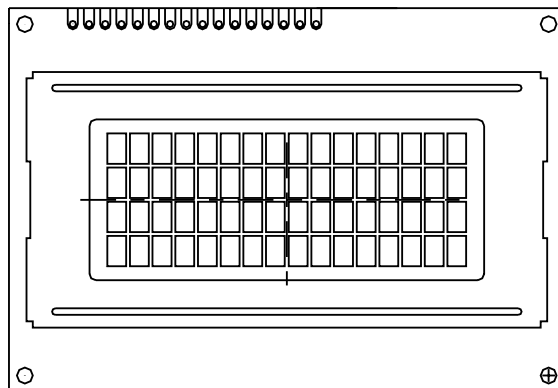




PRODUCT SPECIFICATION

HDM16416H-S00S

16 CHARACTERS , 4 LINES
LCD DISPLAY MODULE



| | | | | |
|--|-------|-------|----------------|------------------|
| HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014 | Q.A.: | REV.: | HDM16416H-S00S | SHEET 1 OF 11 |
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? ?General Specifications

1.Features

- A. Drive Method: 1/16 Duty, 1/5 Bias
- B. The Module Operating Voltage: 5.0V;
- C. The LCD Operating Voltage : 4.7V;
- D. Viewing Direction: 6:00
- E. Operating Temperature: 0°C ~50°C
- F. Storage Temperature: -20°C ~70°C
- G. Display type: STN mode, Positive type display

2.Mechanical Data and Conditions:

- (1) Module Size-----87.0 w *60.0 h mm
- (2) Viewing Area ----- 61.8 w * 25.2 h mm
- (3) Dot Size -----0.55 w * 0.55 h mm
- (4) Character Size -----2.95 w *4.75 h mm
- (5) Number of Characters -----16 Characters*4 Line
- (6) Outline Dimensions-----See Attached Drawing `

| | | | | |
|--|-------|-------|----------------|------------------|
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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 | LED+ | LED Power |
| 16 | LED- | LED Power |

4. Absolute Maximum Ratings

| Characteristics | Symbol | Ratings | Unit | Note |
|-----------------------|------------------|-----------------------|------|------|
| Operating Voltage | VDD | -0.3 to +7.0 | V | |
| Driver Supply Voltage | V _{LCD} | VDD - 10 to VDD + 0.3 | V | |
| Input Voltage Range | V _{IN} | -0.3 to VDD + 0.3 | V | |

Note: Stresses beyond those given in the Absolute Maximum Rating table may cause operational errors or damage to the device. For normal operational conditions see AC/DC Electrical Characteristics.

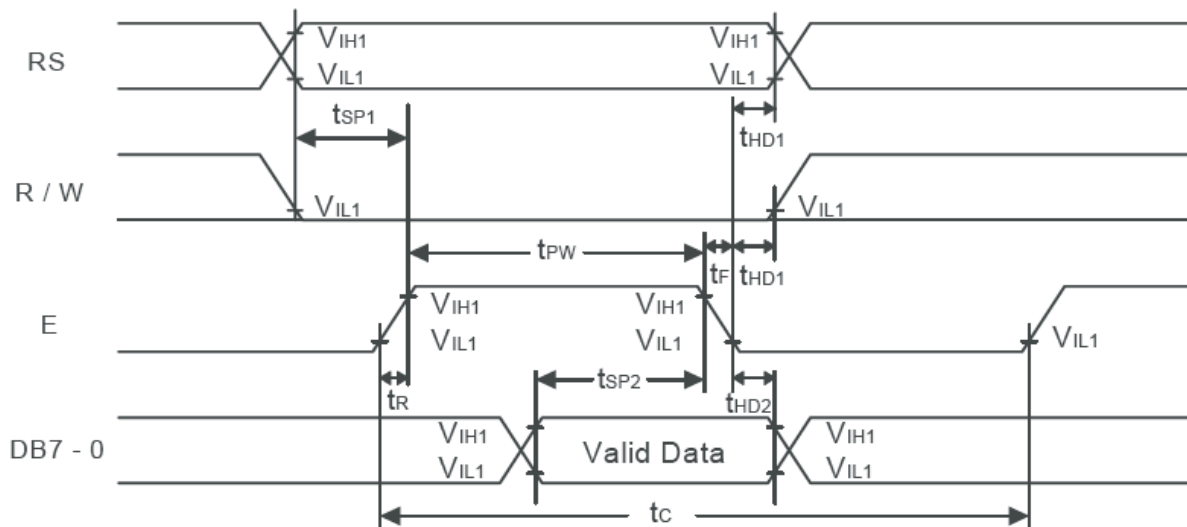
| | | | | |
|--|-------|-------|----------------|------------------|
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5. Timing Characteristics:

Write Operation Writing Data from MPU to SPLC780D1

| Characteristics | Symbol | Limit | | | Unit | Test Condition |
|--------------------|------------|-------|------|------|------|------------------|
| | | Min. | Typ. | Max. | | |
| E Cycle Time | t_c | 400 | - | - | ns | Pin E |
| E Pulse Width | t_{PW} | 150 | - | - | ns | Pin E |
| E Rise/Fall Time | t_R, t_F | - | - | 25 | ns | Pin E |
| Address Setup Time | t_{SP1} | 30 | - | - | ns | Pins: RS, R/W, E |
| Address Hold Time | t_{HD1} | 10 | - | - | ns | Pins: RS, R/W, E |
| Data Setup Time | t_{SP2} | 40 | - | - | ns | Pins: DB0 - DB7 |
| Data Hold Time | t_{HD2} | 10 | - | - | ns | Pins: DB0 - DB7 |

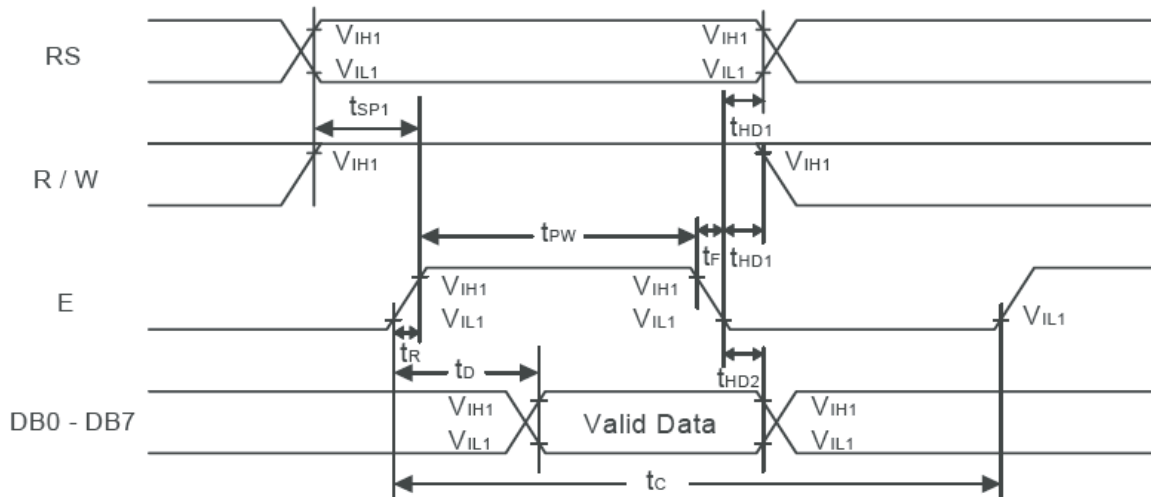
Write mode timing diagram Writing Data from MPU to SPLC780D1



Read Operation Reading Data from SPLC780D1 to MPU

| Characteristics | Symbol | Limit | | | Unit | Test Condition |
|------------------------|------------|-------|------|------|------|------------------|
| | | Min. | Typ. | Max. | | |
| E Cycle Time | t_c | 400 | - | - | ns | Pin E |
| E Pulse Width | t_w | 150 | - | - | ns | Pin E |
| E Rise/Fall Time | t_r, t_f | - | - | 25 | ns | Pin E |
| Address Setup Time | t_{SP1} | 30 | - | - | ns | Pins: RS, R/W, E |
| Address Hold Time | t_{HD1} | 10 | - | - | ns | Pins: RS, R/W, E |
| Data Output Delay Time | t_d | - | - | 100 | ns | Pins: DB0 - DB7 |
| Data hold time | t_{HD2} | 5.0 | - | - | ns | Pin DB0 - DB7 |

Read mode timing diagram Reading Data from SPLC780D1 to MPU



.The Characteristics and The Reliability Test

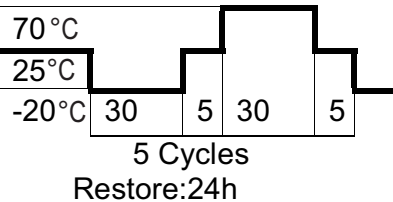
1.Electro-Optic Characteristics:

Condition:TEMP=(23 ± 3) °C

| NO | Item | Symbol | Min. | Typ. | Max. | Unit | Condition |
|----|-----------------------|--------------------|------|------|------|------|------------|
| 1 | Supply Voltage(Logic) | Vdd-Vss | | 5.0 | | V | |
| 3 | LCD Operating Voltage | Vdd-V ₀ | | 4.9 | | V | 0°C |
| | | | | 4.7 | | V | 25°C |
| | | | | 4.5 | | V | 50°C |
| 4 | Response Time | Ton | | 180 | | ms | |
| | | Toff | | 212 | | ms | |
| 5 | Contrast | CR | 2 | | | | |
| 6 | Viewing Angel | 12H | 1 | 50 | | Deg. | (CR ≥ 2.0) |
| | | 6H | 2 | 65 | | | |
| | | 3H | 3 | 58 | | | |
| | | 9H | 4 | 58 | | | |

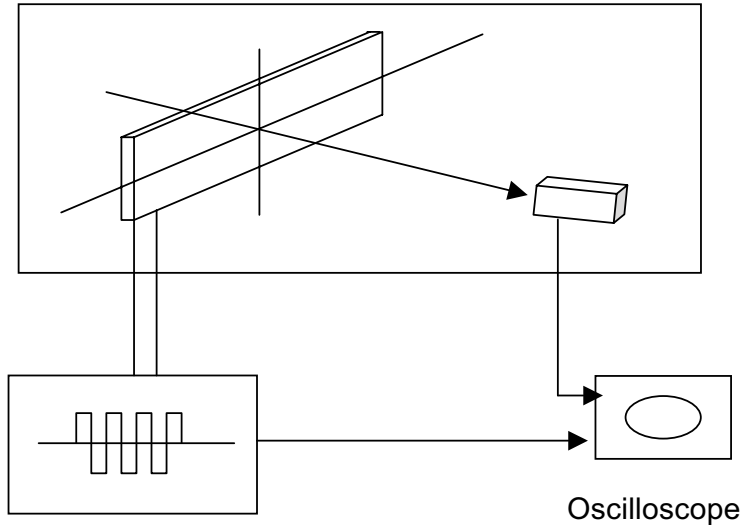
:

3. 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: ($^\circ\text{C}$)  70 $^\circ\text{C}$ 25 $^\circ\text{C}$ -20 $^\circ\text{C}$ 30 5 30 5 5 Cycles Restore: 24h | Tenny | Passed |

The Equipment and LCD Measuring Method

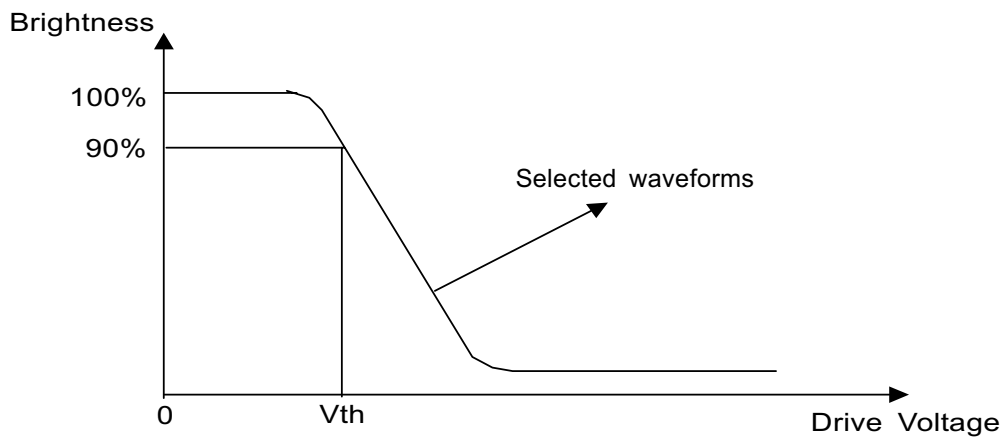
1. Equipment



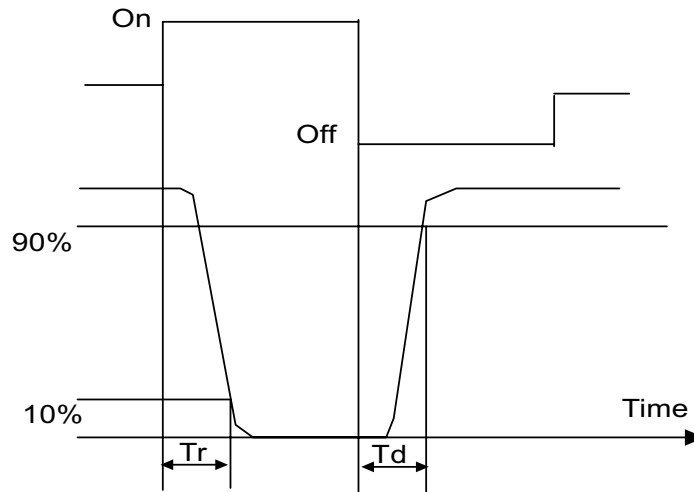
Waveform Generator

(2) Definition

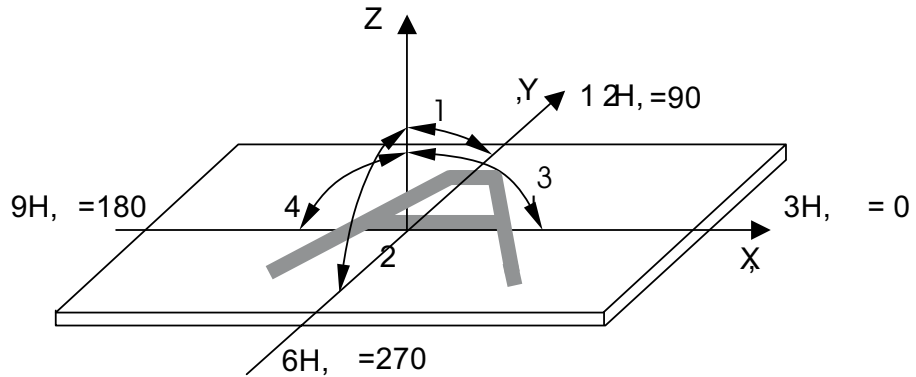
a. Threshold Voltage (V_{th})



b. Response Time



a. Viewing Angle:



b. Contrast Ratio (positive)

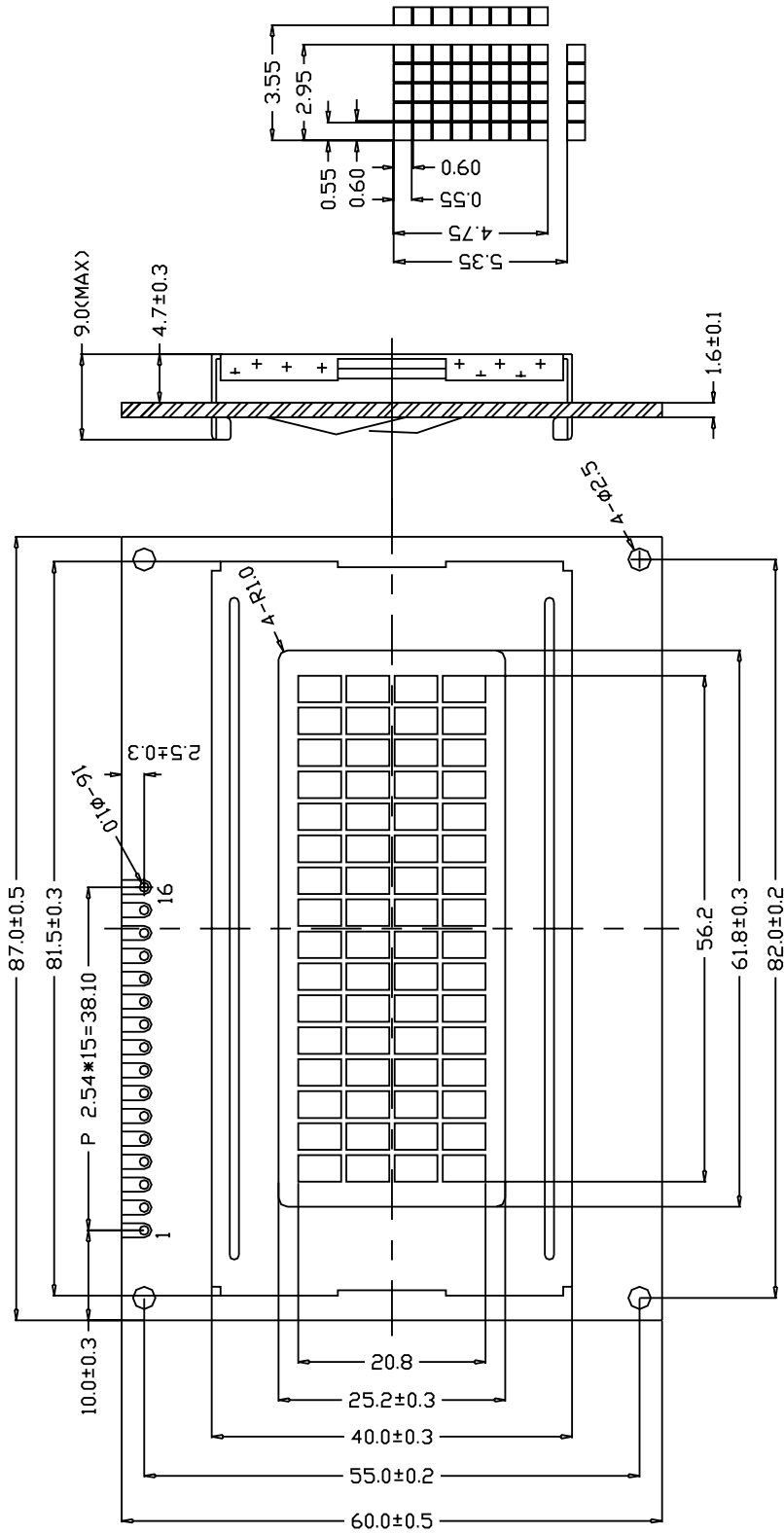
$$CR = \frac{\text{Brightness of non-selected wave-form}}{\text{Brightness of selected wave-form}}$$

4. Reliability Test:

Equipment : Tenny

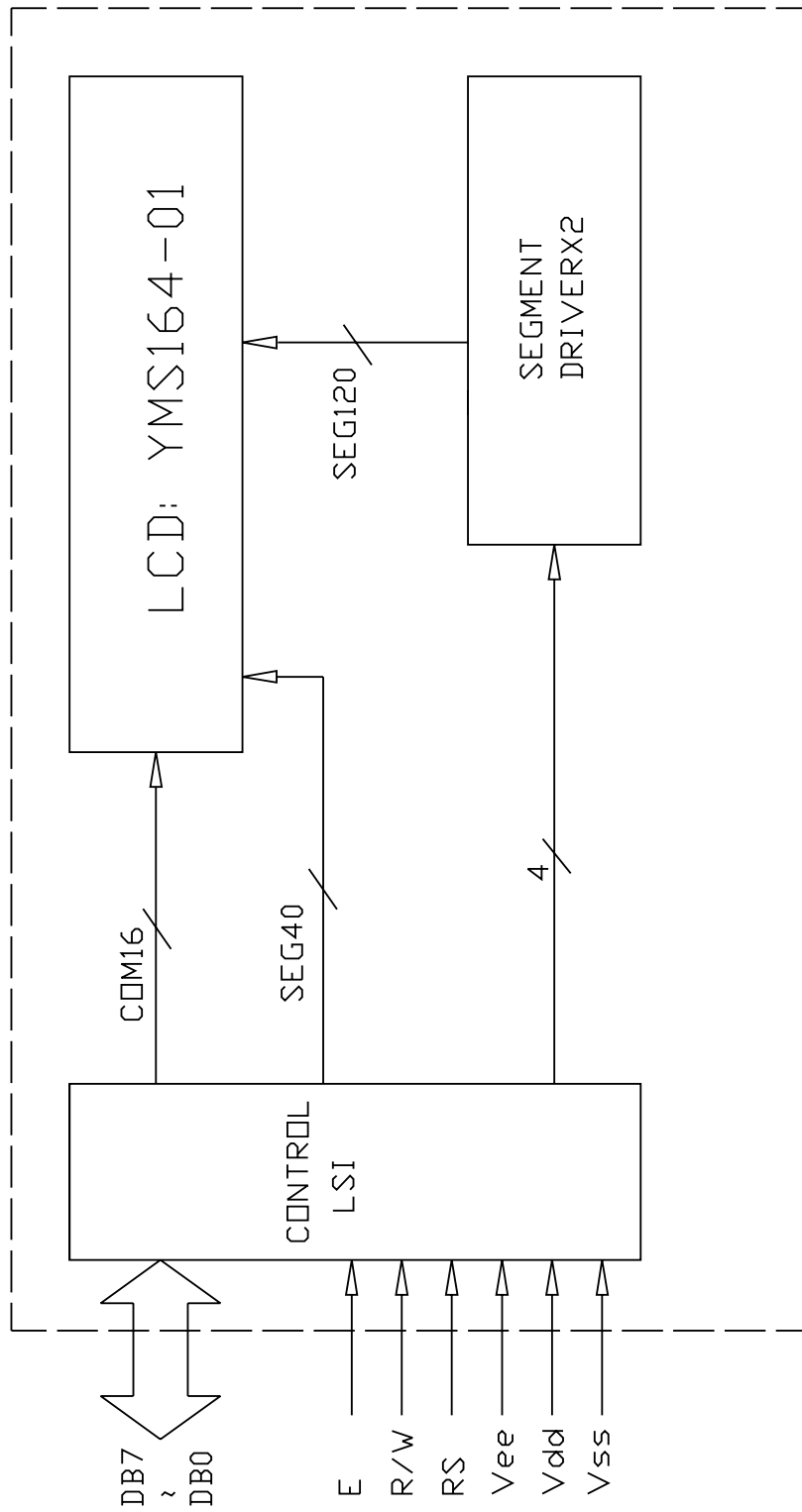
| | | | | |
|--|-------|-------|----------------|------------------|
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.Attached Drawing



- 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

| | | | | |
|--|-------|-------|----------------|----------------|
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| | | | | | | | | | | | | | | | | |
|---------|-----|-----|-----|----|-----|---|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| 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- |

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