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-1024600LHMQW-T30H
APPROVED BY	
DATE	

☐ Approved For Specifications
☐ Approved For Specifications & Sample

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2019/09/16	-	New Release	Simon

1. FEATURES

The TFT is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module is composed of a TFT LCD panel, a driving circuit and a back light system. This TFT LCD has a 10.1 (17:10) inch diagonally measured active display area with WSVGA(1024 x 600 pixel) resolution.

(1) 10.1 (17:10 diagonal) inch configuration
(2) One channel LVDS interface
(3) 262K color by 6 bit R.G.B signal input
(4) RoHS Compliance

2. PHYSICAL SPECIFICATIONS

Item	Specifications	Unit	Note
LCD size	10.1” (Diagonal)	inch	
Active area	222.72 (H) ×125.28 (V)	mm	
Number of pixels	1024(H) × 600(V)	pixels	
Pixel pitch	0.2715(H) × 0.2088(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	262,144	colors	
Display mode	Normally white		
Dimensional outline	235.0 (Typ) ×145.8 (Typ) ×9.0(D)	mm	
Back-light	Single LED (Side-Light type)		
Weight	TBD	g	
Surface treatment	Anti-glare		

3. ABSOLUTE MAX. RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
LED 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	

4. ELECTRICAL CHARACTERISTICS

4.1 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	4.7	5	5.3	V	
LED driver current of power supply	ILED	-	600		mA	**VLED=5V ADJ=100%**

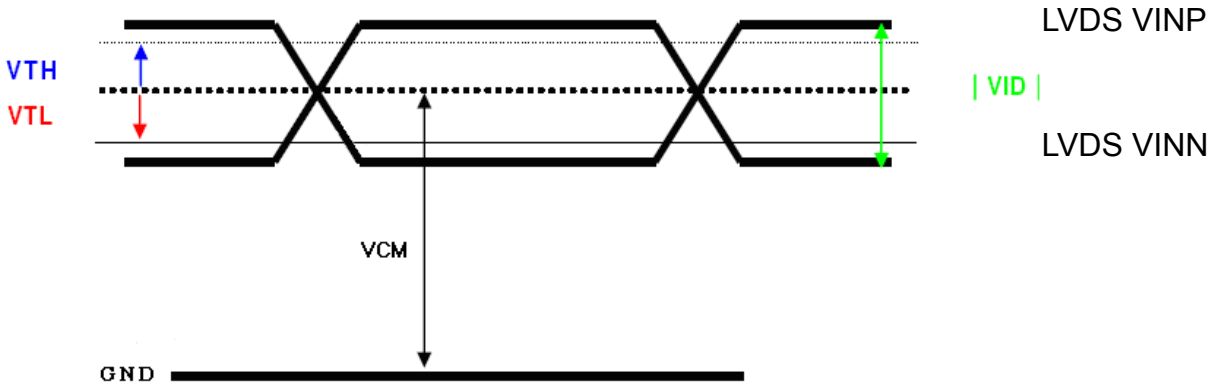
Note 1: **VDD-dip condition :**

when 2.7V≦VDD<3.0V，td≦10ms.

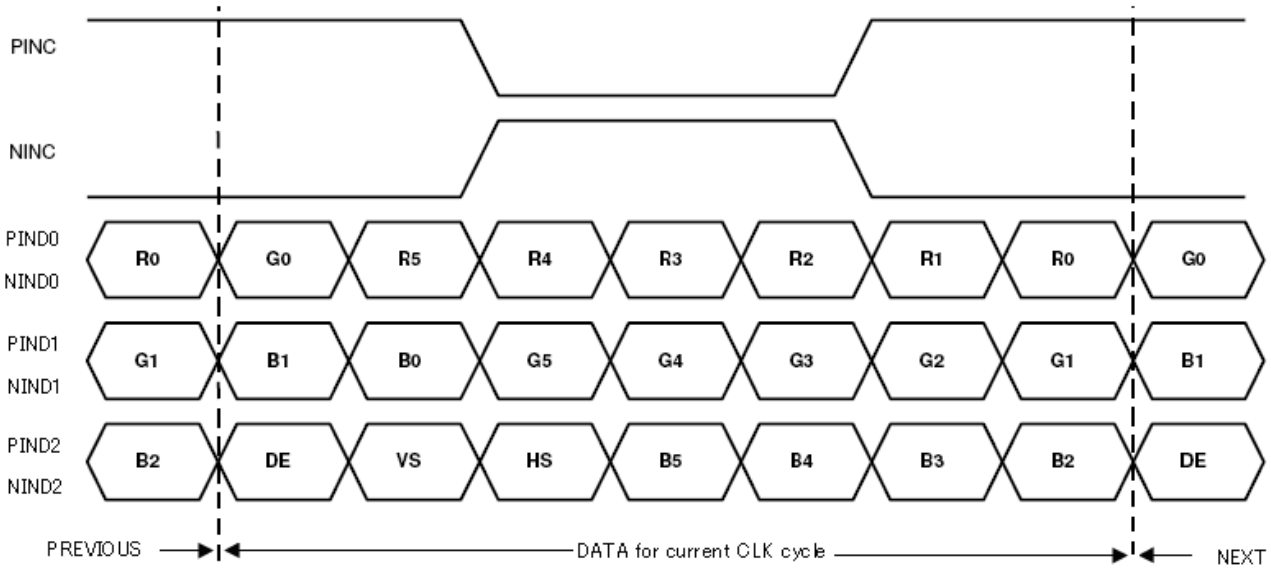
VDD＞3.0V，VDD-dip condition should be same as VDD-turn-con condition.

4.2 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	



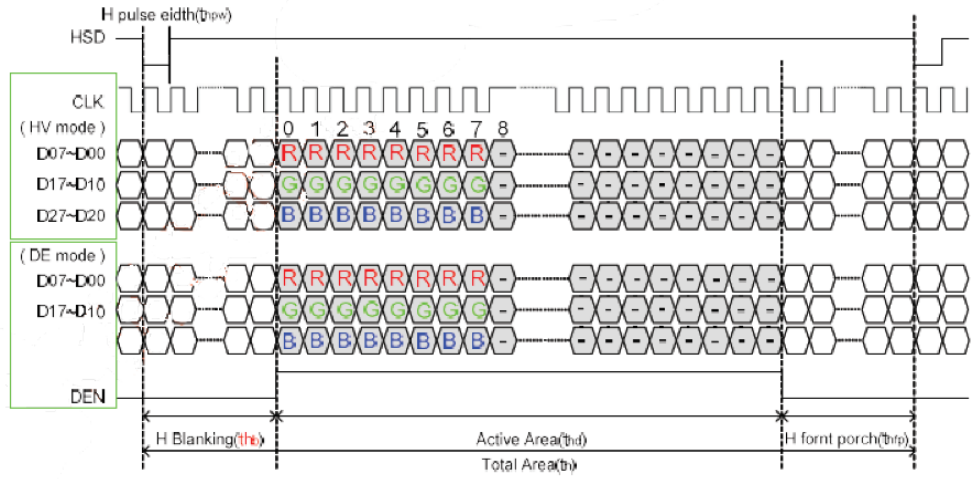
4.3 6-bit LVDS Input Data Mapping



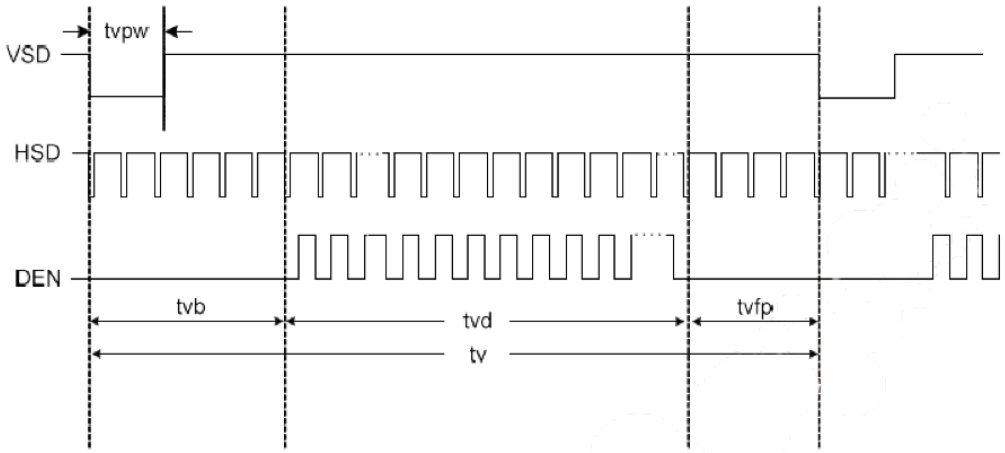
4.4 Timing characteristics of input signals

Item				Symbol	Min.	Typ.	Max.	Unit
LVDS input signal sequence	Frame Rate			tclk	42.6	51.2	67.2	MHz
LCD input signal sequence (input LVDS Transmitter)	DENA	Horizontal	Horizontal total Timing	t_H	1164	1344	1400	tCLK
			Horizontal effective Timing	t_{HA}	1024			tCLK
			Horizontal Blank Time	t_{HB}	190	320	376	tCLK
		Vertical	Vertical total Time	t_V	610	635	800	t_H
			Vertical effective Time	t_{VA}	600			t_H
			Vertical Blank Time	t_{VB}	15	35	200	t_H

Horizontal input timing



Vertical input timing

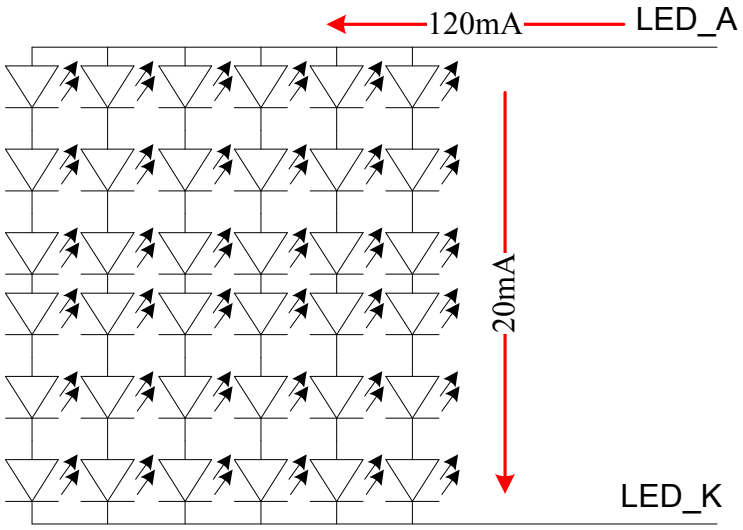


4.5 Backlight Driving Conditions

Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
LED Driver voltage	VLED	4.7	5	5.3	V	
Power Supply Current For LED Driver	ILED	-	600	-	mA	VLED=5V VADJ=3.3V (duty 100%)
ADJ Input Voltage	V_{ADJ}	-	3.3	VLED	V	duty=100% Note(3)
LED voltage	VAK	--	19.2	--	V	I_L =120mA Ta=25℃
LED current	I_L	--	120	--	mA	Ta=25℃
		--	100	--	mA	Ta=60℃
LED Life Time	-	--	20K	--	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 100mA max

There are 6 Groups LED shown as below , $V_{LEDA-LEDK}$=19.2V ,Ta=25℃



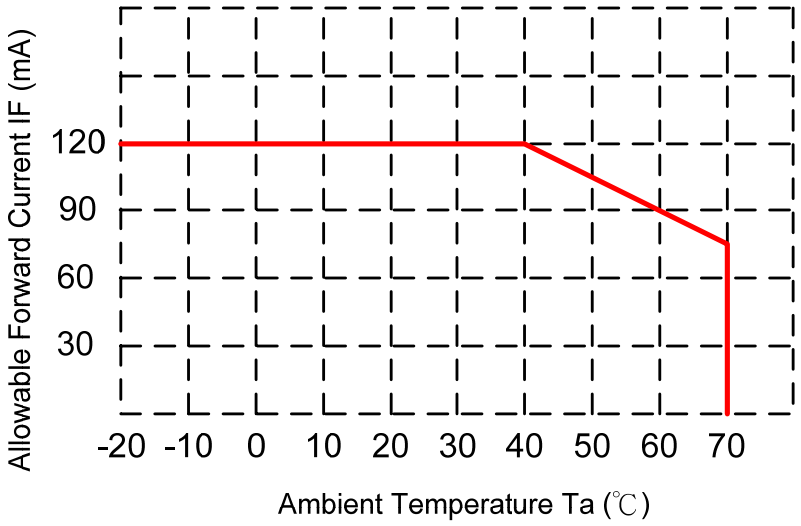
Note2 : Condition: Ta=25℃, continuous lighting

Life time is estimated data.

Definitions of failure:

1. LCM brightness becomes half of the minimum value.
2. LED doesn't light normally.

When LCM is operated over 40℃ ambient temperature, the I_{LED} should be follow :



5. OPTICAL SPECIFICATION

5.1 Optical specification

Item	Symbol	Condition	Values			Unit	Note
			Min.	Typ.	Max.		
Viewing angle	θ L	(CR≧10)	60	70	--	degree	Note1 Note2
	θ R		60	70	--		
	θ U		60	70	--		
	θ D		40	50	--		
Response time	TR	Normal θ =Φ=0°	--	4	8	msec	Note3
	TF		--	12	24	msec	
Contrast ratio	CR		400	500	--	--	Note2
Color chromaticity	WX		0.263	0.313	0.363	--	Note1 Note4
	WY		0.279	0.329	0.379	--	
	RX		0.555	0.605	0.655	--	
	RY		0.277	0.327	0.377	--	
	GX		0.236	0.286	0.336	--	
	GY		0.476	0.526	0.576	--	
	BX		0.100	0.150	0.200	--	
	BY		0.095	0.145	0.195	--	
Luminance	L		160	200	--	cd/m^2	Note4
Luminance uniformity	YU		70	--	--	%	Note5

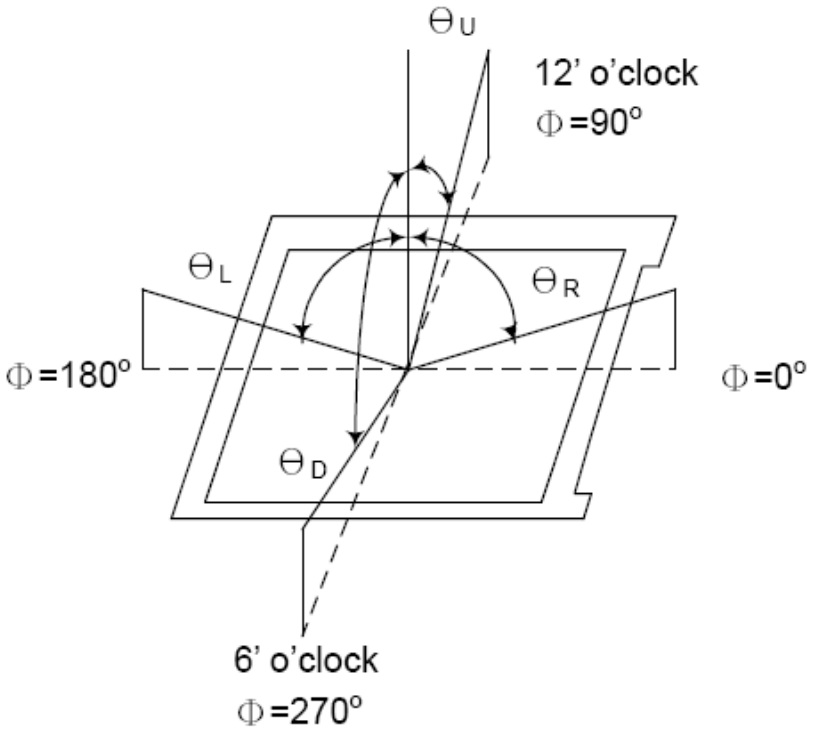
5.2 Measuring Condition

- Measuring surrounding : dark room
- Ambient temperature : 25±2℃
- 15min. warm-up time

5.2 Measuring Equipment

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 of view : 1° / Height : 120mm.)

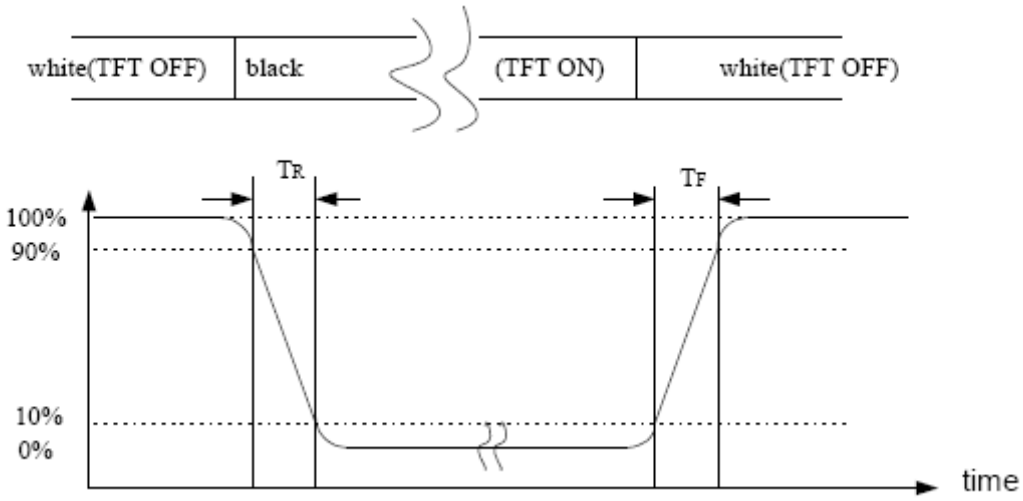
Note 1 : Definition of viewing angle range



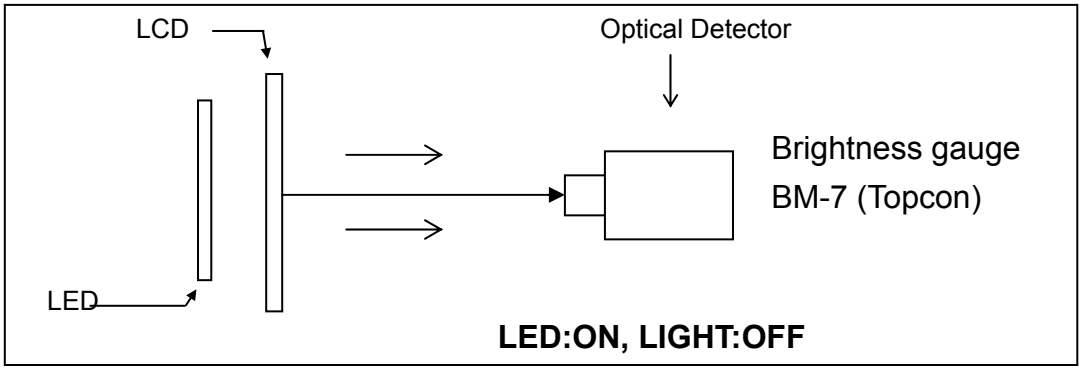
Note 2 : Definition of Contrast Ratio (CR) :
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

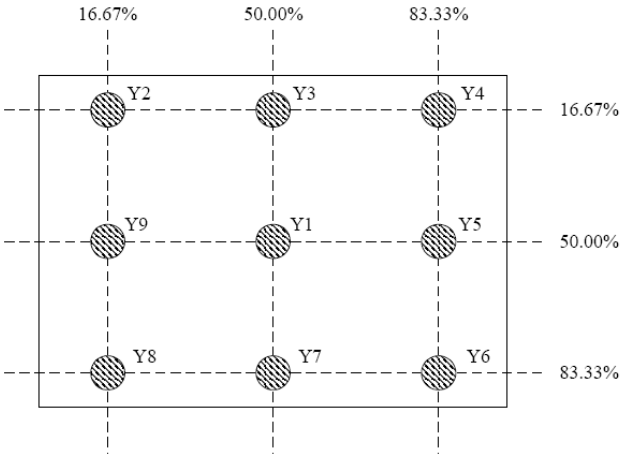
Note 3 : Definition of Response time : Sum of T_R and T



Note 4 : Definition of optical measurement setup



Note 5 : Definition of brightness uniformity



$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

Note 6 : Rubbing Direction (The different Rubbing Direction will cause the different optima view direction

Note 7 : Condition: Ta=25℃, Life time is estimated data.

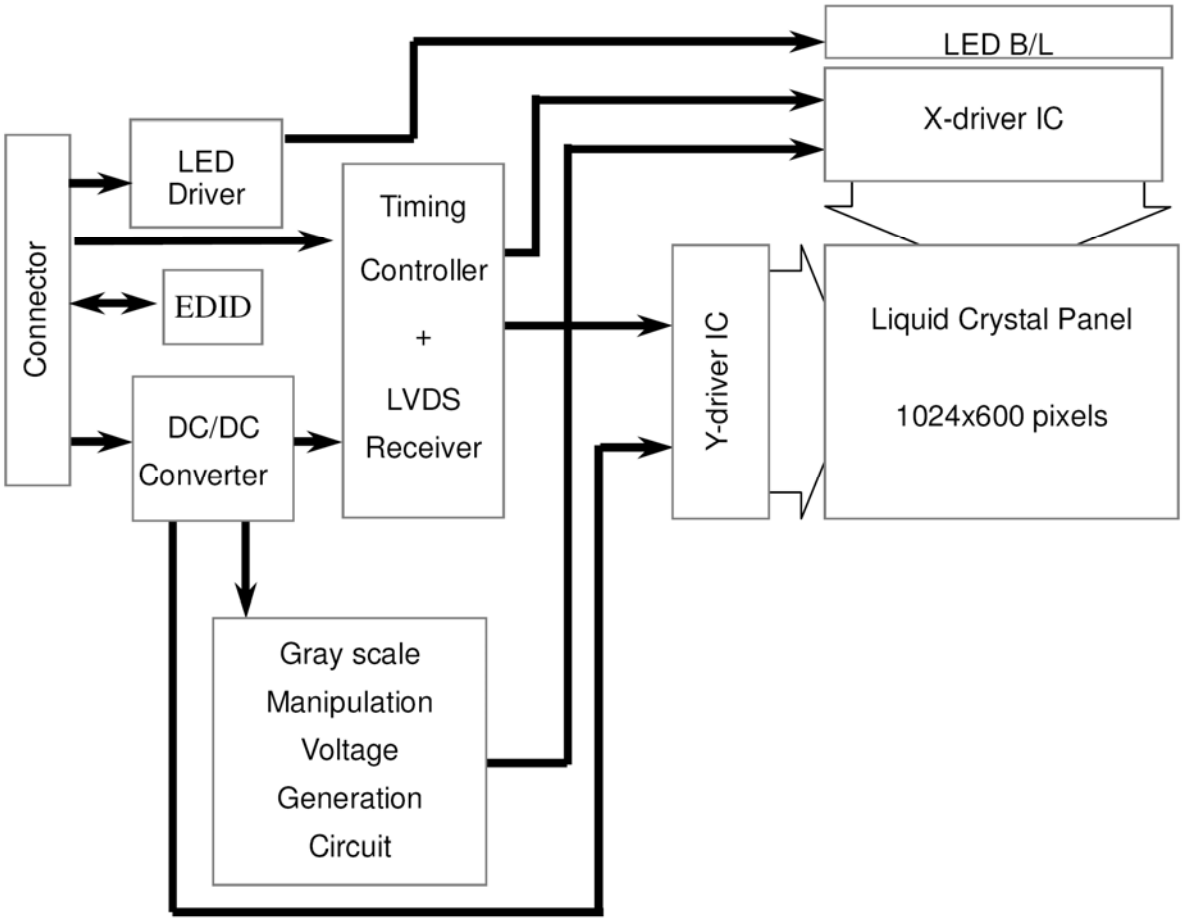
Definitions of failure:

i. LCM brightness becomes half of the minimum value.

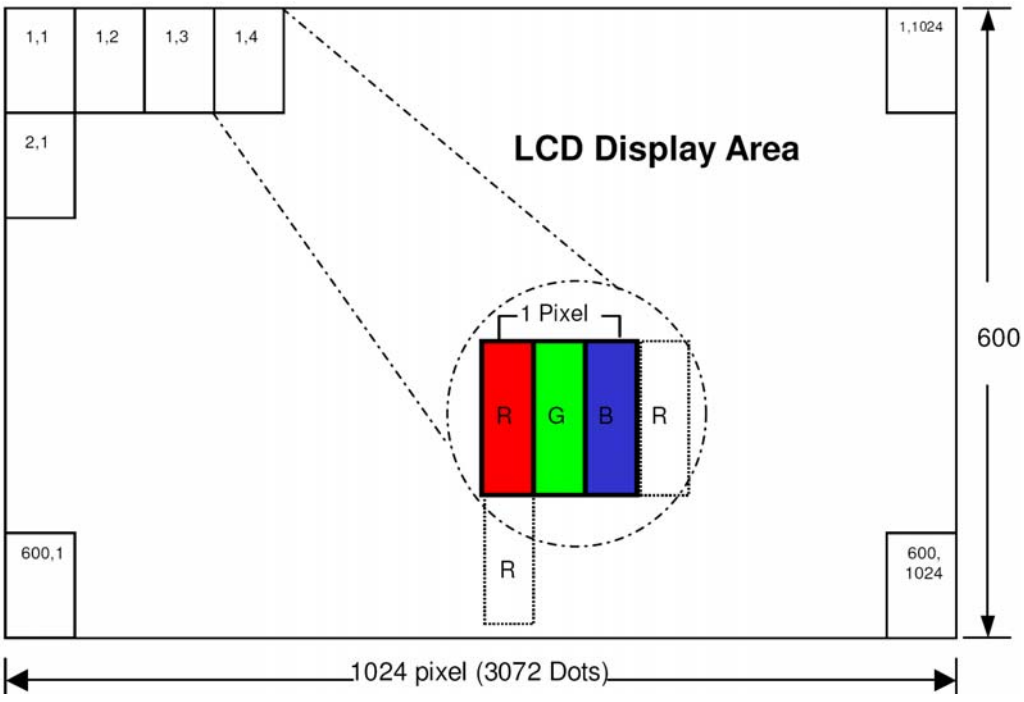
ii. LED doesn't light normally.

6. BLOCK DIAGRAM

6.1 TFTLCD Module



6.2 Pixel format



7.INTERFACE

7.1 Electrical Interface Connection

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	ADJ	Adjust for LED brightness	Note*
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	VLED	VLED Power +5V	

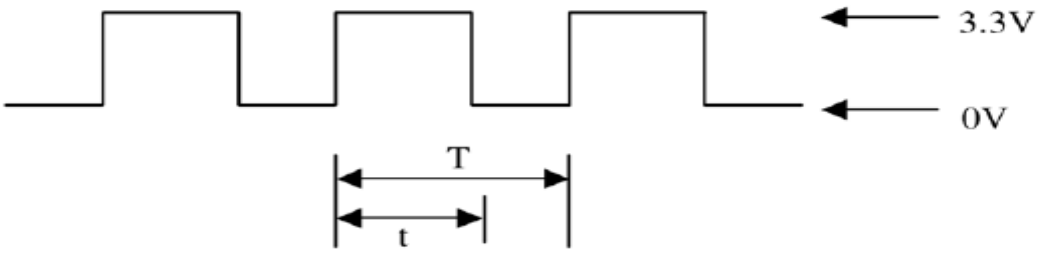
25	VLED	VLED Power +5V	
26	VLED	VLED Power +5V	
27	NC	No connection	
28	NC	No connection	
29	NC	No connection	
30	NC	No connection	

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

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

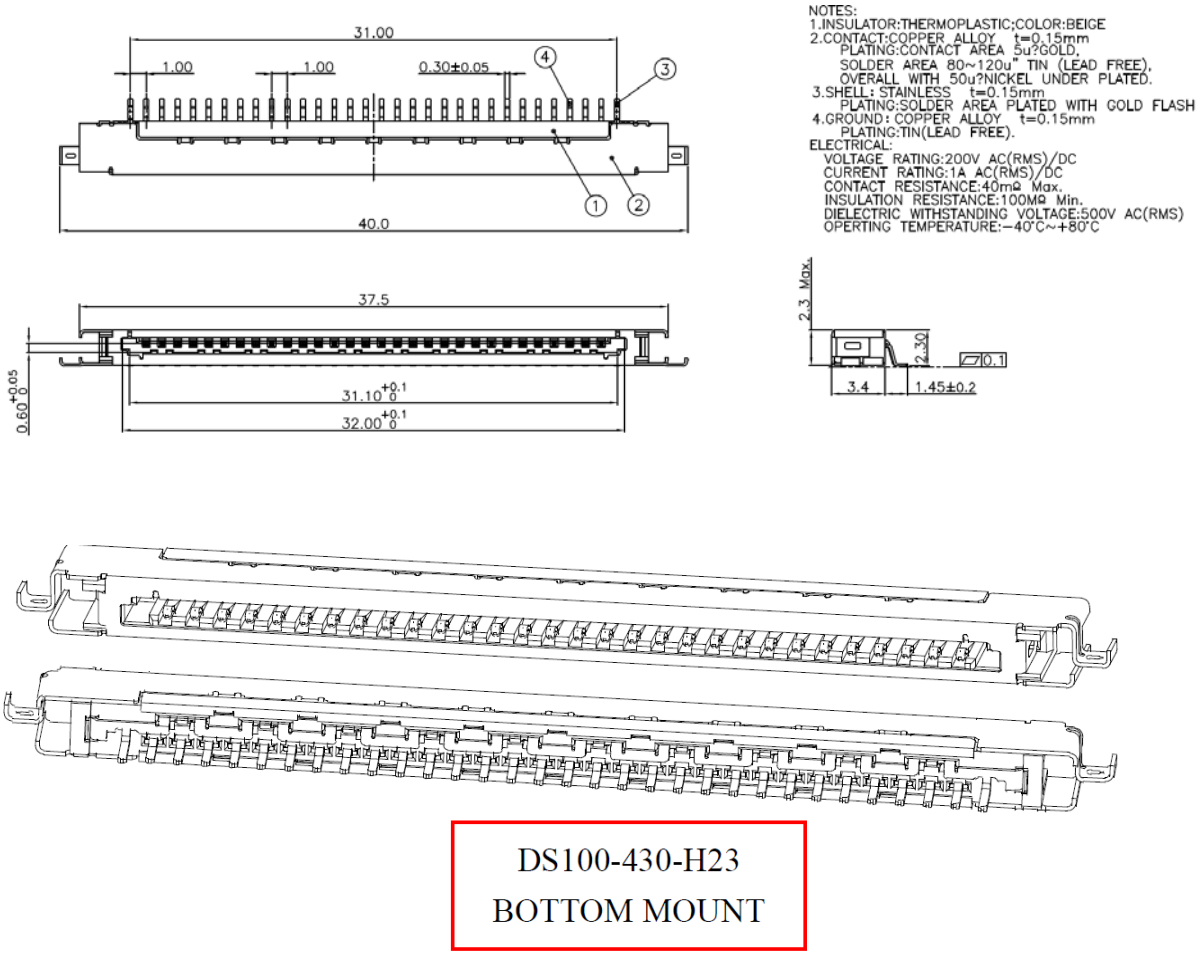
(2) ADJ is PWM signal input. It is for brightness control.

ITEM	SYMBOL	MIN	TYP	MAX	UNIT
ADJ signal frequency	f_{PWM}	5	--	100	KHz
ADJ signal logic level High	VIH	1.2V	--	VLED (5.0V)	V
ADJ signal logic level Low	VIL	0	--	0.4	V



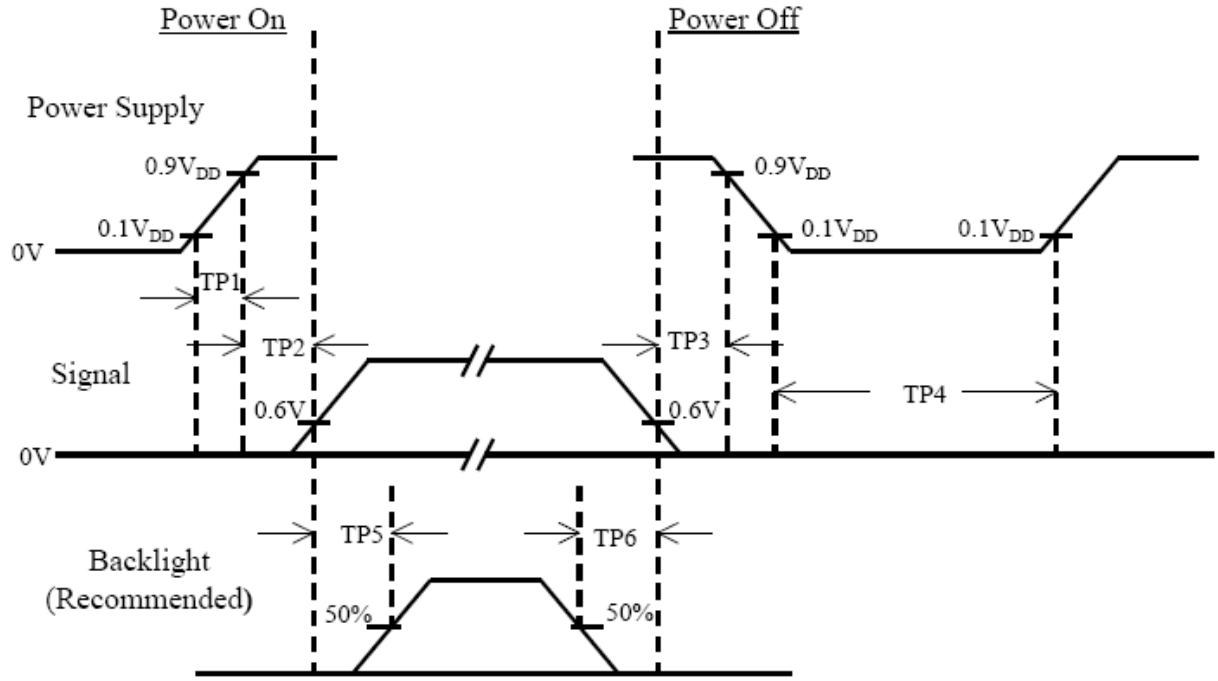
Duty Cycle = t / T *100%

(3) LVDS Connector : CSTAR DS100-430-H23



DS100-430-H23
BOTTOM MOUNT

8. 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 VDD.

(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 VDD = 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.

9. TOUCH PANEL ELECTRICAL SPECIFICATION

9.1 Touch Screen Panel Characteristics

9.1 Electrical characteristics

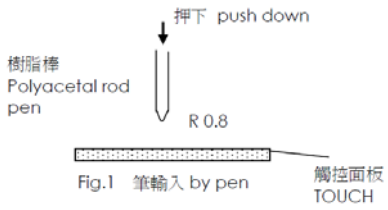
	ITEM	SPEIFICATION	REMARKS
1	Rated Voltage	DC 7V Max.	
2	Resistance	X axis：250Ω ~ 1200Ω(FILM)	FPC At connector
		Y axis：100Ω ~ 600Ω(GLASS)	
4	Chattering	10ms Max At connector pin	
5	Insulation Resistance	25MΩ 以上(DC 25V) 25MΩ Min(DC 25V)	

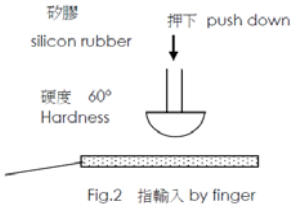
9.2 Life test condition

	ITEM	SPEIFICATION	REMARKS
1	Notes life	50000 words Min	Note A.
2	Input life	10000000 times Min.	Note B.

➢ **Measurement condition of minimum input force**

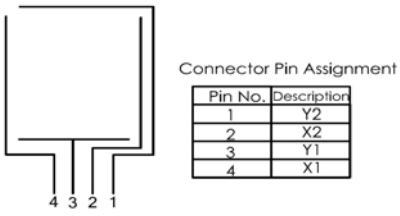
Resistance between X & Y axis must be equal or lower than 2kΩ (Ron ≤ 2kΩ)





Note A. Notes life test condition (by pen) Shape of pen end : R 0.8 (Refer Fig.1) Materials of pen : Polyacetal Load : 250g Speed : 60mm/s	**Note B.** Input life test condition(by finger) Sharp of rubber end : R8 Hardness 60°(Refer fig.2) Load : 200g Frequency : 5Hz

9.3 Touch Screen Pane & Interface



No.	Symbol	Function
1	Y2	Touch Panel Top Signal in Y Axis
2	X2	Touch Panel Right Signal in X Axis
3	Y1	Touch Panel Bottom Signal in Y Axis
4	X1	Touch Panel Left Signal in X Axis

- **Attention**

(1) Since touch panel is consist of Glass, pls. be careful your hand and other part from injury at handling. You must wear gloves at handling.

(2) Do not put a heavy shock or stress on touch panel.

(3) Do not lift Touch Panel by cable (FPC).

(4) Do not add any stress only film face.

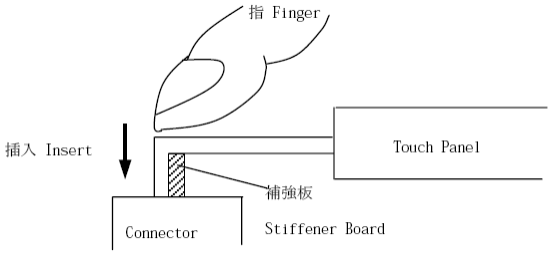
(Ex. Don't transfer the panel by film face with vacuum)

(5) Pls. use dry cloth or soft cloth with neutral detergent (after wring dry) or one with ethanol at cleaning. Do not use any organic solvent, acid or alkali solution.

(6) Do not pile Touch Panel. Do not put heavy goods on Touch Panel.

(7) Do not bend a cable of Touch Panel for prevent happen to line cut failure.

Please don't uses following method for insert the cable to connector



(8) Please pay attention for the matter as stated below at mounting design of touch panel & enclosure

-1. Enclosure support to fix touch panel must be out of view (transparent) area. (Do not design enclosure presses the view area to protect from miss input)

-2. Enclosure edge must be between view area & Guaranteed active area. (Enclosure edge must not touch with view area)

-3. We recommend the material of support to fix touch panel is elastic material.

-4. Do not bond top surface (film) of touch panel with enclosure.

-5. The corner parts (fig.*) has conductivity. Do not touch any metal part after mounting.

-6. Special design is required for water resistance use.

10. RELIABILITY TEST CONDITIONS

Item	Test Conditions	Note
High Temperature Storage	Ta = 70℃ 240 hrs	1.2
Low Temperature Storage	Ta = -20℃ 240 hrs	1.2
High Temperature Operation	Ts = 80℃ 240 hrs	
Low Temperature Operation	Ta = -30℃ 240 hrs	
Thermal Shock	-20℃ /30 min ~ +70℃ /30 min 100 cycles	1.2

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

Note(2) The module should be inspired after 1 hour storage in normal conditions (15~35℃, 45~65%RH).

Note(3) The module shouldn't be tested over one condition, and all the tests are independent.

Note(4) All reliability tests should be done without the protective film.

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.

11 USE PRECAUTIONS

11.1 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.
4) 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.

11.2 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. 1MΩ 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.

11.3 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.

11.4 Operating precautions

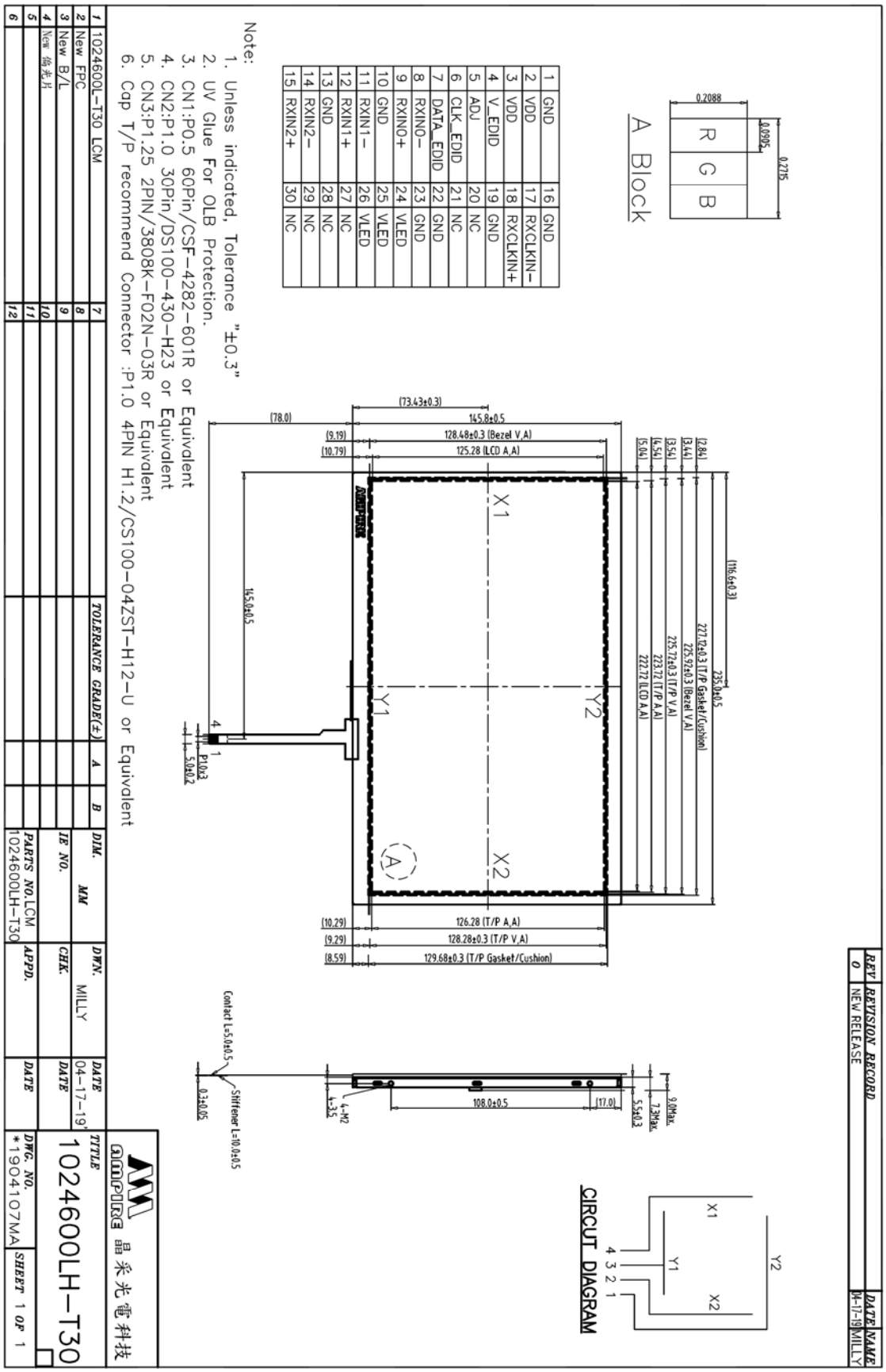
1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input connector 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 dive 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: 0.2Vdd or less and H level: 0.8Vdd 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.

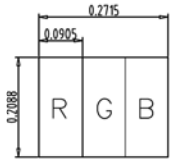
11.5 Other

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.

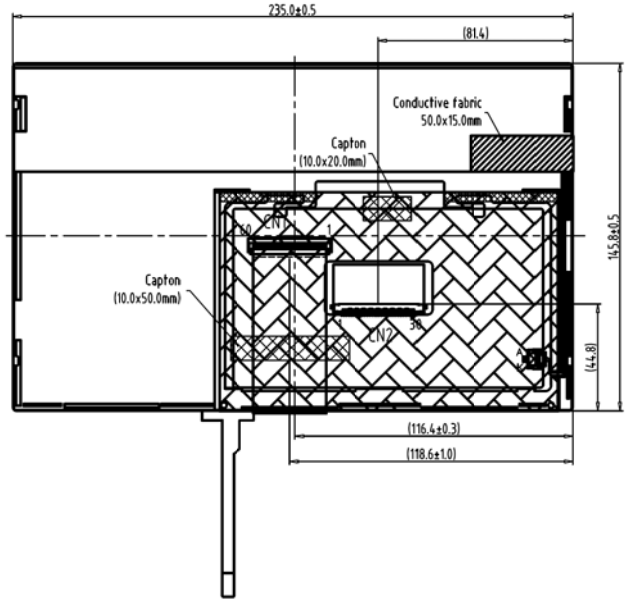
12. OUTLINE DIMENSION



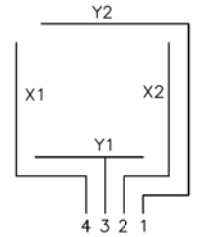
REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	04-17-19	MILLY



A Block



Back view



CIRCUT DIAGRAM

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

Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN1:P0.5 60Pin/CSF-4282-601R or Equivalent
4. CN2:P1.0 30Pin/DS100-430-H23 or Equivalent
5. CN3:P1.25 2PIN/3808K-F02N-03R or Equivalent
6. Cap T/P recommend Connector :P1.0 4PIN H1.2/CS100-04ZST-H12-U or Equivalent

1	1024600L-T30 LCM	7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. MILLY	DATE 04-17-19	TITLE 1024600LH-T30
2	New FPC	8								
3	New B/L	9					IE NO.	CHK.	DATE	
4	New 偏光片	10								
5		11					PARTS NO. LCM-1 1024600LH-T30	APPD.	DATE	DWG. NO. *1904108MA SHEET 1 OF 1
6		12								

AMPIRE 晶采光電科技