

# NAN YA PLASTICS CORPORATION

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SPECIFICATION OF LCD MODULE PRODUCT NO.: LDC65H591CDS
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SPEC. NO.: LM591-0A-△

CUSTOMER
APPROVED BY
DATE:

LCD DEPARTMENT  
ELECTRONIC MATERIALS DIVISION  
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EDITED ON : May. 08. 2006

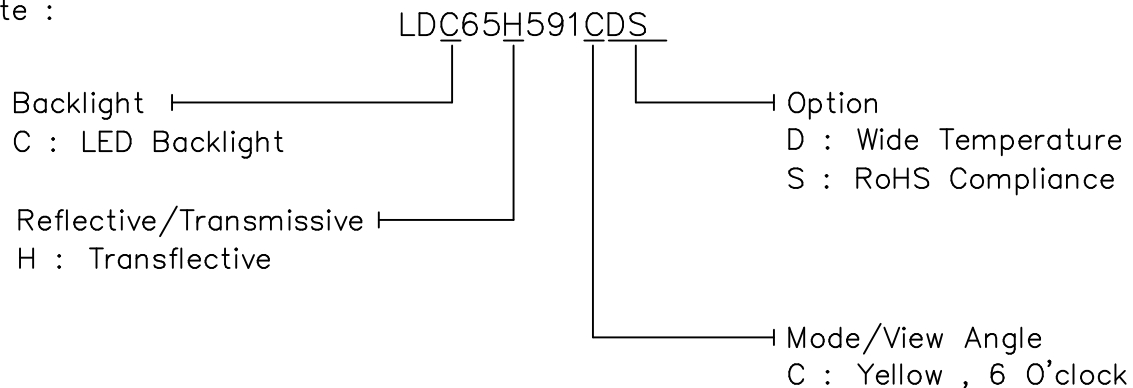
Q.C. DEPT.	DESIGN MANAGER	DESIGN CHECK	DESIGNER
			W.R.HSU



# 1. MECHANICAL DATA

NO	ITEM	CONTENTS	UNIT
1	Product No.	LDC65H591CDS	-
2	Module Size	69.0 (W) x 58.5 (H) x 5.8 (D)	mm
3	Dot Size	0.41 (W) x 0.57 (H)	mm
4	Dot Pitch	0.44 (W) x 0.60 (H)	mm
5	Number of Dots	128 (W) x 64 (H)	Dot
6	Duty	1/65	-
7	LCD Display Mode	STN, Yellow Mode	-
8	Rear Polarizer	Transflective Type	-
9	Viewing Direction	6	O'clock
10	Backlight	LED	-
11	Controller	S1D15605D00B000 or Compatible	-
12	Touch Panel	Excluded	-
13	Weight	28 (Approx.)	g

Note :



**RoHS Compliance.**

Nan Ya guarantees that this project doesn't include any materials (6 materials) or includes less than specified quantities which are regulated by RoHS Compliance.

REV/DATE	RO/ 05.08.06'					BY W.R.HSU
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## 2. ABSOLUTE MAXIMUM RATINGS

### (1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

	SYMBOL	MIN.	MAX.	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	5.5	V	
Input Voltage	VI	-0.3	VDD	V	
Static Electricity	-	-	-	-	Note 1

Note 1 LCM should be grounded during handling LCM.

### (2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	WIDE TEMP.			
	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	-20	70	-40	80
Humidity (Without Condensation)	Note 2,4		Note 3,4	


Note 2  $T_a \leq 70^\circ\text{C}$  : 75%RH max

Note 3 Please refer to item of reliability test

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

### 3. ELECTRICAL CHARACTERISTICS

#### 3-1. ELECTRICAL CHARACTERISTICS OF LCM

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	
Power Supply for Logic	VDD-VSS	-	4.5	5.0	5.5	V	
Input Voltage	VIH	H level	0.8VDD	-	VDD	V	
	VIL	L level	0	-	0.2VDD		
Recommended LC Driving Voltage	VDD-V5 (Vop)	*Note	-20°C	9.0	9.3	9.6	V
			0°C	8.4	8.7	9.0	
			25°C	8.1	8.4	8.7	
			50°C	7.9	8.2	8.5	
			70°C	7.7	8.0	8.3	
Power Supply Current	IDD	VDD-VSS=5.0V VDD-V5=8.4V Ta=25°C Pattern: 	-	0.5	0.7	mA	
Surface Luminance of LCM	L	IAK = 40mA Pattern: Dots All ON	-	4	8	cd/m <sup>2</sup>	
		IAK = 40mA Pattern: Dots All OFF	4	8	-		

\*Note :

- (1) Duty=1/65, Bias=1/9
- (2) Internal Resistance Ratio Register : (1,1,0) Binary
- (3) Electronic Volumn Value : (11) Decimal
- (4) Thermal Gradient : -0.05 %/°C
- (5) Range of Electronic Volumn Control : (11±3) Decimal

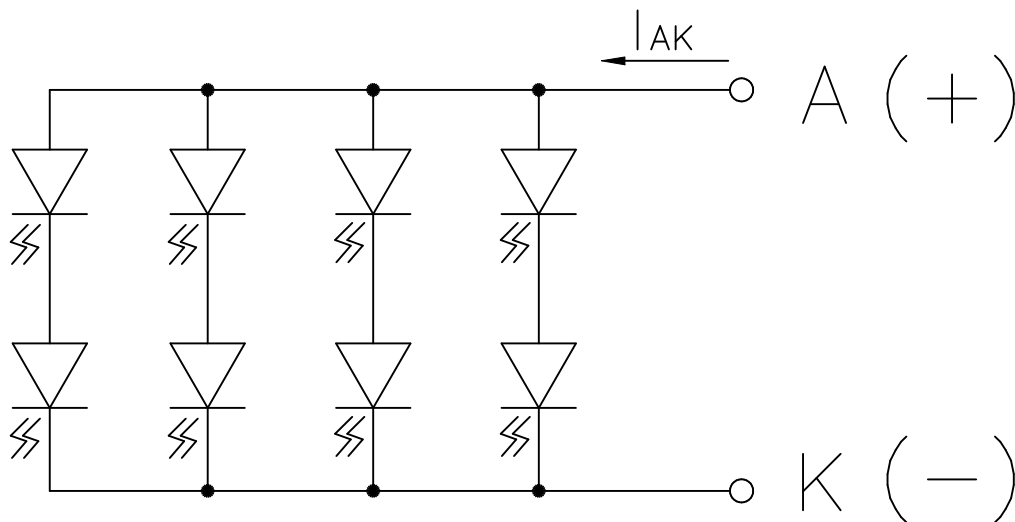
### 3-2.ELECTRICAL CHARACTERISTICS OF BACKLIGHT

Used LED Rating (Constant Current Driving)

Temp.=25°C

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Peak forward current	$I_P$	-	-	120	mA	-
Maximum reverse voltage	$V_R$	-	-	-10	V	-
Applied forward current	$I_{AK}$	-	40	-	mA	-
Applied forward voltage	$V_{AK}$	3.8	4.2	4.6	V	-
LED power consumption	$P_F$	0.15	0.16	0.17	W	-
LED life time	$L_L$	-	40000	-	hrs	at $I_{AK} = 40 \text{ mA}$ (*1)

(\*1) LED life time is defined as follows : The final brightness is at 50% of original brightness.



## 4. OPTICAL CHARACTERISTICS

WIDE TEMPERATURE MODE

AT V<sub>OP</sub>

ITEM MODE		Cr(Contrast Ratio)										$\theta$ (Viewing Angle)		$\theta$ (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.
H	C	2.5	4	3	4.5	3.5	5	2.5	4	2	3	-	F: 35 R: 30	-	L: 30 R: 30
NOTE		NOTE 6										NOTE 5			

NOTE :

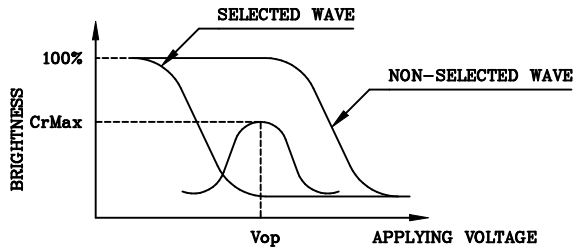
H : Transflective  
C : Yellow, 6 O'clock

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

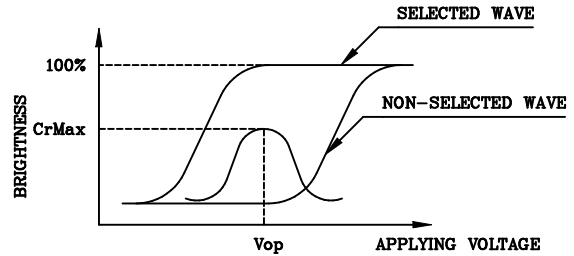
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	3200	4000	6000	ms	NOTE 2
		0℃	680	850	1270		
		25℃	160	200	300		
		50℃	95	120	180		
		70℃	45	60	90		
Response Time (fall)	Tf	-20℃	1900	2400	3600	ms	NOTE 2
		0℃	400	500	600		
		25℃	95	120	180		
		50℃	40	50	75		
		70℃	30	40	60		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



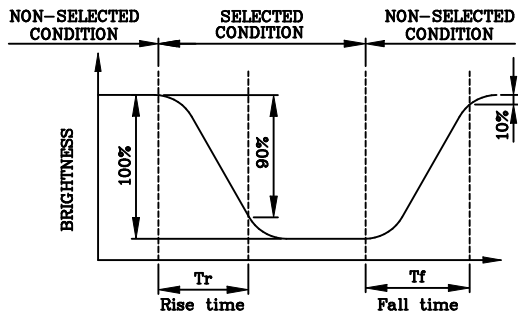
(negative type)

\*Conditions

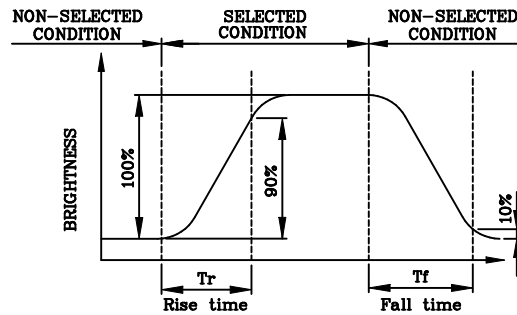
Viewing Angle : 0  
 Frame Frequency : 70Hz  
 Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



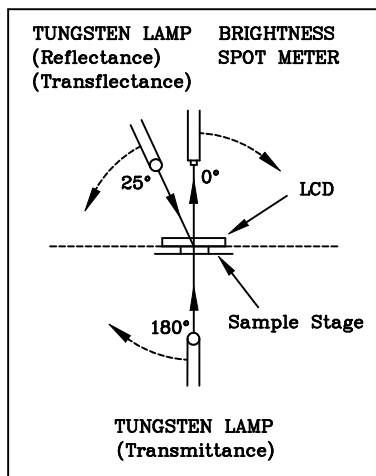
(negative type)

\*Conditions

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

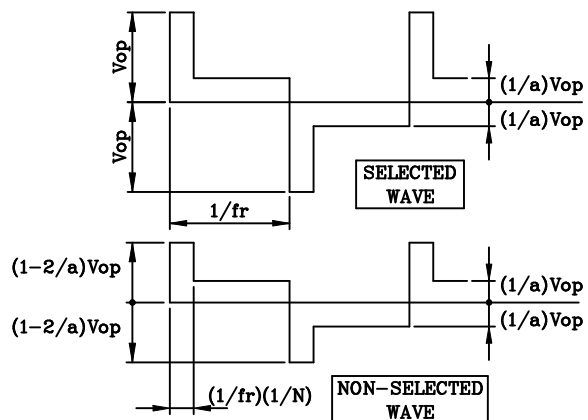
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



CONST.  
 TEMP.  
 CHAMBER

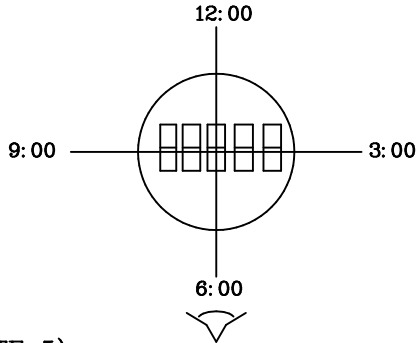
Multiplex Driving ( 1/N duty 1/a bias )





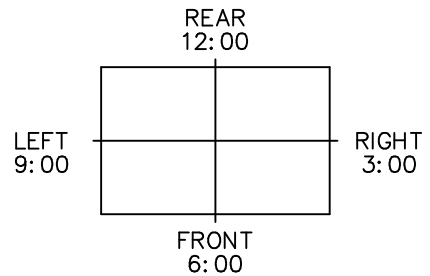
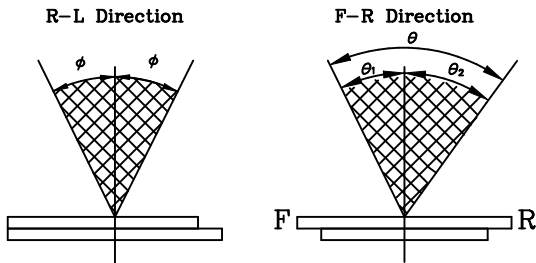
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



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

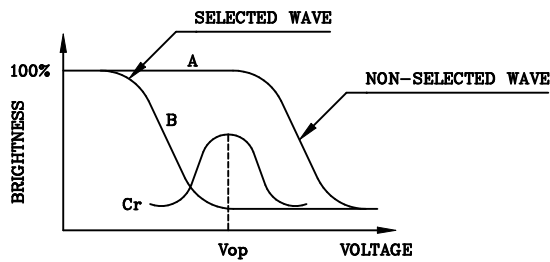
$$\theta = \theta_1 + \theta_2$$

\*Conditions

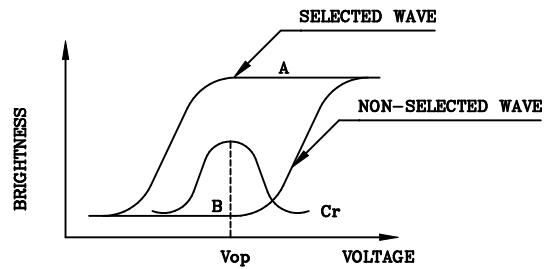
Operating Voltage :  $V_{op}$   
 Frame Frequency : 70Hz  
 Applying Waveform : 1/N duty 1/a bias  
 Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



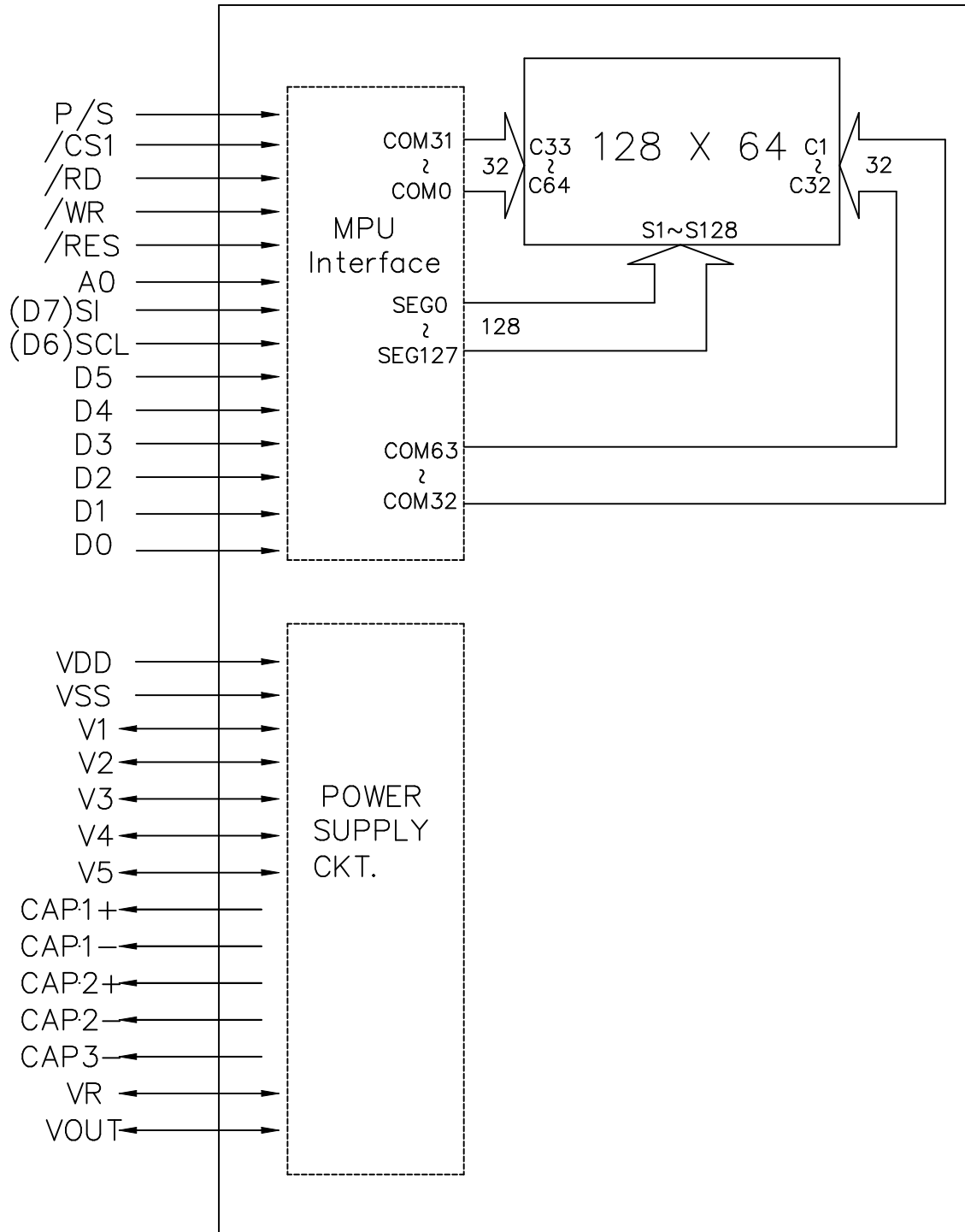
(negative type)

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

\*Conditions

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

## 5. BLOCK DIAGRAM



## 6. INTERNAL PIN CONNECTION

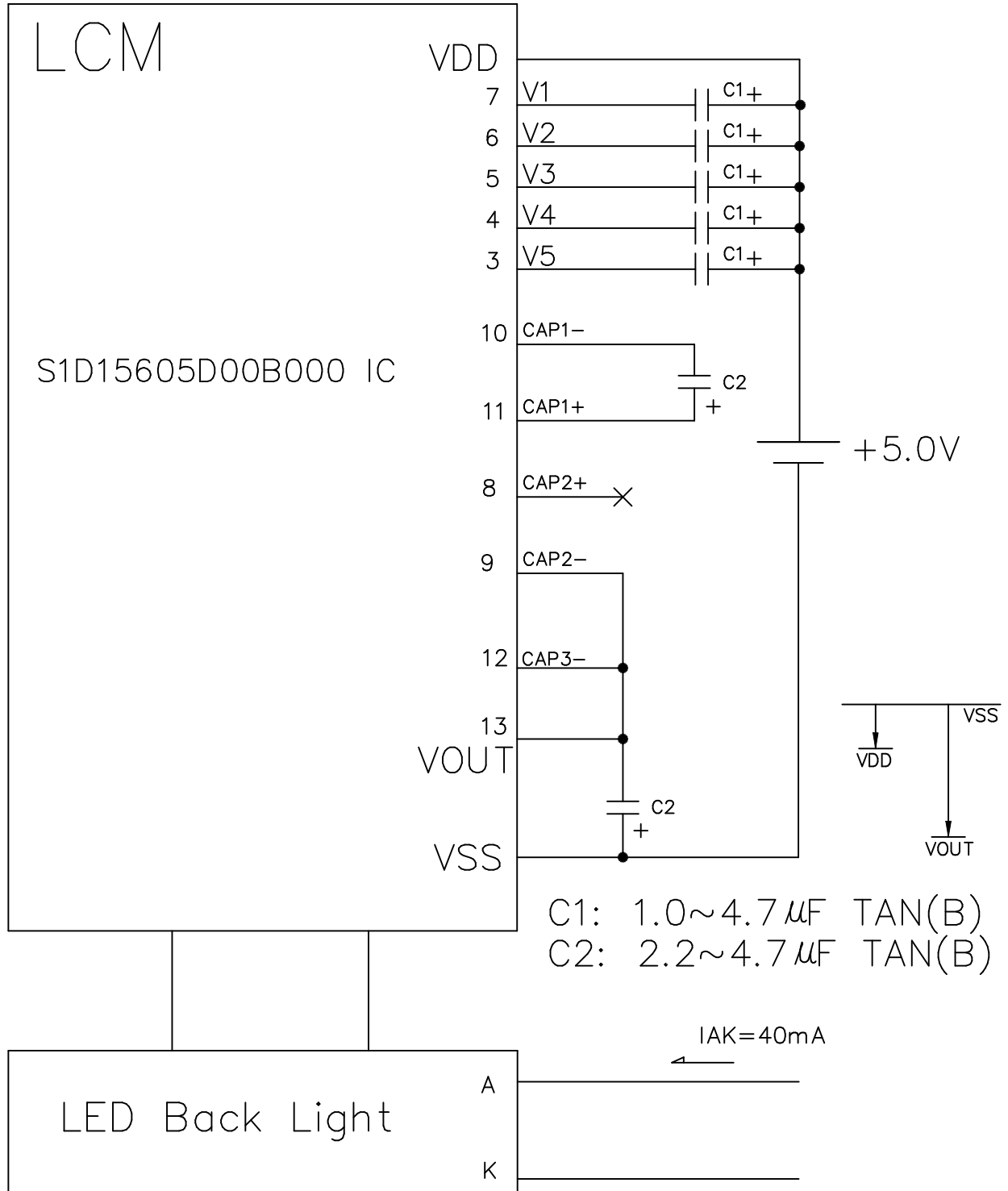
### CN1. LCD INTERFACE (FPC, PITCH 1.0)

PIN NO	SYMBOL	FUNCTION
1	P/S	HIGH: Parallel ; LOW: Serial data input
2	V <sub>R</sub>	Output voltage regulator terminal. Provides the voltage between VDD and V5 through a resistive voltage divider
3	V5	This is a multi-level power supply for the liquid crystal drive
4	V4	
5	V3	
6	V2	
7	V1	
8	CAP2+	DC/DC Voltage converter
9	CAP2-	
10	CAP1-	
11	CAP1+	
12	CAP3-	
13	Vout	
14	V <sub>SS</sub>	This is a 0V terminal connected to the system GND
15	VDD	Shared with the MPU power supply terminal VCC(+5V)
16	D7(SI)	Serial data input
17	D6(SCL)	Serial clock input
18	D5	Parallel data input
19	D4	
20	D3	
21	D2	
22	D1	
23	D0	
24	$\overline{RD}$	Fixed to either "H" or to "L"
25	$\overline{WR}$	Fixed to either "H" or to "L"
26	A0	"H" = Display data , "L" = Control data
27	/RES	Reset signal
28	/CS1	Chip select signal

### CN2. LED CONNECTOR, PHR-2 (JST) OR COMPATIBLE

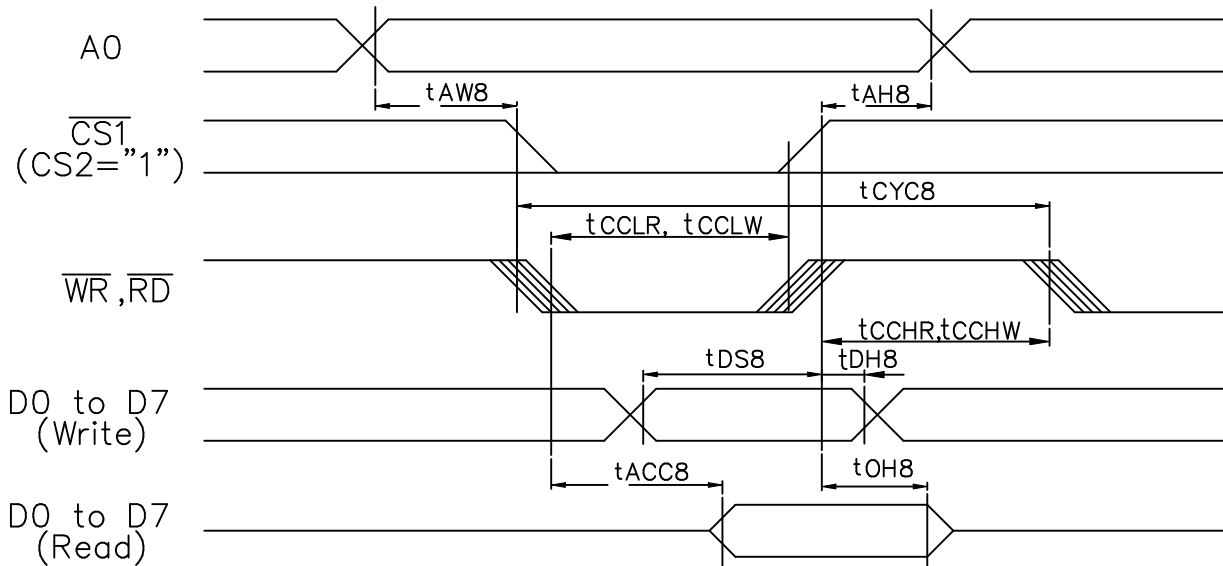
PIN NO	SYMBOL	FUNCTION
1	A	Power Supply Voltage LED Backlight (4.2V)
2	K	GND

# 7. POWER SUPPLY



## 8. TIMING CHARACTERISTICS

### 8-1 For 8080 Series MPU



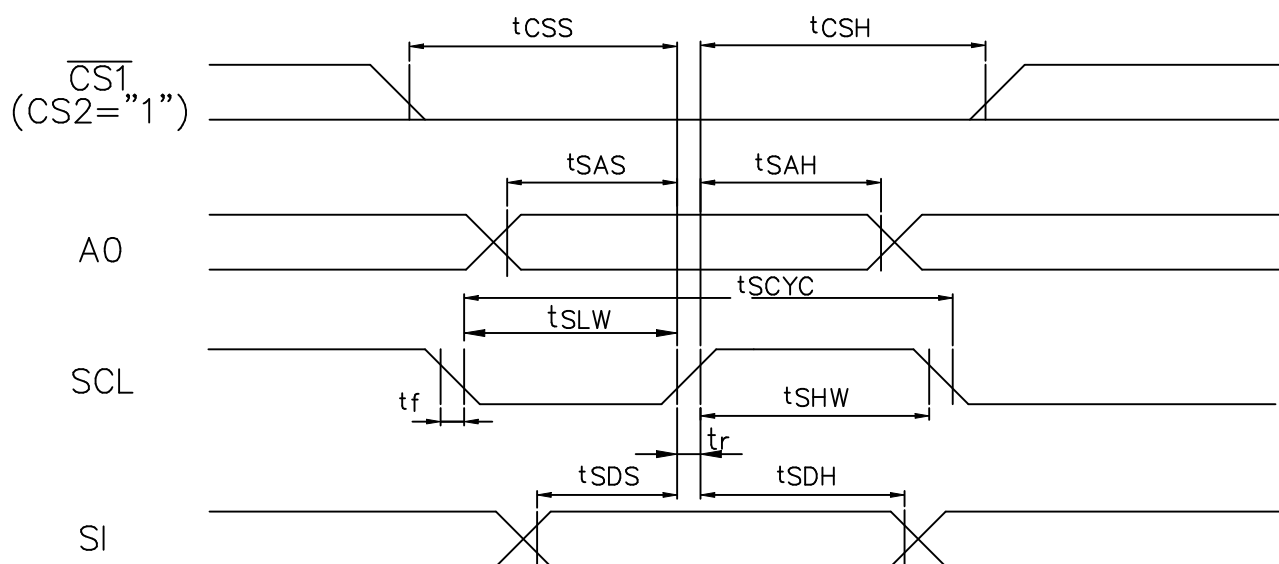
VDD=4.5~5.5V, Ta=-40~85°C

Item	Signal	Symbol	Condition	Rating		Unites
				Min	Max	
Address hold time	A0	tAH8		0	-	ns
Address setup time	A0	tAW8		0	-	ns
System cycle time	A0	tCYC8		166	-	ns
Control L pulse width	WR	tCCLW		30	-	ns
Control L pulse width	RD	tCCLR		70	-	ns
Control H pulse width	WR	tCCHW		30	-	ns
Control H pulse width	RD	tCCHR		30	-	ns
Data setup time	D0 to D7	tDS8		30	-	ns
Data hold time		tDH8		10	-	ns
RD access time	D0 to D7	tACC8	CL=100pF	-	70	ns
Output disable time		tOHR		5	50	ns

VDD=2.7~4.5V, Ta=-40~85°C

Item	Signal	Symbol	Condition	Rating		Unites
				Min	Max	
Address hold time	A0	tAH8		0	-	ns
Address setup time	A0	tAW8		0	-	ns
System cycle time	A0	tCYC8		300	-	ns
Control L pulse width	WR	tCCLW		60	-	ns
Control L pulse width	RD	tCCLR		120	-	ns
Control H pulse width	WR	tCCHW		60	-	ns
Control H pulse width	RD	tCCHR		60	-	ns
Data setup time	D0 to D7	tDS8		40	-	ns
Data hold time		tDH8		15	-	ns
RD access time	D0 to D7	tACC8	CL=100pF	-	140	ns
Output disable time		tOHR		10	100	ns

8-2 For Series Interface



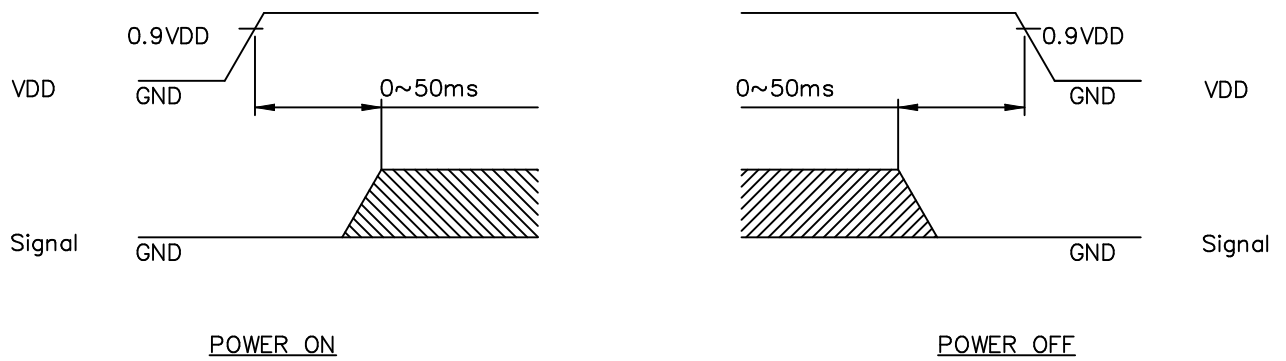
VDD=4.5~5.5V, Ta=-40~85°C

Item	Signal	Symbol	Condition	Rating		Unites
				Min	Max	
Serial Clock Period		tSCYC		200	-	ns
SCL "H" pulse width	SCL	tSHW		75	-	ns
SCL "L" pulse width		tSLW		75	-	ns
Address setup time		tSAS		50	-	ns
Address hold time	A0	tSAH		100	-	ns
Data setup time		tSDS		50	-	ns
Data hold time	SI	tSDH		50	-	ns
CS-SCL time	CS	tCSS		100	-	ns
		tCSH		100	-	ns

VDD=2.7~4.5V, Ta=-40~85°C

Item	Signal	Symbol	Condition	Rating		Unites
				Min	Max	
Serial Clock Period		tSCYC		250	-	ns
SCL "H" pulse width	SCL	tSHW		100	-	ns
SCL "L" pulse width		tSLW		100	-	ns
Address setup time		tSAS		150	-	ns
Address hold time	A0	tSAH		150	-	ns
Data setup time		tSDS		100	-	ns
Data hold time	SI	tSDH		100	-	ns
CS-SCL time	CS	tCSS		150	-	ns
		tCSH		150	-	ns

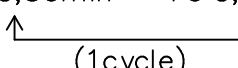
### 8-3. POWER ON/OFF TIMING



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

## 9. RELIABILITY TEST

### WIDE TEMPERATURE RELIABILITY TEST

NO	ITEM	CONDITION			STANDARD	NOTE
1	High Temp. Storage	80°C	120Hrs		Appearance without defect	
2	Low Temp. Storage	-40°C	120Hrs		Appearance without defect	
3	High Temp. & High Humi. Storage	60°C 90%RH	120Hrs		Appearance without defect	
4	High Temp. Operating Display	70°C	120Hrs		Appearance without defect	
5	Low Temp. Operating Display	-20°C	120Hrs		Appearance without defect	
6	Thermal Shock	-20°C, 30min → 70°C, 30min  (1cycle)			Appearance without defect	10 cycles



Inspection Provision

1. Purpose

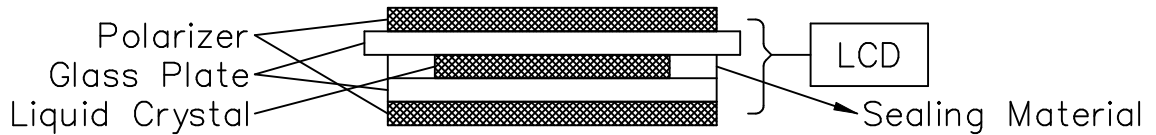
The NAN YA inspection provision provides outgoing inspection provision and its expected quality level based on our outgoing inspection of NAN YA LCD produces.

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

4-1 Inspection Method

MIL-STD-105E Level II Regular inspection

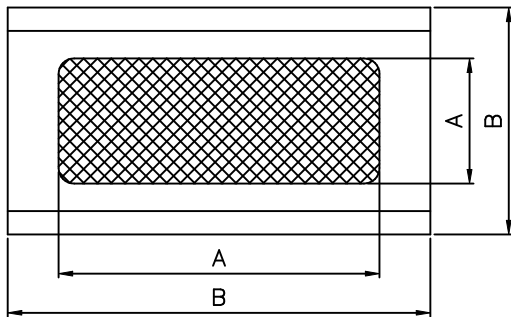
4-2 Inspection Standard

	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		

	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 Outline

\*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 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)

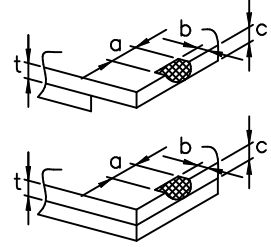
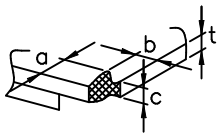
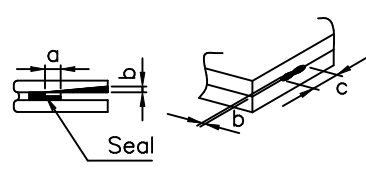
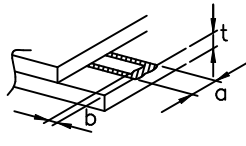
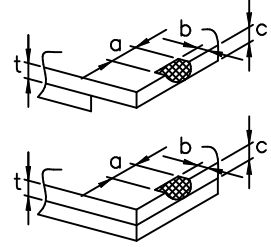
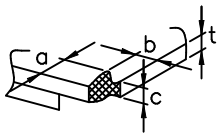
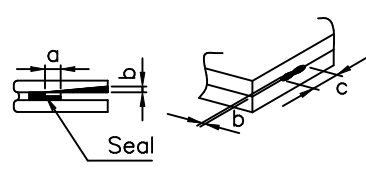
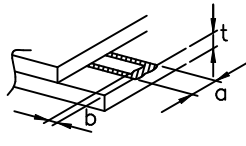
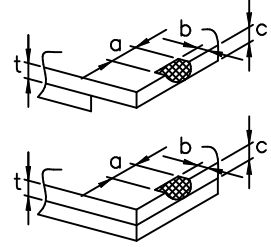
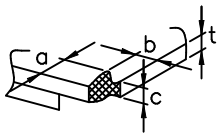
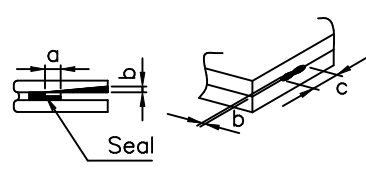
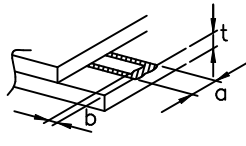
5.Specification for quality check  
5-1 Electrical characteristics

NO.	Item	Criterion
1	Non operational	Fail
2	Miss operating	Fail
3	Missing dot	Fail
4	Contrast irregular	Fail
5	Response time	Within Specified value
6	Backlight turn on/off	Within Specified value

5-2 External Appearance Defect

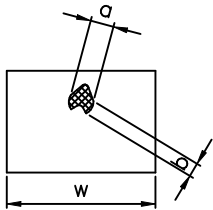
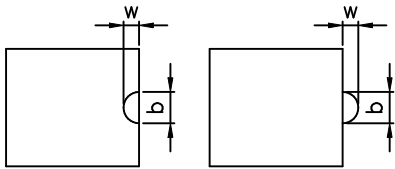
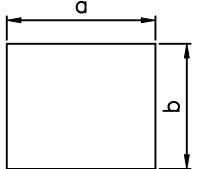
NO.	Item	Criterion																		
1	Black spots, foreign matter, and white spots (Including light leakage due to pinholes of polarizing plates, etc.)	<p>(1)-1-Spots</p> <table border="1" data-bbox="703 488 1337 770"> <thead> <tr> <th>Average Diameter(mm):D</th> <th>Number of pieces permitted</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.1</math></td> <td>Ignore</td> </tr> <tr> <td><math>0.1 &lt; D \leq 0.2</math></td> <td>5</td> </tr> <tr> <td><math>0.2 &lt; D \leq 0.3</math></td> <td>2</td> </tr> <tr> <td><math>0.3 &lt; D</math></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-Blurred Spots(At lighting condition)</p> <table border="1" data-bbox="703 1182 1337 1420"> <thead> <tr> <th>Average Diameter(mm):D</th> <th>Number of pieces permitted</th> </tr> </thead> <tbody> <tr> <td><math>D \leq 0.3</math></td> <td>Ignore</td> </tr> <tr> <td><math>0.3 &lt; D \leq 0.75</math></td> <td>5</td> </tr> <tr> <td><math>0.75 &lt; D</math></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
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$D \leq 0.1$	Ignore																			
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1	Line	<p>(1)-1-Lines</p> <table border="1" data-bbox="703 443 1430 721"> <thead> <tr> <th>Width(mm): W</th> <th>Length(mm): L</th> <th>Number of pieces permitted</th> </tr> </thead> <tbody> <tr> <td><math>W \leq 0.03</math></td> <td>Ignore</td> <td>Ignore</td> </tr> <tr> <td><math>0.03 &lt; W \leq 0.08</math></td> <td><math>L \leq 4</math></td> <td>2</td> </tr> <tr> <td><math>0.08 &lt; W \leq 0.1</math></td> <td><math>L \leq 1</math></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-Blurred Lines(At lighting condition)</p> <table border="1" data-bbox="703 1021 1430 1299"> <thead> <tr> <th>Width(mm): W</th> <th>Length(mm): L</th> <th>Number of pieces permitted</th> </tr> </thead> <tbody> <tr> <td><math>W \leq 0.03</math></td> <td>Ignore</td> <td>Ignore</td> </tr> <tr> <td><math>0.03 &lt; W \leq 0.08</math></td> <td><math>L \leq 3</math></td> <td>6</td> </tr> <tr> <td><math>0.08 &lt; W</math></td> <td><math>3 &lt; L</math></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
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$0.08 < W$	$3 < L$	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.																								

4	Air bubbles polarizing plates, and reflection plates	<table border="1" data-bbox="702 392 1204 683"> <tr> <td data-bbox="702 392 949 537">Average Diameter (mm): D</td> <td data-bbox="949 392 1204 537">Number of pieces permitted</td> <td data-bbox="1204 392 1450 683" rowspan="2">Average diameter = (Long diameter + Short diameter)/2</td> </tr> <tr> <td data-bbox="702 537 949 683">D ≤ 0.3 0.3 &lt; D</td> <td data-bbox="949 537 1204 683">Ignore 0</td> </tr> </table> <p data-bbox="702 694 1450 772">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 0.3 < D	Ignore 0					
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D ≤ 0.3 0.3 < D	Ignore 0												
5	Cracks	<table border="1" data-bbox="654 784 1450 1948"> <tr> <td data-bbox="654 784 1045 1164"> <p data-bbox="654 784 1045 840">(1) General crack</p>  </td> <td data-bbox="1045 784 1450 1164"> <p data-bbox="1045 784 1450 840"><math>a \leq 5</math></p> <p data-bbox="1045 840 1450 884"><math>b \leq 2</math></p> <p data-bbox="1045 884 1450 929"><math>c \leq t</math></p> <p data-bbox="1045 929 1450 1164">Where, a and b are ignored when less than or equal to 0.5 The numbers of pieces are set at up to 5 pieces.</p> </td> </tr> <tr> <td data-bbox="654 1164 1045 1355"> <p data-bbox="654 1164 1045 1220">(2) Corner crack</p>  </td> <td data-bbox="1045 1164 1450 1355"> <p data-bbox="1045 1164 1450 1220"><math>a \leq 2.5</math></p> <p data-bbox="1045 1220 1450 1265"><math>b \leq 2.5</math></p> <p data-bbox="1045 1265 1450 1310"><math>c \leq t</math></p> <p data-bbox="1045 1310 1450 1355"><math>a + b \leq 4</math></p> </td> </tr> <tr> <td data-bbox="654 1355 1045 1624"> <p data-bbox="654 1355 1045 1411">(3) Seal portion crack</p>  </td> <td data-bbox="1045 1355 1450 1624"> <p data-bbox="1045 1355 1450 1400"><math>a \leq</math> The seal width <math>\times 1/3</math></p> <p data-bbox="1045 1400 1450 1444"><math>b \leq t \times 2/3</math></p> <p data-bbox="1045 1444 1450 1489"><math>c \leq 5</math></p> <p data-bbox="1045 1489 1450 1624">The numbers of pieces are set at up to 5 pieces.</p> </td> </tr> <tr> <td data-bbox="654 1624 1045 1859"> <p data-bbox="654 1624 1045 1680">(4) ITO Pin crack</p>  </td> <td data-bbox="1045 1624 1450 1859"> <p data-bbox="1045 1624 1450 1668"><math>a \leq 5</math></p> <p data-bbox="1045 1668 1450 1713"><math>b \leq 1/3</math> pin length</p> <p data-bbox="1045 1713 1450 1758"><math>c \leq t</math></p> </td> </tr> <tr> <td data-bbox="654 1859 1045 1948"> <p data-bbox="654 1859 1045 1915">(5) Progressive cracks</p> </td> <td data-bbox="1045 1859 1450 1948"> <p data-bbox="1045 1859 1450 1948">All taken to be unacceptable.</p> </td> </tr> </table>		<p data-bbox="654 784 1045 840">(1) General crack</p> 	<p data-bbox="1045 784 1450 840"><math>a \leq 5</math></p> <p data-bbox="1045 840 1450 884"><math>b \leq 2</math></p> <p data-bbox="1045 884 1450 929"><math>c \leq t</math></p> <p data-bbox="1045 929 1450 1164">Where, a and b are ignored when less than or equal to 0.5 The numbers of pieces are set at up to 5 pieces.</p>	<p data-bbox="654 1164 1045 1220">(2) Corner crack</p> 	<p data-bbox="1045 1164 1450 1220"><math>a \leq 2.5</math></p> <p data-bbox="1045 1220 1450 1265"><math>b \leq 2.5</math></p> <p data-bbox="1045 1265 1450 1310"><math>c \leq t</math></p> <p data-bbox="1045 1310 1450 1355"><math>a + b \leq 4</math></p>	<p data-bbox="654 1355 1045 1411">(3) Seal portion crack</p> 	<p data-bbox="1045 1355 1450 1400"><math>a \leq</math> The seal width <math>\times 1/3</math></p> <p data-bbox="1045 1400 1450 1444"><math>b \leq t \times 2/3</math></p> <p data-bbox="1045 1444 1450 1489"><math>c \leq 5</math></p> <p data-bbox="1045 1489 1450 1624">The numbers of pieces are set at up to 5 pieces.</p>	<p data-bbox="654 1624 1045 1680">(4) ITO Pin crack</p> 	<p data-bbox="1045 1624 1450 1668"><math>a \leq 5</math></p> <p data-bbox="1045 1668 1450 1713"><math>b \leq 1/3</math> pin length</p> <p data-bbox="1045 1713 1450 1758"><math>c \leq t</math></p>	<p data-bbox="654 1859 1045 1915">(5) Progressive cracks</p>	<p data-bbox="1045 1859 1450 1948">All taken to be unacceptable.</p>
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6	Outer dimensions	Should be within the tolerance.
7	Newton ring(touch panel)	Orbicular of interference fringes is not allowed in the optimum contrast within the active area under viewing angle.
8	Soldering	Should be no defective soldering such as shorting, loose terminal cold solder, peeling of printed circuit board pattern, improper mounting position, etc.

5-3 Dot Appearance Defect

NO.	Item	Criteria
1	Pinhole	 <p>Dot display a and b are each <math>\leq 0.2\text{mm}</math> 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 <math>\leq 0.2\text{mm}</math> The overall total is taken to be with in 10 units.</p>
3	Thick and thin display	 <p>Taken to be within <math>\pm 1.5\%</math> 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 a soft cloth soaked with a cleaning naphtha solvent.

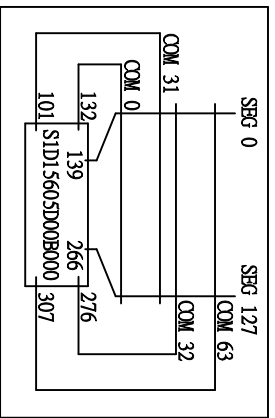
- STORAGE

- 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.





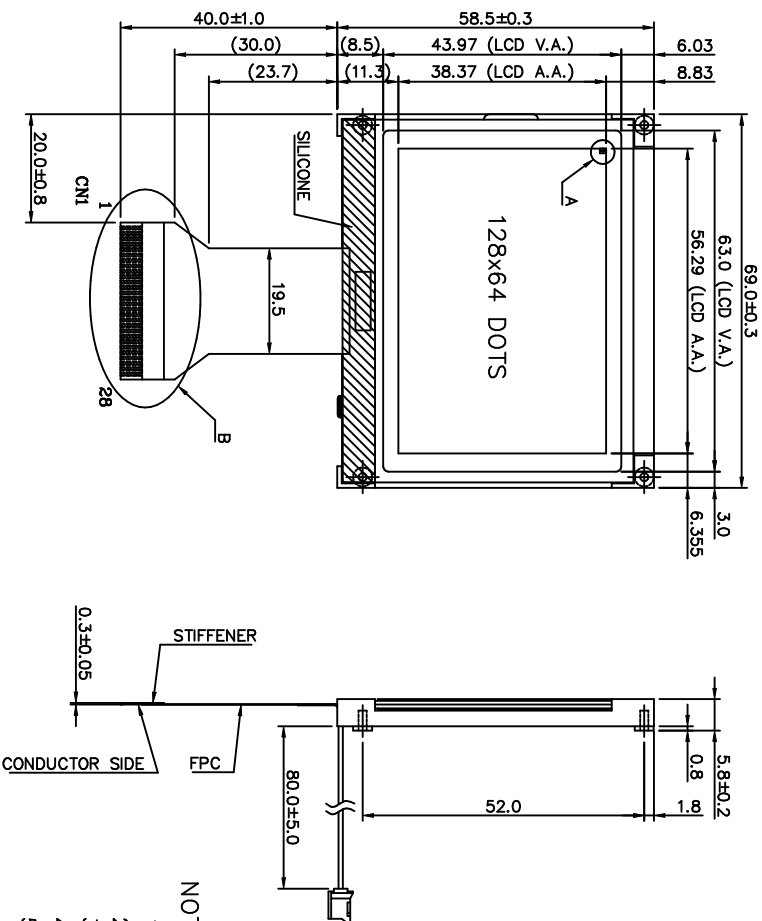
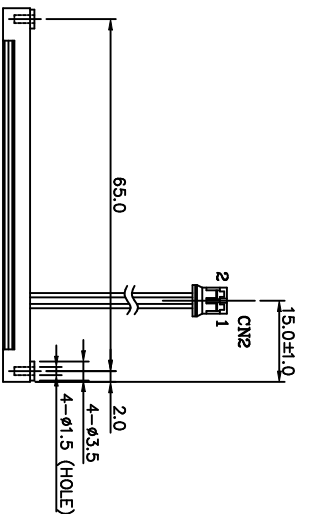
LAYOUT DIAGRAM

CN1. LCD INTERFACE (FPC, PITCH 1.0)

PIN NO.	SYMBOL	FUNCTION
1	P/S	HIGH: Parallel ; LOW: Serial data input
2	V <sub>R</sub>	Output voltage regulator terminal. Provides the voltage between VDD and V5 through a resistive voltage divider
3	V5	This is a multi-level power supply for the liquid crystal drive
4	V4	
5	V3	
6	V2	
7	V1	
8	CAP2+	DC/DC Voltage converter
9	CAP2-	
10	CAP1-	
11	CAP1+	
12	CAP3-	This is a 0V terminal connected to the system GND
13	Vout	
14	Vss	
15	VDD	
16	D7(S/I)	Shared with the MPU power supply terminal VCC(+5V)
17	D6(S/C/L)	Serial data input
18	D5	Serial clock input
19	D4	
20	D3	
21	D2	
22	D1	Parallel data input
23	D0	
24	RD	
25	WR	
26	A0	Fixed to either "H" or to "L"
27	/RES	"H" = Display data , "L" = Control data
28	/CSI	Reset signal
		Chip select signal

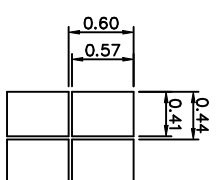
CN2. LED CONNECTOR, PHR-2 (JST) OR COMPATIBLE

PIN NO.	SYMBOL	FUNCTION
1	A	Power Supply Voltage LED Backlight (4.2V)
2	K	GND

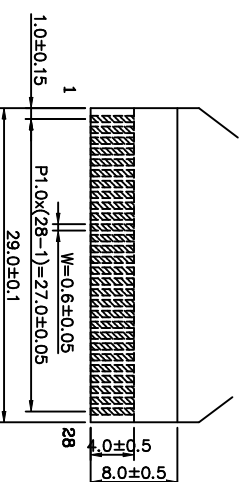


VIEW DIRECTION

DETAIL A (S=20:1)



DETAIL B (S=2:1)



NOTES:

- 1.RESOLUTION: 128X64 DOTS
- 2.BACKLIGHT: LED (YELLOW-GREEN)
- 3.DRIVER IC: S1D15605D00B000 or Compatible
- 4.GLASS THICKNESS: 0.7 mm
- 5.LED CONNECTOR: PHR-2 (JST) or Compatible

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)

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

製品圖  
LDC65HS91CDS

NAME DATE THIRD ANGLE P.

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

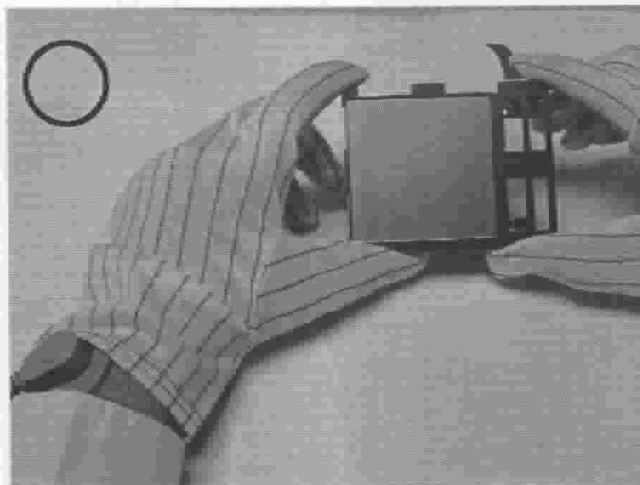
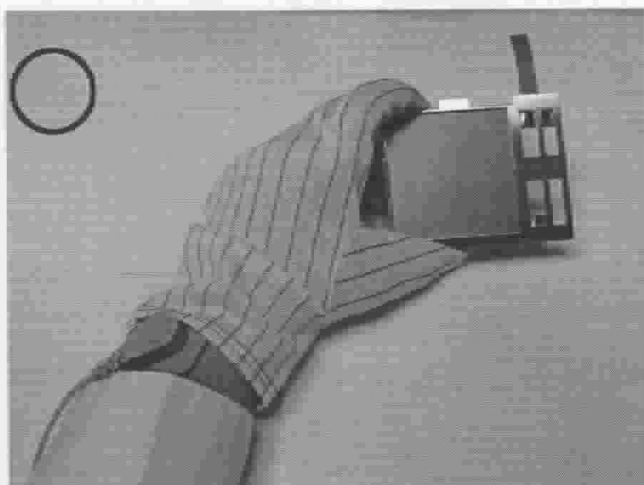
DWG NO.	SCALE	UNIT
M591A1D0A	1/1	mm

# THE NOTES OF LCM USING

LCM is easy to damage.

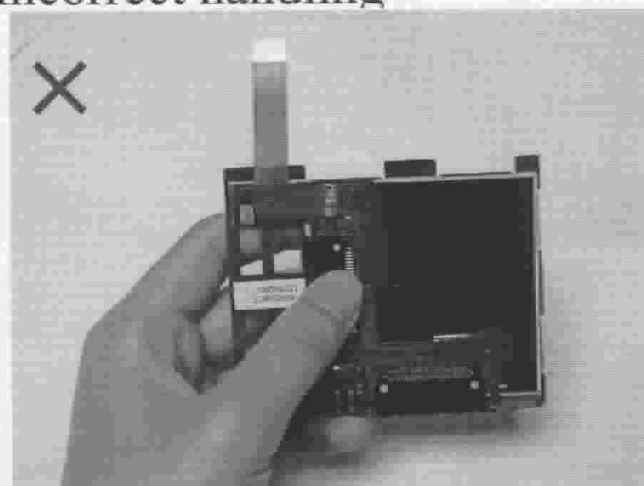
Please follow the notes as bellows, and be careful of handling!

## Correct handling

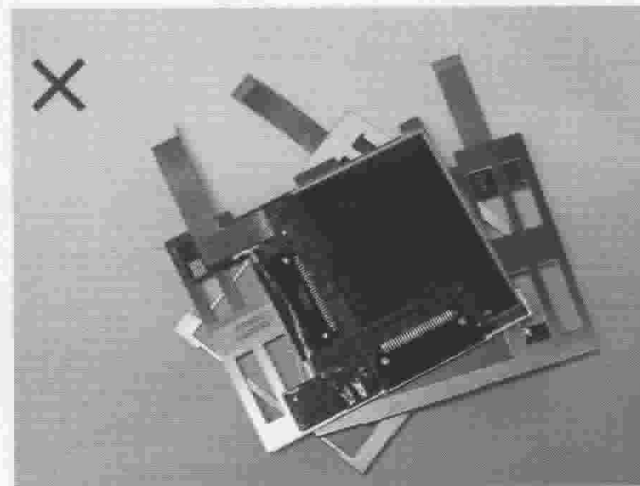


As above picture, please handle with glove by LCM edges and full EOS/ESD protection.

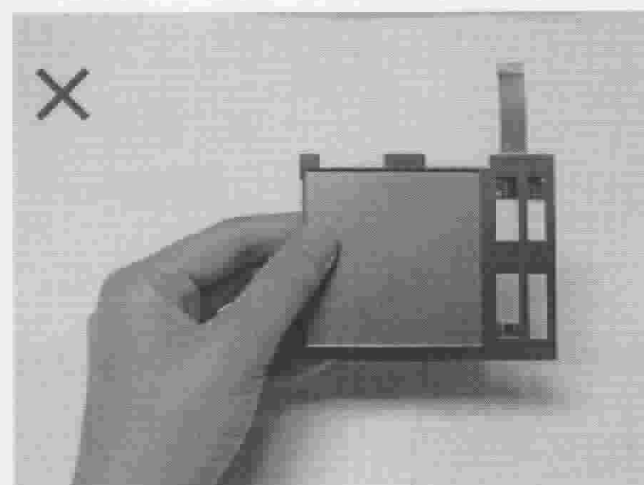
## Incorrect handling



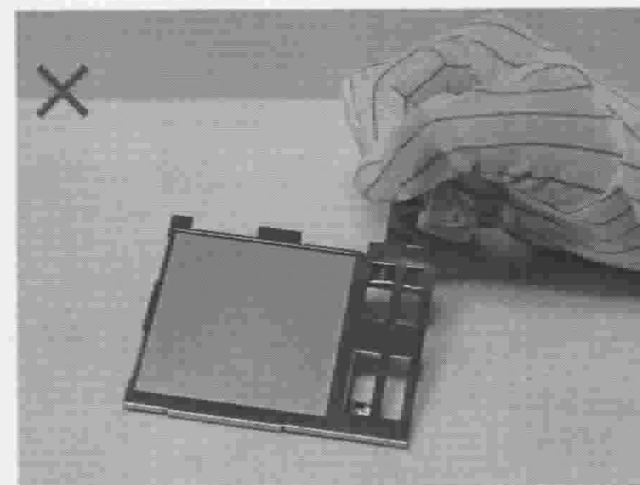
Please don't touch IC directly.



Please don't put one on another LCM.



Please don't hold the surface of LCM.



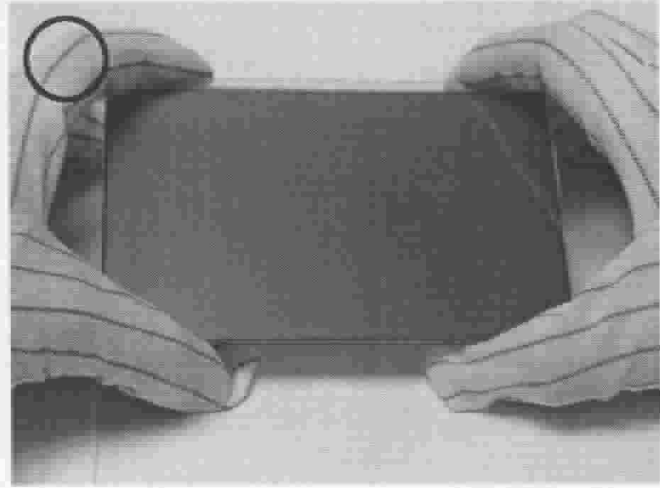
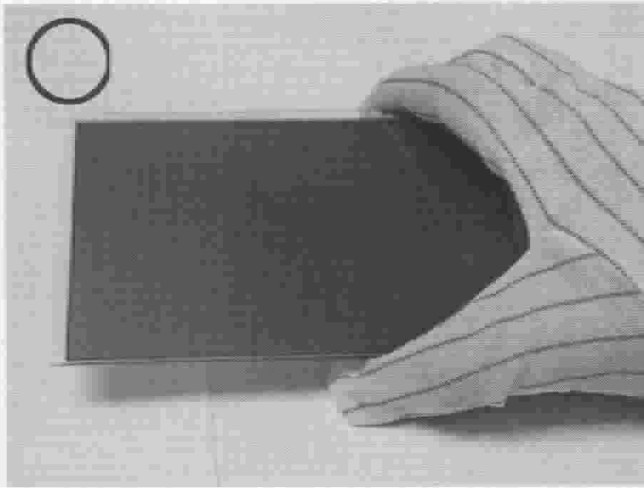
Please don't stretch interface of output.

# THE NOTES OF LCD USING

LCD is easy damage.

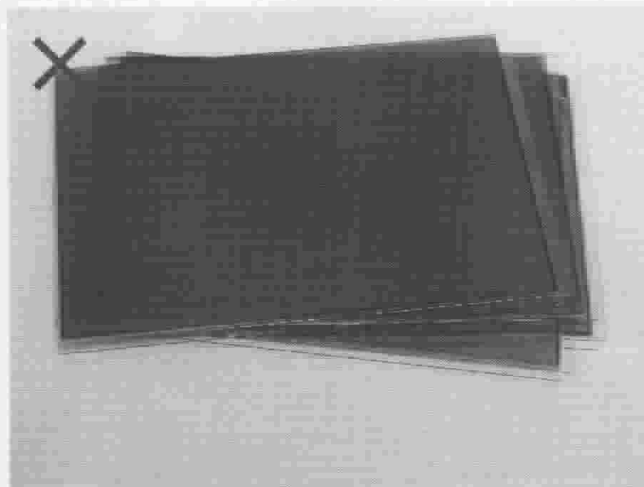
Please follow notes as bellows, and be careful of handling!

## Correct handling

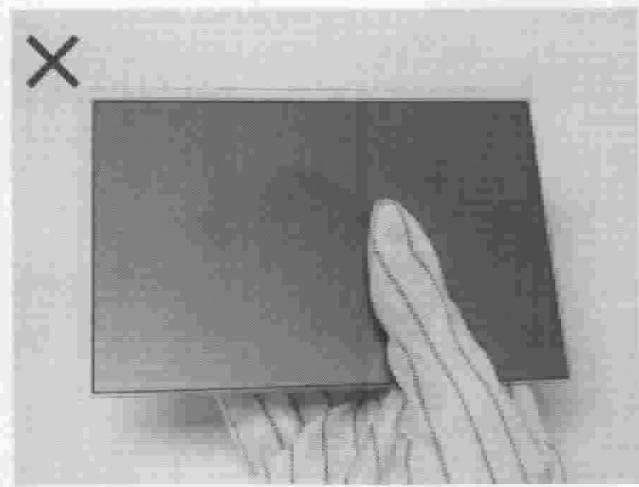


As above picture, please handle with glove by LCD edges and full EOS/ESD protection.

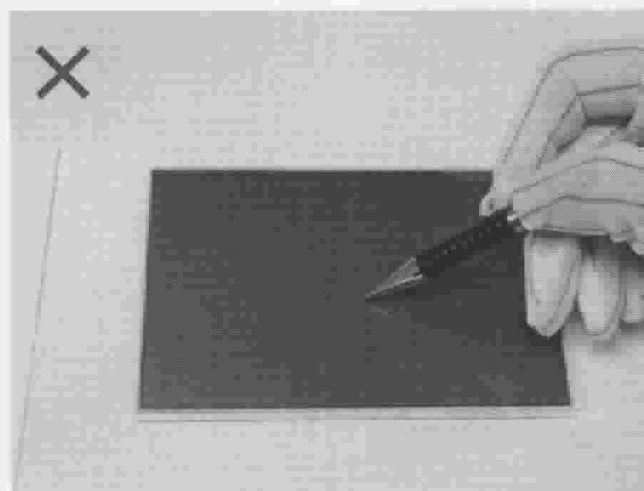
## Incorrect handling



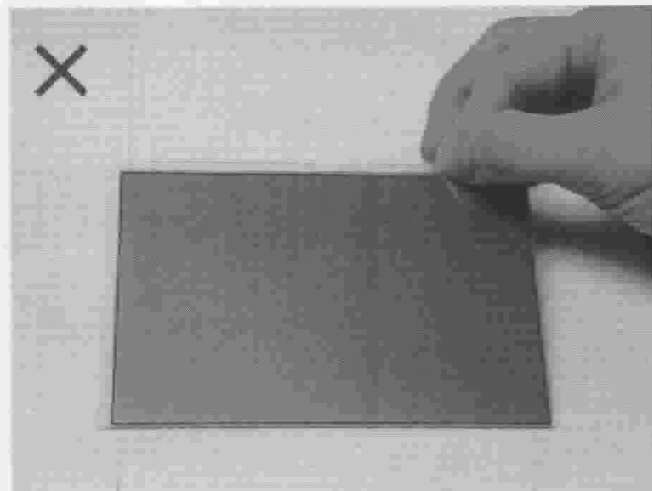
Please don't put one on another LCD.



Please don't hold the surface of LCD.



Please don't operate with sharp stick such as sharp pencil.



Please don't touch ITO glass without anti-static gloves.

