



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-480272QTZQW-01H
APPROVED BY	
DATE	

- Approved For Specifications
 Approved For Specifications & Sample

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2011/07/18	--	New Release	Rober
2011/09/02	--	Redefine Part No.	Rober
2011/09/05	4	Redefine Operation & Storage Temperature	Rober
2011/09/30	15	Update OUTLINE DIMENSION	Rober
2011/11/2	3	Add Application	Patrick
2011/11/8	4	Update Storage Temperature	Patrick
	4	Add LED driving condition	
2012/1/11	5	Add LED Life Time	Rober
2012/4/30	6.7	Correct the Interface setting	Rober
2012/05/29	6	Mention the statement of DE terminal when operate in SYNC and SYNC+DE mode.	Emil
2012/7/23	6.7	Correct Interface setting	Rober
	17	Correct Outline dimension	
2013/6/17	5	Modify the LED IF VS Temperature Diagram	Kokai

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 4.3inch TFT-LCD panel, a driving circuit and LED backlight system. This TFT-LCD has a high resolution (480(R.G.B) X 272) and can display up to 16.7M colors.

1-1. Features

- (1) Construction : a-Si TFT-LCD with driving system
- (2) LCD type : Normally Black, VA
- (3) Number of the Colors : 16.7 M colors (R,G,B 8 bit digital each)
- (4) RGB Interface 54 pin.
- (5) LCD Power Supply Voltage : 3.3V single power input

1-2. Application

- (1) Car navigation
- (2) Multimedia applications and Others AV system

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
Display resolution(dot)	480RGB (W) x 272(H)	dots
Display area	95.04 (W) x 53.856 (H)	mm
Pixel pitch	0.198 (W) x 0.198 (H)	mm
Color configuration	R.G.B Vertical stripe	
Overall dimension	105.5(W) x 113.4 (H) x 3.95(T)	mm
Surface treatment	Glare , Hard-Coating(3H)	
Brightness	500	cd/m ²
Contrast ratio	500 : 1	
Backlight unit	LED	
Display color	16.7 M	colors
Display Mode	Normally Black	

3. ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	MIN	MAX	UNIT	NOTE
Power Supply Voltage	VDD	-0.3	4.5	V	
Digital Supply Voltage	VDDIO	-0.3	4.5	V	
Operation Temperature	Top	-30	80	°C	
Storage Temperature	Tstg	-40	85	°C	

4. ELECTRICAL CHARACTERISTICS

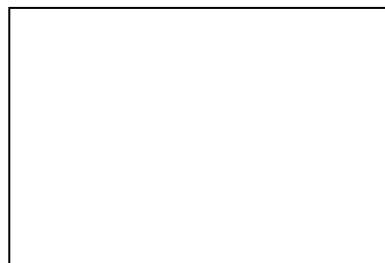
4-1 TFT LCD Module

ITEM	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Power Supply Voltage	VDD	3.0	3.3	3.6	V	
Digital Supply Voltage	VDDIO	1.65	1.8	VDD	V	
Logic Input Voltage	VIH	VDDIO * 0.7	--	VDDIO	V	
	VIL	0	--	VDDIO * 0.3	V	
LCD Power Current	IDD	-	75	-	mA	(1)

NOTE : (1) Typ : under 64 gray pattern Max : under white pattern



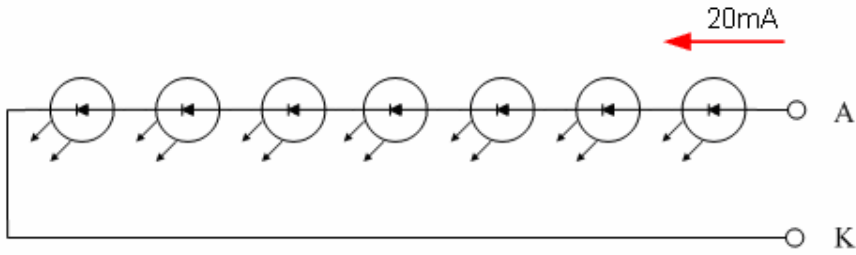
(a) 64 Gray Pattern



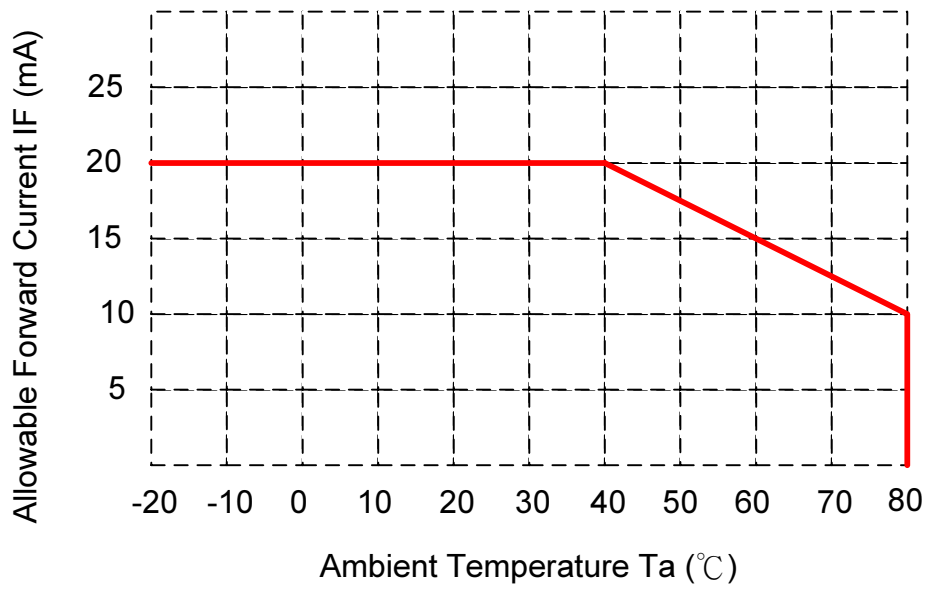
(b) White Pattern

4-2 Backlight Driving Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
LED voltage	V _{AK}	--	22.4	--	V	I _{LED} =20mA Ta=25°C
LED Life time	--	--	30K	--	hours	Note(4)
LED forward current	I _{LED}	--	20	--	mA	Ta=25°C
	I _{LED}	--	15	--	mA	Ta=60°C



Note : When LCM is operated over 40°C ambient temperature, the ILED should be follow :



Note 4: Brightness to be decreased to 50% of the initial value.

5. INTERFACE

5.1 TFT INTERFACE

Pin No	Symbol	Function
1	GND	Power Ground
2	GND	Power Ground
3	NC	No connection
4	NC	No connection
5	NC	No connection
6	NC	No connection
7	VDDIO	Power Supply for digital Interface I/O
8	VDD	Power supply for digital circuit
9	VDD	Power supply for digital circuit
10	VS	Vertical sync signal
11	HS	Horizontal sync signal
12	GND	Power Ground
13	DCLK	Clock signal
14	GND	Power Ground
15	DE	Data input enable. MODE=L: Active High to enable the data input (SYNC+DE mode). MODE=H: connect to low level (SYNC mode).
16	L/R	Horizontal scan direction control
17	U/D	Vertical scan direction control
18	CS	Serial communication chip select(floating type)
19	SDA	Serial communication input and output(floating type)
20	SCL	Serial communication clock input(floating type)
21	DISP	Display control/standby mode selection
22	RESET	Global reset, Active low, Internal pull high
23	MODE	SYNC or DE mode selection
24	DR7	Red Data 7 (MSB)
25	DR6	Red Data 6
26	DR5	Red Data 5
27	DR4	Red Data 4
28	DR3	Red Data 3
29	DR2	Red Data 2
30	DR1	Red Data 1
31	DR0	Red Data 0 (LSB)
32	DG7	Green Data 7 (MSB)
33	DG6	Green Data 6
34	DG5	Green Data 5
35	DG4	Green Data 4
36	DG3	Green Data 3
37	DG2	Green Data 2
38	DG1	Green Data 1
39	DG0	Green Data 0 (LSB)
40	DB7	Blue Data 7 (MSB)

41	DB6	Blue Data 6
42	DB5	Blue Data 5
43	DB4	Blue Data 4
44	DB3	Blue Data 3
45	DB2	Blue Data 2
46	DB1	Blue Data 1
47	DB0	Blue Data 0 (LSB)
48	VDD	Power supply for digital circuit
49	GND	Power Ground
50	GND	Power Ground
51	VBL+	LED backlight Anode
52	VBL+	LED backlight Anode
53	VBL-	LED backlight Cathode
54	VBL-	LED backlight Cathode

Note(1) When Mode=1 , SYNC mode
When Mode=0, SYNC+DE mode

Note(2) When DISP=1, Normal Display
When DISP=0, Standby Mode

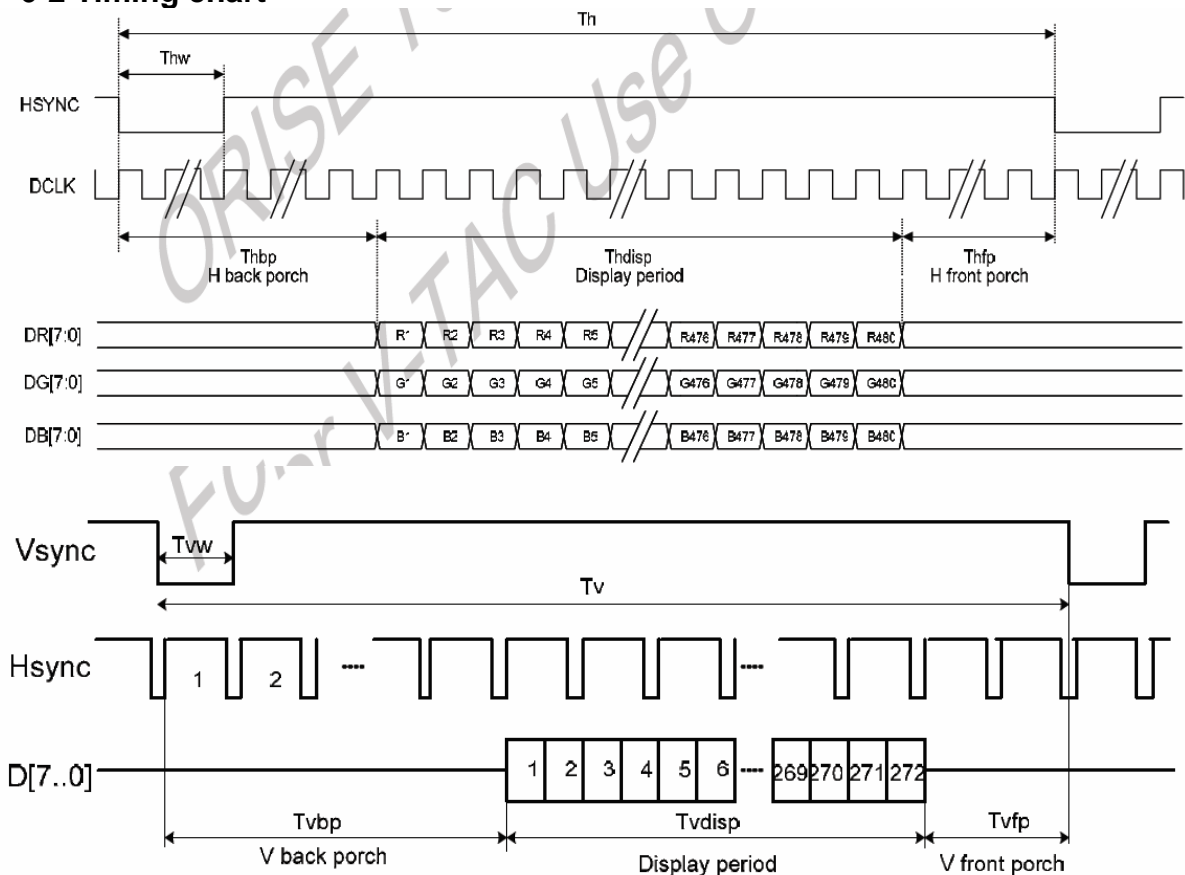
Note(3) Please keep CS SDA SCL in floating type

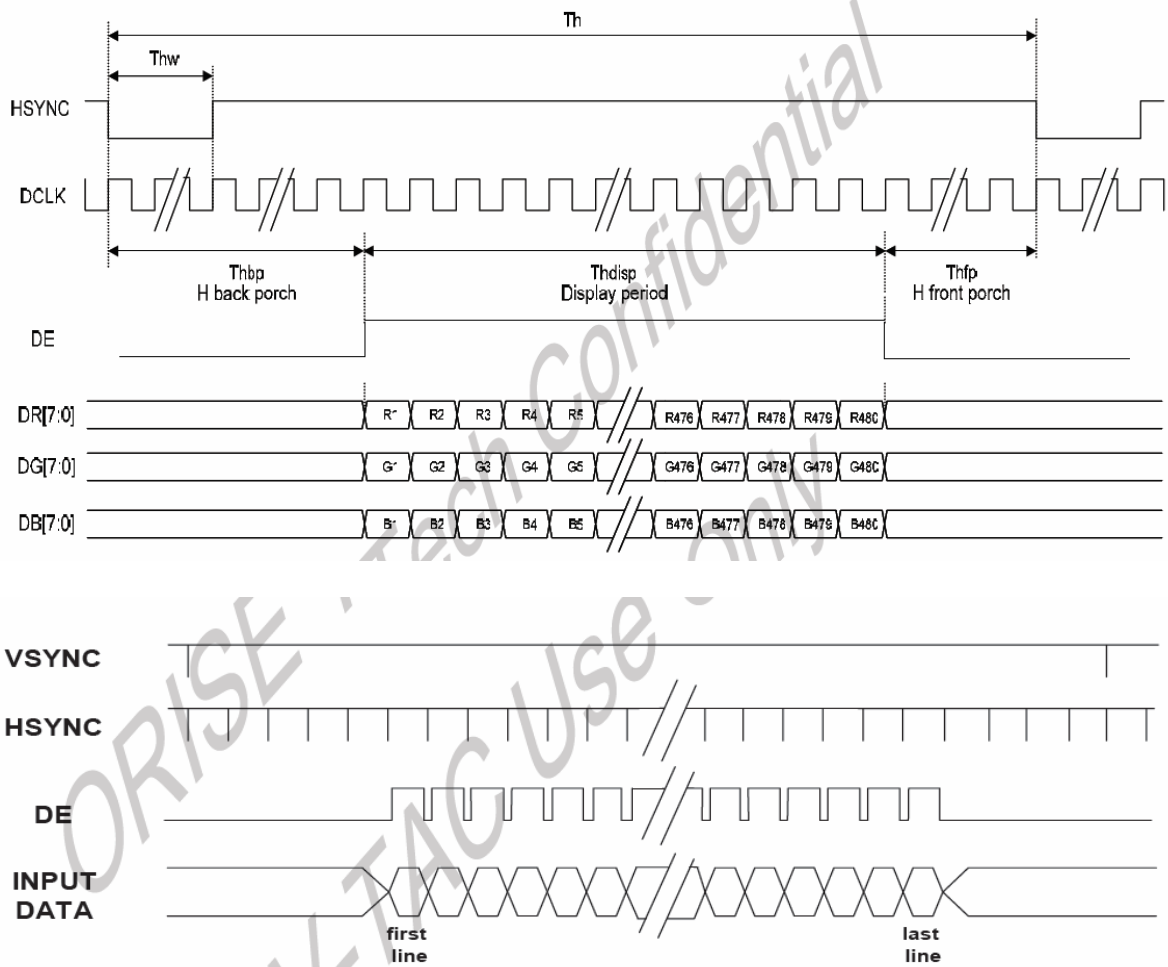
6. INPUT SIGNAL :

6-1 Timing Specification.

Item	Symbol	Min.	Typ.	Max.	Unit		
DCLK Frequency	Fclk	5	9	12	MHz		
DCLK Period	Tclk	83	110	200	ns		
Hsync	Period Time	Th	490	531	605	DCLK	
	Display Period	Thdisp		480		DCLK	
	Back Porch	Thbp	8	43		DCLK	By H_BLANKING setting
	Front Porch	Thfp	2	8		DCLK	
	Pulse Width	Thw	1			DCLK	
Vsync	Period Time	Tv	275	288	335	H	
	Display Period	Tvdisp		272		H	
	Back Porch	Tvbp	2	12		H	By V_BLANKING setting
	Front Porch	Tvfp	1	4		H	
	Pulse Width	Tvw	1	10		H	

6-2 Timing chart





6-3 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	0
	RED(63)	1	1	1	1	1	1	0	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	0
	BLUE(63)	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
	CYAN	0	0	0	0	0	0	1	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	1
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	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
RED	RED(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	1	0	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	0
	RED(62)	1	1	1	1	1	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	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	1	0	0	0	0	0	0	0
GREEN (2)		0	0	0	0	0	0	0	0	0	0	1	0	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	0
GREEN (63)		0	0	0	0	0	0	1	1	1	1	1	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
	BLUE (1)	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	1	0
	BLUE (62)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	BLUE (63)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0

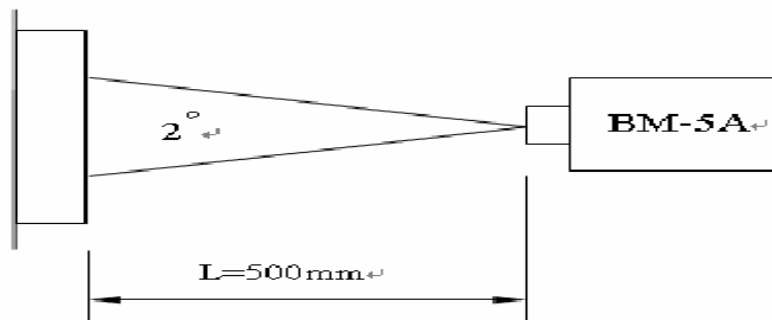
NOTE : (1) Definition of Gray Scale , Color(n) : n is series of Gray Scale
The more n value is the bright Gray Scale
(2) Data : 1-High , 0-Low

7. OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Contrast ratio	CR	Point - 5 $\Theta = \Phi = 0^\circ$	--	500	--	--	(1)(2)(3)	
Luminance	Lw		--	500	-	cd/m ²	(1)(3)	
Luminance Uniformity	ΔL		70	75	-	%	(1)(3)	
Response Time (White – Black)	$T_r + T_f$		--	35	--	ms	(1)(3)(5)	
Viewing Angle	Horizontal	Φ	CR > 10	--	160	-	Deg.	(1)(2)(4)
	Vertical	Θ		--	160	-		
Color chromaticity	Red	Rx	Point - 5 $\Theta = \Phi = 0^\circ$	0.59	0.64	0.69	--	(1)(3)
		Ry		0.29	0.34	0.39		
	Green	Gx		0.30	0.35	0.40		
		Gy		0.54	0.59	0.64		
	Blue	Bx		0.06	0.11	0.16		
		By		0.05	0.10	0.15		
	White	Wx		0.26	0.31	0.36		
		Wy		0.30	0.35	0.40		

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° , VDD=3.3V



- (2) Definition of Contrast Ratio :

Contrast Ratio (CR) = (White) Luminance of ON \div (Black) 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

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

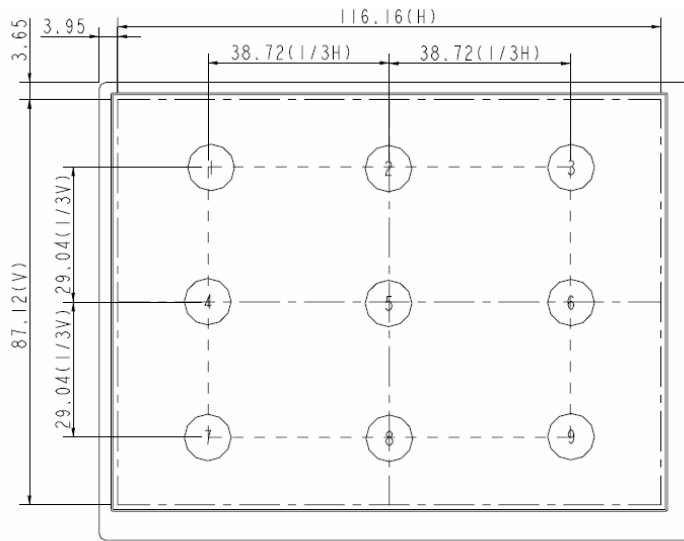


Fig9-1 Measuring point

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

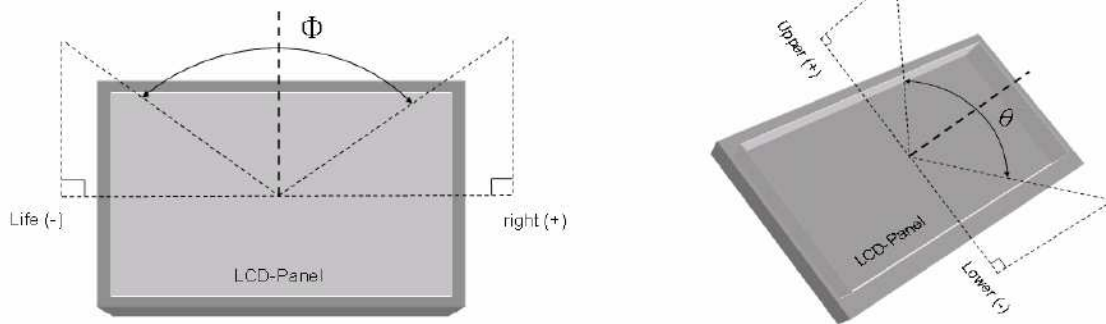


Fig9-2 Definition of Viewing Angle

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

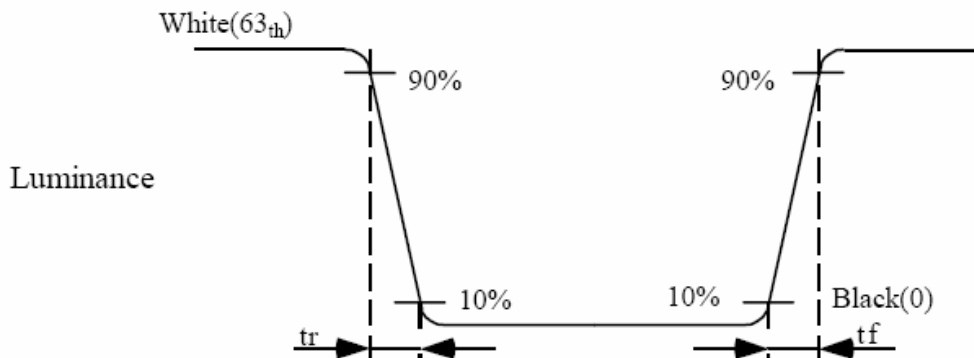


Fig9-3 Definition of Response Time(White-Black)

8 INCOMING INSPECTION STANDARD FOR TFT-LCD PANEL

1. Scope

Specifications contain

1.1 Display Quality Evaluation

1.2 Mechanics Specification

2. Sampling Plan

Unless there is other agreement, the sampling plan for incoming inspection shall follow MIL-STD-105E LEVEL II.

2.1 Lot size: Quantity per shipment as one lot (different model as different lot).

2.2 Sampling type: Normal inspection, single sampling.

2.3 Sampling level: Level II.

2.4 AQL: Acceptable Quality Level

Major defect: AQL=0.65

Minor defect: AQL=1.0

3. Panel Inspection Condition

3.1 Environment:

Room Temperature: $25\pm 5^{\circ}\text{C}$.

Humidity: $65\pm 5\%$ RH.

Illumination: 300 ~ 700 Lux.

3.2 Inspection Distance:

35-40 cm

3.3 Inspection Angle:

The vision of inspector should be perpendicular to the surface of the Module.

3.4 Inspection time :

Perceptibility Test Time: 20 seconds max.

4. Display Quality

4.1 Function Related:

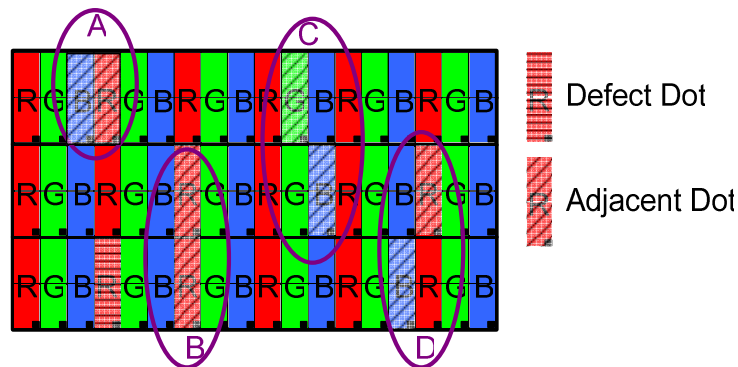
The function defects of line defect, abnormal display, and no display are considered Major defects.

4.2 Bright/Dark Dots:

Defect Type / Specification	G0 Grade	A Grade
Bright Dots	0	$N \leq 1$
Dark Dots	0	$N \leq 3$
Total Bright and Dark Dots	0	$N \leq 3$

[Note 1]

Judge defect dot and adjacent dot as following.

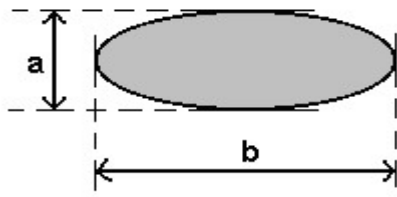


- (1) One pixel consists of 3 sub-pixels, including R,G, and B dot.(Sub-pixel = Dot)
- (2) The definition of dot: The size of a defective dot over 1/2 of whole dot is regarded as one defective dot.
- (3) Allow above (as A, B, C and D status) adjacent defect dots, including bright and dark adjacent dot. And they will be counted 2 defect dots in total quantity.
- (4) Defects on the Black Matrix, out of Display area, are not considered as a defect or counted.
- (5) There should be no distinct non-uniformity visible through 6% ND Filter within 2 sec inspection times.

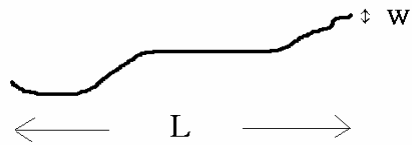
4.3 Visual Inspection specifications:

Defect Type	Specification	Count(N)
Dot Shape (Particle、 Scratch and Bubbles in display area)	$D \leq 0.15\text{mm}$	Ignored
	$0.15\text{mm} < D \leq 0.3\text{mm}$	$N \leq 3$
	$D > 0.3\text{mm}$	$N=0$
Line Shape (Particles、 Scratch、 Lint and Bubbles in display area)	$W \leq 0.05\text{mm}$	Ignored
	$0.05\text{mm} < W \leq 0.1\text{mm}$, $L \leq 3\text{mm}$	$N \leq 3$
	$W > 0.1\text{mm}$, $L > 3\text{mm}$	$N=0$

[Note 2] W : Width[mm], L : Length[mm], N : Number, ϕ : Average Diameter

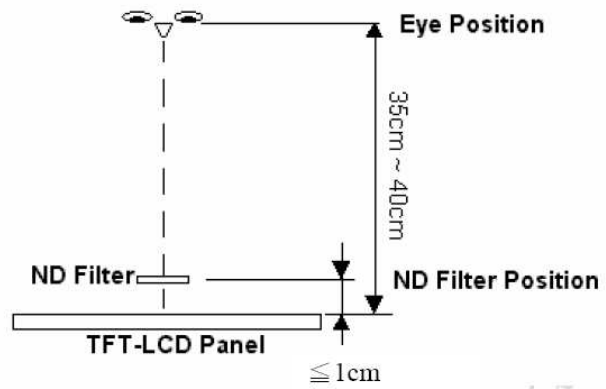
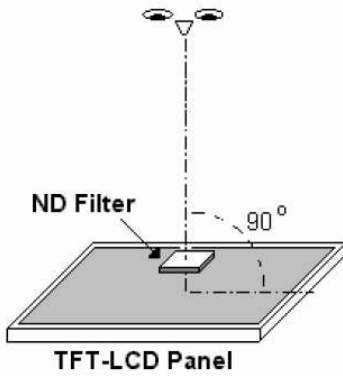


1. (White, black) Spot
2. Polarizer Bubble



1. fiber

[Note 3] Bright dot is defined through 6% transmission ND Filter as following.



9. RELIABILITY TEST CONDITIONS

ITEM	CONDITIONS
HIGH TEMPERATURE OPERATION	80°C , 240Hrs
HIGH TEMPERATURE AND HIGH HUMIDITY OPERATION	60°C , 90%RH , 240Hrs
HIGH TEMPERATURE STORAGE	85°C , 240Hrs
LOW TEMPERATURE OPERATION	-30°C , 240Hrs
LOW TEMPERATURE STORAGE	-40°C , 240Hrs
THERMAL SHOCK	-30°C (1Hr) ~80°C (1Hr) 100Cycle

9.1 OTHERS

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

