

NAN YA PLASTICS CORP. ELEC. MATERIALS DIV. LCD DEPARTMENT	SPECIFICATION	SPEC. NO. : LM042-1 DATE : Nov.6.1997 SHEET NO. : 1/17
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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.: LM_84_042____

SPEC. NO.: LM042-1

APPROVED BY

EDITED ON : Nov.6.1997

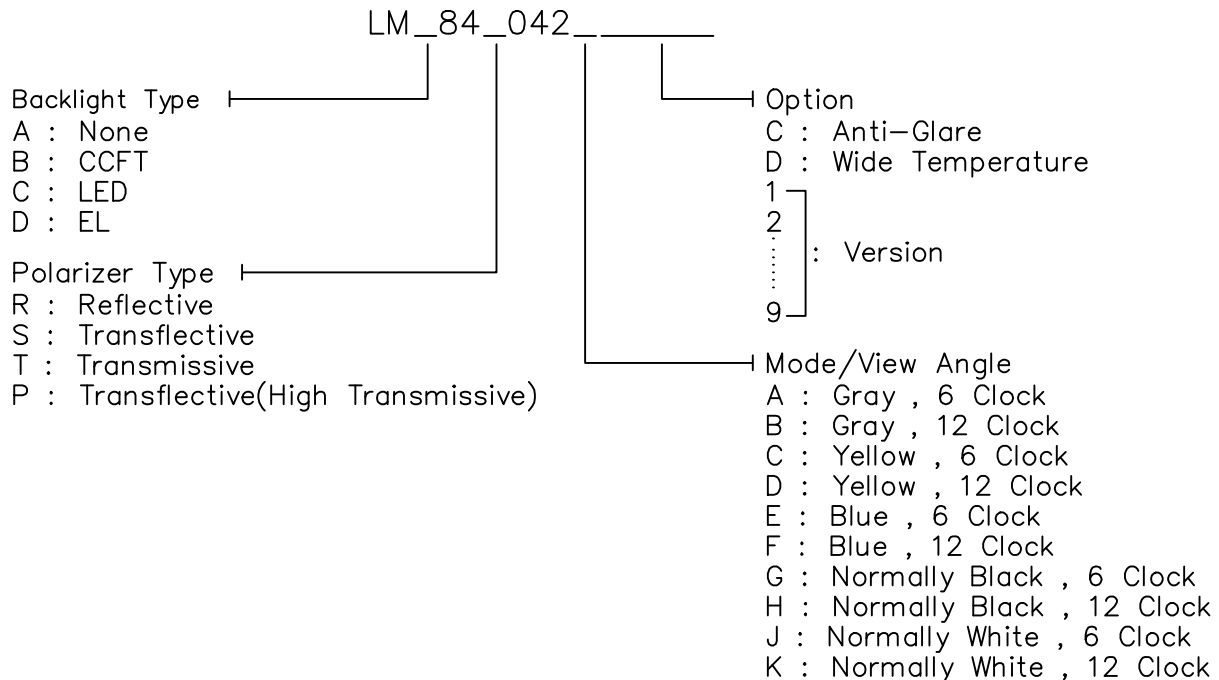
SALES MANAGER	DESIGN MANAGER	PERSON IN CHARGE

REV/DATE	R0/ 11.6.97'	R1/ 07.17.98'				APP	CHK	BY
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1. MECHANICAL DATA

- (1) Product No. LM_84_042_ _____
- (2) Module Size 84.0 (W)mm x 44.0 (H)mm x MAX13.0 (D)mm
(LED B.L.)
84.0 (W)mm x 44.0 (H)mm x MAX9.0 (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 Blue Mode
FSTN: Black and White(Normal White/Positive Image)
 Black and White(Normal Black/Negative Image)
Rear Polarizer: Reflective Transflective Transmissive
- (8) Viewing Direction 6 O'clock 12 O'clock ___O'clock
- (9) Backlight W/O LED B/L EL B/L
- (10) LCD Controller SED1520DAA
- (11) Weight W/O B/L: 26.5 g
EL B/L: 28.0 g
LED B/L: 37.0 g

Note :



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2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

V_{SS}=0V

	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	6.5	V	
Input Voltage	V _I	-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 $T_a \leq 50^\circ\text{C}$: 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.

Note 4 $T_a \leq 70^\circ\text{C}$: 75%RH max
 $T_a > 70^\circ\text{C}$: Absolute humidity must be lower
 than the humidity of 75%RH at 70°C

Note 5 T_a at -30°C will be < 48hrs, at 80°C will be < 120hrs

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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 (LOW VOLTAGE. LCM)	VDD-V0	DUTY= 1/32 Bias= 1/4	0°C	-	-	-	V
			25°C	4.2	4.6	5.0	
			50°C	-	-	-	
Recommended LC Driving Voltage (NORMAL TEMP. LCM)	VDD-V0		0°C	-	5.4	6.0	V
			25°C	4.4	4.9	5.3	
			50°C	3.9	4.3	-	
Recommended LC Driving Voltage (WIDE TEMP. LCM)	VDD-V0		-20°C	-	6.5	7.2	V
			0°C	-	-	-	
			25°C	5.8	6.3	6.8	
			50°C	-	-	-	
		70°C	5.4	5.7	-		
Power Supply Current	IDD	VDD = 5.0V	-	-	2.8	mA	
LED Power Supply Current	ILED	VBL = 5VDC (RBL = 5Ω) (RBL = 10Ω)	-	143	-	mA	
			-	95	-		
EL Power Supply Current	IEL	VBL = 110VAC 400Hz	-	-	5.0	mA	

4. OPTICAL CHARACTERISTICS

(FOR NORMAL TEMPERATURE MODE LCM)

AT Vop

MODE	ITEM	Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	3	4.6	40	80	25	34
	C	5	9	50	80	25	36
	J						
S	A	3	4	40	75	25	32
	C	4.5	9	40	70	25	30
	J						
T	E						
	G						
NOTE		NOTE6		NOTE5			

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	-	580	1200	ms	NOTE 2
		25℃	-	220	450		
		50℃	-	140	280		
Response Time (fall)	Tf	0℃	-	760	1500	ms	NOTE 2
		25℃	-	170	350		
		50℃	-	90	200		

NOTE :

R: REFLECTIVE
S: TRANSFLECTIVE
T: TRANSMISSIVE
A: GRAY
C: YELLOW
E: BLUE
G: NORMALLY BLACK
J: NORMALLY WHITE

REV/DATE	R0/ 11.6.97'	R1/ 07.17.98'				APP	CHK	BY
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4-1. OPTICAL CHARACTERISTICS

(FOR WIDE TEMPERATURE MODE LCM)

AT Vop

MODE	ITEM	Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25 τ		25 τ		25 τ	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	4	4.4	30	35	20	25
	C						
	J						
S	A	3.5	4.2	25	32	20	25
	C						
	J						
T	E						
	G						
NOTE		NOTE6		NOTE5			

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20 τ	-	1100	2200	ms	NOTE 2
		0 τ	-	-	-		
		25 τ	-	90	200		
		50 τ	-	-	-		
		70 τ	-	40	80		
Response Time (fall)	Tf	-20 τ	-	2400	4800	ms	NOTE 2
		0 τ	-	-	-		
		25 τ	-	170	350		
		50 τ	-	-	-		
		70 τ	-	60	120		

NOTE :

R: REFLECTIVE
S: TRANSFLECTIVE
T: TRANSMISSIVE
A: GRAY

C: YELLOW
E: BLUE
G: NORMALLY BLACK
J: NORMALLY WHITE

REV/DATE	R0/ 11.6.97'	R1/ 07.17.98'				APP	CHK	BY
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4-2.OPTICAL CHARACTERISTICS

(FOR LOW VOLTAGE MODE LCM)

AT Vop

MODE	ITEM	Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25 τ		25 τ		25 τ	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A						
	C						
	J						
S	A		4.0		103		58
	C						
	J						
T	E						
	G						
NOTE		NOTE6		NOTE5			

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20 τ	-	-	-	ms	NOTE 2
		0 τ	-	-	-		
		25 τ	-	250	375		
		50 τ	-	-	-		
		70 τ	-	-	-		
Response Time (fall)	Tf	-20 τ	-	-	-	ms	NOTE 2
		0 τ	-	-	-		
		25 τ	-	150	225		
		50 τ	-	-	-		
		70 τ	-	-	-		

NOTE :

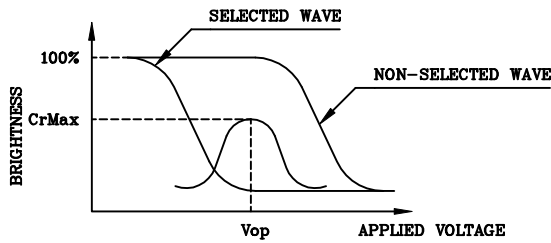
R: REFLECTIVE
S: TRANSFLECTIVE
T: TRANSMISSIVE
A: GRAY

C: YELLOW
E: BLUE
G: NORMALLY BLACK
J: NORMALLY WHITE

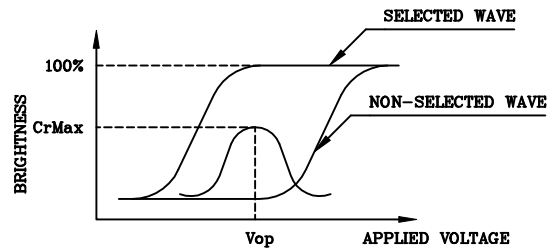
REV/DATE	R0/ 11.6.97'	R1/ 07.17.98'				APP	CHK	BY
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(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



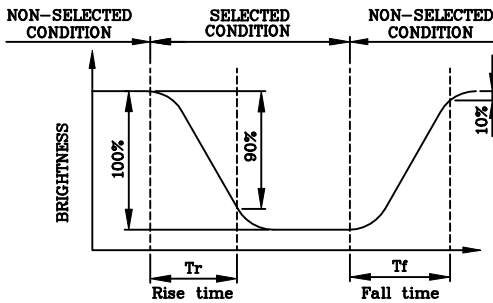
(negative type)

*Conditions

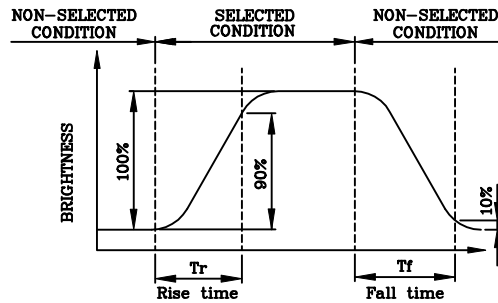
Viewing Angle : 0
Frame Frequency : 70Hz
Applied Waveform : 1/N duty, 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



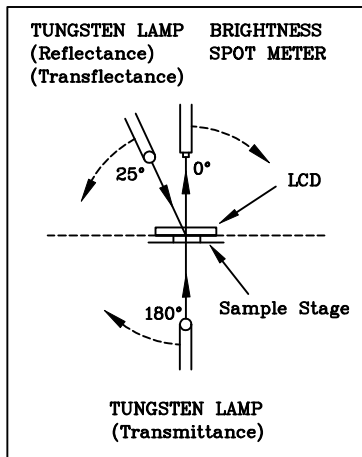
(negative type)

*Conditions

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

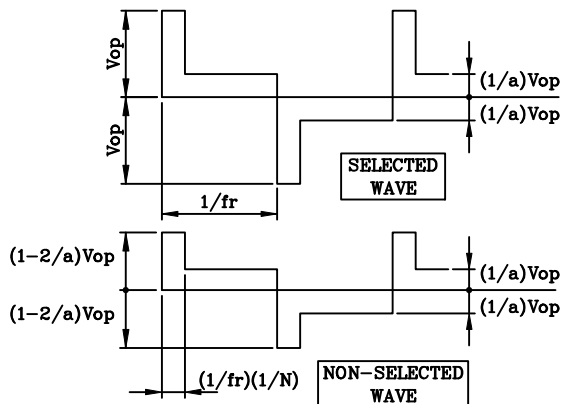
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



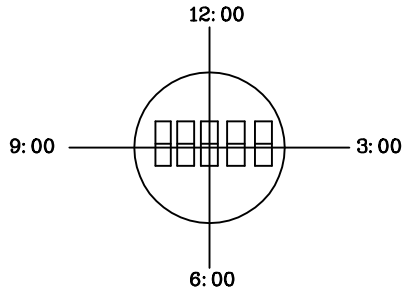
CONST.
TEMP.
CHAMBER

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



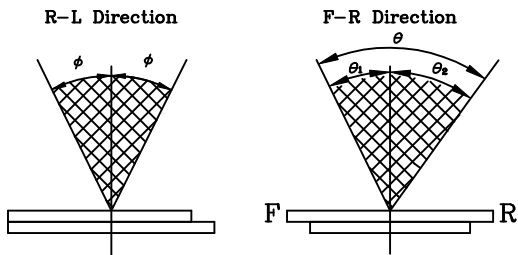
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



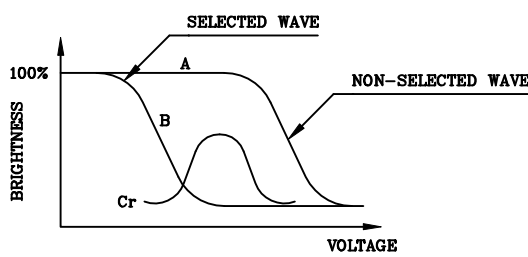
$$\theta = \theta_1 + \theta_2$$

*Conditions

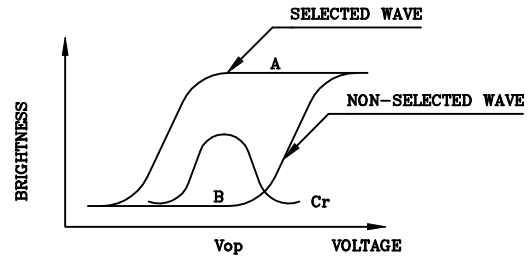
- Operating Voltage : V_{op}
- Frame Frequency : 70Hz
- Applied Waveform : 1/N duty, 1/a bias
- Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



(negative type)

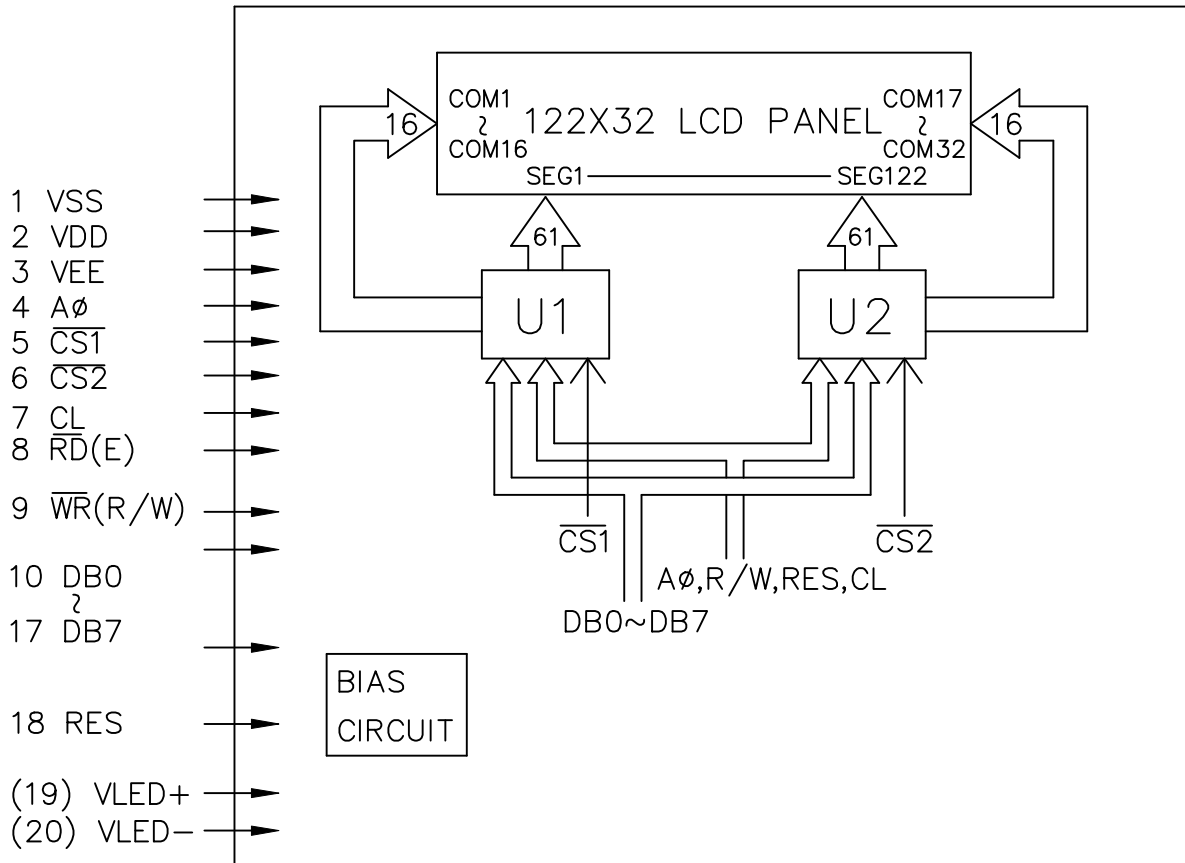
$$\text{Contrast Ratio : } Cr = A/B$$

*Conditions

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

REV/DATE	R0/ 11.6.97'	R1/ 07.17.98'				APP	CHK	BY
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5. BLOCK DIAGRAM

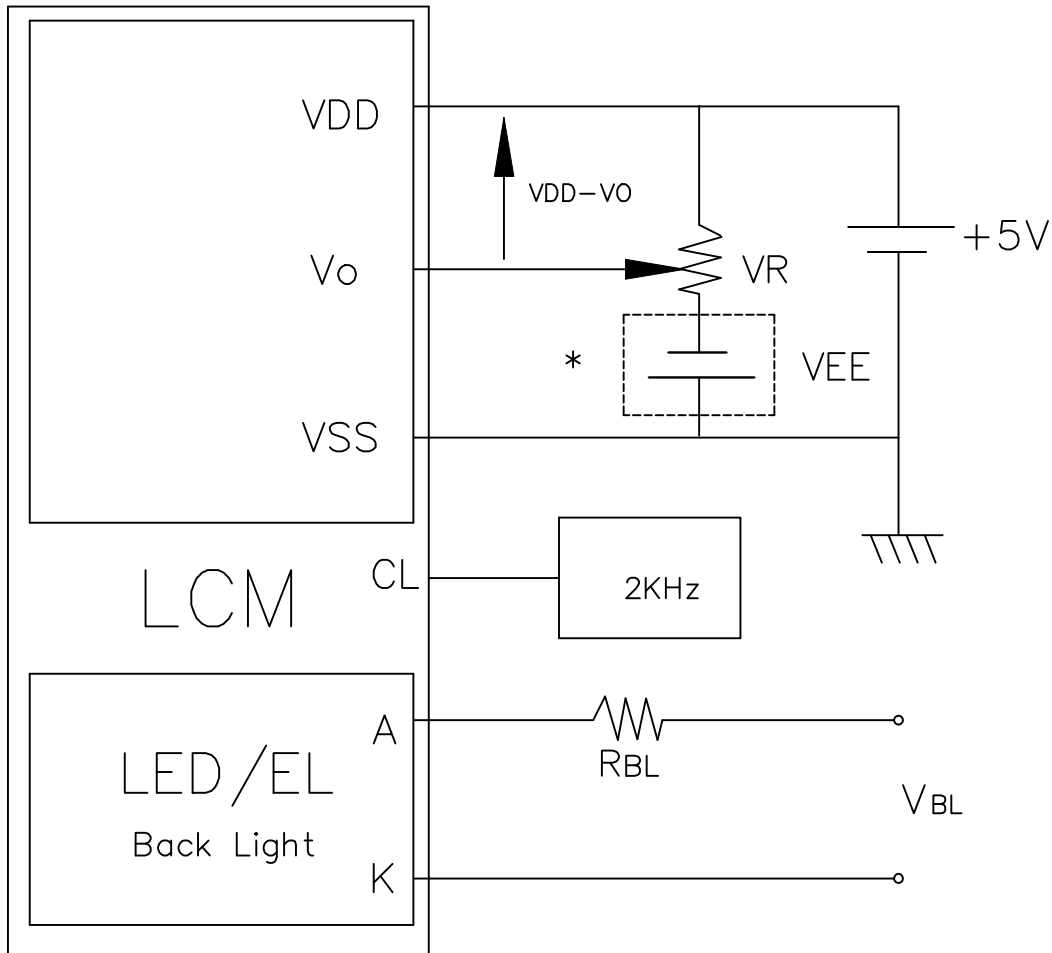


REV/DATE	R0/ 11.6.97'	R1/ 07.17.98'				APP	CHK	BY
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6. INTERNAL PIN CONNECTION

PinNo.	Symbol	Level	Function
1	VSS	—	GROUND
2	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
3	VEE	—	POWER SUPPLY FOR LCD
4	A \emptyset	H/L	L→INSTRUCTION H→DATA
5	$\overline{CS2}$	L	CHIP ENABLE ACTIVE "L"
6	$\overline{CS1}$	L	CHIP ENABLE ACTIVE "L"
7	CL	H/L	EXTERNAL CLOCK(2KHZ)
8	$\overline{RD}(E)$	—	\overline{RD} FOR 80 SERIE, E FOR 68 SERI
9	$\overline{WR}(R/W)$	—	\overline{WR} FOR 80 SERI, R/W FOR 68 SERI
10	DB0	H/L	DATA BUS LINE
11	DB1	H/L	
12	DB2	H/L	
13	DB3	H/L	
14	DB4	H/L	
15	DB5	H/L	
16	DB6	H/L	
17	DB7	H/L	
18	RES	H/L	L→80 SERIES H→68 SERIES
(19)	VLED+	—	POWER SUPPLY FOR LED BACK LIGHT
(20)	VLED-	—	

7. POWER SUPPLY



$VR = 20K\Omega$ (Variable)
 $VEE = 3\sim 5V$

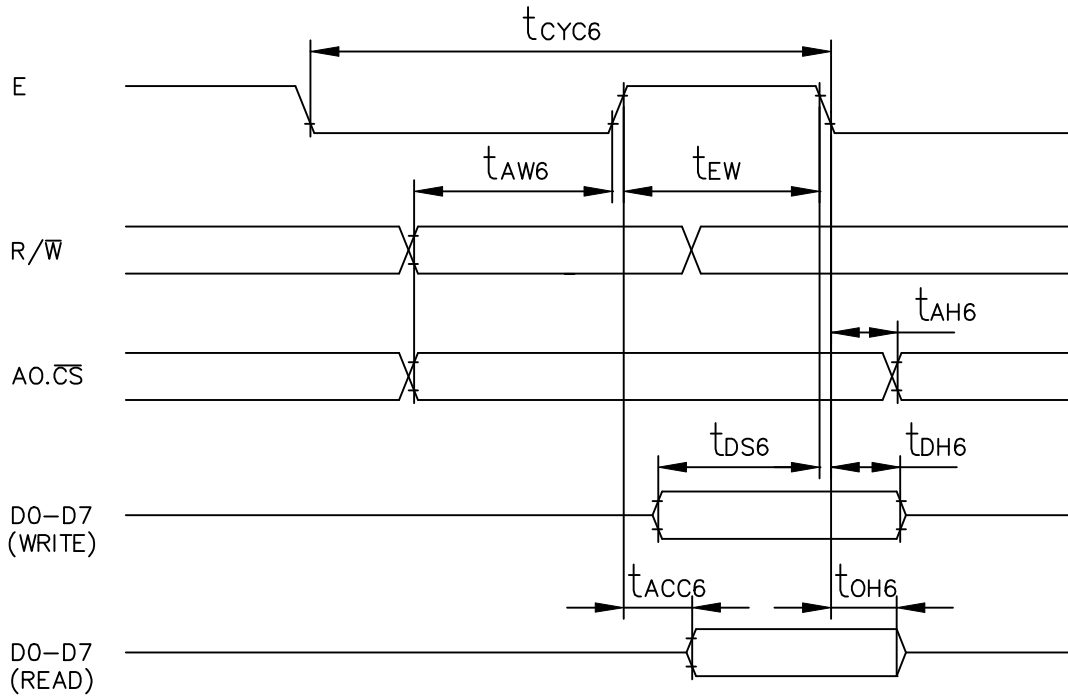
Recommended Value for RBL and VBL

ITEM Back Light	RBL		VBL	
	LED	EL	LED	EL
Interface				
20 PIN	0Ω	0Ω	5V	110V _{AC} 400Hz

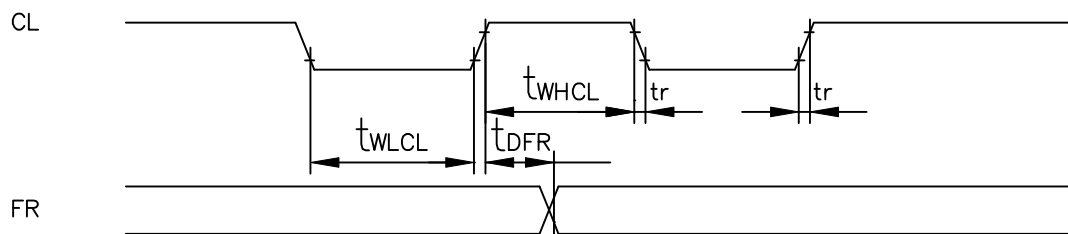
8. TIMING CHART

Item	Signal	Symbol	Condition	Min	Typ	Max	Unit
LOW pulse width	CL	tWLCL		35	-	-	μ s
HIGH pulse width		tWHCL		35	-	-	μ s
Rising time		tr		-	30	150	ns
Falling time		tf		-	30	150	ns
FR delay time	FR	tDFR	(Input timing)	-2.0	0.2	2.0	μ s
			(Output timing), CL=100pF		0.2	0.4	

○Read/write timing for the 68-port MPU



○Control timing for 80-port/68-port display



9. 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

REV/DATE

R0/
11.6.97'

R1/
07.17.98'

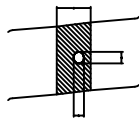
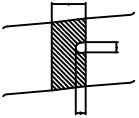
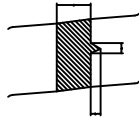
APP

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BY

10.LCD PRODUCT QUALITY STANDARD

(1) DISPLAY APPEARANCE

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

(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.

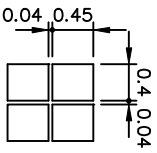
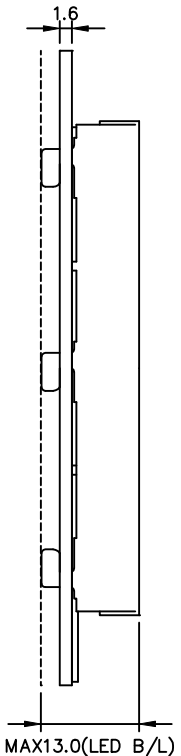
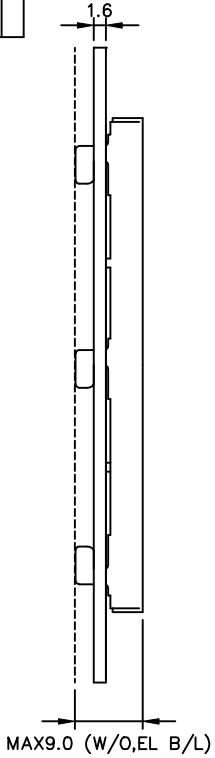
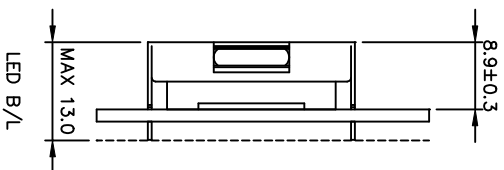
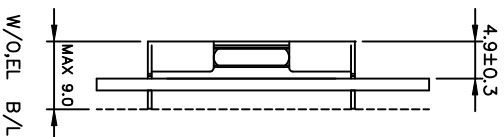
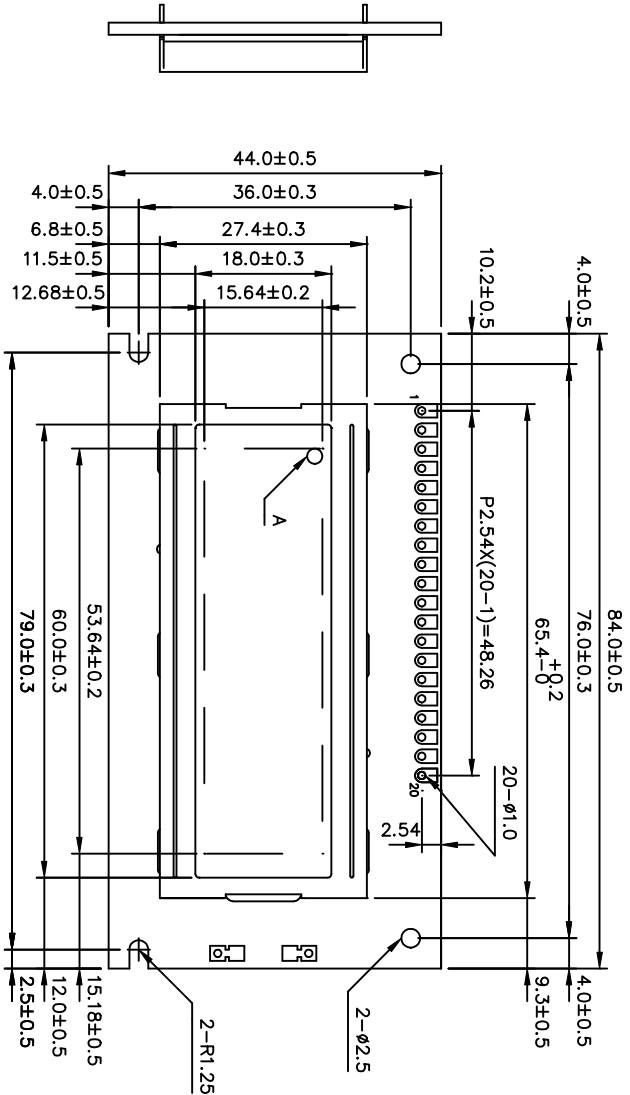
• TERMS OF WARRANTY

- 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

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PinNo.	Symbol	Level	Function
1	VSS	-	GROUND
2	VDD	-	POWER SUPPLY FOR LOGIC CIRCUIT
3	VEE	-	POWER SUPPLY FOR LED
4	A $\bar{0}$	H/L	L-INSTRUCTION H=DATA
5	CS1	L	CHIP ENABLE ACTIVE "L"
6	CS2	L	CHIP ENABLE ACTIVE "L"
7	CL	H/L	EXTERNAL CLOCK(SHIFT)
8	RD(E)	-	RD FOR 80 SERIAL FOR 88 SERI
9	WR(R/W)	-	WR FOR 80 SERIAL FOR 88 SERI
10	DB0	H/L	DATA BUS LINE
11	DB1	H/L	
12	DB2	H/L	
13	DB3	H/L	
14	DB4	H/L	
15	DB5	H/L	L=+80 SERIAL, H=+88 SERIAL
16	DB6	H/L	
17	DB7	H/L	
18	RES	H/L	POWER SUPPLY FOR LED BACK LIGHT
19	VED+	-	
20	VED-	-	

Note :
1. Resolution : 122X32 Dots

產品編號	LM_84_042	南亞塑膠工業股份有限公司
APPREVE	NAME	NAN YA PLASTICS CORPORATION
CHECK	DATE	製圖圖
DESIGN		DWG-NO
DRAW	MAY PING86.11.6	MXAX042X
		Rev.A
		UNIT : mm
		SCALE : 1/1
		THIRD ANGLE PROJECT