

NAN YA PLASTICS CORP.  
ELEC. MATERIALS DIV.  
LCD DEPARTMENT

# SPECIFICATION

SPEC. NO. : LMA23-0  
DATE : Dec. 10, 1998  
SHEET NO. : 1/19

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  
640x200 LCD MODULE  
PRODUCT NO.: LTAM8RA23JP

SPEC. NO.: LMA23-0

CUSTOMER
APPROVED BY
DATE:

EDITED ON : Dec.10.1998

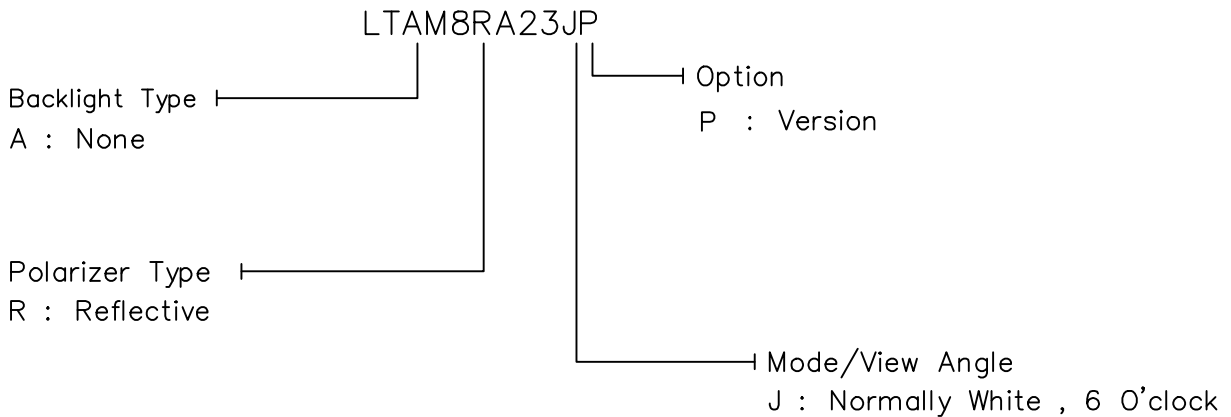
SALE MANAGER	TECHNICAL APPROVE	DESIGN MANAGER	DESIGN CHECK	DESIGNER

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# 1. MECHANICAL DATA

(1) Product No.	LTAM8RA23JP
(2) Module Size	210.6 (W)mm x 89.9 (H)mm x 2.8 (D)mm
(3) Dot Size	0.24 (W)mm x 0.30 (H)mm
(4) Dot Pitch	0.27 (W)mm x 0.33 (H)mm
(5) Number of Dots	640 (W) x 200 (H)Dots
(6) Duty	1/200
(7) LCD Display Mode	FSTN: Black and White(Normally White/Positive Image) Rear Polarizer: Reflective
(8) Viewing Direction	6 O'clock
(9) Backlight	Without
(10) Controller	Excluded
(11) DC/DC Converter	Excluded
(12) Weight	approx. 100g

Note :



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## 2. ABSOLUTE MAXIMUM RATINGS

### (1) ELECTRICAL ABSOLUTE RATINGS

VSS=0 V Standard

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	6.5	V	
Input Voltage	V0-VSS	0	27	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.
Ambient Temperature	0	50	-20	70
Humidity (Without Condensation)	Note 2,4		Note 3,4	

Note 2 Ta < 50°C : 85%RH max

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

Note 3 Ta at -20°C will be < 48hrs, at 70°C will be < 120hrs

Note 4 Background color will change slightly depending on ambient temperature.  
 That phenomenon is reversible.

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### 3. ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Power Supply for Logic	VDD-VSS	-		2.7	3.0	3.3	V
				4.75	5.0	5.25	V
Input Voltage	VIL	L level		VSS	-	0.2VDD	V
	VIH	H level		0.8VDD	-	VDD	V
LCM Recommend LCD Module Driving Voltage	V0-VSS	Duty=1/200 Bias=1/13	0°C	22.0	22.4	22.8	V
			25°C	21.3	21.7	22.1	
			50°C	19.5	19.9	20.3	
Power Supply Current for LCM	IDD	VDD=3~5V V0-VSS=21.7V FLM=70Hz		-	0.3	-	mA
	I0			-	5.8	-	

# 4. OPTICAL CHARACTERISTICS

AT Vop

ITEM		Cr(Contrast Ratio)		$\theta$ (Viewing Angle)		$\phi$ (Viewing Angle)	
		25°C		25°C		25°C	
MODE		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
	R	J	4	8	-	50	-
NOTE		FIG6		FIG5			

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0°C	-	340	680	ms	FIG 2
		25°C	-	120	240		
		50°C	-	90	180		
Response Time (fall)	Tr	0°C	-	370	710	ms	FIG 2
		25°C	-	170	290		
		50°C	-	80	170		

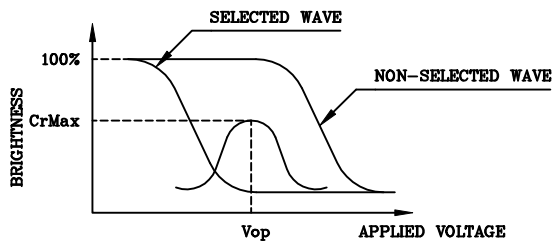
NOTE :

R: REFLECTIVE

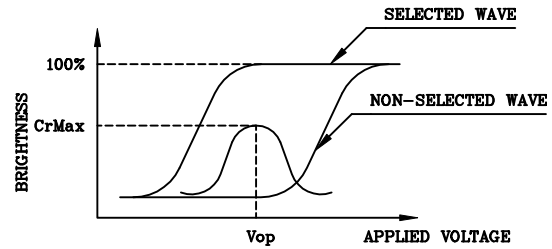
J: NORMALLY WHITE

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



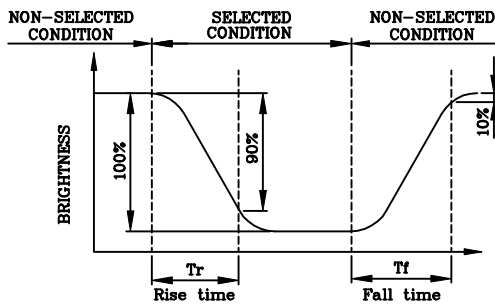
(negative type)

\*Conditions

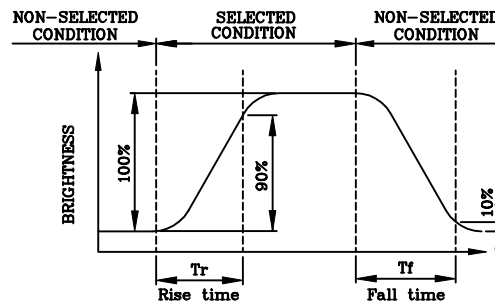
Viewing Angle : 0  
Frame Frequency : 70Hz  
Applied Waveform : 1/N duty, 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



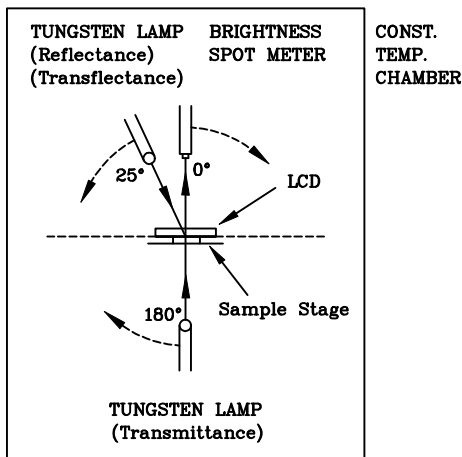
(negative type)

\*Conditions

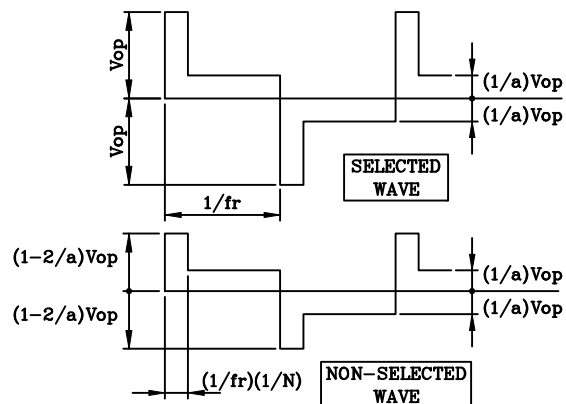
Operating Voltage : Vop  
Viewing Angle (θ,φ) : (0,0)  
Frame Frequency : 70Hz  
Applied Waveform : 1/N duty, 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms

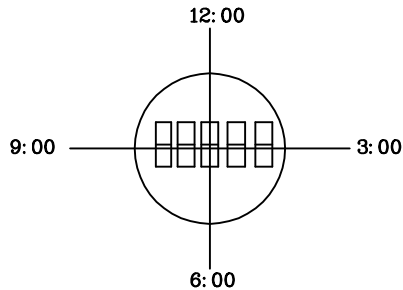


Multiplex Driving ( 1/N duty, 1/a bias )



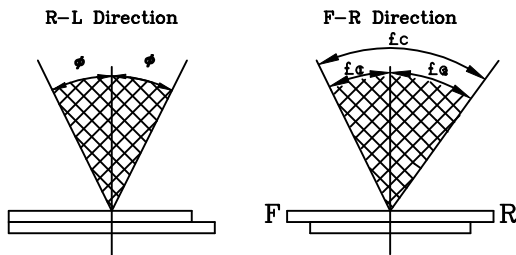
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle

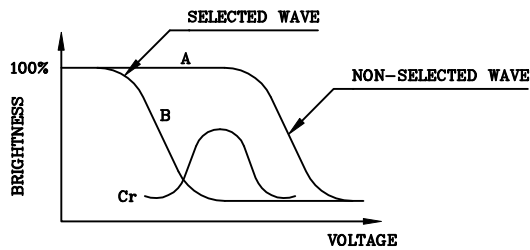


\*Conditions

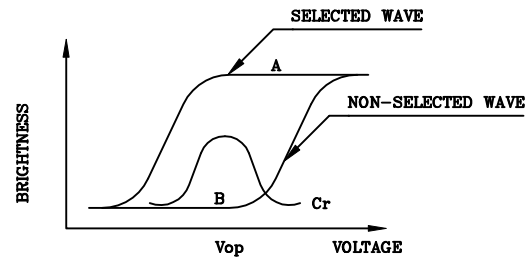
Operating Voltage :  $V_{op}$   
 Frame Frequency : 70Hz  
 Applied Waveform : 1/N duty, 1/a bias  
 Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



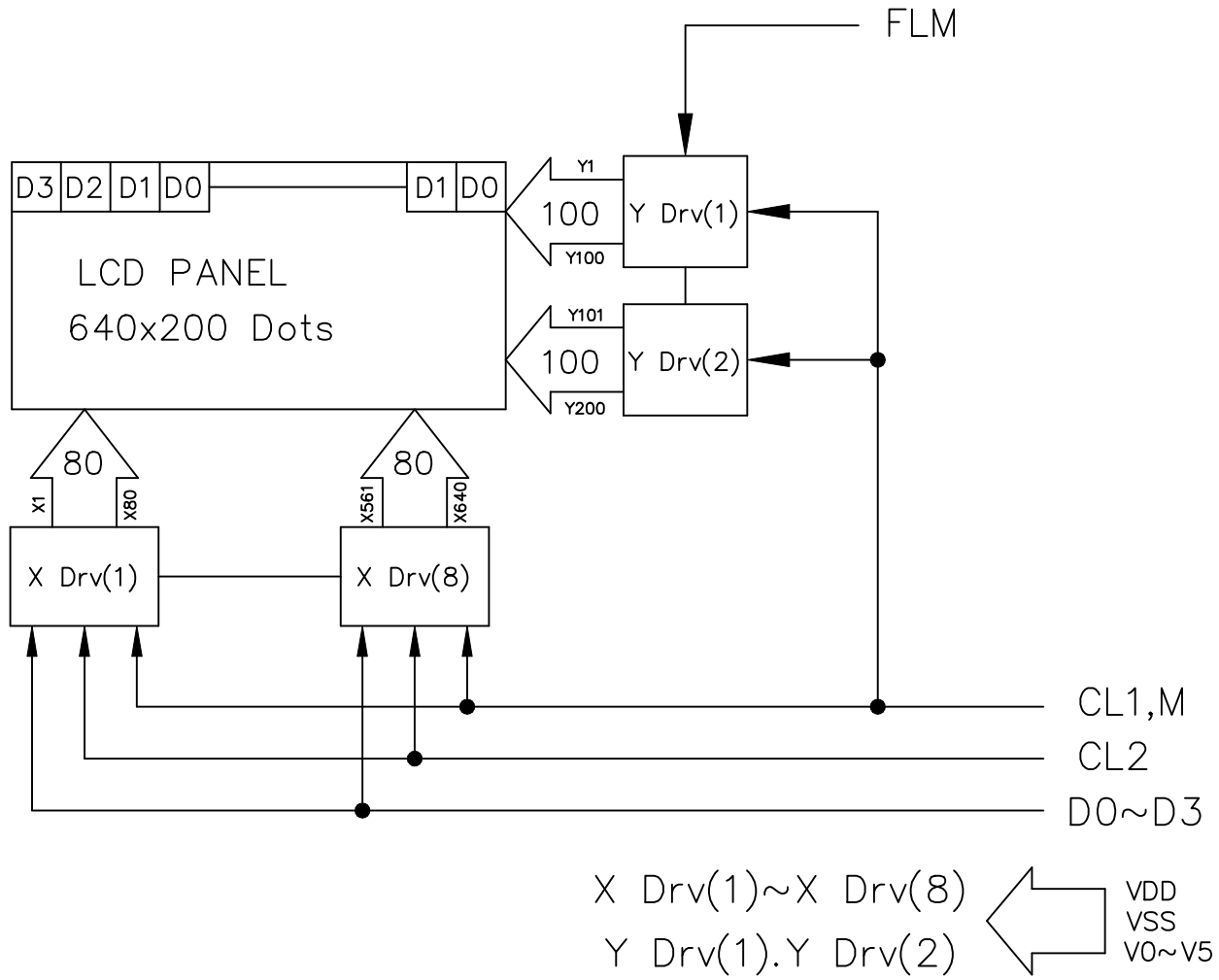
(negative type)

Contrast Ratio :  $Cr = A/B$

\*Conditions

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

# 5. BLOCK DIAGRAM

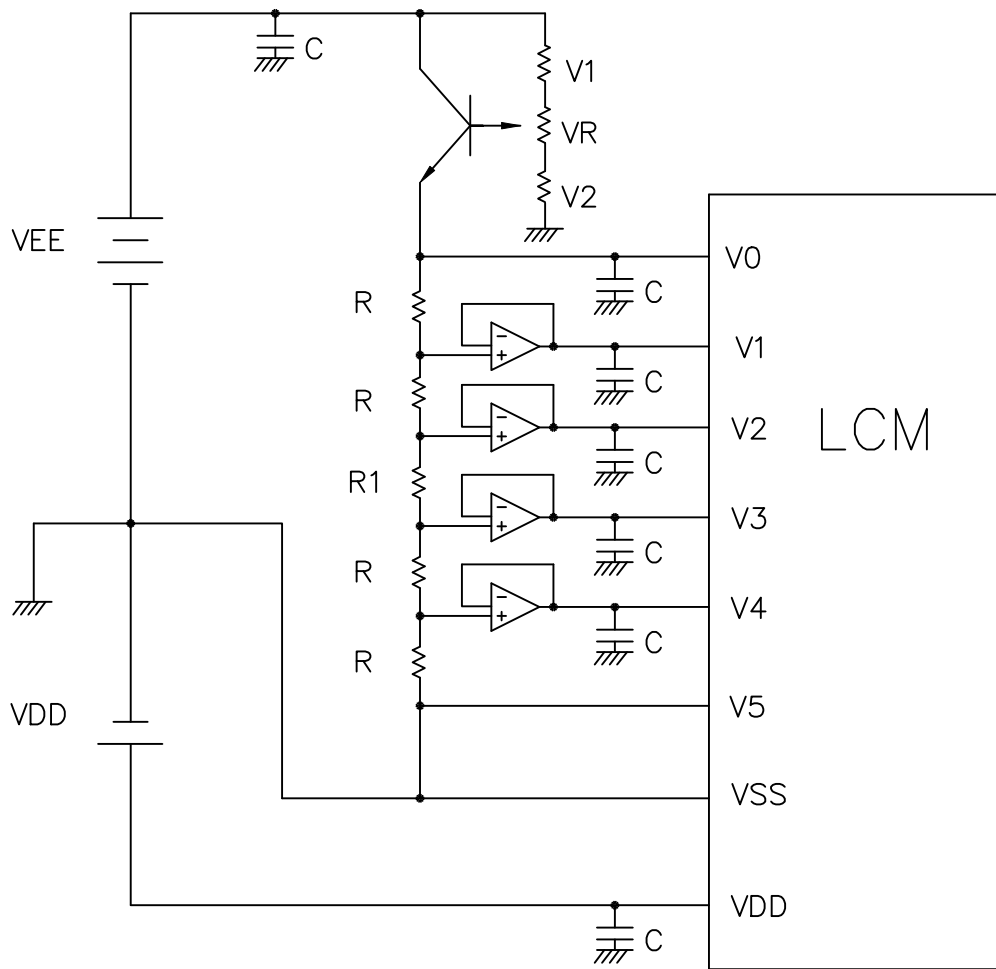




## 6. INTERNAL PIN CONNECTION

Pin No.	Symbol	Function	Level
1	VDD	Power supply for logic (+2.5~+5.5V)	
2	VSS	Power supply (GND)	
3	FLM	First line marker	H
4	CL1	Display data latch clock	H → L
5	CL2	Display data shift clock	H → L
6	M	Control signal for AC driving	H/L
7	D0	Display data	H/L
8	D1	Display data	H/L
9	D2	Display data	H/L
10	D3	Display data	H/L
11	V0	Power supply for LCD(COM,SEG selected level)	
12	V1	Power supply for LCD(COM non-selected level)	
13	V2	Power supply for LCD(SEG non-selected level)	
14	V3	Power supply for LCD(SEG non-selected level)	
15	V4	Power supply for LCD(COM non-selected level)	
16	V5	Power supply for LCD(COM,SEG selected level)	

# 7. POWER SUPPLY



RECOMMENDED :

$$R1 = 9R$$

$$C = 3.3\mu F$$

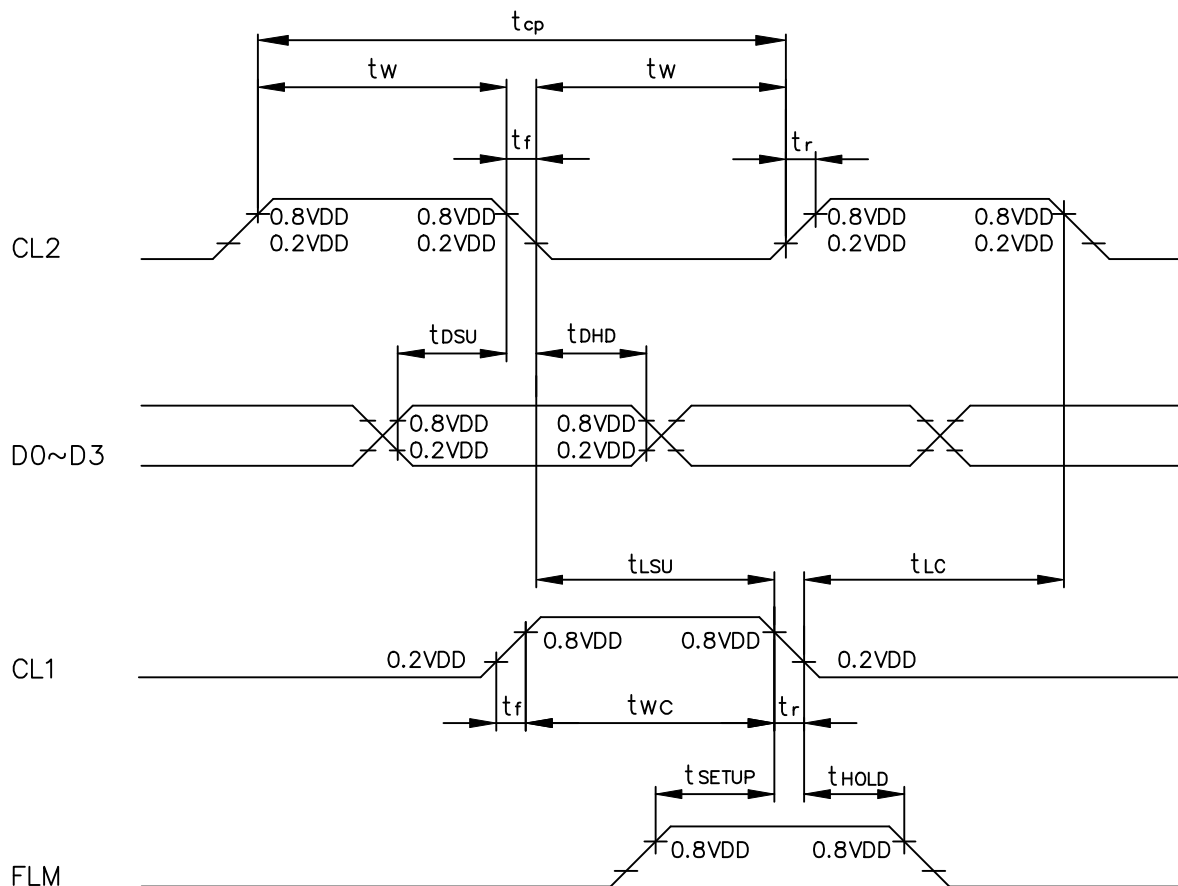
$$R1 + R2 + VR = 10K \sim 20K$$

# 8. TIMING CHARACTERISTICS

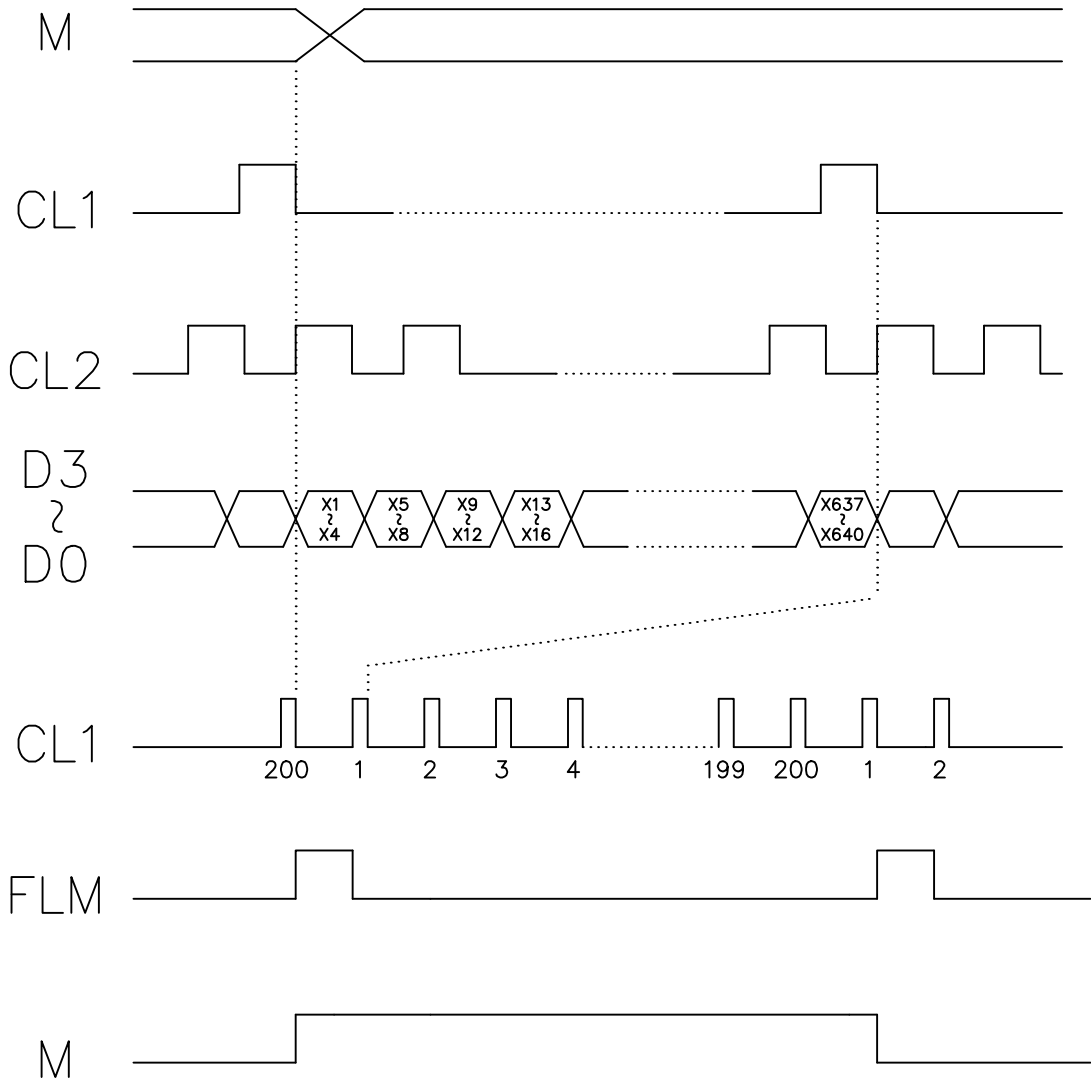
## 8-1. INTERFACE TIMING

@VDD=2.5~5.5V

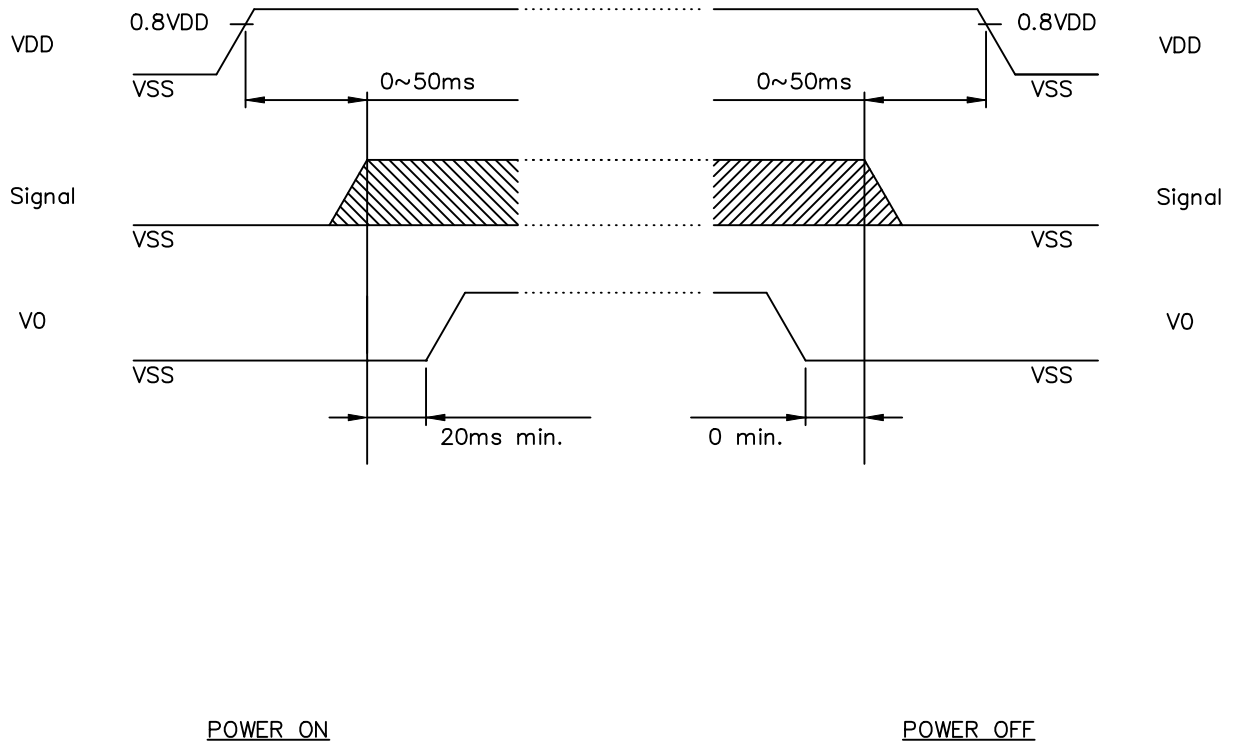
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Shift Clock Period	$t_{cp}$	125	-	-	ns
"CL2" PULSE WIDTH	$t_w$	51	-	-	ns
CLOCK RISE, FALL TIME	$t_r, t_f$	-	-	20	ns
DATA SETUP TIME	$t_{dsu}$	40	-	-	ns
DATA HOLD TIME	$t_{dhd}$	30	-	-	ns
"CL2" → "CL1" FALL TIME	$t_{lsu}$	51	-	-	ns
"CL1" → "CL2" FALL TIME	$t_{lc}$	51	-	-	ns
"FRAME" SETUP TIME	$t_{SETUP}$	30	-	-	ns
"FRAME" HOLD TIME	$t_{HOLD}$	50	-	-	ns
"CL1" PULSE WIDTH	$t_{wc}$	51	-	-	ns



# 8-2. INTERFACE TIMING CHART



### 8-3. POWER ON/OFF TIMING



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

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## 8-5. Note:

### 1. Power on sequence:

The power on/off sequence is very important for LCM. We recommend customer using the following power on/off sequence:

power on : Vdd, Vss → V0 → V1~V5

power off : V1~V5 → V0 → Vss, Vdd

The drivers of LCM maybe will be damaged if customer don't follow the above suggestion.

### 2. LCM connection:

We strongly suggest never short Vss with V0~V2, if customer do that, the drivers of LCM will be damaged or destroyed.

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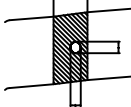
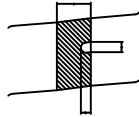
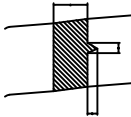
## 9. RELIABILITY TEST

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



# 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>0.20 iØ a</td> <td>NEGLECT</td> </tr> <tr> <td>0.35 iØ a</td> <td>5 MAX</td> </tr> <tr> <td></td> <td>NONE</td> </tr> </tbody> </table>	DIAMETER mm (a*)	NO. OF DEFECT*	0.20 iØ a	NEGLECT	0.35 iØ a	5 MAX		NONE					
DIAMETER mm (a*)	NO. OF DEFECT*														
0.20 iØ a	NEGLECT														
0.35 iØ a	5 MAX														
	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 iØ 0.03</td> <td>NEGLECT</td> </tr> <tr> <td>L iØ 3</td> <td>0.03 iØ W iØ 0.08</td> <td>6</td> </tr> <tr> <td>3 iØ L</td> <td>0.08 iØ W</td> <td>NONE</td> </tr> </tbody> </table>	LENGTH mm(L)	WIDTH mm(W)	NO. OF DEFECT	N A	W iØ 0.03	NEGLECT	L iØ 3	0.03 iØ W iØ 0.08	6	3 iØ L	0.08 iØ W	NONE	
LENGTH mm(L)	WIDTH mm(W)	NO. OF DEFECT													
N A	W iØ 0.03	NEGLECT													
L iØ 3	0.03 iØ W iØ 0.08	6													
3 iØ L	0.08 iØ 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>0.15 iØ a</td> <td>NEGLECT</td> </tr> <tr> <td>0.20 iØ a</td> <td>2 MAX</td> </tr> <tr> <td></td> <td>NONE</td> </tr> </tbody> </table>	DIAMETER mm (a*)	NO. OF DEFECT*	0.15 iØ a	NEGLECT	0.20 iØ a	2 MAX		NONE					
DIAMETER mm (a*)	NO. OF DEFECT*														
0.15 iØ a	NEGLECT														
0.20 iØ a	2 MAX														
	NONE														
		(2) LINEAR TYPE BE JUDGED BY 1.-(2) LINEAR TYPE													
3.	DENT	DIAMETER iØ 1.5mm													
4.	BUBBLE	NOT EXCEEDING 0.5mm AVERAGE DIAMETER IS ACCEPTABLE BETWEEN GLASS AND POLARIZING FILM.													
5.	PIN HOLE	(a+b)/2 iØ 0.15 mm MAXIMUM NUMBER: IGNORED 0.15 iØ (a+b)/2 iØ 0.20i@ MAXIMUM NUMBER: 10													
6.	DOT DEFECT	(a+b)/2 iØ 0.20 mm MAXIMUM NUMBER: IGNORED 0.20 iØ (a+b)/2 iØ 0.30i@ MAXIMUM NUMBER: 5 x = WIDTH	 												
7.	CONTRAST IRREGULARITY (SPOT)	DIAMETER SPEC. a iØ 0.50 mm 0.50 iØ a iØ 0.75 0.75 iØ a iØ 1.00 1.00 iØ 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													

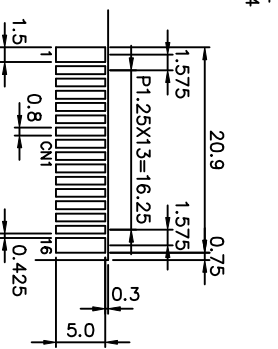
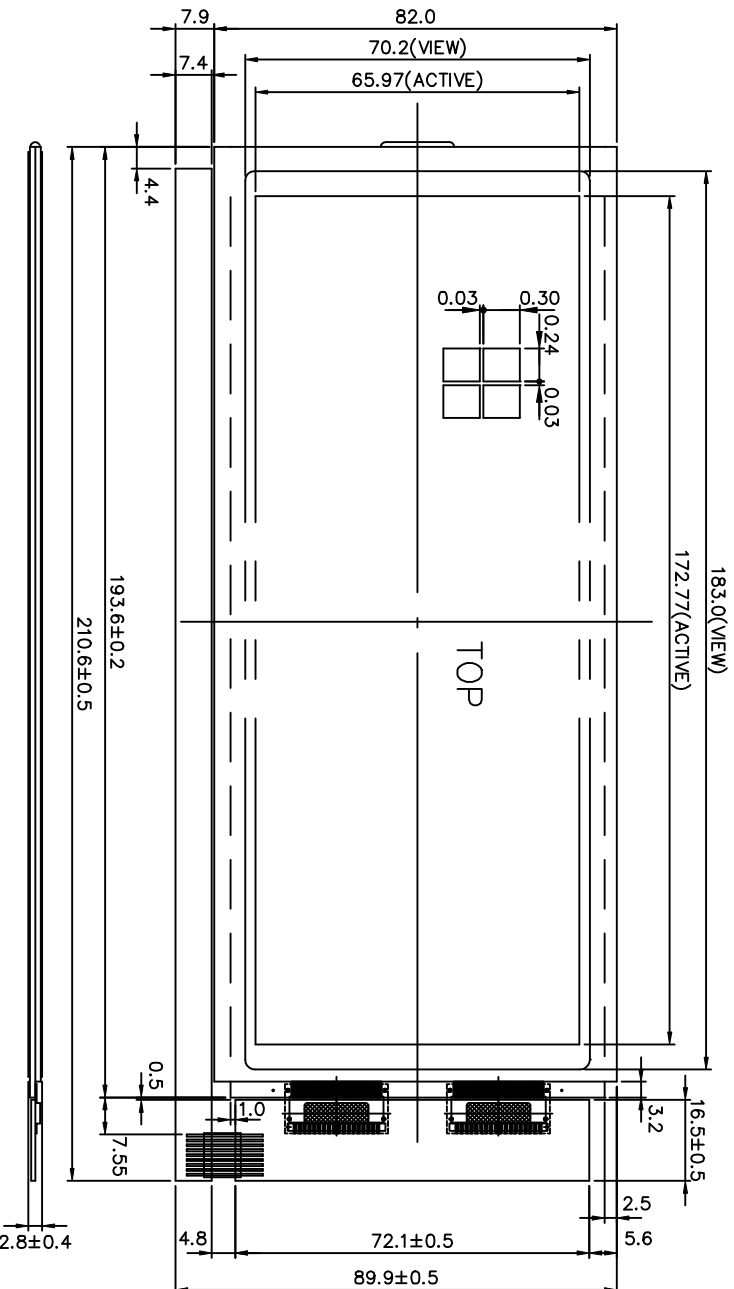
(2) NOTE:

- 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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INTERNAL PIN CONNECTION

Pin No.	Symbol	Function	Level
1	VDD	Power supply for logic (+5V)	
2	VSS	Power supply (GND)	
3	FLM	First line marker	H
4	CL1	Display data latch clock	H → L
5	CL2	Display data shift clock	H → L
6	M	Control signal for AC driving	H/L
7	D0	Display data	H/L
8	D1	Display data	H/L
9	D2	Display data	H/L
10	D3	Display data	H/L
11	V0	Power supply for L20(C0A/530 selected level)	
12	V1	Power supply for L20(C0A non-selected level)	
13	V2	Power supply for L20(S20 non-selected level)	
14	V3	Power supply for L20(S20 non-selected level)	
15	V4	Power supply for L20(C0A non-selected level)	
16	V5	Power supply for L20(C0A/530 selected level)	



NOTES :

1. RESOLUTION : 640 X 200 DOTS
2. GENERAL TOLERANCE : ±0.2mm
3. ENSURE THAT VOLTAGES ARE SET SUCH THAT VSS≤V5<V4<V3<V2<V1<V0

BOTTOM

TOP

產品編號	LTAM8RA23JP	南亞塑膠工業股份有限公司
NAME	NAN YA PLASTICS CORPORATION	
DATE		
APPROVE		製圖
CHECK	DWG-NO TAARA23JP	Rev.A
DESIGN		UNIT : mm
DRAWN	MAY PING 87.11.18	SCALE : 1/1