

SPECIFICATIONS FOR LCD MODULE

Module No. JH32240400B

E-mail: sales@jhlcd.com Website: www.jhlcd.com

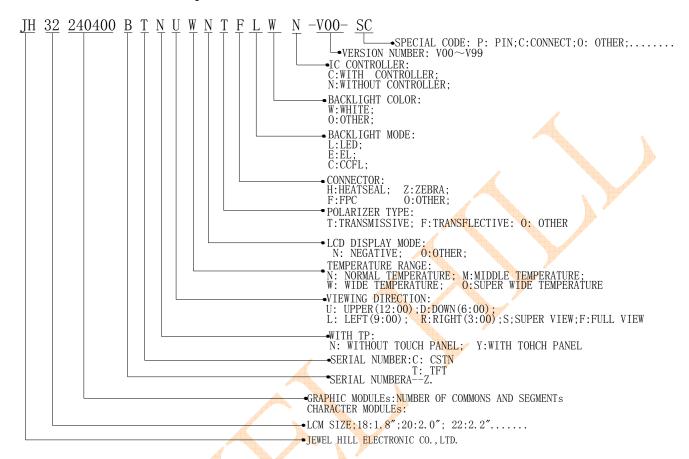
JH32240400B VER: 0.1 - 0 - Issue date: 2013/08/01

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LCM Number System



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1. GENERAL DESCRIPTION.

The JH32240400B model is a Color TFT LCD .This main Module has a **3.2** inch diagonally measured active display area with 240(RGB)×400 resolution. Each pixel is divided into Red, Green and Blue sub-pixels and dots which are arranged in vertical stripes.

The LCD color is determined with 262,000 colors signal for each pixel.

The JH32240400B has been designed to apply the interface method that enables low power, high speed, and high contrast.

The JH32240400B is intended to support applications where thin thickness, wide viewing angle and low power are critical factors and graphic displays are important.

2. GENERAL FEATURES

Item	Display Panel	Remark
Display Mode	Normally White, Transmissive LCD	
Viewing Direction	12 O'CLOCK	
Input Signals	8 Bits	
Outside Dimensions	47.66mm(W)*80.9mm(H)*2.35mm(T)	
Effective Area	-	
Active Area	41.76mm(W)×69.6mm(H)	
Number of Pixels	240xRGBx400Pixels	
Pixel Pitch	0.153mm(H) x0.153mm(W)	
Pixel Arrangement	RGB Vertical stripes	
Drive IC	ILI9327	

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3.ABSOLUTE MAXIMUM RATINGS.

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

ITEM	Symbol	Min.	Тур.	Max.	Unit	Remark
Power for Circuit Driving	VDD	-0.3	-	3.3	V	
Power for Circuit Logic	VCI	-0.3	ı	4.6	V	
LC Operating Voltage *1)	Vop		-		V	
LED Forward Voltage	V_{f}	3.0	3.2	3.4	V	per LED
LED Forward Current	lr	-	90	-	mA	per LED
LED Luminance	B_P	3200	-	-	cd/m ²	
Storage Humidity	H _{ST}	10		90	%RH	
Storage Temperature	T _{ST}	-30	-	80	$^{\circ}$ C	At
Operating Ambient Humidity	H _{OP}	10		90	%RH	25±5 ℃
Operating Ambient temperature	T_OP	-20		70	$^{\circ}$	

Note:

- *1) Liquid Crystal driving voltage.

 Due to the characteristics of LC Material, this voltage vary with environmental temperature.
- *2) Temp. >60℃, Absolute humidity shall be less than 90%RH at 60℃
- *3) Temp. ≤60°C, 90%RH MAX.



4.ELECTRICAL SPECIFICATION.

MAIN WINDOW DISPLAY

(Unless specified, the ambient temperature Ta=25℃)

Prop	Sym.	Min	Тур.	Max	Unit	Note	
Power for Circuit Driving		VDD	1.65	2.8	3.3	V	Note
Power for	VCI	2.7	2.8	3.3	V	Note	
BLU Dri	BLU Driving Logic		-	-	-	V	4
Logic Input	Low Voltage	VIL	0	-	0.2VDD	V	
Voltage	High Voltage	VIH	0.8VDD	ı	V DD	V	
Logic Output	Low Voltage	VOL	0	-	0.1VDD	V	
Voltage	High Voltage	VOH	0.9VDD	-	VDD	V	
D	White	P_{w}	T.B.D	T.B.D	T.B.D	mW	
Power	Black	P _b	T.B.D	T.B.D	T.B.D	mW	
Consumption	Vertical Stripe	P _v	T.B.D	T.B.D	T.B.D	mW	

Note:

The recommended operating conditions refer to a range in which operation of this product is guaranteed. Should this range is exceeded, the operation cannot be guaranteed even if the values may be without the absolute maximum ratings.

Accordingly, please make sure that the module is used within this range. And these current values are measured under the condition that all devices are stopped, each component is stable and logic signal is input.

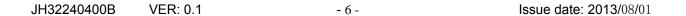
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5.OPTICAL SPECIFICATION.

Item		Cumbal	Conditions	Spe	cificatio	ns	Linit	Note	
		Symbol	Conditions	Min.	Тур.	Max.	Unit	Note	
Transmittance		Т%			4.7		%		
Contrast Ratio		CR		150	250	-	-		
Response Time		T _R		-	10	20	ms		
Response Time		T _F		-	20	30	ms	All left side data	
Chromaticity	Red	X_R		0.604	0.634	0.664	-	All left side data are based on	
	Red	Y_R	Viewing normal angle $\theta_X = \theta_Y = 0^\circ$	0.296	0.326	0.356	-	CMO's following	
	Green	X_{G}		0.260	0.290	0.320	-	condition	
		Y_G		0.551	0.581	0.611	-	NTSC: 60%	
	Blue	X _B		0.102	0.132	0.162	-	Light : C light	
		Y _B		0.096	0.126	0.156	-	(Machine:BM5A)	
	White	X_W		0.262	0.292	0.322	-	Normal Polarizer	
	vvnite	Y_W		0.306	0.336	0.366	-	Reference Only	
Viewing Angle	Hor.	θ_{X^+}		-	45	-			
	HOI.	θ_{X-}	Center	-	45	-	doa		
	Ver.	θ_{Y^+}	CR≥10		35	-	deg.		
	ver.	θ_{Y-}		-	15	-			

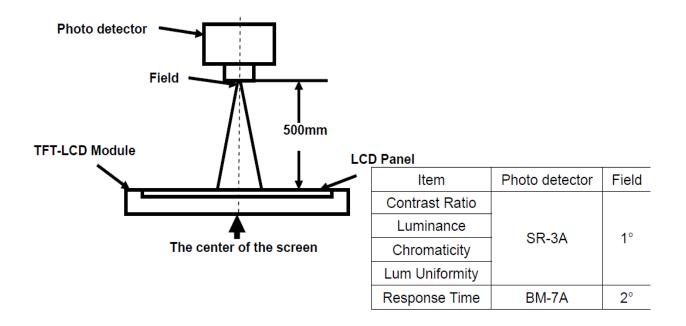
^{*}Note (1) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

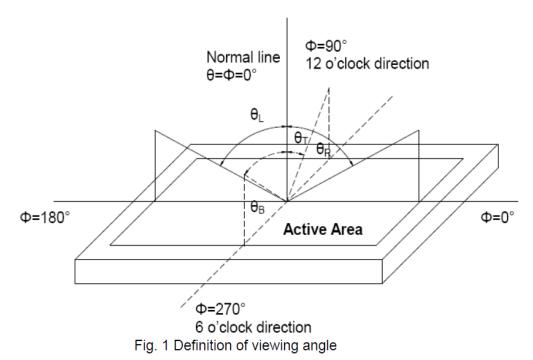


Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Note 2: Definition of viewing angle range and measurement system. viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).



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Note 3: Definition of contrast ratio

Contrast ratio (CR) = Luminance measured when LCD is on the "White" state

Luminance measured when LCD is on the "Black" state

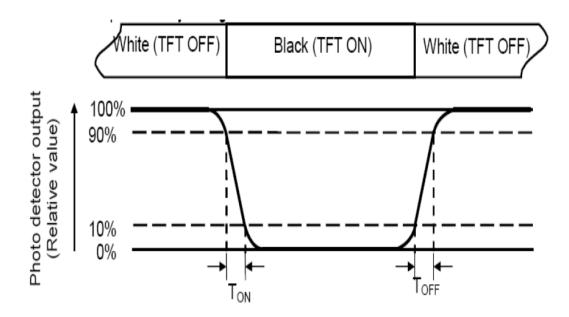
"White state ":The state is that the LCD should driven by Vwhite.

"Black state": The state is that the LCD should driven by Vblack.

Vwhite: To be determined Vblack: To be determined.

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) is the time between photo detector output intensity changed from 10% to 90%.



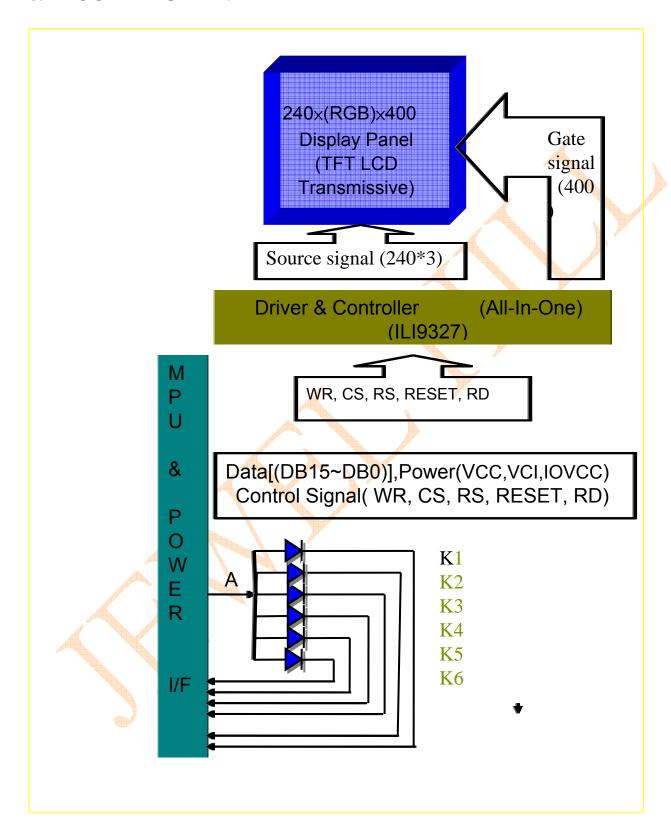
Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

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6. BLOCK DIAGRAM.





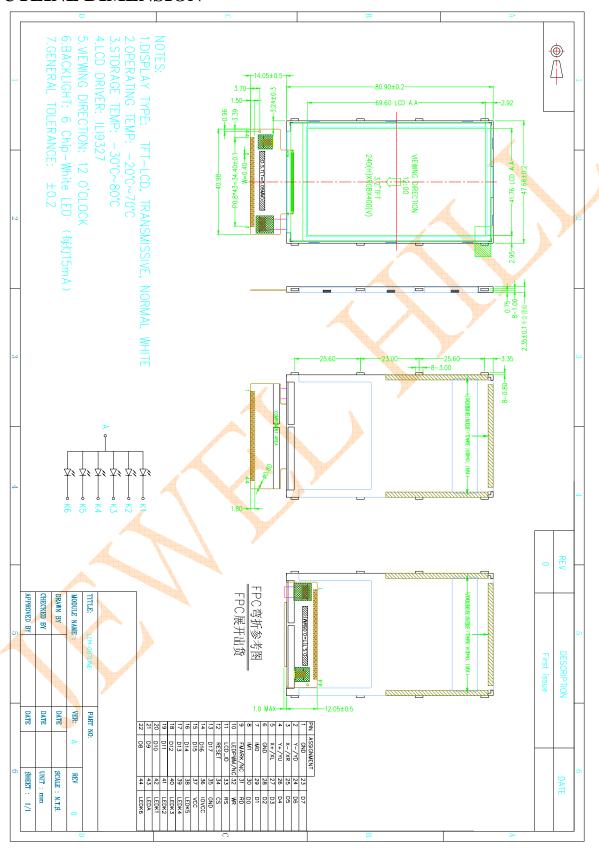
7.INTERFACE DESCRIPTION

Pin NO.	Symbol	Description
1	GND	GND
2	YD	Touch panel down side (NC)
3	XR	Touch panel Right side(NC)
4	YU	Touch panel Up side(NC)
5	XL	Touch panel Left side(NC)
6	GND	GND
7	IM0	The MPU system interface mode select pin 0
8	IM1	The MPU system interface mode select pin1
9	FMARK	Output a frame head pulse signal
10	LEDPWM	NC
11	ID	NC
12	/REST	System Reset Pin
13~20	DB17~DB10	Data Bus
31	/RD	Read execution control pin
32	/WR	Write execution input pin
33	/RS(DC)	Data/Command/Write select pin
34	/CS	Chip Select pin
35	GND	GND
36	IOVCC	The power supply (1.8V-2.8V)
37	VCC	Power supply
38	LED-K1	LED Negative
39	LED-K2	LED Negative
40	LED-K3	LED Negative
41	LED-K4	LED Negative
42	LED-K5	LED Negative
43	LEDA	LED positive
44	LED-K6	LED Negative

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8.OUTLINE DIMENSION

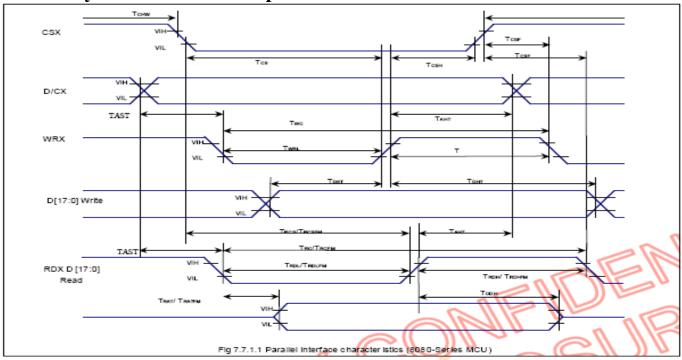


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9.TIMING CHARACTERISTICS.

9.1. 80-System bus interface operation.



9.2. Timing Characteristics.

Normal Write Mode, IOVcc=1.65V~3.3V,Vcc=2.5V~3.3V

,	Annua / Vinto	100100			
Parameter	Symbol	Unit	Min.	Max.	Uni t
Bus cycle time write	tcycw	ns	125	-	-
Bus cycle time read	tcycr	ns	450	-	-
Write low-level pulse width	PWLW	ns	45	-	-
Read low-level pulse width	PWLR	ns	170	ı	=
Write high-level pulse width	PWHW	ns	70	-	-
Read high-level pulse width	PWHR	ns	250	-	-
Write/Read rise/fall time	t WR, W Rf	ns	-	-	25
Setup time Write	tas	ns	0	-	-
Setup time Read	tas	ns	10	-	-
Address hold time	tah	ns	2	-	-
Write data setup time	tosw	ns	25	-	-
Write data hold time	tн	ns	10	-	-
Read data delay time	t ddr	ns	-	-	150
Read data hold time	tdhr	ns	5	-	-

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9.3. Reset Operation.

Table 13-6

Item	Symbol	Unit	Min.	Тур.	Max.
Reset low-level width	tRES	ms	1	_	_
Reset rise time	trRES	μs	_	_	10

10.RELIABILITY AND INSPECTION STANDARD.

No.	Test Iten	n	Test Conditions	Remark
4	High Tayon and wa	Storage	80℃, 120Hr	Note
1	High Temperature	Operation	70℃, 120Hr	Note
2	Low Tomporoture	Storage	-30℃, 120Hr	Note
2	Low Temperature	Operation	-20℃, 120Hr	Note
3	High Temperature Humidity	J	60℃, 90%RH, 120Hr	Note
4	Tomporaturo Cyclo	Storage	-10℃(1Hr)→25℃(5min)→60℃(1Hr) 32 Cycles	Note
4	Temperature Cycle	Operation	-20°C(1Hr)→25°C(5min)→60°C(1Hr) 25 Cycles	Note
5	Peeling Off (Sto	orage)	≥500gf/cm	Note
6	FPC Bending	Test	≧6,000 times, 2/sec	Note
7	Vibration Test(S	torage)	50HZ, 30min, Amplitude: 2 cm, X/Y/Z directions	Note
8	Drop Tes		60cm/ 3Corner/ 8Face, 1Cycle	Note

Note:

- 1) The test samples should be applied to only one test item.
- 2) Sample size for each test item is 5~10pcs.
- 3) For Damp Proof Test, pure water(Resistance>1M Ω) should be used.
- 4) In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.
- 5) EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and fluorescence EL has.
- 6) After the reliability test, the test samples should be inspected after 2 hours at least.
- 7) Functional test is OK. Missing segment, shorts, unclear segment, non display, display abnormally, liquid crystal leak are not allowed.
- 8) After testing, the current Idd should be within initial value ±20%.

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9) No low temperature bubbles ,end seal loose and fall, frame rainbow, ACF bubble growing are allowable in the appearance test.

11.INSPECTION CRITERION.

11.1. Sampling Method.

Unless otherwise agreed upon in writing, the sampling inspection shall be applied to the Customer's incoming inspection.

- 1) Lot size: Quantity per shipment lot
- 2) Sampling type: Normal inspection, single sampling
- 3) Inspection level: Π
- 4) Sampling table: MIL-STD-105D
- 5) Acceptable Quality Level(AQL): Major=0.65 Minor=1.5

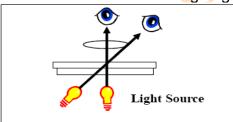
11.2. Inspection Method.

- 1) Ambient Condition:
 - a. Temperature: Room temperature 25±5℃
 - b. Illumination: Single fluorescent lamp non-directive (300 to 700 Lux)
- 2) Viewing distance

The distance between the LCD and the inspector's eyes shall be at least 30-50cm.

3) Viewing Angle

The inspection shall be conducted within normal viewing angle range.



11.3. Inspection Criteria.

11.3.1 Major defect

No.	Item	Inspection Standard	Classification of defects
1	All functional defects	 No display Display abnormally Open or missing segment Short circuit Excess power consumption Backlight no lighting, flickering and abnormal lighting 	Major
2	Missing	Missing component	Major
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	Major

11.3.2. Cosmetic Defect.

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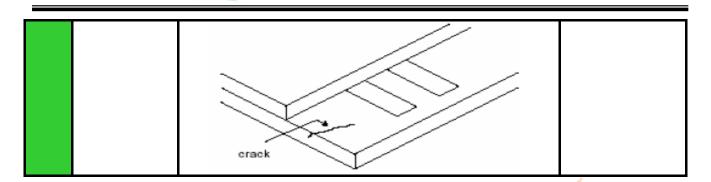
No.	Item	Inspection	Classification of defects	
		For dark/white spot, size Φ is defined as Φ=(x+y)/2	y ×	
	(spot defect)			
1	Black and	Size Φ (mm)	Acceptable Quantity	Minor
'	White spot	Ф≤0.1	Ignore	IVIIIIOI
	pinhole	0.10≤Φ≤0.15	2	
		0.15≤Φ≤0.2	1	
		0.2<Ф	0	
2	(line defect) Black and White line Polarizer scratch	Define: Width W Length L Width(mm) Length(mm); Acceptable Qty $\Phi \le 0.03$ Ignore $0.03 < W \le 0.05$ L\le 3.0; N\le 2		Minor
		0.05 <w≤0.1< td=""><td>L≤2.0; N≤2</td><td></td></w≤0.1<>	L≤2.0; N≤2	
		0.1 <w< td=""><td>Define as spot defect</td><td></td></w<>	Define as spot defect	
		Dent or bubble(between the polarizer and glass)		
		Size Φ(mm)	Acceptable Qty	
3	Polarizer	Ф≤0.10	Ignor	Minor
	defect	0.10<Φ≤0.20	2	
		0.20<Φ≤0.30	1	
		0.30<Ф	0	

11.3.3.Cosmetic Defect.

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No.	Item	Inspection Standard			Classification of defects
		1) Chip on the co	rner Y ≤S	Z ≤T	Minor
1	Glass defect	Remark: S=contact pad length; T=the thickness of glass Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal. Acceptable Quantity N≤2.			
		2) Chip on the edge of glass			Minor
		Ignore Acceptable Quar	Y ≤0.5 ntity: N≤2	Z ≤T	
		3) Creak	break are not a	llowed.	Minor

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12.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 alcohol

Do 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.

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- Water
- Ketone
- Aromatic solvents
 Wipe 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).

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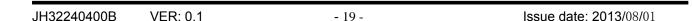
Others.

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.





13. REVISION HISTORY.

Version	Revise record	Date
00	Original version	12-04-24
0.1	Original version	13-08-01
		<u> </u>
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SAMPLE APPROVED REPORT

(样品确认单)

SAMPLE MODEL NO. (样品型号)	JH32240400B			
SAMPLE SERIES NUMBER NO. (样品序号)				
SAMPLE QUANTITY (样品数量)	-			
COLOR/TYPE (底色/类型)	TFT/NEGATIVE			
VIEWING DIRECTION (视角)	12:00			
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) ℃	-20~70°C			
STORAGE TEMP. (储存温度) ℃	-30~80℃			
POLARIZERFRONT (首偏光片)	TRANSMISSIVE			
POLARIZERBACK (后偏光片)				
CONTROLLER/DRIVER IC(控制/驱动 IC)	ILI9327 (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): □ OK □ N.G.				
2) DRIVER CONDITION (驱动条件): □ OK □	N.G.			
3) DISPLAY MODE (显示模式): □ OK □ N.G.				
4) VIEWING ANGLE (视角): □ OK	□ N.G.			
5) BACKLIGHT (背光源): □ OK □ N.G.				
6) DISPLAYING PATTERN (显示效果): □ OK □ N.G.				
CUSTOMER'S CONCLUSIONS (客户意见):				
CUSTOMER'S SIGNATURE(客户签名): DATE (日期):				