新諾亞顯示技術股份有限公司

NEW NOAH DISPLAY TECHNOLOGY SHARES CO.,LTD.

SPECIFICATION

MODULE NO	KNY320240B1SDBTCW-5NNWC
VERSION	
CUSTOMER	
APPROVE by	

Sale by	Check by	Prepare by

INDEX

ISSUE RECORD

NO.	VER.	DATE	MODIFY REASON	MODIFY CONTENTS
1	A	2010/5/29	New issued	
2	B	2014/5/5	New issued	

1. An overview

KNY320240B1 graphic dot matrix liquid crystal display. Driven by the row/column drives RA0086 of 320 * 240 dot matrix LCD (line).. Products adopt SMT packaging way, through the metal frame tied to the conductive rubber and liquid crystal, make its long service life, reliable connection.

2. General Specifi Cation

2.1 Mechanical Dimension

Item	Dimension	Unit
Number of Dots	320 x 240	dots
Module dimension (L x W x H)	166.0 x 109.0 x 11.0	mm
View area	122.0x 92.0	mm
Active area	115.17 x 86.37	mm
Dot size	0.33x 0.33	mm
Dot pitch	0.36 x 0.36	mm
LCD TYPE	FSTN/Negative, White mode/Transmissive	
Viewing Direction	6H	
Backlight	CCFL White	
Driver IC	RA0086	

3. Electrical Characteristics

3.1 Absolute Maximum Ratings

V_{SS} = 0V

Parameter	Symbol	Conditions	Min.	Max.	Units
Supply Voltage (Logic)	V_{DD} - V_{SS}	--	- 0.3	7.0	V
Supply Voltage (LCD Drive)	V_{LCD} - V_{SS}	--	0	35.0	V
Input Voltage	V_I	--	- 0.3	V_{DD} + 0.3	V

3.2 DC Characteristics

Ta = 25°C, V_{SS} = 0V

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Supply Voltage (Logic)	V_{DD} - V_{SS}	--	4.5	5.0	5.5	V
Supply Voltage (LCD Drive)	V_{DD} - V_{EE}	--	18.0	--	27.0	V
	V_{DD} - V_O	Shown in 3.1				V
High Level (Input Voltage)	V_{IH}	--	0.8xV_{DD}	--	V_{DD}	V
Low Level (Input Voltage)	V_{IL}	--	V_{SS}	--	0.2xV_{DD}	V
High Level (Output Voltage)	V_{OH}	I_{OH} = -0.5mA	2.4	--	--	V
Supply Current	I_{DD}	V_{DD} = 5.0V	--	20	30	mA
	I_{EE}	V_{DD} =5.0V	--	3.0	5.0	mA
Frame	f_F	Duty = 50%	32	64	128	Hz

3.3 AC Characteristics

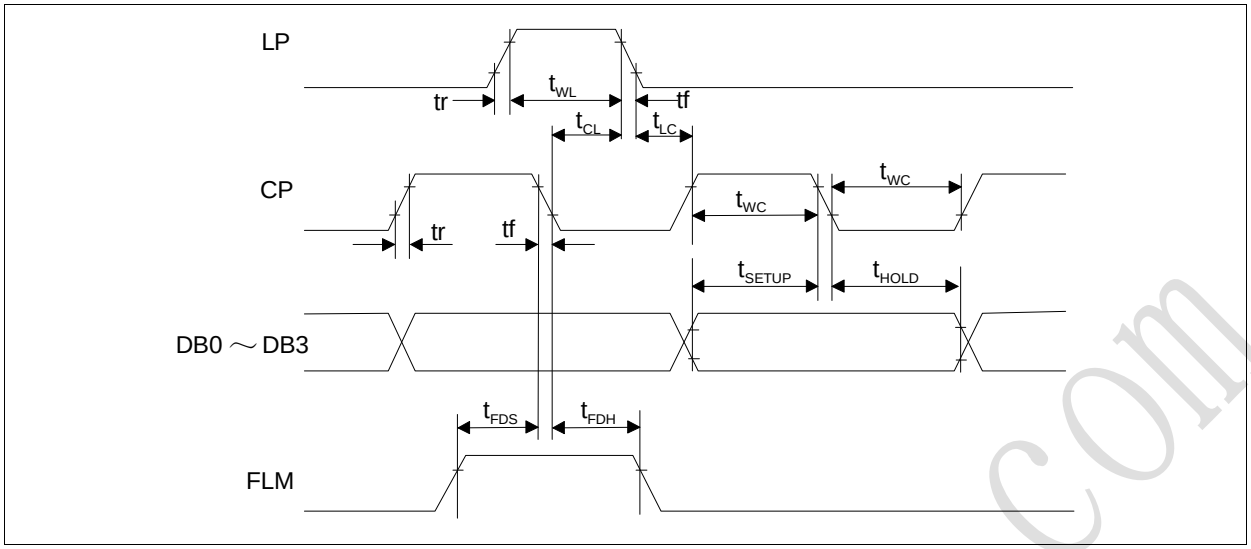
V_{DD} = 5.0V±10%

Parameter	Symbol	Min.	Max.	Units
CP Pulse Time	f_{CP}	--	6.0	MHz
Clock Pulse Width	t_{WC}	50	--	ns
Load Pulse Width	t_{WL}	63	--	ns
Data Setup Time	t_{SEPUP}	30	--	ns
Data Hold Time	t_{HOLD}	30	--	ns
Clock Pulse Setup Time	t_{CL}	80	--	ns
Clock Pulse Hold Time	t_{LC}	110	--	ns
Rise/Fall Time	tr, tf	--	Note1	ns
FLM Setup Time	t_{FDS}	100	50	ns
FLM Hold Time	t_{FDH}	100	--	ns

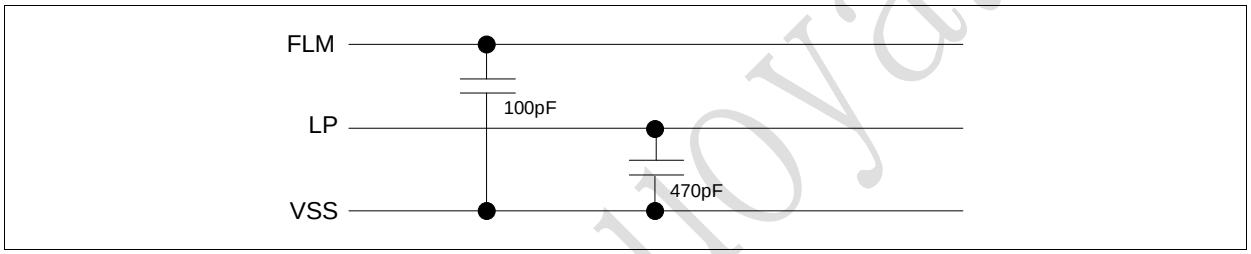
Note1: The rise and fall times (tr, tf) must satisfy the following relationship (a. and b.).

a. tr, tf < $\frac{1}{2\,fcp}$ - t_{WC}

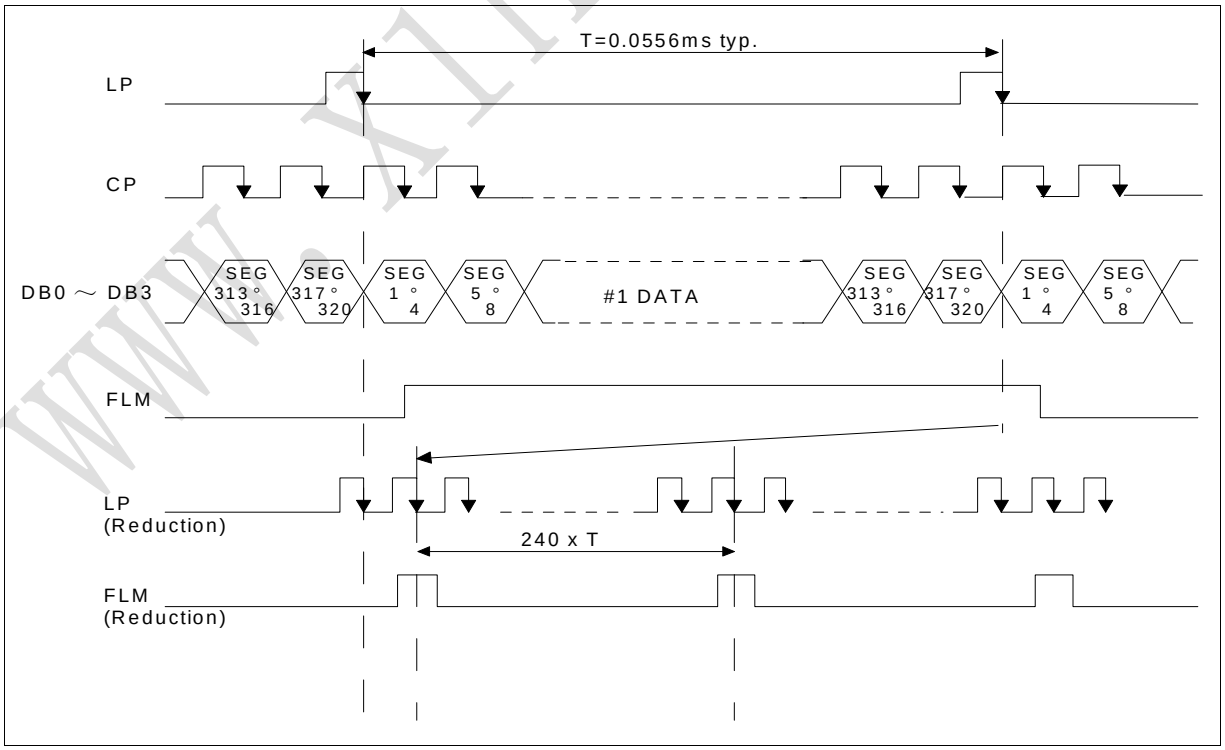
b. tr, tf < 50ns



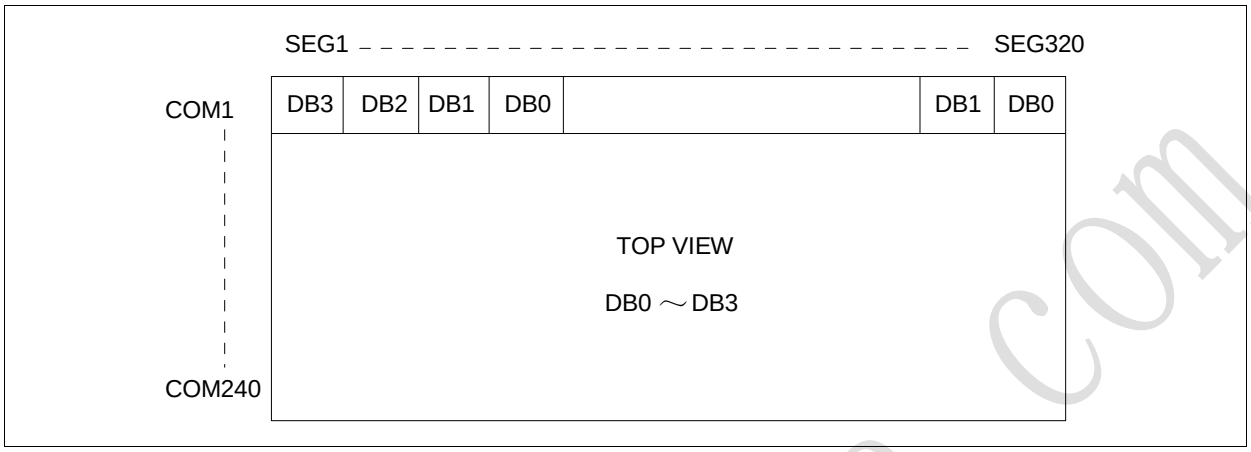
This module contains these capacitors. Please be careful about timing characteristics.



3.4 Timing Chart

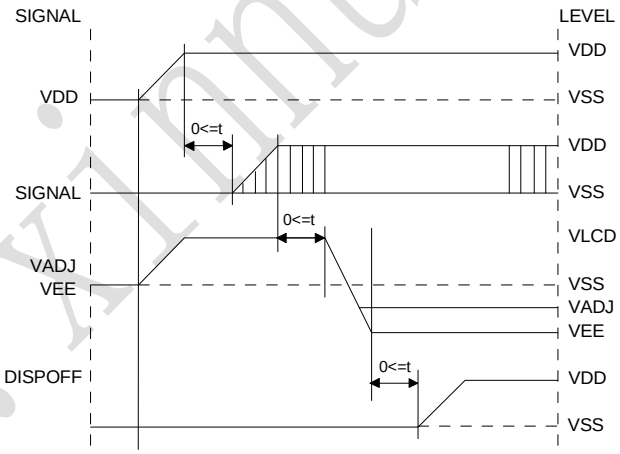


3.5 Comparison of Display and Data

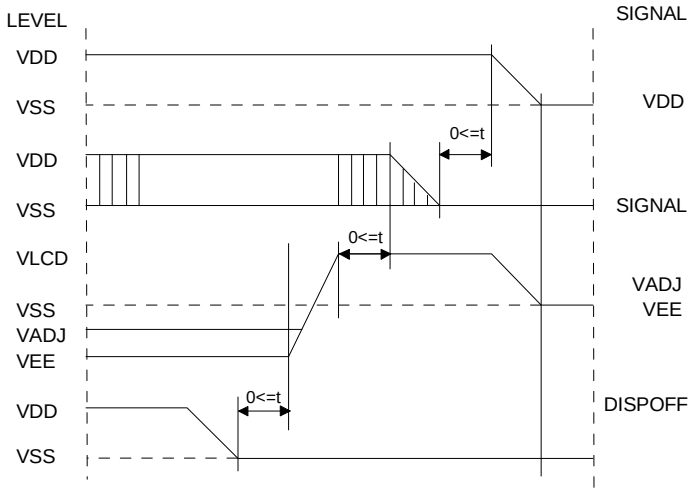


3.6 Power Supply ON/OFF Sequence

3.6.1 ON Sequence



3.6.2 OFF Sequence



Please maintain the above sequence when turning on and off the power supply of the module. If DISPOFF is supplied to the module while internal alternate signal for LCD driving (M) is unstable, DC component will be supplied to the LCD panel. This may cause damage to the LCD module.

3.7 CCFL and LED back-light

3.7.1 Absolute Maximum Ratings （LED）

Parameter	Symbol	Conditions	Max	Units
Forward Current	I_F	--	200	mA
Reverse Voltage	V_R	--	5.5	V
LED Power Dissipation	P_D	--	1	W
Operation Temperature	T_{OPR}		-30 to 80	°C
Storage Temperature	T_{STG}		-40 to 90	°C

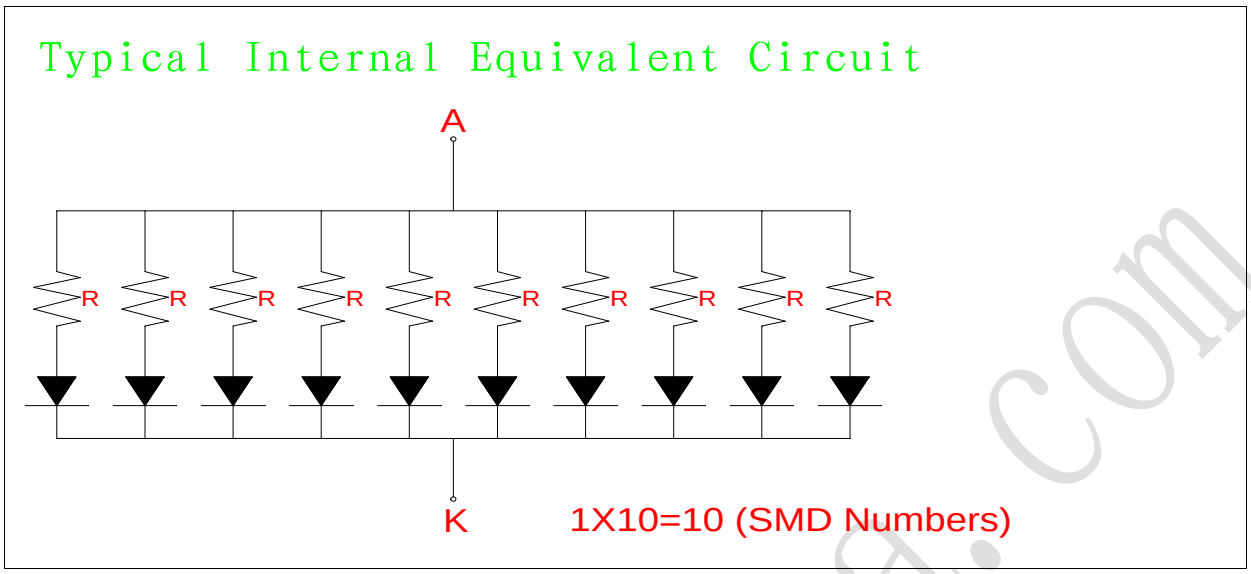
3.7.2 Operating Characteristics （LED）

Ta = 25°C

Parameter	Symbol	Conditions	Min	Typ.	Max	Units
Forward Voltage*	V_F	I_F=160mA	3	--	5.5	V
Reverse Current	I_R	V_R=5.0V	--	--	0.3	mA
Luminance of Backlight Surface	L	I_F=160mA	>150	--	--	cd/m^2
Uniformity**			85	90	--	%
AVG. x of 1931 C.I.E.	X		0.27	0.30	0.33	--
	Y		0.25	0.28	0.31	--

*Measured between A,K (see the figure below)
**Uniformity = (Min./Max.) x 100%

3.7.3 Schematics Related （LED）



3.7.4 Electrical-Optical Characteristics（CCFL）

Ta = 25°C

Parameter	Symbol	Conditions	Min	Typ.	Max	Units
Lamp Outer Dia	¢	I_F=160mA	--	2.6	--	mm
Tube Lenght	L	V_R=5.0V	--	100	--	mA
Lamp Current	I_L	I_F=5mA	4	5	6	mArms
Lamp Voltage	V_L			300		V (AC)
Lamp Power	W_L			1.5		W
Frequency	V_F			55		KHZ
Lamp Life			20000			Hour
Chromaticity	X		0.25	0.28	0.31	
	Y		0.26	0.29	0.32	
Luminance	I_V		400	470	--	cd/m^2
Uniformitc	Avg		75			%

4. Interface Description

4.1 CN1 interface

Pin No.	Symbol	Level	Function
1	DB0	I/O	Display data
2	DB1	I/O	Display data
3	DB2	I/O	Display data
4	DB3	I/O	Display data
5	/DISPOFF	H/L	Display control signal H: Display on L: Display off
6	FLM	H/L	Fist line marker
7	N/C	--	Non-connection
8	LP	H/L	Data latch signal
9	CP	H/L	Clock signal for shifting data
10	V_{DD}	--	Power supply for logic
11	V_{SS}	--	Power supply (0V, GND)
12	V_{EE}	--	Power supply for LCD drive
13	Vo	--	Voltage level for LCD contrast adjustment
14	FGND	--	Frame Ground

4.2 CN2 interface (LED)

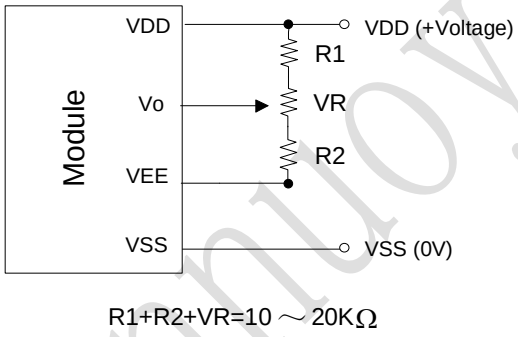
Pin No.	Symbol	Level	Function
1	LEDA	--	Power Supply for LED Backlight Anode (+)
2	N/C	--	No-connection
3	N/C	--	No-connection
4	LEDK	--	LED Backlight Power Supply Cathode (-)

4.3 CN2 interface (CCFL)

Pin No.	Symbol	Level	Function
1	CCFL	--	Power Supply Cathode
2	N/C	--	No-connection
3	N/C	--	No-connection
4	CCFL	--	Power Supply Cathode

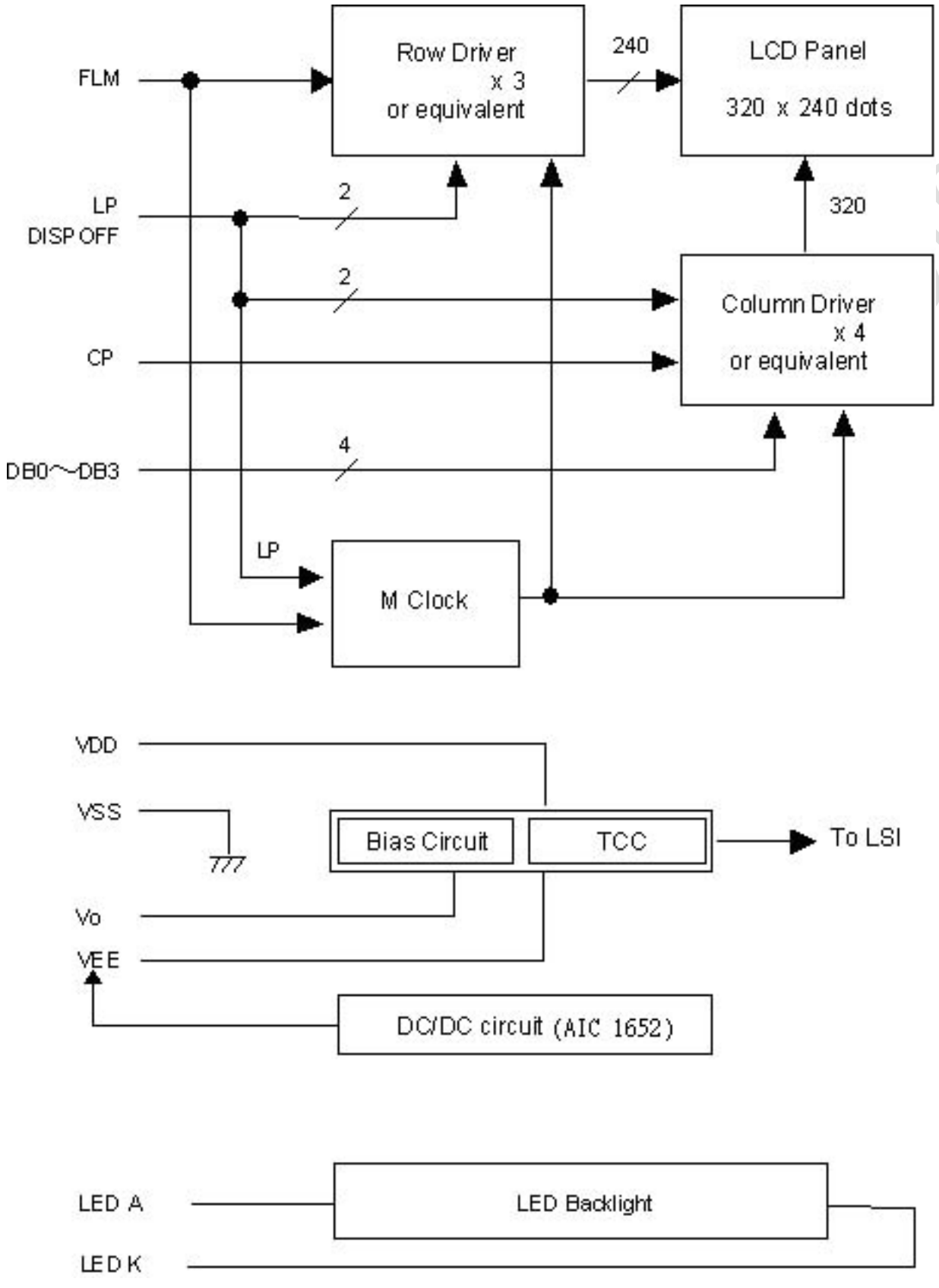
4.4 Example of Power Supply

It is recommended to apply a potentiometer for the contrast adjust due to the tolerance of the driving voltage and its temperature dependence.



R1+R2+VR=10 ～ 20KΩ

4.5 Block Diagram



5. Optical Characteristics

5.1 LCD Driving Voltage Recommended

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
LCD Driving Voltage (Note 1)	V_{DD}-V_O	Ta = -20 °C	24.7	25.2	25.7	V
		Ta = 25 °C	20.8	21.2	21.6	V
		Ta = 70 °C	19.5	20.0	20.5	V

Note 1 : Voltage (Applied actual waveform to LCD panel) for the best contrast. The range of minimum and maximum shows tolerance of the operating voltage. The specified contrast ratio and response time are not guaranteed over the entire range.

5.2 Optical Characteristics

Ta=25 °C, 1/240 Duty, 1/13 Bias, V_{DD} = 5.0V (Note 4)

Parameter		Symbol	Conditions	Min.	Typ.	Max.	Units
Contrast Ratio (Note 1)		CR	Ta=25 °C	4	5.5	8	--
Viewing Angle (Shown in 3.3)		F-R	θ Ta=25 °C	--	65	--	deg.
		R-L	ϕ Ta=25 °C	--	-30 +30	--	deg.
Response Time	Rise (Note 2)	T_{ON}	Ta = 25 °C	100	120	180	msec
	Fall (Note 3)	T_{OFF}	Ta = 25 °C	110	140	210	msec

Note 1 : Contrast ratio is defined as follows.
CR = L_{OFF} / L_{ON}
L_{ON} : Luminance of the ON segments, L_{OFF} : Luminance of the OFF segments

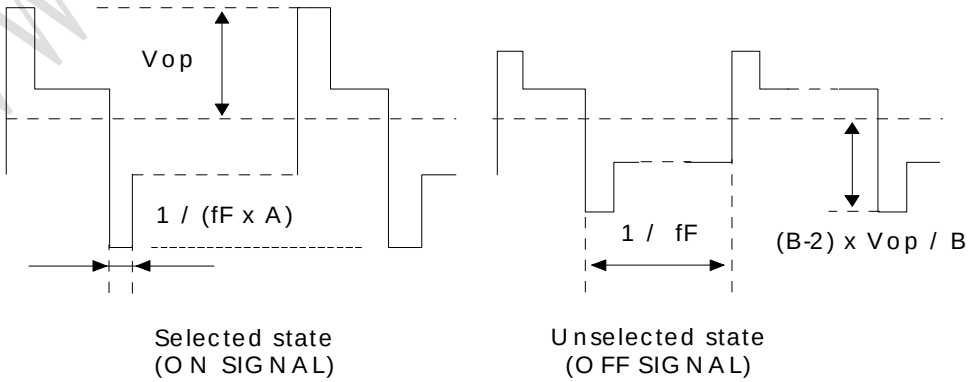
Note 2 : The time that the luminance level reaches 90% of the saturation level from 0% when ON signal is applied.

Note 3 : The time that the luminance level reaches 10% of the saturation level from 100% when OFF signal is applied.

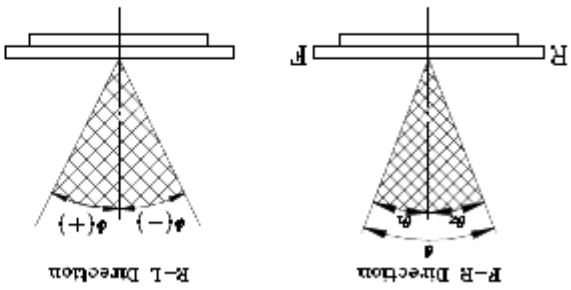
Note 4 : Definition of Driving Voltage V_D. Assuming that the typical driving waveforms shown below are applied to the LCD Panel at /A Duty - 1/B Bias (A : Duty Number, B : Bias Number). Driving voltage V_D is defined s follows: V_D = (Vth1+Vth2) / 2

Vth1 : The voltage VO-P that should provide 50% of the saturation level in the luminance at the segment which the ON signal is applied to.

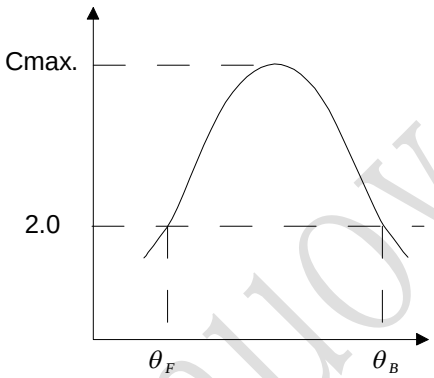
Vth2 : The voltage VO-P that should provide 50% of the saturation level in the luminance at the segment which the OFF signal is applied to.



5.3 Definition of Viewing Angle



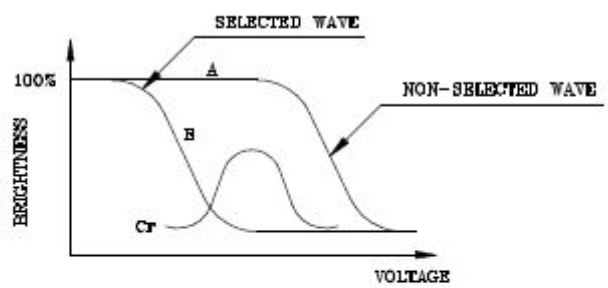
5.4 Definition of Viewing Angle θ F and θ $_B$



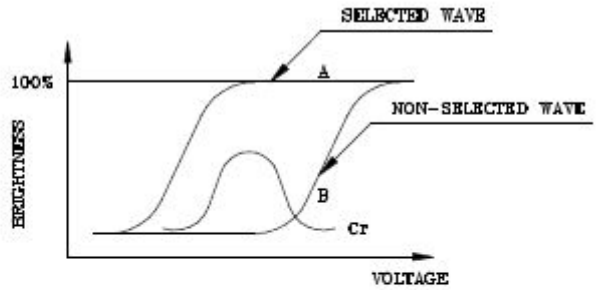
Viewing angles θ (ϕ fixed)

Optimum viewing angle with the naked eye and viewing angle θ at Cmax. Above are not always the same.

5.5 Definition of Contrast Ratio(Cr)



(positive type)



(negative type)

Contrast Ratio : Cr = A/B

*Conditions

Operating Voltage : Vop
Temperature : 25°C
Viewing Angle (ϕ ·Φ) : (0,0)
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias

6.Precautions and Warranty

6.1 Precautions

The Following precautions will guide you in handling our product correctly.

6.1.1 Liquid crystal display devices

The liquid crystal display device panel used in the liquid crystal display module is made of plate glass. Avoid any strong mechanical shock. Should the glass break handle it with care.

The polarizer adhering to the surface of the LCD is made of a soft material. Guard against scratching it.

6.1.2 Care of the liquid crystal display module against static electricity discharge.

When working with the module, be sure to ground your body and any electrical equipment you may be using. We strongly recommend the use of anti static mats (made of rubber), to protect work tables against the hazards of electrical shock.

Avoid the use of work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.

Slowly and carefully remove the protective film from the LCD module, since this operation can generate static electricity.

6.1.2 When the LCD module alone must be stored for long periods of time:

Protect the modules from high temperature and humidity.

Keep the modules out of direct sunlight or direct exposure to ultra-violet rays.

Protect the modules from excessive external forces.

6.1.3 Use the module with a power supply that is equipped with an over current protector circuit, since the module is not provided with this protective feature.

6.1.4 Do not ingest the LCD fluid itself should it leak out of a damaged LCD module. Should hands or clothing come in contact with LCD fluid, wash immediately with soap.

6.1.5 Conductivity is not guaranteed for models that use metal holders where solder connections between the metal holder and the PCB are not used. Please contact us to discuss appropriate ways to assure conductivity.

6.2 Warranty

This product has been manufactured to your company's specifications as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in medical devices, nuclear power control equipment, aerospace equipment, fire and security systems, or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

6.2.1 We cannot accept responsibility for any defect, which may arise from additional manufacturing of the product (including disassembly and reassembly), after product delivery.

6.2.2We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.

6.2.3We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed your company's acceptance inspection procedures.

6.2.4We cannot accept responsibility for industrial property, which may arise through the use of your product, with exception to those issues relating directly to the structure or method of manufacturing of our product. Acrowise-origin longer than one year from Acrowise production.

7. 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.	80℃ 96hrs	——
2	Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-30℃ 96hrs	——
3	High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70℃ 96hrs	——
4	Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20℃ 96hrs	——
5	High Temperature/ Humidity Storage	Endurance test applying the high temperature and high humidity storage for a long time.	70℃,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℃,90%RH 96hrs	——
7	Temperature Cycle	Endurance test applying the low and high temperature cycle. -20℃ 25℃ 70℃ 30min 5min 30min 1 cycle	-20℃/60℃ 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 msedc 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℃

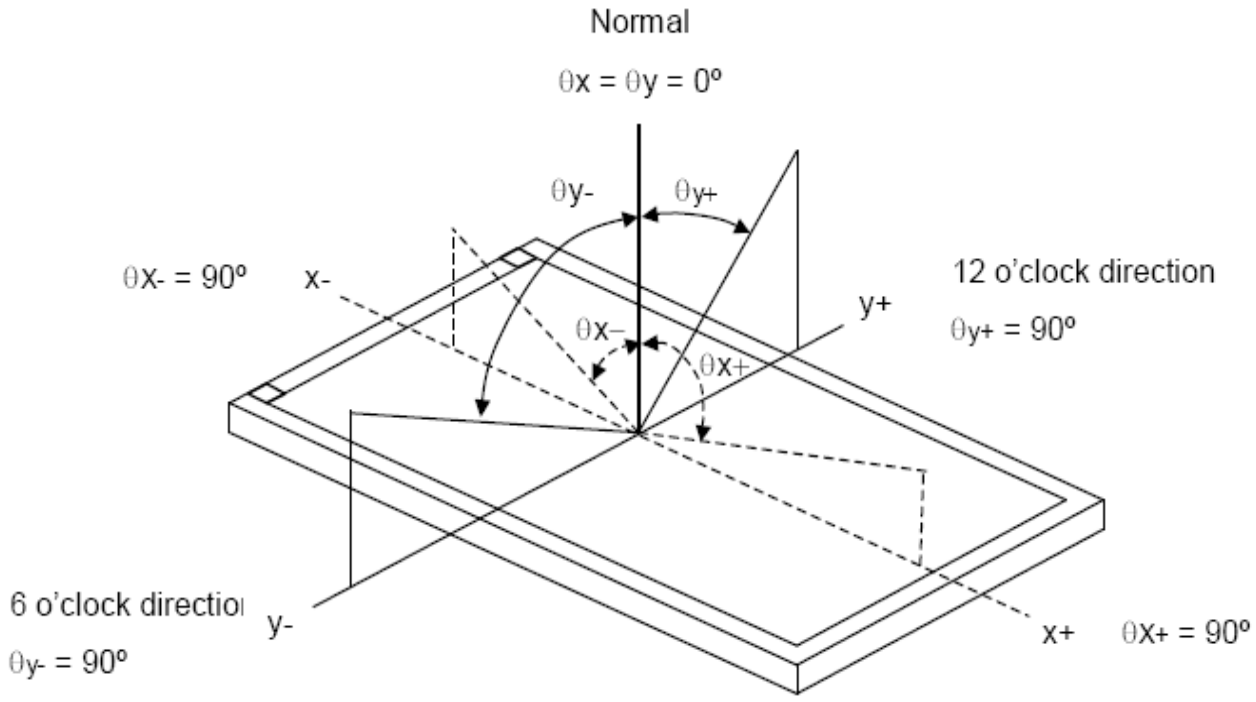
8. Quality Assurance

8.1 Inspection conditions

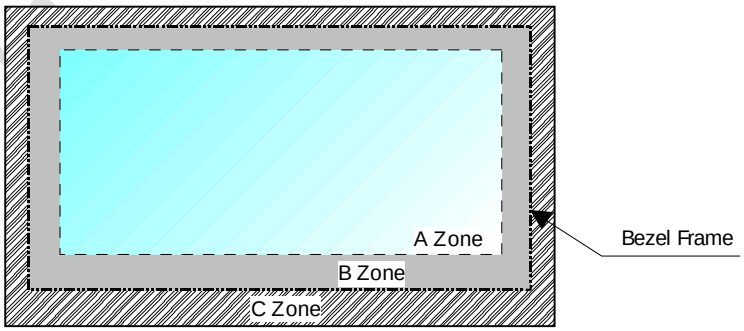
The LCD shall be inspected under 40W white fluorescent light.

8.1.1 Inspection Conditions

The LCD shall be inspected under 40W white fluorescent light. The distance between the eyes and the sample shall be more than 30cm. All directions for inspecting the sample should be within 45° against perpendicular line.



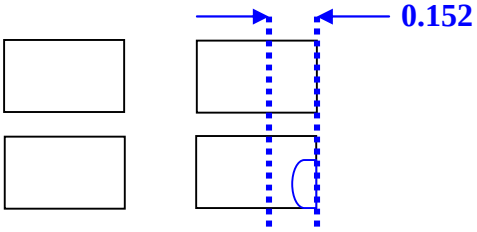
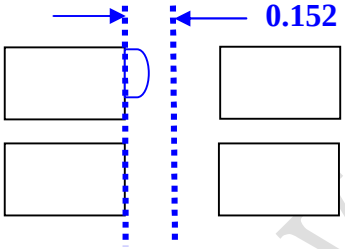
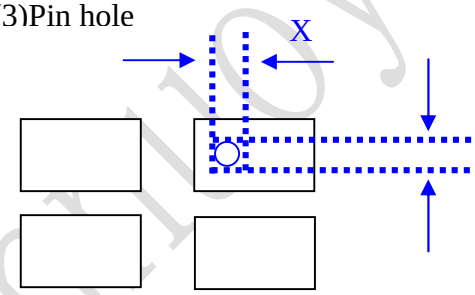
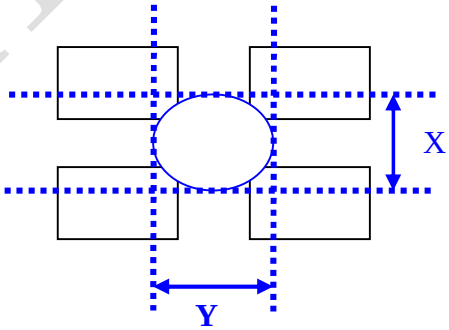
8.1.2 Definition of Applicable Zones



A Zone : Active display area
B Zone : Area from outside of "A Zone" to validity viewing area
C Zone : Rest parts
A Zone + B Zone = Validity viewing area

8.2 Inspection Parameters

<table>
<tr><th>NO.</th><th>Parameter</th><th>Criteria</th></tr>
<tr><td>1</td><td>Black or White spots</td><td>
<table>
<tr><th rowspan="2">Zone
Dimension</th><th colspan="2">Acceptable Number</th><th rowspan="2">Class Of Defects</th><th rowspan="2">Acceptable Level</th></tr>
<tr><th>A</th><th>B</th></tr>
<tr><td>D＜0.15</td><td>*</td><td>*</td><td rowspan="4">Minor</td><td rowspan="4">2.5</td></tr>
<tr><td>0.15≦D≦0.2</td><td>4</td><td>4</td></tr>
<tr><td>0.2≦D≦0.25</td><td>2</td><td>2</td></tr>
<tr><td>D≦0.3</td><td>0</td><td>1</td></tr>
</table>
D=(Long + Short)/2 *: Disregard
</td></tr>
<tr><td>2</td><td>Scratch, Substances</td><td>
<table>
<tr><th rowspan="2">Zone
X(mm) Y(mm)</th><th colspan="2">Acceptable Number</th><th rowspan="2">Class Of Defects</th><th rowspan="2">Acceptable Level</th></tr>
<tr><th>A</th><th>B</th></tr>
<tr><td>*</td><td>0.04≧W</td><td>*</td><td>*</td><td rowspan="4">Minor</td><td rowspan="4">2.5</td></tr>
<tr><td>3.0≧L</td><td>0.06≧W</td><td>4</td><td>4</td></tr>
<tr><td>2.0≧L</td><td>0.08≧W</td><td>2</td><td>3</td></tr>
<tr><td>—</td><td>0.1＜W</td><td>0</td><td>1</td></tr>
</table>
X: Length Y: Width *: Disregard
Total defects should not exceed 4/module
</td></tr>
<tr><td>3</td><td>Air Bubbles
(between glass & polarizer)</td><td>
<table>
<tr><th rowspan="2">Zone
Dimension</th><th colspan="2">Acceptable Number</th><th rowspan="2">Class Of Defects</th><th rowspan="2">Acceptable Level</th></tr>
<tr><th>A</th><th>B</th></tr>
<tr><td>D≦0.15</td><td>*</td><td>*</td><td rowspan="3">Minor</td><td rowspan="3">2.5</td></tr>
<tr><td>0.15＜D≦0.25</td><td>2</td><td>*</td></tr>
<tr><td>0.25＜D</td><td>0</td><td>1</td></tr>
</table>
*: Disregard
Total defects shall not excess 3/module.
</td></tr>
</table>

4.	Uniformity	(1)Pixel shape (with Dent)  (2)Pixel shape (with Projection)  (3)Pin hole  (X +Y)/2≦0.02mm (Less than 0.1mm is No counted) (4) Deformation  (X + Y)/2≦0.3mm Total acceptable number: 1/pixel ;.5/cell

9.Numbering system

KNY	320240	B1	S	D	B	T	C	W	-	5	N	N	W	C
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	Transfiective	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

12. Module interface

S	serial port
P	Parallel port
N	Don't choose

13. Module temperature

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

14. Touch screen

C	With touch screen
N	Without a touch screen

10. Dimensional Outlines