

# 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. ) : G13265-1

编号No.:

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客 户 确 认 (APPROVED SIGNATURES)

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本厂型号	<b>G13265-1</b>		
产品类型	液晶显示模组	送样日期	
修改次数	第 <b>1</b> 次	页 数	共 <b>11</b> 页
客户签回意见			
 签名:			

业 务	制 定	审 核	批 准

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# Revision record

Rev mark	Revision description	Rev by	Rev date	Sample No
<b>1.0</b>	<b>Preliminary</b>	<b>BIN</b>	2008-10-20	<b>YMG13265-1</b>

## 1. FEATURES

YMG13265-1 V1.0 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: 132 x 65 Dots
- 2) Display type: STN(GREY) / 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	68	65	6	mm
Viewing area	61	43.9	—	mm
Dot	Size	0.4	0.53	mm
	Pitch	0.44	0.57	mm
Diameter of mounting hole	3.0			mm

## 3. MAXIMUM ABSOLUTE LIMIT

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

## 4. TEMPERATURE CHARACTERISTICS

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

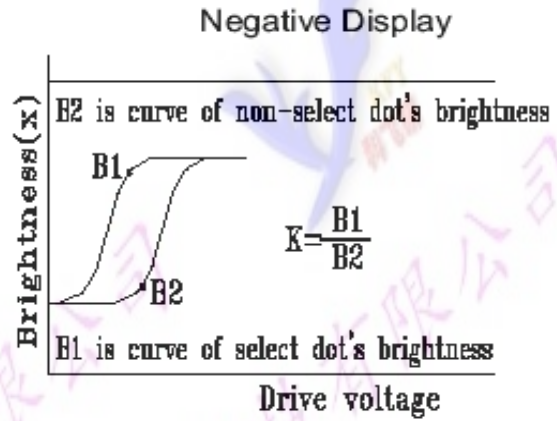
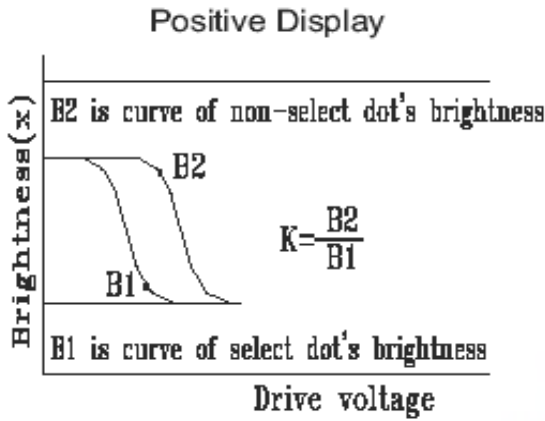
## 5 ELECTRICAL CHARACTERISTICS

Item	Symbol	Condition	Standard value			Unit
			Min.	Typ	Max.	
Input "High" Voltage	V <sub>IH</sub>	—	0.8V <sub>dd</sub>	—	V <sub>dd</sub>	V
Input "Low" Voltage	V <sub>IL</sub>	—	0	—	0.2V <sub>dd</sub>	V
Output "High" Voltage	V <sub>OH</sub>	—	0.8V <sub>dd</sub>	—	—	V
Output "Low" Voltage	V <sub>OL</sub>	—	—	—	0.2V <sub>dd</sub>	V

## 6. ELECTRO-OPTICAL CHARACTERISTICS

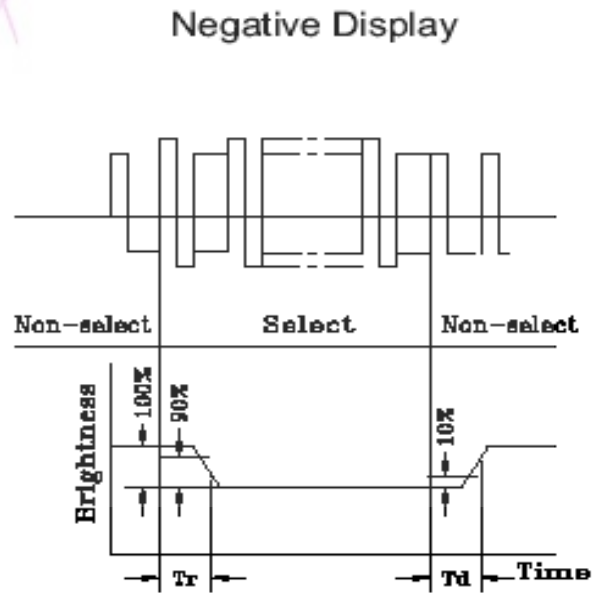
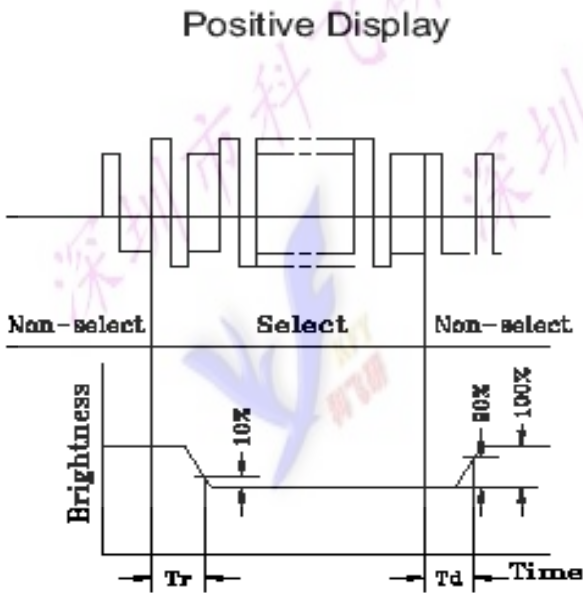
(Ta=25°C)

Item	Symbol	Condition	Min	Typ	Max	Unit
Contrast Ratio	K	$\phi = 10^\circ, \theta = 0^\circ$	2	3	—	-
Response Time (rise)	Tr	$\phi = 10^\circ, \theta = 0^\circ$	—	250	300	ms
Response Time(Fall)	Tf	$\phi = 10^\circ, \theta = 0^\circ$	—	250	350	ms
Viewing Angle	$\phi 2-\phi 1$	$K\alpha = 2$	20	-	-	Deg.



Contrast Ratio (K)

Brightness of non-selected dot (B2)  
Brightness of selected dot (B1)



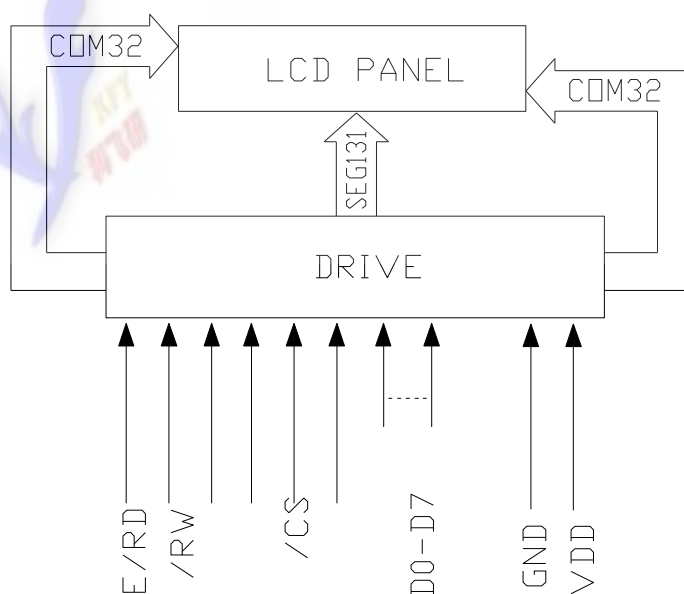
## 7. PIN CONNECTIONS

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

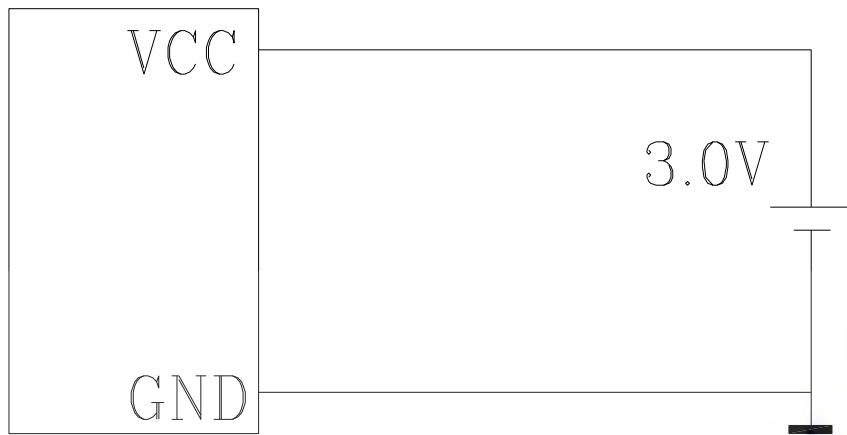
### PIN DESCRIPTION:

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)

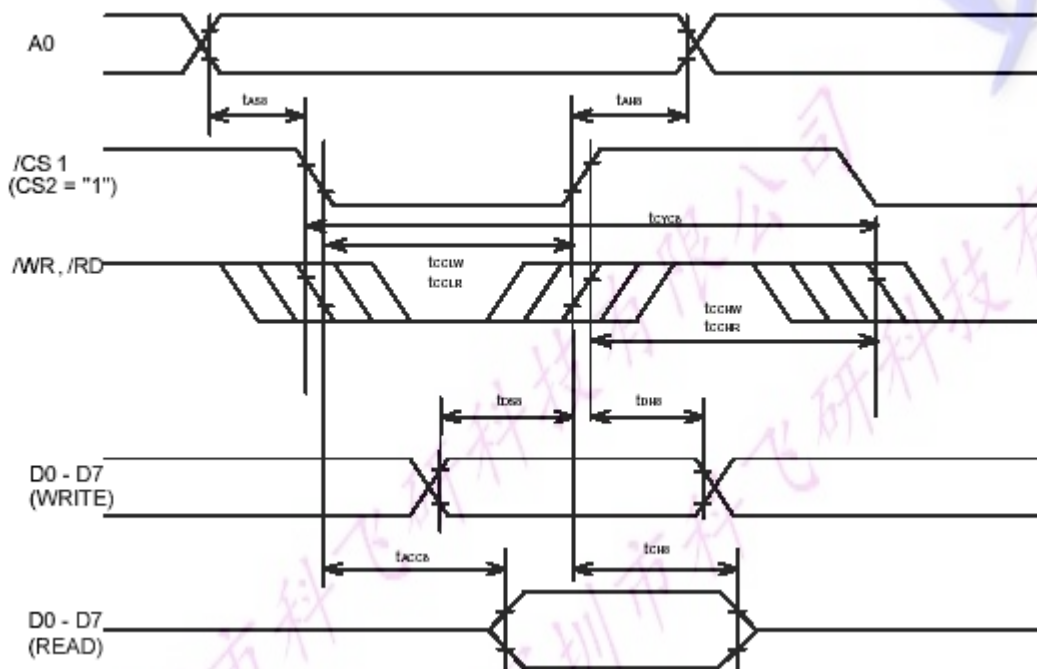
## 8 BLOCK DIAGRAM



## 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 Electronic Volume Register set	0	1	0	1	0	0	0	0	0	0	1	Set the V0 output voltage electronic volume register
	0	1	0	*	*	Electronic control value						
(19) Set static indicator On/Off Set Static indicator register	0	1	0	1	0	1	0	1	1	0	D	Set static indicator On/Off 0: OFF 1: ON
	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.

## Reset Circuit

When the  $\overline{\text{RES}}$  input falls to "L", these LS1s reenter their default state. The default settings are shown below:

1. Display OFF
2. Normal display
3. ADC select: Normal display (ADC command D0= "L")
4. Power control register (D2, D1, D0)=(0, 0, 0,)
5. Read modify write OFF
6. Register data clear in serial interface
7. LCD power supply bias ratio 1/9 (1/65 duty), 1/8 (1/55, 1/49 duty) , 1/6 (1/33 duty)
8. Static indicator: OFF  
Static indicator register: (D1, D2)=(0, 0)
9. Display start line register set at first line
10. Column address counter set at address0
11. Page address register set at page 0
12. Common output status normal
13. V0 voltage regulator internal power supply ratio set mode clear:  
V0 voltage regulator internal resistor ratio register: (D2, D1, D0)=(1, 0, 0)
14. Electronic volume register set mode clear  
Electronic volume register: (D5, D4, D3, D2, D1, D0) = (1, 0, 0, 0, 0, 0,)
15. Test mode clear
16. All-indicator-lamps-on OFF (All-indicator-lamps ON/OFF command D0="L").
17. Output condition of COM, SEG  
COM: V1  
SEG: V2

On the other hand, when the reset command is used only default settings 7 to 15 above are put into effect.

As is described in "11. The MPU interface (Refence Example )," the  $\overline{\text{RES}}$  terminal is connected to the MPU reset terminal, making the chip reinitialize simultaneously with the MPU. At the time of power up, it is necessary to reinitialize using the  $\overline{\text{RES}}$  terminal. Moreover, when the control signal from the MPU is in a high impedance state, there may be an overcurrent condition to take measures to prevent the input terminal from entering a high impedance state.

In the NT7502, if the internal liquid crystal power supply circuit is not used, then it is necessary to apply a "L" signal to the  $\overline{\text{RES}}$  terminal when the external liquid crystal power supply is applied.

Even though the oscillator circuit operates while the  $\overline{\text{RES}}$  terminal is "L", the display timing generator circuit is stopped, and the FR, FRS, and  $\overline{\text{DOF}}$  terminals are fixed to "H" and the CL pin is fixed to "H" only when the internal oscillator circuit is used. There is no influence on the D0 to D7 terminals.

## 12 RELIABILITY

✎ Reliability characteristics shall meet following requirements

ITEM	TEST	CRITERION
High temp	70°C/200HRS	* Total current consumption should be below double of initial value
Low temp	-20°C/200HRS	
High humidity	60°C×90%RH/200HRS	* Contrast ratio should be within initial value ±50%
Thermal shock	-20°C→25°C→70°C→/5 CYCLES (20min)(5min)(30min)	
Vibration	1 Operating time: thirty minutes exposure for each direction (x y z) 2 Sweep frequency (1 min):10Hz→22HZ→10HZ 3 Amplitude:1.5mm	* No defect in cosmetic and operational function is allowable

## 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

