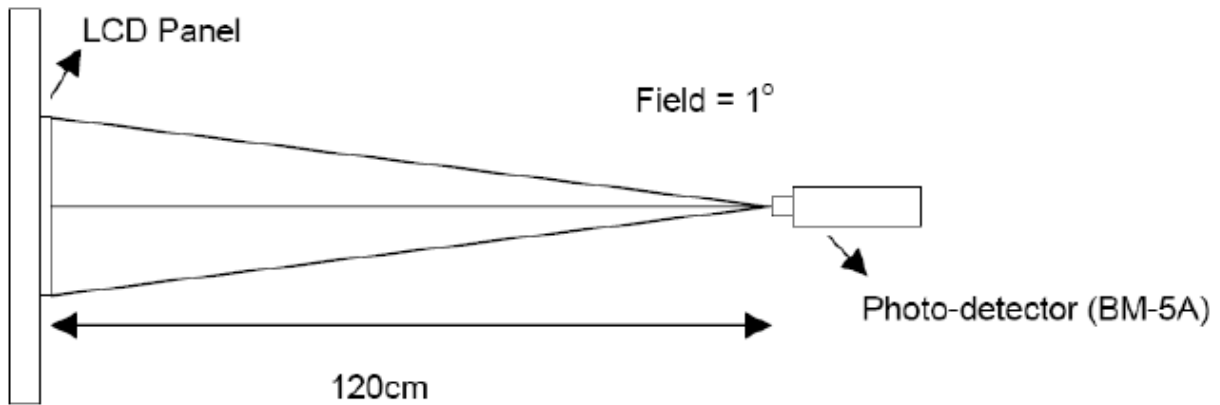
Measured at the center point of panel
Luminance with all pixels white

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

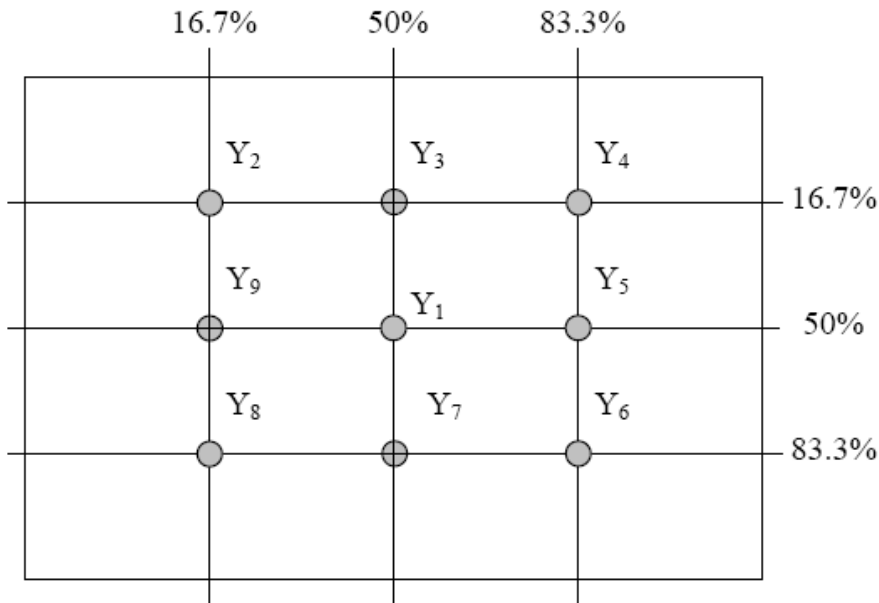
Note (3) Definition of Response Time : Sum of T_r and T_f



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity



(Min Luminance of 9 points)

$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

Note (6) Rubbing Direction (The different Rubbing Direction will cause the different optimal view direction.)

Note (7) Measured at the brightness of the panel when all terminals of LCD panel are electrically open.

6. INTERFACE

6-1 TFT LCD Module

CN2 (Input signal): FPC Down Connector, (FH28-60S-0.5SH (HIROSE), 60pin,
PITCH = 0.5mm)

Pin No.	Symbol	I/O	Function
1	AGND	P	Analog Ground
2	AVDD	P	Analog Power
3	VCC	P	Digital Power
4	R0	I	Red Data Input (LSB)
5	R1	I	Red Data Input
6	R2	I	Red Data Input
7	R3	I	Red Data Input
8	R4	I	Red Data Input
9	R5	I	Red Data Input
10	R6	I	Red Data Input
11	R7	I	Red Data Input (MSB)
12	G0	I	Green Data Input (LSB)
13	G1	I	Green Data Input
14	G2	I	Green Data Input
15	G3	I	Green Data Input
16	G4	I	Green Data Input
17	G5	I	Green Data Input
18	G6	I	Green Data Input
19	G7	I	Green Data Input (MSB)
20	B0	I	Blue Data Input (LSB)
21	B1	I	Blue Data Input
22	B2	I	Blue Data Input
23	B3	I	Blue Data Input

24	B4	I	Blue Data Input
25	B5	I	Blue Data Input
26	B6	I	Blue Data Input
27	B7	I	Blue Data Input (MSB)
28	DCLK	I	Clock input
29	DE	I	Data Enable signal
30	HSD	I	Horizontal sync input. Negative polarity.
31	VSD	I	Vertical sync input. Negative polarity
32	MODE3	I	DE/SYNC mode select. normally pull high H : DE mode L : HSD/VSD mode
33	RSTB	I	global reset pin. Active low to enter reset state. suggest to connecting with an RC reset circuit for stability. normally pull high.
34	STBYB	I	standby mode, normally pull high STBYB="1", normal operation STBYB="0", timing control, source driver will turn off, all output are high-Z
35	SHLR	I	Source right or left sequence control. SHLR="L", shift left: last data=S1<-S2...S1200=first data SHLR="H", shift right: first data=S1->SS2...S1200=last data
36	VCC	P	Digital Power
37	UPDN	I	gate up or down scan control. UPDN="L", DOWN shift : G1->G2...->G480 ; UPDN="H", UP shift: G1<-G2...<-G480
38	GND	P	Digital Ground
39	AGND	P	Analog Ground
40	AVDD	P	Analog Ground
41	VCOMin	I	For external VCOM DC input(Optional)
42	DITH	I	Dithering setting: DITH="H" 6bit resolution (last 2 bits of input data truncated) (default setting) DITH="L" 8bit resolution

43	NC	-	Not connect
44	NC	-	Not connect
45	V10	P	Gamma correction voltage reference
46	V9	P	Gamma correction voltage reference
47	V8	P	Gamma correction voltage reference
48	V7	P	Gamma correction voltage reference
49	V6	P	Gamma correction voltage reference
50	V5	P	Gamma correction voltage reference
51	V4	P	Gamma correction voltage reference
52	V3	P	Gamma correction voltage reference
53	V2	P	Gamma correction voltage reference
54	V1	P	Gamma correction voltage reference
55	NC	-	Not connect
56	VGH	P	Positive Power for TFT
57	VCC	P	Digital Power
58	VGL	P	Negative Power for TFT
59	GND	P	Digital Ground
60	NC	-	Not connect

6-2 Backlight Unit

CN1 : LED Power Source (BHSR-02VS-1) or equivalent

Mating Connector : (SBHT-002T-P0.5) or equivalent

Pin No.	Symbol	Function
1	VL	LED power supply (high voltage)
2	GL	LED power supply (low voltage)

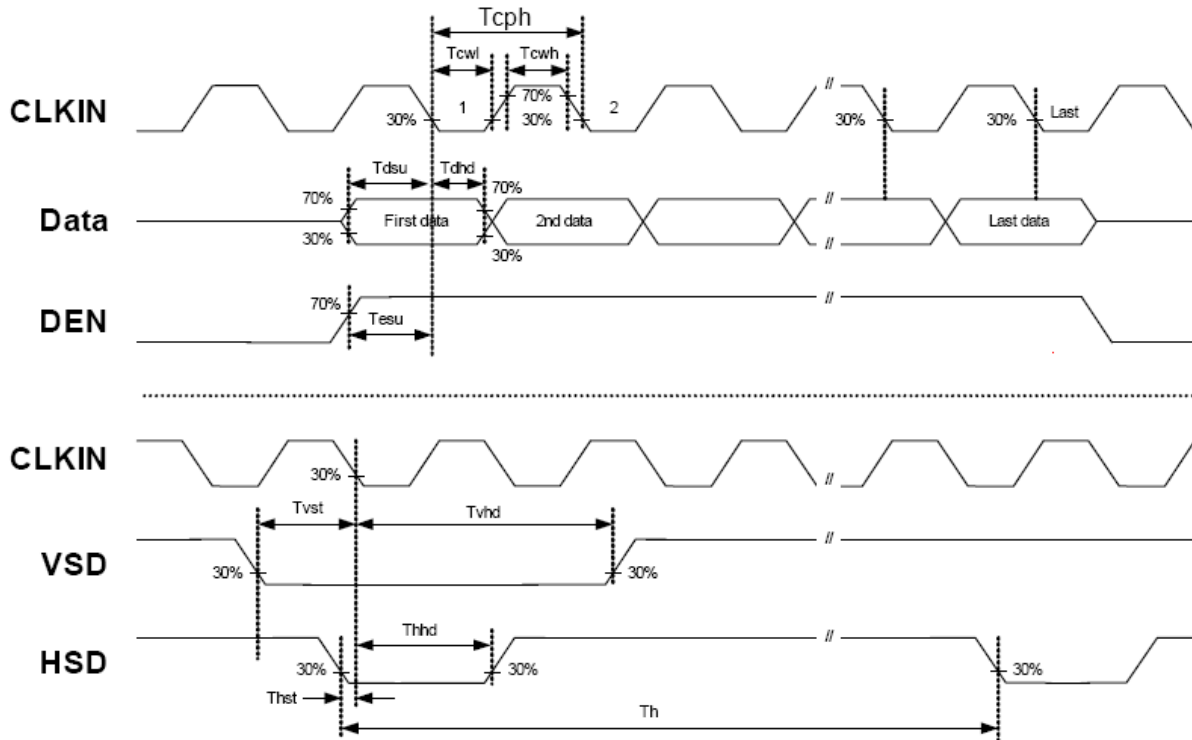
7. INPUT SIGNAL :

7-1 AC Electrical Characteristics

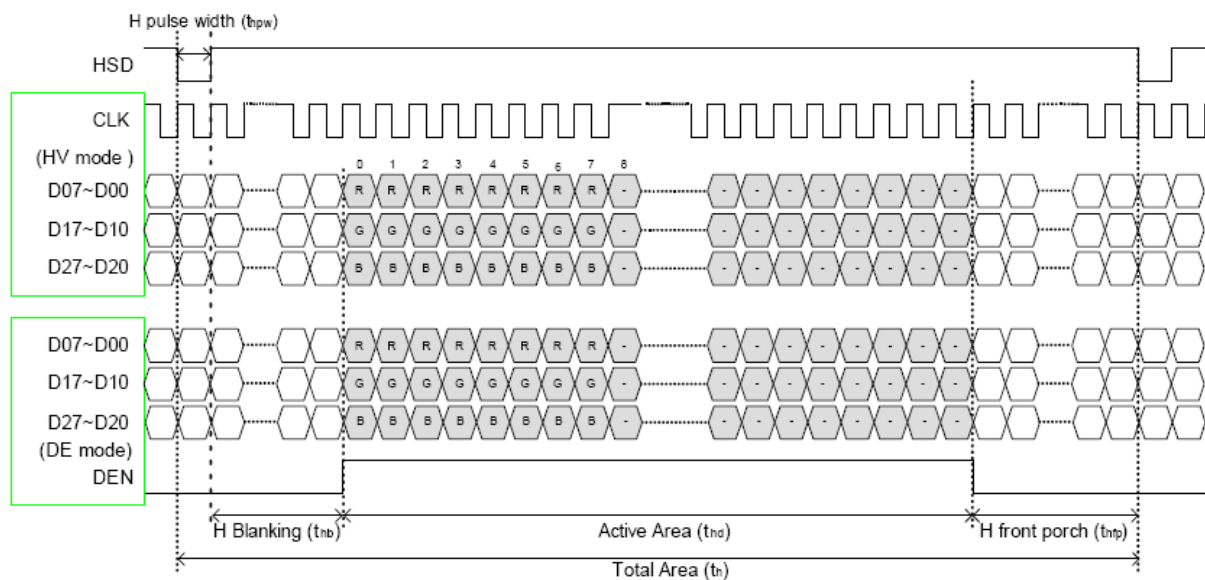
Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK cycle time	Tcph	25			ns	
DCLK frequency	fclk		30	40	MHz	
DCLK pulse duty	Tcwh	40	50	60	%	
VSD setup time	Tvst	8			ns	
VSD hold time	Tvhd	8			ns	
HSD setup time	Thst	8			ns	
HSD hold time	Thhd	8			ns	
Data setup time	Tdsu	8			ns	
Data hold time	Tdhd	8			ns	
DE setup time	Tesu	8			ns	
DE hold time	Tehd	8			ns	
Horizontal display area	thd		800		Tcph	
HSD period time	th		928		Tcph	
HSD pulse width	thpw	1	48		Tcph	
HSD back porch	thb		40		Tcph	
HSD front porch	thfp		40		Tcph	
Vertical display area	tvd		480		th	
VSD period time	tv		525		th	
VSD pulse width	tvpw		3		th	
VSD back porch	tvb		29		th	
VSD front porch	tvfp		13		th	

7-2 Timing Diagram of Interface Signal

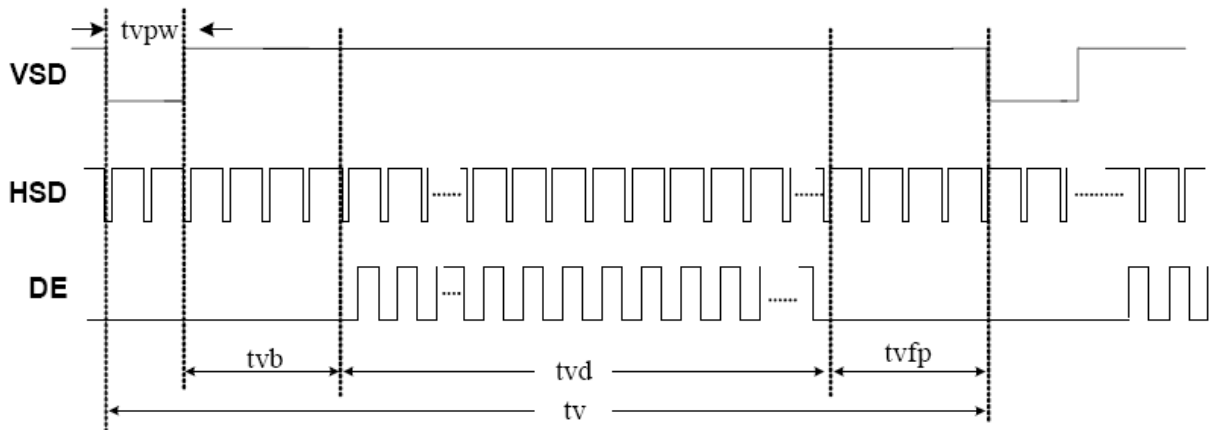
Sampling clock timing



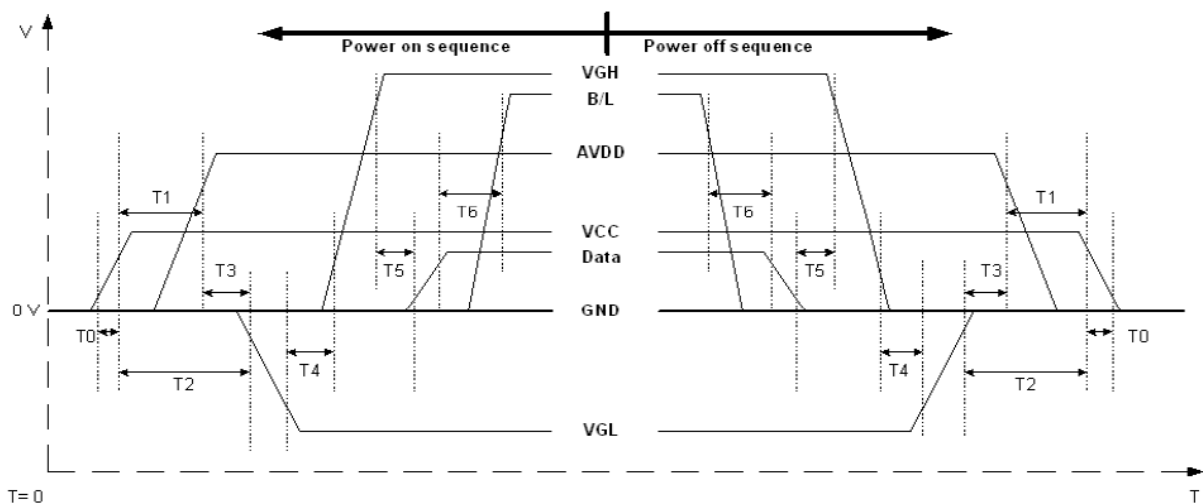
Horizontal display timing range



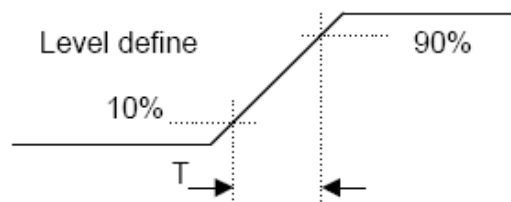
Vertical timing



7-3 Power Sequence



Item	Min.	Typ.	Max.	Unit
T0	0.5	--	20	msec
T1	16			msec
T2	20			msec
T3	0			msec
T4	20		--	msec
T5	20			msec
T6	50			msec



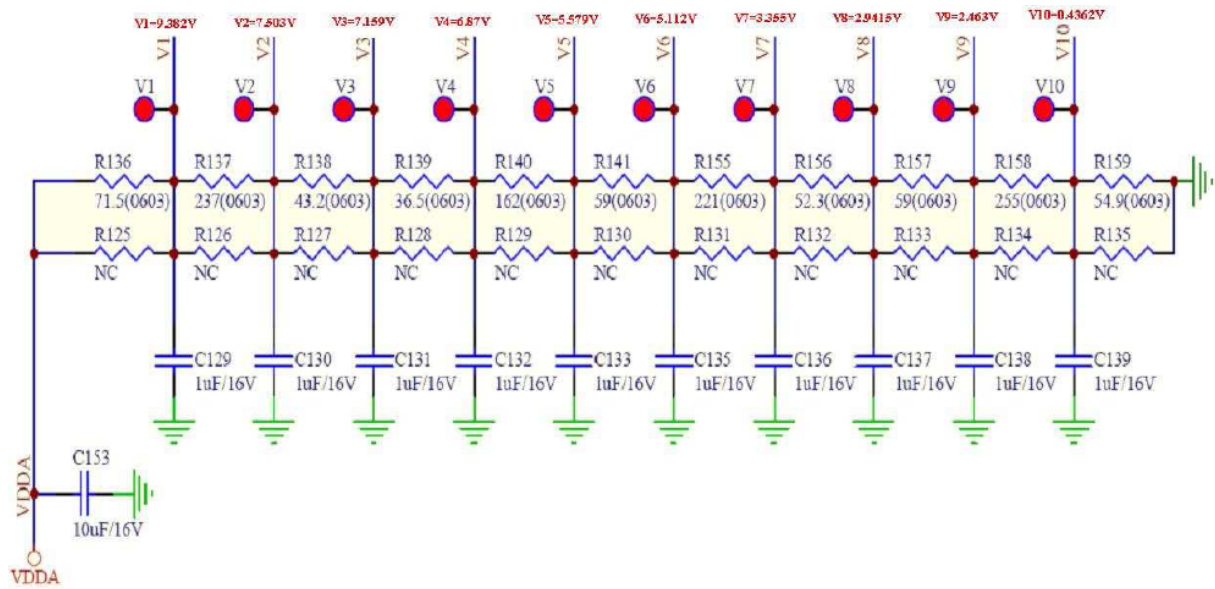
Power On Sequence: VCC-> AVDD -> VGL -> VGH -> Data -> B/L

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

Notes: Data include R0~R7, G0~G7, B0~B7, HSD, VSD, DCLK, SHLR, UPDN, DE MODE, RSTB, STBYB, SHLR, UPDN, DITH

7-4 Gamma circuit

Suggested Gamma Circuit



8. RELIABILITY TEST CONDITIONS

8-1 RELIABILITY

Item	Test Conditions	Note
High Temperature Storage	Ta = 80°C 240 hrs	
Low Temperature Storage	Ta = -30°C 240 hrs	
High Temperature Operation	Ts = 70°C 240 hrs	
Low Temperature Operation	Ta = -20°C 240 hrs	
High Temperature and High Humidity (operation)	Ta = +60°C, 90%RH 240 hrs	
Thermal Cycling Test (non operation)	-30°C (30min) → +80°C (30min), 200cycles	
Electrostatic Discharge	±200V, 200pF(0Ω) 1 time/each terminal	
Vibration	1. Random: 1.04Grms, 5~500Hz, X/Y/Z, 30min/each direction 2. Sine: Freq. Range: 8~33.3Hz Stoke: 1.3mm Sweep: 2.9G, 33.3~400Hz X/Z: 2hr, Y: 4hr, cyc: 15min	
Shock	100G, 6ms, ±X, ±Y, ±Z 3 time for each direction	JIS C7021, A-10 (Condition A)
Vibration (with carton)	Random: 0.015G ² /Hz, 5~200Hz -6dB/Octave, 200~400Hz XYZ each direction: 2hr	
Drop (with carton)	Height: 60cm 1 corner, 3 edges, 6 surfaces	JIS Z0202

Note: There is no display function NG issue occurred, all the cosmetic specification is judged before the reliability stress.

9. General Precautions

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 Disassembling or Modification

Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. Ampire does not warrant the module, if customers disassemble or modify the module.

9-3 Breakage of LCD Panel

- 9.3.1. 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.
- 9.3.2. If liquid crystal contacts mouth or eyes, rinse out with water immediately.
- 9.3.3. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
- 9.3.4. Handle carefully with chips of glass that may cause injury, when the glass is broken.

9-4 Electric Shock

- 9.4.1. Disconnect power supply before handling LCD module.
- 9.4.2. Do not pull or fold the LED cable.
- 9.4.3. Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

9-5 Absolute Maximum Ratings and Power Protection Circuit

- 9.5.1. 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.
- 9.5.2. Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
- 9.5.3. It's recommended to employ protection circuit for power supply.

9-6 Operation

9.6.1 Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

9.6.2 Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

9.6.3 When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

9.6.4 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.

9.6.5 When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzine or other adequate solvent.

9-7 Mechanism

Please mount LCD module by using mounting holes arranged in four corners tightly.

9-8 Static Electricity

9.8.1 Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

9.8.2. Because LCD module use 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.

9-9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

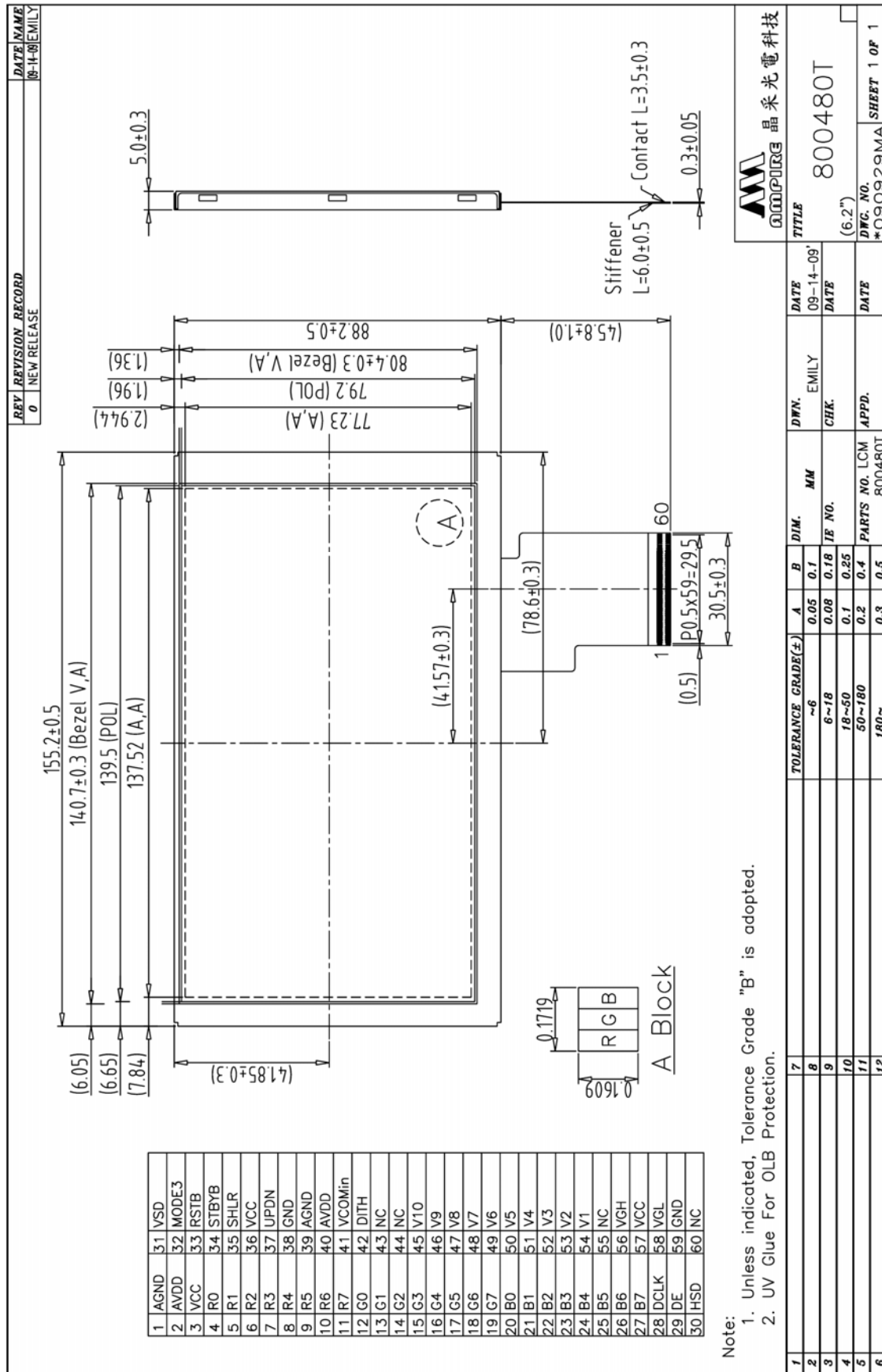
9-10 Disposal

When disposing LCD module, obey the local environmental regulations.

9-11 Others

AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

10. OUTLINE DIMENSION



Note:
 1. Unless indicated, Tolerance Grade "B" is adopted.
 2. UV Glue For OLB Protection.