深圳市科飞研科技有限公司

SHENZHEN KEFEIYAN TECHNOLOGY CO. , LTD.

LCM Samples Approval

客户名称（Customer）：

模块型号（Model NO. ）：G13164-1

APPROVED SIGNATURES

0755-25324802

	Rev by		Rev date	Sample No
1.0	Preliminary	BIN	2004-10-20	G13164-1

1. FEATURES

YMG13164-1 is a low-power consumption dot matrix LCD module with built in controller. The controller has a built-in DDRAM. All the display functions are controlled by instructions and the module can be easily interfaced with 8080 parallel Interface MPU.

1) Format: 131 x 64 Dots
2) Display type: FSTN / Transflective 6 O ?clock Positive.
3) Driving method: 1/65 duty.
4) Low power consumption.
5) Easy interface with a 8080 parallel interface MPU
6) Power supply Voltage:+3.0V

2. MECHANICAL DATA

Item		Width	Height	Thickness	Unit
Module size without FFC		61	54.7	6	mm
Viewing area		53.4	31	—	mm
Dot	Size	0.34	0.38	—	mm
	Pitch	0.375	0.415	—	mm
Diameter of mounting hole		4.0			mm

3. MAXIMUN ABSOLUTE LIMIT

Item	Symbol	Test Condition	Standard Value			Unit
			Min.	Typ.	Max.	
Power Supply Voltage	Vdd -Vss	Ta=25	-0.3	3.0	+3.1	V
Voltage Supply for LCD Drive	Vdd -Vo	Ta=25	—	—	—	V
Input Voltage	VI	Ta=25	-0.3	—	Vdd+0.3	V

4. TEMPERATUTE CHARACTERISTICS

Item	Symbol	Test Condition	Standard Value			Unit
			Min.	Typ.	Max.	
Operating Temperature	Topr	—	-10	—	+60	
Storage Temperature	Tstg	—	-20	—	+70	

5 ELECTRICAL CHARACTERISTICS

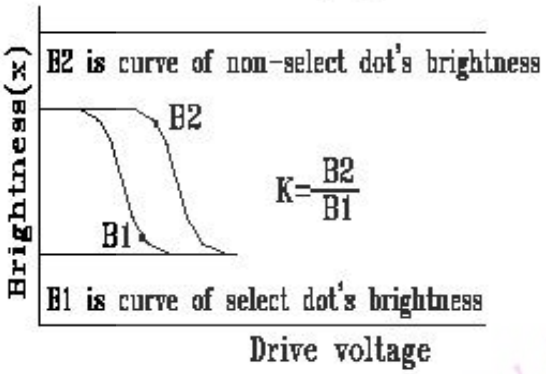
Item	Symbol	Condition	Standard value			Unit
			Min.	Typ	Max.	
Input "High" Voltage	V_{IH}	—	0.8Vdd	—	Vdd	V
Input "Low" Voltage	V_{IL}	—	0	—	0.2Vdd	V
Output "High" Voltage	V_{OH}	—	0.8Vdd	—	—	V
Output "Low" Voltage	V_{OL}	—	—	—	0.2Vdd	V

6. ELECTRO-OPTICAL CHARACTERISTICS

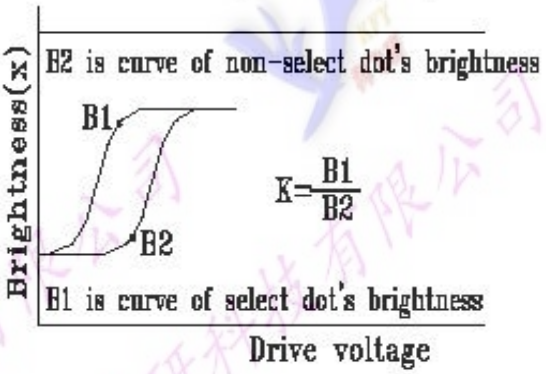
(Ta=25)

Item	Symbol	Condition	Min	Typ	Max	Unit
Contrast Ratio	K	ϕ=10°, θ=0°	2	3		-
Response Time (rise)	Tr	ϕ=10°, θ=0°		250	300	ms
Response Time(Fall)	Tf	ϕ=10°, θ=0°		250	350	ms
Viewing Angle	ϕ2-ϕ1	Kα=2	20	-	-	Deg.

Positive Display

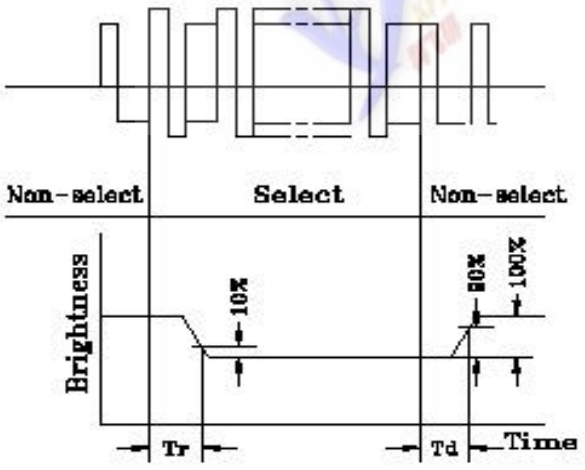


Negative Display

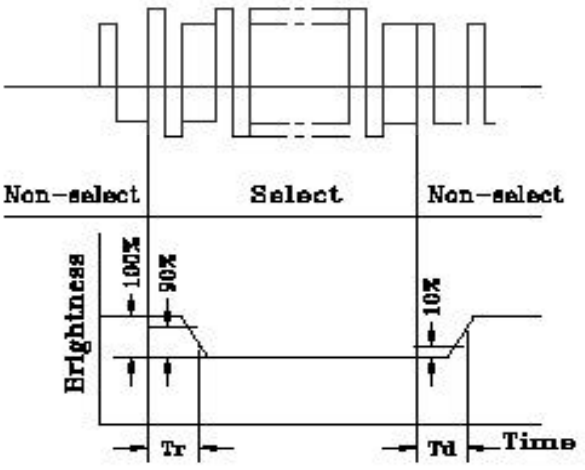


Contrast Ratio (K) $=\frac{\text{Brightness of non-selected dot (B2)}}{\text{Brightness of selected dot (B1)}}$

Positive Display



Negative Display



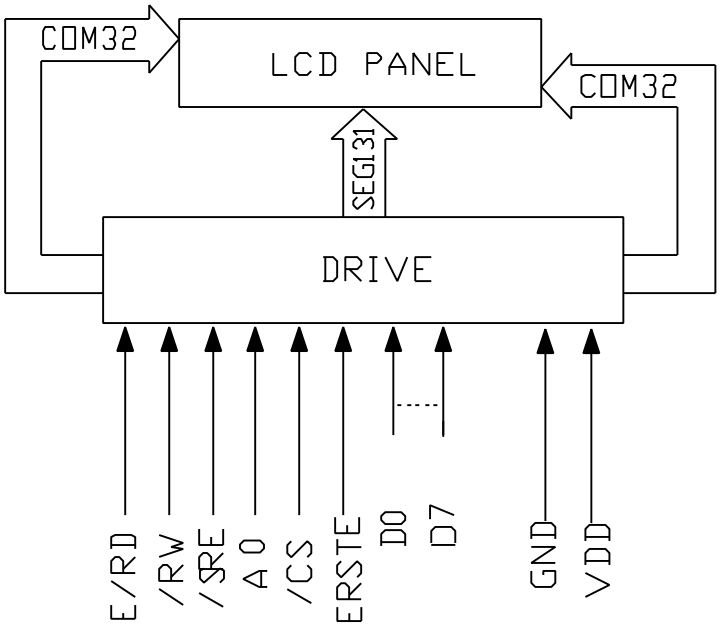
7. PIN CONNECTIONS

1	2	3	4	5	6	7	8
NC	/CS	/RES	A0	/WR	E/RD	D0	D1
9	10	11	12	13	14	15	16
D2	D3	D4	D5	D6	D7	VDD	GND

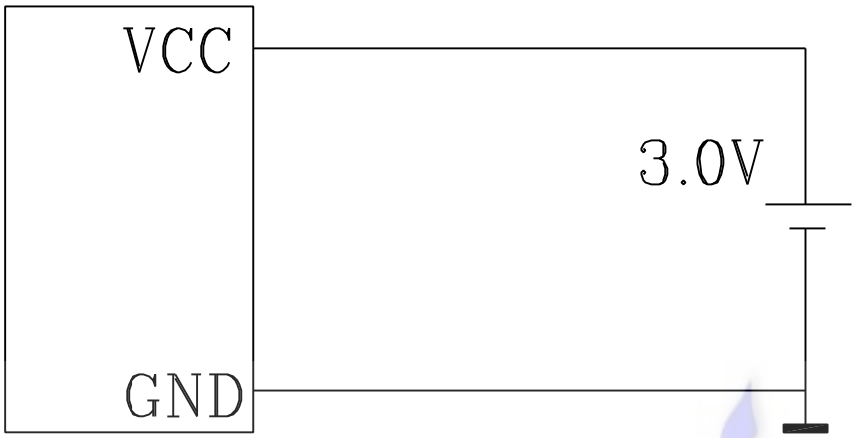
PIN DESCRIPTION:

Pin No.	Pin Name	I/O	Description
1	NC		No connection
2	/CS		Chip selection. Low active.
3	/RES	I	Reset signal input pin, When RES is set to "L", the settings are initialized.
4	A0	I	DATA /OMMAND Control pin A0="H": Indicate that D0 to D7 are display data. A0="L": Indicates that D0 to D7 are control data.
5	/WR	I	This is active LOW. This terminal connects to the 8080 MPU /WR signal. The signals on the data bus are latched at the rising edge of the /WR signal.
6	E/RD	I	It is active LOW, This pad is connected to the /RD signal of the 8080MPU, and the IC data bus is in an output status when this signal is"L".
7-14	D0-D7	I/O	8-bit bi-directional data bus connects to 8-bit standard MPU data bus.
15	VDD	--	Power supply voltage.
16	GND	--	Ground (0V)

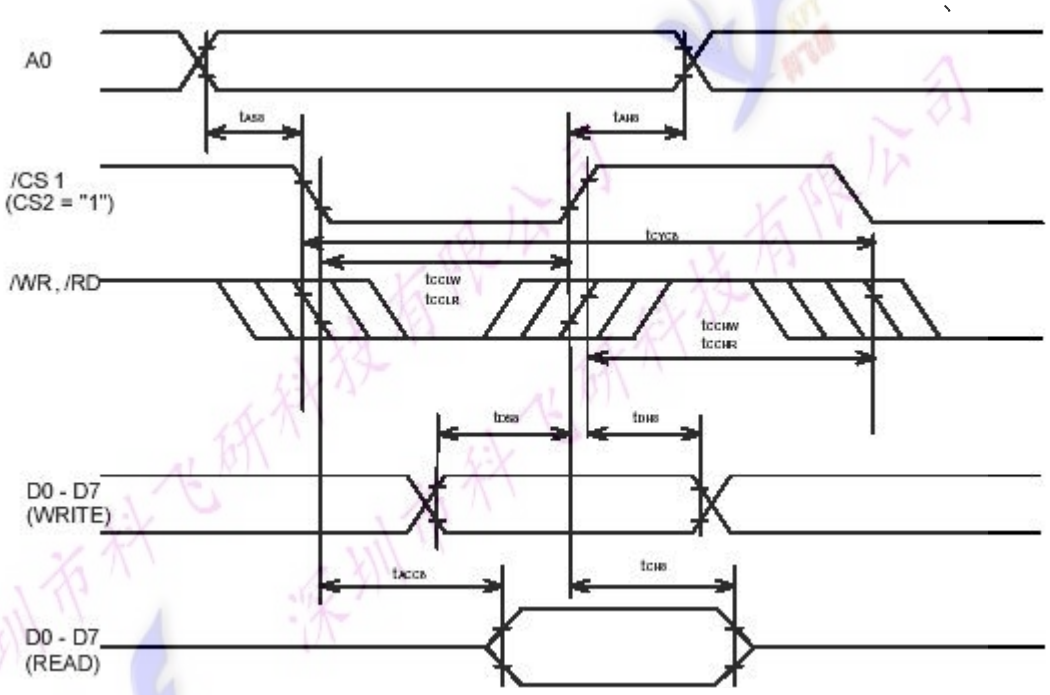
8 BLOCK DIAGRAM



9. Power Supply



10. Bus Timing Characteristics



(V_{DD} = 2.4 - 3.5V)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Conditions
tAH8	Address hold time	0			ns	
tAS8	Address setup time	0			ns	
tCYC8	System cycle time	300			ns	
tCCLW	Control L pulse width (/WR)	90			ns	
tCCLR	Control L pulse width (/RD)	120			ns	
tCCHW	Control H pulse width (/WR)	120			ns	
tCCHR	Control H pulse width (/RD)	60			ns	
tDS8	Data setup time	40			ns	
tDH8	Data hold time	15			ns	
tACC8	/RD access time			140	ns	C_L = 100pF
tCH8	Output disable time	10		100	ns	C_L = 100pF

11. INSTRUCTION SET

Command	Code											Function
	A0	$\overline{RD}$	$\overline{WR}$	D7	D6	D5	D4	D3	D2	D1	D0	
(1) Display ON/OFF	0	1	0	1	0	1	0	1	1	1	D	Turns on LCD panel when goes high, and turns off when goes low
(2) Set Display Start Line	0	1	0	0	1	Display start address						Specifies RAM display line for COM0
(3) Set Page Address	0	1	0	1	0	1	1	Page address				Sets the display RAM page in Page Address register
(4) Set Column Address 4 higher bits	0	1	0	0	0	0	1	Higher column address				Sets 4 higher bits of column address of display RAM in register
(4) Set column Address 4 lower bits	0	1	0	0	0	0	0	Lower column address				Sets 4 lower bits of column address of display RAM in register
(5) Read Status	0	0	1	Status				0	0	0	0	Reads the status information
(6) Write Display Data	1	1	0	Write data								Writes data in display RAM
(7) Read Display Data	1	0	1	Read data								Reads data from display RAM
(8) ADC select	0	1	0	1	0	1	0	0	0	0	D	Sets the display RAM address SEG output correspondence
(9) Normal/Reverse Display	0	1	0	1	0	1	0	0	1	1	D	Normal indication when low, but full indication when high
(10) Entire Display ON/OFF	0	1	0	1	0	1	0	0	1	0	0 1	Selects normal display (0) or Entire Display ON (1)
(11) Set LCD Bias	0	1	0	1	0	1	0	0	0	1	D	Sets LCD drive voltage bias ratio
(12) Read-Modify-Write	0	1	0	1	1	1	0	0	0	0	0	Increments Column Address counter during each write
(13) End	0	1	0	1	1	1	0	1	1	1	0	Releases the Read-Modify-Write
(14) Reset	0	1	0	1	1	1	0	0	0	1	0	Resets internal functions
(15) Common output mode select	0	1	0	1	1	0	0	D	*	*	*	Selects COM output scan direction. * Invalid data
(16) Set Power Control	0	1	0	0	0	1	0	1	Operation status			Selects the power circuit operation mode
(17) V0 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	0	1	0	1	0	0	0	0	0	0	1	Set the V0 output voltage electronic volume register
Electronic Volume Register set	0	1	0	*	*	Electronic control value						
(19) Set static indicator On/Off	0	1	0	1	0	1	0	1	1	0	D	Set static indicator On/Off 0: OFF 1: ON
Set Static indicator register	0	1	0	*	*	*	*	*	*	Mode		Set the flashing mode
(20) Power Save	-	-	-	-	-	-	-	-	-	-	-	Compound command of display OFF and entire display ON
(21) NOP	0	1	0	1	1	1	0	0	0	1	1	Command for non-operation
(22) Test Command	0	1	0	1	1	1	1	*	*	*	*	IC Test command. Do not use!
(23) Test Mode Reset	0	1	0	1	1	1	1	0	0	0	0	Command of test mode reset

Note: Do not use any other command, or the system malfunction may result.

When the /RES input comes to the "L" level, these LSIs return to the default state. Their default states are as follows:

1. Display OFF
2. Normal display
3. ADC select: Normal (ADC command D0 = "L")
4. Power control register: (D2, D1, D0) = (0, 0, 0)
5. Serial interface internal register data clear
6. LCD power supply bias rate:
   1/65 DUTY = 1/9 bias
   1/49,1/55,1/53 DUTY = 1/8 bias
   1/33 DUTY = 1/6 bias
7. All-indicator lamps-on OFF (All-indicator lamps ON/OFF command D0 = "L")
8. Power saving clear
9. Vo voltage regulator internal resistors Ra and Rb separation
10. Output conditions of SEG and COM terminals SEG=VSS , COM=VSS
11. Read modify write OFF
12. Static indicator OFF Static indicator register : (D1, D2) = (0, 0)
13. Display start line set to first line
14. Column address set to Address 0
15. Page address set to Page 0
16. Common output status normal
17. Vo voltage regulator internal resistor ratio set mode clear
18. Electronic volume register set mode clear Electronic volume register :
(D5, D4, D3, D2, D1, D0) = (1, 0. 0, 0, 0,0)
19. Test mode clear

On the other hand, when the reset command is used, the above default settings from 11 to 19 are only executed. When the power is turned on, the IC internal state becomes unstable, and it is necessary to initialize it using the /RES terminal. After the initialization, each input terminal should be controlled normally.

Moreover, when the control signal from the MPU is in the high impedance, an over current may flow to the IC. After applying a current, it is necessary to take proper measures to prevent the input terminal from getting into the high impedance state.

If the internal liquid crystal power supply circuit is not used on ST7565P,it is necessary that /RES is "H" when the external liquid crystal power supply is turned on. This IC has the function to discharge V_o when /RES is "L," and the external power supply short-circuits to V_{ss} when /RES is "L." While /RES is "L," the oscillator and the display timing generator stop, and the CL, FR, FRS and /DOF terminals are fixed to "H." The terminals D0 to D7 are not affected. The Vss level is output from the SEG and COM output terminals. This means that an internal resistor is connected between Vss and V_o.

When the internal liquid crystal power supply circuit is not used on other models of ST7565P series, it is necessary that /RES is "L" when the external liquid crystal power supply is turned on.

While /RES is "L," the oscillator works but the display timing generator stops, and the CL, FR, FRS and /DOF terminals are fixed to "H." The terminals D0 to D7 are not affected.

12 RELIABILITY

- Reliability characteristics shall meet following requirements

ITEM	TEST	CRITERION
High temp	70/200HRS	* Total current consumption should be below value * Contrast ratio should be within initial value ±50% * No defect in cosmetic and operational function is allowable
Low temp	-20/200HRS	
High humidity	60×90%RH/200HRS	
Thermal shock	-202570/5 CYCLES (20min)(5min)(30min)	
Vibration	1 Operating time: thirty minutes exposure for each direction (x y z) 2 Sweep frequency (l min):10Hz22HZ 10HZ 3 Amplitude:1.5mm	

13 PRECAUTION FOR USING

- HANDLING
- Refrain from storing mechanical shock and from applying any force to LCD MODULE it may cause mis-operation or damage of LCD
- Do not touch ,press or rub the display panel with a hard, stiff tool or object as the polarizers in the panel are easily scratched
- If LCD is broken and liquid crystal material flow out, ingestion, inhalation, or contact with skin should be avoided. If liquid crystal material contact with skin, wash immediately with alcohol and rinse thoroughly with water.
- Never use organic solvents to clear the display panel as these solvent may adversely

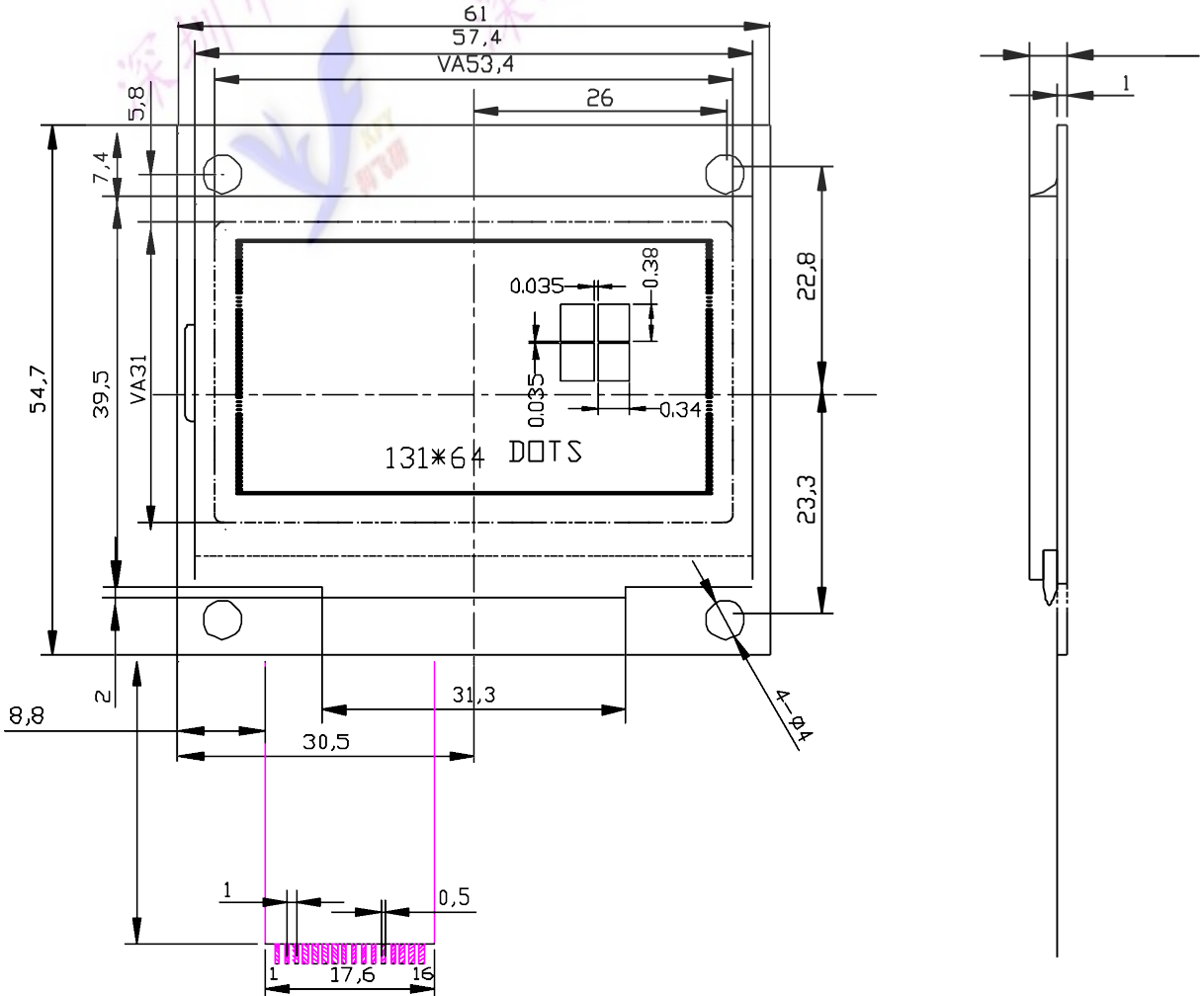
affect the polarizer . To clean the display panel dampen a bit of absorbent cotton with petroleum benzene and gently wipe the panel,or contaminations by using a scotch tape.

- Refrain from discharge of high electro-static voltage, it will damage C_MOS LSI in the MODULE
- Do not leave the MODULE in high temperature, especially in high humidity for a long time. It is recommended to store the MODULE where the temperature is in the range of 0 to 35and the humidity is lower than 70%.
- Store the MODULE without exposure to direct sunlight or fluorescent lamp.
- Ultra violet cut filter is necessary for outdoor operation.
- Avoid condensation of water, it may cause misoperation or disconnection of electrode.
- OPERATION
- Never connect or disconnect the LCD MODULE from the main system while power is being supplied.
- When supplying the M signal from the external unit to a GRAPHIC MODULE , set the duty to 50%±1%.

If the duty deviates too greatly from the value, a DC voltage will be applied to the liquid crystal, which could induce an electrochemical reaction and reduce the life of the MODULE.

- Do not exceed the maximum rating values under the worst conditions taking account of the supply voltage variation, input voltage variation , and environmental temperature, etc. Otherwise LCD module may be damaged.

14 EXTERNAL DIMENSION



Unspecified tolerance 0.3mm.