



新諾亞顯示技術股份有限公司
NEW NOAH DISPLAY TECHNOLOGY SHARES CO., LTD.

SPECIFICATION

MODULE NO	KNY2004ASDBTSW-5APWN
VERSION	
CUSTOMER	
APPROVE by	

Sale by	Check by	Prepare by

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ISSUE RECORD

NO.	VER.	DATE	MODIFY REASON	MODIFY CONTENTS
1	A	2008/5/29	New issued	

www.xinnoya.com

1. Precaution in use of LCD Module

- (1) Avoid applying excessive shocks to the module or making any alterations or modifications to it.
- (2) Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD module.
- (3) Don't disassemble the LCM.
- (4) Don't operate it above the absolute maximum rating.
- (5) Don't drop, bend or twist LCM.
- (6) Soldering: only to the I/O terminals.
- (7) Storage: please storage in anti-static electricity container and clean environment.
- (8) Don't touch the elastomer connector, especially insert a backlight panel (EL or CCFL)

2. General Specification

2.1 Mechanical Dimension

Item	Dimension	Unit
Number of Dots	20 * 04	dots
Module dimension (L x W x H)	98.0 x 60.0 x 13.5(MAX)	mm
View area	76.0 x 26.0	mm
Active area	70.40 x 20.80	mm
Dot size	0.55x 0.55	mm
Dot pitch	0.60 x 0.60	mm
LCD TYPE	STN Blue	
Viewing Direction	6H	
Backlight	LED White	
Controller IC	SPLC780D controller or equivalent	

3. Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	Vdd-Vss	—	4.5	—	5.5	V
Supply Voltage For LCD	VLCD	Ta=-20°C	—	3.0	—	V
		Ta=25°C	—		11	V
		Ta=+70°C	—		—	V
Input High Volt.	V _{IH}	—	2.5	—	Vdd	V
Input Low Volt.	V _{IL}	—	-0.3	—	0.6	V
Output High Volt.	V _{OH}	—	2.4	—	Vdd	V
Output Low Volt.	V _{OL}	—	—	—	0.4	V
Supply Current	I _{dd}	Vdd=5V	—	0.55	0.8	mA

3.1 Electrical Absolute Maximum Ratings

(V_{ss}=0V, Ta=25°C)

Item		Symbol	Min	Max	Unit
Supply Voltage (Logic)		Vdd	-0.3	7.0	V
Supply Voltage(LCD driver)		Vlcd	Vdd-12	Vdd+0.3	V
Input Voltage		V _I	-0.3	Vdd+0.3	V
Normal Temp. Type	Operation Temp.	TOP	0	50	°C
	Storage Temp.	TSTG	-10	60	°C
Wide Temp. Type	Operation Temp.	TOP	-20	70	°C
	Storage Temp.	TSTG	-30	80	°C

4. Interface Description

Pin No.	Symbol	Level	Description
1	Vss	0V	Ground
2	Vdd	5.0V	Supply voltage for logic (option +3.3V)
3	V _O	(Variable)	Operating voltage for LCD
4	RS	H/L	H: Data , L: Instruction
5	R/W	H/L	H: Read(MPU←Module) , L :Write(MPU→Module)
6	E	H	Enable signal
7	DB0	H/L	Data bus line
8	DB1	H/L	Data bus line
9	DB2	H/L	Data bus line
10	DB3	H/L	Data bus line
11	DB4	H/L	Data bus line
12	DB5	H/L	Data bus line
13	DB6	H/L	Data bus line
14	DB7	H/L	Data bus line
15	BLA	—	Power supply for B/L (+)
16	BLK	—	Power supply for B/L (-)

5. Backlight Information

5.1 Specification

- LED edge white

Parameter	Symbol	Min	Typical	Max	Unit	Test Condition
Supply Current	I _{LED}	—	50	—	mA	V _{LED} =3.0V
Supply Voltage	V		3.0	3.2	V	—
Reverse Voltage	V _R	—	—	5	V	—
Luminous Intensity	I _V	>100	—	—	cd/m ²	I _{LED} =50mA
Chromaticity	X	—	0.30	—		I _{LED} =50mA
	Y		0.31			
Life Time	—	—	35,000	—	Hr.	V ≤ 3.2V
Color	white					

5.2 Backlight driving methods

LED B/L drive from pin15 (LED+) pin16 (LED-) OR pin A (LED+) pin K(LED-)

6. Timing Characteristics

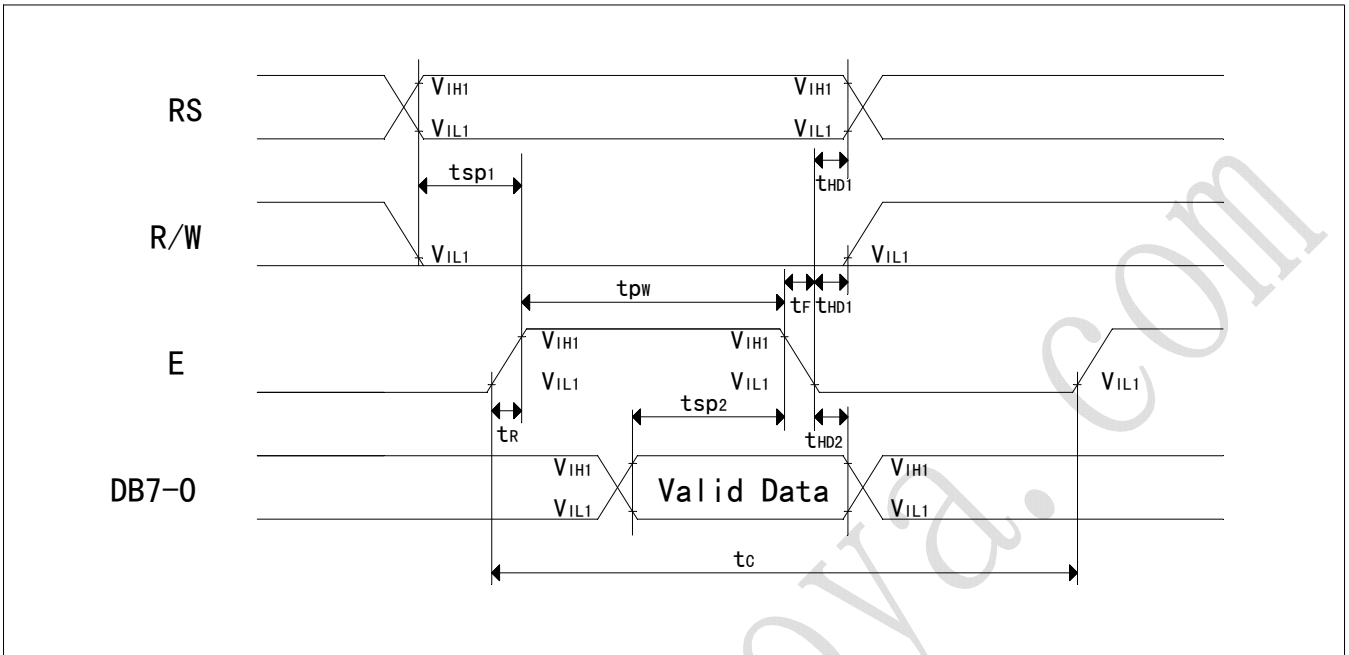
6.1 Write mode (writing Data from MPU to SPLC780D)

Characteristic	Symbol	Min	Typ	Max	Unit
E cycle Time	t_c	500	-	-	ns
E Pulse width	t_{pw}	230	-	-	ns
E Rise/Fall Time	$t_r, t_f,$	-	-	20	ns
Address setup time	t_{SP1}	40	-	-	ns
Address Hold time	t_{HD1}	10	-	-	ns
Data Setup time	t_{SP2}	80	-	-	ns
Data hold time	t_{HD2}	10	-	-	ns

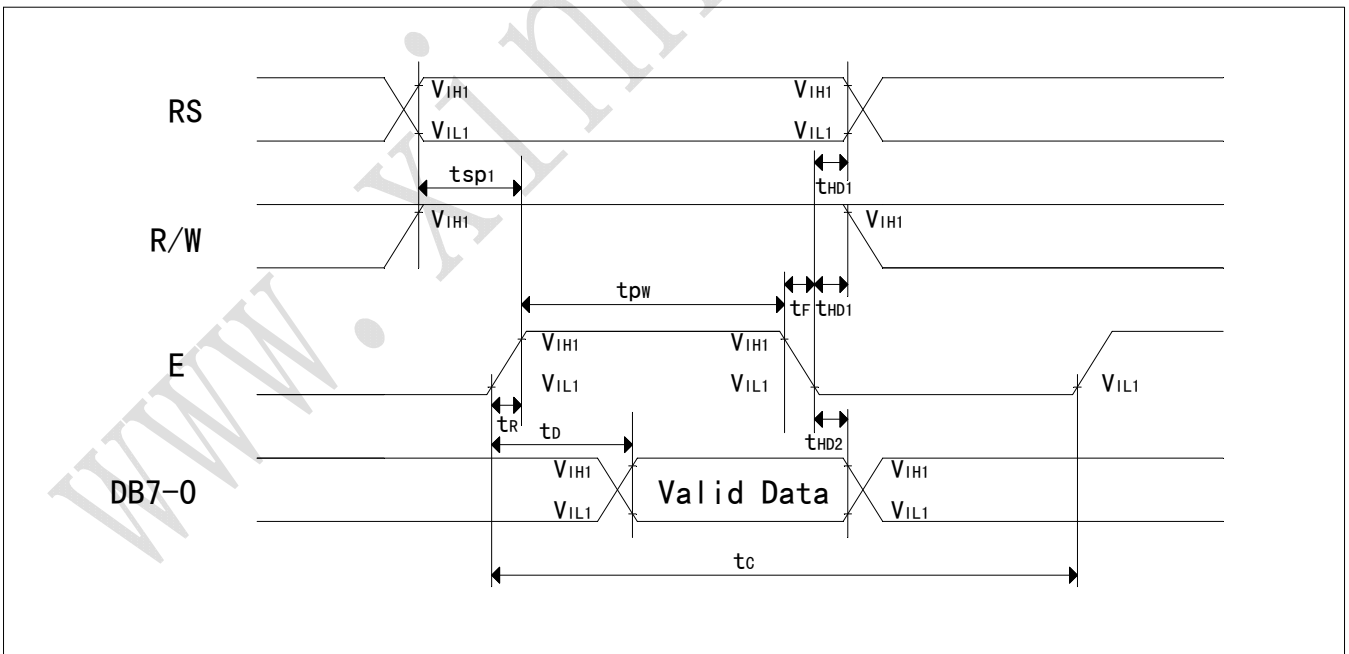
6.2 Read mode (Reading Data from SPLC780D to MPU)

Characteristic	Symbol	Min	Typ	Max	Unit
E cycle Time	t_c	500	-	-	ns
E Pulse width	t_{pw}	230	-	-	ns
E Rise/Fall Time	$t_r, t_f,$	-	-	20	ns
Address setup time	t_{SP1}	40	-	-	ns
Address Hold time	t_{HD1}	10	-	-	ns
Data Output Delay time	t_D	-	-	120	ns
Data hold time	t_{HD2}	5.0	-	-	ns

MPU Write Timing



MPU Read Timing



7.SPLC780D controller data

The display control instructions control the internal state of the SPLC780D. Instruction is received from MPU to SPLC780D for the display control. The following table shows various instructions.

Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
Clear Display	0	0	0	0	0	0	0	0	0	1	Write “20H” to DDRAM and set DDRAM address to “00H” from AC
Return Home	0	0	0	0	0	0	0	0	1	-	Set DDRAM address to “00H” from AC and return cursor to its original position if shifted. The contents of DDRAM are not changed.
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	S	Assign cursor moving direction and enable the shift of entire display.
Display ON/OFF Control	0	0	0	0	0	0	1	D	C	B	Set display (D), cursor(C), and blinking of cursor(B), on/off control bit.
Cursor or Display Shift	0	0	0	0	0	1	S/C	R/L	-	-	Set cursor moving and display Shift control bit, and the direction, without changing of DDRAM data.
Function Set	0	0	0	0	1	DL	N	F	-	-	Set interface data length (DL:8-bit/4-bit), numbers of display line (N:2-line/1-line) and, display font type (F:5x10dots/5x8dots)
Set CGRAM Address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	Set CGRAM Address in Address counter.
Set DDRAM Address	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Set DDRAM Address in Address counter.
Read Busy Flag and Address Counter	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Whether during internal operation or not can be known by reading BF. The contents of address counter can also be read.
Write Data from RAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data into internal RAM(DDRAM/CGRAM).
Read Data from RAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from internal RAM(DDRAM/CGRAM).

8. Optical Characteristics

8.1 OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
View Angle	(V) θ	$CR \geq 2$	10		45	deg
	(H) φ	$CR \geq 2$	-30		30	deg
Contrast Ratio	CR	—		3		—
Response Time 25°C	T rise	—		100	150	ms
	T fall	—		150	200	ms

Conditions :

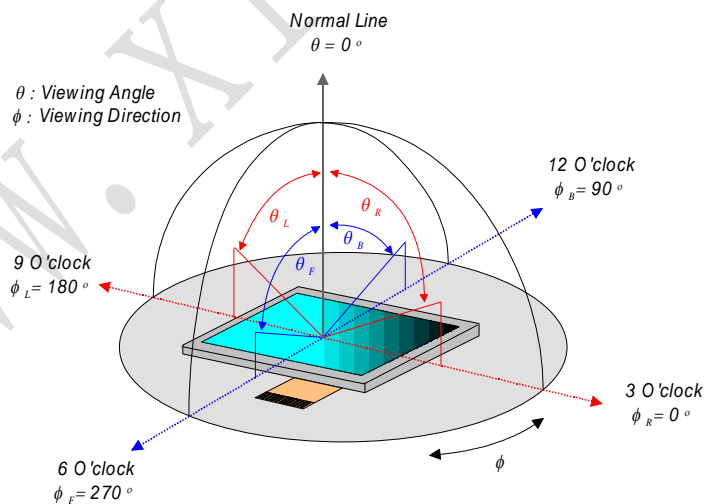
Operating Voltage : Vop

Viewing Angle(θ , φ) : 0° , 0°

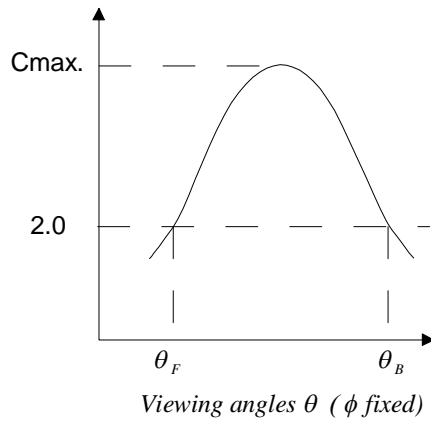
Frame Frequency : 64 HZ

Driving Waveform : 1/N duty , 1/a bias

8.2 Definition of Viewing Angle and Optimum Viewing Area



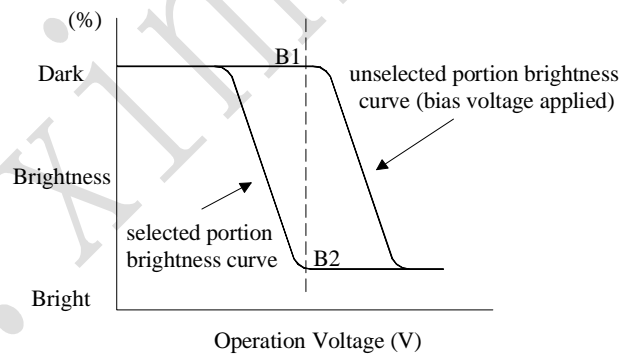
8.3 Definition of Viewing Angle θ_F and θ_B



Optimum viewing angle with the naked eye and viewing angle θ at C_{max} . Above are not always the same.

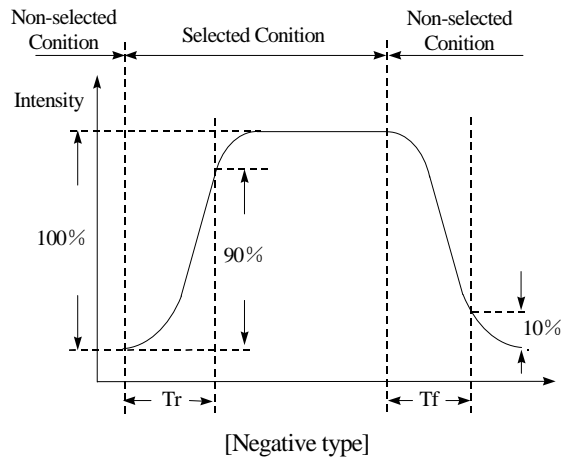
8.4 Definition of Contrast CR

$CR = \text{Brightness of selected dot (B1)} / \text{Brightness of unselected dot (B2)}$

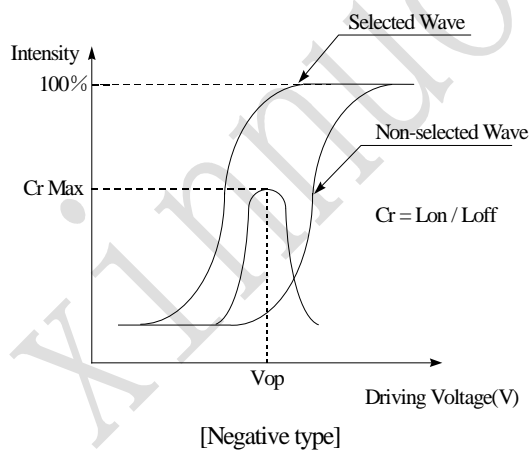


8.5 Definition of Response Time

(Tr , Tf)

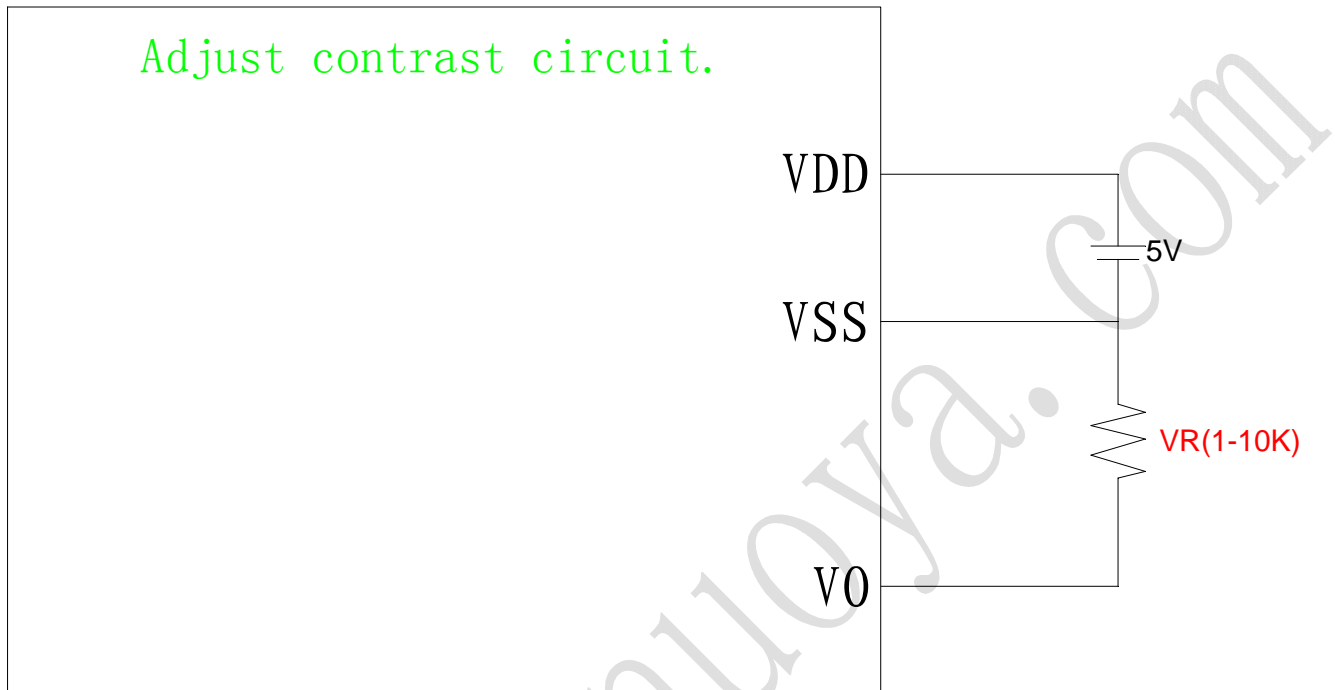


8.6 Definition of Operation Voltage (Vop)



9. Power Supply for LCD Module and LCD Operating Voltage

Adjustment



Remark:When the display screen have resistance R7,do not use the above circuit, because have already adjusted the contrast on the screen; When the display screen R7 is empty, use the above circuit.

10. Reliability

Content of Reliability Test

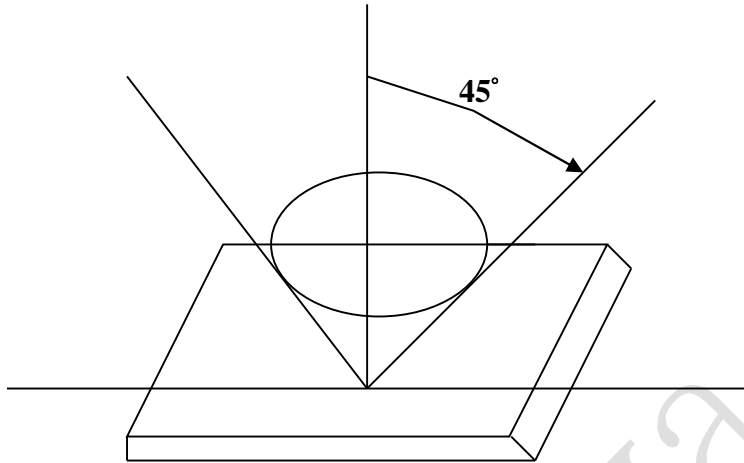
Environmental Test				
No.	Test Item	Content of Test	Test Condition	Applicable Standard
1	High Temperature storage	Endurance test applying the high storage temperature for a long time.	60°C 96hrs	—
2	Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-10°C 96hrs	—
3	High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	50°C 96hrs	—
4	Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	0°C 96hrs	—
5	High Temperature/ Humidity Storage	Endurance test applying the high temperature and high humidity storage for a long time.	70°C, 90%RH 96hrs	—
6	High Temperature/ Humidity Operation	Endurance test applying the electric stress (Voltage & Current) and temperature / humidity stress to the element for a long time.	40°C, 90%RH 96hrs	—
7	Temperature Cycle	Endurance test applying the low and high temperature cycle. <div style="text-align: center;"> $\leftarrow -10^{\circ}\text{C} \quad 25^{\circ}\text{C} \quad 60^{\circ}\text{C} \rightarrow$ 30min 5min 30min 1 cycle </div>	-10°C/60°C 10 cycles	—
Mechanical Test				
8	Vibration test	Endurance test applying the vibration during transportation and using.	10~22Hz→1.5mmp-p 22~500Hz→1.5G Total 0.5hrs	—
9	Shock test	Constructional and mechanical endurance test applying the shock during transportation.	50G Half sign wave 11 msdc 3 times of each direction	—
10	Atmospheric pressure test	Endurance test applying the atmospheric pressure during transportation by air.	115mbar 40hrs	—
Others				
11	Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V, RS=1.5kΩ CS=100pF 1 time	—

***Supply voltage for logic system=5V. Supply voltage for LCD system =Operating voltage at 25°C

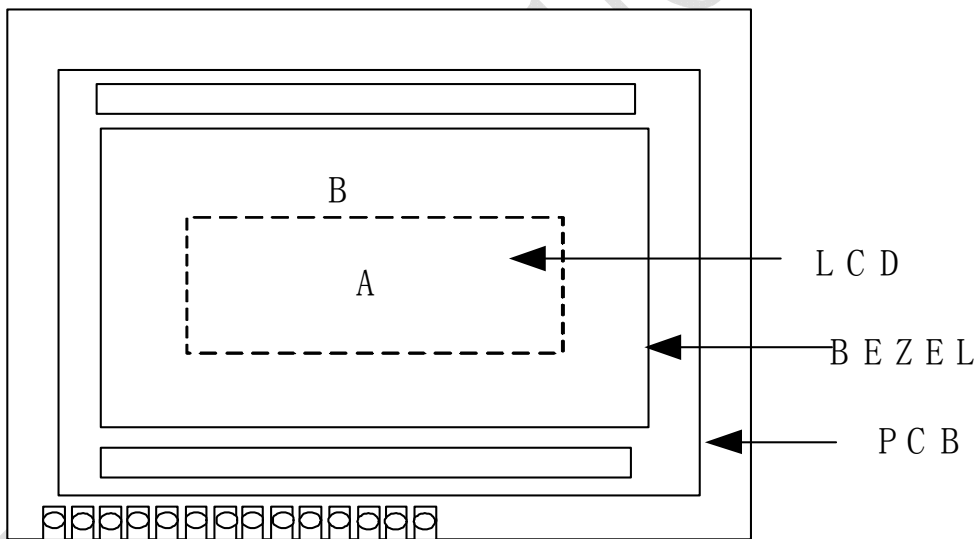
11. Quality Assurance

11.1 Inspection conditions

The LCD shall be inspected under 40W white fluorescent light.



Definition of applicable Zones

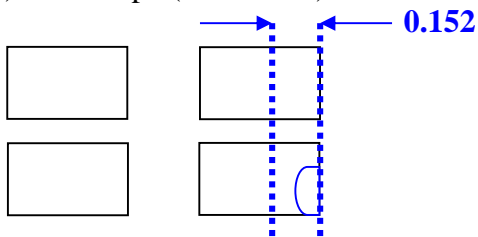
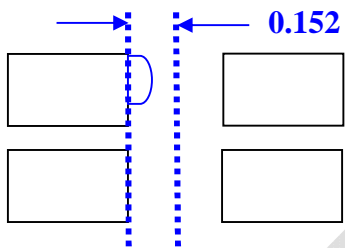
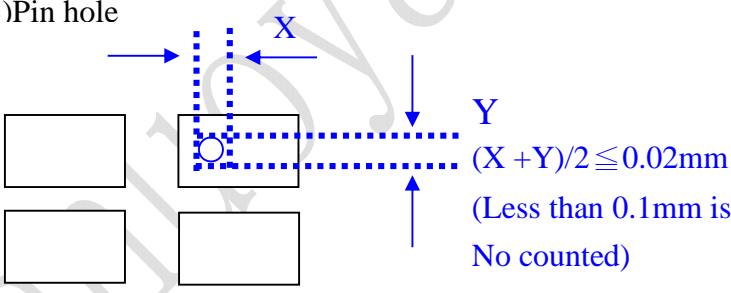
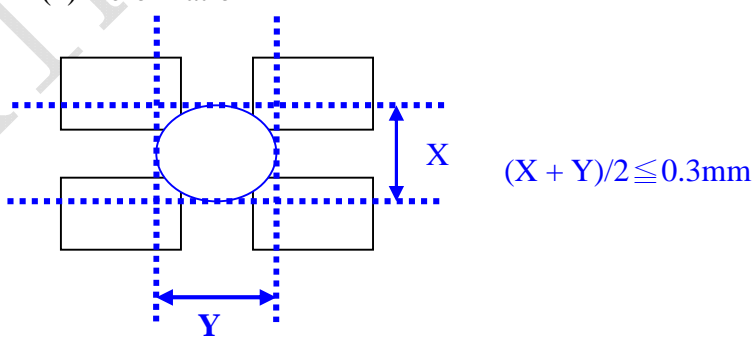


A : Display Area

B : Non-Display Area

11.2 Inspection Parameters

NO.	Parameter	Criteria																								
1	Black or White spots	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="width: 20%;">Zone Dimension</th> <th colspan="2" style="width: 20%;">Acceptable Number</th> <th rowspan="2" style="width: 20%;">Class Of Defects</th> <th rowspan="2" style="width: 20%;">Acceptable Level</th> </tr> <tr> <th style="width: 10%;">A</th> <th style="width: 10%;">B</th> </tr> </thead> <tbody> <tr> <td>$D < 0.15$</td> <td style="text-align: center;">*</td> <td style="text-align: center;">*</td> <td rowspan="4" style="text-align: center;">Minor</td> <td rowspan="4" style="text-align: center;">2.5</td> </tr> <tr> <td>$0.15 \leq D \leq 0.2$</td> <td style="text-align: center;">4</td> <td style="text-align: center;">4</td> </tr> <tr> <td>$0.2 \leq D \leq 0.25$</td> <td style="text-align: center;">2</td> <td style="text-align: center;">2</td> </tr> <tr> <td>$D \leq 0.3$</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> </tr> </tbody> </table> <p>$D = (\text{Long} + \text{Short})/2$ *: Disregard</p>	Zone Dimension	Acceptable Number		Class Of Defects	Acceptable Level	A	B	$D < 0.15$	*	*	Minor	2.5	$0.15 \leq D \leq 0.2$	4	4	$0.2 \leq D \leq 0.25$	2	2	$D \leq 0.3$	0	1			
Zone Dimension	Acceptable Number			Class Of Defects	Acceptable Level																					
	A	B																								
$D < 0.15$	*	*	Minor	2.5																						
$0.15 \leq D \leq 0.2$	4	4																								
$0.2 \leq D \leq 0.25$	2	2																								
$D \leq 0.3$	0	1																								
2	Scratch, Substances	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="width: 20%;">Zone X(mm)/Y(mm)</th> <th colspan="2" style="width: 20%;">Acceptable Number</th> <th rowspan="2" style="width: 20%;">Class Of Defects</th> <th rowspan="2" style="width: 20%;">Acceptable Level</th> </tr> <tr> <th style="width: 10%;">A</th> <th style="width: 10%;">B</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">*</td> <td style="text-align: center;">$0.04 \geq W$</td> <td style="text-align: center;">*</td> <td style="text-align: center;">*</td> <td rowspan="4" style="text-align: center;">Minor 2.5</td> </tr> <tr> <td style="text-align: center;">$3.0 \geq L$</td> <td style="text-align: center;">$0.06 \geq W$</td> <td style="text-align: center;">4</td> <td style="text-align: center;">4</td> </tr> <tr> <td style="text-align: center;">$2.0 \geq L$</td> <td style="text-align: center;">$0.08 \geq W$</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">—</td> <td style="text-align: center;">$0.1 < W$</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> </tr> </tbody> </table> <p>X: Length Y: Width *: Disregard Total defects should not exceed 4/module</p>	Zone X(mm)/Y(mm)	Acceptable Number		Class Of Defects	Acceptable Level	A	B	*	$0.04 \geq W$	*	*	Minor 2.5	$3.0 \geq L$	$0.06 \geq W$	4	4	$2.0 \geq L$	$0.08 \geq W$	2	3	—	$0.1 < W$	0	1
Zone X(mm)/Y(mm)	Acceptable Number			Class Of Defects	Acceptable Level																					
	A	B																								
*	$0.04 \geq W$	*	*	Minor 2.5																						
$3.0 \geq L$	$0.06 \geq W$	4	4																							
$2.0 \geq L$	$0.08 \geq W$	2	3																							
—	$0.1 < W$	0	1																							
3	Air Bubbles (between glass & polarizer)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2" style="width: 20%;">Zone Dimension</th> <th colspan="2" style="width: 20%;">Acceptable Number</th> <th rowspan="2" style="width: 20%;">Class Of Defects</th> <th rowspan="2" style="width: 20%;">Acceptable Level</th> </tr> <tr> <th style="width: 10%;">A</th> <th style="width: 10%;">B</th> </tr> </thead> <tbody> <tr> <td>$D \leq 0.15$</td> <td style="text-align: center;">*</td> <td style="text-align: center;">*</td> <td rowspan="3" style="text-align: center;">Minor</td> <td rowspan="3" style="text-align: center;">2.5</td> </tr> <tr> <td>$0.15 < D \leq 0.25$</td> <td style="text-align: center;">2</td> <td style="text-align: center;">*</td> </tr> <tr> <td>$0.25 < D$</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> </tr> </tbody> </table> <p>*: Disregard Total defects shall not excess 3/module.</p>	Zone Dimension	Acceptable Number		Class Of Defects	Acceptable Level	A	B	$D \leq 0.15$	*	*	Minor	2.5	$0.15 < D \leq 0.25$	2	*	$0.25 < D$	0	1						
Zone Dimension	Acceptable Number			Class Of Defects	Acceptable Level																					
	A	B																								
$D \leq 0.15$	*	*	Minor	2.5																						
$0.15 < D \leq 0.25$	2	*																								
$0.25 < D$	0	1																								

4.	Uniformity	<p>(1)Pixel shape (with Dent)</p>  <p>(2)Pixel shape (with Projection)</p>  <p>(3)Pin hole</p>  <p>(4) Deformation</p>  <p>Total acceptable number: 1/pixel ;.5/cell</p>
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12.Numbering system

KNY 2004 A S D B T S W - 5 A P W N
 1 2 3 4 5 6 7 8 9 10 11 12 13 14

1. Display Type:

KNY	New Noah company's brand
LCM	Neutral type
Other	The customer designated named

2. Number of Pixels:

Character Module	Characters per line × Lines
Graphic Module	Row Dots × Column Dots

3. Series number:

(A-Z) - (1-20)	Series Number
----------------	---------------

4.LCD type:

TN	HTN	STN	FSTN	DFSTN
T	H	S	F	D

5.LCD Polarize:

6:00	12:00	3:00	9:00
D	U	E	W

6.LCD Mode:

	Positive	Negative	Black
TN/HTN/FSTN/ DFSTN	P	N	V
	Yellow	Blue	Gray
STN	Y	B	G

7.LCD pervious to light :

Transmissive	Transflective	Reflective
T	F	R

8. Backlight type:

None	EL	LED	LED	CCFL
N	E	M	S	C
No backlight	EL backlight	The bottom of the LED light	The LED side light	Bulb light

9. Backlight color:

None	White	Green	Yellow	Red	Amber	Blue
N	W	G	Y	R	A	B

10. Module voltage

3	Module power supply to 3.3 V
5	Module power supply to 5.0 V
Other	The customer request module power supply

11. Contrast

N	Without Negative Voltage
A	Contrast external regulation
F	Fixed on module
T	Temperature Compensation
S	Customer special requirement

11. Module interface

S	serial port
P	Parallel port
N	Don't choose

13. Module temperature

R	Work environment 0 to 40 °C
W	Work environment -20 to 70 °C
O	Work environment -30 to 80 °C

14. Touch screen

C	With touch screen
N	Without a touch screen

13. Dimensional Outlines

REV.	DESCRIPTION	NAME	DATE

Pin	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Symbol	VSS	VDD	V0	RS	RW	E	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	BLA	BLK

UNIT : mm

VIEWING DIRECTION

新諾亞顯示技術股份有限公司

DWN :	XXJ	2008-05-29	MODEL NO.	KNT2004A	UNITS :	mm
CHK :		TEL:	86-755-29440039	SCALE :	NTS	
APP :		FAX:	86-755-81752033	ANGLES:	±0.5°	
TOLERANCES UNLESS OTHERWISE SPECIFIED:±0.2				SHEET :	1 OF 1	