

DISPLAY Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 128064H FGH-PW

Product Specification

Version : 7.1.4.4

09.08.2017

GENERAL SPECIFICATION

MODULE NO. :

DEM 128064H FGH-PW

CUSTOMER P/N:

| VERSION NO. | CHANGE DESCRIPTION | DATE |
|-------------|-----------------------------------------------------------|------------|
| 0 | ORIGINAL VERSION | 15/03/2005 |
| 1 | CHANGED SERIES | 09/05/2005 |
| 2 | CHANGED MODULE DRAWING | 25/05/2005 |
| 3 | CHANGED BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATIONS | 29/06/2005 |
| 4 | CHANGED PCB DRAWING AND DESCRIPTION | 01/11/2005 |
| 5 | CHANGED PCB DRAWING AND DESCRIPTION | 07/11/2005 |
| 6 | ADDED VERSION | 07/08/2006 |
| 7 | MODIFY CONTRAST REGULATION | 09/08/2006 |
| 7.1.0 | CHANGE IC | 04.03.2008 |
| 7.1.1 | CHANGE SRAM | 24.10.2012 |
| 7.1.2 | CORRECT PAD SIZE AND PCB | 01.11.2012 |
| 7.1.3 | Change RAM | 08.09.2015 |
| 7.1.4.4 | Correct Block Diagram | 14.09.2015 |
| 7.1.4.4 | Correct Block Diagram | 09.08.2017 |

PREPARED BY : MH

DATE: 09.08.2017

APPROVED BY: MH

DATE: 09.08.2017

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1. FUNCTIONS & FEATURES

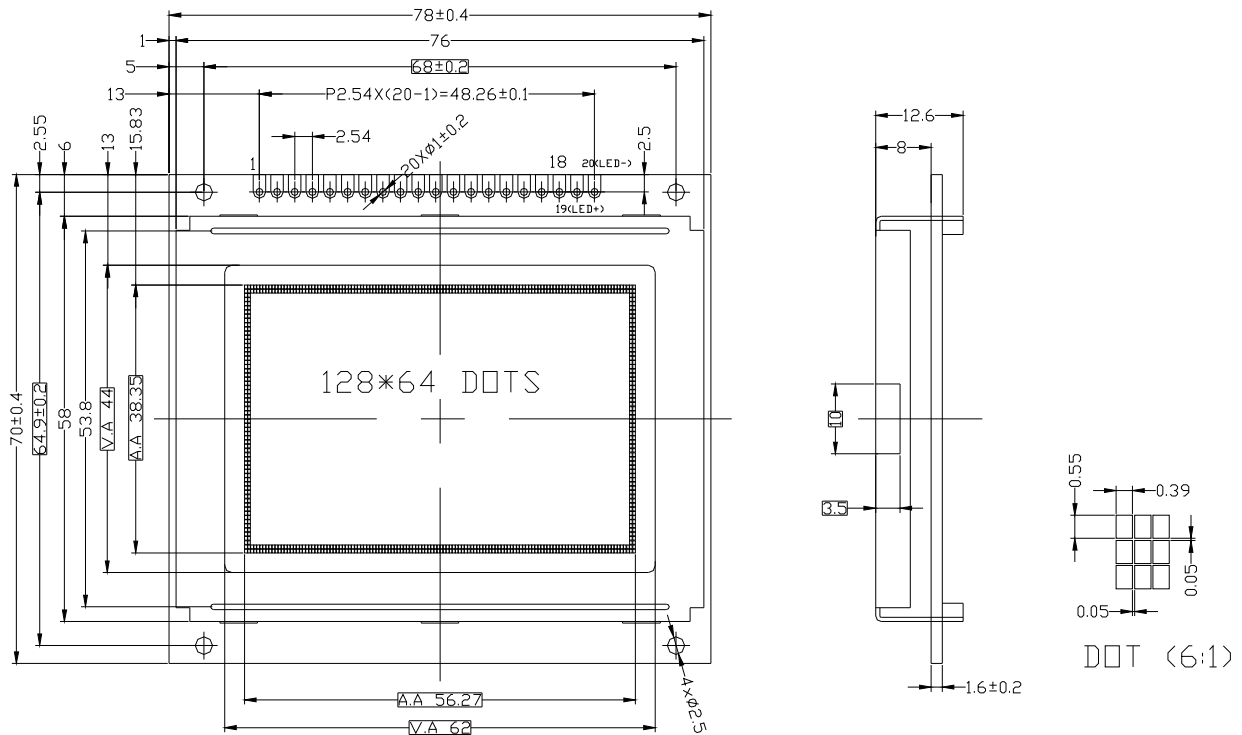
| MODULE NAME | LCD TYPE |
|--------------------|----------------------------------|
| DEM 128064H FGH-PW | FSTN Transflective Positive Mode |

- Display Format : 128 x 64 Dots
- Glass Thickness : 1.1mm
- Viewing Direction : 6 o'clock
- Driving Scheme : 1/64 Duty, 1/9 Bias
- Power Supply for logic : 5.0 Volt (typ.)
- Backlight Color : LED, Lightguide, White
- V_{LCD} : 12.6 Volt (typ.)
- Operation temperature : -20°C to +70°C
- Storage temperature : -25°C to +75°C
- Integrated LCD-Controller : T6963C (Toshiba)
- DC/DC-Converter : NJU7670M (or equivalent)on Board

2. MODULE ARTWORK

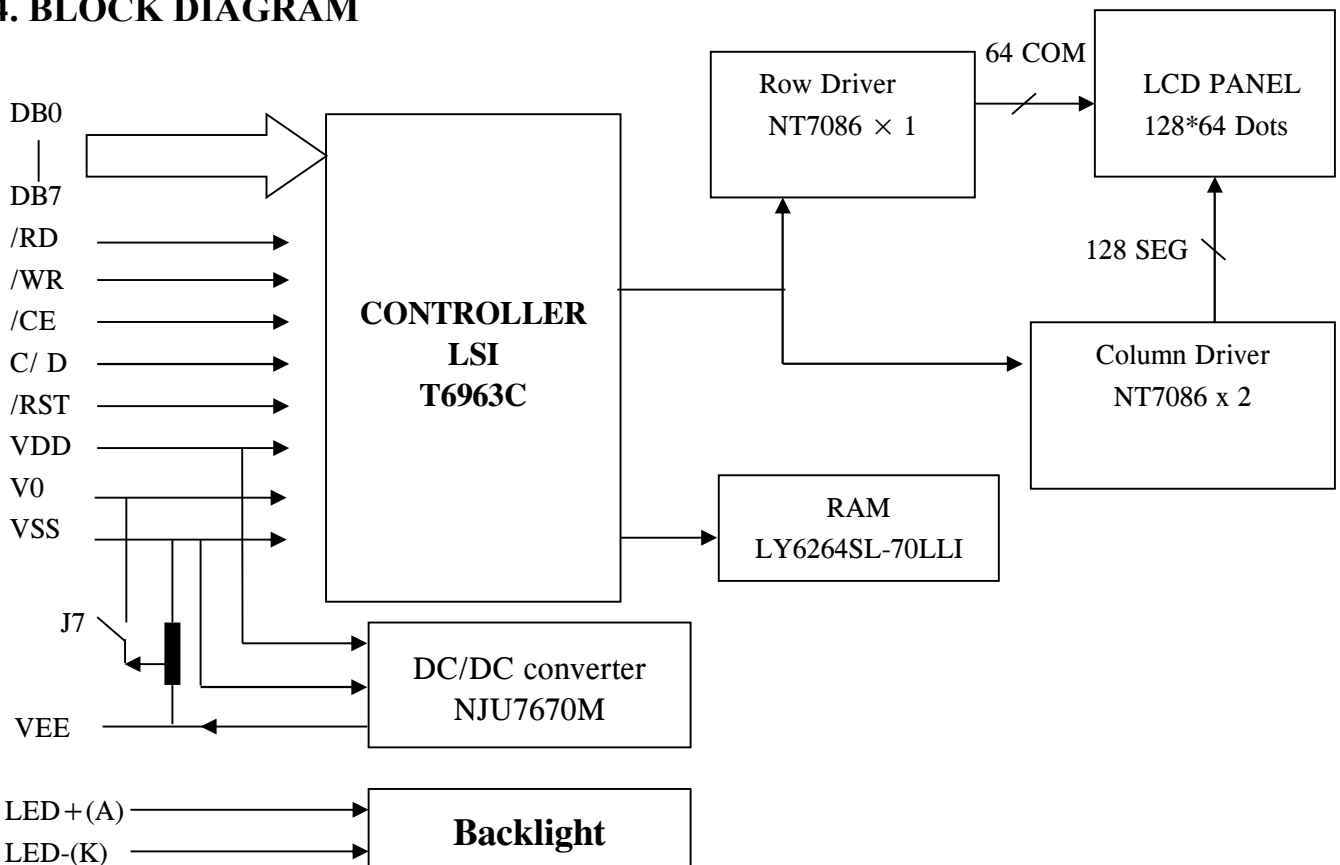
- Module Size : 78.00 x 70.0 x 12.60 mm
- Viewing Area : 62.00 x 44.00 mm
- Active Area : 56.27 x 38.35 mm
- Dot Pitch : 0.44 x 0.60 mm
- Dot Size : 0.39 x 0.55 mm
- Dot Gap : 0.05 mm

3. EXTERNAL DIMENSIONS



REMARKS:
 1. UNMARKED TOLERANCE IS ± 0.3 ;
 2. ALL MATERIAL COMPLY WITH ROHS.

4. BLOCK DIAGRAM

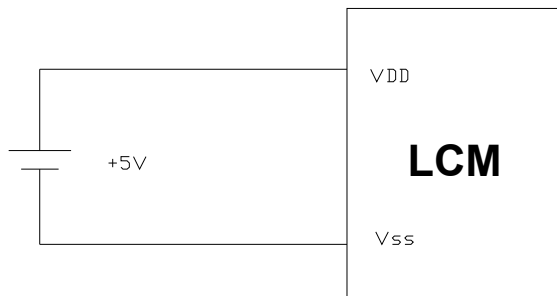


5. PIN ASSIGNMENT

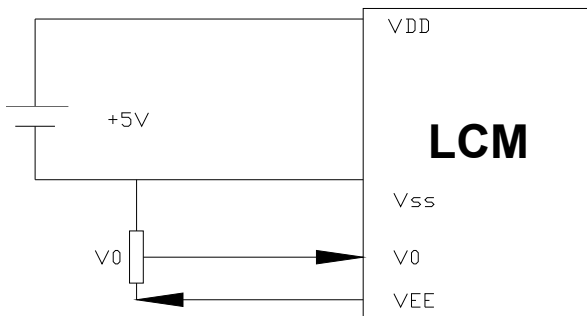
| NO. | SYMBOL | FUNCTION |
|-----|---------|---------------------------------------------------------------------------------|
| 1 | VEE | Power supply output for LCD |
| 2 | VSS | Ground (0V) |
| 3 | VDD | Power Supply(+5V) |
| 4 | V0 | Power Supply for LCD Drive |
| 5 | /WR | Data write. Write data to controller T6963C when “L” |
| 6 | /RD | Data read. Read data from controller T6963C when “L” |
| 7 | /CE | Chip enable of controller when “L” |
| 8 | C/ D | Command/Data read/write. “H” for command read/write and “L” for data read/write |
| 9 | /RST | Controller reset when “L” |
| 10 | DB0 | Data input/output(LSB) |
| 11 | DB1 | Data input/output |
| 12 | DB2 | Data input/output |
| 13 | DB3 | Data input/output |
| 14 | DB4 | Data input/output |
| 15 | DB5 | Data input/output |
| 16 | DB6 | Data input/output |
| 17 | DB7 | Data input/output(MSB) |
| 18 | FS | Font select. “H” for 6x8 font & “L” for 8x8 font |
| 19 | LED+(A) | Anode of LED backlight |
| 20 | LED-(K) | Cathode of LED backlight |

6. POWER SUPPLY

➤ **Mode(Internal contrast regulation)-J7 is close**

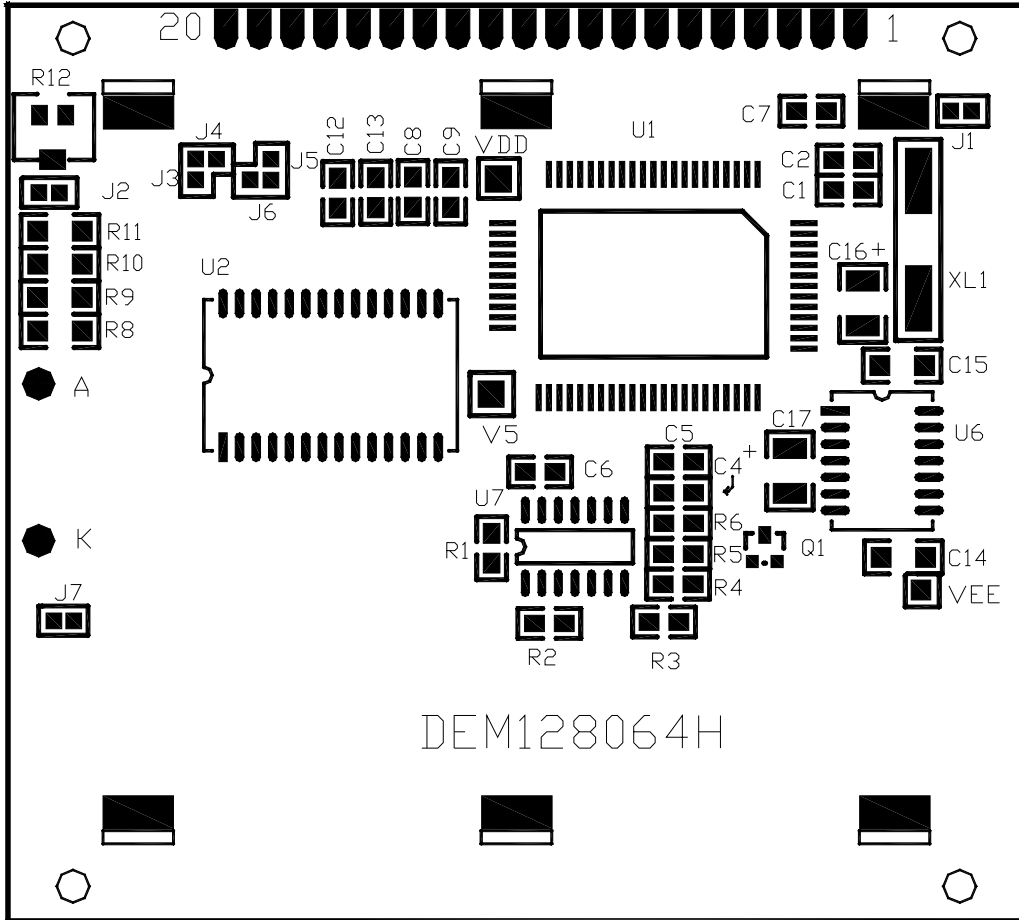


➤ **Mode(external contrast regulation)-J7 is open**



7. PCB DRAWING AND DESCRIPTION

7.1. PCB DRAWING



Note: The part no. DEM128064H is printed on the PCB.

7.2. PCB DESCRIPTION

7.2.1..The polarity of the pin 19 and the pin 20:

| symbol | symbol state | J3,J5 | J6, J4 | LED Polarity | |
|--------|--------------------|-------------|-------------|--------------|---------|
| | | | | 19 Pin | 20 Pin |
| J6,J4 | Each solder-bridge | Each closed | Each open | Anode | Cathode |
| J3,J5 | Each solder-bridge | Each open | Each closed | Cathode | Anode |

Note: In application module, J3=J5 =0 Ohm, J4=J6=open.

7.2.2. The metal-bezel is set be on ground when the J1 is closed

Note: In application module, J1=0 Ohm

7.2.3. The LED resistor on board are used when J2 is open.

Note: In application module, J2=open

7.2.4. The module use internal contrast regulation when J7 is closed.

Note: In application module, J7 is open, but potentiometer is calibrated by the factory.

7.2.5. The R8 and the R9, R10, R11 are the LED resistor.

Note: In application module, R9= R10= R11=Not used, R8=47 Ohm.

8. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATIONS

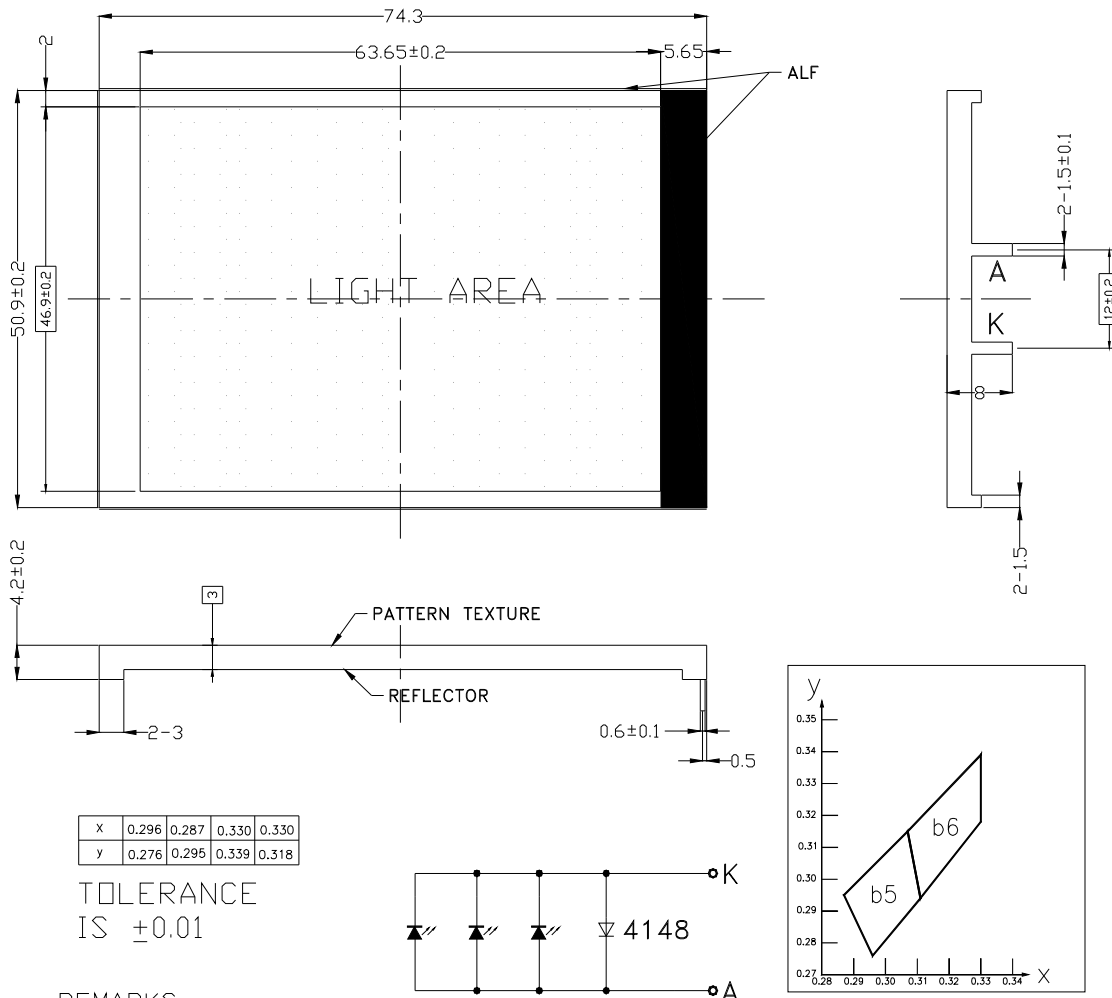
8-1 Absolute Maximum Ratings (Ta=25°C)

| Item | Symbol | Conditions | Rating | Unit |
|----------------------------------|----------|----------------------------|--------|------|
| Absolute Maximum Forward Current | I_{fm} | | 75 | mA |
| Peak Forward Current | I_{fp} | 1 msec Plus 10% Duty Cycle | 180 | mA |
| Reverse Voltage | V_r | | 1 | V |
| Power Dissipation | P_d | | 180 | mW |

8-2 Backlight Electro/Optical Characteristics

| Item | Symbol | Min. | Typ. | Max. | Unit | Condition |
|--------------------------|------------------|------|------|------|-------------------|------------|
| Forward Voltage | V_f | 2.9 | 3.3 | 3.6 | V | $I_f=45mA$ |
| Reverse Current | I_r | | 35 | | uA | $V_r=0.8V$ |
| Peak Wave Length | λ_p | | | | nm | $I_f=45mA$ |
| Spectral Line Half Width | $\Delta \lambda$ | | | | nm | $I_f=45mA$ |
| Luminance | L_v | 90 | 120 | | cd/m ² | $I_f=45mA$ |

8-3 Backlight Drawing



9. ABSOLUTE MAXIMUM RATINGS (V_{SS}=0V, T_a=25°C)

| PARAMETER | SYMBOL | RATING | UNIT |
|------------------------|------------------|------------------------------|------|
| Supply Voltage (Logic) | V _{DD} | -0.3 to 7.0 | V |
| Input Voltage | V _{IN} | -0.3 to V _{DD} +0.3 | V |
| Operating Temperature | T _{opr} | -20 to +70 | °C |
| Storage Temperature | T _{stg} | -25 to +75 | °C |

10. ELECTRICAL CHARACTERISTICS

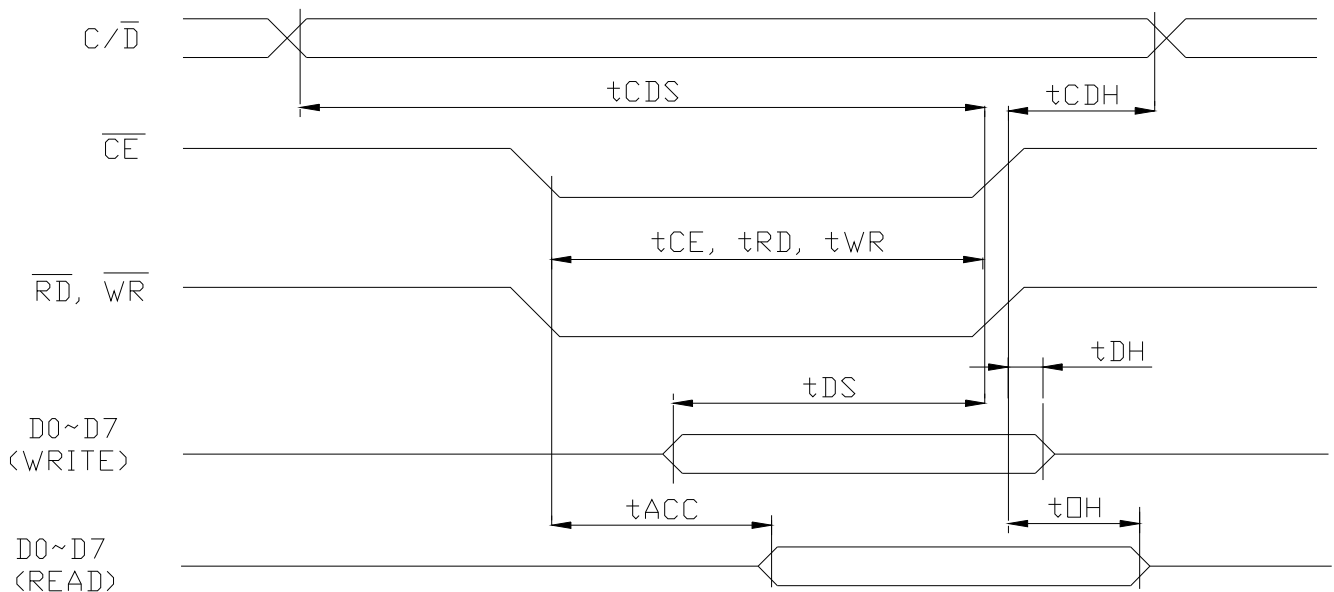
10.1 DC Characteristics

T_a=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 |
| High Level Input Voltage | V _{IH} | V _{DD} =5.0V ±10% | V _{DD} -2.2 | - | V _{DD} | V |
| Low Level Input Voltage | V _{IL} | V _{DD} =5.0V ±10% | 0 | - | 0.8 | V |
| High Level Output Voltage | V _{OH} | I _{OH} =0.75mA | V _{DD} -0.3 | - | V _{DD} | V |
| Low Level Output Voltage | V _{OL} | I _{OL} =0.75mA | 0 | - | 0.3 | V |
| Current Consumption (Operating) | I _{DD(1)} | V _{DD} =5.0V f _{OSC} = 3.0 MHz | - | 3.3 | 6.0 | mA |
| Current Consumption (Halt) | I _{DD(2)} | V _{DD} =5.0V | - | - | 3 | μA |

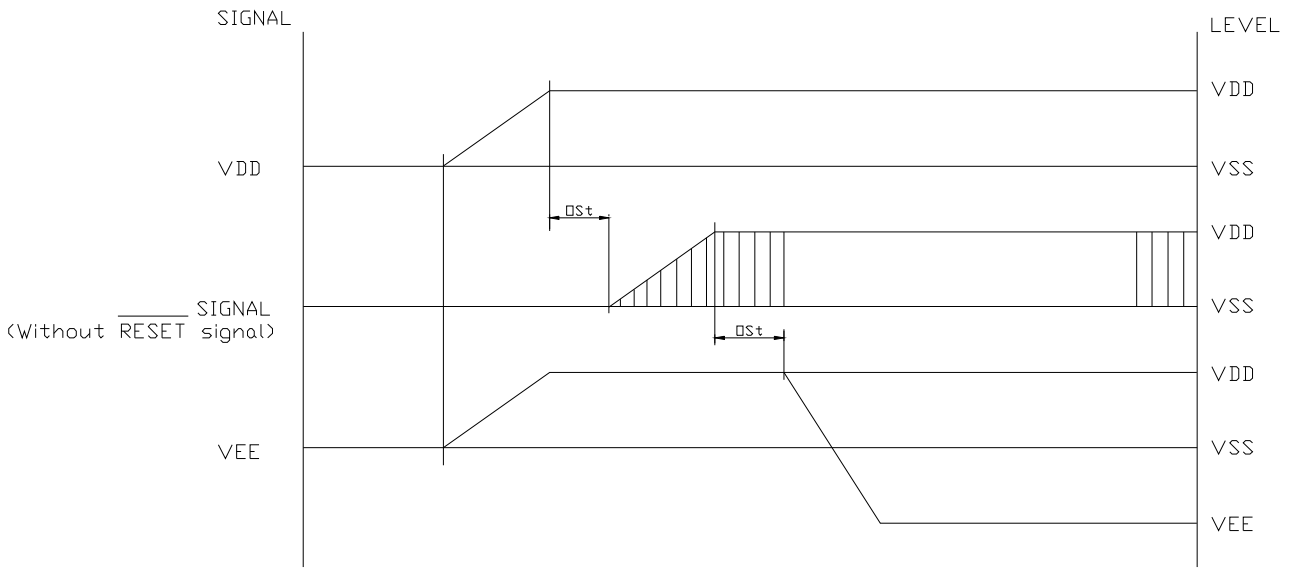
10.2 AC Characteristics

| Parameter | Symbol | Min. | Max. | Units |
|------------------------|-----------------------------------------------------|------|------|-------|
| C/D Setup Time | t _{CDS} | 100 | - | ns |
| C/D Hold Time | t _{CDH} | 10 | - | ns |
| CE, RD, WR Pulse Width | t _{CE} , t _{RD} , t _{WR} | 80 | - | ns |
| Data Setup Time | t _{DS} | 80 | - | ns |
| Data Hold Time | t _{DH} | 40 | - | ns |
| Access Time | t _{ACC} | - | 150 | ns |
| Output Hold Time | t _{OH} | 10 | 50 | ns |

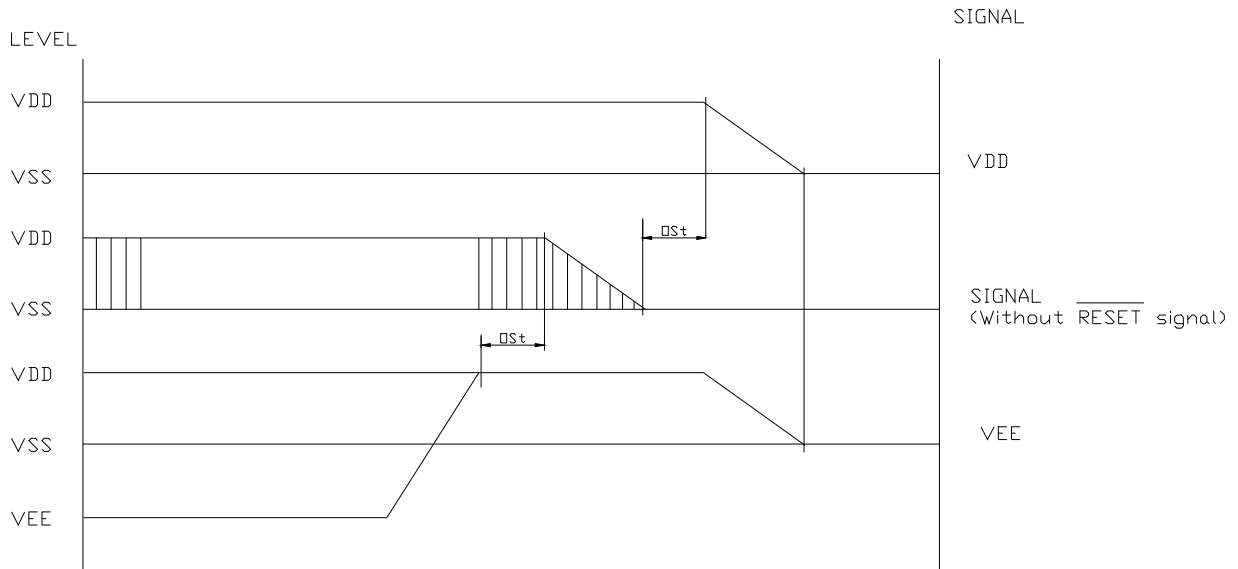


10.3 Power Supply ON/OFF Sequence

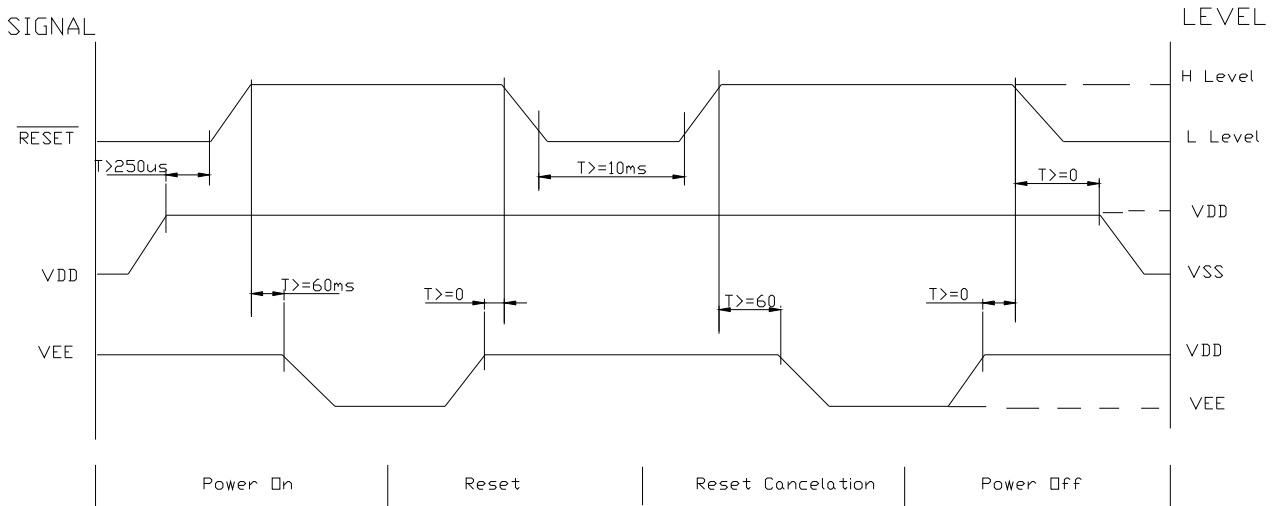
● **ON Sequence**



● **OFF Sequence**



● Reset Sequence



Please maintain the above sequence when turning on and off the power supply of the module.

If VEE is supplied to the module while internal alternate signal for LCD driving (M) is unstable or RESET is active, DC component will be supplied to the LCD panel. This may cause damage to the LCD module.

11. LCD MODULES HANDLING PRECAUTIONS

- Please remove the protection foil of polarizer before using.
- The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- If the display panel is damaged and the liquid crystal substance inside it leaks out, do not get any in your mouth. If the substance come into contact with your skin or clothes promptly wash it off using soap and water.
- Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarize carefully.
- To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - Be sure to ground the body when handling the LCD module.
 - Tools required for assembly, such as soldering irons, must be properly grounded.
 - To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 - The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.
- Storage precautions

When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep the modules in bags designed to prevent static electricity charging under low temperature / normal humidity conditions (avoid high temperature / high humidity and low temperatures below 0°C). Whenever possible, the LCD modules should be stored in the same conditions in which they were shipped from our company.

12. OTHERS

- Liquid crystals solidify at low temperature (below the storage temperature range) leading to defective orientation of liquid crystal or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subjected to a strong shock at a low temperature.
- If the LCD modules have been operating for a long time showing the same display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. Abnormal operating status can be resumed to be normal condition by suspending use for some time. It should be noted that this phenomena does not adversely affect performance reliability.
- To minimize the performance degradation of the LCD modules resulting from caused by static electricity, etc. exercise care to avoid holding the following sections when handling the modules:
 - Exposed area of the printed circuit board
 - Terminal electrode sections