



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-800480HTMQW-00H
APPROVED BY	
DATE	

☒ Approved For Specifications

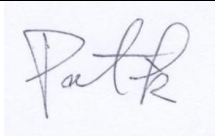

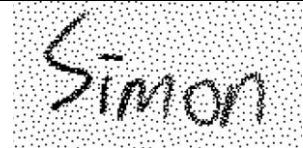
☐ Approved For Specifications & Sample

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2018/03/28	--	New Release	Simon
2020/08/14	5	Remove VCOM	Tank
	12	Modify Pin6 to No connection	
	20, 21	Update OUTLINE DIMENSION	

1. Features

7 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module.
This module is composed of a 7" TFT-LCD panel and LED backlight.

- (1) Construction: 7" a-Si TFT active matrix, White LED Backlight .
- (2) Resolution (pixel): 800(R.G.B) X480
- (3) Number of the Colors : 16.7M colors (R , G , B 8 bit digital each)
- (4) LCD type : Transmissive , normally White
- (5) Interface: 50 Pin (RGB 24bit).
- (6) Beside 3.3V power input. AVDD, VGH ,VGL and VCOM are needed for TFT LCD driving.
- (7) Viewing Direction: 6 O'clock (Gray Inversion). Best image quality is in 12 O'clock.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
LCD size	7 inch (Diagonal)	
Resolution	800 x (RGB) x 480	dot
Dot pitch	0.1926(W) x 0.179(H)	mm
Active area	154.08(W) x 85.92(H)	mm
Module size	164.9(W) x 100.0(H) x 5.7(D)	mm
Surface treatment	Anti-Glare	
Color arrangement	RGB-stripe	
interface	Digital	
Weight	157.5	g

3. ABSOLUTE MAX. RATINGS

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Power voltage	DVDD	-0.5	5	V	
Input signal voltage	Vin	-0.50	5.00	V	Note 1
Operation temperature	TOP	-20	70	°C	
Storage temperature	TST	-30	80	°C	
Analog Power Supply Voltage	AVDD	-0.5	15.00	V	
TFT Device on voltage	VGH	-0.3	42	V	
TFT Device off voltage	VGL	-20	0.3	V	

Note 1: Note1: Input voltage include R0~R7, G0~G7, B0~B7, DCLK, HSYNC, VSYNC, DE, R/L, U/D, MODE, RESET, DITHB.

4. ELECTRICAL CHARACTERISTICS

4-1 TFT LCD Module

GND=0V ,Ta=25°C

Item	Symbol	Values			Unit	Remark
		MIN	TYP	MAX		
Power Voltage	DVDD	3.0	3.3	3.6	V	NOTE 2
	AVDD	10.1	10.4	10.7	V	
	VGH	14.4	16.0	17.6	V	
	VGL	-7.7	-7.0	-6.3	V	
Input logic high voltage	V _{IH}	0.7*DVDD	-	DVDD	V	NOTE3
Input logic low voltage	V _{IL}	0	-	0.3*DVDD	V	NOTE3
Power Consumption	I _{VDD}	--	--	10	mA	Note 1,2 VDD=3.3V
	I _{AVDD}	--	--	30	mA	AVDD=10.4V
	I _{VGH}	--	--	0.3	mA	VGH=16.0V
	I _{VGL}	--	--	0.3	mA	VGL=-7.0 V

Note 1: Be sure to apply DVDD and VGL to the LCD first, and then apply VGH.

Note 2: VDD setting should match the signals output voltage (refer to Note 3) of Customer's system board.

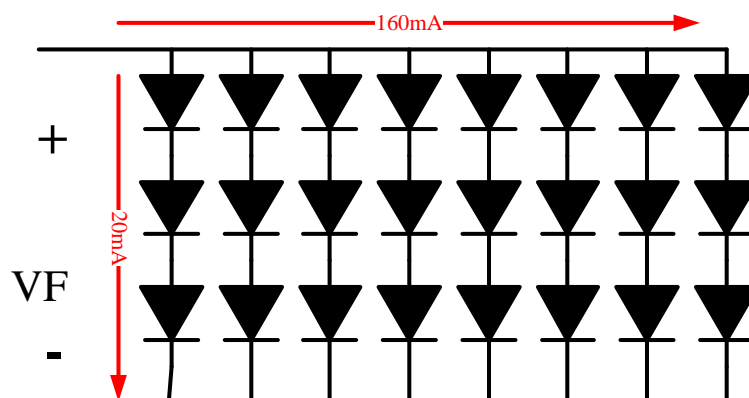
Note 3: DCLK,HSD,VSD,RSTB,UPDN, SHLR,DITHB,CLKPOL,MODE, DE,DR0~DR7,DG0~DG7,DB0~DB7.

4-2 Backlight Driving Conditions

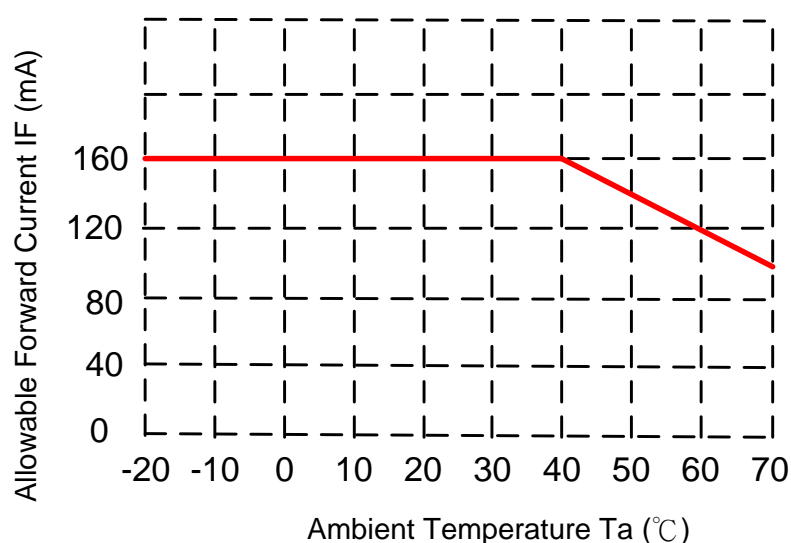
Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
LED voltage	V_F	9	9.6	10.8	V	$I_{LED}=160\text{mA}$ $T_a=25^\circ\text{C}$
LED current	I_F	--	160	200	mA	$T_a=25^\circ\text{C}$
LED Life Time	-	20K	--	--	Hour	$T_a=25^\circ\text{C}$ Note (2)

Note (1) The LED Supply Voltage is defined by the number of LED, at $T_a=25^\circ\text{C}$ and $I_F=160\text{mA}$.

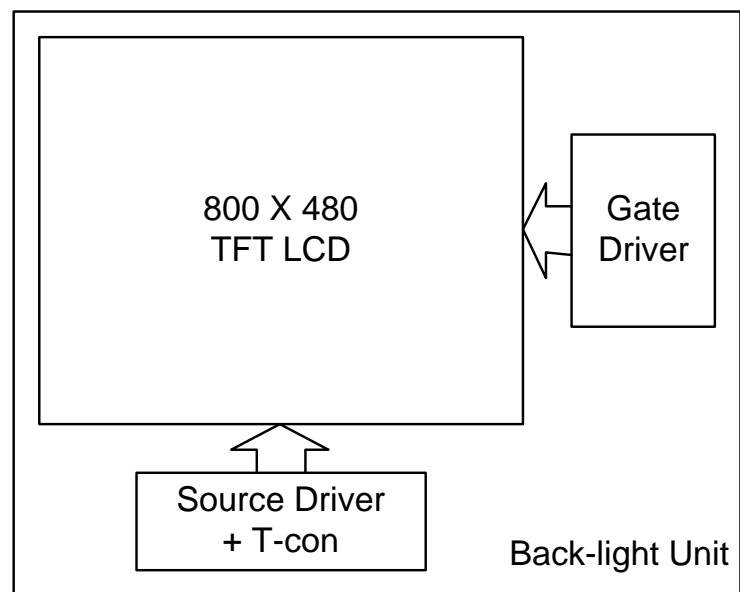
Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at $T_a=25^\circ\text{C}$ and $I_F=160\text{mA}$. The LED lifetime could be decreased if operating I_F is larger than 160mA.



When LCM is operated over 40°C ambient temperature, the I_{LED} should be follow :



4-3 Block Diagram



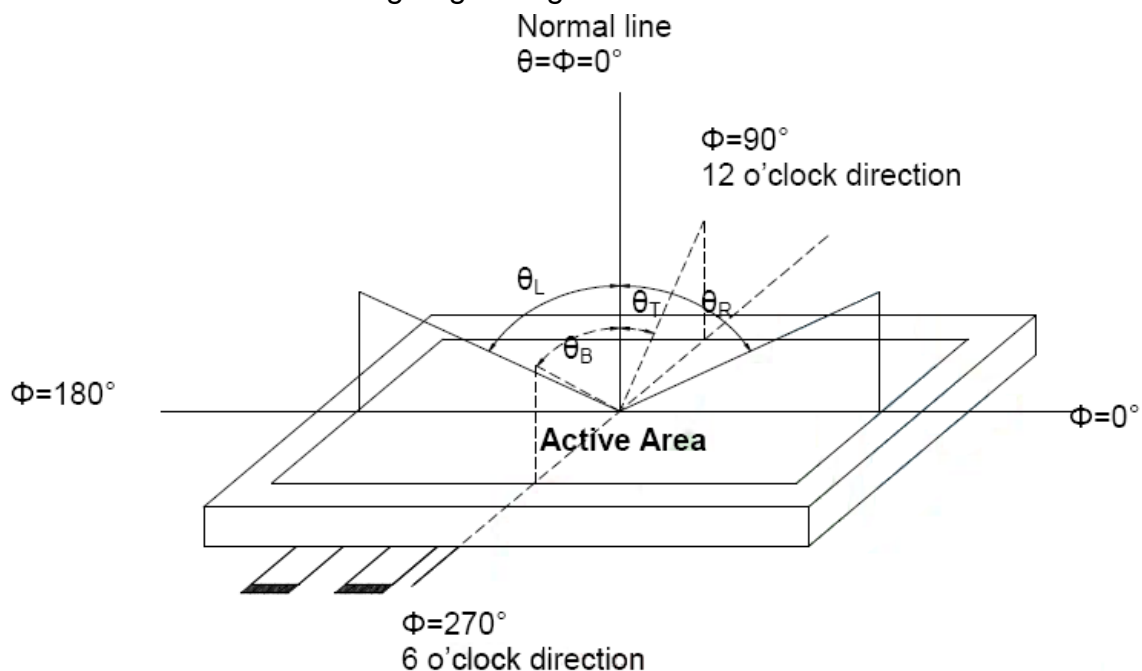
5. Optical Specifications

Item	Symbol	Condition	Values			Unit	Note
			Min.	Typ.	Max.		
Viewing angle (CR \geq 10)	θL	$\Phi = 180^\circ$ (9 o'clock)	60	80	--	degree	Note1
	θR	$\Phi = 0^\circ$ (3 o'clock)	60	80	--		
	θT	$\Phi = 90^\circ$ (12 o'clock)	50	60	--		
	θB	$\Phi = 270^\circ$ (6 o'clock)	60	80	--		
Response time	TON	Normal $\theta = \Phi = 0^\circ$	--	25	--	msec	Note3
	TOFF		--	25	--	msec	
Contrast ratio	CR		600	800	--	--	Note4
Color chromaticity	Rx		0.538	0.588	0.638	--	Note5 Note6
	Ry		0.302	0.352	0.402		
	Gx		0.298	0.348	0.398		
	Gy		0.531	0.581	0.631		
	Bx		0.100	0.150	0.200		
	By		0.036	0.086	0.136		
	Wx		0.259	0.309	0.359		
	Wy		0.268	0.318	0.368	--	
Luminance	L		350	400	--	cd/m ²	Note6
Luminance uniformity	YU		80	85	--	%	Note7
NTSC			45	50	--	%	Note5

Test Conditions :

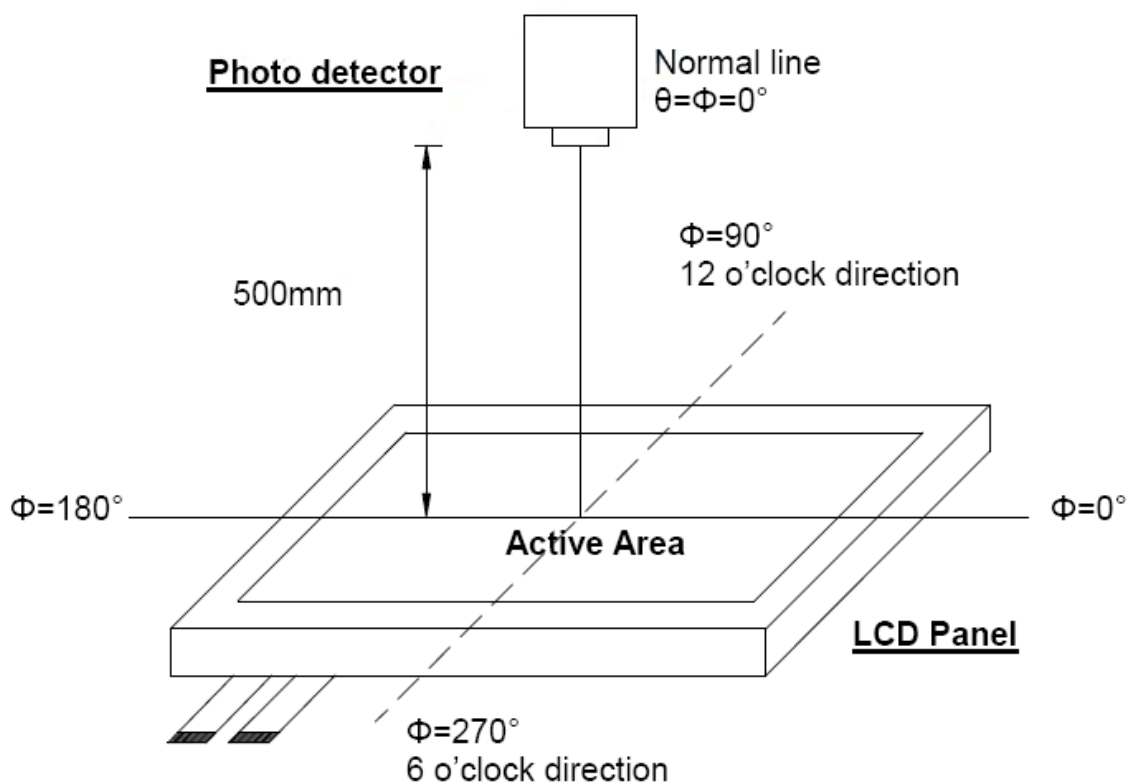
1. $I_L = 160\text{mA}$ (Backlight current), the ambient temperature is 25°C .
2. The test systems refer to Note 2.

Note 1 : Definition of viewing angle range



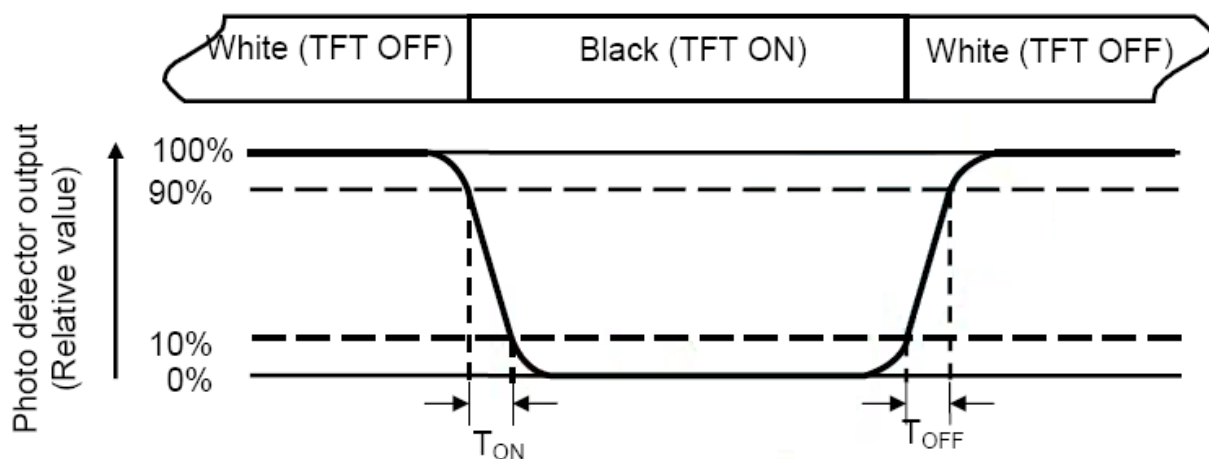
Note 2 : Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON BM-7, other items are measured by BM-5A/Field of view : 1° / Height : 500mm.)



Note 3 : Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 4 : Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5 : Definition of color chromaticity (CIE1931)

Color coordinated measured at center point of LCD.

Note 6 : All input terminals LCD panel must be ground when measuring the center area of the panel.

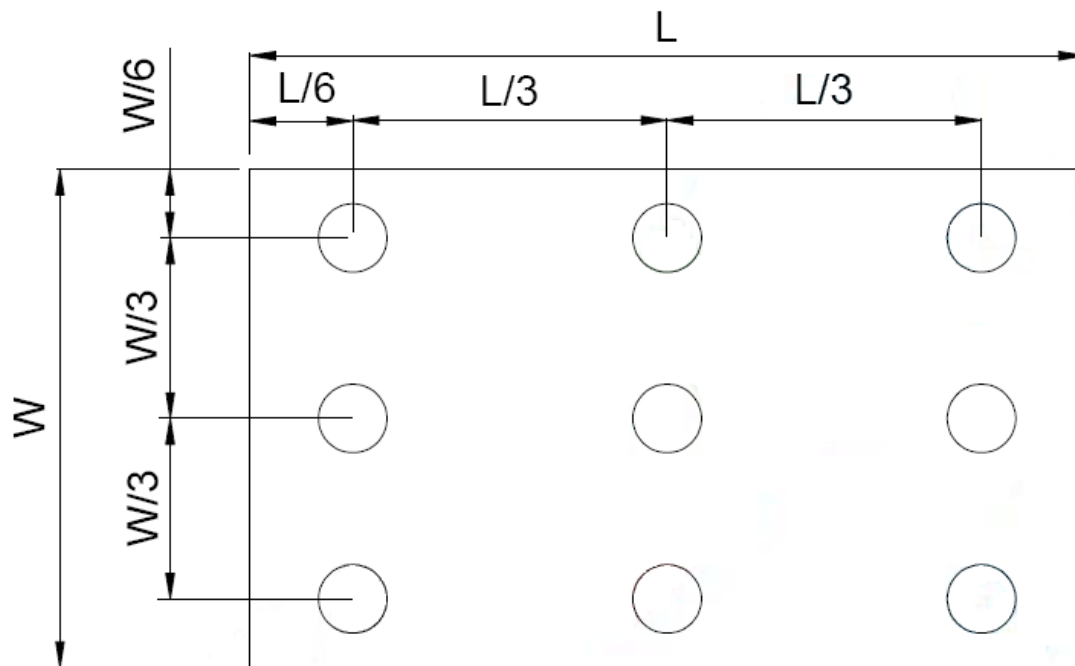
Note 7 : Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to bellow figure). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{B_{\min}}{B_{\max}}$$

L ----- Active area length

W ----- Active area width



B_{\max} : The measured maximum luminance of all measurement position.

B_{\min} : The measured minimum luminance of all measurement position.

6. INTERFACE

Pin No	Symbol	Function
1	VLED+	Led anode
2	VLED+	Led anode
3	VLED-	Led cathode
4	VLED-	Led cathode
5	GND	Power Ground
6	NC	No connection
7	DVDD	Power supply for digital circuit
8	MODE	DE/SYNC mode select (Note 1)
9	DE	Data input enable
10	VS	Vertical sync signal
11	HS	Horizontal sync signal
12	B7	Blue Data 7 (MSB)
13	B6	Blue Data 6
14	B5	Blue Data 5
15	B4	Blue Data 4
16	B3	Blue Data 3
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	G7	Green Data 7 (MSB)
21	G6	Green Data 6
22	G5	Green Data 5
23	G4	Green Data 4
24	G3	Green Data 3
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	R7	Red Data 7 (MSB)
29	R6	Red Data 6
30	R5	Red Data 5
31	R4	Red Data 4
32	R3	Red Data 3
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0 (LSB)
36	GND	Power Ground
37	DCLK	Clock for input data, latching data at falling edge
38	GND	Power Ground
39	L/R	Left/ right selection (Note 4)
40	U/D	Up/down selection (Note 4)
41	VGH	Gate ON voltage
42	VGL	Gate OFF voltage
43	AVDD	Power for Analog circuit

44	RESET	Global reset pin (Note 2)
45	NC	No connection
46	NC	No connection
47	DITHB	Dithering function (Note 3)
48	GND	Power Ground
49	NC	No connection
50	NC	No connection

Note 1: DE/SYNC mode select, normally pull high.

High: DE mode

Low: SYNC mode

Note 2: Global reset pin. Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high.

Note 3: Dithering function enable control. Normally pull high:

DITHB="1". Disable internal dithering function. For 18 bits RGB interface, connect two LSB bits of all the R/G/B data buses to GND.

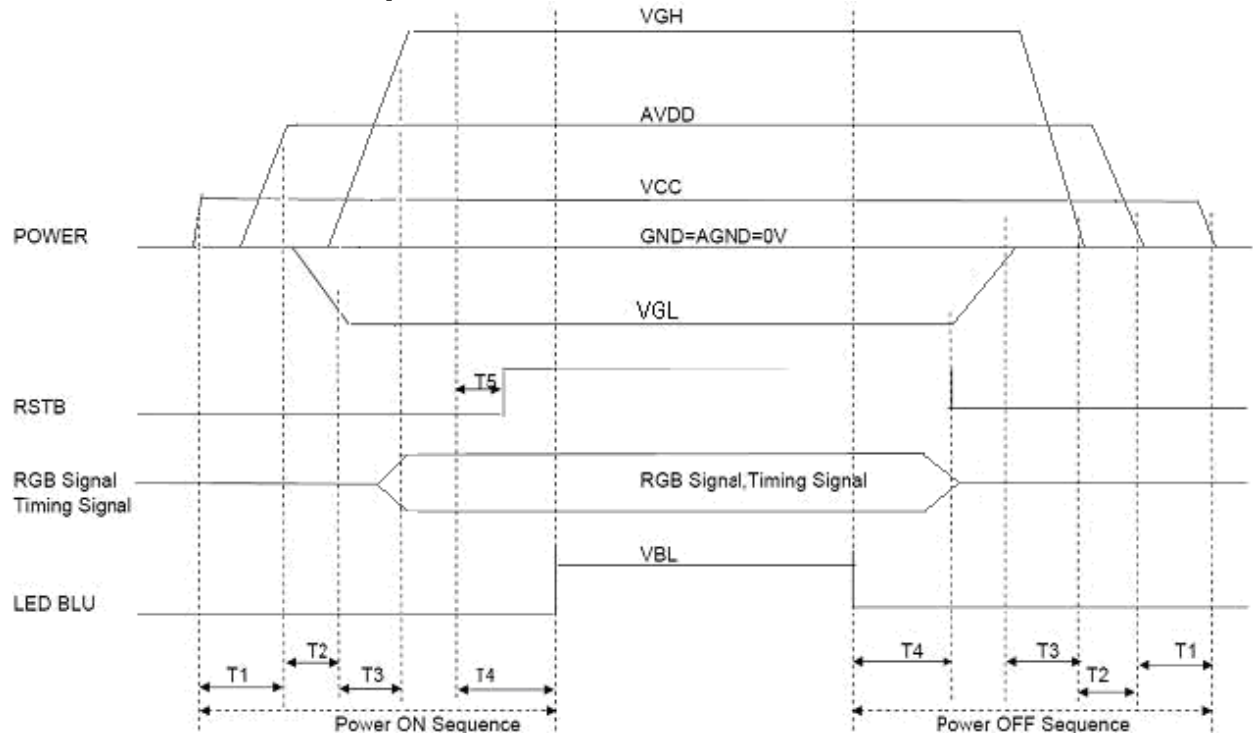
DITHB="0". Enable internal dithering function. For 24 bits RGB interface.

Note 4: The 39 and 40pin(L/R、U/D) scanning direction set section.

Setting of scan control input		Scanning direction
U/D	L/R	
GND	VCC	Up to down, left to right
VCC	GND	Down to up, right to left
GND	GND	Up to down, right to left
VCC	VCC	Down to up, left to right

7. INTERFACE TIMING

7-1 Power On/Off Sequence

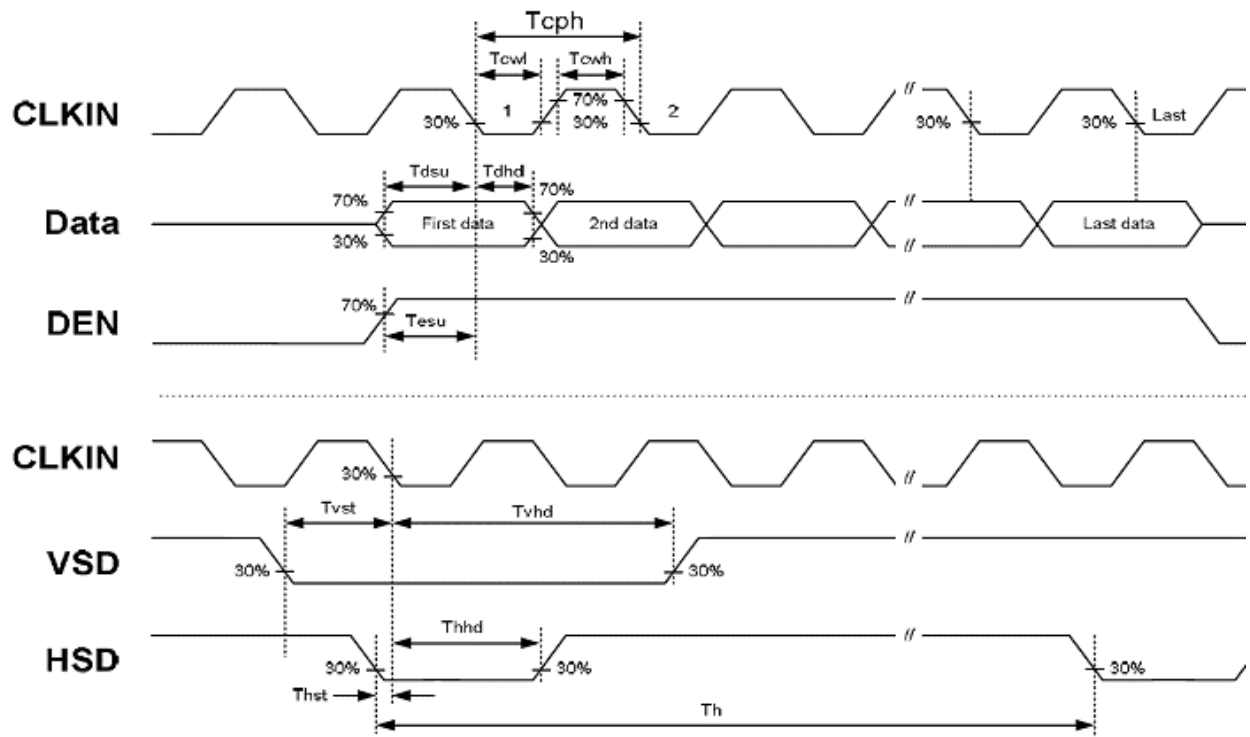


Note 1: $T1 \geq 20\text{ms}$, $T2 \geq 20\text{ms}$, $T3 \geq 5\text{ms}$, $T4 \geq 100\text{ms}$, $T5 \geq 5\text{ms}$.

7-2 Timing Characteristics

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
DCLK frequency	Fclk	28	30.0	40.0	MHz
DCLK cycle time	Tcph	25	33.3	36	ns
DCLK pulse width	Tcw	40%	50%	60%	Tcph
VS setup time	Tvst	8	--	--	ns
VS hold time	Tvhd	8	--	--	ns
HS setup time	Thst	8	--	--	ns
HS 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

Input Clock and Data timing Diagram:



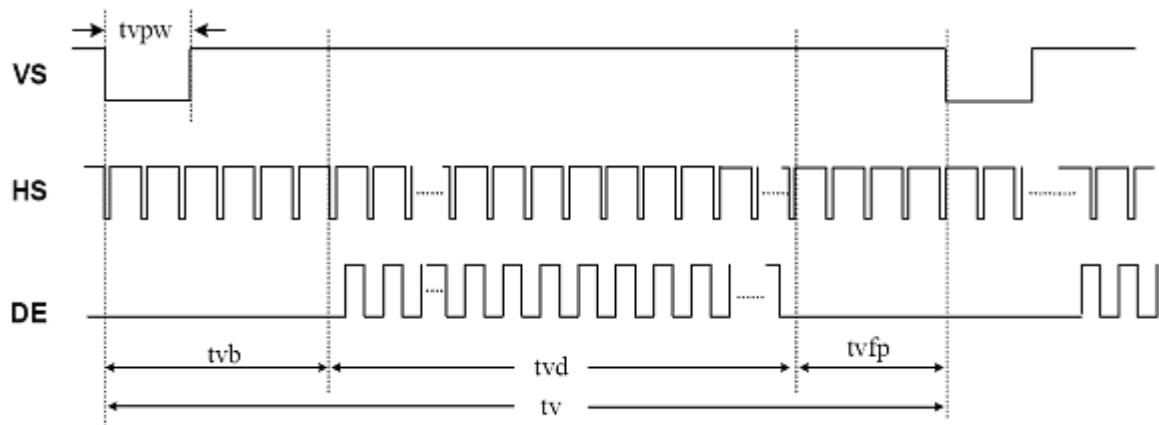
7-3 Recommended Timing Setting Of TCON

TCON (Embedded In Source IC) Input Timing (DCLK, HS, VS, DE)

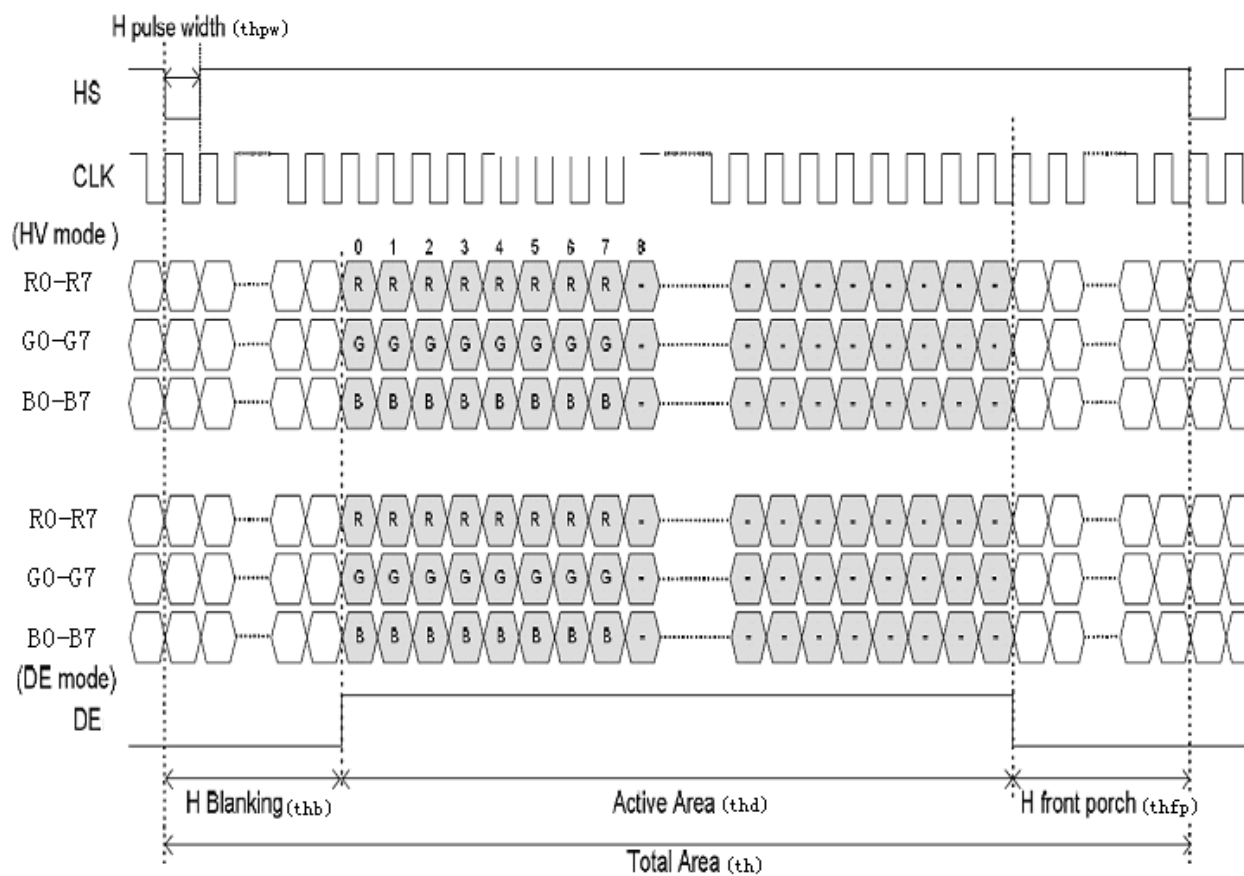
Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	F _{clk}	28	30	40	MHZ	
	t _{clk}	20	33.3	36	ns	
HSD	t _h	862	1056	1200	t _{clk}	
	t _{hd}	800	800	800	t _{clk}	
	t _{h_{pw}}	1	-	40	t _{clk}	
	t _{hb}	46	46	46	t _{clk}	
	t _{h_{fp}}	16	210	354	t _{clk}	
VSD	t _v	510	525	650	th	
	t _{vd}	480	480	480	th	
	t _{v_{pw}}	1	3	20	th	
	t _{vb}	23	23	23	th	
	t _{v_{fp}}	7	22	147	th	

Note 1: DE timing refer to HS, VS input timing.

TCON Vertical Input Timing Diagram HV



TCON Horizontal Input Timing Diagram



8. RELIABILITY TEST CONDITIONS

(Note 3)

Item	Test Conditions	Note
High Temperature Storage	Ta = 80℃ 240 hrs	Note 1,4
Low Temperature Storage	Ta = -30℃ 240 hrs	Note 1,4
High Temperature Operation	Ts = 70℃ 240 hrs	Note 2,4
Low Temperature Operation	Ta = -20℃ 240 hrs	Note1,4
Operate at High Temperature and Humidity	+60℃, 90%RH 240 hrs	

Note 1 : Ta is the ambient temperature of samples.

Note 2 : Ts is the temperature of panel's surface.

Note 3 : In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

Note 4 : Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

10. General Precautions

10-1 Safety

Liquid crystal is poisonous. Do not put it 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 operation 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 $+25\pm 10^{\circ}\text{C}$ 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.

10-5 Others

1. AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.
2. 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

