深圳市秋田视佳有限公司

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LCD MODULE SPECIFICATION
FOR CUSTOMER'S APPROVAL

CUSTOMER : Standard

MODULE TYPE : HY-16032A-201

APPROVED BY: (FOR CUSTOMER USE ONLY)

Approved By	Checked By	Prepared By	MT File No	Date Issued

CONTENTS

Specification For

Liquid Crystal Display Module

`MODEL NO. : HY-16032A-201

View Direction	☑ 6 O'clock			☐12 O'clock	
LCD Type	☐ FSTN Positive			☐ FSTN Negative	
	☑ STN Gray	☐ STN Yellow Green		☐ STN Blue	
Rear Polarizer	☐Reflective	☑Transflective		☐Transmissive	
Backlight Type	☑ LED	☐ Internal Power	☐ EL	☑ 5V input	
		☐ External Power	☐ CCFL	☐ 24V input	
Backlight Color	☐ White	☐ Amber	☐ Blue Green	☑ Yellow	☐ Other
Temperature Range	☑Normal	☐ Wide		☐ Super Wide	
EL Driver IC	☐ Build-in	☑ Not Build-in			
DC-to-DC	☑ With	☐ Without			

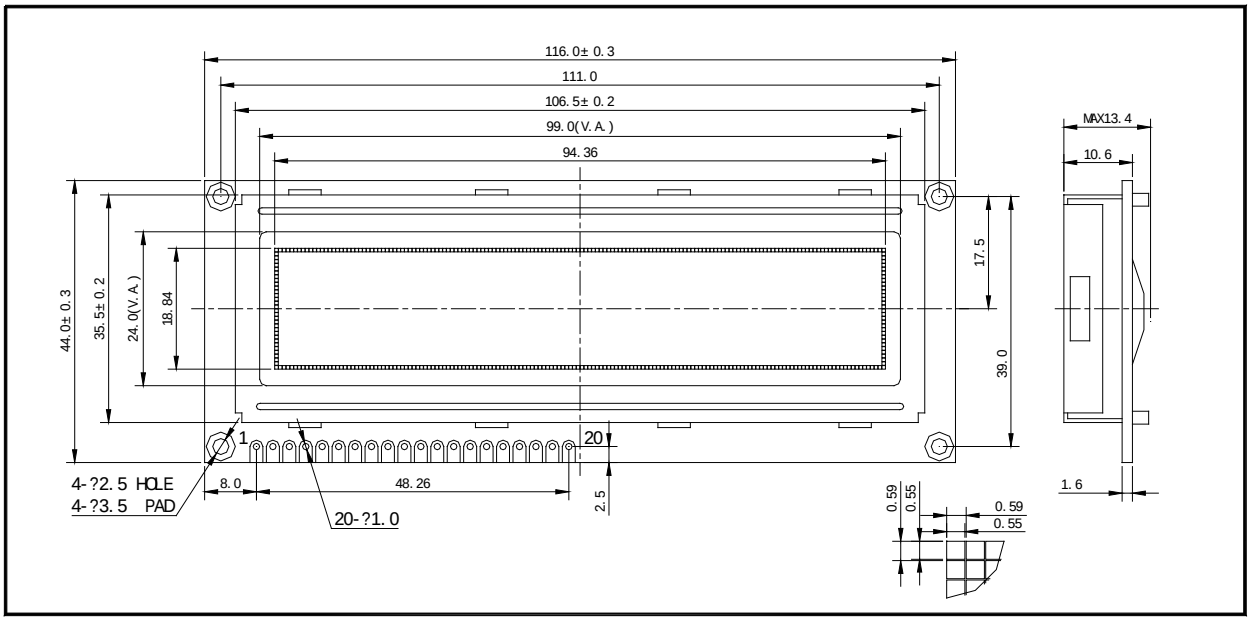
To Be Very Careful !

The LCD driver ICs are made by CMOS process, which are very easy to be damaged by static charge, make sure the user is grounded when handling the LCM.

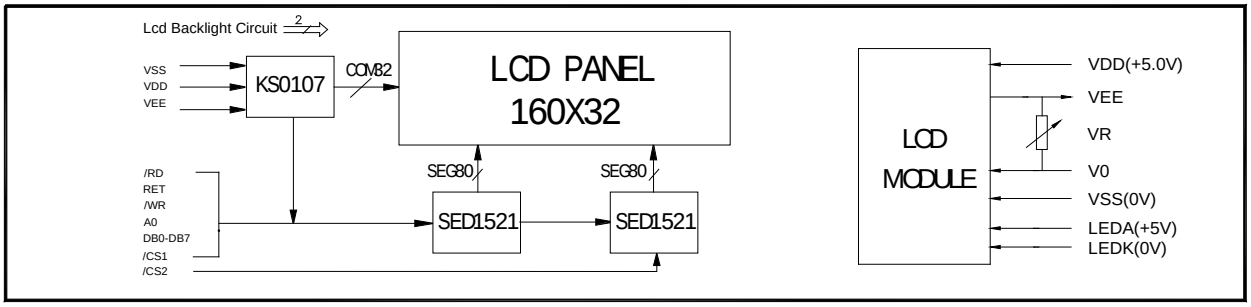
LCM Module Drawing

QiuTian,ShiJia **HY-16032A-201** 160X32 GRAPHIC 1/32DUTY,1/5BIAS

1.0 DIMENSIONAL DRAWING



2.0 BLOCK DIAGRAM & POWER SUPPLY



3.0 MECHANICAL SPECIFICATIONS & FEATURE

Item	Nominal Dimensions(mm)	FEATURE	
		LCD Type	STN
Module Size (W*H*T)	116.0x44.0x13.4	LCD Colour	Gray
View Area (W*H)	99.0x24.0	View Angle	6 Oclock
Character Font	160x32	Display Type	Positive Type
Dot Pitch (W*H)	0.59x0.59	Rear polarizer	Transflective
Dot Size (W*H)	0.55x0.55	Operating Temperature	0℃~ 50℃
---	---	Storage Temperature	-20℃~ 70℃
---	---	Blacklight	LED(Yellow)

4.0 ELECTRICAL CHARACTERISTICS

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operating Voltage	Vdd	Ta= 25℃	---	5.0	---	V
Operating Voltage for LCD	Vlcd	Ta= 25℃	---	6.5	---	V
Supply Current	Idd	Ta= 25℃, Vdd= 5V	---	4.0	---	mA
Supply Current for Blacklight	If	Ta= 25℃, Vf= 4.2V	---	160	200	mA

5.0 INTERFACE PIN CONNECTIONS

Pin No	Symbol	Level	Description
1	A0	H/L	Register selection (H:Data registor, L:Instruction registor)
2	CS2	L	Chip select signal for Half-rignt screen
3	CS1	L	Chip select signal for Half-left screen
4	/RD(E)	L(H/H→L)	/RD for 80 serial,E for 68 serial
5	/WR(R/W)	L (H/L)	/WR for 80 serial,R/W for 68 serial
6	VDD	I	Logic supply voltage (+ 5V)
7	VSS	I	GND
8-15	DB0-DB7	H/L	3-state I/O Data Bus
16	RET	I	Reset signal The rise of the signal is for active and keep RET= 'h'
17	V0	I	Power supply for LCD
18	VEE	O	Nogtave voltage output
19	LEDA	I	Power supply for LED backlight(+ 5v)
20	LEDK	I	Power supply for LED backlight(0v)

General Specification

Item	Content
Display Resolution	160(W)×32(H)
Dimensional Outline(mm)	116.0(W)×44.0(H)×13.4max(D)
Display mode	Transfltive Type/Positive
Circuit	Common-Driver IC, Segment-driver IC with build-in SRAM
Interface	A0,CS2,CS1,E,R/W,VDD,VSS,DB0-DB7,RET,V0, VEE,LEDA,LEDK

Absolute Maximum Rating

(1) Electrical Absolute Ratings

Item	Symbol	Min.	Max.	Unit	Note
Power Supply for Logic	V_{DD}-V_{SS}	0	5.5	Volt	
Power Supply for LCD	V_{DD}-V_O	0	5.0	Volt	
Input Voltage	V_I	0	V_{DD}	Volt	
Static Electricity	-	0	5.5	Volt	Note 1
Supply Current for LED Backlight	I_{LED}	-	-	-	

Note 1 : Operator should be grounded during handling LCM.

(2) Environmental Absolute Maximum Ratings

Item	Normal Temperature				Wide Temperature			
	Operating		Storage		Operating		Storage	
	Min,	. Max,	Min,	. Max,	Min,	. Max,	Min,	. Max,
Ambient Temperature	0℃	+50℃	-20℃	+70℃	-20℃	+70℃	-30℃	+80℃
Humidity(without condensation)	Note 2,4		Note 3,5		Note 4,5		Note 4,6	

Note 2 Ta≦50℃: 80% RH max
Ta>50℃: Absolute humidity must be lower than the humidity of 85%RH at 50℃
Note 3 Ta at -20℃ will be<48hrs at 70℃will be <120hrs when humidity is higher than 70%.
Note 4 Background color changes slightly depending on ambient temperature. This phenomenon is reversible.
Note 5 Ta≦70℃: 75RH max
Ta>70℃: absolute humidity must be lower than the humidity of 75%RH at 70℃
Note 6 Ta at -30℃ will be <48hrs, at 80 ℃ will be <120hrs when humidity is higher than 70%.

Electrical Characteristics

Item	Symbol	Condition	Min.	Typ	Max.	Unit	note
Power Supply for Logic	V_{DD}-V_{SS}	-	4.7	5.0	5.5	Volt	
Input Voltage	V_{IL}	L level	V_{SS}	0.2 V_{DD}	-	Volt	
	V_{IH}	H level	0.8 V_{DD}	V_{DD}	-	Volt	
LCM Recommend LCD Module Driving Voltage	Vlcd= V_{DD} −V_O	Ta＝-20℃	-	7.1	-	Volt	
		Ta＝0℃	-	6.8	-		
		Ta＝25℃	6.2	6.5	6.8		
		Ta＝50℃	-	6.2	-		
Power Supply for LED B/L	LEDA-LEDK	-	-	5.0	-	Volt	
Power Supply Current for LCM	I_{DD}(EL B/L OFF)	V_{DD} =5.0V V_{DD}-V_O =5.0V FLM=64Hz V_{LED}=5.0V	-	2.0	3.0	mA	
	I_{LED} (EL B/L ON)		-	200	250		

Optical Characteristics

Item	Symbol	Condition	Min.	Typ	Max.	Unit	note
Viewing angle range	Φf(12 o'clock)	When Cr,〈2	-	20	-	Degree	9,10
	Φb(6 o'clock)		-	40	-		
	Φl(9 o'clock)		-	30	-		
	Φr(3 o'clock)		-	30	-		
Rise Time	Tr	V_{DD}-V_O =5.0V Ta=25°C		150		mS	
Fall Time	Tf			200			
Frame frequency	Frm		-	64	-	Hz	8,10
Contrast	Cr		-	4.0	-		7

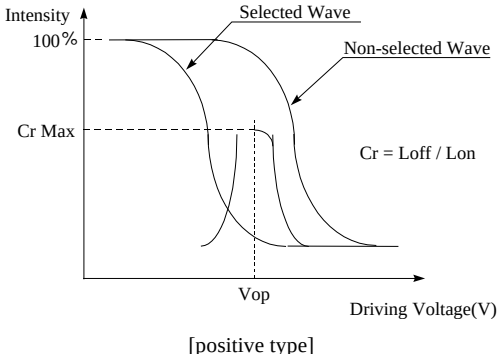
Mechanical Specification

Product No.		HY-16032A-201
Module Size		116.0(W)×44.0(H)×13.4max(D)
Dot Size		0.55(W)mm×0.55(H)mm
Dot Pitch		0.59(W)mm×0.59(H)mm
Resolution		160(W)×32(H) Dots Matrix
Duty Ratio		1/32 Duty
LCD Display Mode	STN	☑Gray Mode ☐Yellow Mode ☐Blue Mode
	FSTN	☐ Black & White(Normally White/Positive Image) ☐ Black & White(Normally White/Negative Image)
	Rear Polarizer:	☐Reflective ☑ Transflective ☐Transmissive ☐ Transflective(High Transmissive)
Viewing Direction		☑6 O'clock ☐12 O'clock ☐3 O'clock ☐9 O'clock
Backlight		☐W/O ☐CCFL ☐EL ☑LED
Controller		Epson SED1521 or compatible
DC/DC Converter		Build in
EL Driver		Without

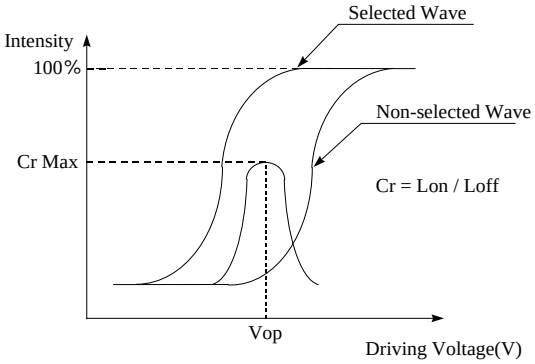
Interface Pin Assignment

Pin No.	Pin Out	Description
1	A0	Register selection: A0=’H’ select Data register and A0=’L’ select Instruction register.
2	CS2	Chip select signal for Half-right screen
3	CS1	Chip select signal for Half=left screen
4	/RD(E)	/RD for 80 serial,E for 68 serial
5	/WR(R/W)	/WR for 80 serial,R/W for 68 serial
6	VDD	Logic Supply Voltage (5V)
7	VSS	GND
8	DB0	3-State I/O Data Bus.
9	DB1	
10	DB2	
11	DB3	
12	DB4	
13	DB5	
14	DB6	
15	DB7	
16	RET	Reset signal The rise of the signal is for active and keep RET=’H’
17	V0	LCD Driver Supply Voltage
18	VEE	Nogtave voltage output
19	LEDA	Backlight driver supply voltage(+5V)
20	LEDK	Backlight driver supply voltage(0V)

[Note 7] Definition of Operation Voltage (Vop)

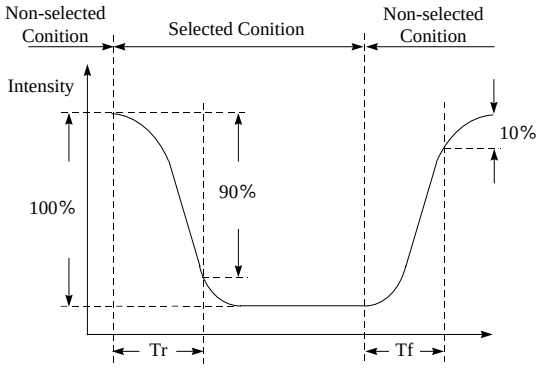


[positive type]

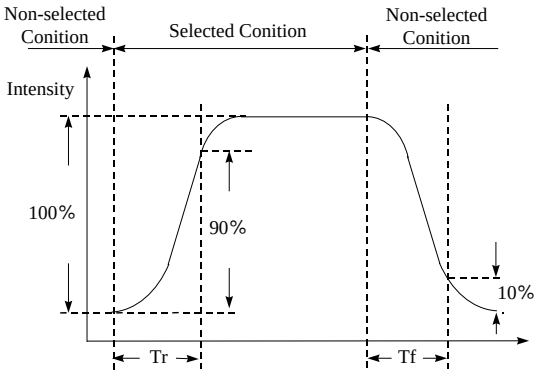


[Negative type]

[Note 8] Definition of Response Time (Tr, Tf)



[positive type]



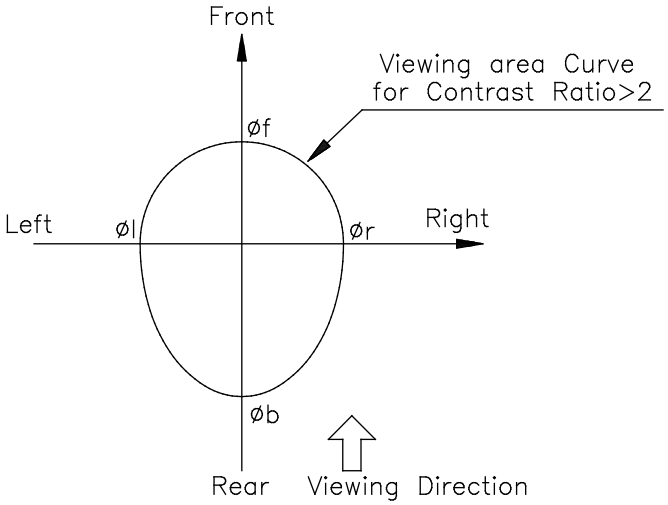
[Negative type]

Conditions:

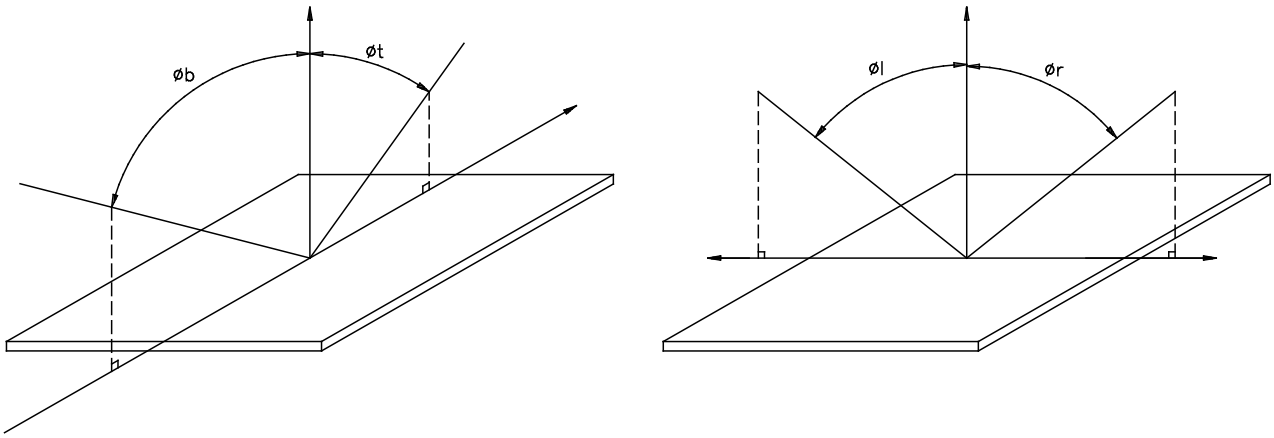
Operating Voltage : Vop **Viewing Angle(θ, φ): 0°, 0°**

Frame Frequency : 64Hz **Driving Waveform : 1/N duty, 1/a bias**

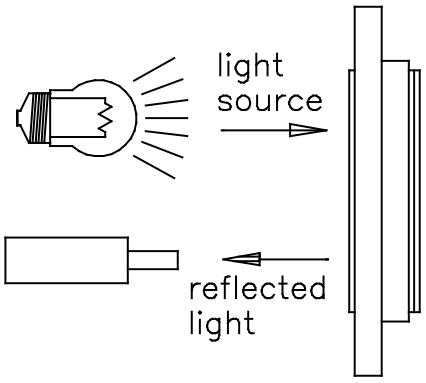
[Note 9] Definition of Viewing Direction



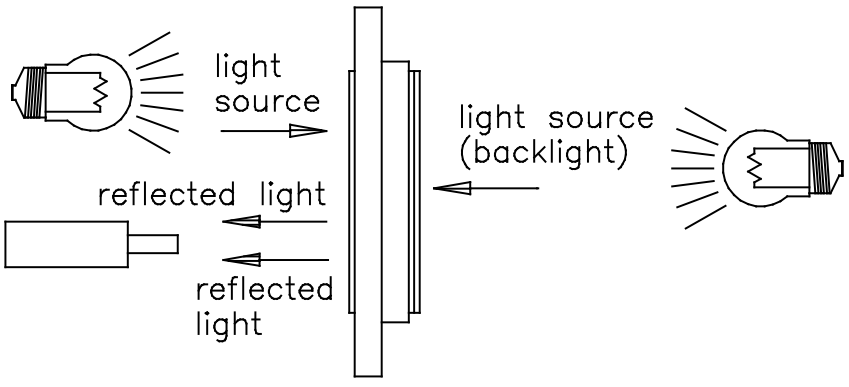
[Note 10] Definition of viewing angle



[Note 11] Description of Measuring Equipment

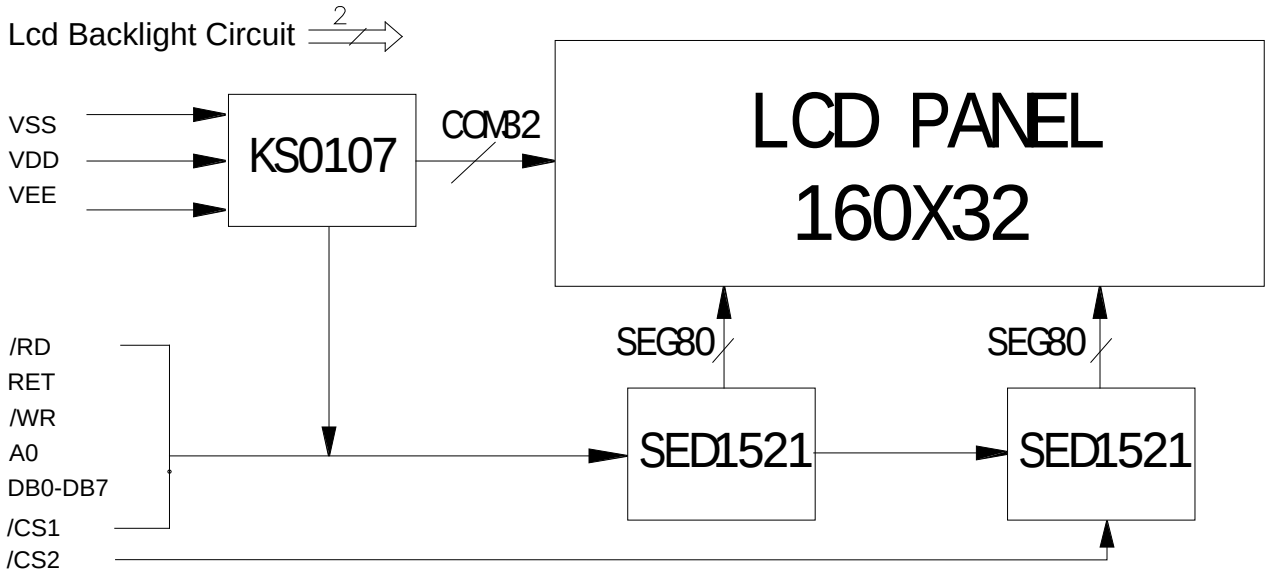


Reflective type

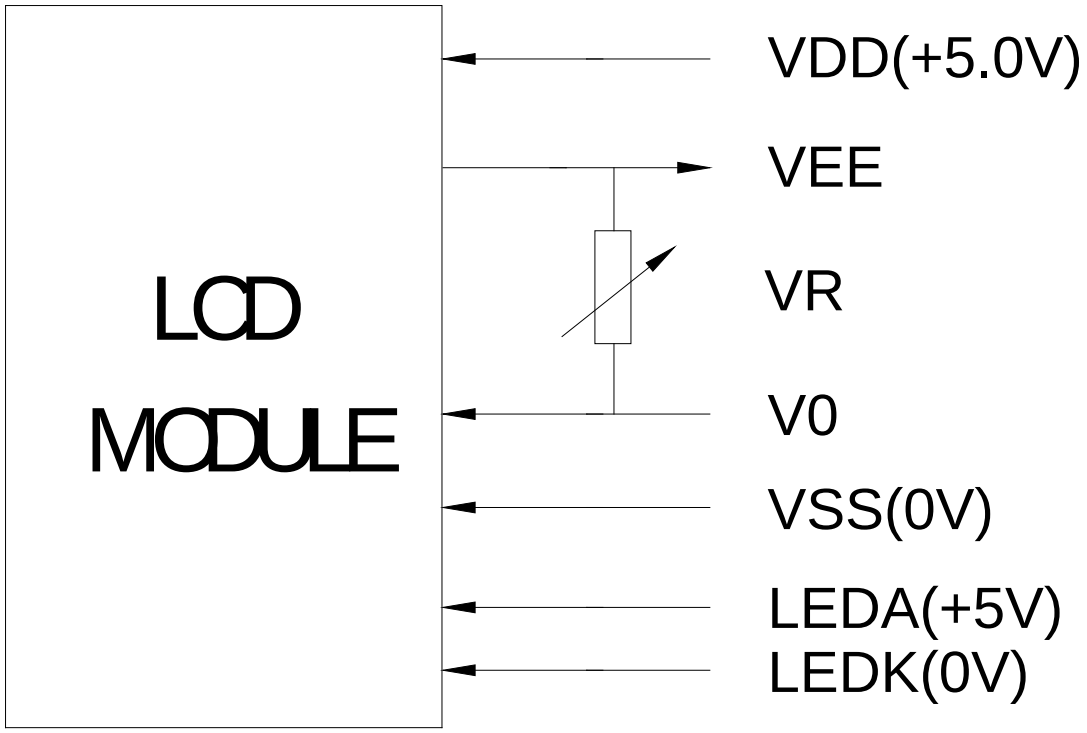


Transflective type

Block Diagram

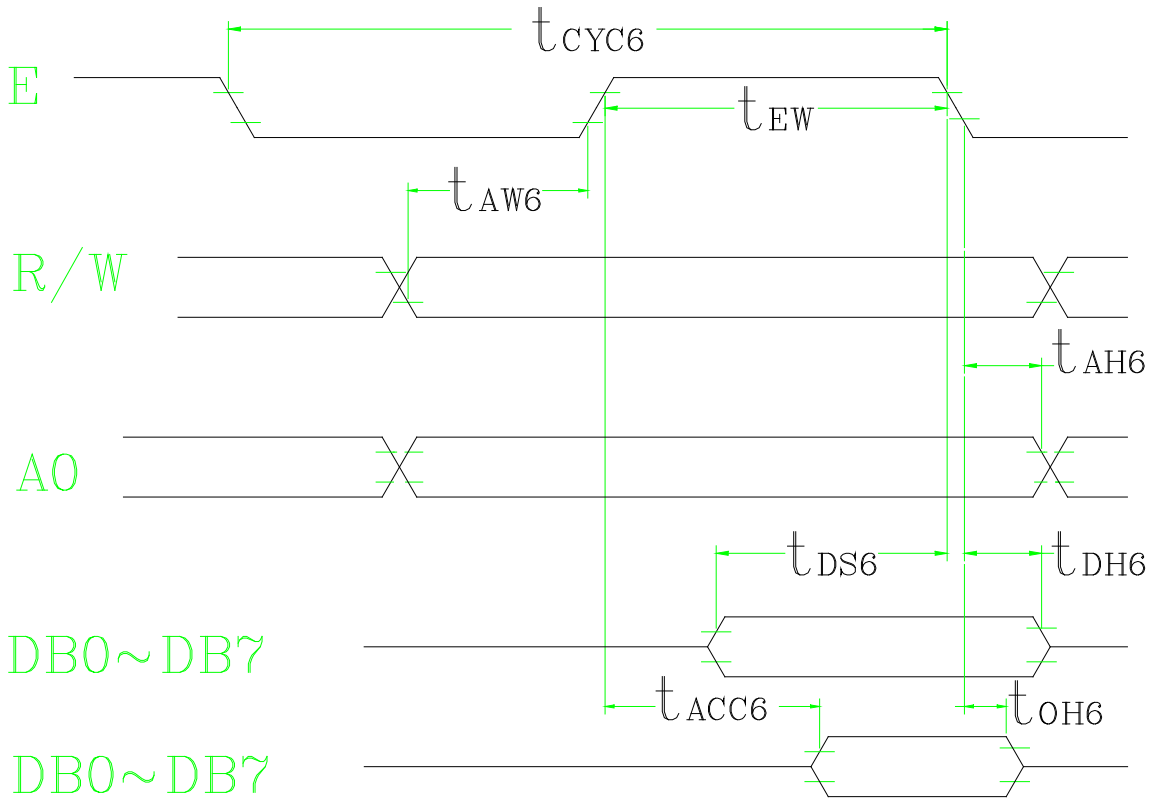


Power Supply



Timing Characteristics

AC Characteristic—68-series MPU Bus Read/Write

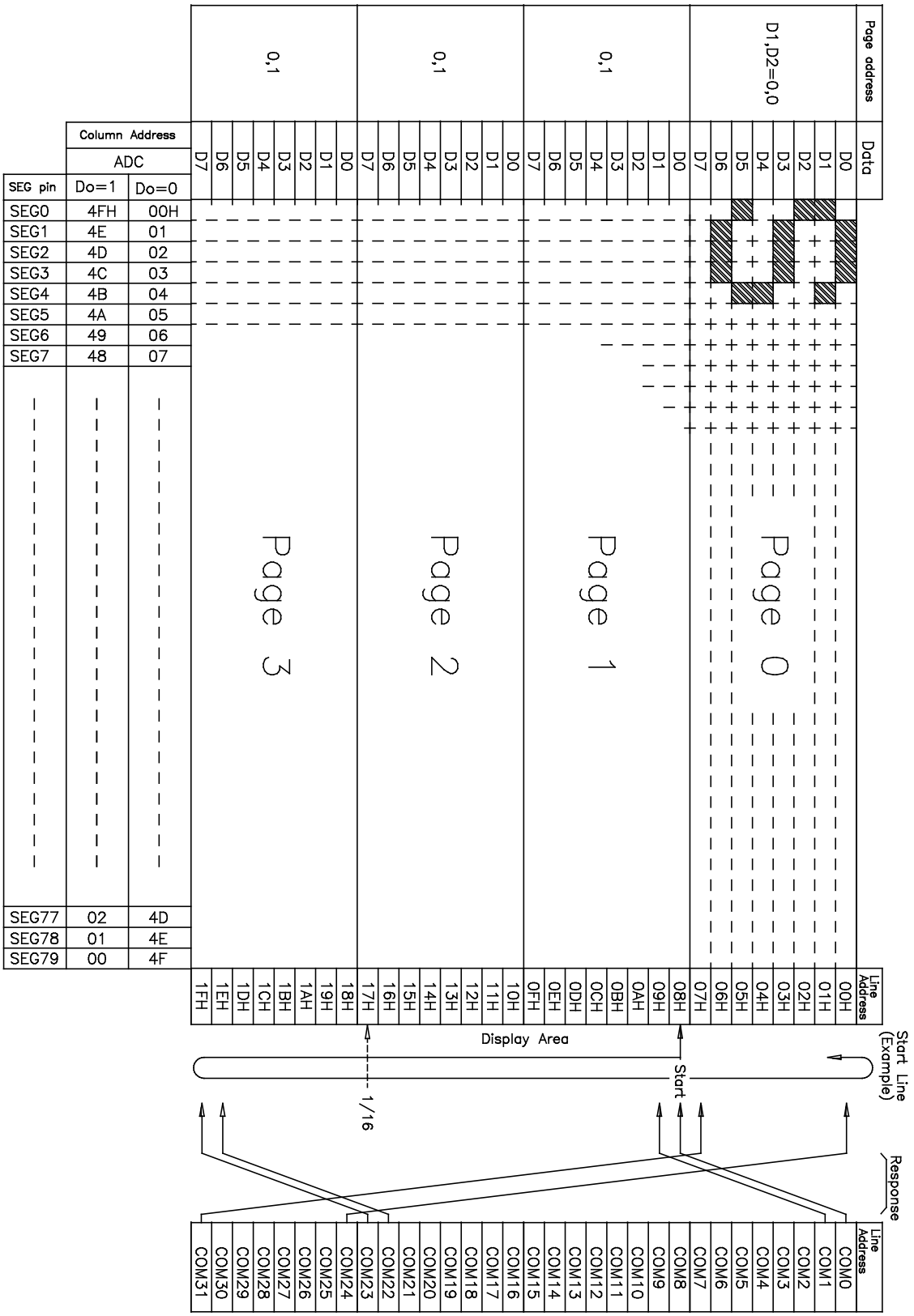


Read/Write Timing for the 68-port MPU

Ta=0~50℃, V_{DD}=5.0V±10%, unless state otherwise

Parameter		Symbol	Condition	Rating		Unit	Signal
				Min.	Max.		
Address hold time		t_{AH6}	-	10	-	ns	Ao,
Address setup time		t_{AW6}	-	20	-	ns	
System cycle time		t_{CYC6}	-	1000	-	ns	R/W
Control pulse-width		t_{CC}	-	200	-	ns	
Data setup time		t_{DS6}	-	80	-	ns	D0 to D7
Data hold time		t_{DH6}	-	10	-	ns	
RD access time		t_{ACC6}	C_L=100pF	-	90	ns	
Output disable time		t_{CH6}		10	60	ns	
Rise and fall time		t_r, t_f	-	-	15	ns	-
Enable pulse width	R/ /W	T_{EW}		100	-	ns	E
				80	-	ns	

Display Data Ram Addressing



Display Commands

Instruction	A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	Function
Display ON/OFF	0	1	0	1	0	1	0	1	1	1	1/0	To control the display ON or OFF. The internal status and display RAM data are not affected. 0:OFF, 1:ON
Display start line	0	1	0	1	1	0	Display start address (0~31)					Specifies RAM line corresponding to top line of display.
Set page address	0	1	0	1	0	1	1	1	0	Page (0 to 3)		To set the display RAM page in page address register.
Set column (segment) address	0	1	0	0	Column address (0 to 79)							To set display RAM column address in column address register.
Status Read	0	0	1	Busy	ADC	ON/ OFF	Reset	0	0	0	0	Read the following status: Busy 1: Busy 0: Ready ADC 1: CW output 0: CCW output ON/OFF 1: Display OFF 0: Display ON Reset 1: Being reset 0: Normal
Write display data	1	1	0	Write Data								To write data from data bus to display RAM.
Read display data	1	0	1	Read Data								To read data from display RAM to data bus
Select ADC	0	1	0	1	0	1	0	0	0	0	0/1	0: CW output, 1: CCW output
Status drive ON/OFF	0	1	0	1	0	1	0	0	1	0	0/1	To select static driving operation 1: Static drive, 0: Normal driving
Select Duty	0	1	0	1	0	1	0	1	0	0	0/1	To select duty cycle 1: 1/32 duty, 0: 1/16 duty
Read-modity-write	0	1	0	1	1	1	0	0	0	0	0	Read-modify-write ON
End	0	1	0	1	1	1	0	1	1	1	0	Read-modify-write OFF
Reset	0	1	0	1	1	1	0	0	0	1	0	To reset by software

Command Description

Display ON/OFF

A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	
0	1	0	1	0	1	0	1	1	1	D	AEH, AFH

This command turns the display ON or OFF.
D=1 : Display ON
D=0 : Display OFF

Display Start Line

This command specifies the line address shown in page 14 and indicates the display line that corresponding to COM 0. The display area begins at the specified line address and continues in the line address increment direction. This area having the number of line of specified display duty is displayed. If the line address is changed dynamically by this command, the vertical smooth scrolling and paging can be used.

A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	
0	1	0	1	1	0	A4	A3	A2	A1	A0	C0H to DFH

This command loads the display start line register.

A4	A3	A2	A1	A0	Line Address
0	0	0	0	0	0
0	0	0	0	1	1
		⋮			⋮
1	1	1	1	1	31

See the figure in page 14.

Set Page address

This command specifies the page address that corresponds to the low address of the display data RAM when it is accessed by the MPU. Any bit of the display data RAM can be accessed when its page address and column address are specified. The display status is not changed even when the page address is changed.

A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	
0	1	0	11	0	1	1	1	0	A1	A0	B8H to BBH

This command loads the page address register.

A1	A0	Page
0	0	0
0	1	1
1	0	2
1	1	3

See the figure in page 14.

Set Column Address

This command specifies a column address of the display data RAM. When the display data RAM is accessed by the MPU continuously, the column address in increased by 1 every time. Therefore the MPU can access to data continuously. The column address stops to be incremented at address 80, and the page address is not changed continuously.

A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	
0	1	0	0	A6	A5	A4	A3	A2	A1	A0	00H to 4FH

This command loads the column address register.

A6	A5	A4	A3	A2	A1	A0	Line Address
0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	1
			⋮				⋮
1	1	1	1	1	1	1	79

Read Status

A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	
0	0	1	BUSY	ADC	ON/OFF	RESET	0	0	0	0	00H to 4FH

Reading the command I/O register (Ao=0) yields system status information.

- The busy bit indicates whether the driver will accept a command or not.
  Busy=1: The driver is currently executing a command or is resetting. No new command will be accepted.
  Busy=0: The driver will accept a new command.
- The ADC bit indicates the way column addresses are assigned to a segment drivers
  ADC=1: Normal. Column address n → segment address n.
  ADC=0: Inverted. Column address 79-u → segment driver u.
- The ON/OFF bit indicates the current status of the display.
  It is the inverse of the polarity of the display ON/OFF command.
  ON/OFF=1: Display OFF.
  ON/OFF=0: Display ON.
- The RESET bit indicates whether the driver is executing a hardware or a software reset or it is in a normal operating mode.

RESET=1: Currently executing the reset command.
RESET=0: Normal operating.

Write Display Data

A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0
1	1	0	Write Data							

To write an 8-bit data into the display RAM, at a location specified by the contents of the column address and page address register by one.

Read Display Data

A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0
1	0	1	Read Data							

To read an 8-bit data from the data I/O latch, updates the contents of the I/O latch with display data from the display data RAM location specified by the contents of the column address and page address registers and then increments the column address register.
After loading a new address into the column address register one dummy read is required before valid data is obtained.

Select ADC

A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	
0	1	0	1	0	1	0	0	0	0	D	A0H, A1H

This command selects the relationship between display data RAM column address and segment driver.
D=0: SEG0 ← column address 00H, …(normal)
This command is provided to reduce restrictions on the placement of the driver ICs and routing of tracing during printed circuit board layout. In this LCD module the D should be cleared to 0.

Static Driver ON/OFF

A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	
0	1	0	1	0	1	0	0	1	0	D	A4H, A5H

To force the display on and all common outputs to be selected.
D=1: Static driver ON.
D=0: Static driver OFF.

Select Duty

A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	
0	1	0	1	0	1	0	1	0	0	D	A8H, A9H

To set the D-bit to 1 because the LCD module is 1/32 duty.

End

A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	
0	1	0	1	1	1	0	1	1	1	0	EEH

This command cancels the **Read-Modify-Write** mode and restores the contents of the column address register to their value prior to the receipt of the **Read-Modify-Write** command.

Reset

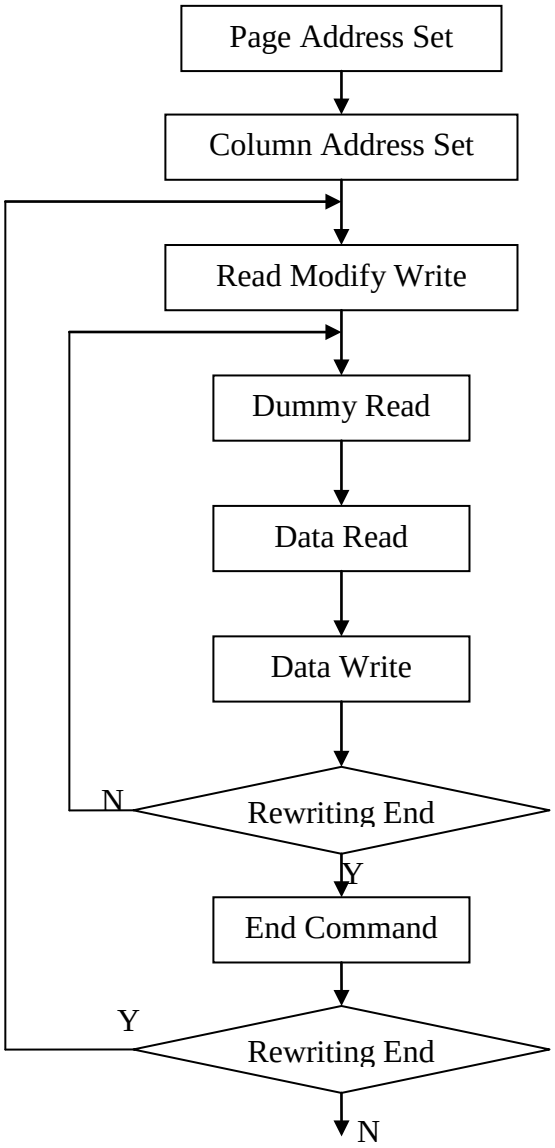
A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	
0	1	0	1	1	1	0	0	0	1	0	E2H

This command clears:
Set the 1st line in the display start line register and to set page address register to 3 page.
It does not affect the contents of the display data RAM. When the power supply is turned on, the user must send a Reset signal into the RES pin. The Reset command cannot be used instead of this Reset signal.

Read-Modify-Write

A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0	
0	1	0	1	1	1	0	0	0	0	0	E0H

This command defeats column address register auto-increment after reading data. The current contents of the column address register are saved. This mode remains active until an **END** command is received.



Initialization Procedure

Detects a rising edge or falling edge of an RES input and initializes the MPU during power-on. Initialization status:

1. Display is OFF
2. Display start line register is set to line 1
3. Static drive is turn off
4. Column address counter is set to address 0.
5. Page address register is set to page 3.
6. 1/32 duty is selected.
7. Forward ADC is selected(ADC command D0 is 1 and ADC status flag is 1)
8. Read-modify-write is OFF.

Reliability Test

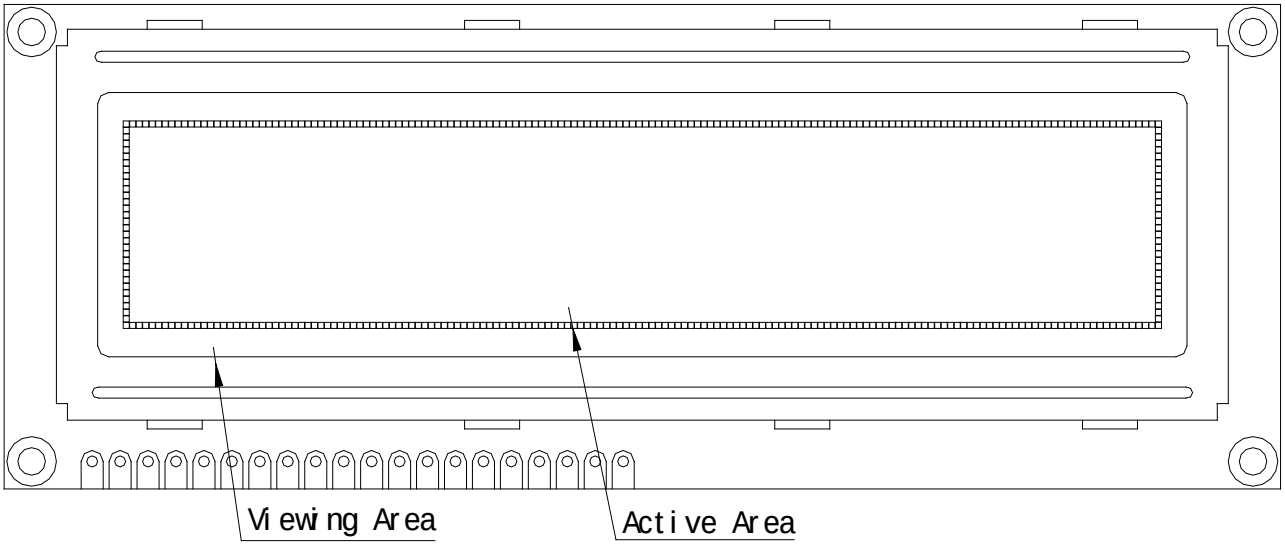
No	Item	Conditions		Note
1	High Temp. Operation	50℃	120HR	
2	High Temp. Storage	70℃	120HR	
3	Low Temp. Operation	0℃	120HR	
4	Low Temp. Storage	-20℃	120HR	
5	High Temp./Humid Storage	60℃ 90%RH	120HR	
6	Thermal Shock	-20℃ ,30min +60℃ ,30min	10 cycle	
7	Vibration Test (IEC-68-2-6)	Frequency : 10~55 Hz Duration : 20 times, 6 min/time Amplitude : 0.75 mm	-	
8	Shock (IEC 68-2-27)	Duration : 11 mS Acceleration : 100g	-	X, Y, Z direction

Appearance Check

CONDIITON OF APPEARANCE CHECK:

(1)Specimen shall be checked by eyes in distance of 30cm under 40w-fluorescence lamp.

(2)Checking direction shall be in 45 degree from perpendicular line op specimen surface.



Handling Precautions

(1)Treat polarizer very carefully since it is easy to be damaged.

(2)When cleaning the display surface, use soft cloth (e.g. gauss) with a solvent (recommended below) and wipe lightly.

- ethyl alcohol
- iso-prcolol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvents:

- water
- ketone
- aromatics

(3)Direct current causes electro-chemical reaction with remarkable degradation of the display quality. Give careful consideration to prevent direct current at ON/OFF timing and during operation.

(4)Avoid strong shock and drop from the height.

(5)To prevent LCD panels from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity.

(6)Give careful consideration to avoid electrical static discharge with causes uneven contrast.

(7)Even a small condensation on the contact pads (terminals) causes electro-chemical reaction which makes missing row and column. Give careful attention to avoid condensation. When assembling with zebra connector, clean the surface of the pads with alcohol and keep the air very clean.

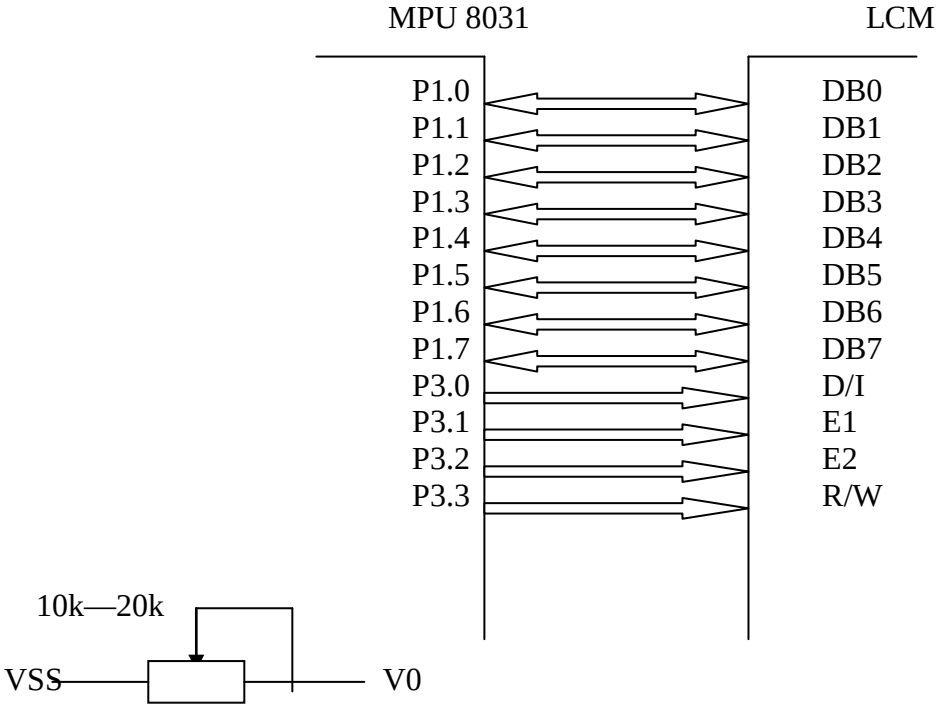
Lcd Product Quality Standard

DISPLAY APPEARANCE

No	Item	Criteria
1	inclusions (black spot, white spot, dust)	(1)round type diameter mm(a*) no of defect* a≦0.20 neglect 0.20＜a≦0.35 5max 0.35＜a none (2)linear type length mm(l) width mm(W) no. of defect na W≦0.03 neglect l≦3 0.03＜W≦0.08 6 3＜l 0.08＜W none
2	scratch	1.scratch on protective film is permitted. 2.scratch on polarizer shall be as follow: (1)round type diameter mm(a*) no of defect a≦0.15 neglect 0.15＜a≦0.20 2 max 0.20＜a none (2)linear type be judged bye 1.-(2) linear type
3	dent	diameter ＜ 1.5mm
4	bubble	not exceeding 0.5mm average diameter is acceptable between glass and polarizing film
5	pin hole	(a+b)/2 ≦ 0.15mm maximum number: ignored 0.15＜(a+b)/2≦0.20mm maximum number:10
6	dot defect	(a+b)/2≦0.20mm maximum number: ignored 0.20＜(a+b)/2≦0.30mm maximum number:5 x=width
7	contrast irregularity(spot)	diameter spec no of defect a≦0.50mm neglect 0.50＜a≦0.75 5 0.75＜a≦1.00 3 1.00＜a none
8	dot width	design width ±15%
9	color tone and uniformity	obvious uneven color is not permitted

Interface circuit and driving programme on LCM of dots matrix series .

一.Interface circuit:



二. Driving programme

```
#include<reg51.h>

sbit di=P3^0;
sbit e1=P3^1;
sbit e2=P3^2;
sbit rw=P3^3;

unsigned char x,y;

void delay(int num)
{
      while(num--) ;
}

void send_command(unsigned char cmd)
{
      e1=e2=0;
      di=rw=0;
      P1=cmd;

+     e1=e2=1;
```

```
	delay(2);
	e1=e2=0;
	delay(2);
	P1=0xff;
	e1=e2=1;
}

void lw(unsigned char x,unsigned char y,unsigned char dd) {
	if (x<61)
		{	e1=e2=1;
			di=rw=0;P1=0xb8|y;e1=1;delay(2);e1=0;delay(2);
			e1=e2=1;
			di=rw=0;P1=0x00|x;e1=1;delay(2);e1=0;delay(2);
			e1=e2=1;
			di=1;rw=0;P1=dd;e1=1;delay(2);e1=0;delay(2);
			e1=e2=1;
		}
	  else
		{
			x=x-61;e1=e2=1;
			di=rw=0;P1=0x00|x;e2=1;delay(2);e2=0;delay(2);
			e1=e2=1;
			di=rw=0;P1=0xb8|y;e2=1;delay(2);e2=0;delay(2);
			e1=e2=1;
			di=1;rw=0;P1=dd;e2=1;delay(2);e2=0;delay(2);
			e1=e2=1;
		}
	P1=0xff;
}

void lcd_init(void) {
	unsigned char x,y;
	e1=e2=0;
	di=rw=0;
	send_command(0xae);
	send_command(0xc0);
	send_command(0xa4);
	send_command(0x00);
	send_command(0xbb);
	send_command(0xa9);
	send_command(0xa0);
	send_command(0xee);

	for (y=0;y<4;y++)
		{
			for (x=0;x<122;x++) lw(x,y,0);
		}
	send_command(0xaf);
```

```
}

unsigned char
a[16]={0xff,0x00,0x00,0xff,0xaa,0xaa,0x55,0x55,0xaa,0x55,0x55,0xaa,0xff,0xff,0x00,0x00};

unsigned char code
yu[32]={0x00,0x00,0x88,0x88,0x4A,0xAC,0xB8,0xAA,0xBC,0xA8,0xB8,0xAC,0x4A,0x88,0x88,
0x00,0x00,0x00,0x00,0x00,0x3A,0x2A,0x2A,0x2A,0x2A,0x2A,0x2A,0x3A,0x00,0x00,0x00
};
unsigned char code
xin[32]={0x00,0x00,0x80,0x60,0xF8,0x06,0x08,0xA8,0xA8,0xAA,0xAC,0xA8,0xA8,0xA8,0x08,
0x00,0x00,0x00,0x00,0x00,0x3F,0x00,0x00,0x3E,0x12,0x12,0x12,0x12,0x12,0x3E,0x00,0x00};
unsigned char code
dian[32]={0x00,0x00,0xF0,0x90,0x90,0x90,0x90,0xFE,0x90,0x90,0x90,0x90,0xF0,0x00,0x00,0x0
0,0x00,0x00,0x0F,0x04,0x04,0x04,0x04,0x1F,0x24,0x24,0x24,0x24,0x27,0x20,0x18,0x00};
unsigned char code
zi[32]={0x00,0x00,0x80,0x82,0x82,0x82,0x82,0x82,0xE2,0x92,0x8A,0x86,0x82,0x80,0x80,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x10,0x20,0x1F,0x00,0x00,0x00,0x00,0x00,0x00,0x00};
unsigned char code
you[32]={0x00,0x00,0x04,0x84,0x44,0xF4,0x9C,0x96,0x94,0x94,0x94,0x94,0xF4,0x04,0x04,0x0
0,0x00,0x00,0x01,0x00,0x00,0x3F,0x04,0x04,0x04,0x14,0x24,0x24,0x1F,0x00,0x00,0x00};
unsigned char code
xian[32]={0x00,0x00,0xFE,0x02,0x22,0x5A,0x86,0x00,0xFE,0x92,0x92,0x92,0x92,0xFE,0x00,0x
00,0x00,0x00,0x3F,0x04,0x08,0x04,0x03,0x00,0x3F,0x12,0x04,0x0A,0x11,0x30,0x10,0x00};
unsigned char code
gong[32]={0x00,0x00,0x80,0x80,0x40,0x30,0x0C,0x00,0xC0,0x06,0x18,0x20,0xC0,0x80,0x80,0x
00,0x00,0x00,0x00,0x10,0x18,0x14,0x12,0x11,0x10,0x10,0x14,0x18,0x30,0x00,0x00,0x00};
unsigned char code
si[32]={0x00,0x00,0x10,0x92,0x92,0x92,0x92,0x92,0x92,0x92,0x12,0x02,0x02,0xFE,0x00,0x00,0
x00,0x00,0x00,0x1F,0x08,0x08,0x08,0x08,0x08,0x1F,0x00,0x10,0x20,0x1F,0x00,0x00};
unsigned char code
d[32]={0x00,0x00,0x00,0xC0,0x40,0x40,0x40,0x7E,0x48,0x48,0x48,0x48,0xC8,0x08,0x00,0x00,0
x00,0x00,0x20,0x1B,0x02,0x02,0x0A,0x32,0x02,0x0A,0x32,0x02,0x0B,0x10,0x20,0x00};
unsigned char code
zhen[32]={0x00,0x00,0xFE,0x22,0x5A,0x86,0x08,0xC8,0xB8,0x8E,0xE8,0x88,0x88,0x88,0x08,0
x00,0x00,0x00,0x3F,0x02,0x04,0x03,0x04,0x04,0x04,0x04,0x3F,0x04,0x04,0x04,0x04,0x00};
unsigned char code
ye[32]={0x00,0x00,0x12,0x24,0x8C,0x00,0x84,0xC4,0x34,0xC4,0xB6,0x24,0x24,0xE4,0x04,0x0
0,0x00,0x00,0x02,0x3F,0x00,0x01,0x00,0x3F,0x21,0x12,0x0C,0x05,0x0B,0x30,0x20,0x00};
unsigned char code
jin[32]={0x00,0x00,0x00,0x80,0x80,0xBE,0xAA,0xAA,0x2A,0xAA,0xAA,0xBE,0x80,0x80,0x00,
0x00,0x00,0x00,0x00,0x3F,0x24,0x24,0x24,0x3F,0x00,0x3F,0x24,0x24,0x24,0x3F,0x00,0x00};
unsigned char code
xi[32]={0x00,0x00,0x00,0x00,0xFE,0x92,0x92,0x92,0x92,0x92,0x92,0x92,0xFE,0x00,0x00,0x00,
0x00,0x00,0x21,0x22,0x26,0x20,0x3F,0x20,0x20,0x20,0x3F,0x20,0x24,0x22,0x23,0x00};
unsigned char code
s[32]={0x00,0x00,0x20,0x22,0x22,0x22,0x22,0x22,0xE2,0x22,0x22,0x22,0x22,0x22,0x20,0x00,0
x00,0x00,0x08,0x04,0x02,0x03,0x10,0x20,0x1F,0x00,0x00,0x01,0x02,0x04,0x0C,0x00};
unsigned char code
```

```
mo[32]={0x00,0x00,0x10,0xD0,0xFE,0x50,0x94,0xF4,0x5E,0x54,0x54,0x54,0x5E,0xF4,0x04,0x0
0,0x00,0x00,0x03,0x00,0x3F,0x00,0x24,0x25,0x15,0x0D,0x07,0x0D,0x15,0x25,0x24,0x00};
unsigned char code
kuai[32]={0x00,0x00,0x20,0x20,0xFE,0x20,0x20,0x10,0x10,0xFE,0x10,0x10,0x10,0xF0,0x00,0x0
0,0x00,0x00,0x08,0x08,0x0F,0x24,0x25,0x11,0x0D,0x03,0x05,0x09,0x11,0x21,0x21,0x00};

void write_chinese(x,y,array)
unsigned char x,y;
unsigned char array[];
{
      unsigned char j,dd;
      for(j=0;j<32;j++)
      {
            dd=array[j];
            if(j<16) lw(x+j,y,dd);
            else       lw(x+j-16,y+1,dd);
      }
}

void main()
{
      unsigned char i,dd;
loop:       lcd_init();
              write_chinese(0,0,yu);
      write_chinese(16,0,xin);
      write_chinese(31,0,dian);
      write_chinese(46,0,zi);
      write_chinese(61,0,you);
      write_chinese(77,0,xian);
      write_chinese(92,0,gong);
      write_chinese(107,0,si);

      write_chinese(0,2,d);
      write_chinese(16,2,zhen);
      write_chinese(31,2,ye);
      write_chinese(46,2,jin);
      write_chinese(61,2,xi);
      write_chinese(77,2,s);
      write_chinese(92,2,mo);
      write_chinese(107,2,kuai);
      delay(60000);
            for(i=0;i<8;i++)
      {
            for(y=0;y<4;y++)
            {
                  for(x=0;x<122;x++)
                  {
                        if(x%2==0)
                        lw(x,y,a[2*i]);
```

```
                else
                lw(x,y,a[2*i+1]);
}
        }
        delay(60000);
    }
goto loop;
```

Revision History

Revision Content	Page	Date