

NAN YA PLASTICS CORPORATION

SPECIFICATION OF
LCD MODULE
PRODUCT NO.: LTD75_227_3_

SPEC. NO.: LT227-3- \triangle 2

CUSTOMER
APPROVED BY
DATE :

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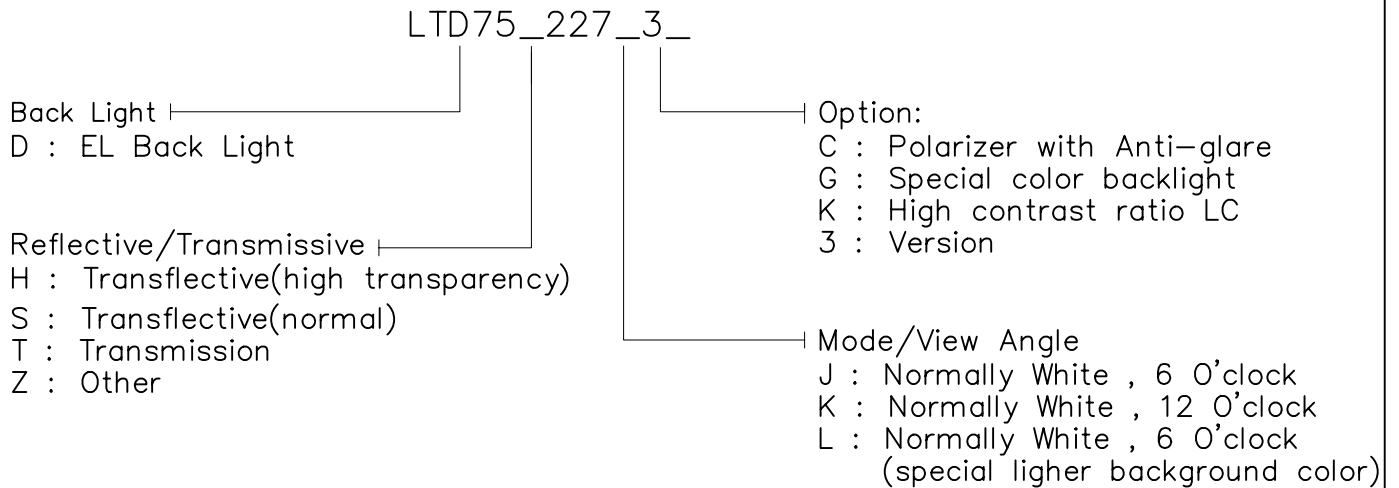
EDITED ON. : Aug. 11. 2005

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

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: <input type="checkbox"/> Reflective <input type="checkbox"/> Transflective <input type="checkbox"/> Transmission |
| (8) Viewing Direction | <input type="checkbox"/> 6 O'clock <input type="checkbox"/> 12 O'clock |
| (9) Backlight | <input type="checkbox"/> W/O <input type="checkbox"/> EL (White) <input type="checkbox"/> EL (Blue Green) <input type="checkbox"/> 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 :



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	VEE-VSS	0	27	V	
Static Electricity	-	-	-	-	Note 1

(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 2,4		Note 3,4		Note 4,5		Note 4,6	
Vibration(Note 7)	-		49cm/S ² (5G)		-		49cm/S ² (5G)	

Note 1 LCM should be grounded during handling LCM.

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 < 48 hrs, at 70°C will be < 120 hrs

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

Note 5 Ta ≤ 70°C : 75%RH max
Ta > 70°C : Absolute humidity must be lower than the humidity of 75%RH at 70°C

Note 6 Ta at -30°C will be < 48 hrs, at 80°C will be < 120 hrs

Note 7

Frequency (HZ)	10~55~10/1 min
Vibration Width	1.5 m/m
Vibration Direction	X/Y/Z
Vibration Time	15 min/cycle X 3 directions

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

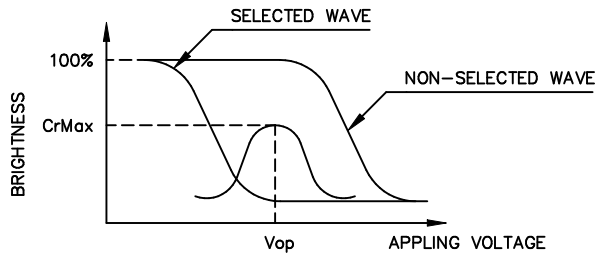
(special lighter background color)

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

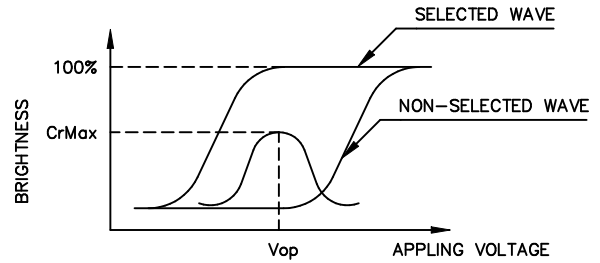
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20°C	-	300	-	ms	NOTE 2
		0°C	-	700	-		
		25°C	-	200	-		
		50°C	-	90	-		
		70°C	-	60	-		
Response Time (fall)	Tf	-20°C	-	2000	-	ms	NOTE 2
		0°C	-	400	-		
		25°C	-	100	-		
		50°C	-	50	-		
		70°C	-	30	-		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



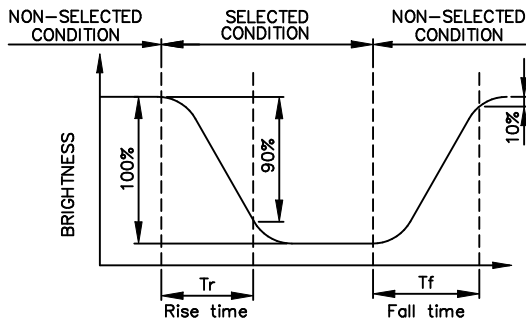
(negative type)

*Conditions

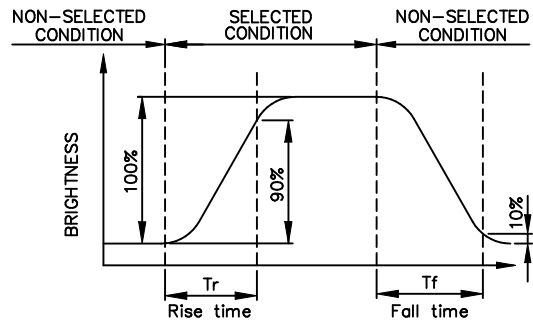
Viewing Angle : 0
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



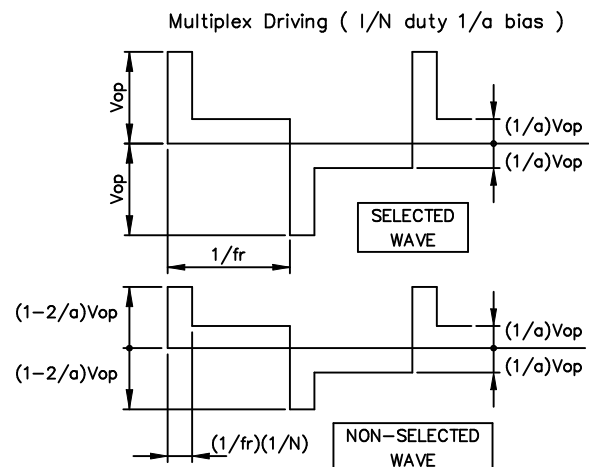
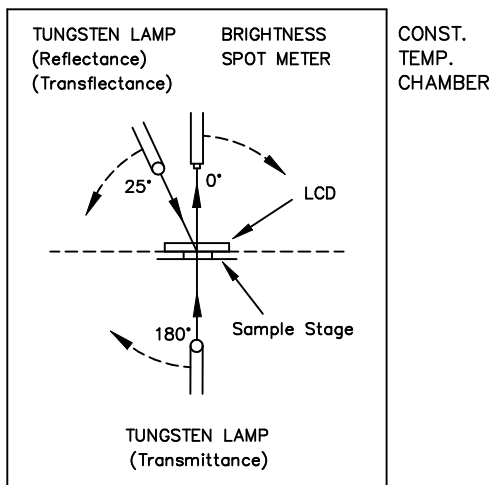
(negative type)

*Conditions

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

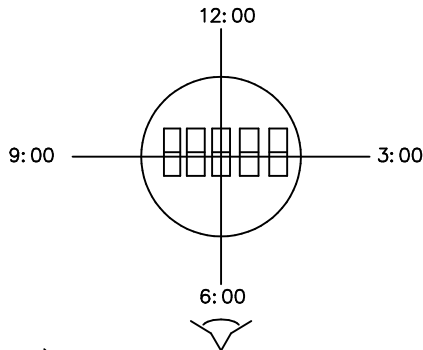
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



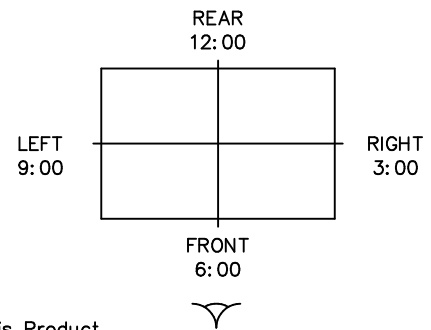
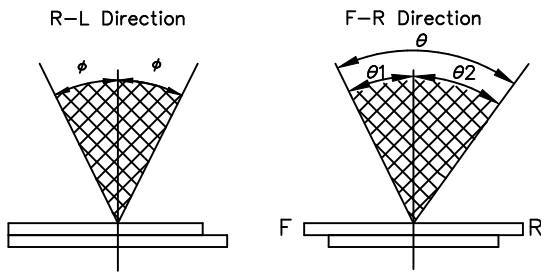
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



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

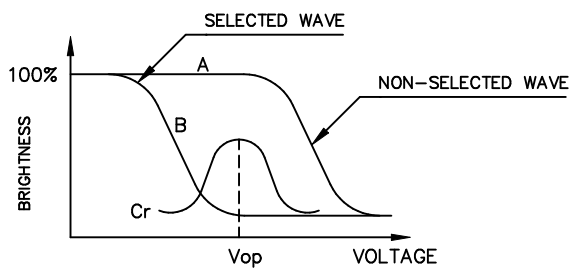
$$\theta = \theta_1 + \theta_2$$

*Conditions

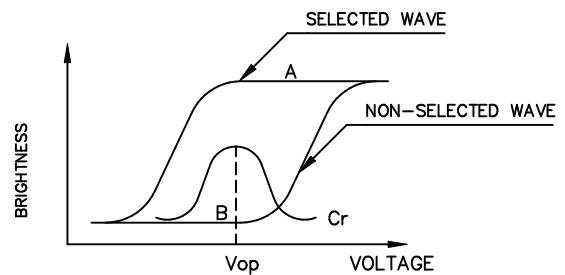
Operating Voltage : V_{op}
 Frame Frequency : 70Hz
 Applying Waveform : 1/N duty 1/a bias
 Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



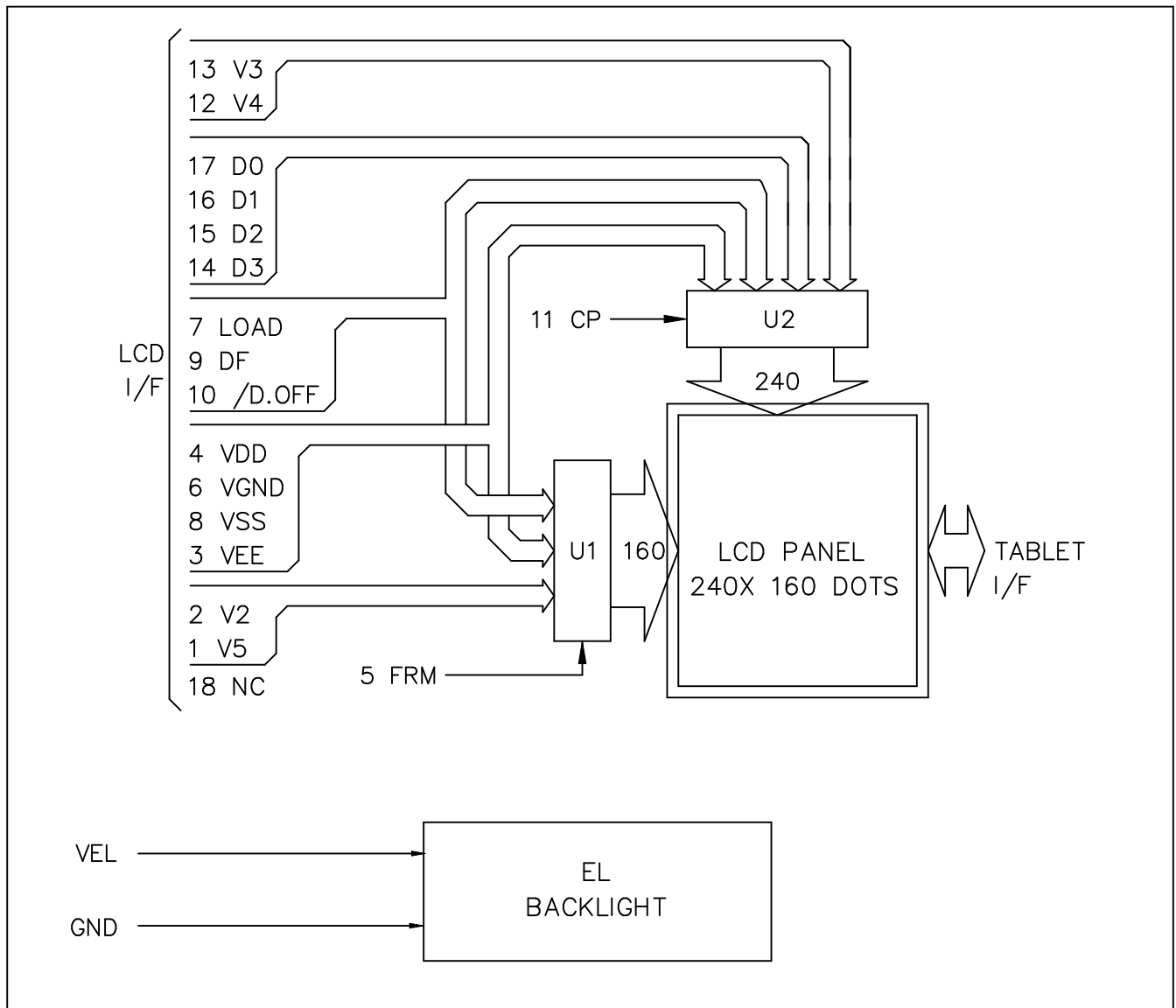
(negative type)

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

*Conditions

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

5. BLOCK DIAGRAM



Note1 :

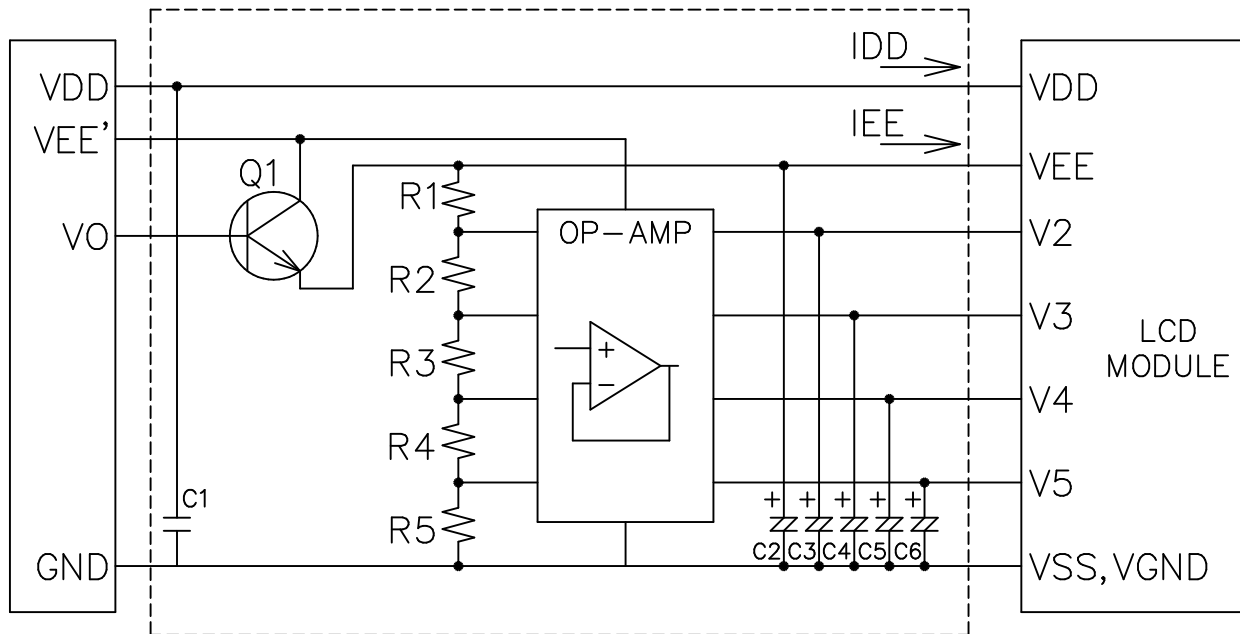
- 1) Controller and bias voltage supply circuit are not included.
- 2) VEE, VGND, V2, V3, V4 and V5 are power supply voltage for LCD.
($VEE > V2 > V3 > V4 > V5 > VGND$)
- 3) The bias is 1/13, $\left\{ \begin{array}{l} VOP = VEE - VSS = 20.4 \text{ V. (Normal Temp.)} \\ VOP = VEE - VSS = 20.8 \text{ V.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

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

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

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

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 °C

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

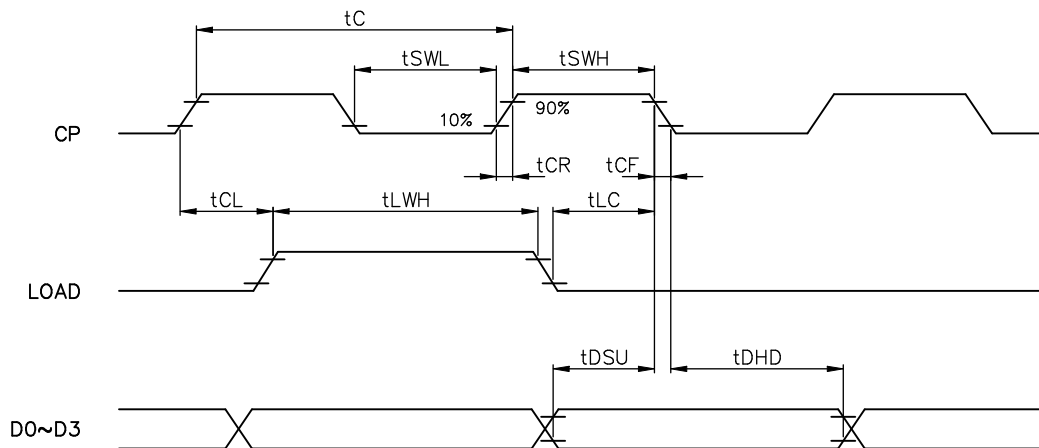


Fig . a Interface timing (SEGMENT)

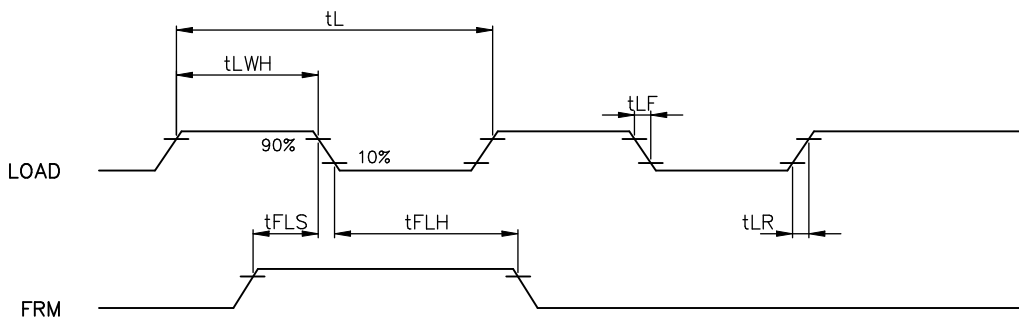
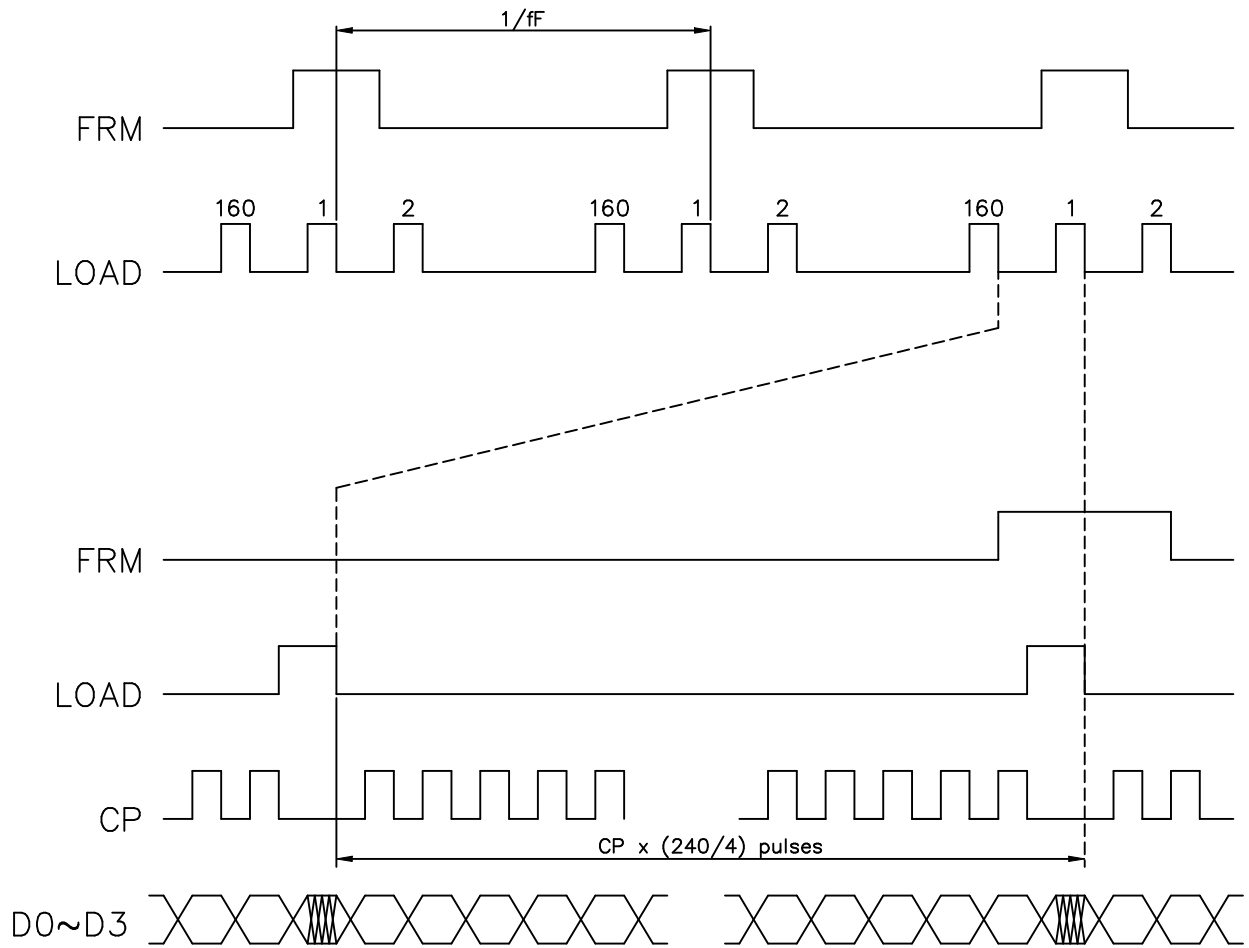
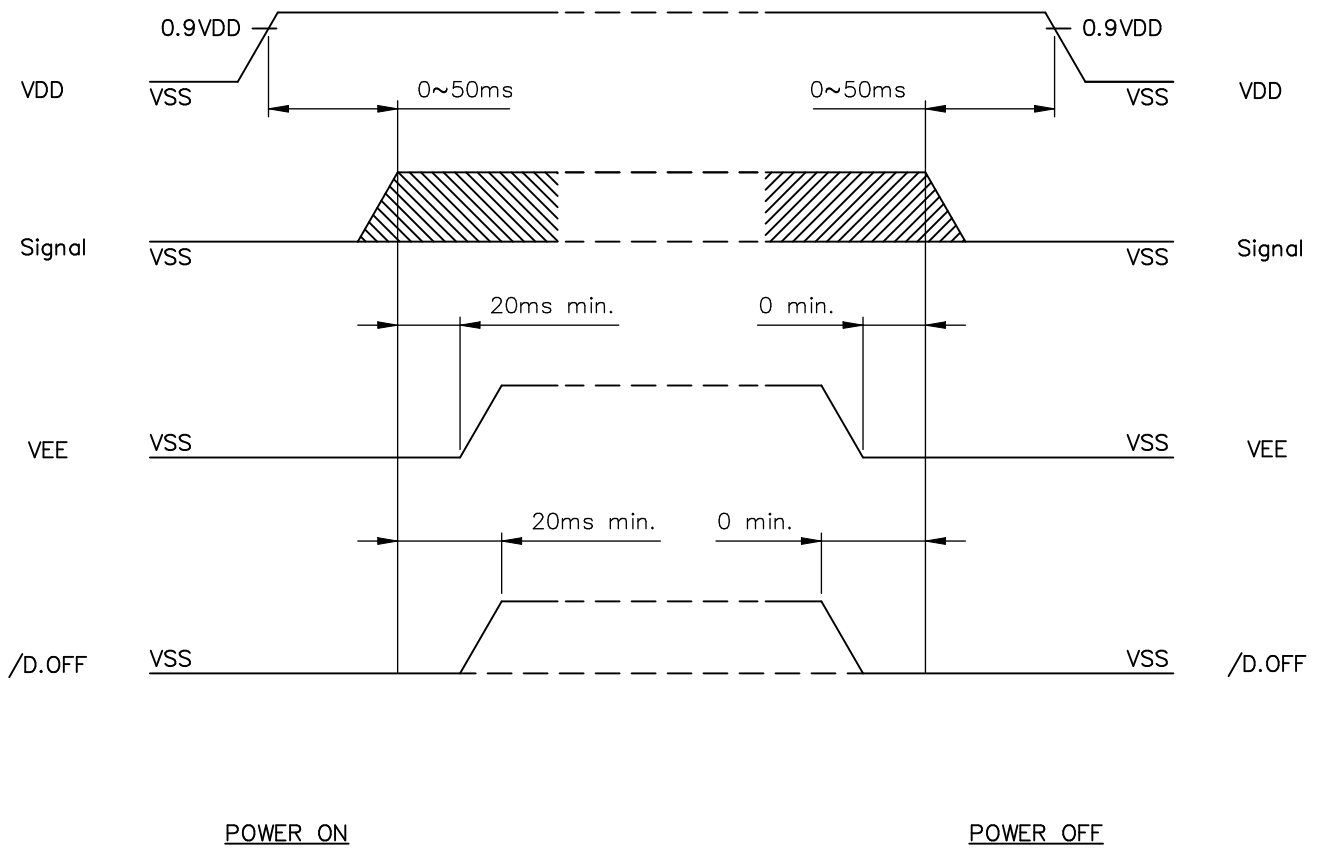


Fig . b Interface timing (COMMON)

8-2. TIMING CHART OF INPUT SIGNAL

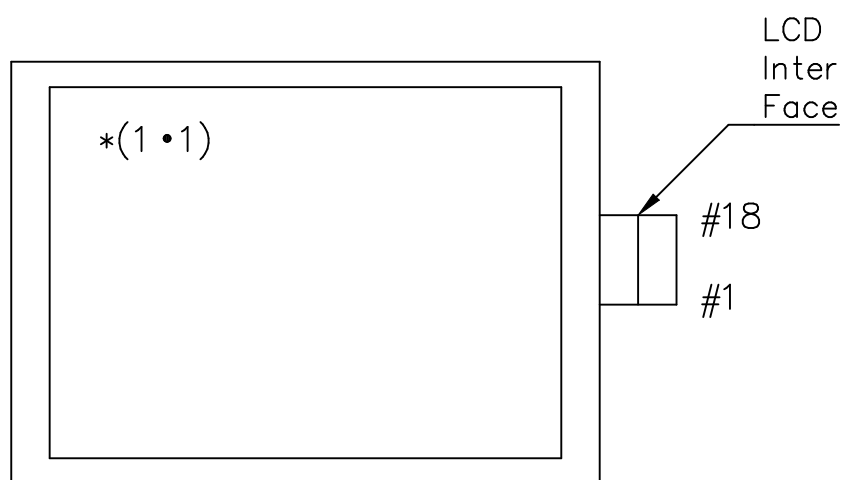
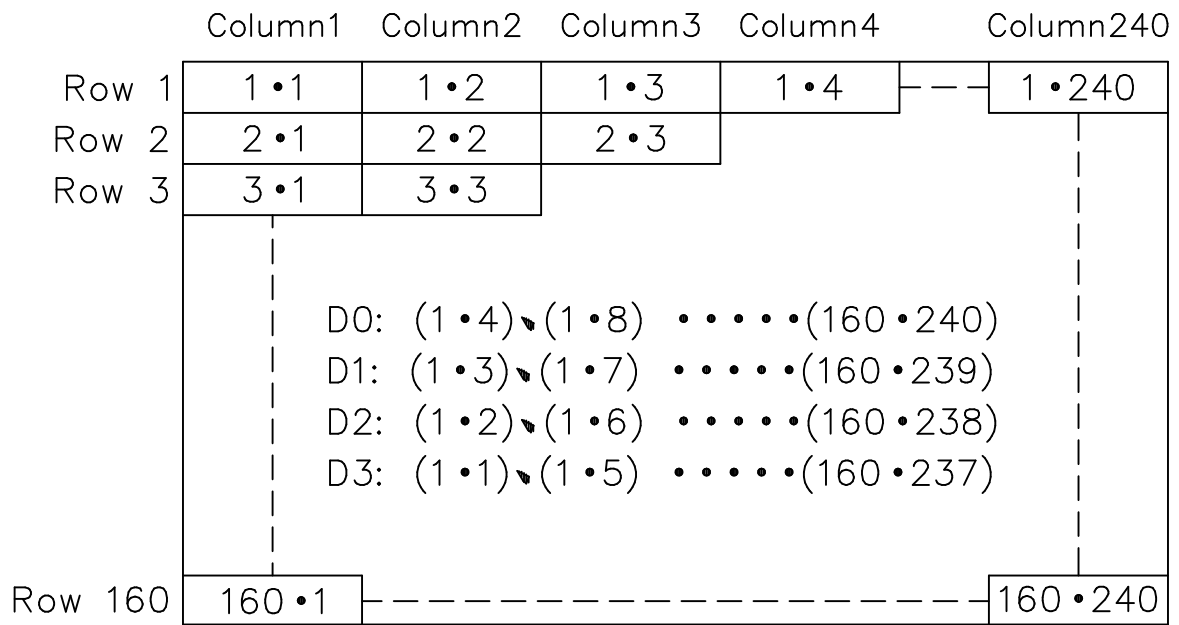


8-3. POWER ON/OFF TIMING



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

8-4.DISPLAY PATTERN



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

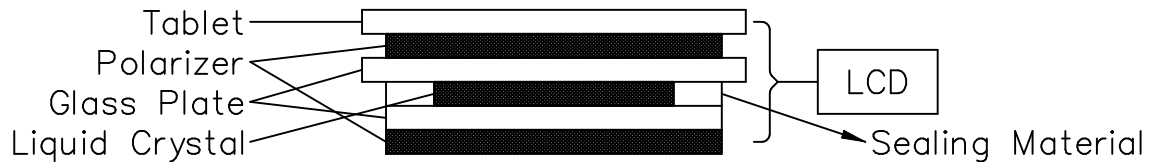
The NAN YA inspection provision provides outgoing inspection provision and its expected quality level based on our outgoing inspection of NAN YA LCD produces.

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

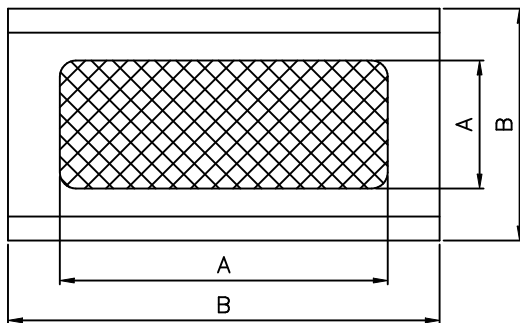
4-2 Inspection Standard

	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			

		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.

*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

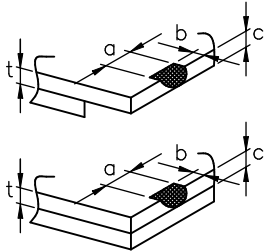
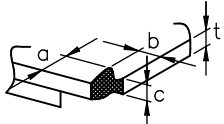
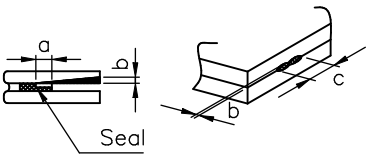
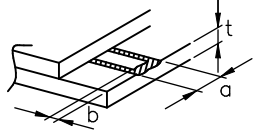
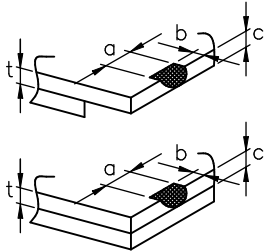
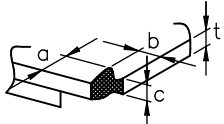
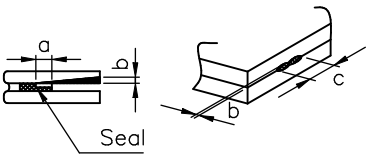
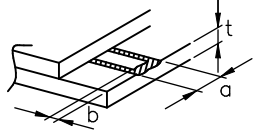
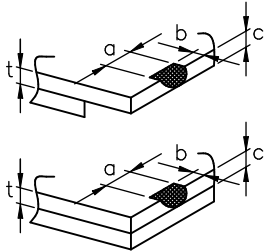
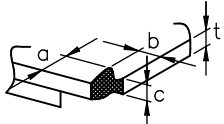
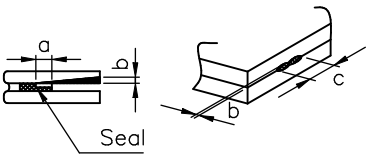
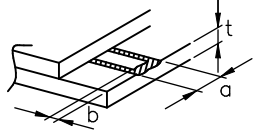
NO.	Item	Criterion
1.	Non operational	Fail
2.	Miss operating	Fail
3.	Missing dot	Fail
4.	Contrast irregular	Not allowable
5.	Response time	Within Specified value
6.	Tablet contact resistance	Within Specified value
7.	Tablet input load	Within Specified value
8.	Tablet lineality	Within Specified value
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.)	<p>(1)-1-Spots(At non lighting condition)</p> <table border="1" data-bbox="730 477 1377 763"> <thead> <tr> <th>Average Diameter(mm):D</th> <th>Number of pieces permitted</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>Number of total pieces is set to within 5 pieces.</p> <p>Note that when there are 2 pieces or more, they are not to be concentrated. Set as: Average diameter = (Long diameter + Short diameter)/2</p> <p>(1)-2-Spots(At lighting condition)</p> <table border="1" data-bbox="730 1189 1377 1429"> <thead> <tr> <th>Average Diameter(mm):D</th> <th>Number of pieces permitted</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>Number of total pieces is set to within 5 pieces.</p> <p>Note that when there are 2 pieces or more, they are not to be concentrated. Set as: Average diameter = (Long diameter + Short diameter)/2</p>	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																			
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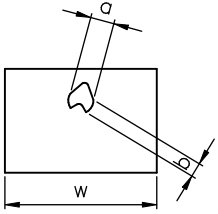
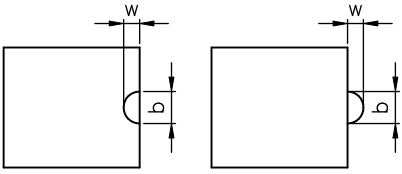
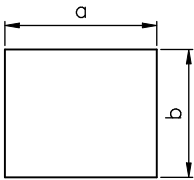
SPECIFICATION

<p>1. Black spots, foreign matter, and white spots (Including light leakage due to pinholes of polarizing plates, etc.)</p>	<p>(1)-1 Spots(At non lighting condition)</p> <table border="1" data-bbox="730 427 1474 712"> <thead> <tr> <th>Width(mm): W</th> <th>Length(mm):L</th> <th>Number of pieces permitted</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>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.</p> <p>(1)-2 Spots(At lighting condition)</p> <table border="1" data-bbox="730 1016 1474 1301"> <thead> <tr> <th>Width(mm): W</th> <th>Length(mm):L</th> <th>Number of pieces permitted</th> </tr> </thead> <tbody> <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> </tbody> </table> <p>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.</p>	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																							
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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																							
<p>2. Scratches(Glass, reflection plates, and polarizing plates)</p>	<p>In accordance with black spots. (At non lighting condition)</p>																								
<p>3. Color irregular</p>	<p>Not remarkable color irregular.</p>																								

<p>4. Air bubbles polarizing plates, and reflection plates</p>	<table border="1" data-bbox="730 376 1248 667"> <tr> <th data-bbox="730 376 991 524">Average Diameter (mm): D</th> <th data-bbox="991 376 1248 524">Number of pieces permitted</th> <td data-bbox="1248 376 1498 667" rowspan="2">Average diameter = (Long diameter + Short diameter)/2</td> </tr> <tr> <td data-bbox="730 524 991 667">D ≤ 0.3</td> <td data-bbox="991 524 1248 667">Ignore</td> </tr> <tr> <td data-bbox="730 667 991 779">0.3 < D</td> <td data-bbox="991 667 1248 779">0</td> <td></td> </tr> </table> <p data-bbox="730 689 1498 779">Note that when there are 4 pieces or more, they are not to be concentrated.</p>		Average Diameter (mm): D	Number of pieces permitted	Average diameter = (Long diameter + Short diameter)/2	D ≤ 0.3	Ignore	0.3 < D	0				
Average Diameter (mm): D	Number of pieces permitted	Average diameter = (Long diameter + Short diameter)/2											
D ≤ 0.3	Ignore												
0.3 < D	0												
<p>5. Cracks</p>	<table border="1" data-bbox="683 779 1498 1964"> <tr> <td data-bbox="683 779 1086 1171"> <p>(1) General crack</p>  </td> <td data-bbox="1086 779 1498 1171"> <p>$a \leq 5$ $b \leq 2$ $c \leq t$</p> <p>Where, a and b are ignored when less than or equal 0.5. The numbers of pieces are set at up to 5 pieces.</p> </td> </tr> <tr> <td data-bbox="683 1171 1086 1361"> <p>(2) Corner crack</p>  </td> <td data-bbox="1086 1171 1498 1361"> <p>$a \leq 2.5$ $b \leq 2.5$ $c \leq t$ $a + b \leq 4$</p> </td> </tr> <tr> <td data-bbox="683 1361 1086 1641"> <p>(3) Seal portion crack</p>  </td> <td data-bbox="1086 1361 1498 1641"> <p>$a \leq \text{The seal width} \times 1/3$ $b \leq t \times 2/3$ $c \leq 5$</p> <p>The numbers of pieces are set at up to 5 pieces.</p> </td> </tr> <tr> <td data-bbox="683 1641 1086 1877"> <p>(4) ITO Pin crack</p>  </td> <td data-bbox="1086 1641 1498 1877"> <p>$a \leq 5$ $b \leq 1/3 \text{ pin length}$ $c \leq t$</p> </td> </tr> <tr> <td data-bbox="683 1877 1086 1964"> <p>(5) Progressive cracks</p> </td> <td colspan="2" data-bbox="1086 1877 1498 1964"> <p>All taken to be unacceptable.</p> </td> </tr> </table>		<p>(1) General crack</p> 	<p>$a \leq 5$ $b \leq 2$ $c \leq t$</p> <p>Where, a and b are ignored when less than or equal 0.5. The numbers of pieces are set at up to 5 pieces.</p>	<p>(2) Corner crack</p> 	<p>$a \leq 2.5$ $b \leq 2.5$ $c \leq t$ $a + b \leq 4$</p>	<p>(3) Seal portion crack</p> 	<p>$a \leq \text{The seal width} \times 1/3$ $b \leq t \times 2/3$ $c \leq 5$</p> <p>The numbers of pieces are set at up to 5 pieces.</p>	<p>(4) ITO Pin crack</p> 	<p>$a \leq 5$ $b \leq 1/3 \text{ pin length}$ $c \leq t$</p>	<p>(5) Progressive cracks</p>	<p>All taken to be unacceptable.</p>	
<p>(1) General crack</p> 	<p>$a \leq 5$ $b \leq 2$ $c \leq t$</p> <p>Where, a and b are ignored when less than or equal 0.5. The numbers of pieces are set at up to 5 pieces.</p>												
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<p>(5) Progressive cracks</p>	<p>All taken to be unacceptable.</p>												

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	 <p>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.</p>
2.	Missing	 <p>Dot display a and b are each $\leq 0.2\text{mm}$ The overall total is taken to be with in 10 units.</p>
3.	Thick and thin display	 <p>Taken to be within $\pm 1.5\%$ of display character width(a) and height(b).</p>

NOTICE:

• 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 $25^{\circ}\text{C}\pm 5^{\circ}\text{C}$ 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 WARRANT

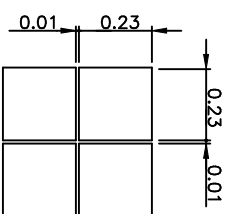
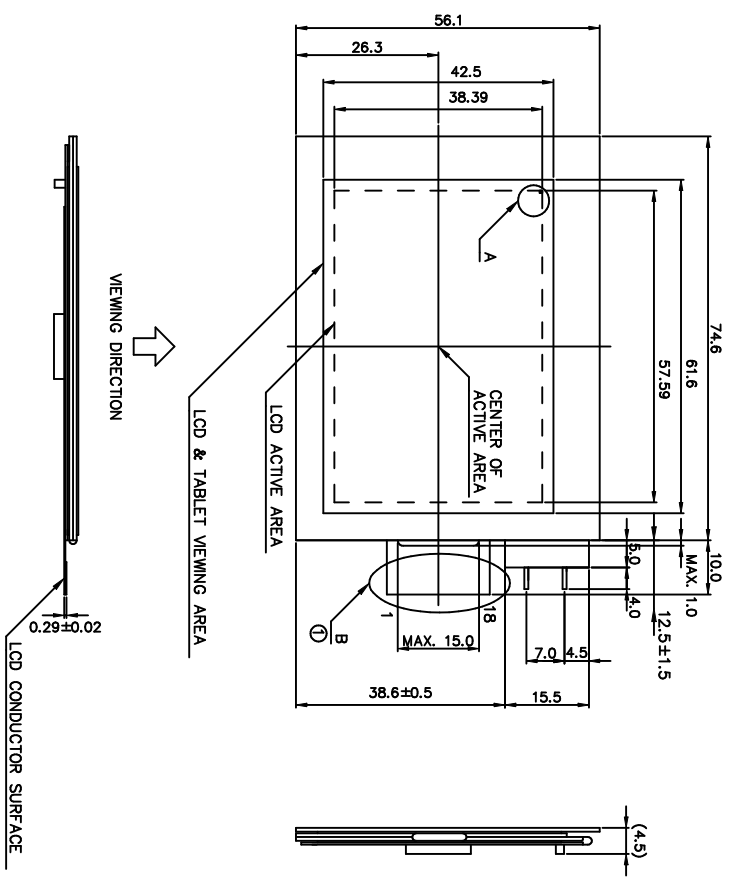
- 1.Acceptance inspection period
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
- 2.Applicable warrant period
The period is within twelve months since the date of shipping out under normal using and storage conditions.

• THE OPERATING LIFE TIME OF BACK LIGHT

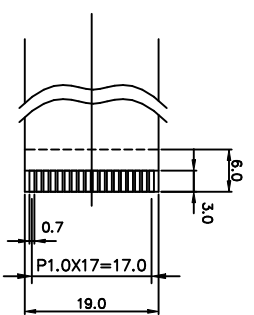
- EL : 2000hrs for AC 100Vrms, 400Hz, 20°C, 60%RH
(Operating life time is defined as follows : The final brightness is at 50% of original brightness.)

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



A DETAIL



B DETAIL(接指面)
SCALE=1/1


TOLERANCE LIST(S)

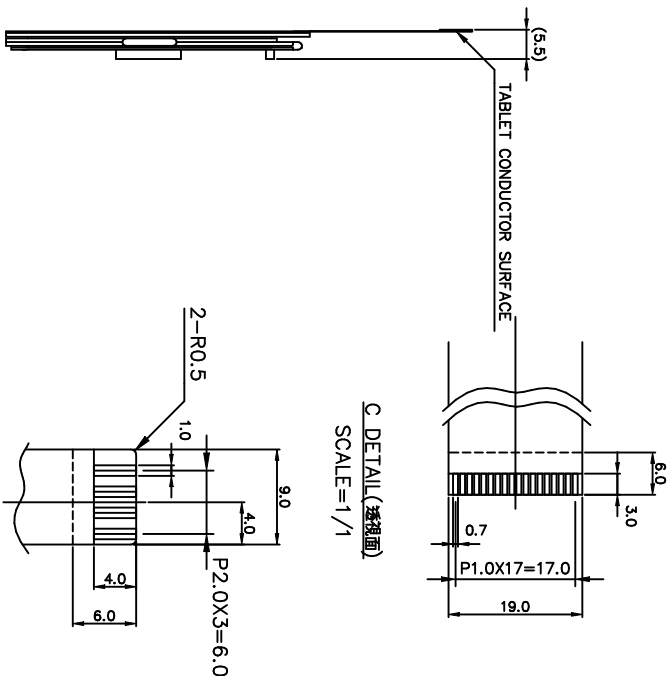
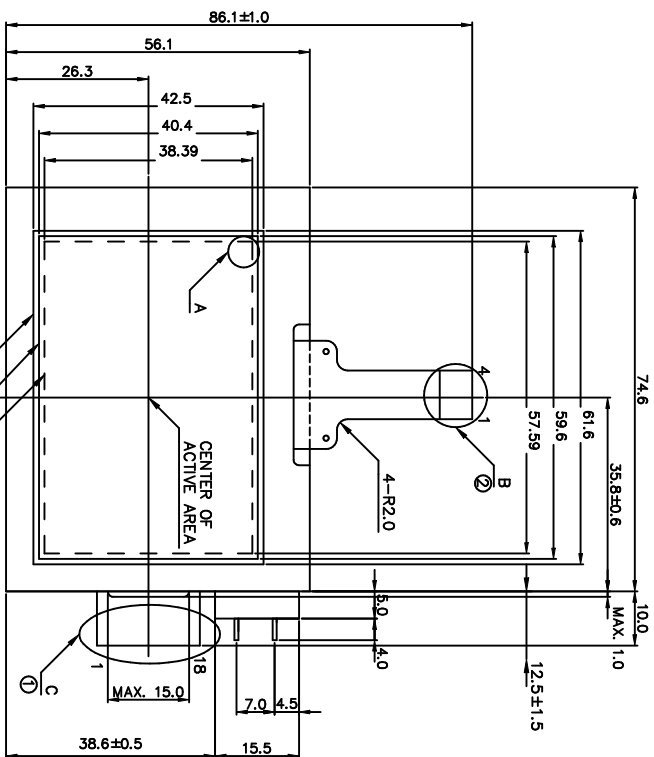
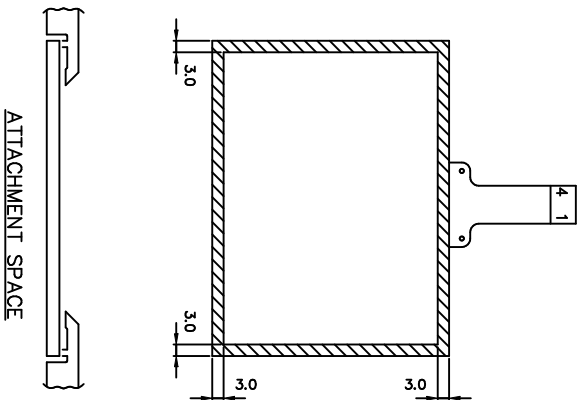
NOTE :

1.RESOLUTION : 240X160 DOTS

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)

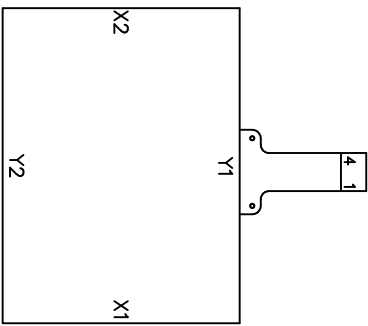
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 南亚塑膠工業股份有限公司 NAN YA PLASTICS CORPORATION 製品圖	
LTD75H227L3	
APPROVE	DATE
TONY CHOU	89.01.12
CHECK	LOUIS LEE
	89.01.12
DESIGN	J.Y. LIN
	89.01.12
DRAWN	PING PING
	89.01.12
DWG NO.	SCALE UNIT
T D X 2 2 7 X X	1 mm
APPROVE DATE THIRD ANGLE F	



② TABLET CONNECTION

No.	Symbol
1	Y2
2	X1
3	Y1
4	X2



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

GENERAL TOLERANCE LIST

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)
ANGLE	$\pm 1'$ (DEG)

A DETAIL

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

REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE
△					
△					
△					
△					

DWG NO.	NAME	DATE	THIRD ANGLE P.
M27A1D3A	LTD75T227J3GK		

CHECK	DESIGN	DRAWN	SCALE	UNIT
APPROVE	J.Y. Ima	Ping Ping	88.06.20	mm

REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE
△					
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南亞塑膠工業股份有限公司
 NAN YA PLASTICS CORPORATION

製 品 圖

LTD75T227J3GK

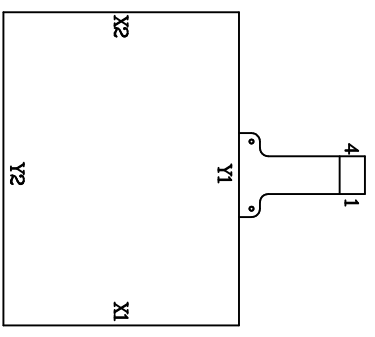
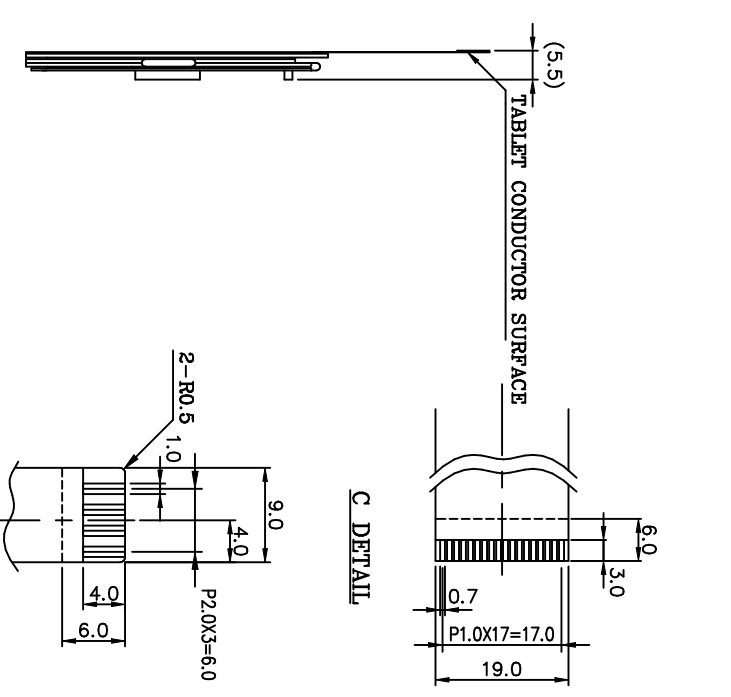
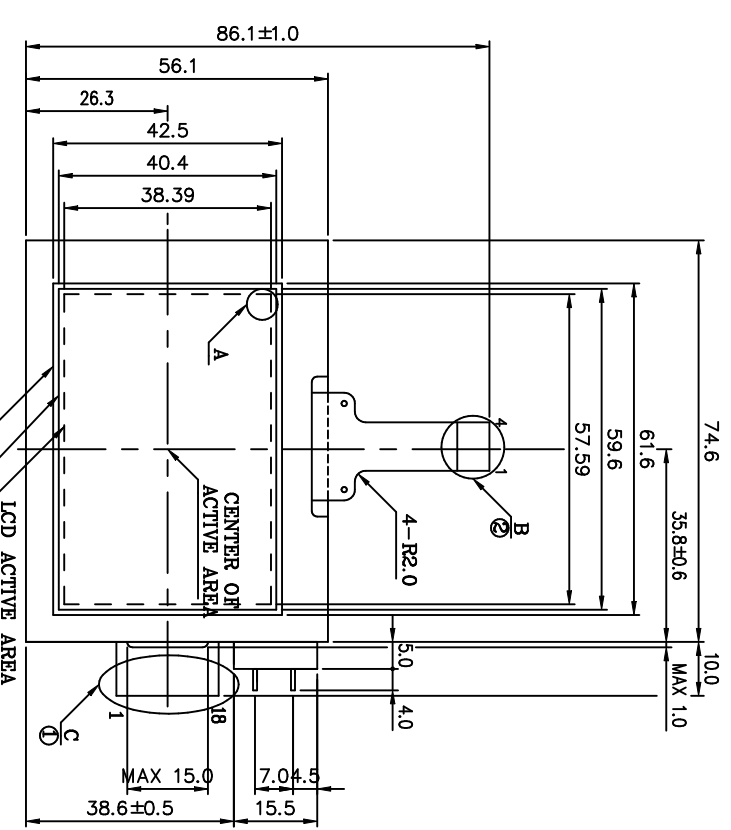
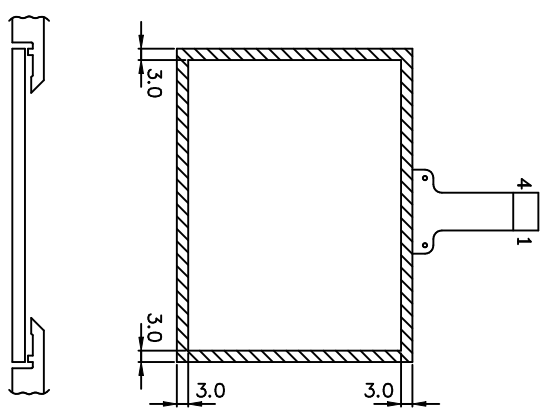
APPROVE

CHECK

DESIGN

DRAWN

DWG NO.



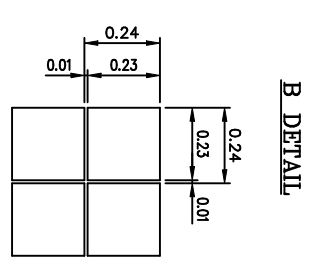
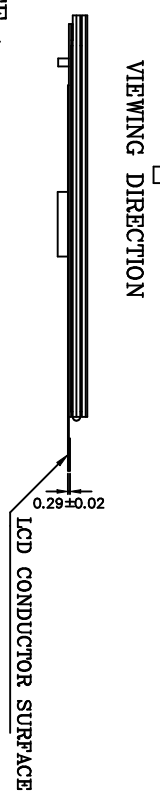
② TABLET CONNECTION

No.	Symbol
1	Y2
2	X1
3	Y1
4	X2

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	VGND	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 connection

- NOTE :
1. RESOLUTION : 240X160 DOTS
 2. DRIVER 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)

REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE
1					
2					
3					
4					
5					
6					
7					
8					

NAME	DATE	THIRD ANGLE P.

DWG NO.	SCALE	UNIT
M227BD3A		mm

APPROVE	CHECK	DESIGN	DRAWN

APPROVE	CHECK	DESIGN	DRAWN

南洋塑膠工業股份有限公司
NAN YA PLASTICS CORPORATION
製品圖
LTD75Z227L3K