SPECIFICATION

(ISO9001:2008)

PRODUCT : LCM

MODEL NO. : HG1286433-B-LWH-01

SUPPLIER : TSINGTEK DISPLAY CO.,LTD

REVISION : B

www.china-lcdmodules.com

E-mail:sales@tsingtek.com

Rev NO.	Rev Date	CONTENS	REMARKS
A	Sept. 20,2011	First Release	
B	Aug.10,2012	RoHS Compliant	

PRODUCT CODING SYSTEM

HG 128 64 33 – B - LW H- 01

(1) (2) (3) (4) (5) (6) (7)

(1): Brand and Display Type
HG→Tsingtek COB Graphic Type
(2): Graphic→row dots×column dots
(3): Series No.
(4): Display mode
B→STN Blue Mode
(5): Backlight Type
LW→LED White
(6): Temperature
H→Wide Temperature
(7): Interior Coding

CONTENTS

1. BASIC SPECIFICATIONS

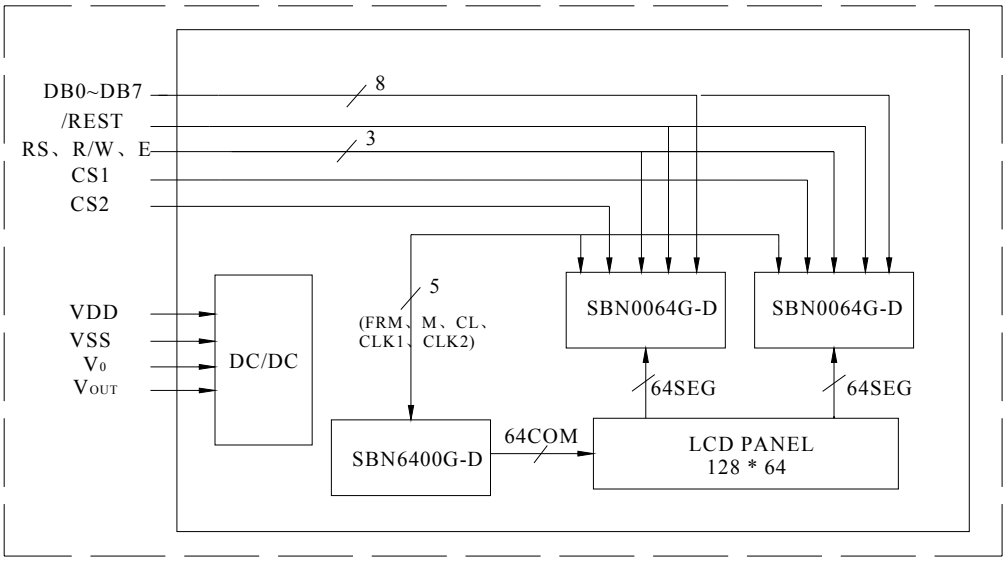
1.1 DISPLAY SPECIFICATION

ITEM	SPECIFICATION
DISPLAY TYPE	STN/BLUE/NEGATIVE/TRANSMISSIVE
COLOR	DISPLAY DOT: WHITE
	DISPLAY BACKGROUNTND: BLUE
INPUT DATA	8 BIT 68-TYPE
DUTY	1/64DUTY
VIEW ANGLE	6 O'CLOCK
CONTROLLER	SBN0064G-D
BEZEL	0.7T
BACKLIGHT	LED (WHITE)
OPERATING TEMPERATURE	-20 °C ~70 °C
STORAGE TEMPERATURE	-30 °C ~ 80 °C
OTHERS	

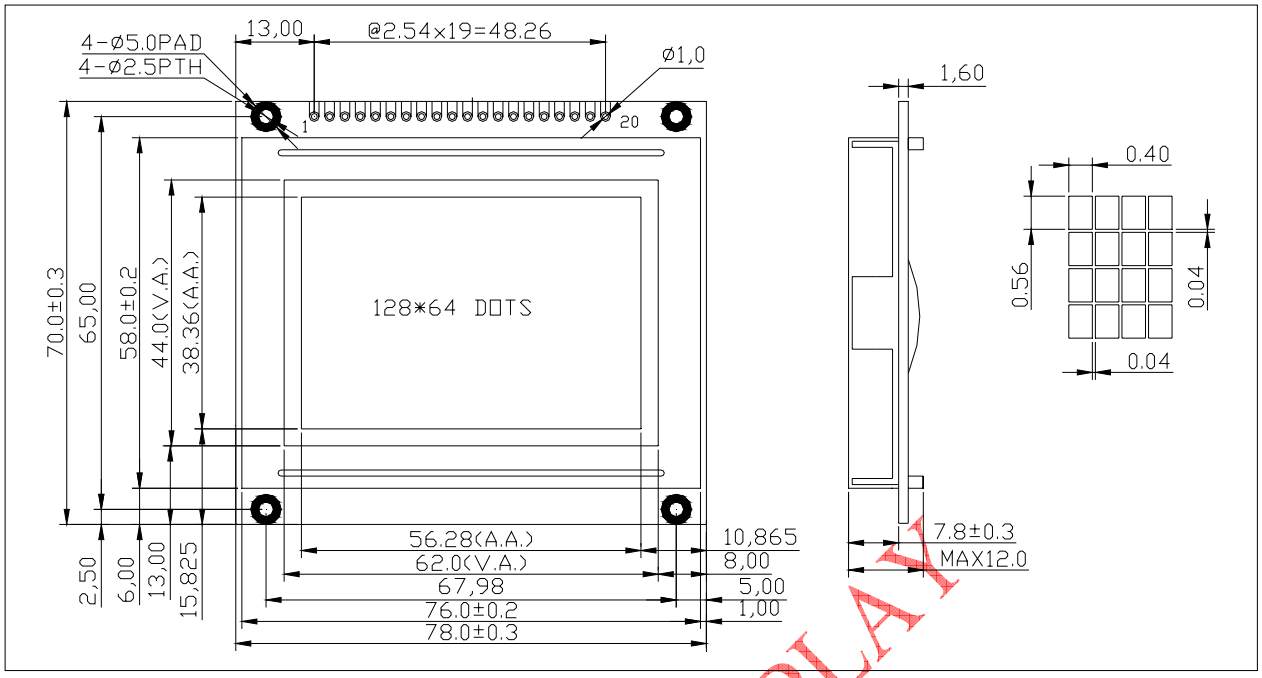
1.2 MECHANICAL SPECIFICATION

ITEM	SPECIFICATION	UNIT	NOTE
DIMENSIONAL OUTLINE	78.0(W)×70.0(H)×12.0MAX.(T)	mm	
VIEW AREA	62.0(W)×44.0(H)	mm	
EFFECTIVE V/AREA	56.27(W)×38.35(H)	mm	
NUMBER OF DOTS	128Dots×64Dots	---	
DOT PITCH	0.44(W)×0.60 (H)	mm	
DOT SIZE	0.40(W)×0.56(H)	mm	

1.3 BLOCK DIAGRAM



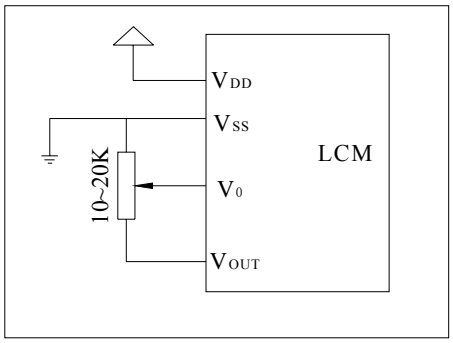
1.4 DIMENSIONAL OUTLINE



1.5 TERMINAL FUNCTIONS

PIN NO.	SYMBOL	LEVEL	FUNCTION
1	/CS1	L	Chip selection for IC1
2	/CS2	L	Chip selection for IC2
3	VSS	0V	GND
4	VDD	+5.0V	Power Supply for logic
5	V0	-	Operating voltage for LCD
6	RS	H/L	H: Data L: Instruction code
7	R/W	H/L	H: Read L: Write
8	E	H/L	Chip Enable signal
9~16	DB0~DB7	H/L	Data bus line
17	/REST	L	Reset signal,active “L”
18	VOUT	-	Negative voltage output
19	LEDA	+5.0V	Power Supply for LED Backlight
20	LEDK	0V	

1.6 POWER SUPPLY AND CONTRAST ADJUST CIRCUIT



2. ABSOLUTE MAXIMUM RATINGS （Ta=25 °C, VSS=0V）

PARAMETER	SYMBOL	RATINGS	UNITS
POWER SUPPLY FOR LOGIC	VDD-VSS	-0.3~ 7.0	V
POWER SUPPLY FOR LCD DRIVER	VDD-V0	-0.3~ 15.0	V
INPUT VOLTAGE	VIN	VSS ~ VDD	V
OPERATING TEMPERATURE	Topr	-20 ~70	°C
STORAGE TEMPERATURE	Tstg	-30 ~ 80	°C

3. ELECTRICAL CHARACTERISTICS

3.1 ELECTRICAL CHARACTERISTICS （Ta=25 °C ,VSS=0V）

ITEM	SYMBOL	CONDITION	MIN	TYPE	MAX.	UNIT	NOTE
LOGIC CIRCUIT POWER SUPPLY VOLTAGE	VDD –VSS	--	4.5	5.0	5.3	V	
INPUT VOLTAGE	VIL	--	0	--	0.8	V	
INPUT VOLTAGE	VIH	--	VDD-2.2	--	VDD	V	
OUTPUT VOLTAGE	VOL	--	0	--	0.3	V	
OUTPUT VOLTAGE	VOH	--	VDD-0.3	--	VDD	V	
LOGIC CIRCUIT POWER SUPPLY CURRENT	IDD	VDD –VSS =5.0V	--	2.5	--	mA	
RECOMMENDED LCD DRIVING VOLTAGE	* VDD-V0	Ta=25 °C	--	9.0	--	V	

*Note: VDD-V0 is produced by module's inside circuit, do not need the external input. The customer only need to offer +5.0V voltage which is stated in the interface definition.

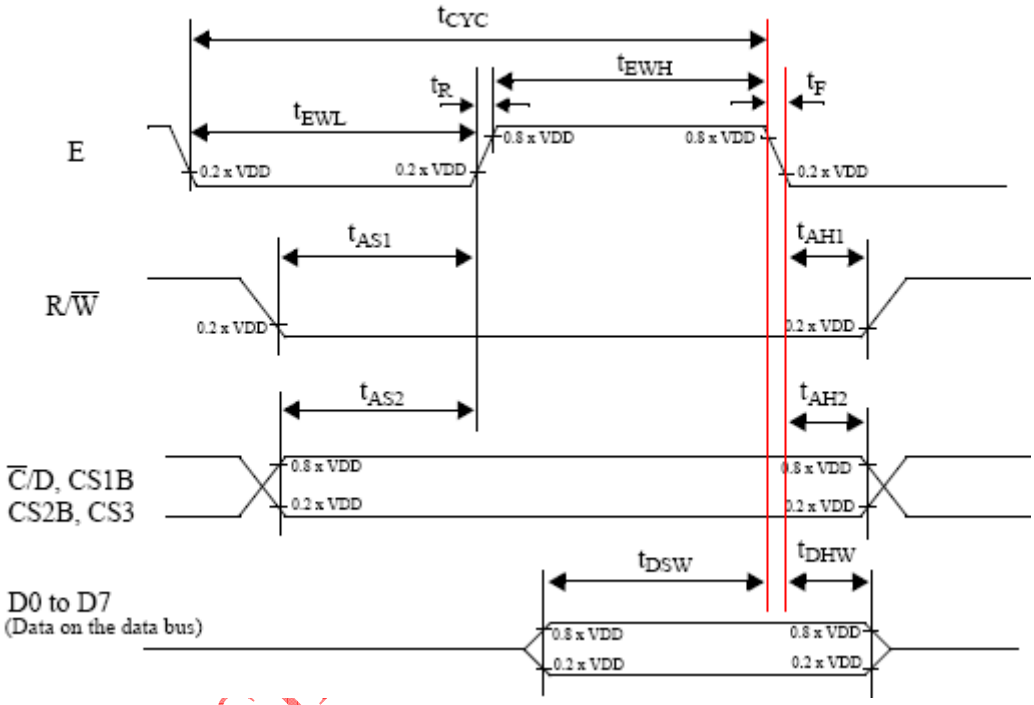
3.2 LED BACKLIGHT SPECIFICATION

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
FORWARD VOLTAGE	Vf	2.9	3.1	3.2	V	If= 60 mA
COLOR	WHITE					

*Note: The customer needs to offer +5.0V voltage which is stated in the interface definition, but do not need the current- limiting circuit.

4. TIMING CHARACTERISTICS（68-type）

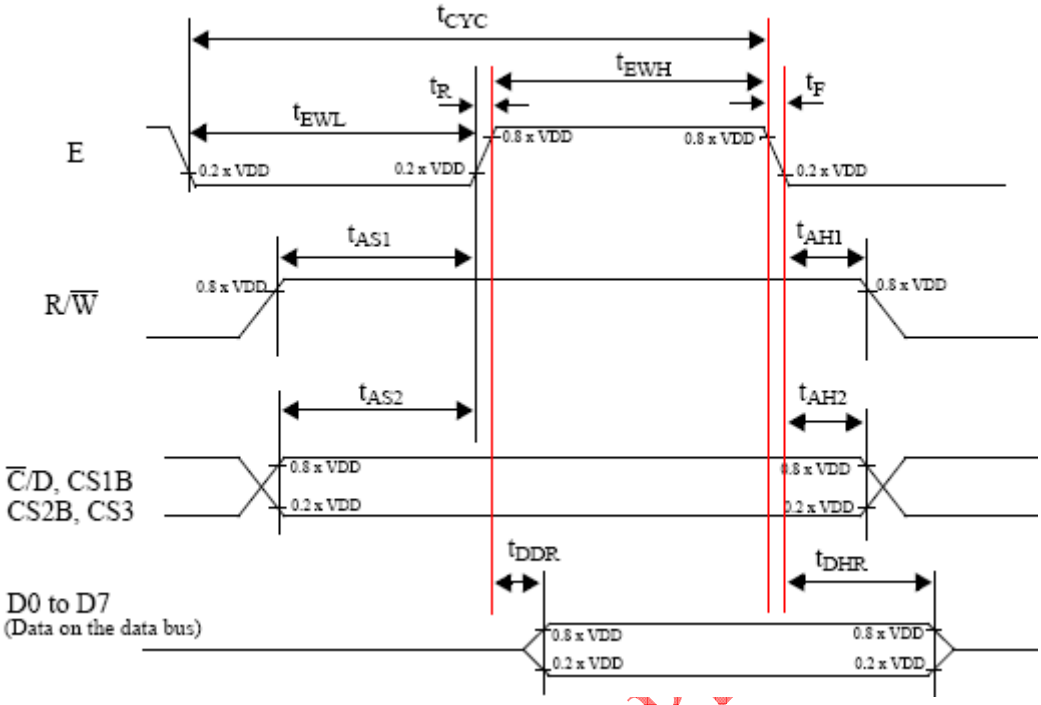
4.1 Microcontroller interface timing for writing to the SBN0064G



VDD=5V±10%; VSS=0V; Tamb=-20°Cto+75°C.

symbol	parameter	min.	max.	test conditions	unit
t_{CYC}	Enable (E) cycle time	1000			ns
t_{EWL}	Enable (E) LOW width	450			
t_{EWH}	Enable (E) HIGH width	450			
t_R	Enable (R) rise time		20		
t_F	Enable (F) fall time		20		
t_{AS1}	Write set-up time	140			
t_{AH1}	Write hold time	10			
t_{AS2}	C/D, CS1B, CS2B, CS3 set-up time	140			
t_{AH2}	C/D, CS1B, CS2B, CS3 hold time	10			
t_{DSW}	Data setup time (on the data bus)	200		The loading on the data bus is shown in Fig. 18.	
t_{DHW}	Data hold time (on the data bus)	10			

4.2 Microcontroller interface timing for reading from the SBN0064G



VDD=5V±10%; VSS=0V; Tamb=-20°Cto+75°C.

symbol	parameter	min.	max.	test conditions	unit
t_{CYC}	Enable (E) cycle time	1000			ns
t_{EWL}	Enable (E) LOW width	450			
t_{EWH}	Enable (E) HIGH width	450			
t_R	Enable (R) rise time		20		
t_F	Enable (F) fall time		20		
t_{AS1}	READ set-up time	140			
t_{AH1}	READ hold time	20			
t_{AS2}	C/D, CS1B, CS2B, CS3 set-up time	140			
t_{AH2}	C/D, CS1B, CS2B, CS3 hold time	10			
t_{DDR}	Data delay time (on the data bus)	320		The loading on the data bus is shown in Fig. 18.	
t_{DHR}	Data hold time (on the data bus)	20			

5. COMMANDS AND FUNCTION DESCRIPTIONS

5.1 Interface signals and operation

The interface signals between the host microcontroller and the SBN0064G are data bus and control bus. The data bus is an 8-bit (DB0~DB7) bi-directional bus. The control bus is composed of the following signals: C/D(RS), E, and R/W.

By means of data bus and control bus, the host microcontroller can write data to or read data from the Display Data Memory, can program the internal registers, and can read status of the SBN0064G. It is the host microcontroller's responsibility to put proper data and timing on the data bus and control bus to ensure correct data transfer.

Table 4 lists the setting for control bus and the types of data transfer.

$\overline{C}$/D	R/$\overline{W}$	Types of data transfer
1	1	The host microcontroller reads data from the Display Data Memory.
1	0	The host microcontroller writes data to the Display Data Memory
0	1	The host microcontroller reads the Status Register.
0	0	The host microcontroller programs an internal register.

5.2 DISPLAY DATA MEMORY AND LCD DISPLAY

The Display Data Memory is a static memory bit(cell) array of 64-row x 64-column. So, the total bit number is 64x64=4096 bits (512 bytes). Each bit of the memory is mapped to a single pixel (dot) on the LCD panel. A "1" stored in the Display Data Memory bit corresponds to an ON pixel (black dot in normal display). A "0" stored in the Display Data Memory bit corresponds to an OFF pixel (background dot in normal display).

Column outputs (Column0~63) of the Display Data Memory is mapped to SEG0~63 outputs of the SBN0064G. The mapping can be Normal Mapping or Inverse Mapping. Normal Mapping means that Column 0 is mapped to SEG0, Column 1 to SEG1, Column 2 to SEG2, and so on. Inverse Mapping means that Column 0 is mapped to SEG 63, Column 1 to SEG 62, Column 2 to SEG 61, and so on. The mapping relation is decided by the CSM input (Column/Segment Mapping). CSM=1 selects Normal Mapping and CSM=0 selects Inverse Mapping.

Any row (64 bits) of the Display Data Memory can be selected to map to the first row (COM0) of the LCD panel. This is decided by the Display Start Line Register. The Display Start Line

Register points at a row of the Display Data Memory, which will be mapped to COM0 of LCD Display.

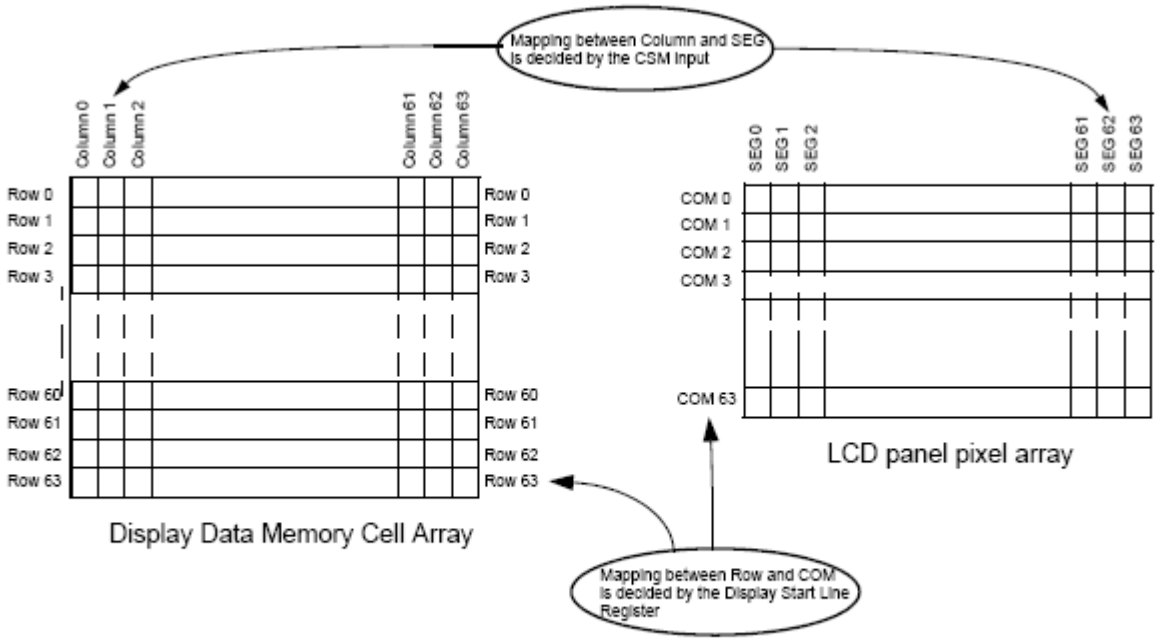


Fig.8 Memory cell array and LCD pixel array

5.3 REGISTER

Registers and their states after hardware RESET

The SBN0064G has 5 registers. Four of them must be programmed by the host microcontroller after hardware reset. The Status Register can be read by the host microcontroller to check the current status of the SBN0064G.

The registers and their states after RESET is given in Table 5.

Table 5Registers and their states after RESET

Register Name	Description	States after RESET
Display ON/OFF Register	The Display ON/OFF Register is a 1-bit register. After RESET, its value is LOW and, therefore, the LCD display is turned OFF.	0
Display Start Line Register	The Display Start Line Register is a 6-bit register. After RESET, its value is 00 0000 and, therefore, Row 0 of the Display Data Memory is mapped to COM0 of LCD panel.	00 0000
Page Address Register	The Page Address Register is a 3-bit register. It point to a page of the Display Data Memory.	xxx
Column Address Register	The Column Address Register is a 6-bit register.	xx xxxx
Status Register	The Status Register shows the current state of the SBN0064G. It is a 3-bit register, with each bit showing the status of a programmed function.	0010 0000

●Display ON/OFF and the Display ON/OFF Register

The Display ON/OFF Register is a 1-bit Register. When this bit is programmed to HIGH, the display is turned ON. When this bit is programmed to LOW, the display is turned OFF and SEG0~SEG63 outputs are set to VDD.

To program this register, the setting of control bus is given in Table 6 and the setting of the data bus is given in Table 7.

Table 6Setting of the control bus for programming the Display ON/OFF Register

$\overline{C}$/D	R/$\overline{W}$
0	0

Table 7Setting of the data bus for programming the Display ON/OFF Register

D7(MSB)	D6	D5	D4	D3	D2	D1	D0(LSB)
0	0	1	1	1	1	1	D0

When D0=1, the code is 3F(Hex) and the display is turned ON. When D0=0, the code is 3E(Hex) and the display is turned OFF.

●Display Start Line and the Display Start Line Register

The Display Start Line Register is a 6-bit register. It points at the first row of a block of the Display Data Memory, which will be mapped to COM0. The length of the block of the memory is decided by the display duty, which is decided by the SBN6400G. For example, if the Display Start Line Register is programmed with 00010 (decimal 2) and display duty is 1/64, then Row2 of the Display Data Memory will be mapped to COM0 of LCD panel, Row3 to COM1, Row4 to COM2, ...Row62 to COM60, Row63 to COM61, ...Row0 to COM62, and finally Row1 to COM63, as illustrated in Fig. 9.

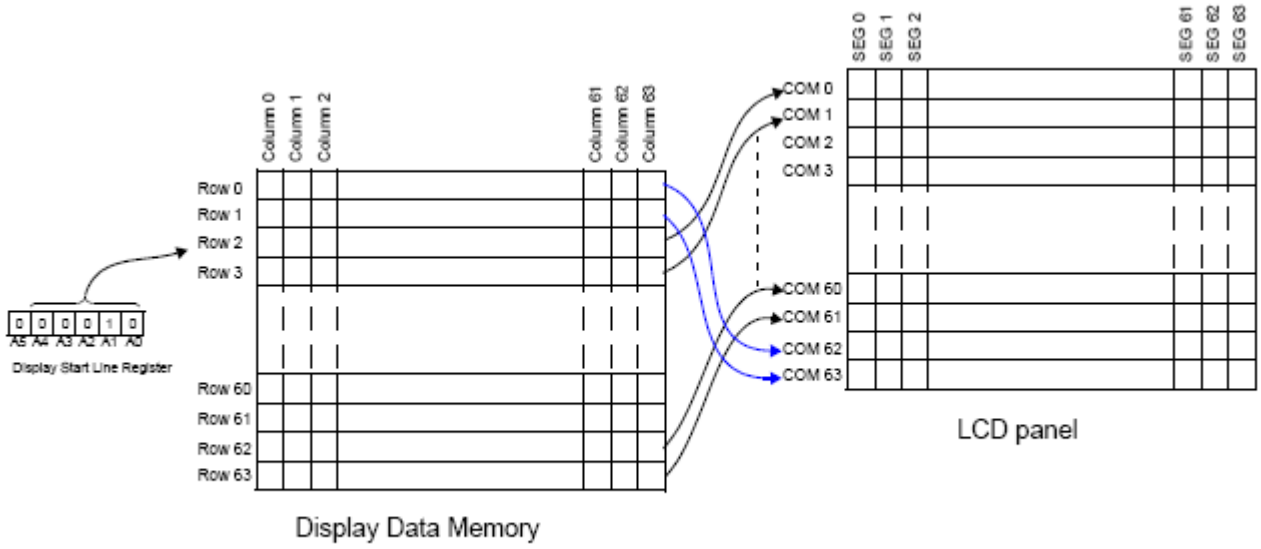


Fig.9 Display Start Line Register

To program this register, the setting of the control bus is given in Table8 and the setting of the data bus is given in Table9.

Table 8The setting of the control bus for programming the Display Start Line Register

$\overline{C}$/D	R/$\overline{W}$
0	0

Table 9The setting of the data bus for programming the Display Start Line Register

D7(MSB)	D6	D5	D4	D3	D2	D1	D0(LSB)
1	1	A5	A4	A3	A2	A1	A0

A5~A0 are Display Start Line address bits and can be programmed with a value in the range from 0 to 63. Therefore, the code can be from 1100 0000 (C0 Hex) to 1111 1111 (FF Hex).

●Mapping between Memory Columns and Segments

The mapping relation between the column outputs of the Display Data Memory and the Segment outputs SEG0~SEG63 is decided by the CSM (Column/Segment Mapping) input.

If CSM input is connected to HIGH, then data from column 0 of the Display Data Memory is output from SEG0. This type of mapping is called normal mapping.

If CSM input is connected to LOW, then the data from column 63 of the Display Data Memory is output from SEG0. This type of mapping is called inverted mapping.

By use of this input, the flexibility of component placement and routing on a PCB can be increased.

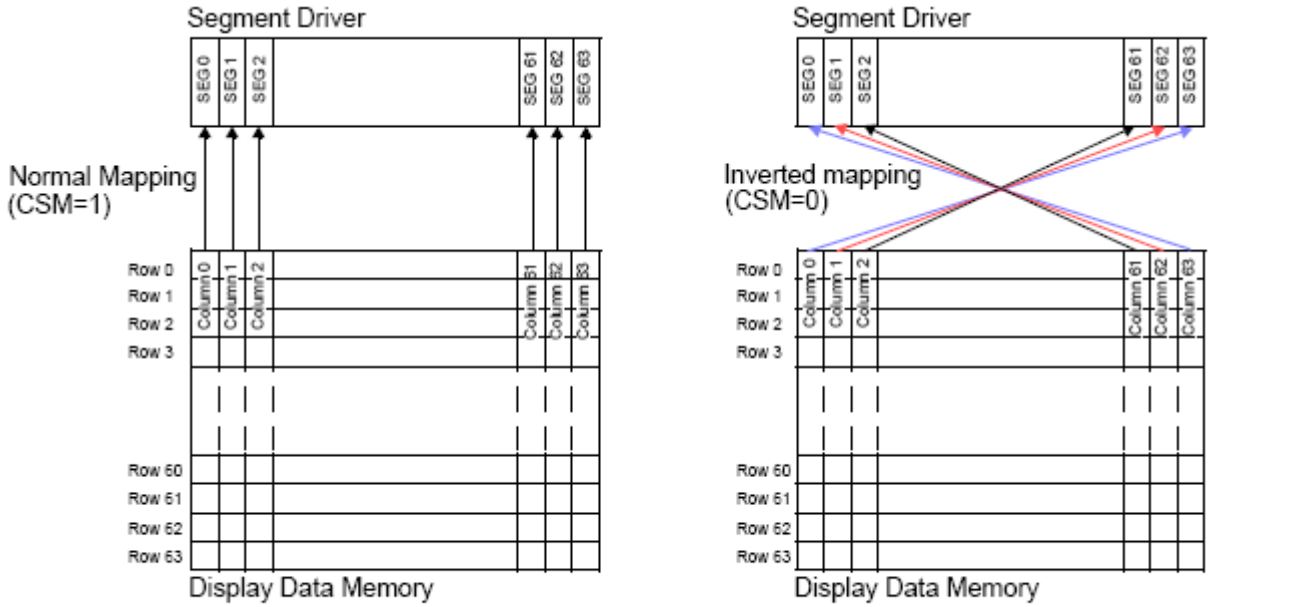


Fig.10 Column/Segment Mapping.

●Display Data Memory Page and the Page Address Register

The Display Data Memory is divided into 8 pages: Page0~ Page7, with each page having 64 bytes in horizontal direction. Page 0 is from Row 0 to Row 7, Page 1 from Row 8 to Row 15, Page 2 from Row 16 to Row 23, and Page 3 from Row 24 to Row 31,...etc, as shown in Fig 11. When the host microcontroller intends to perform a READ/WRITE operation to the Display Data Memory, it has to program the Page Address Register to indicate which page it intends to access.

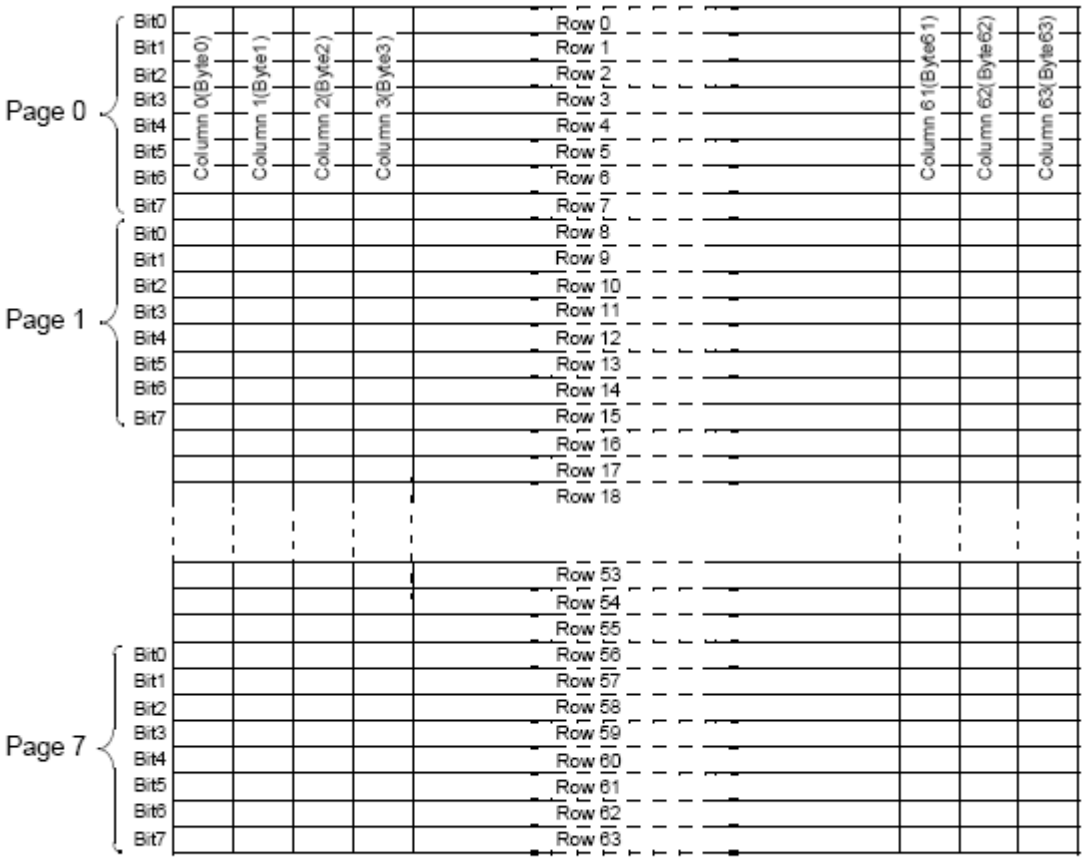


Fig.11 Page/Column address of the Display Data Memory

To program this register, the setting of the control bus is given in Table 10 and the setting of the data bus is given in Table 11.

Table 10The setting of the control bus for programming the Page Address Register

$\overline{C}$/D	R/$\overline{W}$
0	0

Table 11The setting of the data bus for programming the Page Address Register

D7(MSB)	D6	D5	D4	D3	D2	D1	D0(LSB)
1	0	1	1	1	A2	A1	A0

A2, A1and A0 are page address bits and can be programmed with a value in the range from 0 to 7. A2 A1A0=000 selects Page0; A2A1A0=001 selects Page1; A2A1A0=010 selects Page2, and A2A1A0=011 selects Page3...etc. Therefore, the code can be from 1011 1000 (B8 Hex) to 1011 1111 (BF Hex).

●Column address and the Column Address Register

The Column Address Register points at a column of the Display Data Memory which the host

microcontroller intends to perform a READ/WRITE operation. To read or write a byte of the Display Data Memory, both its Page Address and Column Address must be specified.

The Column Address Register automatically increments by 1 after a READ or WRITE operation is finished. When the Column Address Register reaches 63, it overflows to 0. Please refer to Fig.11 for the column address sequence in a page of the Display Data Memory.

To program this register, the setting of the control bus is given in Table 12 and the setting of the data bus is given in Table 13.

Table 12 The setting of the control bus for programming the Column Address Register

$\overline{C}$/D	R/$\overline{W}$
0	0

Table 13The setting of the data bus for programming the Column Address Register

D7(MSB)	D6	D5	D4	D3	D2	D1	D0(LSB)
0	1	A5	A4	A3	A2	A1	A0

A5~A0 are column address bits and can be programmed with a value in the range from 0 to 63. Therefore, the code can be from 0100 0000 (40 Hex) to 0111 1111 (7F Hex).

●Status Read and Status Register

The Status Register shows the current state of the SBN0064G. It can be read by the host microcontroller. Bits4,5,7 shows the current status and Bits0~3,and6 are always fixed at 0.

To read the Status Register, the setting of the control bus is given in Table14; the bit allocation is given in Table 15; the description for each bit is given in Table 16.

Table 14The setting of the control bus for reading the Status Register

$\overline{C}$/D	R/$\overline{W}$
0	1

Table 15 The Status Register bit allocation

D7(MSB)	D6	D5	D4	D3	D2	D1	D0(LSB)
BUSY	0	ON/OFF	RESET	0	0	0	0

Table 16 The Status Register bit description

Bit	Description
BUSY	BUSY=1 indicates that the SBN0064G is currently busy and can not accept new code or data. The SBN0064G is executing an internal operation. BUSY=0 indicates that the SBN0064G is not busy and is ready to accept new code or data.
ON/OFF	The ON/OFF bit indicates the current of status of display. If ON/OFF=0, the display has been turned ON. If ON/OFF=1, the display has been turned OFF. Note that the polarity of this bit is inverse to that of the Display ON/OFF Register.
RESET	RESET=1 indicates that the SBN0064G is currently in the process of being reset. RESET=0 indicates that the SBN0064G is currently in normal operation.

5.4 READ OR WRITE OPERATION TO THE DISPLAY DATA MEMORY

READ or WRITE operation to the Display Data Memory is shown in Table 17. When performing a READ or WRITE operation, the host microcontroller should give the control bus C/D, E, and R/W proper value and timing.

Table 17 READ/WRITE operation

Operation	DATA								Description
	D7	D6	D5	D4	D3	D2	D1	D0	
Write Display Data	Data to be written into the Display Data Memory.								Write a byte of data to the Display Data Memory. The data to be written is put on the data bus by the host microcontroller.
Read Display Data	Data read from the Display Data Memory output latch.								Read a byte of data from the Display Data Memory. The data read from the internal 8-bit output latch (refer to Fig. 12) appears on the data bus. A dummy read is needed to get correct value.

5.4.1 Write Display Data

The Write Display Data operation writes a byte (8 bits) of data to the Display Data Memory. Data is put on the data bus by the host microcontroller. The location which accepts this byte of data is pointed to by the Page Address Register and the Column Address Register. At the end of the operation, the content of the Column Address Register is automatically incremented by 1.

For page address and column address of the Display Data Memory, please refer to Fig. 11.

Table 18 gives the control bus setting for this command.

Table 18The setting of the control bus for Write Display Data operation

$\overline{C}$/D	R/$\overline{W}$
1	0

5.4.2 Read Display Data

The Read Display Data operation is a 3-step operation.

1. First, the current data of the internal 8-bit output latch of the Display Data Memory is read by the microcontroller, via the 8-bit data bus DB0~DB7.
2. Then, a byte of data of the Display Data Memory is transferred to the 8-bit output latch from a location specified by the Page Address Register and the Column Address Register,
3. Finally, the content of the Column Address Register is automatically incremented by one.

Fig.12 shows the internal 8-bit output latch located between the 8-bit I/O data bus and the Display Data Memory cell array. Because of this internal 8-bit output latch, a dummy read is needed to obtain correct data.

For Display Data Write operation, a dummy write is not needed, because data can be directly written from the data bus to internal memory cells.

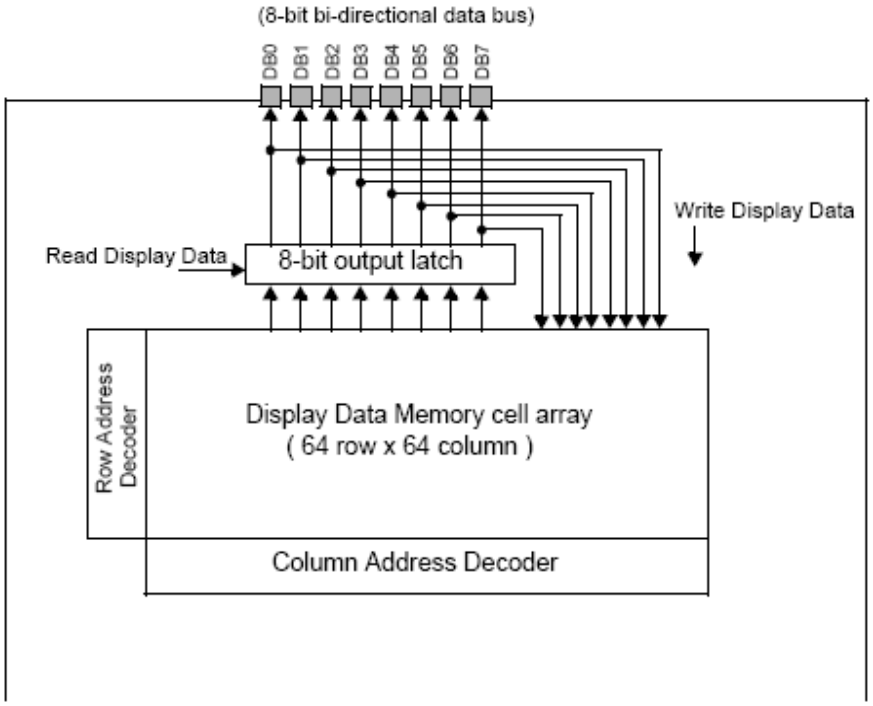


Fig.12 Read Display Data Memory

Table 19 gives the control bus setting for this command.

Table 19 The setting of the control bus for Read Display Data command

$\overline{C}$/D	R/$\overline{W}$
1	1

6. QUALITY SPECIFICATIONS

6.1 ACCEPTABLE QUALITY LEVEL

Inspection items	Sampling procedures	AQL
Visual-operating (Electro-optical)	GB2828-81 Inspection level Ⅱ Normal inspection Single sample inspection	0.65
Visual-not operating	GB2828-81 Inspection level Ⅱ Normal inspection Single sample inspection	1.5
Dimension measurement	GB2828-81 Inspection level Ⅱ Normal inspection Single sample inspection	1.5

6.2 INSPECTION CONDITIONS（THE ENVIRONMENTAL）

-Room temperature: 25±3 ℃
-Humidity: 65±20%RH

6.3 INSPECTION STANDARDS

6.3.1 VISUAL WHILE OPERATING

Items to be inspected	Inspection standard
. No display	. If any pattern is not active at all, they can be rejected.
. Irregular operating	. No irregular operating are allowed . Appeared different display, which they should be chosen in the pattern, or appeared in different position where they should be chosen.
.Irregular display	. Any segment doesn't active, they can be rejected.
. Over current	. The total current required to activate the module should not be exceed the MAX current in specification.
.View angles	. Valves that don't meet the minimum value noted in the specification. they can be rejected.
.Contrast	. Valves that don't meet the minimum value noted in the specification, they can be reject.
.LCD operate voltage	. Meet the specification.

6.3.2Visual while not operating

Module dimension	. Meet the module outline drawing, not exceed the tolerance.
LCD panel scratch	.Following scratches inside the effective viewing area considered as the defects when their width & length are larger than the following combinations. Number: one or more Width: 0.15 length: 5.0 two or more Width: 0.10 length: 3.0 three or more Width: 0.05 length: 2.0 When the defects exceed this, it can be rejected.

7.RELIABILITY

Test Item	Content of Test	Test Condition
High temperature storage	Endurance test applying the high storage temperature for a long time	60℃ 120hrs
Low temperature storage	Endurance test applying the low storage temperature for a long time	-10℃ 120hrs
High temperature operation	Endurance test applying the electic stress（Voltage and Current）and the thermal stress to the element for a long time	50℃ 120hrs
Low temperature operation	Endurance test applying the electic stress under low temperature for a long time	0℃ 120hrs
High temperature /Humidity storage	Endurance test applying the high temperature and high humidity storage for a long time	60℃,90%RH 120hrs
Temperature cycle	Endurance test applying the low and high Temperature cycle -10℃→25℃→60℃ 30min←5min←30min 1 cycle	-10℃/60℃ 10 cycle
Vibration test	Endurance test applying the vibration during transportation and using	10~55Hz 1.5mmp-p One cycle 60 seconds to 3 directions of X,Y,Z

Note 1: Condensation of water is not permitted on the module.

Note 2: The module should be inspected after 4 hours storage in normal

8.TEST REPORT

（VDD=+5V ,Ta=25℃）

Item	Condition	Standard	Note
High temp. storage	80℃,120 hrs	Appearance without defect	---
Low temp. storage	–30℃,120 hrs	Appearance without defect	---
High temp. operation	70℃,120 hrs	Appearance without defect	---
Low temp. operation	–20℃,120 hrs	Appearance without defect	---
High temp. & humi. Storage	60℃,90% RH,120 hrs	Appearance without defect	---
Thermal shock	-10℃,30min→+25℃, 5min→+60℃,30min	Appearance without defect	10 cycles

9. PRECAUTIONS FOR USING LCD MODULES

9.1 Precaution

To our module ,we have made accurately assembly and debugging .So customer should do as follows:

（1）Modules use LCD elements, so we must be treated as such avoid intense shock 、impact 、extrusion and falls from a height.

（2）Avoid to twist and disassemble module's buckle legs.

（3）Avoid to operate modules on the table if it's surface have printed circuit

（4）Avoid to touch 、adjust and modify the rubber that connects LCD and PCB.

（5）Liquid crystal is harmful Substances .When liquid crystal leaked out and contacted to your hand、body or clothes ,you must wash it immediately with soap.

9.2 Caution Of Mounting

The panel of the LCD module consists of two thin glass plates with polarizes which easily get damaged since the module is fixed by utilizing fitting holes in the printed circuit board. Extreme care should be taken when handling the LCD modules.

9.3 Caution Of LCD Handling & Cleaning

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

-Isopropyl alcohol

-Ethyl alcohol

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

Do not use the following solvent:

-Water

-Ketone

- Aromatics

9.4 Caution Against Static Charge

The LCD modules use COMS LSI drivers. So we recommend that you connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on and ground your body. work/assembly table. And assembly equipment to protect against static electricity. the following ways are recommended.

（1） If you doesn't intend to mount,please don't take module from bag.The module's packaging bag is handled by antistatic technology.

（2） If you intend to operate module that you must make sure your body is good grounding , keeping your body and module at the same level.

（3） The operating equipment requires to good grounding , especially the driver .In order to avoid interference we must make sure good grounding and no leakage.

（4） Each module have a protective film .It is used to avoid the polaroid LCD is scratched or polluted .Please peel off the Protective Film slowly ,or else will produce static .

（5） The humidity range at workshop: 50 ~ 60% RH

9.5 Current Protection Devices

Module was not equipped with current protection devices, so we must prepared the current protection devices for using.

9.6 Caution For Operation

-It is indispensable to drive LCM within the specified voltage limit since the higher voltage than the limit shortens LCM life.

-Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD show dark color in them.

However those phenomena do not mean malfunction or out of order with LCD, which will come back in the specified operating temperature range.

-If the display area is pushed hard during operation. Some font will be abnormally displayed but it resumes normal condition after turning off once.

-A slight dew depositing on terminals is a cause for Electro-chemical reaction resulting in terminal open circuit.

Under the maximum operating temperature, 50%RH or less is required

9.7 Caution For Soldering

If need soldering,we must notice as follows:

※ Except the connect position of INPUT and OUTPUT doesn’t allow to soldering.

※ Soldering iron required to be insulated.

（1）Soldering Conditions:

Iron Temperature : 280℃±10℃

Soldering Time: < 3-4S

Soldering Materials: Low melting point, can be fully molten solder

（2）Caution for repeat soldering:

Because connect line is through module's pad connected to module. Removing the line we

must wait until the solder is completely melted . If solder doesn't completely melted , it is easily lead to the pad damage or loss.Using " XI QIANG" is the best way to remove the connect line .Besides, we must notice that repeat soldering doesn't allow more than three time.

9.8 Packaging And Storage

When module needs to store a long time ,we should do as follows.If storage method is improper,it will have an effect on the Polaroid ,causing display not good.Meanwhile pads are easily oxidized lead to soldering didn't easily .

（1）As far as possible to use the original packaging bag.
（2）If we intend to store bulk modules ,we should put them in anti-static bag and sealing .
（3）To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity.
（4）The reasonable storage method is low humidity, temperature in 0℃ to 35℃
（5）Storing with no touch on polarizes surface by the anythingelse.

10.PRECAUTIONS FOR CUSTOMER

（1）A limit sample should be provided by the both parties on an occasion when the both parties agree its necessity.Judgement by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.
（2）On the following occasions, the handling of problem should be decided through discussion and agreement between representative of the both parties.
-When a question is arisen in this specification.
-When a new problem is arisen which is not specified in this specifications.
-When an inspection specification change or operating condition change in customer is reported to TSINGTEK, and some problem is arisen in this specification due to the change.
-When a new problem is arisen at the customer's operating set for sample evaluation in the customer size.