



# Wincom Tech CO., LTD.

**The LCD(M) Specialist**

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PART NO. : WC0802D  
-STBLWNC06

FOR MESSRS. : \_\_\_\_\_

## ***CONTENTS***

<b><i>NO.</i></b>	<b><i>ITEM</i></b>	<b><i>PAGE</i></b>
1.	COVER	1
2.	RECORD OF REVISION	2
3.	GENERAL SPECIFICATION	3
4.	MECHANICAL DATA	3
5.	ABSOLUTE MAXIMUM RATINGS	4
6.	ELECTRICAL CHARACTERISTICS	5
7.	OPTICAL CHARACTERISTICS	5
8.	OUTLINE DIMENSION	6~7
9.	BLOCK DIAGRAM	7~8
10	INTERFACE TIMING CHART	9~10
11	INSTRUCTION CODE	11~12
12	CHARACTER GENERATOR ROM	13

ACCEPTED BY: .....

PROPOSED BY: .....

## RECORD OF REVISION

DATE	PAGE	SUMMARY

### **3. General specifications**

#### **3.1 General specifications**

PLEASE REFER TO:

“CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-10000)”.

#### **3.2 Quality Assurance and Warranty**

PLEASE REFER TO:

“QUALITY ASSURANCE MANUL (MS-10-10001)“.

#### **3.3 This individual specification is prior to general specifications**

### **4. Mechanical data**

- Display format: 8 characters x 2 line
- LCD type: STN Negative, Blue, Transmissive
- Backlight color: LED, White
- Viewing angle: 6 : 00
- Data transfer: 8Bit Parallel
- LCD controller: S6A0069
- Module size: 40 x 35.4 mm
- View area: 30.4x13.9 mm
- Dot size: 0.60 x 0.60 mm
- Driving method: 1/16 duty, 1/5 bias

## 5. Absolute maximum ratings

### 5.1 Electrical absolute maximum ratings

<i>I T E M</i>	<i>SYMBOL</i>	<i>MIN.</i>	<i>MAX.</i>	<i>UNIT</i>	<i>COMMENT</i>
POWER SUPPLY FOR LOGIC	V <sub>DD</sub> -V <sub>SS</sub>	-0.3	6	V	-----
STATIC ELECTRICITY	-----	-----	-----	V	--
POWER SUPPLY FOR BACKLIGHT	V <sub>S</sub>	0	4.3	V <sub>rms</sub>	-----
	f <sub>FL</sub>	-----	-----	KHz	-----
STARTING VOLTAGE FOR BACKLIGHT	-----	-----	-----	V <sub>rms</sub>	Ta = 25°C
	-----	-----	-----	V <sub>rms</sub>	Ta = 25°C

### 5.2 Environmental absolute maximum ratings

<i>I T E M</i>	<i>OPERATING</i>		<i>STORAGE</i>		<i>COMMENT</i>
	<i>MIN.</i>	<i>MAX.</i>	<i>MIN.</i>	<i>MAX.</i>	
AMBIENT TEMPERATURE	-0°C	50°C	-10°C	60°C	-----
HUMIDITY	NOTE (2)		NOTE (2)		NO CONDENSATION
VIBRATION NOTE (3)	-----	0.5G	-----	2G	10~300Hz XYZ DIRECTIONS 1 Hr EACH
SHOCK NOTE (3)	-----	3G	-----	5G	10 msec XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		-----

NOTE (2): Ta ≅ 70°C: 75% RH MAX.

Ta > 70°C: ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 75% RH AT 70°C.

NOTE (3): 1G = 9.8 m/s<sup>2</sup>

## 6. Electrical characteristics

Ta = 25°C VDD = 5.0 V

<i>I T E M</i>	<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>
Power supply voltage for circuit	VDD-VSS	-----	4.75	5.0	5.25	V
Power supply voltage for LCD drive	VDD-V0	-----	-----	4.8	-----	V
Data input voltage	V <sub>IH</sub>	H LEVEL	2.4	-----	V <sub>DD</sub> +0.3	V
	V <sub>IL</sub>	L LEVEL	-0.3	-----	0.2V <sub>DD</sub>	V
LCD display duty ratio	DUTY	-----	-----	1/16	-----	-----
LED BACKLIGHT	I <sub>fp</sub>	I mse0 plus 10% Dutg cycle		---		mA
		Operating voltage	-----	4.1	----	V
		Forward current		50		mA
LED Lifetime	-----	V <sub>FL</sub> =4.1Vrms f <sub>FL</sub> = KHZ	-----	100,000	-----	Hr

## 7. Optical characteristics

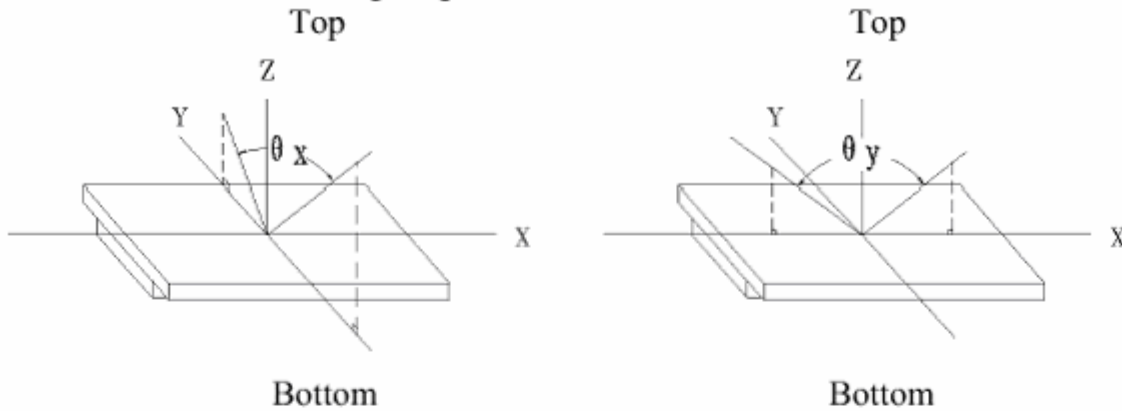
Ta = 25°C VDD-V0 = 4.8V

<i>I T E M</i>	<i>SYMBOL</i>	<i>CONDITION</i>	<i>MIN.</i>	<i>TYP.</i>	<i>MAX.</i>	<i>UNIT</i>	<i>NOTE</i>
Viewing angle	Φ2-Φ1	K ≥ 2.0	-35	----	20	deg.	1
Contrast ratio	K	Φ = 10° θ = 0°	4.0	----	-----	-----	1
Response time (at 25°C)	tr (rise)	Φ = 10° θ = 0°	-----	----	250	ms	1
	tf (fall)	Φ = 10° θ = 0°	-----	----	250	ms	1
The brightness of backlighting source	B	V <sub>FL</sub> =4.1Vrms f <sub>FL</sub> = KHZ	-----	150	-----	cd/m <sup>2</sup>	2

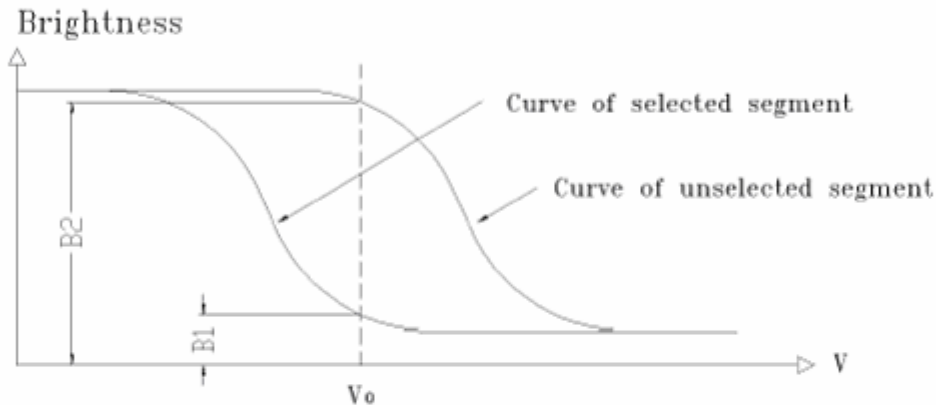
NOTE (1): SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS

NOTE (2): UNDER NORMAL TEMPERATURE AND HUMIDITY IN A DARK ROOM

### 7.2.1 Definition of Viewing Angle



### 7.2.2 Definition of Contrast Ratio

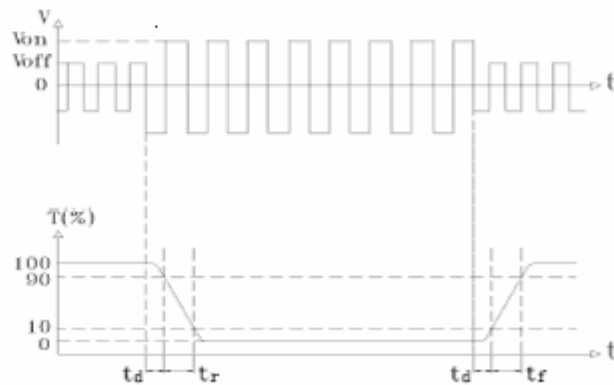


$$\text{Contrast Ratio} = B2/B1 = \frac{\text{unselected state brightness}}{\text{selected state brightness}}$$

Measuring Conditions:

- 1) Ambient Temperature: 25°C ;
- 2) Frame frequency: 64Hz

### 7.2.3 Definition of Response time

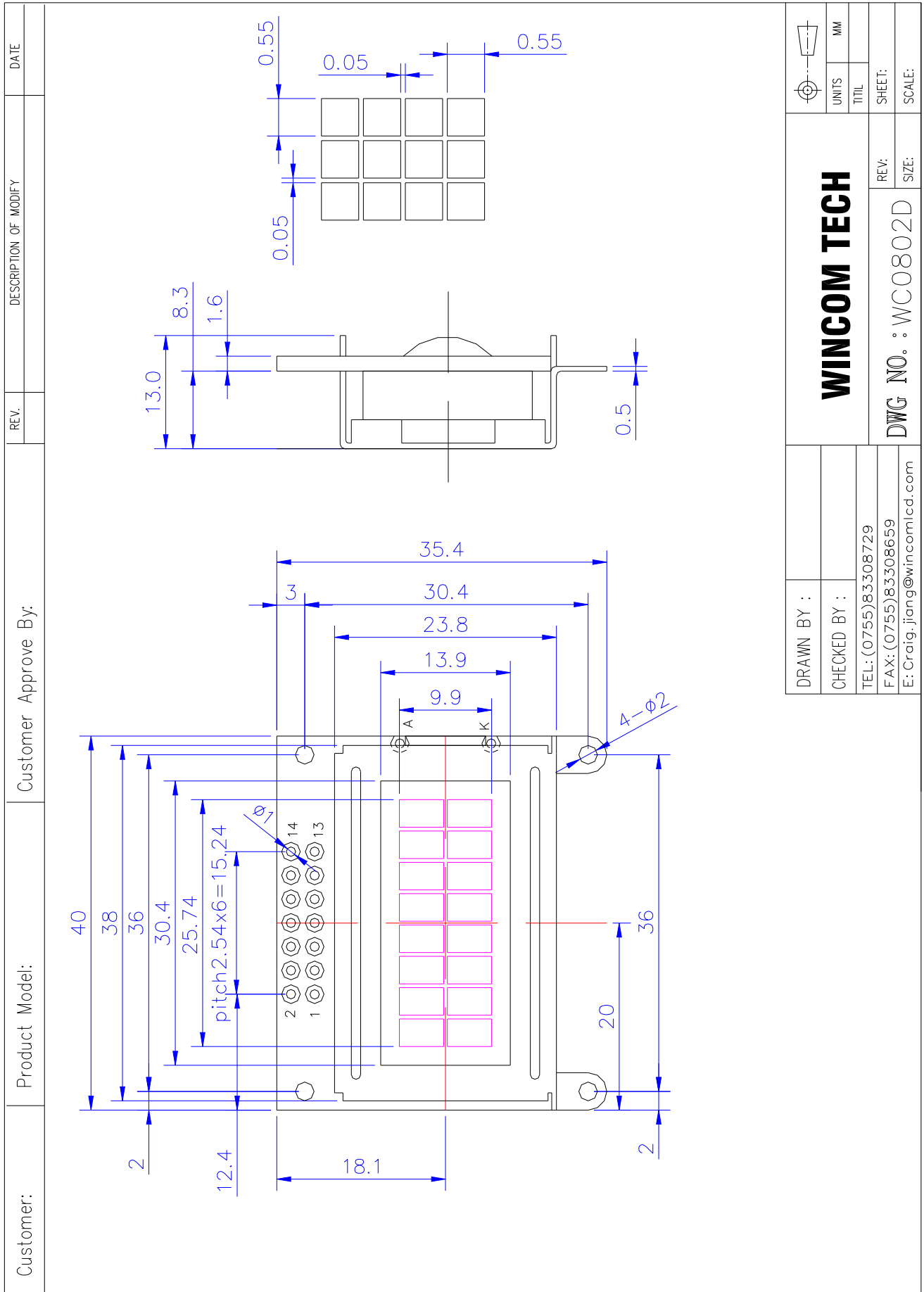


Turn on time:  $t_{on} = t_d + t_r$       Turn off time:  $t_{off} = t_d + t_f$

Measuring Condition:

- 1) Operating Voltage: 5.0V
- 2) Frame frequency: 64Hz

# 8. Outline dimension



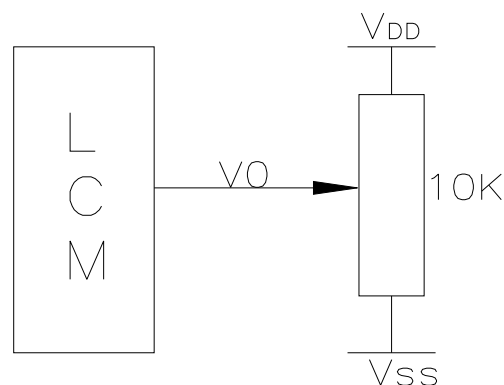
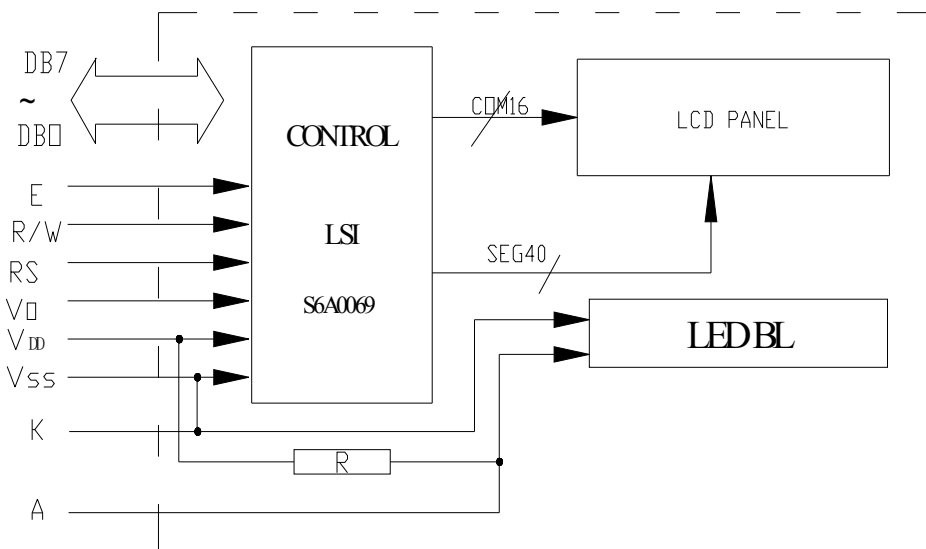
DRAWN BY :	CHECKED BY :	TEL: (0755)83308729	FAX: (0755)83308659	E: Craig.jiang@wincomlcd.com	WINCOM TECH	UNITS	MM
						TITL	
					DWG NO. : WC0802D	REV:	SHEET:
						SIZE:	SCALE:

## 8.1 Interface

### Pin Assignment

PIN NO.	Symbol	Level	Function
1	Vss	0V	Ground
2	Vdd	5.0V	Power Supply for LCD and LED Backlight(+)
3	V0	----	Contrast Adjust
4	RS	H/L	Register select signal
5	RW	H/L	Data read / write
6	E	H/L	Enable signal
7	DB0	H/L	Data bus line
8	DB1	H/L	Data bus line
9	DB2	H/L	Data bus line
10	DB3	H/L	Data bus line
11	DB4	H/L	Data bus line
12	DB5	H/L	Data bus line
13	DB6	H/L	Data bus line
14	DB7	H/L	Data bus line
A	+	4.1V/50mA	Power Supply for LED Backlight(+)
K	-	0V	Power Supply for LED Backlight(-)

## 9. Block diagram



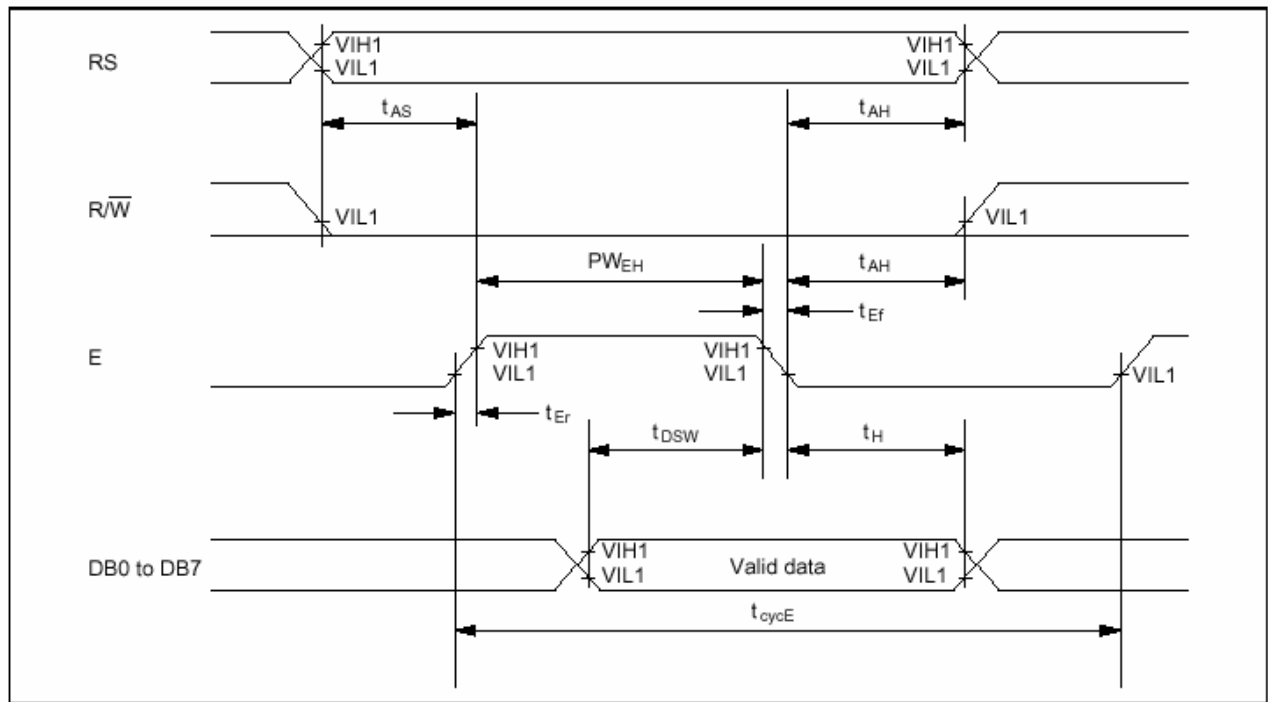


## 10. Interface Timing Chart

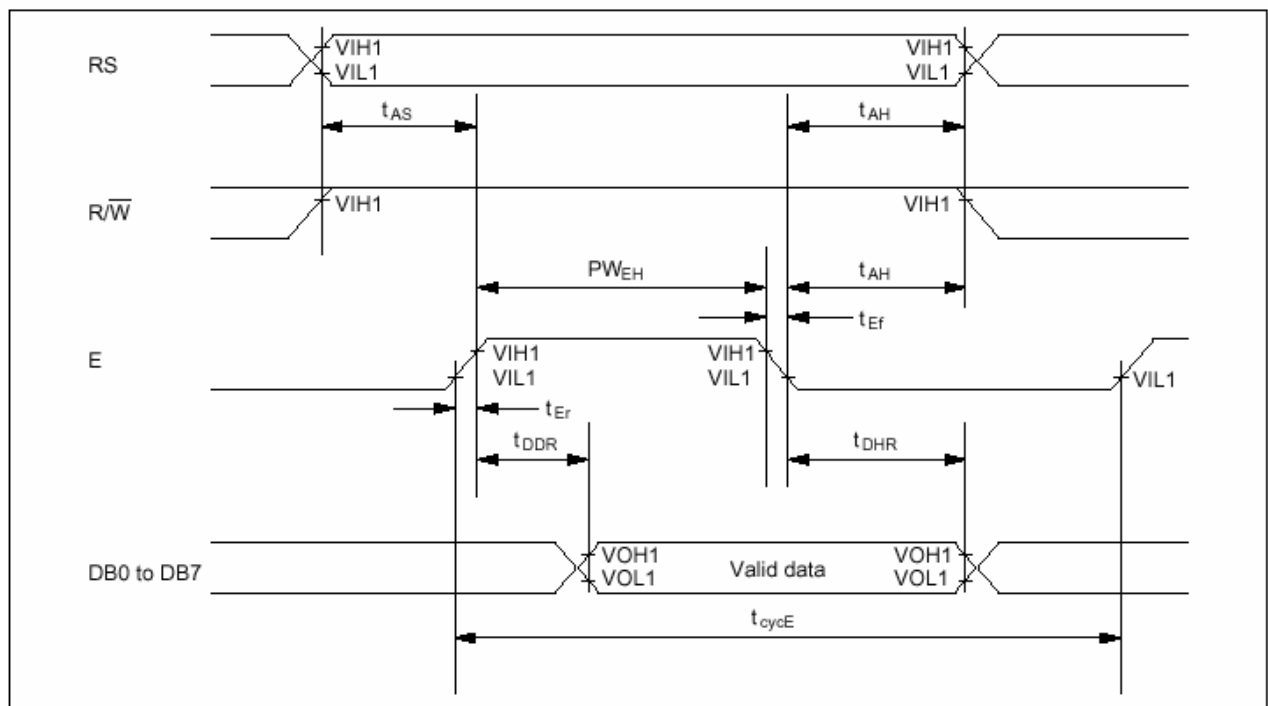
AC Characteristics ( $V_{DD}=4.5V\sim 5.5V, T_a=-30\sim +85^{\circ}C$  )

Mode	Characteristic	Symbol	Min.	Typ.	Max.	Unit
Write Mode (Refer to Fig-6)	E Cycle Time	$t_c$	500	-	-	ns
	E Rise / Fall Time	$t_R, t_F$	-	-	20	
	E Pulse Width (High, Low)	$t_w$	230	-	-	
	R/W and RS Setup Time	$t_{su1}$	40	-	-	
	R/W and RS Hold Time	$t_{H1}$	10	-	-	
	Data Setup Time	$t_{su2}$	80	-	-	
	Data Hold Time	$t_{H2}$	10	-	-	
Read Mode (Refer to Fig-7)	E Cycle Time	$t_c$	500	-	-	ns
	E Rise / Fall Time	$t_R, t_F$	-	-	20	
	E Pulse Width (High, Low)	$t_w$	230	-	-	
	R/W and RS Setup Time	$t_{su}$	40	-	-	
	R/W and RS Hold Time	$t_H$	10	-	-	
	Data Output Delay Time	$t_D$	-	-	120	
	Data Hold Time	$t_{DH}$	5	-	-	

## Timing Characteristics



**Write Operation**



**Read Operation**

## 11. Instruction Code

**Instruction Table**

Instruction	Instruction Code										Description	Execution time (fosc= 270 kHz)
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0		
Clear Display	0	0	0	0	0	0	0	0	0	1	Write "20H" to DDRAM and set DDRAM address to "00H" from AC	1.53 ms
Return Home	0	0	0	0	0	0	0	0	0	1	Set DDRAM address to "00H" from AC and return cursor to its original position if shifted. The contents of DDRAM are not changed.	1.53 ms
Entry Mode Set	0	0	0	0	0	0	0	1	I/D	SH	Assign cursor moving direction and enable the shift of entire display.	39 μs
Display ON/OFF Control	0	0	0	0	0	0	1	D	C	B	Set display(D), cursor(C), and blinking of cursor(B) on/off control bit.	39 μs
Cursor or Display Shift	0	0	0	0	0	1	S/C	R/L	-	-	Set cursor moving and display shift control bit, and the direction, without changing of DDRAM data.	39 μs
Function Set	0	0	0	0	1	DL	N	F	-	-	Set interface data length (DL: 8-bit/4-bit), numbers of display line (N: 2-line/1-line) and, display font type (F:5×11dots/5×8 dots)	39 μs
Set CGRAM Address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0	Set CGRAM address in address counter.	39 μs
Set DDRAM Address	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Set DDRAM address in address counter.	39 μs
Read Busy Flag and Address	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0	Whether during internal operation or not can be known by reading BF. The contents of address counter can also be read.	0 μs
Write Data to RAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data into internal RAM (DDRAM/CGRAM).	43 μs
Read Data from RAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from internal RAM (DDRAM/CGRAM).	43 μs

\* "-": don't care

NOTE: When an MPU program with checking the Busy Flag(DB7) is made, it must be necessary 1/2Fosc is necessary for executing the next instruction by the falling edge of the 'E' signal after the Busy Flag (DB7) goes to "Low".

8-bit interface mode (Condition: fosc = 270KHZ)

Power on

Wait for more than 30 ms after VDD rises to 4.5 v

Function set									
RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	1	1	N	F	X	X

Wait for more than 39 μs

Display ON/OFF Control									
RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	0	0	1	D	C	B

Wait for more than 39 μs

Display Clear									
RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	0	0	0	0	0	1

Wait for more than 1.53 ms

Entry Mode Set									
RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	0	0	0	1	I/D	SH

Initialization end

N	0	1-line mode
	1	2-line mode

F	0	display off
	1	display on

D	0	display off
	1	display on

C	0	cursor off
	1	cursor on

B	0	blink off
	1	blink on

I/D	0	decrement mode
	1	increment mode

SH	0	entire shift off
	1	entire shift on

## 12.Character generator ROM

Lower 4 Bits \ Upper 4 Bits	0000	0010	0011	0100	0101	0110	0111	1010	1011	1100	1101	1110	1111
xxxx0000	CG RAM (1)		Ø	Q	P	`	P		-	タ	ミ	α	ρ
xxxx0001	(2)	!	1	A	Q	a	q	。	ア	チ	△	ä	g
xxxx0010	(3)	"	2	B	R	b	r	「	イ	ツ	×	β	θ
xxxx0011	(4)	#	3	C	S	c	s	」	ウ	テ	モ	ε	ω
xxxx0100	(5)	\$	4	D	T	d	t	、	イ	ト	ト	μ	Ω
xxxx0101	(6)	%	5	E	U	e	u	・	オ	ナ	1	ε	ü
xxxx0110	(7)	&	6	F	V	f	v	ヲ	カ	ニ	ヨ	ρ	Σ
xxxx0111	(8)	'	7	G	W	g	w	ア	キ	ヌ	ラ	g	π
xxxx1000	(1)	(	8	H	X	h	x	イ	ク	ネ	リ	r	x
xxxx1001	(2)	)	9	I	Y	i	y	ウ	ケ	ル		”	y
xxxx1010	(3)	*	:	J	Z	j	z	エ	コ	ン	レ	j	¥
xxxx1011	(4)	+	;	K	C	k	c	オ	サ	ヒ	ロ	*	万
xxxx1100	(5)	,	<	L	¥	l	l	ヤ	シ	フ	ワ	φ	円
xxxx1101	(6)	-	=	M	J	m	n	ユ	ヌ	ン	シ	も	÷
xxxx1110	(7)	.	>	N	^	n	キ	ヨ	セ	ホ	シ	ん	
xxxx1111	(8)	/	?	O	_	o	←	ッ	ソ	マ	°	ö	■