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-1024600L3HMQW-T00H
APPROVED BY	
DATE	

☐ Approved For Specifications
☐ Approved For Specifications & Sample

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APPROVED BY	CHECKED BY	ORGANIZED BY

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2019/01/29	-	New Release	Mark

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
(5) Halogen Free

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) ×10.05(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	9.0	12.0	15.0	V	
LED driver current of power supply	ILED	-	330		mA	**VLED=12V ADJ=100%**

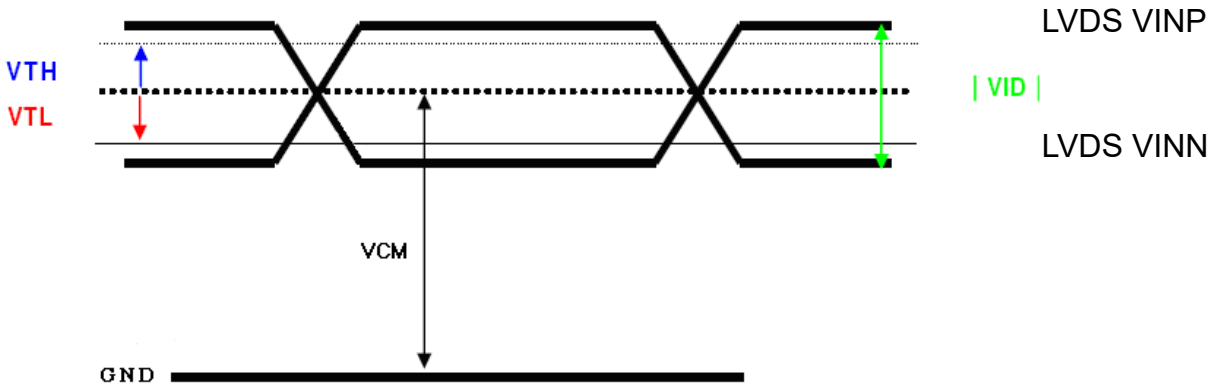
Note 1: **VDD-dip condition :**

when 2.7V≦VDD<3.0V，td≦10ms.

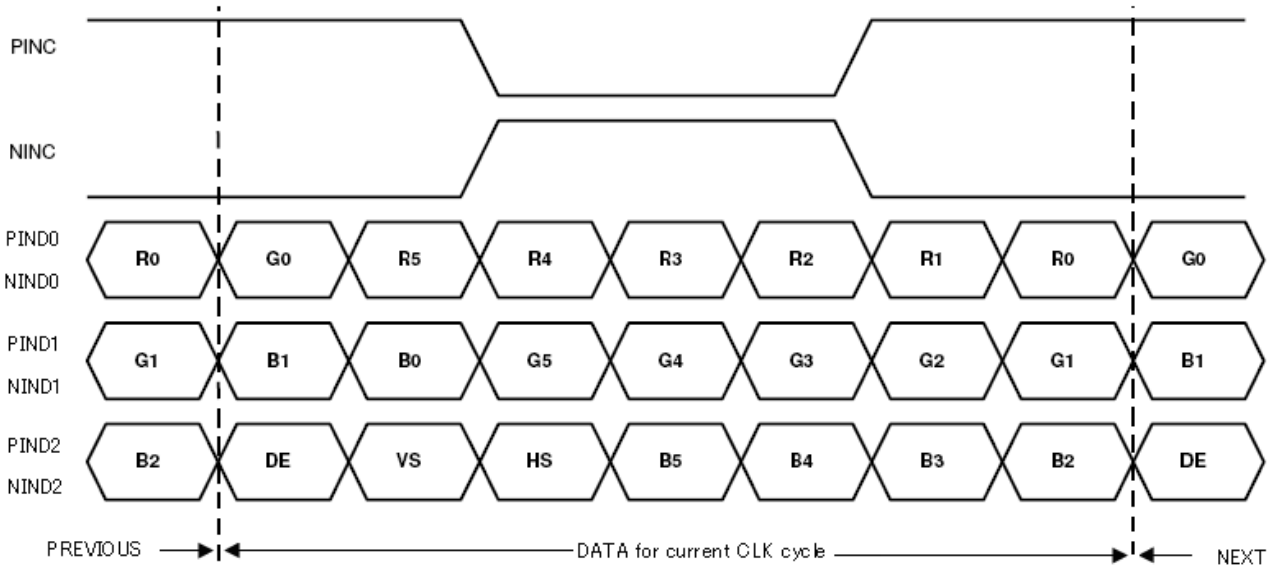
VDD＞3.0V，VDD-dip condition should be same as VDD-turn-con condition.

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

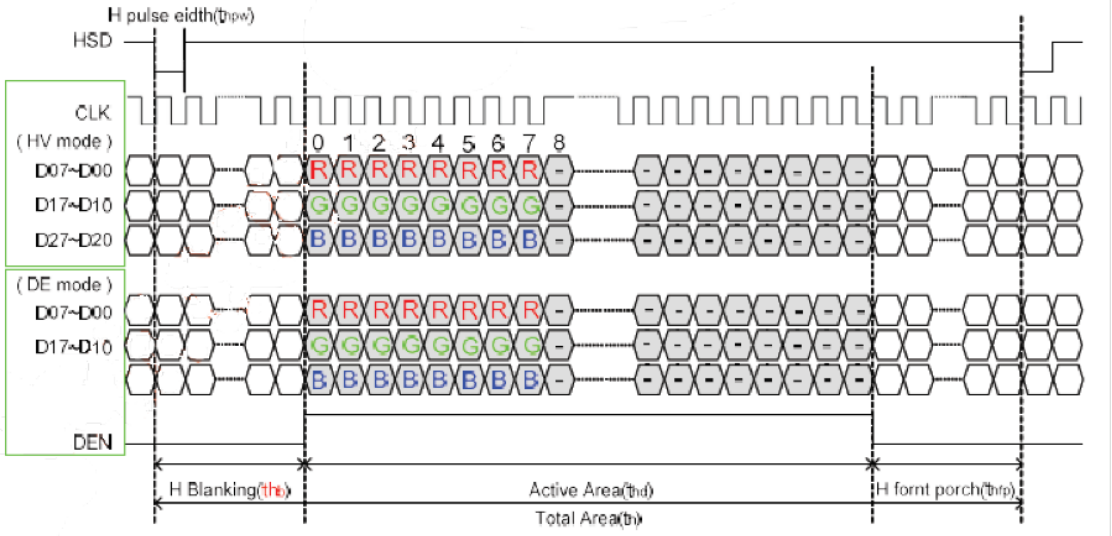


4.4 Timing characteristics of input signals

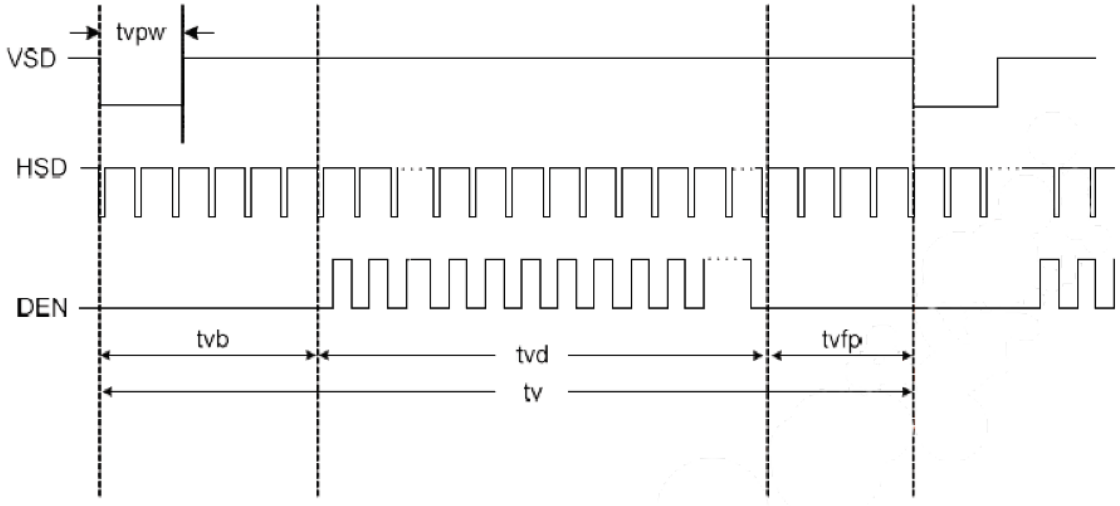
DE Mode

Parameter	Symbol	Value			Unit
		Min	Typ.	Max	
DCLK frequency Frame rate = 60Hz	fclk	42.6	51.2	67.2	MHz
Horizontal display area	thd		1024		DCLK
HSYNC period time	th	1164	1344	1400	DCLK
HSYNC blanking	thb+thfp	140	320	376	DCLK
Vertical display area	tvd		600		H
VSYNC period time	tv	610	635	800	H
VSYNC blanking	tvb+tvfp	10	35	200	H

Horizontal input timing



Vertical input timing

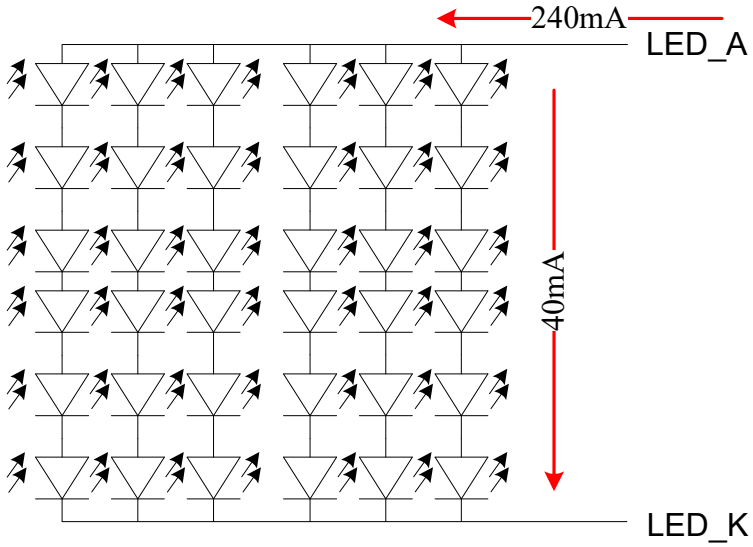


4.5 Backlight Driving Conditions

Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
LED Driver voltage	VLED	9	12	15	V	
Power Supply Current For LED Driver	ILED	-	330	-	mA	VLED=12V VADJ=3.3V (duty 100%)
ADJ Input Voltage	V_{ADJ}	-	3.3	VLED	V	duty=100%
LED voltage	VAK	--	18.9	21.6	V	I_L =240mA Ta=25℃
LED current	I_L	--	240	--	mA	Note (1)
		--	205	--	mA	Note (1)
LED Life Time	-	--	30K	--	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 205mA max

There are 6 Groups LED shown as below , $V_{LEDA-LEDK}$=18.9V ,Ta=25℃



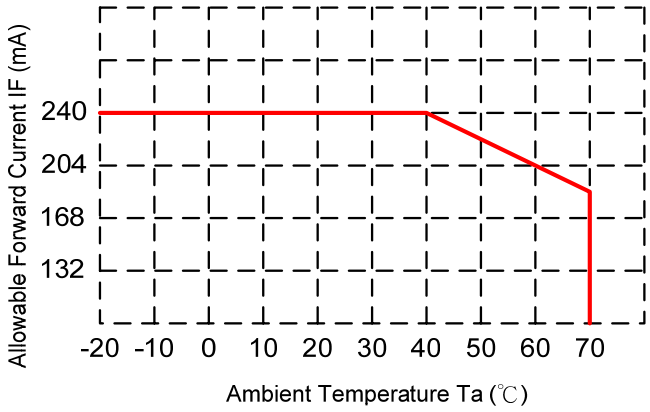
Note2 : Condition: Ta=25℃, continuous lighting

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)	70	80	--	degree	Note1 Note2
	θ R		70	80	--		
	θ U		60	70	--		
	θ D		70	80	--		
Response time	TR+TF	Normal θ =Φ=0°	--	16	32	msec	Note3
Contrast ratio	CR		400	500	--	--	Note2
Color chromaticity	WX		TBD	TBD	TBD	--	Note1 Note4
	WY		TBD	TBD	TBD	--	
	RX		TBD	TBD	TBD	--	
	RY		TBD	TBD	TBD	--	
	GX		TBD	TBD	TBD	--	
	GY		TBD	TBD	TBD	--	
	BX		TBD	TBD	TBD	--	
	BY		TBD	TBD	TBD	--	
Luminance	L		350	--	--	cd/m^2	Note4
Luminance uniformity	YU		70	--	--	%	Note5

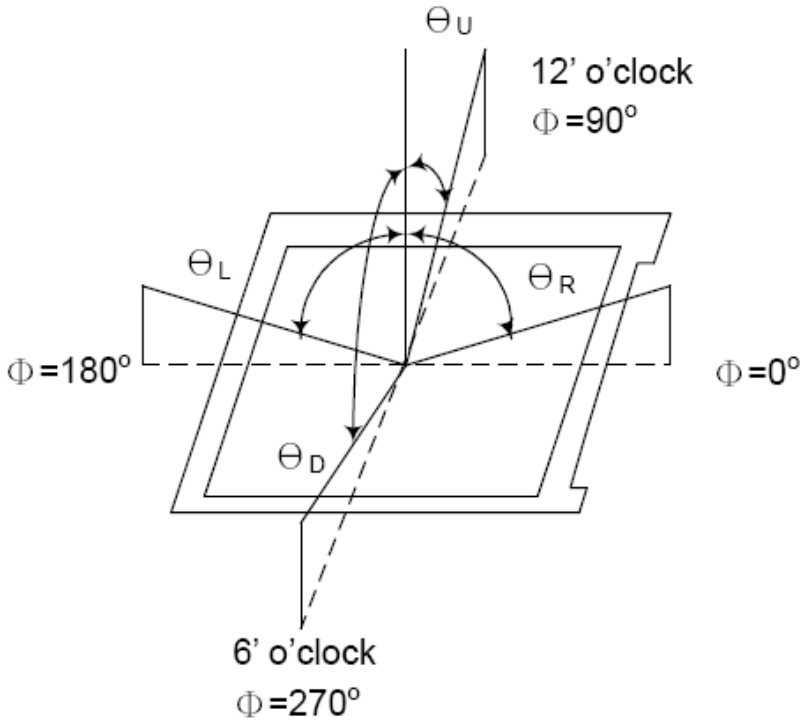
5.2 Measuring Condition

- 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.)

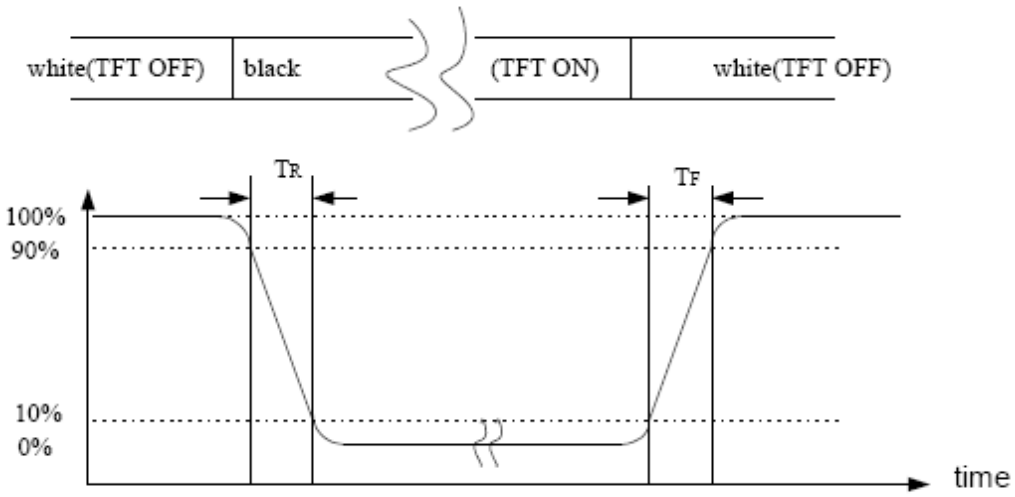
Note 1 : Definition of viewing angle range



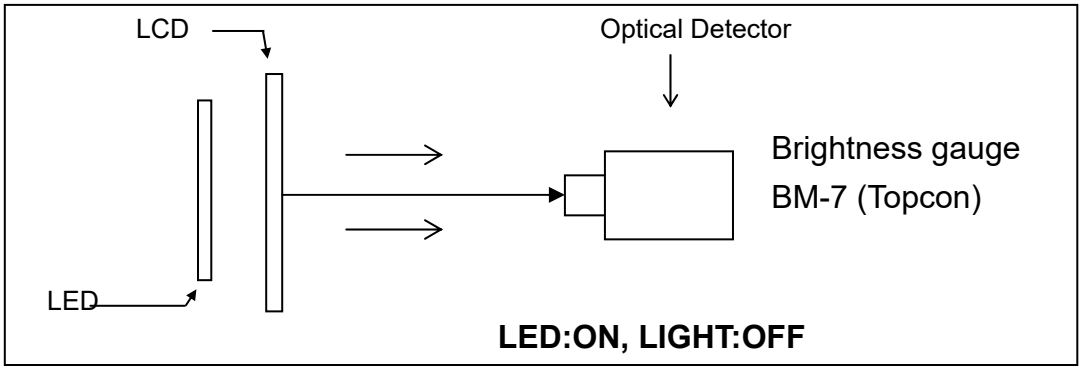
Note 2 : Definition of Contrast Ratio (CR) :
measured at the center point of panel

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

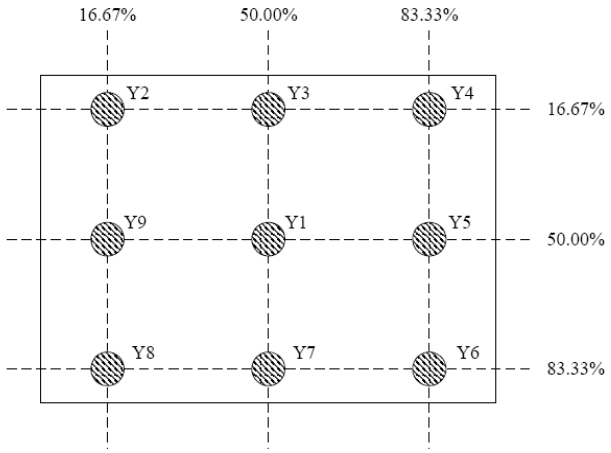
Note 3 : Definition of Response time : Sum of T_R and T



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.

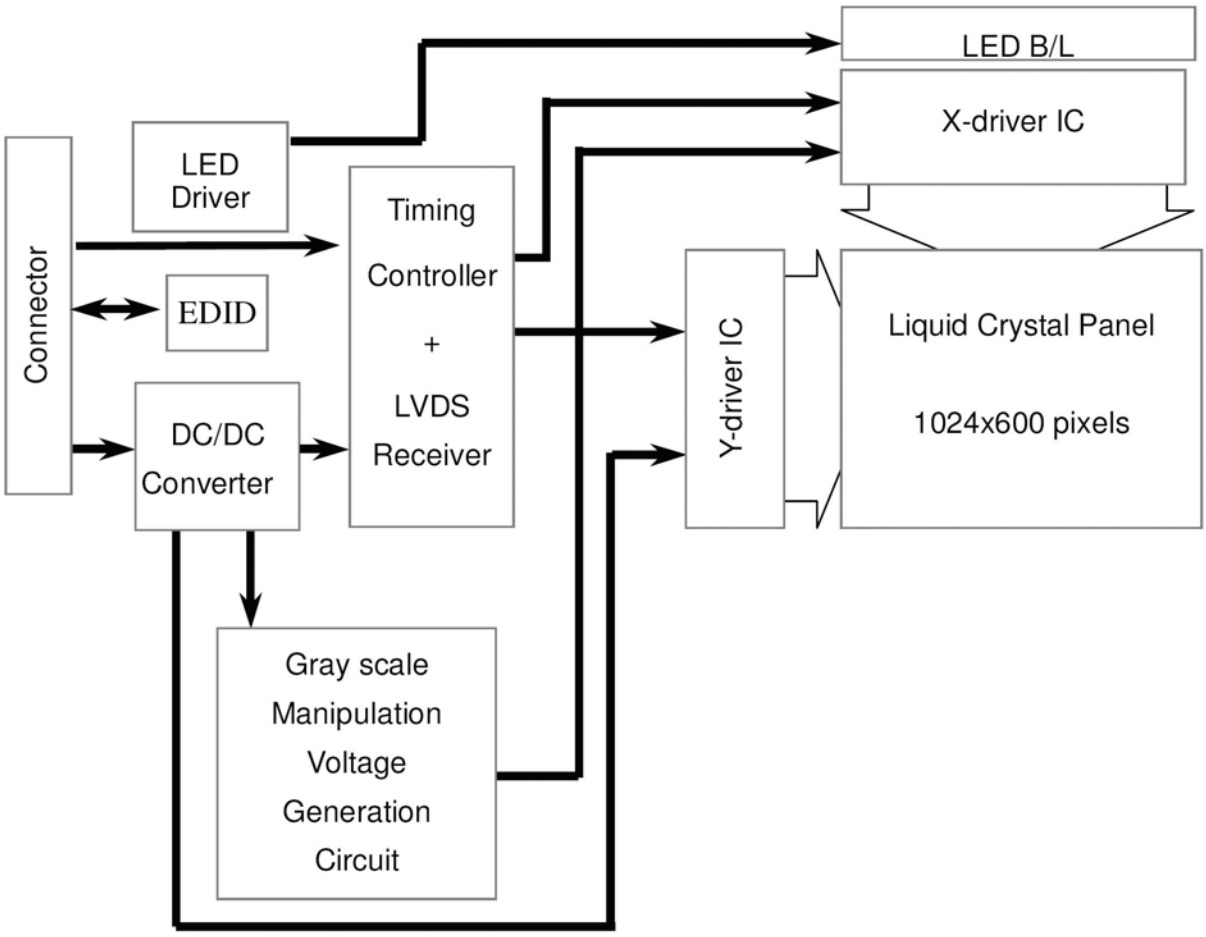
Definitions of failure:

i. LCM brightness becomes half of the minimum value.

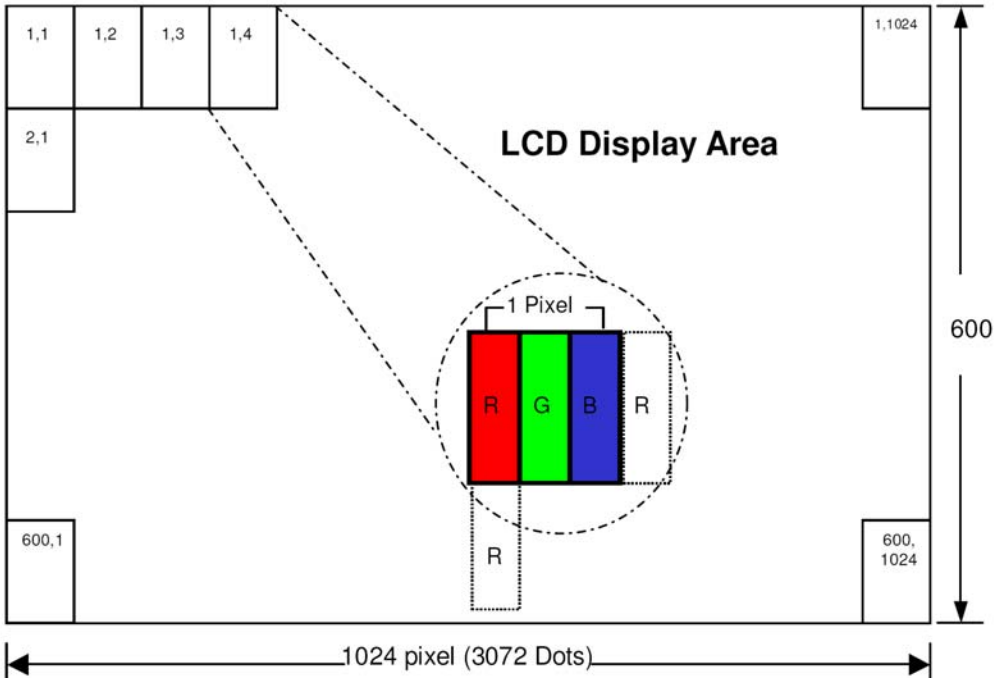
ii. LED doesn't light normally.

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	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)

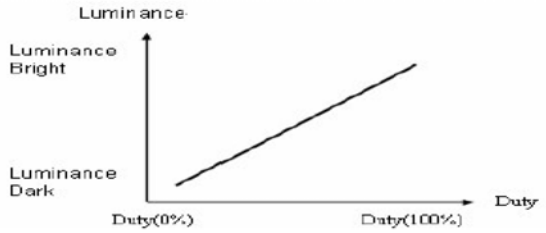
Pin No.	Symbol	Description	Note
1	A	Anode for LED backlight	
2	K	Cathode for LED backlight	

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	

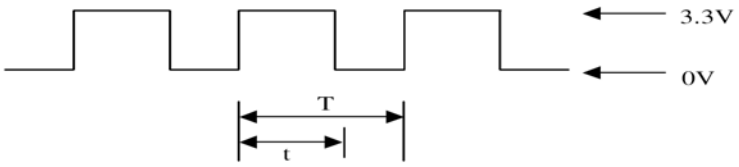
Note* : **The brightness of LCD panel could be changed by adjusting ADJ**

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



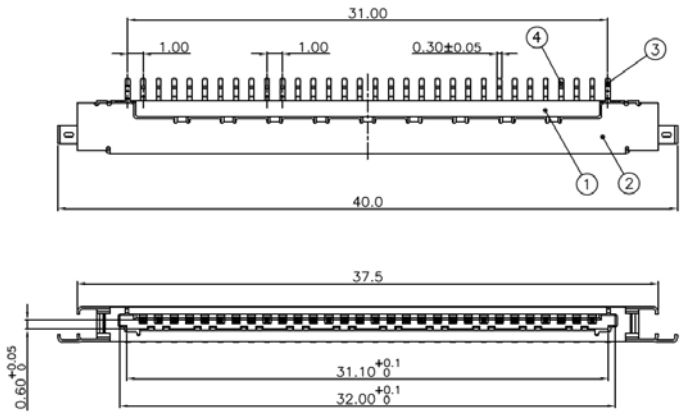
(2) ADJ Signal=0~3.3V，Operation Frequency：

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

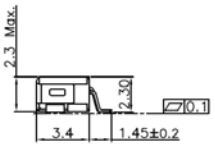


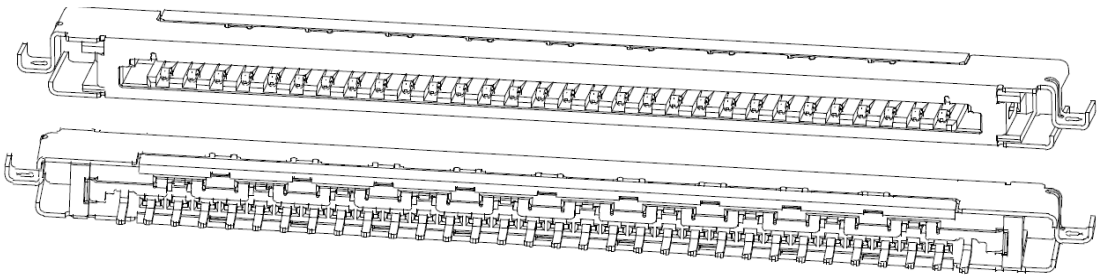
Duty Cycle = t / T *100%

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



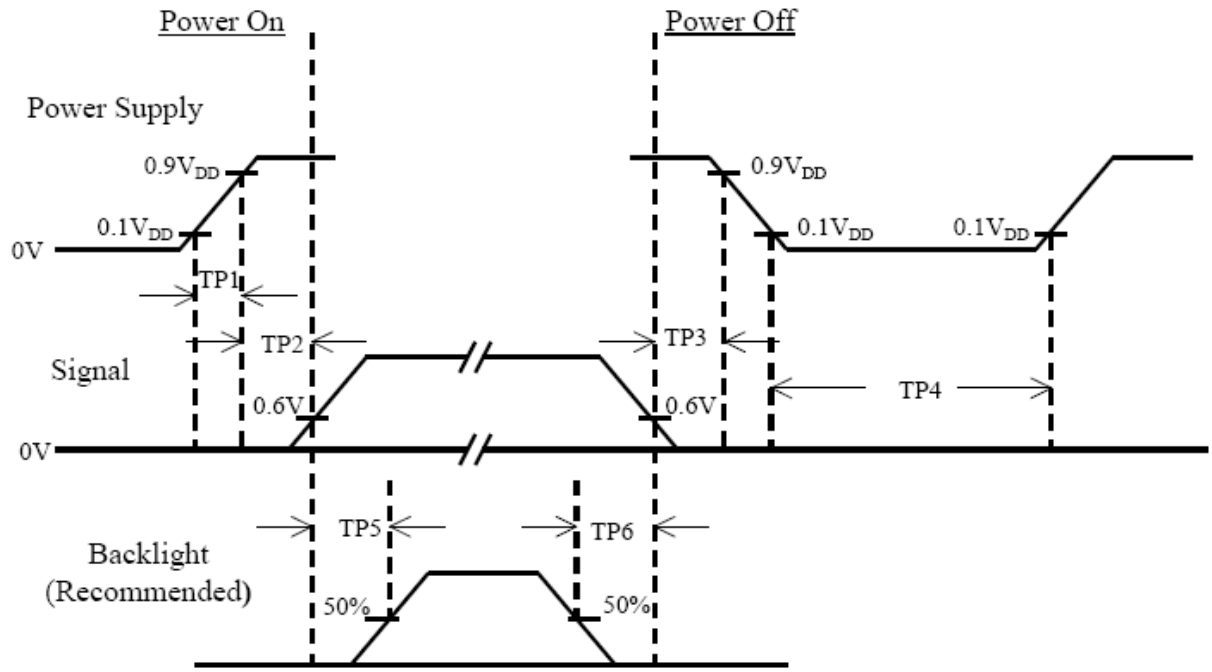
NOTES:
1.INSULATOR:THERMOPLASTIC;COLOR:BEIGE
2.CONTACT:COPPER ALLOY t=0.15mm
PLATING:CONTACT AREA 5u?GOLD,
SOLDER AREA 80~120u" TIN (LEAD FREE).
OVERALL WITH 50u?NICKEL UNDER PLATED.
3.SHELL: STAINLESS t=0.15mm
PLATING:SOLDER AREA PLATED WITH GOLD FLASH
4.GROUND: COPPER ALLOY t=0.15mm
PLATING:TIN(LEAD FREE).
ELECTRICAL:
VOLTAGE RATING:200V AC(RMS)/DC
CURRENT RATING:1A AC(RMS)/DC
CONTACT RESISTANCE:40mΩ Max.
INSULATION RESISTANCE:100MΩ Min.
DIELECTRIC WITHSTANDING VOLTAGE:500V AC(RMS)
OPERTING TEMPERATURE:-40°C~+80°C





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

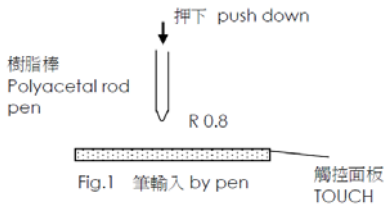
	ITEM	SPEIFICATION	REMARKS
1	Rated Voltage	DC 7V Max.	
2	Resistance	X axis：250Ω ~ 1200Ω(FILM)	FPC At connector
		Y axis：100Ω ~ 600Ω(GLASS)	
4	Chattering	10ms Max At connector pin	
5	Insulation Resistance	25MΩ 以上(DC 25V) 25MΩ Min(DC 25V)	

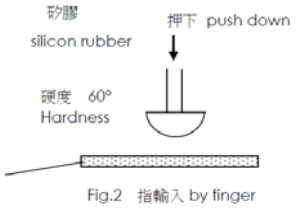
9.2 Life test condition

	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**

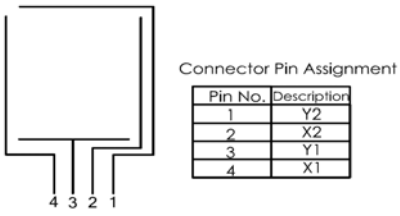
Resistance between X & Y axis must be equal or lower than 2kΩ (Ron ≤ 2kΩ)





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.

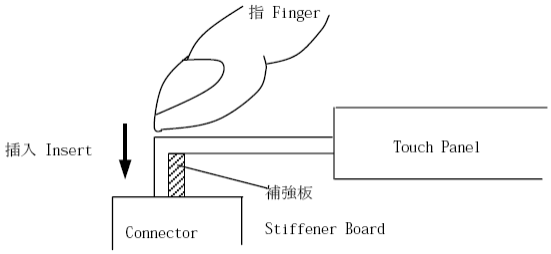
(Ex. Don't transfer the panel by film face with vacuum)

(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

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
Thermal Shock Test	-20°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. (1 cycle) Total 100 cycle(Dry)	1,2
Humidity Test	40 °C, Humidity 90%, 240 hrs	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.

11. HANDLING & CAUTIONS

11.1 Cautions when taking out the module

Pick the pouch only, when taking out module from a shipping package.

11.2 Cautions for handling the module

11.2.1 As the electrostatic discharges may break the LCD module, handle the LCD module with care. Peel a protection sheet off from the LCD panel surface as slowly as possible.

11.2.2 As the LCD panel and backlight element are made from fragile glass material, impulse and pressure to the LCD module should be avoided.

11.2.3 As the surface of the polarizer is very soft and easily scratched, use a soft dry cloth without chemicals for cleaning.

11.2.4 Do not pull the interface connector in or out while the LCD module is operating.

11.2.5 Put the module display side down on a flat horizontal plane.

11.2.6 Handle connectors and cables with care.

11.3 Cautions for the operation

11.3.1 When the module is operating, do not lose MCLK, DE signals. If any one of these signals were lost, the LCD panel would be damaged.

11.3.2 Obey the supply voltage sequence. If wrong sequence were applied, the module would be damaged.

11 .4 Cautions for the atmosphere

11.4.1 Dewdrop atmosphere should be avoided.

11.4.2 Do not store and/or operate the LCD module in a high temperature and/or humidity atmosphere. Storage in an electro-conductive polymer-packing pouch and under relatively low temperature atmosphere is recommended.

11.5 Cautions for the module characteristics

11.5.1 Do not apply fixed pattern data signal to the LCD module at product aging.

11.5.2 Applying fixed pattern for a long time may cause image sticking.

11.6 Other cautions

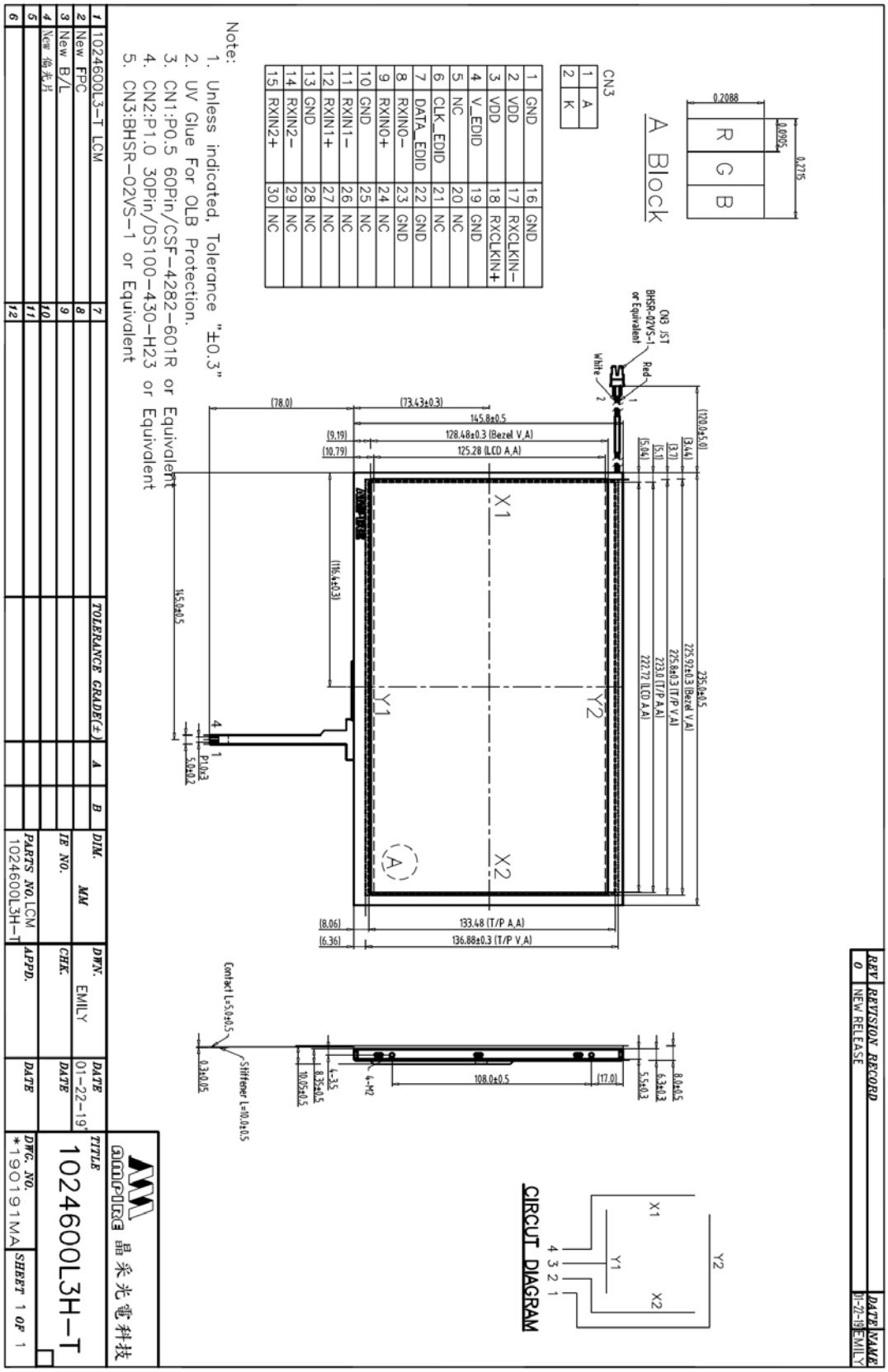
11.6.1 Do not disassemble and/or re-assemble LCD module.

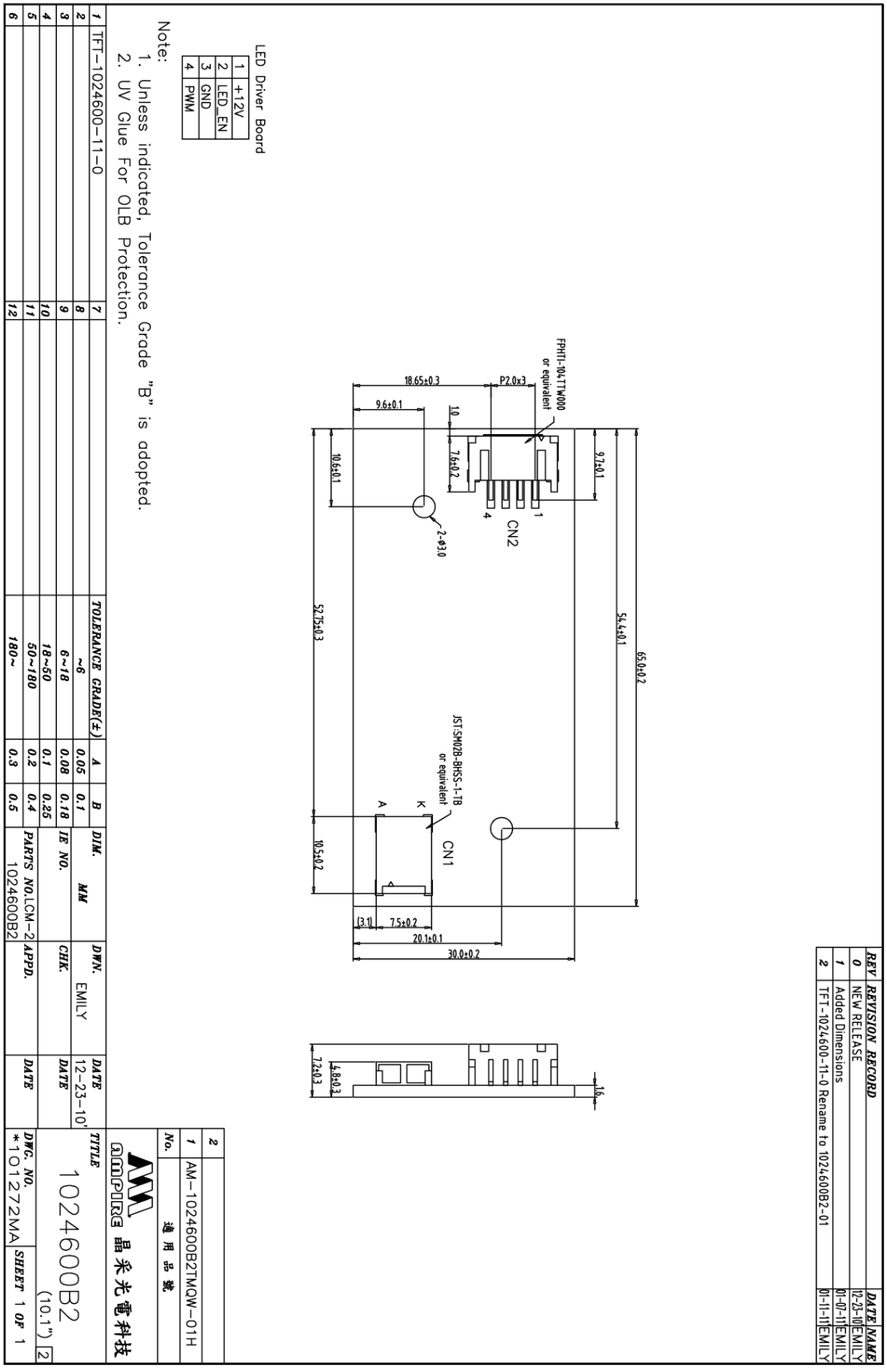
11.6.2 Do not re-adjust variable resistor or switch etc.

11.6.3 When returning the module for repair or etc, please pack the module not to be broken. We recommend using the original shipping packages.

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

12. OUTLINE DIMENSION



A Block
0.2088
0.0905
0.2715
R G B
CN3
1 A
2 K
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 RXINO− 23 GND
9 RXINO+ 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. 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:BHSR−02VS−1 or Equivalent
Back view
145.8±0.5
235.0±0.5
(81.4)
(116.4±0.3)
145.0±0.5
(78.0)
(44.8)
P1.0x3
5.0±0.2
CN2 30
CN3 JST
BHSR-02VS-1
or Equivalent
White
Red
CIRCUIT DIAGRAM
Y2
X1
X2
Y1
4 3 2 1
REV. REVISION RECORD
0 NEW RELEASE
DATE NAME
01-22-19 EMILY
TOLERANCE GRADE(±) A B
DIM. MM
DWN. EMILY
CHK.
APPD.
DATE 01-22-19
DATE
PARTS NO. LCM-1024600L3H-T
IE NO.
TITLE 1024600L3H-T
DWG. NO. *190192MA
SHEET 1 OF 1
1 1024600L3-T LCM
2 New FPC
3 New B/L
4 New 偏光片
5
6

OUTLINE DIMENSION (LED driver)