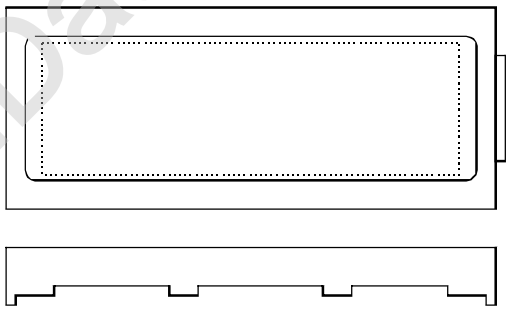
HANTRONIX

PRODUCT SPECIFICATION

HDM32GS12Y-3

122x32 GRAPHICS
(SMALL SIZE, LOW POWER)
LCD DISPLAY MODULE



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JK	**REV.:** 1.1	HDM32GS12Y-3	SHEET 1 OF 17 **DATE:** 2/4/03

1. MECHANICAL DATA

(1) Product No.		**HDM32GS12Y-3**
(2) Module Size		66.1 (W)mm x 27.3 (H)mm x 8.5 (D)mm (W/O, EL B.L.)
(3) Dot Size		0.40 (W)mm x 0.45 (H)mm
(4) Dot Pitch		0.44 (W)mm x 0.49 (H)mm
(5) Number of Characters		122 (W) x 32 (H)DOts
(6) Duty		1/32
(7) LCD Display Mode	STN:	☐ Gray Mode ☐ Yellow Mode
	Rear Polarizer:	☐ Reflective ☐ Transflective
(8) Viewing Direction		6 O'clock
(9) Backlight		☐ W/O ☐ EL B/L
(10) LCD Controller		AX6120AA
(11) Weight		W/O B/L: 16.0 g EL B/L: 17.0 g

2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

Vss=0V

	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD−VSS	−0.3	6.5	V	
Input Voltage	VI	−0.3	VDD	V	
Static Electricity	−	−	−		Note 1

Note 1 LCM should be grounded during handling LCM.

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	NORMAL TEMP.				WIDE TEMP.			
	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 1,3		Note 2,3		Note 3,4		Note 3,5	

Note 1 Ta ≦ 50°C : 85%RH max
Ta > 50°C : Absolute humidity must be lower than the humidity of 85%RH at 50°C

Note 2 Ta at −20°C will be < 48hrs, at 70°C will be < 120hrs

Note 3 Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Note 4 Ta ≦ 70°C : 75%RH max
Ta > 70°C : Absolute humidity must be lower than the humidity of 75%RH at 70°C

Note 5 Ta at −30°C will be < 48hrs, at 80°C will be < 120hrs

3. ELECTRICAL CHARACTERISTICS

(VDD = 5V±10%)

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Input Voltage		VIH	H level		0.8VDD	–	VDD	V
		VIO	L level		0	–	0.2VDD	V
Recommended LC Driving Voltage (NORMAL TEMP. LCM)		VDD–VEE	DUTY= 1/32 Bias= 1/4.7	0°C	–	6.0	–	V
				25°C	–	5.4	–	
				50°C	–	4.7	–	
Recommended LC Driving Voltage (WIDE TEMP. LCM)		VDD–VEE		−20°C	–	7.3	–	V
				0°C	–	7.2	–	
				25°C	–	7.0	–	
				50°C	–	6.7	–	
				70°C	–	6.2	–	
Power Supply Current (NORMAL TEMP. LCM)		IDD	VDD=5.0V VDD–VEE=5.4V PATTERN : ■□■□■□ □■□■□■		–	0.4	0.6	mA
		IEE			–	0.4	0.6	
Power Supply Current (WIDE TEMP. LCM)		IDD	VDD=5.0V VDD–VEE=7.0V PATTERN : ■□■□■□ □■□■□■		–	0.5	0.75	mA
		IEE			–	0.5	0.75	
Power Supply Current For EL		IEL	VBL=110VAC 400Hz		–	2.1	3.5	mA
LCM Surface Luminance	LMD62S042C13M_	L	VDD=5.0V VDD–VEE =5.4V VBL=110VAC 400Hz	PATTERN: (Dots All On)	–	2.3	–	cd/m²
				PATTERN: (Dots All Off)	–	8.1	–	
	LMD62S042A13M_	L	VDD=5.0V VDD–VEE =5.4V VBL=110VAC 400Hz	PATTERN: (Dots All On)	–	3.0	–	cd/m²
				PATTERN: (Dots All Off)	–	7.7	–	
	LMD62S042A13DM_	L	VDD=5.0V VDD–VEE =7.0V VBL=110VAC 400Hz	PATTERN: (Dots All On)	–	3.0	–	cd/m²
				PATTERN: (Dots All Off)	–	7.7	–	

4.OPTICAL CHARACTERISTICS

4-1.FOR NORMAL TEMPERATURE MODE LCM

AT Vop

ITEM / MODE		Cr(Contrast Ratio)						θ(Viewing Angle)		ϕ(Viewing Angle)	
		0°C		25°C		50°C		50°C		50°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	–	3.0	–	3.0	–	2.5	–	51	–	(L) 17 (R) 20
	C	–	5.0	–	4.5	–	4.5	–	58	–	(L) 22 (R) 24
S	A	–	3.0	–	3.0	–	2.5	–	46	–	(L) 15 (R) 19
	C	–	4.5	–	3.5	–	4.5	–	59	–	(L) 20 (R) 26
NOTE		NOTE 6						NOTE 5			

NOTE :

R: REFLECTIVE
S: TRANSFLECTIVE
A: GRAY
C: YELLOW

AT ϕ=0° θ=0°

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	–	1000	–	ms	NOTE 2
		25℃	–	300	–		
		50℃	–	100	–		
Response Time (fall)	Tf	0℃	–	500	–	ms	NOTE 2
		25℃	–	150	–		
		50℃	–	100	–		

4-2. FOR WIDE TEMPERATURE MODE LCM

AT Vop

ITEM / MODE		Cr(Contrast Ratio)										θ(Viewing Angle)		ϕ(Viewing Angle)	
		-20°C		0°C		25°C		50°C		70°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
S	A	-	3.0	-	3.0	-	3.0	-	3.0	-	2.0	-	44	-	(L) 8 (R) 17
note		NOTE 6										NOTE 5			

NOTE :

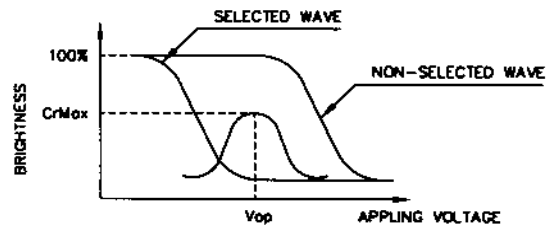
S: TRANSFLECTIVE A: GRAY

AT ϕ=0° θ=0°

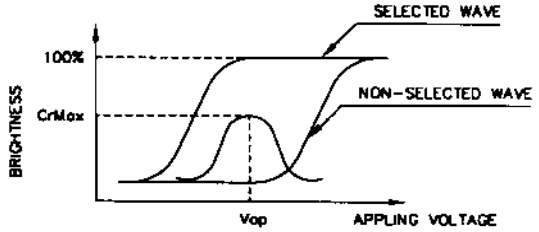
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	-	2000	-	ms	NOTE 2
		0℃	-	400	-		
		25℃	-	100	-		
		50℃	-	100	-		
		70℃	-	50	-		
Response Time (fall)	Tf	-20℃	-	1000	-	ms	NOTE 2
		0℃	-	200	-		
		25℃	-	100	-		
		50℃	-	50	-		
		70℃	-	50	-		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



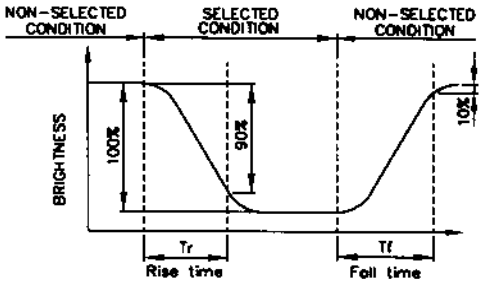
(negative type)

*Conditions

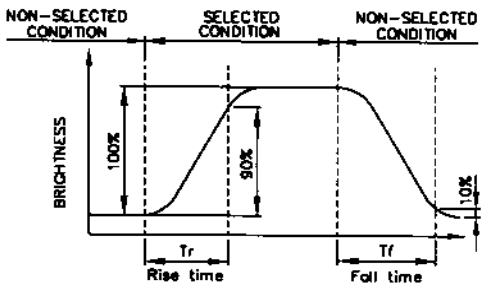
Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



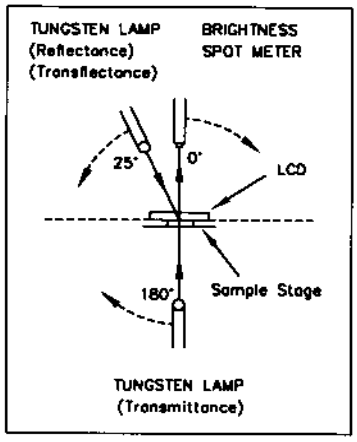
(negative type)

*Conditions

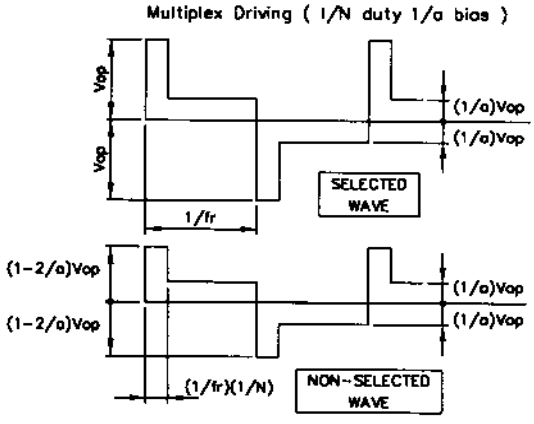
Operating Voltage : Vop
Viewing Angle (θ,ϕ) : (0,0)
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



Multiplex Driving (1/N duty 1/a bias)



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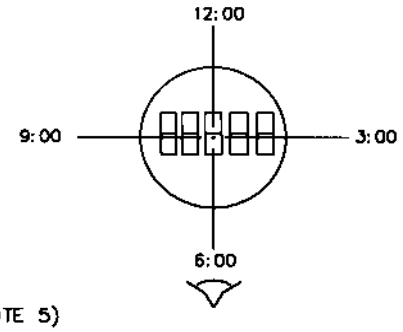
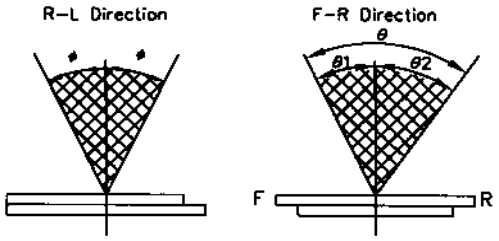
(NOTE 4)

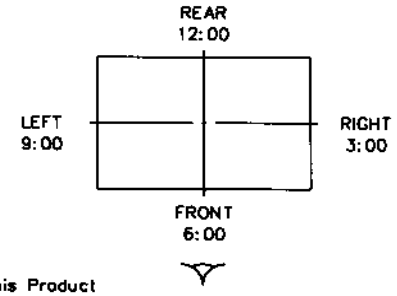
Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle





•For This Product

The Viewing Direction Is 6 O'clock

So $\theta 1 > \theta 2$

$\theta = \theta 1 + \theta 2$

•Conditions

Operating Voltage : Vop

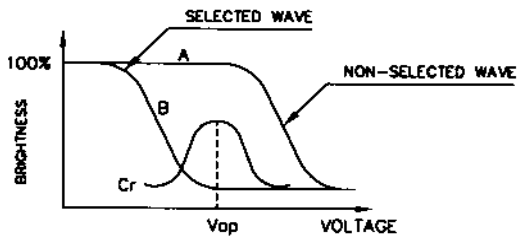
Frame Frequency : 70Hz

Appling Waveform : 1/N duty 1/a bias

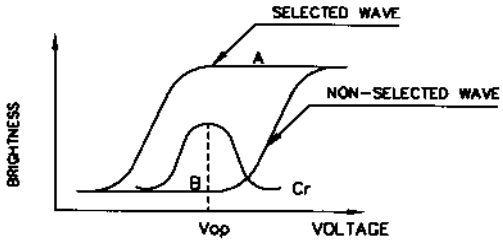
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



(negative type)

Contrast Ratio : Cr=A/B

•Conditions

Viewing Angle : 0

Frame Frequency : 70Hz

Appling Waveform : 1/N duty 1/a bias

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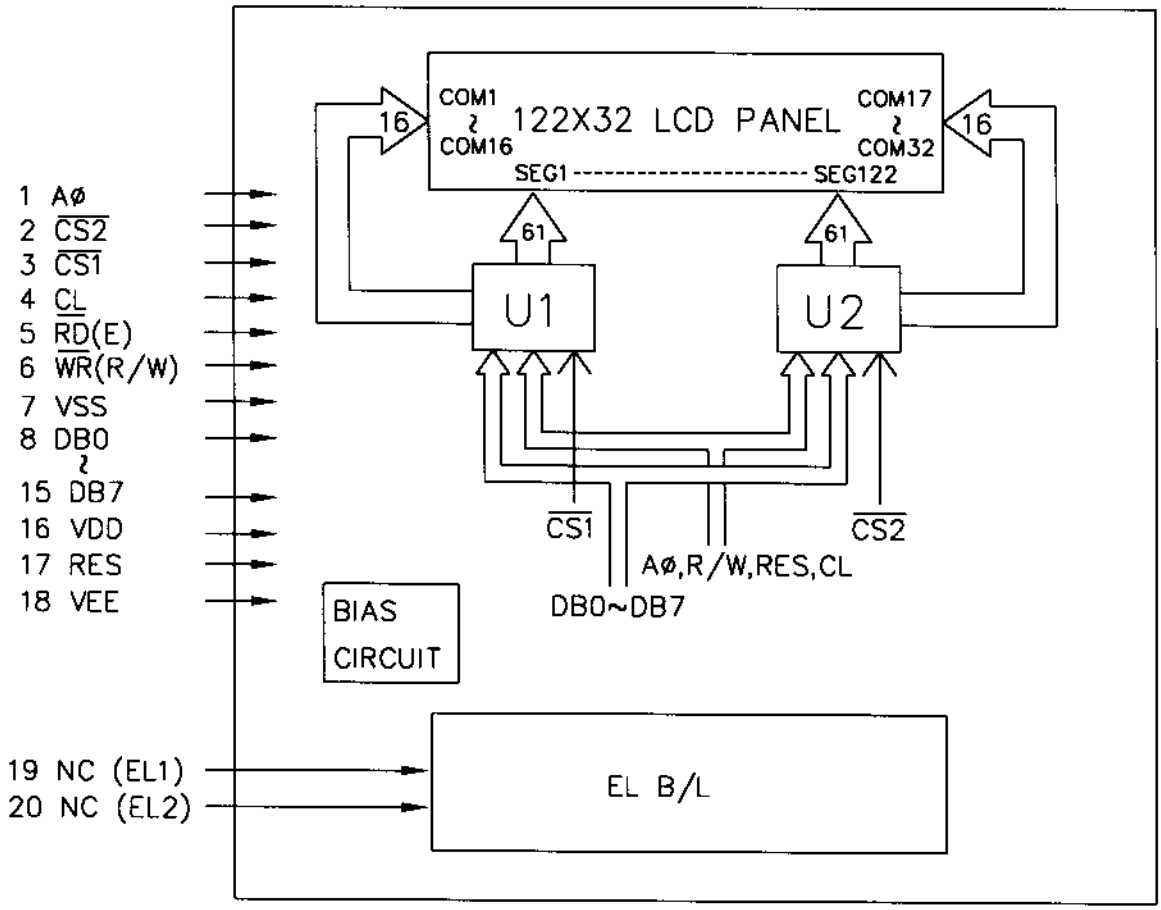
5. BLOCK DIAGRAM



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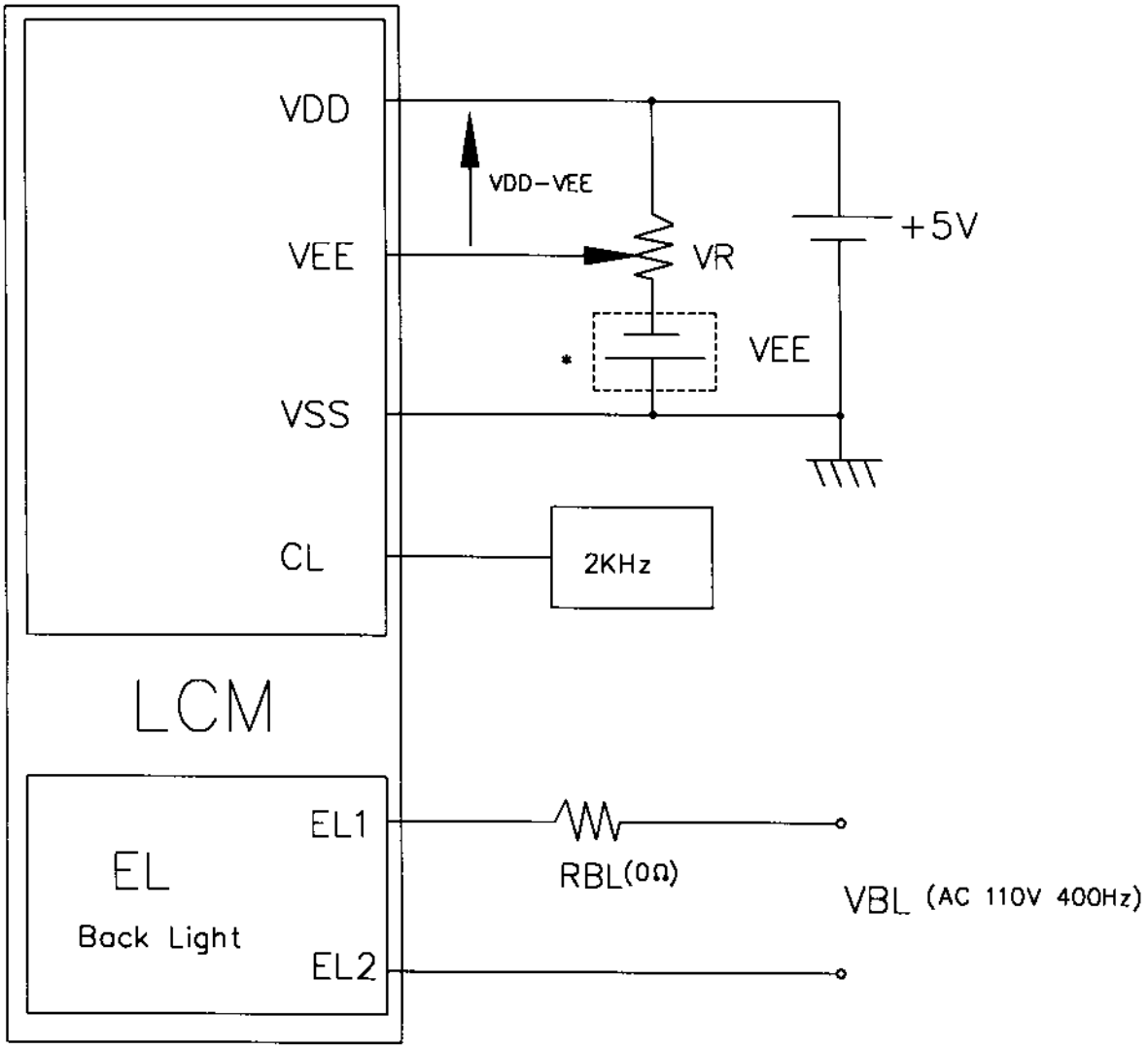
6. INTERNAL PIN CONNECTION

PinNo.	Symbol	Level	Function
1	AØ	H/L	L→INSTRUCTION H→DATA
2	$\overline{CS2}$	L	CHIP ENABLE ACTIVE "L"
3	$\overline{CS1}$	L	CHIP ENABLE ACTIVE "L"
4	CL	H/L	EXTERNAL CLOCK(2KHZ)
5	$\overline{RD}$(E)	–	$\overline{RD}$ FOR 80 SERI,E FOR 68 SERI
6	$\overline{WR}$(R/W)	–	$\overline{WR}$ FOR 80 SERI,R/W FOR 68 SERI
7	VSS	–	GROUND
8	DB0	H/L	DATA BUS LINE
9	DB1	H/L	
10	DB2	H/L	
11	DB3	H/L	
12	DB4	H/L	
13	DB5	H/L	
14	DB6	H/L	
15	DB7	H/L	
16	VDD	–	POWER SUPPLY FOR LOGIC CIRCUIT
17	RES	H/L	L→80 SERIES H→68 SERIES
18	VEE	–	POWER SUPPLY FOR LCD
19	NC (EL1)	–	NC (NO CONNECTION): FOR LMA62x042x13x EL1,EL2 (POWER SUPPLY FOR EL): FOR LMD62x042x13x
20	NC (EL2)	–	

7. POWER SUPPLY



VR = 20KΩ (Variable)

* VEE= 5V

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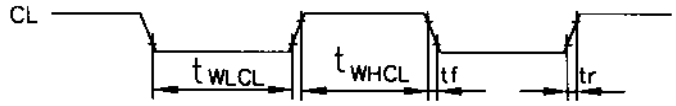
8. TIMING CHARACTERISTICS

8-1. Control timing for 80-port/68-port display

Item	Signal	Symbol	Condition	Min	Typ	Max	Unit
LOW pulse width	CL	tWLCL		35	–	–	us
HIGH pulse width		tWHCL		35	–	–	us
Rising time		tr		–	30	150	ns
Falling time		tf		–	30	150	ns

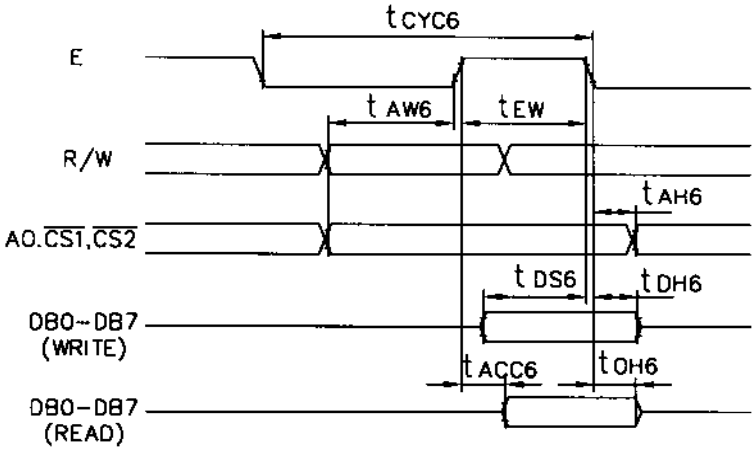


8-2. Read/write timing for the 68-port MPU

VDD=5V, To=-20~70°C

Item	Symbol	condition	Min.	Typ.	Max.	Unit
System cycle time (Note 1)	tCYC6		1000	–	–	ns
Address set-up time	tAW6		20	–	–	ns
Address hold time	tAH6		10	–	–	ns
Data set-up time	tDS6		80	–	–	ns
Data hold time	tDH6		10	–	–	ns
Output disable time	tOH6	C_L =100pf	10	–	60	ns
Access time	tACC6		–	–	90	ns
Enable pulse width (Read)	tEW		100	–	–	ns
Enable pulse width (Write)			80	–	–	ns

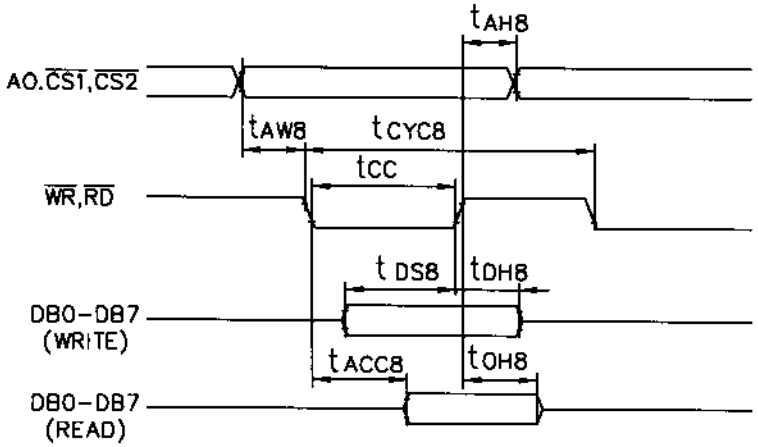
Note: 1.tCYC6 indicates the cycle during which $\overline{CS}$/E are HIGH; it does not indicate the cycle of the E signal.



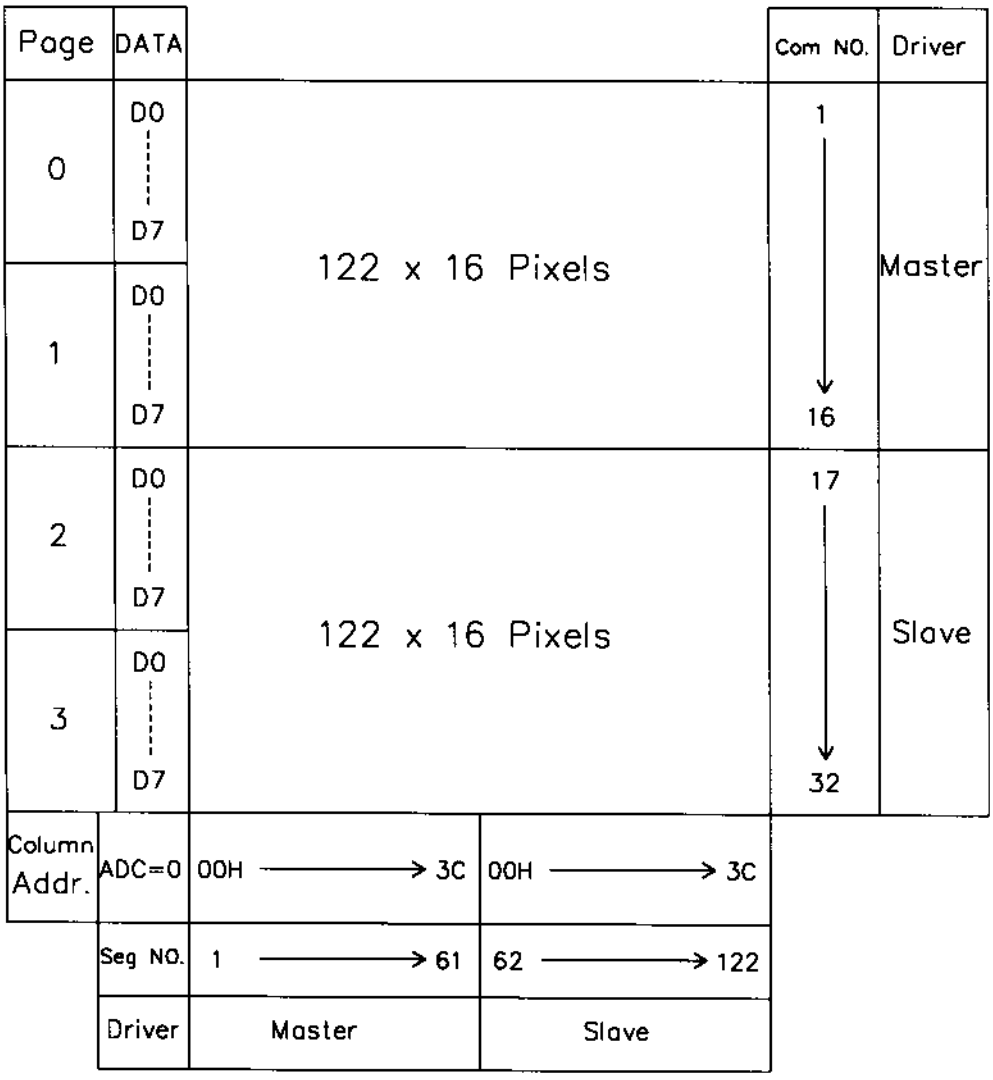
8-3.Read/write timing for the 80-port MPU

VDD=5V, Ta=-20~70°C

Item	Symbol	condition	Min.	Typ.	Max.	Unit
Address hold time	tAH8		10	-	-	ns
Address set-up time	tAW8		20	-	-	ns
System cycle time	tCYC8		1000	-	-	ns
Control pulse width	tCC		200	-	-	ns
Data set-up time	tDS8		80	-	-	ns
Data hold time	tDH8		10	-	-	ns
$\overline{RD}$ access time	tACC8	C_L =100pf	-	-	90	ns
Output disable time	tOH8		10	-	60	ns



9. DISPLAY PATTERN



10. RELIABILITY TEST

NO	ITEM	CONDITION			STANDARD	NOTE
1	High Temp. Storage	70°C	120HR		Appearance without defect	
2	Low Temp. Storage	−20°C	120HR		Appearance without defect	
3	High Temp. & High Humi. Storage	40°C 90%RH	120HR		Appearance without defect	
4	Thermal Shock	−20°C, 30min → 25°C, 5min → 70°C, 30min → 25°C, 5min (1cycle)			Appearance without defect	5 cycles

(2) NOTE:

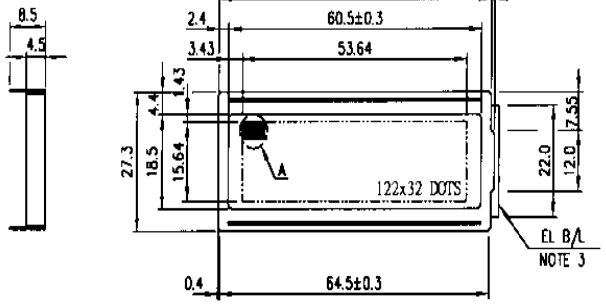
- SAFETY
  1. If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.
  2. If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

- HANDLING
  1. Avoid static electricity which can damage the CMOS LSI.
  2. Do not remove the panel or frame from the module.
  3. The polarizing plate of the display is very fragile. So, please handle it very carefully.
  4. Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
  5. Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.

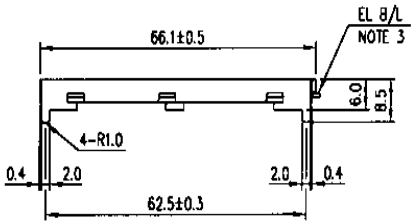
- STORAGE
  1. Store the panel or module in a dark place where the temperature is 25°C±5°C and the humidity is below 65% RH.
  2. Do not place the module near organics solvents or corrosive gases.
  3. Do not crush, shake, or jolt the module.

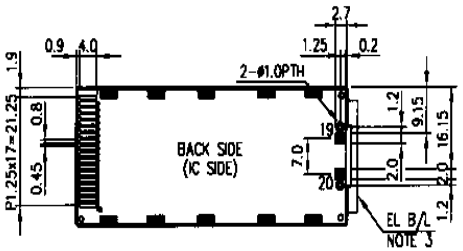
- TERMS OF WARRANT
  1. Acceptance inspection period
     The period is within one month after the arrival of contracted commodity at the buyer's factory site.
  2. Applicable warrant period
     The period is within twelve months since the date of shipping out under normal using and storage conditions.

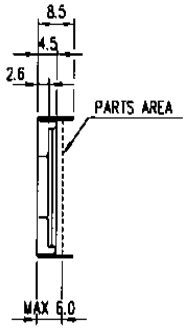
- THE OPERATING LIFE TIME OF BACK LIGHT
  EL : 2000hrs for AC 110Vrms, 400Hz, 20°C, 60%RH
  (Operating life time is defined as follows : The final brightness is at 50% of original brightness.)

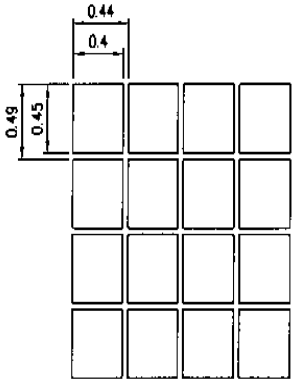


VIEW DIRECTION









A DETAIL
S = 30:1

NOTE:
1. RESOLUTION : 122x32 DOTS
2. NC (NO CONNECTION)
   EL1,EL2 (POWER SUPPLY FOR EL)
3. EL B/L : WHITE
4. DRIVER IC : AX6120AA
5. FRAME MATERIAL : T/N PLATE

INTERNAL PIN CONNECTION

PIN NO.	SYMBOL	FUNCTION	PIN NO.	SYMBOL	FUNCTION
1	Aϕ	L: INSTRUCTION H: DATA	11	DB3	DATA BUS LINE
2	$\overline{CS2}$	CHIP ENABLE ACTIVE "L"	12	DB4	
3	$\overline{CS1}$		13	DB5	
4	CL	EXTERNAL CLOCK(2KHZ)	14	DB6	
5	RD(E)	RD FOR 80 SERI,E FOR 68 SERI	15	DB7	
6	WR(R/W)	$\overline{WR}$ FOR 80 SERI,R/W FOR 68 SERI	16	VDD	POWER SUPPLY FOR LOGIC CIRCUIT
7	VSS	GROUND	17	RES	L: 80 SERIEL H: 68 SERIEL
8	DB0	DATA BUS LINE	18	VEE	POWER SUPPLY FOR LCD
9	DB1		19	NC (EL1)	NOTE 2
10	DB2		20	NC (EL2)	

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