JEWEL HILL ELECTRONIC CO.,LTD.

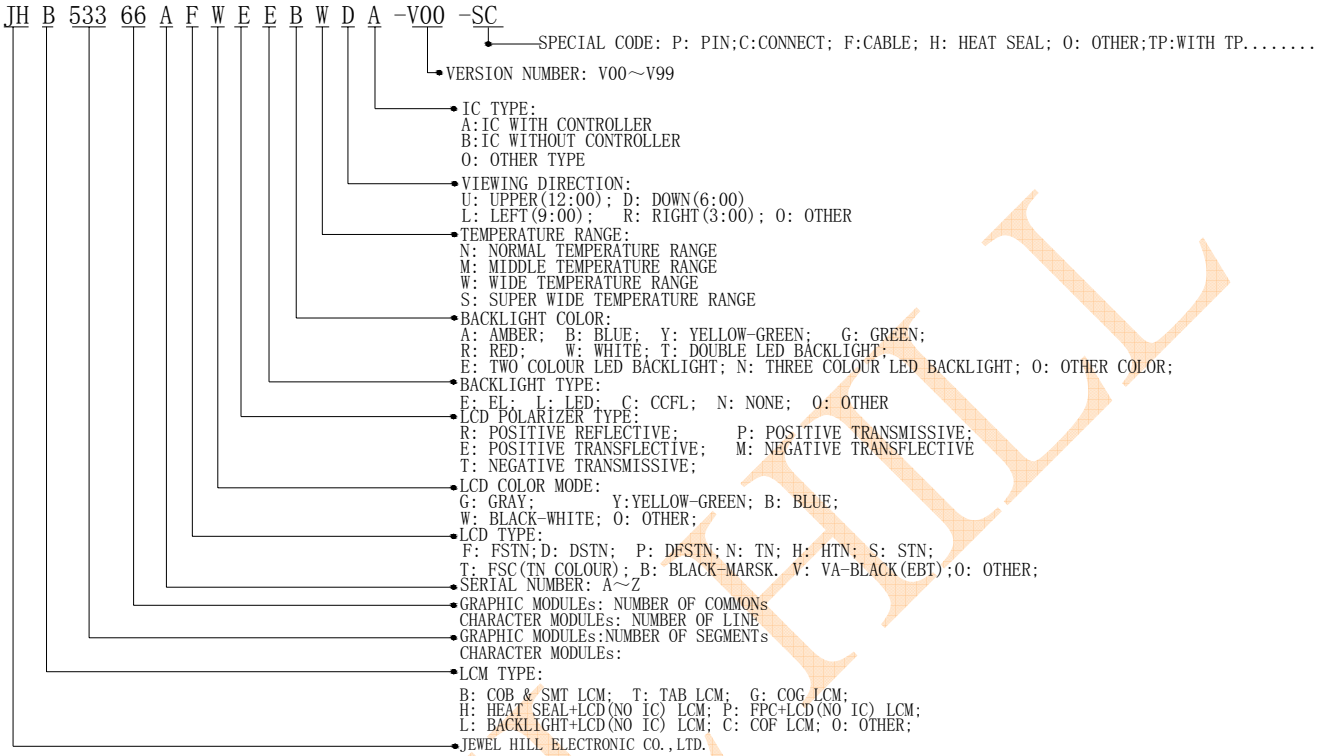
SPECIFICATIONS FOR LCD MODULE

Module No. JHB53366A

E-mail: sales@jhlcd.com Website: www.jhlcd.com

TABLE OF CONTENTS

LCM Number System



1. GENERAL DESCRIPTION

The JHB53366A is a 533 x 66 Dots Graphics LCD module. It has a FSTN panel composed of 533 segments and 66 commons. The LCM can be easily accessed by micro-controller via parallel interface.

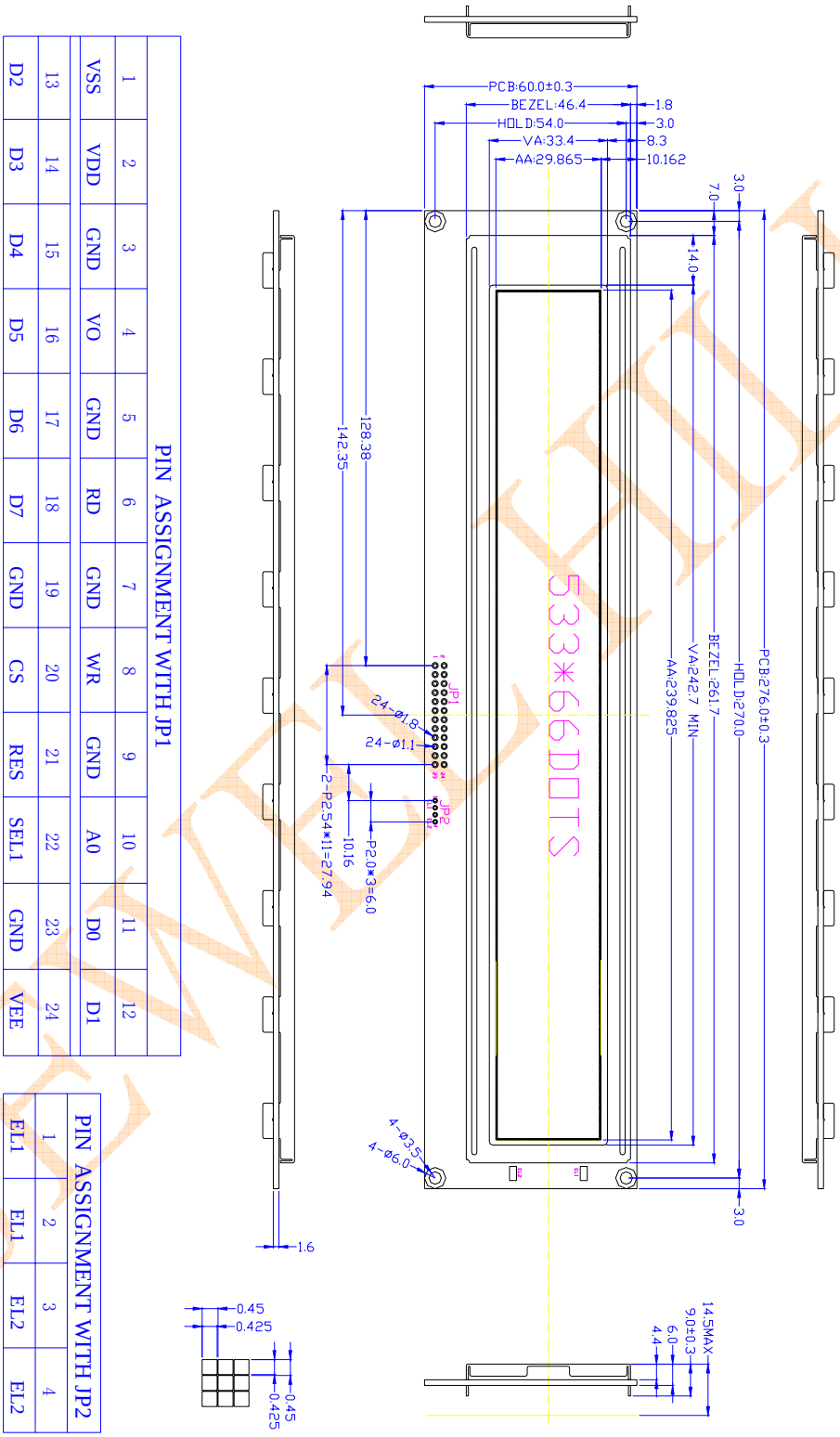
2. FEATURES

Display Mode	Transflective and Positive
	FSTN module
Display Format	Graphic 533 x 66 dots
Input Data	Parallel data input from MPU
Multiplexing Ratio	1/66Duty
Bias	1/9 Bias
Viewing Direction	6 O'clock
Controller	RA8835 or Equiv
Backlight	EL(BLUE)

3. MECHANICAL SPECIFICATION

Item	Specifications	Unit
Dimensional outline	276.0(PCB) x 60.0 x 14.5 (max)	mm
Resolution	533segs x 66coms	dots
Viewing area	242.7(W) x 33.4(H)	mm
Active area	239.825(W) x 29.865(H)	mm
Dots pitch	0.45 (W)×0.45(H)	mm
Dots size	0.425(W)×0.425(H)	mm

4. MECHANICAL DIMENSION



PIN ASSIGNMENT WITH JP1												
1	2	3	4	5	6	7	8	9	10	11	12	
VSS	VDD	GND	VO	GND	RD	GND	WR	GND	A0	D0	D1	
13	14	15	16	17	18	19	20	21	22	23	24	
D2	D3	D4	D5	D6	D7	GND	CS	RES	SEL1	GND	VEE	

PIN ASSIGNMENT WITH JP2			
1	2	3	4
EL1	EL1	EL2	EL2

5. MAXIMUM RATINGS

Item	Symbol	Min	Max	Unit	Note
Supply voltage	V_{DD} - Vss	-0.3	7.0	V	
	V_{LCD}	-0.3	20.0	V	
Input Voltage	V_{IN}	-0.3	V_{DD}+0.3	V	
Operating temperature	T_{OPR}	-20	+70	℃	
Storage temperature	T_{STR}	-30	+80	℃	
Humidity	---	---	90	%RH	

6. ELECTRICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Supply Voltage	Logic	V_{DD}	---	-	5.0	5.5	V
Input Voltage	H level	V_{IH}	---	0.8V_{DD}	---	V_{DD}	V
	L level	V_{IL}		V_{SS}	---	0.2V_{DD}	
Current Consumption (LCD DRIVER)		I_{DD}	V_{DD}=5.0V; V_{LCD}=15.0V, T_{amb}=25℃	---	35	45	mA
LCD Driving Voltage		V_{LCD}	Bias=1/9 VLCD=VDD-V0	14.5	15.0	15.5	V
Supply Voltage with E/L Backlight		Vf	---		110		V
Frequency with E/L Backlight		FOSC	Vf=110V	---	400	---	KHz

7. MODULE FUNCTION DESCRIPTION

7.1. PIN DESCRIPTION

（JP1）

Pin No.	Symbol	Description
1	VSS	Power Supply for Negative
2	VDD	Power Supply for Positive
3	GND	System Ground
4	VO	LCD driver voltage regulation terminal
5	GND	System Ground
6	RD	Read/Write Enable for 6800 or Read Signal input for 8080
7	GND	System Ground
8	WR	Read/Write Control for 6800 or Write Signal input for 8080
9	GND	System Ground
10	A0	Instruction/Data Selection
11	D0	Data bit0 for Controller
12	D1	Data bit1 for Controller
13	D2	Data bit2 for Controller
14	D3	Data bit3 for Controller
15	D4	Data bit4 for Controller
16	D5	Data bit5 for Controller
17	D6	Data bit6 for Controller
18	D7	Data bit7 for Controller
19	GND	System Ground
20	CS	Chip Selection Action terminal
21	RES	Reset signal input terminal
22	SEL1	Timing Selection for 6800 or 8080
23	GND	System Ground
24	VEE	Power supply for LCD driver voltage

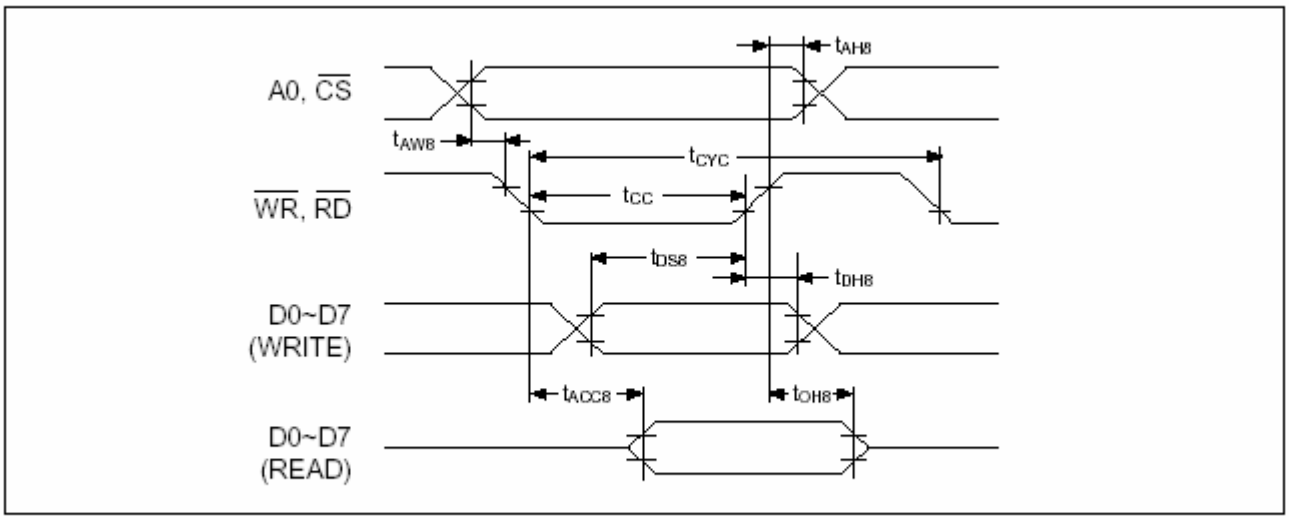
（JP2）

Pin No.	Symbol	Description
1	EL1	E/L backlight driver voltage(EL1—EL2AC=110)
2	EL1	E/L backlight driver voltage(EL1—EL2AC=110)
3	EL2	E/L backlight driver voltage(EL1—EL2AC=110)
4	EL2	E/L backlight driver voltage(EL1—EL2AC=110)

7.2. TIMING CHARACTERISTICS

(1). SYSTEM BUS READ/WRITE CHARACTERISTIC.

System bus READ/WRITE timing I (8080)



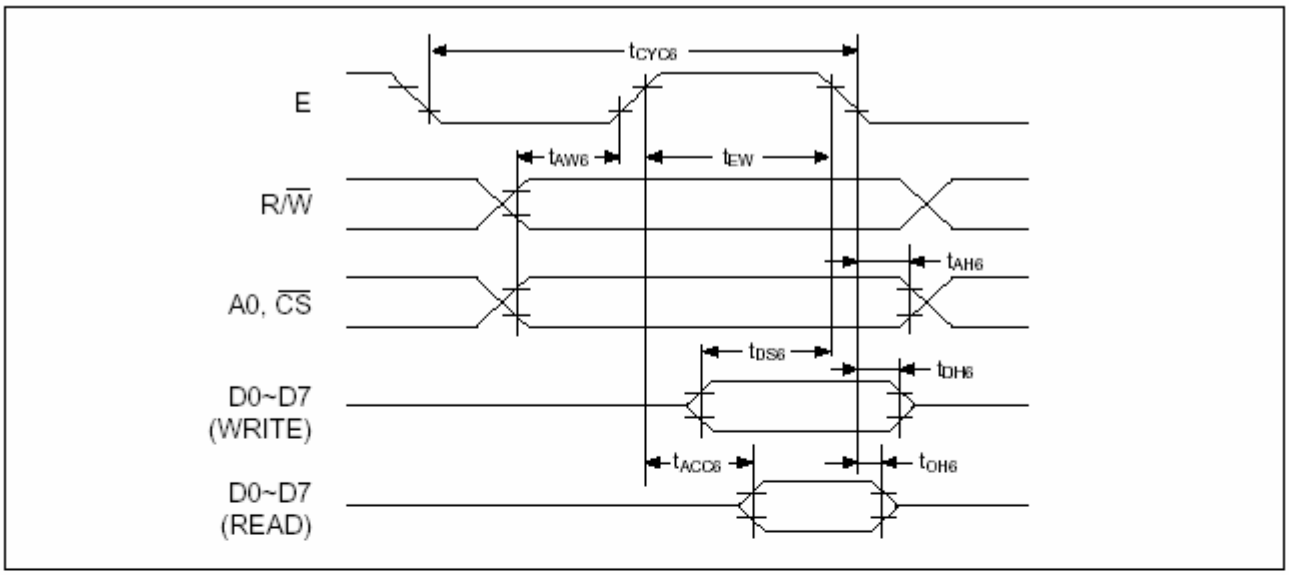
System bus READ/WRITE timing I (8080)

Ta = –20 to 75°C

Signal	Symbol	Parameter	Rating		Unit	Condition
			min	max		
A0, CS	tAH8	Address hold time	10	—	ns	CL = 100 pF
	tAW8	Address setup time	30	—	ns	
WR, RD	tCYC	System cycle time	(1)	—	ns	
	tCC	Strobe pulsewidth	220	—	ns	
D0 to D7	tDS8	Data setup time	120	—	ns	
	tDH8	Data hold time	10	—	ns	
	tACC8	RD access time	—	120	ns	
	tOH8	Output disable time	10	50	ns	

Note: t_{CYC} = $2t_C + t_{CC} + t_{CEA} + 75 > t_{ACV} + 245$: memory control/movement control commands:
$= 4t_C + t_{CC} + 30$: all other commands:

System bus READ/WRITE timing II (6800)



System bus READ/WRITE timing II (6800)

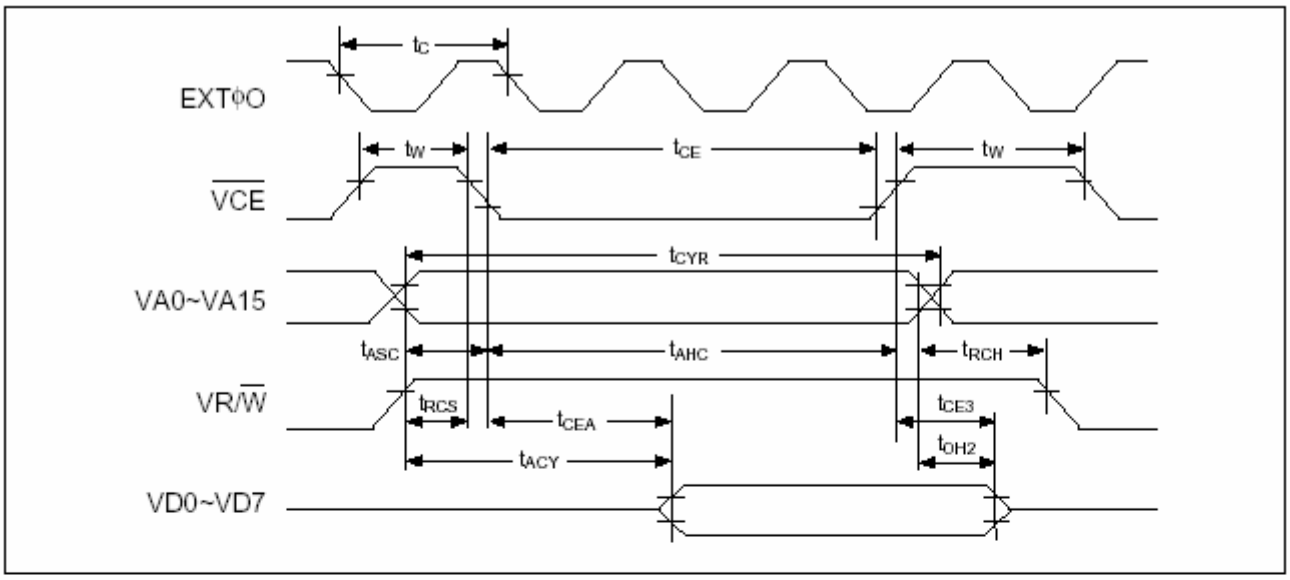
Ta = –20 to 75°C

Signal	Symbol	Parameter	Rating		Unit	Condition
			min	max		
A0, CS R/W	tAH6	Address hold time	10	—	ns	CL=100pF+1TTL pF
	tAW6	Address setup time	30	—	ns	
	tCYC6	System cycle time	(1)	—	ns	
D0 to D7	tDS6	Data setup time	120	—	ns	
	tDH6	Data hold time	10	—	ns	
	tACC6	Access time	—	120	ns	
	tOH6	Output disable time	10	50	ns	
E	tEW	Enable pulse width	220	—	ns	

Note: (1) $t_{CYC6} = 2t_C + t_{EW} + t_{CEA} + 75 > t_{ACV} + 245$:
memory control/movement control commands:
$= 4t_C + t_{EW} + 30$:
all other commands:

1. t_{CYC6} means a cycle of (CS.E) not E alone.

Display memory READ timing



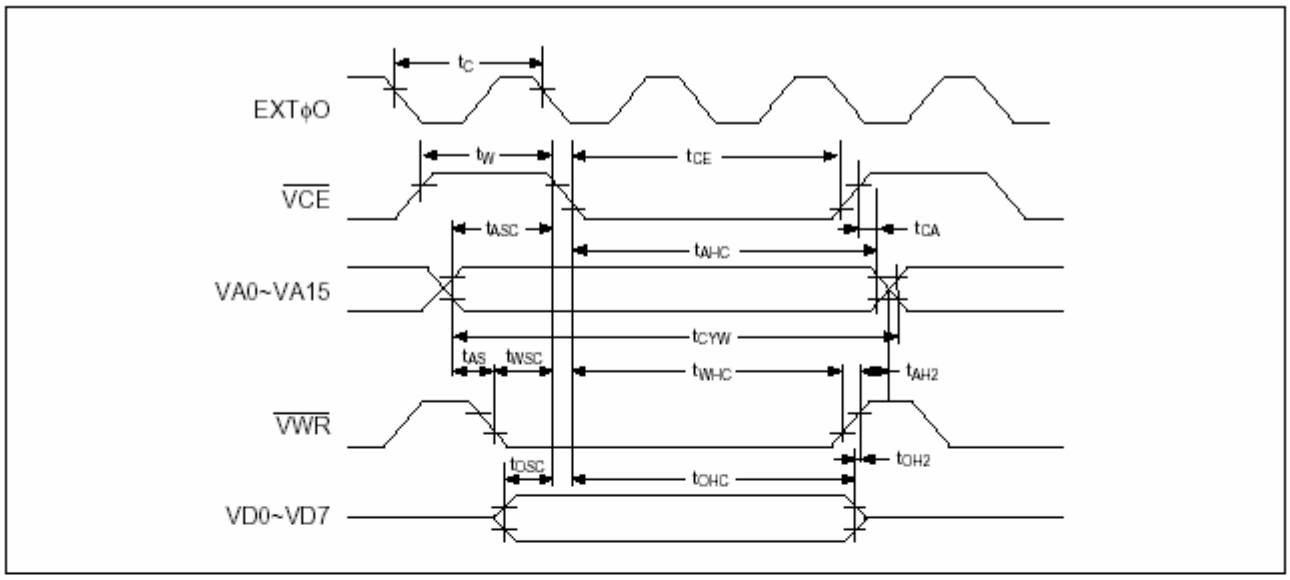
Display memory READ timing

Ta = –20 to 75°C

Signal	Symbol	Parameter	Rating		Unit	Condition
			min	max		
EXT ø0	tC	Clock cycle	100	—	ns	CL = 100pF +1TTL
$\overline{VCE}$	tW	$\overline{VCE}$ high level pulse width	tc–40	—	ns	
	tCE	$\overline{VCE}$ low level pulse width	2tc–40	—	ns	
VA0 to VA15	tCYR	Read cycle time	(1)	—	ns	
	tASC	$\overline{VCE}$ address setup time (fall)	tc–45	—	ns	
	tAHC	$\overline{VCE}$ address hold time (fall)	2tc–40	—	ns	
VR/$\overline{W}$	tRCS	$\overline{VCE}$ read cycle setup time (fall)	tc–45	—	ns	
	tRCH	$\overline{VCE}$ read cycle hold time (fall)	tc/2–35	—	ns	
VD0 to VD7	tACV	Address access time	—	(2)	ns	
	tCEA	$\overline{VCE}$ access time	—	(3)	ns	
	tOH2	Output data hold time	0	—	ns	
	tCE2	$\overline{VCE}$ data off time	0	—	ns	

Note: 1. $t_{CYR} = 3t_C$
2. $t_{ACV} = 3t_C - 120$
3. $t_{CEA} = 2t_C - 120$

Display memory WRITE timing



Display memory WRITE timing

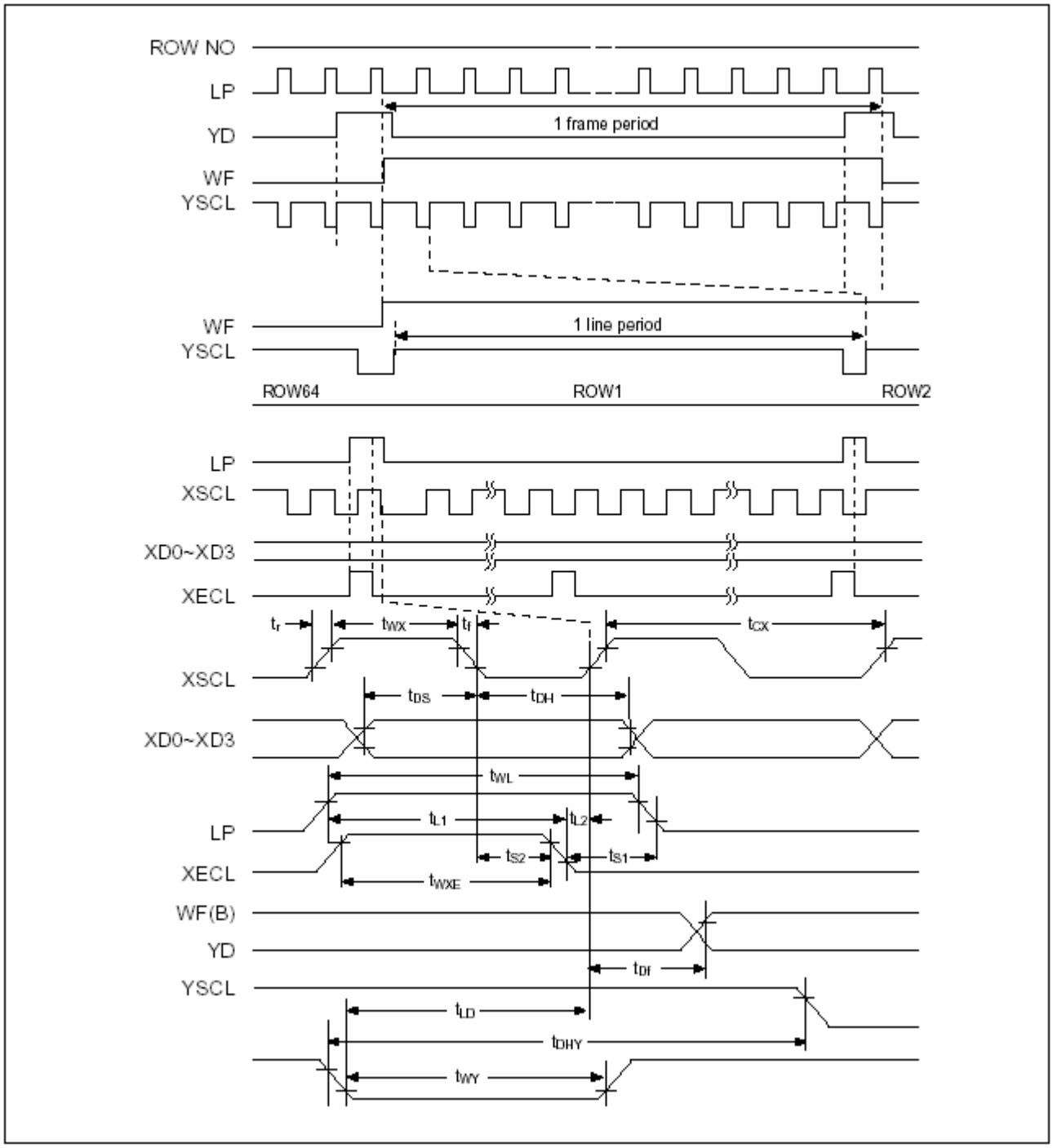
Ta = –20 to 75°C

Signal	Symbol	Parameter	Rating		Unit	Condition
			min	max		
EXT ø0	tC	Clock cycle	100	—	ns	CL = 100pF +1TTL
$\overline{VCE}$	tW	$\overline{VCE}$ high level pulse width	tc–40	—	ns	
	tCE	$\overline{VCE}$ low level pulse width	2tc–40	—	ns	
VA0 to VA15	tCYW	Write cycle time	3tc	—	ns	
	tAHC	$\overline{VCE}$ address hold time (fall)	2tc–40	—	ns	
	tASC	$\overline{VCE}$ address setup time (fall)	tc–55	—	ns	
	tCA	$\overline{VCE}$ address hold time (rise)	5	—	ns	
	tAS	VR/$\overline{W}$ address setup time (fall)	0	—	ns	
	tAH2	VR/$\overline{W}$ address hold time (rise)	15	—	ns	
VR/$\overline{W}$	tWSC	$\overline{VCE}$ write setup time (fall)	tc–55	—	ns	
	tWHC	$\overline{VCE}$ write hold time (fall)	tc2–40	—	ns	
VD0 to VD7	tDSC	$\overline{VCE}$ data input setup time (fall)	twsc–10	—	ns	
	tDHC	$\overline{VCE}$ data input hold time (fall)	2tc–30	—	ns	
	tDH2	VR/$\overline{W}$ data hold time (rise)	10*	50	ns	

* Lines VD0 to VD7 are latched.

(2.) DISPLAY CONTROL OUTPUT TIMING

LCD control timing

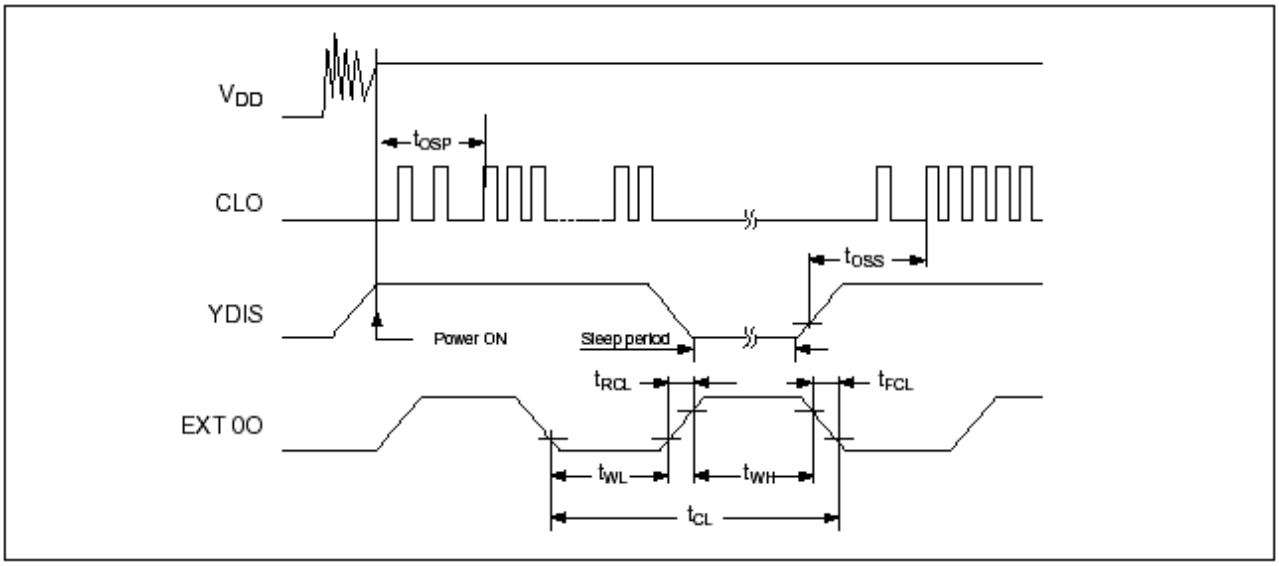


LCD control timing

Ta = –20 to 75°C

Signal	Symbol	Parameter	Rating		Unit	Condition
			min	max		
EXT ø0	tC	Clock cycle	100	—	ns	
	tr	$\overline{VCE}$ high level pulse width	—	35	ns	
	tf	$\overline{VCE}$ low level pulse width	—	35	ns	
XSCL	tCX	Shift clock cycle time	4tc	—	ns	
	tWX	XSCL clock pulse width	tCX2–80	—	ns	
XD0 to XD3	tDH	X-data hold time	tCX2–100	—	ns	VDD = 5.0V ±10% CL=150F
	tDS	X-data setup time	tCX2–100	—	ns	
LP	tLS	Latch data setup time	tCX2–100	—	ns	
	tWL	LP signal pulse width	tCX4–80	—	ns	
XECL	tL1	XECL setup time	tCX3–100	—	ns	
	tL2	XECL data hold time	tC–30	—	ns	
	tS1	Enable setup time	tC–30	—	ns	
	tS1	Enable delay time	tC–30	—	ns	
	tWXE	XECL clock pulse width	tCX3–80	—	ns	
WF	tDF	Time allowance of WF delay	—	100	ns	
YSCL	tLD	LP delay time against YSCL	tCX4–100	—	ns	
	tWY	YSCL clock pulse width	tCX4–80	—	ns	
YD	tDHY	Y-data hold time	tCX6–100	—	ns	

(3). OSCILLATOR TIMING.



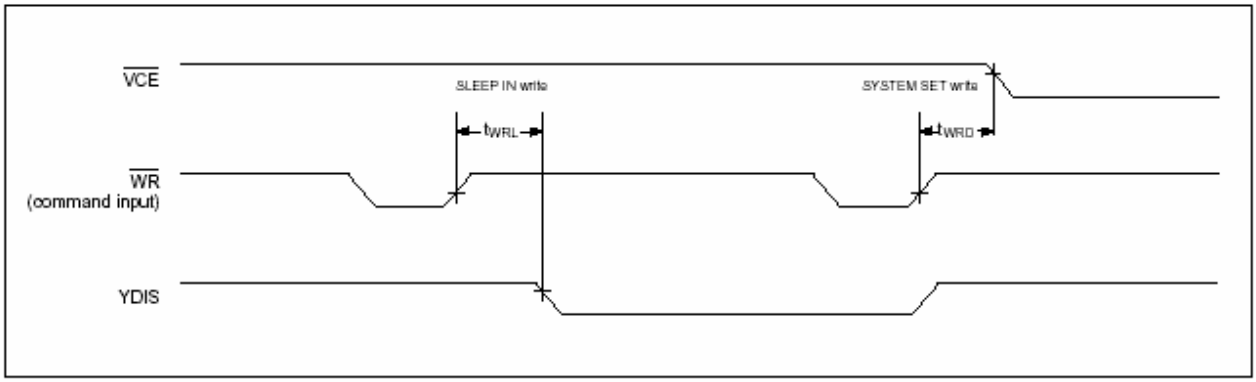
Oscillator timing

Ta = –20 to 75°C

Signal	Symbol	Parameter	Rating		Unit	Condition
			min	max		
CLO	tOSP	Time to stable CLO output after power ON	—	3	ms	$\overline{RES}$ = H
	tOSS	Time to stable CLO output after sleep OFF	—	1	ms	20 pF
EXTø0	tRCL	External clock rise time	—	15	ns	
	tFCL	External clock fall time	—	15	ns	
	tWH	External clock high-pulse width	Note 1	Note 2	ns	
	tWL	External clock low-pulse width	Note 1	Note 2	ns	
	tCL	External clock cycle	100	—	ns	

1. $(t_C - t_{RCL} - t_{FCL}) \times 475/1000 < t_{WH}, t_{WL}$
2. $(t_C - t_{RCL} - t_{FCL}) \times 525/1000 > t_{WH}, t_{WL}$

(4). SLEEP IN COMMAND TIMING.



SLEEP IN command timing

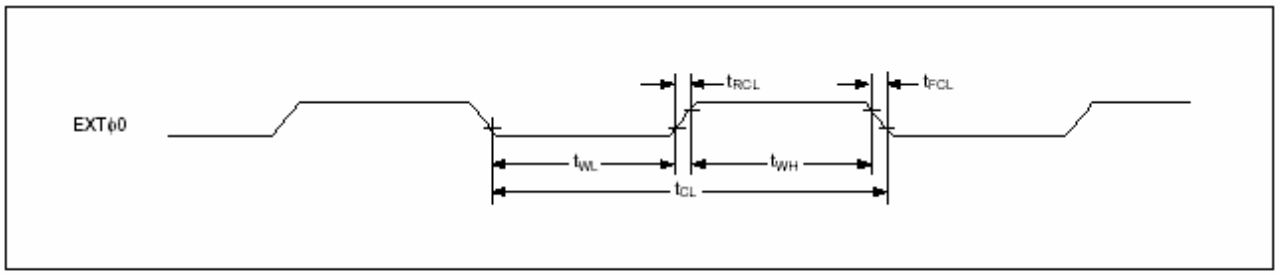
Ta = –20 to 75°C

Signal	Symbol	Parameter	VDD = 4.5 to 5.5V		VDD = 2.7 to 4.5V		Unit	Condition
			min	max	min	max		
WR	tWRD	VCE falling-edge delay time	See note 1	—	See note 1	—	ns	CL = 100 pF
	tWRL	YDIS falling-edge delay time	—	See note 2	—	See note 2	ns	

Notes:

1. $t_{WRD} = 18t_C + t_{OSS} + 40$ (t_{OSS} is the time delay from the sleep state until stable operation)
2. $t_{WRL} = 36t_C \times [TC/R] \times [L/F] + 70$

(5). EXTERNAL OSCILLATOR SIGNAL TIMING



External oscillator signal timing

Ta = –20 to 75°C

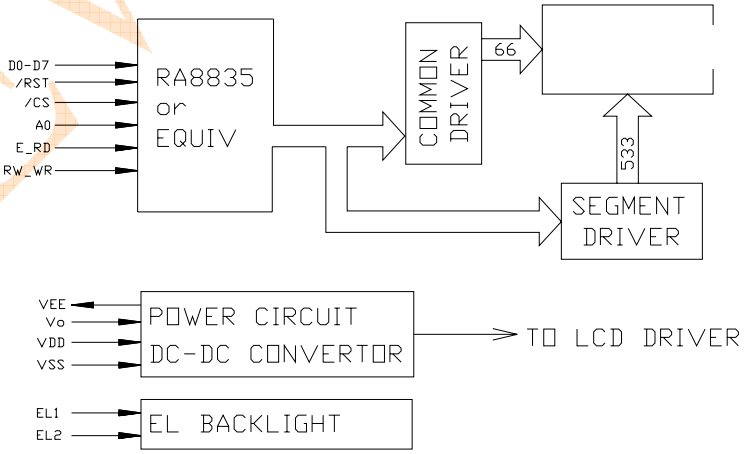
Signal	Symbol	Parameter	VDD = 4.5 to 5.5V		VDD = 2.7 to 4.5V		Unit	Condition
			min	max	min	max		
EXT ϕ0	tRCL	External clock rise time	—	15	—	15	ns	
	tFCL	External clock fall time	—	15	—	15	ns	
	tWH	External clock HIGH-level pulsewidth	See note 1	See note 2	See note 1	See note 2	ns	
	tWL	External clock LOW-level pulsewidth	See note 1	See note 2	See note 1	See note 2	ns	
	tC	External clock period	100	—	125	—	ns	

Notes:

1. $(tc - tRCL - tFCL) \times \frac{475}{1000} \leq tWH, tWL$
2. $(tc - tRCL - tFCL) \times \frac{525}{1000} \geq tWH, tWL$

7.3 APPLICATION OF LCM

■Circuit Block Diagram



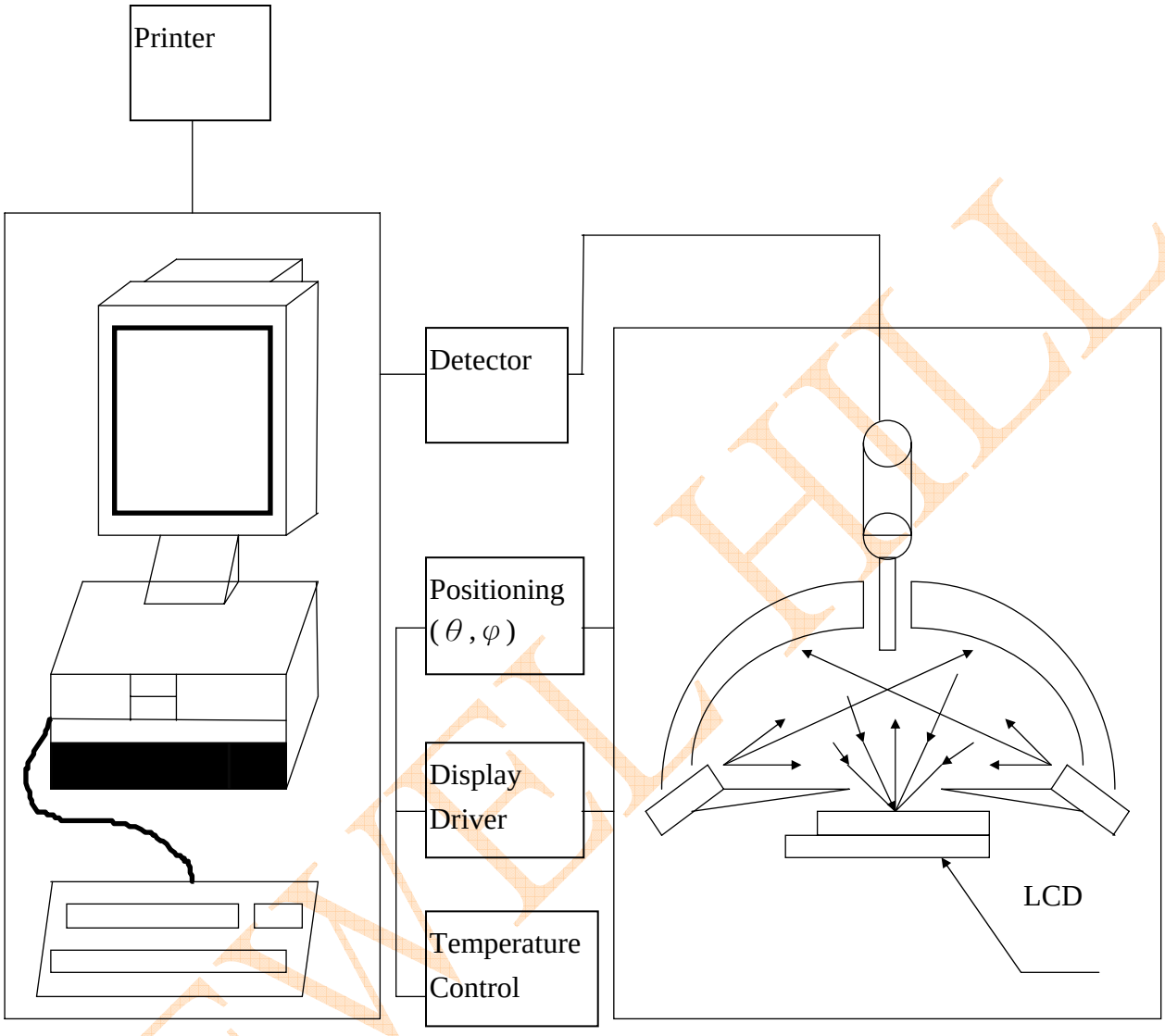
8. ELECTRO-OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Temp	Min	Typ.	Max	Units	Note
LCD driving voltage	V_{LCD}	$\theta = \phi = 0$	-20℃	---	16.0	---	V	NOTE1
			25℃	14.5	15.0	15.5		
			70℃	---	14.5	---		
Response Time	Rise Time (Tr)	$\theta = \phi = 0$	0℃	---	---	--	msec	NOTE2
	Decay Time (Tf)			---	----	---		
	Rise Time (Tr)		25℃	---	225	340		
	Decay Time (Tf)			---	240	360		
	Rise Time (Tr)		50℃	---	---	--		
	Decay Time (Tf)			---	---	--		
Contrast Ratio	Cr	$\theta = \phi = 0$	25℃	5	10	---	---	NOTE4

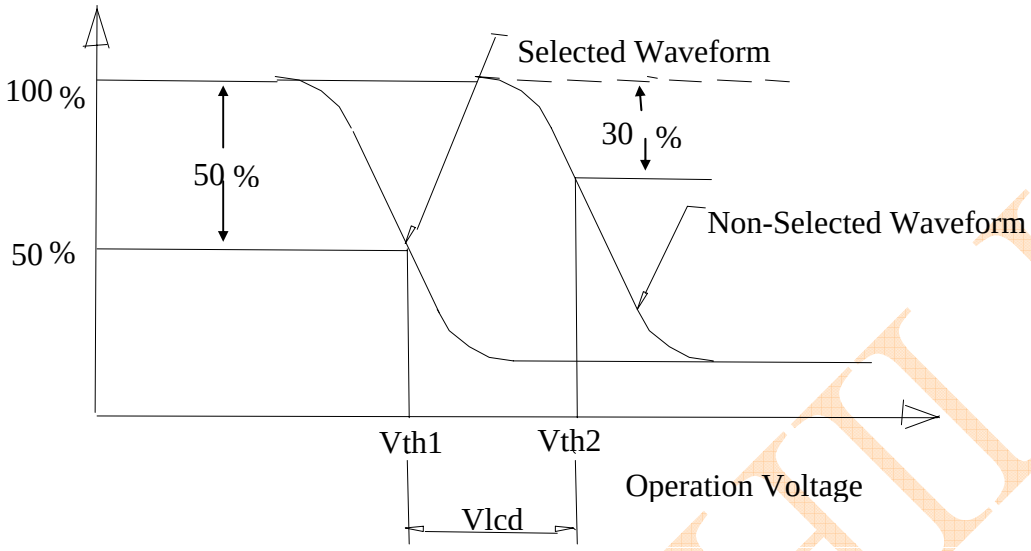
Viewing Angle Range	θ (ϕ = 0°) (6”)	ϕ = 90° (3”)	ϕ =180° (12”)	ϕ =270° (9”)	備註
θ (25℃) CR≥2	40	35	25	35	Deg NOTE3

● For panel only

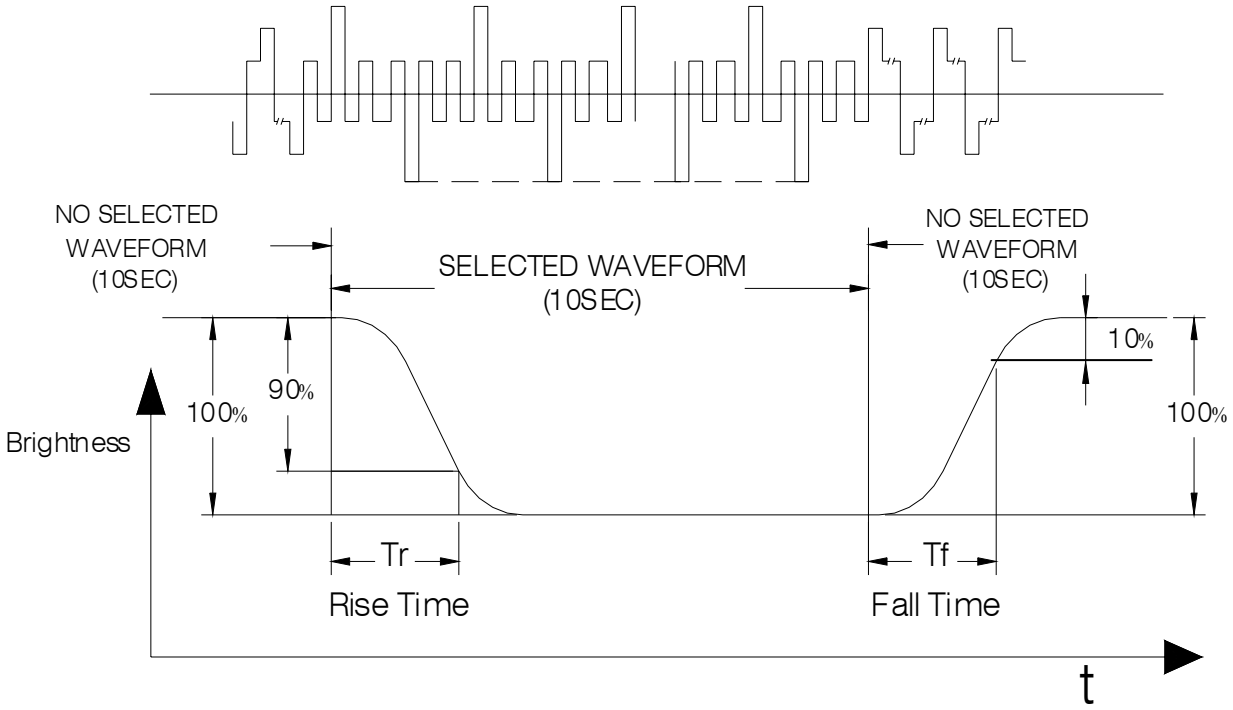
- **Electro-Optical Characteristics Measuring Equipment(DMS501)**



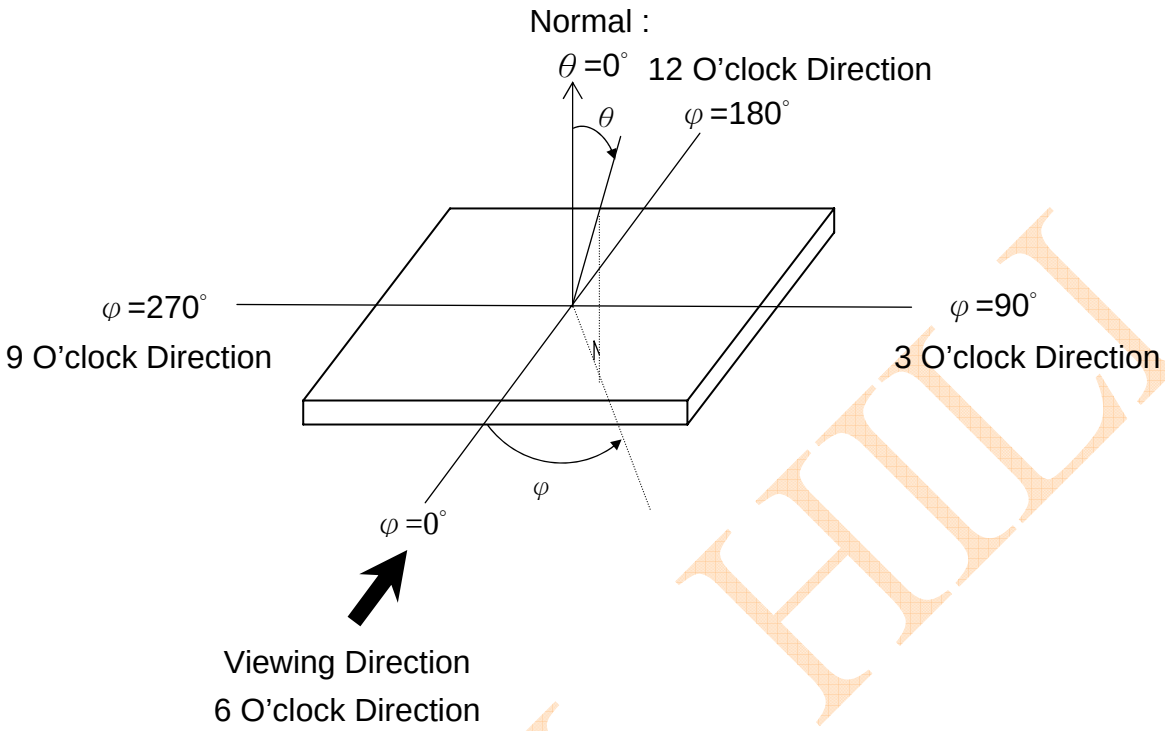
- **Note 1. Definition of Driving Voltage(Vlcd) :**



- **Note 2. Definition of Optical Response Time :**

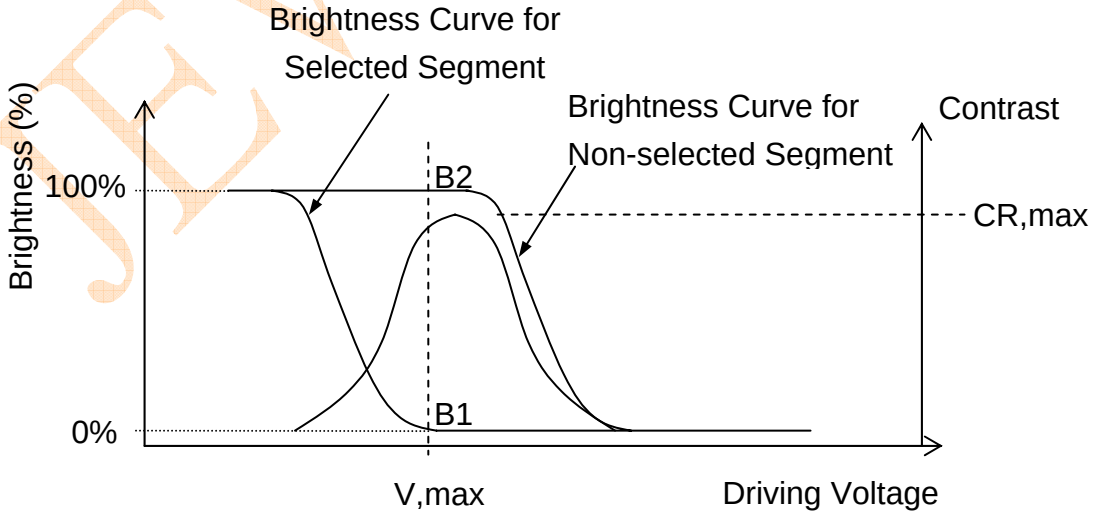


• Note 3. Definition of Viewing Angle θ and ϕ :



• Note 4. Definition of Contrast ratio(CR) :

$$CR = \frac{\text{Brightness of Non-selected Segment (B2)}}{\text{Brightness of Selected Segment (B1)}}$$



9. RELIABILITY

A) MTBF

The LCD module shall be designed to meet a minimum MTBF value of 30000 hours with normal. (25°C in the room without sunlight)

B) TESTS

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Operating	70℃ 120Hrs	◦ No Defect Of Operational Function In Room Temperature Are Allowable. ◦ IDD of LCM in Pre-and post-test should follow specification
2	Low Temperature Operating	-20℃ 120Hrs	
3	High Temperature/ Humidity Non-Operating	60℃ ,90%RH ,120 Hrs	
4	High Temperature Non-Operating	80℃ 120Hrs	
5	Low Temperature Non-Operating	-30℃ 120Hrs	
6	Temperature Cycling Non-Operating	- 20℃(30Min)↔ 60℃(30Min) 10 CYCLES	

Notes: Judgments should be mode after exposure in room temperature for two hours.

10. PRECAUTIONS FOR USING LCD MODULES

a) HANDLING PRECAUTIONS

(1) The display panel is made of glass. Do not subject it to a mechanical shock or impact by dropping it.

(2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.

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

(4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

(5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten a cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

(6) Solvents other than those above mentioned may damage the polarizer.
Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents

(7) Extra care to minimize corrosion of the electrode. Water droplets, moisture condensation or a current flow in a high-humidity environment accelerates corrosion of the electrode.

(8) Install the LCD Module by using the mounting holes. When mounting the LCD Module, make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.

(9) Do not attempt to disassemble or process the LCD Module.

(10) NC terminal should be open. Do not connect anything.

(11) If the logic circuit power is off, do not apply the input signals.

(12) 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 he LCD Module.
- Tools required for assembling, such as soldering irons, must be properly grounded.
-To reduce the amount of static electricity generated, do not conduct assembling 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.

B) STORAGE CONDITIONS

When storing, avoid the LCD module to be exposed to direct sunlight of fluorescent lamps. For stability, to keep it away form high temperature and high humidity environment (The best condition is : 23±5°C, 45±20%RH). ESD protection is necessary for long-term storage also.

C) OTHERS

Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

If the LCD Module have been operating for a long time showing the same display patterns the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be recovered by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

To minimize the performance degradation of the LCD Module resulting from destruction 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.

11. Using LCD modules

11.1 LIQUID CRYSTAL DISPLAY MODULES

LCD is composed of glass and polarizer. Pay attention to the following items when handling.

(1) Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

(2) Do not touch, push or rub the exposed polarizers with anything harder than a HB pencil lead (glass, tweezers, etc).

(3) N-hexane is recommended for cleaning the adhesives used to attach front/rear polarizers and reflectors made of organic substances, which will be damaged by chemicals such as acetone, toluene, toluene, ethanol and isopropyl alcohol.

(4) When the display surface becomes dusty, wipe gently with absorbent cotton or other soft material like chamois soaked in petroleum ether. Do not scrub hard to avoid damaging the display surface.

(5) Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading.

(6) Avoid contacting oil and fats.

(7) Condensation on the surface and contact with terminals due to cold will damage, stain or polarizers. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.

(8) Do not put or attach anything on the display area to avoid leaving marks on.

(9) Do not touch the display with bare hands. This will stain the display area and degrade insulation between terminals (some cosmetics are determinate to the polarizers).

(10)As glass is fragile, it tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring.

11.2 INSTALLING LCD MODULE

Attend to the following items when installing the LCM.

(1) Cover the surface with a transparent protective plate to protect the polarizer and LC cell.

(2) When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be ±0.1mm.

11.3 ELECTRO-STATIC DISCHARGE CONTROL

Since this module uses a CMOS LSI, the same careful attention should be paid for electrostatic discharge as for an ordinary CMOS IC.

(1) Make certain that you are grounded when handing LCM.
(2) Before removing LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential.
(3) When soldering the terminal of LCM, make certain the AC power source for the soldering iron does not leak.
(4) When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.
(5) As far as possible, make the electric potential of your work clothes and that of the workbenches to the ground potential.
(6) To reduce the generation of electro-static discharge, be careful that the air in the work is not too dried. A relative humidity of 50%-60% is recommended.

11.4 PRECAUTIONS FOR OPERATION

(1) Viewing angle varies with the change of liquid crystal driving voltage (Vo). Adjust Vo to show the best contrast.
(2) Driving the LCD in the voltage above the limit will shorten its lifetime.
(3) Response time is greatly delayed at temperature below the operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.
(4) If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then on.
(5) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, this product must be used and stored within the specified condition of 23±5°C, 45±20%RH.
(6) When turning the power on, input each signal after the positive/negative voltage becomes stable.

11.5 SAFETY

(1) It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.
(2) If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

12.REVISION HISTORY

Version	Revise record	Date
1.0	Original version	09-03-26
2.0	Change “LCM Number System”	09-12-05
2.01	Perfect the VER2.0spec，Commany internal modify.	13-08-01

SAMPLE APPROVED REPORT

(样品确认单)

SAMPLE MODEL NO. (样品型号)	JHB53366A
SAMPLE SERIES NUMBER NO. (样品序号)	
SAMPLE QUANTITY (样品数量)	
TYPE /COLOR (类型/底色)	FSTN
VIEWING DIRECTION (视角)	6:00
DRIVING METHOD (驱动参数)	1/66Duty, 1/9Bias
LOGIC VOLTAGE (工作电压)	5.0V
LCD VOP (LCD 驱动电压)	15.0V
OPERATING TEMP. (操作温度)	-20 ~ +70℃
STORAGE TEMP. (储存温度)	-30 ~ +80℃
POLARIZER MODE (偏光片类型)	Transflective/Positive
CONTROLLER/DRIVER IC(控制/驱动 IC)	RA8835/SDN8080
BACKLIGHT COLOR/TYPE (背光源类型/颜色)	EL/SKY-BLUE
DRAWING REV/NO./QUANTITY (图纸版本/数量)	
SPECIFICATION (规格书　份数)	

REMARKS:
(备注)
WRIT BY: _____ DATE: _____ APROV BY: _____ DATE: _____

CUSTOMER'S APPROVAL (客户确认):

1） FUNCTION （功能）: ☐ OK ☐ N.G.
2） DRIVER CONDITION （驱动条件）: ☐ OK ☐ N.G.
3） DISPLAY MODE （显示模式）: ☐ OK ☐ N.G.
4） VIEWING ANGLE （视角）: ☐ OK ☐ N.G.
5） BACKLIGHT （背光源）: ☐ OK ☐ N.G.
6） DISPLAYING PATTERN （显示效果）: ☐ OK ☐ N.G.

CUSTOMER'S CONCLUSIONS (客户意见): _____
_____
_____

CUSTOMER'S SIGNATURE（客户签名）: _____ DATE (日期): _____