

SPECIFICATION



YMSP-G320240A-2DBSWWD

September 28, 2007
Version 1.01



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1. GENERAL SPECIFICATIONS :

1-1 SCOPE:

This specification covers the delivery requirements for the liquid crystal display delivered by YAOYU TECHNOLOGY to Customer .

1-2 PRODUCTS:

Liquid Crystal Display Module (LCM)

1-3 MODULE NAME:

YMSP-G320240A-2DBSWWD

2. FEATURES :

2-1 MAIN LCD (LARGE)

Item	Standard Value
Display Type	320 *240 dots
LCD Type	<input type="checkbox"/> FSTN, BLUE, Transmissive, Negative, Extended TEMP <input type="checkbox"/> FSTN, Transflective, Positive, Extended TEMP <input checked="" type="checkbox"/> STN, BLUE, Transflective, Negative, Extended TEMP <input type="checkbox"/> STN, GREY, Transflective, Positive, Extended TEMP <input type="checkbox"/> STN, Yellow-GREEN, Positive, Normal TEMP
Drive Pattern	1/240Duty, 1/17Bias
Viewing Direction	6 O'clock
Backlight Type	<input type="checkbox"/> YELLOW-GREEN LED BOTTOM BL <input type="checkbox"/> WHITE EDGE LED BL <input checked="" type="checkbox"/> CCFL WHITE BL
Weight	TBD
Interface	8-bit 8080 MPU interface / 6800 series
Driver IC	SED1335

3. MACHANICAL SPECIFICATIONS :

ITEM	STANDARD VALUE	UNIT
DISPLAY FORMAT	320X 240 DOTS	
MODULE DIMENSION	167.0(W) X 109.0(H) X 12.0(T)	mm
EFFECTTVE DISPLAY AREA	122.0(W) X92.0(H)	mm
DOT SIZE	0.33(W) X 0.33(H)	mm
DOT PITCH	0.36W) X 0.36 (H)	mm
LCD TYPE	BLUE, STN	
DUTY AND BIAS	1/240 DUTY; 1/17 BIAS	
VIEWING DIRECTION	6:00	
BACK LIGHT	CCFL WHITE	

4. ABSOLUTE MAXIMUM RATING

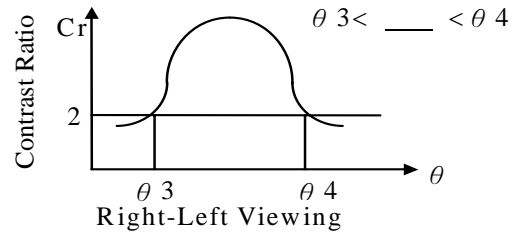
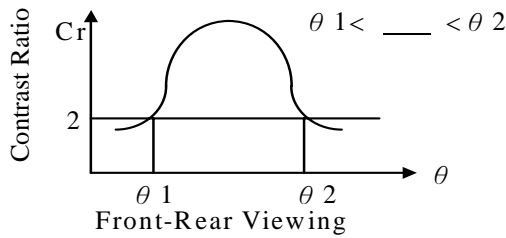
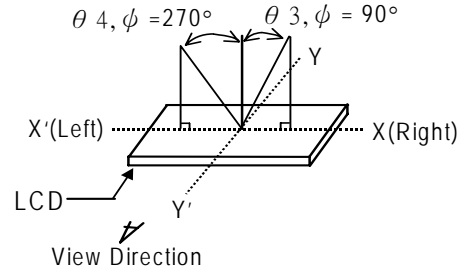
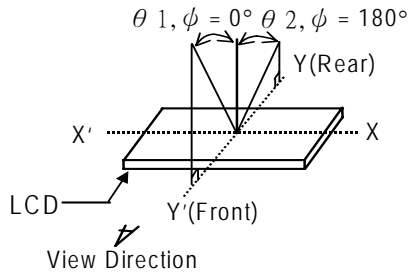
ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY FOR LOGIC	VDD	Ta=25°C	-0.3	—	7.0	V
INPUT VOLTAGE	VIN	Ta=25°C	-0.3	—	VDD+0.3	V
Module OPERATION TEMPERATURE	TOPR	---	-10	—	+60	°C
Module STORAGE TEMPERATURE	TSTG	---	- 20	—	+70	°C
Storage Humidity	H _D	Ta < 40 °C	-		90	%RH

5. ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Supply Voltage (logic)	Vdd-Vss	-	4.5	5	5.5	V
Supply Voltage (LCD)	Vlcd	Vdd=5.0(25°C)	20	-	24	V
Input signal voltage	V-ih	“H” level	0.5Vdd	-	Vdd	V
	V-il	“L” level	VSS	-	0.2Vdd	V
Output signal voltage	V-oh	“H” level	2.4	-	-	V
	V-ol	“H” level	vss	-	0.4	V
Supply Current (logic)	Icc	-	-	0.3	0.5	mA
Supply Current (LCD)	Io	-	-	-	-	mA
Supply Voltage (LED)	V-bl		-	220AC-	-	V
Supply Current (LED)	I-bl		400	-	500	mA

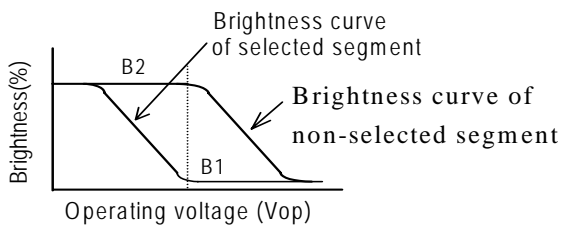
6.OPTICAL CHARACTERISTICS

(1) DEFINITION OF VIEWING ANGLE

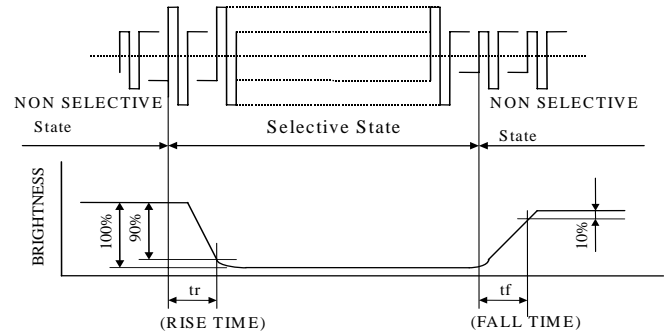


(2) DEFINITION OF CONTRAST

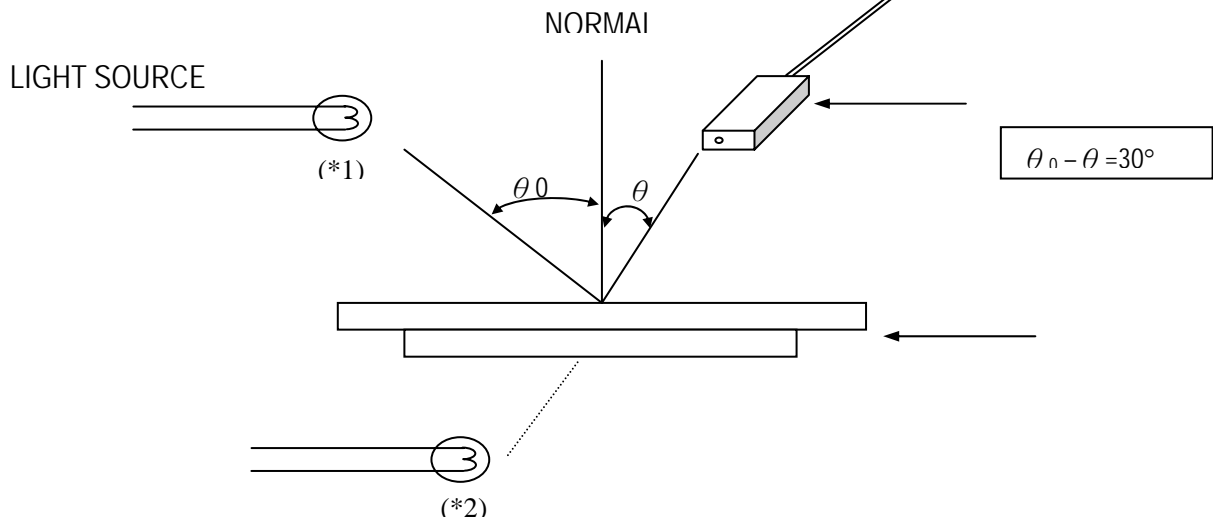
$$C.R = \frac{\text{Brightness of non-selected segment (B2)}}{\text{Brightness of selected segment (B1)}}$$



(3) DEFINITION OF RESPONSE



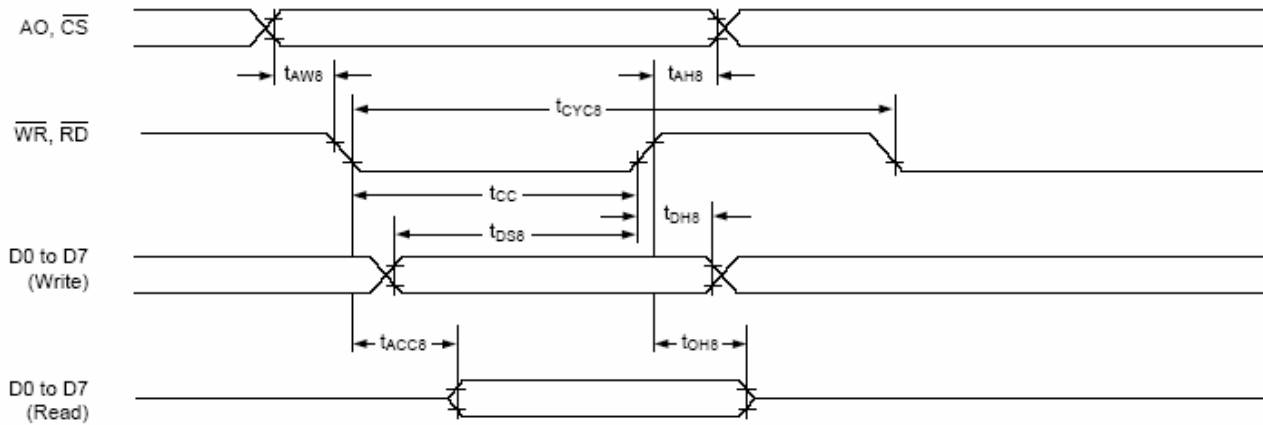
(4) Measuring Instruments For Electro-optical Characteristics





7.0 .TIMING CHARACTERISTICS

8080 family interface timing



$T_a = -20$ to 75°C

Signal	Symbol	Parameter	$V_{DD} = 4.5$ to 5.5V		$V_{DD} = 2.7$ to 4.5V		Unit	Condition
			min	max	min	max		
A0, $\overline{\text{CS}}$	t_{AH8}	Address hold time	10	—	10	—	ns	CL = 100pF
	t_{AW8}	Address setup time	0	—	0	—	ns	
$\overline{\text{WR}}, \overline{\text{RD}}$	t_{CYC8}	System cycle time	See note.	—	See note.	—	ns	
	t_{CC}	Strobe pulsewidth	120	—	150	—	ns	
D0 to D7	t_{DS8}	Data setup time	120	—	120	—	ns	
	t_{DH8}	Data hold time	5	—	5	—	ns	
	t_{ACC8}	$\overline{\text{RD}}$ access time	—	50	—	80	ns	
	t_{OH8}	Output disable time	10	50	10	55	ns	

Note: For memory control and system control commands:

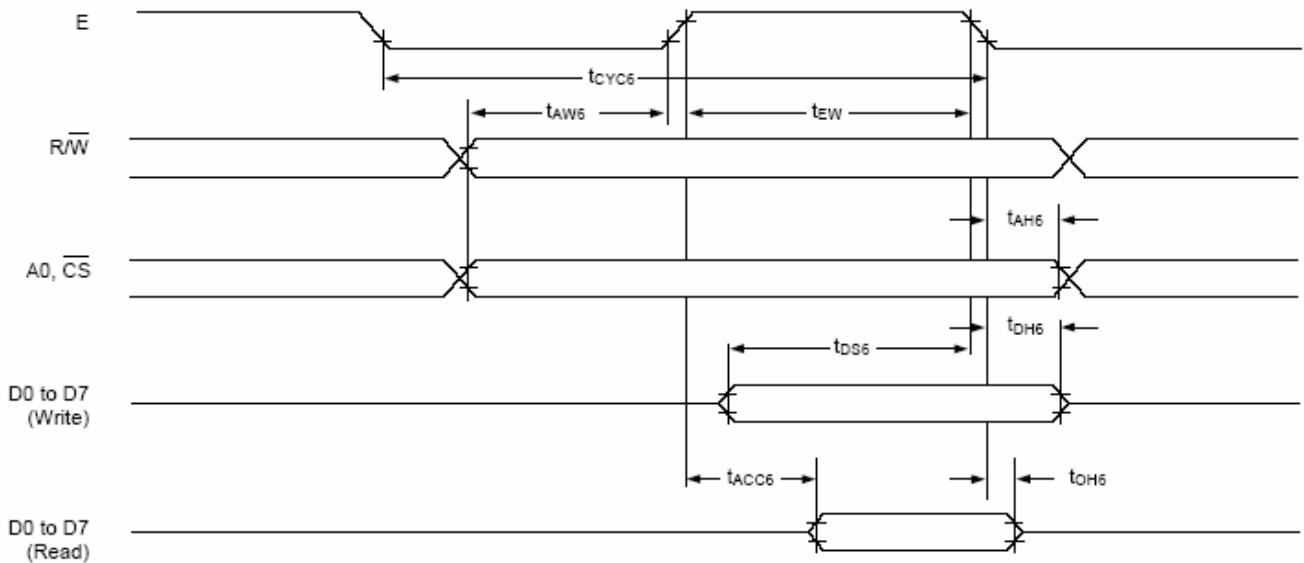
$$t_{CYC8} = 2t_c + t_{CC} + t_{CEA} + 75 > t_{ACV} + 245$$

For all other commands:

$$t_{CYC8} = 4t_c + t_{CC} + 30$$



. 6800 family interface timing



Note: t_{CYC6} indicates the interval during which CS is LOW and E is HIGH.

$T_a = -20$ to 75°C

Signal	Symbol	Parameter	VDD = 4.5 to 5.5V		VDD = 2.7 to 4.5V		Unit	Condition
			min	max	min	max		
A0, \overline{CS} , R/W	t_{CYC6}	System cycle time	See note.	—	See note.	—	ns	CL = 100 pF
	t_{AW6}	Address setup time	0	—	10	—	ns	
	t_{AH6}	Address hold time	0	—	0	—	ns	
D0 to D7	t_{DS6}	Data setup time	100	—	120	—	ns	
	t_{DH6}	Data hold time	0	—	0	—	ns	
	t_{OH6}	Output disable time	10	50	10	75	ns	
	t_{ACC6}	Access time	—	85	—	130	ns	
E	t_{EW}	Enable pulsewidth	120	—	150	—	ns	

Note: For memory control and system control commands:

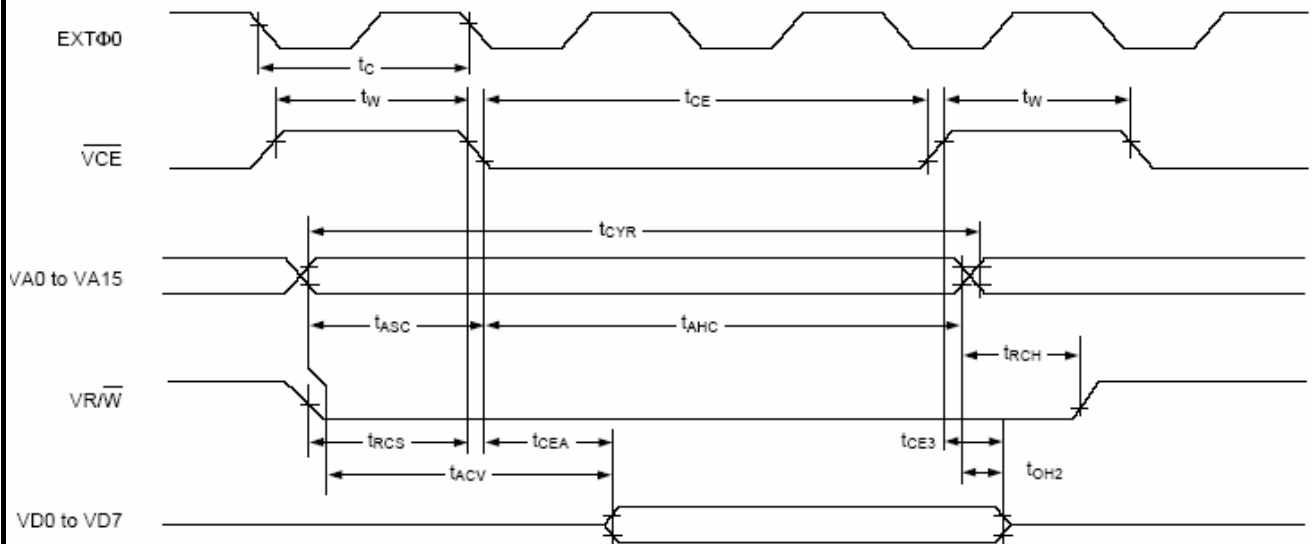
$$t_{CYC6} = 2t_c + t_{EW} + t_{CEA} + 75 > t_{ACV} + 245$$

For all other commands:

$$t_{CYC6} = 4t_c + t_{EW} + 30$$



3. Display memory read timing

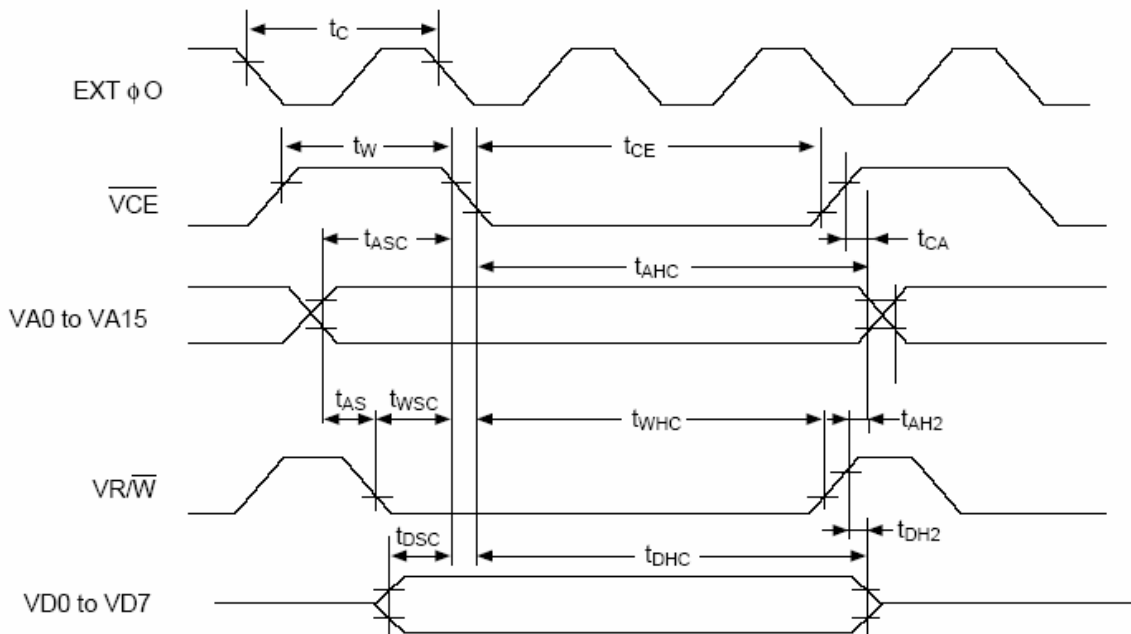


Ta = -20 to 75°C

Signal	Symbol	Parameter	VDD = 4.5 to 5.5V		VDD = 2.7 to 4.5V		Unit	Condition
			min	max	min	max		
EXT φ0	t _c	Clock period	100	—	125	—	ns	CL = 100 pF
VCE	t _w	VCE HIGH-level pulsewidth	t _c - 50	—	t _c - 50	—	ns	
	t _{ce}	VCE LOW-level pulsewidth	2t _c - 30	—	2t _c - 30	—	ns	
VA0 to VA15	t _{cyr}	Read cycle time	3t _c	—	3t _c	—	ns	
	t _{asc}	Address setup time to falling edge of VCE	t _c - 70	—	t _c - 100	—	ns	
	t _{ahc}	Address hold time from falling edge of VCE	2t _c - 30	—	2t _c - 40	—	ns	
VRD	t _{r_{cs}}	Read cycle setup time to falling edge of VCE	t _c - 45	—	t _c - 60	—	ns	
	t _{r_{ch}}	Read cycle hold time from rising edge of VCE	0.5t _c	—	0.5t _c	—	ns	
VD0 to VD7	t _{acv}	Address access time	—	3t _c - 100	—	3t _c - 115	ns	
	t _{cea}	VCE access time	—	2t _c - 80	—	2t _c - 90	ns	
	t _{oh2}	Output data hold time	0	—	0	—	ns	
	t _{ce3}	VCE to data off time	0	—	0	—	ns	



Display memory write timing





T_a = -20 to 75°C

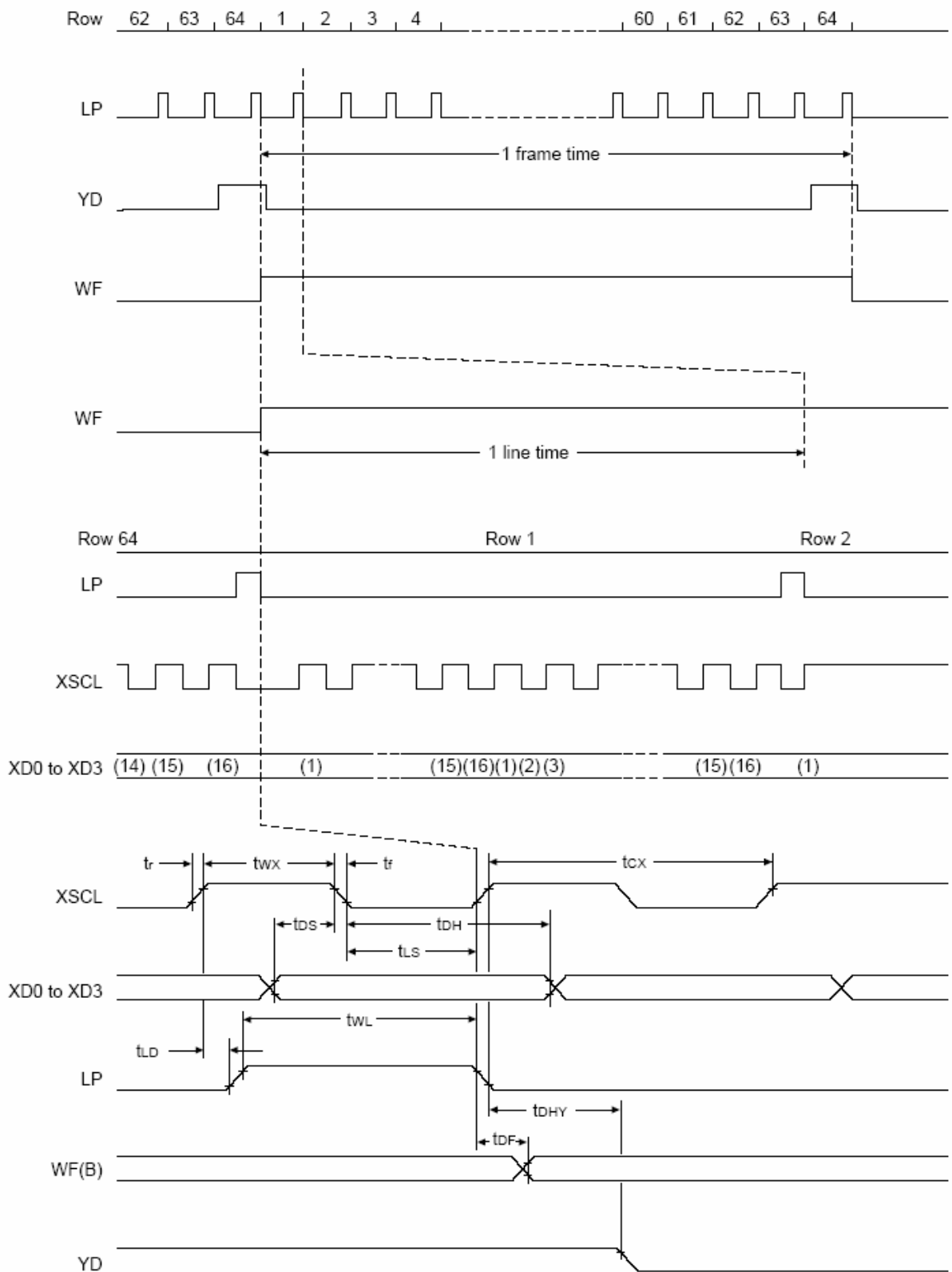
Signal	Symbol	Parameter	VDD = 4.5 to 5.5V		VDD = 2.7 to 4.5V		Unit	Condition
			min	max	min	max		
EXT φ0	t _c	Clock period	100	—	125	—	ns	CL = 100 pF
V _{CE}	t _w	V _{CE} HIGH-level pulsewidth	t _c - 50	—	t _c - 50	—	ns	
	t _{CE}	V _{CE} LOW-level pulsewidth	2t _c - 30	—	2t _c - 30	—	ns	
VA0 to VA15	t _{CYW}	Write cycle time	3t _c	—	3t _c	—	ns	
	t _{AHC}	Address hold time from falling edge of V _{CE}	2t _c - 30	—	2t _c - 40	—	ns	
	t _{ASC}	Address setup time to falling edge of V _{CE}	t _c - 70	—	t _c - 110	—	ns	
	t _{CA}	Address hold time from rising edge of V _{CE}	0	—	0	—	ns	
	t _{AS}	Address setup time to falling edge of V _{WR}	0	—	0	—	ns	
	t _{AH2}	Address hold time from rising edge of V _{WR}	10	—	10	—	ns	
V _{WR}	t _{WSC}	Write setup time to falling edge of V _{CE}	t _c - 80	—	t _c - 115	—	ns	
	t _{WHC}	Write hold time from falling edge of V _{CE}	2t _c - 20	—	2t _c - 20	—	ns	
VD0 to VD7	t _{DSC}	Data input setup time to falling edge of V _{CE}	t _c - 85	—	t _c - 125	—	ns	
	t _{DHC}	Data input hold time from falling edge of V _{CE}	2t _c - 30	—	2t _c - 30	—	ns	
	t _{DH2}	Data hold time from rising edge of V _{WR}	5	50	5	50	ns	

Note: VD0 to VD7 are latching input/outputs. While the bus is high impedance, VD0 to VD7 retain the write data until the data read from the memory is placed on the bus.

LCD output timing



The following characteristics are for a 1/64 duty cycle.





T_a = -20 to 75°C

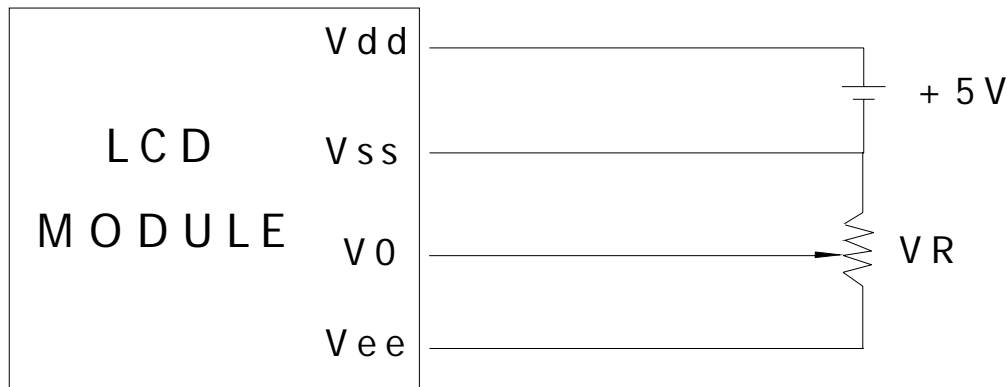
Signal	Symbol	Parameter	VDD = 4.5 to 5.5V		VDD = 2.7 to 4.5V		Unit	Condition
			min	max	min	max		
	t _r	Rise time	—	30	—	40	ns	CL = 100 pF
	t _f	Fall time	—	30	—	40	ns	
XSCL	t _{CX}	Shift clock cycle time	4t _C	—	4t _C	—	ns	
	t _{WX}	XSCL clock pulsewidth	2t _C - 60	—	2t _C - 60	—	ns	
XD0 to XD3	t _{DH}	X data hold time	2t _C - 50	—	2t _C - 50	—	ns	
	t _{DS}	X data setup time	2t _C - 100	—	2t _C - 105	—	ns	
LP	t _{LS}	Latch data setup time	2t _C - 50	—	2t _C - 50	—	ns	
	t _{WL}	LP pulsewidth	4t _C - 80	—	4t _C - 120	—	ns	
	t _{LD}	LP delay time from XSCL	0	—	0	—	ns	
WF	t _{DF}	Permitted WF delay	—	50	—	50	ns	
YD	t _{DHY}	Y data hold time	2t _C - 20	—	2t _C - 20	—	ns	

8. PIN ASSIGNMENT

PIN	SYMBOL	FUNCTION
1	VSS	Ground.
2	VDD	Power supply.
3	V0	Contrast adjust.
4	A0	A0= "L" : Instruction ; A0= "H"; Data.
5	/WR	WR= "L" :Write.
6	/RD	RD= "L" :Read
7~14	DB0~DB7	This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data bus.
15	/CS	Chip select for SED1335. 'L' active.
16	/RES	Reset signal.
17	VEE	DC/DC voltage converter.
18	SEL1	"L": 8080 series. "H":6800 series.

19	DCLK	External Clock Input. This clock runs the SAR conversion process and synchronizes serial data I/O.
20	/CS2	Chip select for touch screen.
21	DIN	Serial Data Input. If \overline{CS} is LOW, data is latched on rising edge of DCLK.
22	DOUT	Serial Data Output. Data is shifted on the falling edge of DCLK. This output is high impedance when \overline{CS} is HIGH.
23	/PEN	Pen Interrupt. Open anode output (requires 10k Ω to 100k Ω pull-up resistor externally).
24	BUSY	Busy Output. This output is high impedance when \overline{CS} is HIGH.
25	IN3	Auxiliary Input 1. ADC input Channel 3.
26	IN4	Auxiliary Input 2. ADC input Channel 4.

9. BLOCK DIAGRAM



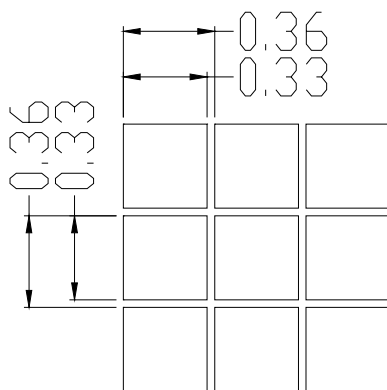
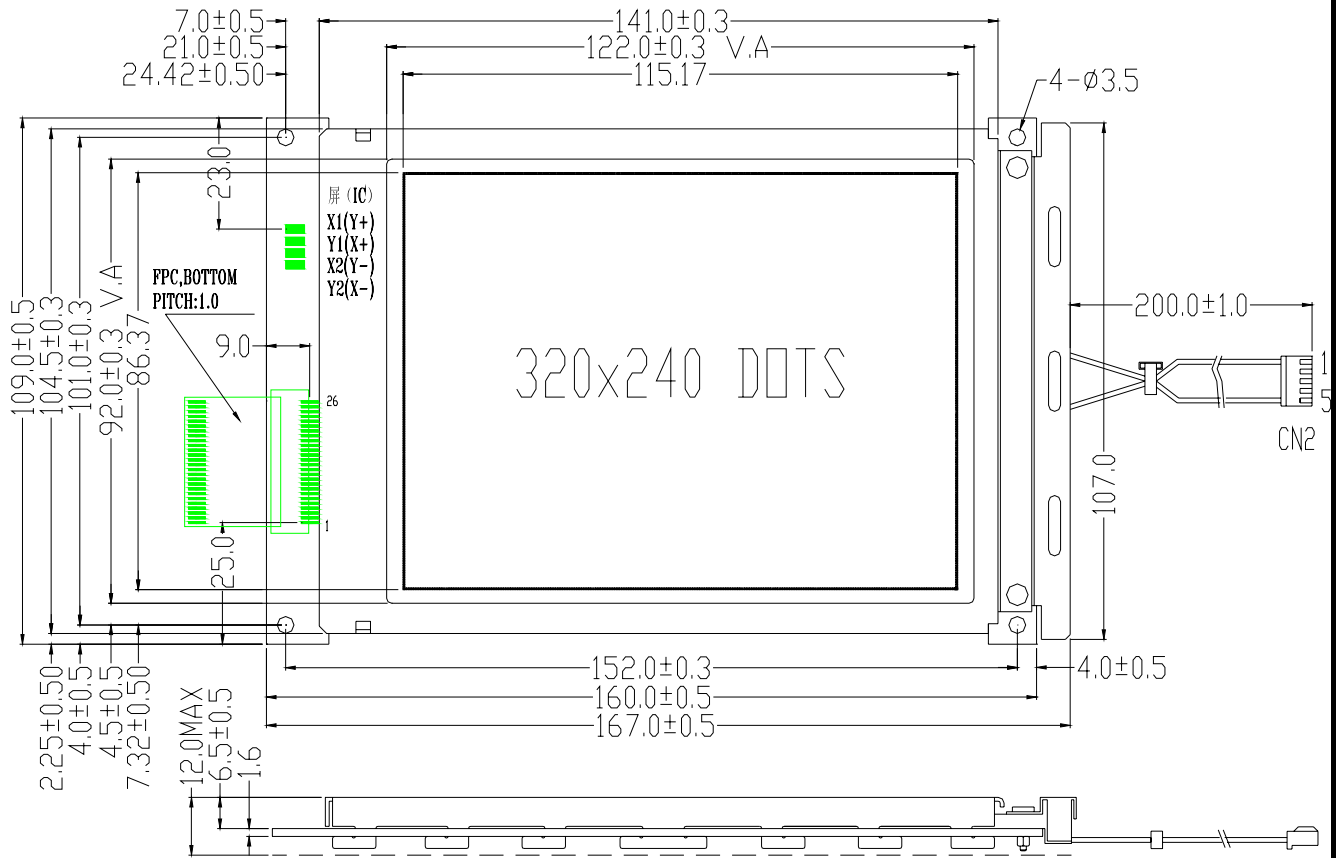
Vdd-V0: LCD Driving Voltage
VR: 10K - 20K

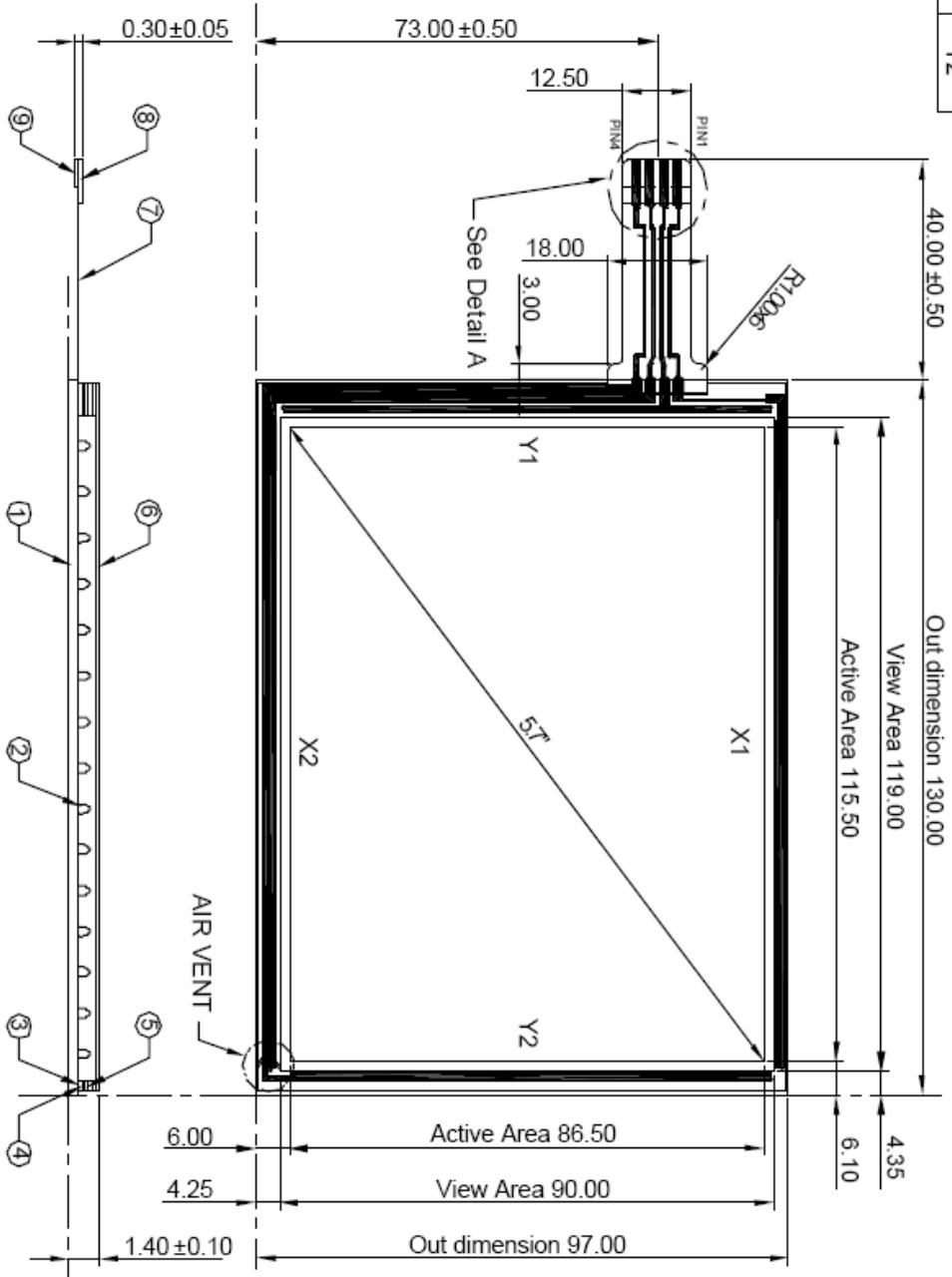
Display Control Instruction:

Please refer to the series of SED1335.



10. OUTLINE DIMENSIONS





PIN OUT	
1	X1
2	Y1
3	X2
4	Y2

PIN 1 ~ 3	280ohm~520ohm
PIN 2 ~ 4	500ohm~920ohm

Out dimension 130.00

View Area 119.00

Active Area 115.50

4.35

6.10

Active Area 86.50

View Area 90.00

Out dimension 97.00

Pitch 2.54 ± 0.05x3

Line Width 1.50 ± 0.05x4

2.44

Detail A

Stiffener 8.00 ± 0.50

Contact Side 5.00 ± 0.50

①	1.10mm ITO Glass
②	Spacer dot
③	Silver
④	Insulation
⑤	Adhesive
⑥	0.188mm ITO Film /Anti-glare
⑦	FPC Tail
⑧	Stiffener
⑨	Contact Side

11. ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITIONS	CRITERION
OPERATING TEMPERATURE	TOPR	-20°C ~ +70°C	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
STORAGE TEMPERATURE	TSTG	-30°C ~ +80°C	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
HUMIDITY	—	See Note	WITHOUT CONDENSATION

12. RELIABILITY
12-1 RELIABILITY TEST

ITEM	CONDITIONS	CRITERION
OPERATING TEMPERATURE	HIGH TEMPERATURE +70°C 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERATURE -20°C 240HRS	
STORAGE TEMPERATURE	HIGH TEMPERATURE +80°C 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERATURE - 30°C 240HRS	
HUMIDITY	40°C 90%RH 240HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
VIBRATION	<ul style="list-style-type: none"> • Operating Time: thirty minutes exposure for each direction (X,Y,Z) • Sweep Frequency: 10~55Hz (1 min) • Amplitude: 1.5mm 	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
THERMAL SHOCK	-20°C (30mins) ←→ +70°C (30mins) 10 cycles	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

*NOTE: TEST CONDITION

(1) TEMPERATURE AND HUMIDITY: IF NO SPECIFICATION, TEMP. SET AT 25±2°C, HUMIDITY SET AT 60±5%RH

(2) OPERATING STATE: SAMPLES SUBJECT TO THE TESTS SHALL BE IN "OPERATING" CONDITION



13. Precaution for Use

The following precautions should be followed, since this module contains precise parts.

- (1) Do not store module for an extended periods of time under the conditions of high temperature and high humidity.
- (2) Avoid using or storing the module in areas that expose it to direct sunlight or ultraviolet rays.
- (3) Use protective finger covers when handling the module to avoid scratching or staining the module.
- (4) Care should be taken not to expose the module to static electricity, because the module contains C-MOS LSI's.
- (5) The LSI is sensitive to light.
The user's product should be designed so that LSI is not exposed to any light during operation.
- (6) During installation, cover the display area with acrylic protection plates to protect the polarizer plate and LCD cells.
- (7) Do not apply any excessive shocks to the module because the module contains sensitive LCD cells.
Do not use a module, which has experienced strong mechanical shock.
- (8) Care should be taken when the power supply turns on as following.
 - (a) Do not apply any input signals before the supplying voltage is applied.
 - (b) Do not turn off the power supply while any input signals are applied.

Caution

- (1) Dangerous. Do not shock glass because glass can break.
- (2) If module breaks, do not touch it directly.
(Glass could stick or cut skin.)
- (3) Do not swallow Liquid Crystal.
(In case of broken LCD panel, do not swallow liquid crystal even if there is no proof that liquid crystal is poisonous.)
- (4) If liquid crystal is exposed to skin, wash the area thoroughly with alcohol or soap.
- (5) When disposing of the product, please observe industrial waste disposal laws in each country and district.
- (6) In case of injury, give immediate treatment and consult with a doctor.
- (7) This product is constructed precisely. Don't disassemble or modify.

※ Neglecting this mark can cause injury to humans and damage to materials