图形液晶显示模块

LCM12864R

使用说明书

北京青云创新科技发展有限公司
BEIJING QINGYUN HI-TECH DEVELOPMENT CO.,LTD

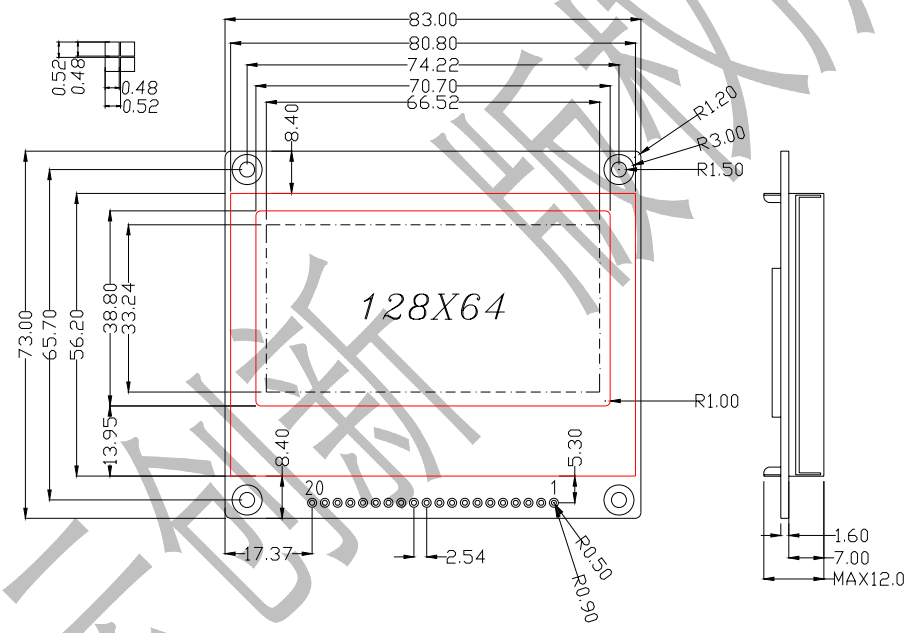
2009/1 Version: 1.0

内容

■ 物理特性

项目	内容	单位
显示类型	STN ， 黄绿	---
控制器	NT7538	---
占空比	1/65	---
偏压比	1/9	---
视角	6	o'clock
模块尺寸 (长×宽×高)	83.0 ×73.0 × 12.0MAX	mm
视域 (长×宽)	70.7 × 38.8	mm
点阵数量	128× 64	dots
点阵尺寸 (长×宽)	0.48 × 0.48	mm
点阵间距	0.52 × 0.52	mm

■ 外形尺寸示意图



■ 极限参数 (常温 Ta = 25°C)

特性	符号	数值	单位
电源电压	VDD	3.0-3.5	V
液晶屏驱动电压	VLCD	8.5	V
输入电压	VI	-0.3~VDD+0.3	V
工作温度	TOPR	-20~70	°C
储存温度	TSTG	-30~80	°C

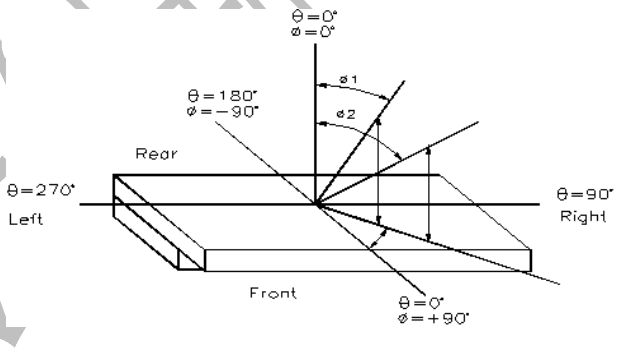
■ **电气参数** (VDD = +3.3V±5% , VSS = 0V, Ta = 25°C)

特性	符号	条件	最小值	典型值	最大值	单位	备注
逻辑工作电压	VDD	---	3.0	3.3	3.5	V	
逻辑工作电流	IDD	---	---	10		mA	
液晶屏工作电压	VLCD	-20°C	7.3	7.8	8.0	V	对比度可软件调整
		25°C	8.0	8.5	9.0	V	
		70°C	8.8	9.3	9.8	V	
输入高电平	VIH	---	0.7VDD	---	VDD	V	
输入低电平	VIL	---	0	---	0.3VDD	V	

■**光电参数表**（Ta=25 °C VDD=3.3±0.25V VOP=12.0V）

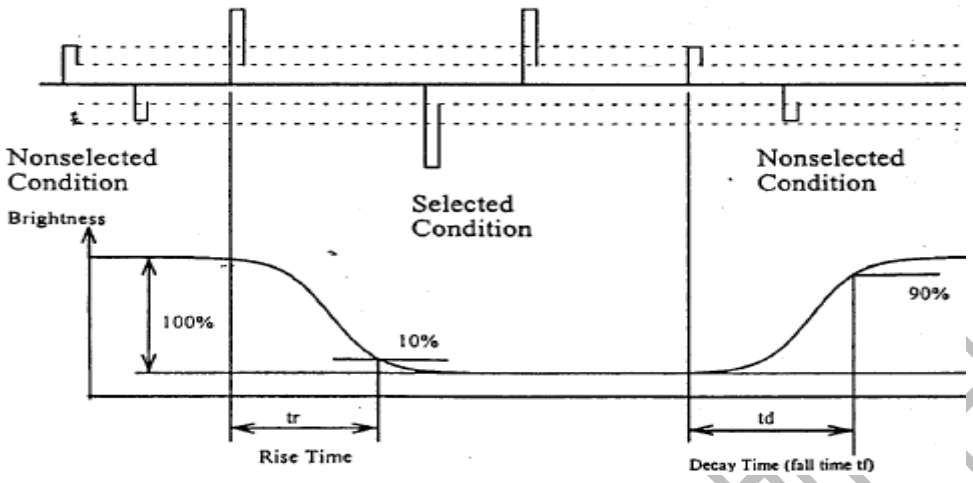
	符号	条件	最小值	典型值	最大值	单位
视角	Δϕ	θ=0°,Cr≥2 -90 ° <ϕ1, ϕ2<90 °	35	40	_	Deg
对比度	Cr	ϕ=0 °,θ=0 °	4	10	_	_
上升响应时间	tr(rise)	ϕ=0 °,θ=0 °	_	250	300	ms
下降响应时间	tf(fall)	ϕ=0 °,θ=0 °	_	300	350	ms
帧频	fF	25 °C		64		Hz

注 1:视角定义 θ, ϕ

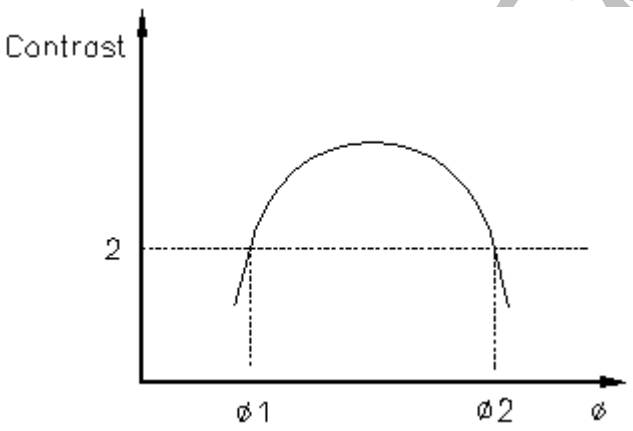


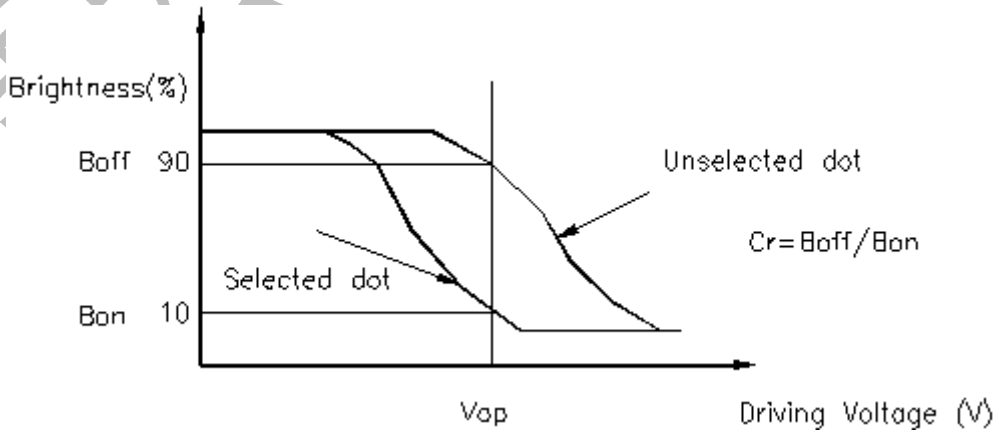
注 2 响应时间：

(NOTE 2) Response time :



注 3: 对比度





■ LED 黄绿背光参数说明:

参数	符号				单位	条件
		最小值.	典型值	最大值		
正向电压	OV	4.8	5	5.2	V	IF =90mA Ta=25 °C
正向电流	fc		90		mA	
峰值波长	λP	569	572	575	nm	
光谱半宽度	Δλ	-	30		nm	
工作温度	Topr	-20	25	70	°C	
存储温度	Tst	-30	25	80	°C	

■ LCM引出脚定义（6800时序）

Pin NO.	Symbol	I/O	Description
1	/CS	I	片选信号，低有效
2	/RES	I	复位信号，低有效
3	A0	I	A0 为高，输入为数据；A0 为低，输入为指令
4	R/W	I	R/W 为高，读信号；R/W 为地，写信号
5	E	I	使能信号
6-13	DB0-DB7	I/O	8 位数据线
14	VCC		电源正极；
15	GND		电源负极
16	VOUT		负电源输出
17	VO		对比度调整
18	NC		空
19	LED+		背光正极
20	LED-		背光负极

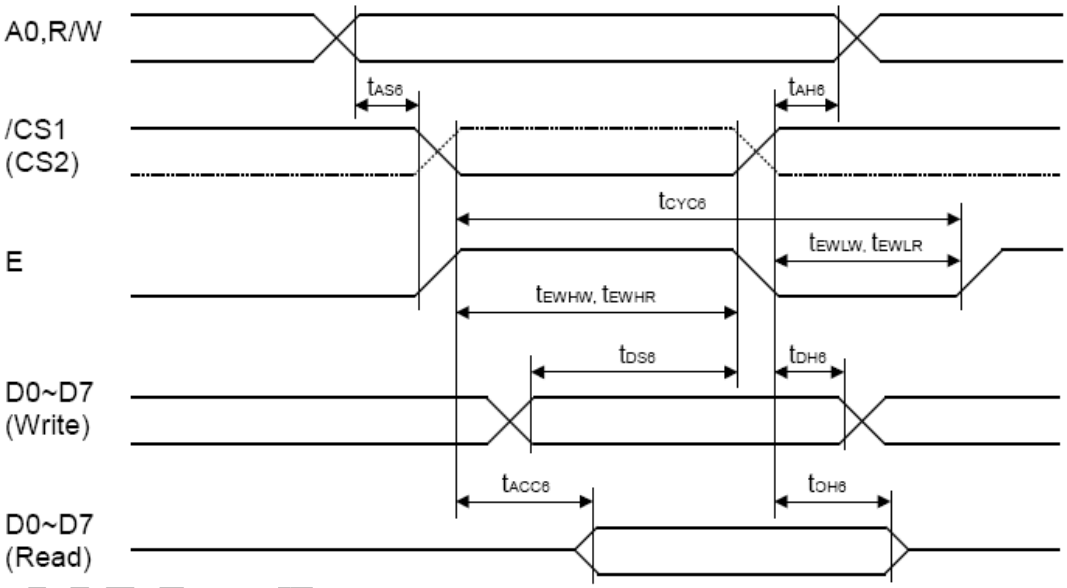
注：VOUT、VO 不用外接，对比度可通过软件，做适当调节

■ 读写操作时序

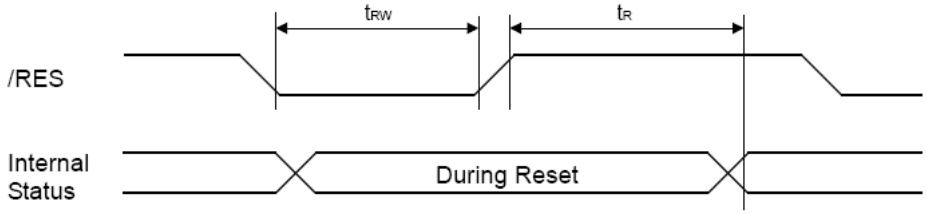
(VDD = 2.7 ~ 3.6V, Ta = -40 ~ +85°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
t_{AH6}	Address hold time	0	-	-	ns	A0, R/W
t_{AS6}	Address setup time	0	-	-	ns	
t_{CYC6}	System cycle time	240	-	-	ns	
t_{EWHW}	Control high pulse width (write)	90	-	-	ns	E
t_{EWHR}	Control high pulse width (read)	120	-	-	ns	E
t_{EWLW}	Control low pulse width (write)	100	-	-	ns	E
t_{EWLR}	Control low pulse width (read)	60	-	-	ns	E
t_{DS6}	Data setup time	40	-	-	ns	D0~D7
t_{DH6}	Data hold time	0	-	-	ns	
t_{ACC6}	/RD access time	-	-	140	ns	D0~D7 CL = 100pF
t_{OH6}	Output disable time	5	-	50	ns	

● 读写操作波形图



● 复位时序



(VDD = 2.7 ~ 3.6V, Ta = -40 ~ +85°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
t_R	Reset Time	-	-	1.0	μs	
t_{RW}	Reset low pulse width	10	-	-	μs	/RES

■ 指令说明

指令表

Command	A0	/RD	/WR	Code									Function
				D7	D6	D5	D4	D3	D2	D1	D0	Hex	
(1) Display OFF	0	1	0	1	0	1	0	1	1	1	0 1	AEh AFh	Turn on LCD panel when high, and turn off when low
(2) Display Start Line Set	0	1	0	0	1	Display Start Address						40h to 7Fh	Specifies RAM display line for COM0
(3) Page Address Set	0	1	0	1	0	1	1	Page Address				B0h to B8h	Set the display data RAM page in Page Address register
(4) Column Address Set	0	1	0	0	0	0	1	Higher Column Address				00h to 18h	Set 4 higher bits and 4 lower bits of column address of display data RAM in register
	0	1	0	0	0	0	0	Lower Column Address					
(5) Read Status	0	0	1	Status				0	0	0	0	XX	Reads the status information
(6) Write Display Data	1	1	0	Write Data								XX	Write data in display data RAM
(7) Read Display Data	1	0	1	Read Data								XX	Read data from display data RAM
(8) ADC Select	0	1	0	1	0	1	0	0	0	0	0 1	A0h A1h	Set the display data RAM address SEG output correspondence
(9) Normal/Reverse Display	0	1	0	1	0	1	0	0	1	1	0 1	A6h A7h	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	A4h A5h	Select normal display (0) or entire display on
(11)LCD Bias Set	0	1	0	1	0	1	0	0	0	1	0 1	A2h A3h	Sets LCD driving voltage bias ratio
(12)Read-Modify-Write	0	1	0	1	1	1	0	0	0	0	0	E0h	Increments column address counter during each write
(13)End	0	1	0	1	1	1	0	1	1	1	0	EEh	Releases the Read-Modify-Write
(14)Reset	0	1	0	1	1	1	0	0	0	1	0	E2h	Resets internal functions
(15)Common Output Mode Select	0	1	0	1	1	0	0	0 1	*	*	*	C0h to CFh	Select COM output scan direction *: invalid data
(16)Power Control Set	0	1	0	0	0	1	0	1	Operation Status			28h to 2Fh	Select the power circuit operation mode
(17)V0 Voltage Regulator Internal Resistor ratio Set	0	1	0	0	0	1	0	0	Resistor Ratio			20h to 27h	Select internal resistor ratio Rb/Ra mode
(18)Electronic Volume mode Set	0	1	0	1	0	0	0	0	0	0	1	81h	
Electronic Volume Register Set	0	1	0	*	*	Electronic Control Value						XX	Sets the V0 output voltage electronic volume register
(19)Set Static indicator ON/OFF	0	1	0	1	0	1	0	1	1	0	0 1	ACh ADh	Sets static indicator ON/OFF 0: OFF, 1: ON
Set Static Indicator Register	0	1	0	*	*	*	*	*	*	Mode		XX	Sets the flash mode
(20)Power Save	0	1	0	-	-	-	-	-	-	-	-	-	Compound command of Display OFF and Entire Display ON
(21)NOP	0	1	0	1	1	1	0	0	0	1	1	E3h	Command for non-operation

Command	A0	/RD	/WR	Code									Function
				D7	D6	D5	D4	D3	D2	D1	D0	Hex	
(22)Oscillation Frequency Select	0	1	0	1	1	1	0	0	1	0	0 1	E4h E5h	Select the oscillation frequency
(23)Partial Display mode Set	0	1	0	1	0	0	0	0	0	1	0 1	82h 83h	Enter/Release the partial display mode
(24)Partial Display Duty Set	0	1	0	0	0	1	1	0	Duty Ratio			30h 37h	Sets the LCD duty ratio for partial display mode
(25)Partial Display Bias Set	0	1	0	0	0	1	1	1	Bias Ratio			38h 3Fh	Sets the LCD bias ratio for partial display mode
(26)Partial Start Line Set	0	1	0	1	1	0	1	0	0	1	1	D3h	Enter Partial Start Line Set
Partial Start Line Set	0	1	0	1	1	Partial Start Line						XX	Sets the LCD Number of partial display start line
(27)N-Line Inversion Set	0	1	0	1	0	0	0	0	1	0	1	85h	Enter N-Line inversion
Number of Line Set	0	1	0	*	*	*	Number of Line					XX	Sets the number of line used for N-Line inversion
(28)N-Line Inversion Release	0	1	0	1	0	0	0	0	1	0	0	84h	Exit N-Line Inversion
(29)DC/DC Clock Set	0	1	0	1	1	1	0	0	1	1	0	E6h	Set DC/DC Clock Frequency
DC/DC Clock Division Set	0	1	0	1	1	0	0	Clock Division				XX	Set the Division of DC/DC Clock Frequency
(30)Test Command	0	1	0	1	1	1	1	*	*	*	*	F1h to FFh	IC test command. Do not use!
(31)Test Mode Reset	0	1	0	1	1	1	1	0	0	0	0	F0h	Command of test mode reset

■ 命令描述

Command Description

Instruction Setup: Reference

1. Initialization

Note: With this IC, when the power is applied, LCD driving non-selective potentials V2 and V3 (SEG pin) and V1 and V4 (COM pin) are output through the LCD driving output pins SEG and COM. When electric charge is remaining in the smoothing capacitor connecting between the LCD driving voltage output pins (V0 - V4) and the VDD pin, the picture on the display may instantaneously become totally dark when the power is turned on. To avoid such failure, we recommend the following flow sequence when turning on the power.

1.1. When the built-in power is being used immediately after turning on the power:

见下左表 a

1.2. When the built-in power is not being used immediately after turning on the power

见下右表 b

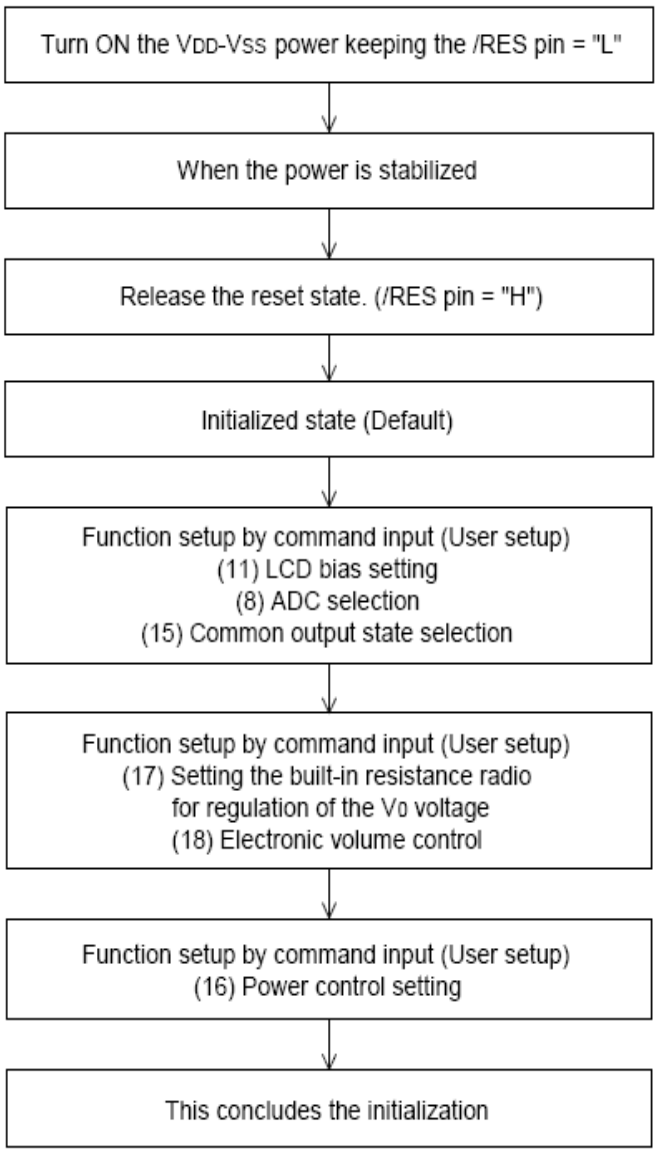

Turn ON the VDD-Vss power keeping the /RES pin = "L"
When the power is stabilized
Release the reset state. (/RES pin = "H")
Initialized state (Default)
Function setup by command input (User setup)
(11) LCD bias setting
(8) ADC selection
(15) Common output state selection
Function setup by command input (User setup)
(17) Setting the built-in resistance radio
for regulation of the V0 voltage
(18) Electronic volume control
Function setup by command input (User setup)
(16) Power control setting
This concludes the initialization

表 a

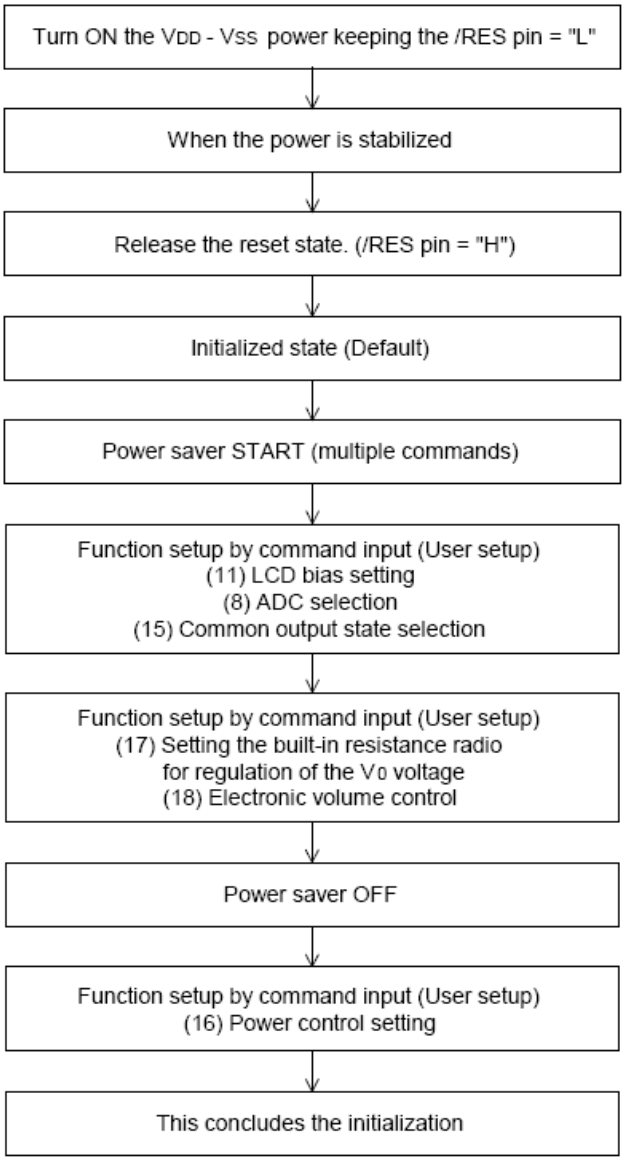
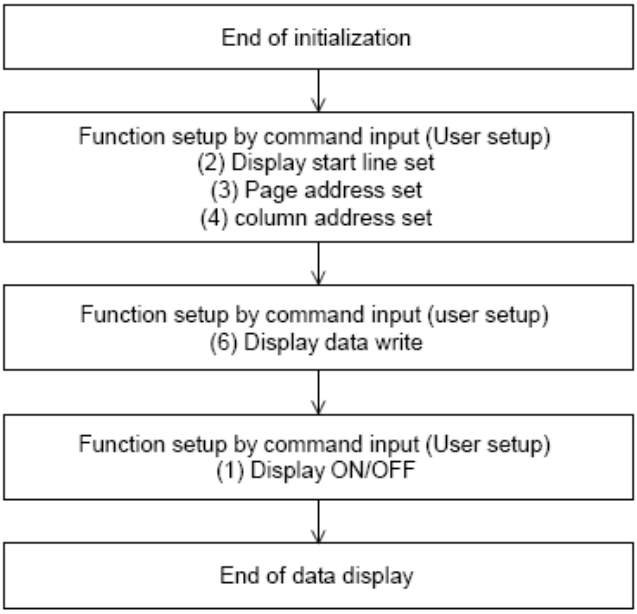
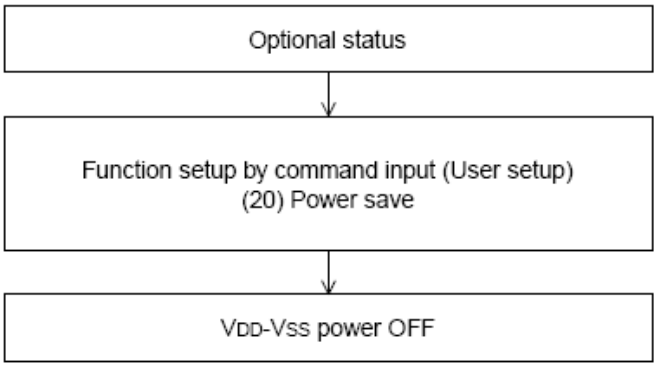

Turn ON the VDD - Vss power keeping the /RES pin = "L"
When the power is stabilized
Release the reset state. (/RES pin = "H")
Initialized state (Default)
Power saver START (multiple commands)
Function setup by command input (User setup)
(11) LCD bias setting
(8) ADC selection
(15) Common output state selection
Function setup by command input (User setup)
(17) Setting the built-in resistance radio
for regulation of the V0 voltage
(18) Electronic volume control
Power saver OFF
Function setup by command input (User setup)
(16) Power control setting
This concludes the initialization

表 b

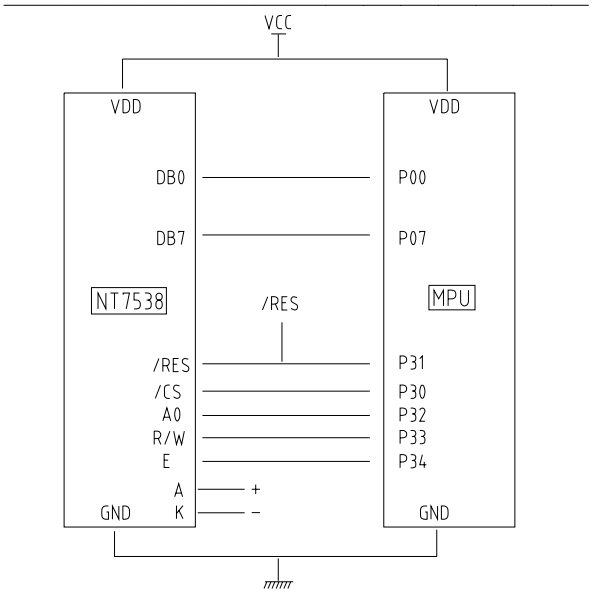
2. Data Display



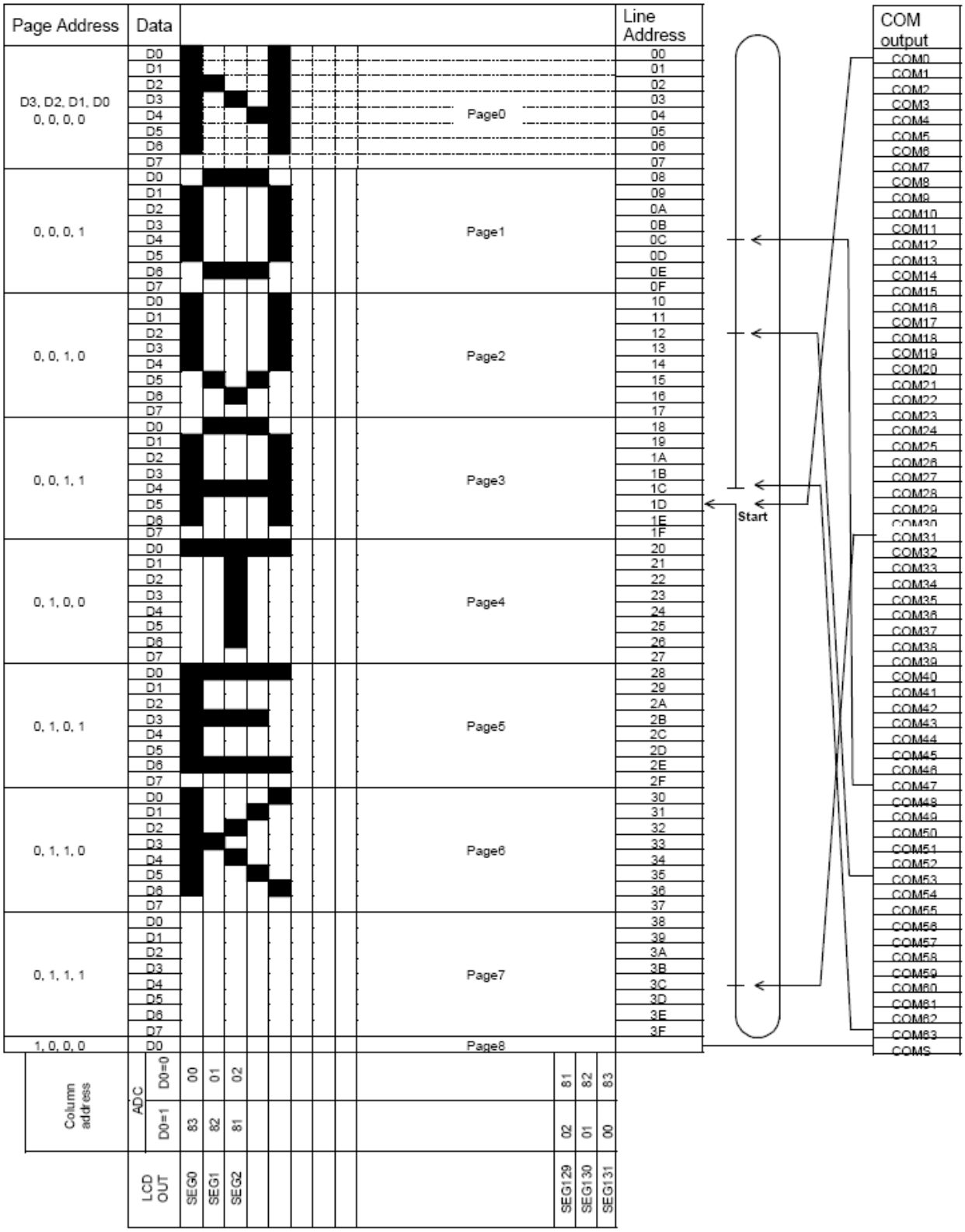
3. Power OFF



■ 典型应用电路



Relationship between display data RAM and address. (if initial display line is 1DH)



■ 注意事项

▼处理

1. 要避免在处理机械振动和对模块施加外力，都可能使屏不显示或损坏。
2. 不能用手或坚硬工具或物体接触、按压、摩擦显示屏，否则屏上的偏振片被物体划坏。
3. 如果屏破裂液晶材料外漏，液晶可以通过空气被吸入，而且要避免液晶与皮肤接触，如果接触应立即用酒精冲洗，然后再用水彻底冲洗。
4. 不能使用可溶有机体来清洗显示屏。因为这些可溶的溶剂对偏振片不利，清洗显示屏时，可用棉花蘸少量石油苯轻轻地擦拭或用透明胶带粘起脏物。
5. 要防止高压静电产生的放电，将损坏模块中的 CMOS 电路。
6. 不能把模块放在温度高的地方，尤其不能长时间放在湿度大的地方，最好把模块放在温度为 0℃～35℃，湿度低于 70%的环境中。
7. 模块不能贮存在太阳光或日光灯直射的地方。
8. 在户外操作时，需要配有紫外滤光片装置。
9. 避免水蒸气凝结，否则将导致屏或电极开路。

▼操作

1. 当电源接通时，不能组装或拆卸模块。
2. 当从外部单元向图形模块提供 M 信号时，将占空比设置为 50%±1%，如果占空比超过额定值太大将会对液晶产生直流电压，将导致电化学反应，减少模块寿命。
3. 在电源电压的偏差、输入电压的偏差及环境温度等最坏条件下，也不能超过最大的额定值，否则将损坏 LCD 模块。

北京青云创新科技发展有限公司

地　　址：北京海淀北三环西路 43 号北京青云航空仪表公司
通信地址：北京 2402 信箱青云创新科技公司　　邮编:100086
电　　话：010-62168698　　62168669　　62168699(传真)
电子信箱：bjqycx@public2.bta.net.cn
公司网址：http://www.qingyun-it.com