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-800600GTMQW-T03H**
APPROVED BY	
DATE	

☐ Approved For Specifications

☑ **Approved For Specifications & Sample**

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RECORD OF REVISION

Revision Date	Page	Contents	Editor
2009/3/25	--	New Release	JOHN

1. Features

8 inch Amorphous-TFT-LCD (Thin Film Transistor Liquid Crystal Display) module. This module is composed of a 8" TFT-LCD panel, LED backlight, LED driver unit ,touch panel and T-CON unit.

(1) Construction: 8" a-Si TFT active matrix, White LED Backlight, and touch panel.

(2) Resolution (pixel): 800(R.G.B) X600

(3) Number of the Colors : 262K colors (R , G , B 6 bit digital each)

(4) LCD type : Transmissive , normally White

(5) Interface: 20 Pin (LVDS interface)

(6) Power Supply Voltage: 3.3V single power input.

(7) Viewing Direction: 6 O'clock (The direction it's hard to be discolored)

(8) LED driving circuit is built-in to provide dimmer function.

2. PHYSICAL SPECIFICATIONS

Item	Specifications	unit
LCD size	8 inch (Diagonal)	
Resolution	800 x 3(RGB) x 600	dot
Dot pitch	0.0675(W) x 0.2025(H)	mm
Active area	162.0(W) x 121.5(H)	mm
Module size	183.0(W) x 141.0(H) x 11.0(D)	mm
Surface treatment	Anti-Glare	
Color arrangement	RGB-stripe	
interface	Digital	

3. ABSOLUTE MAXIMUM RATINGS

| Item	Symbol	Min.	Max.	Unit	Note
Power Voltage	VDD	-0.3	+6.0	V	
Logic Input Signal	VI	-0.3	VDD+0.3	V	
Operating Temperature	Top	-10	60	℃	
Storage Temperature	Tstg	-30	70	℃	

Note : Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above.

4. Optical Specifications

Item		Symbol	Condition	Values Min.	Values Typ.	Values Max.	Unit	Note
Viewing angle (CR≧10)	Front	θF (6 o'clock)	CR≧10	--	70	--	degree	(1)(2)(3)
	Back	θB (12 o'clock)		--	60	--		
	Left	θL (9 o'clock)		--	70	--		
	Right	θR (3 o'clock)		--	70	--		
Response time		Tr		--	15	--	msec	(1)(4)
		Tf		--	35	--	msec	(1)(4)
Contrast ratio		CR		--	400	--	--	(1)(3)
Color chromaticity	Red	Rx	Normal θ=Φ=0°	0.57	0.62	0.67	--	(1)
		Ry		0.29	0.34	0.39	--	
	Green	Gx		0.29	0.34	0.39		
		Gy		0.56	0.61	0.66		
	Blue	Bx		0.09	0.14	0.19		
		By		0.05	0.10	0.15		
	White	Wx		0.27	0.32	0.37		
		Wy		0.31	0.36	0.41		
Luminance		L		200	240	--	cd/㎡	(1)(5)
Luminance uniformity		ΔL		70	75	--	%	(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
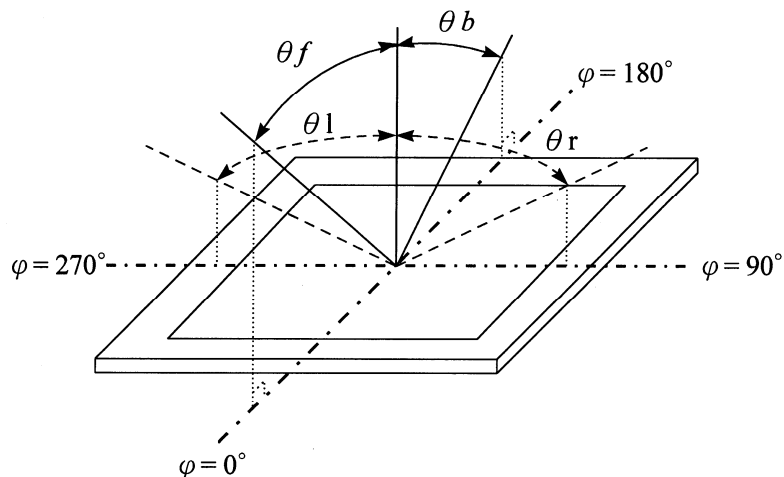
Note 3: Definition of contrast ratio:

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.
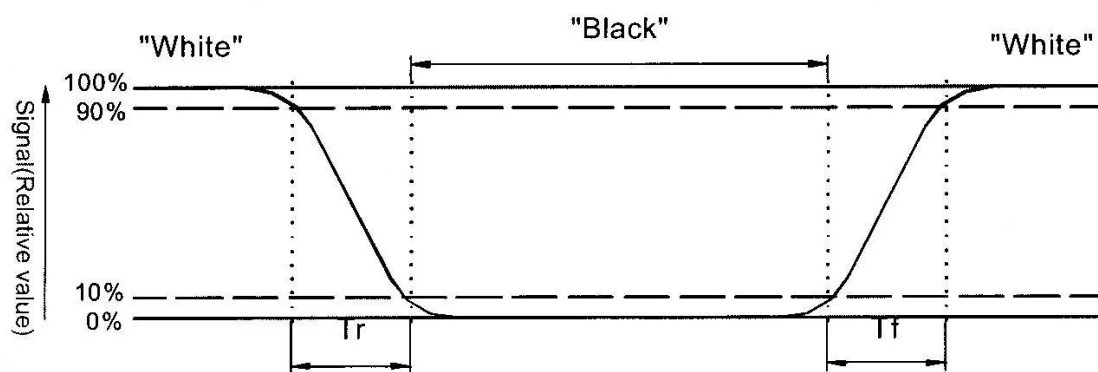
Note 5 : Luminance is measured at point 5 of the display.
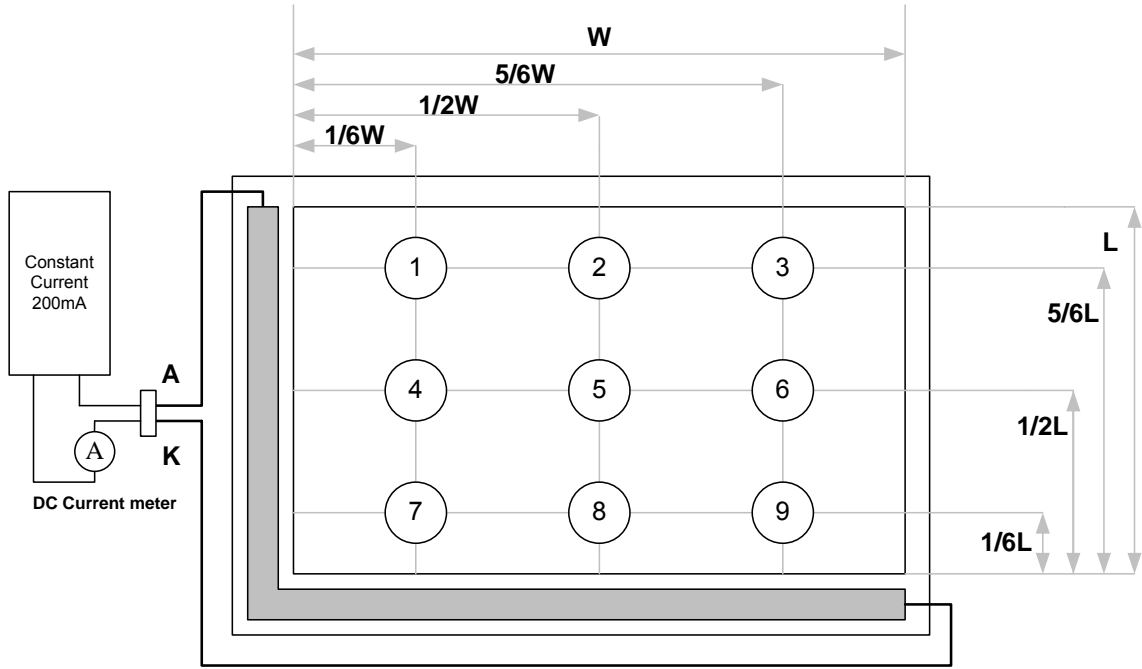
Note 6 : Definition of Luminance Uniformity
ΔL = [L(min.) of 9 points / L(max.) of 9 points] X 100%

4-1 Touch Panel Electrical Specification

Parameter	Condition	Standard Value
Terminal Resistance	X Axis	300 ~ 1100 Ω
	Y Axis	150 ~ 650 Ω
Insulating Resistance	DC 25 V	More than 20MΩ
Linearity	--	$\pm$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 : R0.8

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	Y1	Touch Panel Bottom Signal in Y Axis
2	X1	Touch Panel Left Signal in X Axis
3	Y2	Touch Panel Top Signal in Y Axis
4	X2	Touch Panel Right Signal in X Axis

# 5. ELECTRICAL CHARACTERISTICS

5-1 TFT LCD Module voltage

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply Voltage	VDD	3.0	3.3	3.6	V	
Power Supply Current	IDD	--	150	165	mA	(1)
Power Consumption	PLCD	--	0.5	0.55	mW	

Note 1: fV =60Hz , Ta=25℃ , Display pattern : All Black

5-2 Backlight Driving Conditions

| Item	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
LED Voltage	VL	9.3	9.9	10.5	V	I_{LED} =180mA Ta=25℃
LED Current	IL	--	180	200	mA	Ta=25℃
Power Supply Voltage For LED Driver	VLED	4.5	5.0	5.5	V	
Power Supply Current For LED Driver	ILED		460		mA	
LED life time	--	--	20,000	--	Hr	(1)

■ The constant current source is needed for white LED back-light driving. When LCM is operated over 60 deg.C ambient temperature, the I_{LED} of the LED back-light should be adjusted to 150mA max
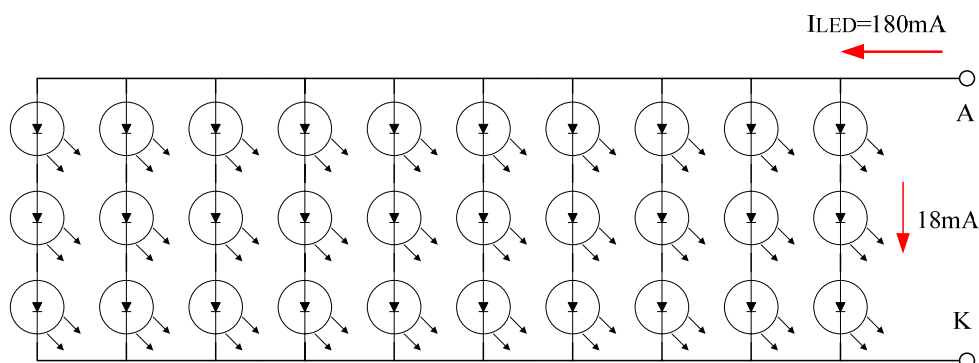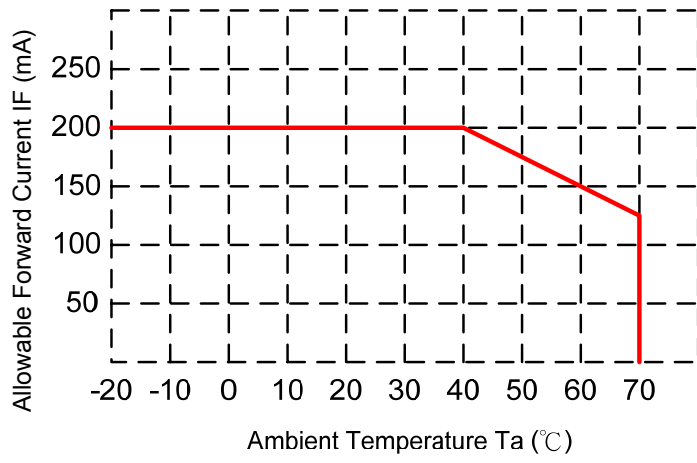
Note 1: Estimated data, I_{LED} =180mA, Ta=25℃

6. BLOCK DIAGRAM
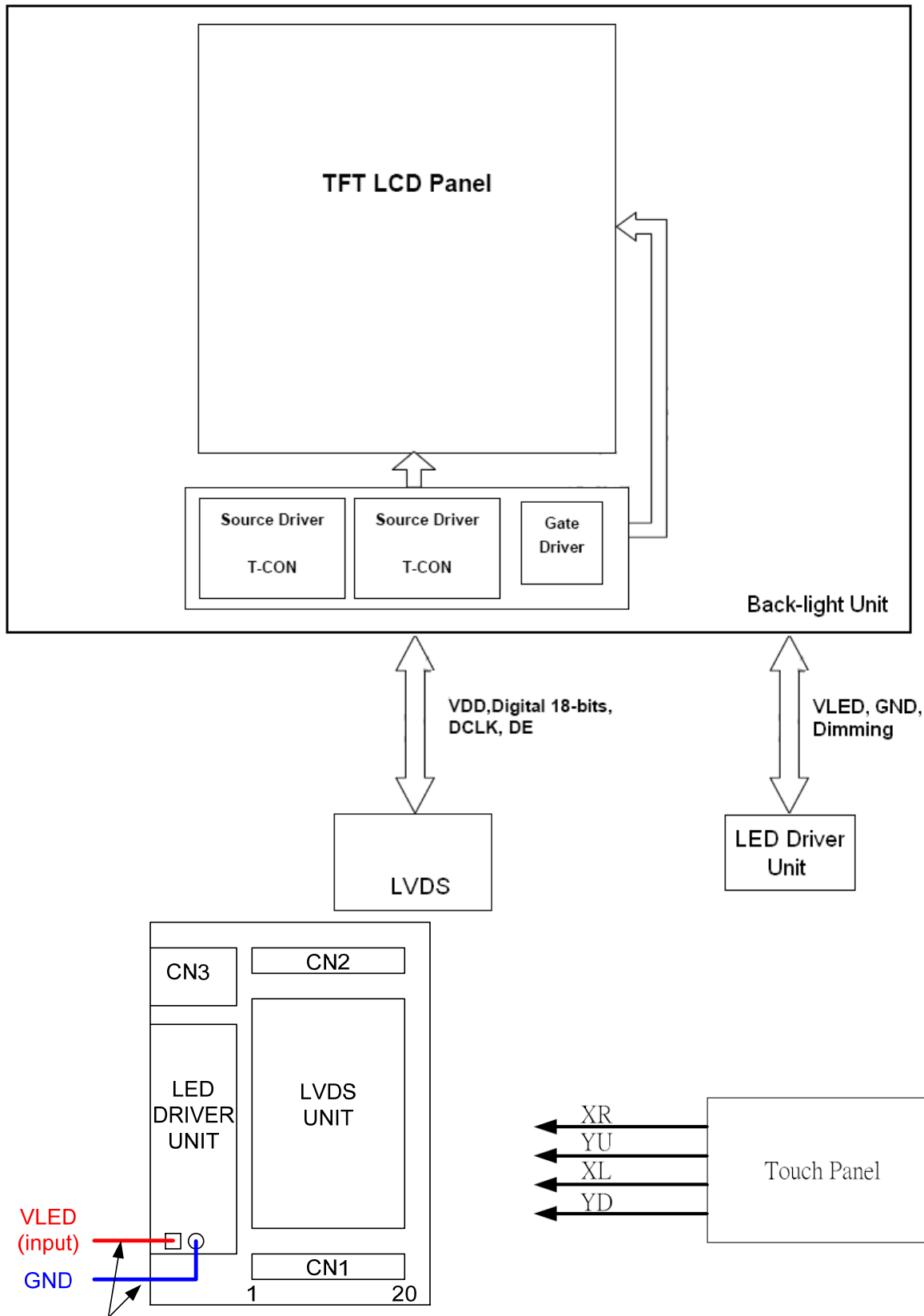
7. INTERFACE PIN ASSIGNMENT

Pin no	Symbol	Function	Note
1	VDD	POWER SUPPLY:3.3V	
2	VDD	POWER SUPPLY:3.3V	
3	Gnd	Power Ground	
4	Gnd	Power Ground	
5	IN0-	Transmission Data of Pixels(R data input)	
6	IN0+	Transmission Data of Pixels(R data input)	
7	Gnd	Power Ground	
8	IN1-	Transmission Data of Pixels 1(G data input)	
9	IN1+	Transmission Data of Pixels 1(G data input)	
10	Gnd	Power Ground	
11	IN2-	Transmission Data of Pixels 2(B data input)	
12	IN2+	Transmission Data of Pixels 2(B data input)	
13	Gnd	Power Ground	
14	CLK-	Sampling Clock	
15	CLK+	Sampling Clock	
16	Gnd	Power Ground	
17	ADJ	Adjust for LED Brightness	(1)
18	NC	No Connect	
19	Gnd	Power Ground	
20	Gnd	Power Ground	

NOTE 1:
Pin17: ADJ is PWM signal input. It is for brightness control.

Item	Symbol	Min.	Typ.	Max.	Unit
ADJ signal frequency	f_{PWM}	100	--	1K	Hz
ADJ signal logic level High	VIH	2.2	--	VLED (5.0V)	V
ADJ signal logic level Low	VIL	0	--	0.5	V

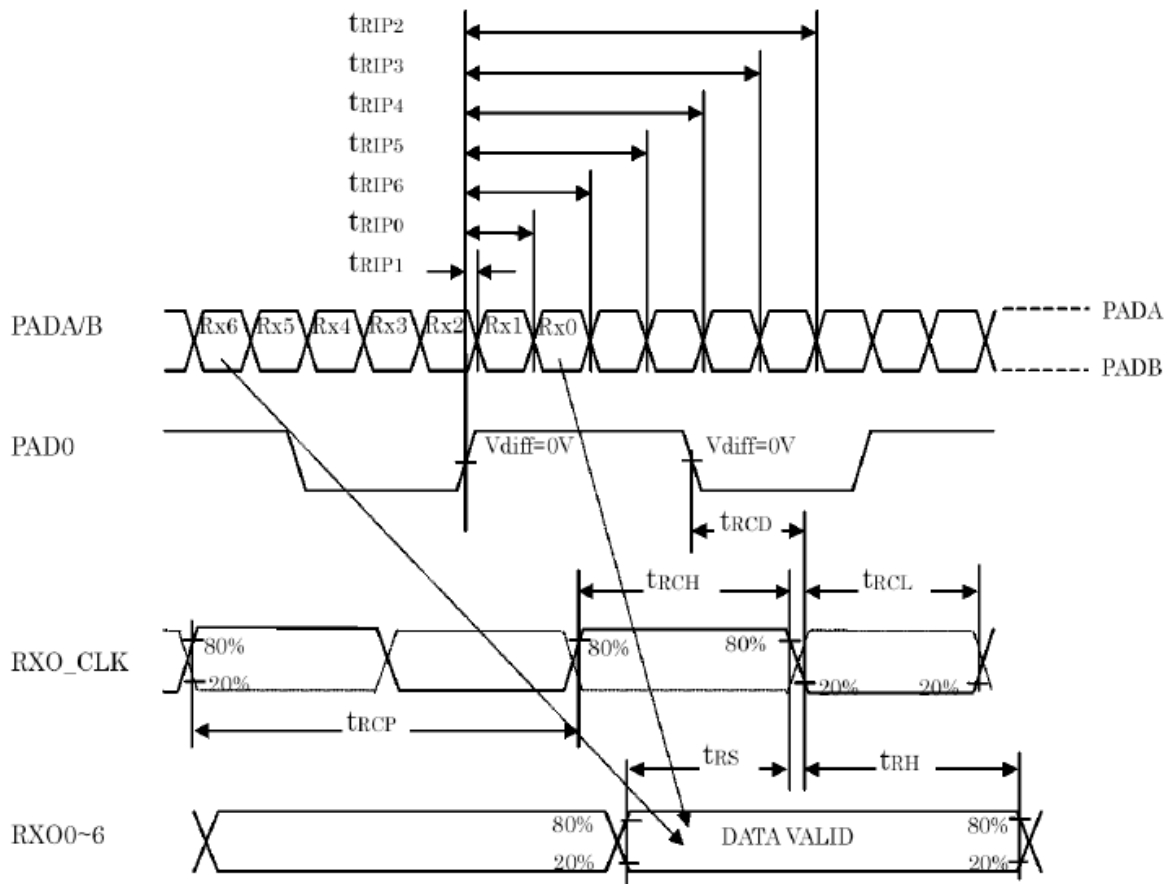ADJ adjust brightness to control Pin, Pulse duty the smaller the brighter.
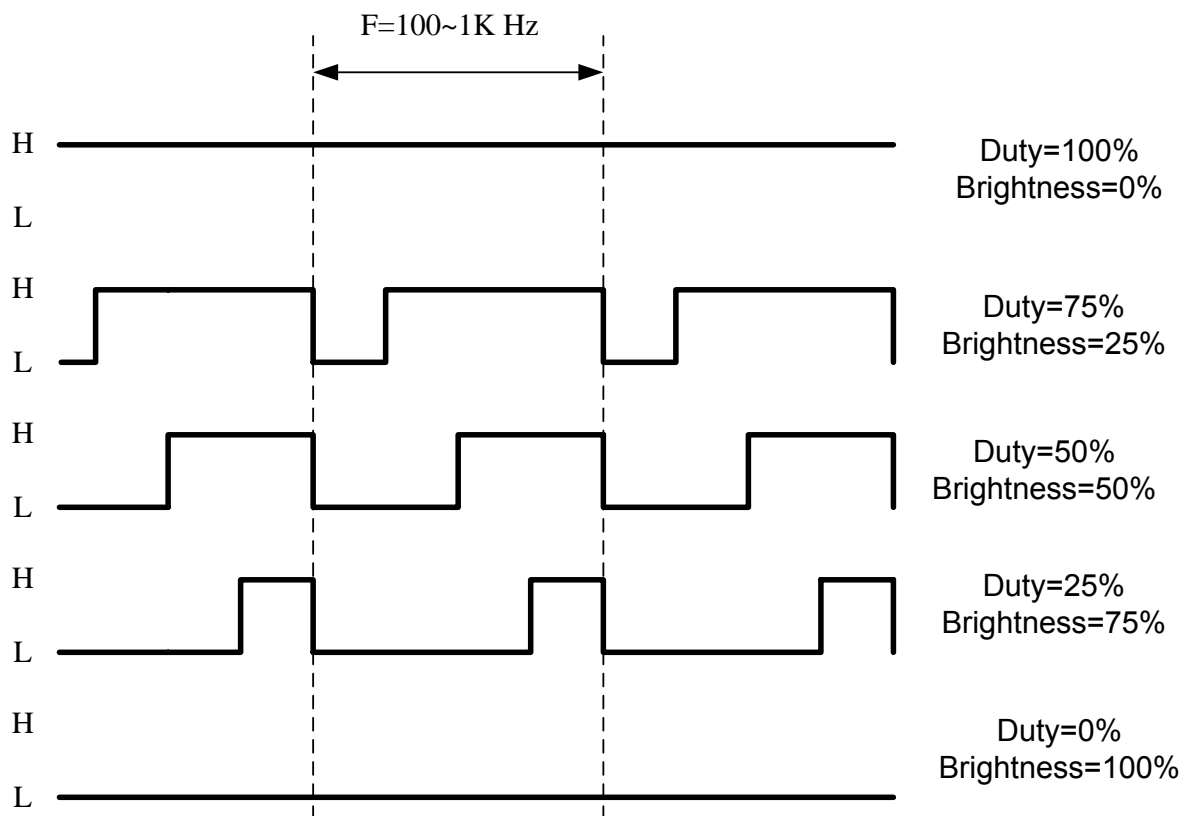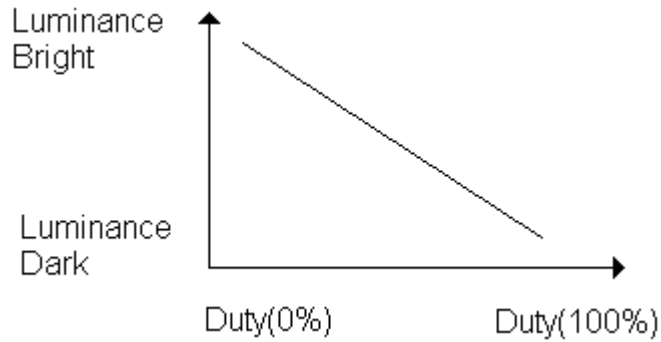
8. INTERFACE TIMING   (The information as below is to be defined.)
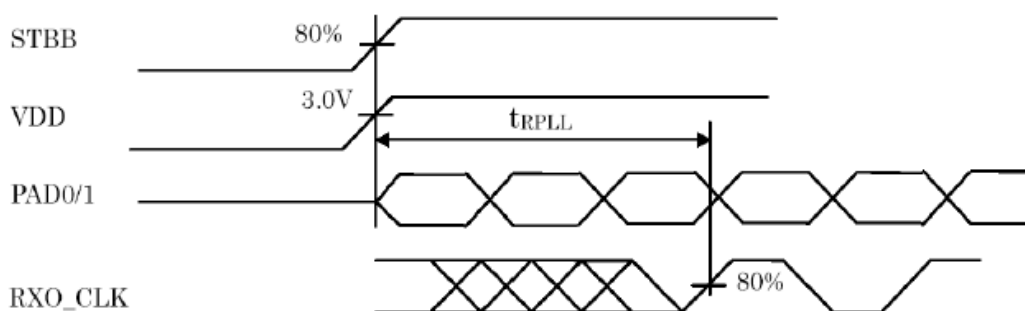
8-1 LVDS SIGNAL :
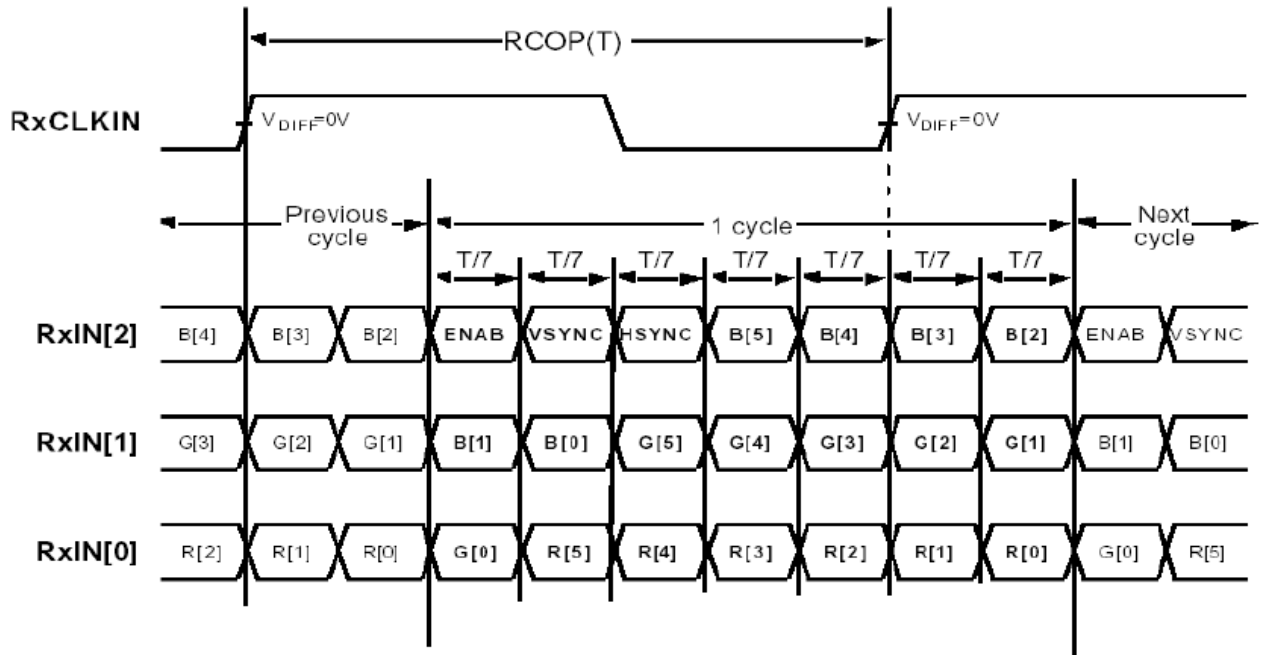
Note : R/G/B[5]s are MSBs and R/G/B[0]s are LSBs
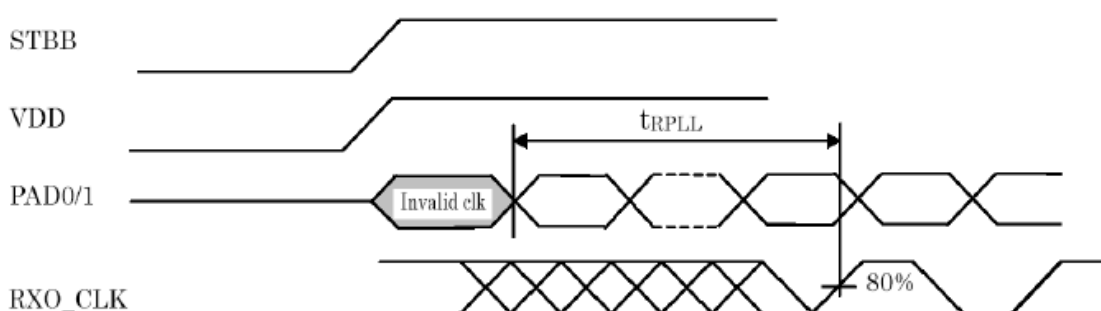
8-2 LVDS AC Timing Diagram :

8-3 Phase Lock Loop Set Time :

(Case1)

(Case2)

8-4 Switching Characteristics :

< recommended operating condition (unless otherwise noted) >

Parameter	Symbol	min	typ	max	Unit
RXO_CLK Period	t_{RCP}	11.76	T	50	ns
RXO_CLK High Time	t_{RCH}	-	T/2	-	ns
RXO_CLK Low Time	t_{RCL}	-	T/2	-	ns
PAD0/1 to RXO_CLK Delay	t_{RCD}	-	3T/7	-	ns
Data Setup to RXO_CLK	t_{RS}	1.9	-	-	ns
Data Hold from RXO_CLK	t_{RH}	3.0	-	-	ns
Input Data Position 0 (T=11.76ns) (note1)	t_{RIP1}	-0.4	0	0.4	ns
Input Data Position 1 (T=11.76ns) (note1)	t_{RIP0}	T/7-0.4	T/7	T/7+0.4	ns
Input Data Position 2 (T=11.76ns) (note1)	t_{RIP6}	2T/7-0.4	2T/7	2T/7+0.4	ns
Input Data Position 3 (T=11.76ns) (note1)	t_{RIP5}	3T/7-0.4	3T/7	3T/7+0.4	ns
Input Data Position 4 (T=11.76ns) (note1)	t_{RIP4}	4T/7-0.4	4T/7	4T/7+0.4	ns
Input Data Position 5 (T=11.76ns) (note1)	t_{RIP3}	5T/7-0.4	5T/7	5T/7+0.4	ns
Input Data Position 6 (T=11.76ns) (note1)	t_{RIP2}	6T/7-0.4	6T/7	6T/7+0.4	ns
Phase Lock Loop Set	t_{RPLL}	-	-	10	ms

note1： VDD=3.3V, Ta=25°C

8-5 TTL SIGNAL :

Timing Condition

Parameter	Symbol	Values			Unit	Note
		Min.	Typ.	Max.		
CLK Frequency	FCPH	--	39.79	--	MHZ	
CLK Period	FCPH	--	25.13	--	ns	
CLK Pulse Duty	FCWH	40	50	60	%	
DE Period	Fdeh+TDEL	1000	1056	--	TCPH	
DE Pulse Width	FDH	--	800	--	TCPH	
DE Frame Blanking	FHS	10	28	110	FDEH+TDEL	
DE Frame Width	FEP	--	600	--	FDEH+TDEL	
OEV Pulse Width	TOEV	--	150	--	TCPH	
OKV Pulse Width	TCKV	--	133	--	TCPH	
DE(internal)-STV Time	T1	--	4	--	TCPH	
DE(internal)-CKV Time	T2		40		TCPH	
DE(internal)-OEV Time	T3		23		TCPH	
DE(internal)-POL Time	T4	--	157	--	TCPH	
STV Pulse Width	-		1		TH	

THS+THA<TH

8-6 Timing Characteristic
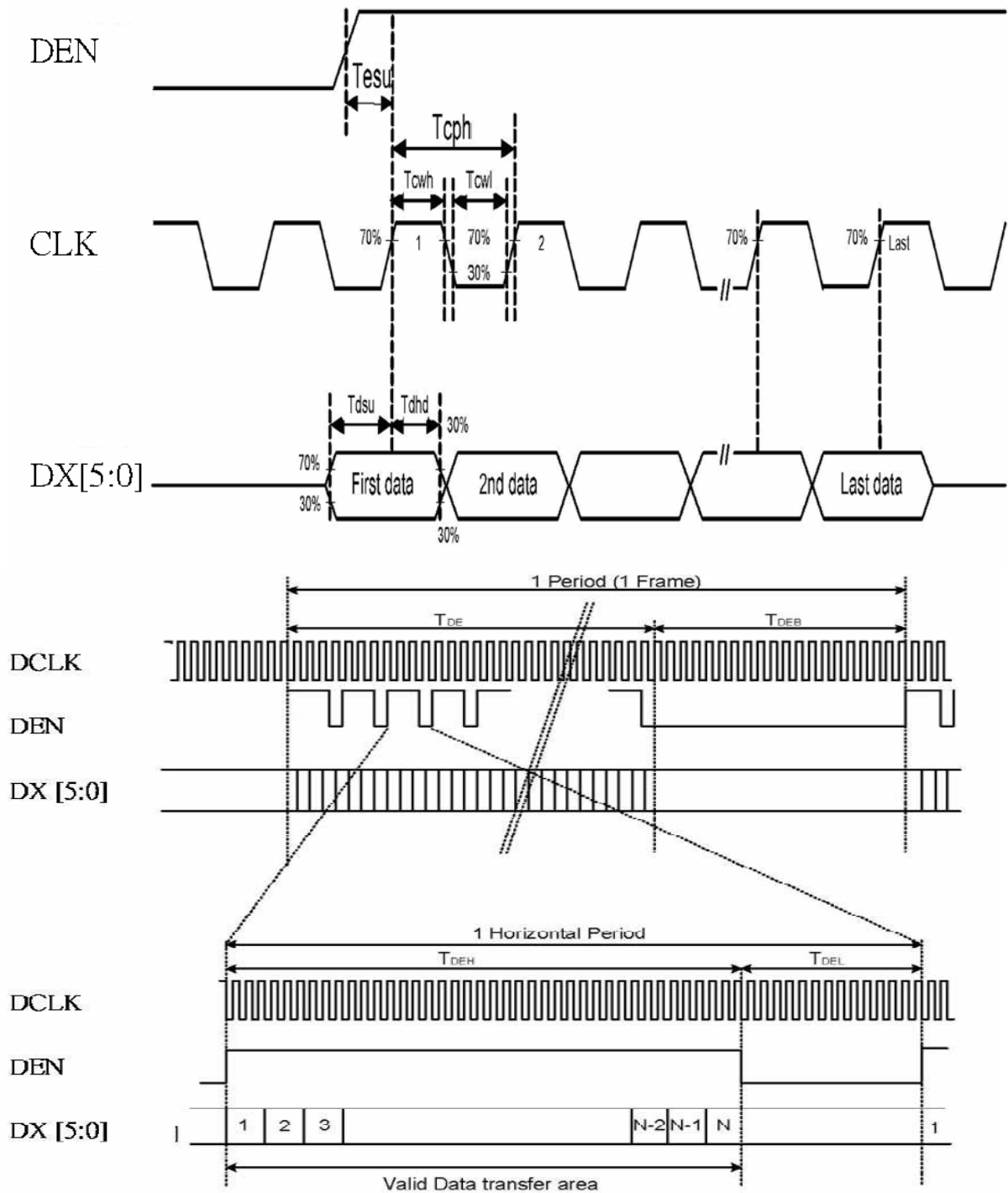
9. DISPLAYED COLOR AND INPUT DATA

	Color & Gray Scale	DATA SIGNAL																	
		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
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	1	0	0	0	0	0	0
	Blue(63)	0	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	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	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	1
Red	Black	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(31)	0	1	1	1	1	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	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Green	Black	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	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(31)	0	0	0	0	0	0	0	1	1	1	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	1	0	0	0	0	0	0
Blue	Black	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(31)	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue(62)	0	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	0	1	1	1	1	1	1

10. QUALITY AND RELIABILITY

10.1 Test Conditions

Tests should be conducted under the following conditions :
Ambient temperature   : $25 \pm 5°C$
Humidity   : $60 \pm 25\%$ RH.

10.2 Sampling Plan

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

10.3 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.

10.4 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.


ZONE A active area

ZONE B viewing area
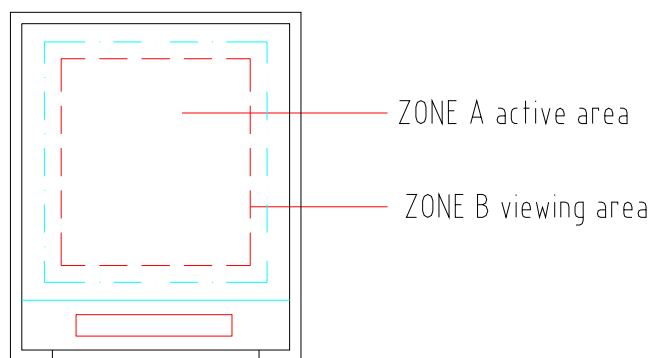
10.5 Incoming Inspection Standard

| DEFECT TYPE			LIMIT		Note
VISUAL DEFECT	INTERNAL	SPOT	$\varphi < 0.15mm$	Ignore	(1)
			$0.15mm \leqq \varphi \leqq 0.5mm$	$N \leqq 4$	
			$0.5mm < \varphi$	N=0	
		FIBER	$0.03mm < W \leqq 0.1mm, L \leqq 5mm$	$N \leqq 3$	(1)
			$1.0mm < W, 1.5mm < L$	N=0	
		POLARIZER BUBBLE	$\varphi < 0.15mm$	Ignore	(1)
			$0.15mm \leqq \varphi \leqq 0.5mm$	$N \leqq 2$	
			$0.5mm < \varphi$	N=0	
		Mura	It' OK if mura is slight visible through 6%ND filter		
ELECTRICAL DEFECT		BRIGHT DOT	A Grade	B Grade	
			Total	Total	(3)
			$N \leqq 4$	$N \leqq 5$	(2)
		DARK DOT	$N \leqq 5$	$N \leqq 8$	
		TOTAL DOT	$N \leqq 9$	$N \leqq 12$	(2)
		TWO ADJACENT DOT	$N \leqq 4$ pair	$N \leqq 5$ pair	(4)
		THREE OR MORE ADJACENT DOT	$N \leqq 1$		
		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

$$\phi = \{ a + b \} / 2$$
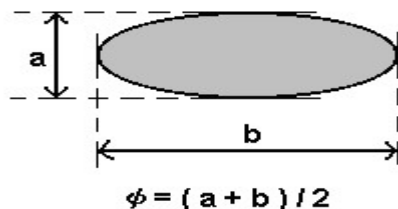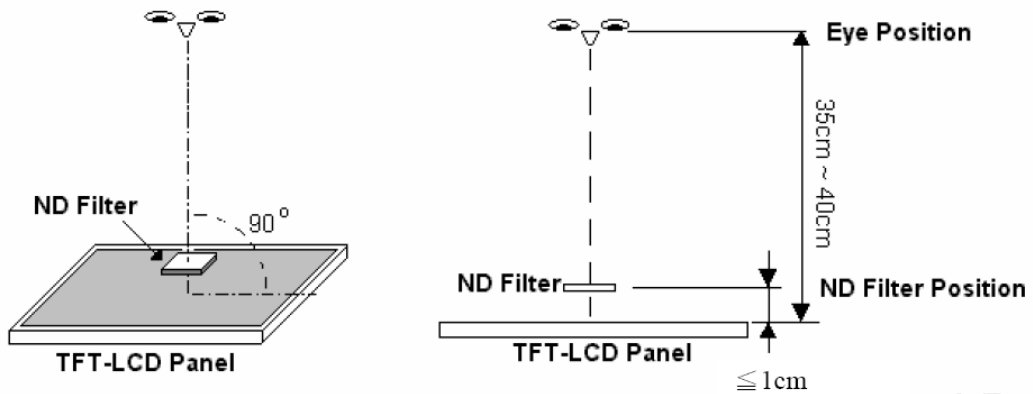
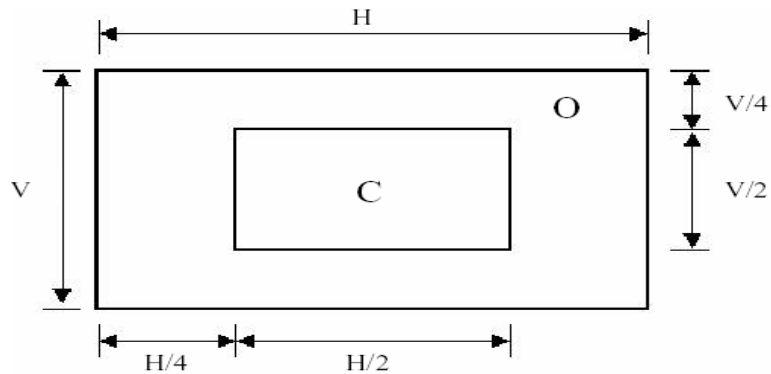1. (White, black) Spot
2. Polarizer Bubble
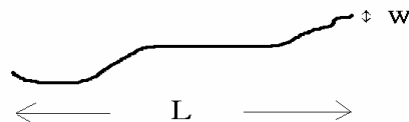
1. fiber

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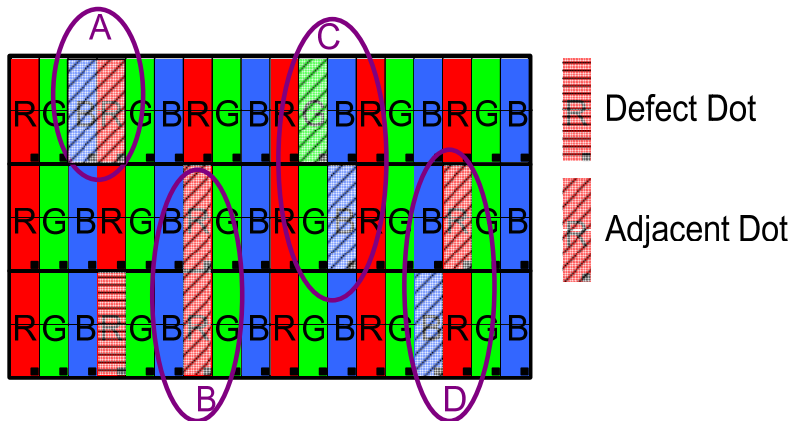

[Note3]

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.

10.6 RELIABILITY TEST CONDITIONS

Test Item	Test Conditions	Note
High Temperature Operation	60±3°C , t=96 hrs	
Low Temperature Operation	-10±3°C , t=96 hrs	
High Temperature Storage	70±3°C , t=96 hrs	1,2
Low Temperature Storage	-30±3°C , t=96 hrs	1,2
Thermal Shock Test	-30°C ~ 25°C ~ 70°C 30 m in. 5 min. 30 min. (1 cycle) Total 5 cycle	1,2
Humidity Test	40 °C, Humidity 90%, 96 hrs	1,2

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.

11. USE PRECAUTIONS

11-1 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.

(4) 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.

11-2 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. $1M\Omega$ 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

11-3 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.

11-4 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.

11-5 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.

12. OUTLINE DIMENSION