OCM16096-2 图形点阵液晶显示模块

使用说明书

感谢您关注和使用我们的液晶显示器产品， 欢迎您提出您的要求、意见和建议，我们将竭诚为您服务、让您满意。您可以浏览 www.shsixian.com了解最新的产品与应用信息,或拨打热线电话 021-53083613 以及向sx@shsixian.com 邮箱发 E-mail 获取具体的技术咨询与服务

上海思先电子有限公司

Shanghai Sixian Electronics Co; Ltd.

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1、 产品简介

主要工艺：COG
显示内容：160X96 点阵
显示模式：STN，POSITIVE
驱动条件：**1/96Duty,1/9Bias**
视向：6：00
背光：LED，白色
工作温度：-20℃**-+70**℃
储存温度：**-30**℃**-+80**℃
驱动 **IC**：**S6B0719**
辅助字库 **IC**：标准字库 **IC**

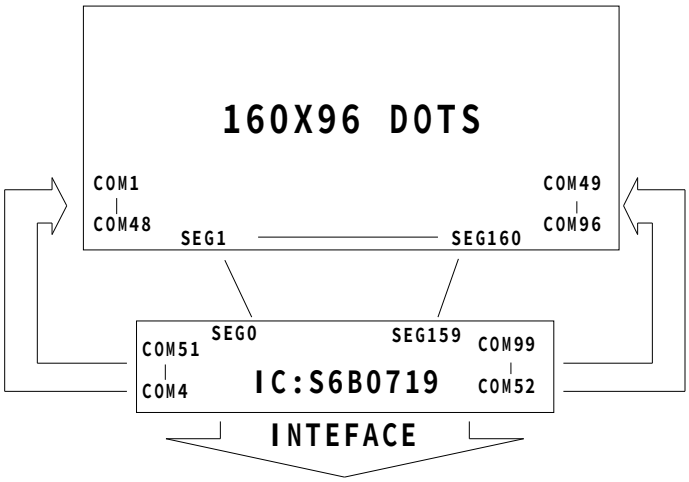
2、 引用文件

S6B0719 规格书
标准汉字字库芯片使用手册

3、机械特性

类别	标准值	单位
模块	**71.6**（w）**X60.6(h)X9.2(t)Max**	mm
有效显示区	**62.0(w)X36.0(h)**	mm
点大小	**0.35(w)X0.33(h)**	mm
点间隙	**0.02 (w)X0.02 (h)**	mm

4、产品框图



5、光电特性

类别	符号	条件	最小值	TYP	最大值	单位
驱动电压	Vop.	25℃	8.8	9.0	9.2	V
响应时间	Ton	25℃	—	127	400	Ms
对比度	Toff	25℃	—	263	400	Ms
	CR	25℃	—	9	—	—
视角范围		25℃	—	88	—	DEG
交叉效应		25℃	—	1.2	—	—

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6、极限参数

参数	符号	最小值	最大值	单位
逻辑电压	Vdd	-0.3	+3.3	V
驱动电压	Vout,VO	-0.3	-10.8	V
工作温度	Top	-20	+70	℃
存储温度	Tst	-30	+80	℃

7、接口时序

Read / Write Characteristics (8080-series MPU)

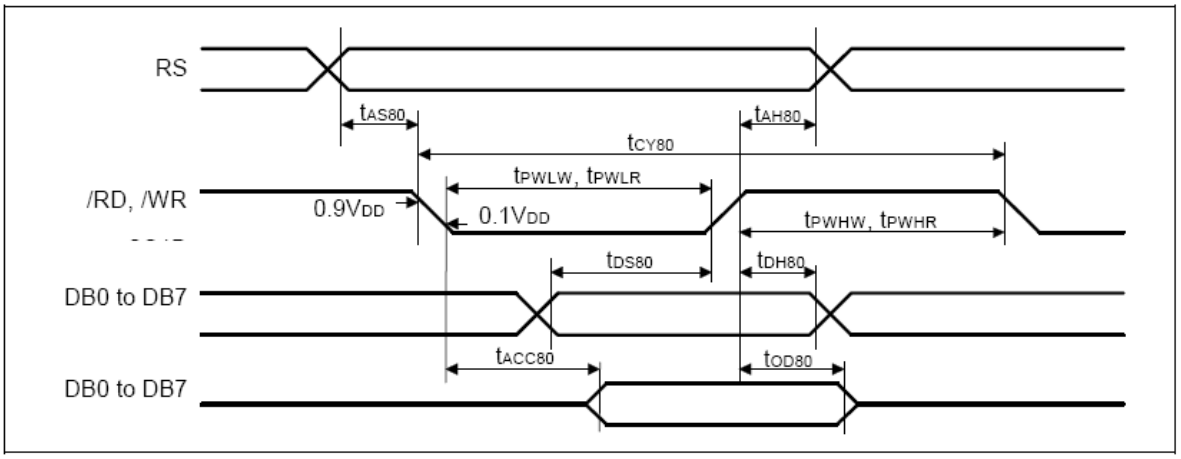

Figure 39. Parallel Interface (8080-series MPU) Timing Diagram

Table 27. AC Characteristics (8080-series Parallel Mode)

(V_{DD} = 2.4 ~ 3.6V, Ta = -40 ~ +85°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time Address hold time	RS	t_{AS80} t_{AH80}		0 0	- -	ns
System cycle time		t_{CY80}		300	-	ns
Pulse width low for write Pulse width High for write	RW_WR (/WR)	t_{PWLW} t_{PWHW}		60 60	- -	ns
Pulse width low for read Pulse width high for read	E_RD (/RD)	t_{PWLR} t_{PWHR}		120 60	- -	ns
Data setup time Data hold time	DB0 to DB7	t_{DS80} t_{DH80}		40 15	- -	ns
Read access time Output disable time		t_{ACC80} t_{OD80}	CL = 100 pF	- 10	140 100	ns

NOTE: *1. The input signal rise time and fall time (tr, tf) is specified at 15 ns or less.
(tr + tf) < (tCY80 - tPWLW - tPWHW) for write, (tr + tf) < (tCY80 - tPWLR - tPWHR) for read

Read / Write Characteristics (6800-series Microprocessor)

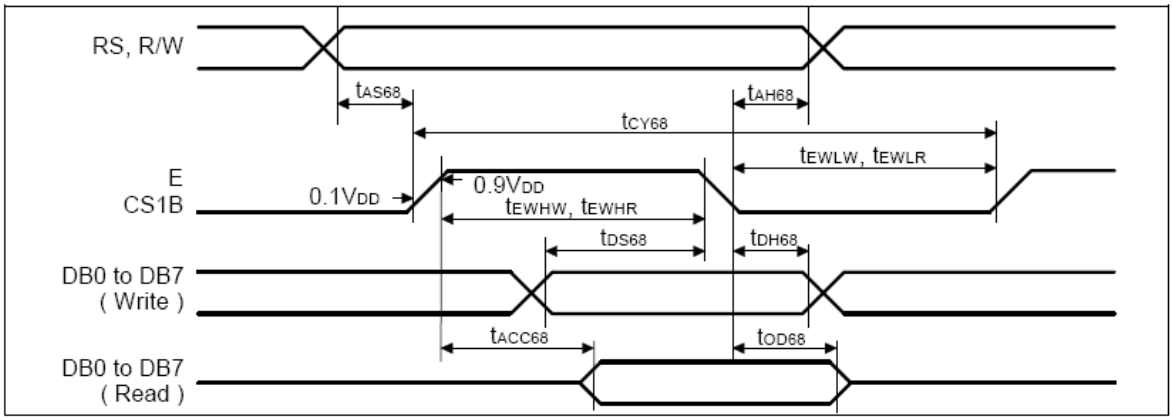

Figure 40. Parallel Interface (6800-series MPU) Timing Diagram

Table 28. AC Characteristics (6800-series Parallel Mode)

(V_{DD} = 2.4 ~ 3.6V, Ta = -40 ~ +85°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time Address hold time	RS RW	t_{AS68} t_{AH68}		0 0	- -	ns
System cycle time		t_{CY68}		300	-	ns
Enable width high for write Enable width low for write	E_RD (E)	t_{EWHW} t_{EWLW}		60 60	- -	ns
Enable width high for read Enable width low for read	E_RD (E)	t_{EWHR} t_{EWLR}		120 60	- -	ns
Data setup time Data hold time	DB0 to DB7	t_{DS68} t_{DH68}		40 15	- -	ns
Read access time Output disable time		t_{ACC68} t_{OD68}	C_L = 100 pF	- 10	140 100	ns

NOTE: *1. The input signal rise time and fall time (tr, tf) is specified at 15 ns or less.
(tr + tf) < (tCY68 - tEWHW - tEWLW) for write, (tr + tf) < (tCY68 - tEWHR - tEWLR) for read

Serial Interface Characteristics

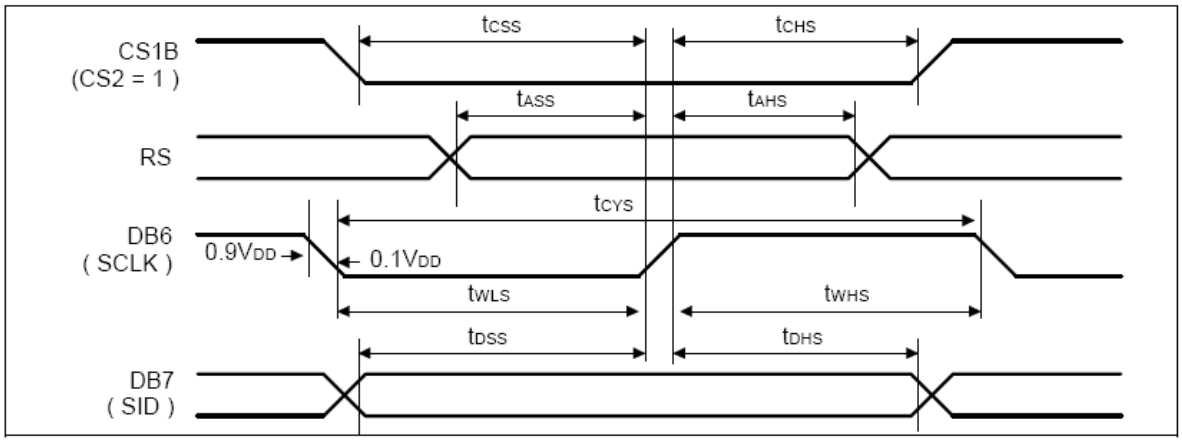

Figure 41. Serial Interface Timing Diagram

Table 29. AC Characteristics (Serial Mode)

(V_{DD} = 2.4 ~ 3.6V, Ta = -40 ~ +85°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock cycle SCLK high pulse width SCLK low pulse width	DB6 (SCLK)	t_{SCY} t_{SHW} t_{SLW}		250 100 100	- - -	ns
Address setup time Address hold time	RS	t_{ASS} t_{AHS}		150 150	- -	ns
Data setup time Data hold time	DB7 (SID)	t_{DSS} t_{DHS}		100 100	- -	ns
CS1B setup time CS1B hold time	CS1B	t_{CSS} t_{CHS}		150 150	- -	ns

Reset Input Timing

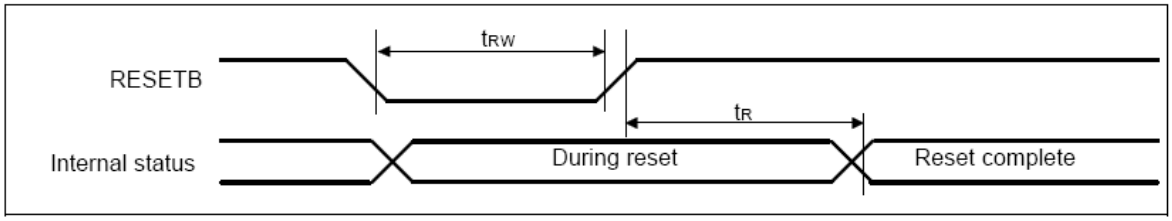

Figure 42. Reset Input Timing Diagram

Table 30. AC Characteristics (Reset mode)

(V_{DD} = 2.4 ~ 3.6V, Ta = -40 ~ +85°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Reset low pulse width	RESETB	t_{RW}		1000	-	ns
Reset time	-	t_R		-	1000	ns

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8、直流特性（VDD=2.84V）

(VSS = 0V, VDD = 2.4 to 3.6V, Ta = -40~85°C)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Pin used
Operating voltage (1)		V_{DD}		2.4	-	3.6	V	V_{DD} *1
Operating voltage (2)		V0		4.0	-	15.0	V	V0, *2
Input voltage	High	V_{IH}		0.8V_{DD}	-	V_{DD}	V	*3
	Low	V_{IL}		V_{SS}	-	0.2V_{DD}		
Output voltage	High	V_{OH}	I_{OH} = -0.5mA	0.8V_{DD}	-	V_{DD}	V	*4
	Low	V_{OL}	I_{OL} = 0.5mA	V_{SS}	-	0.2V_{DD}		
Input leakage current		I_{IL}	V_{IN} = V_{DD} or V_{SS}	- 1.0	-	+ 1.0	µA	*3
Output leakage current		I_{OZ}	V_{IN} = V_{DD} or V_{SS}	- 3.0	-	+ 3.0	µA	*5
LCD driver ON resistance		R_{ON}	Ta = 25°C, V0 = 8V	-	2.0	3.0	kΩ	SEGn COMn *6
Frame frequency		f_{FR}	Ta = 25°C	70	85	100	Hz	*7 FR

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Pin used
Voltage converter circuit output voltage	VOUT	×3 / ×4 / ×5 / ×6 voltage conversion (no-load)	95	99	-	%	VOUT
Voltage regulator circuit operating voltage	VOUT		6.0	-	17.0	V	VOUT
Voltage follower circuit operating voltage	V0		4.0	-	15.0	V	V0 *8
Reference voltage	V_{REF}	Ta = 25°C	1.94	2.00	2.06	V	*9

(VDD = 3.0V, Ta = 25°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Pin used
Dynamic current consumption (1)	I_{DD1}	V0 - Vss = 7.0V, duty = 1/33			TBD	µA	*10
		V0 - Vss = 10.0V, duty = 1/65			TBD		
		V0 - Vss = 13.0V, duty = 1/105			TBD		

(VDD = 3.0V, Ta = 25°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Pin used
Dynamic current consumption (1)	I_{DD1}	V0 - Vss = 7.0V, duty = 1/33			TBD	µA	*10
		V0 - Vss = 10.0V, duty = 1/65			TBD		
		V0 - Vss = 13.0V, duty = 1/105			TBD		

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(VDD = 3.0V, Ta = 25°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Pin used
Dynamic current consumption (2)	IDD2	V0 - Vss = 7.0V, X3 boosting, duty = 1/33, normal mode	-	-	TBD	μA	*10
		V0 - Vss = 7.0V, X3 boosting, duty = 1/33, high power mode	-	-	TBD		
		V0 - Vss = 10.0V, X4 boosting, duty = 1/65, normal mode	-	-	TBD	μA	*10
		V0 - Vss = 10.0V, X4 boosting, duty = 1/65, high power mode	-	-	TBD		
		V0 - Vss = 13.0V, X5 boosting, duty = 1/105, normal mode	-	-	TBD	μA	*10
		V0 - Vss = 13.0V, X5 boosting, duty = 1/105, high power mode	-	-	TBD		

(VDD = 3.0V, Ta = 25°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Pin used
Dynamic current consumption (2)	IDD2	V0 - Vss = 7.0V, X3 boosting, duty = 1/33, normal mode	-	-	TBD	μA	*10
		V0 - Vss = 7.0V, X3 boosting, duty = 1/33, high power mode	-	-	TBD		
		V0 - Vss = 10.0V, X4 boosting, duty = 1/65, normal mode	-	-	TBD	μA	*10
		V0 - Vss = 10.0V, X4 boosting, duty = 1/65, high power mode	-	-	TBD		
		V0 - Vss = 13.0V, X5 boosting, duty = 1/105, normal mode	-	-	TBD	μA	*10
		V0 - Vss = 13.0V, X5 boosting, duty = 1/105, high power mode	-	-	TBD		

(VDD = 3.0V, Ta = 25°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Pin used
Sleep mode current	IDDS1	During sleep	-	-	2	μA	
Standby mode current	IDDS2	During standby	-	-	10	μA	

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9、引脚描述

接口定义：

引脚编号	引脚名称	方向	引脚功能描述
1	VSS	I	逻辑电源地 0V
2	VDD	I	逻辑电源正 3.0V
3	RS	I	数据\指令选择：高电平：DB0-DB7 为显示数据 低电平：DB0-DB7 为操作指令
4	RW/WR	I	读/写控制脚：当接口定义为 6800 接口时，RW=H：读操作 RW=L：写操作 当接口定义为 8080 接口时，/WR 为写入控制脚
5	E/RD	I	当接口定义为 6800 接口时，为使能控制脚，E=H 有效 当接口定义为 8080 接口时，/RD 为读控制脚，低有效
6	DB0	I/O	数据输入输出引脚
7	DB1	I/O	数据输入输出引脚
8	DB2	I/O	数据输入输出引脚
9	DB3	I/O	数据输入输出引脚
10	DB4	I/O	数据输入输出引脚
11	DB5	I/O	数据输入输出引脚
12	DB6	I/O	数据输入输出引脚
13	DB7	I/O	数据输入输出引脚
14	/CS	I	片选择信号，低电平时有效
15	/RST	I	复位信号，低电平有效
16	/CE	I	片选输入，低有效（辅助 IC）
17	SCLK	I	串行时钟输入（辅助 IC）
18	SO	O	串行数据输出（辅助 IC）
19	SI	I	串行数据输入（辅助 IC）
20	BL（K）	-	背光电源,LED-（0V）

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10、命令描述

指令表：

× : Don't care

Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
Read display data	1	1	Read data								Read data from DDRAM
Write display data	1	0	Write data								Write data into DDRAM
Read status	0	1	BUSY	ADC	ON	RES	0	0	0	0	Read the internal status
Set page address	0	0	1	0	1	1	P3	P2	P1	P0	Set page address
Set column address MSB	0	0	0	0	0	1	Y7	Y6	Y5	Y4	Set column address MSB
Set column address LSB	0	0	0	0	0	0	Y3	Y2	Y1	Y0	Set column address LSB
Set modify-read	0	0	1	1	1	0	0	0	0	0	Set modify-read mode
Reset modify-read	0	0	1	1	1	0	1	1	1	0	release modify-read mode
Display ON / OFF	0	0	1	0	1	0	1	1	1	D	D = 0: display OFF D = 1: display ON
Set initial display line register	0	0	0	1	0	0	0	0	×	×	2-byte instruction to specify the initial display line to realize vertical scrolling
	0	0	×	S6	S5	S4	S3	S2	S1	S0	
Set initial COM0 register	0	0	0	1	0	0	0	1	×	×	2-byte instruction to specify the initial COM0 to realize window scrolling
	0	0	×	C6	C5	C4	C3	C2	C1	C0	
Set partial display duty ratio	0	0	0	1	0	0	1	0	×	×	2-byte instruction to set partial display duty ratio
	0	0	×	D6	D5	D4	D3	D2	D1	D0	
Set N-line inversion	0	0	0	1	0	0	1	1	×	×	2-byte instruction to set n-line inversion register
	0	0	×	×	×	N4	N3	N2	N1	N0	
Release N-line inversion	0	0	1	1	1	0	0	1	0	0	Release N-line Inversion mode
Reverse display ON / OFF	0	0	1	0	1	0	0	1	1	REV	REV = 0: normal display REV = 1: reverse display
Entire display ON / OFF	0	0	1	0	1	0	0	1	0	EON	EON = 0: normal display EON = 1: entire display ON

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Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
Power control	0	0	0	0	1	0	1	VC	VR	VF	Control power circuit operation
Select DC-DC step-up	0	0	0	1	1	0	0	1	DC1	DC0	Select the step-up of the internal voltage converter
Select regulator resistor	0	0	0	0	1	0	0	R2	R1	R0	Select internal resistance ratio of the regulator resistor
Set electronic volume register	0	0	1	0	0	0	0	0	0	1	2-byte instruction to specify the electronic volume register
	0	0	x	x	EV5	EV4	EV3	EV2	EV1	EV0	
Select LCD bias	0	0	0	1	0	1	0	B2	B1	B0	Select LCD bias
SHL select	0	0	1	1	0	0	SHL	x	x	x	COM bi-directional selection SHL = 0: normal direction SHL = 1: reverse direction
ADC select	0	0	1	0	1	0	0	0	0	ADC	SEG bi-directional selection ADC = 0: normal direction ADC = 1: reverse direction
Set static indicator mode	0	0	1	0	1	0	1	1	0	SM	2-byte instruction to specify the static indicator mode
Set static indicator register	0	0	x	x	x	x	x	x	S1	S0	
Oscillator ON start	0	0	1	0	1	0	1	0	1	1	Start the built-in oscillator
Set power save mode	0	0	1	0	1	0	1	0	0	P	P = 0: standby mode P = 1: sleep mode
Release power save mode	0	0	1	1	1	0	0	0	0	1	Release power save mode
Reset	0	0	1	1	1	0	0	0	1	0	Initialize the internal functions
NOP	0	0	1	1	1	0	0	0	1	1	*No operation*
Test instruction	0	0	1	1	1	1	x	x	x	x	*Don't use this instruction.*

指令介绍：

Read Display Data

8-bit data from Display Data RAM specified by the column address and page address can be read by this instruction. As the column address is incremented by 1 automatically after each this instruction, the microprocessor can continuously read data from the addressed page. A dummy read is required after loading an address into the column address register. Display data cannot be read through the serial interface.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
1	1	Read data							

Write Display Data

8-bit data of display data from the microprocessor can be written to the RAM location specified by the column address and page address. The column address is incremented by 1 automatically so that the microprocessor can continuously write data to the addressed page.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
1	0	Write data							

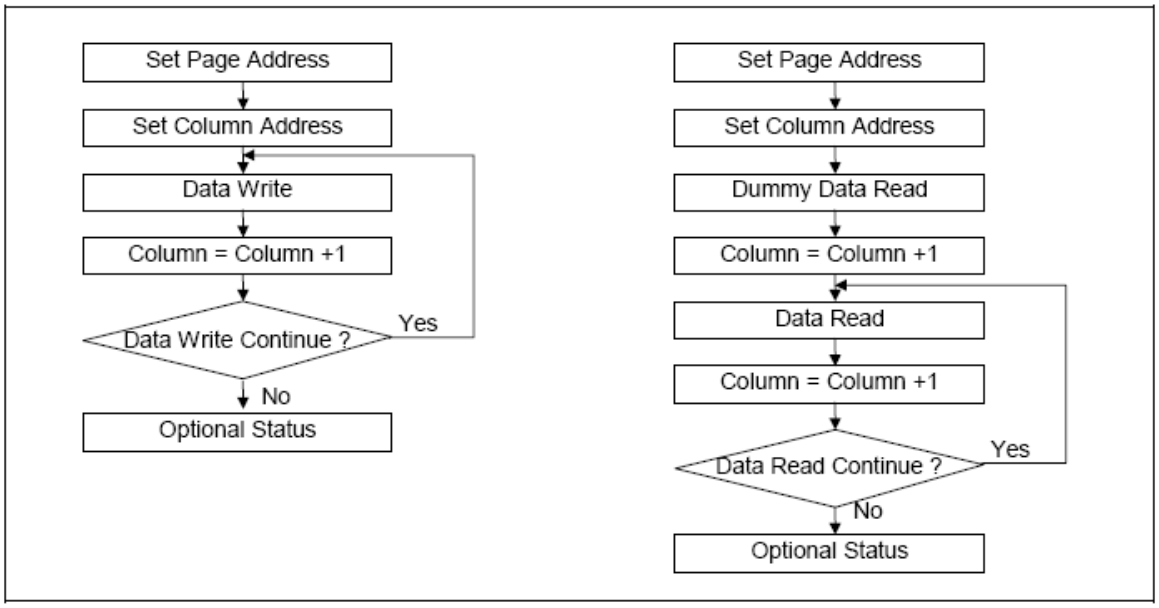

Figure 25. Sequence for Writing Display Data **Figure 26. Sequence for Reading Display Data**

Read Status

Indicates the internal status of the S6B0719

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	1	BUSY	ADC	ON	RES	0	0	0	0

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Flag	Description
BUSY	The device is busy when internal operation or reset Any instruction is rejected until BUSY goes Low. 0: chip is active, 1: chip is being busy.
ADC	Indicates the relationship between RAM column address and segment driver. 0: reverse direction (SEG159 → SEG0), 1: normal direction (SEG0 → SEG159)
ON	Indicates display ON / OFF status 0: display ON, 1: display OFF
RES	Indicates the initialization is in progress by RESETB signal 0: chip is active, 1: chip is being reset.

Set Page Address

Sets the Page Address of display data RAM from the microprocessor into the Page Address register. Any RAM data bit can be accessed when its Page Address and column address are specified. Along with the column address, the Page Address defines the address of the display RAM to write or read display data. Changing the Page Address doesn't effect to the display status.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	1	P3	P2	P1	P0

P3	P2	P1	P0	Selected page	Description
0	0	0	0	0	Accessible pages for displaying dot-matrix display data
0	0	0	1	1	
0	0	1	0	2	
:	:	:	:	:	
1	0	0	1	10	
1	0	1	0	11	
1	0	1	1	12	
1	1	0	0	13	Accessible page for displaying icons
1	1	0	1	14	Not accessible page.
1	1	1	0	15	Do not use these pages.

Set Modify-Read

This instruction stops the automatic increment of the column address by the read display data instruction, but the column address is still increased by the write display data instruction. And it reduces the load of microprocessor when the data of a specific area is repeatedly changed during cursor blinking or others. This mode is canceled by the reset Modify-read instruction.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	1	0	0	0	0	0

Reset Modify-Read

This instruction cancels the Modify-read mode, and makes the column address return to its initial value just before the set Modify-read instruction is started.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	1	0	1	1	1	0

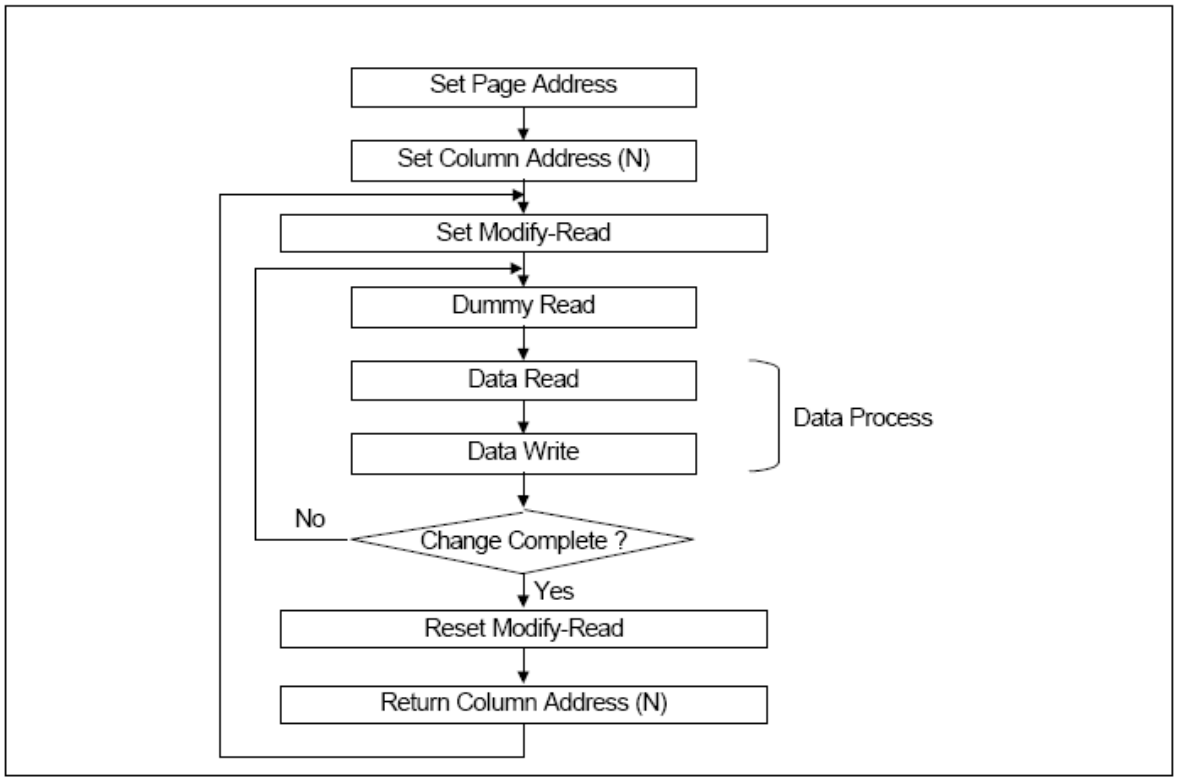


Figure 27. Sequence for Cursor Display

The 2nd Instruction

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	×	S6	S5	S4	S3	S2	S1	S0

Display ON / OFF

Turns the Display ON or OFF

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	0	1	1	1	D

D = 1: display ON
D = 0: display OFF

Set Initial Display Line Register

Sets the line address of display RAM to determine the initial display line using 2-byte instruction. The RAM display data is displayed at the top row (COM0) of LCD panel.

The 1st Instruction

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	1	0	0	0	0	×	×

The 2nd Instruction

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	×	S6	S5	S4	S3	S2	S1	S0

S6	S5	S4	S3	S2	S1	S0	Selected line address
0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	1
:	:	:	:	:	:	:	:
1	1	0	0	1	1	0	102
1	1	0	0	1	1	1	103
1	1	0	1	0	0	0	No operation
:	:	:	:	:	:	:	
1	1	1	1	1	1	1	

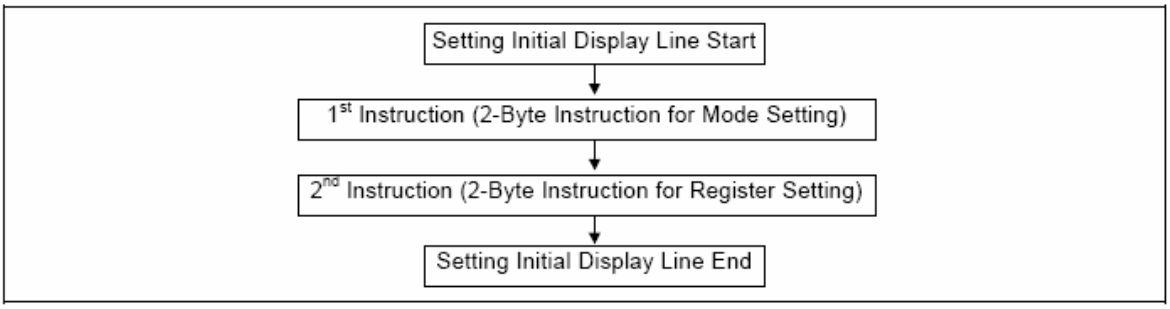


Figure 28. The Sequence for Setting the Initial Display Line

Set Initial COM0 Register

Sets the initial row (COM) of the LCD panel using the 2-byte instruction. By using this instruction, it is possible to realize the window moving without the change of display data.

The 1st Instruction

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	1	0	0	0	1	×	×

The 2nd Instruction

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	×	C6	C5	C4	C3	C2	C1	C0

C6	C5	C4	C3	C2	C1	C0	Initial COM0
0	0	0	0	0	0	0	COM0
0	0	0	0	0	0	1	COM1
0	0	0	0	0	1	0	COM2
:	:	:	:	:	:	:	:
1	1	0	0	1	0	1	COM101
1	1	0	0	1	1	0	COM102
1	1	0	0	1	1	1	COM103
1	1	0	1	0	0	0	No operation
:	:	:	:	:	:	:	
1	1	1	1	1	1	1	

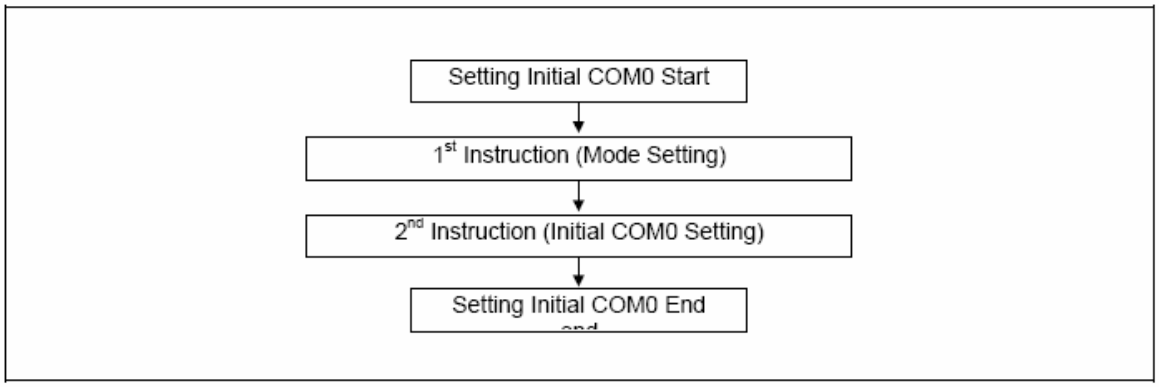


Figure 29. Sequence for Setting the Initial COM0

Set Partial Display Duty Ratio

Sets the duty ratio within range of 9, 17 and 32 to 105 to realize Partial Display by using the 2-byte instruction.

The 1st Instruction

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	1	0	0	1	0	×	×

The 2nd Instruction

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	×	D6	D5	D4	D3	D2	D1	D0

D6	D5	D4	D3	D2	D1	D0	Selected partial duty ratio
0	0	0	1	0	0	1	1/9
0	0	1	0	0	0	1	1/17
0	1	0	0	0	0	0	1/32
0	1	0	0	0	0	1	1/33
:	:	:	:	:	:	:	:
1	0	1	0	1	0	0	1/104
1	0	1	0	1	0	1	1/105
Other combinations							No operation

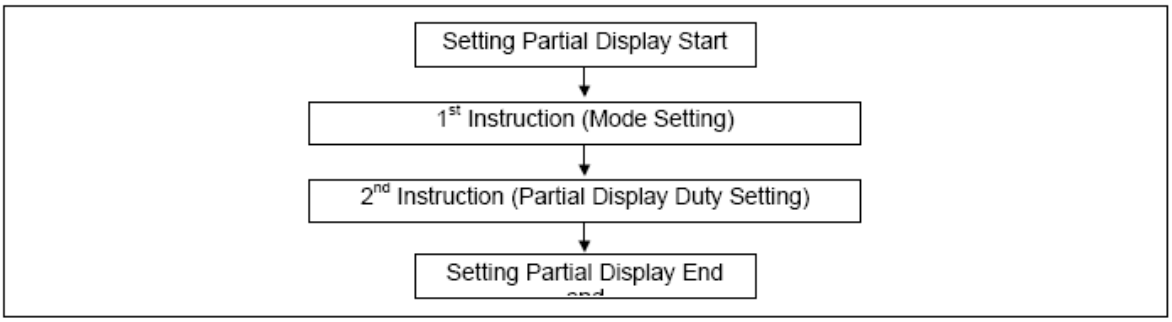


Figure 30. Sequence for Setting Partial Display

Set N-line Inversion Register

Sets the inverted line number within range of 2 to 32 to improve the display quality by controlling the phase of the internal LCD AC signal (M) by using the 2-byte instruction.

The 1st Instruction

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	1	0	0	1	1	×	×

The 2nd Instruction

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	**0**	×	×	×	**N4**	**N3**	**N2**	**N1**	**N0**

N4	N3	N2	N1	N0	Selected n-line inversion
0	0	0	0	0	0-line inversion (frame inversion)
0	0	0	0	1	2-line inversion
0	0	0	1	0	3-line inversion
0	0	0	1	1	4-line inversion
:	:	:	:	:	:
1	1	1	0	1	30-line inversion
1	1	1	1	0	31-line inversion
1	1	1	1	1	32-line inversion

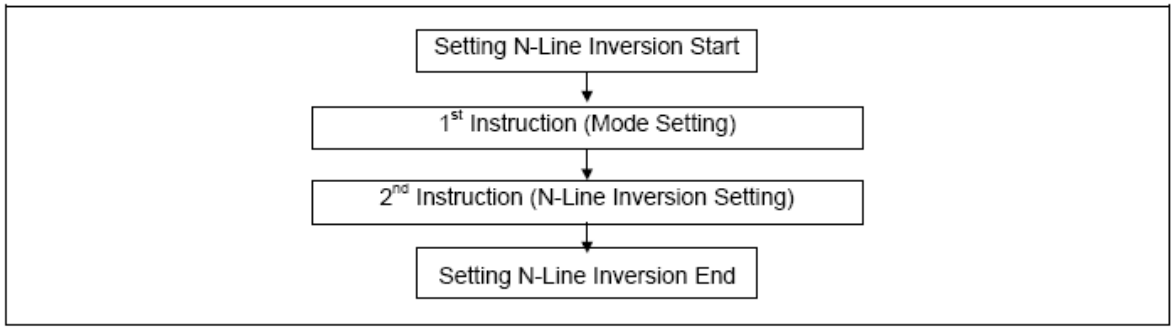


Figure 31. Sequence for Setting Partial Display

Release N-line Inversion

Returns to the frame inversion condition from the n-line inversion condition.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	1	0	0	1	0	0

Reverse Display ON / OFF

Reverses the display status on LCD panel without rewriting the contents of the display data RAM.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	0	0	1	1	REV

REV	RAM bit data = "1"	RAM bit data = "0"
0 (normal)	LCD pixel is illuminated	LCD pixel is not illuminated
1 (reverse)	LCD pixel is not illuminated	LCD pixel is illuminated

Entire Display ON / OFF

Forces the whole LCD points to be turned on regardless of the contents of the display data RAM. At this time, the contents of the display data RAM are held. This instruction has priority over the reverse Display ON / OFF instruction.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	0	0	1	0	EON

EON	RAM bit data = "1"	RAM bit data = "0"
0 (Normal)	LCD pixel is illuminated	LCD pixel is not illuminated
1 (Entire)	LCD pixel is illuminated	LCD pixel is illuminated

Power Control

Selects one of eight power circuit functions by using 3-bit register. An external power supply and part of internal power supply functions can be used simultaneously.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	1	0	1	VC	VR	VF

VC	VR	VF	Status of internal power supply circuits
0			Internal voltage converter circuit is OFF
1			Internal voltage converter circuit is ON
	0		Internal voltage regulator circuit is OFF
	1		Internal voltage regulator circuit is ON
		0	Internal voltage follower circuit is OFF
		1	Internal voltage follower circuit is ON

Select DC/DC Step-up

Selects one of 4 DC/DC step-up to reduce the power consumption by this instruction. It is very useful to realize the partial display function.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	1	1	0	0	1	DC1	DC0

DC1	DC0	Selected DC-DC converter circuit
0	0	3 times boosting circuit
0	1	4 times boosting circuit
1	0	5 times boosting circuit
1	1	6 times boosting circuit

Regulator Resistor Select

Selects resistance ratio of the internal resistor used in the internal voltage regulator. See voltage regulator section in power supply circuit. Refer to the table 15.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	1	0	0	R2	R1	R0

R2	R1	R0	[Rb / Ra] ratio
0	0	0	Small
0	0	1	:
:	:	:	:
1	1	0	:
1	1	1	Large

Set Electronic Volume Register

Consists of 2-byte instruction. The 1st instruction sets Electronic Volume mode, the 2nd one updates the contents of Electronic Volume register. After second instruction, Electronic Volume mode is released.

The 1st Instruction

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	0	0	0	0	0	1

The 2nd Instruction

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	×	×	EV5	EV4	EV3	EV2	EV1	EV0

EV5	EV4	EV3	EV2	EV1	EV0	Reference voltage (α)
0	0	0	0	0	0	0
0	0	0	0	0	1	1
:	:	:	:	:	:	:
1	1	1	1	1	0	62
1	1	1	1	1	1	63

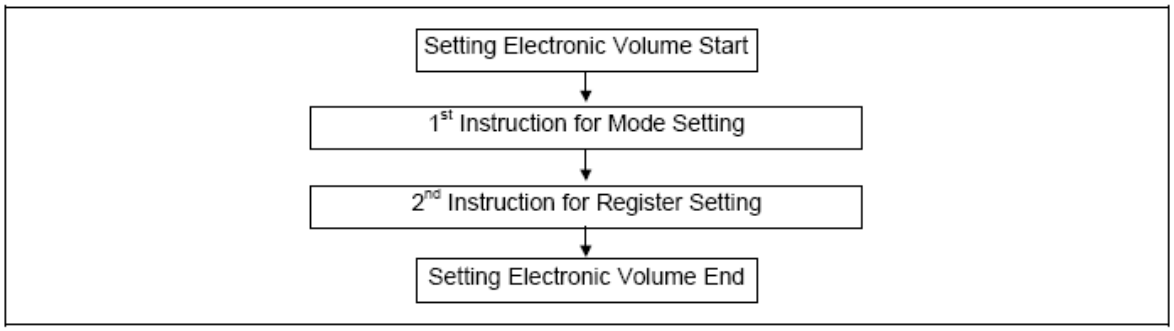


Figure 32. Sequence for Setting the Electronic Volume

Select LCD Bias

Selects LCD Bias ratio of the voltage required for driving the LCD.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	1	0	1	0	B2	B1	B0

B2	B1	B0	Selected LCD bias
0	0	0	1/4
0	0	1	1/5
0	1	0	1/6
0	1	1	1/7
1	0	0	1/8
1	0	1	1/9
1	1	0	1/10
1	1	1	1/11

SHL Select

COM output scanning direction is selected by this instruction which determines the LCD driver output status.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	0	0	SHL	×	×	×

SHL = 0: normal direction (COM0 → COM103)
SHL = 1: reverse direction (COM103 → COM0)

SHL Select

COM output scanning direction is selected by this instruction which determines the LCD driver output status.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	0	0	SHL	×	×	×

SHL = 0: normal direction (COM0 → COM103)
SHL = 1: reverse direction (COM103 → COM0)

ADC Select

Changes the relationship between RAM column address and segment driver. The direction of segment driver output pins can be reversed by software. This makes IC layout flexible in LCD module assembly.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	0	0	0	0	ADC

ADC = 0: normal direction (SEG0 → SEG159)
ADC = 1: reverse direction (SEG159 → SEG0)

Set Static Indicator State

Consists of two bytes instruction. The first byte instruction (set Static Indicator mode) enables the second byte instruction (set Static Indicator register) to be valid. The first byte sets the Static Indicator ON / OFF. When it is on, the second byte updates the contents of Static Indicator register without issuing any other instruction and this Static Indicator state is released after setting the data of indicator register.

The 1st Instruction: Set Static Indicator Mode (ON / OFF)

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	0	1	1	0	SM

SM = 0: static indicator OFF
SM = 1: static indicator ON

The 2nd Instruction: Set Static Indicator Register

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	×	×	×	×	×	×	S1	S0

S1	S0	Status of static indicator output
0	0	OFF
0	1	ON (about 0.5 second blinking)
1	0	ON (about 1 second blinking)
1	1	ON (always ON)

Oscillator ON Start

This instruction enables the built-in oscillator circuit.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	0	1	0	1	1

Reset

This instruction resets initial display line, column address, page address, and common output status select to their initial status, but dose not affect the contents of display data RAM. This instruction cannot initialize the LCD power supply that is initialized by the RESETB pin.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	1	0	0	0	1	0

Power Save

The S6B0719 enters the Power Save status to reduce the power consumption to the static power consumption value and returns to the normal operation status by the following instructions.

Set Power Save Mode

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	0	1	0	0	P

P = 0: standby mode
P = 1: sleep mode

Release Power Save Mode

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	1	0	0	0	0	1

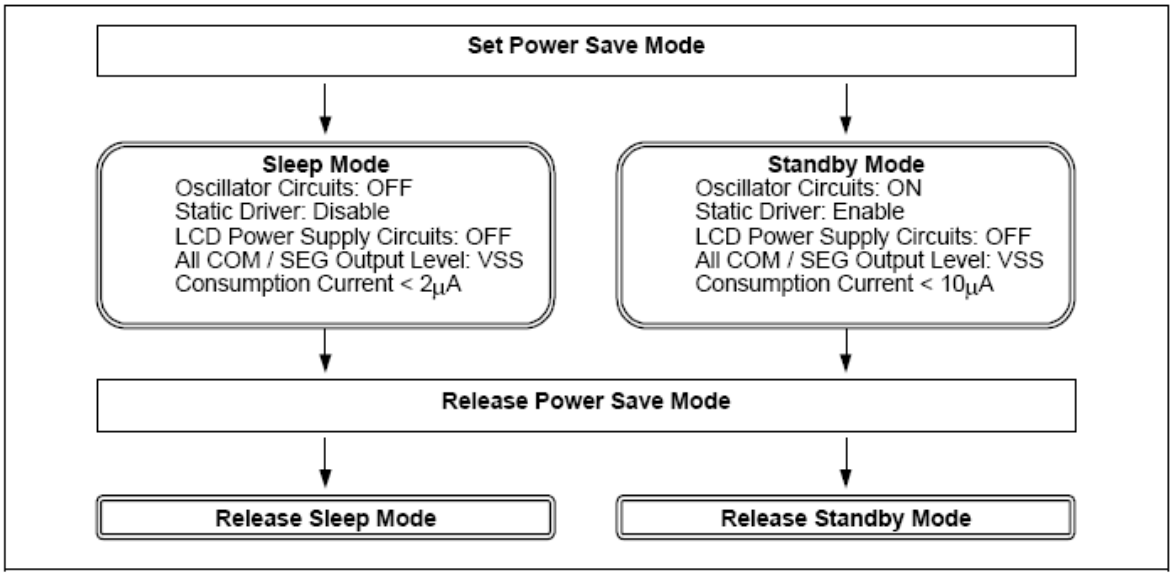


Figure 33. Power Save Routine

NOP

Non-operation

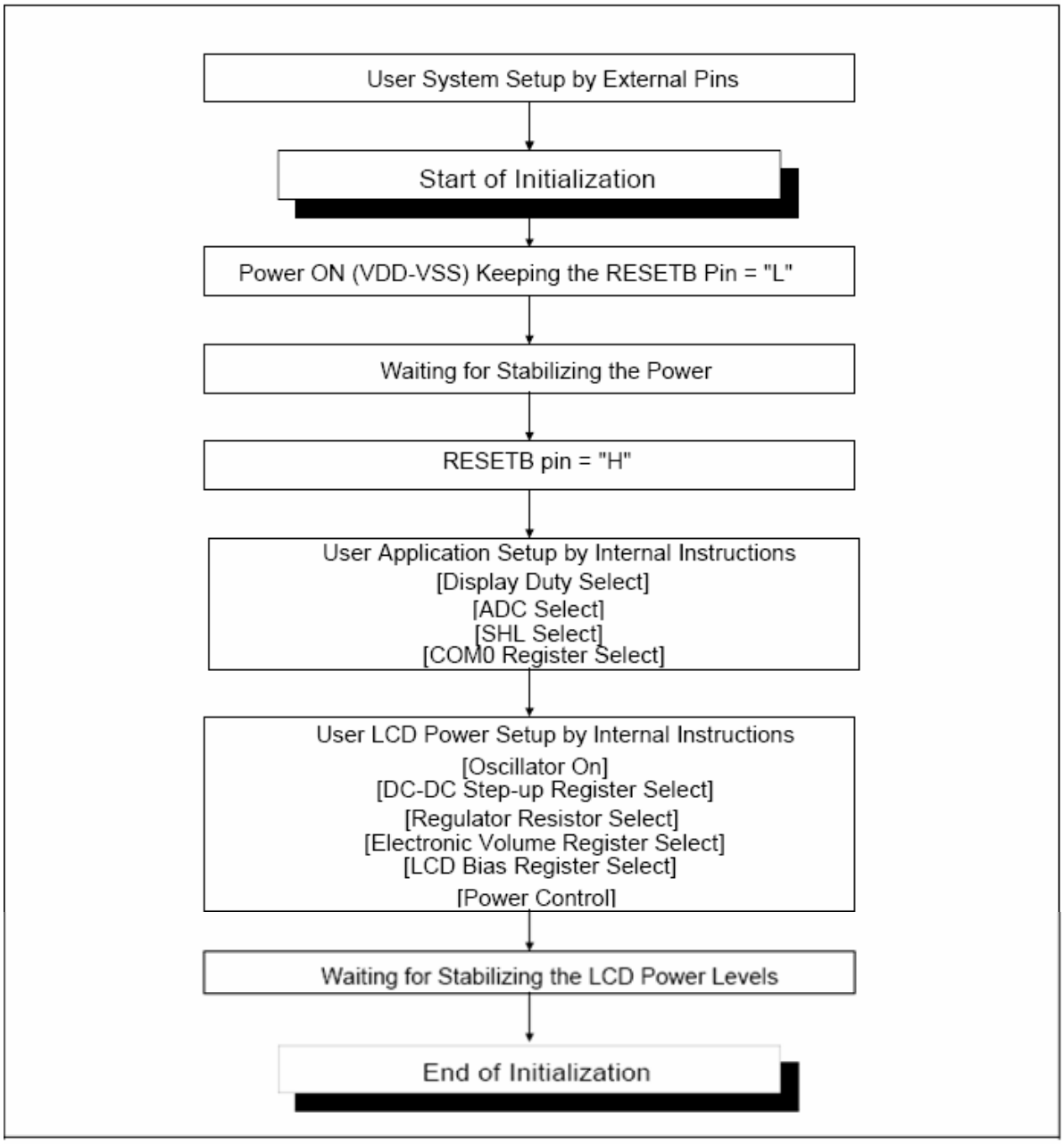
RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	1	0	0	0	1	1

Test Instruction

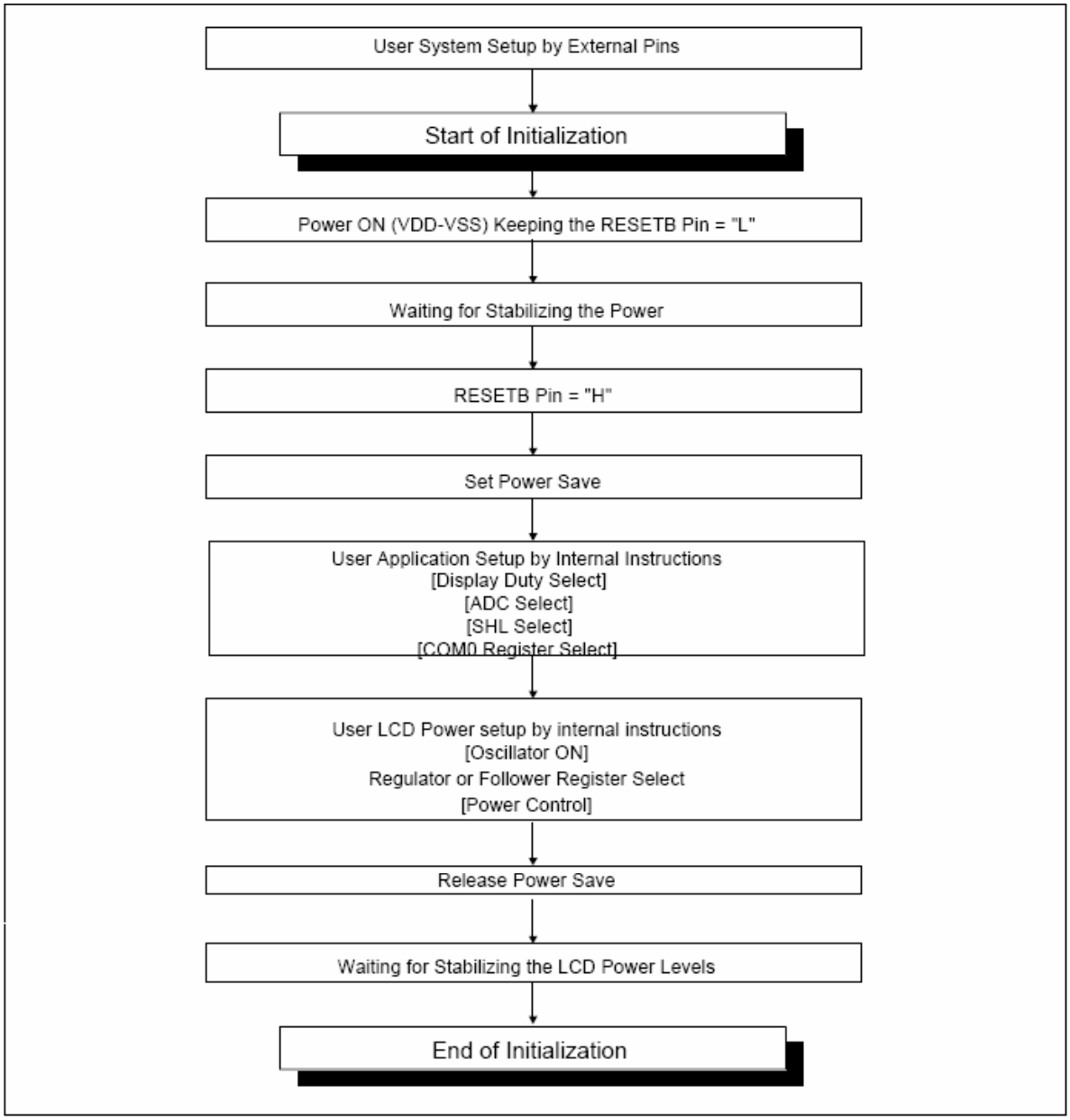
This instruction is for testing IC. Please do not use it.

RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	1	1	×	×	×	×

Referential Instruction Setup Flow: Initializing with the Built-in Power Supply Circuits



Referential Instruction Setup Flow: Initializing without the Built-in Power Supply Circuits



Referential Instruction Setup Flow: Data Displaying

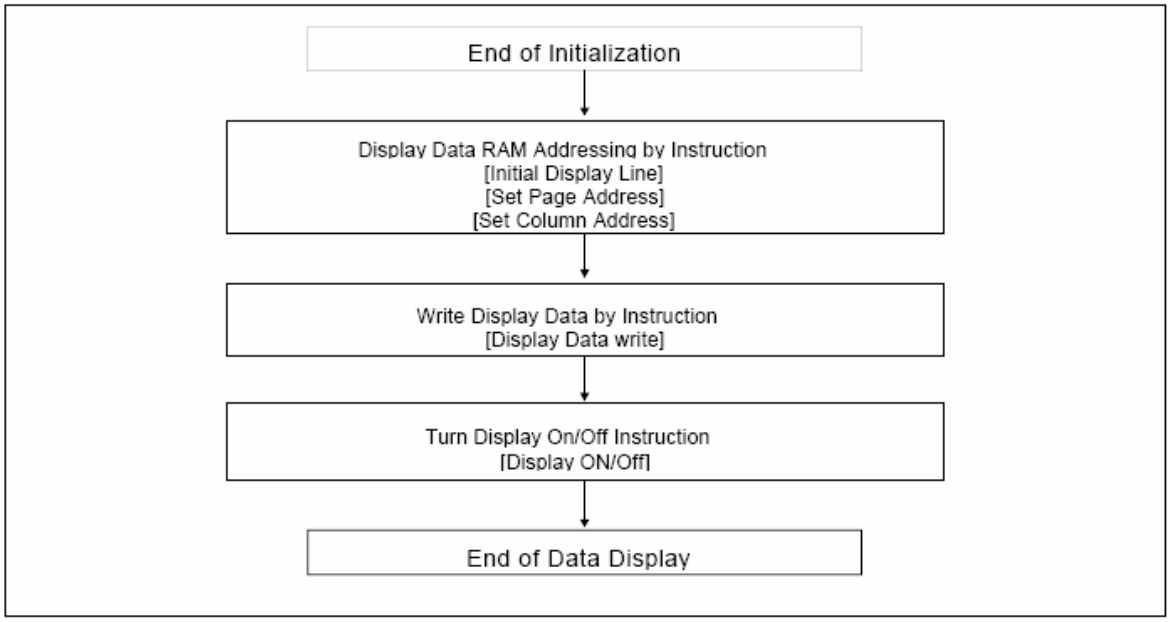


Figure 36. Data Displaying

Referential Instruction Setup Flow: Power OFF

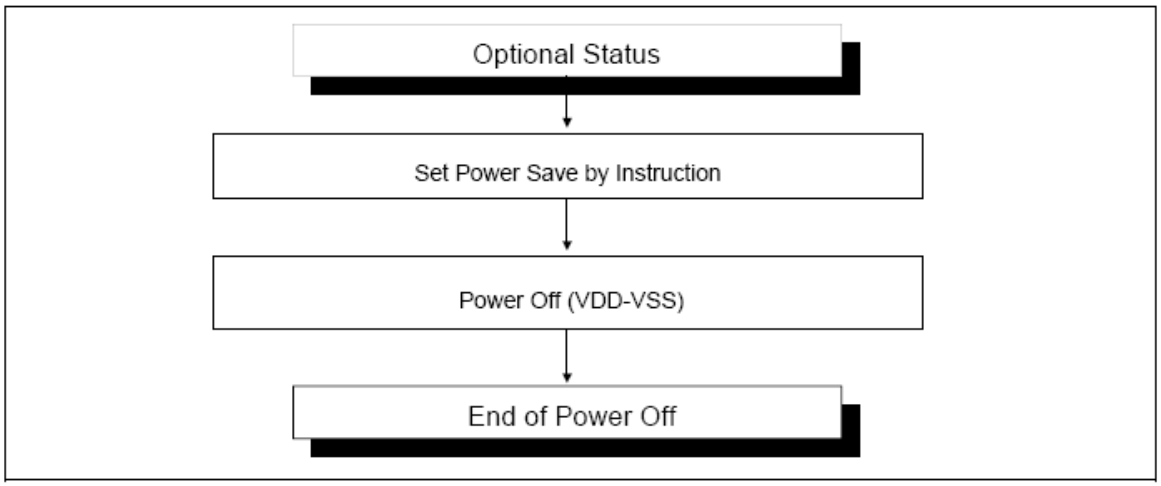


Figure 37. Power OFF

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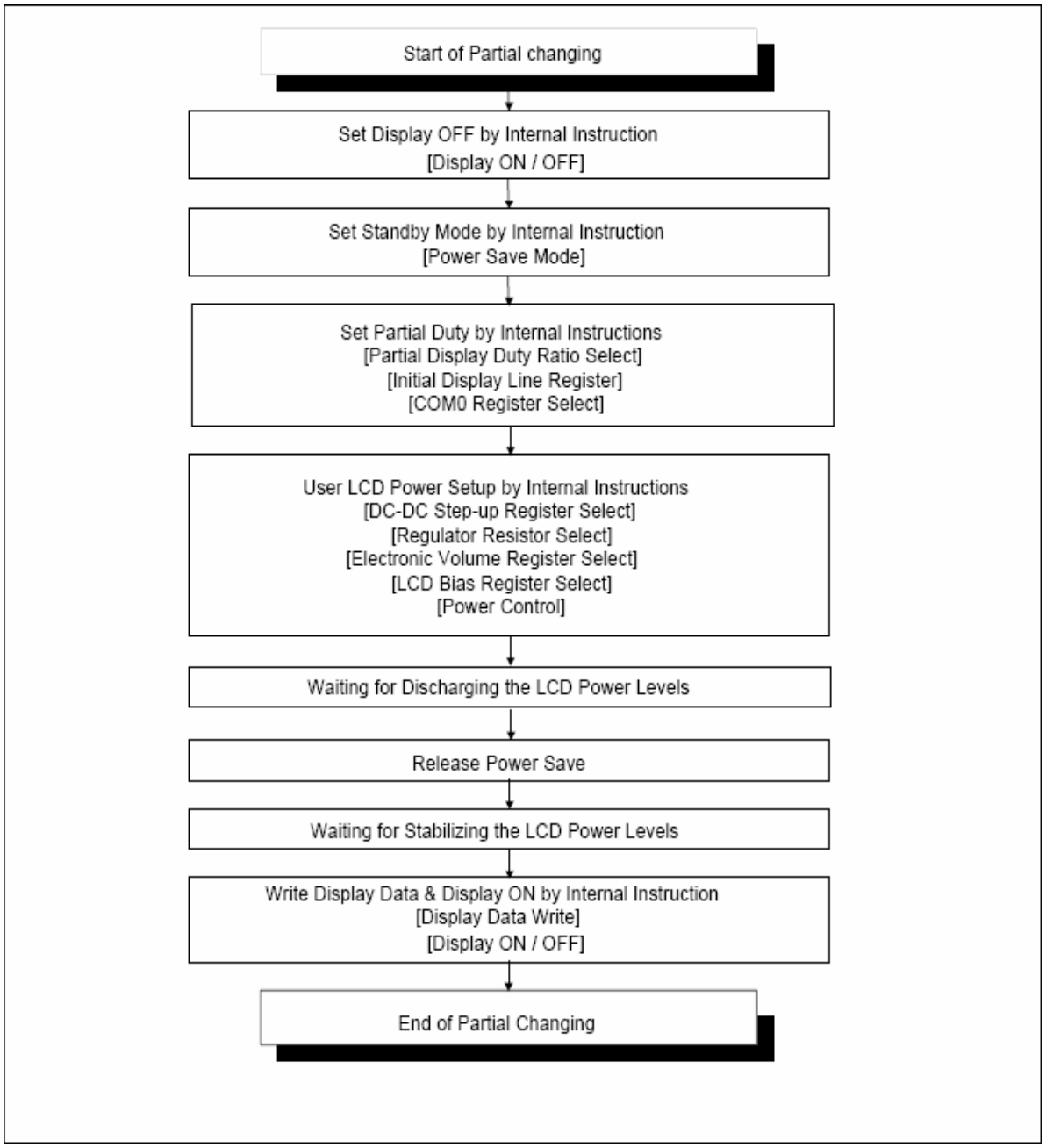
Referential Instruction Setup Flow: Partial Duty Changing



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11、附录

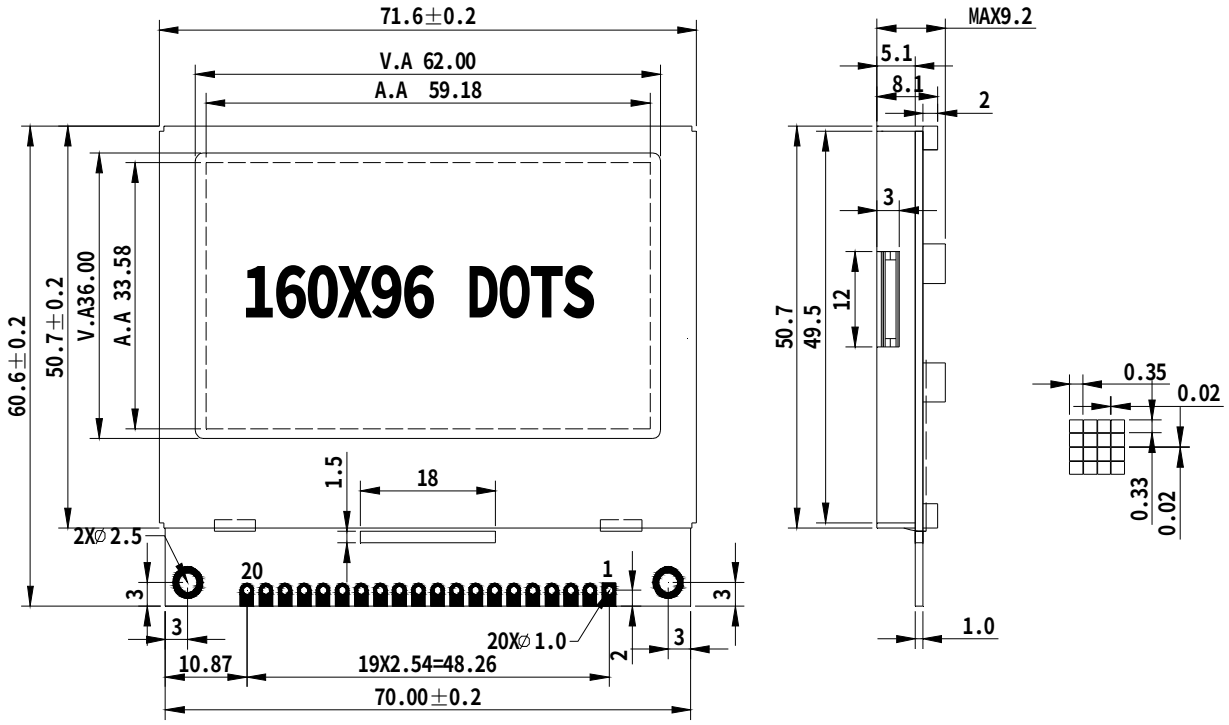
初始化程序参考：

```
//=====忙检测================
void check_busy(void)
{
   uchar read_data=0xff;
   data_bus=0xff;
   LCD_RS=0;
   LCD_RW=1;                    //读命令
   LCD_CS1=0;                   //片使能
   while((read_data&0x80)==0x80)
   {
      LCD_E=1;
      _nop_();
      _nop_();
      read_data=data_bus;
      LCD_E=0;
   }
   LCD_E=0;
   LCD_CS1=1;                   //片禁能
}

//=====写命令到寄存器=========
void send_cmd(uchar cmd) small
{
   check_busy();
   LCD_RS=0;
   LCD_RW=0;                    //写命令
   LCD_CS1=0;                   //片使能
   data_bus=cmd;
   LCD_E=1;
   _nop_();
   _nop_();
   LCD_E=0;
   _nop_();
   _nop_();
   LCD_CS1=1;                   //片禁能
}

//=====写数据到 DDRAM=========
void send_dat(uchar dat) small
{
   check_busy();
   LCD_RS=1;
   LCD_RW=0;                    //写数据
   LCD_CS1=0;                   //片使能
   data_bus=dat;
   LCD_E=1;
   _nop_();
```

```
    _nop_();
    LCD_E=0;
    _nop_();
    _nop_();
    LCD_CS1=1;                    //片禁能
}

void lcd_initial(void) small
{
    LCD_RES=1;
    delay_nms(50);
    send_cmd(0xE2);//Software Reset
    send_cmd(0x57);//Set LCD Bias(1/11 bias)
    send_cmd(0x64);//DC-DC step-up
    send_cmd(0xA0);//Set Segment Re-map
    send_cmd(0xC8);//Set COM output Scan Direction
    send_cmd(0x26);//Set Internal Regulator Resistor Raio
    send_cmd(0x81);//Set contrast Control Register
    send_cmd(0x28);
    send_cmd(0x48);//
    send_cmd(0x61);//
    send_cmd(0x40);//Set Display Start Line
    send_cmd(0x00);//Set Page Address
    send_cmd(0x44);//Set Higher column Address
    send_cmd(0x04);//Set lower column Address
    send_cmd(0xAF);//Set Display On
    send_cmd(0xAB);//Oscillator ON start
    send_cmd(0x2C);//Set Power Control Register
    send_cmd(0x2E);
    send_cmd(0x2F);
}

//=======写页地址==============
void Set_Page_Address(unsigned char dat)
{
      send_cmd(0xb0|dat);
}

//=======写列地址==============
void Set_Colume_Address(unsigned char dat)
{
      unsigned char tmp;
     tmp=dat>>4;
      send_cmd(0x10|tmp);   //送列地址高四位
     tmp=0x0f&dat;
      send_cmd(tmp);          //送列地址低四位
}
```

注： 辅助字库 IC 的应用可以参考《标准汉字字库芯片使用手册》，在公司网站可以下载

模块外形图



J1 接口定义

1	2	3	4	5	6	7	8	9	10
VSS	VDD	RS	RW/WR	E/RD	DB0	DB1	DB2	DB3	DB4
11	12	13	14	15	16	17	18	19	20
DB5	DB6	DB7	/CS	/RST	/CE	SCLK	SO	SI	BL(K)

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