



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-800600P6TMQW-B0H-E
APPROVED BY	
DATE	

☒ Approved For Specifications

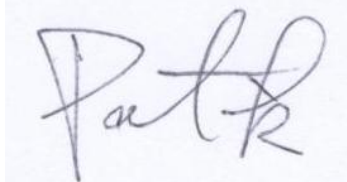
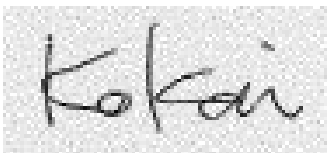

☐ Approved For Specifications & Sample

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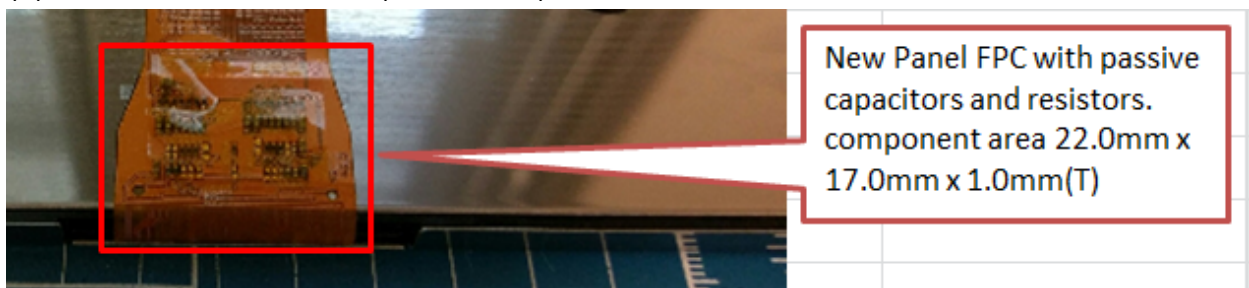
RECORD OF REVISION

Revision Date	Page	Contents	Editor
2018/4/24	--	New Release	Emil

1. Features

8 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module. This module is composed of a 8" TFT-LCD panel, LED backlight and power circuit unit.

- (1) Construction: 8" a-Si TFT active matrix, White LED Backlight and power circuit board.
- (2) Resolution (pixel): 800(R.G.B) X600
- (3) Number of the Colors : 262K colors (R , G , B 6 bit digital each)
- (4) LCD type : Transmissive , normally White
- (5) Interface: 40 Pin (RGB interface)
- (6) Power Supply Voltage: 3.3V for logic voltage, **12V for LED driver power voltage.**
- (7) New TFT LCD Panel (LCD Mask). Passive RC on FPC.



- (8) Viewing Direction: 6 O'clock (Gray inversion)

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
LCD size	8 inch (Diagonal)	
Resolution	800 x 3(RGB) x 600	dot
Dot pitch	0.0675(W) x 0.2025(H)	mm
Active area	162.0(W) x 121.5(H)	mm
Module size	200.4(W) x 141.0(H) x 10.35(D)	mm
Surface treatment	Anti-Glare	
Color arrangement	RGB-stripe	
interface	Digital	
Weight	TBD	g

3. ABSOLUTE MAX. RATINGS

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Power voltage	VCC	-0.5	5	V	
	VLED	-0.5	18		
Input signal voltage	V _i	-0.3	VCC+0.3	V	Note 1
Operation temperature	T _{OP}	-20	70	°C	
Storage temperature	T _{ST}	-30	80	°C	

Note 1:

The product is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above.

Signals include: DCLK, DE, HS, VS, R0~R5, G0~G5, B0~B5.

4. ELECTRICAL CHARACTERISTICS

4-1 Typical Operation Conditions

Item		Symbol	Values			Unit	Remark
			MIN	TYP	MAX		
Power Voltage		V _{CC}	3.0	3.3	3.6	V	Note 1,2
Power Consumption		I _{CC}	-	10	15	mA	Note 1,2 VCC=3.3V
Logic Input Voltage	Input Voltage	V _{IN}	0	-	V _{CC}	V	
	Logic input high voltage	V _{TH}	0.7V _{CC}	-	V _{CC}	V	Note 3
	Logic input low voltage	V _{TL}	GND	-	0.3V _{CC}	V	Note 3

Note 1: Value for Power Board combined panel.

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

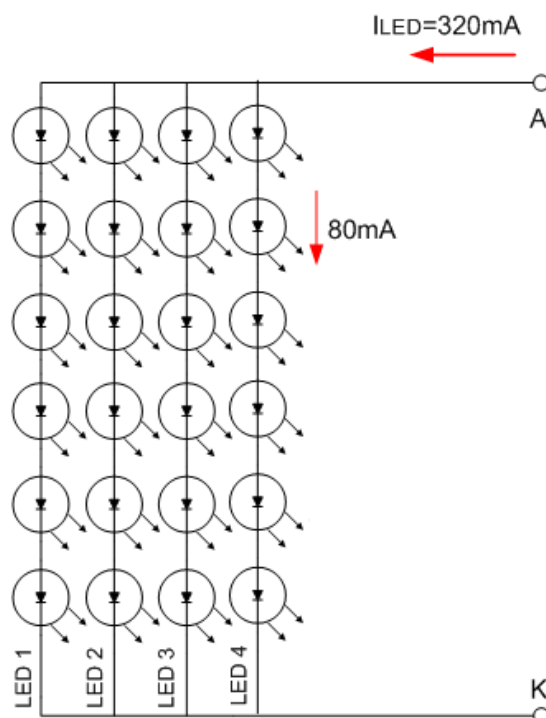
Note 3: DCLK, DE, HS, VS, R0~R5, G0~G5, B0~B5.

4-2 Backlight Driving Conditions

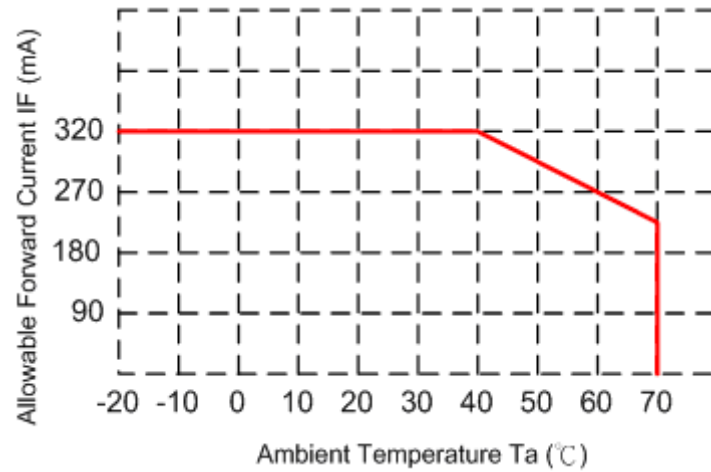
Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
LED Driver voltage	VLED	--	12	--	V	
Power Supply Current For LED Driver	ILED	-	640	-	mA	VLED=12V VADJ=3.3V (duty 100%)
ADJ Input Voltage	V _{ADJ}	-	3.3	5	V	duty=100% Note(3)
LED voltage	V _{AK}	--	19.8	--	V	I _L =320mA Ta=25°C
LED current	I _L	324	320	396	mA	Ta=25°C
		--	270	--	mA	Ta=60°C
LED Life Time	-	--	50K	--	Hour	Note (2)

Note (1) The constant current source is needed for white LED back-light driving. When LCM is operated over 60 deg.C ambient temperature, the I_L of the LED back-light should be adjusted to 270mA max

Note (2) Brightness to be decreased to 50% of the initial value.

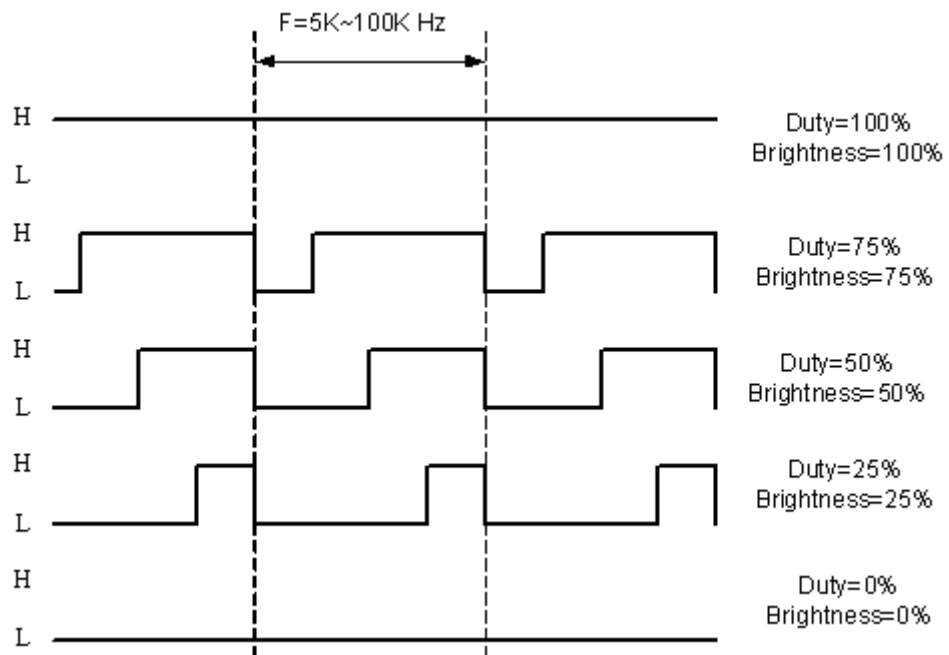


When LCM is operated over 40°C ambient temperature, the ILED should be follow :

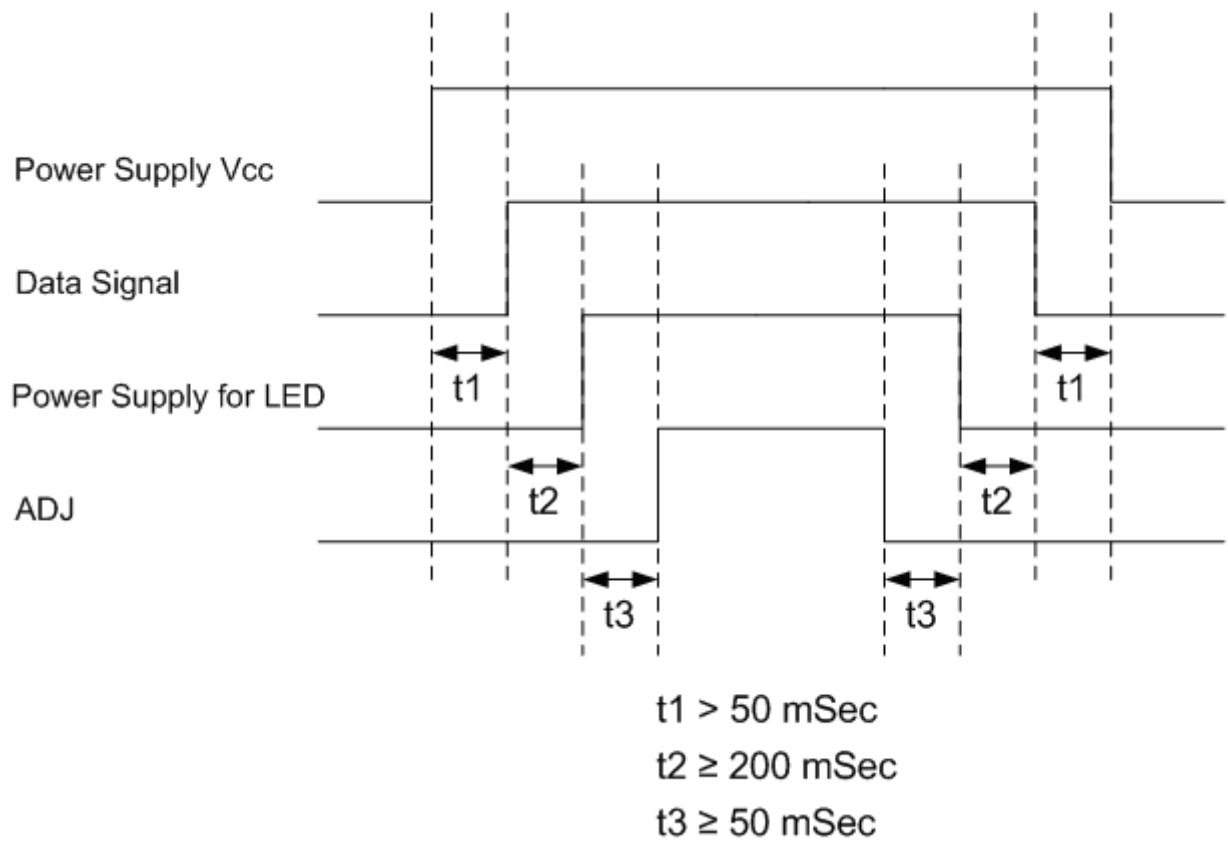


Note (3) VLEDADJ is PWM signal input. It is for brightness control.

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
ADJ signal frequency	f_{PWM}	5K	20K	100K	Hz
ADJ signal logic level High	VIH	2.4	3.3	5.0	V
ADJ signal logic level Low	VIL	0	--	0.8	V



4-3 Power Sequence

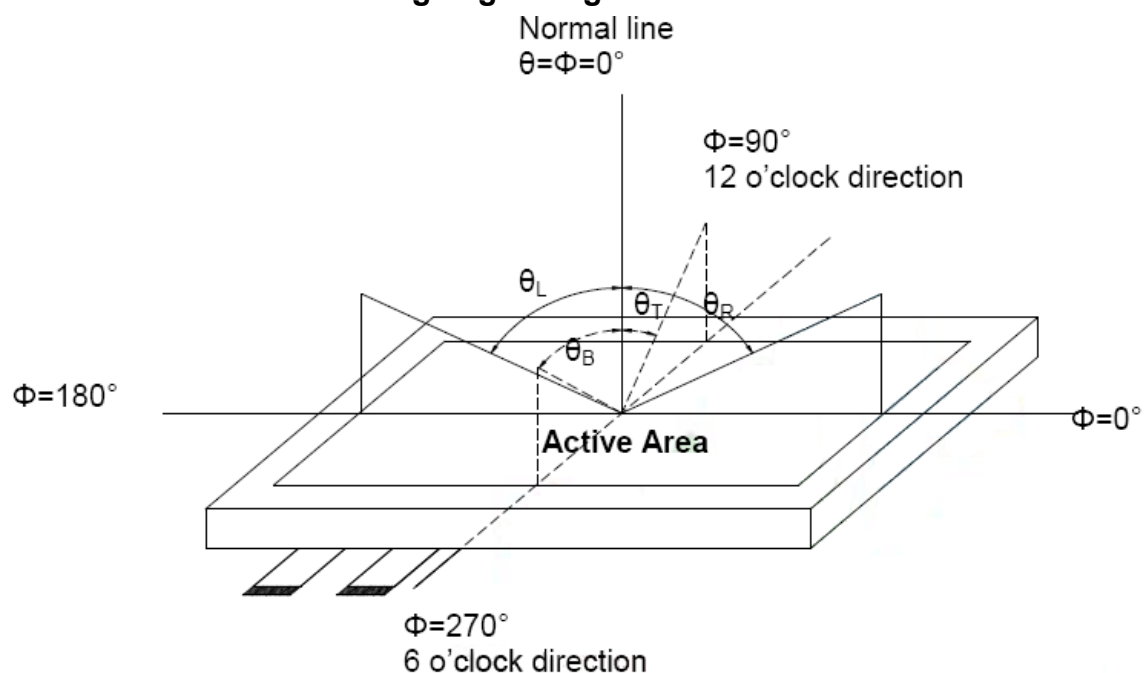


5. Optical Specifications

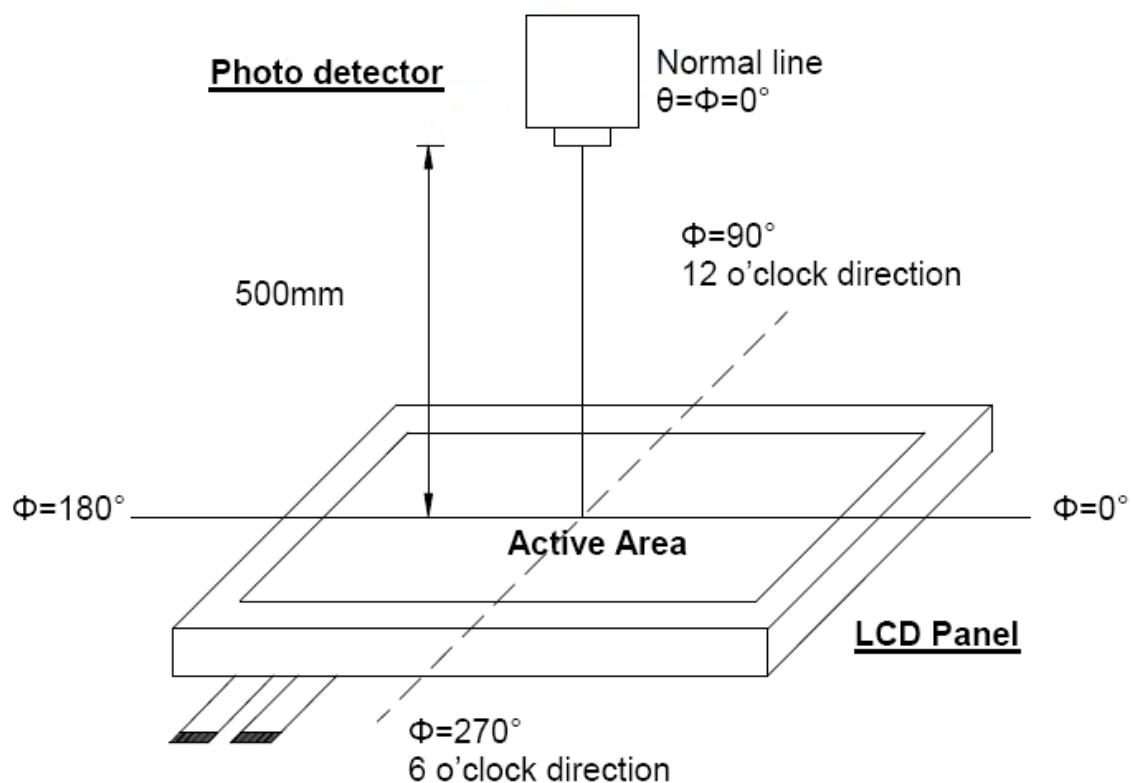
Item	Symbol	Condition	Values			Unit	Note
			Min.	Typ.	Max.		
Viewing angle (CR \geq 10)	θ L	$\Phi = 180^\circ$ (9 o'clock)	60	70	--	degree	Note1
	θ R	$\Phi = 0^\circ$ (3 o'clock)	60	70	--		
	θ T	$\Phi = 90^\circ$ (12 o'clock)	40	50	--		
	θ B	$\Phi = 270^\circ$ (6 o'clock)	60	70	--		
Response time	TON	Normal $\theta = \Phi = 0^\circ$	--	10	20	msec	Note3
	TOFF		--	15	30	msec	
Contrast ratio	CR		400	500	--	--	Note4
Color chromaticity	Rx		0.578	0.628	0.678	--	Note5 Note6
	Ry		0.294	0.344	0.394		
	Gx		0.289	0.339	0.389		
	Gy		0.538	0.588	0.538		
	Bx		0.104	0.154	0.204		
	By		0.081	0.131	0.181		
	Wx		0.26	0.31	0.36		
	Wy		0.28	0.33	0.38	--	
Luminance	L		800	1000	--	cd/m ²	Note6
Luminance uniformity	YU		70	75	--	%	Note7

Test Conditions:

1. $V_{LED} = 12V$, $I_L = 320mA$ (Backlight current), the ambient temperature is $25^\circ C$.
2. The test systems refer to Note 2.

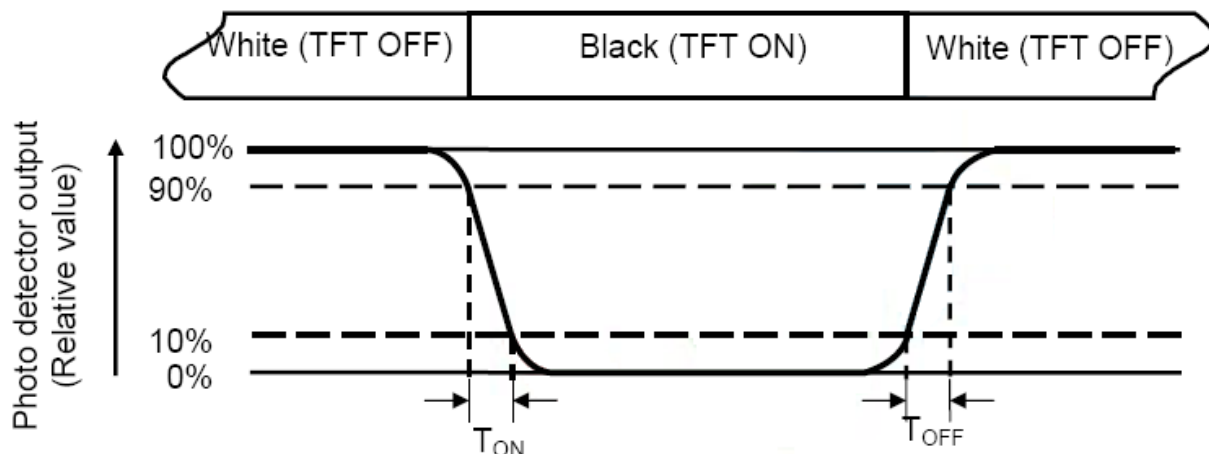
Note 1: Definition of viewing angle range**Note 2: Definition of optical measurement system.**

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)

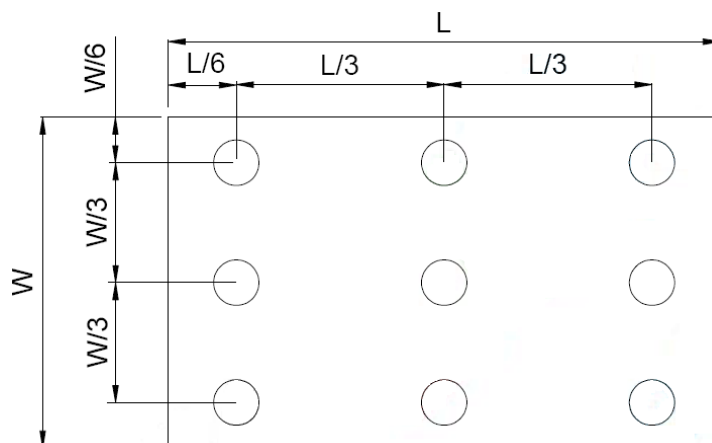
Color coordinated measured at center point of LCD.

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.

$$\Delta L = [L(\text{min.}) \text{ of 9 points} / L(\text{max.}) \text{ of 9 points}] \times 100\%$$



6. INTERFACE

TFT LCD Panel Driving Section

Pin No.	Symbol	I/O	Description	Note
1	VLED	P	Voltage for LED circuit (5.0V)	
2	VLED	P	Voltage for LED circuit (5.0V)	
3	ADJ	I	Adjust the LED brightness	(1)
4	GLED	P	Ground for LED circuit	
5	GLED	P	Ground for LED circuit	
6	VCC	P	Power supply for digital circuit (3.3V)	
7	VCC	P	Power supply for digital circuit (3.3V)	
8	MODE	I	DE or SYNC mode control	(2)
9	DE	I	Data enable	
10	VSYNC	I	VSYNC signal input	
11	HSYNC	I	HSYNC signal input	
12	GND	P	Power ground	
13	B5	I	Blue data input (MSB)	
14	B4	I	Blue data input	
15	B3	I	Blue data input	
16	GND	P	Power ground	
17	B2	I	Blue data input	
18	B1	I	Blue data input	
19	B0	I	Blue data input (LSB)	
20	GND	P	Power ground	
21	G5	I	Green data input (MSB)	
22	G4	I	Green data input	
23	G3	I	Green data input	
24	GND	P	Power ground	
25	G2	I	Green data input	

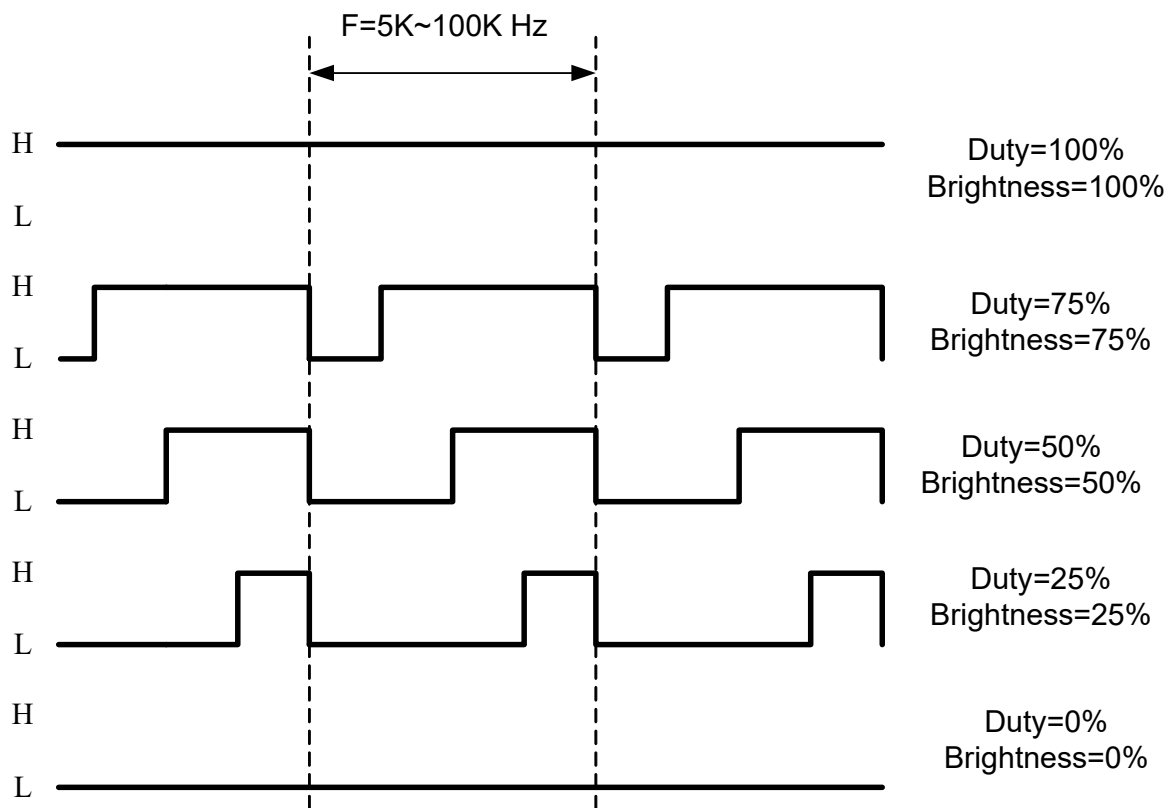
26	G1	I	Green data input	
27	G0	I	Green data input (LSB)	
28	GND	P	Power ground	
29	R5	I	Red data input (MSB)	
30	R4	I	Red data input	
31	R3	I	Red data input	
32	GND	P	Power ground	
33	R2	I	Red data input	
34	R1	I	Red data input	
35	R0	I	Red data input (LSB)	
36	GND	P	Power ground	
37	DCLK	I	Sample clock	
38	GND	P	Power ground	
39	L/R	I	Select left to right scanning direction	(3)
40	U/D	I	Select up or down scanning direction	(3)

I: input, O: output, P: power

NOTE:

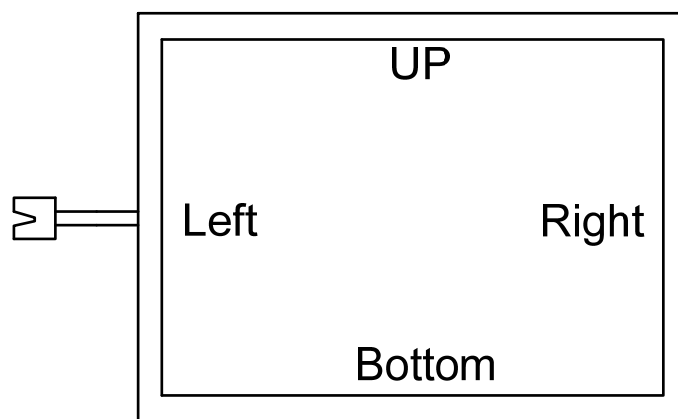
(1) Pin19: ADJ is PWM signal input. It is for brightness control.

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
ADJ signal frequency	f_{PWM}	5K	20K	100K	Hz
ADJ signal logic level High	VIH	2.4	3.3	5.0	V
ADJ signal logic level Low	VIL	0	--	0.8	V



(3) Selection of scanning mode

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



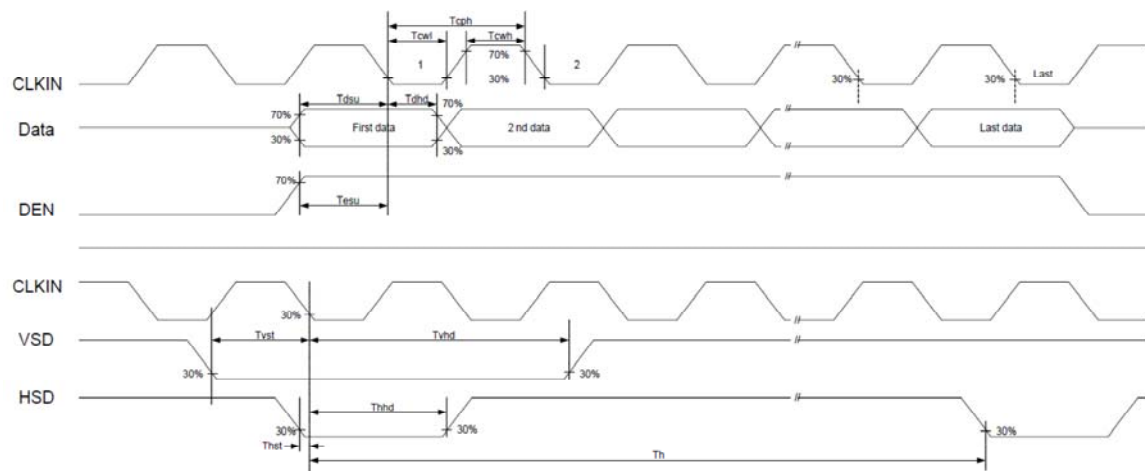
7. INPUT SIGNAL:

7.1 TFT-LCD Input Timing

VCC=3.3V, AVDD=12.6V, AGND=GND=0V, Ta=25°C

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
VDD Power On Slew rate	T _{POR}	-	-	20-	ms	From 0V to 90% VDD
GRB pulse width	T _{GRB}	50	-	-	us	DCLK=65MHz
DCLK Cycle Time	T _{cph}	14			ns	
DCLK Pulse Duty	T _{cwh}	40	50	60	%	
VSD Setup Time	T _{vst}	5	-	-	ns	
VSD Hold Time	T _{vhd}	5	-	-	ns	
HSD Setup Time	T _{hst}	5	-	-	ns	
HSD Hold Time	T _{hhd}	5	-	-	ns	
Data Setup Time	T _{dsu}	5	-	-	ns	Data to DCLK
Data Hold Time	T _{dhd}	5	-	-	ns	Data to DCLK
DE Setup Time	T _{esu}	5	-	-	ns	
DE Hold Time	T _{ehd}	5	-	-	ns	

Input Clock and Data timing Diagram:



7.2 Recommended Timing Setting Of TCON

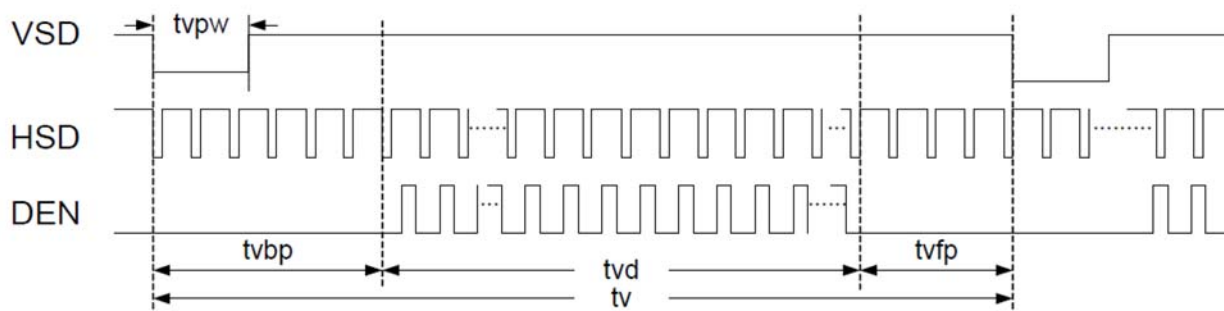
TCON (Embedded In Source IC) Input Timing (DCLK, HSD, VSD, DE)

VCC=3.3V, AVDD=12.6V, AGND=GND=0V, Ta=25°C

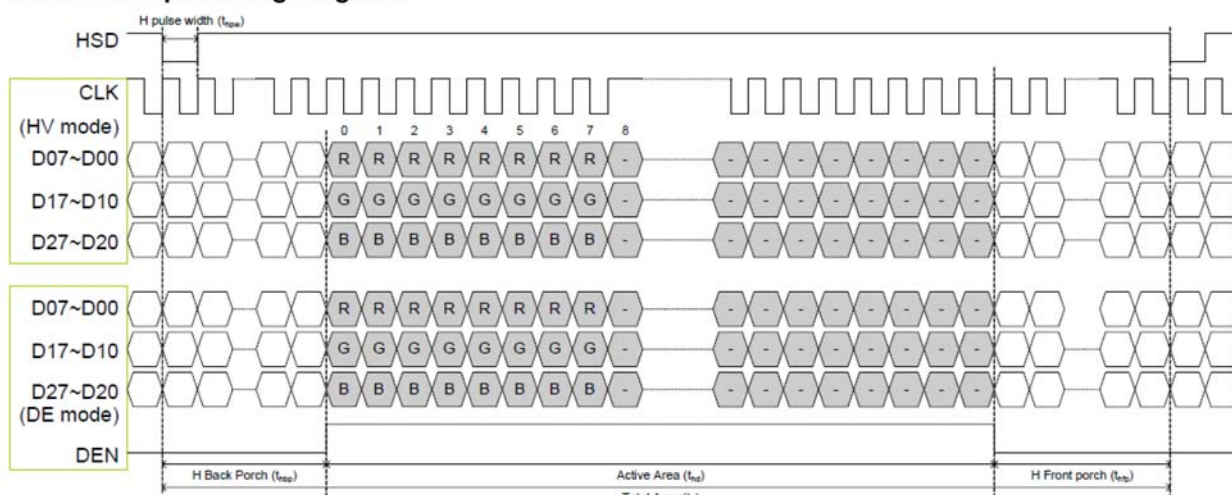
Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	Fclk	34.5	39.6	50.4	MHZ	
	tclk		25.3		ns	
HSD	th	900	1000	1200	DCLK	
	thd	-	800	-	DCLK	
	thpw	1	-	40	DCLK	
	thbp	-	88	-	DCLK	
	thfp	12	112	312	DCLK	
VSD	tv	640	660	700	th	
	tvd	-	600	-	th	
	tvpw	1	-	20	th	
	tvbp	-	39	-	th	
	tvfp	1	21	61	th	

Note: DE timing refer to HSD, VSD input timing.

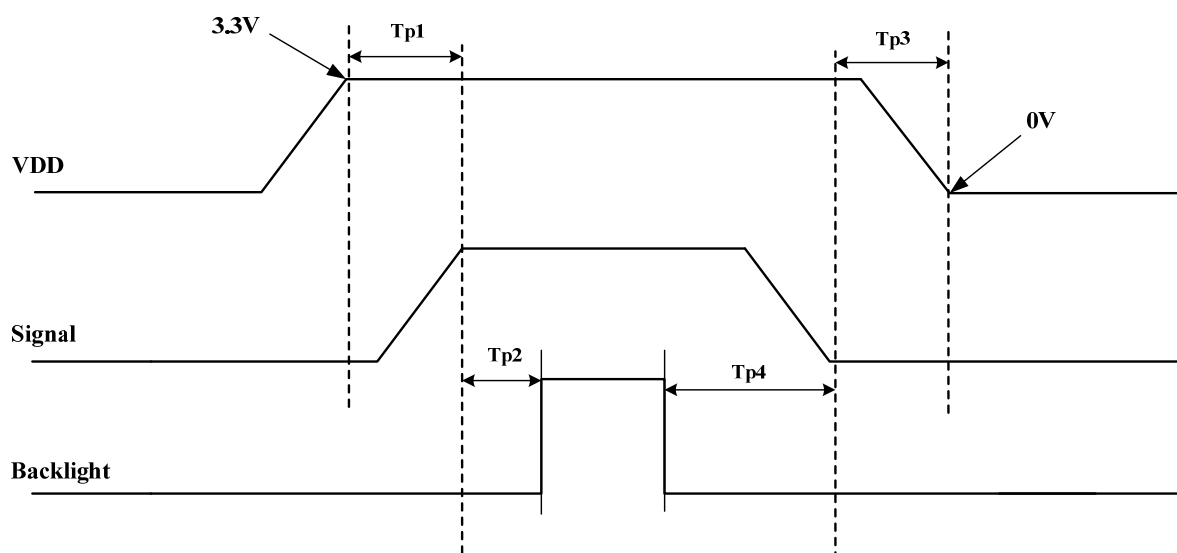
Vertical input timing Diagram:



Horizontal input timing Diagram:



7.3 TM Power ON/OFF sequence



Item	Symbol	Value			Units	Remark
		Min.	Typ.	Max.		
VDD on to signal starting	Tp1	5	-	50	ms	
Signal starting to backlight on	Tp2	150	-	-	ms	
Signal off to VDD off	Tp3	5	-	50	ms	
Backlight off to signal off	Tp4	150	-	-	ms	

8. ELIABILITY TEST CONDITIONS

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , Dry t=240 hrs	
Low Temperature Operation	-20±3°C , Dry t=240 hrs	
High Temperature Storage	80±3°C , Dry t=240 hrs	1,2
Low Temperature Storage	-30±3°C , Dry t=240 hrs	1,2
Storage at High Temperature and Humidity	60°C, 90% RH , 240 hrs	1,2
Thermal Shock Test	-20°C (30min.) ~ 25°C(5min.) ~ 70°C (30min.) 100 cycles	1,2
Vibration Test (Packing)	Sweep frequency : 10 ~ 55 ~ 10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axis Duration : 30min/each axis	2

Note 1 : Condensation of water is not permitted on the module.

Note 2 : The module should be inspected after 1 hour storage in normal conditions (15-35°C , 45-65%RH).

Note 3 : The module shouldn't be tested more than one condition, and all the test conditions are independent.

Note 4 : All the reliability tests should be done without protective film on the LCM

conditions

(15-35°C , 45-65%RH).

Definitions of life end point :

- Current drain should be smaller than the specific value.
- Function of the module should be maintained.
- Appearance and display quality should not have degraded noticeably.
- Contrast ratio should be greater than 50% of the initial value.

9. USE PRECAUTIONS

9-1 Handling precautions

- (1) The polarizing plate may break easily so be careful when handling it. Do not touch, press or rub it with a hard-material tool like tweezers.
- (2) Do not touch the polarizing plate surface with bare hands so as not to make it dirty. If the surface or other related part of the polarizing plate is dirty, soak a soft cotton cloth or chamois leather in benzine and wipe off with it. Do not use chemical liquids such as acetone, toluene and isopropyl alcohol. Failure to do so may bring chemical reaction phenomena and deteriorations.
- (3) Remove any spit or water immediately. If it is left for hours, the suffered part may deform or decolorize.
- (1) If the LCD element breaks and any LC stuff leaks, do not suck or lick it. Also if LC stuff is stuck on your skin or clothing, wash thoroughly with soap and water immediately.

9-2 Installing precautions

- (1) The PCB has many ICs that may be damaged easily by static electricity. To prevent breaking by static electricity from the human body and clothing, earth the human body properly using the high resistance and discharge static electricity during the operation. In this case, however, the resistance value should be approx. $1\text{M}\Omega$ and the resistance should be placed near the human body rather than the ground surface. When the indoor space is dry, static electricity may occur easily so be careful. We recommend the indoor space should be kept with humidity of 60% or more. When a soldering iron or other similar tool is used for assembly, be sure to earth it.
- (2) When installing the module and ICs, do not bend or twist them. Failure to do so may crack LC element and cause circuit failure.
- (3) To protect LC element, especially polarizing plate, use a transparent protective plate (e.g., acrylic plate, glass etc) for the product case.
- (4) Do not use an adhesive like a both-side adhesive tape to make LCD surface (polarizing plate) and product case stick together. Failure to do so may cause the polarizing plate to peel off

9-3 Storage precautions

- (1) Avoid a high temperature and humidity area. Keep the temperature between 0°C and 35°C and also the humidity under 60%.
- (2) Choose the dark spaces where the product is not exposed to direct sunlight or fluorescent light.
- (3) Store the products as they are put in the boxes provided from us or in the same conditions as we recommend.

9-4 Operating precautions

- (1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector is removed or inserted while the power is turned on, the LC module internal circuit may break.
- (2) The display response may be late if the operating temperature is under the normal standard, and the display may be out of order if it is above the normal standard. But this is not a failure; this will be restored if it is within the normal standard.
- (3) The LCD contrast varies depending on the visual angle, ambient temperature, power voltage etc. Obtain the optimum contrast by adjusting the LC drive voltage.
- (4) When carrying out the test, do not take the module out of the low-temperature space suddenly. Failure to do so will cause the module condensing, leading to malfunctions.
- (5) Make certain that each signal noise level is within the standard (L level: $0.2V_{dd}$ or less and H level: $0.8V_{dd}$ or more) even if the module has functioned properly. If it is beyond the standard, the module may often malfunction. In addition, always connect the module when making noise level measurements.
- (6) The CMOS ICs are incorporated in the module and the pull-up and pull-down function is not adopted for the input so avoid putting the input signal open while the power is ON.
- (7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.
- (8) Crosstalk occurs because of characteristics of the LCD. In general, crosstalk occurs when the regularized display is maintained. Also, crosstalk is affected by the LC drive voltage. Design the contents of the display, considering crosstalk.

9-5 Other

- (1) Do not disassemble or take the LC module into pieces. The LC modules once disassembled or taken into pieces are not the guarantee articles.
- (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.
- (3) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products..

10. OUTLINE DIMENSION

