

NAN YA PLASTICS CORPORATION

SPECIFICATION OF
LCD MODULE
PRODUCT NO.: LTD75_227_3_

SPEC. NO.: LT227-3-2

CUSTOMER
APPROVED BY
DATE :

LCD DEPARTMENT
ELECTRONIC MATERIALS DIVISION
NAN YA PLASTICS CORPORATION
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EDITED ON. : Aug. 11. 2005

Q.C. DEPT.	DESIGN MANAGER	DESIGN CHECK	DESIGNER
			W. R. HSU

[illegible]

NAN YA PLASTICS CORP. ELEC. MATERIALS DIV. LCD DEPARTMENT		SPECIFICATION		SPEC. NO. : LT227-3 DATE : Jan. 12, 2000 SHEET NO. : 1/24	
1.MECHANICAL DATA					
(1) Product No.		LTD75_227_3_			
(2) Module Size		74.6 (W)mm X 56.1 (H)mm X 5.5 (D)mm			
(3) Dot Size		0.23 (W)mm X 0.23 (H)mm			
(4) Dot Pitch		0.24 (W)mm X 0.24 (H)mm			
(5) Number of Dots		240 (W) X 160 (H) Dots			
(6) Duty		1/160			
(7) LCD Display Mode		FSTN: Black and White(Normally White/Positive Image)			
		Rear Polarizer: ☐ Reflective ☐ Transflective ☐ Transmission			
(8) Viewing Direction		☐ 6 O'clock ☐ 12 O'clock			
(9) Backlight		☐ W/O ☐ EL (White) ☐ EL (Blue Green) ☐ LED			
(10) Weight		W/O B/L : 15 g (Approx.)			
(11) Controller		EL B/L : 17 g (Approx.)			
(12) DC/DC Converter		Excluded			
		Excluded			
Note :					
LTD75_227_3_ Back Light D : EL Back Light Reflective/Transmissive H : Transflective(high transparency) S : Transflective(normal) T : Transmission Z : Other Option: C : Polarizer with Anti-glare G : Special color backlight K : High contrast ratio LC 3 : Version Mode/View Angle J : Normally White , 6 O'clock K : Normally White , 12 O'clock L : Normally White , 6 O'clock (special lighter background color)					
REV/DATE	R0/ 01.12.00'	R1/ 06.20.00'	R2/ 08.11.05'		BY W.R.HSU

3. ELECTRICAL CHARACTERISTICS

(VDD = 3.3V±10%)

ITEM			SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Supply voltage for logic			VDD–VSS	–		2.97	3.3	3.63	V
Input Voltage			VIH	H level		0.8VDD	–	VDD	V
			VIO	L level		0	–	0.2VDD	
Recommended LC Driving Voltage (Normal Temp. LCM)			VEE–VSS (Vop)	1/240 Duty 1/13 Bias	0°C	21.7	22.0	22.3	V
					25°C	20.1	20.4	20.7	
					50°C	18.0	18.3	18.6	
Recommended LC Driving Voltage (Wide Temp. LCM)			VEE–VSS (Vop)	1/240 Duty 1/13 Bias	0°C	22.3	22.6	22.9	V
					0°C	21.2	21.5	21.8	
					25°C	20.5	20.8	21.1	
					50°C	19.6	19.9	20.2	
					50°C	18.6	18.9	19.2	
Power Supply Current (Normal Temp. LCM)			IDD	VDD= 3.3 V VSS= 0V VEE–VSS= 20.4V FLM=70Hz PATTERN : □ ■ □ ■ □ ■ ■ □ ■ □ ■ □		–	0.55	0.83	mA
			IEE			–	0.8	1.2	
Power Supply Current (Wide Temp. LCM)			IDD	VDD= 3.3 V VSS= 0V VEE–VSS=20.8V FLM=70Hz PATTERN : □ ■ □ ■ □ ■ ■ □ ■ □ ■ □		–	0.58	0.88	mA
			IEE			–	0.9	1.4	
EL Power Supply Current			IEL	65Vrms 250HZ		–	4.7	7.1	mA
LCM	Surface Luminance (Normal Temp. LCM)	L	VDD= 3.3 V VSS= 0V VEE–VSS= 20.4V 65Vrms 250HZ	S227J	PATTERN: (Dots All On)	–	0.42	–	cd/m ²
				H227K		–	0.96	–	
				H227L		–	1.23	–	
				S227J	PATTERN: (Dots All Off)	–	2.01	–	
				H227K		–	3.4	–	
				H227L		–	4.37	–	
LCM	Surface Luminance (Wide Temp. LCM)	L	VDD= 3.3 V VSS= 0V VEE–VSS= 20.8V 65Vrms 250HZ	Z227L3K	PATTERN: (Dots All On)	–	–	–	cd/m ²
				T227J3GK		–	–	–	
				Z227L3K	PATTERN: (Dots All Off)	–	–	–	
				T227J3GK		–	–	–	

4-1.OPTICAL CHARACTERISTICS

(FOR NORMAL TEMPERATURE MODE LCM)

AT V_{OP}

ITEM MODE		Cr(Contrast Ratio)						θ (Viewing Angle)		ϕ (Viewing Angle)	
		0°C		25°C		50°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
G	L	—	5.5	—	5.0	—	4.0	—	74	—	±37
S	J	—	8.0	—	7.5	—	6.0	—	70	—	±35
H	K	—	8.0	—	6.5	—	5.0	—	68	—	±33
H	L	—	8.2	—	7.0	—	5.5	—	69	—	±34
NOTE		NOTE 6						NOTE 5			

NOTE :

G : REFLECTIVE

J : NORMALLY WHITE 6 O'CLOCK

S : TRANSFLECTIVE(normal)

L : NORMALLY WHITE 6 O'CLOCK

H : TRANSFLECTIVE
(high transparency)

(special lighter background color)

K : NORMALLY WHITE 6 O'CLOCK

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0°C	—	800	—	ms	NOTE 2
		25°C	—	230	—		
		50°C	—	100	—		
Response Time (fall)	Tf	0°C	—	300	—	ms	NOTE 2
		25°C	—	115	—		
		50°C	—	65	—		

4-2.OPTICAL CHARACTERISTICS

(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.
Z	L	−	8.5	−	9.5	−	10	−	9.0	−	6.0	−	−	−	−
T	J	−	4.5	−	5.0	−	4.5	−	4.0	−	3.0	−	−	−	−
note		NOTE 6										NOTE 5			

NOTE :

Z : OTHER

T : TRANSMISSION

J : NORMALLY WHITE 6 O'CLOCK

L : NORMALLY WHITE 6 O'CLOCK

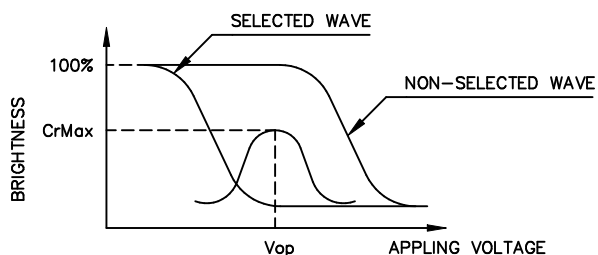
(special lighter background color)

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

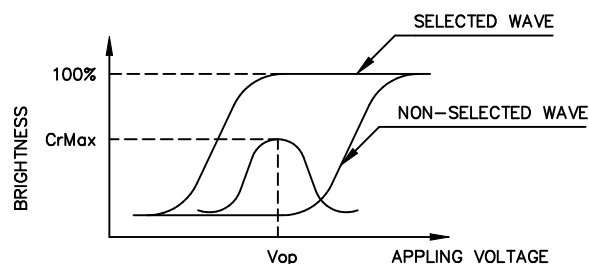
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20°C	-	300	-	ms	NOTE 2
		0°C	-	700	-		
		25°C	-	200	-		
		50°C	-	90	-		
		70°C	-	60	-		
Response Time (fall)	Tf	-20°C	-	2000	-	ms	NOTE 2
		0°C	-	400	-		
		25°C	-	100	-		
		50°C	-	50	-		
		70°C	-	30	-		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



(negative type)

*Conditions

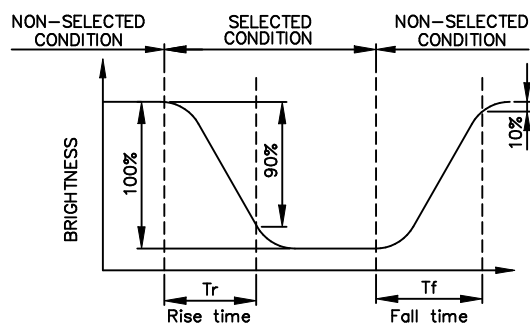
Viewing Angle : 0

Frame Frequency : 70Hz

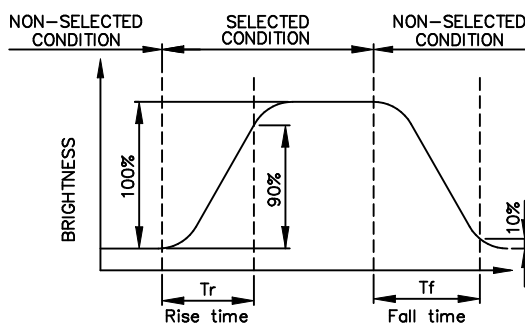
Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



(negative type)

*Conditions

Operating Voltage : Vop

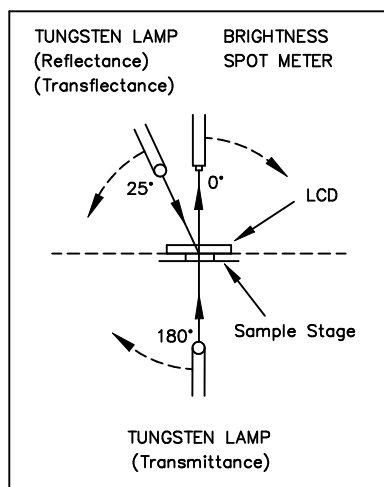
Viewing Angle (θ, θ) : (0,0)

Frame Frequency : 70Hz

Applying Waveform : 1/N duty 1/a bias

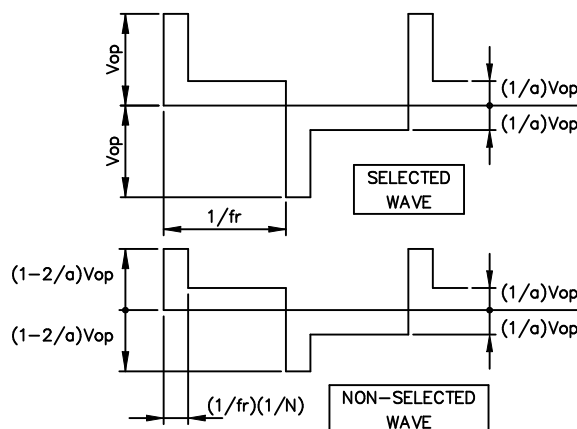
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



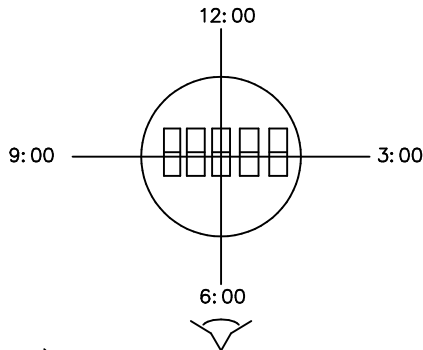
CONST.
TEMP.
CHAMBER

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



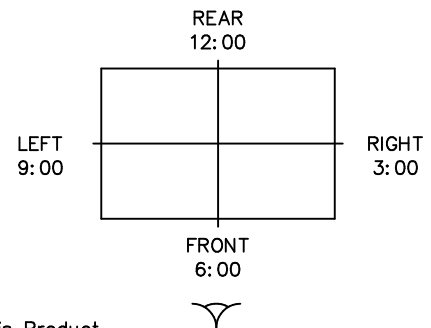
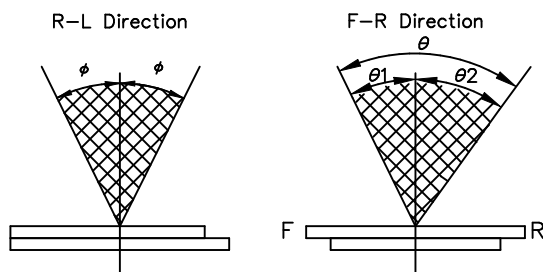
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



*For This Product
The Viewing Direction Is 6 O'clock
So $\theta_1 > \theta_2$

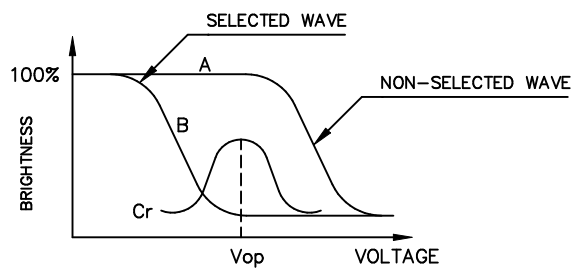
$$\theta = \theta_1 + \theta_2$$

*Conditions

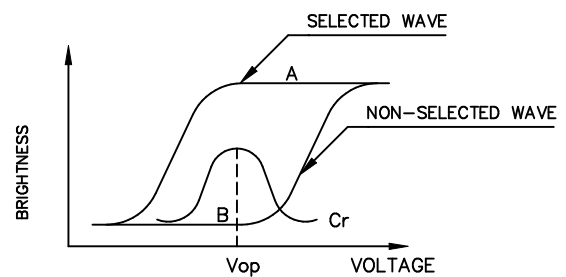
Operating Voltage : V_{op}
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



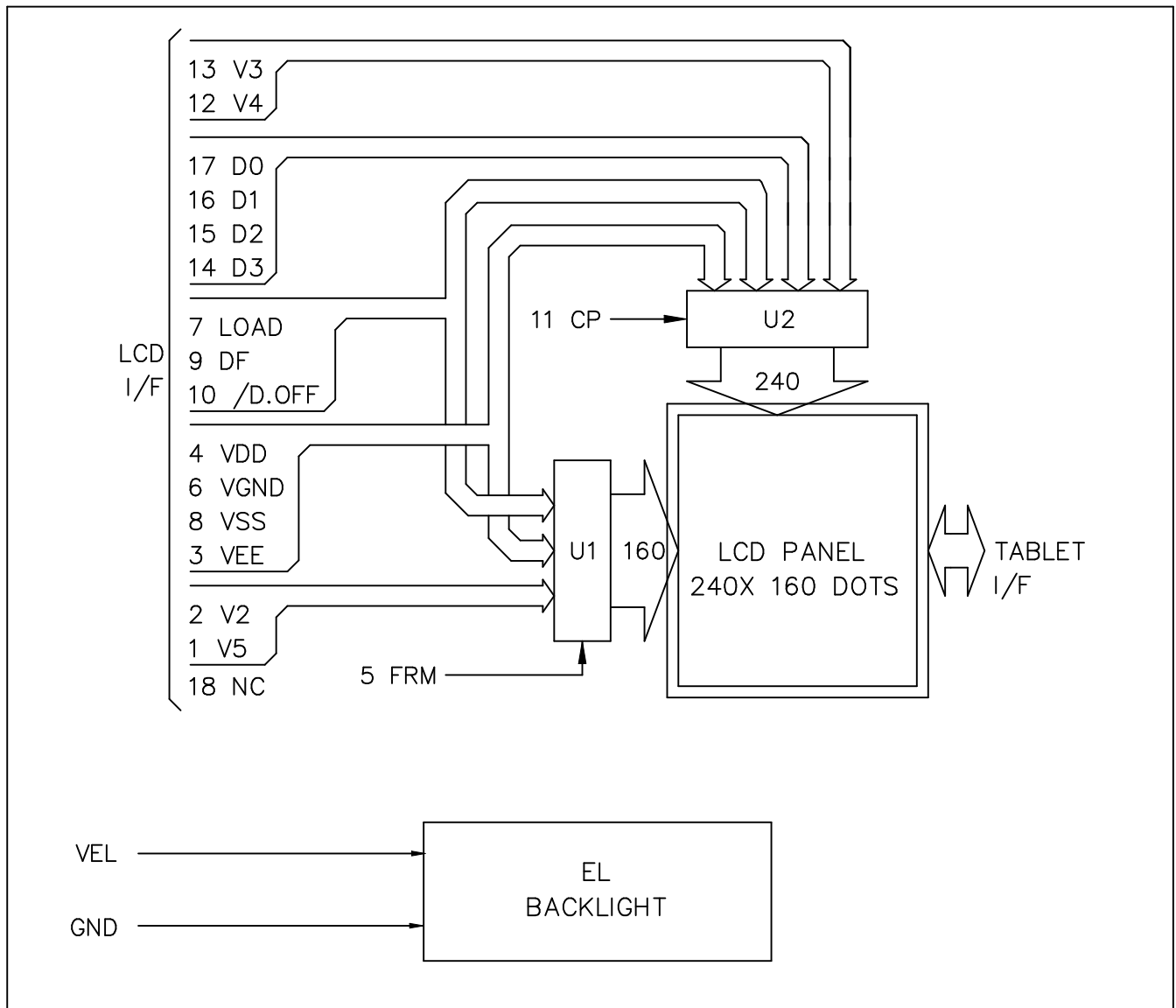
(negative type)

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

*Conditions

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

5. BLOCK DIAGRAM



Note1 :

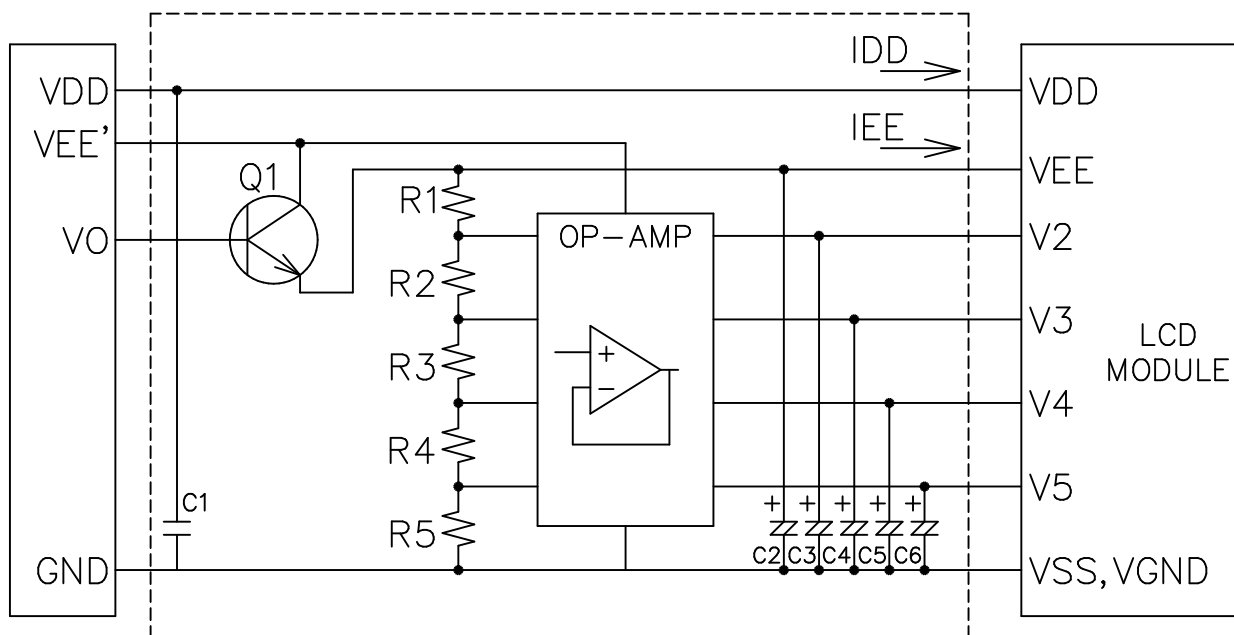
- 1) Controller and bias voltage supply circuit are not included.
- 2) VEE, VGND, V2, V3, V4 and V5 are power supply voltage for LCD.
($VEE > V2 > V3 > V4 > V5 > VGND$)
- 3) The bias is 1/13, $\begin{cases} VOP = VEE - VSS = 20.4 \text{ V. (Normal Temp.)} \\ VOP = VEE - VSS = 20.8 \text{ V. (Wide Temp.)} \end{cases}$

6.INTERNAL PIN CONNECTION

LCD

Pin No.	Symbol	Function
1	V5	Bias voltage for non-select (Common driver)
2	V2	Bias voltage for non-select (Common driver)
3	VEE	Power supply for LCD (+V)
4	VDD	Power supply for logic (+3.3V)
5	FRM	Frame start signal (Data signal of the shift register of the common driver)
6	VGND	GND,Power supply for LCD
7	LOAD	1)Latch pulse of display data 2)Shift clock for common driver
8	VSS	GND
9	DF	Switch signal to convert LCD drive waveform into AC
10	/D.OFF	H : Display ON, L : Display OFF
11	CP	Clock pulse for segment shift register
12	V4	Bias voltage for non-select (Segment driver)
13	V3	Bias voltage for non-select (Segment driver)
14	D3	Input data signal
15	D2	Input data signal
16	D1	Input data signal
17	D0	Input data signal
18	N.C.	No connectoin

7. POWER SUPPLY



Q1 : 2SC1815

OP-AMP : LP324

$R1=R2=R4=R5=10K\Omega$, $R3=9R1=91K\Omega$ (1/13 Bias)

$C1=0.1\mu F$, $C2\sim C6=3.3\mu F$

Note 1 : These are general values.

In case to decrease LCD driving voltage with minimizing bias value, set these values with check display to avoid display's deterioration (response etc).

Note 2 : EL Driving Method

- Constant Voltage Source Driving : AC 100 Vrms 400 Hz
- Inverter IC Driving : HV823 (Supertex) or SP4428CN (Sipex)

8. TIMING CHARACTERISTICS

8-1. INTERFACE TIMING

@ VDD=3.3V±10%, Ta= 0~50 ℃

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
CP Cycle Time	tC	Fig.a	82	—	—	ns
CP Pulse Width	tSWH,tSWL	Fig.a	28	—	—	ns
CP Rise/Fall Time	tCR,tCF	Fig.a	—	—	50	ns
Data Set Up Time	tDSU	Fig.a , Fig.b	20	—	—	ns
Data Hold Time	tDHD	Fig.a , Fig.b	23	—	—	ns
LOAD Cycle Time	tL	Fig.b	250	—	—	ns
LOAD "H" Pulse Width	tLWH	Fig.a , Fig.b	30	—	—	ns
LOAD Rise/Fall Time	tLR,tLF	Fig.b	—	—	50	ns
CP To LOAD Delay Time	tCL	Fig.a	30	—	—	ns
LOAD To CP Delay Time	tLC	Fig.a	65	—	—	ns
FRM TO LOAD SETUP TIME	tFLS	Fig.b	30	—	—	ns
FRM TO LOAD HOLD TIME	tFLH	Fig.b	50	—	—	ns

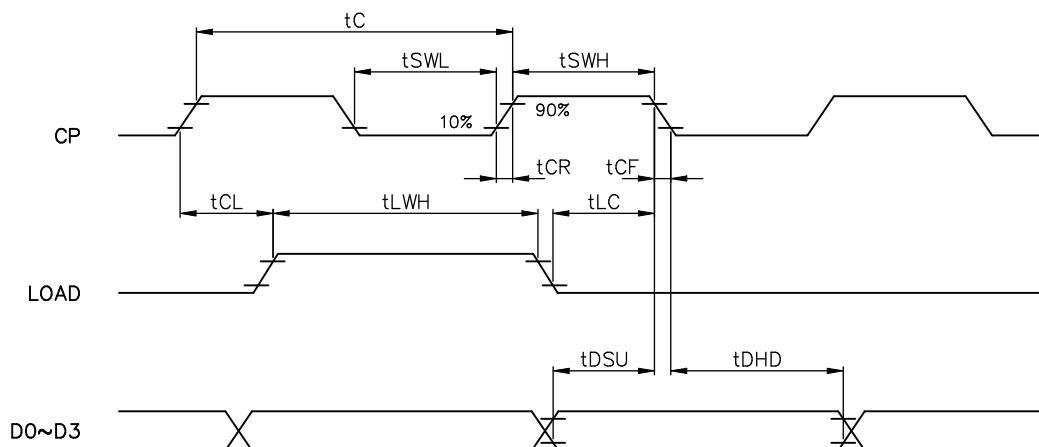


Fig . a Interface timing (SEGMENT)

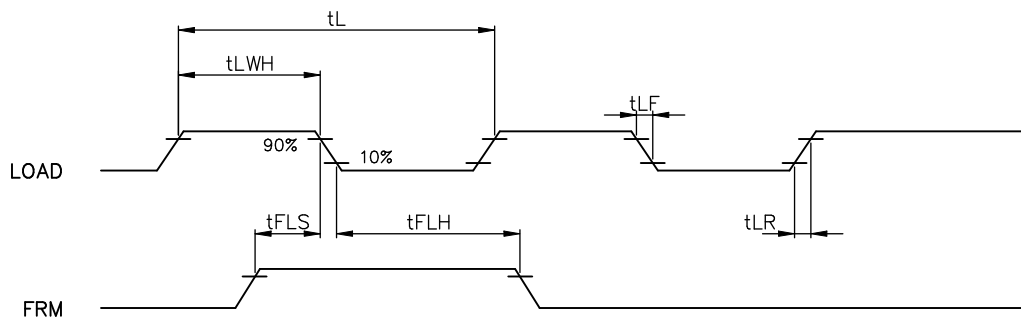
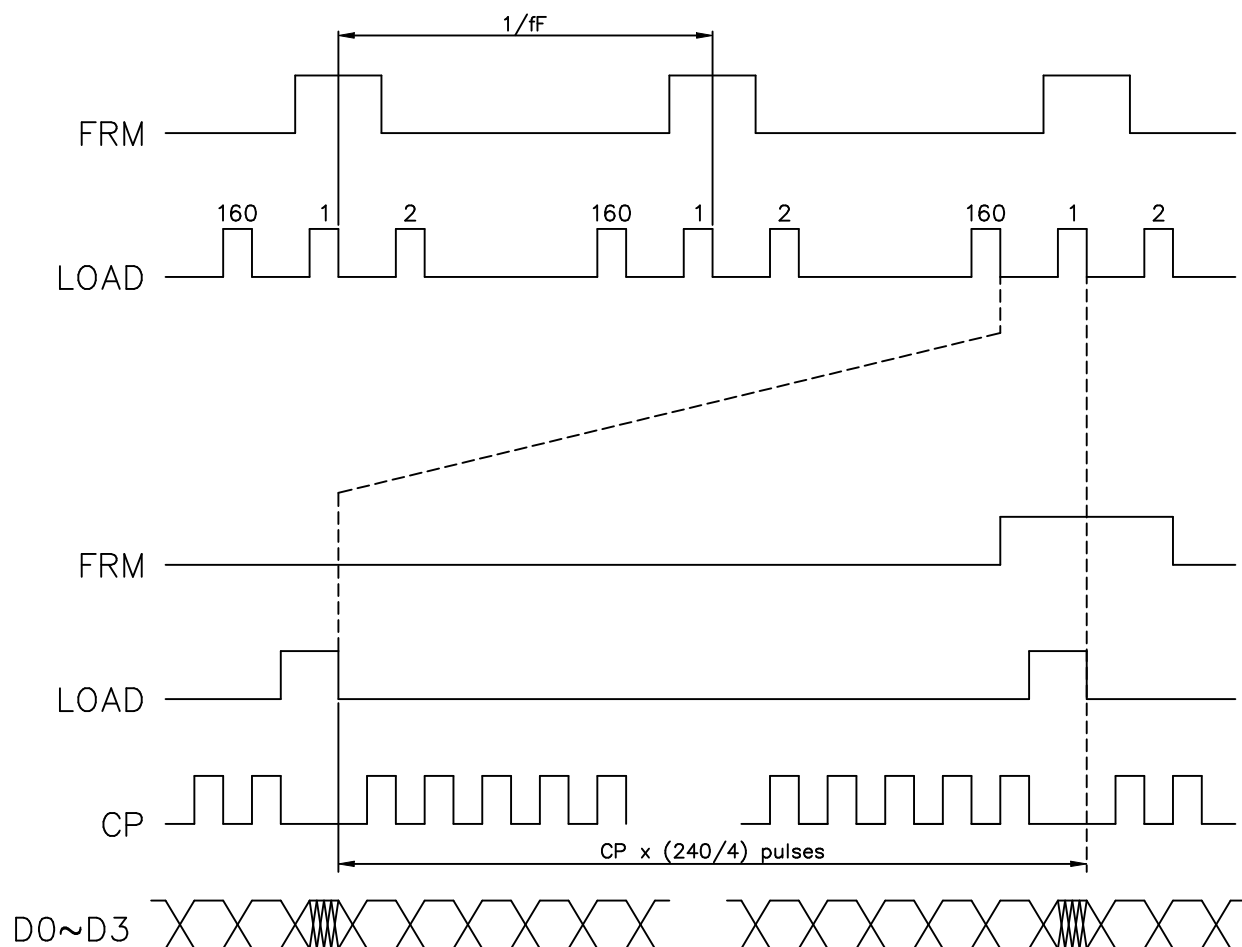
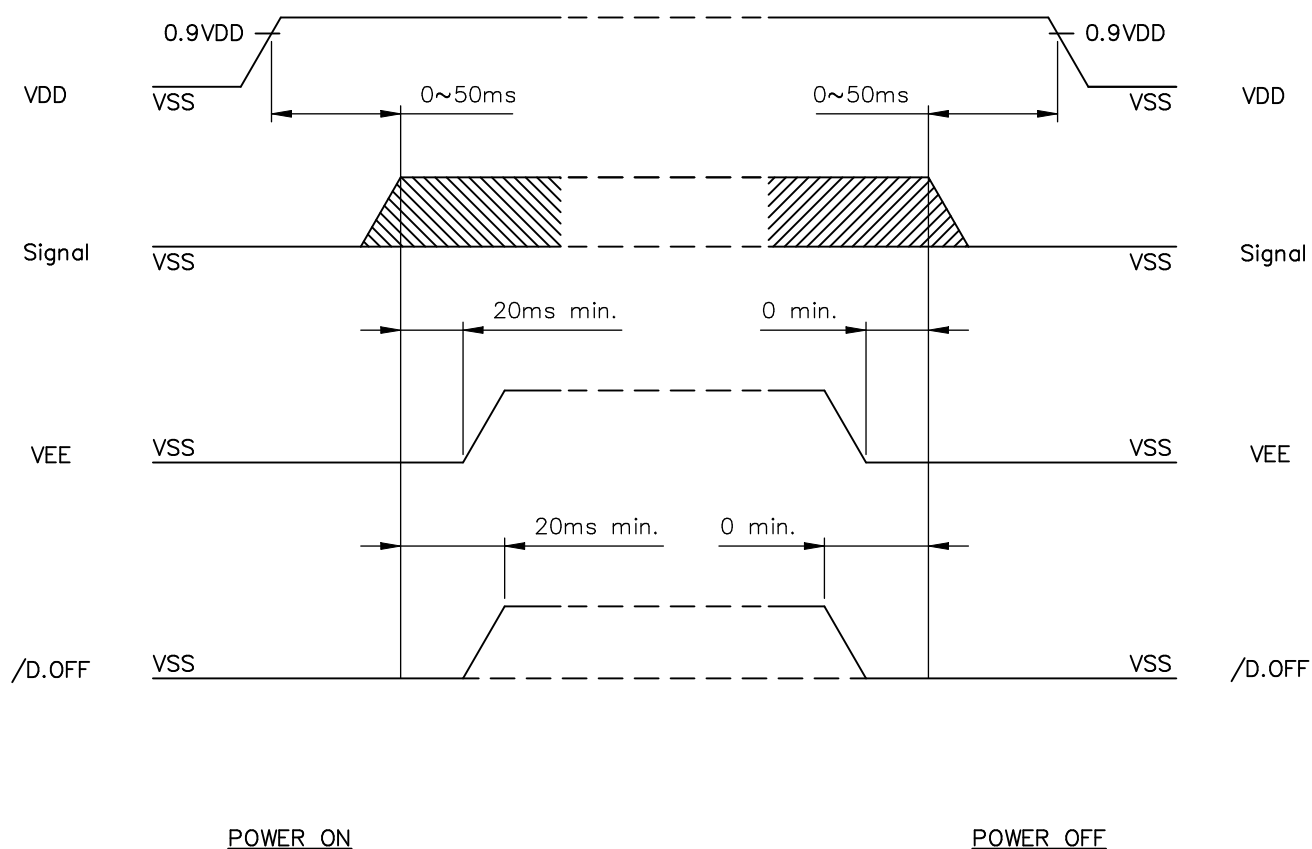


Fig . b Interface timing (COMMON)

8-2. TIMING CHART OF INPUT SIGNAL



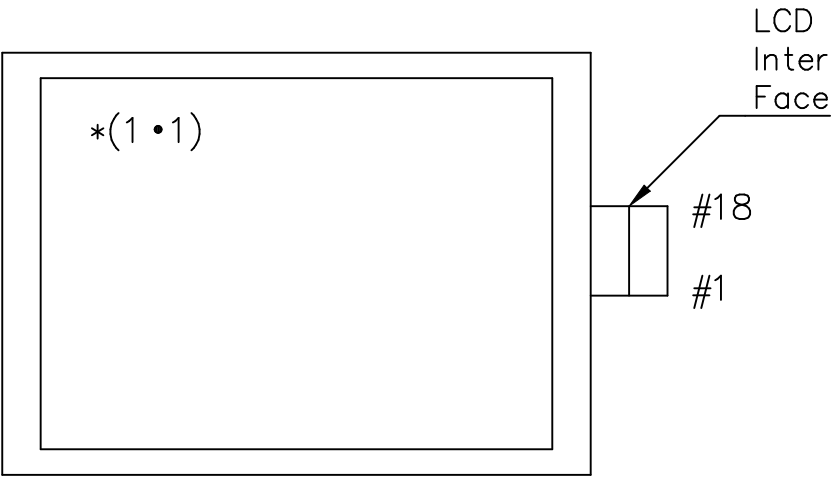
8-3. POWER ON/OFF TIMING



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

8-4.DISPLAY PATTERN

	Column1	Column2	Column3	Column4	Column240
Row 1	1 • 1	1 • 2	1 • 3	1 • 4	1 • 240
Row 2	2 • 1	2 • 2	2 • 3		
Row 3	3 • 1	3 • 3			
	D0: (1 • 4)↘(1 • 8)(160 • 240) D1: (1 • 3)↘(1 • 7)(160 • 239) D2: (1 • 2)↘(1 • 6)(160 • 238) D3: (1 • 1)↘(1 • 5)(160 • 237)				
Row 160	160 • 1				160 • 240



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 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

Inspection Provision

1.Purpose

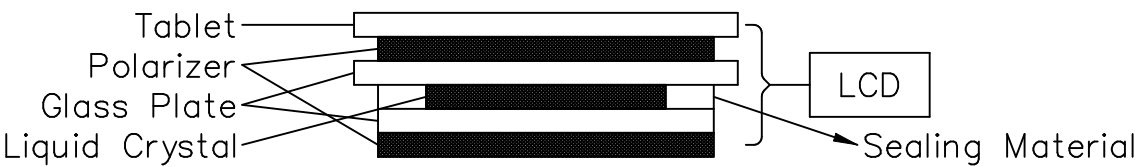
The NAN YA inspection provision provides outgoing inspection provision and its expected quality level based on our outgoing inspection of NAN YA LCD produces.

2.Applicable Scope

The NAN YA inspection provision is applicable to the arrangement in regard to outgoing inspection and quality assurance after outgoing.

3.Technical Terms

3-1 NAN YA Technical Terms



4.Outgoing Inspection Provision

Outgoing inspection is according to the product inspection manual.
(Per 1-1, 1-2 & 1-3)

4-1 Inspection Method

MIL-STD-105D Level II Regular inspection

4-2 Inspection Standard

	Item		AQL(%)	Remarks
Major Defect	Dots	Opens Shorts Erroneous operation	0.4	faults which substantially lower the practicality and the initial purpose difficult to achieve.
	Solder appearance	Shorts Loose		
	Cracks	Display surface cracks		
	Tablet contact resistance			
	Tablet input load			

NAN YA PLASTICS CORP. ELEC. MATERIALS DIV. LCD DEPARTMENT		SPECIFICATION		SPEC. NO. : LT227-3 DATE : Jan. 12, 2000 SHEET NO. : 17/24	
	Tablet lineality		0.4		
	Dimensions	External from Dimensions	0.4		
Minor Defect	Inside the glass	Black spots	0.65	faults which appear to pose almost no obstacle to the practicality, effective use, and operation.	
	Polarizing plate	Scratches, foreign Matter, air bubbles, and peeling			
	Dots	Pinhole, deformation			
	Color tone	Color unevenness			
	Solder appearance	Cold solder Solder projections			
4-3 Inspection Provisions *Viewing Area Definition					
Fig. 1					
			A : Zone Viewing Area B : Zone Glass Plate Out Line		
*Inspection place to be 500 to 1000 lux illuminance uniformly without glaring. The distance between luminous source(daylight fluorescent lamp and cool white fluorescent lamp) and a sample to be 30cm to 50cm.					
REV/DATE	R0/ 01.12.00'	R1/ 06.20.00'			BY J.Y. Lin

SPECIFICATION

*Test and measurement are performed under the following conditions, unless otherwise specified.

Temperature 20± 15°C
Humidity 65± 20%R.H..
Pressure 860~1060hPa(mmbar)

In case of doubtful judgment, it is performed under the following conditions.

Temperature 20± 2°C
Humidity 65± 5%R.H..
Pressure 860~1060hPa(mmbar)

5.Specification for quality check 5-1 Electrical characteristics

NO.	Item	Criterion
1.	Non operational	Fail
2.	Miss operating	Fail
3.	Missing dot	Fail
4.	Contrast irregular	Not allowable
5.	Response time	Within Specified value
6.	Tablet contact resistance	Within Specified value
7.	Tablet input load	Within Specified value
8.	Tablet lineality	Within Specified value
9.	EL backlight turn on/off	Within Specified value

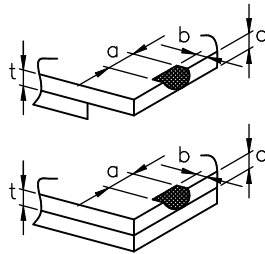
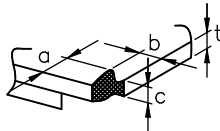
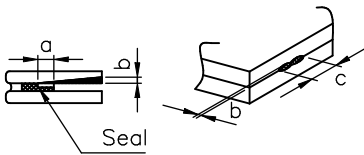
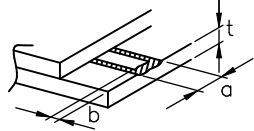
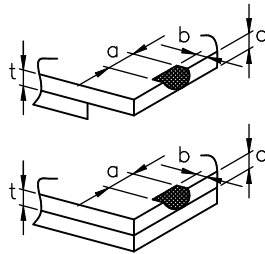
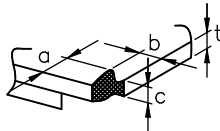
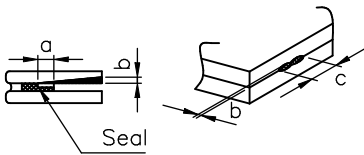
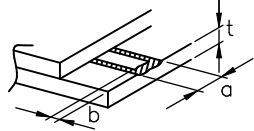
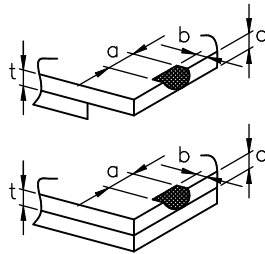
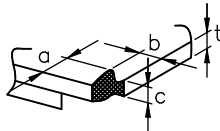
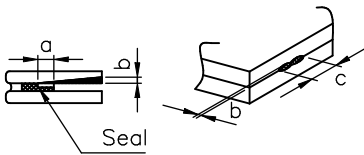
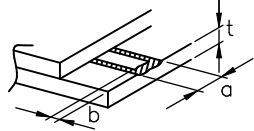
5-2 External Appearance Defect

NO.	Item	Criterion																		
1.	Black spots, foreign matter, and white spots (Including light leakage due to pinholes of polarizing plates, etc.)	(1)–1–Spots(At non lighting condition) <table><tr><th>Average Diameter(mm):D</th><th>Number of pieces permitted</th></tr><tr><td>$D \leq 0.1$</td><td>Ignore</td></tr><tr><td>$0.1 < D \leq 0.2$</td><td>5</td></tr><tr><td>$0.2 < D \leq 0.3$</td><td>2</td></tr><tr><td>$0.3 < D$</td><td>0</td></tr></table> Number of total pieces is set to within 5 pieces. Note that when there are 2 pieces or more, they are not to be concentrated. Set as: Average diameter = (Long diameter + Short diameter)/2 (1)–2–Spots(At lighting condition) <table><tr><th>Average Diameter(mm):D</th><th>Number of pieces permitted</th></tr><tr><td>$D \leq 0.3$</td><td>Ignore</td></tr><tr><td>$0.3 < D \leq 0.75$</td><td>5</td></tr><tr><td>$0.75 < D$</td><td>0</td></tr></table> Number of total pieces is set to within 5 pieces. Note that when there are 2 pieces or more, they are not to be concentrated. Set as: Average diameter = (Long diameter + Short diameter)/2	Average Diameter(mm):D	Number of pieces permitted	$D \leq 0.1$	Ignore	$0.1 < D \leq 0.2$	5	$0.2 < D \leq 0.3$	2	$0.3 < D$	0	Average Diameter(mm):D	Number of pieces permitted	$D \leq 0.3$	Ignore	$0.3 < D \leq 0.75$	5	$0.75 < D$	0
Average Diameter(mm):D	Number of pieces permitted																			
$D \leq 0.1$	Ignore																			
$0.1 < D \leq 0.2$	5																			
$0.2 < D \leq 0.3$	2																			
$0.3 < D$	0																			
Average Diameter(mm):D	Number of pieces permitted																			
$D \leq 0.3$	Ignore																			
$0.3 < D \leq 0.75$	5																			
$0.75 < D$	0																			

SPECIFICATION

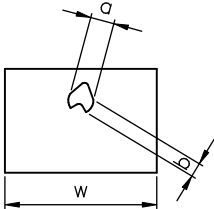
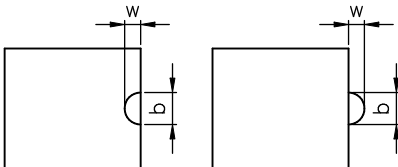
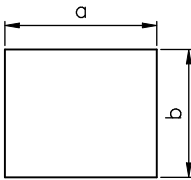
1.	Black spots, foreign matter, and white spots (Including light leakage due to pinholes of polarizing plates, etc.)	(1)-1 Spots(At non lighting condition) <table> <tr> <th>Width(mm): W</th><th>Length(mm):L</th><th>Number of pieces permitted</th></tr> <tr> <td>$W \leq 0.03$</td><td>Ignore</td><td>Ignore</td></tr> <tr> <td>$0.03 < W \leq 0.08$</td><td>$L \leq 4$</td><td>2</td></tr> <tr> <td>$0.08 < W \leq 0.1$</td><td>$L \leq 1$</td><td>1</td></tr> </table> Object exceeding 0.1mm follow the standards of the spots form. Note that when there are 2 pieces or more, they are not to be concentrated. (1)-2 Spots(At lighting condition) <table> <tr> <th>Width(mm): W</th><th>Length(mm):L</th><th>Number of pieces permitted</th></tr> <tr> <td>$W \leq 0.03$</td><td>Ignore</td><td>Ignore</td></tr> <tr> <td>$0.03 < W \leq 0.08$</td><td>$L \leq 3$</td><td>6</td></tr> <tr> <td>$0.08 < W$</td><td>$3 < L$</td><td>None</td></tr> </table> Object exceeding 0.1mm follow the standards of the spots form. Note that when there are 2 pieces or more, they are not to be concentrated.	Width(mm): W	Length(mm):L	Number of pieces permitted	$W \leq 0.03$	Ignore	Ignore	$0.03 < W \leq 0.08$	$L \leq 4$	2	$0.08 < W \leq 0.1$	$L \leq 1$	1	Width(mm): W	Length(mm):L	Number of pieces permitted	$W \leq 0.03$	Ignore	Ignore	$0.03 < W \leq 0.08$	$L \leq 3$	6	$0.08 < W$	$3 < L$	None
Width(mm): W	Length(mm):L	Number of pieces permitted																								
$W \leq 0.03$	Ignore	Ignore																								
$0.03 < W \leq 0.08$	$L \leq 4$	2																								
$0.08 < W \leq 0.1$	$L \leq 1$	1																								
Width(mm): W	Length(mm):L	Number of pieces permitted																								
$W \leq 0.03$	Ignore	Ignore																								
$0.03 < W \leq 0.08$	$L \leq 3$	6																								
$0.08 < W$	$3 < L$	None																								
2.	Scratches(Glass, reflection plates, and polarizing plates)	In accordance with black spots. (At non lighting condition)																								
3.	Color irregular	Not remarkable color irregular.																								

SPECIFICATION

4.	Air bubbles polarizing plates, and reflection plates	<table><tr><td>Average Diameter (mm): D</td><td>Number of pieces permitted</td><td rowspan="2">Average diameter = (Long diameter + Short diameter)/2</td></tr><tr><td>$D \leq 0.3$ $0.3 < D$</td><td>Ignore 0</td></tr></table> Note that when there are 4 pieces or more, they are not to be concentrated.	Average Diameter (mm): D	Number of pieces permitted	Average diameter = (Long diameter + Short diameter)/2	$D \leq 0.3$ $0.3 < D$	Ignore 0										
Average Diameter (mm): D	Number of pieces permitted	Average diameter = (Long diameter + Short diameter)/2															
$D \leq 0.3$ $0.3 < D$	Ignore 0																
5.	Cracks	<table><tr><td>(1)General crack</td><td></td><td>$a \leq 5$ $b \leq 2$ $c \leq t$ Where, a and b are ignored when less than or equal 0.5. The numbers of pieces are set at up to 5 pieces.</td></tr><tr><td>(2)Corner crack</td><td></td><td>$a \leq 2.5$ $b \leq 2.5$ $c \leq t$ $a + b \leq 4$</td></tr><tr><td>(3)Seal portion crack</td><td></td><td>$a \leq \text{The seal width} \times 1/3$ $b \leq t \times 2/3$ $c \leq 5$ The numbers of pieces are set at up to 5 pieces.</td></tr><tr><td>(4)ITO Pin crack</td><td></td><td>$a \leq 5$ $b \leq 1/3 \text{ pin length}$ $c \leq t$</td></tr><tr><td>(5)Progressive cracks</td><td></td><td>All taken to be unacceptable.</td></tr></table>	(1)General crack		$a \leq 5$ $b \leq 2$ $c \leq t$ Where, a and b are ignored when less than or equal 0.5. The numbers of pieces are set at up to 5 pieces.	(2)Corner crack		$a \leq 2.5$ $b \leq 2.5$ $c \leq t$ $a + b \leq 4$	(3)Seal portion crack		$a \leq \text{The seal width} \times 1/3$ $b \leq t \times 2/3$ $c \leq 5$ The numbers of pieces are set at up to 5 pieces.	(4)ITO Pin crack		$a \leq 5$ $b \leq 1/3 \text{ pin length}$ $c \leq t$	(5)Progressive cracks		All taken to be unacceptable.
(1)General crack		$a \leq 5$ $b \leq 2$ $c \leq t$ Where, a and b are ignored when less than or equal 0.5. The numbers of pieces are set at up to 5 pieces.															
(2)Corner crack		$a \leq 2.5$ $b \leq 2.5$ $c \leq t$ $a + b \leq 4$															
(3)Seal portion crack		$a \leq \text{The seal width} \times 1/3$ $b \leq t \times 2/3$ $c \leq 5$ The numbers of pieces are set at up to 5 pieces.															
(4)ITO Pin crack		$a \leq 5$ $b \leq 1/3 \text{ pin length}$ $c \leq t$															
(5)Progressive cracks		All taken to be unacceptable.															

6.	Outer dimensions	Should be with in the tolerance.
7.	Newton ring	Orbicular of interference fringes. To be non. In case of doubtful judgenemt, agreement shall be reachment.
8.	Soldering	Should be no defective soldering such as shorting, loose terminal cold solder, peeling of printed circuit board pattern, improper mouting position, etc.

5-3 Dot Appearance Defect

NO.	Item	Criteria
1.	Plinhole	 Dot display a and b are each $\leq 0.2\text{mm}$ The overall total is taken be with in 10 units. Note that they are not to be concentrated.
2.	Missing	 Dot display a and b are each $\leq 0.2\text{mm}$ The overall total is taken to be with in 10 units.
3.	Thick and thin display	 Taken to be within $\pm 1.5\%$ of display character width(a) and height(b).

NAN YA PLASTICS CORP. ELEC. MATERIALS DIV. LCD DEPARTMENT		SPECIFICATION			SPEC. NO. : LT227-3 DATE : Jan. 12, 2000 SHEET NO. : 23/24
NOTICE: - SAFETY - If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin. - If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water. - HANDLING - Avoid static electricity which can damage the CMOS LSI. - Do not remove the panel or frame from the module. - The polarizing plate of the display is very fragile. So, please handle it very carefully. - Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate. - Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent. - STORAGE - Store the panel or module in a dark place where the temperature is 25°C±5°C and the humidity is below 65% RH. - Do not place the module near organics solvents or corrosive gases. - Do not crush, shake, or jolt the module. - TERMS OF WARRANT - Acceptance inspection period The period is within one month after the arrival of contracted commodity at the buyer's factory site. - 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 100Vrms, 400Hz, 20°C, 60%RH (Operating life time is defined as follows : The final brightness is at 50% of original brightness.)					
REV/DATE	R0/ 01.12.00'	R1/ 06.20.00'			BY J.Y. Lin

① LCD CONNECTION

Pin No.	Symbol	Pin No.	Symbol
1	V5	10	/D.OFF
2	V2	11	CP
3	VEE	12	V4
4	VDD	13	V3
5	FRM	14	D3
6	VGND	15	D2
7	LOAD	16	D1
8	VSS	17	D0
9	DF	18	NC

TOLERANCE LIST(S)

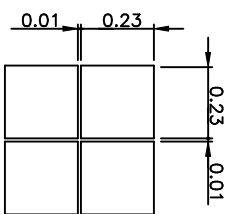
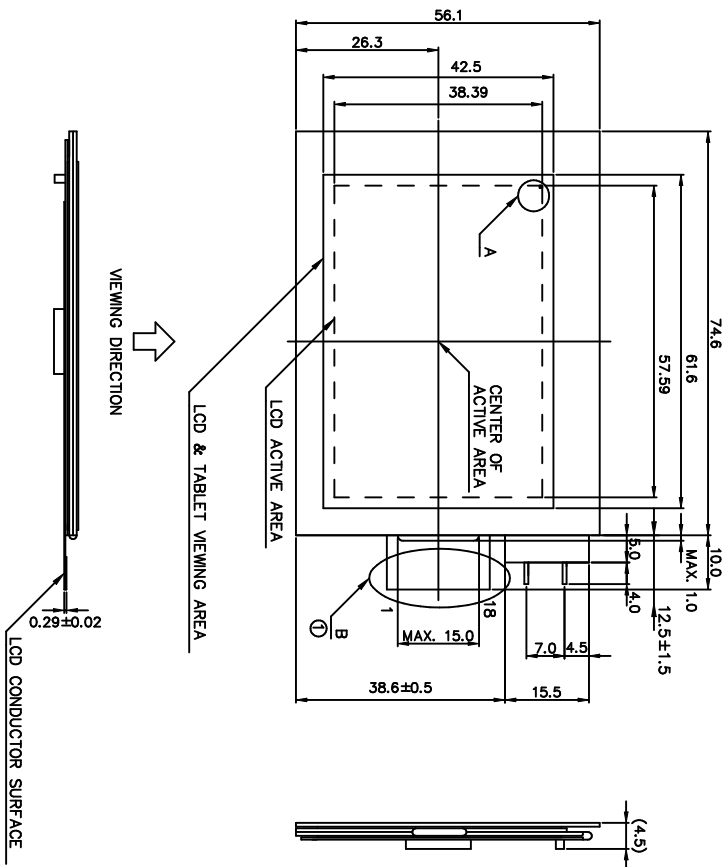
DIMENSION	TOLERANCE
$L \leq 6$	± 0.25 (mm)
$6 < L \leq 18$	± 0.3 (mm)
$18 < L \leq 50$	± 0.4 (mm)
$50 < L \leq 125$	± 0.5 (mm)
$125 < L$	± 0.6 (mm)

NOTE :

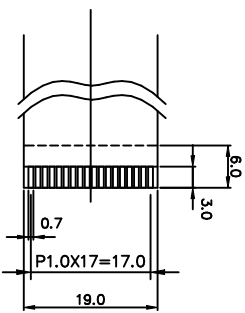
1.RESOLUTION : 240X160 DOTS

REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK
3				
3				
3				
3				
3				

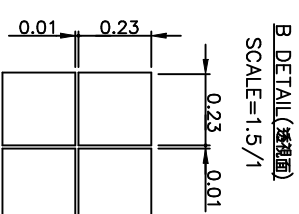
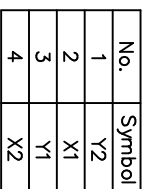
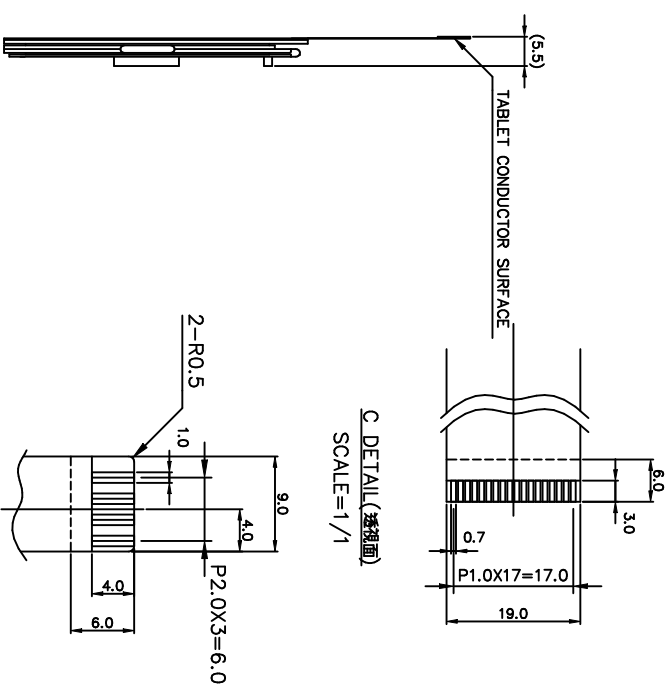
			
南亞塑膠工業股份有限公司 NAN YA PLASTICS CORPORATION			
製品圖			
L TD75H227L_3			
APPROVE CHECK DESIGN DRAWN	NAME TONY CHOU LOUIS LEE J.Y. LIN PING PING	DATE 88.01.12 88.01.12 88.01.12 88.01.12	THIRD ANGLE  SCALE UNIT mm
DWG NO. TD x 2 x 2 x 7 x x  			



A DETAIL



B DETAIL(透視面)
SCALE=1/1



SHARP LH156018

② TABLET

REV. NO.	DESCRIPTION	DATE	ISSN	CHECK	APPROVE	SCALE	UNIT
1					APPROVE		
2					CHECK		
3					DESIGN	88.06.20	
4					DRAWN	88.06.20	mm

DIMENSION		TOLERANCE	
L ≤ 6		±0.25 (mm)	
6 < L ≤ 18		±0.3 (mm)	
18 < L ≤ 50		±0.4 (mm)	
50 < L ≤ 125		±0.5 (mm)	
125 < L		±0.6 (mm)	
ANGLE		±1° (DEG)	



NAN YA PLASTICS CORPORATION

製品圖

南亞塑膠工業股份有限公司

LTD75T227J3GK

NAME	DATE	THIRD	ANGLE	P

南亞塑膠工業股份有限公司
NAN YA PLASTICS CORPORATION

製品圖

LTD75T227J3GK

NAME	DATE	THIRD ANGLE PROJECTION
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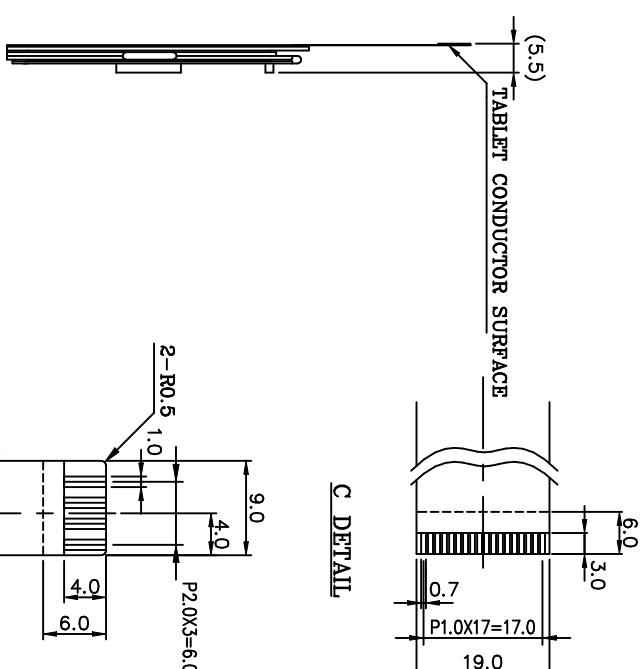
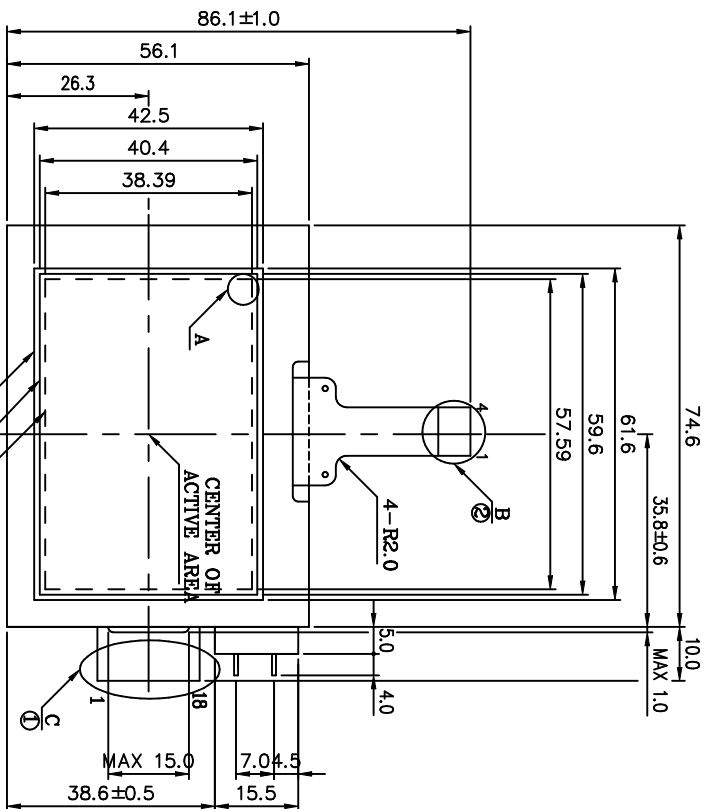
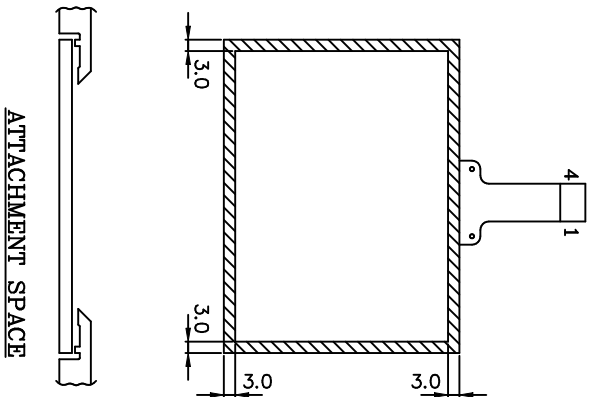
[illegible]

J. Y. Lin	89.06.20	SCALE	UNIT
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Ping Ping	89.06.20	-	mm
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$$[M_2]_2 [M_1]_1 [D]_2 [M_1]_1 [M_2]_2 [I]_1 \rightarrow \Delta$$

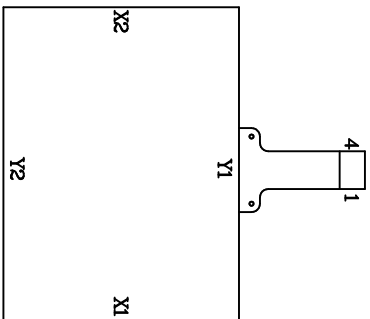
2027AD3A 10



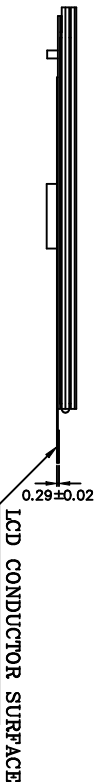
ATTACHMENT SPACE

② TABLET CONNECTION

No.	Symbol
1	Y2
2	X1
3	Y1
4	X2



VIEWING DIRECTION



① LCD CONNECTION

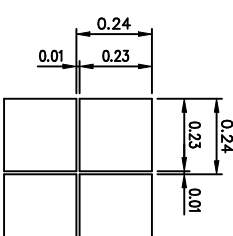
PIN NO	SYMBOL	FUNCTION	PIN NO	SYMBOL	FUNCTION
1	V5	Bias voltage for non-select (Common driver)	9	DF	Switch signal to convert LCD driver waveform into AC
2	V2	Bias voltage for non-select (Common driver)	10	/D.OFF	H:Display ON, L:Display OFF
3	VEE	Power supply for LCD (+V)	11	CP	Clock Pulse for segment shift register
4	VDD	Power supply for logic (+3.3V)	12	V4	Bias voltage for non-select (Segment driver)
5	FRM	Frame start signal (Data Signal of the shift register of the common driver)	13	V3	Bias voltage for non-select (Segment driver)
6	VCND	GND, Power supply for LCD	14	D3	Input data signal
7	LOAD	(1) Latch pulse of display data (2) Shift clock for common driver	15	D2	Input data signal
8	VSS	GND	16	D1	Input data signal
			17	DO	Input data signal
			18	NC	No connectoin

- NOTE :
1. RESOLUTION : 240X160 DOTS
 2. DROVER IC : SHARP LH1562F4 SHARP LH156018
 3. BACKLIGHT: EL (WHITE)

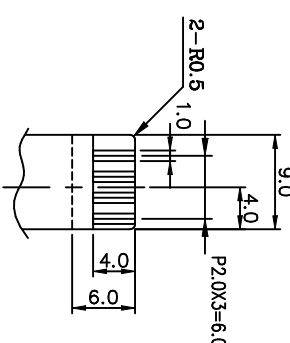
GENERAL TOLERANCE LIST

DIMENSION	TOLERANCE
L ≤ 6	±0.25 (mm)
6 < L ≤ 18	±0.3 (mm)
18 < L ≤ 50	±0.4 (mm)
50 < L ≤ 125	±0.5 (mm)
125 < L	±0.6 (mm)

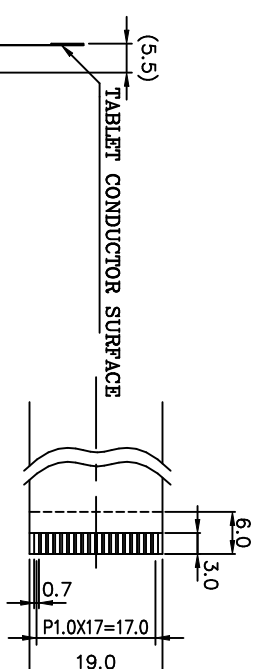
A DETAIL



B DETAIL



C DETAIL



REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

南亞塑膠工業股份有限公司
NAN YA PLASTICS CORPORATION

製品圖

LTD75Z227L3K

NAME DATE THIRD ANGLE P.

CHECK DESIGN DRAWN

DATE 89.06.20 89.06.20

SCALE UNIT mm

DWG NO. M227BD3A40