

| | |
|---------------|--------------------|
| CUSTOMER : | |
| MODEL : | MOC-16116B-3-A0A01 |
| DESCRIPTION : | LCD MODULE |

◆ CUSTOMER APPROVAL

| | CHECKED | CHECKED | APPROVAL |
|----------|---------|---------|----------|
| APPROVAL | | | |
| REMARK | | | |

◆ SUPPLIER APPROVAL

| PREPARED | CHECKED | | APPROVAL |
|----------|---------|--|----------|
| | | | |

MYTECH CORPORATION

180 Old Tappan Rd., Bldg. 6, Old Tappan, NJ 07675

Tel: (201) 784-8867 Fax: (201) 784-8932

Email: mysales@mytechcorp.com

- NOTE:** 1. This specification may, wholly or partially, be subjected to change without notice.
2. Information contained herein is proprietary information of MYTECH CORPORATION. The dissemination use or duplication for any purpose other than for which the information is provided is prohibited by MYTECH CORPORATION except by express permission.

I .General Specifications

1. Features

- A. Low power consumption 5.0V power supply
- B. 1/16 duty,1/5 bias
- C. Viewing direction:6:00
- D. Operating tempration:0~50°C
- E. Storage tempration:-20~70°C
- F. Display mode: STN mode, positive type display

2.Mechanical Data and Conditions:

- (1) Number of Characters----- 16 Characters* 1 Line
- (2) Module Size-----80.0 w * 36.0 h mm
- (3) Viewing Area ----- 64.5 w * 14.0 h mm
- (4) Dot Size -----0.55 w * 0.75 h mm
- (5) Character Size -----3.07 w * 6.56 h mm
- (6) Outline Dimensions-----See Attached Drawing

3.Pin Connections:

| Pin No. | Symbol | Function |
|---------|---------|----------------------------------|
| 1 | Vss | Ground(0v) |
| 2 | Vdd | Logic Supply Voltage(+5.0v) |
| 3 | Vee | LCD Driver Voltage Input |
| 4 | RS | Data/Instruction Register Select |
| 5 | R/W | Read/Write Select |
| 6 | E | Enable Signal |
| 7-14 | DB0-DB7 | Data Bus Line |
| 15-16 | LED+,- | NC |

4. Absolute Maximum Ratings

| Characteristics | Symbol | Ratings |
|-----------------------|------------------|-------------------|
| Operating Voltage | VDD | -0.3V to +7.0V |
| Driver Supply Voltage | V _{LCD} | -0.3V to +13.5V |
| Input Voltage Range | V _{IN} | -0.3V to VDD+0.3V |

5. Timing Characteristics: (VDD=4.5 to 5.5V)

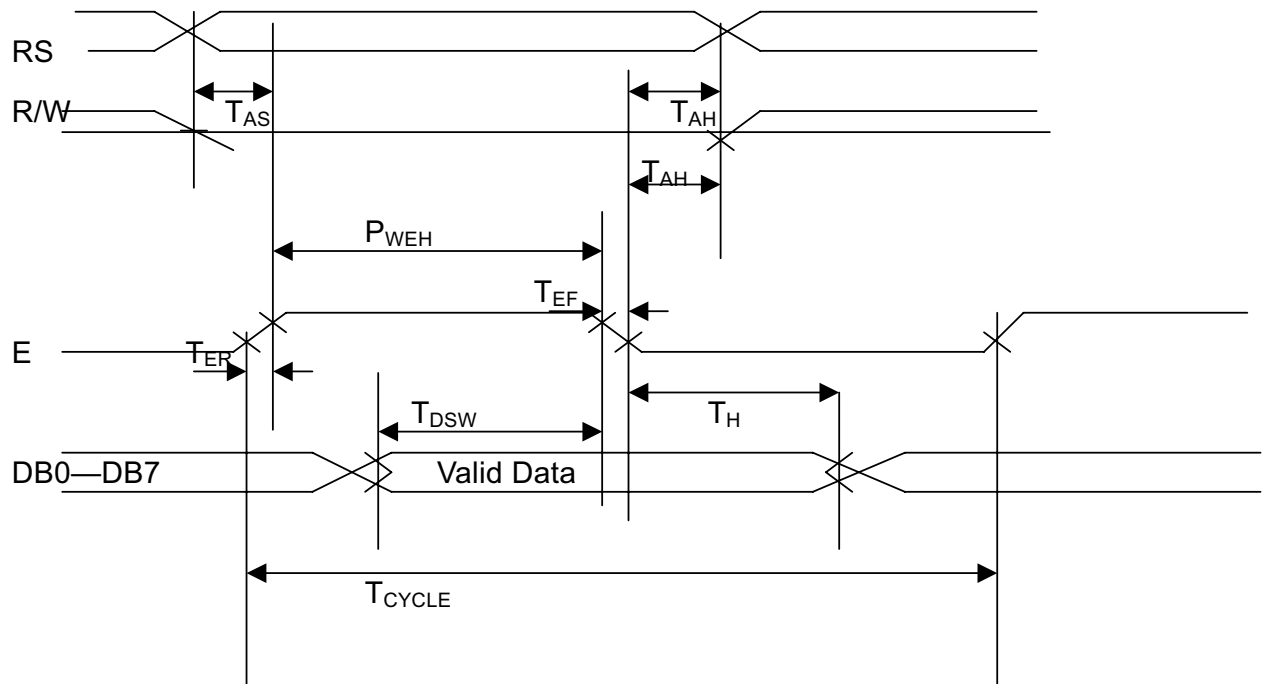
Write Operation

| Item | Symbol | Min. | Typ. | Max. | Unit |
|-------------------------|---------------------|------|------|------|------|
| Enable Cycle Time | T _{CYCLE} | 400 | -- | -- | nS |
| Enable Pulse Width | P _{WEH} | 150 | -- | -- | nS |
| Enable Rise & Fall Time | T _{ER,TEF} | -- | -- | 25 | nS |
| Address Set-Up Time | T _{AS} | 30 | -- | -- | nS |
| Address Hold Time | T _{AH} | 10 | -- | -- | nS |
| Data Set-Up Time | T _{DSW} | 40 | -- | -- | nS |
| Data Hold Time | T _H | 10 | -- | -- | nS |

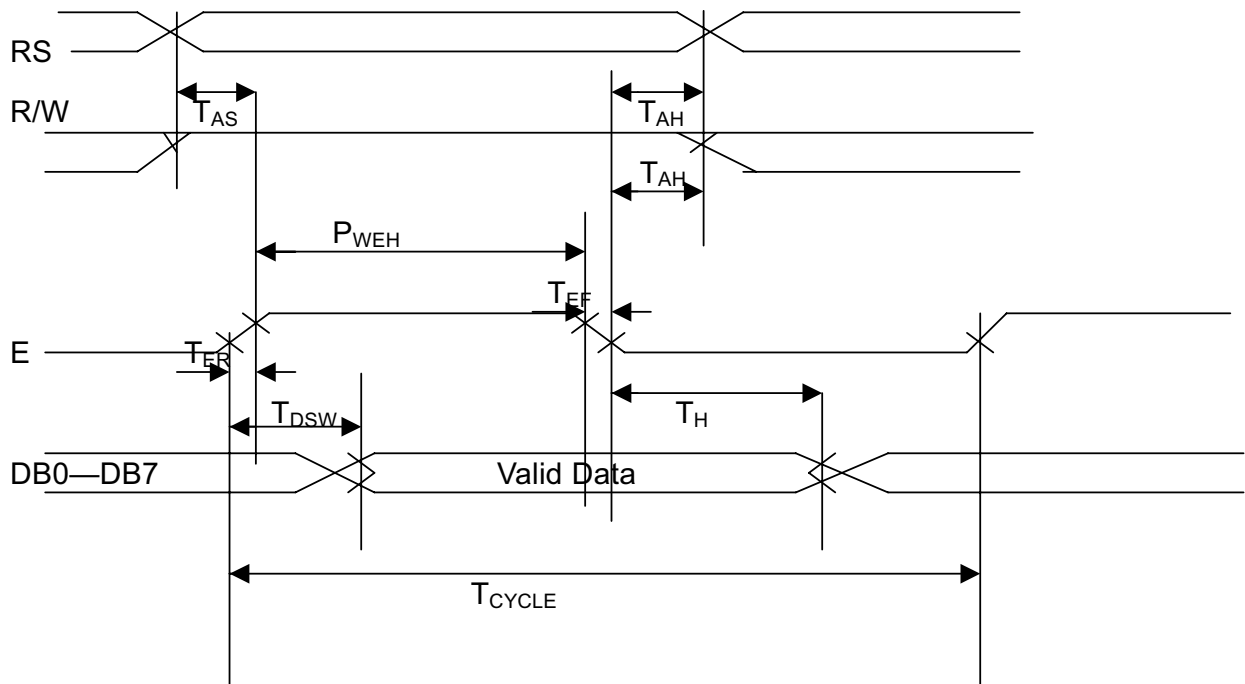
Read Operation

| Item | Symbol | Min. | Typ. | Max. | Unit |
|-------------------------|---------------------|------|------|------|------|
| Enable Cycle Time | T _{CYCLE} | 400 | -- | -- | nS |
| Enable Pulse Width | P _{WEH} | 150 | -- | -- | nS |
| Enable Rise & Fall Time | T _{ER,TEF} | - | -- | 25 | nS |
| Address Set-Up Time | T _{AS} | 30 | -- | -- | nS |
| Address Hold Time | T _{AH} | 10 | -- | -- | nS |
| Data Output Delay Time | T _{DSW} | - | -- | 100 | nS |
| Data Hold Time | T _H | 20 | -- | -- | nS |

Write Operation:



Read Operation



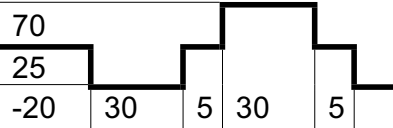
II .The Characteristics and Reliability Test

1. Electro-Optic Characteristics(module unit):

Condition:TEMP=(23±3)°C

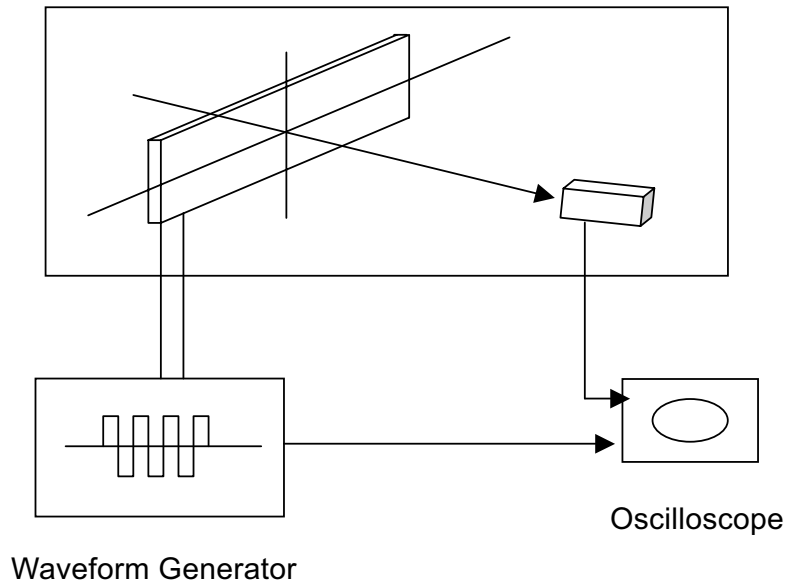
| NO | Item | Symbol | Min. | Typ. | Max. | Unit | Condition |
|----|------------------------|--------------------|------|------|------|------|-----------|
| 1 | Supply Voltage(Logic) | Vdd-Vss | 4.5 | 5.0 | 5.5 | V | |
| 2 | Supply Current (Logic) | Idd | | 1.22 | | mA | Vdd=5V |
| 3 | LCD Operating Voltage | Vdd-V ₀ | | 4.90 | | V | 0°C |
| | | | | 4.70 | | V | 25°C |
| | | | | 4.50 | | V | 50°C |
| 4 | Response Time | Ton | | 176 | | ms | |
| | | Toff | | 77 | | ms | |
| 5 | Contrast | CR | 3 | | | | |
| 6 | Viewing Angel | 12H | θ 1 | 43 | | Deg. | (CR≥3.0) |
| | | 6H | θ 2 | 54 | | | |
| | | 3H | θ 3 | 60 | | | |
| | | 9H | θ 4 | 60 | | | |
| 7 | LCD Threshold Voltage | Vth | | 3.72 | | V | 25°C |

2. Reliability Test

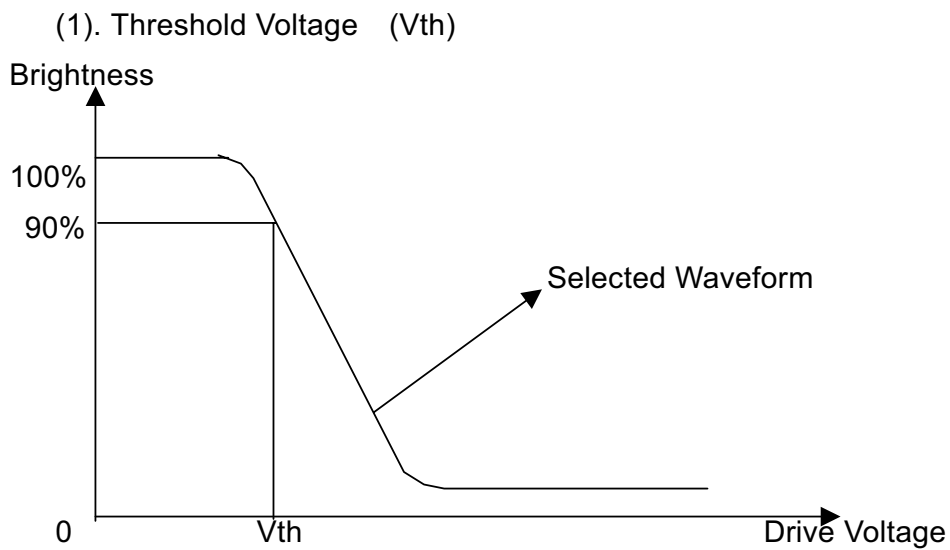
| No | Items | Test Condition | Equipment | Test Result |
|----|----------------------------|---|-----------|-------------|
| 1 | High Temp Storage | Temp: $70 \pm 2^\circ\text{C}$ Time: 96h Restore: 24h | Tenny | Passed |
| 2 | Low Temp Storage | Temp: $-20 \pm 3^\circ\text{C}$ Time: 96h Restore: 24h | Tenny | Passed |
| 3 | High Temp Static drive | Temp: $50 \pm 2^\circ\text{C}$ Vop: 5V Time: 24h Restore: 24h | Tenny | Passed |
| 4 | Low Temp Static drive | Temp: $0 \pm 3^\circ\text{C}$ Vop: 5V Time: 24h Restore: 24h | Tenny | Passed |
| 5 | High Temp High Hum Storage | Temp: $40 \pm 2^\circ\text{C}$ Hum: 95%Rh Time: 96h Restore: 24h | Tenny | Passed |
| 6 | Thermal Shock | Temp: ($^\circ\text{C}$)  5 Cycles Restore: 24h | Tenny | Passed |

III. The Equipment and LCD Measuring Method

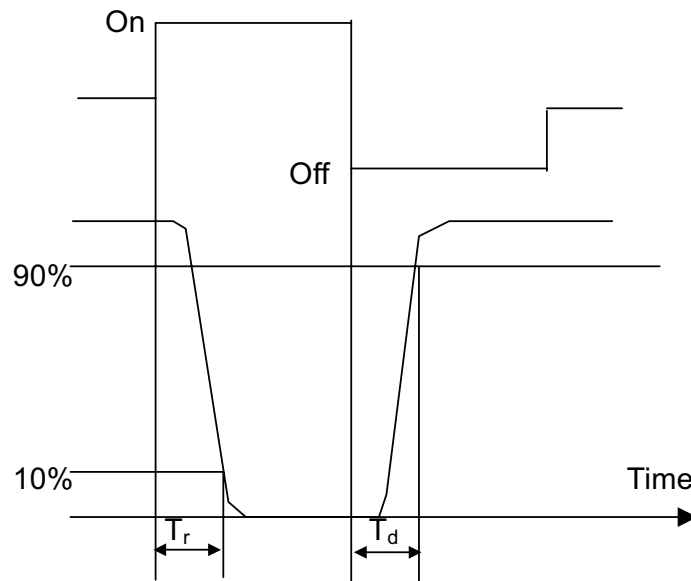
1. Equipment



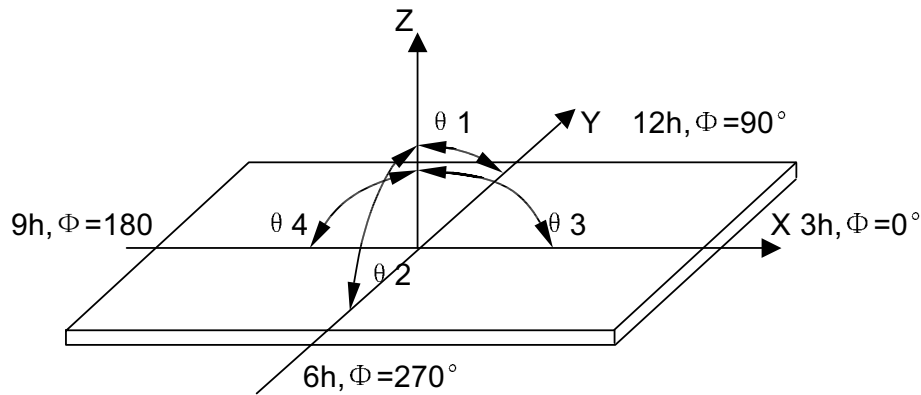
2. Definition



(2). Response Time



(3). Viewing Angle:



(4). Contrast Ratio (Positive)

$$CR = \frac{\text{Brightness of non-selected wave-form}}{\text{Brightness of selected wave-form}}$$

3. Reliability Test:

Equipment : TENNY

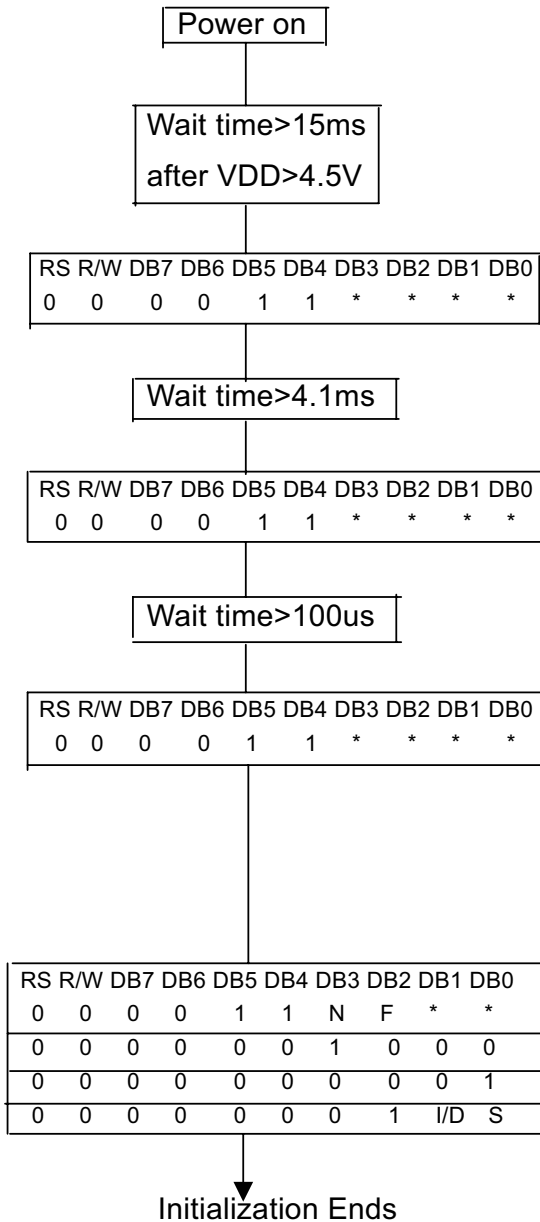
IV. Instruction Sets

1. Instruction Table

| Instruction | Instruction Code | | | | | | | | | | Description | Execution time(fosc=270kHz) | |
|------------------------------------|------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|---|--|--------|
| | RS | RW | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 | | | |
| Clear Display | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | Write "20H" to DDRM and set DDRAM address to "00H" from AC | 1.52mS | |
| Return Home | 0 | 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. | 1.52mS |
| 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 | 38uS | |
| 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. | 38uS | |
| 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. | 38uS | |
| Function Set | 0 | 0 | 0 | 0 | 1 | DL | N | F | - | - | Set interface data length(DL:8-bit/4bit), numbers of display line (N:2-line/1line) and, display font type (F:5*10dots/5*8dot) | 38uS | |
| Set CGRAM Address | 0 | 0 | 0 | 1 | AC5 | AC4 | AC3 | AC2 | AC1 | AC0 | Set CGRAM address in address counter | 38uS | |
| Set DDRAM Address | 0 | 0 | 1 | AC6 | AC5 | AC4 | AC3 | AC2 | AC1 | AC0 | Set DDRAM address in counter | 38uS | |
| 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 to RAM | 1 | 0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Write data into internal RAM (DDRM/CGRAM). | 38uS | |
| Read Data from RAM | 1 | 1 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Read data from internal RAM (DDRM/CGRAM). | 38uS | |

2.Reset Function

(1).8-Bit Interface



(Wait time > 40ms
After VDD > 2.7V)

BF cannot be checked before this instruction.
Function set(Interface is 8 bits length.)

BF cannot be checked before this instruction.
Function set(Interface is 8 bits length.)

BF cannot be checked before this instruction.
Function set(Interface is 8 bits length.)

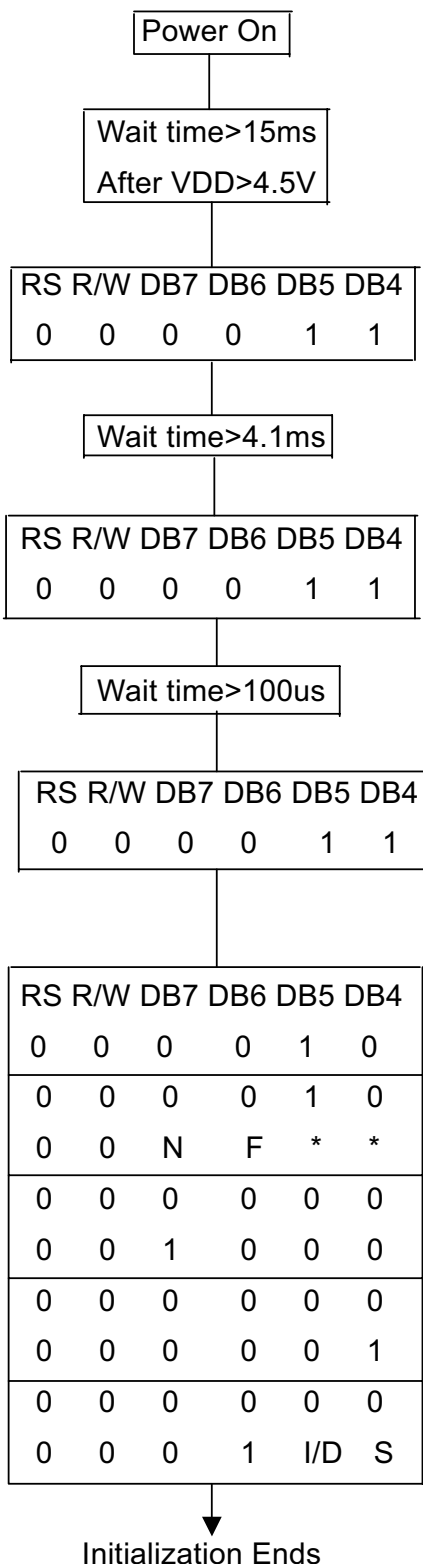
BF can be checked after the following instructions.
Function set(Interface is 8 bits length. Specify the
Number of display lines and character font.)
The number of display lines and character font
cannot be changed afterwards.

Display off

Display clear

Entry mode set

(2).4-Bit Interface



(Wait time > 40ms
after VDD > 2.7V)

BF cannot be checked before this instruction.
Function set (Interface is 8 bits length.)

BF cannot be checked before this instruction.
Function set (Interface is 8 bits length.)

BF cannot be checked before this instruction.
Function set (Interface is 8 bits length.)

BF can be checked after the following instructions.

Function set (Set interface to be 4 bits length) Interface is 8 bits length.

Function set (Interface is 4 bits length. Specify the number of the display lines and character font.)

The number of display lines and character font cannot be changed afterwards.

Display off

Display clear

Entry mode set

V. Standard Specifications for Product Quality

1. Manner of Test:

1.1. The Test Must Be Under 40w Fluorescent Light, And The Distance Of View Must Be At 30cm.

1.2. The Test Direction Is Based On Around 15° - 45° Of Vertical Line.

2. Definition Of Defects

2.1 Major Defects

A: Non-Display

B: Segment Missing

C: Over Current

D: Segment Short

E: Sealant Dishardexn

F: Wrong Polarizer Direction

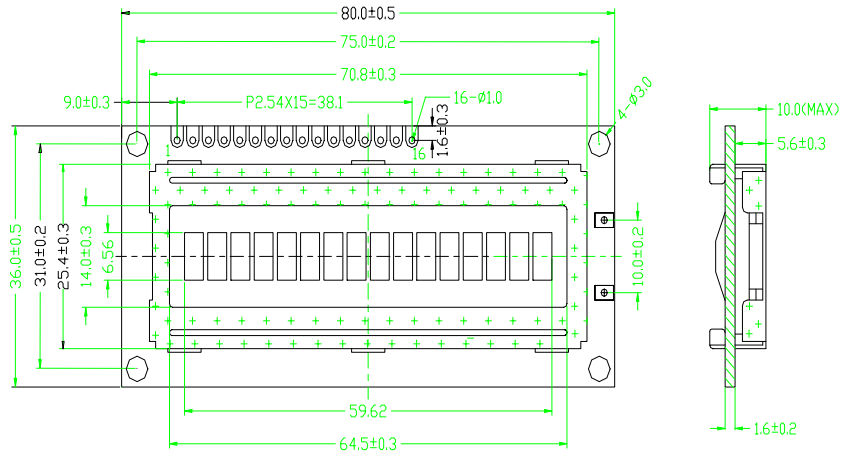
2.2 minor Defects: The Others.

3. Major Defects Should Be In AQL 0.25, and The Minor In AQL 1.00

4. Inspection Item and Standards

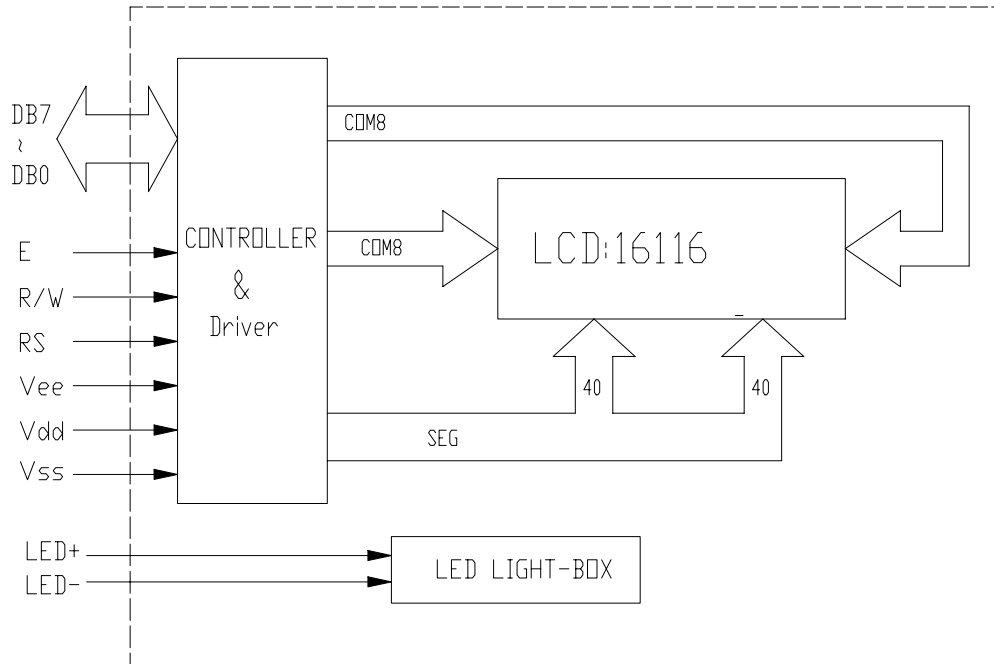
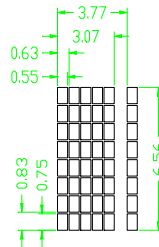
| Item | The Standard Of Quality Inspection | Checking Manner | Quality Ratio |
|--|---|---|---------------|
| Frame | Smooth and even surface,no crack,no scratch,no rusty,and not be wrenched out of shape.the range between convex and concave is: $d \leq 0.35\text{mm}$,and the frame must be connected to the ground. | Checking With Eyes And Using Vernier Caliper, Multimeter | 100% |
| LCD | The major defects would be reject.no scratch and no dusty on the LCD glass surface. $d \leq 0.15\text{mm}$ $n \leq 2$ diameter of bubble: $d \leq 0.5$ $n \leq 2$ damaged size of polarizer: $d \leq 0.15\text{mm}$, $n \leq 2$. | Check It When Displaying | 100% |
| The Relative Position of LCD and Frame | The sealant mouth of the LCD must be at the same side with the frame's. | Checking With Eyes | 100% |
| The Relative Position of PCB Panel and Frame | The frame installing direction must be correct.the twisted angle of the pin is from 45° to 60° ,the pin is vertical to PCB panel and it must be in the middle position of the installing holes. | Checking With Eyes | 100% |
| Function Test | <ol style="list-style-type: none"> 1. The major defects must be reject. 2. Test flow chart (see attached chart) 3. Background changes evenly and no disorderly displaying phenomenon. 4. Display no shortage. | Check It When Displaying | 100% |

Note:D~Diameter N~Quantity Unit:mm



Note:

1. Operating Voltage: 5V
2. Drive method: 1/16Duty, 1/5 Bias
3. Viewing Direction: 6:00
4. Operating Temp: 0°C~50°C
5. Storage Temp: -20°C~70°C
6. Display type: STN,Positive



| | | | | | | | | | | | | | | | | |
|---------|-----|-----|-----|----|-----|---|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| PIN NO. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| SYMBOL | Vss | Vdd | Vee | RS | R/W | E | DB0 | DB1 | DB2 | DB3 | DB4 | DB5 | DB6 | DB7 | LED+ | LED- |