



JEWEL HILL ELECTRONIC CO.,LTD.



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**SPECIFICATIONS FOR
LCD MODULE**

Module No. JH30240400B

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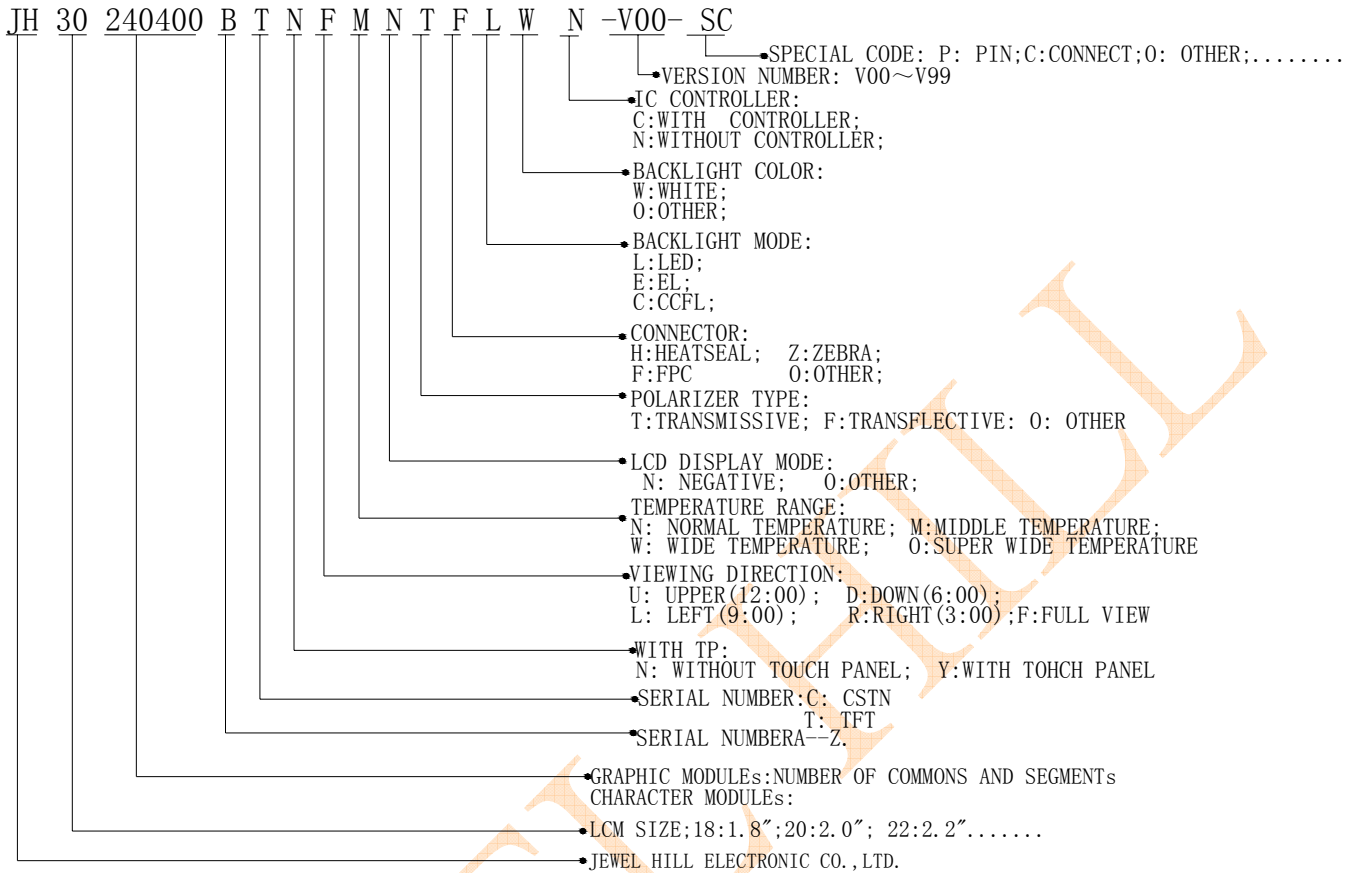
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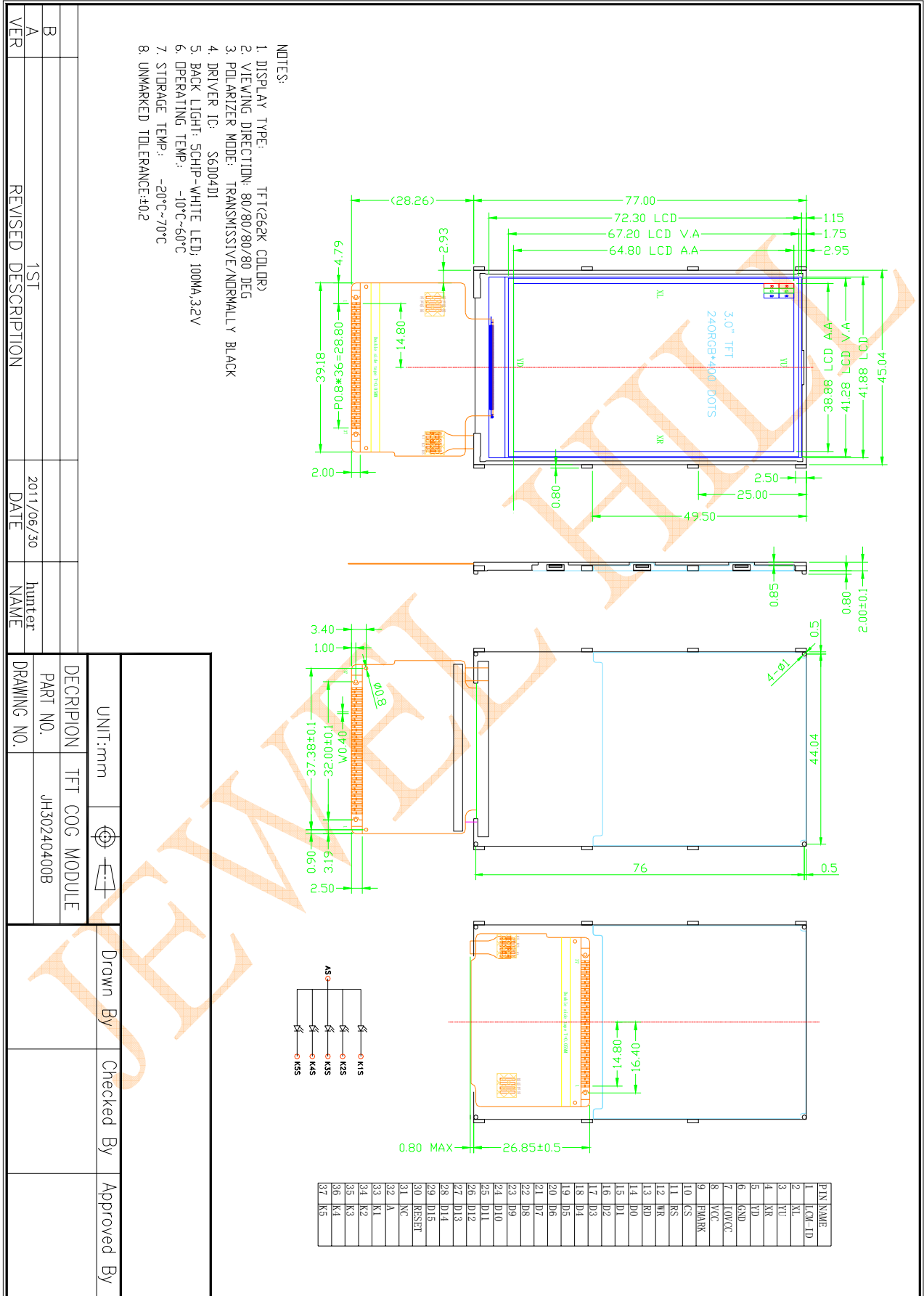
LCM Number System



1. General Specification

Item	Display Panel	Remark
Display Format	240*RGBx400(H) Dots	
Colour	262k colours	
Pixel Pitch	0.054mmx0.162mm	
Active Area	38.88mm(W)*64.8mm(H)	
Outline Dimensions	45.04mm(W)*77.00mm(H)*2.0mm(T)	
LCD Type	IPS	
Polarizer Mode	Transmissive, Normally Black	
View Angle(U/D/L/R)	80/80/80/80 DEG	
Driver IC	S6D04D1	
Backlight	LED	
Backlight Color	White	
Backlight Driver Type	External Power	

2. OutlineDraw



3. Absolute Maximum Ratings

The following are maximum values which, if exceeded may cause operation or damage to the unit.

ITEM	Symbol	Min	Typ.	Max.	Unit	Remark
Power Supply for Logic	$V_{CC} - V_{SS}$	2.4	-	3.3	V	
Power Supply for LCD	$V_{Gh} - V_{SS}$	12	14	16	V	
Input Voltage	V_{GL}	-10	-8	-6	V	
Storage Temperature	T_{ST}	-20	-	70	°C	
Operating Ambient temperature	T_{OP}	-10	-	60	°C	

Note:

***1:**Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

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

***2:**The maximum possible V_{LCD} voltage that may be generated is dependent on supply voltage V_{DD2} , temperature and (display) load.

$T_a \leq 80^\circ\text{C}$: 75% RH max



4. Electrical Specification

4.1 Electrical Characteristics

(Unless specified, the ambient temperature $T_a=25^\circ\text{C}$)

Parameter	Symbol	Condition	Min	Typ	Max	Unit	Note
Operation voltage for Main LCD	V_{dd}	$T_a=25^\circ\text{C}$	2.8	2.8	3.3	V	
Operation voltage for Sub LCD	Vdd	$T_a=25^\circ\text{C}$	-	-	-	V	1
Input voltage	H , '	V_{IH}	$V_{DD}=2.8\text{V}$	$0.8V_{DD}$	-	V_{DD}	V
	L , '	V_{IL}	$V_{DD}=2.8\text{V}$	V_{SS}	-	$0.2V_{DD}$	V
Output Voltage	H , '	V_{OH}	-	$0.8V_{DD}$	-	V_{DD}	V

	‘ L ,’	V_{OL}	-	V_{SS}	-	$0.2V_{DD}$	V	
Current Consumption		I_{CC1}	Normal mode	-	-	-	mA	2
		I_{CC2}	Stand-by mode	-	-	-	uA	

Note:

1: Display full white. Backlight on state.

2: FOG

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4.2 LED Backlight Specification

Item	Symb ol	Condition	Min	Typ	Max	Unit	Note
Forward voltage	V_f	$I_f=18\text{mA/L}$ ED	3.1	3.2	3.4	V	
Reverse voltage	V_r	-	-	-	1.2	V	
Forward current	Normal	I_{pn}		90	-	mA	
	Dimmi ng	I_{pd}	5-chip parallel				
Reverse Current	I_r	$V_r=1.2\text{V}$	-	40	-	μA	
Uniformity		$I_f=18\text{mA/L}$ ED	80%	-	-		

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4.3 Interface Signals

Pin NO.	Symbol	Description
1	LCM-ID	TBD
2	XL	Touch Panel connection(NC)
3	YU	Touch Panel connection(NC)
4	XR	Touch Panel connection(NC)
5	YD	Touch Panel connection(NC)
6	GND	Ground
7	IOVCC	A Power Supply For The Internal Logic(1.65-3.3V)
8	VCC	A Power Supply For The Internal Logic:Vcc=2.8V
9	FMARK	Frame Head Pulse Signal
10	CS	LCD Chip Select Input Pin
11	RS	Reg Selection For Command/Data
12	WR	Write Execution Control Pin
13	RD	Read Execution Control Pin
14-29	DB0-DB15	Data Bus
30	RESET	Reset Pin
31	NC	No Connect
32	A	Backlight Anode
33	K1	Backlight Cathode1
34	K2	Backlight Cathode2
35	K3	Backlight Cathode3
36	K4	Backlight Cathode4
37	K5	Backlight Cathode5

Signal	Symbol	Parameter	MIN	MAX	Unit	Description	
DCX	tAST	Address setup time	0	-	ns		
	tAHT	Address hold time (Write/Read)	10	-	ns		
CSX	tCHW	Chip select "H" pulse width	0	-	ns		
	tCS	Chip select setup time (Write)	25	-	ns		
	tRCS	Chip select setup time (Read ID)	45	-	ns		
	tRCSFM	Chip select setup time (Read FM)	355	-	ns		
	tCSF	Chip select wait time (Write/Read)	10	-	ns		
WRX	CASE 1	tWC	Write cycle	84	-	ns	Refer to note 6
		tWRH	Control pulse "H" duration	25	-	ns	
		tWRL	Control pulse "L" duration	25	-	ns	
	CASE 2	tWC	Write cycle	60	-	ns	
		tWRH	Control pulse "H" duration	20	-	ns	
		tWRL	Control pulse "L" duration	20	-	ns	
	CASE 3	tWC	Write cycle	60	-	ns	
		tWRH	Control pulse "H" duration	20	-	ns	
		tWRL	Control pulse "L" duration	20	-	ns	
RDX(ID)	tRC	Read cycle (ID)	160	-	ns	When read ID data	
	tRDH	Control pulse "H" duration (ID)	90	-	ns		
	tRDL	Control pulse "L" duration (ID)	45	-	ns		
RDX(FM)	tRCFM	Read cycle (FM)	450	-	ns	When read from the frame memory	
	tRDHFM	Control pulse "H" duration (FM)	90	-	ns		
	tRDLFM	Control pulse "L" duration (FM)	355	-	ns		
DB[23:0]	tDST	Data setup time	15	-	ns	For the maximum CL = 30pF, For the minimum CL = 8pF	
	tDHT	Data hold time	15	-	ns		
	tRAT	Read access time (ID)	-	40	ns		
	tRATFM	Read access time (FM)	-	340	ns		
	tODH	Output disable time	20	80	ns		

Note: Please refer to S6D04D1 data sheet for more details.

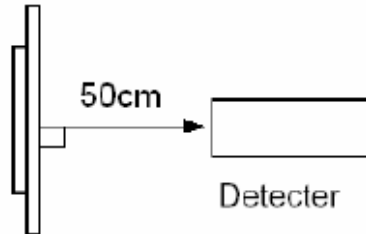
S6D04D1 INTERFACE AND INSTRUCTION DESCRIPTION

5. Optical Specification

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
Brightness	Bp	$\Phi_1=0^\circ$	150			Cd/m ²	1	
Uniformity	ΔBp	$\Phi_2=0^\circ$	70%				1,2	
Viewing Angle	Φ_1 (up down)	$C_r \geq 10$	-80~+80			Deg	3	
	Φ_2 (left right)		-80~+80					
Contrast Ratio	C_r	$\Phi_1=0^\circ$	-	500	-	-	4	
Response Time	T_r+T_f	$\Phi_2=0^\circ$	-	35	-	ms		
Color of CIE Coordinate	W	x	-	0.310	-	-	1,6	
		y	-	0.329	-	-		
	R	x	-	0.657	-	-		
		y	-	0.320	-	-		
	G	x	$\Phi_1=0^\circ$	-	0.289	-		-
		y	$\Phi_2=0^\circ$	-	0.589	-		-
	B	x		-	0.138	-		-
		y		-	0.080	-		-
NTSC Ratio	S			60%				



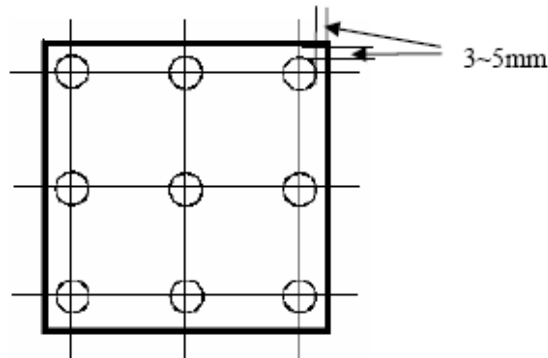
Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment PR-705 (Φ10mm)



Note 2: $\Delta Bp = Bp (\text{Min.}) / Bp (\text{Max.}) \times 100 (\%)$

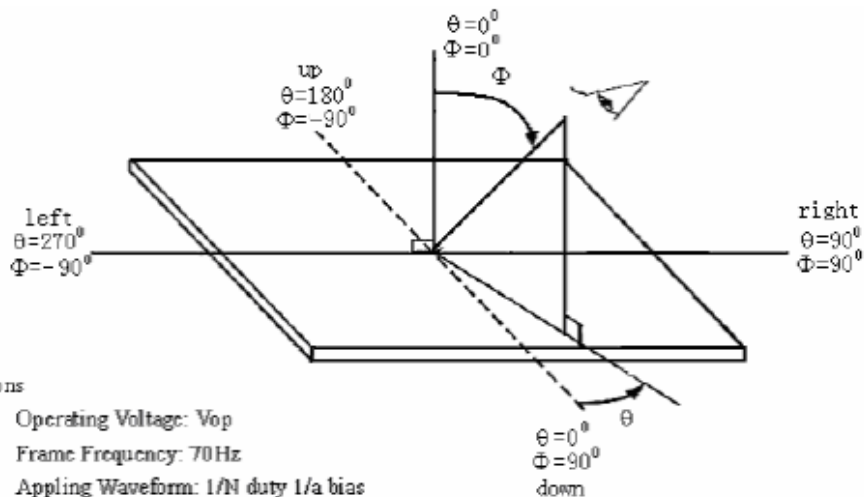
$Bp (\text{Max.}) =$ Maximum brightness in 9 measured spots

$Bp (\text{Min.}) =$ Minimum brightness in 9 measured spots.



Measurement equipment PR-705 (Φ10mm)

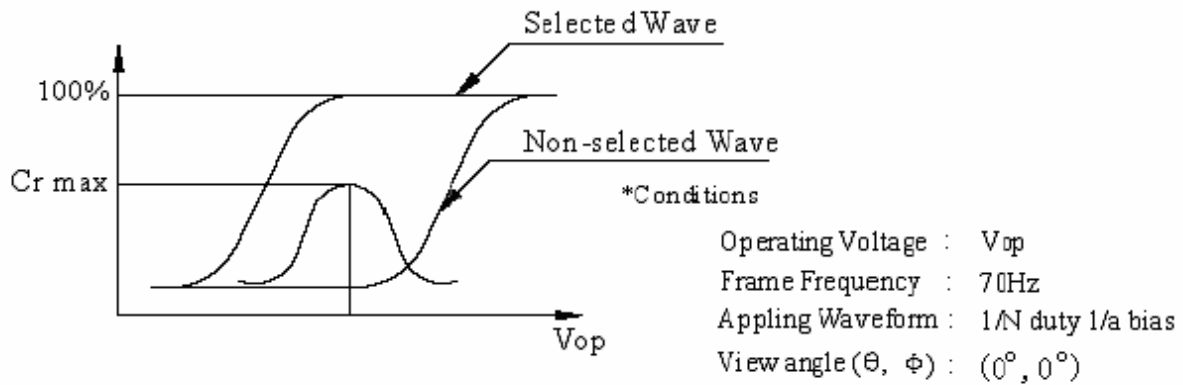
Note 3: Definition of Viewing Angle(Test LCD using DMS501)



*Conditions

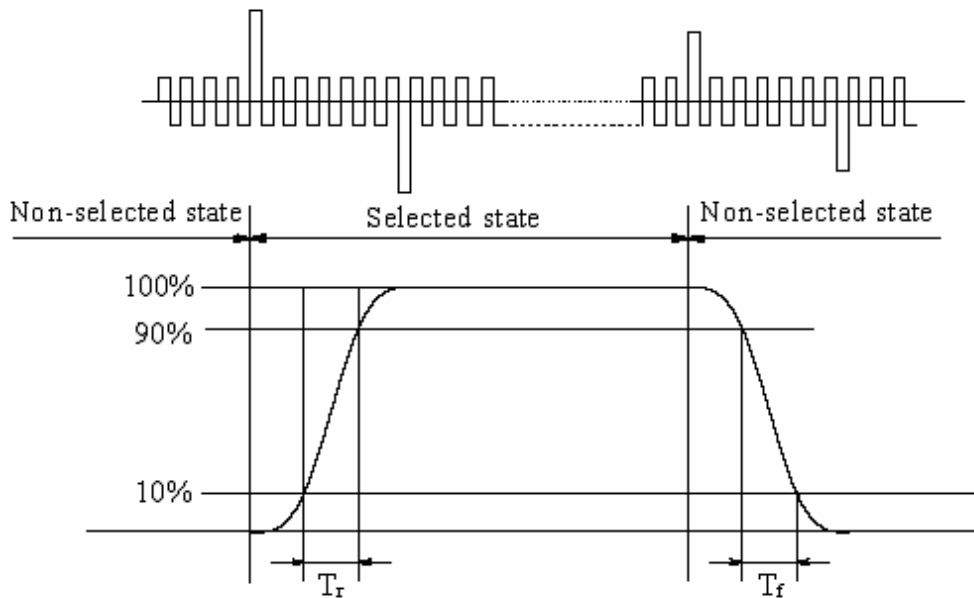
- Operating Voltage: Vop
- Frame Frequency: 70Hz
- Applying Waveform: 1/N duty 1/a bias
- Contrast ratio: ≥ 2

Note 4: Definition of contrast ratio.(Test LCD using DMS501)



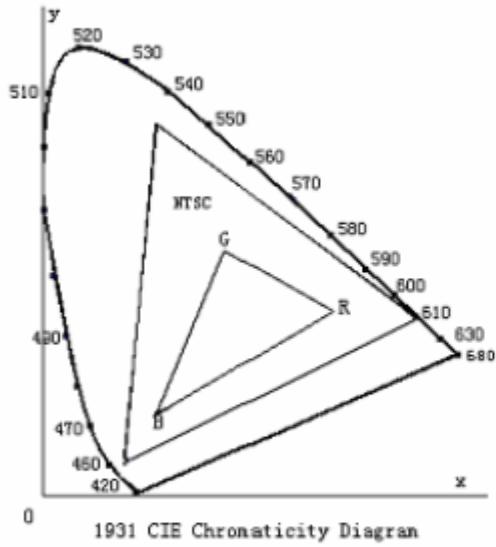
$$\text{Contrast ratio}(Cr) = \frac{\text{Brightness of selected dots}}{\text{Brightness of non-selected dots}}$$

Note 5: Definition of Response time(Test LCD using DMS501)



Operating Voltage: V_{op}
 Frame Frequency: 70Hz
 Applying Waveform: 1/N duty 1/a bias
 View angle (θ, φ): (0°, 0°)

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



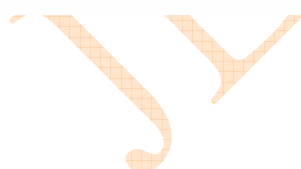
Color gamut:

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

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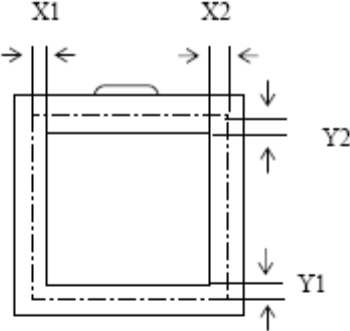
6. Reliability

No.	Test Item	Test condition	Criterion
1	High Temperature Storage	70 °C±2°C 96H Restore 4H at 25 °C	1. After testing, cosmetic defects should not happen. 2.Total current consumption should not be over 10% of initial value.
2	Low Temperature Storage	-20 °C±2°C 96H Restore 4H at 25 °C	
3	High Temperature Operation	60 °C±2°C 48H Restore 4H at 25 °C	
4	Low Temperature Operation	-10 °C±2°C 48H Restore 4H at 25 °C	
5	High Temperature /Humidity Storage	40°C±2°C 90%RH 48H	
6	Temperature Cycle	-20 °C ← 25 °C → 70 °C 5min 30min ← 25 °C , 5min after 10cycle, Restore 4H at 25 °C	
7	Vibration Test (package state)	10Hz~150Hz, 100m/s ² , 120min	Not allowed cosmetic and electrical defects.
8	Shock Test (package state)	Half- sine wave, 300m/s ² , 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


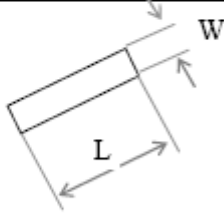
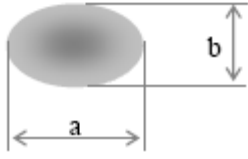
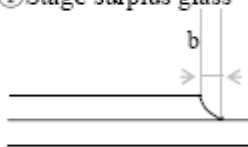
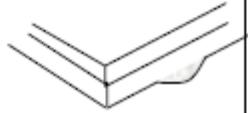


7. Quality Level

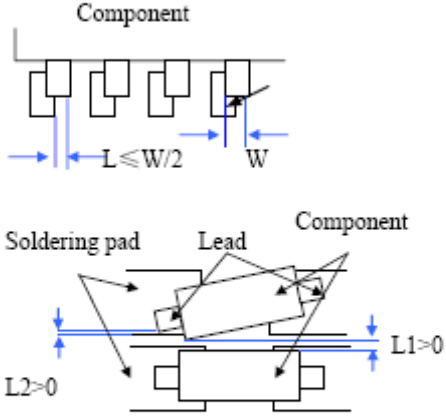
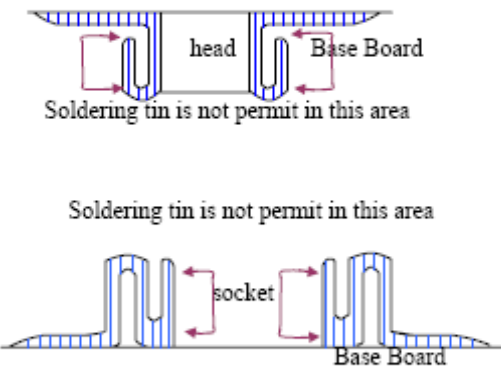
7.1. Notes For Quality Standard

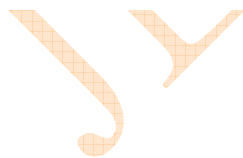
	Note	
General	1. Should any defects which are not specified in this standard happen, additional standard shall be determined by mutual agreement between customer and NICHE. 2. Viewing Area should be the area which NICHE guarantees. 3. Limited sample should be prior to this Inspection standard. 4. Viewing 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	 <p style="text-align: right;">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</p>	
Outgoing Inspection standard	Inspection level II 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

7.2. Standards of Inspection Items

Inspection item		Judgement standard					
		Category		Acceptable number			
				A zone	B zone		
1	Black spot, White spot Bright Spot, Pinhole Foreign Particle, Bubble and Particle Between polarizer and glass, Scratch on polarizer	 $\Phi=(a+b)/2(\text{mm})$	A	$\Phi \cong 0.15$	Neglecte	Neglected	
			B	$0.15 < \Phi \cong 0.20$	2		
		C		$0.20 < \Phi \cong 0.30$	1		
		D		$0.30 < \Phi$	0		
		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	$W \cong 0.03$	Neglected	Neglected	
			B	$0.03 < W \cong 0.05$ $L \cong 5.0$	2		
			C	$0.05 < W$	0		
			D				
		Total defective point(B,C)			2		
3	Contrast variation	 $\Phi=(a+b)/2(\text{mm})$	A	$\Phi \cong 0.2$	Neglected	Neglected	
			B	$0.2 < \Phi \cong 0.3$	2		
			C	$0.3 < \Phi \cong 0.4$	1		
			D	$0.4 < \Phi$	0		
		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. Bubble, dent and convex	Refer to item 1 and item 2.				
			A	$\Phi \cong 0.3$	Neglected	Neglected	
			B	$0.3 < \Phi \cong 0.7$	2		
			C	$0.7 < \Phi$	0		
		Total defective point(B,C)			2		
6	Surplus glass	①Stage surplus glass 	$b \cong 0.3\text{mm}$				
		②Surrounding surplus glass 	Should not influence outline dimension and assembling.				

Inspection item		Judgment standard		
		Category(application: B zone)		
7	Glass defect crack	①The front of lead terminals	A	If $a \cong t$ and $b \cong 1.0$, c is not limited
			B	$a \cong t$, $1 \cong b \cong 2\text{mm}$, $c \cong 3\text{mm}$
			C	If glass crack cover alignment mark, $b \cong 0.5\text{mm}$.
			D	Crack at two sides of lead terminals should not cover patterns and alignment mark
		②Surrounding crack—non-contact side seal	$b <$ Inner borderline of the seal	
		③ Surrounding crack— contact side	$b <$ Outer borderline of the seal	
		④Corner	A	$a \cong t$, $b \cong 3.0$, $c \cong 3.0$
			*Glass crack should not cover patterns used for	

Inspection item		Judgement standard	
8	PCB defect	<p>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)</p>	
		<p>lead defect: The lead lack must be less than 1/2 of its width; The lead burr must be less than 1/2 of the seam; Impurities connect with the near leads is not permitted</p>	
		<p>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</p>	



8.PRECAUTIONS FOR USING LCD MODULES

Handing Precautions

- (1) The display panel is made of glass and polarizer. As glass is fragile, it tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.
- (2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.
- (3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined to the polarizer).
- (4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.
- (5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents
 - Isopropyl alcohol
 - Ethyl alcoholDo not scrub hard to avoid damaging the display surface.
- (6) Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.
 - Water
 - Ketone
 - Aromatic solventsWipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contacting oil and fats.
- (7) Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.
- (8) Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.

- (9) Do not attempt to disassemble or process the LCD module.
- (10) NC terminal should be open. Do not connect anything.
- (11) If the logic circuit power is off, do not apply the input signals.
- (12) Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.
 - Do not alter, modify or change the shape of the tab on the metal frame.
 - Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
 - Do not damage or modify the pattern writing on the printed circuit board.
 - Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.
 - Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
 - Do not drop, bend or twist LCM.

Storage Precautions

When storing the LCD modules, the following precaution is necessary.

- (1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for the dessicant.
- (2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.
- (3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped).

Others

Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.

- Exposed area of the printed circuit board.
- Terminal electrode sections.

.ROHS COMPLIANT WARRANTY.

RoHs Hazardous substances including:

- Cd< 100 ppm
- Pb< 1000 ppm
- Hg< 1000 ppm
- Cr +6 < 1000 ppm
- PBDE < 1000 ppm
- PBB < 1000 ppm

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SAMPLE APPROVED REPORT
(样品确认单)

SAMPLE MODEL NO. (样品型号)	JH30240400B
SAMPLE SERIES NUMBER NO. (样品序号)	
SAMPLE QUANTITY (样品数量)	2PCS
COLOR/TYPE (底色/类型)	TFT/NEGATIVE
VIEWING DIRECTION (视角)	FULL VIEW
DRIVING METHOD (驱动参数)	-
LOGIC VOLTAGE (工作电压)	2.8V
LCD VOP (LCD 驱动电压)	-
OPERATING TEMP. (操作温度) °C	-10~60°C
STORAGE TEMP. (储存温度) °C	-20~70°C
POLARIZER---FRONT (首偏光片)	TRANSMISSIVE
POLARIZER---BACK (后偏光片)	
CONTROLLER/DRIVER IC(控制/驱动 IC)	S6D04D1 (COG)
BACKLIGHT COLOR/TYPE (背光源类型/颜色)	LED/WHITE
BACKLIGHT VOLTAGE (背光电压)	-
SPECIFICATION (规格书 份数)	1BATE
REMARKS: (备注)	
WRIT BY: _____ DATE: _____ APROV BY: _____ DATE: _____	
CUSTOMER'S APPROVAL (客户确认):	
1) FUNCTION (功能): <input type="checkbox"/> OK <input type="checkbox"/> N.G.	
2) DRIVER CONDITION (驱动条件): <input type="checkbox"/> OK <input type="checkbox"/> N.G.	
3) DISPLAY MODE (显示模式): <input type="checkbox"/> OK <input type="checkbox"/> N.G.	
4) VIEWING ANGLE (视角): <input type="checkbox"/> OK <input type="checkbox"/> N.G.	
5) BACKLIGHT (背光源): <input type="checkbox"/> OK <input type="checkbox"/> N.G.	
6) DISPLAYING PATTERN (显示效果): <input type="checkbox"/> OK <input type="checkbox"/> N.G.	
CUSTOMER'S CONCLUSIONS (客户意见): _____	

CUSTOMER'S SIGNATURE (客户签名): _____ DATE (日期): _____	