DISPLAY Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 128064A2 FGH-PW

Product Specification   *Version: 3*

21.11.2025

GENERAL SPECIFICATION

MODULE NO. :

DEM 128064A2 FGH-PW

CUSTOMER P/N

VERSION NO.	CHANGE DESCRIPTION	DATE
0	ORIGINAL VERSION	22.08.2025
1	Updated the module drawing on page4 Add the life time of the BL on page 6	27.08.2025
2	Updated the life time of the BL on page 6	11.09.2025
3	Updated the PCB drawing on page 5	21.11.2025

PREPARED BY: CC   DATE: 21.11.2025

APPROVED BY: WH   DATE: 21.11.2025

CONTENTS

1. FUNCTIONS & FEATURES

MODULE NAME	LCD TYPE	Backlight Color	Remarks
DEM 128064A2 FGH-PW	FSTN Transflective Positive Mode	White	-

- l   Viewing Direction : 6 O'clock
- l   Driving Scheme : 1/64 Duty Cycle, 1/9 Bias
- l   Power Supply Voltage : 5.0 Volt (typ.)
- l V_{LCD} Adjustable For Best Contrast : 12.9 Volt (typ.)
- l   Display Contents : 128 x 64 Dots
- l   **Internal Memory** : **512 bytes (4096 bits)**
- l   **Interface** : **Easy Interface with a 4-Bit or 8-Bit MPU**

2. MECHANICAL SPECIFICATIONS

- l   Module Size : 93.00 x 70.00 x 12.80 mm
- l   Dot Size : 0.48 x 0.48 mm
- l   Dot Pitch : 0.52 x 0.52 mm

3. BLOCK DIAGRAM

DB0~ DB7

8

RS, R/W, E

3

RSTB

CS2

SEGMENT DRIVER IC
Aip31108E(1)

SEGMENT DRIVER IC
Aip31108E(2)

CS1

5

Seg1~ Seg64

Seg65~ Seg128

VSS

VDD

V0

COMMON DRIVER IC
Aip31107E

Com1~ Com6

LCD PANEL

128 × 64 DOTS

VOUT

DC/DC Converter
NJU7670M

LED+ (A)

LED-(K)

LED BACK LIGHT
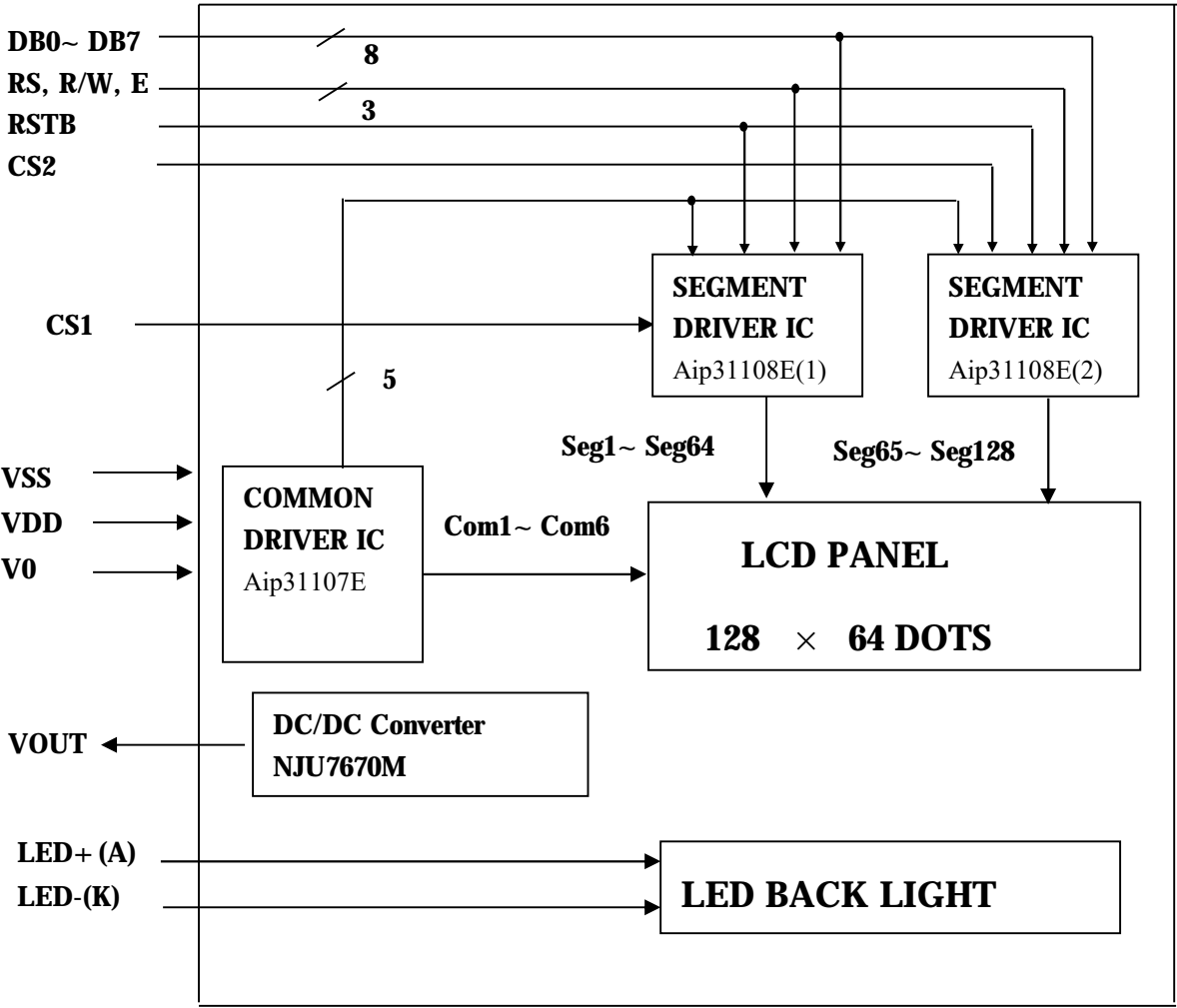
4. EXTERNAL DIMENSIONS
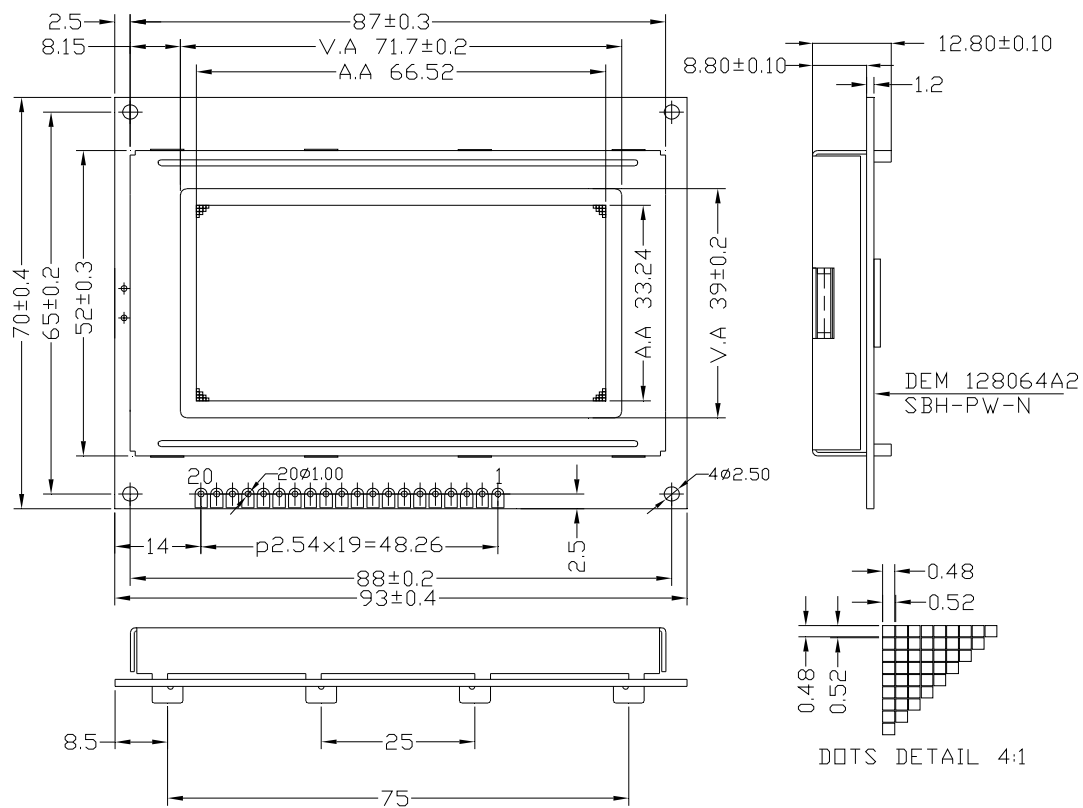
REMARKS:
1,UNMARKED TOLERANCE IS ±0.3,
2,ALL METERIALS COMPLY WITH ROHS..

5. PIN ASSIGNMENT

Pin No.	Symbol	Function
1	VSS	Ground
2	VDD	Power supply voltage for logic,+ 5.0V.
3	V0	Input voltage for LCD
4	RS	Data or Instruction. RS=H→DB<0:7>: Display RAM Data RS=L→DB<0:7>: Instruction Data
5	R/W	Read or Write. R/W=H→Data appears at DB<0:7> and can be read.
6	E	Chip enable signal
7	DB0	
8	DB1	
9	DB2	
10	DB3	Data bus. There state I/O common terminal.
11	DB4	
12	DB5	
13	DB6	
14	DB7	
15	CS1	Chip select signal for Aip31108E(1)
16	CS2	Chip select signal for Aip31108E(2)
17	RSTB	Reset signal
18	VOUT	Output voltage for LCD,-5.0V
19	LED + (A)	Please also refer to 6.2 Description
20	LED – (K)	Please also refer to 6.2 Description

6. PCB DRAWING AND DESCRIPTION

6-1 PCB DRAWING.
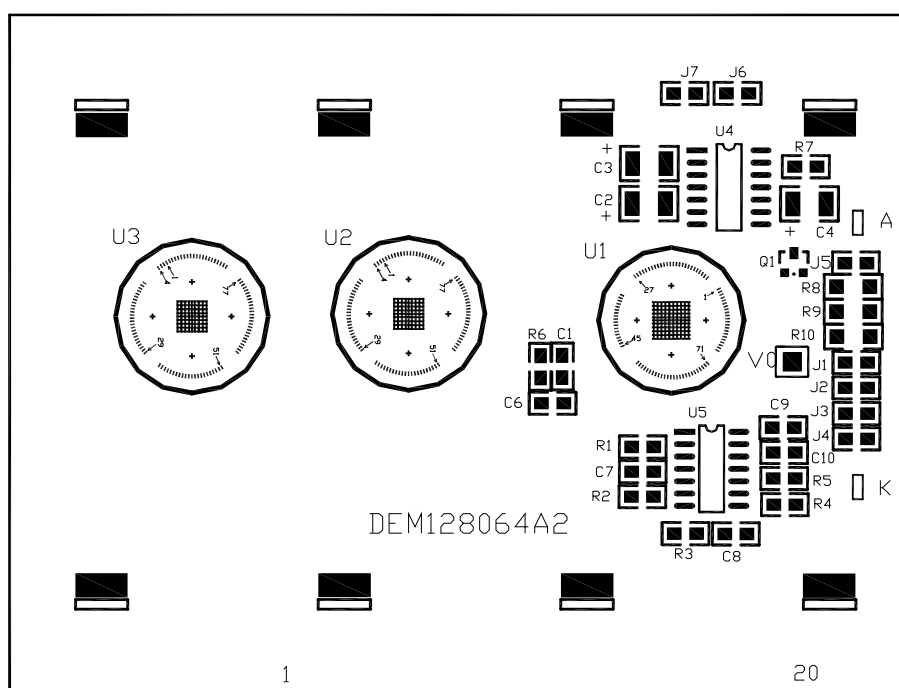
6-2 DESCRIPTION:

6-2-1.The polarity of the pin 19 and the pin 20:

	J2,J4	J1,J3	19 Pin	20 Pin
Option 1	Open	Close	Anode	Cathode
Option 2	Close	Open	Cathode	Anode

Note: In application module, J2=J4=open, J1=J3=closed

6-2-2.The LED resistor can be bridged when the J5 is closed

Note: In application module, J5=open

6-2-3.The R8, R9 and R10 are the LED resistor.

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

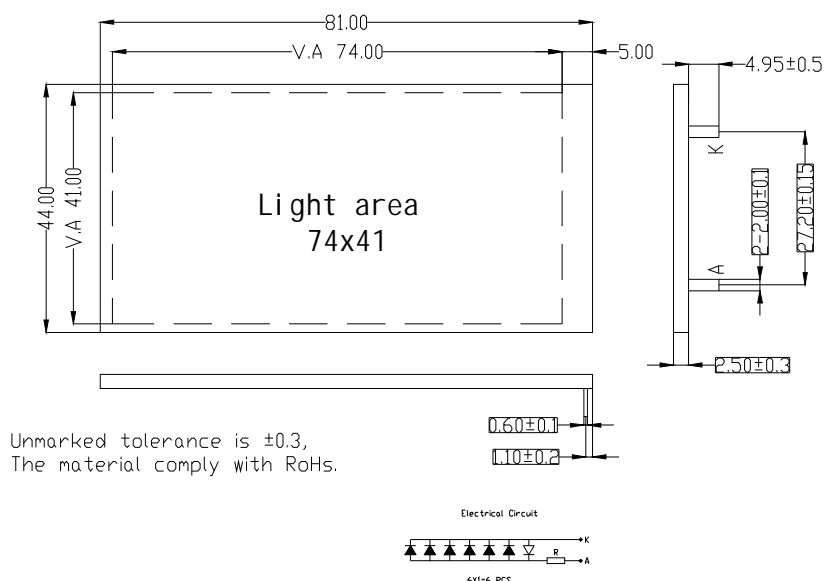6-2-4.The metal-bezel is set on ground when the J6 is closed.

Note: In application module, J6=closed.

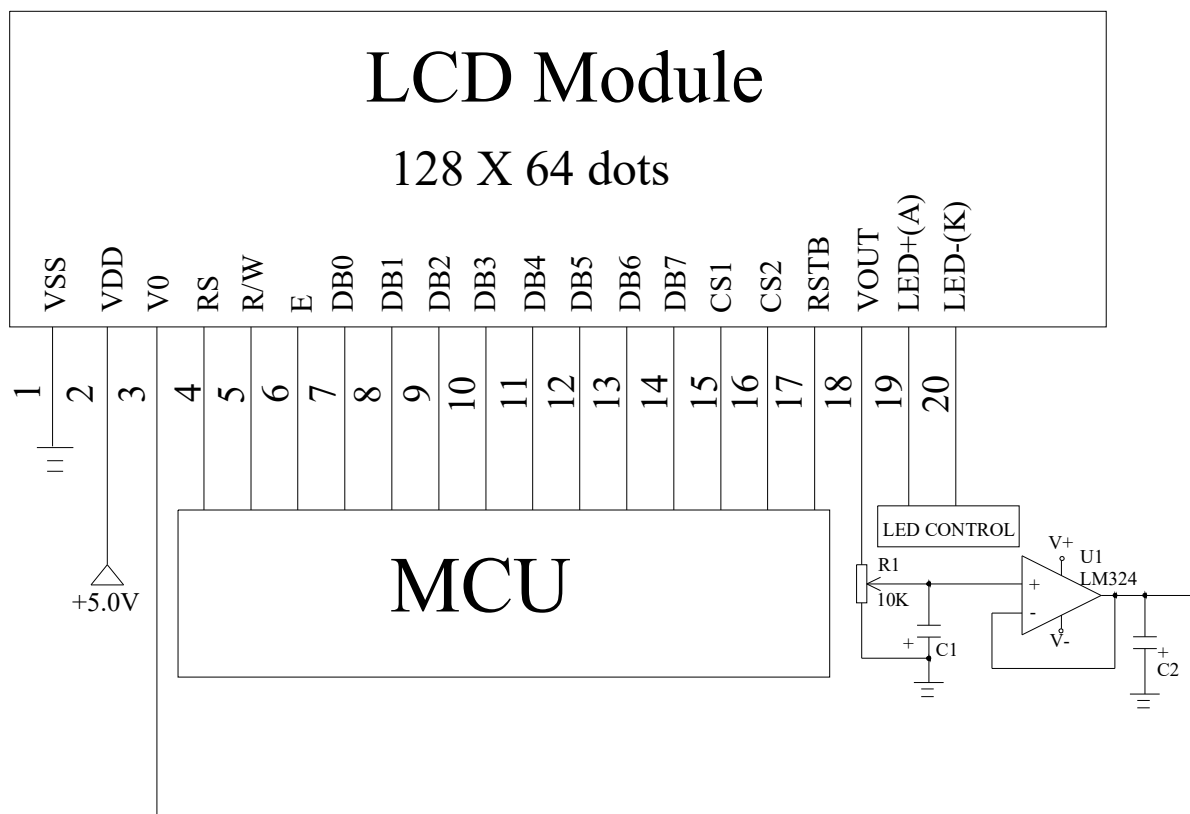# 7. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATION

7-1 BACKLIGHT ELECTRICAL/OPTICAL DESCRIPTION.

Item	Symbol	MIN.	TYP.	MAX.	Unit	Conditions
Forward Voltage	Vf	-	4.0	-	V	-
Forward Current	If	-	90	120	mA	Vf = 4.0V
Power Dissipation	Pd	-	0.36	-	W	Vf = 4.0V
Reverse Voltage	VR	-	-	5.0	V	-
Reverse Current	IR	-	-	0.4	mA	
Luminous Intensity	Lv	130	-	-	cd/m^2	Vf = 4.0V
Luminous Uniformity	∆ Lv	70	-	-	%	Vf = 4.0V
Emission Wavelength	x	0.27	-	0.32		If=10mA, Ta=25°C each chip
	y	0.27	-	0.32		
Backlight Color	White					
Lifetime	50.000 Hours					

7-2. BACKLIGHT DRAWING

81.00
V.A 74.00
5.00
4.95±0.5
44.00
V.A 41.00

**Light area
74x41**

Unmarked tolerance is ±0.3,
The material comply with RoHs.

2.22.00±0.1
27.20±0.15
2.50±0.3
0.60±0.1
1.10±0.2

Electrical Circuit
6XI=6 PCS

8. 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.

9. 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	℃

10. ELECTRICAL CHARACTERISTICS

10-1 DC Characteristics (VDD=+5±10% V_{ss}=0V,Ta=-20~+70°C)

Item	Symbol	Standard Value			Test Condition	Unit
		MIN	TYP	MAX		
Supply Current for Logic	V_{DD}	4.5	5.0	5.5	-------	V
Supply Current for Logic	I_{DD}	----	2.62	4	-------	mA
Operating Voltage for LCD	$V_{DD}-V_0$	13.4	14.1	14.8	-20°C	V
		12.2	12.9	13.6	+25°C	
		11.0	11.7	12.4	+70°C	
Input Voltage "H" Level	VIH	$0.7V_{DD}$	---	V_{DD}	---	V
Input Voltage "L" Level	VIL	0	---	$0.3V_{DD}$	---	V

10-2 MPU Interface

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
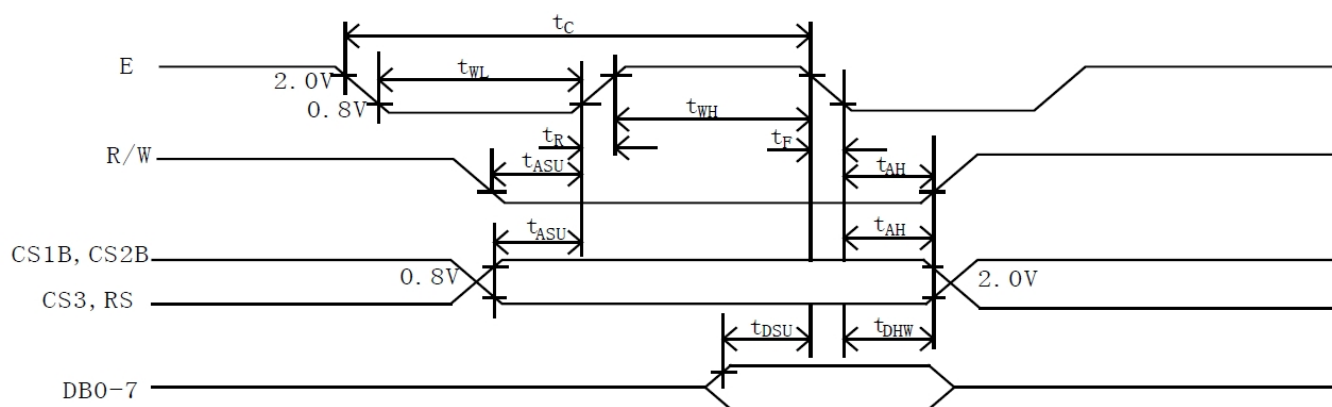
MPU Write Timing
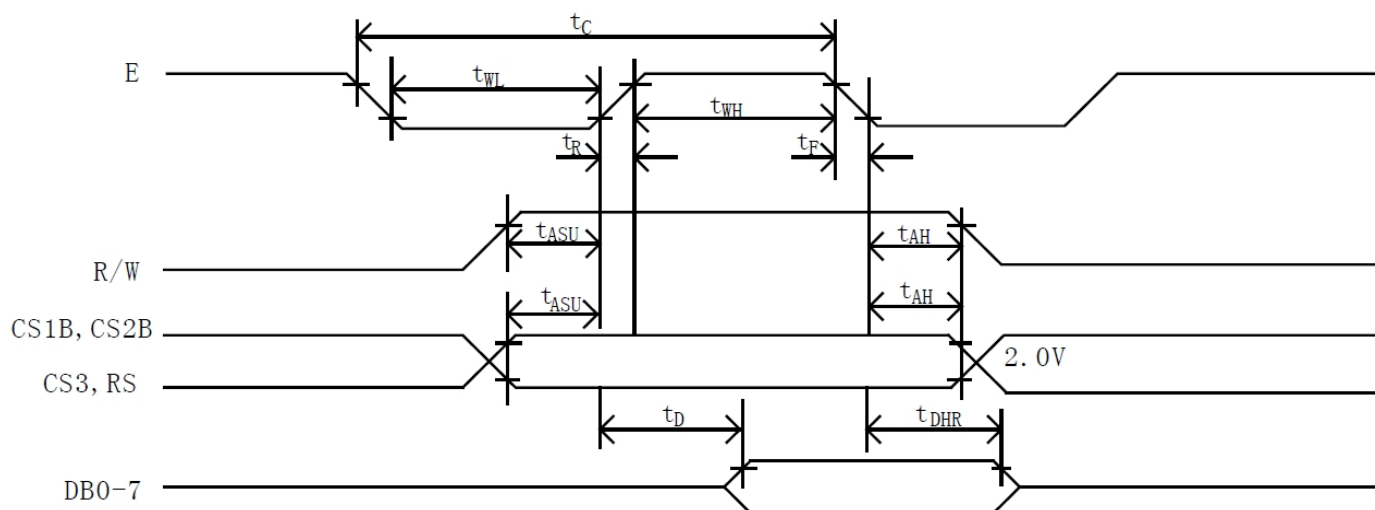
MPU Read Timing

11. 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. BUSY L: Ready H: In operation ON/OFF L: Display ON H: Display OFF RESET L: Normal 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.

12. MODULE ACCEPT QUALITY LEVEL (AQL)

12.1 AQL Standard Value: Fatal Defect =0.1, Major Defect=0.65; Minor Defect =2.5.

12.2 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 product will be inspected if the batch QTY less than inspected QTY.

3). Each batch fixed to be 500pcs.

13. 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°C * 96hrs (Without Polarizer)
Low Temperature Storage	-25°C * 96hrs
High Temperature Operation	+70°C * 96hrs
Low Temperature Operation	-20°C * 96hrs
High Temperature, High Humidity	+70°C * 95%RH * 96hrs (Without Polarizer)
Thermal Shock	-20°C * 30min. 10s 5Cycles +70°C * 30min.
Vibration Test	Frequency * Swing * Time 40Hz * 4mm * 4hrs
Drop Test	Drop Height * Times 1.0m * 6times

14. LCD MODULES HANDLING PRECAUTIONS

n   Please remove the protection foil of polarizer before using.

n   The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

n   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.

n   Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

n   The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarize carefully.

n   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.

n   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.

15. OTHERS

n   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.

n   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.

n   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