MULTI-INNO TECHNOLOGY CO., LTD.

LCD MODULE SPECIFICATION

Model : MI0200PT

Revision	v1.0
Engineering	
Date	
Our Reference	

REVISION RECORD

Date	Rev.No.	Revision Items	Prepared	Checked	Approved
2008-2-18	V1.0	**New release**			

CONTENTS

1.General Specifications

Item	Main LCD	Unit	Note
LCD Type	TFT	-	
Display color	262K/65K		1
LCD Duty	-	-	
LCD Bias	-	-	
Viewing Direction	6:00	O'Clock	
Viewing Area(W×H)	-	mm	
Active Area(W×H)	31.68×39.6	mm	
Number of Dots	176(RGB)×220	mm	
Dote Size(W×H)	-	mm	
Dot Pitch(W×H)	-	mm	
Controller	HX8340B	-	
V_{DD}	2.85	V	
Vop	-	V	
Outline Dimensions	Refer to outline drawing on next page		
Backlight	White led		
Operating Temperature	-20　+70	-	
Storage　Temperature	-30　+80	-	
Weight	TBD	g	3
Data Transfer	16/8bits parallel	-	
Polarizer Mode	Transmissive/ Positive	-	

Note 1:　Color tune is slightly changed by temperature and driving voltage.
Note 2:　TBD- To Be Determined.

2. Outline Drawing

PIN SYMBOL
1 DB15
2 DB14
3 DB13
4 DB12
5 DB11
6 DB10
7 DB9
8 DB8
9 GND
10 DB7
11 DB6
12 DB5
13 DB4
14 DB3
15 DB2
16 DB1
17 DB0
18 IOVCC
19 VCC
20 /RD
21 /WR
22 RS
23 /CS
24 /RESET
25 IM0
26 GND
27 LCD_A
28 LED_K1
29 LED_K2
30 LED_K3
31 Y+
32 Y−
33 X+
34 X−
35 FMARK
36 NC

NOTE?

IM0	System Interface	
0	8080 16-bit I/F	? use DB15 0?
1	8080 8-bit I/F	? use DB15 8?

CIRCUIT DIAGRAM

A(+)

K1(−)
K2(−)
K3(−)

COMPONENT AREA

D.S.T (T=0.0mm)

0.50±0.30
10.00
0.60±0.20
12.70(REF)
37.0
36.68±0.10
50.30±0.10
1.50
3.75 0/−0.20
3−0.60±0.10
0.4MAX

REMOVE TAPE

2.0" TFT
176(RGB)×220DOTS
HX8340B

X+
Y+
X−

9.85
30.00±0.20
4−2.40
4−0.80
5.00
4.70±0.5
2.70±0.10
1.80
1.50
3.25
10.85
32.80
P0.7×35=24.50(W+0.35)
0.5mm(MAX)
1.79

39.60(LCD AA)
40.60(V-A)MDS
44.70(T/P AA)
46.85±0.20(LCD)
51.10±0.20(T/P)
51.30±0.10(B/L)
52.20±0.20(FRAME)
12.60±0.30

3.20
2.70
2.40
1.30
0.55
0.20

38.80±0.20(FRAME)
37.48±0.20(T/P)
35.48±0.20(LCD)
33.49(T/P AA)
32.68(V-A)MDS
31.68(LCD AA)

0.20
0.30
1.30
2.30
2.70
3.20

NOTES:
1. DISPLAY TYPE:　　　　　　　　　TFT
2. VIEWING DIRECTION:　　　　　　6:00
3. POLARIZER MODE:　　　　　　　TRANSMISSIVE/POSITIVE
4. LCD CONTROLLER:　　　　　　　HX8340B
5. VDD:　　2.85V
6. BACKLIGHT:　　　　　　　　　　WHITE LED
7. OPERATING TEMP.:　　−20°C −− 70°C
8. STORAGE TEMP.:　　　−30°C −− 80°C
9. UNMARKED TOLERANCE:　　±0.2
    UNMARKED FILLET RADIUS:　R=0.5
10. CONTROL DIMENSIONS:

NICHE OPTRONICS LIMITED
Hang Fung Industrial Building 2C Hok Yuen Street, Hunghom, Kowloon, Hong Kong

DRAWN BY:
CHECKED BY:
APPROVED BY:

TITLE: N0176220NNFC2−3 G−2
PURPOSE: LCM OUTLINE
SCALE: 1:1　　UNIT: mm　SHEET NO: 1 OF 1

2.0	change FPC	01.16
1.0	New release	12.24
VER	DESCRIPTION	DATE

3. Circuit Block Diagram

4. Absolute Maximum Ratings(Ta=25)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage(1)	V_{BAT}	-	-	V	
Power Supply Voltage(2)	V_{DD}	2.55	3.3	V	
Power Supply Voltage for Mail LCD	Vop=	-	-	V	
Power Supply Voltage for Sub LCD	Vop=	-	-	V	1,2
Logic Signal Input Voltage	V_I	-0.3	V_{DD}+0.3	V	
Operating Temperature	Top	-20	+70		
Storage Temperature	Tst	-30	+80		

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.

2. $V_{DD} > V_{SS}$ must be maintained.

5. Electrical Specifications and Instruction Code

5.1 Electrical characteristics (Ta=25)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Operation voltage for Main LCD		V_{OPM}	Ta=25	2.55	2.85	3.3	V	1
Operation voltage for Sub LCD		Vops	Ta=25	-	-	-	V	
Input voltage	'H'	V_{IH}	V_{DD}=2.85 V	$0.8V_{DD}$	-	V_{DD}	V	
	'L'	V_{IL}	V_{DD}=2.85 V	Vss	-	$0.2V_{DD}$	V	
Output Voltage	'H'	V_{OH}	-	$0.8V_{DD}$	-	V_{DD}	V	
	'L'	V_{OL}	-	Vss	-	$0.2V_{DD}$	V	
Current Consumption		I_{CC1}	Normal mode	-	1.5	3.0	mA	2
		I_{CC2}	Stand-by mode	-	-	-	uA	3

Note:

1: IC default setting, Duty:-,Bias:-, the voltage is VDD voltage.

2: Display full white. Backlight on state.

3: FOG

5.2 LED backlight specification

Item		Symbol	Condition	Min	Typ	Max	Unit	Note
Forward voltage		V_f	I_f=45mA	2.9	3.2	3.5	V	
Reverse voltage		V_r	-	-	-	5.0	V	
Forward current	Normal	I_{pn}	3-chip Parallel		45	-	mA	
	Dimming	I_{pd}			-	-		
Reverse Current		I_r	V_r=5V	-	-	20	μA	
Uniformity			I_f=45mA	75%	-	-		

Note : 3 chips parallel connection, LED luminous color: WHITE.

5.4 Interface Signals

Pin No.	Symbol	Level	Description
1	DB15	I/O	16-bit bi-directional data bus.
2	DB14	I/O	
3	DB13	I/O	
4	DB12	I/O	
5	DB11	I/O	
6	DB10	I/O	
7	DB9	I/O	
8	DB8	I/O	
9	GND	P	Ground
10	DB7	I/O	16-bit bi-directional data bus.
11	DB6	I/O	
12	DB5	I/O	
13	DB4	I/O	
14	DB3	I/O	
15	DB2	I/O	
16	DB1	I/O	
17	DB0	I/O	
18	VDD	P	Digital circuit power supply
19	VDD	P	
20	/RD	I	Read enable clock input pin
21	/WR	I	Write enable clock input pin
22	RS	I	Selects the register. Low : Index / status; High : Data
23	/CS	I	Chip select pin. Active: low
24	/RESET	I	Reset pin. Initializes the LCM when low.
25	IM0	I	INTERFACE MODE SELECTION
26	GND	P	Ground
27	LED_A	P	ANODE PIN of LED BL
28	LED_K1	P	CATHODE PIN of LED BL
29	LED_K2	P	
30	LED_K3	P	
31	Y+	P	Touch panel connection
32	Y-	P	
33	X+	P	
34	X-	P	
35	FMARK	-	NO CONNECT
36	NC	-	

5.5 Interface Timing Chart

Note: Please refer to HX8340B data sheet for more details. HX8340B INTERFACE AND INSTRUCTION DESCRIPTION
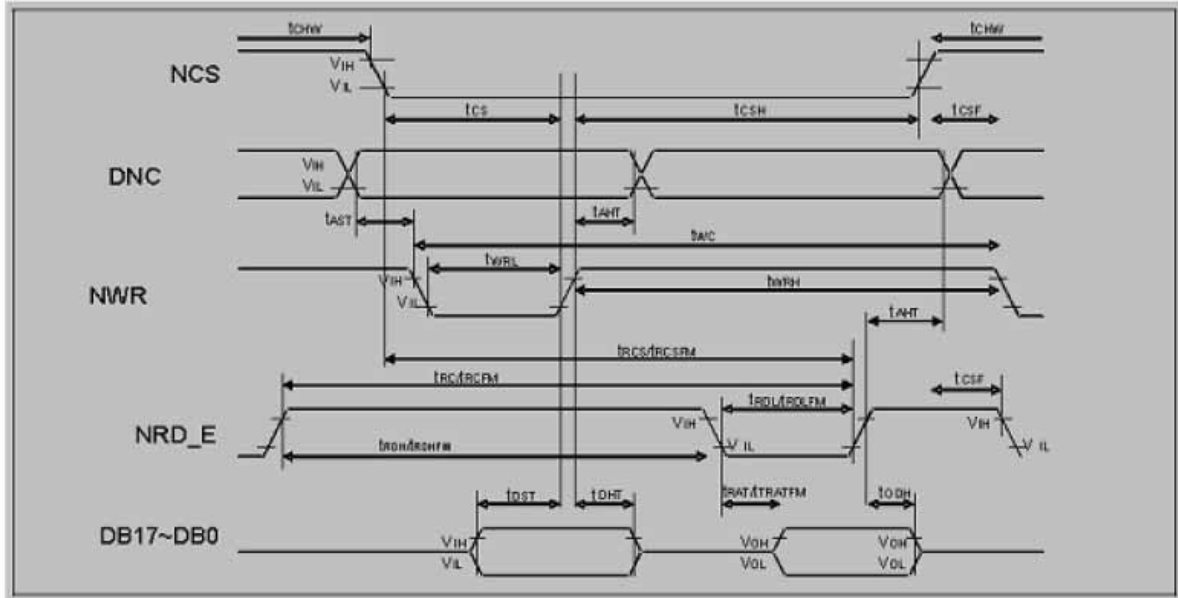
Figure 11. 1 Parallel Interface Characteristics (8080-series MPU)

(VSSA=0V, IOVCC=1.65V to 1.95V, VCI=2.5V to 3.3V,Ta = -30 to 70°C)

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DNC	t_{AST}	Address setup time	0	-	ns	-
	t_{AHT}	Address hold time (Write/Read)	10	-		
NCS	t_{CHW}	Chip select "H" pulse width	0	-	ns	-
	t_{CS}	Chip select setup time (Write)	15	-		
	t_{RCS}	Chip select setup time (Read ID)	45	-		
	t_{RCSFM}	Chip select setup time (Read FM)	355	-		
	t_{CSF}	Chip select wait time (Write/Read)	10	-		
	t_{CSH}	Chip select hold time	10	-		
NWR_RNW	t_{WC}	Write cycle	66	-	ns	-
	t_{WRH}	Control pulse "H" duration	15	-		
	t_{WRL}	Control pulse "L" duration	15	-		
NRD_E (ID)	t_{RC}	Read cycle (ID)	160	-	ns	When read ID data
	t_{RDH}	Control pulse "H" duration (ID)	90	-		
	t_{RDL}	Control pulse "L" duration (ID)	45	-		
NRD_E (FM)	t_{RCFM}	Read cycle (FM)	450	-	ns	When read from frame memory
	t_{RDHFM}	Control pulse "H" duration (FM)	90	-		
	t_{RDLFM}	Control pulse "L" duration (FM)	355	-		
D15 to D0	t_{DST}	Data setup time	10	-	ns	For maximum C_L=30pF For minimum C_L=8pF
	t_{DHT}	Data hold time	10	-		
	t_{RAT}	Read access time (ID)	-	40		
	t_{RATFM}	Read access time (FM)	-	340		
	t_{ODH}	Output disable time	20	80		

Note: The input signal rise time and fall time (tr, tf) is specified at 15 ns or less.
Logic high and low levels are specified as 30% and 70% of IOVCC for Input signals.

6. Optical Characteristics

Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp		$\Phi_1=0°$ $\Phi_2=0°$	TBD			Cd/m^2	1
Uniformity	Bp			70%				1,2
Viewing Angle	Φ_1(up down)		Cr≥10	-15 +35			Deg	3
	Φ_2(left right)			-45 +45				
Contrast Ratio	Cr		$\Phi_1=0°$ $\Phi_2=0°$	150	250	-	-	4
Response Time	Tr			-	15	30	ms	5
	T_f			-	35	50		
Color of CIE Coordinate	W	x	$\Phi_1=0°$ $\Phi_2=0°$	0.272	0.302	0.332	-	1,6
		y		0.316	0.346	0.376	-	
	R	x		0.606	0.636	0.666	-	
		y		0.298	0.328	0.358	-	
	G	x		0.270	0.300	0.330	-	
		y		0.549	0.579	0.609	-	
	B	x		0.102	0.132	0.162	-	
		y		0.107	0.137	0.167	-	
NTSC Ratio	S				60%			

Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment PR-705 (Φ10mm)
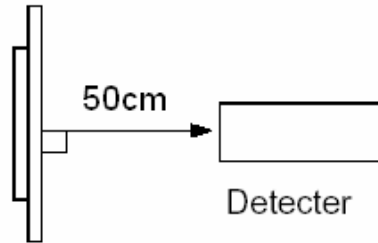
Note 2:   Bp = Bp (Min.) / Bp (Max.)×100 (%)

Bp (Max.) = Maximum brightness in 9 measured spots

Bp (Min.) = Minimum brightness in 9 measured spots.

3~5mm
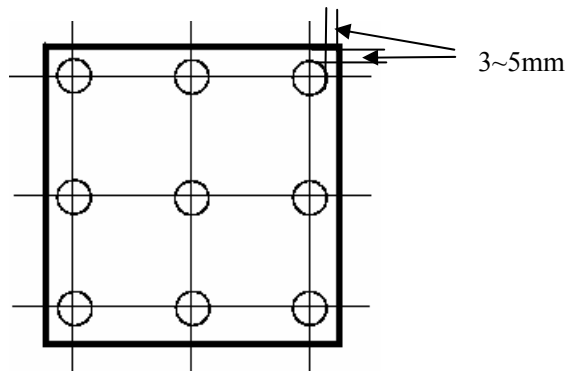
Measurement equipment PR-705 (Φ10mm)

Note 3: Definition of Viewing Angle(Test LCD using DMS501)

$\theta=0^0$
$\Phi=0^0$
Φ

up
$\theta=180^0$
$\Phi=-90^0$

left
$\theta=270^0$
$\Phi=-90^0$

right
$\theta=90^0$
$\Phi=90^0$

*Conditions

Operating Voltage: Vop

Frame Frequency: 70Hz

Appling Waveform: 1/N duty 1/a bias

Contrast ratio: ≥ 2

$\theta=0^0$
$\Phi=90^0$
down

θ
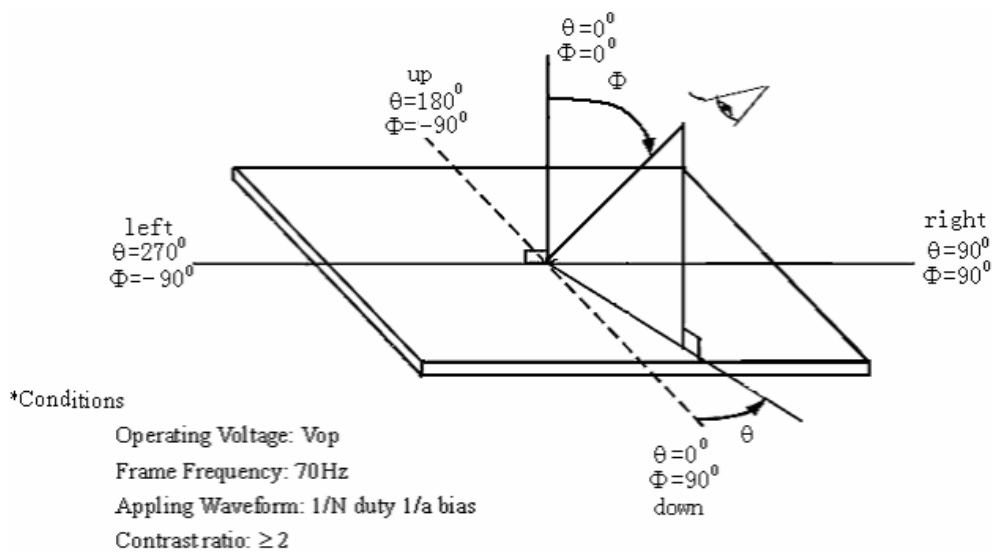
Note 4: Definition of contrast ratio.(Test LCD using DMS501)
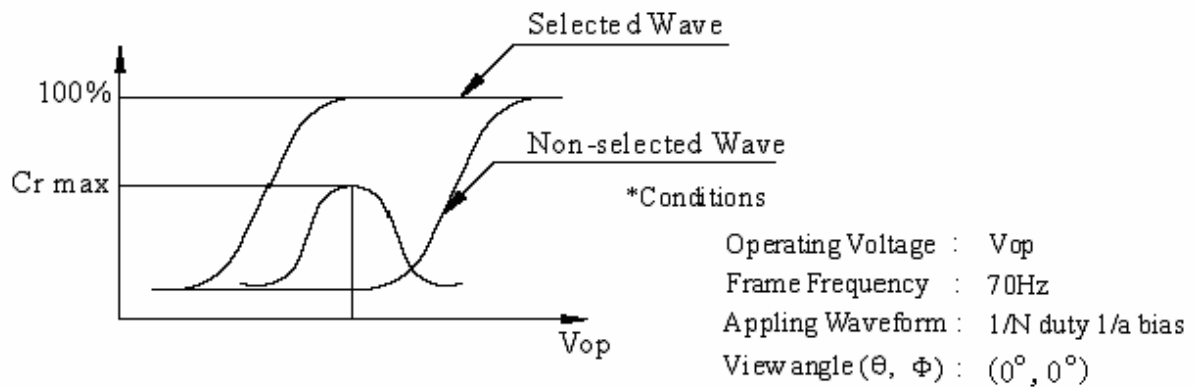
$$Contrast\ ratio(Cr) = \frac{Brightness\ of\ selected\ dots}{Brightness\ of\ non-selected\ dots}$$

Note 5: Definition of Response time(Test LCD using DMS501)
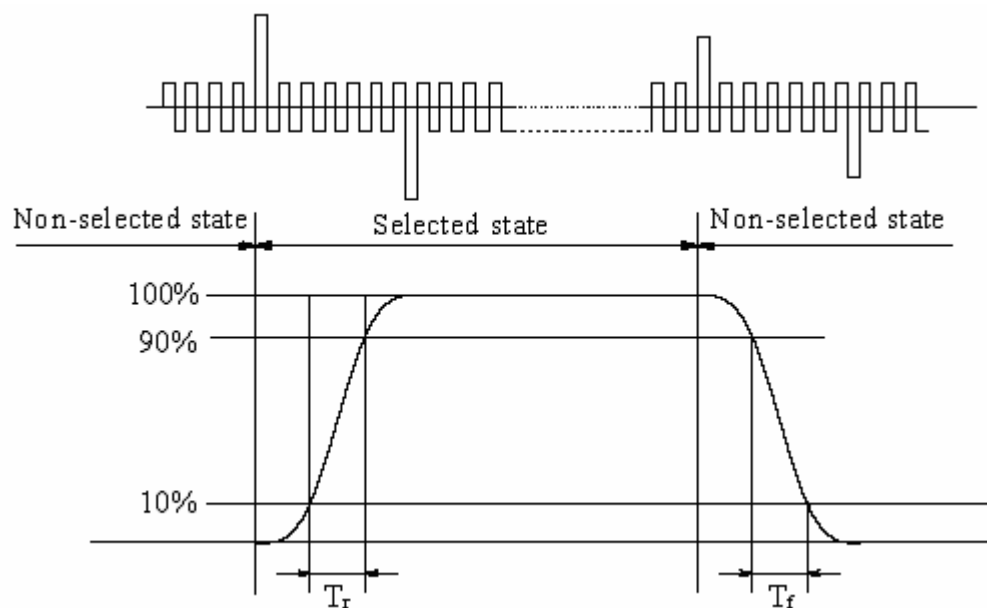
Operating Voltage: Vop
Frame Frequency: 70Hz
Appling Waveform: 1/N duty 1/a bias
View angle (θ, Φ):   (0^0, 0^0)

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.

1931 CIE Chromaticity Diagram
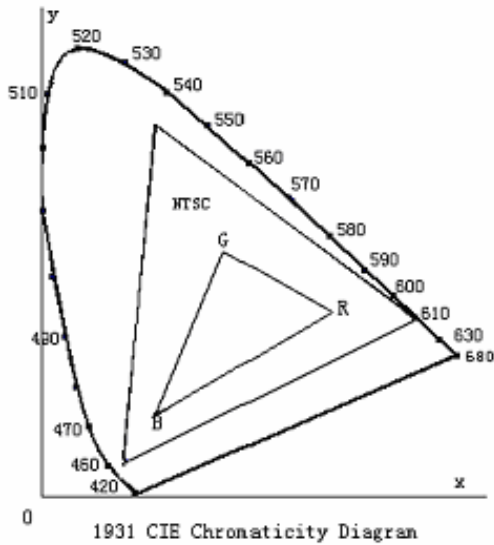
Color gamut:

$$S = \frac{area \ of \ RGB \ triangle}{area \ of \ NTSC \ triangle} \times 100\%$$
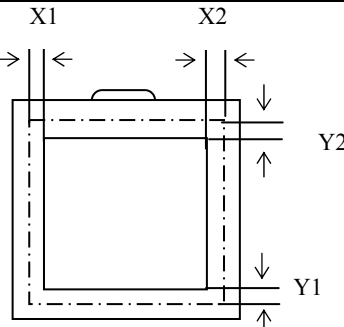
7. Reliability
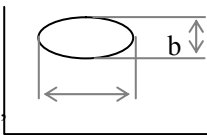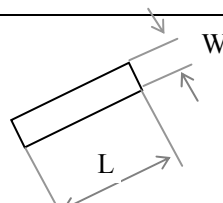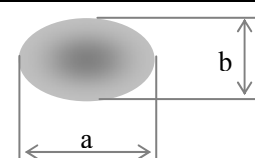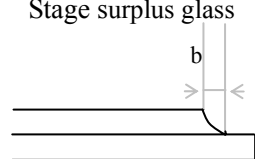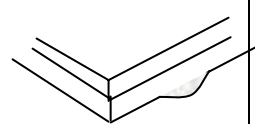
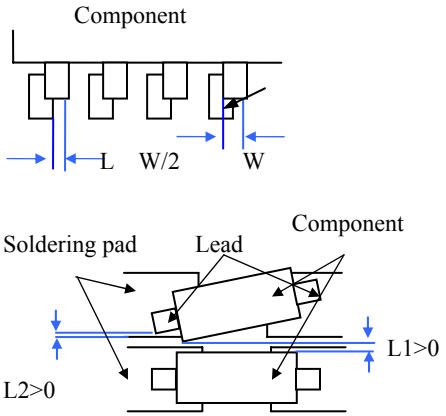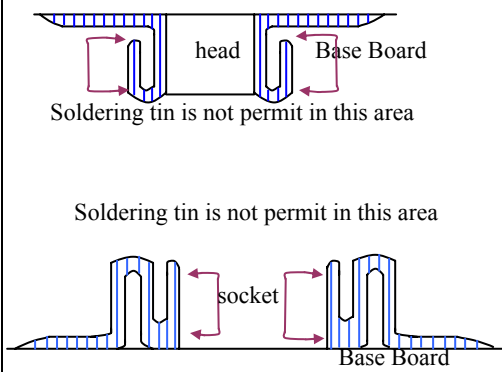| No.	Test Item	Test condition	Criterion
1	High Temperature Storage	80 ±2 96H Restore 4H at 25	1. After testing, cosmetic defects should not happen. 2.Total current consumption should not be over 10% of initial value.
2	Low Temperature Storage	-30 ±2 96H Restore 4H at 25	
3	High Temperature Operation	70 ±2 48H Restore 4H at 25	
4	Low Temperature Operation	-20 ±2 48H Restore 4H at 25	
5	High Temperature /Humidity Storage	40 ±2 90%RH 48H	
6	Temperature Cycle	-30 ←→25 ←→80 　5min　30min ←→25 , 　5min after 10cycle, Restore 4H at 25	
7	Vibration Test (package state)	10Hz~150Hz, 100m/s2, 120min	Not allowed cosmetic and electrical defects.
8	Shock Test (package state)	Half- sine wave, 300m/s2, 18ms	
9	Atmospheric Pressure Test	25kPa 16H Restore 2H	
10	Cable Bending Test	Bending area and angle follow design document requirement	More than 50000 times

8 Quality level

8.1 Notes for quality standard

	Note
General	1. Should any defects which are not specified in this standard happen, additional standard shall be determined by mutual agreement between customer and NICHE. 2. Viewing Area should be the area which NICHE guarantees. 3. Limited sample should be prior to this Inspection standard. 4. Viewing Judgement should be under static pattern. 5. Inspection conditions 　Inspection distance　　: 250 mm (from the sample) 　Temperature　　　　: 25±5 　Inspection angle　　　: 45degrees in LCD view direction

Definitions of Inspection items	Pinhole, Bright spot, Black spot, White spot, Black line, White Line, Foreign particle, Bubble	The color of a small area is different from the remainder. The phenomenon dose not change with voltage.
	Contrast variation	The color of a small area is different from the remainder. The phenomenon changes with voltage.
	Polarizer defect	Scratch, Dirt, Particle, Bubble on polarizer or between polarizer and glass.
	Glass defect	Glass crack, Shaved corner of glass, Surplus glass

Definitions of Inspection ranges	Dividing A zone and B zone proceed to make a judgment. 　A zone : Inside Viewing area 　B zone : Outside Viewing area 　X1(A.A~V.A):　mm 　X2(A.A~V.A):　mm 　Y1(A.A~V.A):　mm 　Y2(A.A~V.A):　mm

Outgoing Inspection standard	Inspection level　　　Normal Inspection Sampling standard conforms to GB2828		
	Rank	Inspection Item	AQL(Number of defective LCMs counted)
	Major defect	All Functional defects(Such as No display, Display abnormally, Open or missing segment, Short circuit Missing component, No sound, Blight abnormally),Outline dimension beyond the drawing	0.65
	Minor defect	Appearance defects, such as Black/White spot, Bright spot, Pinhole, Black/White line, Contrast variation, Bubble Glass defect,　Polarizer defect, and so on. Details of the standard as follows.	1.50

8.2 Standards of inspection items

Inspection item			Judgement standard		Acceptable number	
			Category		A zone	B zone
1	Black spot, White spot Bright Spot, Pinhole Foreign Particle, Bubble and Particle =(a+b)/2(mm) Between polarizer and glass, Scratch on polarizer		A B C D	0.15 0.15< 0.20 0.20< 0.30 0.30<	Neglecte 2 1 0	Neglected
			Total defective point(B,C)		3	
2	Black line, White line, Bubble and Particle Between Polarizer and glass, Scratch on polarizer	 W:Width, L:Length(mm)	A B C D	W 0.10 0.01<W 0.03 L 3.0 0.03<W 0.05 L 3.0 0.05<W	Neglected 2 1 0	Neglected
			Total defective point(B,C)		2	
3	Contrast variation	 Φ=(a+b)/2(mm)	A B C D	Φ 0.2 0.2<Φ 0.3 0.3<Φ 0.4 0.4<Φ	Neglected 2 1 0	Neglected
			Total defective point(B,C)		3	
4	Bubble inside cell		any size		none	none
5	Polarizer defect (if Polarizer is used)	Scratch and damage on polarizer, Particle on polarizer or between polarizer and glass.	Refer to item 1 and item 2.			
		Bubble, dent and convex	A B C	Φ 0.3 0.3<Φ 0.7 0.7<Φ	Neglected 2 0	Neglected
			Total defective point(B,C)		2	
6	Surplus glass	Stage surplus glass	b 0.3mm			
		Surrounding surplus glass	Should not influence outline dimension and assembling.			

Inspection item			Judgment standard	
			Category(application: B zone)	
7	Glass defect crack	The front of lead terminals	A	If a t and b 1.0, c is not limited
			B	a t, 1 b 2mm, c 3mm
			C	If glass crack cover alignment mark, b 0.5mm.
			D	Crack at two sids of lead terminals should not cover patterns and alignment mark
		Surrounding crack—non-contact side Inner border line of the seal Outer border line of the seal	b < Inner borderline of the seal	
		Surrounding crack— contact side Inner border line of the seal Outer border line of the seal	b < Outer borderline of the seal	
		Corner	A	a t, b 3.0, c 3.0
			*Glass crack should not cover patterns used for	

		Inspection item	Judgement standard
8	PCB defect	Component soldering: No cold soldering short open circuit burr tin ball The flat encapsulation component position deviation must be less than 1/2 width of the pin (Pic.1) the sheet component deviation: Pin deviates from the pad and contact with the near components is not permitted Pic.2	Component L W/2 W Component Soldering pad Lead L1>0 L2>0
		lead defect: The lead lack must be less than 1/2of its width; The lead burr must be less than 1/2 of the seam; Impurities connect with the near leads is not permitted	
		Connector soldering: Soldering tin is at contact position of the plug and socket is not permitted No foundation is scald Serious cave distortion on plug and socket contact pin is not permitted	head Base Board Soldering tin is not permit in this area Soldering tin is not permit in this area socket Base Board

9. Precautions for Use of LCD Modules

9.1 Handling Precautions

9.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

9.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

9.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

9.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

9.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

— Isopropyl alcohol

— Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer.   Especially, do not use the following:

— Water

— Ketone

— Aromatic solvents

9.1.6 Do not attempt to disassemble the LCD Module.

9.1.7 If the logic circuit power is off, do not apply the input signals.

9.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

a. Be sure to ground the body when handling the LCD Modules.

b. Tools required for assembly, such as soldering irons, must be properly ground.

c. To reduce the amount of static electricity generated, do not conduct assembly and

other work under dry conditions.

d. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

9.2 Storage precautions

9.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

9.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature :　　　0　　　40

Relatively humidity: ≤80%

9.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

9.3 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.