**DISPLAY Elektronik GmbH**

# DATA SHEET

## LCD MODULE

# DEM 128064A2 SBH-PW-N (A-TOUCH)

***Product Specification*** ***Version: 4***

**17.12.2025**

# GENERAL SPECIFICATION

---

## MODULE NO. :

# DEM 128064A2 SBH-PW-N (A-TOUCH)

CUSTOMER P/N

| VERSION NO. | CHANGE DESCRIPTION | DATE |
|---|---|---|
| 0 | ORIGINAL VERSION | 21.08.2025 |
| 1 | Add the life time of the BL on page 8. | 11.09.2025 |
| 2 | Correct the RTP drawing on page 4. | 16.09.2025 |
| 3 | Update the PCB drawing | 15.12.2025 |
| 4 | Correct the FPC drawing | 17.12.2025 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

PREPARED BY: CC DATE: 17.12.2025

APPROVED BY: WH DATE: 17.12.2025

# CONTENTS


**1. FUNCTIONS & FEATURES ..... 2**

**2. MECHANICAL SPECIFICATIONS ..... 2**

**3. EXTERNAL DIMENSIONS ..... 3**

**4. TOUCH PANEL DRAWING ..... 4**

**5. BLOCK DIAGRAM ..... 6**

**6. PIN ASSIGNMENT ..... 7**

**7 PCB DRAWING AND DESCRIPTION ..... 7**

**8. BACKLIGHT ELECTRICAL/OPTICAL CHARACTERISTICS ..... 9**

**9. APPLICATION CIRCUIT ..... 11**

**10. MAXIMUM ABSOLUTE POWER RATINGS ( TA=25°C) ..... 11**

**11. ELECTRICAL CHARACTERISTICS ..... 12**

**12. DISPLAY CONTROL INSTRUCTION ..... 13**

**13. MODULE ACCEPTS QUALITY LEVEL (AQL). ..... 16**

**14. RELIABILITY TEST. ..... 18**

**15. LCD MODULES HANDLING PRECAUTIONS ..... 19**

**16. OTHERS ..... 19**

## 1. FUNCTIONS & FEATURES

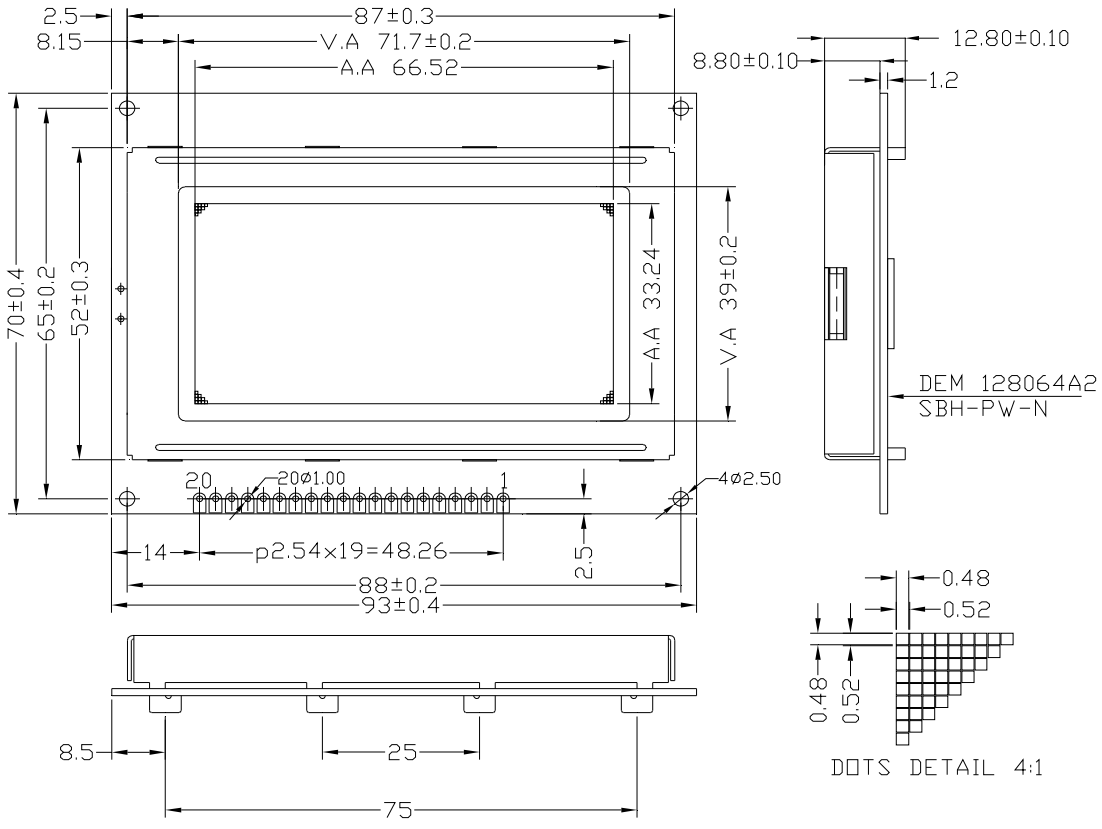
| Module Name | LCD Type | Backlight Type | Remark |
|---|---|---|---|
| DEM 128064A2 SBH-PW-N (A-TOUCH) | STN-BLUE Transmissive Negative Mode | White | - |

- Viewing Direction : 6 O'clock
- Driving Scheme : 1/64 Duty Cycle, 1/9 Bias
- Power Supply Voltage : 5.0 Volt (typ.)
- $V_{LCD}$ Adjustable For Best Contrast : 12.9 Volt (typ.)
- Display Contents : 128 x 64 Dots
- Interface RAM : 512 bytes (4096 bits)
- Interface : 8-Bit parallel display data from MPU
- Touch-Panel : Analog-4-Wire-Resistive-Touch-Panel on board

## 2. MECHANICAL SPECIFICATIONS

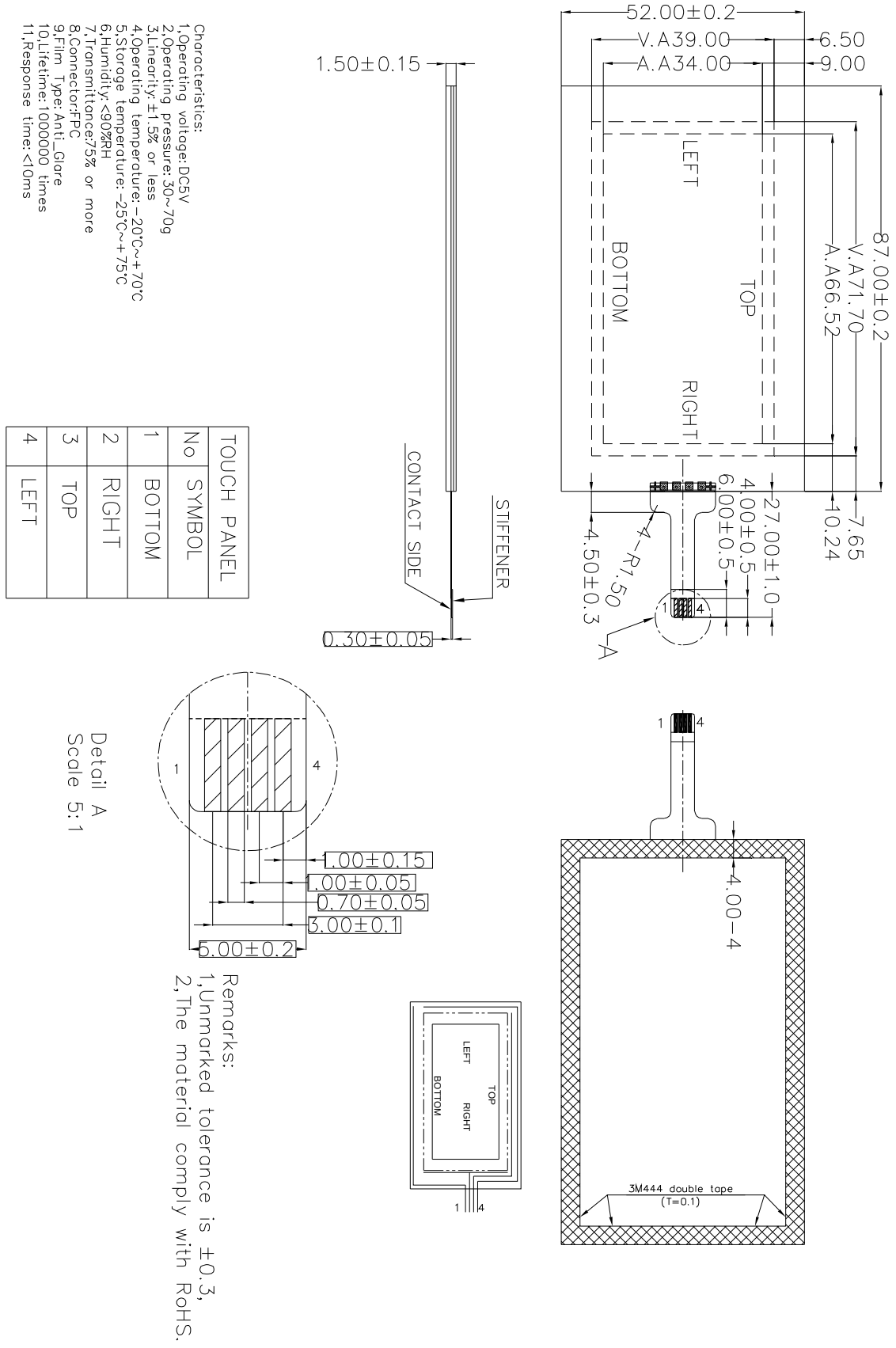
- Module Size : 93.00 x 70.00 x 14.30 mm
- Viewing Area : 71.70 x 39.00 mm
- Active Area : 66.52 x 33.24 mm
- Dot Size : 0.48 x 0.48 mm
- Dot Pitch : 0.52 x 0.52 mm
- Dot gap : 0.04 mm

## 3. EXTERNAL DIMENSIONS

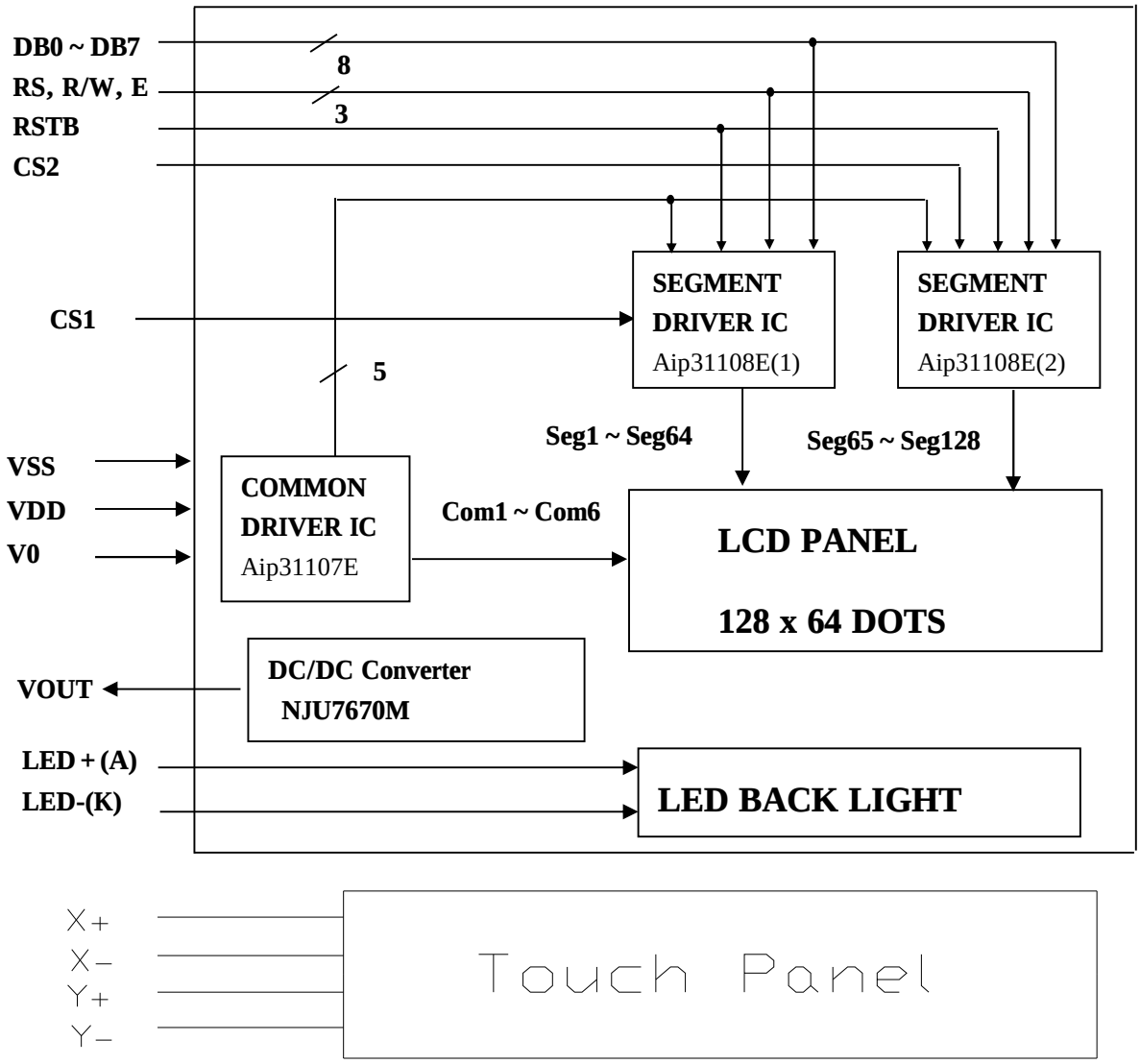



REMARKS:
1,UNMARKED TOLERANCE IS ±0.3,
2,ALL METERIALS COMPLY WITH ROHS..

## 4. TOUCH PANEL DRAWING


Characteristics:
1,Operating voltage:DC5V
2,Operating pressure:30~70g
3,Linearity:±1.5% or less
4,Operating temperature:-20°C~+70°C
5,Storage temperature:-25°C~+75°C
6,Humidity:<90%RH
7,Transmittance:75% or more
8,Connector:FPC
9,Film Type:Anti_Glare
10,Lifetime:1000000 times
11,Response time:<10ms
TOUCH PANEL
No SYMBOL
1 BOTTOM
2 RIGHT
3 TOP
4 LEFT
1.50±0.15
CONTACT SIDE
STIFFENER
0.30±0.05
52.00±0.2
V.A39.00
A.A34.00
6.50
9.00
LEFT
BOTTOM
TOP
RIGHT
87.00±0.2
V.A71.70
A.A66.52
4-R1.50
4.50±0.3
6.00±0.5
4.00±0.5
27.00±1.0
7.65
10.24
A
Detail A
Scale 5:1
1.00±0.15
1.00±0.05
0.70±0.05
3.00±0.1
5.00±0.2
4.00-4
3M444 double tape
(T=0.1)
Remarks:
1,Unmarked tolerance is ±0.3,
2,The material comply with RoHS.

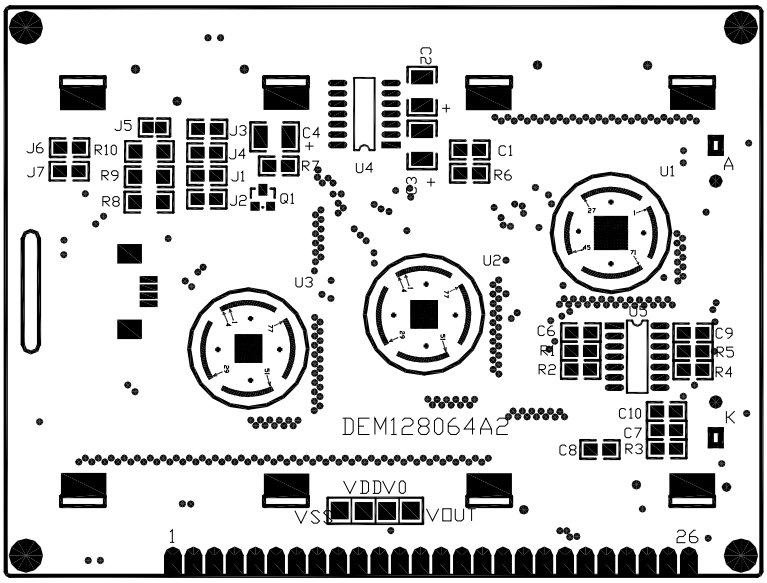
## 5. BLOCK DIAGRAM



## 6. PIN ASSIGNMENT

| Pin No. | Symbol | Function |
|---|---|---|
| 1 | Y- | Y- Position input. |
| 2 | X- | X- Position input. |
| 3 | Y+ | Y+ Position input |
| 4 | X+ | X+ Position input. |
| 5 | VSS | Ground |
| 6 | VDD | Power supply voltage for logic,+ 5.0V. |
| 7 | V0 | Input voltage for LCD |
| 8 | RS | Data or Instruction.<br>RS=H→DB<0:7>: Display RAM Data<br>RS=L→DB<0:7>: Instruction Data |
| 9 | R/W | Read or Write.<br>R/W=H→Data appears at DB<0:7> and can be read. |
| 10 | E | Chip enable signal |
| 11 | DB0 | Data bus. There state I/O common terminal. |
| 12 | DB1 | |
| 13 | DB2 | |
| 14 | DB3 | |
| 15 | DB4 | |
| 16 | DB5 | |
| 17 | DB6 | |
| 18 | DB7 | |
| 19 | CS1 | Chip select signal for Aip31108E(1) |
| 20 | CS2 | Chip select signal for Aip31108E(2) |
| 21 | RSTB | Reset signal |
| 22 | VOUT | Output voltage for LCD,-5.0V |
| 23 | LED+(A) | Please also refer to 6. PCB drawing and description. |
| 24 | LED-(K) | |
| 25 | NC | No connection |
| 26 | NC | No connection |

## 7 PCB DRAWING AND DESCRIPTION




**DESCRIPTION:**

**7-0-1.The polarity of the pin 23 and the pin 24:**

| J2,J4 | J1, J3 | LED Polarity | |
|---|---|---|---|
| | | 23 Pin | 24 Pin |
| Each open | Each close | Anode | Cathode |
| Each close | Each open | Cathode | Anode |

Note: In module application, J1=J3=0 ohm, J2=J4=open.

**7-0-2.The LED resistor should be bridged when the J5 is solder-Bridge.**

Note: In module application, J5=open.

**7-0-3.The R8, R9 and R10 are the LED resistor.**

Note: In module application, R8=R9=33 ohm, R10= open.

**7-0-4. The metal-bezel should be on ground when the J7 is solder-Bridge.**

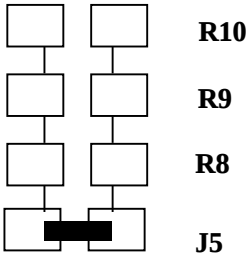
Note: In module application, J7=0 ohm.

**7-0-5.The mounting holes should be on ground when the J6 is solder-bridge.**

Note: In module application, J6=0 ohm.

## 7. 1 Example application

7-1-1. The LED resistor should be bridged as following.

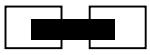



7-1-2. The 23 pin is the anode and the 24 pin is the cathode as following.

**J3**

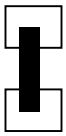
**J1**

7-1-3.The 23 pin is the cathode and the 24 pin is the anode as following.

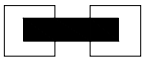


**J2**

**J4**

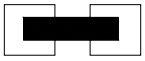


7-1-4. The bezel should be on ground as following



**J6**

7-1-5. The mounting hole should be on ground as following:

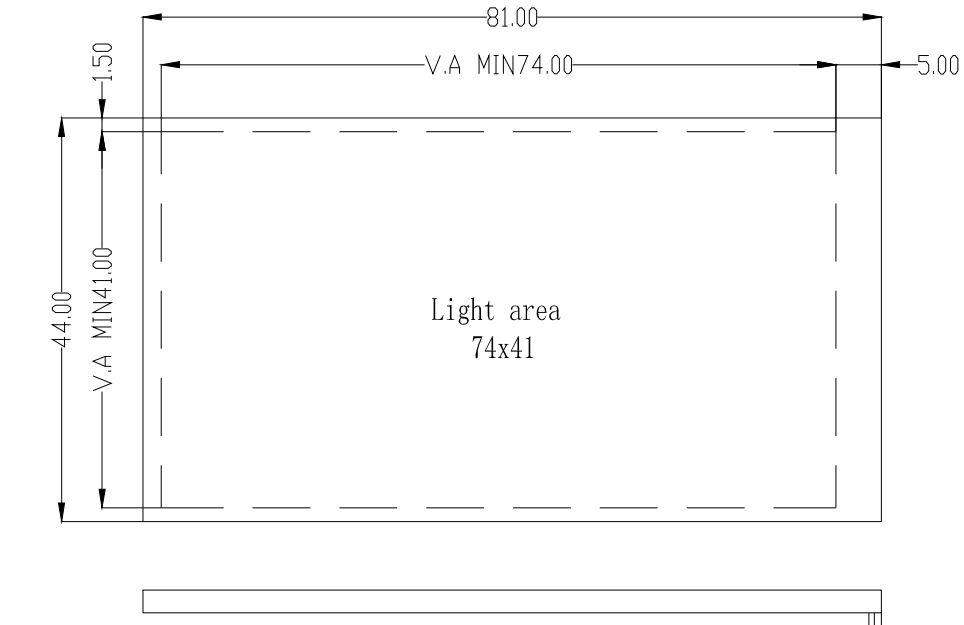


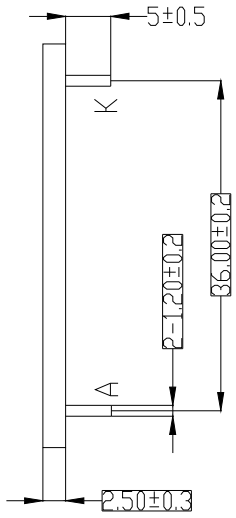
**J7**

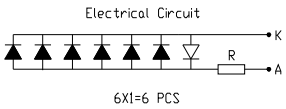
## 8. BACKLIGHT ELECTRICAL/OPTICAL CHARACTERISTICS

Electronics/Optical Specifications:

| | SYMBOL | MIN. | TYP. | MAX. | UNIT | CONDITIONS |
|---|---|---|---|---|---|---|
| Forward Voltage | $V_f$ | | 4.0 | | V | |
| Forward Current | $I_f$ | | 90 | 120 | mA | Vf= 4.0 V |
| Power Dissipation | $P_d$ | | 0.36 | | W | Vf= 4.0 V |
| Reverse Voltage | $V_r$ | | | 5.0 | V | |
| Reverse Current | $I_r$ | | | 0.4 | mA | |
| Luminous Intensity | $L_V$ | 150 | 250 | | $cd/m^2$ | Vf= 4.0 V |
| Luminous Uniformity | $\Delta L_V$ | 70 | | | % | Vf= 4.0 V |
| Emission Wavelength | X | 0.27 | | 0.32 | | If=20mA Ta=25° Each chip |
| | Y | 0.27 | | 0.32 | | |
| Lifetime | 50,000 | | | | Hours | |

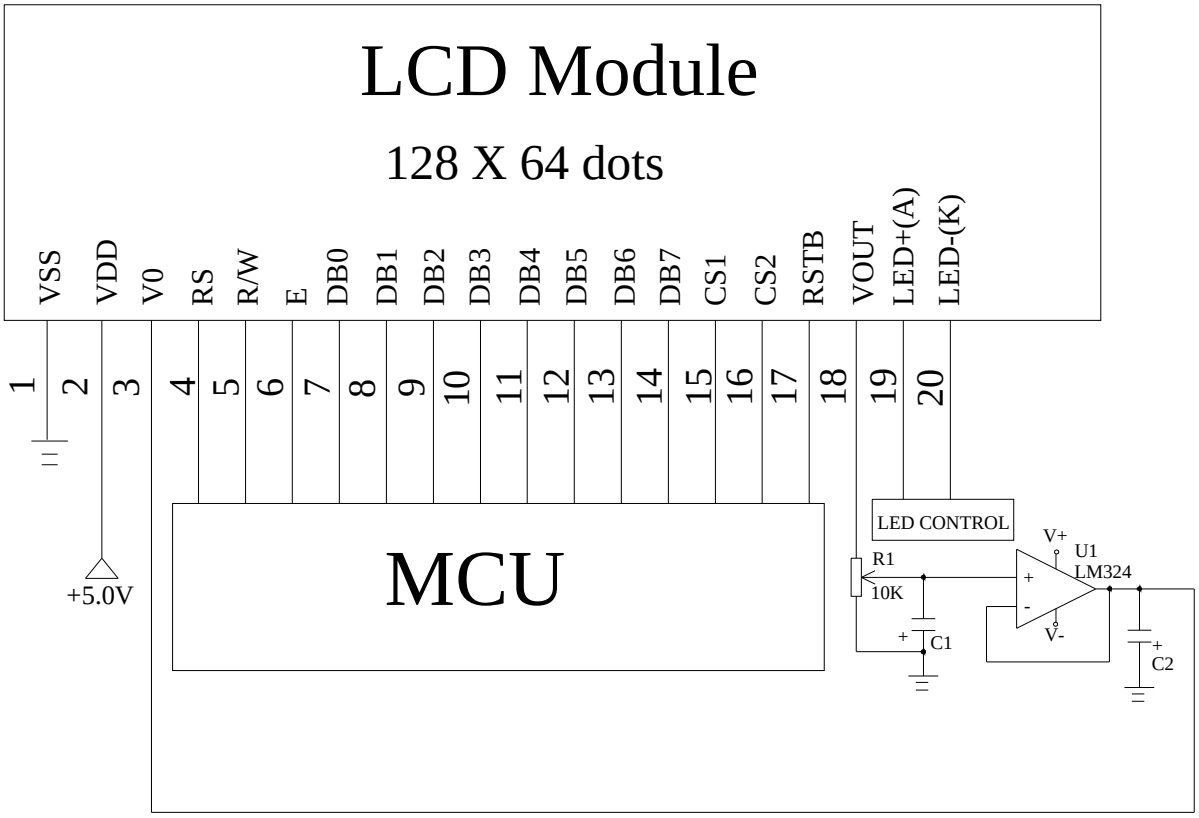



Remarks:
1,Unmarked tolerance is ±0.3,
2,Color: White,
3,The material comply with RoHs.

## 9. APPLICATION CIRCUIT




**NOTE:** 1. R1 is the contrast resistor.

2. VOUT=-9.5V

3. Adjust R1, it will be best contrast when V0 is –7.9V.

## 10. MAXIMUM ABSOLUTE POWER RATINGS ( Ta=25°C)

| Item | Symbol | Value | Unit |
|---|---|---|---|
| Operating Voltage | $V_{DD}$ | -0.3~+7.0 | V |
| Supply Voltage | $V_{EE}$ | VDD-19~VDD+0.3 | V |
| Driver Supply Voltage | VB | -0.3~VDD+0.3 | V |
| | VLCD | VEE-0.3 ~ VDD+0.3 | V |
| Operating Temperature | Topr | -20~+70 | ℃ |
| Storage Temperature | Tstg | -25~+75 | ℃ |

# 11. ELECTRICAL CHARACTERISTICS

## 11-1 DC Characteristics ($V_{DD}$=5V,$V_{ss}$=0V,Ta=25°C)

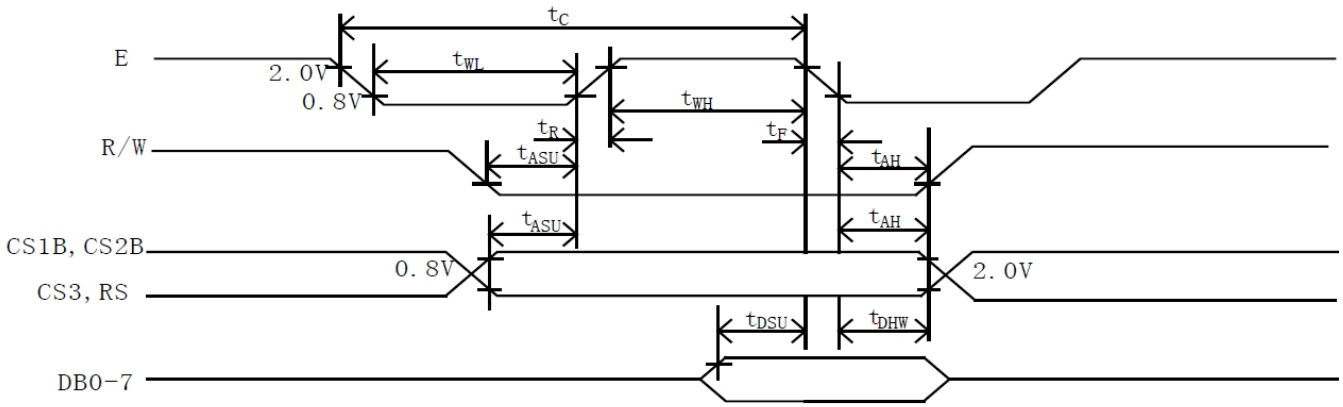
| Item | Symbol | Standard Value | | | Test Condition | Unit |
|---|---|---|---|---|---|---|
| | | MIN | TYP | MAX | | |
| Supply Current for Logic | $V_{DD}$ | 4.7 | 5.0 | 5.3 | ------- | V |
| Supply Current for Logic | $I_{DD}$ | ---- | TBD | ---- | ------- | mA |
| Supply Current for LCD | $V_{LCD}$ | 12.7 | 12.9 | 13.0 | 25°C | - |

## 11-2 AC Characteristics

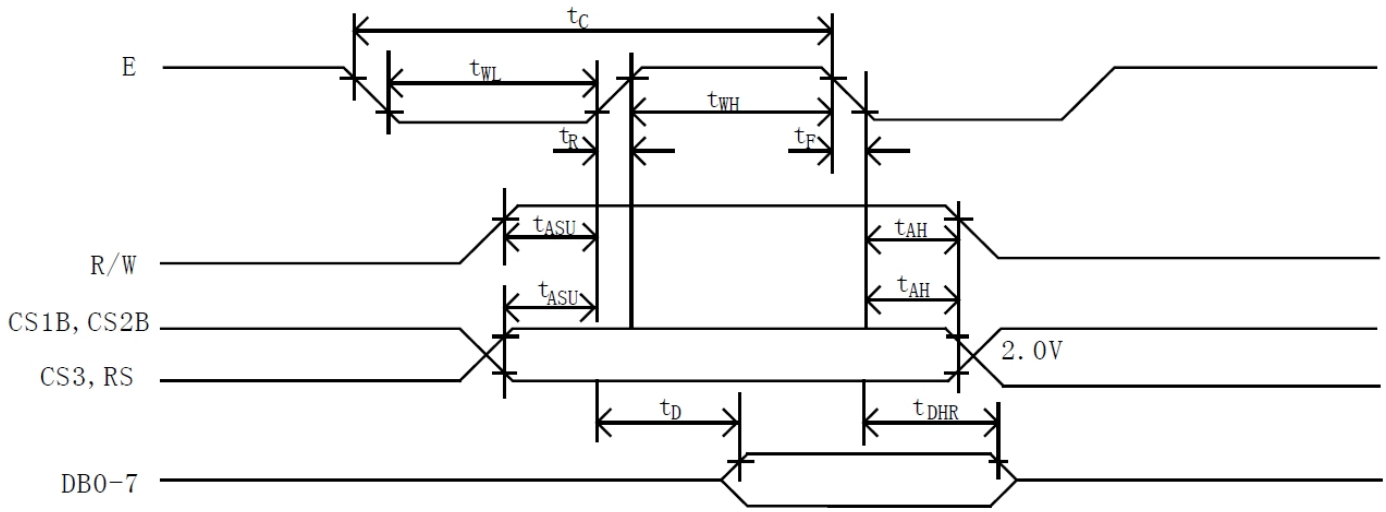
**11-2. AC Characteristics (**Aip31108E) (VDD = 5 V; VSS = 0 V; Tamb = 25°C)

**MPU Interface**

| Characteristic | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| E Cycle | $t_C$ | 1000 | — | — | ns |
| E High Level Width | $t_{WH}$ | 450 | — | — | ns |
| E Low Level Width | $t_{WL}$ | 450 | — | — | ns |
| E Rise Time | $t_R$ | — | — | 25 | ns |
| E Fall Time | $t_F$ | — | — | 25 | ns |
| Address Set-Up Time | $t_{ASU}$ | 140 | — | — | ns |
| Address Hold Time | $t_{AH}$ | 10 | — | — | ns |
| Data Set-Up Time | $t_{DSU}$ | 200 | — | — | ns |
| Data Delay Time | $t_D$ | — | — | 320 | ns |
| Data Hold Time (Write) | $t_{DHW}$ | 10 | — | — | ns |
| Data Hold Time (Read) | $t_{DHR}$ | 20 | — | — | ns |




MPU Write Timing




MPU Read Timing

## 12. DISPLAY CONTROL INSTRUCTION

| Instruction | RS | R/W | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 | Function |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Display ON/OFF | L | L | L | L | H | H | H | H | H | L/H | Controls the display on or off. Internal status and display RAM data is not affected. L:OFF H:ON |
| Set Address (Y address) | L | L | L | H | Y address (0~63) | | | | | | Sets the Y address in the Y address counter. |
| Set Page ( X address) | L | L | H | L | H | H | H | Page（0-7） | | | Sets the X address at the X address register. |
| Display Start Line (Z address) | L | L | H | H | Display start line（0-63） | | | | | | Indicates the display data RAM displayed at the top of the screen. |
| Status Read | L | H | BUSY | L | ON/ OFF | RESET | L | L | L | L | Read status.<br>BUSY<br>L: Ready<br>H: In operation<br>ON/OFF<br>L: Display ON<br>H: Display OFF<br>RESET<br>L: Normal<br>H: Reset |
| Write Display Data | H | L | Write Data | | | | | | | | Writes data (DB0:7) into display data RAM. After writing instruction, Y address is increased by 1 automatically. |
| Read Display Data | H | H | Read Data | | | | | | | | Reads data (DB0:7) from display data RAM to the data bus. |

**Display On/Off**

| RS | R/W | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | D |

The display data appears when D is 1 and disappears when D is 0.

Though the data is not on the screen with D=0, it remains in the display data RAM.

Therefore, you can make it appear by changing D=0 into D=1.

**Set Address (Y Address)**

| RS | R/W | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 1 | AC5 | AC4 | AC3 | AC2 | AC1 | AC0 |

Y address (AC0 ~ AC5) of the display data RAM is set in the Y address counter.

An address is set by instruction and increased by 1 automatically by read or write operations of display data.

**Set Page (X Address)**

| RS | R/W | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 0 | 1 | 1 | 1 | AC2 | AC1 | AC0 |

X address(AC0 ~ AC2) of the display data RAM is set in the X address register.

Writing or reading to or from MPU is executed in this specified page until the next page is set.

**Display Start Line (Z Address)**

| RS | R/W | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 1 | AC5 | AC4 | AC3 | AC2 | AC1 | AC0 |

Z address (AC0 ~ AC5) of the display data RAM is set in the display start line register and displayed at the top of the screen. When the display duty cycle is 1/64 or others(1/32 ~ 1/64), the data of total line number of LCD screen, from the line specified by display start line instruction, is displayed.

**Status Read**

| RS | R/W | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | BUSY | 0 | ON/OFF | RESET | 0 | 0 | 0 | 0 |

- BUSY

  When BUSY is 1, the Chip is executing internal operation and no instructions are accepted.

  When BUSY is 0, the Chip is ready to accept any instructions.
- ON/OFF

  When ON/OFF is 1, the display is off.

  When ON/OFF is 0, the display is on.
- RESET

  When RESET is 1, the system is being initialized. In this condition, no instructions except status read can be accepted.

  When RESET is 0, initializing has finished and the system is in the usual operation condition.

**Write Display Data**

| RS | R/W | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |

Writes data (D0 ~ D7) into the display data RAM.After writing instruction, Y address is increased by 1 automatically.

**Read Display Data**

| RS | R/W | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |

Reads data (D0 ~ D7) from the display data RAM. After reading instruction, Y address is increased by 1 automatically.

## 13. MODULE ACCEPTS QUALITY LEVEL (AQL).

**13.1 AQL standard value: Fatal defect =0.1, Major defect=0.65; Minor defect =2.5.**

**13.2 Curtailed inspection scheme**

| Type | Batch Qty | inspection Qty | AQL value | pass | Reject |
|---|---|---|---|---|---|
| module product | 350PCS＜ 1000PCS | 125pcs | 0.1 | 0 | 1 |
| | | | 0.65 | 2 | 3 |
| | | | 2.5 | 7 | 8 |
| | 200PCS＜ 350PCS | 80pcs | 0.1 | 0 | 1 |
| | | | 0.65 | 1 | 2 |
| | | | 2.5 | 5 | 6 |
| | ＜200PCS | 32pcs | 0.1 | 0 | 1 |
| | | | 0.65 | 0 | 1 |
| | | | 2.5 | 4 | 5 |
| Module sample | ＜200PCS | All inspected | / | / | The sample will be reject when the fateful defect>2pcs or main defect>5pcs. |
| | ＞200PCS | 125pcs | | | |

**Notes: 1). Batch QTY is the production amount that production department ship to QA department.**

**2). All of productions will be inspected if the batch QTY less than inspected QTY.**

**3). Each batch fixed to be 500pcs.**

## 14. RELIABILITY TEST.

Operating life time: Longer than 50000 hours (at room temperature without direct irradiation of sunlight)
Reliability characteristics shall meet following requirements.

| TEMPERATURE TESTS | NORMAL GRADE |
|---|---|
| High Temperature Storage | +75□ * 96hrs<br>(Without Polarizer) |
| Low Temperature Storage | -25℃ * 96hrs |
| High Temperature Operation | +**70**□ * 96hrs |
| Low Temperature Operation | -20□ * 96hrs |
| High Temperature, High Humidity | +**70**□ * 95%RH * 96hrs<br>(Without Polarizer) |
| Thermal Shock | -20□ * 30min.<br>10s ↓ 5Cycles<br>+**70**□ * 30min. |
| Vibration Test | Frequency * Swing * Time<br>40Hz * 4mm * 4hrs |
| Drop Test | Drop Height * Times<br>1m * 6times |

## 15. 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.

## 16. 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**