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-19201200GTZQW-51H**
Approved by	
Date	

☐ **Preliminary Specification**
☐ **Approved 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
Patrick	Jessica	Mantle

This Specification is subject to change without notice.

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2020/04/20	--	New release	Mantle
2020/04/30	10	Pin 26 27	Mantle
	14	6.2 TTL Timing Table	

1.0 General Descriptions

1.1 Introduction

The LCM is a Color Active Matrix Liquid Crystal Display composed of a TFT LCD panel, a driver circuit. The screen format is intended to support the 16:10 WUXGA, 1920(H) x1200(V) screen and 16M colors (RGB 6-bits + Hi-FRC).

1.2 Features

- Power Supply Voltage: 3.3V single power input. Built-in power supply circuit.
- LVDS (2ch) Interface for 1920RGB x 1200 resolution.
- 16M Colors (6bit + 2 bits Hi-FRC)
- Data Enable Signal Mode
- With internal LED Driver

1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	10.1	Inch
Active Area	217.44(H) x 135.9(V)	mm
Pixel Format	1920 (H) x RGB x 1200 (V)	-
Pixel Pitch	0.11325 (H) × 0.11325(V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally Black (AHVA mode)	-
White Luminance	1000 (Typ)	cd /m^2
Contrast Ratio	800 : 1 (Typ)	-
Support Color	16M (6bit + HiFRC)	-

2.0 Absolute Maximum Ratings

Item	Symbol	Values		UNIT	Note
		Min.	Max.		
Power voltage	VDD	-0.3	4.0	V	
Operation temperature	TOP	-30	80	℃	
Storage temperature	TST	-30	80	℃	

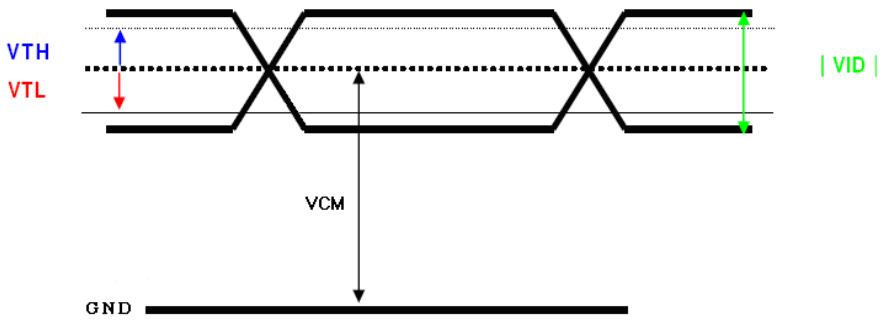
Note(1)

The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

3.0 Electrical CHARACTERISTICS

(1).TFT-LCD

Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Power Supply Voltage	VDD	3.0	3.3	3.6	V	GND=0V
Power Supply Current	I_{VDD}	--	(T.B.D)	(T.B.D)	mA	Max value are recommend power design spec.
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	



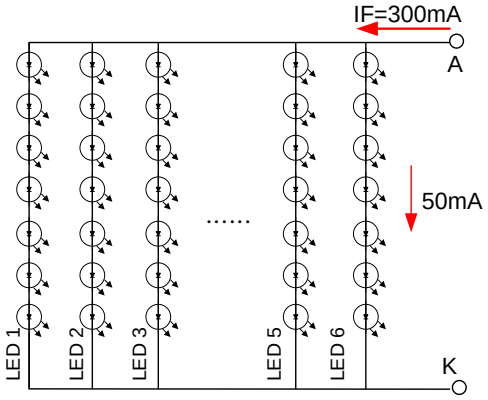
3.1 Backlight Unit

The distance of the LED A,K supply copper trace of the LED light-bar is 1.34mm at least.

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LED Driver voltage	VLED		12		V	
Power Supply current For LED Driver	ILED		720		mA	VLED=12V VLEN=3.3V duty 100%
LED_EN Voltage	VLEN		3.3		V	duty=100%
LED_PWM Freq..	FPWM	0.1		30	kHZ	
LED voltage	VAK	21	24.5	25.2	V	Note 1
LED current	IF	--	300	--	mA	Note 1
LED life time	--	--	50000	--	Hrs	Note 2

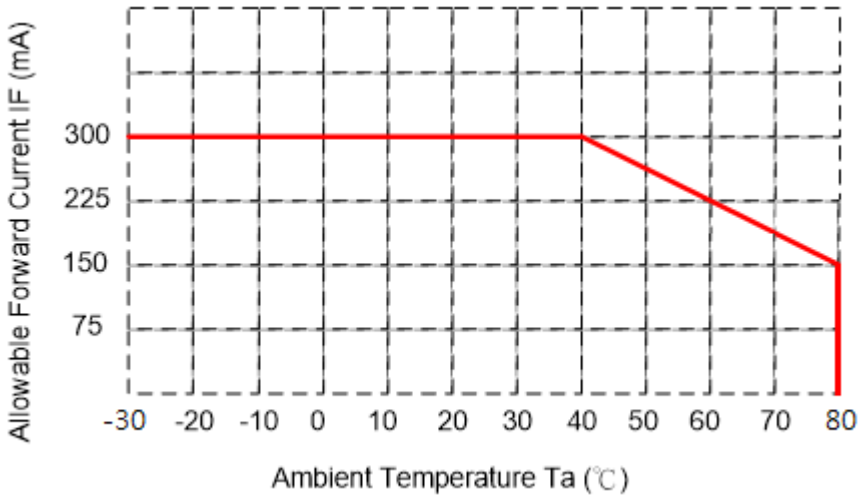
Note(1) The LED Supply Voltage is defined by the number of LED at Ta=25℃ and IF=300 mA.

Note(2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IF=300mA. The LED lifetime could be decreased if operating IF is larger than 225mA.



Note(3)

When LCM is operated over 40℃ ambient temperature, the IF should be follow :


Allowable Forward Current IF (mA)
300
225
150
75
-30
-20
-10
0
10
20
30
40
50
60
70
80
Ambient Temperature Ta (℃)

4.0 Optical Specifications

The optical characteristics are measured under stable conditions as following notes.

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR>10）	Horizontal	θ_L	-	80	-	degree	Note1
		θ_R	-	80	-		
	Vertical	θ_T	-	80	-		
		θ_B	-	80	-		
Contrast Ratio	Center		-	800	-	-	Note2
Response Time	Rising + Falling		-	-	50	ms	Note5
Color Chromaticity (CIE1931)	Red	x	Typ. -0.05	0.588	Typ. +0.05	-	Note3
	Red	y		0.299		-	
	Green	x		0.298		-	
	Green	y		0.615		-	
	Blue	x		0.105		-	
	Blue	y		0.119		-	
	White	x		0.319		-	
	White	y		0.344		-	
	Gamut			57.2%			
White Luminance	Center		800	1000	-	cd/m^2	Note4
Luminance Uniformity	9Points		75	-	-	%	Note4

Note(1)

Viewing angle defines as the angle at the contrast ratio over 10. Besides, the viewing angles are determined by the horizontal (3, 9 o'clock) and vertical (6, 12 o'clock) direction with respect to the optical axis which is normal to the LCD surface (see Figure1).

Note(2)

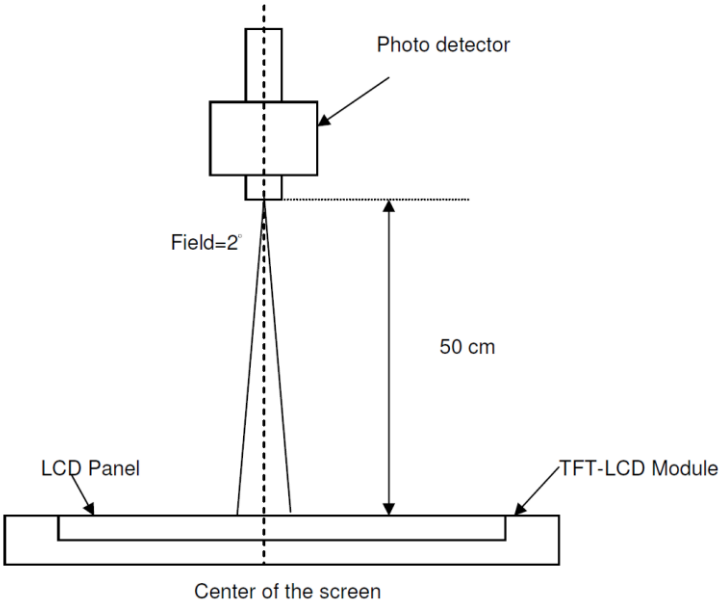
Contrast measurements shall be made at viewing angle Θ=0 and the center of the LCD surface. Luminance shall be measured with all pixels in the view field. Moreover, you need to set white at first, and then you have to change to dark (black) state (see Figure1). Luminance Contrast Ratio (CR) is defined mathematically as CR = Luminance as displaying a white raster / Luminance as displaying a black raster.

Note(3)

Reference only / Standard Front Surface Treatment Measured with green cover glass. The color chromaticity coordinates specified in Table 4, and it shall be calculated from the spectral data which measured with all pixels in red, green, blue, and white at first. Measurements shall be done at the center of the panel.

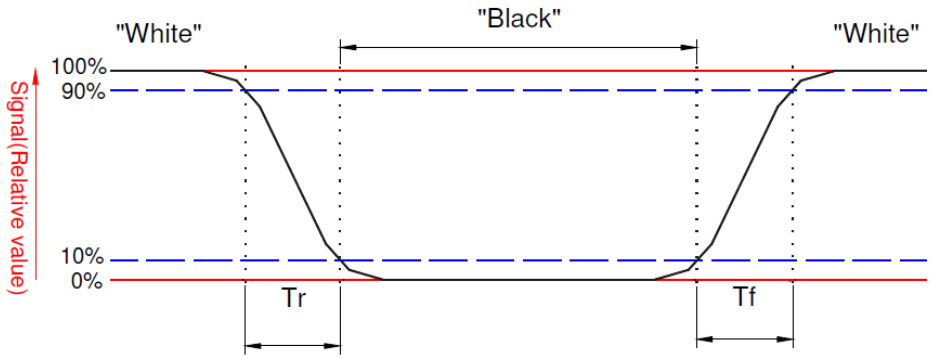
Note(4)

Measurement method: The LCD module should be stabilized at the 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 stable, windless, and dark room, and it should be measured in the center of screen.



Note(5)

Definition of response time: The output signals of BM-7 or equivalent are measured when the input signals changed from “Black” to “White” (falling time) and from “White” to “Black” (rising time), respectively. The response time interval between the 10% and 90% signal, and it is shown below.



5.0 Interface Connections

5.1 LVDS Interface Connection

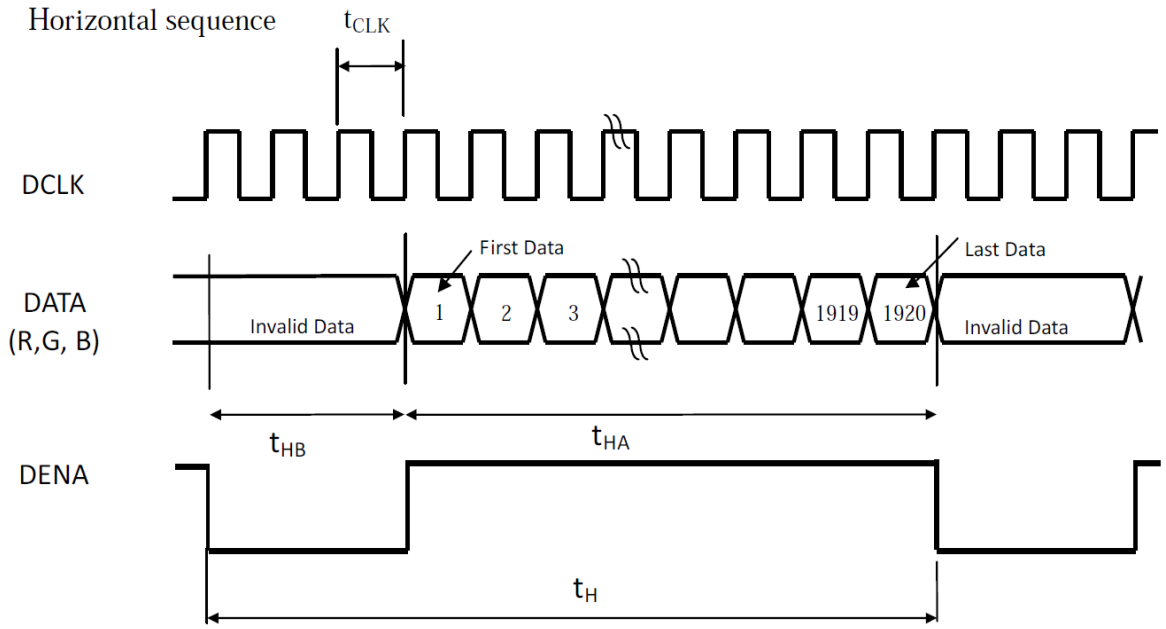
Pin #	Signal Name	Description
1	GND	Ground
2	NC	Not Connect
3	VDD	Power Supply, 3.3V (typical)
4	VDD	Power Supply, 3.3V (typical)
5	GND	Ground
6	GND	Ground
7	NC	Not Connect
8	NC	Not Connect
9	GND	Ground
10	IN0-	-LVDS differential data input
11	IN0+	+LVDS differential data input
12	IN1-	-LVDS differential data input
13	IN1+	+LVDS differential data input
14	IN2-	-LVDS differential data input
15	IN2+	+LVDS differential data input
16	CLK-	-LVDS differential data input
17	CLK+	+LVDS differential data input
18	IN3-	-LVDS differential data input
19	IN3+	+LVDS differential data input
20	E_IN0-	-LVDS differential data input
21	E_IN0+	+LVDS differential data input
22	E_IN1-	-LVDS differential data input
23	E_IN1+	+LVDS differential data input
24	E_IN2-	-LVDS differential data input
25	E_IN2+	+LVDS differential data input
26	E_CLK-	-LVDS differential data input
27	E_CLK+	+LVDS differential data input
28	E_IN3-	-LVDS differential data input
29	E_IN3+	+LVDS differential data input
30	GND	Ground
31	GND	Ground

32	VLED	LED voltage
33	VLED	LED voltage
34	VLED	LED voltage
35	VLED	LED voltage
36	LED_EN	LED enable 3.3V
37	LED_PWM	LED ADJ Frequence
38	GND	Ground
39	GND	Ground
40	GND	Ground

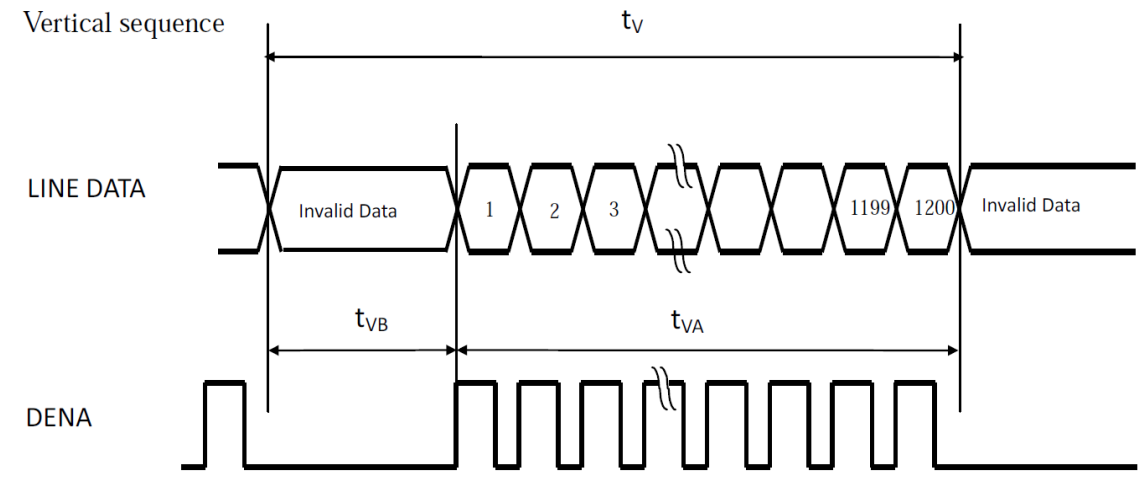
6. Interface Timings

6.1 LVDSTiming Characteristics

(a). LVDS input time sequence



(b) LCD input time sequence



(c) Data mapping

COLOR	INPUT DATA	R DATA								G DATA								B DATA							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
		MSB							LSB	MSB							LSB	MSB							LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	GREEN(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	GREEN(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
BLUE	BLUE(0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	BLUE(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

【Note】

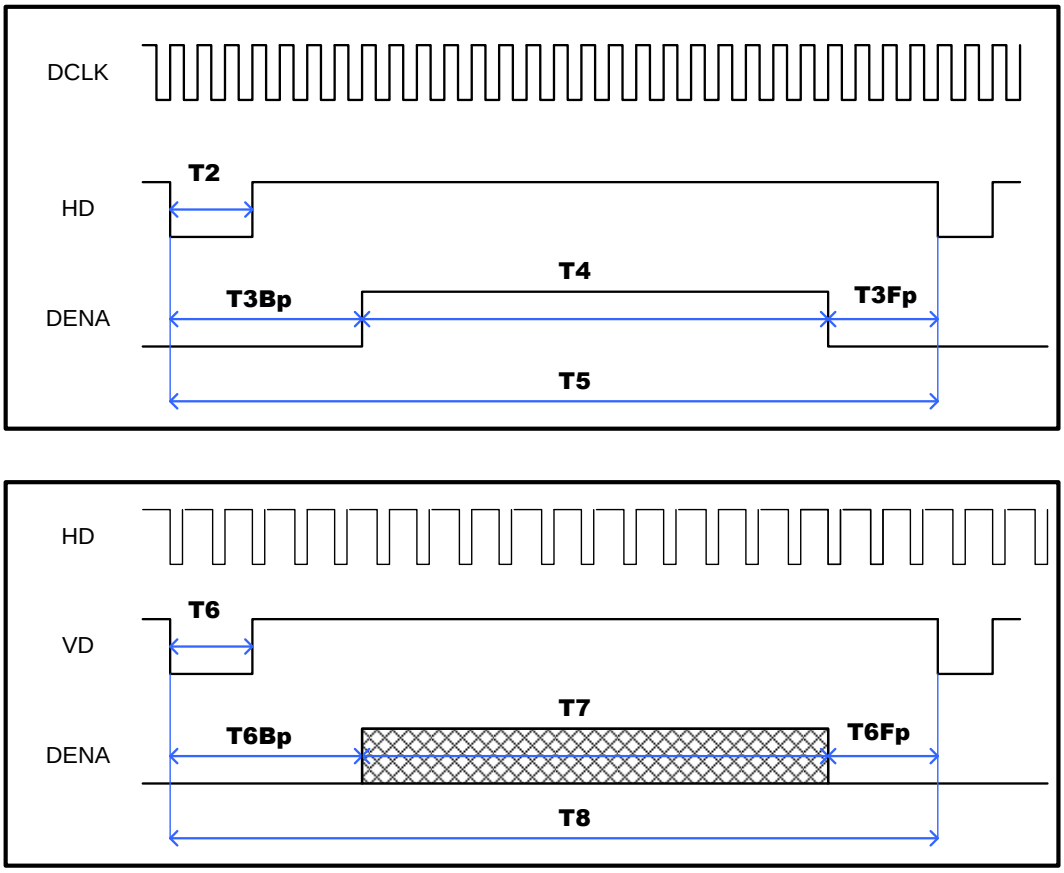
1) Gray level:

Color(n)：n is level order; higher n means brighter level.

2) DATA:

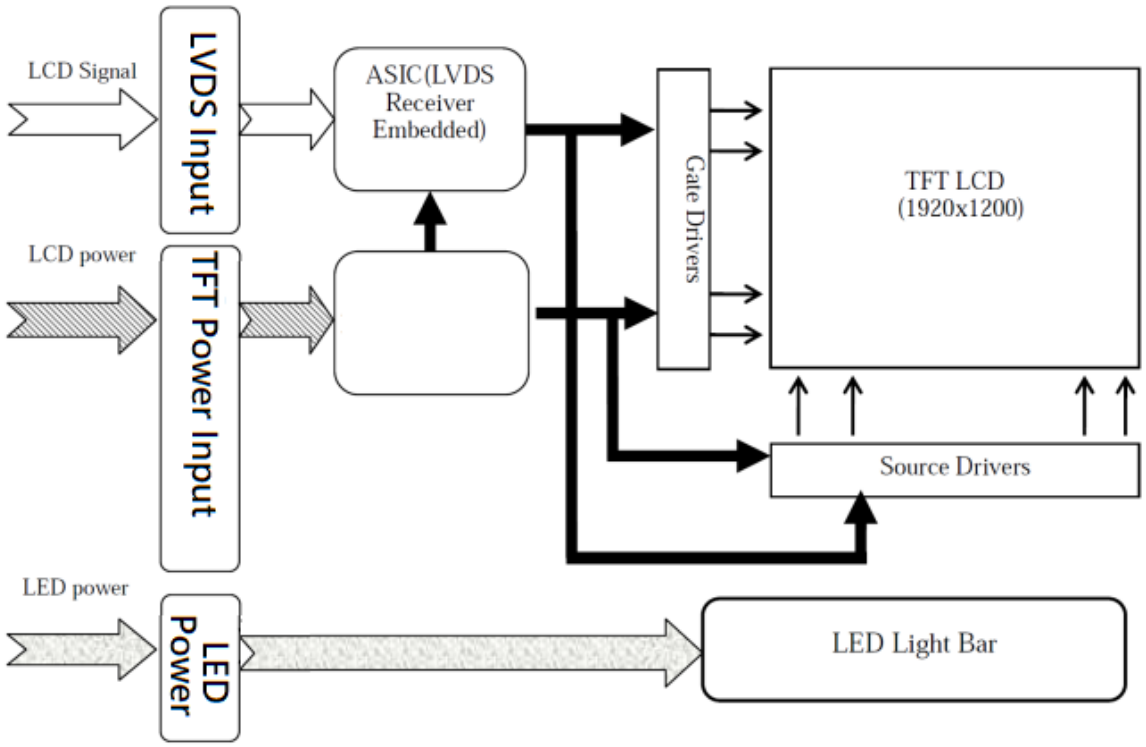
1: high，0: low

6.2 TTL Timing Table



ITEM	SYMBOL	MIN	TYP	MAX	UNIT
Clock Frequency	1/T1	--	130	--	MHz
Horizontal Blanking	T3Fp+T3Bp	154	280	1374	Clocks
Horizontal Display Period	T4		1920		Clocks
Horizontal total Period	T5	2074	2200	3294	Clocks
Vertical Blanking	T6Fp+T6Bp	10	50	260	Lines
Vertical Display Period	T7		1200		Lines
Vertical total Period	T8	1210	1250	1460	Lines

7. BLOCK DIAGRAM



8.0 Reliability Test and INCOMING INSPECTION STANDARD

The reliability test items and its conditions are shown below.

Test Item	Test Conditions	Note
High Temperature Operation	80°C , t=240 hrs	
Low Temperature Operation	-30°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	-30°C (30min) ~ 80 (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.

- 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.

9 USE PRECAUTIONS

9.1 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.

9.2 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.

9.3 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.

9.4 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.

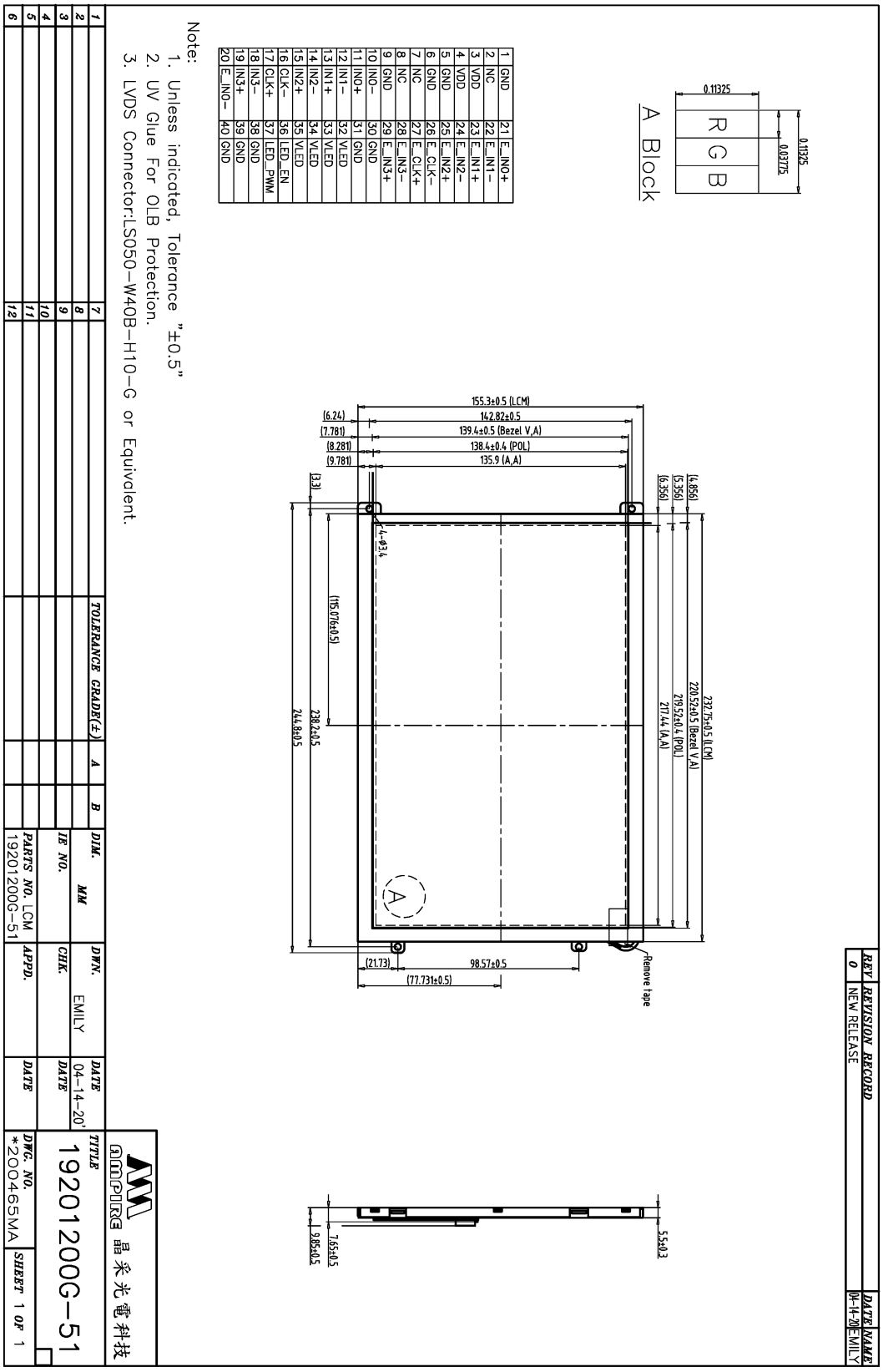
7) The characteristic of the semiconductor element changes when it is exposed to light emissions, therefore ICs on the LCD may malfunction if they receive light emissions. To prevent these malfunctions, design and assemble ICs so that they are shielded from light emissions.

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.

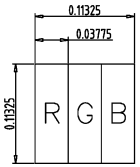
9.5Other

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 save
3) AMIPRE will provide one year warrantee for all products and three months warrantee for all repairing products.

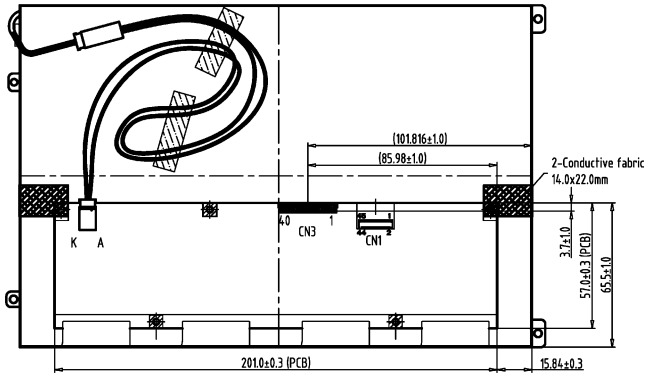
10.0 Outline Dimension



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	04-14-20	EMILY



A Block



Back View

1	GND	21	E_IN0+
2	NC	22	E_IN1−
3	VDD	23	E_IN1+
4	VDD	24	E_IN2−
5	GND	25	E_IN2+
6	GND	26	E_CLK−
7	NC	27	E_CLK+
8	NC	28	E_IN3−
9	GND	29	E_IN3+
10	IN0−	30	GND
11	IN0+	31	GND
12	IN1−	32	VLED
13	IN1+	33	VLED
14	IN2−	34	VLED
15	IN2+	35	VLED
16	CLK−	36	LED_EN
17	CLK+	37	LED_PWM
18	IN3−	38	GND
19	IN3+	39	GND
20	E_IN0−	40	GND

Note:
1. Unless indicated, Tolerance "±0.5"
2. UV Glue For OLB Protection.
3. LVDS Connector:LS050−W40B−H10−G or Equivalent.

1		7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. EMILY	DATE 04−14−20'
2		8							
3		9					IE NO.	CHK.	DATE
4		10							
5		11					PARTS NO. LCM−1 19201200G−51	APPD.	DATE
6		12							

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TITLE: 19201200G−51

DWG. NO. *200466MA

SHEET 1 OF 1

AMPIRE CO., LTD.

Date: 2020/04/30