JEWEL HILL ELECTRONIC CO.,LTD.

SPECIFICATIONS FOR LCD MODULE

Module No. JHB7015A

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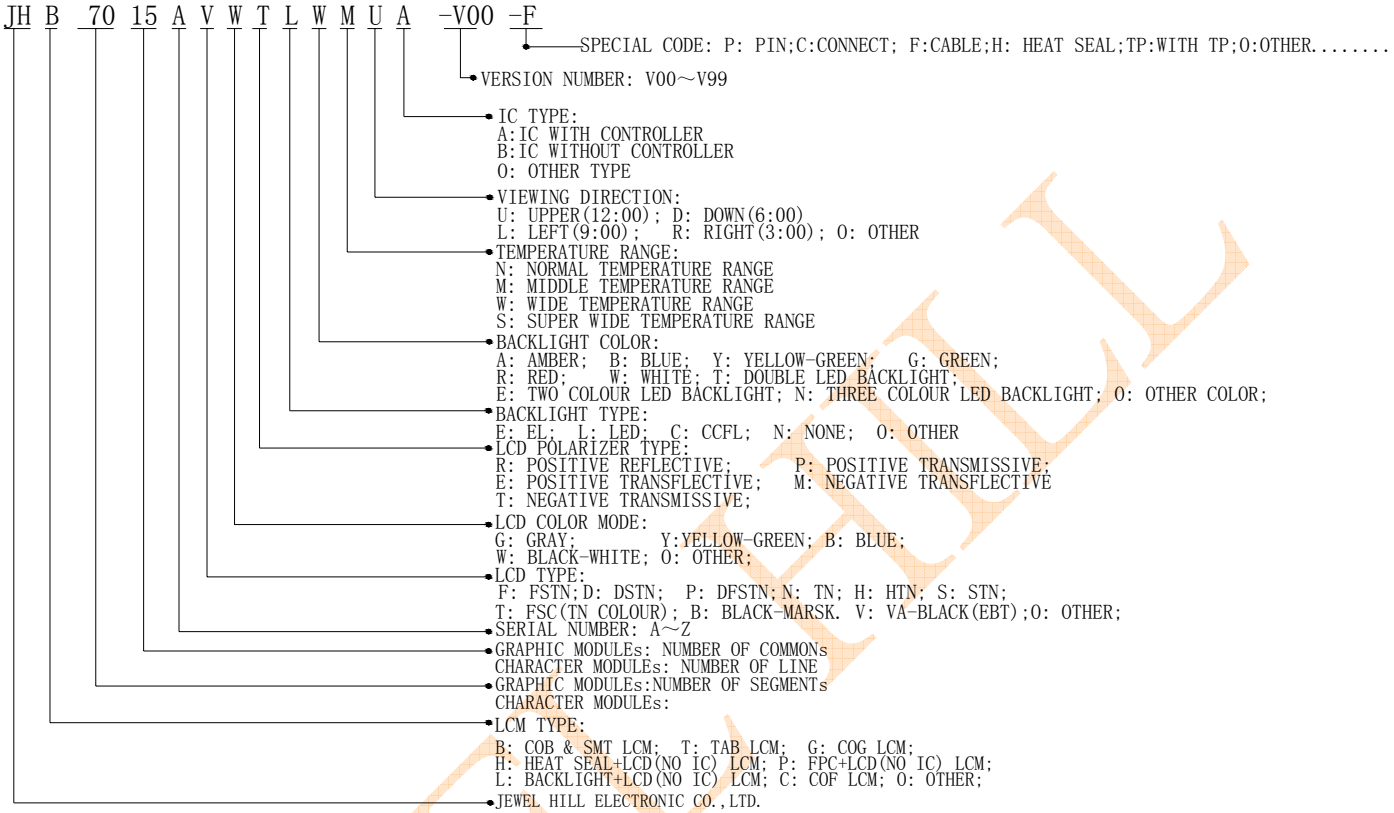
TABLE OF CONTENTS

LCM Number System.



1.GENERAL DESCRIPTION.

The JHB7015A is a 18 segment x 4 common LCD module. It has a V.A(EBT) panel composed of 18 segments and 4 commons. The LCM can be easily accessed by micro-controller via serial interface.

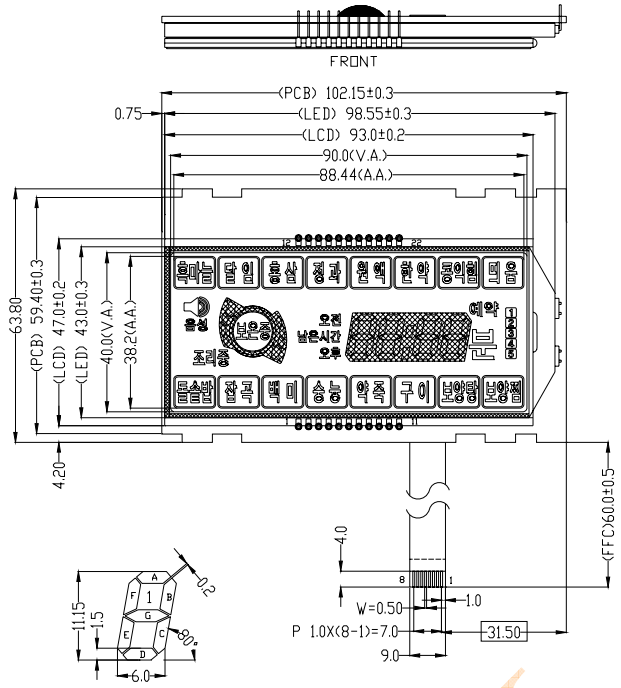
2.FEATURES.

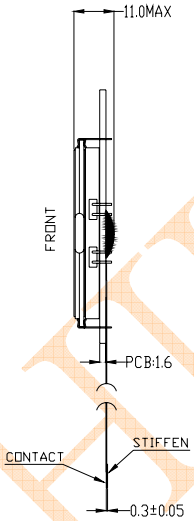
Display Mode	V.A(EBT) and negative
	Transmissive module
Display Format	segments 18 x 4
Input Data	4-line serial data input from MPU
Multiplexing Ratio	1/4 Duty
Bias	1 /3 Bias
Viewing Direction	12 O'clock
Backlight	LED（WHITE）

3.MECHANICAL SPECIFICATION.

Item	Specifications	Unit
Dimensional outline	102.15 x 63.8 x 11.0(max)	mm
Resolution	18segs x 4coms	-
Viewing area	90.0(W) x 40.0(H)	mm
Active area	88.44(W) x 38.2(H)	mm

4.MECHANICAL DIMENSION.

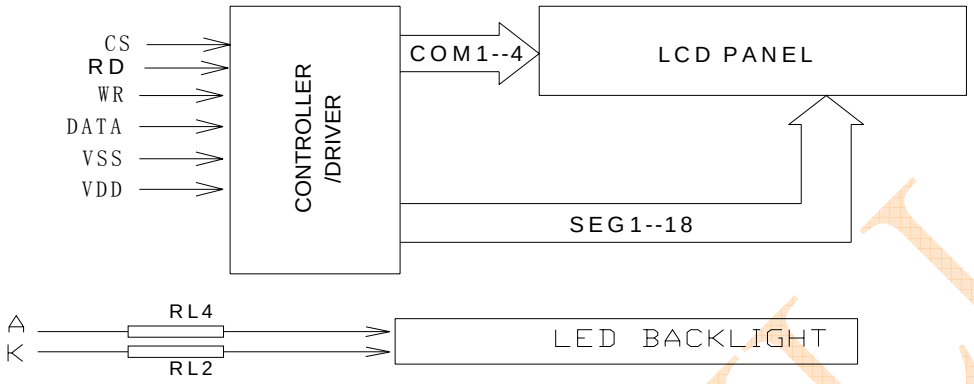




PIN CONNECTIONS:

PIN NO.	SIGNAL
1	$\overline{CS}$
2	$\overline{RD}$
3	$\overline{WR}$
4	DATA
5	VSS
6	VDD
7	LED+
8	LED−

5.BLACK DIAGRAM.



(1)MAXIMUM RATINGS

Item	Symbol	Min	Max	Unit	Note
Supply voltage	V_{DD} - Vss	-0.3	5.5	V	
	V_{OP}	-	5.3	V	
Input Voltage	V_{IN}	-0.3	5.3	V	
Operating temperature	T_{OPR}	-10	+60	℃	
Storage temperature	T_{STR}	-20	+70	℃	
Humidity	---	---	90	%RH	

VDD=+5.0V±10%, Ta=-10℃ to +60℃.

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Operating Voltage	VDD	-	2.4	5.0	5.5	V
Supply Current	I_{DD}	VDD=5.0V	-	1.2	1.5	mA
Input Voltage	V_{IH}	VDD=5.0V	4.0V	-	5.0V	V
Output voltage	V_{OH}	I_{OH}=-1.8mA	2.7	-	4.5	V
	V_{OL}	I_{OL}=2.6mA	0.3	-	0.5	V
LCD Driving Voltage	V_{OP}	VOP= VLCD-VSS	4.4	4.7	4.9	V
Back light Supply Voltage	VF	If=40mA	4.8	5.0	5.2	V
Back light Supply Current	If	VF=5.0V	-	40	50	mA

6.INTERFACE PIN CONNECTIONS.

ITEM	SYMBOL	DESCRIPTION
1	/CS	chip select
2	/RD	RD clock input
3	/WR	WR clock input
4	/DATA	Serial data input
5	VSS	GND
6	VDD	Power
7	LED+	LED backlight +(5V)
8	LED-	LED backlight -

7.ELECTRICAL CHARACTERISTIC.

(1) DC CHARACTERISTICS.

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{DD}	Conditions				
V_{DD}	Operating Voltage	—	—	2.7	—	5.2	V
I_{DD1}	Operating Current	3V	No load/LCD ON On-chip RC oscillator	—	80	210	μA
		5V		—	135	415	μA
I_{DD2}	Operating Current	3V	No load/LCD OFF On-chip RC oscillator	—	8	30	μA
		5V		—	20	55	μA
I_{STB}	Standby Current	3V	No load Power down mode	—	1	8	μA
		5V		—	2	16	μA
V_{IL}	Input Low Voltage	3V	DATA, $\overline{WR}$, $\overline{CS}$, $\overline{RD}$	0	—	0.6	V
		5V		0	—	1.0	V
V_{IH}	Input High Voltage	3V	DATA, $\overline{WR}$, $\overline{CS}$, $\overline{RD}$	2.4	—	3	V
		5V		4.0	—	5	V
I_{OL1}	BZ, $\overline{BZ}$, $\overline{IRQ}$	3V	V_{OL}=0.3V	0.9	1.8	—	mA
		5V	V_{OL}=0.5V	1.7	3	—	mA
I_{OH1}	BZ, $\overline{BZ}$	3V	V_{OH}=2.7V	–0.9	–1.8	—	mA
		5V	V_{OH}=4.5V	–1.7	–3	—	mA
I_{OL1}	DATA	3V	V_{OL}=0.3V	200	450	—	μA
		5V	V_{OL}=0.5V	250	500	—	μA
I_{OH1}	DATA	3V	V_{OH}=2.7V	–200	–450	—	μA
		5V	V_{OH}=4.5V	–250	–500	—	μA
I_{OL2}	LCD Common Sink Current	3V	V_{OL}=0.3V	15	40	—	μA
		5V	V_{OL}=0.5V	100	200	—	μA
I_{OH2}	LCD Common Source Current	3V	V_{OH}=2.7V	–15	–30	—	μA
		5V	V_{OH}=4.5V	–45	–90	—	μA
I_{OL3}	LCD Segment Sink Current	3V	V_{OL}=0.3V	15	30	—	μA
		5V	V_{OL}=0.5V	70	150	—	μA
I_{OH3}	LCD Segment Source Current	3V	V_{OH}=2.7V	–6	–13	—	μA
		5V	V_{OH}=4.5V	–20	–40	—	μA
R_{PH}	Pull-high Resistor	3V	DATA, $\overline{WR}$, $\overline{CS}$, $\overline{RD}$	100	200	300	kΩ
		5V		50	100	150	kΩ

(2) A.C CHARACTERISTICS.

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{DD}	Conditions				
f_{SYS1}	System Clock	3V	On-chip RC oscillator	22	32	40	kHz
		5V		24	32	40	kHz
f_{SYS2}	System Clock	3V	External clock source	—	32	—	kHz
		5V		—	32	—	kHz
f_{LCD1}	LCD Frame Frequency	3V	On-chip RC oscillator	44	64	80	Hz
		5V		48	64	80	Hz
f_{LCD2}	LCD Frame Frequency	3V	External clock source	—	64	—	—
		5V		—	64	—	—
t_{COM}	LCD Common Period	—	n: Number of COM	—	n/f_{LCD}	—	sec
f_{CLK1}	Serial Data Clock ($\overline{WR}$ pin)	3V	Duty cycle 50%	—	—	150	kHz
		5V		—	—	300	kHz
f_{CLK2}	Serial Data Clock ($\overline{RD}$ pin)	3V	Duty cycle 50%	—	—	75	kHz
		5V		—	—	150	kHz
t_{CS}	Serial Interface Reset Pulse Width (Figure 3)	—	$\overline{CS}$	—	250	—	ns
t_{CLK}	$\overline{WR}$, $\overline{RD}$ Input Pulse Width (Figure 1)	3V	Write mode	3.34	—	—	μs
			Read mode	6.67	—	—	
		5V	Write mode	1.67	—	—	μs
			Read mode	3.34	—	—	
t_r, t_f	Rise/Fall Time Serial Data Clock Width (Figure 1)	3V	—	—	120	—	ns
		5V					
t_{su}	Setup Time for DATA to $\overline{WR}$, $\overline{RD}$ Clock Width (Figure 2)	3V	—	—	120	—	ns
		5V					
t_h	Hold Time for DATA to $\overline{WR}$, $\overline{RD}$, Clock Width (Figure 2)	3V	—	—	120	—	ns
		5V					
t_{su1}	Setup Time for $\overline{CS}$ to $\overline{WR}$, $\overline{RD}$ Clock Width (Figure 3)	3V	—	—	100	—	ns
		5V					
t_{h1}	Hold Time for $\overline{CS}$ to $\overline{WR}$, $\overline{RD}$ Clock Width (Figure 3)	3V	—	—	100	—	ns
		5V					

8. DRIVER IC FUNCTION DESCRIPTION.

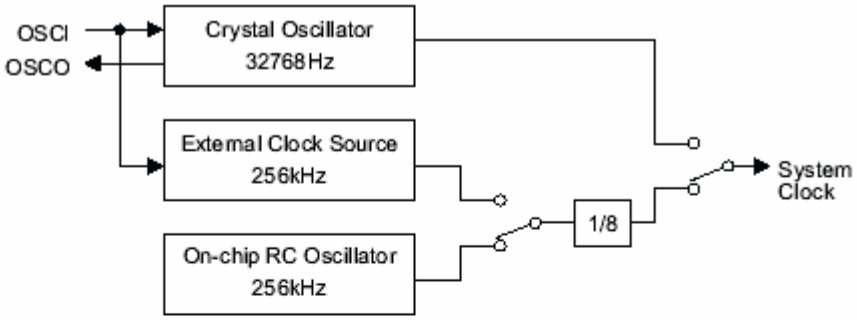
8.1 DISPLAY MEMORY-RAM.

The static display memory (RAM) is organized into 32 x 4 bits and stores the displayed data.The contents of the RAM are directly mapped to the contents of the LCD driver. Data in the RAM can be accessed by the READ, WRITE, and READ-MODIFY-WRITE commands. The following is a mapping from the RAM to the LCD pattern:

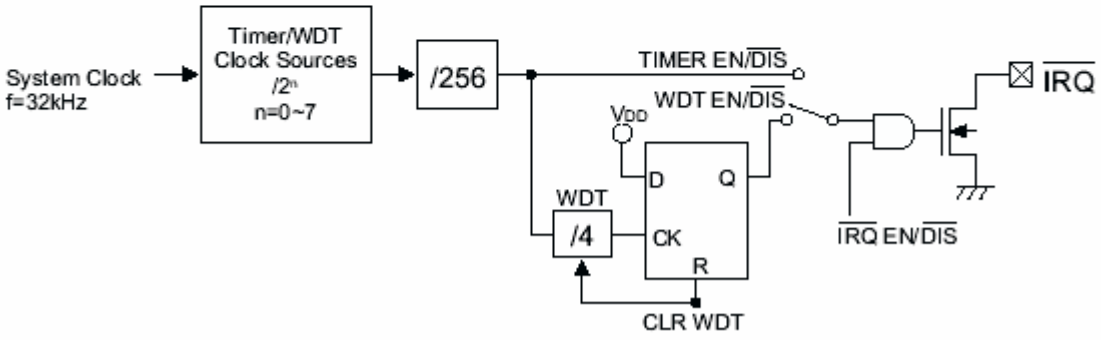
8.1.1 Time base and watch dog time (WDT).

The time base generator and WDT share the same divided (/256)counter.TIMER DIS/EN/CLR, WDT DIS/EN/CLR, and IRQ EN/DIS are independent from each other. Once the WDT timeout occurs ,the IRQ pin will remain at logic low level until the CLR WDT or the IRQ DIS command is issued.

If an external clock is selected as the source of system frequency, the SYS DIS command turns out invalid and the power down mode fails to be carried out until the external clock source is removed.



System oscillator configuration



Timer and WDT configurations

8.2 BUZZER TONE OUTPUT.

A simple tone generator is implemented in the HT1621.The tone generator ean output a pair lf differential driving signals on the BZ and /BZ which are used to generate a single tone .

Name	Command Code	Function
TONE OFF	0000-1000-X	Turn-off tone output
TONE 4K	010X-XXXX-X	Turn-on tone output, tone frequency is 4kHz
TONE 2K	0110-XXXX-X	Turn-on tone output, tone frequency is 2kHz

8.3 COMMAND FORMAT.

The HT1621 can be configured by the software setting. There are two mode commands to configure the HT1621 resource and to reansfer the LCD display data.

The following are the data mode ID and the command mode ID;

Operation	Mode	ID
READ	Data	1 1 0
WRITE	Data	1 0 1
READ-MODIFY-WRITE	Data	1 0 1
COMMAND	Command	1 0 0

If successive commands have been issued, the command mode ID can be omitted. While the system is operating in a non-successive command or a non-successive address data mode, the /CS pin should be set to “1” and the previous operation mode will be reset also. The /CS pin returns to “0”, a new operation mode ID should be issued first.

9. INSTRUCTION DESCRIPTION.

Command Summary.

Name	ID	Command Code	D/C	Function	Def.
READ	1 1 0	A5A4A3A2A1A0D0D1D2D3	D	Read data from the RAM	
WRITE	1 0 1	A5A4A3A2A1A0D0D1D2D3	D	Write data to the RAM	
READ-MODIFY-WRITE	1 0 1	A5A4A3A2A1A0D0D1D2D3	D	READ and WRITE to the RAM	
SYS DIS	1 0 0	0000-0000-X	C	Turn off both system oscillator and LCD bias generator	Yes
SYS EN	1 0 0	0000-0001-X	C	Turn on system oscillator	
LCD OFF	1 0 0	0000-0010-X	C	Turn off LCD bias generator	Yes
LCD ON	1 0 0	0000-0011-X	C	Turn on LCD bias generator	
TIMER DIS	1 0 0	0000-0100-X	C	Disable time base output	
WDT DIS	1 0 0	0000-0101-X	C	Disable WDT time-out flag output	
TIMER EN	1 0 0	0000-0110-X	C	Enable time base output	
WDT EN	1 0 0	0000-0111-X	C	Enable WDT time-out flag output	
TONE OFF	1 0 0	0000-1000-X	C	Turn off tone outputs	Yes
TONE ON	1 0 0	0000-1001-X	C	Turn on tone outputs	
CLR TIMER	1 0 0	0000-11XX-X	C	Clear the contents of time base generator	
CLR WDT	1 0 0	0000-111X-X	C	Clear the contents of WDT stage	
XTAL 32K	1 0 0	0001-01XX-X	C	System clock source, crystal oscillator	
RC 256K	1 0 0	0001-10XX-X	C	System clock source, on-chip RC oscillator	Yes
EXT 256K	1 0 0	0001-11XX-X	C	System clock source, external clock source	
BIAS 1/2	1 0 0	0010-abX0-X	C	LCD 1/2 bias option ab=00: 2 commons option ab=01: 3 commons option ab=10: 4 commons option	
BIAS 1/3	1 0 0	0010-abX1-X	C	LCD 1/3 bias option ab=00: 2 commons option ab=01: 3 commons option ab=10: 4 commons option	
TONE 4K	1 0 0	010X-XXXX-X	C	Tone frequency, 4kHz	
TONE 2K	1 0 0	011X-XXXX-X	C	Tone frequency, 2kHz	
$\overline{\text{IRQ}}$ DIS	1 0 0	100X-0XXX-X	C	Disable $\overline{\text{IRQ}}$ output	Yes

Name	ID	Command Code	D/C	Function	Def.
$\overline{IRQ}$ EN	**1 0 0**	100X-1XXX-X	C	Enable $\overline{IRQ}$ output	
F1	**1 0 0**	101X-X000-X	C	Time base/WDT clock output:1Hz The WDT time-out flag after: 4s	
F2	**1 0 0**	101X-X001-X	C	Time base/WDT clock output:2Hz The WDT time-out flag after: 2s	
F4	**1 0 0**	101X-X010-X	C	Time base/WDT clock output:4Hz The WDT time-out flag after: 1s	
F8	**1 0 0**	101X-X011-X	C	Time base/WDT clock output:8Hz The WDT time-out flag after: 1/2 s	
F16	**1 0 0**	101X-X100-X	C	Time base/WDT clock output:16Hz The WDT time-out flag after: 1/4 s	
F32	**1 0 0**	101X-X101-X	C	Time base/WDT clock output:32Hz The WDT time-out flag after: 1/8 s	
F64	**1 0 0**	101X-X110-X	C	Time base/WDT clock output:64Hz The WDT time-out flag after: 1/16 s	
F128	**1 0 0**	101X-X111-X	C	Time base/WDT clock output:128Hz The WDT time-out flag after: 1/32 s	Yes
TEST	**1 0 0**	1110-0000-X	C	Test mode, user don't use.	
NORMAL	**1 0 0**	1110-0011-X	C	Normal mode	Yes

Note: X : Don't care

A5~A0 : RAM addresses

D3~D0 : RAM data

D/C : Data/command mode

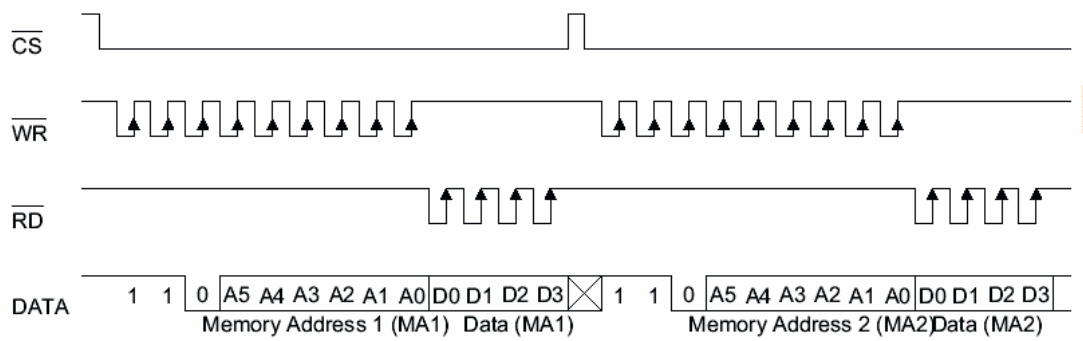
Def. : Power on reset default

All the bold forms, namely **1 1 0**, **1 0 1**, and **1 0 0**, are mode commands. Of these, **1 0 0** indicates the command mode ID. If successive commands have been issued, the command mode ID except for the first command will be omitted. The source of the tone frequency and of the time base/WDT clock frequency can be derived from an on-chip 256kHz RC oscillator, a 32.768kHz crystal oscillator, or an external 256kHz clock. Calculation of the frequency is based on the system frequency sources as stated above. It is recommended that the host controller should initialize the HT1621 after power on reset, for power on reset may fail, which in turn leads to the malfunctioning of the HT1621.

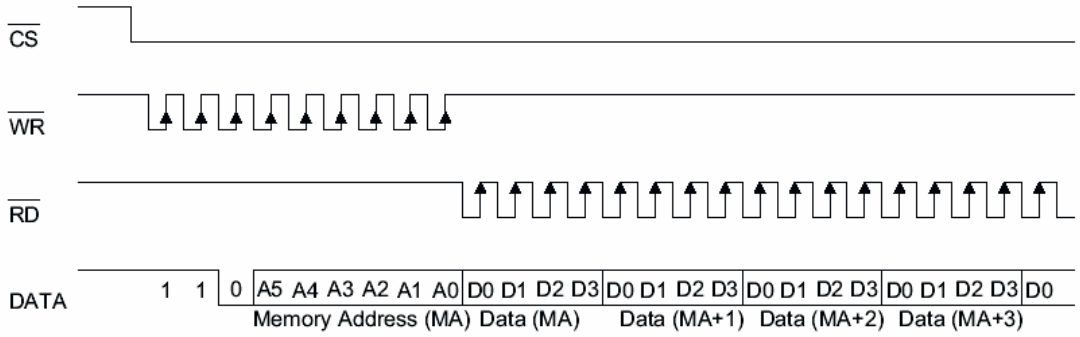
10.INTERFACE WITH MPU.

TIMING DIAGRAMS.

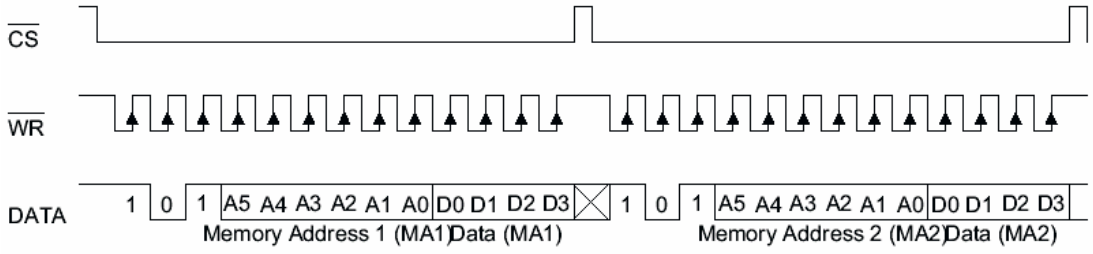
READ mode (command code :110)



READ mode (successive address reading)

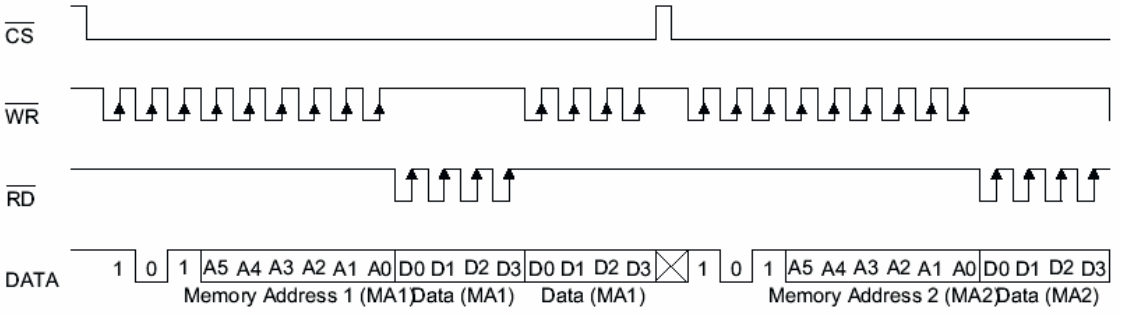


WRITE mode (command code :101)

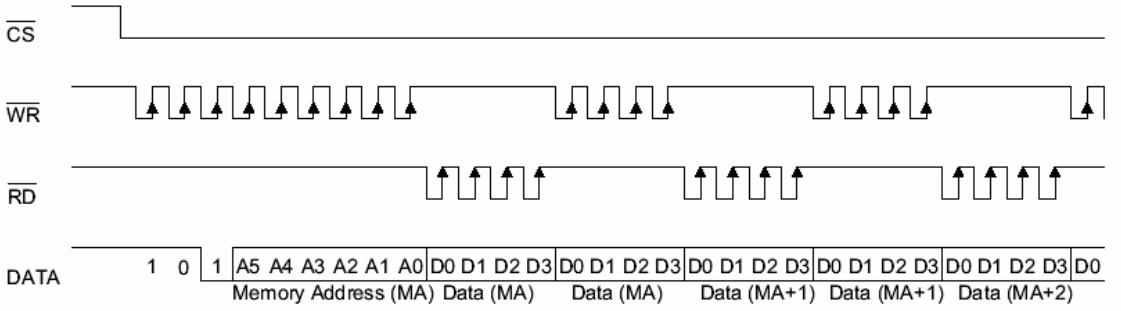


WRITE mode (successive address writing).

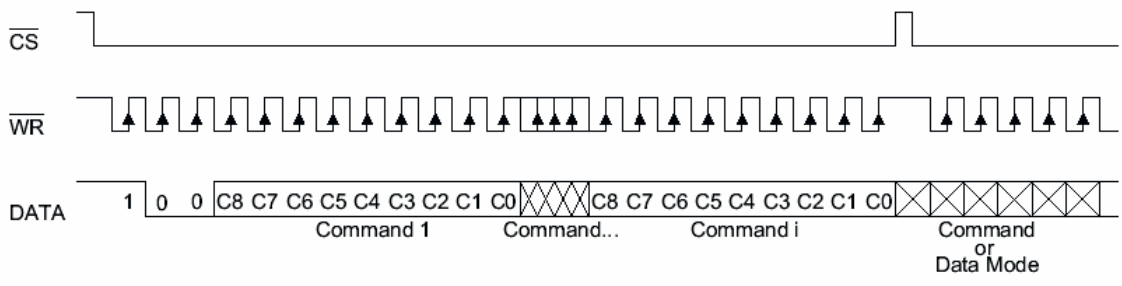
READ-MODIFY-WRITE mode (command code :101)



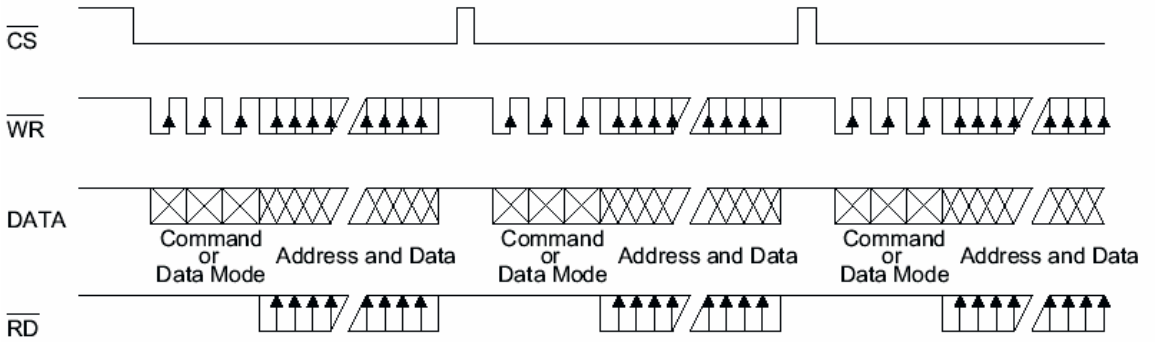
READ-MODIFY-WRITE mode (successive address accessing).



Command mode (command code :100).



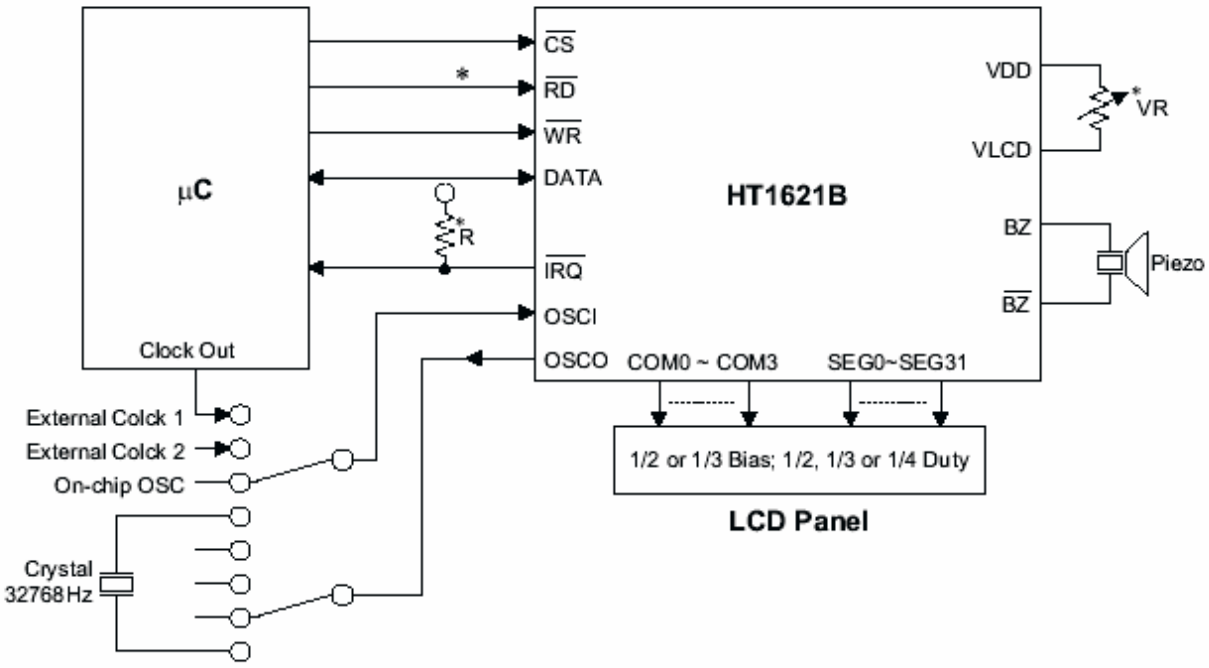
Mode (data & command code).



Note: It is suggested that the host controller should read in the data from the DATA line between
the raising edge of the RD line and the falling edge of the next RD line.

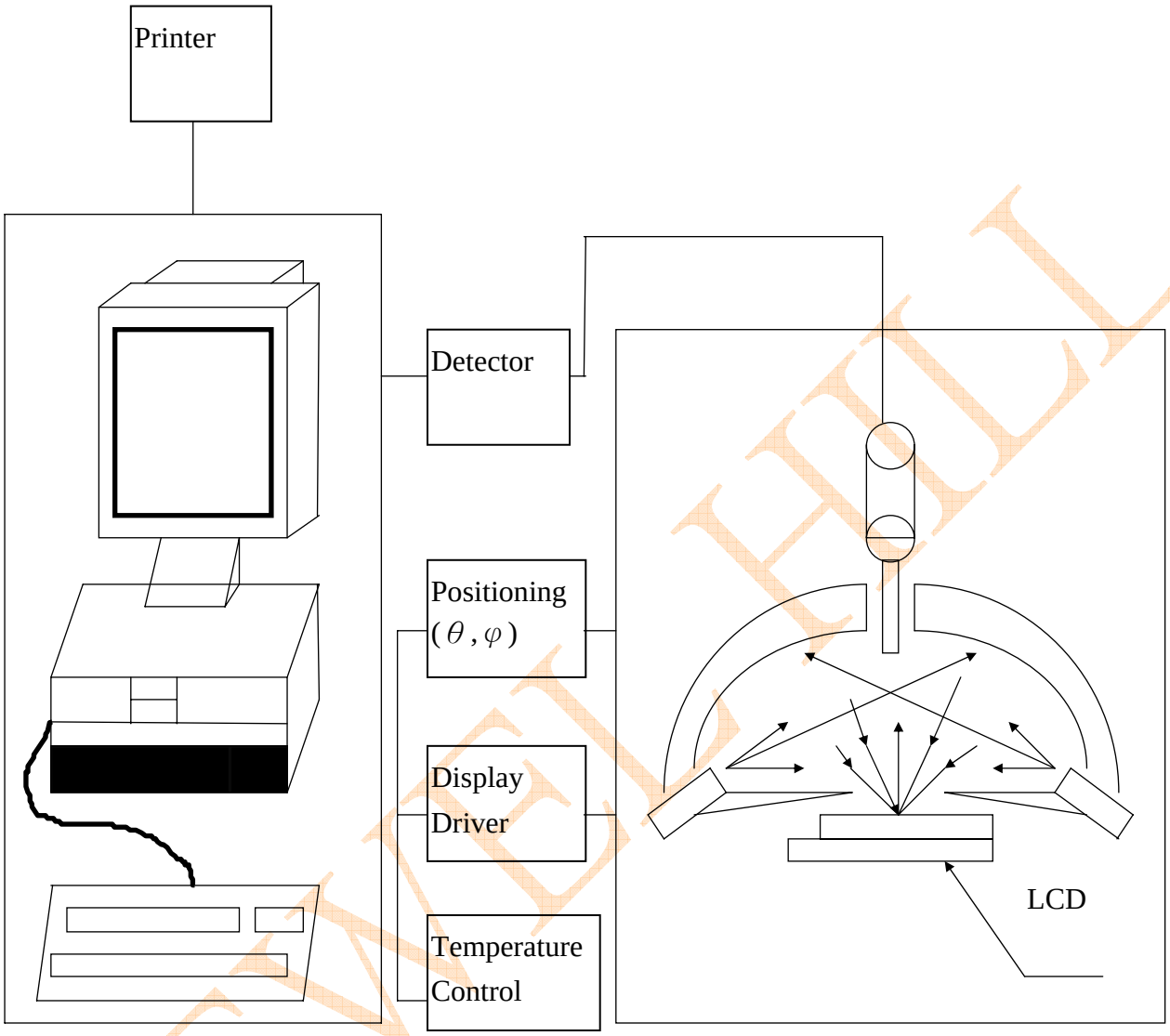
APPLICATION DIAGRAM.

HOST CONTROLLER WITH AN HT1621 DISPLAY SYSTEM

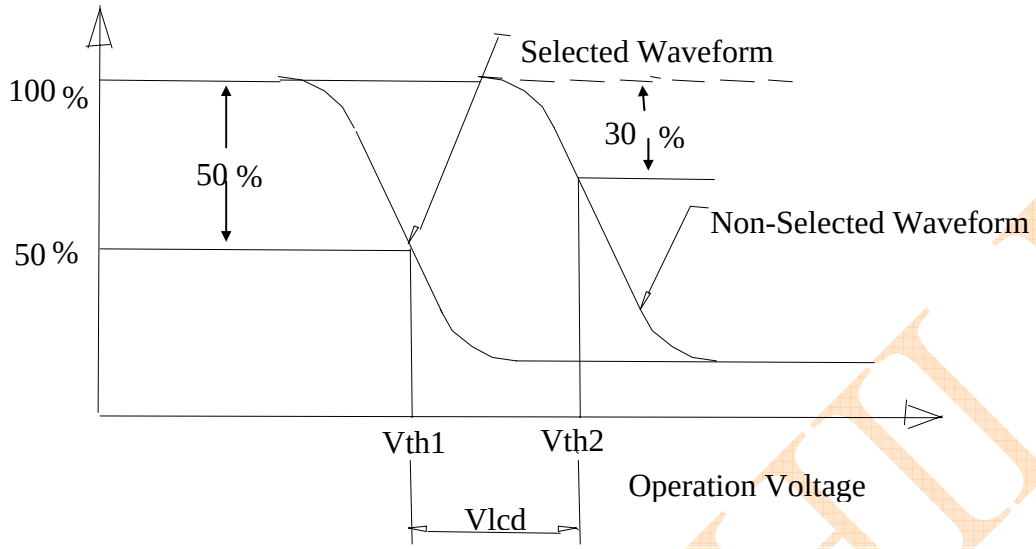


Note: The connection of $\overline{IRQ}$ and $\overline{RD}$ pin can be selected depending on the requirement of the µC.
The voltage applied to V_{LCD} pin must be lower than V_{DD}.
Adjust VR to fit LCD display, at V_{DD}=5V, V_{LCD}=4V, VR=15kΩ±20%.
Adjust R (external pull-high resistance) to fit user s time base clock.

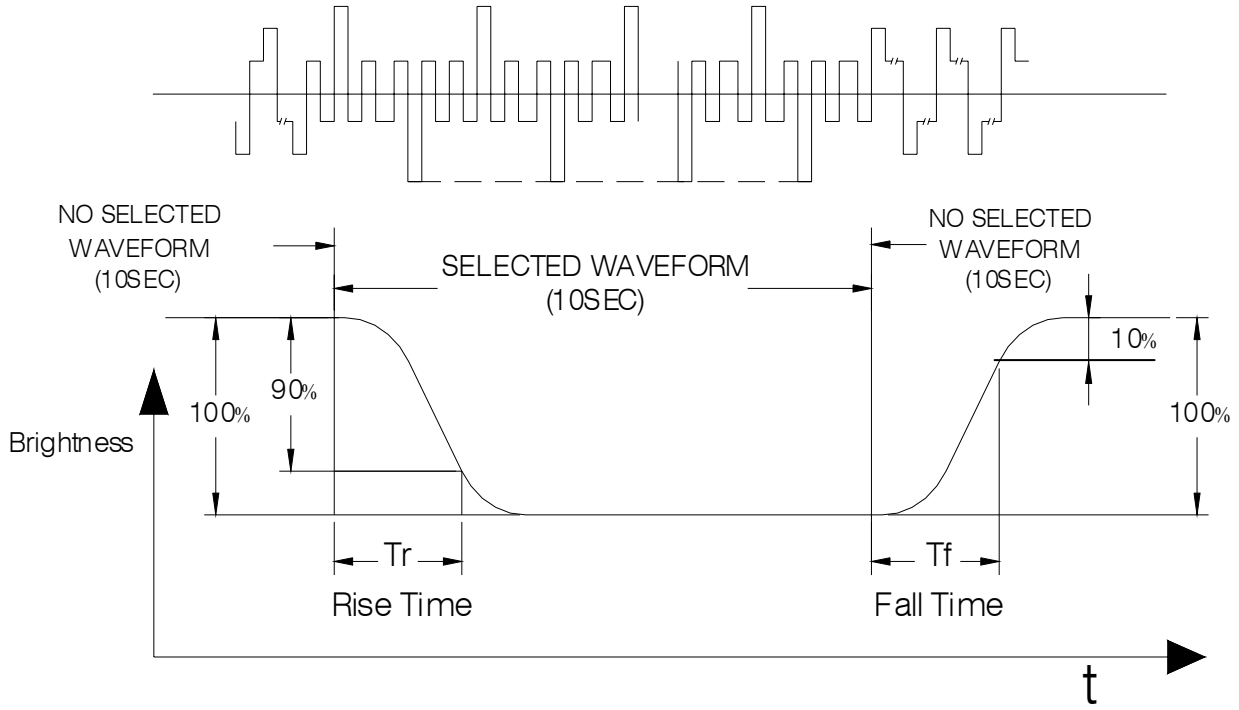
11.Electro-Optical Characteristics Measuring Equipment(DMS501).



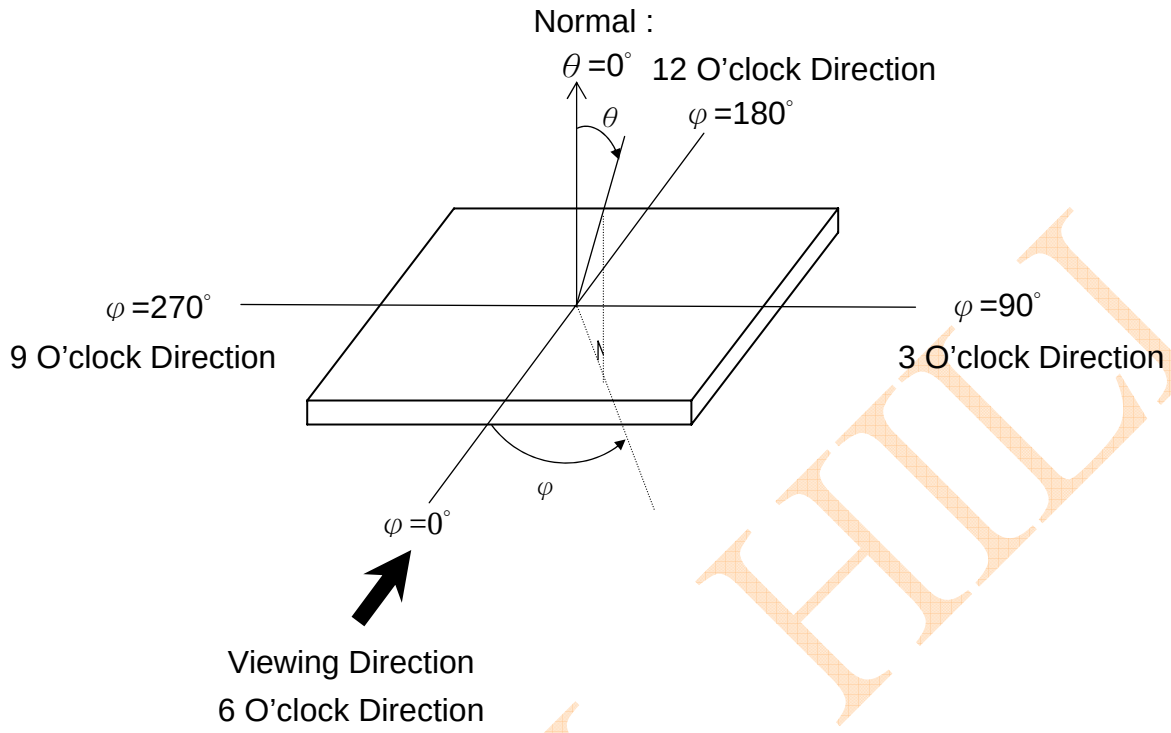
- **Note 1. Definition of Driving Voltage(Vlcd) :**



- **Note 2. Definition of Optical Response Time :**

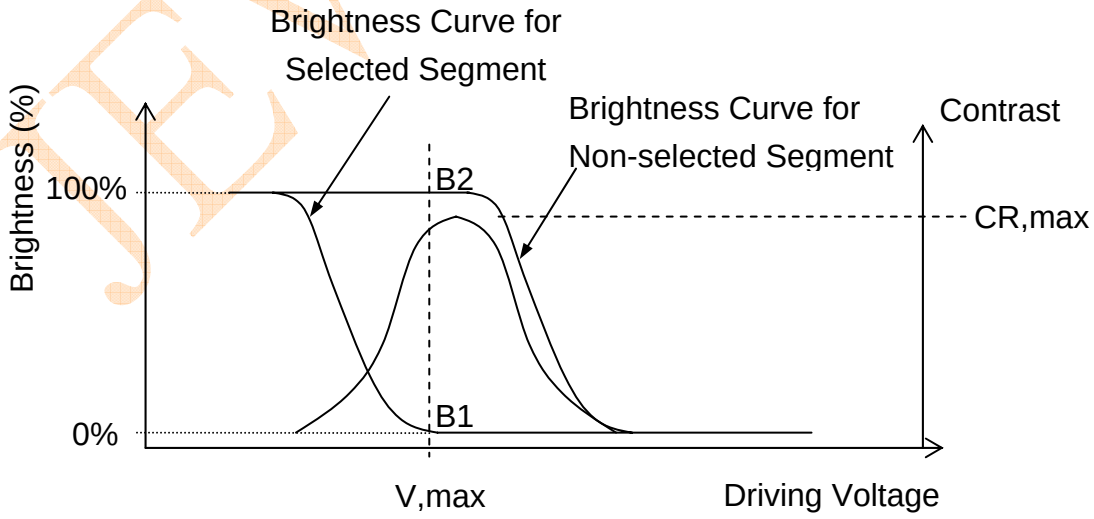


• Note 3. Definition of Viewing Angle θ and ϕ :



• Note 4. Definition of Contrast ratio(CR) :

$$CR = \frac{\text{Brightness of Non-selected Segment (B2)}}{\text{Brightness of Selected Segment (B1)}}$$



12. RELIABILIT.

12.1 MTBF.

The LCD module shall be designed to meet a minimum MTBF value of 30000 hours with normal. (25°C in the room without sunlight)

12.1.1 TESTS.

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Operating	60℃ 120Hrs	◦ No Defect Of Operational Function In Room Temperature Are Allowable. ◦ IDD of LCM in Pre-and post-test should follow specification
2	Low Temperature Operating	-10℃ 120Hrs	
3	High Temperature/ Humidity Non-Operating	60℃ ,90%RH ,120 Hrs	
4	High Temperature Non-Operating	70℃ 120Hrs	
5	Low Temperature Non-Operating	-20℃ 120Hrs	
6	Temperature Cycling Non-Operating	-10℃(30Min)↔ 60℃(30Min) 10 CYCLES	

Notes: Judgments should be mode after exposure in room temperature for two hours.

13. PRECAUTIONS FOR USING LCD MODULES.

13.1HANDLING PRECAUTIONS.

(1) The display panel is made of glass. Do not subject it to a mechanical shock or impact by dropping it.

(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.

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

(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 a cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

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

- Water
- Ketone
- Aromatic solvents

(7) Extra care to minimize corrosion of the electrode. Water droplets, moisture condensation or a current flow in a high-humidity environment accelerates corrosion of the electrode.

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

- Be sure to ground the body when handling he LCD Module.
- Tools required for assembling, such as soldering irons, must be properly grounded.
-To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.
-The LCD Module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

13.2 STORAGE CONDITIONS.

When storing, avoid the LCD module to be exposed to direct sunlight of fluorescent lamps. For stability, to keep it away form high temperature and high humidity environment (The best condition is : 23±5°C, 45±20%RH). ESD protection is necessary for long-term storage also.

13.3 OTHER.

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 Module 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 recovered 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 Module 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.*

14.Using LCD MODULE.

14.1 LIQUID CRYSTAL DISPLAY MODULE.

LCD is composed of glass and polarizer. Pay attention to the following items when handling.

(1) Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

(2) Do not touch, push or rub the exposed polarizers with anything harder than a HB pencil lead (glass, tweezers, etc).

(3) N-hexane is recommended for cleaning the adhesives used to attach front/rear polarizers and reflectors made of organic substances, which will be damaged by chemicals such as acetone, toluene, toluene, ethanol and isopropyl alcohol.

(4) When the display surface becomes dusty, wipe gently with absorbent cotton or other soft material like chamois soaked in petroleum ether. Do not scrub hard to avoid damaging the display surface.

(5) Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading.

(6) Avoid contacting oil and fats.

(7) Condensation on the surface and contact with terminals due to cold will damage, stain or polarizers. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.

(8) Do not put or attach anything on the display area to avoid leaving marks on.

(9) Do not touch the display with bare hands. This will stain the display area and degrade insulation between terminals (some cosmetics are determinate to the polarizers).

(10)As glass is fragile, it tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring.

14.2 INSTALLNG LCD MODULE.

Attend to the following items when installing the LCM.

(1) Cover the surface with a transparent protective plate to protect the polarizer and LC cell.

(2) When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be ±0.1mm.

14.3 ELECTRO-STATIC DISCHARGE CONTROL.

Since this module uses a CMOS LSI, the same careful attention should be paid for electrostatic discharge as for an ordinary CMOS IC.

(1) Make certain that you are grounded when handing LCM.

(2) Before removing LCM from its packing case or incorporating it into a set, be sure the module and

your body have the same electric potential.

(3) When soldering the terminal of LCM, make certain the AC power source for the soldering iron does not leak.

(4) When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.

(5) As far as possible, make the electric potential of your work clothes and that of the workbenches to the ground potential.

(6) To reduce the generation of electro-static discharge, be careful that the air in the work is not too dried. A relative humidity of 50%-60% is recommended

14.4 PRECAUTIONS FOR OPERATION.

(1) Viewing angle varies with the change of liquid crystal driving voltage (Vo). Adjust Vo to show the best contrast.

(2) Driving the LCD in the voltage above the limit will shorten its lifetime.

(3) Response time is greatly delayed at temperature below the operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.

(4) If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then on.

(5) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, this product must be used and stored within the specified condition of 23±5°C, 45±20%RH.

(6) When turning the power on, input each signal after the positive/negative voltage becomes stable.

14.5 SAFETY.

(1) It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

(2) If any liquid leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

15. REVISION HISTORY.

Version	Revise record	Date
00	Original version	09-10-23
01	Change inside dimension	09-12-14
01.01	Perfect the VER01 spec，Commany internal modify.	13-08-01

SAMPLE APPROVED REPORT

(样品确认单)

SAMPLE MODEL NO. (样品型号)	JHB7015A
SAMPLE SERIES NUMBER NO. (样品序号)	
SAMPLE QUANTITY (样品数量)	
COLOR/TYPE (底色/类型)	V.A(EBT)
VIEWING DIRECTION (视角)	12:00
DRIVING METHOD (驱动参数)	1/4Duty, 1/3Bias
LOGIC VOLTAGE (工作电压)	5.0V
LCD VOP (LCD 驱动电压)	4.7V
OPERATING TEMP. (操作温度)	-10 ~ +60℃
STORAGE TEMP. (储存温度)	-20 ~ +70℃
POLARIZER----FRONT (首偏光片)	Transmissive
POLARIZER----BACK (后偏光片)	Transmissive
CONTROLLER/DRIVER IC(控制/驱动 IC)	HT1621
BACKLIGHT COLOR/TYPE (背光源类型/颜色)	LED/WHITE
DRAWING REV/NO./QUANTITY (图纸版本/数量)	
SPECIFICATION (规格书　份数)	

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): _____