

NAN YA PLASTICS CORPORATION

SPECIFICATION OF
LCD MODULE
PRODUCT NO.: LDA75R656J2DS

SPEC. NO.: LM656-2A-1

CUSTOMER
APPROVED BY
DATE :

LCD DEPARTMENT
ELECTRONIC MATERIALS DIVISION
NAN YA PLASTICS CORPORATION
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EDITED ON : AUG. 22, 2006

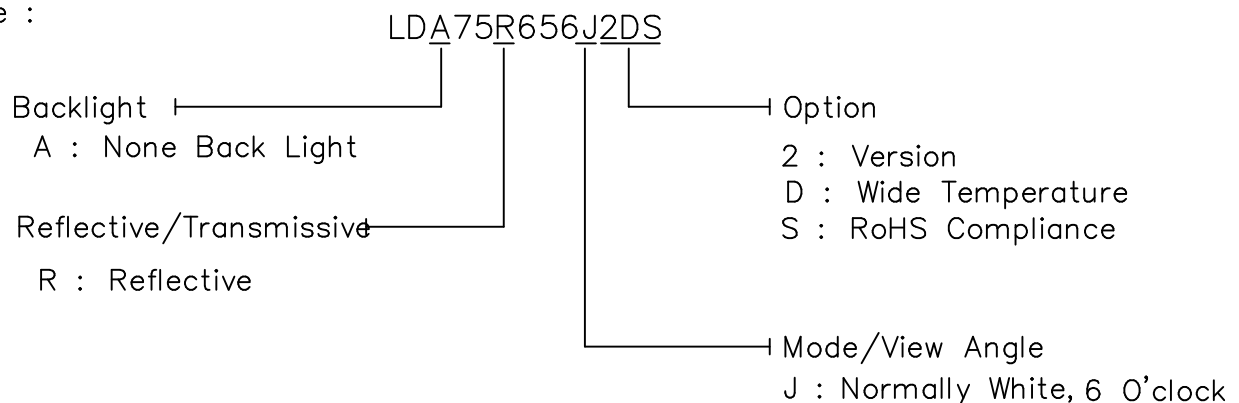
Q.C. DEPT.	DESIGN MANAGER	DESIGN CHECK	DESIGNER
			J.P Weng

[illegible][illegible]

1.MECHANICAL DATA

NO	ITEM	CONTENTS	UNIT
1	Product No.	LDA75R656J2DS	—
2	Module Size	77.5 (W) x 51.3 (H) x 2.8 (D) (Without FPC)	mm
3	Dot Size	0.48 (W) x 0.48 (H)	mm
4	Dot Pitch	0.52 (W) x 0.52 (H)	mm
5	Number of Dots	128 (W) x 64 (H)	Dot
6	Duty	1/65	—
7	LCD Display Mode	FSTN, Normally White / Positive Image	—
8	Rear Polarizer	Reflective	—
9	Viewing Direction	6	O'clock
10	Backlight	None	—
11	Controller	SPLC501C	—
12	Weight	23.4(Approx.)	g
13	Soldering	Lead Free	—

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.

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 T_a at -40°C will be < 120hrs, at 80°C will be < 120hrs

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

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3.ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Power Supply for Logic	VDD	25℃		4.5	5	5.5	V
Input Voltage	VIH	H level		0.7VDD	—	VDD	V
	VIO	L level		-0.3	—	0.2VDD	V
Recommended LCD Driving Voltage	VDD-V5 (VLCD)	*Note	-20℃	9.7	10.1	10.5	V
			0℃	9.5	9.9	10.3	
			25℃	9.4	9.7	10.1	
			50℃	9.1	9.5	9.9	
			70℃	8.9	9.3	9.7	
Power Supply Current	IDD	VDD = +5.0v		—	0.8	1.2	mA

*Note :

- (1)Duty=1/65, Bias=1/9
- (2)Internal Resistance Ratio Register : (1,0,0)Binary
- (3)Electronic Volumn Value : (31)Decimal
- (4)Thermal Gradient : -0.05 %/℃
- (5)Range of Electronic Volumn Control : (31±3)Decimal

REV/DATE	R0/ 05.26.06'	R1/ 08.22.06'				BY J.P Weng
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4.OPTICAL CHARACTERISTICS

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.
R	J	6.0	9.0	7.0	10	8.0	12	4.0	6.0	2.5	4.0	—	(F)35 (R)25	—	(L)25 (R)25
NOTE		NOTE 6										NOTE 5			

NOTE :

R : REFLECTIVE

J : Normally White , 6 O'CLOCK

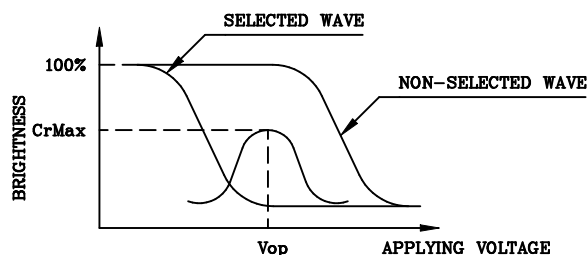
AT $\phi=0^\circ$ $\theta=0^\circ$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20°C	1400	1800	2700	ms	NOTE 2
		0°C	290	370	560		
		25°C	80	110	170		
		50°C	40	50	80		
		70°C	30	40	60		
Response Time (fall)	Tf	-20°C	8000	10000	15000	ms	NOTE 2
		0°C	850	110	170		
		25°C	240	300	450		
		50°C	130	170	260		
		70°C	80	110	170		

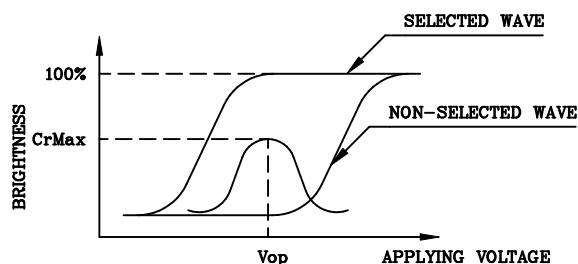
REV/DATE	R0/ 05.26.06'	R1/ 08.22.06'				BY J.P Weng
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(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



(negative type)

*Conditions

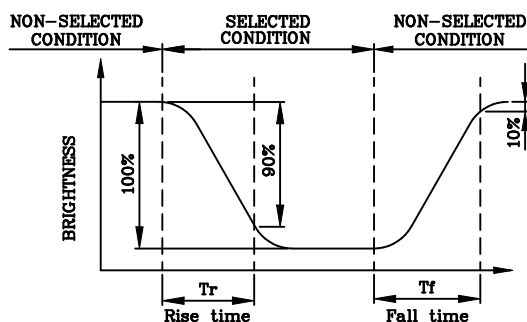
Viewing Angle : 0

Frame Frequency : 70Hz

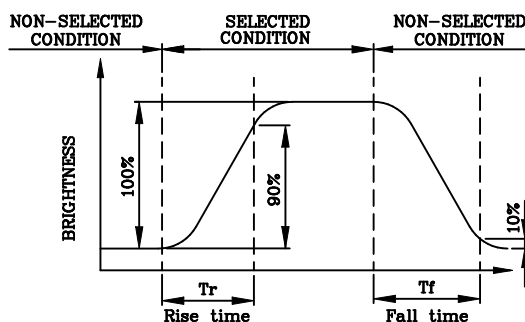
Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



(negative type)

*Conditions

Operating Voltage : Vop

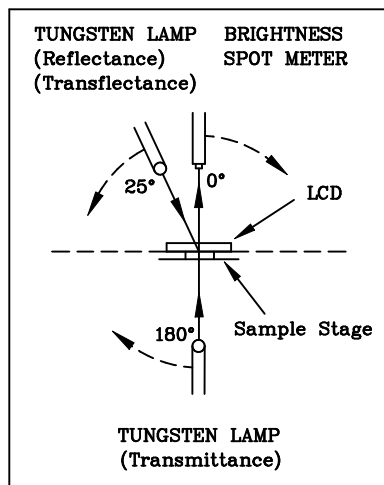
Viewing Angle (θ,φ) : (0,0)

Frame Frequency : 70Hz

Applying Waveform : 1/N duty 1/a bias

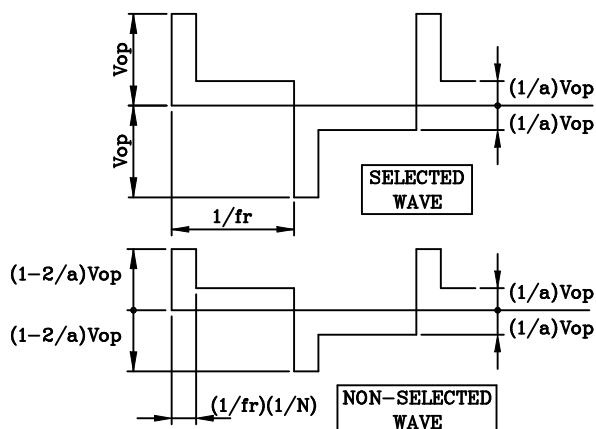
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



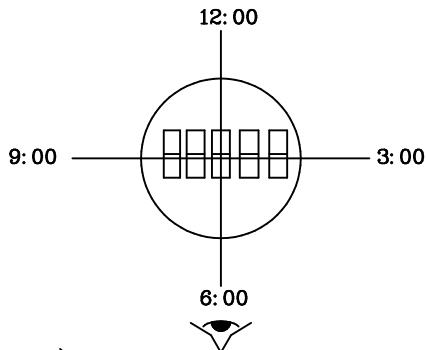
CONST.
TEMP.
CHAMBER

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



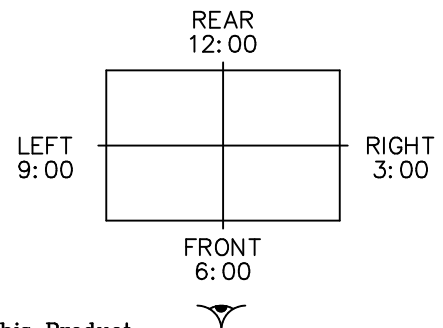
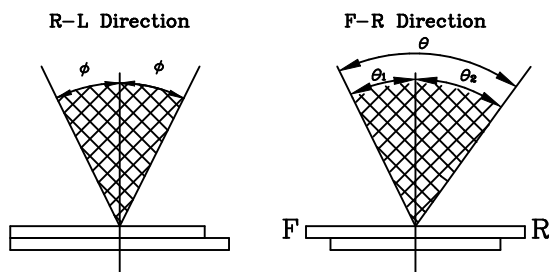
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



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

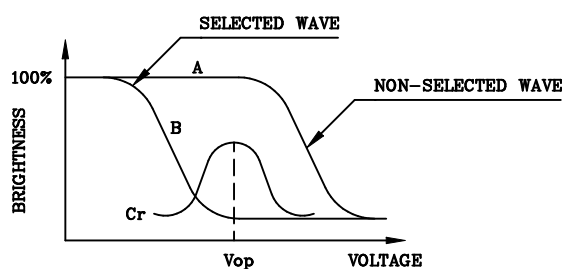
$$\theta = \theta_1 + \theta_2$$

*Conditions

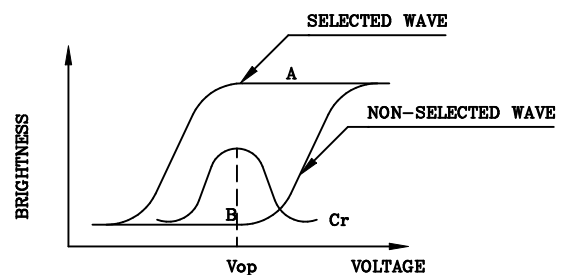
Operating Voltage : Vop
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



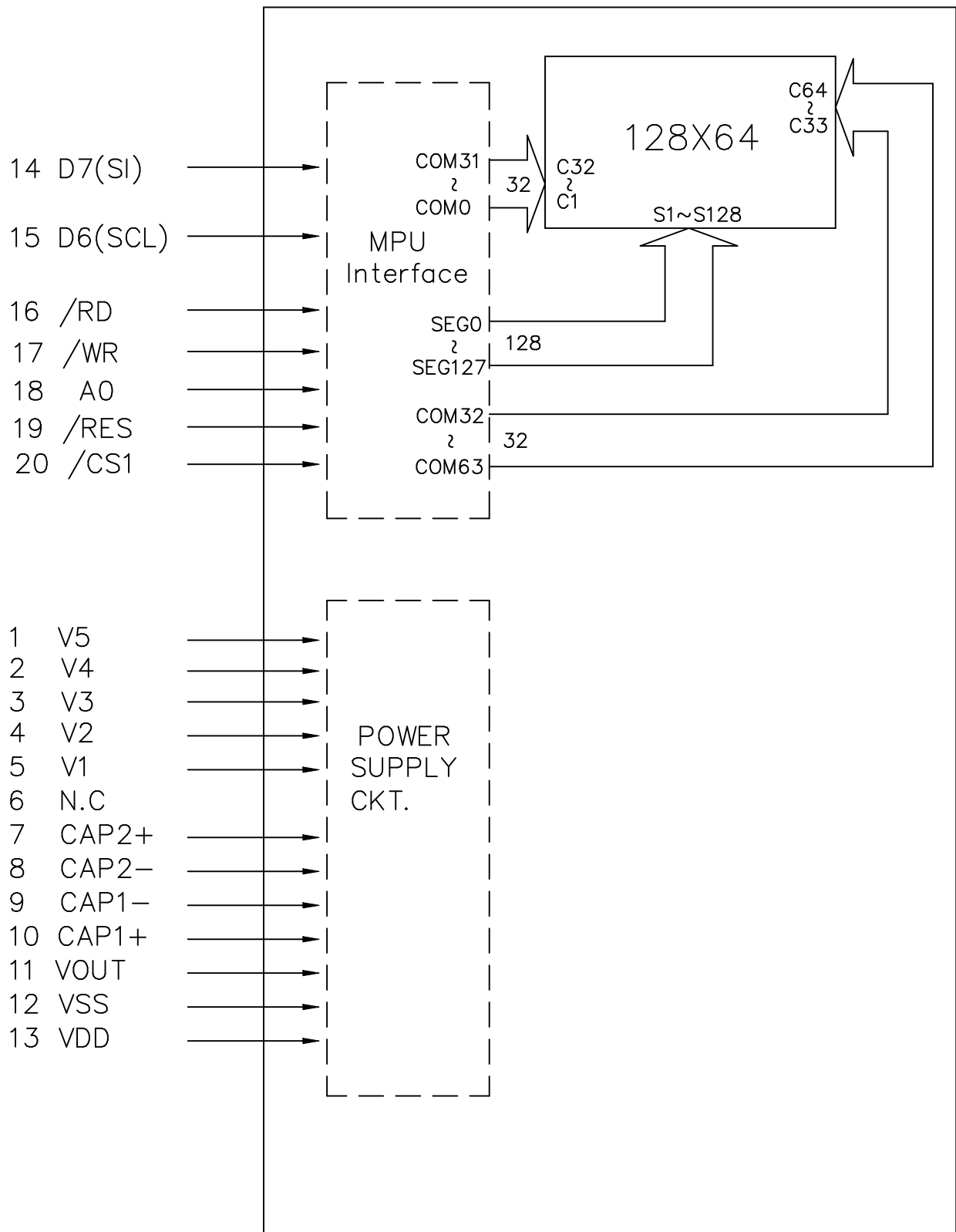
(negative type)

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

*Conditions

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

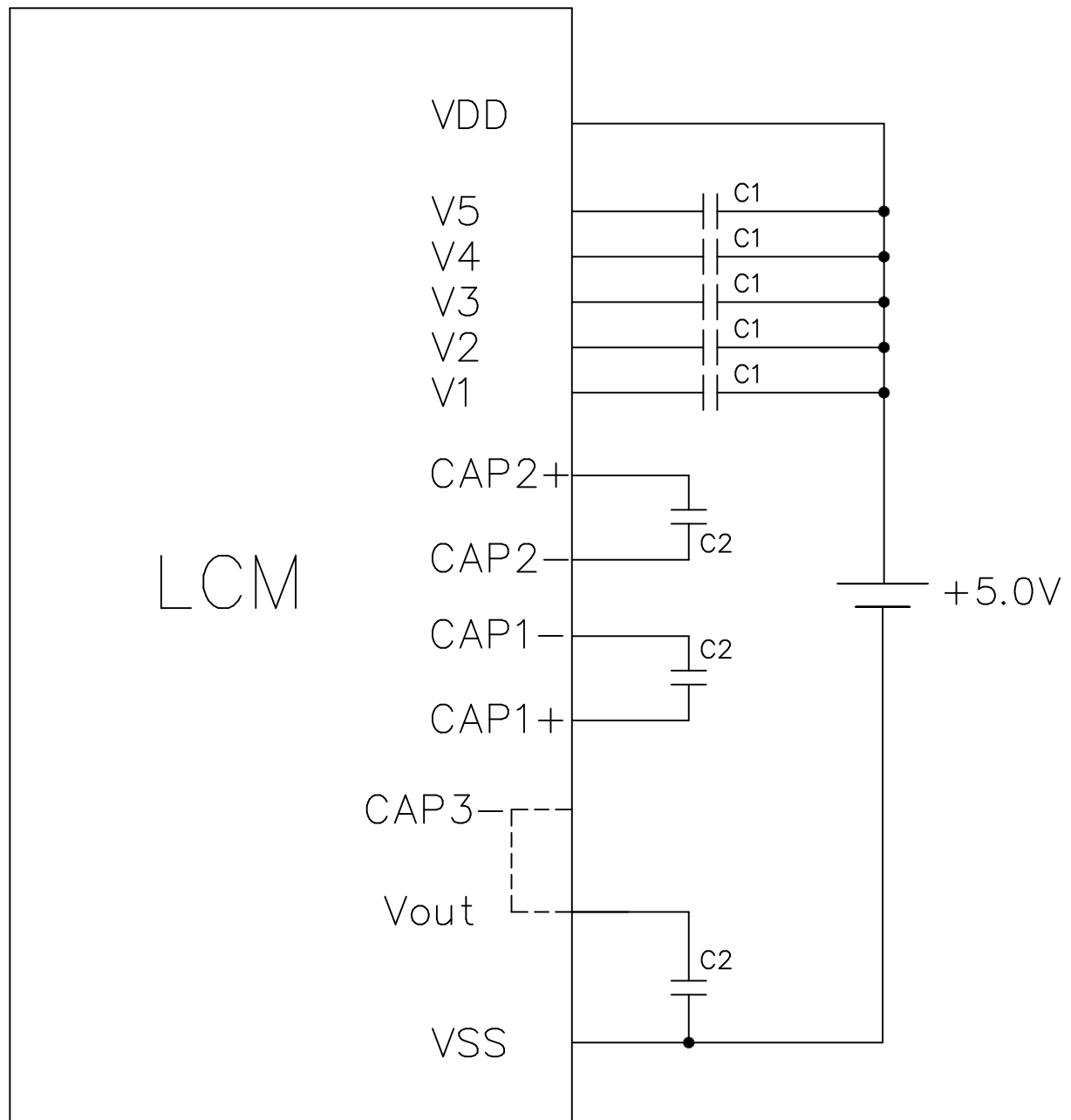
5. BLOCK DIAGRAM



6.INTERNAL PIN CONNECTION

No	Symbol	Function
1	V5	This is a multi-level power supply for the liquid crystal drive. $VDD(=V0) \geq V1 \geq V2 \geq V3 \geq V4 \geq V5$
2	V4	
3	V3	
4	V2	
5	V1	
6	N.C	No connection
7	CAP2+	Connect a capacitor between this terminal and the CAP2- terminal
8	CAP2-	Connect a capacitor between this terminal and the CAP2+ terminal
9	CAP1-	Connect a capacitor between this terminal and the CAP1+ terminal
10	CAP1+	Connect a capacitor between this terminal and the CAP1- terminal
11	VOUT	Connect a capacitor between this terminal and the VSS
12	VSS	Ground(0V)
13	VDD	Power supply for logic voltage(5.0V)
14	D7(SI)	Serial data input
15	D6(SCL)	Serial clock input
16	/RD	Fixed to either "H" or "L"
17	/WR	Fixed to either "H" or "L"
18	A0	"H":Display data "L":Control data
19	/RES	Reset signal
20	/CS1	Chip select signal

7. POWER SUPPLY



C1: 3.3uF 16V

C2: 4.7uF 25V

8.TIMING CHARACTERISTICS

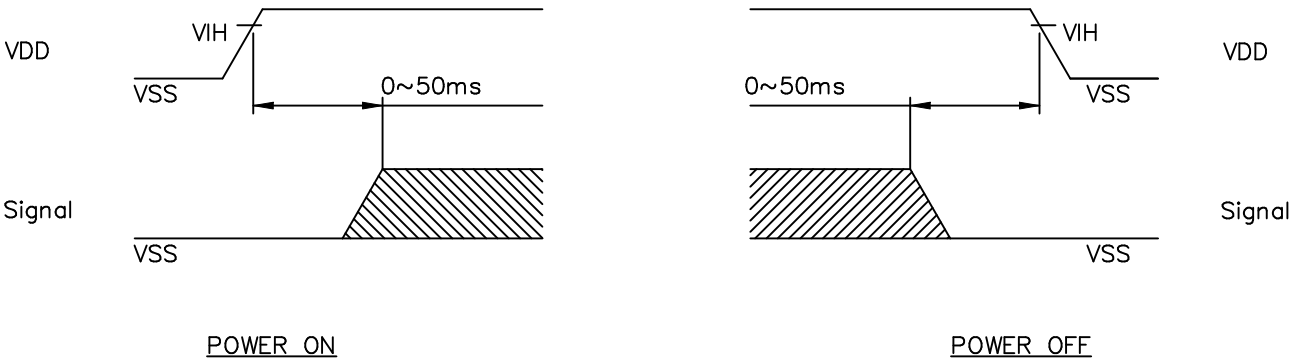
8-1 INTERFACE TIMING

Refer SUNPLUS Data Sheet SPLC501C Series

8-2 CONTROL AND COMMAND

Refer SUNPLUS Data Sheet SPLC501C Series

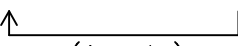
8-3 POWER ON/OFF



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

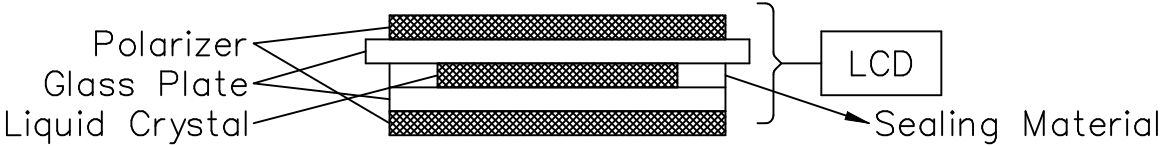
The NAN YA inspection provision provides outgoing inspection provision and its expected quality level based on our outgoing inspection of NAN YA LCD produces.

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		

NAN YA PLASTICS CORP. ELEC. MATERIALS DIV. LCD DEPARTMENT		SPECIFICATION		SPEC. NO. : LM656-2A DATE : MAY.26, 2006 SHEET NO. : 13/20	
	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/ 05.26.06'					BY J.P Weng
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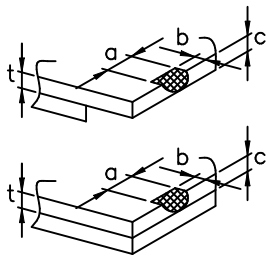
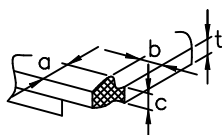
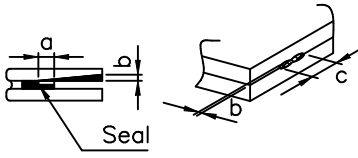
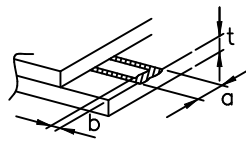
NAN YA PLASTICS CORP. ELEC. MATERIALS DIV. LCD DEPARTMENT		SPECIFICATION			SPEC. NO. : LM656-2A DATE : MAY.26, 2006 SHEET NO. : 14/20																															
<p>*Test and measurement are performed under the following conditions, unless otherwise specified.</p> <table> <tr> <td>Temperature</td> <td>20± 15℃</td> </tr> <tr> <td>Humidity</td> <td>65± 20%R.H..</td> </tr> <tr> <td>Pressure</td> <td>860~1060hPa(mmbar)</td> </tr> </table> <p>In case of doubtful judgment, it is performed under the following conditions.</p> <table> <tr> <td>Temperature</td> <td>20± 2℃</td> </tr> <tr> <td>Humidity</td> <td>65± 5%R.H..</td> </tr> <tr> <td>Pressure</td> <td>860~1060hPa(mmbar)</td> </tr> </table> <p>5.Specification for quality check</p> <p>5-1 Electrical characteristics</p> <table border="1"> <thead> <tr> <th>NO.</th> <th>Item</th> <th>Criterion</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Non operational</td> <td>Fail</td> </tr> <tr> <td>2.</td> <td>Miss operating</td> <td>Fail</td> </tr> <tr> <td>3.</td> <td>Missing dot</td> <td>Fail</td> </tr> <tr> <td>4.</td> <td>Contrast irregular</td> <td>Fail</td> </tr> <tr> <td>5.</td> <td>Response time</td> <td>Within Specified value</td> </tr> </tbody> </table>							Temperature	20± 15℃	Humidity	65± 20%R.H..	Pressure	860~1060hPa(mmbar)	Temperature	20± 2℃	Humidity	65± 5%R.H..	Pressure	860~1060hPa(mmbar)	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
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REV/DATE	R0/ 05.26.06'					BY J.P Weng																														

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.)	<div>(1)–1–Spots</div> <table><tr><th>Average Diameter(mm):D</th><th>Number of pieces permitted</th></tr><tr><td>D≤0.1</td><td>Ignore</td></tr><tr><td>0.1<D≤0.2</td><td>5</td></tr><tr><td>0.2<D≤0.3</td><td>2</td></tr><tr><td>0.3<D</td><td>0</td></tr></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> <div>(1)–2–Blurred Spots(At lighting condition)</div> <table><tr><th>Average Diameter(mm):D</th><th>Number of pieces permitted</th></tr><tr><td>D≤0.3</td><td>Ignore</td></tr><tr><td>0.3<D≤0.75</td><td>5</td></tr><tr><td>0.75<D</td><td>0</td></tr></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≤0.1	Ignore	0.1<D≤0.2	5	0.2<D≤0.3	2	0.3<D	0	Average Diameter(mm):D	Number of pieces permitted	D≤0.3	Ignore	0.3<D≤0.75	5	0.75<D	0
Average Diameter(mm):D	Number of pieces permitted																			
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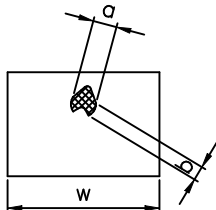
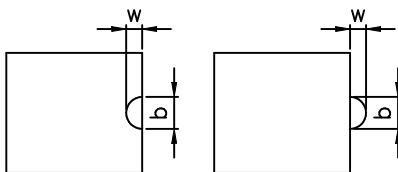
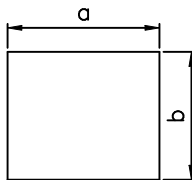
SPECIFICATION

1.	Line	<p>(1)--Lines(At non lighting condition)</p> <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> <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> <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> <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																								
$0.08 < W \leq 0.1$	$L \leq 1$	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.																								

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> <p>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	$D \leq 0.3$ $0.3 < D$	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	(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.				

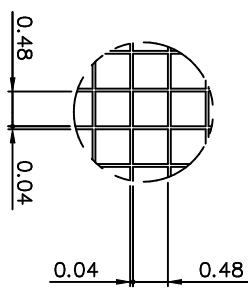
NAN YA PLASTICS CORP. ELEC. MATERIALS DIV. LCD DEPARTMENT		SPECIFICATION	SPEC. NO. : LM656-2A DATE : MAY.26, 2006 SHEET NO. : 18/20
6.	Outer dimensions	Should be with in the tolerance.	
7.	Newton ring(touch panel)	Orbicular of interference fringes is not allowed in the optimum contrast within the active 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 mouting position, etc.	

5-3 Dot Appearance Defect

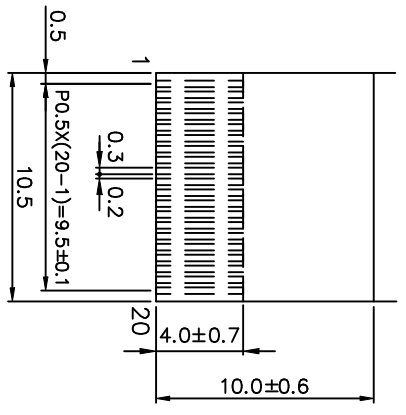
NO.	Item	Criteria
1.	Plinhole	<div></div> <p>Dot display a and b are each $\leq 0.2\text{mm}$ The overall total is taken be with in 10 units. Note that they are not to be concentrated.</p>
2.	Missing	<div></div> <p>Dot display a and b are each $\leq 0.2\text{mm}$ The overall total is taken to be with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

REV/DATE	R0/ 05.26.06'					BY J.P Weng
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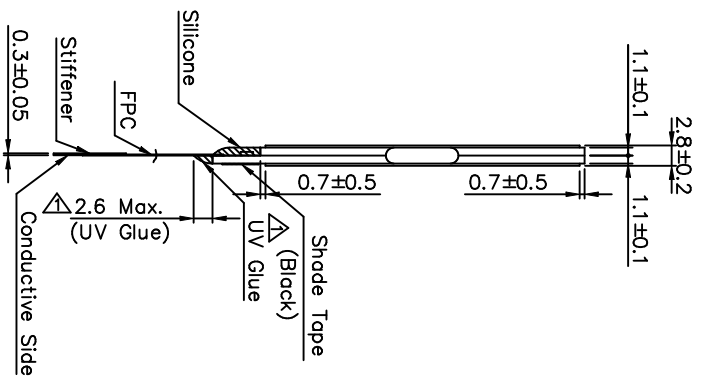
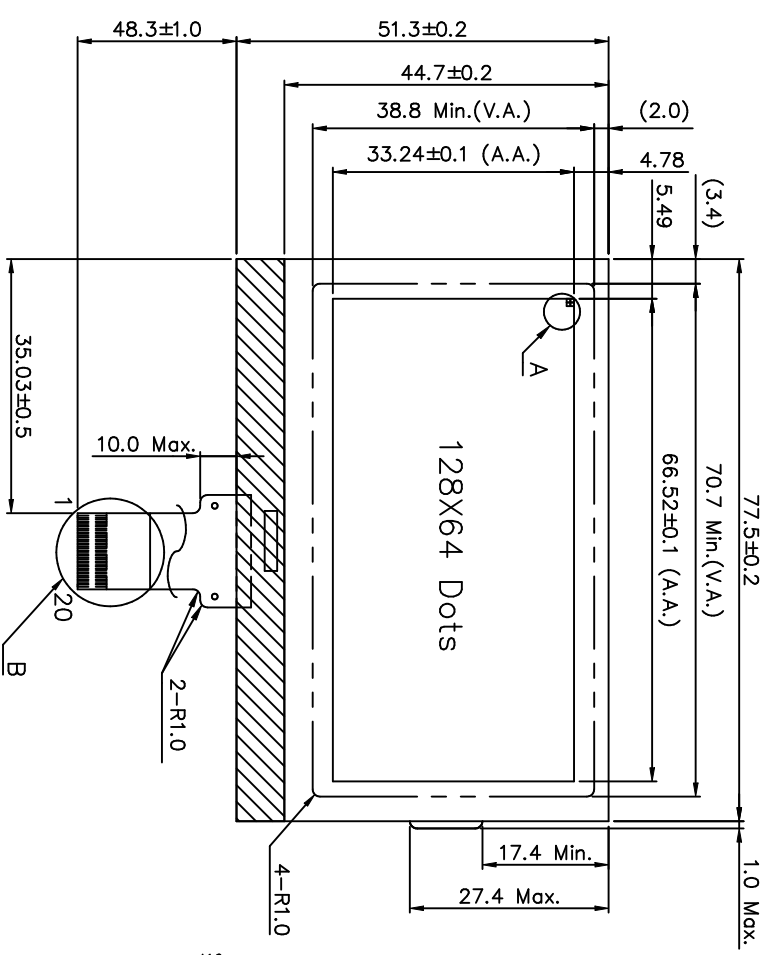
NAN YA PLASTICS CORP. ELEC. MATERIALS DIV. LCD DEPARTMENT	SPECIFICATION	SPEC. NO. : LM656-2A DATE : MAY.26, 2006 SHEET NO. : 19/20
<p>NOTE:</p> <ul style="list-style-type: none">• SAFETY<ol style="list-style-type: none">1.If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.2.If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.• HANDLING<ol style="list-style-type: none">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<ol style="list-style-type: none">1.Store the panel or module in a dark place where the temperature is 25°C±5°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<ol style="list-style-type: none">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.3.Strengthen Q.C inspection on the light guide, especially the hooks & pinholes.		
REV/DATE	R0/ 05.26.06'	BY J.P Weng



DETAIL A
(S=10:1)



DETAIL B
(S=3:1)



Note:

- 1.RESOLUTION : 128X64 Dots
- 2.DRIVER IC : Supplus (SPLC501C)

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	$\pm 1^\circ$ (DEG)

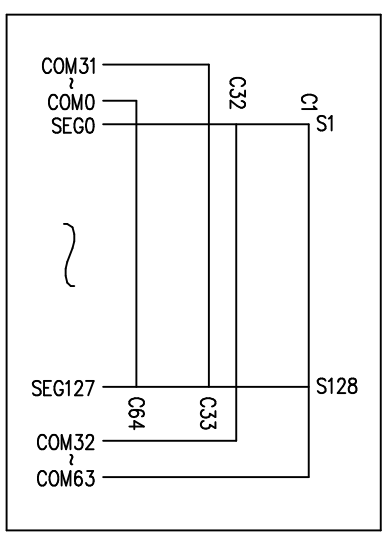
南亞塑膠工業股份有限公司
NAN YA PLASTICS CORPORATION

製品圖

LDA75R656J2DS

REV. NO.	DESCRIPTION	DATE	DESIGN	CHECK	APPROVE	DWG NO.
△						
△						
△						
△						
△	Added the UV glue & remove the tape	95.08.01	Design	Check	Approve	

No	Symbol	Function
1	V5	This is a multi-level power supply for the liquid crystal drive. VDD(=V0)≧V1≧V2≧V3≧V4≧V5
2	V4	
3	V3	
4	V2	
5	V1	
6	N.C	No connection
7	CAP2+	Connect a capacitor between this terminal and the CAP2- terminal
8	CAP2-	Connect a capacitor between this terminal and the CAP2+ terminal
9	CAP1-	Connect a capacitor between this terminal and the CAP1+ terminal
10	CAP1+	Connect a capacitor between this terminal and the CAP1- terminal
11	VOUT	Connect a capacitor between this terminal and the VSS
12	VSS	Ground(OV)
13	VDD	Power supply for logic voltage(5.0V)
14	D7(S)	Serial data input
15	D6(SCL)	Serial clock input
16	/RD	Fixed to either "H" or "L"
17	/WR	Fixed to either "H" or "L"
18	A0	"H":Display data "L":Control data
19	/RES	Reset signal
20	/CS1	Chip select signal



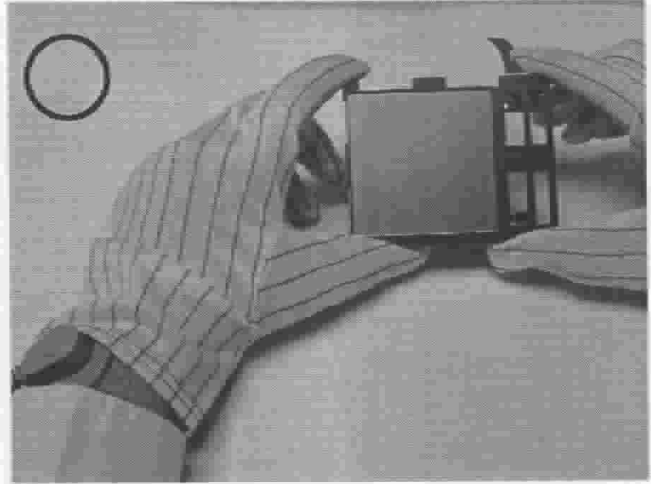
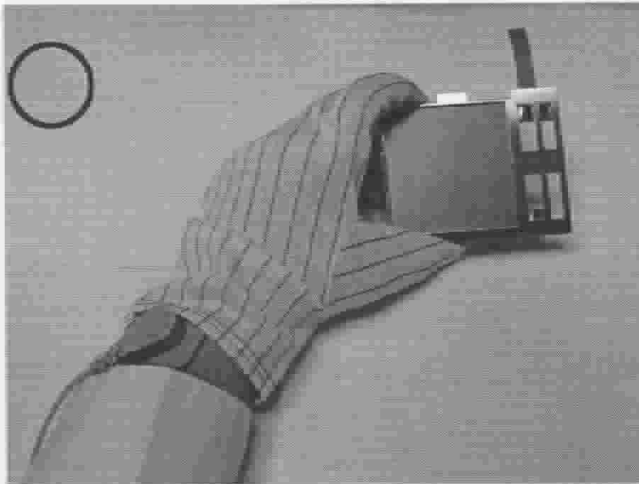
PANEL LAYOUT

THE NOTES OF LCM USING

LCM is easy to damage.

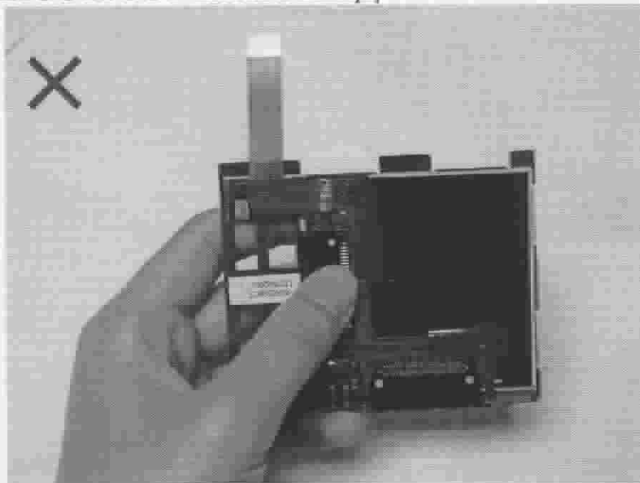
Please follow the notes as bellows, and be careful of handling!

Correct handling

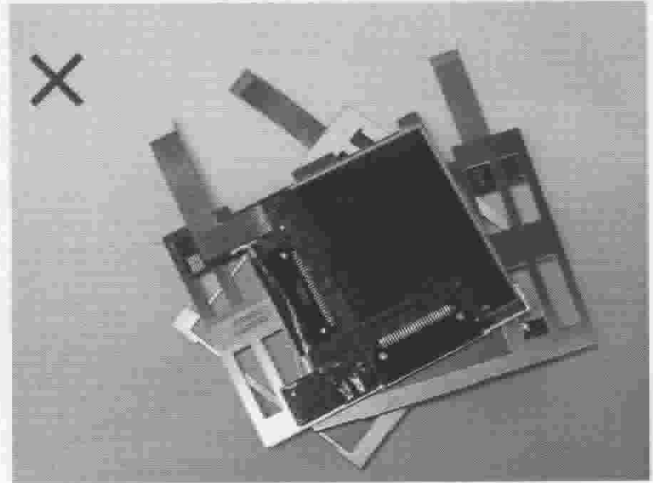


As above picture, please handle with glove by LCM edges and full EOS/ESD protection.

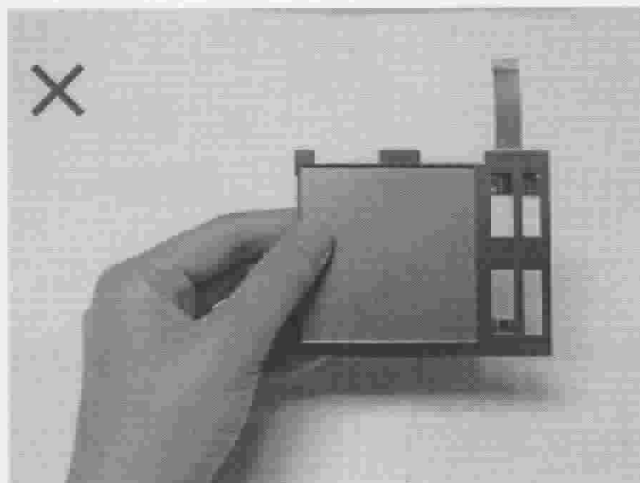
Incorrect handling



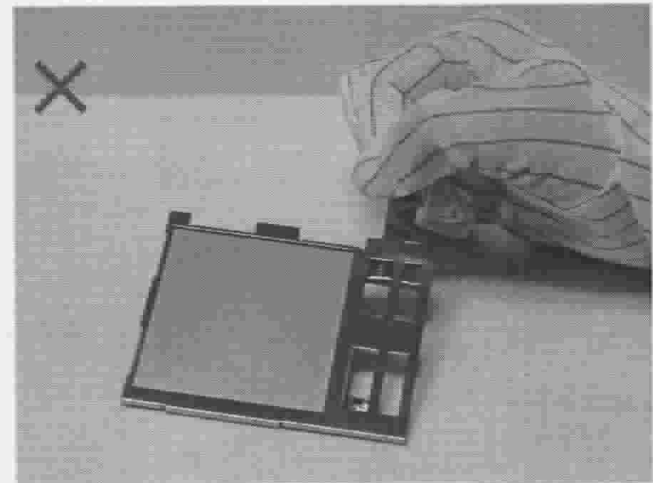
Please don't touch IC directly.



Please don't put one on another LCM.



Please don't hold the surface of LCM.



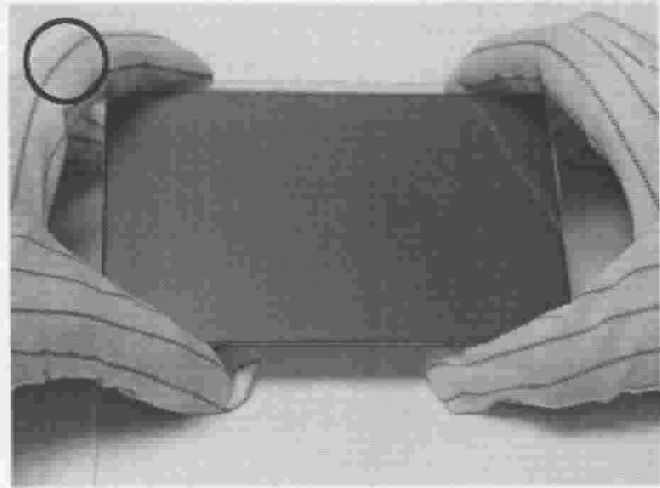
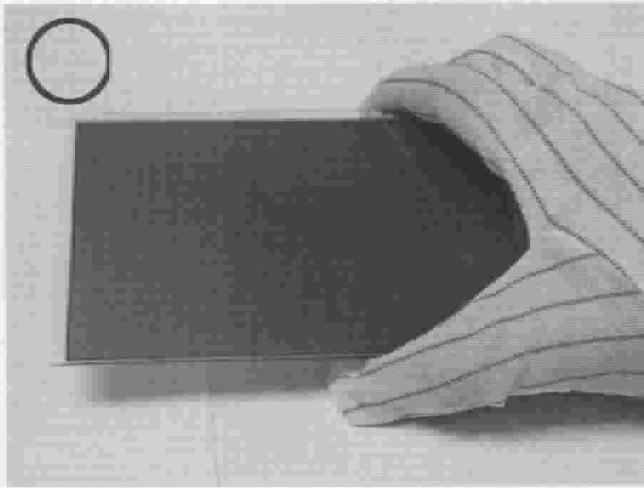
Please don't stretch interface of output.

THE NOTES OF LCD USING

LCD is easy damage.

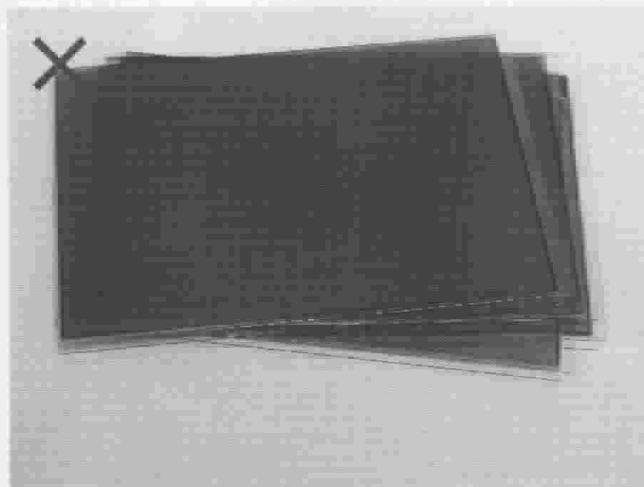
Please follow notes as bellows, and be careful of handling!

Correct handling

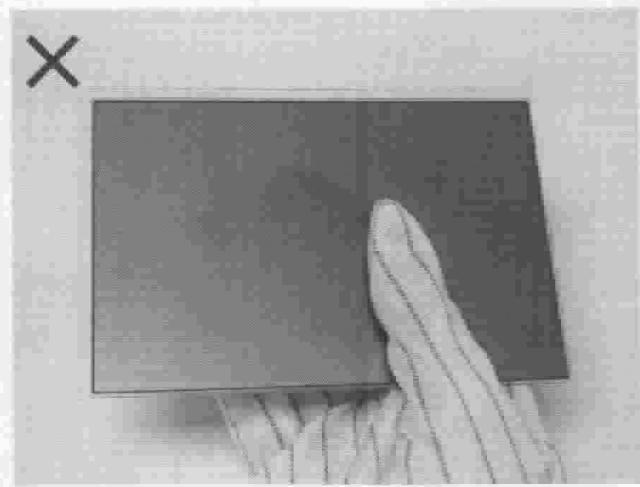


As above picture, please handle with glove by LCD edges and full EOS/ESD protection.

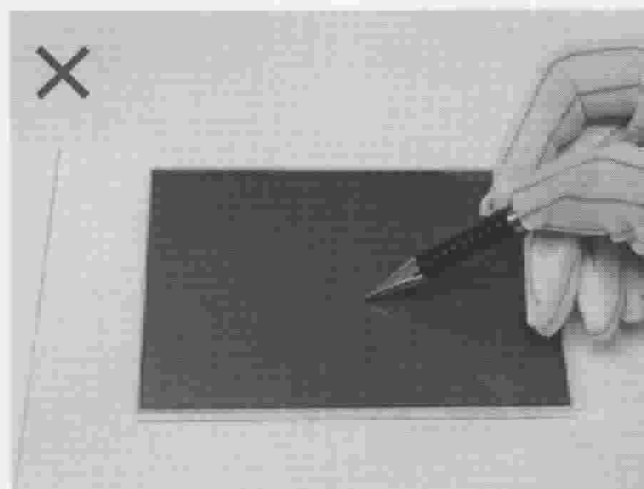
Incorrect handling



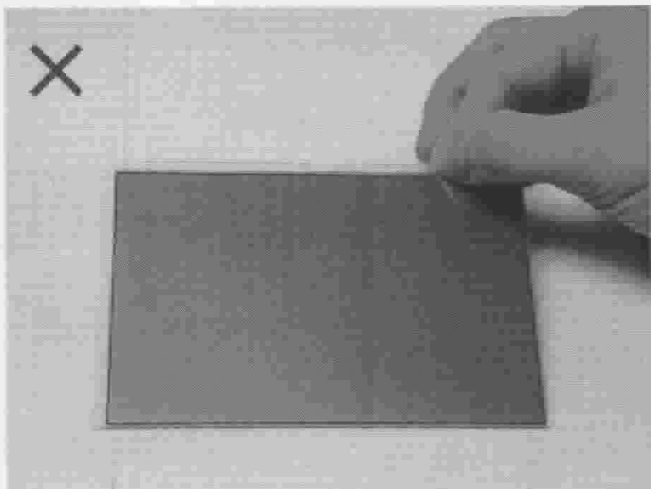
Please don't put one on another LCD.



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.

