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-800480GTMQW-T05H**
APPROVED BY	
DATE	

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

AMPIRE CO., LTD.
2F., No.88, Sec. 1, Sintai 5th Rd., Sijhih City, Taipei County 221, Taiwan (R.O.C.)台北縣汐止市新台五路一段88號2樓(東方科學園區D棟)
TEL:886-2-26967269 , FAX:886-2-26967196 or 26967270

APPROVED BY	CHECKED BY	ORGANIZED BY
	Jack	
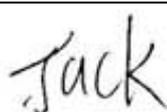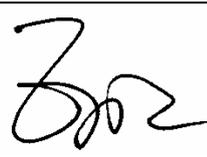
RECORD OF REVISION

Revision Date	Page	Contents	Editor
2008/11/20	-	New Release	Eric

1. FEATURES

(1) Construction : a-Si TFT-LCD with driving system, White LED Backlight and Touch Pane

(2) LCD type : Transmissive , Normally White

(3) Number of the Colors : 262K colors (R,G,B 6 bit digital each)

(4) RGB Interface 40 pin, support DE only mode.

(5) LCD Power Supply Voltage : 3.3Vand 5.0V single power input, built-in power supply circuit.

(6) LED driving circuit is built-in to provide PWM dimmer function.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display size (diagonal)	7.0	inch
Resolution	800 (W) x RGB x 480 (H)	dot
Display area	152.4 (W) x 91.44 (H)	mm
Pixel pitch	0.1905 (W) x 0.1905 (H)	mm
Overall dimension	165.0(W) x 104.0(H) x 7.06(D)	mm
Color configuration	R.G.B Vertical stripe	
Surface treatment	Antiglare	
View Direction (Gray Inversion)	6 o'clock	

3. ABSOLUTE MAXIMUM RATINGS

| Item	Symbol	Min.	Max.	Unit	Note
Power Supply for logic	Vcc	-0.5	5	V	
Input Signal Voltage	VI	-0.5	VCC + 0.5	V	(1)
Operating Temperature	Top	-10	60	℃	(2)
Storage Temperature	Tstg	-20	70	℃	

Note 1: Hsync, Vsync, DEN, DCLK, R0~R5, G0~G5, B0~B5

Note 2: Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

4. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Front	θ f	CR≧10	--	60	--	deg.	(1)(2)(3)
	Back	θ b		--	60	--		
	Left	θ l		--	70	--		
	Right	θ r		--	70	--		
Contrast ratio		CR	Θ=Φ=0°	200	250	--	--	(1)(3)
Response Time		T_r	Θ=Φ=0°	--	20	30	ms	(1)(4)
		T_f					ms	(1)(4)
Color chromaticity	Red	Rx	Θ=Φ=0°	0.566	0.616	0.666	--	(1)
		Ry		0.302	0.352	0.402		
	Green	Gx		0.308	0.358	0.408		
		Gy		0.518	0.568	0.618		
	Blue	Bx		0.096	0.146	0.196		
		By		0.086	0.136	0.186		
	White	Wx		0.296	0.346	0.396		
		Wy		0.328	0.378	0.428		
Luminance		L	Θ=Φ=0°	--	280	--	cd/m²	(1)(5)
Luminance Uniformity		ΔL	Θ=Φ=0°	70	--	--	%	(1)(5)(6)

Note 1: Ta=25°C. To be measured on the center area of panel after 10 minutes operation.

Note 2: Definition of Viewing Angle
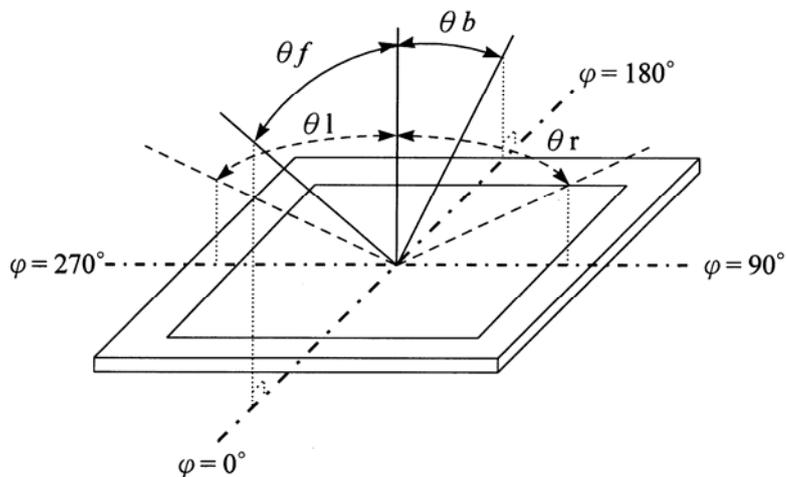
Note 3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio(CR)}= \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector Output when LCD is at "Black" state}}$$

Note 4: Definition of response time:

The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black" (rising time) respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.
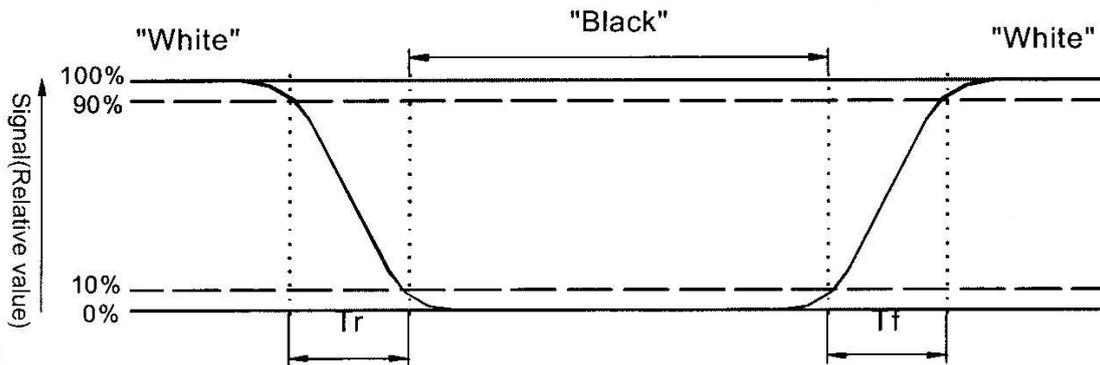
Note 5 : Luminance is measured at point 5 of the display.
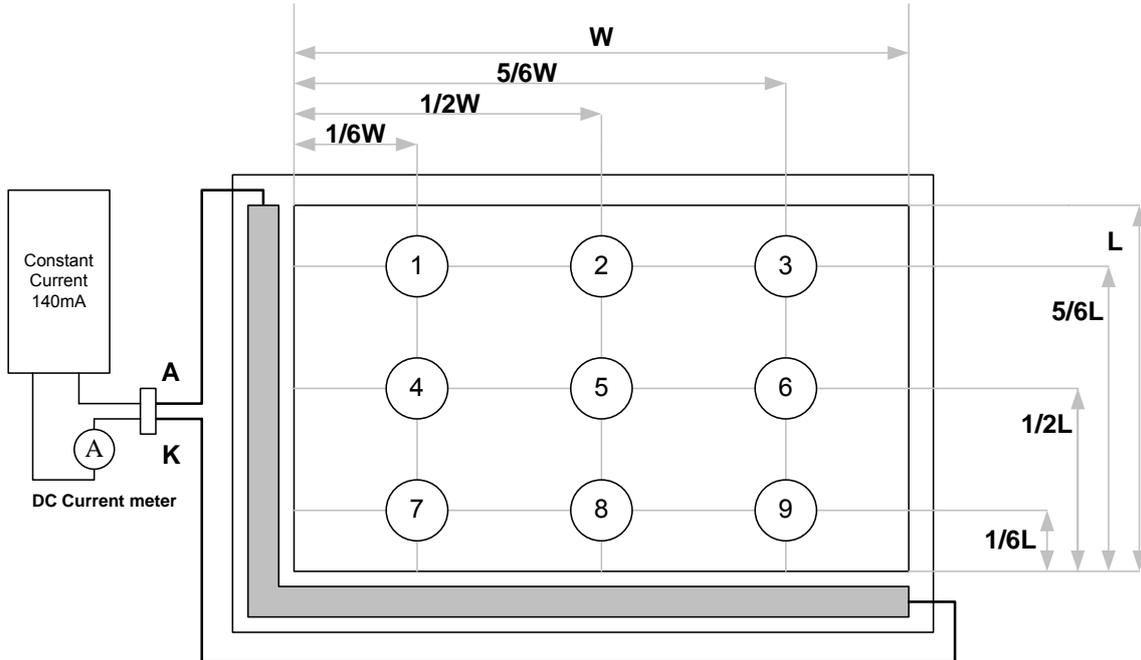
Note 6 : Definition of Luminance Uniformity

$$\Delta L = [\text{ L(min.) of 9 points} / \text{L(max.) of 9 points}] \times 100\%$$

5. ELECTRICAL CHARACTERISTICS

5.1 TFT LCD Module voltage

| Item		Symbol	Min.	Typ.	Max.	Unit	Note
Power supply voltage For LCD		Vcc	3.0	3.3	3.6	V	
Power Supply Voltage For LED		VDD	3	5	5.5	V	
Input voltage for logic	H Level	V_{IH}	0.7 VDD	--	VDD	V	(1)
	L Level	V_{IL}	0	--	0.3 VDD	V	
Power Supply Current For LED		IDD	--	460	--	mA	VDD=3.3; Efficiency of LED Driver IC is 75%
			--	310	--	mA	VDD=5.0; Efficiency of LED Driver IC is 75%.

Note 1: Hsync, Vsync, DEN, DCLK, R0~R5, G0~G5, B0~B5

Note 2: fV =60Hz , Ta=25℃ , Display pattern : All Black

VCC –dip codition:
1) When 2.7 V≤VCC<3.0V，td≤10ms.
2) VCC＞3.0V，VCC-dip condition should be same as VCC-turn-on condition.
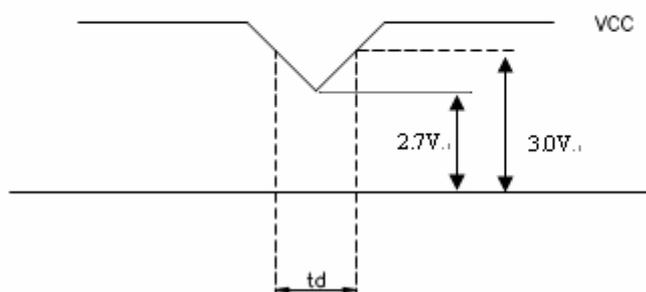
5.2 Touch Panel Specification

Parameter	Condition	Standard Value
Terminal Resistance	X Axis	180 ~ 670 Ω
	Y Axis	140 ~ 560 Ω
Insulating Resistance	DC 25 V	More than 20MΩ
Linearity	--	$\pm$1.5 %
Notes life by Pen	Note a	100,000 times(min)
Input life by finger	Note b	1,000,000 times (min)

Note A .

Notes area for pen notes life test is 10 x 9 mm.

Size of word is 7.5 x 6.75

Shape of pen end : R0.8

Load : 250 g

Note B

By Silicon rubber tapping at same point

Shape of rubber end : R8

Load : 250g

Frequency : 5 Hz

Interface

| No.	Symbol	Function
1	Y2	Touch Panel Top Signal in Y Axis
2	X2	Touch Panel Right Signal in X Axis
3	Y1	Touch Panel Bottom Signal in Y Axis
4	X1	Touch Panel Left Signal in X Axis

6. BLOCK DIAGRAM

800 (RGB)×480 TFT LCD Panel

Timing
Controller

DC/DC
Converter

R[5:0]
G[5:0]
B[5:0]

DE

CLK

LED Driver
Circuit

Adj
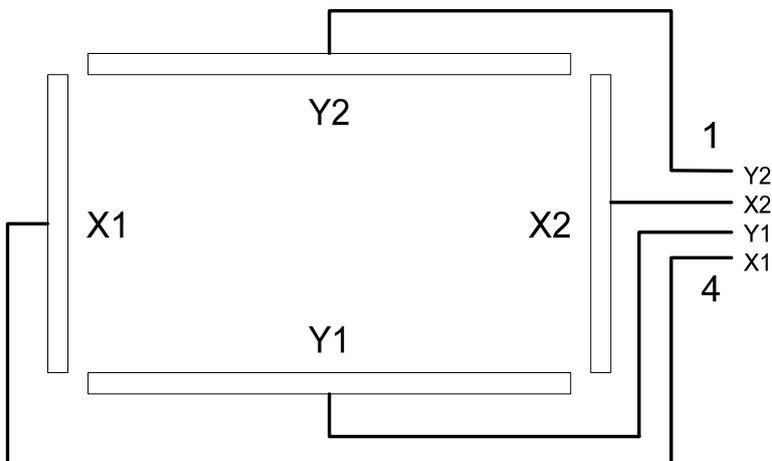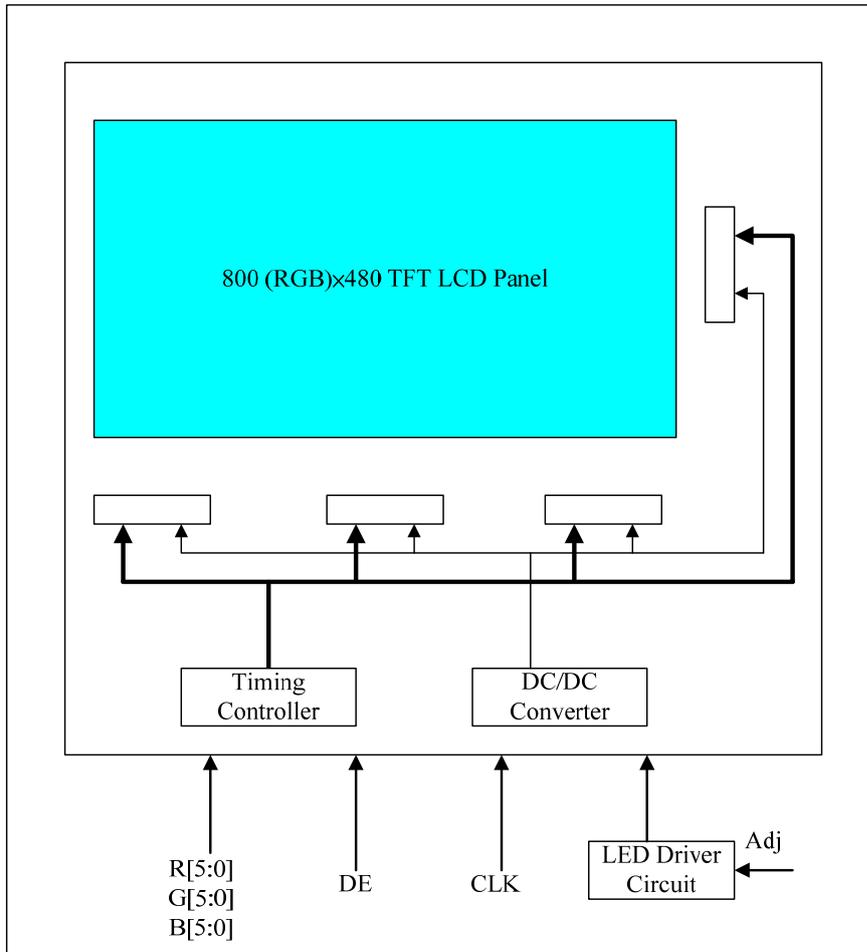
7. INTERFACE PIN ASSIGNMENT

Pin No	Symbol	Function
1	GND	Ground
2	GND	Ground
3	ADJ	Brightness control for LED B/L
4	VDD	Power supply for LED Driver circuit
5		
6		
7	VCC	Power supply (3.3V)
8		
9	DE	Data Enable Timing Signal
10	GND	Ground
11	GND	Ground
12	GND	Ground
13	B5	Blue data (MSB)
14	B4	Blue data
15	B3	Blue data
16	GND	Ground
17	B2	Blue data
18	B1	Blue data
19	B0	Blue data (LSB)
20	GND	Ground
21	G5	Green data (MSB)
22	G4	Green data
23	G3	Green data
24	GND	Ground
25	G2	Green data
26	G1	Green data
27	G0	Green data (LSB)
28	GND	Ground
29	R5	Red data (MSB)
30	R4	Red data
31	R3	Red data
32	GND	Ground
33	R2	Red data
34	R1	Red data
35	R0	Red data (LSB)
36	GND	Ground
37	GND	Ground
38	DCLK	Data Clock
39	GND	Ground
40	GND	Ground

Remark:

1. ADJ adjust brightness to control Pin , Pulse duty the bigger the brighter.
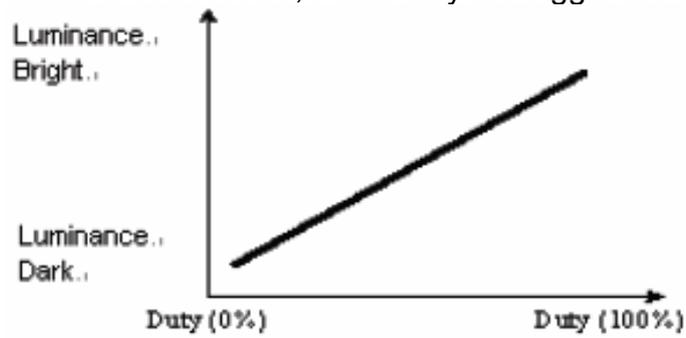
2. ADJ signal = 0 ~ 3.3V , operation frequency : 20±10KHz
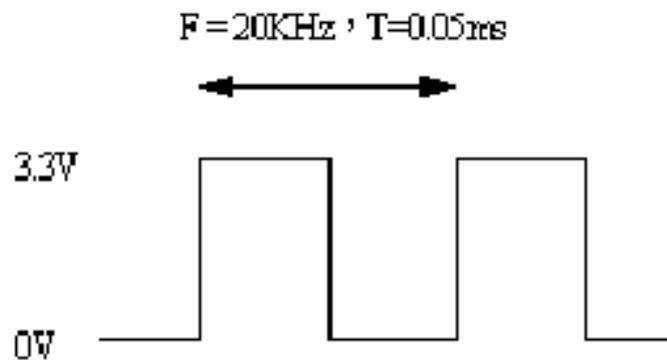
3. VSS Pin must ground contact, can not be floating.

8. INTERFACE TIMING

WVGA mode (800x480)

Signal	Item	Symbol	Min	Type	Max	Unit
Clock Frequency	1/tclk	1/tclk	25	37	50	Mhz
Vertical Section	Period	Tv	481	513	1023	Th
	Active	Tdisp(v)	480	480	480	Th
Horizontal Section	Period	Th	832	900	1054	Tclk
	Active	Tdisp(h)	800	800	800	Tclk

9. DISPLAYED COLOR AND INPUT DATA

	Color & Gray Scale	DATA SIGNAL																	
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(0)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green(0)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue(0)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	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
Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(61)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(31)	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(1)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(0)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(61)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(31)	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(1)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(0)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(62)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(61)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(31)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue(0)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

10. QUALITY AND RELIABILITY

10.1. Test Conditions

Tests should be conducted under the following conditions :
Ambient temperature   : $25 \pm 5°C$
Humidity   : $60 \pm 25\%$ RH.

10.2. Sampling Plan

Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

10.3. Acceptable Quality Level

A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant bearing on its effective use or operation.

10.4. Appearance

An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under florescent light. The inspection area of LCD panel shall be within the range of following limits.


ZONE A active area

ZONE B viewing area
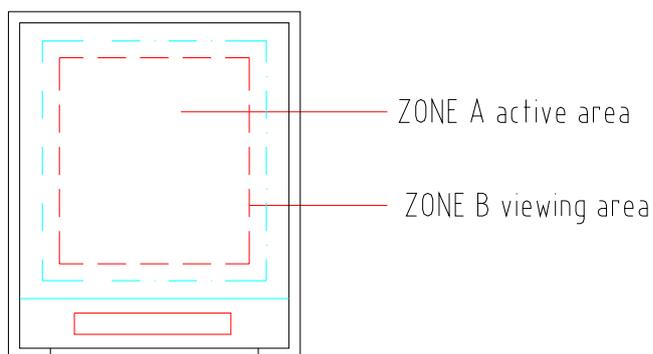
10.5. Incoming Inspection Standard

Defect Type			Limit						Note
Visual Defect	Internal	Spot	φ＜0.15mm				Ignore		(1)
			0.15mm≦φ≦0.5mm				N≦4		
			0.5mm＜φ				N=0		
		Fiber	0.03mm<W≦0.1mm, L≦5mm				N≦3		(1)
			1.0mm＜W, 1.5mm＜L				N=0		
		Polarizer Bubble	φ＜0.15mm				Ignore		(1)
			0.15mm≦φ≦0.5mm				N≦2		
			0.5mm＜φ				N=0		
		Mura	It' OK if mura is slight visible through 6%ND filter						
Electrical Defect		Bright Dot	A Grade			B Grade			
			C Area	O Area	Total	C Area	O Area	Total	(3)
			N≦0	N≦2	N≦2	N≦2	N≦3	N≦5	(2)
		Dark Dot	N≦2	N≦3	N≦3	N≦3	N≦5	N≦8	
		Total Dot	N≦4			N≦5	N≦6	N≦8	(2)
		Two Adjacent Dot	N≦0	N≦1 pair	N≦1 pair	N≦1 pair	N≦1 pair	N≦1 pair	(4)
		Three or More Adjacent Dot	Not Allowed						
		Line Defect	Not Allowed						

[**Note1**] W : Width[mm], L : Length[mm], N : Number, φ : Average Diameter

$$\phi = (a + b) / 2$$
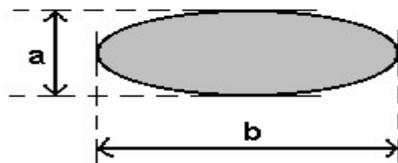
1. (White, black) Spot
2. Polarizer Bubble
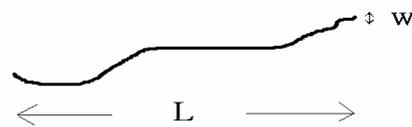
1. fiber

[Note2] Bright dot is defined through 6% transmission ND Filter as following.
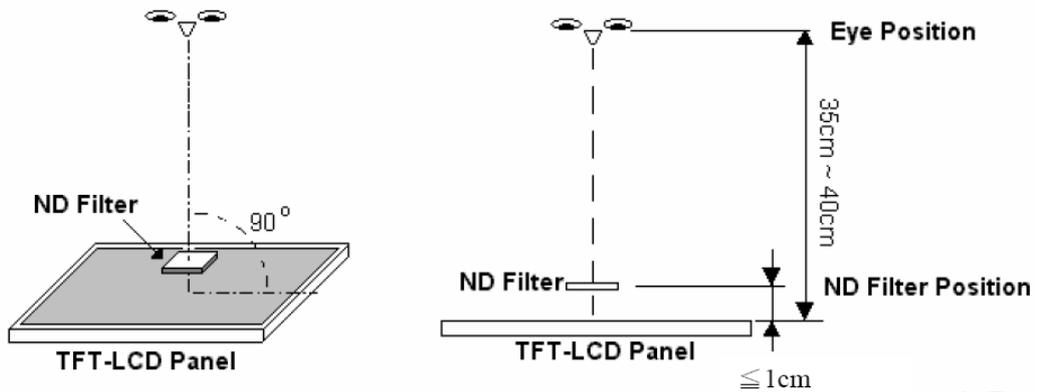

[Note3]
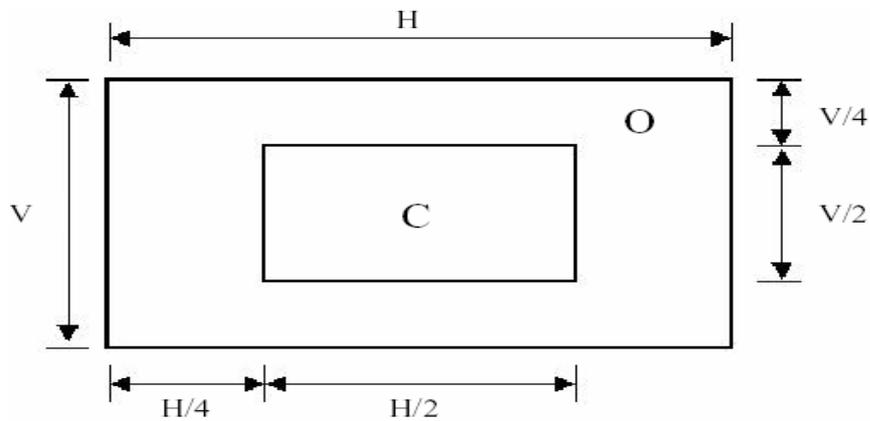
C Area: Center of display area

C Area: Outer of display area

[Note4]

Judge defect dot and adjacent dot as following. Allow below (as A, B, C and D status) adjacent defect dots, including bright and dart adjacent dot. And they will be counted 2 defect dots in total quantity.
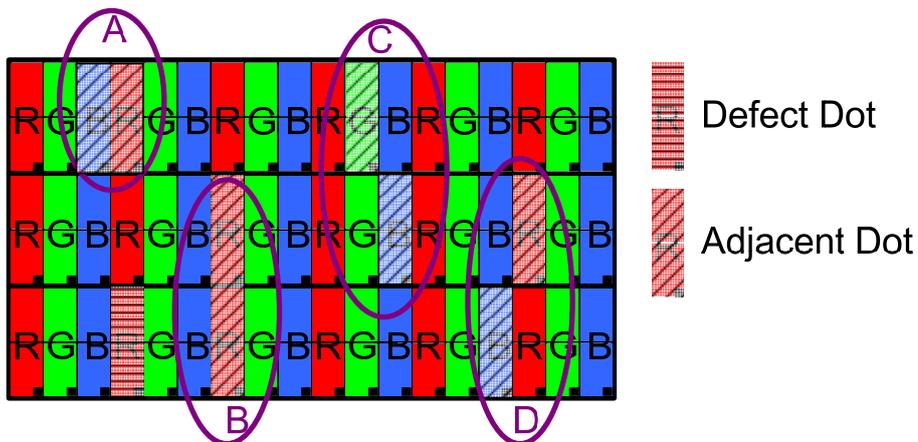
(1) The defects that are not defined above and considered to be problem shall be reviewed and discussed by both parties.

(2) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.

10.6. Reliability Test

Test Item	Test Conditions	Note
High Temperature Operation	60±3°C , t=96 hrs	
Low Temperature Operation	-10±3°C , t=96 hrs	
High Temperature Storage	70±3°C , t=96 hrs	1,2
Low Temperature Storage	-20±3°C , t=96 hrs	1,2
Thermal Shock Test	-20°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. (1 cycle) Total 5 cycle	1,2
Humidity Test	40 °C, Humidity 90%, 96 hrs	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).

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.

11. USE PRECAUTIONS

11.1. 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.

11.2. 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.

11.3. 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.

11.4.　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.

11.5. 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.

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

11. OUTLINE DIMENSION