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-1024600V3TZQW-50H
APPROVED BY	
DATE	

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

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TEL:886-2-26967269 , FAX:886-2-26967196 or 26967270

APPROVED BY	CHECKED BY	ORGANIZED BY
Kokai	Jessica	Simon

*This specification is subject to change without notice.

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2024/07/30	-	New Release	Simon

1. GENERAL DESCRIPTION

1.1 Introduction

This is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 10.1 (16:9) inch diagonally measured active display area with WVGA (1024 horizontal by 600 vertical pixels) resolution.

1.2 Features

- 10.1” (16:9 diagonal) Inch configuration.
- 16.2M color by 6 bit +Hi-FRC input
- 1024600L3 REV.C PCB with DC/DC
- External LED Driver Board

1.3 General information

Item	Specifications	unit
Outline Dimension	235.0 x 143.0 x 7.05 (typ)	mm
Display area	222.72(H) x 125.28(V)	mm
Number of Pixel	1024 RGB (H) x 600(V)	Pixels
Pixel pitch	0.2175(H) x 0.2088(V)	mm
Pixel arrangement	RGB Vertical stripe	
Display mode	Normally Black	
Surface treatment	Antiglare,	
Back-light	White LED	

2. ABSOLUTE MAXIMUM RATINGS

2.1 Electrical Absolute Rating

2.1.1 TFT LCD Module

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
LED driver Power Supply Voltage	V_{LED}	-0.3	15.0	V	GND=0
Logic Supply Voltage	V_{DD}	-0.3	5.0	V	
Operating Temperature	T_{OPA}	-20	70	°C	
Storage Temperature	T_{STG}	-30	80	°C	

2.1.2 Backlight unit

Item	Symbol	Typ.	Max.	Unit	Note
LED current	I_L	TBD	TBD	mA	(1) (2)(3)
LED voltage	V_L	TBD	TBD	V	(1) (2)(3)
LED reverse voltage	V_R	TBD	TBD	V	
LED forward current	I_F	TBD	TBD	mA	

Note:

(1) Permanent damage may occur to the LCD module if beyond this specification. Functional operation should be restricted to the conditions described under normal operating conditions.

(2) Ta =25±2℃

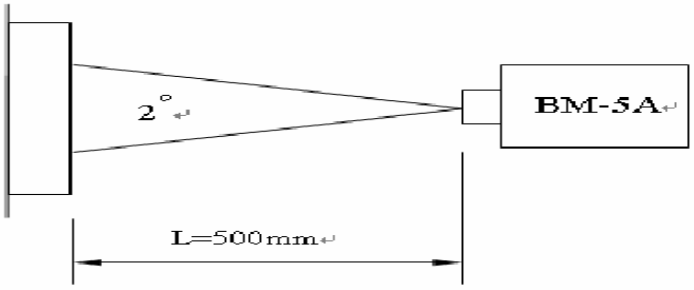
(3) Test Condition: LED current TBD mA. The LED lifetime could be decreased if operating IL is larger than TBD
mA.

3. OPTICAL CHARACTERISTICS

Item			Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast ratio			CR	Point - 5 Θ=Φ=0°	800	1000	--	--	(1)(2)(3)
Luminance			Lw		400	500	-	cd/m^2	(1)(3)
Luminance Uniformity			ΔL		70	80	-	%	(1)(3)
Response Time (White – Black)			$T_r + T_f$		--	25	35	ms	(1)(3)(5)
Viewing Angle	Vertical		Θ	CR≧10 Point – 5	160	-	-	Deg.	(1)(2)(4)
	Horizontal		Φ		160	-	-		
Color chromaticity		Red	Rx	Point - 5 Θ=Φ=0°		TBD		--	(1)(3)
			Ry			TBD			
		Green	Gx			TBD			
			Gy			TBD			
		Blue	Bx			TBD			
			By			TBD			
		White	Wx			TBD			
			Wy			TBD			

NOTE :

(1) Measure conditions : 25℃±2℃ , 60±10%RH under 10Lux , in the dark room by BM-7TOPCON) ,viewing 2° , VCC=3.3V , VDD=3.3V



(2) Definition of Contrast Ratio :

Contrast Ratio (CR) = (White) Luminance of ON ÷ (Black) Luminance of OFF

(3) Definition of Luminance :
Definition of Luminance Uniformity
Measure white luminance on the point 5 as figure9-1
Measure white luminance on the point 1 ~ 9 as figure9-1

ΔL = [L(MIN) / L(MAX)] X 100%

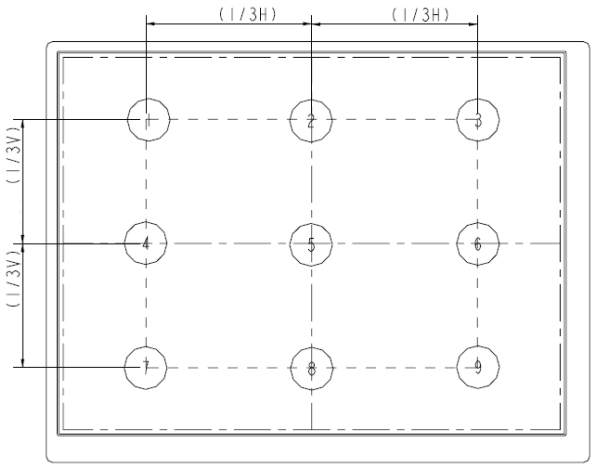


Fig9-1 Measuring point

(4) Definition of Viewing Angle(Θ,Φ), refer to Fig9-2 as below :

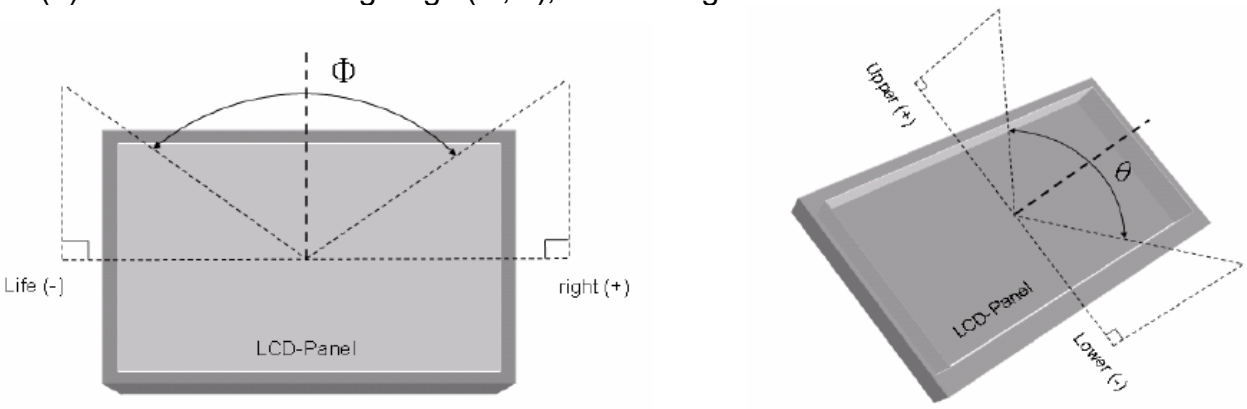


Fig9-2 Definition of Viewing Angle

(5) Definition of Response Time.(White – Black)

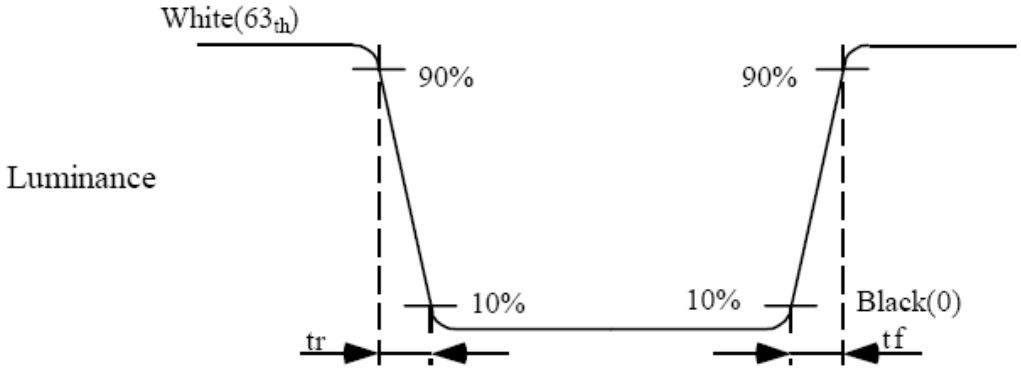


Fig9-3 Definition of Response Time(White-Black)

(6) End of Life shall be determined by the time when any of the following is satisfied under continuous lighting at 25℃

- Intensity drops to 50% of the Initial Value (Min. Luminance)
- Based on LED
- It is an estimative value

4. Pin Definition

4.1 TFT Module

CN1(Input signal): CSTAR DS100-430-H23 (equivalent JAE FI-XB30SSRL-HF16)

Pin No.	Symbol	Description	Note
1	GND	Ground	
2	VDD	3.3V Power	
3	VDD	3.3V Power	
4	V_EDID	3.3V Power for EDID	
5	NC	No connection	
6	CLK_EDID	EDID Clock Input	
7	DATA_EDID	EDID Data Input	
8	RXIN0-	LVDS Signal - channel0-	
9	RXIN0+	LVDS Signal+ channel0+	
10	GND	Ground	
11	RXIN1-	Data Input channel1-	
12	RXIN1+	Data Input channel1+	
13	GND	Ground	
14	RXIN2-	Data Input channel2-	
15	RXIN2+	Data Input channel2+	
16	GND	Ground	
17	RXCLKIN-	Data Input CLK-	
18	RXCLKIN+	Data Input CLK+	
19	GND	Ground	
20	NC	No connection	
21	NC	No connection	
22	GND	Ground	
23	GND	Ground	
24	NC	No connection	
25	NC	No connection	

26	NC	No connection	
27	NC	No connection	
28	NC	No connection	
29	NC	No connection	
30	NC	No connection	

CN2(LED backlight): BHSR-02VS-1 (JST or equivalent)

Pin No.	Symbol	Description	Note
1	A	Anode for LED backlight	
2	K	Cathode for LED backlight	

CN2(LED Driver Board): FPHTI-104TTW000(Kingfont or equivalent)

Pin No.	Symbol	Description	Note
1	+12V	Voltage for LED circuit (+12V)	
2	LED_EN	LED BLU ON/OFF	
3	GND	Power ground	
4	PWM	Adjust the LED brightness by PWM	

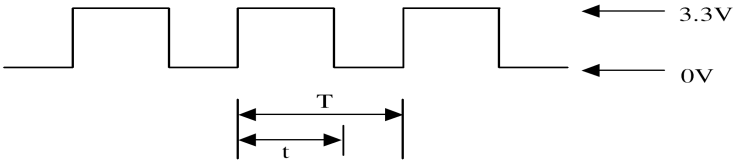
Note* : **The brightness of LCD panel could be changed by adjusting ADJ**

[Note]

(1) ADJ can adjust brightness to control Pin. Pulse duty the bigger the brighter.

(2) ADJ Signal=0~3.3V，Operation Frequency：

Dimming Range		
PWM Frequency (F)	Duty Cycle (Min.)	Duty Cycle (Max.)
100Hz < F < 500Hz	5%	100%
500Hz < F < 20KHz	10%	100%



Duty Cycle = t / T *100%

5 Back-Light Unit

Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
LED Driver voltage	VLED	9	12	15	V	
Power Supply Current For LED Driver	ILED	-	TBD	-	mA	VLED=12V VADJ=3.3V (duty 100%)
ADJ Input Voltage	V_{ADJ}	-	3.3	VLED	V	duty=100%
LED voltage	VAK	--	TBD	TBD	V	I_L =TBDmA Ta=25℃
LED current	I_L	--	TBD	--	mA	Note (1)
LED Life Time	-	--	30K	--	Hour	Note (2)

Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 ₀C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL=TBDmA. The LED lifetime could be decreased if operating IL is larger than 140mA. The constant current driving method is suggested.

Note (3) LED Light Bar Circuit

6 ELECTRICAL CHARACTERISTICS

6.1 TFT LCD Module

Item	Symbol	Values			UNIT	Note
		Min.	Typ.	Max.		
Power voltage	VDD	3.0	3.3	3.6	V	Note1
Current of power supply	IDD	-	0.3	-	A	**VDD=3.3V Black pattern**
Power voltage for LED driver	VLED	9.0	12.0	15.0	V	
LED driver current of power supply	ILED	-	TBD		mA	**VLED=12V ADJ=100%**

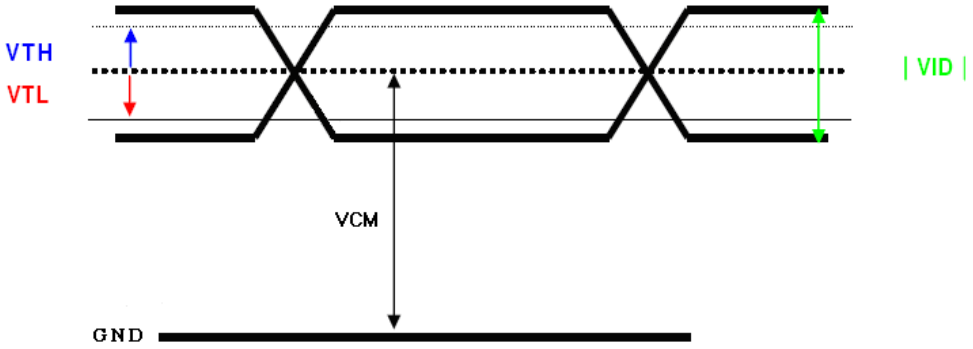
Note 1: **VDD-dip condition :**

when 2.7V≦VDD<3.0V，td≦10ms.

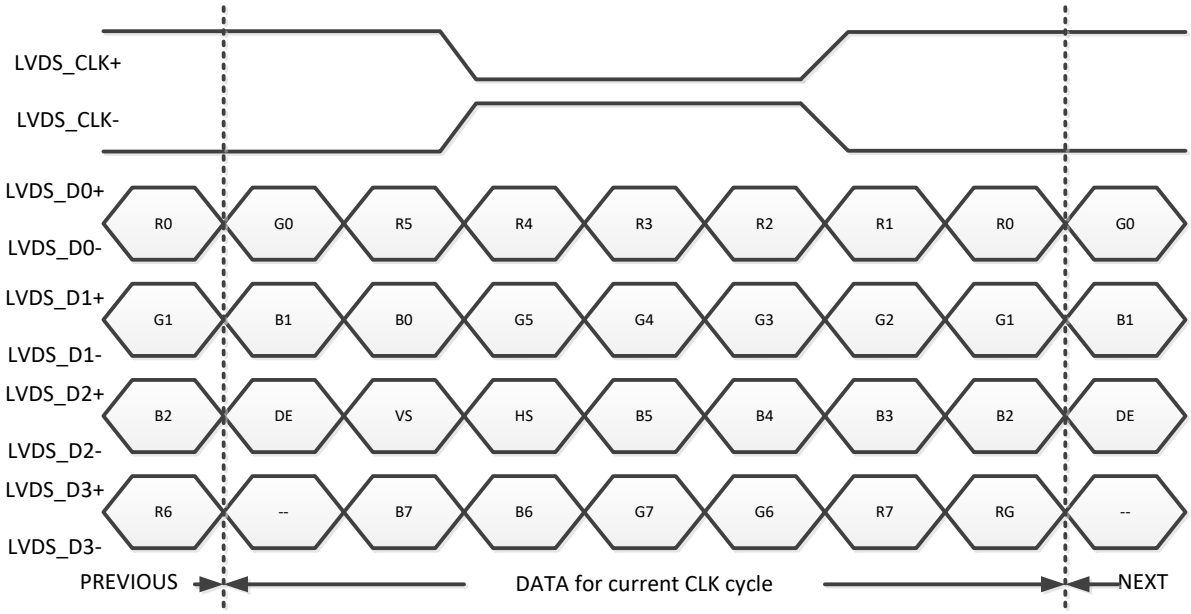
VDD＞3.0V，VDD-dip condition should be same as VDD-turn-con condition.

6.2 Switching Characteristics of LVDS Receiver

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
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	



24-BIT LVDS Input Data Format



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

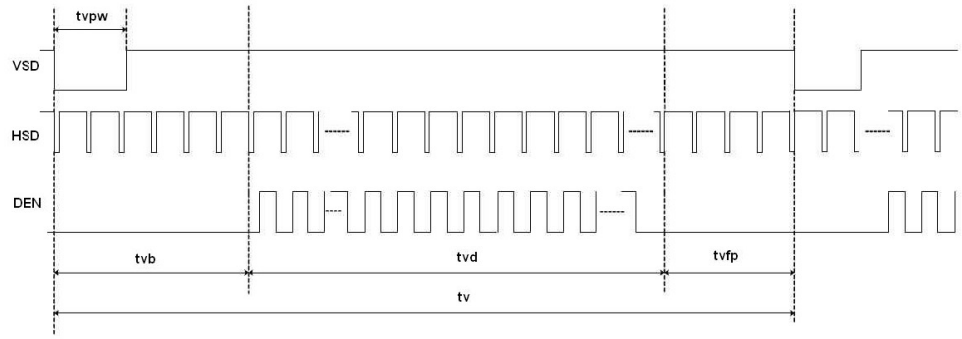
Signal Name	Description	Remark
R7 R6 R5 R4 R3 R2 R1 R0	Red Data 7 (MSB) Red Data 6 Red Data 5 Red Data 4 Red Data 3 Red Data 2 Red Data 1 Red Data 0 (LSB)	Red-pixel Data Each red pixel's brightness data consists of these 8 bits pixel data.
G7 G6 G5 G4 G3 G2 G1 G0	Green Date 7 (MSB) Green Date 6 Green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

LCD Input Timing

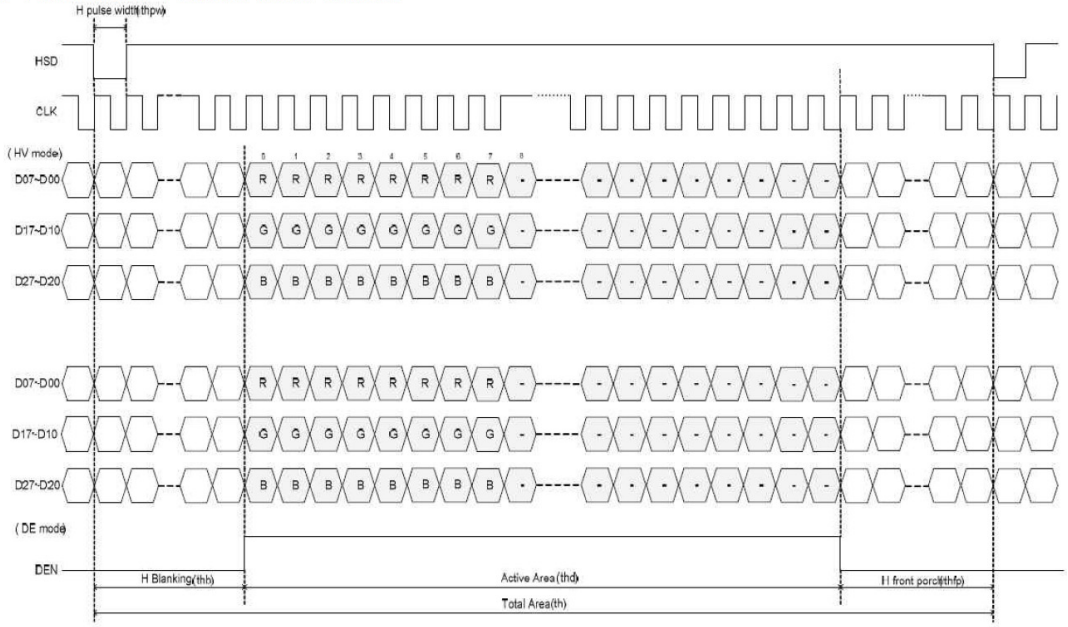
Item	Symbol	Min.	Typ.	Max.	Unit
Frame Rate	--	55	60	65	Hz
Frame Period	t1	610	635	800	line
Vertical Display Time	t2	600	600	600	line
Vertical Blanking Time	t3	10	35	200	line
1 Line Scanning Time	t4	1164	1344	1400	clock
Horizontal Display Time	t5	1024	1024	1024	clock
Horizontal Blanking Time	t6	140	320	376	clock
Clock Rate	t7	42.6	51.2	72.8	MHz

Timing Diagram of Interface Signal (DE mode)

(1) Vertical input timing



(2) Horizontal Vertical input timing



7. RELIABILITY TEST CONDITIONS

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	60°C, 90% RH , 240 hrs	1,2
Thermal Shock Test	-20°C (30min) ~ 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 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.

8. General Precautions

8-1 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.

8-2 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.

8-3 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.

8-4 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.

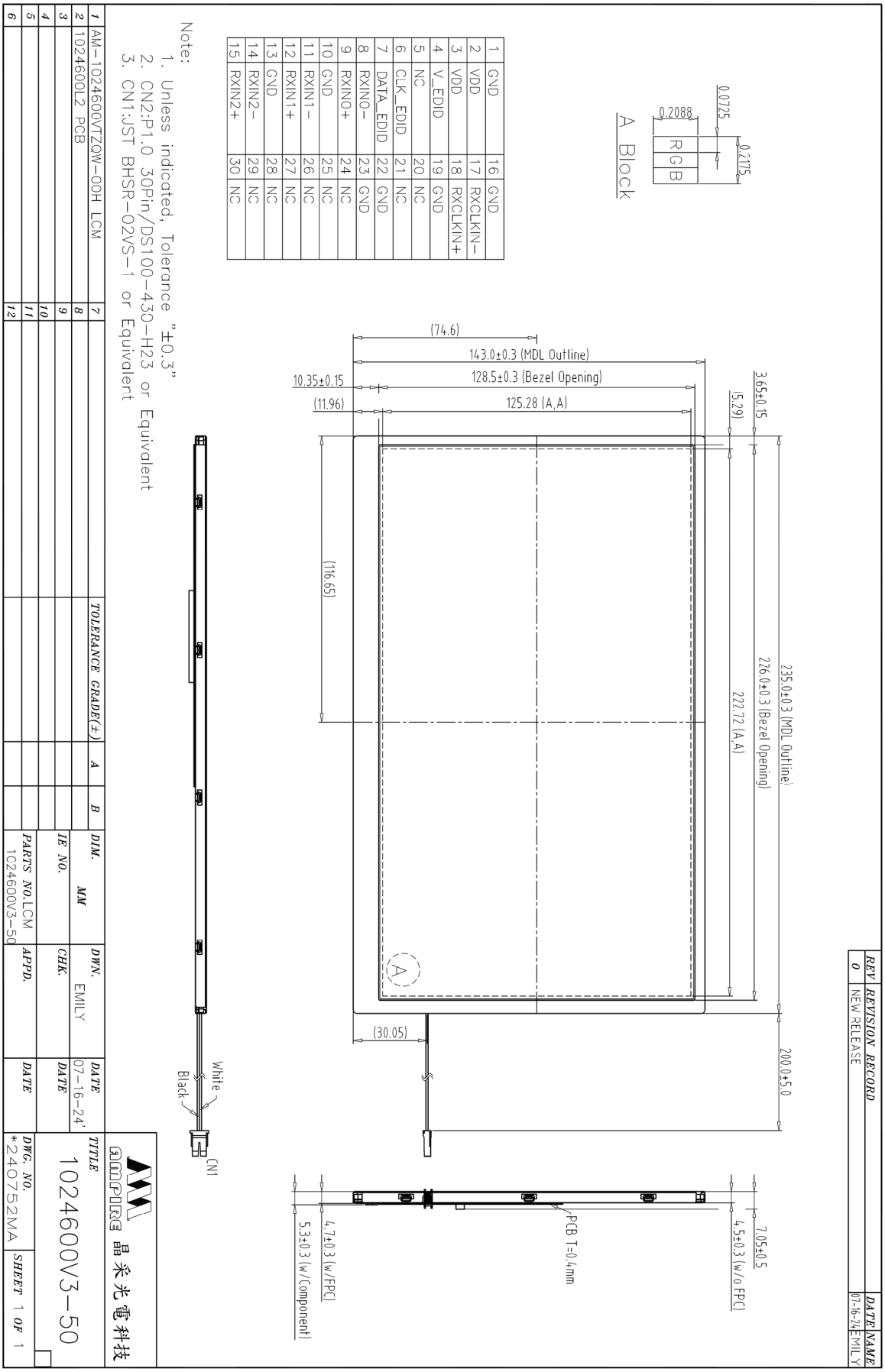
8-5 Cleaning

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.

8-6 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

9. OUTLINE DIMENSION



REV	REVISION RECORD	DATE	NAME
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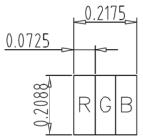
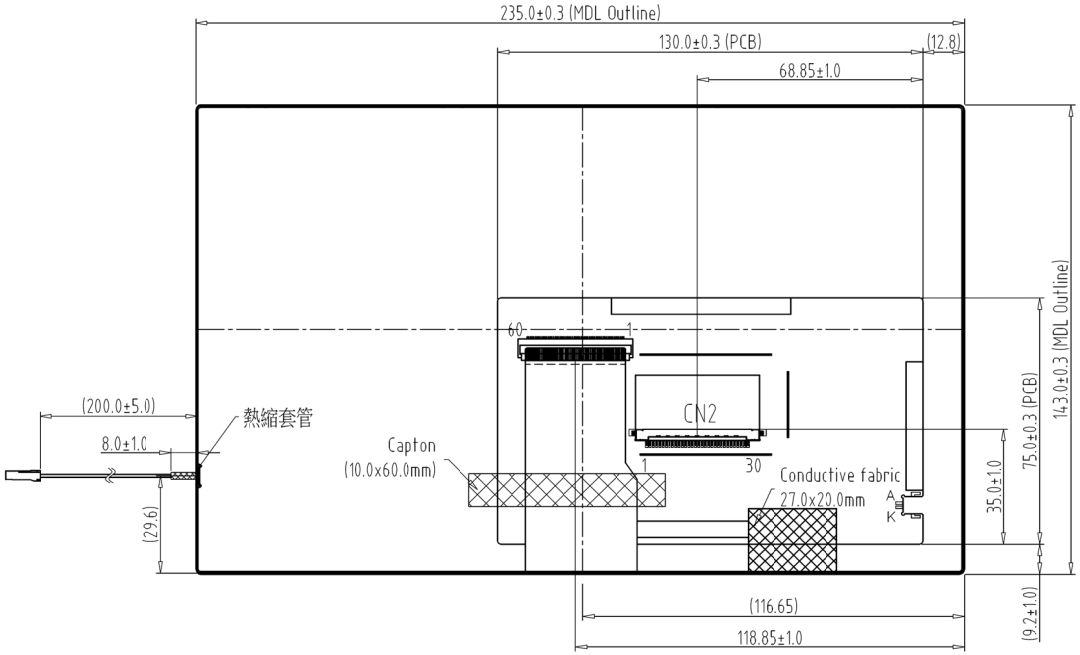


A Block



Back View

1	GND	16	GND
2	VDD	17	RXCLKIN−
3	VDD	18	RXCLKIN+
4	V_EDID	19	GND
5	NC	20	NC
6	CLK_EDID	21	NC
7	DATA_EDID	22	GND
8	RXIN0−	23	GND
9	RXIN0+	24	NC
10	GND	25	NC
11	RXIN1−	26	NC
12	RXIN1+	27	NC
13	GND	28	NC
14	RXIN2−	29	NC
15	RXIN2+	30	NC

Note:
1. Unless indicated, Tolerance "±0.3"
2. CN2:P1.0 30Pin/DS100-430-H23 or Equivalent
3. CN1:JST BHSR-02VS-1 or Equivalent

				TOLERANCE GRADE(±)	A	B	DIM.	DWN.	DATE
1	AM-1024600VTZQW-00H LCM	7					MM	EMILY	07-16-24'
2	1024600L2 PCB	8					IE NO.	CHK.	DATE
3		9							
4		10					PARTS NO. LCM-1	APPD.	DATE
5		11					1024600V3-50		
6		12							

晶采光電科技

TITLE: 1024600V3-50

DWG. NO. *240753MA

SHEET 1 OF 1

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	12-23-10	EMILY
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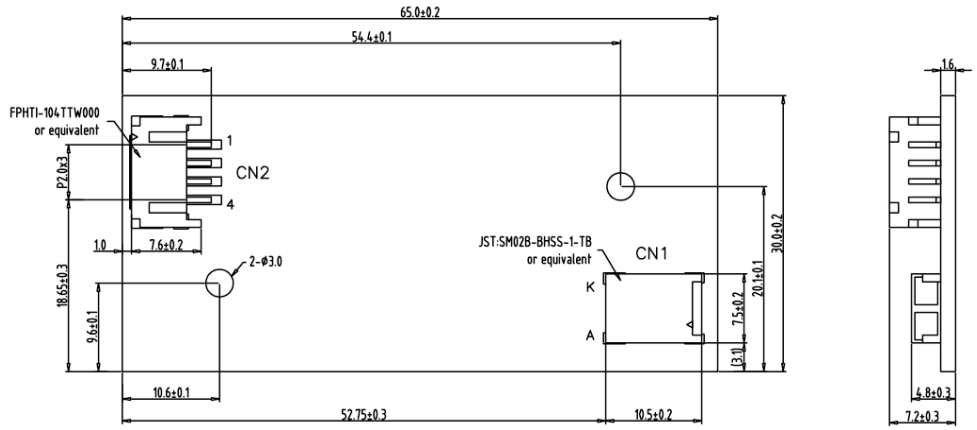
2	TFT-1024600-11-0 Rename to 1024600B2-01	01-11-11	EMILY



LED Driver Board

1	+12V
2	LED_EN
3	GND
4	PWM

Note:

1. Unless indicated, Tolerance Grade "B" is adopted.
2. UV Glue For OLB Protection.

2	
1	AM-1024600B2TMQW-01H
No.	適用品號

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1	TFT-1024600-11-0	7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. EMILY	DATE 12-23-10'
2		8		~6	0.05	0.1			
3		9		6~18	0.08	0.18	IE NO.	CHK.	DATE
4		10		18~50	0.1	0.25			
5		11		50~180	0.2	0.4	PARTS NO. LCM-2 1024600B2	APPD.	DATE
6		12		180~	0.3	0.5			

TITLE: 1024600B2 (10.1") 2

DWG. NO. *101272MA SHEET 1 OF 1