晶采光電科技股份有限公司
AMPIRE CO., LTD.

SPECIFICATIONS FOR
LCD MODULE

CUSTOMER	Reference only
CUSTOMER PART NO.	
AMPIRE PART NO.	Digital 4.0 inch LCM
APPROVED BY	
DATE	2005/09/26

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

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2005/09/26	-	New Release	LEE

1. INTRODUCTION

Ampire Display Module 4 inch 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 and a backlight system . This TFT-LCD has a high resolution (480(R.G.B) X 272) and can display up to 16.7M colors .

1-1. Features

- 16:9 diagonal configuration
- 8 Bits color driver with 1 channel TTL interface
- High brightness

1-2. Applications

- PMP
- GPS
- GAME

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display resolution(dot)	480RGB (W) x 272(H)	dots
Active area	87.84 (W) x 49.776 (H)	mm
Pixel pitch	0.183 (W) x 0.183 (H)	mm
Color configuration	R.G.B Vertical stripe	
Overall dimension	98.3(W)x62.6(H)x5.5(D)---(Typ)	mm
Weight	TBD	g
Surface treatment	Anti-glare	
Brightness	180(Typ)	cd/m^2
Contrast ratio	300 : 1	
Backlight unit	LED	
Display color	16.7M	colors

3. BLOCK DIAGRAM

480 X RGB X 272

GD   SD   SD   SD

FPC

LED
CONNECTOR

LED
PWM   DC/DC   PCB   Tcon

1   50
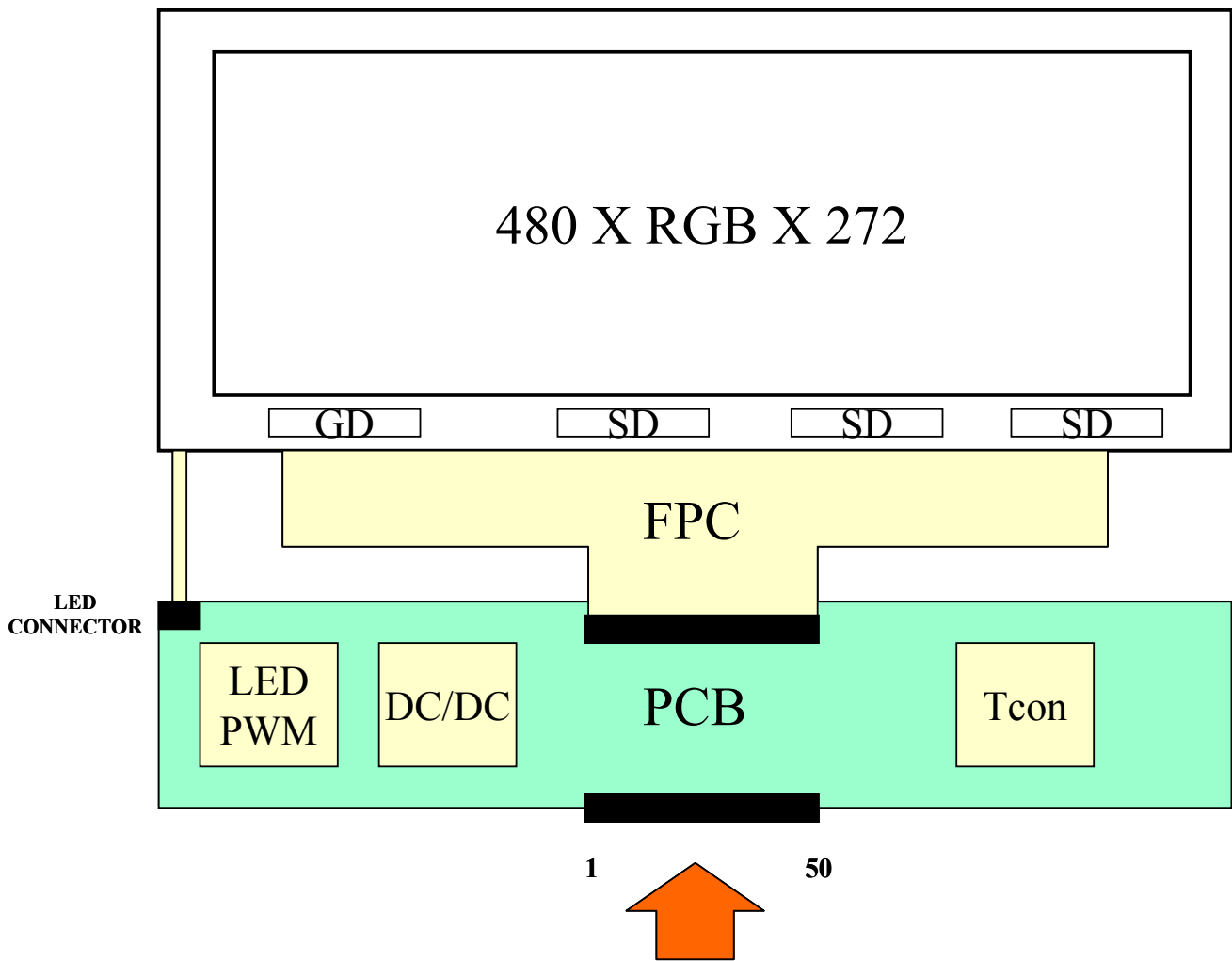
4. INTERFACE

Pin no	Symbol	Function
1	GND LED	Ground For LED PWM IC
2	VLED	Voltage For LED PWM IC
3	VLED	Voltage For LED PWM IC
4	VCC	Power Input (3.3V)
5	VCC	Power Input (3.3V)
6	R0	Red data (LSB)
7	R1	Red data
8	R2	Red data
9	R3	Red data
10	GND	Ground
11	R4	Red data
12	R5	Red data
13	R6	Red data
14	R7	Red data (MSB)
15	GND	Ground
16	G0	Green data (LSB)
17	G1	Green data
18	G2	Green data
19	G3	Green data
20	GND	Ground
21	G4	Green data
22	G5	Green data
23	G6	Green data
24	G7	Green data (MSB)
25	GND	Ground
26	B0	Blue data (LSB)
27	B1	Blue data
28	B2	Blue data
29	B3	Blue data
30	GND	Ground
31	B4	Blue data
32	B5	Blue data
33	B6	Blue data
34	B7	Blue data (MSB)
35	GND	Ground
36	DUMMY	DUMMY
37	GND	Ground
38	HS	HSYNC
39	GND	Ground
40	VS	VSYNC
41	GND	Ground
42	DE	Data Enable
43	GND	Ground
44	CLK	Dot Clock
45	GND	Ground
46	DUMMY	DUMMY
47	Vcom	Vcom For Testing
48	DUMMY	DUMMY
49	DUMMY	DUMMY
50	DUMMY	DUMMY

5. OPTICAL CHARACTERISTICS

Item		Symbol	Conditon	Min.	Typ.	Max.	Unit	Note
Response Time		$T_r + T_f$	$\Theta=\Phi=0°$	-	(30)	-	ms	(1)
Contrast ratio		CR		-	(300)	-	-	(2)(3)
Viewing Angle	Vertical	Θ	$CR\geqq 10$	-	(100)	-	Deg.	(5)
	Horizontal	Φ		-	(120)	-		
Luminance		L	$\Theta=\Phi=0°$	-	(180)	-	cd/m^2	(3)(4)
Luminance Uniformity		ΔL		-	TBD	-	%	(3)(4)
Color chromaticity	Red	Rx	$\Theta=\Phi=0°$	TBD	TBD	TBD	-	(3)
		Ry						
	Green	Gx		TBD	TBD	TBD		
		Gy						
	Blue	Bx		TBD	TBD	TBD		
		By						
	White	Wx		TBD	TBD	TBD		
		Wy						

NOTE :

● These items are measured by BM-5A(TOPCON) or CA-1000(MINOLTA) in the dark room (no ambient light)
● Brightness conditions : IL=6.0mA.

(1) Definition of Response Time (White-Black)
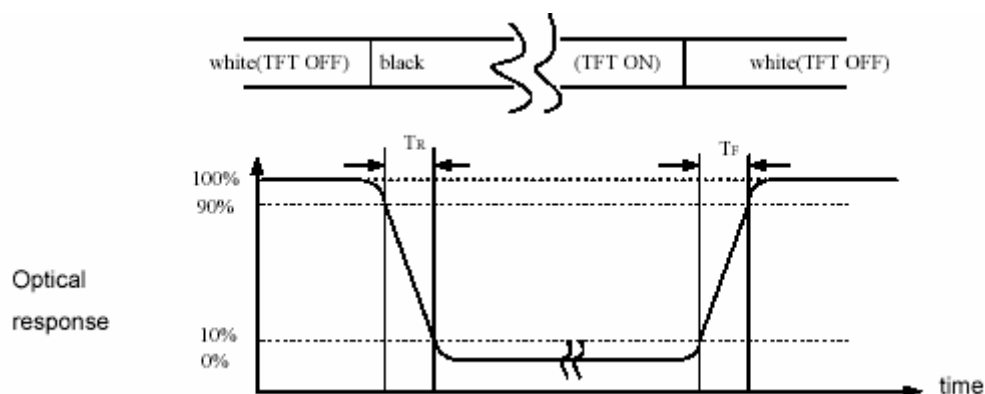
(2) Definition of Contrast Ratio
Measure contrast ratio on the below 5 points(refer to figurel,#1~#5point) and take the average value
Contrast ratio is calculated with the following formula :

Contrast Ratio(CR)=(White)Luminance of ON ÷ (Black)Luminance of OFF

(3) Definition of Luminance :

Measure white luminance on the same 5 points and take the average value
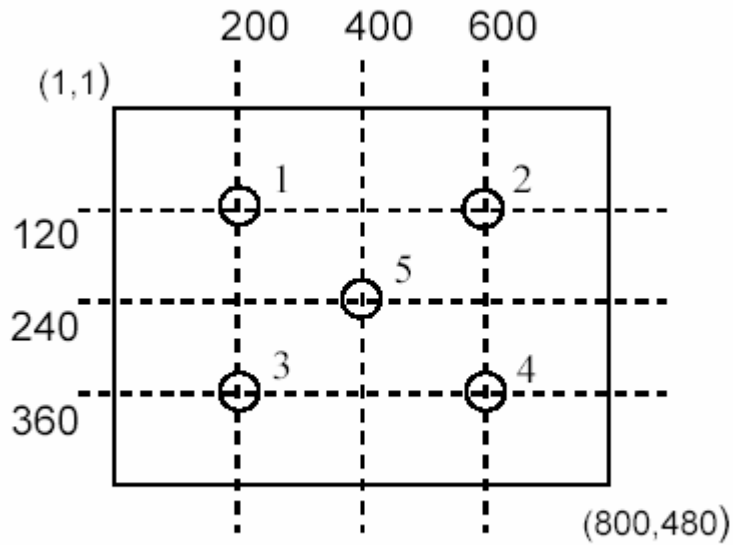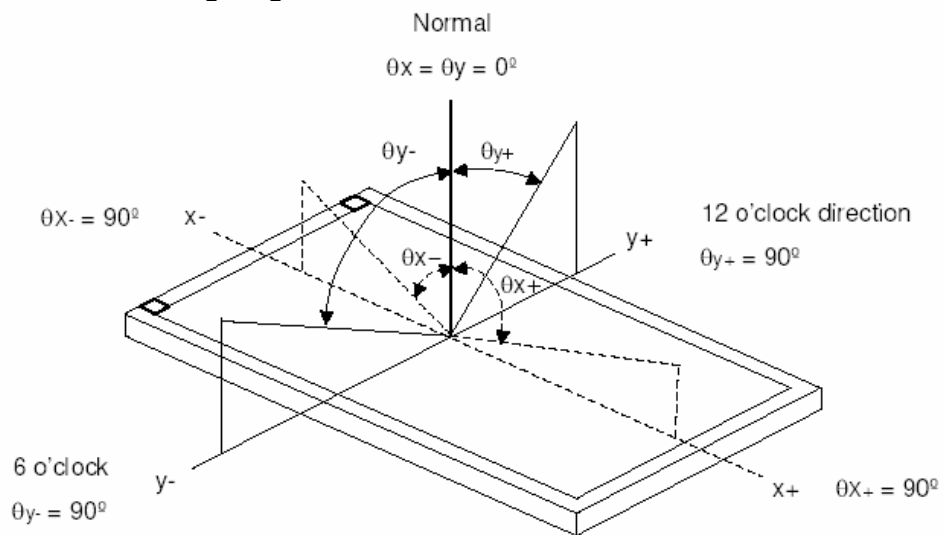

Fig.1 Measuring point

(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 :

ΔL =[L(MAX) / L(MIN) −1] X 100

(5) Definition of Viewing Angle

$$\Phi = (\Theta x+) + (\Theta x-) \qquad \Theta = (\Theta y+) + (\Theta y-)$$

6. RELIABILITY TEST CONDITIONS

ITEM	CONDITIONS	NOTE
HIGH TEMPERATURE OPERATION	(50℃ , 240Hrs)	
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	{ 40℃ , 90%RH , 240Hrs(No condensation) }	
HIGH TEMPERATURE STORAGE	(60℃ , 240Hrs)	
LOW TEMPERATURE OPERATION	(0℃ , 240Hrs)	
LOW TEMPERATURE STORAGE	(-20℃ , 1000Hrs)	
THERMAL SHOCK (No operation)	{ -20℃(1Hr) ~60℃(1Hr) 100Cycle }	

7. USE PRECAUTIONS

7-1 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.

(1) 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.

7-2 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

7-3 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.
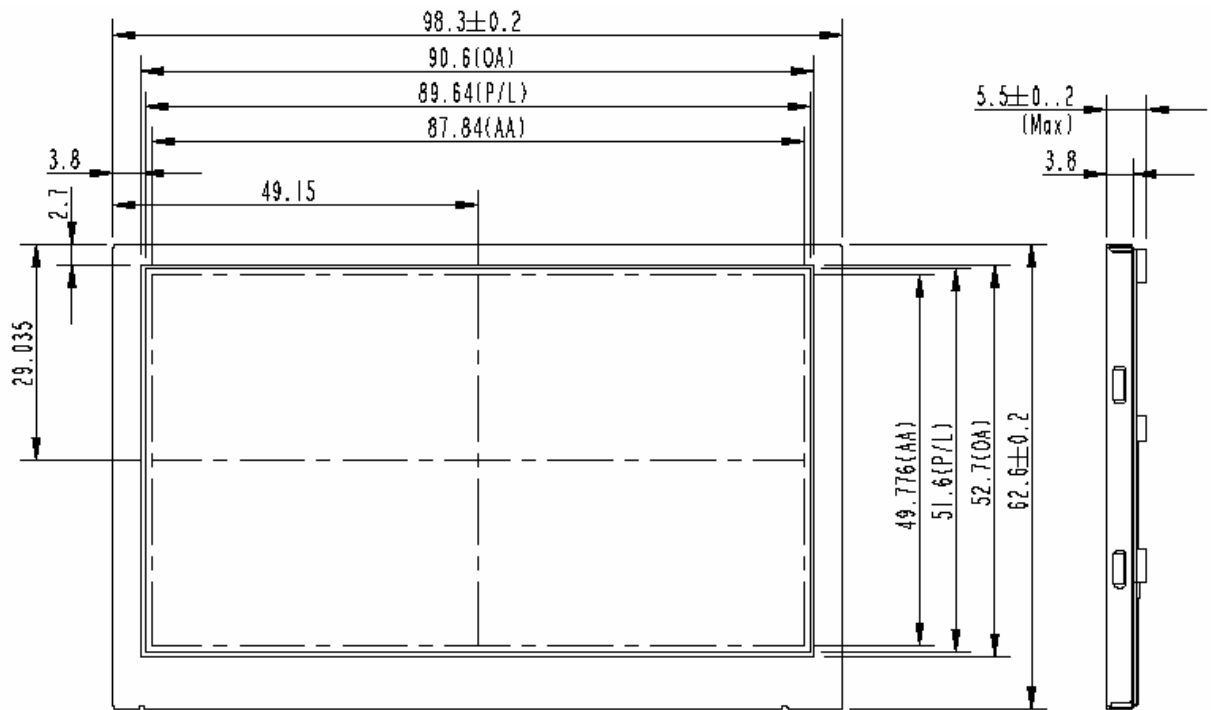
7-4 Operating precautions

(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.

7-5 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) The residual image may exist if the same display pattern is shown for hours. This residual image, however, disappears when another display pattern is shown or the drive is interrupted and left for a while. But this is not a problem on reliability.

8. OUTLINE DIMENSION

8-1 Front view(unit:mm)

8-2 Back view(unit:mm)