



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

**SPECIFICATION**

MODULE NO	KNY12864J-3SDBTSW-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	

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## **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	128 x 64	dots
Module dimension (L x W x H)	93.0 x 70.0 x 13.0(MAX)	mm
View area	70.7 x 38.8	mm
Active area	66.52 x 33.24	mm
Dot size	0.48x 0.48	mm
Dot pitch	0.52 x 0.52	mm
LCD TYPE	STN Blue	
Viewing Direction	6H	
Backlight	LED White	
Controller IC	KS0107 / KS0108 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	Vdd-Vo	Ta=-20°C	—	8.0	—	V
		Ta=25°C	—		—	V
		Ta=+70°C	—		—	V
Input High Volt.	V <sub>IH</sub>	—	0.7Vdd	—	Vdd	V
Input Low Volt.	V <sub>IL</sub>	—	0	—	0.3Vdd	V
Output High Volt.	V <sub>OH</sub>	—	2.4	—	—	V
Output Low Volt.	V <sub>OL</sub>	—	0	—	0.4	V
Supply Current	I <sub>dd</sub>	Vdd=5V	—	4	—	mA

#### 3.1 Electrical Absolute Maximum Ratings

(V<sub>ss</sub>=0V, Ta=25°C)

Item		Symbol	Min	Max	Unit
Supply Voltage (Logic)		Vdd- Vss	-0.3	6.7	V
Supply Voltage(LCD driver)		Vdd-Vo	-0.3	16.7	V
Input Voltage		V <sub>I</sub>	V <sub>ss</sub>	Vdd	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 <sub>O</sub>	(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	CSA	H/L	Chip Select for IC1
16	CSB	H/L	Chip Select for IC2
17	/RST	L	Reset signal
18	VEE		Negative Voltage output -10V
19	A	—	Power supply for B/L ( + )
20	K	—	Power supply for B/L (GND)

## 5. Backlight Information

### 5.1 Specification

- LED edge white

Parameter	Symbol	Min	Typical	Max	Unit	Test Condition
Supply Current	I <sub>LED</sub>	—	70	—	mA	V <sub>LED</sub> =3.0V
Supply Voltage	V		3.0	3.2	V	—
Reverse Voltage	V <sub>R</sub>	—	—	5	V	—
Luminous Intensity	I <sub>V</sub>	>60	—	—	cd/m <sup>2</sup>	I <sub>LED</sub> =70mA
Chromaticity	X	—	0.30	—		I <sub>LED</sub> =70mA
	Y		0.31			
Life Time	—	—	35,000	—	Hr.	V ≤ 3.2V
Color	white					

### 5.2 Backlight driving methods

LED B/L drive from pin19 (LED+) pin20 (LED-) OR pin A (LED+) pinK(LED-)

## 6. Timing Characteristics

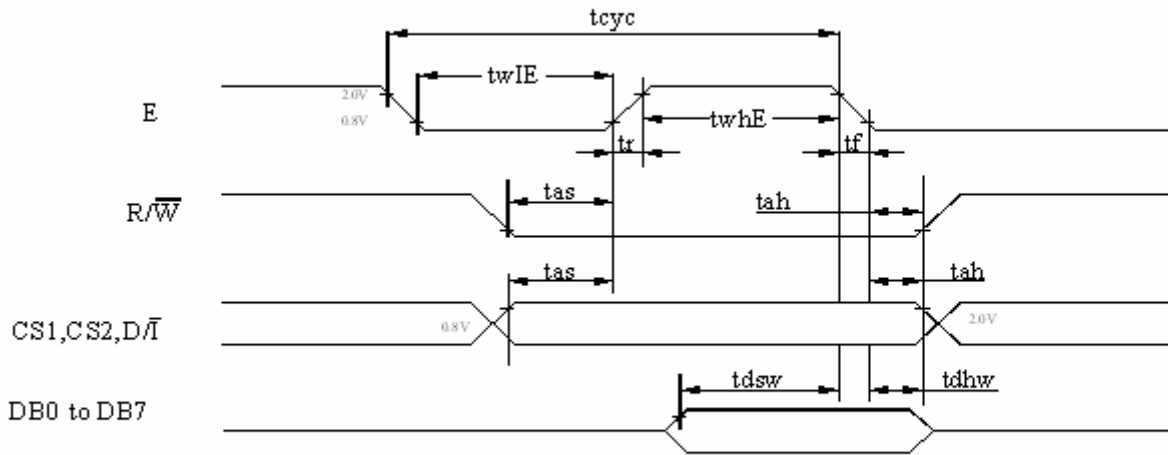
MPU Interface

(T=25°C, VDD=+5.0V±0.5)

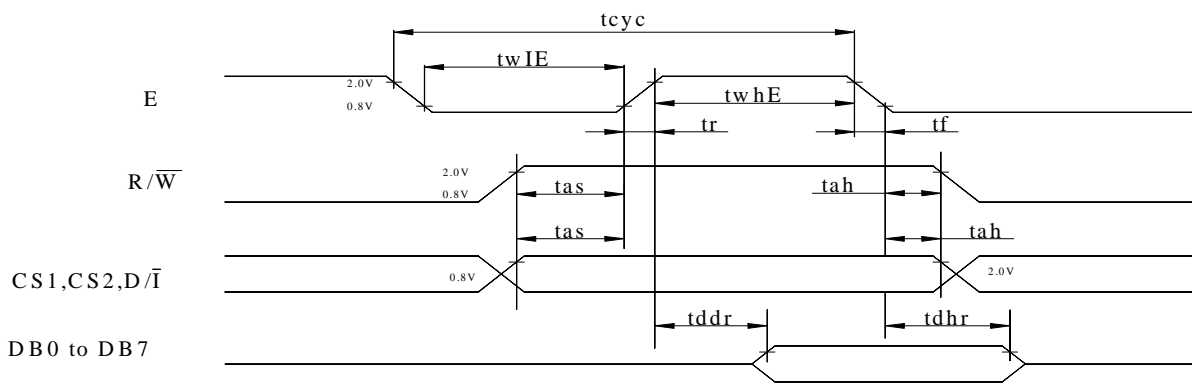
Characteristic	Symbol	Min	Typ	Max	Unit
E cycle	t <sub>cyE</sub>	1000	-	-	ns
E high level width	t <sub>whE</sub>	450	-	-	ns
E low level width	t <sub>wlE</sub>	450	-	-	ns
E rise time	t <sub>r</sub>	-	-	25	ns
E fall time	t <sub>f</sub>	-	-	25	ns
Address set-up time	t <sub>as</sub>	140	-	-	ns
Address hold time	t <sub>ah</sub>	10	-	-	ns
Data set-up time	t <sub>dsw</sub>	200	-	-	ns
Data delay time	t <sub>ddr</sub>	-	-	320	ns
Data hold time (write)	t <sub>dhw</sub>	10	-	-	ns
Data hold time (read)	t <sub>dhr</sub>	20	-	-	ns

MPU Write Timing





MPU Read Timing



## 7.KS0108 controller data

The display control instructions control the internal state of the KS0108B. Instruction is received from MPU to KS0108B for the display control. The following table shows various instructions.

Instruction	D/I	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Function
Display ON/OFF	0	0	0	0	1	1	1	1	1	0/1	Controls the display on or off. Internal status and display RAM data are not affected. 0:OFF, 1:ON
Set Address	0	0	0	1	Y address (0~63)					Sets the Y address in the Y address counter.	
Set Page (X address)	0	0	1	0	1	1	1	Page (0 ~7)		Sets the X address at the X address register.	
Display Start Line	0	0	1	1	Display start line(0~63)					Indicates the display data RAM displayed at the top of the screen.	
Status Read	0	1	B U S Y	0	ON/ OFF	R E S E T	0	0	0	0	Read status. BUSY 0:Ready 1:In operation ON/OFF 0:Display ON 1:Display OFF RESET 0:Normal 1:Reset
Write Display Data	1	0	Display Data								Writes data (DB0:7) into display data RAM. After writing instruction, Y address is increased by 1 automatically.
Read Display Data	1	1	Display Data								Reads data (DB0:7) from display data RAM to the data bus.

## 7.1 Detailed Explanation

### Display On/Off

R/W	D/I	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	1	1	1	1	1	D

The display data appears when D is 1 and disappears when D is 0. Though the data is not on the screen with D = 0, it remains in the display data RAM. Therefore, you can make it appear by changing D = 0 into D = 1.

### Display Start Line

R/W	D/I	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	A	A	A	A	A	A

Z address AAAAAA ( binary ) of the display data RAM is set in the display start line register and displayed at the top of the screen. Figure 2. shows examples of display ( 1/64 duty cycle ) when the start line = 0-3. When the display duty cycle is 1/64 or more ( ex. 1/32, 1/24 etc. ), the data of total line number of LCD screen, from the line specified by display start line

### Set Page ( X Address )

R/W	D/I	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	1	1	A	A	A

X address AAA ( binary ) of the display data RAM is set in the X address register. After that, writing or reading to or from MPU is executed in this specified page until the next page is set. See Figure 1.

### Set Y Address

R/W	D/I	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	1	A	A	A	A	A	A

Y address AAAAAA ( binary ) of the display data RAM is set in the Y address counter. After that, Y address counter is increased by 1 every time the data is written or read to or from MPU.

Status Read

R/W	D/I	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	Busy	0	On/Off	RESET	0	0	0	0

◆ •Busy

When busy is 1, the LSI is executing internal operations. No instruction are accepted while busy is 1, so you should make sure that busy is 0 before writing the next instruction.

◆ •ON/OFF

Shows the liquid crystal display condition: on condition or off condition.

When on/off is 1, the display is in off condition.

When on/off is 0, the display is in on condition.

◆ •RESET

RESET = 1 shows that the system system is being initialized. In this condition, no instructions except status read can be accepted.

RESET = 0 shows that initializing has system is in the usual operation condition.

Write Display Data

R/W	D/I	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	D	D	D	D	D	D	D	D

Writes 8-bit data DDDDDDDD ( binary ) into the display data RAM. The Y address is increased by 1 automatically.

Read Display Data

R/W	D/I	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	D	D	D	D	1	D	D	D

Reads out 8-bit data DDDDDDDD (binary) from the display data RAM. Then Y address is increased by 1 automatically.

One dummy read is necessary right after the address setting. For details, refer to the explanation of output register in “Function of Each Block”.

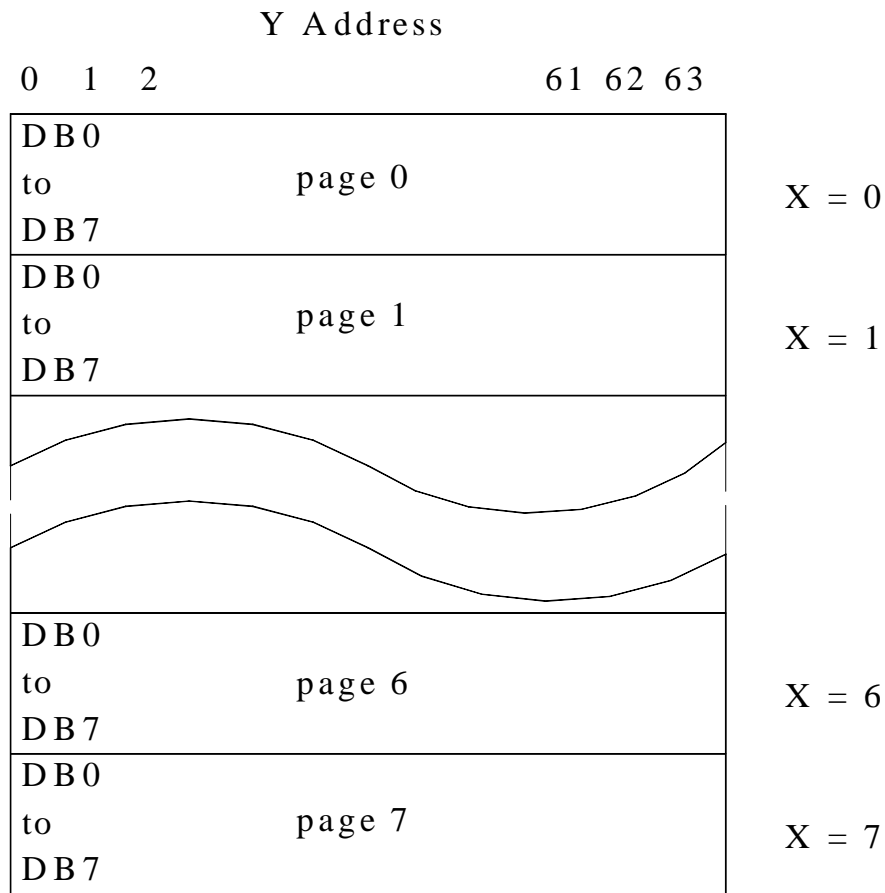
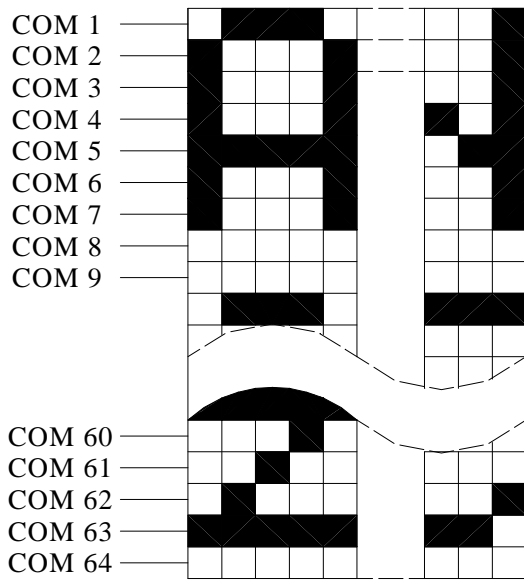
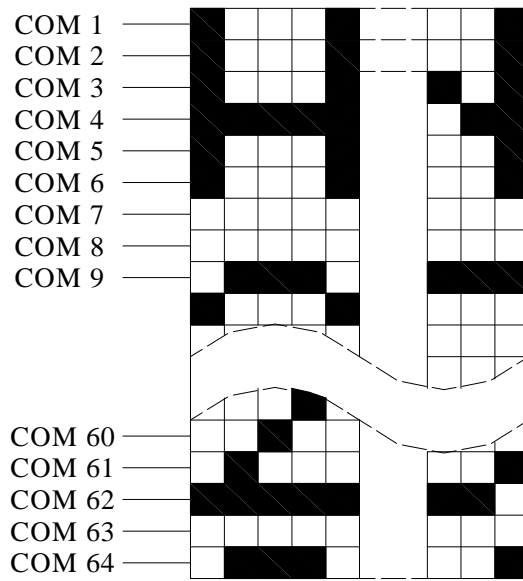


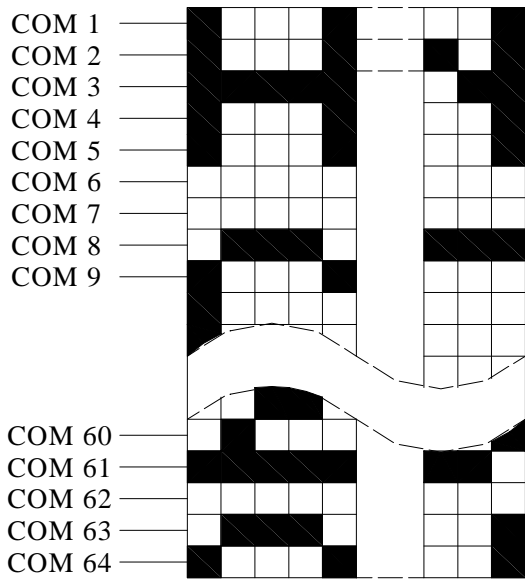
Figure 1.



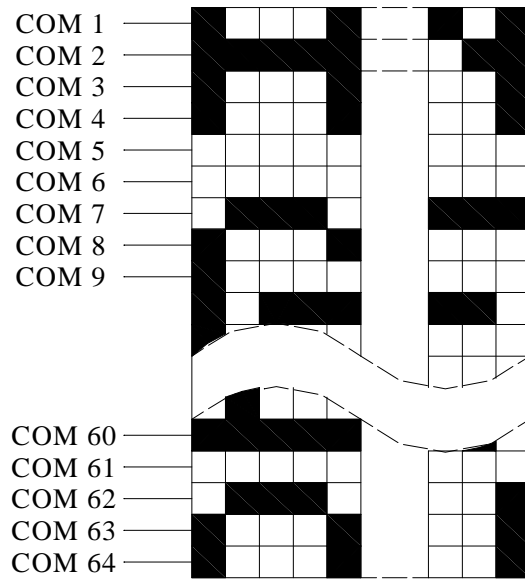
Start line = 0



Start line = 1



Start line = 3



Start line = 4

Figure 2

## 8. Optical Characteristics

### 8.1 OPTICAL CHARACTERISTICS

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

#### Conditions :

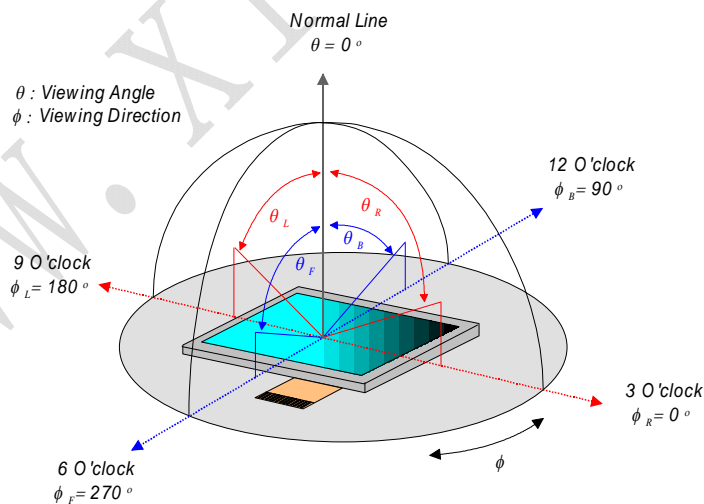
Operating Voltage : Vop

Viewing Angle( $\theta$  ,  $\varphi$ ) : 0° , 0°

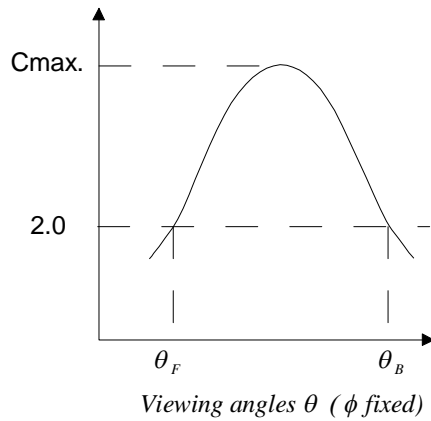
Frame Frequency : 64 HZ

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

### 8.2 Definition of Viewing Angle and Optimum Viewing Area



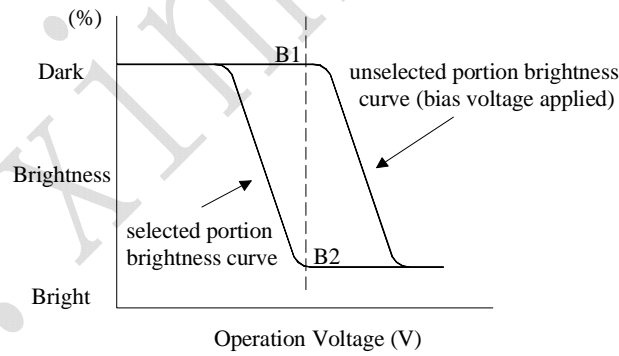
### 8.3 Definition of Viewing Angle $\theta_F$ and $\theta_B$



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

### 8.4 Definition of Contrast CR

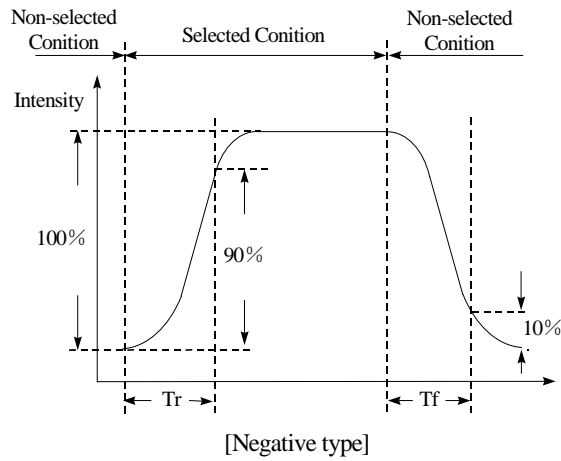
$CR = \text{Brightness of selected dot (B1)} / \text{Brightness of unselected dot (B2)}$



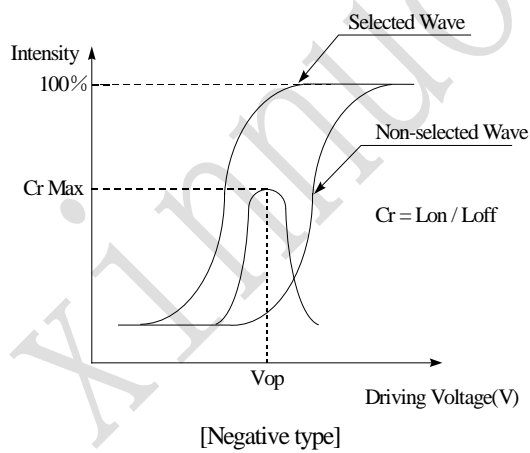


### 8.5 Definition of Response Time

( Tr , Tf )

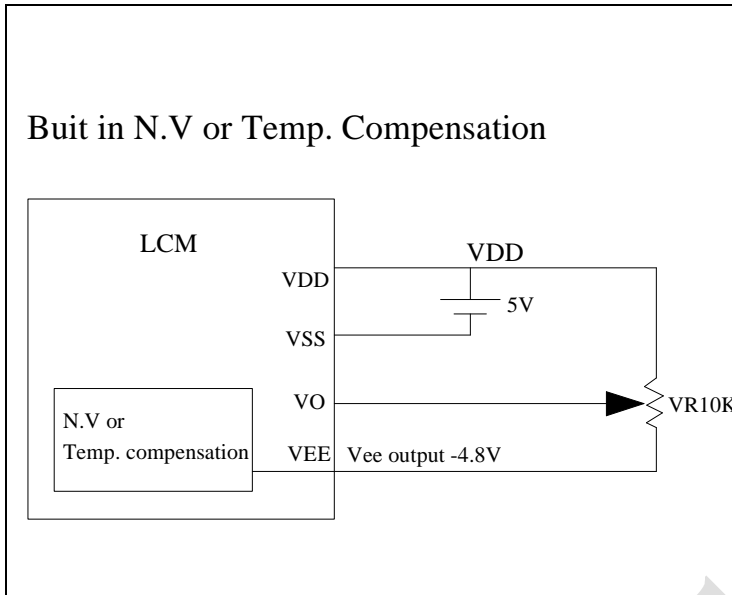


### 8.6 Definition of Operation Voltage (Vop)



## 9. Power Supply for LCD Module and LCD Operating Voltage

### Adjustment



## 10. Reliability

### Content of Reliability Test

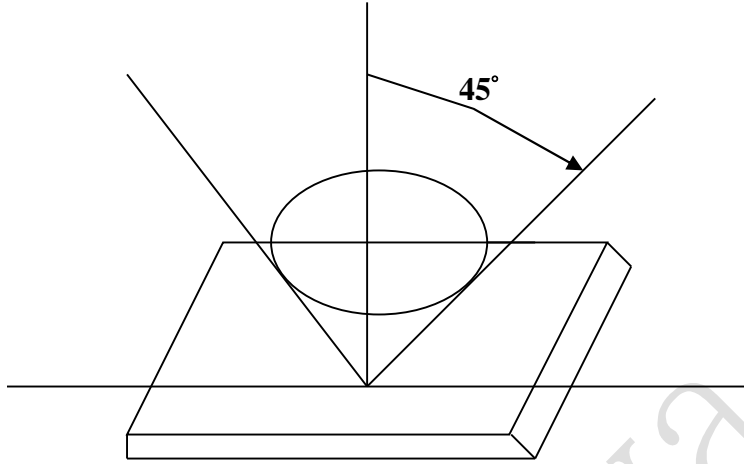
Environmental Test				
No.	Test Item	Content of Test	Test Condition	Applicable Standard
1	High Temperature storage	Endurance test applying the high storage temperature for a long time.	60°C 96hrs	—
2	Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-10°C 96hrs	—
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;"> <math>\leftarrow -10^{\circ}\text{C} \quad 25^{\circ}\text{C} \quad 60^{\circ}\text{C} \rightarrow</math>                      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

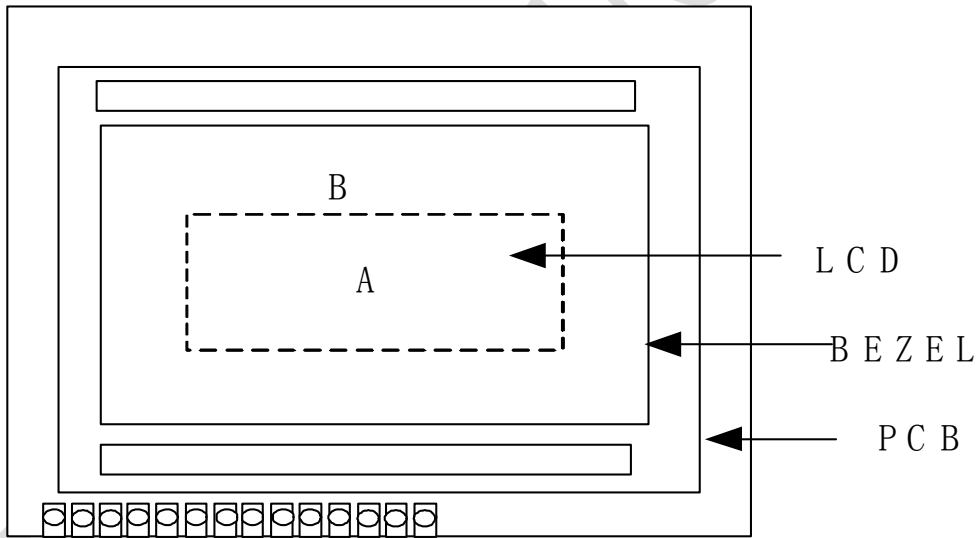
## 11. Quality Assurance

### 11.1 Inspection conditions

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



Definition of applicable Zones

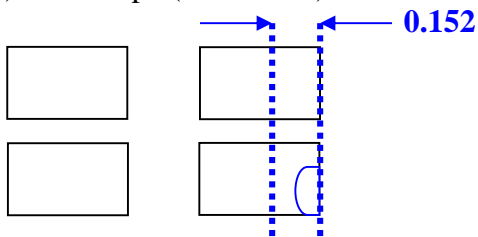
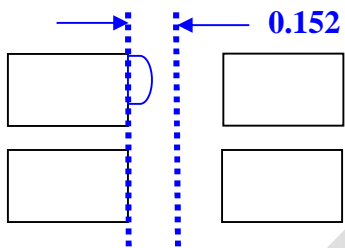
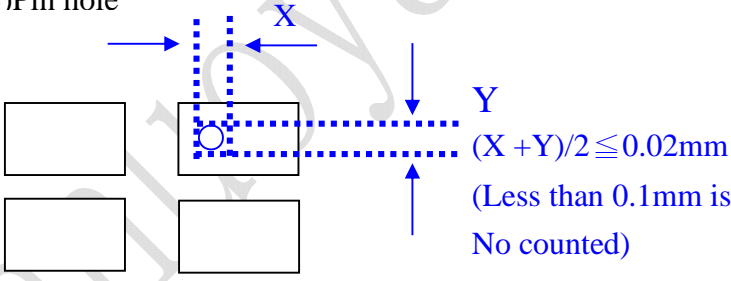
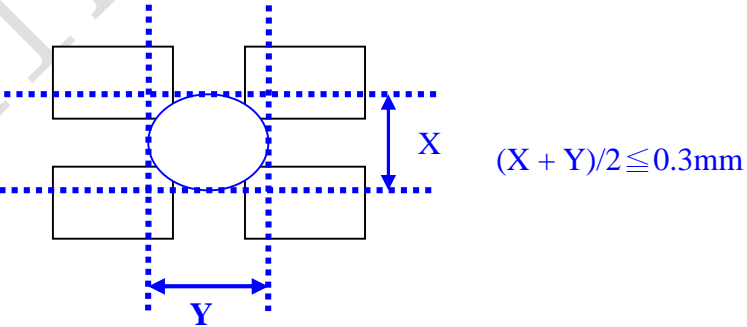


A : Display Area

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><math>D &lt; 0.15</math></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><math>0.15 \leq D \leq 0.2</math></td> <td style="text-align: center;">4</td> <td style="text-align: center;">4</td> </tr> <tr> <td><math>0.2 \leq D \leq 0.25</math></td> <td style="text-align: center;">2</td> <td style="text-align: center;">2</td> </tr> <tr> <td><math>D \leq 0.3</math></td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> </tr> </tbody> </table> <p><math>D = (\text{Long} + \text{Short})/2</math>      *: 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;"><math>0.04 \geq W</math></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;"><math>3.0 \geq L</math></td> <td style="text-align: center;"><math>0.06 \geq W</math></td> <td style="text-align: center;">4</td> <td style="text-align: center;">4</td> </tr> <tr> <td style="text-align: center;"><math>2.0 \geq L</math></td> <td style="text-align: center;"><math>0.08 \geq W</math></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;"><math>0.1 &lt; W</math></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><math>D \leq 0.15</math></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><math>0.15 &lt; D \leq 0.25</math></td> <td style="text-align: center;">2</td> <td style="text-align: center;">*</td> </tr> <tr> <td><math>0.25 &lt; D</math></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																					
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$0.25 < D$	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>
----	------------	---

## 12. Numbering system

**KNY 12864 J-3 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																																												
	<p style="text-align: center; color: green;">UNIT : mm</p>																																														
	<table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <td>Pin</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td> </tr> <tr> <td>Symbol</td><td>VSS</td><td>VDD</td><td>VO</td><td>RS</td><td>RW</td><td>E</td><td>DB0</td><td>DB1</td><td>DB2</td><td>DB3</td> </tr> <tr> <td>Pin</td><td>I1</td><td>I2</td><td>I3</td><td>I4</td><td>I5</td><td>I6</td><td>I7</td><td>I8</td><td>I9</td><td>I20</td> </tr> <tr> <td>Symbol</td><td>DB4</td><td>DB5</td><td>DB6</td><td>DB7</td><td>CSA</td><td>CSB</td><td>RST</td><td>VEE</td><td>BLA</td><td>BLK</td> </tr> </table> <p style="text-align: center; color: green;">VIEWING DIRECTION</p>	Pin	1	2	3	4	5	6	7	8	9	10	Symbol	VSS	VDD	VO	RS	RW	E	DB0	DB1	DB2	DB3	Pin	I1	I2	I3	I4	I5	I6	I7	I8	I9	I20	Symbol	DB4	DB5	DB6	DB7	CSA	CSB	RST	VEE	BLA	BLK	<p style="text-align: center; color: red;">新諾亞顯示技術股份有限公司</p>	
Pin	1	2	3	4	5	6	7	8	9	10																																					
Symbol	VSS	VDD	VO	RS	RW	E	DB0	DB1	DB2	DB3																																					
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Symbol	DB4	DB5	DB6	DB7	CSA	CSB	RST	VEE	BLA	BLK																																					
1. DISPLAY TYPE	5. DRIVE METHOD	DWN : XXJ	2008-05-29	MODEL NO. KNY12864J-3	UNITS : mm																																										
2. POLARIZER MODE	6. OPERATING TEMP	CHK :		TEL: 86-755-29440039	SCALE : NTS																																										
3. VIEWING DIRECTION	7. STORAGE TEMP	APP :		FAX: 86-755-81752083	ANGLES: ±0.5°																																										
4. OPERATING VOLTAGE	8. CONNECTOR	TOLERANCES UNLESS OTHERWISE SPECIFIED:±0.2			SHEET : 1 OF 1																																										