GAMMA

AMPIRE

Specyfikacja wyświetlacza

AM-1024768H2TMQW-10H

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SPECIFICATIONS FOR
LCD MODULE

CUSTOMER	
CUSTOMER PART NO.	
AMPIRE PART NO.	AM-1024768H2TMQW-10H
APPROVED BY	
DATE	

Preliminary Specification   Approved Specification

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This Specification is subject to change without notice

RECORD   OF   REVISION

Revision Date	Page	Contents	Editor
2022/05/11	-	New Release	Mark

1. INTRODUCTION

Ampire Display Module 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 15.0 inch diagonally measured active area with XGA resolutions (1024 horizontal by 768 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.

1-1. Features

*   Wide viewing angle 80°/80° (L/R); 80°/80° (U/D)
*   High contrast ratio 800:1
*   Edge light type backlight (White-LED)
*   LVDS interface 6/8bit Mode
*   Green Product (RoHS)
*   Viewing Direction :12 o'clock

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Active area	304.128(H) ×228.096(V)	mm
Diagonal size	15.0	inch
Numbers of pixels	1024(H) ×768(V)	pixel
Pixel pitch	0.297(H) ×0.297(V)	mm
Pixel arrangement	RGB Vertical Stripe	-
Display colors	16.7M	color
Display mode	Normally White	-
Surface treatment	Anti-Glare	-
Outline dimension	326.5(H)×253.5(V)×11.8(D)(Typ)	mm

3. ABSOLUTE MAX. RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit.

Item	Symbol	Min.	Max.	Unit	Note
Logic Power Supply Voltage	V_{DD}	-0.5	5.0		
Input Voltage of Signal	V_I	-0.5	5.0	V	
Operating Temperature	T_{op}	-20	70	℃	-
Storage Temperature	T_{stg}	-30	80	℃	

Note 1.

a).Ta means the ambient temperature.

b).It is necessary to limit the relative humidity to the specified temperature range.

c).Condensation on the module is not allowed.

d).Wet-bulb temperature should be39°C Max. (Ta> 40°C)

e).90%RH Max. (Ta≤ 40°C)

4. ELECTRICAL CHARACTERISTICS

Parameter		Symbol	min.	typ.	max.	Unit	Remarks
Power supply voltage		VCC	3.0	3.3	3.6	V	-
Power supply ripple		Vp-p			200	mV	Including spike noise
Power supply current		ICC	-	550	-	mA	Note 1
Permissible ripple voltage		VRP	-	-	100	mV	
Differential input voltage		| Vid |	250		450	mV	
Differential input threshold voltage for LVDS receiver	High	VTH	-	-	100	mV	VCM = 1.25V Note2
	Low	VTL	-100	-		mV	
Input voltage width for LVDS receiver		Vi	0	-	1.90	V	-
Terminating resistor		RT	-	100	-	Ω	-
Rush current		I$_{rush}$	-	-	1.5	A	Note3
Input voltage for MSL signals	High	VFH	0.7VCC		VCC	V	
	Low	VFL	0		0.3VCC	V	

Note 1: Black mode, 65MHz, at VCC = 3.3V.
Note 2: Common mode voltage for LVDS receiver.
Note 3: Measurement Conditions:

4.2 Driving For Backlight

(Ta=25°C)   Note1

Parameter		Symbol	min.	typ.	max.	Unit	Remarks
Power supply voltage		VDD	10.8	12.0	12.6	V	
Power supply current		IDD	-	705	-	mA	
Input voltage for PWM signal	High	VDFH1	2.0		5.0	V	
	Low	VDFL1	0		0.4	V	
Input voltage for BRTC signal	High	VDFH2	2.0		5.0	V	
	Low	VDFL2	0		0.4	V	
PWM frequency		fpwm	200		(20K)	Hz	
PWM duty		--	5		100	%	
Led life time		Hr	-	50000	-	Hour	Note1

Note1: Optical performance should be evaluated at Ta=25℃ .Only If LED is driven by high current, high ambient temperature & humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is an estimated data.

5. INTERFACE

5.1 LCD PINS

CN1 socket(Module side): 185083-20121 (P-TWO ELECTRIC TECHNOLOGY CO., LTD.)

Pin No.	Symbol	Signal	Input data signal: 8bit	Input data signal:6bit	Remarks
1	VCC	Power supply	Power supply		
2	VCC				
3	GND	Ground	Ground		
4	REV	Selection of scan direction	High: Reverse scan Low or Open: Normal scan		
5	D0-	Pixel data	R0-R5,G0		
6	D0+				
7	GND	Ground	Ground		
8	D1-	Pixel data	G1-G5,B0-B1		
9	D1+				
10	GND	Ground	Ground		
11	D2-	Pixel data	B2-B5,DE		
12	D2+				
13	GND	Ground	Ground		
14	CLK-	Pixel clock	Pixel clock		
15	CLK+				
16	GND	Ground	Ground		
17	D3-	Pixel data	R6-R7, G6-G7, B6-B7	Ground	
18	D3+				
19	NC	Non connection	-		
20	SEL6/8	Selection of the number of colors	Low	High or Open	

5.2 BACKLIGHT

CN2: MSB24038P5 (Produced by STM) or equivalent.

Pin	Symbol	Description
5	VDD	12V
4	GND	Ground
3	BRTC	Back light ON/OFF control: 5V-On / 0V-Off
2	PWM	PWM Luminance control
1	NC	NC

6. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min	Typ.	Max	Unit	Remark
View Angles		θT	CR≧10	70	80	-	Degree	Note 2
		θB		70	80	-		
		θL		70	80	-		
		θR		70	80	-		
Contrast Ratio		CR	θ=0°	600	800	-	-	Note1 Note3
Luminance uniformity		U		-	1.25	1.33	-	Note6
Response Time		T_ON	25℃	-	8	12	ms	Note1 Note4
		T_OFF						
Chromaticity	White	x	Backlight is on	0.263	0.313	0.363	-	Note5 Note1
		y		0.279	0.329	0.379		
	Red	x		0.582	0.632	0.682		
		y		0.305	0.355	0.405		
	Green	x		0.294	0.344	0.394		
		y		0.558	0.608	0.658		
	Blue	x		0.107	0.157	0.207		
		y		0.037	0.087	0.137		
NTSC				50	60	-	%	Note5
Luminance		L		400	450	-	cd/m²	Note7

Test Conditions:

1. The ambient temperature is 25℃. VDD= 3.3V, VCC=12V, 100% brightness,

2. The test systems refer to Note 1 and Note2.

Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.
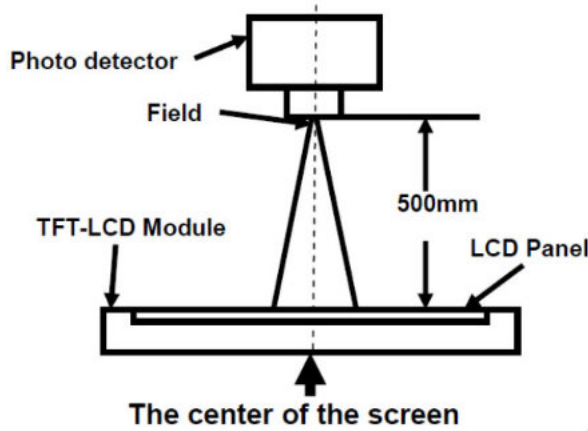
Item	Photo detector	Field
Contrast Ratio		
Luminance	SR-3A	1°
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

The center of the screen

Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80)。
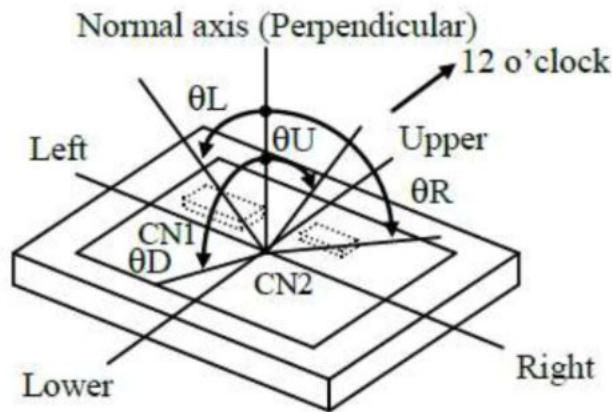
Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

"White state ": The state is that the LCD should drive by Vwhite.

"Black state": The state is that the LCD should drive by Vblack.

Vwhite: To be determined   Vblack: To be determined.

Note 4:　Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.
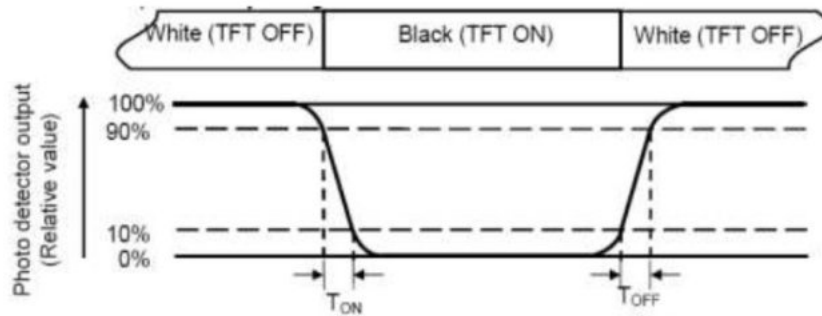
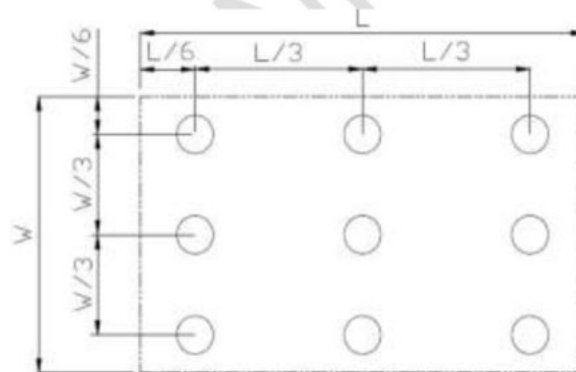

Note 5:　Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note 6:　Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

　　Luminance Uniformity (U) = Lmin/ Lmax

L-------Active area length W----- Active area width

　　Lmax: The measured Maximum luminance of all measurement position.

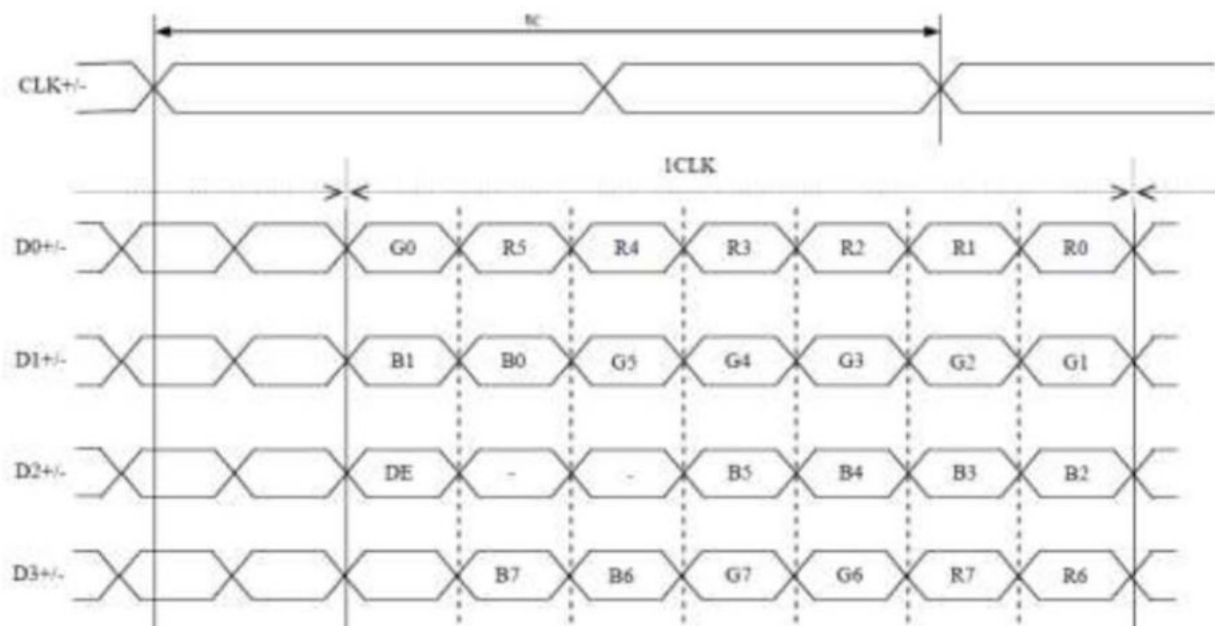　　Lmin: The measured Minimum luminance of all measurement position.

Note 7:　Definition of Luminance:
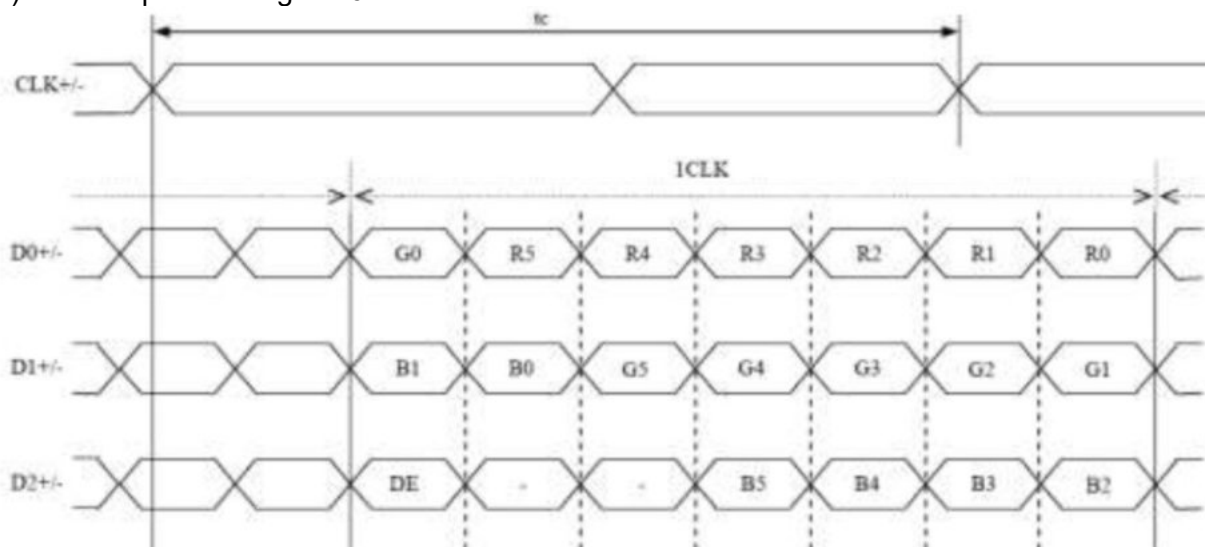
Measure the luminance of white state at center point.

7. INPUT SIGNAL

DATA MAPPING

(1) LVDS Input data signal: 8bit


(2) LVDS Input data signal: 6bit

8. Timing Chart

TIMING CHARACTERISTICS

Parameter		Symbol	min.	typ.	max.	Unit	Remarks
Clock	Frequency	1/tc	52	56.88	71	MHz	17.58ns (typ.)
		tc	19.23	17.58	14.08	ns	
Horizontal signals	Cycle	th	1114	1200	1400	CLK	
	Display period	thd	1024				-
Vertical signals	Cycle	tv	778	790	845	H	60.0Hz(typ.)
	Display period	tvd	768				-

INPUT SIGNAL TIMING CHART

Horizontal timing
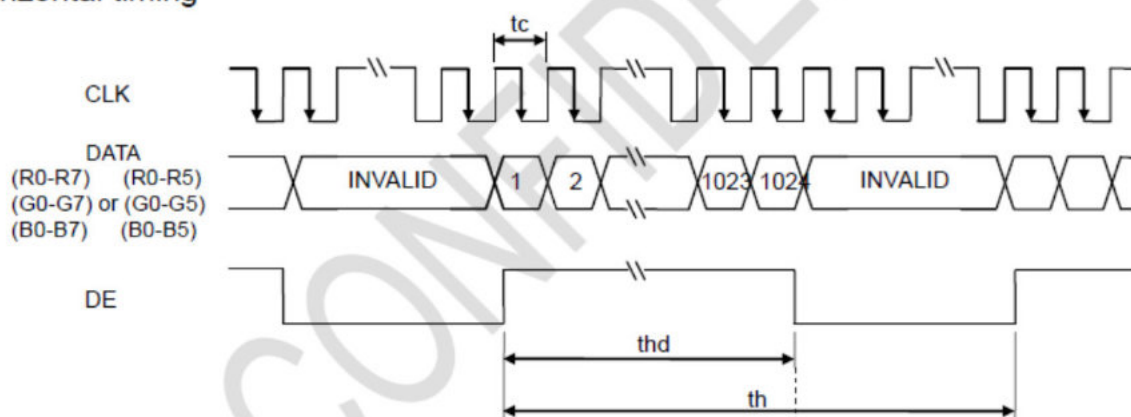
Vertical timing
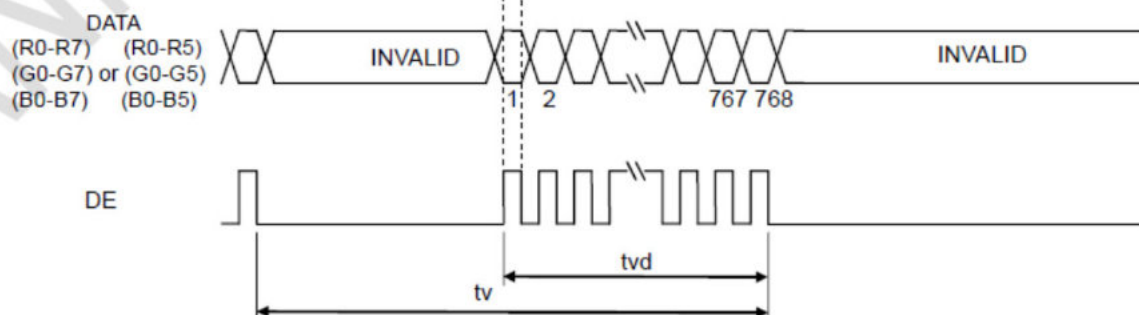
PIXEL DATA ALIGNMENT OF DISPLAY IMAGE
The following chart is the coordinates of per pixel

D(1,1)

B	G	R

D(1,1)	D(2,1)	D(3,1)	•••	D(1024,1)
D(1,2)	D(2,2)	D(3,2)	•••	D(1024,2)
D(1,3)	D(2,3)	D(3,3)	•••	D(1024,3)
. . .	. . .	. . .	••• ••• •••	. . .
D(1,768)	D(2,768)	D(3,768)	•••	D(1024,768)
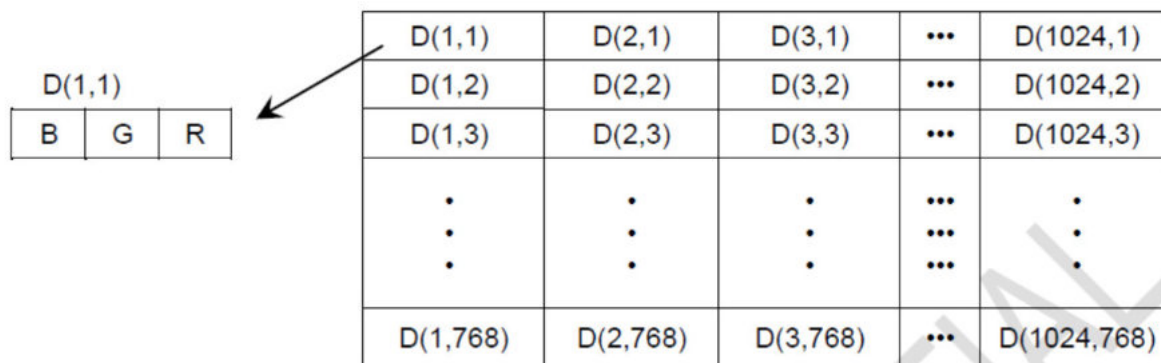
Note: Pixel arrangement is BGR stripe when module's PCB side placed upward. It is suggested that module's PCB side should placed downward to compatible with RGB pixel arranging modules.

10. POWER SEQUENCE
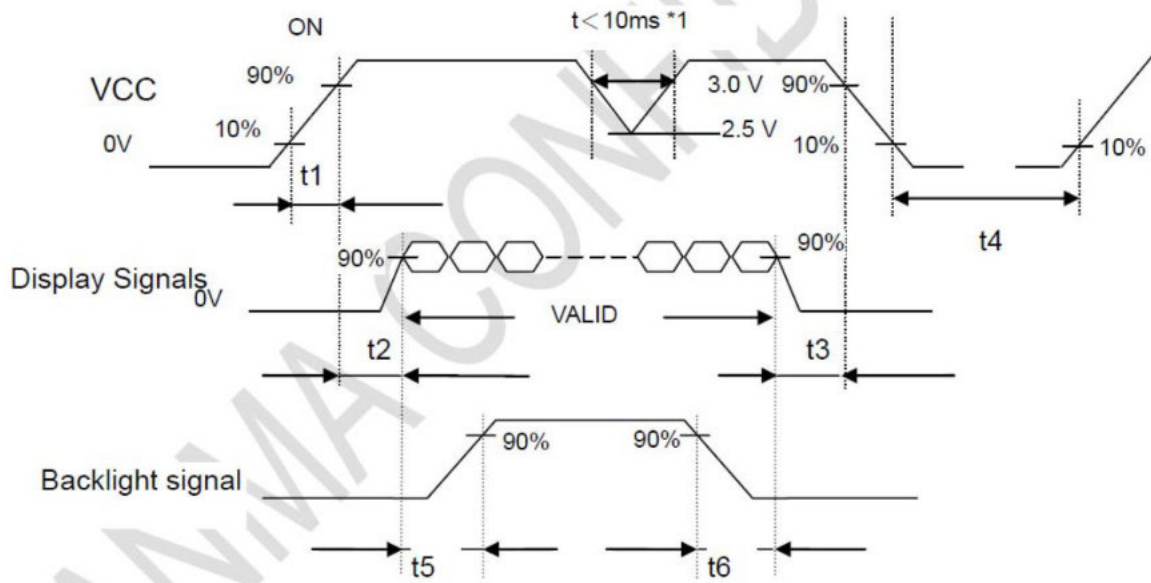
Timing Specifications:
t1 :0.5ms<t1 <10ms;
t2 :0.5 ms<t2 <50ms;
t3 :0ms<t3 <50ms;
t4 :t4 >1000ms;
t5 :t5 >200ms;
t6 :t6 >200ms;

11. QUALITY AND RELIABILITY

Test Item	Test Conditions	Note
High Temperature Operation	70 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
Thermal Shock Test	-20 C ~ 25 C ~ 60 C 30 m in.　5 min.30 min. (1 cycle) Total 20 cycle	1,2
Humidity Test	50 C, Humidity 80%, 240 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.

12 USE PRECAUTIONS

12.1 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.

12.2 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.

12.3 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.

12.4 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.

12.5 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.

13. OUTLINE DIMENSION