



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-640480GSTMQW-T00H -A
APPROVED BY	
DATE	

- Approved For Specifications
 Approved For Specifications & Sample

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2011/06/22	--	New Release	Rober

1. INTRODUCTION

This is a color active matrix TFT-LCD that uses amorphous silicon TFT as a switching device. This model is composed of a 5.7inch TFT-LCD panel, a driving circuit, touch panel and LED backlight system. This TFT-LCD has a high resolution (640(R.G.B) X 480) and can display up to 262,144 colors.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display resolution(dot)	640RGB (W) x 480(H)	dots
Display area	115.2 (W) x 86.4 (H)	mm
Pixel pitch	0.1815 (W) x 0.1815 (H)	mm
Color configuration	R.G.B Vertical stripe	
Overall dimension	144.0(W)x104.6(H)x14.2(D)---(Typ)	mm
Brightness	320	cd/m ²
Contrast ratio	250 : 1	
Backlight unit	LED	
Display color	262,144	colors

3. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN	MAX	UNIT	NOTE
Power Supply Voltage	Vcc	-0.5	5	V	
Signal Input Voltage	DCLK , DE R0~R5 G0~G5 B0~B5	-0.5	Vcc + 0.5	V	
Operation Temperature	Top	-10	60	°C	(1)
Storage Temperature	Tstg	-20	70	°C	(1)

4. ELECTRICAL CHARACTERISTICS

4-1 TFT LCD Module voltage

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Power Voltage For LCD	V_{CC}	3.0	3.3	3.6	V	
Power Voltage For VLED	V_{LED}	--	12.0	--	V	(1)
Logic Input Voltage	V_{IH}	$V_{CC} \cdot 0.7$	--	V_{CC}	V	
	V_{IL}	0	--	$V_{CC} \cdot 0.3$	V	
PWM Input Voltage	V_{IH}	3.0	--	5.0	V	
	V_{IL}	GND	--	0.3	V	

4-2 TFT LCD current consumption

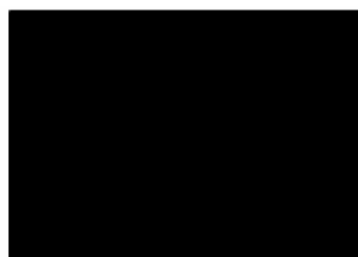
ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
LCD Power Current	I_{CC}	-	82	-	mA	(1)
LED Power Current	$I_{LED}(V_{LED}=12v)$	-	100	-	mA	

NOTE : (1) Typ : under 64 gray pattern

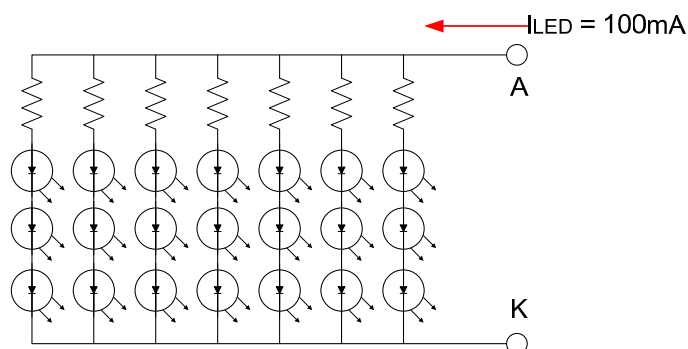
Max : under black pattern



(a) 64 Gray Pattern



(b) Black Pattern



5. Touch Panel Electrical Specification

Parameter	Condition	Standard Value
Terminal Resistance	X Axis	300 ~ 1000 Ω
	Y Axis	100 ~ 800 Ω
Insulating Resistance	DC 25 V	More than 20M Ω
Linearity	--	± 1.5 %
Pen writing Durability	Note a	100,000 times(min)
Input life by finger	Note b	1,000,000 times (min)

Note A .

Area for pen notes life test is 10x9mm. Size of word is 7.5x6.75mm.

Writing speed: 60mm/sec.

Shape of pen end : R0.8

Load : 250 g

Note B

By Silicon rubber tapping at same point

Shape of rubber end : R8

Load : 200g

Frequency : 5 Hz

Interface

No.	Symbol	Function
1	YU	Touch Panel Top Signal
2	XL	Touch Panel Left Signal
3	YD	Touch Panel Bottom Signal
4	XR	Touch Panel Right Signal

6. INTERFACE

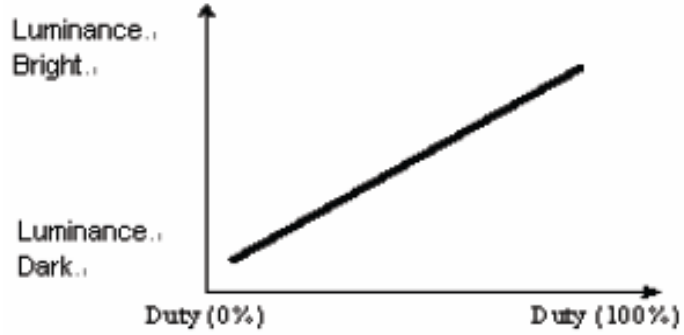
Pin no	Symbol	I/O	Description
1	GND	I	Ground
2	CK	I	Clock signal. Latching data at the falling edge
3	Hsync	I	Horizontal sync input in digital RGB mode
4	Vsync	I	Vertical sync input in digital RGB mode
5	GND	I	Ground
6	R0	I	Red data
7	R1	I	
8	R2	I	
9	R3	I	
10	R4	I	
11	R5	I	
12	XR	I	Touch Panel Right Signal
13	G0	I	Green data
14	G1	I	
15	G2	I	
16	G3	I	
17	G4	I	
18	G5	I	
19	XL	I	Touch Panel Left Signal
20	B0	I	Blue data
21	B1	I	
22	B2	I	
23	B3	I	
24	B4	I	
25	B5	I	
26	YU	I	Touch Panel Top Signal
27	ENAB	I	Input data enable control
28	VCC	I	+3.3V Power Supply
29	VCC	I	
30	R/L	I	Right / Left Reverses Mode
31	U/D	I	Up / Down Reverses Mode
32	NC	I	No Connection
33	YD	I	Touch Panel Bottom Signal

CN2:

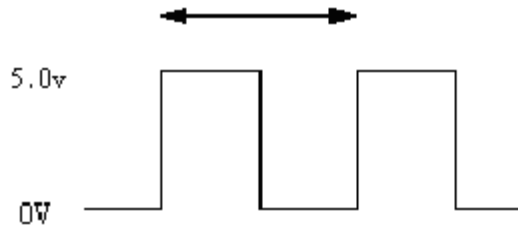
1	12V	LED drive circuit power supply (12V)
2	12V	LED drive circuit power supply (12V)
3	GND	Ground
4	GND	Ground
5	PWM	PWM Dimmer
6	LEDO	LED OPEN[normal:High(5V), open error:Low]

NOTE :

1. PWM adjust brightness to control Pin, Pulse duty the bigger the brighter.

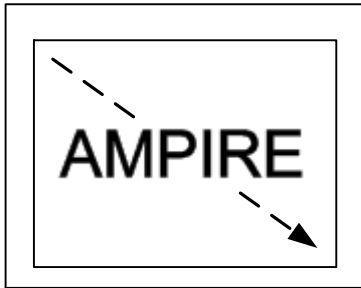


2. PWM signal = 0 ~ 5.0V , operation frequency : 200Hz~1KHz



3. U/D and L/R are controlled function

L/R : L, U/D : H



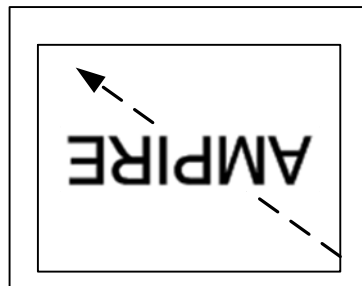
L/R : H, U/D : H



L/R : L, U/D : L



L/R : H, U/D : L



7. INPUT SIGNAL :

7-1 Timing Specification.

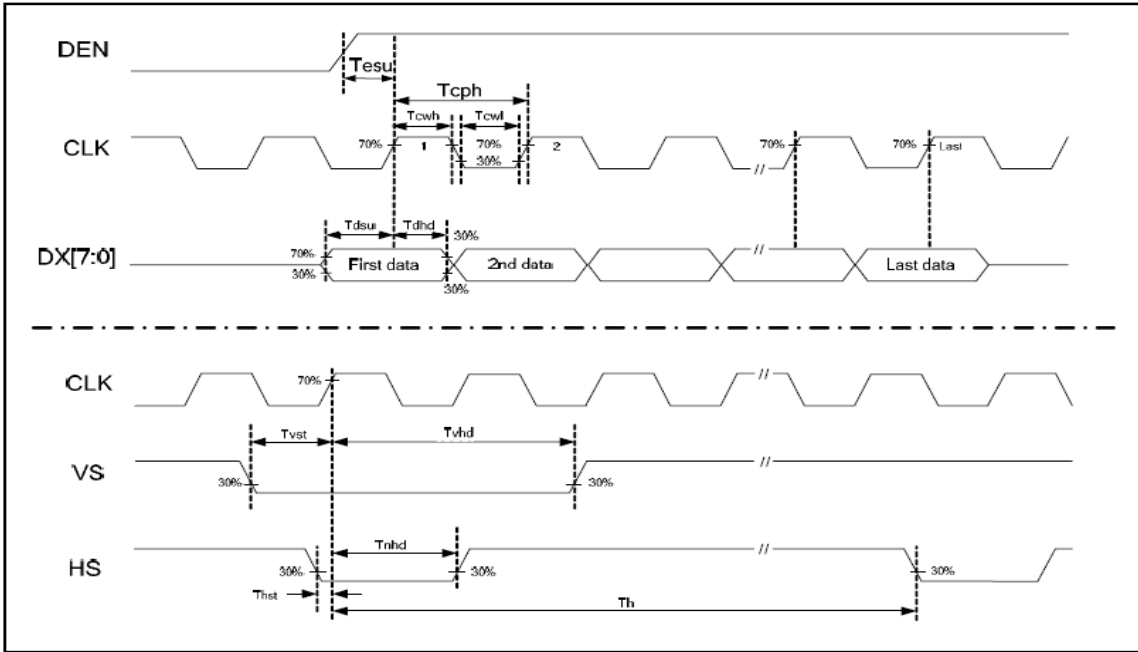
PARAMETER	Symbol	Min.	Typ.	Max	Unit
CLK frequency	F_{CPH}		25.175		MHz
CLK period	T_{CPH}	-	39.7	-	ns
CLK pulse duty	T_{CWH}	40	50	60	%
HS period	T_H	-	800	-	T_{CPH}
HS pulse width	T_{WH}	5	30	-	T_{CPH}
HS-first horizontal data time	T_{HS}	112	144	175	T_{CPH}
DEN pulse width	T_{EP}	-	640	-	T_{CPH}
VS pulse width	T_{WV}	1	3	5	T_H
VS-DEN time	T_{STV}	-	35	-	T_H
VS period	T_V	-	525	-	T_H

Note: When SYNC mode is used, 1st data start from 144th CLK after HS falling (when $STHD[5:0]=00000$)

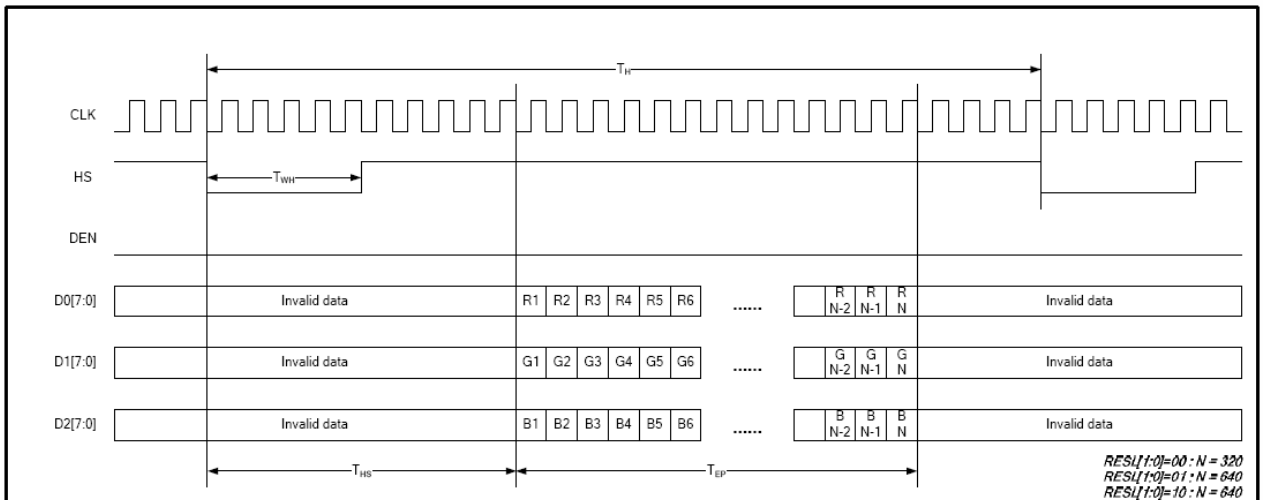
PARAMETER	Symbol	Min.	Typ.	Max	Unit
OEV pulse width	T_{OEV}		100	-	T_{CPH}
CKV pulse width	T_{CKV}	-	96	-	T_{CPH}
HS-CKV time	T_1	-	52	-	T_{CPH}
HS-OEV time	T_2	-	8	-	T_{CPH}
HS-POL time	T_3	-	72	-	T_{CPH}
STV setup time	T_{SUV}	-	46	-	T_{CPH}
STV pulse width	T_{WSTV}	-	1	-	T_H

7-2 Timing chart

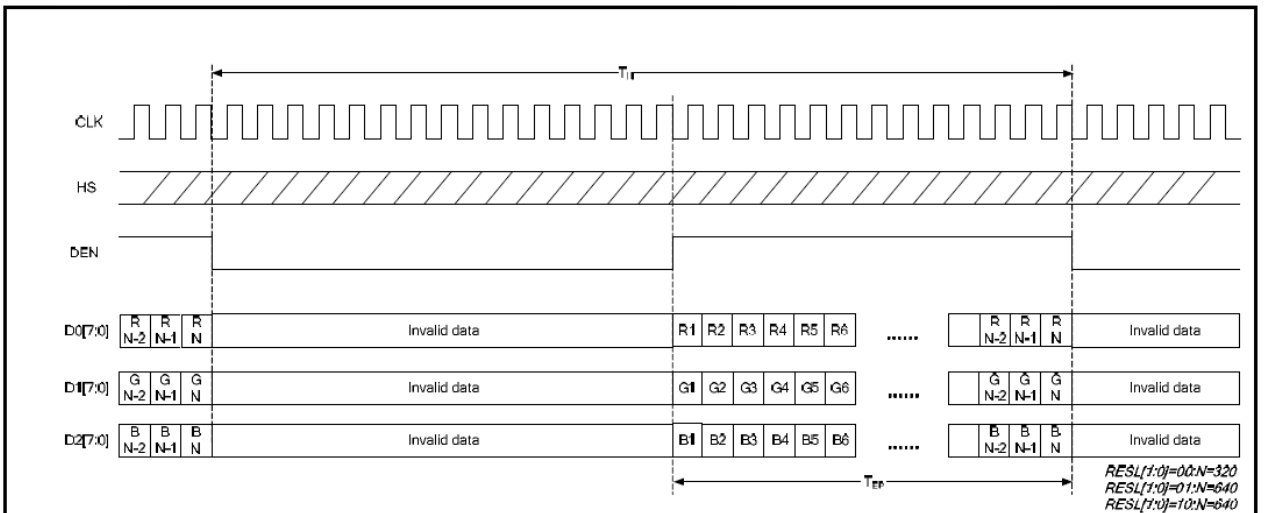
Clock and Data input waveforms



Parallel RGB SYNC Mode Horizontal Data Format



Parallel RGB DE Mode Horizontal Data Format



7-3 Color Data Assignment

COLOR	Input Data	R DATA						G DATA						B DATA					
		R5 MSB	R4	R3	R2	R1	R0 LSB	G5 MSB	G4	G3	G2	G1	G0 LSB	B5 MSB	B4	B3	B2	B1	B0 LSB
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	RED(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	
	GREEN(63)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	
	CYAN	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	
	MAGENTA	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	
	WHITE	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	
	RED(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	
	RED(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	
	RED(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	
	RED(63)	1	1	1	1	1	1	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	
	GREEN (1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
	GREEN (2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	
	GREEN (62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	
	GREEN (63)	0	0	0	0	0	0	1	1	1	1	1	1	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	
	BLUE (1)	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	1	0	
	BLUE (62)	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0	
	BLUE (63)	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	

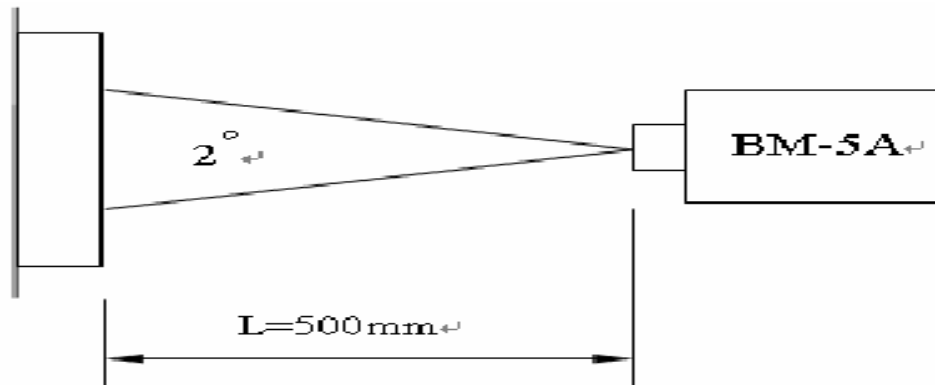
- NOTE : (1) Definition of Gray Scale , Color(n) : n is series of Gray Scale
The more n value is the bright Gray Scale
(2) Data : 1-High , 0-Low

8. OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast ratio	CR	Point - 5 $\Theta = \Phi = 0^\circ$	200	250	--	--	(1)(2)(3)	
Luminance	Lw		--	320	-	cd/m ²	(1)(3)	
Luminance Uniformity	ΔL		70	75	-	%	(1)(3)	
Response Time (White – Black)	$T_r + T_f$		--	50	--	ms	(1)(3)(5)	
Viewing Angle	Vertical	Θ	$CR \geq 10$ Point - 5	80	100	-	Deg.	(1)(2)(4)
	Horizontal	Φ		120	140	-		
Color chromaticity	Red	Rx	Point - 5 $\Theta = \Phi = 0^\circ$	0.566	0.616	0.666	--	(1)(3)
		Ry		0.302	0.352	0.402		
	Green	Gx		0.308	0.358	0.408		
		Gy		0.518	0.568	0.618		
	Blue	Bx		0.096	0.146	0.196		
		By		0.086	0.136	0.186		
	White	Wx		0.296	0.346	0.396		
		Wy		0.328	0.378	0.428		

NOTE :

- (1) Measure conditions : $25^\circ\text{C} \pm 2^\circ\text{C}$, $60 \pm 10\% \text{RH}$ under 10Lux , in the dark room by BM-7TOPCON) ,viewing 2° , $V_{CC}=3.3\text{V}$, $V_{DD}=3.3\text{V}$



- (2) Definition of Contrast Ratio :

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

- (3) Definition of Luminance :

Definition of Luminance Uniformity

Measure white luminance on the point 5 as figure9-1

Measure white luminance on the point 1 ~ 9 as figure9-1

$$\Delta L = [L(\text{MIN}) / L(\text{MAX})] \times 100\%$$

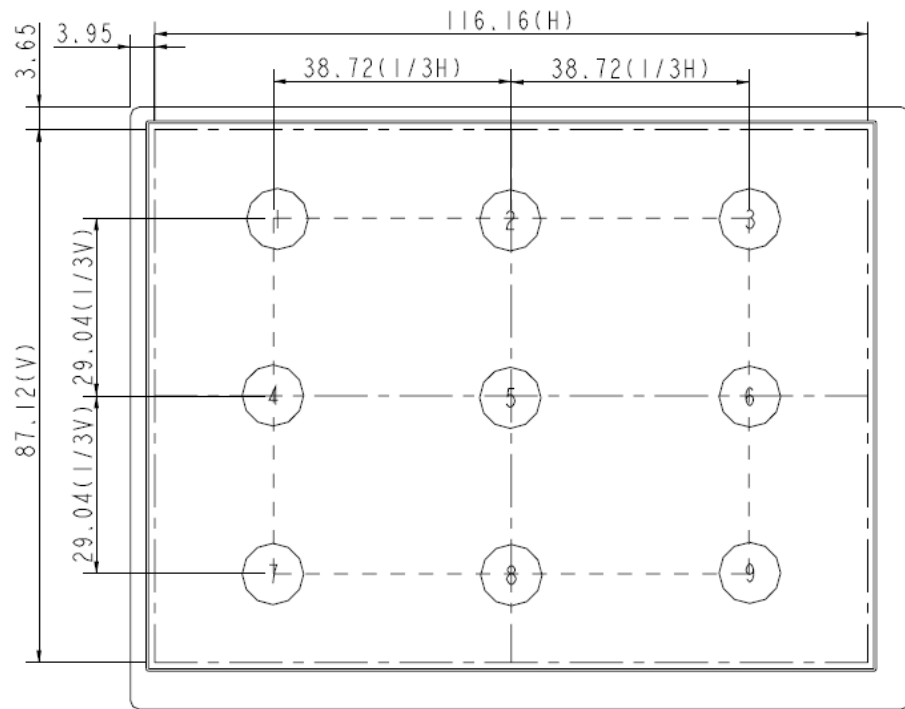


Fig9-1 Measuring point

(4) Definition of Viewing Angle(Θ, Φ), refer to Fig9-2 as below :

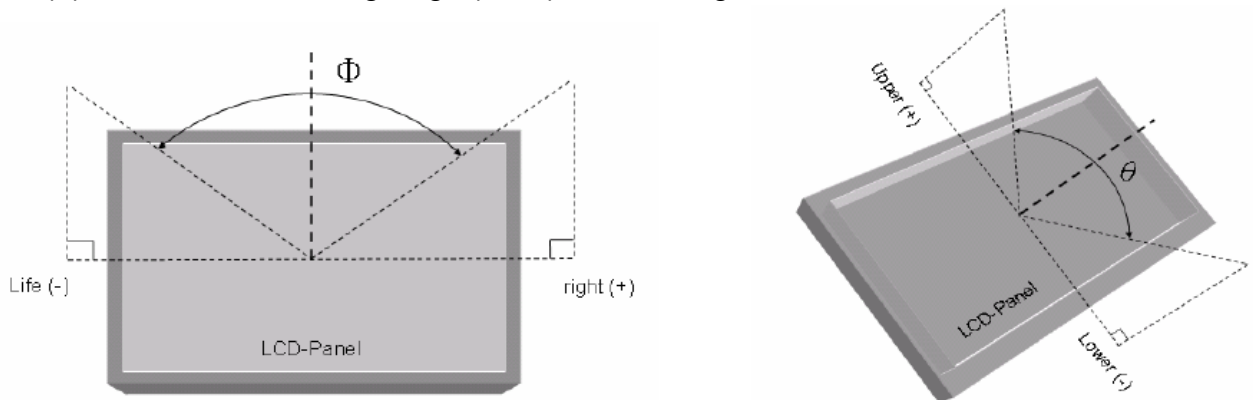


Fig9-2 Definition of Viewing Angle

(5) Definition of Response Time.(White – Black)

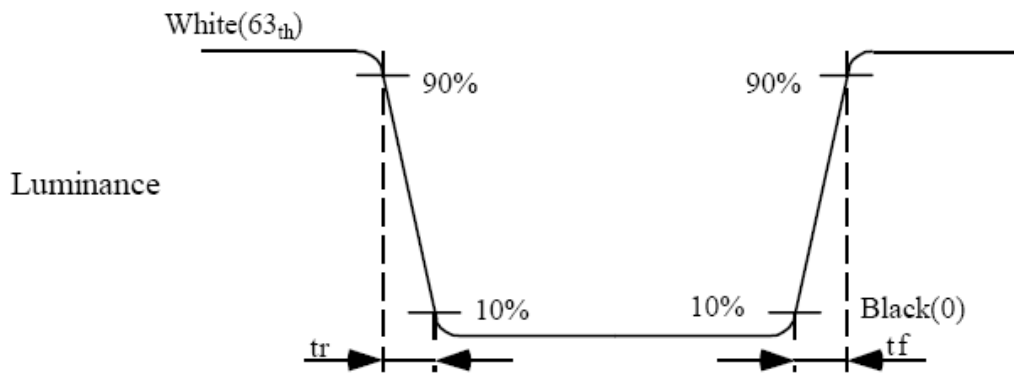


Fig9-3 Definition of Response Time(White-Black)

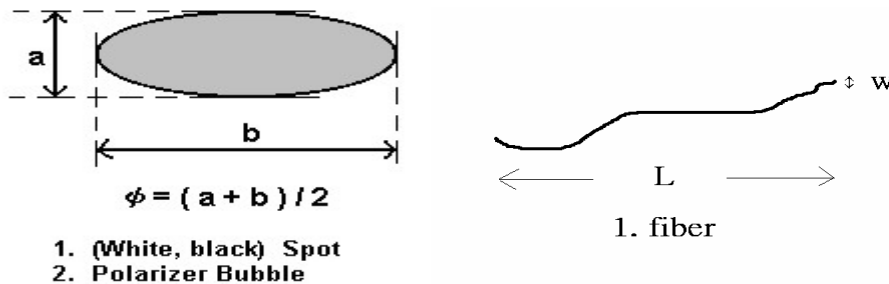
9 INCOMING INSPECTION STANDARD FOR TFT-LCD PANEL

DEFECT TYPE			LIMIT			Note		
VISUAL DEFECT	INTERNAL	SPOT	$\varphi < 0.15\text{mm}$		Ignore	Note1		
			$0.15\text{mm} \leq \varphi \leq 0.5\text{mm}$		$N \leq 4$			
			$0.5\text{mm} < \varphi$		$N=0$			
		FIBER	$0.03\text{mm} < W \leq 0.1\text{mm}, L \leq 5\text{mm}$		$N \leq 3$	Note1		
			$1.0\text{mm} < W, 1.5\text{mm} < L$		$N=0$			
		POLARIZER BUBBLE	$\varphi < 0.15\text{mm}$		Ignore	Note1		
			$0.15\text{mm} \leq \varphi \leq 0.5\text{mm}$		$N \leq 2$			
			$0.5\text{mm} < \varphi$		$N=0$			
		Mura	It' OK if mura is slight visible through 6%ND filter					
ELECTRICAL DEFECT	BRIGHT DOT	A Grade			B Grade			
		C Area	O Area	Total	C Area	O Area	Total	Note3
		$N \leq 0$	$N \leq 2$	$N \leq 2$	$N \leq 2$	$N \leq 3$	$N \leq 5$	Note2
	DARK DOT	$N \leq 2$	$N \leq 3$	$N \leq 3$	$N \leq 3$	$N \leq 5$	$N \leq 8$	
	TOTAL DOT	$N \leq 4$			$N \leq 5$	$N \leq 6$	$N \leq 8$	Note2
	TWO ADJACENT DOT	$N \leq 0$	$N \leq 1$ pair	$N \leq 1$ pair	$N \leq 1$ pair	$N \leq 1$ pair	$N \leq 1$ pair	Note4
	THREE OR MORE ADJACENT DOT	NOT ALLOWED						
	LINE DEFECT	NOT ALLOWED						

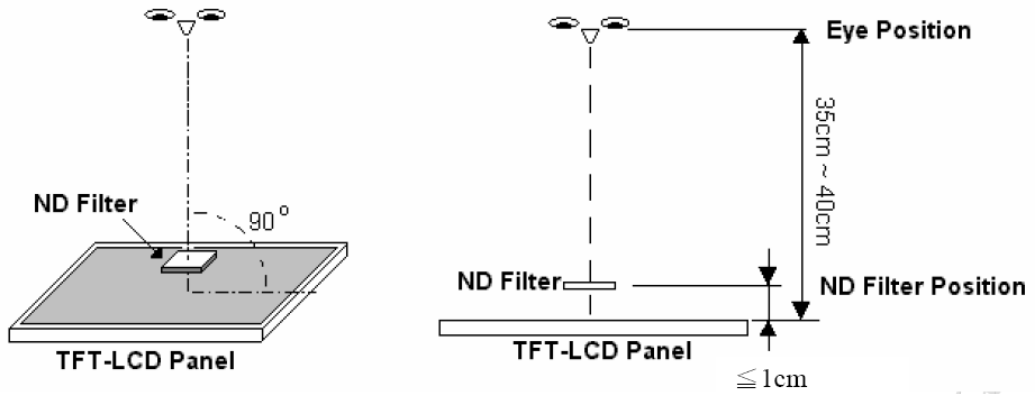
(1) One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)

(2) LITTLE BRIGHT DOT ACCEPTITABLE UNDER 6 % ND-Filter

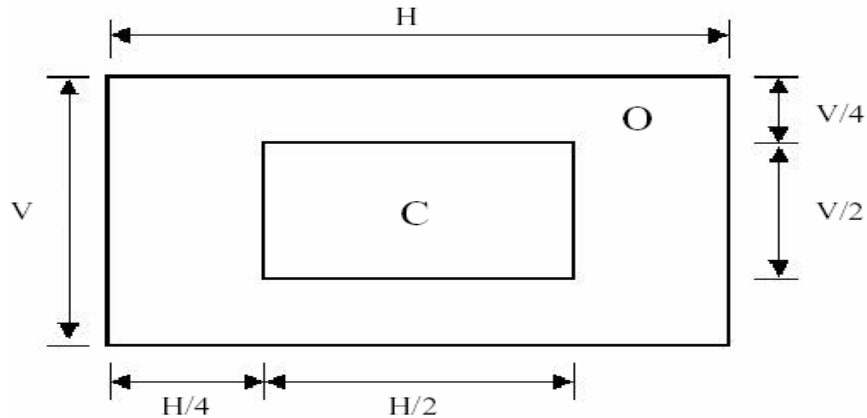
[Note1] W : Width[mm], L : Length[mm], N : Number, φ : Average Diameter



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



[Note3]

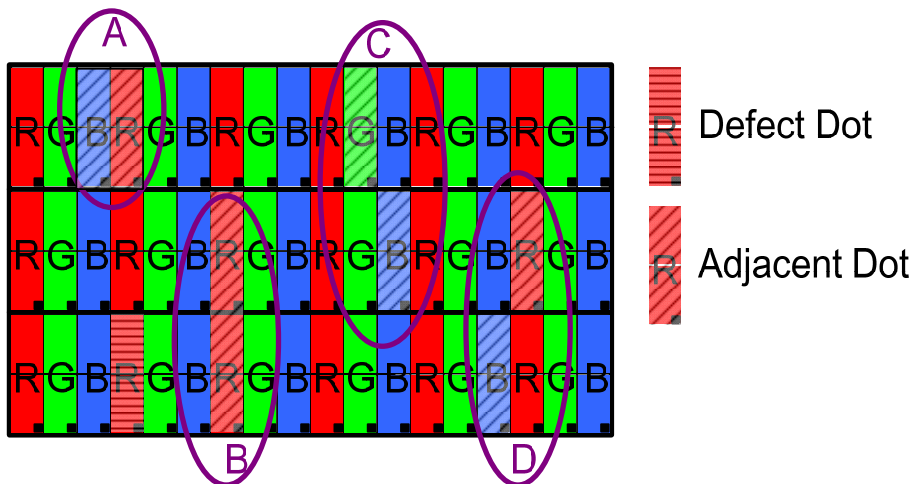


C Area: Center of display area

O 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 dark 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.

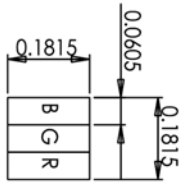
10. RELIABILITY TEST CONDITIONS

ITEM	CONDITIONS
HIGH TEMPERATURE OPERATION	60°C , 240Hrs*
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	60°C , 90%RH , 240Hrs*
HIGH TEMPERATURE STORAGE	70°C , 240Hrs*
LOW TEMPERATURE OPERATION	-10°C , 240Hrs*
LOW TEMPERATURE STORAGE	-20°C , 240Hrs*
THERMAL SHOCK	-30°C (0.5Hr) ~80°C (0.5Hr)* 10 Cycle

* To place in room temperature 24hrs then test

10.1 OTHERS

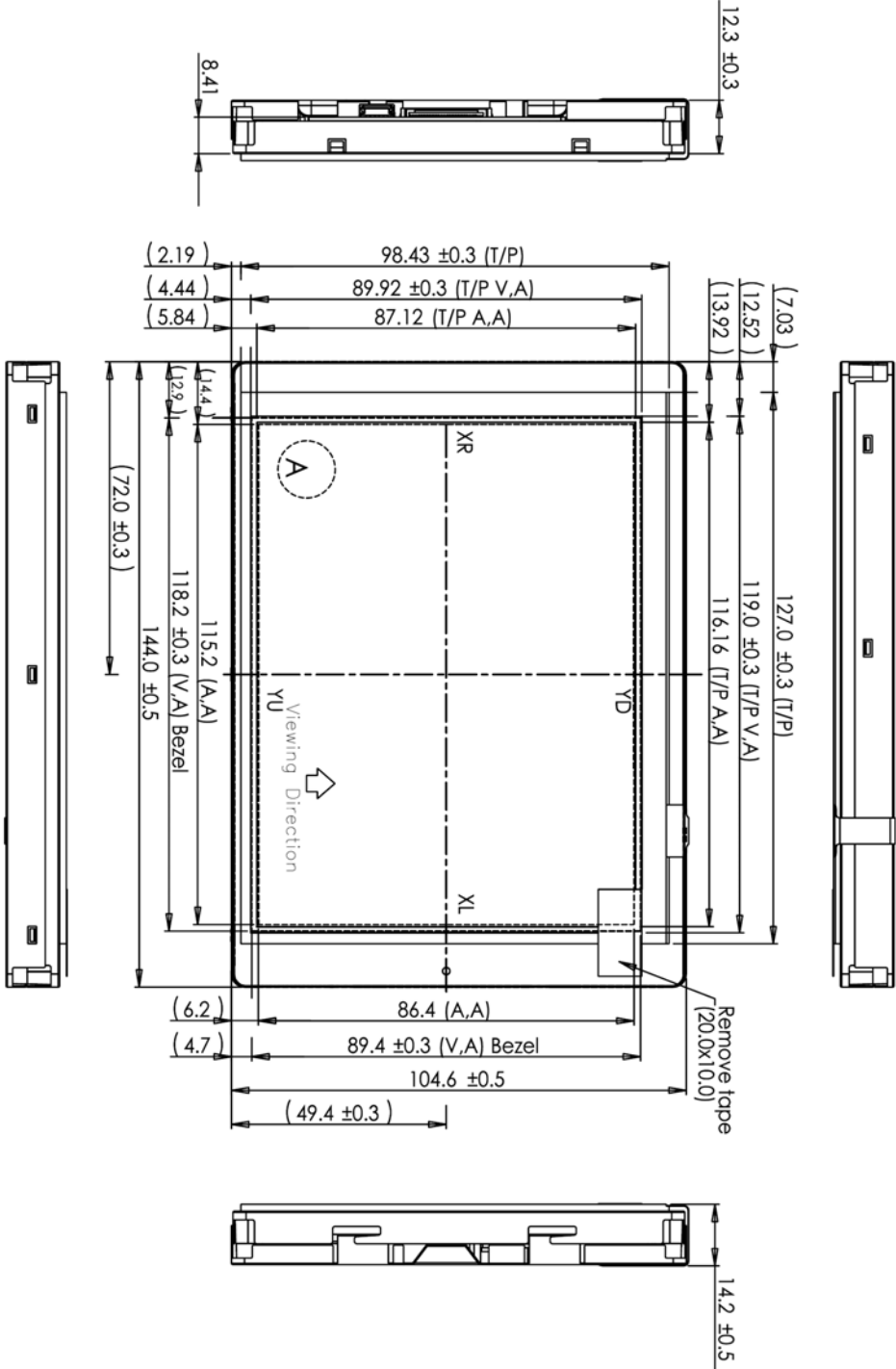
AMIPRE will provide one year warranty for all products and three months warrantee for all repairing products.



A Block

CN2			
1	12V	1	YU
2	12V	2	XL
3	GND	3	YD
4	GND	4	XR
5	PWM		
6	LEDO		

CN1			
1	GND	18	G5
2	CK	19	XL
3	H SYNC	20	B0
4	V SYNC	21	B1
5	GND	22	B2
6	R0	23	B3
7	R1	24	B4
8	R2	25	B5
9	R3	26	YU
10	R4	27	ENAB
11	R5	28	VCC
12	XR	29	VCC
13	G0	30	R/L
14	G1	31	U/D
15	G2	32	NC
16	G3	33	YD
17	G4		



Note:
 1. Unless indicated, Tolerance Grade "B" is adopted.
 2. UV Glue For OLB Protection.
 3. Main LCD 640x480 (R,G,B) TFT LCD => 5.7" TFT LCD

REV	REVISION RECORD	DATE	NAME
0	NEW RELEASE	03-09-09	EMILY

REV	TOLERANCE GRADE(±)	A	B	DRW.	DATE
1	640480GS-T/P	~6	0.05	EMILY	03-09-09
2		6~18	0.08		DATE
3		18~50	0.1		DATE
4		50~180	0.2		DATE
5		180~	0.3		DATE
6					

AMPIRE 晶采光電科技

TITLE: 640480GS-T

DRG. NO.: *090312MA

SHEET 10P 1