



晶采光電科技股份有限公司
AMPIRE CO., LTD.

Specifications for LCD module

Customer	
Customer part no.	
Ample part no.	AM-800600MYVZQW-53H-A
Approved by	
Date	

Preliminary Specification

Formal Specification

AMPIRE CO., LTD.

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Approved by	Checked by	Organized by
Patrick	Simon	Jessica

This Specification is subject to change without notice.

RECORD OF REVISION

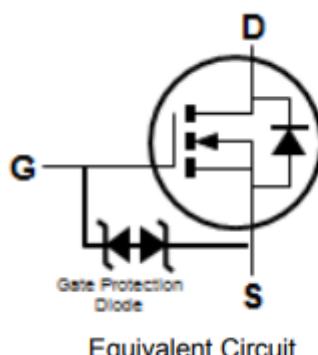
Revision Date	Page	Contents	Editor
2022/06/22	--	New Release	Jessica
2022/09/14	4	Update Driver IC	Lawlite
2022/09/28	6,8,11	Update data	Lawlite
2022/11/24	4	Update Driver IC(ILI6150M6 + ILI5120)	Lawlite
2023/06/30	6	Update contrast ratio	Jessica
2024/06/06	3	new transistor	Lawlite

1. Instruction

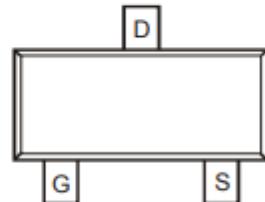
Ampire 8.4" Display Module is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device. This model is composed of a TFT-LCD panel, a driving circuit. This TFT-LCD has a high resolution (800(R.G.B) X 600) and can display up to 16.2M colors.

1.1 Features

- (1) Construction: a-Si TFT-LCD with driving system, White LED Backlight.
- (2) LCD type : Transmissive , Normally White
- (3) Number of the Colors
- (4) LVDS Interface 8 bit resolution 256 gray-scale with Dithering (6 bits DAC + 2 bit FRC or HFRC)
- (5) LCD Power Supply Voltage: 3.3V single power input, built-in power supply circuit.
- (6) Build-in LED Driver IC (VL=12V).
- (7) ILITEK source and gate IC
- (8) New transistor DMN3069L-7(Diodes) (ESD Protected Gate)



Equivalent Circuit

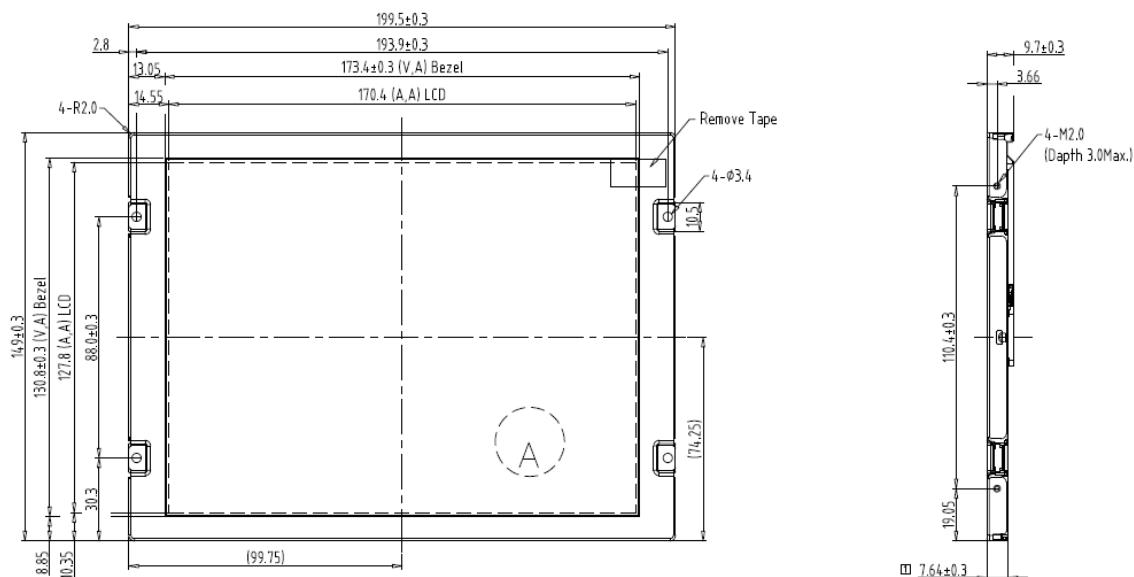


Top View

2. Physical Specifications

Item	Specifications	unit
Display resolution(dot)	800RGB (W) x 600(H)	dots
Pixel pitch	213 (W) x 213 (H)	um
Color configuration	R.G.B -stripe	
Backlight unit	LED	
Display color	--	colors
Driver IC	ILI6150M6 ILI5120	

If user wants to change the default setting for mass production, please contact with Ampire. We'll apply a new P/N for you.

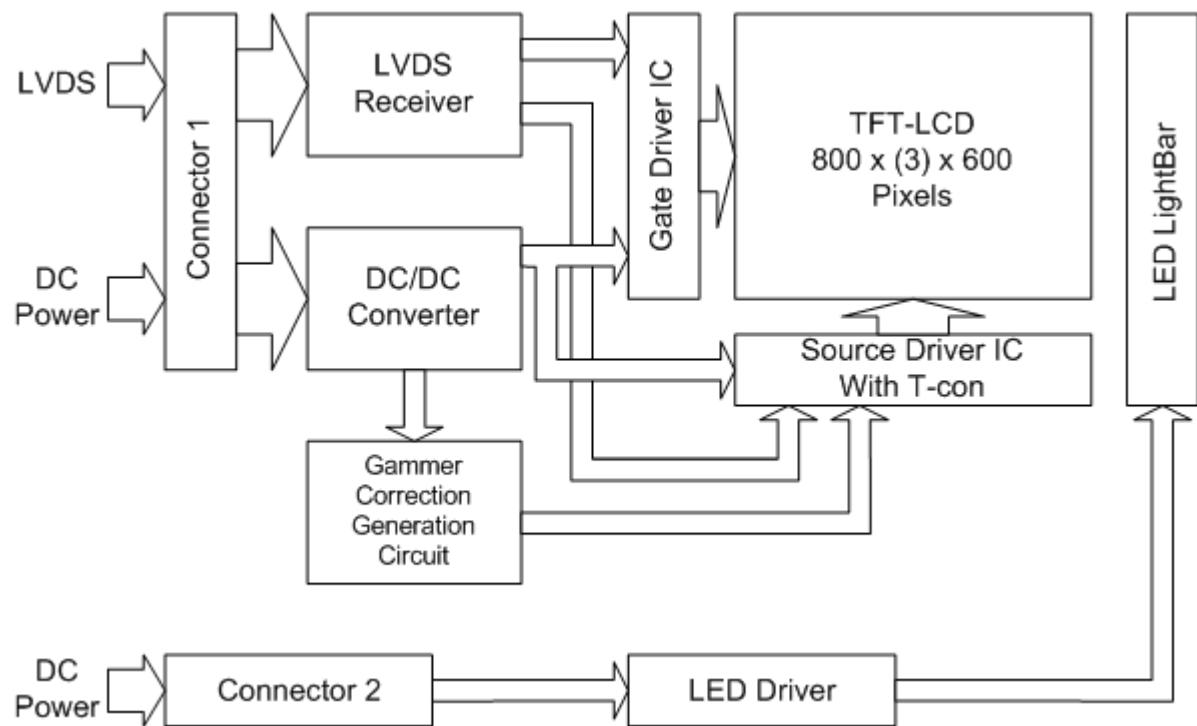


3. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Note
Supply voltage range	VCC	-0.3	4	V	(1)
Voltage range at any terminal	VI	-0.3	VCC + 0.3	V	
Operating Temperature	Top	-20	70	°C	
Storage Temperature	Tstg	-30	80	°C	

Note: All voltage values are with respect to the GND terminals unless otherwise noted.

4. Block Diagram

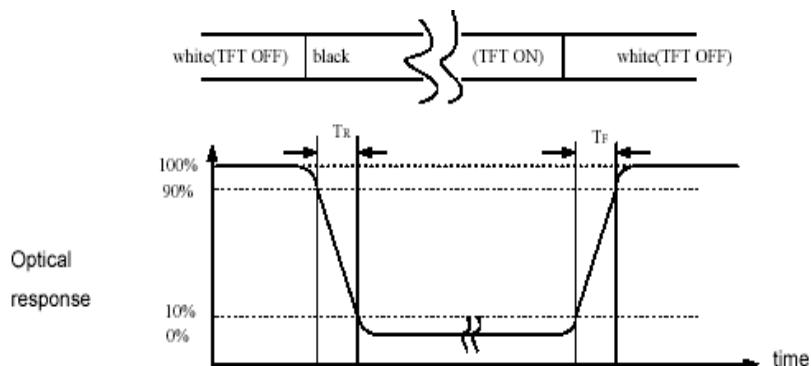


5. Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Response Time		$T_r + T_f$	$\Theta = \Phi = 0^\circ$	-	16	25	ms	(1)	
Contrast ratio (EVA)		CR		288	360	-	-	(2)(3)	
Viewing Angle	Horizontal	Θ_L	$CR \geq 10$	-	85	-	Deg.	(5)	
		Θ_R		-	85	-			
	Vertical	Θ_U		-	85	-			
		Θ_D		-	85	-			
Luminance (Center)		L	$\Theta = \Phi = 0^\circ$	452	565	--	cd/m ²	(3)(4) $T_a = 25^\circ C$	
Luminance Uniformity		ΔL		-	70	-	%	(3)(4)	
Color chromaticity	White	Wx		-0.05	0.309	+0.05			
		Wy			0.346				

These items are measured by BM-5A (TOPCON) or CA-1000(MINOLTA) in the dark room (no ambient light).

Note(1) Definition of Response Time (White-Black)



Note(2) Definition of Contrast Ratio

Measure contrast ratio on the below 5 points (refer to figure1, #1~#5point) and take the average value

Contrast ratio is calculated with the following formula:

$$\text{Contrast Ratio (CR)} = (\text{White}) \text{ Luminance of ON} \div (\text{Black}) \text{ Luminance of OFF}$$

Note(3) Definition of Luminance :

Measure white luminance on the center point (point 5) and take the value.

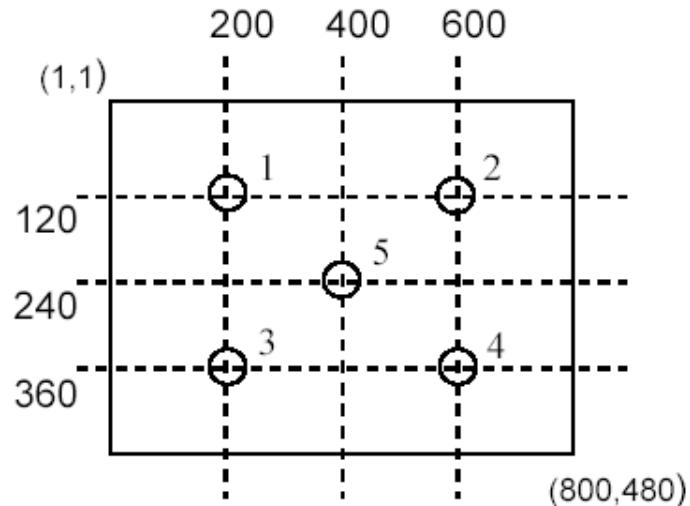


Fig.1 Measuring point

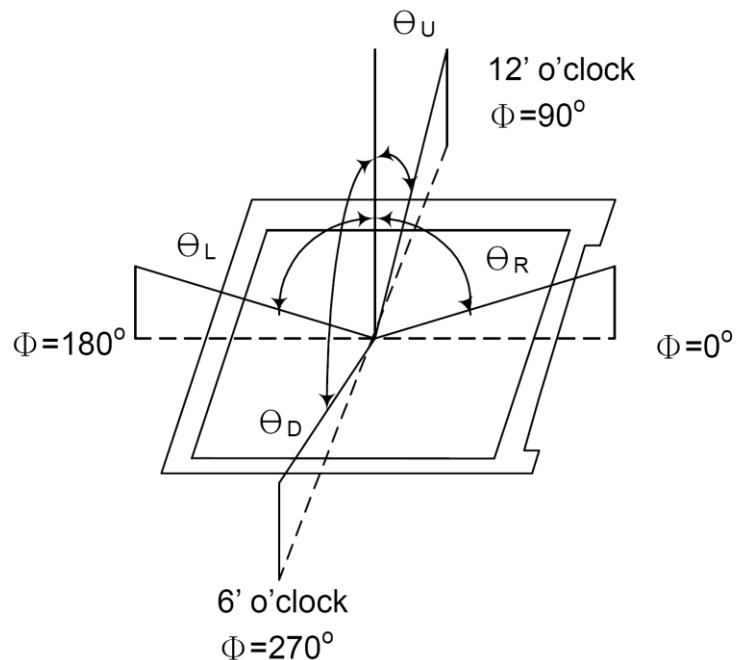
Note(4) Definition of Luminance Uniformity :

Measured Maximum luminance [L (MAX)] and Minimum luminance [L (MIN)] on the 5 points

Luminance Uniformity is calculated with the following formula:

$$\Delta L = [L(\text{MIN}) / L(\text{MAX})] \times 100\%$$

Note(5) Definition of Viewing Angle



6. Electrical Characteristics

6.1 DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Logic / LCD Drive Voltage	VCC	3.0	3.3	3.6	V	
VCC Current	ICC		100		mA	(1)

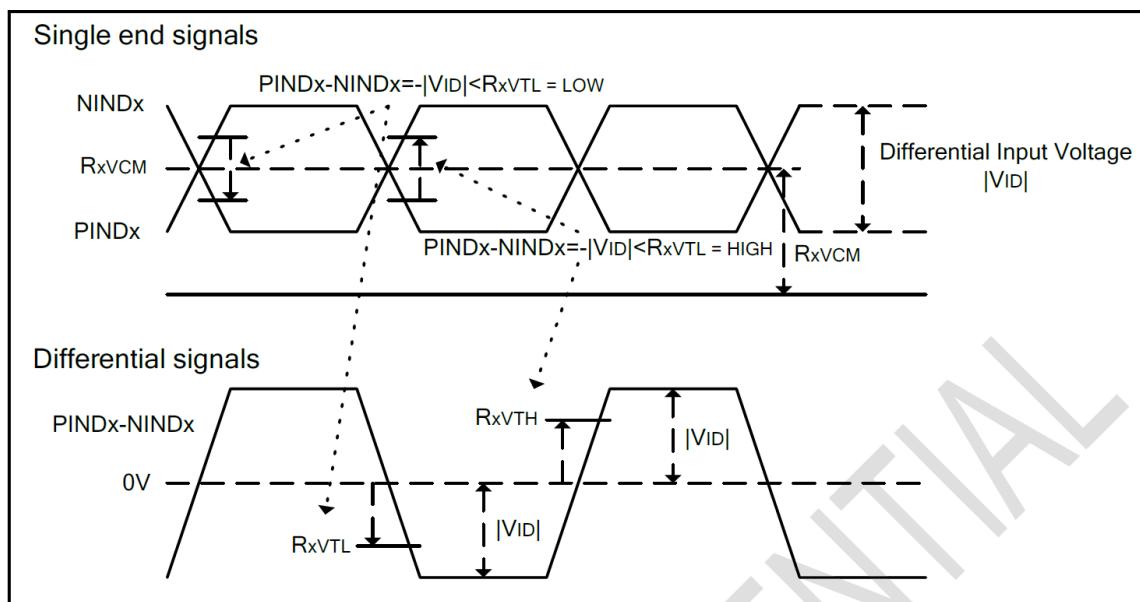
Note(1) $f_V = 60\text{Hz}$, $T_a = 25^\circ\text{C}$, Display pattern : All Black

6.2 AC Timing characteristic

6.2.1 LVDS Electrical Specification

LVDS mode (Receiver Differential Input: PIND0~PIND3, NIND0~NIND3, PINC, NINC)

Parameter	Symbol	Min	Typ.	Max	Unit	Conditions
Differential input high threshold voltage	RxVTH	-	-	0.1	V	RxVCM=1.2V
Differential input low threshold voltage	RxVTL	-0.1	-	-	V	
Input voltage range (singled-end)	RxVIN	0	-	2.4	V	
Differential input common mode voltage	RxVCM	VID/2	-	2.1- VID /2	V	
Differential input voltage	VID	0.2	-	0.6	V	
Differential input leakage current	RVxliZ	-10	-	+10	uA	
LVDS Digital Operating Current	Iddlvds	-	22	30	mA	Fclk=65MHz, VDD=3.3V
LVDS Digital Standby Current	Istlvds	-	200	300	uA	Clock & all Functions are stopped



6.2.2 Parallel RGB input timing table

DE Mode

Parameter	Symbol	Value			Unit
		Min	Typ.	Max	
DCLK frequency Frame rate = 60Hz	fclk	32.6	39.6	62.4	MHz
Horizontal display area	thd	800			DCLK
H SYNC period time	th	890	1000	1300	DCLK
H SYNC blanking	thb+thfp	90	200	500	DCLK
Vertical display area	tvd	600			H
V SYNC period time	tv	610	660	800	H
V SYNC blanking	tvb+tvfp	10	60	200	H

HV Mode

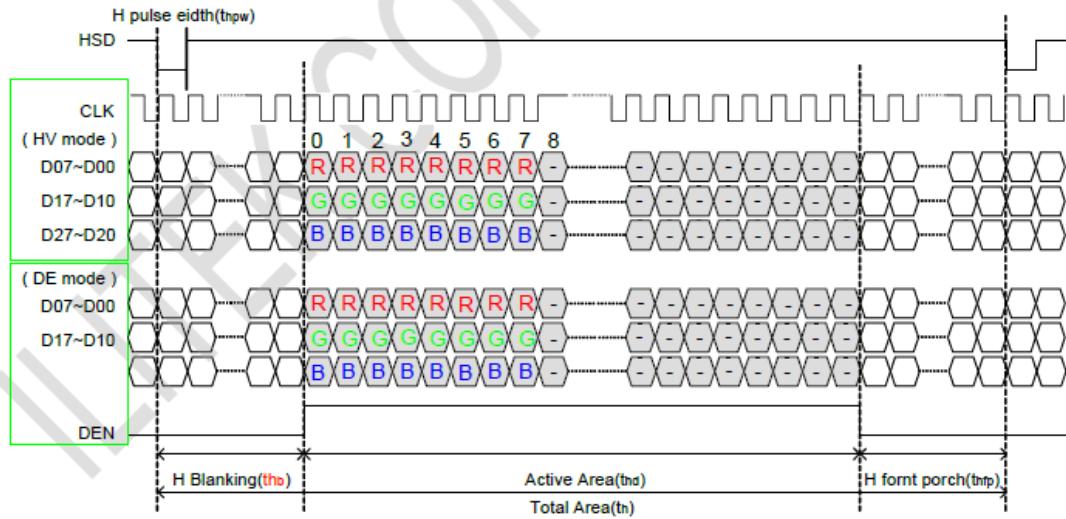
a. Horizontal input timing

Parameter	Symbol	Value			Unit	
Horizontal display area	thd	800			DCLK	
DCLK frequency Frame rate = 60Hz	fclk	Min	Typ.	Max	MHz	
		34.5	39.6	50.4		
1 Horizontal Line	th	900	1000	1200	DCLK	
H SYNC pulse width	Min	1			DCLK	
	Typ.	-				
	Max	40				
H SYNC blanking	thb	88	88	88		
H SYNC front porch	thfp	12	112	312		

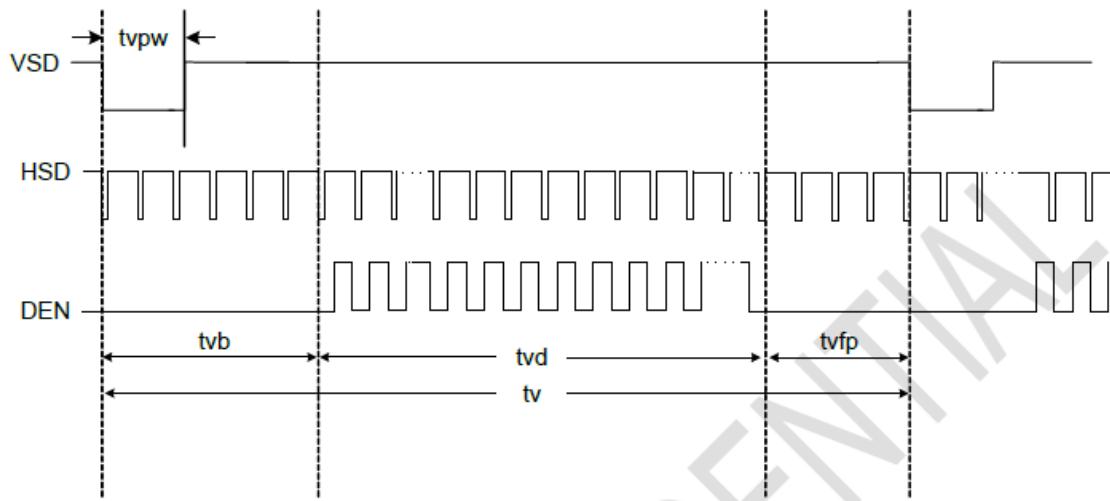
b. Vertical input timing

Parameter	Symbol	Value			Unit
		Min	Typ.	Max	
Vertical display area	tvd	600			H
V SYNC period time	tv	640	660	700	H
V SYNC pulse width	tvpw	1	-	20	H
V SYNC blanking	tvb	39	39	39	H
V SYNC front porch	tvfp	1	21	61	H

Horizontal input timing



Vertical input timing



7. Backlight Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Input Voltage	VL	10.8	12.0	13.2	V	
Input Current	ILED	--	300	--	mA	100% PWM duty, VL=12.0V
BLEN Logic High	VIH	2.5	--	VL	V	
BLEN Logic Low	VIL	0	--	0.4	V	
V _{PDIM} Logic High	VIH	2.5	--	5.5	V	
V _{PDIM} Logic Low	VIL	0	--	0.4	V	
V _{PDIM} PWM Frequency	F _{PDIM}	100	500	1000	Hz	
V _{PDIM} PWM Duty Range	DR	5	--	100	%	
LED Life Time	LT	80,000	100,000			

Note(1) Ta means ambient temperature of TFT-LCD module.

Note(2) VL, ILED are defined for LED B/L. (100% duty of PWM dimming)

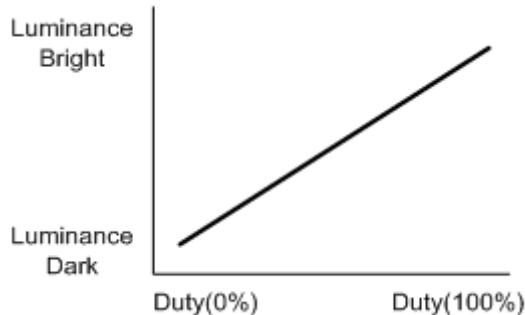
Note(3) FPDIM are defined for LED Driver.

Note(4) If the module is driven by high current or at high ambient temperature & humidity condition. The operating life will be reduced.

Note(5) Note 5: Operating life means brightness goes down to 50% minimum brightness. LED life time is estimated data.

Note(6) Note 6: the structure of LED B/L shows as below.

6.1 PWM Dimming Control



8. Interface

8.1 Interface Definition

CN 1(Interface Signal)

Used connector 20186-020E-11F (I-PEX) or FI-SEB20P-HFE (JAE) Corresponding connector 20197-20U-F (I-PEX) or FI-S20S [for discrete Wire FI-SE20ME (for FPC) (JAE)

Pin no	Symbol	Function
1	VCC	POWER SUPPLY:3.3V
2	VCC	POWER SUPPLY:3.3V
3	GND	Power Ground
4	GND	Power Ground
5	Link 0-	Transmission Data of Pixels 1
6	Link 0+	Transmission Data of Pixels 1
7	GND	Power Ground
8	Link 1-	Transmission Data of Pixels 2
9	Link 1+	Transmission Data of Pixels 2
10	GND	Power Ground
11	Link 2-	Transmission Data of Pixels 3
12	Link 2+	Transmission Data of Pixels 3
13	GND	Power Ground
14	CLKKIN-	Sampling Clock
15	CLKKIN+	Sampling Clock
16	GND	Power Ground
17	Link 3-	Transmission Data of Pixels 4
18	Link 3+	Transmission Data of Pixels 4
19	MODE	Not connect
20	SC	Scan direction control(Low = Normal, High = Reverse)

CN2: LED Driver Connector

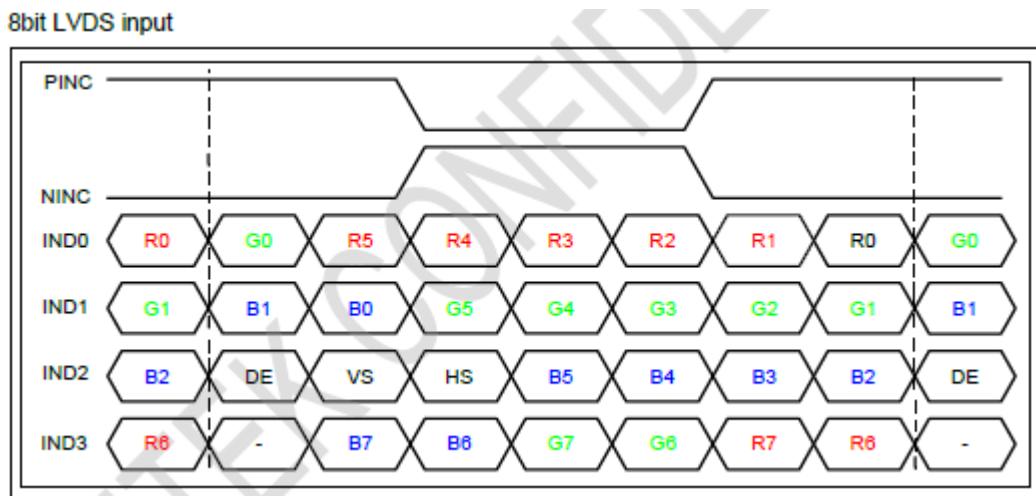
Backlight-side connector FI-S6P-HFE (JAE)

Corresponding connector FI-S6S (JAE)

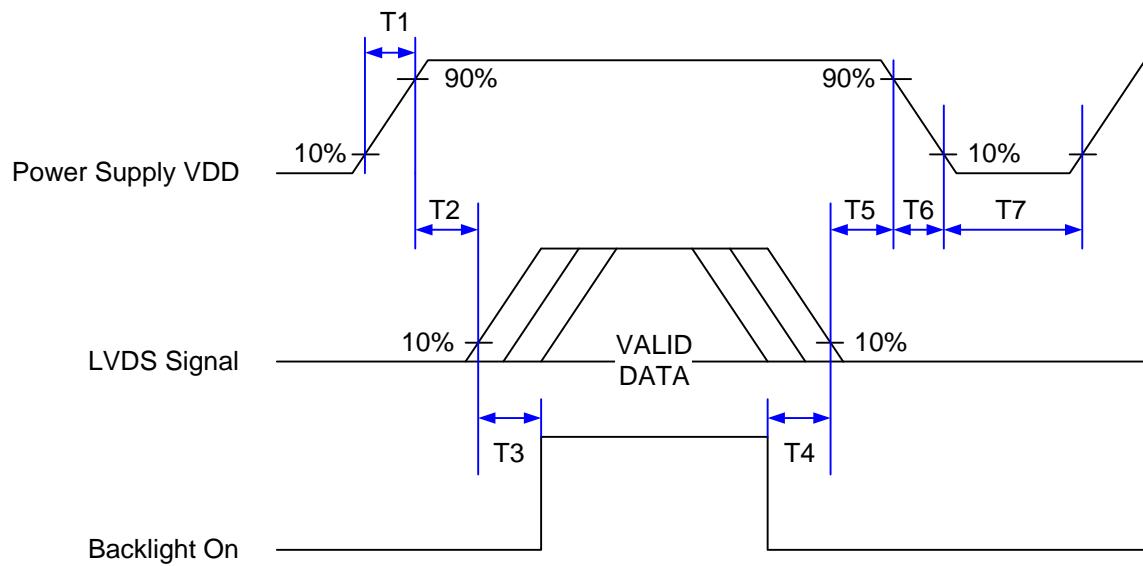
Pin NO.	Symbol	Description	Note
1	VL	LED Driver input voltage	12V
2	VL	LED Driver input voltage	12V
3	GND	LED Driver ground	Ground
4	GND	LED Driver ground	Ground
5	BLEN	LED Driver Enable pin. High : LED Back-light ON Low : LED Back-light Low	
6	V _{PDIM}	PWM input for Back-light brightness adjust	

9. Data Input Format

8 bits LVDS input



10. Power ON/OFF Sequence



Symbol	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	--	20	ms
T2	0	40	50	ms
T3	200	--	--	ms
T4	200	--	--	ms
T5	0	40	50	ms
T6	0	--	20	ms
T7	1000	--	--	ms

11. Reliability Test Items

Test Item	Test Conditions	Note
High Temperature Operation	$70\pm3^{\circ}\text{C}$, $t=240$ hrs	
Low Temperature Operation	$-20\pm3^{\circ}\text{C}$, $t=240$ hrs	
High Temperature Storage	$80\pm3^{\circ}\text{C}$, $t=240$ hrs	1,2
Low Temperature Storage	$-30\pm3^{\circ}\text{C}$, $t=240$ 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 ($15\text{-}35^{\circ}\text{C}$, 45-65%RH).

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.

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.

12. Use Precautions

12.1 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.

12.2 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. $1M\Omega$ 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.

12.3 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.

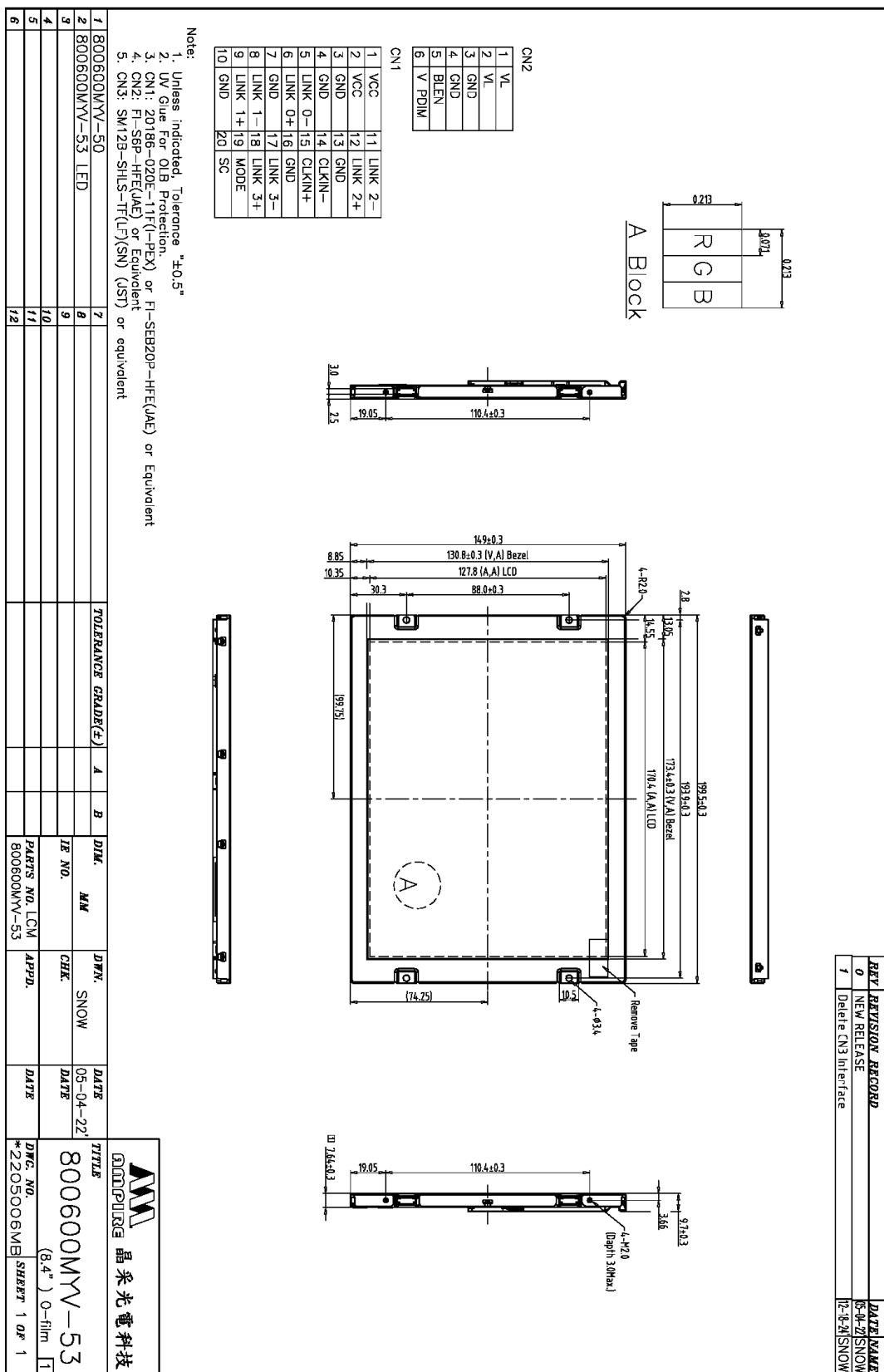
12.4 Operating precautions

- (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 drive 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: 0.2Vcc or less and H level: 0.8Vcc 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.

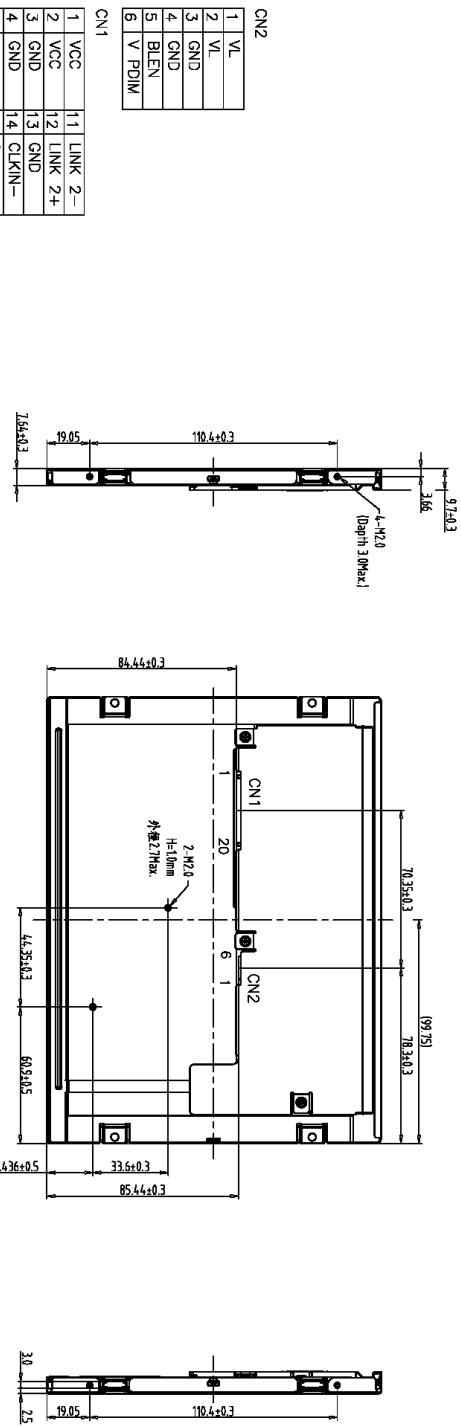
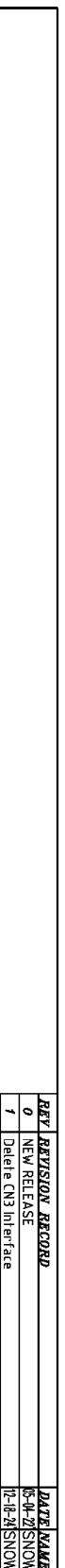
12.5 Other

- (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 warranty for all products and three months warranty for all repairing products.

13. Outline Dimension



REV.	REVISION RECORD	DATE NAME
0	NEW RELEASE	05-04-22 SNOW
1	Delete CN3 interface	12-12-24 SNOW



CN2	
1	V _L
2	V _I
3	GND
4	GND
5	BLEN
6	V PDIM

CN1	
1	VCC
2	VCC
3	GND
4	GND
5	LINK 0-15
6	LINK 0+
7	GND
8	LINK 1-18
9	LINK 1+19
10	GND
11	LINK 2-
12	LINK 2+
13	GND
14	CLKIN-
15	CLKIN+
16	GND
17	LINK 3-
18	LINK 3+
19	MODE
20	SC

Back View

Note:
 1. Unless indicated, Tolerance "±0.5"
 2. UV Glue for OLF Protection.
 3. CN1: 20186-020E-11F(I-PEX) or FI-SEB203-HFE(MAE) or Equivalent
 4. CN2: FI-S6P-HFE(MAE) or Equivalent
 5. CN3: SM120-SHS-TF(I)(SN) (UST) or equivalent

PARTS NO. (CM-1)	APPD.	DATE	TITLE	
			DNC. NO.	DATE
1 800600MYY-50	7			
2 800600MYY-53 LFD	8			
3	9			
4	10			
5	11			
6	12			

AMPIRE 晶采光電科技
 800600MYY-53
 (8.4") 0-film
 *2205007MB SHEET 1 OF 1

14. Package

