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-19201200B1TZQW-00-B**
Approved by	
Date	

☐**Approved For Specifications**
☐**Approved For Specifications & Sample**

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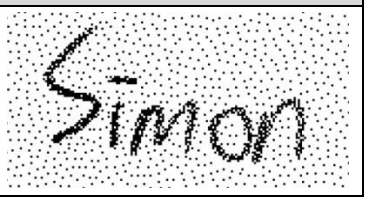
Approved by	Checked by	Organized by
		

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2018/05/25	--	New Release	Simon
2019/02/01	14	Update LED series and parallel diagram	Lawlite

1 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 10.1 inch diagonally measured active area with WUXGA resolutions (1920 horizontal by 1200 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. 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 1920RGB x 1200 resolution.(Max 150MHz / 2 Ch)
- 16.7M Colors (6bit + HiFRC)
- Data Enable Signal Mode
- Green Product (RoHS)

1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	10.1	Inch
Active Area	216.8064(W) x 135.504(H)	mm
Pixel Format	1920 (W) x RGB x 1200 (H)	-
Pixel Pitch	0.11292 (W) × 0.11292 (H)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally Black	-
White Luminance	1000 (Typ)	cd /m^2
Contrast Ratio	800 : 1 (Typ)	-
Input Voltage	3.3	V
Outline Dimensions	232.65(W) x 155.2(H) x 9.11(D)	mm
Support Color	16.7M (6bit + HiFRC)	-
LCM polarizer surface treatment	Anti-Glare	-

2 Absolute Maximum Ratings

Item	Symbol			Unit	Remark
		Min.	Max.		
Logic/LCD Driver Voltage	V_{in}	-0.3	+4.5	V	
LED Power Voltage	VLED	-0.3	13	V	
Operating Temperature	Top	-20	65	℃	
Storage Temperature	Tst	-30	80	℃	

3 Electrical Specifications

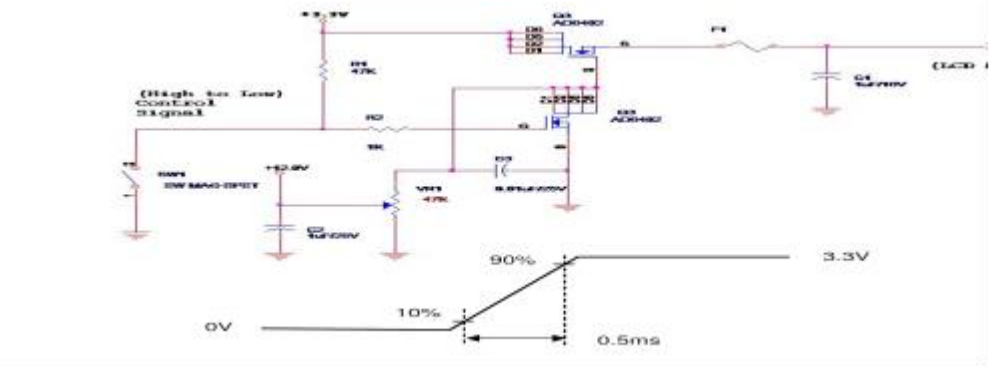
3.1 Electrical Specifications

Parameter		Min.	Typ.	Max.	Unit	Note
LCD Logic Power Supply Voltage	VDD	3.0	3.3	4.2	V	
LCD Logic Power Supply Current	IDD	-	T.B.D	-	mA	Note1 VDD=3.3V 25℃
LED Driver Power Voltage	VLED	-	12	-	V	
LED Driver Power Current	I_{LED}(VLED=12V)	-	880	--	mA	Ta=25℃
Back-light LED Voltage	VBL	-	22	24	V	
Back-light LED Current	IBL	-	360	-	mA	
PWM Frequency for LED Driver	LED_PWM	100	-	20K	Hz	
IRush Current				T.B.D	mA	Note3.
EN High Level	VEN Rising	2.4			V	
EN Low Level	VEN Falling			0.7	V	
PWMI Input High Level	-	2.4		VDD	V	
PWMI Input Low Level	-	0		0.7	V	

Note1：The supply voltage is measured and specified at the interface connector of LCM. (Test Pattern : White)

Note2：PBL is calculated value for reference.This value is without LED driver efficiency .

Note3:



4 Optical Specifications

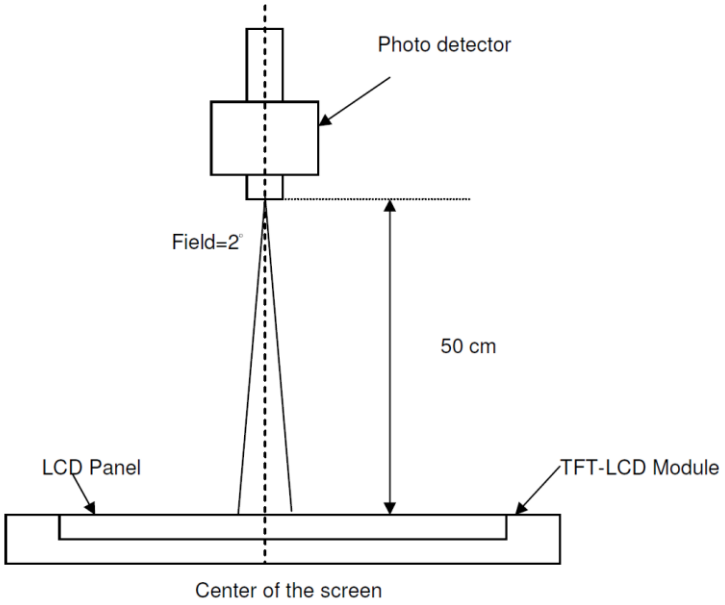
The optical characteristics are measured under stable conditions as following notes.

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR>10）	Horizontal	θ_L	80	85	-	degree	Note1
		θ_R	80	85	-		
	Vertical	θ_T	80	85	-		
		θ_B	80	85	-		
Contrast Ratio	Center		600	800	-	-	Note2
Response Time	Rising + Falling		-	25	35	ms	Note5
Color Chromaticity (CIE1931)	Red	x	Typ. -0.05	0.593	Typ. +0.05	-	Note3
	Red	y		0.341		-	
	Green	x		0.324		-	
	Green	y		0.589		-	
	Blue	x		0.154		-	
	Blue	y		0.123		-	
	White	x		0.313		-	
	White	y		0.329		-	
White Luminance	Center		800	1000	-	cd/m^2	Note4
Luminance Uniformity	U		75	-	-	%	Note4
Cross Talk	CT	Θ=0	-	-	2.0	%	Note6

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) It's for 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

Luminance of white is defined as luminance values of 9 points across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown Figure 1 for a total of the measurements per display.

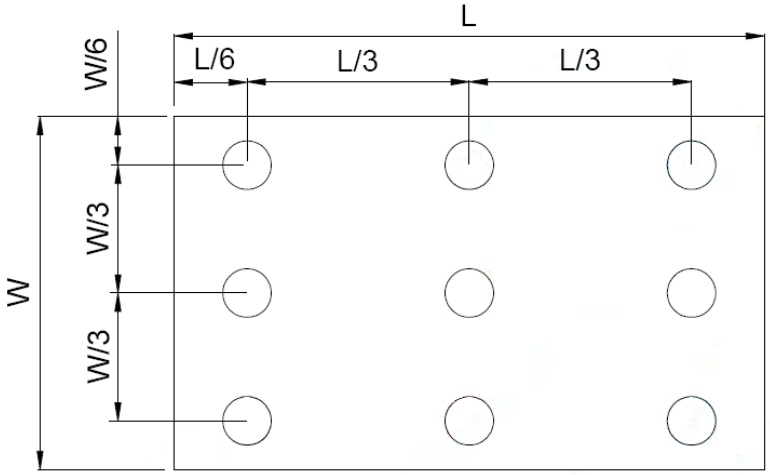


Figure 1. White Luminance and Uniformity Measurement Location(9 points)

$$Y_W = \frac{Sum\ of\ 9\ Points\ Luminance}{9}$$

$$\Delta Y9 = \frac{Min\ Luminance\ of\ 9\ points}{Max\ Luminance\ of\ 9\ points} \times 100\%$$

LED Condition → Duty Ratio 100%, LED current 360mA

Note **5**
The electro-optical response time measurements shall be made as Figure 2 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

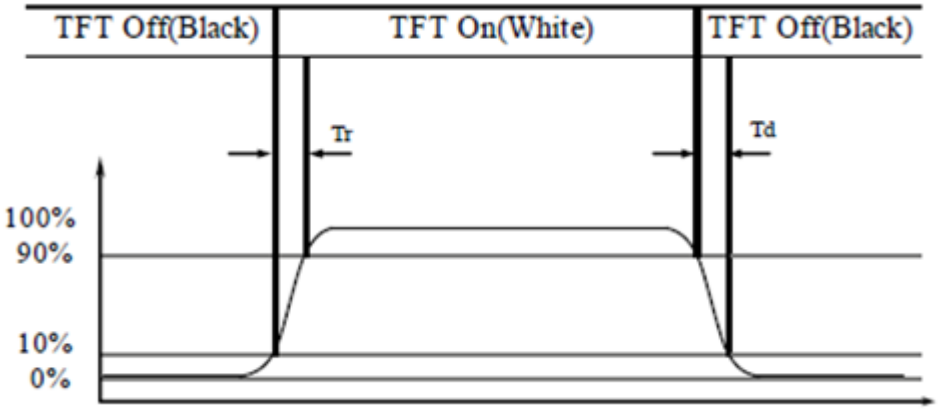


Figure 2. Response Time Testing

Note 6
Cross-Talk of one area of the LCD surface by another shall be measured by comparing the luminance (YA) of a 25mm diameter area, with all display pixels set to a gray level, to the luminance(YB) of that same area when any adjacent area is driven dark (Refer to Figure 3).

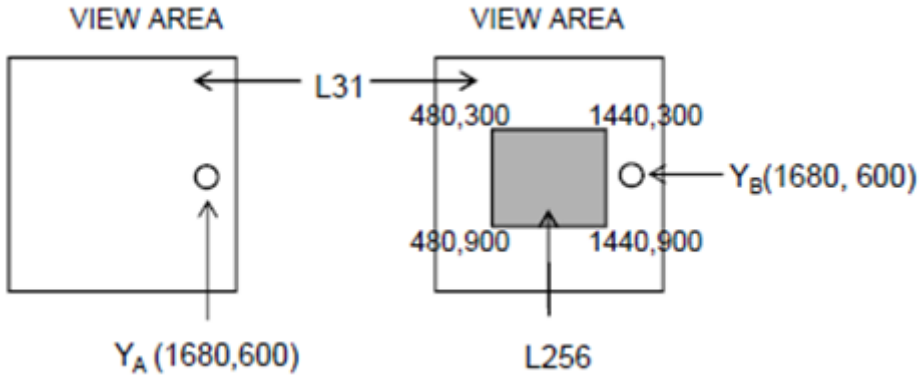


Figure 3. Cross Modulation Test Description

$$Cross - Talk(\%) = \left|\frac{Y_B - Y_A}{Y_B}\right| \times 100$$

Where:
Y_A = Initial luminance of measured area (cd/m^2)
Y_B = Subsequent luminance of measured area (cd/m^2)
The location measured will be exactly the same in both patterns.

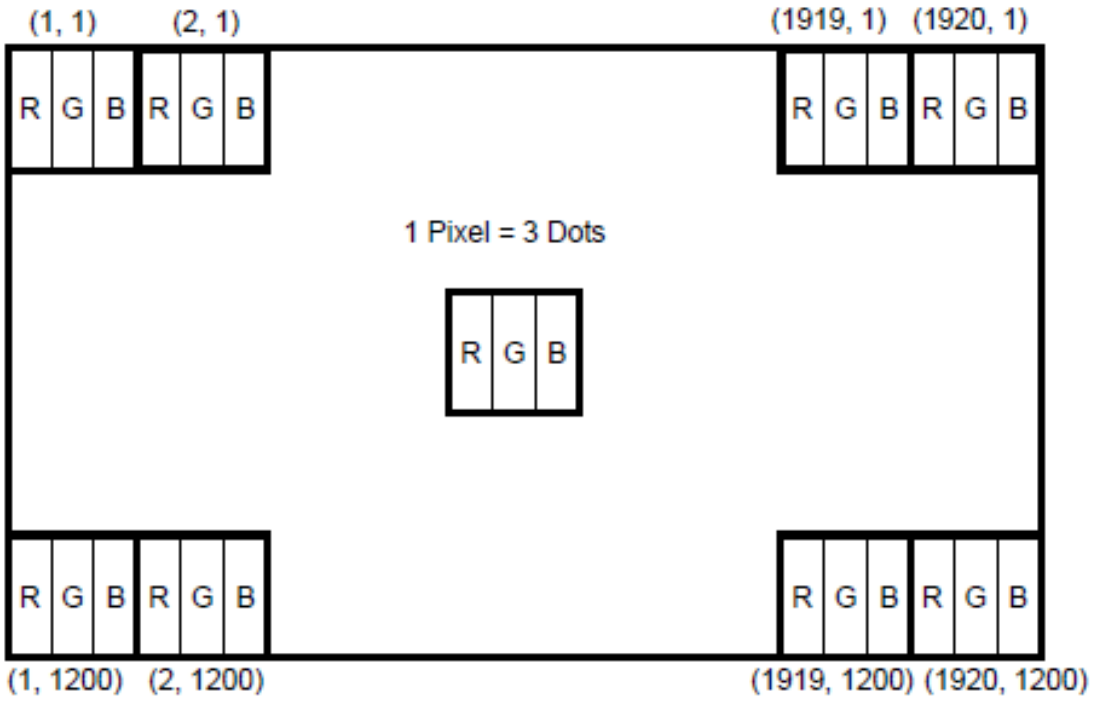
5 Interface Connections

5.1 Electrical Interface Connection

Pin #	Signal Name	Description
1	GND	Ground
2	NC	Not Connect
3	VDD	Power Supply
4	VDD	Power Supply
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 clock input
17	CLK+	+LVDS differential clock 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 clock input
27	E_ CLK +	+LVDS differential clock input
28	E_IN3-	-LVDS differential data input
29	E_IN3+	+LVDS differential data input

30	GND	Ground
31	GND	Ground
32	VLED	LED Power Supply(12V)
33	VLED	LED Power Supply(12V)
34	VLED	LED Power Supply(12V)
35	VLED	LED Power Supply(12V)
36	LED_EN	LED Enable Pin：High→Enable (Typ:3.3V)
37	LED_PWM	PWM Signal for LED Dimming Control
38	GND	Ground
39	GND	Ground
40	GND	Ground

5.2 Data Input Format

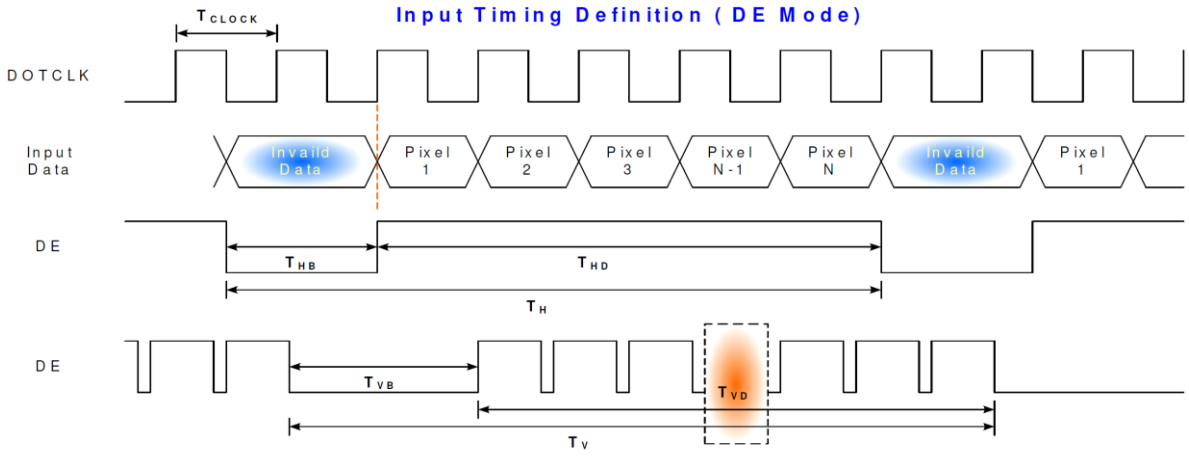


6. Interface Timings

6.1 Timing Characteristics

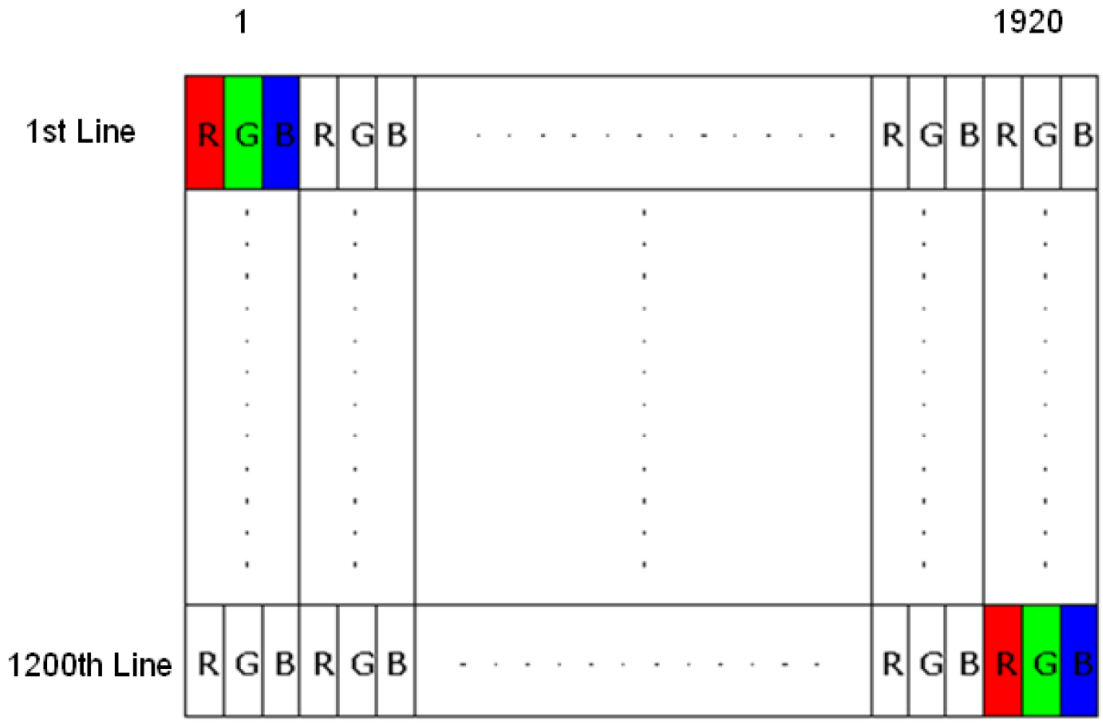
Parameter		Symbol	Min.	Typ.	Max.	Unit
Frame Rate		---	---	60	---	Hz
Clock frequency		1/ T_{Clock}	---	150	---	MHz
Vertical Section	Period	T_V	---	1212	---	T_{Line}
	Active	T_{VD}	1200			
	Blanking	T_{VB}	---	12	---	
Horizontal Section	Period	T_H	---	2058	---	T_{Clock}
	Active	T_{HD}	1920			
	Blanking	T_{HB}	---	138	---	

6.2 Timing diagram



7 Pixel Format Image

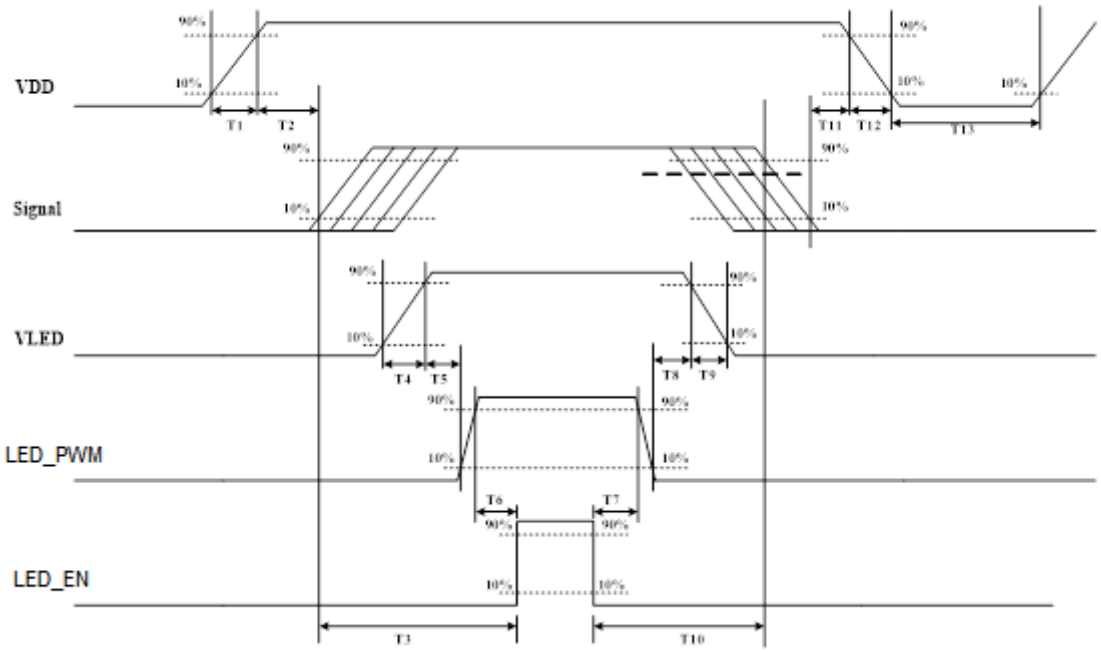
Following figure shows the relationship of the input signals and LCD pixel format.



8 Power Sequence

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown below.

VDD power and LED on/off sequence are as follows. Interface signals are also shown in the chart. Signal shall be Hi-Z state or low level when VDD is off.

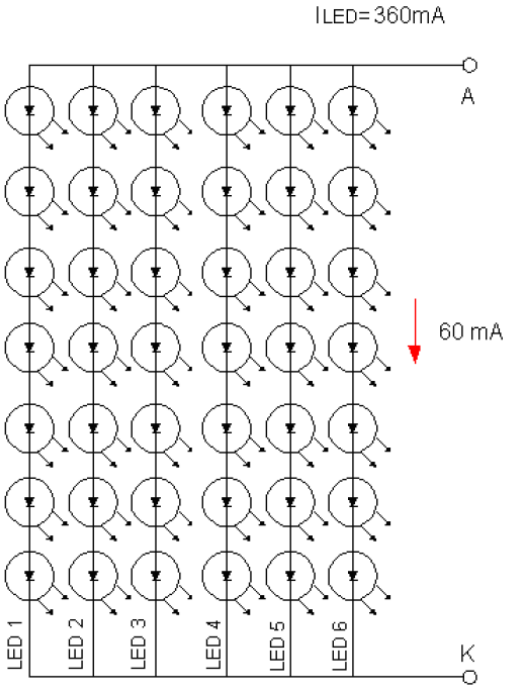


Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	0	40	50	[ms]
T3	200	-	-	[ms]
T4	0.5	-	10	[ms]
T5	10	-	-	[ms]
T6	10	-	-	[ms]
T7	0	-	-	[ms]
T8	10	-	-	[ms]
T9	-	-	10	[ms]
T10	110	-	-	[ms]
T11	0.5	16	50	[ms]
T12	-	-	100	[ms]
T13	1000	-	-	[ms]

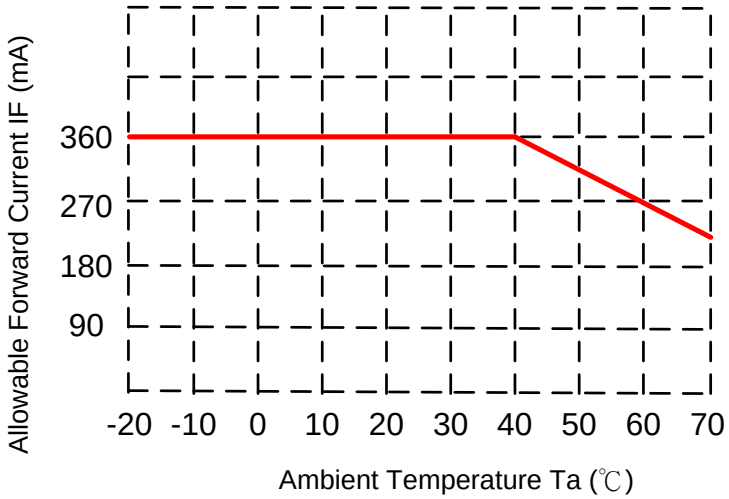
9. LED Driving Conditions

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	CONDITION
LED Backlight Voltage	V_{BL}	--	22	24	V	For reference
LED Backlight Current	I_{BL}	-	360	--	mA	Ta=25℃
LED Life Time		--	50K	-	KHr	Note*

Note* : Brightness to be decreased to 50% of the initial value. Ta=25℃



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



10 Reliability Test

The reliability test items and its conditions are shown below.

Test Item	Test Conditions	Note
High Temperature Operation	65±3°C , t=240 hrs	
Low Temperature Operation	-20±3°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	40°C, 90% RH , 240 hrs	1,2
Thermal Shock Test	-20°C (30min) ~ 60°C (30min) , 27 cycles	1,2
Vibration Test (Packing)	Sweep frequency : 10~55~10 Hz/1min Amplitude : 0.75mm Test direction : X.Y.Z/3 axes Duration : 30 min/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) Note 3 : The module shouldn't be tested more than one condition, and all the test conditions are independent.

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

11 Use Precautions

11.1 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.

11.2 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.

11.3 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.

11.4 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.

11.5 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.

11.6 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.

11.7 Mechanism

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

11.8 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.

11.9 Strong Light Exposure

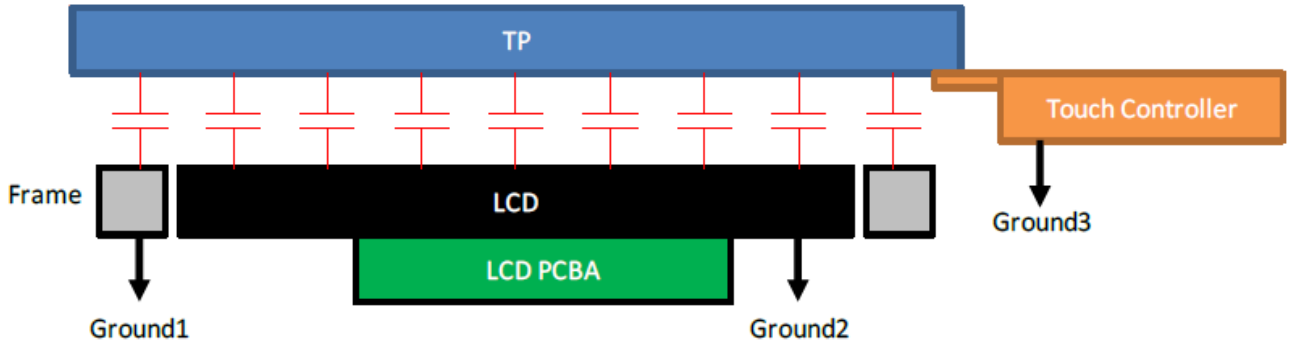
The module shall not be exposed under strong light such as direct sunlight. Otherwise, display characteristics may be changed.

11.10 Disposal

When disposing LCD module, obey the local environmental regulations.

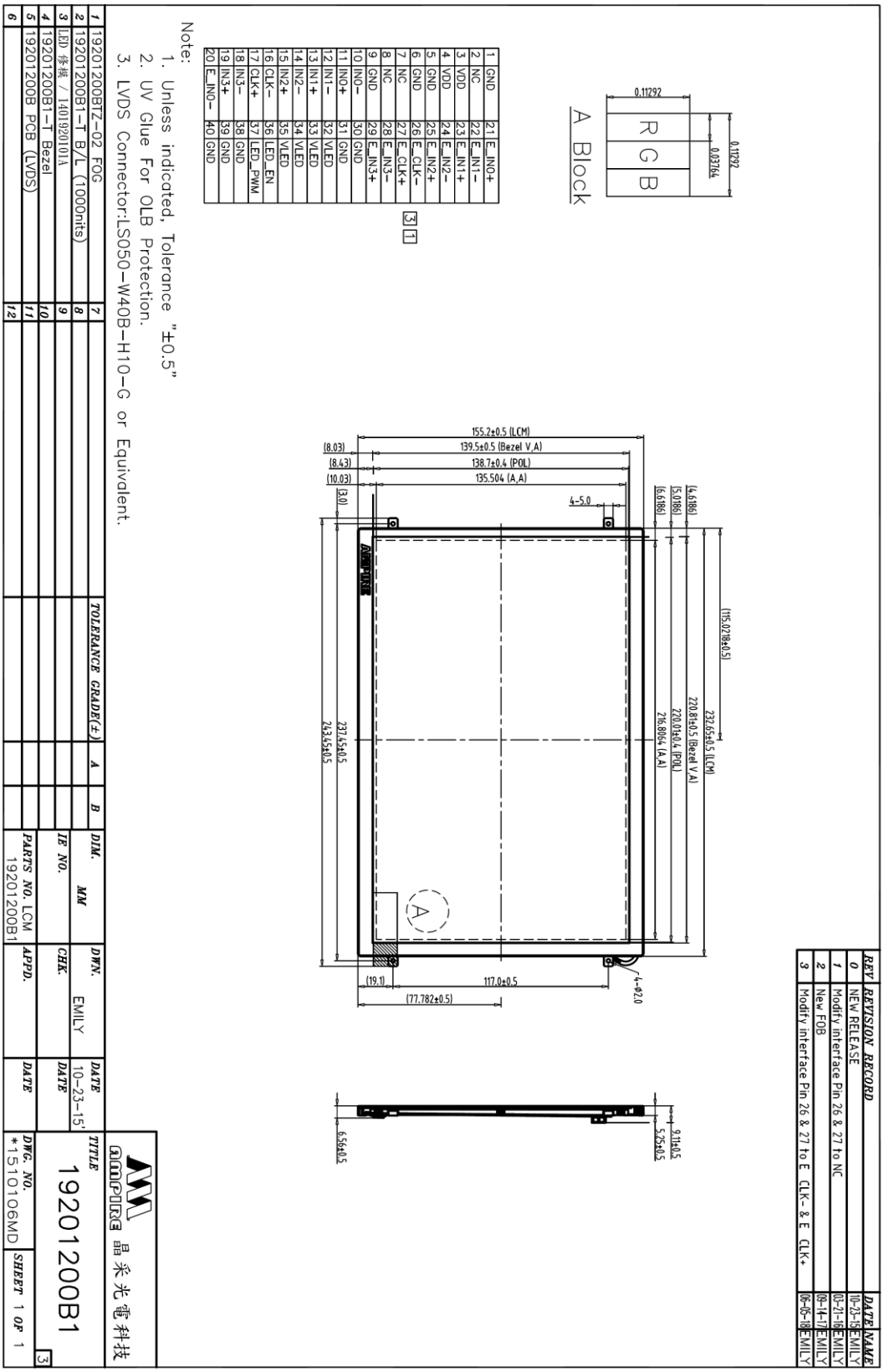
11.11 Others

1. 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.
2. TP needs to work in environment with stable stray capacitance. In order to minimize the variation in stray capacitance, all conductive mechanical parts must not be floating. Intermittent floating any conductive part around the touch sensor may cause significant stray capacitance change and abnormal touch function. It is recommended to keep all conductive parts having same electrical potential as the GND of the touch controller module.

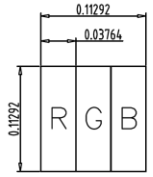


GND1, GND2 and GND3 should be connected together to have the same ground

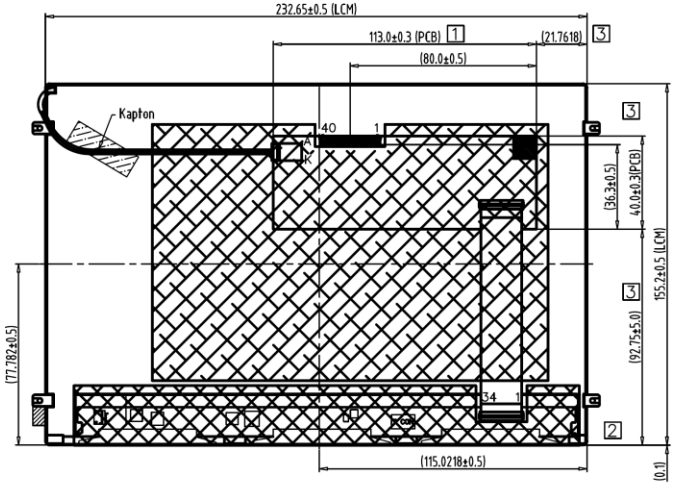
12 Outline Dimension



REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	10-23-15	EMILY
1	Modify interface Pin 26 & 27 to NC	03-21-16	EMILY
2	Modify 37.75 to (37.75±5.0)	09-14-17	EMILY
3	Modify interface Pin 26 & 27 to E_CLK- & E_CLK+	06-05-18	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

3 1

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

1	19201200BTZ-02 FOG	7		TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. EMILY	DATE 10-23-15'	TITLE 19201200B1 3
2	19201200B1-T B/L (1000nits)	8					IE NO.	CHK.	DATE	
3	LED 修模 / 1401920101A	9								
4	19201200B1-T Bezel	10								
5	19201200B PCB (LVDS)	11					PARTS NO. LCM-19201200B1	APPD.	DATE	DWG. NO. *1510107MD / SHEET 1 OF 1
6		12								

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AMPIRE CO., LTD.

Date: 2019/02/01