



HTM240120B-31W-N3S-V01

产品名称 (Product name) : 黑白点阵 LCM
型 号 (Model) : HTM240120B-31W-N3S-V01
接 口 (Interface) : 3-wire SPI
日 期 (Date) : 2024-02-26

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序号:

深圳市鑫洪泰电子科技有限公司 Shenzhen Hot Display Technology Co.,Ltd		
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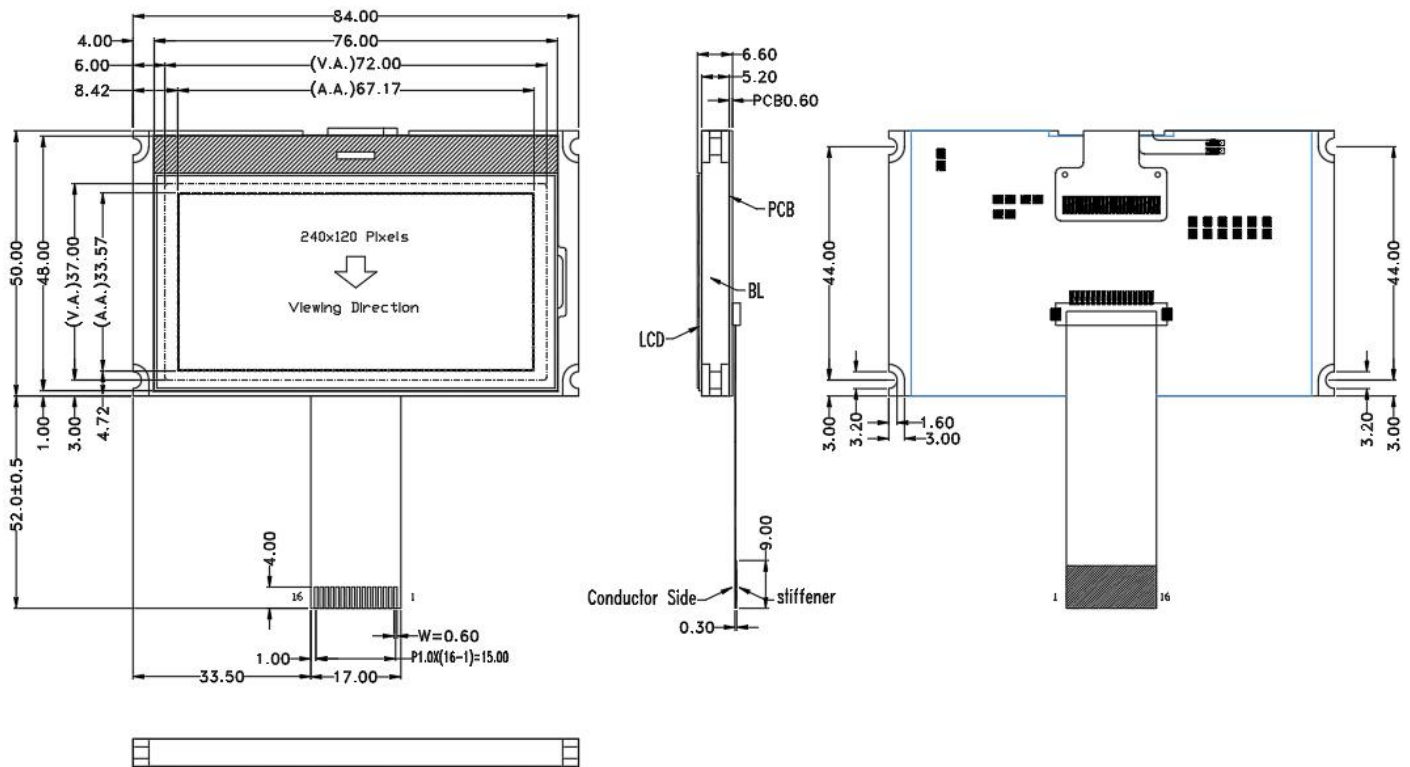
1. Basic Specifications

1.1 Display Specifications

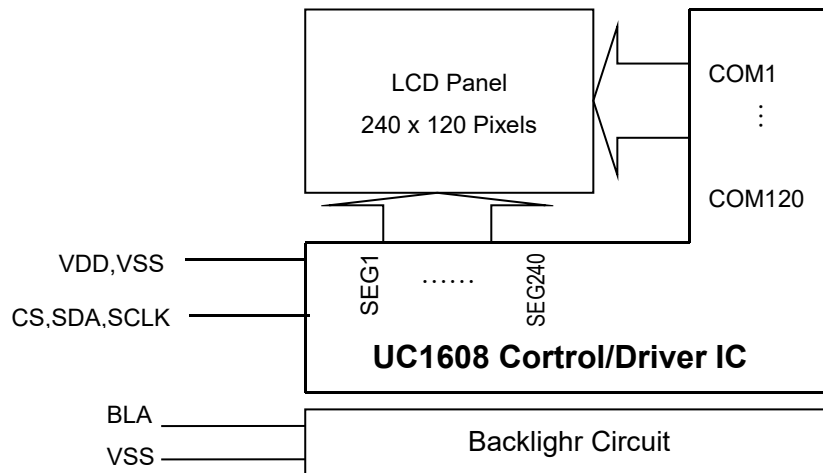
- 1>LCD Display Mode : FSTN, Positive, Transflective
- 2>Viewing Angle : 12H
- 3>Driving Method : 1/128 Duty, 1/10Bias
- 4>Backlight : White LED (5PCS)

1.2 Mechanical Specifications

- 1>Outline Dimension : 84.0x 50.0x 6.6mm (See attached Outline Drawing for Details)

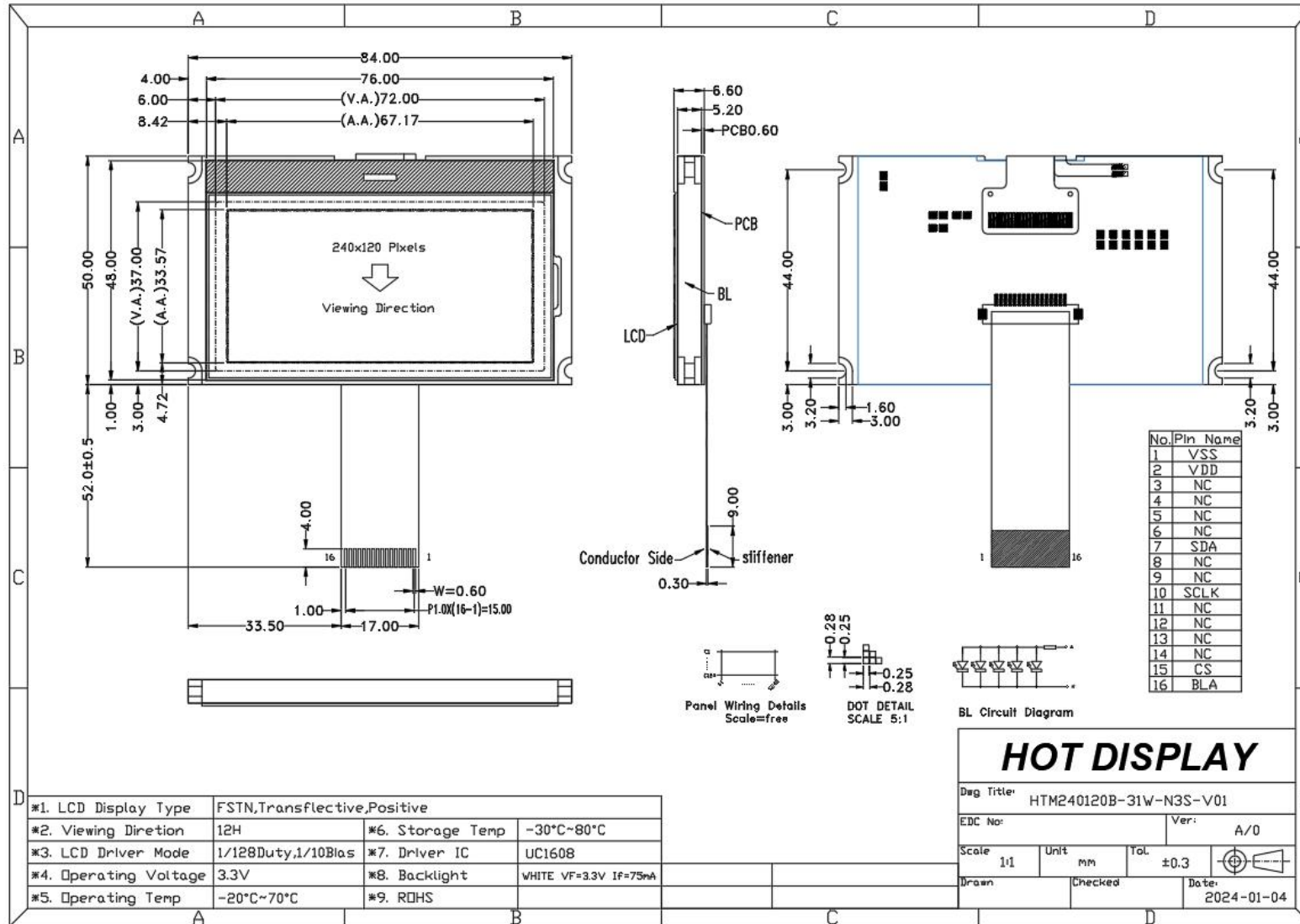


1.3 Circuit Diagram



1.4 Terminal Function

Pin No.	Pin Name	Function
1	VSS	Power Supply, (VSS/0V)
2	VDD	Positive Power Supply(3.3V)
3	NC	
4	NC	
5	NC	
6	NC	
7	SDA	Serial Data Input
8	NC	
9	NC	
10	SCLK	Serial Clock Input
11	NC	
12	NC	
13	NC	
14	NC	
15	CS	Chip Select
16	BLA	Backlight Power Supply +(3.3V)

1.5 Product Outline


2. Absolute Maximum Ratings

Items	Symbol	MIN.	MAX.	Unit	Condition
Supply Voltage	V _{DD}	-0.3	+3.6	V	V _{SS} = 0V
	V _{DD2}	-0.3	+3.6	V	V _{SS} = 0V
Input Voltage	V _{IN}	-0.3	V _{DD} +0.3	V	V _{SS} = 0V
Operating Temperature	T _{OP}	-20	+70	°C	No Condensation
Storage Temperature	T _{st}	-30	+80	°C	No Condensation

3. Electrical Characteristics

3.1 DC Characteristics

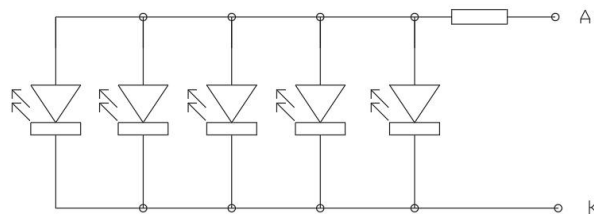
(V_{SS} = 0V, V_{DD} = 2.4 to 3.6V, T_a = -40~85°C)

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Operating Voltage(1)	V _{DD}	3.0	-	3.3	V	-
Driver Voltage	V _{LCD}	-0.3	-	19.0	V	-
Input High Voltage	V _{IH}	0.8 x V _{DD}	-	V _{DD}	V	SDA,SCLK,CS
Input Low Voltage	V _{IL}	V _{SS}	-	0.2 x V _{DD}	V	
Output High Voltage	V _{OH}	0.8 x V _{DD}	-	V _{DD}	V	I _{OH} = -0.5mA
Output Low Voltage	V _{OL}	V _{SS}	-	0.2 x V _{DD}	V	I _{OL} = 0.5mA
Input Leakage Current	I _{LI}	-	-	1.5	μA	V _{IN} = V _{DD} or V _{SS}

3.2 LED Backlight Circuit

V_{SS} = 0V, T_{OP} = 25°C

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Forward Voltage	V _f BLA	-	3.3	-	V	A=3.1V
Forward Current	I _f BLA	-	75	90	mA	-



3.3 AC Characteristics
3-wire Serial Interface

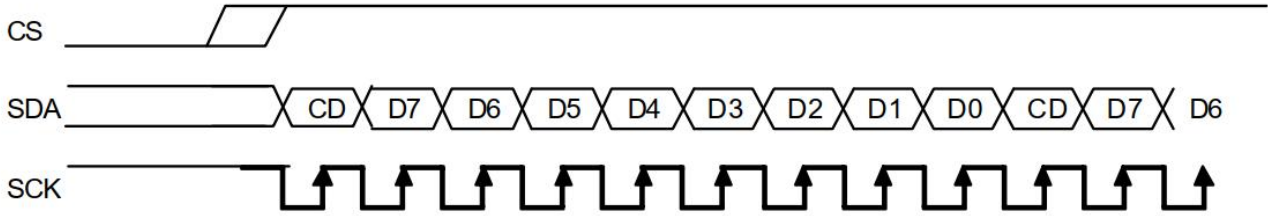


FIGURE 4.c: 3-wire Serial Interface (S9)

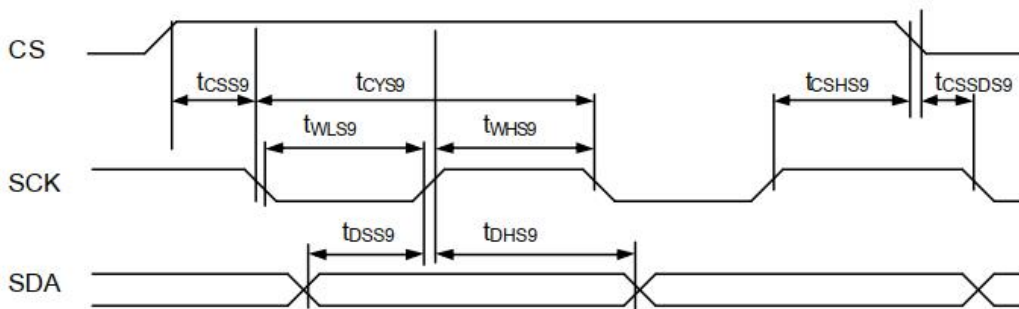


FIGURE 18: Serial Bus Timing Characteristics (for S9)

($2.7V \leq V_{DD} < 3.3V$, $T_a = -30$ to $+85^\circ C$)

Symbol	Signal	Description	Condition	Min.	Max.	Units
t_{cYS9}	SCK	System cycle time		140	–	nS
t_{LPWS9}		Low pulse width		65	–	nS
t_{HPWS9}		High pulse width		65	–	nS
t_{DSS9}	SDA	Data setup time		30	–	nS
t_{DHS9}		Data hold time		20	–	nS
t_{cSSAS9} t_{cSSDS9} t_{cSHS9}	CS	Chip select setup time		10 20 10		nS

3.3 Resret Timing

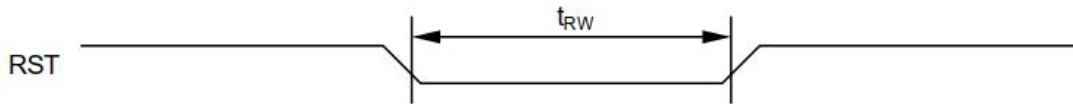


FIGURE 19: Reset Characteristics

($2.7V \leq V_{DD} < 3.3V$, $T_a = -30$ to $+85^\circ C$)

Symbol	Signal	Description	Condition	Min.	Max.	Units
t_{RW}	RST	Reset low pulse width		1000	–	nS

4. Function specifications

4.1 Display data format

MSF		Line																
0	1	Address																
D0	D7	00H																
D1	D6	01H																
D2	D5	02H																
D3	D4	03H																
D4	D3	04H																
D5	D2	05H																
D6	D1	06H																
D7	D0	07H																
D0	D7	08H																
D1	D6	09H																
D2	D5	0AH																
D3	D4	0BH																
D4	D3	0CH																
D5	D2	0DH																
D6	D1	0EH																
D7	D0	0FH																
D0	D7	10H																
D1	D6	11H																
D2	D5	12H																
D3	D4	13H																
D4	D3	14H																
D5	D2	15H																
D6	D1	16H																
D7	D0	17H																
D0	D7	18H																
D1	D6	19H																
D2	D5	1AH																
D3	D4	1BH																
D4	D3	1CH																
D5	D2	1DH																
D6	D1	1EH																
D7	D0	1FH																
D0	D7	70H																
D1	D6	71H																
D2	D5	72H																
D3	D4	73H																
D4	D3	74H																
D5	D2	75H																
D6	D1	76H																
D7	D0	77H																
D0	D7	78H																
D1	D6	79H																
D2	D5	7AH																
D3	D4	7BH																
D4	D3	7CH																
D5	D2	7DH																
D6	D1	7EH																
D7	D0	7FH																

MY-0		MY-1					
SL-0	SL-16	SL-0	SL-0	SL-16	SL-16		
COM1	COM113	COM126	COM96	COM18	---		
COM2	COM114	COM127	COM95	COM15	---		
COM3	COM115	COM126	COM94	COM14	---		
COM4	COM116	COM125	COM93	COM13	---		
COM5	COM117	COM124	COM92	COM12	---		
COM6	COM118	COM123	COM91	COM11	---		
COM7	COM119	COM122	COM90	COM10	---		
COM8	COM120	COM121	COM89	COM9	---		
COM9	COM121	COM120	COM88	COM8	---		
COM10	COM122	COM119	COM87	COM7	---		
COM11	COM123	COM118	COM86	COM6	---		
COM12	COM124	COM117	COM85	COM5	---		
COM13	COM125	COM116	COM84	COM4	---		
COM14	COM126	COM115	COM83	COM3	---		
COM15	COM127	COM114	COM82	COM2	---		
COM16	COM128	COM113	COM81	COM1	---		
COM17	COM1	COM112	COM80	COM128	---		
COM18	COM2	COM111	COM79	COM127	---		
COM19	COM3	COM110	COM78	COM126	---		
COM20	COM4	COM109	COM77	COM125	---		
COM21	COM5	COM108	COM76	COM124	---		
COM22	COM6	COM107	COM75	COM123	---		
COM23	COM7	COM106	COM74	COM122	---		
COM24	COM8	COM105	COM73	COM121	---		
COM25	COM9	COM104	COM72	COM120	COM98		
COM26	COM10	COM103	COM71	COM119	COM95		
COM27	COM11	COM102	COM70	COM118	COM94		
COM28	COM12	COM101	COM69	COM117	COM93		
COM29	COM13	COM100	COM68	COM116	COM92		
COM30	COM14	COM99	COM67	COM115	COM91		
COM31	COM15	COM98	COM66	COM114	COM90		
COM32	COM16	COM97	COM65	COM113	COM89		
COM113	COM97	COM18	---	COM32	---		
COM114	COM98	COM15	---	COM31	---		
COM115	COM99	COM14	---	COM30	---		
COM116	COM100	COM13	---	COM29	---		
COM117	COM101	COM12	---	COM28	---		
COM118	COM102	COM11	---	COM27	---		
COM119	COM103	COM10	---	COM26	---		
COM120	COM104	COM9	---	COM25	---		
COM121	COM105	COM8	---	COM24	---		
COM122	COM106	COM7	---	COM23	---		
COM123	COM107	COM6	---	COM22	---		
COM124	COM108	COM5	---	COM21	---		
COM125	COM109	COM4	---	COM20	---		
COM126	COM110	COM3	---	COM19	---		
COM127	COM111	COM2	---	COM18	---		
COM128	COM112	COM1	---	COM17	---		

128	96	128	96
MUX			

MX																				
0	1																			
SEG1	SEG2	SEG3	SEG4	SEG5	SEG6	SEG7	SEG8									SEG206	SEG207	SEG208	SEG209	SEG210
SEG240	SEG239	SEG238	SEG237	SEG236	SEG235	SEG234	SEG233									SEG5	SEG4	SEG3	SEG2	SEG1

Example for memory mapping: let MX = 0, MY = 0, SL = 0, MSF = 0, according to the data shown in the above table:

- ⇒ Page 0 SEG 1: 00011110b
- ⇒ Page 0 SEG 2: 01111000b

4.2 Commands Table

COMMAND TABLE

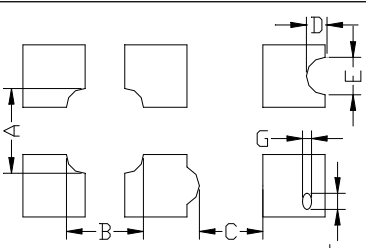
The following is a list of host commands supported by UC1608

C/D: 0: Control, 1: Data
 W/R: 0: Write Cycle, 1: Read Cycle
 # Useful Data bits
 – Don't Care

	Command	C/D	W/R	D7	D6	D5	D4	D3	D2	D1	D0	Action	Default
1	Write Data Byte	1	0	#	#	#	#	#	#	#	#	Write 1 byte	N/A
2	Read Data Byte	1	1	#	#	#	#	#	#	#	#	Read 1 byte	N/A
3	Get Status	0	1	BZ	MX	DE	RS	WA	GN1	GN0	1	Get Status	N/A
4	Set Column Address LSB	0	0	0	0	0	0	#	#	#	#	Set CA[3:0]	0
	Set Column Address MSB	0	0	0	0	0	1	#	#	#	#	Set CA[7:4]	0
5	Set Mux Rate and temperature compensation.	0	0	0	0	1	0	0	#	#	#	Set {MR, TC[1:0]}	MR: 1b TC: 00b
6	Set Power Control	0	0	0	0	1	0	1	#	#	#	Set PC[2:0]	101b
7	Set Adv. Program Control. (double byte command)	0	0	0	0	1	1	0	0	0	R	For UltraChip only. Do not use.	N/A
		0	0	#	#	#	#	#	#	#	#		
8	Set Start Line	0	0	0	1	#	#	#	#	#	#	Set SL[5:0]	0
9	Set Gain and Potentiometer (double-byte command)	0	0	1	0	0	0	0	0	0	1	Set {GN[1:0], PM[5:0]}	GN=3 PM=0
		0	0	#	#	#	#	#	#	#	#		
10	Set RAM Address Control	0	0	1	0	0	0	1	#	#	#	Set AC[2:0]	001b
11	Set All-Pixel-ON	0	0	1	0	1	0	0	1	0	#	Set DC[1]	0=disable
12	Set Inverse Display	0	0	1	0	1	0	0	1	1	#	Set DC[0]	0=disable
13	Set Display Enable	0	0	1	0	1	0	1	1	1	#	Set DC[2]	0=disable
14	Set Fixed Lines	0	0	1	0	0	1	#	#	#	#	Set FL[3:0]	0
15	Set Page Address	0	0	1	0	1	1	#	#	#	#	Set PA[3:0]	0
16	Set LCD Mapping Control	0	0	1	1	0	0	#	#	#	#	Set LC[3:0]	0
17	System Reset	0	0	1	1	1	0	0	0	1	0	System Reset	N/A
18	NOP	0	0	1	1	1	0	0	0	1	1	No operation	N/A
19	Set LCD Bias Ratio	0	0	1	1	1	0	1	0	#	#	Set BR[1:0]	10b=12
20	Reset Cursor Mode	0	0	1	1	1	0	1	1	1	0	AC[3]=0, CA=CR	N/A
21	Set Cursor Mode	0	0	1	1	1	0	1	1	1	1	AC[3]=1, CR=CA	N/A
22	Set Test Control (double byte command)	0	0	1	1	1	0	0	1	TT		For UltraChip only. Do not use.	N/A
		0	0	#	#	#	#	#	#	#	#		

* Other than commands listed above, all other bit patterns may result in undefined behavior.

5. Inspection Standards

Item	Criterion for defects	Defect type
1) Display on inspection	(1) Non display (2) Vertical line is deficient (3) Horizontal line is deficient (4) Cross line is deficient	Major
2) Black / White spot	Size Φ (mm) $\Phi \leq 0.3$ Acceptable number $0.3 < \Phi \leq 0.45$ Ignore (note) $0.45 < \Phi \leq 0.6$ 3 $0.6 < \Phi$ 1 0	Minor
3) Black / White line	Length (mm) Width (mm) Acceptable number $L \leq 10$ $W \leq 0.03$ Ignore $5.0 \leq L \leq 10$ $0.03 < W \leq 0.04$ 3 $5.0 \leq L \leq 10$ $0.04 < W \leq 0.05$ 2 $1.0 \leq L \leq 10$ $0.05 < W \leq 0.06$ 2 $1.0 \leq L \leq 10$ $0.06 < W \leq 0.08$ 1 $L \leq 10$ $0.08 < W$ follows 2) point defect Defects separate with each other at an interval of more than 20mm	Minor
4) Display pattern	 $\frac{A+B}{2} \leq 0.28$ $0 < C$ $\frac{D+E}{2} \leq 0.25$ $\frac{F+G}{2} \leq 0.25$	Minor
5) Spot-like contrast irregularity	Size Φ (mm) Acceptable Number $\Phi \leq 0.7$ Ignore (note) $0.7 < \Phi \leq 1.0$ 3 $1.0 < \Phi \leq 1.5$ 1 $1.5 < \Phi$ 0 Note: 1) Conformed to limit samples. 2) Intervals of defects are more than 30mm.	Minor
6) Bubbles in polarizer	Size Φ (mm) Acceptable Number $\Phi \leq 0.4$ Ignore (note) $0.4 < \Phi \leq 0.65$ 2 $0.65 < \Phi \leq 1.2$ 1 $1.2 < \Phi$ 0	Minor
7) Scratches and dent on the polarizer	Scratches and dent on the polarizer shall be in the accordance with "2) Black/white spot", and "3) Black/White line".	Minor
8) Stains on the surface of LCD panel	Stains which cannot be removed even when wiped lightly with a soft cloth or similar cleaning.	Minor
9) Rainbow color	No rainbow color is allowed in the optimum contrast on state within the active area.	Minor
10) Viewing area encroachment	Polarizer edge or line is visible in the opening viewing area due to polarizer shortness or sealing line.	Minor
11) Bezel appearance	Rust and deep damages that are visible in the bezel are rejected.	Minor
12) Defect of land surface contact	Evident crevices that are visible are rejected.	Minor
13) Parts mounting	(1) Failure to mount parts (2) Parts not in the specifications are mounted (3) For example: Polarity is reversed, HSC or TCP falls off.	Minor
14) Part alignment	(1) LSI, IC lead width is more than 50% beyond pad outline. (2) More than 50% of LSI, IC leads is off the pad outline.	Minor
15) Conductive foreign matter (solder ball, solder hips)	(1) $0.45 < \Phi$, $N \geq 1$ (2) $0.3 < \Phi \leq 0.45$, $N \geq 1$, Φ : Average diameter of solder ball (unit: mm) (3) $0.5 < L$, $N \geq 1$, L : Average length of solder chip (unit: mm)	Minor
16) Bezel flaw	Bezel claw missing or not bent	Minor
17) Indication on name plate (sampling indication label)	(1) Failure to stamp or label error, or not legible.(all acceptable if legible) (2) The separation is more than 1/3 for indication discoloration, in which the characters can be checked.	Minor

6. Handling Precautions

6.1 Mounting method

A panel of LCD module made by our company consists of two thin glass plates with polarizers that easily get damaged. And since the module is so constructed as to be fixed by utilizing fitting holes in the printed circuit board (PCB), extreme care should be used when handling the LCD modules.

6.2 Cautions of LCD handling and cleaning

When cleaning the display surface, use soft cloth with solvent (recommended below) and wipe lightly.

- Isopropyl alcohol
- Ethyl alcohol
- Trichlorotrifluoroethane

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:

- Water
- Ketene
- Aromatics

6.3 Caution against static charge

The LCD module uses C-MOS LSI drivers. So we recommend you:

Connect any unused input terminal to V_{dd} or V_{ss} . Do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

6.4 Packaging

- Module employs LCD elements, and must be treated as such. Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity.

6.5 Caution for operation

It is an indispensable condition to drive LCD module within the limits of the specified voltage since the higher voltage over the limits may cause the shorter life of LCD module.

-An electrochemical reaction due to DC (direct current) causes LCD undesirable deterioration so that the uses of DC (direct current) drive should be avoided.

-Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD module may show dark color in them. However those phenomena do not mean malfunction or out of order of LCD module, which will come back in the specified operating temperature.

6.6 Storage

In the case of storing for a long period of time, the following ways are recommended:

- Storage in polyethylene bag with the opening sealed so as not to enter fresh air outside in it. And with not desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light is. Keeping the storage temperature range.
- Storing with no touch on polarizer surface by any thing else.

6.7 Safety

-It is recommendable to crash damaged or unnecessary LCD into pieces and to wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.

-When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well at once with soap and water.