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-1024600DTZQW-TD0H-A**
Approved by	
Date	

☐ **Preliminary Specification**
■ **Approved Specification**

AMPIRE CO., LTD.
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Approved by	Checked by	Organized by
Kokai	Lawlite	Mantle

This Specification is subject to change without notice.

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2022/12/06	-	New release	Mantle

1. Features

It's a 7 inches Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module. This module is composed of a 7" TFT-LCD panel, LED backlight, and Projective capacitive-type touch panel.

(1) Construction: 7" a-Si TFT active matrix, White LED Backlight.
(2) Resolution (pixel): 1024 RGB (H) x 600 (V)
(3) Number of the Colors : 16.7M colors (R , G , B 8 bit digital each)
(4) LCD type : Normally Black
(5) Interface: LVDS
(6) LED driver IC: TPS61185
(7) Projective Capacitive Touch
a. Interface : USB
b. Touch Controller: ILI2511
c. Cover Lens : Tempered Soda Lime Glass : T=1.1mm.
d. Printing : Black border (Pantone:Black)

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
LCD size	7 inch (Diagonal)	
Resolution	1024 x (RGB) x 600	dot
Pixel pitch	0.1506(W) x 0.1432(H)	mm
Active area	154.2144(W) x 85.92(H)	mm
Color arrangement	RGB-stripe	

3. ABSOLUTE MAX. RATINGS

Item	Symbol	Values		Unit	Remark
		MIN	MAX		
Power Voltage	VDD	-0.3	4	V	
LED Driver Power Voltage	VLED	-0.3	19	V	
Operation Temperature	TOP	-20	70	℃	
Storage Temperature	TST	-30	80	℃	

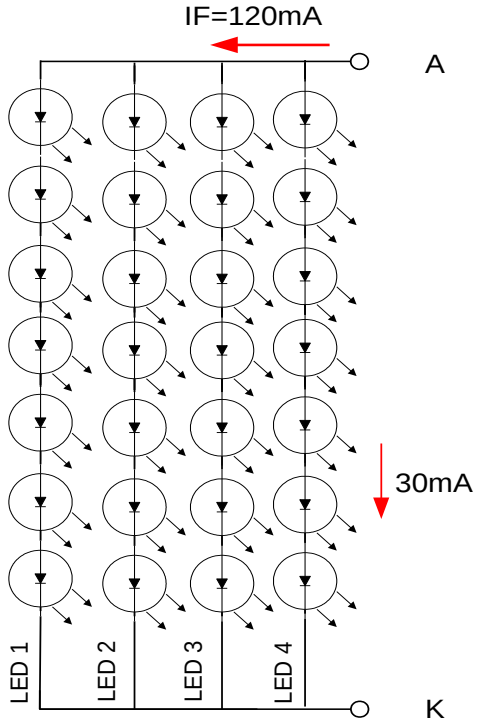
Note (1) The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

4. Backlight Driving Conditions

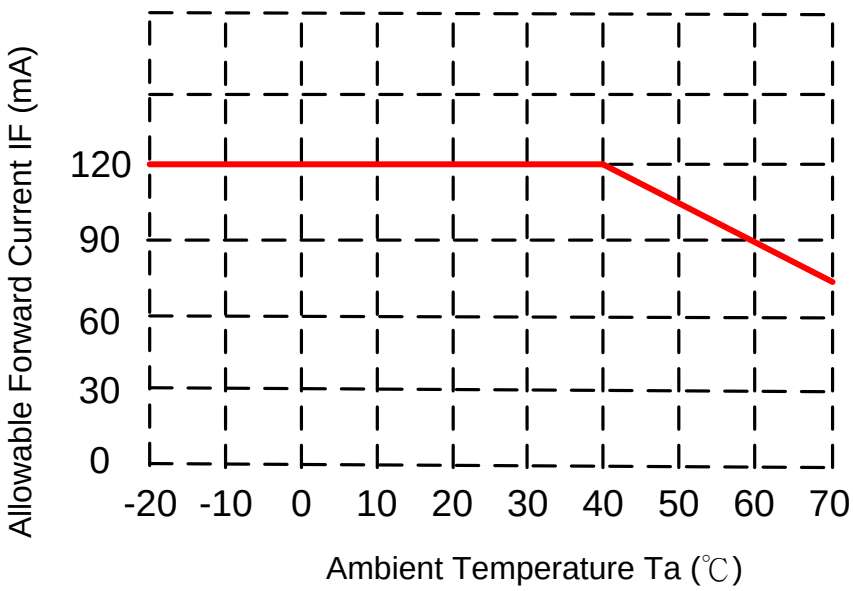
ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LED Driver Power Voltage	VLED	--	12	19	V	
LED Driver Power Current	ILED(VLED=12V)	--	289	--	mA	Ta=25℃
PWM Dimming DC active level	VDIMH	2.1	--	6	V	
	VDIML	--	--	0.8	V	
PWM Dimming Freq.	FDIM	0.2		20	kHz	
BLEN Pin High Voltage	VBLENH	2.1		VLED	V	
BLEN Pin Low Voltage	VBLENL	--		0.8	V	
LED voltage	VAK	--	23.1	--	V	Note 1
LED current	IF	--	120	--	mA	Note 1
LED life time	--	--	30	--	kHrs	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and IF=120 mA.

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IF=120mA. The LED lifetime could be decreased if operating IF is larger than 120mA.



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



5. Optical Specifications

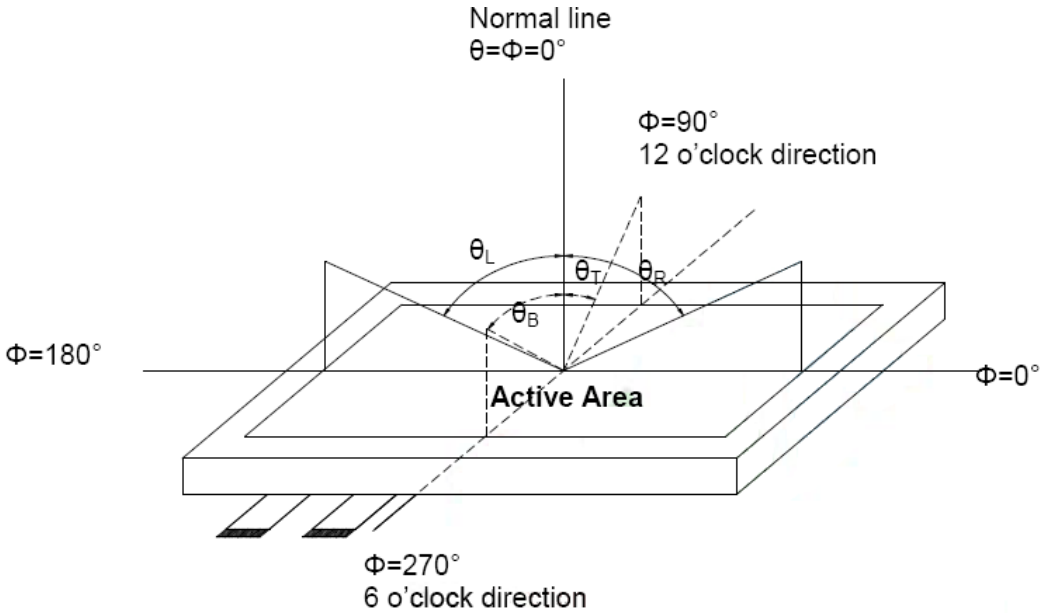
Item	Symbol	Condition	Values			Unit	Note
			Min.	Typ.	Max.		
Viewing angle (CR≧10)	θ L	Φ = 180° (9 o'clock)	80	85	--	degree	Note1
	θ R	Φ = 0° (3 o'clock)	80	85	--		
	θ T	Φ = 90° (12 o'clock)	80	85	--		
	θ B	Φ = 270° (6 o'clock)	80	85	--		
Response time	TON	Normal θ =Φ=0°	--	13	20	msec	Note3
	TOFF		--	15	25	msec	
Contrast ratio	CR		600	800	--	--	Note4
Color chromaticity	WX		0.26	0.31	0.36	--	Note5 Note6
	WY		0.31	0.36	0.41	--	
	RX		0.56	0.61	0.66		
	RY		0.29	0.34	0.39		
	GX		0.31	0.36	0.41		
	GY		0.52	0.57	0.62		
	BX		0.05	0.10	0.15		
	BY		0.03	0.08	0.13		
Luminance (central point)	L		**340**	**425**	--	cd/m^2	Note6
Luminance uniformity	YU		70	75	--	%	Note6

Test Conditions:

VDD = 3.3V, IF = 120 mA (Backlight current), the ambient temperature is 25℃.

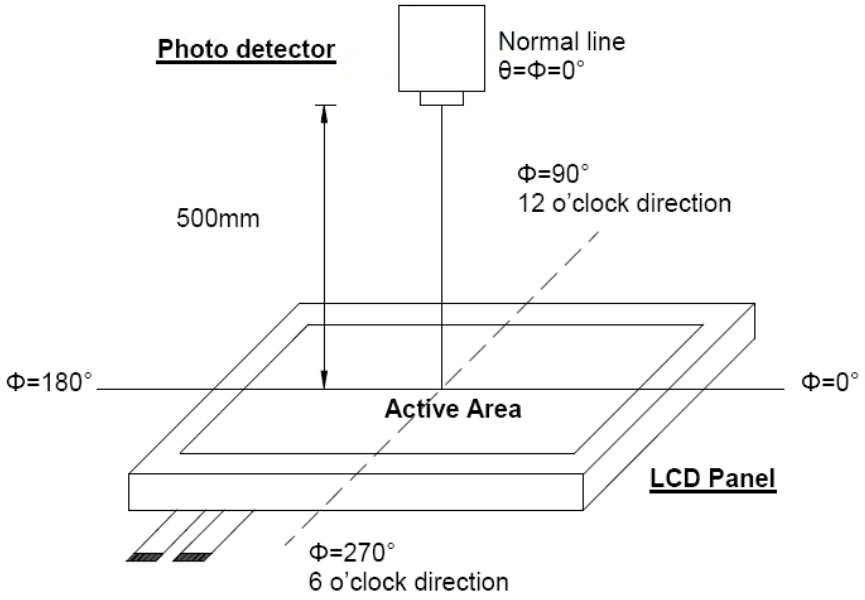
The test systems refer to Note 2.

Note (1) Definition of viewing angle range



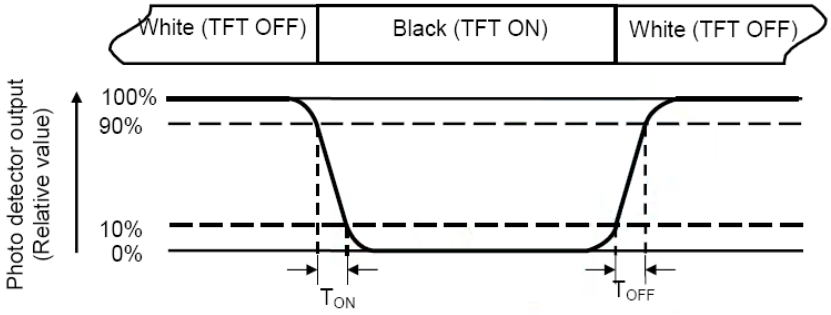
Note (2) Definition of optical measurement system

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 (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) 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.

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

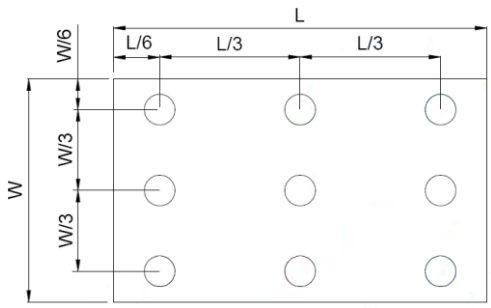
Note (6) Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer to bellow figure).

Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (Yu)} = \frac{\text{Bmin}}{\text{Bmax}}$$

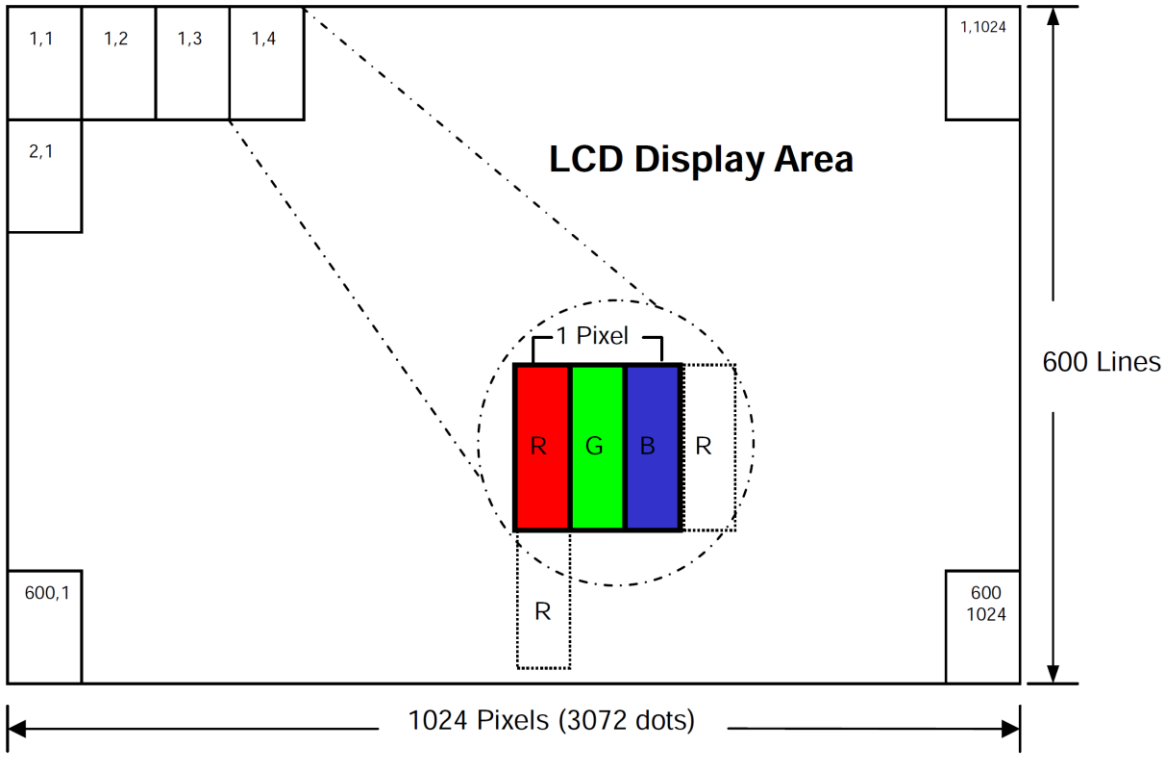
L ----- Active area length W ----- Active area width



Bmax : The measured maximum luminance of all measurement position.

Bmin : The measured minimum luminance of all measurement position.

Note (7) Pixel format



6. INTERFACE

CN2:P 1.0 20PIN/CP100-S20G-H16 or Equicalent.

Pin No.	Symbol	Function
1	VDD	POWER SUPPLY
2	VDD	POWER SUPPLY
3	GND	Power Ground
4	GND	Power Ground
5	IN0-	Transmission Data of Pixels
6	IN0+	Transmission Data of Pixels
7	GND	Power Ground
8	IN1-	Transmission Data of Pixels 1
9	IN1+	Transmission Data of Pixels 1
10	GND	Power Ground
11	IN2-	Transmission Data of Pixels 2
12	IN2+	Transmission Data of Pixels 2
13	GND	Power Ground
14	CLK-	Sampling Clock
15	CLK+	Sampling Clock
16	GND	Power Ground
17	IN3-	Transmission Data of Pixels 3
18	IN3+	Transmission Data of Pixels 3
19	GND	Power Ground
20	GND	Power Ground

I: input, O: output, P: power

CN3: ENTERY 3808K-F05N-03L or Equivalent, Mating Connector: ENTERY H208-P05N-02B or Equivalent.

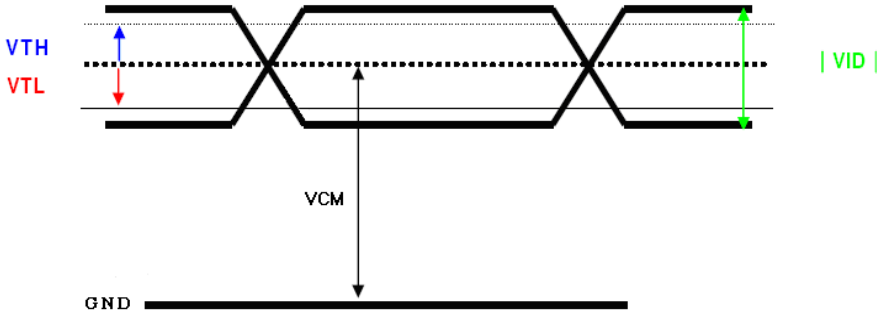
1	VLED	Power supply of LED driving circuit
2	GND	Power Ground
3	BLEN	LED BLU ON/OFF, High: enable, Low: disable
4	DIM	Adjust the LED brightness by PWM
5	NC	No connection

Note 1: BLU means Backlight Unit

7. ELECTRICAL CHARACTERISTICS

7.1. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Digital Power Supply Voltage	VDD	3.0	3.3	3.6	V	
Digital Power Supply Current	IDD		TBD		mA	
Differential Input High Threshold	VTH	--	--	100	mV	VCM=1.2V
Differential Input Low Threshold	VTL	-100	--	--	mV	
Input current	IIN	-10	--	+10	uA	
Differential input Voltage	|VID|	0.2	--	0.6	V	
Common Mode Voltage Offset	VCM	$\frac{\|VID\|}{2}$	1.25	$2.4-\frac{\|VID\|}{2}$	V	

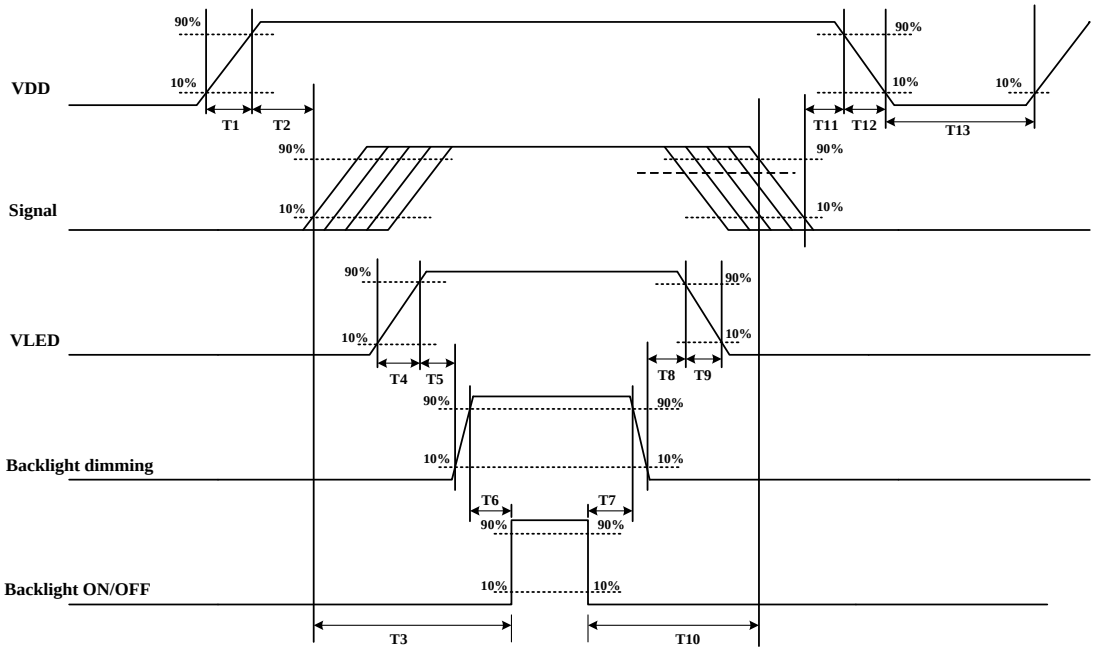


7.2. AC Characteristics TTL

DE mode					
Parameter	Symbol	Spec.			
		Min.	Typ.	Max.	Unit
DCLK frequency	fclk	40.8	51.2	67.2	MHz
Horizontal display area	thd		1024		DCLK
HSD period	th	1114	1344	1400	DCLK
HSD blanking	thb+ thfp	90	320	376	DCLK
Vertical display area	tvd		600		TH
VSD period	tvbp	610	635	800	TH
VSD blanking	tvbp+ tvfp	10	35	200	TH
HV mode					
DCLK frequency	fclk	44.9	51.2	63	MHz
Horizontal display area	thd		1024		DCLK
HSD period	th	1200	1344	1400	DCLK
HSD pulse Width	thpw	1	-	140	DCLK
HSD back porch	thbp		160		DCLK
HSD front porch	thfp	16	160	216	DCLK
Vertical display area	tvd		600		TH
VSD period	tv	624	635	750	TH
VSD pulse Width	tvpw	1	-	20	TH
VSD back porch	tvbp		23		TH
VSD front porch	tvfp	1	12	127	TH

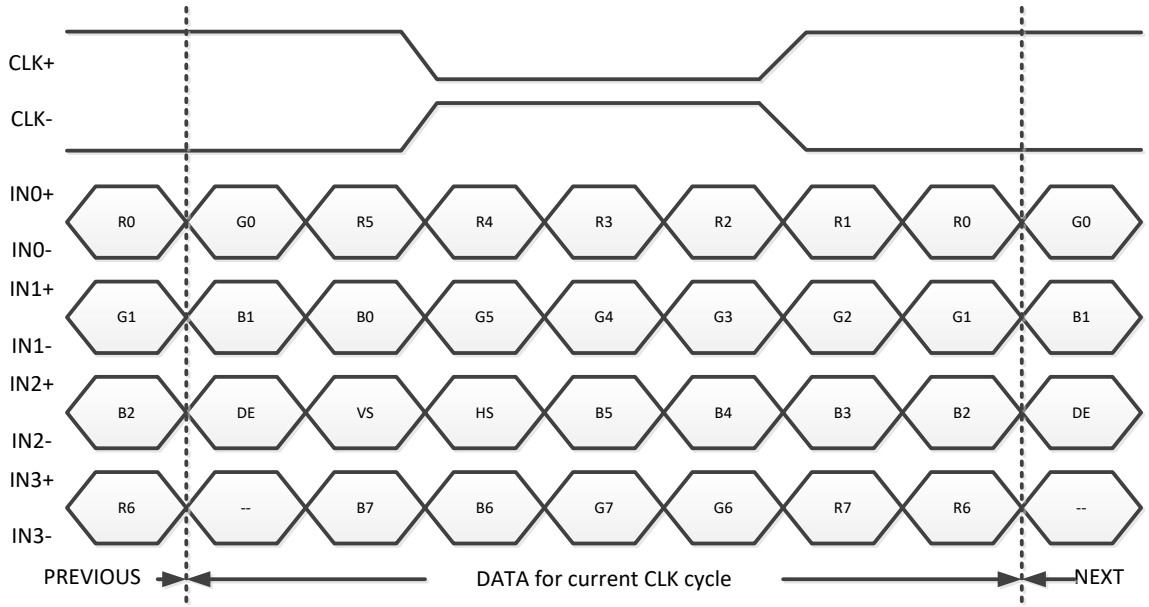
7.3. Power ON/OFF sequence

VDD power and LED on/off sequence are as follows. Interface signals are also shown in the chart. Signal shall be Hi-Z state or low level when VDD is off.



Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	0	40	50	[ms]
T3	200	-	-	[ms]
T4	0.5	-	10	[ms]
T5	10	-	-	[ms]
T6	10	-	-	[ms]
T7	0	-	-	[ms]
T8	10	-	-	[ms]
T9	-	-	10	[ms]
T10	110	-	-	[ms]
T11	0.5	16	50	[ms]
T12	-	-	100	[ms]
T13	1000	-	-	[ms]

7.4. 24-BIT LVDS Input Data Format



Note: R/G/B data 7: MSB, R/G/B data 0: LSB

Signal Name	Description	Remark
R7 R6 R5 R4 R3 R2 R1 R0	Red Data 7 (MSB) Red Data 6 Red Data 5 Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
G7 G6 G5 G4 G3 G2 G1 G0	Green Date 7 (MSB) Green Date 6 Green Date 5 Green Date 4 Green Date 3 Green Date 2 Green Date 1 Green Date 0 (LSB)	Green-pixel Data Each green pixel's brightness data consists of these 8 bits pixel data.
B7 B6 B5 B4 B3 B2 B1 B0	Blue Data 7 (MSB) Blue Data 6 Blue Data 5 Blue Data 4 Blue Data 3 Blue Data 2 Blue Data 1 Blue Data 0 (LSB)	Blue-pixel Data Each blue pixel's brightness data consists of these 8 bits pixel data.
CLK+ CLK-	LVDS Clock Input	
DE	Display Enable	
VS	Vertical Sync Signal	
HS	Horizontal Sync Signal	

8. projected capacitive Touch Panel Electrical Specifications

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
Cover Glass	1.1mm chemically strength glass with black border
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	Note
Power Supply Voltage	VIN	4.75	5.0	5.25	V	
Power Current	IIN		TBD			

Interface

Pin No.	Symbol	Function
1	GND	POWER GND
2	DA-	USB Data-
3	DA+	USB Data+
4	VIN	USB power input 5V
5	NA	No connection
6	NA	No connection

9. RELIABILITY 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

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.

10. USE PRECAUTIONS

10-1 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.

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±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.

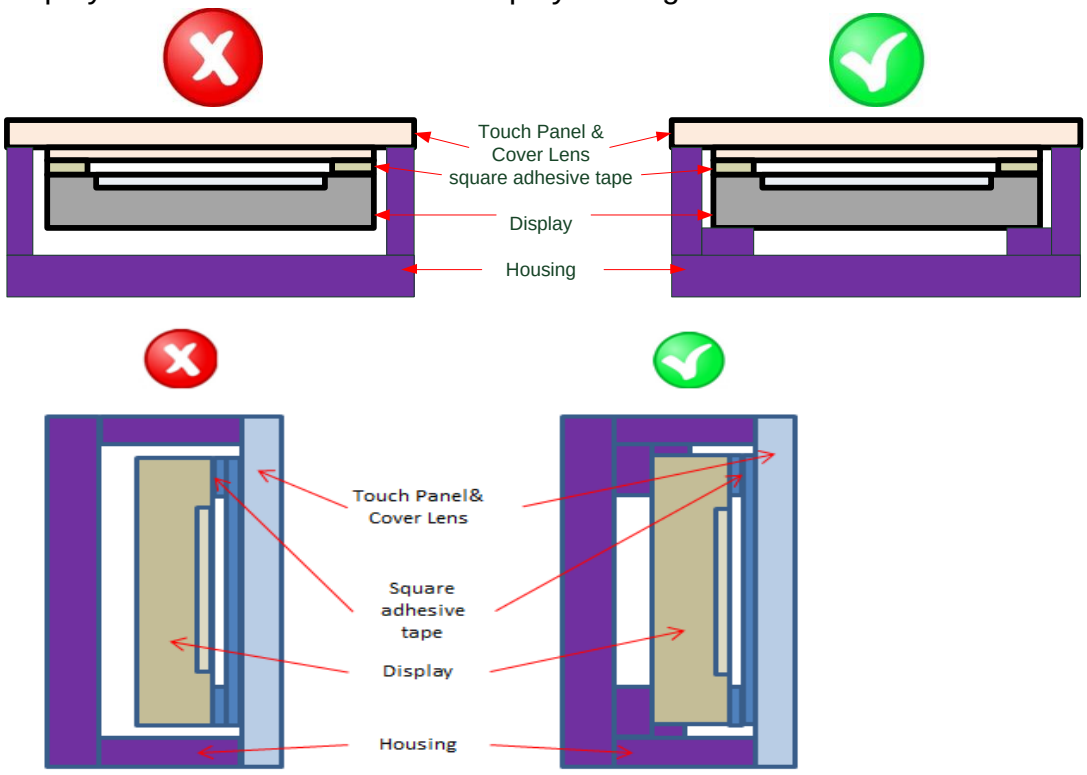
10-5 Cleaning

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.

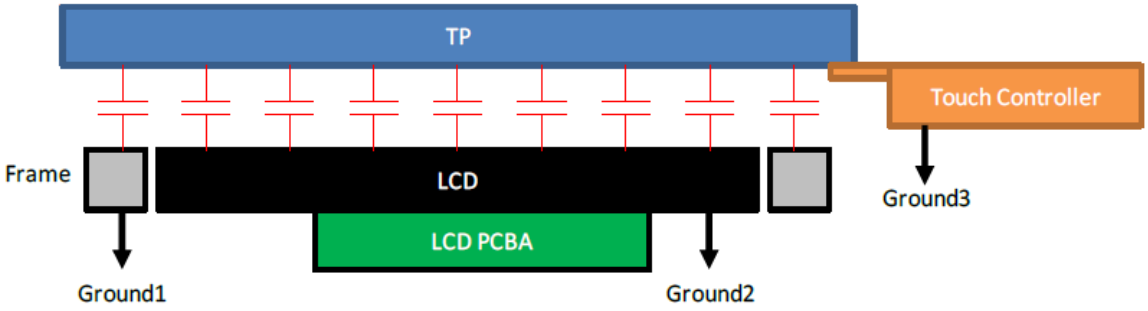
10-6 Mechanism

(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.



(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.

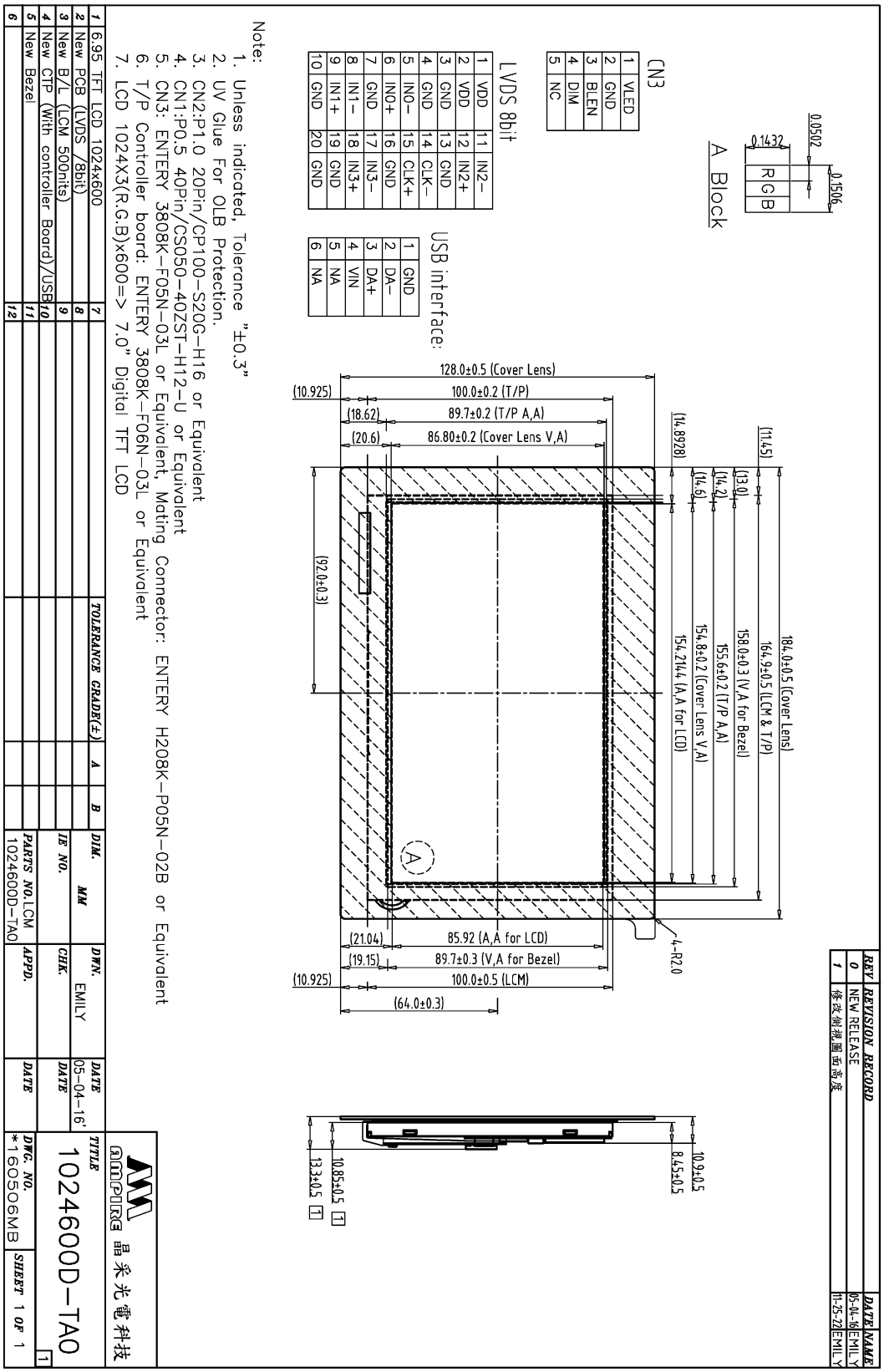


GND1, GND2 and GND3 should be connected together to have the same ground

10-7 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 save

11. OUTLINE DIMENSION



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	05-04-16	EMILY
1	修改側視圖面高度	11-25-22	EMILY

1	6.95 TFT LCD 1024x600	7					
2	New PCB (LVDS /8bit)	8					
3	New B/L (LCM 500nits)	9					
4	New CTP (With controller Board)/USB	10					
5	New Bezel	11					
6		12					

TOLERANCE GRADE(±)	A	B

DIM.	MM
IB NO.	
PARTS NO.	LCM 1024600D-TA0

	DWN.	DATE
	EMILY	05-04-16'
	CHK.	DATE
	APPD.	DATE

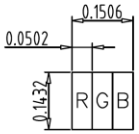
晶采光電科技 AMPIRE

TITTLE: 1024600D-TA0

DWG. NO.: *160506MB

SHEET 1 OF 1

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	05-04-16	EMILY



A Block

CN3

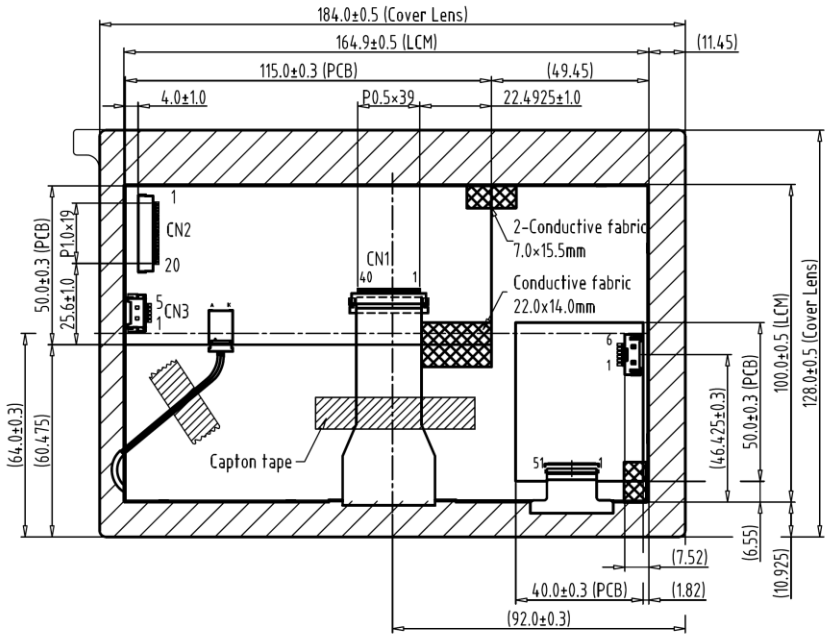
1	VLED
2	GND
3	BLEN
4	DIM
5	NC

LVDS 8bit

1	VDD	11	IN2−
2	VDD	12	IN2+
3	GND	13	GND
4	GND	14	CLK−
5	IN0−	15	CLK+
6	IN0+	16	GND
7	GND	17	IN3−
8	IN1−	18	IN3+
9	IN1+	19	GND
10	GND	20	GND

USB interface:

1	GND
2	DA−
3	DA+
4	VIN
5	NA
6	NA



Back View

Note:

1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN2:P1.0 20Pin/CP100−S20G−H16 or Equivalent
4. CN1:P0.5 40Pin/CS050−40ZST−H12−U or Equivalent
5. CN3: ENTERY 3808K−F05N−03L or Equivalent, Mating Connector: ENTERY H208K−P05N−02B or Equivalent
6. T/P Controller board: ENTERY 3808K−F06N−03L or Equivalent
7. LCD 1024X3(R.G.B)x600=> 7.0" Digital TFT LCD

1	6.95 TFT LCD 1024x600	7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. EMILY	DATE 05-04-16'	TITLE 1024600D−TA0	
2	New PCB (LVDS /8bit)	8					IE NO.	CHK.	DATE		
3	New B/L (LCM 500nits)	9									
4	New CTP (With controller Board)/USB	10									
5	New Bezel	11					PARTS NO. LCM−1 1024600D−TA0	APPD.	DATE	DWG. NO. *160507MA	SHEET 1 OF 1
6		12									

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AMPIRE CO., LTD.

Date: 2022/12/06