

Display Elektronik GmbH

**DATA
SHEET**

TFT MODULE

DEM 4801280B VMH-PW-N

6,75" TFT

Product Specification

Version: 0

28.12.2024

Revision History

Date	Rev. No.	Page	Summary
28.12.2024	0	ALL	FIRST ISSUE

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*** Description**

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This module is composed of a Transmissive type TFT-LCD Panel, driver circuit, backlight unit. The resolution of a 6.75” TFT-LCD contains 480xRGBx1280 pixels, and can display up to 16.7Million colors.

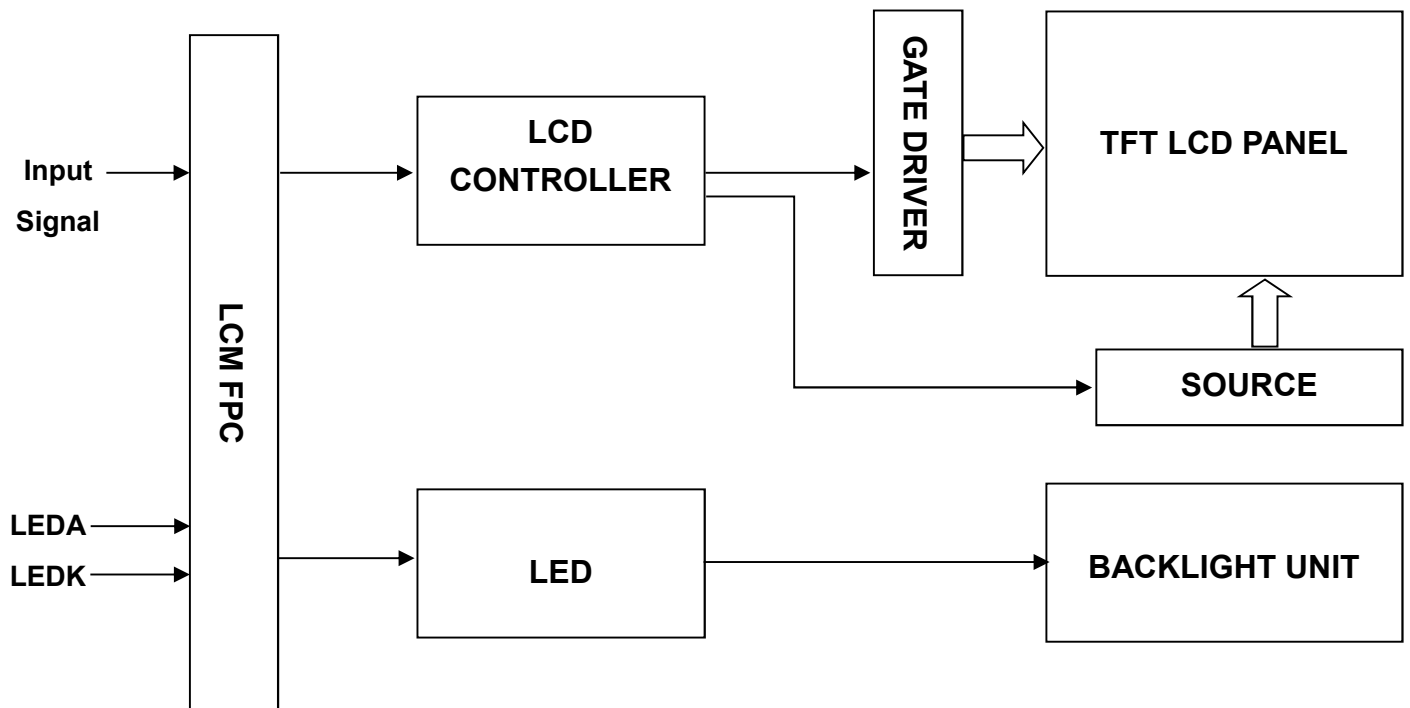
*** Features**

General Information Items	Specification	Unit	Note
	Main Panel		
Display Area(AA)	60.192 x 160.512 (6.75 Inch)	mm	-
Driver Element	TFT Active Matrix	-	-
Display Colors	16.7 Million	colors	-
Number of Pixels	480 x RGB x 1280	dots	-
TFT Pixel Arrangement	RGB Vertical Stripe	-	-
Pixel Pitch	0.0418 x 0.1254	Mm	-
Viewing Angle	ALL	o'clock	-
TFT Controller IC	NV3051F-L	-	-
LCM Interface	LVDS	-	-
Display Mode	IPS, Transmissive / Normally Black	-	-
Operating Temperature	-20°C ~ +70°C	°C	-
Storage Temperature	-30°C ~ +80°C	°C	-

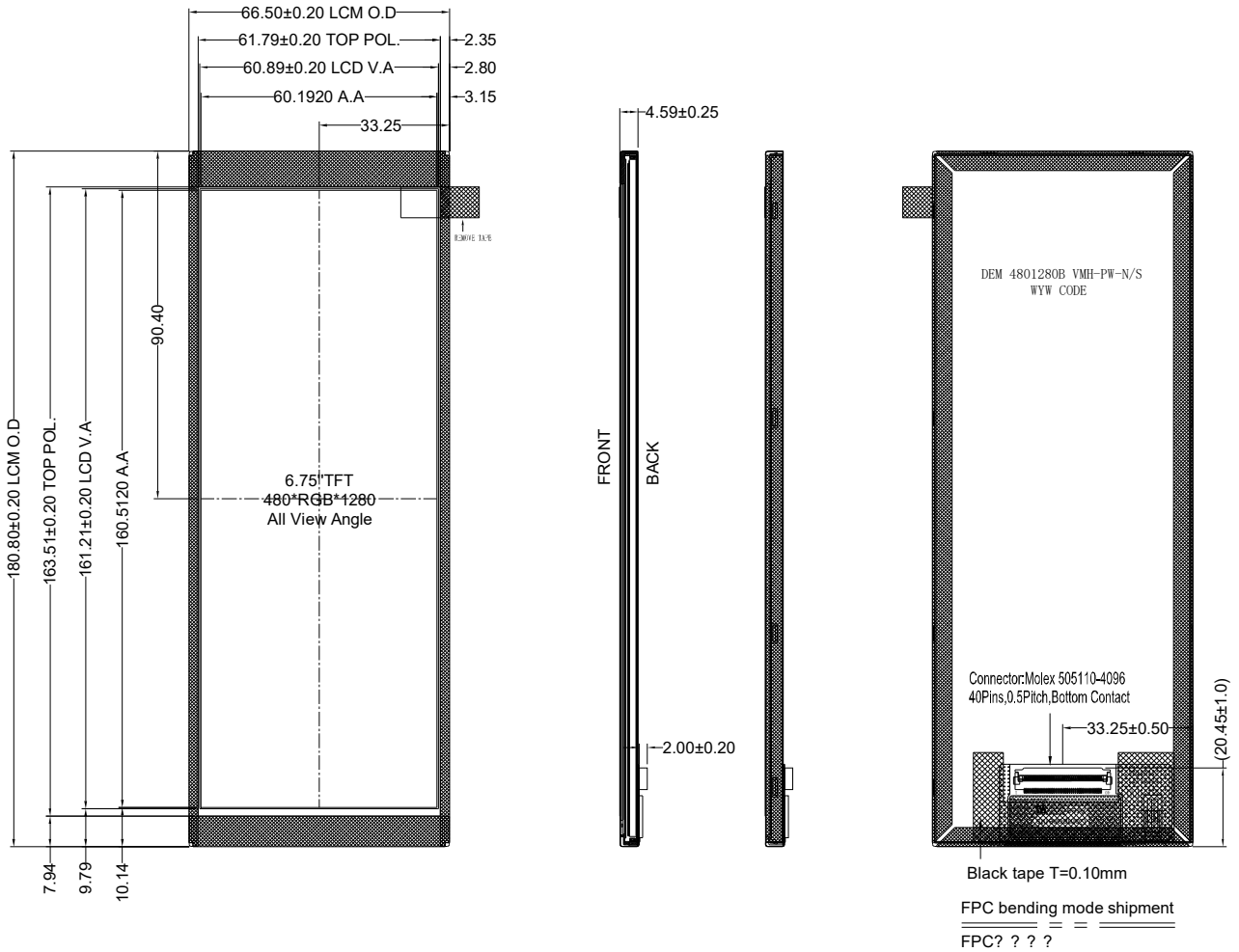
*** Mechanical Information**

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	-	66.50	-	mm	-
	Vertical(V)	-	180.80	-	mm	-
	Depth(D)	-	4.59	-	mm	-
Weight		-	t.b.d.	-	g	-

1. Block Diagram

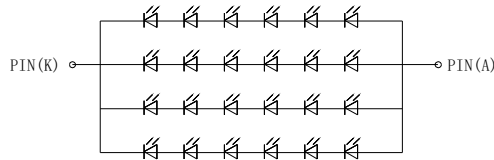


2. Outline Dimension



NOTES:

1. DISPLAY TYPE: 6.75", TFT LCD, 16.7M COLORS
2. DISPLAY MODE: NORMALLY BLACK, IPS
3. VIEWING DIRECTION: FREE
4. LCM DRIVER IC: NV3051F-L(COG)
5. TFT INTERFACE: LVDS
6. VDD: 3.3V
7. OPERATING TEMP: -20°C TO 70°C
STORAGE TEMP: -30°C TO 80°C
8. BACK LIGHT: LED WHITE, 24 LED, 240mA, 16.8~19.8V
9. RoHS AND REACH COMPLIANT.



LED(B/L) CIRCUIT

Pin	Name
1	NC
2	VDD
3	VDD
4	NC
5	NC
6	STBYB
7	GND
8	RXIN0-
9	RXIN0+
10	GND
11	RXIN1-
12	RXIN1+
13	GND
14	RXIN2-
15	RXIN2+
16	GND
17	RXCLKIN-
18	RXCLKIN+
19	GND
20	RXIN3-
21	RXIN3+
22	GND
23	NC
24	NC
25	GND
26	NC
27	NC
28	NC
29	NC
30	GND
31	LED-
32	LED-
33	NC
34	NC
35	NC
36	NC
37	NC
38	NC
39	LED+
40	LED+

Note: The opening of top case must be less than LCD POL 0.3mm at least, the LCD V.A is the Recommended opening of Lens.

3. Input terminal Pin Assignment

NO.	SYMBOL	DISCRIPTION	I/O
1	NC	--	--
2	VDD	Power supply for digital circuits	P
3	VDD		
4	NC	--	--
5	NC	--	--
6	STBYB	Power ON/OFF PIN, Normally pulled high STBYB = "1", Power ON. STBYB = "0", Power OFF.	I
7	GND	Ground.	P
8	RXIN0-	- LVDS differential data input	I/O
9	RXIN0+	+ LVDS differential data input	
10	GND	Ground.	P
11	RXIN1-	- LVDS differential data input	I/O
12	RXIN1+	+ LVDS differential data input	
13	GND	Ground.	P
14	RXIN2-	- LVDS differential data input	I/O
15	RXIN2+	+ LVDS differential data input	
16	GND	Ground.	P
17	RXCLK-	- LVDS differential clock input	I/O
18	RXCLK+	+ LVDS differential clock input	
19	GND	Ground.	P
20	RXIN3-	- LVDS differential data input	I/O
21	RXIN3+	+ LVDS differential data input	
22	GND	Ground.	P
23	NC	--	--
24	NC	--	--
25	GND	Ground.	P

26	NC	--	--
27	NC	--	--
28	NC	--	--
29	NC	--	--
30	GND	Ground.	P
31	LED-	Cathode pin of backlight.	P
32	LED-		
33	NC	--	--
34	NC	--	--
35	NC	--	--
36	NC	--	--
37	NC	--	--
38	NC	--	--
39	LED+	Anode pin of backlight.	P
40	LED+		

4. LCD Optical Characteristics

4.1 Optical Specification

Item	Symbol	Condition	Min.	Typ.	Max.	Unit.	Note	
Contrast Ratio	CR	$\Theta=0$	800	1000	--		(1)(2)	
Response Time	Rising	T_{R+T_F}	Normal Viewing Angle	--	30	40	msec	
	Falling							(1)(3)
Color Gamut	S(%)	-	--	63.64	--	%		
Color Filter Chromaticity	White	W_X	-	-0.04	0.296	+0.04	-	(1)(4) CF glass
		W_Y	-		0.317			
	Red	R_X	-		0.630			
		R_Y	-		0.341			
	Green	G_X	-		0.296			
		G_Y	-		0.567			
	Blue	B_X	-		0.147			
		B_Y	-		0.065			
Viewing Angle	Hor.	Θ_L	CR>10	75	85	--	-	(1)(4)
		Θ_R		75	85	--		
	Ver.	Θ_U		75	85	--		
		Θ_D		75	85	--		
Option View Direction	ALL							

*The data comes from the LCD specification.

Measuring Condition

Measuring surrounding: dark room

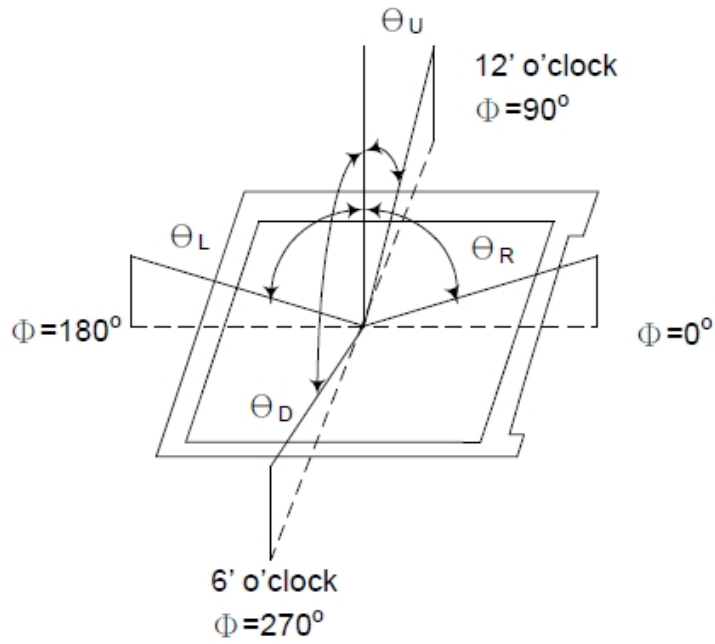
Ambient temperature: 25°C ± 2°C

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.

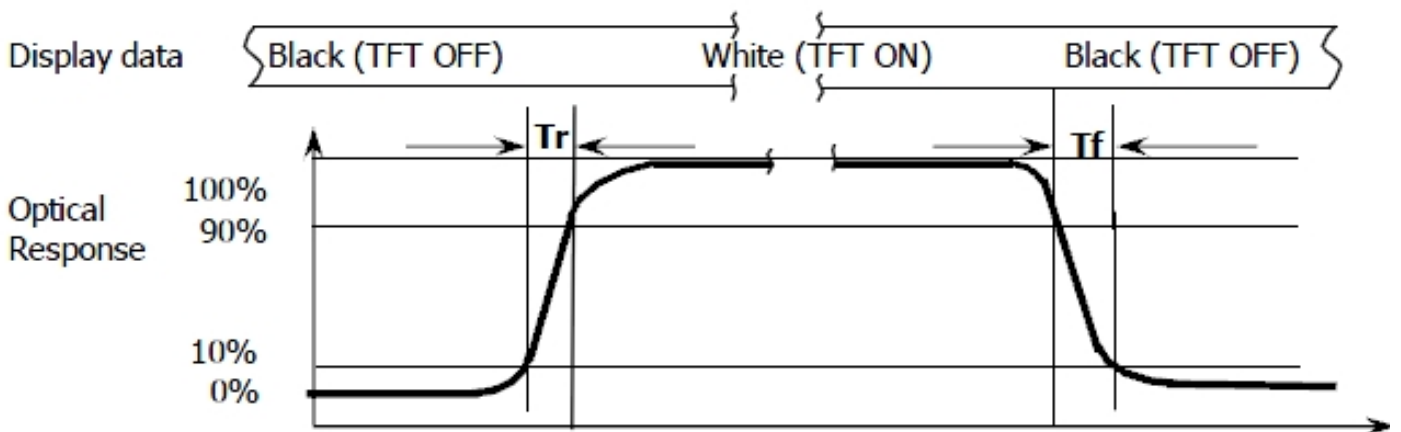
Note (1): Definition of Viewing Angle:



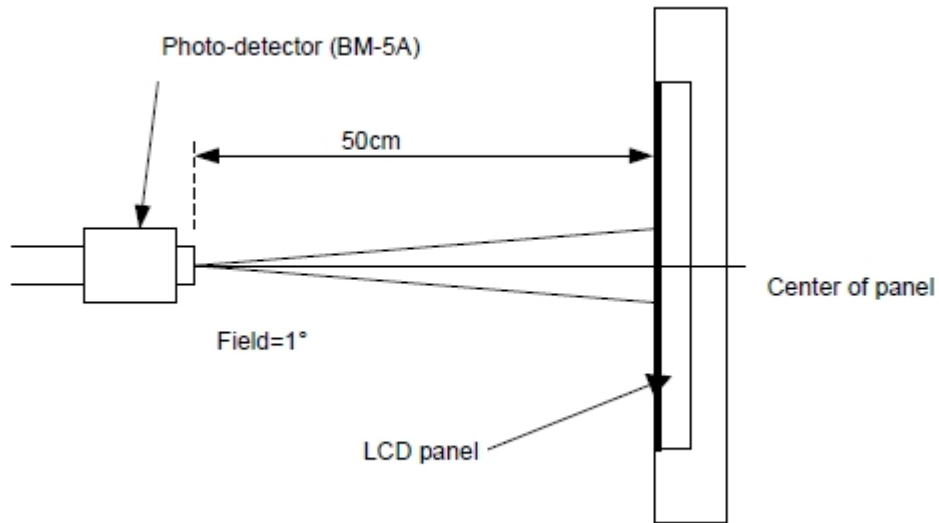
Note (2): Definition of Contrast Ratio(CR) :measured at the center point of panel

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

Note (3): Response Time



Note (4): Definition of optical measurement setup



5. TFT Electrical Characteristics

5.1 Absolute Maximum Rating (Ta=25°C V_{SS}=0V)

Characteristics	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	VDD	-0.3	6.6	V	Note
Operating Temperature	T _{OP}	-20	+70	°C	-
Storage Temperature	T _{ST}	-30	+80	°C	-

NOTE1: 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
Digital Supply Voltage	VDD	2.5	2.8	6.0	V	--
Normal mode Current consumption	I _{DD}	--	45	90	mA	--
Level input voltage	V _{IH}	0.7 VDD	--	VDD	V	--
	V _{IL}	-0.3	--	0.3 VDD	V	--
Level output voltage	V _{OH}	0.8* VDD	--	VDD	V	--
	V _{OL}	GND	--	0.2 VDD	V	--

5.3 LED Backlight Characteristics

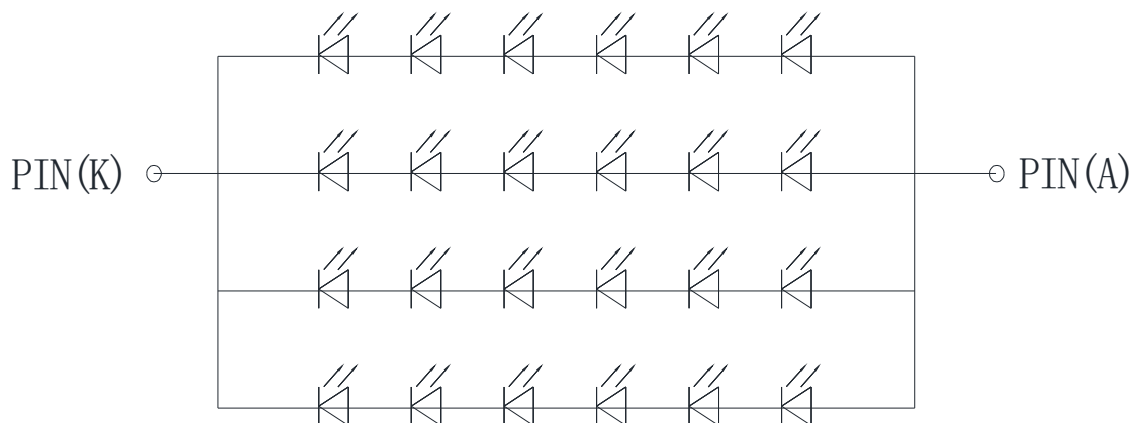
The Backlight system is edge-lighting type with 24 chips White LED

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I _F	--	240	--	mA	
Forward Voltage	V _F	--	19.2	--	V	--
LCM Luminance	L _v	1500	1650	--	cd/m ²	Note3
LED Lifetime	Hr	50000			Hour	Note1,2
Uniformity	AVg	80	--	--	%	Note3

Note1: 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%.

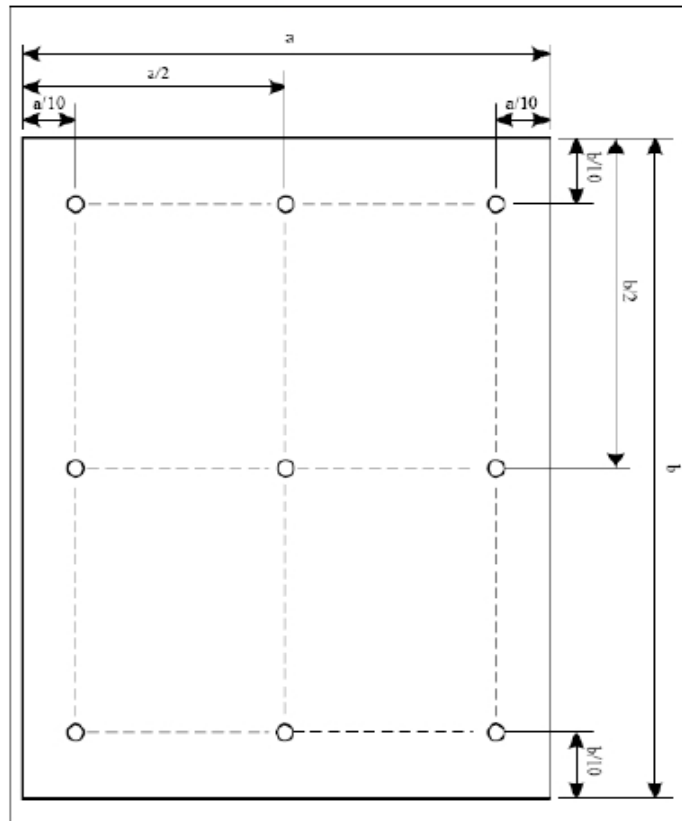
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25°C and IL=240mA. The LED lifetime could be decreased if operating IL is larger than 240mA.

The constant current driving method is suggested.



LED (B/L) CIRCUIT

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. LVDS Interface Characteristics

6.1 LVDS AC Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Clock Frequency	RxFCLK	-	30	-	TBD	MHz
Input data skew margin	TRSKM	$ VID =200mV$ RxVCM=1.2V RxFCLK=81MHz	500	-	-	ps
Clock High Time	TLVCH	-	-	$4/(7 * RxFCLK)$	-	ns
Clock Low Time	TLVCL	-	-	$3/(7 * RxFCLK)$	-	ns
PLL wake-up-time	TenPLL	-	-	-	150	us

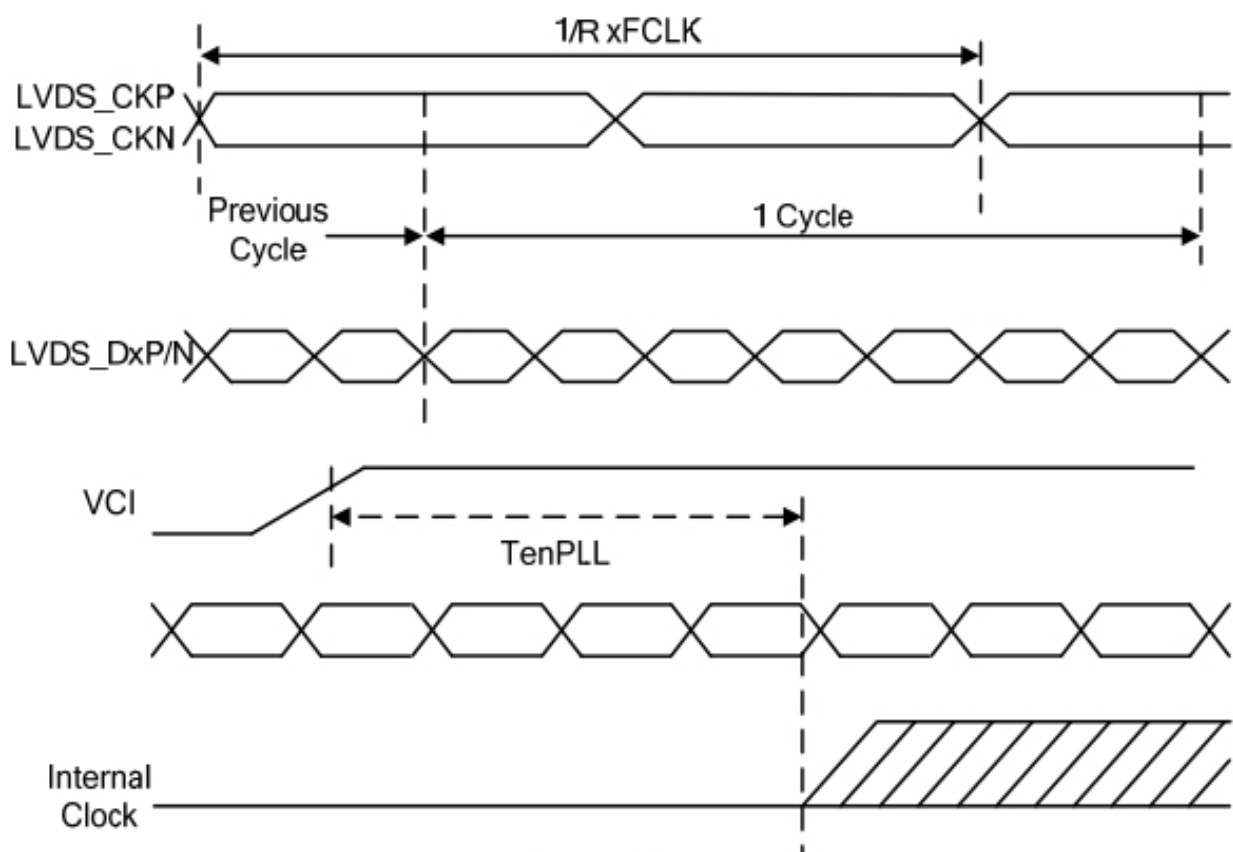
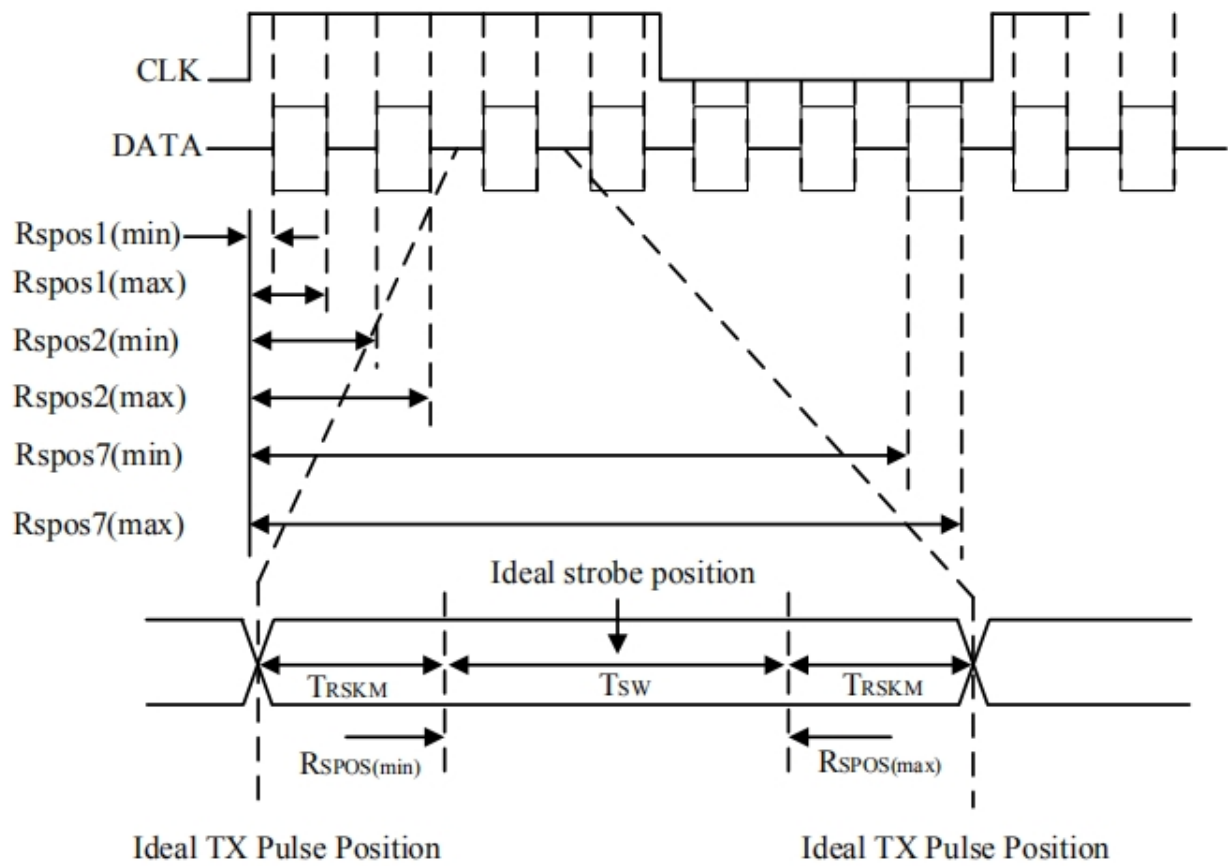


Figure LVDS figure

Parameter	Symbol	Min.	Typ.	Max.	Units	Condition
Modulation Frequency	SSCMF	23	-	93	KHz	
Modulation Rate	SSCMR	-	-	+3	%	



T_{sw} : Strobe width (Internal data sampling window)
 $RSPOS$: Receiver strobe position
 T_{RSKM} : Receiver strobe margin

6.2 LVDS DC Characteristics

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Differential input high threshold voltage	$V_{Rx,TH}$	$V_{RxVCM}=1.2V$	-	0.2	-	V
Differential input low threshold voltage	$V_{Rx,TL}$		-	-0.2	-	V
Input voltage range(single-end)	V_{RxIN}		0	-	1.8	V
Differential input common mode voltage	V_{RxVCM}		$ VID /2$	1.2	$1.8 - VID /2$	V
Differential input voltage	$ VID $		0.2	0.4	0.6	V
Differential input leakage current	I_{LCLVDS}		-10	-	10	μA
Differential input impedance	Z_{ID}		80	100	140	Ω

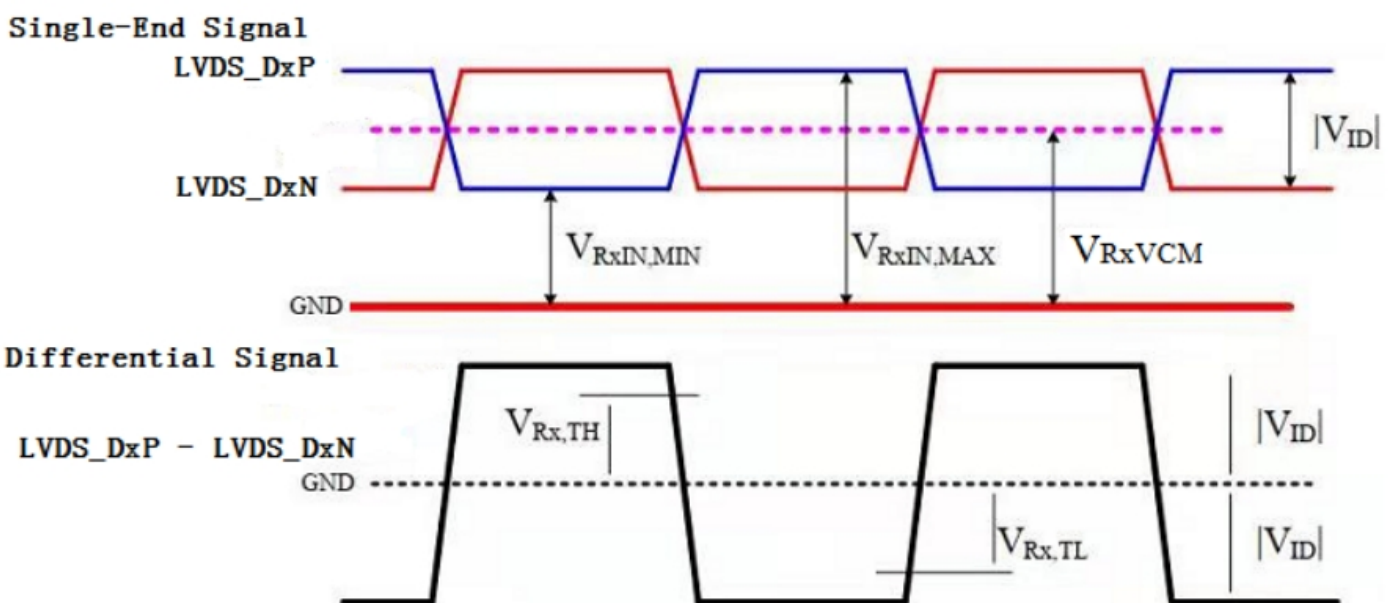
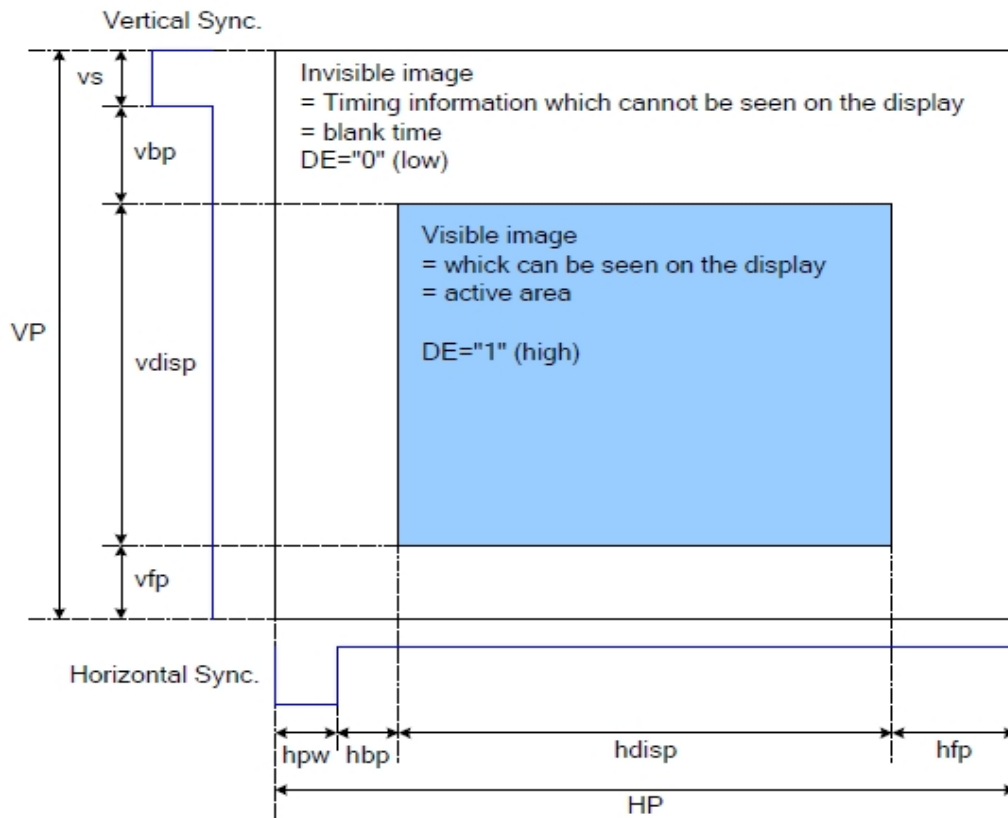


Figure: LVDS Receiver Differential Definition

6.3 Timing for LVDS Mode



Please refer to the following table for the setting limitation of LVDS interface signals.(Only 2-Port LVDS)

Parameter	Symbol	Min.	Typ.	Max.	Unit
DCLK frequency	FCLK	--	(52)	--	MHz
Horizontal display area	HDISP	--	600	--	Clock
Horizontal Sync. Width	hpw	1	4	--	Clock
Horizontal Sync. Back Porch	hbp	1	30	-	Clock
Horizontal Sync. Front Porch	hfp	1	24	--	Clock
Vertical display area	VDISP	--	1280	--	Line
Vertical Sync. Width	vs	2	4	--	Line
Vertical Sync. Back Porch	vbp	2	8	--	Line
Vertical Sync. Front Porch	vfp	2	16	--	Line
Frame-Rate		--	60	--	Hz

Note: Typical value are related to the setting frame rate is 60Hz.

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.

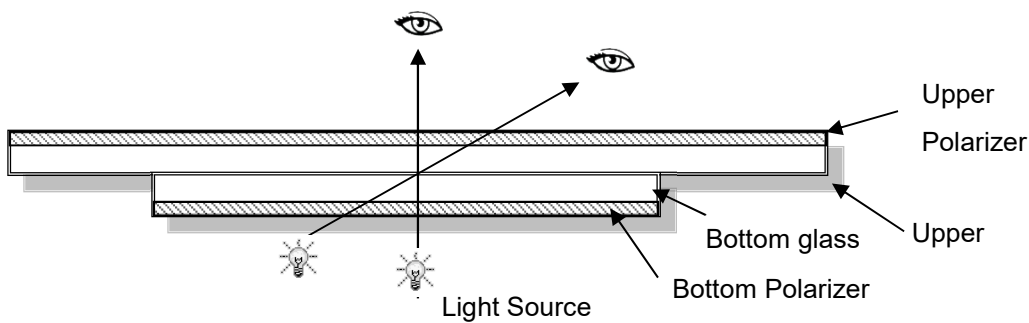
Temperature: 25°C±5°C

Humidity: 65%±10%RH

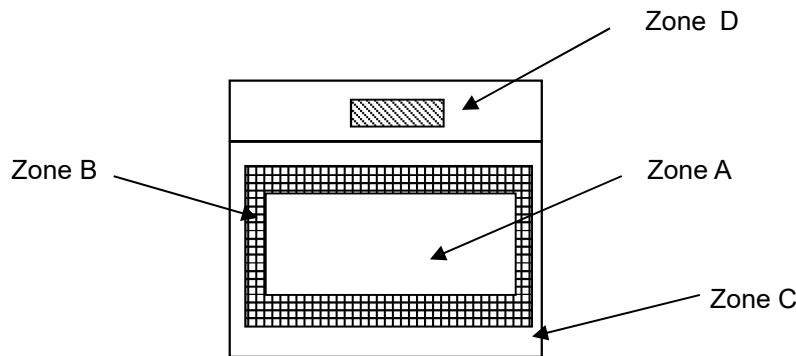
Viewing Angle: Normal viewing Angle.

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

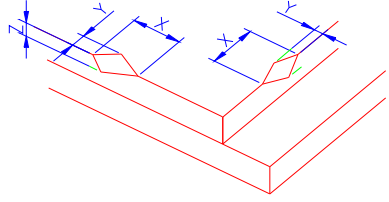
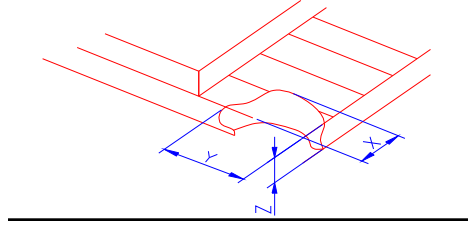
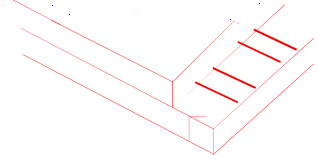
LCD: Liquid Crystal Display , LCM: Liquid Crystal Module

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:

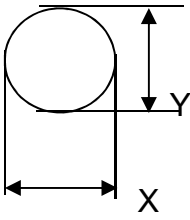
- a) Light dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.
- b) Dim dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.

7.1.4 Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD	(1) The edge of LCD broken	 <table border="1" data-bbox="762 611 1465 757"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>≤3.0mm</td> <td><Inner border line of the seal</td> <td>≤T</td> </tr> </tbody> </table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
	X	Y	Z					
	≤3.0mm	<Inner border line of the seal	≤T					
(2)LCD corner broken	 <table border="1" data-bbox="842 1070 1385 1171"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>≤3.0mm</td> <td>≤L</td> <td>≤T</td> </tr> </tbody> </table>	X	Y	Z	≤3.0mm	≤L	≤T	
X	Y	Z						
≤3.0mm	≤L	≤T						
(3) LCD crack	 <p style="text-align: center;">Crack Not allowed</p>							

2.0

Spot defect



$$\Phi = (X + Y) / 2$$

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

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.15$	Ignore		
$0.15 < \Phi \leq 0.25$	3(distance ≥ 10 mm)		
$0.25 < \Phi \leq 0.4$	2(distance ≥ 10 mm)		
$\Phi > 0.4$	0		

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

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.15$	Ignore		
$0.15 < \Phi \leq 0.25$	3(distance ≥ 10 mm)		
$0.25 < \Phi \leq 0.4$	2(distance ≥ 10 mm)		
$\Phi > 0.4$	0		


③ Polarizer accidented spot

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.2$	Ignore		
$0.2 < \Phi \leq 0.5$	2(distance ≥ 10 mm)		
$\Phi > 0.5$	0		

④ Polarizer Bubble

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.2$	Ignore		
$0.2 < \Phi \leq 0.4$	2(distance ≥ 10 mm)		
$0.4 < \Phi \leq 0.5$	1		
$\Phi > 0.5$	0		

3.0	LCD Pixel defect	<p>Pixel bad points</p> <table border="1" data-bbox="544 253 1501 999"> <thead> <tr> <th data-bbox="544 253 738 304">Item</th> <th data-bbox="738 253 1252 304">Zone A</th> <th data-bbox="1252 253 1501 304">Acceptable Qty</th> </tr> </thead> <tbody> <tr> <td data-bbox="544 304 738 465" rowspan="3">Bright dot</td> <td data-bbox="738 304 1252 360">Random</td> <td data-bbox="1252 304 1501 360">N≤2</td> </tr> <tr> <td data-bbox="738 360 1252 416">2 dots adjacent</td> <td data-bbox="1252 360 1501 416">N≤0</td> </tr> <tr> <td data-bbox="738 416 1252 465">3 dots adjacent</td> <td data-bbox="1252 416 1501 465">N≤0</td> </tr> <tr> <td data-bbox="544 465 738 633" rowspan="3">Dark dot</td> <td data-bbox="738 465 1252 521">Random</td> <td data-bbox="1252 465 1501 521">N≤3</td> </tr> <tr> <td data-bbox="738 521 1252 577">2 dots adjacent</td> <td data-bbox="1252 521 1501 577">N≤0</td> </tr> <tr> <td data-bbox="738 577 1252 633">3 dots adjacent</td> <td data-bbox="1252 577 1501 633">N≤0</td> </tr> <tr> <td data-bbox="544 633 738 943">Distance</td> <td data-bbox="738 633 1252 943"> 1. Minimum Distance Between Bright dots. 2. Minimum Distance Between dark dots 3. Minimum Distance Between dark and bright dot. </td> <td data-bbox="1252 633 1501 943">5mm</td> </tr> <tr> <td colspan="2" data-bbox="544 943 1252 999">Total bright and dark dot</td> <td data-bbox="1252 943 1501 999">N≤4</td> </tr> </tbody> </table> <p data-bbox="544 1010 624 1043">Note:</p> <p data-bbox="544 1066 1485 1155">A) Bright dot: Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.</p> <p data-bbox="544 1171 1445 1261">B) Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.</p> <p data-bbox="544 1317 1038 1350">C) 2 dot adjacent = 1 pair = 2 dots</p> <p data-bbox="544 1368 655 1402">Picture:</p> <div data-bbox="671 1451 746 1507"> </div> <p data-bbox="592 1559 799 1592">2 dot adjacent</p> <div data-bbox="1082 1451 1193 1507"> </div> <p data-bbox="1034 1559 1241 1592">2 dot adjacent</p> <div data-bbox="679 1619 719 1727"> </div> <p data-bbox="544 1749 879 1783">2 dot adjacent (vertical)</p> <div data-bbox="1090 1619 1270 1727"> </div> <p data-bbox="1023 1749 1326 1783">2 dot adjacent (slant)</p>	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
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																							

4.0	Line defect (LCD /Polarizer backlight black/white line, scratch, stain)  W: width, L : length N : Count	<table border="1"> <thead> <tr> <th rowspan="2">Width(mm)</th> <th rowspan="2">Length(m)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.05$</td> <td>Ignore</td> <td colspan="2">Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$0.05 < W \leq 0.06$</td> <td>$L \leq 5.0$</td> <td colspan="2">$N \leq 3$</td> </tr> <tr> <td>$0.06 < W \leq 0.08$</td> <td>$L \leq 4.0$</td> <td colspan="2">$N \leq 2$</td> </tr> <tr> <td>$W > 0.08$</td> <td colspan="4">Define as spot defect</td> </tr> </tbody> </table>	Width(mm)	Length(m)	Acceptable Qty			A	B	C	$\Phi \leq 0.05$	Ignore	Ignore		Ignore	$0.05 < W \leq 0.06$	$L \leq 5.0$	$N \leq 3$		$0.06 < W \leq 0.08$	$L \leq 4.0$	$N \leq 2$		$W > 0.08$	Define as spot defect			
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$W > 0.08$	Define as spot defect																											
5.0	Electronic Components SMT.	Not allow missing parts, solderless connection, cold solder joint, mismatch, The positive and negative polarity opposite																										
6.0	Display color & Brightness.	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.																										
7.0	LCD Mura/Waving/ Hot spot	Not visible through 5% ND filter in 50% gray or judge by limit sample if necessary.																										

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

8. Reliability Test Result

Remark:

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, 96HR	
High Temperature Storage	80°C, 96HR	
Low Temperature Storage	-30°C, 96HR	
High Temperature & High Humidity Operating	+60°C, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-20°C,30 min ↔ +70°C,30 min, Change time:5min 20CYC.	
ESD test	C=150pF, R=330,5points/panel Air:±8KV, 5times; Contact:±6KV, 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	
Box Drop Test	1 Corner 3 Edges 6 faces,80cm(MEDIUM BOX)	

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.
6. The color fading mura of polarizing filter should not care.

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.