

MDT0660AIH-LVDS	1440 x 240	LVDS Interface	TFT Module
Specification			
Version: 1		Date: 01/06/2018	
Revision			
1	30/05/2018	First issue	

Display Features			
Display Size	6.60"		
Resolution	1440 x 240		
Orientation	Landscape		
Appearance	RGB		
Logic Voltage	3.3V		
Interface	LVDS		
Brightness	1000 cd/m ²		
Touchscreen	---		
Module Size	178.40 x 40.00 x 3.35mm		
Operating Temperature	-30°C ~ +85°C		
Pinout	40 way FFC		
Pitch	0.5mm	Box Quantity	Weight / Display
		---	---

* - For full design functionality, please use this specification in conjunction with the SSD1305Z specification.(Provided Separately)

Display Accessories	
Part Number	Description
MPBV6	40 Way FFC to cable and wires. Driven by any driver board that can be wired to a 1mm pitch SHDR-40V-S-B receptacle.
MCIB14/16	HDMI-to-LVDS interface board, with voltage generation.

Optional Variants	
Appearances	Voltage

* 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, back-light unit. The resolution of a 6.6 " TFT-LCD contains 1440x240 pixels, and can display up to 16.7M colors.

* Features

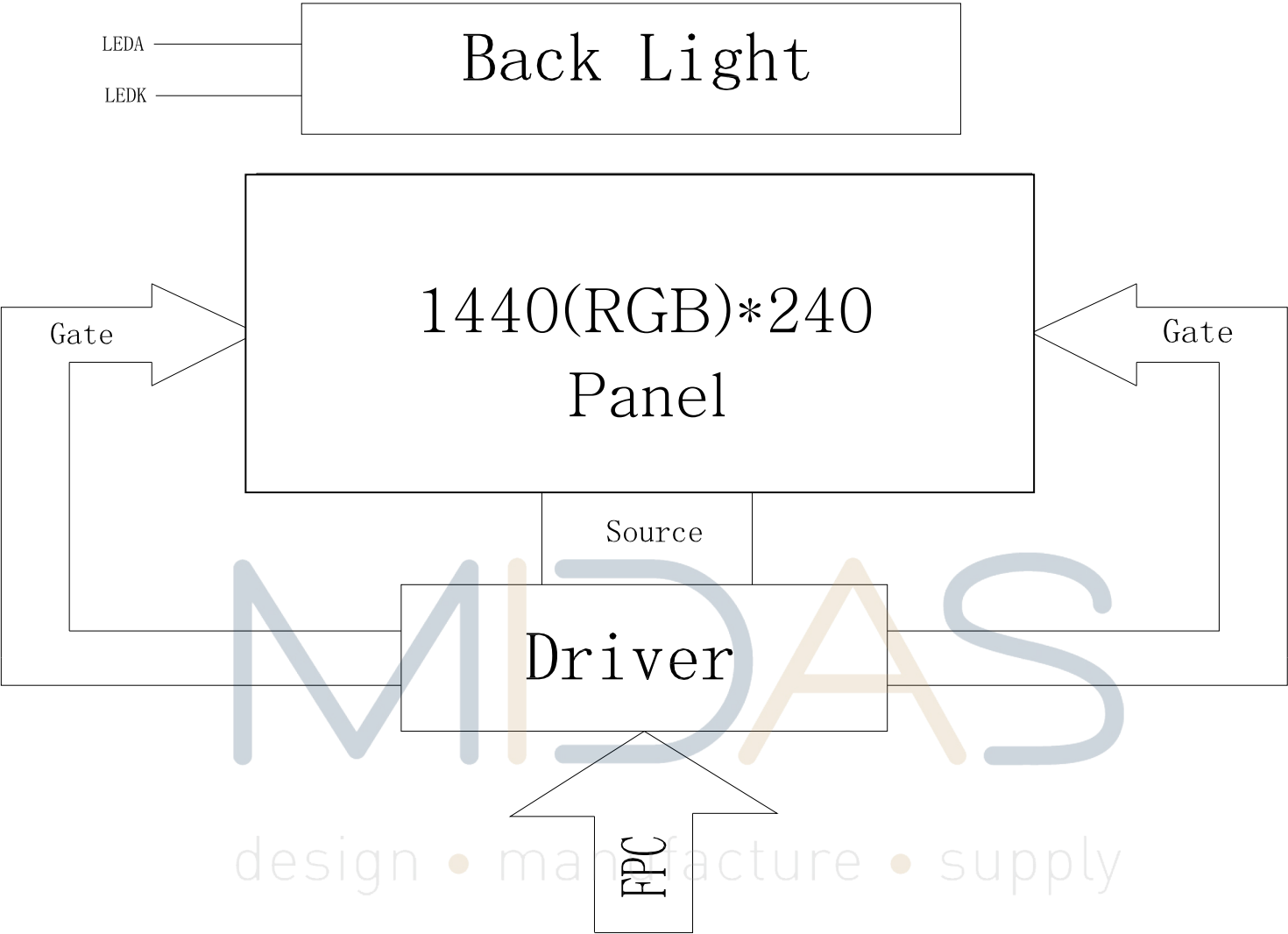
General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	164.16(H)*27.36(V) (6.6 inch)	mm	
Driver element	TFT active matrix	-	
Display colors	262K/16.7M	colors	
Number of pixels	1440(RGB)*240	dots	
Pixel arrangement	RGB vertical stripe	-	
Pixel pitch	0.114(H)*0.114(V)	mm	
Viewing angle	Free	o'clock	
Controller IC	2*HX8249+HX8678	-	
LCM Interface	6/8Bit LVDS	-	
Display mode	Transmissive /Normally Black	-	
Operating temperature	-30~+85	°C	
Storage temperature	-40~+90	°C	

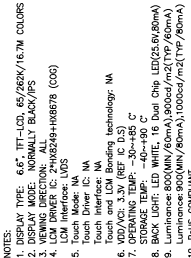
* Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	178.4	-	mm	
	Vertical(V)	-	40	-	mm	
	Depth(D)	-	3.35	-	mm	
Weight		-	TBD	-	g	



1. Block Diagram





Input terminal Pin Assignment

NO.	SYMBOL	DISCRIPTION	I/O
1	STBYB	Enale 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	NC	No connected	
24	NC	No connected	
25	NC	No connected	



26	NC	No connected	
27	NC	No connected	
28	NC	No connected	
29	GND	Ground	P
30	RL	Horizontal shift direction	Note 4
31	TB	Vertical shift direction	Note 4
32	ATREN	ATREN should be kept H.	I
33	CSB	No connected	-
34	SCL	No connected	-
35	SDA	No connected	-
36	VDD-OTP	7.5V for OTP program (No connected)	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 operation.

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

Note.2

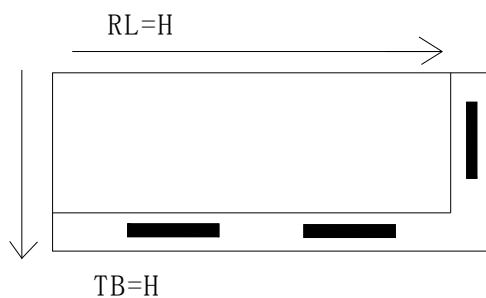
Suggest to connection with an RC reset circuit for stability,Normally pull high.
(47KΩ+0.1μF or external MCU control)

Note.3

If LVDS input data is 8 bit,SELB must be set to high.

Note.4

Scan control Input		Scanning direction
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.



LCD Optical Characteristics

1. Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	$\Theta=0$ Normal viewing angle	600	800	--		
Response time	Rising	T_{R+T_F}		--	25	--	msec	
	Falling							
Uniformity		S(%)		--	(60)	--	%	
Color Filter Chromacicity	White	W_X		0.271	0.311	0.351		
		W_Y		0.293	0.333	0.373		
	Red	R_X		0.552	0.592	0.632		
		R_Y		0.287	0.327	0.367		
	Green	G_X		0.319	0.359	0.399		
		G_Y		0.553	0.593	0.633		
	Blue	B_X		0.108	0.148	0.188		
		B_Y		0.061	0.101	0.141		
Viewing angle	Hor.	Θ_L	CR>10	--	80	--		
		Θ_R		--	80	--		
	Ver.	Θ_U		--	80	--		
		Θ_D		--	80	--		
Option View Direction		Free						



Electrical Characteristics

1. Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	VDD	-0.3	4.0	V	Note1
Operating temperature	T _{OP}	-30	+85	°C	
Storage temperature	T _{ST}	-40	+90	°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.

2. DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VDD	2.7	3.3	3.6	V	
Normal mode Current	IDD	--	75	--	mA	
Level input voltage	V _{IH}	0.7*VDD	--	VDD+0.3	V	
	V _{IL}	GND-0.3	--	0.3*VDD	V	
Level output voltage	V _{OH}	VDD-0.4	--	--	V	
	V _{OL}	GND	--	GND+0.4	V	



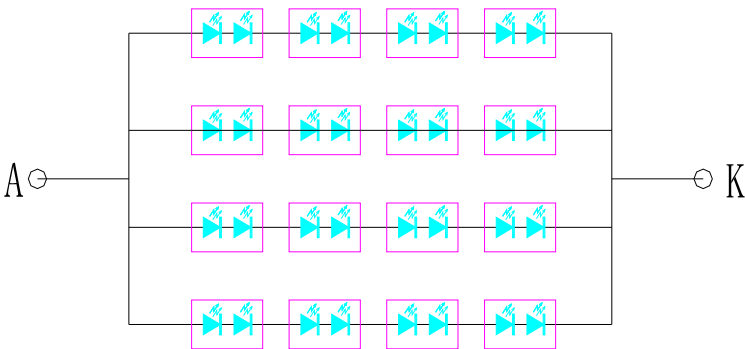
3. LED Backlight Characteristics

The back-light system is edge-lighting type with 32 chips LED

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I _F	60	80	--	mA	
Forward Voltage	V _F	--	25.6	--	V	
LCM Luminance (I _F =60mA)	LV	800	900	--	cd/m2	Note3
LCM Luminance (I _F =80mA)	LV	900	1000	--	cd/m2	Note3
LED life time	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±3 °C, typical IL value indicated in the above table until the brightness becomes less than 50%.

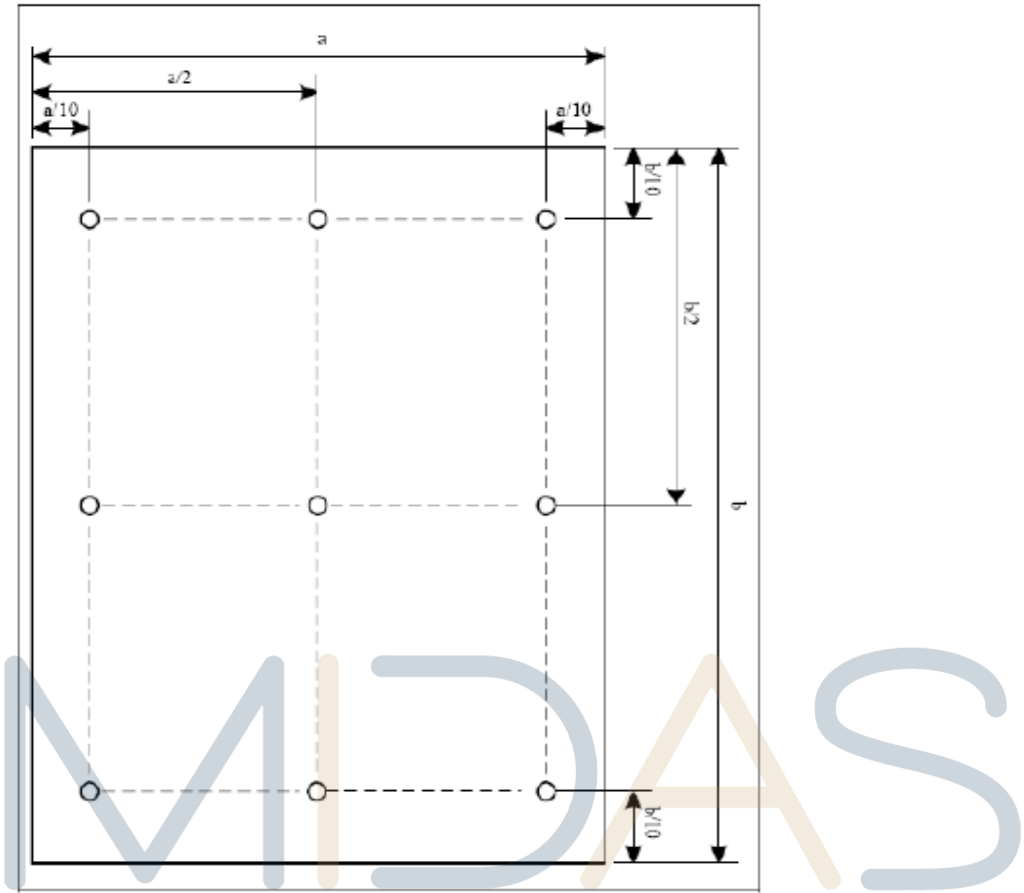
Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at
Ta=25℃ and IL=80mA. The LED lifetime could be decreased if operating IL is larger than 80mA. The
constant current driving method is suggested.



B/L Circuit



Note (3) Luminance Uniformity of these 9 points is defined as below:



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

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



AC Characteristics

1. LVDS 6-bit vs. 8-bit mode

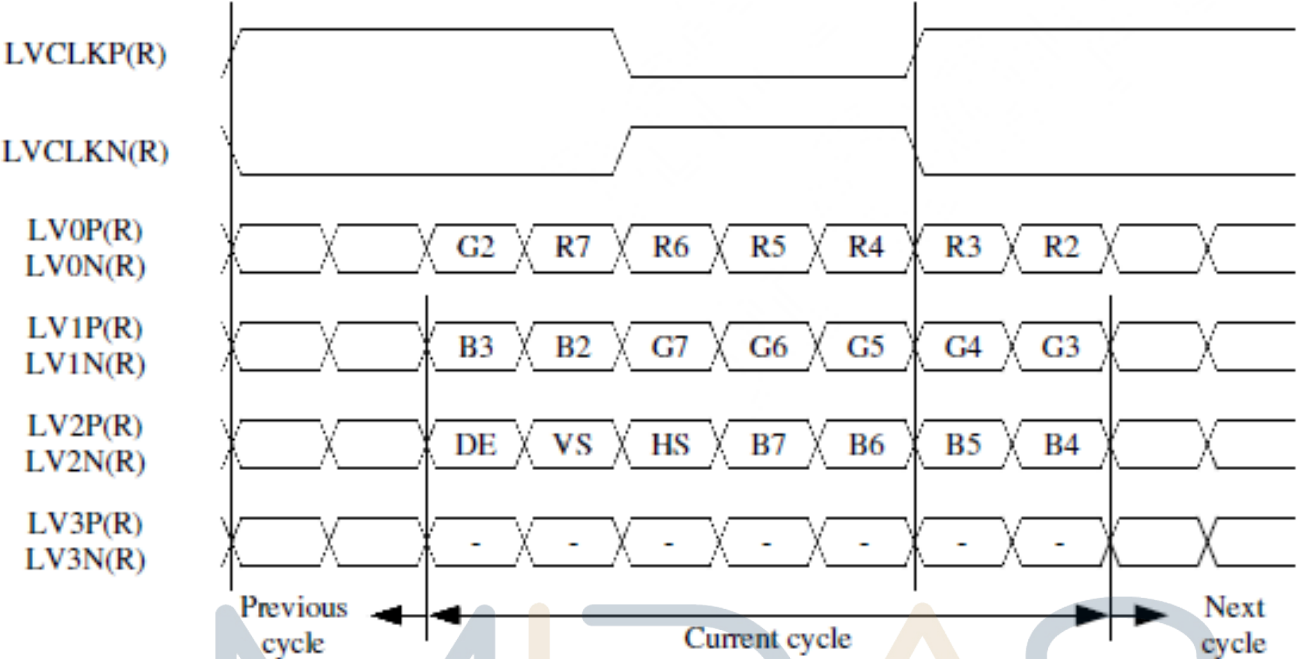


Figure 4.1: LVDS 6-bit

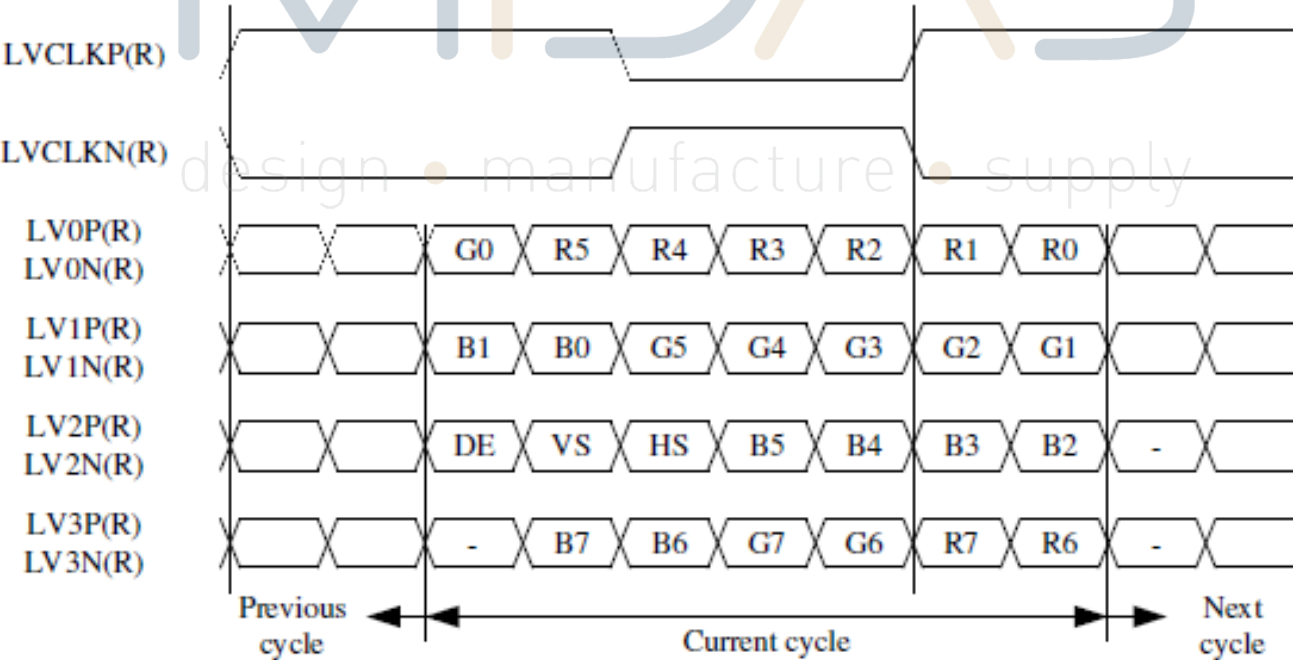


Figure 4.2: LVDS 8-bit (VESA format)



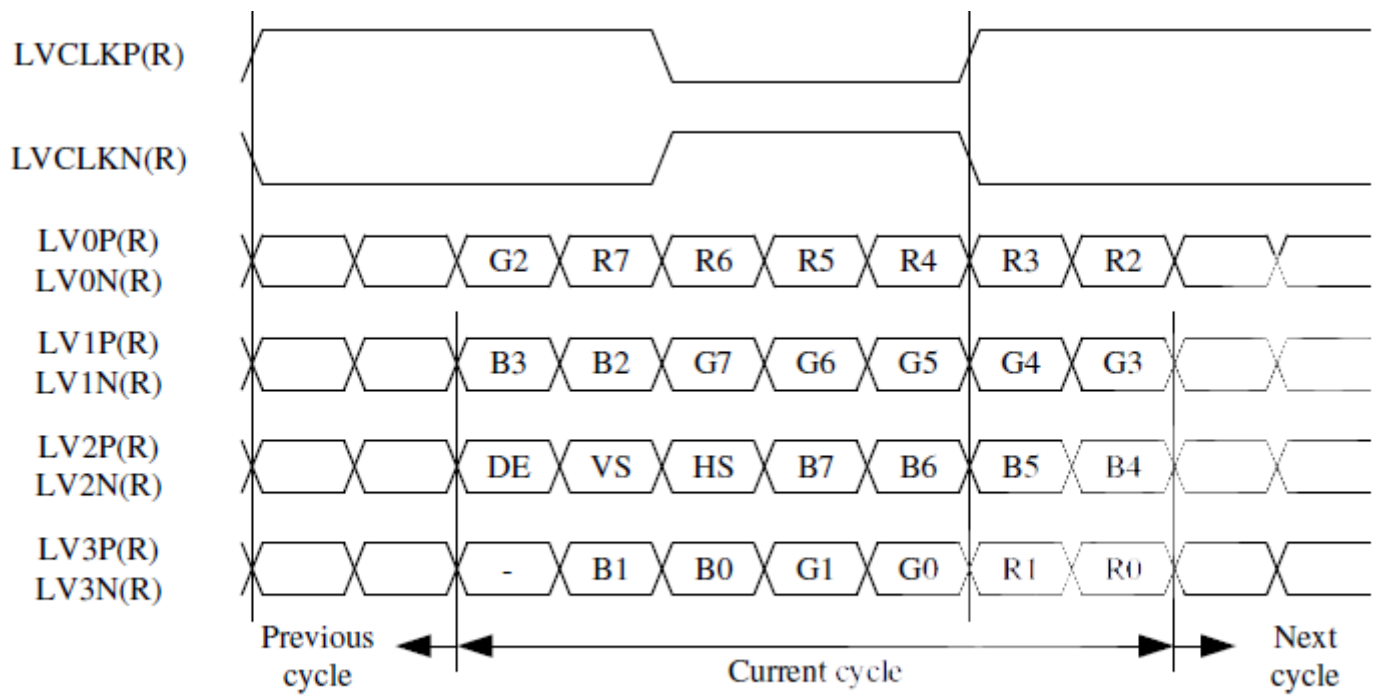


Figure 4.3: LVDS 8-bit (JEIDA format)

MIDAS

design • manufacture • supply



2. LVDS input timing

LVDS input timing is described as below.

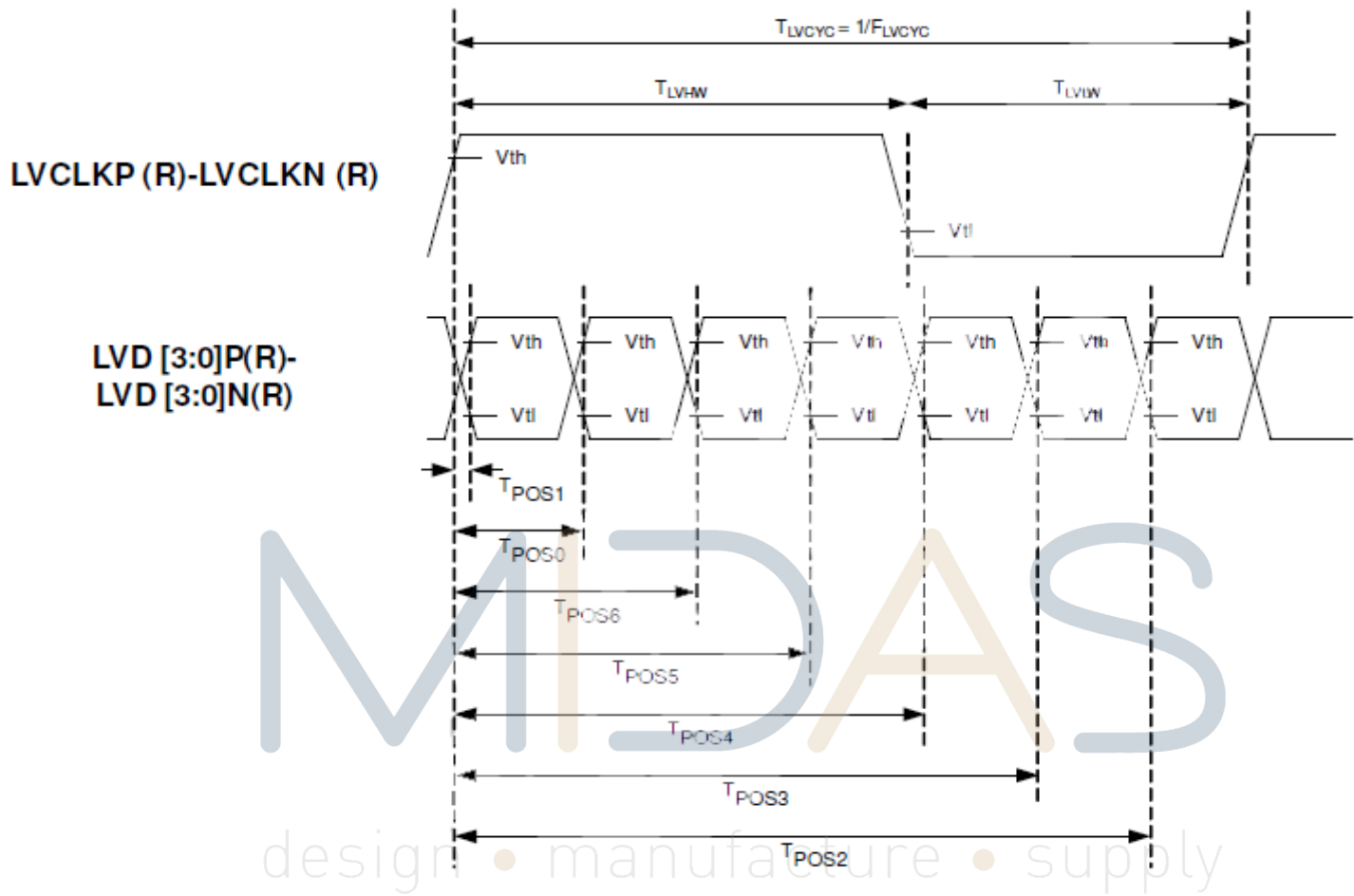


Figure 7.2: LVDS input timing

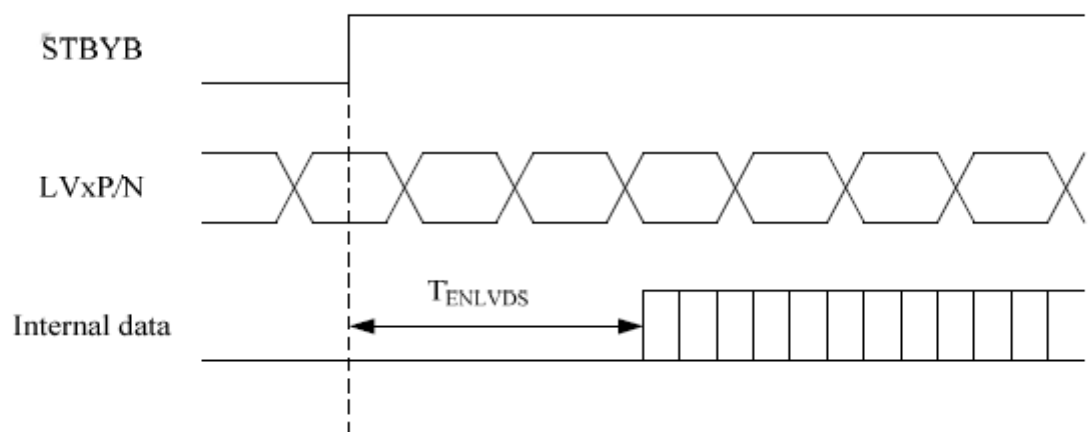
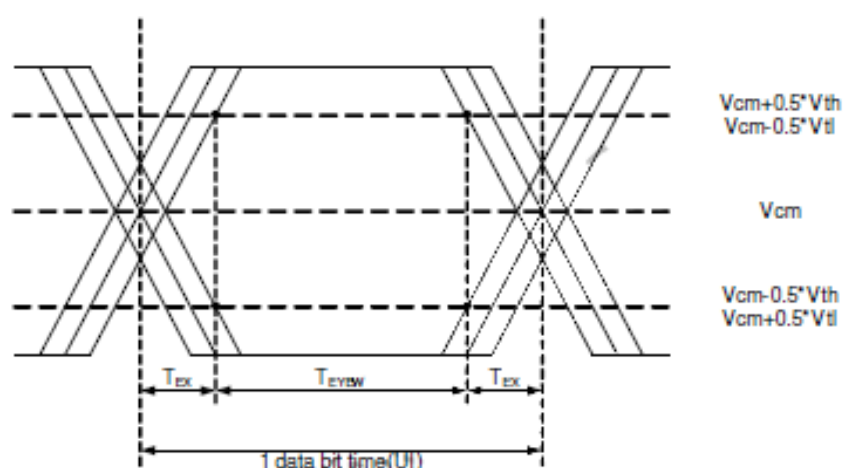


Figure 7.3: LVDS wake up time

Single-ended:
LVD [3:0]P,
LVD [3:0]N



Differential:
LVD [3:0]P-LVD [3:0]N

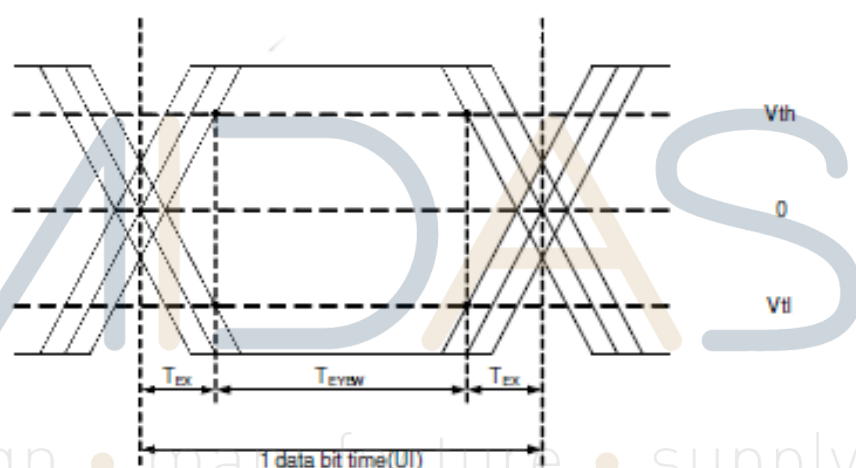


Figure 7.4: LVDS input eye diagram

Parameter	Symbol	Min.	Spec. Typ.	Max.	Unit
Clock frequency	FLVCYC	10	-	85	MHz
Clock period	TLVCYC	11.76	-	100	nsec
1 data bit time	UI	-	1/7	-	TLVCYC
Clock high time	LVHW	2.9	4	4.1	UI
Clock low time	LVLW	2.9	3	4.1	UI
Position 1	TPOS1	-0.2	0	0.2	UI
Position 0	TPOS0	0.8	1	1.2	UI
Position 6	TPOS6	1.8	2	2.2	UI
Position 5	TPOS5	2.8	3	3.2	UI
Position 4	TPOS4	3.8	4	4.2	UI
Position 3	TPOS3	4.8	5	5.2	UI
Position 2	TPOS2	5.8	6	6.2	UI
Input eye width	TEYEW	0.6	-	-	UI
Input eye border	TEX	-	-	0.2	UI
LVDS wake up time	TENLVDS	-	-	150	μ s

Table 7.2: LVDS input timing parameters

3. Reset timing

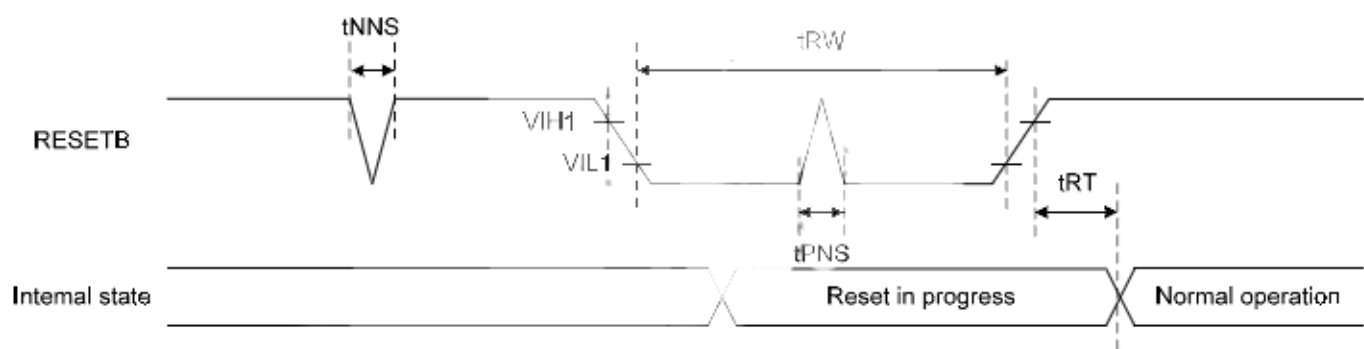


Figure 7.5: Reset timing

(VDD1=VDD2=2.7 to 3.6V, GND=0V, TA=-40 to +95 °C)

Signal	Parameter	Symbol	Spec.			Unit
			Min.	Typ.	Max.	
RESETB	Reset pulse width	tRW	10	-	-	μs
	Reset complete time	tRT	-	-	5	μs
	Positive spike noise width	tPNS	-	-	100	ns
	Negative spike noise width	tNNS	-	-	100	ns

Table 7.4: Reset timing parameters



LCD Module Out-Going Quality Level

1. VISUAL & FUNCTION INSPECTION STANDARD

1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

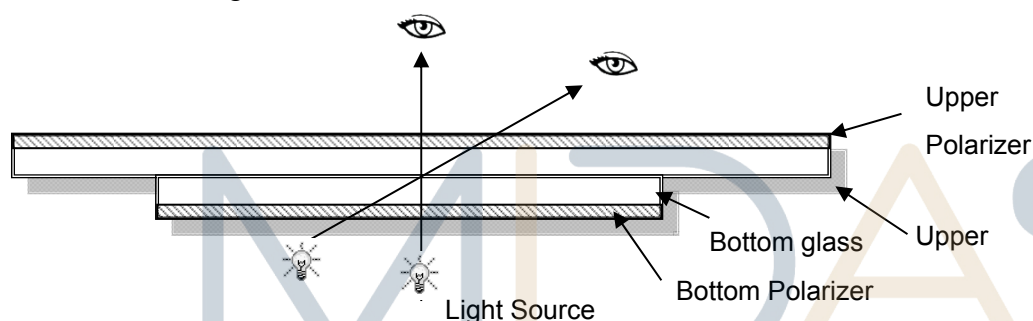
Temperature : $25 \pm 5^{\circ}\text{C}$

Humidity : $65\% \pm 10\% \text{RH}$

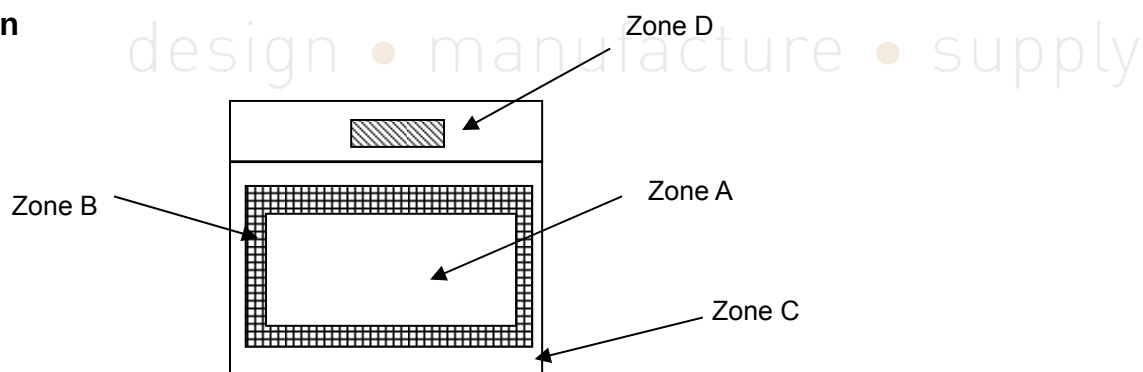
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance: 30-50cm



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

1.3 Sampling Plan

According to GB/T 2828.1-2003 ; , normal inspection, Class II

AQL:

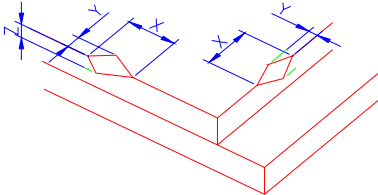
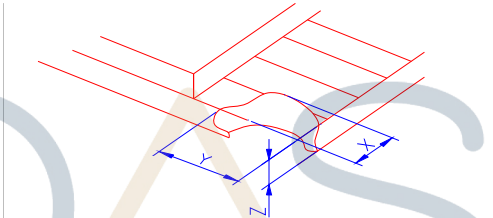
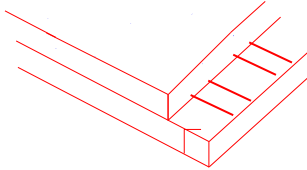
Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , TP: Touch Panel , 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. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot Line defect	Light dot, Dim spot,Polarizer Bubble ; Polarizer accidented spot.	
6	Soldering appearance	Good soldering , Peeling off is not allowed.	
7	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	



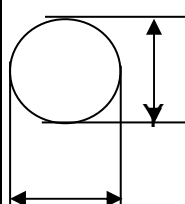
1.4 Criteria (Visual)

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><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr></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><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr></table>	X	Y	Z	≤3.0mm	≤L	≤T
X	Y	Z						
≤3.0mm	≤L	≤T						
	(3) LCD crack	 Crack Not allowed						



2.0

Spot defect



X

Φ=(X+Y)/2

① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.10	Ignore		
0.10<Φ≤0.25	4(distance ≥ 10mm)		
0.25<Φ≤0.35	3		
Φ>0.4	0		

②Dim spot (LCD/TP/Polarizer dim dot, light leakage、 dark spot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.1	Ignore		
0.10<Φ≤0.25	4(distance ≥ 10mm)		
0.25<Φ≤0.35	3		
Φ>0.4	0		

③ Polarizer accidented spot

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		
0.3<Φ≤0.5	3(distance ≥ 10mm)		
Φ>0.5	1		

④Pixel bad points (light dot, Dim dot, color dot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.15	Ignore		
0.2<Φ≤0.3	2(distance ≥ 10mm)		
Φ>0.4	1		

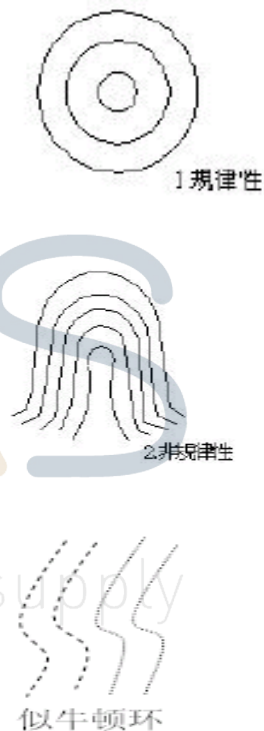
⑤ Polarizer Bubble

Zone Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		
0.3<Φ≤0.4	4(distance ≥ 10mm)		
0.4<Φ≤0.5	3		
Φ>0.5	1		

3.0	Line defect (LCD/TP /Polarizer backlight black/white line, scratch, stain)	<table><tr><th rowspan="2">Width(mm)</th><th rowspan="2">Length(m m)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>$\phi\leq0.05$</td><td>Ignore</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr><tr><td>$0.05<W\leq0.06$</td><td>$L\leq5.0$</td><td colspan="2">$N\leq3$</td></tr><tr><td>$0.07<W\leq0.08$</td><td>$L\leq4.0$</td><td colspan="2">$N\leq2$</td></tr><tr><td>$0.08<W$</td><td colspan="4">Define as spot defect</td></tr></table>	Width(mm)	Length(m m)	Acceptable Qty			A	B	C	$\phi\leq0.05$	Ignore	Ignore		Ignore	$0.05<W\leq0.06$	$L\leq5.0$	$N\leq3$		$0.07<W\leq0.08$	$L\leq4.0$	$N\leq2$		$0.08<W$	Define as spot defect			
Width(mm)	Length(m m)	Acceptable Qty																										
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$0.07<W\leq0.08$	$L\leq4.0$	$N\leq2$																										
$0.08<W$	Define as spot defect																											
4.0	Electronic Comp onents SMT	Not allow missing parts, solderless connection, cold solder joint, mis match, The positive and negative polarity opposite																										
5.0	Display color& B rightness	1. Color: Measuring the color coordinates, The measurement standar d according to the datasheet or samples. 2. Brightness: Measuring the brightness of White screen, The measu rement standard according to the datasheet or Samples.																										
6.0	LCD Mura	By 5% ND filter invisible.																										

7.0	RTP Related	TP film bubble/ accident spot	<table><tr><th rowspan="2">Size Φ(mm)</th><th colspan="3">Acceptable Qty</th></tr><tr><th>A</th><th>B</th><th>C</th></tr><tr><td>$\Phi \leq 0.1$</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr><tr><td>$0.1 < \Phi \leq 0.25$</td><td colspan="2">4 (distance ≥ 10mm)</td></tr><tr><td>$0.25 < \Phi \leq 0.35$</td><td colspan="2">3</td></tr><tr><td>$\Phi > 0.4$</td><td colspan="2">1</td></tr></table>				Size Φ (mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.1$	Ignore		Ignore	$0.1 < \Phi \leq 0.25$	4 (distance ≥ 10 mm)		$0.25 < \Phi \leq 0.35$	3		$\Phi > 0.4$	1							
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			$0.25 < \Phi \leq 0.35$	3																												
		$\Phi > 0.4$	1																													
		TP film scratch	<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>$\Phi \leq 0.05$</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>$0.07 < W \leq 0.08$</td><td>$L \leq 4.0$</td><td colspan="2">$N \leq 2$</td></tr><tr><td>$0.08 < W$</td><td colspan="4">Define as spot defect</td></tr></table>				Width(mm)	Length(mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.05$	Ignore	Ignore		Ignore	$0.05 < W \leq 0.06$	$L \leq 5.0$	$N \leq 3$		$0.07 < W \leq 0.08$	$L \leq 4.0$	$N \leq 2$		$0.08 < W$	Define as spot defect			
			Width(mm)	Length(mm)	Acceptable Qty																											
					A	B	C																									
			$\Phi \leq 0.05$	Ignore	Ignore		Ignore																									
			$0.05 < W \leq 0.06$	$L \leq 5.0$	$N \leq 3$																											
$0.07 < W \leq 0.08$	$L \leq 4.0$		$N \leq 2$																													
$0.08 < W$	Define as spot defect																															



		Assembly deflection	beyond the edge of backlight ≤0.2mm					
		Bulge (undulation included)	The ITO film plumped below 0.40mm, it's ok. 					
		Newton Ring	Newton Ring area>1/3 TP area NG Newton Ring area≤1/3 TP area OK					
		TP corner broken X : length Y : width Z : height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤3mm</td><td>Y≤3mm</td><td>Z<COVER thickness</td></tr></table> *Circuitry broken is not allowed.	X	Y	Z	X≤3mm	Y≤3mm
X	Y	Z						
X≤3mm	Y≤3mm	Z<COVER thickness						

		TP edge broken X : length Y : width Z : height	<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>X≤4mm</td><td>Y≤2mm</td><td>Z<COVER thickness</td></tr></table>	X	Y	Z	X≤4mm	Y≤2mm	Z<COVER thickness	
X	Y	Z								
X≤4mm	Y≤2mm	Z<COVER thickness								
			* Circuitry broken is not allowed.							

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	TP no function	Not allowed

design • manufacture • supply



Reliability Test Result

Item	Condition	Inspection after test
High Temperature Operating	85°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	-30°C, 96HR	
High Temperature Storage	90°C, 96HR	
Low Temperature Storage	-40°C, 96HR	
High Temperature & High	+60°C, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-30°C,30 min ↔ +85°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 condition).	
Box Drop Test	1 Corner 3 Edges 6 faces,80cm(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.



Cautions and Handling Precautions

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

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 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.

