晶采光電科技股份有限公司
AMPIRE CO., LTD.

/SIMPLEPLUS
Touch Displays

SPECIFICATIONS　FOR
LCD　MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AMA-070A12-DU2511-G010
APPROVED　BY	
DATE	

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

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Approved by	Checked by	Organized by
Kokai	*Simon*	*Tank*

*This specification is subject to change without notice.

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2023/10/06	--	New Release	Tank
2023/12/01	21,22	Update Drawing	Tank
2023/12/08	7	Add Backlight Pin Assignment	Tank
	8	Update Block Diagram	
	4,21,22	Update Drawing	

1. General Specifications

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
- TTL interface
- Without LED driver
- Capacitive Touch Panel
  - Interface: USB
  - Cover Lens (T=1.1mm)
  - Printing : Black border (Pantone :Black)
  - Surface Treatment: None
- ROHS compliant

1.2 Product Summary

NO	Item	Specification	Remark
1	LCD Size	7.0 inch (Diagonal)	
2	Resolution	800 x 3 (RGB) x 480	
3	Display Mode	Normally Black.	
4	Pixel Pitch	0.1905 (W) x 0.1905(H) mm	
5	Active Area	152.4(W) x 91.44(H) mm	
6	Interface	TTL	
7	Color Arrangement	RGB-stripe	
8	Luminance	**425**	cd/m^2
9	Viewing Direction	All direction	
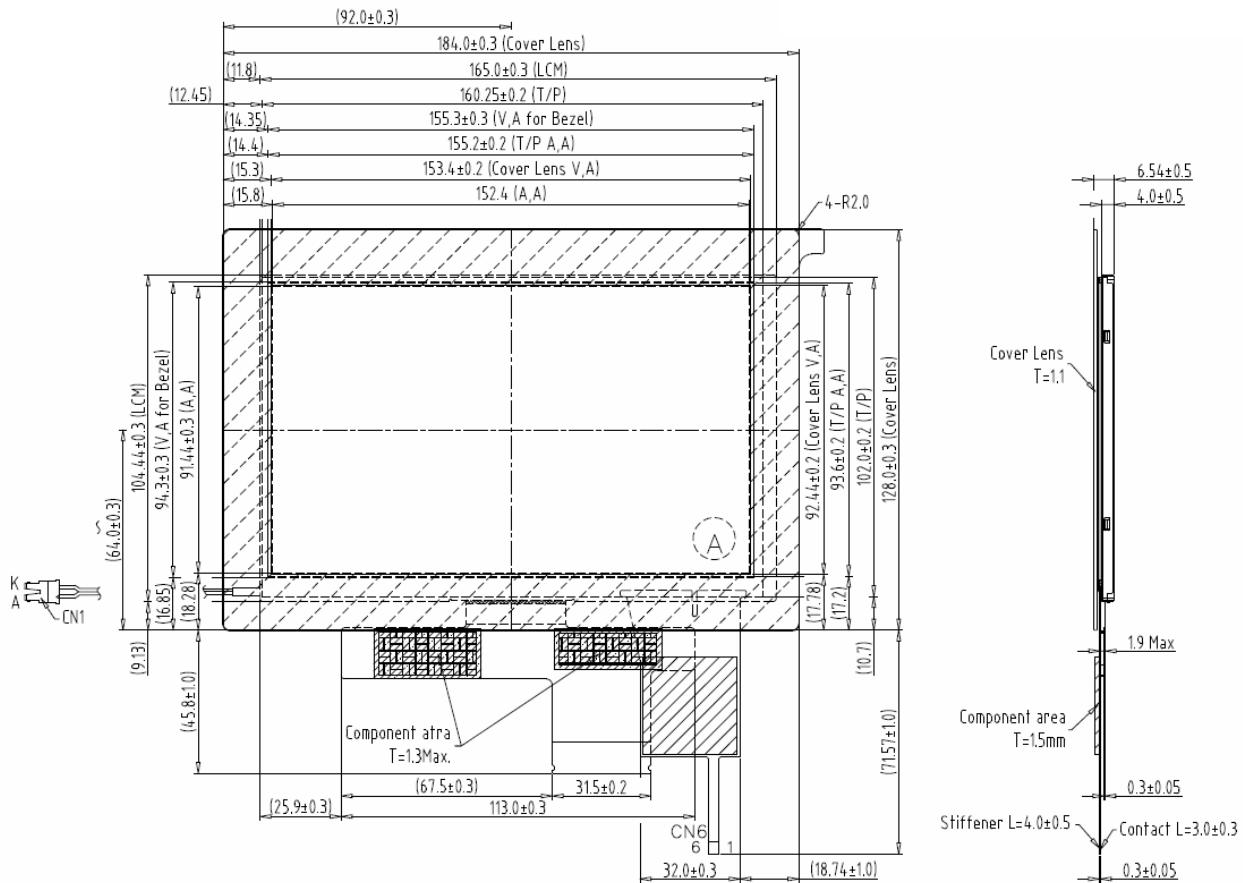
2. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Remakes
Supply Voltage	V_{DD}	-0.3	3.6	V	-
Input Voltage of Logic	V_I	-0.3	$V_{DD+0.3}$	V	Note 1
Operating Temperature	T_{OP}	-20	70	℃	Note 2
Storage Temperature	T_{ST}	-30	80	℃	Note 2

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

Note 2: 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. Electrical Characteristics

3.1 Recommended Operating Condition

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LCD Supply Voltage	V_{DD}	3.0	3.3	3.6	V	-
LCD Supply Current	I_{DD}	-	154	231		(1)
LVDS RECEIVER DC SPECIFICATIONS						
Differential Input High Threshold	VTH	-	-	+100	mV	VOC=+1.2V
Differential Input Low Threshold	VTL	-100	-	-	mV	

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

3.2 Recommended Driving Condition for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
LED Backlight Voltage	VAK	8.1	9.0	10.2	V	For reference IAK=180mA
LED Backlight Current	IAK	-	180	-	mA	**Ta=25℃**
LED Life Time			50K		Hr	Note(2)

Note(1) The backlight must be driven by constant current source.
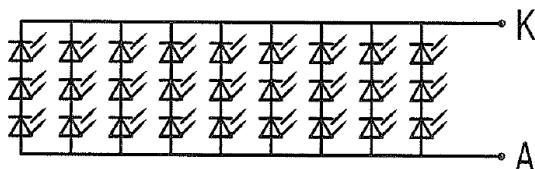
Note(2) Brightness to be decreased to 50% of the initial value. The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IAK=180mA. The LED lifetime could be decreased if operating IAK is larger than 180mA.

Note(3) When LCM is operated over 40℃ ambient temperature, the IAK should be follow :
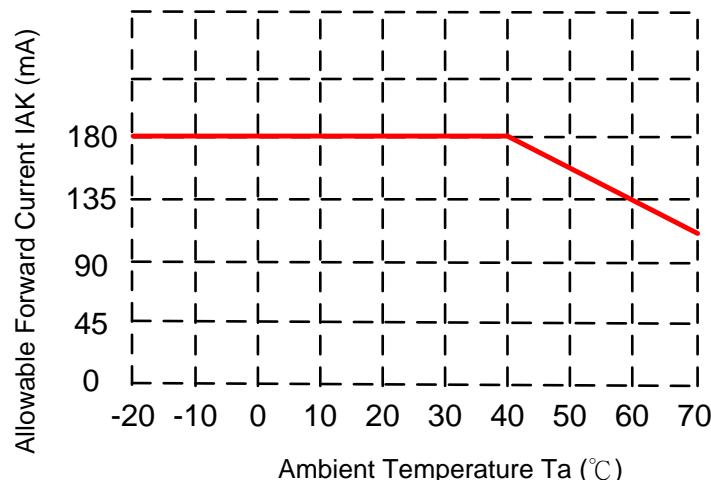

CN1:

Symbol	Description
A	LED Anode
K	LED Cathode

3.3 Block Diagram
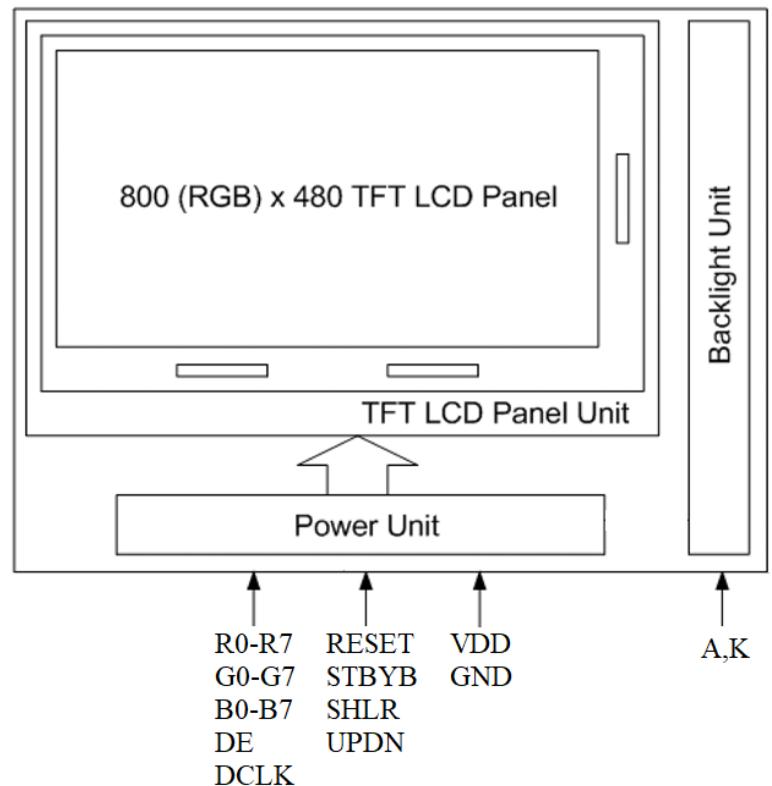
3.4 Pixel format
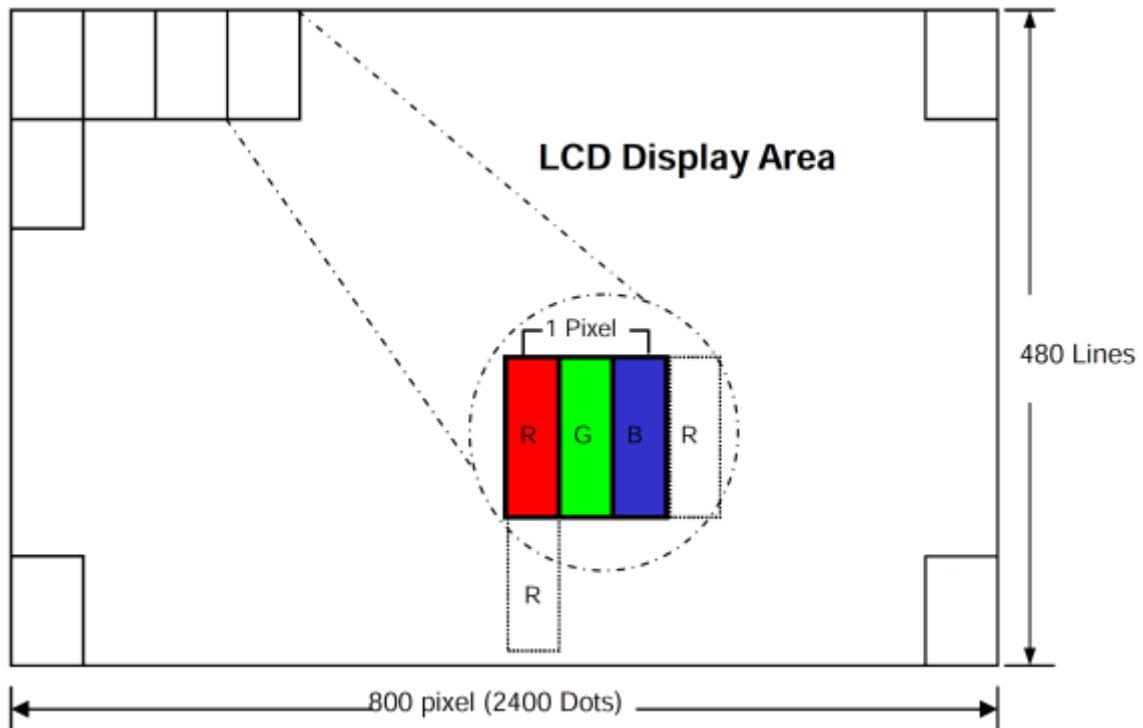
4. Input / Output Terminals

CN3: P0.5 60PIN / 089K60-002100-A2-R or Equivalent

Pin No	Symbol	I/O	Function
1	GND	P	Digital Ground
2	NC	-	Not connect
3	VDD	P	Digital Power
4	R0	I	Data Input(LSB)
5	R1	I	Data Input
6	R2	I	Data Input
7	R3	I	Data Input
8	R4	I	Data Input
9	R5	I	Data Input
10	R6	I	Data Input
11	R7	I	Data Input(MSB)
12	G0	I	Data Input(LSB)
13	G1	I	Data Input
14	G2	I	Data Input
15	G3	I	Data Input
16	G4	I	Data Input
17	G5	I	Data Input
18	G6	I	Data Input
19	G7	I	Data Input(MSB)
20	B0	I	Data Input(LSB)
21	B1	I	Data Input
22	B2	I	Data Input
23	B3	I	Data Input
24	B4	I	Data Input
25	B5	I	Data Input
26	B6	I	Data Input
27	B7	I	Data Input(MSB)
28	DCLK	I	Clock Input
29	DE	I	Data Enable signal
30	VDD	P	Digital Power
31	VDD	P	Digital Power
32	NC	-	Not connect
33	RESET	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",timming control , source driver will turn off, all Input 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->S2…S1200=last data
36	VDD	P	Digital Power
37	UPDN	I	gate up or down scan control. UPDN="L" , DOWN shift : G1->G2…->G600 ; UPDN="H", up shift: G1<-G2…<-G600

38	GND	P	Digital Ground
39	GND	P	Digital Ground
40	NC	-	Not connect
41	NC	-	Not connect
42	NC	-	Not connect
43	NC	-	Not connect
44	NC	-	Not connect
45	NC	-	Not connect
46	NC	-	Not connect
47	NC	-	Not connect
48	NC	-	Not connect
49	VDD	P	Digital Power
50	NC	-	Not connect
51	GND	P	Digital Ground
52	GND	P	Digital Ground
53	GND	P	Digital Ground
54	VDD	P	Digital Power
55	NC	-	Not connect
56	NC	-	Not connect
57	VDD	P	Digital Power
58	NC	-	Not connect
59	GND	P	Digital Ground
60	NC	-	Not connect

Note (1)

SHLR	UPDN	Data shifting
VDD	VDD	Left→Right，UP→Down(default)
VDD	GND	Left→Right，Down→UP
GND	VDD	Right→Left，UP→Down
GND	GND	Right→Left，Down→UP

Refer to the figure as below:
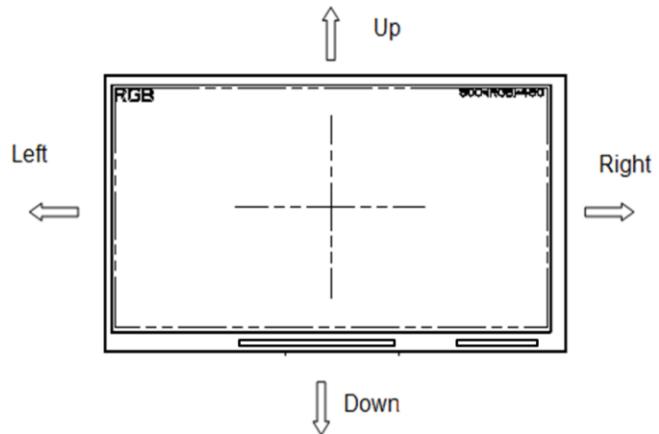
5. Timing Chart

5.1 TFT-LCD Input Timing

Horizontal Input Timing Table

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
DCLK frequency	fclk	20	33.3	42.8	MHz	
Horizontal display area	thd		800		DCLK	
1 Horizontal Line	th	908	928	1178	DCLK	
HSD pulse width	thpw	1	48	87	DCLK	thb+thpw=88 DCLK is fixed.
HSD Back Porch (Blanking)	thb	87	40	1	DCLK	
HSD Front Porch	thfp	20	40	290	DCLK	

Vertical Input Timing Table

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Vertical display area	tvd		480		H	
VSD period time	tv	517	525	606	H	
VSD pulse width	tvpw	1	1	3	H	Tvpw+tvb=32 H is fixed
VSD Back Porch (Blanking)	tvb	31	31	29	H	
VSD Front Porch	tvfp	5	13	94	H	

5.2 POWER ON/OFF SEQUENCE
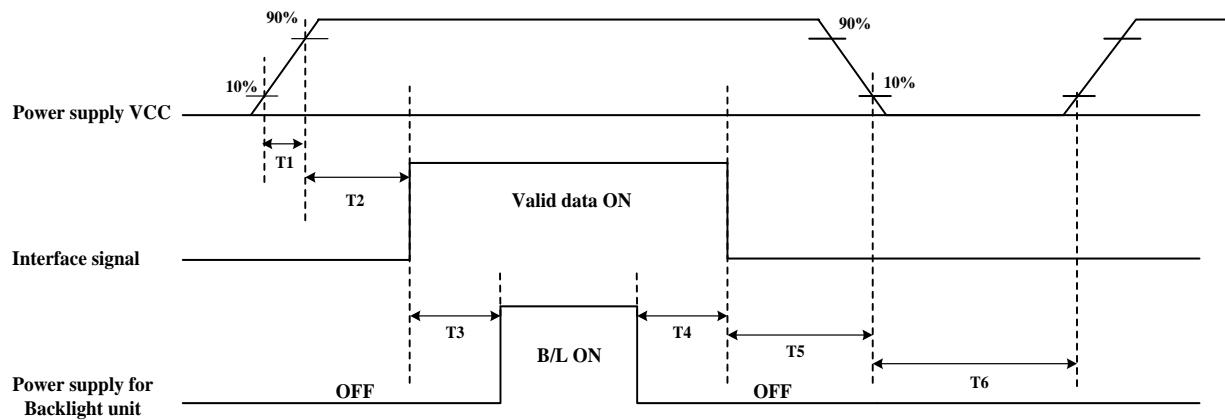
Parameter	SPEC.			Unit
	Min.	Typ.	Max.	
T1	1	-	2	[ms]
T2	0	60	100	[ms]
T3	200	-	-	[ms]
T4	200	-	-	[ms]
T5	1	-	-	[ms]
T6	1000	-	-	[ms]

6. Optical Characteristics

Item		Symbol	Condition	Min	Typ.	Max	Unit	Remark
View Angles		θT	CR≧10	80	85		Degree	Note 2
		θB		80	85			
		θL		80	85			
		θR		80	85			
Contrast Ratio		CR	θ=0°	800	1000	-		Left/right 0° Top/bottom 5°
Response Time		$T_{ON}+T_{OFF}$	25℃	-	20	30	ms	Note1 Note4
Chromaticity	White	x		Typ. -0.05	0.30	Typ. +0.05		
		y			0.34			
	Red	x			0.62			
		y			0.35			
	Green	x			0.33			
		y			0.65			
	Blue	x			0.15			
		y			0.06			
Uniformity		U		70	-	-	%	Note1、Note6
Luminance		L		340	425	-	cd/m^2	Note7

Test Conditions:

1. I$_F$= 180mA, 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 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.)
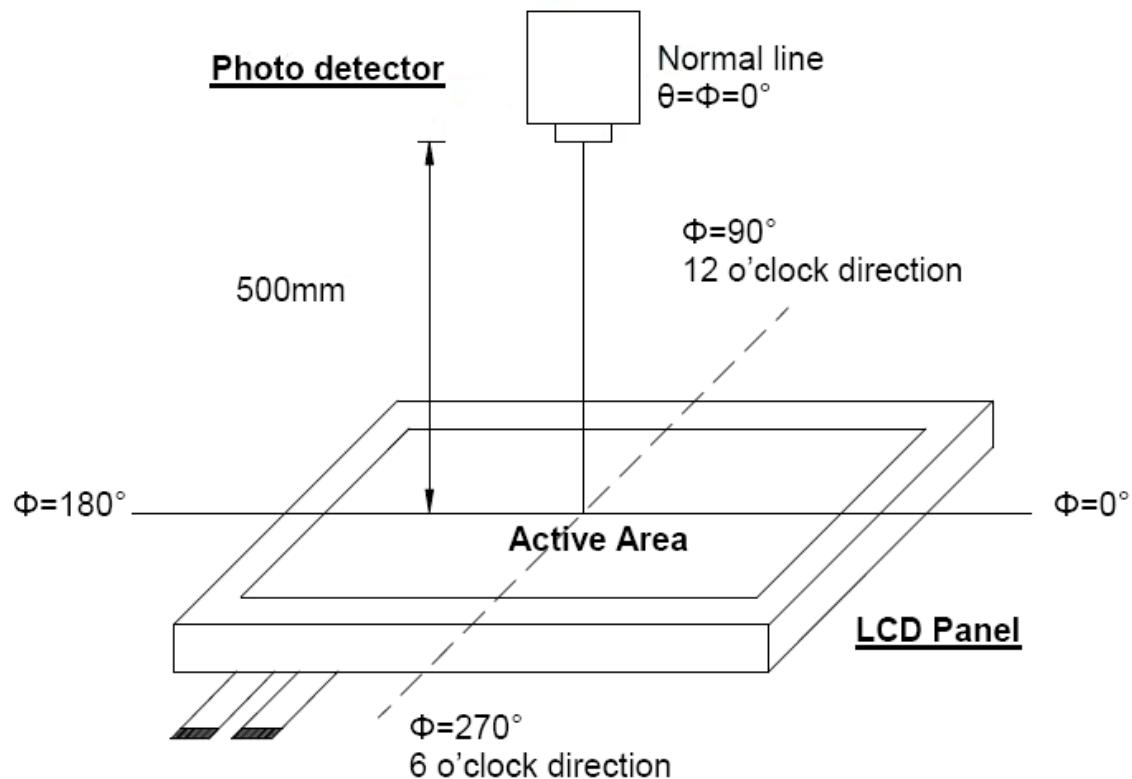
Note 2 : Definition of viewing angle range
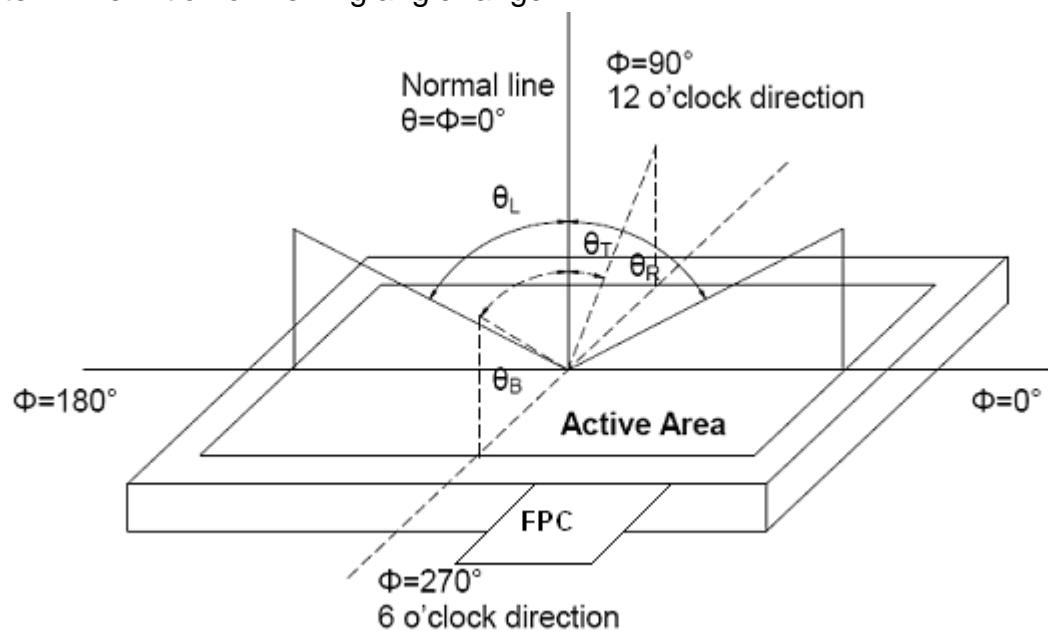
Note 3 : Definition of Response time

   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%.
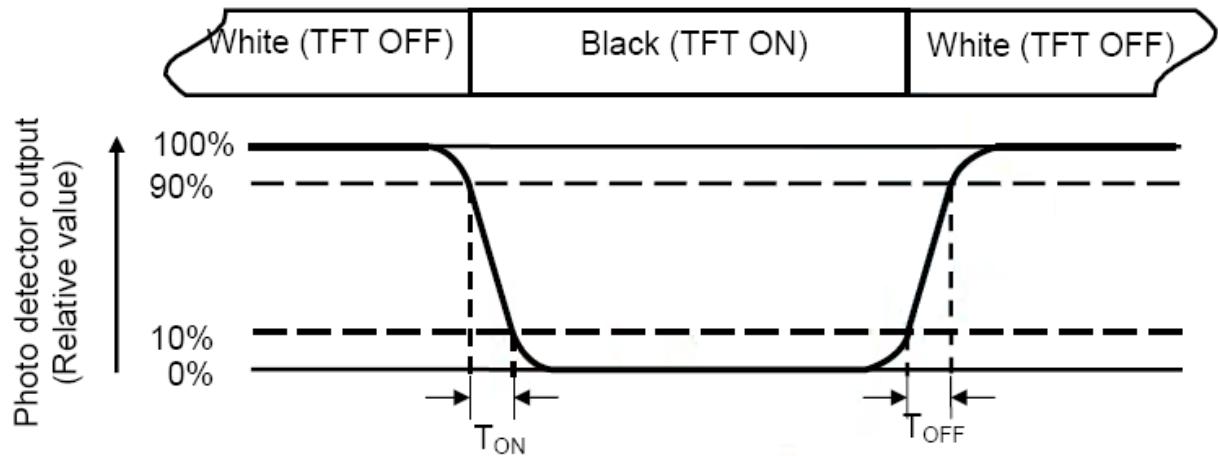
Note 4 : Definition of contrast ratio

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

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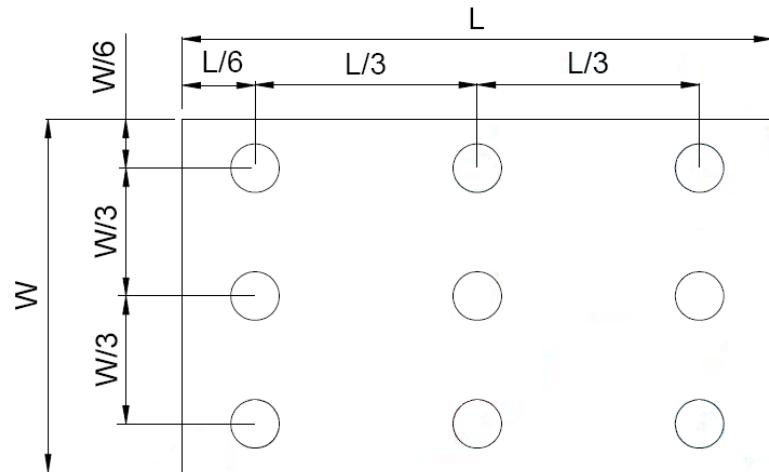
B_{max} : The measured maximum luminance of all measurement position.

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

7. Touch Panel Unit

Basic Characteristic

ITEM	SPECIFICATION
Type	Projective Capacitive Touch Panel
Activation	Multi-finger
X/Y Position Reporting	Absolute Position
Touch Force	No contact pressure required
Calibration	No need for calibration
Report Rate	Approx. 100 points/sec
Interface	USB
Control IC	ILI2511
Bonding method	CG to sensor: optical bonding
	TP module to LCM: tape bonding

Specify the normal operating condition (GND=0V)

Item	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	VDD	4.75	5.0	5.25	V
Power Consumption	I_{VDD}		T.B.D		mA

Interface

Pin No.	Symbol	Function
1	GND	POWER GND
2	D-	USB Data-
3	D+	USB Data+
4	VDD	USB power input 5V
5	NC	No connection
6	NC	No connection

8. Reliability Test Items

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=240 hrs	
Low Temperature Operation	-20±3°C , t=240 hrs	
High Temperature Storage	80±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	-20°C (30min) ~ 70°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 initial value.

9. General Precautions

9-1 Safety

Liquid crystal is poisonous. Do not put it your month. If liquid crystal touches your skin or clothes, wash it off immediately by using soap and water.

9-2 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.

9-3 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.

9-4 Storage

1. Store the module in a dark room where must keep at +25±10℃ 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.

9-5 Cleaning

1. Do not wipe the polarizer with dry cloth. It might cause scratch.
2. Only use a soft sloth with IPA to wipe the polarizer, other chemicals might permanent damage to the polarizer.

9-6 Mechanism

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

(2) The square adhesive tape which is between the touch panel and display can't provide well supporting in the long term and high ambient temperature condition. Whether upright or horizontal position the support holder which is in the back side of the display is needed. Do not let the display floating.

Touch Panel & Cover Lens
square adhesive tape
Display
Housing

Touch Panel& Cover Lens
Square adhesive tape
Display
Housing
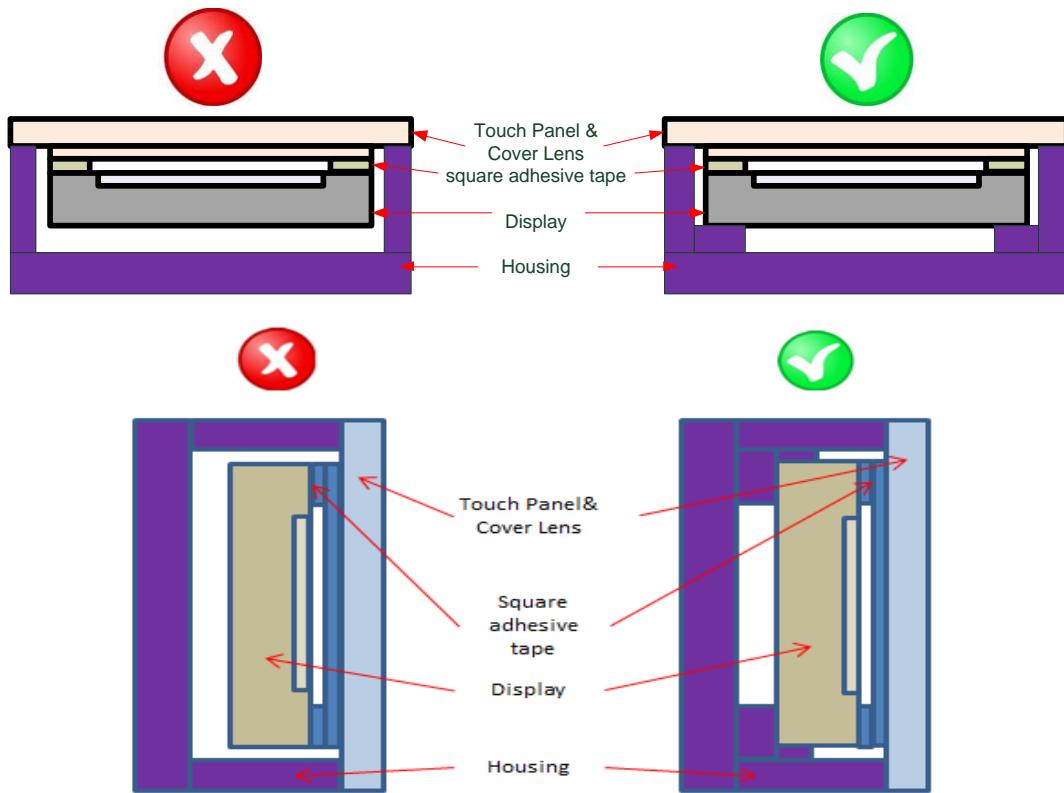
(3) TP needs to work in environment with stable stray capacitance. In order to minimize the variation in stray capacitance, all conductive mechanical parts must not be floating. Intermittent floating any conductive part around the touch sensor may cause significant stray capacitance change and abnormal touch function. It is recommended to keep all conductive parts having same electrical potential as the GND of the touch controller module.
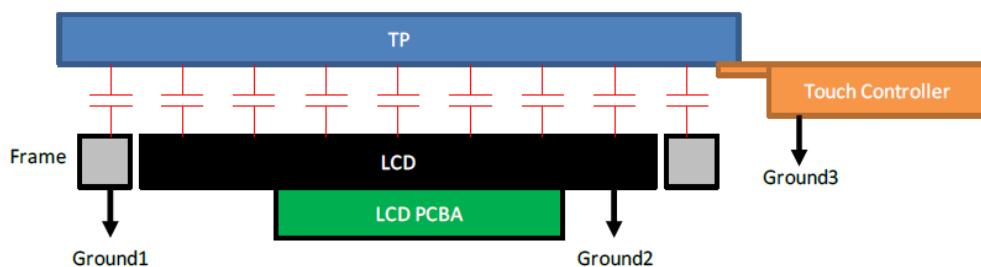
GND1, GND2 and GND3 should be connected together to have the same ground

9-7 Others

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

CN3

1	GND	31	VDD
2	NC	32	NC
3	VDD	33	RESET
4	R0	34	STBYB
5	R1	35	SHLR
6	R2	36	VDD
7	R3	37	UPDN
8	R4	38	GND
9	R5	39	GND
10	R6	40	NC
11	R7	41	NC
12	G0	42	NC
13	G1	43	NC
14	G2	44	NC
15	G3	45	NC
16	G4	46	NC
17	G5	47	NC
18	G6	48	NC
19	G7	49	VDD
20	B0	50	NC
21	B1	51	GND
22	B2	52	GND
23	B3	53	GND
24	B4	54	VDD
25	B5	55	NC
26	B6	56	NC
27	B7	57	VDD
28	DCLK	58	NC
29	DE	59	GND
30	VDD	60	NC

CN6 (USB)

1	GND
2	D-
3	D+
4	VDD
5	NC
6	NC

Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN1: JST : BHSR-02VS-1
4. CN3:P0.5 60PIN/IMSA-12001S-60Y903 or Equivalent

1	800480C8M_LCM	7
2	800480RI-T50 CTP(179804972OA)	8
3	CTP: P0.5 6PIN/089H06-000000-G2-R	9
4		10
5		11
6		12

A Block — R G B

TOLERANCE GRADE(±)

DIM.	A	B
IE NO.		
MM	DWN. MILLY	CHK.

PARTS NO. LCM AMA-070A12-DU2511-G010

TITLE: AMA-070A12-DU2511-G010 (7.0") IPS

DWG. NO. *230712 3MA

SHEET 1 OF 1

REV REVISION RECORD
0 NEW RELEASE
1 Modify interface

CN3 □

1	GND	31	VDD
2	NC	32	NC
3	VDD	33	RESET
4	R0	34	STBYB
5	R1	35	SHLR
6	R2	36	VDD
7	R3	37	UPDN
8	R4	38	GND
9	R5	39	GND
10	R6	40	NC
11	R7	41	NC
12	G0	42	NC
13	G1	43	NC
14	G2	44	NC
15	G3	45	NC
16	G4	46	NC
17	G5	47	NC
18	G6	48	NC
19	G7	49	VDD
20	B0	50	NC
21	B1	51	GND
22	B2	52	GND
23	B3	53	GND
24	B4	54	VDD
25	B5	55	NC
26	B6	56	NC
27	B7	57	VDD
28	DCLK	58	NC
29	DE	59	GND
30	VDD	60	NC

CN6 (USB)

1	GND
2	D-
3	D+
4	VDD
5	NC
6	NC

Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN1: JST : BHSR-02VS-1
4. CN3:P0.5 60PIN/IMSA-12001S-60Y903 or Equivalent

1	800480C8M LCM	7	
2	800480RI-T50 CTP(179804972OA)	8	
3	CTP: P0.5 6PIN/Q89H06-000000-G2-R	9	
4		10	
5		11	
6		12	

Back view

B Block

Stiffener

SUS304(T=0.15)

CN6
P0.5x5
6CN6

CN1

P0.5x(9-29.5±0.05,W=0.35)

TOLERANCE GRADE(±)		
	A	B	DIM.
			MM

IE NO.	CHK.	DWN.	APPD.	DATE
		MILLY		
PARTS NO. LCM-1		DATE	DATE	
AMA-070A12-DU2511-G10		07-24-23'		

AMPIRE 晶采光電科技

TITLE
AMA-070A12-DU2511-G010
(7.0") IPS

DWG. NO.
*230712.4MA

SHEET 1 OF 1

11. Packing

T.B.D.