



冀雅（廊坊）电子有限公司

JIYA (LANGFANG) ELECTRONICS CO., LTD

模块产品规格书 SPECIFICATION FOR LCD MODULE

客户 COSTOMER	
产品型号 MODEL	JYG-12864G8G-FS6N2-VA

设 计 ORGANIZED BY	审 核 CHECKED BY	批 准 APPROVED BY
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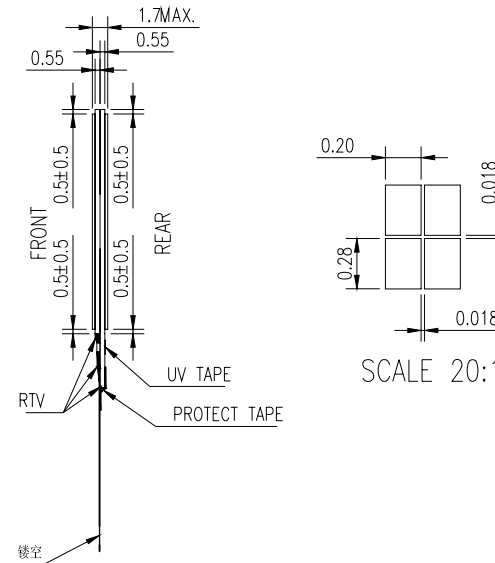
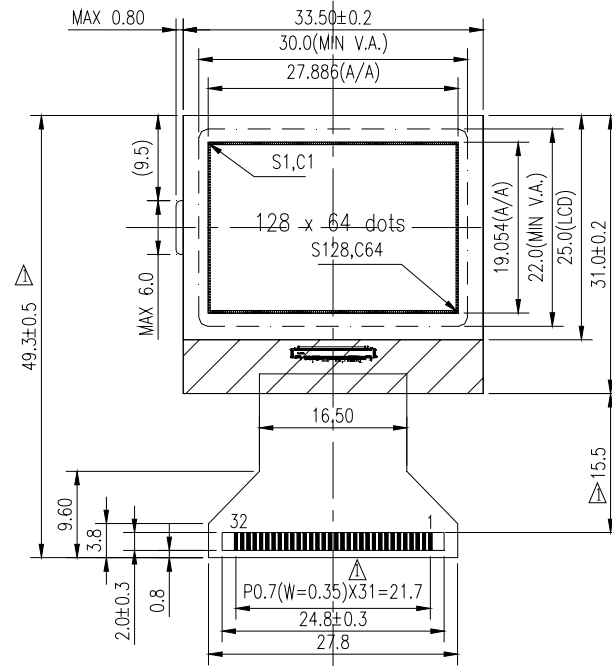
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1.LCM DRWING



- NOTE:
1. FSTN, POSITIVE, HIGH-TRANSFLECTIVE
 2. 1/64 DUTY CYCLE, 1/9 BIAS, V_{op}=9.0V, V_{DD}=3.0V
 3. VIEWING DIRECTION: 6:00 O'CLOCK
 4. DRIVER IC: ST-7565P
 5. Top.: -20 TO +70 DEGREE C
 6. Tst.: -30 TO +80 DEGREE C
 7. LCD DRAWING NO.: JY05A02
 8. IRS&P/S CONNECT TO VDD

PIN	1	2	3	4	5	6	7	8
SYMBOL	NC	/CS1	NC	/RES	A0	WR	RD	D0
PIN	9	10	11	12	13	14	15	16
SYMBOL	D1	D2	D3	D4	D5	D6	D7	VDD
PIN	17	18	19	20	21	22	23	24
SYMBOL	VSS	VOUT	NC	CSP	C1N	CTP	C2P	C2N
PIN	25	26	27	28	29	30	31	32
SYMBOL	V4	V3	V2	V1	V0	VR	C86	NC

LCD PIN	IC PIN
C1-C64	COM63-COM0
S1-S128	SEGO-SEG127

更改记录					设计	审核	工艺	标准化	批准	产品型号	JYG-12864G8G-FS6N2-VA
更改标记	日期	更改内容	设计	审核	批准	签名	宫毓娟			文件编号	G12864G8G-WX
△	05.3.14	更改FPC的尺寸,增加NOTE 8	宫毓娟			日期	04.12.31			分文件号	4
						页数	1-1	单位	mm	河北冀雅电子有限公司	
						未注公差	±0.2				

2. GENERAL DESCRIPTION

MAIN TECHNICS:	COG
DISPLAY CONTENT:	128*64DOTS
DISPLAY TYPE:	FSTN, POSITIVE,HIGH-TRANSFLECTIVE
DRIVER METHODOD:	1/64 DUTY , 1/9 BIAS
VIEWING DIRECTION:	6:00
CONTROLLER:	ST-7565P
BACKLIGHT:	---
OPEATING TEMPERATURE:	-20°C-+70°C
STORAGE TEMPERATURE:	-30°C-+80°C
REFERENCE DOCUMENTS :	ST-7565P datasheet

3. MECHANICAL SPECIFICATIONS

ITEM	CONTENT	UNIT
DOTS NUMBER	128x64	DOTS
MODULE DIMENSION	33.5(w)*49.3(h)*1.7(t) Max	mm
ACTIVE AREA	27.886(w)*19.05(h)	mm
DOT SIZE	0.20(w)*0.28(h)	mm
DOT SPACE	0.018 (w)*0.018(h)	mm

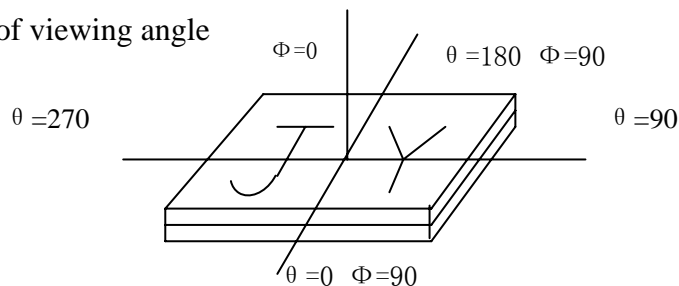
4. ELECTRO-OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITIO N	MIN.	TYP.	MAX	UNIT
LCD OPERATING VOLTAGE	Vop.	25°C	8.8	9.0	9.2	V
RESPONSE TIME	Ton	25°C	-	27	400	Ms
	Toff	25°C	-	220	400	Ms
CONTRAST RATIO	CR	25°C	-	14	-	-
VIEWING RANGE		25°C	-	88	-	DEG
CROSSTALK		25°C	-	1.2	-	-

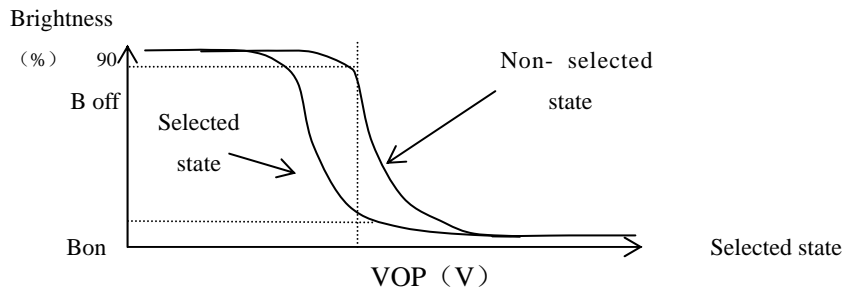
Note1: Definition of viewing angle

$0 \leq \Phi \leq 90$

$0 \leq \theta \leq 360$



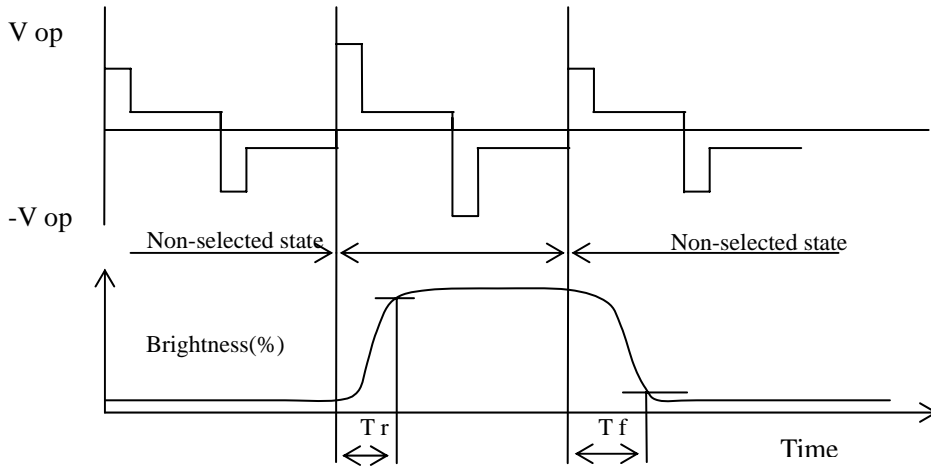
Note 2: Definition of contrast ratio



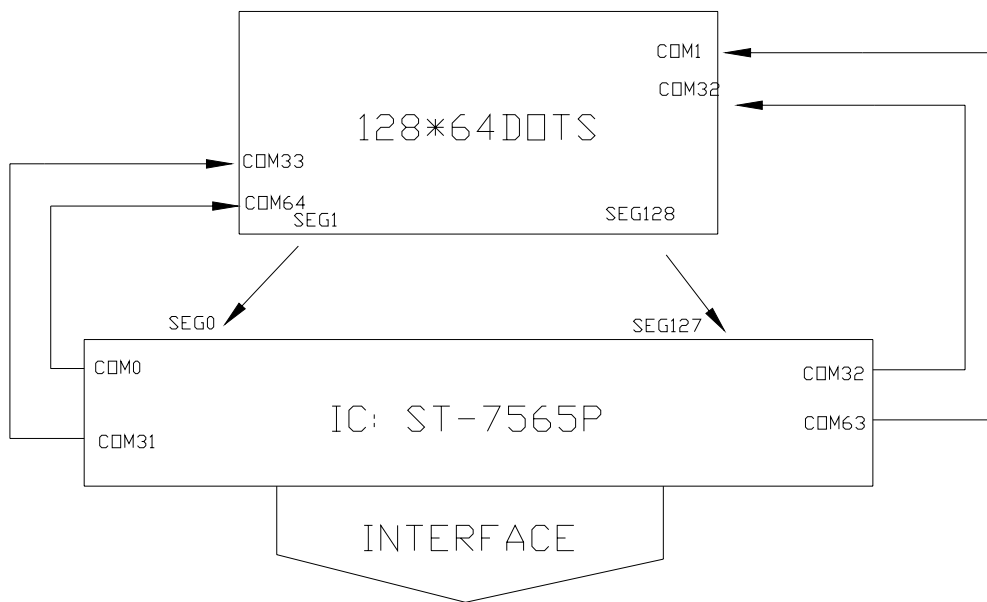
$$\text{Contrast ratio} = \frac{\text{Brightness under non-selected state}}{\text{Brightness under selected state}}$$

$$\text{Cross talk} = \frac{\text{Brightness under non-selected state}}{\text{Brightness under off state}}$$

Note 3: Definition of response time



5.BLOCK DIAGRAM



6.ELECTRONIC CHARACTERISTICS

6.1 MAXIMUM VALUES

ITEM	SYMBOL	STANDARD VALUE		UNIT
		MIN	MAX	
Logic supply voltage	V _{DD1}	0.3	+5.0	V
LCD supply voltage	V _{LCD}	0.3	+18.0	V
Operating Temperature	Top	-20	+70	°C
Storage Temperature	Tst	-30	+80	°C

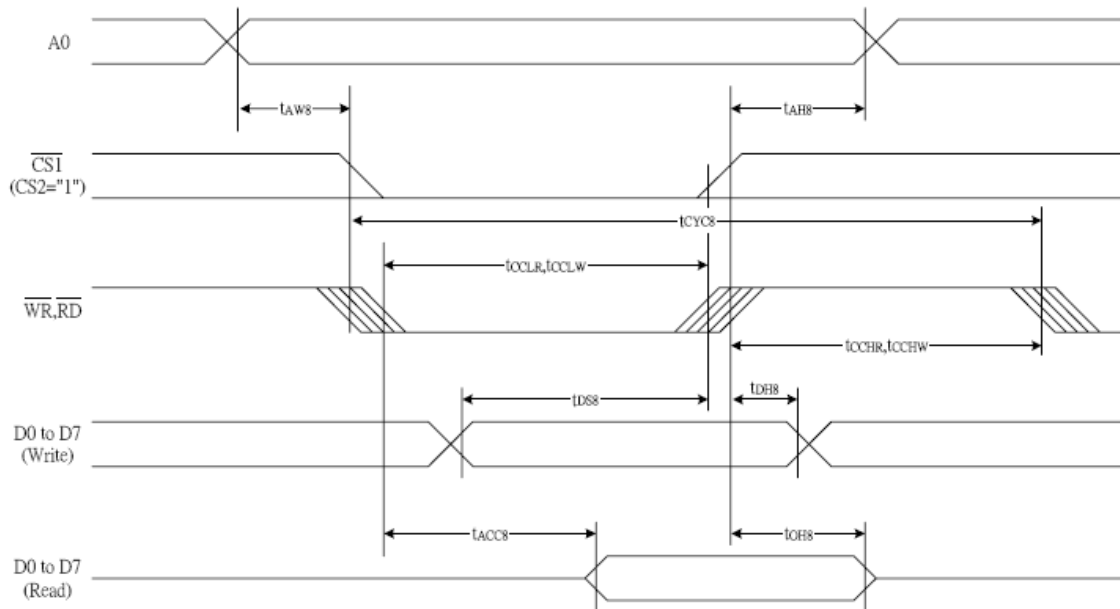
6.2. DC CHARACTERISTICS

Item	Symbol	Condition	Rating			Units	Applicable Pin		
			Min.	Typ.	Max.				
Operating Voltage (1)	V _{DD}		1.8	—	3.3	V	V _{SS} *1		
Operating Voltage (2)	V _{DD2}	(Relative to V _{SS})	2.4	—	3.3	V	V _{SS}		
High-level Input Voltage	V _{IHC}		0.8 x V _{DD}	—	V _{DD}	V	*3		
Low-level Input Voltage	V _{ILC}		V _{SS}	—	0.2 x V _{DD}	V	*3		
High-level Output Voltage	V _{OHC}	I _{OH} = -0.5 mA	0.8 x V _{DD}	—	V _{DD}	V	*4		
Low-level Output Voltage	V _{OLC}	I _{OL} = 0.5 mA	V _{SS}	—	0.2 x V _{DD}	V	*4		
Input leakage current	I _{LI}	V _{IN} = V _{DD} or V _{SS}	-1.0	—	1.0	μA	*5		
Output leakage current	I _{LO}	V _{IN} = V _{DD} or V _{SS}	-3.0	—	3.0	μA	*6		
Liquid Crystal Driver ON Resistance	R _{ON}	T _a = 25°C V _O = 13.0 V	—	2.0	3.5	KΩ	SE _{Gn} CO _{Mn} *7		
		(Relative To V _{DD}) V _O = 8.0 V	—	3.2	5.4				
Static Consumption Current	I _{SSQ}	V _O = 13.0 V (Relative To V _{DD})	—	0.01	2	μA	V _{DD} , V _{DD2}		
Output Leakage Current	I _{5Q}		—	0.01	10	μA	V _O		
Input Terminal Capacitance	C _{IN}	T _a = 25°C, f = 1 MHz	—	5.0	8.0	pF			
Oscillator Frequency	Internal Oscillator	f _{OSC}	1/65 duty 1/33 duty	T _a = 25°C	17	20	24	kHz	*8
	External Input	f _{CL}			17	20	24	kHz	CL
	Internal Oscillator	f _{OSC}	1/49 duty 1/53 duty 1/55 duty	T _a = 25°C	25	30	35	kHz	*8
	External Input	f _{CL}			25	30	35	kHz	CL

Item	Symbol	Condition	Rating			Units	Applicable Pin
			Min.	Typ.	Max.		
Internal Power	Input voltage	VDD2 (Relative To Vss)	2.4	—	3.3	V	Vss
	Supply Step-up output voltage Circuit	VOUT (Relative To Vss)	—	—	16.0	V	VOUT
	Voltage regulator Circuit Operating Voltage	VOUT (Relative To Vss)	6.0	—	16.0	V	VOUT
	Voltage Follower Circuit Operating Voltage	V0 (Relative To Vss)	4.0	—	13.0	V	V0 * 9
	Base Voltage	VR	Ta = 25°C, (Relative To Vss) -0.01%/°C	2.07	2.10	2.13	V

6.3 . TIMING CHARACTERISTICS

System Bus Read/Write Characteristics 1 (For the 8080 Series MPU)

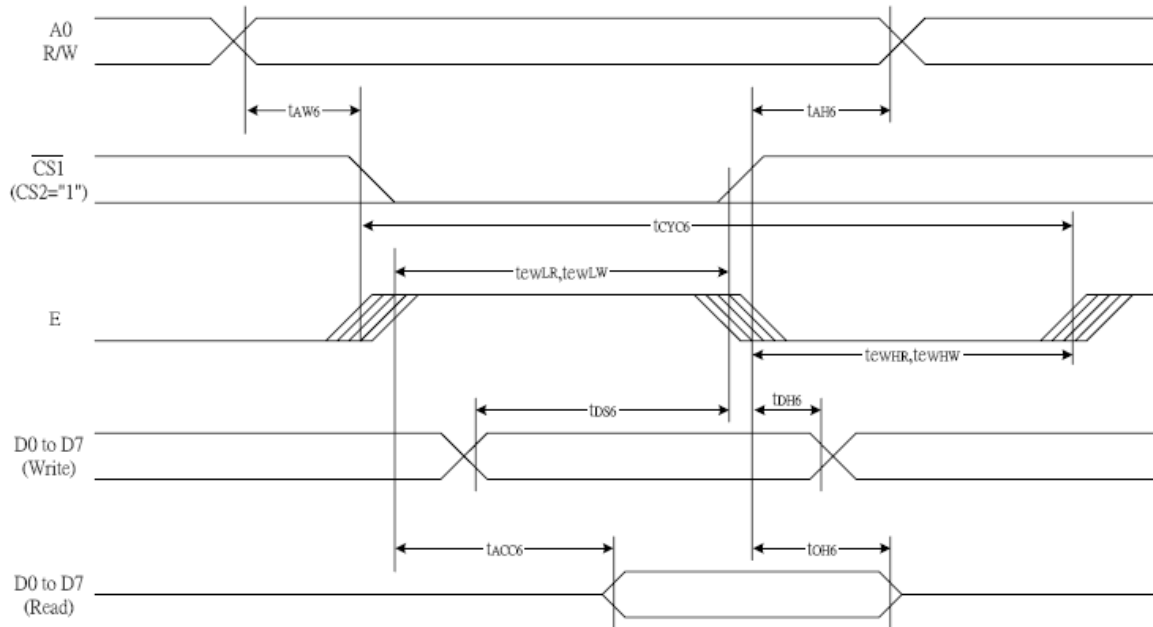


(VDD = 3.3V, Ta = 25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH8		0	—	Ns
Address setup time		tAW8		0	—	
System cycle time		tCYCS		240	—	
Enable L pulse width (WRITE)	WR	tCCLW		80	—	
Enable H pulse width (WRITE)		tCCHW		80	—	
Enable L pulse width (READ)	RD	tCCLR		140	—	
Enable H pulse width (READ)		tCCHR		80	—	
WRITE Data setup time	D0 to D7	tDS8		40	—	
WRITE Address hold time		tDH8		0	—	
READ access time		tACC8	CL = 100 pF	—	70	
READ Output disable time		tOH8	CL = 100 pF	5	50	

(VDD = 2.7 V, Ta = 25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t _{AH8}		0	—	ns
Address setup time		t _{AW8}		0	—	
System cycle time		t _{CYC8}		400	—	
Enable L pulse width (WRITE)	WR	t _{CCLW}		220	—	
Enable H pulse width (WRITE)		t _{CCHW}		180	—	
Enable L pulse width (READ)	RD	t _{CCLR}		220	—	
Enable H pulse width (READ)		t _{CCHR}		180	—	
WRITE Data setup time	D0 to D7	t _{DS8}		40	—	
WRITE Address hold time		t _{DH8}		0	—	
READ access time		t _{ACC8}	CL = 100 pF	—	140	
READ Output disable time		t _{OH8}	CL = 100 pF	10	100	



System Bus Read/Write Characteristics 2 (For the 6800 Series MPU)

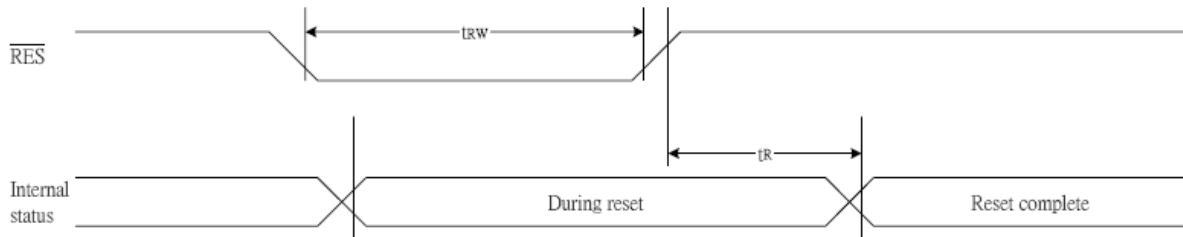
(VDD = 3.3 V , Ta = 25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t _{AH6}		0	—	ns
Address setup time		t _{AW6}		0	—	
System cycle time		t _{CYC6}		240	—	
Enable L pulse width (WRITE)	WR	t _{EWLW}		80	—	
Enable H pulse width (WRITE)		t _{EWHW}		80	—	
Enable L pulse width (READ)	RD	t _{EWLR}		80	—	
Enable H pulse width (READ)		t _{EWHR}		140	—	
WRITE Data setup time	D0 to D7	t _{DS6}		40	—	
WRITE Address hold time		t _{DH6}		0	—	
READ access time		t _{ACC6}	CL = 100 pF	—	70	
READ Output disable time		t _{OH6}	CL = 100 pF	5	50	

(VDD = 2.7V , Ta =25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t _{AH6}		0	—	ns
Address setup time		t _{AW6}		0	—	
System cycle time		t _{CYC6}		400	—	
Enable L pulse width (WRITE)	WR	t _{EWLW}		220	—	
Enable H pulse width (WRITE)		t _{EWHW}		180	—	
Enable L pulse width (READ)	RD	t _{EWLR}		220	—	
Enable H pulse width (READ)		t _{EWHR}		180	—	
WRITE Data setup time	D0 to D7	t _{DS6}		40	—	
WRITE Address hold time		t _{DH6}		0	—	
READ access time		t _{ACC6}	CL = 100 pF	—	140	
READ Output disable time		t _{OH6}	CL = 100 pF	10	100	

Reset Timing



(VDD = 3.3V , Ta = -40 to 85°C)

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		t _R		—	—	1.0	us
Reset "L" pulse width	/RES	t _{RW}		1.0	—	—	us

(VDD = 2.7V , Ta = -40 to 85°C)

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		t _R		—	—	2.0	us
Reset "L" pulse width	/RES	t _{RW}		2.0	—	—	us

7. PINS DESCRIPTION

Pin no.	SIGNAL	CAPACITOR CONNECTIONS
1	NC	----
2	/CS1	L: Chip select H: Chip unselected
3	NC	----
4	/RES	Reset L: Enable; H: Disable
5	A0	H: display data; L: command;
6	WR	Write L: Enable H: Disable(8080INTERFACE) L:Write H:Read(68INTERFACE)
7	RD	Read L: Enable H: Disable(8080INTERFACE) H: Enable(68INTERFACE)
8	D0	DATA BUS
9	D1	DATA BUS
10	D2	DATA BUS
11	D3	DATA BUS
12	D4	DATA BUS
13	D5	DATA BUS
14	D6	DATA BUS
15	D7	DATA BUS
16	VDD	Power supply(+3.0V)
17	VSS	Ground
18	VOUT	Connect to 1.0uF→VSS
19	NC	----
20	C3P	Connect to 1.0uF→CAP1-
21	C1N	Connect to 1.0uF→CAP1+
22	C1P	Connect to 1.0uF→CAP1-
23	C2P	Connect to 1.0uF→CAP2-
24	C2N	Connect to 1.0uF→CAP2+
25	V4	Connect to 1.0uF→VSS
26	V3	Connect to 1.0uF→VSS
27	V2	Connect to 1.0uF→VSS
28	V1	Connect to 1.0uF→VSS
29	V0	Connect to 1.0uF→VSS
30	VR	
31	C86	H: 6800 series selected; L: 8080 series selected.
32	NC	----

8. INSTRUCTION DESCRIPTION

Command	Command Code									Function			
	A0	/RD	/WR	D7	D6	D5	D4	D3	D2		D1	D0	
(1) Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0	1	LCD display ON/OFF 0: OFF, 1: ON
(2) Display start line set	0	1	0	0	1	Display start address						Sets the display RAM display start line address	
(3) Page address set	0	1	0	1	0	1	1	Page address				Sets the display RAM page address	
(4) Column address set upper bit	0	1	0	0	0	0	1	Most significant column address				Sets the most significant 4 bits of the display RAM column address. Sets the least significant 4 bits of the display RAM column address.	
Column address set lower bit	0	1	0	0	0	0	0	Least significant column address					
(5) Status read	0	0	1	Status				0	0	0	0	0	Reads the status data
(6) Display data write	1	1	0	Write data								Writes to the display RAM	
(7) Display data read	1	0	1	Read data								Reads from the display RAM	
(8) ADC select	0	1	0	1	0	1	0	0	0	0	0	0	Sets the display RAM address SEG output correspondence 0: normal, 1: reverse
(9) Display normal/reverse	0	1	0	1	0	1	0	0	1	1	0	1	Sets the LCD display normal/reverse 0: normal, 1: reverse
(10) Display all points ON/OFF	0	1	0	1	0	1	0	0	1	0	0	1	Display all points 0: normal display 1: all points ON
(11) LCD bias set	0	1	0	1	0	1	0	0	0	1	0	1	Sets the LCD drive voltage bias ratio 0: 1/9 bias, 1: 1/7 bias (ST7565P)
(12) Read/modify/write	0	1	0	1	1	1	0	0	0	0	0	0	Column address increment At write: +1 At read: 0
(13) End	0	1	0	1	1	1	0	1	1	1	0	0	Clear read/modify/write
(14) Reset	0	1	0	1	1	1	0	0	0	0	1	0	Internal reset
(15) Common output mode select	0	1	0	1	1	0	0	0	1	*	*	*	Select COM output scan direction 0: normal direction 1: reverse direction
(16) Power control set	0	1	0	0	0	1	0	1	Operating mode			Select internal power supply operating mode	
(17) Vo voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio			Select internal resistor ratio(Rb/Ra) mode	
(18) Electronic volume mode set Electronic volume register set	0	1	0	1	0	0	0	0	0	0	0	1	Set the Vo output voltage electronic volume register
(19) Static indicator ON/OFF Static indicator register set	0	1	0	1	0	1	0	1	1	0	0	1	0: OFF, 1: ON Set the flashing mode
(20) Booster ratio set	0	1	0	1	1	1	1	1	0	0	0	0	select booster ratio 00: 2x,3x,4x 01: 5x 11: 6x
(21) Power saver													Display OFF and display all points ON compound command
(22) NOP	0	1	0	1	1	1	0	0	0	0	1	1	Command for non-operation
(23) Test	0	1	0	1	1	1	1	*	*	*	*	*	Command for IC test. Do not use this command

9. BACKLIGHT PARAMETERS

NO

10. Product Quality & Reliability

10.1 Standard for Quality Test

10.1.1 Inspection :

Before delivering, the supplier should take the following tests, and affirm the quality of product.

10.1.2 Electro-Optical Characteristics:

According to the individual specification to test the product.

10.1.3 Test of Appearance Characteristics:

According to the individual specification to test the product.

10.1.4 Test of Reliability Characteristics:

According to the definition of reliability on the specification for testing products.

10.1.5 Delivery Test:

Before delivering, the supplier should take the delivery test.

A. Test method: According to MIL-STD-105E, General Inspection Level II take a single time.

B. The defects classify of AQL as following:

Major defect: AQL=0.65

Minor defect: AQL=2.5

Total defects: AQL=2.5

10.2 Standard for inspection

10.2.1 Manner of appearance test:

a. The test must be under a 40W fluorescent light, and the distance of view must be at 30 cm.

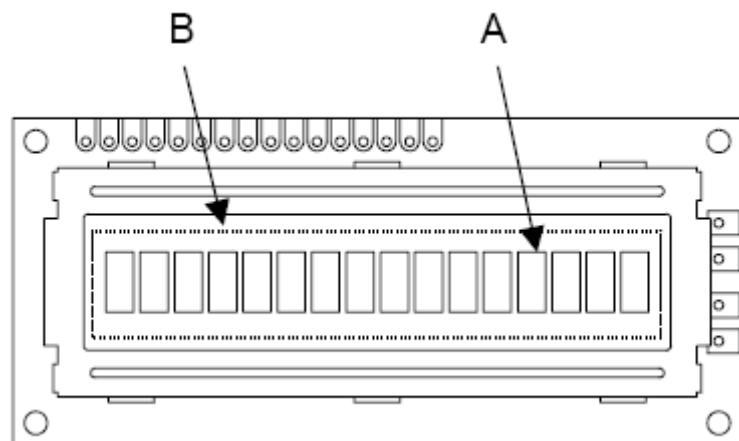
b. When test the model of transmissive product must add the reflective plate.

c. The test direction is base on about around 45° of vertical line.

10.2.2 Definition of area: B A

A Area : Viewing area.

B Area : Out of viewing area.(Outside viewing area)

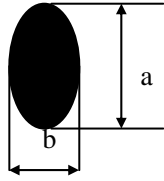


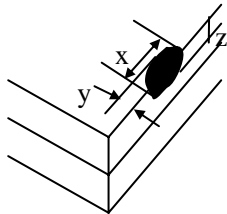
10.2.3 Basic principle:

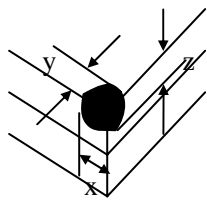
- A. In principle the defect out of Area A should be acceptable if the defect does not affect assemblage and the quality of productions.
- B. If defects that can not describe clearly, acceptable samples will be the standard.
- C. The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
- D. Must add new item on time when it is necessary.

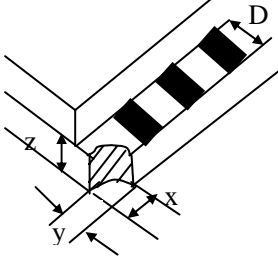
10.2.4 Standard of inspection

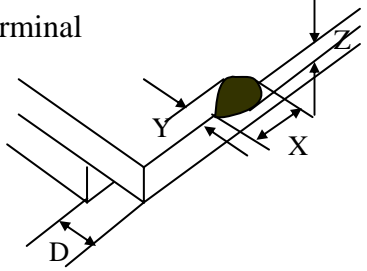
Defect	Inspect item	Criteria
1 Minor	Scratch and fold on polarizer. Scratch on glass. Glass fiber etc. (by bare eyes, defect outside viewing area is acceptable)	length ignore width $\leq 0.03\text{mm}$ acceptable

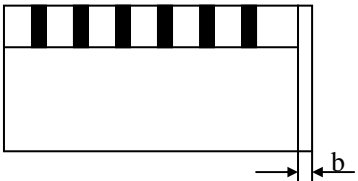
Defect	Inspect item	Criteria
2 Minor	Chip on glass(round type) Chip on polarizer(round type) Air bubble between polarizer and glass  $\Phi = (a + b) / 2$	$\Phi \leq 0.5\text{mm}$ acceptable 0. $5 < \Phi \leq 0.7\text{mm}$ two are acceptable $\Phi > 0.7\text{mm}$ reject 1.The distance between any two dots should be more than 5mm. 2.Defect outside viewing area is acceptable. 3.If the air bubble is black, it can be judged as black spot.

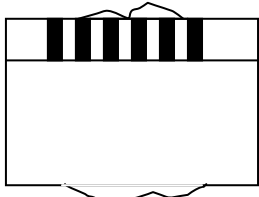
Defect	Inspect item	Criteria
3 Minor	<p>Chip out</p>  <p>a: LCD length x: length y: width z: thickness</p>	<p>$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject</p> <p>$a < 80\text{mm}, x \geq 5\text{mm}$ reject</p> <p>$z < 2/3t, y \geq s$ reject</p> <p>$z \geq 2/3t, y \geq 1/3s$ reject</p> <p>t: glass thickness. S: distance between glass edge and inside of edge sealing</p>

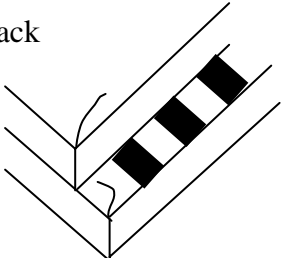
Defect	Inspect item	Criteria
4 Minor	<p>Chip on corner of neat edge</p>  <p>X: length Y: width S: width of edge sealing</p>	<p>$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject</p> <p>$a < 80\text{mm}, x \geq 5\text{mm}$ reject</p> <p>$x > S * 2/3, x > S * 2/3$ reject</p> <p>z: ignore</p> <p>any chip exposes the silver dot reject</p>

Defect	Inspect item	Criteria
5 Minor	<p>Chip on corner of terminal edge</p>  <p>D: terminal length</p>	<p>$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject</p> <p>$a < 80\text{mm}, x \geq 5\text{mm}$ reject</p> <p>y, z: ignore</p>

Defect	Inspect item	Criteria
6 Minor	Chip on opposite side of terminal 	$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject $a < 80\text{mm}, x > 5\text{mm}$ reject $y > 1/2D$ reject $z > 1/2t, y > 1/4D$ reject D: terminal length

Defect	Inspect item	Criteria
7 Minor	Cutting/breaking defect (flare) 	Dimension not meet the drawing specification reject $b \geq 0.3\text{mm}$ reject

Defect	Inspect item	Criteria
8 Major	Cutting/breaking defect (flare) 	According to the dimension of drawing

Defect	Inspect item	Criteria
9 Major	Crack 	Any crack trend to extend reject

Defect	Inspect item	Criteria
16 Minor	The soldering tin of pinouts is not enough	A. The height of soldering tin in though-holes is 1/2 less than the height of PCB looked down from the component side reject B. The width of soldering tin on pads around the though-hole is 2/3 less than the width of pad reject

Defect	Inspect item	Criteria
17 Minor	The soldering tin of pinouts overflows	The distance between pieces of soldering tin is less than 0.2 mm reject

Defect	Inspect item	Criteria
18 Minor	The soldering tin of SMT is not enough	The height that soldering tin covers the bump of SMT component is 1/2 less than the height of bump reject

Defect	Inspect item	Criteria
19 Minor	The soldering tin of SMT overflows	The soldering tin covers whole bump reject

Defect	Inspect item	Criteria
20 Minor	The component is broken	reject

Defect	Inspect item	Criteria
21 Minor	The shape of pinouts is not the same as that in the criterion	It makes the LCM work badly reject

Defect	Inspect item	Criteria
22 Mjor	The pinout is broken	reject

Defect	Inspect item	Criteria
23 Minor	The paint falls off the frame or the frame is damaged	$\Phi > 1.0\text{mm}$ reject $\phi = (\text{length} + \text{width}) / 2$

Defect	Inspect item	Criteria
24 Minor	The frame is scratched visibly	Length ignore Width $\leq 0.5\text{mm}$ reject

Defect	Inspect item	Criteria
25 Minor	The frame is rusted (accumulation)	When the shape is as dot, reference to defect 23 When the shape is as line, reference to defect 24

Defect	Inspect item	Criteria
26 Major	The foot of frame is broken or can not be fixed	reject

Defect	Inspect item	Criteria
27 Minor	The copper on PCB is damaged	A. the track or pad is broken reject

Defect	Inspect item	Criteria
28 Minor	Paste layer falls off	When the shape is as dot, reference to defect 23 When the shape is as line, reference to defect 24

Defect	Inspect item	Criteria
29 Major	The bolt is missed	reject

Defect	Inspect item	Criteria
30 Minor	The bolt is not hard up	reject

Defect	Inspect item	Criteria
31 Major	No function	reject

Defect	Inspect item	Criteria
32 Major	Some row or column is absent	reject

Defect	Inspect item	Criteria
33 Major	The frame is absent	reject

Defect	Inspect item	Criteria
34 Major	The LCM can not follow the program	reject

Defect	Inspect item	Criteria
35 Minor	Some row or column displays more heavily or lightly than others in the same frame	Reference to the sample

Defect	Inspect item	Criteria
36 Minor	The display is not equality	Reference to the sample

Defect	Inspect item	Criteria
37 Major	Pattern not meet the drawing specification	reject

Defect	Inspect item	Criteria
38 Major	Deformation	reject

Defect	Inspect item	Criteria
39 Minor	Black dots or white dots in viewing area	reference to defect 23 or the sample

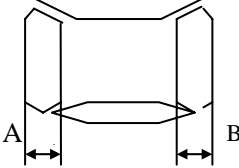
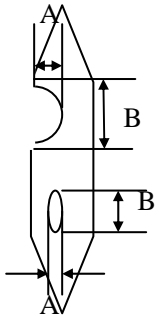
Defect	Inspect item	Criteria
40 Minor	Black lines or white lines in viewing area	reference to defect 1

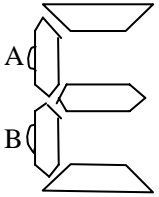
Defect	Inspect item	Criteria
41 Major	Wrong viewing direction	reject

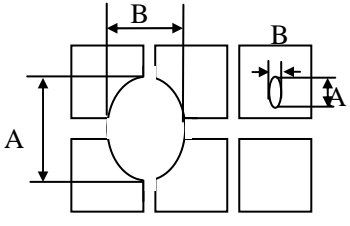
Defect	Inspect item	Criteria
42 Major	Operating current upper the specification	reject

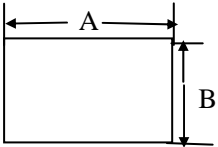
Defect	Inspect item	Criteria
43 Major	The backlight can not light	reject

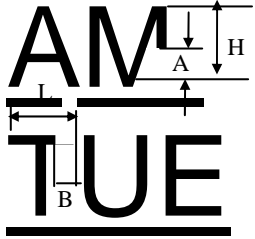
Defect	Inspect item	Criteria
44 Minor	The backlihg is not equality	Reference to the sample

Defect	Inspect item	Criteria
45 Minor	Shape of pattern  W: width of pattern	$ A-B > 1/3W$ reject $ A-W > 1/3W$ reject $ A-B > 0.25mm$ reject
46 Minor	pinhole  W: width of character	$\phi < 0.2mm$ acceptable $0.2mm < \phi \leq 0.25mm$ three are acceptable (distance between two spots should be more than 20mm) $\phi > 0.25mm$ or $\phi > 1/3W$ reject

Defect	Inspect item	Criteria
47 Minor	Concave  $\Phi = 1/2 (\text{length} + \text{width})$	$\Phi > 0.25mm$ or $1/3W$ reject

Defect	Inspect item	Criteria
48 Minor	Pinhole in pixels  $\Phi = (A+B) / 2$	Reference to defect 10

Defect	Inspect item	Criteria
49 Minor	Pixel deformation 	A: Quantity of deformation > 25% reject B: Quantity of deformation > 25% reject

Defect	Inspect item	Criteria
50 Minor	Pinhole in character 	Vertical: $A > 1/4H$ reject Horizontal: $B > 1/3L$ reject

10.3RELIABILITY

ITEM	CONDITION
High temperature operation	70 °C, 96 hrs
Low temperature operation	-20 °C, 96 hrs
Moisture storage	60 °C, 90%RH, 96 hrs
High temperature storage	80 °C, 96 hrs
Low temperature storage	-30 °C, 96 hrs
Thermal shock	-30 °C (30 minute) 25 °C (5 minute) 80 °C (30 minute) CYCLES: 10
LIFE TIME	50,000 hours, 25±10°C, 45±20% RH

11.PRECAUTIONS IN USING

11.1 Liquid crystal display (LCD)

The LCD panel is made up of glass, organic fluid and polarizer. When handling, please pay attention to the following items:

- 1) Keep the operation and storage temperature of the LCD within the range specified in the LCD specification. Otherwise, excessive temperature and humidity would cause polarization degradation, bubble generation or polarizer peel-off.
- 2) Prevent it from mechanical shock by dropping it from a high place, etc.
- 3) Don't contact, push or rub the exposed polarizers with anything harder than

HB pencil lead.

- 4) Avoid using chemicals such as acetone, toluene, ethanol and isoropyl alcohol to clean the front/rear polarizers and reflectors, which will cause damage to them.
- 5) Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause deformation or color fading. The LCM is assembled and adjusted with a high degree of precision.
- 6) Do not put or attach anything on the display area. Avoid touching the display area with bare hand.

11.2 Precaution for handling LCD modules

The LCM is assembled and adjusted with a high degree of precision, do not applying excessive shocks to it or making any alterations or modifications to it, the following precautions should be taken when handing.

- 1) Do not drop, bend or twist the module.
- 2) Do not alter or making any modification on the shape of the metal frame.
- 3) Do not change the shape, the pattern wiring or add any extra hole on the PCB.
- 4) Do not modify or touch the zebra rubber strip(conductive rubber) with another object.
- 5) Do not change the positions of components on the PCB.

11.3 Eletro-static discharge control

Careful attention should be paid to control the electrostatic discharge of the modules, since the modules contain no. of CMOS LSI.

- 1) Make sure you are grounded properly when remove the module from its antistatic bag. Be sure that the module and have the same electric potential.
- 2) Only properly grounded soldering iron should be used.
- 3) Modules should be stored in antistatic bag or other containers resistant to static after remove from its original package.
- 4) When using the electric screw-driver is used, make sure the screw driver had been ground potentiality to minimize the transmission of EM wave produced by commutator sparks.
- 5) In order to reduce the generation of static electricity, a relative humidity of 50-60% is recommended.

11.4 Precaution for soldering

- 1) Soldering should apply to I/O terminals only.
- 2) Soldering temperature is 280°C+(-)10°C.
- 3) Soldering time 3-4 seconds.
- 4) Eutectic solder (rosin flux filled) should be used.
- 5) If soldering flux is used, be sure to remove any remaining flux after finishing the soldering operation and LCD surface should be covered during soldering to prevent any damage to flux spatters.
- 6) When remove the lead wires from the I/O terminals, use proper de-soldering methods, e.g. suction type de-soldering irons. Do not repeat wiring by soldering more than three times at the pads and plated though

holes may be damaged.

11.5 Precaution for operation

- 1) Adjust liquid crystal driving voltage (V_0) to varies viewing angle and obtain the contrast.
- 2) V_0 should be kept in proper range stated in the specification. Excess voltage will shorten the LCD life.
- 3) Response time is greatly delayed at low temperature. It will recover when go back to normal temperature.
- 4) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore it should be used under the relative condition of 50% RH.

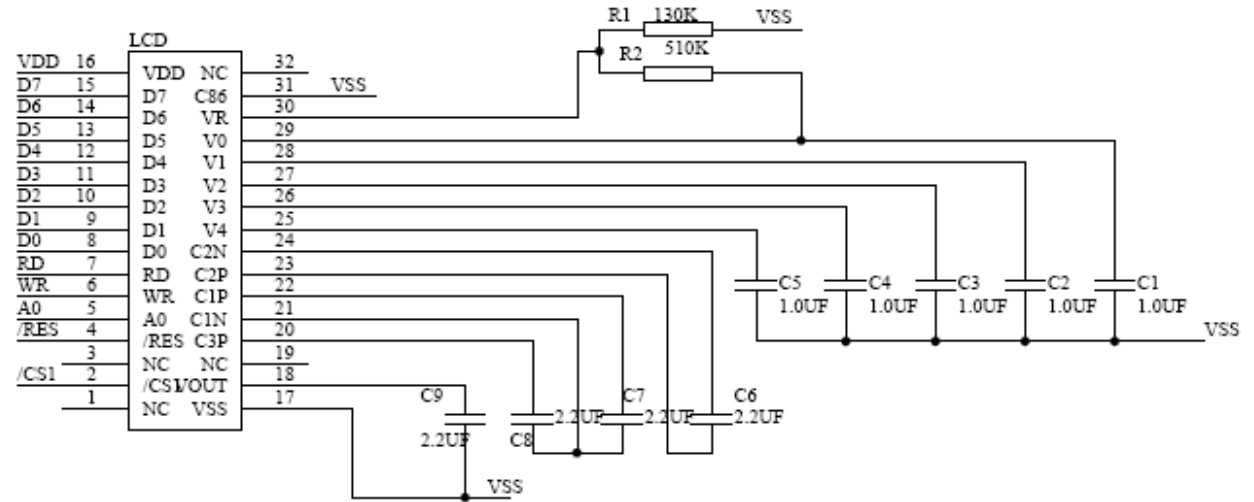
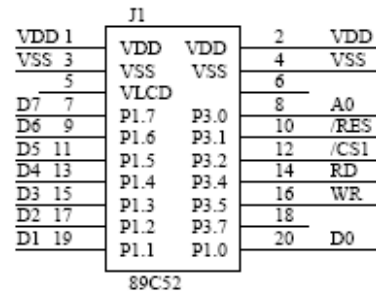
11.6 Storage

When long term storage is required, following precautions are necessary:

- 1) Storage them in a sealed polyethylene bag (antistatic), seal the opening, and store it where it is not subjected to direct sunshine, or to the light of fluorescent lamp. If properly sealed, there is no need for desiccant.
- 2) Store them in the temperature range of $-30^{\circ}\text{C}\sim 80^{\circ}\text{C}$ and at low humidity is recommended.

12. APPLICATION

12.1 REFERENCE CIRCUIT



12.2 APPENDIX

INITIALIZATION FOR REFERENCE (MPU: AT89C52):

BINITIAL: mov time1,#40

lcall Delay

mov a,#0a0h

lcall bwrctrl

MOV A,#0C0H

LCALL BWRCTRL

mov a,#0f8h

lcall bwrctrl

mov a,#00h

lcall bwrctrl

mov a,#0a2h

lcall bwrctrl

MOV TIME1,#20

LCALL DELAY

mov a,#2Ch

lcall Bwrctrl

MOV TIME1,#40

LCALL DELAY

mov a,#2Eh

lcall Bwrctrl

MOV TIME1,#40

LCALL DELAY

mov a,#2fh

lcall Bwrctrl

MOV TIME1,#40

LCALL DELAY

MOV A,#25H

LCALL BWRCTRL

MOV TIME1,#20

LCALL DELAY

MOV A,#81H

LCALL BWRCTRL

MOV A,#28 ;vop=9.0V

LCALL BWRCTRL

```
MOV TIME1,#20
LCALL DELAY
mov a,#0afh
lcall bwrctrl    ;display on
```

.....**TO YOUR CODE**

REVISIONS

No.	DATE	DESCRIPTION	ORGANIZED BY	CHECKED BY	APPROVED BY
1					
2					
3					
4					
5					
6					
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8					
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