

JLX172104G-590-PN 使用说明书

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1. 概述

晶联讯电子专注于液晶屏及液晶模块的研发、制造。所生产 JLX172104G-590-PN 型液晶模块由于使用方便、显示清晰，广泛应用于各种人机交流面板。

JLX172104G-590-PN 可以显示 172 列*104 行点阵单色图片，或显示 16*16 点阵的汉字 10 个*6 行，或显示 8*16 点阵的英文、数字、符号 21 个*6 行。或显示 5*8 点阵的英文、数字、符号 21 个*13 行。

2. JLX172104G-590-PN 图像型点阵液晶模块的特性

2.1 结构牢：背光带有挡墙，焊接式 FPC。

2.2 IC 采用矽创公司 ST75256, 功能强大，稳定性好

2.3 功耗低：不带背光 1mW (3.3V*0.3mA)，带背光不大于 150mW (3.3V*45mA)；

2.4 显示内容：

(1) 172*104 点阵单色图片，或其它小于 172*104 点阵的单色图片；

(2) 可选用 16*16 点阵或其他点阵的图片来自编汉字，按照 16*16 点阵汉字来计算可显示 10 字*6 行；

(3) 按照 8*16 点阵汉字来计算可显示 21 字*6 行；

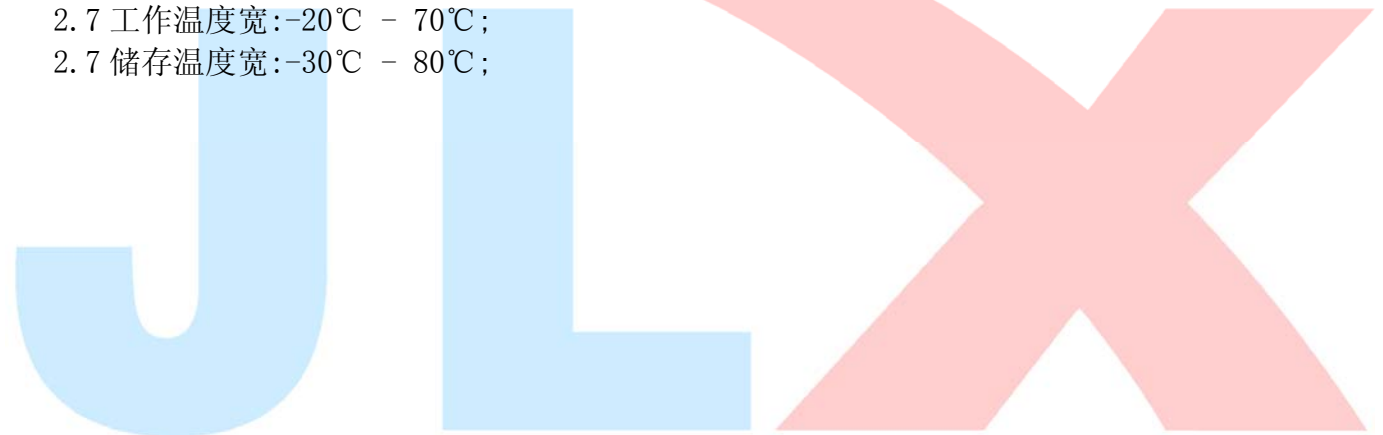
(4) 按照 5*8 点阵汉字来计算可显示 21 字*13 行；

2.5 指令功能强：可软件调对比度；

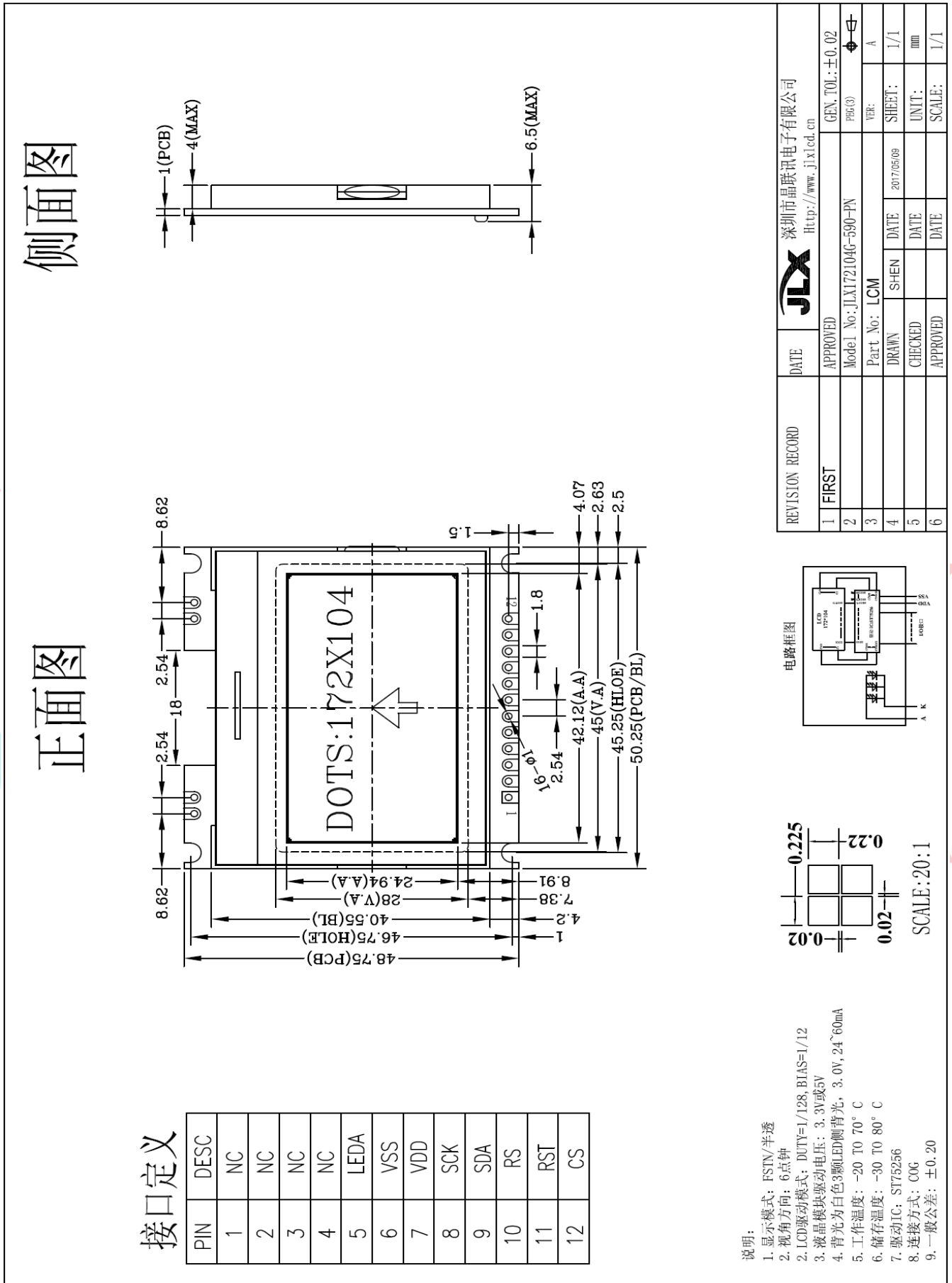
2.6 接口简单方便：采用 4 线 SPI 串行接口。

2.7 工作温度宽：-20℃ - 70℃；

2.7 储存温度宽：-30℃ - 80℃；



3.1 外形尺寸及接口引脚功能



| REVISION RECORD | | DATE | 深圳市晶联讯电子有限公司 Http://www.jlxlcd.cn | |
|-----------------|-------|----------|--------------------------------------|------------------|
| 1 | FIRST | APPROVED | Model No.: JLX172104G-590-PN | GEN. TOL.: ±0.02 |
| 2 | | | Part No.: LCM | VER.: A |
| 3 | | | DRWN | SHEET: 1/1 |
| 4 | | | CHEKED | UNIT: mm |
| 5 | | | APPROVED | SCALE: 1/1 |
| 6 | | | | |

图 1. 外形尺寸

3.2 模块的接口引脚功能

| 引线号 | 符号 | 名称 | 功能 |
|-----|------|---------|-------------------------------|
| 1 | NC | NC | 空脚 |
| 2 | NC | NC | 空脚 |
| 3 | NC | NC | 空脚 |
| 4 | NC | NC | 空脚 |
| 5 | LEDA | 背光电源正极 | 同 VDD 电压 |
| 6 | VSS | 接地 | 0V |
| 7 | VDD | 供电电源正极 | 供电电源正极 |
| 8 | SCK | 串行时钟 | 串行时钟 |
| 9 | SDA | 串行数据 | 串行数据 |
| 10 | RS | 寄存器选择信号 | H: 数据寄存器 0: 指令寄存器 |
| 11 | RST | 复位 | 低电平复位, 复位完成后, 回到高电平, 液晶模块开始工作 |
| 12 | CS | 片选 | 低电平片选 |

表 1: 模块接口引脚功能

4. 基本原理

4.1 液晶屏 (LCD)

在 LCD 上排列着 172×104 点阵, 172 个列信号与驱动 IC 相连, 104 个行信号也与驱动 IC 相连, IC 邦定在 LCD 玻璃上 (这种加工工艺叫 COG)。

4.2 工作电路:

图 2 是 JLX172104G-590 图像点阵型模块的电路框图, 它由驱动 IC ST75256 及几个电阻电容组成。

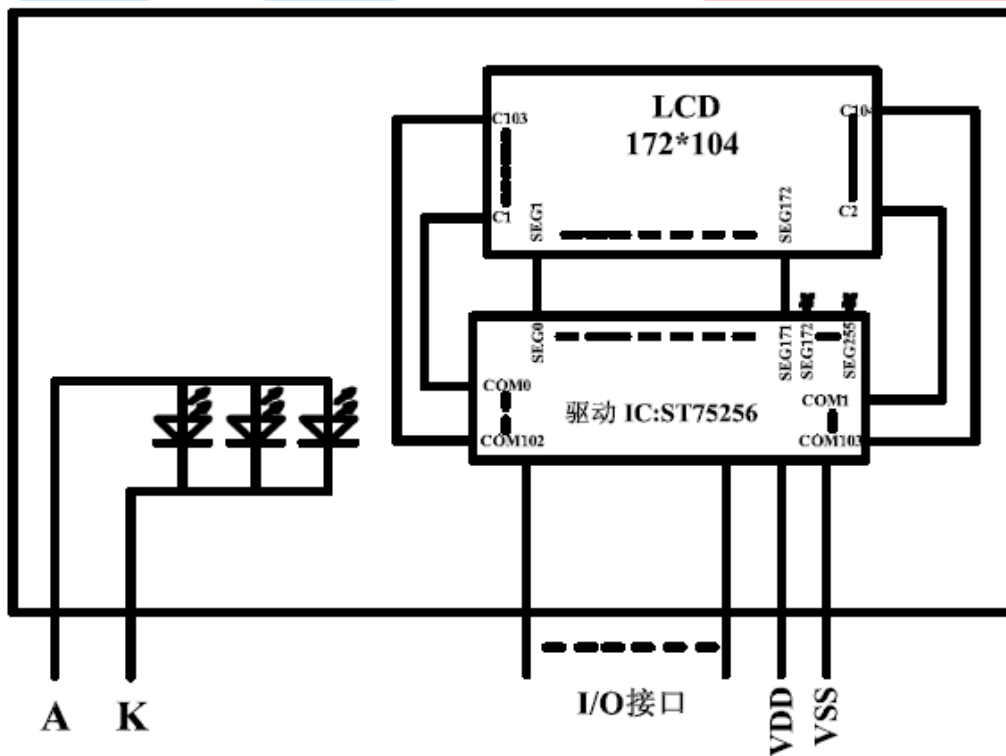


图 2: JLX172104G-590-PN 图像点阵型液晶模块的电路框图

4.2 背光参数

该型号液晶模块带 LED 背光源。它的性能参数如下:

工作温度: $-20^{\circ}\text{C} \sim +70^{\circ}\text{C}$;

存储温度: $-30^{\circ}\text{C} \sim +80^{\circ}\text{C}$;
 背光板为白色。
 正常工作电流为: $24 \sim 60\text{mA}$ (LED 灯数共 3 颗);
 工作电压: 3.0V ;

5. 技术参数

5.1 最大极限参数 (超过极限参数则会损坏液晶模块)

| 名称 | 符号 | 标准值 | | | 单位 |
|----------|-----------|------|----|------|--------------------|
| | | 最小 | 典型 | 最大 | |
| 电路电源 | VDD - VSS | -0.3 | — | 5.5 | V |
| LCD 驱动电压 | VDD - V0 | -0.3 | — | 13.5 | V |
| 静电电压 | | — | — | 100 | V |
| 工作温度 | | -20 | — | +70 | $^{\circ}\text{C}$ |
| 储存温度 | | -30 | — | +80 | $^{\circ}\text{C}$ |

表 2: 最大极限参数

5.2 直流 (DC) 参数

| 名称 | 符号 | 测试条件 | 标准值 | | | 单位 |
|--------|-----------------|-------------------------|--------|------|--------|----|
| | | | MIN | TYPE | MAX | |
| 工作电压 | VDD | — | 2.6 | 3.3 | 3.6 | V |
| 背光工作电压 | VLED | — | 2.9 | 3.0 | 3.1 | V |
| 输入高电平 | V _{IH} | — | 0.8VDD | — | VDD | V |
| 输入低电平 | V _{IO} | — | 0 | — | 0.2VDD | V |
| 输出高电平 | V _{OH} | I _{OH} = 0.2mA | 0.8VDD | — | VDD | V |
| 输出低电平 | V _{OO} | I _{OO} = 1.2mA | 0 | — | 0.2VDD | V |
| 模块工作电流 | IDD | VDD = 3.0V | — | 0.3 | 1.0 | mA |
| 背光工作电流 | ILED | VLED=3.0V | 24 | 45 | 60 | mA |

表 3: 直流 (DC) 参数

6. 读写时序特性 (AC 参数)

6.1 4 线 SPI 串行接口写时序特性 (AC 参数)

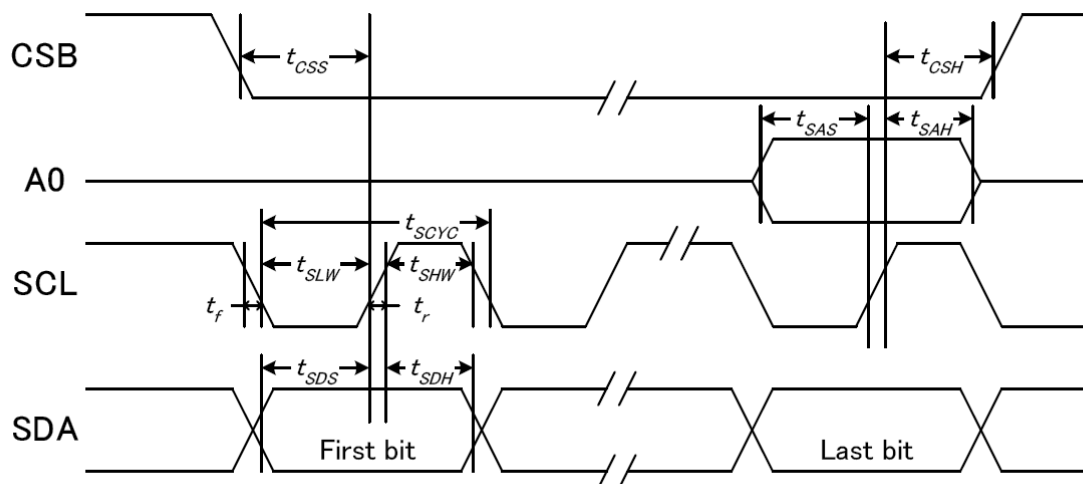


图 3. 从 CPU 写到 ST75256 (Writing Data from CPU to ST75256)

表 4. 写数据到 ST75256 的时序要求

| 项目 | 符号 | 测试条件 | 极限值 | | | 单位 |
|---|-------|---------|-----|------|-----|----|
| | | | MIN | TYPE | MAX | |
| 4线 SPI串口时钟周期 (4-line SPI Clock Period) | tSCYC | 引脚: SCL | 80 | -- | -- | ns |
| 保持SCK高电平脉宽 (SCL "H" pulse width) | tSHW | | 30 | -- | -- | ns |
| 保持SCLK低电平脉宽 (SCL "L" pulse width) | tSLW | | 30 | -- | -- | ns |
| 地址建立时间 (Address setup time) | tSAS | 引脚: A0 | 20 | -- | -- | ns |
| 地址保持时间 (Address hold time) | tSAH | | 20 | -- | -- | ns |
| 数据建立时间 (Data setup time) | tSDS | 引脚: SID | 20 | -- | -- | ns |
| 数据保持时间 (Data hold time) | tSDH | | 20 | -- | -- | ns |
| 片选信号建立时间 (CS-SCL time) | tCSS | 引脚: CSB | 20 | -- | -- | ns |
| 片选信号保持时间 (CS-SCL time) | tCSH | | 20 | -- | -- | ns |

VDD = 1.8~3.3V ± 5%, Ta = -30~85°C

输入信号的上升和下降时间 (TR, TF) 在 15 纳秒或更少的规定。

所有的时间, 用 20%和 80%作为标准规定的测定。

6.4 电源启动后复位的时序要求 (RESET CONDITION AFTER POWER UP):

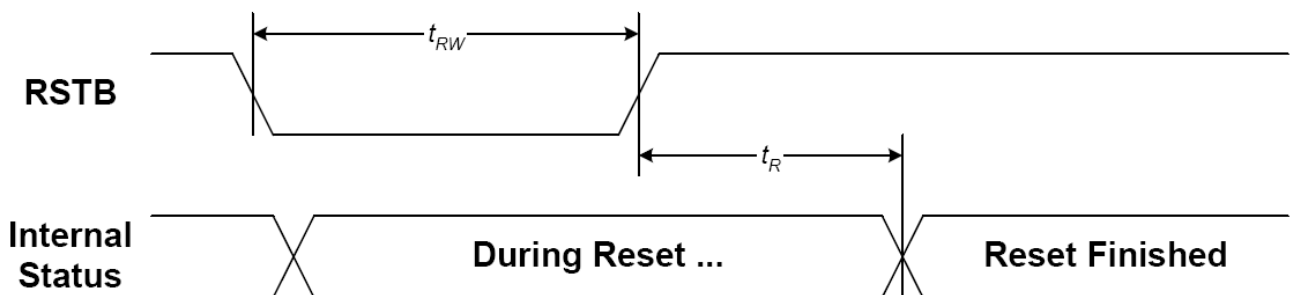


图 4: 电源启动后复位的时序

表 5: 电源启动后复位的时序要求

| 项目 | 符号 | 测试条件 | 极限值 | | | 单位 |
|------------|----------|---------------|-----|------|-----|----|
| | | | MIN | TYPE | MAX | |
| 复位时间 | T_{RW} | | -- | -- | 1 | us |
| 复位保持低电平的时间 | T_{RD} | 引脚: RESET, WR | 1 | -- | -- | ms |



7. 指令功能:

7.1 指令表

表 6

| 指令名称 | 指令码 | | | | | | | | | | |
|--|-----|-----|------|------|------|------|------|------|------|------|--|
| | RS | R/W | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 | |
| (1)扩展指令1 | 0 | 0 | 0 | 0 | 1 | 1 | EXT1 | 0 | 0 | EXT0 | 扩展指令 1、2、3、4 OX30:扩展指令 1 |
| Ext[1:0]=0,0(Extension Command/扩展指令 1) OX30 扩屏指令 1 一定要调用 OX30 才能用扩展指令 1 | | | | | | | | | | | |
| (2)显示开/关 (display on/off) | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 显示开/关: OXAE:关, OXAF: 开 |
| (3)正显/反显 (Inverse Display) | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 显示正显/反显 OXA6:正显, 正常 OXA7: 反显 |
| (4)所有点阵开/关 (All Pixel ON/OFF) | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | OX22: 所有点阵关 OX23: 所有点阵开 |
| (5) 控制液晶屏显示 (Display Control) | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | OXCA:显示控制 |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | CLD | 0 | 0 | OX00:设置 CL 驱动频率: CLD=0 |
| | 1 | 0 | DT7 | DT6 | DT5 | DT4 | DT3 | DT2 | DT1 | DT0 | OX7F:点空比: Duty=128 |
| | 1 | 0 | 0 | 0 | LF4 | F1 | LF3 | LF2 | LF1 | LF0 | OX20:帧周期 |
| (6)省电模式 (Power save) | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | SLP | OX94: SLP=0, 退出睡眠模式 OX95: SLP=1, 进入睡眠模式 |
| | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | OX75: 页地址设置 |
| (7)页地址设置 (Set Page Address) | 1 | 0 | YS7 | YS6 | YS5 | YS4 | YS3 | YS2 | YS1 | YS0 | OX00: 起始页地址 |
| | 1 | 0 | YE7 | YE6 | YE5 | YE4 | YE3 | YE2 | YE2 | YE0 | OX1F: 结束页地址, 每 4 行为 1 页 |
| | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | OX15: 列地址设置 |
| (8)列地址设置 (Set Column Address) | 1 | 0 | XS7 | XS6 | XS5 | XS4 | XS3 | XS2 | XS1 | XS0 | OX00: 起始列地址 |
| | 1 | 0 | XE7 | XE6 | XE5 | XE4 | XE3 | XE2 | XE1 | XE0 | OXFF: 结束列地址 XE=256 |
| | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | OXBC: 行列扫描方向 |
| (9)行列扫描方向 (Data Scan Direction) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | MV | MX | MY | OX00: MX、MY=Normal |
| | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | OX5C: 写数据 |
| (10)写数据到液晶屏 (Write Data) | 1 | 0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | 8 位显示数据 |
| | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | OX5D: 读数据 |
| (11)读液晶屏显示数据 (Read Data) | 1 | 1 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | 8 位显示数据 |
| | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | OXA8: 指定显示区域 |
| (12)指定区域显示数据 (Partial In) | 1 | 0 | PTS7 | PTS6 | PTS5 | PTS4 | PTS3 | PTS2 | PTS1 | PTS0 | 起始区域地址: 00h≤PTS≤A1h |
| | 1 | 0 | PTE7 | PTE6 | PTE5 | PTE4 | PTE3 | PTE2 | PTE1 | PTE0 | 结束区域地址: 00h≤PTE≤A1h |
| | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | OXA9: 退出指定区域显示 |
| (13) 退出指定区域显示 (Partial Out) | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | OXA9: 退出指定区域显示 |
| (14)读/改/写 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | OXE0: 进入读/改/写 |
| (15)退出读/改/写 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | OXEE: 退出读/改/写 |
| (16)指定显示滚动区域 (Scroll Area) | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | OXAA: 滚动区域设置 |
| | 1 | 0 | TL7 | TL6 | TL5 | TL4 | TL3 | TL2 | TL1 | TL0 | TL[7:0]:起始区域地址 |
| | 1 | 0 | BL7 | BL6 | BL5 | BL4 | BL3 | BL2 | BL1 | BLO | BL[7:0]:结束区域地址 |
| | 1 | 0 | NSL7 | NLS6 | NSL5 | NSL4 | NSL3 | NSL2 | NSL1 | NSLO | NSL[7:0]:指定行数 |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | SCM1 | SCM0 | SCM[1:0]:显示模式 |

| | | | | | | | | | | | |
|---|--------------|---|-----|-----|------|------|------|------|------|------|--|
| (17)显示初始行设置 (Set Start Line) | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | OXAB: 滚动开始初始行设置 00h≤SL≥A1h |
| | 1 | 0 | SL7 | SL6 | SL5 | SL4 | SL3 | SL2 | SL1 | SL0 | |
| (18)开振荡电路 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | OXD1: 开内部振荡电路 |
| (19)关振荡电路 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 0 | OXD2: 关内部振荡电路 |
| (20)电源控制 (Power Control) | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | OX20: 电源控制 |
| | 1 | 0 | 0 | 0 | 0 | 0 | VB | 0 | VF | VR | OX0B: VB、VF、VR=1 |
| (21)液晶内部电压设置 (Set Vop) | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | OX81: 设置对比度 |
| | 1 | 0 | 0 | 0 | Vop5 | Vop4 | Vop3 | Vop2 | Vop1 | Vop0 | OX26: 微调对比度, 范围 OX00-OXFF |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | Vop7 | Vop6 | Vop5 | OX04: 粗调对比度, 范围 OX00-OX07 先微调再粗调, 顺序不能变 |
| (22)液晶内部电压控制 (Vop Control) | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | VOL | OXD6: VOP 每格增加 0.04V OXD7: VOP 每格减少 0.04V |
| (23)读寄存器模式 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | REG | OX7C: 读寄存器值 Vop[5:0] OX7D: 读寄存器值 Vop[8:6] |
| (24)空操作 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | OX25: 空操作 |
| (25)读状态 (并行、IIC) | 0 | 1 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | 读状态字节 |
| (26)读状态 (串行接口) | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 读状态字节 |
| | 0 | 1 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | |
| (27)数据格式选择 (Data Format Select) | 0 | 0 | 0 | 0 | 0 | 0 | 1 | D0 | 0 | 0 | OX80: 数据 D7→D0 OXC0: 数据 D0→D7 |
| | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | DM | OXF0: 显示模式设置 OX10: 黑白模式 OX11: 4 灰级模式 |
| (29)ICON设置 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | ICON | OX77: 使能 ICON RAM OX76: 禁用 ICON RAM |
| (30)设置主/从模式 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | MS | OX6E: 主模式(使用主模式) OX6F: 从模式 |
| Ext[1:0]=0,1(Extension Command 2) OX31 扩屏指令 2 一定要调用 OX31 才能用扩展指令 2 | | | | | | | | | | | |
| (31)灰度设置 Set Gray Level | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | OX20: 灰度级设置 GL[4:0]: 浅灰度级设置 GD[4:0]: 深灰度级设置 |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 0 | 0 | 0 | 0 | GL4 | GL3 | GL2 | GL1 | GL0 | |
| | 1 | 0 | 0 | 0 | 0 | GL4 | GL3 | GL2 | GL1 | GL0 | |
| | 1 | 0 | 0 | 0 | 0 | GL4 | GL3 | GL2 | GL1 | GL0 | |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 0 | 0 | 0 | 0 | GD4 | GD3 | GD2 | GD1 | GD0 | |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 0 | 0 | 0 | 0 | GD4 | GD3 | GD2 | GD1 | GD0 | |
| | 1 | 0 | 0 | 0 | 0 | GD4 | GD3 | GD2 | GD1 | GD0 | |
| | 1 | 0 | 0 | 0 | 0 | GD4 | GD3 | GD2 | GD1 | GD0 | |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | (32)LCD偏压比设置 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | |

| | | | | | | | | | | | | |
|---|---|---|------|------|-----------|------|------|------|------|------|----|--|
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | BE1 | BE0 | | 0X01: 升压电容频率 |
| | 1 | 0 | 0 | 0 | 0 | 0 | 0 | BS2 | BS1 | BS0 | | 0X02: 偏压比, BIAS=1/12 |
| (33)升压倍数 (Booster Level) | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | | 0X51: 内建升压倍数设置 |
| | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | BST | | 0X7B: 10 倍 |
| (34)电压驱动选择 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | DS | 0X41: LCD 内部升压 |
| (35)自动读取控制 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | | XARD=0: 使能自动读 |
| | 1 | 0 | 1 | 0 | 0 | XARD | 1 | 1 | 1 | 1 | | XARD=0: 不使能自动读 |
| (36)控制OTP读写 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | | 0xe0: OTP 读写 |
| | 1 | 0 | 0 | 0 | ER/ RD | 0 | 0 | 0 | 0 | 0 | | WR/RD=0; 0x00, 使能 OTP 读 ER/RD=1; 0x20, 使能 OTP 写 |
| (37)控制OTP出 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | | 控制 OTP 出 |
| (38)写OTP | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | | 写 OTP |
| (39)读OTP | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | | 读 OTP |
| (40)OTP选择控制 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | | 0xe4: OTP 选择控制 |
| | 1 | 0 | 1 | Ctrl | 0 | 0 | 1 | 0 | 0 | 1 | | Ctrl=1: 0xc9, 不使能 OTP Ctrl=0: 0x89, 使能 OTP |
| (41)OTP程序设置 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | | OTP 程序设置 |
| | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | | |
| (42)帧速率 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | | 0xf0: 帧速率设置在不同的温度范围 |
| | 1 | 0 | 0 | 0 | 0 | FRA4 | FRA3 | FRA2 | FRA1 | FRA0 | | |
| | 1 | 0 | 0 | 0 | 0 | FRB4 | FRB3 | FRB2 | FRB1 | FRB0 | | |
| | 1 | 0 | 0 | 0 | 0 | FRC4 | FRC3 | FRC2 | FRC1 | FRC0 | | |
| | 1 | 0 | 0 | 0 | 0 | FRD4 | FRD3 | FRD2 | FRD1 | FRD0 | | |
| (43)温度范围 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | | 0xf2: 温度范围设置 |
| | 1 | 0 | 0 | TA6 | TA5 | TA4 | TA3 | TA2 | TA1 | TA0 | | |
| | 1 | 0 | 0 | TB6 | TB5 | TB4 | TB3 | TB2 | TB1 | TB0 | | |
| | 1 | 0 | 0 | TC6 | TC5 | TC4 | TC3 | TC2 | TC1 | TC0 | | |
| (44)温度梯度补偿 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | | 0xf4: 温度补偿系数设置 |
| | 1 | 0 | MT13 | MT12 | MT11 | MT10 | MT03 | MT02 | MT01 | MT00 | | |
| | 1 | 0 | MT33 | MT32 | MT31 | MT30 | MT23 | MT22 | MT21 | MT20 | | |
| | 1 | 0 | MT53 | MT52 | MT51 | MT50 | MT43 | MT42 | MT41 | MT40 | | |
| | 1 | 0 | MT73 | MT72 | MT71 | MT70 | MT63 | MT62 | MT61 | MT60 | | |
| | 1 | 0 | MT93 | MT92 | MT91 | MT90 | MT83 | MT82 | MT81 | MT80 | | |
| | 1 | 0 | MTB3 | MTB2 | MTB1 | MTB0 | MTA3 | MTA2 | MTA1 | MTA0 | | |
| | 1 | 0 | MTD3 | MTD2 | MTD1 | MTD0 | MTC3 | MTC2 | MTC1 | MTC0 | | |
| | 1 | 0 | MTF3 | MTF2 | MTF1 | MTF0 | MTE3 | MTE2 | MTE1 | MTE0 | | |
| Ext[1:0]=1,0(Extension Command 3) 0x38 扩屏指令 3 一定要调用 0X38 才能用扩展指令 3 | | | | | | | | | | | | |
| (45) ID 设置 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | | 0xd5: ID 设置 |
| | 1 | 0 | ID7 | ID6 | ID5 | ID4 | ID3 | ID2 | ID1 | ID0 | | |
| (46) 读 ID | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | RID | | RID=1: 0x7f, 使能 |
| Ext[1:0]=1,1(Extension Command 4) 0x39 扩屏指令 4 一定要调用 0X39 才能用扩展指令 4 | | | | | | | | | | | | |
| (47) 使能 OTP | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | | 0xd6: 使能 OTP |
| | 1 | 0 | 0 | 0 | 0 | EOTP | 0 | 0 | 0 | 0 | | EOTP=1; 不使能 EOTP, 一般不使能 EOTP EOTP=0; 使能 EOTP |

请详细参考 IC 资料”ST75256.PDF”。

7.2 点阵与 DD RAM 地址的对应关系

请留意页的定义：PAGE, 与平时所讲的“页”并不是一个意思，在此表示 **8 个行就是一个“页”**，一个 172*104 点阵的屏分为 13 个“页”，从第 0 “页” 到第 12 “页”。

DB7--DB0 的排列方向：数据是从下向上排列的。最低位 D0 是在最上面，最高位 D7 是在最下面。每一位 (bit) 数据对应一个点阵，通常“1”代表点亮该点阵，“0”代表关掉该点阵。 如下图所示：

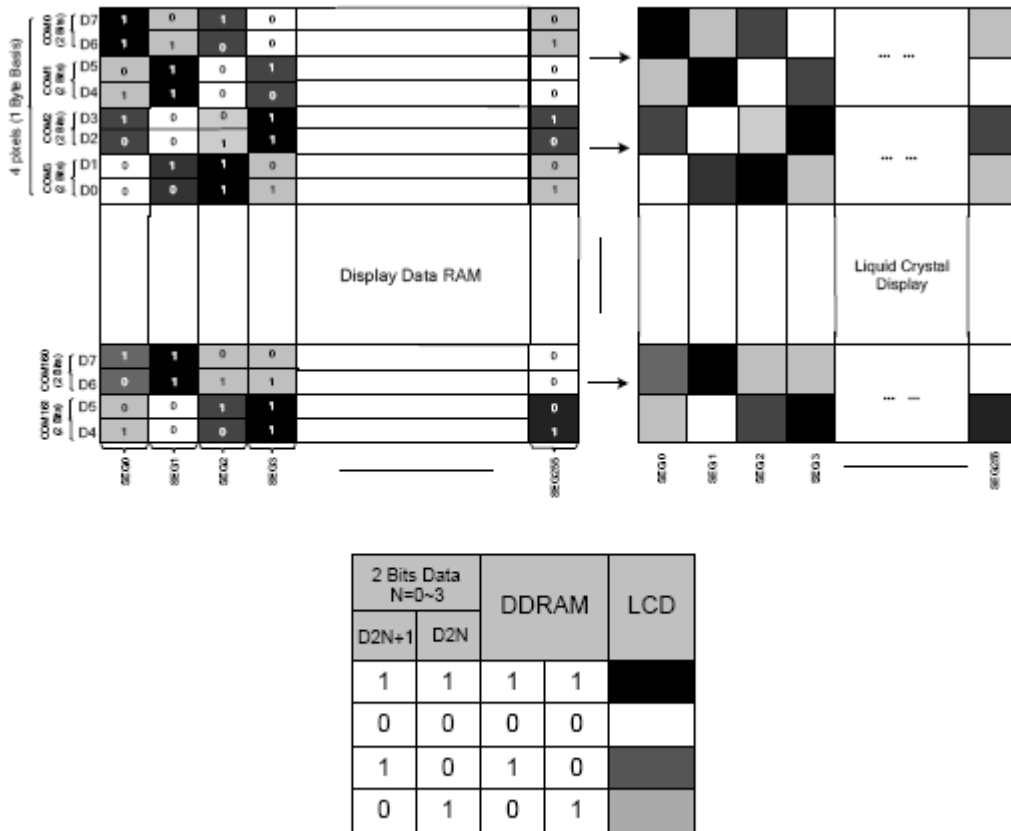
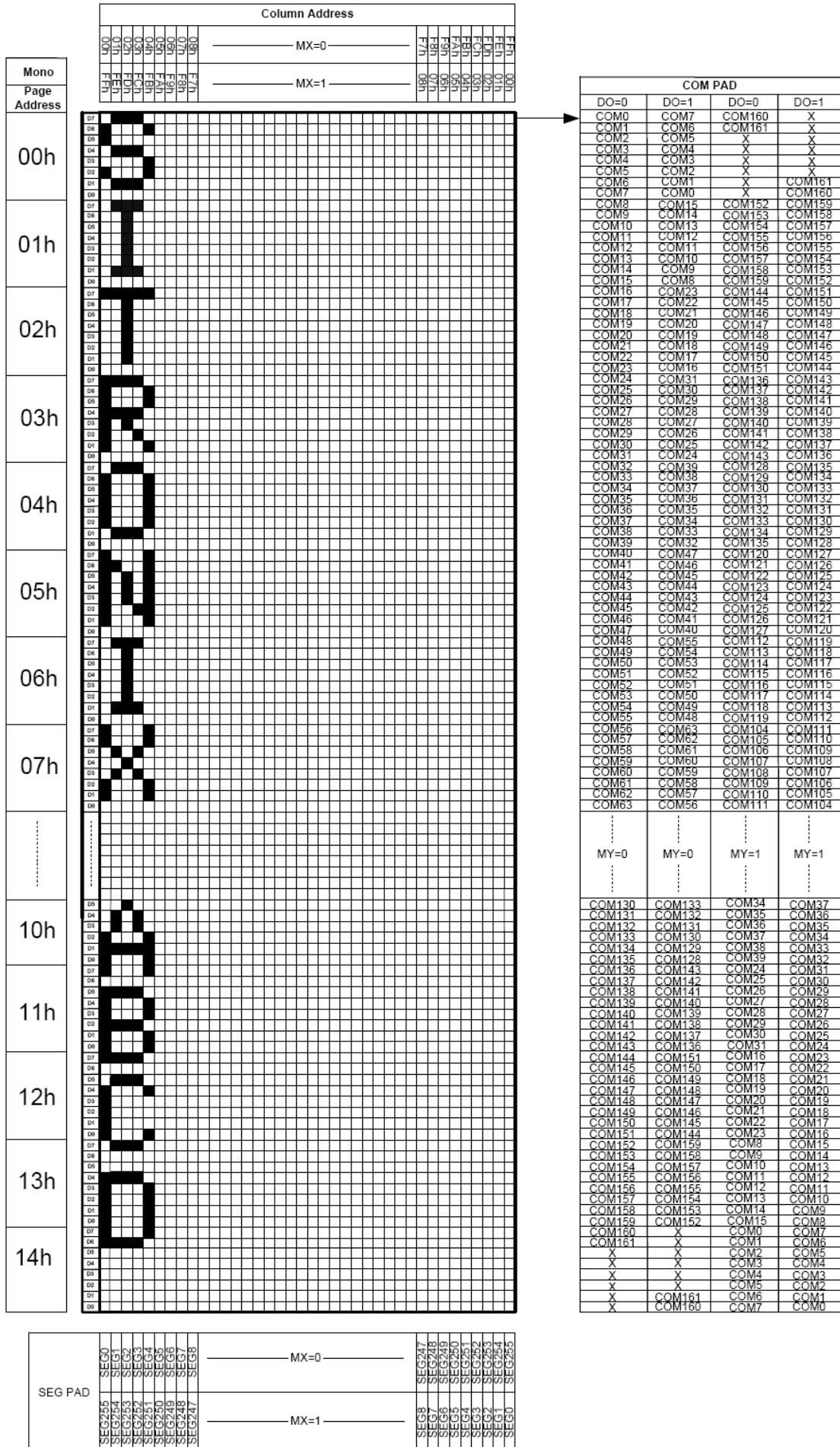


Figure 21 DDRAM Mapping (4-Level Gray Scale Mode)

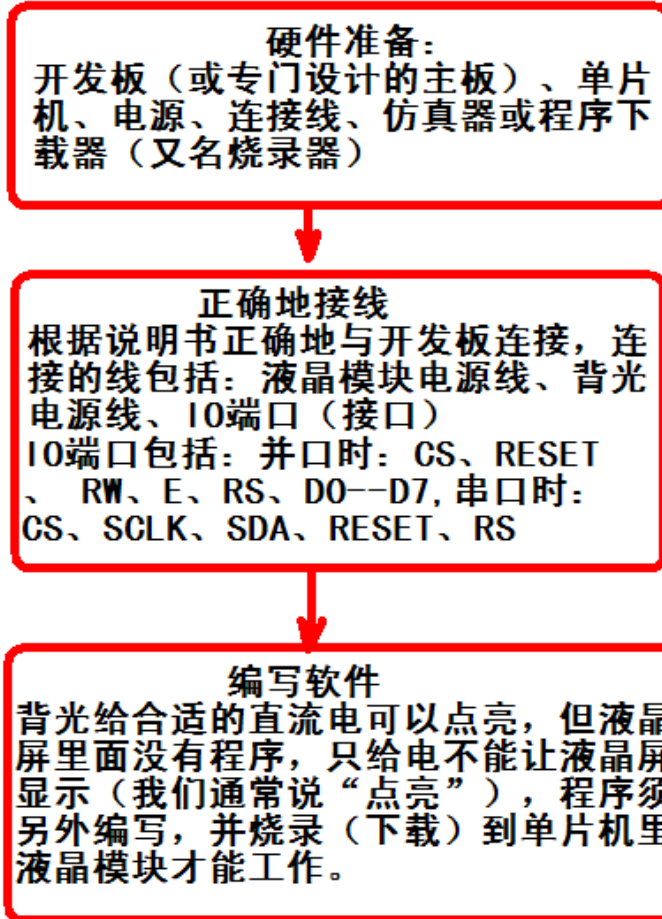
下图摘自 ST75256 IC 资料，可通过 “ST75256.PDF” 之第 37 页获取最佳效果。



7.4 初始化方法

用户所编的显示程序, 开始必须进行初始化, 否则模块无法正常显示, 过程请参考程序

点亮液晶模块的步骤



7.4 程序举例：

7.4.1 串行接口

液晶模块与 MPU(以 8051 系列单片机为例)接口图如下：

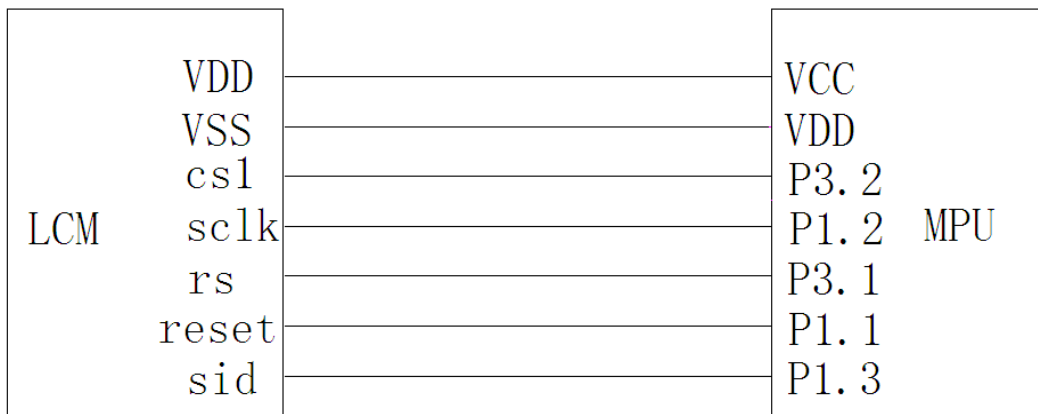


图 5. 串行接口

```
/* 液晶模块型号: JLX72104G-590-PN  
4 线串行接口  
驱动 IC 是:ST75256  
版权所有: 晶联讯电子: 网址 http://www.jlxlcd.cn;
```

```
*/
```

```
#include <reg52.H>  
#include <intrins.h>
```

```
sbit lcd_cs1 = P3^2;//CS  
sbit lcd_reset= P1^1;//RST  
sbit lcd_sclk = P1^2;//串行时钟  
sbit lcd_rs = P3^1;//RS  
sbit lcd_sid = P1^3;//串行数据
```

```
sbit key = P2^0; //按键
```

```
#define uchar unsigned char  
#define uint unsigned int  
#define ulong unsigned long
```

```
uchar code J[];  
uchar code L[];  
uchar code X[];  
uchar code num1[];  
uchar code num7[];  
uchar code num2[];  
uchar code num0[];  
uchar code num4[];  
uchar code G[];  
uchar code henggang[];  
uchar code num5[];  
uchar code num9[];  
uchar code shen[];  
uchar code zhen[];  
uchar code jing[];  
uchar code lian[];  
uchar code xun[];  
uchar code ye[];  
uchar code mo[];  
uchar code kuai[];  
uchar code chang[];  
uchar code shen1[];  
uchar code zhen1[];  
uchar code jing1[];  
uchar code lian1[];  
uchar code xun1[];
```

```
uchar code dian1[];
uchar code zi1[];
uchar code jing2[];
uchar code lian2[];
uchar code xun2[];
uchar code dian2[];
uchar code zi2[];
```

```
uchar code bmp1[];
uchar code bmp2[];
uchar code bmp_4gray_1[];
```

/*延时: 1 毫秒的 i 倍*/

```
void delay(int i)
{
    int j,k;
    for(j=0;j<i;j++)
        for(k=0;k<110;k++);
}
```

/*延时: 1us 的 i 倍*/

```
void delay_us(int i)
{
    int j,k;
    for(j=0;j<i;j++)
        for(k=0;k<1;k++);
}
```

/*等待一个按键, 我的主板是用 P2.0 与 GND 之间接一个按键*/

```
void waitkey()
{
    repeat:
        if (key==1) goto repeat;
        else delay(800);
}
```

//写指令到 LCD 模块

```
void transfer_command_lcd(int data1)
{
    char i;
    lcd_cs1=0;
    lcd_rs=0;
    for(i=0;i<8;i++)
    {
        lcd_sclk=0;
        if(data1&0x80) lcd_sid=1;
```



```

        else lcd_sid=0;
        lcd_sclk=1;
        data1<<=1;
    }
    lcd_cs1=1;
}

//写数据到 LCD 模块
void transfer_data_lcd(int data1)
{
    char i;
    lcd_cs1=0;
    lcd_rs=1;
    for(i=0;i<8;i++)
    {
        lcd_sclk=0;
        if(data1&0x80) lcd_sid=1;
        else lcd_sid=0;
        lcd_sclk=1;
        data1<<=1;
    }
    lcd_cs1=1;
}

void initial_lcd()
{
    lcd_reset=0;
    delay(100);
    lcd_reset=1;
    delay(100);

    transfer_command_lcd(0x30); //EXT=0
    transfer_command_lcd(0x94); //Sleep out
    transfer_command_lcd(0x31); //EXT=1
    transfer_command_lcd(0xD7); //Autoread disable
    transfer_data_lcd(0X9F); //

    transfer_command_lcd(0x32); //Analog SET
    transfer_data_lcd(0x00); //OSC Frequency adjustment
    transfer_data_lcd(0x01); //Frequency on booster capacitors->6KHz
    transfer_data_lcd(0x03); //Bias=1/11

    transfer_command_lcd(0x20); // Gray Level
    transfer_data_lcd(0x01);
    transfer_data_lcd(0x03);
    transfer_data_lcd(0x05);

```



```

transfer_data_lcd(0x07);
transfer_data_lcd(0x09);
transfer_data_lcd(0x0b);
transfer_data_lcd(0x0d);
transfer_data_lcd(0x10);
transfer_data_lcd(0x11);
transfer_data_lcd(0x13);
transfer_data_lcd(0x15);
transfer_data_lcd(0x17);
transfer_data_lcd(0x19);
transfer_data_lcd(0x1b);
transfer_data_lcd(0x1d);
transfer_data_lcd(0x1f);

transfer_command_lcd(0x30); //EXT=0
transfer_command_lcd(0x75); //Page Address setting
transfer_data_lcd(0X00); // XS=0
transfer_data_lcd(0X4F); // XE=159
transfer_command_lcd(0x15); //Column Address setting
transfer_data_lcd(0X00); // XS=0
transfer_data_lcd(0Xff); // XE=256 ff

transfer_command_lcd(0xBC); //Data scan direction
transfer_data_lcd(0x02); //MX.MY=Normal
transfer_data_lcd(0xA6);

transfer_command_lcd(0x0c); //数据格式选择,0x0C 是低位在前 D0-D7,0x08 是高位在前 D7-D0

transfer_command_lcd(0xCA); //Display Control
transfer_data_lcd(0X00); //
transfer_data_lcd(0X9F); //Duty=160
transfer_data_lcd(0X20); //Nline=off

transfer_command_lcd(0xF0); //Display Mode
transfer_data_lcd(0X10); //10=Monochrome Mode,11=4Gray

transfer_command_lcd(0x81); //EV control
transfer_data_lcd(0x08); //VPR[5-0]
transfer_data_lcd(0x04); //VPR[8-6]
transfer_command_lcd(0x20); //Power control
transfer_data_lcd(0x0B); //D0=regulator ; D1=follower ; D3=booste, on:1 off:0
delay_us(100);
transfer_command_lcd(0xAF); //Display on
}

```

/*写 LCD 行列地址: X 为起始的列地址, Y 为起始的行地址, x_total,y_total 分别为列地址及行地址的起点到终

点的差值 */

```
void lcd_address(int x,int y,x_total,y_total)
{
    x=x+83;
    y=y-1;

    transfer_command_lcd(0x15);    //Set Column Address
    transfer_data_lcd(x);
    transfer_data_lcd(x+x_total-1);

    transfer_command_lcd(0x75);    //Set Page Address
    transfer_data_lcd(y);
    transfer_data_lcd(y+y_total-1);
    transfer_command_lcd(0x30);
    transfer_command_lcd(0x5c);
}
```

/*清屏*/

```
void clear_screen(int x,int y)
{
    int i,j;

    lcd_address(x,y,172,13);

    for(i=0;i<13;i++)
    {
        for(j=0;j<172;j++)
        {
            transfer_data_lcd(0x00);
        }
    }
}
```

//=====测试画面=====

```
void test(int x,int y)
{
    int i,j;

    lcd_address(x,y,172,13);

    for(i=0;i<13;i++)
    {
        for(j=0;j<172;j++)
        {
            transfer_data_lcd(0xff);
        }
    }
}
```

```
    }  
}  
  
void test1(int x,int y)  
{  
    int i,j;  
  
    lcd_address(x,y,172,13);  
  
    for(i=0;i<13;i++)  
    {  
        for(j=0;j<172;j++)  
        {  
            transfer_data_lcd(0x55);  
        }  
    }  
}
```

```
void test2(int x,int y)  
{  
    int i,j;  
  
    lcd_address(x,y,172,13);  
  
    for(i=0;i<13;i++)  
    {  
        for(j=0;j<172;j++)  
        {  
            transfer_data_lcd(0xaa);  
        }  
    }  
}
```

//=====

```
/*显示 172*104 点阵的图像*/  
void disp_172x104(int x,int y,char *dp)  
{  
    int i,j;  
  
    lcd_address(x,y,172,13);  
  
    for(i=0;i<13;i++)  
    {  
        for(j=0;j<172;j++)  
        {  
            transfer_data_lcd(*dp);  
        }  
    }  
}
```

```

        dp++;
    }
}

```

/*显示 32*32 点阵的汉字或等同于 32*32 点阵的图像*/

void disp_32x32(int x,int y,uchar *dp)

```

{
    int i,j;
    lcd_address(x,y,32,4);
    for(i=0;i<4;i++)
    {
        for(j=0;j<32;j++)
        {
            transfer_data_lcd(*dp);
            dp++;
        }
    }
}

```

/*显示 24*24 点阵的汉字或等同于 24*24 点阵的图像*/

void disp_24x24(int x,int y,uchar *dp)

```

{
    int i,j;
    lcd_address(x,y,24,3);
    for(i=0;i<3;i++)
    {
        for(j=0;j<24;j++)
        {
            transfer_data_lcd(*dp);
            dp++;
        }
    }
}

```

/*显示 16*16 点阵的汉字或等同于 16*16 点阵的图像*/

void disp_16x16(int x,int y,uchar *dp)

```

{
    int i,j;
    lcd_address(x,y,16,2);
    for(i=0;i<2;i++)
    {
        for(j=0;j<16;j++)
        {
            transfer_data_lcd(*dp);
            dp++;
        }
    }
}

```

```

    }
}

/*显示 12*24 点阵的汉字或等同于 16*32 点阵的图像*/
void disp_12x24(int x,int y,uchar *dp)
{
    int i,j;
    lcd_address(x,y,12,3);
    for(i=0;i<3;i++)
    {
        for(j=0;j<12;j++)
        {
            transfer_data_lcd(*dp);
            dp++;
        }
    }
}

```

```

void disp_4gray_172x104(int x,int y,uchar *dp)
{
    int i,j;
    lcd_address(x,y,172,26);
    for(i=0;i<26;i++)
    {
        for(j=0;j<172;j++)
        {
            transfer_data_lcd(*dp);
            dp++;
        }
    }
}

```

```

//-----
void main ()
{
    initial_lcd(); //对液晶模块进行初始化设置
    while(1)
    {
        clear_screen(1,1);
        transfer_command_lcd(0xF0); //Display Mode
        transfer_data_lcd(0X11); //10=Monochrome Mode,11=4Gray
        disp_4gray_172x104(1,1,bmp_4gray_1); //显示一幅 172*104 点阵的 4 灰度级图。
        waitkey();
        transfer_command_lcd(0xF0); //Display Mode
        transfer_data_lcd(0X10); //10=Monochrome Mode,11=4Gray
    }
}

```

```

clear_screen(1,1); //清屏
disp_172x104(1,1,bmp1); //显示一幅 240*160 点阵的黑白图。地址从 1 开
始
waitkey();
disp_172x104(1,1,bmp2); //显示一幅 240*160 点阵的黑白图。地址从 1 开
始
waitkey();
clear_screen(1,1); //清屏
disp_32x32(7,1,jing2); //地址从 1 开始
disp_32x32((32*1+7),1,lian2);
disp_32x32((32*2+7),1,xun2);
disp_32x32((32*3+7),1,dian2);
disp_32x32((32*4+7),1,zi2);
disp_24x24(3+24*0,5,shen1);
disp_24x24(3+24*1,5,zhen1);
disp_24x24(3+24*2,5,jing1);
disp_24x24(3+24*3,5,lian1);
disp_24x24(3+24*4,5,xun1);
disp_24x24(3+24*5,5,dian1);
disp_24x24(3+24*6,5,zi1);
disp_16x16(7+16*0,8,shen);
disp_16x16(7+16*1,8,zhen);
disp_16x16(7+16*2,8,jing);
disp_16x16(7+16*3,8,lian);
disp_16x16(7+16*4,8,xun);
disp_16x16(7+16*5,8,ye);
disp_16x16(7+16*6,8,jing);
disp_16x16(7+16*7,8,mo);
disp_16x16(7+16*8,8,kuai);
disp_16x16(7+16*9,8,chang);
disp_12x24(3+12*0,10,J);
disp_12x24(3+12*1,10,L);
disp_12x24(3+12*2,10,X);
disp_12x24(3+12*3,10,num1);
disp_12x24(3+12*4,10,num7);
disp_12x24(3+12*5,10,num2);
disp_12x24(3+12*6,10,num1);
disp_12x24(3+12*7,10,num0);
disp_12x24(3+12*8,10,num4);
disp_12x24(3+12*9,10,G);
disp_12x24(3+12*10,10,henggang);
disp_12x24(3+12*11,10,num5);
disp_12x24(3+12*12,10,num9);
disp_12x24(3+12*13,10,num0);
waitkey();
clear_screen(1,1); //清屏

```

```

    test(1,1);
    waitkey();
    test1(1,1);
    waitkey();
    test2(1,1);
    waitkey();
}
}

```

```

uchar code J[]={
/*-- 文字: J --*/
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=12x24 --*/
0x00,0x00,0x00,0x20,0x20,0x20,0xE0,0xE0,0xE0,0x20,0x20,0x20,0x00,0x00,0x00,0x00,
0x00,0x00,0xFF,0xFF,0xFF,0x00,0x00,0x00,0x60,0xE0,0xE0,0xA0,0x80,0xC0,0xFF,0x7F,
0x3F,0x00,0x00,0x00,
};

```

```

uchar code L[]={
/*-- 文字: L --*/
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=12x24 --*/
0x20,0xE0,0xE0,0xE0,0xE0,0x20,0x00,0x00,0x00,0x00,0x00,0x00,0xFF,0xFF,0xFF,
0xFF,0x00,0x00,0x00,0x00,0x00,0x00,0x10,0x1F,0x1F,0x1F,0x1F,0x10,0x10,0x10,
0x18,0x1C,0x1E,0x00,
};

```

```

uchar code X[]={
/*-- 文字: X --*/
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=12x24 --*/
0x20,0x20,0xE0,0xE0,0x20,0x00,0xA0,0xE0,0xE0,0x20,0x00,0x00,0x01,0x07,
0xDF,0xFE,0xFC,0xEF,0x83,0x00,0x00,0x00,0x10,0x18,0x1C,0x1F,0x13,0x00,0x01,0x17,
0x1F,0x1E,0x18,0x00,
};

```

```

uchar code num1[]={
/*-- 文字: 1 --*/
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=12x24 --*/
0x00,0x00,0x80,0x80,0x80,0xC0,0xE0,0xE0,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0xFF,0xFF,0xFF,0x00,0x00,0x00,0x00,0x00,0x10,0x10,0x18,0x1F,0x1F,0x1F,
0x10,0x10,0x00,0x00,
};

```

```

uchar code num7[]={
/*-- 文字: 7 --*/
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=12x24 --*/
0x00,0xE0,0xE0,0xE0,0x60,0x60,0x60,0x60,0xE0,0xE0,0x60,0x00,0x00,0x03,0x03,0x00,
0x80,0xE0,0xF8,0x3E,0x07,0x01,0x00,0x00,0x00,0x00,0x00,0x00,0x1F,0x1F,0x1F,0x00,

```

```
0x00,0x00,0x00,0x00,  
};
```

```
uchar code num2[]={  
/*-- 文字: 2 --*/  
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=12x24 --*/  
0x00,0x80,0xC0,0xE0,0x60,0x20,0x20,0x60,0xE0,0xC0,0x80,0x00,0x00,0x03,0x03,0x03,  
0x80,0xC0,0xE0,0x78,0x3F,0x1F,0x07,0x00,0x18,0x1C,0x1E,0x1B,0x19,0x18,0x18,0x18,  
0x1C,0x1F,0x1F,0x00,  
};
```

```
uchar code num0[]={  
/*-- 文字: 0 --*/  
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=12x24 --*/  
0x00,0x00,0xC0,0xE0,0xE0,0x20,0x20,0xE0,0xE0,0xC0,0x00,0x00,0x78,0xFF,0xFF,0xFF,  
0x00,0x00,0x00,0x00,0xFF,0xFF,0xFF,0x00,0x00,0x03,0x0F,0x1F,0x1C,0x10,0x10,0x1C,  
0x1F,0x0F,0x03,0x00,  
};
```

```
uchar code num4[]={  
/*-- 文字: 4 --*/  
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=12x24 --*/  
0x00,0x00,0x00,0x00,0x00,0x80,0xE0,0xF0,0xF0,0x00,0x00,0x00,0x80,0xE0,0xF8,0xBC,  
0x8F,0x83,0xFF,0xFF,0xFF,0x80,0x80,0x00,0x00,0x00,0x00,0x00,0x10,0x10,0x1F,0x1F,  
0x1F,0x18,0x10,0x00,  
};
```

```
uchar code G[]={  
/*-- 文字: G --*/  
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=12x24 --*/  
0x00,0x80,0xC0,0xE0,0xE0,0x20,0x20,0x60,0xE0,0xE0,0x80,0x00,0xFE,0xFF,0xFF,0x03,  
0x00,0x00,0x40,0x40,0xC0,0xC1,0xC1,0x00,0x01,0x07,0x0F,0x1F,0x18,0x10,0x10,0x18,  
0x1F,0x0F,0x0F,0x00,  
};
```

```
uchar code henggang[]={  
/*-- 文字: - --*/  
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=12x24 --*/  
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x10,0x10,0x10,0x10,  
0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,  
0x00,0x00,0x00,0x00,  
};
```

```
uchar code num5[]={  
/*-- 文字: 5 --*/
```



```
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=12x24 --*/  
0x00,0x00,0xE0,0xE0,0x60,0x60,0x60,0x60,0x60,0x60,0x60,0x00,0x00,0x30,0x3F,0x3F,  
0x18,0x08,0x08,0x18,0xF8,0xF0,0xE0,0x00,0x00,0x0F,0x0F,0x1F,0x10,0x10,0x10,0x18,  
0x1F,0x0F,0x07,0x00,  
};
```

```
uchar code num9[]={  
/*-- 文字: 9 --*/  
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=12x24 --*/  
0x00,0x80,0xC0,0xE0,0x60,0x20,0x20,0x60,0xE0,0xC0,0x80,0x00,0x0E,0x3F,0x7F,0x7F,  
0x60,0x40,0x60,0x60,0xFF,0xFF,0xFF,0x00,0x00,0x0C,0x1C,0x1C,0x1C,0x10,0x18,0x1E,  
0x0F,0x07,0x01,0x00,  
};
```

```
uchar code shen[]={  
/*-- 文字: 深 --*/  
/*-- 新宋体 12; 此字体下对应的点阵为: 宽 x 高=16x16 --*/  
0x10,0x61,0x06,0xE0,0x00,0x26,0x22,0x1A,0x02,0xC2,0x0A,0x12,0x32,0x06,0x02,0x00,  
0x04,0xFC,0x03,0x20,0x20,0x11,0x11,0x09,0x05,0xFF,0x05,0x09,0x19,0x31,0x10,0x00,  
};
```

```
uchar code zhen[]={  
/*-- 文字: 圳 --*/  
/*-- 新宋体 12; 此字体下对应的点阵为: 宽 x 高=16x16 --*/  
0x10,0x10,0x10,0xFE,0x10,0x10,0xFE,0x00,0x00,0xFC,0x00,0x00,0x00,0xFE,0x00,0x00,  
0x08,0x08,0x04,0x47,0x24,0x18,0x07,0x00,0x00,0x1F,0x00,0x00,0x00,0x7F,0x00,0x00,  
};
```

```
uchar code jing[]={  
/*-- 文字: 晶 --*/  
/*-- 新宋体 12; 此字体下对应的点阵为: 宽 x 高=16x16 --*/  
0x00,0x00,0x00,0x00,0x7E,0x2A,0x2A,0x2A,0x2A,0x2A,0x2A,0x7E,0x00,0x00,0x00,0x00,  
0x00,0x7F,0x25,0x25,0x25,0x25,0x7F,0x00,0x00,0x7F,0x25,0x25,0x25,0x25,0x7F,0x00,  
};
```

```
uchar code lian[]={  
/*-- 文字: 联 --*/  
/*-- 新宋体 12; 此字体下对应的点阵为: 宽 x 高=16x16 --*/  
0x02,0xFE,0x92,0x92,0x92,0xFE,0x12,0x11,0x12,0x1C,0xF0,0x18,0x17,0x12,0x10,0x00,  
0x08,0x1F,0x08,0x08,0x04,0xFF,0x05,0x81,0x41,0x31,0x0F,0x11,0x21,0xC1,0x41,0x00,  
};
```

```
uchar code xun[]={  
/*-- 文字: 讯 --*/  
/*-- 新宋体 12; 此字体下对应的点阵为: 宽 x 高=16x16 --*/  
0x20,0x21,0x2E,0xE4,0x00,0x42,0x42,0xFE,0x42,0x42,0x42,0x02,0xFE,0x00,0x00,0x00,  
};
```

```
0x00,0x00,0x00,0x7F,0x20,0x10,0x00,0x7F,0x00,0x00,0x00,0x00,0x3F,0x40,0x38,0x00,
};
```

```
uchar code ye[]={
/*-- 文字: 液 --*/
/*-- 新宋体 12; 此字体下对应的点阵为: 宽 x 高=16x16 --*/
0x10,0x61,0x06,0xE0,0x18,0x84,0xE4,0x1C,0x84,0x65,0xBE,0x24,0xA4,0x64,0x04,0x00,
0x04,0x04,0xFF,0x00,0x01,0x00,0xFF,0x41,0x21,0x12,0x0C,0x1B,0x61,0xC0,0x40,0x00,
};
```

```
uchar code mo[]={
/*-- 文字: 模 --*/
/*-- 新宋体 12; 此字体下对应的点阵为: 宽 x 高=16x16 --*/
0x10,0xD0,0xFF,0x50,0x90,0x04,0xF4,0x54,0x5F,0x54,0x54,0x5F,0xF4,0x04,0x00,0x00,
0x03,0x00,0xFF,0x00,0x00,0x84,0x85,0x45,0x35,0x0F,0x15,0x25,0x65,0xC4,0x44,0x00,
};
```

```
uchar code kuai[]={
/*-- 文字: 块 --*/
/*-- 新宋体 12; 此字体下对应的点阵为: 宽 x 高=16x16 --*/
0x10,0x10,0xFF,0x10,0x10,0x00,0x08,0x08,0xFF,0x08,0x08,0x08,0xF8,0x00,0x00,0x00,
0x08,0x18,0x0F,0x04,0x85,0x41,0x31,0x0D,0x03,0x05,0x09,0x11,0x31,0x61,0x21,0x00,
};
```

```
uchar code chang[]={
/*-- 文字: 厂 --*/
/*-- 新宋体 12; 此字体下对应的点阵为: 宽 x 高=16x16 --*/
0x00,0x00,0xFE,0x02,0x02,0x02,0x02,0x02,0x02,0x02,0x02,0x02,0x02,0x02,0x02,0x00,
0x40,0x30,0x0F,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
};
```

```
uchar code shen1[]={
/*-- 文字: 深 --*/
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=24x24 --*/
0x00,0x00,0x00,0x18,0x78,0x70,0x70,0x80,0xC0,0xE0,0xF8,0xB8,0xD0,0xD0,0x90,0x50,
0xD0,0xD0,0xD0,0xF0,0x38,0x38,0x10,0x00,0x01,0x03,0x0E,0x1E,0xDC,0xF8,0x7F,0x27,
0x28,0x2C,0x2E,0xA3,0xE3,0xE1,0xFE,0xFE,0xE4,0xE0,0x23,0x27,0x37,0x36,0x20,0x00,
0x00,0x02,0x72,0x7F,0x7F,0x23,0x20,0x30,0x18,0x1C,0x0E,0x07,0x03,0x01,0xFF,0x7F,
0x71,0x07,0x0F,0x1E,0x1C,0x18,0x10,0x00,
};
```

```
uchar code zhen1[]={
/*-- 文字: 圳 --*/
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=24x24 --*/
0x00,0x00,0x00,0x00,0xFC,0xFC,0xFC,0x08,0x00,0x00,0xFC,0xFC,0xFC,0x08,0x00,0xF0,
0xF0,0xE0,0x00,0x00,0xFC,0xFC,0x08,0x00,0x02,0x02,0x02,0x02,0xFF,0xFF,0xFF,0x03,
};
```

```
0x03,0x03,0xFF,0xFF,0xFF,0x00,0x00,0xFF,0xFF,0xFF,0x00,0x00,0xFF,0xFF,0x00,0x00,
0x04,0x0C,0x0C,0x0E,0x07,0x43,0x43,0x63,0x39,0x1F,0x0F,0x07,0x00,0x00,0x00,0x0F,
0x0F,0x07,0x00,0x00,0x7F,0x7F,0x38,0x00,
};
```

```
uchar code jing1[]={
/*-- 文字: 晶 --*/
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=24x24 --*/
0x00,0x00,0x00,0x00,0x00,0x00,0xFC,0xFC,0xFC,0x48,0x48,0x48,0x48,0x48,0x48,
0xFC,0xFC,0xFC,0x08,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x20,0x2F,0x2F,
0xE7,0xF2,0xF2,0x22,0x02,0xF2,0xF2,0x22,0x27,0x27,0x27,0xF0,0xF0,0xF0,0x20,0x00,
0x00,0x00,0x7F,0x7F,0x7F,0x22,0x22,0x22,0x7F,0x7F,0x7F,0x00,0x00,0x7F,0x7F,0x22,
0x22,0x22,0x22,0x7F,0x7F,0x7F,0x00,0x00,
};
```

```
uchar code lian1[]={
/*-- 文字: 联 --*/
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=24x24 --*/
0x10,0x10,0xF0,0xF0,0xF0,0x10,0x10,0xF0,0xF0,0xF8,0x18,0x18,0x1C,0x7C,0x78,0x30,
0xC0,0xF8,0x3E,0x9E,0x8C,0x80,0x00,0x00,0x00,0x00,0xFF,0xFF,0xFF,0x22,0x22,0xFF,
0xFF,0xFF,0x11,0x11,0x11,0x11,0xFF,0xFF,0xFF,0xF1,0x11,0x11,0x18,0x19,0x31,0x20,
0x00,0x0C,0x0F,0x0F,0x07,0x06,0x06,0x7F,0x7F,0x7F,0x41,0x61,0x38,0x1E,0x0F,0x07,
0x01,0x07,0x1F,0x3C,0x78,0x70,0x20,0x20,
};
```

```
uchar code xun1[]={
/*-- 文字: 讯 --*/
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=24x24 --*/
0x00,0x00,0x00,0x04,0x1C,0x38,0x38,0x30,0x10,0x10,0x10,0x10,0xF0,0xF0,0x50,0x10,
0x10,0xF8,0xF8,0xF8,0x10,0x00,0x00,0x00,0x04,0x04,0x04,0x04,0xFE,0xFE,0x16,
0x10,0x10,0x10,0x10,0xFF,0xFF,0x18,0x1C,0x0C,0x3F,0xFF,0xFF,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x10,0x3F,0x3F,0x1C,0x0E,0x03,0x01,0x00,0x7F,0x3F,0x00,0x00,
0x00,0x00,0x07,0x1F,0x3F,0x3F,0x7F,0x00,
};
```

```
uchar code dian1[]={
/*-- 文字: 电 --*/
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=24x24 --*/
0x00,0x00,0x00,0xC0,0xC0,0xC0,0x40,0x40,0x40,0x40,0xFC,0xFC,0xFC,0x44,0x40,0x40,
0x40,0xC0,0xC0,0xC0,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0xFF,0xFF,0xFF,0x08,0x08,
0x08,0x08,0xFF,0xFF,0xFF,0x08,0x08,0x08,0x08,0xFF,0xFF,0xFF,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x03,0x03,0x03,0x01,0x01,0x01,0x01,0x3F,0x7F,0x7F,0x41,0x41,0x41,
0x41,0x43,0x43,0x61,0x7E,0x7E,0x30,0x00,
};
```

```
uchar code zi1[]={
```

```
/*-- 文字: 子 --*/  
/*-- 新宋体 18; 此字体下对应的点阵为: 宽 x 高=24x24 --*/  
0x00,0x00,0x00,0x08,0x08,0x08,0x08,0x08,0x08,0x08,0x08,0x88,0x88,0x88,0xC8,0x68,  
0x78,0x38,0x1C,0x1C,0x18,0x10,0x00,0x00,0x00,0x08,0x08,0x08,0x08,0x08,0x08,0x08,  
0x08,0x08,0x08,0xFF,0xFF,0xFF,0x0A,0x08,0x08,0x08,0x08,0x0C,0x0C,0x0C,0x18,0x00,  
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x20,0x20,0x60,0x60,0x7F,0x7F,0x3F,0x00,0x00,  
0x00,0x00,0x00,0x00,0x00,0x00,0x00,  
};
```

```
uchar code jing2[]={  
/*-- 文字: 晶 --*/  
/*-- 新宋体 23; 此字体下对应的点阵为: 宽 x 高=32x31 --*/  
/*-- 高度不是 8 的倍数, 现调整为: 宽度 x 高度=32x32 --*/  
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0xF8,0xF8,0xF8,0xF8,0x10,0x10,0x10,0x10,  
0x10,0x10,0x10,0x10,0x10,0xF8,0xFC,0xFC,0x18,0x00,0x00,0x00,0x00,0x00,0x00,0x00,  
0x00,0x00,0x00,0x80,0x80,0x00,0x00,0x00,0x7F,0x7F,0x3F,0x3F,0x91,0x91,0x11,0x11,  
0x11,0x91,0x11,0x11,0x11,0x3F,0x3F,0x3F,0x00,0x00,0x80,0x80,0x00,0x00,0x00,0x00,  
0x00,0x00,0x00,0xFF,0xFF,0xFF,0x41,0x41,0x41,0x41,0x41,0xFF,0xFF,0xFF,0x03,0x00,  
0x00,0xFF,0xFF,0xFF,0x41,0x41,0x41,0x41,0x41,0xFF,0xFF,0xFF,0x03,0x00,0x00,0x00,  
0x00,0x00,0x00,0x3F,0x3F,0x1F,0x08,0x08,0x08,0x08,0x08,0x1F,0x1F,0x1F,0x00,0x00,  
0x00,0x3F,0x3F,0x1F,0x08,0x08,0x08,0x08,0x1F,0x1F,0x1F,0x00,0x00,0x00,0x00,  
};
```

```
uchar code lian2[]={  
/*-- 文字: 联 --*/  
/*-- 新宋体 23; 此字体下对应的点阵为: 宽 x 高=32x31 --*/  
/*-- 高度不是 8 的倍数, 现调整为: 宽度 x 高度=32x32 --*/  
0x00,0x20,0x20,0xE0,0xE0,0xE0,0x20,0x20,0x20,0xE0,0xE0,0xF0,0x38,0x18,0x30,0x2C,  
0x3C,0xF8,0xF0,0xE0,0x00,0x80,0xE0,0xFC,0x7C,0x1C,0x08,0x08,0x00,0x00,0x00,  
0x00,0x00,0x00,0xFF,0xFF,0xFF,0x08,0x08,0x08,0xFF,0xFF,0xFF,0x04,0x04,0x04,0x04,  
0x04,0x04,0x04,0xFC,0xFE,0xFF,0x07,0x04,0x06,0x07,0x83,0xC7,0xC6,0x80,0x00,0x00,  
0x00,0x00,0x00,0xFF,0xFF,0xFF,0x82,0xC2,0xC2,0xFF,0xFF,0xFF,0x21,0x21,0x21,0x01,  
0x01,0x81,0xF9,0xFF,0x7F,0x1F,0xFF,0xF1,0xC1,0x01,0x01,0x01,0x01,0x01,0x01,0x00,  
0x00,0x01,0x03,0x03,0x01,0x01,0x00,0x00,0x00,0x3F,0x3F,0x3F,0x20,0x30,0x18,0x1C,  
0x0E,0x07,0x03,0x01,0x00,0x00,0x00,0x03,0x07,0x0F,0x1E,0x1C,0x18,0x18,0x00,0x00,  
};
```

```
uchar code xun2[]={  
/*-- 文字: 讯 --*/  
/*-- 新宋体 23; 此字体下对应的点阵为: 宽 x 高=32x31 --*/  
/*-- 高度不是 8 的倍数, 现调整为: 宽度 x 高度=32x32 --*/  
0x00,0x00,0x00,0x00,0x08,0x18,0x78,0xF8,0xF0,0x60,0x20,0x20,0x20,0x20,0x20,0xA0,  
0xA0,0xA0,0xA0,0x20,0x20,0x20,0x20,0xF0,0xF8,0xF0,0x20,0x00,0x00,0x00,0x00,  
0x00,0x20,0x20,0x20,0x20,0x20,0xF0,0xF0,0xF0,0x30,0xA0,0x80,0x80,0x80,0xFF,  
0xFF,0xFF,0x81,0xC0,0xE0,0x60,0xC0,0xFF,0xFF,0xFF,0x00,0x00,0x00,0x00,0x00,  
0x00,0x00,0x00,0x00,0x00,0x00,0xFF,0xFF,0xFF,0x80,0xC0,0xE0,0x60,0x20,0x00,0xFF,
```

```
0xFF,0xFF,0x00,0x00,0x00,0x00,0x00,0x00,0x7F,0xFF,0xFF,0xC0,0x80,0xF0,0xF0,0x00,0x00,  
0x00,0x00,0x00,0x00,0x00,0x00,0x07,0x0F,0x0F,0x07,0x03,0x00,0x00,0x00,0x00,0x1F,  
0x1F,0x1F,0x00,0x00,0x00,0x00,0x00,0x00,0x03,0x07,0x0F,0x1F,0x1F,0x1F,0x00,0x00,  
};
```

```
uchar code dian2[]={  
/*-- 文字: 电 --*/  
/*-- 新宋体 23; 此字体下对应的点阵为: 宽 x 高=32x31 --*/  
/*-- 高度不是 8 的倍数, 现调整为: 宽度 x 高度=32x32 --*/  
0x00,0x00,0x00,0x00,0x80,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,  
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,  
0x00,0x00,0x00,0x00,0xFF,0xFF,0xFF,0x41,0x41,0x41,0x41,0x41,0x41,0x41,0x41,0x41,0xFF,0xFF,0xFF,  
0x41,0x41,0x41,0x41,0x41,0x41,0x41,0xFF,0xFF,0xFF,0xFF,0x02,0x00,0x00,0x00,0x00,0x00,  
0x00,0x00,0x00,0x00,0xFF,0xFF,0x7F,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0xFF,0xFF,0xFF,  
0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x3F,0x3F,0x3F,0x3F,0xC0,0xC0,0x00,0x00,0x00,0x00,  
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,  
0x18,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x18,0x1F,0x1F,0x1F,0x08,0x00,0x00,  
};
```

```
uchar code zi2[]={  
/*-- 文字: 子 --*/  
/*-- 新宋体 23; 此字体下对应的点阵为: 宽 x 高=32x31 --*/  
/*-- 高度不是 8 的倍数, 现调整为: 宽度 x 高度=32x32 --*/  
0x00,0x00,0x00,0x00,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0x10,  
0x10,0x10,0x10,0x90,0xD0,0xF0,0x70,0x78,0x38,0x38,0x30,0x20,0x00,0x00,0x00,0x00,  
0x00,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,  
0xFC,0x4E,0x4B,0x41,0x41,0x40,0x40,0x40,0x40,0x60,0x70,0x70,0xE0,0xC0,0x00,0x00,  
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,  
0xFF,0xFF,0xFF,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,  
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,  
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,  
0x1F,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,  
};
```

```
uchar code bmp1[]={  
/*-- 调入了一幅图像: G:\WORK\记录文档\图片\172104 点阵图片\G-590.bmp --*/  
/*-- 宽度 x 高度=172x104 --*/  
0xFF,0xFF,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,  
0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x13,0x63,0x03,0x03,0x63,0x23,0xA3,0x23,  
0x23,0xA3,0x23,0x23,0x63,0x23,0x03,0x03,0x03,0x03,0xE3,0x03,0x03,0xE3,0x03,0x03,  
0xC3,0x03,0x03,0x03,0xE3,0x03,0x03,0x43,0x43,0x43,0x43,0x43,0x43,0x43,0x53,0xE3,0x43,  
0x43,0x43,0x43,0x43,0x43,0x43,0x03,0x03,0x03,0x03,0x03,0xE3,0xA3,0xA3,0xA3,0xA3,  
0xA3,0xA3,0xE3,0x03,0x03,0x03,0x03,0x23,0xE3,0x23,0x23,0x23,0xE3,0x23,0x13,0x23,  
0xC3,0x03,0x83,0x73,0x23,0x03,0x03,0x03,0x13,0xE3,0x43,0x03,0x23,0x23,0xE3,0x23,  
0x23,0x23,0x23,0xE3,0x03,0x03,0x03,0x03,0x03,0x83,0x83,0x83,0x83,0x83,0xF3,0x83,  
0x83,0x83,0x83,0x83,0x03,0x03,0x03,0x03,0x03,0x23,0x23,0x23,0x23,0x23,0x23,0x23,  
0xA3,0x63,0x23,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,  
};
```

0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0x03,0xFF,0xFF,0xFF,0xFF,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x41,0xC6,0x30,0x0E,0x00,0x12,0x12,0x91,0x50,0xFC,0x50,0x91,0x93,
0x10,0x00,0x00,0x81,0x81,0x41,0x7F,0x41,0x81,0x7F,0x00,0x00,0xFF,0x00,0x00,0x00,
0xFF,0x00,0x00,0x00,0x00,0xFE,0x02,0x02,0x02,0xFF,0x02,0x02,0x02,0xFE,
0x00,0x00,0x00,0x00,0xF0,0x50,0x50,0x57,0x52,0xF2,0x02,0x02,0xF2,0x52,0x57,0x50,
0x50,0xF0,0x00,0x80,0xFF,0x89,0x89,0x49,0xFF,0x51,0x11,0x11,0xFF,0x11,0x11,
0x11,0x11,0x00,0x02,0x02,0x02,0xFE,0x00,0x04,0x04,0xFF,0x04,0x04,0x04,0x00,0xFF,
0x00,0x80,0x00,0x00,0x00,0xFF,0x44,0x44,0x44,0x44,0xFF,0x44,0x44,0x44,0xFF,
0x00,0x00,0x00,0x10,0x10,0x10,0x10,0x10,0x10,0x10,0xFE,0x11,0x10,0x10,0x10,0x10,
0x18,0x10,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0xFF,0xFF,0xFF,0xFF,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x0F,0x80,0x82,0x82,0x81,0x81,0x00,0x80,0x8F,0x80,0x00,0x01,0x03,0x01,0x00,0x80,
0x80,0x80,0x04,0x02,0x81,0x80,0x80,0x00,0x01,0x00,0x80,0x00,0x07,0x00,0x00,0x00,
0x80,0x80,0x83,0x80,0x80,0x80,0x0F,0x00,0x00,0x81,0x82,0x81,0x80,0x00,0x00,0x00,
0x07,0x02,0x82,0x02,0x02,0x07,0x00,0x00,0x07,0x02,0x82,0x82,0x02,0x07,0x00,0x00,
0x01,0x00,0x00,0x00,0x8F,0x00,0x08,0x04,0x03,0x80,0x81,0x82,0x8C,0x04,0x00,0x00,
0x00,0x00,0x07,0x02,0x01,0x00,0x07,0x00,0x80,0x80,0x80,0x83,0x84,0x83,0x00,0x00,
0x00,0x00,0x80,0x80,0x00,0x00,0x03,0x04,0x04,0x04,0x84,0x84,0x04,0x07,0x00,0x00,
0x00,0x00,0x00,0x00,0x04,0x08,0x07,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0xFF,0xFF,0xFF,0xFF,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0xFF,
0x00,0x00,0x00,0x00,0xFF,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x01,0xC6,0x38,0x38,
0xC6,0x01,0x00,0x00,0x01,0x01,0xFF,0x00,0x00,0x00,0x00,0x00,0x03,0x00,0xF0,0x0C,
0x03,0x00,0x00,0x00,0x07,0x80,0x40,0x20,0x18,0x07,0x00,0x00,0x01,0x01,0xFF,0x00,
0x00,0x00,0x00,0x00,0xFE,0x01,0x00,0x00,0x01,0xFE,0x00,0x00,0x70,0x4C,0x42,0x41,
0xFF,0x40,0x00,0x7C,0x83,0x00,0x00,0x20,0xE3,0x20,0x00,0x00,0x10,0x10,0x10,0x10,
0x10,0x10,0x10,0x00,0x9F,0x10,0x08,0x08,0x10,0xE0,0x00,0x00,0x0E,0x11,0x20,0x20,
0x11,0xFE,0x00,0x00,0xFE,0x01,0x00,0x00,0x01,0xFE,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0xFF,0xFF,
0xFF,0xFF,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x0C,0x08,0x08,0x08,0x07,0x00,0x00,0x00,0x02,
0x03,0x02,0x02,0x02,0x02,0x03,0xF0,0x42,0x43,0x42,0x40,0x40,0x02,0x03,0x02,0xE0,
0x22,0x22,0xA3,0x62,0x82,0x80,0x80,0xF0,0x80,0x80,0x83,0x80,0x80,0x00,0x00,0x00,
0x03,0x02,0x02,0x02,0x02,0x03,0x00,0x00,0x02,0x02,0x83,0x02,0x02,0x00,0x00,0x00,
0x80,0x81,0x82,0x82,0x81,0x80,0x00,0x00,0x00,0x80,0x82,0x82,0x83,0x02,0x00,0x80,
0x81,0x82,0x02,0x02,0x81,0x80,0x80,0x00,0x00,0x00,0x80,0x00,0x00,0x00,0x00,
0x01,0x02,0x82,0x82,0x01,0x00,0x00,0x00,0x00,0x03,0x02,0x02,0x81,0x00,0x00,0x00,
0x00,0x01,0x02,0x02,0x01,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0xFF,0xFF,0xFF,0xFF,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x7E,0x22,

0x22,0x22,0xA3,0x22,0x22,0x22,0xFF,0x02,0x00,0x00,0x00,0xFF,0x00,0x21,0x42,0x3C,
0x48,0x4C,0x4B,0x48,0xFE,0x48,0x48,0x48,0x48,0x40,0x00,0x00,0x00,0x00,0x0C,0x0C,
0x00,0x00,0x00,0x00,0x01,0x01,0xFF,0x00,0x00,0x00,0x00,0x00,0x03,0x00,0xF0,0x0C,
0x03,0x00,0x00,0x00,0x07,0x80,0x40,0x20,0x18,0x07,0x00,0x00,0x01,0xC6,0x38,0x38,
0xC6,0x01,0x00,0x00,0x01,0x01,0xFF,0x00,0x00,0x00,0x00,0x00,0xFE,0x01,0x00,0x00,
0x01,0xFE,0x00,0x00,0x70,0x4C,0x42,0x41,0xFF,0x40,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0xFF,0xFF,0xFF,0xFF,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x80,0x84,0x93,0xE0,0xA1,0x86,0x00,0xE0,0x21,
0x26,0xA0,0x20,0x21,0xE6,0x00,0x00,0x0F,0xC0,0x40,0x40,0x40,0x40,0x40,0x50,0x60,
0x4F,0xC0,0x40,0x40,0x40,0xC0,0x00,0x00,0x00,0x00,0x03,0x03,0x00,0x00,0x00,0x00,
0x02,0x02,0x03,0x02,0x82,0x00,0x00,0x00,0x80,0x80,0x83,0x80,0x80,0x80,0x00,0x80,
0x83,0x82,0x02,0x02,0x82,0x83,0x80,0x02,0x03,0x82,0x80,0x80,0x82,0x03,0x02,0x00,
0x02,0x82,0x83,0x82,0x82,0x00,0x00,0x00,0x00,0x01,0x02,0x02,0x01,0x00,0x00,0x00,
0x00,0x00,0x02,0x02,0x03,0x02,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0xFF,0xFF,0xFF,0xFF,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x20,0x10,0x08,0xF4,0x0A,0x71,0x20,0x1F,0x80,0x60,0x1F,0xE0,0x00,
0x3F,0x00,0x00,0x00,0x04,0x04,0xFE,0x45,0x24,0x56,0x9D,0x54,0x34,0x14,0x05,0xFD,
0x02,0x02,0x00,0x00,0x00,0x00,0x0C,0x0C,0x00,0x00,0x00,0x00,0x70,0x4C,0x42,0x41,
0xFF,0x40,0x00,0x00,0x9F,0x10,0x08,0x08,0x10,0xE0,0x00,0x00,0x01,0xC6,0x38,0x38,
0xC6,0x01,0x00,0x00,0x07,0x80,0x40,0x20,0x18,0x07,0x00,0x00,0xC7,0x28,0x10,0x10,
0x28,0xC7,0x00,0x08,0xF8,0x08,0x08,0xF8,0x08,0x08,0xF0,0x08,0xF8,0x08,0x08,0xF8,
0x08,0x08,0xF0,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0xFF,0xFF,
0xFF,0xFF,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x0F,0x00,0x08,0x04,0x02,0x01,0x80,0x80,0x83,0x84,0x84,0x07,0x00,0x00,
0x00,0x80,0x8F,0x84,0x86,0x85,0x04,0x05,0x04,0x04,0x04,0x0F,0x00,0x00,0x00,0x00,
0x00,0x80,0x83,0x83,0x80,0x80,0x00,0x80,0x80,0x80,0x82,0x82,0x83,0x82,0x00,0x00,
0x81,0x82,0x82,0x82,0x81,0x80,0x00,0x02,0x83,0x82,0x80,0x80,0x82,0x83,0x02,0x00,
0x03,0x82,0x82,0x82,0x82,0x03,0x00,0x00,0x81,0x82,0x82,0x82,0x82,0x81,0x00,0x02,
0x03,0x02,0x80,0x83,0x82,0x00,0x03,0x02,0x03,0x02,0x00,0x03,0x02,0x00,0x03,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0xFF,0x00,0x00,0x00,0x00,0x7C,0x83,0x00,0x00,0x00,
0x00,0x83,0x00,0x00,0x00,0x00,0x0C,0x0C,0x00,0x00,0x00,0x00,0x87,0x08,0x10,0x10,
0x20,0xC3,0x00,0x01,0x00,0x00,0xFF,0x00,0x00,0x01,0x00,0x00,0x03,0x00,0xF0,0x0C,

```
0x03,0x00,0x00,0x00,0x9F,0x10,0x08,0x08,0x10,0xE0,0x00,0x00,0x07,0x80,0x40,0x20,
0x18,0x07,0x00,0x00,0x9F,0x10,0x08,0x08,0x10,0xE0,0x00,0x00,0xFE,0x11,0x08,0x08,
0x11,0xE0,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
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0x92,0x92,0x93,0x92,0x12,0x00,0x00,0x00,0x81,0x42,0x32,0x62,0xA1,0x20,0xA0,0x40,
0x30,0x60,0xA3,0x23,0x20,0x20,0x00,0x00,0x03,0x02,0x02,0x02,0x01,0x00,0x00,
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0x00,0x00,0x00,0x00,0xF0,0x10,0x10,0x17,0x12,0xF2,0x02,0xF2,0x12,0x12,0x17,0x10,
0xF0,0x00,0x00,0x00,0x00,0xFF,0x00,0x00,0xFC,0x04,0x06,0xF5,0x04,0x04,0xFC,0x00,
0x00,0x00,0x00,0x01,0x00,0x00,0x3D,0x25,0x25,0xA5,0x65,0xFF,0x25,0x25,0x25,0x27,
0xE0,0x00,0x00,0x00,0x08,0x08,0x08,0x08,0x08,0x08,0x08,0x08,0x08,0x08,0x08,0x08,
0x0C,0x08,0x00,0x00,0x00,0x80,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0xFF,0x09,0x09,0xFF,0x00,0x00,0xFF,0x1C,0x64,0x84,0x65,
0x1C,0x00,0x00,0x02,0x11,0x11,0x28,0x28,0x24,0xE5,0x3A,0x22,0x25,0x24,0xE8,0x08,
0x18,0x08,0x00,0x00,0x00,0x24,0x26,0x25,0x24,0x22,0xFE,0x22,0x22,0x22,0x27,0x22,
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0xFF,0xFF,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,
0xC7,0xC2,0xC2,0xC2,0xC2,0xC7,0xC0,0xC7,0xC2,0xC2,0xC2,0xC2,0xC7,0xC0,0xC0,0xC8,
0xC6,0xC1,0xC0,0xC8,0xC4,0xC2,0xC1,0xC0,0xC1,0xC2,0xCE,0xC4,0xC0,0xC0,0xC0,0xC0,
0xC2,0xC2,0xC2,0xC1,0xC1,0xC0,0xC0,0xCF,0xC0,0xC0,0xC1,0xC2,0xC1,0xC0,0xC0,0xC0,
0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,
0xC0,0xC5,0xC3,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC4,
0xC3,0xC0,0xC2,0xC4,0xC3,0xC0,0xC0,0xC7,0xC2,0xC1,0xC0,0xC3,0xC6,0xC2,0xC0,0xC8,
0xC8,0xC4,0xC4,0xC2,0xC1,0xC0,0xC0,0xC0,0xC4,0xC8,0xC7,0xC0,0xC0,0xC0,0xC0,0xC2,
0xC2,0xC2,0xC2,0xC2,0xC2,0xC3,0xC2,0xC2,0xC2,0xC2,0xC2,0xC2,0xC2,0xC0,0xC0,
0xC4,0xC4,0xC4,0xC4,0xC4,0xC4,0xC7,0xC4,0xC4,0xC4,0xC4,0xC4,0xC6,0xC4,0xC0,0xC0,
0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xC0,0xFF,0xFF,
};
```

```
uchar code bmp2[]={
/*-- 调入了一幅图像： G:\WORK\记录文档\图片\172104 点阵图片\猫.bmp --*/
/*-- 宽度 x 高度=172x104 --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
```


0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x80,0xC0,0xE0,0x70,0x70,0x38,
0x1C,0x0E,0x8E,0x0F,0x3E,0xF8,0xE0,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0xF0,0x50,0x50,0x50,0x50,0x50,0x50,0xF0,0x00,0x00,0x00,
0x00,0x10,0xF0,0x90,0x90,0x90,0xF0,0x90,0x88,0x90,0xE0,0x80,0xC0,0xB8,0x90,0x80,
0x00,0x00,0x08,0x70,0x20,0x00,0x10,0x10,0xF0,0x10,0x10,0x10,0x10,0xF0,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x80,0x80,0xC0,0xC0,0xC0,0xE0,0x60,0x60,0x70,0x30,0x70,0xF0,
0x30,0x38,0x38,0xDC,0x9E,0x07,0x03,0x01,0x00,0x00,0x00,0x00,0x38,0x26,0x21,0x27,
0x38,0x00,0x1F,0x7F,0xFC,0xE0,0xC0,0xC0,0x80,0x80,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x28,0x2B,0x29,0xF9,0x01,0x01,0xF9,0x29,0x2B,0x28,0x28,0xF8,0x00,0x40,0xFF,0x44,
0x44,0x24,0xFF,0x28,0x08,0x08,0x88,0x7F,0x88,0x08,0x08,0x08,0x00,0x01,0x01,0x01,
0xFF,0x00,0x82,0x02,0xFF,0x02,0x02,0x02,0x00,0xFF,0x00,0xC0,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x80,0xC0,0xE0,0x60,0x30,0x38,0x38,0x4C,0x4E,0x46,0x47,0x83,
0x83,0x81,0x01,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x01,0x02,0x0C,0x18,0x20,
0x43,0x87,0x19,0x22,0xC2,0x84,0x04,0x04,0x08,0x08,0x18,0x10,0x20,0xC0,0x00,0x00,
0x00,0x00,0x01,0x01,0x03,0x03,0x07,0x07,0x0E,0x1C,0x38,0x38,0x70,0xE0,0xC0,0x80,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x03,0x01,0x01,0x01,0x81,0x83,
0x80,0xC0,0xC3,0xC1,0xC1,0xC1,0xE3,0xE0,0xE0,0xE0,0x60,0x60,0x60,0x67,0x60,
0x64,0x62,0xE1,0xE0,0xE0,0xE1,0xC6,0xC2,0xC0,0xC0,0xC0,0x80,0x83,0x81,0x80,0x00,
0x03,0x00,0x00,0x00,0x00,0x01,0x02,0x01,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x80,0x80,
0xC0,0xE0,0x60,0x70,0x30,0x30,0x38,0x18,0x18,0x18,0x18,0x18,0x1C,0x1E,0x0E,0x07,
0x03,0x01,0x00,0x00,0x01,0x03,0x0E,0x3E,0xE4,0x04,0x0C,0x08,0x18,0x11,0x21,0x42,
0x82,0x04,0x0C,0x18,0x30,0x60,0xC0,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x01,0x02,0x0C,
0x70,0xC1,0x03,0x02,0x06,0x04,0x04,0x04,0x02,0x03,0x00,0x00,0xC0,0x60,0x70,0x30,
0x98,0x88,0xDC,0x58,0x58,0x48,0x48,0xD8,0xF8,0xFE,0x33,0x0F,0x0F,0x1E,0x38,0x70,
0xB8,0x3C,0x1C,0x0C,0x0E,0x06,0x07,0x07,0x03,0x03,0x03,0x01,0x01,0x01,0x00,0x00,
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0x0E,0x0E,0x0C,0x1C,0x18,0x18,0x30,0x70,0x60,0xE0,0xC0,0xC0,0x80,0x00,0x00,0x00,
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0x78,0xF0,0xE2,0xC3,0x86,0x0A,0x1B,0x33,0x1F,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
0x00,0x00,0x00,0x00,0x03,0x1E,0x70,0x80,0x00,0x00,0x00,0x00,0x00,0x03,0x0E,0xF8,
0x00,0x00,0x00,0x03,0x06,0x18,0x60,0x80,0x00,0x00,0x00,0x00,0x00,0x01,0x3E,0xE0,
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0x00,0x00,0xE0,0xFC,0xFC,0x59,0x00,0x00,0x00,0x00,0x00,0x00,0x03,0xFC,0x00,0x00,

0X00,0X30,0X30,0X0F,0X00,0XC0,0X03,0X0C,0X3C,0X00,0X00,0X00,0X00,0X00,0X00,0X00,
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0X00,0X00,0X00,0X00,0X00,0X00,0X00,0X00,0X00,0X00,0X00,0X00,0X00,0X00,0X00,0X00,
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