SPECIFICATIONS   FOR
LCD   MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	**AM-800480CTZQW-B6H-A**
APPROVED BY	
DATE	

☐ **Preliminary Specification**
☐ **Formal Specification**

Approved by	Checked by	Organized by
Patrick	Jessica	Mantle

This Specification is subject to change without notice.

RECORD   OF   REVISION

Revision Date	Page	Contents	Editor
2021/03/08	--	New Release	Mantle

RECORD   OF   REVISION

1.0   General Descriptions

7 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module.

This module is composed of a 7" TFT-LCD panel and backlight unit.

1.1 Features

- 7 inch (16:9 diagonal) configuration
- 16.2M colors (R , G , B, 8bit digital each)
- New LCD FOG
- RoHS

1.2 Product Summary

NO	Item	Specification	Remark
1	LCD Size	7.0 inch (Diagonal)	
3	Resolution	800 x 3 (RGB) x 480	
4	Display Mode	Normally Black.	
5	Pixel pitch	0.1905 (W) x 0.1905(H) mm	
6	Active area	152.4(W) x 91.44(H) mm	
7	Module Size	165.0(W) x 104.44(H) x 11.31(T) mm	Note 1
8	interface	RGB	
9	Color arrangement	RGB-stripe	
10	Luminance	1500 cd/m^2	cd/m^2
11	Viewing Direction	All direction	

(Note1) Refer to the mechanical drawing.

2.0 Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Remakes
Supply Voltage	V_{CC}	-0.3	3.6	V	-
Input Voltage of Logic	V_I	-0.3	$V_{CC}+0.3$	V	Note 1
Operating Temperature	T_{OP}	-30	85	℃	Note 2
Storage Temperature	T_{ST}	-30	85	℃	Note 2

Note 1: The rating is defined for the signal voltages of the interface such as CLK and pixel data pairs.

Note2: The maximum rating is defined as above based on the chamber temperature, which might be different from ambient temperature after assembling the panel into the application. Moreover, some temperature-related phenomenon as below needed to be noticed:

- Background color, contrast and response time would be different in temperatures other than 25℃.

-Operating under high temperature will shorten LED lifetime.

3.0 ELECTRICAL CHARACTERISTICS
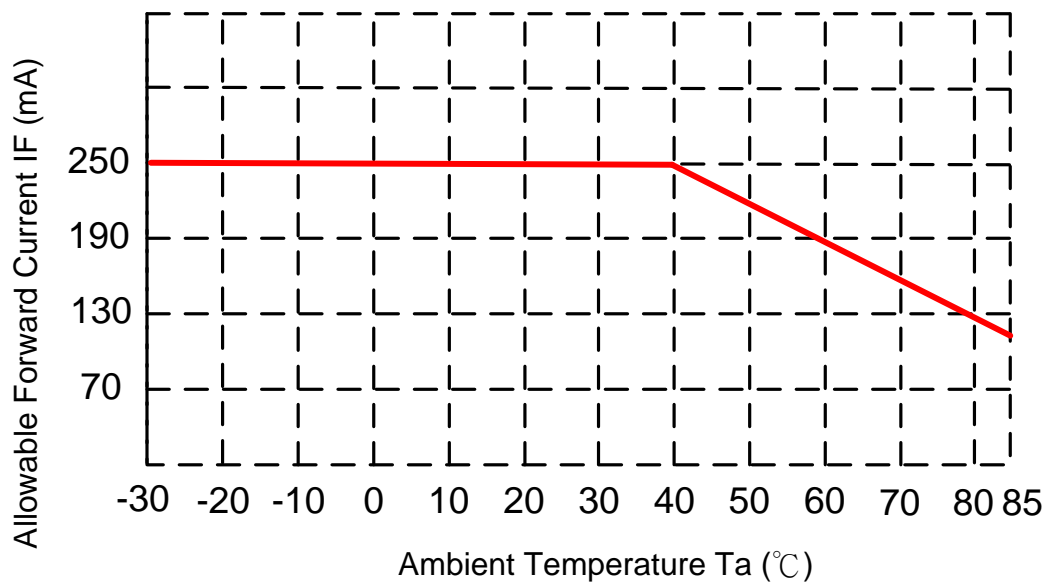
3.1 LCD CHARACTERISTICS

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LCD Supply Voltage	VCC	3.0	3.3	3.6	V	-
Logic Input Voltage	VIH	0.7VCC	-	VCC		
	VIL	GND	-	0.3VCC	V	
LCD Supply Current	ICC	-	180	-	mA	(1)
Power Supply Voltage For LED Driver	VLED	11.7	12	12.3	V	(1)
Power Supply Current For LED Driver	ILED	--	375	--	mA	VLED =12V

Note1: Ta=25℃ , Display pattern : All White

3.2 BACKLIGHT CHARACTERISTICS

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Input Voltage	VLED	11.7	12.0	12.3	V	
Input Current	ILED	--	375	--	mA	
DIM Frequency	Fpwm	100		20K	Hz	
DIM Signal Logic High	VIH	1.2	--	3.3	V	
DIM signal logic Low	VIL	0	--	0.4	V	
LED Forward Current	IF	--	250	--	mA	Ta=25℃
LED Forward Voltage	VF	--	18	--	V	IF=250mA, Ta=25℃
LED life time			50,000	-	Hr	IF=250mA, Ta=25℃

■ The constant current source is needed for white LED back-light driving.

■ When LCM is operated over 40℃ ambient temperature, the IF should be follow :
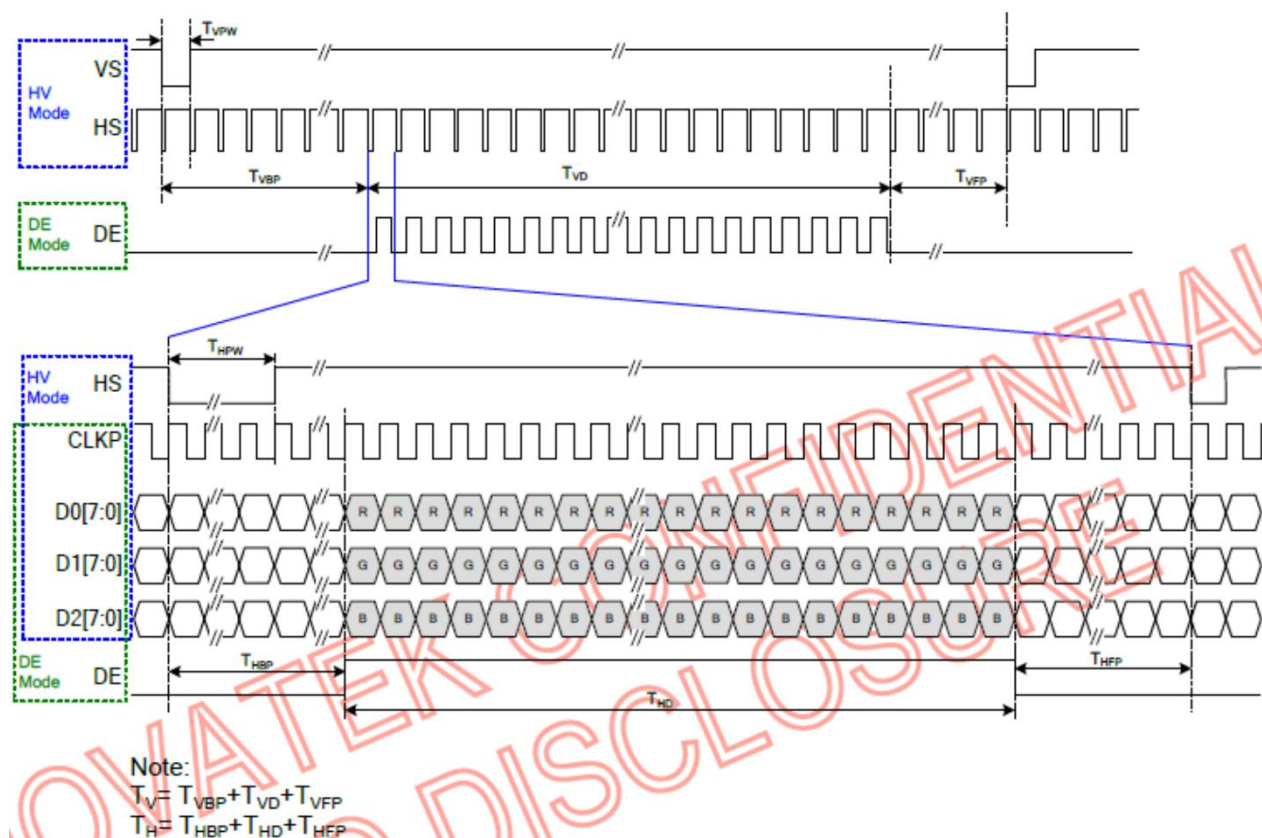
■ 6 LED Serial x 5 LED Parallel

IF = 250mA

LED K

LED A

■ DIM Duty

F=100~20K Hz

Duty=100%
Brightness=100%

Duty=75%
Brightness=75%

Duty=50%
Brightness=50%

Duty=25%
Brightness=25%

Duty=0%
Brightness=0%

4.0 TIMING

4.1 time table

Note:
$T_V = T_{VBP} + T_{VD} + T_{VFP}$
$T_H = T_{HBP} + T_{HD} + T_{HFP}$
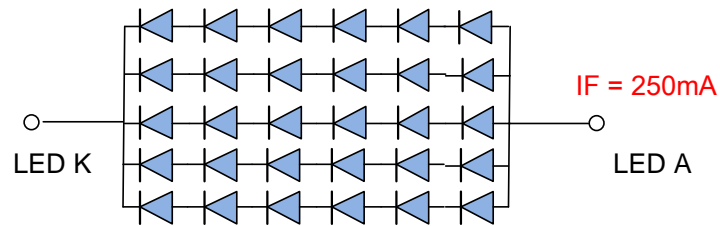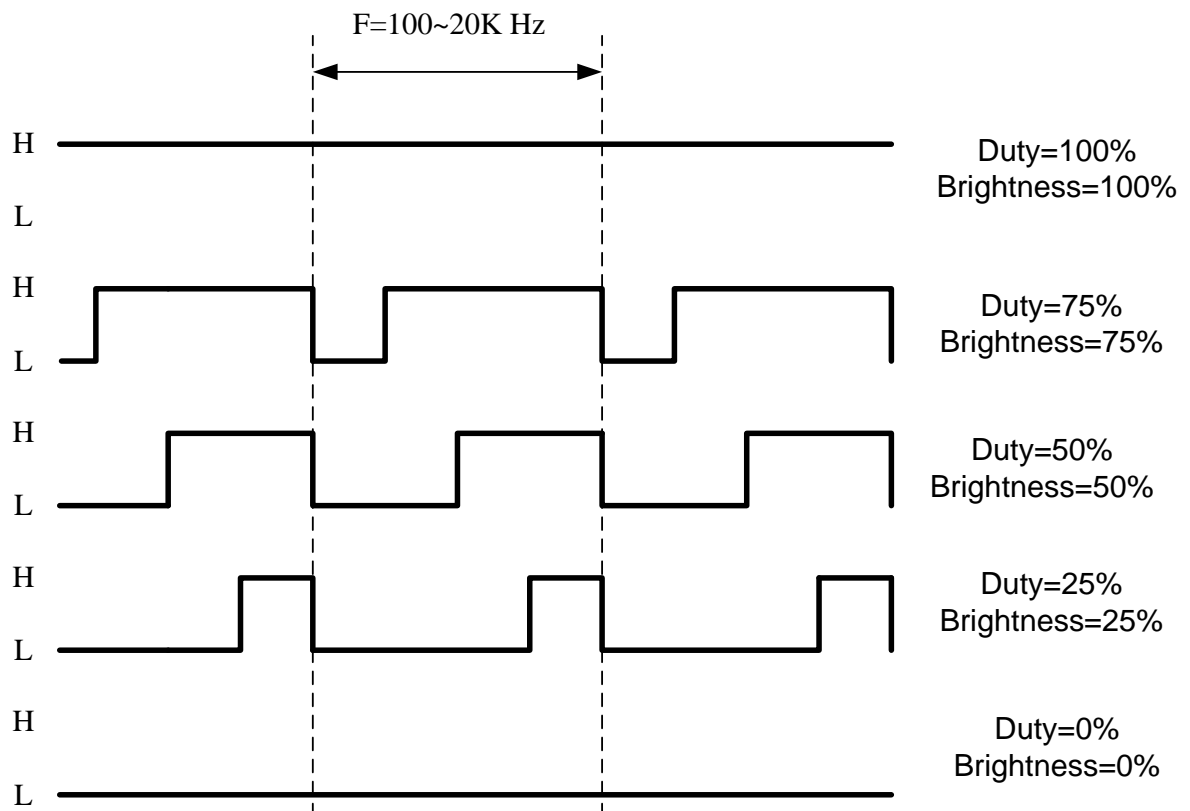
HV mode for 800x480

Parameter	Symbol	Min.	Typ.	Max.	Unit
CLK frequency	F_{CLK}	25.2	25.4	35.7	MHz
Horizontal display area	T_{HD}		800		CLK
HS period time	T_H	860	864	974	CLK
HS pulse width	T_{HPW}	1	2	40	CLK
HS back porch	T_{HBP}		32		CLK
HS front porch	T_{HFP}	28	32	142	CLK
Vertical display area	T_{VD}		480		H
VS period time	T_V	488	490	611	H
VS pulse width	T_{VPW}	1	2	20	H
VS back porch	T_{VBP}		5		H
VS front porch	T_{VFP}	3	5	126	H

DE mode for 800x480

Parameter	Symbol	Min.	Typ.	Max.	Unit
CLK frequency	F_{CLK}	25.2	25.4	35.7	MHz
Horizontal display area	T_{HD}		800		CLK
HS period time	T_H	860	864	974	CLK
HS blanking	$T_{HFP} + T_{HBP}$	60	64	174	CLK
Vertical display area	T_{VD}		480		H
VS period time	T_V	488	490	611	H
VS blanking	$T_{VBP} + T_{VFP}$	8	10	131	H

4.3 Power On / Off Sequence
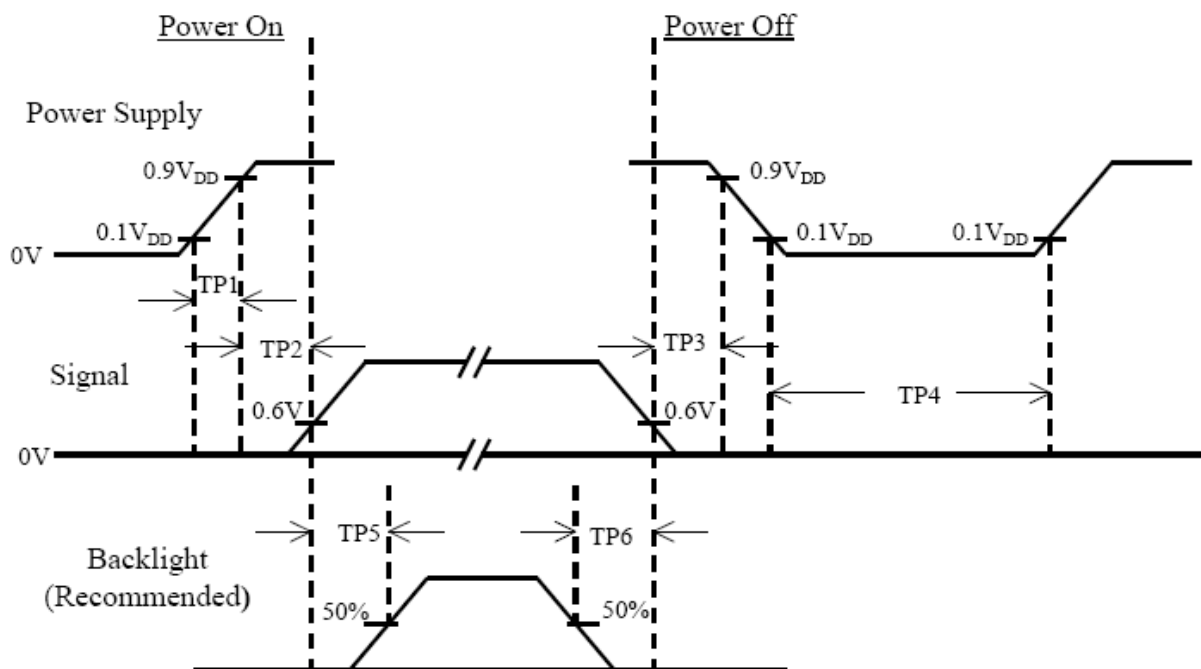
Item	Min.	Typ.	Max.	Unit	Remark
TP1	0.5	--	10	msec	
TP2	0	--	50	msec	
TP3	0	--	50	msec	
TP4	500	--	--	msec	
TP5	200	--	--	msec	
TP6	200	--	--	msec	

Note：

(1) The supply voltage of the external system for the module input should be the same as the definition of VCC.

(2) Apply the lamp voltage within the LCD operation range. When the back-light turns on before the LCD operation or the LCD turns off before the back-light turns off, the display may momentarily become white.

(3) In case of VCC = off level, please keep the level of input signal on the low or keep a high impedance.

(4) TP4 should be measured after the module has been fully discharged between power off and on period.

(5) Interface signal shall not be kept at high impedance when the power is on.

5.0 BLOCK DIAGRAM
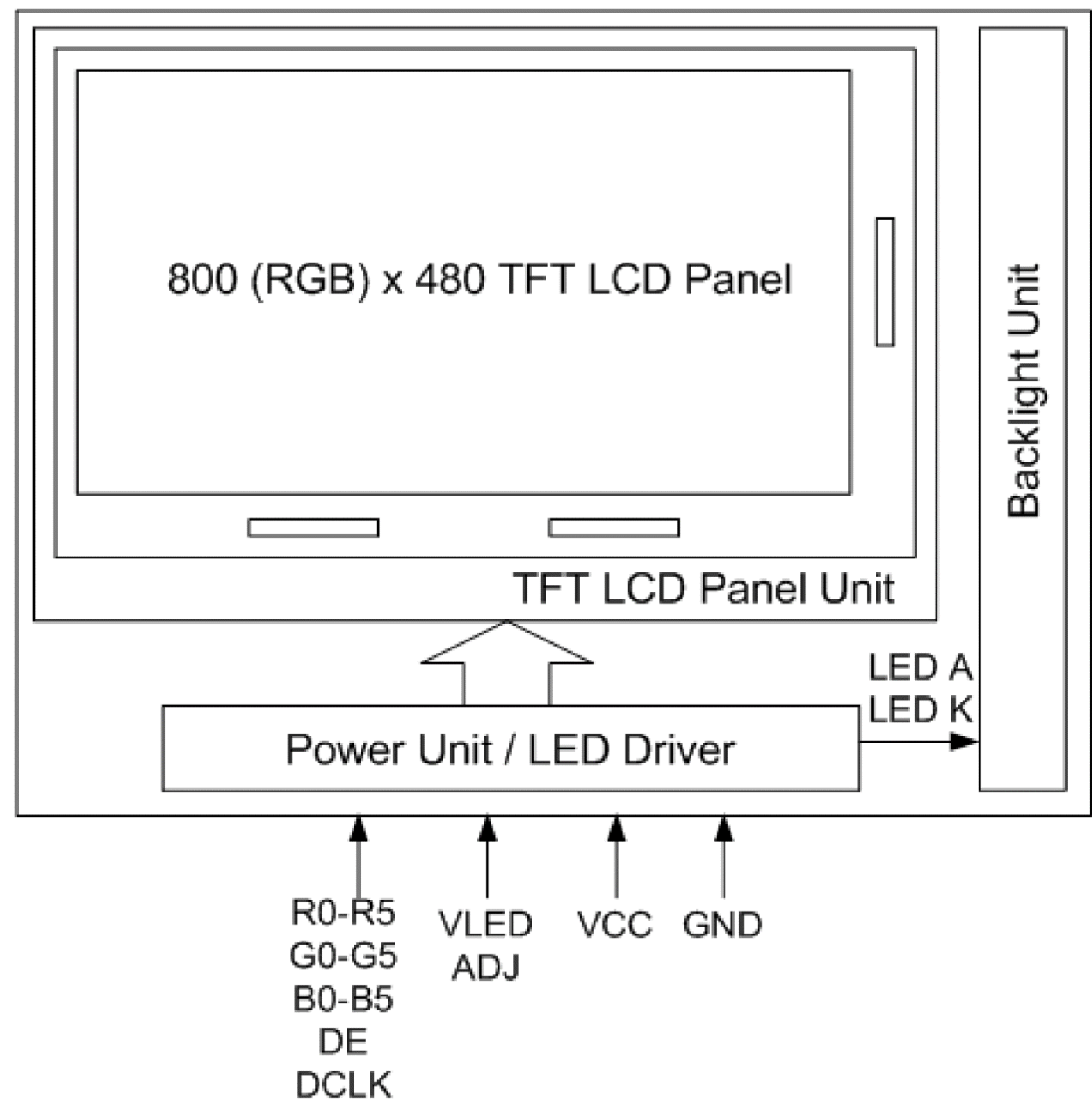
6.0 INTERFACE

Pin No	Symbol	Function
1	GND	Power Ground
2	Vcc	Power Supply for LCD
3	Vcc	Power Supply for LCD
4	Vcc	Power Supply for LCD
5	R0	Red data (LSB)
6	R1	Red data
7	R2	Red data
8	R3	Red data
9	R4	Red data
10	R5	Red data
11	R6	Red data
12	R7	Red data (MSB)
13	G0	Green data (LSB)
14	G1	Green data
15	G2	Green data
16	G3	Green data
17	G4	Green data
18	G5	Green data
19	G6	Green data
20	G7	Green data (MSB)
21	B0	Blue data (LSB)
22	B1	Blue data
23	B2	Blue data
24	B3	Blue data
25	B4	Blue data
26	B5	Blue data
27	B6	Blue data
28	B7	Blue data(MSB)
29	GND	Power Ground
30	DCLK	Clock Signals
31	NC	Not Connection
32	Hsync	Horizontal SYNC. (Sync mode used)
33	Vsync	Vertical SYNC. (Sync mode used)
34	DE	Data Enable
35	VLED	LED anode.
36	VLED	
37	GND	Power Ground
38	GND	Power Ground
39	ADJ	LED PWM dimming signal
40	EN	LED backlight on/off, on=high level, off=low level.

7.0 Optical Specifications

7.1 TFT Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10		80	-	Degree	Note 2
		θB			80	-		
		θL			80	-		
		θR			80	-		
Contrast Ratio		CR	θ=0°	800	1000	-		Left/right 0° Top/bottom 5°
Response Time		$T_{ON}+T_{OFF}$	25℃	-	25	35	ms	Note1, Note4
Chromaticity	White	x		-0.05	0.328	+0.05		Note1, Note5
		y			0.347			
	Red	x			0.615			
		y			0.321			
	Green	x			0.310			
		y			0.563			
	Blue	x			0.136			
		y			0.098			
Uniformity		U		70		-	%	Note1、Note6
Luminance		L		1200	1500	-	cd/m²	Note7

Test Conditions:

1. I_F=250mA, the ambient temperature is 25℃.

2. The test systems refer to Note 1 and Note2.

Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 10 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.

Note 1 : 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.)
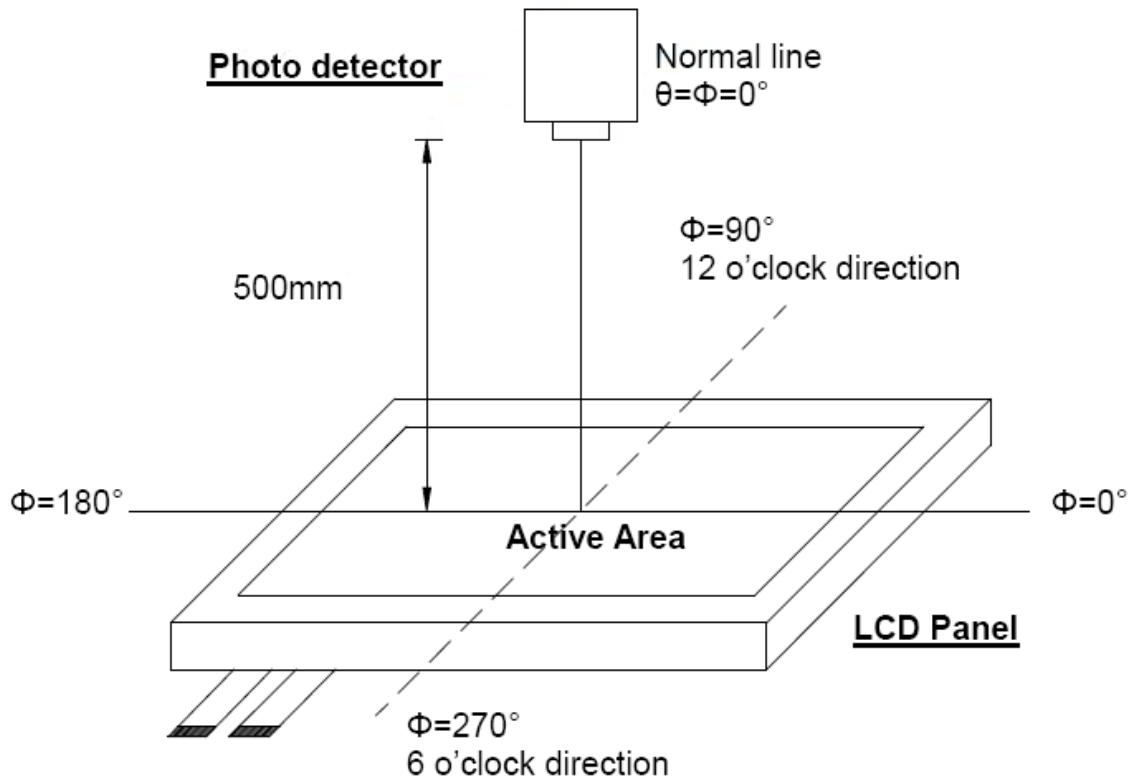
Note 2 : Definition of viewing angle range
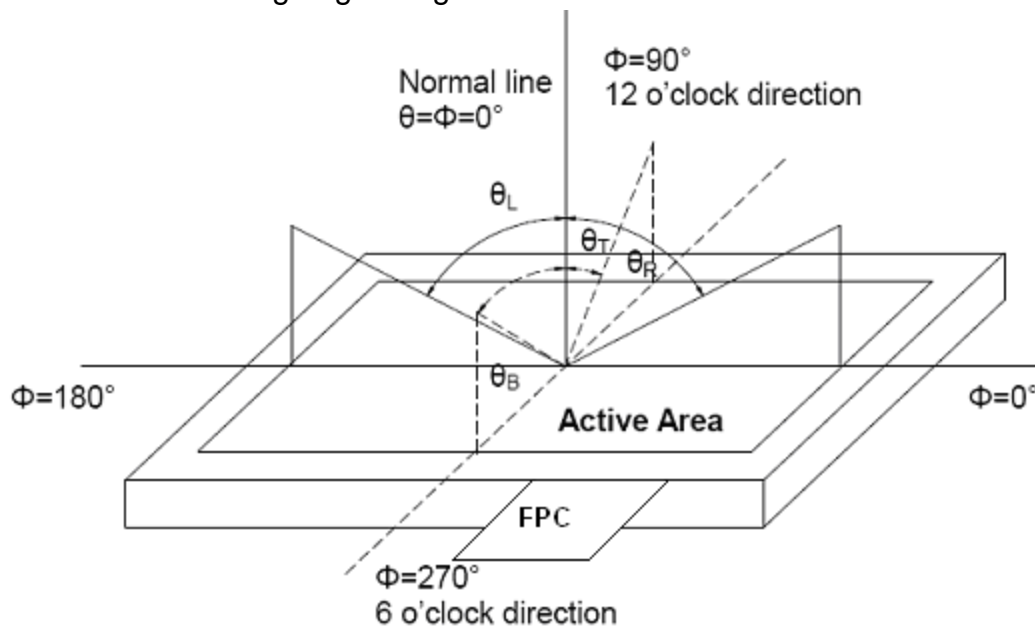
Note 3 : Definition of Response time

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%.
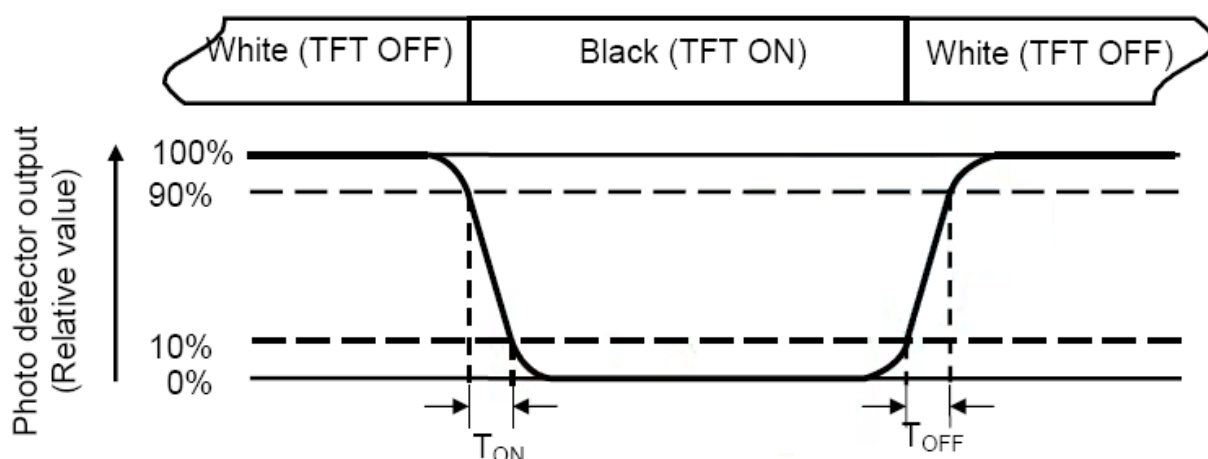
Note 4 : Definition of contrast ratio

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

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.

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

L ----- Active area length   W ----- Active area width
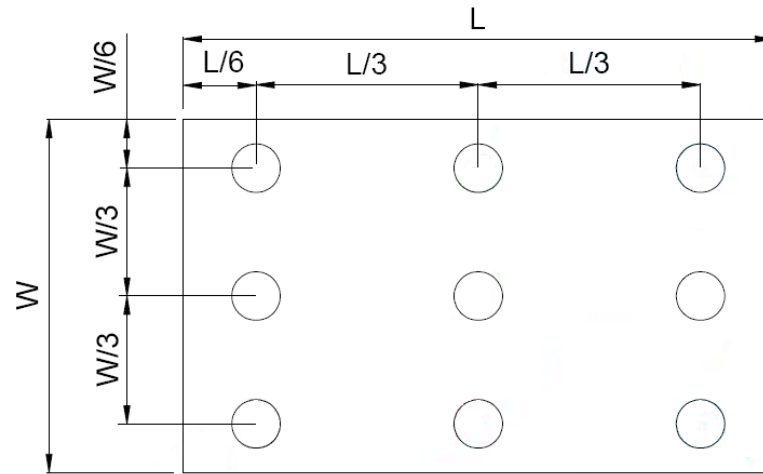
Bmax : The measured maximum luminance of all measurement position.

Bmin : The measured minimum luminance of all measurement position.

8.0 Reliability Test Items

Test Item	Test Conditions	Note
High Temperature Operation	85±3°C , t=240 hrs	
Low Temperature Operation	-30±3°C , t=240 hrs	
High Temperature Storage	85±3°C , t=240 hrs	1,2
Low Temperature Storage	-30±3°C , t=240 hrs	1,2
Storage at High Temperature and Humidity	40°C, 85% RH , 240 hrs	1,2
Thermal Shock Test	-30°C (30min) ~ 85°C (30min) 50 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 module.

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.

9.0 GENERAL PRECAUTION

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

(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.

(2) If liquid crystal contacts mouth or eyes, rinse out with water immediately.

(3) If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.

(4) Handle carefully with chips of glass that may cause injury, when the glass is broken.

9.4 Electric Shock

(1) Disconnect power supply before handling LCD module.

(2) Do not pull or fold the LED cable.

(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

(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.

(2) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

(3) It's recommended to employ protection circuit for power supply.

9.6 Operation

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

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

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

(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 cause deformation or color fading.

(5) When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzene or other adequate solvent.

9.7 Static Electricity

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

(2) Because LCD modules 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.

9.8 Strong Light Exposure

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

9.9 Disposal

When disposing LCD module, obey the local environmental regulations.

9.10 Others

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.

10.0 Outline Dimension

CN2 (8 bits)

Pin	Signal	Pin	Signal
1	GND	21	B0
2	VCC	22	B1
3	VCC	23	B2
4	VCC	24	B3
5	R0	25	B4
6	R1	26	B5
7	R2	27	B6
8	R3	28	B7
9	R4	29	GND
10	R5	30	DCLK
11	R6	31	NC
12	R7	32	HSYNC
13	G0	33	VSYNC
14	G1	34	DE
15	G2	35	VLED
16	G3	36	VLED
17	G4	37	GND
18	G5	38	GND
19	G6	39	ADJ
20	G7	40	EN

A Block

Note:
1. Unless indicated, Tolerance "±0.3".
2. UV Glue For OLB Protection.
3. CN1:JST : BHSR-02VS-1
4. CN2:P0.5 40Pin H2.0/089H40-000000-C2-C or Equivalent
5. CN3:P0.5 60Pin IRISO IMSA-120015-60Y903 or Equivalent
6. LCD 800x3(R.G.B)x480=> 7.0" IPS TFT LCD

		TOLERANCE GRADE(±)	A	B	DIM.	MM
1	800480R3 Outline	7				
2	800480C-A0	8	9		IE NO.	CHK.
3	500nits	9	9			
4	800480C-B0 PCB	4		10		
5		5		11	PARTS NO. LCM	APPD.
6		6		12	800480C-B1	

DWN. SNOW
DATE 12-01-17'
PARTS NO. LCM 800480C-B1

TITLE 800480C-B1
(7.0") IPS 8 bit TTL 40pin
DWG. NO. *1712 13MA SHEET 1 OF 1

AMPIRE 晶采光電科技

REV. REVISION RECORD
0 NEW RELEASE — 12-01-17/SNOW
1 Added Component T=4.4/1131±0.3 — IC-06-18/SNOW

CN2 (8 bits)

No	Signal	No	Signal
1	GND	21	B0
2	VCC	22	B1
3	VCC	23	B2
4	VCC	24	B3
5	R0	25	B4
6	R1	26	B5
7	R2	27	B6
8	R3	28	B7
9	R4	29	GND
10	R5	30	DCLK
11	R6	31	NC
12	R7	32	HSYNC
13	G0	33	VSYNC
14	G1	34	DE
15	G2	35	VLED
16	G3	36	VLED
17	G4	37	GND
18	G5	38	GND
19	G6	39	ADJ
20	G7	40	EN

Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN1:JST : BHSR-02VS-1
4. CN2:P0.5 40Pin H2.0/089H40-000000-G2-C or Equivalent
5. CN3:P0.5 60Pin IRISO IMSA-12001S-60Y903 or Equivalent
6. LCD 800x3(R.G.B)x480=> 7.0" IPS TFT LCD

Back View

2-Copper foil
10.0x20.0mm
(1861024.601)

(43.5±1.0) (50.0±0.3 PCB)
(11.0)
(90.0±0.5)
(144.5±0.3 PCB)
84.55±0.3
(80.4±0.3)
CN3
CN2
CN1
Capton tape
50.94±0.5
(54.97±0.3) (49.47±0.3)

7	800480R3 Outline				
2	800480C-A0				
3	500nits				
4	800480C-B0 PCB				

TOLERANCE GRADE(±)	A	B	DIM.		
			IR NO.		

PARTS NO. 800480C-B1
DWN. SNOW DATE 12-01-17'

AMPIRE 晶采光電科技

TITLE 800480C-B1 (7.0") IPS 8 bit TTL 40pin
DWG. NO. *171214MA SHEET 1 OF 1

11.0 Package