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-T01H-A
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

RECORD OF REVISION

Revision Date	Page	Contents	Editor
2009/12/11	--	New Release	Edward

1. INTRODUCTION

Ampire Display Module AM800480G 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, 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
- Build-in LED Driver IC

1-2. Applications

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

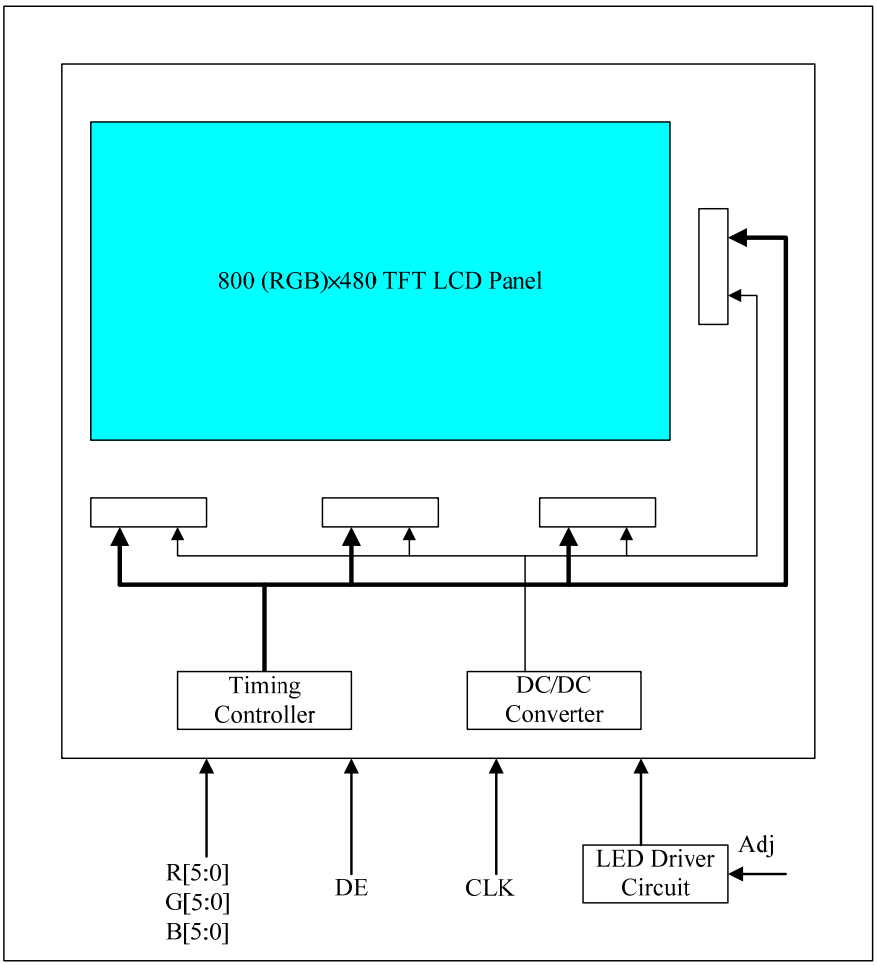
2. PHYSICAL SPECIFICATIONS

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)x104.0(H)	mm
Weight	T.B.D	g
Brightness	240 nit(typ)	cd/m^2
Contrast ratio	250 : 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	5.0	V
Signal input voltage	DCLK DE R0~R5 G0~G5 B0~b5	-0.5	VCC+0.5	V
Operation Temperature	Top	-10	60	℃
Storage Temperature	Tstg	-20	70	℃

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



4. ELECTRICAL CHARACTERISTICS

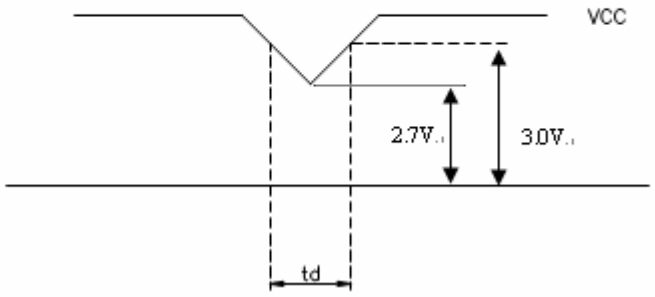
4-1 TFT LCD Module voltage

ITEM		SYMBOL	MIN	TYP	MAX	UNIT	Remark
Power Supply Voltage For LCD		Vcc	3.0	3.3	4.0	V	-
Power Supply Current For LCD		Icc	200	250	300	mA	-
Power Supply Voltage For LED		VDD	3	5	5.5	V	-
Power Supply Current For LED		IDD	-	(698)	-	mA	VDD=3.3; Efficiency of LED Driver IC is 75%
			-	(460)	-	mA	VDD=5.0; Efficiency of LED Driver IC is 75%.
Logic Input Voltage	Input Voltage	V_{IN}	0	-	Vcc	V	-
	Threshold Voltage(High)	V_{TH}	3.0	-	Vcc	V	-
	Threshold Voltage(Low)	V_{TL}	GND	-	0.5	V	-
LED life time			--	30K	--	Hours	Ta=25℃; VDD=5.0; Efficiency of LED Driver IC is 75%.

( ): For Reference Only.

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. INTERFACE

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

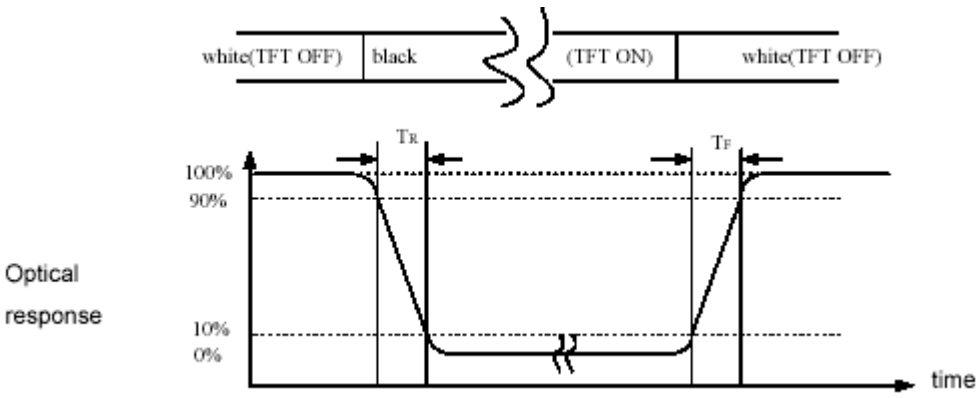
6. OPTICAL CHARACTERISTICS

Item			Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Response Time			$T_r + T_f$	Θ=Φ=0°	-	20	30	ms	(1)
Contrast ratio			CR			250			(2)(3)
Viewing Angle	Vertical		Θ	CR≧10		120			(5)
	Horizontal		Φ			140			
Luminance			L	Θ=Φ=0°		240			(3)(4)
Color chromaticity	Red	Rx		Θ=Φ=0°	0.551	0.581	0.611		(3)
		Ry			0.331	0.361	0.391		
	Green	Gx			0.324	0.354	0.384		
		Gy			0.534	0.564	0.594		
	Blue	Bx			0.118	0.148	0.178		
		By			0.094	0.124	0.154		
	White	Wx			0.287	0.317	0.347		
		Wy			0.325	0.355	0.385		

NOTE:

- These items are measured by BM-7(TOPCON) in the dark room (no ambient light)
- Brightness conditions: IL=180mA.

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



(2) Definition of Contrast Ratio

Measure contrast ratio on the below 5 points (refer to figurel, #1~#5point) and take the average value

Contrast ratio is calculated with the following formula:

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

(3) Definition of Luminance :

Measure white luminance on the same 5 points and take the average value

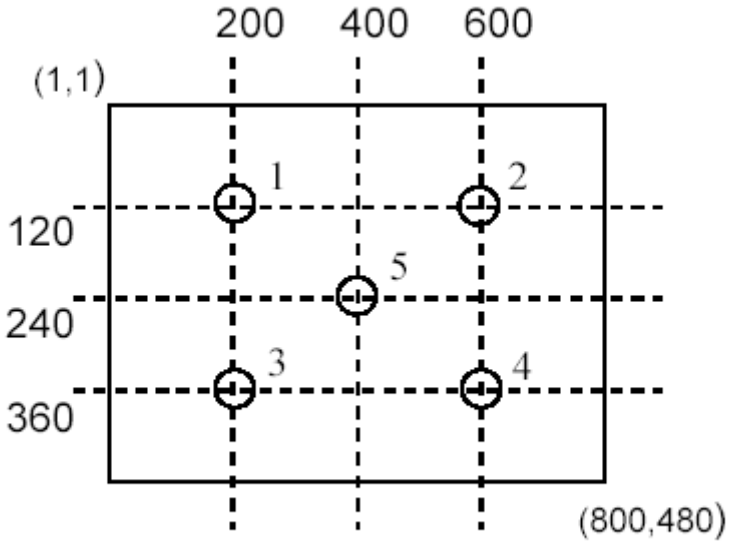
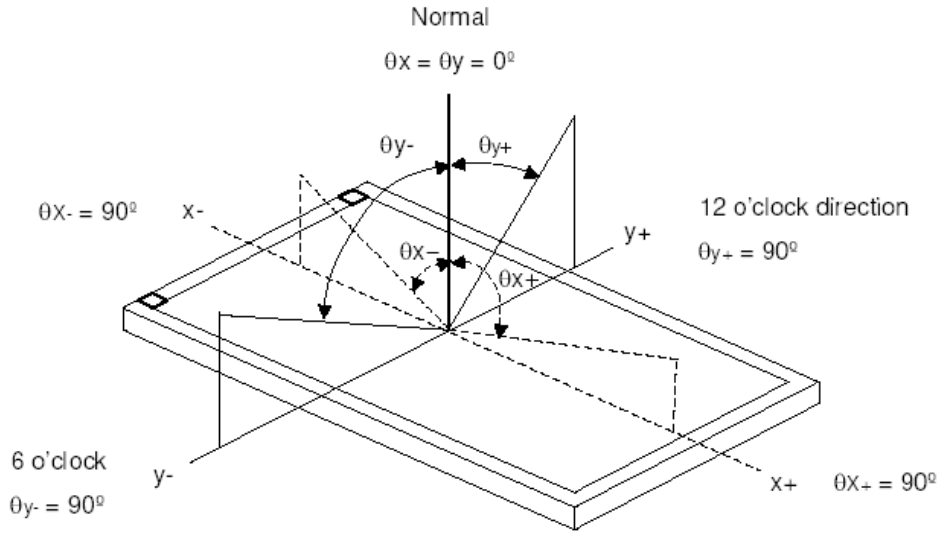


Fig.1 Measuring point

(1) Definition of Luminance Uniformity :
Measured Maximum luminance[L(MAX)] and Minimum luminance[L(MIN)] on the 5 points
Luminance Uniformity is calculated with the following formula:

ΔL =[L(MAX) / L(MIN) –1] X 100

(2) Definition of Viewing Angle



Φ =(Θx+)+(Θx-) Θ =(Θy+)+(Θy-)

7. INPUT SIGNAL (DE ONLY MODE)

Timing Characteristics

DE mode Input signal characteristics, 800 x 480

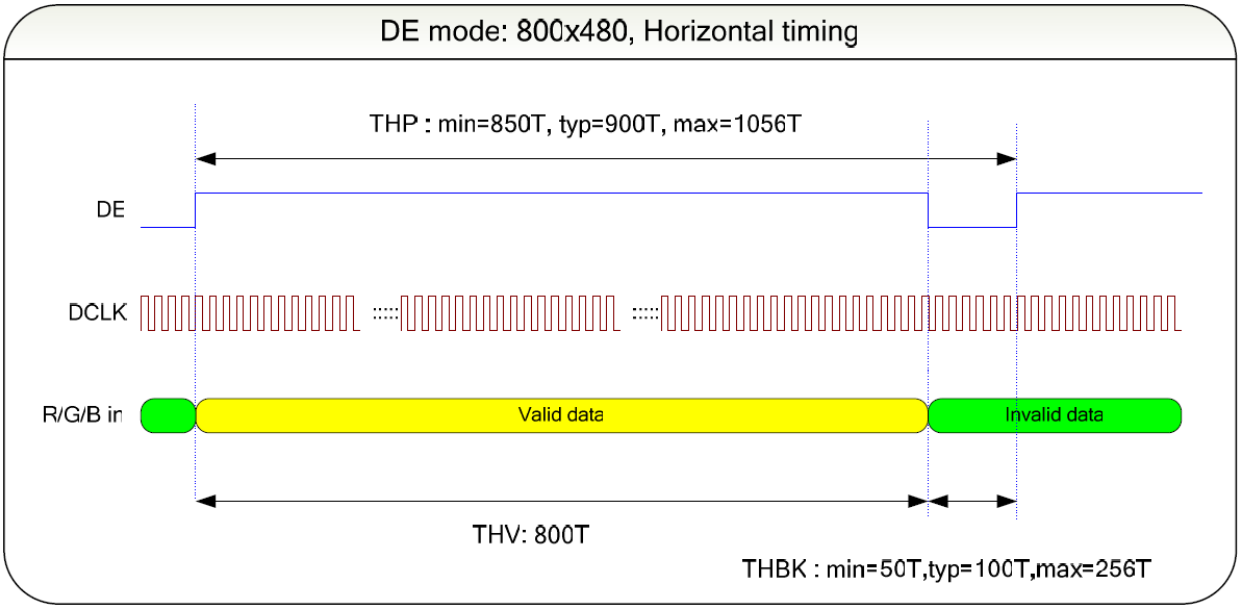
PARAMETER		SYMBOL	MIN	TYP	MAX	UNIT	REMARK
DCLK	PERIOD	TCLK	25	34	-	NS	
	FREQUENCY	FCLK	-	29.5	40	MHZ	
	LOW LEVEL WIDTH	TWCL	6	-	-	NS	
	HIGH LEVEL WIDTH	TWCH	6	-	-	NS	
	RISE, FALL TIME	TCLKR, TCLKF	-	-	3	NS	
	DUTY	-	0.45	0.50	0.55	-	
DE	SETUP TIME	TDES	5	-	-	NS	
	HOLD TIME	TDEH	5	-	-	NS	
	RISE, FALL TIME	TDER, TDEF	-	-	5	NS	
	HORIZONTAL PERIOD	THP	810	928	1600	TCLK	
	HORIZONTAL VALID	THV	800			TCLK	
	HORIZONTAL BLANK	THBK	THP - THV			TCLK	
	VERTICAL PERIOD	TVP	485	525	960	THP	
	VERTICAL VALID	TW	480			THP	
	VERTICAL BLANK	TVBK	TVP - TW			THP	
DATA	SETUP TIME	TDS	5	-	-	NS	
	HOLD TIME	TDH	5	-	-	NS	
	RISE, FALL TIME	TDR, TDF	-	-	3	NS	

- This module is operated by DE only mode

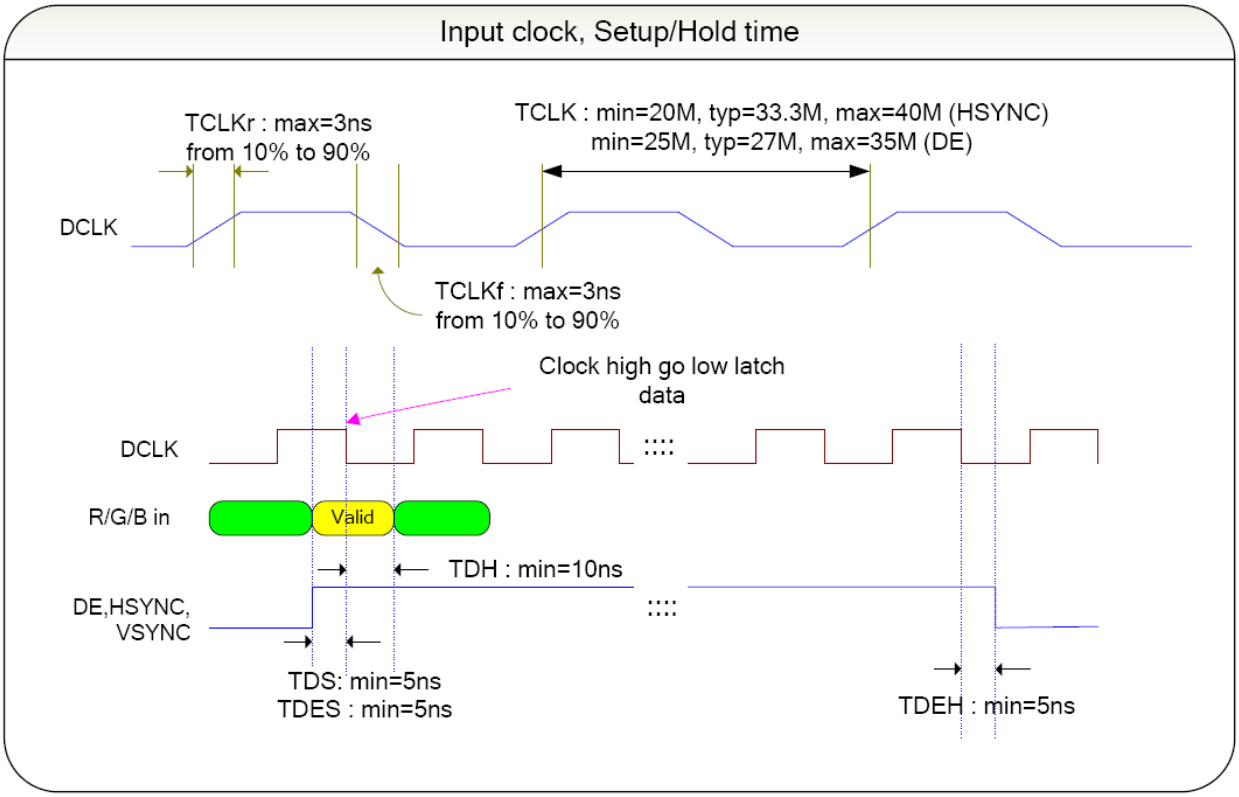
Output Signal Characteristics, 800 x 480

PARAMETER		SYMBOL	VALUE	UNIT
HCLK FREQUENCY	NORMAL	FHCLK	1	FCLK
HCLK FREQUENCY	DUAL	1/2FHCLK	0.5	FCLK
HCLK PERIOD	NORMAL	THCLK	1	TCLK
HCLK PERIOD	DUAL	2THCLK	2	TCLK
DATA, REV DIO VALID TO HCLK RISING		TSU	0.5	THCLK
HCLK RISING TO DATA, REV, DIO VALID		THD	0.5	THCLK
POL PULSE WIDTH		TPOL	1	THP
POL VALID TO LD RISING		TPSU	0.5 THP + 12	THCLK
LD RISING TO POL VALID		TPHD	THP - TPSU	THCLK
STV PULSE WIDTH		TSTV	1	THP
STV VALID TO CKV RISING		TVSU	0.5	THP
CKV RISING TO STV VALID		TVHD	0.5	THP
DIO PULSE WIDTH		TDIOW	1	THCLK
LD PULSE WIDTH		TLDW	4	THCLK
OEV PULSE WIDTH		TOEV	66	THCLK
CKV PULSE WIDTH		TCKV	0.5	THP
TIME FROM LD TO CKV		TGS	1	THCLK
TIME FROM LD TO DIO		TLDO	THBK – 6	THCLK
TIME FROM THE LAST DATA TO LD		TED	5.5	THCLK
AP PULSE WIDTH		TAPW	THP – 62	THCLK
TIME FROM LD TO AP		TLDAP	44	THCLK

◆ Waveform : DE mode, 800x600, Horizontal timing



◆ Waveform : input clock, setup/hold time



8. TOUCH PANEL ELECTRICAL SPECIFICATION

Parameter	Condition	Standard Value
Terminal Resistance	X Axis	150~ 900 Ω
	Y Axis	150 ~ 900 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

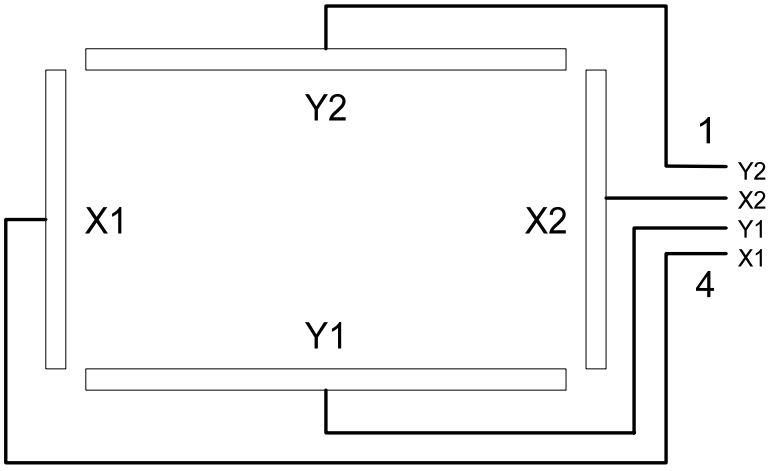
Shape of rubber end : R8mm

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



8. QUALITY AND RELIABILITY

8.1 TEST CONDITIONS

Tests should be conducted under the following conditions:

Ambient temperature: 25 ± 5°C

Humidity : 60 ± 25% RH.

8.2 SAMPLING PLAN

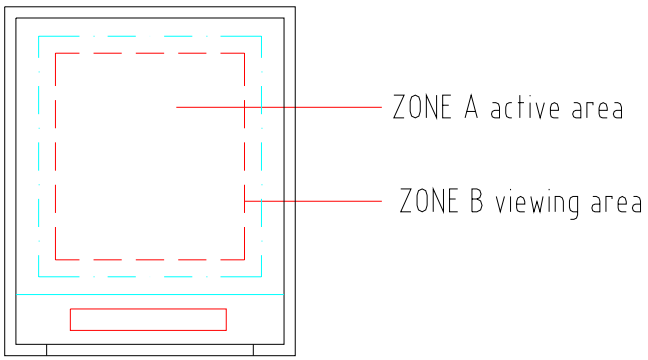
Sampling method shall be in accordance with MIL-STD-105E, level II, normal single sampling plan.

8.3 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.

8.4 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.



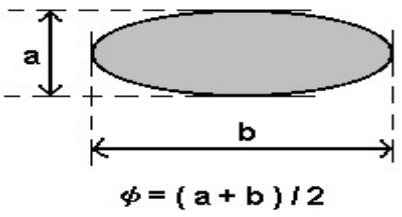
8.5 INCOMING INSPECTION STANDARD FOR TFT-LCD PANEL

<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="10">INTERNAL</td><td rowspan="3">SPOT</td><td colspan="5">φ＜0.15mm</td><td>Ignore</td><td rowspan="3">Note1</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">0.03mm<W≦0.1mm, L≦5mm</td><td>N≦3</td><td rowspan="2">Note1</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">Note1</td></tr>
<tr><td colspan="5">0.15mm≦φ≦0.5mm</td><td>N≦2</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>Note3</td></tr>
<tr><td colspan="2">N≦0</td><td>N≦2</td><td>N≦2</td><td>N≦2</td><td>N≦3</td><td>N≦5</td><td>Note2</td></tr>
<tr><td colspan="2">DARK DOT</td><td>N≦2</td><td>N≦3</td><td>N≦3</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>Note2</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>Note4</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>

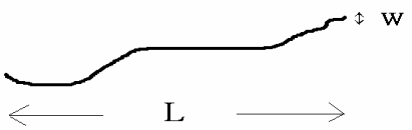
(1) One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)

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

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

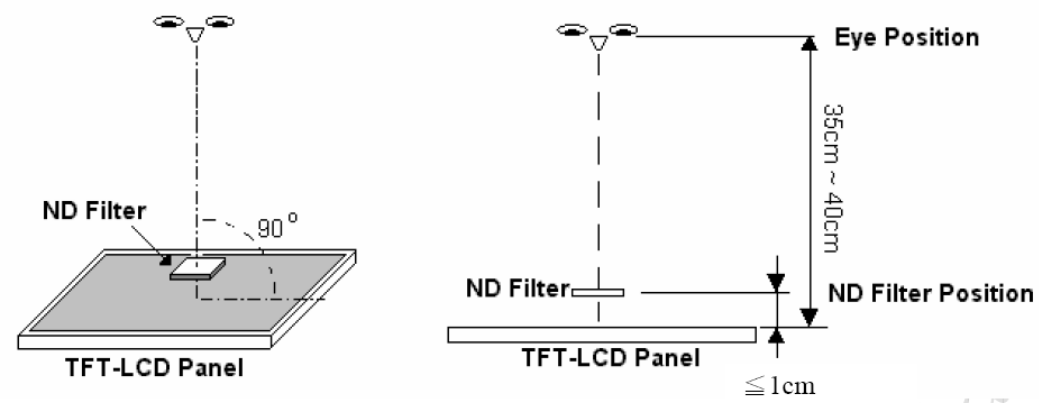


1. (White, black) Spot
2. Polarizer Bubble

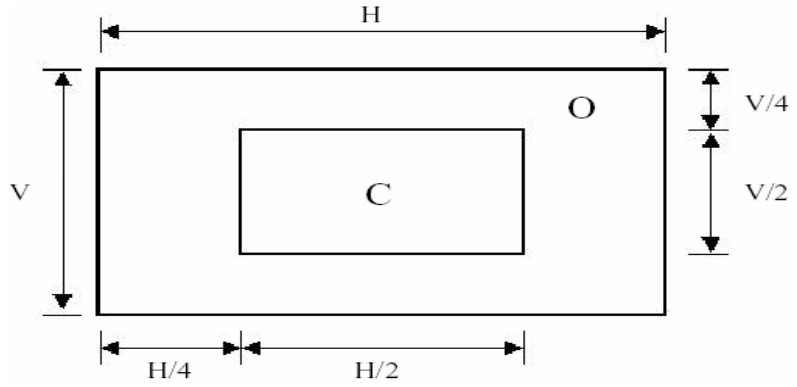


1. fiber

[Note2] Bright dot is defined through 5% transmission ND Filter as following.



[Note3]

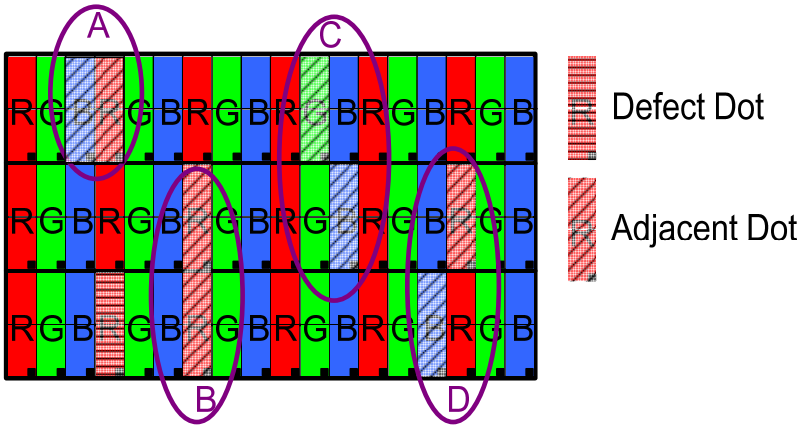


C Area: Center of display area

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.

8.6 RELIABILITY TEST CONDITIONS

ITEM	CONDITIONS	NOTE
HIGH TEMPERATURE OPERATION	60℃ , 240Hrs	
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	40℃ , 90%RH , 240Hrs	
HIGH TEMPERATURE AND HIGH HUMIDITY STORAGE	60℃ , 90%RH , 48 Hrs	
HIGH TEMPERATURE STORAGE	70℃ , 240Hrs	
LOW TEMPERATURE OPERATION	-10℃ , 240Hrs	
LOW TEMPERATURE STORAGE	-20℃ , 240Hrs	
THERMAL SHOCK (No operation)	-20℃(0.5Hr) ~60℃(0.5Hr) 200Cycle	
ESD	±8kV&±15kV air & contact test	(1)
	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 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.

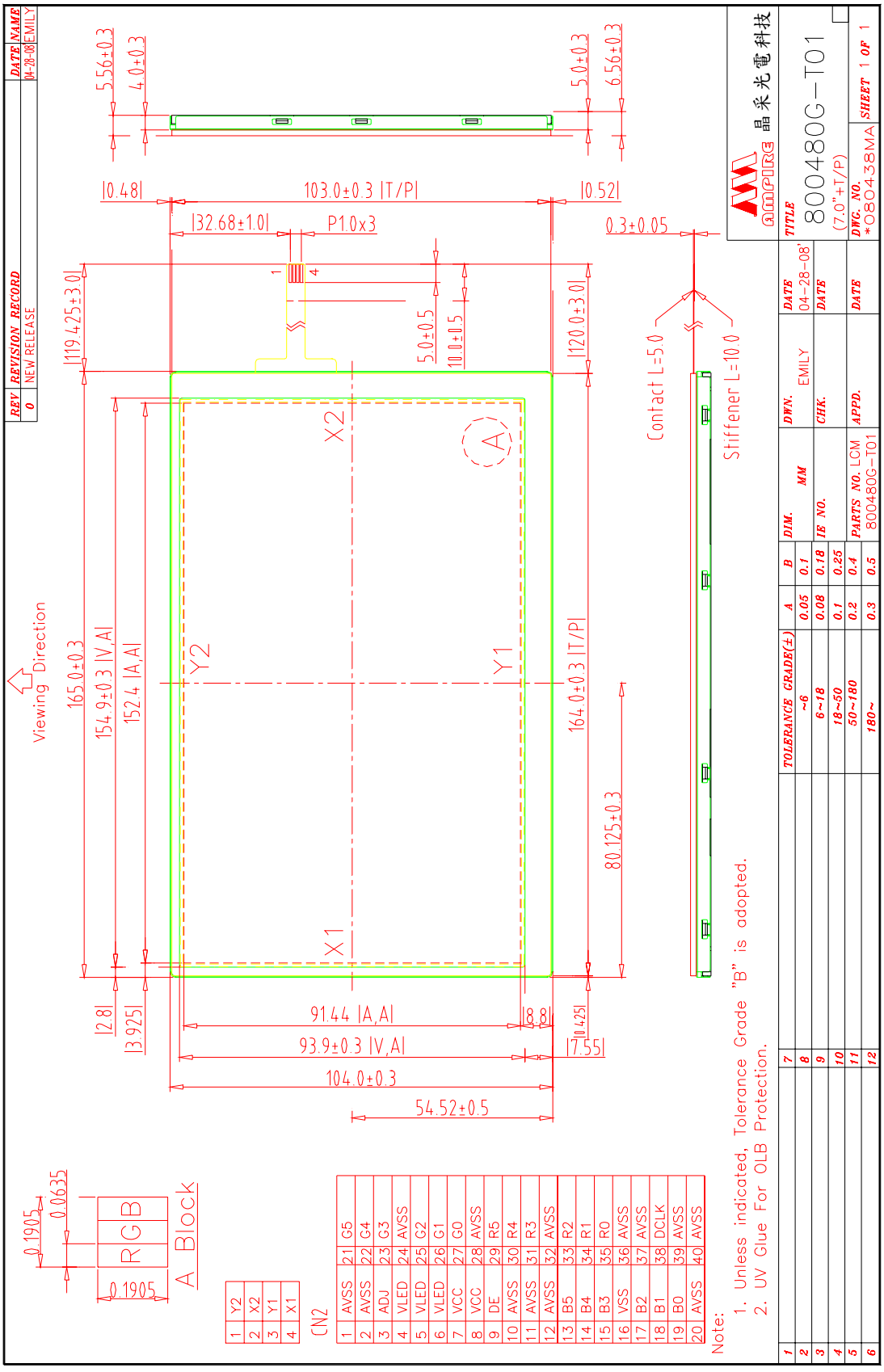
9-5 Other

(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.

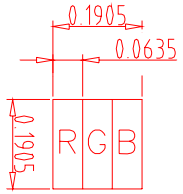
(2) The residual image may exist if the same display pattern is shown for hours. This residual image, however, disappears when another display pattern is shown or the drive is interrupted and left for a while. But this is not a problem on reliability.

(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
0	NEW RELEASE	04-28-08	EMILY

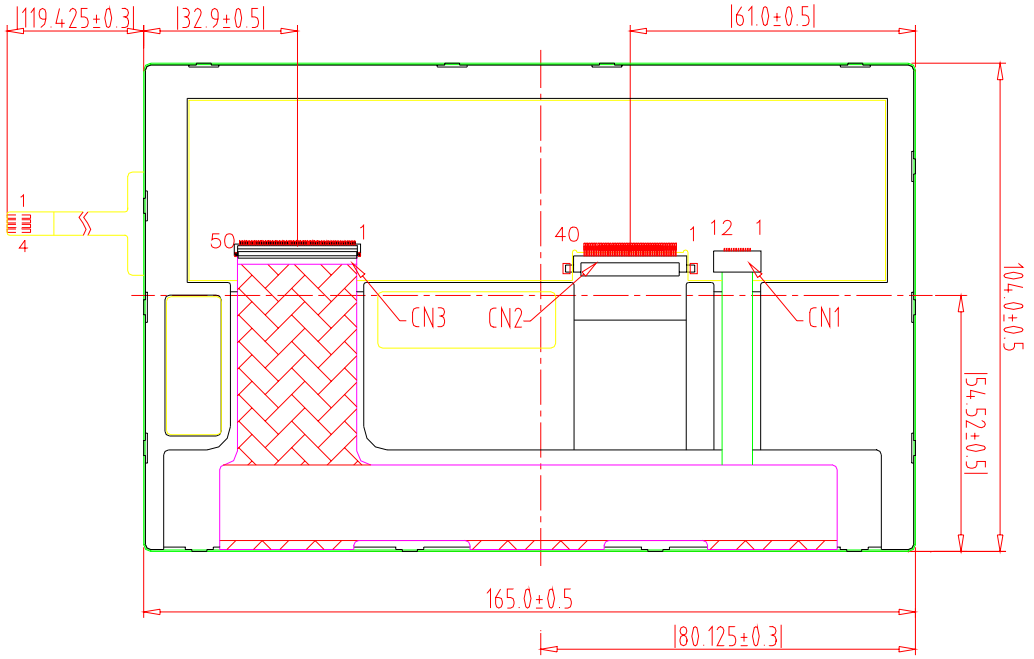


A Block

CN2

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

1	Y2
2	X2
3	Y1
4	X1



Back View

Note:
1. Unless indicated, Tolerance "±0.3"
2. UV Glue For OLB Protection.
3. CN1:106A12-000000-G2-R
4. CN2:089N40-000R00-G2-R
5. CN3:FH19SC-50S-0.5SH
6. LCD 800X3(R.G.B)x480=> 7.0" Digital TFT LCD

				TOLERANCE GRADE(±)	A	B	DIM. MM	DWN. EMILY	DATE 04-28-08'	TITLE 800480G-T01 (7.0"+T/P)
1		7								
2		8		~6	0.05	0.1	IE NO.	CHK.	DATE	
3		9		6~18	0.08	0.18				
4		10		18~50	0.1	0.25				
5		11		50~180	0.2	0.4	PARTS NO. LCM-1 800480G-T01	APPD.	DATE	DWG. NO. *080439MA / SHEET 1 OF 1
6		12		180~	0.3	0.5				

晶采光電科技