深圳市華宇彩晶科技有限公司
SHENZHEN UNICO DISPLAY TECHNOLOGY CO.,LTD

PRODUCT SPECIFICATION

Rev. A

Customer Name:

Customer No:

Module No: UD0019PS057

CUSTOMER'S APPROVAL:		
A:尺寸（Structure）	**☐OK**	**☐NG**
B:效果（Effect ion）	**☐OK**	**☐NG**
C:可靠性（Reliability）	**☐OK**	**☐NG**
D:其他（Other）		
客户签字/日期（**Customer's Signature&Date**）：		

Please sign the cover page of the spec for your approval and return it to our local sales within a month after your receipt of the spec from Unico Display. In the case Unico Display does not receive the signed spec even after one month later; in general we will consider that the spec was already accepted by your company.

Address: 深圳市南山區深圳軟件園二期九棟四樓東 402

Prepared	Checked	Approved	Date

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History of Versions and Modifications

Rev.	Date	Modifications	Page
A	June,9,2013	First issue	All

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1. GENERAL DESCRIPTION

1.1 Introduction

Shenzhen Unico Display model **UD0019PS057** is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This model is composed of a TFT LCD panel, a driving circuit and a back-light system. This TFT LCD has a **5.72** inch diagonally measured active display area with **HD** (**720** horizontal by **1280** vertical pixel) resolution.

1.2 Features

- **5.72** inch configuration
- 4lane **MIPI** interface
- **LED** Backlight
- RoHS Compliance

1.3 Applications

- Multimedia applications
- Mobile Phone applications

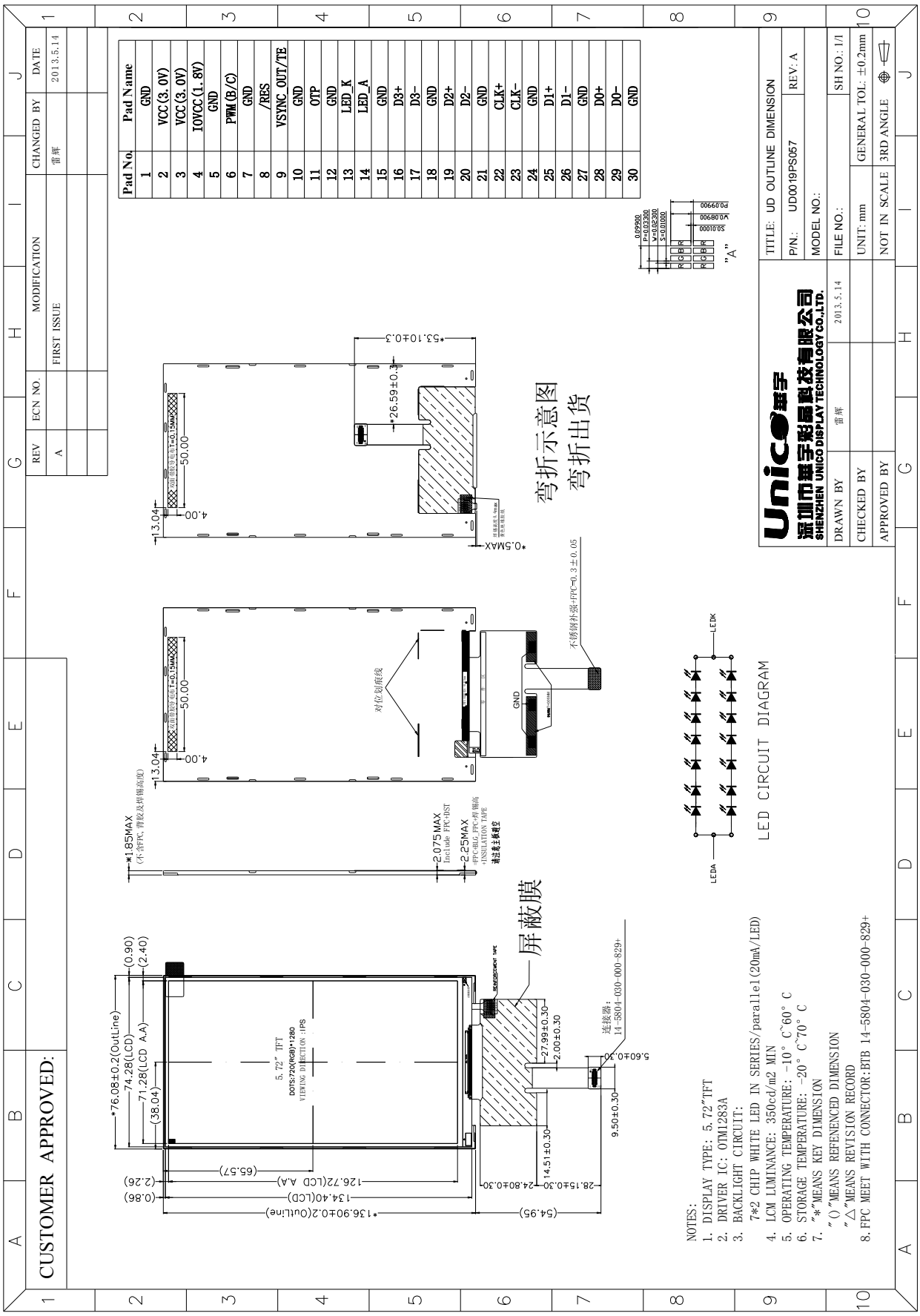
1.4 General information

Size	5.72"
Display Type	16.7M TFT
Display Mode	NORMAL BACK
Viewing Direction	IPS
Connection Type	BTB
Interface	MIPI 4 lane
ColorPixel Arrangement	RGB Vertical Stripe
Driving IC	OTM1283A

1.5 Mechanical Description

Item	Standard Value	Unit	Remark
Number of dots	720RGB×1280dots	-	
LCM dimension	76.08(W)×136.9(H)×1.85(T)	mm	
Active area	71.28(W)×126.72(H)	mm	
Dot pitch	0.099(W)×0.099 (H)	mm	
Backlight	14-CHIP-white LEDS TWO Series	/	
The KEY and accessory materials of our product according with ROHS standard			

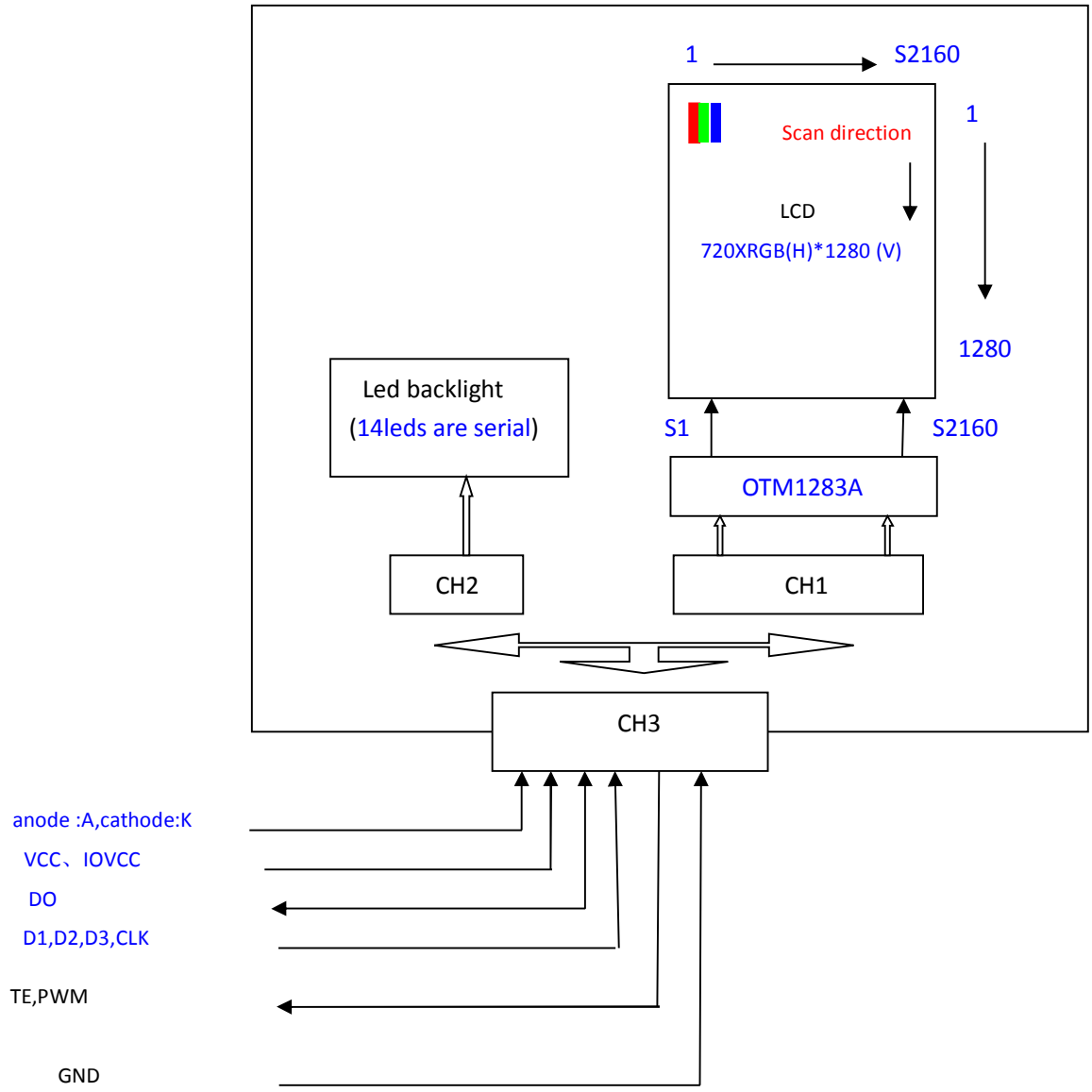
2. OUTLINE DIMENSION



3.PIN ASSIGNMENTS

No.	Signal	I/O	Fuction
1	GND	P	Ground
2	VCC	P	Power Supply input for analog circuit
3	VCC	P	
4	IOVCC	P	Power Supply for io pad
5	GND	P	Ground
6	PWM(B/C)	o	Lcd backlight control PWM output pin
7	GND	P	Ground
8	/RES	I	Reset signal
9	TE	o	Tearing effect output pin
10	GND	P	Ground
11	OTP	I	Input power for NV memory programming
12	GND	P	Ground
13	LED_K		Backlight cathode signal
14	LED_A		Backlight anode signal
15	GND	P	Ground
16	D3+	I	MIPI-DSI data lane 3 input pin
17	D3-	I	
18	GND	P	Ground
19	D2+	I	MIPI-DSI data lane 2 input pin
20	D2-	I	
21	GND	P	Ground
22	CLK+	I	MIPI-DSI clk lane input pin
23	CLK-	I	
24	GND	P	Ground
25	D1+	I	MIPI-DSI data lane 1 input pin
26	D1-	I	
27	GND	P	Ground
28	D0+	I	MIPI-DSI data lane 0 input pin
29	D0-	I	
30	GND	P	Ground

4.BLOCK DIAGRAM

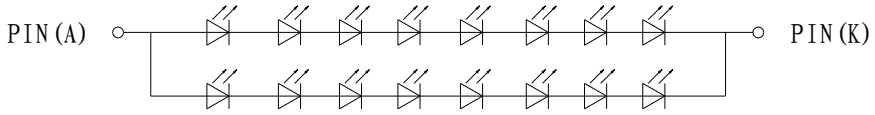


5. BACKLIGHT CHARACTERISTICS

5.1 Backlight specification

Item	Symbol	Condition	Min	Typ	Max	Unit
Forward Voltage	Vf	Ta=25℃,If=20mA	19.6	21.7	23.8	V
Forward Current	If	Ta=25℃,Vf=19.2V		20		mA
Uniformity	Avg		80			%
Reverse Current	Ir				20	uA
Power consumption	Pd			868		mW
Drive method	Constant current 20mA/LED					
LED configuration	14 LEDs TWO series					

5.2 LED Circuit Diagram



LED CIRCUIT DIAGRAM

6.ELECTRICAL CHARACTERISTICS

LCD MODULE DC CHARACTERISTICS **VSS=0,Ta=25℃**

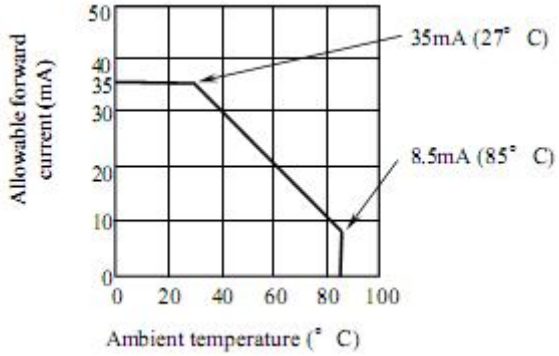
Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Power Supply Voltage for I/O Interface	IOVCC	-----	1.65	1.8	3.3	V	
Power Supply Voltage for Analog and MIPI-DSI	VCC	-----	2.3	2.8	4.8	V	
Power Supply for Switching Regurater	VCI	-------	2.3	2.8	4.8	V	
Input Voltage for Logic Circuits	Vi	"H" level	0.70×IOVCC	-	IOVCC	V	
		"L" level	0		0.30×IOVCC	V	
Output Voltage for Logic Circuits	Vo	"H" level	0.80×IOVCC	-	IOVCC	V	
		"L" level	0		0.20×IOVCC	V	
Power Supply Current for IOVCC	Iio	Display on	-	-	TBD	mA	
		Sleep IN	-	-	TBD	uA	
Power Supply Current for VCC and VCI	Icc+Ici	Display on	-	-	TBD	mA	
		Sleep IN	-	-	TBD	uA	

7. ABSOLUTE MAXIMUM RATINGS

7.1ELECTRICAL ABSOLUTE MAXIMUM RATINGS OF LCD **VSS=0,Ta=25℃**

Item	Symbol	Min	Max	Unit	Note
Power Supply for Interface	IOVCC	-0.3	4.5	V	(1) (4)
Power Supply for Analog and MIPI-DSI	VCC	-0.3	6.0	V	(1)
Power Supply for Switching Regurater	VCI	-0.3	6.0	V	(1)
Input Voltage	Vi	-0.3	6.0	V	(2)
LED Reverse Voltage	Vr	-	5	V	Per led
LED Forward Current	Iled	-	Note(3)	mA	Per led

Notes (1) Keep all Voltages no lower than GND.
(2) Applies to the RES.
(3) Ambient Temperatures vs. Allow able Forward Current.



(4) IOVCC < VCI

7.2ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

Item	Operating		Storage		Remark
	Min	Max	Min	Max	
Ambient temperature	-20°C	70°C	-30°C	80°C	Note(2)
Humidity	Note(1)		Note(1)		No condensation

Notes (1) Ta < 40°C 85%RH max.
Ta > 40°C Absolute humidity must be lower than the humidity of 85%RH at 40°C.
(2) Background color slightly changes depending on ambient temperature and viewing angle.

8. OPTICAL CHARACTERISTICS

8.1Optical specification

Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Contrast		CR	Θ=0 Normal viewing angle	500	900	-		(1)(2)
Response time	Rising	Tr+Tf		-	30	40	ms	(1)(3)
	Falling			-				
White Brightness (Center)		L		350	-		cd/m2	(1)(4)
Viewing angle	Hor	Θ_L	CR>5	-	85	-		
		Θ_R		-	85	-		
	Ver	Θ_U		-	85	-		
		Θ_D		-	85	-		
Brightness uniformity		U	Θ=0	-	80	-		(5)
Color Tone (Primary Color)	red	x	Θ=0	-	TBD	-	-	CF glass-
		y		-	TBD	-		
	green	x		-	TBD	-		
		y		-	TBD	-		
	blue	x		-	TBD	-		
		y		-	TBD	-		
	white	x		-	TBD	-		
		y		-	TBD	-		
NTSC Ratio		-		-	70	-	%	
Optima View Direction		IPS						(6)

8.2 Measuring Condition

- Measuring surrounding: dark room
- LED current I_L: **20**mA

■ Ambient temperature: 25±2oC

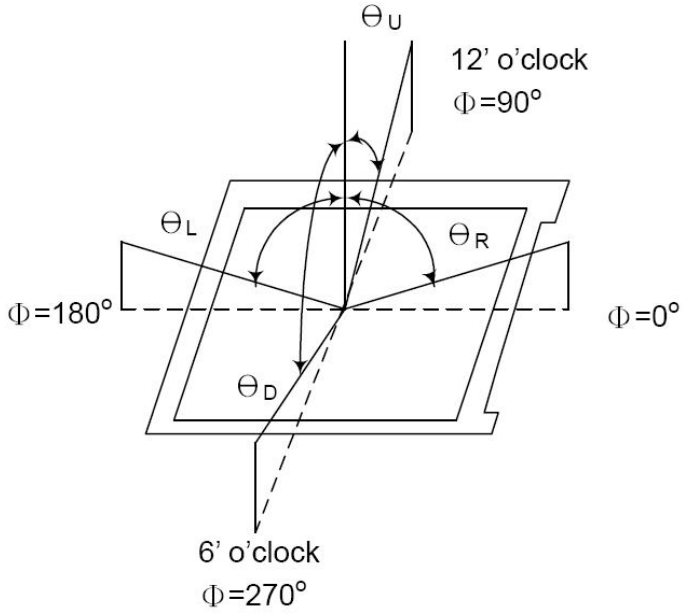
■Power supply voltage : IOVCC=1.8V, VCC=VCI=2.8V

■Backlight current : ILED=20mA

8.3 Measuring Equipment

■ BM-7

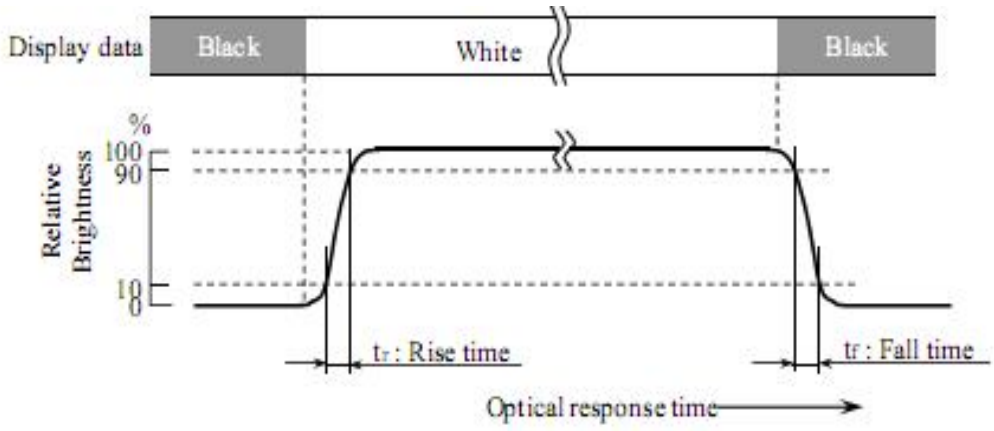
Note (1) Definition of Viewing Angle:



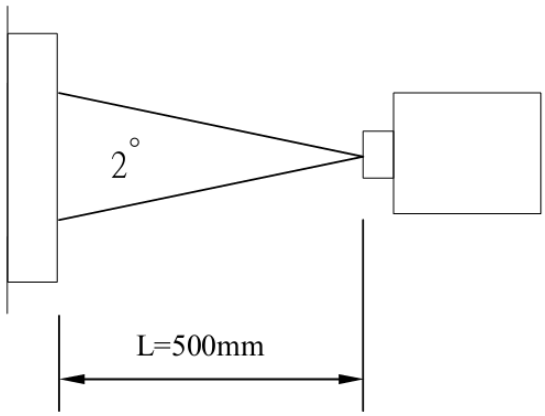
Note (2) Definition of Contrast Ratio(CR) :

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

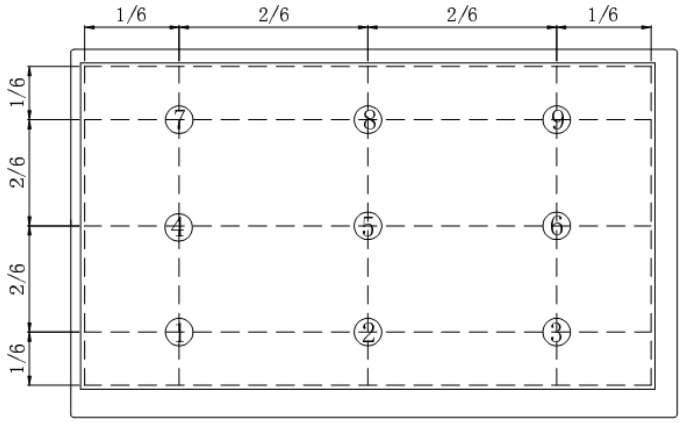
Note (3) Definition of Response Time: Sum of T_R and T_F



Note (4) Definition of optical measurement setup



Note (5) Definition of brightness uniformity



$$\text{Luminance uniformity} = \frac{\text{(Min Luminance of 9 points)}}{\text{(Max Luminance of 9 points)}} \times 100\%$$

Note (6) Optimal view direction is opposite grayscale inversion direction

9. SEQUENTIAL CHART

9.1 Power On/OFF sequence

VDDIO and VDD can be applied in any order.

VDDIO and VDD can be powered down in any order.

During power off, if LCD is in the Sleep Out mode, VDD and VDDIO must be powered down minimum 120msec after RESX has been released.

During power off, if LCD is in the Sleep In mode, VDDIO or VDD can be powered down minimum 0msec after RESX has been released.

CSX can be applied at any timing or can be permanently grounded. RESX has priority over CSX.

Note 1: There will be no damage to the display module if the power sequences are not met.

Note 2: There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.

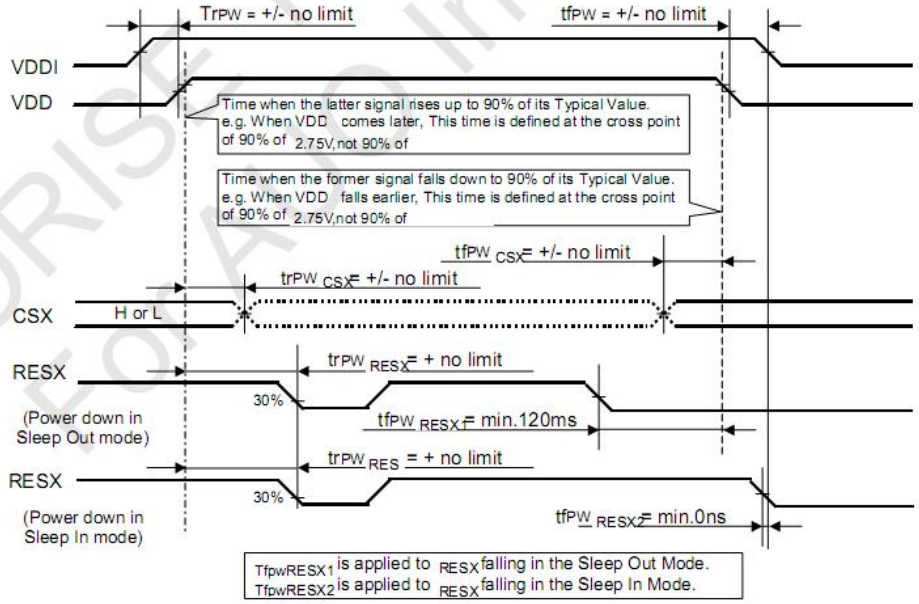
Note 3: There will be no abnormal visible effects on the display between end of Power On Sequence and before receiving Sleep Out command. Also between receiving Sleep In command and Power Off Sequence.

If RESX line is not held stable by host during Power On Sequence, then it will be necessary to apply a Hardware Reset (RESX) after Host Power On Sequence is complete to ensure correct operation. Otherwise function is not guaranteed.

The power on/off sequence is illustrated below:

Case 1 – RESX line is held high or unstable by host at power on

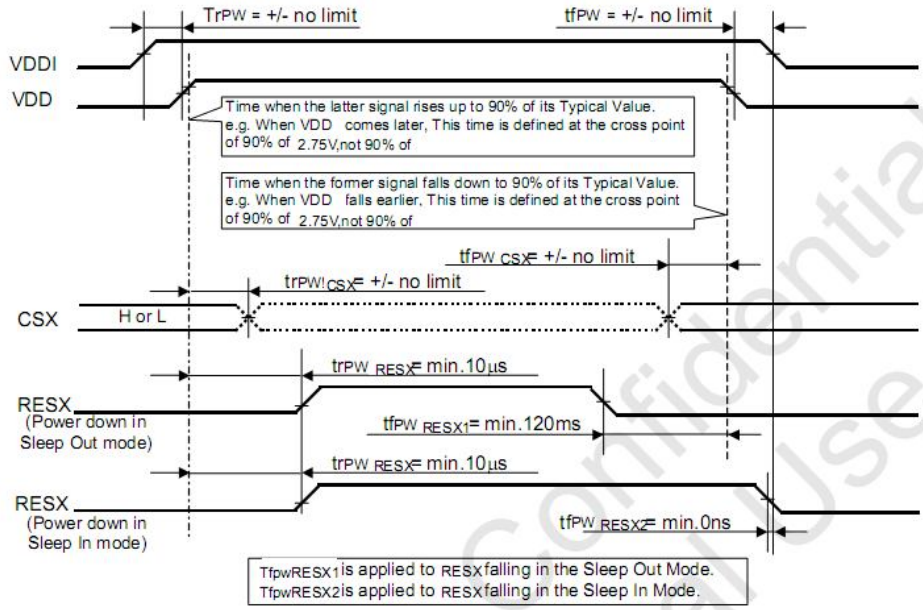
If RESX line is held High or unstable by the host during Power On, then a Hardware Reset must be applied after both VDD and VDDIO have been applied – otherwise correct functionality is not guaranteed. There is no timing restriction upon this hardware reset.



Note: Unless otherwise specified, timings herein show cross point at 50% of signal/power level.

Case 2--RESX line is hold low or unstable by host at power on.

If RESX line is held Low (and stable) by the host during Power On, then the RESX must be held low for minimum 10μsec after both VDD and VDDIO have been applied.



Note: Unless otherwise specified, timings herein show cross point at 50% of signal/power level.

Uncontrolled power off

The uncontrolled power off means a situation when e.g. there is removed a battery without the controlled power off sequence. There will not be any damages for the display module or the display module will not cause any damages for the host or lines of the interface.

At an uncontrolled power off the display will go blank and there will not be any visible effects within (TBD) second on the display (blank display) and remains blank until "Power On Sequence" powers it up.

9.3 RESET TIMING CHARACTERISTICS

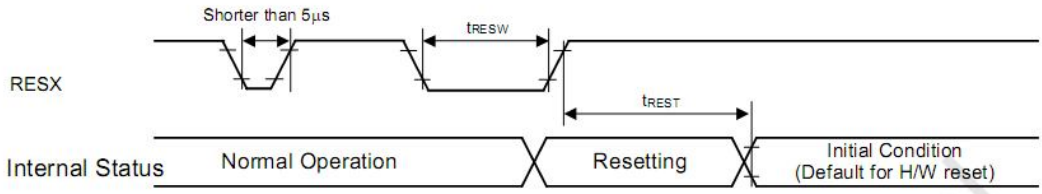
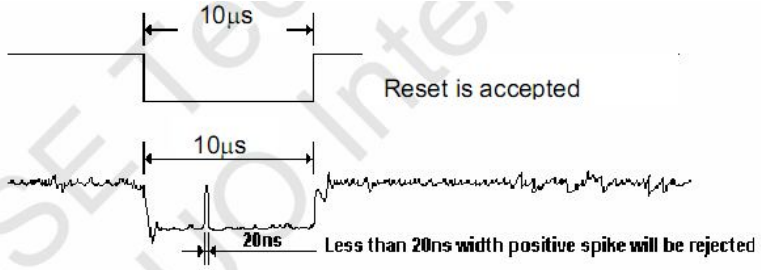


Table 7.3.8.1 Reset input timing VSS=0V, VDDIO=1.6V to 3.6V, VCI=2.5V to 5.5V,Ta = -30 to 70°C

Symbol	Parameter	Related Pins	MIN	TYP	MAX	Note	Unit
t_{RESW}	*1) Reset low pulse width	RESX	10	-	-	-	μs
t_{REST}	*2) Reset complete time	-	-	-	5	When reset applied during Sleep in mode	ms
		-		-	120	When reset applied during Sleep out mode	ms

Note 1. Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5μs	Reset Rejected
Longer than 10μs	Reset
Between 5μs and 10μs	Reset starts (It depends on voltage and temperature condition.)

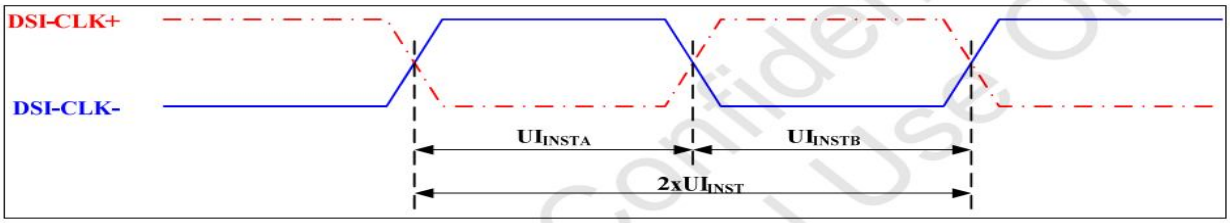


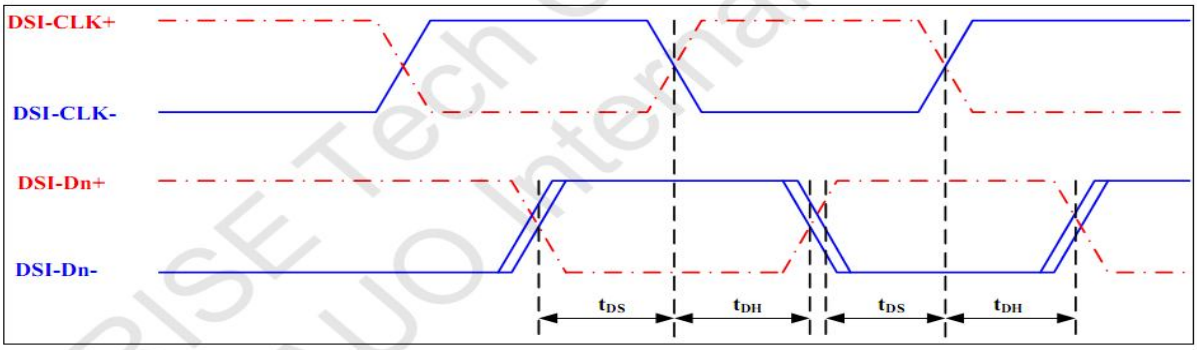
Note 5. It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

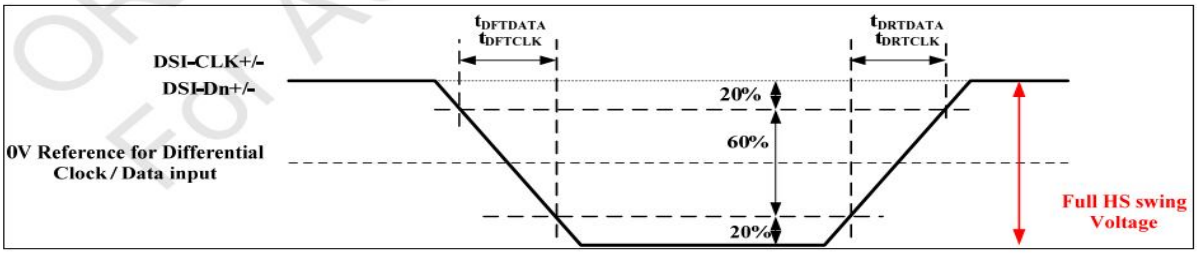
9.4 AC CHARACTERISTICS

High speed mode

Parameter	Symbol	Parameter	Specification			Unit
			MIN	TYP	MAX	
High Speed mode						
DSI-CLK+/-	$2xUI_{INST}$	Double UI instantaneous	4	-	25	ns
DSI-CLK+/-	UI_{INSTA} , UI_{INSTB}	UI instantaneous Halfs	2	-	12.5	ns
DSI-Dn+/-	t_{DS}	Data to clock setup time	0.15	-	-	UI
DSI-Dn+/-	t_{DH}	Data to clock hold time	0.15	-	-	UI
DSI-CLK+/-	t_{DRTCLK}	Differential rise time for clock	150	-	0.3UI	ps
DSI-Dn+/-	$t_{DRTDATA}$	Differential rise time for data	150	-	0.3UI	ps
DSI-CLK+/-	t_{DFTCLK}	Differential fall time for clock	150	-	0.3UI	ps
DSI-Dn+/-	$t_{DFTDATA}$	Differential fall time for data	150	-	0.3UI	ps

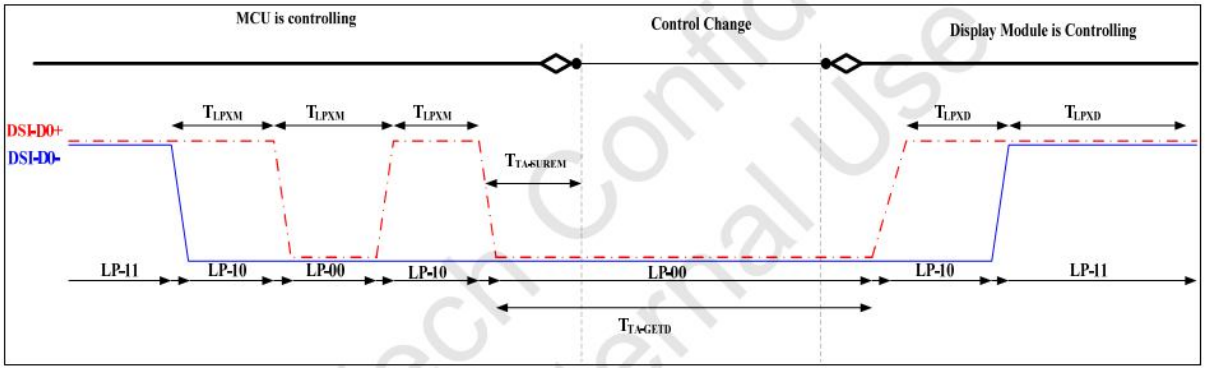


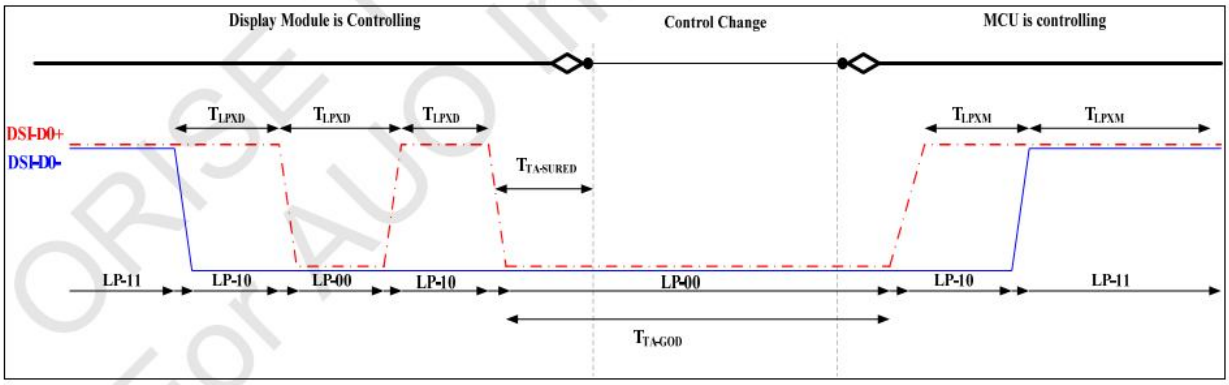




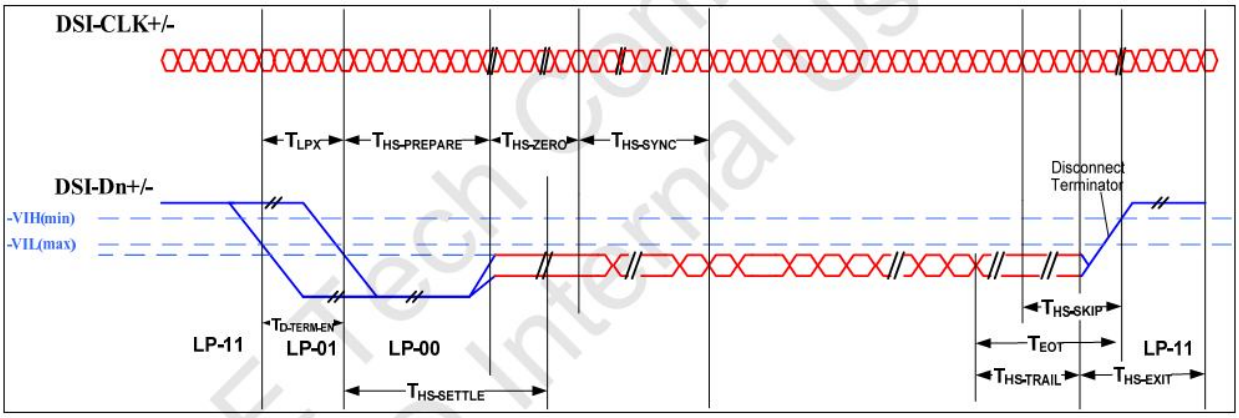
Low power mode

Parameter	Symbol	Parameter	Specification			Unit
			MIN	TYP	MAX	
Low Power mode						
DSI-D0+/-	T_{LPXM}	Length of LP-00, LP-01, LP-10 or LP-11 periods MPU → Display Module	50	-	-	ns
DSI-D0+/-	T_{LPXD}	Length of LP-00, LP-01, LP-10 or LP-11 periods Display Module → MPU	58	-	-	ns
DSI-D0+/-	$T_{TA-SURED}$	Time-out before the MPU start driving	T_{LPXD}	-	$2XT_{LPXD}$	ns
DSI-D0+/-	$T_{TA-GETD}$	Time to drive LP-00 by display module	$5XT_{LPXD}$	-	-	ns
DSI-D0+/-	T_{TA-GOD}	Time to drive LP-00 after turnaround request - MPU	$4XT_{LPXD}$	-	-	ns
DSI-D0+/-	Ratio T_{LPX}	Ratio of T_{LPXM} / T_{LPXD} between MCU and display module	2/3	-	3/2	





Parameter	Symbol	Parameter	Specification			Unit
			MIN	TYP	MAX	
High Speed Data Transmission Bursts						
DSI-Dn+/-	T_{LPX}	Length of any low-power state period	50	-	-	ns
DSI-Dn+/-	$T_{HS-PREPARE}$	Time to drive LP-00 to prepare for HS transmission	40ns + 4UI	-	85ns + 6UI	ns
DSI-Dn+/-	$T_{HS-PREPARE}$ +$T_{HS-ZERO}$	$T_{HS-PREPARE}$ + time to drive HS-0 before the sync sequence	145ns + 10UI	-	-	ns
DSI-Dn+/-	$T_{D-TERM-EN}$	Time to enable Data Lane receiver line termination measured from when Dn crosses $V_{IL(max)}$	Time for Dn to reach $V_{TERM-EN}$	-	35ns + 4UI	ns
DSI-Dn+/-	$T_{HS-SKIP}$	Time-out at RX to ignore transition period of EoT	40	-	55ns + 4UI	ns
DSI-Dn+/-	$T_{HS-TRAIL}$	Time to drive flipped differential state after last payload data bit of a HS transmission burst	max (8UI, 60ns+4UI)	-	-	ns
DSI-Dn+/-	$T_{HS-EXIT}$	Time to drive LP-11 after HS burst	100	-	-	ns
DSI-Dn+/-	T_{EoT}	Time from start of $T_{HS-TRAIL}$ period to start of LP-11 state	-	-	105ns + 12UI	ns



Parameter	Symbol	Parameter	Specification			Unit
			MIN	TYP	MAX	
Switching the clock Lane between clock Transmission and Low Power Mode						
DSI-CLK+/-	$T_{CLK-POST}$	Time that the transmitter shall continue sending HS clock after the last associated Data Lane has transitioned to LP mode	60ns + 52UI	-	-	ns
DSI-CLK+/-	$T_{CLK-PRE}$	Time that the HS clock shall be driven prior to any associated Data Lane beginning the transition from LP to HS mode	8	-	-	UI
DSI-CLK+/-	$T_{CLK-PREPARE}$	Time to drive LP-00 to prepare for HS clock transmission	38	-	95	ns
DSI-CLK+/-	$T_{CLK-TERM-EN}$	Time to enable Clock Lane receiver line termination measured from when Dn crosses $V_{IL(max)}$	Time for Dn to reach $V_{TERM-EN}$	-	38	ns
DSI-CLK+/-	$T_{CLK-PREPARE}$ +$T_{CLK-ZERO}$	$T_{CLK-PREPARE}$ + time for lead HS-0 drive period before starting Clock	300	-	-	ns
DSI-CLK+/-	$T_{CLK-TRAIL}$	Time to drive HS differential state after last payload clock bit of a HS transmission burst	60	-	-	ns
DSI-CLK+/-	T_{EoT}	Time from start of $T_{CLK-TRAIL}$ period to start of LP-11 state	-	-	105ns + 12UI	ns

10.RELIABILITY TEST ITEMS

NO	ITEM	CONDTTION	STANDARD
1	High Temp. Storage	70℃, 12 hours	1. Functional test is OK.Missing Segment, short,unclear segment, non-display,display abnormally and liquid crystal leak are un-allowed. 2. No low temperature bubbles, end seal loose and fall, frame rainbow.
2	Low Temp. Storage	-20℃, 12 hours	
3	High Temp. Operation	60℃, 12 hours	
4	Low Temp. Operation	-20℃, 12 hours	
5	High temperature and high Humidity storage	40℃,90%RH ,12 hours	
6	Thermal and cold shock	Static state， -20℃（30 Min）~70℃ （30 Min）~ -20℃ （30Min），packaging，10 cycles	

7	Vibration test	Packaging，Frequency : 10-55Hz Amplitude : 1.0mm， Each direction on X,Y axe 0.5 houre，circle 2 hours	1. Function test is OK. 2. No glass crack, chipped glass, end seal loose and fall, epoxy frame crack and so on. 3. No structure loose and fall.
8	Dropping test	Pack products into the carton box. Drop it from 80cm height to ground. Once for each side of the carton	

NOTE：

2.1 The reliability items will be fully performed in new sample qualification,

2.2 The reliability status will be tested as monitor during mass production. Individual reliability test shall be performed by lot , Moreover, the individual reliability item shall be decided according to reliability plan.

2.3 All samples are inspected after keeping in the room with normal temperature and humidity for 2 hours or above.

2.4 Vibration test: It is not necessary to test for those products without assembly frame , back light ,PCB and so on.

2.5 Dropping test : It is necessary for affirming new package.

2.6 For the high temperature and high humidity test, pure water of over 10 MΩ.cm should be used.

2.7 Each test item applies for test LCM only once .Then tested LCM cannot be used again in any other test item.

2.8 The quantity of LCM examination for each test item is 5pcs to 10pcs.

11. VISUAL & FUNCTION INSPECTION STANDARD

1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

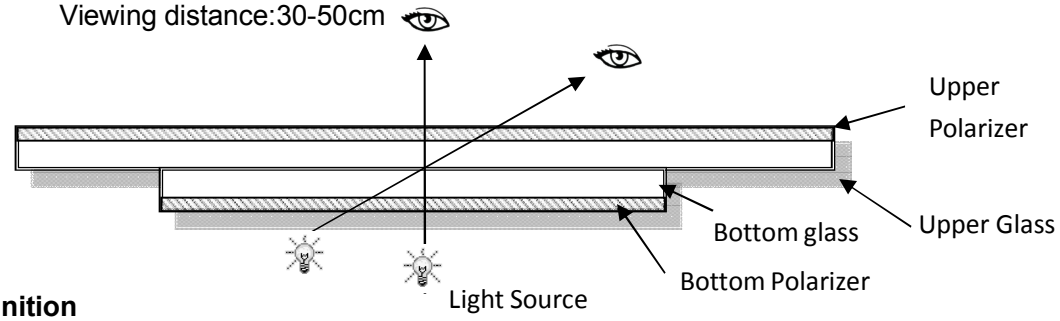
Temperature : 25±5℃

Humidity : 65%±10%RH

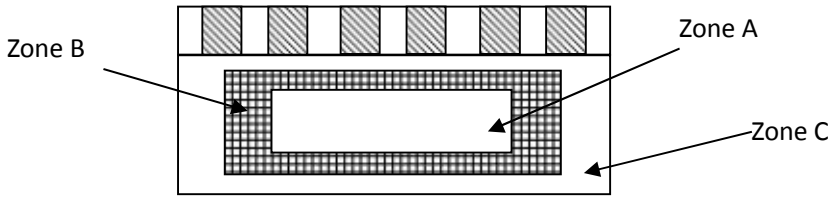
Viewing Angle : Normal viewing Angle.

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 .)

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 2828-2003 ; , normal inspection, Class Ⅱ

AQL:

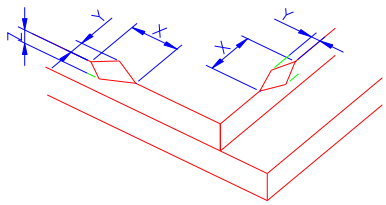
Major defect	Minor defect
0.65	1.5

LCD: Liquid Crystal Display , TP: Touch Panel , LCM: Liquid Crystal Module

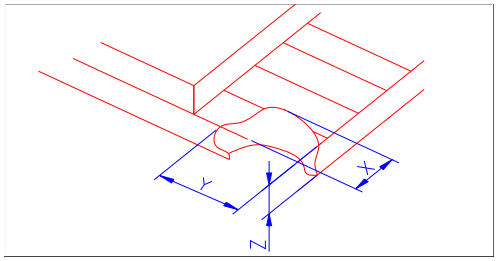
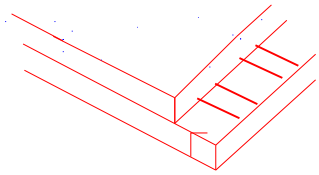
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Soldering appearance	Good soldering , Peeling off is not allowed.	
6	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

1.4 Criteria (Visual)

<table>
<tr><th>Number</th><th>Items</th><th>Criteria(mm)</th></tr>
<tr><td>1.0 LCD Crack/Broken

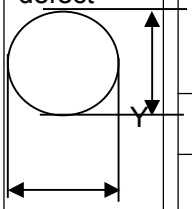
NOTE:
X: Length
Y: Width</td><td>(1) The edge of LCD broken</td><td> 

<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>
</table>

Z: Height L: Length of ITO, T: Height of LCD	(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>
	(3) LCD crack	 Crack Not allowed

Number	Items	Criteria (mm)

2.0 Spot defect



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		Ignore
0.10<Φ≤0.15	3(distance≧10mm)		
0.15<Φ≤0.2	1		
0.2<Φ	0		

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

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.1	Ignore		Ignore
0.1<Φ≤0.2	2(distance≧10mm)		
0.2<Φ≤0.3	1		
Φ＞0.3	0		

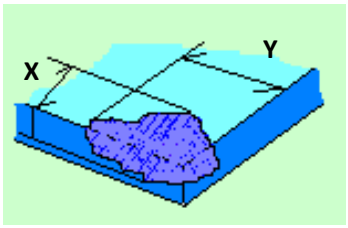
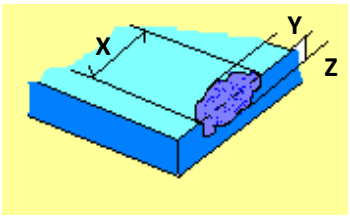
③ Polarizer accidented spot

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		

Line defect (LCD/TP /Polarizer black/white line, scratch, stain)

Width(mm)	Length(mm)	Acceptable Qty		
		A	B	C
Φ≤0.03	Ignore	Ignore		Ignore
0.03<W≤0.05	L≤3.0	N≤2		
0.05<W≤0.08	L≤2.0	N≤2		
0.08<W	Define as spot defect			

<table>
<tr><td>3.0</td><td>Polarizer Bubble</td><td colspan="3">
<table>
<tr><td rowspan="2">Zone
Size (mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.2</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.2<Φ≤0.4</td><td colspan="2">2(distance≧10mm)</td></tr>
<tr><td>0.4<Φ≤0.6</td><td colspan="2">1</td></tr>
<tr><td>0.6<Φ</td><td colspan="2">0</td></tr>
</table>
</td></tr>
<tr><td>4.0</td><td>SMT</td><td colspan="3">According to IPC-A-610C class Ⅱ standard . Function defect and missing part are major defect ,the others are minor defect.</td></tr>
<tr><td rowspan="3">5.0</td><td rowspan="3">TP Related</td><td>TP bubble/ accidented spot</td><td colspan="2">
<table>
<tr><td rowspan="2">Size Φ(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.1</td><td colspan="2">Ignore</td><td rowspan="4">Ignore</td></tr>
<tr><td>0.1<Φ≤0.2</td><td colspan="2">2（distance≧10mm）</td></tr>
<tr><td>0.2<Φ≤0.3</td><td colspan="2">1</td></tr>
<tr><td>0.3<Φ</td><td colspan="2">0</td></tr>
</table>
</td></tr>
<tr><td>Assembly deflection</td><td colspan="2">beyond the edge of backlight ≤0.15mm</td></tr>
<tr><td>Newton Ring</td><td>Newton Ring area>1/3 TP area NG
Newton Ring area≤1/3 TP area OK</td><td> 
</td></tr>
</table>

		TP corner broken X：length Y：width Z：height	X ≤3.0mm, Y ≤3.0mm, Z<LCD thickness *Circuitry broken is not allowed.	
		TP edge broken X：length Y：width Z：height	X ≤6.0mm, Y ≤2.0mm, Z<LCD 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

12.SUGGESTIONS FOR USING LCD MODULES

- **Safety instructions**

1. If the LCD panel breaks, be careful not to get any liquid crystal substance in your mouth.
2. If the liquid crystal substance touches your skin or clothes, please wash it off immediately by using soap and water.

- **Handling Precautions**

1. Avoid static electricity damaging the LSI.
2. Do not remove the panel or frame from the module .
3. The polarizing plate of the display is very fragile . So, please handle it very carefully.
4. Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of the plate.
5. The color tone of display and background of LCM has the possibility to be changed in the storage temperature range.
6. Pay attention to the working environment, as the element may be destroyed by static electricity.
   --Be sure to ground human body and electric appliance during work.
   --Avoid working in a dry environment to minimize the generations of static electricity.
   --Static electricity may be generated when the protective film is fast peeled off.
7. When soldering the terminal of LCM, make certain the AC power source of soldering iron does not leak.
8. If the display surface becomes contaminated ,breathe on the surface and gently wipe it with a soft-dry- clean cloth .If it is heavily contaminated ,moisten cloth with the following solvent(ex:Ethyl alcohol).Solvents other than those above-mentioned may damage the polarizer(Especially ,do not use them .ex: Warter / Ketone)

- **Operation instructions**

1. It is recommended to drive the LCD within the specified voltage limits, try to adjust the operating

voltage for the optimal contrast, the color and contrast of LCD panel will varies at different temperature.

2. Response time is greatly delayed at low operating temperature range. However, this does not mean the LCD will be out of the order, It will recover when it returns to the specified temperature range.
3. If the display area is pushed hard during operation, the display will become abnormal.
4. Do not operate the LCD at the environments over the specified conditions, this may cause damage on the LCD and shorten the lifetime.

- **Storage instructions**

1. Store LCDs in a sealed polyethylene bag.
2. Store LCDs in a dark place, Do not expose to sunlight or fluorescent light. Keep the temperature between 0℃and 35℃.
3. Avoid the polarizer touch any other object, (It is recommended to store them in the container in which they were shipped.)

- **Limited Warranty**

1. LEAD will replace or repair any of its LCD modules, which are found to be defective, when inspected in accordance with LEAD LCM acceptance standards (copies available upon request) for a period of 12 months from ink- print date on product
2. Any defects must be returned to LEAD within 60 days since ship-out. Confirmation of such date shall be based on freight documents. The warranty liability of LEAD limited to repair and/or replacement on defects above (7.1,7.2)
3. No warranty can be granted if the precautions stated above have been disregarded. The typical samples are as below:
   -- LCD glass crack/break
   --PCB outlet is damaged or modified.
   --PCB conductors damaged.
   --Circuit modified with by grinding, engraving or painting varnish.
   --FPC crack
4. Modules must be returned with sufficient description of the failures of defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB outlet, conductors and terminals. Modules must be packed with the container in which they were shipped.

12.PACKAGE SPECIFICATION

TBD