Display Elektronik GmbH

DATA SHEET

TFT MODULE

DEM 1600480B VMH-PW-N

8,0“ TFT

Product Specification

Version: 1

13.02.2025

Revision History

Date	Rev. No.	Page	Summary
27.12.2024	0	ALL	FIRST ISSUE
13.02.2025	1	13	Update Backlight Features

Contents

* Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amo rphous silicon TFT as a switching device. This model is composed of a Transmissive type TFT-LCD Panel, driver circuit, backlight unit. The resolution of a 8'TFT-LCD contains 1600X480 pixels, and can display up to 16.7M colors.

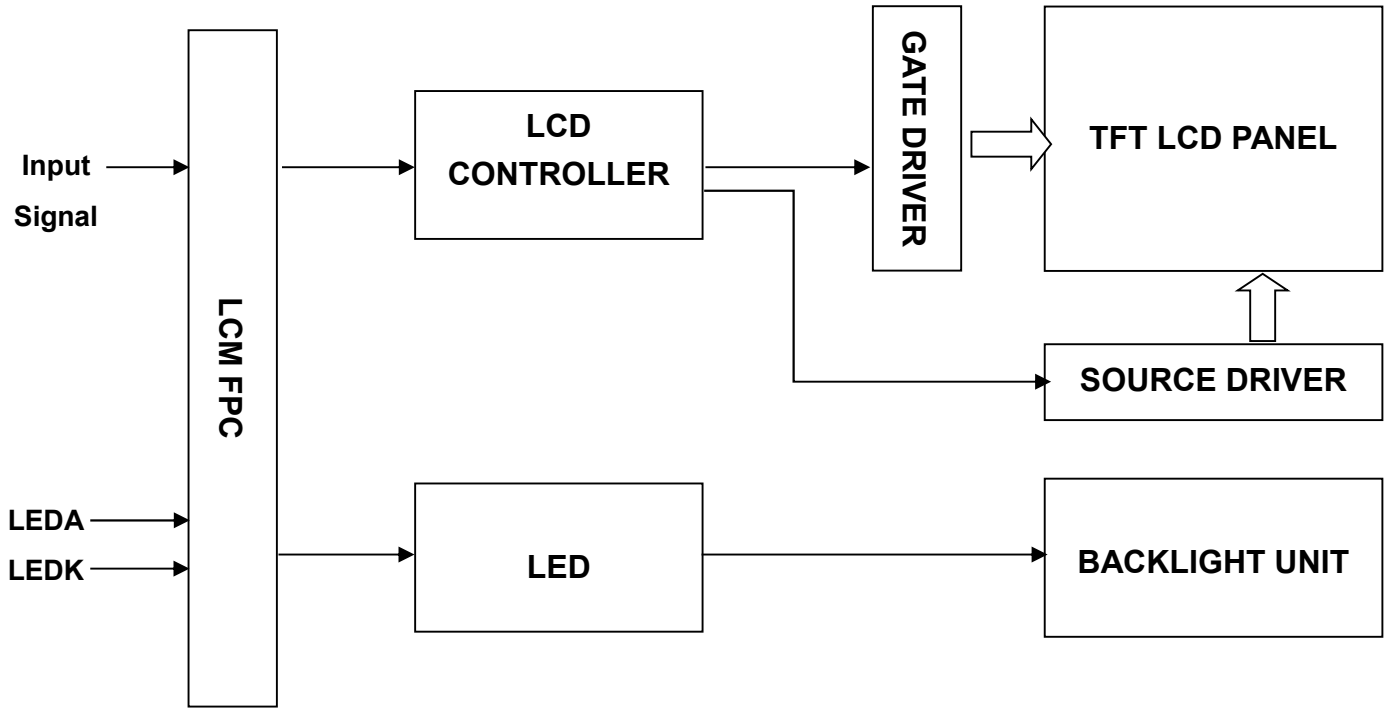
*** Features**

General Information Items	Specification	Unit	Note
	Main Panel		
Display Area (AA)	194.40 x 58.32 (8.0 Inch)	mm	-
Driver Element	TFT Active Matrix	-	-
Display Colors	16.7 Million	colors	-
Number of Pixels	1600 x RGB x 480	dots	-
TFT Pixel Arrangement	RGB Vertical Stripe	-	-
Pixel Pitch	0.1215 x 0.1215	mm	-
Viewing Angle	All	o'clock	-
Controller IC	HX8249 & HX8678	-	-
Interface	6/8 BIT LVDS	-	-
Display Mode	IPS, Transmissive/ Normally Black	-	-
Operating Temperature	-20°C ~ +70°C	°C	-
Storage Temperature	-30°C ~ +80°C	°C	-

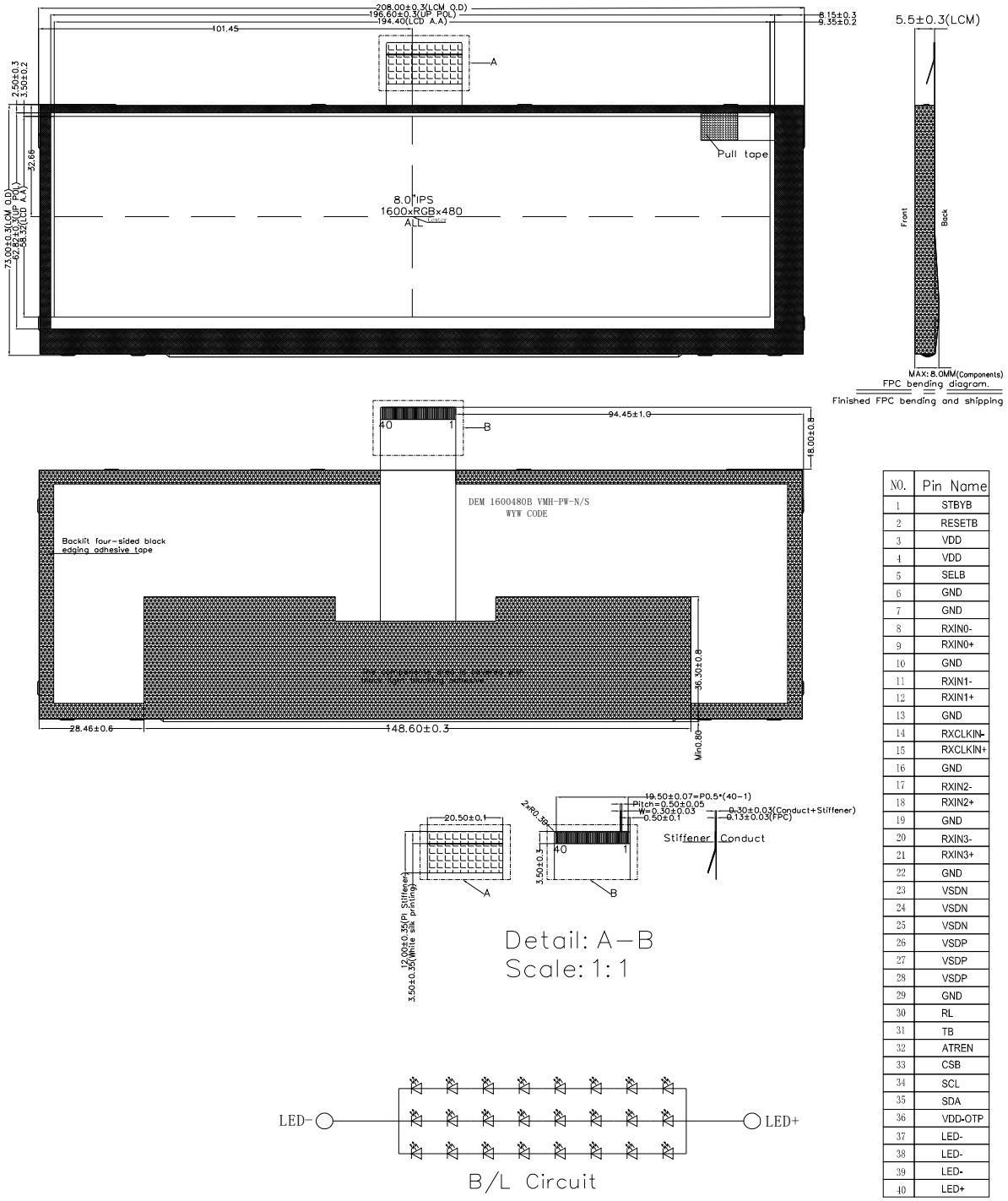
*** Mechanical Information**

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	-	208.00	-	mm	-
	Vertical(V)	-	73.00	-	mm	-
	Depth(D)	-	8.0	-	mm	-
Weight		-	108	-	g	-

1. Block Diagram



2. Outline Dimension



NO.	Pin Name
1	STBYB
2	RESETB
3	VDD
4	VDD
5	SELB
6	GND
7	GND
8	RXIN0-
9	RXIN0+
10	GND
11	RXIN1-
12	RXIN1+
13	GND
14	RXCLKIN-
15	RXCLKIN+
16	GND
17	RXIN2-
18	RXIN2+
19	GND
20	RXIN3-
21	RXIN3+
22	GND
23	VSDN
24	VSDN
25	VSDN
26	VSDP
27	VSDP
28	VSDP
29	GND
30	RL
31	TB
32	ATREN
33	CSB
34	SCL
35	SDA
36	VDD-OTP
37	LED-
38	LED-
39	LED-
40	LED+

NOTE:

1. DISPLAY TYPE:8.0″,TFT-LCD,16.7M COLORS
2. DISPLAY MODE:NORMALLY BLACK/IPS
3. VIEWING DIRECTION:ALL
4. TFT DRIVER IC:SOURCE IC:HX8249,GATE IC:HX8678
   LCM Interface:LVDS
5. VDD/VCI:3.0-3.6V(TYP.)
6. OPERATING TEMP: -20° C TO 70° C
   STORAGE TEMP: -30° C TO 80° C
7. BACK LIGHT:LED WHITE,24 LED 75mA,25.6±0.2V
8. RoHS COMPLIANT.

3. Input Terminal Pin Assignment

NO	SYMBOL	DISCRIPTION	I/O
1	STBYB	Enable IC	Note 1
2	Reset	Reset IC	Note 2
3	VDD	Digital power-3.3v	P
4	VDD	Digital power-3.3v	P
5	SELB	6bit/8bit mode select	Note 3
6	GND	Ground	P
7	GND	Ground	P
8	RXINO-	Negative LVDS differential data input	I
9	RXINO+	Positive LVDS differential data input	I
10	GND	Ground	P
11	RXIN1-	Negative LVDS differential data input	I
12	RXIN1+	Positive LVDS differential data input	I
13	GND	Ground	P
14	RXCLKIN-	Negative LVDS differential data input	I
15	RXCLKIN+	Positive LVDS differential data input	I
16	GND	Ground	P
17	RXIN2-	Negative LVDS differential data input	I
18	RXIN2+	Positive LVDS differential data input	I
19	GND	Ground	P
20	RXIN3-	Negative LVDS differential data input	I
21	RXIN3+	Positive LVDS differential data input	I
22	GND	Ground	P
23	VSDN	Power for Driver IC	P
24	VSDN	Power for Driver IC	P
25	VSDN	Power for Driver IC	P
26	VSDP	Power for Driver IC	P
27	VSDP	Power for Driver IC	P
28	VSDP	Power for Driver IC	P

29	GND	Ground	P
30	RL	Horizontal shift direction	Note 4
31	TB	Vertical shift direction	Note 4
32	ATREN	Only for OTP program	I
33	CSB	SPI	-
34	SCL	SPI	-
35	SDA	SPI	-
36	VDD-OTP	7.5V for OTP program	P
37	LED-	LED Cathode	P
38	LED-	LED Cathode	P
39	LED+	LED Anode	P
40	LED+	LED Anode	P

Note.1

STBYB=H(3.3V),normal operarion.

STBYB=L(GND),timing controller,source driver will rurn off,all opout are High-Z.

Note.2

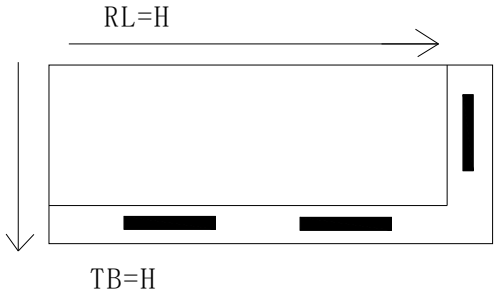
Suggest to connection with an RC reset circuit for stability,Normally pull high. (47KΩ+0.1uF or extirnal MCU control)

Note.3

If LVDS iput data is 8 bit,SELB must be set to hight.

Note.4

Scan control Input		Scanning direcrion
RL	TB	
VDD	VDD	Up to Down,Left to Right
GND	VDD	Up to Down,Right to left
VDD	GND	Down to Up,Left to Right
GND	GND	Down to Up,Right to left.



4. LCD Optical Characteristics

4.1 Optical Specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	Θ=0 Normal viewing angle	700	900	--	--	--
Response Time	Rising	$T_{R+}T_F$		--	25	35	msec	--
	Falling			--				
Color Gamut		S(%)	--	45	50	--	%	--
Color Filter Chromacicity	White	W_X	--	0.252	0.292	0.332		--
		W_Y	--	0.255	0.295	0.335		
	Red	R_X	--	0.598	0.608	0.628		
		R_Y	--	0.329	0.349	0.369		
	Green	G_X	--	0.267	0.307	0.327		
		G_Y	--	0.527	0.547	0.567		
	Blue	B_X	--	0.122	0.142	0.162		
		B_Y	--	0.070	0.090	0.110		
Viewing Angle	Hor.	$Θ_L$	CR>10	--	85	--	--	--
		$Θ_R$		--	85	--		
	Ver.	$Θ_U$		--	85	--		
		$Θ_D$		--	85	--		
Option View Direction		ALL						--

*The data comes from the LCD specification.

Measuring Condition

Measuring surrounding: dark room

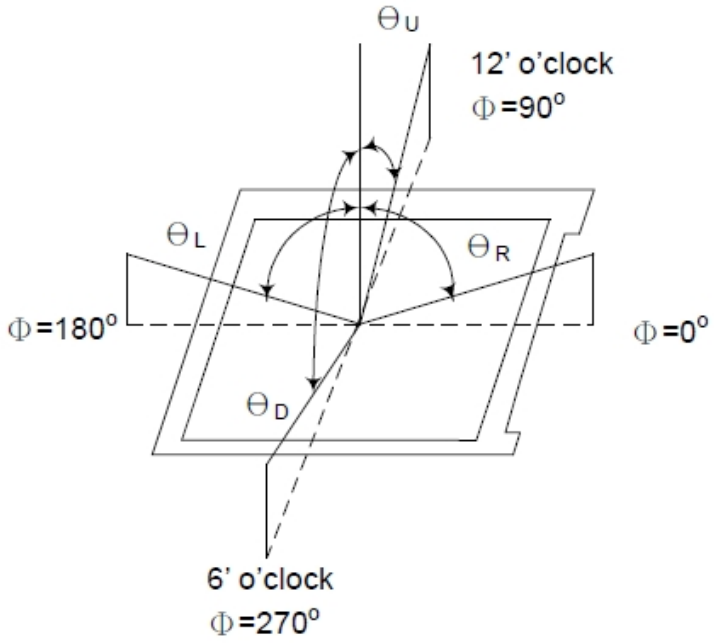
Ambient temperature: 25°C±2°C

15min. warm-up time.

Measuring Equipment

FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

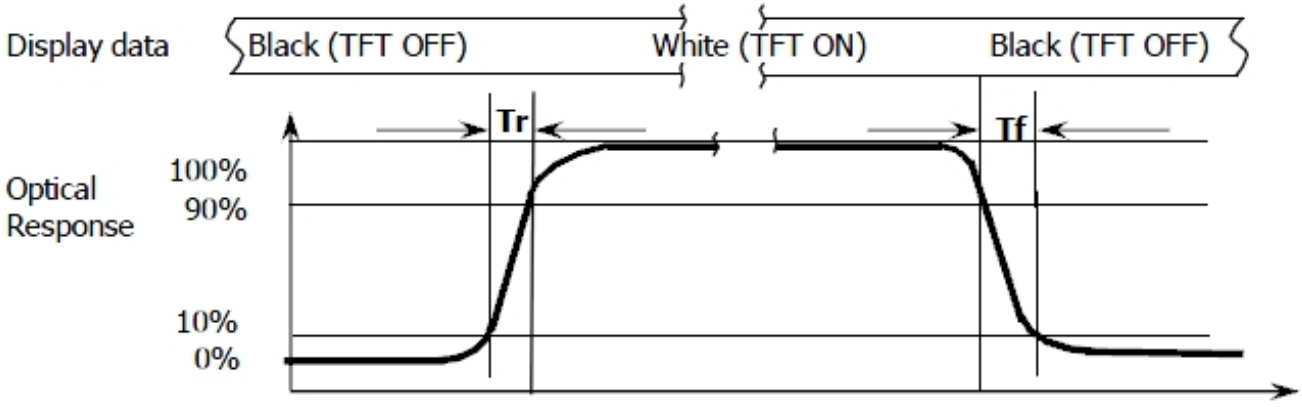
Note (1): Definition of Viewing Angle:



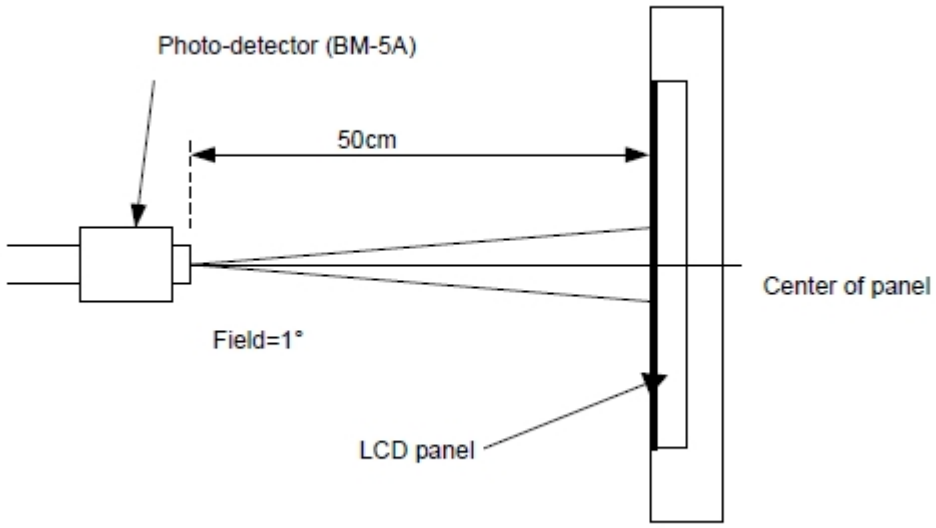
Note (2): Definition of Contrast Ratio(CR) :measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3): Response Time



Note (4): Definition of optical measurement setup



5. Electrical Characteristics

5.1 Absolute Maximum Rating (Ta=25°C VSS=0V)

Characteristics	Symbol	Min.	Max.	Unit
Digital Supply Voltage	VDD	2.8	3.5	V
Operating Temperature	T_{OP}	-20	+70	°C
Storage Temperature	T_{ST}	-30	+80	°C

NOTE: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged.
Be sure to use the product within the range of the absolute maximum ratings.

5.2 DC Electrical Characteristics

Characteristics		Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage		VDD	3.0	3.3	3.6	V	-
Current Consumption VDD		IDD	--	25	--	mA	-
Supply Voltage IC& GAMA		VSDP	5.4	5.5	5.6	V	-
Current Consumption VSDP		IVSDP	--	25	--	mA	-
Supply Voltage IC & GAMA		VSDN	-5.4	-5.5	-5.6	V	-
Current Consumption VSDN		IVSDN	--	25	--	mA	-
CMOS Interface		VIH	2.6	-	3.3	V	-
		VIL	GND	-	0.8	V	-
LVDS Interface	Differential Input Hight Threshold Voltage	VLVTH	100	-	300	mV	-
	Differential Input Low Threshold Voltage	VLVTL	-300	-	-100	mV	-
	Common Input Voltage	VLVC	1	1.2	1.77-VID/2	V	-
	Differential Input Voltage	VID	0.2	-	0.6	V	

5.3 LED Backlight Characteristics

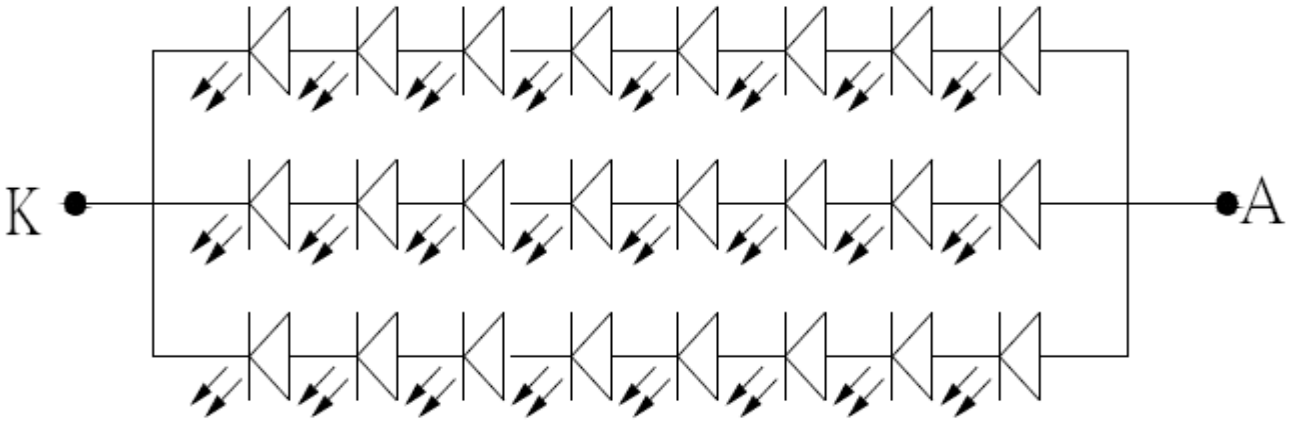
The backlight system is edge-lighting type with 24 chips White LED

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	60	80	--	mA	--
Forward Voltage	V_F	20.5	22.0	25.6	V	--
LCM Luminance	L_V	450	500	--	cd/m2	Note3
LED Lifetime	Hr	50000	--	--	Hour	Note1,2
Uniformity	AVg	80	--	--	%	Note3

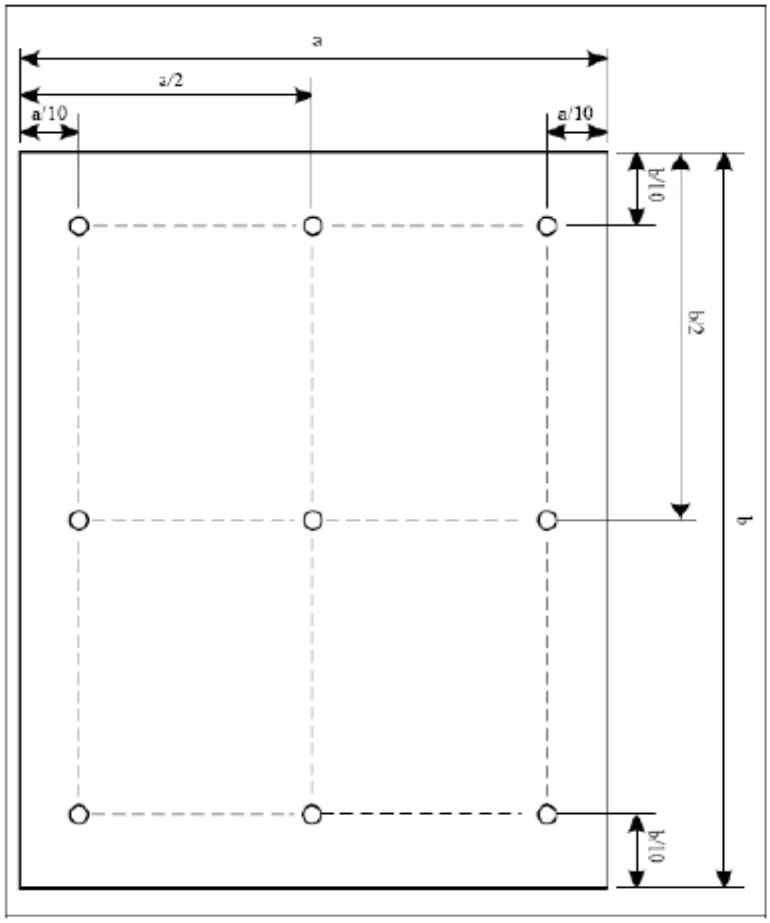
Note (1) LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25°C±3°C, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note (2) The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL=75mA. The LED lifetime could be decreased if operating IL is larger than 75mA.

The constant current driving method is suggested.



NOTE 3：Luminance Uniformity of these 9 points is defined as below:



$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

$$\text{Luminance} = \frac{\text{Total Luminance of 9 points}}{9}$$

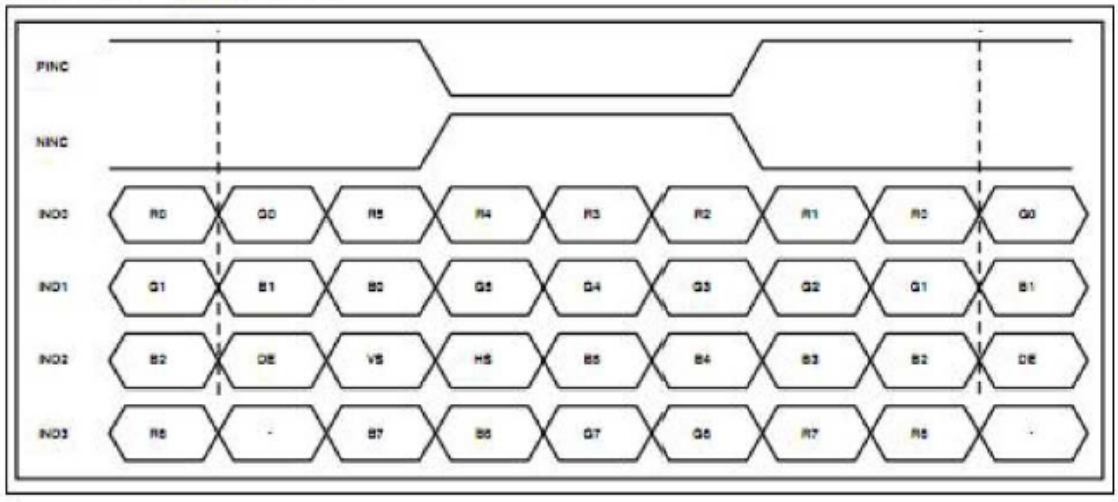
6. SIGNAL TIMING SPECIFICATIONS

6.1 Timing Parameters (Sync Mode)

Parameter	Symbol	Value			Unit.	Note
		Min.	Typ.	Max.		
DCLK Frequency	FDCLK	48.69	52.59	60.83	MHz	
Horizontal valid data	thd		1600		DCLK	
Hsync Pulse Width	thpw	1	2	140	DCLK	
Hsync back porch	thbp	5	16	141	DCLK	
Hsync front porch	thfp	19	44	155	DCLK	
1 Horizontal Line	th	1656	1660	1760	DCLK	
Vertical valid data	tvd		480		H	
Vsync Pulse Width	tvpw	1	2	90	H	
Vsync back porch	tvbp	5	5	91	H	
Vsync front porch	tvfp	5	43	91	H	
1 Vertical field	tv	490	528	576	H	

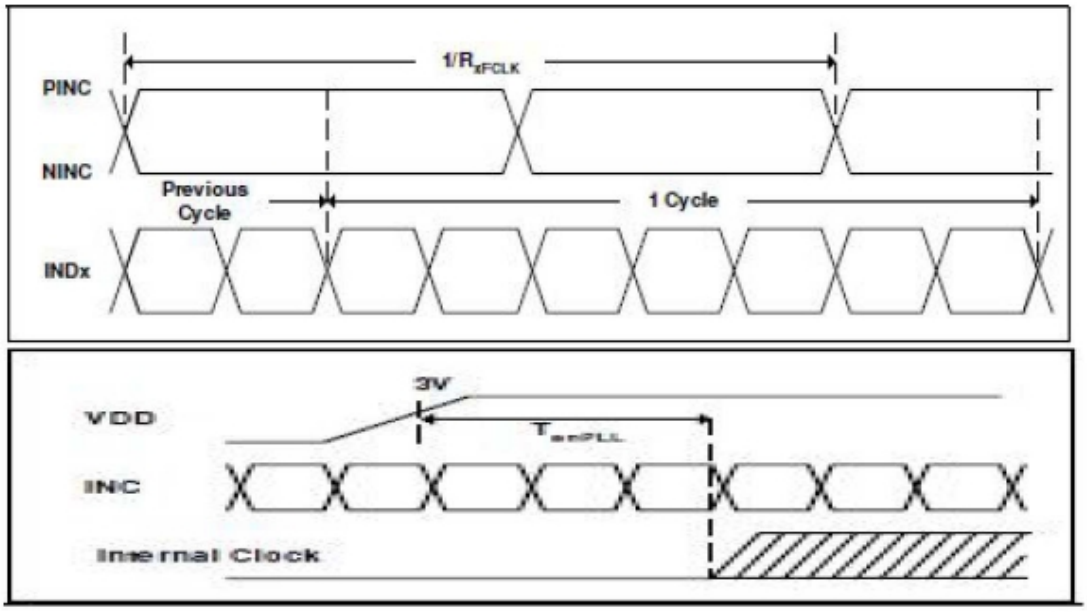
Notes: This product is Sync mode

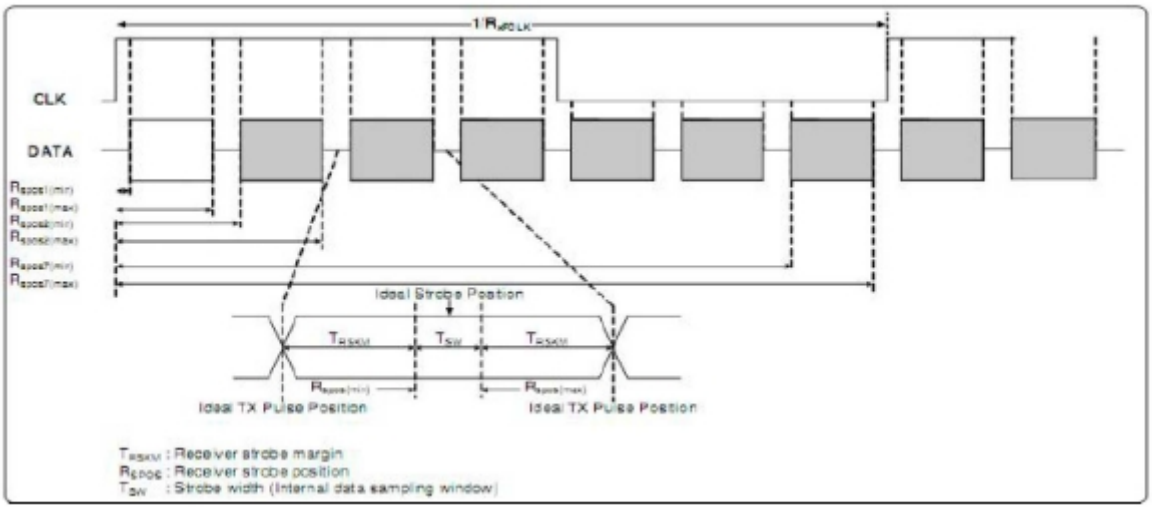
8-bit LVDS input (HSD='L')



6.2 LVDS Rx Interface Timing Parameter

Parameter	Symbol	Value			Unit.	Condition
		Min.	Typ.	Max.		
Clock frequency	RxFCLK	TBD	TBD	TBD	MHz	
Input data skew margin	TRSKM	500	-	-	ps	|VID|=400mV, RxVCM=1.2V, RxFCLK=71MHz
Clock high time	TLVCH	-	4/(7*RxFCLK)	-	ns	
Clock low time	TLVCL	-	3/(7*RxFCLK)	-	ns	
PLL wake-up time	TenPLL	-	-	150	us	



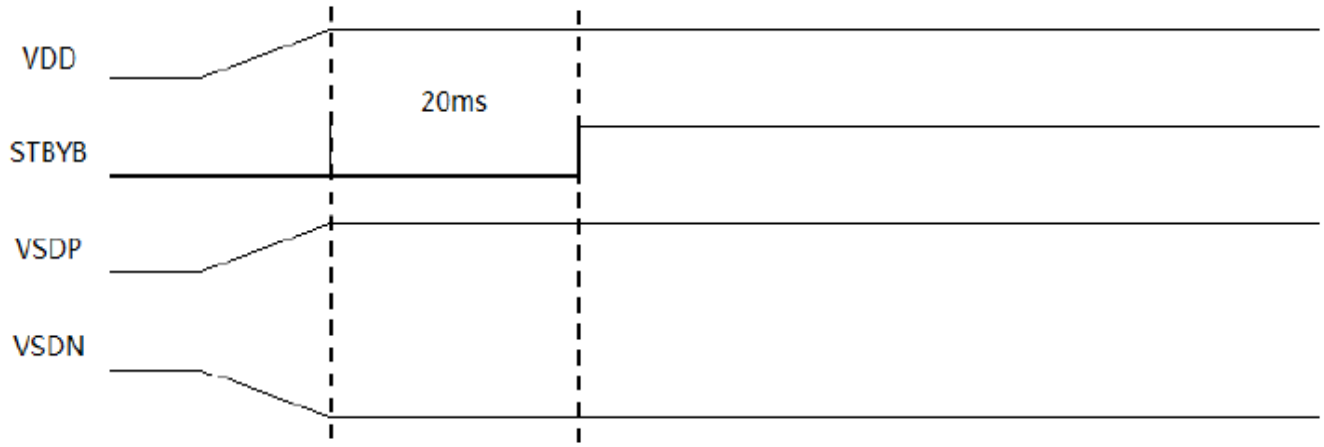


6.3 Input Signals, Basic Display Colors & Gray Scale Of Colors

Color & Gray Scale		Input Data Signal																							
		Red Data								Green Data								Blue Data							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	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	1	1	1	1	1	1
Gray Scale of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Gray Scale of White	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
	▽	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

6.4 Power Sequence

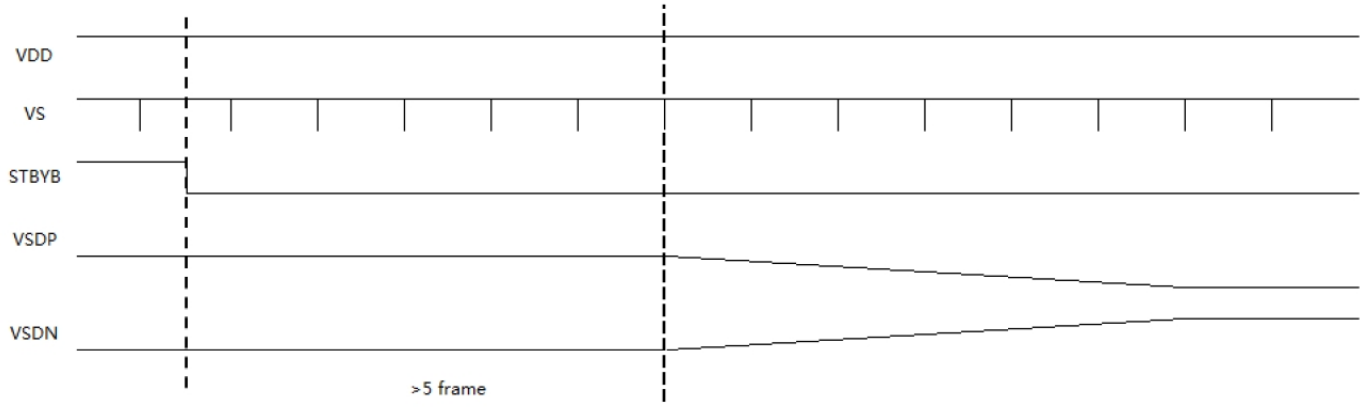
Power On Sequence



Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

Power Off Sequence



7. LCD Module Out-Going Quality Level

7.1 VISUAL & FUNCTION INSPECTION STANDARD

7.1.1 Inspection Conditions

Inspection performed under the following conditions is recommended.

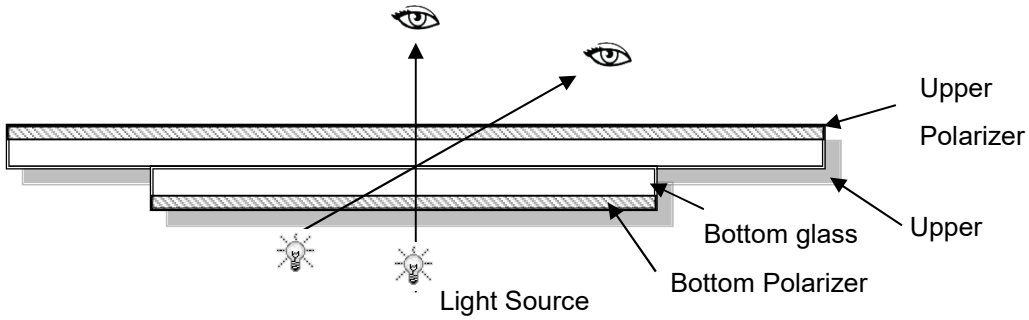
Temperature: 25°C±5°C

Humidity: 65%±10%RH

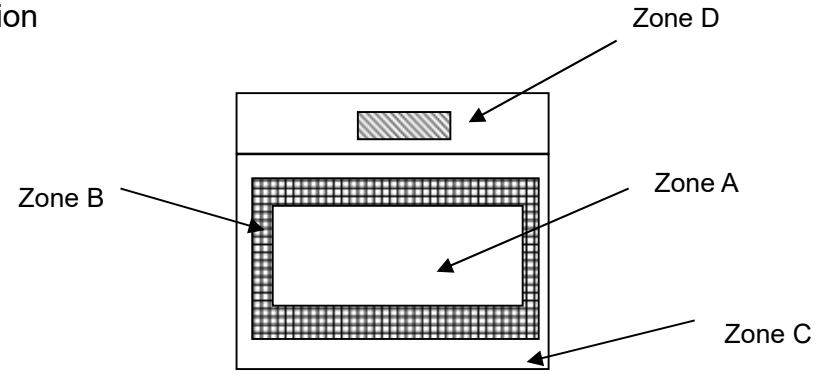
Viewing Angle: Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance: 30-50cm



7.1.2 Definition



Zone A: Effective Viewing Area (Character or Digit can be seen)

Zone B: Viewing Area except Zone A

Zone C: Outside (Zone A+Zone B) which can not be seen after assembly by customer)

Zone D: IC Bonding Area

Note: As a general rule visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer

7.1.3 Sampling Plan

According to GB/T 2828-2012, normal inspection, Class Ⅱ

AQL:

Major Defect	Minor Defect
0.65	1.5

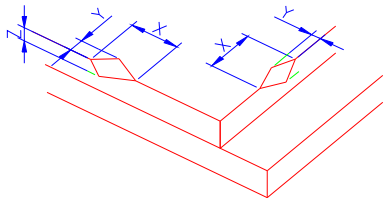
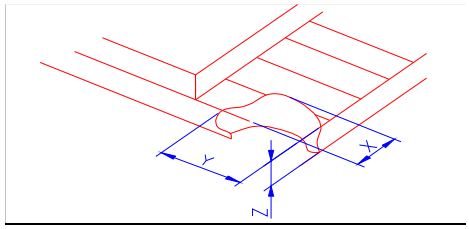
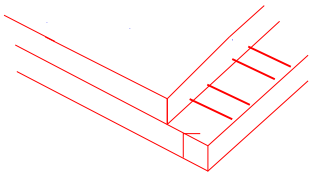
LCD: Liquid Crystal Display, LCM: Liquid Crystal Module

No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. etc	Major
2	Missing	Missing components and etc	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed,deformation and etc	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot/Line defect	Light dot,Dim spot,(Note1) Polarizer Air Bubble, Polarizer accidented spot and etc	
6	Soldering appearance	Good soldering , Peeling off is not allowed and etc	
7	LCD/Polarizer	Black/White spot/line, scratch, crack, etc.	

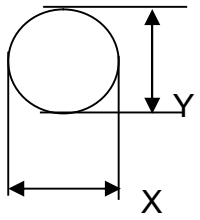
Note1: a) Light dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

b) Dim dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.

7.1.4 Criteria (Visual)

<table>
<tr><th>Number</th><th>Items</th><th>Criteria(mm)</th></tr>
<tr><td rowspan="3">1.0 LCD Crack/Broken
NOTE:
X: Length
Y: Width
Z: Height
L: Length of ITO,
T: Height of LCD</td><td>(1) The edge of LCD broken</td><td> 
<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></table></td></tr>
<tr><td>(2)LCD corner broken</td><td> 
<table><tr><th>X</th><th>Y</th><th>Z</th></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table></td></tr>
<tr><td>(3) LCD crack</td><td> 
Crack
Not allowed</td></tr>
</table>

2.0 Spot defect



Φ=(X+Y)/2

① light dot（ black/white spot , pinhole, stain，etc.）

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.15	Ignore	Ignore	
0.15<Φ≤0.25	3(distance≧10mm)		
0.25<Φ≤0.4	2(distance≧10mm)		
Φ>0.4	0		

② Dim spot（light leakage、dent、dark spot，etc）

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.15	Ignore	Ignore	
0.15<Φ≤0.25	3(distance≧10mm)		
0.25<Φ≤0.4	2(distance≧10mm)		
Φ>0.4	0		

③ Polarizer accidented spot

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.2<Φ≤0.5	2(distance≧10mm)		
Φ>0.5	0		

④Polarizer Bubble

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.2<Φ≤0.4	2(distance≧10mm)		
Φ>0.4	0		

3.0 LCD Pixel defect

Pixel bad points

Item	Zone A	Acceptable Qty
Bright dot	Random	N≤2
	2 dots adjacent	N≤0
	3 dots adjacent	N≤0
Dark dot	Random	N≤3
	2 dots adjacent	N≤0
	3 dots adjacent	N≤0
Distance	1. Minimum Distance Between Bright dots. 2. Minimum Distance Between dark dots 3. Minimum Distance Between dark and bright dot.	5mm
Total bright and dark dot		N≤4

Note:

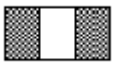
A) Bright dot：Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

B) Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.

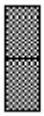
C) 2 dot adjacent = 1 pair = 2 dots

Picture:

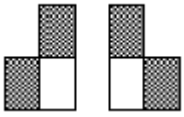
2 dot adjacent



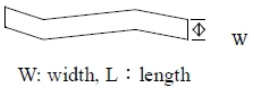
2 dot adjacent



2 dot adjacent (vertical)



2 dot adjacent (slant)

<table>
<tr>
<td>4.0</td>
<td>Line defect (LCD /Polarizer backlight black/white line, scratch, stain)
 

N：Count</td>
<td>
<table>
<tr><th rowspan="2">Width(mm)</th><th rowspan="2">Length(mm)</th><th colspan="3">Acceptable Qty</th></tr>
<tr><th>A</th><th>B</th><th>C</th></tr>
<tr><td>Φ≤0.05</td><td>Ignore</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.05<W≤0.06</td><td>L≤5.0</td><td colspan="2">N≤3</td></tr>
<tr><td>0.06<W≤0.08</td><td>L≤4.0</td><td colspan="2">N≤2</td></tr>
<tr><td>W>0.08</td><td colspan="4">Define as spot defect</td></tr>
</table>
</td>
</tr>
<tr>
<td>5.0</td>
<td>Electronic Components SMT.</td>
<td>Not allow missing parts，solderless connection，cold solder joint，mismatch，The positive and negative polarity opposite</td>
</tr>
<tr>
<td>6.0</td>
<td>Display color& Brightness.</td>
<td>1. Color：Measuring the color coordinates, The measurement standard according to the datasheet or samples.
2. Brightness：Measuring the brightness of White screen, The measurement standard according to the datasheet or Samples.</td>
</tr>
<tr>
<td>7.0</td>
<td>LCD Mura/Waving/ Hot spot</td>
<td>Not visible through 5% ND filter in 50% gray or judge by limit sample if necessary.</td>
</tr>
</table>

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed
5	CTP no function	Not allowed

8. Reliability Test Result

Item	Condition	Inspection after test
High Temperature Operating	+70°C, 96h	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1. Air bubble in the LCD; 2. Non-display; 3. Missing segments/line; 4. Glass crack; 5. Current IDD is twice higher than initial value.
Low Temperature Operating	-20°C, 96h	
High Temperature Storage	+80°C, 96h	
Low Temperature Storage	-30°C, 96h	
High Temperature & High Humidity Storage	+60°C, 90% RH, 96h	
Thermal Shock (Non-operation)	-30°C, 30 min ↔ 80°C, 30 min, Change time: 5min 20CYC.	
ESD Test	C=150pF, R=330, 5points/panel Air:±15kV, 5times; Contact:±8kV, 5 times; (Environment: 15°C~35°C, 30%~60%).	
Vibration (Non-operation)	Frequency range: 10~55Hz, Stroke: 1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total) (Package condition).	
Box Drop Test	1 Corner 3 Edges 6 faces, 80㎝(MEDIUM BOX)	

Remark:

1. The test samples should be applied to only one test item.
2. Sample size for each test item is 5~10pcs.
3. For Damp Proof Test, Pure water (Resistance > 10MΩ) should be used.
4. In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.
5. Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

9. Cautions and Handling Precautions

9.1 Handling and Operating the Module

(1) When the module is assembled, it should be attached to the system firmly.
Do not warp or twist the module during assembly work.

(2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.

(3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.

(4) Do not allow drops of water or chemicals to remain on the display surface.
If you have the droplets for a long time, staining and discoloration may occur.

(5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.

(6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.
Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.

(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.

(8) Protect the module from static; it may cause damage to the CMOS ICs.

(9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

(10) Do not disassemble the module.

(11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

(12) Pins of I/F connector shall not be touched directly with bare hands.

(13) Do not connect, disconnect the module in the “Power ON” condition.

(14) Power supply should always be turned on/off by the item 6.1 Power On Sequence & 6.2 Power Off Sequence

9.2 Storage and Transportation.

(1) Do not leave the panel in high temperature, and high humidity for a long time.
It is highly recommended to store the module with temperature from 0°C to 35°C
and relative humidity of less than 70%

(2) Do not store the TFT-LCD module in direct sunlight.

(3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.

(4) It is recommended that the modules should be stored under a condition where no condensation is allowed.
Formation of dewdrops may cause an abnormal operation or a failure of the module.
In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.

(5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.