A Brighter Solution

AMP DISPLAY INC.

SPECIFICATIONS

7.0-in Color LCD TFT MODULE

CUSTOMER:	
CUSTOMER PART NO.	
AMP DISPLAY PART NO.	A M - 8 0 0 4 8 0 R 2 T M Q W - T 0 1 H
APPROVED BY:	
DATE:	

☐ APPROVED FOR SPECIFICATIONS

☐ APPROVED FOR SPECIFICATION AND PROTOTYPES

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2010/5/24	--	New Release	John

1. INTRODUCTION

Ampire Display Module 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, timing controller ,touch panel and LED driver . This TFT-LCD has a high resolution (800(R.G.B) X 480) and can display up to 262,144 colors .

1-1. Features

- 7” WVGA (16:9 diagonal) configuration
- Input interface voltage : 3.3V
- Data enable mode
- LED driver : 5V input
- Touch Panel

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	152.4 (W) x 91.44 (H)	mm
Pixel pitch	0.1905 (W) x 0.1905 (H)	mm
Color configuration	R.G.B Vertical stripe	
Overall dimension	165.0(W)x104.44(H)X9.52(T)	mm
Brightness	400 nit	cd/m^2
Contrast ratio	400 : 1	
Backlight unit	LED	
Display color	262,144	colors

3. ABSOLUTE MAX. RATINGS

ITEM	SYMBOL	MIN	MAX	UNIT
Power Supply Voltage for LCD	Vcc	-0.5	6.0	V
Signal input voltage	DCLK DE R0~R5 G0~G5 B0~b5	-0.5	VCC+0.3	V
Operation Temperature	Top	-20	70	℃
Storage Temperature	Tstg	-30	80	℃

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

4. ELECTRICAL CHARACTERISTICS

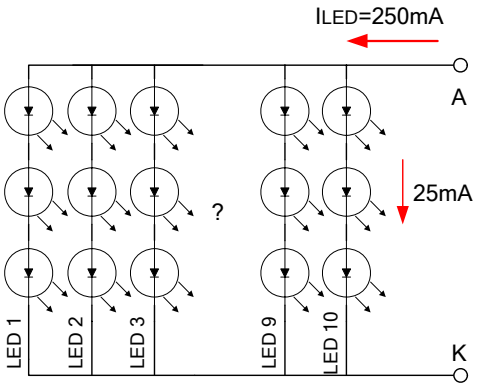
4-1 TFT LCD Module voltage

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	CONDITION
Power Supply Voltage For LCD		Vcc	3.0	3.3	3.6	V	
Power Supply Current For LCD		Icc	-	170	220	mA	Black pattern
Logic Input Voltage	Input Voltage	V_{IN}	0	-	Vcc	V	
	Threshold Voltage(High)	V_{TH}	0.7Vcc	-	Vcc	V	
	Threshold Voltage(Low)	V_{TL}	0	-	0.3Vcc	V	
Power Supply Voltage For LED		VLED	-	5.0	5.5	V	
Power Supply Current For LED		ILED	-	580	-	mA	VLED=5V
ADJ signal frequency		f_{PWM}	100	--	1K	Hz	
ADJ signal logic level High		VIH	-	3.3	5.0	V	
ADJ signal logic level Low		VIL	-	-	0.5	V	

4-2 LED Driving Conditions

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	CONDITION
LED Backlight Voltage	V_{BL}	8.4	--	10.8	V	For reference
LED Backlight Current	I_{BL}	-	250	-	mA	**Ta=25℃**
LED Life Time			30K		Hr	Note*

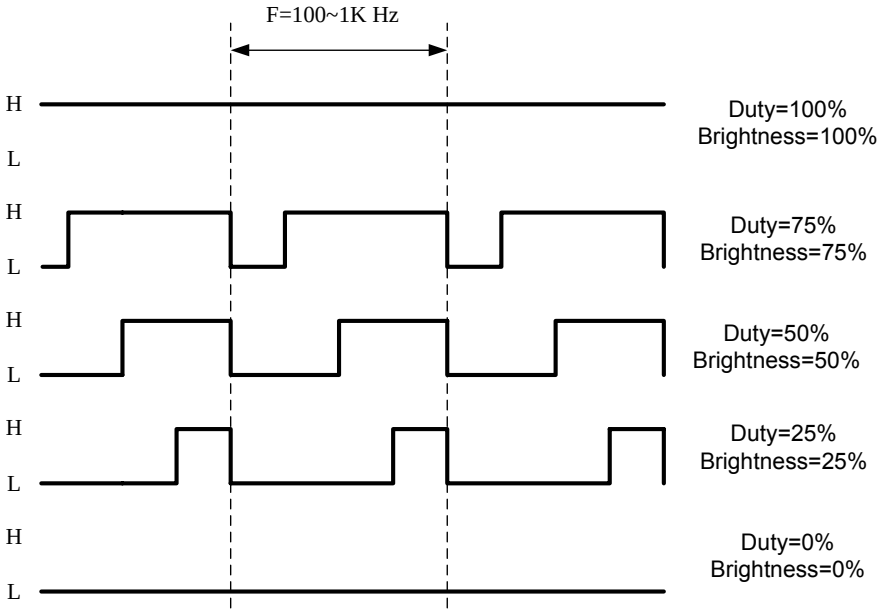
Note* : Brightness to be decreased to 50% of the initial value.



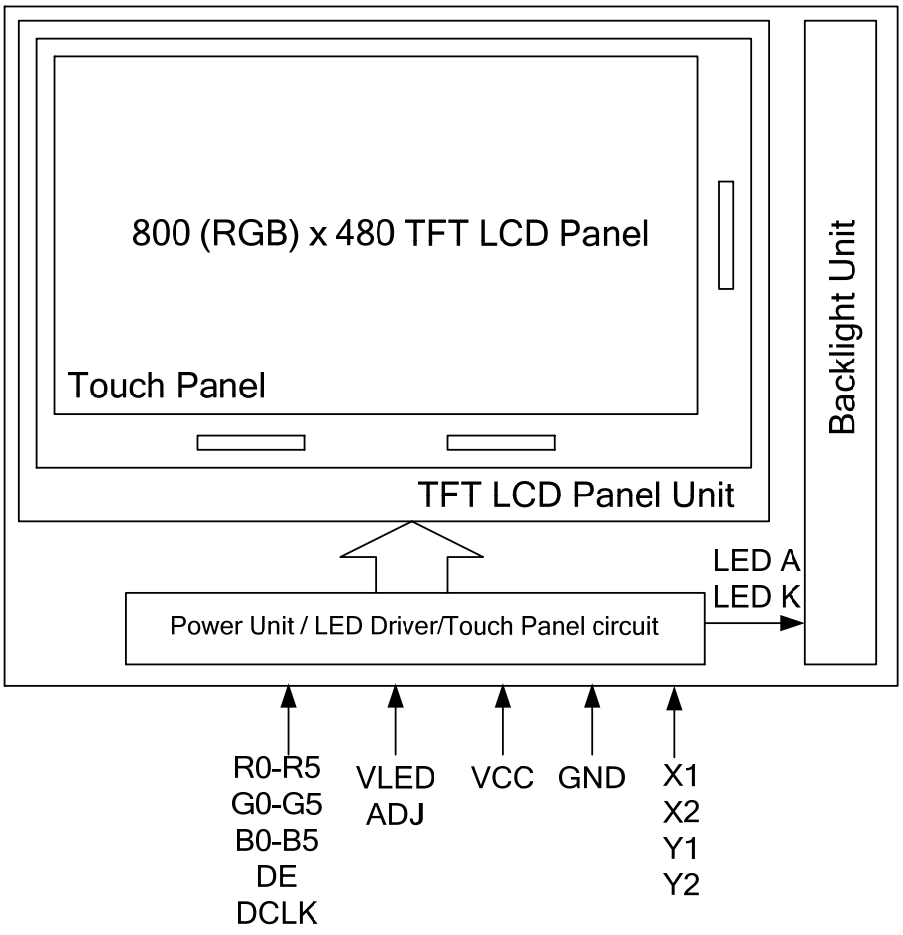
5. INTERFACE

Pin No	Symbol	Function
1	NC	No connection
2	NC	No connection
3	NC	No connection
4	VLED	Power Supply for LED
5	VLED	Power Supply for LED
6	VLED	Power Supply for LED
7	Vcc	Power Supply for LCD
8	NC	No connection
9	DE	Data Enable
10	X1	Left electrode – differential analog
11	Y2	Top electrode – differential analog
12	ADJ	Adjust for LED Brightness *Note1
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	Vss	Power Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	Vss	Power Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	Vss	Power Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	Vss	Power Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	Vss	Power Ground
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0 (LSB)
36	X2	Right electrode – differential analog
37	Y1	Bottom electrode – differential analog
38	DCLK	Clock Signals
39	Vss	Power Ground
40	NC	No connection

Note1: ADJ is PWM signal input. It is for brightness control.



● BLOCK DIAGRAM

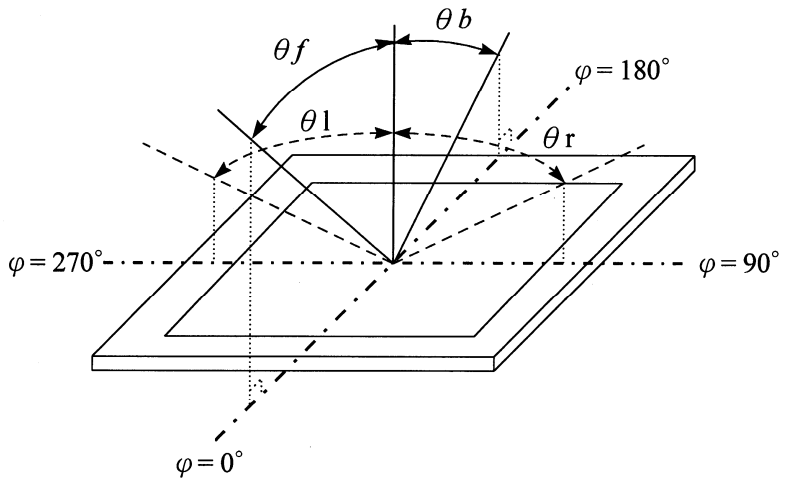


6. OPTICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Front	θ f	CR≧10	55	60	--	deg.	(1)(2)(3)
	Back	θ b		55	60	--		
	Left	θ l		65	70	--		
	Right	θ r		65	70	--		
Contrast ratio		CR	Θ=Φ=0°	250	400	--	--	(1)(3)
Response Time		T_r	Θ=Φ=0°	--	5	10	ms	(1)(4)
		T_f		--	11	16	ms	(1)(4)
Color chromaticity	White	Wx		0.239	0.299	0.359	--	(1)
		Wy		0.268	0.328	0.388		
Luminance		L	Θ=Φ=0°	--	400	--	cd/m^2	(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



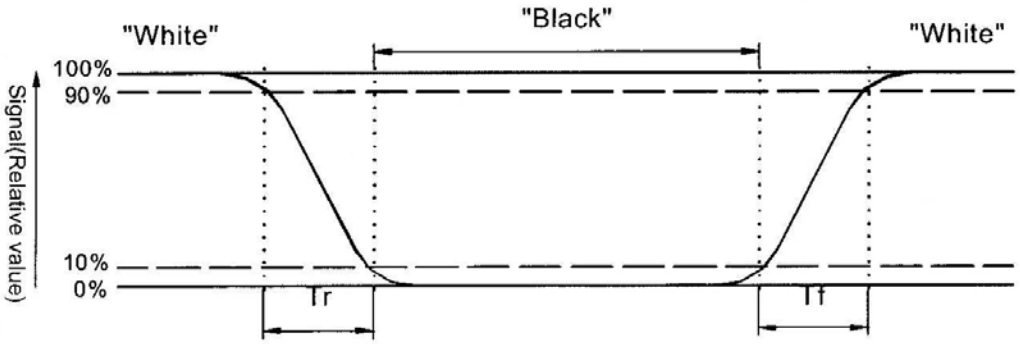
Note 3: Definition of contrast ratio:

Contrast ratio is calculated with the following formula.

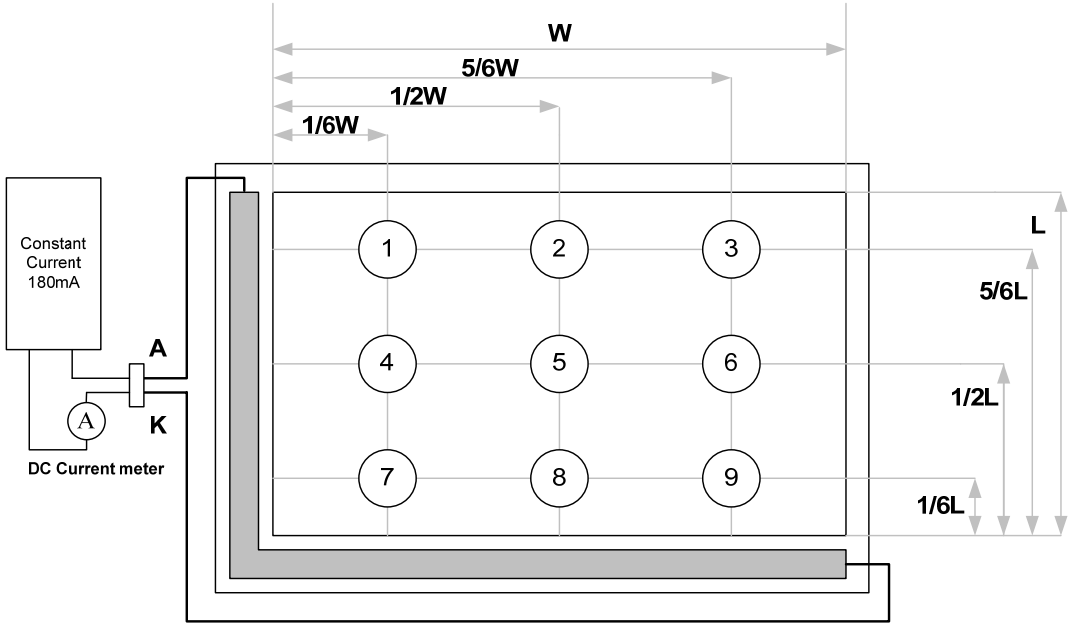
$$\text{Contrast ratio(CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector Output when LCD is at "Black" state}}$$

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.



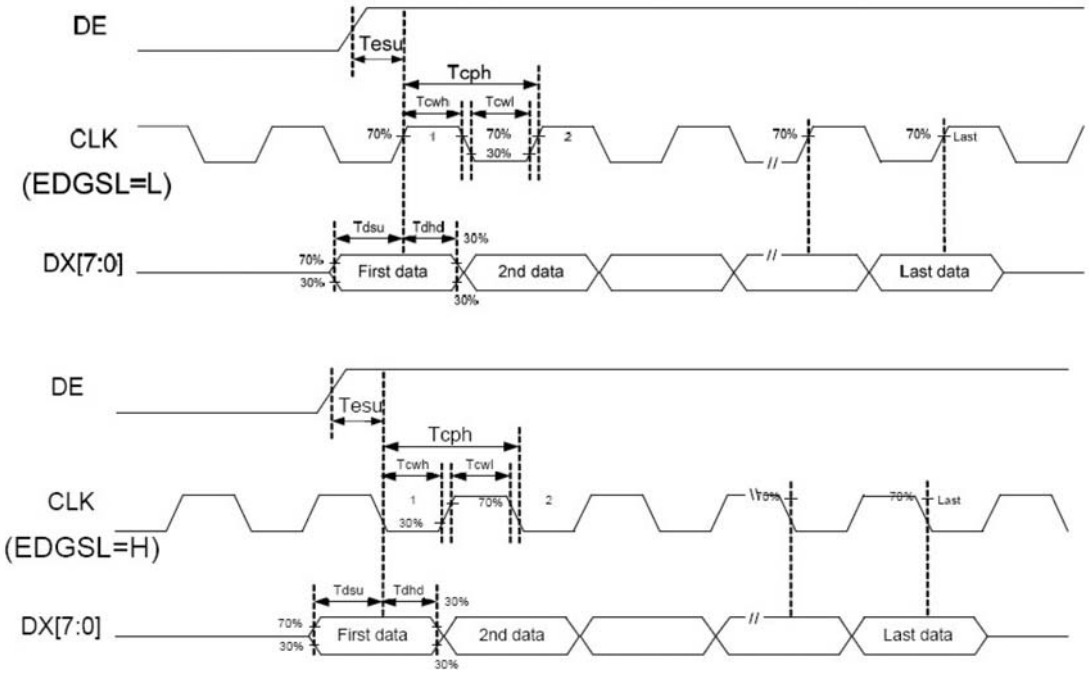
Note 6 : Definition of Luminance Uniformity

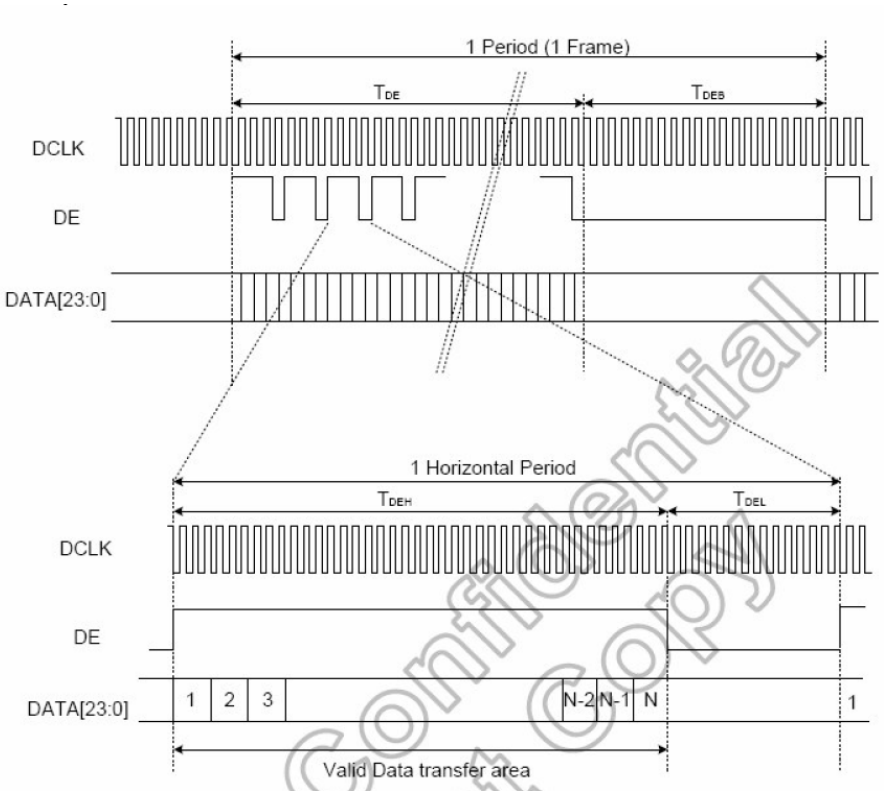
ΔL = [L(min.) of 9 points / L(max.) of 9 points] X 100%

7. INPUT SIGNAL (DE ONLY MODE)

Parameter	Symbol				Unit
		Min.	Typ.	Max.	
Data setup time	Tdsu	6	-	-	ns
Data hold time	Tdhd	6	-	-	Tcph
DE setup time	Tesu	6	-	-	Tcph
CLK frequency	F_{CPH}		33.26		MHz
CLK period	T_{CPH}		30.06		ns
CLK pulse duty	T_{CWH}	40	50	60	%
DE period	$T_{DEH}+T_{DEL}$	1000	1056	1200	T_{CPH}
DE pulse width	T_{DEH}	-	800	-	T_{CPH}
DE frame blanking	T_{DEB}	10	45	110	$T_{DEH}+T_{DEL}$
DE frame width	T_{DE}	-	480	-	$T_{DEH}+T_{DEL}$

Note：We suggest using the typical value, so it can have better performance.





8. Touch Panel ELECTRICAL SPECIFICATION

Parameter	Condition	Standard Value
Terminal Resistance	X Axis	200 ~ 900 Ω
	Y Axis	160 ~ 640 Ω
Insulating Resistance	DC 25 V	More than 20MΩ
Linearity	--	≦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 : R0.8mm

Load : 250 g

Note B

By Silicon rubber tapping at same point

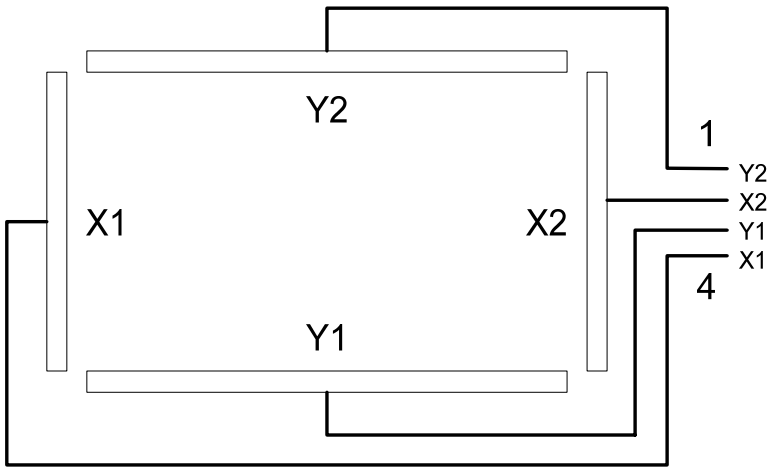
Shape of rubber end : R8mm

Load : 250gf

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



9. **QUALITY AND RELIABILITY**

9.1 TEST CONDITIONS

Tests should be conducted under the following conditions :

Ambient temperature : 25 ± 5°C

Humidity : 60 ± 25% RH.

9.2 SAMPLING PLAN

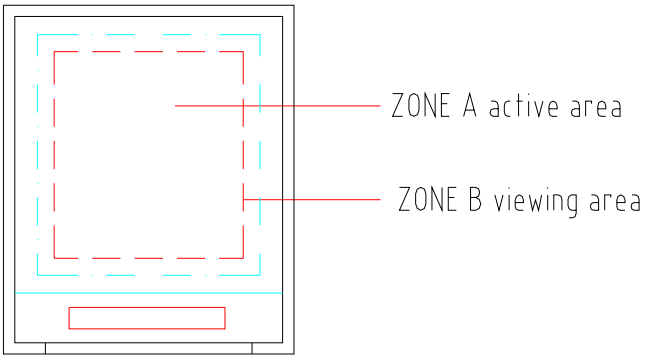
Sampling method shall be in accordance with MIL-STD-105E , level II, normal single sampling plan .

9.3 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.

9.4 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.



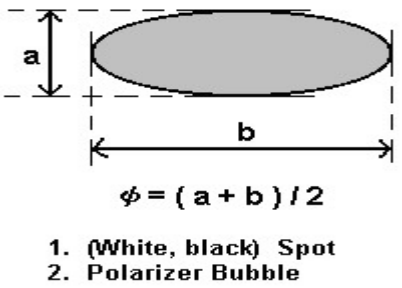
9.5 Incoming Inspection Standard

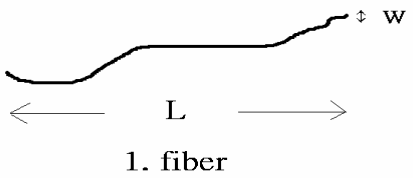
<table>
<tr><th colspan="3">Defect Type</th><th colspan="7">Limit</th><th>Note</th></tr>
<tr><td rowspan="10">Visual Defect</td><td rowspan="8">Internal</td><td rowspan="3">Spot</td><td colspan="5">φ＜0.15mm</td><td>Ignore</td><td rowspan="3">(1)</td></tr>
<tr><td colspan="5">0.15mm≦φ≦0.5mm</td><td>N≦4</td></tr>
<tr><td colspan="5">0.5mm＜φ</td><td>N=0</td></tr>
<tr><td rowspan="2">Fiber</td><td colspan="5">0.1mm<W≦0.5mm, L≦1.5mm</td><td>N≦4</td><td rowspan="2">(1)</td></tr>
<tr><td colspan="5">1.0mm＜W, 1.5mm＜L</td><td>N=0</td></tr>
<tr><td rowspan="3">Polarizer Bubble</td><td colspan="5">φ＜0.15mm</td><td>Ignore</td><td rowspan="3">(1)</td></tr>
<tr><td colspan="5">0.15mm≦φ≦0.5mm</td><td>N≦4</td></tr>
<tr><td colspan="5">0.5mm＜φ</td><td>N=0</td></tr>
<tr><td>Mura</td><td colspan="7">It' OK if mura is slight visible through 6%ND filter</td><td></td></tr>
<tr><td rowspan="8">Electrical Defect</td><td colspan="2" rowspan="2">Bright Dot</td><td colspan="3">A Grade</td><td colspan="3">B Grade</td><td></td></tr>
<tr><td>C Area</td><td>O Area</td><td>Total</td><td>C Area</td><td>O Area</td><td>Total</td><td>(3)</td></tr>
<tr><td colspan="2"></td><td>N≦0</td><td>N≦2</td><td>N≦2</td><td>N≦2</td><td>N≦3</td><td>N≦5</td><td>(2)</td></tr>
<tr><td colspan="2">Dark Dot</td><td>N≦2</td><td>N≦4</td><td>N≦4</td><td>N≦3</td><td>N≦5</td><td>N≦8</td><td></td></tr>
<tr><td colspan="2">Total Dot</td><td colspan="3">N≦4</td><td>N≦5</td><td>N≦6</td><td>N≦8</td><td>(2)</td></tr>
<tr><td colspan="2">Two Adjacent Dot</td><td>N≦0</td><td>N≦1 pair</td><td>N≦1 pair</td><td>N≦1 pair</td><td>N≦1 pair</td><td>N≦1 pair</td><td>(4)</td></tr>
<tr><td colspan="2">Three or More Adjacent Dot</td><td colspan="6">Not Allowed</td><td></td></tr>
<tr><td colspan="2">Line Defect</td><td colspan="6">Not Allowed</td><td></td></tr>
</table>

(1) One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)

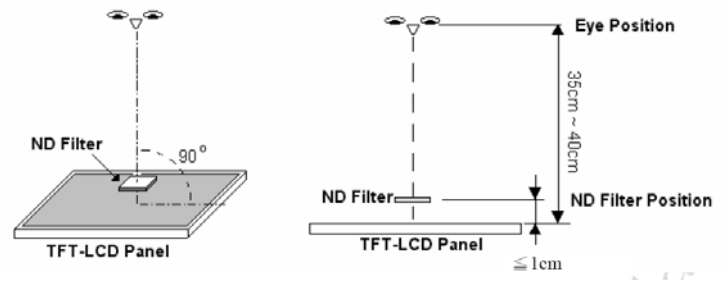
(2) LITTLE BRIGHT DOT acceptable under 6% ND-Filter

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

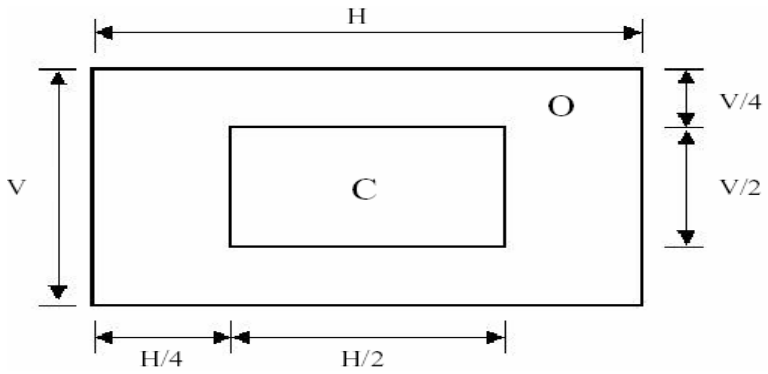




[Note2] Bright dot is defined through 6% transmission ND Filter as following.



[Note3]

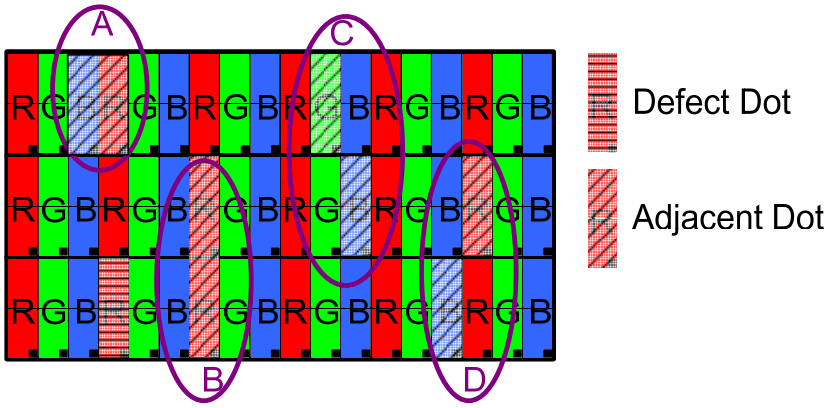


C Area: Center of display area

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.

9.6 RELIABILITY TEST CONDITIONS

Test Item	Test Conditions	Note
High Temperature Operation	70±3°C ,Dry t=240 hrs	
Low Temperature Operation	-20±3°C, Dry t=240 hrs	
High Temperature Storage	80±3°C , Dry t=240 hrs	1,2
Low Temperature Storage	-30±3°C ,Dry t=240 hrs	1,2
Thermal Shock Test	-20°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. (1 cycle) Total 100 cycle(Dry)	1,2
Humidity Test	40 °C, Humidity 90%, 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.

10. USE PRECAUTIONS

10-1 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.

10-2 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

10-3 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.

10-4 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.

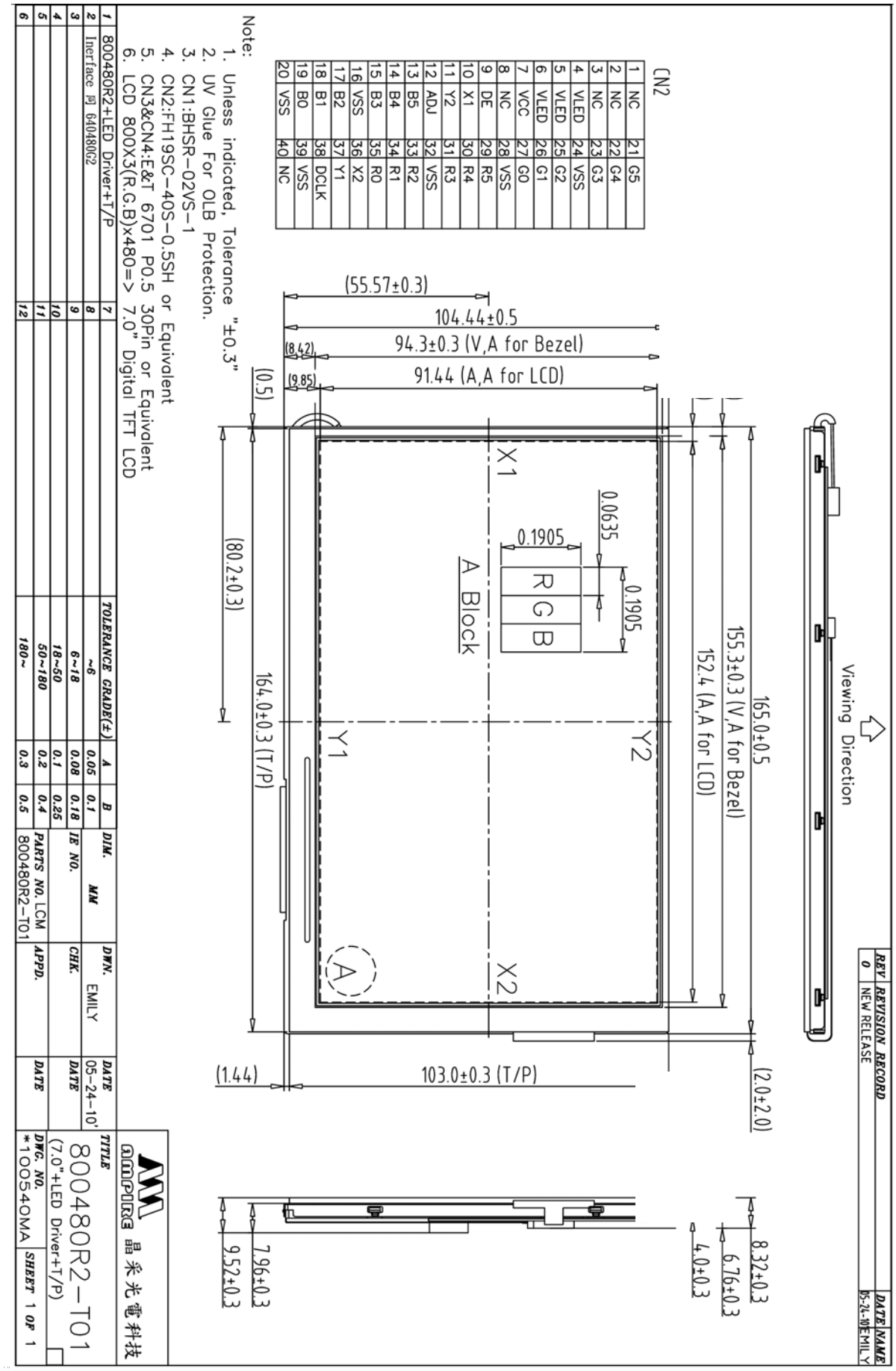
10-5 Other

(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..

11. OUTLINE DIMENSION



REV	REVISION RECORD	DATE	NAME
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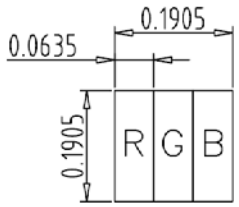
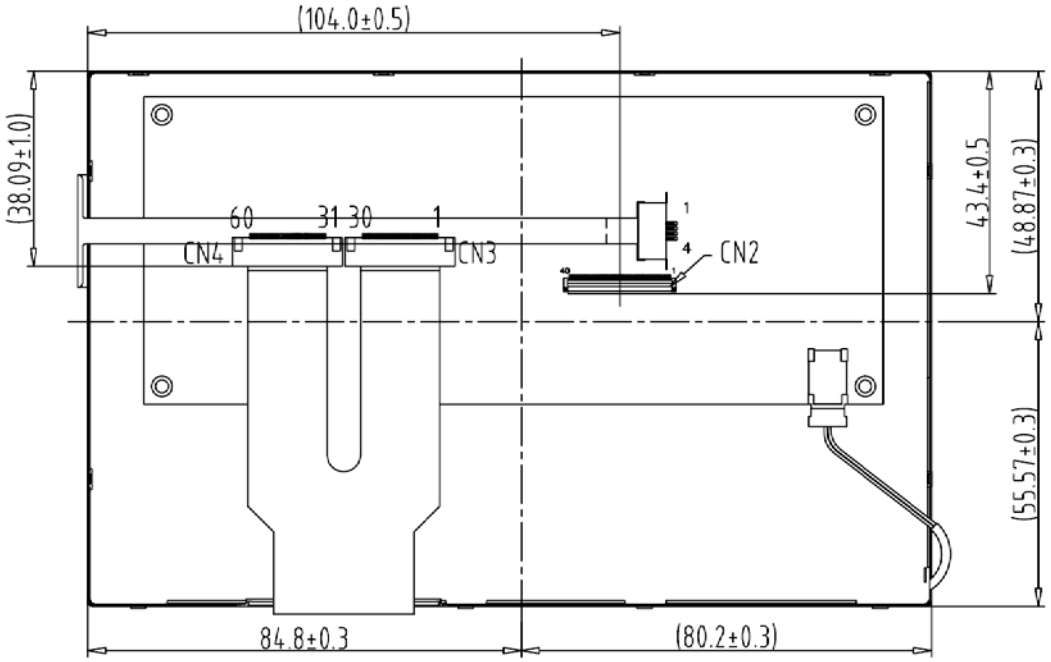


A Block

CN2

1	NC	21	G5
2	NC	22	G4
3	NC	23	G3
4	VLED	24	VSS
5	VLED	25	G2
6	VLED	26	G1
7	VCC	27	G0
8	NC	28	VSS
9	DE	29	R5
10	X1	30	R4
11	Y2	31	R3
12	ADJ	32	VSS
13	B5	33	R2
14	B4	34	R1
15	B3	35	R0
16	VSS	36	X2
17	B2	37	Y1
18	B1	38	DCLK
19	B0	39	VSS
20	VSS	40	NC



Back View

Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN1:BHSR-02VS-1
4. CN2:FH19SC-40S-0.5SH or Equivalent
5. CN3&CN4:E&T 6701 P0.5 30Pin or Equivalent
6. LCD 800X3(R.G.B)x480=> 7.0" Digital TFT LCD

				TOLERANCE GRADE(±)	A	B	DIM.	DWN.	DATE	TITLE
1	800480R2+LED Driver+T/P	7								
2	Inerface 同 640480G2	8		~6	0.05	0.1	MM	EMILY	05-24-10'	800480R2-T01
3		9		6~18	0.08	0.18	IE NO.	CHK.	DATE	(7.0"+LED Driver+T/P)
4		10		18~50	0.1	0.25				
5		11		50~180	0.2	0.4	PARTS NO. LCM-1	APPD.	DATE	DWG. NO. *100541MA
6		12		180~	0.3	0.5	800480R2-T01			SHEET 1 OF 1

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AMPIRE CO., LTD.

Date : 2010/5/24