

NAN YA PLASTICS CORPORATION

SPECIFICATION OF
LCD MODULE
PRODUCT NO.: LMBHAT014G16CDS_

SPEC. NO.: LM014-16L-1

CUSTOMER
APPROVED BY
DATE :

LCD DEPARTMENT
ELECTRONIC MATERIALS DIVISION
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EDITED ON. : APR.16, 2007

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

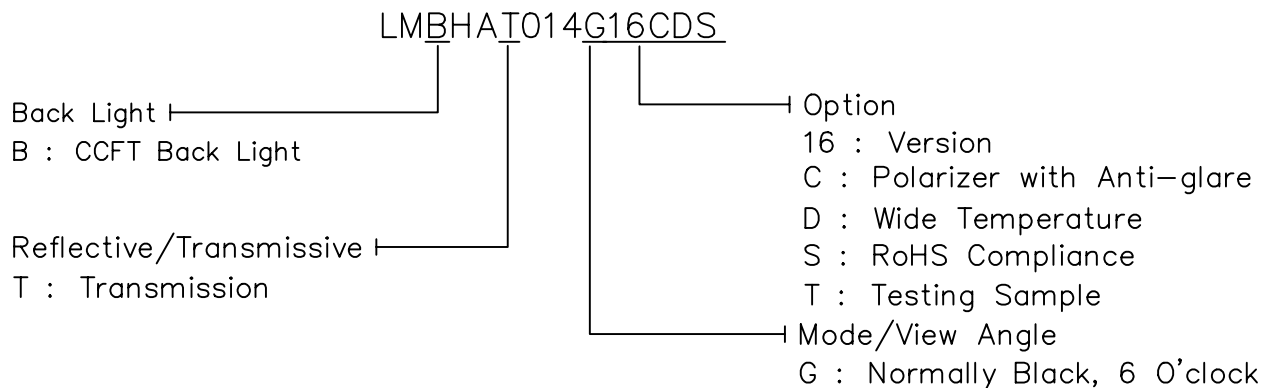
[illegible]

NAN YA PLASTICS CORP. ELEC. MATERIALS DIV. LCD DEPARTMENT	SPECIFICATION	SPEC. NO. : LM014-16L DATE : MAR. 31, 2006 SHEET NO. : 1 /24
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1.MECHANICAL DATA

NO	ITEM	CONTENTS	UNIT
1	Product No.	LMBHAT014G16CDS_	—
2	Module Size	170.0(W) X 102.0(H) X MAX14.0(D)	mm
3	Dot Size	0.47 (W) x 0.47 (H)	mm
4	Dot Pitch	0.5 (W) x 0.5 (H)	mm
5	Number of Dots	240 (W) x 128 (H)	Dot
6	Duty	1/128	—
7	LCD Display Mode	FSTN : Normal Black/Negative Image	—
8	Rear Polarizer	Transmission	—
9	Viewing Direction	6	O'clock
10	Backlight	CCFL	—
11	Controller	T6963CFG-0101	—
12	DC/DC Converter	Excluded	—
13	Weight	235 (approx.)	g
14	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.

REV/DATE	R0/ 03.31.06'	R1/ 04.16.07'				BY J.P. Weng
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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	
Power Supply for LCD Driver	VDD-VEE	0	20.0	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—GND	Ta=25°C		4.5	5.0	5.5	V
Power Supply for LCD Driving		VDD—VEE	VDD=5.0V 1/128 Duty	−20°C	20.4	20.8	21.2	V
				0°C	19.4	19.8	20.2	
				25°C	19.3	19.7	20.1	
				50°C	19.2	19.6	20.0	
				70°C	18.8	19.2	19.6	
Input Voltage		VIH	H level		0.9VDD	—	VDD	V
		VIL	L level		GND	—	0.3VDD	
Supply Current (LCD)		IDD	VDD = 5.0V VEE = −14.7V		—	12.2	18.3	mA
		IEE			—	4.3	6.5	
LCM Surface Luminance	L	T014G16	VDD=5.0V VEE=−14.7V IL=5mA @ Vin=10.8V for Inverter TDK CXA−L10L	PATTERN: DOTS ALL ON	128	160	—	cd/m ²
				PATTERN: DOTS ALL OFF	—	24	36	

4.OPTICAL CHARACTERISTICS

AT Vop

ITEM MODE		Cr(Contrast Ratio)										θ (Viewing Angle)		ϕ (Viewing Angle)	
		-20℃		0℃		25℃		50℃		70℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
T	G	5.5	8	7	10	7	10	4.5	7	4	6.5	—	60	—	±50
Note		NOTE 6										NOTE 5			

Note:

T : Transmission

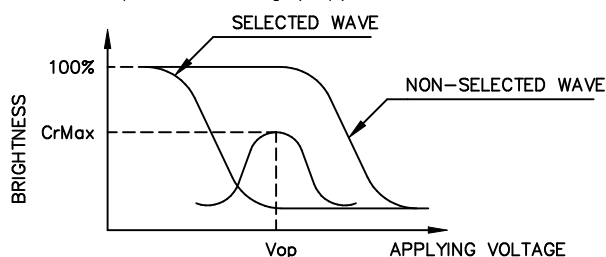
G : Normally Back, 6 O'clock

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

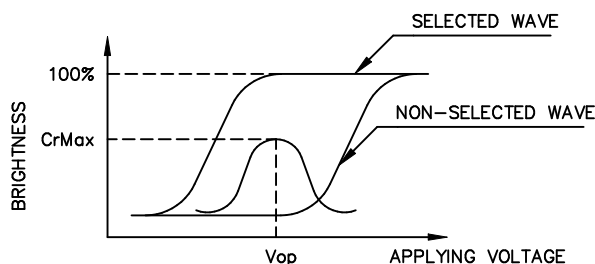
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	—	2700	4100	ms	NOTE 2
		0℃	—	600	900		
		25℃	—	200	300		
		50℃	—	110	170		
		70℃	—	90	140		
Response Time (fall)	Tf	-20℃	—	1400	2100	ms	NOTE 2
		0℃	—	300	450		
		25℃	—	130	200		
		50℃	—	70	110		
		70℃	—	40	60		

(NOTE 1)

Definition of Operation Voltage(V_{op})



(positive type)



(negative type)

*Conditions

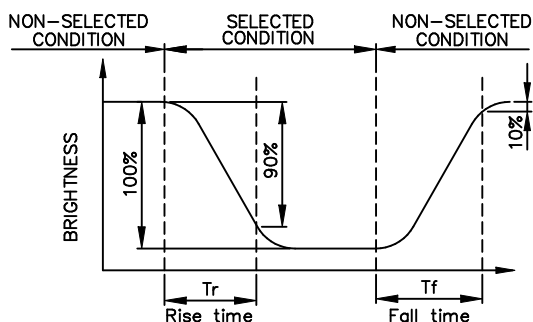
Viewing Angle : 0

Frame Frequency : 70Hz

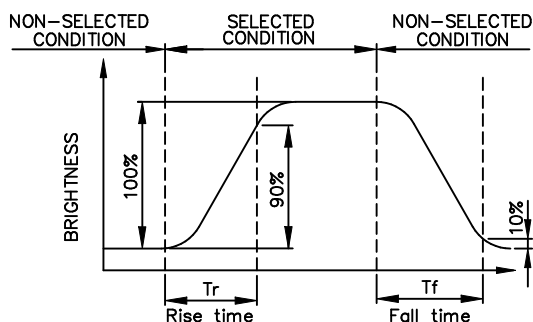
Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(T_r, T_f)



(positive type)



(negative type)

*Conditions

Operating Voltage : V_{op}

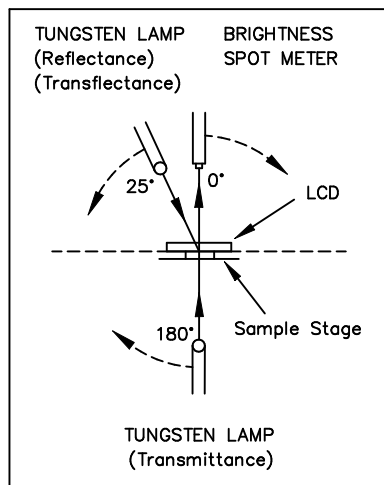
Viewing Angle (θ, ϕ) : (0,0)

Frame Frequency : 70Hz

Applying Waveform : 1/N duty 1/a bias

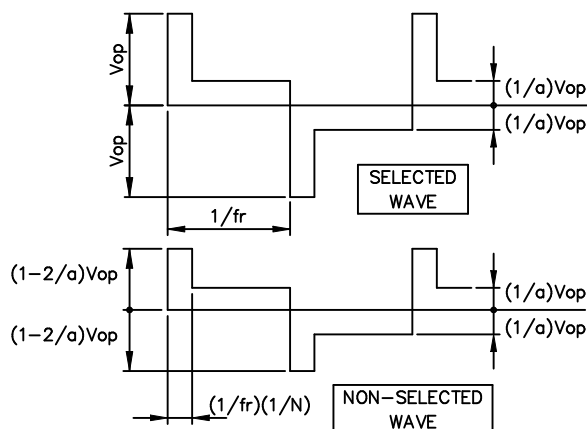
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



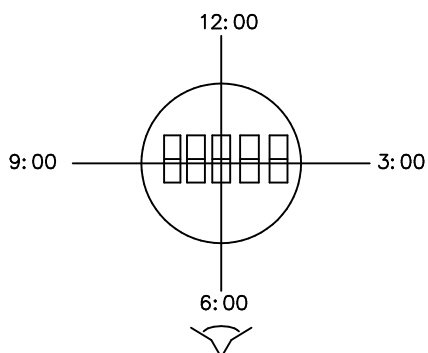
CONST.
TEMP.
CHAMBER

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



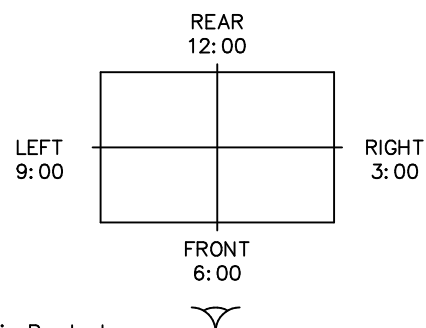
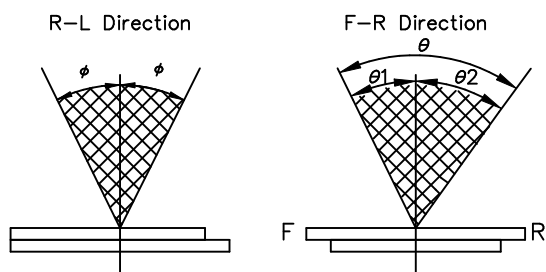
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



*For This Product

The Viewing Direction Is 6 O'clock
So $\theta_1 > \theta_2$

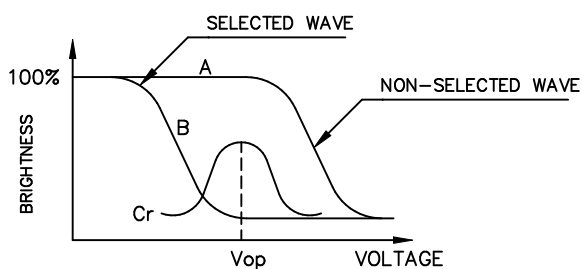
$$\theta = \theta_1 + \theta_2$$

*Conditions

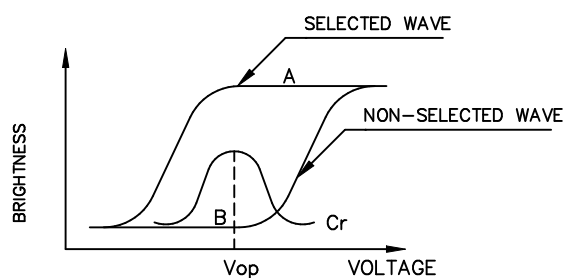
Operating Voltage : Vop
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



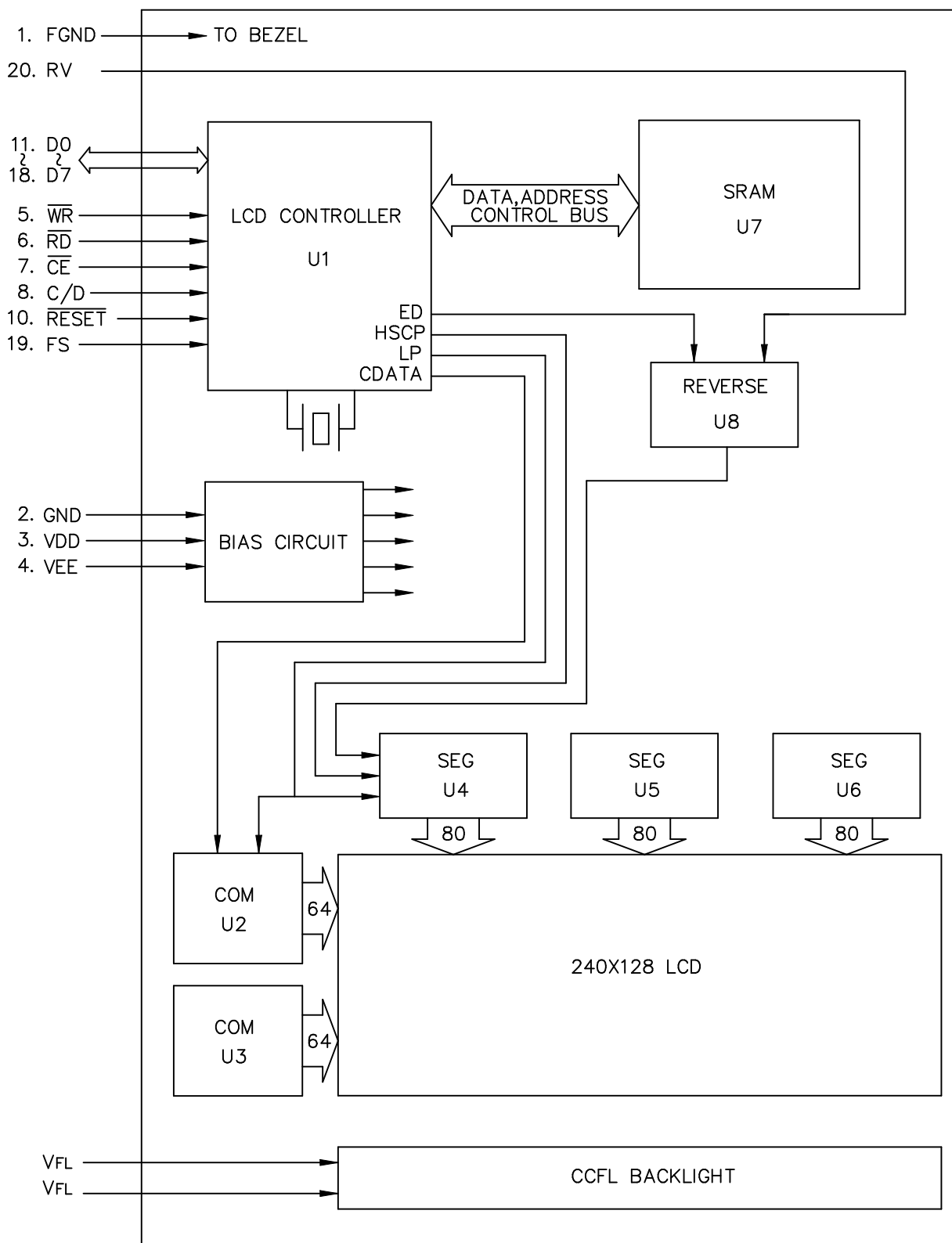
(negative type)

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

*Conditions

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

5.BLOCK DIAGRAM



6.INTERNAL PIN CONNECTION

LCD INTERFACE

PIN NO.	SYMBOL	FUNCTION
1	FGND	FRAME GROUND (0V)
2	GND	GROUND
3	VDD	POWER SUPPLY FOR LOGIC (+5V)
4	VEE	POWER SUPPLY FOR LC DRIVING
5	$\overline{WR}$	DATA WRITE
6	$\overline{RD}$	DATA READ
7	$\overline{CE}$	CHIP ENABLE
8	C/D	$\overline{WR}$ ="L",C/D="H" :COMMAND WRITE $\overline{WR}$ ="L",C/D="L" :DATA WRITE $\overline{RD}$ ="L",C/D="H" :STATUS READ $\overline{RD}$ ="L".C/D="L" :DATA READ
9	NC	NO CONNECTION
10	$\overline{RESET}$	CONTROLLER RESET
11	D0	DATA INPUT/OUTPUT
12	D1	DATA INPUT/OUTPUT
13	D2	DATA INPUT/OUTPUT
14	D3	DATA INPUT/OUTPUT
15	D4	DATA INPUT/OUTPUT
16	D5	DATA INPUT/OUTPUT
17	D6	DATA INPUT/OUTPUT
18	D7	DATA INPUT/OUTPUT
19	FS	FONT SELECT CONNECT TO VDD : 6X8 PIXELS/CHARACTER CONNECT TO GND : 8X8 PIXELS/CHARACTER
20	RV	DISPLAY DATA REVERSE RV=H : REVERSE DISPLAY RV=L : NORMAL DISPLAY

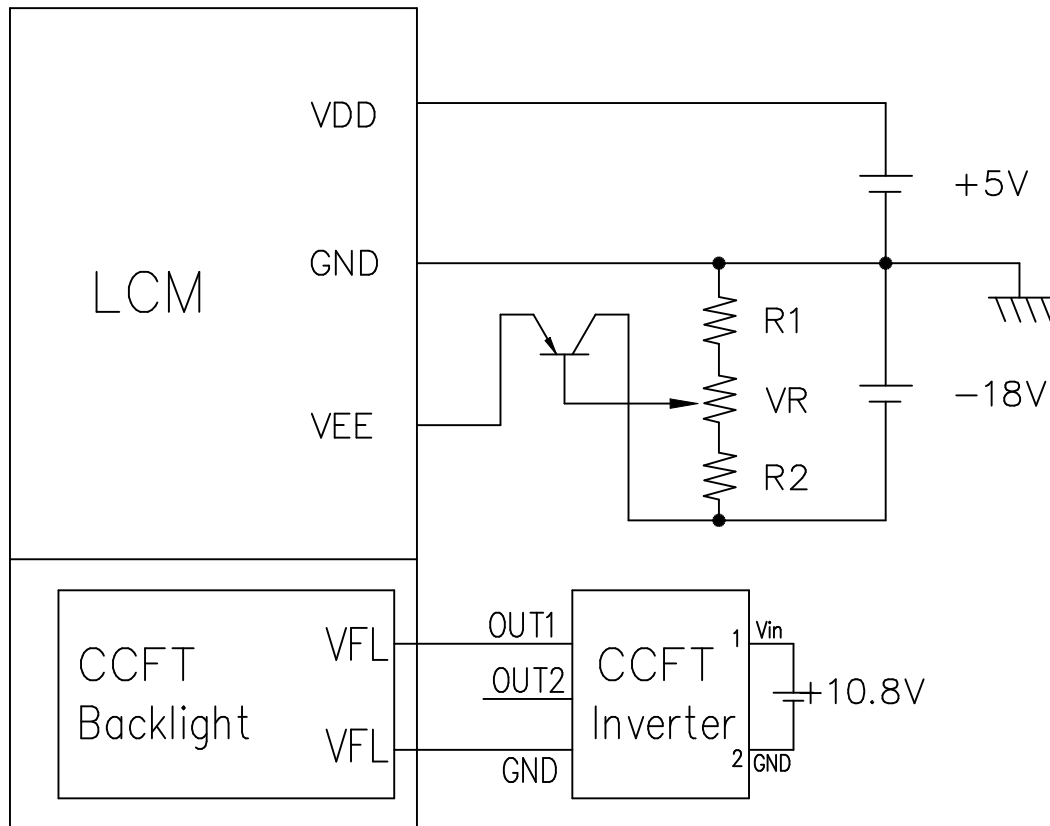
CN1 CONNECTOR : Pitch : 2.54mm (2x10)

CCFL INTERFACE

PIN NO.	SYMBOL	FUNCTION
1	VFL	POWER SUPPLY FOR FL DRIVE
2	NC	NO CONNECTION
3	NC	NO CONNECTION
4	NC	NO CONNECTION
5	VFL	POWER SUPPLY FOR FL DRIVE

USED CCFL CONNECTOR : IL-G-5S-S3C2(JAE) or Compatible

7. POWER SUPPLY



1. $R1 + VR + R2 = 10K \sim 20K$
2. Recommended CCFL Inverter : TDK CXA-L10L
@ $V_{in} = 10.8V$

8. TIMING CHARACTERISTICS

8-1. INTERFACE TIMING

@VDD = 5V±10%

ITEM	ITEM	CONDITION	MIN.	MAX.	UNIT
C/D SET UP TIME	t_{CDS}	Fig.	100	—	ns
C/D HOLD TIME	t_{CDH}	Fig.	10	—	ns
$\overline{CE}$, $\overline{RD}$, $\overline{WR}$ CLOCK WIDTH	t_{CP}, t_{RP}, t_{WP}	Fig.	80	—	ns
DATA SET UP TIME	t_{DS}	Fig.	80	—	ns
DATA HOLD TIME	t_{DH}	Fig.	40	—	ns
ACCESS TIME	t_{ACC}	Fig.	—	150	ns
DATA OUTPUT HOLD TIME	t_{OH}	Fig.	10	50	ns

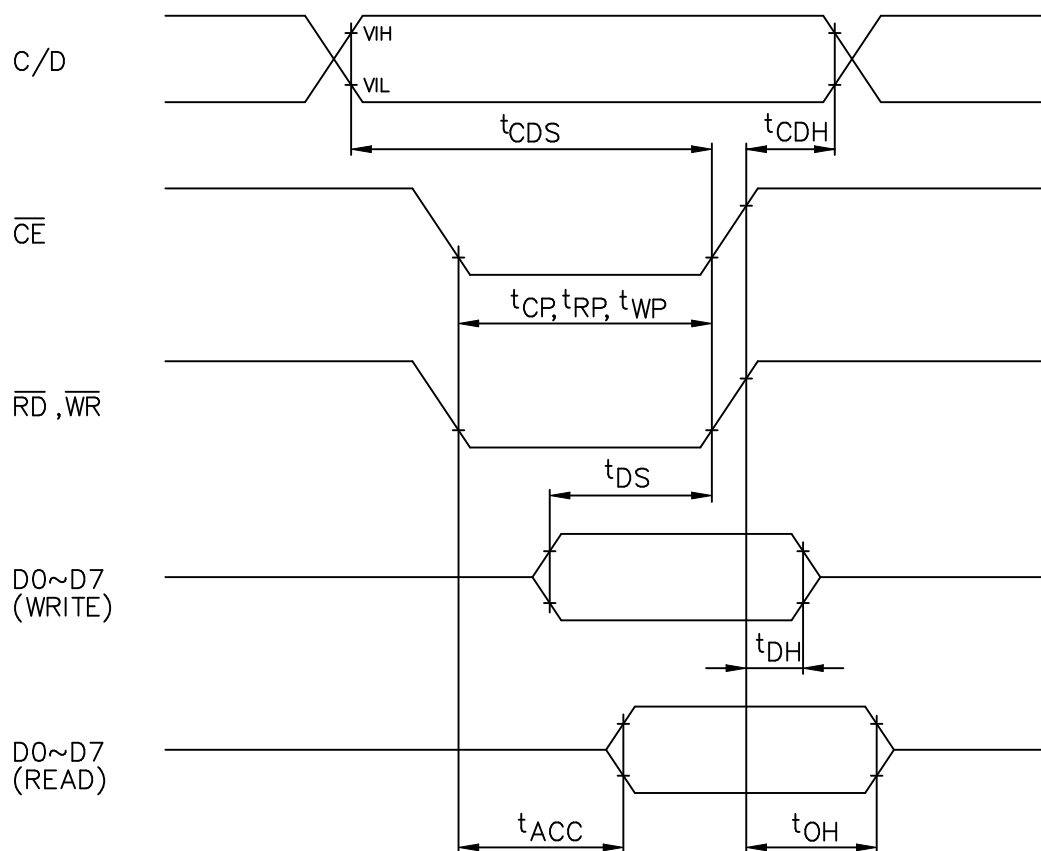
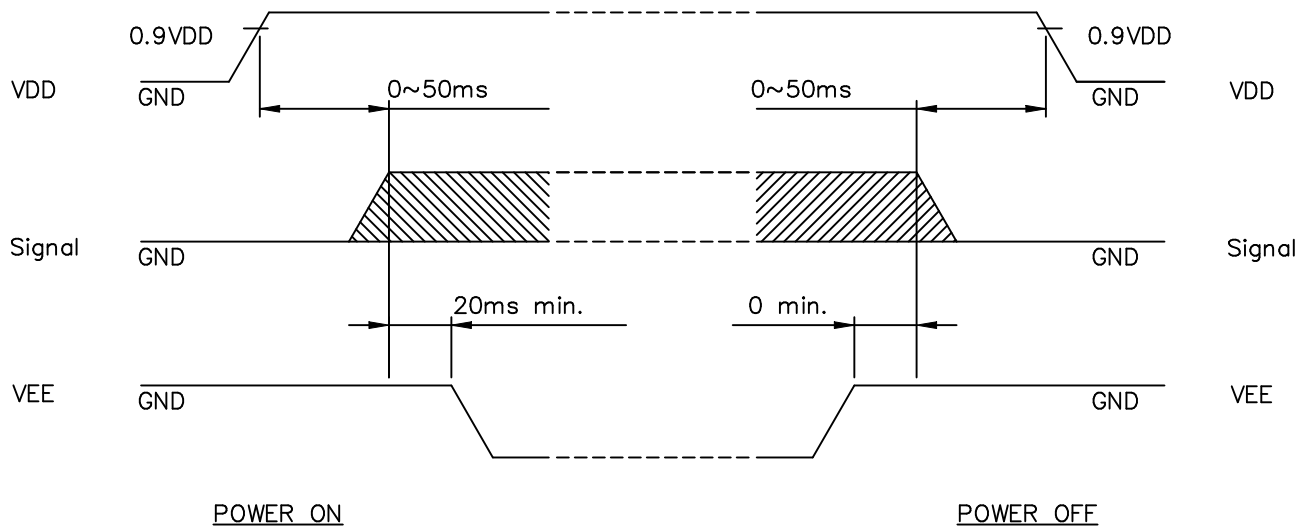


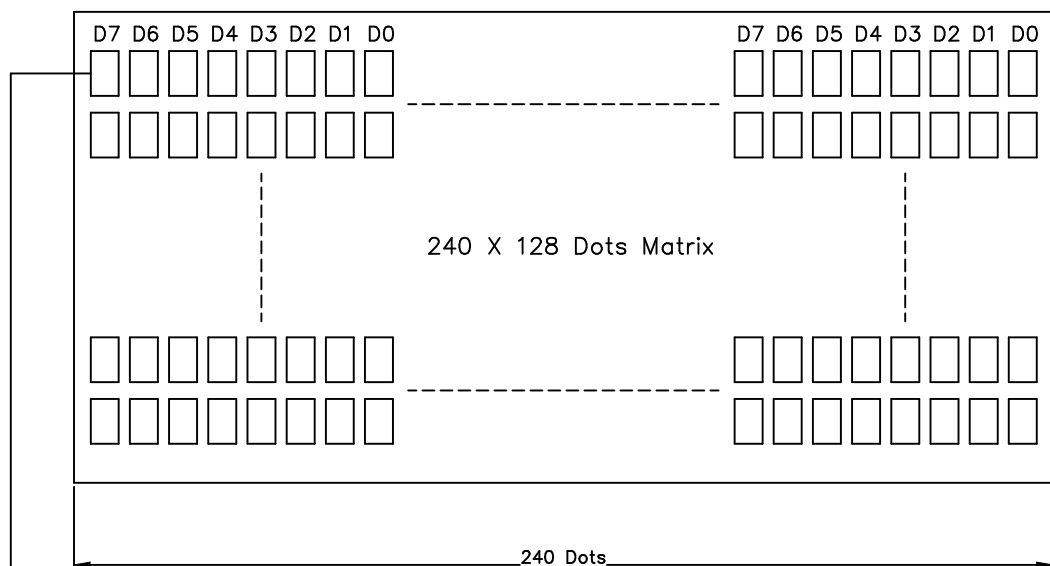
Fig. INTERFACE TIMING CHART

8-2. POWER ON/OFF TIMING



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

8-3. DISPLAY PATTERN



Startting dot for the startting address of display RAM.

D0~D7 are 8 bits transmitted data, where D0 is LSB and D7 is MSB.

8-4.COMMAND LIST

COMMAND	CODE	D1	D2	FUNCTION
REGISTER SET	00100001	X address	X address	Cursor pointer set
	00100010	Data	OOH	Offset register set
	00100100	Low address	High address	Address pointer set
CONTROL WORD SET	01000000	Low address	High address	Text home address set
	01000001	Columns	OOH	Text area set
	01000010	Low address	High address	Graphic home address set
	01000011	Columns	OOH	Graphic area set
MODE SET	1000X000	—	—	"OR" mode
	1000X001	—	—	"EXOR" mode
	1000X011	—	—	"AND" mode
	1000X100	—	—	"Text attribute" mode
	10000XXX	—	—	Internal CG ROM mode
	10001XXX	—	—	External CG RAM mode
DISPLAY MODE	10010000	—	—	Display off
	1001XX10	—	—	Cursor on, blink off
	1001XX11	—	—	Cursor on, blink on
	100101XX	—	—	Text on, graphic off
	100110XX	—	—	Text off, graphic on
	100111XX	—	—	Text on, graphic on
CURSOR PATTERN SELECT	10100000	—	—	1 line cursor
	10100001	—	—	2 lines cursor
	10100010	—	—	3 lines cursor
	10100011	—	—	4 lines cursor
	10100100	—	—	5 lines cursor
	10100101	—	—	6 lines cursor
	10100110	—	—	7 lines cursor
	10100111	—	—	8 lines cursor
DATA AUTO READ/WRITE	10110000	—	—	Data auto write set
	10110001	—	—	Data auto read set
	10110010	—	—	Auto reset
DATA READ WRITE	11000000	Data	—	Data write and ADP increment
	11000001	—	—	Data read and ADP increment
	11000010	Data	—	Data write and ADP decrement
	11000011	—	—	Data read and ADP decrement
	11000100	Data	—	Data write and ADP nonvariable
	11000101	—	—	Data read and ADP nonvariable
SCREEN PEEK	11100000	—	—	Screen peek
SCREEN COPY	11101000	—	—	Screen copy
BIT SET/RESET	11110XXX	—	—	bit reset
	11111XXX	—	—	bit set
	1111X000	—	—	bit0(LSB)
	1111X001	—	—	bit1
	1111X010	—	—	bit2
	1111X011	—	—	bit3
	1111X100	—	—	bit4
	1111X101	—	—	bit5
	1111X110	—	—	bit6
	1111X111	—	—	bit7(MSB)

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*** STATUS READ**

Before sending data (read/write), command it is necessary to check the status.

T6963C status word format is following :

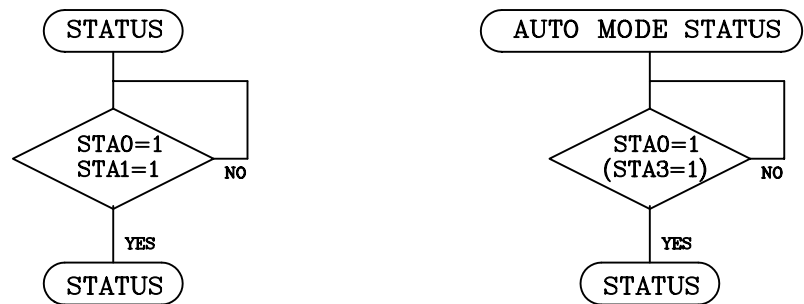
LSB	D0	STA0	Check capability of command execution	0: Disable 1: Enable
	D1	STA1	Check capability of data read/write	0: Disable 1: Enable
	D2	STA2	Check capability of auto mode data read	0: Disable 1: Enable
	D3	STA3	Check capability of auto mode data write	0: Disable 1: Enable
	D4	STA4	Not use	
	D5	STA5	Check capability of controller operation	0: Disable 1: Enable
	D6	STA6	Error flag. Using screen peek/copy command	0: Disable 1: Enable
MSB	D7	STA7	Check the condition blink	0: Disable 1: Enable

Note 1: It is necessary to check STA0 and STA1 at the same time. The error is happened by sending data at executing command.

Note 2: The status check will be enough to check STA0/STA1.

Note 3: STA2/STA3 are valid in auto mode STA0/STA1 are invalid.

Status checking flow



Note 4: It is impossible to save status check in the case of command of MSB0. To have the delay time cannot be save status check. The interrupt of hardware is happened at the end of lines. If command of MSB0 is sent in this period, the command executing is waited. The state of waiting doesn't disregarded or rewrites data of waiting command.

REV/DATE	R0/ 03.31.06'	R1/ 04.16.07'				BY J.P. Weng
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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

LCD VIBRATION & DROP TEST

NO	ITEM	CONDITIONS			RESULT
1.	Vibration Test	a. Frequency	5 → 13.95Hz 13.95 → 33Hz 33 → 51Hz 51 → 500Hz	Displacement: 0.2inch Acceleration: 2G Displacement: 0.036inch Acceleration: 5G	OK
		b. Time Total Time	20 min. ± 1 min. X.Y.Z 3 Direction 60 min. ± 3 min.		
2.	Drop Test	Three-time free drop In X.Y.Z direction & One conner from a height of 70cm about ground			OK

REV/DATE	R0/ 03.31.06'					BY J.P. Weng
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Inspection Provision

1.Purpose

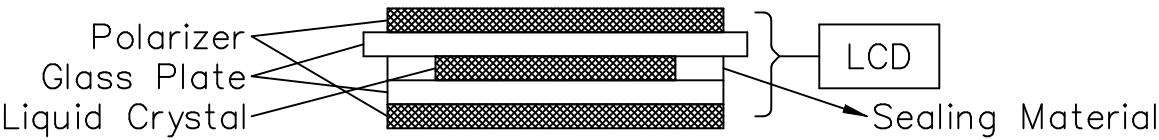
The NAN YA inspection provision provides outgoing inspection provision and its expected quality level based on our outgoing inspection of NAN YA LCD produces.

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 Ispection Method

MIL-STD-105E Level II Regular inspection

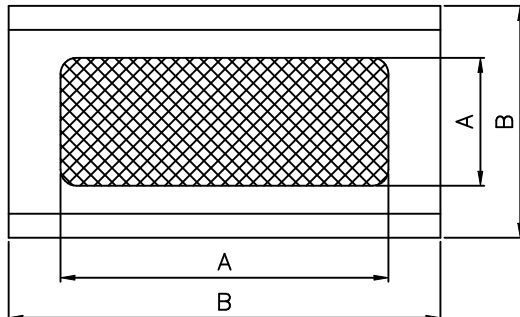
4-2 Inspection Standard

	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		

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	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.

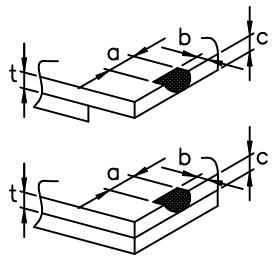
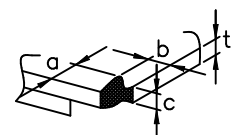
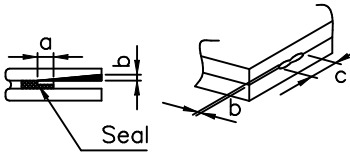
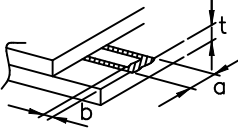
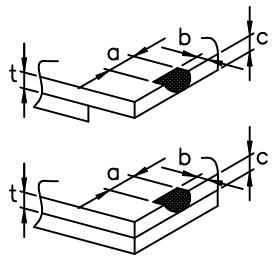
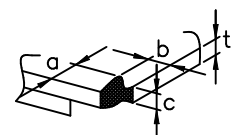
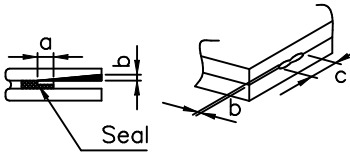
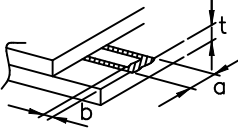
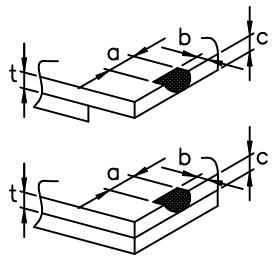
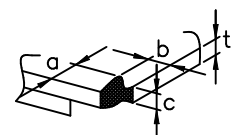
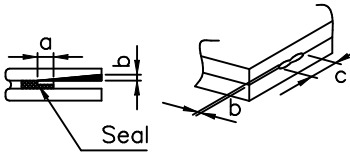
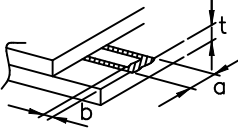
REV/DATE	R0/ 03.31.06'					BY J.P. Weng
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NAN YA PLASTICS CORP. ELEC. MATERIALS DIV. LCD DEPARTMENT		SPECIFICATION			SPEC. NO. : LM014-16L DATE : MAR. 31, 2006 SHEET NO. : 18/24																																		
*Test and measurement are performed under the following conditions, unless otherwise specified. Otherwise specified. <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> In case of doubtful judgment, it is performed under the following conditions. <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> 5.Specification for quality check 5-1 Electrical characteristics <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> <tr> <td>6.</td> <td>CCFL backlight turn on/off</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	6.	CCFL backlight turn on/off	Within Specified value
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REV/DATE	R0/ 03.31.06'					BY J.P. Weng																																	

5-2 External Appearance Defect

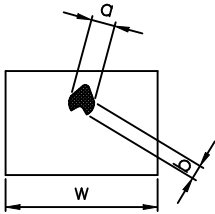
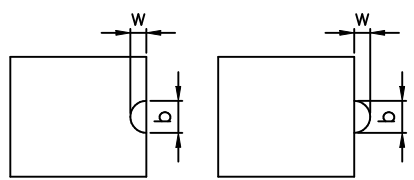
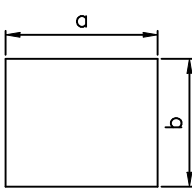
NO.	Item	Criterion																		
1.	Black spots, foreign matter, and white spots (Including light leakage due to pinholes of polarizing plates, etc.)	(1)–1–Spots <table><tr><th>Average Diameter(mm):D</th><th>Number of pieces permitted</th></tr><tr><td>$D \leq 0.1$</td><td>Ignore</td></tr><tr><td>$0.1 < D \leq 0.2$</td><td>5</td></tr><tr><td>$0.2 < D \leq 0.3$</td><td>2</td></tr><tr><td>$0.3 < D$</td><td>0</td></tr></table> Number of total pieces is set to within 5 pieces. Note that when there are 2 pieces or more, they are not to be concentrated. Set as: Average diameter = (Long diameter + Short diameter)/2 (1)–2–Blurred Spots(At lighting condition) <table><tr><th>Average Diameter(mm):D</th><th>Number of pieces permitted</th></tr><tr><td>$D \leq 0.3$</td><td>Ignore</td></tr><tr><td>$0.3 < D \leq 0.75$</td><td>5</td></tr><tr><td>$0.75 < D$</td><td>0</td></tr></table> Number of total pieces is set to within 5 pieces. Note that when there are 2 pieces or more, they are not to be concentrated. Set as: Average diameter = (Long diameter + Short diameter)/2	Average Diameter(mm):D	Number of pieces permitted	$D \leq 0.1$	Ignore	$0.1 < D \leq 0.2$	5	$0.2 < D \leq 0.3$	2	$0.3 < D$	0	Average Diameter(mm):D	Number of pieces permitted	$D \leq 0.3$	Ignore	$0.3 < D \leq 0.75$	5	$0.75 < D$	0
Average Diameter(mm):D	Number of pieces permitted																			
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NAN YA PLASTICS CORP. ELEC. MATERIALS DIV. LCD DEPARTMENT		SPECIFICATION			SPEC. NO. : LM014-16L DATE : MAR. 31, 2006 SHEET NO. : 20/24													
1.	Line	(1)-1-Lines																
		<table><tr><td>Width(mm): W</td><td>Length(mm): L</td><td>Number of pieces permitted</td></tr><tr><td>W≤0.03</td><td>Ignore</td><td>Ignore</td></tr><tr><td>0.03<W≤0.08</td><td>L≤4</td><td>2</td></tr><tr><td>0.08<W≤0.1</td><td>L≤1</td><td>1</td></tr></table>					Width(mm): W	Length(mm): L	Number of pieces permitted	W≤0.03	Ignore	Ignore	0.03<W≤0.08	L≤4	2	0.08<W≤0.1	L≤1	1
		Width(mm): W	Length(mm): L	Number of pieces permitted														
		W≤0.03	Ignore	Ignore														
		0.03<W≤0.08	L≤4	2														
0.08<W≤0.1	L≤1	1																
Object exceeding 0.1mm follow the standards of the spots form.																		
Note that when there are 2 pieces or more, they are not to be concentrated.																		
		(1)-2-Blurred Lines(At lighting condition)																
		<table><tr><td>Width(mm): W</td><td>Length(mm): L</td><td>Number of pieces permitted</td></tr><tr><td>W≤0.03</td><td>Ignore</td><td>Ignore</td></tr><tr><td>0.03<W≤0.08</td><td>L≤3</td><td>6</td></tr><tr><td>0.08<W</td><td>3<L</td><td>None</td></tr></table>					Width(mm): W	Length(mm): L	Number of pieces permitted	W≤0.03	Ignore	Ignore	0.03<W≤0.08	L≤3	6	0.08<W	3<L	None
		Width(mm): W	Length(mm): L	Number of pieces permitted														
		W≤0.03	Ignore	Ignore														
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0.08<W	3<L	None																
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.																		
2.	Scratches(Glass, reflection plates, and polarizing plates)	In accordance with black spots. (At non lighting condition)																
3.	Color irregular	Not remarkable color irregular.																
REV/DATE		R0/ 03.31.06'				BY J.P. Weng												

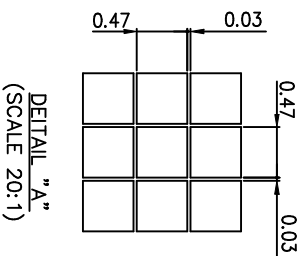
4.	Air bubbles polarizing plates, and reflection plates	<table><tr><th>Average Diameter (mm): D</th><th>Number of pieces permitted</th><th rowspan="2">Average diameter = (Long diameter + Short diameter)/2</th></tr><tr><td>$D \leq 0.3$ $0.3 < D$</td><td>Ignore 0</td></tr></table> Note that when there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

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.	Pinhole	 Dot display a and b are each $\leq 0.2\text{mm}$ The overall total is taken be with in 10 units. Note that they are not to be concentrated.
2.	Missing	 Dot display a and b are each $\leq 0.2\text{mm}$ The overall total is taken to be with in 10 units.
3.	Thick and thin display	 Taken to be within $\pm 1.5\%$ of display character width(a) and height(b).

NAN YA PLASTICS CORP. ELEC. MATERIALS DIV. LCD DEPARTMENT		SPECIFICATION			SPEC. NO. : LM014-16L DATE : MAR. 31, 2006 SHEET NO. : 23/24	
NOTE: • 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°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 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.						
REV/DATE	R0/ 03.31.06'					BY J.P. Weng

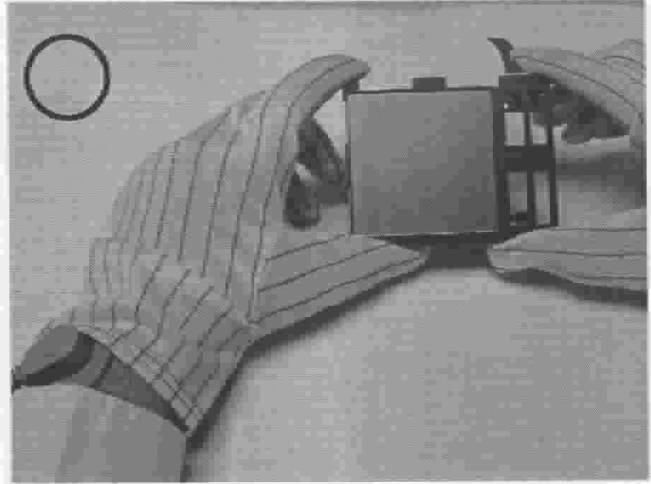
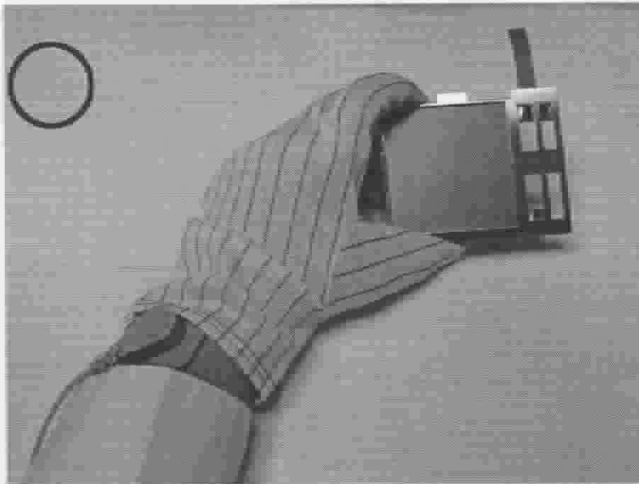


THE NOTES OF LCM USING

LCM is easy to damage.

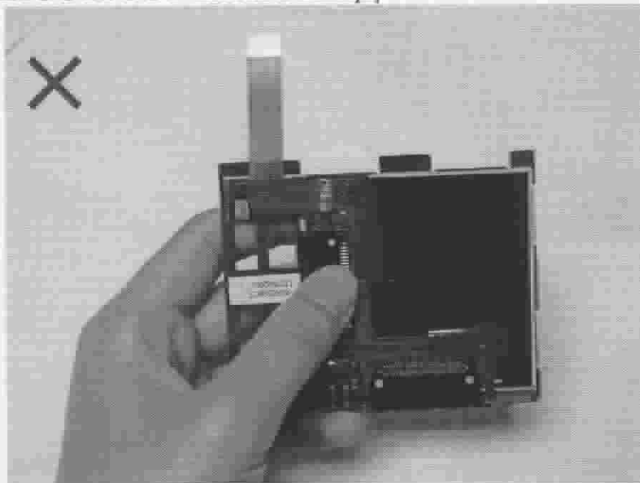
Please follow the notes as bellows, and be careful of handling!

Correct handling

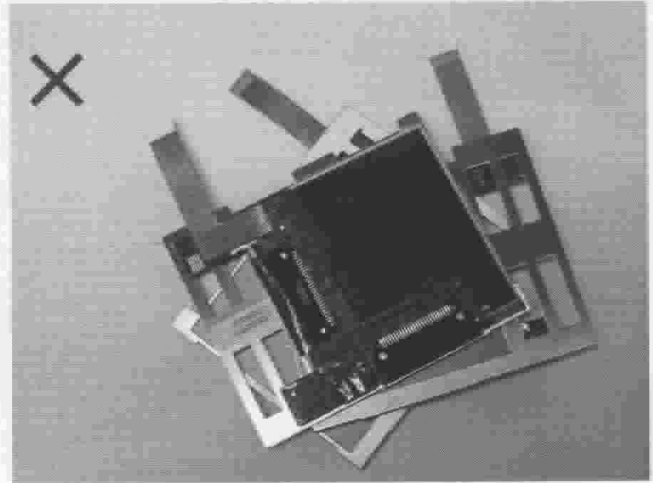


As above picture, please handle with glove by LCM edges and full EOS/ESD protection.

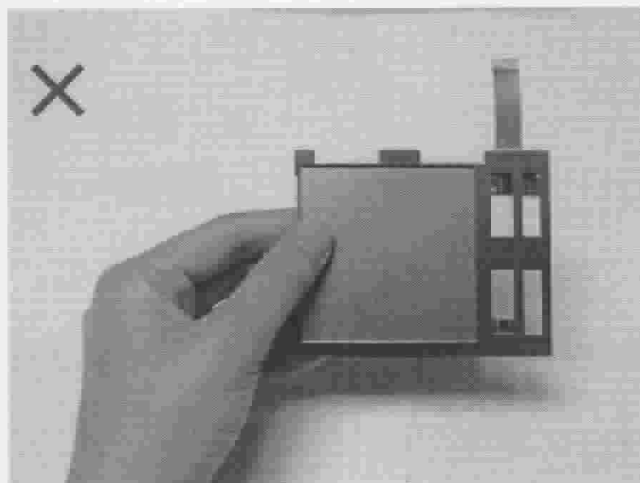
Incorrect handling



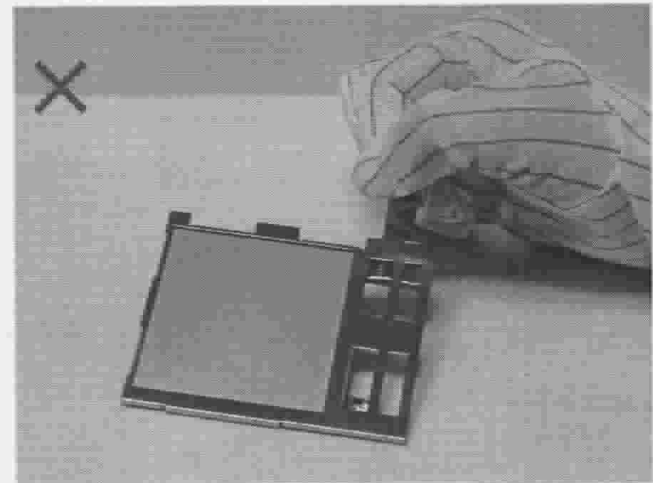
Please don't touch IC directly.



Please don't put one on another LCM.



Please don't hold the surface of LCM.



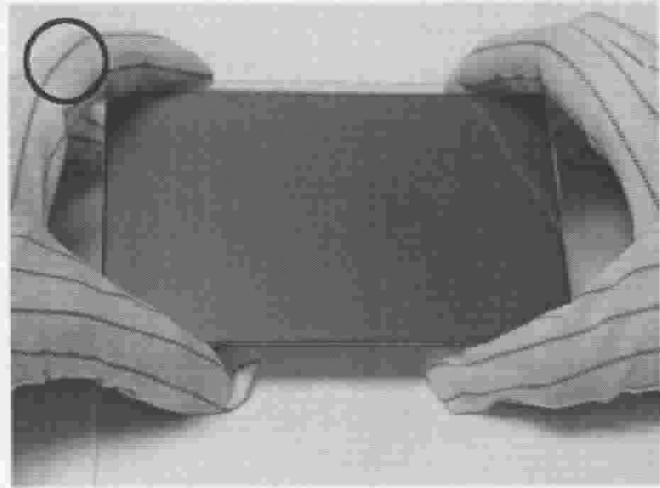
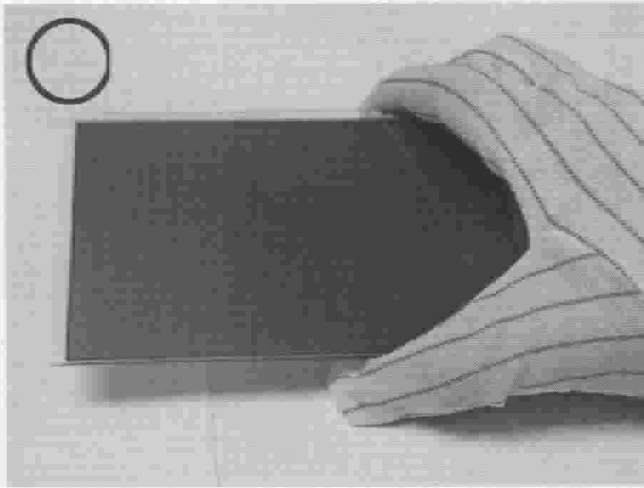
Please don't stretch interface of output.

THE NOTES OF LCD USING

LCD is easy damage.

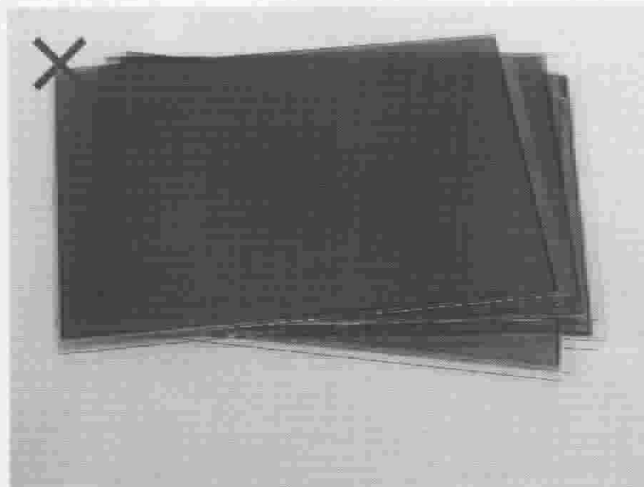
Please follow notes as bellows, and be careful of handling!

Correct handling

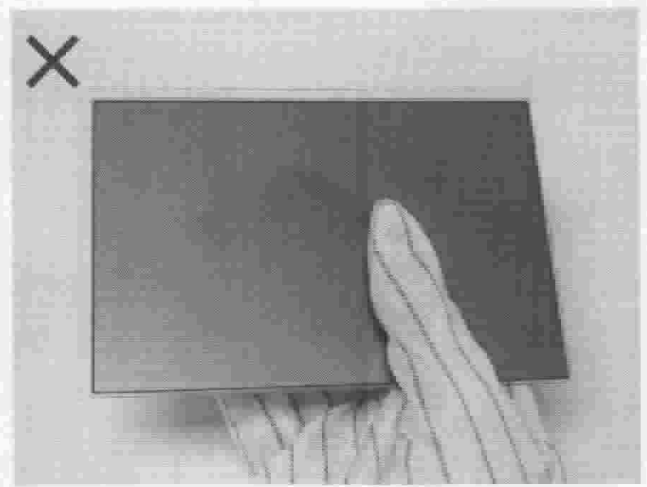


As above picture, please handle with glove by LCD edges and full EOS/ESD protection.

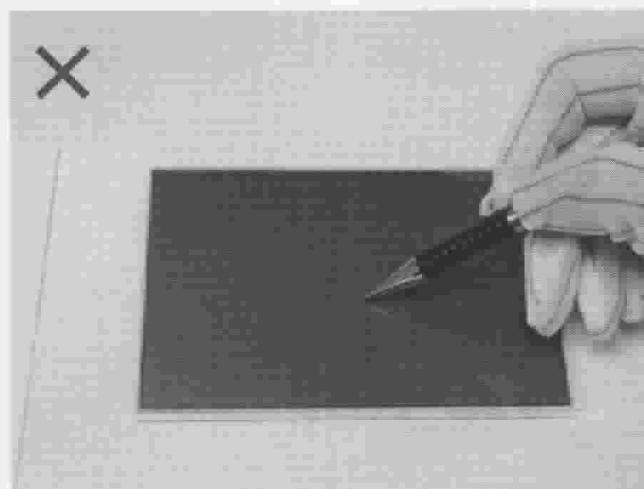
Incorrect handling



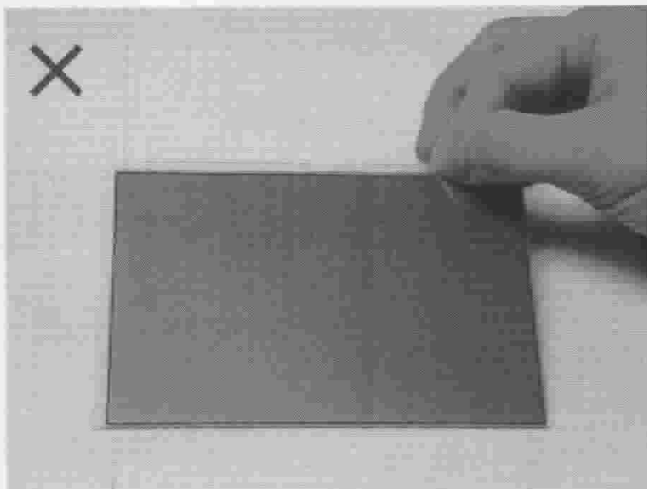
Please don't put one on another LCD.



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.

