ZETTLER DISPLAYS

SPECIFICATIONS FOR LIQUID CRYSTAL DISPLAY

CUSTOMER APPROVAL

※ **PART NO. :** ATM0800D9-T (ZETTLER DISPLAYS) VER2.0

APPROVAL		COMPANY CHOP	
CUSTOMER COMMENTS			

ZETTLER DISPLAYS ENGINEERING APPROVAL		
DESIGNED BY	CHECKED BY	APPROVED BY
Herbert		

REVISION RECORD

REVISION	REVISION DATE	PAGE	CONTENTS
VER1.0	**2016-03-08**		**FIRST ISSUED**
VER2.0	**2016-09-08**	**7，19**	**ADD TOUCH PANEL SECTION**
			ADD SOME DIMENSION

※ **CONTENTS**

1. GENERAL SPECIFICATIONS

Item	Specification	Remark
1. LCD size	8.0 inch(Diagonal)	
2. Driver element	a-Si TFT active matrix	
3. Resolution	800x(RGB)x600	
4. Display mode	Normally white , Transmissive	
5. Dot Pitch (W*H)	0.0675(W) × 0.2025(H) mm	
6. Pixel pitch(W*H)	0.2025 (W) × 0.2025(H) mm	
7. Active Area(W*H)	162.0(W) × 121.5(H) mm	
8. Module size (W*H)	183.0(W) × 141.0(H) × 8.0(D) mm	Note 1
9. Surface treatment	Anti-glare	
11. Color arrangement	RGB-stripe	
12. Color	16.7M	
13. Interface	24bit RGB interface	
14. Weight	TBD	
15. RoHS	RoHS compliant	

Note 1: **Please refer to mechanical drawing.**

2. PIN ASSIGNMENT

TFT LCD Panel Driving Section

FPC Connector is used for the module electronics interface. The recommended model is FH12A-50S-0.5SH manufactured by Hirose.

PinNo.	Symbol	I/O	Function	Remark
1	NC		No connection	
2	NC		No connection	
3	NC		No connection	
4	NC		No connection	
5	GND	P	Power ground	
6	VCOM	I	Common voltage	
7	VCC	P	Power for Digital circuit	
8	MODE	I	DE/SYNC mode select	Note3
9	DE	I	Data Input Enable	
10	VS	I	Vertical Sync Input	
11	HS	I	Horizontal Sync Input	
12	B7	I	Blue data(MSB)	
13	B6	I	Blue data	
14	B5	I	Blue data	
15	B4	I	Blue data	
16	B3	I	Blue data	
17	B2	I	Blue data	
18	B1	I	Blue data	
19	B0	I	Blue data(LSB)	
20	G7	I	Green data (MSB)	
21	G6	I	Green data	
22	G5	I	Green data	
23	G4	I	Green data	
24	G3	I	Green data	
25	G2	I	Green data	
26	G1	I	Green data	
27	G0	I	Green data (LSB)	
28	R7	I	Red data (MSB)	
29	R6	I	Red data	
30	R5	I	Red data	

31	R4	I	Red data	
32	R3	I	Red data	
33	R2	I	Red data	
34	R1	I	Red data	
35	R0	I	Red data (LSB)	
36	GND	P	Power ground	
37	DCLK	I	Sample clock	
38	GND	P	Power ground	
39	L/R	I	Right/ left selection	Note2,5
40	U/D	I	Up/down selection	Note2,5
41	VGH	P	Gate ON voltage	
42	VGL	P	Gate OFF voltage	
43	AVDD	P	Power for Analog circuit	
44	RESET	I	Global reset pin.	Note1
45	NC		No connection	
46	VCOM	I	Common voltage	
47	DITHB	I	Dithering function	Note 4
48	GND	P	Power ground	
49	NC		No connection	
50	NC		No connection	

I: input, O: output, P: Power

Note 1: Global reset pin. Active Low to enter Reset State. Suggest to connecting with an RC reset circuit for stability. Normally pull high.

Note 2: Selection of scanning mode

Setting of scan control input		Scanning direction
U/D	R/L	
GND	Vcc	Up to down, left to right
Vcc	GND	Down to up, right to left
GND	GND	Up to down, right to left
Vcc	Vcc	Down to up, left to right

Note 3: DE/SYNC mode select, Normally pull high.
        H: DE mode.
        L: HS/VS mode.
Note4: Dithering function enable control.Normally pull high.
        DITHB= "1" ,Disable internal dithering function. For 18bit RGB interface, connect two LSB bits of all the R/G/B data buses to GND.
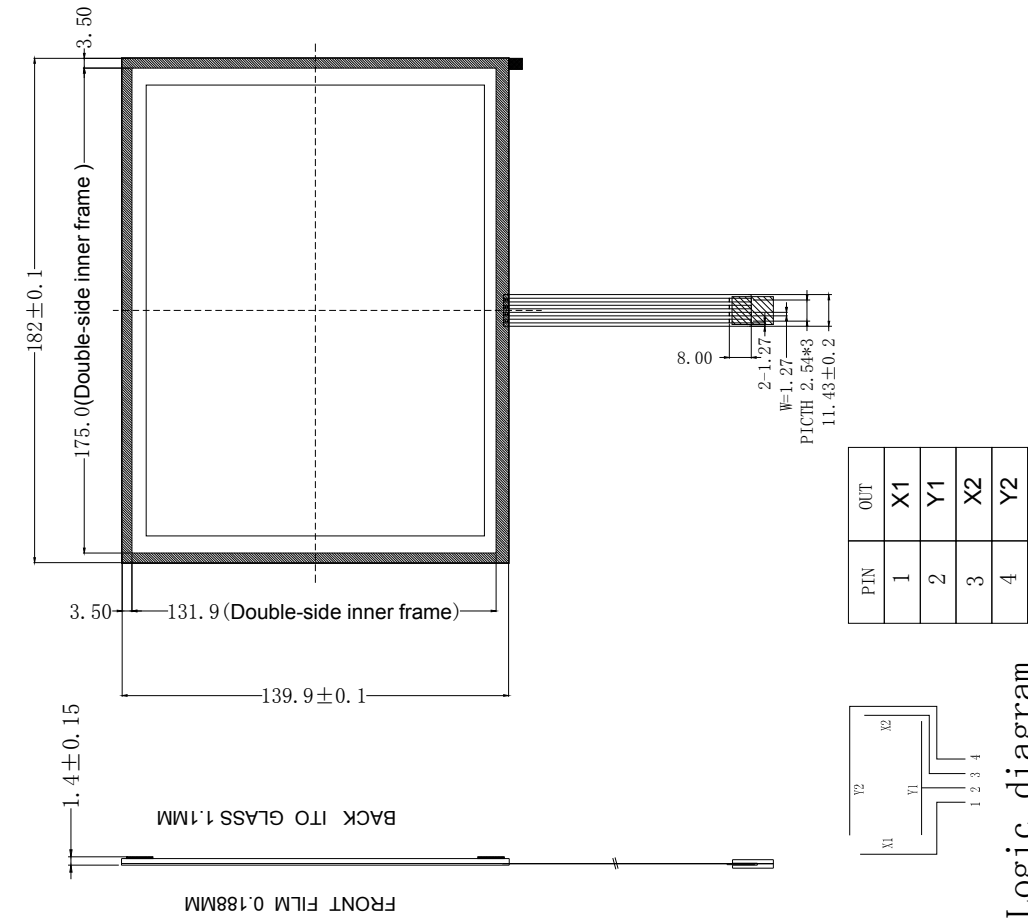
DITHB=＂0＂,Enable internal dithering function, For TTL 24bit parallel RGB image data input.

Note 5: Definition of scanning direction.

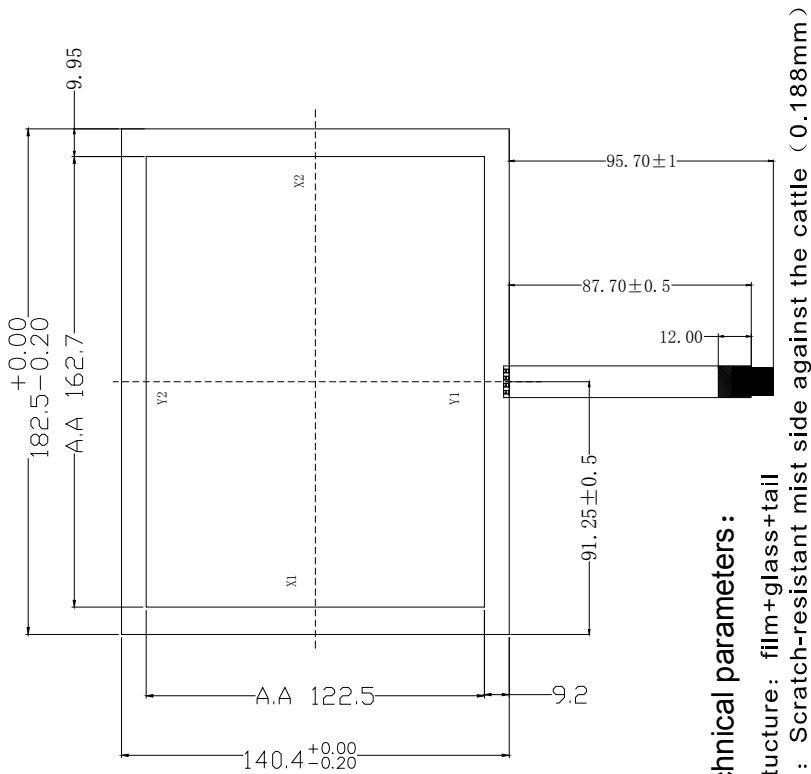Refer to the figure as below:

Touch Panel Section

PIN	OUT
1	X1
2	Y1
3	X2
4	Y2

Logic diagram

BACK ITO GLASS 1.1MM
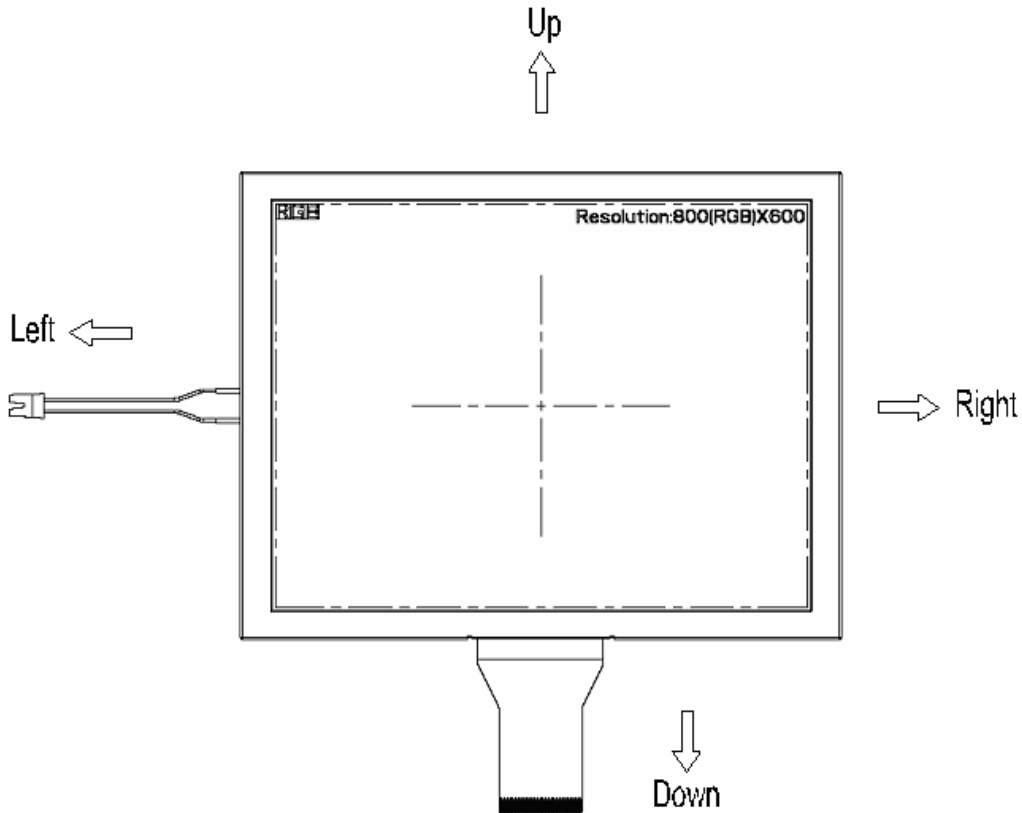
FRONT FILM 0.188MM

Technical parameters：

1.Stucture： film+glass+tail
film： Scratch-resistant mist side against the cattle（0.188mm）
glass:1.1mm
tail: FPC (pitch2.54)
2.Circuit： DC5V 1mA
3.Insulation resistance： ≥20MΩ (25V DC)
4.Linearity： ≤1.5%
5.Light transmittance： ≥78%
6Operating pressure： 50-120g
7.Operating temperature： -10℃～+60℃，
8.Storage temperature： -20℃～+70℃，
9.X:200-900Ω Y:200-900Ω.
10.Unmark tolerance:±0.50

3. Operating Specification

3.1 ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Values		Unit	Remark
		Min.	Max.		
Power Voltage	DV_{DD}	-0.3	5.0	V	
	AV_{DD}	-0.5	13.5	V	
	V_{GH}	13.0	19.0	V	
	V_{GL}	-12.0	-2.0	V	
	$V_{GH}\text{-}V_{GL}$	--	31	V	
Operation Temperature	T_{OP}	-20	70	℃	
Storage Temperature	T_{ST}	-30	80	℃	
LED Reverse Voltage	V_R	-	1.2	V	Each LED Note 2
LED Forward Current	I_F		25	mA	Each LED

Note 1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

Note 2: V_R Conditions: Zener Diode 20mA

3.1.1 Typical Operation Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Voltage	DV_{DD}	3.1	3.3	3.5	V	Note 2
	AV_{DD}	10.2	10.4	10.6	V	
	V_{GH}	15.3	16.0	16.7	V	
	V_{GL}	-7.7	-7	-6.3	V	
Input Signal Voltage	V_{COM}	2.8	3.8	4.8	V	
Input Logic High Voltage	V_{IH}	$0.8DV_{DD}$	--	DV_{DD}	V	Note 3
Input Logic Low Voltage	V_{IL}	0	--	$0.2DV_{DD}$	V	Note 3

Note 1: Be sure to apply DV_{DD} and V_{GL} to the LCD first, and then apply V_{GH}.
Note 2: DV_{DD} setting should match the signals output voltage (refer to Note 3) of customer's system board.
Note 3: DCLK,HS,VS,RESET,U/D, L/R,DE,R0~R7,G0~G7,B0~B7,MODE,DITHB.

3.1.2 Current Consumption

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power Voltage	I_{GH}	--	0.2	0.5	mA	V_{GH}=16.0V
	I_{GL}	--	0.2	1.0	mA	V_{GL}=-7.0V
	I_{DVDD}	--	5.5	10	mA	DV_{DD}=3.3V
	I_{AVDD}	--	32	50	mA	AV_{DD}=10.4V

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3.1.3 Backlight driving conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	V_L	8.8	9.2	9.6	V	Note 1
Current for LED Backlight	I_L	--	200	--	mA	
LED life time	--	20000	--	--	Hr	Note 2

Note 1: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and I_L =100mA.

Note 2: The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and I_L =100mA.
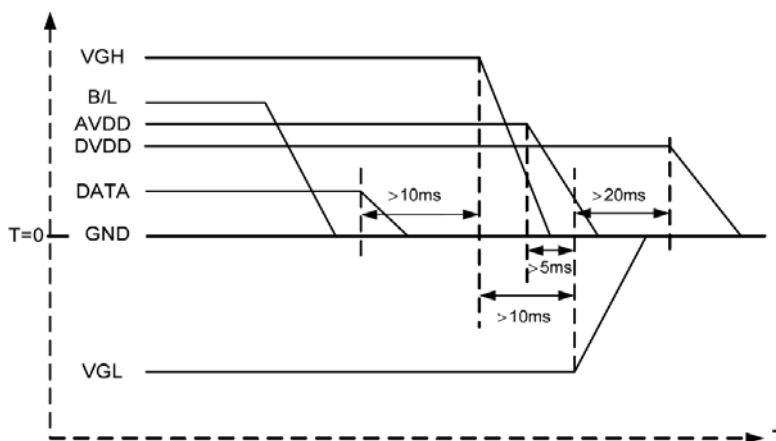
3.2 Power Sequence

a.Power on:
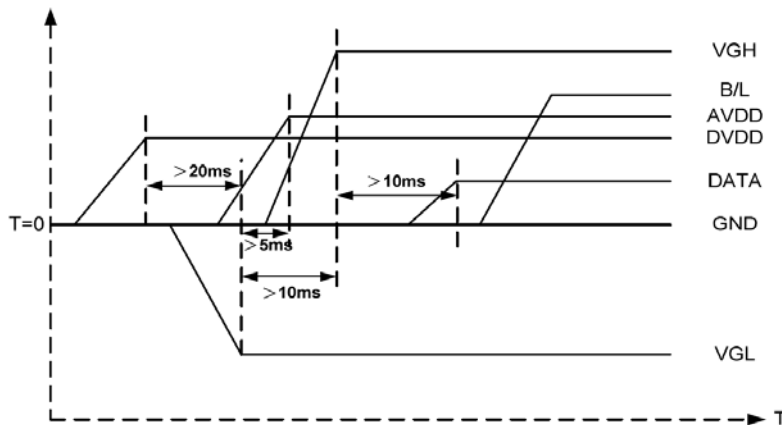
$DV_{DD} \rightarrow V_{GL} \rightarrow V_{GH} \rightarrow Data \rightarrow B/L$

b.Power off:

$B/L \rightarrow Data \rightarrow V_{GH} \rightarrow V_{GL} \rightarrow DV_{DD}$

Note: Data include R0~R7, B0~B7, GO~G7, U/D, L/R, DCLK, HS,VS,DE.

3.3 Timing Characteristics

3.3.1 AC Electrical Characteristics

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
HS Setup Time	Thst	8	--	--	ns	
HS Hold Time	Thhd	8	--	--	ns	
VS Setup Time	Tvst	8	--	--	ns	
VS Hold Time	Tvhd	8	--	--	ns	
Data Setup Time	Tdsu	8	--	--	ns	
Data Hold Time	Tdhd	8	--	--	ns	
DE Setup Time	Tesu	8	--	--	ns	
DE Hold Time	Tehd	8	--	--	ns	
DV_{DD} Power On Slew Time	TPOR	--	--	20	ms	From 0 to 90% DV_{DD}
Reset Pulse Width	TRst	10	--	--	ms	
DCLK Cycle Time	Tcoh	20	--	--	ns	
DCLK Pulse Duty	Tcwh	40	50	60	%	

3.3.2 Data Input Format

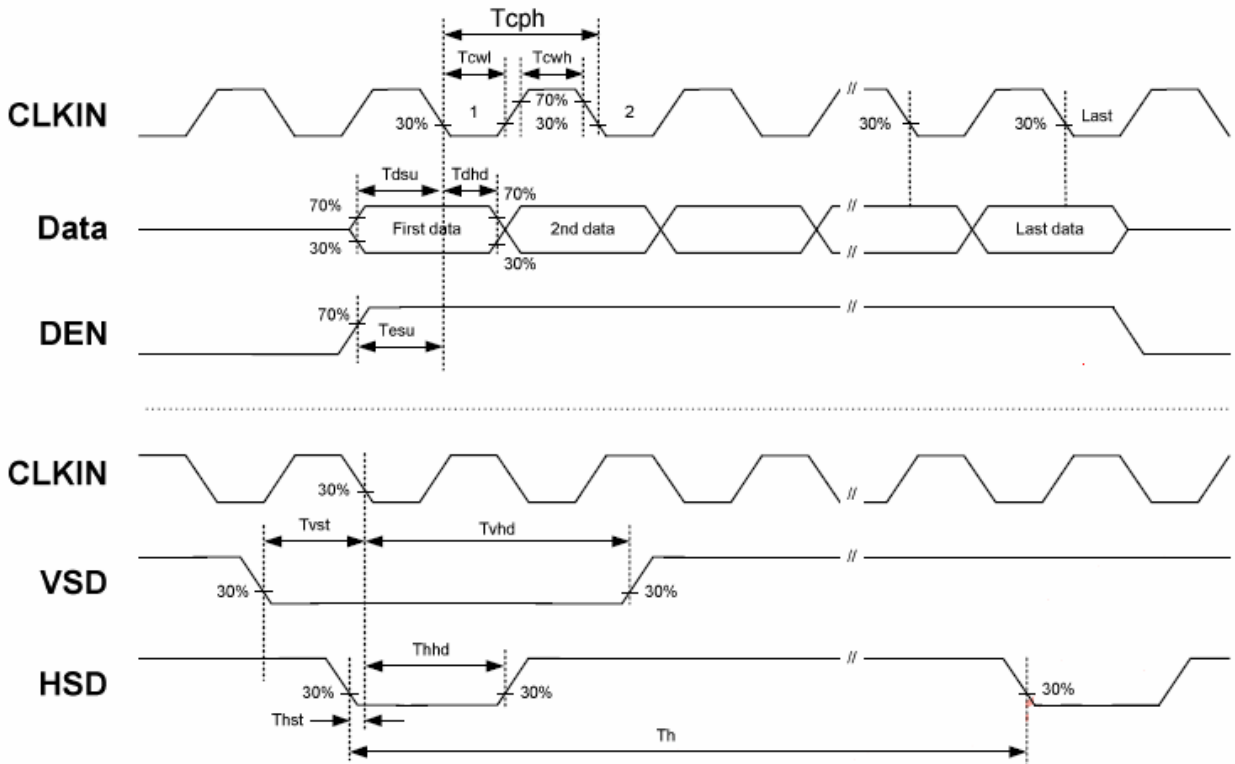**Figure 3.1 Input Clock and Data Timing Diagram**
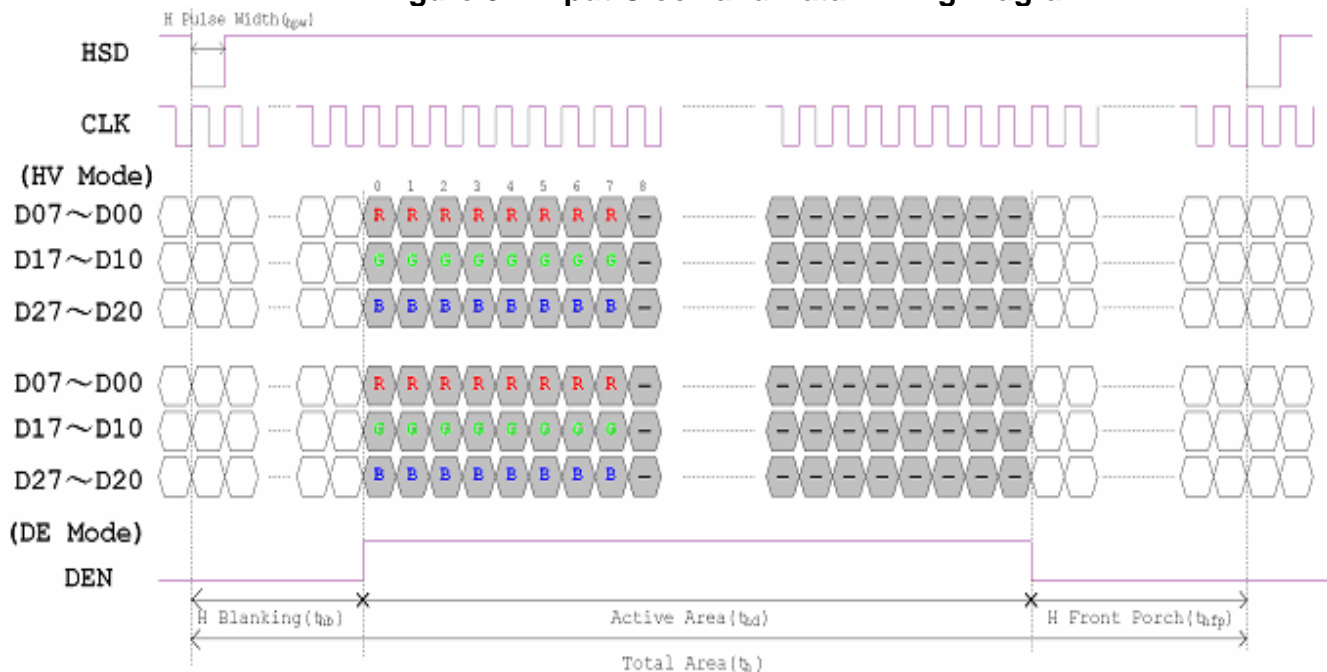
Figure 3.2 Horizontal input timing diagram.

3.3.3 Timing

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	--	800	--	DCLK	
DCLK Frequency	fclk	--	40	50	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS Pulse Width	thpw	1	--	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	210	354	DCLK	

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	--	600	--	TH	
VS Period Time	tv	624	635	700	TH	
VS Pulse Width	tvpw	1	--	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	1	12	77	TH	

4.0 OPTICAL SPECIFICATIONS

Item	Symbol	Condition	Values			Unit	Remark
			Min.	Typ.	Max.		
Viewing Angle (CR≥10)	θ_L	Φ=180°(9 O'CLOCK)	60	70	--	degree	Note 1
	θ_R	Φ=0°(3 O'CLOCK)	60	70	--		
	θ_T	Φ=90°(12 O'CLOCK)	60	70	--		
	θ_B	Φ=270°(6 O'CLOCK)	40	50	--		
Response Time	T_{ON}		--	10	20	msec	Note 3
	T_{OFF}		--	15	30	msec	Note 3
Contrast Ratio	CR		400	500	--	--	Note 4
Color Chromaticity	W_X	Normal Θ=Φ=0°	0.26	0.31	0.36	--	Note 2
	W_Y		0.28	0.33	0.38	--	Note 5 Note 6
Luminance	L		240	280	--	cd/m^2	Note 6
Luminance Uniformity	YU		70	75	--	%	Note 7

Test Conditions:
1. IL=100mA (Backlight current), the ambient temperature is 25℃.
2. The test systems refer to Note 2.
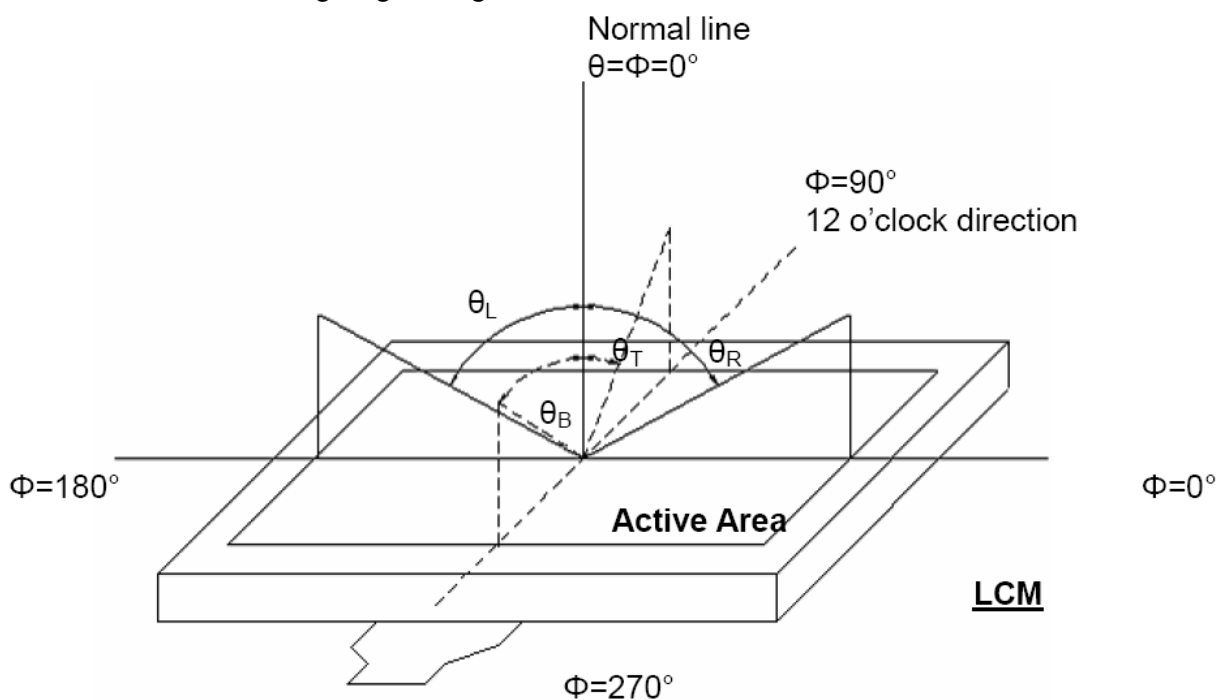
Note 1: Definition of viewing angle range

Figure 4.1 Definition of viewing angle.

Note 2: Definition of optical measurement system.
The optical characteristics should be measured in dark room. After 30 minutes operation, the optical properties are measured at the center point of the LCD screen. (Response time is measured by Photo detector TOPCON
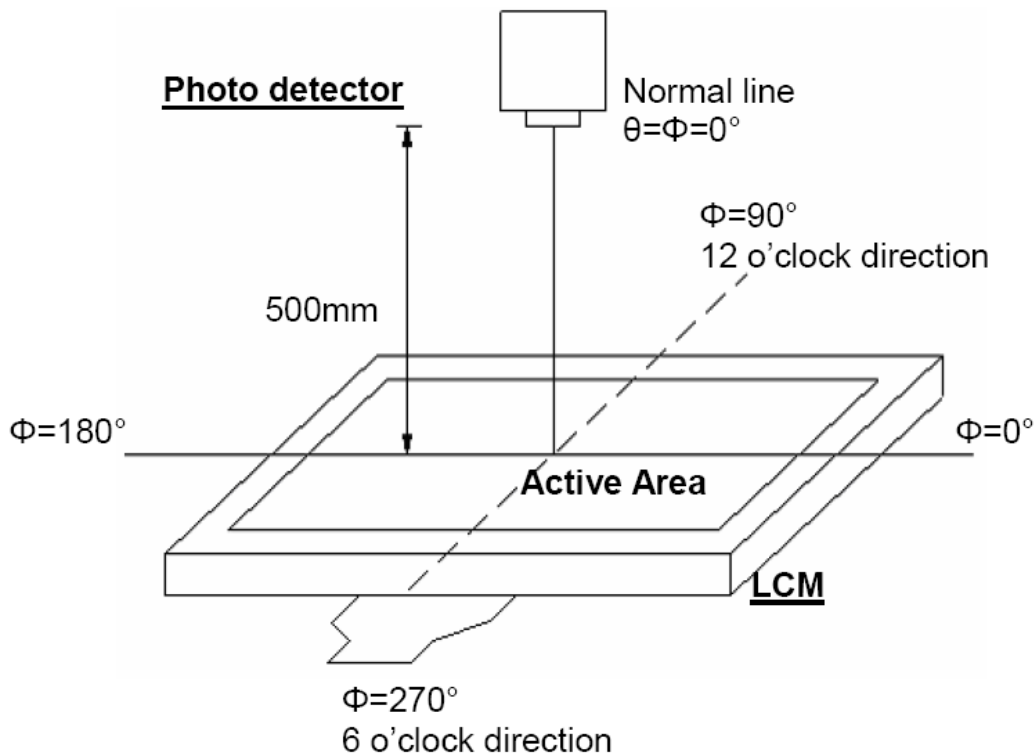

Figure 4.2 Optical measurement system setup

Note 3: Definition of Response time
The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.
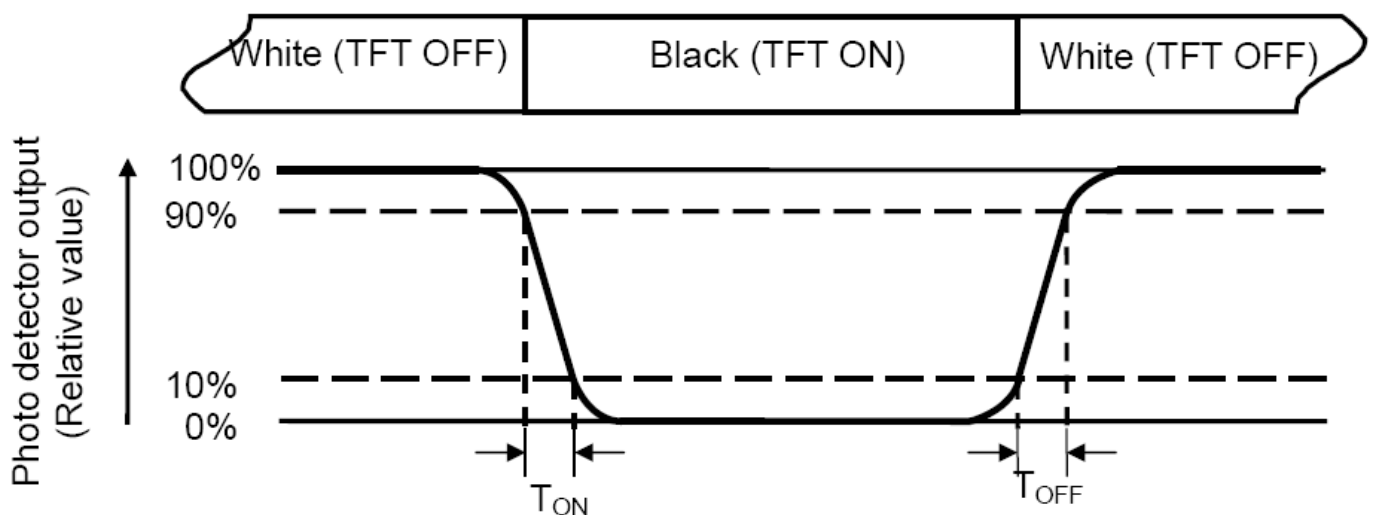

Figure 4.3 Definition of response.

Note 4: Definition of contrast ratio

$$Contrast\ ratio(CR)=\frac{Luminance\ measured\ when\ LCD\ on\ the\ "white"\ state}{Luminance\ measured\ when\ LCD\ on\ the\ "black"\ state}$$

Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.
Note 6: All input terminals LCD panel must be ground while measuring the center area of the panel.
Note 7: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (Refer to Fig. 4-4).Every measuring point is placed at the center of each measuring area.

$$Luminance\ Uniformity\ (Yu) = \frac{B_{min}}{B_{max}}$$

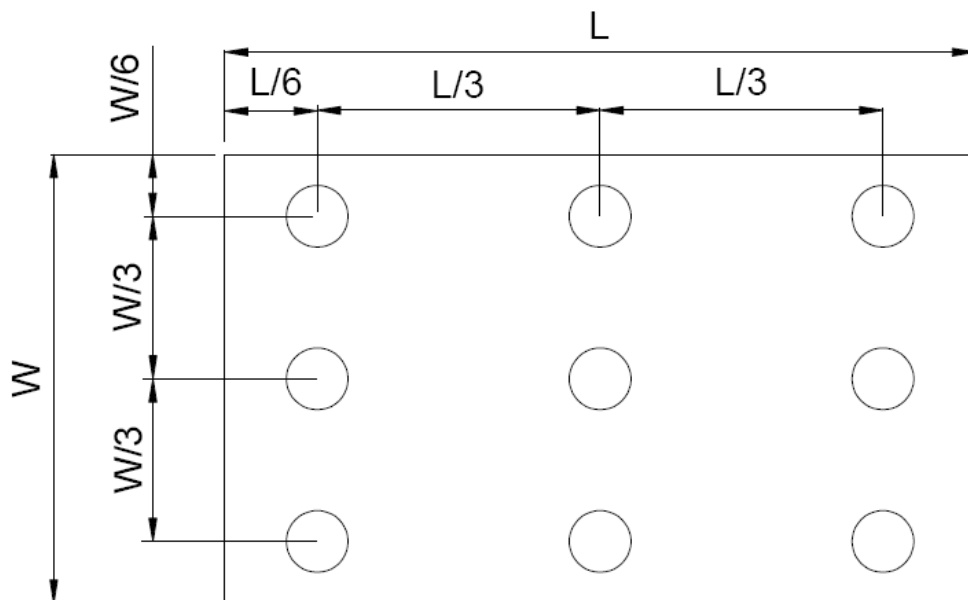L-------Active area length   W----- Active area width

Figure 4.3 Definition of measuring points.

Bmax: The measured maximum luminance of all measurement position.
Bmin: The measured minimum luminance of all measurement position.

5. RELIABILITY TEST

Item	Test Condition Item	Remark
High temperature storage	Ta= 80 ºC 120hrs	Note 1 Note 4
Low temperature storage	Ta=-30 ºC 120hrs	Note 1 Note 4
High temperature operation	Ts= 70 ºC 120hrs	Note 2 Note 4
Low temperature operation	Ts=-20 ºC 120hrs	Note 1 Note 4
High temperature/High humidity operation	90% RH 60ºC 120hrs	Note 4
Thermal Shock	-30℃/30 min ~ +80℃/30 min for a total 50 cycles, Start with cold temperature and end with high temperature.	Note 4
Vibration test	Freq:10~55~10Hz Amplitude:1.5mm 1 hours for each direction of X,Y,Z (3 hours for total)	
Mechanical shock	50G 6ms,±X, ±Y, ±Z 3 times for each direction	
Package vibration test	Random Vibration : 0.015G*G/Hz from 5-200HZ, -6dB/Octave from 200-500HZ 1 hours for each direction of X. Y. Z. (3 hours for total)	
Package drop test	Height:60 cm 1 corner, 3 edges, 6 surfaces	
Electro static discharge	± 2KV, Human Body Mode, 100pF/1500Ω	

Note 1: Ta is the ambient temperature of samples.
Note 2: Ts is the temperature of panel's surface.
Note 3: In the standard condition, there shall be no practical problem that may affect the
display function. After the reliability test, the product only guarantees operation,
but don't guarantee all of the cosmetic specification.
Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours
 at room temperature.

6. PRECAUTION FOR USING LCM

1. When design the product with this LCD Module, make sure the viewing angle matches to its purpose of usage.
2. As LCD panel is made of glass substrate, Dropping the LCD module or banging it against hard objects may cause cracking or fragmentation. Especially at corners and edges.
3. Although the polarizer of this LCD Module has the anti-glare coating, always be careful not to scratch its surface. Use of a plastic cover is recommended to protect the surface of polarizer.
4. If the LCD module is stored at below specified temperature, the LC material may freeze and be deteriorated. If it is stored at above specified temperature, the molecular orientation of the LC material may change to Liquid state and it may not revert to its original state. Excessive temperature and humidity could cause polarizer peel off or bubble. Therefore, the LCD module should always be stored within specified temperature range.
5. Saliva or water droplets must be wiped off immediately as those may leave stains or cause color changes if remained for a long time. Water vapor will cause corrosion of ITO electrodes.
6. If the surface of LCD panel needs to be cleaned, wipe it swiftly with cotton or other soft cloth. If it is not still clean enough, blow a breath on the surface and wipe again.
7. The module should be driven according to the specified ratings to avoid malfunction and permanent damage. Applying DC voltage cause a rapid deterioration of LC material. Make sure to apply alternating waveform by continuous application of the M signal. Especially the power ON/OFF sequence should be kept to avoid latch-up of driver LSIs and DC charge up to LCD panel.
8. Mechanical Considerations
   a) LCM are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modifications. The following should be noted.
   b) Do not tamper in any way with the tabs on the metal frame.
   c) Do not modify the PCB by drilling extra holes, changing its outline, moving its components or modifying its pattern.
9. Static Electricity
   a) Operator
Wear the electrostatics shielded clothes because human body may be statically charged if not ware shielded clothes. Never touch any of the conductive parts such as the LSI pads; the copper leads on the PCB and the interface terminals with any parts of the human body.
   b) Equipment
There is a possibility that the static electricity is charged to the equipment, which has a function of peeling or friction action (ex: conveyer, soldering iron, working table). Earth the equipment through proper resistance (electrostatic earth: 1×10^8 ohm).
Only properly grounded soldering irons should be used.
If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.
The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended.
   c) Floor
Floor is the important part to drain static electricity, which is generated by operators or equipment.
There is a possibility that charged static electricity is not properly drained in case of insulating floor. Set the electrostatic earth (electrostatic earth: 1×10^8 ohm).
   d) Humidity
Proper humidity helps in reducing the chance of generating electrostatic charges. Humidity should be kept over 50%RH.
   e) Transportation/storage
The storage materials also need to be anti-static treated because there is a possibility that the human body or storage materials such as containers may be statically charged by friction or peeling.
The modules should be kept in antistatic bags or other containers resistant to static for storage.
   f) Soldering
Soldering anything to this TFT display would void the warranty.
   g) Others
The laminator (protective film) is attached on the surface of LCD panel to prevent it from scratches or stains. It should be peeled off slowly using static eliminator.
Static eliminator should also be installed to the workbench to prevent LCD module from static charge.
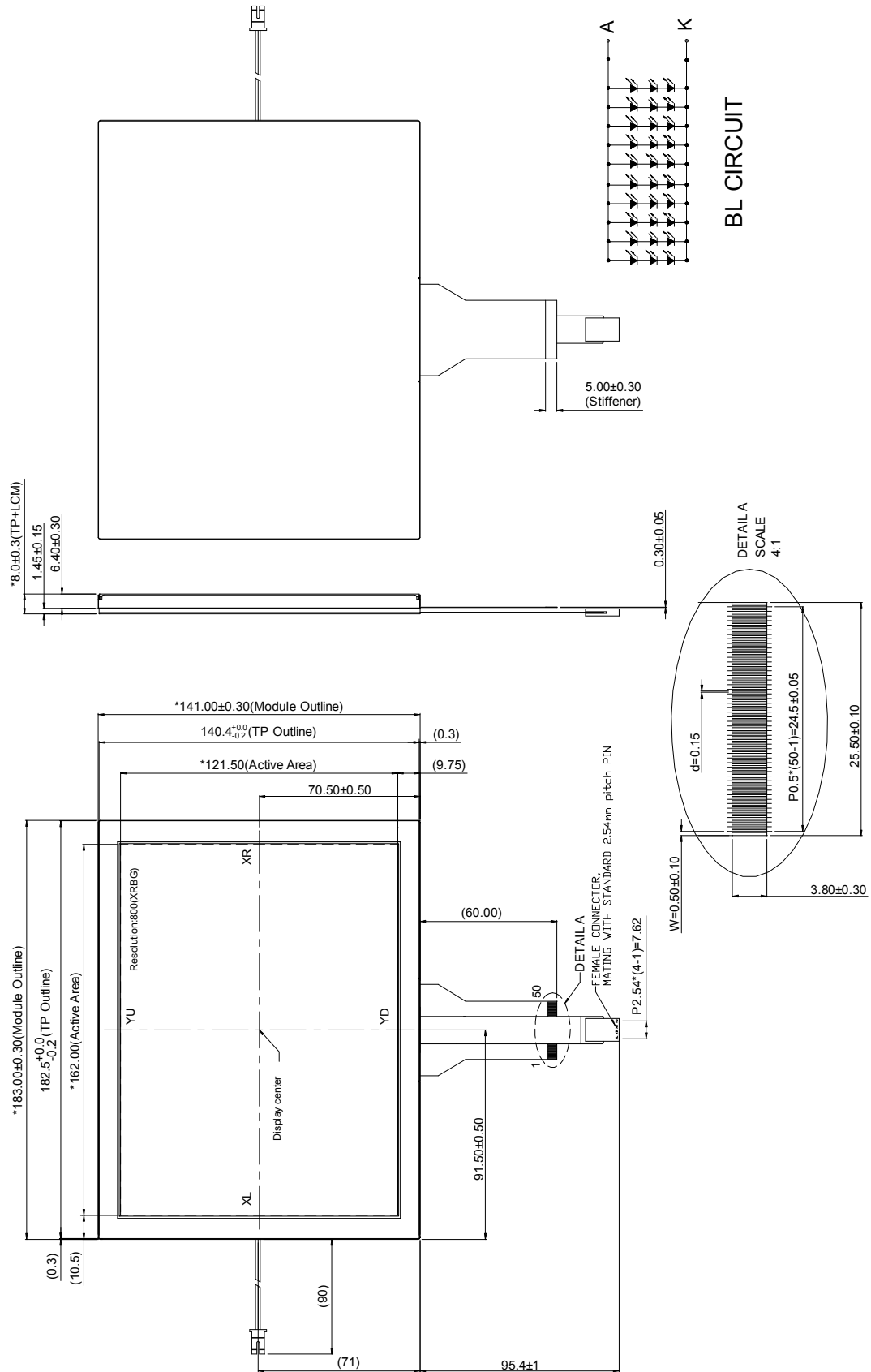10. Operation
   a) Driving voltage should be kept within specified range; excess voltage shortens display life.
   b) Response time increases with decrease in temperature.
   c) Display may turn black or dark blue at temperatures above its operational range; this is (however not pressing on the viewing area) may cause the segments to appear "fractured".
   d) Mechanical disturbance during operation (such as pressing on the viewing area) may cause the segments to appear "fractured".
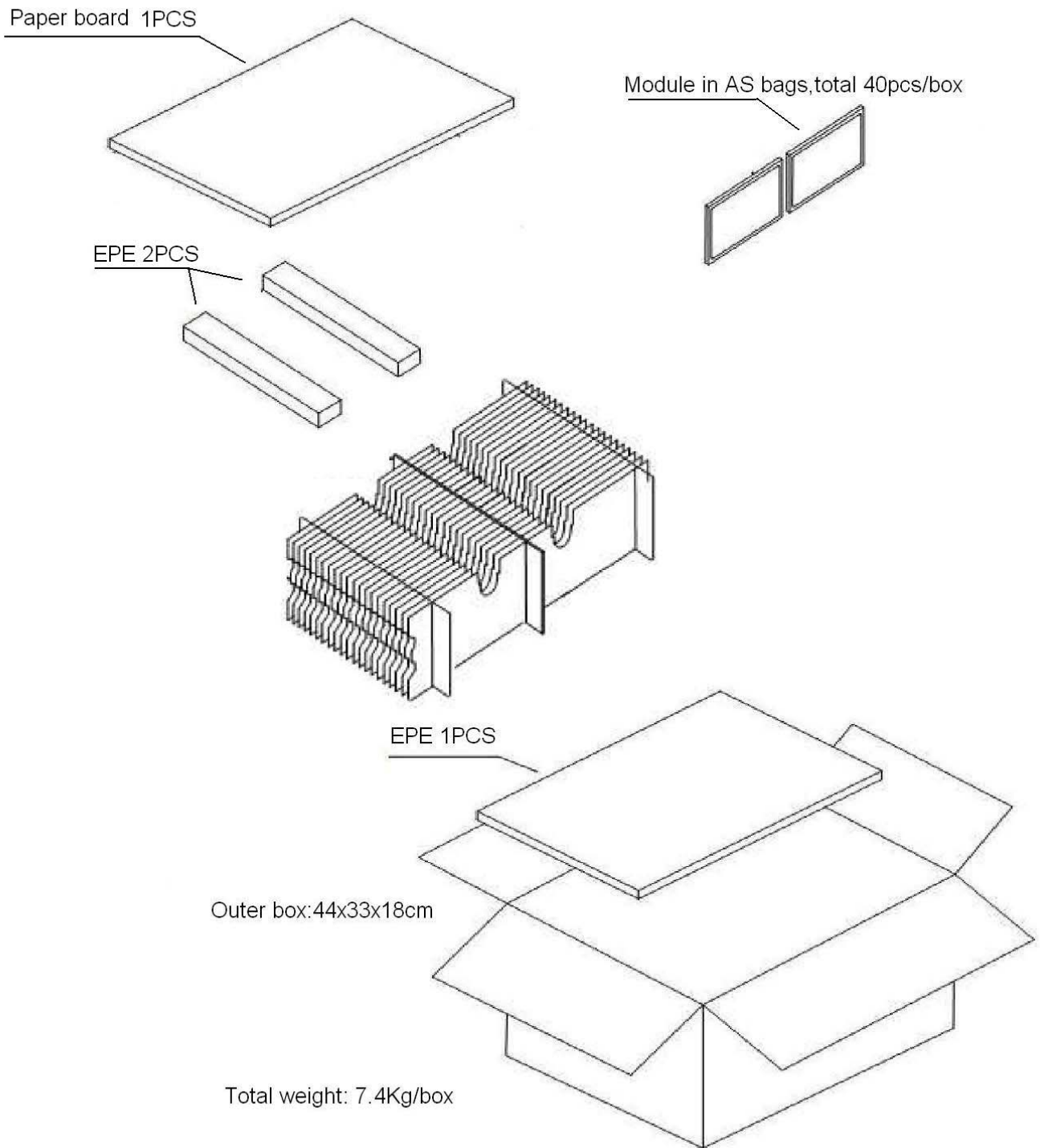
11. If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water. The toxicity is extremely low but caution should be exercised at all the time.

12. Disassembling the LCD module can cause permanent damage and it should be strictly avoided.

13. LCD retains the display pattern when it is applied for long time (Image retention). To prevent image retention, do not apply the fixed pattern for a long time. Image retention is not a deterioration of LCD. It will be removed after display pattern is changed.

14. Do not use any materials, which emit gas from epoxy resin (hardener for amine) and silicone adhesive agent (dealcohol or deoxym) to prevent discoloration of polarizer due to gas.

15. Avoid the exposure of the module to the direct sunlight or strong ultraviolet light for a long time.

7. MECHANICAL DRAWING

BL CIRCUIT

A

K

5.00±0.30
(Stiffener)

*8.0±0.3(TP+LCM)
1.45±0.15
6.40±0.30

0.30±0.05

DETAIL A
SCALE
4:1

d=0.15

P0.5*(50-1)=24.5±0.05

25.50±0.10

3.80±0.30

W=0.50±0.10

*141.00±0.30(Module Outline)
140.4$^{+0.0}_{-0.2}$(TP Outline)

(0.3)

*121.50(Active Area)

(9.75)

70.50±0.50

XR

Resolution:800(XRBG)

YU

YD

Display center

XL

(60.00)

DETAIL A

FEMALE CONNECTOR,
MATING WITH STANDARD 2.54mm pitch PIN

50

1

P2.54*(4-1)=7.62

*183.00±0.30(Module Outline)
182.5$^{+0.0}_{-0.2}$(TP Outline)
*162.00(Active Area)

91.50±0.50

(0.3)
(10.5)

(90)

(71)

95.4±1

8. PACKAGE DRAWING

Paper board 1PCS

Module in AS bags,total 40pcs/box

EPE 2PCS

EPE 1PCS

Outer box:44x33x18cm

Total weight: 7.4Kg/box

9. INSPECTION SPECIFICATION
T.B.D.