

NAN YA PLASTICS CORP.
ELEC. MATERIALS DIV.
LCD DEPARTMENT

SPECIFICATION

SPEC. NO. : LM042-0

DATE : Nov.6.1997

SHEET NO. : 1/16

U.S. MARKETING ARM:

MARK PRODUCTS CORPORATION
800 N. EDGEWOOD AVENUE
WOOD DALE, IL 60191
TEL: 630-787-9089
FAX: 630-787-9015

SPECIFICATION OF
122x32 LCD MODULE
PRODUCT NO.: LM_62_042_M

SPEC. NO.: LM042-0

APPROVED BY

EDITED ON : Nov.6.1997

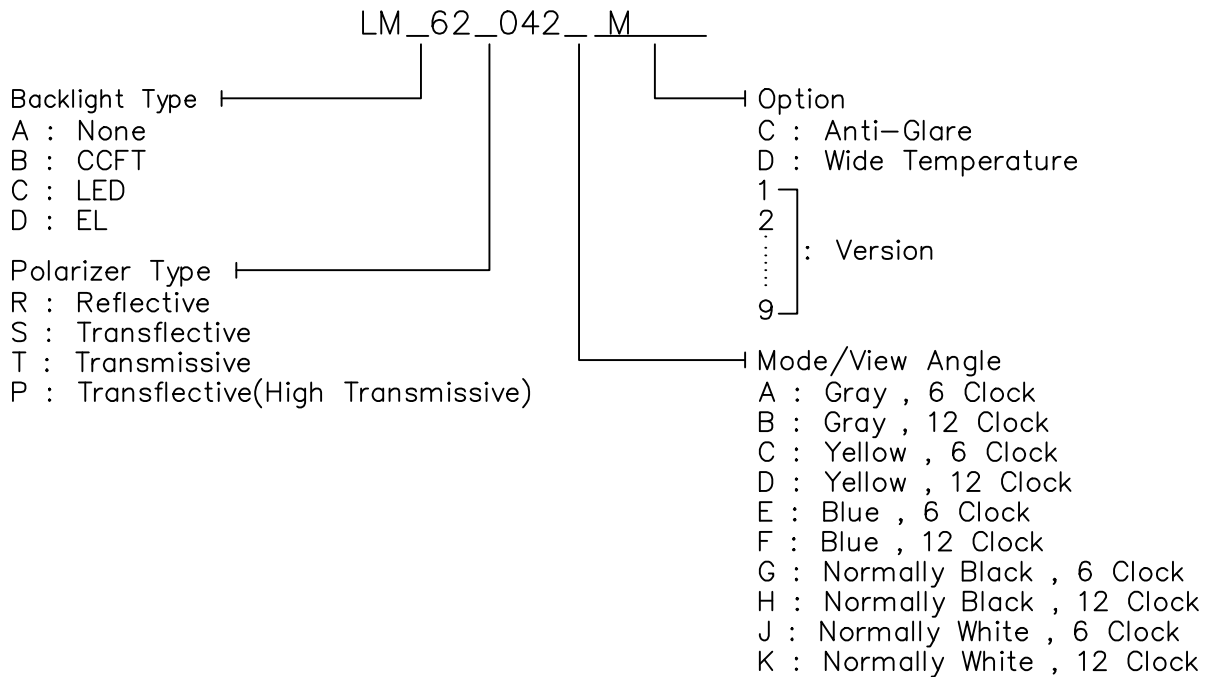
| SALES MANAGER | DESIGN MANAGER | PERSON IN CHARGE |
|------------------|-------------------|---------------------|
| | | |

| | | | | | | | | |
|----------|----------------|--|--|--|--|-----|-----|----|
| REV/DATE | RO/ 11.6.97 | | | | | APP | CHK | BY |
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1. MECHANICAL DATA

- (1) Product No. LM_62_042_M
- (2) Module Size 66.1 (W)mm x 27.3 (H)mm x MAX8.4 (D)mm
(W/O, EL B.L.)
- (3) Dot Size 0.40 (W)mm x 0.45 (H)mm
- (4) Dot Pitch 0.44 (W)mm x 0.49 (H)mm
- (5) Number of Characters 122 (W) x 32 (H)DOTs
- (6) Duty 1/32
- (7) LCD Display Mode STN: Gray Mode Yellow Mode Blue Mode
FSTN: Black and White(Normal White/Positive Image)
 Black and White(Normal Black/Negative Image)
Rear Polarizer: Reflective Transflective Transmissive
- (8) Viewing Direction 6 O'clock 12 O'clock ___O'clock
- (9) Backlight W/O LED B/L EL B/L
- (10) LCD Controller SED1520DAA
- (11) Weight W/O B/L: 17.5 g
EL B/L: 19.0 g

Note :



| | | | | | | | | |
|----------|-----------------|--|--|--|--|-----|-----|----|
| REV/DATE | RO/ 11.6.97' | | | | | APP | CHK | BY |
|----------|-----------------|--|--|--|--|-----|-----|----|

2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

V_{SS}=0V

| | SYMBOL | MIN | MAX | UNIT | COMMENT |
|------------------------|----------------|------|-----|------|---------|
| Power Supply for Logic | VDD-VSS | -0.3 | 6.5 | V | |
| Input Voltage | V _I | -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 1,3 | | Note 2,3 | | Note 3,4 | | Note 3,5 | |

Note 1 Ta ≤ 50°C : 85%RH max
Ta > 50°C : Absolute humidity must be lower
than the humidity of 85%RH at 50°C

Note 2 Ta at -20°C will be < 48hrs, at 70°C will be < 120hrs

Note 3 Background color changes slightly depending on ambient temperature.
This phenomenon is reversible.

Note 4 Ta ≤ 70°C : 75%RH max
Ta > 70°C : Absolute humidity must be lower
than the humidity of 75%RH at 70°C

Note 5 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-V0 | DUTY= 1/32 Bias= 1/4.7 | 0°C | — | 6.0 | 6.8 | V |
| | | | 25°C | 4.9 | 5.4 | 5.8 | |
| | | | 50°C | 4.3 | 4.7 | — | |
| Recommended LC Driving Voltage (WIDE TEMP. LCM) | VDD-V0 | | -20°C | — | 7.3 | 7.9 | V |
| | | | 0°C | — | — | — | |
| | | | 25°C | 6.6 | 7.0 | 7.5 | |
| | | | 50°C | — | — | — | |
| | | 70°C | 5.9 | 6.4 | — | | |
| Power Supply Current | IDD | VDD = 5.0V | — | — | 2.8 | mA | |
| EL Power Supply Current | IEL | VBL = 110VAc 400Hz | — | — | 5.0 | mA | |

4.OPTICAL CHARACTERISTICS

(FOR NORMAL TEMPERATURE MODE LCM)

AT Vop

| MODE \ ITEM | | Cr(Contrast Ratio) | | θ (Viewing Angle) | | ϕ (Viewing Angle) | |
|-------------|---|--------------------|------|--------------------------|------|------------------------|------|
| | | 25℃ | | 25℃ | | 25℃ | |
| | | MIN. | TYP. | MIN. | TYP. | MIN. | TYP. |
| R | A | 3 | 4.5 | 40 | 70 | 25 | 34 |
| | C | 5 | 9 | 50 | 80 | 25 | 36 |
| | J | | | | | | |
| S | A | 3 | 4 | 40 | 75 | 25 | 32 |
| | C | 4.5 | 9 | 40 | 70 | 25 | 30 |
| | J | | | | | | |
| T | E | | | | | | |
| | G | | | | | | |
| NOTE | | NOTE6 | | NOTE5 | | | |

AT $\phi=0^\circ$ $\theta=0^\circ$

| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT | NOTE |
|----------------------|--------|-----------|------|------|------|------|--------|
| Response Time (rise) | Tr | 0℃ | - | 580 | 1200 | ms | NOTE 2 |
| | | 25℃ | - | 220 | 450 | | |
| | | 50℃ | - | 140 | 280 | | |
| Response Time (fall) | Tf | 0℃ | - | 760 | 1500 | ms | NOTE 2 |
| | | 25℃ | - | 170 | 350 | | |
| | | 50℃ | - | 90 | 200 | | |

NOTE :

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

4-1.OPTICAL CHARACTERISTICS

(FOR WIDE TEMPERATURE MODE LCM)

AT Vop

| MODE | ITEM | Cr(Contrast Ratio) | | θ (Viewing Angle) | | ϕ (Viewing Angle) | |
|------|------|--------------------|------|--------------------------|------|------------------------|------|
| | | 25℃ | | 25℃ | | 25℃ | |
| | | MIN. | TYP. | MIN. | TYP. | MIN. | TYP. |
| R | A | 3 | 3.5 | 40 | 45 | 22 | 28 |
| | C | | | | | | |
| | J | | | | | | |
| S | A | 3 | 3.4 | 40 | 45 | 20 | 26 |
| | C | | | | | | |
| | J | | | | | | |
| T | E | | | | | | |
| | G | | | | | | |
| NOTE | | NOTE6 | | NOTE5 | | | |

AT $\phi=0^\circ$ $\theta=0^\circ$

| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT | NOTE |
|----------------------|--------|-----------|------|------|------|------|--------|
| Response Time (rise) | Tr | -20℃ | - | 1100 | 2200 | ms | NOTE 2 |
| | | 0℃ | - | - | - | | |
| | | 25℃ | - | 105 | 210 | | |
| | | 50℃ | - | - | - | | |
| | | 70℃ | - | 40 | 80 | | |
| Response Time (fall) | Tf | -20℃ | - | 2400 | 4800 | ms | NOTE 2 |
| | | 0℃ | - | - | - | | |
| | | 25℃ | - | 160 | 320 | | |
| | | 50℃ | - | - | - | | |
| | | 70℃ | - | 55 | 110 | | |

NOTE :

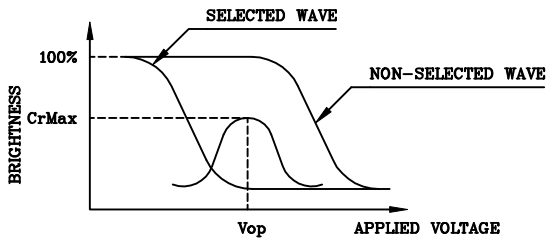
R: REFLECTIVE
S: TRANSFLECTIVE
T: TRANSMISSIVE
A: GRAY

C: YELLOW
E: BLUE
G: NORMALLY BLACK
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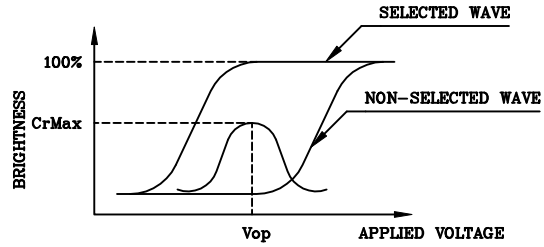
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|----------|-----------------|--|--|--|--|-----|-----|----|
| REV/DATE | RO/ 11.6.97' | | | | | APP | CHK | BY |
|----------|-----------------|--|--|--|--|-----|-----|----|

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



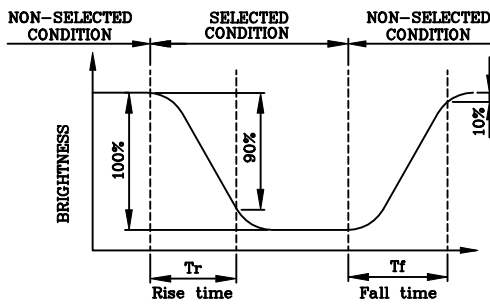
(negative type)

*Conditions

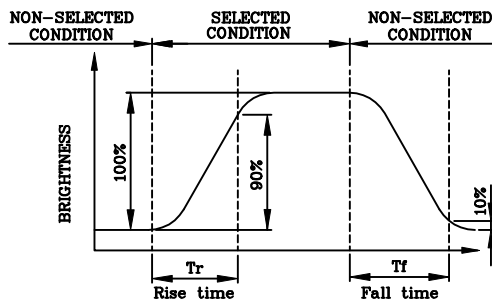
Viewing Angle : 0
 Frame Frequency : 70Hz
 Applied Waveform : 1/N duty, 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



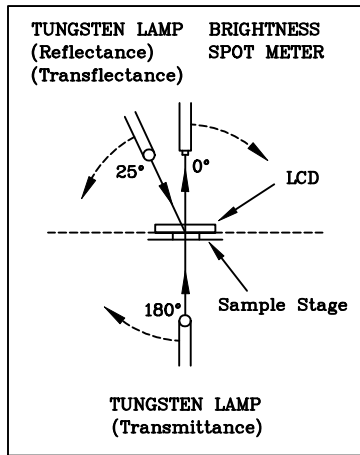
(negative type)

*Conditions

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

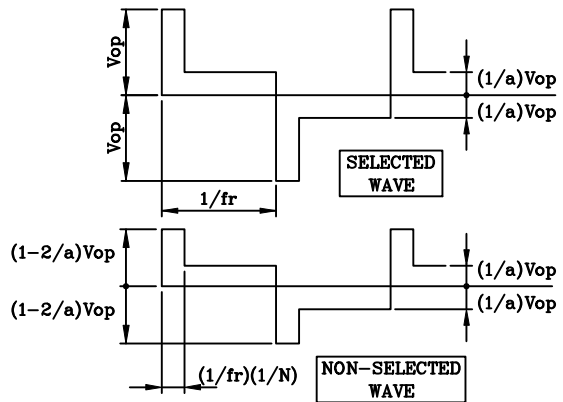
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



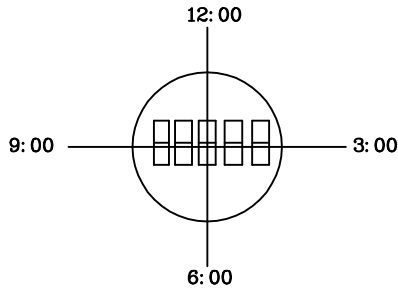
CONST.
 TEMP.
 CHAMBER

Multiplex Driving (1/N duty, 1/a bias)



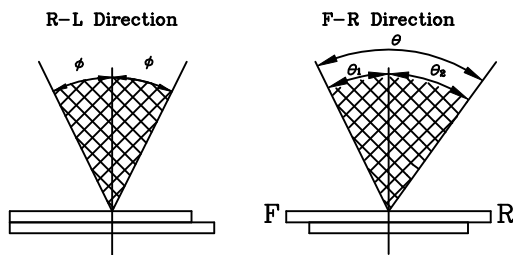
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



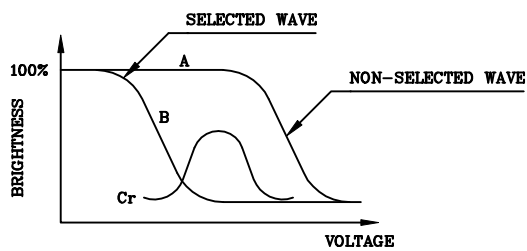
$$\theta = \theta_1 + \theta_2$$

*Conditions

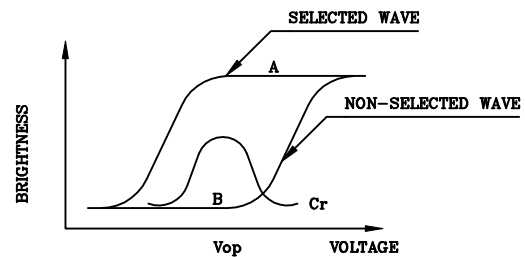
Operating Voltage : V_{op}
 Frame Frequency : 70Hz
 Applied Waveform : 1/N duty, 1/a bias
 Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



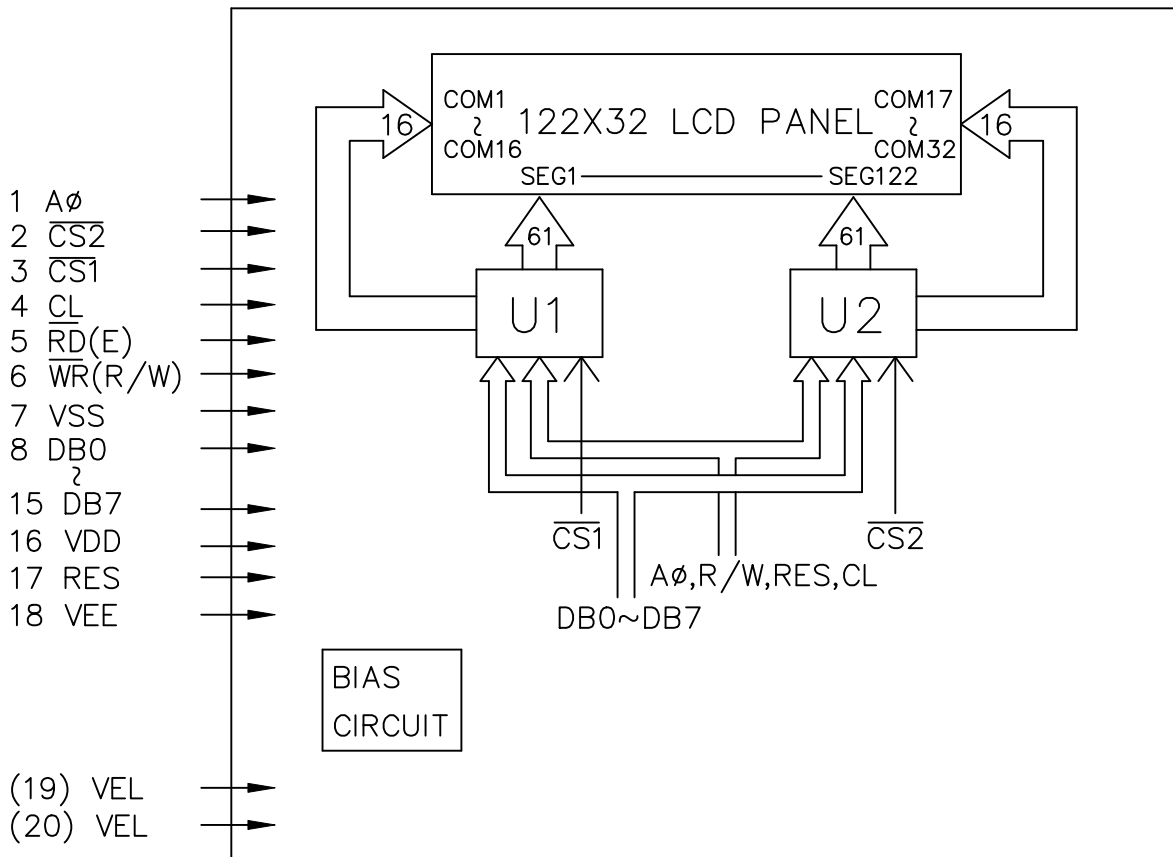
(negative type)

$$\text{Contrast Ratio : } Cr = A/B$$

*Conditions

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

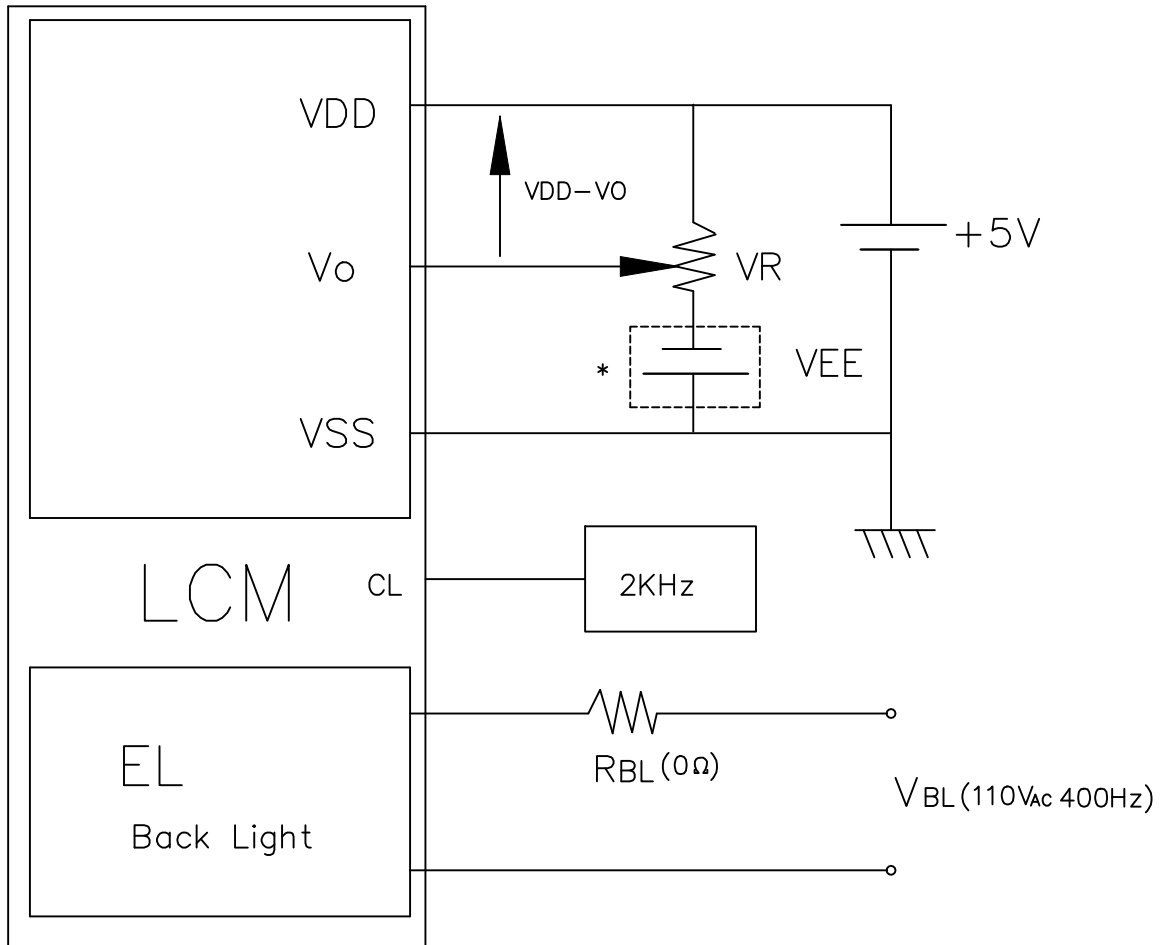
5. BLOCK DIAGRAM



6. INTERNAL PIN CONNECTION

| PinNo. | Symbol | Level | Function |
|--------|----------------------|-------|---|
| 1 | A \emptyset | H/L | L→INSTRUCTION H→DATA |
| 2 | $\overline{CS2}$ | L | CHIP ENABLE ACTIVE "L" |
| 3 | $\overline{CS1}$ | L | CHIP ENABLE ACTIVE "L" |
| 4 | CL | H/L | EXTERNAL CLOCK(2KHZ) |
| 5 | $\overline{RD}(E)$ | — | \overline{RD} FOR 80 SERI,E FOR 68 SERI |
| 6 | $\overline{WR}(R/W)$ | — | \overline{WR} FOR 80 SERI,R/W FOR 68 SERI |
| 7 | VSS | — | GROUND |
| 8 | DB0 | H/L | DATA BUS LINE |
| 9 | DB1 | H/L | |
| 10 | DB2 | H/L | |
| 11 | DB3 | H/L | |
| 12 | DB4 | H/L | |
| 13 | DB5 | H/L | |
| 14 | DB6 | H/L | |
| 15 | DB7 | H/L | |
| 16 | VDD | — | POWER SUPPLY FOR LOGIC CIRCUIT |
| 17 | RES | H/L | L→80 SERIES H→68 SERIES |
| 18 | VEE | — | POWER SUPPLY FOR LCD |
| (19) | VEL | — | POWER SUPPLY FOR EL BACK LIGHT |
| (20) | VEL | — | |

7. POWER SUPPLY



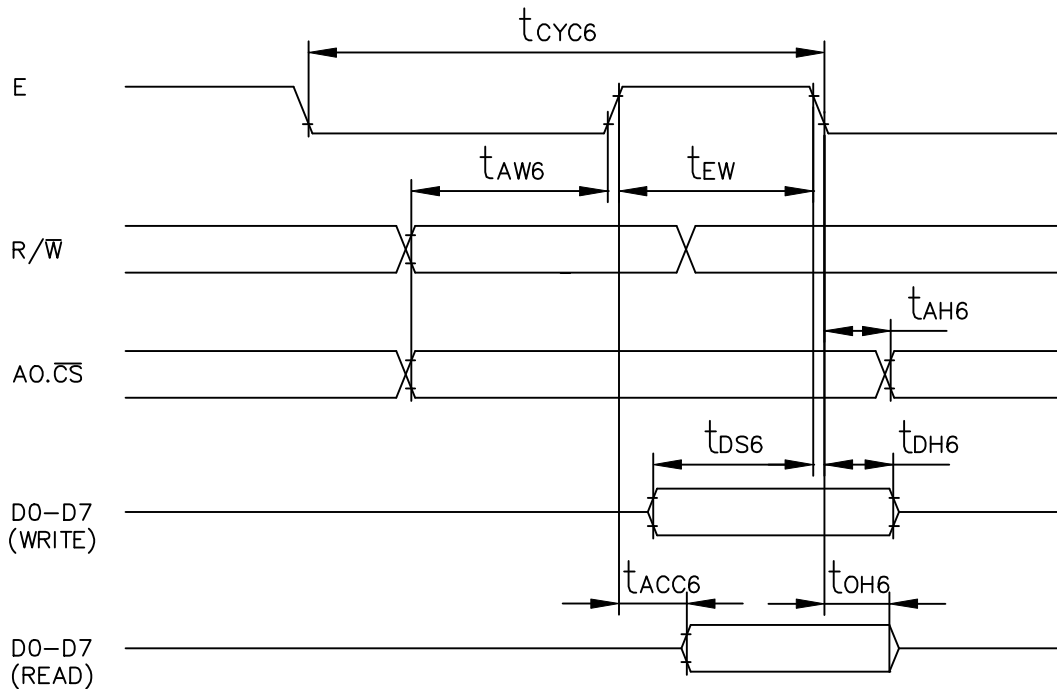
VR = 20KΩ (Variable)

* VEE = 5V

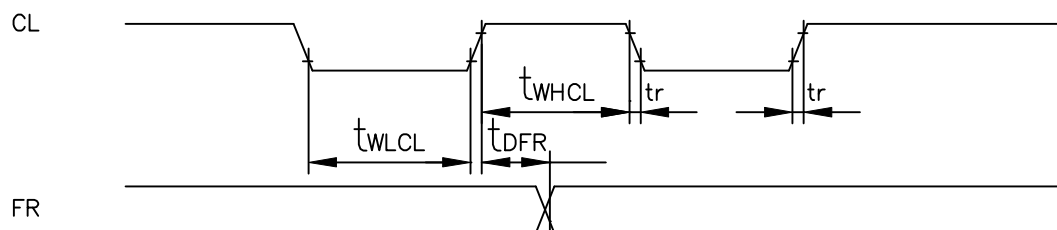
8. TIMING CHART

| Item | Signal | Symbol | Condition | Min | Typ | Max | Unit |
|------------------|--------|--------|---------------------------|------|-----|-----|---------|
| LOW pulse width | CL | tWLCL | | 35 | - | - | μ s |
| HIGH pulse width | | tWHCL | | 35 | - | - | μ s |
| Rising time | | tr | | - | 30 | 150 | ns |
| Falling time | | tf | | - | 30 | 150 | ns |
| FR delay time | FR | tDFR | (Input timing) | -2.0 | 0.2 | 2.0 | μ s |
| | | | (Output timing), CL=100pF | | 0.2 | 0.4 | |

○Read/write timing for the 68-port MPU



○Control timing for 80-port/68-port display

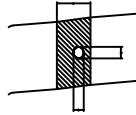
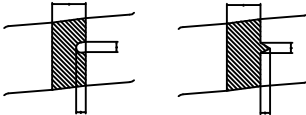


9. RELIABILITY TEST

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

10.LCD PRODUCT QUALITY STANDARD

(1) DISPLAY APPEARANCE

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

(2) NOTE:

• SAFETY

- 1.If the LCD panel breaks, be careful not to allow 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.Prevent all contact with static electricity, which can damage the CMOS ICs. The module is packaged in a static-shielding bag to prevent damage during shipment, warehousing and removal from the shipping carton.
- 2.Do not remove the panel or frame from the module.
- 3.The polarizing plate on the front surface of the display is very fragile and easily scratched. The module is shipped with a protective liner which must be removed from the polarizing plate prior to assembly.
- 4.Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of polarizing plate.
- 5.Do not use ketonics solvent or aromatic solvent on the polarizing plate. Use a soft cloth soaked with plastic-lens cleaning solution.

• STORAGE

- 1.Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C}\pm 5^{\circ}\text{C}$ 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.

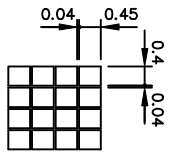
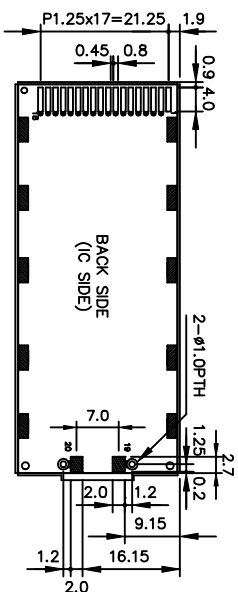
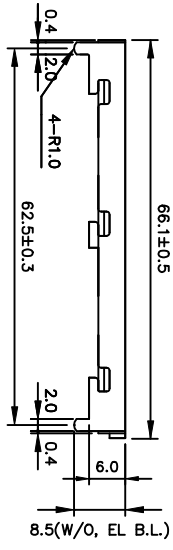
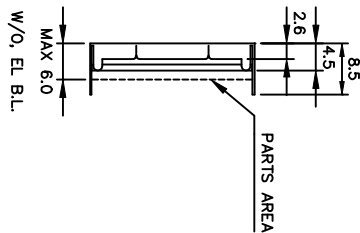
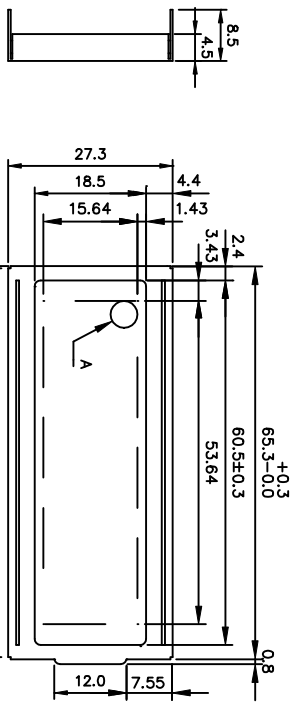
• TERMS OF WARRANTY

- 1.Acceptance inspection period
The inspection period is within one month after the arrival of the contracted goods at the buyer's factory site.
- 2.Applicable warranty period
The warranty period is within twelve months from the date of invoice under normal usage and storage conditions.

• TYPICAL OPERATING LIFETIME OF BACKLIGHT

- LED : 50,000HR
EL : 5,000HR
CCFT : 10,000HR

| | | | | | | | | |
|----------|-----------------|--|--|--|--|-----|-----|----|
| REV/DATE | RO/ 11.6.97' | | | | | APP | CHK | BY |
|----------|-----------------|--|--|--|--|-----|-----|----|



A DETAIL

INTERNAL PIN CONNECTION

| PinNo. | Symbol | Level | Function |
|--------|-----------|-------|--------------------------------|
| 1 | A β | H/L | L-INSTRUCTION H-HDATA |
| 2 | CS2 | L | CHIP ENABLE ACTIVE "1" |
| 3 | CS1 | L | CHIP ENABLE ACTIVE "1" |
| 4 | CL | H/L | EXTERNAL CLOCK(SHHD) |
| 5 | RD(E) | - | RD FOR 60 SERIAL FOR 68 SER |
| 6 | WR(R/W) | - | WR FOR 60 SERIAL FOR 68 SER |
| 7 | VSS | - | GROUND |
| 8 | DB0 | H/L | DATA BUS LINE |
| 9 | DB1 | H/L | |
| 10 | DB2 | H/L | |
| 11 | DB3 | H/L | |
| 12 | DB4 | H/L | DATA BUS LINE |
| 13 | DB5 | H/L | |
| 14 | DB6 | H/L | |
| 15 | DB7 | H/L | |
| 16 | VDD | - | POWER SUPPLY FOR LOGIC CIRCUIT |
| 17 | RES | H/L | L-40 SERIAL, H-48 SERIAL |
| 18 | VEE | - | POWER SUPPLY FOR LDD |
| 19 | NC | - | |
| 20 | NC | - | |

1. Resolution : 122X32 Dots

| | | |
|---------|------------------|-----------------------------|
| 產品編號 | LM_62_042 | 南亞塑膠工業股份有限公司 |
| NAME | | NAN YA PLASTICS CORPORATION |
| DATE | | |
| TITLE | | 製品圖 |
| APPROVE | | |
| CHECK | | DWG-NO |
| DESIGN | | MX-X042X |
| DRAW | | Rev.A |
| | MAY PING 86.11.6 | UNIT : mm |
| | | SCALE : 1.5/3 |
| | | THIRD ANGLE PROJECT |