NAN YA PLASTICS CORPORATION

SPECIFICATION OF
LCD MODULE
PRODUCT NO.: LM_S8_199__

SPEC. NO.: LM199-0-0

CUSTOMER
APPROVED BY
DATE:

LCD DEPARTMENT
ELECTRONIC MATERIALS DIVISION
NAN YA PLASTICS CORPORATION
201, TUNG HWA N. ROAD, TAIPEI
TEL: 886-2-27122211 EXT. 5993~5995
FAX: 886-2-27178253
E-mail: nanyalcd@tpts5.seed.net.tw

SALE MANAGER	TECHNICAL APPROVE	DESIGN MANAGER	DESIGN CHECK	DESIGNER

RECORDS OF REVISION

DATE	REVISED NO.	REF. PAGE	SUMMARY	CHECK & APPROVAL
09.04.98'	0	15/15	First Issue	

1. MECHANICAL DATA

(1) Product No.	LM_S8_199_ ____	
(2) Module Size	290.0 (W)mm x 88.0 (H)mm x MAX9.5 (D)mm (W/O,EL B.L.)	
(3) Dot Size	0.42 (W)mm x 0.55 (H)mm	
(4) Dot Pitch	0.47 (W)mm x 0.6 (H)mm	
(5) Number of Characters	80 (W) x 4 (H)Characters	
(6) Character Format	5 (W) x 7 (H)Dots + Cursor	
(7) Duty	1/16	
(8) LCD Display Mode	STN: ☐ Gray Mode ☐ Yellow Mode ☐ Blue Mode	
	FSTN: ☐ Black and White(Normally White/Positive Image)	
	☐ Black and White(Normally Black/Negative Image)	
	Rear Polarizer: ☐ Reflective ☐ Transflective ☐ Transmissive	
(9) Viewing Direction	☐ 6 O'clock ☐ 12 O'clock ☐ ____O'clock	
(10) Backlight	☐ W/O ☐ LED ☐ EL	
(11) Weight	W/O B/L: 216 g	
	EL B/L: 230 g	

Note :

LM_S8_199_ _____

Back Light
K : None Back Light
M : LED Back Light
N : EL Back Light

Reflective/Transmissive
R : Reflective
S : Transflective
T : Transmissive
P : Transflective(High Transmissive)

Option
C : Anti-Glare
D : Wide Temperature
1
2
: Version
9

Mode/View Angle
A : Gray , 6 Clock
B : Gray , 12 Clock
C : Yellow , 6 Clock
D : Yellow , 12 Clock
E : Blue , 6 Clock
F : Blue , 12 Clock
G : Normally Black , 6 Clock
H : Normally Black , 12 Clock
J : Normally White , 6 Clock
K : Normally White , 12 Clock

2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD−VSS	−0.3	5.5	V	
Input Voltage	VI	−0.3	VDD	V	
Static Electricity	−	−	−	−	Note 1

Note 1 LCM should be grounded during handling LCM.

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	NORMAL TEMP.				WIDE TEMP.			
	OPERATING		STORAGE		OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	−20	70	−20	70	−30	80
Humidity (Without Condensation)	Note 2,4		Note 3,4		Note 4,5		Note 4,6	

Note 2 Ta ≦ 50°C : 85%RH max.
Ta > 50°C : Absolute humidity must be lower than the humidity of 85%RH at 50°C

Note 3 Ta at −20°C will be < 48hrs, at 70°C will be < 120hrs

Note 4 Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Note 5 Ta ≦ 70°C : 75%RH max.
Ta > 70°C : Absolute humidity must be lower than the humidity of 75%RH at 70°C

Note 6 Ta at −30°C will be < 48hrs, at 80°C will be < 120hrs

3. ELECTRICAL CHARACTERISTICS

(VDD=5V±10%)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage	VIH	H level	0.8VDD	–	VDD	V
	VIO	L level	0	–	0.2VDD	V
Recommended LC Driving Voltage (NORMAL TEMP. LCM)	VDD–VO	0°C	6.5	7.9	8.3	V
		25°C	6.2	7.2	8.1	
		50°C	5.8	6.1	7.4	
Power Supply Current	IDD	VDD–VO=7.2V	–	8.5	–	mA
	IO		–	1.0	–	
EL Power Supply Current	IEL	V_{BL} = 110V_{AC} 400Hz	–	–	10.0	mA

4. OPTICAL CHARACTERISTICS

(FOR NORMAL TEMPERATURE MODE LCM)

AT Vop

ITEM / MODE		Cr(Contrast Ratio) 25°C		θ(Viewing Angle) 25°C		φ(Viewing Angle) 25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A						
	C						
	J						
S	A						
	C						
	J	6	10	60	100	35	50
T	C						
	E						
NOTE		NOTE6		NOTE5			

NOTE :

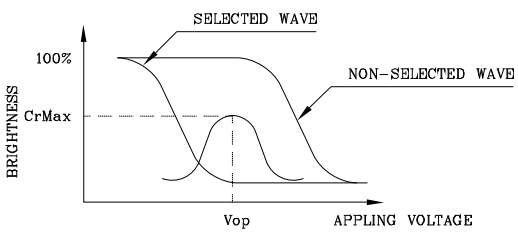
R: REFLECTIVE
S: TRANSFLECTIVE
T: TRANSMISSIVE
A: GRAY
C: YELLOW
E: BLUE
G: NORMALLY BLACK
J: NORMALLY WHITE

AT φ=0° θ=0°

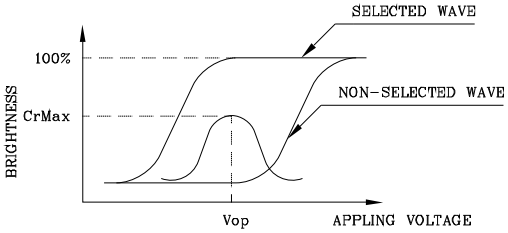
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0°C	–	170	500	ms	NOTE 2
		25°C	–	65	130		
		50°C	–	60	120		
Response Time (fall)	Tf	0°C	–	820	1600	ms	NOTE 2
		25°C	–	170	350		
		50°C	–	50	110		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



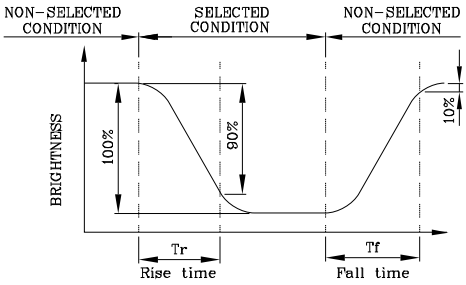
(negative type)

*Conditions

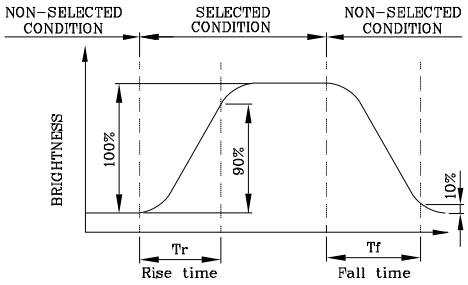
Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



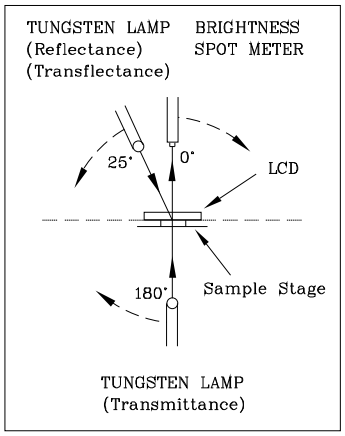
(negative type)

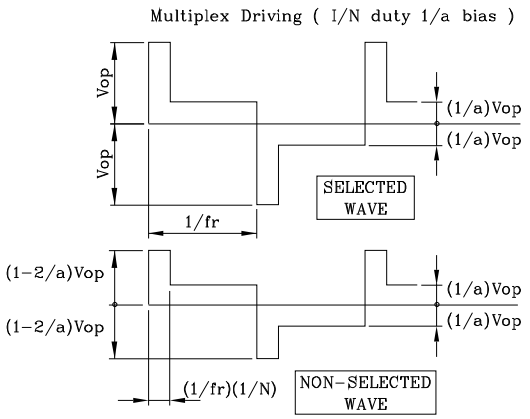
*Conditions

Operating Voltage : Vop
Viewing Angle (θ,ϕ) : (0,0)
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(NOTE 3)

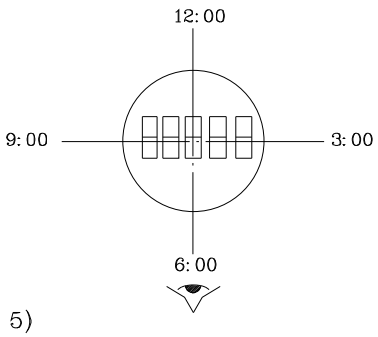
Description of Measuring Equipment and Driving Waveforms





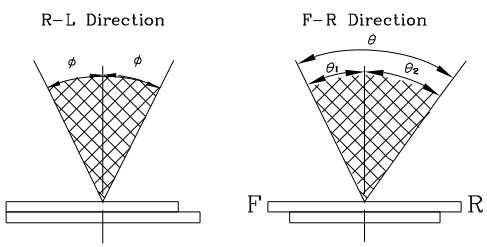
(Fig 4)

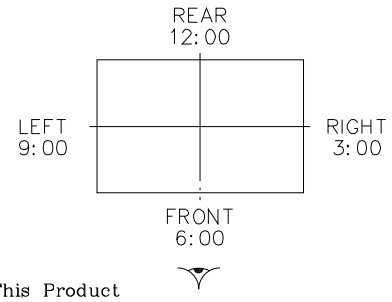
Definition of Viewing Direction



(Fig 5)

Definition of Viewing Angle





*For This Product

The Viewing Direction Is 6 O'clock

So $\theta 1 > \theta 2$

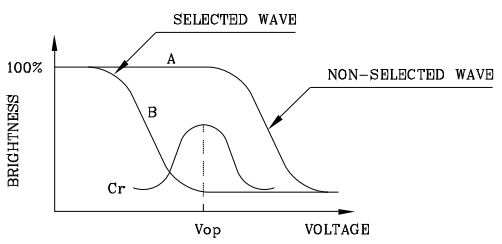
$\theta = \theta_1 + \theta_2$

*Conditions

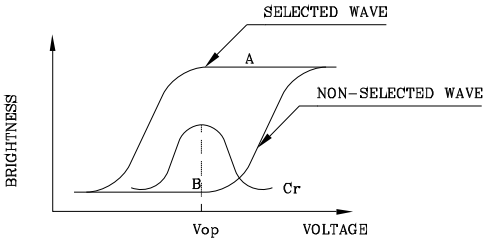
Operating Voltage : Vop
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(Fig 6)

Definition of Contrast Ratio (Cr)



(positive type)



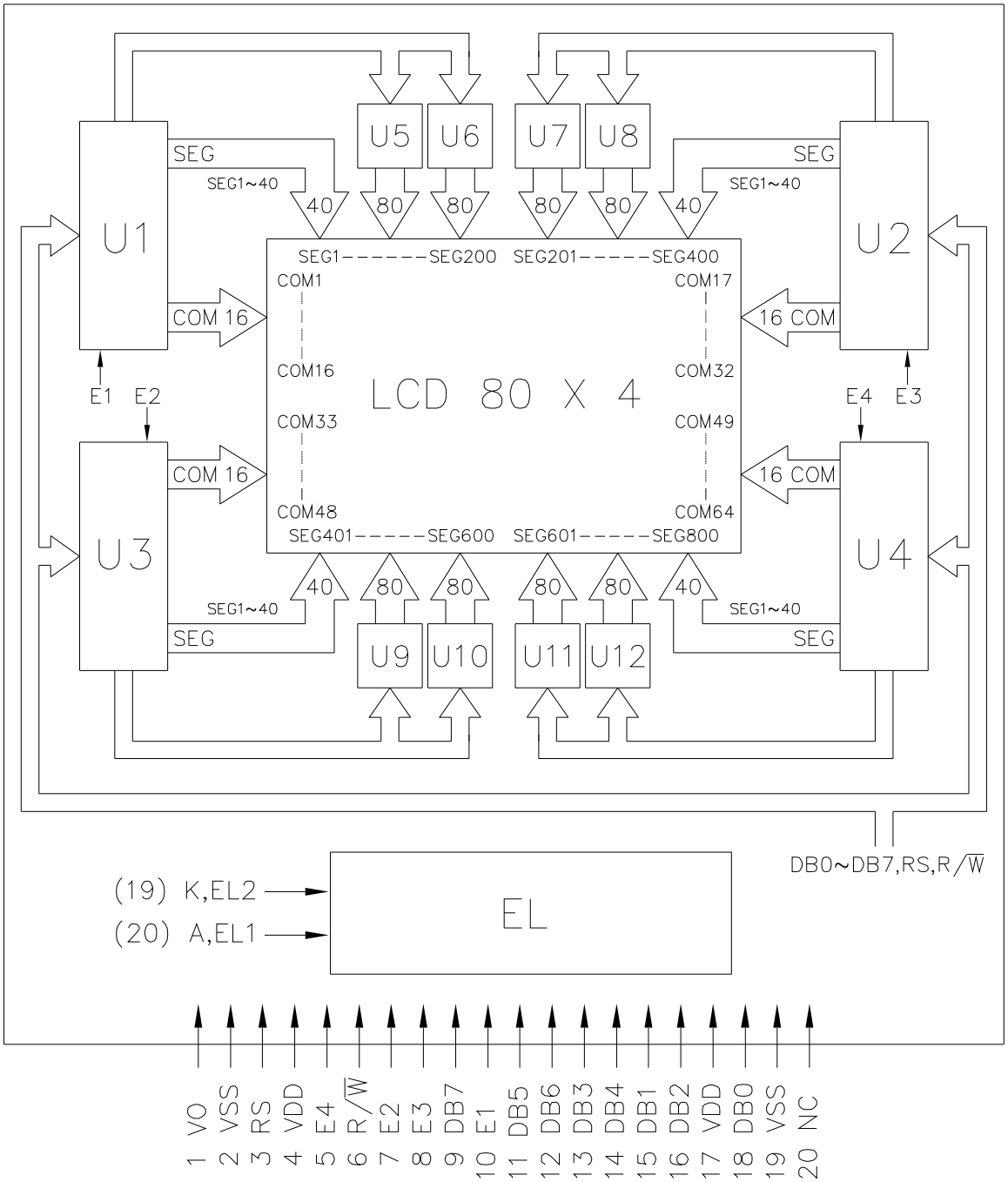
(negative type)

Contrast Ratio : Cr=A/B

*Conditions

Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias

5. BLOCK DIAGRAM

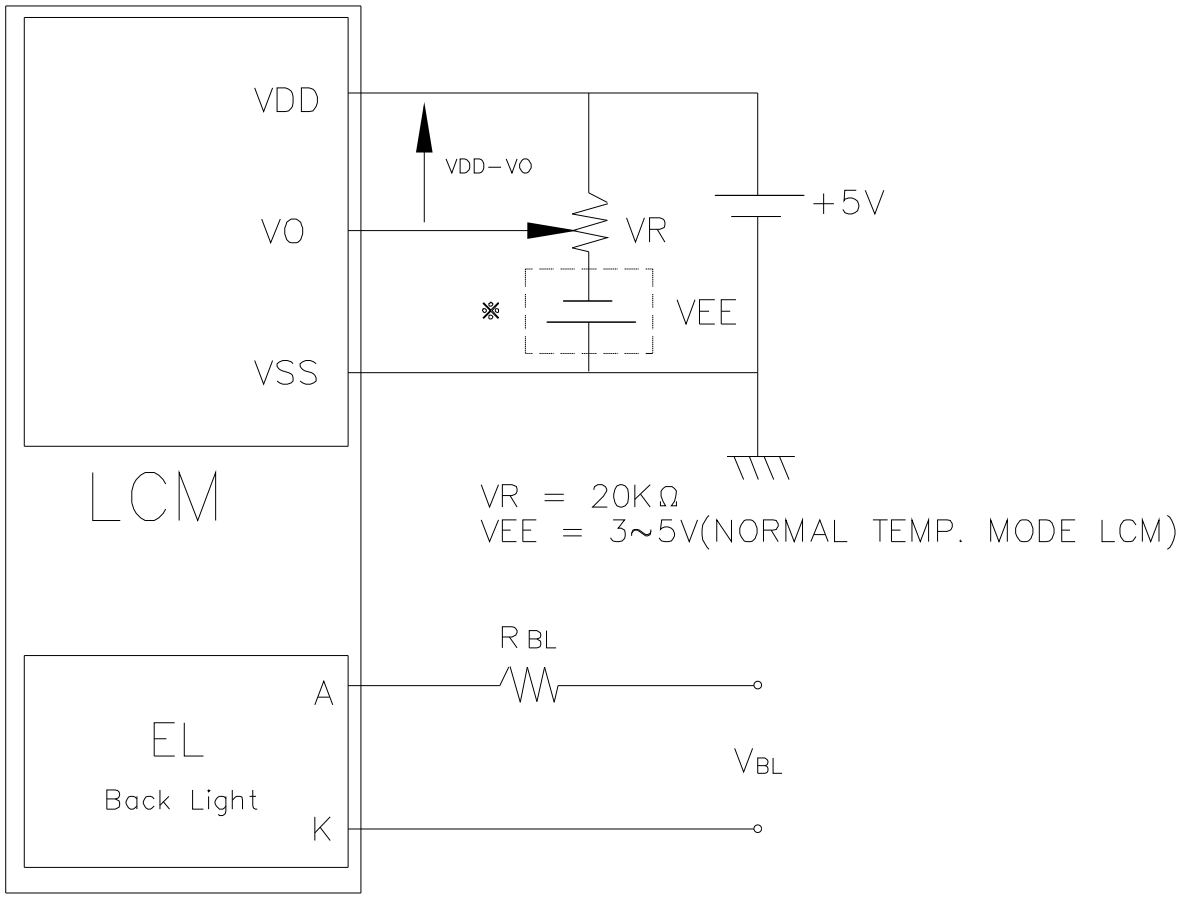


REV/DATE	R0/ 09.04.98'					APP	CHK	BY

6. INTERNAL PIN CONNECTION

Pin No.	Symbol	Function
1	V0	Power Supply for LCD
2	VSS	Power Supply (0V)
3	RS	L: INSTRUCTION CODE INPUT H: DATA INPUT
4	VDD	Power Supply (+5V)
5	E4	Chip Enable for U4
6	R/$\overline{W}$	H: DATA READ(FROM LCM To MPU) L: DATA WRITE(FROM MPU To LCM)
7	E2	Chip Enable for U2
8	E3	Chip Enable for U3
9	DB7	Data Bus
10	E1	Chip Enable for U1
11	DB5	Data Bus
12	DB6	
13	DB3	
14	DB4	
15	DB1	
16	DB2	
17	VDD	Power Supply (+5V)
18	DB0	Data Bus
19	VSS	Power Supply (0V)
20	NC	Non-Connection

7. POWER SUPPLY



Recommended Value for R_{BL} and V_{BL}

ITEM / Back Light / Interface	R BL	V BL
	EL	EL
Using 19Pin,20Pin	0Ω	110 VAC 400Hz
Using Internal Pad		

8. TIMING CHARACTERISTICS

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Enable cycle time	t_{cyc}	Fig.a, Fig.b	667	–	–	ns
Enable pulse width	PW_{EH}	Fig.a, Fig.b	280	–	–	ns
Enable rise/fall time	t_{Er} , t_{Ef}	Fig.a, Fig.b	–	–	25	ns
RS,R/W set up time	t_{AS}	Fig.a, Fig.b	140	–	–	ns
Data delay time	t_{DDR}	Fig.b	–	–	120	ns
Data set up time	t_{DSW}	Fig.a	180	–	–	ns
Hold time	t_H	Fig.a, Fig.b	20	–	–	ns

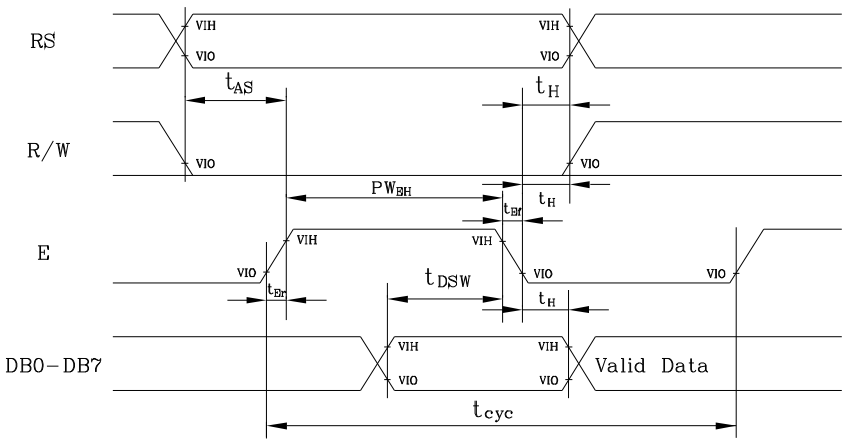


Fig. a Interface timing (data write)

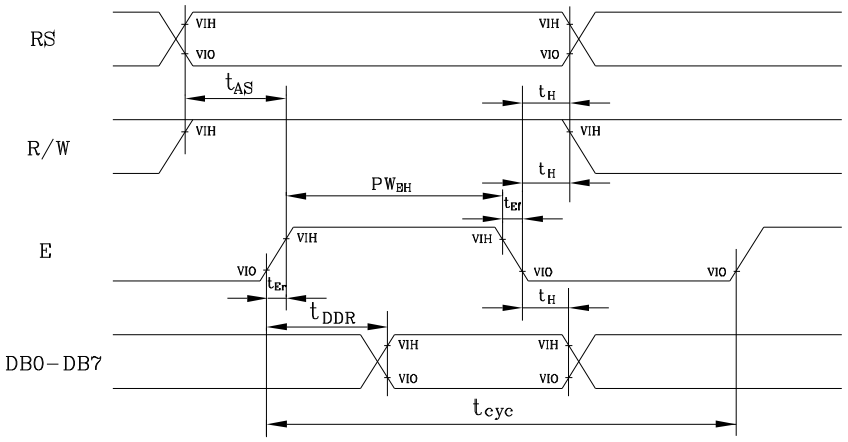
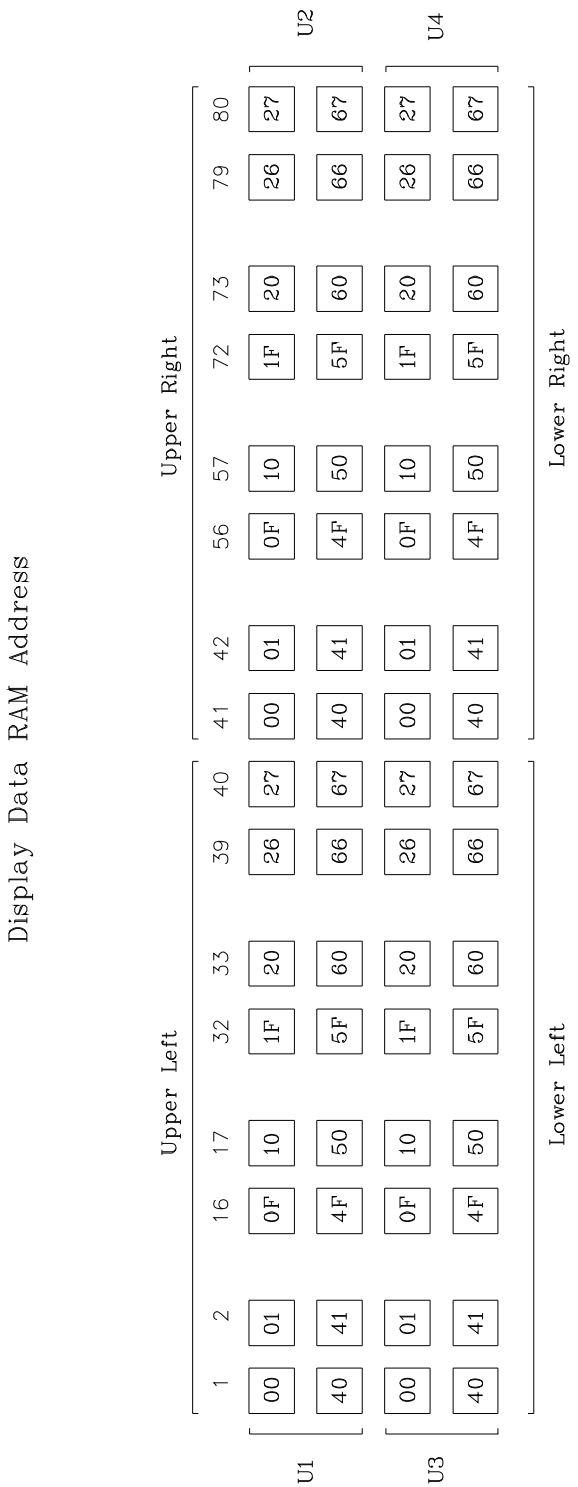


Fig. b Interface timing (data read)

9. RELIABILITY TEST

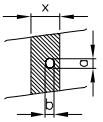
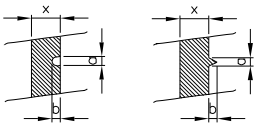
NO	ITEM	CONDITION			STANDARD	NOTE
1	High Temp. Leaving	70°C	120HR		Appearance without defect	
2	Low Temp. Leaving	−20°C	120HR		Appearance without defect	
3	High Temp. & High Humi. Leaving	40°C 90%RH	120HR		Appearance without defect	
4	Thermal Shock	−20°C,30min→25°C,5min →60°C,30min→25°C,5min (1cycle)			Appearance without defect	5 cycles

DISPLAY PATTERN (80 X 4)



LCD PRODUCT QUALITY STANDARD

(1) DISPLAY APPEARANCE

<table>
<tr><th>NO</th><th>ITEM</th><th>C R I T E R I A</th></tr>
<tr><td>1.</td><td>INCLUSI-ONS (BLACK SPOT , WHITE SPOT , DUST)</td><td>(1) ROUND TYPE
<table>
<tr><th>DIAMETER mm (a*)</th><th>NO. OF DEFECT*</th></tr>
<tr><td>a ≦ 0.20
0.20 < a ≦ 0.35
0.35 < a</td><td>NEGLECT
5 MAX
NONE</td></tr>
</table>
(2) LINEAR TYPE
<table>
<tr><th>LENGTH mm(L)</th><th>WIDTH mm(W)</th><th>NO. OF DEFECT</th></tr>
<tr><td>N A
L ≦ 3
3 < L</td><td>W ≦ 0.03
0.03 < W ≦ 0.08
0.08 < W</td><td>NEGLECT
6
NONE</td></tr>
</table></td></tr>
<tr><td>2.</td><td>SCRATCH</td><td>1.SCRATCH ON PROTECTIVE FILM IS PERMITTED .
2.SCRATCH ON POLARIZER SHALL BE AS FOLLOW:
(1) ROUND TYPE
<table>
<tr><th>DIAMETER mm (a*)</th><th>NO. OF DEFECT*</th></tr>
<tr><td>a ≦ 0.15
0.15 < a ≦ 0.20
0.20 < a</td><td>NEGLECT
2 MAX
NONE</td></tr>
</table>
(2) LINEAR TYPE
BE JUDGED BY 1.-(2) LINEAR TYPE</td></tr>
<tr><td>3.</td><td>DENT</td><td>DIAMETER < 1.5mm</td></tr>
<tr><td>4.</td><td>BUBBLE</td><td>NOT EXCEEDING 0.5mm AVERAGE DIAMETER IS ACCEPTABLE BETWEEN GLASS AND POLARIZING FILM.</td></tr>
<tr><td>5.</td><td>PIN HOLE</td><td>(a+b)/2 ≦ 0.15 mm
MAXIMUM NUMBER: IGNORED
0.15 < (a+b)/2 ≦ 0.20
MAXIMUM NUMBER: 10
  </td></tr>
<tr><td>6.</td><td>DOT DEFECT</td><td>(a+b)/2 ≦ 0.20 mm
MAXIMUM NUMBER: IGNORED
0.20 < (a+b)/2 ≦ 0.30
MAXIMUM NUMBER: 5
x = WIDTH
  </td></tr>
<tr><td>7.</td><td>CONTRAST IRREGUL-ARITY (SPOT)</td><td>DIAMETER SPEC. — NO. OF DEFECT*
a ≦ 0.50 mm — NEGLECT
0.50 < a ≦ 0.75 — 5
0.75 < a ≦ 1.00 — 3
1.00 < a — NONE</td></tr>
<tr><td>8.</td><td>DOT WIDTH</td><td>DESIGN WIDTH±15%</td></tr>
<tr><td>9.</td><td>COLOR TONE AND UNIFOR-MITY</td><td>OBVIOUS UNEVEN COLOR IS NOT PERMITTED</td></tr>
</table>

(2) NOTE:

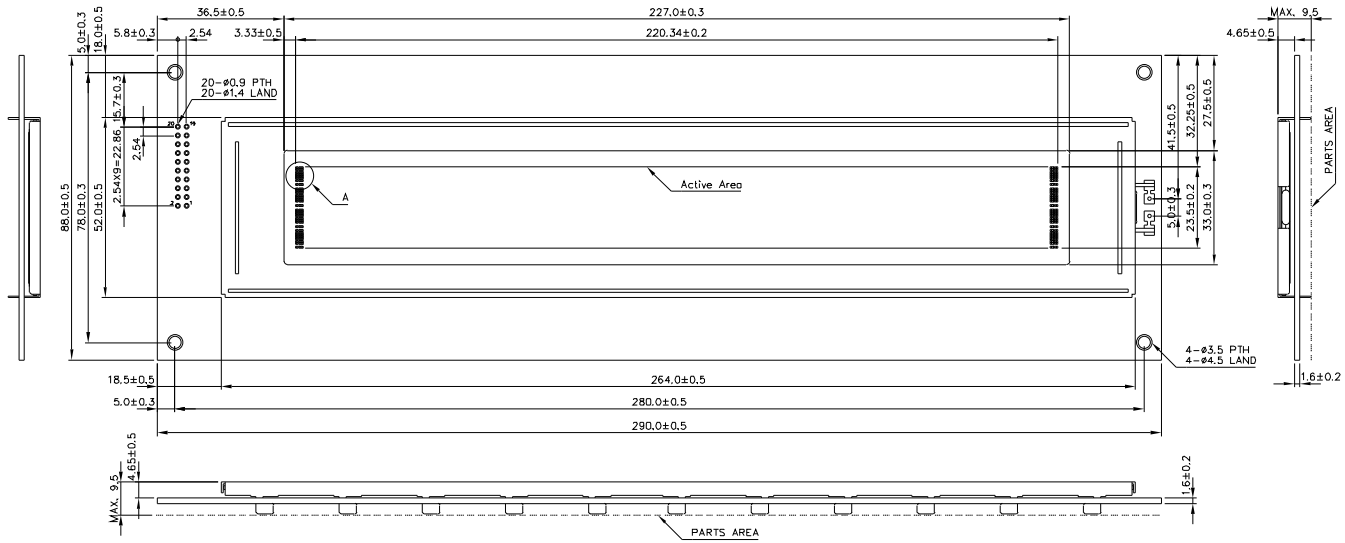
- SAFETY
  1. If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.
  2. If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

- HANDLING
  1. Avoid static electricity which can damage the CMOS 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 plate.
  5. Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.

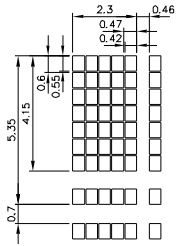
- STORAGE
  1. Store the panel or module in a dark place where the temperature is 25°C±5°C and the humidity is below 65% RH.
  2. Do not place the module near organics solvents or corrosive gases.
  3. Do not crush, shake, or jolt the module.

- TERMS OF WARRANT
  1. Acceptance inspection period
     The period is within one month after the arrival of contracted commodity at the buyer's factory site.
  2. Applicable warrant period
     The period is within twelve months since the date of shipping out under normal using and storage conditions.

- THE OPERATING LIFE TIME OF BACK LIGHT
  EL : 3,000HR



Pin No.	Symbol	Description
1	VO	Power Supply for LCD
2	VSS	Power Supply (0V)
3	RS	Control/Data Selection
4	VDD	Power Supply (+5V)
5	E4	Enable Signal (Lower Right)
6	R/W	Read/Write Signal
7	E2	Enable Signal (Upper Right)
8	E3	Enable Signal (Lower Left)
9	DB7	Data Bus
10	E1	Enable Signal (Upper Left)
11	DB5	Data Bus
12	DB6	
13	DB3	
14	DB4	
15	DB1	
16	DB2	
17	VDD	Power Supply (+5V)
18	DB0	Data Bus
19	VSS	Power Supply (0V)
20	NC	Non-Connection



80CX4L

A DETAIL

NOTES:

1.Resolution : 80 X 4 Characters
2.General Tolerance : ±0.5 mm
3.Logic Voltage : 5V
4.Backlight : EL/None

產品編號	LMXS8X199X		南亞塑膠工業股份有限公司 NAN YA PLASTICS CORPORATION	
	NAME	DATE		
APPROVE			TITLE	製 品 圖
CHECK			DWG-NO	MX-X199X Rev.A
DESIGN				
DRAWN	MAY PING	87.09.04	UNIT : mm	
			SCALE : 1/1	

THIRD ANGLE PROJECT