



A Brighter Solution

AMP DISPLAY INC.

SPECIFICATIONS

9.0" COLOR TFT MODULE

CUSTOMER:	
CUSTOMER PART NO.	
AMP DISPLAY PART NO.	AM-800480CTMCW-00H
APPROVED BY:	
DATE:	

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APPROVED FOR SPECIFICATIONS

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APPROVED FOR SPECIFICATION AND PROTOTYPES

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2006/09/12	-	New Release	LEE

1. INTRODUCTION

Ampire Display Module AM800480C is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device . This model is composed of the CPT 9 inch TFT-LCD panel , a driving circuit and a backlight system . This TFT-LCD has a high resolution (800(R.G.B) X 480) and can display up to 262,144 colors .

1-1. Features

- WVGA (16:9 diagonal) configuration
- Input interface voltage : 3.3V
- Data enable mode
- Maximum power consumption : below 4.6W

1-2. Applications

- Portable TV
- Car user DVD
- Industrial application
- HMI (Human machine interface)

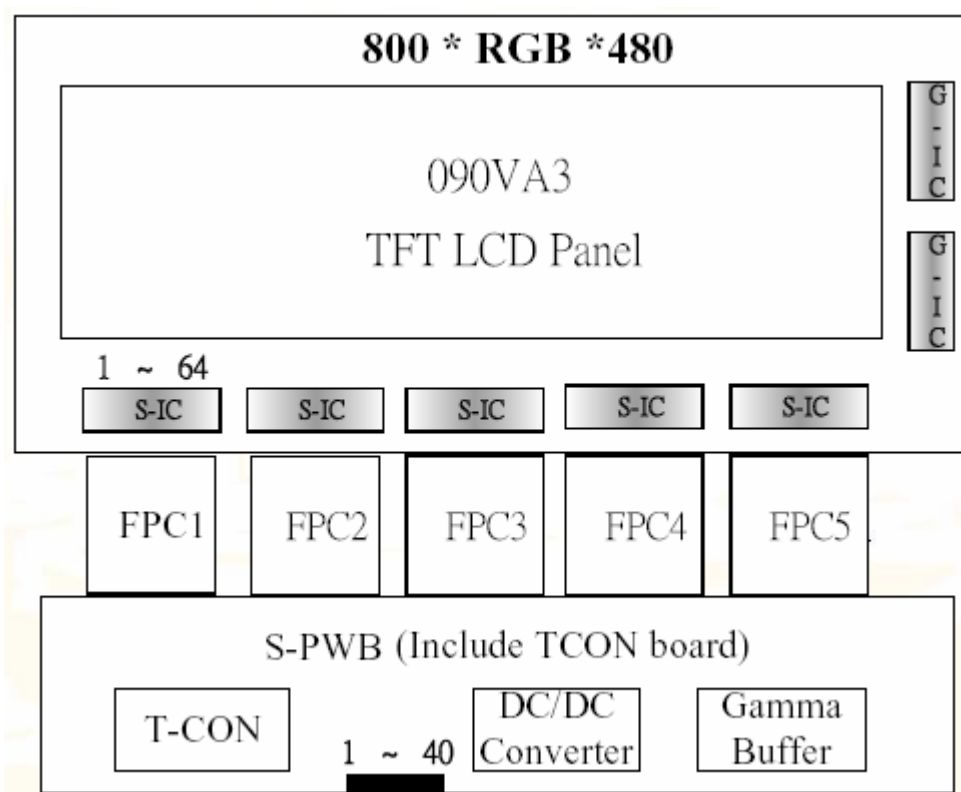
2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display resolution(dot)	800RGB (W) x 480(H)	dots
Active area	198.0 (W) x 112.08 (H)	mm
Pixel pitch	0.2475 (W) x 0.2335 (H)	mm
Color configuration	R.G.B Vertical stripe	
Overall dimension	210.7(W)x126.4(H)x7.2(D)	mm
Weight	250(Typ)	g
Brightness	300 nit(typ)	cd/m ²
Contrast ratio	350 : 1	
Backlight unit	CCFL	
Display color	262,144	colors
Viewing Angle	120 degree(Horizontal) 110 degree(Vertical)	

3. ABSOLUTE MAX. RATINGS

ITEM	SYMBOL	MIN	MAX	UNIT
Power Supply Voltage for LCD	Vcc	-0.5	5.0	V
Signal input voltage	DCLK DE R0~R5 G0~G5 B0~B5	-0.5	Vcc+0.5	V
Operation Temperature	Top	0	60	°C
Storage Temperature	Tstg	-30	70	°C

The following values are maximum operation conditions , If exceeded , it may cause faulty operation or damage



4. ELECTRICAL CHARACTERISTICS

4-1 TFT LCD Module voltage

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Power Supply Voltage		Vcc	3.0	3.3	3.6	V	1)
Power Supply Current	64Gray	Icc	-	140	190	mA	2)
	Black		-	150	200		
	White		-	130	180		
Signal input voltage	High Level	DCLK, DE R0~R5 G0~G5 B0~B5	Vcc*0.7	-	Vcc	V	
	Low Level		0	-	Vcc*0.3	V	

Note :

1) Power Signal sequence :

$$t1 \leq 10\text{ms}$$

$$0\text{ms} \leq t2$$

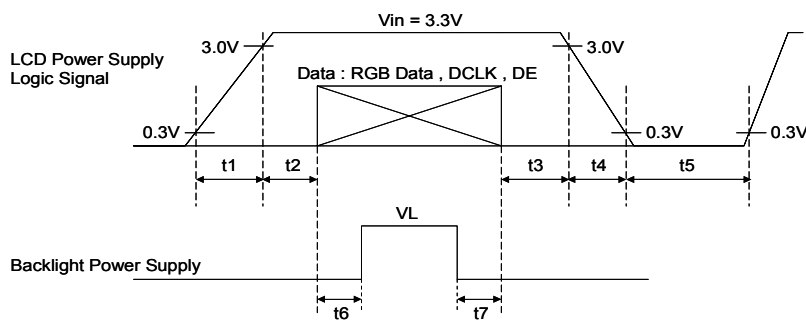
$$0 < t3 \leq 50\text{ms}$$

$$0 < t4 \leq 10\text{ms}$$

$$1\text{sec} \leq t5$$

$$200\text{ms} \leq t6$$

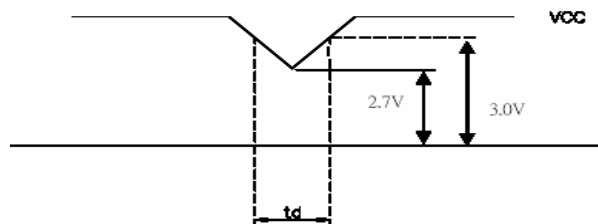
$$200\text{ms} \leq t7$$



Vcc-dip condition :

(1) $2.7\text{V} \leq V_{cc} < 3.0\text{V}$, $t_d \leq 10\text{ms}$

(2) $V_{cc} > 3.0\text{V}$, Vcc-dip condition should be the same with Vcc-turn-on condition

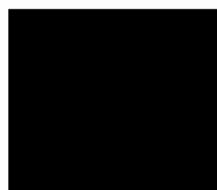


2) Current condition(Typ)

480 line mode , Vcc=3.3V , fH=30KHz , fV=60Hz , fCLK=27MHz



(a) 64 Gray



(b) Black



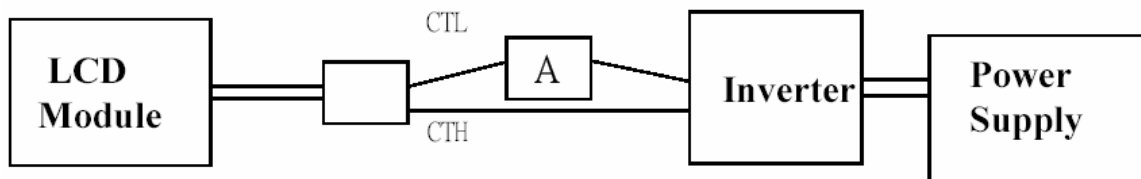
(c) White

4-2 Backlight unit

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Lamp Voltage	VL	583	648	713	Vrms	IL=6mA
Lamp Current	IL	5.5	6.0	6.5	mA	1)
Lamp Frequency	FL	40	-	80	KHZ	3)
Lamp life time	LT	15K	-	-	Hr	2)
Lamp Start Voltage	Ta=0°C	Vs	-	1530	Vrms	4)
	Ta=25°C		-	1180		

NOTE :

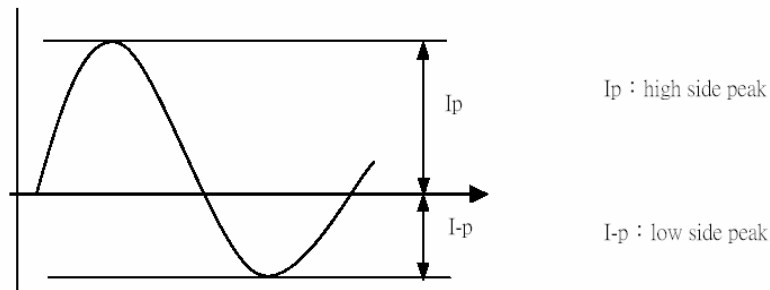
1) Lamp Current measurement method (The current meter is inserted in cold line)



2) Lamp Life Time define : Lamp brightness decay to 50% , Vs=1180V , Ta=25°C , IL=6.0mA

If the waveform of light up-driving is asymmetric , the distribution of mercury inside the lamp tube will become unequally or will deplete the Ar gas in it. Then it may cause the abnormal phenomenon of lighting-up. Therefore , designers have to try their best to fulfill the conditions under the inverter designing-stage as below

- The degrees of unbalance : < 10%
- The ratio of wave height : < $\sqrt{2} \pm 10\%$



A : The degrees of unbalance = $|I_p - I-p| / I_{rms} \times 100(\%)$

B : The ratio of unbalance = $|I_p - I-p| / I_{rms}$

3) Frequency in this range can mala the characterisitics of electric and optics maintain in +/- 10% except hue. Lamp frequency of inverter may produce interference with horizontal synchronous frequency(or vertical synchronous frequency),and this may cause ripple noise on the display .Therefore,please adjust lamp requency,and keep inverter as far from module as possible or use electronic shielding between inverter and module to avoid the interference.

4) The initial voltage for the lamp had to as possible as arrive to the maximum of the initial voltage.

5. INTERFACE

5-1 Pin Assignment

Pin no	Symbol	Function
1	Vss	Ground
2	Vss	Ground
3	NC	NO Connection
4	Vcc	Power supply for digital circuit
5	Vcc	Power supply for digital circuit
6	Vcc	Power supply for digital circuit
7	Vcc	Power supply for digital circuit
8	NC	NO Connection
9	DE	Data Enable Signal
10	Vss	Ground
11	Vss	Ground
12	Vss	Ground
13	B5	Blue data (MSB)
14	B4	Blue data
15	B3	Blue data
16	Vss	Ground
17	B2	Blue data
18	B1	Blue data
19	B0	Blue data (LSB)
20	Vss	Ground
21	G5	Green data (MSB)
22	G4	Green data
23	G3	Green data
24	Vss	Ground
25	G2	Green data
26	G1	Green data
27	G0	Green data (LSB)
28	Vss	Ground
29	R5	Red data (MSB)
30	R4	Red data
31	R3	Red data
32	Vss	Ground
33	R2	Red data
34	R1	Red data
35	R0	Red data (LSB)
36	Vss	Ground
37	Vss	Ground
38	DCLK	Data Clock
39	Vss	Ground
40	Vss	Ground

5-2 Backlight connector

Backlight-side : BHSR-02VS-1(JST) , Inverter-side : SM02B-BHSS-1(JST)

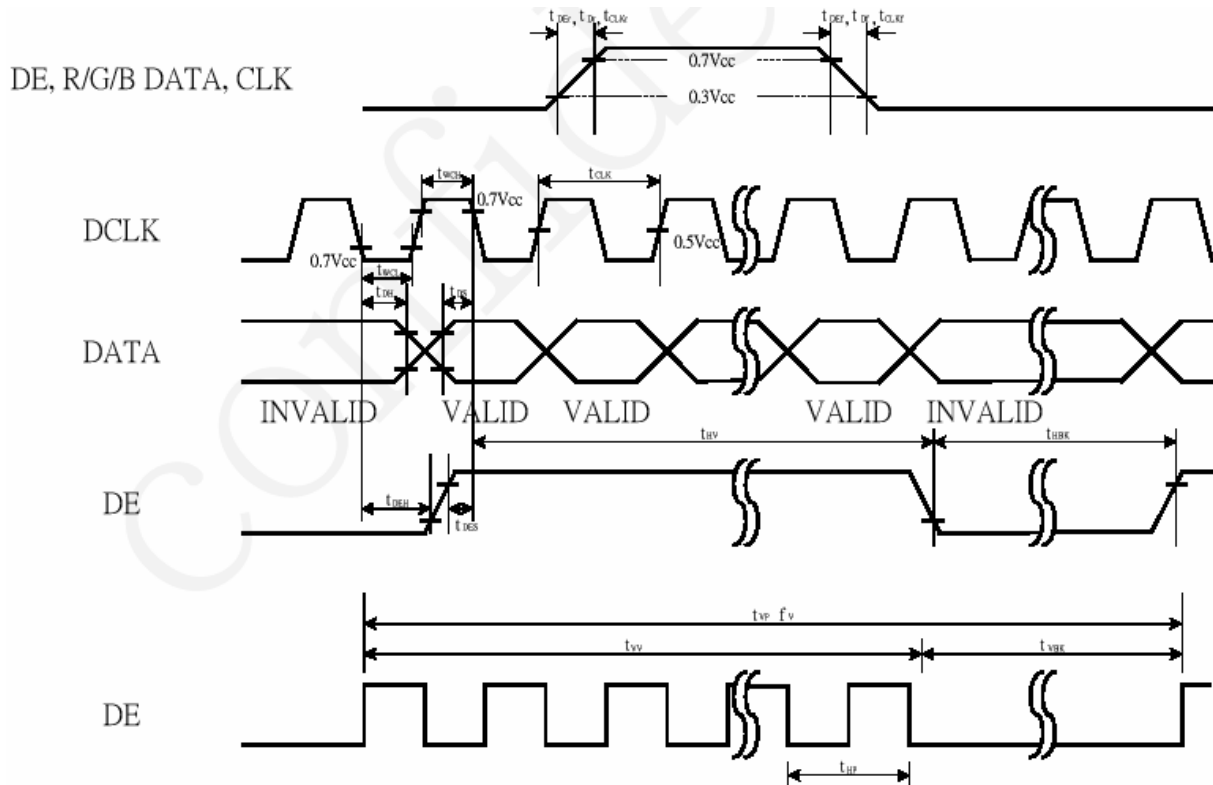
Pin No.	Symbol	Function
1	CTH	VBLH(High)
2	CTL	VBLL(Low)

6. INPUT SIGNAL :

6-1 Timing Specification

ITEM		Symbol	SPEC			UNIT
			Min	Typ	Max	
DCLK	CLK Frequency	Fclk	25	27	32	MHZ
	Period	Tclk	40	37	31	ns
	Low Level Width	Twcl	6	-	-	ns
	High Level Width	Twch	6	-	-	ns
	Rise/Fall Time	Tclkr Tclkf	-	-	10	ns
	Duty	-	0.45	0.5	0.55	-
DE	Setup Time	Tdes	5	-	-	ns
	Hold Time	Tdeh	10	-	-	ns
	Rise/Fall Time	Tder Tdef	-	-	16	ns
	Horizontal Period	Thp	850	900	950	Tclk
	Horizontal Valid	Thv	800			
	Horizontal Blank	Thbk	50	100	150	
	Vertical Period	Tvp	490	500	520	Thp
	Vertical Valid	Tvv	480			
	Vertical Blank	Tvbk	10	20	40	
	Vertical Frequency	Fv	55	60	65	Hz
DATA	Setup Time	Tds	5	-	-	ns
	Hold Time	Tdh	10	-	-	
	Rise/Fall Time	Tdr , Tdf	-	-	10	

6-2 Timing Characteristic

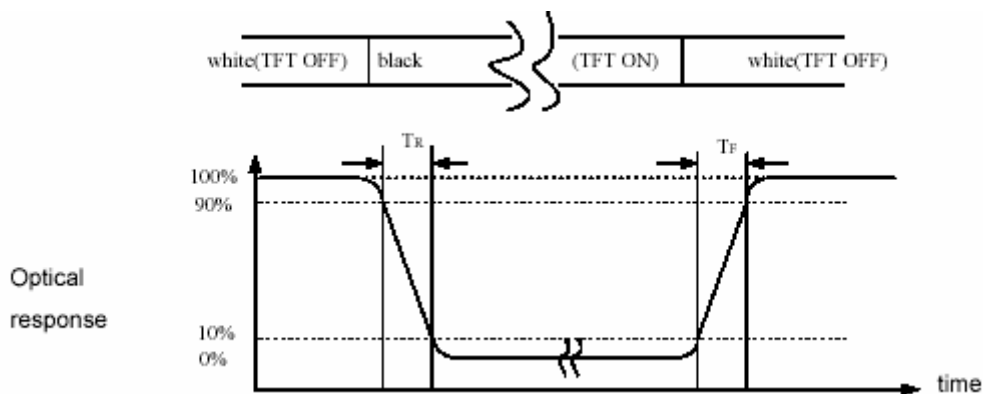


7. OPTICAL CHARACTERISTICS

Item		Symbol	Conditon	Min.	Typ.	Max.	Unit	Note
Response Time		$T_r + T_f$	$\Theta = \Phi = 0^\circ$	-	30	45	ms	(1)
Contrast ratio		CR		300	350	-	-	(2)(3)
Viewing Angle	Vertical	Θ	$CR \geq 10$	100	110	-	Deg.	(5)
	Horizontal	Φ		110	120	-		
Luminance		L	$\Theta = \Phi = 0^\circ$	260	300	-	cd/m ²	(3)(4)
Luminance Uniformity		ΔL		70	80	-	%	(3)(4)
Color chromaticity	Red	Rx	$\Theta = \Phi = 0^\circ$	0.561	0.591	0.621	-	(3)
		Ry		0.305	0.335	0.365		
	Green	Gx		0.283	0.313	0.343		
		Gy		0.518	0.548	0.578		
	Blue	Bx		0.121	0.151	0.181		
		By		0.108	0.138	0.168		
	White	Wx		0.283	0.313	0.343		
		Wy		0.299	0.329	0.359		

NOTE : These items are measured by BM-5A(TOPCON) or CA-1000(MINOLTA) in the dark room (no ambient light)

(1) Definition of Response Time (White-Black)



(2) Definition of Contrast Ratio

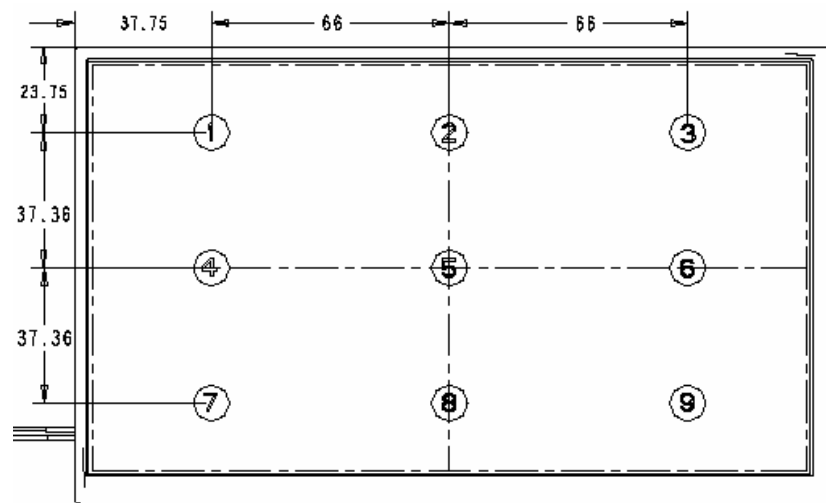
Measure contrast ratio on the below 9 points(refer to figurel,#1~#9point) and take the average value

Contrast ratio is calculated with the following formula :

$$\text{Contrast Ratio(CR)} = (\text{White})\text{Luminance of ON} \div (\text{Black})\text{Luminance of OFF}$$

(3) Definition of Luminance :

Measure white luminance on the same 9 points and take the average value



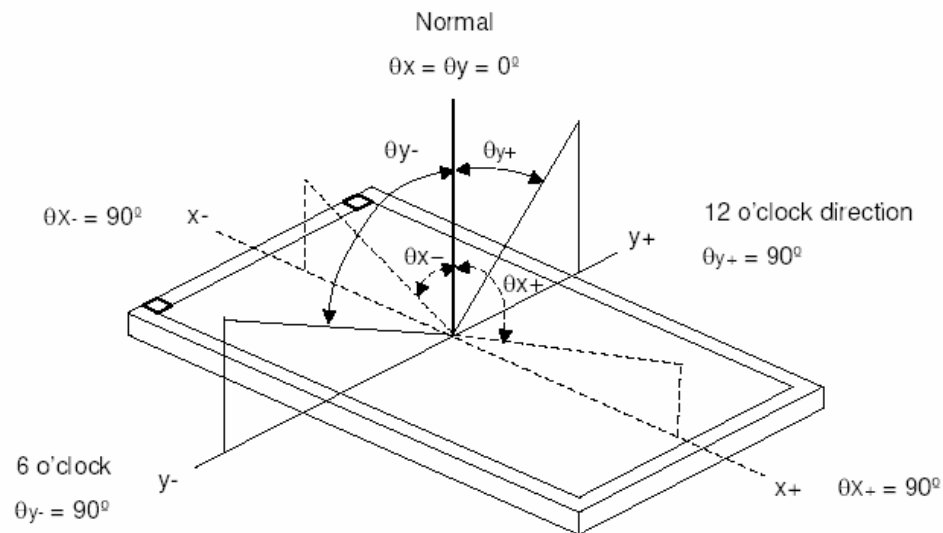
(4) Definition of Luminance Uniformity :

Measured Maximum luminance[L(MAX)] and Minimum luminance[L(MIN)] on the 9 points

Luminance Uniformity is calculated with the following formula :

$$\Delta L = [(MAX) \div L(MIN)] \times 100$$

(5) Definition of Viewing Angle



$$\Phi = (\theta_{x+}) + (\theta_{x-}) \quad \Theta = (\theta_{y+}) + (\theta_{y-})$$

8. RELIABILITY TEST CONDITIONS

ITEM	CONDITIONS	NOTE
HIGH TEMPERATURE OPERATION	60°C , 240Hrs	
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	40°C , 90%RH , 240Hrs	
HIGH TEMPERATURE AND HIGH HUMIDITY STORAGE	60°C , 90%RH , 48 Hrs	
HIGH TEMPERATURE STORAGE	70°C , 240Hrs	
LOW TEMPERATURE OPERATION	0°C , 240Hrs	
LOW TEMPERATURE STORAGE	-30°C , 240Hrs	
THERMAL SHOCK (No operation)	-20°C (0.5Hr) ~60°C (0.5Hr) 200Cycle	
SHOCK (NON-OPERATIONS)	• 980m/S ² (equal to 100G),6ms • (1/2 Sine wave),XYZ	
VIBRATION (NON-OPERATIONS)	• Frequency range:8~33.3Hz 1stoke:1.3mm Vibration sinusoidal wave, perpendicular axis(both x,z axis:2Hrs,y axis :4Hrs) 1 sweep:2.9G , 33.3~400Hz 1cycle : 15min	
ESD	150Pf,330Ω, ±8kV&±15kV air & contact test	(1)
	200Pf , 0Ω,±200V contact test	(2)

NOTE : Measure point :

(1) LCD glass and bezel

(2) IF connector pins

9. USE PRECAUTIONS

9-1 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.

9-2 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

9-3 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.

9-4 Operating precautions

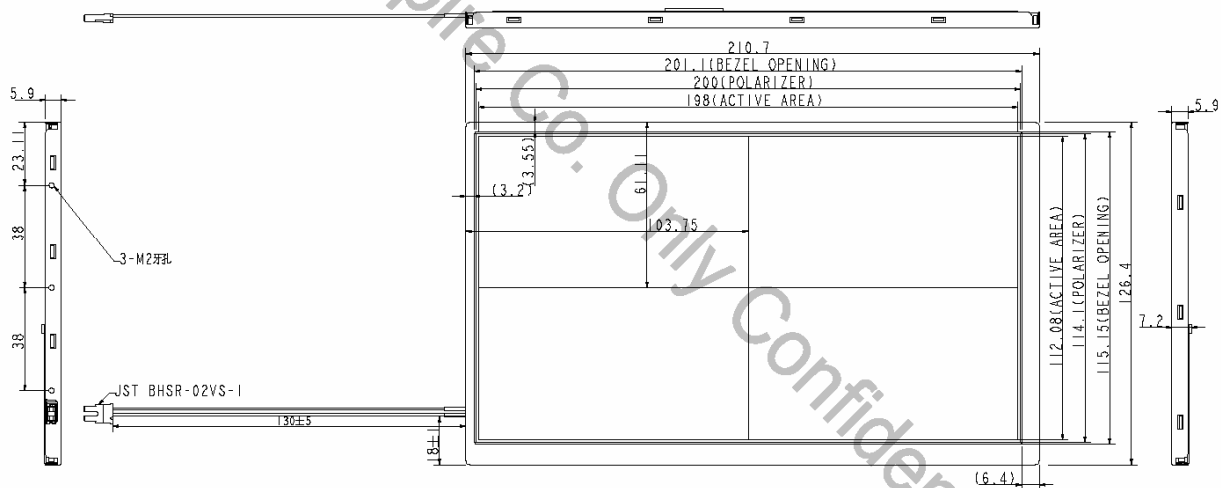
- (1) Do not boost the applied drive voltage abnormally. Failure to do so may break ICs. When applying power voltage, check the electrical features beforehand and be careful. Always turn off the power to the LC module controller before removing or inserting the LC module input connector. If the input 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 drive 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: $0.2V_{dd}$ or less and H level: $0.8V_{dd}$ 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.

9-5 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.

10. OUTLINE DIMENSION

10-1 Front view(unit:mm)



10-2 Back view(unit:mm)

