

ELEC. MATERIALS DIV.
LCD DEPARTMENT

SPECIFICATION

SPEC. NO. : LM036-0

DATE : Nov. 07, 1997

SHEET NO. : 1/17

U.S. MARKETING ARM:

MARK PRODUCTS CORPORATION
800 N. EDGEWOOD AVENUE
WOOD DALE, IL 60191
TEL: 630-787-9089
FAX: 630-787-9015

SPECIFICATION OF
122x32 LCD MODULE
PRODUCT NO.: LMA63_036_M

SPEC. NO.: LM036-0

APPROVED BY

EDITED ON : Nov. 07, 1997

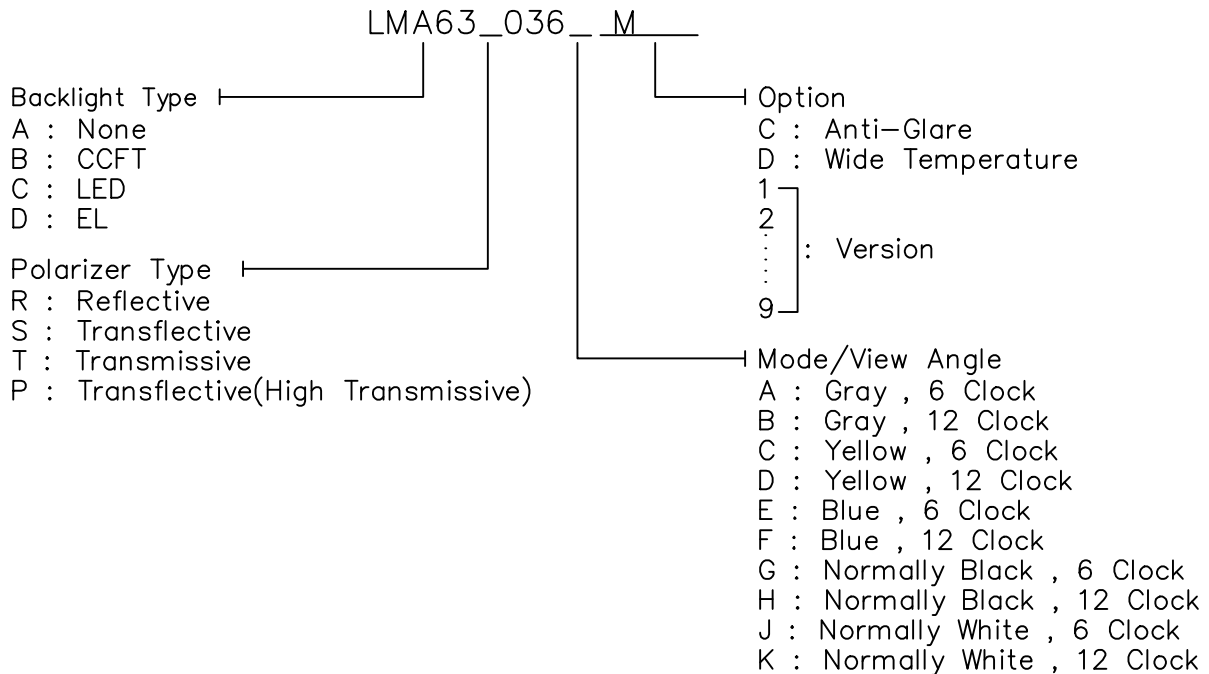
SALES MANAGER	DESIGN MANAGER	PERSON IN CHARGE

REV/DATE	RO/ 11.07.97					APP	CHK	BY
----------	-----------------	--	--	--	--	-----	-----	----

1. MECHANICAL DATA

- (1) Product No. LMA63_036_M
- (2) Module Size 67.2 (W)mm x 32.0 (H)mm X MAX 8.0 (D)mm
(W/O B.L.)
- (3) Dot Size 0.38 (W)mm x 0.38 (H)mm
- (4) Dot Pitch 0.43 (W)mm x 0.43 (H)mm
- (5) Number of Dots 122 (W) x 32 (H)Dots
- (6) Duty 1/32
- (7) LCD Display Mode STN: Gray Mode Yellow Mode Blue Mode
FSTN: Black and White(Normally White/Positive Image)
 Black and White(Normally Black/Negative Image)
- Rear Polarizer: Reflective
- (8) Viewing direction 6 O'clock 12 O'clock ____O'clock
- (9) Backlight W/O B.L.
- (10) Weight 18g

Note :



REV/DATE	R0/ 11.07.97'					APP	CHK	BY
----------	------------------	--	--	--	--	-----	-----	----

2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

ITEM	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.			
	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambien Temperature	0	50	-20	70
Humidity (Without Condensation)	Note 1,3		Note 2,3	

NOTE 1 $T_a \leq 50^\circ\text{C}$: 85% RH max

$T_a > 50^\circ\text{C}$: Absolute humidity must be lower

than the humidity of 85%RH at 50°C

NOTE 2 T_a 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.

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
Recommeded LCD Driving Voltage	VDD-V5	1/32 Duty 1/6 Bias	0°C	-	7.2	8.0	V
			25°C	6.1	6.5	7.4	
			50°C	5.4	5.8	-	
Power Supply Current	IDD	VDD-V5=6.5V		-	0.6	-	mA

4.OPTICAL CHARACTERISTICS

At Vop

ITEM MODE		Cr (Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	2.5	3.5	20	30	25	35
	C	—	—	—	—	—	—
	J	—	—	—	—	—	—
NOTE		NOTE 6		NOTE 5			

At $\phi=0^\circ$ $\theta=0^\circ$

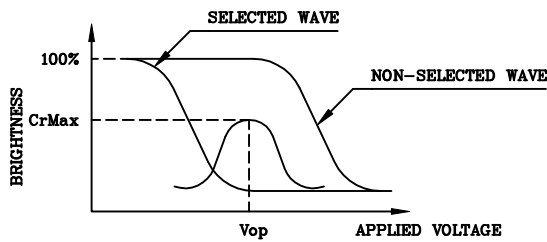
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0°C	—	400	800	ms	NOTE 2
		25°C	—	150	300		
		50°C	—	70	140		
Response Time (fall)	Tf	0°C	—	600	1000	ms	NOTE 2
		25°C	—	150	300		
		50°C	—	110	220		

NOTE :

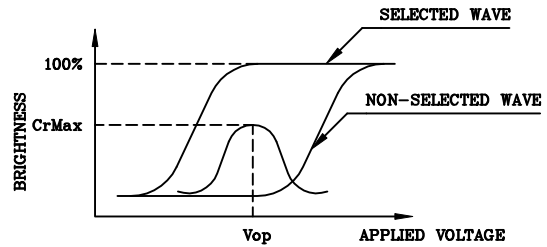
- R: REFLECTIVE
- A: GRAY
- C: YELLOW
- J: NORMALLY WHITE

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



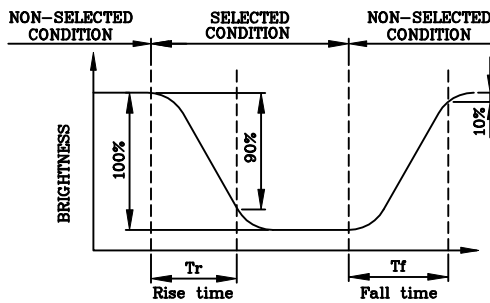
(negative type)

*Conditions

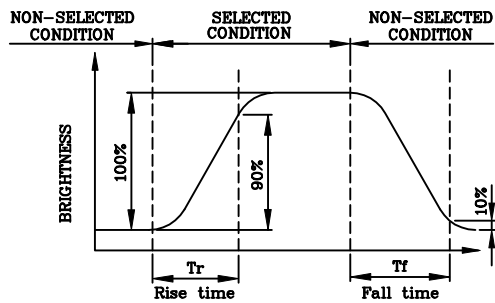
Viewing Angle : 0
Frame Frequency : 70Hz
Applied Waveform : 1/N duty, 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



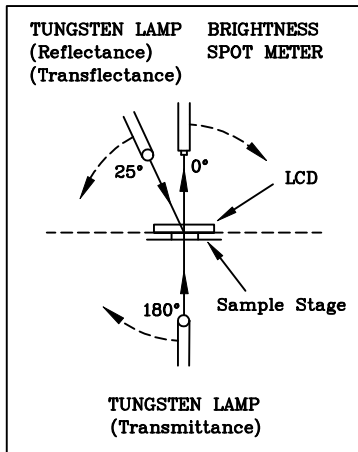
(negative type)

*Conditions

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

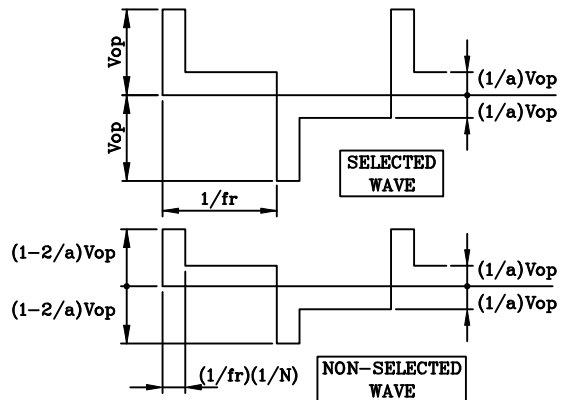
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



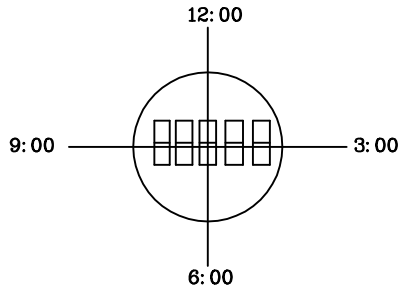
CONST.
TEMP.
CHAMBER

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



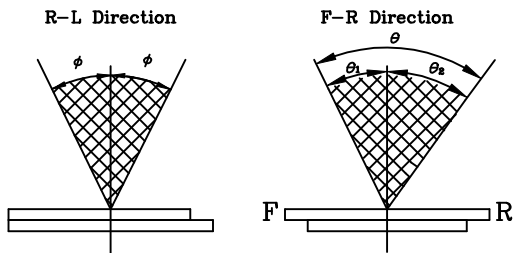
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



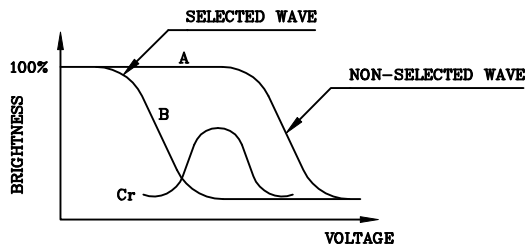
$$\theta = \theta_1 + \theta_2$$

*Conditions

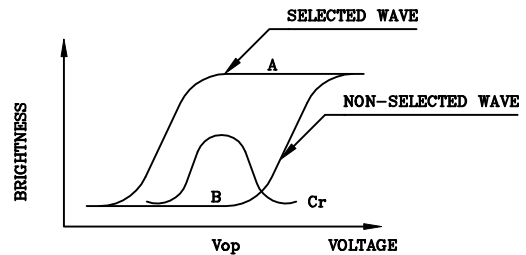
- Operating Voltage : V_{op}
- Frame Frequency : 70Hz
- Applied Waveform : 1/N duty, 1/a bias
- Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



(negative type)

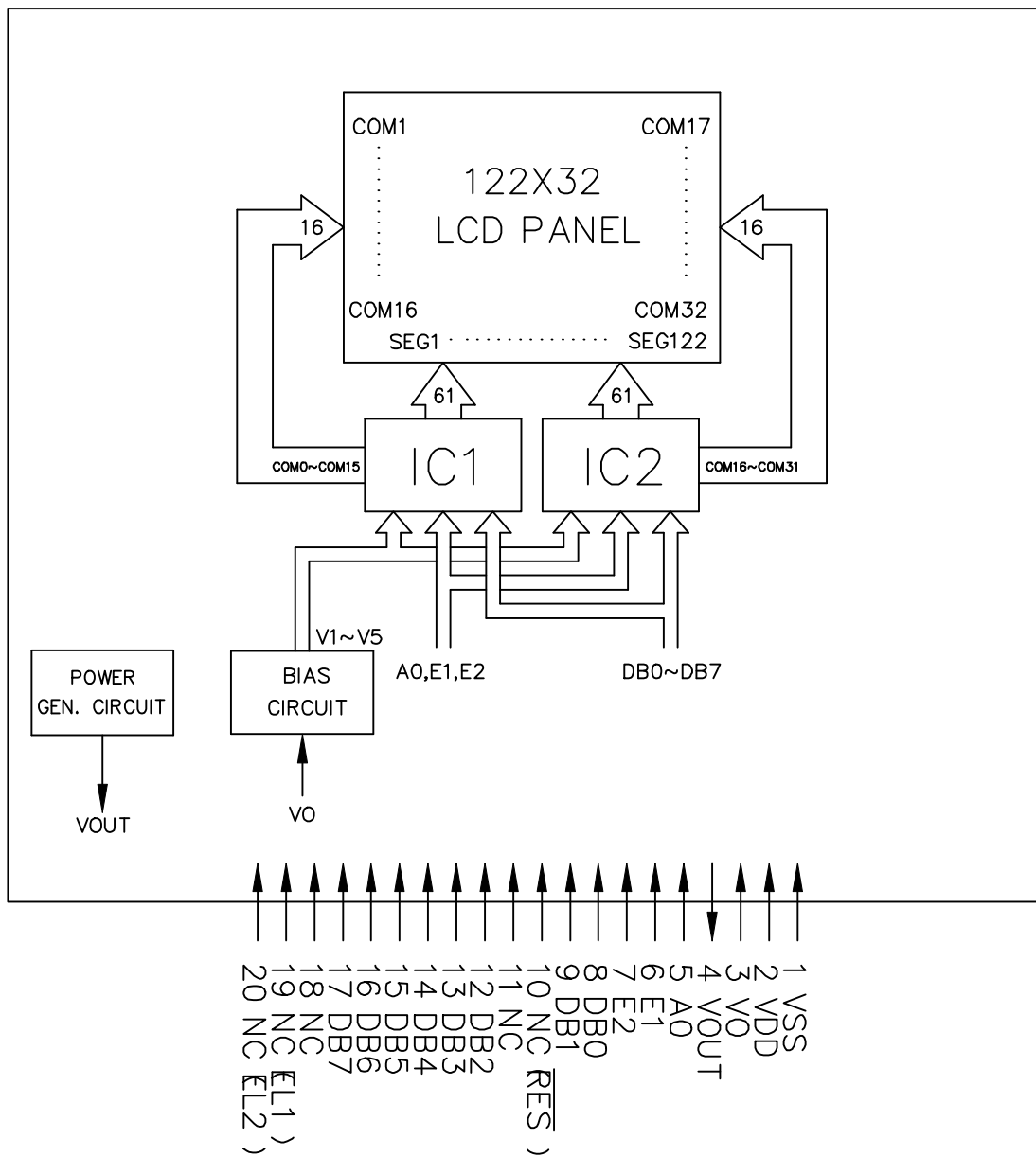
Contrast Ratio : $Cr = A/B$

*Conditions

- Viewing Angle : 0
- Frame Frequency : 70Hz
- Applied Waveform : 1/N duty, 1/a bias

REV/DATE	RO/ 11.07.97'					APP	CHK	BY
----------	------------------	--	--	--	--	-----	-----	----

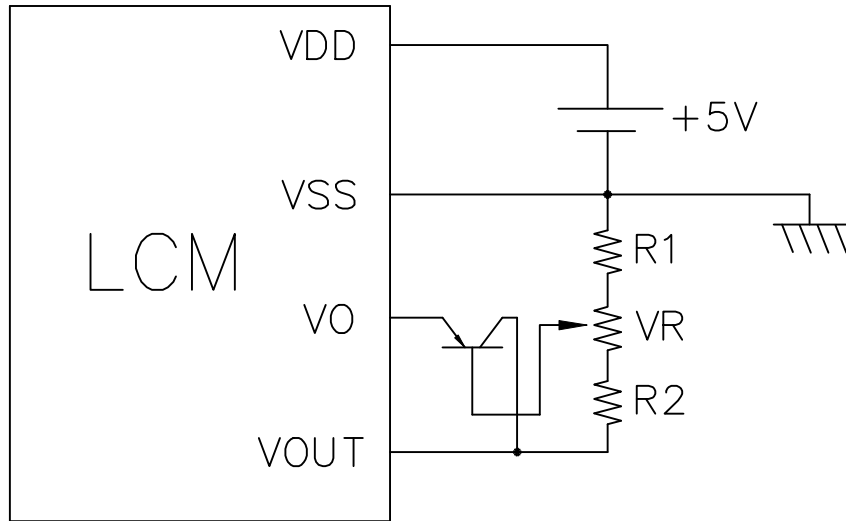
5. BLOCK DIAGRAM



6. INTERNAL PIN CONNECTION

PinNo.	Symbol	Level	Function
1	VSS	-	Power Supply (0V)
2	VDD	-	Power Supply (+5V)
3	V0	-	LCD Driving Voltage
4	VOUT	-	Power Supply
5	A0	H/L	Control/Data Selection
6	E1	H/L	Chip Enable for IC1
7	E2	H/L	Chip Enable for IC2
8	DB0	H/L	Data Bus
9	DB1	H/L	
10	($\overline{\text{RES}}$)	H/L	Reset Control Signal
11	NC	-	Non-Connection
12	DB2	H/L	Data Bus
13	DB3	H/L	
14	DB4	H/L	
15	DB5	H/L	
16	DB6	H/L	
17	DB7	H/L	
18	NC	-	Non-Connection
19	(EL1)	-	EL Backlight Connection
20	(EL2)	-	

7. POWER SUPPLY



$$R1 + VR + R2 = 10 \sim 20K \Omega$$

8. TIMING CHARACTERISTICS

8-1. INTERFACE TIMING

$V_O = -2.7 \sim -4.5V$, $T_a = -20 \sim 70^\circ C$

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
System cycle time (Note 1)	tCYC	Fig.a , Fig.b	2000	-	-	ns
Address setup time	tAW	Fig.a , Fig.b	40	-	-	ns
Address hold time	tAH	Fig.a , Fig.b	20	-	-	ns
Data setup time	tDS	Fig.b	160	-	-	ns
Data hold time	tDH	Fig.b	20	-	-	ns
Output disable time	tOH	Fig.a	20	-	120	ns
Access time	tACC	Fig.a	-	-	180	ns
Enable pulse width (Read)	tEWR	Fig.a	200	-	-	ns
Enable pulse width (Write)	tEWW	Fig.b	160	-	-	ns
Rise and fall time	tr,tf	Fig.a , Fig.b	-	-	15	ns

Note: 1.tCYC6 is the cycle time of $\overline{CS} * E = H$, not the cycle time of E.

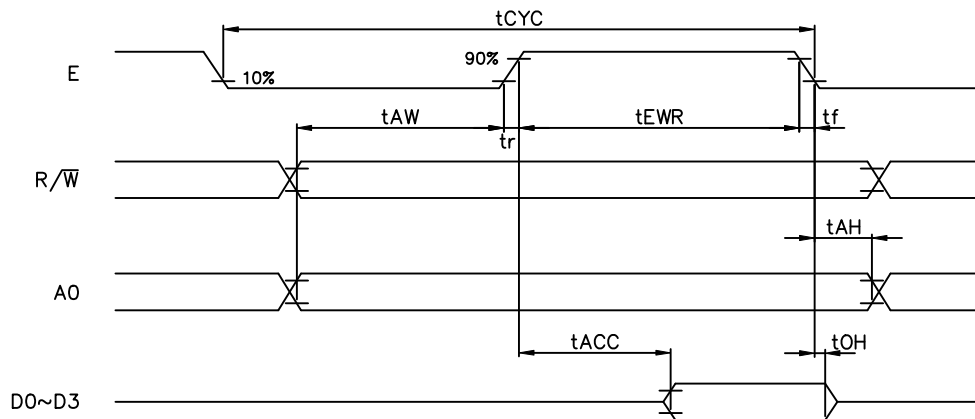


Fig . a Interface timing (Read)

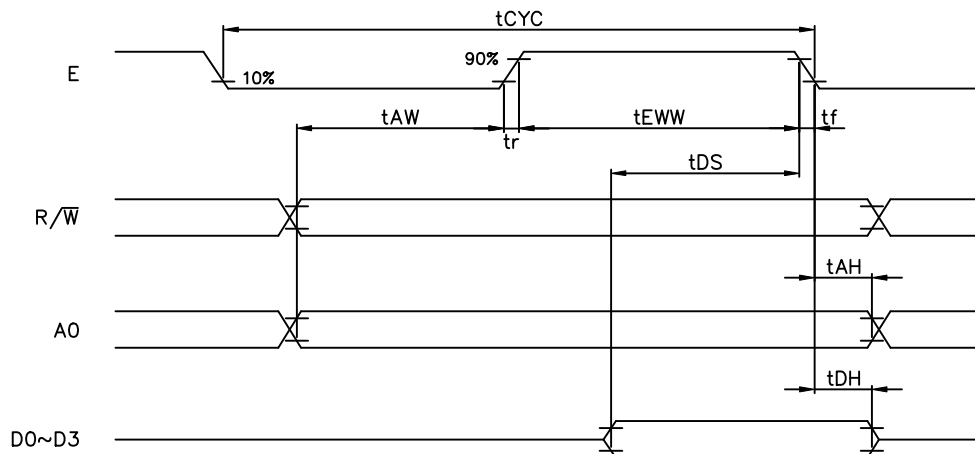
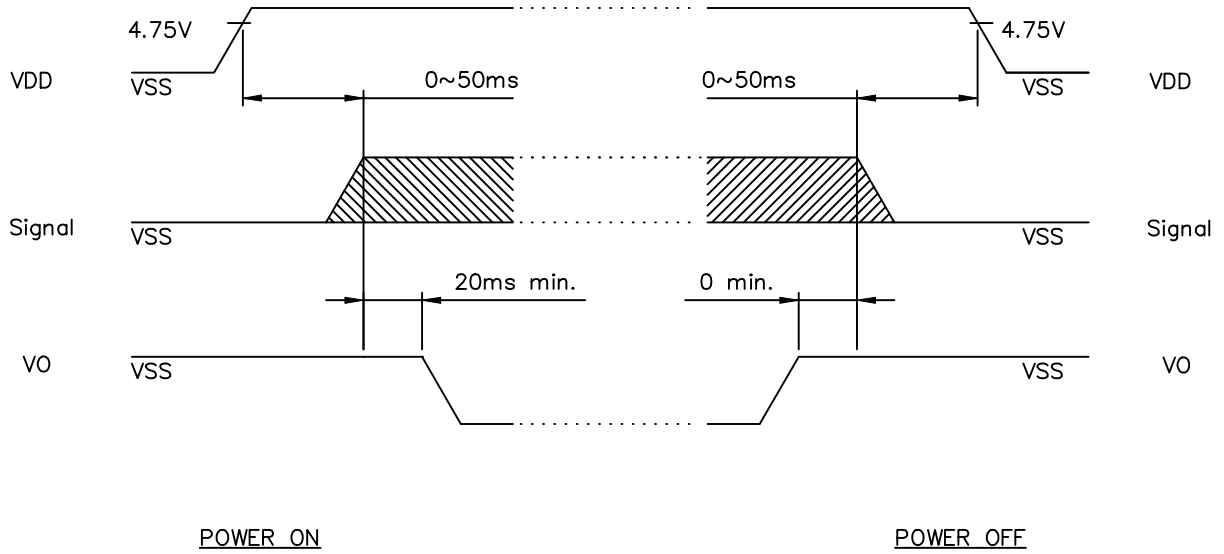


Fig . b Interface timing (Write)

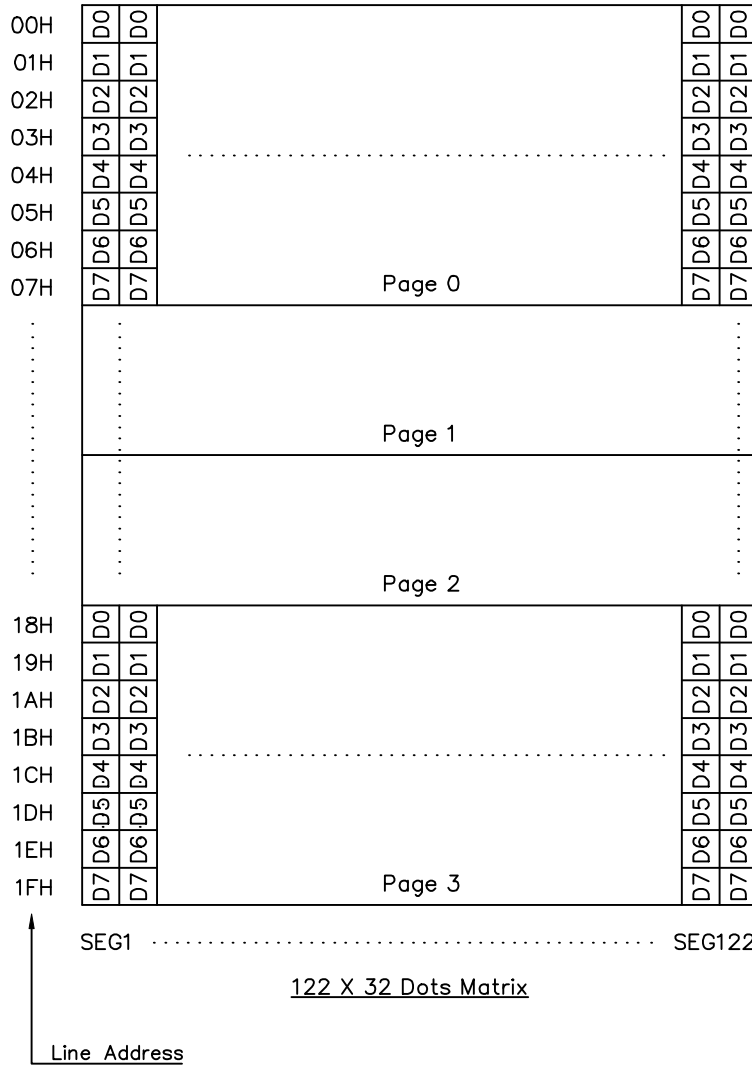
REV/DATE	R0/ 11.07.97'					APP	CHK	BY
----------	------------------	--	--	--	--	-----	-----	----

8-2. POWER ON/OFF TIMING



The missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

9. DISPLAY PATTERN



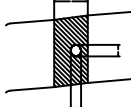
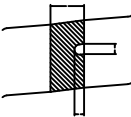
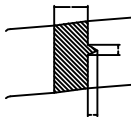
- *The first line of display (COM0) is set by the Display Start Line command.
- *The column addresses of SEG1~SEG61 and SEG62~SEG122 are 3CH~00H of IC1 and IC2 separately.

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 Humidity Storage	40°C 90%RH	120HR		Appearance without defect	
4	Thermal Shock	-20°C,30min → 25°C,5min → 60°C,30min → 25°C,5min (= 1 cycle)			Appearance without defect	5 cycles

11.LCD PRODUCT QUALITY STANDARD

(1) DISPLAY APPEARANCE

NO	ITEM	C R I T E R I A																					
1.	INCLUSIONS (BLACK SPOT , WHITE SPOT , DUST)	<p>(1) ROUND TYPE</p> <table border="1"> <thead> <tr> <th>DIAMETER mm (a*)</th> <th>NO. OF DEFECT*</th> </tr> </thead> <tbody> <tr> <td>a ≦ 0.20</td> <td>NEGLECT</td> </tr> <tr> <td>0.20 < a ≦ 0.35</td> <td>5 MAX</td> </tr> <tr> <td>0.35 < a</td> <td>NONE</td> </tr> </tbody> </table> <p>(2) LINEAR TYPE</p> <table border="1"> <thead> <tr> <th>LENGTH mm(L)</th> <th>WIDTH mm(W)</th> <th>NO. OF DEFECT</th> </tr> </thead> <tbody> <tr> <td>N A</td> <td>W ≦ 0.03</td> <td>NEGLECT</td> </tr> <tr> <td>L ≦ 3</td> <td>0.03 < W ≦ 0.08</td> <td>6</td> </tr> <tr> <td>3 < L</td> <td>0.08 < W</td> <td>NONE</td> </tr> </tbody> </table>		DIAMETER mm (a*)	NO. OF DEFECT*	a ≦ 0.20	NEGLECT	0.20 < a ≦ 0.35	5 MAX	0.35 < a	NONE	LENGTH mm(L)	WIDTH mm(W)	NO. OF DEFECT	N A	W ≦ 0.03	NEGLECT	L ≦ 3	0.03 < W ≦ 0.08	6	3 < L	0.08 < W	NONE
DIAMETER mm (a*)	NO. OF DEFECT*																						
a ≦ 0.20	NEGLECT																						
0.20 < a ≦ 0.35	5 MAX																						
0.35 < a	NONE																						
LENGTH mm(L)	WIDTH mm(W)	NO. OF DEFECT																					
N A	W ≦ 0.03	NEGLECT																					
L ≦ 3	0.03 < W ≦ 0.08	6																					
3 < L	0.08 < W	NONE																					
2.	SCRATCH	<p>1.SCRATCH ON PROTECTIVE FILM IS PERMITTED . 2.SCRATCH ON POLARIZER SHALL BE AS FOLLOW: (1) ROUND TYPE</p> <table border="1"> <thead> <tr> <th>DIAMETER mm (a*)</th> <th>NO. OF DEFECT*</th> </tr> </thead> <tbody> <tr> <td>a ≦ 0.15</td> <td>NEGLECT</td> </tr> <tr> <td>0.15 < a ≦ 0.20</td> <td>2 MAX</td> </tr> <tr> <td>0.20 < a</td> <td>NONE</td> </tr> </tbody> </table> <p>(2) LINEAR TYPE BE JUDGED BY 1.-(2) LINEAR TYPE</p>		DIAMETER mm (a*)	NO. OF DEFECT*	a ≦ 0.15	NEGLECT	0.15 < a ≦ 0.20	2 MAX	0.20 < a	NONE												
DIAMETER mm (a*)	NO. OF DEFECT*																						
a ≦ 0.15	NEGLECT																						
0.15 < a ≦ 0.20	2 MAX																						
0.20 < a	NONE																						
3.	DENT	DIAMETER < 1.5mm																					
4.	BUBBLE	NOT EXCEEDING 0.5mm AVERAGE DIAMETER IS ACCEPTABLE BETWEEN GLASS AND POLARIZING FILM.																					
5.	PIN HOLE	<p>(a+b)/2 ≦ 0.15 mm MAXIMUM NUMBER:IGNORED 0.15 < (a+b)/2 ≦ 0.20 MAXIMUM NUMBER:10</p>																					
6.	DOT DEFECT	<p>(a+b)/2 ≦ 0.20 mm MAXIMUM NUMBER:IGNORED 0.20 < (a+b)/2 ≦ 0.30 MAXIMUM NUMBER:5 x = WIDTH</p>	 																				
7.	CONTRAST IRREGULARITY (SPOT)	<p>DIAMETER SPEC.</p> <p>a ≦ 0.50 mm 0.50 < a ≦ 0.75 0.75 < a ≦ 1.00 1.00 < a</p>	<p>NO. OF DEFECT*</p> <p>NEGLECT 5 3 NONE</p>																				
8.	DOT WIDTH	DESIGN WIDTH±15%																					
9.	COLOR TONE AND UNIFORMITY	OBVIOUS UNEVEN COLOR IS NOT PERMITTED																					

ELEC. MATERIALS DIV. LCD DEPARTMENT	SPECIFICATION	SPEC. NO. : LM036-0 DATE : Nov. 07, 1997 SHEET NO. : 16/17
--	---------------	--

(2) NOTE:

- SAFETY
 - 1.If the LCD panel breaks, be careful not to allow 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.Prevent all contact with static electricity, which can damage the CMOS ICs. The module is packaged in a static-shielding bag to prevent damage during shipment, warehousing and removal from the shipping carton.
 - 2.Do not remove the panel or frame from the module.
 - 3.The polarizing plate on the front surface of the display is very fragile and easily scratched. The module is shipped with a protective liner which must be removed from the polarizing plate prior to assembly.
 - 4.Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of polarizing plate.
 - 5.Do not use ketonics solvent or aromatic solvent on the polarizing plate. Use a soft cloth soaked with plastic-lens cleaning solution.

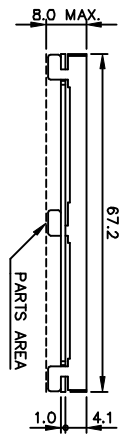
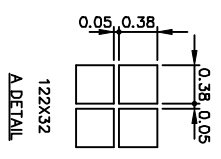
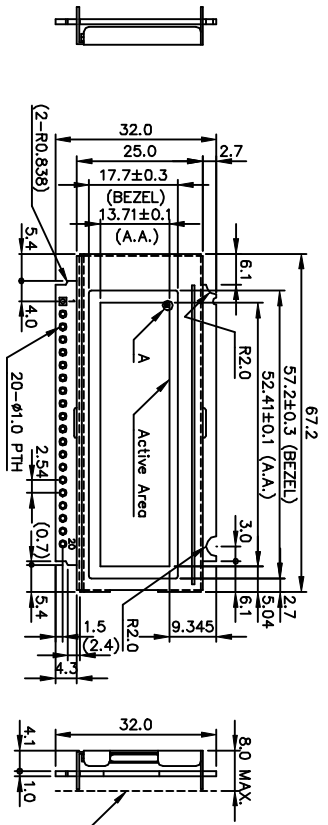
- STORAGE
 - 1.Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C}\pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.
 - 2.Do not place the module near organics solvents or corrosive gases.
 - 3.Do not crush, shake, or jolt the module.

- TERMS OF WARRANTY
 - 1.Acceptance inspection period
The inspection period is within one month after the arrival of the contracted goods at the buyer's factory site.
 - 2.Applicable warranty period
The warranty period is within twelve months from the date of invoice under normal usage and storage conditions.

- TYPICAL OPERATING LIFETIME OF BACKLIGHT
 - LED : 50,000HR
 - EL : 5,000HR
 - CCFT : 10,000HR

REV/DATE	RO/ 11.07.97'					APP	CHK	BY
----------	------------------	--	--	--	--	-----	-----	----

Pin No.	Symbol	Description
1	VSS	Power Supply (GND)
2	VDD	Power Supply
3	VO	LCD Driving Voltage
4	VOUT	Power Supply (-5V)
5	A0	Control/Data Selection
6	E1	Chip Enable for IC1
7	E2	Chip Enable for IC2
8	DB0	Data Bus
9	DB1	Data Bus
10	(RES)	Reset Control Signal
11	NC	Non-Connection
12	DB2	Data Bus
13	DB3	Data Bus
14	DB4	Data Bus
15	DB5	Data Bus
16	DB6	Data Bus
17	DB7	Data Bus
18	NC	Non-Connection
19	(EL1)	EL Backlight Connection
20	(EL2)	EL Backlight Connection



3.GENERAL TOLERANCE : ±0.5mm

- NOTES:
- 1.RESOLUTION : 122X32 Dots
 - 2.DOT SIZE : 0.38mmX0.38mm
 - 3.GENERAL TOLERANCE : ±0.5mm
 - 4.CONTROLLER: SED1520

產品編號	LMA63_036_M	南亞塑膠工業股份有限公司
NAME		NAN YA PLASTICS CORPORATION
DATE		
APPROVE		製圖
CHECK		DWG-NO MA-X036XM
DESIGN		Rev.A
DRAWN	MAY PING	86.11.07
		UNIT : mm
		SCALE : 2/3