AMP DISPLAY INC.

A Brighter Solution

SPECIFICATIONS

CUSTOMER	
CUSTOMER PART NO.	
AMP PART NO	**AM-480272H2TMQW-A0H-F**
APPROVED BY	
DATE	

☑ **Approved For Specifications**

☐ **Approved For Specifications & Sample**

AMP DISPLAY INC

9856 SIXTH STREET RANCHO CUCAMONGA CA 91730

TEL: 909-980-13410 FAX: 909-980-1419

WWW.AMPDISPLAY.COM

APPROVED BY	CHECKED BY	ORGANIZED BY

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2010/8/27		New Release	Patrick
2012/4/23	4	Remove the Power Voltage	Leo

1. FEATURES

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

(2) LCD type : Transmissive , Normally White

(3) Number of the Colors : 16.7M colors (R,G,B 8 bit digital each)

(4) RGB Interface 40 pin.

(5) LCD Power Supply Voltage : 3.3V single power input

(6) Interface mode: TTL RGB interface. **Sync mode.**

(7) **Reflective ratio 0.5% ~ 2%**

The timing control IC both supports DE mode and Sync mode timing. **The module default is Sync mode.**

Mode Setting	Hardware	PIN32: HSYNC	PIN33: VSYNC	PIN37: NC(DE)	Remark
Sync Mode	R8 NC	HSYNC needed	VSYNC needed	NC	**Default** DE pull low internally.
DE mode	R8= 0 ohm	HSYNC don't needed	VSYNC don't needed	DE needed	Option In DE mode, only DE signal is needed. HSYNC and VSYNC pull High internally.

It is necessary to keep tvp+tvb=12 and thp+thb=43 in SYNC mode. DE mode is unnecessary.

If you need the DE mode for mass production, please contact us to apply a part number for this option. (R8= 0 ohm).

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display size (diagonal)	4.3	inch
Resolution	480RGB (W) x 272(H)	dots
Display area	98.7 (W) x57.5 (H)	mm
Pixel pitch	0.198 (W) x 0.198 (H)	mm
Overall dimension	105.5(W)x114.05(H)x3.95(D)	mm
Color configuration	R.G.B Vertical stripe	
View Direction (Gray Inversion)	6 o'clock	

3. ABSOLUTE MAXIMUM RATINGS

item	Symbol	Values		Unit	Remark
		Min	Max		
Power Supply for logic	VCC	-0.3	5.0	V	GND=0
Operation Temperature (Ambient)	T_{OP}	-20	70	℃	
Storage Temperature (Ambient)	T_{ST}	-30	80	℃	Note 1
LED Forward current	I_f		20	mA	OneLED/Note2
LED Power Dissipation	P_d		64	mW	One LED

*TFT LCD Ratings

Note 1: Hsync, Vsync, DEN, DCLK, R0~R7, G0~G7, B0~B7

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
Response Time		$T_r + T_f$	Θ=Φ=0°	-	40		ms	(3)
Contrast ratio		CR			250	-	-	(1)
Viewing Angle	Vertical	Θ	CR≧10		90.	-	Deg.	(4)
	Horizontal	Φ			130	-		
Luminance		L	Θ=Φ=0°	--	500	--	cd/m^2	(2)
Color chromaticity	White	Wx			0.301			(2)(3)
		Wy			0.339			

NOTE :

Measure Condition:IL= 20.0mA

Measure Item Definition as follow：

(1)Definition of Contrast Ratio：(Measured by BM-7 (TOPCON) [dark room])

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

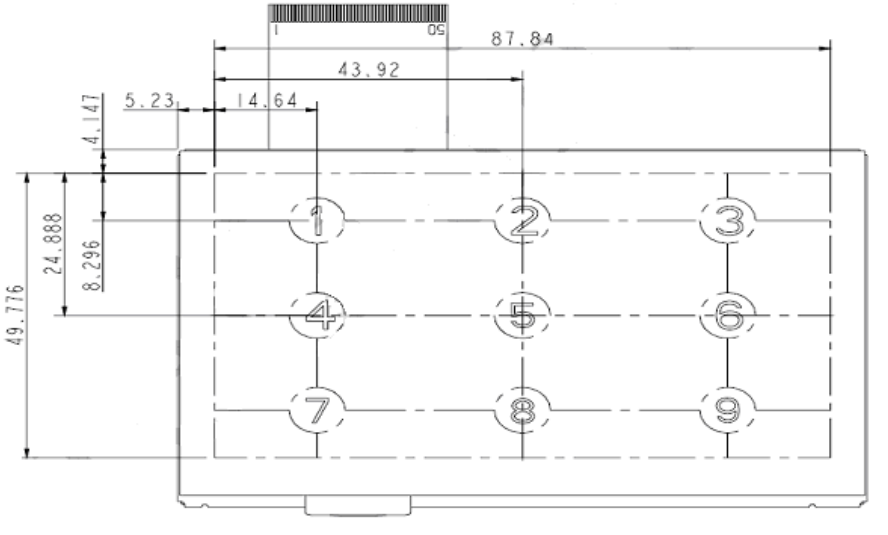


Fig.9-1: Test Point Position

(2) Definition of Center Luminance &Luminance Uniformity：(Measured by BM-7 (TOPCON) [dark room])

Center Luminance：Measure luminance on Point No5 as figure 9-1.

Luminance Uniformity：Measure maximum luminance(L(MAX))and minimum luminance (L(MIN))on the **9** points as figure 9-1.

L = [L(MIN)/L(MAX)]×100%△

(3) Response Time (White - Black)

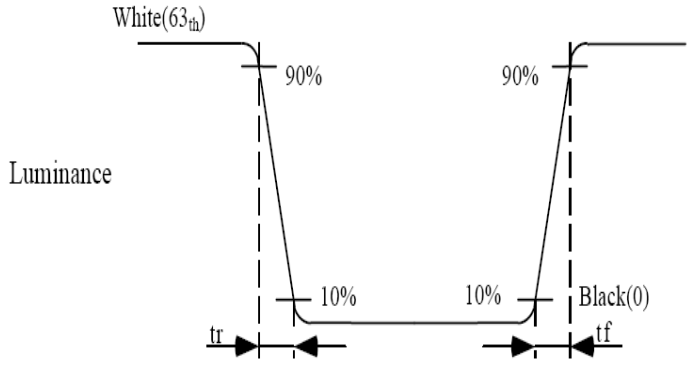
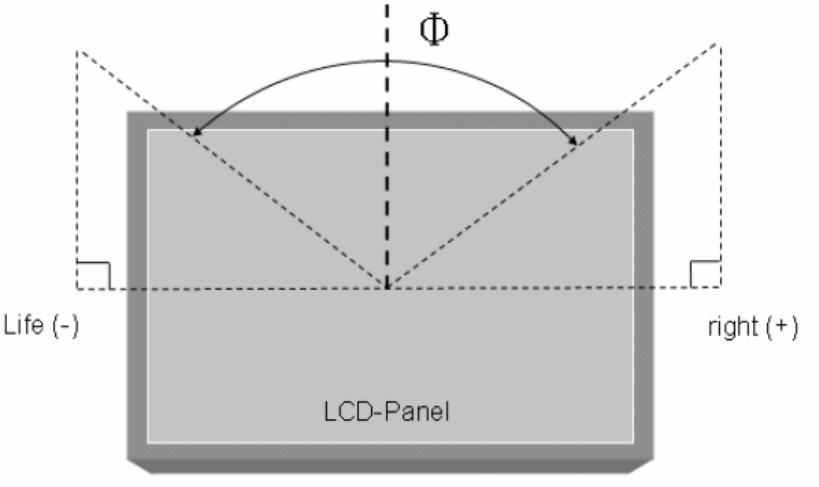
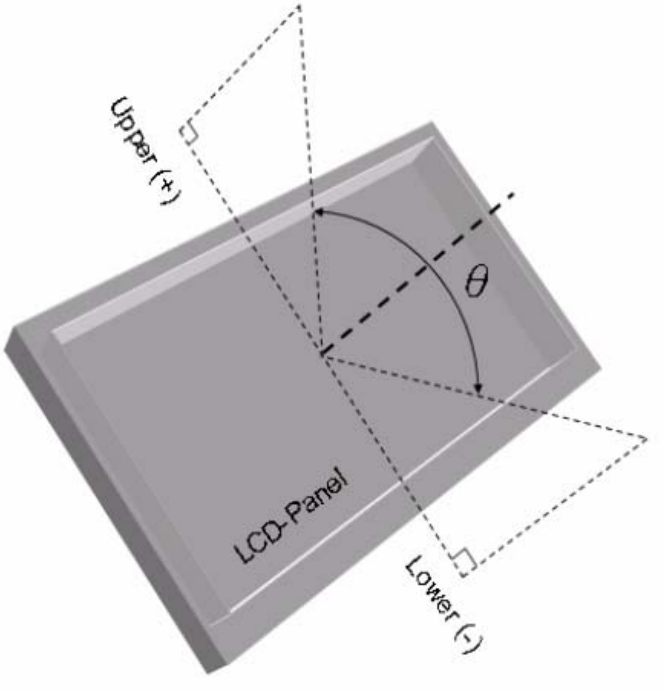


Fig.9-2: Definition of Response Time (White - Black)

(4)Definition of Viewing Angle.() ：(by EZ-CONTRAST (ELDIM) in the dark room.)





5. ELECTRICAL CHARACTERISTICS

LCD driving

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Power supply voltage		VDD	3.0	3.3	3.6	V	
Input voltage for logic	H Level	V_{IH}	0.8 VDD	--	VDD	V	(1)
	L Level	V_{IL}	0	--	0.2 VDD	V	
Power Supply current		IDD	--	45	--	mA	(2)

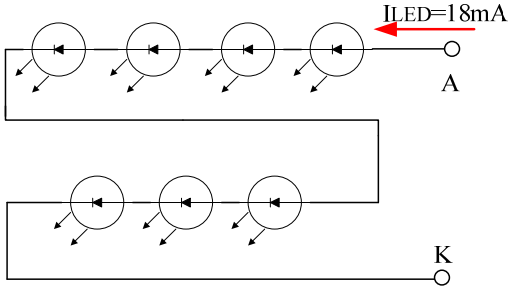
Note 1: Hsync, Vsync, DEN, DCLK, R0~R5, G0~G5, B0~B5

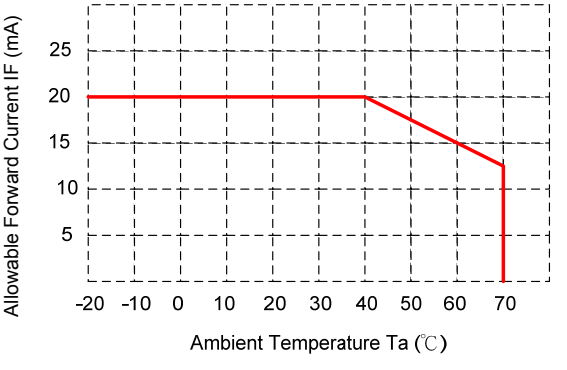
Note 2: fV =60Hz , Ta=25℃ , Display pattern : All Black

LED back light specification

Item	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Forward voltage	V_f	I_f =18mA		23.1	25.2	V
Forward current	I_f	7-chip serial	-	18	20	mA
Uniformity (with L/G)	-	I_f=18mA	75%*1	-	-	
Life Time (LED Dice)	-	Ta=25°C, IF=20mA	17.7K			Hrs
Luminous color	White					
Chip connection	7 chip serial connection					

■ The constant current source is needed for white LED back-light driving. When LCM is operated over 60 deg.C ambient temperature, the I_{LED} of the LED back-light should be adjusted to 15mA max

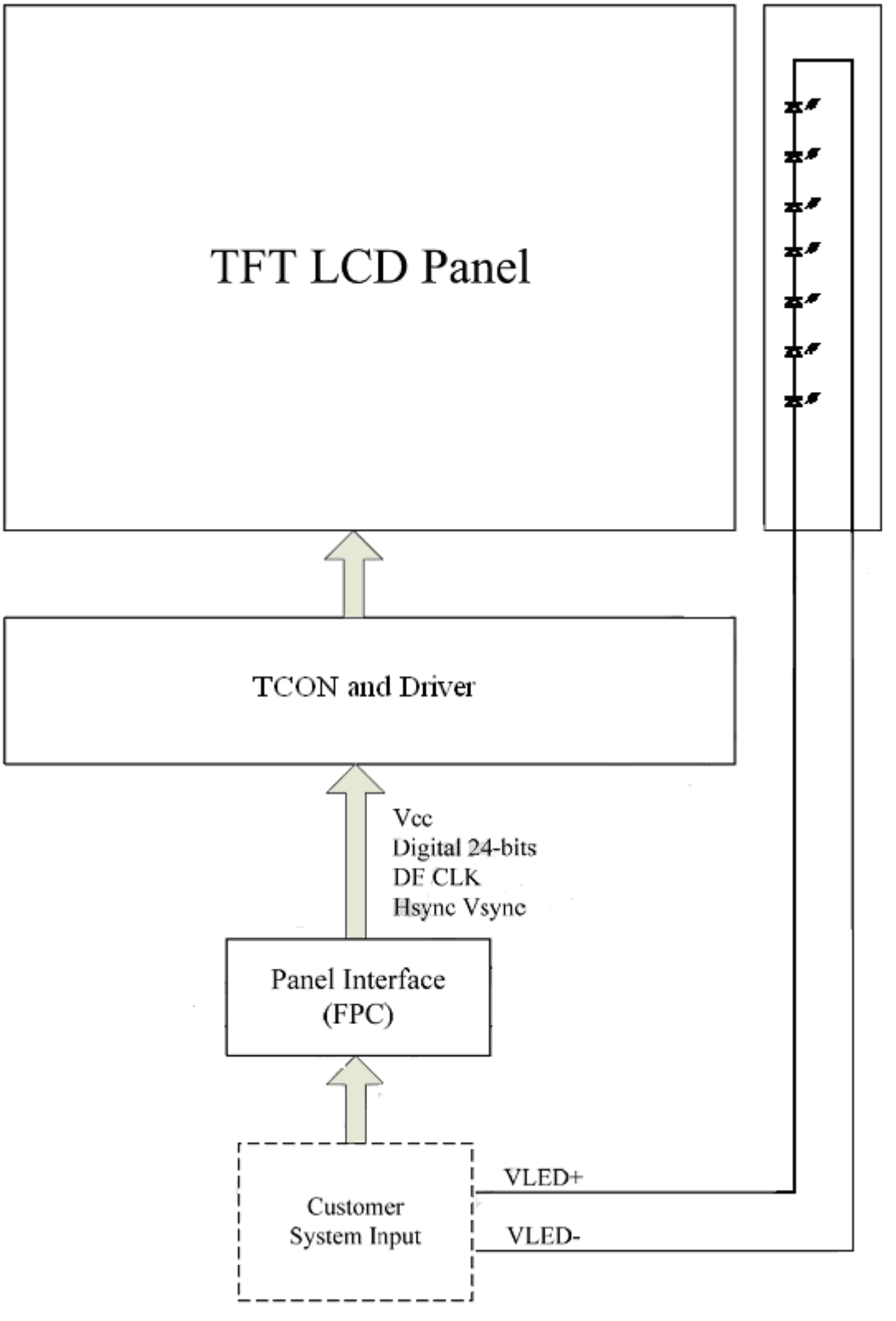




Pin definition of Backlight

Pin no	Symbol	Function
1	LED_K	LED Cathode
2	NC	Keep NC
3	NC	Keep NC
4	LED_A	LED Anode

6. BLOCK DIAGRAM



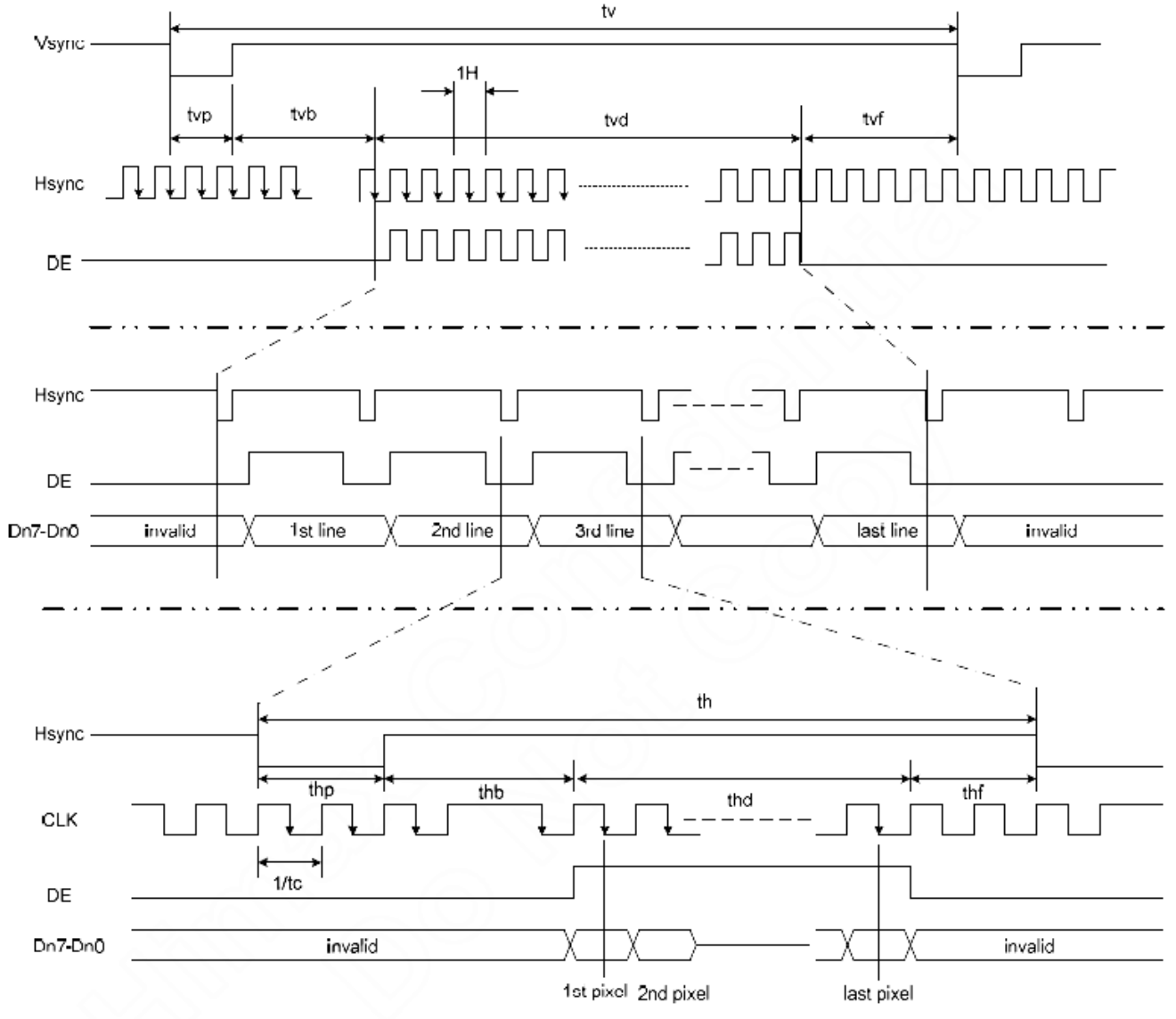
7. TFT LCD Panel FPC Descriptions

Pin no	Symbol	Function	Remark
1	GND	Ground	
2	GND	Ground	
3	VCC	Power Supply(3.3V)	
4	VCC	Power Supply(3.3V)	
5	R0	Red Data Bit 0	
6	R1	Red Data Bit 1	
7	R2	Red Data Bit 2	
8	R3	Red Data Bit 3	
9	R4	Red Data Bit 4	
10	R5	Red Data Bit 5	
11	R6	Red Data Bit 6	
12	R7	Red Data Bit 7	
13	G0	Green Data Bit 0	
14	G1	Green Data Bit 1	
15	G2	Green Data Bit 2	
16	G3	Green Data Bit 3	
17	G4	Green Data Bit 4	
18	G5	Green Data Bit 5	
19	G6	Green Data Bit 6	
20	G7	Green Data Bit 7	
21	B0	Blue Data Bit 0	
22	B1	Blue Data Bit 1	
23	B2	Blue Data Bit 2	
24	B3	Blue Data Bit 3	
25	B4	Blue Data Bit 4	
26	B5	Blue Data Bit 5	
27	B6	Blue Data Bit 6	
28	B7	Blue Data Bit 7	
29	GND	Ground	
30	DCLK	Dot Data Clock	
31	DISP	Display ONOFF	
32	Hsync	SYNC mode: Horizontal Sync Input DE mode: no function. Can be floating.	(Note1)
33	Vsync	SYNC mode: Vertical Sync Input DE mode: no function. Can be floating.	(Note1)
34	NC	Not Connection	
35	NC	Not Connection	
36	NC	Not Connection	
37	NC (DE)	SYNC mode : Not Connection DE mode: DE signal input	(Note1)
38	Test1	Not Connection	
39	Test2	Not Connection	
40	Test3	Not Connection	

(Note1): The module is SYNC mode, if R8 is open. The module is DE mode, if R8 is 0 ohm.

8. INPUT SIGNAL

8.1 Parallel RGB input timing Chart



8.2 Timing Specification

Parallel RGB input timing requirement

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
Clock cycle	$1/t_C$*1		9	15	MHz
Hsync cycle	$1/f_H$		17.14	-	KHz
Vsync cycle	$1/f_V$		59.94	-	Hz
Horizontal Signal					
Horizontal cycle	th*2	525	525	605	CLK
Horizontal display period	thd	480	480	480	CLK
Horizontal front porch	thf	2	2	82	CLK
Horizontal pulse width	thp	2	41	41	CLK
Horizontal back porch	thb	2	2	41	CLK
Vertical Signal					
Vertical cycle	tv	285	286	399	H
Vertical display period	tvd	272	272	272	H
Vertical front porch	tvf	1	2	227	H
Vertical pulse width	tvp	1	10	11	H
Vertical back porch	tvb	1	2	11	H

Note:

1. Unit: CLK=1/ fCLK , H=th
2. Parallel interface. Clock frequency and horizontal signal parameters are tripled in serial interface. The Maximum clock frequency of serial interface is 33MHz
3. **It is necessary to keep tvp+tvb=12 and thp+thb=43 in SYNC mode. DE mode is unnecessary.**

8.3 Timing Chart 2

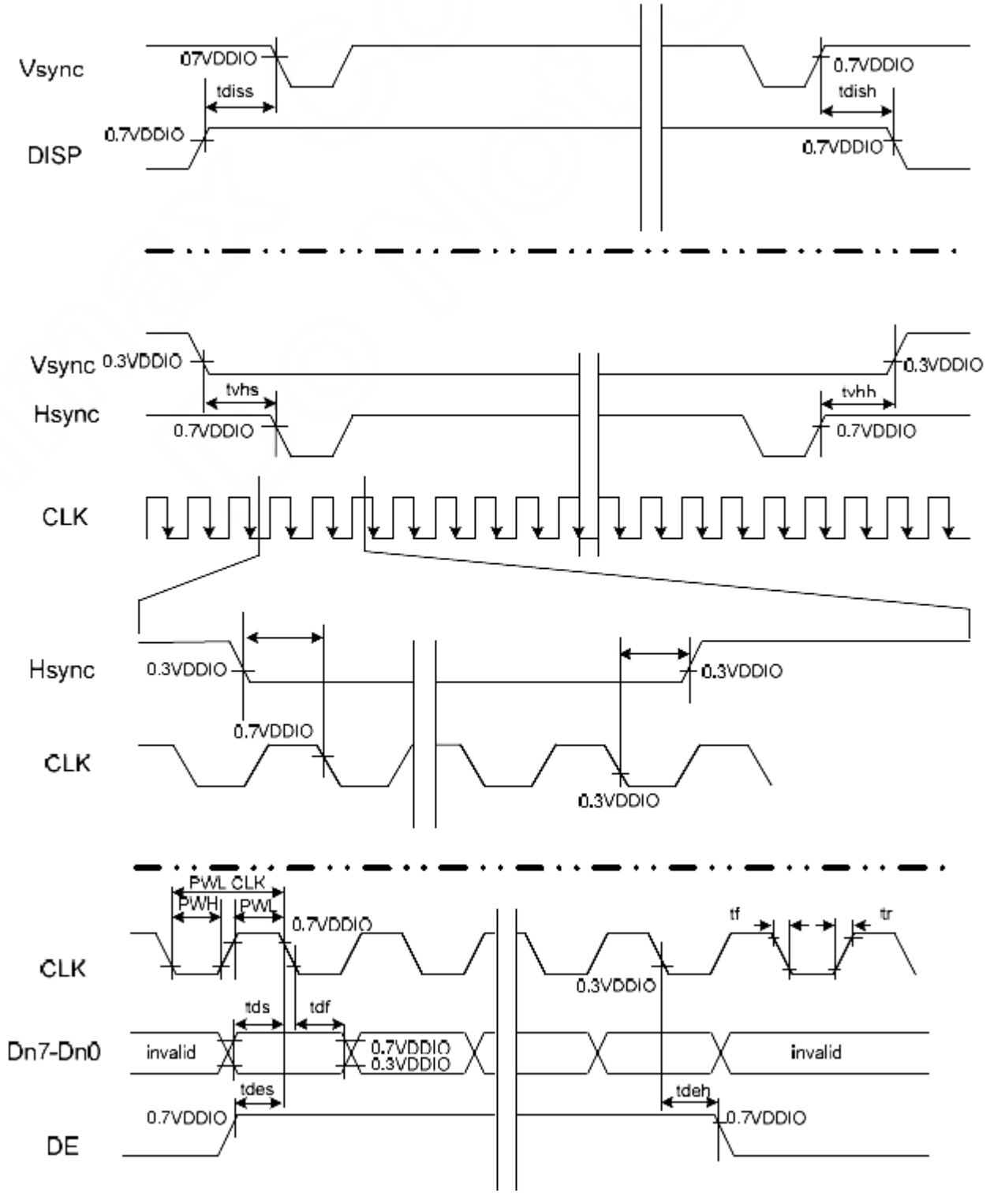
Input setup timing requirement

PARAMETER	Symbol	Min.	Typ.	Max.	Unit
DISP setup time	t_{diss}	10	-	-	ns
DISP hold time	t_{dish}	10	-		ns
Clock period	PW_{CLK}*1	66.7	-	-	ns
Clock pulse high period	PWH*1	26.7	-	-	ns
Clock pulse low period	PWL*1	26.7	-	-	ns
Hsync setup time	t_{hs}	10	-	-	ns
Hsync hold time	t_{hh}	10	-		ns
Data setup time	t_{ds}	10	-	-	ns
Data hold time	t_{dh}	10	-	-	ns
DE setup time	t_{des}	10	-	-	ns
DE hold time	t_{deh}	10	-	-	ns
Vsync setup time	t_{vhs}	10	-	-	ns
Vsync hold time	t_{vhh}	10	-	-	ns

Note

1. For parallel interface, maximum clock frequency is 15MHz.
2. tr, tf is defined 10% to 90% of signal amplitude.

8.4 Input setup timing Chart



9. Color Data Assignment

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

10. QUALITY AND RELIABILITY

10.1Test Conditions

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

10.2 Sampling Plan

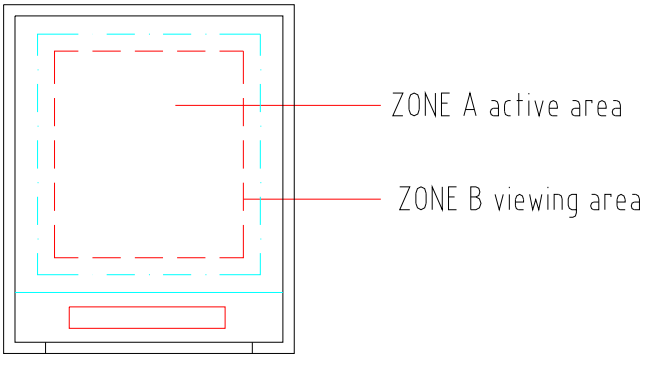
Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

10.3 Acceptable Quality Level

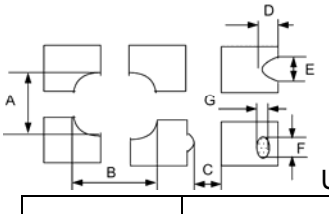
A major defect is defined as one that could cause failure to or materially reduce the usability of the unit for its intended purpose. A minor defect is one that does not materially reduce the usability of the unit for its intended purpose or is an infringement from established standards and has no significant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

10.4 Appearance

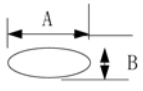
An appearance test should be conducted by human sight at approximately 30 cm distance from the LCD module under florescent light. The inspection area of LCD panel shall be within the range of following limits.



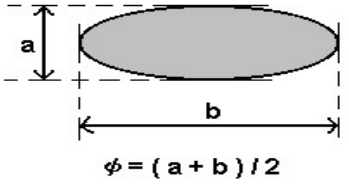
11. Incoming Inspection Standard

<table>
<tr><th>No.</th><th>Item</th><th>Criterion for defects</th><th>Class of Defect</th><th>Acceptable level</th></tr>
<tr><td>1</td><td>Non display</td><td>No non display is allowed</td><td>Major</td><td>0.4</td></tr>
<tr><td>2</td><td>Irregular operation</td><td>No irregular operation is allowed</td><td>Major</td><td>0.4</td></tr>
<tr><td>3</td><td>Short</td><td>No short are allowed</td><td>Major</td><td>0.4</td></tr>
<tr><td>4</td><td>Open</td><td>Any segments or common patterns that don’t activate are rejectable.</td><td>Major</td><td>0.4</td></tr>
<tr><td>5</td><td>Black/White spot (I)</td><td>
<table>
<tr><th>Size D (mm)</th><th>Acceptable number</th></tr>
<tr><td>D ≤ 0.1</td><td>Ignore</td></tr>
<tr><td>0.1 < D ≤ 0.3</td><td>4 ※1</td></tr>
<tr><td>0.3 < D</td><td>0</td></tr>
</table>
※1: The distance of two defects must be more than 20mm.
</td><td>Minor</td><td>1.5</td></tr>
<tr><td>6</td><td>Dot Defect</td><td>
<table>
<tr><td>Bright dot</td><td>N≦2</td></tr>
<tr><td>Dark dot</td><td>N≦4</td></tr>
<tr><td>Total dot defect
(Bright dot + Dark dot)</td><td>N≦6</td></tr>
<tr><td>Minimum distance between dark dot and dark dot</td><td>L≧5mm</td></tr>
</table>
</td><td>Minor</td><td>1.5</td></tr>
<tr><td>7</td><td>Back Light</td><td>1. No Lighting is rejectable
2. Flickering and abnormal lighting are rejectable</td><td>Major</td><td>0.4</td></tr>
<tr><td>8</td><td>Display pattern</td><td> 

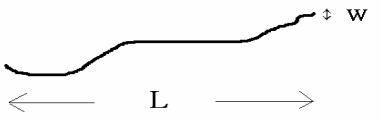
Unit:mm
<table>
<tr><td>$\frac{A+B}{2} \le 0.30$</td><td>0 < C</td><td>$\frac{D+E}{2} \le 0.25$</td><td>$\frac{F+G}{2} \le 0.25$</td></tr>
</table>
Note: 1. Acceptable up to 3 damages
2. NG if there’re to two or more pinholes per dot</td><td>Minor</td><td>1.5</td></tr>
<tr><td>9</td><td>Blemish & Foreign matters
Size:
$D = \frac{A+B}{2}$</td><td>
<table>
<tr><th>Size D (mm)</th><th>Acceptable number</th></tr>
<tr><td>D ≤ 0.15</td><td>Ignore</td></tr>
<tr><td>0.15 < D ≤ 0.20</td><td>3</td></tr>
<tr><td>0.20 < D ≤ 0.30</td><td>2</td></tr>
<tr><td>0.30 < D</td><td>0</td></tr>
</table>
</td><td>Minor</td><td>1.5</td></tr>
</table>

<table>
<tr><td>10</td><td>Scratch on Polarizer</td><td><table><tr><th>Width (mm)</th><th>Length (mm)</th><th>Acceptable number</th></tr><tr><td colspan="2">W≦0.05 and L≦ 0.3</td><td>Ignore</td></tr><tr><td>0.05＜W≦0.03</td><td>0.3＜L ≦ 2.0</td><td>3</td></tr></table>Note: The distance of two defects must be more than 20mm.</td><td>Minor</td><td>1.5</td></tr>
<tr><td>11</td><td>Bubble in polarizer
  </td><td>D≦ 0.15 mm, Ignored
0.15 ≦ D ≦ 0.5 mm, N ≦ 4
D ＞ 0.5 mm, not allowable
D= (A+B) / 2</td><td>Minor</td><td>1.5</td></tr>
<tr><td>12</td><td>Stains on LCD panel surface</td><td>Stains that cannot be removed even when wiped lightly with a soft cloth or similar cleaning too are rejectable.</td><td>Minor</td><td>1.5</td></tr>
<tr><td>13</td><td>Rust in Bezel</td><td>Rust which is visible in the bezel is rejectable.</td><td>Minor</td><td>1.5</td></tr>
<tr><td>14</td><td>Defect of land surface contact (poor soldering)</td><td>Evident crevices which is visible are rejectable.</td><td>Minor</td><td>1.5</td></tr>
<tr><td>15</td><td>Parts mounting</td><td>1. Failure to mount parts
2. Parts not in the specifications are mounted
3. Polarity, for example, is reversed</td><td>Major
Major
Major</td><td>0.4</td></tr>
<tr><td>16</td><td>Parts alignment</td><td>1. LSI, IC lead width is more than 50% beyond pad outline.
2. Chip component is off center and more than 50% of the leads is off the pad outline.</td><td>Minor
Minor</td><td>1.5</td></tr>
<tr><td>17</td><td>Conductive foreign matter (Solder ball, Solder chips)</td><td>1. 0.45<φ ,N≧1
2. 0.30<φ≦0.45 ,N≧1
φ:Average diameter of solder ball (unit: mm)
3. 0.50<L ,N≧1
L: Average length of solder chip (unit: mm)</td><td>Major
Minor
Minor</td><td>0.4
1.5
1.5</td></tr>
<tr><td>18</td><td>Faulty PCB correction</td><td>1. Due to PCB copper foil pattern burnout, the pattern is connected, using a jumper wire for repair; 2 or more places are corrected per PCB.
2. Short circuited part is cut, and no resist coating has been performed.</td><td>Minor
Minor</td><td>1.5</td></tr>
<tr><td>19</td><td>mura</td><td>ND 6% , See, not allowable</td><td>Minor</td><td></td></tr>
</table>

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

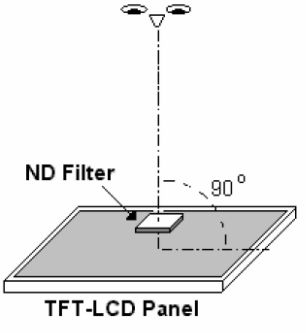


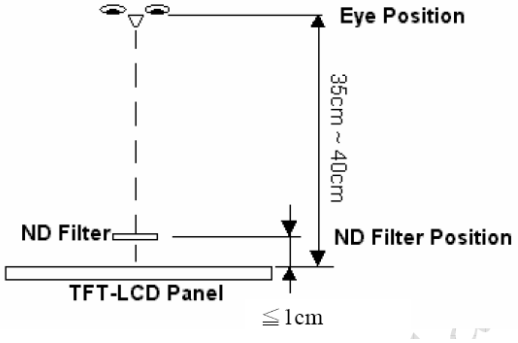
1. (White, black) Spot
2. Polarizer Bubble



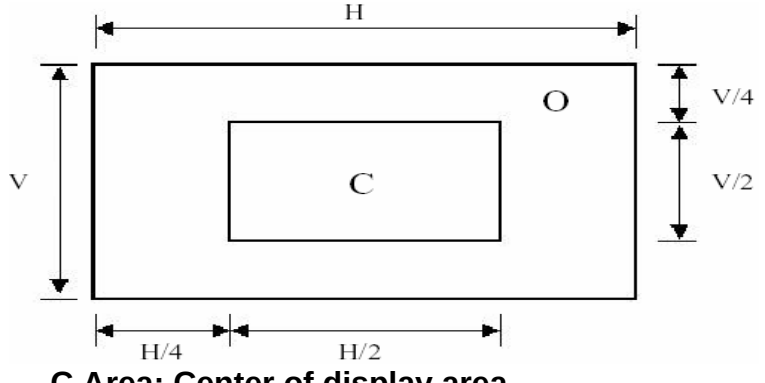
1. fiber

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





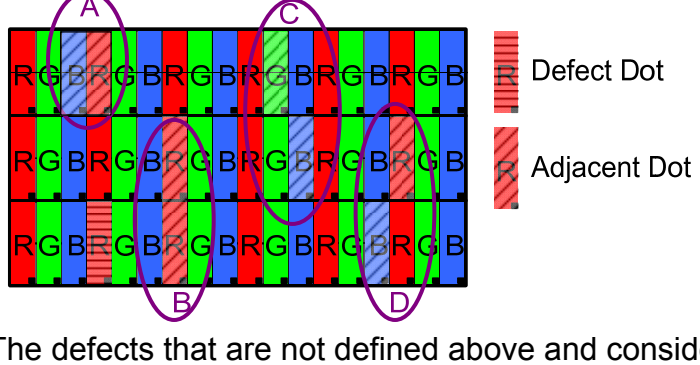
[Note3]



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.

12. Reliability Test

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C , t=96 hrs	
Low Temperature Operation	-20±3°C , t=96 hrs	
High Temperature Storage	80±3°C , t=96 hrs	1,2
Low Temperature Storage	-30±3°C , t=96 hrs	1,2
Thermal Shock Test	-30°C ~ 25°C ~ 80°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.

13. USE PRECAUTIONS

13.1 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 benzene 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.

13.2 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.

13.3 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.

13.4 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.

13.5 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 warrantee for all products and three months warrantee for all repairing products.

14 OUTLINE DIMENSION