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-19201080ITZQW-00H**
APPROVED BY	
DATE	

☐ **Preliminary Specification**
■ **Formal Specification**

AMPIRE CO., LTD.
4F., No.116, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City221, Taiwan (R.O.C.)
新北市汐止區新台五路一段 **116** 號 **4** 樓**(**東方科學園區 **A** 棟**)**
TEL:886-2-26967269 , FAX:886-2-26967196 or 26967270

APPROVED BY	CHECKED BY	ORGANIZED BY
Kokai	Mark	Lawlite

This Specification is subject to change without notice.

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2022/05/03	--	New Release	Lawlite
2023/03/06	6,14,19 20	Update Timing & LED connector & interface & drawing	Lawlite

1.0 General Descriptions

1.1 Introduction

The LCM is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 15.6 inch diagonally measured active area with FHD resolutions (1920 horizontal by 1080 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical Stripe and this module can display 16.7M colors(6bit+FRC). The TFT-LCD panel used for this module is a low reflection and higher color type.

1.2 Features

- 3.3 V Logic Power
- LVDS (2ch) Interface for 1920 RGB x 1080 resolution
- 16.7M Colors(6bit+FRC)
- Green Product (RoHS)

1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	15.6	Inch
Active Area	344.16 (H) ×193.59 (V)	mm
Pixel Format	1920 (H) x RGB x 1080 (V)	-
Pixel Pitch	0.17925 (H) X 0.17925 (V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally Black	-
White Luminance	1000 (Typ)	cd /m2
Contrast Ratio	1000 : 1 (Typ)	-
Input Voltage	3.3	V
Outline Dimensions	363.8x215.9x9.32(Max.)	mm
Support Color	16M(6Bit+FRC)	-

2.0 Absolute Maximum Ratings

ITEM	SYMBOL	VALUES		UNIT	REMARK
		MIN	MAX		
Logic Supply Voltage	VDD	-0.3	4.0	V	
Operation Temperature	T_{op}	-30	85	℃	
Storage Temperature	T_{st}	-30	85	℃	

Note (1) Ta =25±2℃

3.0 ELECTRICAL SPECIFICATIONS

3.1 LCD ELECTRONICS SPECIFICATION

Parameter		Symbol	Value			Unit	Note
			Min	Typ.	Max.		
Power Supply Voltage		VDD	3.0	3.3	3.6	V	(1),(2)
Ripple Voltage		VRP	-	-	200	mV	(1),(3)
Rush Current		IRUSH	-	-	1.5	A	(1),(4)
VDD Current	White Pattern	IDD	-	-	0.454	A	(1),(3)
VDD Power Consumption	White Pattern	PDD	-	-	1.5	W	

Note (1) All of the specifications are guaranteed under normal conditions. Normal conditions are defined as follow: Temperature: 25℃ , Humidity: 55± 10%RH.

Note (2) All of the absolute maximum ratings specified in the table, if exceeded, may cause faulty operation or unrecoverable damage. It is recommended to follow the typical value.

Note (3) The specified VDD current and power consumption are measured under the VDD = 3.3 V, FV = 60 Hz condition and White Pattern.

Note (4) The figures below is the measuring condition of VDD. Rush current can be measured when TRUSH is 0.5 ms.
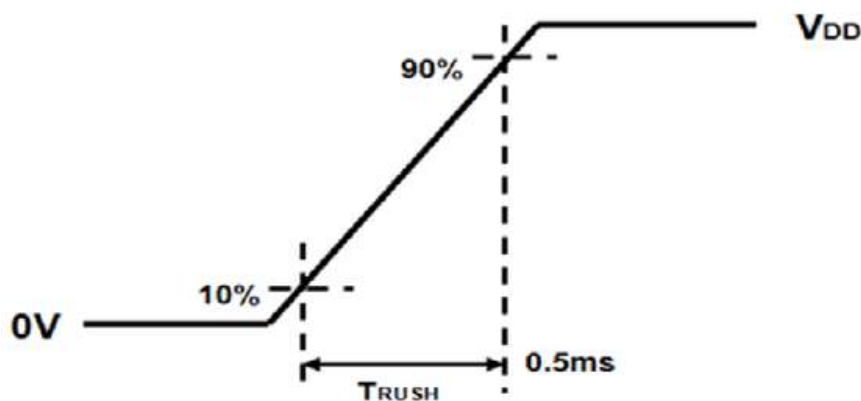
4. Interface Timings

4.1 DISPLAY TIMING SPECIFICATIONS

Parameter	Symbol	Min.	Typ.	Max.	Unit
LVDS Clock Frequency	Fclk	(69.5)	(70.5)	(73)	MHz
V Total Time	VT	(1104)	(1116)	(1080+A)	Clocks
VActive Time	VA		1080		-
H Total Time	HT	(1050)	(1052)	(960+B)	Lines
H Active Time	HA		960		-
Frame Rate	FV	-	(60)	-	Hz

Note (1) SCC can only be driven to 2%

Note (2) The maximum clock frequency=[(960+B)*(1080+A)*60]<73MHz

4.2 POWER ON/OFF SEQUENCE
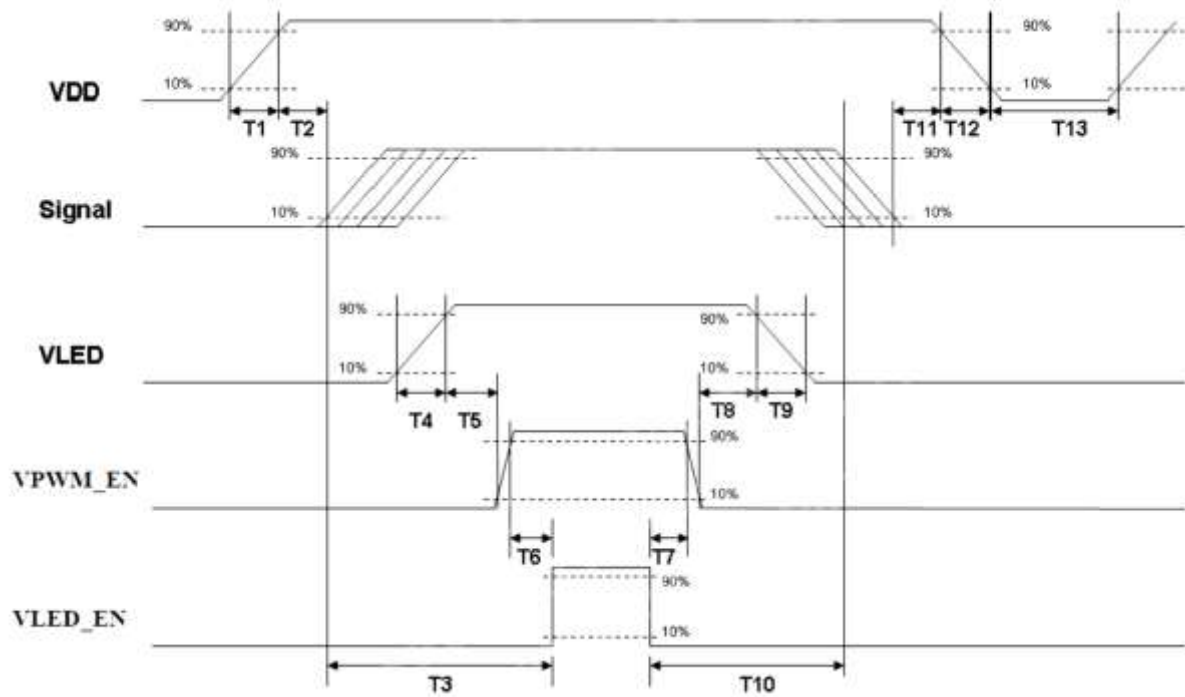
Power Sequencing Requirements

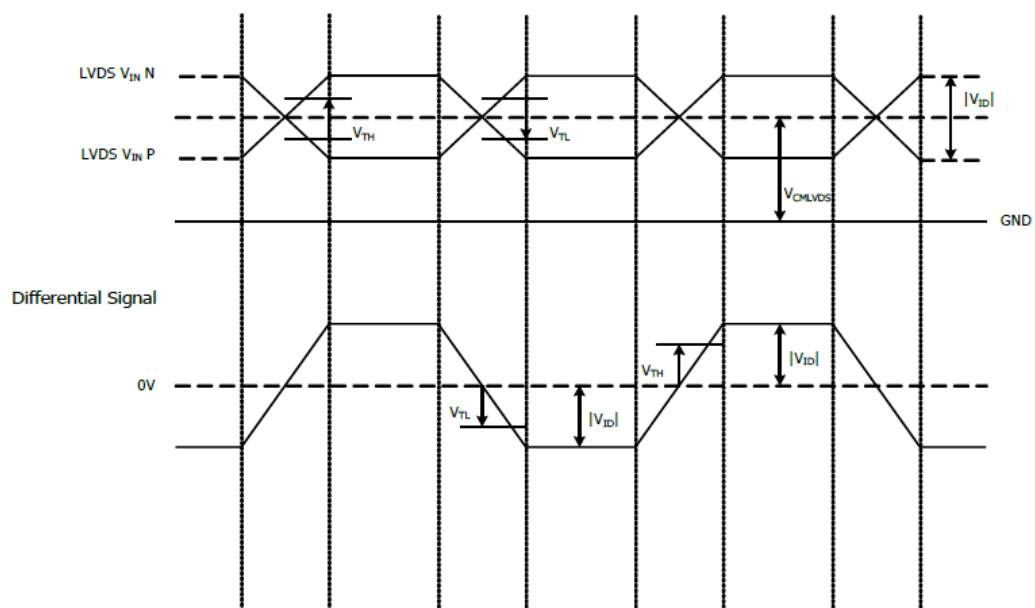| Parameter	Min.	Typ.	Max.	Unit
T1	0.5	-	10	ms
T2	30	40	50	ms
T3	200	-	-	ms
T4	0.5	-	10	ms
T5	10	-	-	ms
T6	10	-	-	ms
T7	0	-	-	ms
T8	10	-	-	ms
T9	-	-	10	ms
T10	110	-	-	ms
T11	0	16	50	ms
T12	-	-	10	ms
T13	1000	-	-	ms

4.3 LVDS INPUT SIGNAL SPECIFICATIONS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Differential Input High Threshold	Vth	-	-	+100	mV	VCM=1.2V
Differential Input Low Threshold	Vtl	-100	-	-	mV	VCM=1.2V
Magnitude Differential Input Voltage	|VID|	100	-	600	mV	-
Common Mode Voltage	VCM	0.7		1.6	V	-

Note (1) Input signals shall be low or Hi- resistance state when VDD is off.

Note (2) All electrical characteristics for LVDS signal are defined and shall be measured at the interface connector of LCD.

LVDS AC Electrical Characteristics

| Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock Period	TLVCP	-	(T)	-	ns
Clock High Time	TLVCH	-	(4T/7)	-	ns
Clock Low Time	TLVCL	-	(3T/7)	-	ns

Note：T=1/Fclk

Data Mapping
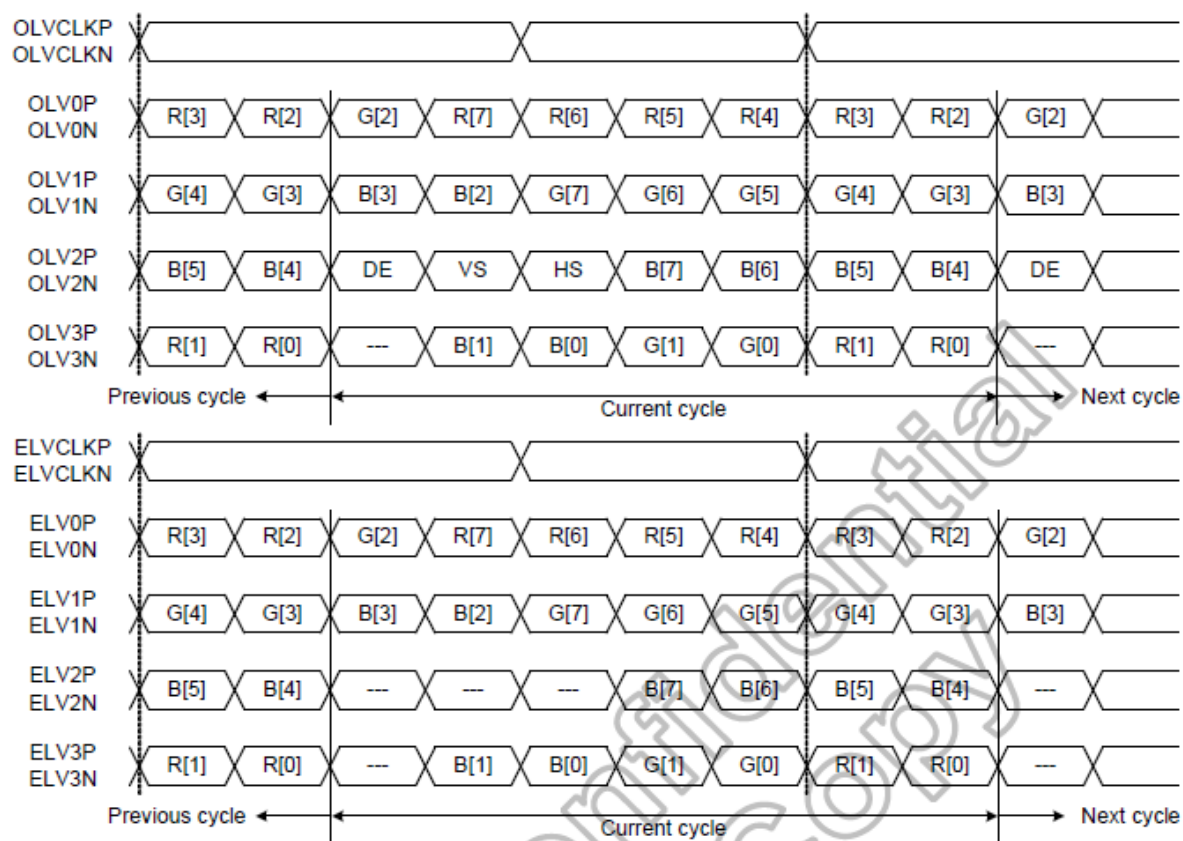
5.0 Optical Specifications

The optical characteristics are measured under stable conditions as following notes

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity (CIE 1931)	Red	Rx	$\theta_x=0°$, $\theta_Y=0°$ CS-2000	Typ – 0.05	T.B.D	Typ + 0.05	-	(1), (5)
		Ry			T.B.D			
	Green	Gx			T.B.D			
		Gy			T.B.D			
	Blue	Bx			T.B.D			
		By			T.B.D			
	White	Wx			0.313			
		Wy			0.329			
Center Luminance of White		L_C		800	1000	-	cd/m^2	(4), (5)
Contrast Ratio		CR		700	1000	-	-	(2), (5)
Response Time		$T_{R+}T_F$	$\theta_x=0°$, $\theta_Y=0°$	-	25	35	ms	(3)
NTSC			$\theta_x=0°$, $\theta_Y=0°$	-	72	-	%	(5), (6)
Luminance Uniformity			9 Points	75	80		%	(5), (6)
Viewing Angle	Horizontal	θ_x+	CR $\geqq$ 10	80	85	---	Deg.	(1), (5)
		θ_x-		80	85			
	Vertical	θ_Y+		80	85			
		θ_Y-		80	85	---		

Note (1) Definition of Viewing Angle (θx, θy):
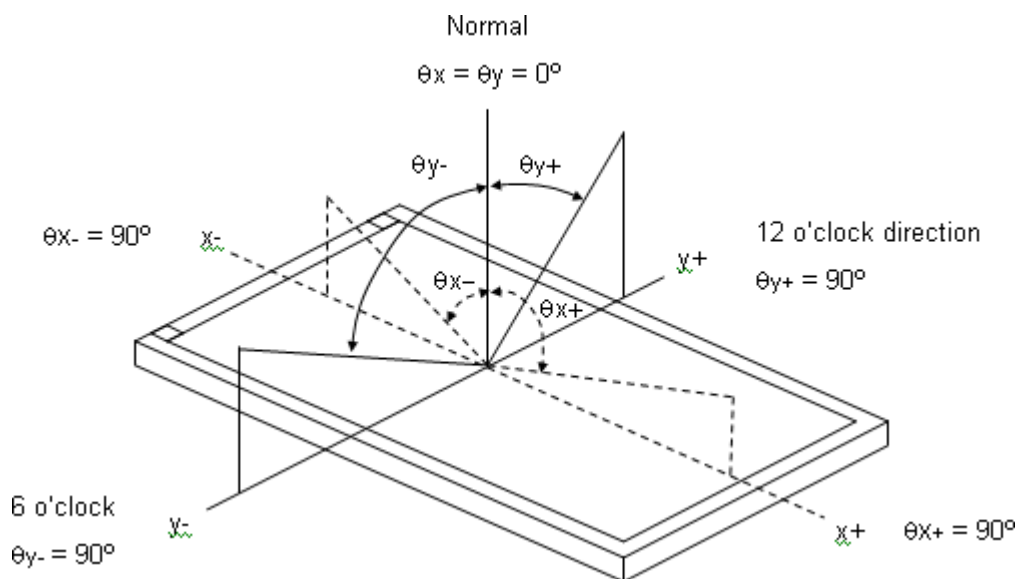
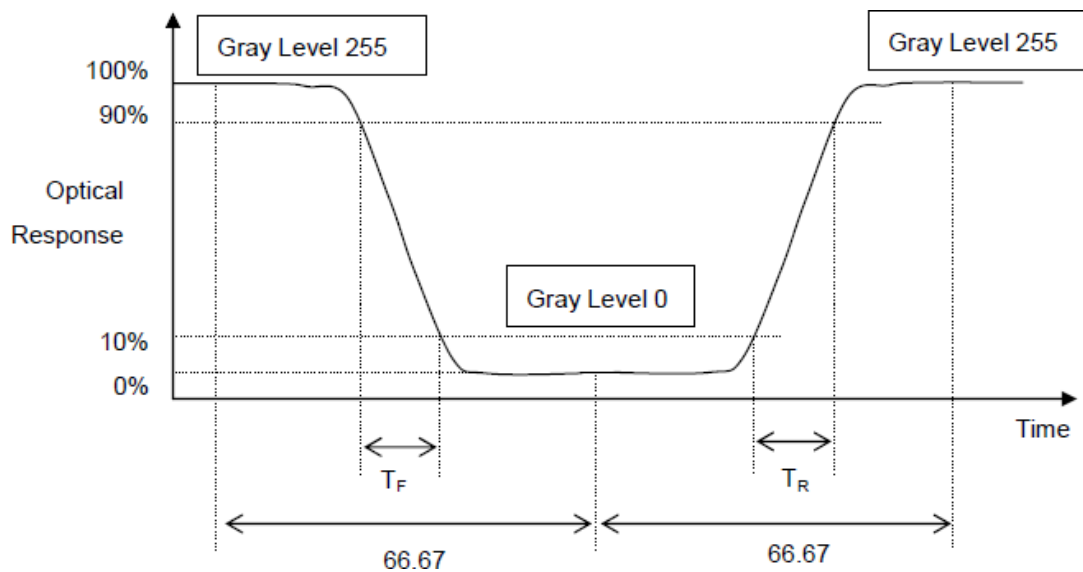
Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression. Contrast Ratio (CR) = L255 / L0

L255: Luminance of gray level 255 L 0: Luminance of gray level 0

CR = CR (5)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time (T_R, T_F):

Note (4) Definition of Luminance of White (L_C):

Measure the luminance of gray level 255 at center point $L_C = L (5)$

L (x) is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.
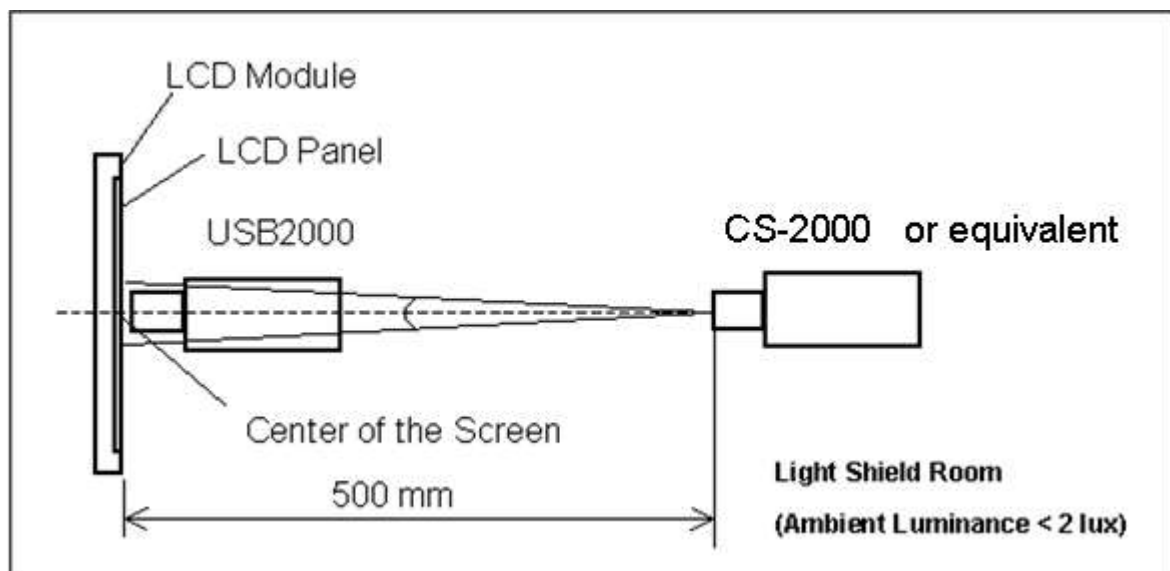
Note (6) Definition of White Variation

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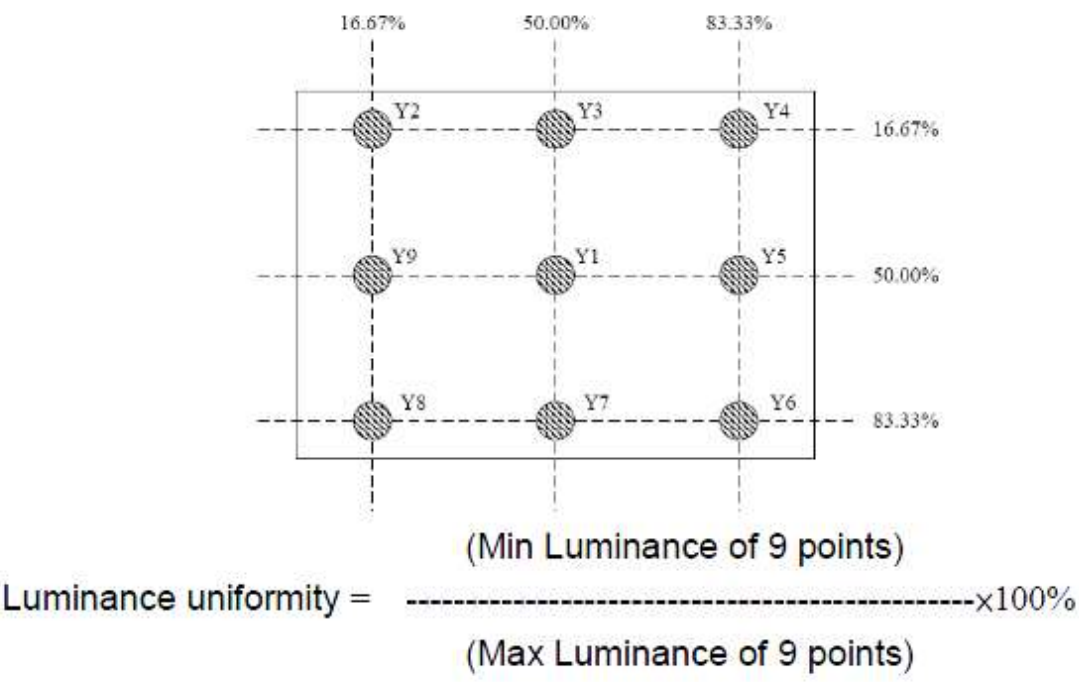
6. Interface Connections

LVDS connector

Item	Description
Manufacturer / Type	STM MSBKT2407P30HB
Mating Receptacle / Type (Reference)	JAE FI-X30HL(Locked Type)

Pin	Name	Description
1	RxO0-	Negative LVDS differential data input (Odd data)
2	RxO0+	Positive LVDS differential data input (Odd data)
3	RxO1-	Negative LVDS differential data input (Odd data)
4	RxO1+	Positive LVDS differential data input (Odd data)
5	RxO2-	Negative LVDS differential data input (Odd data)
6	RxO2+	Positive LVDS differential data input (Odd data)
7	GND	Ground
8	RxOCLK-	Negative LVDS differential clock input (Odd clock)
9	RxOCLK+	Positive LVDS differential clock input (Odd clock)
10	RxO3-	Negative LVDS differential data input (Odd data)
11	RxO3+	Positive LVDS differential data input (Odd data)
12	RxE0-	Negative LVDS differential data input (Even data)
13	RxE0+	Positive LVDS differential data input (Even data)
14	GND	Ground
15	RxE1-	Negative LVDS differential data input (Even data)
16	RxE1+	Positive LVDS differential data input (Even data)
17	GND	Ground
18	RxE2-	Negative LVDS differential data input (Even data)
19	RxE2+	Positive LVDS differential data input (Even data)
20	RxECLK-	Negative LVDS differential clock input (Even clock)
21	RxECLK+	Positive LVDS differential clock input (Even clock)
22	RxE3-	Negative LVDS differential data input (Even data)
23	RxE3+	Positive LVDS differential data input (Even data)
24	GND	Ground
25	Bist	LCD Panel Self Test Enable(3.3V Typ.) For Ampire use, When it is not used, Connecting to GND or Floating is recommended
26	SDA	I2C-Compatible Serial-Data Input. Floating is recommended in the Costumer
27	SCL	I2C-Compatible Serial-Data Input. Floating is recommended in the Costumer
28	VDD	Power Supply Input Voltage(3.3V)
29	VDD	Power Supply Input Voltage(3.3V)
30	VDD	Power Supply Input Voltage(3.3V)

LED connector

Item	Description
Manufacturer / Type	STM/MSB24038P8A(P1.25x8pin)

Pin	Name	Description
1	VLED	LED power supply(12V Typ)
2	VLED	LED power supply(12V Typ)
3	VLED	LED power supply(12V Typ)
4	GND	Ground
5	GND	Ground
6	GND	Ground
7	VLED_EN	Backlight On/Off (3.3V Typ)
8	VPWM_EN	System PWM signal imput for dimming (3.3V Typ)

7. LED Driving Conditions

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Converter Power Supply Voltage		LED_Vin	10.8	12.0	13.2	V	
Converter Power Supply Current		Ii			2	A	@LED_Vin= 12V Duty=100%
Power Consumption		P_LED			26.3	W	@ LED_Vin = 12V Duty=100%
EN Control Level	Backlight on	LED_EN	1.5	-	5.5	V	
	Backlight off		0		0.5		
PWM Control Level	PWM High Level	LED_PWM	1.2	-	5.5	V	
	PWM Low Level		0	-	0.5		
PWM Control Duty Ratio		PWM	10	--	100	%	
PWM Control Frequency		f_PWM	100	-	1000	Hz	
LED Life Time		L_L	50,000			Hrs	(2)

Note (1) LED light bar input voltage and current are measured by utilizing a true RMS

multimeter as shown below:

Note (2) The lifetime of LED is estimated data and defined as the time when it continues to

operate under the conditions at Ta = 25±2℃ and Duty 100% until the brightness

becomes ≦ 50% of its original value. Operating LED under high temperature

environment will reduce life time and lead to color shift.
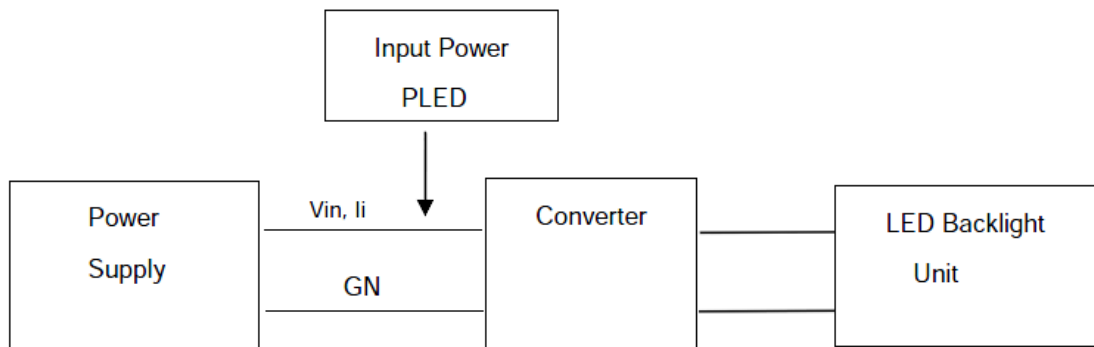
8. Reliability Test

The reliability test items and its conditions are shown below.

Test Item	Test Conditions	Note
High Temperature Operation	85±3°C , t=240 hrs	
Low Temperature Operation	-30±3°C , t=240 hrs	
High Temperature Storage	85±3°C , t=240 hrs	1,2
Low Temperature Storage	-30±3°C , t=240 hrs	1,2
Storage at High Temperature and Humidity	40°C, 90% RH , 240 hrs	1,2
Thermal Shock Test	-20°C (30min) ~ 60°C (30min) , 100 cycles	1,2
Shock (Non-Operating)	50G, 11ms, half sine wave, 1 time for ± X, ± Y, ± Z.	
Vibration (Non-Operating)	1.5G, 10 ~ 300 Hz, 10min/cycle, 3 cycles each X, Y, Z	

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.

9 . GENERAL PRECAUTION

9.1 Use Restriction
This product is not authorized for use in life supporting systems, aircraft navigation control   systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

9.2 Disassembling or Modification
Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. AMPIRE does not warrant the module, if customers disassemble or modify the module.

9.3 Breakage of LCD Panel
(1) If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid crystal, and do not contact liquid crystal with skin.
(2) If liquid crystal contacts mouth or eyes, rinse out with water immediately.
(3) If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and rinse thoroughly with water.
(4) Handle carefully with chips of glass that may cause injury, when the glass is broken.

9.4 Electric Shock
(1) Disconnect power supply before handling LCD module.
(2) Do not pull or fold the LED cable.
(3) Do not touch the parts inside LCD modules and the fluorescent LED's connector or cables in order to prevent electric shock.

9.5 Absolute Maximum Ratings and Power Protection Circuit
(1) Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature, etc., otherwise LCD module may be damaged.
(2) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.
(3) It's recommended to employ protection circuit for power supply.

9.6 Operation

(1) Do not touch, push or rub the polarizer with anything harder than HB pencil lead.

(2) Use fingerstalls of soft gloves in order to keep clean display quality, when persons handle the LCD module for incoming inspection or assembly.

(3) When the surface is dusty, please wipe gently with absorbent cotton or other soft material.

(4) Wipe off saliva or water drops as soon as possible. If saliva or water drops contact with polarizer for a long time, they may cause deformation or color fading.

(5) When cleaning the adhesives, please use absorbent cotton wetted with a little petroleum benzene or other adequate solvent.

9.7 Mechanism

Please mount LCD module by using mounting holes arranged in four corners tightly.

9.8 Static Electricity

(1) Protection film must remove very slowly from the surface of LCD module to prevent from electrostatic occurrence.

(2) Because LCD modules use CMOS-IC on circuit board and TFT-LCD panel, it is very weak to electrostatic discharge. Please be careful with electrostatic discharge. Persons who handle the module should be grounded through adequate methods.

9.9 Strong Light Exposure

The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

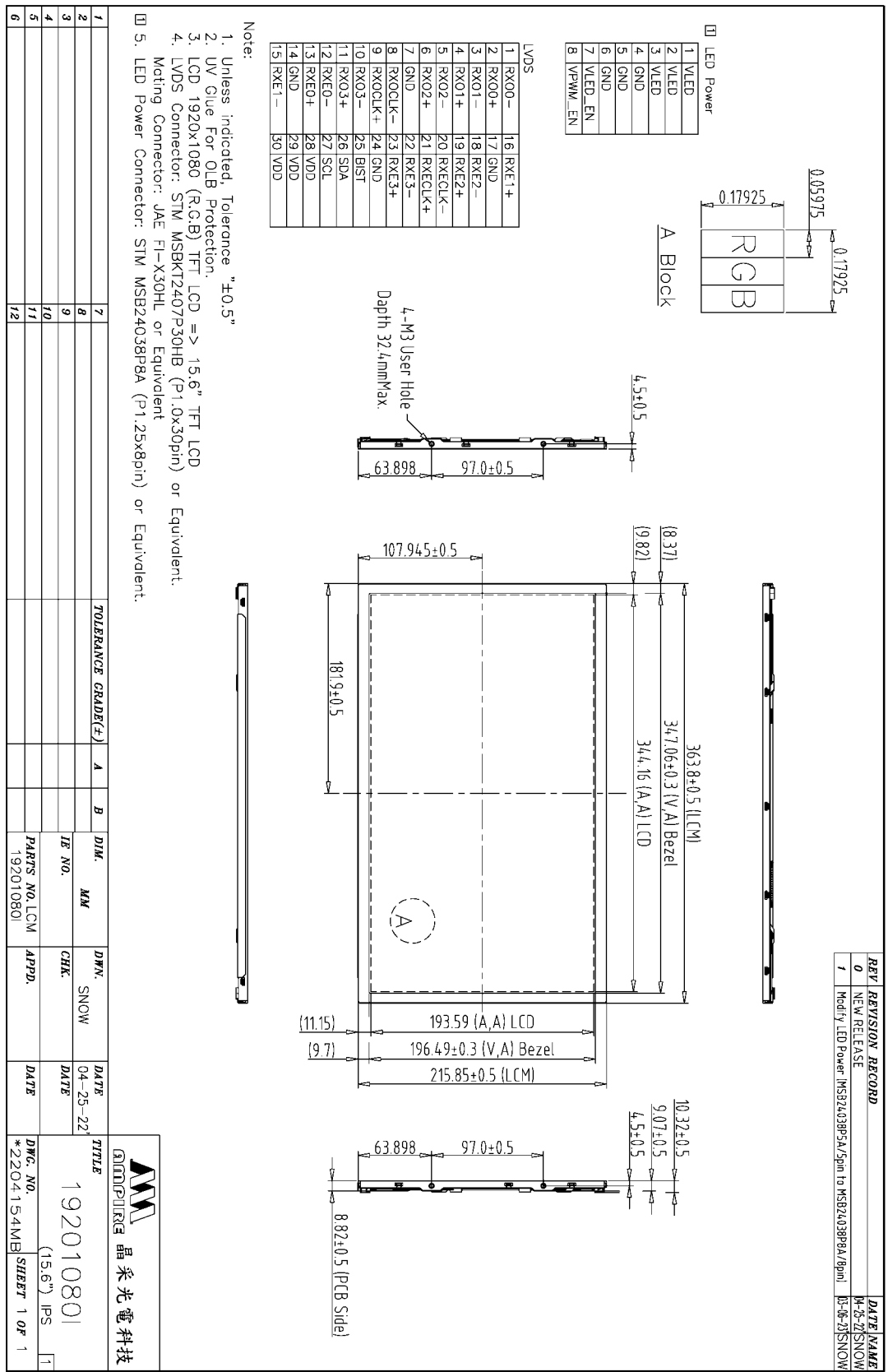### 9.10 Disposal

When disposing LCD module, obey the local environmental regulations.

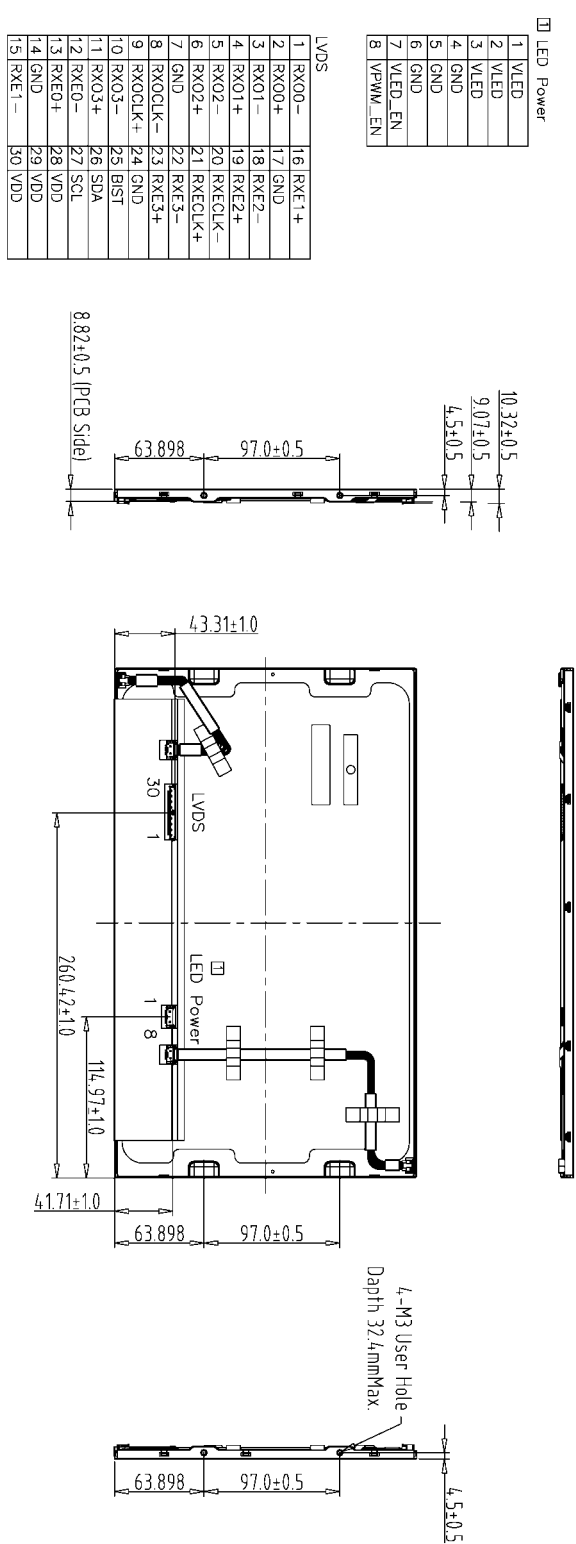### 9.11 Others

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.

10.0 Outline Dimension

LED Power

1	VLED
2	VLED
3	VLED
4	GND
5	GND
6	GND
7	VLED_EN
8	VPWM_EN

LVDS

1	RX00−	16	RXE1+
2	RX00+	17	GND
3	RX01−	18	RXE2−
4	RX01+	19	RXE2+
5	RX02−	20	RXECLK−
6	RX02+	21	RXECLK+
7	GND	22	RXE3−
8	RXOCLK−	23	RXE3+
9	RXOCLK+	24	GND
10	RX03−	25	BIST
11	RX03+	26	SDA
12	RXE0−	27	SCL
13	RXE0+	28	VDD
14	GND	29	VDD
15	RXE1−	30	VDD

A Block

R G B

0.17925
0.05975
0.17925

4-M3 User Hole
Depth 3.24mmMax.

4.5±0.5
63.898
97.0±0.5

107.945±0.5
(8.37)
(9.82)
363.8±0.5 (LCM)
347.06±0.3 (V,A) Bezel
344.16 (A,A) LCD
181.9±0.5

(A)

(11.15)
(9.7)
193.59 (A,A) LCD
196.49±0.3 (V,A) Bezel
215.85±0.5 (LCM)

63.898
97.0±0.5
10.32±0.5
9.07±0.5
4.5±0.5
8.82±0.5 (PCB Side)

Note:
1. Unless indicated, Tolerance "±0.5"
2. UV Glue For OLB Protection.
3. LCD 1920x1080 (R,G,B) TFT LCD => 15.6" TFT LCD
4. LVDS Connector: STM MSBKT2407P30HB (P1.0x30pin) or Equivalent.
   Mating Connector: STM MSBKT2407P30HB (P1.0x30pin) or Equivalent.
5. LED Power Connector: STM MSB24038P8A (P1.25x8pin) or Equivalent.
   Mating Connector: JAE FI-X30HL or Equivalent.

			TOLERANCE GRADE(±)	A	B	DIM.		
7	8	9				IE. NO.		
1	2	3	4	5	6	MM		
			10	11	12	PART'S NO. LCM		
						19201080I		

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	04-25-22	SNOW
1	Modify LED Power (MSB24038P5A/5pin to MSB24038P8A/8pin)	03-06-23	SNOW

IE. NO.		
DWN.	CHK.	APPD.
SNOW		
DATE	DATE	DATE
04-25-22		

TITLE 19201080I (15.6") IPS

DWG. NO. *220415 4MB **SHEET** 1 OF 1

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LED Power

1	VLED
2	VLED
3	VLED
4	GND
5	GND
6	GND
7	VLED_EN
8	VPWM_EN

LVDS

1	RXO0−	16	RXE1+
2	RXO0+	17	GND
3	VLED	18	RXE2−
4	RXO1+	19	RXE2+
5	RXO2−	20	RXECLK−
6	RXO2+	21	RXECLK+
7	GND	22	RXE3−
8	RXOCLK−	23	RXE3+
9	RXOCLK+	24	GND
10	RXO3−	25	BIST
11	RXO3+	26	SDA
12	RXEO−	27	SCL
13	RXEO+	28	VDD
14	GND	29	VDD
15	RXE1−	30	VDD

Note:
1. Unless indicated, Tolerance "±0.5"
2. UV Glue For OLB Protection.
3. LCD 1920x1080 (R.G.B) TFT LCD => 15.6" TFT LCD
4. LVDS Connector: STM MSBKT2407P30HB (P1.0x30pin) or Equivalent.
   Mating Connector: JAE FI-X30HL or Equivalent.
□5. LED Power Connector: STM MSB24O38P8A (P1.25x8pin) or Equivalent.

8.82±0.5 (PCB Side)
10.32±0.5
9.07±0.5
4.5±0.5
63.898
97.0±0.5

43.31±1.0
30
1
LVDS
260.42±1.0
114.97±1.0
41.71±1.0
63.898
97.0±0.5
LED Power
1
8

Back view

4−M3 User Hole
Depth 32.4mmMax.
63.898
97.0±0.5
4.5±0.5

TOLERANCE GRADE(±)	A	B	DIM.
			MM

IE NO.	
PARTS NO.LCM−1	19201080I

DWN.	CHK.	APPD.
SNOW		
DATE 04−25−22	DATE	DATE

TITLE 19201080I
(15.6") IPS
DWG. NO. *2204155MB SHEET 1 OF 1

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